

# AIS Operational and Performance Testing of the Vesper Marine CORTEX VHF SYSTEM; MODEL: M1 Class B Transceiver

In accordance with IEC 62287-2 2017

Prepared for: Vesper Marine  
45 Sale Street  
Freemans Bay  
Auckland  
NEW ZEALAND



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## COMMERCIAL-IN-CONFIDENCE

Document Number: 75943855-12 | Issue: 02

FCC ID: Cortex VHF SYSTEM M1: YJDVESPM1  
Cortex VHF SYSTEM H1: YJDVESPH1  
IC: Cortex VHF SYSTEM M1: 9118A-M1  
Cortex VHF SYSTEM H1: 9118A-H1

| RESPONSIBLE FOR      | NAME          | DATE         | SIGNATURE |
|----------------------|---------------|--------------|-----------|
| Project Management   | Adam Porteous | 18 June 2020 |           |
| Authorised Signatory | Nic Forsyth   | 18 June 2020 |           |

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

### EXECUTIVE SUMMARY

A sample of this product was tested and found to be in compliance with IEC 62287-2 2017



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## 1 Report Summary

### 1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

| Issue | Description of Change                       | Date of Issue   |
|-------|---------------------------------------------|-----------------|
| 1     | First Issue                                 | 16 January 2020 |
| 2     | FCC & IC ID's added to front page of report | 18 June 2020    |

### 1.2 Introduction

|                               |                              |
|-------------------------------|------------------------------|
| Applicant                     | Vesper Marine                |
| Manufacturer                  | Vesper Marine                |
| Model Number(s)               | CORTEX VHF SYSTEM; MODEL: M1 |
| Serial Number(s)              | M1.00000065                  |
| Hardware Version(s)           | Refer to section 1.7         |
| Software Version(s)           | Refer to section 1.7         |
| Number of Samples Tested      | 1                            |
| Test Specification/Issue/Date | IEC 62287-2 2017             |
| Test Plan/Issue/Date          | None                         |
| Order Number                  | 75943855                     |
| Date                          |                              |
| Date of Receipt of EUT        | 21-January-2019              |
| Start of Test                 | 21-January-2019              |
| Finish of Test                | 10-December-2019             |
| Name of Engineer(s)           | Nic Forsyth<br>Finlay Orr    |



### 1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with IEC 62287-2 2017 is shown below.

| Section | Specification Clause | Test Description                                   | Mod State | Date        | Result |
|---------|----------------------|----------------------------------------------------|-----------|-------------|--------|
| 2.1     | 10.1.1               | Tests by inspection                                | 17        | 26-Nov-2019 | Pass   |
|         | 10.1.2               | Safety of operation                                | 17        | 19-Nov-2019 | Pass   |
|         | 10.1.3               | Additional features                                | 17        | 19-Nov-2019 | Pass   |
| 2.2     | 10.2.1.1             | Transmit position reports                          | 0         | 21-Jan-2019 | Pass   |
|         | 10.2.1.2             | Receive AIS Class A position reports               | 0         | 21-Jan-2019 | Pass   |
|         | 10.2.1.3             | Receive AIS Class B "SO" position reports          | 1         | 22-Jan-2019 | Pass   |
|         | 10.2.1.4             | Receive Class B "CS" position reports              | 1         | 22-Jan-2019 | Pass   |
|         | 10.2.1.5             | Receive in time slot adjacent to own transmission  | 2         | 23-Jan-2019 | Pass   |
|         | 10.2.1.6             | High VDL loading reception test                    | 8         | 20-Jun-2019 | Pass   |
|         | 10.2.2.1             | Transmit an addressed binary message               | 8         | 20-Jun-2019 | Pass   |
|         | 10.2.2.2             | Transmit an addressed safety related Message 12    | 6         | 12-Feb-2019 | Pass   |
|         | 10.2.2.3             | Acknowledgement of addressed Messages              | 6         | 12-Feb-2019 | Pass   |
|         | 10.2.2.4             | Transmit a broadcast binary Message 8              | 8         | 20-Jun-2019 | Pass   |
|         | 10.2.2.5             | Transmit a broadcast safety related Message 14     | 6         | 12-Feb-2019 | Pass   |
|         | 10.2.2.6             | ITDMA and RATDMA transmission                      | 7         | 05-Jun-2019 | Pass   |
|         | 10.2.3               | Polled mode and interrogation response             | 3         | 24-Jan-2019 | Pass   |
| 2.3     | 10.3.1               | Valid channels                                     | 10        | 05-Aug-2019 | Pass   |
|         | 10.3.2               | Invalid channels                                   | 10        | 05-Aug-2019 | Pass   |
| 2.4     | 10.5.1               | Information content                                | -         | -           | Pass   |
|         | 10.5.2.1             | Autonomous reporting interval                      | 4         | 25-Jan-2019 | Pass   |
|         | 10.5.2.2             | Polite behaviour                                   | 8         | 20-Jun-2019 | Pass   |
|         | 10.5.2.3             | Static data reporting interval                     | 13        | 13-Sep-2019 | Pass   |
| 2.5     | 10.6                 | Initialisation period                              | 11        | 19-Aug-2019 | Pass   |
| 2.6     | 10.7.1               | Built in integrity test                            | 6         | 26-Apr-2019 | Pass   |
|         | 10.7.2               | Transceiver protection                             | 16        | 09-Oct-2019 | Pass   |
|         | 10.7.3               | Transmitter shutdown procedure                     | 15        | 24-Sep-2019 | Pass   |
|         | 10.7.4               | Position sensor fallback conditions                | 16        | 09-Oct-2019 | Pass   |
| 2.7     | 10.8.1               | Status indication                                  | 15        | 03-Oct-2019 | Pass   |
|         | 10.8.2               | Message display                                    | 12        | 30-Aug-2019 | Pass   |
|         | 10.8.3               | Static data input                                  | 17        | 07-Nov-2019 | Pass   |
| 2.8     | 12.1.1               | Synchronisation test using UTC direct and indirect | 17        | 24-Oct-2019 | Pass   |



| Section | Specification Clause | Test Description                                          | Mod State | Date        | Result |
|---------|----------------------|-----------------------------------------------------------|-----------|-------------|--------|
|         | 12.1.2               | Synchronisation test without UTC, EUT receiving semaphore | 3         | 24-Jan-2019 | Pass   |
| 2.9     | 12.2                 | Time division (frame format)                              | 4         | 24-Jan-2019 | Pass   |
| 2.1     | 12.3                 | Synchronisation jitter                                    | 4         | 24-Jan-2019 | Pass   |
| 2.11    | 12.4                 | Data encoding (bit stuffing)                              | 4         | 24-Jan-2019 | Pass   |
| 2.12    | 12.5                 | Frame check sequence                                      | 0         | 21-Jan-2019 | Pass   |
| 2.13    | 12.6.1               | Network entry                                             | 4         | 24-Jan-2019 | Pass   |
|         | 12.6.2               | Autonomous scheduled transmissions (SOTDMA)               | 4         | 31-Jan-2019 | Pass   |
|         | 12.6.3               | Autonomous scheduled transmissions (ITDMA)                | 13        | 13-Sep-2019 | Pass   |
|         | 12.6.4               | Transmission of Messages 24A and 24B (ITDMA)              | 6         | 21-Feb-2019 | Pass   |
|         | 12.6.5.1             | Message 16 with slot assignment                           | 12        | 03-Sep-2019 | Pass   |
|         | 12.6.5.2             | Message 16 with rate assignment                           | 8         | 21-Jun-2019 | Pass   |
|         | 12.6.5.3             | Assigned mode using invalid reporting rates               | 8         | 21-Jun-2019 | Pass   |
|         | 12.6.5.4             | Slot assignment to FATDMA reserved slots                  | 8         | 21-Jun-2019 | Pass   |
|         | 12.6.6.1             | Entering interval assignment                              | 12        | 11-Sep-2019 | Pass   |
|         | 12.6.6.2             | Assignment by region                                      | 9         | 23-Jul-2019 | Pass   |
|         | 12.6.6.3             | Assignment by station type                                | 9         | 23-Jul-2019 | Pass   |
|         | 12.6.6.4             | Addressing by ship and cargo type                         | 9         | 23-Jul-2019 | Pass   |
|         | 12.6.6.5             | Quiet time command                                        | 9         | 23-Jul-2019 | Pass   |
|         | 12.6.6.6             | Reverting from interval assignment                        | 9         | 23-Jul-2019 | Pass   |
|         | 12.6.6.7             | Assignment priority test – Message 16 and 23              | 9         | 25-Jul-2019 | Pass   |
|         | 12.6.6.8             | Assignment priority test – Message 22 and 23              | 9         | 25-Jul-2019 | Pass   |
|         | 12.6.7               | Base station reservations                                 | 14        | 20-Sep-2019 | Pass   |
| 2.14    | 12.7.1               | Received messages                                         | 15        | 26-Sep-2019 | Pass   |
|         | 12.7.2               | Transmitted messages                                      | 12        | 09-Sep-2019 | Pass   |
| 2.15    | 13.1                 | Regional area designation by VDL Message                  | 11        | 19-Aug-2019 | Pass   |
| 2.16    | 13.2                 | Channel management by addressed Message 22                | 16        | 17-Oct-2019 | Pass   |
| 2.17    | 13.3                 | Invalid regional operating areas                          | 13        | 11-Sep-2019 | Pass   |
| 2.18    | 13.4                 | Continuation of autonomous mode reporting interval        | 15        | 02-Oct-2019 | Pass   |
| 2.19    | 13.5                 | Slot reuse and FATDMA reservations                        | 10        | 12-Aug-2019 | Pass   |
| 2.20    | 13.6.1               | Long-range broadcast                                      | 14        | 25-Sep-2019 | Pass   |
|         | 13.6.2               | Multiple assignment operation                             | 12        | 02-Sep-2019 | Pass   |



#### 1.4 Declaration of Build Status

| MAIN EUT                                                                         |                                                                                  |        |  |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------|--|
| MANUFACTURING DESCRIPTION                                                        | AIS/VHF/Monitoring Transceiver                                                   |        |  |
| MANUFACTURER                                                                     | Vesper Marine Ltd                                                                |        |  |
| MODEL NAME/NUMBER                                                                | Cortex M1                                                                        |        |  |
| PART NUMBER                                                                      | CM1                                                                              |        |  |
| SERIAL NUMBER                                                                    | 100                                                                              |        |  |
| HARDWARE VERSION                                                                 | B                                                                                |        |  |
| SOFTWARE VERSION                                                                 | 0.2                                                                              |        |  |
| PSU VOLTAGE/FREQUENCY/CURRENT                                                    | 12-24 V, 300 mA nominal                                                          |        |  |
| HIGHEST INTERNALLY GENERATED / USED FREQUENCY                                    | 2.4 GHz                                                                          |        |  |
| FCC ID (if applicable)                                                           | TBD                                                                              |        |  |
| INDUSTRY CANADA ID (if applicable)                                               | TBD                                                                              |        |  |
| TECHNICAL DESCRIPTION<br>(a brief description of the intended use and operation) | A VHF and Class B AIS transponder with integrated Wifi and cellular connectivity |        |  |
| COUNTRY OF ORIGIN                                                                | New Zealand                                                                      |        |  |
| RF CHARACTERISTICS (if applicable)                                               |                                                                                  |        |  |
| TRANSMITTER FREQUENCY OPERATING RANGE (MHz)                                      | 156.025 – 162.025 MHz                                                            |        |  |
| RECEIVER FREQUENCY OPERATING RANGE (MHz)                                         | 156.025 – 162.025 MHz                                                            |        |  |
| INTERMEDIATE FREQUENCIES                                                         | SDR RC                                                                           |        |  |
| EMISSION DESIGNATOR(S):<br>(i.e. G1D, GXW)                                       |                                                                                  |        |  |
| MODULATION TYPES:<br>(i.e. GMSK, QPSK)                                           | FM, GMSK, FSK                                                                    |        |  |
| OUTPUT POWER (W or dBm)                                                          | 25 W max, 1 W min                                                                |        |  |
| SEPARATE BATTERY/POWER SUPPLY (if applicable)                                    |                                                                                  |        |  |
| MANUFACTURING DESCRIPTION                                                        |                                                                                  |        |  |
| MANUFACTURER                                                                     |                                                                                  |        |  |
| TYPE                                                                             |                                                                                  |        |  |
| PART NUMBER                                                                      |                                                                                  |        |  |
| PSU VOLTAGE/FREQUENCY/CURRENT                                                    |                                                                                  |        |  |
| COUNTRY OF ORIGIN                                                                |                                                                                  |        |  |
| MODULES (if applicable)                                                          |                                                                                  |        |  |
| MANUFACTURING DESCRIPTION                                                        | Wifi                                                                             | 3G     |  |
| MANUFACTURER                                                                     | TI                                                                               | Sierra |  |
| TYPE                                                                             |                                                                                  |        |  |
| POWER                                                                            | 17 dBm                                                                           |        |  |
| FCC ID                                                                           |                                                                                  |        |  |
| INDUSTRY CANADA ID                                                               |                                                                                  |        |  |
| EMISSION DESIGNATOR                                                              |                                                                                  |        |  |
| DHSS/FHSS/COMBINED OR OTHER                                                      |                                                                                  |        |  |
| COUNTRY OF ORIGIN                                                                |                                                                                  |        |  |
| ANCILLARIES (if applicable)                                                      |                                                                                  |        |  |
| MANUFACTURING DESCRIPTION                                                        |                                                                                  |        |  |
| MANUFACTURER                                                                     |                                                                                  |        |  |
| TYPE                                                                             |                                                                                  |        |  |
| PART NUMBER                                                                      |                                                                                  |        |  |
| SERIAL NUMBER                                                                    |                                                                                  |        |  |
| COUNTRY OF ORIGIN                                                                |                                                                                  |        |  |

I hereby declare that the information supplied is correct and complete.

Name: Carl Omdundsen

Position held: Director

Date: 30-Jan-2019



## 1.5 Product Information

### 1.5.1 Technical Description

The Vesper Marine CORTEX VHF SYSTEM; MODEL: M1 Class B AIS Transceiver is a VHF transceiver used by ships to relay voyage and identification data to other vessels.

### 1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

### 1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

| Serial Number: 103 |            |                                                                                                                                                                                                                                                                                                          |             |
|--------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Modification State | RTOS       | Modification/Fix Details                                                                                                                                                                                                                                                                                 | Date        |
| 0                  | 0.2.20433  | As supplied by the customer.                                                                                                                                                                                                                                                                             | 21-Jan-2019 |
| 1                  | 0.2.20434  | Group delay correction, ALR updated to 60 secs output rate and ITDMA randomisation of slot offset.                                                                                                                                                                                                       | 22-Jan-2019 |
| 2                  | 0.2.20435  | Fix for adjacent channel reception.                                                                                                                                                                                                                                                                      | 23-Jan-2019 |
| 3                  | 0.2.20454  | Fix for interrogation response in clause 10.2.3.                                                                                                                                                                                                                                                         | 24-Jan-2019 |
| 4                  | 0.2.20456  | Removed a check on target position, so that a target with no position can now be used as a sync source.                                                                                                                                                                                                  | 24-Jan-2019 |
| 5                  | 0.3.20551  | Fixes for ITDMA slots increments, ALR time and the SSD response sentence.                                                                                                                                                                                                                                | 01-Feb-2019 |
| 6                  | 0.4.20603  | Updated binary message support and hysteresis for speed change- as well as improved loading performance.                                                                                                                                                                                                 | 12-Feb-2019 |
| 7                  | 0.6.21228  | Fixes for binary messages, slot reuse and FATDMA reservations, BIIT and Message 24. Improved loading performance.                                                                                                                                                                                        | 04-Jun-2019 |
| 8                  | 0.8.21261  | Fix for Message 18 not transmitting and improved loading performance.                                                                                                                                                                                                                                    | 19-Jun-2019 |
| 9                  | 0.9.21333  | Fixes for SSD queries and the default position of the EUT. The reporting rate under load, the target slots being used under loading and the reallocation of Message 20 slots also addressed. Position reports now change to ITDMA to announce Message 24.                                                | 09-Jul-2019 |
| 10                 | 0.11.21423 | Resolved problem resuming transmission on "off-channel" after returning from a TX/RX mode change. Fixes for problem sending multi-slot message 26 binaries.                                                                                                                                              | 05-Aug-2019 |
| 11                 | 0.13.21467 | Resolved problem whereby messages 11, 25, and 26 were not being forwarded as VDMs correctly. An off by one issue with Message 22 and the transition zone size is now fixed. Enabling long-range transmissions (Message 27) now delays initial transmission by a minimum of one frame.                    | 19-Aug-2019 |
| 12                 | 0.15.21502 | Quiet mode LED colour has been changed to orange.                                                                                                                                                                                                                                                        | 30-Aug-2019 |
| 13                 | 0.16.21521 | Modification contains fix relating to the assignment priority test (12.6.6.8), whereby addressed region assignment was not timing out correctly. A blocker issue with 12.6.2, whereby slot allocations reserved by commstate were off by two has also fixed.                                             | 11-Sep-2019 |
| 14                 | 0.17.21557 | Contains fix relating to 12.6.7, whereby transmissions were not correctly stopping/resuming when influenced by basestation reservation.                                                                                                                                                                  | 19-Sep-2019 |
| 15                 | 0.18       | Contains fix for clause 10.5.2.2, whereby polite behaviour under VLD load was required to wait 3 minutes before increasing reporting interval. Also addresses the issue relating to 13.5, whereby non-compliant devices were being allowed to allocate slots that had already been reserved for own use. | 24-Sep-2019 |
| 16                 | 0.19.21633 | Update to regional channel management, whereby the channel change frequency stage was not working as expected.                                                                                                                                                                                           | 09-Oct-2019 |
| 17                 | 0.21.21718 | Contains fix for MOB/SART test mode- relating to test clause 10.8.2.                                                                                                                                                                                                                                     | 01-Nov-2019 |



## **1.8 Test Location**

TÜV SÜD conducted all tests at our Fareham Test Laboratory.

Office Address:

Octagon House  
Concorde Way  
Segensworth North  
Fareham  
Hampshire  
PO15 5RL  
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## 2 Test Details

### 2.1 General

#### 2.1.1 Specification Reference

IEC 62287-2, Clause 10.1

#### 2.1.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: M1.00000065– See section 1.3 for modification states

#### 2.1.3 Date of Test

19-November-2019

#### 2.1.4 Test Results and Methods of Measurement

Tests by inspection – Clause 10.1.1

#### 2.1.5 Method of Measurement

By inspection of documentation.

#### 2.1.6 Required Results

The relevant requirements shall be met.

#### 2.1.7 Test Results

| Clause | Title                      | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Verdict |
|--------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 4.1.2  | Quality assurance          | Manufacturers shall have a quality control system audited by a competent authority to ensure continuous compliance with the requirements of this document. Alternatively, the manufacturer may use final product verification procedures where a competent authority verifies compliance with the requirements of this document before the product is put to the market.<br>ISO 9000 (all parts), as applicable, meets the requirements of a quality control system.                                                                                                                                                                       | Pass    |
| 4.2    | Manuals                    | The manuals shall include <ul style="list-style-type: none"><li>the type of external connectors, if applicable,</li><li>the information for correct installation and positioning of the antennas, and</li><li>the information for compass safe distance.</li></ul>                                                                                                                                                                                                                                                                                                                                                                         | Pass    |
| 4.3    | Marking and identification | In addition to the requirements of IEC 60945:2002, 4.9, the markings shall include: <ul style="list-style-type: none"><li>details of the power supply from which the equipment is intended to be operated;</li><li>if applicable, the date by which batteries need to be replaced.</li></ul>                                                                                                                                                                                                                                                                                                                                               | Pass    |
| 6.1    | Internal processes         | The Class B "SO" AIS shall comprise <ul style="list-style-type: none"><li>a communication processor, capable of operating in the VHF maritime mobile service band,</li><li>at least one transmitter and two receiving processes for TDMA operation,</li><li>a third receiving process for DSC channel management,</li><li>a means for automatic channel switching in the maritime mobile band (by Message 22 and by DSC) – manual channel switching shall not be provided – , and</li><li>an internal GNSS position sensor, which provides a resolution of one ten thousandth of a minute of arc and uses the WGS-84 datum only.</li></ul> | Pass    |



Safety of operation – Clause 10.1.2

**Method of Measurement**

By inspection.

**Required Results**

The requirements of 4.1.3 shall be met.

**Test Results**

The requirements of 4.1.3 are:

It shall not be possible for the operator to augment, amend or erase any program software required for operation in accordance with this document. The manufacturer may provide means to install software updates.

Data used during operation and stored in the system shall be protected in such a way that necessary modifications and amendments by the user cannot endanger its integrity and correctness.

| Clause | Title               | Requirement                                                                                                                                                                                                                                                                                     | Verdict |
|--------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 4.1.3  | Safety of operation | The document does not contain information to allow the operator to augment, amend or erase the program software. Only data that can be set by standard NMEA sentences can be modified. The MMSI cannot be changed after it has been set from its default value. See section 2.7, clause 10.8.3. | Pass    |

Additional features – Clause 10.1.3

**Method of Measurement**

Operate the EUT in standard test environment and enable any additional features provided. Repeat tests that might be affected by the additional feature.

**Required Results**

The requirements of 4.1.4 shall be met.

Where equipment provides a feature that is additional to the minimum requirements and options of this document, the operation and, as far as is reasonably practicable, the malfunction of such additional features shall not degrade the performance of the equipment.

**Test Results**

The EUT has the ability to connect to an application on a smartphone, streaming data via a wifi connection.

A transmission and reception performance check was made while the application and wifi, streaming data, were active. There was no loss in transmitted or received data.



## 2.2 Modes of operation

### 2.2.1 Specification Reference

IEC 62287-2, Clause 10.2

### 2.2.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: 103 – See section 1.3 for modification states

### 2.2.3 Date of Test

21-January 2019

### 2.2.4 Test Results and Methods of Measurement

Autonomous Mode – Clause 10.2.1

Transmit Position Reports – Clause 10.2.1.1

#### Method of Measurement

Set up standard test environment. Record the VDL communication and check for messages of the EUT.

#### Required Results

Confirm that the EUT transmits Messages 18 and 24 part A and B following the autonomous continuous schedules, alternating between channels A and B and that Message 27 is not transmitted on the long-range channels when the default setting is used.

#### Test Results

| Requirement                                                 | Result                                                                                                                                                                                                                                                                                                                                                                                                                       | Verdict |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Message 18 transmitted alternating between A and B          | !AIVDM,1,1,,A,B7`B3LP00?vUg@WAlp6wwVQjlgJ,0*3C<br>!AIVDM,1,1,,B,B7`B3LP00?vUg@WAlp6wwW1jlgJ,0*5E                                                                                                                                                                                                                                                                                                                             | Pass    |
| Message 18 transmitted every 3 min                          | 12:19:13<br>- !AIVDM,1,1,,A,B7`B3LP00?vUg@WAlp6wwVQjlgJ,0*3C<br>12:22:24<br>- !AIVDM,1,1,,B,B7`B3LP00?vUg@WAlp6wwW1jlgJ,0*5E<br>12:25:13<br>- !AIVDM,1,1,,A,B7`B3LP00?vUg@WAlp6wwVQjlgJ,0*3C<br>12:28:14<br>- !AIVDM,1,1,,B,B7`B3LP00?vUg@WAlp6wwVQjlgJ,0*3F                                                                                                                                                                 | Pass    |
| Message 24A and 24B transmitted alternating between A and B | !AIVDM,1,1,,A,H7`B3LQv>khvOP000000000000,2*45<br>!AIVDM,1,1,,A,H7`B3LTUFC@D01WJ=1ijk000000<,0*40<br>!AIVDM,1,1,,B,H7`B3LQv>khvOP000000000000,2*46<br>!AIVDM,1,1,,B,H7`B3LTUFC@D01WJ=1ijk000000<,0*43                                                                                                                                                                                                                         | Pass    |
| Message 24A and 24B transmitted every 6 min                 | Message 24A:<br>12:16:46<br>- !AIVDM,1,1,,A,H7`B3LQv>khvOP000000000000,2*45<br>12:22:46<br>- !AIVDM,1,1,,B,H7`B3LQv>khvOP000000000000,2*46<br>12:28:46<br>- !AIVDM,1,1,,A,H7`B3LQv>khvOP000000000000,2*45<br>Message 24B:<br>12:17:27<br>- !AIVDM,1,1,,A,H7`B3LTUFC@D01WJ=1ijk000000<,0*40<br>12:23:27<br>- !AIVDM,1,1,,B,H7`B3LTUFC@D01WJ=1ijk000000<,0*43<br>12:29:26<br>- !AIVDM,1,1,,A,H7`B3LTUFC@D01WJ=1ijk000000<,0*40 | Pass    |
| Message 27 not transmitted                                  | Message 27 is currently not supported and was not transmitted.                                                                                                                                                                                                                                                                                                                                                               | Pass    |



## Receive AIS Class A position reports – Clause 10.2.1.2

### **Method of Measurement**

Set up standard test environment. Perform the tests below and validate the required result for each test.

- Switch on test targets, and then start operation of the EUT.
- Start operation of the EUT, and then switch on test targets.
- Transmit test targets using same time slots on channels A and B.
- Transmit test targets that are not synchronised to time slot boundaries on channels A and B.

Check the VDL communication and external interface of the EUT and, where provided, display.

### **Required Results**

Confirm that the EUT receives continuously under the conditions above and outputs the received messages on the external interface in accordance with IEC 61162-1 and, where provided, on the display.

### **Test Results**

| Test Targets |           |
|--------------|-----------|
| Type         | MMSI      |
| Class A      | 200300900 |
| Class A      | 231000501 |
| Base Station | 2222222   |

| Switch on test targets, and then start operation of the EUT. |           |                                                  |      |         |
|--------------------------------------------------------------|-----------|--------------------------------------------------|------|---------|
| Requirement                                                  | MMSI      | Sample Messages                                  | Rate | Verdict |
| Class A received continuously                                | 200300900 | !AIVDM,1,1,,A,12w1I18P00wrCR8M6q?>4?w820SA,0*78D | 10 s | Pass    |
|                                                              |           | !AIVDM,1,1,,B,12w1I18P00wrCRVM6q=N4?wL25a8,0*5D  |      |         |
| Class A received continuously                                | 231000501 | !AIVDO,1,1,,A,13LC9e@2P:wrFc0M6;d02gw80HET,0*1A  | 10 s | Pass    |
|                                                              |           | !AIVDO,1,1,,B,13LC9e@2P:wrFc0M6;d02gwN0D00,0*72  |      |         |

| Start operation of the EUT, and then switch on test targets. |           |                                                 |      |         |
|--------------------------------------------------------------|-----------|-------------------------------------------------|------|---------|
| Requirement                                                  | MMSI      | Sample Messages                                 | Rate | Verdict |
| Class A received continuously                                | 200300900 | !AIVDM,1,1,,A,12w1I18P00wrCP8M6q9v4?w>28GB,0*2D | 10 s | Pass    |
|                                                              |           | !AIVDM,1,1,,B,12w1I18P00wrCPHM6q:v4?vp2<01,0*12 |      |         |
| Class A received continuously                                | 231000501 | !AIVDM,1,1,,A,33LC9e@2P:wrFc0M6jh02gvD0361,0*57 | 10 s | Pass    |
|                                                              |           | !AIVDM,1,1,,B,33LC9e@2P:wrFc0M6jh02gvb0371,0*73 |      |         |

| Transmit test targets using same time slots on channels A and B |      |                                                 |         |
|-----------------------------------------------------------------|------|-------------------------------------------------|---------|
| Channel                                                         | Slot | Received Message                                | Verdict |
| A                                                               | 1437 | !AIVDM,1,1,,A,12w1I18P00wrCOBm6qQf4?w<25ql,0*07 | Pass    |
| B                                                               | 1437 | !AIVDM,1,1,,B,13LC9e@2P:wrFc0M6jh02gw<1000,0*2A |         |

| Transmit test targets that are not synchronised to time slot boundaries on channels A and B |           |                                                 |         |
|---------------------------------------------------------------------------------------------|-----------|-------------------------------------------------|---------|
| Channel                                                                                     | Sync Diff | Received Message                                | Verdict |
| A                                                                                           | +5.59 ms  | !AIVDM,1,1,,A,32w1I18P?w<tSF0I4Q@>4?wv1Rvi,0*2D | Pass    |
| B                                                                                           | +5.67 ms  | !AIVDM,1,1,,B,32w1I18P?w<tSF0I4Q@>4?wv1Rui,0*2D |         |



### Receive AIS Class B "SO" position reports – Clause 10.2.1.3

#### **Method of Measurement**

Set up standard test environment. Simulate at least one additional Class B "SO" test target (bit stuffing shall not exceed 4 bits). Perform the tests below and validate the required result for each test.

- Switch on test targets, and then start operation of the EUT.
- Start operation of the EUT, and then switch on test targets.
- Transmit test targets using same time slots on channels A and B.
- Transmit test targets that are not synchronised to time slot boundaries on channels A and B.

Check the VDL communication and external interface of the EUT and, where provided, display.

#### **Required Results**

Confirm that the EUT receives continuously under the conditions above and outputs the received messages on the external interface and, where provided, on the display.

#### **Test Results**

| Test Targets |           |
|--------------|-----------|
| Type         | MMSI      |
| Class B SO   | 234567898 |
| Class B SO   | 777888999 |

| Switch on test targets, and then start operation of the EUT. |           |                                                 |       |         |
|--------------------------------------------------------------|-----------|-------------------------------------------------|-------|---------|
| Requirement                                                  | MMSI      | Sample Messages                                 | Rate  | Verdict |
| Class B received continuously                                | 234567898 | !AIVDM,1,1,,A,B3OdnpP007vTp1WAfFh03wa1jC5:,0*3A | 3 min | Pass    |
|                                                              |           | !AIVDM,1,1,,B,B3OdnpP007vTp1WAfFh03wVQjD=J,0*11 |       |         |
| Class B received continuously                                | 777888999 | !AIVDM,1,1,,A,B;UnTqh00GvUbh7Add01TAVP2J7h,0*04 | 3 min | Pass    |
|                                                              |           | !AIVDM,1,1,,B,B;UnTqh00GvUbh7Add01TAVP2930,0*28 |       |         |

| Start operation of the EUT, and then switch on test targets. |           |                                                 |       |         |
|--------------------------------------------------------------|-----------|-------------------------------------------------|-------|---------|
| Requirement                                                  | MMSI      | Sample Messages                                 | Rate  | Verdict |
| Class B received continuously                                | 234567898 | !AIVDM,1,1,,A,B3OdnpP007vTo1WAfGd03w1jE:r,0*64  | 3 min | Pass    |
|                                                              |           | !AIVDM,1,1,,B,B3OdnpP007vTo1WAfGd03wiQjE`J,0*60 |       |         |
| Class B received continuously                                | 777888999 | !AIVDM,1,1,,A,B;UnTqh00GvUbh7AI:0000KP2000,0*5B | 3 min | Pass    |
|                                                              |           | !AIVDM,1,1,,B,B;UnTqh00GvUbh7AI:0000702000,0*44 |       |         |

| Transmit test targets using same time slots on channels A and B |      |                                                 |         |
|-----------------------------------------------------------------|------|-------------------------------------------------|---------|
| Channel                                                         | Slot | Received Message                                | Verdict |
| A                                                               | 0620 | !AIVDM,1,1,,B,B;UnTqh00GvUbh7Add01TA`0389d,0*20 | Pass    |
| B                                                               | 0620 | !AIVDM,1,1,,A,B3OdnpP007vTp1WAfFh03wWQjE0r,0*27 |         |

| Transmit test targets that are not synchronised to time slot boundaries on channels A and B |           |                                                 |         |
|---------------------------------------------------------------------------------------------|-----------|-------------------------------------------------|---------|
| Channel                                                                                     | Sync      | Received Message                                | Verdict |
| A                                                                                           | +11.30 ms | !AIVDM,1,1,,A,B3OdnpP0001LQoWAdQd03wpQjErb,0*6C | Pass    |
| B                                                                                           | +11.32 ms | !AIVDM,1,1,,B,B3OdnpP0001LQoWAdQd03wq1jDfr,0*0B |         |



#### Receive Class B "CS" position reports – Clause 10.2.1.4

##### **Method of Measurement**

Set up standard test environment. Simulate at least one additional Class B "CS" test target (bit stuffing shall not exceed 4 bits). Perform the four tests below and validate the required result for each test.

- Switch on test targets, and then start operation of the EUT.
- Start operation of the EUT, and then switch on test targets.
- Transmit test targets using same time slots on channels A and B.
- Transmit test targets that are not synchronised to time slot boundaries on channels A and B.

Check the VDL communication and external interface of the EUT and, where provided, display.

##### **Required Results**

Confirm that the EUT receives continuously under the conditions above and outputs the received messages on the external interface and, where provided, on the display.

##### **Test Results**

| Test Targets |           |
|--------------|-----------|
| Type         | MMSI      |
| Class B CS   | 123456789 |
| Class B CS   | 666666666 |

| Switch on test targets, and then start operation of the EUT. |           |                                                 |       |         |
|--------------------------------------------------------------|-----------|-------------------------------------------------|-------|---------|
| Requirement                                                  | MMSI      | Sample Messages                                 | Rate  | Verdict |
| Class B received continuously                                | 123456789 | !AIVDM,1,1,,A,B1mg=5@007vTohWafDH03wcUkP06,0*06 | 3 min | Pass    |
|                                                              |           | !AIVDM,1,1,,B,B1mg=5@007vToJ7AfGT03wc5kP06,0*38 |       |         |
| Class B received continuously                                | 666666666 | !AIVDM,1,1,,A,B9sj6bP007vTp:7AfF8000c5kP06,0*2A | 3 min | Pass    |
|                                                              |           | !AIVDM,1,1,,B,B9sj6bP007vToJWafGT03wc5kP06,0*0F |       |         |

| Start operation of the EUT, and then switch on test targets. |           |                                                 |       |         |
|--------------------------------------------------------------|-----------|-------------------------------------------------|-------|---------|
| Requirement                                                  | MMSI      | Sample Messages                                 | Rate  | Verdict |
| Class B received continuously                                | 123456789 | !AIVDM,1,1,,A,B1mg=5@007vToW7AfGD03wc5kP06,0*36 | 3 min | Pass    |
|                                                              |           | !AIVDM,1,1,,B,B1mg=5@007vTp47AfEBv:wr5kP06,0*12 |       |         |
| Class B received continuously                                | 666666666 | !AIVDM,1,1,,A,B9sj6bP3wovToS7AfEoQ3wP5kP06,0*02 | 3 min | Pass    |
|                                                              |           | !AIVDM,1,1,,B,B9sj6bP007vTp7WafE<03wr5kP06,0*16 |       |         |

| Transmit test targets using same time slots on channels A and B                                                                                                                                                                                                                                                                                                |      |                                                 |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------|---------|
| Channel                                                                                                                                                                                                                                                                                                                                                        | Slot | Received Message                                | Verdict |
| A                                                                                                                                                                                                                                                                                                                                                              | 270  | !AIVDM,1,1,,B,B9sj6bP0001LQnWAdQh03wn5kP06,0*68 | Pass    |
| B                                                                                                                                                                                                                                                                                                                                                              | 270  | !AIVDM,1,1,,A,14N6S:@2P:wle'2MEs7h2gv<1h4>,0*6F |         |
| A                                                                                                                                                                                                                                                                                                                                                              | 233  | !AIVDM,1,1,,B,14N6S202P:wle'2MEs7h2gv:1h3a,0*4B | Pass    |
| B                                                                                                                                                                                                                                                                                                                                                              | 233  | !AIVDM,1,1,,A,B9sj6bP0001LQo7AdQt03wnUoP06,0*72 |         |
| Comments                                                                                                                                                                                                                                                                                                                                                       |      |                                                 |         |
| It is not possible to force two Class B CS to operate on the same slots on both channels. Therefore, the test was performed with 100% channel loading, first on channel B, where reception of Class B CS position reports was verified on channel A. The test was repeated with 100 % channel loading on Channel A and position reports received on channel B. |      |                                                 |         |

| Transmit test targets that are not synchronised to time slot boundaries on channels A and B |          |                                                 |         |
|---------------------------------------------------------------------------------------------|----------|-------------------------------------------------|---------|
| Channel                                                                                     | Sync     | Received Message                                | Verdict |
| A                                                                                           | +15.5 ms | !AIVDM,1,1,,A,B1mg=5@0001LQm7AdQt03wP5kP06,0*7D | Pass    |
| B                                                                                           | +15.4 ms | !AIVDM,1,1,,B,B9sj6bP0001LQmWAdQt03wn5kP06,0*77 |         |



Receive in time slot adjacent to own transmission – Clause 10.2.1.5

**Method of Measurement**

Set up standard test environment. Simulate 80 % VDL loading. The reporting interval of the EUT may be decreased for the purpose of this test.

Check the external interface of the EUT.

**Required Result**

Confirm that the EUT continuously receives messages in the slots before and after own transmission with an acceptable loss of 5 %.

**Test Result**

80 % loading was achieved with a repeating block of 4 targets, on consecutive slots, with a gap of 1 slot, on channel A only.

| Requirement                       | Result                             | Verdict |
|-----------------------------------|------------------------------------|---------|
| Adjacent slot reception loss < 5% | Adjacent slot reception loss = 0 % | Pass    |

High VDL loading reception test – Clause 10.2.1.6

**Method of Measurement**

Set up standard test environment. Simulate 90 % VDL loading.

Check the external interface of the EUT.

**Required Result**

Confirm that the EUT continuously receives messages and outputs the received messages on the external interface with a loss of not more than 2 %.

**Test Result**

90 % loading was achieved with a repeating block of 45 targets, on consecutive slots, with a gap of 5 slots, on channel A and B.

| Requirement                            | Result | Verdict |
|----------------------------------------|--------|---------|
| Reception loss $\leq$ 2 % on Channel A | 0.10 % | Pass    |
| Reception loss $\leq$ 2 % on Channel B | 0.09 % | Pass    |



## Single messages – Clause 10.2.2

### Transmit an addressed binary message – 10.2.2.1

#### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode.

- Initiate the transmission of an addressed binary Message 6 by the EUT using an ABM sentence input. An acknowledgement Message 7 shall be applied. Record the transmitted messages.
- Repeat the test without acknowledgement.
- Repeat test with a Message 6 exceeding 2 slots.
- Apply more than 3 ABM sentences with 1 slot Message 6 to the EUT.
- Repeat test a) with the addressed unstructured binary Message 25.
- Repeat tests a), b) and d) with the addressed structured binary Message 25.
- Repeat test a) with a single addressed unstructured binary Message 26.
- Repeat tests a), b), c) and d) with a single addressed structured binary Message 26.

#### **Required Results**

Check that:

- the EUT transmits Message 6 as appropriate within 30 s. Check the content of Message 6. Check that the EUT outputs the appropriate ABK sentence;
- the EUT transmits Message 6 as appropriate. Check that the EUT outputs the appropriate ABK sentence indicating that no acknowledgment has been received. Check that the EUT does not retransmit Message 6;
- the EUT does not transmit Message 6. Check that the EUT outputs the appropriate ABK sentence indicating that the message could not be sent;
- the EUT transmits the first 3 Message 6s and does not transmit all following Message 6s within one frame. Check that the EUT outputs the appropriate ABK sentence indicating that the message could not be sent;
- the EUT transmits Message 25 as appropriate;
- the EUT transmits Message 25 as appropriate;
- the EUT transmits Message 26 as appropriate;
- the EUT transmits Message 26 as appropriate.

#### **Test Results**

| a) Message 6 with acknowledgement                                                                                                        |         |
|------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                              | Verdict |
| Message sent to PI, with sequential message identifier = 2:<br>!AIABM,1,1,2,200300900,1,6,04205@E=B0IE=<4LD,2*14                         | -       |
| Message 6 transmitted within 30s, EUT transmitted after 1 second.                                                                        | Pass    |
| Message transmitted by EUT on channel 1:<br>!AIVDO,1,1,,A,67'B00HghFF@04205@E=B0IE=<4LD0,4*59                                            | Pass    |
| Message "TESTMESSAGE" received by addressed station with MMSI = 321000000                                                                | Pass    |
| Message 7 transmitted by addressed station with MMSI = 321000000                                                                         | -       |
| Message 7 received on channel 1:<br>!AIVDM,1,1,,A,72w1II1r4P06,0*44                                                                      | Pass    |
| Acknowledge message output on PI, with sequential message identifier = 2 and type of acknowledgment = 0:<br>\$AIABK,200300900,A,6,2,0*21 | Pass    |



| b) Message 6 without acknowledgement                                                                                                     |         |
|------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                              | Verdict |
| Message sent to PI, with sequential message identifier = 0:<br>!AIABM,1,1,0,200300901,1,6,04205@E=B0IE=<4LD,2*17                         | -       |
| Message transmitted by EUT on channel 1:<br>!AIVDO,1,1,,A,67'B00@ghFFD04205@E=B0IE=<4LD0,4*55                                            | Pass    |
| Message 7 is not transmitted.                                                                                                            | -       |
| Acknowledge message output on PI, with sequential message identifier = 0 and type of acknowledgment = 1:<br>\$AIABK,200300901,A,6,0,1*23 | Pass    |

| c) Message 6 exceeding 2 slots                                                                                                                                         |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                            | Verdict |
| Message sent to PI:<br>!AIABM,2,1,2,321000000,1,6,04205@E=@IE=<4LE@E=@IE=<4LE@E=@IE=<4LE@E=@IE=<4L,2*04<br>!AIABM,2,2,2,321000000,1,6,04205@E=@IE=<4LE@E=@IE=<4LD,2*43 | Pass    |
| EUT does not transmit Message 6                                                                                                                                        | Pass    |
| ABK states message cannot be sent:<br>\$AIABK,321000000,A,6,2,2*2B                                                                                                     | Pass    |

| d) More than 3 ABM sentences                                                                                                                                                                                                                    |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                                                     | Verdict |
| Messages sent to PI on channel 1 with sequence number = 0-3<br>!AIABM,1,1,0,200300900,1,6,04205@E=@,2*30<br>!AIABM,1,1,1,200300900,1,6,04205@E=@,2*31<br>!AIABM,1,1,2,200300900,1,6,04205@E=@,2*32<br>!AIABM,1,1,3,200300900,1,6,04205@E=@,2*33 | -       |
| 3 x Message 6s transmitted by EUT on channel 1:<br>!AIVDO,1,1,,A,67'B00DghFF@04205@E=@0,4*73<br>!AIVDO,1,1,,A,67'B00@ghFF@04205@E=@0,4*77<br>!AIVDO,1,1,,A,67'B00HghFF@04205@E=@0,4*7F                                                          | Pass    |
| ABK sentence output on PI, with type of acknowledgment = 2 and sequence number 3 indicating that the last message could not be sent:<br>\$AIABK,200300900,A,6,3,2*22                                                                            | Pass    |
| 3 x ABK sentences output on PI, with correct type of acknowledgment and sequence number = 0-2:<br>\$AIABK,200300900,A,6,1,0*22<br>\$AIABK,200300900,A,6,0,0*23<br>\$AIABK,200300900,A,6,2,0*21                                                  | Pass    |

| e) Addressed Unstructured Binary Message 25                                                                                        |         |
|------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                        | Verdict |
| Message sent to PI with sequential message identifier = 2:<br>!AIABM,1,1,2,412000000,1,70,bGEEEEMbRbVjbaTg,0*73                    | -       |
| Message transmitted by EUT:<br>!AIVDO,1,1,,A,17'B00IR>Wh0bGEEEEMbRbVjbaTg,0*64                                                     | Pass    |
| Message 25 transmitted within 30s, EUT transmitted within one second.                                                              | Pass    |
| ABK sentence output on PI, with sequential message identifier = 2 and type of acknowledgment = 3:<br>\$AIABK,412000000,A,25,2,3*1C | Pass    |



| f) Addressed Structured Binary Message 25                                                                                                                                                                                                            |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                                                          | Verdict |
| Message sent to PI:<br>!AIABM,1,1,2,412000000,1,25,0400:PbJQ`bJH8p`,0*7A                                                                                                                                                                             | -       |
| Message transmitted by EUT:<br>!AIVDM,1,1,,A,I7`B00MR>Wh00400:PbJQ`bJH8p`,0*6B                                                                                                                                                                       | Pass    |
| Message 25 transmitted within 30s, EUT transmitted message after 21 seconds.                                                                                                                                                                         | Pass    |
| ABK sentence output on PI, with type of acknowledgment = 3:<br>\$AIABK,412000000,A,25,2,3*1C                                                                                                                                                         | Pass    |
| Messages sent to PI on channel 1 with sequence number = 0-3:<br>!AIABM,1,1,0,412000000,1,25,0400:PbJP,0*51<br>!AIABM,1,1,1,412000000,1,25,0400:PbJP,0*50<br>!AIABM,1,1,2,412000000,1,25,0400:PbJP,0*53<br>!AIABM,1,1,3,412000000,1,25,0400:PbJP,0*52 | Pass    |
| 3 x Message 25s transmitted by EUT on channel 1:<br>!AIVDO,1,1,,A,I7`B00MR>Wh00400:PbJP0,4*74<br>!AIVDO,1,1,,A,I7`B00MR>Wh00400:PbJP0,4*74<br>!AIVDO,1,1,,A,I7`B00MR>Wh00400:PbJP0,4*74                                                              | Pass    |
| ABK sentence output on PI, with type of acknowledgment = 2 and sequence number 3 indicating that the last message could not be sent:<br>\$AIABK,412000000,A,25,3,2*1C                                                                                | Pass    |
| 3 x ABK sentences output on PI, with correct type of acknowledgment and sequence number = 0-2:<br>\$AIABK,412000000,A,25,0,3*1E<br>\$AIABK,412000000,A,25,1,3*1F<br>\$AIABK,412000000,A,25,2,3*1C                                                    | Pass    |
| Comments                                                                                                                                                                                                                                             |         |
| Step b) is not tested as the specification is incorrect, a message 25 shall not be acknowledged                                                                                                                                                      |         |

| g) Single Addressed Unstructured Binary Message 26                                           |         |
|----------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                  | Verdict |
| Message sent to PI:<br>!AIABM,1,1,2,412000000,1,71,2EQEEBEG735FI000,4*28                     | Pass    |
| Message transmitted by EUT:<br>!AIVDO,1,1,,A,J7`B00IR>Wh02EQEEBEG735FI008000,2*03            | Pass    |
| Message 26 transmitted within 30s                                                            | Pass    |
| ABK sentence output on PI, with type of acknowledgment = 3:<br>\$AIABK,412000000,A,26,2,3*1F | Pass    |



| h) Single Addressed Structured Binary Message 26                                                                                                                                                                                                                        |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                                                                             | Verdict |
| Message sent to PI:<br>!AIABM,1,1,2,412000000,1,26,0400:PbJV>@I000,4*55                                                                                                                                                                                                 | -       |
| Message transmitted by EUT:<br>!AIVDO,1,1,,A,J7' B00MR>Wh00400:PbJV>@00008000,2*31                                                                                                                                                                                      | Pass    |
| Message 26 transmitted within 30s                                                                                                                                                                                                                                       | Pass    |
| ABK sentence output on PI, with type of acknowledgment = 3:<br>\$AIABK,412000000,A,26,2,3*1F                                                                                                                                                                            | Pass    |
| Message exceeding two slots sent to PI:<br>!AIABM,4,1,2,412000000,1,26,04008I0:@8JPbBHI000,4*4B<br>!AIABM,4,2,2,412000000,1,26,04008I0:@8JPbBHI000,4*48<br>!AIABM,4,3,2,412000000,1,26,04008I0:@8JPbBHI000,4*49<br>!AIABM,4,4,2,412000000,1,26,04008I0:@8JPbBHI000,4*4E | -       |
| EUT does not transmit Message 26.                                                                                                                                                                                                                                       | Pass    |
| ABK states message cannot be sent:<br>\$AIABK,412000000,A,26,2,2*1E                                                                                                                                                                                                     | Pass    |
| Messages sent to PI on channel 1 with sequence number = 0-3:<br>!AIABM,1,1,0,412000000,1,26,0400:V80000,4*10<br>!AIABM,1,1,1,412000000,1,26,0400:V@0000,4*69<br>!AIABM,1,1,2,412000000,1,26,0400:VH0000,4*62<br>!AIABM,1,1,3,412000000,1,26,0400:VP0000,4*7B            | -       |
| 3 x Message 26s transmitted by EUT on channel 1:<br>!AIVDO,1,1,,A,J7' B00MR>Wh00400:V@00008000,2*77<br>!AIVDO,1,1,,A,J7' B00MR>Wh00400:VH00008000,2*7F<br>!AIVDO,1,1,,A,J7' B00MR>Wh00400:V800008000,2*0F                                                               | Pass    |
| ABK sentence output on PI, with type of acknowledgement = 2 and sequence number 3 indicating that the last message could not be sent:<br>\$AIABK,412000000,A,26,3,2*1F                                                                                                  | Pass    |
| 3 x ABK sentences output on PI, with correct type of acknowledgment and sequence number = 0-2:<br>\$AIABK,412000000,A,26,1,3*1C<br>\$AIABK,412000000,A,26,2,3*1F<br>\$AIABK,412000000,A,26,0,3*1D                                                                       | Pass    |
| Comments                                                                                                                                                                                                                                                                |         |
| Step b) is not tested as the specification is incorrect, a message 26 shall not be acknowledged                                                                                                                                                                         |         |



Transmit an addressed safety related Message 12 – Clause 10.2.2.2

**Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode.

Initiate the transmission of an addressed binary Message 12 by the EUT using an ABM sentence input.

