Report On

FCC and Industry Canada Testing of the
Raymarine Belgium BVBA Class D DSC
In accordance with FCC CFR 47 Part 80 and
Industry Canada RSS-182

COMMERCIAL-IN-CONFIDENCE

FCC ID: PJ5-RAY260
IC ID: 4069B-RAY260

Document 75920234 Report 11 Issue 1 February 2013

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REPORT ON

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Document 75920234 Report 11 Issue 1

February 2013

PREPARED FOR

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PREPARED BY

Natalie Bennett
Senior Administrator (Technical)

APPROVED BY

Mark Jenkins
Authorised Signatory

DATED 07 February 2013

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

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SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Raymarine Belgium BVBA Class D DSC
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 Raymarine Belgium BVBA Class D DSC 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	Raymarine Belgium BVBA
Model Number(s)	RAY260
Serial Number(s)	Base No.4 Base No.1
Number of Samples Tested	2
Test Specification/Issue/Date	FCC CFR 47 Part 80 (2011) Industry Canada RSS-182 (Issue 5, 2012)
Incoming Release Date	Application Form 21 December 2012
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	N6506 02 October 2012
Start of Test	3 December 2012
Finish of Test	20 December 2012
Name of Engineer(s)	M Russell

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			
DSC Radio					
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	80.215	5.2 and 7.5	Transmitter Power	Pass	
2.6	80.215 (e)(g)(1)(2)(3)	7.5	Transmitter Carrier Power Reduction	Pass	
2.7	80.217 (b)	-	Suppression of Interface Aboard Ships	Pass	

Product Service

1.3 APPLICATION FORM

APPLICANT'S DETAILS

COMPANY NAME : Raymarine UK Ltd
ADDRESS : Cartwright Drive, Fareham, Hampshire, PO15 5RJ
.....
.....
NAME FOR CONTACT PURPOSES : .Andy Little

TELEPHONE NO: 01329 246897 FAX NO: .....
E-MAIL: andy.little@raymarine.com

EQUIPMENT INFORMATION

AIS Version (Unit tested)
Model name/number RAY260 VHF-AIS Identification/Part number E70088

Non-AIS Version (Identical transmitter, AIS receiver module removed)
Model name/number RAY260 VHF Identification/Part number E70087

Hardware Version T0 Software Version 0.4
Manufacturer Raymarine Country of Origin China

FCC ID PJ5-RAY260..... Industry Canada ID 4069B-RAY260
Technical description (a brief description of the intended use and operation)
Class D marine VHF radio

Supply Voltage:
[ ] AC mains State AC voltage ..... V and AC frequency ..... Hz
[√] DC (external) State DC voltage 12 V and DC current .....6.... A
[ ] DC (internal) State DC voltage ..... V and Battery type .....

Frequency characteristics:
Transmitter Frequency range 155.5 MHz to 161.425 MHz Channel spacing 12.5kHz (if channelized)
Receiver Frequency range (if different) 155.5 MHz to 163.275 MHz Channel spacing 12.5kHz (if channelized)
Designated test frequencies:
Bottom: ..... MHz Middle: ..... MHz Top: ..... MHz

Intermediate Frequencies : Working Chanel Receiver: 1st IF Freq.: 21.6MHz, 2nd IF Freq.: 455Hz
Dedicated CH70 Receiver: 1st IF Freq.: 45.1MHz, 2nd IF Freq.: 455Hz
Highest Internally Generated Frequency : 161.425MHz. Frequency of the Private channel M2.

Power characteristics:
Maximum transmitter power 25 W Minimum transmitter power (if variable) 1 W
[ ] Continuous transmission
[√] Intermittent transmission State duty cycle .....
If intermittent, can transmitter be set to continuous transmit test mode? Y/N

Antenna characteristics:
[√] Antenna connector State impedance 50 ohm
[ ] Temporary antenna connector State impedance ..... ohm
[ ] Integral antenna State gain ..... dBi

Modulation characteristics:
[ ] Amplitude [ ] Other
[√] Frequency Details: .....
[ ] Phase (GMSK, QSPK etc)
Can the transmitter operate un-modulated? Y
ITU Class of emission: .....

Battery/Power Supply
Model name/number N/A..... Identification/Part number .....
Manufacturer ..... Country of Origin .....

Ancillaries (if applicable)

Product Service

Handset			
Model name/number	RAYMIC260 Handset	Identification/Part number	A80196
Country of Origin: China			
Active Speaker			
Model name/number	RAY260 Active Speaker	Identification/Part number	A80199
Country of Origin: China			
Passive Speaker			
Model name/number	RAY260 Speaker	Identification/Part number	A80198
Country of Origin: China			
Extreme conditions:			
Maximum temperature	60 °C	Minimum temperature	-20 °C
Maximum supply voltage	15.6 V	Minimum supply voltage	10.8 V

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature : Andy Little

Name : Andy Little

Position held : Compliance Manager

Date : 21st December 2012

Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Raymarine Belgium BVBA Class D DSC. 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 or test plan 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
Raymarine Belgium BVBA Class D DSC
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

RAY260 S/N: Base No.4 - Modification State 0

2.1.3 Date of Test

10 December 2012

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	20.5°C
Relative Humidity	24.4%

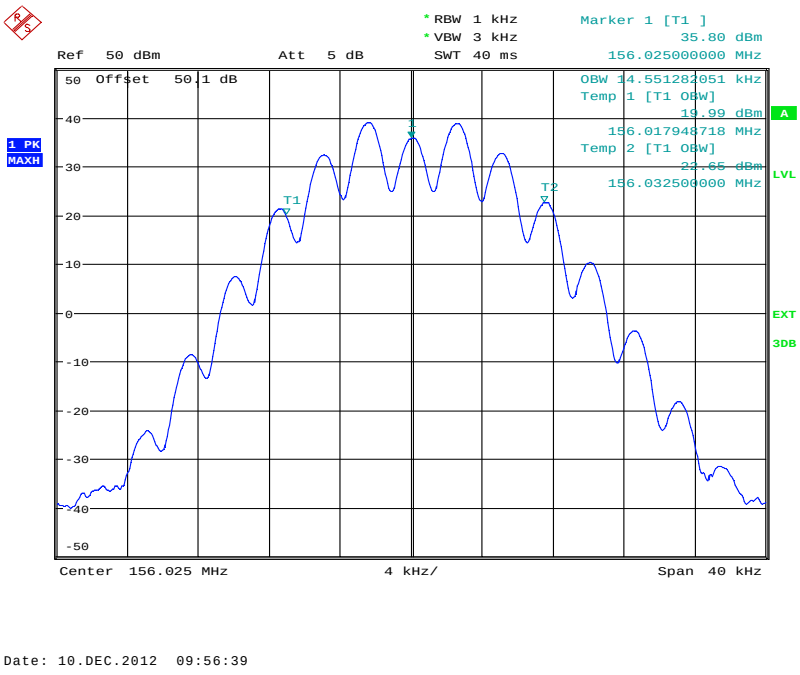
Product Service

2.1.7 Test Results

Radio Telephony

Frequency	Authorised Bandwidth	Result (kHz)
156.025 MHz	20 kHz	14.5512
156.800 MHz	20 kHz	14.6794
157.425 MHz	20 kHz	14.8076

156.025 MHz



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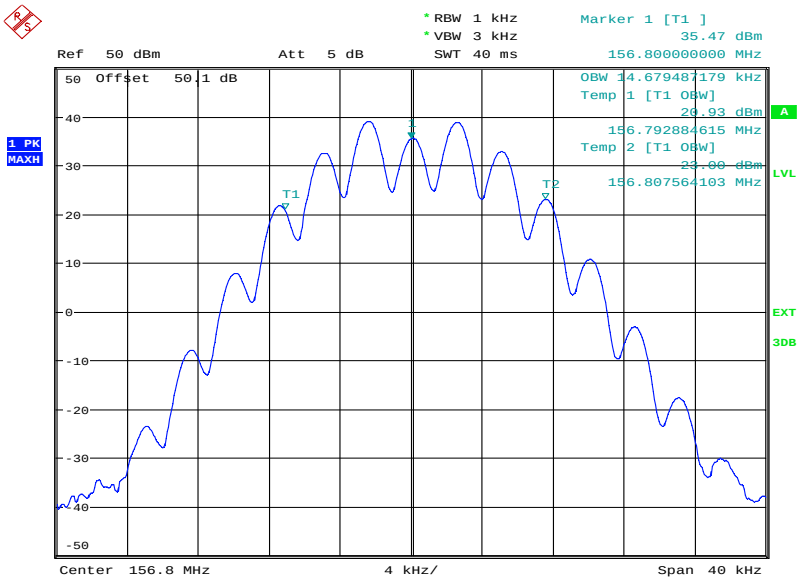
Product Service

156.800 MHz



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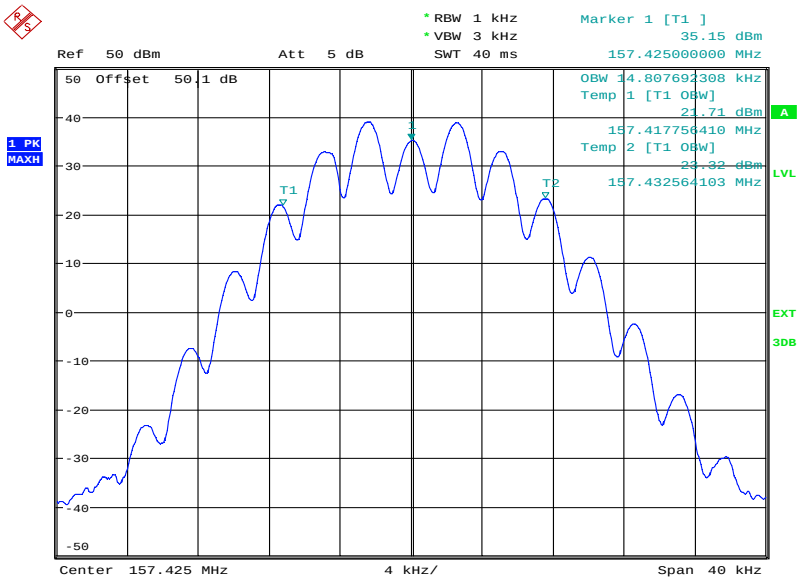
157.425 MHz

