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# Report On

FCC and Industry Canada Testing of the

Inmarsat Global Ltd IsatPhone2

In accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 25 and  
Industry Canada RSS-170

COMMERCIAL-IN-CONFIDENCE

FCC ID: YCT-ISATPHONE2

Document 75924065 Report 07 Issue 1

November 2013



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COMMERCIAL-IN-CONFIDENCE

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Inmarsat Global Ltd IsatPhone2  
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Industry Canada RSS-170

Document 75924065 Report 07 Issue 1

November 2013

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**DATED**

20 November 2013

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**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 2, FCC CFR 47 Part 25 and Industry Canada RSS-170. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler

A Galpin





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## **SECTION 1**

### **REPORT SUMMARY**

FCC and Industry Canada Testing of the  
Inmarsat Global Ltd IsatPhone2

In accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 25 and Industry Canada RSS-170



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC and Industry Canada Testing of the Inmarsat Global Ltd IsatPhone2 to the requirements of FCC CFR 47 Part 2, FCC CFR 47 Part 25 and Industry Canada RSS-170.

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	Inmarsat Global Ltd
Model Number(s)	IsatPhone2
Serial Number(s)	IX40100471
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2 (2012) FCC CFR 47 Part 25 (2012) Industry Canada RSS-170 (2011)
Incoming Release Date	Declaration of Build Status 17 November 2013
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	57-00098-01/1 30 August 2013
Start of Test	23 October 2013
Finish of Test	4 November 2013
Name of Engineer(s)	G Lawler A Galpin
Related Document(s)	ANSI C63.4: 2003



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 25 and Industry Canada RSS-170 is shown below.

Section	Spec Clause			Test Description	Result	Comments/Base Standard
	Pt 2	Pt 25	RSS-170			
Inmarsat						
2.1	2.1055	25.202(d)	5.2	Frequency Tolerance	Pass	
2.2	2.1053	25.202(f)	5.4.3.1	Emission Limitations	Pass	
2.3	-	25.204	5.3	Power Limits	Pass	
2.4	-	25.216	-	Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service	Pass	
2.5	2.1047(d)	-	-	Modulation Characteristics	Pass	
2.6	2.1049	-	-	Occupied Bandwidth	Pass	



### 1.3 DECLARATION OF BUILD STATUS

MAIN EUT		
MANUFACTURING DESCRIPTION	Inmarsat GMR2+ Satellite Phone	
MANUFACTURER	Inmarsat	
TYPE	IsatPhone 2	
PART NUMBER	NA	
SERIAL NUMBER	IX40100452	
HARDWARE VERSION	1302	
SOFTWARE VERSION	5.0.0	
TRANSMITTER OPERATING RANGE	GMR 2+ 1626.5 – 1660.5 1668 - 1675MHz BT 2402 – 2480 MHz	
RECEIVER OPERATING RANGE	GMR2+ 1518 – 1559 MHz BT 2402 – 2480 MHz GPS 1575.42MHz	
INTERMEDIATE FREQUENCIES	110.592 MHz	
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	G1D	
MODULATION TYPES: (i.e. GMSK, QPSK)	GMR 2+ TX: GMSK RX:OQPSK	
HIGHEST INTERNALLY GENERATED FREQUENCY	3350MHz	
HIGHEST INTERNALLY GENERATED FREQUENCY IN RECEIVE IDLE MODE	3118MHz	
OUTPUT POWER (W or dBm)	GMR2+ +33.5dBm BT +3.8dBm	
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	GMR2+ Satellite Phone for Inmarsat satellite network system	
FCC ID	YCT-ISATPHONE2	
IC ID	8944A-ISATPHONE2	
BATTERY/POWER SUPPLY		
MANUFACTURING DESCRIPTION	Li-Ion Battery	AC-Charger
MANUFACTURER	VARTA	Tenwei
TYPE	Li-Ion 3180mAh	TAV01-0501200
PART NUMBER	56426702098	
VOLTAGE	3.7V	5V
SERIAL NUMBER	NA	NA
ANCILLARIES (if applicable)		
MANUFACTURING DESCRIPTION	Headset	
MANUFACTURER	TopDen	
TYPE	Mono headset with 2.5mm plug	
PART NUMBER	TS628D-168-4	
SERIAL NUMBER	NA	

Signature

Held on file

Date

17 November 2013

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.

No responsibility will be accepted by TÜV SÜD Product Service as to the accuracy of the information declared in this document by the manufacturer.



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## **1.4 PRODUCT INFORMATION**

### **1.4.1 Technical Description**

The Equipment Under Test (EUT) was a Inmarsat Global Ltd IsatPhone2. 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 3.7 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.





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## **SECTION 2**

### **TEST DETAILS**

FCC and Industry Canada Testing of the  
Inmarsat Global Ltd IsatPhone2

In accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 25 and Industry Canada RSS-170



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## **2.1 FREQUENCY TOLERANCE**

### **2.1.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1055  
FCC CFR 47 Part 25, Clause 25.202(d)  
Industry Canada RSS-170, Clause 5.2

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

IsatPhone2 S/N: IX40100471 - Modification State 0

### **2.1.3 Date of Test**

28 October 2013 & 29 October 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 an FSQ spectrum analyser via a cable and 30 dB attenuator. The EUT was configured to transmit a modulated carrier at maximum power using customer supplied test scripts.

The trace was set to max hold until a sufficient number of sweeps was observed. Measurements were made over 145.75 symbols. The VSA function was selected on the Spectrum Analyser and the result and the trace were recorded.

### **2.1.6 Environmental Conditions**

Ambient Temperature	23.0 - 24.6°C
Relative Humidity	34.2 - 37.5%



## 2.1.7 Test Results

3.7 V DC Supply

Under Temperature Variations

1643.675 MHz

Temperature Interval °C	Frequency Error	
	%	ppm
-30	0.000082591	0.825906751
-20	0.000066194	0.661939970
-10	0.000074089	0.740886939
0	0.000030562	0.305621935
+10	0.000028584	0.285842683
+20	0.000006334	0.063339760
+30	-0.000013700	-0.137003355
+40	-0.000040354	-0.403540468
+50	-0.000051449	-0.514500000

Under Voltage Variations

1643.675 MHz

DC Voltage	Deviation	
	%	ppm
3.55	-0.000000334	-0.003340064
3.7	0.000006334	0.063339760
4.2	-0.000005902	-0.059015896

Limit Clause FCC CFR 47, 25.202(d)

Frequency tolerance, Earth stations. The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 per cent of the reference frequency.

Limit Clause RSS-170, 5.2

For mobile earth station equipment, the carrier frequency shall not depart from the reference frequency by more than  $\pm 10$  ppm.

For ATC equipment, the carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile equipment, and  $\pm 1.5$  ppm for base station equipment.



## **2.2 EMISSION LIMITATIONS**

### **2.2.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1053  
FCC CFR 47 Part 25, Clause 25.202(f)  
Industry Canada RSS-170, Clause 5.4.3.1

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

IsatPhone2 S/N: IX40100471 - Modification State 0

### **2.2.3 Date of Test**

24 October 2013 & 3 November 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**

#### Emissions Mask

The EUT was connected to a spectrum analyser via 30dB of attenuation. The RBW was set to 3 kHz and the VBW to 10 kHz. The path loss was measured between the spectrum analyser and the EUT and entered as a reference level offset. Added to this offset was a correction factor of 1.25dB to account for the used RBW of 3 kHz instead of 4 kHz as defined in 25.202(f). The reference level was established by measuring the wideband power using over the burst length, using the Time Domain Power function on the spectrum analyser. The emission mask was based on an authorised bandwidth of 100 kHz as defined by the satellite service provider. Measurements of the emission mask were performed using an RMS detector with trace averaging over 50 sweeps with a gated trigger ensuring averaging was only performed with the transmit signal active. Measurements were performed on bottom, middle and top channels. The plots are on the following pages.

For conducted testing, in accordance with Part 25.202(f) the spurious conducted emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 9 kHz to 17 GHz. The EUT was set to transmit on full power. The spectrum analyser detector was set to Max Hold. (Worst case)

The maximum path loss was used as the reference level offset to ensure worst case results.

For radiated testing, 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.



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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 on the bottom, middle and top channels.

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.

#### **2.2.6 Environmental Conditions**

Ambient Temperature	20.0 - 24.9°C
Relative Humidity	34.0 - 42.1%



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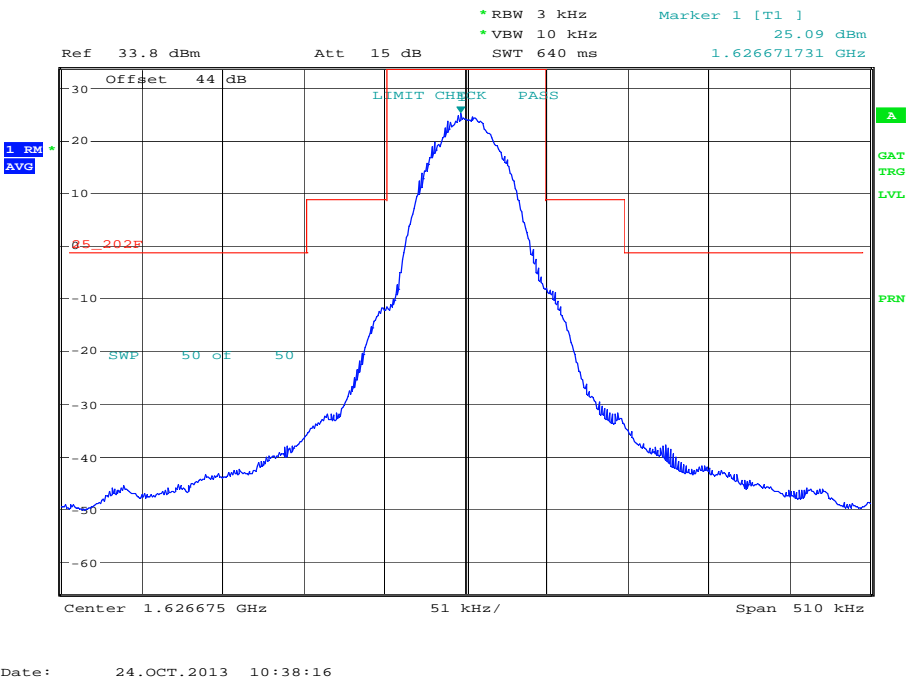
2.2.7 Test Results

