Report On

FCC and Industry Canada Testing of the
Thrane & Thrane A/S TT-6282A
In accordance with FCC CFR 47 Part 80
and Industry Canada RSS-182

COMMERCIAL-IN-CONFIDENCE

FCC ID: ROJ6282
IC ID: 6200B-6282A

Document 75921133 Report 07 Issue 2 July 2013

Product Service

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REPORT ON

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Document 75921133 Report 07 Issue 2

July 2013

PREPARED FOR

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PREPARED BY

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APPROVED BY

Nic Forsyth
Authorised Signatory

DATED

This report has been up-issued to Issue 2 to amend the Industry Canada ID and to amend the limit clause of section 2.4 Modulations Requirements.

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 and Industry Canada RSS-182. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

M Russell G Lawler

UKAS TESTING 0141

Product Service

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Product Service

SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Thrane & Thrane A/S TT-6282A
In accordance with FCC CFR 47 Part 80 and Industry Canada RSS-182

Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC and Industry Canada Testing of the Thrane & Thrane A/S TT-6282A to the requirements of FCC CFR 47 Part 80 and Industry Canada RSS-182.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Thrane & Thrane A/S
Model Number(s)	TT-6282A
Serial Number(s)	0917080025
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 80 (2012) and Industry Canada RSS-182 (Issue 5, 2012)
Incoming Release Date	Declaration of Build Status 14 May 2013
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	QAF HEK/135392 REV 1 18 December 2012
Start of Test	21 January 2013
Finish of Test	12 March 2013
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 and Industry Canada RSS-182 is shown below.

Section	Spec Clause		Test Description	Result	Comments/Base Standard
	FCC	IC			
Transmit					
2.1	80.205	7.3	Bandwidths	Pass	
2.2	80.209	5.1 and 7.4	Transmitter Frequency Tolerances	Pass	
2.3	80.211	7.9	Emission Limitations	Pass	
2.4	80.213	7.3	Modulation Requirements	Pass	
2.5	80.213 (a)(2)	7.3	Transmitter Frequency Deviation	Pass	
2.6	80.215	5.2 and 7.5	Transmitter Power	Pass	
2.7	80.215 (e)(g)(1)(2)(3)	7.5	Transmitter Carrier Power Reduction	Pass	
2.8	80.217 (b)	-	Suppression of Interface Aboard Ships	Pass	

Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION			
MANUFACTURER	Thrane & Thrane A/S		
TYPE	SAILOR 6282 AIS Transponder		
PART NUMBER	406282A		
SERIAL NUMBER	000019		
HARDWARE VERSION	38-135110-B		
SOFTWARE VERSION	-		
TRANSMITTER OPERATING RANGE	156.025 MHz – 162.025 MHz		
RECEIVER OPERATING RANGE	156.025 MHz – 162.025 MHz		
COUNTRY OF ORIGIN	Denmark		
INTERMEDIATE FREQUENCIES	33.145 MHz to 39.145 MHz		
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	25K0GXW		
MODULATION TYPES: (i.e. GMSK, QPSK)	GMSK		
HIGHEST INTERNALLY GENERATED FREQUENCY	595.2 MHz		
OUTPUT POWER (W or dBm)	41 dBm		
FCC ID	ROJ6282		
INDUSTRY CANADA ID	6200B-6282A		
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	AIS Class A Transponder		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
PART NUMBER			
VOLTAGE			
COUNTRY OF ORIGIN			
MODULES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER	Thrane & Thrane A/S	Thrane & Thrane A/S	Thrane & Thrane A/S
TYPE	SAILOR 6004 Control Panel	SAILOR 6285 GPS Antenna-Active	SAILOR 6283 AIS Connection Box and Wall Tray
POWER			
FCC ID			
COUNTRY OF ORIGIN	Denmark	Denmark	Denmark
INDUSTRY CANADA ID			
EMISSION DESIGNATOR			
DHSS/FHSS/COMBINED OR OTHER			
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION			
MANUFACTURER			
TYPE			
PART NUMBER			
SERIAL NUMBER			
COUNTRY OF ORIGIN			

Signature Helge Hoff

Date: 14-05-2013

Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Thrane & Thrane A/S TT-6282A. 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 12 V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 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 and Industry Canada Testing of the
Thrane & Thrane A/S TT-6282A
In accordance with FCC CFR 47 Part 80 and Industry Canada RSS-182

2.1 BANDWIDTHS

2.1.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.205
Industry Canada RSS-182, Clause 7.3

2.1.2 Equipment Under Test and Modification State

TT-6282A S/N: 0917080025 - Modification State 0

2.1.3 Date of Test

22 January 2013

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 EUT was connected to a spectrum analyser via a cable and attenuators. The EUT was configured to transmit three different packet data loads at maximum power.

The trace was set to max hold until a sufficient number of sweeps was observed. The 99% occupied bandwidth function was selected on the spectrum analyser and the result and the trace were recorded.

2.1.6 Environmental Conditions

Ambient Temperature	24.5°C
Relative Humidity	21.2%

2.1.7 Test Results

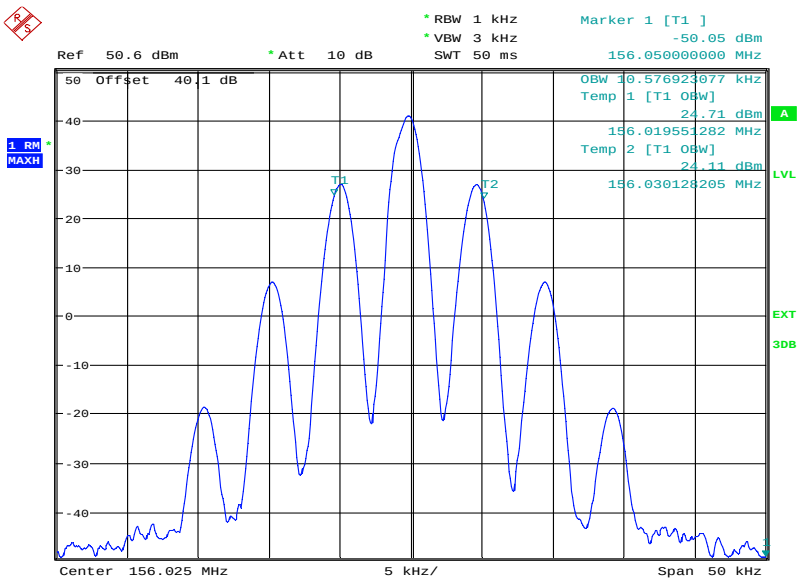
AIS

Frequency	Test Signal	Authorised Bandwidth	Result (kHz)
156.025 MHz	01010101	16 kHz	10.57
	00001111	16 kHz	10.01
	PRS	16 kHz	9.85
162.025 MHz	01010101	16 kHz	10.65
	00001111	16 kHz	9.05
	PRS	16 kHz	10.01

Product Service

156.025 MHz

01010101



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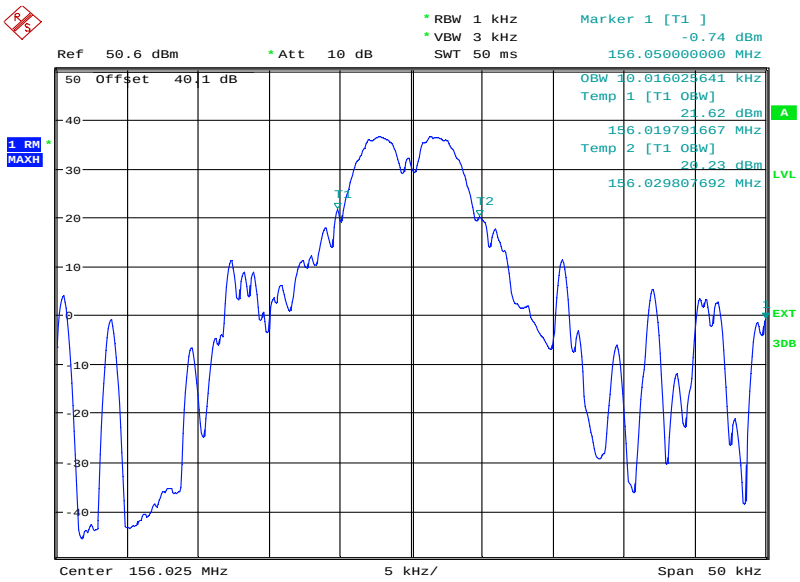