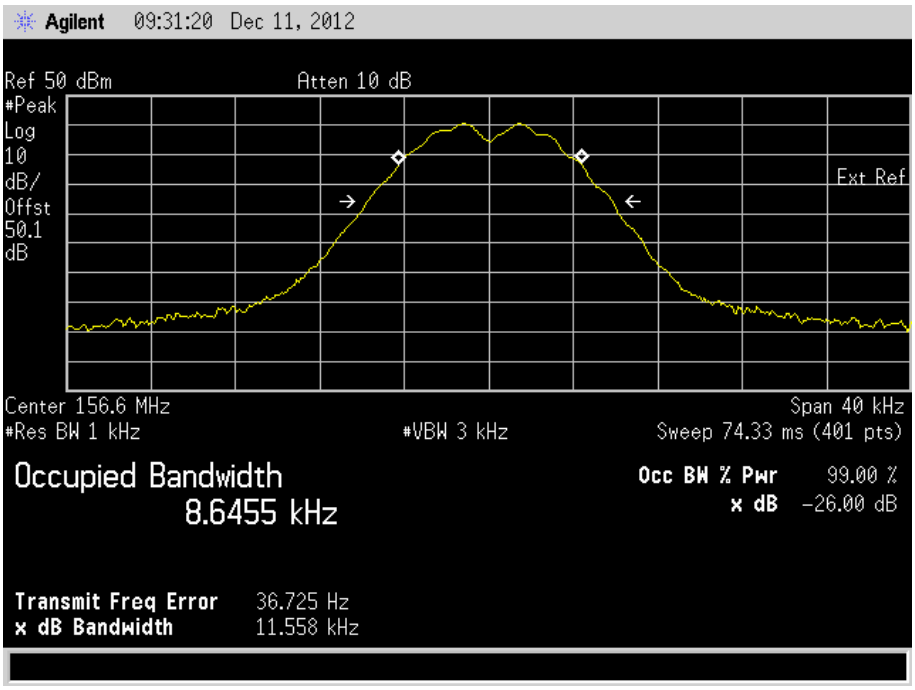


Date: 10.DEC.2012 09:58:41

DSC

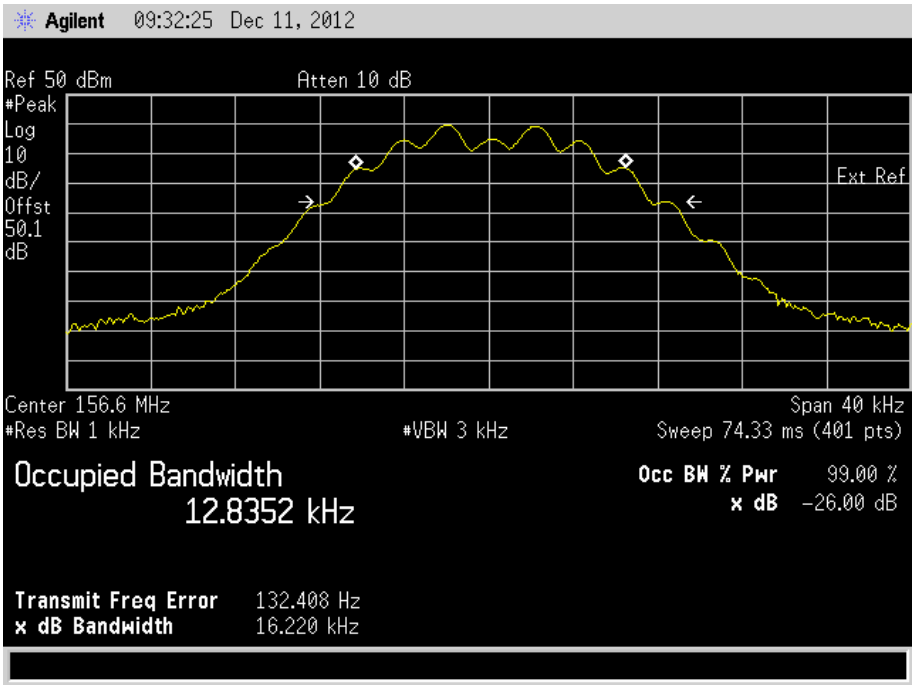
Test Mode	Occupied Bandwidth (kHz)	Authorised Bandwidth
1300 Hz	8.64550	16 kHz
2100 Hz	12.8352	16 kHz
Dotting Pattern	12.0345	16 kHz

156.025 MHz

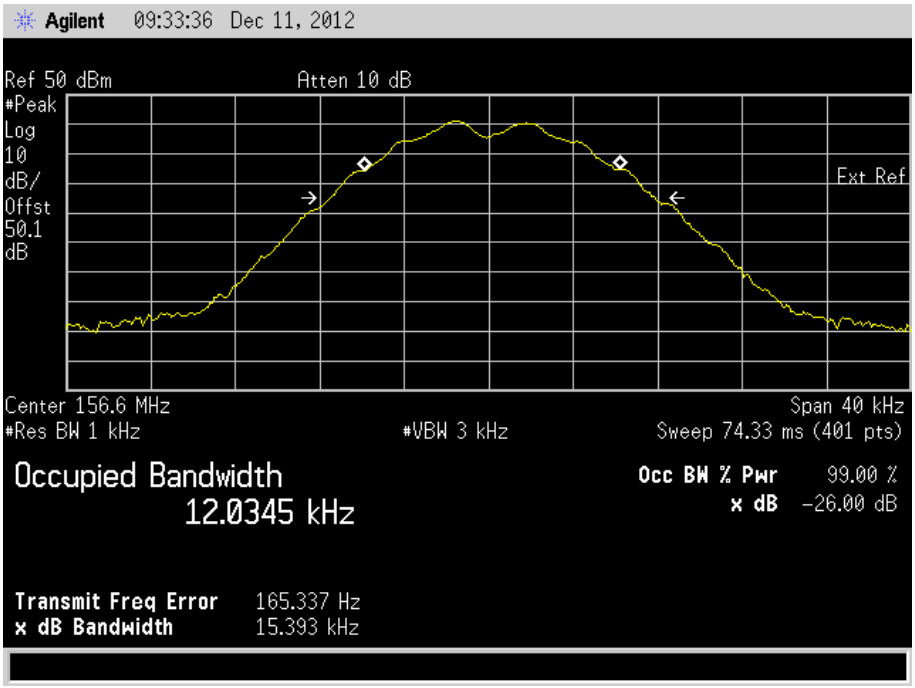


Product Service

156.800 MHz



157.425 MHz



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

RAY260 S/N: Base No.1 - Modification State 0

2.2.3 Date of Test

13 December 2012 & 20 December 2012

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	20.0 - 24.9°C
Relative Humidity	27.3 - 54.0%

Product Service

2.2.7 Test Results

Radio Telephony - Other

156.025 MHz

Temperature	Frequency Error (ppm)		
	12 V DC	10.2 V DC	13.8 V DC
-20°C	0.17	0.17	0.17
-10°C	0.15	0.17	0.15
0°C	0.37	0.33	0.31
+10°C	0.88	0.87	0.86
+20°C	0.66	0.65	0.67
+30°C	0.58	0.60	0.58
+40°C	0.72	0.73	0.71
+50°C	1.28	1.29	1.27

156.800 MHz

Temperature	Frequency Error (ppm)		
	12 V DC	10.2 V DC	13.8 V DC
-20°C	0.16	0.17	0.17
-10°C	0.18	0.17	0.15
0°C	0.35	0.34	0.31
+10°C	0.87	0.88	0.85
+20°C	0.65	0.65	0.66
+30°C	0.59	0.59	0.57
+40°C	0.73	0.73	0.71
+50°C	1.29	1.28	1.28

157.425 MHz

Temperature	Frequency Error (ppm)		
	12 V DC	10.2 V DC	13.8 V DC
-20°C	0.16	0.18	0.16
-10°C	0.17	0.17	0.17
0°C	0.36	0.32	0.32
+10°C	0.86	0.88	0.86
+20°C	0.65	0.65	0.65
+30°C	0.58	0.60	0.58
+40°C	0.71	0.72	0.71
+50°C	1.28	1.29	1.26

Product Service

DSC

156.525 MHz

Test Conditions		Transmitter Frequency (Hz)	
		B-State (2100 Hz)	Y-State (1300Hz)
T_{nom} (21.2°C)	V_{nom} 12 V DC	2099.9944	1299.9971

Limit Clause

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

±3ppm.

TSR0026 was used for measurements from +50 to +10 degrees. TSR0001 was used for measurements below +10degrees due to a technical fault of the EUT on channel 60 below +10degrees only.

Product Service

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

RAY260 S/N: Base No.4 - Modification State 0

2.3.3 Date of Test

3 December 2012 & 7 December 2012

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.

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.

