Report On

FCC Testing of the
Orolia SAS KanAtoN3
In accordance with FCC CFR 47 Part 80

COMMERCIAL-IN-CONFIDENCE

FCC ID: VIQ-KANATON

Document 75925284 Report 02 Issue 1 March 2014

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REPORT ON

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Orolia SAS KanAtoN3
In accordance with FCC CFR 47 Part 80

Document 75925284 Report 02 Issue 1

March 2014

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DATED 25 March 2014

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 80. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

M Russell G Lawler

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

FCC Testing of the
Orolia SAS KanAtoN3
In accordance with FCC CFR 47 Part 80

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Orolia SAS KanAtoN3 to the requirements of FCC CFR 47 Part 80.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Orolia SAS
Model Number(s)	Kan AtoN3
Serial Number(s)	LX1200023441
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 80 (2013)
Incoming Release Date	Declaration of Build Status 17 March 2014
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	1400012 10 January 2014
Start of Test	3 March 2014
Finish of Test	12 March 2014
Name of Engineer(s)	M Russell G Lawler

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 80 is shown below.

Section	Spec Clause	Test Description	Result	Comments/Base Standard
Transmit				
2.1	80.205	Bandwidths	Pass	
2.2	80.209	Transmitter Frequency Tolerances	Pass	
2.3	80.211	Emission Limitations	Pass	
2.4	80.213	Modulation Requirements	Pass	
2.5	80.213 (a)(2)	Transmitter Frequency Deviation	Pass	
2.6	80.215	Transmitter Power	Pass	
2.7	80.215 (e)(g)(1)(2)(3)	Transmitter Carrier Power Reduction	Pass	
2.8	80.217 (b)	Suppression of Interface Aboard Ships	Pass	

Product Service

1.3 DECLARATION OF BUILD STATUS

Manufacturer	OROLIA SAS
Country of origin	FRANCE
Technical Description	AIS transponder used in automated systems for Aids To Navigation
Model No	KanAtoN3
Part No	1202570
Serial No	Not Applicable
Drawing Number	B0301801
Build Status	In production
Software Issue	YLB0302K
Hardware Issue	I618A
FCC ID	VIQ-KANATON
IC ID	
Highest Operating Frequency	162.025 MHz
Signature	S. JINCHELEAU
Date	19/03/2014
D of B S Serial No	

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Orolia SAS KanAtoN3. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 24 V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Orolia SAS KanAtoN3
In accordance with FCC CFR 47 Part 80

2.1 BANDWIDTHS

2.1.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.205

2.1.2 Equipment Under Test and Modification State

Kan AtoN3 S/N: LX1200023441 - Modification State 0

2.1.3 Date of Test

3 March 2014

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 Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 80.205, Part 2.1049 and KDB 971168.

The EUT was transmitting at maximum power, modulated by the standard AIS test signals using either PRBS, 01010101 or 00001111 packet payloads. The EUT was connected to a spectrum analyser via a cable and attenuator, the RBW of the spectrum analyser was set to at least 1% of the emission bandwidth and a video bandwidth of 3 times RBW, the occupied bandwidth measurement function of the analyser was used and the 99% bandwidth recorded.

The plots on the following pages show the resultant display from the Spectrum Analyser.

2.1.6 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	30.5%

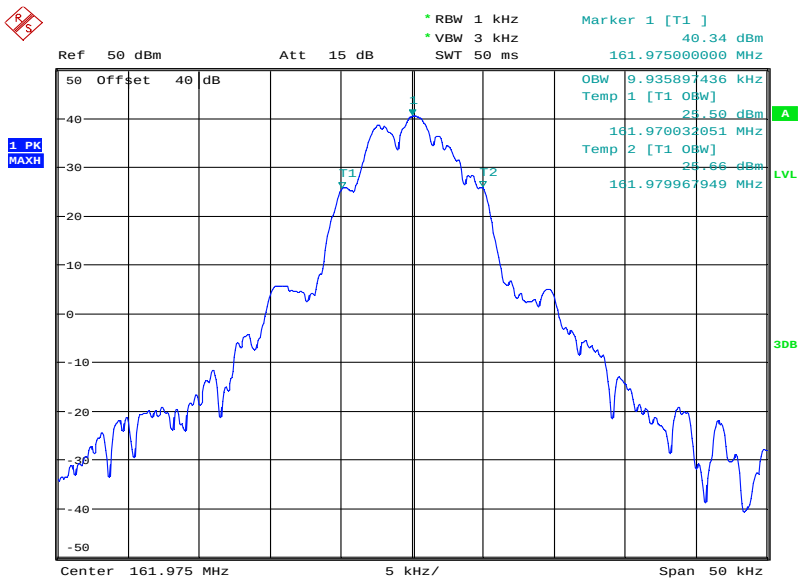
2.1.7 Test Results

Frequency	Test Signal	Authorised Bandwidth	Result (kHz)
161.975 MHz	01010101	20 kHz	9.935
	00001111	20 kHz	9.535
	PRBS	20 kHz	9.455
162.025 MHz	01010101	20 kHz	9.856
	00001111	20 kHz	9.695
	PRBS	20 kHz	9.695

Product Service

161.975 MHz

01010101



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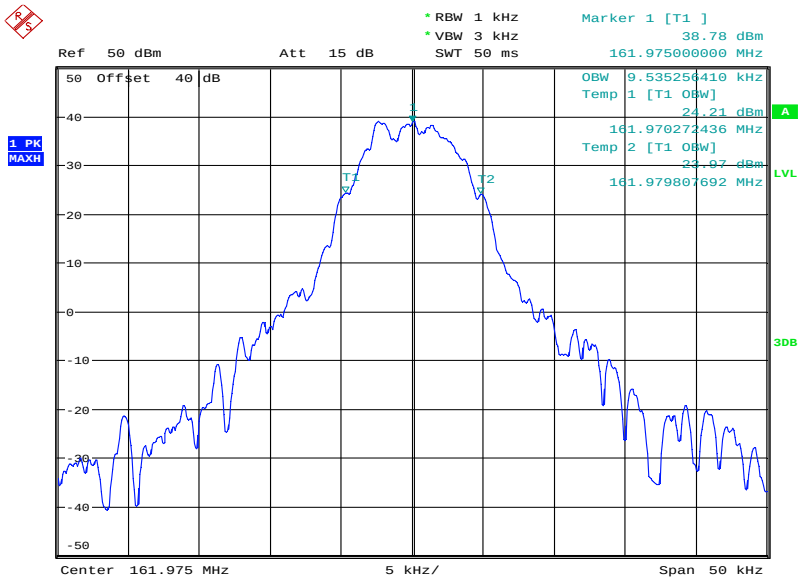

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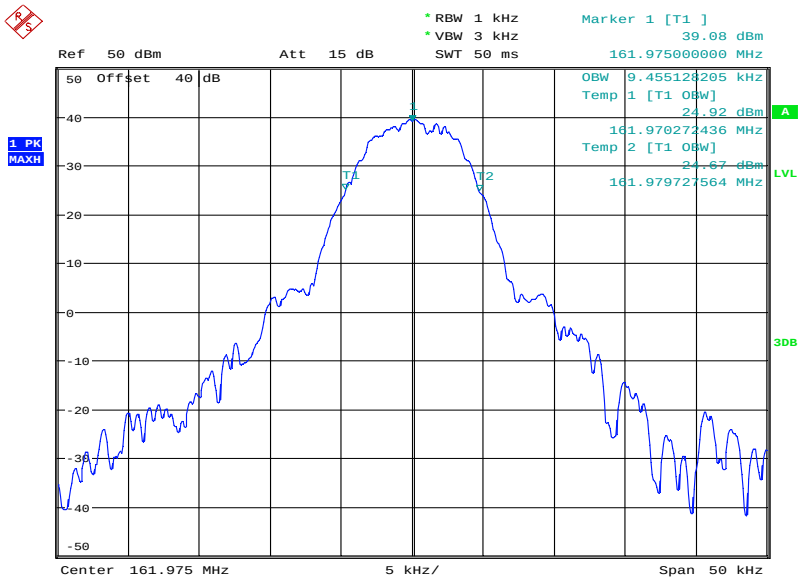
Product Service

PRBS



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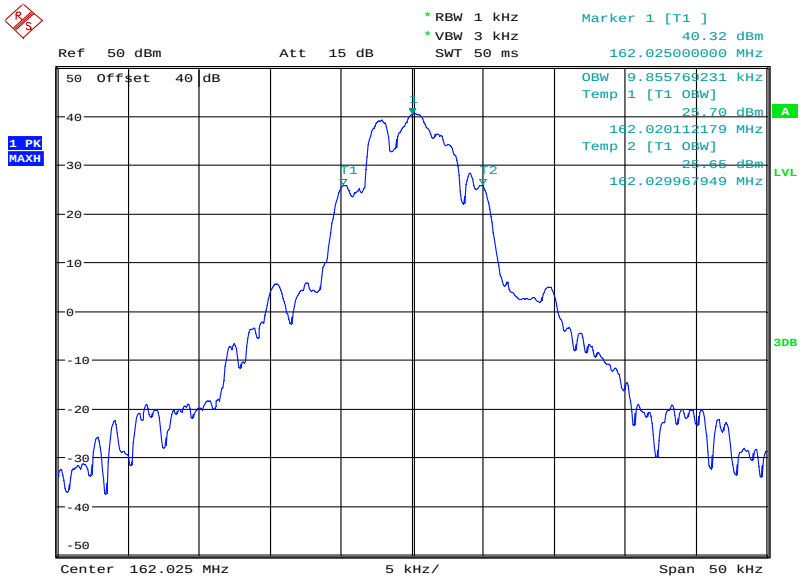
162.025 MHz

