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Report On

FCC Testing of the
Sharp CDMA SHI11 Tri Band CDMA (BC0/BC3 and BC6) and Cellular
Phone with Bluetooth, WLAN & FeliCa and GPS

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FCC ID: APYHRO00149

Document 75913699 Report 06 Issue 1

June 2011



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REPORT ON

FCC Testing of the
Sharp CDMA SH111 Tri Band CDMA (BC0/BC3 and BC6) and
Cellular Phone with Bluetooth, WLAN & FeliCa and GPS

Document 75913699 Report 06 Issue 1

June 2011

PREPARED FOR

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Bracknell
Berkshire
RG12 7QY

PREPARED BY

N Bennett
Senior Administrator

APPROVED BY

M Jenkins
Authorised Signatory

DATED

11 June 2011

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 22. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

R Henley
G Lawler



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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp CDMA SH111 Tri Band CDMA (BC0/BC3 and BC6) and Cellular Phone with Bluetooth,
WLAN & FeliCa and GPS



1.1 INTRODUCTION

The information contained in this report is intended to show verification of Sharp CDMA SH11 Tri Band CDMA (BC0/BC3 and BC6) and Cellular Phone with Bluetooth, WLAN & FeliCa and GPS to the requirements of FCC CFR 47 Part 2 and 22.

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	Sharp Corporation
Model Number(s)	CDMA SH11
Serial Number(s)	SSHFL000934 SSHFL000935
Software Version	A4010
Hardware Version	PP1
Number of Samples Tested	Two
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2010 FCC CFR 47 Part 22: 2010
Incoming Release Date	Application Form 10 June 2011
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	8528 10 May 2011
Start of Test	30 May 2011
Finish of Test	9 June 2011
Name of Engineer(s)	G Lawler R Henley
Related Document(s)	ANSI C63.4: 2003



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2 and 22 is shown below.

Configuration 1: Handset							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Base Standard
	Part 2	Part 22					
2.1	2.1051	22.905	Spurious Emissions at Band Edge	824.7 MHz	0	Pass	
				836.52 MHz		N/A	
				848.37 MHz	0	Pass	
2.2	-	22.913(a)	Effective Radiated Power	824.7 MHz	0	Pass	
				836.52 MHz	0	Pass	
				848.37 MHz	0	Pass	
2.3	2.1046	22.913(a)	Maximum Peak Output Power – Conducted	824.7 MHz	0	Pass	
				836.52 MHz	0	Pass	
				848.37 MHz	0	Pass	
2.4	-	22.917	Emission Limitations for Cellular Equipment	824.7 MHz	0	Pass	
				836.52 MHz	0	Pass	
				848.37 MHz	0	Pass	
2.5	2.1051	22.917(a)	Conducted Spurious Emissions	824.7 MHz	0	Pass	
				836.52 MHz	0	Pass	
				848.37 MHz	0	Pass	
2.6	2.1049(h)	22.917(b)	Occupied Bandwidth	824.7 MHz	0	Pass	
				836.52 MHz	0	Pass	
				848.37 MHz	0	Pass	
2.7	2.1055	22.355	Frequency Stability Under Temperature Variations	824.7 MHz		N/A	
				836.52 MHz	0	Pass	
				848.37 MHz		N/A	
2.8	2.1055	22.355	Frequency Stability Under Voltage Variations	824.7 MHz		N/A	
				836.52 MHz	0	Pass	
				848.37 MHz		N/A	

N/A – Not Applicable



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1.3 APPLICATION FORM

APPLICANT'S DETAILS	
COMPANY NAME :	Sharp Telecommunications of Europe Ltd
ADDRESS :	Azure House, Bagshot Road Bracknell, Berkshire RG12 7QY
NAME FOR CONTACT PURPOSES :	Ken Newman
TELEPHONE NO: 01344 301 883	FAX NO: 01344 300 293 E-MAIL: ken.newman@sharp.eu

EQUIPMENT INFORMATION	
<u>Equipment designator:</u>	
Model name/number CDMA SHI11	Identification number APYHRO00149
<u>Supply Voltage:</u>	
☐ AC mains	State AC voltage V and AC frequency Hz
☐ DC (external)	State DC voltage V and DC current A
☒ DC (internal)	State DC voltage 3.7 V and Battery type Li-ion
<u>Frequency characteristics:</u>	
Frequency range 824.7 MHz to 848.31 MHz	Channel spacing (if channelized)
Designated test frequencies:	
Bottom: 824.7 MHz Middle: 836.52 MHz	Top: 848.31 MHz
<u>Power characteristics:</u>	
Maximum transmitter power 24 dBm	Minimum transmitter power W (if variable)
☒ Continuous transmission	State duty cycle If intermittent, can transmitter be set to continuous transmit test mode? Y/N
☐ Intermittent transmission	
<u>Antenna characteristics:</u>	
☒ Antenna connector	State impedance 50 ohm
☐ Temporary antenna connector	State impedance ohm
☐ Integral antenna	State gain dBi
<u>Modulation characteristics:</u>	
☐ Amplitude	☐ Other
☐ Frequency	Details:
☒ Phase	
Can the transmitter operate un-modulated?	N
ITU Class of emission:	



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Extreme conditions:

Maximum temperature	+60 °C	Minimum temperature	-20 °C
Maximum supply voltage	4.0 V	Minimum supply voltage	3.7 V



1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was an Sharp CDMA SHI11 Tri Band CDMA (BC0/BC3 and BC6) and Cellular Phone with Bluetooth, WLAN & FeliCa and GPS. A full technical description can be found in the manufacturer's documentation.

1.4.2 Test Configuration

Configuration 1:

The EUT was configured in accordance with FCC CFR 47 Part 2 and 22.

1.4.3 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 – 824.7 MHz Loopback

Mode 2 – 836.52 MHz Loopback

Mode 3 – 848.37 MHz Loopback

Mode 4 – 824.7 MHz Test Data Service

Mode 5 – 836.52 MHz Test Data Service

Mode 6 – 848.37 MHz Test Data Service

Mode 7 – 824.88 MHz Loopback

Mode 8 – 848.22 MHz Loopback

Mode 9 – 824.76 MHz Test Data Service

Mode 10 – 828.25 MHz Test Data Service

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



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 or test laboratories as appropriate.

The EUT was powered from either a 3.7 V DC Supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.



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SECTION 2

TEST DETAILS

FCC Testing of the
Sharp CDMA SH111 Tri Band CDMA (BC0/BC3 and BC6) and Cellular Phone with Bluetooth,
WLAN & FeliCa and GPS



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2.1 SPURIOUS EMISSIONS AT BAND EDGE

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 22, Clause 22.905

2.1.2 Equipment Under Test

CDMA SHI11, S/N: SSHFL000934

2.1.3 Date of Test and Modification State

9 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and 22.

In accordance with 22.917(e), 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 9 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 dBm ($43 + 10 \log(P)$), limit. The EUT was operated at maximum power with 64-Ray Orthogonal and BPSK modulation schemes.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 7
 - Mode 8
 - Mode 9
 - Mode 10

2.1.6 Environmental Conditions

	2011
Ambient Temperature	24.2°C
Relative Humidity	33.9%



2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and 22 for Spurious Emissions at Band Edge. Below are the Frequency Blocks the EUT was tested against along with the tested channels.

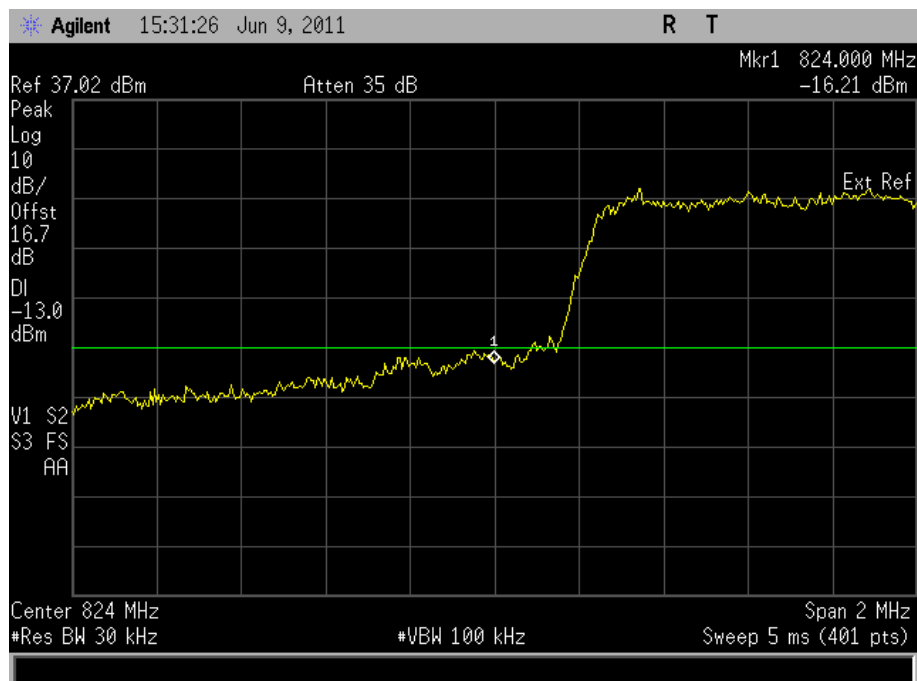
The test results are shown below.

