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Report On

FCC Testing of the
ip.access Ltd 239B E16 3G Enterprise Access Point (Bands 2 & 5)
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 24

COMMERCIAL-IN-CONFIDENCE

FCC ID: QGGIPA239B

Document 75918441 Report 03 Issue 1

July 2012



Product Service

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COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC Testing of the
ip.access Ltd 239B E16 3G Enterprise Access Point (Bands 2 & 5)
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Document 75918441 Report 03 Issue 1

July 2012

PREPARED FOR

ip.access Ltd
Building 2020
Cambourne Business Park
Cambourne
Cambridge
CB23 6DW

PREPARED BY

Natalie Bennett
Senior Administrator (Technical)

APPROVED BY

Ryan Henley
Authorised Signatory

DATED

14 August 2012

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 and FCC CFR 47 Part 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler





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SECTION 1

REPORT SUMMARY

FCC Testing of the
ip.access Ltd 239B E16 3G Enterprise Access Point (Bands 2 & 5)
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 24



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the ip.access Ltd 239B E16 3G Enterprise Access Point (Bands 2 & 5) to the requirements of FCC CFR 47 Part 2 and FCC CFR 47 Part 24.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	ip.access Ltd
Model Number(s)	239B
Serial Number(s)	000295-0000105698
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2 (2011) FCC CFR 47 Part 24 (2011)
Incoming Release Date	Application Form 27 June 2012
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	PO30803 06 July 2012
Start of Test	15 July 2012
Finish of Test	30 July 2012
Name of Engineer(s)	G Lawler
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 and FCC CFR 47 Part 24 is shown below.

Section	Spec Clause		Test Description	Result	Comments/Base Standard
	Pt 2	Pt 24			
Transmit - with Microsemi POE Inserter					
2.3	-	24.232(c)	Effective Isotropic Radiated Power	Pass	
2.6	2.1051	24.238	Emission for Broadband PCS Equipment	Pass	
Transmit - with Phihong POE Inserter					
2.3	-	24.232(c)	Effective Isotropic Radiated Power	Pass	
2.6	2.1051	24.238	Emission for Broadband PCS Equipment	Pass	
Transmit - with 12V AC/DC Adapter					
2.1	2.1055	24.135(a)	Frequency Stability	Pass	
2.2	2.1051	24.229	Spurious Emissions at Band Edge	Pass	
2.3	-	24.232(c)	Effective Isotropic Radiated Power	Pass	
2.4	2.1046	24.232	Maximum Peak Output Power - Conducted	Pass	
2.5	2.1047(d)	-	Modulation Characteristics	-	Customer Declaration
2.6	2.1051	24.238	Emission for Broadband PCS Equipment	Pass	
2.7	2.1051	24.238(a)	Conducted Spurious Emissions	Pass	
2.8	2.1049	24.238(b)	Occupied Bandwidth	Pass	



1.3 APPLICATION FORM

APPLICANT'S DETAILS			
COMPANY NAME :	IP Access Ltd		
ADDRESS :	Building 2020 Cambourne Business Park Cambourne Cambridge CB23 6DW		
NAME FOR CONTACT PURPOSES :	Costa Panayi		
TELEPHONE NO: 01954 713721	FAX NO: 01954 713799	E-MAIL: costa.panayi@ipaccess.com	

EQUIPMENT INFORMATION			
Model name/number	E16 Enterprise Access Point	Identification/Part number	nano3G 239B (Bands 2 & 5)
Hardware Version	XA	Software Version	573.1
Manufacturer	IP Access Ltd	Country of Origin	UK
FCC ID	QGGIPA239B	Industry Canada ID	N/A
Technical description (a brief description of the intended use and operation):			
The 239B E16 Access Point is a 16 user 3G Basestation operating in Bands 2 & 5 for the US market.			
<u>Supply Voltage:</u>			
<input checked="" type="checkbox"/> AC mains	State AC voltage	110 V	and AC frequency 60 Hz
<input checked="" type="checkbox"/> POE DC (external)	State DC voltage	48 V	and DC current 0.25 A
<input type="checkbox"/> DC (internal)	State DC voltage V	and Battery type
<u>Frequency characteristics:</u>			
Transmitter Frequency range	869 MHz to 894 MHz	Channel spacing	200 kHz
	1930 MHz to 1990 MHz		(if channelized)
Receiver Frequency range	824 MHz to 849 MHz	Channel spacing	200 kHz
(if different)	1850 MHz to 1910 MHz		(if channelized)
Designated test frequencies:			
Bottom: 871.4 MHz	Middle: 881.6 MHz	Top: 891.6 MHz	
Bottom: 1932.4 MHz	Middle: 1960.0 MHz	Top: 1987.6 MHz	
Intermediate Frequencies : N/A			
Highest Internally Generated Frequency : 700 MHz			
<u>Power characteristics:</u>			
Maximum transmitter power	0.25 W (Band 2)	Minimum transmitter power	N/A
	0.02 W (Band 5)	(if variable)	
<input checked="" type="checkbox"/> Continuous transmission	State duty cycle		
<input type="checkbox"/> Intermittent transmission	If intermittent, can transmitter be set to continuous transmit test mode? Y/N		
<u>Antenna characteristics:</u>			
<input type="checkbox"/> Antenna connector	State impedance ohm		
<input type="checkbox"/> Temporary antenna connector	State impedance ohm		
<input checked="" type="checkbox"/> Integral antenna	State gain 0 dBi		
<u>Modulation characteristics:</u>			
<input checked="" type="checkbox"/> Amplitude	<input type="checkbox"/> Other		
<input type="checkbox"/> Frequency	Details:		
<input checked="" type="checkbox"/> Phase			
Can the transmitter operate un-modulated? No			
ITU Class of emission: 5M00D1W			
<u>Battery/Power Supply</u>			
Model name/number	POE Power Supply	Identification/Part number	POE36U-1AT-R
Manufacturer	Phihong	Country of Origin	Taiwan
Model name/number	POE Single Port Midspan	Identification/Part number	PD-9001GR
Manufacturer	PowerDsine	Country of Origin	China
Model name/number	12VDC Power Adapter	Identification/Part number	PSC30R-120
Manufacturer	Phihong	Country of Origin	Taiwan
<u>Extreme conditions:</u>			
Maximum temperature	45 °C	Minimum temperature	0 °C
Maximum supply voltage V	Minimum supply voltage V



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

Signature : Held on file at TÜV SÜD Product Service Ltd

Name : Costa Panayi

Position held : Product Design and Development Engineer

Date : 27th June 2012

TÜV Product Service Ltd formally certifies that the manufacturer's declaration as typed out in this report, is a true and accurate record of the original received from the applicant.



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a ip.access Ltd 239B E16 3G Enterprise Access Point (Bands 2 & 5). 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

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 Testing of the
ip.access Ltd 239B E16 3G Enterprise Access Point (Bands 2 & 5)
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 24



Product Service

2.1 FREQUENCY STABILITY

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 24, Clause 24.135(a)

2.1.2 Equipment Under Test and Modification State

239B S/N: 000295-0000105698 - Modification State 0

2.1.3 Date of Test

29 July 2012 & 30 July 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 set to transmit on maximum power with WCDMA modulation. A CMU 300 Signal Analyser, was used to measure the frequency error. The maximum result was taken over 200 bursts. The temperature was adjusted between -30°C and +50°C in 10° steps as per 2.1055.

2.1.6 Environmental Conditions

Ambient Temperature	21.0 - 25.3°C
Relative Humidity	46.0 - 51.0%



2.1.7 Test Results

Transmit - with 12V AC/DC Adapter

12V DC Supply

Under Temperature Variations

1960.0 MHz

Temperature Interval (°C)	Mode	Deviation (ppm)
-30	WCDMA	0.0418
-20	WCDMA	0.0372
-10	WCDMA	0.0352
0	WCDMA	0.0301
+10	WCDMA	0.0270
+20	WCDMA	0.0214
+30	WCDMA	0.0184
+40	WCDMA	0.0158
+50	WCDMA	0.0128

Limit Clause

The frequency stability of the transmitter shall be maintained within $\pm 0.0001\%$ (± 1 ppm).

Under Voltage Variations

1960.0 MHz

DC Voltage (V)	Mode	Deviation (ppm)
12V DC via 110V AC	WCDMA	0.0408
12V DC via 93.5V AC	WCDMA	0.0431
12V DC via 126.5V AC	WCDMA	0.0397

Limit Clause

The frequency stability of the transmitter shall be maintained within $\pm 0.0001\%$ (± 1 ppm).



Product Service

2.2 SPURIOUS EMISSIONS AT BAND EDGE

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 24, Clause 24.229

2.2.2 Equipment Under Test and Modification State

239B S/N: 000295-0000105698 - Modification State 0

2.2.3 Date of Test

23 July 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

In accordance with 24.238, any emissions outside of the block edges shall be attenuated by at least $43 + 10 \log (P)$. The measurements are shown to ± 1 MHz from the block edges. The plots shown under the Spurious Emissions sections covers the required range of 9 kHz to 20 GHz.

The reference power and path losses of all channels used for testing in each frequency block were measured. Having entered the reference level offset, a limit line was displayed, showing the $-13 \text{ dBm} (43 + 10 \log (P))$, limit.

2.2.6 Environmental Conditions

Ambient Temperature	26.6°C
Relative Humidity	30.4%



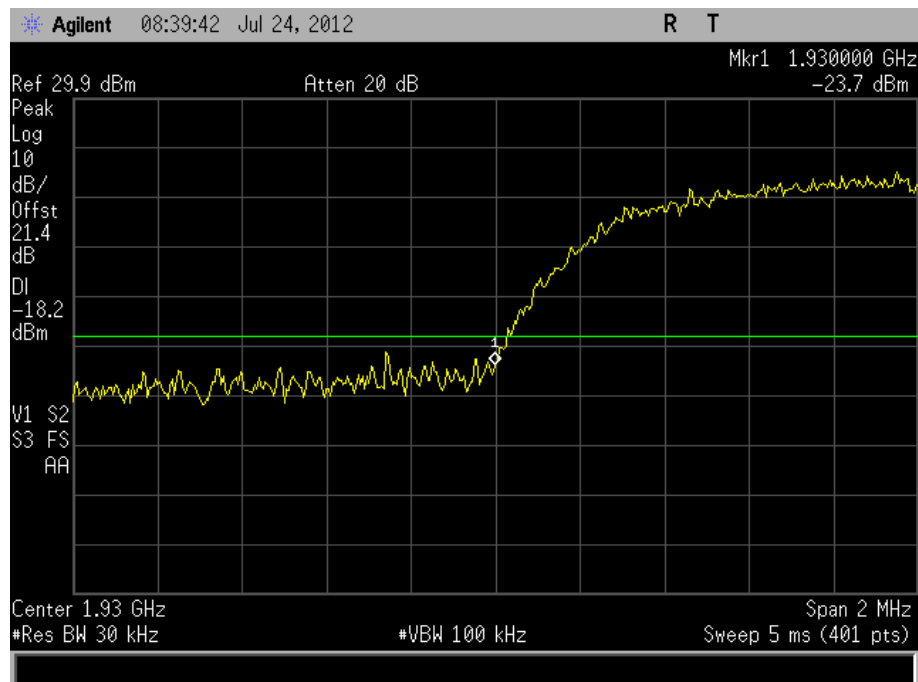
2.2.7 Test Results

Transmit - with 12V AC/DC Adapter

12V DC Supply

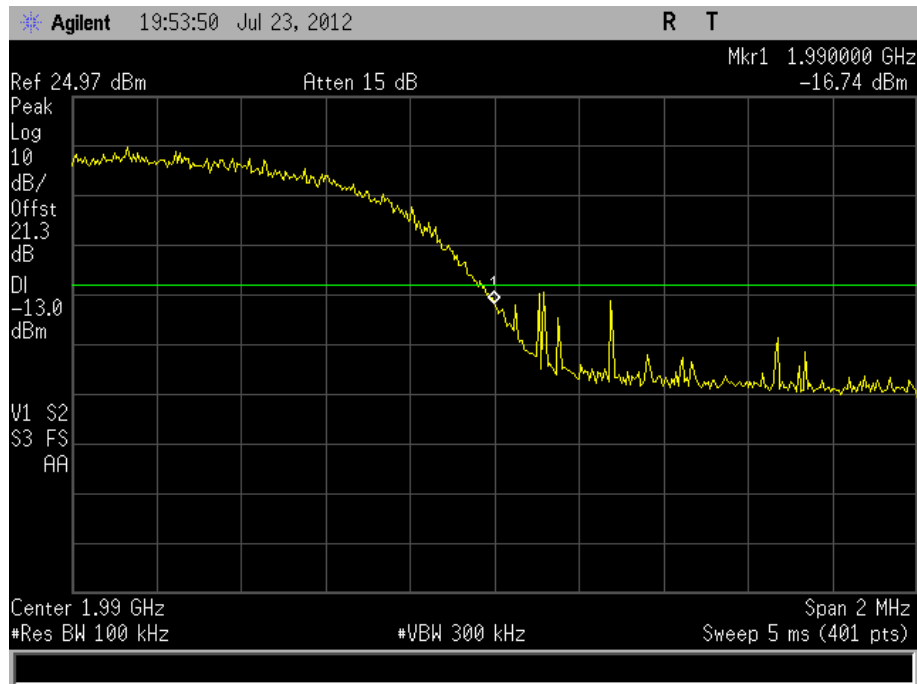
Frequency Block (MHz)	Mode	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A : (1930.0 – 1945.0)	WCDMA	Channel : 9662 Frequency : 1932.4 MHz	N/A
B : (1975.0 – 1990.0)	WCDMA	N/A	Channel : 9938 Frequency : 1987.6 MHz

Frequency Block A





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Frequency Block BLimit Clause

-13 dBm at block edge.



2.3 EFFECTIVE ISOTROPIC RADIATED POWER

2.3.1 Specification Reference

FCC CFR 47 Part 24, Clause 24.232(c)

2.3.2 Equipment Under Test and Modification State

239B S/N: 000295-0000105698 - Modification State 0

2.3.3 Date of Test

15 July 2012, 16 July 2012 & 30 July 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

Measurements of the fundamental from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The fundamental frequency was maximised by adjusting the antenna height, antenna polarisation and turntable azimuth. A peak detector was used with the trace set to max hold. The maximum result was recorded.

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 (ERP) 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	21.0 - 26.0°C
Relative Humidity	38.8 - 54.0%



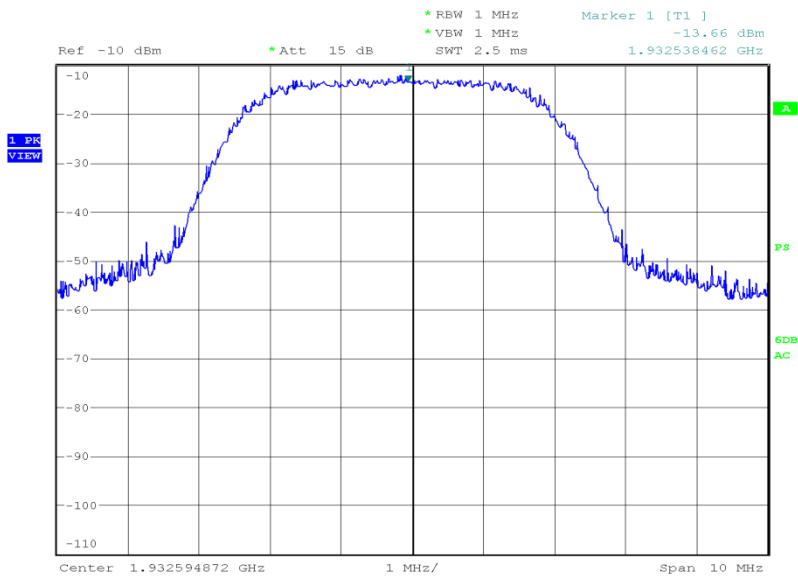
Product Service

2.3.7 Test Results

Transmit - with 12V AC/DC Adapter

1932.4 MHz

Result (dBm)	Result (W)
34.41	2.761



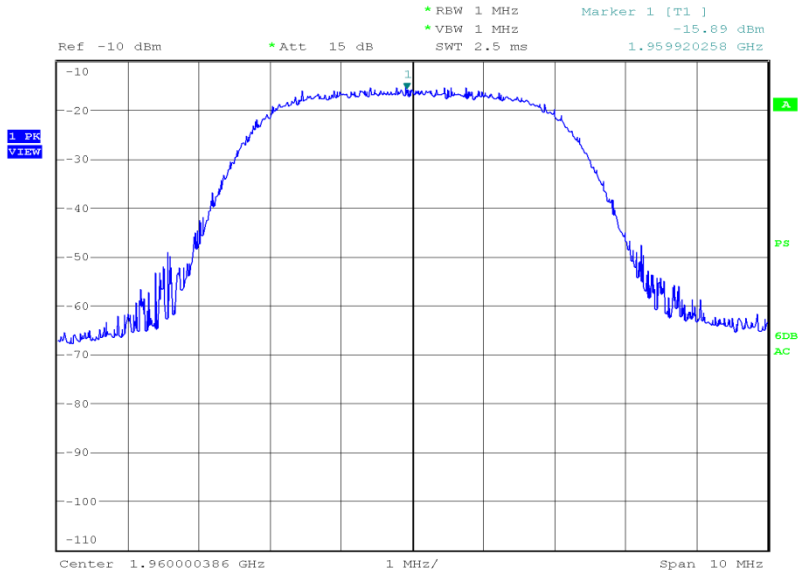
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Product Service

1960.0 MHz

Result (dBm)	Result (W)
30.98	1.253



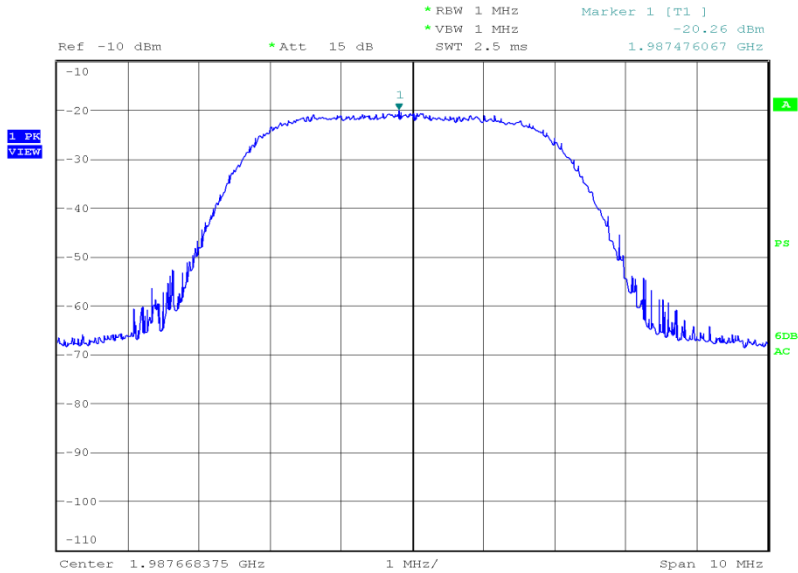
Date: 14.JUL.2012 18:05:55



Product Service

1987.6 MHz

Result (dBm)	Result (W)
26.18	0.420



Date: 14.JUL.2012 18:18:34

EUT shows a Pass for EIRP but disagrees with the application form.

