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Report On

Digital Interface Testing of the Ocean Signal Class A Transceiver In accordance with IEC 61162-1

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REPORT ON

Digital Interface Testing of the
Ocean Signal ATA100 Class A Transceiver
In accordance with IEC 61162-1

Document 75936860 Report 03 Issue 1

January 2020

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DATED 31 January 2020

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SECTION 1

REPORT SUMMARY

Digital Interface Testing of the
Ocean Signal ATA100 Class A Transceiver
In accordance with IEC 61162-1

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Digital Interface Testing of the Ocean Signal Class A to the requirements of IEC IEC 61162-1.

Objective	To perform Type Approval Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Ocean Signal
Model Number(s)	ATA100
Serial Number(s)	S/N TA007 (TSR0022) S/N TA010 (TSR0021)
Number of Samples Tested	1
Test Specification/Issue/Date	IEC 61162-1: 2016
Declared Product Equipment Category	Protected Excluding GPS antenna which declared as Exposed
Date of Receipt of Test Samples	03 April 2017
Order Number Date	3123-00 31-October-2016
Start of Test	27 June 2019
End of Test	09 December 2019
Name of Engineer(s)	Theano Papakosta Finlay Orr

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with IEC 61162-1 is shown below.

Section	Spec Clause	Test Description	Result	Comments
2.1	B.3	Examination of the manufacturer's documentation	Pass	
2.2	B.4.1	Interface units	Pass	
2.3	B.4.2	Ability of the input circuits to work with limited current	Pass	
2.4	B.4.3	Check of electrical isolation	Pass	
2.5	B.4.4	Ability of input circuits to withstand maximum voltage on the bus	Pass	
2.6	B.4.5	Test arrangement for performance tests according to IEC 60945	-	See TUV SUD document 75936860 report 05
2.7	B.4.6	Test under maximum interface workload	Pass	
2.8	B.4.7	Test for correct parsing of sentences	Pass	
2.9	B.4.8	Test under long term conditions	Pass	
2.10	B.4.9.1	Data strings transmitted by the EUT	Pass	
2.11	B.4.9.2	Data strings received by the EUT	Pass	

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

Equipment Under Test (EUT) was an Ocean Signal ATA100. A full technical description can be found in the manufacturer's documentation.

Equipment Under Test

1.4 DEVIATIONS FROM THE STANDARD

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

1.5 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.

TA 007 / TA 010			
Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	EUT running firmware v0.2.02.	Theano Papakosta	24/06/2019
1	Corrections to special character encoding, fix for draught being saved 10 times smaller than input and the user no longer needs to press 'Setup' to save the ETA. Class B CS and base stations are no longer available to select in the comms test menu by manual selection and the EUT no longer displays the incorrect NavStatus.	Theano Papakosta	01/07/2019
2	Type of EPFS is now set to 15 when internal GNSS in use. The EUT correctly syncs to other Class A's. There is no longer an extra space in sentence number field when there is no alerts '$AIALC,01, 01,34,0*51'. BIIT 9 is now output after 15< minutes. LC, IN and GX no longer result in internal GNSS in use and EPFS type = 15. Message 12 is now displayed on MKD or in the addressed message list. Sensor 3 configure mode can now be changed between RTCM and IEC 61162-1. When the mode indicator is set to E, M, S and N, the external position is no longer used and the time stamp is not the actual time. VTG does not cause the COG/SOG to alternate between N/A and the values in the VTG sentence anymore.	Finlay Orr	25/07/2019
3	Update includes fixes for EUT entering assigned mode after receiving Message 16, and for the EUT not using Message 2 when receiving a Message 23.	Finlay Orr	06/08/2019
4	Fixes for the most recently received messages not being displayed foremost, Message 3 slot interval not conforming to ± 20% tolerance, Message 8 not always broadcasting within 4 seconds, Class B CS being included in the number of received stations, EUT using slots that contain loading with Message 26 and MOB TEST targets being displayed when 'Display Devices Under Test' option is not checked.	Finlay Orr	13/08/2019
5	Most recently received messages are not displayed foremost on the MKD,	Finlay Orr	20/08/2019
6	Fixes related to IEC 61993-2 Ed.3 §16, §17 and long-range transmissions.	Finlay Orr	04/09/2019
7	The EUT no longer enters silent mode autonomously, long range transmissions no longer auto-transmit even when configured not to and fix for using Message 26 as a target identifier.	Finlay Orr	21/10/2019
8	Fixes for BAM alert compliancy issues.	Finlay Orr	28/10/2019
9	Fix for DSC region definitions.	Finlay Orr	31/10/2019
10	Fixes related to IEC 61993-2 Ed.3 §17.8.2, §19.7 and §14.9.9; operating regions were being overwritten when defined via MKD.	Finlay Orr	06/11/2019
11	Fixes for DSC where the EUT was rejecting Messages that contain course or vessel type, and the freezing problem with Message 22.	Finlay Orr	08/11/2019
12	Fixes for CPA/TCPA detection. RTCM sentences now supported by sensor port 3 after the internal GNSS receiver's firmware was updated.	Finlay Orr	27/11/2019

SECTION 2

TEST DETAILS

Digital Interface Testing of the
Ocean Signal Class A
In accordance with IEC 61162-1

2.1 EXAMINATION OF MANUFACTURER'S DOCUMENTATION

2.1.1 Specification Reference

IEC 61162-1, Clause B.3 – Examination of manufacturer's documentation

2.1.2 Equipment Under Test and Modification State

ATA100, S/N: TA010 – Modification State 12 - See section 1.5 for modification details.

2.1.3 Date of Test

09 December 2019

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Requirements and Results

Test Requirements

Check for completeness according to this standard (IEC 61162-1).

Check the availability of the defined minimum sentences on the EUT (receiving and transmitting).

Check the documentation of approved and proprietary sentences:
- approved sentences for conformity with the standard;
- proprietary sentences for conformity with the standard and the documentation of the manufacturer;
- fields that are required or acceptable to a listener;
- noted unused fields to a talker;
- transmission interval for each sentence;
- interface port selection.

Check the used talker – IDs.

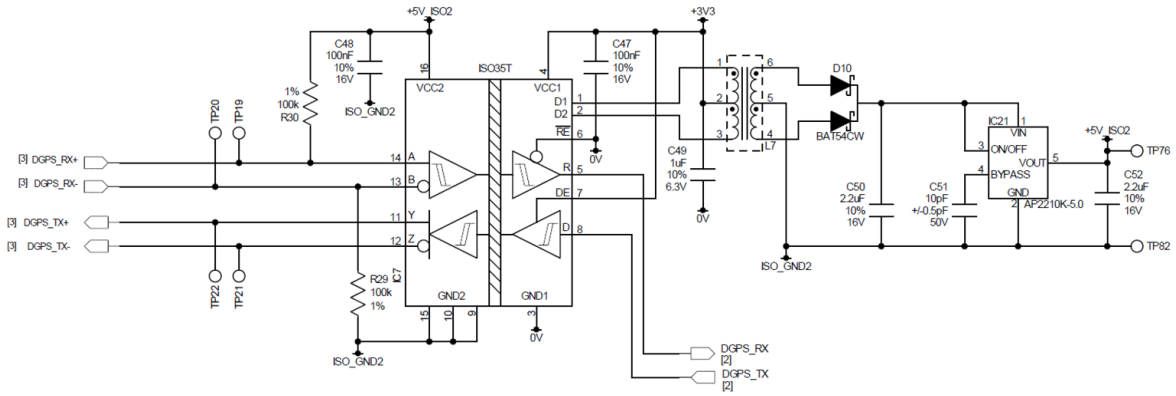
Check the hardware requirements:
- output drive capability of talker;
- load requirement as listener;
- current software and hardware revision;
- interface pin configuration;
- electrical isolation of the input circuits for compliance with IEC 60945;
- description, schematic and PCB of listener receive and talker driver circuits, citing actual components and devices used, including connector type and part number.