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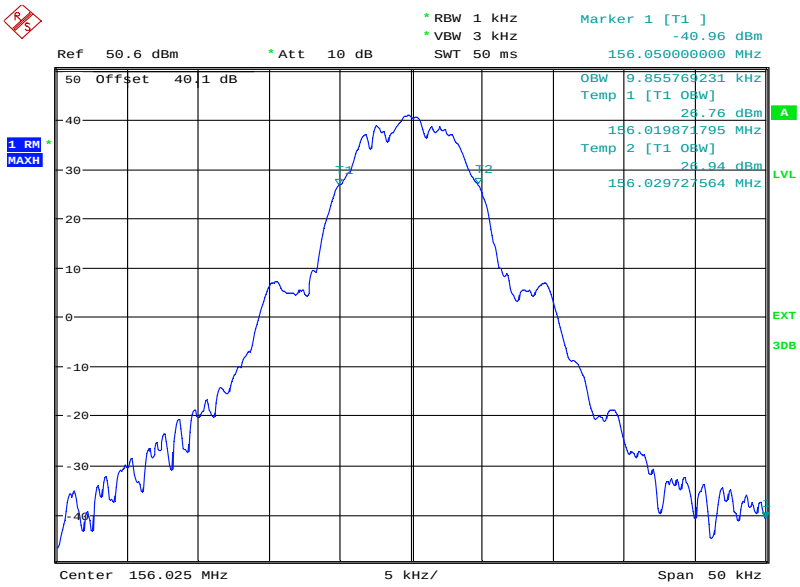

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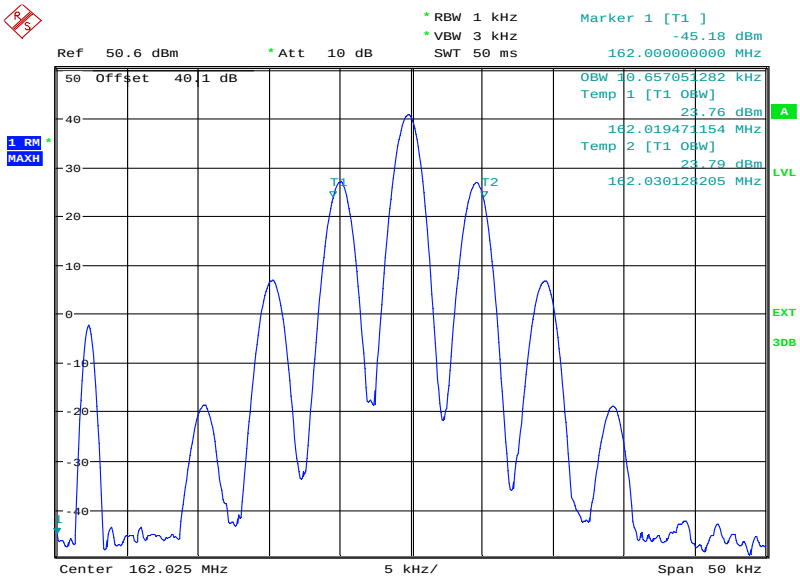
162.025 MHz

01010101



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Product Service

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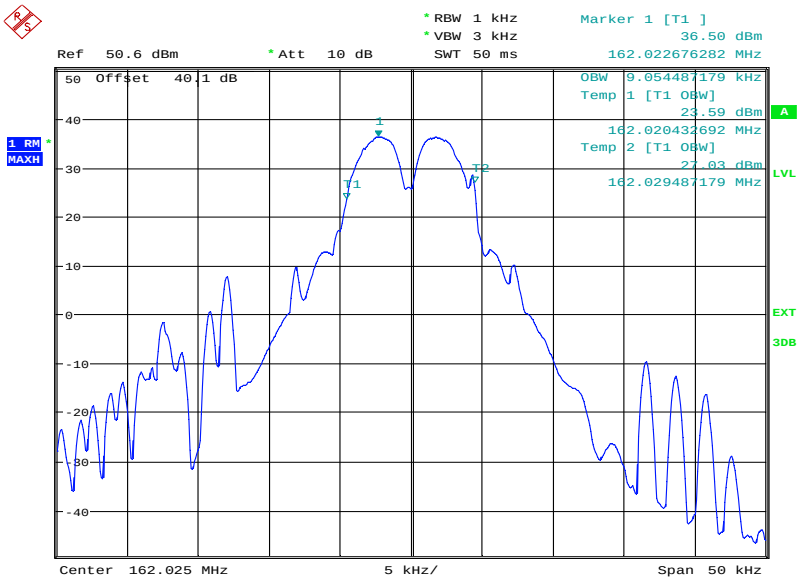

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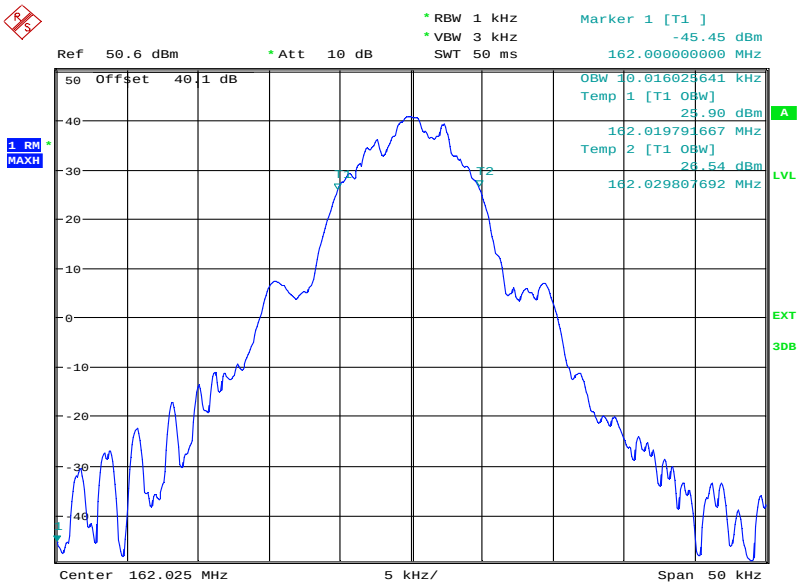
PRS



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Limit Clause

(d) The nominal authorised channel bandwidth for voice is 20 kHz
(e) For data modulation, an authorised bandwidth of 16 kHz is permitted.
± 5 KHz.

2.2 TRANSMITTER FREQUENCY TOLERANCES

2.2.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.209,
Industry Canada RSS-182, Clause 5.1 and 7.4

2.2.2 Equipment Under Test and Modification State

TT-6282A S/N: 0917080025 - Modification State 0

2.2.3 Date of Test

24 January 2013

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 EUT was connected to a spectrum analyser via a 30 dB attenuator with an external high stability frequency reference connected.

The EUT was transmitted unmodulated and the trace set to max hold with a 100 Hz resolution bandwidth.

The marker was then used to measure the peak response and the result recorded in the table on the following page.

The EUT was connected to a spectrum analyser via a 30 dB attenuator with an external high stability frequency reference connected. The EUT was transmitted unmodulated and the trace set to max hold with a 100 Hz resolution bandwidth. The marker was then used to measure the peak response and the result recorded in the table on the following page.