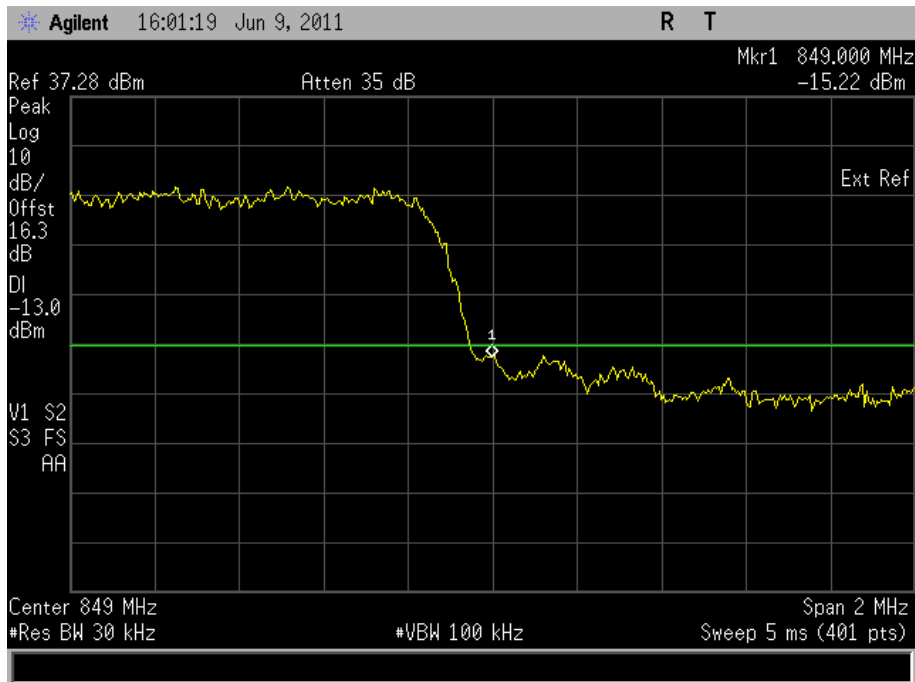
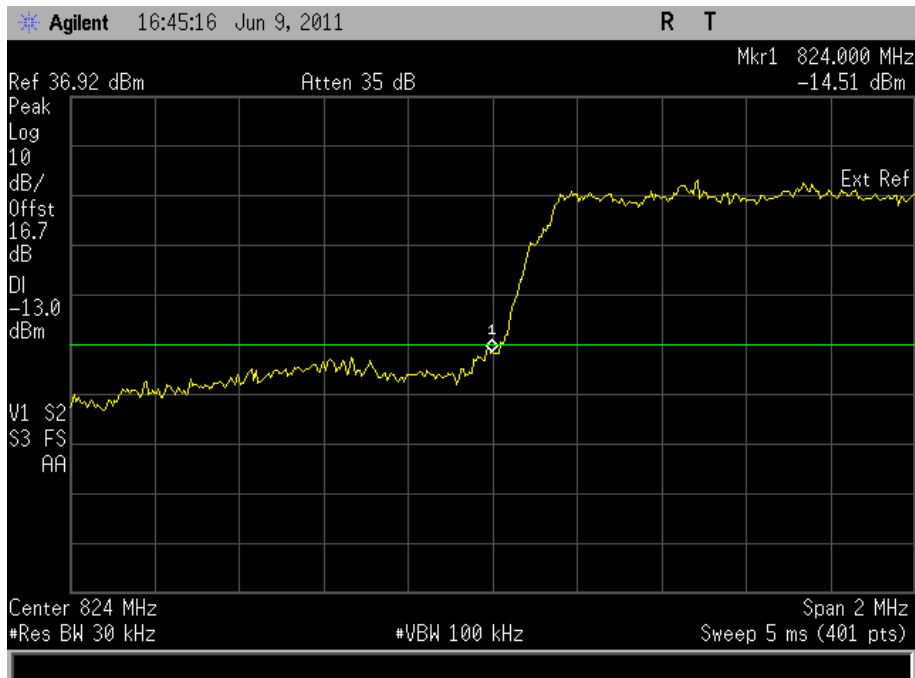
Configuration 1 – Modes 7, 8, 9 and 10

4 V DC Supply

Frequency Block (Mhz)	Mode	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A : (824.0 – 835.0)	SO55, RC1	Channel : 1019 Frequency : 824.88 MHz	N/A
B : (846.5 – 849.0)	SO55, RC1	N/A	Channel : 774 Frequency : 848.22MHz
A : (824.0 – 835.0)	BPSK	Channel : 1015 Frequency : 824.76 MHz	N/A
B : (846.5 – 849.0)	BPSK	N/A	Channel : 775 Frequency : 848.25MHz

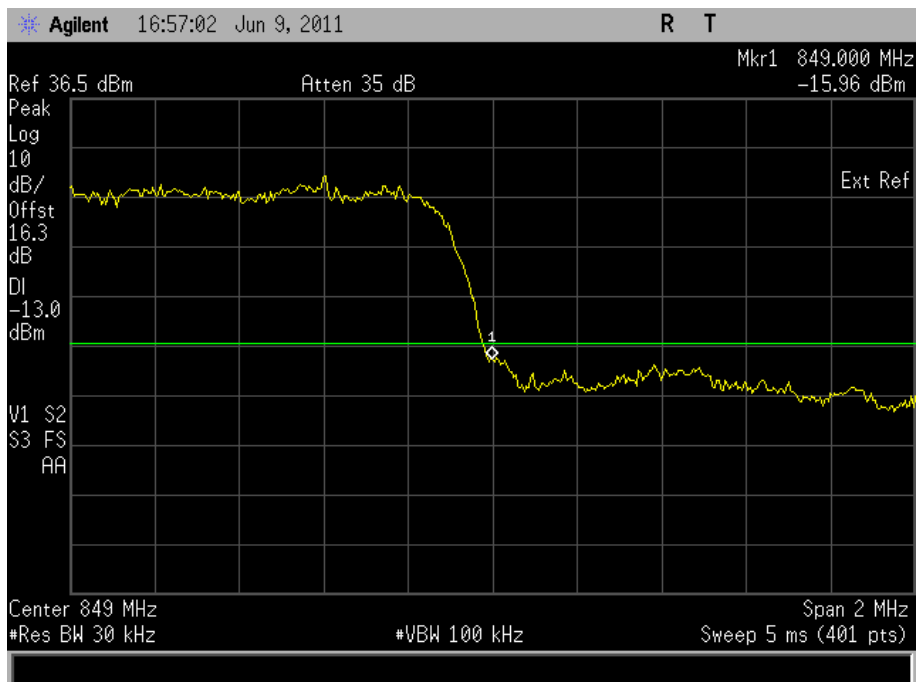
Frequency Block A SO55, RC1



Frequency Block B SO55, RC1Frequency Block A BPSK



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Frequency Block B BPSKLimit Clause

-13 dBm at block edge.