**Required Result**

Check that the EUT does not transmit Message 12.

**Test Result**

| Requirement                                                                                                                                                            | Verdict |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Transmission of addressed binary Message 12 by the EUT using ABM sentence input:<br>!AIABM,1,1,2,321000000,1,12,D5CDP=5CC175,6*5D                                      | -       |
| The EUT does not transmit Message 12                                                                                                                                   | Pass    |
| ABK sentence output on PI, with type of acknowledgement = 2 and sequence number 2 indicating that the last message could not be sent:<br>\$AIABK,321000000,A,12,2,2*1E | Pass    |

Acknowledgement of addressed Messages – Clause 10.2.2.3

**Method of Measurement**

Operate standard test environment and the EUT in autonomous mode.

- Apply an addressed binary Message 6 with the EUT as destination to the VDL on Channel A.  
Record transmitted messages on both channels.
- Repeat for Message 12.
- Repeat the test a) on channel B.

**Required Results**

Confirm that:

- the EUT transmits a binary acknowledge Message 7, with the appropriate sequence numbers within 4 s on the channel where the Message 6 was received;
- the EUT transmits a binary acknowledge Message 13, with the appropriate sequence numbers within 4 s on the channel where the Message 12 was received;
- the EUT transmits a binary acknowledge Message 7 on channel B.



## Test Results

| a) Message 6 on channel A                                                                                                    |         |
|------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                  | Verdict |
| Message sent to EUT on channel 1 with MMSI = 331445669 and sequence number = 0:<br>!AIVDO,1,1,,A,64t5maAr4P0404205@E=@0,4*47 | -       |
| Message 7 transmitted by EUT with MMSI = 331445669:<br>!AIVDO,1,1,,A,77'B00A?1MJD,0*0A                                       | Pass    |
| Message 7 received on channel 1 within 4s:<br>!AIVDM,1,1,,A,77'B00A?1MJD,0*08 after 1s                                       | Pass    |
| Sequence number in Message 7 = 0                                                                                             | Pass    |

| b) Message 12                                                                                                                     |         |
|-----------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                       | Verdict |
| Message sent to EUT on channel 1 with MMSI = 556998774 and sequence number = 2:<br>!AIVDO,1,1,,A,<8C<PMar4P04D5CDP=C7Pijklm0,2*55 | -       |
| Message 13 transmitted by EUT with MMSI = 556998774:<br>!AIVDO,1,1,,A,=7'B00B4k87J,0*54                                           | Pass    |
| Message 13 received on channel 1 within 4s:<br>!AIVDM,1,1,,A,=7'B00B4k87J,0*56 within 1s                                          | Pass    |
| Sequence number in Message 13 = 2                                                                                                 | Pass    |

| c) Message 6 on channel B                                                                                                    |         |
|------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                  | Verdict |
| Message sent to EUT on channel 2 with MMSI = 331445669 and sequence number = 0:<br>!AIVDO,1,1,,B,64t5maAr4P0404205@E=@0,4*44 | -       |
| Message 7 transmitted by EUT with MMSI = 331445669:<br>!AIVDO,1,1,,B,77'B00A?1MJD,0*09                                       | Pass    |
| Message 7 received on channel 2 within 4s:<br>!AIVDM,1,1,,B,77'B00A?1MJD,0*0B after 2s                                       | Pass    |
| Sequence number in Message 7 = 0                                                                                             | Pass    |



#### Transmit a broadcast binary Message 8 – Clause 10.2.2.4

##### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode.

- a) Initiate the transmission of a broadcast binary Message 8 by the EUT using a BBM sentence input. Record the transmitted messages.
- b) Repeat test with a Message 8 exceeding 2 slots.
- c) Apply more than 3 BBM sentences with 1 slot Message 8 to the EUT.
- d) Repeat test a) with the broadcast unstructured binary Message 25.
- e) Repeat tests a) and c) with the broadcast structured binary Message 25.
- f) Repeat test a) with a single broadcast unstructured binary Message 26.
- g) Repeat tests a), b) and c) with a single broadcast structured binary Message 26.

##### **Required Results**

Check that:

- a) the EUT transmits Message 8 as appropriate within 30 s. Check the content of Message 8. Check that the EUT outputs the appropriate ABK sentence;
- b) the EUT does not transmit Message 8. Check that the EUT outputs the appropriate ABK sentence indicating that the message could not be sent;
- c) the EUT transmits the first 3 Message 8s and does not transmit all following Message 8s. Check that the EUT outputs the appropriate ABK sentence indicating that the message could not be sent;
- d) the EUT transmits Message 25 as appropriate;
- e) the EUT transmits Message 25 as appropriate;
- f) the EUT transmits Message 26 as appropriate;
- g) the EUT transmits Message 26 as appropriate.

##### **Test Results**

| a) Message 8                                                                                                      |         |
|-------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                       | Verdict |
| Message sent to PI on channel 1 with sequence number = 2:<br>!AIBBM,1,1,2,1,8,04005@E=@,2*29                      | -       |
| Message 8 transmitted within 30 s, EUT transmitted message 8 after 2 s.                                           | Pass    |
| Message transmitted by EUT on channel 1 with sequence number = 1:<br>!AIVDO,1,1,,A,87'B00@0@00E1Dm0,0*54          | Pass    |
| Acknowledge message output on PI, with type of acknowledgment = 0 with sequence number = 2:<br>\$AIBK,,A,8,2,3*14 | Pass    |

| b) Message 8 exceeding 2 slots                                                                                                           |         |
|------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                              | Verdict |
| Message sent to PI:<br>!AIBBM,2,1,2,1,8,04005@E=@ E=<4LE@E=@ E=<4LE@E=@ E=<4LE@E=@ E=<4LD,2*53<br>!AIBBM,2,2,2,1,8,04005@E=@ E=<4LD,2*3D | -       |
| EUT does not transmit Message 8                                                                                                          | Pass    |
| ABK states message cannot be sent:<br>\$AIBK,,A,8,2,2*15                                                                                 | Pass    |



| c) More than 3 BBM sentences                                                                                                                                                                             |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                              | Verdict |
| Messages sent to PI on channel 1 with sequence number = 0-3:<br>!AIBBM,1,1,0,1,8,04005@E=@,2*2B<br>!AIBBM,1,1,1,1,8,04005@E=@,2*2A<br>!AIBBM,1,1,2,1,8,04005@E=@,2*29<br>!AIBBM,1,1,3,1,8,04005@E=@,2*28 | -       |
| 3 x Message transmitted by EUT on channel 1:<br>!AIVDO,1,1,,A,87'B00@0@00E1Dm0,0*54<br>!AIVDO,1,1,,A,87'B00@0@00E1Dm0,0*54<br>!AIVDO,1,1,,A,87'B00@0@00E1Dm0,0*54                                        | Pass    |
| 1 x Acknowledge message output on PI, with type of acknowledgement = 2 and the sequence number of the unsent BBM:<br>\$AIABK,,A,8,3,2*14                                                                 | Pass    |
| 3 x Acknowledge message output on PI, with type of acknowledgment = 3 and sequence number = 0-2:<br>\$AIABK,,A,8,0,3*16<br>\$AIABK,,A,8,1,3*17<br>\$AIABK,,A,8,2,3*14                                    | Pass    |

| d) Broadcast Unstructured Binary Message 25                                                |         |
|--------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                | Verdict |
| Message sent to PI:<br>!AIBBM,1,1,2,1,70,bGEEEEMbRbVjbaTeQG`pGP,4*7C                       | -       |
| Message 25 transmitted within 30s, EUT transmitted message 25 within 1 s                   | Pass    |
| Message transmitted by EUT:<br>!AIVDO,1,1,,A,I7'B00BaMEEEEEnb:bK:bVBn5NSQN,0*1C            | Pass    |
| Acknowledge message output on PI, with type of acknowledgment = 3:<br>\$AIABK,,A,25,2,3*2B | Pass    |

| e) Broadcast Structured Binary Message 25                                                                                                                                                                                                                        |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                                                                      | Verdict |
| Message sent to PI:<br>!AIBBM,1,1,2,1,25,0400:PbJT1`bJH8pd6>FH0,4*60                                                                                                                                                                                             | -       |
| Message 25 transmitted within 30s, EUT transmitted message 25 after 1 s                                                                                                                                                                                          | Pass    |
| Message transmitted by EUT:<br>!AIVDO,1,1,,A,I7'B00D0@00b2ab@6RaaPSRhHqIP,0*22                                                                                                                                                                                   | Pass    |
| Acknowledge message output on PI, with type of acknowledgment = 3:<br>\$AIABK,,A,25,2,3*2B                                                                                                                                                                       | Pass    |
| Messages sent to PI on channel 1 with sequence number = 0-3:<br>!AIBBM,1,1,0,1,25,0400:PbJT1`bJH8pd6>FH0,4*62<br>!AIBBM,1,1,1,1,25,0400:PbJT1`bJH8pd6>FH0,4*63<br>!AIBBM,1,1,2,1,25,0400:PbJT1`bJH8pd6>FH0,4*60<br>!AIBBM,1,1,3,1,25,0400:PbJT1`bJH8pd6>FH0,4*61 | Pass    |
| 3 x Message transmitted by EUT on channel 1:<br>!AIVDO,1,1,,A,I7'B00D0@00b2ab@6RaaPSRhHqIP,0*22<br>!AIVDO,1,1,,A,I7'B00D0@00b2ab@6RaaPSRhHqIP,0*22<br>!AIVDO,1,1,,A,I7'B00D0@00b2ab@6RaaPSRhHqIP,0*22                                                            | Pass    |
| 1 x Acknowledge message output on PI, with type of acknowledgement = 2 and the sequence number of the unsent BBM:<br>\$AIABK,,A,25,3,2*2B                                                                                                                        | Pass    |
| 3 x Acknowledge message output on PI, with type of acknowledgment = 3 and sequence number = 0-2:<br>\$AIABK,,A,25,2,3*2B<br>\$AIABK,,A,25,0,3*29<br>\$AIABK,,A,25,1,3*28                                                                                         | Pass    |
| Comments                                                                                                                                                                                                                                                         |         |
| Step b) is not tested as the specification is incorrect, a message 25 shall not be acknowledged                                                                                                                                                                  |         |

| f) Single Broadcast Unstructured Binary Message 26                                         |         |
|--------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                | Verdict |
| Message sent to PI:<br>!AIBBM,1,1,2,1,71,2EQEEBEG735Fc2bbTP,4*1C                           | -       |
| Message transmitted by EUT:<br>!AIVDO,1,1,,A,J7'B00@9F5EE9ELL<EJd:bbB2000,0*20             | Pass    |
| Message 26 transmitted within 30s                                                          | Pass    |
| Acknowledge message output on PI, with type of acknowledgment = 3:<br>\$AIABK,,A,26,2,3*28 | Pass    |



| g) Single Broadcast Structured Binary Message 26                                                                                                                                                                                    |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                                         | Verdict |
| Message sent to PI:<br>!AIBBM,1,1,2,1,26,04008I0:@8JPbBN8,3*16                                                                                                                                                                      | -       |
| Message transmitted by EUT:<br>!AIVDO,1,1,,A,J7' B00D0@00QT0a0Qb2a9pRH000,2*2A                                                                                                                                                      | Pass    |
| Message 26 transmitted within 30s                                                                                                                                                                                                   | Pass    |
| Acknowledge message output on PI, with type of acknowledgment = 3:<br>\$AIABK,,A,26,2,3*28                                                                                                                                          | Pass    |
| Message exceeding two slots sent to PI:<br>!AIBBM,4,1,1,1,26,04008I0:@8JPbBN86@00,2*67<br>!AIBBM,4,2,1,1,26,04008I0:@8JPbBN86@00,2*64<br>!AIBBM,4,3,1,1,26,04008I0:@8JPbBN86@00,2*65<br>!AIBBM,4,4,1,1,26,04008I0:@8JPbBN86@00,2*62 | -       |
| EUT does not transmit Message 26.                                                                                                                                                                                                   | Pass    |
| ABK states message cannot be sent:<br>\$AIABK,,A,26,1,2*2A                                                                                                                                                                          | Pass    |
| Messages sent to PI on channel 1 with sequence number = 0-3:<br>!AIVDM,1,1,,A,J7' B00D0@00b2abIR000,0*35<br>!AIBBM,1,1,1,1,26,0400:PbJV@,3*0E<br>!AIBBM,1,1,2,1,26,0400:PbJVH,3*05<br>!AIBBM,1,1,3,1,26,0400:PbJVP,3*1C             | -       |
| 3 x Message transmitted by EUT on channel 1 with sequence number = 0-2:<br>!AIVDO,1,1,,A,J7' B00D0@00b2abHR000,0*36<br>!AIVDO,1,1,,A,J7' B00D0@00b2abi2000,0*57<br>!AIVDO,1,1,,A,J7' B00D0@00b2abIR000,0*37                         | Pass    |
| Acknowledge message output on PI, with type of acknowledgement = 2 and sequence number 3 indicating that the last message could not be sent:<br>\$AIABK,,A,26,3,2*28                                                                | Pass    |
| 3 x Acknowledge message output on PI, with correct type of acknowledgment and sequence number = 0-2:<br>\$AIABK,,A,26,2,3*28<br>\$AIABK,,A,26,1,3*2B<br>\$AIABK,,A,26,0,3*2A                                                        | Pass    |
| Comments                                                                                                                                                                                                                            |         |
| Step b) is not tested as the specification is incorrect, a message 26 shall not be acknowledged                                                                                                                                     |         |



*Transmit a broadcast safety related Message 14 – Clause 10.2.2.5*

**Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode.

Initiate the transmission of a broadcast binary Message 14 by the EUT using an BBM sentence input.

**Required Results**

Check that the EUT does not transmit the Message 14.

**Test Results**

| Requirement                                                                                                             | Verdict |
|-------------------------------------------------------------------------------------------------------------------------|---------|
| Transmission of broadcast binary Message 14 by the EUT using BBM sentence input:<br>!AIBBM,1,1,2,1,14,D5CDP=5CC175,6*44 | -       |
| The EUT does not transmit Message 14                                                                                    | Pass    |
| ABK states message cannot be sent:<br>\$AIBBK,,A,14,2,2*28                                                              | Pass    |



ITDMA and RATDMA transmission – Clause 10.2.2.6

**Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode.

- Apply a 1 slot binary broadcast message (Message 8) to the PI of the EUT less than 30 s before the next scheduled transmission. Record transmitted messages.
- Apply a 1 slot binary broadcast message (Message 8) to the PI of the EUT more than 30 s before the next scheduled transmission. Record transmitted messages.

**Required Results**

Confirm that:

- the EUT transmits the Message 8 within 30 s using ITDMA;
- the EUT transmits the Message 8 within 30 s using RATDMA.

**Test Results**

| Message 8 transmitted less than 30s before the next scheduled transmission                                                         |         |
|------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                        | Verdict |
| Message sent to PI:<br>!AIBBM,1,1,2,1,8,04005@E=@,2*29                                                                             | -       |
| Message 18 uses ITDMA to announce Message 8 on slot 1519 with slot offset = 127:<br>!AIVDM,1,1,,A,B7'B00@0I?vUg@WAlp6wwkQj0Oi,0*40 | Pass    |
| Message transmitted by EUT within 30s using ITDMA on slot 1646<br>!AIVDM,1,1,,A,87'B00@0@00E1Dm0,0*56                              | Pass    |

| Message 8 transmitted more than 30s before the next scheduled transmission |         |
|----------------------------------------------------------------------------|---------|
| Requirement                                                                | Verdict |
| Message sent to PI:<br>!AIBBM,1,1,2,1,8,04005@E=@,2*29                     | -       |
| Message transmitted by EUT:<br>!AIVDM,1,1,,A,87'B00@0@00E1Dm0,0*56         | Pass    |
| Message transmitted by EUT within 30s using RATDMA.                        | Pass    |



### Polled mode and interrogation response – Clause 10.2.3

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode. Apply interrogation Message 15 with the EUT as destination:

- interrogation for Message 19 with transmission offset = 0;
- interrogation for Message 19 with transmission offset = 10;
- interrogation for Message 18 with transmission offset = 0;
- interrogation for Message 24 with transmission offset = 0.

Record transmitted messages and frame structure.

#### **Required Results**

Confirm that:

- the EUT transmits the appropriate interrogation response message within 30 s;
- the EUT transmits the appropriate interrogation response message as requested after defined transmission offset;
- the EUT transmits the appropriate interrogation response Message 18 within 30 s;
- the EUT transmits the appropriate interrogation response Messages 24A within 30 s and 24B within 1 min of Message 24A.

Confirm that the EUT transmits the response on the same channel as the interrogation was received.

#### **Test Results**

| a) Interrogation for Message 19 with transmission offset = 0                                                                                        |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                         | Verdict |
| Transmission of interrogation Message 15 to the EUT on slot 2198:<br>!AIVDO,1,1,,A,?6k'<Pir4P05<00000000000000,2*0E                                 | -       |
| EUT transmits appropriate interrogation response within 30s:<br>!AIVDM,1,1,,A,C7'B00@0I?vUg@WAllp6wwb0'be0':V'000000000000BP00Q1VP,0*1A – Slot 2242 | Pass    |

| b) Interrogation for Message 19 with transmission offset = 10                                                                                                                                                |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                  | Verdict |
| Transmission of interrogation Message 15 to the EUT on slot 819:<br>!AIVDO,1,1,,A,?027'SQr4P05<0'000000000000,2*31                                                                                           | -       |
| The EUT transmits the appropriate interrogation response message as requested after defined transmission offset of 10:<br>!AIVDM,1,1,,A,C7'B00@0I?vUg@WAllp6wwbP'be0':V'000000000000BP00Q1VP,0*7A – Slot 829 | Pass    |

| c) Interrogation for Message 18 with transmission offset = 0                                                                                 |         |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                  | Verdict |
| Transmission of interrogation Message 15 to the EUT on slot 2121:<br>!AIVDO,1,1,,A,?027'SQr4P05800000000000000,2*65                          | -       |
| The EUT transmits the appropriate interrogation response message within 30 s:<br>!AIVDM,1,1,,A,B7'B00@0I?vUg@WAllp6wwtQh000,0*7B – Slot 2161 | Pass    |

| d) Interrogation for Message 24 with transmission offset = 0                                                                                                                                                                                                  |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                                                                   | Verdict |
| Transmission of interrogation Message 15 at 11:07:08 on slot 312:<br>!AIVDO,1,1,,A,?027'SQr4P05P00000000000000,2*0D                                                                                                                                           | -       |
| The EUT transmits the appropriate interrogation response Message 24A within 30 s and 24B within 1 min of 24A:<br>!AIVDM,1,1,,A,H7'B00AAEJ1@E=@000000000000,2*3F – 11:07:09, slot 356<br>!AIVDM,1,1,,A,H7'B00DUFC@D000123456700123<,0*67 – 11:07:49, slot 1867 | Pass    |



## 2.3 Channel selection

### 2.3.1 Specification Reference

IEC 62287-2, Clause 10.3

### 2.3.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### 2.3.3 Date of Test

10-December 2019

### 2.3.4 Test Results and Methods of Measurement

Valid channels – Clause 10.3.1

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode. Switch the EUT to different channels within the operating band as specified in 6.2 by transmission of channel management Message 22, broadcast and addressed to the EUT.

Record the VDL Messages on the designated channels and check "band flag" and "Message 22 flag" in Message 18.

#### **Required Results**

Confirm that the EUT switches to the correct channel and uses the correct "band flag" and "Message 22 flag".

#### **Test Results**

| Requirement                                                                                     | Result                                                                                                                                                                                                                                                                                  | Verdict |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| An initial Message 22 is to be broadcast to the EUT, specifying the operating region.           | The Message 22 broadcast to the EUT specifies a primary channel of 87, and a secondary channel of 67. The operating region has a north-eastern corner located at 51°N, 1°W and a south-western corner at 50°N, 2°W:<br>!AIVDM,1,1,,A,F027'SR2N1<7vm1oR?sD3bH2P000,0*26                  | -       |
| The EUT shall accept the region defined by the Message 22.                                      | The EUT accepts the regional operating settings in the Message 22, as seen in the messages output to the PI:<br>\$AITXT,01,01,04,RGN,NEW,B,5100.0,N,00100.0,W,5000.0,N,00200.0,W*13<br>\$AITXT,01,01,04,RGN,DATA,2087,2067,0,0,6*27<br>\$AITXT,01,01,04,REGION,ENTER,2087,2088,0,0,0*3B | -       |
| The EUT shall switch to the correct channels.                                                   | The EUT successfully times out slot reservations from the previous transmission schedule, before reserving slots on the designated regional channels and transmitting autonomously; as seen in the table below.                                                                         | Pass    |
| The band flag and Message 22 flags shall be set appropriately.                                  | The band flag remains set to 1 and the Message 22 flag is set 1.                                                                                                                                                                                                                        | Pass    |
| A second Message 22 is to be addressed to the EUT, specifying a second regional operating area. | The Message 22 broadcast to the EUT specifies a primary channel of 88, and a secondary channel of 68. The operating region has a north-eastern corner located at 51°N, 1°W and a south-western corner at 50°N, 2°W:<br>!AIVDM,1,1,,A,F027'SR2R1@3I9008000000BP000,0*59                  | -       |
| The EUT shall accept the region defined by the second Message 22.                               | The EUT accepts the regional operating settings in the Message 22, as seen in the messages output to the PI:<br>\$AITXT,01,01,04,RGN,ADDR,A,5100.0,N,00100.0,W,5000.0,N,00200.0,W*5F<br>\$AITXT,01,01,04,RGN,DATA,2088,2068,0,0,6*27                                                    | -       |
| The EUT shall switch to the correct channels.                                                   | The EUT successfully times out slot reservations from the previous transmission schedule, before reserving slots on the designated regional channels and transmitting autonomously; as seen in the table below.                                                                         | Pass    |
| The band flag and Message 22 flags shall be set appropriately.                                  | The band flag remains set to 1 and the Message 22 flag is set 1.                                                                                                                                                                                                                        | Pass    |



| Broadcast Message 22 |      |     |                                                 |              |                                      |
|----------------------|------|-----|-------------------------------------------------|--------------|--------------------------------------|
| Slot                 | Chan | Msg | Sentence                                        | Slot Timeout | Comment                              |
| 1010                 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1hD01,0*7B | 5            |                                      |
| 2211                 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0I?vUg@WAlIp6swu1h62t,0*5D | 1            |                                      |
| 188                  | A    | 24  | !AIVDM,1,1,,A,H7'B00AAEJ1=D@000000000000,2*4E   |              |                                      |
| 483                  | A    | 22  | !AIVDO,1,1,,A,F027'SR2N1<7vm1oR?sD3bH2P000,0*24 |              | Broadcast Msg 22                     |
| 1010                 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1j0>Q,0*63 | 0            | EUT times out slot on channel A (87) |
| 1068                 | A    | 24  | !AIVDM,1,1,,A,H7'B00DUFC@D000DEF2C?038:37<,0*6B |              |                                      |
| 2211                 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0I?vUg@WAlIp6swu1h000,0*1D | 0            | EUT times out slot on channel B (88) |
| 1010                 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1h<01,0*03 | 3            |                                      |
| 1010                 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1h8?j,0*53 | 2            |                                      |
| 2190                 | C    | 18  | !AIVDM,1,1,,C,B7'B00@0I?vUg@WAlIp6swu1j001,0*1F |              |                                      |
| 1010                 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1h63<,0*07 | 1            | EUT operates on channel A (87)       |
| 2190                 | C    | 18  | !AIVDM,1,1,,C,B7'B00@0I?vUg@WAlIp6swu1h<01,0*11 | 3            | EUT transmits on channel C (67)      |
| 1010                 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1h0T1,0*6B | 0            |                                      |
| 2190                 | C    | 18  | !AIVDM,1,1,,C,B7'B00@0I?vUg@WAlIp6swu1h8R>,0*78 | 2            |                                      |
| 1065                 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swf1hD01,0*78 | 5            |                                      |

| Addressed Message 22 |      |     |                                                 |              |                                                                |
|----------------------|------|-----|-------------------------------------------------|--------------|----------------------------------------------------------------|
| Slot                 | Chan | Msg | Sentence                                        | Slot Timeout | Comment                                                        |
| 994                  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1h8?R,0*6B | 2            | EUT operating in autonomous mode on channels A (87) and B (68) |
| 2164                 | C    | 18  | !AIVDM,1,1,,C,B7'B00@0I?vUg@WAlIp6swtQh0SB,0*6C | 0            |                                                                |
| 994                  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1h68L,0*7C | 1            |                                                                |
| 1123                 | A    | 22  | !AIVDO,1,1,,A,F027'SR2R1@3I9008000000BP000,0*5B |              |                                                                |
| 2172                 | C    | 18  | !AIVDM,1,1,,C,B7'B00@0I?vUg@WAlIp6swtQh000,0*7D | 0            | EUT times out slots from previous schedule                     |
| 994                  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6swe1h000,0*0E | 0            |                                                                |
| 542                  | D    | 18  | !AIVDM,1,1,,D,B7'B00@0I?vUg@WAlIp6swW1j001,0*3A |              | EUT reserves new slots on channels B (88) and D (68)           |
| 1624                 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0I?vUg@WAlIp6swmQj001,0*66 |              |                                                                |
| 542                  | D    | 18  | !AIVDM,1,1,,D,B7'B00@0I?vUg@WAlIp6swW1h@8N,0*3F | 4            | EUT begins transmitting autonomously on channels 88 and 68.    |
| 1624                 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0I?vUg@WAlIp6swmQh<01,0*68 | 3            |                                                                |
| 542                  | D    | 18  | !AIVDM,1,1,,D,B7'B00@0I?vUg@WAlIp6swW1h<01,0*34 | 3            |                                                                |



### Invalid channels – Clause 10.3.2

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode. Apply a Message 22 with 25 kHz channels not specified in Recommendation ITU-R M. 1084-5.

Record the VDL messages on the designated channels.

#### **Required Results**

Confirm that the EUT disregards Message 22.

#### **Test Results**

| Requirement                                                                                                          | Result                                                                                                                                         | Verdict |
|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Transmission of broadcast Message 22 to the EUT commanding the use of channels not specified by the 1084-5 standard. | The configuration to use invalid channels 2090 and 2091 was sent via Message 22 to the EUT:<br>!AIVDO,1,1,,A,F027`SR2b2d7vm1qp?sD3bH2P000,0*6F | -       |
| Confirm Message 22 received by the EUT.                                                                              | The command was received by the EUT successfully:<br>!AIVDM,1,1,,A,F027`SR2b2d7vm1qp?sD3bH2P000,0*6D                                           | -       |
| EUT does not output text sentence ID 36.                                                                             | Text sentence ID 36 not shown.                                                                                                                 | Pass    |
| Transmissions should continue on the default channels.                                                               | EUT transmits on the default channels as shown in the table below.                                                                             | Pass    |

| Confirm that the EUT disregards Message 22 |      |     |                                                 |                                                           |
|--------------------------------------------|------|-----|-------------------------------------------------|-----------------------------------------------------------|
| Slot                                       | Chan | Msg | Sentence                                        | Comment                                                   |
| 595                                        | B    | 18  | !AIVDM,1,1,,B,B7`B00@0I?vUg@WAlIp6wwWQhH9C,0*59 |                                                           |
| 1773                                       | A    | 18  | !AIVDM,1,1,,A,B7`B00@0I?vUg@WAlIp6wwWQh<01,0*6D |                                                           |
| 2149                                       | A    | 22  | !AIVDO,1,1,,A,F027`SR2b2d7vm1qp?sD3bH2P000,0*6F | Message 22 commands the EUT to use channels 2090 and 2091 |
| 595                                        | B    | 18  | !AIVDM,1,1,,B,B7`B00@0I?vUg@WAlIp6wwWQhD01,0*2E | EUT does not time out transmissions on channel B          |
| 1773                                       | A    | 18  | !AIVDM,1,1,,A,B7`B00@0I?vUg@WAlIp6wwWQh8Ke,0*46 | EUT does not time out transmissions on channel A          |
| 595                                        | B    | 18  | !AIVDM,1,1,,B,B7`B00@0I?vUg@WAlIp6wwWQh@9C,0*51 | Transmissions continue on channel B                       |
| 1773                                       | A    | 18  | !AIVDM,1,1,,A,B7`B00@0I?vUg@WAlIp6wwWQh5kH,0*46 | Transmissions continue on channel A                       |



## 2.4 AIS information

### 2.4.1 Specification Reference

IEC 62287-2, Clause 10.5

### 2.4.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: 103 – See section 1.3 for modification states

### 2.4.3 Date of Test

25-January 2019

### 2.4.4 Test Results and Methods of Measurement

Information content - Clause 10.5.1

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode. Apply all static data to the EUT.

Record all Messages on VDL and check the content of position report Message 18 and static data reports, Messages 24A and 24B.

#### **Required Results**

Confirm that data transmitted by the EUT complies with static data and position sensor data.

#### **Test Results**

| Ship Static Data (SSD) Assignment                                                                                                                                                                           |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                 | Verdict |
| Proprietary commands were used to set static data to the following:<br>Call sign = CS12345<br>Name = TUV CLASS B TEST EUT<br>Dimension of ship/reference for position = 0,1,2,3<br>Ship Type and Cargo = 31 | -       |
| Transmission of Message 18:<br>!AIVDM,1,1,,B,B7'B00@00?vTp>WAFpkkwUQjF8b,0*22                                                                                                                               | Pass    |
| Class B unit flag = 1.                                                                                                                                                                                      | Pass    |
| Display flag = 0, the EUT does not support a display and therefore this data is fixed.                                                                                                                      | Pass    |
| DSC = 1, the EUT has a DSC receiver.                                                                                                                                                                        | Pass    |
| Transmission of Messages 24A and 24B:<br>!AIVDM,1,1,,B,H7'B00AAEJ0<h5=>0:1@E=B0EE@,2*16<br>!AIVDM,1,1,,B,H7'B00DNFC@D0003Cijklm00123<,0*56                                                                  | Pass    |
| Dimension of ship/reference for position" is present in Message 24B according to SSD sentence.                                                                                                              | Pass    |
| Call sign is present in Message 24B according to SSD sentence.                                                                                                                                              | Pass    |
| Vessel's name is present in Message 24A according to SSD sentence.                                                                                                                                          | Pass    |
| Messages 24A and 24B comply with ship static data.                                                                                                                                                          | Pass    |



| Message 18 Decode                               |                                                 |
|-------------------------------------------------|-------------------------------------------------|
| !AIVDM,1,1,,B,B7'B00@00?vTp>WaffPkkwUQjF8b,0*22 |                                                 |
| Parameter                                       | Decoded Value                                   |
| Message ID                                      | 18                                              |
| Repeat Indicator                                | 0                                               |
| MMSI                                            | 512000001                                       |
| Reserved                                        | 0                                               |
| SOG                                             | 0                                               |
| Position Accuracy                               | 1 - high (> 10 m)                               |
| Longitude                                       | 1 14.6467 W                                     |
| Latitude                                        | 50 52.171 N                                     |
| COG                                             | 82.8                                            |
| True Heading                                    | 511 - not available                             |
| Time Stamp                                      | 11                                              |
| Spare                                           | 0                                               |
| Class B unit flag                               | 0                                               |
| Class B display flag                            | 0                                               |
| Class B DSC flag                                | 1                                               |
| Class B band flag                               | 1                                               |
| Class B Message 22 flag                         | 1                                               |
| Mode flag                                       | 0                                               |
| RAIM Flag                                       | 0 - RAIM not in use                             |
| Comm State Flag                                 | 1 - ITDMA                                       |
| Communication State - Sync State                | 0                                               |
| Communication State - ITDMA Slot Increment      | 5666                                            |
| Communication State - ITDMA Number of Slots     | 5 - 5 = 1 slot; offset = slot increment + 8 192 |
| Communication State - ITDMA Keep Flag           | 0                                               |

| Message 24A                                    |                      |
|------------------------------------------------|----------------------|
| !AIVDM,1,1,,B,H7'B00AAEJ0<h5=>0:1@E=B0EE@,2*16 |                      |
| Parameter                                      | Decoded Value        |
| Message ID                                     | 24                   |
| Repeat Indicator                               | 0                    |
| MMSI                                           | 512000001            |
| Part Number                                    | 0                    |
| Name                                           | TUV CLASS B TEST EUT |

| Message 24B prior to testing decode             |               |
|-------------------------------------------------|---------------|
| !AIVDM,1,1,,B,H7'B00DNFC@D0003Cijklm00123<,0*56 |               |
| Parameter                                       | Decoded Value |
| Message ID                                      | 24            |
| Repeat Indicator                                | 0             |
| MMSI                                            | 512000001     |
| Part Number                                     | 1             |
| Type of ship and cargo type                     | 30            |
| Vendor ID                                       | VSPT@@@       |
| Call Sign                                       | CS12345       |
| Dimension of ship/reference for position        | 0,1,2,3       |
| Spare                                           | 12            |



## Information update intervals – Clause 10.5.2

### Autonomous reporting interval – Clause 10.5.2.1

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode.

- Start with own SOG of 1 kn; record all Messages on VDL for at least 30 min and evaluate reporting interval for position report of the EUT by calculating average transmission offset over test period.
- Increase speed to 3 kn.
- Increase speed to 15 kn.
- Increase speed to 24 kn.
- Reduce speed to 22 kn.
- Reduce speed to 13 kn.
- Reduce speed to 1 kn.

Record all messages on VDL and check transmission offset between two consecutive transmissions.

#### **Required Results**

Confirm that:

- the reporting interval is 3 min ( $\pm 10$  s);
- the reporting interval is 30 s ( $\pm 3$  s);
- the reporting interval is 15 s ( $\pm 1,5$  s);
- the reporting interval is 5 s ( $\pm 0,5$  s);
- the reporting interval is 15 s;
- the reporting interval is 30 s;
- the reporting interval is 3 min.

#### **Test Results**

| a) SOG of 1kn                                  |                                                                             |         |
|------------------------------------------------|-----------------------------------------------------------------------------|---------|
| Requirement                                    | Result                                                                      | Verdict |
| The reporting interval is 3 min ( $\pm 10$ s). | Message 18:<br>Min Rr = 170.9 s<br>Max Rr = 186.9 s<br>Average Rr = 179.6 s | Pass    |

| b) Increase speed to 3 kn                    |                                                                          |         |
|----------------------------------------------|--------------------------------------------------------------------------|---------|
| Requirement                                  | Result                                                                   | Verdict |
| The reporting interval is 30 s ( $\pm 3$ s). | Message 18:<br>Min Rr = 25.5 s<br>Max Rr = 34.5 s<br>Average Rr = 30.0 s | Pass    |

| c) Increase speed to 15 kn                     |                                                                          |         |
|------------------------------------------------|--------------------------------------------------------------------------|---------|
| Requirement                                    | Result                                                                   | Verdict |
| The reporting interval is 15 s ( $\pm 1,5$ s). | Message 18:<br>Min Rr = 13.0 s<br>Max Rr = 18.0 s<br>Average Rr = 15.0 s | Pass    |

| d) Increase speed to 24 kn                    |                                                                       |         |
|-----------------------------------------------|-----------------------------------------------------------------------|---------|
| Requirement                                   | Result                                                                | Verdict |
| The reporting interval is 5 s ( $\pm 0,5$ s). | Message 18:<br>Min Rr = 3.5 s<br>Max Rr = 6.5 s<br>Average Rr = 5.0 s | Pass    |



| e) Reduce speed to 22 kn        |                                                                          |         |
|---------------------------------|--------------------------------------------------------------------------|---------|
| Requirement                     | Result                                                                   | Verdict |
| The reporting interval is 15 s. | Message 18:<br>Min Rr = 13.2 s<br>Max Rr = 17.0 s<br>Average Rr = 15.0 s | Pass    |

| f) Reduce speed to 13 kn        |                                                                          |         |
|---------------------------------|--------------------------------------------------------------------------|---------|
| Requirement                     | Result                                                                   | Verdict |
| The reporting interval is 30 s. | Message 18:<br>Min Rr = 25.4 s<br>Max Rr = 34.6 s<br>Average Rr = 30.0 s | Pass    |

| g) Reduce speed to 1 kn          |                                                                             |         |
|----------------------------------|-----------------------------------------------------------------------------|---------|
| Requirement                      | Result                                                                      | Verdict |
| The reporting interval is 3 min. | Message 18:<br>Min Rr = 172.4 s<br>Max Rr = 184.6 s<br>Average Rr = 179.7 s | Pass    |



*Polite behaviour – Clause 10.5.2.2*

***Method of Measurement***

Set up standard test environment and operate the EUT in autonomous mode. Simulate a VDL loading of 55 %. Record all messages.

- a) Start with own SOG of 1 kn.
- b) Increase speed to 20 kn.
- c) Reduce VDL loading to 40 %.
- d) Reduce VDL loading to 30 %.
- e) Increase VDL loading to 45 %.
- f) Increase VDL loading to 55 %.
- g) Increase speed to 30 kn.
- h) Reduce VDL loading to 40 %.
- i) Reduce VDL loading to 30 %.
- j) Increase VDL loading to 45 %.
- k) Increase VDL loading to 55 %.
- l) Reduce speed to 10 kn.
- m) Reduce VDL loading to 30 %.

Record all messages on the VDL.

***Required Results***

Confirm that:

- a) the reporting interval is 3 min;
- b) the reporting interval of 30 s has been established;
- c) the reporting interval of 30 s is maintained;
- d) the reporting interval decreases to 15 s within 4 min to 5 min;
- e) the reporting interval of 15 s is maintained;
- f) the reporting interval increases to 30 s within 4 min to 5 min;
- g) the reporting interval decreases to 15 s;
- h) the reporting interval of 15 s is maintained;
- i) the reporting interval decreases to 5 s within 4 min to 5 min;
- j) the reporting interval of 5 s is maintained;
- k) the reporting interval increases to 15 s within 4 min to 5 min;
- l) the reporting interval increases to 30 s;
- m) the reporting interval of 30 s is maintained.



### Test Results

| Requirement |     |        |        |            | Test System Configuration |     |       |        | EUT Results     |                |            |         |
|-------------|-----|--------|--------|------------|---------------------------|-----|-------|--------|-----------------|----------------|------------|---------|
| Step        | SOG | Load % | RI (s) | Time (min) | Targets                   | Gap | Block | Load % | Test Start Time | Time of Change | EUT RI (s) | Verdict |
| a           | 1   | 55     | 180.0  | -          | 42                        | 33  | 75    | 56     | 10:25:00        | 10:25:33       | 164        | Pass    |
| b           | 20  | 55     | 30.0   | -          | 42                        | 33  | 75    | 56     | 10:32:00        | 10:34:41       | 30         | Pass    |
| c           | 20  | 40     | 30.0   | -          | 30                        | 45  | 75    | 40     | 10:41:44        | 10:42:03       | 30         | Pass    |
| d           | 20  | 30     | 15.0   | 4-5        | 23                        | 52  | 75    | 31     | 10:51:09        | 10:51:36       | 15         | Pass    |
| e           | 20  | 45     | 15.0   | -          | 34                        | 41  | 75    | 45     | 11:00:00        | -              | 15         | Pass    |
| f           | 20  | 55     | 30.0   | 4-5        | 42                        | 33  | 75    | 56     | 15:32:00        | 15:36:39       | 30         | Pass    |
| g           | 30  | 55     | 15.0   | -          | 42                        | 33  | 75    | 56     | 08:47:29        | 08:47:43       | 15         | Pass    |
| h           | 30  | 40     | 15.0   | -          | 30                        | 45  | 75    | 40     | 08:51:00        | -              | 15         | Pass    |
| i           | 30  | 30     | 5.0    | 4-5        | 23                        | 52  | 75    | 31     | 09:00:00        | 09:05:43       | 5          | Pass    |
| j           | 30  | 45     | 5.0    | -          | 34                        | 41  | 75    | 45     | 09:08:00        | -              | 5          | Pass    |
| k           | 30  | 55     | 15.0   | 4-5        | 42                        | 33  | 75    | 56     | 09:16:00        | 09:20:15       | 15         | Pass    |
| l           | 10  | 55     | 30.0   | -          | 42                        | 33  | 75    | 56     | 09:22:13        | 09:23:13       | 30         | Pass    |
| m           | 10  | 30     | 30.0   | -          | 23                        | 52  | 75    | 31     | 09:25:00        | -              | 30         | Pass    |



### Static data reporting interval – Clause 10.5.2.3

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode. Record the transmitted messages and check for static data Messages 24A and 24B.

Repeat the test at an assigned reporting interval of 5 s for Message 18.

#### **Required Results**

Confirm that the EUT transmits Messages 24A and 24B every 6 min. Confirm that Message 24B is transmitted within 1 min of transmission of Message 24A, and on the same channel. Transmissions shall alternate between channels A and B and shall be independent of the Message 18 reporting interval.

#### **Test Results**

| Message 18 reporting interval. SOG = 10 kn.                                                                                                                 |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                 | Verdict |
| Transmission of Messages 24A and 24B:<br>!AIVDM,1,1,,B,H7`B00@<h5=<9<u@E=@00000000,2*52<br>!AIVDM,1,1,,B,H7`B00E8FC@D000ijklmno00000<,0*50                  | Pass    |
| Message 24A and 24B transmit every 6 min, transmissions for 24A and 24B recorded at:<br>(08:41:04 & 08:41:05), (08:47:04 & 08:47:06), (08:53:04 & 08:53:04) | Pass    |
| Message 24B is transmitted within 1 min of the transmission of 24A.                                                                                         | Pass    |
| Message 24B is transmitted on the same channel as 24A                                                                                                       | Pass    |
| Transmission of Message 24 pair alternates between channels A and B                                                                                         | Pass    |
| Message 24 is independent of message 18                                                                                                                     | Pass    |

| Message 18 assigned 5 s reporting interval at 10:08:41                                                                                         |         |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                    | Verdict |
| Message 18 sent by the EUT: !AIVDM,1,1,,A,B7`B00@0I?vUg@WAlIp6ww01pL01,0*65<br>Message 16 sent to the EUT: !AIVDO,1,1,,A,@027`SQR4P04<P1@,0*3C | -       |
| Transmission of Messages 24A and 24B:<br>!AIVDM,1,1,,A,H7`B00@<h5=<9<u@E=@00000000,2*51<br>!AIVDM,1,1,,A,H7`B00E8FC@D000ijklmno00000<,0*53     | Pass    |
| Message 24A and 24B transmit every 6 min.<br>(10:11:54 & 10:11:55), (10:17:54 & 10:17:55), (10:23:57 & 10:23:58)                               | Pass    |
| Message 24B is transmitted within 1 min of the transmission of 24A.                                                                            | Pass    |
| Time between 24A and 24B sentences: 1s, 1s, 1s.                                                                                                | Pass    |
| Message 24B is transmitted on the same channel as 24A                                                                                          | Pass    |
| Transmission of Message 24 pair alternates between channels A and B.                                                                           | Pass    |
| Transmission of Message 24 is independent of Message 18 reporting interval.                                                                    | Pass    |



## 2.5 Initialisation period

### 2.5.1 Specification Reference

IEC 62287-2, Clause 10.6

### 2.5.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### 2.5.3 Date of Test

26-April-2019

### 2.5.4 Test Results and Method of Measurement

#### **Method of Measurement**

Set up standard test environment with SOG > 2 kn.

- Switch on the EUT from cold (off-time minimum 1 h) with the EUT operating in autonomous mode.
- Switch off the EUT for between 15 min to 60 min and switch on again.
- Make the GNSS sensor position unavailable.

Record transmitted messages.

#### **Required Results**

Confirm that the EUT:

- starts regular transmission of Message 18 within 2 min and valid position within 30 min after switch on;
- starts regular transmission of Message 18 within 2 min and valid position within 5 min after switch on;
- continues transmission with last known position and time stamp "63" (positioning system inoperative) with a reporting interval of 3 min. Change to default position values (91, 181) after 30 min.