Limit Clause

Mobile – 7 W or 38.45 dBm
Base Stations – 500 W or 57 dBm

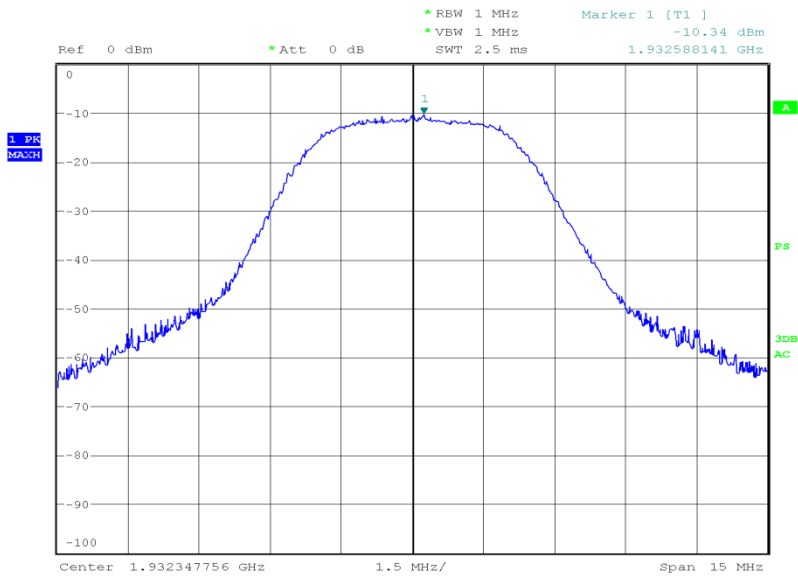


Product Service

Transmit - with Microsemi POE Inserter

1932.4 MHz

Result (dBm)	Result (W)
36.06	4.036



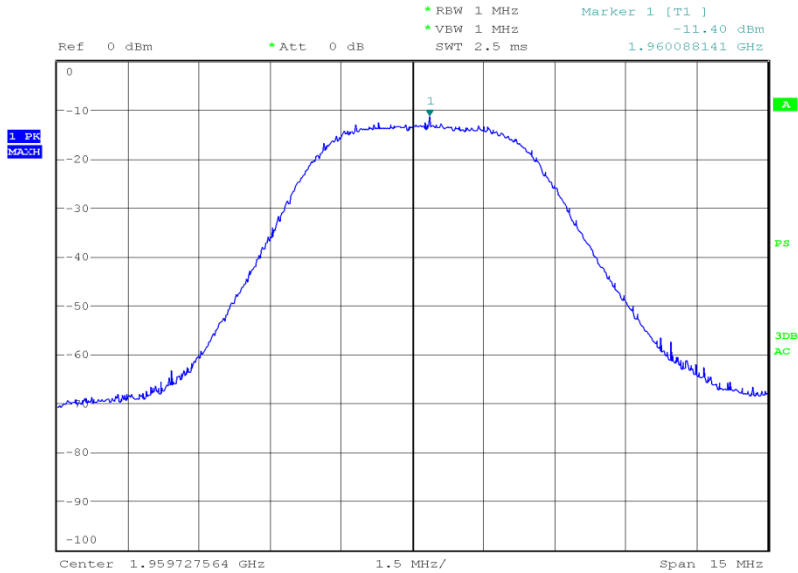
Date: 16.JUL.2012 19:25:00



Product Service

1960.0 MHz

Result (dBm)	Result (W)
34.97	3.141



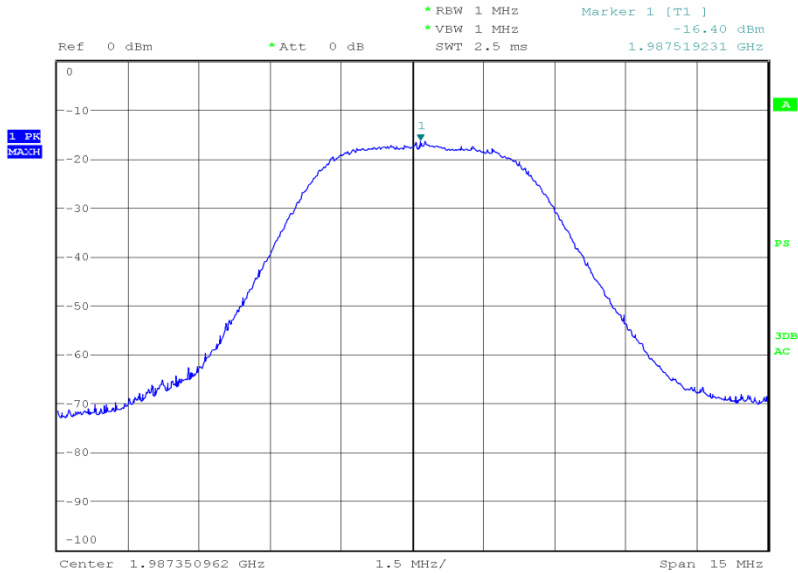
Date: 16.JUL.2012 19:41:26



Product Service

1987.6 MHz

Result (dBm)	Result (W)
29.48	0.887



Date: 16.JUL.2012 20:08:40

Limit Clause

Mobile – 7 W or 38.45 dBm
Base Stations – 500 W or 57 dBm

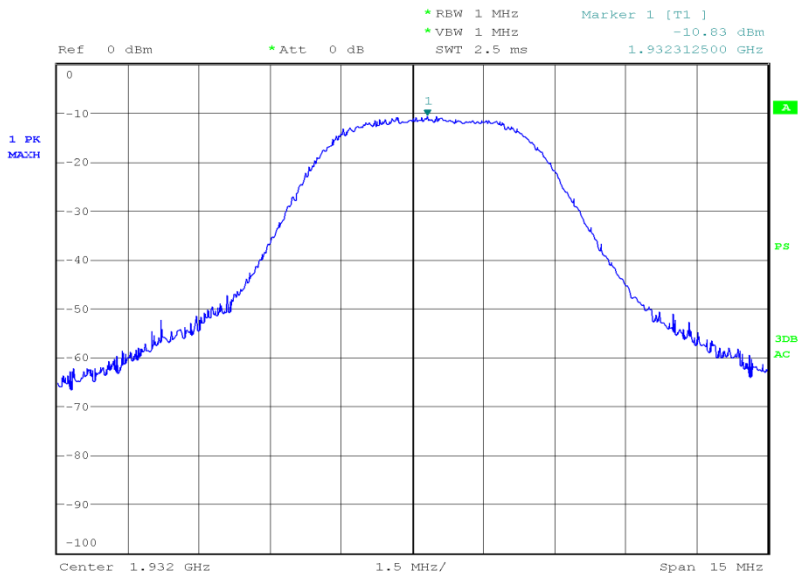


Product Service

Transmit - with Phihong POE Inserter

1932.4 MHz

Result (dBm)	Result (W)
35.57	3.606



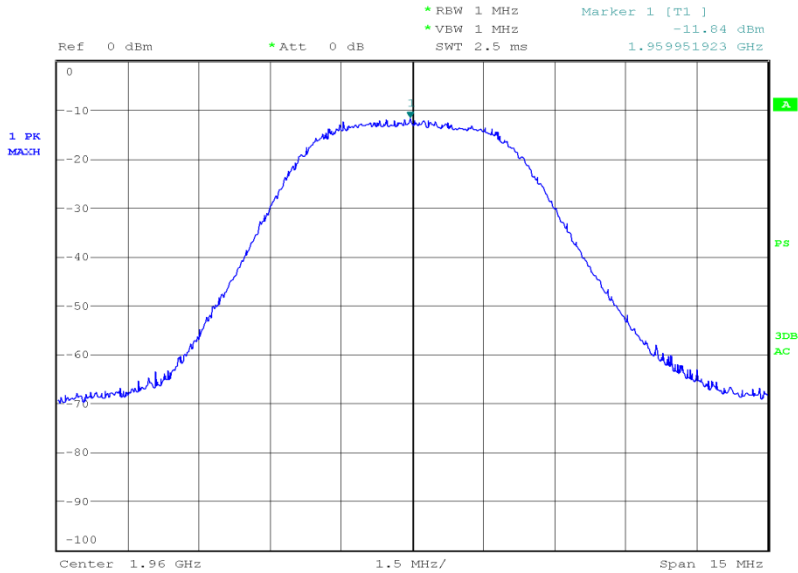
Date: 16.JUL.2012 22:56:28



Product Service

1960.0 MHz

Result (dBm)	Result (W)
34.53	2.838



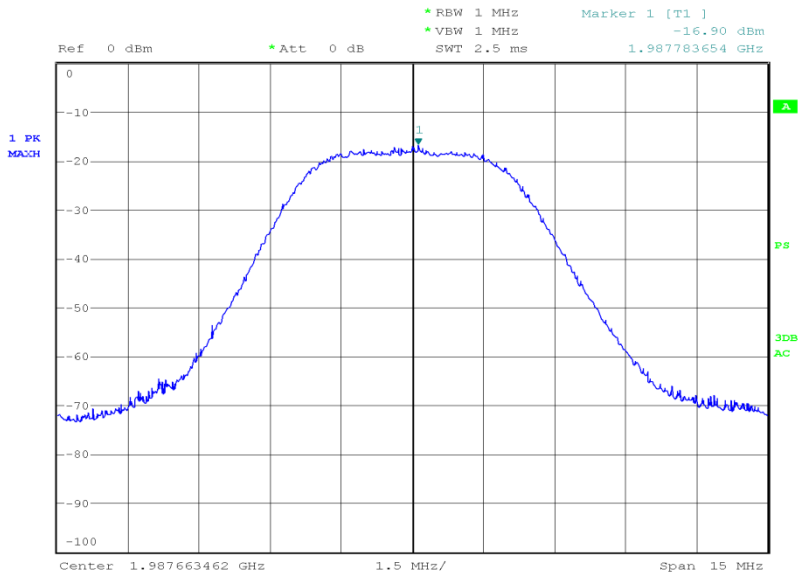
Date: 16.JUL.2012 22:57:52



Product Service

1987.6 MHz

Result (dBm)	Result (W)
28.98	0.791



Date: 16.JUL.2012 23:02:21

Limit Clause

Mobile – 7 W or 38.45 dBm
Base Stations – 500 W or 57 dBm



Product Service

2.4 MODULATION CHARACTERISTICS

2.4.1 Specification Reference

FCC CFR 47 Part 2 and FCC CFR 47 Part 24, Clause 2.1047(d)

2.4.2 Equipment Under Test

239B

2.4.3 Test Results

Transmit - with 12V AC/DC Adapter

Customer Description

As shown in the Application Form in Section 1.3, the modulation type used is Spread Spectrum WCDMA.



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Limit Clause

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.



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2.5 MAXIMUM PEAK OUTPUT POWER - CONDUCTED**2.5.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 24, Clause 24.232

2.5.2 Equipment Under Test and Modification State

239B S/N: 000295-0000105698 - Modification State 0

2.5.3 Date of Test

30 July 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

Using a spectrum analyser and attenuator(s), the output power of the EUT was measured at the antenna terminals.

The EUT supports WCDMA and was tested in this mode of operation.

The spectrum analyser RBW and VBW were set to 1 MHz and the path loss measured and entered as a reference offset level.

2.5.6 Environmental Conditions

Ambient Temperature	26.0°C
Relative Humidity	38.8%



Product Service

2.5.7 Test ResultsTransmit - with 12V AC/DC Adapter

12V DC Supply

1932.4 MHz

Mode	Result (dBm)	Result (W)
WCDMA	33.05	2.02

1960.0 MHz

Mode	Result (dBm)	Result (W)
WCDMA	32.41	1.74

1987.6 MHz

Mode	Result (dBm)	Result (W)
WCDMA	32.29	1.69

Limit Clause

Mobile – 7 W or 38.45 dBm

Base Stations – 500 W or 57 dBm



2.6 EMISSION FOR BROADBAND PCS EQUIPMENT

2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 24, Clause 24.238

2.6.2 Equipment Under Test and Modification State

239B S/N: 000295-0000105698 - Modification State 0

2.6.3 Date of Test

15 July 2012, 16 July 2012 & 17 July 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

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 full power on WCDMA modulation. The EUT was tested on bottom, middle and top channels at maximum power.

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.