3.7 V DC Supply

Conducted

1626.675 MHz

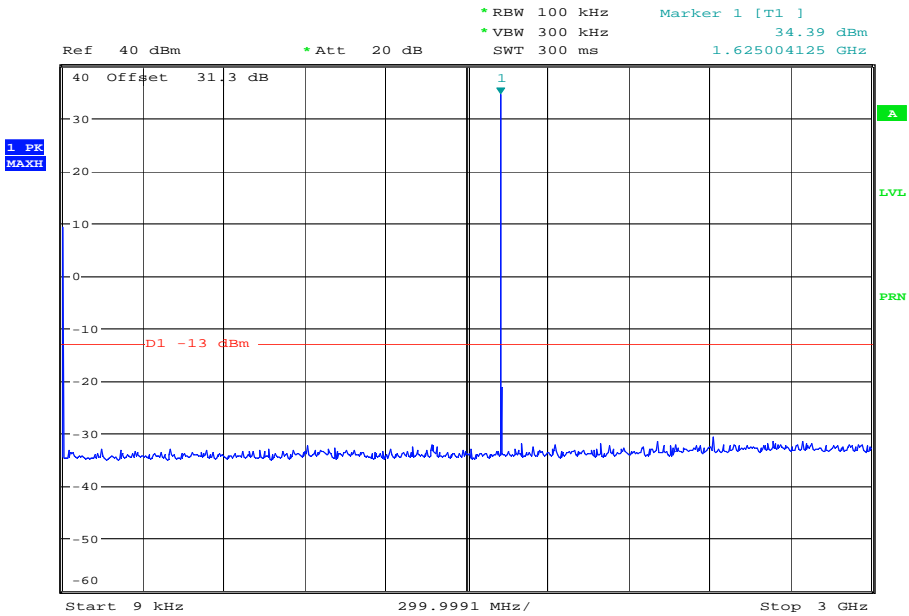
Mask





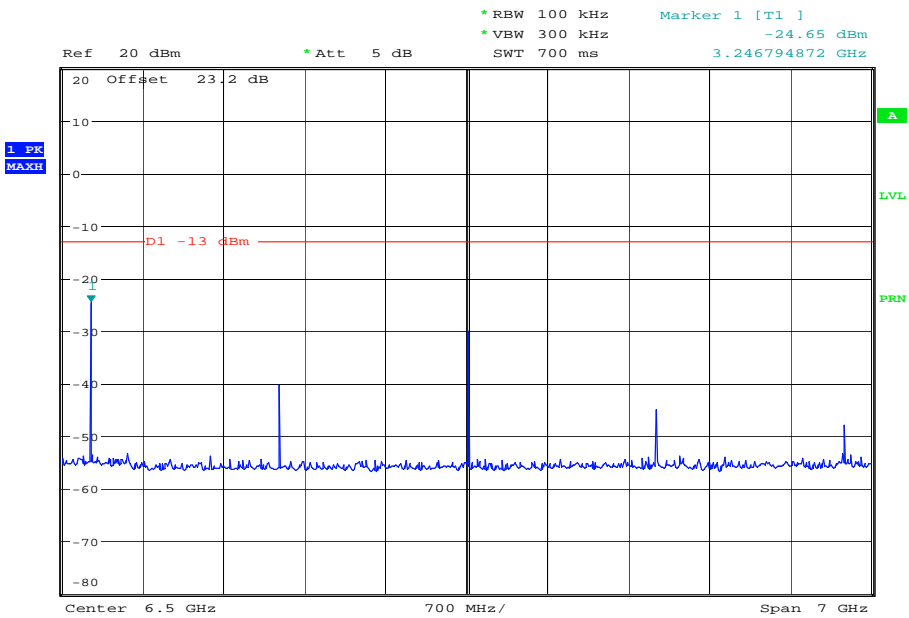
Product Service

9 kHz to 3 GHz



Date: 23.OCT.2013 11:25:11

3 GHz to 10 GHz

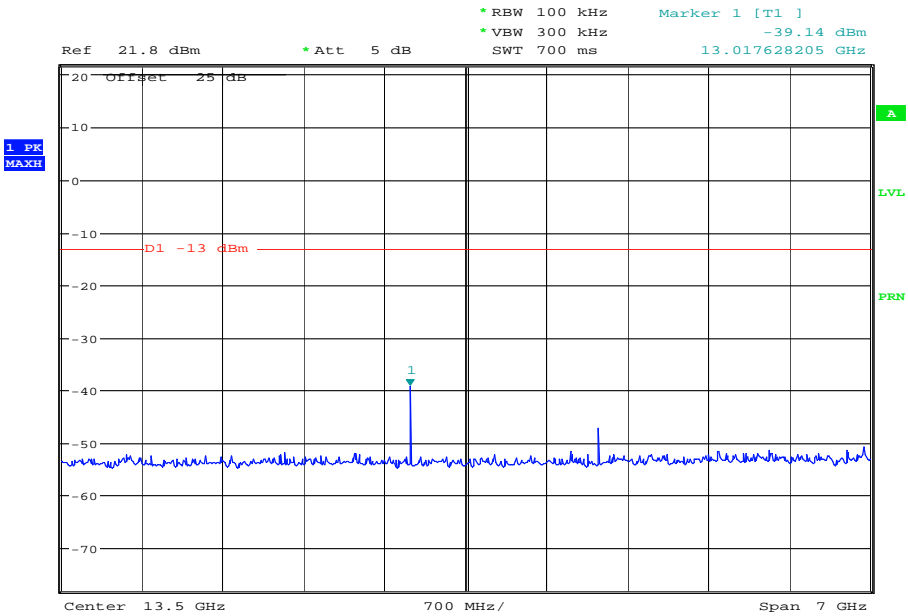


Date: 23.OCT.2013 11:38:46



Product Service

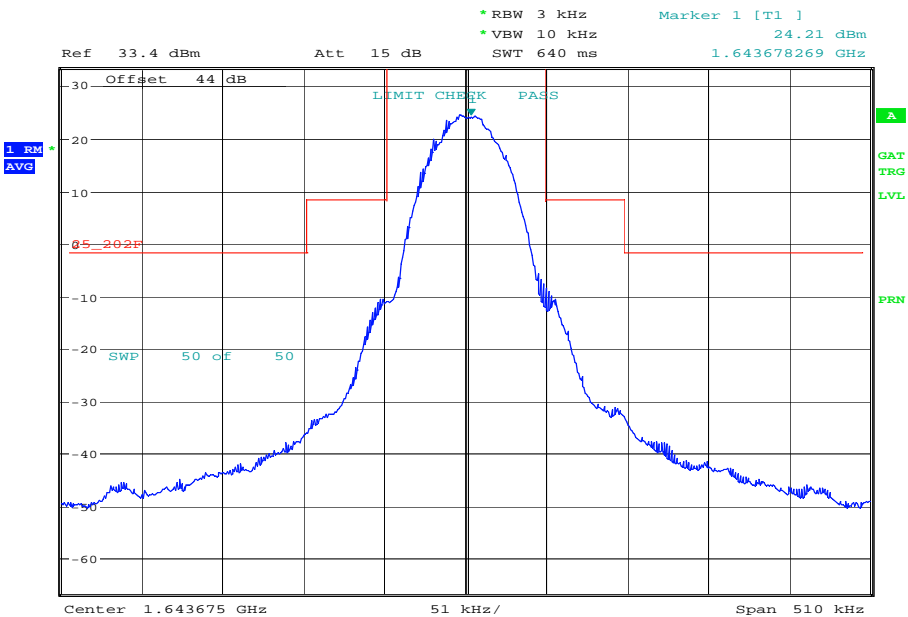
10 GHz to 17 GHz



Date: 23.OCT.2013 11:57:53

1643.675 MHz

Mask



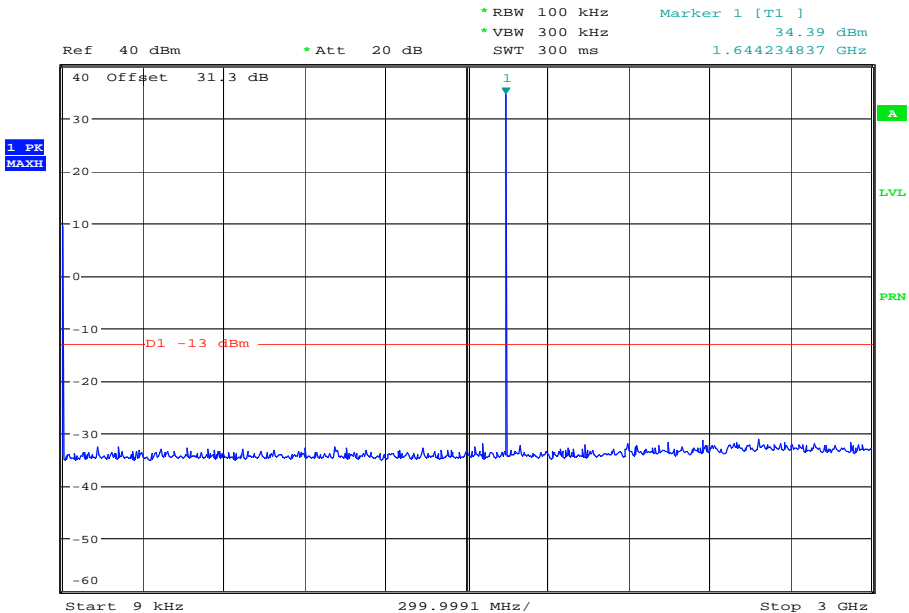
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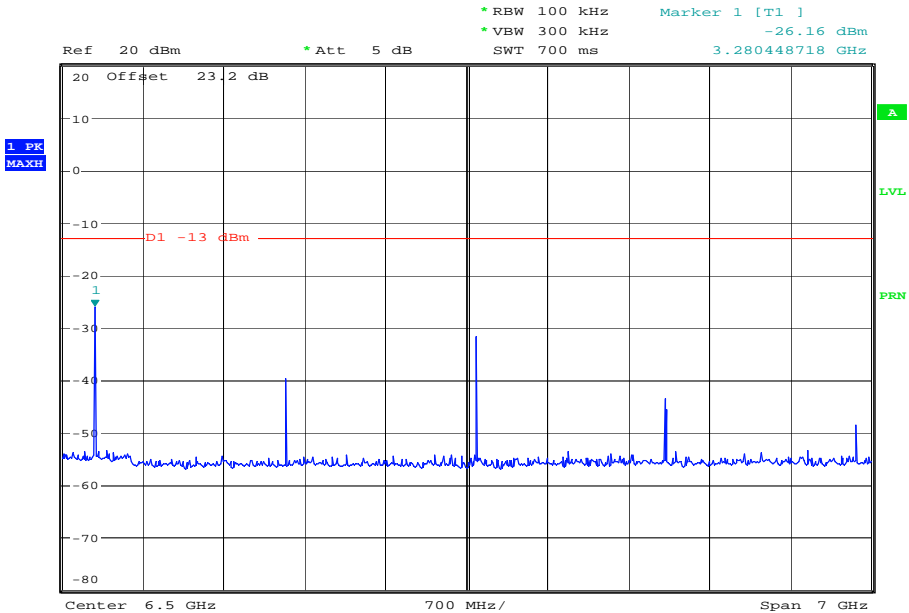
Product Service