#### **Test Results**

It was not possible to set the SOG > 2 knots for this test. The purpose of this test is to check the time to first transmission and SOG would not have impacted the results of this test.

| a) SOG = 0 kn, no power for at least 1 h. |                                                                        |                                                                                               |         |
|-------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------|
| Time                                      | Requirement                                                            | Result                                                                                        | Verdict |
| 14:39:20                                  | Switched-on EUT transmits Message 18 within 2 min                      | First message transmitted at 14:40:45:<br>!AIVDM,1,1,,A,B7'B00@007vTp87AfFo93wn1j<br>C'r,0*4C | Pass    |
| 14:40:45                                  | Switched-on EUT transmits a valid position in Message 18 within 30 min | The first transmission has a valid position at 14:40:45                                       | Pass    |



| a) SOG = 10 kn, no power for at least 1 h – Message 18 within 2 min and valid position within 30 min decode |                                                 |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| !AIVDM,1,1,,A,B7'B00@007vTp87AfFo93wn1jC`r,0*4C                                                             |                                                 |
| Parameter                                                                                                   | Decoded Value                                   |
| Message ID                                                                                                  | 18                                              |
| Repeat Indicator                                                                                            | 0                                               |
| MMSI                                                                                                        | 512000001                                       |
| Reserved                                                                                                    | 0                                               |
| SOG                                                                                                         | 0                                               |
| Position Accuracy                                                                                           | 0 - low (>10 m)                                 |
| Longitude                                                                                                   | 1 14.648 W                                      |
| Latitude                                                                                                    | 50 52.1709 N                                    |
| COG                                                                                                         | 321.6                                           |
| True Heading                                                                                                | 511 - not available                             |
| Time Stamp                                                                                                  | 44                                              |
| Spare                                                                                                       | 0                                               |
| Class B unit flag                                                                                           | 0                                               |
| Class B display flag                                                                                        | 0                                               |
| Class B DSC flag                                                                                            | 1                                               |
| Class B band flag                                                                                           | 1                                               |
| Class B Message 22 flag                                                                                     | 1                                               |
| Mode flag                                                                                                   | 0                                               |
| RAIM Flag                                                                                                   | 0 - RAIM not in use                             |
| Comm State Flag                                                                                             | 1 - ITDMA                                       |
| Communication State - Sync State                                                                            | 0                                               |
| Communication State - ITDMA Slot Increment                                                                  | 5027                                            |
| Communication State - ITDMA Number of Slots                                                                 | 5 - 5 = 1 slot; offset = slot increment + 8 192 |
| Communication State - ITDMA Keep Flag                                                                       | 0                                               |

| b) SOG = 0 kn, no power between 15 to 60 min. |                                                                       |                                                                                           |      |
|-----------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------|
| Time                                          | Requirement                                                           | Result                                                                                    | Time |
| 15:03:35                                      | Switched-on EUT transmits Message 18 within 2 min                     | First message transmitted at 15:04:53:<br>!AIVDM,1,1,,A,B7'B00@007vTo`7AfKp03wrQjD`b,0*24 | Pass |
| 15:04:53                                      | Switched-on EUT transmits a valid position in Message 18 within 5 min | The first transmission has a valid position at 15:04:53                                   | Pass |

| b) SOG = 0 kn, no power for between 15 and 60 min – Message 18 within 2 min decode and valid position within 5 min |                                                 |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| !AIVDM,1,1,,A,B7'B00@007vTo`7AfKp03wrQjD`b,0*24                                                                    |                                                 |
| Parameter                                                                                                          | Decoded Value                                   |
| Message ID                                                                                                         | 18                                              |
| Repeat Indicator                                                                                                   | 0                                               |
| MMSI                                                                                                               | 512000001                                       |
| Reserved                                                                                                           | 0                                               |
| SOG                                                                                                                | 0                                               |
| Position Accuracy                                                                                                  | 0 - low (>10 m)                                 |
| Longitude                                                                                                          | 1 14.6544 W                                     |
| Latitude                                                                                                           | 50 52.179 N                                     |
| COG                                                                                                                | 0                                               |
| True Heading                                                                                                       | 511 - not available                             |
| Time Stamp                                                                                                         | 53                                              |
| Spare                                                                                                              | 0                                               |
| Class B unit flag                                                                                                  | 0                                               |
| Class B display flag                                                                                               | 0                                               |
| Class B DSC flag                                                                                                   | 1                                               |
| Class B band flag                                                                                                  | 1                                               |
| Class B Message 22 flag                                                                                            | 1                                               |
| Mode flag                                                                                                          | 0                                               |
| RAIM Flag                                                                                                          | 0 - RAIM not in use                             |
| Comm State Flag                                                                                                    | 1 - ITDMA                                       |
| Communication State - Sync State                                                                                   | 0                                               |
| Communication State - ITDMA Slot Increment                                                                         | 5182                                            |
| Communication State - ITDMA Number of Slots                                                                        | 5 - 5 = 1 slot; offset = slot increment + 8 192 |
| Communication State - ITDMA Keep Flag                                                                              | 0                                               |



| c) GNSS sensor position unavailable.                                                                                |         |
|---------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                         | Verdict |
| Message 18 contains the last known position and time stamp "63":<br>!AIVDM,1,1,,B,B7'B00@3wovTp47AfFSQ3wwQhUi8,0*25 | Pass    |
| Message 18 has a reporting interval of 3 min.                                                                       | Pass    |
| Message 18 position values change to "91, 181" after 30 min:<br>!AIVDM,1,1,,B,B7'B00@3wk?8mP=18D3Q3wwQjlar,0*42     | Pass    |

| c) GNSS sensor position unavailable – Initial Message 18 |                             |
|----------------------------------------------------------|-----------------------------|
| !AIVDM,1,1,,B,B7'B00@3wovTp47AfFSQ3wwQhUi8,0*25          |                             |
| Parameter                                                | Decoded Value               |
| Message ID                                               | 18                          |
| Repeat Indicator                                         | 0                           |
| MMSI                                                     | 512000001                   |
| Reserved                                                 | 0                           |
| SOG                                                      | not available               |
| Position Accuracy                                        | 0 - low (>10 m)             |
| Longitude                                                | 1 14.6488 W                 |
| Latitude                                                 | 50 52.1704 N                |
| COG                                                      | 360                         |
| True Heading                                             | 511 - not available         |
| Time Stamp                                               | 63                          |
| Spare                                                    | 0                           |
| Class B unit flag                                        | 0                           |
| Class B display flag                                     | 0                           |
| Class B DSC flag                                         | 1                           |
| Class B band flag                                        | 1                           |
| Class B Message 22 flag                                  | 1                           |
| Mode flag                                                | 0                           |
| RAIM Flag                                                | 0 - RAIM not in use         |
| Comm State Flag                                          | 0 - SOTDMA                  |
| Communication State - Sync State                         | 1                           |
| Communication State - SOTDMA Slot Timeout                | 1                           |
| Communication State - SOTDMA Sub Message                 | UTC Hour and Minute = 14:18 |

| c) GNSS sensor position unavailable – Message 18 decode after 30 min |                                                 |
|----------------------------------------------------------------------|-------------------------------------------------|
| !AIVDM,1,1,,B,B7'B00@3wk?8mP=18D3Q3wwQjlar,0*42                      |                                                 |
| Parameter                                                            | Decoded Value                                   |
| Message ID                                                           | 18                                              |
| Repeat Indicator                                                     | 0                                               |
| MMSI                                                                 | 512000001                                       |
| Reserved                                                             | 0                                               |
| SOG                                                                  | not available                                   |
| Position Accuracy                                                    | 0 - low (>10 m)                                 |
| Longitude                                                            | 181 0 E                                         |
| Latitude                                                             | 91 0 N                                          |
| COG                                                                  | 360                                             |
| True Heading                                                         | 511 - not available                             |
| Time Stamp                                                           | 63                                              |
| Spare                                                                | 0                                               |
| Class B unit flag                                                    | 0                                               |
| Class B display flag                                                 | 0                                               |
| Class B DSC flag                                                     | 1                                               |
| Class B band flag                                                    | 1                                               |
| Class B Message 22 flag                                              | 1                                               |
| Mode flag                                                            | 0                                               |
| RAIM Flag                                                            | 0 - RAIM not in use                             |
| Comm State Flag                                                      | 1 - ITDMA                                       |
| Communication State - Sync State                                     | 1                                               |
| Communication State - ITDMA Slot Increment                           | 5287                                            |
| Communication State - ITDMA Number of Slots                          | 5 - 5 = 1 slot; offset = slot increment + 8 192 |
| Communication State - ITDMA Keep Flag                                | 0                                               |



## 2.6 Alarms and indications, fall-back arrangements

### 2.6.1 Specification Reference

IEC 62287-2, Clause 10.7

### 2.6.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIAL NUMBER – See section 1.3 for modification states

### 2.6.3 Date of Test

09-October-2019

### 2.6.4 Test Results and Methods of Measurement

Built in integrity test – Clause 10.7.1

#### Method of Measurement

Check manufacturer's documentation on BIIT.

#### Required Results

Verify that an indication is provided if a malfunction is detected and the appropriate ALR sentence is output on the PI.

#### Test Results

| LED         | Purpose                                                                                                        | LED Status        | States                                                                                   | Verdict |
|-------------|----------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------|---------|
| Cloud       | Internet connection status                                                                                     | Red - solid       | Unable to connect to cell network                                                        | Pass    |
|             |                                                                                                                | Yellow - solid    | Waiting to connect                                                                       | Pass    |
|             |                                                                                                                | Green - flashing  | Connected to Vesper Cloud                                                                | Pass    |
| N2K         | NMEA2000 bus status                                                                                            | Red – solid       | Fault                                                                                    | Pass    |
|             |                                                                                                                | Yellow – solid    | Warning                                                                                  | Pass    |
|             |                                                                                                                | Green – flashing  | On bus                                                                                   | Pass    |
| GPS         | GPS fix status                                                                                                 | Red – solid       | GPS system problem                                                                       | Pass    |
|             |                                                                                                                | Yellow – flashing | Acquiring a fix                                                                          | Pass    |
|             |                                                                                                                | Green – flashing  | Fix obtained                                                                             | Pass    |
| VHF Antenna | VHF AUX TX<br>VHF & AIS TX<br>VSWR<br>AIS TX Status (MMSI, Start time, silent mode)<br>VHF Calibration<br>BIIT | Red               | VSWR issue, BIIT error                                                                   | Pass    |
|             |                                                                                                                | Yellow            | Silent Mode / Quiet Mode / VHF AUX TX active / no MMSI / no VDL sync / AIS not warmed up | Pass    |
|             |                                                                                                                | Green             | AIS/VHF TX active                                                                        | Pass    |
| WiFi        | Remote connected<br>Clients connected (apps)<br>WiFi system functioning                                        | Red               | WiFi interface inactive                                                                  |         |
|             |                                                                                                                | Yellow            | WiFi active but no clients                                                               | Pass    |
|             |                                                                                                                | Green             | If at least one handset is connected                                                     | Pass    |

| ID    | BIIT Description           | ALR Sentence Received                               | Verdict |
|-------|----------------------------|-----------------------------------------------------|---------|
| ID001 | TX Malfunction             | \$AIALR,,001,A,V,AIS: Tx malfunction*72             | Pass    |
| ID002 | Antenna VSWR exceeds limit | \$AIALR,,002,A,V,AIS: Antenna VSWR exceeds limit*7C | Pass    |
| ID003 | RX channel 1 malfunction   | \$AIALR,,003,A,V,AIS: Rx channel 1 malfunction*24   | Pass    |
| ID004 | RX channel 2 malfunction   | \$AIALR,,004,A,V,AIS: Rx channel 2 malfunction*20   | Pass    |
| ID005 | RX channel 70 malfunction  | \$AIALR,,005,A,V,AIS: Rx channel 70 malfunction*14  | Pass    |
| ID006 | General failure            | \$AIALR,,006,A,V,AIS: general failure*2D            | Pass    |
| ID008 | Display connection lost    | \$AIALR,,008,A,V,AIS: display connection lost*7D    | Pass    |
| ID025 | UTC sync invalid           | \$AIALR,,025,A,V,AIS: UTC sync invalid*2E           | Pass    |
| ID026 | No sensor position in use  | \$AIALR,,026,A,V,AIS: no sensor position in use*73  | Pass    |
| ID029 | No valid SOG information   | \$AIALR,,029,A,V,AIS: no valid SOG information*76   | Pass    |
| ID030 | No valid COG information   | \$AIALR,,030,A,V,AIS: no valid COG information*6E   | Pass    |
| ID032 | Heading lost / invalid     | \$AIALR,,032,A,V,AIS: Heading lost/invalid*2E       | Pass    |



## Transceiver protection – Clause 10.7.2

### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode with SOG > 23 kn.

- Open circuit VHF-antenna terminals of the EUT for at least 5 min.
- Short circuit VHF-antenna terminals of the EUT for at least 5 min.
- Reconnect the VHF-antenna.

### **Required Results**

Check that:

- an alarm sentence ALR with alarm ID 002 is sent to the PI;
- an alarm sentence ALR with alarm ID 002 is sent to the PI;
- the EUT shall be operative again after refitting the antenna, without damage to the transceiver and check that an alarm sentence ALR with a deactivated alarm ID 002 is sent to the PI.

### **Test Results**

| <b>a) Open circuit VHF-antenna terminals</b>                                       |                                                                                                                                                        |         |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                        | Result                                                                                                                                                 | Verdict |
| The EUT shall have a SOG of >23 kn.                                                | The EUT maintains a speed of 25 knots throughout the duration of this test clause, as seen below:<br>!AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwSQh@53,0*4D    | -       |
| The VHF-antenna terminals of the EUT shall be disconnected for at least 5 minutes. | The VHF-antenna was disconnected for 7 minutes, from 09:19:16 to 09:26:16.                                                                             | -       |
| An alarm sentence ALR with ID 002 shall be sent to the PI.                         | The alarm with ID 002 is successfully raised by the EUT when the antenna is disconnected:<br>\$AIALR,101917,002,A,V,AIS: Antenna VSWR exceeds limit*73 | Pass    |

| <b>b) Short circuit VHF-antenna terminals</b>                 |                                                                                                                |         |
|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                   | Result                                                                                                         | Verdict |
| Short circuit the VHF-antenna for at least 5 minutes.         | The VHF-antenna terminals are shorted for 7 minutes, from 09:26:16 to 19:33:16.                                | -       |
| The alarm sentence with alarm ID 002 shall be sent to the PI. | The EUT displays the alarm with ID 002 on the PI:<br>\$AIALR,101917,002,A,V,AIS: Antenna VSWR exceeds limit*73 | Pass    |

| <b>c) Reconnect the VHF-antenna</b>                                         |                                                                                                                                                   |         |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                 | Result                                                                                                                                            | Verdict |
| The EUT shall be operative again after refitting the antenna.               | The EUT resumes transmission of position reports after the VHF-antenna is connected:<br>!AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwa1hD01,0*1C            | Pass    |
| There shall be no damage to the transceiver after reconnecting the antenna. | The contents of the messages received and transmitted by the EUT are confirmed to be correct, proving that there is no damage to the transceiver. | Pass    |
| The alarm with ID 002 shall be deactivated by the EUT.                      | The alarm is deactivated 3 seconds after the antenna is reconnected:<br>\$AIALR,103318,002,V,V,AIS: Antenna VSWR exceeds limit*63                 | Pass    |



### Transmitter shutdown procedure – Clause 10.7.3

#### **Method of Measurement**

Check manufacturer's documentation on transmitter shutdown procedure.

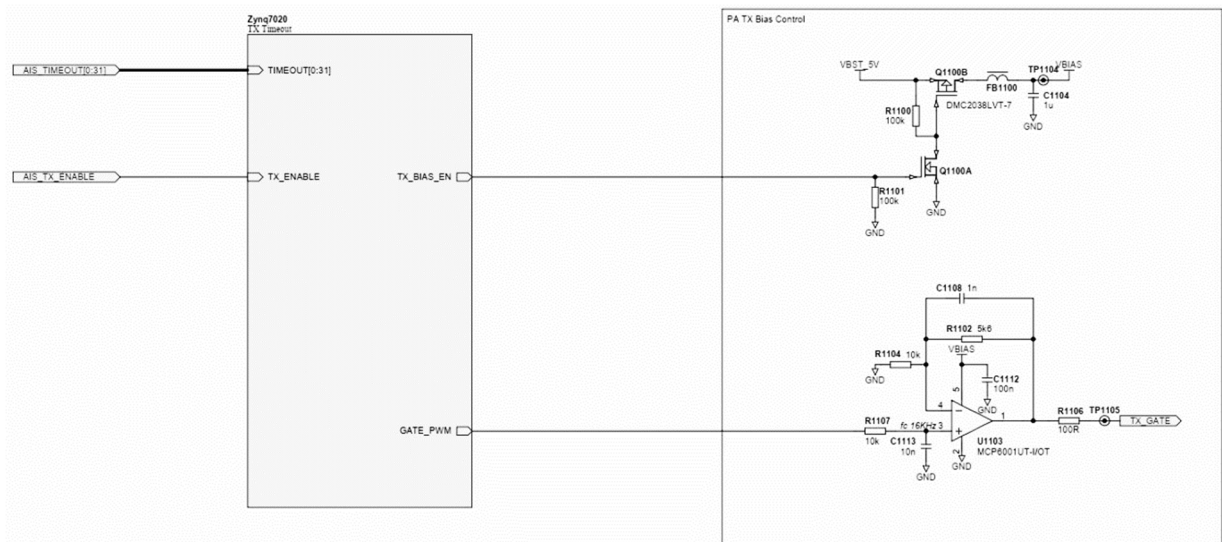
#### **Required Results**

Verify that a transmitter shutdown procedure, independent of the operating software, is provided (see 6.6.2).

#### **Test Results**

| Requirement                                                                                                                                               | Verdict |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Manufacturer's documentation details an automatic transmitter hardware shutdown procedure, should the transmitter continue to transmit for more than 2 s. | Pass    |
| The shutdown procedure does not require software.                                                                                                         | Pass    |

An automatic hardware shutdown of the AIS transmitter circuit is implemented as show below:



#### PA TX Bias Control

TX\_BIAS\_EN asserts the power supply necessary to drive the TX pre-amplification phase (VBIAS). GATE\_PWM asserts the gate level required to turn on the primary TX power amplifier (TX\_GATE).

Note, the gate level circuit is also powered from VBIAS, so removal of just TX\_BIAS\_EN is enough to disable a TX, but both TX\_BIAS\_EN and GATE\_PWM are needed for a TX to occur.

#### Zynq7020 Tx Timeout

The Zynq7020 timer circuit is signalled by an enable line at the beginning of each transmission (TX\_ENABLE). When enabled, the timer countdown circuit shifts in a counter value and begins decrementing, while TX\_BIAS\_EN and GATE\_PWM outputs are simultaneously enabled. The counter value is set to 2000 during circuit initialisation via a 32bit register (TIMEOUT[0:31]). This value represents the TX timeout time in milliseconds.

If the TX\_ENABLE line is enabled when the countdown circuit reaches zero TX\_BIAS\_EN and GATE\_PWM are disabled. When the TX\_ENABLE line is disabled the timer circuit is reset and TX\_BIAS\_EN and GATE\_PWM are disabled.



#### Position sensor fallback conditions – Clause 10.7.4

##### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode.

Apply position sensor data such that the EUT operates as follows:

- internal DGNSS in use (corrected by Message 17);
- internal DGNSS in use (corrected by a beacon), if implemented;
- internal GNSS in use;
- no sensor position in use.

Check the position accuracy and RAIM flag in the VDL Message 18 and, where provided, the ALR sentence.

##### **Required Results**

Verify that:

- the use of position source, position accuracy flag, RAIM flag and position information complies with Table 3;
- the position sensor status is maintained for the next scheduled report and changed for subsequent reports;
- the EUT does not accept Message 17 from a station using a non-base station MMSI.

##### **Test Results**

The implementation of a beacon receiver is an optional feature that is not employed by the Class B. The testing of internal DGNSS corrected by a beacon was therefore not applicable to this device- and has been omitted from this report.

| Switching upwards                                                                                                                                                                                                      |                                                                                                                                                                                                                 |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Test Step                                                                                                                                                                                                              | Result                                                                                                                                                                                                          | Verdict |
| No GNSS.                                                                                                                                                                                                               | EUT outputs alarm sentences indicating no position sensor in use:<br>\$AIALR,026,A,V,AIS: no sensor position in use*73                                                                                          | Pass    |
|                                                                                                                                                                                                                        | EUT outputs default position and timestamp = 63:<br>!AIVDM,1,1,,A,B7'B00@3wk?8mP=18D3Q3wwQjmEb,0*74                                                                                                             | Pass    |
|                                                                                                                                                                                                                        | Position accuracy flag =0.                                                                                                                                                                                      | Pass    |
|                                                                                                                                                                                                                        | RAIM flag = 0.                                                                                                                                                                                                  | Pass    |
| Internal GNSS.                                                                                                                                                                                                         | EUT outputs alarm sentences with alarm status cleared:<br>\$AIALR,026,V,V,AIS: no sensor position in use*64                                                                                                     | Pass    |
|                                                                                                                                                                                                                        | Position is correct:<br>!AIVDM,1,1,,A,B7'B00@007vTq:WafE5:www1jP00,0*28                                                                                                                                         | Pass    |
|                                                                                                                                                                                                                        | Position accuracy flag = 0                                                                                                                                                                                      | Pass    |
|                                                                                                                                                                                                                        | RAIM flag = 0.                                                                                                                                                                                                  | Pass    |
| Internal DGNSS<br>(corrected by Message 17).                                                                                                                                                                           | The EUT maintains the position sensor status for the next scheduled report, seen here as the position accuracy flag remains 0 for the first position report:<br>!AIVDM,1,1,,A,B7'B00@007vTpR7AfFM:www1jkpr,0*63 | Pass    |
|                                                                                                                                                                                                                        | The position sensor status is updated for the following reports:<br>!AIVDM,1,1,,B,B7'B00@00?vTorWafHVqwwpQjD>r,0*6E                                                                                             | Pass    |
|                                                                                                                                                                                                                        | Position accuracy flag = 1.                                                                                                                                                                                     | Pass    |
|                                                                                                                                                                                                                        | RAIM flag = 0.                                                                                                                                                                                                  | Pass    |
| Comments                                                                                                                                                                                                               |                                                                                                                                                                                                                 |         |
| RMC sentence indicates that GNSS is not in differential mode when using the internal GNSS, therefore the PA flag should be 0 as RAIM = 0:<br>\$AIRM,152511.50,A,5052.17300,N,114.64552,W,0.016,0.00,031019,0.50,W,A*27 |                                                                                                                                                                                                                 |         |



| No GNSS – antenna removed                       |                                                 |
|-------------------------------------------------|-------------------------------------------------|
| IAIVDM,1,1,,A,B7'B00@3wk?8mP=18D3Q3wwQjmEb,0*74 |                                                 |
| Parameter                                       | Decoded Value                                   |
| Message ID                                      | 18                                              |
| Repeat Indicator                                | 0                                               |
| MMSI                                            | 512000001                                       |
| Reserved                                        | 0                                               |
| SOG                                             | not available                                   |
| Position Accuracy                               | 0 - low (>10 m)                                 |
| Longitude                                       | 181 0 E                                         |
| Latitude                                        | 91 0 N                                          |
| COG                                             | 360                                             |
| True Heading                                    | 511 - not available                             |
| Time Stamp                                      | 63                                              |
| Spare                                           | 0                                               |
| Class B unit flag                               | 0                                               |
| Class B display flag                            | 0                                               |
| Class B DSC flag                                | 1                                               |
| Class B band flag                               | 1                                               |
| Class B Message 22 flag                         | 1                                               |
| Mode flag                                       | 0                                               |
| RAIM Flag                                       | 0 - RAIM not in use                             |
| Comm State Flag                                 | 1 - ITDMA                                       |
| Communication State - Sync State                | 1                                               |
| Communication State - ITDMA Slot Increment      | 5462                                            |
| Communication State - ITDMA Number of Slots     | 5 - 5 = 1 slot; offset = slot increment + 8 192 |
| Communication State - ITDMA Keep Flag           | 0                                               |

| Internal GNSS                                  |                     |
|------------------------------------------------|---------------------|
| IAIVDM,1,1,,A,B7'B00@007vTq:WAF5:www1jP00,0*28 |                     |
| Parameter                                      | Decoded Value       |
| Message ID                                     | 18                  |
| Repeat Indicator                               | 0                   |
| MMSI                                           | 512000001           |
| Reserved                                       | 0                   |
| SOG                                            | 0                   |
| Position Accuracy                              | 0 - low (>10 m)     |
| Longitude                                      | 1 14.6347 W         |
| Latitude                                       | 50 52.1681 N        |
| COG                                            | 119.9               |
| True Heading                                   | 511 - not available |
| Time Stamp                                     | 60                  |
| Spare                                          | 0                   |
| Class B unit flag                              | 0                   |
| Class B display flag                           | 0                   |
| Class B DSC flag                               | 1                   |
| Class B band flag                              | 1                   |
| Class B Message 22 flag                        | 1                   |
| Mode flag                                      | 0                   |
| RAIM Flag                                      | 0 - RAIM not in use |
| Comm State Flag                                | 1 - ITDMA           |
| Communication State - Sync State               | 1                   |
| Communication State - ITDMA Slot Increment     | 0                   |
| Communication State - ITDMA Number of Slots    | 0 - 0 = 1 slot      |
| Communication State - ITDMA Keep Flag          | 0                   |

| Internal DGNSS – corrected by message 17        |                   |
|-------------------------------------------------|-------------------|
| IAIVDM,1,1,,B,B7'B00@00?vTorWAFHVqwwpQjD>r,0*6E |                   |
| Parameter                                       | Decoded Value     |
| Message ID                                      | 18                |
| Repeat Indicator                                | 0                 |
| MMSI                                            | 512000001         |
| Reserved                                        | 0                 |
| SOG                                             | 0                 |
| Position Accuracy                               | 1 - high (> 10 m) |
| Longitude                                       | 1 14.6507 W       |
| Latitude                                        | 50 52.1737 N      |



| Internal DGNSS – corrected by message 17        |                                                 |
|-------------------------------------------------|-------------------------------------------------|
| !AIVDM,1,1,,B,B7'B00@00?vTorWAFHVqwwpQjD>r,0*6E |                                                 |
| Parameter                                       | Decoded Value                                   |
| COG                                             | 297.5                                           |
| True Heading                                    | 511 - not available                             |
| Time Stamp                                      | 49                                              |
| Spare                                           | 0                                               |
| Class B unit flag                               | 0                                               |
| Class B display flag                            | 0                                               |
| Class B DSC flag                                | 1                                               |
| Class B band flag                               | 1                                               |
| Class B Message 22 flag                         | 1                                               |
| Mode flag                                       | 0                                               |
| RAIM Flag                                       | 0 - RAIM not in use                             |
| Comm State Flag                                 | 1 - ITDMA                                       |
| Communication State - Sync State                | 0                                               |
| Communication State - ITDMA Slot Increment      | 5179                                            |
| Communication State - ITDMA Number of Slots     | 5 - 5 = 1 slot; offset = slot increment + 8 192 |
| Communication State - ITDMA Keep Flag           | 0                                               |

| Switching downwards       |                                                                                                                                                                                                                                                                                   |         |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Test Step                 | Result                                                                                                                                                                                                                                                                            | Verdict |
| Message 17 applied to EUT | RAIM = 0, PA flag = 1, position is correct:<br>!AIVDM,1,1,,B,B7'B00@00?vTpVWAF6tWwqQjDfJ,0*7C                                                                                                                                                                                     | Pass    |
| Internal GNSS connected   | GGA sentence output by the EUT confirms no position correcting beacon<br>\$GPGGA,121848.00,5052.16888,N,00114.64407,W,1,08,1.38,44.6,M,46.8,M,,*7E<br>RAIM = 0, PA flag = 0, Position is correct:<br>!AIVDM,1,1,,A,B7'B00@007vTpL7AfERtWwoQjDg:,0*06<br>See decode in table below | Pass    |
| No GNSS                   | EUT outputs alarm sentences indicating no position sensor in use:<br>\$AIALR,122151,026,A,V,AIS: no sensor position in use*77<br>EUT outputs default position and timestamp = 63:<br>!AIVDM,1,1,,A,B7'B00@3wovTpL7AfESQ3wwQj`jQ,0*00<br>See decode in table below                 | Pass    |

#### Comments

RMC sentence indicates that GNSS is not in differential mode, therefore the PA flag should be 0 as RAIM = 0:  
\$AIRM,121710.00,A,5052.16446,N,114.64578,W,0.003,301.73,031219,0.47,W,A\*2F

#### No GNSS message 18 decode

!AIVDM,1,1,,A,B7'B00@3wovTpL7AfESQ3wwQj`jQ,0\*00

| Parameter                                   | Decoded Value       |
|---------------------------------------------|---------------------|
| Message ID                                  | 18                  |
| Repeat Indicator                            | 0                   |
| MMSI                                        | 512000001           |
| Reserved                                    | 0                   |
| SOG                                         | not available       |
| Position Accuracy                           | 0 - low (>10 m)     |
| Longitude                                   | 1 14.644 W          |
| Latitude                                    | 50 52.1688 N        |
| COG                                         | 360                 |
| True Heading                                | 511 - not available |
| Time Stamp                                  | 63                  |
| Spare                                       | 0                   |
| Class B unit flag                           | 0                   |
| Class B display flag                        | 0                   |
| Class B DSC flag                            | 1                   |
| Class B band flag                           | 1                   |
| Class B Message 22 flag                     | 1                   |
| Mode flag                                   | 0                   |
| RAIM Flag                                   | 0 - RAIM not in use |
| Comm State Flag                             | 1 - ITDMA           |
| Communication State - Sync State            | 1                   |
| Communication State - ITDMA Slot Increment  | 2250                |
| Communication State - ITDMA Number of Slots | 0 - 0 = 1 slot      |
| Communication State - ITDMA Keep Flag       | 1                   |



| GNSS connected message 18 decode                |                                                 |
|-------------------------------------------------|-------------------------------------------------|
| !AIVDM,1,1,,A,B7'B00@007vTpL7AfERtWwoQjDg,,0*06 |                                                 |
| Parameter                                       | Decoded Value                                   |
| Message ID                                      | 18                                              |
| Repeat Indicator                                | 0                                               |
| MMSI                                            | 512000001                                       |
| Reserved                                        | 0                                               |
| SOG                                             | 0                                               |
| Position Accuracy                               | 0 - low (>10 m)                                 |
| Longitude                                       | 1 14.644 W                                      |
| Latitude                                        | 50 52.1688 N                                    |
| COG                                             | 301.7                                           |
| True Heading                                    | 511 - not available                             |
| Time Stamp                                      | 47                                              |
| Spare                                           | 0                                               |
| Class B unit flag                               | 0                                               |
| Class B display flag                            | 0                                               |
| Class B DSC flag                                | 1                                               |
| Class B band flag                               | 1                                               |
| Class B Message 22 flag                         | 1                                               |
| Mode flag                                       | 0                                               |
| RAIM Flag                                       | 0 - RAIM not in use                             |
| Comm State Flag                                 | 1 - ITDMA                                       |
| Communication State - Sync State                | 0                                               |
| Communication State - ITDMA Slot Increment      | 5308                                            |
| Communication State - ITDMA Number of Slots     | 5 - 5 = 1 slot; offset = slot increment + 8 192 |
| Communication State - ITDMA Keep Flag           | 0                                               |

| Message 17 applied to EUT, message 18 decode    |                                                 |
|-------------------------------------------------|-------------------------------------------------|
| !AIVDM,1,1,,B,B7'B00@00?vTpVWAfE6tWwqQjDfJ,0*7C |                                                 |
| Parameter                                       | Decoded Value                                   |
| Message ID                                      | 18                                              |
| Repeat Indicator                                | 0                                               |
| MMSI                                            | 512000001                                       |
| Reserved                                        | 0                                               |
| SOG                                             | 0                                               |
| Position Accuracy                               | 1 - high (> 10 m)                               |
| Longitude                                       | 1 14.6419 W                                     |
| Latitude                                        | 50 52.1681 N                                    |
| COG                                             | 301.7                                           |
| True Heading                                    | 511 - not available                             |
| Time Stamp                                      | 51                                              |
| Spare                                           | 0                                               |
| Class B unit flag                               | 0                                               |
| Class B display flag                            | 0                                               |
| Class B DSC flag                                | 1                                               |
| Class B band flag                               | 1                                               |
| Class B Message 22 flag                         | 1                                               |
| Mode flag                                       | 0                                               |
| RAIM Flag                                       | 0 - RAIM not in use                             |
| Comm State Flag                                 | 1 - ITDMA                                       |
| Communication State - Sync State                | 0                                               |
| Communication State - ITDMA Slot Increment      | 5305                                            |
| Communication State - ITDMA Number of Slots     | 5 - 5 = 1 slot; offset = slot increment + 8 192 |



## 2.7 User interface

### 2.7.1 Specification Reference

IEC 62287-2, Clause 10.8.1

### 2.7.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### 2.7.3 Date of Test

30-August-2019

### 2.7.4 Test Results and Methods of Measurement

#### Method of Measurement

Perform the following.

- Set up standard test environment and operate the EUT in autonomous mode.
- Send Message 23 with a quiet time to EUT.
- Disable GNSS reception.

Check status indications.

#### Required Results

Check that:

- power indicator is on and the no transmission indicator is off;
- no transmission indicator is on and reverts to off after quiet time elapse;
- the error indicator is on.

#### Test Results

| a) Set up standard test environment and operate the EUT in autonomous mode.                |         |
|--------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                | Verdict |
| The VHF status indicator is green, indicating the power is on and the EUT is transmitting. | Pass    |

| b) Send Message 23 with a quiet time to EUT.                                                                     |         |
|------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                      | Verdict |
| Message 23 with quiet time of 5 min received by EUT:<br>!AIVDO,1,1,,A,G027`SSwJPsi7ub1m<2000000D0,2*45           | -       |
| The VHF status indicator changes to orange, indicating no transmissions                                          | Pass    |
| The VHF status indicator changes to green after quiet time has elapsed, indicating that the EUT is transmitting. | Pass    |

| b) Test results |      |     |                                                  |                                                           |
|-----------------|------|-----|--------------------------------------------------|-----------------------------------------------------------|
| Time            | Slot | Msg | Sentence                                         | Comment                                                   |
| 10:56:10        | 404  | 18  | !AIVDM,1,1,,A,B7`B00@0j?vUg@WAlp6wwU1j0v1,0*5C   | EUT operating in autonomous mode.                         |
| 10:56:17        | 652  | 24  | !AIVDM,1,1,,A,H7`B00@<h5=<9<u@E=@00000000,2*51   |                                                           |
| 10:56:27        | 1014 | 18  | !AIVDM,1,1,,B,B7`B00@0j?vUg@WAlp6wwU1h0RM,0*35   |                                                           |
| 10:56:39        | 1486 | 18  | !AIVDM,1,1,,A,B7`B00@0j?vUg@WAlp6wwkQj0HA,0*4C   |                                                           |
| 10:56:42        | 1583 | 24  | !AIVDM,1,1,,A,H7`B00E8FC@D000ijklnmno00000<,0*53 |                                                           |
| 10:56:55        | 2072 | 18  | !AIVDM,1,1,,B,B7`B00@0j?vUg@WAlp6wws1hL01,0*41   |                                                           |
| 10:57:01        | 85   | 23  | !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<2000000D0,2*45   | Message 23 commands a quiet time of 5 minutes to the EUT. |
| 10:57:10        | 404  | 18  | !AIVDM,1,1,,A,B7`B00@0j?vUg@WAlp6wwU1p000,0*01   | EUT begins timing out slots.                              |
| 10:57:25        | 969  | 18  | !AIVDM,1,1,,B,B7`B00@0j?vUg@WAlp6wwdQp000,0*53   |                                                           |
| 10:57:39        | 1486 | 18  | !AIVDM,1,1,,A,B7`B00@0j?vUg@WAlp6wwkQp000,0*5F   |                                                           |
| 10:57:55        | 2072 | 18  | !AIVDM,1,1,,B,B7`B00@0j?vUg@WAlp6wws1p000,0*24   | EUT finishes timing out slots.                            |



| b) Test results |      |     |                                                |                                                               |
|-----------------|------|-----|------------------------------------------------|---------------------------------------------------------------|
| Time            | Slot | Msg | Sentence                                       | Comment                                                       |
| 11:03:11        | 430  | 18  | !AIVDM,1,1,,A,B7'B00@0j?vUg@WAlp6wwUQj4c1,0*2D | EUT begins reserving slots 05:17 after its last transmission. |
| 11:03:25        | 959  | 18  | !AIVDM,1,1,,B,B7'B00@0j?vUg@WAlp6wwdQj4Ni,0*6A |                                                               |
| 11:03:43        | 1626 | 18  | !AIVDM,1,1,,A,B7'B00@0j?vUg@WAlp6wwmQj001,0*42 |                                                               |
| 11:03:56        | 2106 | 18  | !AIVDM,1,1,,B,B7'B00@0j?vUg@WAlp6wwsQj001,0*5F | EUT finishes reserving slots.                                 |
| 11:04:11        | 430  | 18  | !AIVDM,1,1,,A,B7'B00@0j?vUg@WAlp6wwUQh<01,0*74 |                                                               |
| 11:04:25        | 959  | 18  | !AIVDM,1,1,,B,B7'B00@0j?vUg@WAlp6wwdQhH>w,0*7A | EUT reverts to autonomous operation.                          |
| 11:04:43        | 1626 | 18  | !AIVDM,1,1,,A,B7'B00@0j?vUg@WAlp6wwmQh8IJ,0*4A |                                                               |

| c) Disable GNSS reception.                                |         |
|-----------------------------------------------------------|---------|
| Requirement                                               | Verdict |
| The GNSS antenna is disconnected from the EUT.            | -       |
| The status indicator changes to red, indicating an error. | Pass    |



### Static data input – Clause 10.8.2

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode.

- Apply to the VDL Message 12 addressed to EUT.
- Apply to the VDL Message 12 not addressed to EUT.
- Apply to the VDL Message 14 to EUT.
- Apply an active AIS-SART position report to EUT.
- Apply a test mode AIS-SART position report to EUT.
- Disable VHF antenna.

#### **Required Results**

Verify that:

- the EUT displays Message 12;
- the EUT does not display Message 12;
- the EUT displays Message 14;
- the EUT displays the AIS- SART position report Message 1, at least ID and position;
- the EUT displays the AIS-SART position report Message 1, at least ID and position only if unit set to AIS-SART test mode;
- the EUT displays the alarm status and that the error indicator is on.

#### **Test Results**

| a) Message 12 addressed to the EUT                                             |                                                                                                                             |         |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                    | Result                                                                                                                      | Verdict |
| A Message 12 is sent, addressed to the EUT.<br>The EUT has an MMSI = 512000001 | The Message 12 sent is:<br>!AIVDM,1,1,,A,<;UnTqir4P04D5CDP=C7Pij0,0*48                                                      | -       |
| The EUT displays Message 12                                                    | The safety message is displayed on the screen, detailing the source MMSI, the time of transmission and the message contents | Pass    |

| b) Message 12 not addressed to the EUT                                     |                                                                         |         |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------|---------|
| Requirement                                                                | Result                                                                  | Verdict |
| A Message 12, not addressed to the EUT, is transmitted                     | The Message 12 sent is:<br>!AIVDO,1,1,,A,<;UnTqjkrv;2'D5CDP=C7Pij0,0*2F | -       |
| The EUT does not display the Message 12, as it is not addressed to the EUT | The EUT does not display Message 12 when it is not addressed to it      | Pass    |

| c) Message 14 is sent to the EUT                         |                                                                         |         |
|----------------------------------------------------------|-------------------------------------------------------------------------|---------|
| Requirement                                              | Result                                                                  | Verdict |
| A Message 14 is broadcast to the EUT                     | The Message 14 sent is:<br>!AIVDM,1,1,,A,>>M4eT04U>1<59@,2*42           | -       |
| The Message 14 is displayed on the screen of the handset | The Message 14 is displayed on the screen, and the contents are correct | Pass    |

| d) Active AIS-SART                                                                         |                                                                                                                                    |         |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                | Result                                                                                                                             | Verdict |
| A Message 1 with a NavStatus set to 14 is transmitted                                      | The Message 1 sent uses the same MMSI as the previously transmitted Message 14:<br>!AIVDM,1,1,,A,1>M4eT02P:wrFu2M6O>02gvd0000,0*70 | -       |
| The EUT displays the AIS-SART position report Message 1, with at least the ID and position | The location, range, bearing and ID of the Message 1 are displayed on the EUT                                                      | Pass    |



| e) Test mode AIS-SART present; display of test mode AIS-SART devices disabled by configuration |                                                                                                                                      |         |
|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                    | Result                                                                                                                               | Verdict |
| Displaying AIS-SART targets under test is disabled using the MKD                               | The 'MOB test mode' function is turned off under the Configuration / Systems / AIS menu                                              | -       |
| A Message 1 with NavStatus 15 is transmitted from an AIS-SART under test target                | The Message 1 is sent with an MMSI of 970010005 and navigational status of 15 is:<br>!AIVDM,1,1,,A,1>M4eUO000wrKSPM76B02gvN0000,0*01 | -       |
| The AIS-SART target shall not be displayed on the MKD                                          | No alert is raised, and no target is displayed on the MKD via the map screen or target directory                                     | Pass    |

| e) Test mode AIS-SART present; display of test mode AIS-SART devices enabled by configuration |                                                                                                                                                      |         |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                   | Result                                                                                                                                               | Verdict |
| The display of AIS-SART targets under test is enabled by configuration                        | The 'MOB test mode' function is enabled under the Configuration / Systems / AIS menu                                                                 | -       |
| A Message 1 with NavStatus 15 is transmitted from an AIS-SART under test target               | The Message 1 is sent with an MMSI of 970010006 and navigational status of 15 is:<br>!AIVDM,1,1,,A,1>M4eUg000wrKSPM6jh02gwf0000,0*77                 | -       |
| The AIS-SART target shall be displayed on the MKD                                             | An audible alert is sounded, and a visible alert is raised, stating a MOB device has been detected. The target can be seen on the map plotter screen | Pass    |

| f) VHF antenna is removed                                            |                                                                                           |         |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------|
| Requirement                                                          | Result                                                                                    | Verdict |
| The VHF antenna is disabled                                          | The VHF antenna is disconnected from the EUT                                              | -       |
| The EUT displays the alarm status and that the error indicator is on | The alarm with ID 002 is raised and the error indicator displayed on the EUT is turned on | Pass    |



### Static data input – Clause 10.8.3

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode.

- Enter all static data except MMSI.
- Enter an MMSI outside the valid range.
- Enter an MMSI according to the manufacturer's initialisation procedure.
- Enter a new MMSI.
- Enter all other static data.

#### **Required Results**

Verify that:

- the static data is correctly stored according to the manufacturer's initialisation procedure;
- the unit does not accept the MMSI;
- the unit accepts the MMSI as entered by the user;
- the unit does not accept the MMSI as entered by the user;
- static data can be changed.

#### **Test Results**

| a) Enter all static data except MMSI.                                                         |                                                                                                                                             |         |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                   |                                                                                                                                             | Verdict |
| The static data is set to factory settings; removing all values previously defined            | After sending a proprietary command, the result of NMEA query "\$AIAIQ,SSD" is:<br>\$AISSD,@@@@@,@@@@@@@@@@@@@@@@@<br>@@@@@,0,0,0,0,0,AI*34 | -       |
| An MMSI outside the valid range is entered into the EUT                                       | Using the user interface, all parameters except MMSI are defined:<br>Name: TUV TEST<br>Callsign: 1409041<br>Vessel Type: Tug (52)           | -       |
| The static data is stored correctly, according to the manufacturer's initialisation procedure | Static data has been stored according to "\$AIAIQ,SSD"<br>NMEA sentence:<br>\$AISSD,1409041,TUV TEST,35,5,3,7,0,AI*1B                       | Pass    |

| b) Enter an MMSI outside of the valid range            |                                                                                                                                                  |         |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                            |                                                                                                                                                  | Verdict |
| An MMSI with less than 9 digits is entered via the MKD | The MMSI entered is 12345; the MMSI is not accepted and the user is prompted with an error informing them the MMSI must be 9 digits long         | Pass    |
| An AIS-SART MMSI is entered via the MKD                | The MMSI entered is 970999000; the MMSI is not accepted and the user is prompted with an error informing them the MMSI is out of the valid range | Pass    |
| A MOB-AIS MMSI is entered via the MKD                  | The MMSI entered is 972015000; the MMSI is not accepted and the user is prompted with an error informing them the MMSI is out of the valid range | Pass    |
| An EPIRB-AIS MMSI is entered via the MKD               | The MMSI entered is 974015000; the MMSI is not accepted and the user is prompted with an error informing them the MMSI is out of the valid range | Pass    |
| An MMSI outside the valid range is entered via the MKD | The MMSI entered is 150000000; the MMSI is not accepted and the user is prompted with an error informing them the MMSI is out of the valid range | Pass    |

| c) Enter an MMSI within the valid range                                                |                                                                                                                                            |         |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                            |                                                                                                                                            | Verdict |
| A valid MMSI is entered via the MKD with a value in the range of 200000000 – 799999999 | The MMSI provided to the unit is 512000001                                                                                                 | -       |
| The EUT shall accept a valid MMSI                                                      | A prompt is provided for the user to confirm their MMSI. When accepted, the EUT sets the MMSI to the value entered and begins transmitting | Pass    |



| c) Enter an MMSI within the valid range                                                |                                                                                                                                            |         |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                            |                                                                                                                                            | Verdict |
| A valid MMSI is entered via the MKD with a value in the range of 982000000 - 987999999 | After removing the previous MMSI using a proprietary command, the EUT is given an MMSI of 982600123                                        | -       |
| The EUT shall accept the valid MMSI                                                    | A prompt is provided for the user to confirm their MMSI. When accepted, the EUT sets its MMSI to the value entered and begins transmitting | Pass    |

| d) Enter a new, valid MMSI                   |                                                                                          |         |
|----------------------------------------------|------------------------------------------------------------------------------------------|---------|
| Requirement                                  |                                                                                          | Verdict |
| Enter a new MMSI that is valid using the MKD | The MMSI of the EUT is visible via the MKD, however the field cannot be changed once set | Pass    |

| e) Enter new values for static data fields |                                                                                                                               |         |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                |                                                                                                                               | Verdict |
| Enter new values for the static data       | The static data is updated as such:<br>Name = TUV SUD. Callsign = 2010102<br>Dimensions: A=20, B=20, C=5, D=5                 | -       |
| The values for static data can be updated  | The static data values are updated, as shown in the results of the SSD sentence:<br>\$AISSD,2010102,TUV SUD,20,20,5,5,0,AI*71 | Pass    |



## 2.8 TDMA synchronisation

### 2.8.1 Specification Reference

IEC 62287-2, Clause 12.1

### 2.8.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: 103 – See section 1.3 for modification states

### 2.8.3 Date of Test

24-January-2019

### 2.8.4 Test Results and Methods of Measurement

Synchronisation test using UTC direct and indirect – Clause 12.1.1

#### **Method of Measurement**

Set up standard test environment; choose test conditions in a way that the EUT operates in the following synchronisation modes:

- a) UTC direct;
- b) UTC indirect (internal synchronisation source disabled; at least one other station UTC direct synchronised);
- c) BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range);
- d) UTC indirect (internal GNSS receiver disabled; only Class B SO station UTC direct synchronised).

Check all CommState parameters in position report. Check reporting interval.