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2.2 EFFECTIVE RADIATED POWER

2.2.1 Specification Reference

FCC CFR 47 Part 22, Clause 22.913(a)

2.2.2 Equipment Under Test

CDMA SHI11, S/N: SSHFL000935

2.2.3 Date of Test and Modification State

30 May 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 22.

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.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 4
 - Mode 5
 - Mode 6

2.2.6 Environmental Conditions

	2011
Ambient Temperature	20.0°C
Relative Humidity	49.0%
Atmospheric Pressure	1009mbar



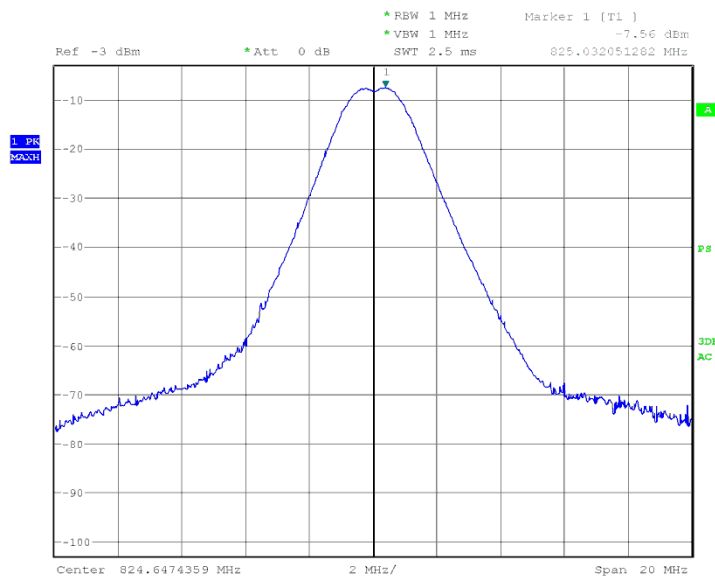
2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22 for Effective Isotropic Radiated Power.

The test results are shown below.

Configuration 1 - Mode 1

Frequency (MHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
824.7	23.0	38.45	0.2	7.0



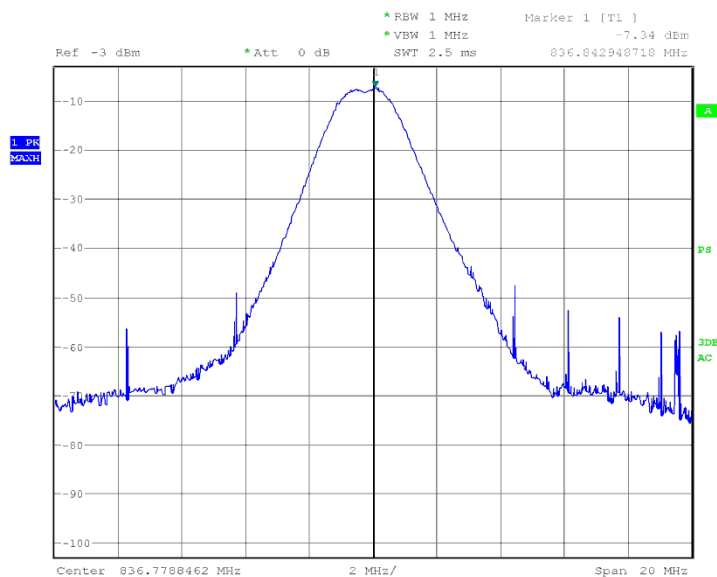
Date: 30.MAY.2011 08:13:29



Product Service

Configuration 1 - Mode 2

Frequency (MHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
836.52	23.2	38.45	0.21	7.0



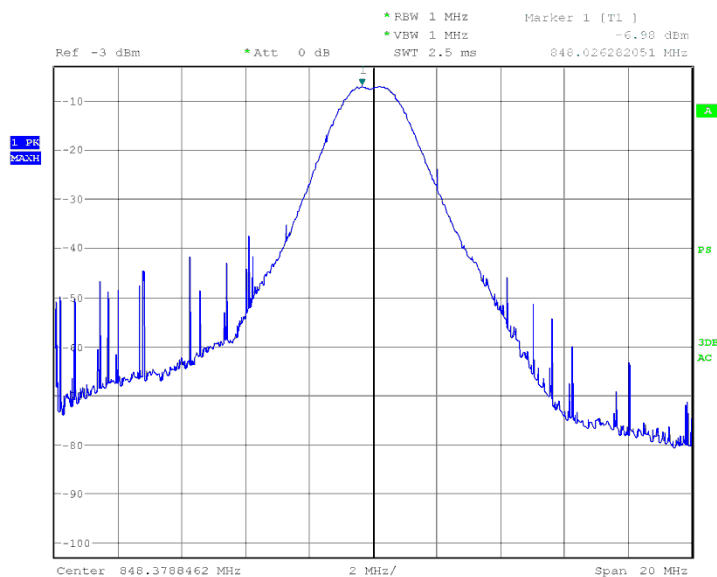
Date: 30.MAY.2011 08:24:04



Product Service

Configuration 1 - Mode 3

Frequency (MHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
848.37	23.4	38.45	0.21	7.0



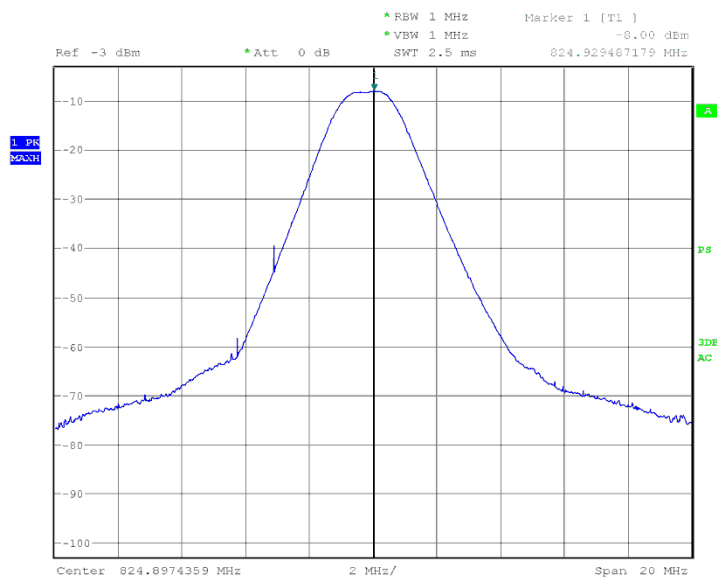
Date: 30.MAY.2011 08:35:01



Product Service

Configuration 1 - Mode 4

Frequency (MHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
848.37	23.4	38.45	0.21	7.0



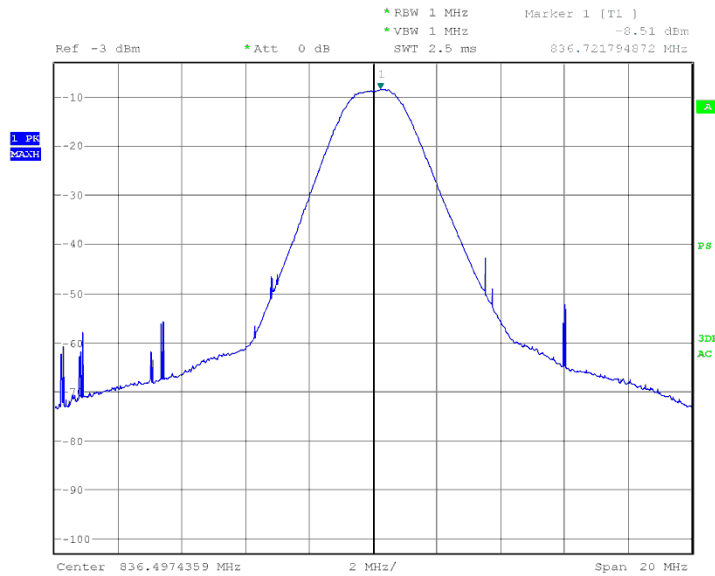
Date: 30.MAY.2011 09:07:42



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Configuration 1 - Mode 5

Frequency (MHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
848.37	22.7	38.45	0.21	7.0



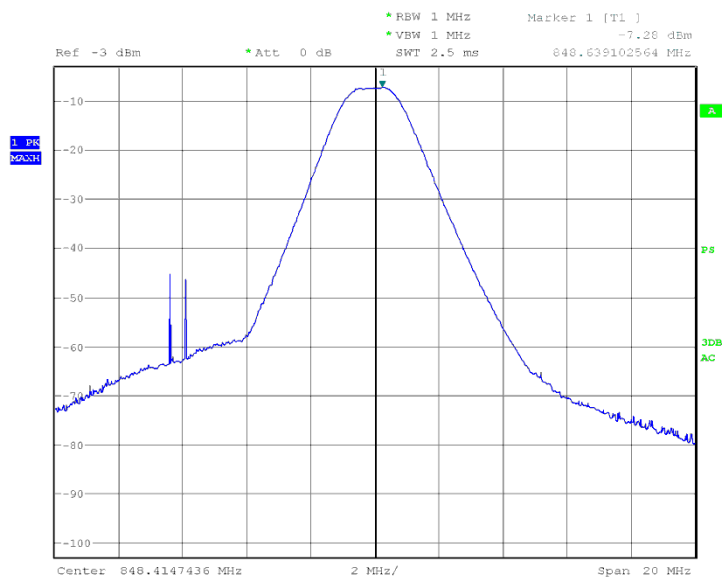
Date: 30.MAY.2011 09:32:40



Product Service

Configuration 1 - Mode 6

Frequency (MHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
848.37	23.6	38.45	0.21	7.0



Date: 30.MAY.2011 09:53:13

Limit Clause

Mobile – 7 W, Base Stations – 500 W



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2.3 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.3.1 Specification Reference

FCC CFR 47 Part 22, Clause 2.1046
FCC CFR 47 Part 22, Clause 22.913(a)

2.3.2 Equipment Under Test

CDMA SH111, S/N: SSHFL000934

2.3.3 Date of Test and Modification State

9 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and 22.