9 kHz to 3 GHz



Date: 23.OCT.2013 11:26:57

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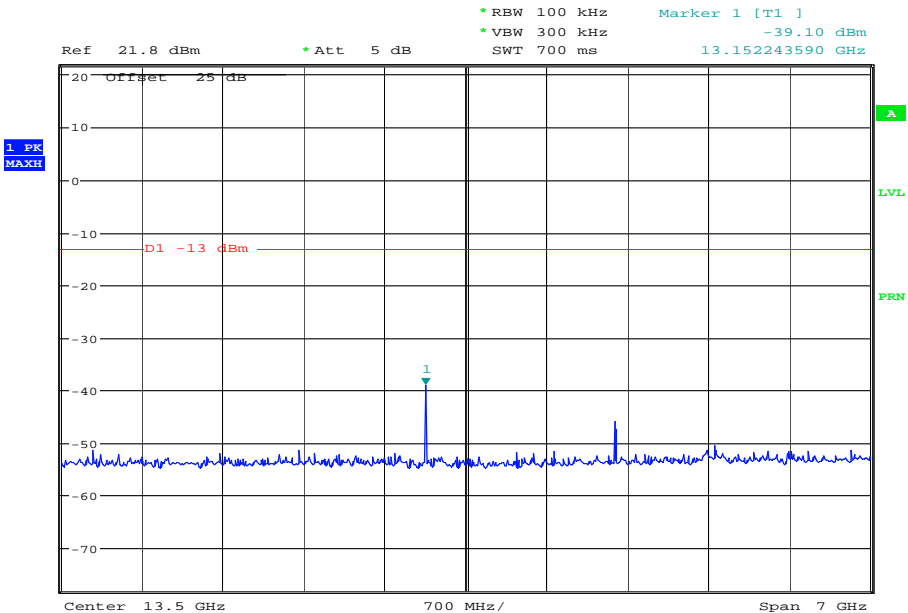


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Product Service

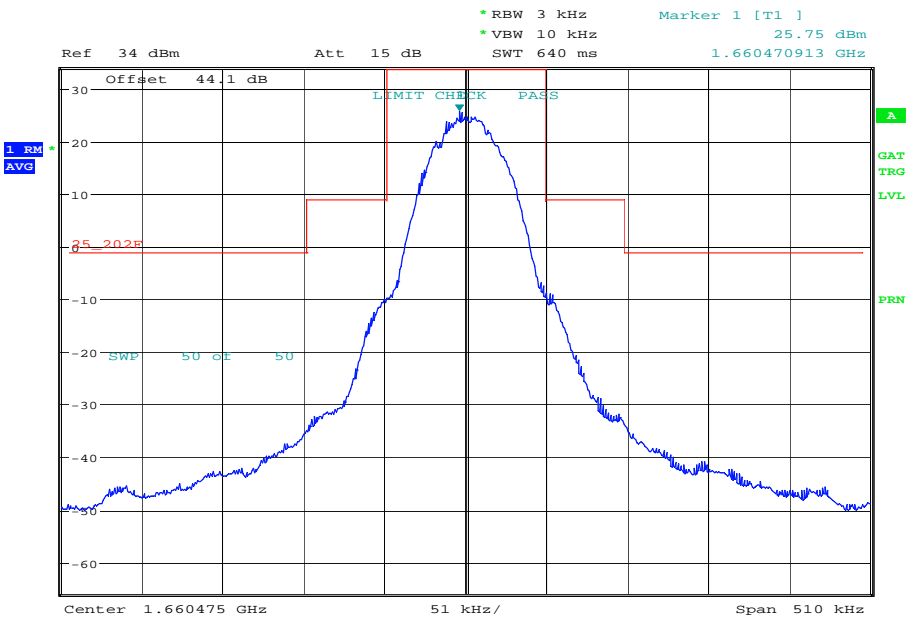
10 GHz to 17 GHz



Date: 23.OCT.2013 11:56:44

1660.475 MHz

Mask

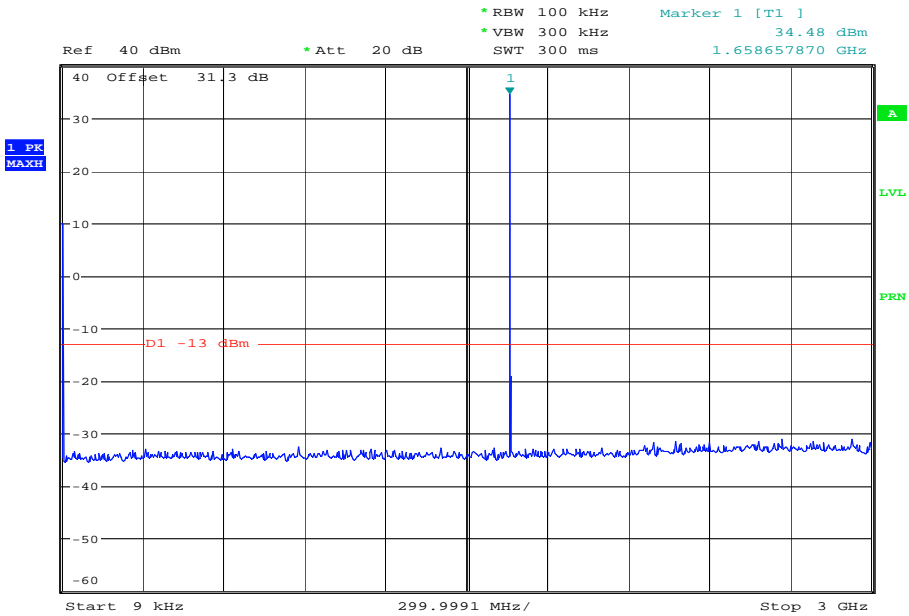


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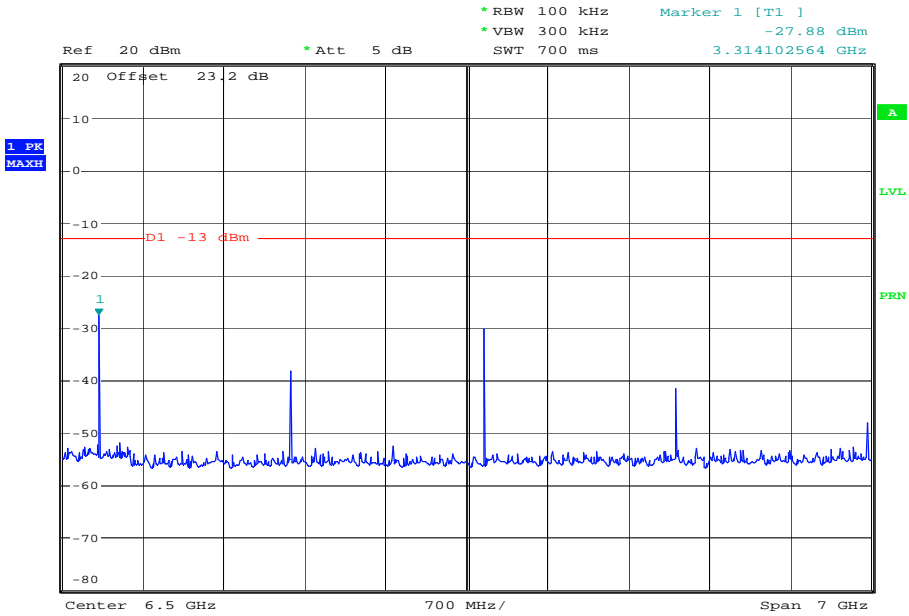
Product Service

9 kHz to 3 GHz



Date: 23.OCT.2013 11:28:37

3 GHz to 10 GHz

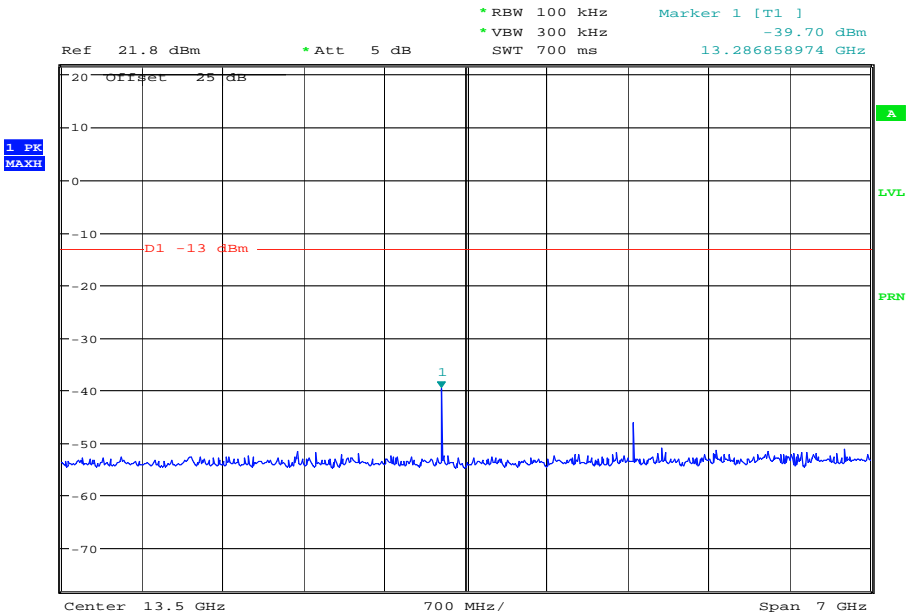


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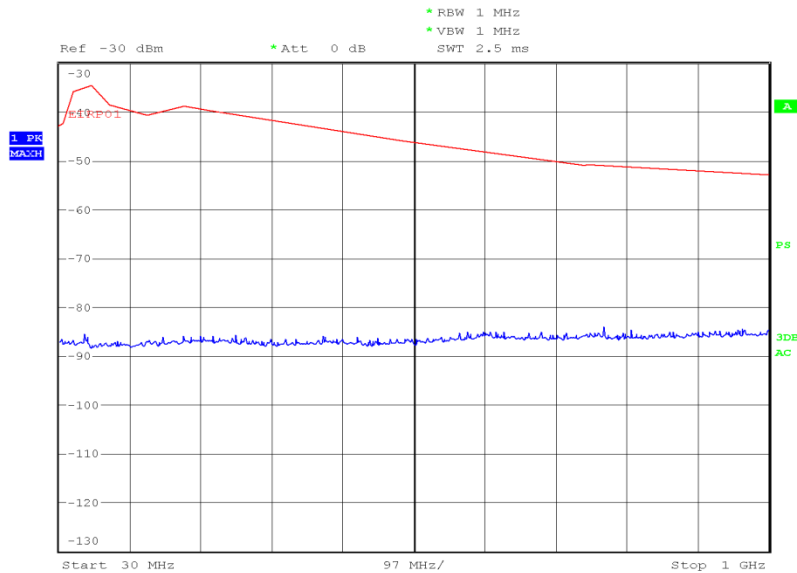