Product Service

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

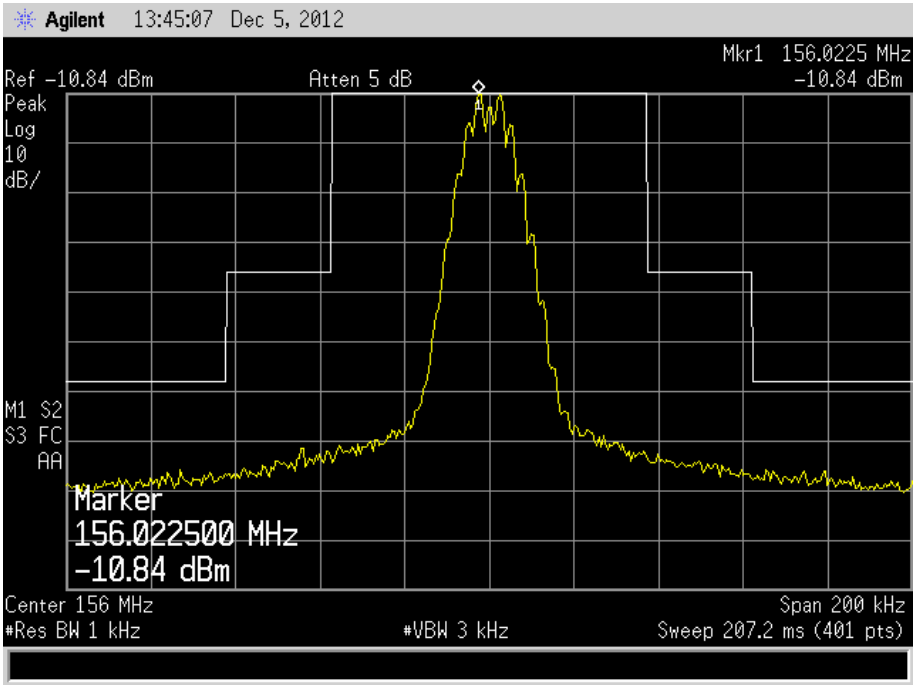
Ambient Temperature	21.1 - 23.4°C
Relative Humidity	25.4 - 28.8%