#### **Required Results**

Confirm that:

- a) the SynchState = 0,
- b) the SynchState = 1,
- c) the SynchState = 1,
- d) the SynchState = 1,

#### **Test Results**

| a) UTC direct                                                                                               |         |
|-------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                 | Verdict |
| EUT is synchronised with internal UTC source.                                                               | Pass    |
| SynchState parameter in the CommState of Message 18 is 0:<br>!AIVDM,1,1,,B,B7'B00@0I?vUg@WAlp6wwi1h<01,0*08 | Pass    |



| a) UTC direct; Message 18 decode               |                       |
|------------------------------------------------|-----------------------|
| !AIVDM,1,1,,B,B7`B00@0I?vUg@WAIp6wwi1h<01,0*08 |                       |
| Parameter                                      | Decoded Value         |
| Message ID                                     | 18                    |
| Repeat Indicator                               | 0                     |
| MMSI                                           | 512000001             |
| Reserved                                       | 0                     |
| SOG                                            | 10                    |
| Position Accuracy                              | 1 - high (> 10 m)     |
| Longitude                                      | 1 13.9423 W           |
| Latitude                                       | 50 52.7902 N          |
| COG                                            | 11.1                  |
| True Heading                                   | 511 - not available   |
| Time Stamp                                     | 34                    |
| Spare                                          | 0                     |
| Class B unit flag                              | 0                     |
| Class B display flag                           | 0                     |
| Class B DSC flag                               | 1                     |
| Class B band flag                              | 1                     |
| Class B Message 22 flag                        | 1                     |
| Mode flag                                      | 0                     |
| RAIM Flag                                      | 0 - RAIM not in use   |
| Comm State Flag                                | 0 - SOTDMA            |
| Communication State - Sync State               | 0                     |
| Communication State - SOTDMA Slot Timeout      | 3                     |
| Communication State - SOTDMA Sub Message       | Received Stations = 1 |

| b) UTC indirect (internal synchronisation source disabled; at least one other station UTC direct synchronised) |         |
|----------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                    | Verdict |
| EUT internal UTC source disabled by disconnecting GPS antenna.                                                 | -       |
| SynchState parameter in the CommState of Message 18 is 1:<br>!AIVDM,1,1,,A,B7`B00@0I?vUg@WAIp6wwRQhh3C,0*75    | Pass    |

| b) UTC indirect; Message 18 decode             |                     |
|------------------------------------------------|---------------------|
| !AIVDM,1,1,,A,B7`B00@0I?vUg@WAIp6wwRQhh3C,0*75 |                     |
| Parameter                                      | Decoded Value       |
| Message ID                                     | 18                  |
| Repeat Indicator                               | 0                   |
| MMSI                                           | 512000001           |
| Reserved                                       | 0                   |
| SOG                                            | 10                  |
| Position Accuracy                              | 1 - high (> 10 m)   |
| Longitude                                      | 1 13.9423 W         |
| Latitude                                       | 50 52.7902 N        |
| COG                                            | 11.1                |
| True Heading                                   | 511 - not available |
| Time Stamp                                     | 5                   |
| Spare                                          | 0                   |
| Class B unit flag                              | 0                   |
| Class B display flag                           | 0                   |
| Class B DSC flag                               | 1                   |
| Class B band flag                              | 1                   |
| Class B Message 22 flag                        | 1                   |
| Mode flag                                      | 0                   |
| RAIM Flag                                      | 0 - RAIM not in use |
| Comm State Flag                                | 0 - SOTDMA          |
| Communication State - Sync State               | 1                   |
| Communication State - SOTDMA Slot Timeout      | 4                   |
| Communication State - SOTDMA Sub Message       | Slot Number = 211   |



| c) BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range);                                                                                           |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                   | Verdict |
| EUT internal UTC source disabled by disconnecting GPS antenna.                                                                                                                                |         |
| SynchState parameter in the CommState of Message 18 is 1:<br>!AIVDM,1,1,,B,B7'B00@0I?vUg@WAlp6wwkQhUJL,0*04                                                                                   |         |
| Comments                                                                                                                                                                                      |         |
| The specification is incorrect, a base station with UTC direct synchronisation will not result in the EUT's sync state in base direct = 2. The correct synch state value is UTC indirect = 1. |         |

| c) UTC indirect; Message 18 decode             |                             |
|------------------------------------------------|-----------------------------|
| !AIVDM,1,1,,B,B7'B00@0I?vUg@WAlp6wwkQhUJL,0*04 |                             |
| Parameter                                      | Decoded Value               |
| Message ID                                     | 18                          |
| Repeat Indicator                               | 0                           |
| MMSI                                           | 512000001                   |
| Reserved                                       | 0                           |
| SOG                                            | 10                          |
| Position Accuracy                              | 1 - high (> 10 m)           |
| Longitude                                      | 1 13.9423 W                 |
| Latitude                                       | 50 52.7902 N                |
| COG                                            | 11.1                        |
| True Heading                                   | 511 - not available         |
| Time Stamp                                     | 39                          |
| Spare                                          | 0                           |
| Class B unit flag                              | 0                           |
| Class B display flag                           | 0                           |
| Class B DSC flag                               | 1                           |
| Class B band flag                              | 1                           |
| Class B Message 22 flag                        | 1                           |
| Mode flag                                      | 0                           |
| RAIM Flag                                      | 0 - RAIM not in use         |
| Comm State Flag                                | 0 - SOTDMA                  |
| Communication State - Sync State               | 1                           |
| Communication State - SOTDMA Slot Timeout      | 1                           |
| Communication State - SOTDMA Sub Message       | UTC Hour and Minute = 11:39 |



| d) UTC indirect (internal GNSS receiver disabled; only Class B SO station UTC direct synchronised).          |         |
|--------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                  | Verdict |
| EUT internal UTC source disabled by disconnecting GPS antenna.                                               | -       |
| SynchState parameter in the CommState of Message 18 is 1:<br>!AIVDM,1,1,,A,B7`B00@0I?vUg@WAlIp6wwrQhhOa,0*0B | Pass    |

| d) UTC indirect; Message 18 decode              |                     |
|-------------------------------------------------|---------------------|
| !AIVDM,1,1,,A,B7`B00@0I?vUg@WAlIp6wwrQhhOa,0*0B |                     |
| Parameter                                       | Decoded Value       |
| Message ID                                      | 18                  |
| Repeat Indicator                                | 0                   |
| MMSI                                            | 512000001           |
| Reserved                                        | 0                   |
| SOG                                             | 10                  |
| Position Accuracy                               | 1 - high (> 10 m)   |
| Longitude                                       | 1 13.9423 W         |
| Latitude                                        | 50 52.7902 N        |
| COG                                             | 11.1                |
| True Heading                                    | 511 - not available |
| Time Stamp                                      | 53                  |
| Spare                                           | 0                   |
| Class B unit flag                               | 0                   |
| Class B display flag                            | 0                   |
| Class B DSC flag                                | 1                   |
| Class B band flag                               | 1                   |
| Class B Message 22 flag                         | 1                   |
| Mode flag                                       | 0                   |
| RAIM Flag                                       | 0 - RAIM not in use |
| Comm State Flag                                 | 0 - SOTDMA          |
| Communication State - Sync State                | 1                   |
| Communication State - SOTDMA Slot Timeout       | 4                   |
| Communication State - SOTDMA Sub Message        | Slot Number = 2025  |



### Synchronisation test without UTC, EUT receiving semaphore – Clause 12.1.2

#### **Method of Measurement**

Set up standard test environment; choose test conditions such that the EUT operates with other units acting as follows.

- The EUT is receiving a mobile station that is acting as semaphore with no Base Stations being received.
- Introduce a Base Station that is acting as a semaphore with different timing.
- Enable internal synchronisation source.

Check all CommState parameters in position report. Check reporting interval.

#### **Required Results**

Confirm that:

- transmitted SynchState = 3,
- the EUT shall change synchronisation source to the Base Station, and
- synchronisation mode shall revert to UTC direct, SynchState = 0.

#### **Test Results**

| a) Mobile acting as a semaphore with no base stations                                                       |         |
|-------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                 | Verdict |
| SynchState parameter in the CommState of Message 18 is 3:<br>!AIVDM,1,1,,A,B7'B00@0I?vUg@WAlp6www1kP01,0*7B | Pass    |

| a) Message 18 decode                           |                     |
|------------------------------------------------|---------------------|
| !AIVDM,1,1,,A,B7'B00@0I?vUg@WAlp6www1kP01,0*7B |                     |
| Parameter                                      | Decoded Value       |
| Message ID                                     | 18                  |
| Repeat Indicator                               | 0                   |
| MMSI                                           | 512000001           |
| Reserved                                       | 0                   |
| SOG                                            | 10                  |
| Position Accuracy                              | 1 - high (> 10 m)   |
| Longitude                                      | 1 13.9423 W         |
| Latitude                                       | 50 52.7902 N        |
| COG                                            | 11.1                |
| True Heading                                   | 511 - not available |
| Time Stamp                                     | 60                  |
| Spare                                          | 0                   |
| Class B unit flag                              | 0                   |
| Class B display flag                           | 0                   |
| Class B DSC flag                               | 1                   |
| Class B band flag                              | 1                   |
| Class B Message 22 flag                        | 1                   |
| Mode flag                                      | 0                   |
| RAIM Flag                                      | 0 - RAIM not in use |
| Comm State Flag                                | 1 - ITDMA           |
| Communication State - Sync State               | 3                   |
| Communication State - ITDMA Slot Increment     | 0                   |
| Communication State - ITDMA Number of Slots    | 0 - 0 = 1 slot      |
| Communication State - ITDMA Keep Flag          | 1                   |

| b) base station acting as a semaphore                                                                                             |         |
|-----------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                       | Verdict |
| The EUT synchronises to the base station.                                                                                         | Pass    |
| SynchState parameter in the CommState of Message 18 is base station direct = 2:<br>!AIVDM,1,1,,B,B7'B00@0I?vUg@WAlp6www1i8L5,0*6A | Pass    |



| b) Message 18 decode                             |                     |
|--------------------------------------------------|---------------------|
| !AIVDM,1,1,,B,B7'B00@0I?vUg@WAlIp6wwwv1i8L5,0*6A |                     |
| Parameter                                        | Decoded Value       |
| Message ID                                       | 18                  |
| Repeat Indicator                                 | 0                   |
| MMSI                                             | 512000001           |
| Reserved                                         | 0                   |
| SOG                                              | 10                  |
| Position Accuracy                                | 1 - high (> 10 m)   |
| Longitude                                        | 1 13.9423 W         |
| Latitude                                         | 50 52.7902 N        |
| COG                                              | 11.1                |
| True Heading                                     | 511 - not available |
| Time Stamp                                       | 60                  |
| Spare                                            | 0                   |
| Class B unit flag                                | 0                   |
| Class B display flag                             | 0                   |
| Class B DSC flag                                 | 1                   |
| Class B band flag                                | 1                   |
| Class B Message 22 flag                          | 1                   |
| Mode flag                                        | 0                   |
| RAIM Flag                                        | 0 - RAIM not in use |
| Comm State Flag                                  | 0 - SOTDMA          |
| Communication State - Sync State                 | 2                   |
| Communication State - SOTDMA Slot Timeout        | 2                   |
| Communication State - SOTDMA Sub Message         | Slot Number = 1797  |

| c) GNSS re-connected to EUT                                                                                  |         |
|--------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                  | Verdict |
| SynchState parameter in the CommState of Message 18 is 0:<br>!AIVDM,1,1,,B,B7'B00@0I?vUg@WAlIp6wwwQh0Qu,0*5D | Pass    |

| c) Message 18 decode                            |                     |
|-------------------------------------------------|---------------------|
| !AIVDM,1,1,,B,B7'B00@0I?vUg@WAlIp6wwwQh0Qu,0*5D |                     |
| Parameter                                       | Decoded Value       |
| Message ID                                      | 18                  |
| Repeat Indicator                                | 0                   |
| MMSI                                            | 512000001           |
| Reserved                                        | 0                   |
| SOG                                             | 10                  |
| Position Accuracy                               | 1 - high (> 10 m)   |
| Longitude                                       | 1 13.9423 W         |
| Latitude                                        | 50 52.7902 N        |
| COG                                             | 11.1                |
| True Heading                                    | 511 - not available |
| Time Stamp                                      | 59                  |
| Spare                                           | 0                   |
| Class B unit flag                               | 0                   |
| Class B display flag                            | 0                   |
| Class B DSC flag                                | 1                   |
| Class B band flag                               | 1                   |
| Class B Message 22 flag                         | 1                   |
| Mode flag                                       | 0                   |
| RAIM Flag                                       | 0 - RAIM not in use |
| Comm State Flag                                 | 0 - SOTDMA          |
| Communication State - Sync State                | 0                   |
| Communication State - SOTDMA Slot Timeout       | 0                   |
| Communication State - SOTDMA Sub Message        | Slot Offset = 2173  |



## 2.9 Time division (frame format)

### 2.9.1 Specification Reference

IEC 62287-2, Clause 12.2

### 2.9.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: 103 – See section 1.3 for modification states

### 2.9.3 Date of Test

24-January-2019

### 2.9.4 Test Results and Methods of Measurement

#### **Method of Measurement**

Set the EUT to maximum reporting interval of 5 s by applying a speed of > 23 kn. Record VDL Messages and check for used slots. Check parameter slot number in CommState of position report. Check slot length (transmission time).

#### **Required Results**

Slot number used and slot number indicated in CommState shall match. Slot number shall not exceed 2249. Slot length shall not exceed 26,67 ms.

#### **Test Results**

| Requirement                                                           | Verdict |
|-----------------------------------------------------------------------|---------|
| Reporting of Message 18 rate is 5 s.                                  | Pass    |
| The slot number in the CommState matches the transmitted slot number. | Pass    |
| Slot number does not exceed 2249.                                     | Pass    |
| Slot length does not exceed 26.67 ms.                                 | Pass    |

| Message 18 decode, slot number = 0759          |                     |
|------------------------------------------------|---------------------|
| !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwaQh8;o,0*55 |                     |
| Parameter                                      | Decoded Value       |
| Message ID                                     | 18                  |
| Repeat Indicator                               | 0                   |
| MMSI                                           | 512000001           |
| Reserved                                       | 0                   |
| SOG                                            | 25                  |
| Position Accuracy                              | 1 - high (> 10 m)   |
| Longitude                                      | 1 13.9423 W         |
| Latitude                                       | 50 52.7902 N        |
| COG                                            | 11.1                |
| True Heading                                   | 511 - not available |
| Time Stamp                                     | 19                  |
| Spare                                          | 0                   |
| Class B unit flag                              | 0                   |
| Class B display flag                           | 0                   |
| Class B DSC flag                               | 1                   |
| Class B band flag                              | 1                   |
| Class B Message 22 flag                        | 1                   |
| Mode flag                                      | 0                   |
| RAIM Flag                                      | 0 - RAIM not in use |
| Comm State Flag                                | 0 - SOTDMA          |
| Communication State - Sync State               | 0                   |
| Communication State - SOTDMA Slot Timeout      | 2                   |
| Communication State - SOTDMA Sub Message       | Slot Number = 759   |



## 2.10 Synchronisation jitter

### 2.10.1 Specification Reference

IEC 62287-2, Clause 12.3

### 2.10.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: 103 – See section 1.3 for modification states

### 2.10.3 Date of Test

24-January-2019

### 2.10.4 Test Results and Methods of Measurement

#### *Method of Measurement*

Set up standard test environment. Set the EUT to 5 s reporting interval using

- a) UTC direct synchronisation, and
- b) UTC indirect synchronisation by disconnecting the synchronisation source of the EUT.

Record VDL Messages and measure the time between the nominal beginning of the slot (Nominal T0) and the start flag and calculate it back to T0.

#### *Required Results*

The synchronisation jitter shall not exceed

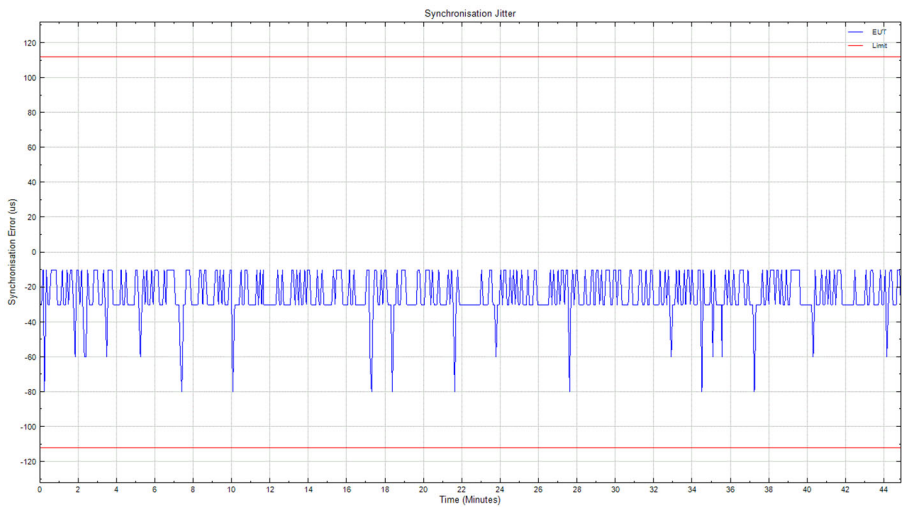
- a)  $\pm 104 \mu\text{s}$  using UTC direct synchronisation, and
- b)  $\pm 312 \mu\text{s}$  using UTC indirect synchronisation.

#### *Test Results*

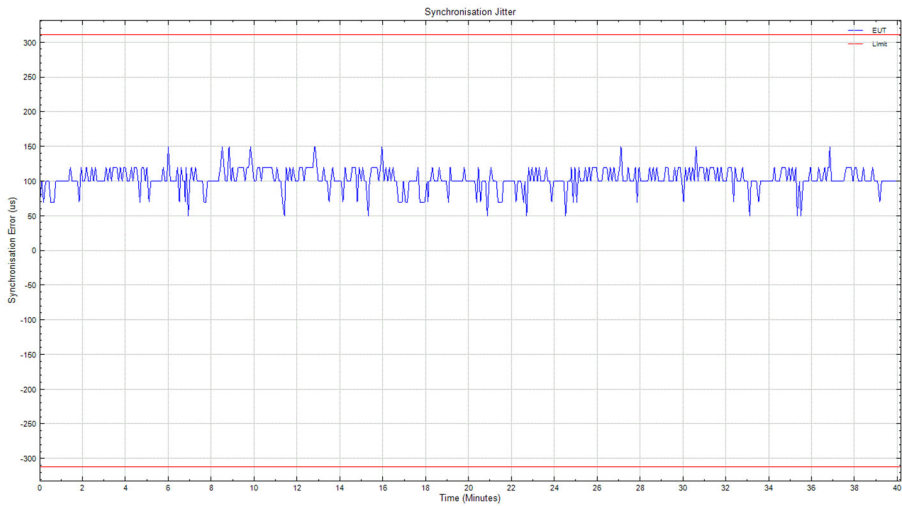
| UTC Direct                                                      |         |
|-----------------------------------------------------------------|---------|
| Requirement                                                     | Verdict |
| Confirm that the jitter does not exceed $\pm 104 \mu\text{s}$ . | Pass    |

| UTC Indirect                                                    |         |
|-----------------------------------------------------------------|---------|
| Requirement                                                     | Verdict |
| Confirm that the jitter does not exceed $\pm 312 \mu\text{s}$ . |         |



Synchronisation Jitter – UTC Direct



Synchronisation Jitter – UTC Indirect



## 2.11 Data encoding (bit stuffing)

### 2.11.1 Specification Reference

IEC 62287-2, Clause 12.4

### 2.11.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: 003 – See section 1.3 for modification states

### 2.11.3 Date of Test

21-January-2019

### 2.11.4 Test Results and Methods of Measurement

#### **Method of Measurement**

Set up standard test environment.

Set ship's name to HEX-Values "7E 3B 3C 3E 7E" so that bit stuffing will be applied and check the VDL (note that this might require that the manufacturer provides means to input this data).

#### **Required Results**

Confirm that transmitted VDL Messages 24A and 24B conform to data input.

#### **Test Results**

| Requirement                                                                                                                                                             | Verdict |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| The manufacturer provided a proprietary sentence to set the ship's name to " #,<O'8"                                                                                    | -       |
| Confirm that the correct Messages 24A and 24B is output by the PI:<br>!AIVDM,1,1,,A,H7`B3LQv>khvOP0000000000000,2*45<br>!AIVDM,1,1,,A,H7`B3LTUFC@D01WJ=1ijk000000<,0*40 | Pass    |

| Message 24A decode                             |               |
|------------------------------------------------|---------------|
| !AIVDM,1,1,,A,H7`B3LQv>khvOP0000000000000,2*45 |               |
| Parameter                                      | Decoded Value |
| Message ID                                     | 24            |
| Repeat Indicator                               | 0             |
| MMSI                                           | 234567898     |
| Part Number                                    | 0             |
| Name                                           | #,<O'8        |

| Message 24B decode                              |               |
|-------------------------------------------------|---------------|
| !AIVDM,1,1,,A,H7`B3LTUFC@D01WJ=1ijk000000<,0*40 |               |
| Parameter                                       | Decoded Value |
| Message ID                                      | 24            |
| Repeat Indicator                                | 0             |
| MMSI                                            | 512000882     |
| Part Number                                     | 1             |
| Type of ship and cargo type                     | 37            |
| Vendor ID                                       | VSPT@A'       |
| Call Sign                                       | ZMA123@       |
| Dimension of ship/reference for position        | 0,0,0,0       |
| Spare                                           | 12            |



## 2.12 Frame check sequence

### 2.12.1 Specification Reference

IEC 62287-2, Clause 12.5

### 2.12.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: 103 – See section 1.3 for modification states

### 2.12.3 Date of Test

24-January-2019

### 2.12.4 Test Results and Methods of Measurement

#### **Method of Measurement**

Apply simulated position report Messages with wrong CRC bit sequence to the VDL.

- a) Check test output; if a display interface is provided, check this.
- b) Repeat test 12.1.2 and check that a station transmitting Messages with wrong CRC is not used for synchronisation.

#### **Required Results**

Confirm that Messages with invalid CRC are not accepted by the EUT in cases a) and b) of 12.5.2.

#### **Test Results**

| a) Message reception with invalid CRC                                                                                             |         |
|-----------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                       | Verdict |
| Message 1 with valid CRC is received by the EUT and a VDM is output to the PI:<br>!AIVDM,1,1,,A,13LC9e@2P:wrFc0M6;d02gv:0000,0*72 | -       |
| Message 1 with invalid CRC is not accepted by the EUT and a VDM is not output to the PI.                                          | Pass    |

| b) Synchronisation                                                                                              |         |
|-----------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                     | Verdict |
| EUT without GNSS synchronises to a station transmitting message 1 with a valid CRC and continues transmissions. | -       |
| EUT ceases to transmit when receiving message 1 with an invalid CRC.                                            | Pass    |



## 2.13 Slot allocation (channel access protocols)

### 2.13.1 Specification Reference

IEC 62287-2, Clause 12.6

### 2.13.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: 103– See section 1.3 for modification states

### 2.13.3 Date of Test

31-January-2019

### 2.13.4 Test Results and Methods of Measurement

Network entry – Clause 12.6.1

#### **Method of Measurement**

Set up standard test environment; switch on EUT. Record transmitted scheduled position reports for the first 3 min of transmission after initialisation period. Check CommState for channel access mode.

#### **Required Results**

EUT shall start autonomous transmissions of Message 18 (position report) with ITDMA CommState with KeepFlag set true for first minute of transmission and Message 18 with SOTDMA CommState thereafter.

#### **Test Results**

| SOG = 25 kn, Rr = 5 s                                                                                        |         |
|--------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                  | Verdict |
| Verify that the first message is Message 18.                                                                 | Pass    |
| Check that the keep flag is set in Message 18 for the first minute.                                          | Pass    |
| Confirm that ITDMA CommState flag is set in Message 18 for the first minute.                                 | Pass    |
| Confirm that the ITDMA Message 18 is transmitted in the allocated slots in the next frame.                   | Pass    |
| Confirm that SOTDMA CommState is used in the Message 18 following one minute.                                | Pass    |
| Verify that the initial slot timeout of the SOTDMA Message 18 is between 3 and 7.                            | Pass    |
| Confirm that the slot timeout values are decreased by one in the next frame the SOTDMA Message 18 transmits. | Pass    |



| Time     | Slot | Chan | Msg | Sentence                                        | Comm State Flag | Keep Flag | Slot Timeout |
|----------|------|------|-----|-------------------------------------------------|-----------------|-----------|--------------|
| 09:33:46 | 1758 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwnQj1JQ,0*1E | 1               | 1         | -            |
| 09:33:50 | 1881 | A    | 24  | !AIVDM,1,1,,A,H7`B00AAEJ0<h5=>0:1@E=B0EE@,2*15  | -               | -         | -            |
| 09:33:51 | 1927 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwq1j1S1,0*1B | 1               | 1         | -            |
| 09:33:56 | 2119 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwsQj1T1,0*7D | 1               | 1         | -            |
| 09:34:01 | 72   | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwP1j1Oi,0*7E | 1               | 1         | -            |
| 09:34:07 | 268  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwS1j1H1,0*21 | 1               | 1         | -            |
| 09:34:12 | 454  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwUQj1MQ,0*21 | 1               | 1         | -            |
| 09:34:16 | 619  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwWQj1T1,0*59 | 1               | 1         | -            |
| 09:34:22 | 827  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwbQj1K1,0*70 | 1               | 1         | -            |
| 09:34:27 | 1018 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6ww1j1Mi,0*4A  | 1               | 1         | -            |
| 09:34:30 | 1138 | A    | 24  | !AIVDM,1,1,,A,H7`B00DNFC@D0003Cijklm00123<,0*55 | -               | -         | -            |
| 09:34:31 | 1190 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwg1j1Q1,0*0F | 1               | 1         | -            |
| 09:34:37 | 1392 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwj1j001,0*61 | 1               | 1         | -            |
| 09:34:42 | 1577 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwlQj001,0*04 | 1               | 1         | -            |
| 09:34:46 | 1758 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwnQh8KN,0*0B | 0               | -         | 2            |
| 09:34:51 | 1927 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwq1h@N7,0*73 | 0               | -         | 4            |
| 09:34:56 | 2119 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwsQh@Q7,0*0D | 0               | -         | 4            |
| 09:35:01 | 72   | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwP1hH18,0*2A | 0               | -         | 6            |
| 09:35:07 | 268  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwS1h@4<,0*23 | 0               | -         | 4            |
| 09:35:12 | 454  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwUQh@76,0*4F | 0               | -         | 4            |
| 09:35:16 | 619  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwWQhD00,0*4B | 0               | -         | 5            |
| 09:35:22 | 827  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwbQhH<s,0*3E | 0               | -         | 6            |
| 09:35:27 | 1018 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6ww1h@?,0*50   | 0               | -         | 4            |
| 09:35:31 | 1190 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwgQh@BV,0*68 | 0               | -         | 4            |
| 09:35:37 | 1392 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwjQh8Eh,0*27 | 0               | -         | 2            |
| 09:35:42 | 1577 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwlQh8Ha,0*26 | 0               | -         | 2            |
| 09:35:46 | 1758 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6ww1h5<:,0*64  | 0               | -         | 1            |
| 09:35:51 | 1927 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwqQh<00,0*16 | 0               | -         | 3            |
| 09:35:56 | 2119 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwt1h<00,0*70 | 0               | -         | 3            |
| 09:36:01 | 72   | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwPQhD00,0*4F | 0               | -         | 5            |
| 09:36:07 | 268  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwSQh<00,0*37 | 0               | -         | 3            |
| 09:36:12 | 454  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwUQh<00,0*32 | 0               | -         | 3            |
| 09:36:16 | 619  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6ww`1h@9c,0*42 | 0               | -         | 4            |
| 09:36:22 | 827  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwbQhD00,0*7D | 0               | -         | 5            |
| 09:36:27 | 1018 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6ww1h<00,0*61  | 0               | -         | 3            |
| 09:36:31 | 1190 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwgQh<00,0*00 | 0               | -         | 3            |
| 09:36:37 | 1392 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0vgvUg@WAlIp6wwj1h5:@,0*1D | 0               | -         | 1            |
| 09:36:42 | 1577 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlIp6wwlQh5:@,0*78 | 0               | -         | 1            |



### Autonomous scheduled transmissions (SOTDMA) – Clause 12.6.2

#### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode.

- a) Record transmitted scheduled position reports Message 18 and check frame structure. Check CommState of transmitted messages for channel access mode and parameters number of received stations, slot timeout, slot number and slot offset.
- b) Repeat the test with 50 % channel loading ensuring there are at least 4 free slots in each SI.

#### **Required Results**

Check that the following is achieved:

- a) nominal reporting interval is achieved  $\pm 20\%$  (allocating slots in selection interval SI). Confirm that the EUT allocates new slots NTS within SI after 3 min to 8 min. Check that slot offset indicated in CommState matches slots used for transmission. Check that Class B "CS" are not included in the number of received stations. Check that during DSC monitoring periods there are no time out values of "0";
- b) only free slots are used for transmission.

#### **Test Results**

| <b>a) No VDL Load, SOG = 25 kn</b>                                                                           |         |
|--------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                  | Verdict |
| Confirm that position reports are transmitted every 5 seconds.                                               | Pass    |
| Confirm that each position report slot interval is $187.5 \pm 20\%$ . Min = 158, Max = 219 over 12 frames    | Pass    |
| Confirm that each position report is transmitted on alternate channels.                                      | Pass    |
| Channel access mode is SOTDMA                                                                                | Pass    |
| Verify that the initial slot timeout is between 3 and 7.                                                     | Pass    |
| Verify that for timeout values 3, 5 and 7, the sub message contains the number of received stations.         | Pass    |
| Verify that for timeout values 2, 4 and 6, the sub message contains the current slot number.                 | Pass    |
| Verify that for timeout value 1, the sub message contains UTC hour and minute.                               | Pass    |
| Verify that for timeout value 0, the sub message contains the next slot offset.                              | Pass    |
| Confirm that after slot time-out is zero, the value indicated by slot offset is used in the following frame. | Pass    |
| Check that Class B "CS" are not included in the number of received stations.                                 | Pass    |

| <b>b) 50 % Load on Channel A with Message 18</b>  |         |
|---------------------------------------------------|---------|
| Requirement                                       | Verdict |
| Position reports are transmitted every 5 seconds. |         |
| Only free slots used for transmission.            | Pass    |



### Autonomous scheduled transmissions (ITDMA) – Clause 12.6.3

#### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode. Set speed to less than 2 knots giving a reporting interval of 3 min. Record transmitted scheduled position reports.

#### **Required Results**

Check that EUT transmits Message 18 with ITDMA CommState and allocates slots using ITDMA and that slot offset indicated in CommState matches slots used for transmission.

Check that nominal reporting interval is achieved  $\pm 20\%$ .

#### **Test Results**

| Requirement                                                                                                                                                                   | Verdict |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| EUT transmits Message 18 using ITDMA                                                                                                                                          | Pass    |
| Reporting rate of Message 18 is 3 min                                                                                                                                         | Pass    |
| Slot offset is correct for the next transmitted slot                                                                                                                          | Pass    |
| Slot interval is $6750 \pm 20\%$ , giving a minimum = 5400 and maximum = 8100. The minimum recorded slot interval = 6440 and the maximum slot interval = 7083 over 25 frames. | Pass    |

| Time     | Slot | Chan | Sentence                                       | Slot Offset | Next Slot | Slot Diff | Report Interval (s) | Slot Gap |
|----------|------|------|------------------------------------------------|-------------|-----------|-----------|---------------------|----------|
| 15:59:05 | 188  | A    | !AIVDM,1,1,,A,B7`B00@00?vUg@WAlp6wwR1jCl:,0*46 | 4964        | 2094      | 188       | 185.0               | 6938     |
| 16:01:56 | 2128 | B    | !AIVDM,1,1,,B,B7`B00@00?vUg@WAlp6wwt1jEqr,0*15 | 5607        | 177       | -310      | 171.7               | 6440     |
| 16:04:55 | 2094 | A    | !AIVDM,1,1,,A,B7`B00@00?vUg@WAlp6wws1jEg:,0*4F | 5564        | 100       | -34       | 179.1               | 6716     |
| 16:08:04 | 177  | B    | !AIVDM,1,1,,B,B7`B00@00?vUg@WAlp6wwQjDAs:,0*29 | 5188        | 57        | 333       | 188.9               | 7083     |
| 16:11:02 | 100  | A    | !AIVDM,1,1,,A,B7`B00@00?vUg@WAlp6wwQ1jDFJ,0*3D | 5209        | 1         | -77       | 177.9               | 6673     |
| 16:14:01 | 57   | B    | !AIVDM,1,1,,B,B7`B00@00?vUg@WAlp6wwPQjDSr,0*72 | 5263        | 12        | -43       | 178.9               | 6707     |
| 16:17:00 | 1    | A    | !AIVDM,1,1,,A,B7`B00@00?vUg@WAlp6wwuQjDhr,0*6F | 5315        | 8         | -56       | 178.5               | 6694     |
| 16:20:00 | 12   | B    | !AIVDM,1,1,,B,B7`B00@00?vUg@WAlp6wwuQjE6r,0*33 | 5403        | 107       | 11        | 180.3               | 6761     |
| 16:23:00 | 8    | A    | !AIVDM,1,1,,A,B7`B00@00?vUg@WAlp6wwuQjDDJ,0*7B | 5201        | 2151      | -4        | 179.9               | 6746     |



#### Transmission of Messages 24A and 24B (ITDMA) – Clause 12.6.4

##### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode. Record transmitted messages.

##### **Required Results**

Confirm that EUT transmits Messages 24A and 24B using the ITDMA access scheme. The SOTDMA CommState of Messages 18 shall, as far as possible, be changed to ITDMA CommState to allocate slots for Messages 24A and 24B.

##### **Test Results**

| SOG > 25, Rr = 5 s                                                             |         |
|--------------------------------------------------------------------------------|---------|
| Requirement                                                                    | Verdict |
| EUT transmits Message 24A and 24B using ITDMA                                  | Pass    |
| Reporting rate between Message 24A is 6 min                                    | Pass    |
| EUT transmits Message 18 using SOTDMA                                          | Pass    |
| EUT transmits Message 18 using ITDMA to allocate slots for Message 24A and 24B | Pass    |

| ITDMA Message 18 allocating slots for Messages 24A |                     |
|----------------------------------------------------|---------------------|
| !AIVDM,1,1,,B,B7`B00@0vgvUg@WAlp6wwqQj3dA,0*3E     |                     |
| Parameter                                          | Decoded Value       |
| Message ID                                         | 18                  |
| Repeat Indicator                                   | 0                   |
| MMSI                                               | 512000001           |
| Reserved                                           | 0                   |
| SOG                                                | 25                  |
| Position Accuracy                                  | 1 - high (> 10 m)   |
| Longitude                                          | 1 13.9423 W         |
| Latitude                                           | 50 52.7903 N        |
| COG                                                | 11.1                |
| True Heading                                       | 511 – not available |
| Time Stamp                                         | 51                  |
| Spare                                              | 0                   |
| Class B unit flag                                  | 0                   |
| Class B display flag                               | 0                   |
| Class B DSC flag                                   | 1                   |
| Class B band flag                                  | 1                   |
| Class B Message 22 flag                            | 1                   |
| Mode flag                                          | 0                   |
| RAIM Flag                                          | 1 - RAIM in use     |
| Comm State Flag                                    | 1 - ITDMA           |
| Communication State - Sync State                   | 0                   |
| Communication State - ITDMA Slot Increment         | 945                 |
| Communication State - ITDMA Number of Slots        | 0 - 0 = 1 slot      |
| Communication State - ITDMA Keep Flag              | 1                   |

| ITDMA Message 24A decode                       |                      |
|------------------------------------------------|----------------------|
| !AIVDM,1,1,,B,H7`B00@<h5=<9<u@E=@00000000,2*52 |                      |
| Parameter                                      | Decoded Value        |
| Message ID                                     | 24                   |
| Repeat Indicator                               | 0                    |
| MMSI                                           | 512000001            |
| Part Number                                    | 0                    |
| Name                                           | CLASSBSOTEST@@@@@@@@ |



| ITDMA Message 18 allocating slots for Messages 24B |                     |
|----------------------------------------------------|---------------------|
| !AIVDM,1,1,,B,B3OdpnP00?vUg@WAlt000FQn0Ni,0*13     |                     |
| Parameter                                          | Decoded Value       |
| Message ID                                         | 18                  |
| Repeat Indicator                                   | 0                   |
| MMSI                                               | 512000001           |
| Reserved                                           | 0                   |
| SOG                                                | 0                   |
| Position Accuracy                                  | 1 - high (> 10 m)   |
| Longitude                                          | 1 13.9423 W         |
| Latitude                                           | 50 52.7903 N        |
| COG                                                | 0                   |
| True Heading                                       | 511 – not available |
| Time Stamp                                         | 21                  |
| Spare                                              | 0                   |
| Class B unit flag                                  | 0                   |
| Class B display flag                               | 0                   |
| Class B DSC flag                                   | 1                   |
| Class B band flag                                  | 1                   |
| Class B Message 22 flag                            | 1                   |
| Mode flag                                          | 0                   |
| RAIM Flag                                          | 1 - RAIM in use     |
| Comm State Flag                                    | 1 - ITDMA           |
| Communication State - Sync State                   | 0                   |
| Communication State - ITDMA Slot Increment         | 245                 |
| Communication State - ITDMA Number of Slots        | 0 - 0 = 1 slot      |
| Communication State - ITDMA Keep Flag              | 1                   |

| ITDMA Message 24B decode                        |               |
|-------------------------------------------------|---------------|
| !AIVDM,1,1,,B,H7`B00E8FC@D000ijklmno00000<,0*50 |               |
| Parameter                                       | Decoded Value |
| Message ID                                      | 24            |
| Repeat Indicator                                | 0             |
| MMSI                                            | 512000001     |
| Part Number                                     | 1             |
| Type of ship and cargo type                     | 72            |
| Vendor ID                                       | VSPT@@@       |
| Call Sign                                       | 1234567       |
| Dimension of ship/reference for position        | 0,0,0,0       |
| Spare                                           | 12            |



#### Assigned operation – Clause 12.6.5

##### Message 16 with slot assignment – Clause 12.6.5.1

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode (SOG < 2 kn).

- Transmit an assigned mode command Message 16 to the EUT with initial slot offset and increment.
- Increase speed to 25 kn while still assigned to a reporting interval of 10 s.
- Every 3 min, send further assignment Messages with the same slot assignment.
- Transmit an assigned mode command Message 16 with a non-base station MMSI to the EUT with initial slot offset and increment.
- Transmit an assigned mode command Message 16 to an MMSI different to the MMSI of the EUT with initial slot offset and increment.

Record transmitted Messages.

#### **Required Results**

Confirm that the following is achieved:

- the EUT transmits a Message 18 in the designated slots. Check that the assigned mode flag is set to 1;
- the EUT stays in assigned mode using the assigned slots;
- the EUT continues in assigned mode when it receives a further assignment commands by Message 16. Verify that the slot timeout value is updated for every received Message 16;
- the EUT ignores Message 16 and continues autonomous mode operation;
- the EUT ignores Message 16 and continues autonomous mode operation.

Confirm that the EUT reverts to autonomous mode with autonomous reporting interval 4 min to 8 min after the last Message 16.

#### **Test Results**

| a) Transmit an assigned mode command Message 16 to the EUT with initial slot offset and increment.                         |         |
|----------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                | Verdict |
| Message 16 transmitted to EUT with slot offset = 100 and increment = 2 in slot 343:<br>!AIVDO,1,1,,A,@027'SQr4P046@0P,0*37 | -       |
| EUT transmits Message 18 in slot 443:<br>!AIVDO,1,1,,A,B7'B00@02qvUg@WAllp6wwUQpH6s,0*5E                                   | Pass    |
| Assigned mode flag is set to 1.                                                                                            | Pass    |
| Assigned mode reporting interval = 10 seconds                                                                              | Pass    |



| a) Message 16 decode                |               |
|-------------------------------------|---------------|
| !AIVDO,1,1,,A,@027'SQR4P046@0P,0*37 |               |
| Parameter                           | Decoded Value |
| Message ID                          | 16            |
| Repeat indicator                    | 0             |
| Source ID                           | 2222222       |
| Spare                               | 0             |
| Destination ID A                    | 512000001     |
| Offset A                            | 100           |
| Increment A                         | 2             |
| Destination ID B                    | 0             |
| Offset B                            | 0             |
| Increment B                         | 0             |
| Spare                               | 0 Bits        |

| a) Message 18 decode                           |                     |
|------------------------------------------------|---------------------|
| !AIVDM,1,1,,A,B7'B00@02gvUg@WAlp6wwUQpH6s,0*5C |                     |
| Parameter                                      | Decoded Value       |
| Message ID                                     | 18                  |
| Repeat Indicator                               | 0                   |
| MMSI                                           | 512000001           |
| Reserved                                       | 0                   |
| SOG                                            | 1                   |
| Position Accuracy                              | 1 - high (> 10 m)   |
| Longitude                                      | 1 13.9423 W         |
| Latitude                                       | 50 52.7902 N        |
| COG                                            | 11.1                |
| True Heading                                   | 511 - not available |
| Time Stamp                                     | 11                  |
| Spare                                          | 0                   |
| Class B unit flag                              | 0                   |
| Class B display flag                           | 0                   |
| Class B DSC flag                               | 1                   |
| Class B band flag                              | 1                   |
| Class B Message 22 flag                        | 1                   |
| Mode flag                                      | 1                   |
| RAIM Flag                                      | 0 - RAIM not in use |
| Comm State Flag                                | 0 - SOTDMA          |
| Communication State - Sync State               | 0                   |
| Communication State - SOTDMA Slot Timeout      | 6                   |
| Communication State - SOTDMA Sub Message       | Slot Number = 443   |

| b) Increase speed to 25 knots                                                |         |
|------------------------------------------------------------------------------|---------|
| Requirement                                                                  | Verdict |
| The EUT stays in the assigned slots and does not increase the reporting rate | Pass    |

| c) Every 3 min, send further assignment Messages                                                                           |         |
|----------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                | Verdict |
| EUT currently in assigned mode, with slot timeout currently = 3:<br>!AIVDM,1,1,,B,B7'B00@0vgvUg@WAlp6wwPQp<01,0*2E         | -       |
| Message 16 transmitted to EUT with slot offset = 100 and increment = 2 in slot 343:<br>!AIVDO,1,1,,A,@027'SQR4P046@0P,0*37 | Pass    |
| EUT updates timeout value to new value = 7:<br>!AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwUQpL01,0*58                              | Pass    |

| d) Non base station MMSI                                                                                                                            |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                         | Verdict |
| Message 4 and 16 transmitted to EUT with MMSI = 22222222:<br>!AIVDO,1,1,,A,43CsGSQv=bdAjOrFc0M6jh100000,0*60<br>!AIVDO,1,1,,A,@3CsGSQR4P046@0P,0*26 | -       |
| EUT ignores assigned mode message and continues in autonomous mode                                                                                  | Pass    |

| e) Different MMSI                                                                                        |         |
|----------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                              | Verdict |
| Message 16 transmitted to EUT with incorrect EUT MMSI = 234567898:<br>!AIVDO,1,1,,A,@027'SPos>=6@0P,0*5B | -       |
| EUT ignores assigned mode message and continues in autonomous mode                                       | Pass    |



### Message 16 with rate assignment – Clause 12.6.5.2

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode (SOG < 2 kn).

- Transmit an assigned mode command Message 16 to the EUT with a designated reporting interval of 5 s.
- Transmit an assigned mode command Message 16 to the EUT with the assigned reporting interval of 10 s.
- Increase speed to 25 kn while still assigned to a reporting interval of 10 s.
- Every 3 min, send further assignment Messages with a reporting interval of 10 s.
- Transmit an assigned mode command Message 16 to the EUT with a non-base station MMSI.

Record transmitted Messages.

#### **Required Results**

Confirm that the following is achieved:

- the EUT transmits with the designated reporting interval of 5 s. Check that the assigned mode flag is set to 1;
- the reporting interval is 10 s;
- the EUT stays in assigned mode with a reporting interval of 10 s;
- the EUT continues in assigned mode when it receives a further assignment commands by Message 16. Verify that the slot timeout value in the CommState is not updated by the received Message 16;
- confirm that the EUT ignores Message 16 and continues autonomous mode operation.

Confirm that the EUT reverts to autonomous mode with autonomous reporting interval 4 min to 8 min after the last Message 16.

#### **Test Results**

| a) Designated reporting interval of 5 s                                                                      |         |
|--------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                  | Verdict |
| Message 16 transmitted to EUT with number of reports / 10 mins = 120<br>!AIVDO,1,1,,A,,@027'SQR4P047P00,0*46 | -       |
| EUT enters assigned mode and sets mode flag = 1:<br>!AIVDM,1,1,,B,B7'B00@02gvUg@WAlp6wwd1r1N1,0*4F           | Pass    |
| Reporting interval changes to 5 seconds                                                                      | Pass    |
| EUT returns to autonomous mode after 4 to 8 minutes                                                          | Pass    |

| b) Designated reporting interval of 10 s                                                             |         |
|------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                          | Verdict |
| Message 16 sent to EUT with number of reports / 10 mins = 60<br>!AIVDO,1,1,,A,,@027'SQR4P043h00,0*7A | -       |
| Reporting interval changes to 10 seconds                                                             | Pass    |
| EUT returns to autonomous mode after 4 to 8 minutes                                                  | Pass    |

| c) Change speed to 25 knots                                                                                                     |         |
|---------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                     | Verdict |
| Reporting interval remains at 10 seconds.                                                                                       | Pass    |
| The EUT stays in the assigned slots and does not increase the reporting rate:<br>!AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwUQp86i,0*72 | Pass    |

| d) Further assigned mode commands – Slot timeout value = 1 before message 16 is received                |         |
|---------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                             | Verdict |
| Message 16 received by EUT with number of reports / 10 mins = 60<br>!AIVDM,1,1,,A,,@027'SPos>=3h00,0*14 | -       |
| EUT remains in assigned mode and the slot offset is unaffected by further assigned mode commands:       | Pass    |



| d) Further assigned mode commands – Slot timeout value = 1 before message 16 is received |         |
|------------------------------------------------------------------------------------------|---------|
| Requirement                                                                              | Verdict |
| !AIVDM,1,1,,A,B7'B00@0!?vUg@WAlp6wwh1p0S3,0*7F                                           |         |

| e) Non base station MMSI                                   |         |
|------------------------------------------------------------|---------|
| Requirement                                                | Verdict |
| Message 4 and 16 transmitted to EUT with MMSI = 222222222: |         |
| !AIVDO,1,1,,A,43CsGSQv=bdAjOrFc0M6jh100000,0*60            | -       |
| !AIVDO,1,1,,A,@027'SQr4P043h00,0*7A                        |         |
| EUT ignores the message and remains in autonomous mode     | Pass    |



Assigned mode using invalid reporting rates – Clause 12.6.5.3

**Method of Measurement**

Operate standard test environment and EUT in autonomous mode. Transmit an assigned mode command Message 16 using a base station MMSI to the EUT with

- a) the number of reports per 10 min which is not a multiple of 20, and
- b) the number of reports per 10 min which is higher than 120.

**Required Results**

Confirm that:

- a) the EUT transmits position reports Message 18 at a reporting rate that corresponds to the next highest multiple of 20 reports per 10 min, and
- b) the EUT transmits position reports Message 18 at a reporting interval of 5 s.

**Test Results**

| a) Not a multiple of 20                                                                                    |         |
|------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                | Verdict |
| Message 16 transmitted to EUT with number of reports / 10 mins = 24<br>!AIVDO,1,1,,A,@027`SQR4P041P00,0*40 | -       |
| EUT transmits at the next multiple of 20, 40 = reporting interval = 15 seconds                             | Pass    |

| b) Greater than 120                                                                                         |         |
|-------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                 | Verdict |
| Message 16 transmitted to EUT with number of reports / 10 mins = 200<br>!AIVDO,1,1,,A,@027`SPos>=`<P00,0*21 | -       |
| EUT transmits with a reporting interval = 5 seconds                                                         | Pass    |



#### Slot assignment to FATDMA reserved slots – Clause 12.6.5.4

#### **Method of Measurement**

Set up the standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (Message 20) using a base station MMSI to the EUT with slot offset and increment. Transmit an Assigned Mode Command (Message 16) using a base station MMSI to the EUT and command it to use one or more of those FATDMA allocated slots. Record transmitted messages.

#### **Required Results**

Confirm that the EUT uses the slots commanded by Message 16 for own transmissions.