Product Service

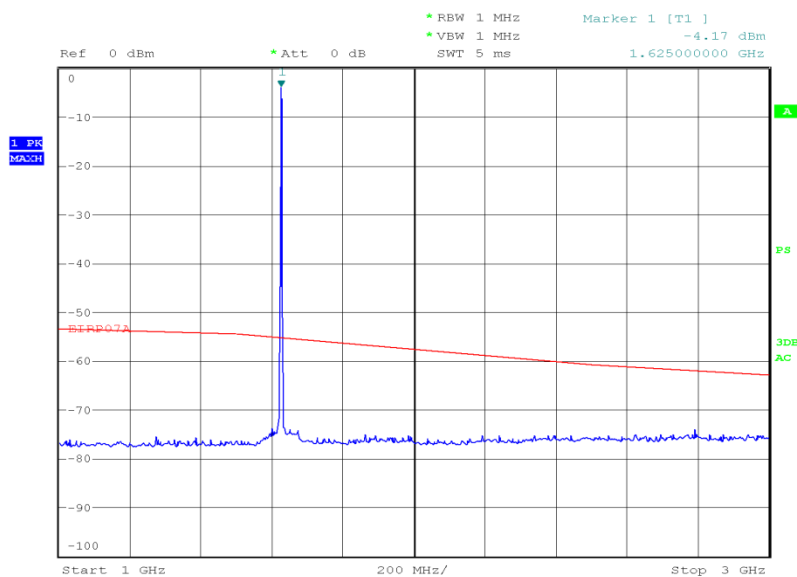
10 GHz to 17 GHz



Date: 23.OCT.2013 11:55:35

Radiated1626.675 MHz30 MHz to 1 GHz

Date: 3.NOV.2013 07:26:40

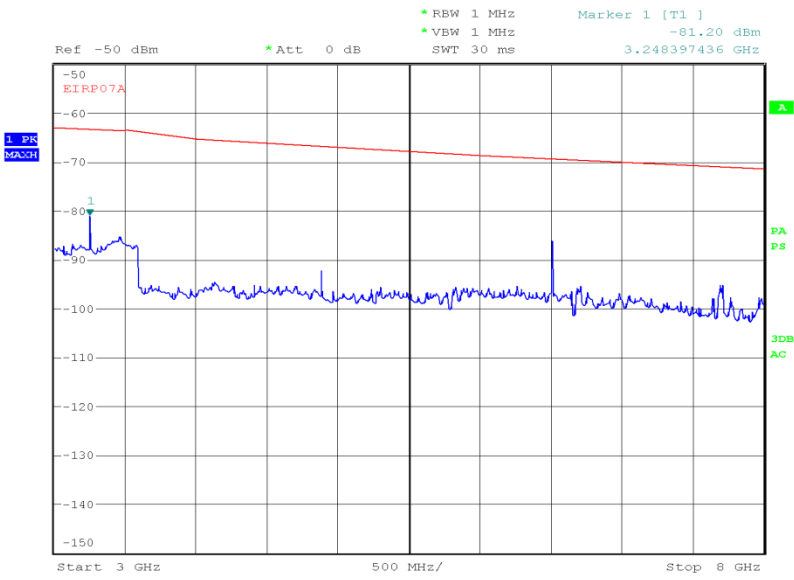
1 GHz to 3 GHz

Date: 3.NOV.2013 10:06:11



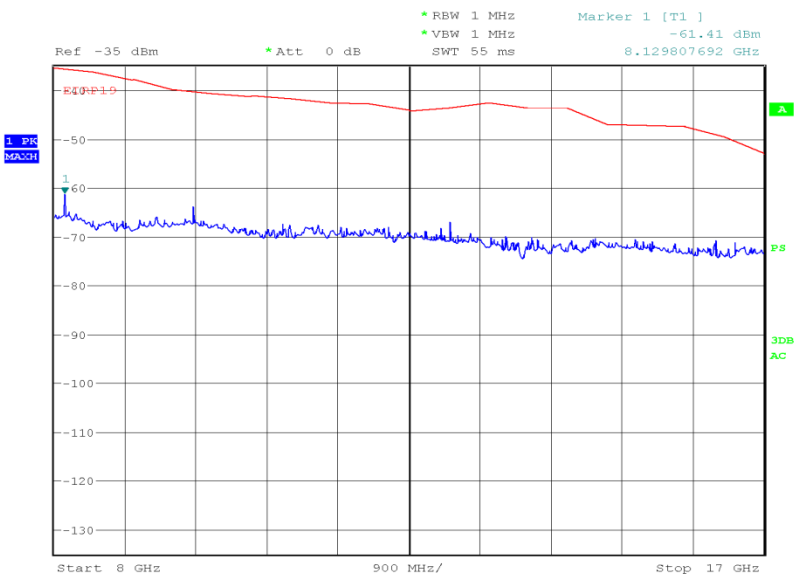
Product Service

3 GHz to 8 GHz



Date: 3.NOV.2013 11:02:45

8 GHz to 17 GHz



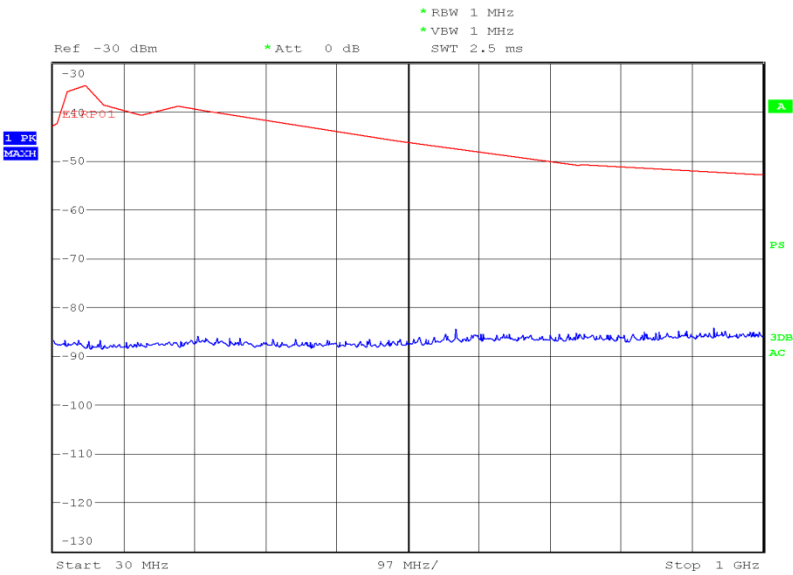
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Product Service

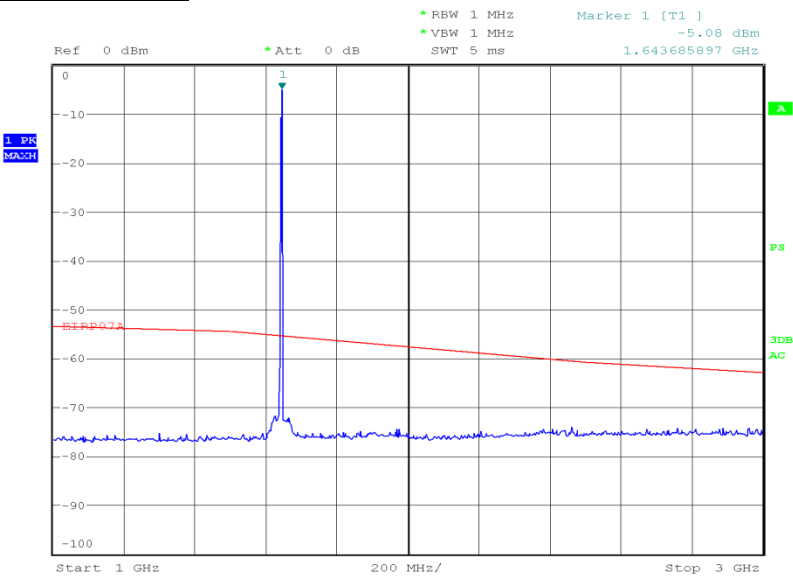
1643.675 MHz

30 MHz to 1 GHz



Date: 3.NOV.2013 07:20:21

1 GHz to 3 GHz

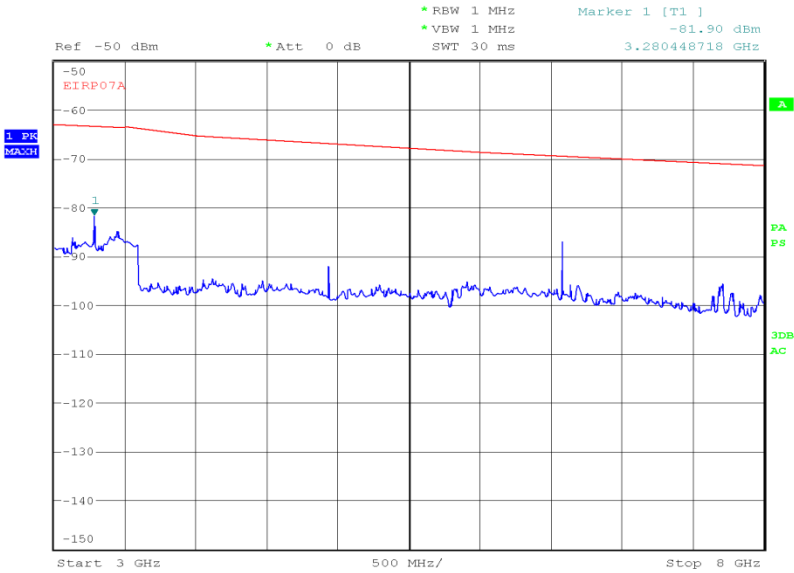


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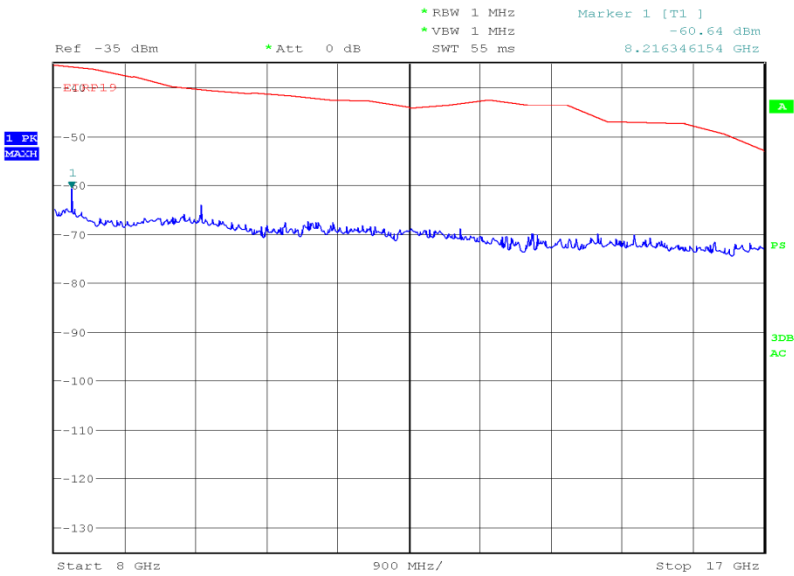
Product Service