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

The EUT supports CDMA 2000. The EUT was tested in SO55, RC1 and TDSO32, FCH + SCH modes of operation.

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

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3

2.3.6 Environmental Conditions

2011

Ambient Temperature 24.2°C

Relative Humidity 33.9%



2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and 22 for Maximum Peak Output Power - Conducted.

The test results are shown below.

Configuration 1 - Modes 1, 2 and 3

4 V DC Supply

Frequency (MHz)	Mode	Modulation	Result Peak(dBm)	Result Peak (W)
824.7	SO55, RC1	64-Ray Orthogonal	29.09	0.811
836.52	SO55, RC1	64-Ray Orthogonal	29.01	0.796
848.37	SO55, RC1	64-Ray Orthogonal	28.94	0.783
824.7	TDSO32, FCH + SCH	BPSK	28.71	0.743
836.52	TDSO32, FCH + SCH	BPSK	28.59	0.723
848.37	TDSO32, FCH + SCH	BPSK	28.70	0.741

Limit Clause

Mobile – 7 W

Base Stations – 500 W



2.4 EMISSION LIMITATIONS FOR CELLULAR EQUIPMENT

2.4.1 Specification Reference

FCC CFR 47 Part 22, Clause 22.917

2.4.2 Equipment Under Test

CDMA SHI11, S/N : SSHFL000935

2.4.3 Date of Test and Modification State

30 May 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and 22.

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 64-Ray Orthogonal and BPSK modulation schemes. 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.

The test was performed with the EUT in the following configurations and modes of operation:

- Configuration 1 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 4
 - Mode 5
 - Mode 6



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2.4.6 Environmental Conditions

30 May 2011

Ambient Temperature 20.0°C

Relative Humidity 49.0%

Atmospheric Pressure 1009mbar

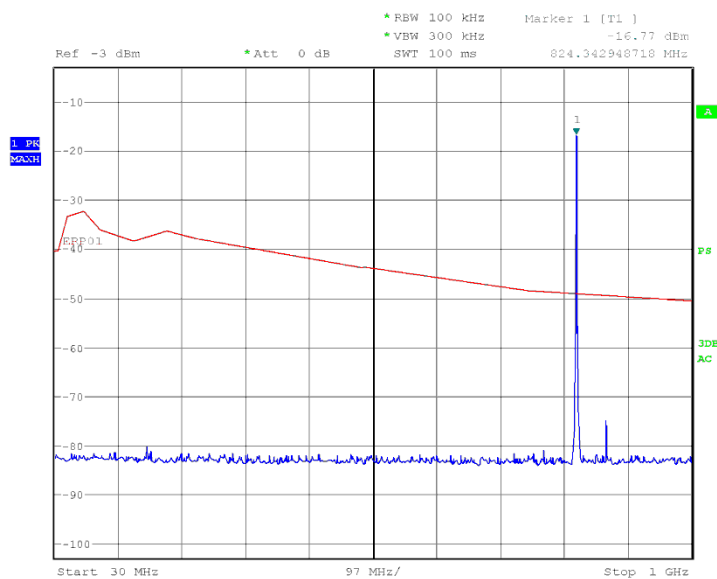
2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 22: 2010 for Emission limitations for Cellular Equipment.

The test results are shown below.

Configuration 1 - Mode 1

30MHz to 1GHz

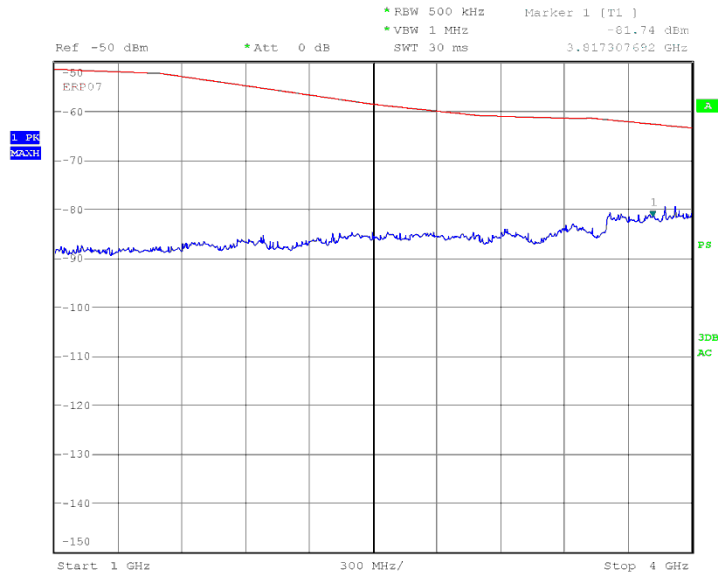


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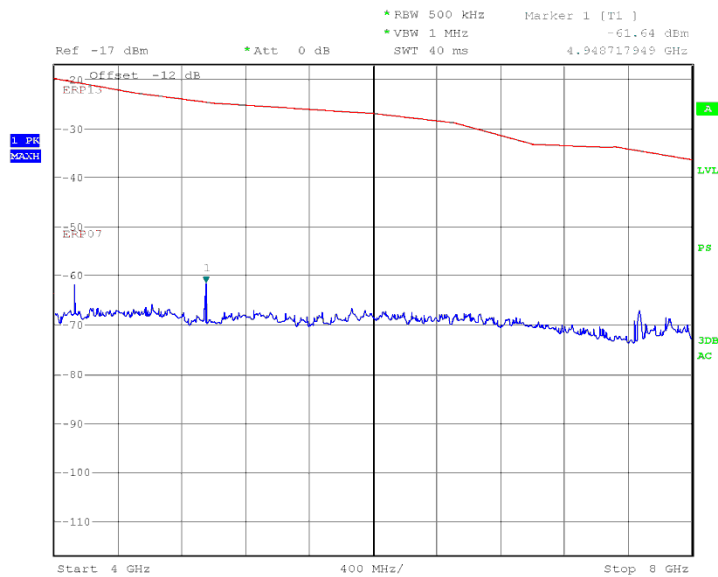
Product Service