2.3.7 Test Results

12 V DC Supply

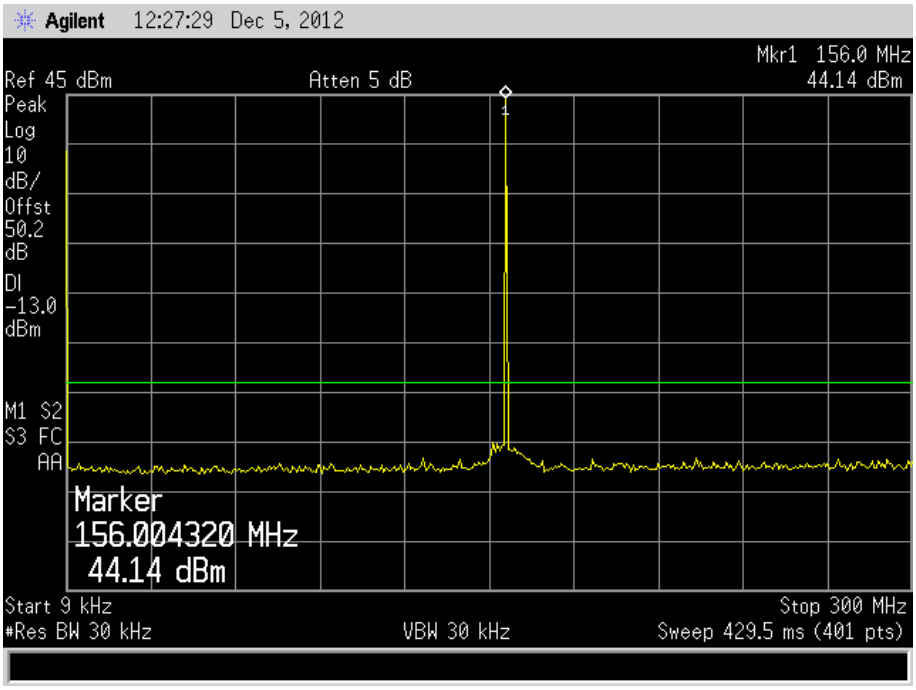
Radio Telephony - Conducted

156.025 MHz

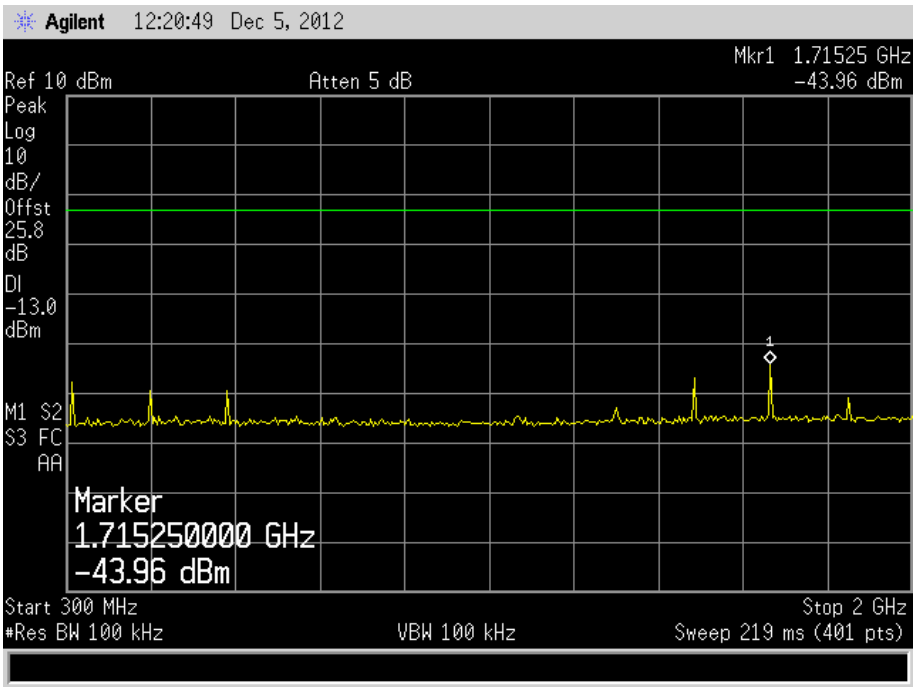


Product Service

30 MHz to 1 GHz

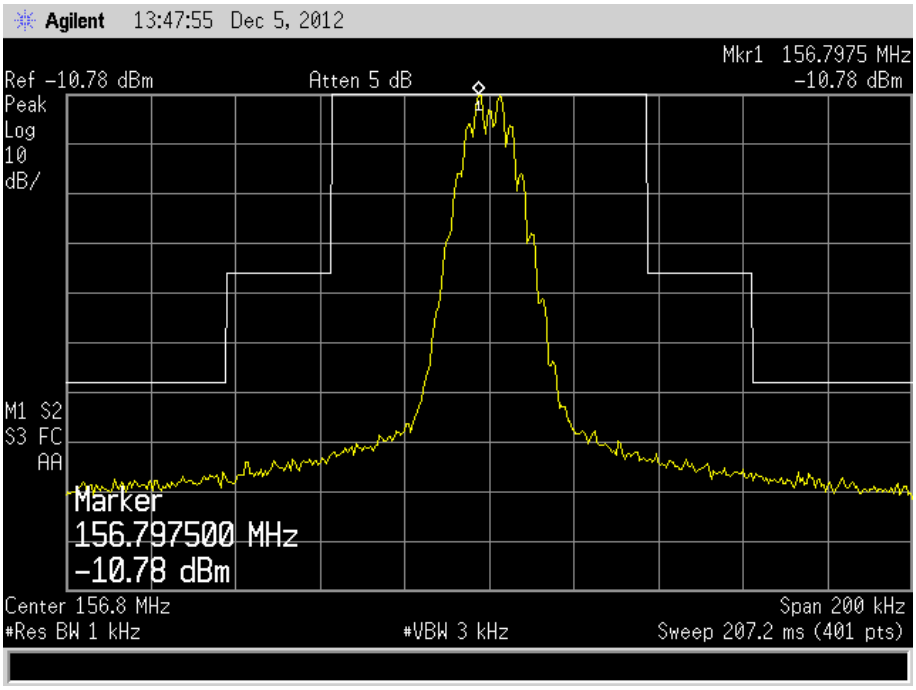


1 GHz to 2 GHz

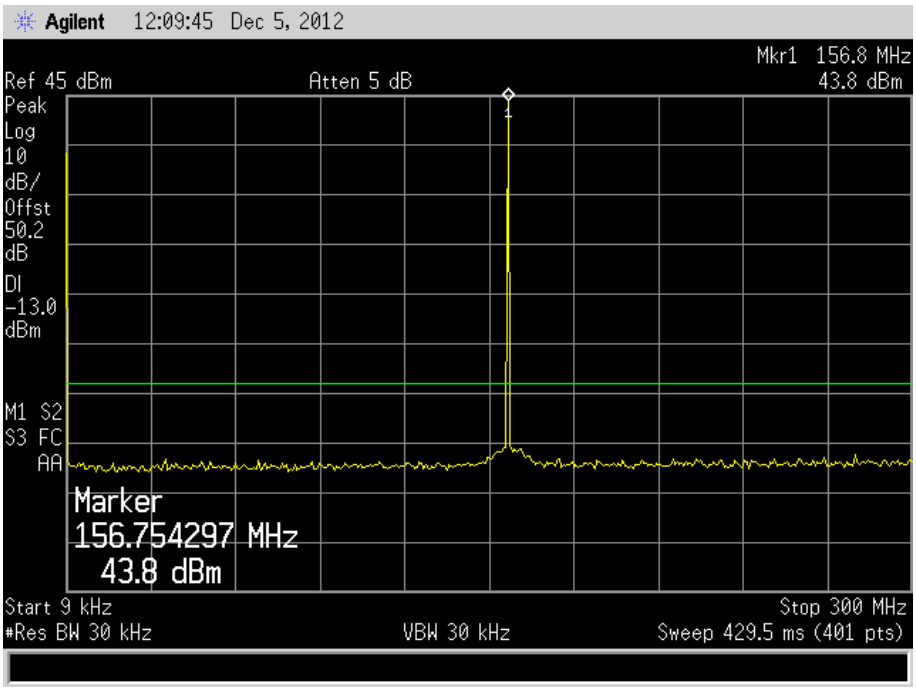


Product Service

156.800 MHz

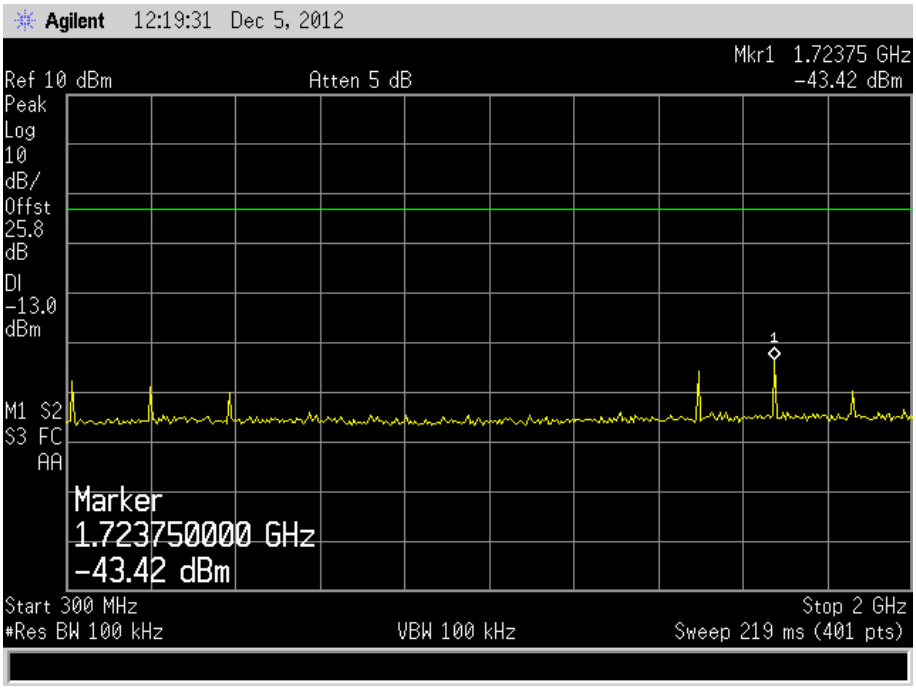


30 MHz to 1 GHz

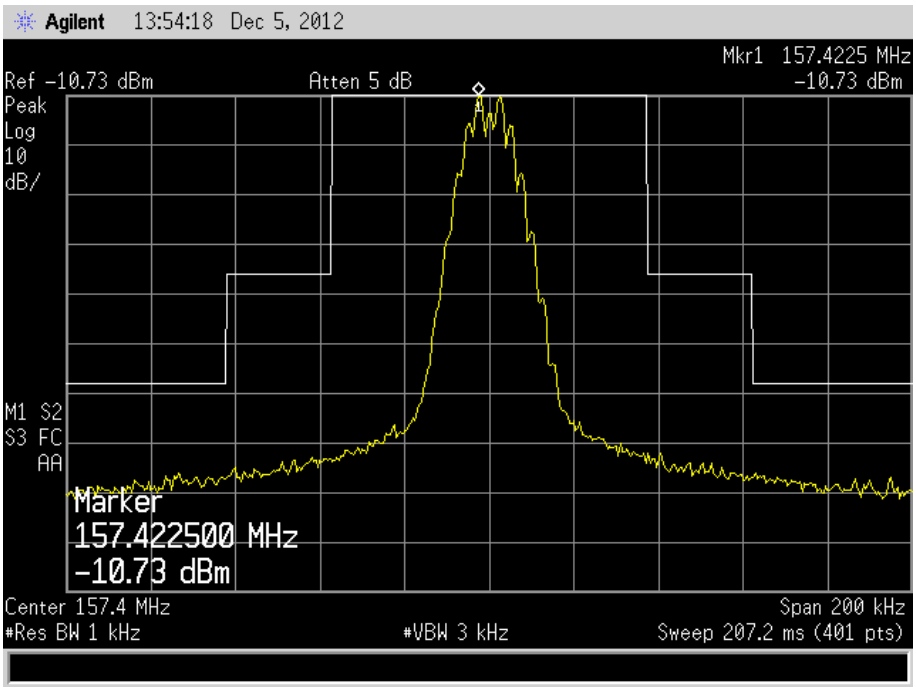


Product Service

1 GHz to 2 GHz

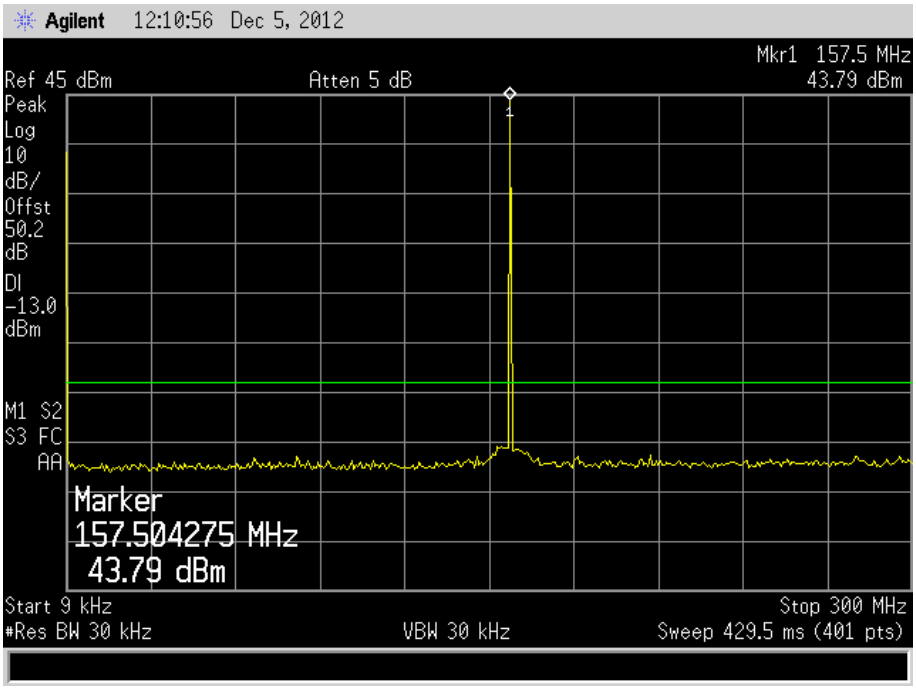


157.425 MHz

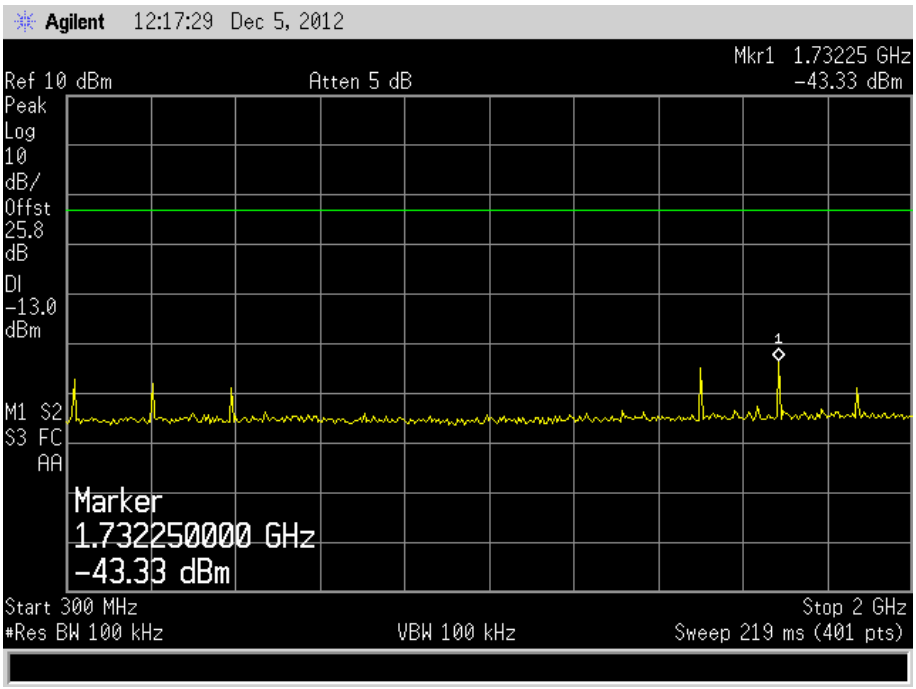


Product Service

30 MHz to 1 GHz



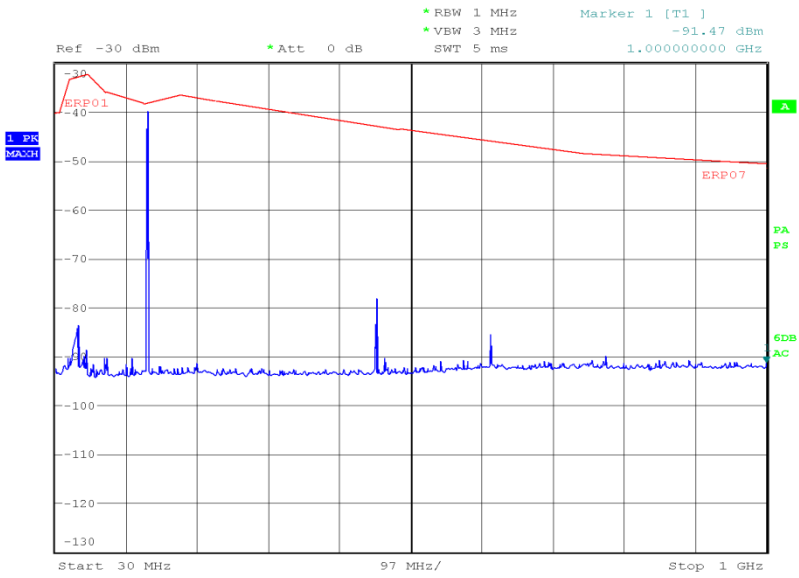
1 GHz to 2 GHz



Radio Telephony - Radiated

156.025 MHz

30 MHz to 1 GHz



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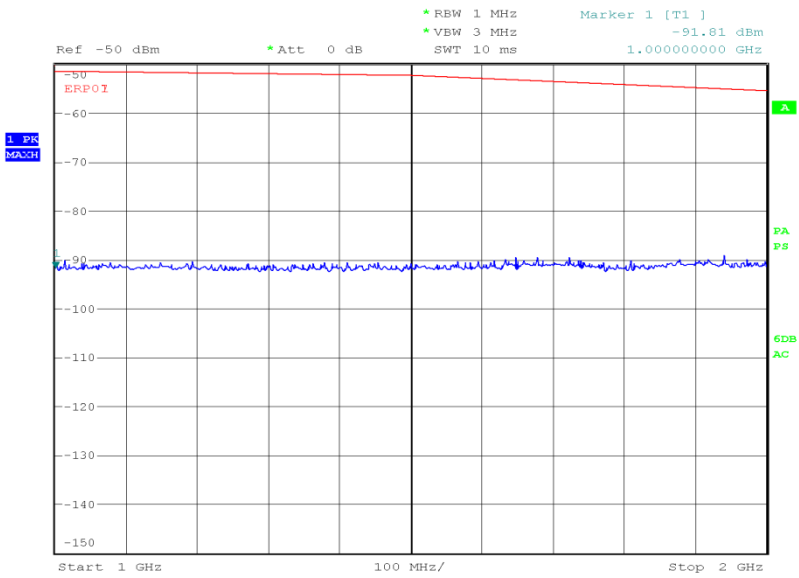
1 GHz to 2 GHz