01010101



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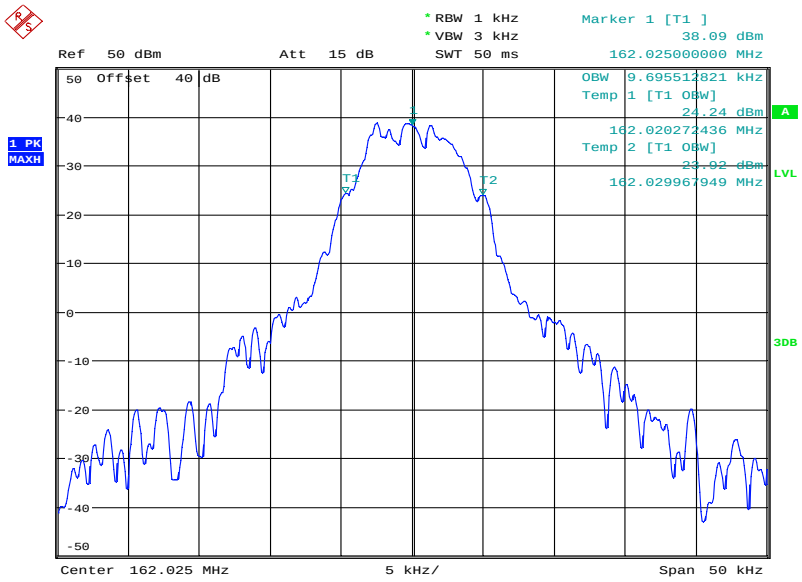

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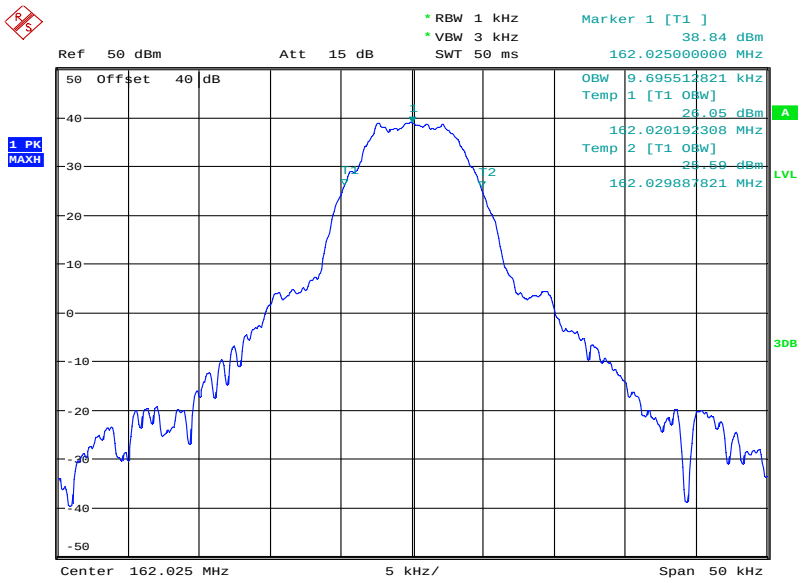
PRBS



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Limit Clause

20 kHz

2.2 TRANSMITTER FREQUENCY TOLERANCES

2.2.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.209

2.2.2 Equipment Under Test and Modification State

Kan AtoN3 S/N: LX1200023441 - Modification State 0

2.2.3 Date of Test

4 March 2014 & 5 March 2014

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 Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 80.209 (a) and FCC CFR 47 Part 2.1055 (a) (2), (d) (1).

The EUT was transmitting at maximum power in turn on either AIS channel. The EUT was modulated using the standard AIS test signal with PRBS packet payload. The EUT was connected to the spectrum analyser via a cable and attenuator. The external frequency reference of the spectrum analyser was locked to a 10 MHz rubidium frequency reference. The FM DEMOD function of the spectrum analyser was used which records the carrier frequency error. In accordance with 2.1055, the temperature was varied from -20°C to +50° in 10° steps at both minimum and maximum voltage extremes.

2.2.6 Environmental Conditions

Ambient Temperature	23.7 - 23.9°C
Relative Humidity	28.1 - 29.7%

Product Service

2.2.7 Test Results

Temperature	Frequency Error (ppm)	
	27.6 V DC	10.2 V DC
-20°C	1.98	1.94
-10°C	1.74	1.70
0°C	1.60	1.57
+10°C	1.38	1.33
+20°C	1.31	1.26
+30°C	0.84	0.80
+40°C	0.52	0.50
+50°C	0.52	0.48

162.025 MHz

Temperature	Frequency Error (ppm)	
	27.6 V DC	10.2 V DC
-20°C	1.97	1.95
-10°C	1.74	1.70
0°C	1.60	1.56
+10°C	1.37	1.34
+20°C	1.31	1.26
+30°C	0.85	0.79
+40°C	0.52	0.50
+50°C	0.50	0.47

Frequency	Maximum Frequency Error (Hz)
161.975 MHz	1.98
162.025 MHz	1.97

Limit Clause

No limit is defined 80.209. Therefore limit from ITU 1371 is used.

±3ppm.

2.3 EMISSION LIMITATIONS

2.3.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.211

2.3.2 Equipment Under Test and Modification State

Kan AtoN3 S/N: LX1200023441 - Modification State 0

2.3.3 Date of Test

4 March 2014 & 5 March 2014

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 Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 80.211(f).

For emissions where the frequency is removed less than 250% of the authorized bandwidth measurements were performed conducted as follows:

The EUT was connected to a spectrum analyser via a cable and attenuator. The EUT was transmitting at maximum power on either AIS channel. The EUT was modulated using the standard AIS test signal with PRBS packet payload. The path loss between the EUT and analyser was calibrated using a network analyser and entered in to the spectrum analyser as a reference level offset. The reference level for the mask was established using an RBW of 100 kHz and VBW of 300 kHz. The RBW and VBW were then reduced to 1 kHz and 3 kHz respectively and the mask as per FCC CFR 47 Part 80.211 (f) was applied.

For emissions where the frequency is removed more than 250% of the authorized bandwidth measurements were performed both conducted and radiated as follows:

Conducted: A network analyser was used to measure the path loss and the worst case was entered as a reference level offset in to the spectrum analyser. The EUT was connected to a spectrum analyser via an attenuator, and cable other than between 200 MHz and 300 MHz where a notch filter was used tuned to the frequency of the fundamental and between 300 MHz and 2 GHz where a 300 MHz high pass filter was used. The EUT was configured to maximum power on bottom and top channels with modulation. The spectrum analyser was configured with an RBW of 100 kHz below 1 GHz and 1 MHz for frequencies greater than 1 GHz with the trace set to max hold using a peak detector.

Radiated; A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

The EUT was set to transmit on maximum power with both channels operating individually.

For any emissions found the EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result was determined by a calculation using the signal generator level, antenna gain and cable loss.

The measurements were performed at a 3m distance unless otherwise stated.