#### **Test Results**

| Requirement                                                                                                                                                                                             | Verdict |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Message 20 received by EUT reserving slots ending in 0-4 over the entire frame<br>!AIVDO,1,1,,A,D020jOP0EN0',0*4C                                                                                       | -       |
| The EUT correctly times out the slots reserved by the previous transmission schedule that occupy a slot reserved by Message 20, while maintaining a transmission interval of 5 seconds, as shown below. | -       |
| Message 16 received by EUT on slot 5, with an offset of 8 and reporting interval of 125 slots:<br>!AIVDO,1,1,,A,@020jOQr4P040P10,0*51                                                                   | -       |
| The EUT uses slots previously reserved by the base station for its own transmissions.                                                                                                                   | Pass    |

| Test Results |      |      |                                                |         |                                         |
|--------------|------|------|------------------------------------------------|---------|-----------------------------------------|
| Time         | Slot | Chan | Sentence                                       | Timeout | Comment                                 |
| 12:34:39     | 1482 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwkQh@G:,0*19 | 4       | EUT operates in autonomous mode         |
| 12:34:44     | 1670 | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwn1h@J6,0*7E | 4       |                                         |
| 12:34:49     | 1852 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwpQh5b8,0*50 | 1       |                                         |
| 12:34:54     | 2043 | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wws1h5b8,0*30 | 1       |                                         |
| 12:34:59     | 2219 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwu1h5b8,0*35 | 1       |                                         |
| 12:34:59     | 5    | A    | !AIVDO,1,1,,A,D020jOP0EN0',0*4C                |         | Msg 20 reserves slots ending in 0-4     |
| 12:35:04     | 173  | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwR1h0Rf,0*7A | 0       | EUT times out reserved slot             |
| 12:35:08     | 331  | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwT1h0SA,0*59 | 0       |                                         |
| 12:35:14     | 531  | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwVQh0Rs,0*0B | 0       |                                         |
| 12:35:19     | 736  | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwaQh5b<,0*45 | 1       | Slot is not reserved as it ends in 5-9. |
| 12:35:23     | 899  | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwcQhD01,0*6A | 5       |                                         |
| 12:35:29     | 1092 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwf1h5b<,0*22 | 1       |                                         |
| 12:35:34     | 1294 | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwi1h0Rq,0*56 | 0       |                                         |
| 12:35:39     | 1482 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwkQh<01,0*19 | 3       |                                         |
| 12:35:44     | 1670 | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwn1h0Rj,0*4A | 0       |                                         |
| 12:35:49     | 1852 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwpQh0S>,0*62 | 0       |                                         |
| 12:35:54     | 2043 | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wws1h0S=,0*01 | 0       |                                         |
| 12:35:59     | 2219 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwu1h0SM,0*74 | 0       | EUT finishes timing out slots           |
| 12:36:03     | 145  | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwQQh<01,0*20 | 3       | EUT only uses slots ending in 5-9       |
| 12:36:09     | 338  | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwT1h<01,0*46 | 3       |                                         |
| 12:36:13     | 516  | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwVQh<01,0*27 | 3       |                                         |
| 12:36:19     | 736  | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwaQh0Re,0*29 | 0       |                                         |
| 12:36:23     | 899  | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwcQh@>3,0*62 | 4       |                                         |
| 12:36:29     | 1092 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwf1h0S?,0*15 | 0       |                                         |
| 12:36:34     | 1277 | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwhQhHCu,0*5A | 6       |                                         |
| 12:36:39     | 1482 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwk1h8G:,0*01 | 2       |                                         |
| 12:36:43     | 1646 | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwmQh@lf,0*4E | 4       |                                         |
| 12:36:49     | 1856 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwp1hHM0,0*6A | 6       |                                         |
| 12:36:54     | 2046 | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwrQh<01,0*03 | 3       |                                         |
| 12:36:59     | 2238 | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwuQhD01,0*7F | 5       |                                         |
| 12:37:03     | 145  | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwQQh82A,0*56 | 2       |                                         |
| 12:37:09     | 338  | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwT1h85B,0*34 | 2       |                                         |
| 12:37:13     | 516  | A    | !AIVDM,1,1,,A,B7'B00@1;?vUg@WAlp6wwVQh884,0*2E | 2       |                                         |
| 12:37:18     | 707  | B    | !AIVDM,1,1,,B,B7'B00@1;?vUg@WAlp6wwa1hD01,0*0B | 5       |                                         |



| Test Results                                                                                 |      |      |                                                 |         |                                                     |
|----------------------------------------------------------------------------------------------|------|------|-------------------------------------------------|---------|-----------------------------------------------------|
| Time                                                                                         | Slot | Chan | Sentence                                        | Timeout | Comment                                             |
| 12:37:23                                                                                     | 899  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwcQj3KA,0*14 | 0       |                                                     |
| 12:37:29                                                                                     | 1097 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwf1h<01,0*74 | 3       |                                                     |
| 12:37:34                                                                                     | 1277 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwhQhD01,0*61 | 5       |                                                     |
| 12:37:39                                                                                     | 1482 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwk1h5bD,0*57 | 1       |                                                     |
| 12:37:43                                                                                     | 1646 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwmQh<01,0*1C | 3       |                                                     |
| 12:37:47                                                                                     | 1776 | A    | !AIVDM,1,1,,A,H7`B00@<h5=<9<u@E=@00000000,2*51  |         |                                                     |
| 12:37:49                                                                                     | 1856 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwp1hD01,0*1A | 5       |                                                     |
| 12:37:54                                                                                     | 2046 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwrQj0D1,0*79 | 0       |                                                     |
| 12:37:56                                                                                     | 2126 | A    | !AIVDM,1,1,,A,H7`B00E8FC@D000ijklmno00000<,0*53 |         |                                                     |
| 12:37:59                                                                                     | 2238 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwu1h@Rv,0*3E | 4       |                                                     |
| 12:37:59                                                                                     | 10   | A    | !AIVDO,1,1,,A,@020jOQr4P040P10,0*51             |         | Msg 16, offset = 8,<br>increment = 125              |
| 12:38:00                                                                                     | 18   | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwuQp@0B,0*13 | 4       | EUT operates in assigned<br>mode                    |
| 12:38:03                                                                                     | 143  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwQQp@2?,0*4B | 4       | EUT uses base station<br>reserved slots             |
| 12:38:03                                                                                     | 145  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwQQp000,0*35 | 0       | EUT begins timing out<br>slots                      |
| 12:38:07                                                                                     | 268  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwS1p@4<,0*2F | 4       |                                                     |
| 12:38:09                                                                                     | 338  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwT1p000,0*53 | 0       |                                                     |
| 12:38:10                                                                                     | 393  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwTQp@69,0*4C | 4       |                                                     |
| 12:38:13                                                                                     | 516  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwV1p000,0*52 | 0       |                                                     |
| 12:38:13                                                                                     | 518  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwVQp@86,0*4C | 4       |                                                     |
| 12:38:17                                                                                     | 643  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6ww`1p@:3,0*1E | 4       |                                                     |
| 12:38:18                                                                                     | 707  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwa1p000,0*66 | 0       |                                                     |
| 12:38:20                                                                                     | 768  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwaQp@<0,0*79 | 4       |                                                     |
| 12:38:23                                                                                     | 893  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwcQp@=u,0*3C | 4       |                                                     |
| 12:38:23                                                                                     | 899  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwcQp000,0*07 | 0       |                                                     |
| 12:38:27                                                                                     | 1018 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwe1p@?r,0*5C | 4       |                                                     |
| 12:38:29                                                                                     | 1097 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwf1p000,0*61 | 0       |                                                     |
| 12:38:30                                                                                     | 1143 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwfQp@Ao,0*5F | 4       |                                                     |
| 12:38:33                                                                                     | 1268 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwhQp@Cl,0*53 | 4       |                                                     |
| 12:38:34                                                                                     | 1277 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwhQp000,0*0C | 0       |                                                     |
| 12:38:37                                                                                     | 1393 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwj1p@Ei,0*31 | 4       |                                                     |
| 12:38:39                                                                                     | 1482 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwk1p000,0*6C | 0       |                                                     |
| 12:38:40                                                                                     | 1518 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwkQp@Gf,0*5E | 4       |                                                     |
| 12:38:43                                                                                     | 1643 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwm1p@lc,0*30 | 4       |                                                     |
| 12:38:43                                                                                     | 1646 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwmQp000,0*09 | 0       |                                                     |
| 12:38:47                                                                                     | 1768 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwp1p@K',0*30 | 4       |                                                     |
| 12:38:49                                                                                     | 1856 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwp1p000,0*77 | 0       |                                                     |
| 12:38:50                                                                                     | 1893 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwpQp@MU,0*7F | 4       |                                                     |
| 12:38:53                                                                                     | 2018 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwr1p@OR,0*1B | 4       |                                                     |
| 12:38:54                                                                                     | 2046 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwrQp000,0*16 | 0       |                                                     |
| 12:38:57                                                                                     | 2143 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwt1p@QO,0*1D | 4       |                                                     |
| 12:38:59                                                                                     | 2238 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwu1p000,0*72 | 0       | EUT finishes timing out<br>slots                    |
| 12:39:00                                                                                     | 18   | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwuQp<01,0*1C | 3       |                                                     |
| 12:39:03                                                                                     | 143  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwQ1p<01,0*5B | 3       |                                                     |
| 12:39:07                                                                                     | 268  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwS1p<01,0*5A | 3       |                                                     |
| 12:39:10                                                                                     | 393  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwTQp<01,0*3E | 3       |                                                     |
| EUT operates in assigned mode for 00:03:47. These results have been omitted from this table. |      |      |                                                 |         |                                                     |
| 12:42:57                                                                                     | 2143 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwt1h000,0*6B | 0       |                                                     |
| 12:43:00                                                                                     | 14   | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwuQj001,0*0A | 0       |                                                     |
| 12:43:05                                                                                     | 206  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwR1j001,0*4E | 0       |                                                     |
| 12:43:10                                                                                     | 387  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwTQhD01,0*5D | 5       | EUT reverts to<br>autonomous mode                   |
| 12:43:15                                                                                     | 590  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwW1h89>,0*47 | 2       | Slots previously reserved<br>by Msg 20 are now free |
| 12:43:20                                                                                     | 770  | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwaQh@<2,0*63 | 4       |                                                     |
| 12:43:25                                                                                     | 959  | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwd1j39i,0*2A | 0       |                                                     |
| 12:43:30                                                                                     | 1147 | A    | !AIVDM,1,1,,A,B7`B00@1;?vUg@WAlIp6wwfQh<01,0*17 | 3       |                                                     |
| 12:43:35                                                                                     | 1323 | B    | !AIVDM,1,1,,B,B7`B00@1;?vUg@WAlIp6wwi1h<01,0*7B | 3       |                                                     |



## Group assignment – Clause 12.6.6

### Entering interval assignment – Clause 12.6.6.1

#### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 15 s (SOG = 15 kn). Perform the following tests after time-out of the previous test.

- Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 30 s assigned.
- Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned.
- Using a non-base station MMSI, transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned.
- Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 2 s assigned.
- Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval field setting 9 (next shorter autonomous reporting interval).
- Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval field setting 10 (next longer autonomous reporting interval).

Monitor the VDL.

#### **Required Results**

Verify that:

- EUT enters assigned operation mode and transmits position report Message 18 with 30 s reporting interval. Verify that EUT builds up the assigned transmission scheduled according to the network entry procedure. Verify that unused slots of the previous reporting schedule are released. Verify that the EUT reverts to autonomous mode after a time out of 4 min to 8 min building up the autonomous transmission schedule according to the network entry procedure and releases unused slots from previous schedule;
- EUT enters assigned operation mode and transmits position report Message 18 with 5 s reporting interval. Verify that EUT builds up the assigned transmission scheduled according to network entry procedure. Verify that unused slots of the previous reporting schedule are released. Verify that the EUT reverts to autonomous mode after a time out of 4 min to 8 min building up the autonomous transmission schedule according to the network entry procedure and releases unused slots from the previous schedule;
- EUT does not react on Message 23;
- EUT does not react on Message 23;
- EUT enters assigned operation mode and transmits position report Message 18 with 5 s reporting interval;
- EUT enters assigned operation mode and transmits position report Message 18 with 30 s reporting interval.

#### **Test Results**

| a) 30 Second reporting interval                                            |                                                                                           |         |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------|
| Requirement                                                                | Result                                                                                    | Verdict |
| Message 23 with reporting interval 30 s received by EUT                    | !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<000000500,2*36                                            | -       |
| EUT transmits Message 18 with 30 s reporting interval                      | See table below                                                                           | Pass    |
| Network entry procedure used                                               | SOTDMA slot is kept and ITDMA is used to schedule new reporting interval, see table below | Pass    |
| EUT releases unused slot of old schedule, slot timeout and offset set to 0 | See table below                                                                           | Pass    |
| EUT reverts to a reporting interval of 15 s after 4 to 8 min               | See table below, after 7:57 the EUT changes schedule                                      | Pass    |



| a) 30 Second reporting interval                 |                                                          |         |
|-------------------------------------------------|----------------------------------------------------------|---------|
| Requirement                                     | Result                                                   | Verdict |
| Unused slots are released following 4 to 8 min: | One unused slot is released when the schedule is changed | Pass    |

| Time     | Msg | Chan | Slot | MMSI      | Mode     | Access | Slot Status | Difference |      | Rate |
|----------|-----|------|------|-----------|----------|--------|-------------|------------|------|------|
|          |     |      |      |           |          |        |             | Slot       | Time |      |
| 14:12:00 | 23  | A    | 10   | 2222222   | -        | -      | -           | -          | -    | -    |
| 14:12:00 | 18  | B    | 22   | 512000001 | Assigned | SOTDMA | Kept        | -          | -    | -    |
| 14:12:14 | 18  | A    | 540  | 512000001 | Assigned | SOTDMA | Released    | -          | -    | -    |
| 14:12:28 | 18  | A    | 1058 | 512000001 | Assigned | ITDMA  | New         | -          | -    | -    |
| 14:12:30 | 18  | B    | 1147 | 512000001 | Assigned | SOTDMA | Released    | -          | -    | -    |
| 14:12:44 | 18  | A    | 1670 | 512000001 | Assigned | SOTDMA | Released    | -          | -    | -    |
| 14:13:00 | 18  | B    | 22   | 512000001 | Assigned | SOTDMA | -           | -          | -    | -    |
| 14:13:28 | 18  | A    | 1058 | 512000001 | Assigned | SOTDMA | -           | 1036       | 27.6 | -    |
| 14:14:00 | 18  | B    | 22   | 512000001 | Assigned | SOTDMA | -           | 1214       | 32.4 | -    |
| 14:14:28 | 18  | A    | 1058 | 512000001 | Assigned | SOTDMA | -           | 1036       | 27.6 | -    |
| 14:15:00 | 18  | B    | 22   | 512000001 | Assigned | SOTDMA | -           | 1214       | 32.4 | -    |
| 14:15:28 | 18  | A    | 1058 | 512000001 | Assigned | SOTDMA | -           | 1036       | 27.6 | -    |
| 14:16:00 | 18  | B    | 22   | 512000001 | Assigned | SOTDMA | -           | 1214       | 32.4 | -    |
| 14:16:28 | 18  | A    | 1058 | 512000001 | Assigned | SOTDMA | -           | 1036       | 27.6 | -    |
| 14:17:00 | 18  | B    | 22   | 512000001 | Assigned | SOTDMA | -           | 1214       | 32.4 | -    |
| 14:17:28 | 18  | A    | 1058 | 512000001 | Assigned | SOTDMA | -           | 1036       | 27.6 | -    |
| 14:18:00 | 18  | B    | 22   | 512000001 | Assigned | SOTDMA | -           | 1214       | 32.4 | -    |
| 14:18:28 | 18  | A    | 1058 | 512000001 | Assigned | SOTDMA | -           | 1036       | 27.6 | -    |
| 14:19:00 | 18  | B    | 22   | 512000001 | Assigned | SOTDMA | -           | 1214       | 32.4 | -    |
| 14:19:28 | 18  | A    | 1058 | 512000001 | Assigned | SOTDMA | Re-assigned | 1036       | 27.6 | 29.8 |
| 14:19:57 | 18  | B    | 2163 | 512000001 | Auto     | ITDMA  | New         | -          | -    | -    |
| 14:20:12 | 18  | A    | 451  | 512000001 | Auto     | ITDMA  | -           | -          | -    | -    |
| 14:20:28 | 18  | A    | 1072 | 512000001 | Auto     | SOTDMA | Released    | -          | -    | -    |
| 14:20:28 | 18  | B    | 1081 | 512000001 | Auto     | ITDMA  | New         | -          | -    | -    |
| 14:20:41 | 18  | A    | 1551 | 512000001 | Auto     | ITDMA  | New         | -          | -    | -    |
| 14:20:57 | 18  | B    | 2163 | 512000001 | Auto     | SOTDMA | -           | 612        | 16.3 | -    |
| 14:21:12 | 18  | A    | 451  | 512000001 | Auto     | SOTDMA | -           | 538        | 14.3 | -    |
| 14:21:28 | 18  | B    | 1081 | 512000001 | Auto     | SOTDMA | -           | 630        | 16.8 | -    |
| 14:21:41 | 18  | A    | 1551 | 512000001 | Auto     | SOTDMA | -           | 470        | 12.5 | -    |
| 14:21:57 | 18  | B    | 2163 | 512000001 | Auto     | SOTDMA | -           | 612        | 16.3 | -    |
| 14:22:12 | 18  | A    | 451  | 512000001 | Auto     | SOTDMA | -           | 538        | 14.3 | 15.1 |

| b) 5 Second reporting interval                                             |                                                                                           |         |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------|
| Requirement                                                                | Result                                                                                    | Verdict |
| Message 23 with reporting interval 5 s received by EUT                     | !AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000800,2*3B                                            | -       |
| EUT transmits Message 18 with 5 s reporting interval                       | See table below                                                                           | Pass    |
| Network entry procedure used                                               | SOTDMA slot is kept and ITDMA is used to schedule new reporting interval, see table below | Pass    |
| EUT releases unused slot of old schedule, slot timeout and offset set to 0 | See table below                                                                           | Pass    |
| EUT reverts to a reporting interval of 15 s after 4 to 8 min               | See table below, after 7:30 the EUT changes schedule                                      | Pass    |
| Unused slots are released following 4 to 8 min:                            | 8 unused slots are released when the schedule is changed                                  | Pass    |

| Time     | Msg | Chan | Slot | MMSI      | Mode     | Access | Slot Status | Difference |      | Rate |
|----------|-----|------|------|-----------|----------|--------|-------------|------------|------|------|
|          |     |      |      |           |          |        |             | Slot       | Time |      |
| 14:22:21 | 23  | A    | 824  | 2222222   | -        | -      | -           | -          | -    | -    |
| 14:22:28 | 18  | B    | 1081 | 512000001 | Assigned | ITDMA  | -           | -          | -    | -    |
| 14:22:34 | 18  | A    | 1281 | 512000001 | Assigned | ITDMA  | -           | -          | -    | -    |
| 14:22:38 | 18  | B    | 1444 | 512000001 | Assigned | ITDMA  | -           | -          | -    | -    |
| 14:22:41 | 18  | A    | 1551 | 512000001 | Assigned | SOTDMA | Released    | -          | -    | -    |
| 14:22:43 | 18  | A    | 1646 | 512000001 | Assigned | ITDMA  | -           | -          | -    | -    |
| 14:22:48 | 18  | B    | 1828 | 512000001 | Assigned | ITDMA  | -           | -          | -    | -    |
| 14:22:53 | 18  | A    | 2024 | 512000001 | Assigned | ITDMA  | -           | -          | -    | -    |
| 14:22:57 | 18  | B    | 2163 | 512000001 | Assigned | SOTDMA | Released    | 139        | 3.7  | -    |
| 14:22:58 | 18  | B    | 2188 | 512000001 | Assigned | ITDMA  | -           | 25         | 0.7  | -    |
| 14:23:03 | 18  | A    | 146  | 512000001 | Assigned | ITDMA  | -           | 208        | 5.5  | -    |
| 14:23:09 | 18  | B    | 341  | 512000001 | Assigned | ITDMA  | -           | 195        | 5.2  | -    |



| Time     | Msg | Chan | Slot | MMSI      | Mode     | Access | Slot Status     | Difference |      | Rate |
|----------|-----|------|------|-----------|----------|--------|-----------------|------------|------|------|
|          |     |      |      |           |          |        |                 | Slot       | Time |      |
| 14:23:12 | 18  | A    | 451  | 512000001 | Assigned | SOTDMA | Released        | 110        | 2.9  | -    |
| 14:23:13 | 18  | A    | 520  | 512000001 | Assigned | ITDMA  | -               | 69         | 1.8  | -    |
| 14:23:18 | 18  | B    | 692  | 512000001 | Assigned | ITDMA  | -               | 172        | 4.6  | -    |
| 14:23:23 | 18  | A    | 874  | 512000001 | Assigned | ITDMA  | -               | 182        | 4.9  | -    |
| 14:23:28 | 18  | B    | 1081 | 512000001 | Assigned | SOTDMA | -               | 207        | 5.5  | -    |
| 14:23:34 | 18  | A    | 1281 | 512000001 | Assigned | ITDMA  | Schedule Msg 24 | 200        | 5.3  | -    |
| 14:23:38 | 18  | B    | 1444 | 512000001 | Assigned | SOTDMA | -               | 163        | 4.3  | -    |
| 14:23:43 | 18  | A    | 1646 | 512000001 | Assigned | SOTDMA | -               | 202        | 5.4  | -    |
| 14:23:48 | 18  | B    | 1828 | 512000001 | Assigned | SOTDMA | -               | 182        | 4.9  | -    |
| 14:23:54 | 18  | A    | 2024 | 512000001 | Assigned | SOTDMA | -               | 196        | 5.2  | -    |
| 14:23:58 | 18  | B    | 2188 | 512000001 | Assigned | SOTDMA | -               | 164        | 4.4  | -    |
| 14:24:03 | 18  | A    | 146  | 512000001 | Assigned | SOTDMA | -               | 208        | 5.5  | -    |
| 14:24:09 | 18  | B    | 341  | 512000001 | Assigned | SOTDMA | -               | 195        | 5.2  | -    |
| 14:24:13 | 18  | A    | 520  | 512000001 | Assigned | SOTDMA | -               | 179        | 4.8  | -    |
| 14:24:18 | 18  | B    | 692  | 512000001 | Assigned | SOTDMA | -               | 172        | 4.6  | -    |
| 14:24:23 | 18  | A    | 874  | 512000001 | Assigned | SOTDMA | -               | 182        | 4.9  | -    |
| 14:24:28 | 18  | B    | 1081 | 512000001 | Assigned | SOTDMA | -               | 207        | 5.5  | -    |
| 14:24:34 | 18  | A    | 1281 | 512000001 | Assigned | SOTDMA | -               | 200        | 5.3  | -    |
| 14:24:38 | 18  | B    | 1444 | 512000001 | Assigned | SOTDMA | -               | 163        | 4.3  | -    |
| 14:24:43 | 18  | A    | 1646 | 512000001 | Assigned | SOTDMA | -               | 202        | 5.4  | -    |
| 14:24:48 | 18  | B    | 1828 | 512000001 | Assigned | SOTDMA | -               | 182        | 4.9  | -    |
| 14:24:54 | 18  | A    | 2024 | 512000001 | Assigned | SOTDMA | -               | 196        | 5.2  | -    |
| 14:24:58 | 18  | B    | 2188 | 512000001 | Assigned | SOTDMA | -               | 164        | 4.4  | -    |
| 14:25:03 | 18  | A    | 146  | 512000001 | Assigned | SOTDMA | -               | 208        | 5.5  | -    |
| 14:25:09 | 18  | B    | 341  | 512000001 | Assigned | SOTDMA | -               | 195        | 5.2  | -    |
| 14:25:13 | 18  | A    | 520  | 512000001 | Assigned | SOTDMA | -               | 179        | 4.8  | -    |
| 14:25:18 | 18  | B    | 692  | 512000001 | Assigned | SOTDMA | -               | 172        | 4.6  | -    |
| 14:25:23 | 18  | A    | 874  | 512000001 | Assigned | SOTDMA | -               | 182        | 4.9  | -    |
| 14:25:28 | 18  | B    | 1081 | 512000001 | Assigned | SOTDMA | -               | 207        | 5.5  | -    |
| 14:25:34 | 18  | A    | 1281 | 512000001 | Assigned | SOTDMA | -               | 200        | 5.3  | -    |
| 14:25:38 | 18  | B    | 1444 | 512000001 | Assigned | SOTDMA | -               | 163        | 4.3  | -    |
| 14:25:43 | 18  | A    | 1646 | 512000001 | Assigned | SOTDMA | -               | 202        | 5.4  | -    |
| 14:25:48 | 18  | B    | 1828 | 512000001 | Assigned | SOTDMA | -               | 182        | 4.9  | -    |
| 14:25:53 | 18  | A    | 2024 | 512000001 | Assigned | SOTDMA | -               | 196        | 5.2  | -    |
| 14:25:58 | 18  | B    | 2188 | 512000001 | Assigned | SOTDMA | -               | 164        | 4.4  | -    |
| 14:26:03 | 18  | A    | 146  | 512000001 | Assigned | SOTDMA | -               | 208        | 5.5  | -    |
| 14:26:09 | 18  | B    | 341  | 512000001 | Assigned | SOTDMA | -               | 195        | 5.2  | -    |
| 14:26:13 | 18  | A    | 520  | 512000001 | Assigned | SOTDMA | -               | 179        | 4.8  | -    |
| 14:26:18 | 18  | B    | 692  | 512000001 | Assigned | SOTDMA | -               | 172        | 4.6  | -    |
| 14:26:23 | 18  | A    | 874  | 512000001 | Assigned | SOTDMA | -               | 182        | 4.9  | -    |
| 14:26:28 | 18  | B    | 1081 | 512000001 | Assigned | SOTDMA | -               | 207        | 5.5  | -    |
| 14:26:34 | 18  | A    | 1281 | 512000001 | Assigned | SOTDMA | -               | 200        | 5.3  | -    |
| 14:26:38 | 18  | B    | 1444 | 512000001 | Assigned | SOTDMA | -               | 163        | 4.3  | -    |
| 14:26:43 | 18  | A    | 1646 | 512000001 | Assigned | SOTDMA | -               | 202        | 5.4  | -    |
| 14:26:48 | 18  | B    | 1823 | 512000001 | Assigned | SOTDMA | -               | 177        | 4.7  | -    |
| 14:26:53 | 18  | A    | 2003 | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | -    |
| 14:26:58 | 18  | B    | 2205 | 512000001 | Assigned | SOTDMA | -               | 202        | 5.4  | -    |
| 14:27:03 | 18  | A    | 135  | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | -    |
| 14:27:09 | 18  | B    | 341  | 512000001 | Assigned | SOTDMA | -               | 206        | 5.5  | -    |
| 14:27:13 | 18  | A    | 520  | 512000001 | Assigned | SOTDMA | -               | 179        | 4.8  | -    |
| 14:27:18 | 18  | B    | 707  | 512000001 | Assigned | SOTDMA | -               | 187        | 5.0  | -    |
| 14:27:23 | 18  | A    | 874  | 512000001 | Assigned | SOTDMA | -               | 167        | 4.5  | -    |
| 14:27:28 | 18  | B    | 1070 | 512000001 | Assigned | SOTDMA | -               | 196        | 5.2  | -    |
| 14:27:34 | 18  | A    | 1281 | 512000001 | Assigned | SOTDMA | -               | 211        | 5.6  | -    |
| 14:27:39 | 18  | B    | 1463 | 512000001 | Assigned | SOTDMA | -               | 182        | 4.9  | -    |
| 14:27:43 | 18  | A    | 1646 | 512000001 | Assigned | SOTDMA | -               | 183        | 4.9  | -    |
| 14:27:48 | 18  | B    | 1823 | 512000001 | Assigned | SOTDMA | -               | 177        | 4.7  | -    |
| 14:27:53 | 18  | A    | 2003 | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | -    |
| 14:27:58 | 18  | B    | 2205 | 512000001 | Assigned | SOTDMA | -               | 202        | 5.4  | -    |
| 14:28:03 | 18  | A    | 135  | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | -    |
| 14:28:09 | 18  | B    | 341  | 512000001 | Assigned | SOTDMA | -               | 206        | 5.5  | -    |
| 14:28:13 | 18  | A    | 522  | 512000001 | Assigned | SOTDMA | -               | 181        | 4.8  | -    |
| 14:28:18 | 18  | B    | 707  | 512000001 | Assigned | SOTDMA | -               | 185        | 4.9  | -    |
| 14:28:23 | 18  | A    | 887  | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | -    |
| 14:28:28 | 18  | B    | 1070 | 512000001 | Assigned | SOTDMA | -               | 183        | 4.9  | -    |



| Time     | Msg | Chan | Slot | MMSI      | Mode     | Access | Slot Status     | Difference |      | Rate |
|----------|-----|------|------|-----------|----------|--------|-----------------|------------|------|------|
|          |     |      |      |           |          |        |                 | Slot       | Time |      |
| 14:28:34 | 18  | A    | 1281 | 512000001 | Assigned | SOTDMA | -               | 211        | 5.6  | -    |
| 14:28:39 | 18  | B    | 1463 | 512000001 | Assigned | SOTDMA | -               | 182        | 4.9  | -    |
| 14:28:43 | 18  | A    | 1646 | 512000001 | Assigned | SOTDMA | -               | 183        | 4.9  | -    |
| 14:28:48 | 18  | B    | 1823 | 512000001 | Assigned | SOTDMA | -               | 177        | 4.7  | -    |
| 14:28:53 | 18  | A    | 2003 | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | -    |
| 14:28:58 | 18  | B    | 2205 | 512000001 | Assigned | SOTDMA | -               | 202        | 5.4  | -    |
| 14:29:03 | 18  | A    | 135  | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | -    |
| 14:29:08 | 18  | B    | 335  | 512000001 | Assigned | ITDMA  | Schedule Msg 24 | 200        | 5.3  | -    |
| 14:29:13 | 18  | A    | 522  | 512000001 | Assigned | SOTDMA | -               | 187        | 5.0  | -    |
| 14:29:18 | 18  | B    | 707  | 512000001 | Assigned | SOTDMA | -               | 185        | 4.9  | -    |
| 14:29:23 | 18  | A    | 887  | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | -    |
| 14:29:28 | 18  | B    | 1070 | 512000001 | Assigned | SOTDMA | -               | 183        | 4.9  | -    |
| 14:29:33 | 18  | A    | 1268 | 512000001 | Assigned | SOTDMA | -               | 198        | 5.3  | -    |
| 14:29:39 | 18  | B    | 1463 | 512000001 | Assigned | SOTDMA | -               | 195        | 5.2  | -    |
| 14:29:43 | 18  | A    | 1646 | 512000001 | Assigned | SOTDMA | -               | 183        | 4.9  | -    |
| 14:29:48 | 18  | B    | 1823 | 512000001 | Assigned | SOTDMA | -               | 177        | 4.7  | -    |
| 14:29:53 | 18  | A    | 2003 | 512000001 | Assigned | SOTDMA | -               | 180        | 4.8  | 5.0  |
| 14:29:58 | 18  | B    | 2205 | 512000001 | Auto     | SOTDMA | Kept            | -          | -    | -    |
| 14:30:03 | 18  | A    | 135  | 512000001 | Auto     | SOTDMA | Released        | -          | -    | -    |
| 14:30:08 | 18  | B    | 335  | 512000001 | Auto     | SOTDMA | Released        | -          | -    | -    |
| 14:30:13 | 18  | A    | 522  | 512000001 | Auto     | SOTDMA | Kept            | -          | -    | -    |
| 14:30:18 | 18  | B    | 707  | 512000001 | Auto     | SOTDMA | Released        | -          | -    | -    |
| 14:30:23 | 18  | A    | 887  | 512000001 | Auto     | SOTDMA | Released        | -          | -    | -    |
| 14:30:28 | 18  | B    | 1070 | 512000001 | Auto     | ITDMA  | Kept            | -          | -    | -    |
| 14:30:33 | 18  | A    | 1268 | 512000001 | Auto     | SOTDMA | Released        | -          | -    | -    |
| 14:30:39 | 18  | B    | 1463 | 512000001 | Auto     | SOTDMA | Released        | -          | -    | -    |
| 14:30:44 | 18  | A    | 1655 | 512000001 | Auto     | ITDMA  | Kept            | -          | -    | -    |
| 14:30:48 | 18  | B    | 1823 | 512000001 | Auto     | SOTDMA | Released        | -          | -    | -    |
| 14:30:53 | 18  | A    | 2003 | 512000001 | Auto     | SOTDMA | Released        | -          | -    | -    |
| 14:30:58 | 18  | B    | 2205 | 512000001 | Auto     | SOTDMA | -               | -          | -    | -    |
| 14:31:13 | 18  | A    | 522  | 512000001 | Auto     | SOTDMA | -               | 567        | 15.1 | -    |
| 14:31:28 | 18  | B    | 1070 | 512000001 | Auto     | SOTDMA | -               | 548        | 14.6 | -    |
| 14:31:44 | 18  | A    | 1655 | 512000001 | Auto     | SOTDMA | -               | 585        | 15.6 | -    |
| 14:31:59 | 18  | B    | 2243 | 512000001 | Auto     | SOTDMA | -               | 588        | 15.7 | -    |
| 14:32:13 | 18  | A    | 522  | 512000001 | Auto     | SOTDMA | -               | 529        | 14.1 | -    |
| 14:32:28 | 18  | B    | 1070 | 512000001 | Auto     | SOTDMA | -               | 548        | 14.6 | -    |
| 14:32:44 | 18  | A    | 1655 | 512000001 | Auto     | SOTDMA | -               | 585        | 15.6 | -    |
| 14:32:59 | 18  | B    | 2243 | 512000001 | Auto     | SOTDMA | -               | 588        | 15.7 | -    |
| 14:33:13 | 18  | A    | 522  | 512000001 | Auto     | SOTDMA | -               | 529        | 14.1 | 15.0 |

| c) Non base station MMSI                                                                              |                                                                                                   |         |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                           | Result                                                                                            | Verdict |
| Message 4 and 23 with reporting interval 5 s received by EUT, with non base station MMSI of 123456789 | !AIVDO,1,1,,A,41mg=5Av=sb`UOrFu2M7AWi00000,0*04<br>!AIVDO,1,1,,A,G1mg=5CwJPsi7ub1m<000000800,2*1E | -       |
| EUT does not change it's reporting interval and mode flag remains equal to zero:                      | !AIVDM,1,1,,B,B3OdpnP0UWvUg@WAlIt6t081h89n,0*3C                                                   | Pass    |

| d) 2 Second reporting interval                                                  |                                                |         |
|---------------------------------------------------------------------------------|------------------------------------------------|---------|
| Requirement                                                                     | Result                                         | Verdict |
| Message 23 with reporting interval 2 s received by EUT                          | !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<000000;00,2*38 | -       |
| EUT does not change it's reporting interval and mode flag remains equal to zero | !AIVDM,1,1,,B,B7`B00@0I?vUg@WAlp6wwrQh5C@,0*78 | Pass    |

| e) Next shorter reporting interval                                                                                 |        |         |
|--------------------------------------------------------------------------------------------------------------------|--------|---------|
| Requirement                                                                                                        | Result | Verdict |
| Message 23 with next shorter reporting interval received by EUT:<br>!AIVDO,1,1,,A,G027`SSwJPsi7ub1m<000000900,2*3A | -      | -       |
| EUT changes to a 5 second reporting interval, see table below.                                                     |        | Pass    |

| Time     | Msg | Chan | Slot | MMSI      | Message                                        |
|----------|-----|------|------|-----------|------------------------------------------------|
| 10:43:26 | 23  | A    | 1003 | 2222222   | !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<000000900,2*3A |
| 10:43:38 | 18  | B    | 1453 | 512000001 | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwrQr1NQ,0*26 |



|          |    |   |      |           |                                                 |
|----------|----|---|------|-----------|-------------------------------------------------|
| 10:43:44 | 18 | A | 1651 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwwQr1LA,0*30  |
| 10:43:48 | 18 | B | 1831 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwwQr1Ki,0*1E  |
| 10:43:53 | 18 | A | 2020 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwr1r1KQ,0*58  |
| 10:43:54 | 18 | A | 2045 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wws1p000,0*40  |
| 10:43:58 | 18 | B | 2198 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwtQp<01,0*29  |
| 10:44:03 | 18 | A | 136  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwQ1r1J1,0*1A  |
| 10:44:08 | 18 | B | 329  | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwSQr1L1,0*7D  |
| 10:44:13 | 18 | A | 496  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwV1r1MQ,0*7A  |
| 10:44:18 | 18 | B | 697  | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6ww'Qr1P1,0*52  |
| 10:44:23 | 18 | A | 870  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwc1r1UA,0*47  |
| 10:44:25 | 18 | A | 971  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwd1p000,0*57  |
| 10:44:28 | 24 | B | 1063 | 512000001 | !AIVDM,1,1,,B,H7'B00@<h5=<9<u@E=@00000000,2*52  |
| 10:44:28 | 18 | B | 1081 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwQr001,0*36   |
| 10:44:34 | 18 | A | 1275 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwh1r001,0*58  |
| 10:44:34 | 24 | B | 1290 | 512000001 | !AIVDM,1,1,,B,H7'B00E6FC@D000ijkImno00000<,0*5E |
| 10:44:38 | 18 | B | 1453 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwjQp5Jh,0*1D  |
| 10:44:44 | 18 | A | 1651 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwwQp8lk,0*14  |
| 10:44:48 | 18 | B | 1831 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwwQpHLW,0*5C  |
| 10:44:53 | 18 | A | 2020 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwr1p8OT,0*52  |
| 10:44:58 | 18 | B | 2198 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwr1p8RF,0*59  |
| 10:45:03 | 18 | A | 136  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwQqH28,0*70   |
| 10:45:08 | 18 | B | 329  | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwT1p<01,0*69  |
| 10:45:13 | 18 | A | 496  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwVQpD01,0*70  |
| 10:45:18 | 18 | B | 697  | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwa1pD01,0*24  |
| 10:45:23 | 18 | A | 870  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwcQpH=V,0*23  |
| 10:45:28 | 18 | B | 1081 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwf1pH@q,0*1F  |
| 10:45:34 | 18 | A | 1275 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwhQp8Cs,0*03  |
| 10:45:38 | 18 | B | 1453 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwk1p0S@,0*48  |
| 10:45:44 | 18 | A | 1651 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwwQp5Jl,0*1D  |
| 10:45:48 | 18 | B | 1831 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwp1pD01,0*35  |
| 10:45:53 | 18 | A | 2020 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwrQp5Jl,0*02  |
| 10:45:58 | 18 | B | 2198 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwu1p5Jl,0*66  |
| 10:46:03 | 18 | A | 136  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwQqQpD01,0*77 |
| 10:46:08 | 18 | B | 329  | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwT1p859,0*60  |
| 10:46:13 | 18 | A | 496  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwVQp@7h,0*2A  |
| 10:46:18 | 18 | B | 697  | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwa1p@:q,0*6A  |
| 10:46:23 | 18 | A | 870  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwcQpD01,0*45  |
| 10:46:28 | 18 | B | 1081 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwf1pD01,0*23  |
| 10:46:34 | 18 | A | 1275 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwhQp5Jp,0*04  |
| 10:46:38 | 18 | B | 1459 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwk1p<01,0*56  |
| 10:46:44 | 18 | A | 1651 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwwQp0Rg,0*0B  |
| 10:46:48 | 18 | B | 1831 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwp1p@LW,0*2B  |

| f) Next longer reporting interval                                                                                 |         |
|-------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                       | Verdict |
| Message 23 with next longer reporting interval received by EUT:<br>!AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000:00,2*39 | -       |
| EUT changes to a 30 second reporting interval, see table below                                                    | Pass    |

| Time     | Msg | Chan | Slot | MMSI      | Message                                        |
|----------|-----|------|------|-----------|------------------------------------------------|
| 10:53:24 | 23  | A    | 939  | 2222222   | !AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000:00,2*39 |
| 10:53:33 | 18  | A    | 1246 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwh1p8CN,0*5E |
| 10:53:49 | 18  | B    | 1850 | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwp1p000,0*40 |
| 10:54:00 | 18  | B    | 22   | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwuQr8jQ,0*14 |
| 10:54:02 | 18  | A    | 101  | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwQ1p000,0*62 |
| 10:54:19 | 18  | B    | 724  | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwa1p000,0*51 |
| 10:54:33 | 18  | A    | 1246 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwh1p5KH,0*5D |
| 10:55:00 | 18  | B    | 22   | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwuQp<01,0*28 |
| 10:55:33 | 18  | A    | 1246 | 512000001 | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwh1p0Qn,0*64 |
| 10:56:00 | 18  | B    | 22   | 512000001 | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwuQr4:A,0*58 |



#### Assignment by region – Clause 12.6.6.2

##### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 15 s and use a base station MMSI to transmit Message 23.

- a) Transmit a Group Assignment command (Message 23) to the EUT (define station type 0 and geographic region so that the EUT is inside this region). Set the reporting rate to 5 s and apply message to VDL.
- b) Transmit a Group Assignment command (Message 23) to the EUT (define station type 0 and geographic region so that the EUT is outside this region). Set the reporting rate to 5 s and apply message to VDL.

##### **Required Results**

- a) EUT switches to assigned mode and transmits position reports with 5 s interval. Verify that EUT reverts to normal operation mode after timeout period;
- b) EUT declines Message 23.

##### **Test Results**

| a) EUT inside region @ 50 52 N 1 13 W                                                                     |         |
|-----------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                               | Verdict |
| Message 23 with reporting interval 5 s received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPSi7ub1m<000000800,2*39 | -       |
| EUT changes to a 5 second reporting interval                                                              | Pass    |

| b) EUT outside region @ 51 52 N 1 13 W                                                                    |         |
|-----------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                               | Verdict |
| Message 23 with reporting interval 5 s received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPSi7ub1m<000000800,2*39 | -       |
| EUT does not change reporting interval and remains in autonomous mode.                                    | Pass    |



### Assignment by station type – Clause 12.6.6.3

#### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 15 s and transmit Message 23 with a reporting interval of 5 s.

- Transmit a Group Assignment command with a station type to 0 (all stations).
- Transmit a Group Assignment command with a station type to 1 (Class A).1
- Transmit a Group Assignment command with a station type to 2 (All Class B).2
- Transmit a Group Assignment command with a station type to 3 (SAR aircraft).
- Transmit a Group Assignment command with a station type to 4 (Class B SO).
- Transmit a Group Assignment command with a station type to 5 (Class B CS).
- Transmit a Group Assignment command with a station type to 6 (Inland AIS).

#### **Required Results**

- EUT switches to assigned mode with 5 s reporting interval;
- EUT declines Message 23;
- EUT switches to assigned mode with 5 s reporting interval;
- EUT declines Message 23;
- EUT switches to assigned mode with 5 s reporting interval;
- EUT declines Message 23;
- EUT declines Message 23.

#### **Test Results**

| <b>a) All stations</b>                                                                              |         |
|-----------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                         | Verdict |
| Message 23 with station type = 0 received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPsi7ub1m<000000800,2*39 | -       |
| EUT changes to a 5 second reporting interval                                                        | Pass    |
| <b>b) Class A</b>                                                                                   |         |
| Requirement                                                                                         | Verdict |
| Message 23 with station type = 1 received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPsi7ub1m<100000800,2*38 | -       |
| EUT does not change reporting interval and remains in autonomous mode.                              | Pass    |
| <b>c) All Class B</b>                                                                               |         |
| Requirement                                                                                         | Verdict |
| Message 23 with station type = 2 received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPsi7ub1m<200000800,2*3B | -       |
| EUT changes to a 5 second reporting interval                                                        | Pass    |
| <b>d) SAR Aircraft</b>                                                                              |         |
| Requirement                                                                                         | Verdict |
| Message 23 with station type = 3 received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPsi7ub1m<300000800,2*3A | -       |
| EUT does not change reporting interval and remains in autonomous mode.                              | Pass    |
| <b>e) Class B SO</b>                                                                                |         |
| Requirement                                                                                         | Verdict |
| Message 23 with station type = 4 received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPsi7ub1m<400000800,2*3D | -       |
| EUT changes to a 5 second reporting interval                                                        | Pass    |
| <b>f) Class B CS</b>                                                                                |         |
| Requirement                                                                                         | Verdict |
| Message 23 with station type = 5 received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPsi7ub1m<500000800,2*3C | -       |
| EUT does not change reporting interval and remains in autonomous mode.                              | Pass    |



| g) Inland AIS                                                                                       |         |
|-----------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                         | Verdict |
| Message 23 with station type = 6 received by EUT:<br>!AIVDM,1,1,,A,G027'SSwJPsi7ub1m<600000800,2*3F | -       |
| EUT does not change reporting interval and remains in autonomous mode.                              | Pass    |



Addressing by ship and cargo type – Clause 12.6.6.4

**Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 15 s and use a base station MMSI to transmit Message 23.

- Transmit a Group Assignment command (Message 23) to the EUT. Set the reporting interval to 5 s and the ship and cargo value to the value which is configured in the EUT.
- Transmit a Group Assignment command (Message 23) to the EUT. Set the reporting interval to 5 s and the ship and cargo value to a value different to the value which is configured in the EUT.
- Configure the ship and cargo type of the EUT to 72. Transmit a Group Assignment command (Message 23) to the EUT. Set the reporting interval to 5 s and the ship and cargo type value to 70.

**Required Results**

- EUT switches to assigned mode and transmits position reports with 5 s reporting interval;
- EUT declines Message 23;
- EUT switches to assigned mode and transmits position reports with 5 s reporting interval.

**Test Results**

| a) EUT ship and cargo type = 37                                                                             |         |
|-------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                 | Verdict |
| Message 23 with ship and cargo type = 37 received by EUT:<br>!AIVDO,1,1,,A,G027'SSwJPsi7ub1m<09@000800,2*42 | -       |
| EUT changes to a 5 second reporting interval.                                                               | Pass    |

| b) EUT ship and cargo type = 37                                                                             |         |
|-------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                 | Verdict |
| Message 23 with ship and cargo type = 81 received by EUT:<br>!AIVDO,1,1,,A,G027'SSwJPsi7ub1m<0D@000800,2*3F | -       |
| EUT does no change reporting interval and remains in autonomous mode.                                       | Pass    |

| c) EUT ship and cargo type = 72                                                                             |         |
|-------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                 | Verdict |
| Message 23 with ship and cargo type = 70 received by EUT:<br>!AIVDO,1,1,,A,G027'SSwJPsi7ub1m<0AP000800,2*2A | -       |
| EUT changes to a 5 second reporting interval.                                                               | Pass    |



#### Quiet time command – Clause 12.6.6.5

##### **Method of Measurement**

Set up the standard test environment and operate EUT in autonomous mode with 15 s reporting interval.

Transmit a Group Assignment message (Message 23) to the EUT with a quiet time command.

Record transmitted messages.

##### **Required Results**

Confirm that the EUT continues transmission for one frame to release the allocated slots and then stops transmission. Confirm that the EUT starts transmission after the quiet time according to the network entry procedure. The quiet time period starts with the reception of Message 23.

##### **Test Results**

The requirements of this test are conflicting and incorrect. If, as stated, the quiet time period starts with the reception of message 23, it is not possible to have a quiet period of 1 minute. As it will take 1 frame to release the allocated slots. Therefore, to ensure a quiet time of 1 minute, as required by ITU-R M.1371-5, this test has been tested against the requirement that quiet time period shall start 1 frame after the reception of message 23.

| Requirement                                                                                                                              | Verdict |
|------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Message 23 received by EUT with quiet time = 1 at 14:09:12: \$AITXT,01,01,04,QUIET,1,1*08 !AIVDO,1,1,,A,G027'SSwJPsi7ub1m<0AP000040,2*26 | -       |
| The EUT continues for one frame and releases slots                                                                                       | Pass    |
| The EUT stops transmission for a period of time equal to the quiet time value, 1 frame after the reception of message 23.                | Pass    |
| The EUT starts transmission using a network entry procedure at 14:11:19                                                                  | Pass    |



Reverting from interval assignment – Clause 12.6.6.6

**Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode. Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned. Monitor the VDL until at least 1 min after timeout occurred. Repeat 10 times (transmissions of Message 23 shall not be synchronised to the initial transmission schedule of the EUT).

Measure the time Trev between the reception of Message 23 and the first transmission after timeout.

**Required Results**

Verify that the time out is randomly distributed between 4 min and 8 min.

**Test Results**

The results below indicate the time between the reception of message 23 and the first transmission when the mode flag = 0.

| Test Number | Trev Results | Verdict |
|-------------|--------------|---------|
| 1           | 00:04:06     | Pass    |
| 2           | 00:04:43     | Pass    |
| 3           | 00:07:01     | Pass    |
| 4           | 00:05:21     | Pass    |
| 5           | 00:05:38     | Pass    |
| 6           | 00:04:13     | Pass    |
| 7           | 00:07:03     | Pass    |
| 8           | 00:04:13     | Pass    |
| 9           | 00:04:56     | Pass    |
| 10          | 00:05:03     | Pass    |



Assignment priority test – Message 16 and 23 – Clause 12.6.6.7

**Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode.

- Transmit a Message 23, addressed to the EUT, to assign a reporting interval of 15 s. Check that the EUT reporting interval is 15 s. Transmit a Message 16, addressed to the EUT, assigning a reporting interval of 10 s while still assigned by Message 23.
- Transmit a Message 16, addressed to the EUT, to assign a reporting interval of 15 s. Check that the EUT reporting interval is 15 s. Transmit a Message 23, addressed to the EUT, assigning a reporting interval of 10 s while still assigned by Message 16.