2.2.6 Environmental Conditions

Ambient Temperature	23.2 - 23.7°C
Relative Humidity	21.3 - 22.0%

Product Service

2.2.7 Test Results

AIS

156.025 MHz

Temperature	Frequency Error (ppm)	
	12 V DC	10.2 V DC
-20°C	-1.4882	-1.4882
-10°C	-1.3017	-1.3004
0°C	-1.2742	-1.2581
+10°C	-1.4094	-1.4075
+20°C	-1.6158	-1.6087
+30°C	-1.7401	-1.7523
+40°C	-1.8670	-1.8625
+50°C	-1.8644	-1.8823

162.025 MHz

Temperature	Frequency Error (ppm)	
	12 V DC	10.2 V DC
-20°C	-1.4757	-1.5022
-10°C	-1.3146	-1.2973
0°C	-1.2677	-1.2677
+10°C	-1.3961	-1.3992
+20°C	-1.6189	-1.5856
+30°C	-1.7411	-1.7436
+40°C	-1.8694	-1.8571
+50°C	-1.8435	-1.8694

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
Industry Canada RSS-182, Clause 7.9

2.3.2 Equipment Under Test and Modification State

TT-6282A S/N: 0917080025 - Modification State 0

2.3.3 Date of Test

21 January 2013 & 12 March 2013

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

Conducted

The EUT transmitting on full power, was connected to a Spectrum Analyser via 50dB of attenuation in the 9kHz – 300MHz frequency range and via a 30dB attenuator with 300MHz High Pass Filter in the 300MHz – 2GHz frequency range.

The EUT was checked (for bottom and top channels of the EUT) against the specification limit for all emissions >250% removed from the assigned frequency, between 9kHz – 2GHz frequency range.

The Path Loss for each frequency range was recorded and the worst case loss was entered as a Reference Level Offset.

Product Service

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 simultaneously.

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	18.6 - 23.1°C
Relative Humidity	21.5 - 24.0%

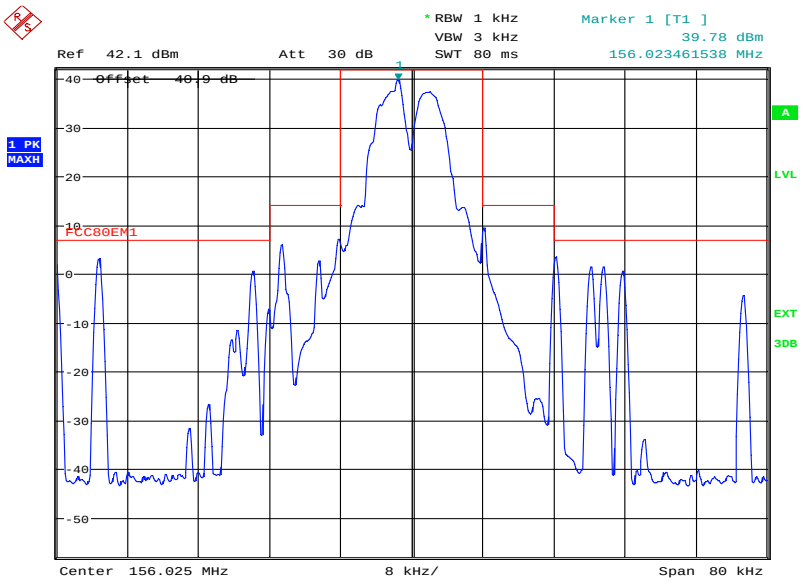
Product Service

2.3.7 Test Results

12 V DC Supply

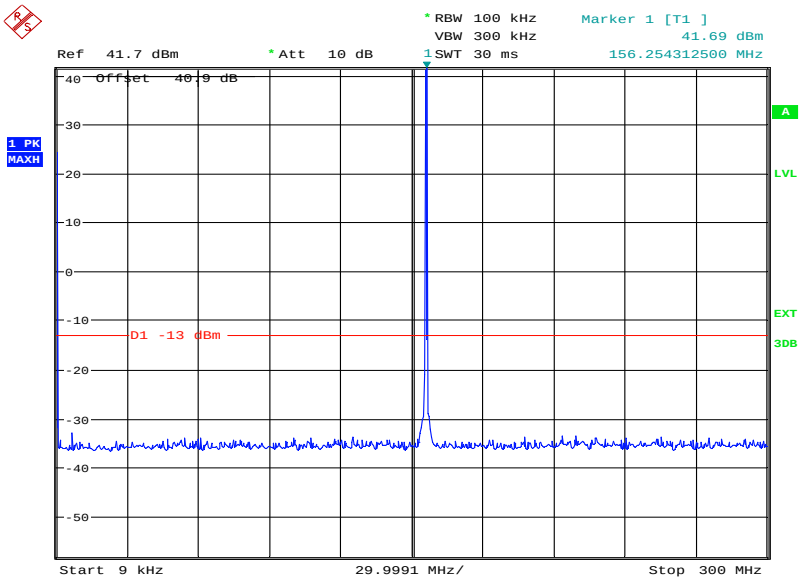
AIS - Conducted

156.025 MHz



Product Service

9 KHz to 300 MHz



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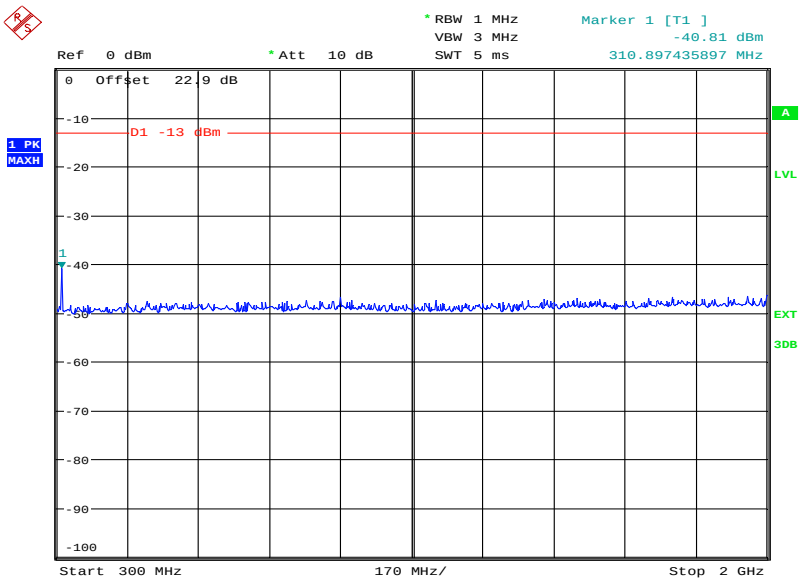
300 MHz to 2 GHz



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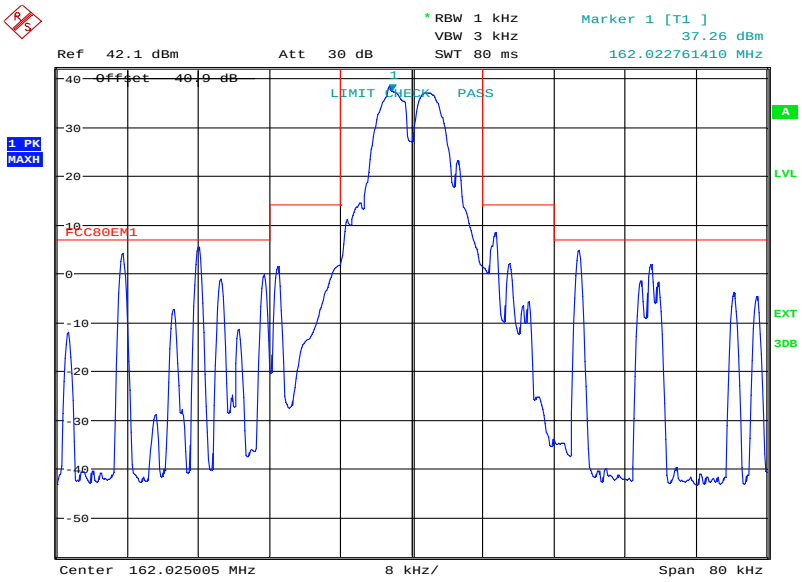
Product Service