2.3.6 Environmental Conditions

Ambient Temperature	18.4 - 23.9°C
Relative Humidity	28.1 - 35.0%

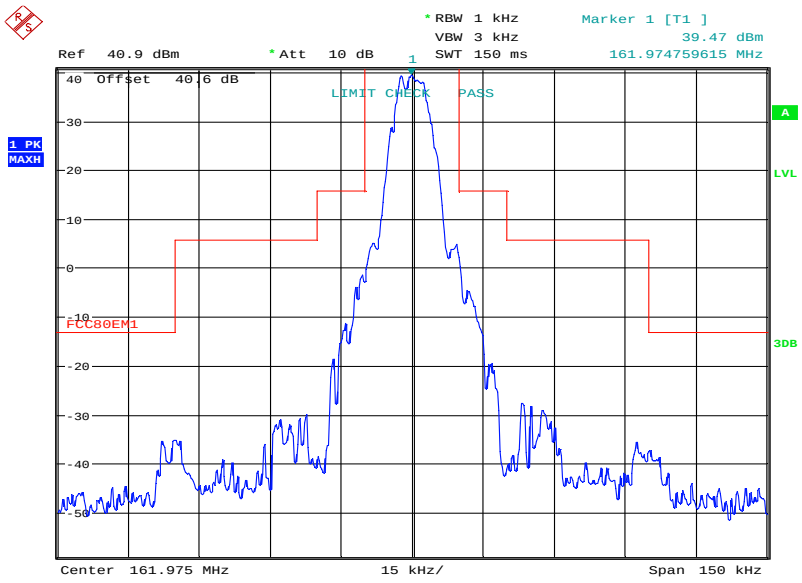
Product Service

2.3.7 Test Results

24 V DC Supply

Conducted

161.975 MHz



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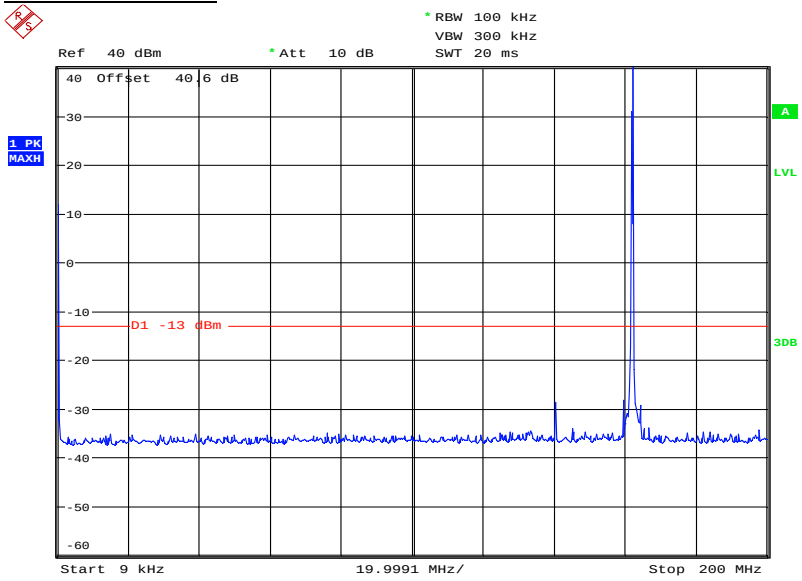
Product Service

9 kHz to 200 MHz



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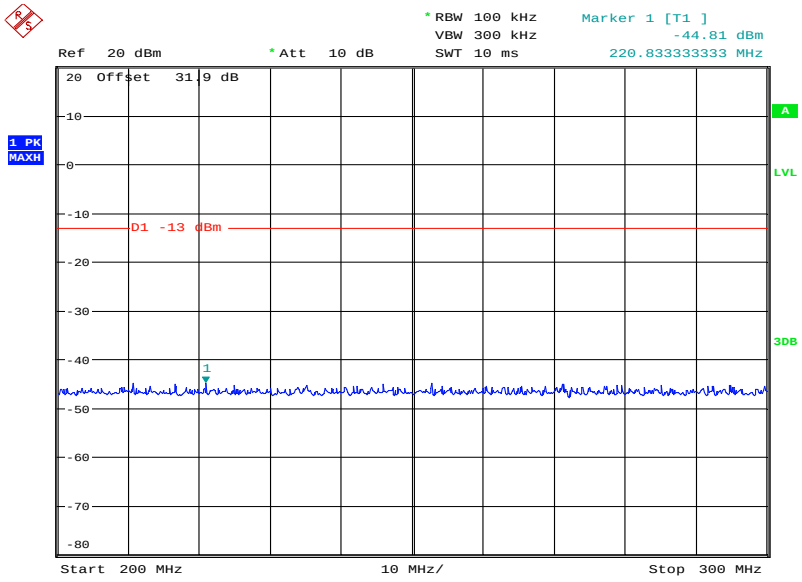
200 MHz to 300 MHz



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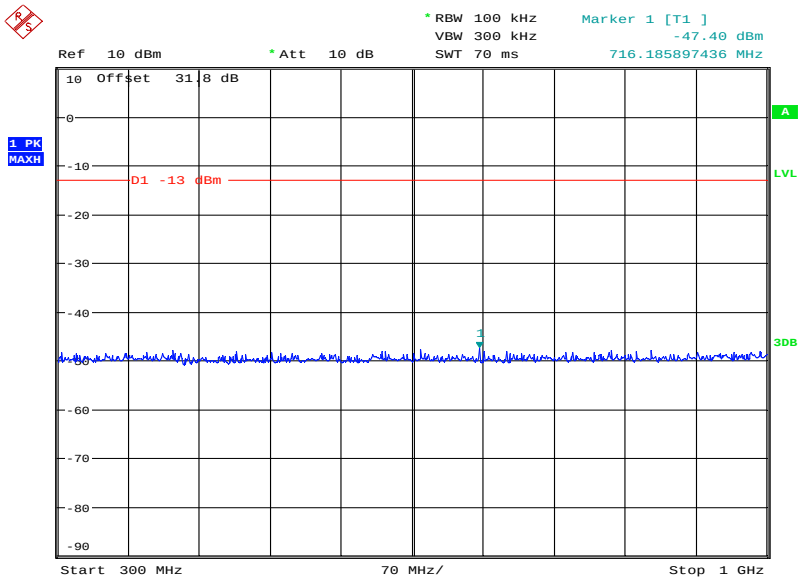
Product Service

300 MHz to 1 GHz



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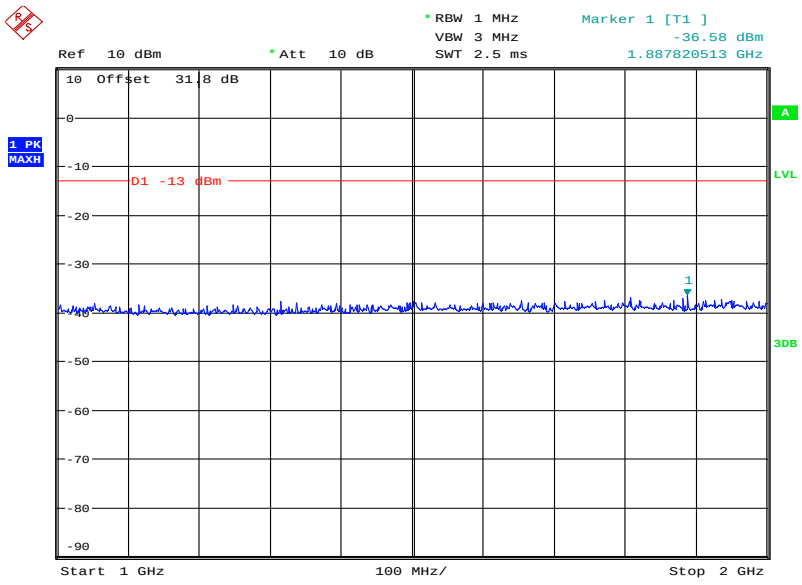
1 GHz to 2 GHz



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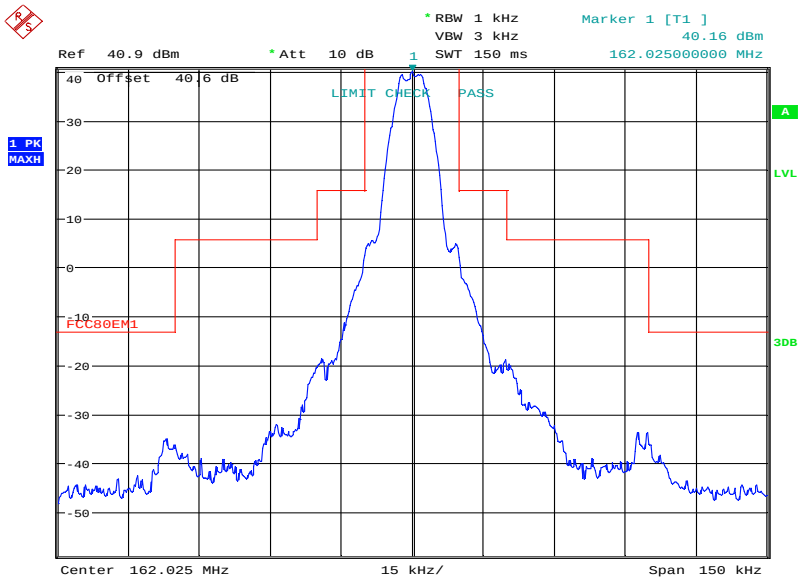
Product Service

162.025 MHz



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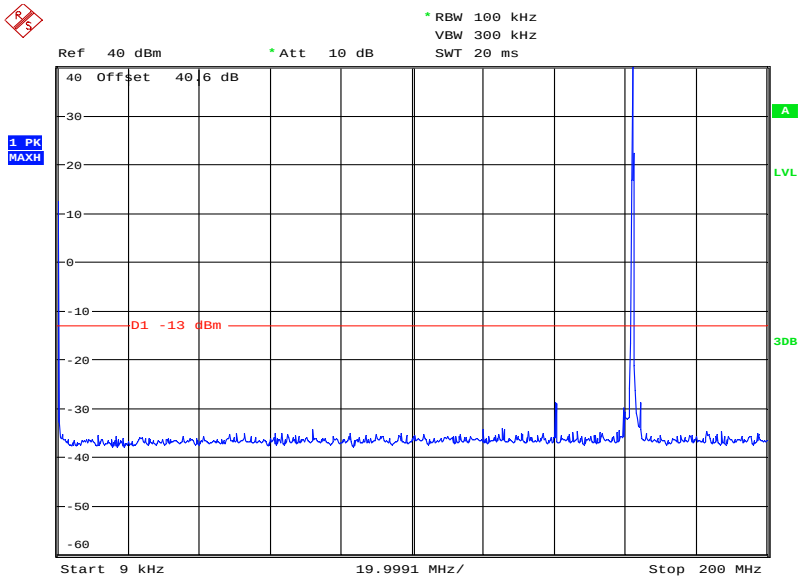
9 kHz to 200 MHz