3 GHz to 8 GHz



Date: 3.NOV.2013 11:55:02

8 GHz to 17 GHz



Date: 3.NOV.2013 12:39:52

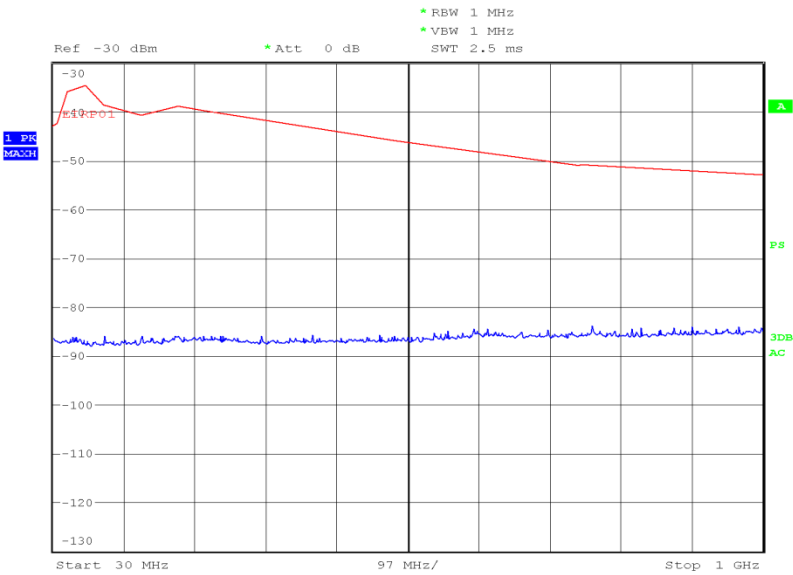




Product Service

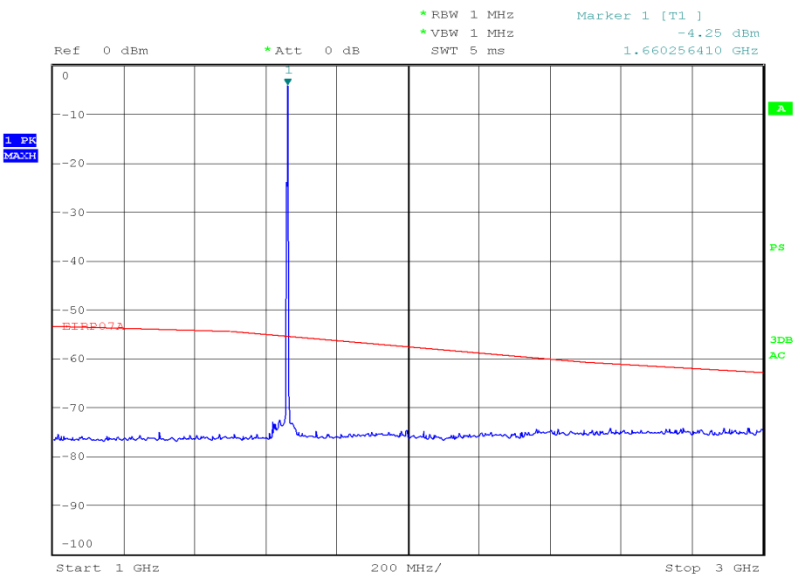
1660.475 MHz

30 MHz to 1 GHz



Date: 3.NOV.2013 07:44:22

1 GHz to 3 GHz

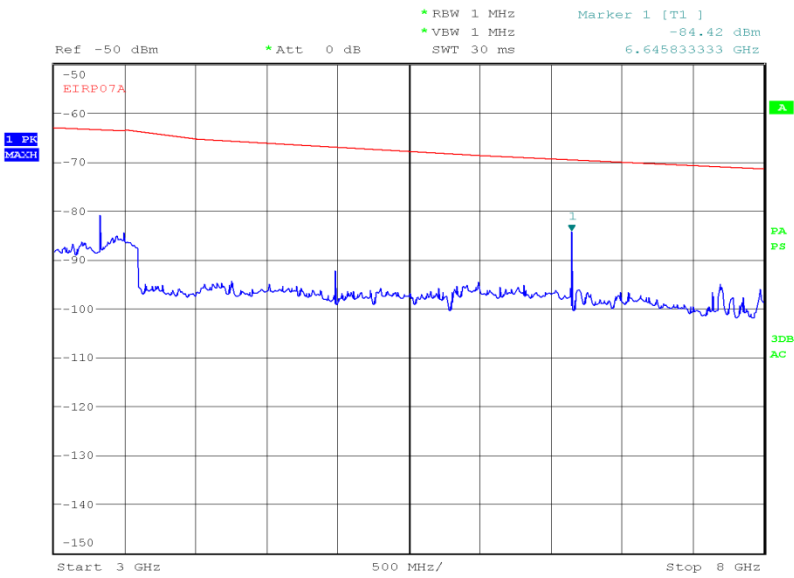


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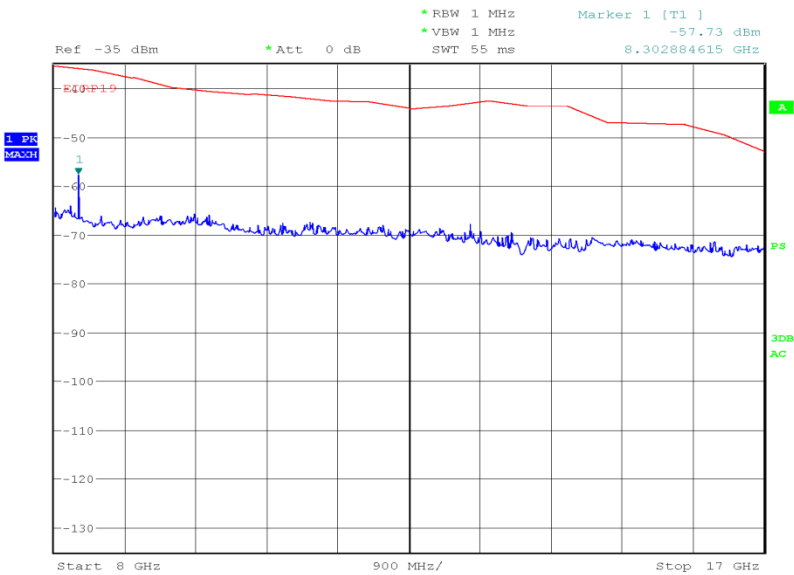
Product Service

3 GHz to 8 GHz



Date: 3.NOV.2013 11:52:05

8 GHz to 17 GHz



Date: 3.NOV.2013 12:45:33



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Limit Clause FCC CFR 47, 25.202(f) and RSS-170, 5.4.3.1

The average power of unwanted emissions shall be attenuated below the average output power, P(dBW), of the transmitter, as specified below:

- 1) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 50%, up to and including 100% of the occupied bandwidth;
- 2) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the occupied bandwidth;
- 3)  $43 + 10 \log p$  (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the occupied bandwidth.



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## **2.3 POWER LIMITS**

### **2.3.1 Specification Reference**

FCC CFR 47 Part 25, Clause 25.204  
Industry Canada RSS-170, Clause 5.3

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

IsatPhone2 S/N: IX40100471 - Modification State 0

### **2.3.3 Date of Test**

23 October 2013 & 3 November 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**

For conducted power, the EUT was connected to a spectrum analyser via a cable and 30dB attenuator. The path loss was measured and entered as a reference level offset into the instrumentation. The transmit power was measured over the whole burst due to its length being less than 100ms. The average power was measured with modulation on bottom, middle and top channels.

For radiated power, the EUT was transmitted at maximum power via a cable to the Spectrum Analyser. The Analyser settings were adjusted to display the resultant trace on screen and a resolution bandwidth and video bandwidth of 1 MHz were used to perform the measurement. The level on the spectrum analyser was maximised by rotating the EUT through 360° and a height search of the measuring antenna. A substitution was then performed using a suitable calibrated antenna and signal generator.

This level was maximised by adjusting the height of the measuring antenna once more. The level from the signal generator was then adjusted to achieve the same raw result as with the EUT. This level was then corrected to account for cable loss and antenna factor.

A calculation was then performed to obtain the final figure.

### **2.3.6 Environmental Conditions**

Ambient Temperature	20.5 - 23.9°C
Relative Humidity	34.0 - 49.6%



### 2.3.7 Test Results

3.7 V DC Supply

#### Conducted

EIRP (dBW)		
1626.675 MHz	1643.675 MHz	1660.475 MHz
3.8	3.43	3.94

#### Radiated

EIRP (dBW)		
1626.675 MHz	1643.675 MHz	1660.475 MHz
5.86	5.24	5.28

#### Limit Clause FCC CFR 47, 25.204

+40 dBW in any 4 kHz band for  $\theta \leq 0^\circ$

+40 + 3 $\theta$  dBW in any 4 kHz band for  $0^\circ < \theta \leq 5^\circ$

#### Limit Clause RSS-170, 5.3

The application for MES certification shall state the MES e.i.r.p. that is necessary for satisfactory communication. The maximum permissible e.i.r.p. will be the stated necessary e.i.r.p. plus a 2 dB margin. If a detachable antenna is used, the certification application shall state the recommended antenna type and manufacturer, the antenna gain and the maximum transmitter output power at the antenna terminal.



Product Service

## **2.4 LIMITS ON EMISSIONS FROM MOBILE EARTH STATIONS FOR PROTECTION OF AERONAUTICAL RADIONAVIGATION-SATELLITE SERVICE**

### **2.4.1 Specification Reference**

FCC CFR 47 Part 25, Clause 25.216  
Industry Canada RSS-170, Clause 5.4.3.2

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

IsatPhone2 S/N: IX40100471 - Modification State 0

### **2.4.3 Date of Test**

25 October 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 connected to a spectrum analyser via a cable and 30dB attenuator. The worst case path loss was measured and entered as a reference level offset into the spectrum analyser. The EUT was set to transmit at maximum power on bottom, middle and top channels. The spectrum analyser detector was set to Peak and trace to Max Hold (worse case) using an RBW of 1MHz.