162.025 MHz



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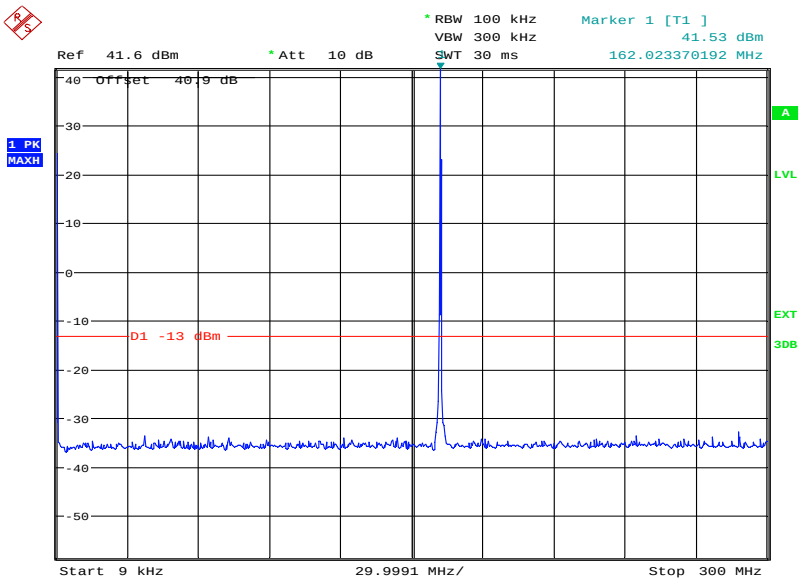
9 KHz to 300 MHz



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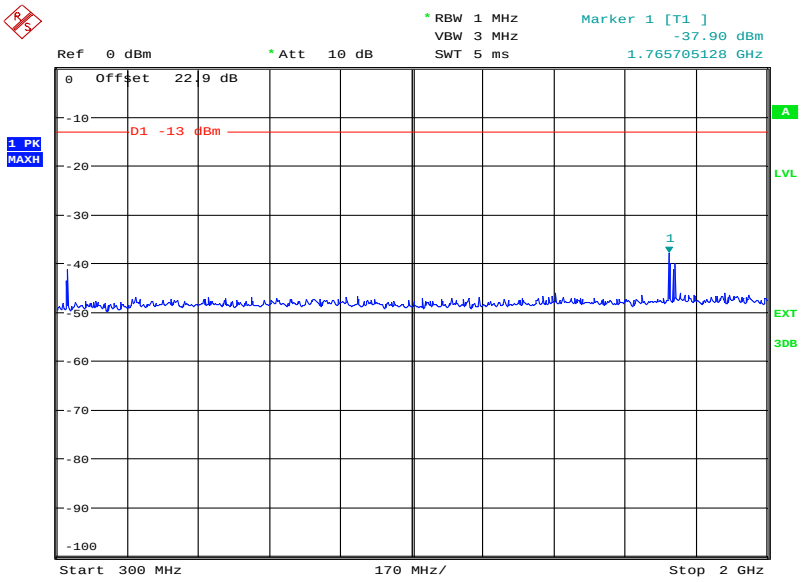
Product Service

300 MHz to 2 GHz



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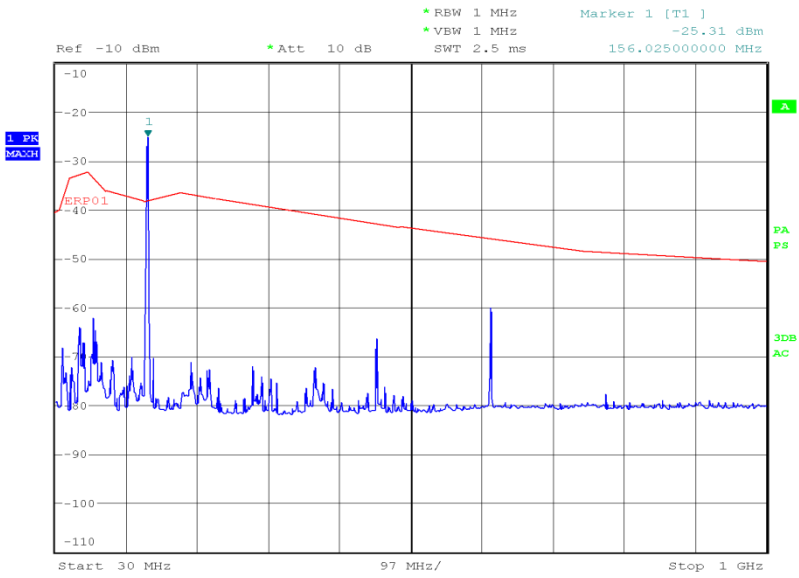
AIS - Radiated

156.025 MHz

30 MHz to 1 GHz



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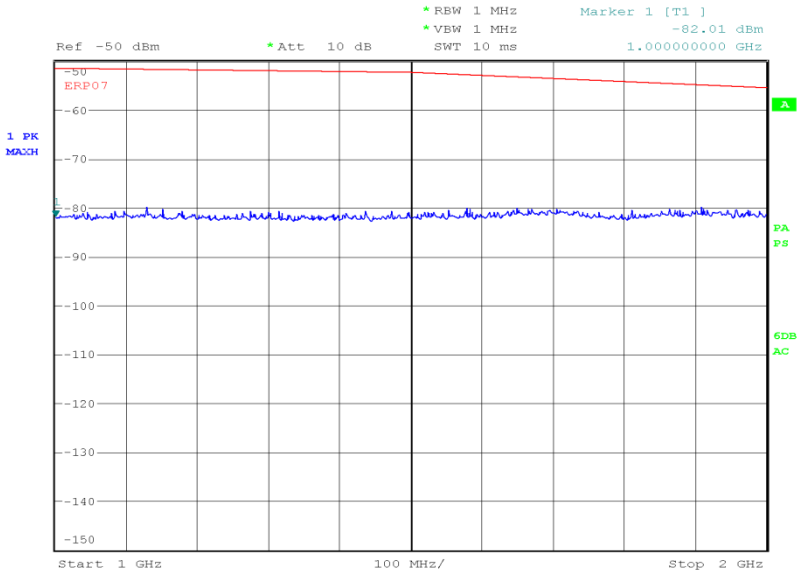
1 GHz to 2 GHz



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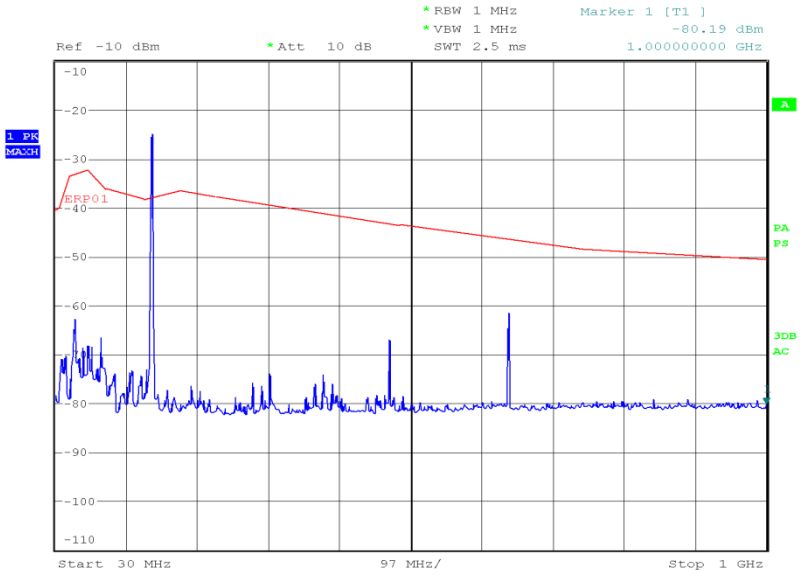
Product Service

162.025 MHz

30 MHz to 1 GHz



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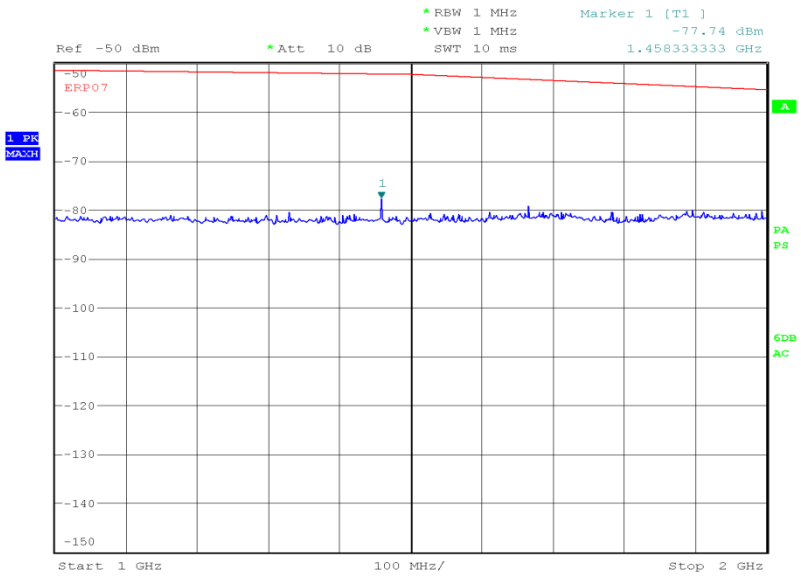
1 GHz to 2 GHz



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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
Industry Canada RSS-182, Clause 7.3

2.4.2 Equipment Under Test and Modification State

TT-6282A S/N: 0917080025 - Modification State 0

2.4.3 Date of Test

22 January 2013

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 three different packet data loads. These were 11110000, 10101010 and PRBS. The traces were recorded as shown below.