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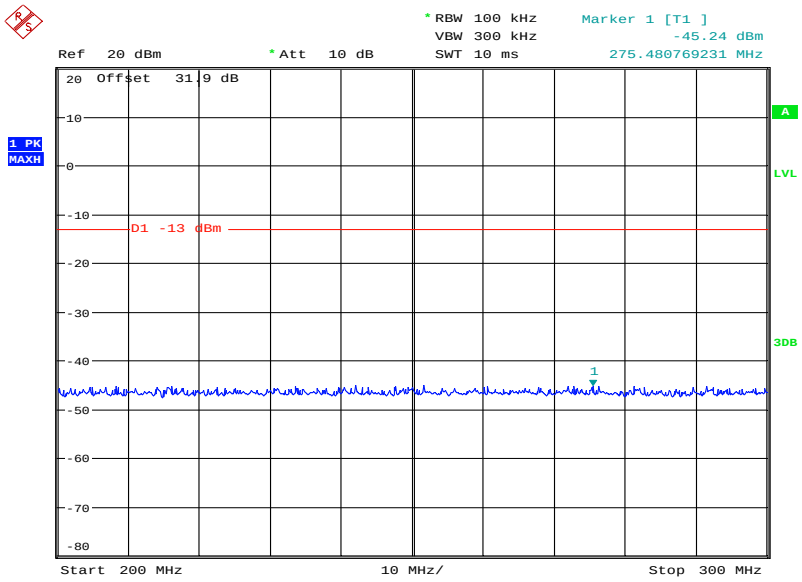
Product Service

200 MHz to 300 MHz



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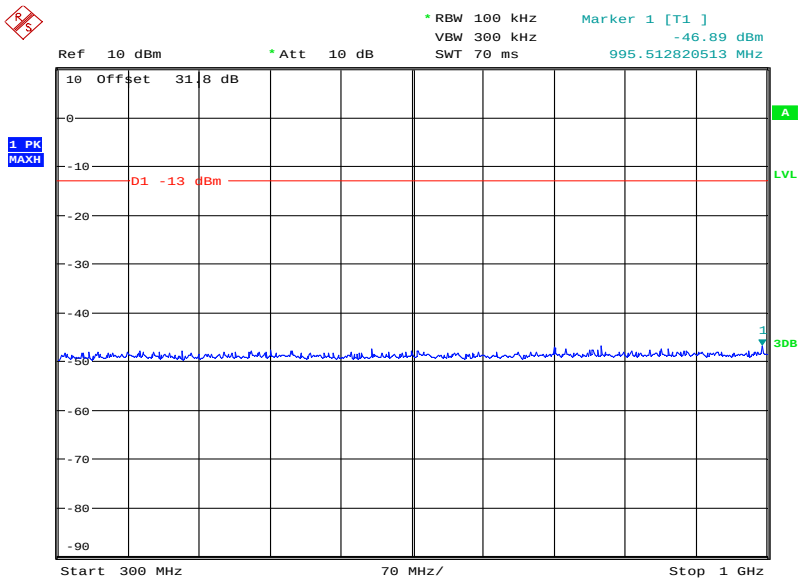
300 MHz to 1 GHz



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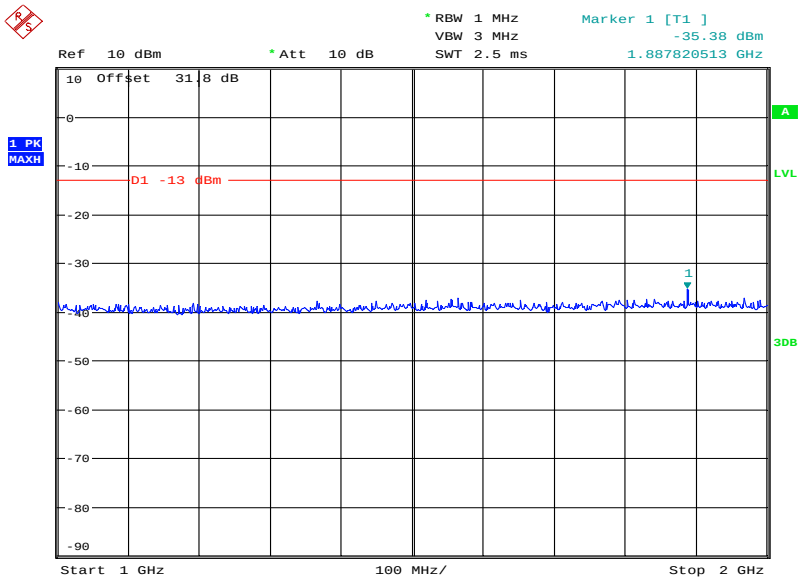
1 GHz to 2 GHz



Date: 4.MAR.2014 11:39:58

Limit Clause 80.211

Emission Mask

On any frequency removed from the assigned frequency by more than 50 % up to and including 100 % of the authorized bandwidth: At least 25 dB

On any frequency removed from the assigned frequency by more than 100 % up to and including 250 % of the authorized bandwidth: At least 35 dB

Outside the Emission Mask

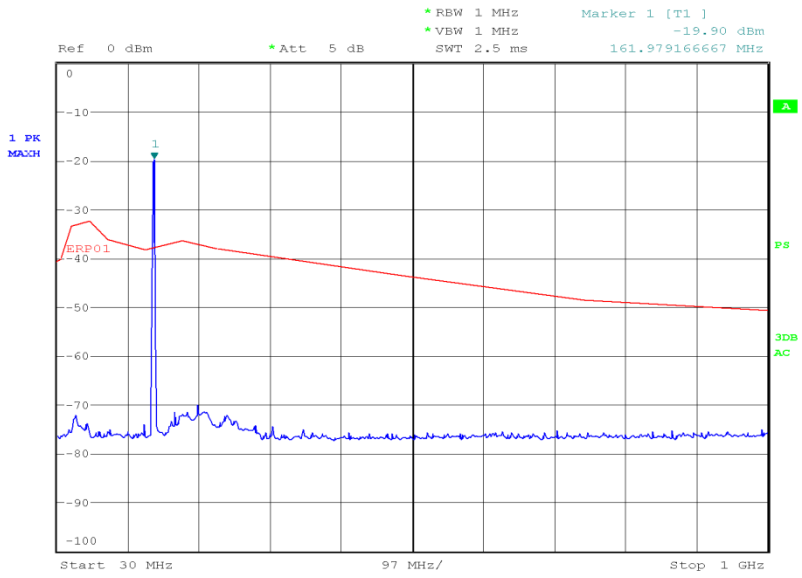
>250 % of authorised bandwidth 43+10 Log P **OR** -13 dBm

Product Service

Radiated

161.975 MHz

30 MHz to 1 GHz



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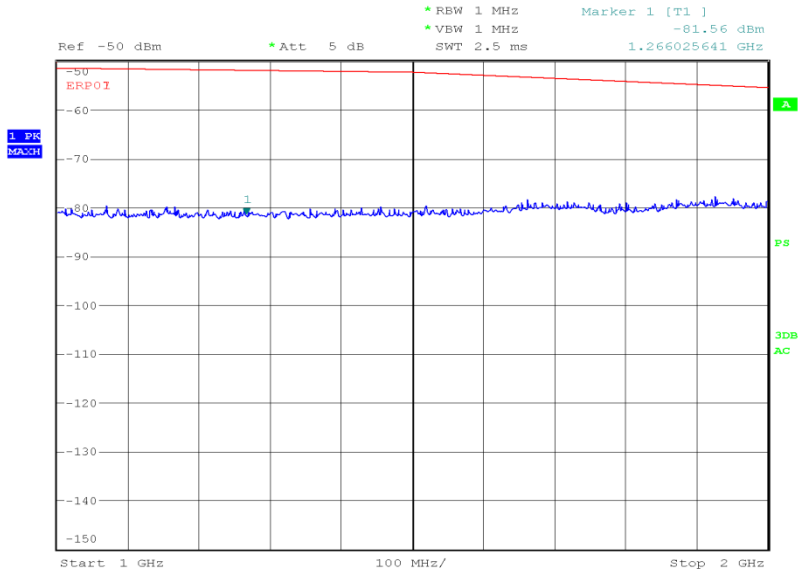
1 GHz to 2 GHz