Test Results

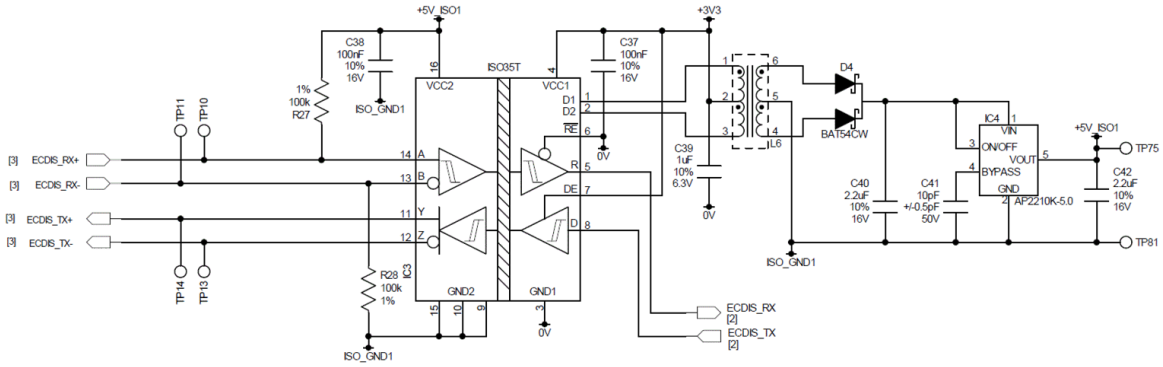
Requirement	Result	Verdict
The manufacturer documentation shall detail the supported received and transmitted sentences.	The ATA100 installation manual defines the sentences supported, along with their normal sources, talkers and category within §5.	Pass
The approved sentences shall confirm with the IEC 61162-1 standard.	The ATA100 installation manual states the serial ports are compliant with IEC 61162-1 in §6-specifications. The user manual states the serial ports are compliant with IEC 61162-1 in §13 – Specifications.	Pass
Proprietary sentences shall conform with the standard and the documentation of the manufacturer.	There are no proprietary sentences available to the end user of the device.	-

Requirement	Result	Verdict
Fields that are either required, or acceptable to a listener shall be detailed in the manufacturer's documentation.	The ATA installation manual details all fields that are applicable to a listener in §5.1.	Pass
The documentation provided by the manufacturer shall detail the unused fields of sentences applied to a talker.	There are no unused fields in the sentences that the EUT supports.	-
The transmission intervals for each of the approved sentences shall be described within the manufacturer's documentation.	The transmission intervals of all supported sentences are detailed in the installation manual, §5.5 – Sentences Output.	Pass
The interface port selection shall be described for each of the supported approved sentences.	For each interface port, the supported sentences are detailed throughout §5 of the installation manual.	Pass
The talker-ID's used each of the supported IEC-61162 sentences shall be detailed within the documentation.	The talker-ID for each of the sentences under normal operation is detailed in the installation manual, §5.1.	Pass
The output drive capability of the talker device shall be checked for conformity with IEC 61162-1.	The output drive capability of the talker is handled by the Texas Instruments ISO35T, which can drive up to 60mA of output current and has a differential output voltage magnitude of 2.5V to Vcc (typically 3.3V ±5%).	Pass
The load requirement as a listener device shall be checked and be in accordance with 61162-1.	The listener device for the high-speed interfaces is handled by the Texas Instruments ISO35T, which requires a differential voltage between 2 and Vcc to trigger a logic high, and between 0 to 0.8V to trigger a logical low. Each low-speed sensor port interface is controlled using a Fairchild H11L1M optocoupler which controls the output using a Schmitt trigger. The H11L1M has a turn-on threshold current of 1.7mA and a turn-off threshold current of 0.3mA. It operates at TTL logic levels.	Pass
The hardware requirements for the current software and hardware revision shall be checked.	The ATA100 user manual details how the user can check the firmware version using the MKD in §11.3.1.	Pass
The interface pin configuration shall match the hardware requirements.	The interface pin configuration is described in §2.3.5 – Data Connections. It contains the 3 required receiver input ports, as well as 3 Rx/Tx ports, a pilot port interface and a micro-USB port.	Pass
Electrical isolation of the input circuits for compliance with IEC 60945 will be detailed in the documentation.	Isolation of the high-speed transceivers (ECDIS, long-range, DGPS and pilot port) is achieved by using isolated RS-422 differential line transceivers (Texas Instruments ISO35T). This device also has integrated oscillator outputs that provides the primary voltage for an isolation transformer. This is used to provide an isolated power supply for the isolated transceiver circuits, which can be seen below. Isolation of the low speed receivers (SENS1, SENS2 and SENS3) is achieved by using high speed optocouplers (Fairchild H11LSM). The input circuit supply bias for these is provided by the isolated power supply of the DGPS high speed data transceivers (+5V_ISO2).	Pass
The description, schematic and PCB of listener receive and talker driver circuits, citing actual components and devices used, including connector type and part number.	The relevant circuit diagrams provided in the documentation are shown below.	Pass

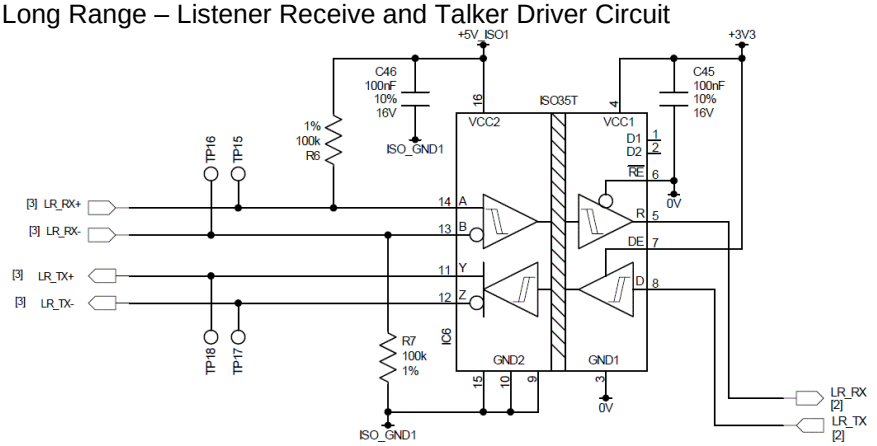
DGPS – Listener Receive and Talker Driver Circuit



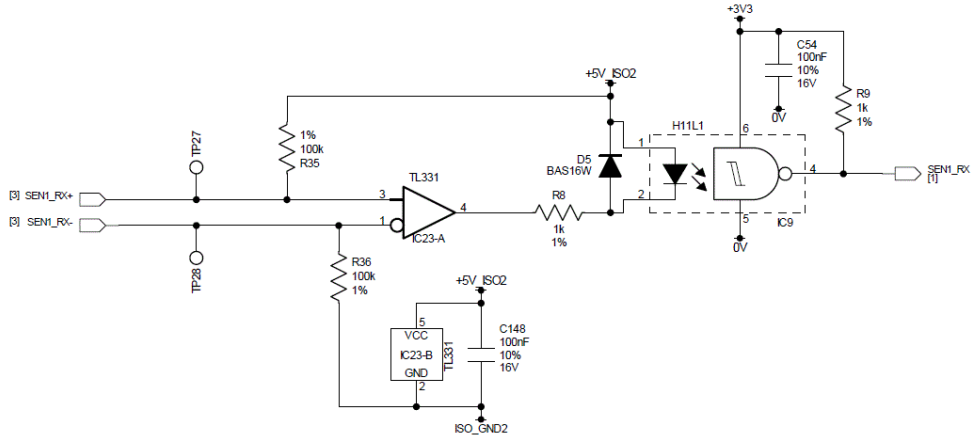
ECDIS – Listener Receive and Talker Driver Circuit



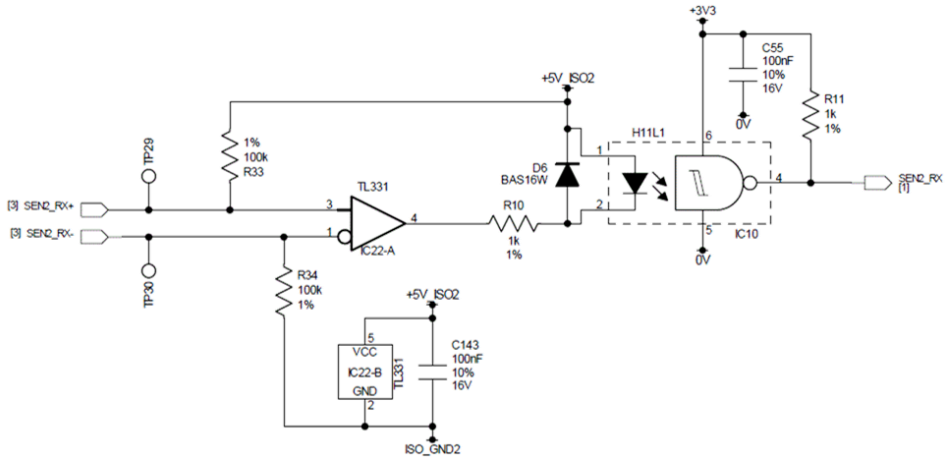
Long Range – Listener Receive and Talker Driver Circuit