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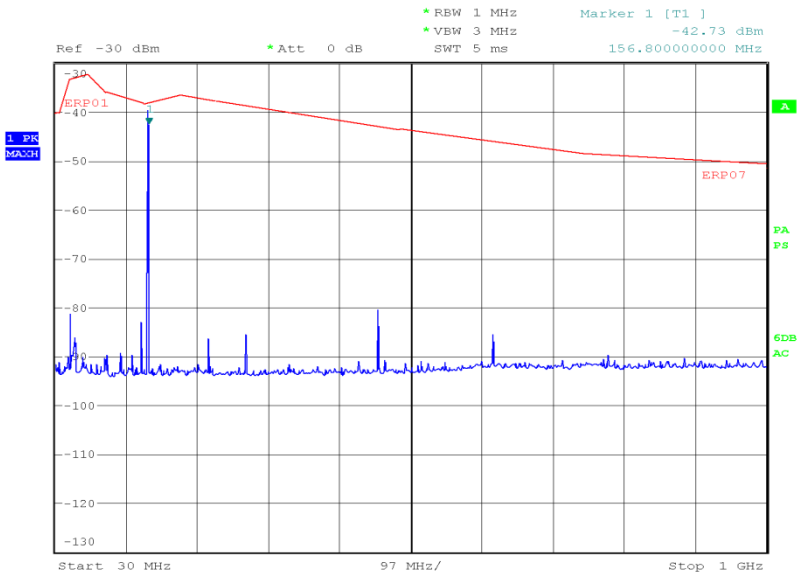
156.800 MHz

30 MHz to 1 GHz



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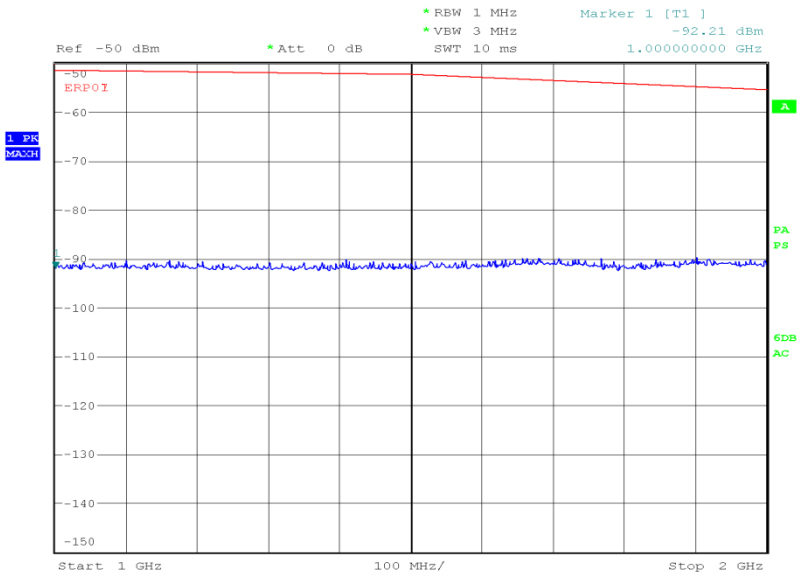
1 GHz to 2 GHz



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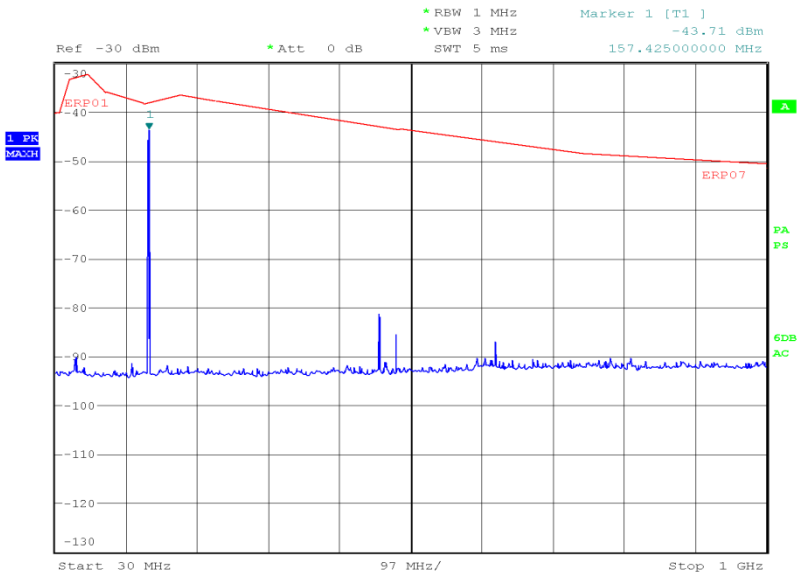
Product Service

157.425 MHz

30 MHz to 1 GHz



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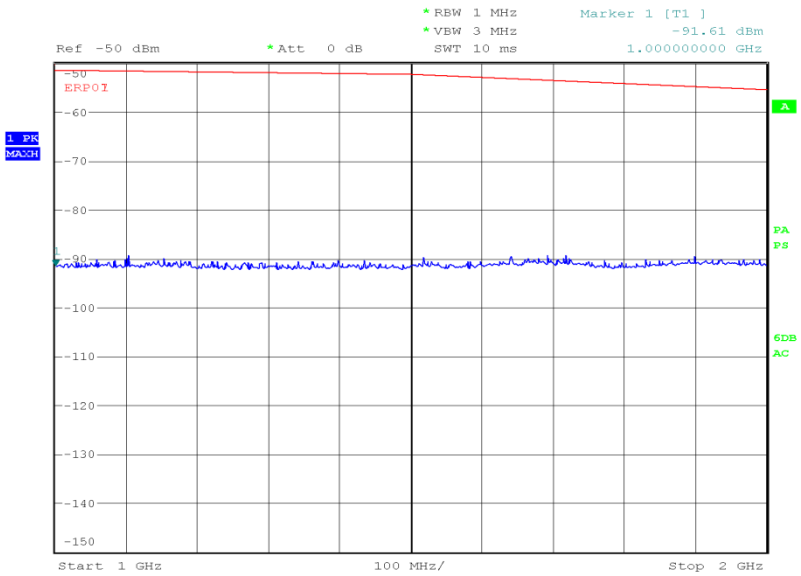
1 GHz to 2 GHz



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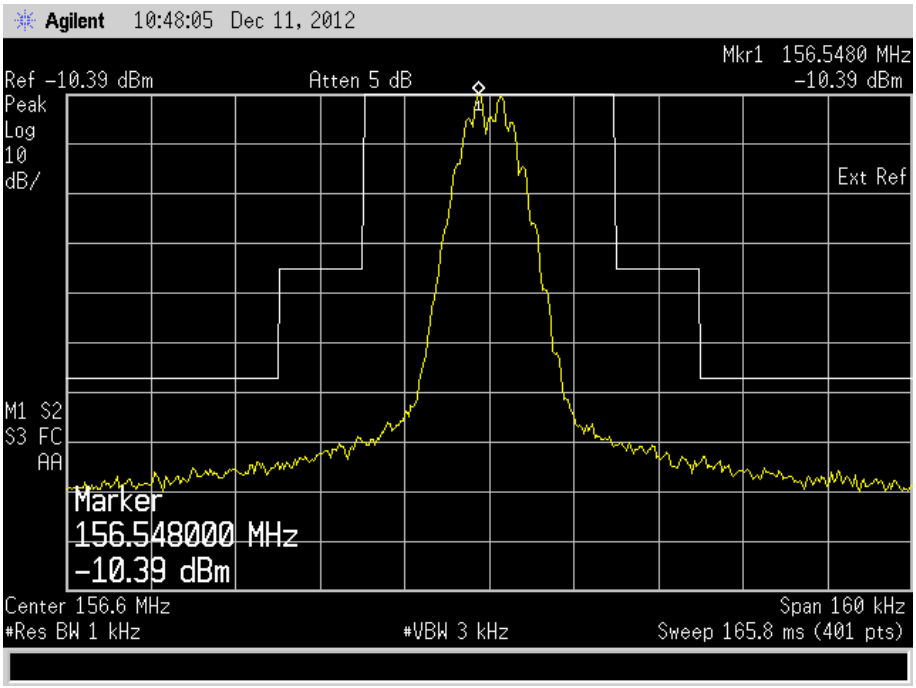
Product Service