**Required Results**

- the EUT adopts the reporting interval of Message 16;
- the EUT continues with the reporting interval of Message 16.

**Test Results**

| a) Message 23, then message 16                                                                                     |         |
|--------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                        | Verdict |
| Message 23 received by EUT with reporting interval = 15 seconds:<br>!AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000600,2*35 | -       |
| Reporting interval is 15 seconds                                                                                   | Pass    |
| Message 16 received by EUT with reporting interval = 10 seconds:<br>!AIVDO,1,1,,A,@027'SQr4P04380P,0*4A            | -       |
| Reporting interval is change to 10 seconds                                                                         | Pass    |

| b) Message 16, then message 23                                                                                     |         |
|--------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                        | Verdict |
| Message 16 received by EUT with reporting interval = 15 seconds:<br>!AIVDO,1,1,,A,@027'SQr4P042P00,0*43            | -       |
| Reporting interval is 15 seconds                                                                                   | Pass    |
| Message 23 received by EUT with reporting interval = 10 seconds:<br>!AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000700,2*34 | -       |
| Reporting interval is unchanged                                                                                    | Pass    |



### Assignment priority test – Message 22 and 23 – Clause 12.6.6.8

#### **Method of Measurement**

Set up standard test environment and operate the EUT in autonomous mode. Transmit a Message 22 defining a region with the EUT inside that region Tx/Rx mode = 0.

- Transmit an Assigned mode command (Message 23) to the EUT with Tx/Rx mode 1.
- Transmit Message 22 to the EUT with regional settings specifying Tx/Rx mode 2.
- Transmit an Assigned mode command (Message 23) to the EUT with Tx/Rx mode 1.
- During assigned mode, transmit a Message 22 to the EUT individually addressed and specifying Tx/Rx mode 2.
- Within 10 min, transmit a Message 22 with regional area settings specifying Tx/Rx mode 0.
- Transmit an Assigned mode command (Message 23) to the EUT with Tx/Rx mode 1 every min for 15 min.
- After timeout of the last Message 23, transmit a Message 22 with regional settings specifying Tx/Rx mode 0.

Record transmitted messages.

#### **Required Results**

The following results are required.

- Check that Tx/Rx mode = 1. The Tx/Rx mode field setting of Message 23 takes precedence over the Tx/Rx mode field setting of Message 22.
- Check that Tx/Rx mode = 1. The EUT reverts to the Tx/Rx mode = 2 defined by Message 22 after the timeout of Message 23.
- Verify that Tx/Rx mode = 1.
- Check that Tx/Rx mode = 2. The Tx/Rx mode field setting of Message 22 takes precedence over the Tx/Rx mode field setting of Message 23.
- Check that Tx/Rx mode = 2. The Tx/Rx mode setting of Message 22 is ignored.
- Check that the Tx/Rx mode remains at 2 min for 10 min after applying Message 22. Check that the Tx/Rx mode is changed to 1 when receiving Message 23 later than 10 min after Message 22. Check that after timeout of the last Message 23 the Tx/Rx mode reverts to 2 according to the individually addressed Message 22.
- Check that Tx/Rx mode = 0. The Tx/Rx mode setting of Message 22 is accepted.

#### **Test Results**

| a)                                                                                                 |  | Verdict |
|----------------------------------------------------------------------------------------------------|--|---------|
| Requirement                                                                                        |  |         |
| Message 22 received by EUT with Tx/Rx mode = 0:<br>!AIVDM,1,1,,A,F027'SR2N2P7vm1oR?sD3bH2P000,0*49 |  | -       |
| Message 23 received by EUT with Tx/Rx mode = 1:<br>!AIVDM,1,1,,A,G027'SSwJPsi7ub1m<000000@00,2*41  |  | -       |
| EUT transmits on channel A only                                                                    |  | Pass    |

| a) Test Results |      |      |     |                                                |                                                        |
|-----------------|------|------|-----|------------------------------------------------|--------------------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                       | Comment                                                |
| 08:27:00        | 15   | A    | 23  | !AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000@00,2*43 | Set Tx/Rx = 1                                          |
| 08:27:14        | 560  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwW1r2?i,0*32 | EUT begins reserving slots                             |
| 08:27:30        | 1135 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwfQr26i,0*6A |                                                        |
| 08:27:30        | 1148 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwg1p000,0*57 | Timeout of channel B slot reservations                 |
| 08:27:44        | 1674 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwn1r2EQ,0*49 |                                                        |
| 08:27:46        | 1738 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6ww01p000,0*5C | EUT is timing out previous transmission schedule slots |
| 08:27:59        | 2236 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwuQp000,0*25 |                                                        |
| 08:28:00        | 22   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwP1r001,0*60 | EUT begins transmitting on channel A only              |



|          |      |   |    |                                                |  |
|----------|------|---|----|------------------------------------------------|--|
| 08:28:14 | 560  | A | 18 | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlp6wwW1p<01,0*69 |  |
| 08:28:30 | 1135 | A | 18 | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlp6wwfQp<01,0*38 |  |
| 08:28:44 | 1674 | A | 18 | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlp6wwn1pD01,0*28 |  |

| b)                                                                                                 |         |
|----------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                        | Verdict |
| Message 22 received by EUT with Tx/Rx mode = 2:<br>!AIVDM,1,1,,A,F027`SR2N2PWvm1oR?sD3bH2P000,0*29 | -       |
| EUT transmits on channel A only                                                                    | Pass    |



| b) Test Results |      |      |     |                                                 |                                                  |
|-----------------|------|------|-----|-------------------------------------------------|--------------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment                                          |
| 08:29:00        | 15   | A    | 22  | !AIVDO,1,1,,A,F027`SR2N2PWvm1oR?sD3bH2P000,0*2B | Tx/Rx = 2 sent to the EUT                        |
| 08:29:00        | 22   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwP1pH0F,0*6D | Message 23 has priority                          |
| 08:29:14        | 560  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwW1p88h,0*3C | EUT maintains Tx/Rx = 1                          |
| 08:29:30        | 1135 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQp8Ag,0*1B |                                                  |
| 08:29:44        | 1674 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwn1p@J:,0*5D |                                                  |
| 08:30:00        | 22   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwP1pD01,0*16 |                                                  |
| 08:30:14        | 560  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwW1p59p,0*28 |                                                  |
| 08:30:30        | 1135 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQp59p,0*79 |                                                  |
| 08:30:44        | 1674 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwn1p<01,0*50 |                                                  |
| 08:31:00        | 22   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwP1p@0F,0*65 |                                                  |
| 08:31:14        | 560  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwW1p0Sa,0*56 |                                                  |
| 08:31:30        | 1135 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQp0Ru,0*12 |                                                  |
| 08:31:44        | 1674 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwn1p8J:,0*25 |                                                  |
| 08:32:00        | 22   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwP1p<01,0*6E |                                                  |
| 08:32:15        | 591  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwWQpL01,0*79 |                                                  |
| 08:32:29        | 1122 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQr3WQ,0*32 |                                                  |
| 08:32:44        | 1674 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwn1p5:0,0*52 |                                                  |
| 08:33:00        | 22   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwP1r0P1,0*00 |                                                  |
| 08:33:15        | 591  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwWQpH9?,0*7A |                                                  |
| 08:33:29        | 1122 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQp8AR,0*2E |                                                  |
| 08:33:44        | 1674 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwn1p0Sm,0*63 |                                                  |
| 08:34:00        | 22   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwP1p5:8,0*64 |                                                  |
| 08:34:15        | 591  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwWQpD01,0*71 |                                                  |
| 08:34:29        | 1122 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQp5:8,0*32 |                                                  |
| 08:34:45        | 1717 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwnQpL01,0*40 |                                                  |
| 08:35:00        | 22   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwP1h000,0*7B | EUT begins timing out slots on channel A         |
| 08:35:08        | 309  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwSQj28A,0*62 | EUT begins reserving slots on channel B          |
| 08:35:15        | 591  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwWQh000,0*1C |                                                  |
| 08:35:22        | 854  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwc1j28A,0*32 |                                                  |
| 08:35:29        | 1122 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQh000,0*2D |                                                  |
| 08:35:37        | 1399 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwj1j28i,0*13 |                                                  |
| 08:35:45        | 1717 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwnQh000,0*25 |                                                  |
| 08:35:51        | 1946 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwqQj001,0*3A |                                                  |
| 08:36:08        | 309  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwSQhH4m,0*3A | EUT uses Tx/Rx = 2 after the Message 23 time out |
| 08:36:22        | 854  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwc1h8=F,0*38 |                                                  |
| 08:36:37        | 1399 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwj1h@Eo,0*18 |                                                  |

| c)                                             |         |
|------------------------------------------------|---------|
| Requirement                                    | Verdict |
| Message 23 received by EUT with Tx/Rx mode = 1 | -       |
| !AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000@00,2*41 | -       |
| EUT transmits on channel A only                | Pass    |

| c) Test Results |      |      |     |                                                 |                                            |
|-----------------|------|------|-----|-------------------------------------------------|--------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment                                    |
| 08:37:00        | 15   | A    | 23  | !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<000000@00,2*43  | Set Tx/Rx = 1                              |
| 08:37:08        | 309  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwSQp000,0*03 | EUT begins timing out channel B slots      |
| 08:37:15        | 581  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwW1r26A,0*13 | EUT begins reserving channel A slots       |
| 08:37:22        | 854  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwc1p000,0*53 |                                            |
| 08:37:29        | 1118 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQr29i,0*65 |                                            |
| 08:37:37        | 1399 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwj1p000,0*5A |                                            |
| 08:37:44        | 1669 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwmQr2FA,0*39 |                                            |
| 08:37:51        | 1946 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlIp6wwqQp000,0*21 | EUT finishes timing out channel B slots    |
| 08:38:00        | 20   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwuQr001,0*25 | EUT transmits on channel A only, Tx/Rx = 1 |
| 08:38:15        | 581  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwW1p@95,0*18 |                                            |
| 08:38:29        | 1118 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwfQr3HA,0*3D |                                            |
| 08:38:44        | 1669 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlIp6wwmQp<01,0*33 |                                            |



| d)                                                                                                |         |
|---------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                       | Verdict |
| Message 22 received by EUT with Tx/Rx mode = 2<br>!AIVDM,1,1,,A,F027`SR2N2PQgnLK@000000BP000,0*17 | -       |
| EUT transmits on channel B only                                                                   | Pass    |

| d) Test Results |      |      |     |                                                 |                                 |
|-----------------|------|------|-----|-------------------------------------------------|---------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment                         |
| 08:39:00        | 15   | A    | 22  | !AIVDO,1,1,,A,F027`SR2N2PSI9008000000BP000,0*34 | Set Tx/Rx = 2                   |
| 08:39:00        | 20   | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlp6wwwQp000,0*26  | EUT releases slots on channel A |
| 08:39:06        | 260  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwS1r2;A,0*19  | EUT begins reserving new slots  |
| 08:39:15        | 581  | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlp6wwW1p000,0*64  |                                 |
| 08:39:21        | 817  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwbQr2J1,0*49  |                                 |
| 08:39:29        | 1118 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlp6wwfQp000,0*35  |                                 |
| 08:39:38        | 1433 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwjQr21A,0*4A  |                                 |
| 08:39:44        | 1669 | A    | 18  | !AIVDM,1,1,,A,B7`B00@0UgvUg@WAlp6wwwQp000,0*3E  |                                 |
| 08:39:52        | 1950 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwqQr001,0*22  |                                 |
| 08:40:06        | 260  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwS1pH44,0*1B  | EUT uses only channel B         |
| 08:40:21        | 817  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwbQp@<i,0*17  | EUT mode flag = 1               |
| 08:40:38        | 1433 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwjQpHFI,0*4D  |                                 |
| 08:40:52        | 1950 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwqQpHNN,0*59  |                                 |

| e)                                                                                            |         |
|-----------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                   | Verdict |
| Message 22 sent to EUT with Tx/Rx mode = 0<br>!AIVDO,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*4B | -       |
| EUT ignores message 22 and continues in Tx/Rx mode 2, transmitting on channel B only          | Pass    |

| e) Test Results |      |      |     |                                                 |                                           |
|-----------------|------|------|-----|-------------------------------------------------|-------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment                                   |
| 09:33:28        | 1093 | A    | 22  | !AIVDO,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*4B |                                           |
| 09:34:40        | 1511 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwl1h@GW,0*24  |                                           |
| 09:34:54        | 2057 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wws1h8P9,0*3A  |                                           |
| 09:35:10        | 394  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwU1h5B<,0*06  |                                           |
| 09:35:25        | 958  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwdQh<01,0*21  |                                           |
| 09:35:40        | 1511 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwl1h<01,0*49  |                                           |
| 09:36:25        | 958  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwdQh8>v,0*6C  |                                           |
| 09:36:40        | 1511 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwl1h8GW,0*5C  |                                           |
| 09:36:54        | 2057 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wws1h0Ri,0*60  |                                           |
| 09:37:10        | 374  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwTQhD01,0*69  |                                           |
| 08:41:00        | 15   | A    | 22  | !AIVDO,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*4B | Commands Tx/Rx = 0                        |
| 08:41:06        | 260  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwS1pD01,0*16  | EUT ignores Msg 22                        |
| 08:41:21        | 817  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwbQp<01,0*3F  | EUT mode flag = 0                         |
| 08:41:38        | 1433 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwjQpD01,0*4F  | Maintains transmissions on channel B only |
| 08:41:52        | 1950 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwqQpD01,0*54  |                                           |
| 08:42:06        | 260  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwS1p@44,0*13  |                                           |
| 08:42:21        | 817  | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwbQp8<i,0*6F  |                                           |
| 08:42:38        | 1433 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwjQp@FI,0*45  |                                           |
| 08:42:52        | 1950 | B    | 18  | !AIVDM,1,1,,B,B7`B00@0UgvUg@WAlp6wwqQp@NN,0*51  |                                           |

| f)                                                                                                             |         |
|----------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                    | Verdict |
| Message 23 received by EUT with Tx/Rx mode = 1, every minute<br>!AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000@00,2*41 | -       |
| EUT changes to Tx/Rx mode 1 after 10 minutes, after 10:17                                                      | Pass    |
| EUT changes to Tx/Rx mode 2 after the timeout of assigned mode                                                 | Pass    |



| f) Test Results                                                 |      |      |     |                                                 |                                                                     |
|-----------------------------------------------------------------|------|------|-----|-------------------------------------------------|---------------------------------------------------------------------|
| Time                                                            | Slot | Chan | Msg | Sentence                                        | Comment                                                             |
| 08:39:00                                                        | 15   | A    | 22  | !AIVDO,1,1,,A,F027'SR2N2PSI900800000BP000,0*34  | Msg 22 sent to the EUT                                              |
| EUT operates with Tx/Rx = 2, as seen in part d)                 |      |      |     |                                                 |                                                                     |
| 08:43:00                                                        | 15   | A    | 23  | !AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000@00,2*43  | Msg 23 with Tx/Rx = 1                                               |
| Msg 23 is sent once per minute for 15 minutes                   |      |      |     |                                                 |                                                                     |
| 08:49:22                                                        | 833  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwbQh8=1,0*2E | EUT operating with Tx/Rx=2                                          |
| 08:49:37                                                        | 1423 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwjQh<01,0*2F |                                                                     |
| 08:49:52                                                        | 1959 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwqQhD01,0*4C |                                                                     |
| 08:50:00                                                        | 15   | A    | 23  | !AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000@00,2*43  | EUT begins reserving slots on channel A, 10 mins after Msg 22 in d) |
| 08:50:07                                                        | 272  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwS1p000,0*63 |                                                                     |
| 08:50:14                                                        | 535  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwVQr2@A,0*04 |                                                                     |
| 08:50:22                                                        | 833  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwbQp000,0*32 |                                                                     |
| 08:50:29                                                        | 1112 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwf1r2?i,0*03 |                                                                     |
| 08:50:37                                                        | 1423 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwjQp000,0*3A |                                                                     |
| 08:50:45                                                        | 1687 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwn1r2@i,0*74 |                                                                     |
| 08:50:52                                                        | 1959 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwqQp000,0*21 | EUT times out slots on B                                            |
| 08:51:00                                                        | 15   | A    | 23  | !AIVDO,1,1,,A,G027'SSwJPsi7ub1m<000000@00,2*43  | EUT operates with Tx/Rx=1                                           |
| 08:51:00                                                        | 16   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwuQr001,0*25 |                                                                     |
| 08:51:14                                                        | 535  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwVQpD01,0*70 |                                                                     |
| 08:51:29                                                        | 1112 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwf1p@AH,0*2C |                                                                     |
| 08:51:45                                                        | 1687 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwn1p8JG,0*58 |                                                                     |
| EUT operates in assigned mode for another 07:15, with Tx/Rx = 1 |      |      |     |                                                 |                                                                     |
| 08:59:00                                                        | 5    | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwuQp<01,0*2B |                                                                     |
| 08:59:15                                                        | 569  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwW1p<01,0*69 |                                                                     |
| 08:59:30                                                        | 1150 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwfQp5;d,0*6F |                                                                     |
| 08:59:45                                                        | 1714 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwn1p0Rn,0*61 |                                                                     |
| 09:00:00                                                        | 5    | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwuQp805,0*2B |                                                                     |
| 09:00:15                                                        | 569  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwW1p'8q,0*7D |                                                                     |
| 09:00:30                                                        | 1150 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwfQp0S4,0*52 |                                                                     |
| 09:00:45                                                        | 1694 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwn1pD01,0*28 |                                                                     |
| 09:01:00                                                        | 5    | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwuQp5@0,0*53 |                                                                     |
| 09:01:15                                                        | 569  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwW1p5@4,0*15 |                                                                     |
| 09:01:30                                                        | 1144 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwfQpD01,0*40 |                                                                     |
| 09:01:37                                                        | 1405 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwj1j29Q,0*2A |                                                                     |
| 09:01:45                                                        | 1694 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwn1h000,0*45 |                                                                     |
| 09:01:52                                                        | 1955 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwqQj2>1,0*36 |                                                                     |
| 09:02:00                                                        | 5    | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwuQh000,0*3E |                                                                     |

| g)                                                                                                 |         |
|----------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                        | Verdict |
| Message 22 received by EUT with Tx/Rx mode = 0:<br>!AIVDM,1,1,,A,F027'SR2N2P7vm1oR?sD3bH2P000,0*49 | -       |
| EUT transmits on channels A and B                                                                  | Pass    |

| g) Test Results |      |      |     |                                                 |                                                          |
|-----------------|------|------|-----|-------------------------------------------------|----------------------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment                                                  |
| 09:02:52        | 1955 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwqQh8NS,0*2C | EUT operating in assigned mode                           |
| 09:03:07        | 273  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwS1h@4A,0*7E | EUT Tx/Rx = 2                                            |
| 09:03:21        | 816  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwb1hD01,0*3F |                                                          |
| 09:03:37        | 1405 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwj1h<01,0*4F |                                                          |
| 09:03:52        | 1955 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwqQh5@<,0*40 |                                                          |
| 09:04:00        | 15   | A    | 22  | !AIVDO,1,1,,A,F027'SR2N2P7vm1oR?sD3bH2P000,0*4B | Msg 22 sets Tx/Rx = 0                                    |
| 09:04:07        | 273  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwS1h<01,0*76 |                                                          |
| 09:04:21        | 813  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlIp6wwb1j4cA,0*6D | EUT begins reserving slots on channel A                  |
| 09:04:21        | 816  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwb1h000,0*4A | EUT times out slots from previous transmissions schedule |
| 09:04:37        | 1405 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlIp6wwj1j001,0*41 |                                                          |



| g) Test Results |      |      |     |                                                |                                          |
|-----------------|------|------|-----|------------------------------------------------|------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                       | Comment                                  |
| 09:04:52        | 1955 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwqQh000,0*39 |                                          |
| 09:04:53        | 2010 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwr1j001,0*5A |                                          |
| 09:05:07        | 273  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwS1h84A,0*06 | EUT begins transmitting on both channels |
| 09:05:21        | 813  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwb1hD01,0*3C |                                          |
| 09:05:37        | 1405 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0UgvUg@WAlp6wwj1h5@D,0*43 |                                          |
| 09:05:53        | 2010 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0UgvUg@WAlp6wwr1hHOJ,0*24 |                                          |



### Base station reservations – Clause 12.6.7

#### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode with 5 s reporting interval (SOG = 25 kn). Apply a Message 4 to the VDL using a base station MMSI.

- Transmit a Data Link Management message (Message 20) on Channel A from a Base Station within 120 NM to the EUT with slot offset = 5 and increment = 10. Record transmitted messages.
- Repeat the test with a Base Station beyond 120 NM.
- Repeat the test without Base Station Report (Message 4).
- Repeat the test reserving 100 % of the slots.
- Repeat the test with a Base Station within 120 NM and maintain transmission of Message 20. Stop transmission Message 4.
- Repeat test a) using a non-base station MMSI.

#### **Required Results**

The following results are required.

- For the Base Station within 120 NM, confirm that EUT does not use slots allocated by Message 20 for own transmissions until timeout of 4 min to 8 min. Confirm that the EUT does not use the same slots on Channel B.
- For the Base Station beyond 120 NM, confirm that the EUT treats the slots as free.
- Confirm that the EUT treats the slots as free.
- Confirm that the EUT stops transmission.
- Confirm that the EUT ignores the slot reservations of a Message 20 which is received after the normal target time-out of Message 4.
- Confirm that the EUT treats the slots as free.

#### **Test Results**

| a) Transmit a Data Link Management Message 20, SOG = 25 kn                                                                                         |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                        | Verdict |
| Msg. 20 with slot offset = 5 and increment = 10, received on slot 5, using Base Station MMSI within 120 NM to EUT: !AIVDM,1,1,,A,D027'SP0EN0',0*5F | -       |
| EUT Starts releasing slots that were previously allocated on the reserved slots                                                                    | Pass    |
| EUT does not use slots allocated by Msg. 20 for own transmissions until the timeout of 4 min to 8 min.                                             | Pass    |
| EUT does not transmit on the slots allocated by Msg. 20 on Channel B.                                                                              | Pass    |

| a) Test Results |      |           |     |                                                 |                                                       |
|-----------------|------|-----------|-----|-------------------------------------------------|-------------------------------------------------------|
| Slot            | Chan | MMSI      | Msg | Sentence                                        | Comments                                              |
| 61              | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t001h@0u,0*7D | Schedule before message 20, using all available slots |
| 246             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t031h<01,0*45 |                                                       |
| 432             | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t05Qh<01,0*20 |                                                       |
| 624             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t081h89h,0*1A |                                                       |
| 810             | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0:1h5B4,0*31 |                                                       |
| 998             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0<Qh<01,0*2A |                                                       |
| 1179            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0?1h<01,0*4A |                                                       |
| 1380            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0AQh8ET,0*43 |                                                       |
| 1566            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0DQh<01,0*51 |                                                       |
| 1748            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0FQh5B4,0*2E |                                                       |
| 1942            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0IQh0Rw,0*74 |                                                       |
| 2122            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0KQh0SA,0*42 |                                                       |
| 5               | A    | 2222222   | 20  | !AIVDO,1,1,,A,D027'SP0EN0',0*5D                 |                                                       |
| 61              | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t001h0S7,0*2C | Slot released                                         |
| 246             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t02Qh83n,0*7C |                                                       |
| 432             | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t051h0S=,0*23 | Slot released                                         |
| 624             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t07Qh0S<,0*43 | Slot released                                         |
| 810             | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0:Qh0S6,0*47 | Slot released                                         |



| a) Test Results |      |           |     |                                                 |                                                       |
|-----------------|------|-----------|-----|-------------------------------------------------|-------------------------------------------------------|
| Slot            | Chan | MMSI      | Msg | Sentence                                        | Comments                                              |
| 998             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0<Qh8?V,0*46 |                                                       |
| 1179            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0>Qh8BK,0*27 |                                                       |
| 1380            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0AQh0Rt,0*7C | Slot released                                         |
| 1566            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0D1h8HN,0*32 |                                                       |
| 1748            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0FQh0S6,0*36 |                                                       |
| 1931            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0IQh0S6,0*34 | Slot released                                         |
| 2129            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0KQh@QA,0*30 |                                                       |
| 58              | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t001hH0r,0*72 | Reserved slots, ending in 0-4 are not used by the EUT |
| 246             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t02Qh5B<,0*52 |                                                       |
| 435             | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t051h@6k,0*60 |                                                       |
| 626             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t081hH9j,0*68 |                                                       |
| 806             | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t09Qh@<V,0*3B |                                                       |
| 998             | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0<Qh5B<,0*5C |                                                       |
| 1179            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0?1h5B<,0*3C |                                                       |
| 1366            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0A1h<01,0*37 |                                                       |
| 1566            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0D1h5B<,0*47 |                                                       |
| 1746            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0FQh@KB,0*24 |                                                       |
| 1927            | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0I1h<01,0*3C |                                                       |
| 2129            | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0KQh<01,0*5D |                                                       |

| a) Test Results – After 8 minutes |      |           |     |                                                 |                    |
|-----------------------------------|------|-----------|-----|-------------------------------------------------|--------------------|
| Slot                              | Chan | MMSI      | Msg | Sentence                                        | Comments           |
| 56                                | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t001hD01,0*3D |                    |
| 243                               | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t021h<01,0*44 | Reserved slot used |
| 437                               | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t04Qh86m,0*7F |                    |
| 617                               | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t07QhL01,0*51 |                    |
| 816                               | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t09Qh<01,0*2C |                    |
| 995                               | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0<1hD01,0*32 |                    |
| 1187                              | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0>Qh0S4,0*41 |                    |
| 1369                              | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0A1h0S6,0*5F |                    |
| 1549                              | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0CQh0SL,0*44 |                    |
| 1739                              | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0F1h8K;,0*45 |                    |
| 1927                              | B    | 234567898 | 18  | !AIVDM,1,1,,B,B3OdpnP0vWvUg@WAlIt6t0HQh0S8,0*3B |                    |
| 2127                              | A    | 234567898 | 18  | !AIVDM,1,1,,A,B3OdpnP0vWvUg@WAlIt6t0K1h5B;,0*17 |                    |

| b) Transmit a Data Link Management with a Base Station beyond 120 NM                                                                                        |                                                                                                                                                                                  |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                 | Result                                                                                                                                                                           | Verdict |
| Transmit a Data Link Management message (Message 20) on Channel A from a Base Station more than 120 NM from the EUT with slot offset = 5 and increment = 10 | The base station is located over 120 NM from the EUT<br>!AIVDM,1,1,,A,405C5Hiv>DbmlOrFu2J@:oi01';p,0*2A<br>The Message 20 sent to the EUT is:<br>!AIVDM,1,1,,A,D05C5Hh0EN0',0*5A | -       |
| The EUT ignores the Message 20 from the distant base station and treats the slots as free                                                                   | The EUT successfully ignores the Message 20 as shown in the table below.                                                                                                         | Pass    |

| b) Test Results |      |      |     |                                                 |         |                                                 |
|-----------------|------|------|-----|-------------------------------------------------|---------|-------------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                        | Timeout | Comment                                         |
| 09:56:00        | 10   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwuQhD02,0*6B | 5       | Transmission schedule before Message 20 is sent |
| 09:56:05        | 198  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwR1h0SM,0*47 | 0       |                                                 |
| 09:56:10        | 400  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwTQhD02,0*4A | 5       |                                                 |
| 09:56:15        | 589  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwW1hL02,0*22 | 7       |                                                 |
| 09:56:21        | 788  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwb1h8<D,0*1A | 2       |                                                 |
| 09:56:25        | 948  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwd1h5CP,0*79 | 1       |                                                 |
| 09:56:30        | 1149 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwfQh5CP,0*18 | 1       |                                                 |
| 09:56:35        | 1337 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwi1h<02,0*6C | 3       |                                                 |
| 09:56:40        | 1535 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwkQj3WA,0*14 | 0       |                                                 |
| 09:56:46        | 1727 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwnQh5CP,0*13 | 1       |                                                 |
| 09:56:50        | 1891 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwpQh<02,0*16 | 3       | Slots 0-4 reserved                              |
| 09:56:55        | 2069 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wws1h0SJ,0*61 | 0       |                                                 |
| 09:56:59        | 5    | A    | 20  | !AIVDO,1,1,,A,D05C5Hh0EN0',0*58                 | 0       |                                                 |
| 09:57:00        | 10   | A    | 18  | !AIVDM,1,1,,A,B7'B03P0vgvUg@WAlIp6wwuQh@0:,0*74 | 4       |                                                 |
| 09:57:05        | 217  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwR1hD02,0*2F | 5       |                                                 |
| 09:57:10        | 400  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwTQj07i,0*60 | 0       |                                                 |
| 09:57:15        | 589  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwW1hH9=,0*20 | 6       |                                                 |
| 09:57:21        | 788  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwb1h5CT,0*78 | 1       |                                                 |
| 09:57:25        | 948  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwd1h0SU,0*69 | 0       | Msg 20 ignored                                  |
| 09:57:30        | 1149 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwfQh0SD,0*19 | 0       |                                                 |



| b) Test Results |      |      |     |                                                 |         |         |
|-----------------|------|------|-----|-------------------------------------------------|---------|---------|
| Time            | Slot | Chan | Msg | Sentence                                        | Timeout | Comment |
| 09:57:35        | 1337 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwi1h8Dq,0*5F | 2       |         |
| 09:57:40        | 1535 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwkQh0Rg,0*36 | 0       |         |
| 09:57:46        | 1727 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwnQh0Rb,0*35 | 0       |         |
| 09:57:50        | 1891 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwpQh8MS,0*0E | 2       |         |
| 09:57:55        | 2085 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wws1h@PU,0*0D | 4       |         |
| 09:58:00        | 10   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0,0*01                     | 0       |         |
| 09:58:05        | 217  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwR1h@3I,0*53 | 4       |         |
| 09:58:10        | 400  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwTQh<02,0*32 | 3       |         |
| 09:58:15        | 589  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwW1hD02,0*2A | 5       |         |
| 09:58:21        | 788  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwb1h0Ra,0*59 | 0       |         |
| 09:58:26        | 975  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwdQh<02,0*01 | 3       |         |
| 09:58:30        | 1159 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwfQh@B7,0*0B | 4       |         |
| 09:58:35        | 1337 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwi1h5C',0*44 | 1       |         |
| 09:58:40        | 1508 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwkQhD02,0*75 | 5       |         |
| 09:58:45        | 1695 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwn1h<02,0*6B | 3       |         |
| 09:58:50        | 1891 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwpQh5C',0*3E | 1       |         |
| 09:58:55        | 2085 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wws1h<02,0*76 | 3       |         |

| c) Transmit a Data Link Management from a Base Station with no Position Report                                                                                 |                                                                                                                                                                                                                                                                 |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                    | Result                                                                                                                                                                                                                                                          | Verdict |
| Transmit a Data Link Management message (Message 20) on Channel A from a Base Station MMSI without a position report, using slot offset = 5 and increment = 10 | A Message 20 is sent from an MMSI that has not transmitted a base station position report (Message 4):<br>!AIVDO,1,1,,A,D086o@P0EN0',0*4A<br>Message acknowledged with text output:<br>\$AITXT,01,01,15,Command received from non-basestation MMSI 008501058*2C | -       |
| The EUT ignores the Message 20 from the distant base station and treats the slots as free                                                                      | The EUT successfully ignores the Message 20 as shown in the table below.                                                                                                                                                                                        | Pass    |

| c) Test Results |      |      |     |                                                 |                                           |  |
|-----------------|------|------|-----|-------------------------------------------------|-------------------------------------------|--|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment                                   |  |
| 10:05:45        | 1695 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwn1h0S',0*56 |                                           |  |
| 10:05:50        | 1903 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwpQh5HD,0*11 |                                           |  |
| 10:05:55        | 2079 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wws1h0SK,0*60 |                                           |  |
| 10:05:59        | 5    | A    | 20  | !AIVDO,1,1,,A,D086o@P0EN0',0*4A                 | Base station MMSI with no position report |  |
| 10:06:00        | 25   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwuQh<01,0*10 | EUT ignores Msg 20                        |  |
| 10:06:05        | 213  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwR1h83E,0*27 | Slots are treated as free                 |  |
| 10:06:10        | 404  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwTQh5HH,0*39 |                                           |  |
| 10:06:16        | 601  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwWQhD01,0*49 |                                           |  |
| 10:06:20        | 768  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwaQhD01,0*7C |                                           |  |
| 10:06:25        | 970  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwd1h<01,0*62 |                                           |  |
| 10:06:30        | 1157 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwfQh8B5,0*71 |                                           |  |
| 10:06:35        | 1346 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwi1h0Rw,0*47 |                                           |  |
| 10:06:40        | 1520 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwkQh<01,0*0E |                                           |  |
| 10:06:46        | 1725 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwn1hHJu,0*22 |                                           |  |
| 10:06:50        | 1903 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwpQh0S7,0*7C |                                           |  |
| 10:06:55        | 2096 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wws1h<01,0*75 |                                           |  |
| 10:07:00        | 25   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwuQh80I,0*6C |                                           |  |
| 10:07:05        | 213  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwR1h5HL,0*58 |                                           |  |
| 10:07:10        | 404  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwTQh0S,0*54  |                                           |  |
| 10:07:16        | 601  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwWQh@9I,0*3C |                                           |  |
| 10:07:20        | 768  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwaQh@<0,0*75 |                                           |  |
| 10:07:25        | 970  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwd1h8?,0*62  |                                           |  |
| 10:07:30        | 1157 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwfQh5HL,0*0F |                                           |  |
| 10:07:35        | 1335 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwi1hL01,0*1F |                                           |  |

| d) Transmit Data Link Management Messages (Message 20) to Give 100% Slot Loading                                                                     |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                          | Verdict |
| A valid Message 4 is transmitted by the base station MMSI:<br>!AIVDM,1,1,,A,4027'SQv>M:TsOrCR2M6qDG00<02,0*74                                        | -       |
| Msg. 20 with slot offset = 5 and increment = 5, received on slot 5, using Base Station MMSI within 120 NM to EUT:<br>!AIVDM,1,1,,A,D027'SP0EN0D,0*7B | -       |
| EUT stops transmitting.                                                                                                                              | Pass    |



| d) Test Results                                                                                 |      |      |     |                                                 |                                                                         |  |
|-------------------------------------------------------------------------------------------------|------|------|-----|-------------------------------------------------|-------------------------------------------------------------------------|--|
| Time                                                                                            | Slot | Chan | Msg | Sentence                                        | Comment                                                                 |  |
| 10:36:46                                                                                        | 1752 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6ww01hL01,0*2F |                                                                         |  |
| 10:36:50                                                                                        | 1875 | B    | 4   | !AIVDM,1,1,,B,4027'SQv>M:TiOrCR2M6qDG00<02,0*6D |                                                                         |  |
| 10:36:51                                                                                        | 1939 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwqQh<01,0*22 |                                                                         |  |
| 10:36:56                                                                                        | 2128 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6wwt1h@Q@,0*28 |                                                                         |  |
| 10:36:59                                                                                        | 5    | A    | 20  | !AIVDO,1,1,,A,D027'SP0EN0D,0*79                 | Message 20 reserves 100% of slots on channel A                          |  |
| 10:37:00                                                                                        | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>M:TsOrCR2M6qDG00<02,0*74 |                                                                         |  |
| 10:37:01                                                                                        | 52   | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwP1h0Rn,0*52 |                                                                         |  |
| 10:37:06                                                                                        | 239  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6wwRQh000,0*0F | EUT begins timing out slots on channel A                                |  |
| 10:37:10                                                                                        | 375  | B    | 4   | !AIVDM,1,1,,B,4027'SQv>M:U9OrCR2M6qDG00<02,0*3C |                                                                         |  |
| 10:37:11                                                                                        | 421  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwU1h0Rp,0*49 |                                                                         |  |
| 10:37:15                                                                                        | 596  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6wwWQh000,0*0A |                                                                         |  |
| 10:37:20                                                                                        | 750  | A    | 4   | !AIVDM,1,1,,A,4027'SQv>M:UCOrCR2M6qDG00D02,0*3D |                                                                         |  |
| 10:37:20                                                                                        | 785  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwb1h0S3,0*3C |                                                                         |  |
| 10:37:26                                                                                        | 995  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6ww1h000,0*58  |                                                                         |  |
| 10:37:30                                                                                        | 1125 | B    | 4   | !AIVDM,1,1,,B,4027'SQv>M:UMOrCR2M6qDG000S,0*2F  |                                                                         |  |
| 10:37:31                                                                                        | 1173 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwg1j3gA,0*7E |                                                                         |  |
| 10:37:36                                                                                        | 1364 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6wwiQh000,0*34 |                                                                         |  |
| 10:37:40                                                                                        | 1500 | A    | 4   | !AIVDM,1,1,,A,4027'SQv>M:UWOrCR2M6qDG005BD,0*5C |                                                                         |  |
| 10:37:41                                                                                        | 1540 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwl1h8H4,0*26 |                                                                         |  |
| 10:37:46                                                                                        | 1752 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6ww01h000,0*52 |                                                                         |  |
| 10:37:50                                                                                        | 1875 | B    | 4   | !AIVDM,1,1,,B,4027'SQv>M:UiOrCR2M6qDG008MC,0*64 |                                                                         |  |
| 10:37:51                                                                                        | 1939 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwqQh8NC,0*2A |                                                                         |  |
| 10:37:56                                                                                        | 2128 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6wwt1h000,0*49 | EUT finishes timing out slots on channel A                              |  |
| 10:37:56                                                                                        | 2130 | B    | 24  | !AIVDM,1,1,,B,H7'B00AAEI@E=C3800000000000,2*36  |                                                                         |  |
| 10:37:57                                                                                        | 2146 | B    | 24  | !AIVDM,1,1,,B,H7'B00E8FC@D0000000000000,0*2E    |                                                                         |  |
| 10:38:00                                                                                        | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>M:UsOrCR2M6qDG00800,0*73 |                                                                         |  |
| 10:38:00                                                                                        | 32   | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwP1h@0P,0*7E | EUT transmits position reports on channel B only                        |  |
| 10:38:10                                                                                        | 375  | B    | 4   | !AIVDM,1,1,,B,4027'SQv>M:V9OrCR2M6qDG00850,0*63 |                                                                         |  |
| 10:38:10                                                                                        | 403  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwU1hH6C,0*66 |                                                                         |  |
| EUT does not transmit on channel A for 06:40; the period of results is omitted from this table. |      |      |     |                                                 |                                                                         |  |
| 10:44:50                                                                                        | 1905 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwq1h0SA,0*5D |                                                                         |  |
| 10:45:00                                                                                        | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>M:dsOrCR2M6qDG00<02,0*44 |                                                                         |  |
| 10:45:00                                                                                        | 29   | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwP1h80M,0*1B |                                                                         |  |
| 10:45:06                                                                                        | 236  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6wwRQj1Mi,0*28 | Message 20 times out after 7 minutes, transmissions resume on channel A |  |
| 10:45:10                                                                                        | 375  | B    | 4   | !AIVDM,1,1,,B,4027'SQv>M:e9OrCR2M6qDG00850,0*50 |                                                                         |  |
| 10:45:11                                                                                        | 430  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WLnSP6wwU1hL01,0*16 |                                                                         |  |
| 10:45:16                                                                                        | 611  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WLnSP6wwWQj1NQ,0*16 |                                                                         |  |
| 10:45:20                                                                                        | 750  | A    | 4   | !AIVDM,1,1,,A,4027'SQv>M:eCOrCR2M6qDG00@,f,0*56 |                                                                         |  |

| e) Removal of message 4                                                                                                                                                    |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                | Verdict |
| Msg. 20 with slot offset = 5 and increment = 5, received on slot 5, using Base Station MMSI within 120 NM to EUT, every frame:<br>!AIVDM,1,1,,A,D027'SP0EN0D,0*7B          | -       |
| EUT stops transmitting.                                                                                                                                                    | -       |
| After removing message 4, the EUT begins transmissions 10 minutes later. Which is equal to the 3 minutes timeout of message 4 plus the timeout of 7 minutes of message 20. | Pass    |

| e) Test Results |      |      |     |                                                 |         |  |
|-----------------|------|------|-----|-------------------------------------------------|---------|--|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment |  |
| 14:18:53        | 1989 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwr1h<01,0*77  |         |  |
| 14:19:00        | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfBsOrCR2M6qDG005i8,0*65 |         |  |
| 14:19:02        | 96   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwPQh@1P,0*29  |         |  |
| 14:19:13        | 495  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwV1h87g,0*06  |         |  |
| 14:19:20        | 750  | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfCCOrCR2M6qDG005i<,0*50 |         |  |
| 14:19:23        | 864  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwc1h@=P,0*76  |         |  |
| 14:19:33        | 1237 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwh1h0SI,0*7A  |         |  |
| 14:19:40        | 1500 | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfCWOrCR2M6qDG005i<,0*44 |         |  |
| 14:19:43        | 1628 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlp6wwm1hD01,0*10  |         |  |



| e) Test Results                                                                         |      |      |     |                                                 |                                                       |
|-----------------------------------------------------------------------------------------|------|------|-----|-------------------------------------------------|-------------------------------------------------------|
| Time                                                                                    | Slot | Chan | Msg | Sentence                                        | Comment                                               |
| 14:19:53                                                                                | 1989 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwr1h8O5,0*08 |                                                       |
| 14:19:59                                                                                | 5    | A    | 20  | !AIVDO,1,1,,A,D027'SP0EN0',0*5D                 |                                                       |
| 14:20:00                                                                                | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfCsOrCR2M6qDG000S:,0*59 |                                                       |
| 14:20:02                                                                                | 96   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwPQh<01,0*35 |                                                       |
| 14:20:13                                                                                | 495  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwV1h5q@,0*6A |                                                       |
| 14:20:20                                                                                | 750  | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfDCOrCR2M6qDG000S:,0*6E |                                                       |
| 14:20:23                                                                                | 864  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwc1h0Rq,0*48 | Reserved slot timed out by EUT after receiving Msg 20 |
| 14:20:33                                                                                | 1252 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwh1h0Rs,0*41 | Reserved slot timed out by EUT after receiving Msg 20 |
| 14:20:40                                                                                | 1500 | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfDwOrCR2M6qDG000S:,0*7A |                                                       |
| 14:20:43                                                                                | 1628 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwm1h@IL,0*10 |                                                       |
| 14:20:53                                                                                | 1989 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwr1h5q@,0*4E |                                                       |
| 14:20:59                                                                                | 5    | A    | 20  | !AIVDO,1,1,,A,D027'SP0EN0',0*5D                 |                                                       |
| 14:21:00                                                                                | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfDsOrCR2M6qDG00@00,0*47 |                                                       |
| 14:21:02                                                                                | 96   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwPQh81P,0*51 |                                                       |
| 14:21:13                                                                                | 495  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwV1h0Rr,0*7E |                                                       |
| 14:21:20                                                                                | 750  | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfECOrCR2M6qDG00H:f,0*23 |                                                       |
| 14:21:22                                                                                | 847  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwbQh<01,0*07 |                                                       |
| 14:21:33                                                                                | 1237 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwgQhHCE,0*71 |                                                       |
| 14:21:40                                                                                | 1500 | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfEWOrCR2M6qDG00L01,0*6F |                                                       |
| 14:21:43                                                                                | 1628 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwmQh<01,0*08 |                                                       |
| 14:21:53                                                                                | 1989 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwr1h0S:,0*13 |                                                       |
| 14:21:59                                                                                | 5    | A    | 20  | !AIVDO,1,1,,A,D027'SP0EN0',0*5D                 |                                                       |
| 14:22:00                                                                                | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LfEsOrCR2M6qDG00<01,0*3B | Message 4 removed at 14:22:00                         |
| 14:22:02                                                                                | 96   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwQ1h5qH,0*65 | EUT does not transmit on reserved slots               |
| 14:22:12                                                                                | 479  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwV1hL01,0*23 |                                                       |
| 14:22:22                                                                                | 847  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwc1h8=?,0*61 |                                                       |
| 14:22:33                                                                                | 1237 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwh1hD01,0*15 |                                                       |
| 14:22:43                                                                                | 1628 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwmQh8IL,0*08 |                                                       |
| 14:22:53                                                                                | 1989 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwr1h@O5,0*70 |                                                       |
| EUT continues to transmit on slots ending in (5, 6, 7, 8, 9) only for the next 00:15:30 |      |      |     |                                                 |                                                       |
| 14:25:00 - 3 minute time out of Message 4                                               |      |      |     |                                                 |                                                       |
| 14:31:00 - 7 minute time out of Message 20                                              |      |      |     |                                                 |                                                       |
| 14:37:59                                                                                | 5    | A    | 20  | !AIVDO,1,1,,A,D027'SP0EN0',0*5D                 |                                                       |
| 14:38:03                                                                                | 125  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwQ1h@1u,0*6D |                                                       |
| 14:38:12                                                                                | 466  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwUQh5rH,0*02 |                                                       |
| 14:38:23                                                                                | 865  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwc1h0S5,0*0D | EUT begins using the previously reserved slots        |
| 14:38:32                                                                                | 1229 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwh1h5rH,0*5F |                                                       |
| 14:38:43                                                                                | 1619 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwm1h0Rk,0*5C |                                                       |
| 14:38:52                                                                                | 1979 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwr1h<00,0*76 |                                                       |

| f) Non base station MMSI                                                                                                                                                 |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                              | Verdict |
| Message 4 sent to EUT with non base station MMSI = 22222222:<br>!AIVDM,1,1,,A,43CsGSQv:N9;>wrFc0M6jh1P2000,0*60                                                          | -       |
| Message 20 with slot offset = 5 and increment = 10, received on slot 5, using non Base Station MMSI = 22222222, within 120 NM to EUT:<br>!AIVDM,1,1,,A,D3CsGSP0EN0',0*4E | -       |
| EUT continues using slots that are reserved by message 20.                                                                                                               | Pass    |

| f) Test Results |      |      |     |                                                 |                                                               |
|-----------------|------|------|-----|-------------------------------------------------|---------------------------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment                                                       |
| 15:40:42        | 1608 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwlQh62P,0*60 |                                                               |
| 15:40:47        | 1791 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwQhD02,0*72  |                                                               |
| 15:40:50        | 1875 | B    | 4   | !AIVDM,1,1,,B,4027'SQv>Lg'iOrCR2M6qDG00HMC,0*7D |                                                               |
| 15:40:53        | 1987 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwr1h62P,0*1E |                                                               |
| 15:40:58        | 2186 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwu1h62P,0*1A |                                                               |
| 15:41:00        | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>Lg'sOrCR2M6qDG00@00,0*62 |                                                               |
| 15:41:00        | 20   | A    | 4   | !AIVDO,1,1,,A,46Wng71v>LhWQOrFu2M7AWi0180D,0*60 | Non base-station MMSI produces a base station position report |
| 15:41:02        | 100  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwQ1h81T,0*34 |                                                               |



| f) Test Results |      |      |     |                                                 |                                                                                |
|-----------------|------|------|-----|-------------------------------------------------|--------------------------------------------------------------------------------|
| Time            | Slot | Chan | Msg | Sentence                                        | Comment                                                                        |
| 15:41:08        | 301  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwSQhD02,0*4E |                                                                                |
| 15:41:10        | 375  | B    | 4   | !AIVDM,1,1,,B,4027'SQv>Lga9OrCR2M6qDG00D03,0*2D |                                                                                |
| 15:41:12        | 484  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwV1h87T,0*35 |                                                                                |
| 15:41:18        | 681  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwa1h62T,0*0A |                                                                                |
| 15:41:20        | 750  | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LgaCOrCR2M6qDG00@:f,0*0E |                                                                                |
| 15:41:22        | 858  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwc1hD02,0*1D |                                                                                |
| 15:41:27        | 1033 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwcQh8@9,0*7F |                                                                                |
| 15:41:30        | 1125 | B    | 4   | !AIVDM,1,1,,B,4027'SQv>LgaMOrCR2M6qDG00<03,0*21 |                                                                                |
| 15:41:33        | 1243 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwh1h8CK,0*60 |                                                                                |
| 15:41:38        | 1439 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwk1h<02,0*6E |                                                                                |
| 15:41:40        | 1500 | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LgaWOrCR2M6qDG00D03,0*40 |                                                                                |
| 15:41:42        | 1608 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwm1h0SF,0*70 |                                                                                |
| 15:41:47        | 1791 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwQh@Kw,0*48  |                                                                                |
| 15:41:50        | 1875 | B    | 4   | !AIVDM,1,1,,B,4027'SQv>LgaiOrCR2M6qDG00D03,0*7D |                                                                                |
| 15:41:53        | 1987 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwr1h0S0,0*19 |                                                                                |
| 15:41:58        | 2186 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwtQh0S3,0*7F |                                                                                |
| 15:41:59        | 5    | A    | 20  | !AIVDO,1,1,,A,D6Wng700EN0'0000000000000000,0*64 | Non base-station MMSI sends a Msg 20 reserving all slots ending in {0,1,2,3,4} |
| 15:42:00        | 0    | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LgasOrCR2M6qDG00<03,0*1C |                                                                                |
| 15:42:00        | 20   | A    | 4   | !AIVDO,1,1,,A,40bHc71v>LhaROrFu2M7AWi0180D,0*44 |                                                                                |
| 15:42:02        | 100  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwQ1h62',0*0D |                                                                                |
| 15:42:06        | 270  | A    | 4   | !AIVDO,1,1,,A,40bHc71v>LhaROrFu2M7AWi0184>,0*3A |                                                                                |
| 15:42:08        | 301  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwSQh@4e,0*19 |                                                                                |
| 15:42:10        | 375  | B    | 4   | !AIVDM,1,1,,B,4027'SQv>Lgb9OrCR2M6qDG00@5o,0*73 |                                                                                |
| 15:42:12        | 484  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwV1h62',0*0A |                                                                                |
| 15:42:13        | 520  | A    | 4   | !AIVDO,1,1,,A,40bHc71v>LhaROrFu2M7AWi01888,0*30 |                                                                                |
| 15:42:18        | 681  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6ww'Qh0Rf,0*3F |                                                                                |
| 15:42:20        | 750  | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LgbCOrCR2M6qDG00<04,0*28 |                                                                                |
| 15:42:20        | 770  | A    | 4   | !AIVDO,1,1,,A,40bHc71v>LhaROrFu2M7AWi018<2,0*3E |                                                                                |
| 15:42:22        | 858  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwc1h@=J,0*6C |                                                                                |
| 15:42:26        | 1020 | A    | 4   | !AIVDO,1,1,,A,46Wng71v>LhaROrFu2M7AWi018?t,0*6A |                                                                                |
| 15:42:27        | 1033 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwcQh62',0*5A |                                                                                |
| 15:42:30        | 1125 | B    | 4   | !AIVDM,1,1,,B,4027'SQv>LgbMOrCR2M6qDG008AU,0*31 |                                                                                |
| 15:42:33        | 1243 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwh1h62',0*34 | EUT ignores the Msg 20, continues to treat the slots as free                   |
| 15:42:33        | 1270 | A    | 4   | !AIVDO,1,1,,A,46Wng71v>LhaROrFu2M7AWi018Cn,0*0C |                                                                                |
| 15:42:38        | 1439 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvUg@WAlIp6wwjQh8FO,0*00 |                                                                                |
| 15:42:40        | 1500 | A    | 4   | !AIVDM,1,1,,A,4027'SQv>LgbWOrCR2M6qDG00@GL,0*4F |                                                                                |
| 15:42:40        | 1520 | A    | 4   | !AIVDO,1,1,,A,46Wng71v>LhaROrFu2M7AWi018Gh,0*0E |                                                                                |
| 15:42:43        | 1620 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvUg@WAlIp6wwm1hHID,0*10 |                                                                                |



## 2.14 Message formats

### 2.14.1 Specification Reference

IEC 62287-2, Clause 12.7

### 2.14.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### 2.14.3 Date of Test

09-September-2019

### 2.14.4 Test Results and Methods of Measurement

Received messages – Clause 12.7.1

#### Method of Measurement

Set up standard test environment and operate EUT in autonomous mode. Apply messages according to Table 8 to the VDL including multiple slot messages up to 5 slots. Record messages output by the PI of EUT.