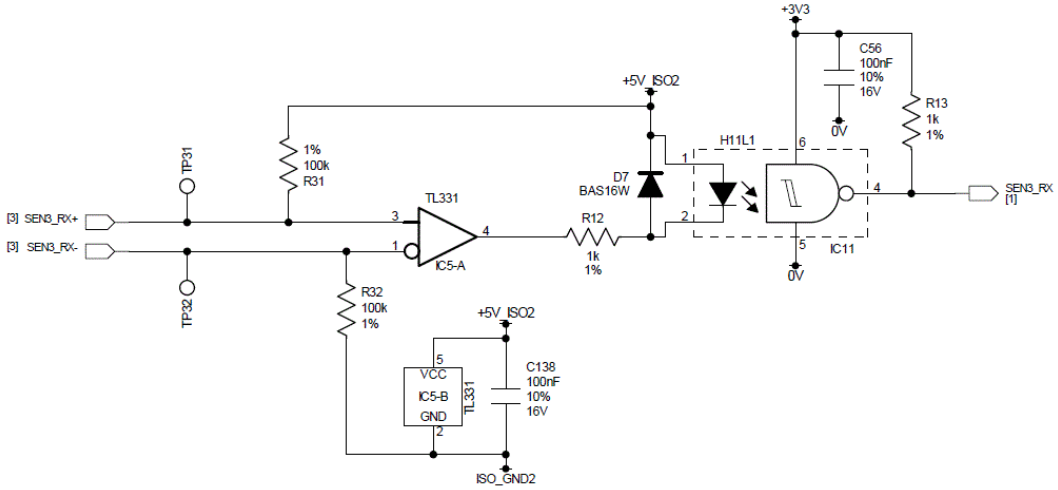
Sensor 1 – Listener Receive Circuit



Sensor 2 – Listener Receive Circuit



Sensor 3 – Listener Receive Circuit



2.2 INTERFACE UNITS

2.2.1 Specification Reference

IEC 61162-1, Clause B.4.1

2.2.2 Equipment Under Test and Modification State

ATA100, S/N: TA007 – Modification State 0 - See section 1.5 for modification details.

2.2.3 Date of Test

27 June 2019

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Requirements and Results

Test Requirements

For compatibility of the hardware, standard tests shall be used as defined in ITU-T X.27/V.11 for all transmitter interface units where compliance with ITU-T X.27/ V.11 is not documented.

Test Results

According to ITU-T X.27/V.11:

5.1 The total generator resistance between points A and B is calculated 74.2Ω.

5.2.1

Measurement	Binary State	Measured Value
V_o	0	-4.67 V
	1	4.44 V
V_{oA}	0	413.79 mV
	1	4.96 V
V_{oB}	0	497.2 mV
	1	4.87 V

5.2.2

Measurement	Binary State	Measured Value
V_t	0	-3.12 V
	1	3.02 V
ΔV_t	-	0.1 V
V_{os}	0	2.64 V
	1	2.94 V
ΔV_{os}	-	0.3 V

5.2.3 I_{sA} = 86.3 mA
I_{sB} = 0.01mA

5.2.4 Under power-off condition, 0.25 V applied between each output point and point, there was no output leakage current

5.3 t_b = 205.6 µs
t_{r1} = 210 ns
t_{r2} = 234 ns

2.3 INPUT CIRCUIT TEST

2.3.1 Specification Reference

IEC 61162-1, Clause B.4.2

2.3.2 Equipment Under Test and Modification State

ATA100, S/N: TA007 – Modification State 1 - See section 1.5 for modification details.

2.3.3 Date of Test

03 July 2019

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Requirements and Results

Test Requirements

The receiver unit shall be connected to a data-source with a differential voltage of 2,0 V. Confirm by measurement that the current does not exceed 2,0 mA. The data source shall transmit appropriate sentences for this EUT. All sentences shall be received and detected without any errors or degradation.

Test Results

2V was applied to lines A and B with both polarities, the current did not exceed 0.6 mA. No errors noticed in sentences received.

2.4 CHECK OF ELECTRICAL ISOLATION

2.4.1 Specification Reference

IEC 61162-1, Clause B.4.3

2.4.2 Equipment Under Test and Modification State

ATA100, S/N: TA007 – Modification State 7 - See section 1.5 for modification details.

2.4.3 Date of Test

25 October 2019

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Requirements and Results

Test Requirements

Check in the manufacturer's documentation that the isolation of the receiver between signal line "A", return line "B", or shield and ships ground or power fulfil the requirements of IEC 60945.

Test Results

	Signal A	Signal B	Common Ground	Supply Ground
Signal A	N/A	>999 MΩ	>999 MΩ	>999 MΩ
Signal B	>999 MΩ	N/A	>999 MΩ	>999 MΩ
Common Ground	>999 MΩ	>999 MΩ	N/A	>999 MΩ
Supply Ground	>999 MΩ	>999 MΩ	>999 MΩ	N/A

After repowering the unit after Power Isolation testing and completing a selection of test sentences, it was found that the EUT was functioning correctly.

2.5 MAXIMUM INPUT VOLTAGE

2.5.1 Specification Reference

IEC 61162-1, Clause B.4.4

2.5.2 Equipment Under Test and Modification State

ATA100, S/N: TA007 – Modification State 8 – See section 1.5 for modification details.

2.5.3 Date of Test

04 July 2019

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Requirements and Results

Test Requirements

Between the connector's 'A' and 'B' of the interface a voltage of 15 V shall be applied for at least 1 min. This test shall be carried out with both polarities of applied test voltage. After all tests the function of the interface shall be checked for any malfunction or damage.

Test Results

15V with both polarities was applied to both lines A and B for 1 minute. The EUT did not malfunction and no damage was observed.

2.6 TEST UNDER MAXIMUM INTERFACE WORKLOAD

2.6.1 Specification Reference

IEC 61162-1, Clause B.4.6

2.6.2 Equipment Under Test and Modification State

ATA100, S/N: TA010 – Modification State 11 – See section 1.5 for modification details.

2.6.3 Date of Test

20 November 2019

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Requirements and Results

Test Requirements

After activating all ports of the EUT with the maximum number of approved sentences to be transmitted and/or received (channel workload 80 % to 90 %), the performance of the EUT shall not be degraded in any way. At least one of these sentences shall be usable for the EUT. The EUT may give an alert for a minor function not supported by the selected sentence, but the main function of the EUT shall be operational without any degradation. The test shall be carried out for 30 min.

Test Results

Maximum Interface Workload		
Requirement	Result	Verdict
The ports of the EUT shall be loaded with the maximum number of approved sentences, such that the channel workload is 80% - 90%.	Each of the EUT's input ports are loaded with between 80-90% channel workload. An example of this is shown in the table below, 'Sentences Applied to Sensor 1'. Here the channel load is 87%.	Pass
At least one of the sentences applied to the EUT shall be usable.	At least one usable sentence is applied to each of the ports; navigational data is applied to sensor 1, rate of turn data is applied to sensor 2 and	Pass
Confirm that the EUT remains operational without any degradation.	The EUT remained operational with no degredation	Pass

Sentences Applied to Sensor 1	
Time	
12:26:07.342	$GPDTM,W84,,,,,,,W84*4A
12:26:07.358	$GPGLL,5052.7903,N,00113.9423,W,122607,A,A*55
12:26:07.371	$GPVTG,11.1,T,,M,10.0,N,,K,A*23
12:26:07.458	$GPGBS,122607,2.6,2.8,4.2,,,,*67
12:26:07.533	$$GPBWR,102001,5133N,00227W,35,T,30,M,20,N,1,A*74*74
12:26:07.717	$GPRMC,122607,A,5052.7903,N,00113.9423,W,10.0,11.1,201119,,,D*6D
12:26:07.849	$$GPBWR,102001,5133N,00227W,35,T,30,M,20,N,1,A*74*74
12:26:07.866	$$GPBWR,102001,5133N,00227W,35,T,30,M,20,N,1,A*74*74
12:26:07.971	$$GPBWR,102001,5133N,00227W,35,T,30,M,20,N,1,A*74*74

THS

Step	RMC + THS Sentence	Result	Verdict
a)	$GPRMC,111808,A,5052.7903,N,00113.9423,W,8.0,11.1,120719,,,D*53 $HETHS,30,A*00	The heading value is correct: !AIVDM,1,1,,B,1;UnTqh01@wrFu2M7AWhKhuH0L02,0*78	Pass
b)	$GPRMC,112137,A,5052.7903,N,00113.9423,W,8.0,11.1,120719,,,D*55	The heading value defaults to 511 – not available: !AIVDM,1,1,,A,1;UnTqhP1@wrFu2M7AWhKwwf05AD,0*56	Pass
c)	$GPRMC,120415,A,5052.7903,N,00113.9423,W,8.0,11.1,120719,,,D*51 $HETHS,90,A*0A	$AIALR,110331.00,011,A,V,Heading sensor offset*20	Pass