### **2.4.6 Environmental Conditions**

Ambient Temperature	24.4°C
Relative Humidity	58.4%



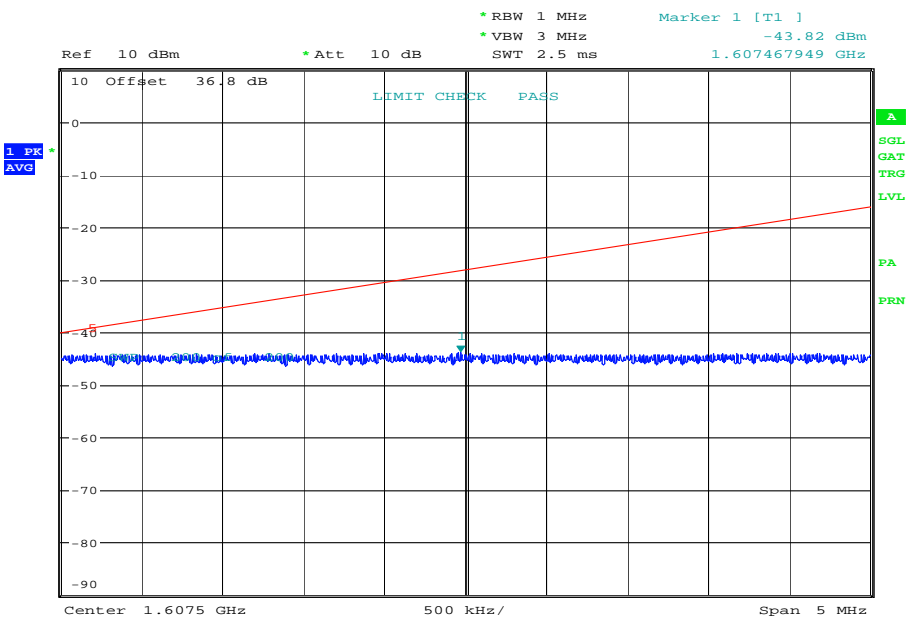
Product Service

2.4.7 Test Results

3.7 V DC Supply

EIRP Density – Broadband Emissions (dBW/MHz)		
1626.675 MHz	1643.675 MHz	1660.475 MHz
-73.82	< Limit, see plot	< Limit, see plot

1626.675 MHz

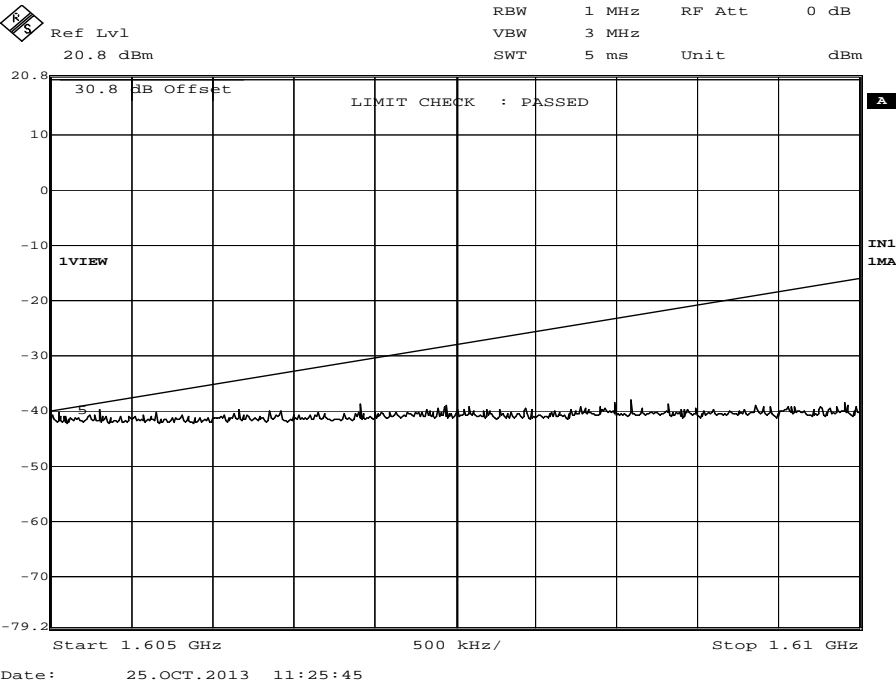


Date: 25.OCT.2013 13:33:44

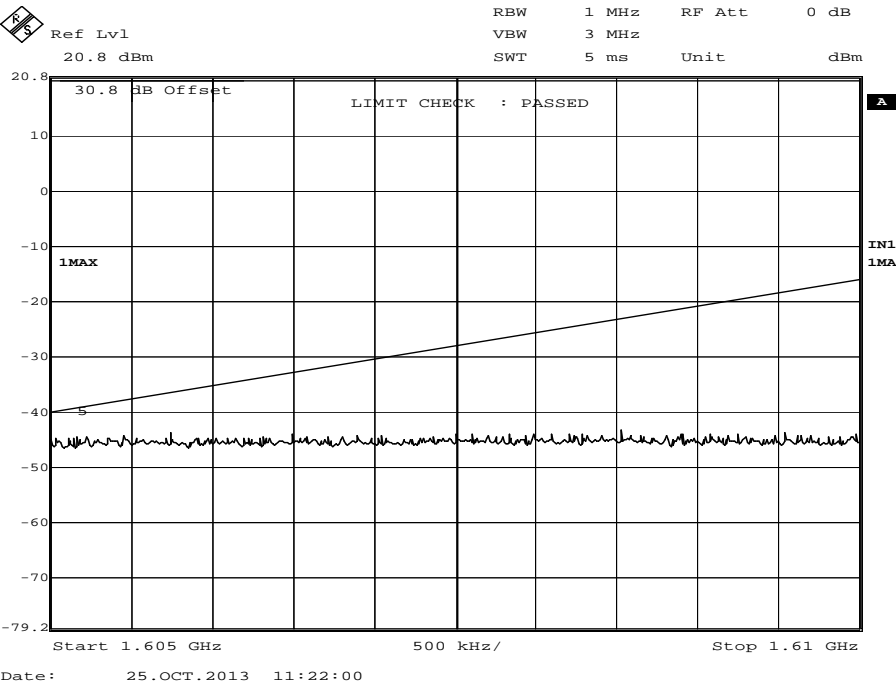


Product Service

1643.675 MHz



1660.475 MHz



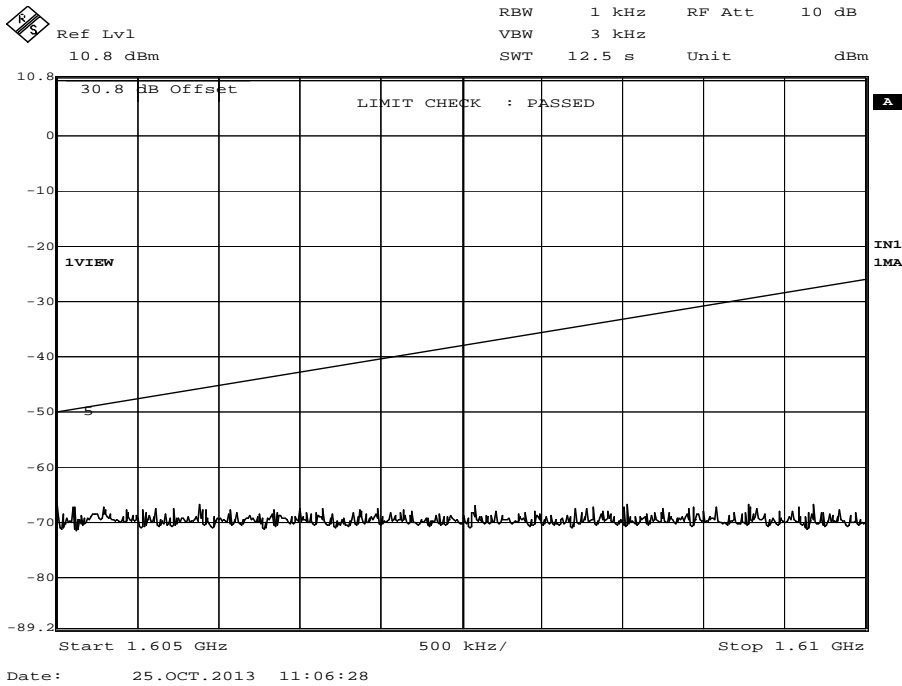




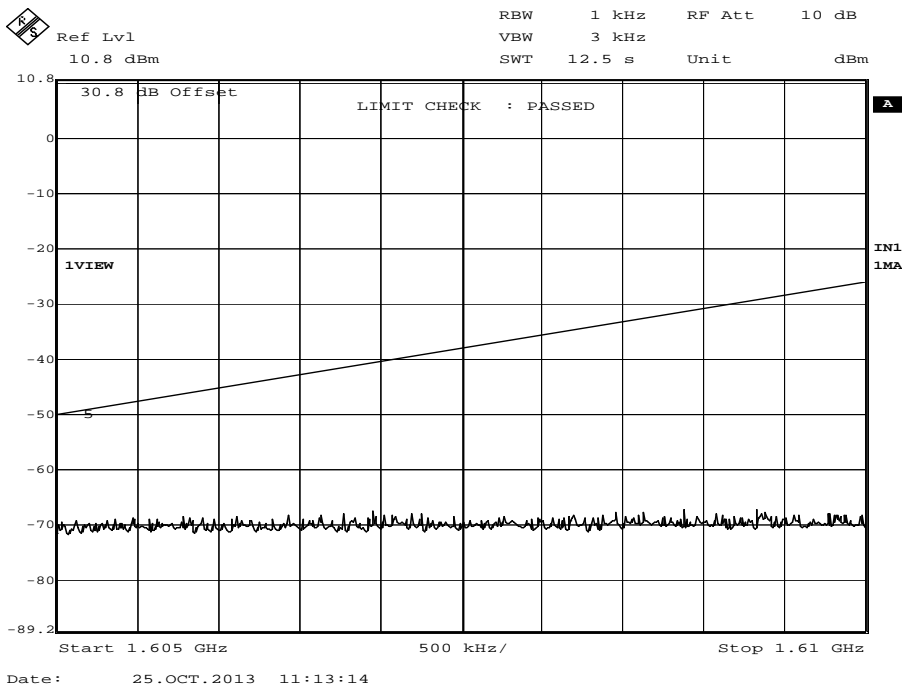
Product Service

EIRP Density – Discrete Emissions (dBW/MHz)		
1626.675 MHz	1643.675 MHz	1660.475 MHz
< Limit, see plot	< Limit, see plot	< Limit, see plot