1GHz to 4GHz



Date: 30.MAY.2011 10:32:19

4GHz to 8GHz

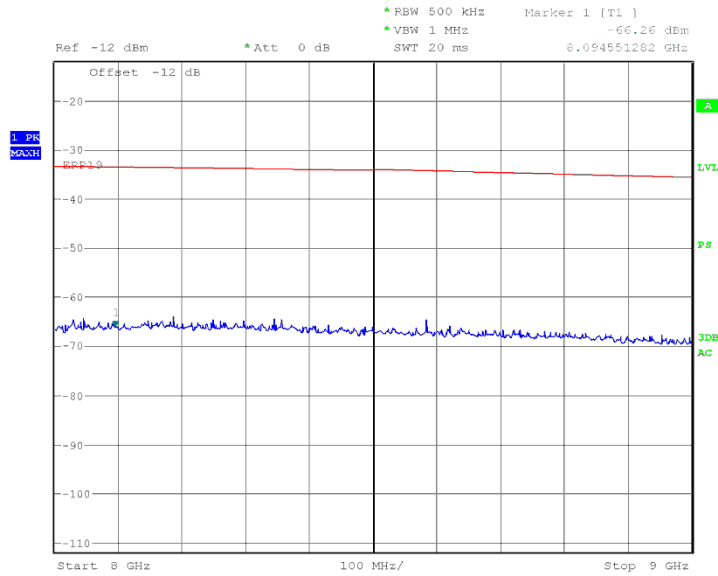


Date: 30.MAY.2011 10:54:20



Product Service

8GHz to 9GHz



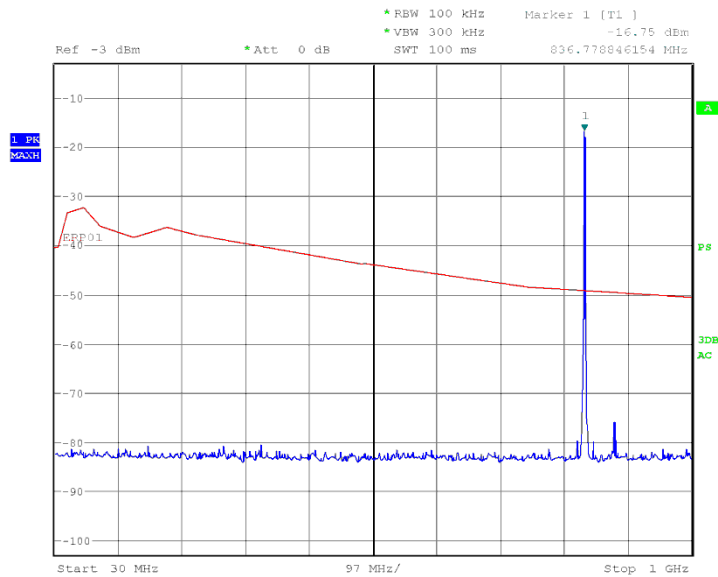
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Product Service