VBW

a)						
Tx / Rx	Sentence	COG	SOG	HDT	ROT	Verdict
Tx	$GPRMC,161339,A,5052.7903,N,00113.9423,W,11,21,140819,,,D*6E $GPVBW,1,1,A,1,1,A,,,,*54 $HEHDT,31.0,T*1D $TIROT,10,A*14	21	11	31	10	-
Rx	!AIVDM,1,1,,A,1;UnTqh3ifwrFu2M7AWhlPw40D02,0*6F	21	11	31	10	Pass
	!AIVDM,1,1,,B,1;UnTqh3ifwrFu2M7AWhlPwH0@J<,0*60	21	11	31	10	
	!AIVDM,1,1,,A,1;UnTqh3ifwrFu2M7AWhlPwd05pl,0*50	21	11	31	10	
	!AIVDM,1,1,,B,1;UnTqh3ifwrFu2M7AWhlPv600SF,0*0C	21	11	31	10	
	!AIVDM,1,1,,A,1;UnTqh3ifwrFu2M7AWhlPvL05pp,0*65	21	11	31	10	

b)						
Tx / Rx	Sentence	COG	SOG	HDT	ROT	Verdict
Tx	$GPRMC,161852,A,5052.7903,N,00113.9423,W,12,22,140819,,,D*68 $GPVBW,2,2,A,2,2,A,,,,*54 $HEHDT,32.0,T*1E $TIROT,11,A*15	22	12	32	11	-
Rx	!AIVDM,1,1,,B,1;UnTqh41pwrFu2M7AWho11H0@JB,0*73	22	12	32	11	Pass
	!AIVDM,1,1,,A,1;UnTqh41pwrFu2M7AWho11d05q8,0*68	22	12	32	11	
	!AIVDM,1,1,,B,1;UnTqh41pwrFu2M7AWho10:0<02,0*76	22	12	32	11	
	!AIVDM,1,1,,A,1;UnTqh41pwrFu2M7AWho10L088p,0*4D	22	12	32	11	
	!AIVDM,1,1,,B,1;UnTqh41pwrFu2M7AWho10h0@>V,0*32	22	12	32	11	

c)						
Tx / Rx	Sentence	COG	SOG	HDT	ROT	Verdict
Tx	$GPRMC,104306,A,5052.7903,N,00113.9423,W,13,23,150819,,,D*60 $GPVBW,3,3,A,3,A,3,A*39 $HEHDT,33.0,T*1F $TIROT,13,A*16	23	13	33	13	-
Rx	!AIVDM,1,1,,B,1;UnTqh4B2wrFu2M7AWhqQ3205:i,0*6A	23	13	33	13	Pass
	!AIVDM,1,1,,A,1;UnTqh4B2wrFu2M7AWhqQ3J0<02,0*49	23	13	33	13	
	!AIVDM,1,1,,B,1;UnTqh4B2wrFu2M7AWhqQ3b00S`,0*5F	23	13	33	13	
	!AIVDM,1,1,,A,1;UnTqh4B2wrFu2M7AWhqQ26082=,0*3D	23	13	33	13	
	!AIVDM,1,1,,B,1;UnTqh4B2wrFu2M7AWhqQ2L05:l,0*10	23	13	33	13	

d)		
Requirement	Result	Verdict
RMC sentence is applied to sensor input 1	The RMC sentence contains the values for COG = 10, SOG = 20: $GPRMC,134352,A,5052.7903,N,00113.9423,W,20,10,150819,,,D*62	-
A VBW sentence is applied to sensor input 2	All fields for the VBW sentence were set to 1, and status fields set to valid: $GPVBW,1,1,A,1,1,A,1,A,1,A*54	-
HDT and ROT sentences are transmitted over sensor input 3	The HDT sentence carries a heading value = 30 and ROT = 2: $TIROT,2,A*27 $HEHDT,30.0,T*1C	-
The contents of COG and SOG should be received should match the data that transmitted	The values for COG and SOG matched those that were applied to the sensor inputs: !AIVDM,1,1,,A,1;UnTqt1k8wrFu2M7AWhI0tH0<01,0*6C	Pass

2.6.6 Specification Reference

IEC 61162-1, Clause B.4.7

2.6.7 Equipment Under Test and Modification State

ATA100, S/N: TA007 – Modification State 1 – See section 1.5 for modification details.

2.6.8 Date of Test

11 July 2019

2.6.9 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.10 Test Requirements and Results

Test Requirements

B.4.7.1 Test for correct use of special characters starting a sentence

There are 2 special characters which can occur on a line. The $ starts a parametric sentence, ! starts an encapsulated sentence. It is not mandatory for the EUT to implement the use of all 2 cases, but it is mandatory that if the EUT does not implement one of them that the EUT does not experience any malfunction when receiving any of 2 cases. This issue should be tested by sending simulated dataflow of mixed examples of all 2 to EUT and by observing correct behaviour of EUT.

B.4.7.2 Test for correct parsing of received sentences

Any characters between the <CR><LF> and the start of the next sentence should be ignored. This issue should be tested by sending simulated dataflow of mixed examples of interleaved valid and invalid characters between sentences to EUT and by observing correct behaviour of the EUT.

B.4.7.3 Test for future extension of received sentences

The provision for extending parametric sentences is to add comma separated fields between the last parameter field and the checksum delimiter character (asterisk). This capability should be tested by sending simulated dataflow of mixed examples with extended sentences with appropriately adjusted checksum to the EUT and by observing correct behaviour of the EUT.

Test Results

B.4.7.1 Test for correct use of special characters starting a sentence

Sentence Sent to EUT	EUT Response	Result
$GPRMC,102334,A,5052.7903,N,00113.9423,W,10.0,11.1,110719,,,D*6F	Uses the data in the RMC sentence and does not experience any malfunction	Pass
!GPRMC,102334,A,5052.7903,N,00113.9423,W,10.0,11.1,110719,,,D*6F	Uses the data in the RMC sentence and does not experience any malfunction	Pass

B.4.7.2 Test for correct parsing of received sentences

Sentences Sent to EUT	EUT Response	Result
$GPRMC,115247,A,5052.7903,N,00113.9423,W,10.0,11.1,110719,,,D*6C<CR><LF> 465755777889899$GPGNS,115247,5052.7903,N,00113.9423,W,AP,4,,,,,*45<CR><LF>	EUT displays SOG = 10.0 and COG = 011º.	Pass
$GPRMC,115247,A,5052.7903,N,00113.9423,W,10.0,11.1,110719,,,D*6C<CR><LF> GPRMC,115247,A,5052.7903,N,00113.9423,W,50.0,11.1,110719,,,D*6C$GPGNS,115247,5052.7903,N,00113.9423,W,AP,4,,,,,*45<CR><LF>	EUT displays SOG = 10.0 and COG = 011º.	Pass

B.4.7.3 Test for future extension of received sentences

Sentence Sent to EUT	EUT Response	Result
$GPRMC,131601,A,5052.7903,N,00113.9423,W,10.0,11.1,110719,,,D,,,,,,,,,,,,*6C	Uses the data in the RMC sentence	Pass

2.7 TEST UNDER LONG TERM CONDITIIONS

2.7.1 Specification Reference

IEC 61162-1, Clause B.4.8

2.7.2 Equipment Under Test and Modification State

ATA100, S/N: TA007 – Modification State 1 – See section 1.5 for modification details.

2.7.3 Date of Test

11 July 2019

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Requirements and Results

Test Requirements

The EUT shall be connected to transmitting sources as defined by the manufacturer for normal operation. This test shall be carried out for 30 min, and all data transmitted by the EUT shall be recorded and analysed for corruption against this standard.

Test Results

This test was performed for 30 minutes and the following sentences were checked for corruption. GGA, RMC, VTG, GLL, GBS and HDT. No corruption was observed

2.8 DATA STRINGS TRANSMITTED BY THE EUT

2.8.1 Specification Reference

IEC 61162-2, Clause B.4.9.1

2.8.2 Equipment Under Test and Modification State

ATA100, S/N: TA007 – Modification State 1 – See section 1.5 for modification details.

2.8.3 Date of Test

08 July 2019 - 11 July 2019

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Requirements and Results

Test requirements

The transmitting output of the EUT shall be checked for conformity with the coding methods of data as specified in this standard and the proprietary sentences of the manufacturer by inspection of the manufacturer's documentation. The receiver of the EUT shall be tested, by connecting it to a source which transmits all sentences which the EUT is able to receive. All sentences shall be detected, and no error shall occur.

Test Results

Notes: Static GPS position applied using GPS Simulator location.

The following sentences: ABK, ACA, ACS, ALC, ALF, ALR, ARC, EPV, GBS, GGA, GSA, GSV, HBT, LR1, LR2, LR3, LRF, RMC, SSD, TRL, TXT, VDM, VDO, VER, VSD and VTG were tested according to IEC 61162-1.