### 1626.675 MHz



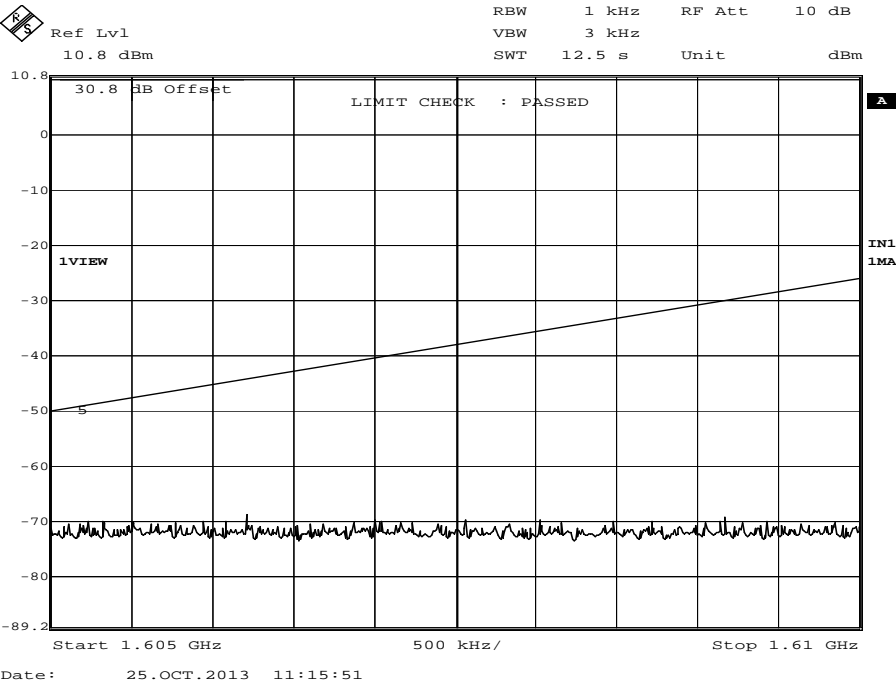
### 1643.675 MHz





Product Service

1660.475 MHz

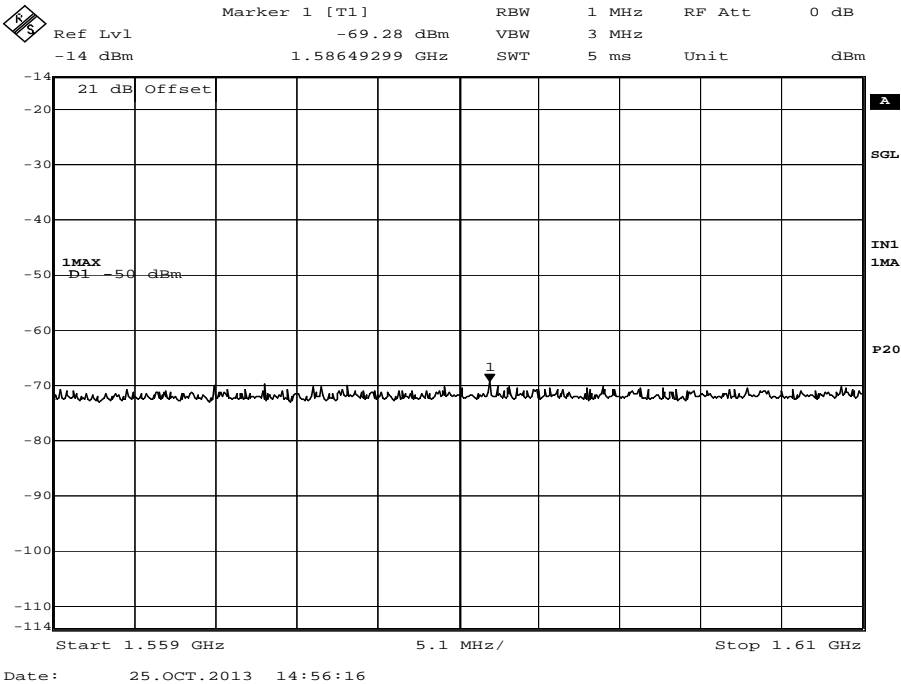




Product Service

EIRP Density- Carrier-off State Emissions (dBW/MHz)
1643.675 MHz
-99.28

1643.675 MHz



Limit Clause FCC CFR 47, 25.216 and RSS-170, 5.4.3.3

Broadband emissions: -70 dBW/MHz at 1605 MHz, linearly interpolated to -46 dBW/MHz at 1610 MHz.  
Discrete emissions -80 dBW/kHz at 1605 MHz, linearly interpolated to -56 dBW/kHz at 1610 MHz.  
Carrier-off state emissions: -80 dBW/MHz



Product Service

## **2.5 MODULATION CHARACTERISTICS**

### **2.5.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1047(d)

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

IsatPhone2 S/N: IX40100471 - Modification State 0

### **2.5.3 Date of Test**

24 October 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 following plots show a representation of the Modulation Characteristics of the Inmarsat signal as measured from the EUT. The test was performed on the middle channel and the plots show duty cycle, on time and modulation accuracy of the signal.

### **2.5.6 Environmental Conditions**

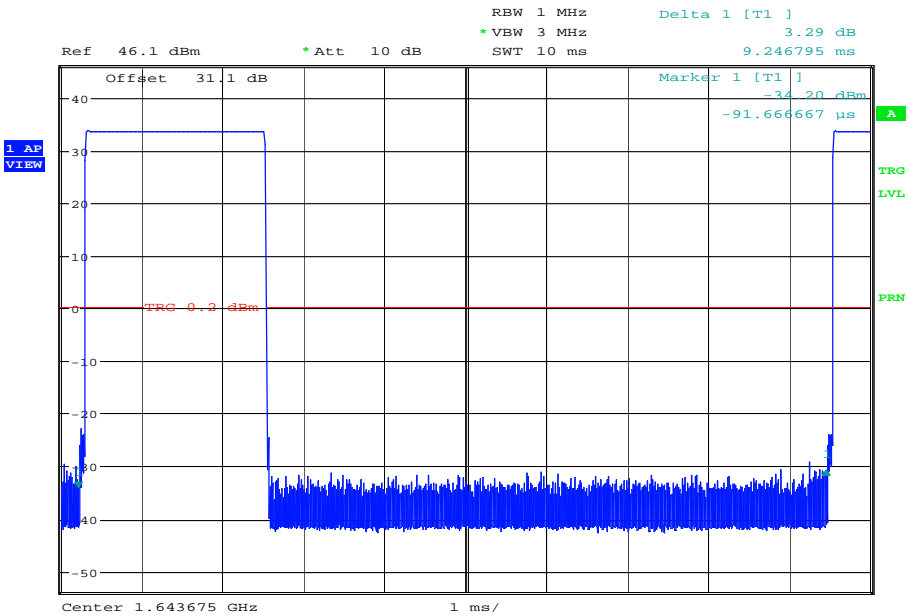
Ambient Temperature	23.2°C
Relative Humidity	51.9%



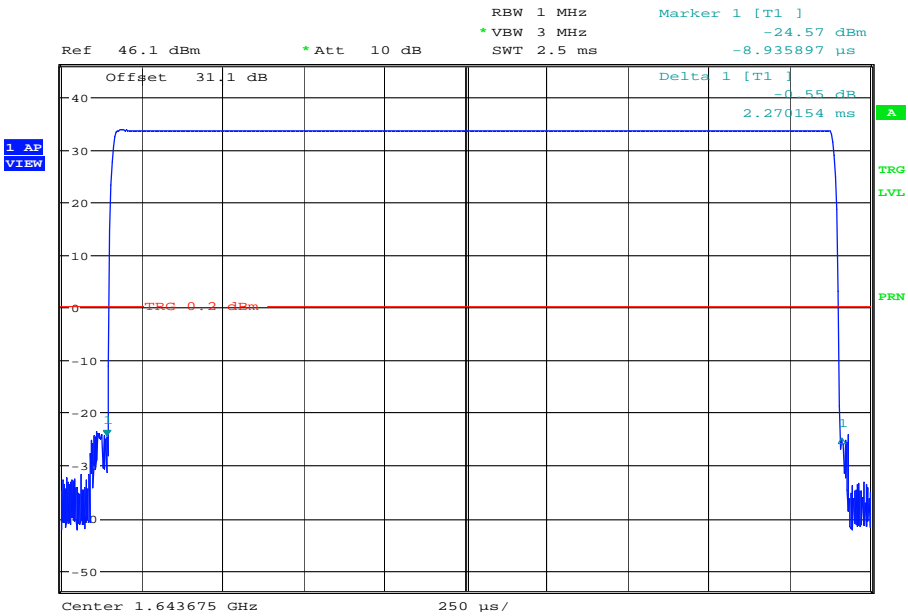
Product Service

2.5.7 Test Results

1643.675 MHz



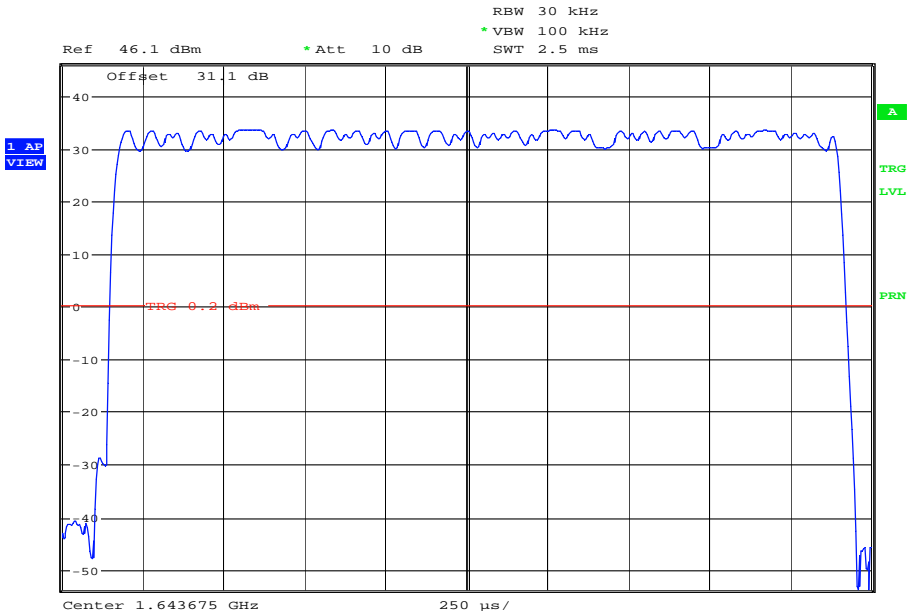
Date: 24.OCT.2013 12:49:41



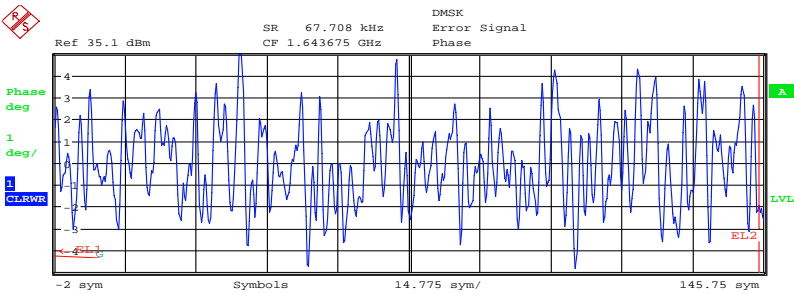
Date: 24.OCT.2013 12:45:37



Product Service



Date: 24.OCT.2013 12:58:01



FILT Ref 35.1 dBm SR 67.708 kHz DMSK Sym&Mod Acc

CF 1.643675 GHz

MODULATION ACCURACY (AVERAGE)										
G	Current Sweep			Statistic Count 100 of 100 (std AVG)						
	Result	Peak	atSym	RMS	AVG	StdDev	95pctl	Total Pk	Unit	
EVM	3.345	9.340	37	3.149	2.775	1.489	5.575	13.407	%	
Magnitude Err	1.696	2.878	1	1.473	1.256	0.770		3.992	%	
Phase Error	1.82	6.17	36	1.77	0.00	1.77		-7.86	deg	
CarrierFreq Err	264.87			262.69	262.68	2.30		265.74	Hz	
Ampt Droop	-0.07			-0.07	-0.07	-43.20			dB	
Origin Offset	-32.09			-33.54	-33.58	-53.89			dB	
Gain Imbalance	-0.03			0.00	0.00	-42.51			dB	
Quadrature Err	0.68			0.56	0.04	0.56			deg	
RHO	0.998881			0.999009	0.999009	0.000097				
Mean Power	33.85	34.10	1	33.84	33.84	-2.52		34.28	dBm	
SNR (MER)	29.51			30.08	30.07	3.74			dB	