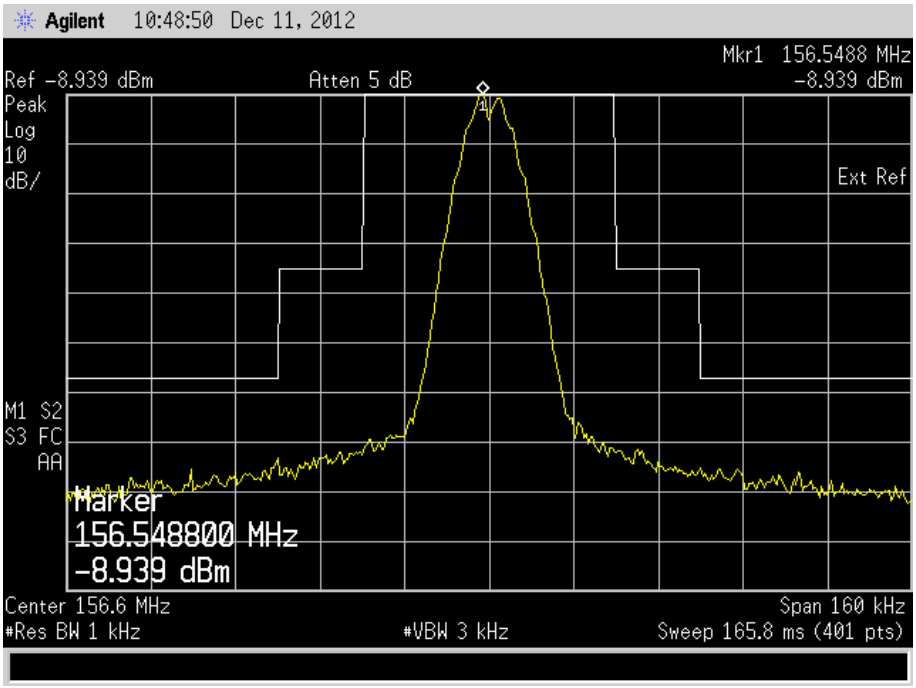
DSC - Conducted

156.525 MHz

Test Mode: 2100 Hz

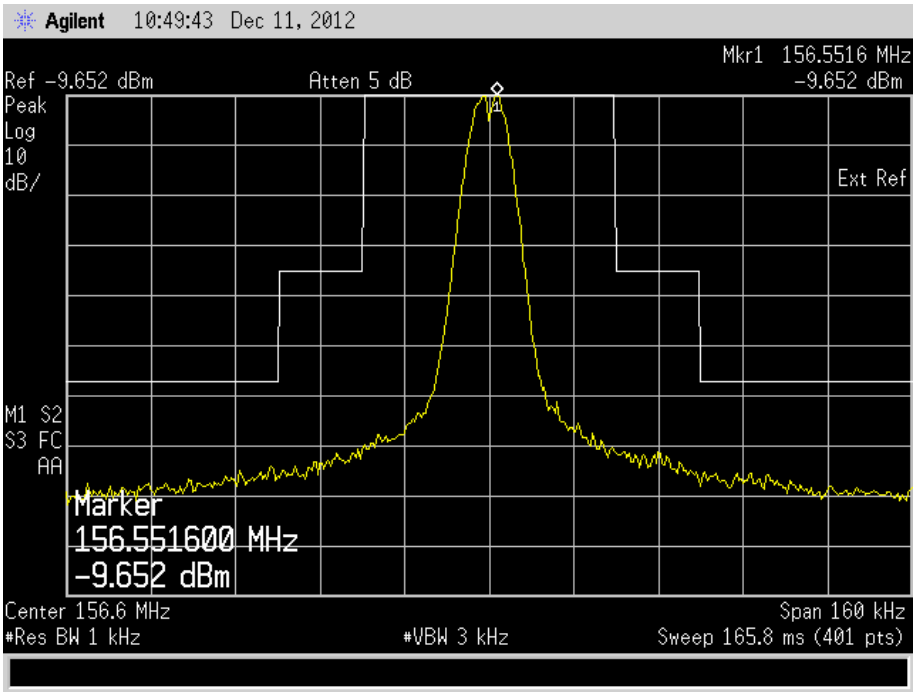


Test Mode: 1300 Hz

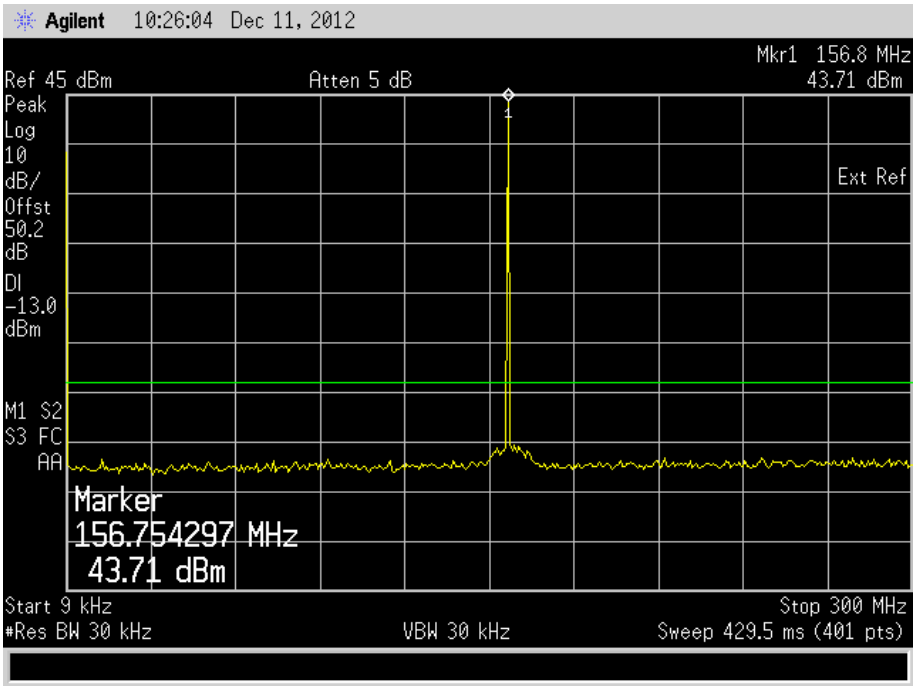


Product Service

Test Mode: Dot Pattern

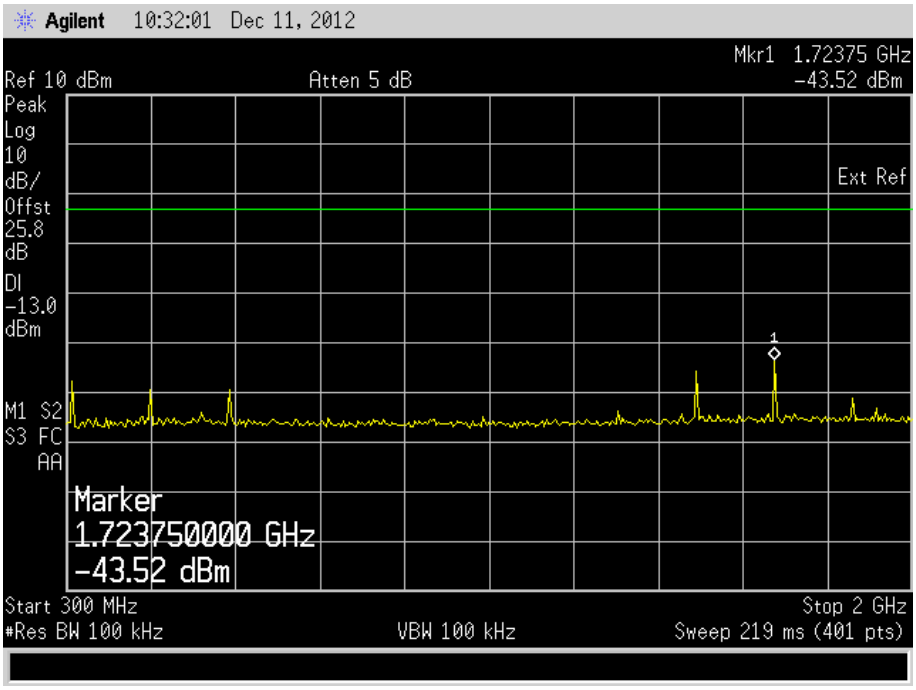


30 MHz to 1 GHz



Product Service

1 GHz to 2 GHz



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

RAY260 S/N: Base No.4 - Modification State 0

2.4.3 Date of Test

6 December 2012 & 11 December 2012

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

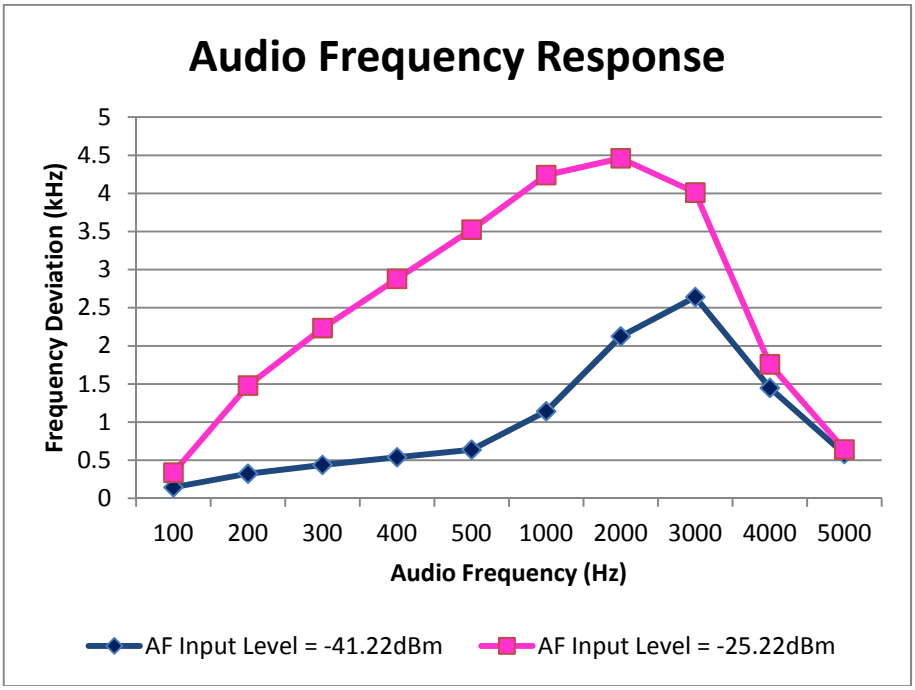
Ambient Temperature	22.2 - 23.1°C
Relative Humidity	24.9 - 322.5%

Product Service

2.4.7 Test Results

Radio Telephony

Modulation Frequency (Hz)	Maximum Deviation (kHz)	
	156.800 MHz	156.800 MHz amplitude increased by 16dB
100	0.145	0.337
200	0.324	1.479
300	0.439	2.234
400	0.540	2.879
500	0.639	3.525
1000	1.142	4.240
2000	2.125	4.460
3000	2.641	4.010
4000	1.448	1.758
5000	0.581	0.641
Maximum Deviation (kHz)	2.641	4.460



DSC

156.525 MHz

Modulation State	Frequency Deviation (kHz)
1300 Hz	2.686
2100 Hz	3.950
Dotting Pattern	3.980

Limit Clause

When phase or frequency modulation is used int he 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 POWER

2.5.1 Specification Reference

FCC CFR 47 Part 80 , Clause 80.215,
Industry Canada RSS-182, Clause 5.2 and 7.5

2.5.2 Equipment Under Test and Modification State

RAY260 S/N: Base No.4 - Modification State 0

2.5.3 Date of Test

10 December 2012

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 connected to a spectrum analyser via a cable and 40 dB of attenuation. The EUT was set to transmit at maximum power with a 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.