ABK - AIS Addressed and Binary Broadcast Acknowledgement

Transmitted Message:				
$AIABK,200300900(1),A(2),6(3),2(4),0(5)*21(6)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	MMSI of the addressed AIS unit	200300900	200300900	Pass
2	AIS channel of reception	A	A	Pass
3	ITU-R M.1371 Message ID	6	6	Pass
4	Message sequence number	1	1	Pass
5	Type of acknowledgement	0	0	Pass
6	Checksum	21	21	Pass

ACA – AIS Channel Assignment Message

Transmitted Message:				
$AIACA,2(1),5100.00(2),N(3),00100.00(4),W(5),5000.00(6),N(7),00200.00(8),W(9),6(10),2087(11),0(12),2067(13),0(14),0(15),0(16),B(17),0(18),000000.00(19)*33(20)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Sequence number	2	2	Pass
2	Region northeast corner latitude	5100.00	5100.00	Pass
3	Region northeast corner N/W hemisphere	N	N	Pass
4	Region northeast corner longitude	00100.00	00100.00	Pass
5	Region northeast corner E/W hemisphere	W	W	Pass
6	Region southwest corner latitude	5000.00	5000.00	Pass

Transmitted Message:				
$AIACA,2(1),5100.00(2),N(3),00100.00(4),W(5),5000.00(6),N(7),00200.00(8),W(9),6(10),2087(11),0(12),2067(13),0(14),0(15),0(16),B(17),0(18),000000.00(19)*33(20)				
Field	Field Label	Expected Result	Actual Result	Verdict
7	Region southwest corner N/S hemisphere	N	N	Pass
8	Region southwest corner longitude	00200.00	00200.00	Pass
9	Region southwest corner E/W hemisphere	W	W	Pass
10	Transition zone size	6	6	Pass
11	Channel A	2087	2087	Pass
12	Channel A bandwidth	0	0	Pass
13	Channel B	2067	2067	Pass
14	Channel B bandwidth	0	0	Pass
15	Tx/Tx mode control	0	0	Pass
16	Power level control	0	0	Pass
17	Information source	2	2	Pass
18	In-use flag	0	0	Pass
19	Time of “in use” change	000000.00	000000.00	Pass
20	Checksum	33	33	Pass

AIS Channel Management Information Source

Transmitted Message:				
$AIACS,2(1),2222222(2),133122.00(3),04(4),12(5),2019(6)*7A(7)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Sequence number, 0 to 9	2	2	Pass
2	MMSI of originator	2222222	2222222	Pass
3	UTC of receipt of channel management information	133122.00	133122.00	Pass
4	UTC day, 01 to 31	04	04	Pass
5	UTC month, 01 to 12	12	12	Pass
6	UTC year	2019	2019	Pass
7	Checksum	7A	7A	Pass

ALC - Cyclic Alert List

Transmitted Message:				
$AIALC,01(1),01(2),45(3),1(4),(5),3013(6),1(7),2(8),(9)*58(10)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of sentences for message	1	1	Pass
2	Sentence number	1	1	Pass
3	Sequential message identifier	45	45	Pass
4	Number of alert entries	1	1	Pass
5	Alert identifier	NULL	NULL	Pass
6	Alert instance	3013	3013	Pass
7	Revision counter	1	1	Pass
8	Additional alert entries	2	2	Pass
9	Alert entry n	NULL	NULL	Pass
10	Checksum	58	58	Pass

ALF - Alert Sentence

Transmitted Message				
$AIALF,2(1),1(2),1(3),163144.00(4),B(5),C(6),V(7),(8),3013(9),1(10),11(11),1(12),Doubtful GNSS(13)*3E(14) $AIALF,2(1),2(2),1(3),(4),(5),(6),(7),(8),3013(9),1(10),11(11),1(12),Int/Ext GNSS position mismatch(13)*5E(14)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of ALF sentences for this message	2	2	Pass
		2	2	Pass
2	Sentence number	1	1	Pass
		2	2	Pass
3	Sequential message identifier	1	1	Pass
		1	1	Pass
4	Time of last change	163144.00	163144.00	Pass
		NULL	NULL	Pass
5	Alert category	B	B	Pass
		NULL	NULL	Pass
6	Alert priority	C	C	Pass
		NULL	NULL	Pass
7	Alert state	V	V	Pass
		NULL	NULL	Pass
8	Manufacturer mnemonic code	NULL	NULL	Pass

		NULL	NULL	Pass
9	Alert identifier	3013	3013	Pass
		3013	3013	Pass
10	Alert instance	1	1	Pass
		1	1	Pass
11	Revision counter	11	11	Pass
		11	11	Pass
12	Escalation counter	1	1	Pass
		1	1	Pass
13	Alert text	Doubtful GNSS	Doubtful GNSS	Pass
		Int/Ext GNSS position mismatch	Int/Ext GNSS position mismatch	Pass
14	Checksum	3E	3E	Pass
		5E	5E	Pass

ALR - Set Alarm State

Transmitted Message				
$AIALR,100233.00(1),035(2),V(3),V(4),AIS: No valid ROT information(5)*73(6)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Time of alarm condition change, UTC	100233.00	100233.00	Pass
2	Unique alarm identifier at alarm source	035	035	Pass
3	Alarm condition (A = threshold exceeded, V = not exceeded)	A	A	Pass
		V	V	
4	Alarm's acknowledge state (A = acknowledged, V = unacknowledged)	A	A	Pass
		V	V	
5	Alarm's description text	AIS: No valid ROT information	AIS: No valid ROT information	Pass
6	Checksum	73	73	Pass

ARC - Alert Command Refused

Transmitted Message				
$AIARC,(1),(2),3013(3),1(4),S(5)*17(6)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Time	NULL	NULL	Pass
2	Manufacturer mnemonic code	NULL	NULL	Pass
3	Alert identifier	3013	3013	Pass
4	Alert instance (1 to 999999)	1	1	Pass
5	Refused alert command, A, Q, O or S	S	S	Pass
6	Checksum	17	17	Pass

EPV - Command or Report Equipment Property Value

Transmitted Message				
$AIEPV,R(1),AI(2),777888999(3),101(4),9600(5)*34(6)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Sentence status flag	R	R	Pass
2	Equipment type	AI	AI	Pass
3	Unique identifier	777888999	777888999	Pass
4	Property identifier for the property to be set	101 (sensor 1 baud rate)	101 (sensor 1 baud rate)	Pass
5	Value of the property to be set	9600	9600	Pass
6	Checksum	34	34	Pass

GBS - GNSS Satellite Fault Detection

Transmitted Message				
$GPGBS,155402.000,13.56,8.56,16.04,05,0.0,-81.7,29.2,1,0*4F				
Field	Field Label	Expected Result	Actual Result	Verdict
1	UTC time of the GGS or GNS fix associated with this sentence	155402.000	155402.000	Pass
2	Expected error in latitude	13.56	13.56	Pass
3	Expected error in longitude	8.56	8.56	Pass
4	Expected error in altitude	16.04	16.04	Pass
5	ID number of most likely failed satellite	05	05	Pass
6	Probability of missed detection for most likely failed satellite	0.0	0.0	Pass
7	Estimate of bias on most likely failed satellite (in metres)	-81.7	-81.7	Pass
8	Standard deviation of bias estimate	29.2	29.2	Pass
9	GNSS system ID	1	1	Pass

Transmitted Message				
$GPGBS,155402.000,13.56,8.56,16.04,05,0.0,-81.7,29.2,1,0*4F				
Field	Field Label	Expected Result	Actual Result	Verdict
10	DNSS signal ID	0	0	Pass
11	Checksum	4F	4F	Pass

GGA - Global Positioning System Fix Data

Transmitted Message				
$GPGGA,142229.000(1),5052.1681(2),N(3),00114.6435(4),W(5),1(6),8(7),1.29(8),47.4(9),M(10),47.5(11),M(12),(13),(14)*7F(15)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	UTC of position	142229.000	142229.000	Pass
2	Latitude	5052.1681	5052.1681	Pass
3	Northern/southern hemisphere	N	N	Pass
4	Longitude	00114.6435	00114.6435	Pass
5	Eastern/western hemisphere	W	W	Pass
6	GPS quality indicator	1	1	Pass
7	Number of satellites in use	8	8	Pass
8	Horizontal dilution of prevision (HDOP)	1.29	1.29	Pass
9	Antenna altitude above/below mean sea level	47.4	47.4	Pass
10	Units of antenna altitude (m)	M	M	Pass
11	Geoidal separation	47.5	47.5	Pass
12	Units of geoidal separation (m)	M	M	Pass
13	Age of differential GPS data	NULL (as EUT in non-differential mode)	NULL	Pass
14	Differential reference station ID	NULL (as EUT in non-differential mode)	NULL	Pass
15	Checksum	7F	7F	Pass