2.6.6 Environmental Conditions

Ambient Temperature	20.4 - 22.1°C
Relative Humidity	48.0 - 63.0%

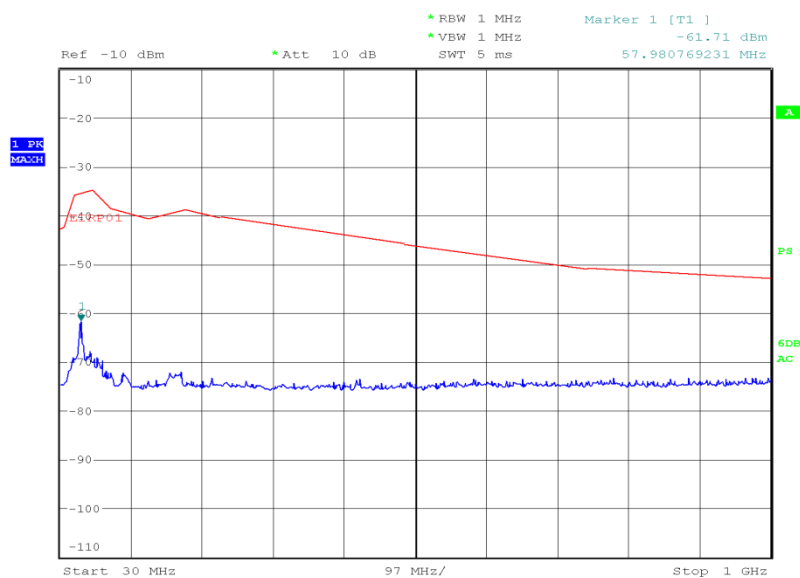


2.6.7 Test Results

Transmit - with 12V AC/DC Adapter

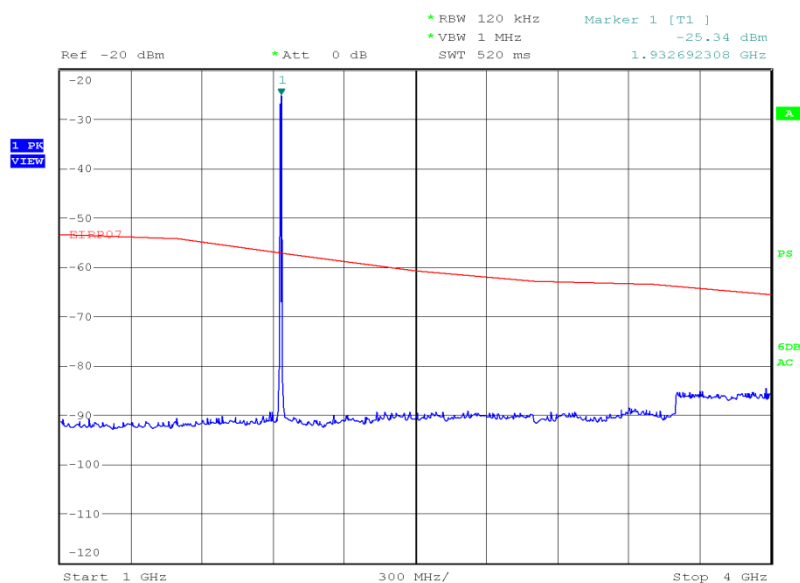
1932.4 MHz

30 MHz to 1 GHz



Date: 14.JUL.2012 13:18:29

1 GHz to 4 GHz

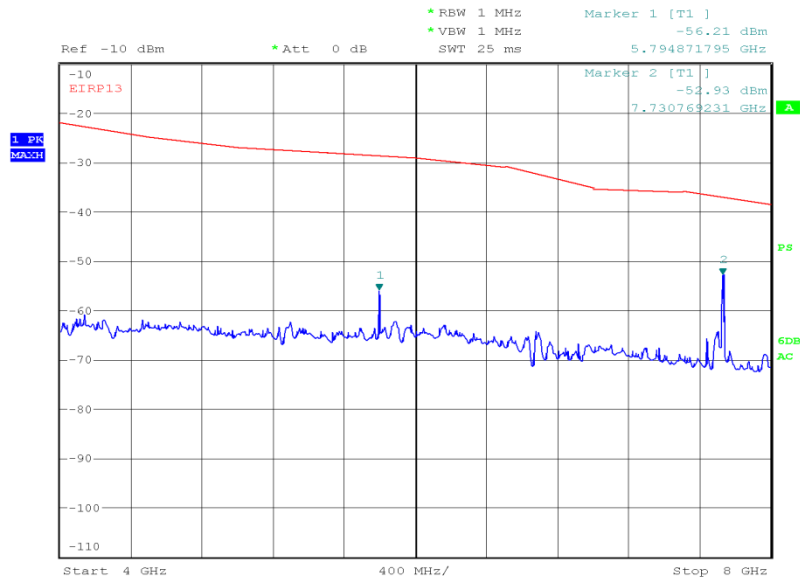


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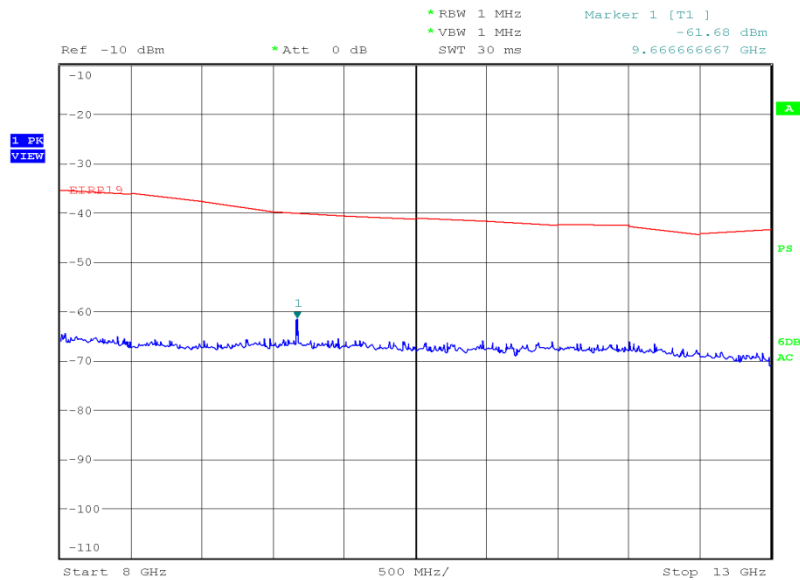
Product Service

4 GHz to 8 GHz



Date: 15.JUL.2012 10:36:53

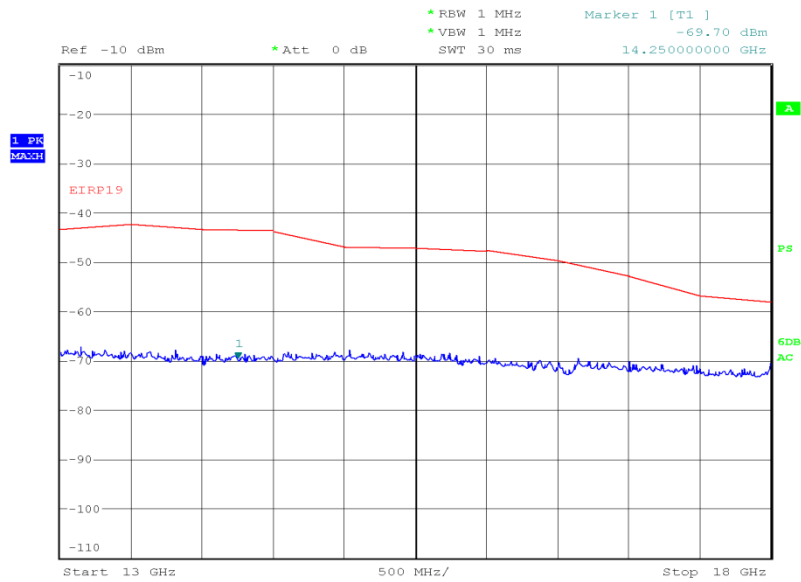
8 GHz to 13.5 GHz



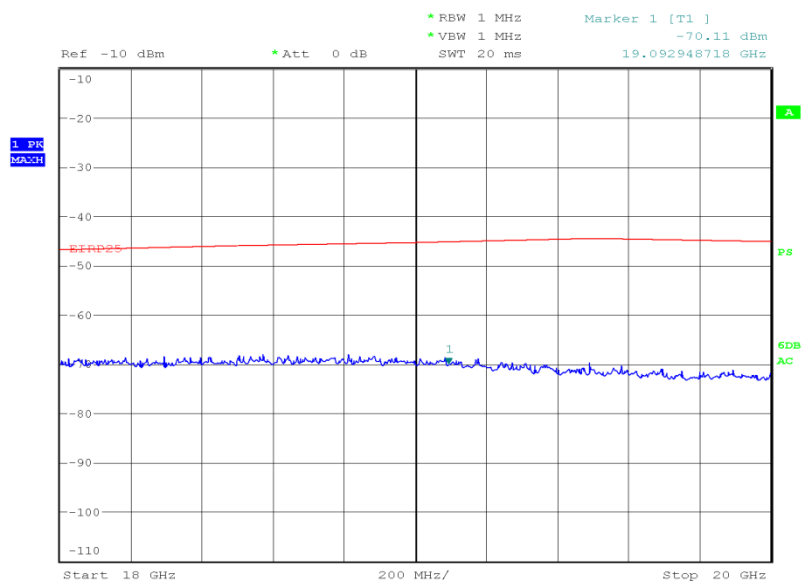
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Product Service

13.5 GHz to 18 GHz

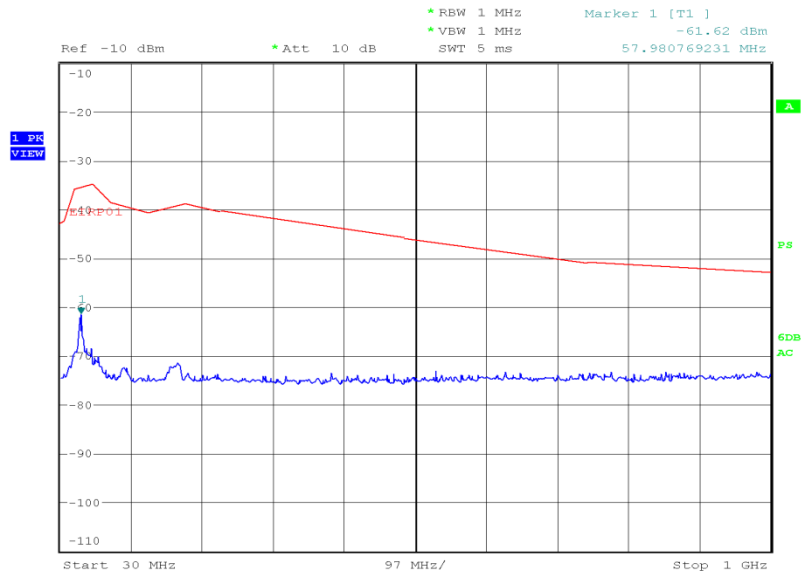
Date: 15.JUL.2012 12:20:47

18 GHz to 20 GHz

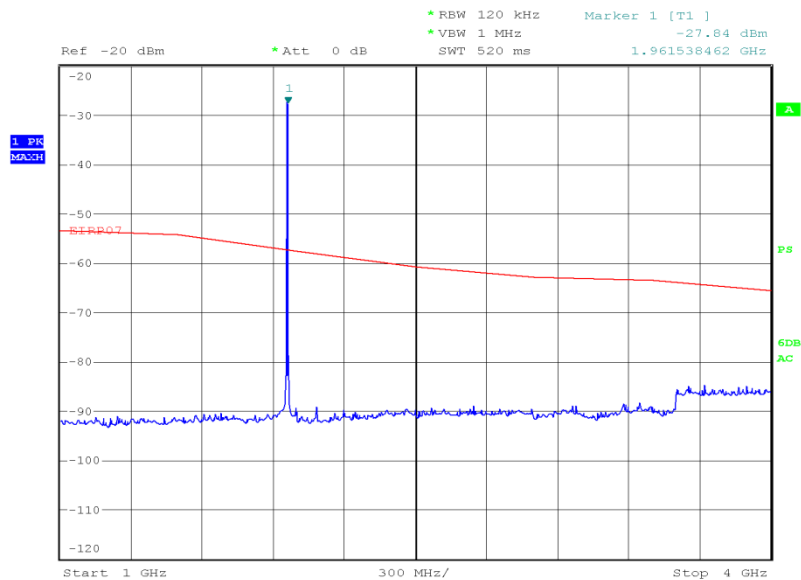
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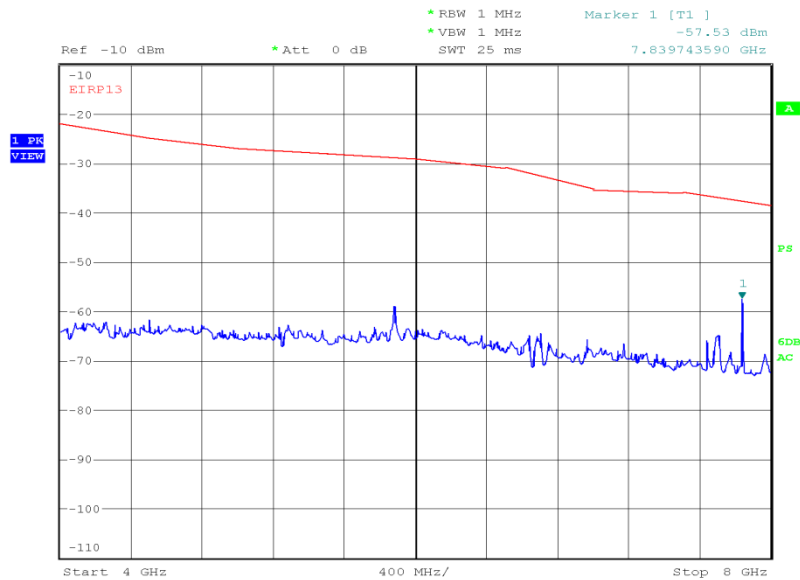
Product Service

1960.0 MHz30 MHz to 1 GHz

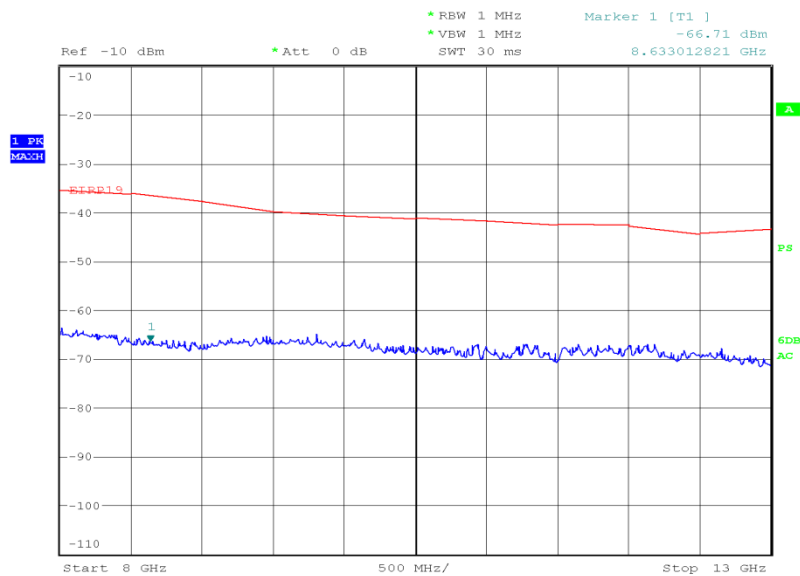
Date: 14.JUL.2012 13:24:30

1 GHz to 4 GHz

Date: 14.JUL.2012 14:09:07

4 GHz to 8 GHz

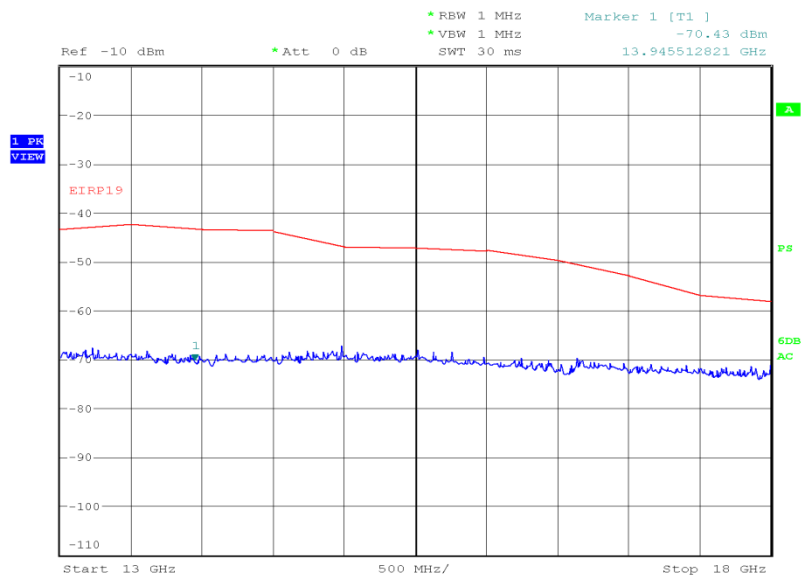
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8 GHz to 13.5 GHz

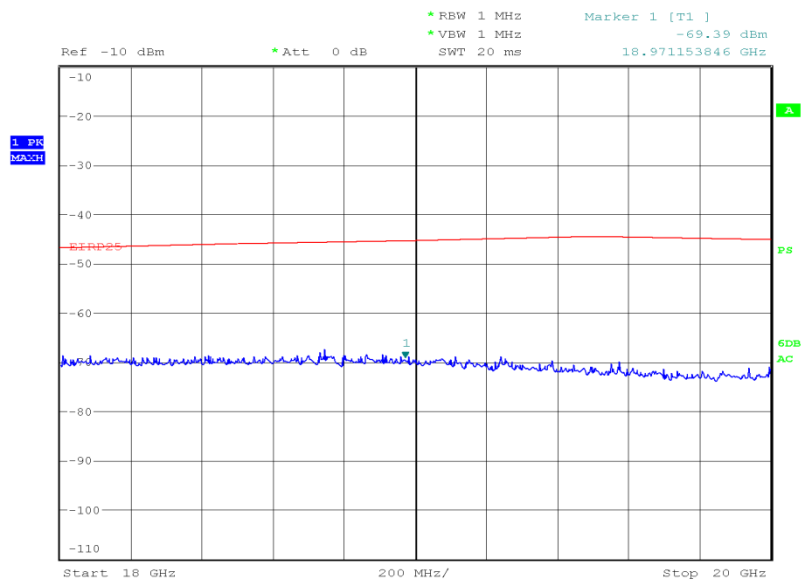
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Product Service

13.5 GHz to 18 GHz

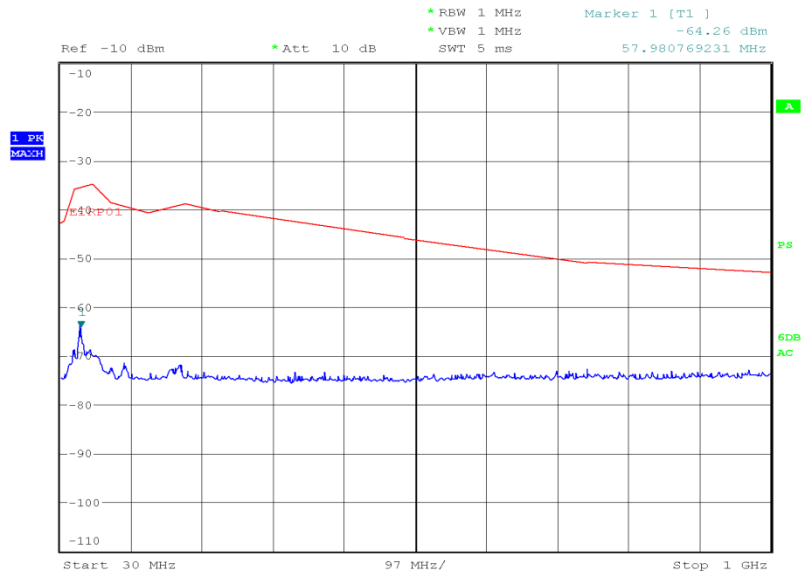
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18 GHz to 20 GHz