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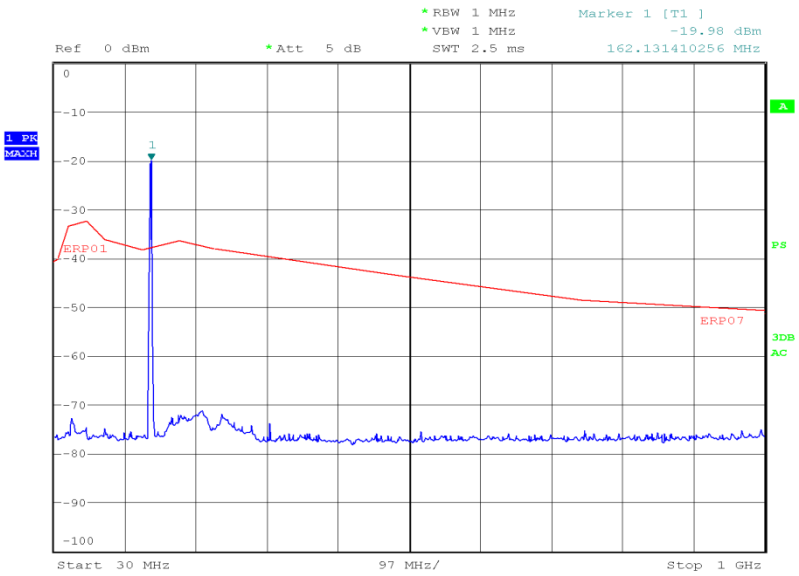
Product Service

162.025 MHz

30 MHz to 1 GHz



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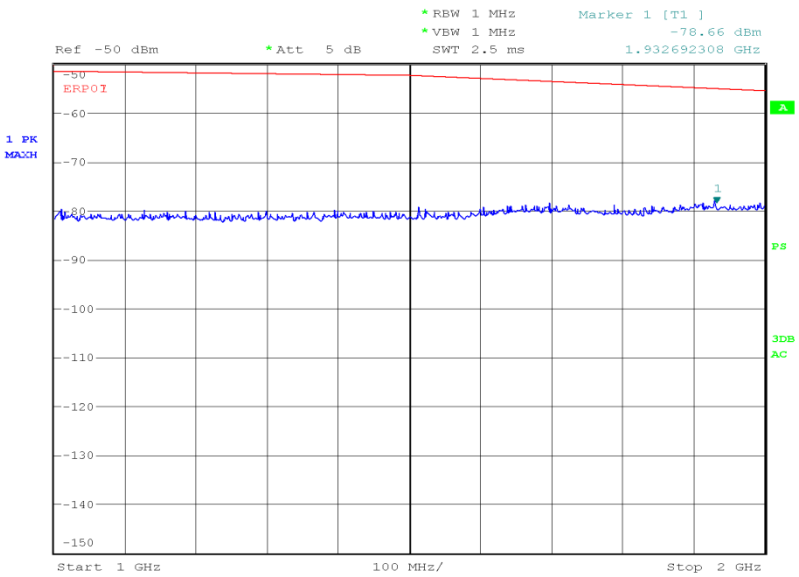
1 GHz to 2 GHz



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Limit Clause 80.211

Emission Mask

On any frequency removed from the assigned frequency by more than 50 % up to and including 100 % of the authorized bandwidth: At least 25 dB

On any frequency removed from the assigned frequency by more than 100 % up to and including 250 % of the authorized bandwidth: At least 35 dB

Outside the Emission Mask

>250 % of authorised bandwidth 43+10 Log P **OR** -13 dBm

2.4 MODULATION REQUIREMENTS

2.4.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.213

2.4.2 Equipment Under Test and Modification State

Kan AtoN3 S/N: LX1200023441 - Modification State 0

2.4.3 Date of Test

3 March 2014

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 Procedure

The EUT was configured to transmit at maximum power with three different packet data loads. These were 11110000, 10101010 and PRBS. The EUT was connected to an FSQ spectrum analyser and using the FM demodulation function the peak deviation was observed as shown in traces below.

2.4.6 Environmental Conditions

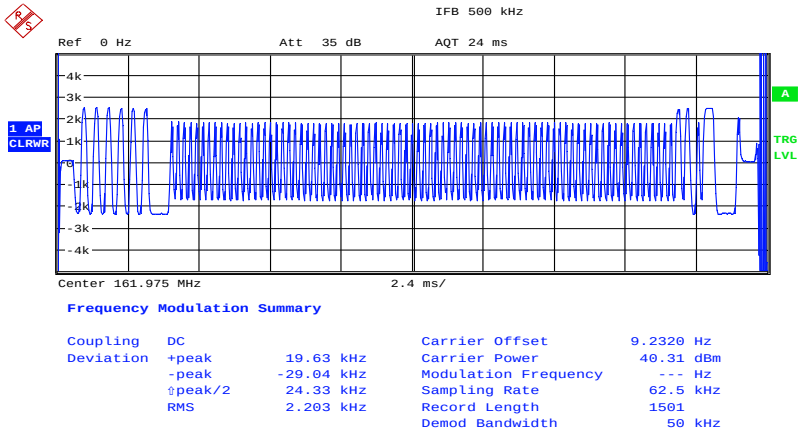
Ambient Temperature	23.1°C
Relative Humidity	30.5%

Product Service

2.4.7 Test Results

161.975 MHz

01010101

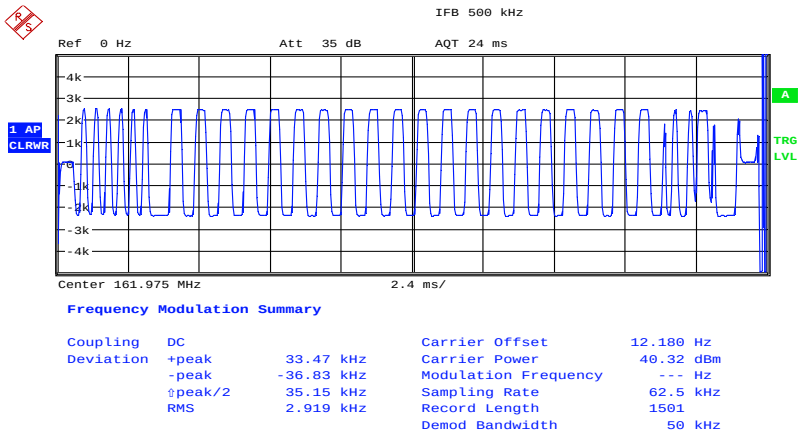


Frequency Modulation Summary

Coupling	DC		Carrier Offset	9.2320 Hz
Deviation	+peak	19.63 kHz	Carrier Power	40.31 dBm
	-peak	-29.04 kHz	Modulation Frequency	--- Hz
	⇳peak/2	24.33 kHz	Sampling Rate	62.5 kHz
	RMS	2.203 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:34:49

00001111



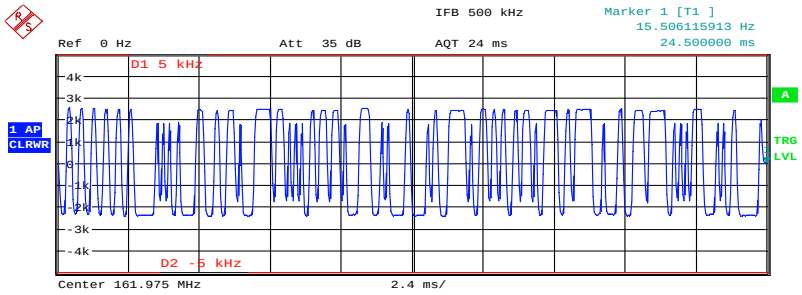
Frequency Modulation Summary

Coupling	DC		Carrier Offset	12.180 Hz
Deviation	+peak	33.47 kHz	Carrier Power	40.32 dBm
	-peak	-36.83 kHz	Modulation Frequency	--- Hz
	⇳peak/2	35.15 kHz	Sampling Rate	62.5 kHz
	RMS	2.919 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:35:18

Product Service

PRBS



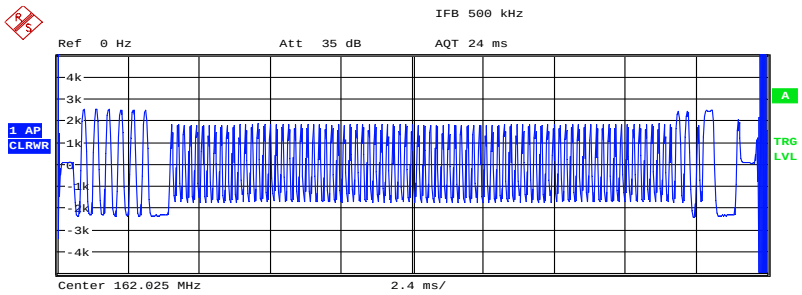
Frequency Modulation Summary

Coupling	DC		Carrier Offset	151.04 Hz
Deviation	+peak	2.526 kHz	Carrier Power	40.31 dBm
	-peak	-2.460 kHz	Modulation Frequency	--- Hz
	⇳peak/2	2.493 kHz	Sampling Rate	62.5 kHz
	RMS	1.953 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:24:21