GSA - GNSS DOP and Active Satellites

Transmitted Message				
$GPGSA,A(1),3(2),30(3),28(4),05(5),07(6),13(8),08(9),21(10),15(11),(12),(13),(14),(15),2.30(16),1.29(17),1.90(18),1(19)*1A(20)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Mode (M = manual, A = automatic)	A	A	Pass
2	Mode (1 = fix not available, 2 = 2D, 3 = 3D)	3	3	Pass
3-15	ID numbers of satellites used in solution	05, 07, 08, 13, 15, 21, 28, 30	05, 07, 08, 13, 15, 21, 28, 30	Pass
16	Position dilution of position (PDOP)	2.30	2.30	Pass
17	Horizontal dilution of position (HDOP)	1.29	1.29	Pass
18	Vertical dilution of position (VDOP)	1.90	1.90	Pass
19	GNSS system ID	1	1	Pass
20	Checksum	1A	1A	Pass

GSV - GNSS Satellites in View – Sentence 1

Transmitted Message				
$GPGSV,3(1),1(2),10(3),13(4),73(5),297(6),41(7),05(8),53(9),194(10),51(11),30(12),53(13),065(14),48(15),28(16),43(17),123(18),51(19),0(20)*61(21)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of messages	3	3	Pass
2	Message number	1	1	Pass
3	Total number of satellites in view	10	10	Pass
4	1st SV ID number	13	13	Pass
5	1st SV elevation (degrees, ≤ 90)	73	73	Pass
6	1st SV azimuth (degrees true)	297	297	Pass
7	1st SV SNR (C/No, 00 – 99 dB-Hz)	41	41	Pass
8	2nd SV ID number	05	05	Pass
9	2nd SV elevation (degrees, ≤ 90)	53	53	Pass
10	2nd SV azimuth (degrees true)	194	194	Pass
11	2nd SV SNR (C/No, 00 – 99 dB-Hz)	51	51	Pass
12	3rd SV ID number	30	30	Pass
13	3rd SV elevation (degrees, ≤ 90)	53	53	Pass
14	3rd SV azimuth (degrees true)	065	065	Pass
15	3rd SV SNR (C/No, 00 – 99 dB-Hz)	48	48	Pass
16	4th SV ID number	28	28	Pass
17	4th SV elevation (degrees, ≤ 90)	43	43	Pass
18	4th SV azimuth (degrees true)	123	123	Pass
19	4th SV SNR (C/No, 00 – 99 dB-Hz)	51	51	Pass
20	Signal ID	0	0	Pass

Transmitted Message				
$GPGSV,3[1],1[2],10[3],13[4],73[5],297[6],41[7],05[8],53[9],194[10],51[11],30[12],53[13],065[14],48[15],28[16],43[17],123[18],51[19],0[20]*61[21]				
Field	Field Label	Expected Result	Actual Result	Verdict
21	Checksum	61	61	Pass

GNS - GNSS Satellites in View (GNS)

Transmitted Message				
$GPGSV,3[1],2[2],10[3],15[4],39[5],289[6],35[7],37[8],27[9],151[10],28[11],07[12],20[13],059[14],45[15],21[16],15[17],312[18],26[19],0[20]*6B[21]				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of messages	3	3	Pass
2	Message number	2	2	Pass
3	Total number of satellites in view	10	10	Pass
4	1st SV ID number	15	15	Pass
5	1st SV elevation (degrees, ≤ 90)	39	39	Pass
6	1st SV azimuth (degrees true)	289	289	Pass
7	1st SV SNR (C/No, 00 – 99 dB-Hz)	35	35	Pass
8	2nd SV ID number	37 (SBAS)	37 (SBAS)	Pass
9	2nd SV elevation (degrees, ≤ 90)	27	27	Pass
10	2nd SV azimuth (degrees true)	151	151	Pass
11	2nd SV SNR (C/No, 00 – 99 dB-Hz)	28	28	Pass
12	3rd SV ID number	07	07	Pass
13	3rd SV elevation (degrees, ≤ 90)	20	20	Pass
14	3rd SV azimuth (degrees true)	059	059	Pass
15	3rd SV SNR (C/No, 00 – 99 dB-Hz)	45	45	Pass
16	4th SV ID number	15	21	Pass
17	4th SV elevation (degrees, ≤ 90)	15	15	Pass
18	4th SV azimuth (degrees true)	311	312	Pass
19	4th SV SNR (C/No, 00 – 99 dB-Hz)	26	26	Pass
20	Signal ID	0	0	Pass
21	Checksum	6B	6B	Pass

GNS - GNSS Satellites in View - Sentence 3

Transmitted Message				
$GPGSV,3[1],3[2],10[3],08[4],07[5],036[6],34[7],27[8],03[9],004[10],[11],0[12]*6B[13]				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of messages	3	3	Pass
2	Message number	3	3	Pass
3	Total number of satellites in view	10	10	Pass
4	1st SV ID number	08	08	Pass
5	1st SV elevation (degrees, ≤ 90)	07	07	Pass
6	1st SV azimuth (degrees true)	035	036	Pass
7	1st SV SNR (C/No, 00 – 99 dB-Hz)	34	34	Pass
8	2nd SV ID number	27	27	Pass
9	2nd SV elevation (degrees, ≤ 90)	02	03	Pass
10	2nd SV azimuth (degrees true)	004	004	Pass
11	2nd SV SNR (C/No, 00 – 99 dB-Hz)	NULL	NULL	Pass
12	Signal ID	0	0	Pass
13	Checksum	6B	6B	Pass

HBT - Heartbeat Supervision Sentence

Transmitted Message				
$AIHBT,1[1],V[2],0[3]*2D[4]				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Configured repeat interval	1	1	Pass
2	Equipment status	V	V	Pass
3	Sequential sentence identifier	0	0	Pass
4	Checksum	2D	2D	Pass

LR1 - AIS Long Range Reply Sentence 1

Transmitted Message				
$AILR1,6[1],777888999[2],400500600[3],TUV SUD A[4],TUVSUD[5],008501058[6]*60[7]				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Sequence number	6	6	Pass
2	MMSI of responder	777888999	777888999	Pass
3	MMSI of requestor	400500600	400500600	Pass
4	Ship's name	TUV SUD A	TUV SUD A	Pass

Transmitted Message				
$AILR1,6(1),777888999(2),400500600(3),TUV SUD A(4),TUVSUD(5),008501058(6)*60(7)				
Field	Field Label	Expected Result	Actual Result	Verdict
5	Call sign	TUVSUD	TUVSUD	Pass
6	IMO number	008501058	008501058	Pass
7	Checksum	60	60	Pass

LR2 - AIS Long Range Reply Sentence 2

Transmitted Message				
$AILR2,6(1),777888999(2),10122019(3),104250.00(4),5052.79(5),N(6),00113.94(7),W(8),11.1(9),T(10),10.0(11),N(12)*31(13)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Sequence number	6	6	Pass
2	MMSI of responder	777888999	777888999	Pass
3	Date (DDMMYYYY)	10122019	10122019	Pass
4	UTC time of position	104250.00	104250.00	Pass
5	Latitude	5052.79	5057.79	Pass
6	Northern/southern hemisphere	N	N	Pass
7	Longitude	00113.94	00113.94	Pass
8	Eastern/western hemisphere	W	W	Pass
9	Course over ground (degrees)	11.1	11.1	Pass
10	Course over ground (true)	T	T	Pass
11	Speed over ground (knots)	10.0	10.0	Pass
12	Speed over ground (knots)	N	N	Pass
13	Checksum	31	31	Pass

LR3 - AIS Long Range Reply Sentence 3

Transmitted Message				
$AILR3,6(1),777888999(2),SOUTHAMPTON(3),111219(4),140000.00(5),8.0(6),52(7),50.0(8),10.0(9),52.0(10),90(11)*40(12)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Sequence number	6	6	Pass
2	MMSI of responder	777888999	777888999	Pass
3	Voyage destination	SOUTHAMPTON	SOUTHAMPTON	Pass
4	ETA date (DDMMYY)	111219	111219	Pass
5	ETA time (HHMMSS.SS)	140000.00	140000.00	Pass
6	Draught	8.0	8.0	Pass
7	Ship/cargo type	52	52	Pass
8	Ship length	50	50	Pass
9	Ship breadth	10	10	Pass
10	Ship type	52	52.0	Pass
11	Persons on board	90	90	Pass
12	Checksum	40	40	Pass

LRF - AIS Long Range Function

Transmitted Message				
$AILRF,6(1),400500600(2),(3),ABCEFIOPUW(4),2222222222(5)*6A(6)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Sequence number	6	6	Pass
2	MMSI of requestor	400500600	400500600	Pass
3	Name of requestor	NULL	NULL	Pass
4	Function request	ABCEDFIOPUW	ABCEFIOPUW	Pass
5	Function reply status	2222222222	2222222222	Pass
6	Checksum	6A	6A	Pass