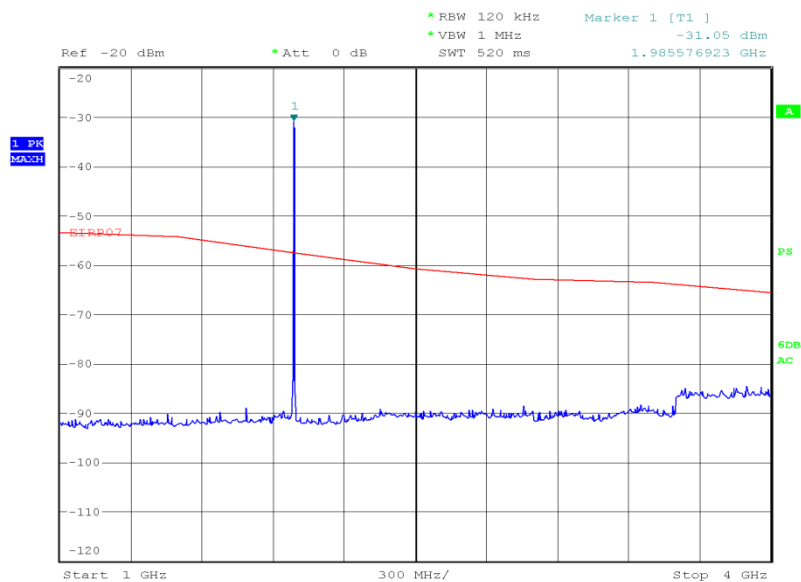
Date: 15.JUL.2012 13:50:06



Product Service

1987.6 MHz30 MHz to 1 GHz

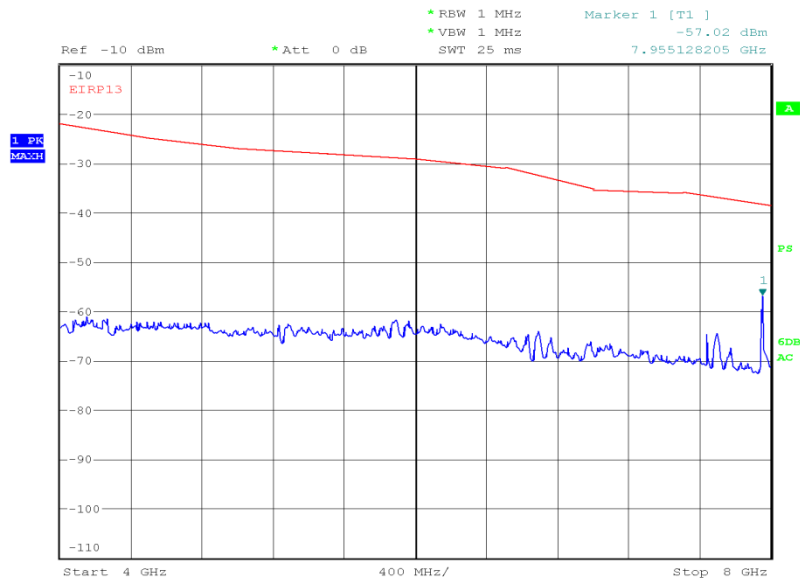
Date: 14.JUL.2012 13:36:39

1 GHz to 4 GHz

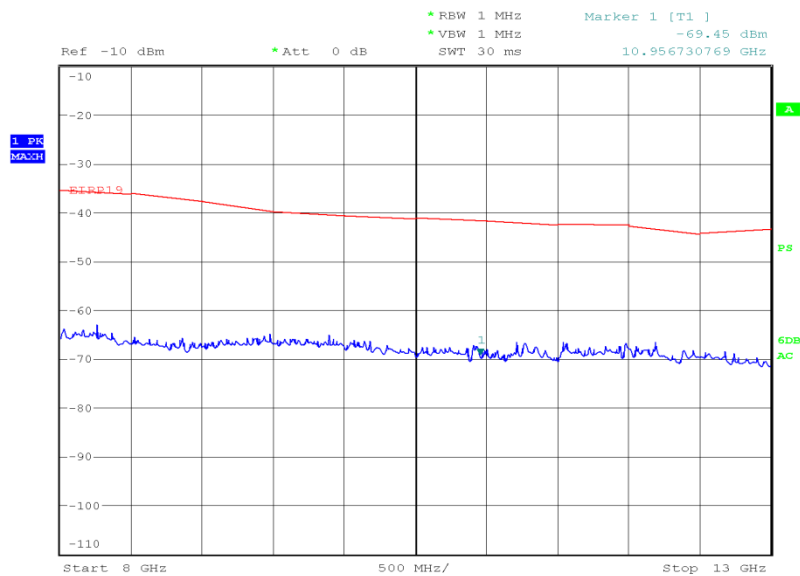
Date: 14.JUL.2012 14:15:04



Product Service

4 GHz to 8 GHz

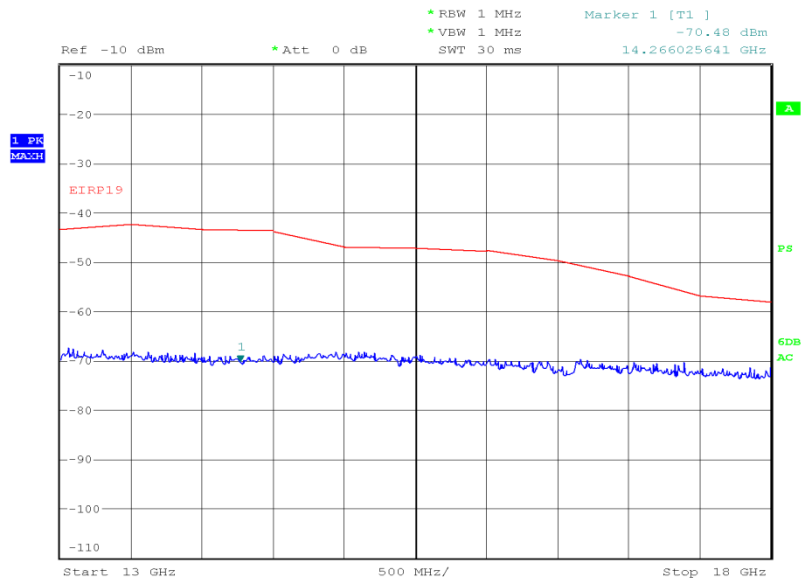
Date: 15.JUL.2012 11:36:51

8 GHz to 13.5 GHz

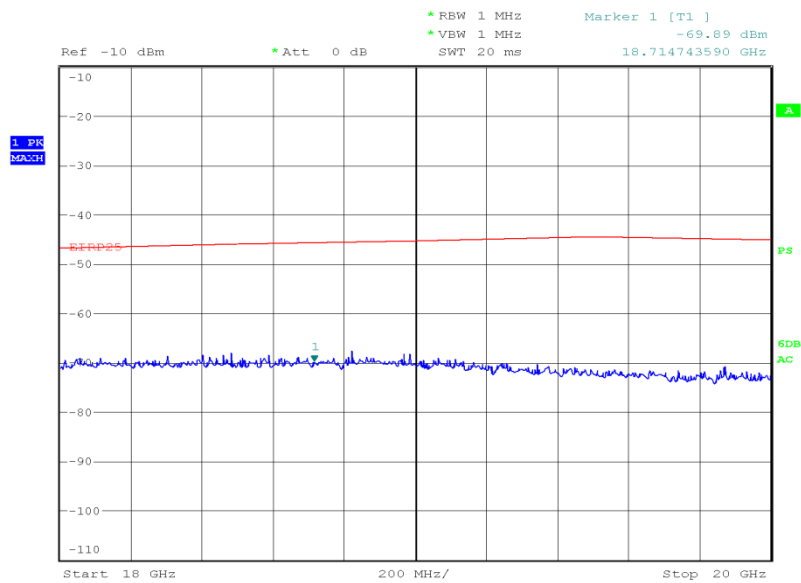
Date: 15.JUL.2012 12:40:36



Product Service

13.5 GHz to 18 GHz

Date: 15.JUL.2012 12:35:49

18 GHz to 20 GHz

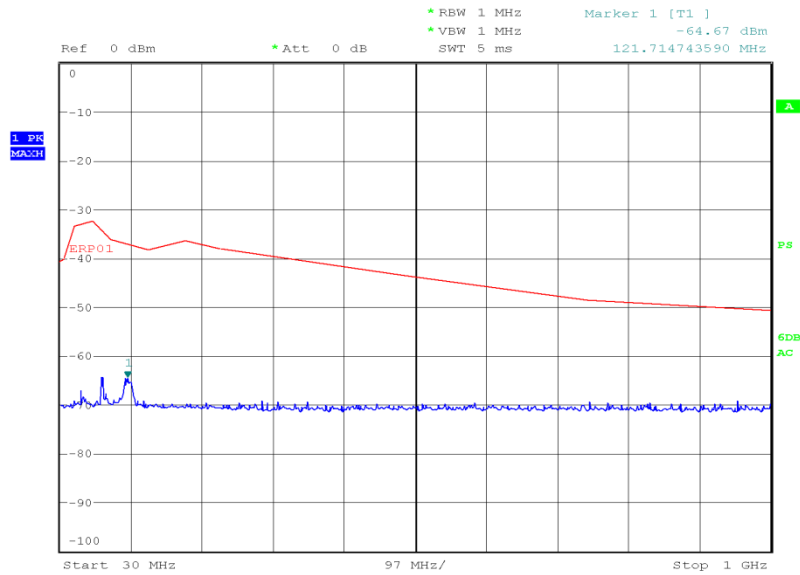
Date: 15.JUL.2012 13:51:28

Limit Clause

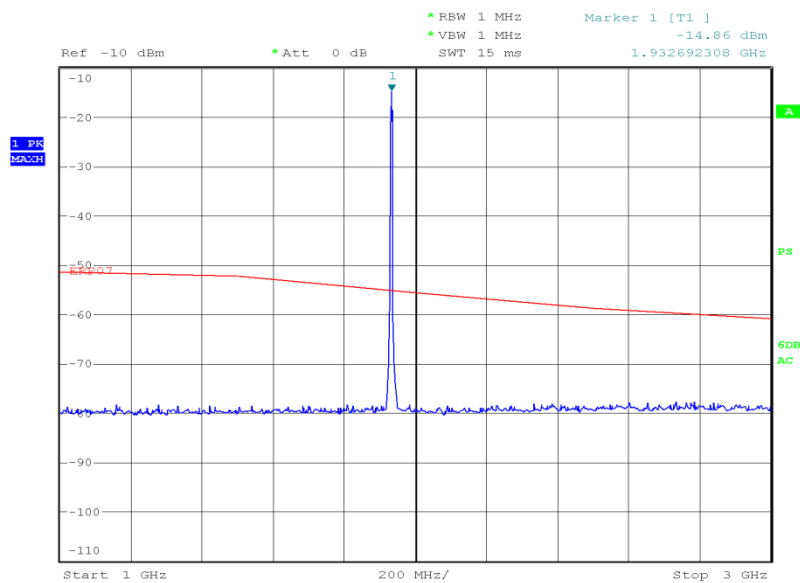
43+10log(P) or -13 dBm



Product Service

Transmit - with Microsemi POE Inserter1932.4 MHz30 MHz to 1 GHz

Date: 16.JUL.2012 17:50:26

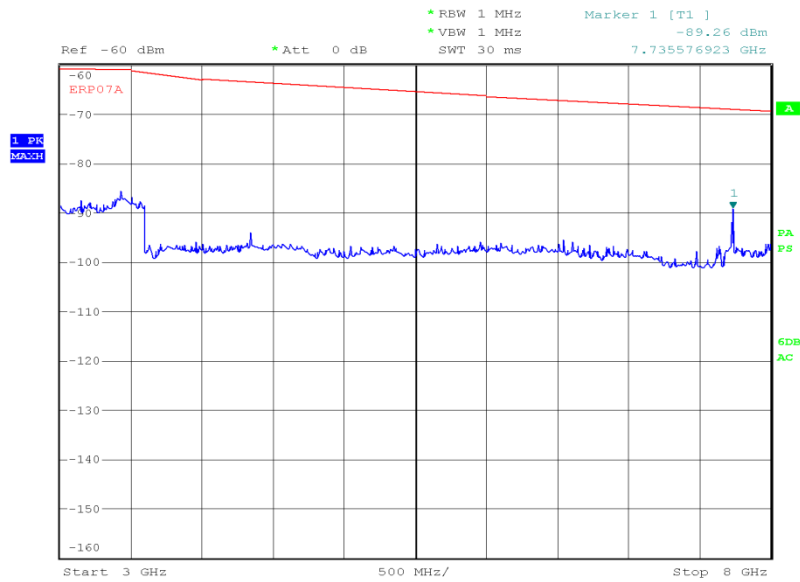
1 GHz to 3 GHz

Date: 16.JUL.2012 22:13:31



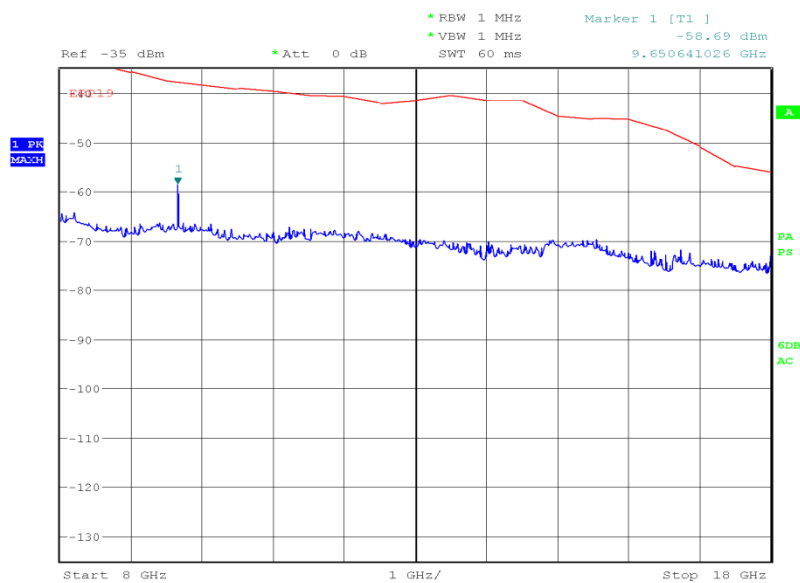
Product Service

3 GHz to 8 GHz



Date: 16.JUL.2012 21:43:34

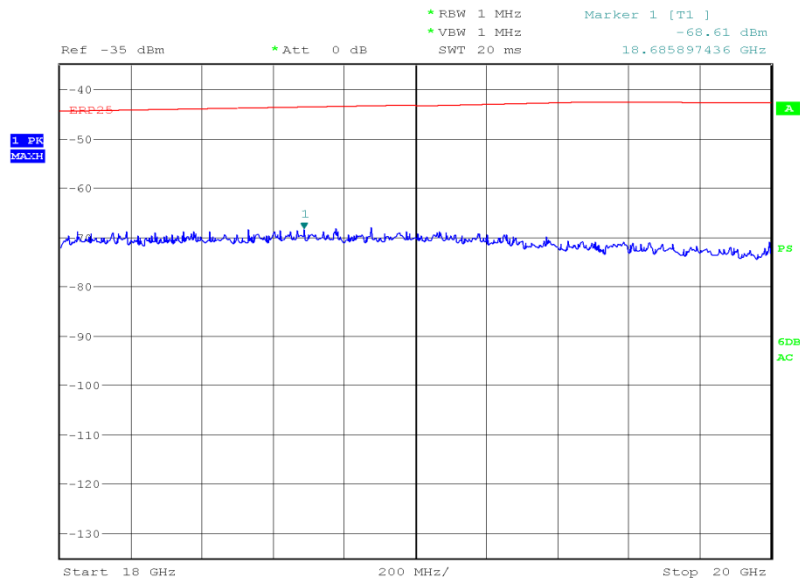
8 GHz to 18 GHz



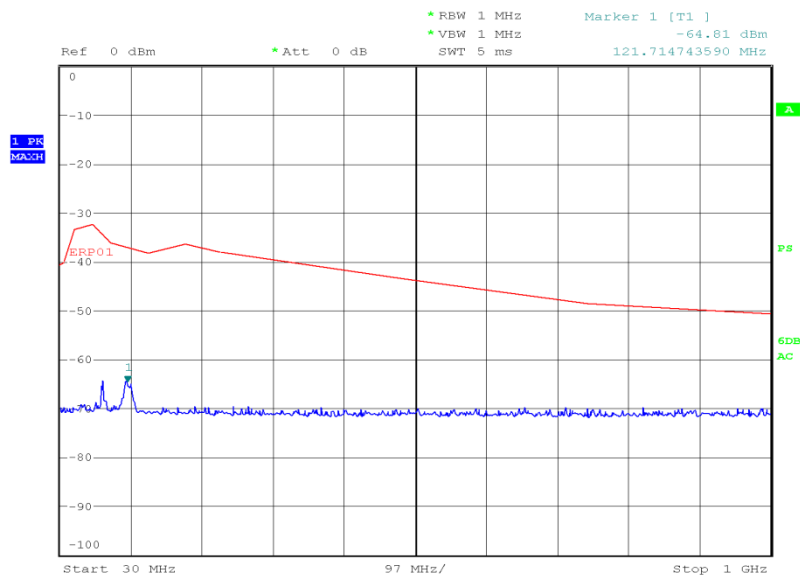
Date: 17.JUL.2012 15:43:45



Product Service

18 GHz to 20 GHz

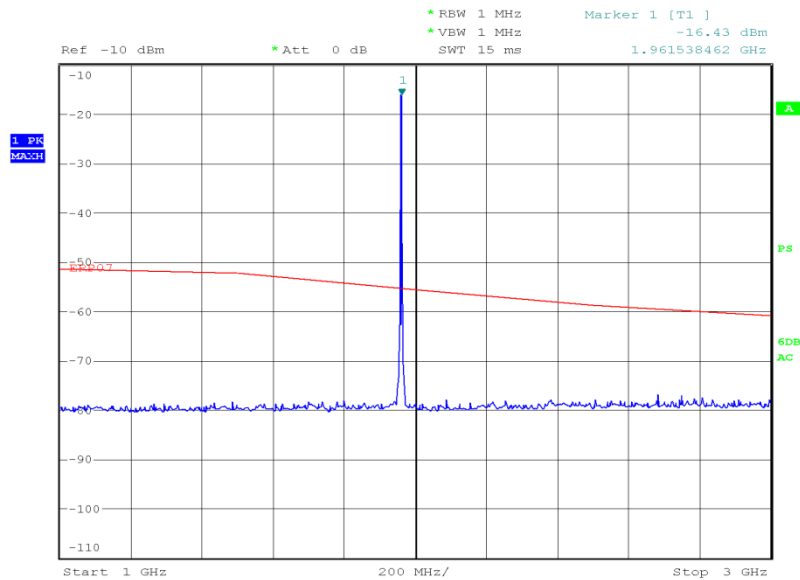
Date: 17.JUL.2012 18:31:10

1960.0 MHz30 MHz to 1 GHz