162.025 MHz

01010101



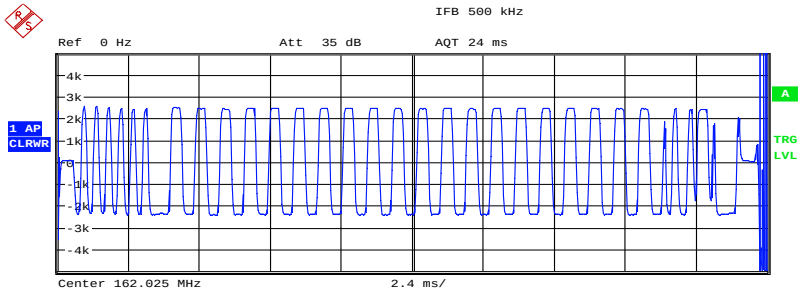
Frequency Modulation Summary

Coupling	DC		Carrier Offset	9.7353 Hz
Deviation	+peak	29.26 kHz	Carrier Power	40.32 dBm
	-peak	-30.65 kHz	Modulation Frequency	--- Hz
	⇳peak/2	29.95 kHz	Sampling Rate	62.5 kHz
	RMS	2.717 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:37:20

Product Service

00001111

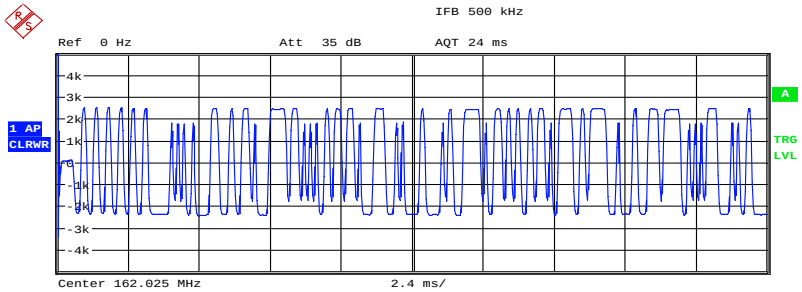


Frequency Modulation Summary

Coupling	DC		Carrier Offset	12.394 Hz
Deviation	+peak	38.26 kHz	Carrier Power	40.32 dBm
	-peak	-29.52 kHz	Modulation Frequency	13.4270 kHz
	⇳peak/2	33.89 kHz	Sampling Rate	62.5 kHz
	RMS	15.40 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:35:54

PRBS



Frequency Modulation Summary

Coupling	DC		Carrier Offset	132.74 Hz
Deviation	+peak	6.289 kHz	Carrier Power	40.32 dBm
	-peak	-3.413 kHz	Modulation Frequency	--- Hz
	⇳peak/2	4.851 kHz	Sampling Rate	62.5 kHz
	RMS	1.952 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:37:57

Limit Clause

When phase or frequency modulation is used in the 156-162 MHz bands the peak modulation must be maintained between 75 and 100 percent. A frequency deviation of ±5 kHz is defined as 100 percent peak modulation.

Ship and cost station transmitters operating in the 156-162 MHz and 216-220 MHz bands must be capable of proper operation with a frequency deviation that does not exceed ±5 kHz.

2.5 TRANSMITTER FREQUENCY DEVIATION

2.5.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.213 (a)(2)

2.5.2 Equipment Under Test and Modification State

Kan AtoN3 S/N: LX1200023441 - Modification State 0

2.5.3 Date of Test

3 March 2014

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 Procedure

The EUT was configured to transmit three different packet data loads at maximum power. These were 11110000, 10101010 and PRBS. The maximum deviation was recorded using the modulation analysis function on the spectrum analyser and compared with the specification limits.

2.5.6 Environmental Conditions

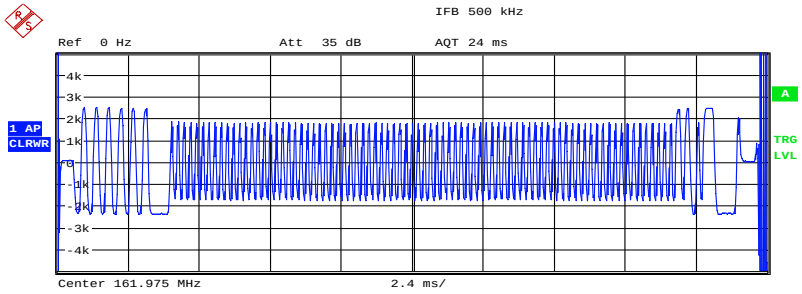
Ambient Temperature	23.1°C
Relative Humidity	30.5%

Product Service

2.5.7 Test Results

Confirm that the frequency deviation does not exceed 5 kHz	**Yes**

161.975 MHz – 01010101

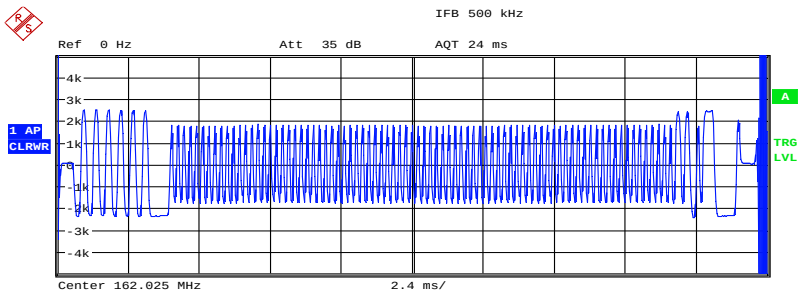


Frequency Modulation Summary

Coupling	DC		Carrier Offset	9.2320 Hz
Deviation	+peak	19.63 kHz	Carrier Power	40.31 dBm
	-peak	-29.04 kHz	Modulation Frequency	--- Hz
	⇳peak/2	24.33 kHz	Sampling Rate	62.5 kHz
	RMS	2.203 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:34:49

162.025 MHz – 01010101



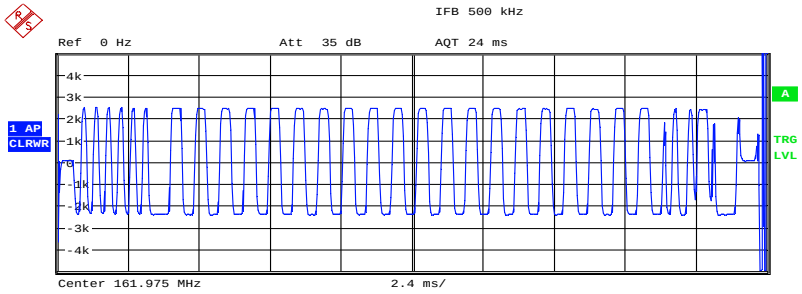
Frequency Modulation Summary

Coupling	DC		Carrier Offset	9.7353 Hz
Deviation	+peak	29.26 kHz	Carrier Power	40.32 dBm
	-peak	-30.65 kHz	Modulation Frequency	--- Hz
	⇳peak/2	29.95 kHz	Sampling Rate	62.5 kHz
	RMS	2.717 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:37:20

Product Service

161.975 MHz – 00001111

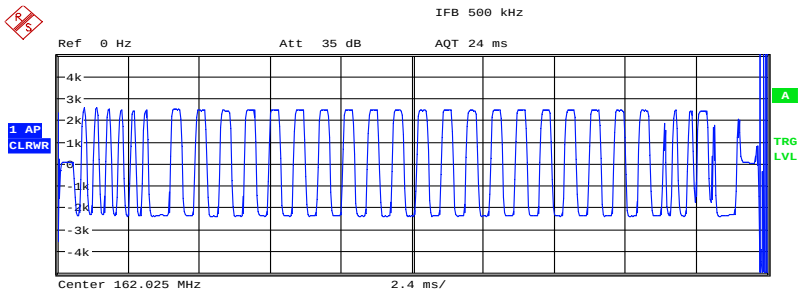


Frequency Modulation Summary

Coupling	DC		Carrier Offset	12.180 Hz
Deviation	+peak	33.47 kHz	Carrier Power	40.32 dBm
	-peak	-36.83 kHz	Modulation Frequency	--- Hz
	⇳peak/2	35.15 kHz	Sampling Rate	62.5 kHz
	RMS	2.919 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:35:18