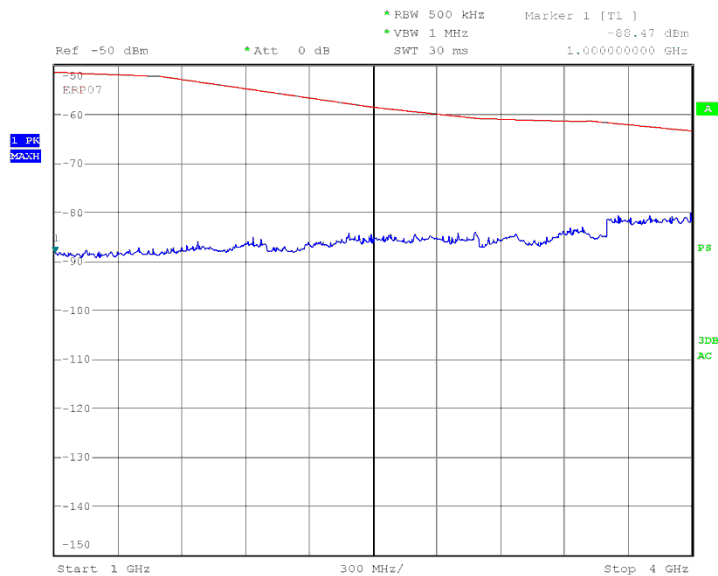
Configuration 1 - Mode 2

30MHz to 1GHz



Date: 30.MAY.2011 08:21:11

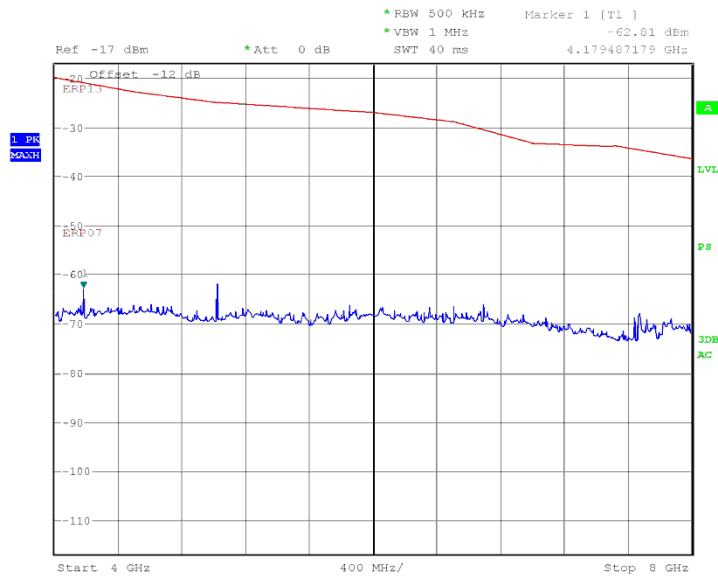
1GHz to 4GHz



Date: 30.MAY.2011 10:38:10

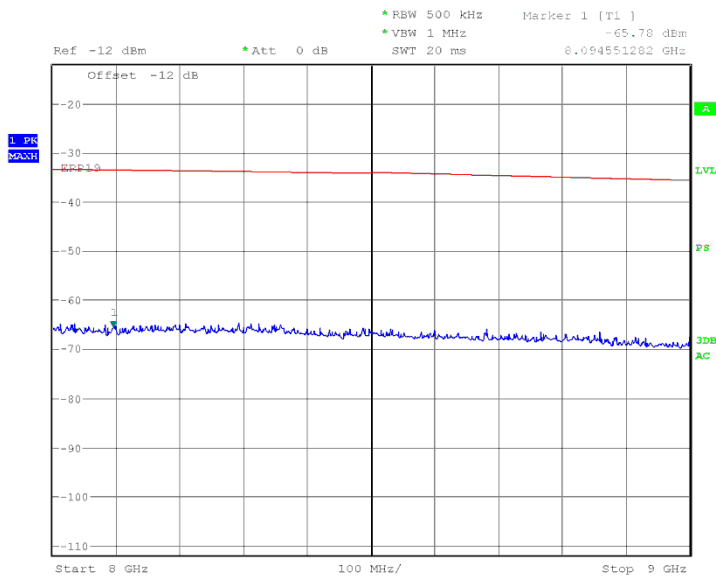


Product Service

4GHz to 8GHz

Date: 30.MAY.2011 10:52:39

-

8GHz to 9GHz

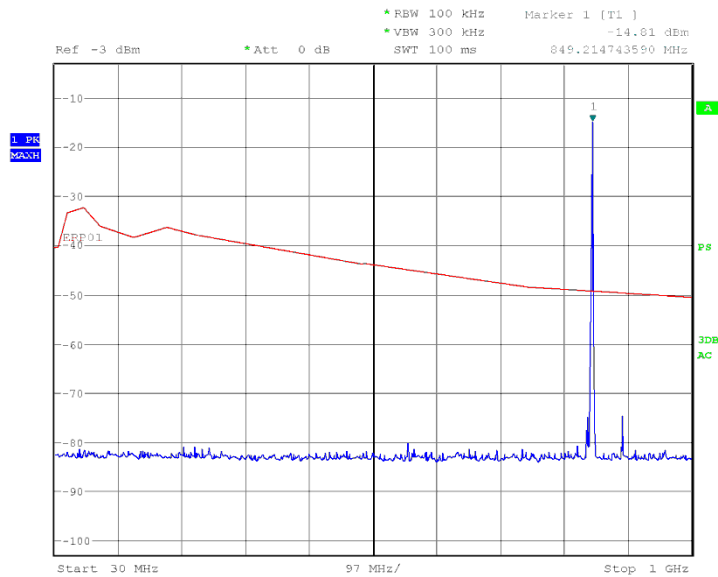
Date: 30.MAY.2011 11:34:37



Product Service

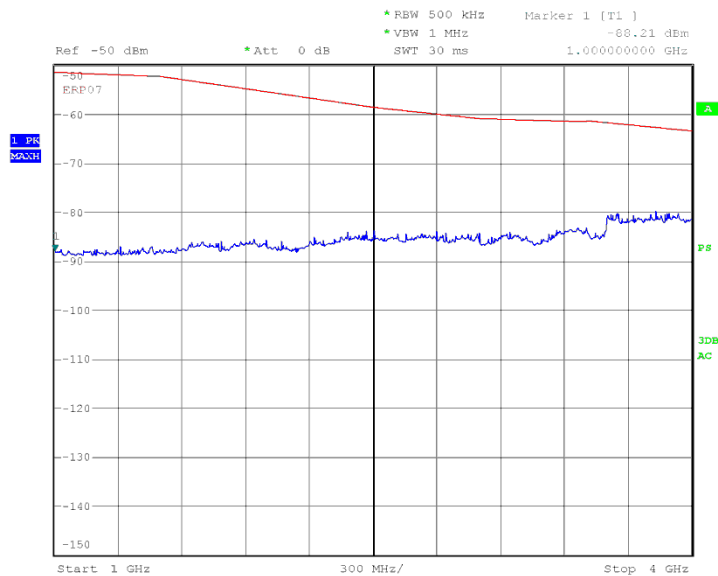
Configuration 1 - Mode 3

30MHz to 1GHz

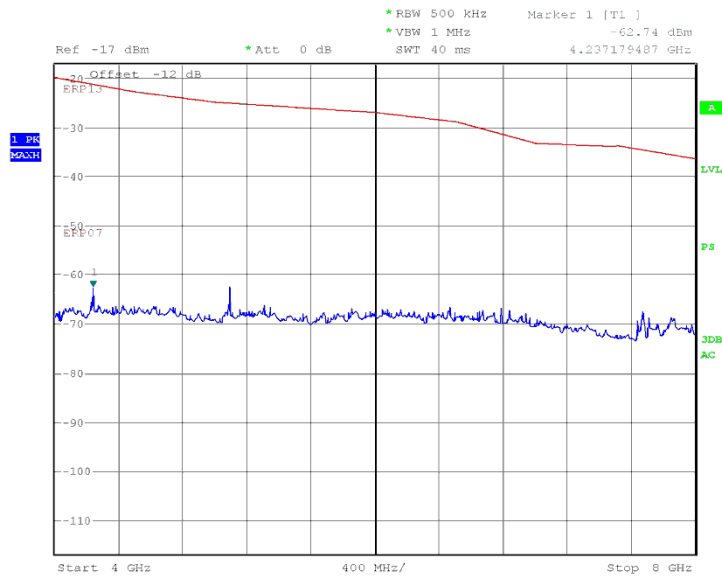


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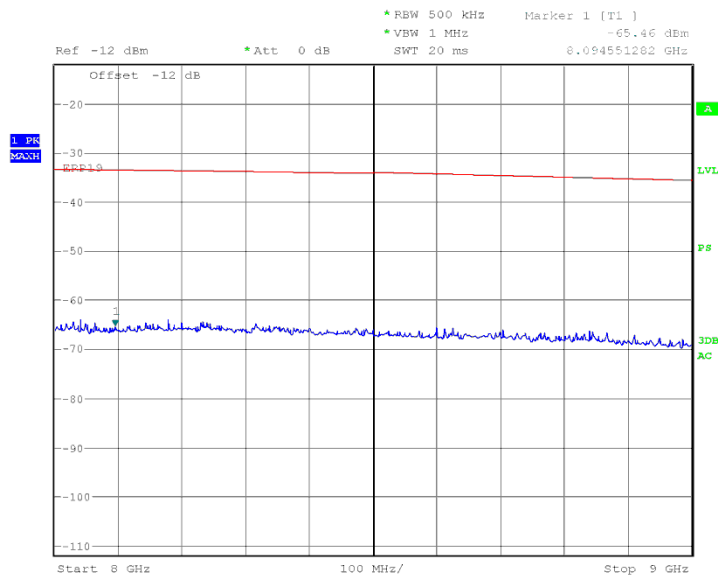
1GHz to 4GHz



Date: 30.MAY.2011 10:42:25

4GHz to 8GHz

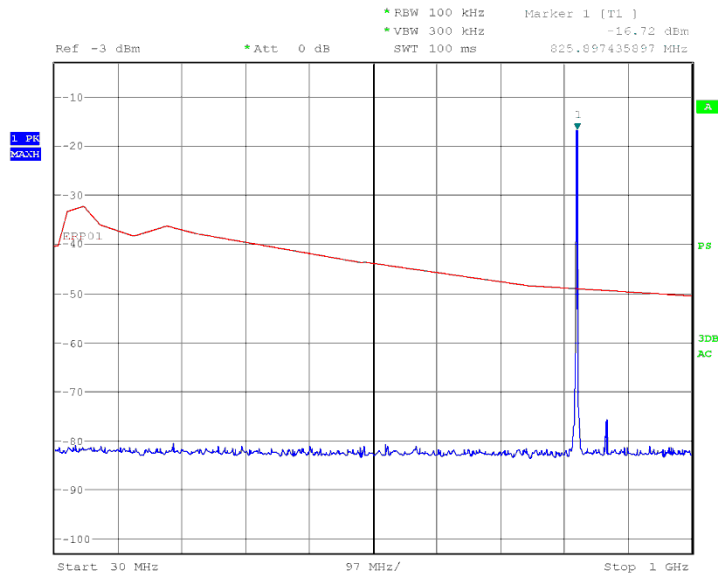
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8GHz to 9GHz

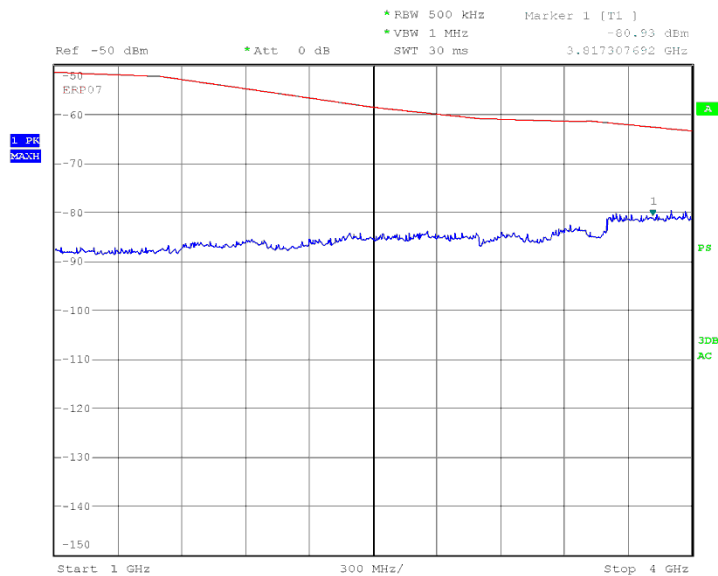
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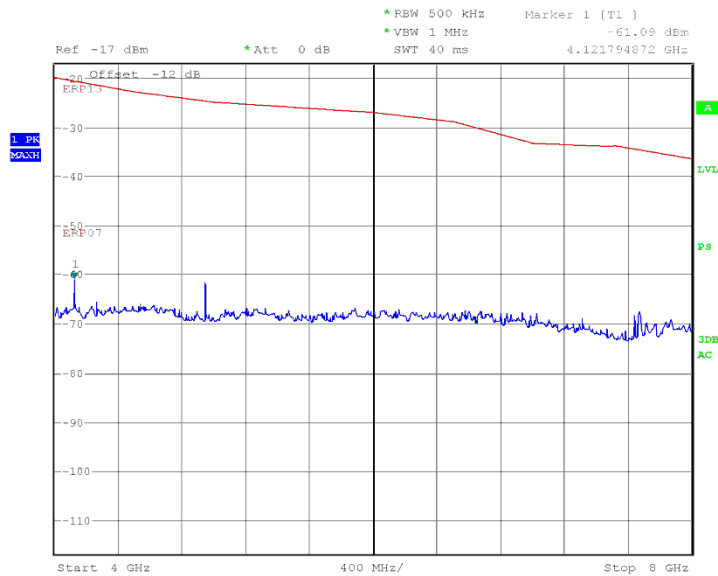
Product Service