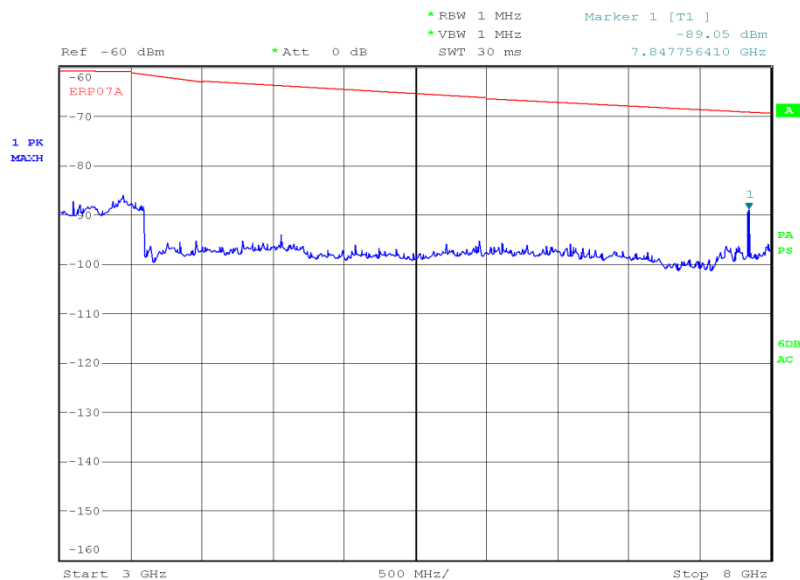
Date: 16.JUL.2012 17:52:25



Product Service

1 GHz to 3 GHz

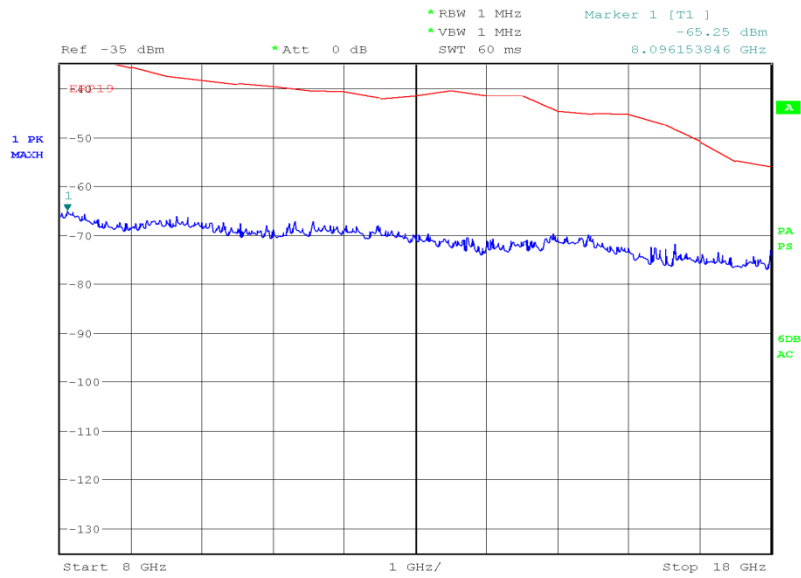
Date: 16.JUL.2012 22:15:45

3 GHz to 8 GHz

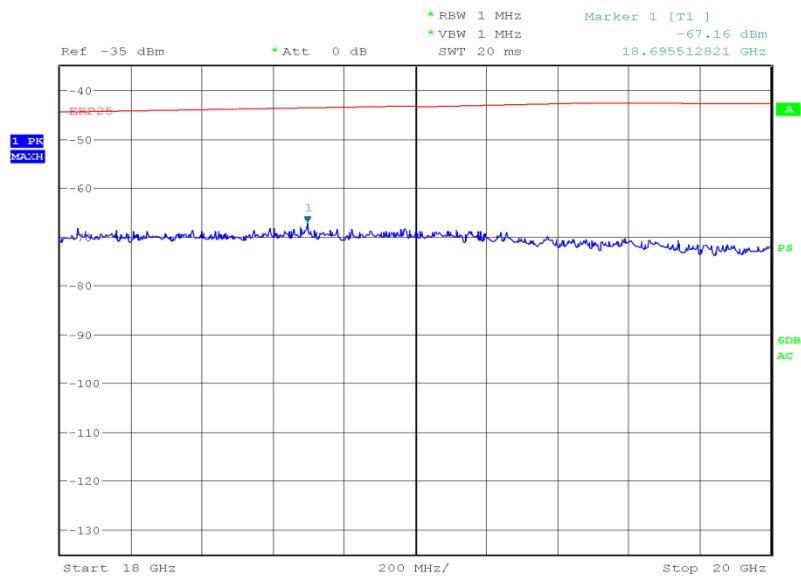
Date: 16.JUL.2012 21:50:11



Product Service

8 GHz to 18 GHz

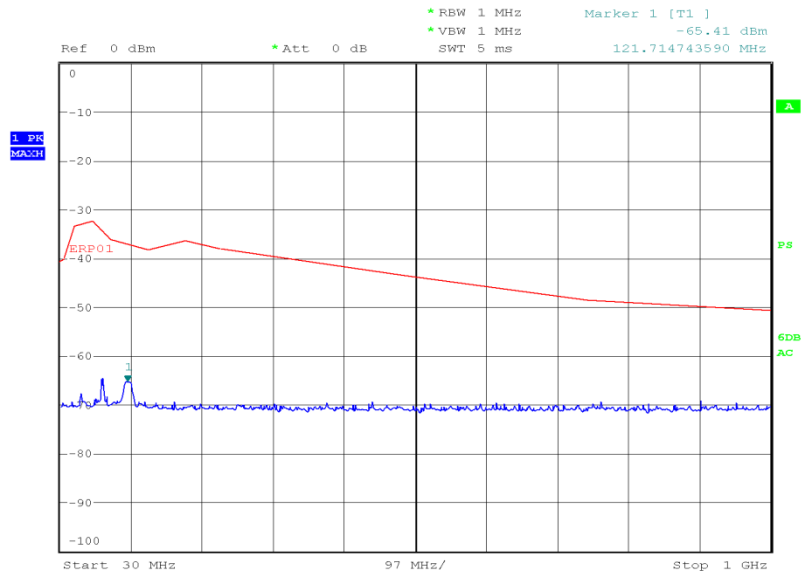
Date: 17.JUL.2012 15:58:36

18 GHz to 20 GHz

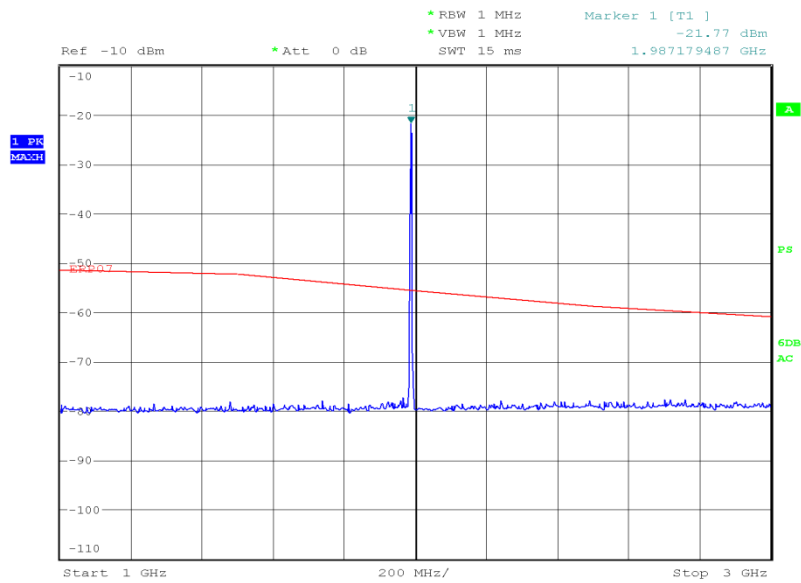
Date: 17.JUL.2012 18:25:15



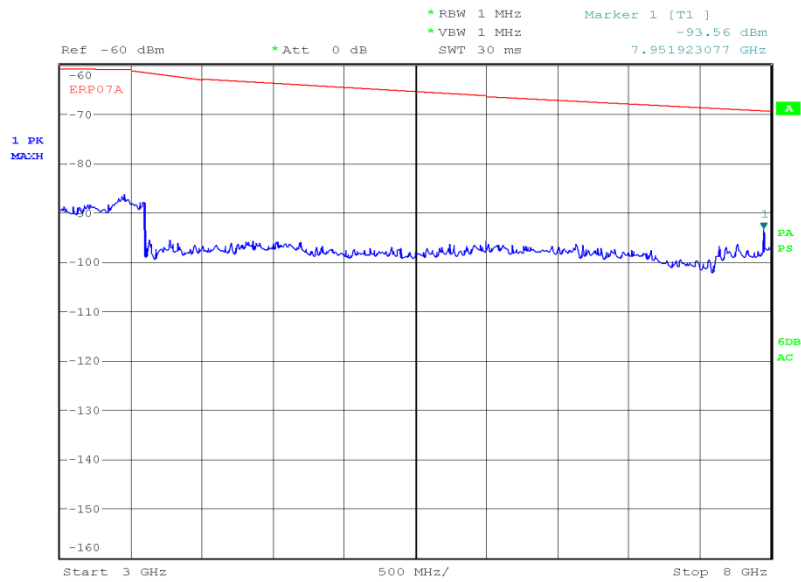
Product Service

1987.6 MHz30 MHz to 1 GHz

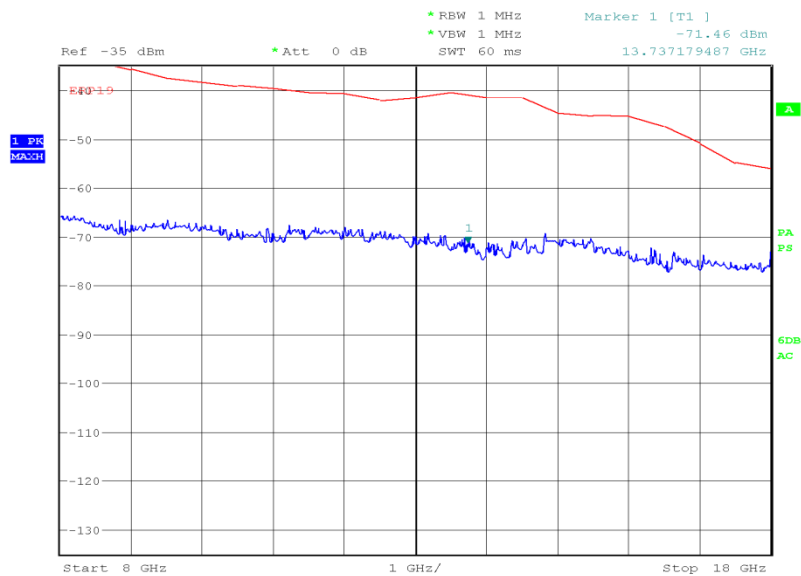
Date: 16.JUL.2012 17:56:21

1 GHz to 3 GHz

Date: 16.JUL.2012 22:18:04

3 GHz to 8 GHz

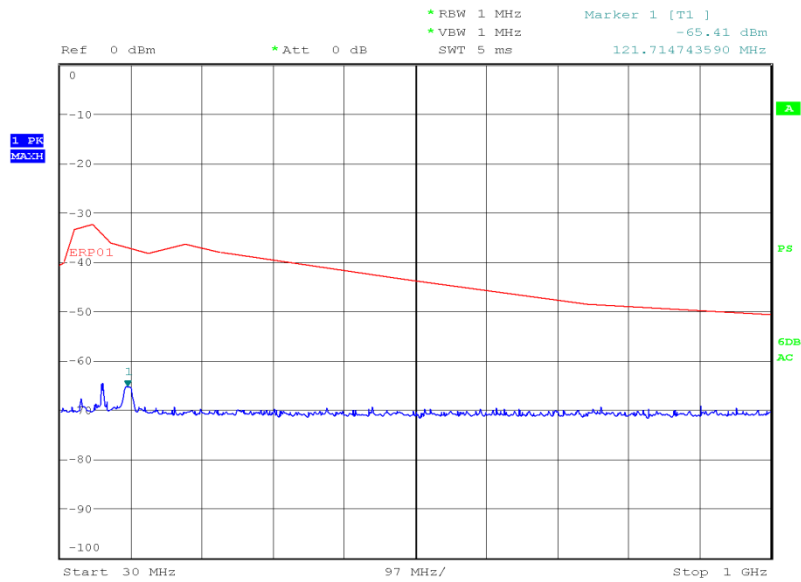
Date: 16.JUL.2012 21:55:52

8 GHz to 18 GHz

Date: 17.JUL.2012 16:02:32



Product Service

18 GHz to 20 GHz

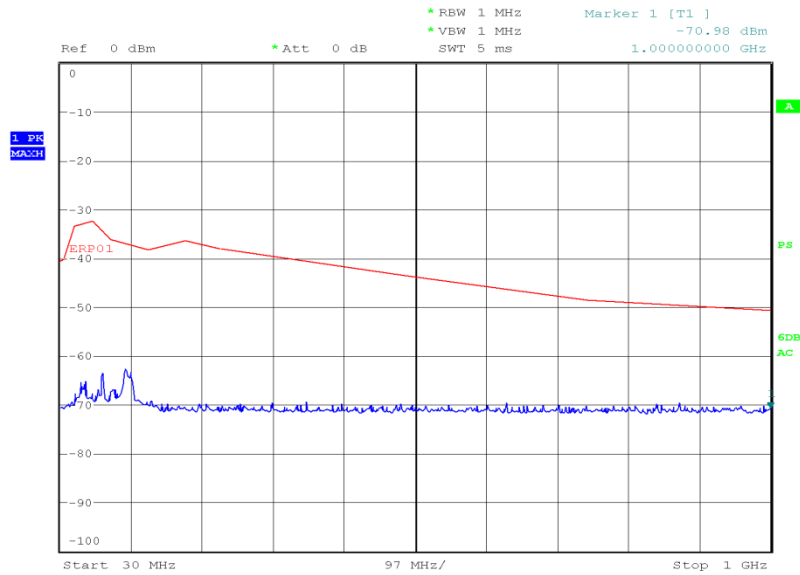
Date: 16.JUL.2012 17:56:21

Limit Clause

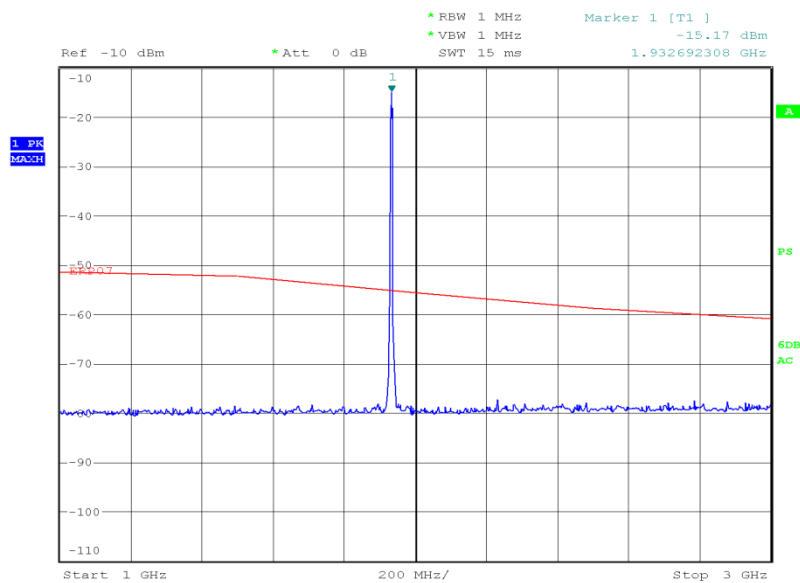
43+10log(P) or -13 dBm



Product Service

Transmit - with Phihong POE Inserter1932.4 MHz30 MHz to 1 GHz

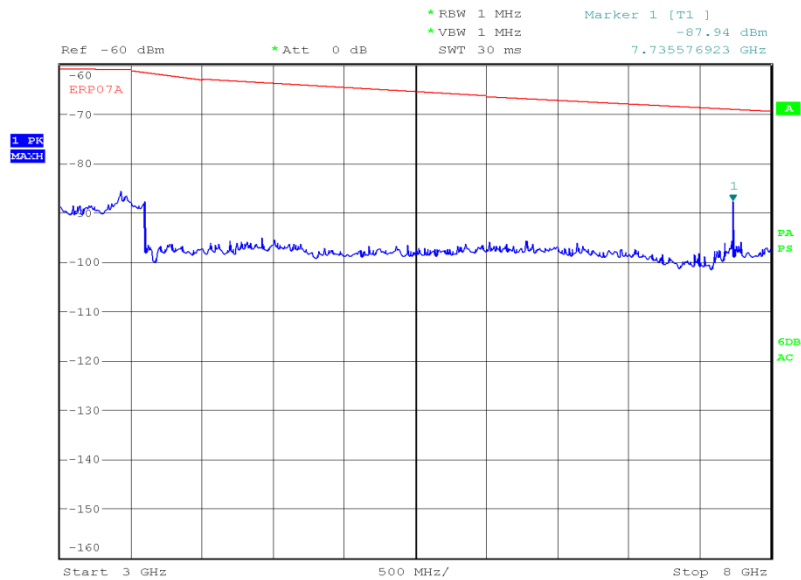
Date: 16.JUL.2012 16:42:01

1 GHz to 3 GHz

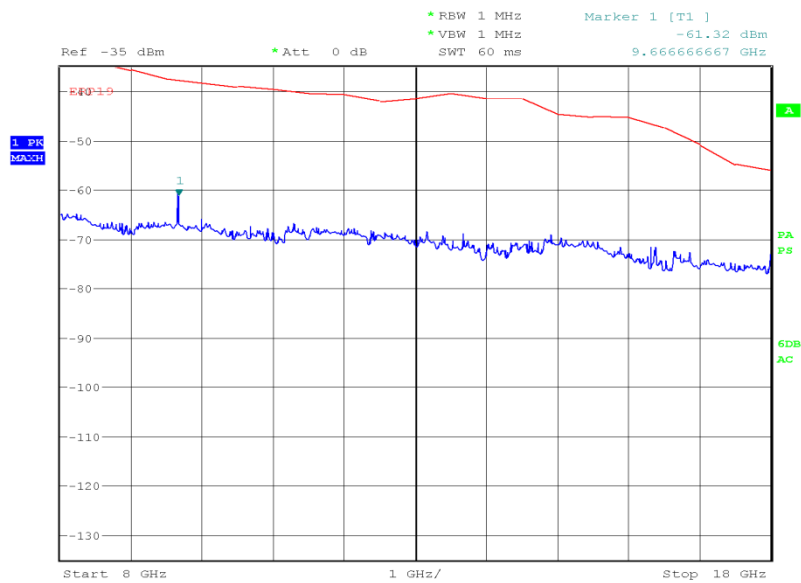
Date: 16.JUL.2012 21:10:49



Product Service

3 GHz to 8 GHz

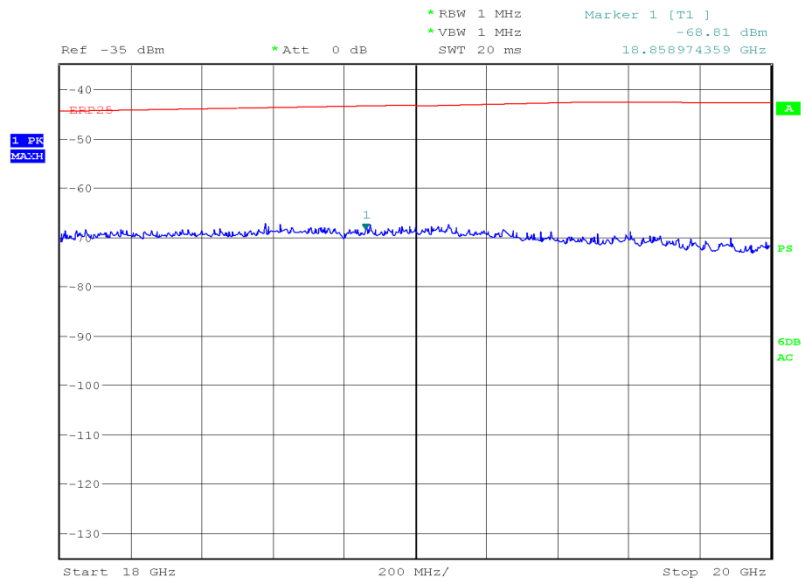