2.4.6 Environmental Conditions

Ambient Temperature	24.5°C
Relative Humidity	21.0%

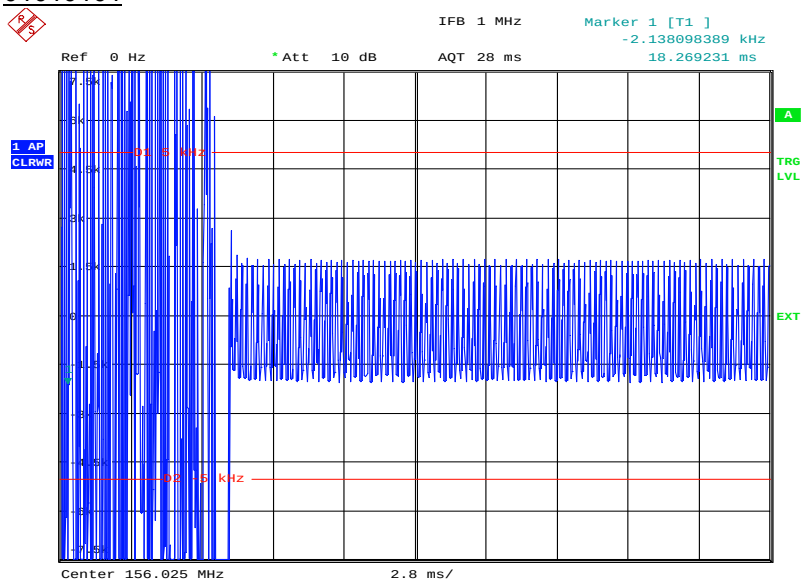
Product Service

2.4.7 Test Results

AIS

156.025 MHz

01010101



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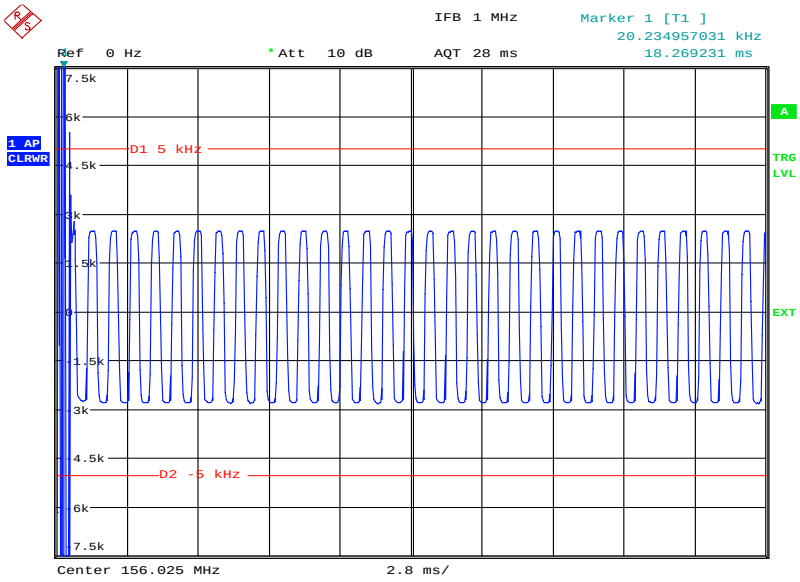
00001111



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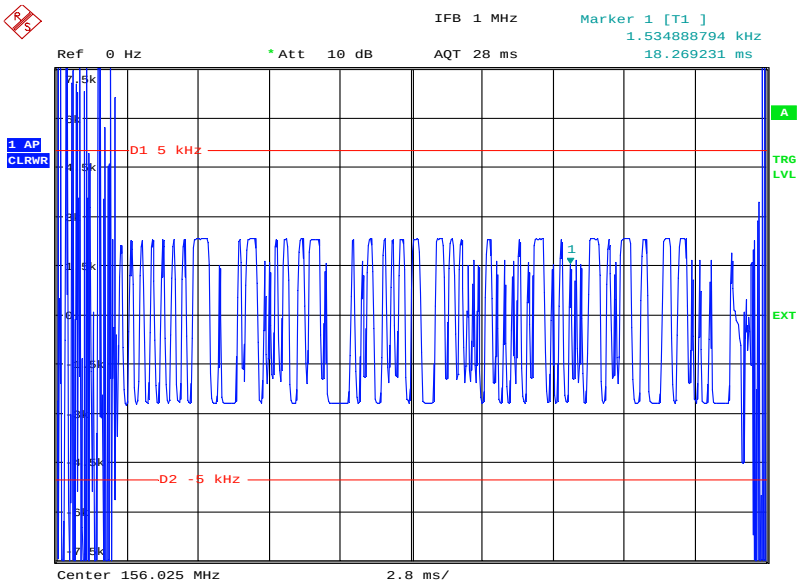
PRS



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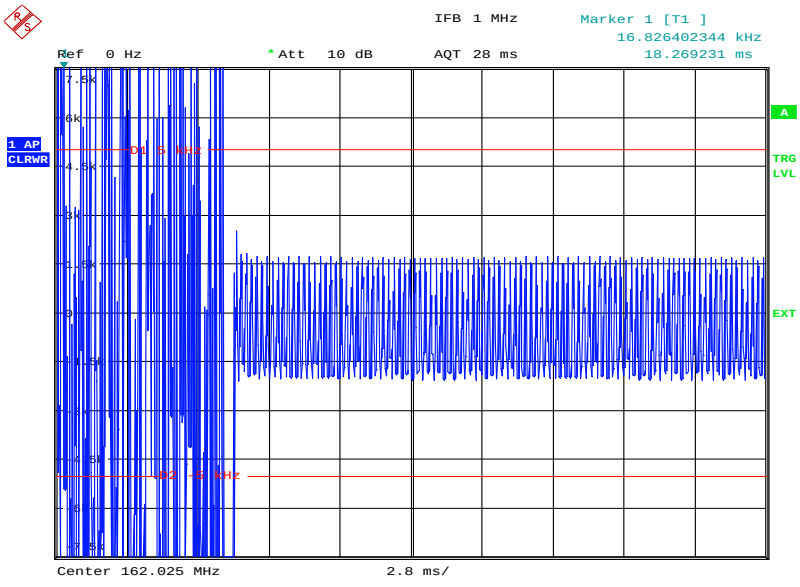
162.025 MHz

01010101



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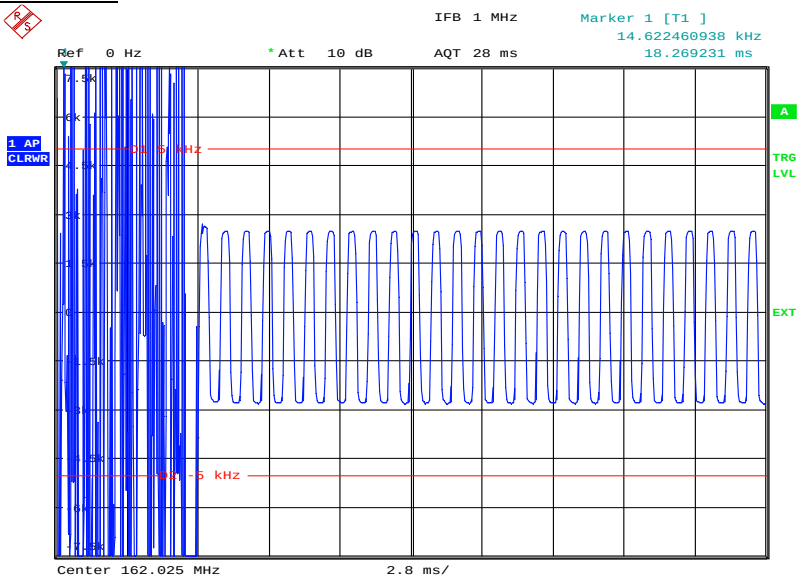
Product Service