162.025 MHz – 00001111



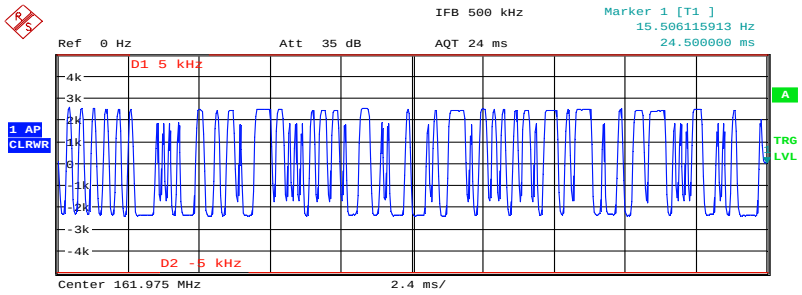
Frequency Modulation Summary

Coupling	DC		Carrier Offset	12.394 Hz
Deviation	+peak	38.26 kHz	Carrier Power	40.32 dBm
	-peak	-29.52 kHz	Modulation Frequency	13.4270 kHz
	⇳peak/2	33.89 kHz	Sampling Rate	62.5 kHz
	RMS	15.40 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:35:54

Product Service

161.975 MHz – PRBS

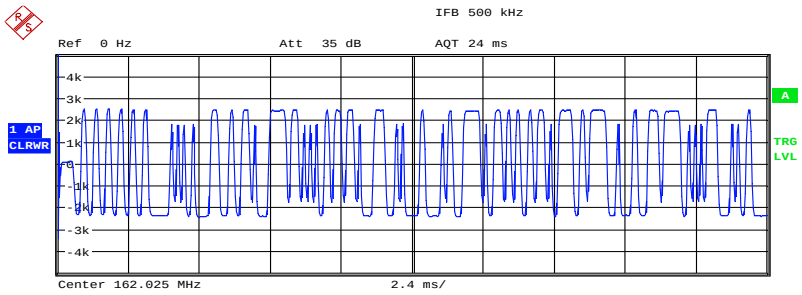


Frequency Modulation Summary

Coupling	DC		Carrier Offset	151.04 Hz
Deviation	+peak	2.526 kHz	Carrier Power	40.31 dBm
	-peak	-2.460 kHz	Modulation Frequency	--- Hz
	⇳peak/2	2.493 kHz	Sampling Rate	62.5 kHz
	RMS	1.953 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:24:21

162.025 MHz – PRBS



Frequency Modulation Summary

Coupling	DC		Carrier Offset	132.74 Hz
Deviation	+peak	6.289 kHz	Carrier Power	40.32 dBm
	-peak	-3.413 kHz	Modulation Frequency	--- Hz
	⇳peak/2	4.851 kHz	Sampling Rate	62.5 kHz
	RMS	1.952 kHz	Record Length	1501
			Demod Bandwidth	50 kHz

Date: 3.MAR.2014 13:37:57

Limit Clause 80.213 (a)(2)

When phase or frequency modulation is used in the 156–162 MHz band the peak modulation must be maintained between 75 and 100 percent. A frequency deviation of ±5 kHz is defined as 100 percent peak modulation.

2.6 TRANSMITTER POWER

2.6.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.215

2.6.2 Equipment Under Test and Modification State

Kan AtoN3 S/N: LX1200023441 - Modification State 0

2.6.3 Date of Test

3 March 2014

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 Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 80.215 (e) and KDB 971168.

The EUT was set to transmit in turn on maximum power and on either AIS channel. The EUT was modulated using the standard AIS test signal with PRBS packet payload. The EUT was connected to a spectrum analyser via a cable and attenuator. The path loss was measured using a network analyser and entered as a reference level offset in the spectrum analyser. The RBW of the spectrum analyser was set to 100 kHz and the video bandwidth to 300 kHz with the trace set to max hold using a peak detector and the result was recorded.

2.6.6 Environmental Conditions

Ambient Temperature	22.7°C
Relative Humidity	33.0%

2.6.7 Test Results

161.975 MHz

Result (dBm)	Result (W)
40.86	12.19

162.025 MHz

Result (dBm)	Result (W)
40.88	12.25

Limit Clause ITR-R M.1371-3 Clause 2.1.2

12.5 W ±1.5 dB

2.7 TRANSMITTER CARRIER POWER REDUCTION

2.7.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.215 (e)(g)(1)(2)(3)

2.7.2 Equipment Under Test

Kan AtoN3 S/N: LX1200023441

Product Service

2.7.3 Test Results

McMURDO
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Portsmouth, Hampshire, PO3 5PB, United Kingdom
mcmurdogroup.com

FCC statement on Kan AtoN autonomous operation

Dear Sarah,

Aids to Navigation help thousands of mariners annually to navigate their way safely around the globe. Lighthouses, buoys, light vessels and beacons together with electronic Aids to Navigation assist all mariners at all times and in all weathers.

For clarity and in accordance with terminology used by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the systems are described as "aids to navigation (AtoN)", to differentiate their provision from the equipment carried on board ships for navigational purposes, which are referred to as navigational aids (Navaids).

An AIS AtoN is typically installed on buoys and other Aids to Navigation to give the automatic AtoN position and can be integrated with lanterns and sensors such as weather, tide, temperature and water current. The AIS AtoN transmits the data via the AIS network allowing the position of the AtoN and sensor information to be monitored in all conditions with an AIS display.

Typical applications include:-

- Systems that improve waterway control and safety
- Improved maritime domain awareness
- Accurate real time monitoring of buoy positions in all weather conditions
- Dynamic marking of shipping lanes
- Instant marking of new hazards with virtual AtoN projection feature
- Automatic alerts in the event of buoy or lantern malfunction
- Ability to broadcast environmental information (meteorological and hydrological)

The Orolia SAS KanAtoN is compliant with the specification IEC62320-2 "AIS AtoN Stations – Operational and performance requirements, methods of testing and required test results". We confirm that our transmitter is used in an automated systems as described in the above text.

Best regards

Stéphane JINCHELEAU
R&D Manager
McMurdo Group

Limit Clause 80.215 (e)(1) (g)(1)

156.000 MHz to 162.000 MHz	≤1W

All transmitters and remote control units must be capable of reducing the carrier power to one watt or less.
This test did not show compliance. However, the document is supplied by the manufacturer as evidence to support the non-compliance of this test.

2.8 SUPPRESSION OF INTERFACE ABOARD SHIPS

2.8.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.217 (b)

2.8.2 Equipment Under Test and Modification State

Kan AtoN3 S/N: LX1200023441 - Modification State 0

2.8.3 Date of Test

5 March 2014

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 Procedure

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 80.217 (b) and KDB 971168.

A network analyser was used to measure the path loss and the worst case was entered as a reference level offset in to the spectrum analyser for each frequency range of interest. The EUT was connected to a spectrum analyser via a cable and attenuator. The EUT was configured in a receive only state receiving on both channels simultaneously. The spectrum analyser settings were configured with an RBW of 100 kHz below 1 GHz and 1 MHz for frequencies greater than 1 GHz using a VBW of 3 times the RBW. The trace set to max hold using a peak detector and the plots recorded as shown.