RMC - Recommended Minimum Specific GNSS Data

Transmitted Message				
$GPRMC,101711.000(1),A(2),5052.1721(3),N(4),00114.6445(5),W(6),0.00(7),(8),101219(9),(10),(11),A(12),V(13)*15(14)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	UTC of position fix	101711.000	101711.00	Pass
2	Status (A = data valid, V = navigation receiver warning)	A	A	Pass
3	Latitude	5052.1721	5052.17	Pass
4	Northern/southern hemisphere	N	N	Pass
5	Longitude	00114.6445	00114.6445	Pass
6	Eastern/western hemisphere	W	W	Pass
7	Speed over ground (knots)	0.00	0.00	Pass
8	Course over ground (degrees true)	NULL	NULL	Pass
9	Date (DDMMYY)	101219	101219	Pass

Transmitted Message				
$GPRMC,101711.000(1),A(2),5052.1721(3),N(4),00114.6445(5),W(6),0.00(7),(8),101219(9),(10),(11),A(12),V(13)*15(14)				
Field	Field Label	Expected Result	Actual Result	Verdict
10	Magnetic variation (degrees)	NULL	NULL	Pass
11	Magnetic variation (east/west)	NULL	NULL	Pass
12	Mode indicator	A	A	Pass
13	Navigational status	V	V	Pass
14	Checksum	15	15	Pass

SSD - AIS Ship Static Data

Transmitted Message				
$AISSD,TUVSUD(1),TUV SUD A(2),35(3),15(4),5(5),5(6),1(7),AI(8)*36(9) $AISSD,TUVSUD(1),TUV SUD A(2),30(3),20(4),3(5),7(6),1(7),GP(8)*2E(9)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Ship's call sign	TUVSUD	TUVSUD	Pass
2	Ship's name	TUV SUD A	TUV SUD A	Pass
3	Position reference point "A"; distance from bow	35	35	Pass
		30	30	Pass
4	Position reference point "B"; distance from stern	15	15	Pass
		20	20	Pass
5	Position reference point "C"; distance from port beam	5	5	Pass
		3	3	Pass
6	Position reference point "D"; distance from stern beam	5	5	Pass
		7	7	Pass
7	DTE indicator flag	1	1	Pass
8	Source identifier	AI	AI	Pass
		GP	GP	Pass
9	Checksum	36	36	Pass
		2E	2E	Pass

TRL - AIS Transmitter Non-Functioning Log

Transmitted Message				
$AITRL,10(1),2(2),2(3),12122019(4),153000(5),12122019(6),155100(7),1(8)*75(9)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of log entries	10	10	Pass
2	Log entry number	2	2	Pass
3	Sequential message identifier	2	2	Pass
4	Switch off date	12122019	12122019	Pass
5	Switch off UTC time	153000	153000	Pass
6	Switch on date	12122019	12122019	Pass
7	Switch on UTC time	155100	155100	Pass
8	Reason code	1	1	Pass
9	Checksum	75	75	Pass

TXT - Text Transmission

Transmitted Message				
$AITXT,01(1),01(2),33(3),AIS: Rate of Turn Indicator in use(4)*02(5)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of sentences	1	1	Pass
2	Sentence number	1	1	Pass
3	Text identifier	33	33	Pass
4	Text message	AIS: Rate of Turn Indicator in use	AIS: Rate of Turn Indicator in use	Pass
5	Checksum	02	02	Pass

VDM - AIS VHF Data-Link Message

Transmitted Message				
!AIVDM,1(1),1(2),(3),B(4),4027`SQv?4ggiwrCR2M6qDG00@MC(5),0(6)*33(7)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of sentences needed to transfer the message	1	1	Pass
2	Sentence number	1	1	Pass
3	Sequential message identifier	NULL	NULL	Pass
4	AIS channel	B	B	Pass
5	Encapsulated ITU-R M.1371 message, see table below for full decode	4027`SQv?4ggiwrCR2M 6qDG00@MC	4027`SQv?4ggiwrCR2M 6qDG00@MC	Pass
6	Number of fill-bits	0	0	Pass
7	Checksum	33	33	Pass

VDM - AIS VHF Data-Link Message Decode

Transmitted Message	
!AIVDM,1,1,,B,4027`SQv?4ggiwrCR2M6qDG00@MC,0*33	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2222222
Year	2019
Month	12
Day	9
Hour	15
Minute	47
Second	49
Position Accuracy	1 - high (> 10 m)
Longitude	1 14.6431 W
Latitude	50 52.1681 N
Type of electronic position fixing device	7 - Surveyed
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	4
Communication State - Sub Message	Slot Number = 1875

VDO - AIS VHF Data Link Own Vessel Report

Transmitted Message				
!AIVDO,1(1),1(2),(3),A(4),1;UnTqh01TwrUVRM7pchKh1d0@P;(5),0(6)*35(7)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of sentences needed to transfer the message	1	1	Pass
2	Sentence number	1	1	Pass
3	Sequential message identifier	NULL	NULL	Pass
4	AIS channel	A	A	Pass
5	Encapsulated ITU-R M.1371 message, see table below for message decode	1;UnTqh01TwrUVRM7 pchKh1d0@P;	1;UnTqh01TwrUVRM7 pchKh1d0@P;	Pass
6	Number of fill bits	0	0	Pass
7	Checksum	05	05	Pass

VDO - AIS VHF Data Link Own Vessel Report Message Decode

Transmitted Message	
!AIVDO,1,1,,A,1;UnTqh01TwrUVRM7pchKh1d0@P;,0*35	
Parameter	Decoded Value
Message ID	1 - Position report
Repeat Indicator	0
MMSI	777888999
Navigational Status	0 - under way using engine
Rate of Turn	0 (Turning Right)
Speed Over Ground	10
Position Accuracy	1 - high (> 10 m)
Longitude	1 10.9423 W
Latitude	50 53.7903 N
Course Over Ground	11.1
True Heading	0
Time Stamp	54
Special Manoeuvre Indicator	0 - not available
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	4
Communication State - Sub Message	Slot Number = 2059

VER - Version

Transmitted Message				
$AIVER,1(1),1(2),AI(3),OSG(4),777888999(5),1234567Q(6),ATA100(7),00.2.16(8),02.0.00(9),0(10)*1F(11)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Total number of sentences needed	1	1	Pass
2	Sentence number	1	1	Pass
3	Device type	AI	AI	Pass
4	Vendor ID	OSG	OSG	Pass
5	Unique identifier	777888999	777888999	Pass
6	Manufacturer serial number	1234567Q	1234567Q	Pass
7	Model code (product code)	ATA100	ATA100	Pass
8	Software revision	0.2.16	00.2.16	Pass
9	Hardware revision	2.0	02.0.00	Pass
10	Sequential message identifier	0	0	Pass
11	Checksum	1F	1F	Pass

VSD - AIS Voyage Static Data

Transmitted Message				
$AIVSD,52(1),8.0(2),120(3),SOUTHAMPTON(4),140000.00(5),11(6),12(7),0(8),0(9)*03(10)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Type of ship and cargo category	52	52	Pass
2	Maximum present static draught	8.0	8.0	Pass
3	Persons on-board	120	120	Pass
4	Destination	SOUTHAMPTON	SOUTHAMPTON	Pass
5	Estimated UTC on arrival at destination	140000.00	140000.00	Pass
6	Estimated day of arrival at destination	11	11	Pass
7	Estimated month of arrival at destination	12	12	Pass
8	Regional application flags	0	0	Pass
9	Regional application flags	0	0	Pass
10	Checksum	03	03	Pass

2.9 DATA STRINGS RECEIVED BY THE EUT

2.9.1 Specification Reference

IEC 61162-1, Clause B.4.9.2

2.9.2 Equipment Under Test and Modification State

ATA100, S/N: TA007 – Modification State 1 – See section 1.5 for modification details.

2.9.3 Date of Test

11 July 2019 – 12 July 2019

2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.5 Test Requirements and Results

Test requirements

Artificially generated data strings with various content and formatting shall be sent to the EUT. These are generated by the above-mentioned means and in accordance with the manufacturer's documentation.

a) Test of correct evaluation of the data.
b) Test of correct evaluation of all status indications and the selected operation mode.
c) Test of adequate reaction in case of incorrectness corresponding with the status information and the selected operation mode.
d) Test of correct evaluation of the checksum.
e) Test of break of data line.
f) Test of the required receiving intervals (if necessary).

Where the transmitted or received data corresponds to that shown on the display of the EUT, this data shall be compared directly with that sent by the test equipment.