Date: 16.JUL.2012 21:23:34

8 GHz to 18 GHz

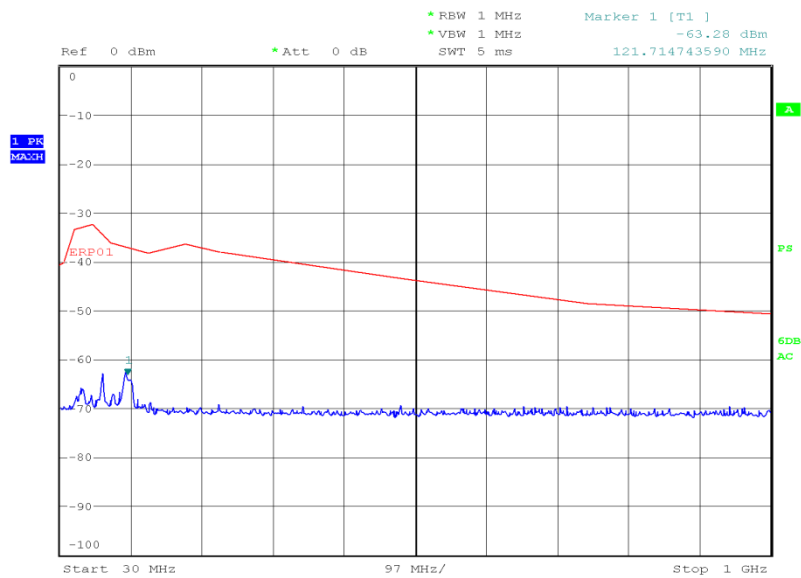
Date: 17.JUL.2012 16:36:16



Product Service

18 GHz to 20 GHz

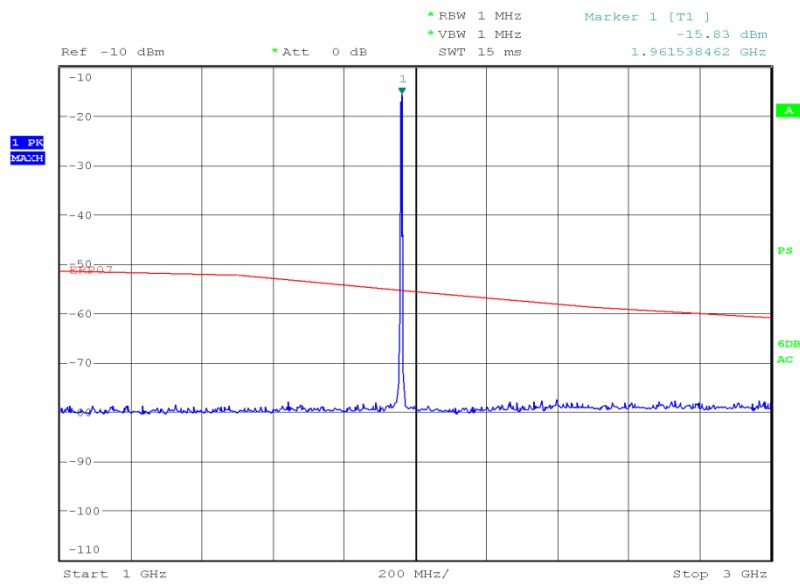
Date: 17.JUL.2012 17:56:44

1960.0 MHz30 MHz to 1 GHz

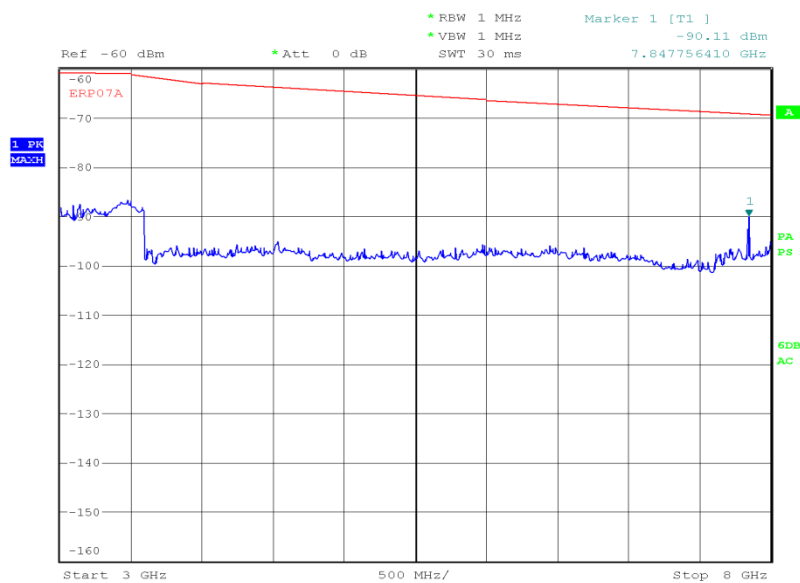
Date: 16.JUL.2012 17:05:28



Product Service

1 GHz to 3 GHz

Date: 16.JUL.2012 21:12:51

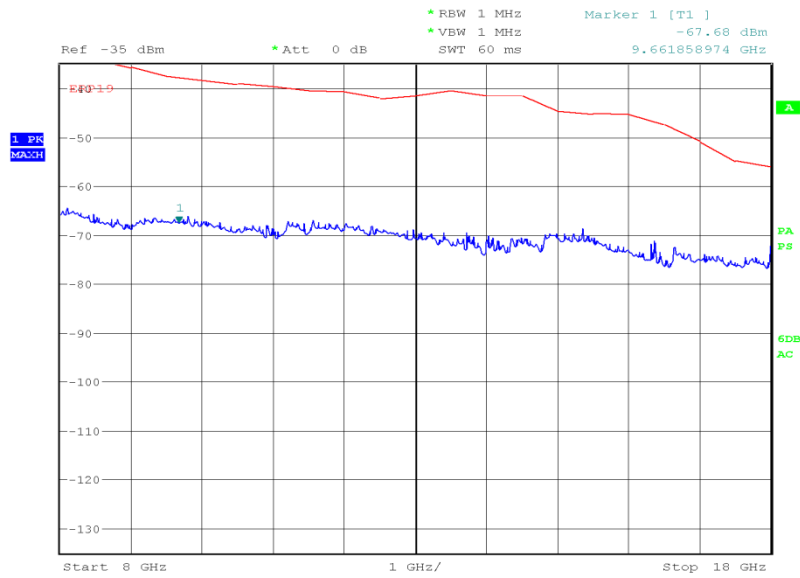
3 GHz to 8 GHz

Date: 16.JUL.2012 21:21:16



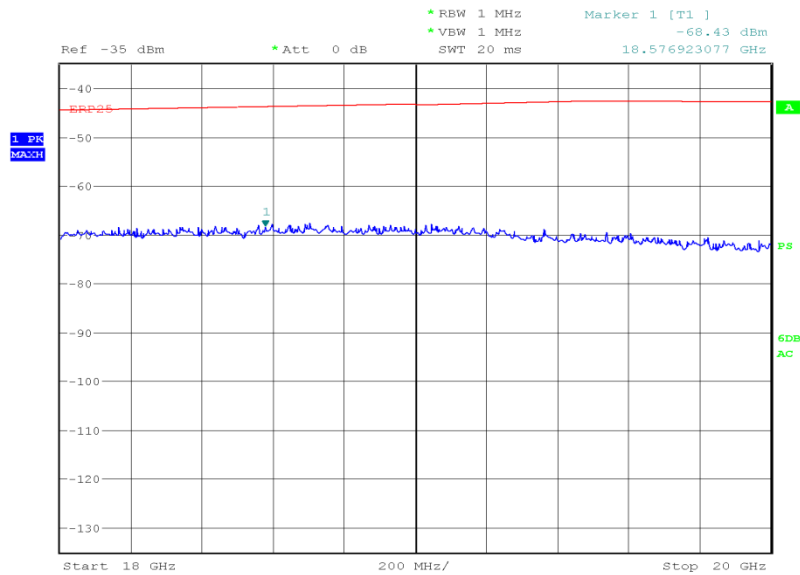
Product Service

8 GHz to 18 GHz



Date: 17.JUL.2012 16:50:47

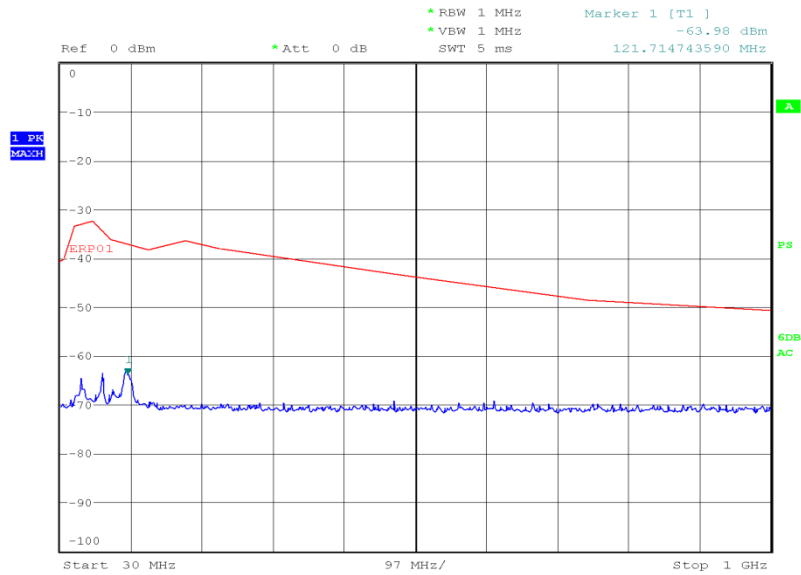
18 GHz to 20 GHz



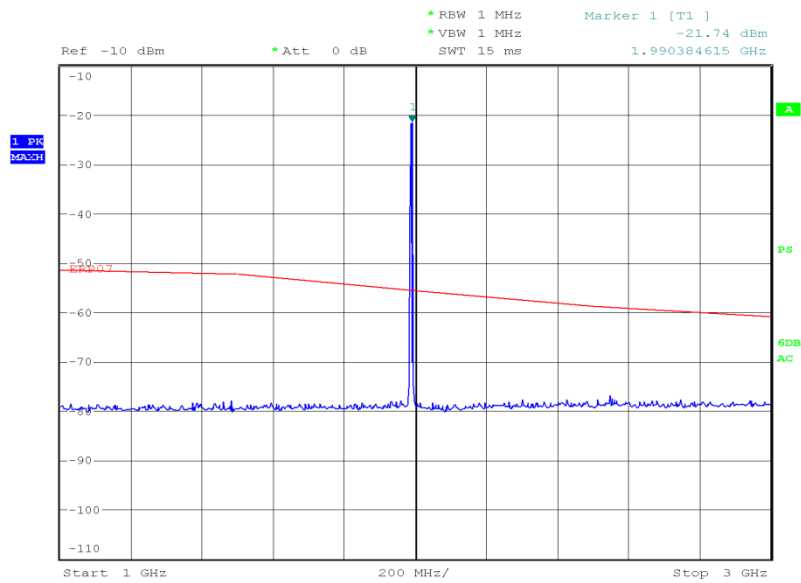
Date: 17.JUL.2012 17:58:15



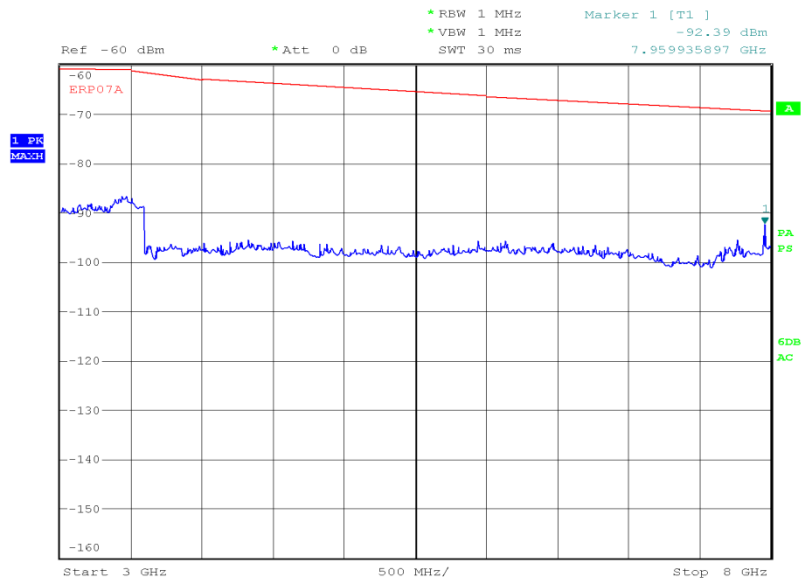
Product Service

1987.6 MHz30 MHz to 1 GHz

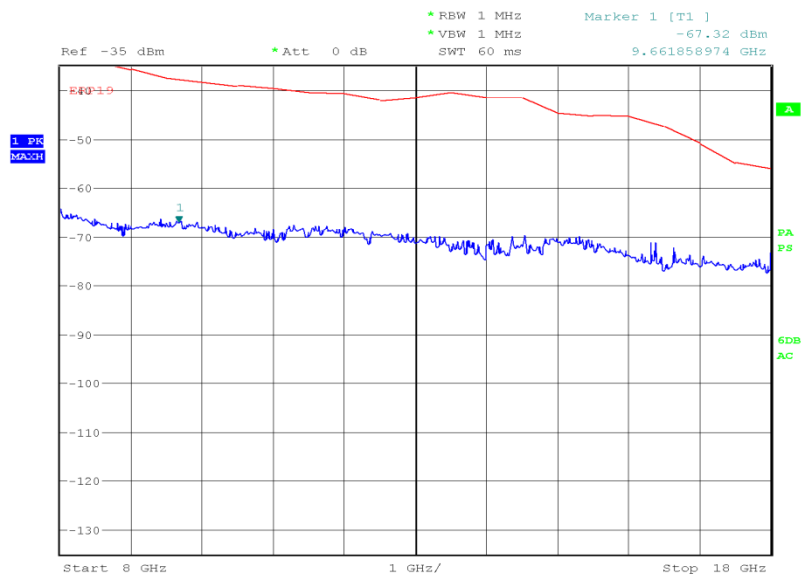
Date: 16.JUL.2012 17:10:08

1 GHz to 3 GHz

Date: 16.JUL.2012 21:16:55

3 GHz to 8 GHz

Date: 16.JUL.2012 21:19:23

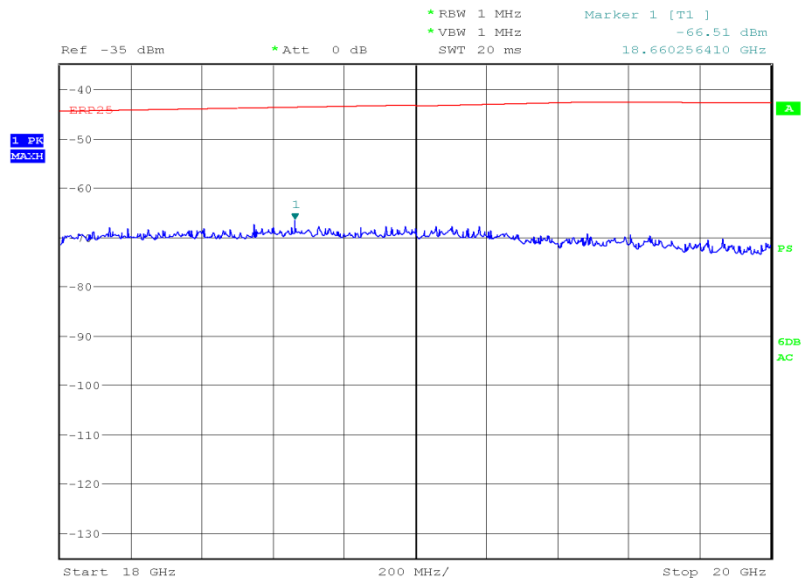
8 GHz to 18 GHz

Date: 17.JUL.2012 16:54:05



Product Service

18 GHz to 20 GHz



Date: 17.JUL.2012 18:00:03

Limit Clause

43+10log(P) or -13 dBm



Product Service

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 24, Clause 24.238(a)

2.7.2 Equipment Under Test and Modification State