00001111



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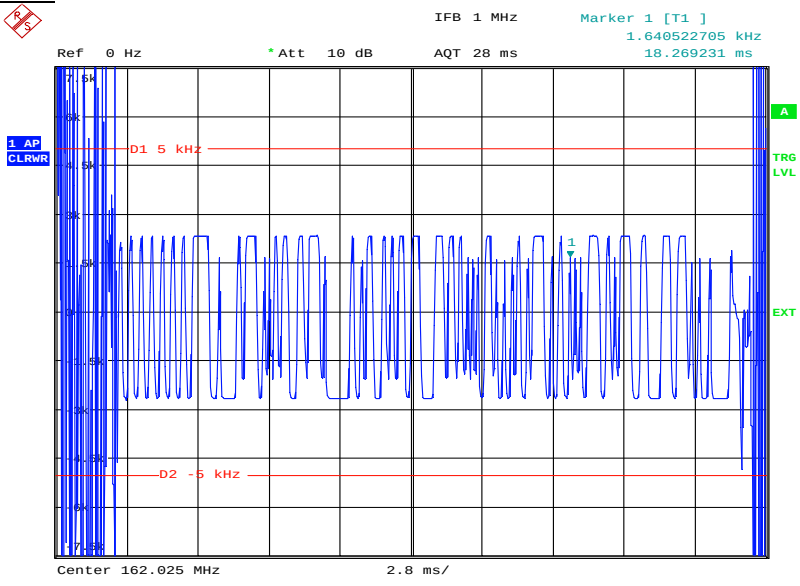
PRS



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Limit Clause

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)
Industry Canada RSS-182, Clause 7.3

2.5.2 Equipment Under Test and Modification State

TT-6282A S/N: 0917080025 - Modification State 0

2.5.3 Date of Test

22 January 2013

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	24.3°C
Relative Humidity	21.7%

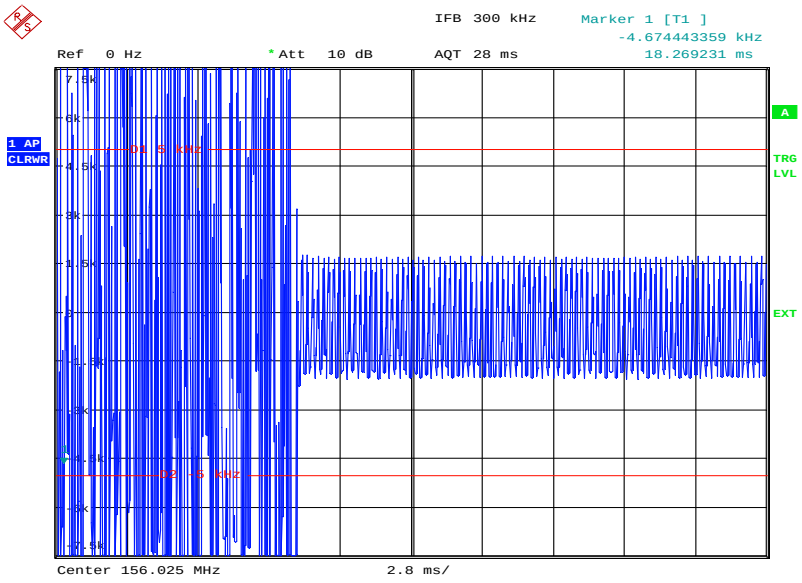
Product Service

2.5.7 Test Results

AIS

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

AIS 1 – 01010101



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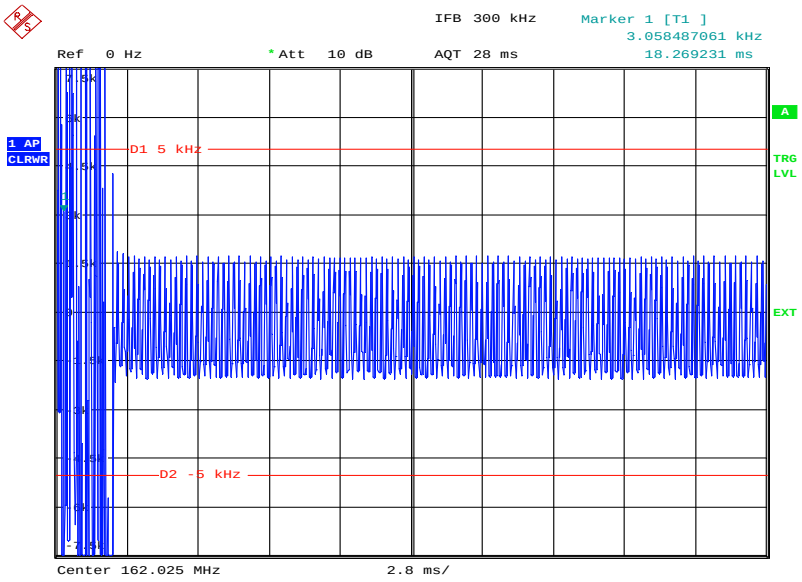
Product Service

AIS 2 – 01010101



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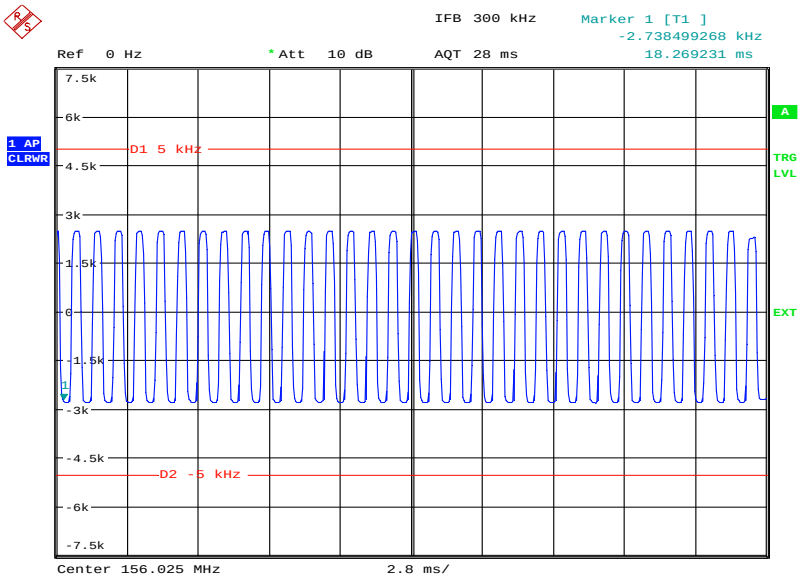