Date: 28.OCT.2013 09:03:58



Product Service

## **2.6 OCCUPIED BANDWIDTH**

### **2.6.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1049

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

IsatPhone2 S/N: IX40100471 - Modification State 0

### **2.6.3 Date of Test**

23 October 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 transmitting at maximum power, with modulation. Using a resolution bandwidth of 3 kHz and a video bandwidth of 10 kHz, the 99% Occupied Bandwidth was measured.

The plot of the following pages shows the resultant display from the Spectrum Analyser.

### **2.6.6 Environmental Conditions**

Ambient Temperature	23.9°C
Relative Humidity	49.6%



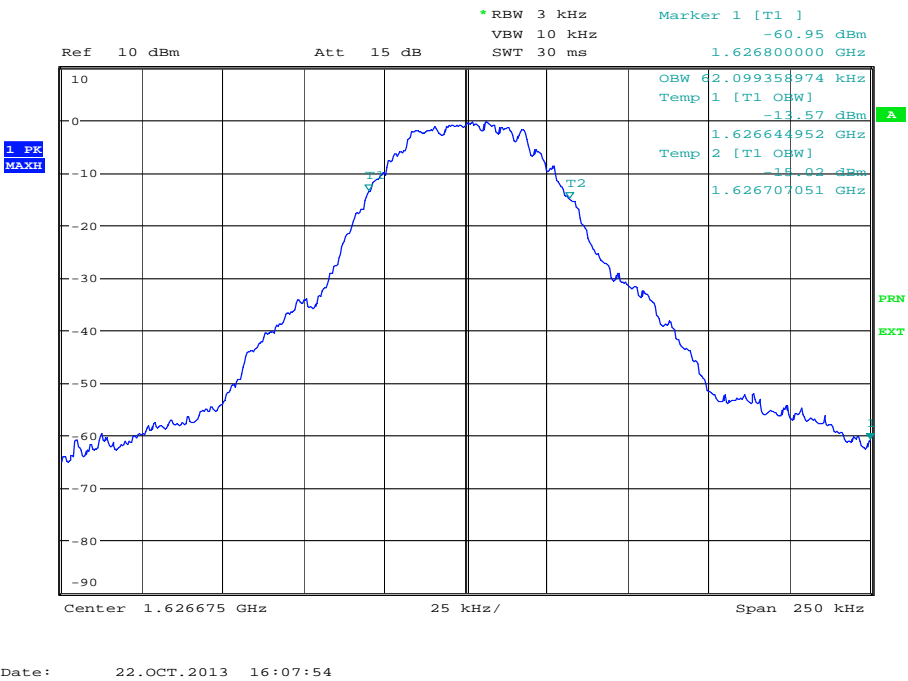
Product Service

2.6.7 Test Results

3.7 V DC

Frequency (MHz)	Occupied Bandwidth (kHz)
1626.675 MHz	62.0994
1643.675 MHz	61.6987
1660.475 MHz	61.6987

1626.675 MHz

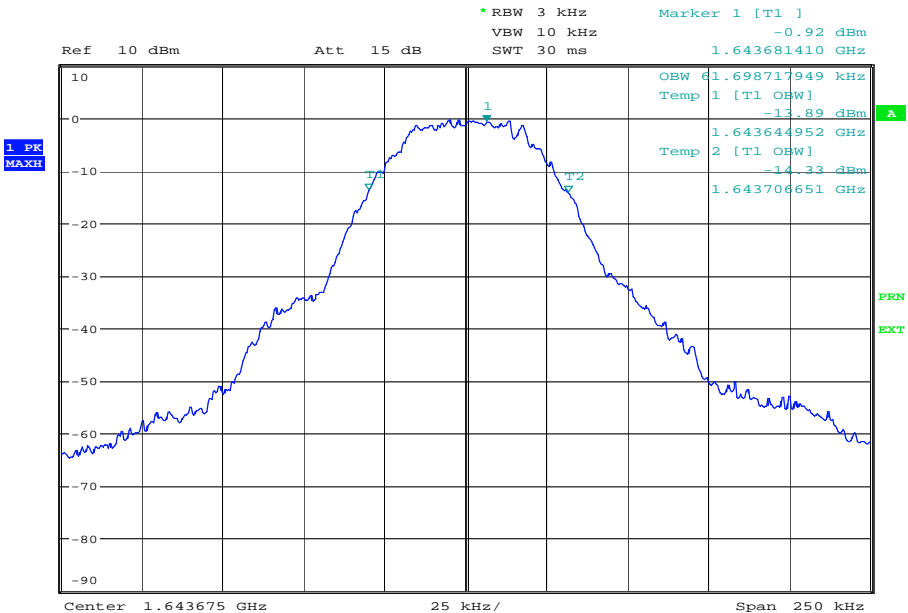






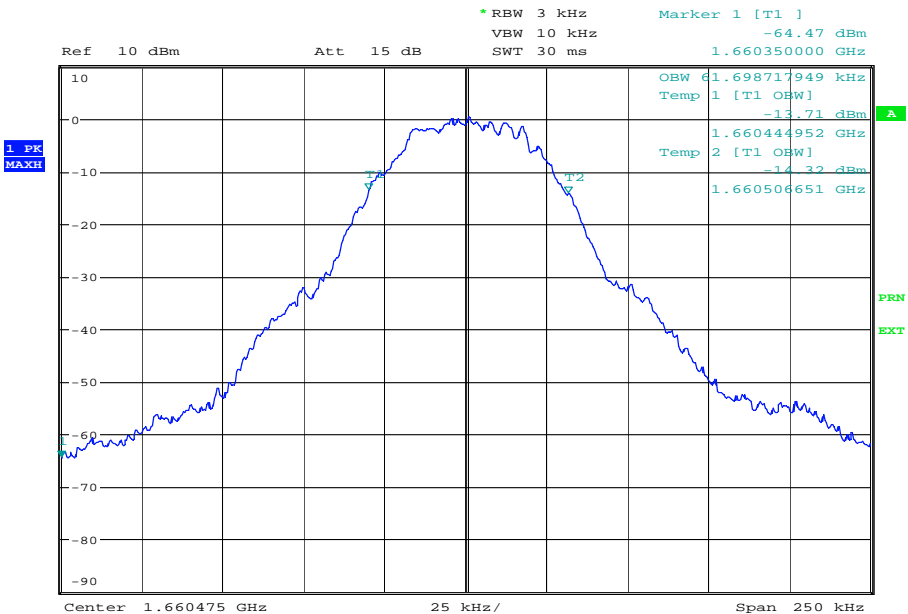
Product Service

1643.675 MHz



Date: 22.OCT.2013 15:46:14

1660.475 MHz



Date: 22.OCT.2013 15:56:42

Limit

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.



Product Service

### **SECTION 3**

#### **TEST EQUIPMENT USED**



### 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
<b>Section 2.1 – Frequency Tolerance</b>					
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	27-Jun-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSQ26	3545	12	4-Jul-2014
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	12-Sep-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013
<b>Section 2.2 - Emission Limitations</b>					
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	3-Apr-2014
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	9-Nov-2013
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Jan-2014
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	27-Jun-2014
Filter (High Pass)	Lorch	SHP7-7000-SR	566	12	20-Feb-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Crystal Detector	Hewlett Packard	8470B	1320	12	3-Jun-2014
Pre-Amplifier	Phase One	PS04-0086	1533	12	O/P MON
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	10-Dec-2013
Filter (Hi Pass)	Lorch	9HP7-7000-SR	2833	12	1-Feb-2014
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	12-Sep-2014
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	10-Sep-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013
Function Generator	Thurlby Thandar Instruments	TG 315	3240	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	1-Feb-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



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
<b>Section 2.3 - Power Limits</b>					
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	3-Apr-2014
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	9-Nov-2013
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	27-Jun-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	10-Dec-2013
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	12-Sep-2014
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	10-Sep-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Oct-2014
Tilt Antenna Mast	matur GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	matur GmbH	NCD	3917	-	TU
P-Series Power Meter	Agilent Technologies	N1911A	3980	12	18-Sep-2014
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3982	12	18-Sep-2014
<b>Section 2.4 - Emission Limitations for Cellular Equipment</b>					
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Test Receiver	Rohde & Schwarz	ESIB26	242	12	10-May-2014
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	27-Jun-2014
Broadband Resistive Power Divider	Weinschel	1506A	605	12	11-Oct-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	12-Sep-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013
<b>Section 2.5 - Modulation Characteristics</b>					
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	27-Jun-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	10-Dec-2013
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	12-Sep-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	4-Jul-2014
<b>Section 2.6 - Occupied Bandwidth</b>					
Multimeter	White Gold	WG022	190	12	28-Oct-2014
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	27-Jun-2014
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	24-Jan-2014
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	10-Dec-2013
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	12-Sep-2014
Hygrometer	Rotronic	I-1000	3220	12	16-Jul-2014
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	11-Dec-2013

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



### 3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Power Limits	Conducted: $\pm 0.70$ dB Radiated: $\pm 6.3$ dB
Emission Limitations	Conducted: $\pm 3.08$ dB Radiated: 30 MHz to 1 GHz: $\pm 5.1$ dB 1 GHz to 17 GHz: $\pm 6.3$ dB
Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radionavigation-Satellite Service	$\pm 3.08$ dB
Frequency Tolerance	$\pm 3.54$ Hz
Occupied Bandwidth	$\pm 16.74$ kHz
Modulation Characteristics	-



Product Service

## **SECTION 4**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



Product Service

#### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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