Configuration 1 - Mode 430MHz to 1GHz

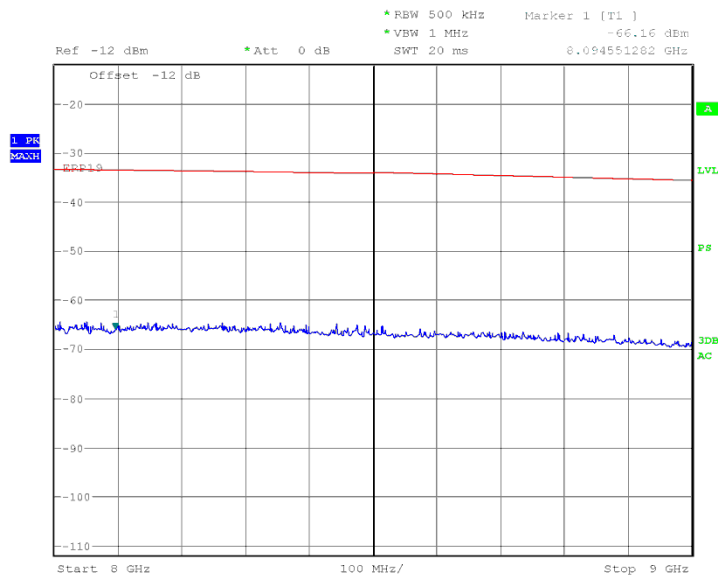
Date: 30.MAY.2011 08:58:30

1GHz to 4GHz

Date: 30.MAY.2011 10:28:05

4GHz to 8GHz

Date: 30.MAY.2011 10:58:22

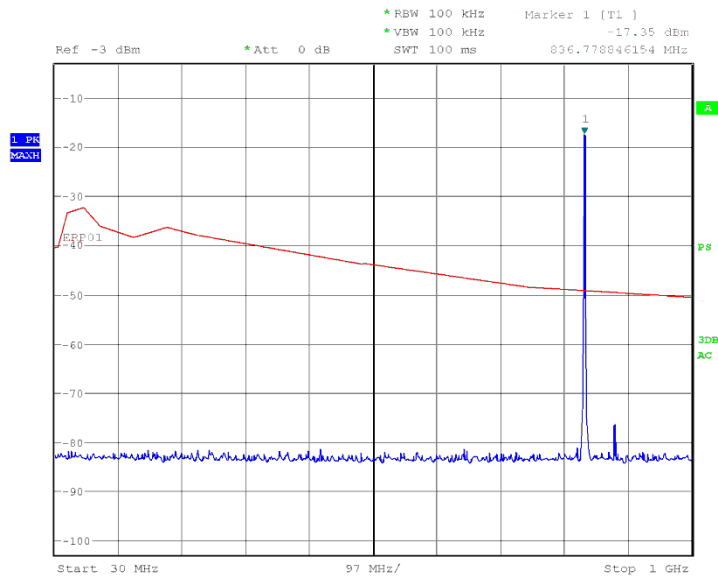
8GHz to 9GHz

Date: 30.MAY.2011 11:25:05



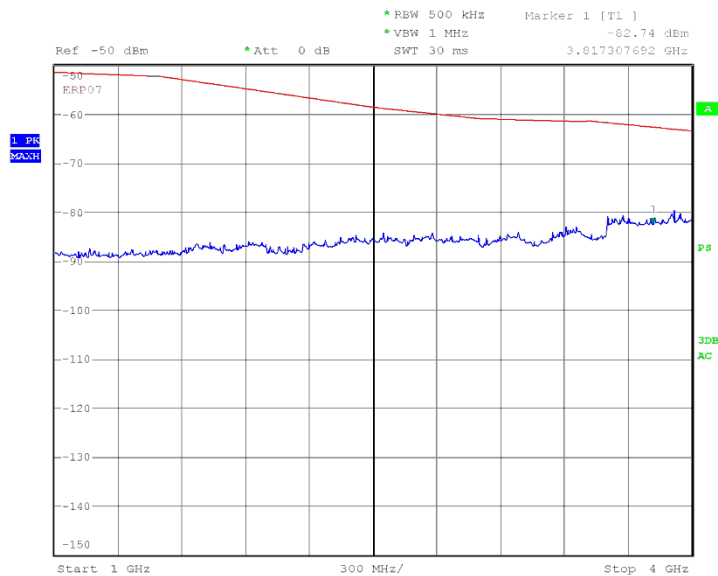
Configuration 1 - Mode 5

30MHz to 1GHz



Date: 30.MAY.2011 09:35:01

1GHz to 4GHz

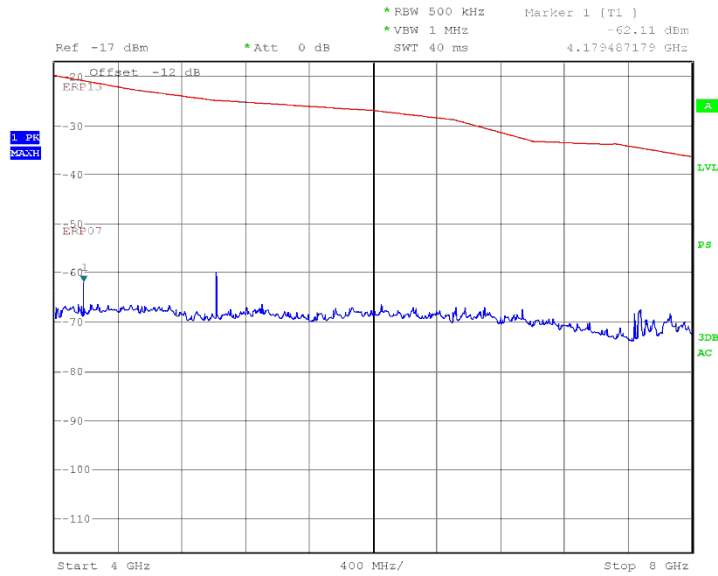


Date: 30.MAY.2011 10:19:51



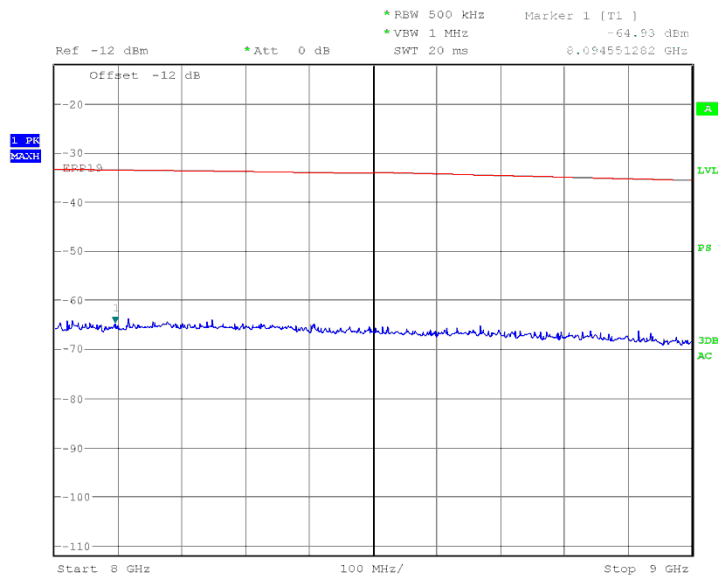
Product Service

4GHz to 8GHz



Date: 30.MAY.2011 11:00:50

8GHz to 9GHz

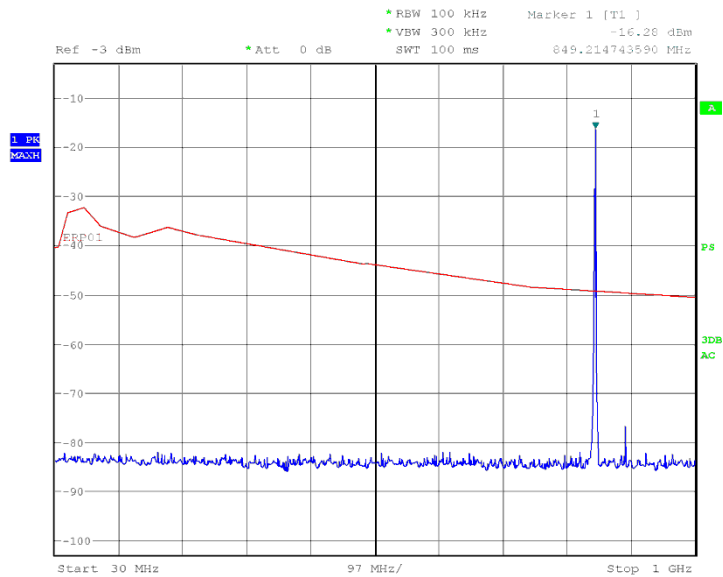


Date: 30.MAY.2011 11:22:17



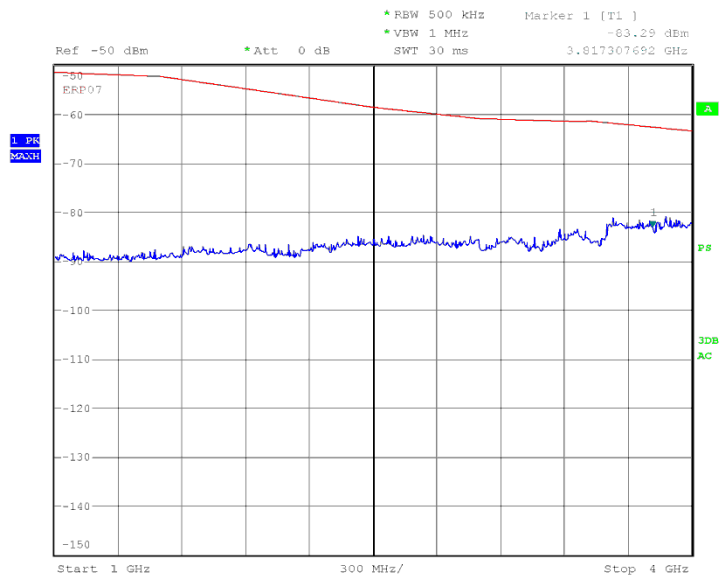
Configuration 1 - Mode 6

30MHz to 1GHz



Date: 30.MAY.2011 09:38:12

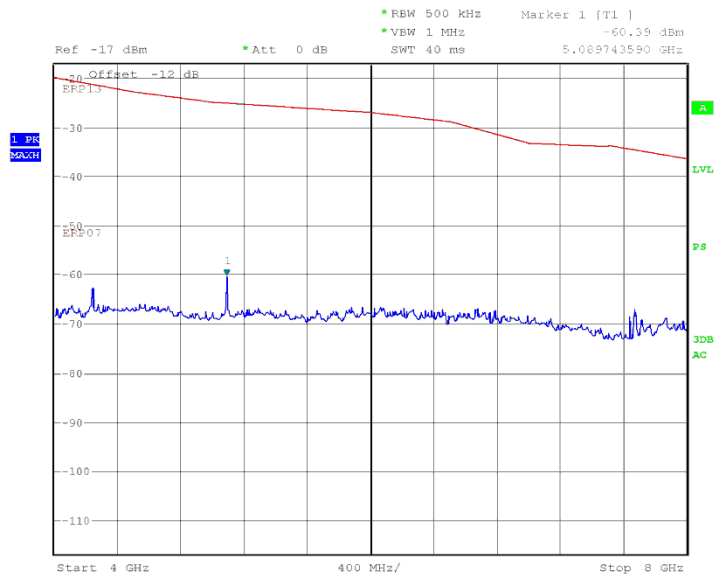
1GHz to 4GHz



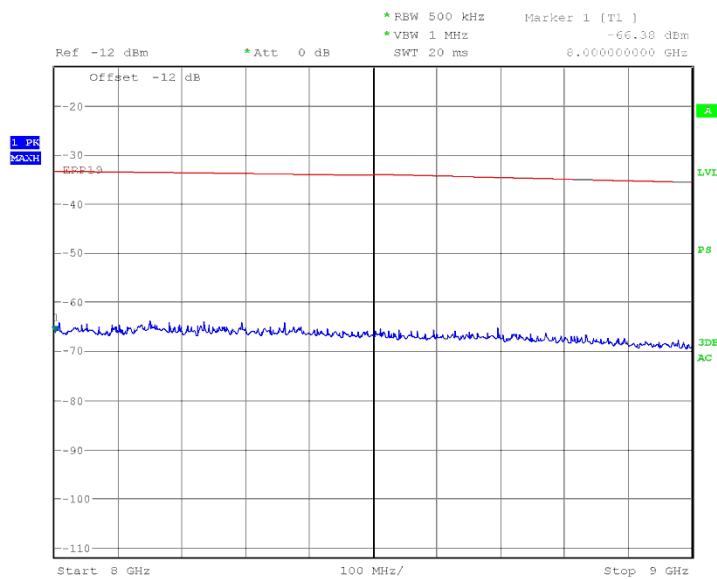
Date: 30.MAY.2011 10:17:59



Product Service

4GHz to 8GHz

Date: 30.MAY.2011 11:06:38

8GHz to 9GHz

Date: 30.MAY.2011 11:15:11

Limit Clause

43+10log(P) or -13 dBm



Product Service

2.5 CONDUCTED SPURIOUS EMISSIONS