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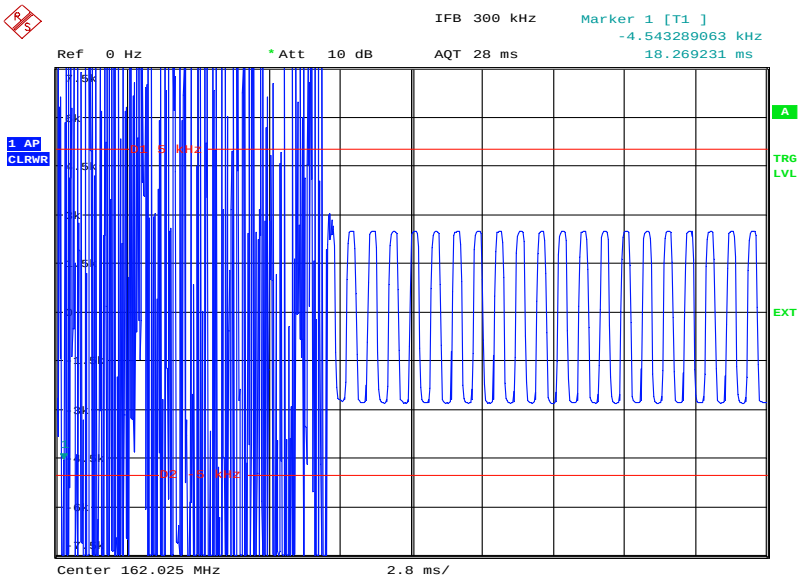
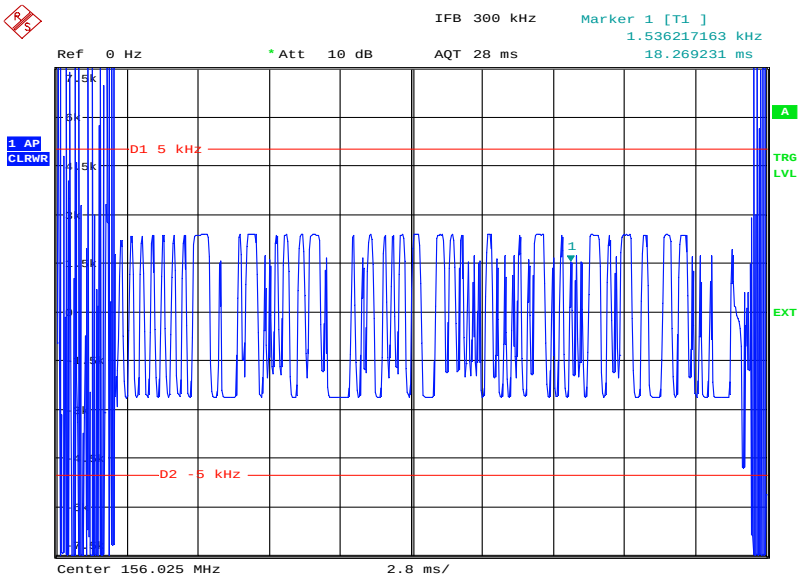
Product Service

AIS 2 – 00001111



Date: 22.JAN.2013 15:18:19

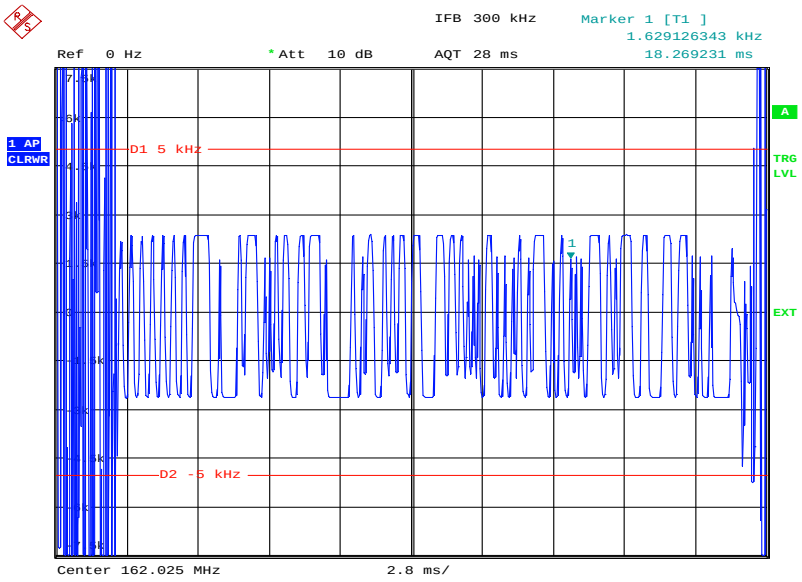
AIS 1 – PRBS



Date: 22.JAN.2013 15:17:03

Product Service

AIS 1 – PRBS



Date: 22.JAN.2013 15:19:19

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
Industry Canada RSS-182, Clause 5.2 and 7.5

2.6.2 Equipment Under Test and Modification State

TT-6282A S/N: 0917080025 - Modification State 0

2.6.3 Date of Test

22 January 2013

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 EUT was connected to a spectrum analyser via a cable and 40dB of attenuation. The EUT was set to transmit at maximum power with a modulated and un-modulated carrier. A resolution bandwidth of 1 MHz and a video bandwidth of 10 MHz were used using an RMS detector and average trace. The results are shown in the table on the following page.

2.6.6 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	20.4%

2.6.7 Test Results

156.025 MHz

Result (dBm)	Result (W)
40.98	12.53
40.98	12.53

162.025 MHz

Result (dBm)	Result (W)
40.94	12.41
41.01	12.61

Limit Clause 80.215 (c)(2)

10W

2.7 TRANSMITTER CARRIER POWER REDUCTION

2.7.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.215 (e)(g)(1)(2)(3)
Industry Canada RSS-182, Clause 7.5

2.7.2 Equipment Under Test and Modification State

TT-6282A S/N: 0917080025 - Modification State 0

2.7.3 Date of Test

22 January 2013

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 Procedure

The maximum measured erp was compared with the limit in Clause 80.215(e)(1) to ensure that the measured power was less than 10W.

2.7.6 Environmental Conditions

Ambient Temperature	23.5°C
Relative Humidity	21.1%

2.7.7 Test Results

AIS

Carrier power: 29.93 dBm / 0.984 W

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

156.000 MHz to 162.000 MHz	≤10W

All transmitters and remote control units must be capable of reducing the carrier power to one watt or less.

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

TT-6282A S/N: 0917080025 - Modification State 0

2.8.3 Date of Test

22 January 2013

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 EUT was connected to a spectrum analyser via a 10 dB attenuator. The spectrum was measured between 9 kHz to 2 GHz. A resolution bandwidth of 100 kHz was used below 1 GHz and 1 MHz was used above 1 GHz. The traces were recorded as shown on the following pages.

2.8.6 Environmental Conditions

Ambient Temperature	22.7°C
Relative Humidity	20.5%

Product Service

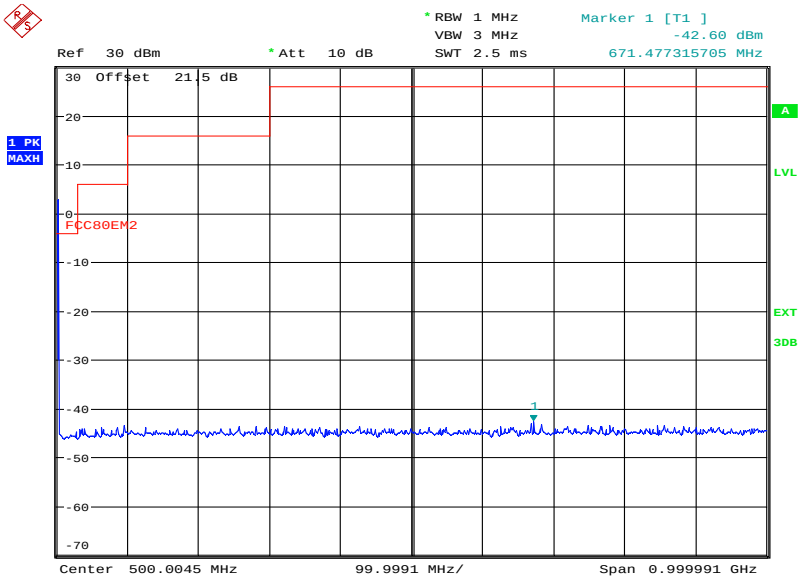
2.8.7 Test Results

Conducted

156.025 MHz

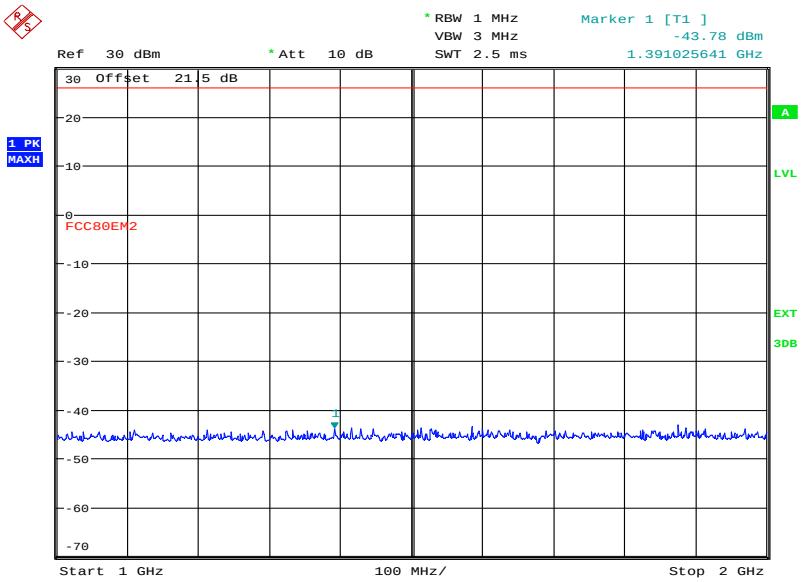
Frequency of Interfering Emissions (MHz)	Power to Artificial Antenna (µW)	Power to Artificial Antenna (dBm)
9 kHz to 30 MHz	0.033	-44.73
30 MHz to 100 MHz	0.036	-44.36
100 MHz to 300 MHz	0.043	-43.62
300 MHz to 1000 MHz	0.043	-43.60
300 MHz to 2000 MHz	0.041	-43.78