2.8.6 Environmental Conditions

Ambient Temperature	23.8°C
Relative Humidity	27.6%

Product Service

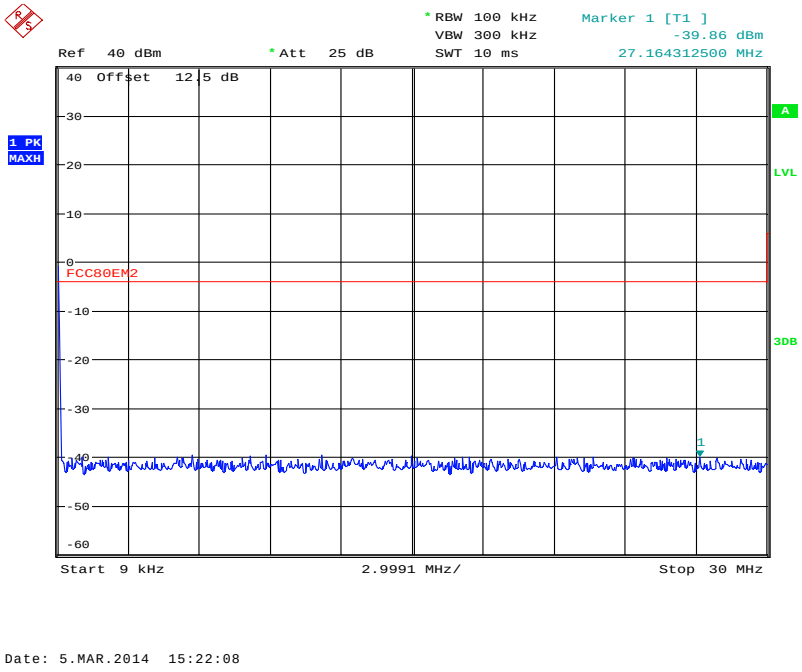
2.8.7 Test Results

Conducted

161.975 MHz

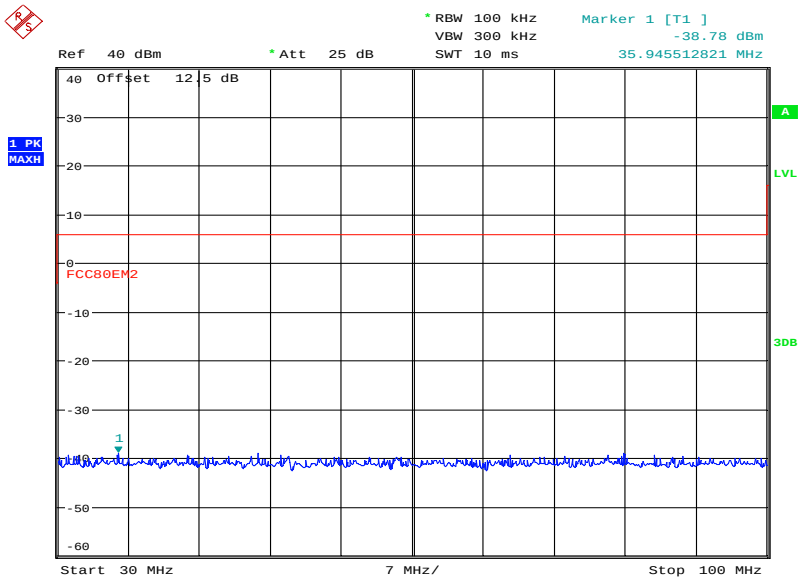
Frequency of Interfering Emissions (MHz)	Power to Artificial Antenna (µW)	Power to Artificial Antenna (dBm)
9 kHz to 30 MHz	0.10	-39.86
30 MHz to 100 MHz	0.13	-38.78
100 MHz to 300 MHz	0.15	-38.21
300 MHz to 1000 MHz	0.16	-38.08
300 MHz to 2000 MHz	0.29	-35.34

9 kHz to 30 MHz



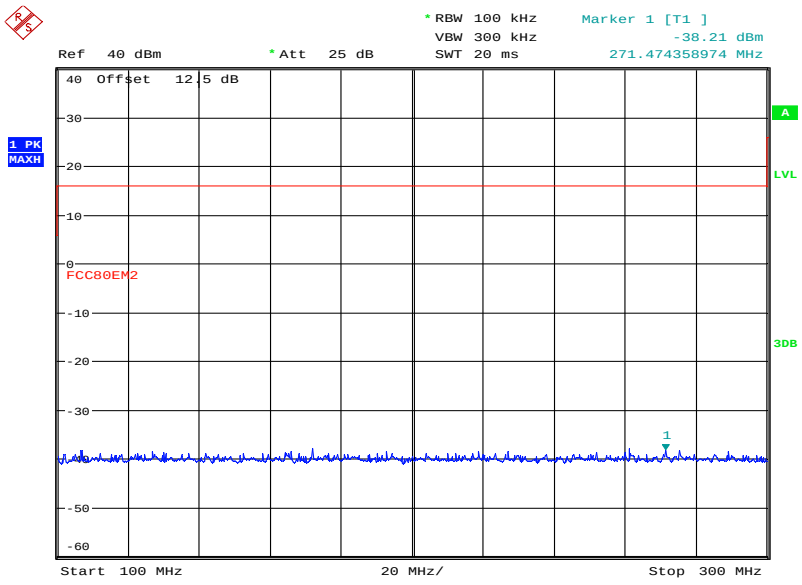
Product Service

30 MHz to 100 MHz



Date: 5.MAR.2014 15:23:56

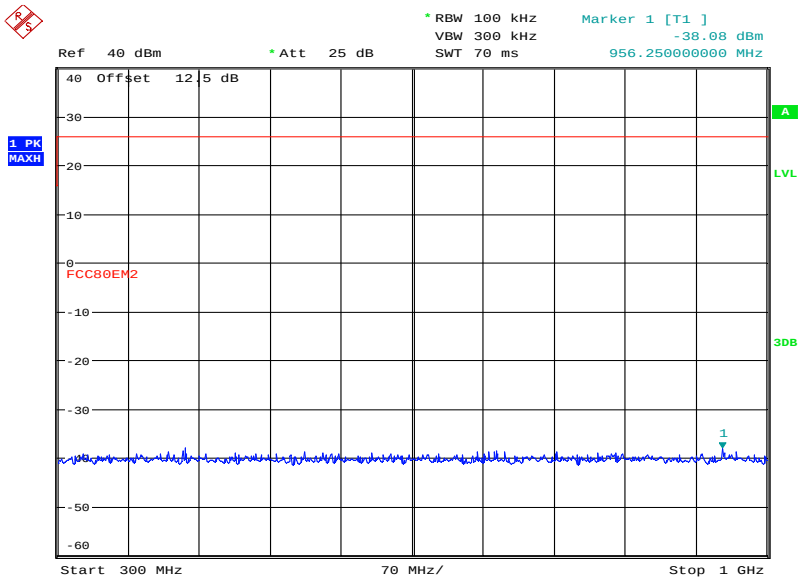
100 MHz to 300 MHz



Date: 5.MAR.2014 15:25:46

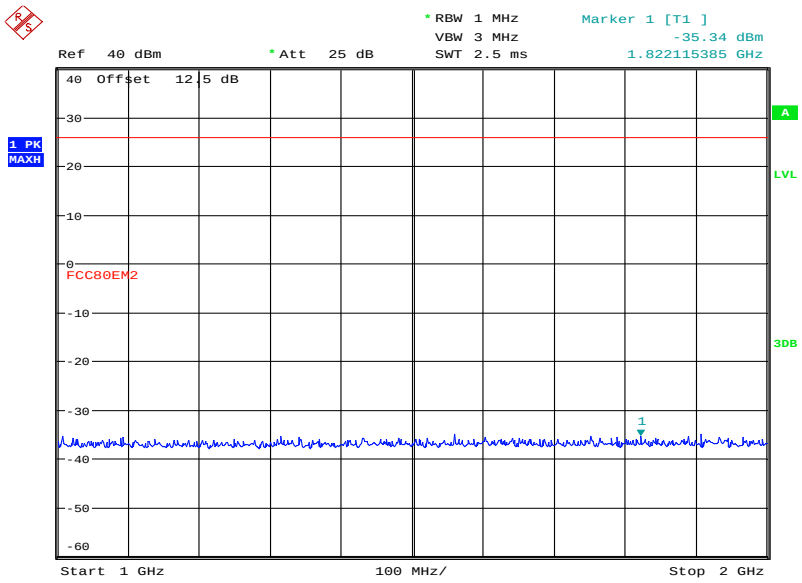
Product Service

300 MHz to 1 GHz



Date: 5.MAR.2014 15:26:30

1 GHz to 2 GHz



Date: 5.MAR.2014 15:27:12

Remarks

No antenna gain was included in the measurement result due to the significant margin from the limit line.

Limit Clause

The EUT shall deliver not more than the following amounts of power, to an artificial antenna having electrical characteristics equivalent to those of the average receiving antenna(s) use on shipboard:

Frequency of interfering emissions	Power to artificial antenna in µW
Below 30 MHz	400
30 to 100 MHz	4,000
100 to 300 MHz	40,000
Over 300 MHz	400,000

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 - Bandwidths					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2014
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (30dB, 150W)	Narda	769-30	3369	12	29-May-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014
Section 2.2 - Transmitter Frequency Tolerances					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Digital Temperature Indicator + T/C	Fluke	51	412	12	12-Feb-2015
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2014
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (30dB, 150W)	Narda	769-30	3369	12	29-May-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014
Section 2.3 - Emission Limitations					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2014
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	1002	12	18-Sep-2014
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Screened Room (5)	Rainford	Rainford	1545	24	10-Jan-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
High Pass Filter	Mini-Circuits	NHP-300	1640	12	21-Aug-2014
Antenna (Bilog)	Chase	CBL6143	2904	24	10-Jun-2015
Antenna (Biconnical)	Schaffner	VBA6106A	3107	12	11-Sep-2014
Antenna (Log Periodic)	Schaffner	UPA6108	3109	12	3-Apr-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (30dB, 150W)	Narda	769-30	3369	12	29-May-2014
Tunable Notch Filter	Wainwright	WRCD 130.0/170.0-0.05/50-5EEK	3412	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Sep-2014
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	18-Sep-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 - Modulation Requirements					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2014
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (30dB, 150W)	Narda	769-30	3369	12	29-May-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014
Section 2.5 - Transmitter Frequency Deviation					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2014
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (30dB, 150W)	Narda	769-30	3369	12	29-May-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014
Section 2.6 - Transmitter Power					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (30dB, 150W)	Narda	769-30	3369	12	29-May-2014
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Sep-2014
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	18-Sep-2014
Section 2.8 - Suppression of Interface Aboard Ships					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2014
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	22-Jul-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Sep-2014
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	18-Sep-2014
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	22-Jul-2014

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

Product Service

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Modulation Requirements	-
Transmitter Frequency Deviation	-
Bandwidths	± 58.05 Hz
Transmitter Power	± 0.70 dB
Suppression of Interface Aboard Ships	-
Transmitter Frequency Tolerances	± 11 Hz
Emission Limitations	Radiated: ± 3.08 dB Conducted: ± 3.454 dB
Transmitter Carrier Power Reduction	-

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).