#### Required Results

Confirm that EUT outputs corresponding message with correct field contents and format via the PI or responds as appropriate.

#### Test Results

| Msg. | Requirement                                                                                                                      | Result                                                                                                                                                                                                                                                                                           | Verdict |
|------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 1    | VDM sentence with the same content as transmitted, output to the PI.                                                             | Transmitted message:<br>!AIVDO,1,1,,A,17`B00@2P:wrFu2M7AWH2Q@N0000,0*75<br>Received message:<br>!AIVDM,1,1,,A,17`B00@2P:wrFu2M7AWH2Q@N0000,0*77                                                                                                                                                  | Pass    |
| 2    | VDM sentence with the same content as transmitted, output to the PI.                                                             | Transmitted message:<br>!AIVDO,1,1,,A,27`B00@2P:wrFu2M7AWH2gv40000,0*0C<br>Received message:<br>!AIVDM,1,1,,A,27`B00@2P:wrFu2M7AWH2gv40000,0*0E                                                                                                                                                  | Pass    |
| 3    | VDM sentence with the same content as transmitted, output to the PI.                                                             | Transmitted message:<br>!AIVDO,1,1,,A,37`B00@1@:wrFu2M7AWH51p20000,0*4F<br>Received message:<br>!AIVDM,1,1,,A,37`B00@1@:wrFu2M7AWH51p20000,0*4D                                                                                                                                                  | Pass    |
| 4    | VDM sentence with the same content as transmitted, output to the PI.                                                             | Transmitted message:<br>!AIVDO,1,1,,A,47`B00Av=vbf8OrFu2M7AWi00000,0*4C<br>Received message:<br>!AIVDM,1,1,,A,47`B00Av=vbf8OrFu2M7AWi00000,0*4E                                                                                                                                                  | Pass    |
| 5    | VDM sentence with the same content as transmitted, output to the PI.                                                             | Transmitted messages:<br>!AIVDO,2,1,0,A,53LC9eD00<3T48<@DH1@E=@00000000<br>00000001600000400004kmE20CD53,0*2F<br>!AIVDO,2,2,0,A,kP000000000,2*1D<br>Received message:<br>!AIVDM,2,1,7,A,53LC9eD00<3T48<@DH1@E=@00000000<br>00000001600000400004kmE20CD53,0*2A<br>!AIVDM,2,2,7,A,kP000000000,2*18 | Pass    |
| 6    | VDM sentence with the same content as transmitted, output to the PI.<br><br>EUT responds to message 6 by transmitting message 7. | Transmitted message:<br>!AIVDO,1,1,,A,67`B00Ar4P04048j000000000000,0*02<br>Received message:<br>!AIVDM,1,1,,A,67`B00Ar4P04048j000000000000,0*00<br>Message 7 transmitted by EUT:<br>!AIVDM,1,1,,A,77`B00Ar4P04,0*57                                                                              | Pass    |
| 7    | VDM sentence with the same content as transmitted, output to the PI.                                                             | Transmitted message:<br>!AIVDO,1,1,,A,77`B00Bhoij<0000000000000000,0*7C<br>Received message:                                                                                                                                                                                                     | Pass    |



| Msg. | Requirement                                                                                                                        | Result                                                                                                                                                                                                                                                                                        | Verdict |
|------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|      |                                                                                                                                    | !AIVDM,1,1,,A,77'B00Bhoij<0000000000000000,0*7E                                                                                                                                                                                                                                               |         |
| 8    | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,84uwmjh0@00E1Dm0,0*58<br>Received message:<br>!AIVDM,1,1,,A,84uwmjh0@00E1Dm0,0*5A                                                                                                                                                                       | Pass    |
| 9    | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,97'B00GI1TwrFu2M7AWoq>H04000,0*72<br>Received message:<br>!AIVDM,1,1,,A,97'B00GI1TwrFu2M7AWoq>H04000,0*70                                                                                                                                               | Pass    |
| 10   | The EUT shall not have the capability to receive, process or output message 10 to the PI.                                          | Transmitted message:<br>!AIVDO,1,1,,A,:7'B00Ar4P04,0*58<br>Received message:<br>No response.                                                                                                                                                                                                  | Pass    |
| 11   | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,B7'B00@0I?vUg@WAlIp6wwnQj1EQ,0*74<br>Received message:<br>!AIVDM,1,1,,A,B7'B00@0I?vUg@WAlIp6wwnQj000,0*5C                                                                                                                                               | Pass    |
| 12   | VDM sentence with the same content as transmitted, output to the PI.<br><br>EUT responds to message 12 by transmitting message 13. | Transmitted message:<br>!AIVDO,1,1,,A,<7'B00Ar4P04D5CDP=C7Pijklm0,2*3A<br>Received message:<br>!AIVDM,1,1,,A,<7'B00Ar4P04D5CDP=C7Pijklm0,2*38<br>Message 13 transmitted by EUT:<br>!AIVDM,1,1,,A,=7'B00Ar4P04,0*5D                                                                            | Pass    |
| 13   | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,=7'B00@nnDB8000000000000000,0*72<br>Received message:<br>!AIVDM,1,1,,A,=7'B00@nnDB8000000000000000,0*70                                                                                                                                                 | Pass    |
| 14   | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,>7c98I1@E=B0m<N37;?CD0,4*51<br>Received message:<br>!AIVDM,1,1,,A,>7c98I1@E=B0m<N37;?CD0,4*53                                                                                                                                                           | Pass    |
| 15   | VDM sentence with the same content as transmitted, output to the PI.<br><br>EUT responds to message 15 by transmitting message 24. | Transmitted message:<br>!AIVDO,1,1,,A,?027'SQr4P05P6@000000000000,2*7B<br>Received message:<br>!AIVDM,1,1,,A,?027'SQr4P05P6@000000000000,2*79<br>Message 24A and 24B transmitted by EUT:<br>!AIVDM,1,1,,A,H7'B00@<h5=<9<u@E=@00000000,2*51<br>!AIVDM,1,1,,A,H7'B00E8FC@D000ijklmno00000<,0*53 | Pass    |
| 16   | VDM sentence with the same content as transmitted, output to the PI.<br><br>EUT enters assigned mode, with mode flag set to 1.     | Transmitted message:<br>!AIVDO,1,1,,A,@027'SQr4P041@0h,0*08<br>Received message:<br>!AIVDM,1,1,,A,@027'SQr4P041@0h,0*0A<br>EUT enters assigned mode:<br>!AIVDM,1,1,,A,B7'B00@00?vTpB7Af6;swrQp<01,0*2F                                                                                        | Pass    |
| 17   | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,A027'SQb3Qba02J'Q3TP7Osk05hOwaT0:rb b,0*07<br>Received message:<br>!AIVDM,1,1,,A,A027'SQb3Qba02J'Q3TP7Osk05hOwaT0:rb b,0*05                                                                                                                             | Pass    |
| 18   | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,B4uwmjh02WvR@hWAdd00003QT000,0*76<br>Received message:<br>!AIVDM,1,1,,A,B4uwmjh02WvR@hWAdd00003QT000,0*74                                                                                                                                               | Pass    |
| 19   | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,C4uwmjh02WvUbh7Add00cwR0`V`00000000000000000030,0*2D<br>Received message:<br>!AIVDM,1,1,,A,C4uwmjh02WvUbh7Add00cwR0`V`00000000000000000030,0*2F                                                                                                         | Pass    |
| 20   | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,D027'SP38B<`,0*23<br>Received message:<br>!AIVDM,1,1,,A,D027'SP38B<`,0*21                                                                                                                                                                               | Pass    |
| 21   | VDM sentence with the same content as transmitted, output to the PI.                                                               | Transmitted message:<br>!AIVDO,1,1,,A,E>j3O450b7W0000000000000000Ou;EP>SI H000000o03<0,2*60<br>Received message:<br>!AIVDM,1,1,,A,E>j3O450b7W0000000000000000Ou;EP>SI H000000o03<0,2*62                                                                                                       | Pass    |



| Msg. | Requirement                                                                                                                                                                    | Result                                                                                                                                                                                                                                                                                                | Verdict |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 22   | VDM sentence with the same content as transmitted, output to the PI. EUT outputs ACA and ACS sentences with the same regional settings as message 22.<br><br>Check ACA and ACS | Transmitted message:<br>!AIVDO,1,1,,A,F027`SR2F2H7vm1qp?sD3g41P000,0*1D<br>Received message:<br>!AIVDM,1,1,,A,F027`SR2F2H7vm1qp?sD3g41P000,0*1F<br>ACA and ACS sentence:<br>\$AIACA,0,5200.0,N,00100.0,W,5100.0,N,00200.0,W,3,2085<br>,,2086,,0,0,B,0,*15<br>\$AIACS,0,002222222,103357,29,07,2019*5E | Pass    |
| 23   | VDM sentence with the same content as transmitted, output to the PI.<br><br>EUT enters assigned mode, with mode flag set to 1.                                                 | Transmitted message:<br>!AIVDO,1,1,,A,G027`SSwJPsi7ub1m<000000700,2*34<br>Received message:<br>!AIVDM,1,1,,A,G027`SSwJPsi7ub1m<000000700,2*36<br>EUT enters assigned mode:<br>!AIVDM,1,1,,A,B7`B00@00?vTp7WafG403wIQR331,0*62                                                                         | Pass    |
| 24   | VDM sentence with the same content as transmitted, output to the PI.                                                                                                           | Transmitted message:<br>!AIVDO,1,1,,A,H7`B00@<h5=>0:0EE@000000000,2*13<br>Received message:<br>!AIVDM,1,1,,A,H7`B00@<h5=>0:0EE@000000000,2*11                                                                                                                                                         | Pass    |
| 25   | VDM sentence with the same content as transmitted, output to the PI.                                                                                                           | Transmitted message:<br>!AIVDO,1,1,,A,I027`ST0@00b2ab@6RaaPSRhHqIP,0*21<br>Received message:<br>!AIVDM,1,1,,A,I027`ST0@00b2ab@6RaaPSRhHqIP,0*23                                                                                                                                                       | Pass    |
| 26   | VDM sentence with the same content as transmitted, output to the PI.                                                                                                           | Transmitted message:<br>!AIVDO,1,1,,A,J7`B00D0@00QT0a0Qb2a9PI000,4*5F<br>Received message:<br>!AIVDM,1,1,,A,J7`B00D0@00QT0a0Qb2a9PI000,4*5D                                                                                                                                                           | Pass    |
| 27   | The EUT shall not have the capability to receive, process or output message 27 to the PI.                                                                                      | Transmitted message:<br>!AIVDO,1,1,,A,KkLC9eL?ub3fLM2n,0*3B<br>Received message:<br>No response                                                                                                                                                                                                       | Pass    |



## Transmitted messages – Clause 12.7.2

### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode. Initiate the transmission of messages relevant for a mobile station according to Table 8 by the EUT. Record transmitted messages.

### **Required Results**

Confirm that EUT transmits messages with correct field contents and format or responses as defined in Table 8.

### **Test Results**

| Requirement                                                                     | Result                                                                                                                                                                 | Verdict |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| EUT transmits message 6 when an ABM sentence is sent to the PI.                 | ABM Sentence:<br>!AIABM,1,1,2,512000001,1,6,048j00,4*26<br>Transmitted message:<br>!AIVDM,1,1,,A,67'B00lr4P04048j00,4*0C                                               | Pass    |
| EUT transmits message 7 after receiving a message 6 addressed to own station    | Message received:<br>!AIVDM,1,1,,A,60E<ESQr4P0404205@E=Bm=A8TpL,0*04<br>Transmitted message:<br>!AIVDO,1,1,,A,77'B00@5C5Hp,0*3D                                        | Pass    |
| EUT transmits message 8 when a BBM sentence is sent to the PI.                  | BBM Sentence:<br>!AIBBM,1,1,2,1,8,04005@E=@,2*29<br>Transmitted message:<br>!AIVDM,1,1,,A,87'B00@0@00E1Dm0,0*56                                                        | Pass    |
| EUT transmits message 13 after receiving a message 12 addressed to own station  | Message received:<br>!AIVDO,1,1,,A,<7'B00Ar4P04D5CDP=C7Pijklm0,2*3A<br>Transmitted message:<br>!AIVDM,1,1,,A,=7'B00Ar4P04,0*5D                                         | Pass    |
| EUT transmits Message 18 when operating in autonomous mode.                     | !AIVDM,1,1,,A,B7'B00@00?vTp8WafGM63wc1jE;J,0*60                                                                                                                        | Pass    |
| EUT transmits Message 19 when interrogated by a Message 15 from a base station. | Message received:<br>!AIVDO,1,1,,A,?027'SQr4P05<38000000000000,2*6A<br>Transmitted message:<br>!AIVDM,1,1,,A,C7'B00@00?vTp0WafG563wdP6H2VV4VN':V`00000000T000006P,0*27 | Pass    |
| EUT transmits Messages 24 A and 24 B when operating in autonomous mode.         | Transmitted message 24A:<br>!AIVDM,1,1,,A,H7'B00@<h5=<9<u@E=@00000000,2*51<br>Transmitted message 24B:<br>!AIVDM,1,1,,A,H7'B00E8FC@D000ijklmno00000<,0*53              | Pass    |
| EUT transmits message 25 when an ABM sentence is sent to the PI.                | ABM Sentence:<br>!AIABM,1,1,2,2222222,1,25,0400:PbJQ'bJH8p',0*7F<br>Transmitted message:<br>!AIVDM,1,1,,A,I7'B00L0Qr8p0400:PbJQ'bJH8p',0*52                            | Pass    |
| EUT transmits message 26 when an ABM sentence is sent to the PI.                | ABM Sentence:<br>!AIABM,1,1,2,412000000,1,71,2EQEEBEG735FI000,4*28<br>Transmitted message:<br>!AIVDM,1,1,,A,J7'B00IR>Wh02EQEEBEG735FI008000,2*01                       | Pass    |
| EUT transmits message 27 when LR is enabled.                                    | !AIVDM,1,1,,C,Ko'B00Kwu7CfOU0d,0*37<br>!AIVDM,1,1,,D,Ko'B00Kwu7CfOU0d,0*30                                                                                             | Pass    |



## **2.15 Regional area designation by VDL Message**

### **2.15.1 Specification Reference**

IEC 62287-2, Clause 13.1

### **2.15.2 Equipment Under Test and Modification State**

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### **2.15.3 Date of Test**

17-October-2019

### **2.15.4 Test Results and Methods of Measurement**

#### ***Method of Measurement***

Set up the standard test environment.

- a) With no Message 4. Apply channel management messages (Message 22) to the VDL defining two adjacent regional areas, 1 and 2, with different channel assignments for both regions and a transitional zone extending 4 NM either side of the regional boundary, Table 14 and Figure 11.
- b) With a Base Station within 120 NM transmitting Message 4. Apply the same channel management Messages as in a). Make the EUT approach region 1 from outside region 2 more than 5 NM away from the region boundary, transmitting on default channels. Record transmitted Messages on all 6 channels. This can be accomplished by either using a dedicated test input for simulated position information or a GNSS simulator.
- c) Operate the unit in an area with Tx/Rx mode 1.
- d) Operate the unit in an area with Tx/Rx mode 2.
- e) Transmit Message 22 using a non-base station MMSI.

#### ***Required Results***

The following results are required.

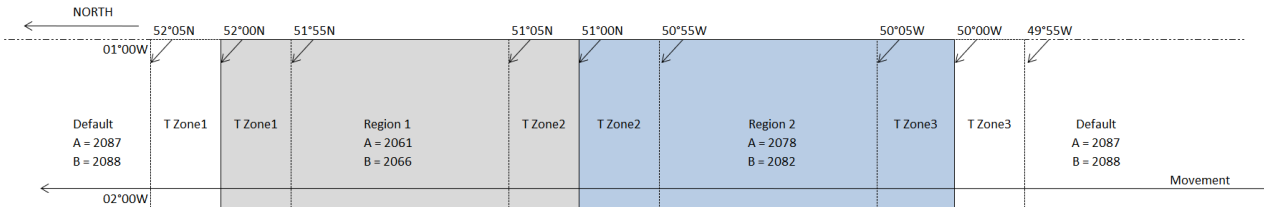
- a) Check that the channel management regions are not stored and not used by the EUT.
- b) Check that the EUT transmits and receives on the primary channels assigned for each region, alternating channels and halving the reporting interval when passing through the transitional zones (see Table 15). Check that the EUT reverts to default autonomous operation on the regional channels after leaving the transitional zones. Check that TXT and ACA sentences are output when defining the area, crossing the boundary of the area and on request. The In-use flag shall be set to "1" if the position is inside the area which is defined by the two corner points of the area setting (e.g. the grey area defining region 2 in Figure 11).
- c) Check that the EUT transmits on only channel A with the nominal reporting interval (the number of transmissions doubles on the active channel when transmitting on one channel only).
- d) Check that the EUT transmits on channel B only with the nominal reporting rate.
- e) When using a non-base station MMSI, verify that the EUT does not accept the channel management.



Test Results

| a) No message 4                                                                                                                                                       |                                             |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------|
| Requirement                                                                                                                                                           | Result                                      | Verdict |
| The following channel management messages were sent to the EUT:<br>!AIVDO,1,1,,A,F01;FQj0n187vm1oR?sD3bH1P000,0*12<br>!AIVDO,1,1,,A,F01;FQj0r1<7ub1oR?pv3bH1P000,0*37 | The EUT does not use or store the settings. | Pass    |

| b) Defining the area                                                                                                                                                  |                                      |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------|
| Requirement                                                                                                                                                           | Result                               | Verdict |
| The following channel management messages were sent to the EUT:<br>!AIVDO,1,1,,A,F027`SR1r287vm1oR?sD3bH20000,0*7C<br>!AIVDO,1,1,,A,F027`SR0n187vm1qp?sD3g420000,0*27 | The regions were accepted by the EUT | Pass    |





| Test | Zone        | Channel | Channel Use | Msg Check       | PI Sentence |                                                                                           | Reporting Interval | Position of Change | Verdict |
|------|-------------|---------|-------------|-----------------|-------------|-------------------------------------------------------------------------------------------|--------------------|--------------------|---------|
| 1    | HS-HSTZ3    | A 2087  | Continued   | 18 Reallocation | -           | -                                                                                         | Halved             | 49°55.1            | Pass    |
|      |             | B 2088  | Ceased      | 18 Timeout      | -           | -                                                                                         |                    |                    |         |
|      |             | C 2078  | Commenced   | 18 Allocation   | -           | -                                                                                         |                    |                    |         |
|      |             | D 2082  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
| 2    | HSTZ3-R2TZ3 | A 2087  | Continued   | 18              | TXT         | \$AITXT,01,01,04,REGION,ENTER,2087,2078,0,1,0*35                                          | Halved             | -                  | Pass    |
|      |             | B 2088  | Not in Use  | N/A             | ACA         | \$AIACA,3,5100.0,N,00100.0,W,5000.0,N,00200.0,W,5,2078,,2082,,0,0,B,1,171956*18           |                    |                    |         |
|      |             | C 2078  | Continued   | 18              | ACS         | \$AIACS,3,00222222,171046,25,09,2019*59                                                   |                    |                    |         |
|      |             | D 2082  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
| 3    | R2TZ3-R2    | A 2087  | Ceased      | 18 Timeout      | -           | -                                                                                         | Normal             | 50°05.1            | Pass    |
|      |             | B 2088  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
|      |             | C 2078  | Continued   | 18 Reallocation | -           | -                                                                                         |                    |                    |         |
|      |             | D 2082  | Commenced   | 18 Allocation   | -           | -                                                                                         |                    |                    |         |
| 4    | R2-R2TZ2    | A 2061  | Commenced   | 18 Allocation   | -           | -                                                                                         | Halved             | 50°55.0            | Pass    |
|      |             | B 2066  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
|      |             | C 2078  | Continued   | 18 Reallocation | -           | -                                                                                         |                    |                    |         |
|      |             | D 2082  | Ceased      | 18 Timeout      | -           | -                                                                                         |                    |                    |         |
| 5    | R2TZ2-R1TZ2 | A 2061  | Continued   | 1               | TXT         | \$AITXT,01,01,36,AIS: Channel management parameters changed*1C                            | Halved             | -                  | Pass    |
|      |             | B 2066  | Not in Use  | N/A             | ACA         | \$AIACA,2,5200.00,N,00100.00,W,5100.00,N,00200.00,W,5,2061,0,2066,0,0,0,B,1,122337.00*3C  |                    |                    |         |
|      |             | C 2078  | Continued   | 1               | ACS         | \$AIACS,2,2222222,121930.00,27,09,2018*78                                                 |                    |                    |         |
|      |             | D 2082  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
| 6    | R2TZ2-R1    | A 2061  | Continued   | 18 Reallocation | -           | -                                                                                         | Normal             | 51°05.1            | Pass    |
|      |             | B 2066  | Commenced   | 18 Allocation   | -           | -                                                                                         |                    |                    |         |
|      |             | C 2078  | Ceased      | 18 Timeout      | -           | -                                                                                         |                    |                    |         |
|      |             | D 2082  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
| 7    | R1-R1TZ1    | A 2061  | Continued   | 18 Reallocation | -           | -                                                                                         | Halved             | 51°55.0            | Pass    |
|      |             | B 2066  | Ceased      | 18 Timeout      | -           | -                                                                                         |                    |                    |         |
|      |             | C 2087  | Commenced   | 18 Allocation   | -           | -                                                                                         |                    |                    |         |
|      |             | D 2088  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
| 8    | R1TZ1-HSTZ1 | A 2061  | Continued   | 1               | TXT         | \$AITXT,01,01,36,AIS: Channel management parameters changed*1C                            | Halved             | -                  | Pass    |
|      |             | B 2066  | Not in Use  | N/A             | ACA         | \$AIACA,3,9000.00,N,18000.00,E,9000.00,S,18000.00,W,4,2087,25,2088,25,0,0,,1,122528.00*71 |                    |                    |         |
|      |             | C 2087  | Continued   | 1               | ACS         | \$AIACS,3,234567898,000000.00,27,09,2018*7B                                               |                    |                    |         |
|      |             | D 2088  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
| 9    | HSTZ1-HS    | A 2061  | Ceased      | 18 Timeout      | -           | -                                                                                         | Normal             | 52°05.0            | Pass    |
|      |             | B 2066  | Not in Use  | N/A             | -           | -                                                                                         |                    |                    |         |
|      |             | C 2087  | Continued   | 18 Reallocation | -           | -                                                                                         |                    |                    |         |
|      |             | D 2088  | Commenced   | 18 Allocation   | -           | -                                                                                         |                    |                    |         |



| c) Tx/Rx mode 1                             |                                      |         |
|---------------------------------------------|--------------------------------------|---------|
| Requirement                                 | Result                               | Verdict |
| EUT is placed in a region with Tx/Rx mode 1 | The EUT transmits on channel A only. | Pass    |

| d) Tx/Rx mode 2                             |                                      |         |
|---------------------------------------------|--------------------------------------|---------|
| Requirement                                 | Result                               | Verdict |
| EUT is placed in a region with Tx/Rx mode 2 | The EUT transmits on channel B only. | Pass    |

| e) Incorrect MMSI = 222222222                                                                                                                                                                |                                             |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------|
| Requirement                                                                                                                                                                                  | Result                                      | Verdict |
| The following base station report and channel management message were sent to the EUT:<br>!AIVDO,1,1,,A,43CsGSQv:L9e0wrFc0M;c@102000,0*7C<br>!AIVDO,1,1,,A,F3CsGSR2B2D7vm1oR?sD3bH1P000,0*41 | The EUT does not use or store the settings. | Pass    |



## 2.16 Channel management by addressed Message 22

### 2.16.1 Specification Reference

IEC 62287-2, Clause 13.2

### 2.16.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1 – SERIALNUMBER - See section 1.3 for modification states

### 2.16.3 Date of Test

11-September-2019

### 2.16.4 Test Results and Methods of Measurement

#### Method of Measurement

Set up a standard test environment and operate the EUT in autonomous mode.

- Send Message 4 within 120 NM and Message 22 with valid regional operating settings that are different from the default operating settings to the EUT. The regional operating area includes the current position of own station.
- Send an addressed Message 22 to the EUT with regional operating settings different from the previous command.
- Move the EUT out of the regional operating area defined by the previous addressed command and into an area without regional operating settings.

#### Required Results

Check that:

- the EUT uses the regional operating settings commanded to it in 13.2.2 a);
- the EUT uses the regional operating settings commanded to it in 13.2.2 b);
- the EUT reverts to default.

#### Test Results

| Broadcast Message 22                                                                                                                                     |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                              | Verdict |
| Transmission of a broadcast Message 22 to the EUT, assigning Tx/Rx mode = 1:<br>!AIVDO,1,1,,A,F020jOR2N2PGvm1oR?sD3bH2P000,0*2A                          | -       |
| EUT uses settings as indicated by the ACA sentence output to the PI:<br>\$AIIACA,1,5100.0,N,00100.0,W,5000.0,N,00200.0,W,6,2087,,2088,,1,0,B,1,165013*1F | Pass    |
| EUT transmits on channel A only while in the operating region.                                                                                           | Pass    |

| Addressed Message 22                                                                                                            |         |
|---------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                     | Verdict |
| Transmission of an addressed Message 22 to the EUT to assign Tx/Rx mode = 2:<br>!AIVDO,1,1,,A,F020jOR2N2PGvm1oR?sD3bH2P000,0*2A | -       |
| The EUT uses the regional operating settings defined in the addressed Message 22, and transmits on channel B only.              | Pass    |

| EUT moved out of regional area – 40°52.7903"N 01°13.9423"W                                                                                                                                                                                |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                                               | Verdict |
| EUT outputs text sentence indicating that channel management parameters have changed:<br>\$AITXT,01,01,04,REGION,DEFAULT*2B                                                                                                               | -       |
| EUT uses default settings as indicated by the sentences output to the PI:<br>\$AIIACA,8,5100.0,N,00100.0,W,5000.0,N,00200.0,W,5,2087,,2088,,0,0,B,1,145258*1B<br>\$AITXT,01,01,04,RGN,DATA,2087,2088,2,0,6*24                             | Pass    |
| EUT transmits Message 18 on designated channels 2087 and 2088 when within region:<br>!AIVDM,1,1,,A,B7*B00@0j?vUg@UnA1t6wwa1hD01,0*24 received on channel 2087<br>!AIVDM,1,1,,B,B7*B00@0j?vUg@UnA1t6wwgQh0Rc,0*05 received on channel 2088 | Pass    |



## 2.17 Invalid regional operating areas

### 2.17.1 Specification Reference

IEC 62287-2, Clause 13.3

### 2.17.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### 2.17.3 Date of Test

02-October-2019

### 2.17.4 Test Results and Methods of Measurement

#### *Method of Measurement*

Set up standard test environment and operate the EUT in autonomous mode. Perform, after completion of all other tests related to change of regional operating settings, the following.

- Send three different valid regional operating settings with adjacent regional operating areas, their corners within 8 NM of each other, to the EUT using Message 22. The current own position of the EUT shall be within the regional operating area of the third regional operating setting.
- Move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

#### *Required Results*

Check that:

- the EUT uses the operating settings that were in use prior to receiving the third regional operating setting;
- the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

#### *Test Results*

| a) Three regional operating areas:<br>Region 1: north east corner (52°N 2°W), south west corner (51°N 3°W) – Tx/Rx Mode = 1<br>Region 2: north east corner (52°N 1°W), south west corner (51°N 2°W) – Tx/Rx Mode = 2<br>Region 3: north east corner (51°N 1°W), south west corner (50°N 2°W) – Channels 2067 & 2068 |                                                                                                |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                                                                                                                                                                         | Result                                                                                         | Verdict |
| A Message 22 defining the first region is sent to the EUT                                                                                                                                                                                                                                                           | The Message 22 sent to the EUT defining region 1 is:                                           | -       |
| A Message 22 defining the second region is sent to the EUT                                                                                                                                                                                                                                                          | The Message 22 sent to the EUT defining region 2 is:                                           | -       |
| A Message 22 defining the second region is sent to the EUT                                                                                                                                                                                                                                                          | The Message 22 sent to the EUT defining region 3 is:                                           | -       |
| The EUT uses the operating settings that were in use before region 3, which contains the EUT, was applied                                                                                                                                                                                                           | The EUT maintains use of the operating settings that were in use prior to receiving Message 22 | Pass    |

| b) EUT moved to 51°30'N, 2°30'W, to be within the first region                                                                            |        |         |
|-------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|
| Requirement                                                                                                                               | Result | Verdict |
| EUT outputs text sentence indicating that channel management parameters have changed:<br>\$AITXT,01,01,04,REGION,ENTER,2087,2088,0,0,0*3B |        | -       |
| EUT transmits on channel A only, as defined by the regional operating settings                                                            |        | Pass    |



| b) EUT moved to 51°30"N, 1°30"W, to be within the second region                                                                           |         |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                               | Verdict |
| EUT outputs text sentence indicating that channel management parameters have changed:<br>\$AITXT,01,01,04,REGION,ENTER,2087,2088,1,0,0*3A | -       |
| EUT transmits on channel B only, as defined by the regional operating settings                                                            | Pass    |



## 2.18 Continuation of autonomous mode reporting interval

### 2.18.1 Specification Reference

IEC 62287-2, Clause 13.4

### 2.18.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### 2.18.3 Date of Test

12-August-2019

### 2.18.4 Test Results and Methods of Measurement

#### **Method of Measurement**

When in the presence of an assigned mode command, and in a transition zone, check that the EUT continues to report at the autonomous reporting interval.

#### **Required Result**

Ensure that the autonomous reporting interval is maintained.

#### **Test Results**

| Pre-Test that assigned mode is working                             |         |
|--------------------------------------------------------------------|---------|
| Requirement                                                        | Verdict |
| Message 16 received by EUT:<br>!AIVDO,1,1,,A,@027'SQR4P046@0P,0*37 | -       |
| EUT enters assigned mode.                                          | Pass    |
| Mode flag = 1.                                                     | Pass    |

| EUT placed @ N50°30' W1°58' after assigned mode is complete                                                                         |         |
|-------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                         | Verdict |
| Message 22 received by EUT:<br>!AIVDO,1,1,,A,F027'SR2N2P7vm1oR?sPSbH2P000,0*3F                                                      | -       |
| EUT confirms it has entered transition zone by transmitting a text message:<br>\$AITXT,01,01,04,TRANSITION,ENTER,2087,2069,0,1,0*22 | -       |
| Message 16 received by EUT:<br>!AIVDO,1,1,,A,@027'SQR4P04381@,0*5B                                                                  | -       |
| EUT ignores assigned mode message and remains at it's current reporting interval.                                                   | Pass    |
| Mode flag = 0.                                                                                                                      | Pass    |



## 2.19 Slot reuse and FATDMA reservations

### 2.19.1 Specification Reference

IEC 62287-2, Clause 13.5

### 2.19.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### 2.19.3 Date of Test

25-September-2019

### 2.19.4 Test Results and Methods of Measurement

#### **Method of Measurement**

Set up standard test environment and operate EUT in autonomous mode. Assure that at test receiver location the signal level received from EUT exceeds the signal level received from test transmitter.

- Transmit test targets on channel A with 50 % channel load. Channel B is free. This test covers Rule 0 and 1.
- Transmit near and distant test targets with 100 % channel load on channel A in all selection intervals which are under observation. Channel B is free. There shall be enough different targets to allow the EUT to meet the requirement to reuse only one slot of each target per frame.
- Transmit near and distant test targets with 100 % channel load on channel B in all selection intervals which are under observation. Channel A is free.
- Transmit Message 4 with a position distance < 120 NM and Message 20 with slot reservations on channel A. Transmit near and distant test targets in the unreserved slots on channel A. Channel B is free.

#### **Required Results**

Confirm the following.

- Only free slots are used for transmission on channel A. Confirm that only slots which are free on channel A are used for transmissions on channel B.
- Slots of the most distant test targets are used for transmission on channel A. Check that not more than one slot of a station is reused in a frame.
- For transmission on channel A, the candidate slots on channel A are organized according to the most distance station on channel B.
- Only unreserved slots are used on channel A. Confirm that slots of the most distant test targets are used for transmission. Confirm that for transmissions on channel B only slots which are not reserved on channel A are used after the next regular time-out 0.

#### **Test Results**

|                                                                                |         |
|--------------------------------------------------------------------------------|---------|
| a) Channel A with 50% load, No. Targets = 5, Block Gap = 5                     |         |
| Requirement                                                                    | Verdict |
| Only free slots are used for transmission on Channel A.                        | Pass    |
| Only slots that are free on Channel A are used for transmissions on Channel B. | Pass    |

|                                                                                |         |
|--------------------------------------------------------------------------------|---------|
| b) Channel A with 100% load, No. Targets = 30, Block Gap = 0                   |         |
| Requirement                                                                    | Verdict |
| Slots of the most distant test targets are used for transmission on Channel A. | Pass    |
| No more than one slot of a station is reused in a frame.                       | Pass    |



| c) Channel B with 100% load, No. Targets = 50, Block Gap = 0                                |         |
|---------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                 | Verdict |
| Slots of the most distant test targets on channel B are used for transmission on channel A. | Pass    |

| d) Channel A with 100% load, No. Targets = 10, Block Gap = 0                   |         |
|--------------------------------------------------------------------------------|---------|
| Requirement                                                                    | Verdict |
| Unreserved slots are used for transmission on channel A.                       | Pass    |
| Slots of the most distant test targets are used for transmission on Channel A. | Pass    |
| After the timeout of message 20, slots that were previously reserved are used. | Pass    |



## **2.20 Long-range application by broadcast**

### **2.20.1 Specification Reference**

IEC 62287-2, Clause 13.6

### **2.20.2 Equipment Under Test and Modification State**

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### **2.20.3 Date of Test**

02-September – 04-October-2019

### **2.20.4 Test Results and Methods of Measurement**

Long-range broadcast – Clause 13.6.1

#### **Method of Measurement**

Set up standard test environment, enable the EUT to transmit Message 27 and operate EUT in autonomous mode. Use base stations MMSI to transmit Message 4 and Message 23. Record the transmitted messages from the EUT. The long-range channels are channel 75 and channel 76.

- a) Do not apply Message 4 and Message 23.
- b) Apply the Message 4 with the long range control bit set to 1 and 0. Place the EUT inside the RF footprint (Message 4 receiving area) of a base station.
- c) Apply the Message 4 with the long range control bit set to 1 and 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the RF footprint area, but outside the base station coverage area.
- d) Apply the Message 4 with the long range control bit set to 1 and 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. Message 23 fields after station type shall not match current settings of EUT.
- e) Repeat the test d) using different MMSIs for Message 4 and Message 23.
- f) Apply the Message 4 with the long range control bit set to 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. After 6 min, remove transmissions of Message 23.
- g) Apply the Message 4 with the long range control bit set to 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. After 6 min, remove transmissions of Message 4.

#### **Required Results**

Check that EUT transmits the appropriate messages. For example, in addition to the normal transmission of Messages 18 and 24 with adequate reporting interval on AIS 1 and AIS 2, confirm the following.

- a) EUT transmits Message 27 alternating the long-range channels with 3 min reporting interval. Confirm that the content of Message 27 is correct.
- b) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval.
- c) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval.
- d) EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval when the Message 4 long-range control bit is set to 1. EUT stops transmitting Message 27



when the Message 4 long-range control bit is set to 0. Verify fields after station type in received Message 23 are ignored.

- e) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval.
- f) EUT begins transmission of Message 27 no sooner than 4 min and no later than 11 min (8 min timeout + 3 min transmission interval) after Message 23 was removed;
- g) EUT begins transmission of Message 27 beyond 3 min after Message 4 was removed.

### Test Results

The NavStatus is set to 15 "unknown" in Message 27. NavStatus is only provided by a Class A unit in Message 1.

Units without MMSI belonging to a base station or that of the EUT, 512000001, are disregarded for the following tests.

| a) Do not apply Message 4 and Message 23                                                                                                       |         |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                    | Verdict |
| The EUT transmits Message 27, alternating between 2075 and 2076:<br>!AIVDM,1,1,,C,Ko`B00Kwu7CfOU0d,0*37<br>!AIVDM,1,1,,D,Ko`B00Kwu7CfOU0d,0*30 | Pass    |
| The content of Message 27 is correct                                                                                                           | Pass    |

| a) Message 27 decode – EUT @ 50°52.7903"N 1°13.9423"W, SOG = 10.0, COG = 11.1 |                                                  |
|-------------------------------------------------------------------------------|--------------------------------------------------|
| !AIVDM,1,1,,C,Ko`B00Kwu7CfOU0d,0*37                                           |                                                  |
| Parameter                                                                     | Decoded Value                                    |
| Message ID                                                                    | 27 - Position report for long-range applications |
| Repeat Indicator                                                              | 3                                                |
| MMSI                                                                          | 512000001                                        |
| Position Accuracy                                                             | 1                                                |
| RAIM Flag                                                                     | 0                                                |
| Navigation Status                                                             | 15                                               |
| Longitude                                                                     | 1 13.9 W                                         |
| Latitude                                                                      | 50 52.7 N                                        |
| SOG                                                                           | 10                                               |
| COG                                                                           | 11                                               |

| a) Long Range Transmissions |         |                                     |                    |
|-----------------------------|---------|-------------------------------------|--------------------|
| Time                        | Channel | Sentence                            | Reporting Interval |
| 10:16:18                    | D       | !AIVDM,1,1,,D,Ko`B00Kwu7CfOU0d,0*30 |                    |
| 10:19:18                    | C       | !AIVDM,1,1,,C,Ko`B00Kwu7CfOU0d,0*37 | 00:03:00           |
| 10:22:18                    | D       | !AIVDM,1,1,,D,Ko`B00Kwu7CfOU0d,0*30 | 00:03:00           |
| 10:25:18                    | C       | !AIVDM,1,1,,C,Ko`B00Kwu7CfOU0d,0*37 | 00:03:00           |

| b) Apply Message 4 with long-range control bit set to 0, EUT inside RF footprint of base station                                          |         |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                               | Verdict |
| Message 4 sent to the EUT:<br>!AIVDO,1,1,,A,404?A71v>A;fKQq8S0LqGH100000,0*25                                                             | -       |
| EUT transmits Message 27 alternating between 2075 and 2076:<br>!AIVDM,1,1,,C,Ko`B00Kwu7CfOU0d,0*37<br>!AIVDM,1,1,,D,Ko`B00Kwu7CfOU0d,0*30 | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval:<br>10:46:18, 10:49:18                                                           | Pass    |

| b) Apply Message 4 with long-range control bit set to 1, EUT inside RF footprint of base station                                          |         |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                               | Verdict |
| Message 4 sent to the EUT:<br>!AIVDO,1,1,,A,404?A71v>A;fKQq8S0LqGH1P0000,0*45                                                             | -       |
| EUT transmits Message 27 alternating between 2075 and 2076:<br>!AIVDM,1,1,,C,Ko`B00Kwu7CfOU0d,0*37<br>!AIVDM,1,1,,D,Ko`B00Kwu7CfOU0d,0*30 | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval:<br>10:58:18, 11:01:18, 11:04:18                                                 | Pass    |



| c) Apply Message 4 with long-range control bit set to 1, Message 23 with station type 10, EUT inside RF footprint but outside coverage area @ 50°52.7N 1°13.9W |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                    | Verdict |
| Message 4 sent to EUT: !AIVDO,1,1,,A,404?A71v>A;fKQq8S0LqGH1P0000,0*45                                                                                         | -       |
| Message 23 sent to EUT: !AIVDO,1,1,,A,G04?A73w7hsi7u4Qm<:00000000,2*61                                                                                         | -       |
| EUT transmits Message 27 alternating between 2075 and 2076.                                                                                                    | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval.                                                                                                      | Pass    |

| c) Apply Message 4 with long-range control bit set to 0, Message 23 with station type 10, EUT inside RF footprint but outside coverage area @ 50°52.7N 1°13.9W |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                    | Verdict |
| Message 4 sent to EUT: !AIVDO,1,1,,A,404?A71v>A<O>Oq8S0LqGH100000,0*7E                                                                                         | -       |
| Message 23 sent to EUT: !AIVDO,1,1,,A,G04?A73w7hsi7u4Qm<:00000000,2*61                                                                                         | -       |
| EUT transmits Message 27 alternating between 2075 and 2076.                                                                                                    | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval.                                                                                                      | Pass    |

| d) Apply Message 4 with long-range control bit set to 1, Message 23 with station type 10, EUT inside coverage area @ 50°52.7N 1°13.9W |         |
|---------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                           | Verdict |
| Message 4 sent to EUT: !AIVDO,1,1,,A,404?A71v>A=sNOFu2M7AWiP0000,0*0C                                                                 | -       |
| Message 23 sent to EUT: !AIVDO,1,1,,A,G04?A73wJPsi7ub1m<:00000G00,2*65                                                                | -       |
| Fields following "Station type" in received Message 23 are ignored, reporting rate and Tx/Rx mode remains the same.                   | Pass    |
| EUT transmits Message 27 alternating between 2075 and 2076.                                                                           | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval.                                                                             | Pass    |

| d) Apply Message 4 with long-range control bit set to 0, Message 23 with station type 10, EUT inside coverage area @ 50°52.7N 1°13.9W |         |
|---------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                           | Verdict |
| Message 4 sent to EUT: !AIVDO,1,1,,A,404?A71v>A>DbOrFu2M7AWi00000,0*74                                                                | -       |
| Message 23 sent to EUT: !AIVDO,1,1,,A,G04?A73wJPsi7ub1m<:00000G00,2*65                                                                | -       |
| Fields following "Station type" in received Message 23 are ignored, reporting rate and Tx/Rx mode remains the same.                   | Pass    |
| EUT stops transmitting Message 27.                                                                                                    | Pass    |

| e) Apply Message 4 (MMSI: 4444444) with long-range control bit set to 1, Message 23 (MMSI: 2222222) with station type 10, EUT inside coverage area @ 50°52 1°14W |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                      | Verdict |
| Message 4 sent to EUT: !AIVDO,1,1,,A,404?A71v>A>LoOrFc0M6jh1P0000,0*48                                                                                           | -       |
| Message 23 sent to EUT: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<:00000G00,2*4E                                                                                           | -       |
| EUT transmits Message 27 alternating between 2075 and 2076.                                                                                                      | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval.                                                                                                        | Pass    |

| e) Apply Message 4 (MMSI: 4444444) with long-range control bit set to 0, Message 23 (MMSI: 2222222) with station type 10, EUT inside coverage area @ 50°52N 1°14W |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                       | Verdict |
| Message 4 sent to EUT: !AIVDO,1,1,,A,404?A71v>A>V0OrFc0M6jh100000,0*6D                                                                                            | -       |
| Message 23 sent to EUT: !AIVDO,1,1,,A,G027`SSwJPsi7ub1m<:00000G00,2*4E                                                                                            | -       |
| EUT transmits Message 27 alternating between 2075 and 2076.                                                                                                       | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval.                                                                                                         | Pass    |

| f) Apply Message 4 with long-range control bit set to 0, Message 23 with station type 10 with same MMSI, EUT inside coverage area, after 6 min stop transmission of Message 23 (Time: 15:24:07) |                                                                                                                       |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------|
| Time                                                                                                                                                                                            | Requirement                                                                                                           | Verdict |
| 15:29:40                                                                                                                                                                                        | EUT begins transmission of Message 27 no sooner than 7 min and no later than 11 min after Message 23 was removed.     | Pass    |
| -                                                                                                                                                                                               | EUT transmits Message 27 with a 3 min reporting interval alternating channels 2075 and 2076 with the correct content. | Pass    |

| g) Apply Message 4 with long-range control bit set to 0, Message 23 with station type 10 with same MMSI, EUT inside coverage area, after 6 min stop transmission of Message 4 (Time: 15:41:02) |                                                                                                                       |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------|
| Time                                                                                                                                                                                           | Requirement                                                                                                           | Verdict |
| 15:45:30                                                                                                                                                                                       | EUT begins transmission of Message 27 after 3 min following the removal of Message 4.                                 |         |
| -                                                                                                                                                                                              | EUT transmits Message 27 with a 3 min reporting interval alternating channels 2075 and 2076 with the correct content. |         |



## Multiple assignment operation – Clause 13.6.2

### **Method of Measurement**

Set up standard test environment, enable the EUT to transmit Message 27 and operate EUT in autonomous mode with a reporting interval of 10 s. Use base stations MMSI to transmit Message 4 and Message 23. Record the transmitted messages from the EUT.

- Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping their RF footprints. Broadcast the Message 23 from multiple base stations with station type 10 to define the base station coverage areas not overlapping. Place the EUT inside the overlapped RF footprint area but outside the coverage area of both base stations.
- Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping RF footprints. Broadcast the Message 23 from multiple base stations with station type 10 to define the base station coverage areas partially overlapping the base station coverage areas. Place the EUT inside the overlapped base station coverage area.
- Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping RF footprints. Broadcast the Message 23 from one base station with station type 10 to define the base station coverage areas. Do not broadcast Message 23 from other base stations. Place the EUT inside the RF footprint area of base station not broadcasting Message 23 but outside the coverage area of the base station transmitting Message 23.

### **Required Results**

Verify that

- irrespective of the Message 4 long-range control bit status of both base stations, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval;
- EUT transmits Message 27;
- irrespective of the Message 4 long range control bit status of both base stations, EUT transmits Message 27 alternating on the long-range channels with 3 min reporting interval.

### **Test Results**

| a) EUT is located within the RF footprint, but outside the coverage area of both base stations          |                                                                                                                                                                 |         |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                             |                                                                                                                                                                 | Verdict |
| Base station 1 transmits position reports with long range control bit set to 0.                         | Base station 1 has MMSI = 2222222 and a position of 51°N, 4°W: !AIVDM,1,1,,A,4027`SQv>R>0COed80M;c@7000S:0*6F                                                   | -       |
| Base station 2 transmits position reports with long range control bit set to 1.                         | Base station 2 has MMSI = 2222333 and a position of 51°N, 0°W: !AIVDM,1,1,,A,4027`wAv::fN0P0000M;c@1P38GQ,0*67                                                  | -       |
| The EUT is positioned inside the RF footprint of both base stations, but outside of the coverage areas. | The EUT is positioned at 51°15"N, 2°10"W, which is within the RF footprints of both stations: !AIVDM,1,1,,A,B7`B00@0j?uQCh7E=C06wwcQh0Qs,0*19                   | -       |
| Message 23 is transmitted by both base stations, defining the coverage areas.                           | The Message 23 sent by the first base station encompasses a region from 52°50"N 4°30"W to 51°10"N 4°59"W: !AIVDM,1,1,,A,G027`SSuG@tgWr:Aos:00000000,2*2F        | -       |
|                                                                                                         | The Message 23 sent by the second base station defines coverage of the region 51°50"N, 0°1"W to 51°10"N, 0°30"W: !AIVDM,1,1,,A,G027`wCwwHtgWwJQos:00000000,2*44 | -       |
| EUT transmits Message 27 alternating between 2075 and 2076.                                             | Message 27 transmitted on channel C: !AIVDM,1,1,,C,Ko`B00Kwrs3h?:0d,0*15<br>Message 27 transmitted on channel D: !AIVDM,1,1,,D,Ko`B00Kwrs3h?:0d,0*12            | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval.                                               | Long range transmissions are made at: 13:55:26, 13:58:26, 14:01:26, 14:04:26, 14:07:26.<br>Average reporting interval is 00:03:00.                              | Pass    |
| Content of Message 27 is correct.                                                                       | For each of the recorded Message 27, the contents are correct.                                                                                                  | Pass    |



| b) EUT is located within the coverage area of both base stations                |                                                                                                                                                                   |         |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                     |                                                                                                                                                                   | Verdict |
| Base station 1 transmits position reports with long range control bit set to 0. | Base station 1 has an MMSI of 2222222 and is located at 51°N, 4°W:<br>!AIVDM,1,1,,B,4027`SQv>R;jiOed80M;c@7000S;,0*19                                             | -       |
| Base station 2 transmits position reports with long range control bit set to 1. | Base station 2 has an MMSI of 2222333 and is located at 51°N, 0°W:<br>!AIVDO,1,1,,A,4027`wAv::fN0P0000M;c@1P38OE,0*79                                             | -       |
| The EUT is positioned within the overlap of the two coverage areas.             | The EUT is positioned at 51°15"N, 2°10"W, which is within the RF footprints of both stations:<br>!AIVDM,1,1,,B,B7`B00@0j?uQCh7E=C06wwT1h85@,0*12                  | -       |
| Message 23 is transmitted by both base stations, defining the coverage areas.   | The Message 23 sent by the first base station defines a coverage area from 51°10"N, 2°0"W to 51°10"N, 3°0"W:<br>!AIVDM,1,1,,A,G027`SSvm0tgWtO1os:00000000,2*75    | -       |
|                                                                                 | The Message 23 sent by the second base station defines a coverage area from 51°50"N, 1°30"W to 51°10"N, 2°30"W:<br>!AIVDM,1,1,,A,G027`wCw7htgWu4Qos:00000000,2*58 | -       |
| EUT transmits Message 27 alternating between 2075 and 2076.                     | Message 27 transmitted on channel C:<br>!AIVDM,1,1,,C,Ko`B00Kwrs3h?:0d,0*15<br>Message 27 transmitted on channel D:<br>!AIVDM,1,1,,D,Ko`B00Kwrs3h?:0d,0*12        | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval.                       | Long range transmissions are made at:<br>11:49:58, 11:52:26, 11:55:26, 11:58:25.<br>The average reporting interval is 00:02:49.                                   | Pass    |
| Content of Message 27 is correct.                                               | For each of the recorded Message 27, the contents are correct.                                                                                                    | Pass    |

| c) EUT is located within the RF footprint of both stations, and outside the coverage area of one station |                                                                                                                                                                             |         |
|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                              |                                                                                                                                                                             | Verdict |
| Base station 1 transmits position reports with long range control bit set to 0.                          | Base station 1 has an MMSI of 2222222 and is located at 51°N, 4°W:<br>!AIVDM,1,1,,B,4027`SQv>R<5MOed80M;c@7008AU,0*10                                                       | -       |
| Base station 2 transmits position reports with long range control bit set to 1.                          | Base station 2 has an MMSI of 2222333 and is located at 51°N, 0°W:<br>!AIVDO,1,1,,A,4027`wAv::fN0P0000M;c@1P38CW,0*67                                                       | -       |
| The EUT is positioned within the overlap of the two coverage areas.                                      | The EUT is positioned at 51°55"N, 2°W, which is within the RF footprints of both stations:<br>!AIVDM,1,1,,A,B7`B00@0j?ueQ07KCs06wwq1h5`H,0*5A                               | -       |
| Message 23 is transmitted by one base station, defining its coverage area.                               | The Message 23 sent by the first base station defines a station coverage area spanning from 51°50"N, 2°W to 51°10"N, 3°W:<br>!AIVDM,1,1,,A,G027`SSvm0tgWtO1os:00000000,2*75 | Pass    |
| EUT transmits Message 27 alternating between 2075 and 2076.                                              | Message 27 transmitted on channel C:<br>!AIVDM,1,1,,C,Ko`B00KwsD3kG:0d,0*58<br>Message 27 transmitted on channel D:<br>!AIVDM,1,1,,D,Ko`B00KwsD3kG:0d,0*5F                  | Pass    |
| EUT transmits Message 27 with a 3 min reporting interval.                                                | Long range transmissions are made at:<br>12:04:26, 12:07:26, 12:10:26, 12:13:26, 12:16:26, 12:19:25<br>The average reporting interval is --:03:00.                          | Pass    |
| Content of Message 27 is correct.                                                                        | For each of the recorded Message 27, the contents are correct.                                                                                                              | Pass    |



## 2.21 DSC Functionality Test

### 2.21.1 Specification Reference

IEC 62287-2, Annex A

### 2.21.2 Equipment Under Test and Modification State

CORTEX VHF SYSTEM; MODEL: M1, S/N: SERIALNUMBER – See section 1.3 for modification states

### 2.21.3 Date of Test

13-November-2019

### 2.21.4 Test Results and Methods of Measurement

#### 2.21.5 A.4.1 / A.4.2 / A.4.3 - Priority of Assigned Mode

DSC test signal number 1:

DSC modulated data signal comprising an infinite length of 01010101 (dotting pattern; refer to ITU-R M.825-3).

DSC test signal number 2:

For test purposes, a "DSC channel management standard test call" is defined as a geographical call to an appropriate area, with category 103 and the expansion Messages 9 (primary channel), 10 or 11 (secondary channel), 12 (NE corner) and 13 (SW corner of region) with valid information.

DSC test signal number 3:

This test signal is an ITU-R M.493 geographic call with the position of the EUT inside the addressing area.

DSC test signal number 4:

This test signal is an ITU-R M.493 individual call addressed to the EUT.

#### **Method of Measurement**

Set the EUT into assigned mode using channels AIS 1 and AIS 2 with a reporting interval of 10 s. Send a sequence of valid calls consisting of:

- DSC test signal number 2,
- DSC test signal number 3,
- DSC test signal number 2,
- DSC test signal number 4, and
- DSC test signal number 2.

#### **Required Results**

Check that the EUT AIS operation is not affected by the interleaved calls.

#### **Test Results**

| A.4.1 / A.4.2 / A.4.3                                                                                                                      |                                                                                                                                                                                                               |         |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                | Result                                                                                                                                                                                                        | Verdict |
| The EUT is set to operate in assigned mode using Message 16, with 'increment a' set to 2, corresponding to a 10 second reporting interval. | The Message 16 transmitted to the EUT is:<br>!AIVDM,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*49                                                                                                                  | -       |
| The sequence of DSC test signals 2,3,2,4,2 is transmitted to the EUT.                                                                      | A sequence of DSC test are transmitted, and successfully received by the EUT. The DSC debugging developer function was enabled during testing, outputting text messages over the PI for testing verification. | -       |



| A.4.1 / A.4.2 / A.4.3                                   |                                                                                                  |         |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------|
| Requirement                                             | Result                                                                                           | Verdict |
| The EUT shall not be affected by the interleaved calls. | The behaviour of the EUT was not affected by the test DSC calls, as assigned mode took priority. | Pass    |

#### A.4.4 / A.4.5 - Scheduling

The purpose of this test is to confirm that the EUT's AIS reporting is not affected during the DSC monitoring times and a response is not transmitted

##### Method of Measurement

Send DSC test signal number 2 to the EUT, with EOS = 127 and another signal with EOS = 117 (RQ).

DSC test signal number 2:

For test purposes, a "DSC channel management standard test call" is defined as a geographical call to an appropriate area, with category 103 and the expansion Messages 9 (primary channel), 10 or 11 (secondary channel), 12 (NE corner) and 13 (SW corner of region) with valid information.

##### Required Results

Check that the EUT's AIS reporting is not affected during the DSC monitoring times.

Check that the EUT accepts the channel management, but a response is not transmitted in either case of EOS = 127 and 117.

##### Test Results

The EUT does not time share DSC with the AIS receivers, as VHF has its own dedicated transceiver. This means the DSC is constantly monitored and this test clause is not applicable to the EUT.

| A.4.4 / A.4.5 |      |      |                                                 |                                                                                         |
|---------------|------|------|-------------------------------------------------|-----------------------------------------------------------------------------------------|
| Time          | Slot | Chan | Sentence                                        | Comment                                                                                 |
| 12:57:36      | 1361 | A    | !AIVDO,1,1,,A,F027 SR2N2P7vm1oR?sD3bH2P000,0*4B | Message 22 defines the initial operating region, using channels 87(A) and 88(B)         |
| 12:57:40      | 1511 | A    | !AIVDO,1,1,,A,@027 SQr4P042P0P,0*23             | Message 16 is used to set EUT into assigned mode, with reporting interval of 10 seconds |
| 12:57:41      | 1551 | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwl1pHH?,0*14 |                                                                                         |
| 12:57:51      | 1926 | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwq1pHN6,0*05 |                                                                                         |
| 12:57:53      | 2008 | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwr1p000,0*05 |                                                                                         |
| 12:58:01      | 51   | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwP1pH0k,0*04 |                                                                                         |
| 12:58:11      | 426  | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwU1pH6b,0*0D |                                                                                         |
| 12:58:21      | 801  | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwb1pH<Q,0*00 |                                                                                         |
| 12:58:24      | 902  | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwcQp000,0*77 |                                                                                         |
| 12:58:31      | 1176 | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwg1pHBH,0*61 |                                                                                         |
| 12:58:41      | 1551 | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwl1pD01,0*6E |                                                                                         |
| 12:58:51      | 1926 | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwq1pD01,0*70 |                                                                                         |
| 12:59:01      | 51   | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwP1pD01,0*52 |                                                                                         |
| 12:59:11      | 426  | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwU1pD01,0*54 |                                                                                         |
| 12:59:21      | 801  | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwb1pD01,0*60 | VTS call is received (EOS = 127)                                                        |
| 12:59:31      | 1176 | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwg1pD01,0*66 | EUT prioritises assigned mode                                                           |
| 12:59:51      | 1926 | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwq1p@N6,0*0D | AIS reporting is not affected                                                           |
| 13:00:01      | 51   | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwP1p@0k,0*0C |                                                                                         |
| 13:00:11      | 426  | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwU1p@6b,0*05 |                                                                                         |
| 13:00:21      | 801  | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwb1p@<Q,0*08 |                                                                                         |
| 13:00:31      | 1176 | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwg1p@BH,0*69 | VTS call is received (EOS = 117)                                                        |
| 13:00:41      | 1551 | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwl1p<01,0*16 | EUT prioritises assigned mode                                                           |
| 13:00:51      | 1926 | B    | !AIVDM,1,1,,B,B7 B00@0I?vUg@WAlIp6wwq1p<01,0*08 | AIS reporting is not affected                                                           |
| 13:01:01      | 51   | A    | !AIVDM,1,1,,A,B7 B00@0I?vUg@WAlIp6wwP1p<01,0*2A |                                                                                         |



| Time     | Debug message output to peripheral interface                                                               | Comment                                   |
|----------|------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| 12:59:22 | (dsc_vts_area): Got a new DSC VTS area message:                                                            |                                           |
| 12:59:22 | (dsc_vts_area): Received address quadrant 1, lat 51°0.00, lon -2°0.00, ver 59.00, hor 59.00.               |                                           |
| 12:59:22 | (vts_check_area): Check Latitude: 50°52.79, Boundaries: 50°1.00 to 51°0.00                                 |                                           |
| 12:59:22 | (vts_check_area): Check Longitude: -1°13.94, Boundaries: -2°0.00 to -1°1.00                                |                                           |
| 12:59:22 | (dsc_vts_decode_message): Checking for message data at:                                                    | Channel management command with EOS = 127 |
| 12:59:22 | >>:104,009,020,087,000,104,010,020,067,000,104,012,015,010,000,000,010,000,104,013,015,000,000,000,020,000 |                                           |
| 12:59:22 | (dsc_vts_decode_message): found request for RF channel1 as 2087.                                           |                                           |
| 12:59:22 | (dsc_vts_decode_message): found request for RF channel2 as 2067.                                           |                                           |
| 12:59:30 | (dsc_vts_decode_message): found regional area NE lat 51°0.00 and lon -1°0.00.                              |                                           |
| 12:59:30 | (dsc_vts_decode_message): found regional area SW lat 50°0.00 and lon -2°0.00.                              |                                           |
| 13:00:30 | (dsc_vts_area): Got a new DSC VTS area message:                                                            |                                           |
| 13:00:30 | (dsc_vts_area): Received address quadrant 1, lat 51°0.00, lon -2°0.00, ver 59.00, hor 59.00.               |                                           |
| 13:00:30 | (vts_check_area): Check Latitude: 50°52.79, Boundaries: 50°1.00 to 51°0.00                                 |                                           |
| 13:00:30 | (vts_check_area): Check Longitude: -1°13.94, Boundaries: -2°0.00 to -1°1.00                                |                                           |
| 13:00:30 | (dsc_vts_decode_message): Checking for message data at:                                                    | Channel management command with EOS = 117 |
| 13:00:30 | >>:104,009,020,087,000,104,010,020,067,000,104,012,015,010,000,000,010,000,104,013,015,000,000,000,020,000 |                                           |
| 13:00:30 | (dsc_vts_decode_message): found request for RF channel1 as 2087.                                           |                                           |
| 13:00:30 | (dsc_vts_decode_message): found request for RF channel2 as 2067.                                           |                                           |
| 13:00:30 | (dsc_vts_decode_message): found regional area NE lat 51°0.00 and lon -1°0.00.                              |                                           |
| 13:00:31 | (dsc_vts_decode_message): found regional area SW lat 50°0.00 and lon -2°0.00.                              |                                           |

#### 2.21.6 A.4.6 - DSC Flag in Message 18

The purpose of this test is to confirm that the DSC flag is set properly when DSC functionality is available.

##### Method of Measurement

Perform the following:

- enable DSC monitoring;
- disable DSC monitoring.

##### Required Results

Check that:

- the DSC flag is set to one, and
- the DSC flag is set to zero.

##### Test Results

As a result of the EUT having dedicated demodulation processes for DSC, the DSC flag is always set to '1' in Message 18 and the monitoring cannot be disabled. This can be seen in the Message 18 decode below, and as a result, this test is not applicable to the EUT.

| !AIVDM,1,1,,A,B7 B00@0j?vUg@WAlp6wwU1h5jT,0*22 |                                  |               |
|------------------------------------------------|----------------------------------|---------------|
| Parameter                                      | Value                            | Decoded Value |
| Message ID                                     | 010010                           | 18            |
| Repeat Indicator                               | 00                               | 0             |
| MMSI                                           | 01111010000100100000000000000001 | 512000001     |
| Reserved                                       | 00000000                         | 0             |



| IAIVDM,1,1,,A,B7 B00@0j?vUg@WAlIp6wwU1h5jT,0*22 |                    |                             |
|-------------------------------------------------|--------------------|-----------------------------|
| Parameter                                       | Value              | Decoded Value               |
| SOG                                             | 200                | 20                          |
| Position Accuracy                               | 1                  | 1 - high (> 10 m)           |
| Longitude                                       | 267696033 (739423) | 1 13.9423 W                 |
| Latitude                                        | 30527902           | 50 52.7902 N                |
| COG                                             | 111                | 11.1                        |
| True Heading                                    | 111111111          | 511 - not available         |
| Time Stamp                                      | 001010             | 10                          |
| Spare                                           | 00                 | 0                           |
| Class B unit flag                               | 0                  | 0                           |
| Class B display flag                            | 0                  | 0                           |
| <b>Class B DSC flag</b>                         | <b>1</b>           | <b>1</b>                    |
| Class B band flag                               | 1                  | 1                           |
| Class B Message 22 flag                         | 1                  | 1                           |
| Mode flag                                       | 0                  | 0                           |
| RAIM Flag                                       | 0                  | 0 - RAIM not in use         |
| Comm State Flag                                 | 0                  | 0 - SOTDMA                  |
| Communication State - Sync State                | 00                 | 0                           |
| Communication State - SOTDMA Slot Timeout       | 1                  | 1                           |
| Communication State - SOTDMA Sub Message        | 14:41              | UTC Hour and Minute = 14:41 |
| Message ID                                      | 010010             | 18                          |

#### 2.21.7 A.4.7 - DSC Monitoring Time Plan

The purpose of this test is to confirm that DSC commands are received during DSC monitoring times and, if time-sharing is used, are not received outside those times.

##### **Method of Measurement**

Perform the following:

- transmit DSC test signal 2 during monitoring time;
- transmit DSC test signal 2 outside monitoring time.

##### **Required Results**

Check that:

- the DSC call is received, and
- the DSC call is not received.

##### **Test Results**

As a result of the EUT having dedicated VHF transceivers for DSC, the EUT does not implement monitoring times.

Therefore, this test is not applicable to the EUT.

#### 2.21.8 A.4.8 - Replacement or Erasure of Dated or Remote Regional Operating Settings

##### **Method of measurement**

Set up standard test environment. Send a valid regional operating setting to the EUT by Message 22 with the regional operating area including the own position of the EUT. Consecutively send a further seven (7) valid regional operating settings to EUT, using both Message 22 and DSC test signal number 2, with regional operating areas not overlapping to the first and to each other. Perform the following in the order shown.

- Send a ninth Message 22 to the EUT with valid regional operating areas not overlapping with the previous eight regional operating areas.
- Step 1: set own position of EUT into any of the regional operating areas defined by the second to the ninth telecommands sent to the EUT previously.  
Step 2: send a tenth telecommand to the EUT, with a regional operating area which partly



overlaps the regional operating area to which the EUT was set by step 1 but which does not include the own position of the EUT.

- c) Step 1: move own position of EUT to a distance of more than 500 NM from all regions defined by previous commands.

Step 2: consecutively set own position of EUT to within all regions defined by the previous telecommands.

### Required results

After the initialisation, the EUT shall operate according to the regional operating settings defined by the first Message 22 sent.

- a) Check that the most distant area is removed.  
b) Step 1: check that the EUT changes its operating settings to those of that region which includes own position of the EUT.

Step 2: check that the EUT reverts to the default operating settings.

NOTE Since the regional operating settings to which the EUT was set in step 1 are erased due to step 2, and since there is no other regional operating setting due to their non-overlapping definition, the EUT returns to default.

- c) Step 1: check that the EUT operates with the default settings.  
Step 2: check that the EUT operates with the default settings.

### Test results

| a) Using Message 22                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |         |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                   | Result                                                                                                                                                                                                                                                                                                                                                                                                                   | Verdict |
| An initial region shall be defined that contains the EUT.                                                     | The EUT is located at 50°50N, 3°30W:<br>!AIVDM,1,1,,B,B7 B00@0I?swah7AI:06wwTQr001,0*3C<br>which is within the first region defined by Message 22:<br>!AIVDM,1,1,,A,F027 SR2N2P7tO1oR?n'3bH2P000,0*50                                                                                                                                                                                                                    | -       |
| Seven valid regions that do not overlap the initial region are defined using Message 22.                      | Seven further regions are defined using Message 22:<br>!AIVDM,1,1,,A,F027 SR2N2P7ub1oR?pv3bH2P000,0*74<br>!AIVDM,1,1,,A,F027 SR2N2P7vm1oR?sD3bH2P000,0*49<br>!AIVDM,1,1,,A,F027 SR2N2P7tO1jn?n'3Q02P000,0*22<br>!AIVDM,1,1,,A,F027 SR2N2P7ub1jn?pv3Q02P000,0*06<br>!AIVDM,1,1,,A,F027 SR2N2P7vm1jn?sD3Q02P000,0*3B<br>!AIVDM,1,1,,A,F027 SR2N2P7tO1f:?n'3G'2P000,0*3C<br>!AIVDM,1,1,,A,F027 SR2N2P7ub1f:?pv3G'2P000,0*18 | -       |
| A ninth Message 22 shall be transmitted to the EUT, which does not overlap any of the previous transmissions. | The ninth region does not overlap any of the previous regions and is located between regions two and five:<br>!AIVDM,1,1,,A,F027 SR2N2P7ub1lk?pv3VN2P000,0*7C                                                                                                                                                                                                                                                            | -       |
| When the ninth region is sent to the EUT, the most distant region shall be removed.                           | The most distant region is region eight, which is removed from the active regions list when the ninth region is added. This can be seen in the text output to the PI:<br>\$AITXT,01,01,04,RGN,ERASE,DIST,B,4700.0,N,00200.0,W,4600.0,N,00300.0,W*2B<br>\$AITXT,01,01,04,RGN,DATA,2087,2088,0,0,6*26<br>\$AITXT,01,01,04,RGN,NEW,B,4950.0,N,00200.0,W,4910.0,N,00300.0,W*14                                               | Pass    |

| b) Using Message 22                                                                                                                         |                                                                                                                                                                                                                                                                                  |         |
|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                 | Result                                                                                                                                                                                                                                                                           | Verdict |
| The EUT is to be moved into one of the regions defined by the second to ninth regional assignments.                                         | The EUT is moved 1° east, into region two:<br>\$AITXT,01,01,04,REGION,EXIT,2087,2088,0,0,0*73<br>\$AIACA,9,5100.0,N,00200.0,W,5000.0,N,00300.0,W,6,2087,,2088,,0,0,B,1,130919*17<br>\$AIACS,9,002222222,130749,13,11,2019*52<br>\$AITXT,01,01,04,REGION,ENTER,2087,2088,0,0,0*3B | -       |
| The EUT shall use the regional operating settings of the region it is moved into.                                                           | The EUT correctly adopts the new regional settings.                                                                                                                                                                                                                              | Pass    |
| A tenth telecommand is to be send to the EUT, which overlaps the region the EUT resides in, but the tenth region shall not contain the EUT. | The tenth region sent to the EUT overlaps region two:<br>!AIVDO,1,1,,A,F027 SR2N2P7tO1mv?oJ3W@2P000,0*62                                                                                                                                                                         | -       |
| Check that the EUT reverts to default operating settings.                                                                                   | The EUT successfully reverts to default:<br>\$AITXT,01,01,04,RGN,DATA,2087,2088,0,0,6*26<br>\$AITXT,01,01,04,REGION,DEFAULT*2B                                                                                                                                                   | Pass    |



| c) Using Message 22                                                                                                  |                                                                                                                                                                                                  |         |
|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                          | Result                                                                                                                                                                                           | Verdict |
| The EUT shall be moved a distance of more than 500 nautical miles from all regions defined by the previous commands. | The EUT is moved 2100 NM from the closest region:<br>!AIVDM,1,1,,A,B7'B00@0I?u8q@1S;b06wwmQp8II,0*67                                                                                             | -       |
| The EUT shall operate with the default settings.                                                                     | The EUT maintains the default settings, transmitting on channels 87 and 88 with a 30 second reporting interval.                                                                                  | Pass    |
| The EUT shall be moved consecutively through each of the regions defined by the previous telecommands.               | The EUT moves through regions one through ten, using only the default settings. No text messages alerting are output to the PI during the process, and the results of an AQA query return empty. | Pass    |

| a) Using DSC Telecommand                                                                                      |                                                                                                                                                                                                                                                     |         |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                   | Result                                                                                                                                                                                                                                              | Verdict |
| An initial region shall be defined that contains the EUT.                                                     | The EUT is located at 50°50N, 3°30W:<br>!AIVDM,1,1,,B,B7'B00@0I?swah7AI:06wwgQh5ht,0*0D which is within the first region defined by the DSC call.                                                                                                   | -       |
| Seven valid regions that do not overlap the initial region are defined using DSC calls.                       | Seven further regions are defined using DSC calls. The symbols transmitted to the EUT can be found in the logs.                                                                                                                                     | -       |
| A ninth Message 22 shall be transmitted to the EUT, which does not overlap any of the previous transmissions. | The ninth region does not overlap any of the previous regions and is located between regions two and five.                                                                                                                                          | -       |
| When the ninth region is sent to the EUT, the most distant region shall be removed.                           | The most distant region is region eight, which is removed from the active regions list when the ninth region is added. This can be seen in the text output to the PI:<br>\$AITXT,01,01,04,RGN,ERASE,DIST,B,4700.0,N,00200.0,W,4600.0,N,00300.0,W*2B | Pass    |

| b) Using DSC Telecommand                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                 |         |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                 | Result                                                                                                                                                                                                                                                                                                                                                                          | Verdict |
| The EUT is to be moved into one of the regions defined by the second to ninth regional assignments.                                         | The EUT is moved 1° east, into region two:<br>!AIVDM,1,1,,B,B7'B00@0I?u8q@7AI:06wwhQh8D2,0*14<br>\$AIACS,5,002222222,141523,13,11,2019*56<br>\$AITXT,01,01,04,REGION,EXIT,2087,2088,0,0,0*73<br>\$AIACA,6,5100.0,N,00200.0,W,5000.0,N,00300.0,W,5,2087,,2088,,0,0,D,1,142206*1D<br>\$AIACS,6,002222222,141544,13,11,2019*54<br>\$AITXT,01,01,04,REGION,ENTER,2087,2088,0,0,0*3B | -       |
| The EUT shall use the regional operating settings of the region it is moved into.                                                           | The EUT correctly adopts the new regional settings.                                                                                                                                                                                                                                                                                                                             | Pass    |
| A tenth telecommand is to be sent to the EUT, which overlaps the region the EUT resides in, but the tenth region shall not contain the EUT. | The tenth region sent to the EUT overlaps region two.                                                                                                                                                                                                                                                                                                                           | -       |
| Check that the EUT reverts to default operating settings.                                                                                   | The EUT successfully reverts to default:<br>\$AITXT,01,01,04,RGN,NEW,B,5020.0,N,00200.0,W,4950.0,N,00300.0,W*1F<br>\$AITXT,01,01,04,RGN,DATA,2087,2088,0,0,5*25<br>\$AITXT,01,01,04,REGION,DEFAULT*2B                                                                                                                                                                           | Pass    |

| c) Using Message 22                                                                                                  |                                                                                                                                                                                                  |         |
|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                          | Result                                                                                                                                                                                           | Verdict |
| The EUT shall be moved a distance of more than 500 nautical miles from all regions defined by the previous commands. | The EUT is moved 2100 NM from the closest region:<br>!AIVDM,1,1,,B,B7'B00@0I?u8q@HfVn06wwh1h0R7,0*7C                                                                                             | -       |
| The EUT shall operate with the default settings.                                                                     | The EUT maintains the default settings, transmitting on channels 87 and 88 with a 30 second reporting interval.                                                                                  | Pass    |
| The EUT shall be moved consecutively through each of the regions defined by the previous telecommands.               | The EUT moves through regions one through ten, using only the default settings. No text messages alerting are output to the PI during the process, and the results of an AQA query return empty. | Pass    |



## 2.21.9 A.4.9 -Test of Addressed Telecommand

### Method of measurement

Set up a standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order.

- Send a DSC test signal number 2 with valid regional operating settings that are different from the default operating settings, to the EUT with a regional operating area, which contains the current position of own station.
- Send an addressed DSC channel management command to the EUT with different regional operating settings than the previous command.
- Move the EUT out of the regional operating area defined by the previous addressed telecommand into an area without regional operating settings.

### Required results

Check that:

- the EUT uses the regional operating settings commanded to it in A.4.9.1 a);
- the EUT uses the regional operating settings commanded to it in A.4.9.1 b)
- the EUT reverts to default.

### Test results

| a)                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                              |         |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                          | Result                                                                                                                                                                                                                                                                                                                                       | Verdict |
| A DSC test signal number 2, defining a region that encompasses the EUT with non-default operating settings is to be sent to the EUT. | The regional DSC call transmitted to the EUT sets the primary AIS channel to 87 and secondary AIS channel to 67, as seen in the debugging output:<br>(dsc_vts_area): Got a new DSC VTS area message:<br>(dsc_vts_decode_message): found request for RF channel1 as 2087.<br>(dsc_vts_decode_message): found request for RF channel2 as 2067. | -       |
| The EUT shall use the settings defined in the regional DSC call.                                                                     | The EUT adopts the settings commanded to it in the regional operating settings. Note channel A = 87, channel B = 88, channel C = 67.                                                                                                                                                                                                         | Pass    |

| a)   |      |     |                                                  |         |                              |
|------|------|-----|--------------------------------------------------|---------|------------------------------|
| Slot | Chan | Msg | Sentence                                         | Timeout | Comment                      |
| 1188 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwwgQh@BT,0*58 | 4       |                              |
| 1587 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwwm1h8Hk,0*7F | 2       |                              |
| 1765 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwwQh000,0*35  | 0       | Slots on B begin timing out  |
| 1956 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwr1h@NT,0*21  | 4       | Slots on A are not timed out |
| 2132 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwt1h000,0*4E  | 0       |                              |
| 79   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwQ1h0SI,0*72  | 0       |                              |
| 260  | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwS1h000,0*69  | 0       |                              |
| 470  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwV1hD01,0*1A  | 5       |                              |
| 831  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwc1h8<w,0*19  | 2       |                              |
| 1013 | B    | 18  | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwv1h000,0*5F  | 0       | EUT times out channel B      |
| 1188 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwwgQh<01,0*33 | 3       |                              |
| 1587 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwwm1h5sH,0*6A | 1       |                              |
| 1774 | C    | 18  | !AIVDM,1,1,,C,B7'B00@0vgvB4p7g:k23wwghq0d1,0*6F  | 0       | New slots are reserved on C  |
| 1956 | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwr1h<01,0*46  | 3       |                              |
| 94   | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>Eh,4*54            | 0       |                              |
| 470  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwV1h@7F,0*6E  | 4       |                              |
| 626  | C    | 18  | !AIVDM,1,1,,C,B7'B00@0vgvB>07>En06ww`1j1QQ,0*06  | 0       | EUT begins using channels    |
| 831  | A    | 18  | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwc1h5sL,0*60  | 1       | A and C for transmissions.   |

| b)                                                                                                                                 |                                                                                                            |         |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                        | Result                                                                                                     | Verdict |
| An addressed DSC channel management command shall be sent to the EUT, with regional operating settings different from the default. | The addressed DSC call transmitted to the EUT sets the primary AIS channel to 87 and secondary AIS channel | -       |



| b)                                                                |                                                                                                                                                                                                                                         |         |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                       | Result                                                                                                                                                                                                                                  | Verdict |
|                                                                   | to 68, as seen in the debugging output:<br>(dsc_vts_ind): Got a new DSC VTS individual message.<br>(dsc_vts_decode_message): found request for RF channel1 as 2087.<br>(dsc_vts_decode_message): found request for RF channel2 as 2068. |         |
| The EUT shall use the settings defined in the addressed DSC call. | The EUT adopts the settings commanded to it in the addressed DSC call, as seen in the table below. It should be noted that channel A = 87, channel B = 88, channel C = 68.                                                              | Pass    |

| b)   |      |                                                   |         |                                                          |
|------|------|---------------------------------------------------|---------|----------------------------------------------------------|
| Slot | Chan | Sentence                                          | Timeout | Comment                                                  |
| 1956 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwr1h8NT,0*59   | 2       | EUT is using channels A and C, as instructed in part a). |
| 2142 | C    | !AIVDM,1,1,,C,B7'B00@0vgvB8h7>Enh,2*5F            | 0       |                                                          |
| 94   | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwQ1hH1N,0*6F   | 6       |                                                          |
| 241  | C    | !AIVDM,1,1,,C,B7'B00@0vgvB8h7>En06wwS1h000,0*68   | 0       | EUT begins timing out channel C.                         |
| 470  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwV1h<01,0*62   | 3       | EUT maintains schedule on A.                             |
| 477  | C    | !AIVDM,1,1,,C,H7'B00AAEJI=D@0000000000001EmP,4*4B | 0       |                                                          |
| 831  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwc1h0S5,0*3C   | 0       |                                                          |
| 850  | C    | !AIVDM,1,1,,C,H7'B00DUFK@E000DEF2C?038:37<,0*60   | 0       |                                                          |
| 1016 | C    | !AIVDM,1,1,,C,B7'B00@0vgvB8h7>En06wwQh000,0*3E    | 0       | EUT finishes timing out slots.                           |
| 1188 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwgQh5sP,0*18   | 1       |                                                          |
| 1578 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwm1h@Hb,0*0E   | 4       |                                                          |
| 1956 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwr1h5sP,0*6D   | 1       |                                                          |
| 94   | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwQ1hD01,0*1D   | 5       |                                                          |
| 274  | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwSQj1LQ,0*11   | 0       | EUT begins reserving slots on channel D.                 |
| 470  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwV1h87F,0*16   | 2       |                                                          |
| 826  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwbQhD01,0*4E   | 5       |                                                          |
| 995  | D    | !AIVDM,1,1,,D,B7'B00@0vgtB907>En06ww1j1R1,0*62    | 0       |                                                          |
| 1188 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwgQh0S@,0*2D   | 0       |                                                          |
| 1387 | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwj1j1K1,0*2F   | 0       |                                                          |
| 1578 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwm1h<01,0*59   | 3       |                                                          |
| 1956 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwr1h0Rh,0*71   | 0       |                                                          |
| 2118 | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwt1h<01,0*45   | 3       | EUT alternates transmissions between channels A and D.   |
| 94   | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwQ1h@1N,0*67   | 4       |                                                          |
| 274  | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwSQhD01,0*7A   | 5       |                                                          |

| c)                                                                                                                                                             |                                                                                                                    |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                                                                    | Result                                                                                                             | Verdict |
| The EUT shall be moved out of the regional operating area defined by the previous addressed telecommand, and into an area without regional operating settings. | The EUT is moved 1° east, so that it is not within any of the active regional operating areas.                     | -       |
| The EUT shall revert to default.                                                                                                                               | The EUT times out slots on channels A and D, before reserving slots on channels A (87 – AIS 1) and B (88 – AIS 2). | Pass    |



## 2.21.10 A.4.10 -Test of Invalid Operating Areas

### General

Test for invalid regional operating areas (three regional operating areas with same corner).

### Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order after completion of all other tests related to change of regional operating settings:

- send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by DSC test signal number 2. The current own position of the EUT shall be within the regional operating area of the third regional operating setting;
- move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

### Required results

Check that:

- the EUT uses the operating settings that were in use prior to receiving the third regional operating setting;
- the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

### Test results

| a)                                                                                                                    |                                                                                                                                                                               |         |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                                                           | Result                                                                                                                                                                        | Verdict |
| Three regional operating areas are to be transmitted to the EUT, with their corners within eight miles of each other. | Three regional operating areas are defined using DSC test signal number 2; their corners meet at 50°N, 2°W.                                                                   | -       |
| The third regional operating area shall include the EUT.                                                              | The EUT is located at 49°30N, 1°30W:<br>!AIVDM,1,1,,B,B7'B00@0vgvB8h75;r06wwe1h0S4,0*51<br>The third operating region spans from 49°N up to 50°N, and from 1°W across to 2°W. | -       |
| The EUT shall use the operating settings that were in use prior to receiving the third regional operating setting.    | The EUT does not change its operating behaviour after the third region is applied. The third region commands the use of channels 87 and 68.                                   | Pass    |

| b)                                                                                  |                                                                                                                                |         |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------|
| Requirement                                                                         | Result                                                                                                                         | Verdict |
| The EUT is moved into region two, which is 1° north of the third region.            | The EUT is moved into region two:<br>!AIVDM,1,1,,A,B7'B00@0vgvB8h75>En06wwUQh0SQ,0*0E                                          | -       |
| The EUT shall now begin using the regional operating settings of the second region. | The EUT begins transmitting on channels 87 (A) and 68(D), once it moves into the operating region, as seen in the table below. | Pass    |
| The EUT is moved into region one, which is 1° west of region two.                   | The EUT is moved into region one:<br>!AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwbQh8=5,0*23                                           | -       |
| The EUT shall now begin using the regional operating settings of the first region.  | The EUT begins transmitting on channels 87 (A) and 67 (C) once it moves into the operating region, as seen below.              | Pass    |

| a)   |      |                                                 |                                                                |
|------|------|-------------------------------------------------|----------------------------------------------------------------|
| Slot | Chan | Sentence                                        | Comment                                                        |
| 107  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h75;r06wwQ1j0@i,0*2A | DSC call defines region three.                                 |
| 275  | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h75;r06wwS1h5pl,0*19 | EUT continues to use channels A and B, without timing them out |
| 451  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h75;r06wwUQh5pl,0*7C |                                                                |
| 637  | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h75;r06ww'1h@9u,0*0F |                                                                |
| 843  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h75;r06wwbQh5pl,0*4B |                                                                |
| 1030 | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h75;r06wwe1h<01,0*3B |                                                                |



| a)   |      |                                                 |         |  |
|------|------|-------------------------------------------------|---------|--|
| Slot | Chan | Sentence                                        | Comment |  |
| 1231 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h75;r06wwh1h<01,0*35 |         |  |
| 1413 | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h75;r06wwj1h5pl,0*20 |         |  |
| 1582 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h75;r06wwlQh<01,0*51 |         |  |

| b) Moving into region two |      |      |                                                    |         |                                             |
|---------------------------|------|------|----------------------------------------------------|---------|---------------------------------------------|
| Time                      | Slot | Chan | Sentence                                           | Timeout | Comment                                     |
| 15:14:02                  | 107  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwQ1h5pp,0*6D    | 1       | Moving into region two                      |
| 15:14:07                  | 275  | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwS1h000,0*69    | 0       | EUT begins timing out slots on channel B    |
| 15:14:12                  | 451  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwUQh0SQ,0*0E    | 0       |                                             |
| 15:14:17                  | 637  | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06ww`1h000,0*5A    | 0       |                                             |
| 15:14:22                  | 843  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwbQh0S4,0*5C    | 0       |                                             |
| 15:14:27                  | 1030 | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwel1h000,0*5F   | 0       |                                             |
| 15:14:32                  | 1231 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwh1h8C?,0*25    | 2       |                                             |
| 15:14:37                  | 1413 | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwj1h000,0*50    | 0       |                                             |
| 15:14:42                  | 1582 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwlQh8Hf,0*13    | 2       |                                             |
| 15:14:47                  | 1767 | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwo1h000,0*55    | 0       |                                             |
| 15:14:52                  | 1979 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwqQh<01,0*25    | 3       |                                             |
| 15:14:57                  | 2148 | B    | !AIVDM,1,1,,B,B7'B00@0vgvB8h7>En06wwt1h000,0*4E    | 0       | EUT finishes timing out slots on channel B  |
| 15:15:02                  | 107  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwQ1h0S7,0*0C    | 0       |                                             |
| 15:15:12                  | 474  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwUQhL01,0*71    | 7       |                                             |
| 15:15:17                  | 639  | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>Er06ww`1j1MAVF<,2*61 | 0       | EUT reserves slots on channel D using ITDMA |
| 15:15:22                  | 837  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwbQhH=5,0*4B    | 6       | EUT uses channels A and D for transmissions |
| 15:15:27                  | 1012 | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwel1j1QA,0*4A   | 0       |                                             |
| 15:15:32                  | 1231 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwh1h5pt,0*50    | 1       |                                             |
| 15:15:37                  | 1401 | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwj1j1LQ,0*48    | 0       |                                             |
| 15:15:42                  | 1582 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwlQh5pt,0*34    | 1       |                                             |
| 15:15:47                  | 1771 | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwol1j1Mi,0*74   | 0       |                                             |
| 15:15:52                  | 1979 | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwqQh8Ns,0*1D    | 2       |                                             |
| 15:15:57                  | 2146 | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwt1j1PQ,0*4A    | 0       |                                             |
| 15:16:02                  | 104  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwPQhH1',0*20    | 6       |                                             |
| 15:16:07                  | 282  | D    | !AIVDM,1,1,,D,B7'B00@0vgvB8h7>En06wwS1j001,0*6C    | 0       |                                             |
| 15:16:12                  | 474  | A    | !AIVDM,1,1,,A,B7'B00@0vgvB8h7>En06wwUQhH7J,0*09    | 6       |                                             |

| b) Moving into region one |      |      |                                                    |         |                                         |
|---------------------------|------|------|----------------------------------------------------|---------|-----------------------------------------|
| Time                      | Slot | Chan | Sentence                                           | Timeout | Comment                                 |
| 15:18:52                  | 1983 | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwr1h<01,0*5E    | 3       | EUT moves into region one               |
| 15:18:57                  | 2146 | D    | !AIVDM,1,1,,D,B7'B00@0vgu8q@7>En06wwt1h000,0*50    | 0       | Slot reservations on D are timed out    |
| 15:19:02                  | 104  | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwPQh<01,0*1C    | 3       | EUT maintains transmissions on A        |
| 15:19:07                  | 282  | D    | !AIVDM,1,1,,D,B7'B00@0vgu8q@7>En06wwS1h000pk@,2*2E | 0       |                                         |
| 15:19:12                  | 474  | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwUQh<01,0*19    | 3       |                                         |
| 15:19:17                  | 639  | D    | !AIVDM,1,1,,D,B7'B00@0vgu8q@7>En06ww`1h000,0*44    | 0       |                                         |
| 15:19:22                  | 837  | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwbQh8=5,0*23    | 2       |                                         |
| 15:19:27                  | 1012 | D    | !AIVDM,1,1,,D,B7'BP0D0vgu8q@7>En06wwel1h000,0*25   | 0       |                                         |
| 15:19:32                  | 1199 | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwgQh8Bg,0*0B    | 2       |                                         |
| 15:19:37                  | 1401 | D    | !AIVDM,1,1,,D,B7'B00@0vgu8q@7>En06wwj1h000,0*4E    | 0       |                                         |
| 15:19:42                  | 1603 | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwlQh@l3,0*27    | 4       |                                         |
| 15:19:47                  | 1771 | D    | !AIVDM,1,1,,D,B7'B00@0vgu8q@7>En06wwol1h000,0*4B   | 0       | Slots on D finish timing out            |
| 15:19:52                  | 1983 | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwr1h8Nw,0*62    | 2       |                                         |
| 15:20:02                  | 104  | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwPQh81',0*48    | 2       |                                         |
| 15:20:07                  | 288  | C    | !AIVDM,1,1,,C,B7'B00@0vgu8q@7>En06wwS1j1OA,0*7D    | 0       | Reservations on channel C begin         |
| 15:20:12                  | 474  | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwUQh87J,0*61    | 2       |                                         |
| 15:20:17                  | 669  | C    | !AIVDM,1,1,,C,B7'B00@0vgu8q@7>En06ww`Qj1KA,0*2A    | 0       |                                         |
| 15:20:22                  | 837  | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwbQh5q@,0*17    | 1       |                                         |
| 15:20:27                  | 1034 | C    | !AIVDM,1,1,,C,B7'B00@0vgu8q@7>En06wwel1j1K1,0*3F   | 0       | EUT alternates between channels A and C |
| 15:20:32                  | 1199 | A    | !AIVDM,1,1,,A,B7'B00@0vgu8q@7>En06wwgQh5q@,0*12    | 1       |                                         |
| 15:20:37                  | 1398 | C    | !AIVDM,1,1,,C,B7'B00@0vgu8q@7>En06wwj1j1Mi,0*6E    | 0       |                                         |



### 3 Test Equipment

List of absolute measuring and other principal items of test equipment.

| Instrument Description | Manufacturer    | Model Type | TE Number | Cal Period (months) | Calibration Due Date |
|------------------------|-----------------|------------|-----------|---------------------|----------------------|
| AIS Test Unit          | Attingimus      | MK II      | 4057      | -                   | O/P MON              |
| AIS Base Station       | SAAB            | R40        | S/N:5006  | -                   | O/P MON              |
| Power Supply           | Rohde & Schwarz | HMP2020    | 4735      | -                   | O/P MON              |
| DVM                    | Fluke           | 179        | 4007      | 12                  | 14-Sep-18            |
| DVM                    | Fluke           | 79         | 0611      | 12                  | 07-Sep-19            |

O/P Mon – Output Monitored Using Calibrated Equipment



## 4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

| Test Name                           | Measurement Uncertainty |
|-------------------------------------|-------------------------|
| Synchronisation and jitter accuracy | $\pm 20.1 \text{ us}$   |

Measurement Uncertainty:

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2007, Clause 4.4.3 and 4.5.1.