2.5.6 Environmental Conditions

Ambient Temperature	20.5°C
Relative Humidity	24.5%

Product Service

2.5.7 Test Results

Radio Telephony

156.025 MHz

Result (dBm)	Result (W)
43.52	22.491

156.800 MHz

Result (dBm)	Result (W)
43.48	22.284

157.425 MHz

Result (dBm)	Result (W)
43.45	22.131

DSC

156.525 MHz

Result (dBm)	Result (W)
43.19	20.845

Limit Clause 80.215 (c)(2)

10W

2.6 TRANSMITTER CARRIER POWER REDUCTION

2.6.1 Specification Reference

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

2.6.2 Equipment Under Test and Modification State

RAY260 S/N: Base No.4 - Modification State 0

2.6.3 Date of Test

10 December 2012

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

2.6.6 Environmental Conditions

Ambient Temperature	20.6°C
Relative Humidity	24.9%

Product Service

2.6.7 Test Results

Radio Telephony

Carrier power: 28.74 dBm / 0.748 W

DSC

Carrier power: 28.68 dBm / 0.738 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.

2.7 SUPPRESSION OF INTERFACE ABOARD SHIPS

2.7.1 Specification Reference

FCC CFR 47 Part 80, Clause 80.217 (b)

2.7.2 Equipment Under Test and Modification State

RAY260 S/N: Base No.4 - Modification State 0

2.7.3 Date of Test

7 December 2012

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 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.

2.7.6 Environmental Conditions

Ambient Temperature	21.0°C
Relative Humidity	24.9%

Product Service

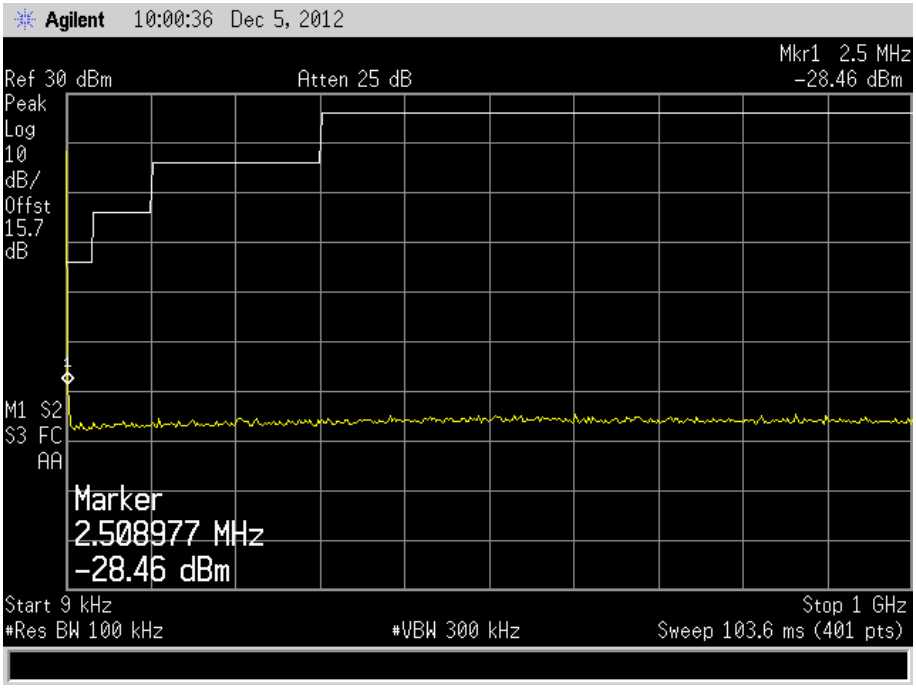
2.7.7 Test Results

Conducted

156.025 MHz

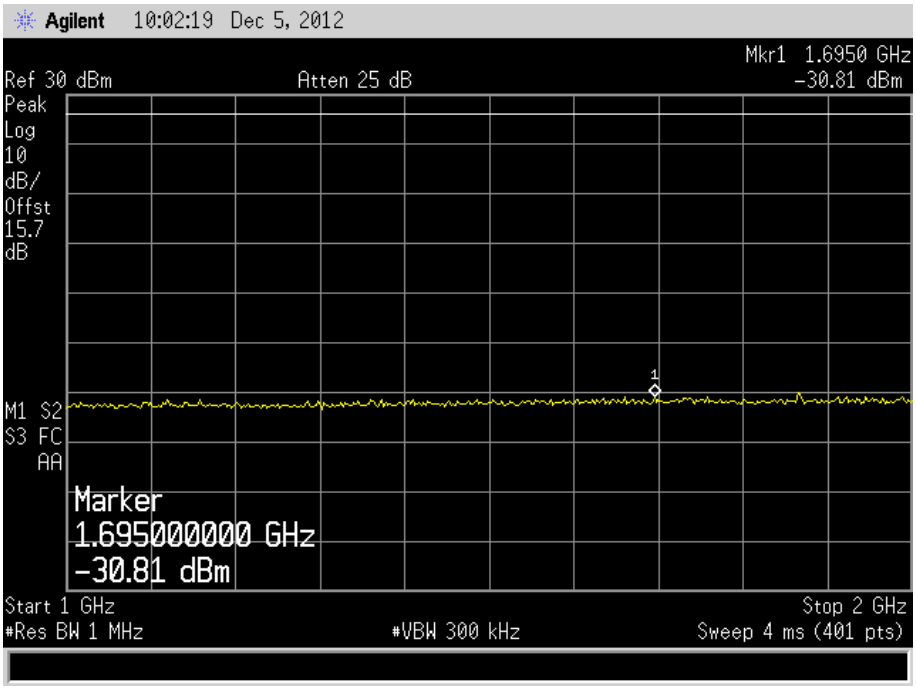
Frequency of Interfering Emissions (MHz)	Power to Artificial Antenna (µW)	Power to Artificial Antenna (dBm)
9 kHz to 30 MHz	1.581	-28.01
30 MHz to 100 MHz	0.258	-35.88
100 MHz to 300 MHz	0.281	-35.51
300 MHz to 1000 MHz	0.345	-34.61
300 MHz to 2000 MHz	0.829	-30.81

9 kHz to 1 GHz



Product Service

1 GHz to 2 GHz

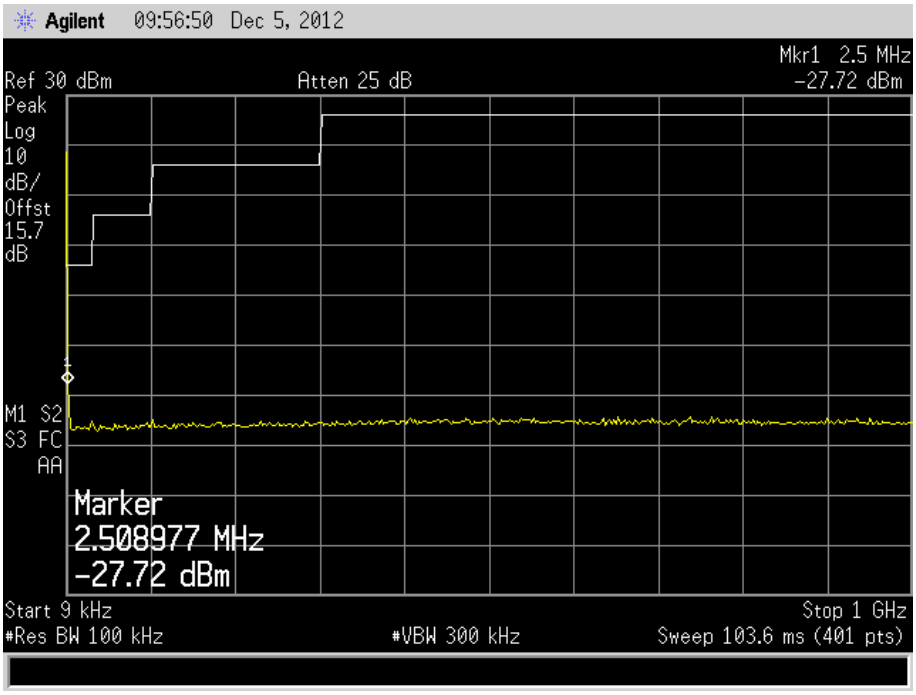


Product Service

156.800 MHz

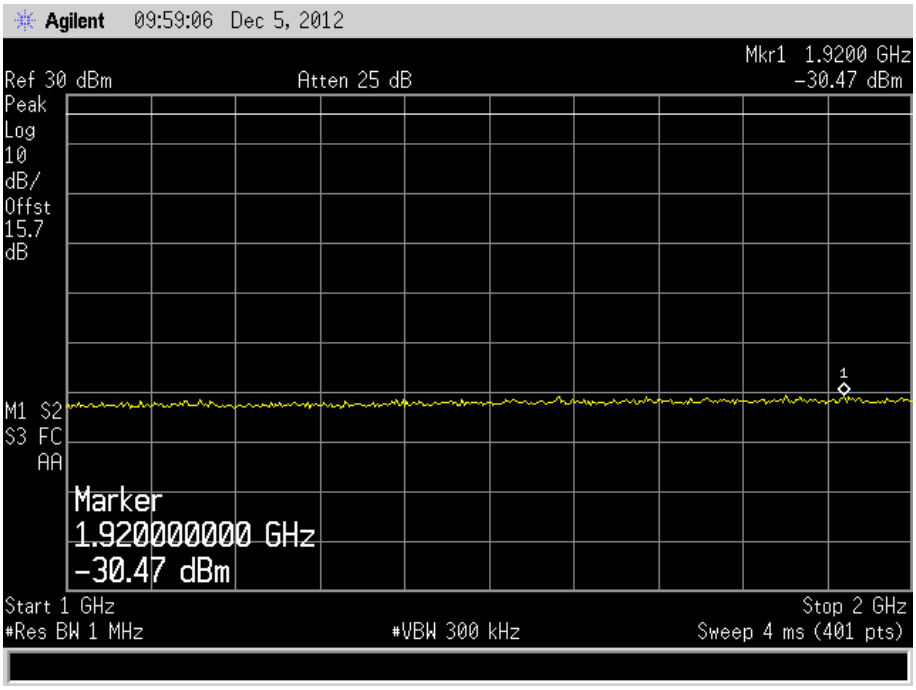
Frequency of Interfering Emissions (MHz)	Power to Artificial Antenna (µW)	Power to Artificial Antenna (dBm)
9 kHz to 30 MHz	1.599	-27.96
30 MHz to 100 MHz	0.216	-36.65
100 MHz to 300 MHz	0.261	-35.83
300 MHz to 1000 MHz	0.306	-35.14
300 MHz to 2000 MHz	0.897	-30.47