Test Results

To see results, see report for IEC 61993-2. For the messages not cover by IEC 61993-2 see below.

The test of incorrect checksum and break of data line was tested with once sentence only as the same software functions are used to check all sentences for correct checksum and break of data line.

ABM - AIS addressed binary and safety related message
This is further tested in IEC 61993-2, Ed.3.0, §14.1.4.1 and §16.6.4.

ACK – Acknowledge alarm
Tested further in IEC 61993-2, Ed 3.0, §14.8.2.6

AIR - AIS interrogation request
This is tested in more detail in IEC61993-2, Ed.3.0, §14.1.3.1, §14.7.2, §14.7.3 and §16.6.4.

BBM – AIS broadcast binary message
Tested further in IEC 61993-2, Ed.3.0, §14.1.6.1, §16.4.1 and §16.6.4.

ACN – Alert Command
Tested further in IEC 61993-2, Ed.3.0, §8.1.3 and §8.1.4.

AIQ – AIS Query
Tested further in IEC 61993-2, Ed.3.0, §14.8.2.8.

ALR – Set Alarm State
Tested further in IEC 61993-2, Ed.3.0, §14.8.2.1, §14.8.2.2, §14.8.2.4b and §14.8.2.6.

BBM – AIS Broadcast Binary Message
Tested further in IEC 61993-2, Ed.3.0, §16.4, §16.6.4 and §16.7.2.

DTM – Datum Reference
Tested further in IEC 61993-2, Ed.3.0, §19.4 and §19.5.3.

EPV – Command/Report Equipment Property Value
Tested further in IEC 61993-2, Ed.3.0, §19.9.4 and §19.9.5.

GBS – GNSS Satellite Fault Detection
Tested further in IEC 61993-2, Ed.3.0, §19.5.4.

GGA – Global Positioning System Fix Data
Tested further in IEC 61993-2, Ed.3.0, §14.8.3.2.

GNS – GNSS Fix Data
Tested further in IEC 61993-2, Ed.3.0, §14.3, §14.8.2.4, §14.8.2.7, §14.8.2.8, §14.8.3.1, §14.8.3.2, §14.8.3.4, §14.8.3.5 and §14.8.3.7.

GSA – GNSS DOP and Active Satellites
Tested further in IEC 61993-2, Ed.3.0, §16.6.6.2.

GSV – GNSS Satellites in View

Messages sent to EUT
$GPGSV,4,1,13,29,74,069,50,31,65,246,49,25,46,100,51,26,36,288,17*75 $GPGSV,4,2,13,21,23,172,44,02,17,039,40,14,14,231,38,23,10,329,*72 $GPGSV,4,3,13,12,09,100,43,16,08,283,17,40,06,109,36,05,05,073,45*7A $GPGSV,4,4,13,32,02,217,27*49

Messages EUT recieved	Verdict
$GPGSV,4,1,13,29,74,069,50,31,65,246,49,25,46,100,51,26,36,288,17*75 $GPGSV,4,2,13,21,23,172,44,02,17,039,40,14,14,231,38,23,10,329,*72 $GPGSV,4,3,13,12,09,100,43,16,08,283,17,40,06,109,36,05,05,073,45*7A $GPGSV,4,4,13,32,02,217,27*49	Pass
The above messages are transmitted every 2 secs and recieved by the EUT	Pass

Messages EUT recieved	Verdict
$GPGSV,4,1,A $GPGSV,4,2,A $GPGSV,4,3,A $GPGSV,4,4,A	Pass
The above messages are transmitted every 2 secs and recieved by the EUT	Pass

Messages EUT recieved	Verdict
$GPGSV,4,1,13,29,74,069,50,31,65,246,49,25,46,100,51,26,36,288,17*75 $GPGSV,4,2,13,21,23,172,44,02,17,039,40,14,14,231,38,23,10,329,*72 $GPGSV,4,3,13,12,09,100,43,16,08,283,17,40,06,109,36,05,05,073,45*7A $GPGSV,4,4,13,32,02,217,27*49	Pass
Recieved checksum is the same as the transmitted checksum	Pass

HBT – Heartbeat Supervision Sentence

Tested further in IEC 61993-2, Ed.3.0, §8.1.1.1.

HDG – Heading Deviation Variation

Tested further in IEC 61993-2, Ed.3.0, §14.8.3.3.

HDT – Heading True

Tested further in IEC 61993-2, Ed.3.0, §14.8.3.3, §19.4, §19.5.5, §19.5.7, §19.5.8, §19.5.9 and §19.5.10.

LRF – AIS Long Range Function

Tested further in IEC 61993-2, Ed.3.0, §20.1.1, §20.1.2 and §20.1.3.

LRI – AIS Long Range Interrogation

Tested further in IEC 61993-2, Ed.3.0, §20.1.1, §20.1.2 and §20.1.3.

RMC – Recommended Minimum Specific GNSS Data

Tested further in IEC 61993-2, Ed.3.0, §10.5.10, §14.8.3.1, §14.8.3.7, §19.4, §19.5.2, §19.5.3, §19.5.4, §19.5.7, §19.5.9 and §19.6.

ROT – Rate of Turn

Messages sent to the EUT: ROT = 0				
$TIROT,0.0(1),A(2)*3B(3)				
Field	Field Label	Value		
1	Rate of turn (°/min)	0.0		
2	Data valid	A		
3	Checksum	3B		
Message received by the EUT				
$TIROT,0.0(1),A(2)*3B(3)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Rate of turn (°/min)	0.0	0.0	Pass
2	Data valid	A	A	Pass
3	Checksum	3B	3B	Pass

Messages sent to the EUT: ROT = 10				
$TIROT,10.0,A*0A				
Field	Field Label	Value		
1	Rate of turn (°/min)	10.0		
2	Data valid	A		
3	Checksum	0A		
Message received by the EUT				
$TIROT,10.0(1),A(2)*0A(3)				
Field	Field Label	Expected Result	Actual Result	Verdict
1	Rate of turn (°/min)	10.0	10.0	Pass
2	Data valid	A	A	Pass
3	Checksum	0A	0A	Pass

Message received by the EUT with an incorrect checksum		
$TIROT,10.0(1),A(2)*FF(3)		
Required Result	Actual Result	Verdict
The EUT shall not use the ROT sentence.	The EUT does not use the value from the invalid rate of turn sentence in position reports: !AIVDM,1,1,,A,1;UnTqh01TwrFu2M7AWhKh1:0<01,0*2A	Pass
The EUT shall release an alert, informing the user that the ROT sentence is missing.	The EUT raises alert with ID 035: $AIALR,133454.00,035,A,V,AIS: No valid ROT information *63	Pass

Message received by the EUT with incorrect line break		
$TIROT,A		
Required Result	Actual Result	Verdict
The EUT shall not use the ROT sentence.	The EUT does not use the value from the invalid rate of turn sentence in position reports: !AIVDM,1,1,,A,1;UnTqh01TwrFu2M7AWhKh1h0D01,0*00	Pass
The EUT shall release an alert, informing the user that the ROT sentence is missing.	The EUT raises alert with ID 035: $AIALR,134500.00,035,A,V,AIS: No valid ROT information*64	Pass

SSA – Sender Signature Authentication
Tested further in IEC 61993-2, Ed.3.0, §18.1.5

SSD – AIS Ship Static Data
Tested further in IEC 61993-2, Ed.3.0, §14.1.1.1, §14.3, §14.3.2.4, §14.8.3.5 and §19.9.3.

SPW – Security Password Sentence
Tested further in IEC 61993-2, Ed.3.0, §14.3.2.4b.

THS – True heading and Status
Tested further in IEC 61993-2, Ed.3.0, §19.5.9 and §19.5.10.

VBW – Dual Ground/Water Speed
Tested further in IEC 61993-2, Ed.3.0, §19.5.5, §19.5.9 and §19.5.10.

VSD – AIS Voyage Static Data
Tested further in IEC 61993-2, Ed.3.0, §14.1.1, §14.3.2.4, §14.9.1 and §19.9.

VTG – Course Over Ground and Ground Speed
Tested further in IEC 61993-2, Ed.3.0, §19.5.6.

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

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

Instrument Description	Manufacturer	Model Type	TE Number	Cal Period (months)	Calibration Due Date
Oscilloscope	Agilent Technologies	DSO9104A	4142	12	22-Aug-2020
Power Supply	Iso-tech	IPS 2010	2440	-	TU
Power Supply	Rhode & Schwarz	HMP2020	4735	-	TU
Multimeter	White Gold	WG022	190	12	16-May-2020
Digital Insulation Tester	Megger	BM223	851	12	30-Apr-2020

Test Software

Testing of NMEA sentences carried out using TUV test software: 'AIS Test Data Suite' v1.40, and Tera Term v4.98.

TU – Traceability Unscheduled

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).