9 kHz to 1 GHz



Product Service

1 GHz to 2 GHz



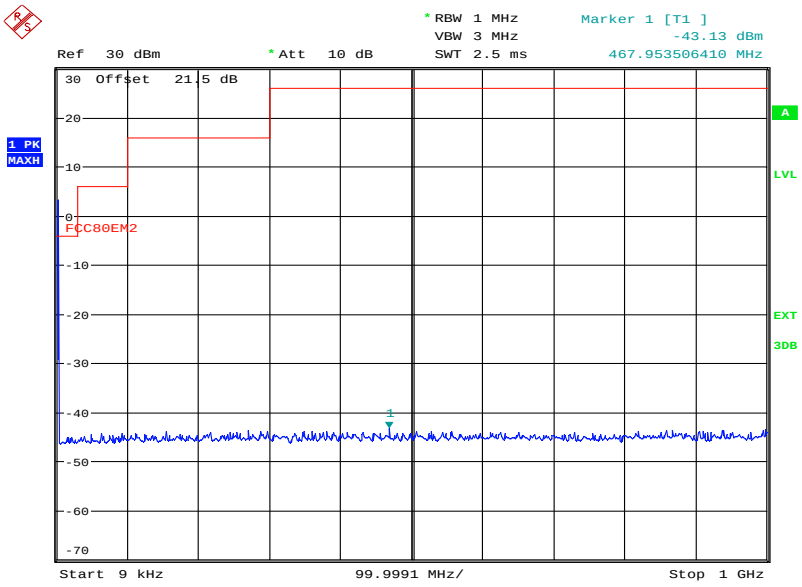
Date: 22.JAN.2013 08:33:51

Product Service

162.025 MHz

Frequency of Interfering Emissions (MHz)	Power to Artificial Antenna (µW)	Power to Artificial Antenna (dBm)
9 kHz to 30 MHz	0.031	-45.04
30 MHz to 100 MHz	0.038	-44.19
100 MHz to 300 MHz	0.041	-43.79
300 MHz to 1000 MHz	0.048	-43.13
300 MHz to 2000 MHz	0.044	-43.53

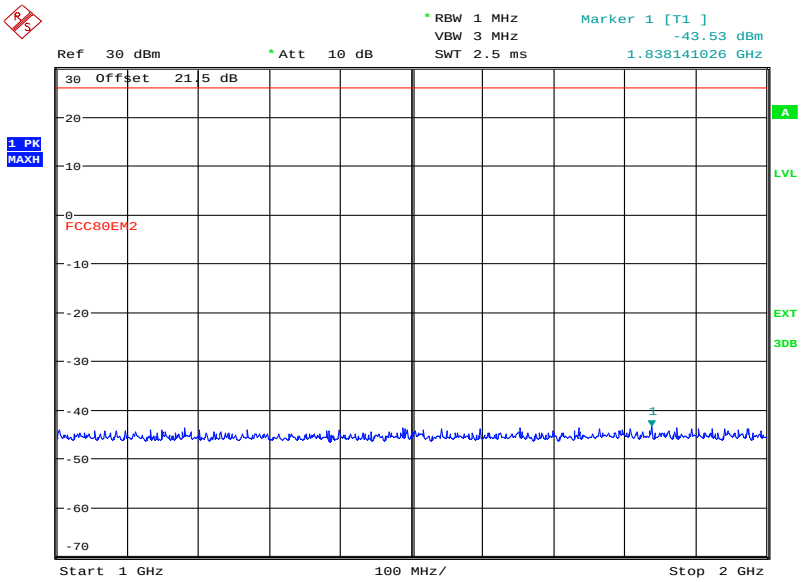
9 kHz to 1 GHz



Date: 22.JAN.2013 08:35:44

Product Service

1 GHz to 2 GHz



Date: 22.JAN.2013 08:36:23

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

Product Service

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					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Hygrometer	Rotronic	I-1000	2891	12	21-May-2013
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	13-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4103	12	1-Jun-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4104	12	1-Jun-2013
Section 2.2 - Transmitter Frequency Tolerances					
Counter	Hewlett Packard	53181A	159	12	28-May-2013
Multimeter	White Gold	WG022	190	12	30-Oct-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Measuring cylinder	Unknown	50mL	3136	-	TU
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4103	12	1-Jun-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4104	12	1-Jun-2013
Section 2.3 – Emission Limitations					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	9-Nov-2013
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
GPS/SBAS Simulator	Spirent	STR4500	3056	-	TU
Antenna (Log Periodic)	Schaffner	UPA6108	3108	12	5-Apr-2013
Amplifier (1 - 8GHz)	Phase One	PS06-0060	3175	12	10-Jul-2013
Amplifier (8 - 18GHz)	Phase One	PS06-0061	3176	12	10-Jul-2013
Signal Generator, 9kHz - 3GHz	Rohde & Schwarz	SMA 100A	3504	12	24-Aug-2013
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
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
1 metre, SMA to SMA	Suhner	Sucoflex armoured cable	4048	-	O/P Mon

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4- Modulation Requirements					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Hygrometer	Rotronic	I-1000	2891	12	21-May-2013
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	13-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4103	12	1-Jun-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4104	12	1-Jun-2013
Section 2.5 – Transmitter Frequency Deviation					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Hygrometer	Rotronic	I-1000	2891	12	21-May-2013
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	13-Jun-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4103	12	1-Jun-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4104	12	1-Jun-2013
Section 2.6 – Transmitter Power					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
Digital Temperature Indicator + T/C	Fluke	51	412	12	16-Jan-2014
Temperature Chamber	Montford	2F3	467	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Hygrometer	Rotronic	I-1000	2891	12	21-May-2013
Measuring cylinder	Unknown	50mL	3136	-	TU
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	13-Jun-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4103	12	1-Jun-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4104	12	1-Jun-2013
Section 2.7 - Transmitter Carrier Power Reduction					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Hygrometer	Rotronic	I-1000	2891	12	21-May-2013
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	13-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4103	12	1-Jun-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4104	12	1-Jun-2013

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.8 - Suppression of Interface Aboard Ships					
Multimeter	White Gold	WG022	190	12	30-Oct-2013
DC Power Supply	Hewlett Packard	6269B	326	-	TU
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	23-Jul-2013
High Pass Filter	Mini-Circuits	NHP-300	1640	12	15-Aug-2013
Power Supply Unit	Farnell	TSV-70	2043	-	O/P Mon
Oscilloscope	Lecroy	9370	2832	12	25-Oct-2013
Hygrometer	Rotronic	I-1000	2891	12	21-May-2013
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	13-Jun-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4103	12	1-Jun-2013
1 Metre N Type Cable	Rhophase	NPS-1601A-1000-NPS	4104	12	1-Jun-2013

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
Transmitter Frequency Tolerances	± 11 Hz
Emission Limitations	Radiated: ± 3.08 dB Conducted: ± 3.454 dB
Suppression of Interface Aboard Ships	-
Transmitter Carrier Power Reduction	-

Product Service

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).