9 kHz to 1 GHz



Product Service

1 GHz to 2 GHz

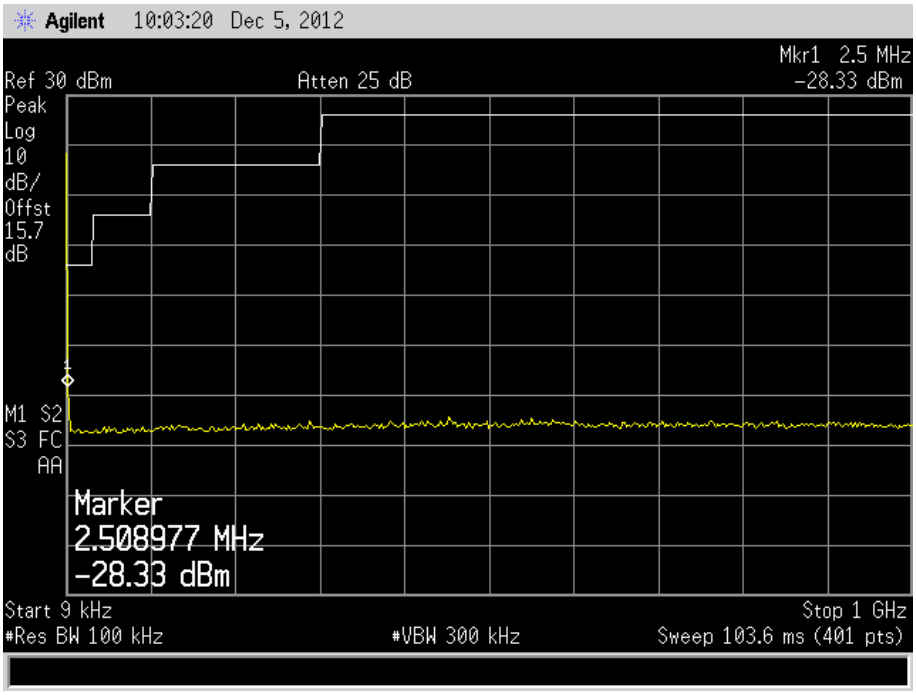


Product Service

157.425 MHz

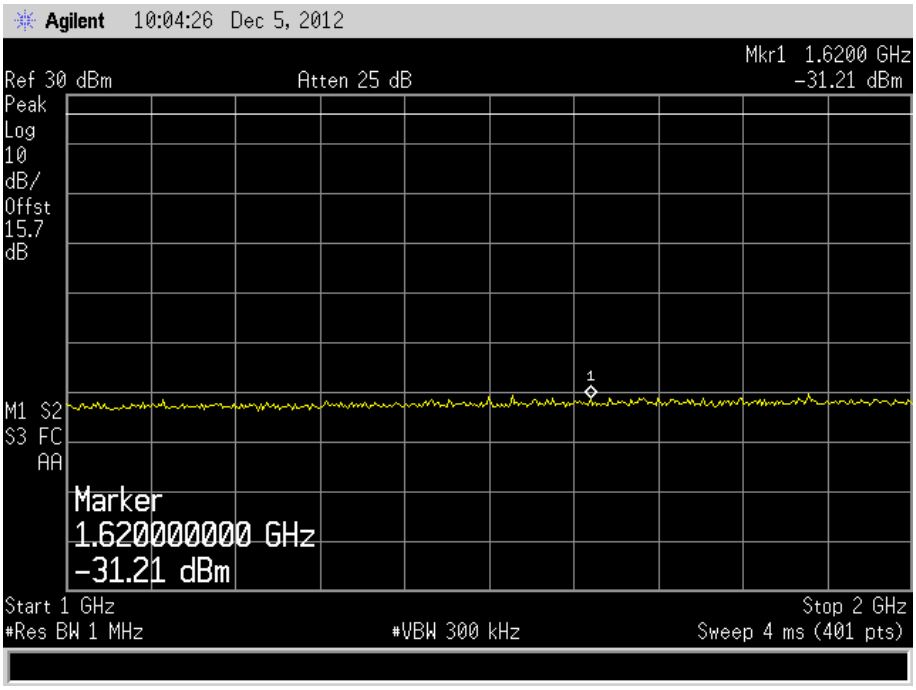
Frequency of Interfering Emissions (MHz)	Power to Artificial Antenna (µW)	Power to Artificial Antenna (dBm)
9 kHz to 30 MHz	1.644	-27.84
30 MHz to 100 MHz	0.298	-35.25
100 MHz to 300 MHz	0.316	-34.99
300 MHz to 1000 MHz	0.354	-34.50
300 MHz to 2000 MHz	0.756	-31.21

9 kHz to 1 GHz



Product Service

1 GHz to 2 GHz



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					
DC Power Supply	Hewlett Packard	6269B	326	-	TU
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	19-Jan-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	14-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	27-Jun-2013
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Section 2.2 - Transmitter Frequency Tolerances					
Modulation Analyser	Hewlett Packard	8901B	45	12	18-Jul-2013
Counter	Hewlett Packard	53181A	159	12	28-May-2013
DC Power Supply	Hewlett Packard	6269B	326	-	TU
Digital Temperature Indicator + T/C	Fluke	51	412	12	6-Jan-2013
Temperature Chamber	Montford	2F3	467	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	19-Jan-2013
Sensor Module	Hewlett Packard	11722A	1333	12	28-Aug-2013
Multimeter	Iso-tech	IDM101	2424	12	10-Sep-2013
Sensor	Hewlett Packard	11722A	2787	12	28-Aug-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
Attenuator (30dB, 150W)	Narda	769-30	3369	12	28-May-2013
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Section 2.3 - Emission Limitations					
Signal Generator	Rohde & Schwarz	SMY 01	118	12	18-Jul-2013
DC Power Supply	Hewlett Packard	6269B	326	-	TU
Digital Temperature Indicator + T/C	Fluke	51	412	12	6-Jan-2013
Temperature Chamber	Montford	2F3	467	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	19-Jan-2013
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
High Pass Filter	Mini-Circuits	NHP-300	1640	12	15-Aug-2013
Multimeter	Iso-tech	IDM101	2424	12	10-Sep-2013
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	30-Nov-2013
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	12	13-Jun-2013
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	27-Jun-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	14-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Attenuator (30dB, 150W)	Narda	769-30	3369	12	28-May-2013
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	31-Aug-2013
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
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 - Modulation Requirements					
Audio Analyser	Hewlett Packard	8903B	44	12	28-Sep-2013
Modulation Analyser	Hewlett Packard	8901B	45	12	18-Jul-2013
DC Power Supply	Hewlett Packard	6269B	326	-	TU
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	19-Jan-2013
Sensor	Hewlett Packard	11722A	2787	12	28-Aug-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
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	27-Jun-2013
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Section 2.5 and 2.6– Transmitter Power and Transmitter Carrier Power Reduction					
Modulation Analyser	Hewlett Packard	8901B	45	12	18-Jul-2013
Signal Generator	Rohde & Schwarz	SMY 01	118	12	18-Jul-2013
DC Power Supply	Hewlett Packard	6269B	326	-	TU
Digital Temperature Indicator + T/C	Fluke	51	412	12	6-Jan-2013
Temperature Chamber	Montford	2F3	467	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	19-Jan-2013
Multimeter	Iso-tech	IDM101	2424	12	10-Sep-2013
Sensor	Hewlett Packard	11722A	2787	12	28-Aug-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Attenuator (30dB, 150W)	Narda	769-30	3369	12	28-May-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	27-Jun-2013
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Section 2.7- Suppression of Interface Aboard Ships					
Signal Generator	Rohde & Schwarz	SMY 01	118	12	18-Jul-2013
DC Power Supply	Hewlett Packard	6269B	326	-	TU
Digital Temperature Indicator + T/C	Fluke	51	412	12	6-Jan-2013
Temperature Chamber	Montford	2F3	467	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	19-Jan-2013
High Pass Filter	Mini-Circuits	NHP-300	1640	12	15-Aug-2013
Multimeter	Iso-tech	IDM101	2424	12	10-Sep-2013
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	30-Nov-2013
Attenuator (20dB, 50W)	Aeroflex / Weinschel	47-20-34	3165	12	13-Jun-2013
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	27-Jun-2013
Hygrometer	Rotronic	I-1000	3220	12	13-Jun-2013
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	14-Jun-2013
Attenuator (20dB, 150W)	Narda	769-20	3367	12	28-May-2013
Attenuator (30dB, 150W)	Narda	769-30	3369	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
True RMS Multimeter	Fluke	179	4007	12	16-Feb-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	-
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	-

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

UKAS TESTING 0141

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).