239B S/N: 000295-0000105698 - Modification State 0

2.7.3 Date of Test

23 July 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

In accordance with Part 2.1051, the spurious 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 20 GHz. The EUT was set to transmit on full power with WCDMA modulation. The EUT was tested on Bottom, Middle and Top channels for maximum power. The resolution and video bandwidths were set to 1 MHz and 3 MHz thus meeting the requirements of Part 24.238(a). The spectrum analyser detector was set to max hold.

From 9 kHz to 4 GHz, an attenuator was used. For measuring the range 4 GHz to 20 GHz an attenuator and high pass filter were used. This was to reduce saturation effects in the spectrum analyser.

The maximum path loss across the measurement bands were used as reference level offsets to ensure worst case.

2.7.6 Environmental Conditions

Ambient Temperature	26.6°C
Relative Humidity	30.4%



Product Service

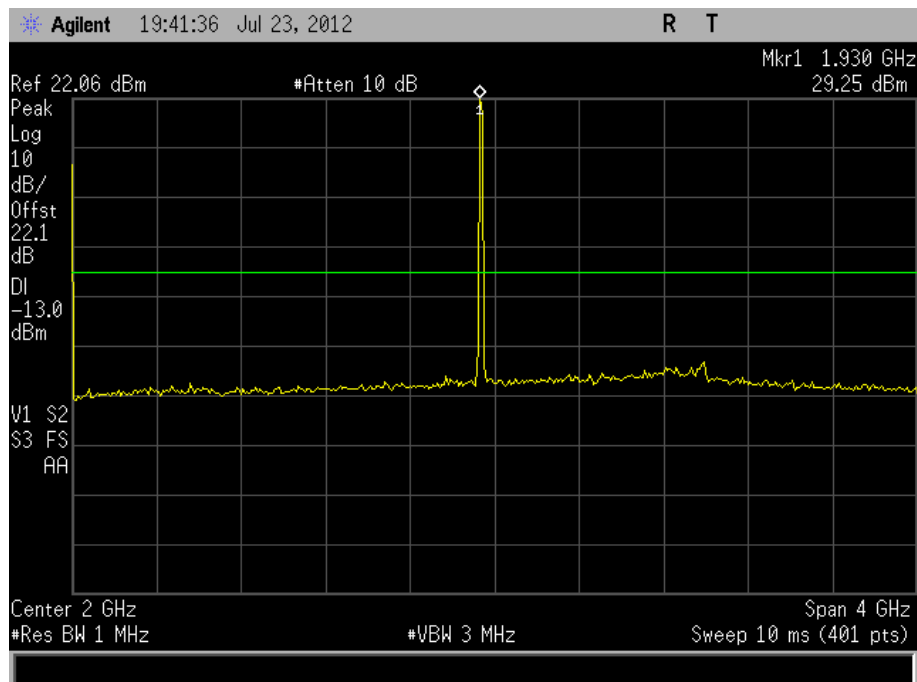
2.7.7 Test Results

Transmit - with 12V AC/DC Adapter

12V DC Supply

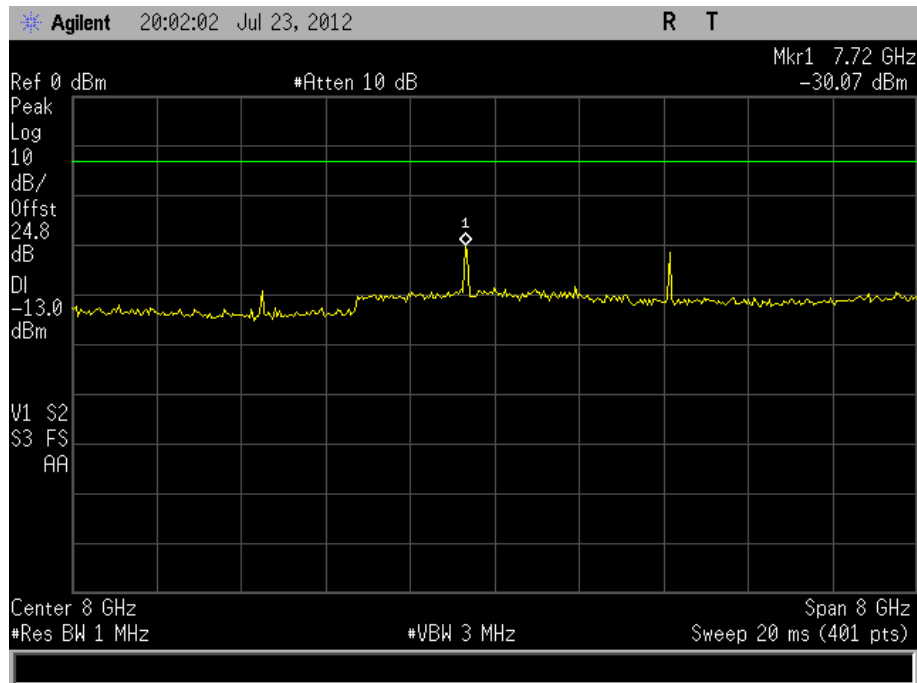
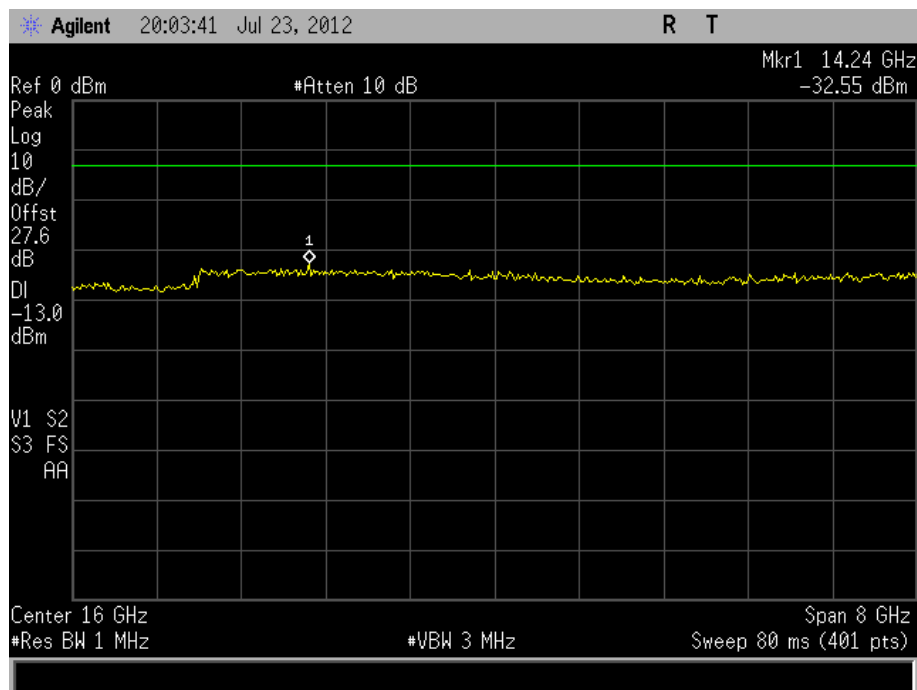
1932.4 MHz

9kHz to 4 GHz



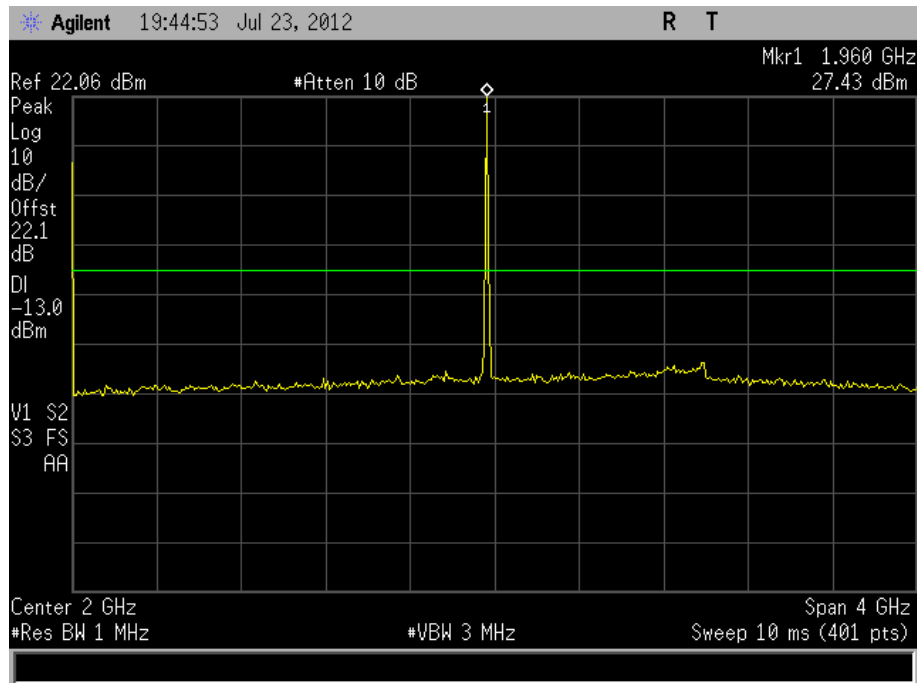
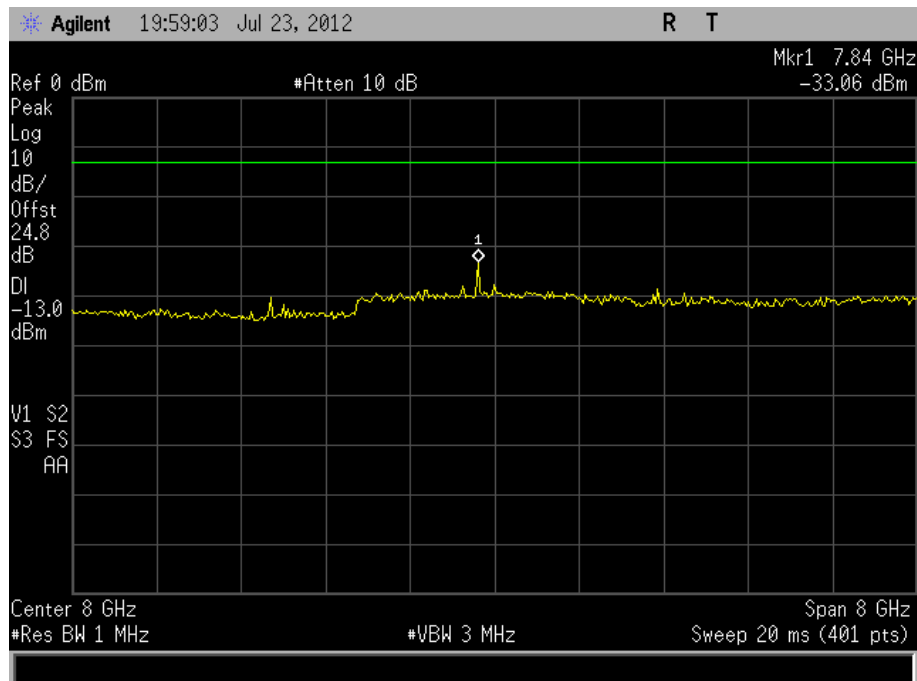


Product Service

4 GHz to 12 GHz12 GHz to 20 GHz

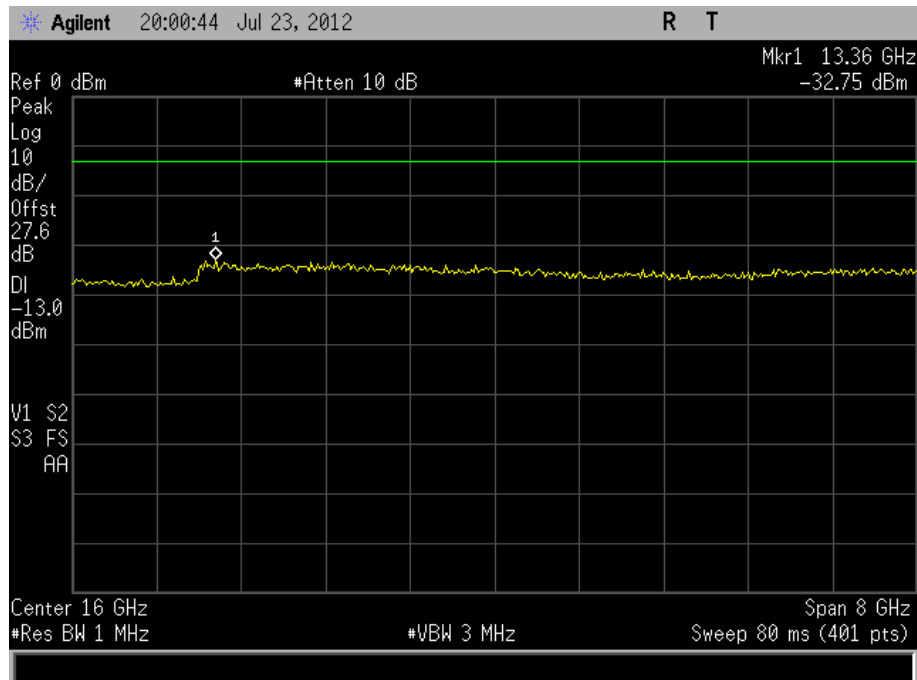
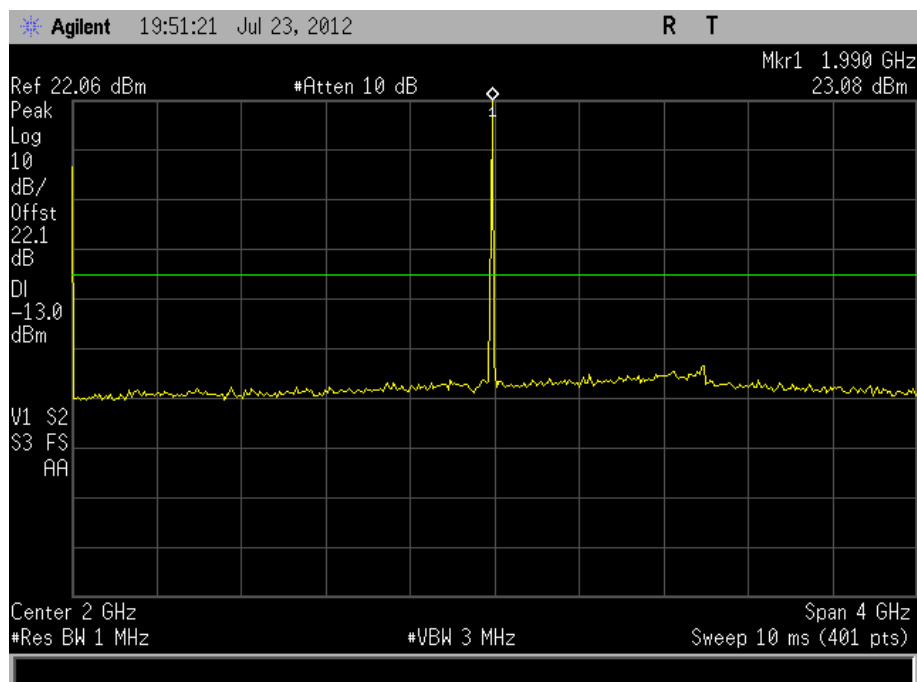


Product Service

1960.0 MHz9kHz to 4 GHz4 GHz to 12 GHz

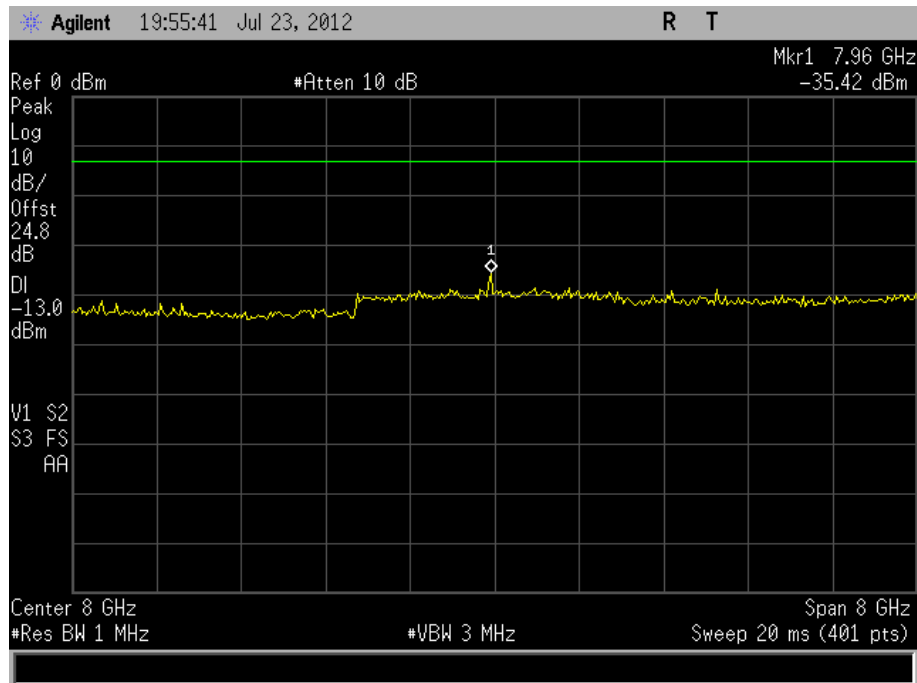
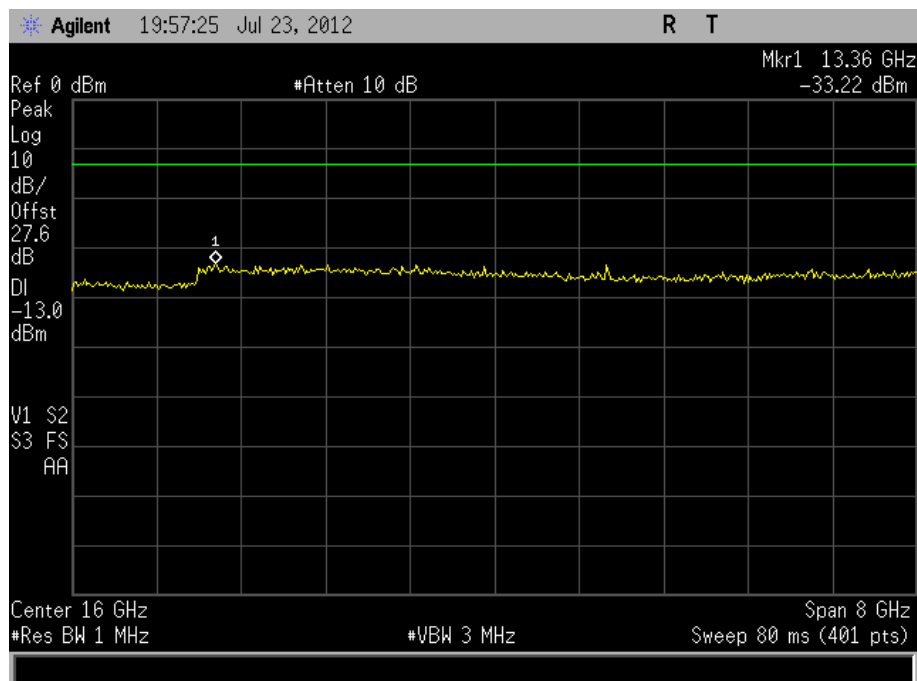


Product Service

12 GHz to 20 GHz1987.6 MHz9kHz to 4 GHz



Product Service

4 GHz to 12 GHz12 GHz to 20 GHzLimit Clause

43+10log(P) or -13 dBm



Product Service

2.8 OCCUPIED BANDWIDTH**2.8.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1049(h)
FCC CFR 47 Part 24, Clause 24.238(b)

2.8.2 Equipment Under Test and Modification State

239B S/N: 000295-0000105698 - Modification State 0

2.8.3 Date of Test

23 July 2012

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 transmitting at maximum power, with WCDMA modulation. Using a resolution bandwidth of 10 kHz and a video bandwidth of 30 kHz, the -26 dBc points were established and the emission bandwidth determined.

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

2.8.6 Environmental Conditions

Ambient Temperature	26.6°C
Relative Humidity	30.4%



Product Service

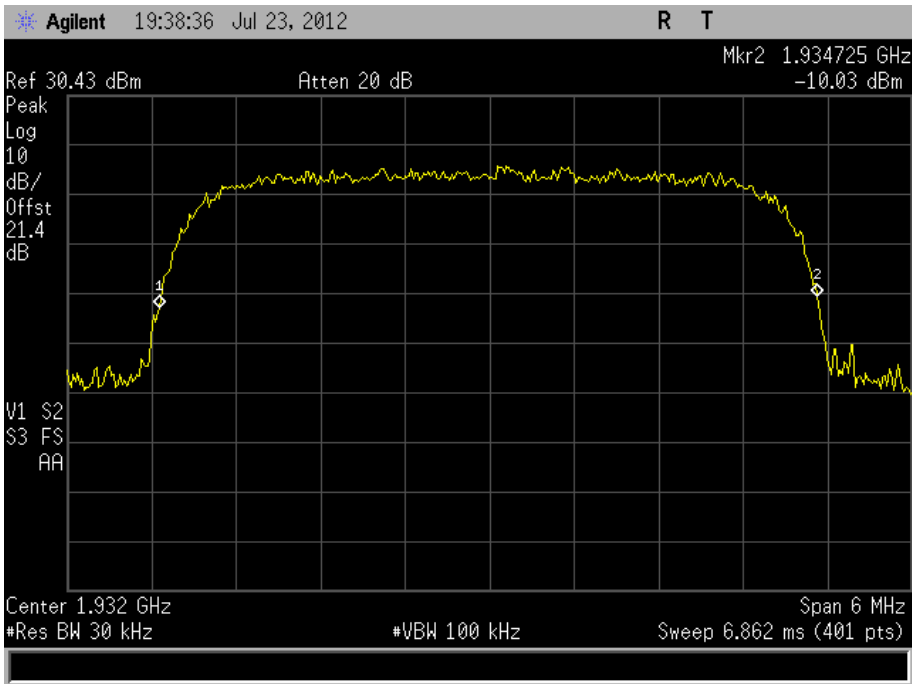
2.8.7 Test Results

Transmit - with 12V AC/DC Adapter

12V DC Supply

1932.4 MHz

Mode	Occupied Bandwidth (kHz)
WCDMA	4665

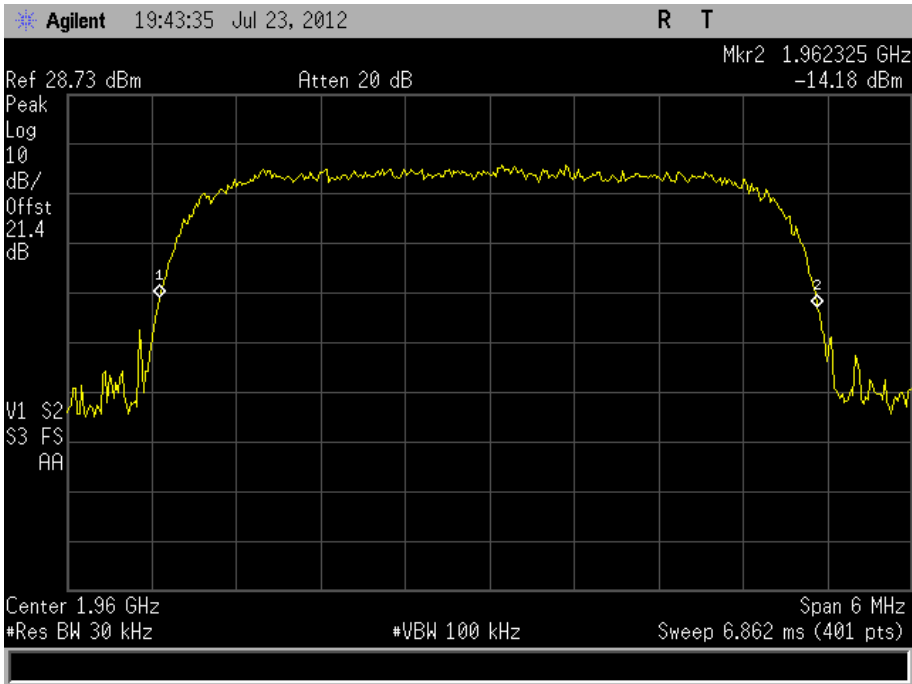




Product Service

1960.0 MHz

Mode	Occupied Bandwidth (kHz)
WCDMA	4665

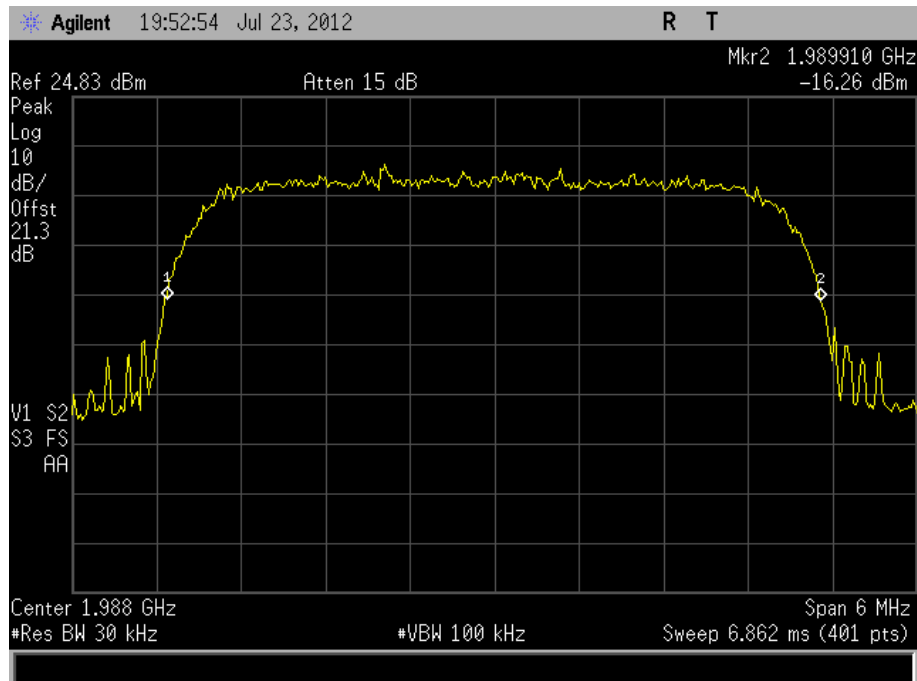




Product Service

1987.6 MHz

Mode	Occupied Bandwidth (kHz)
WCDMA	4635

Limit Clause

The occupied bandwidth, that is the frequency bandwidth such that, below is lower and above is upper frequency limits, the mean powers radiated are each equal to 0.5% 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
Section 2.1 - Frequency Stability					
Mains Voltage Monitor	TUV	MVM1	1378	12	19-Aug-2012
Attenuator (20dB, 20W)	Weinschel	1	3032	-	TU
Variac Transformer	Zenith	Z-710-R	3169	-	O/P Mon
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3702	12	27-Jan-2013
Section 2.2 - Spurious Emissions at Band Edge					
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	27-Jun-2013
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2013
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	17-Jul-2013
4GHz HPF	Sematron	F-100-4000-5-R	2245	-	TU
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	21-Dec-2012
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3697	12	27-Jan-2013
Section 2.3 - Effective Isotropic Radiated Power					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	8-Dec-2012
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	14-Nov-2012
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Signal Generator (1GHz to 40GHz)	Rohde & Schwarz	SMR40	1589	12	11-Nov-2012
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	22-Aug-2012
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	29-Sep-2012
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU
P-Series Power Meter	Agilent	N1911A	3980	12	12-Sep-2012
50 MHz-18 GHz Wideband Power Sensor	Agilent	N1921A	3982	12	12-Sep-2012
Section 2.5 - Maximum Peak Output Power - Conducted					
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	9-May-2013
P-Series Power Meter	Agilent	N1911A	3980	12	12-Sep-2012
50 MHz-18 GHz Wideband Power Sensor	Agilent	N1921A	3982	12	12-Sep-2012



Section 2.6 - Emission for Broadband PCS Equipment					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	8-Dec-2012
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	14-Nov-2012
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Antenna (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	2-Aug-2012
Pre-Amplifier	Phase One	PS04-0086	1533	12	20-Sep-2012
Pre-Amplifier	Phase One	PS04-0087	1534	12	26-Sep-2012
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Signal Generator (1GHz to 40GHz)	Rohde & Schwarz	SMR40	1589	12	11-Nov-2012
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	20-Sep-2012
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	21-Dec-2012
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	22-Aug-2012
High Pass Filter (3GHz)	RLC Electronics	F-100-3000-5-R	3349	12	29-May-2013
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	29-Sep-2012
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	16-Apr-2013
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3702	12	27-Jan-2013
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	12	26-Aug-2012
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
Low Noise Amplifier	Wright Technologies	APS04-0085	3969	12	15-Jul-2012
Section 2.7 - Conducted Spurious Emissions					
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	27-Jun-2013
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2013
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	17-Jul-2013
4GHz HPF	Sematron	F-100-4000-5-R	2245	-	TU
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	21-Dec-2012
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3697	12	27-Jan-2013
Section 2.8 - Occupied Bandwidth					
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	27-Jun-2013
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2013
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	17-Jul-2013
4GHz HPF	Sematron	F-100-4000-5-R	2245	-	TU
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	21-Dec-2012
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3697	12	27-Jan-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
Maximum Peak Output Power - Conducted	± 0.70 dB
Emission for Broadband PCS Equipment	± 3.08 dB
Conducted Spurious Emissions	± 3.454 dB
Effective Isotropic Radiated Power	± 3.08 dB
Spurious Emissions at Band Edge	± 2.20 dB
Occupied Bandwidth	± 10.14 kHz
Modulation Characteristics	-
Frequency Stability	± 99.54 Hz



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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