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 22, Clause 22.917(a)

2.5.2 Equipment Under Test

CDMA SHI11, S/N: SSHFL000934

2.5.3 Date of Test and Modification State

9 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and 22.

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 9 GHz. The EUT was set to transmit on full power with CDMA 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 22.917(b). The spectrum analyser detector was set to max hold.

From 9 kHz to 4 GHz, an attenuator was used. For measuring the range 1.5 GHz to 9 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 band was used as reference level offsets to ensure worst case.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 4
 - Mode 5
 - Mode 6

2.5.6 Environmental Conditions

9 June 2011

Ambient Temperature 24.2°C

Relative Humidity 33.9%



Product Service

2.5.7 Test Results

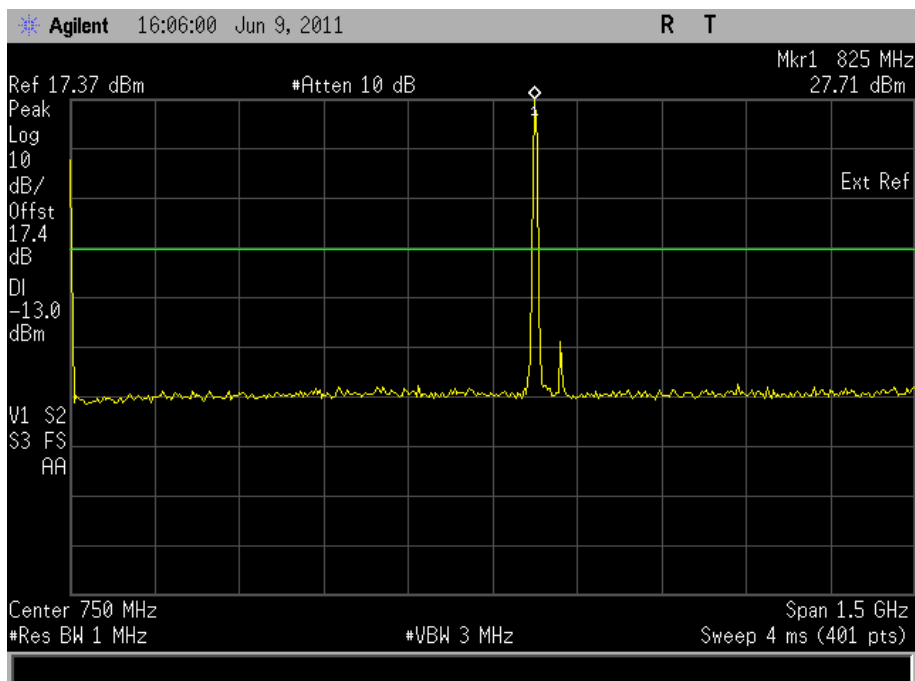
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and 22 for Conducted Spurious Emissions.

The test results are shown below.

9 V DC Supply

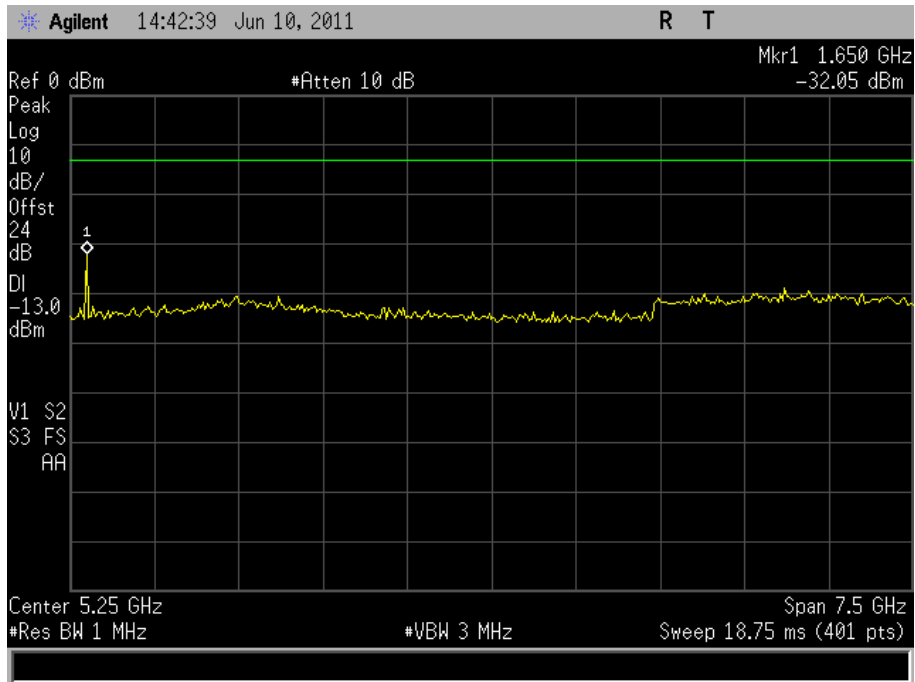
Configuration 1 – Mode 1

9 kHz to 9 GHz



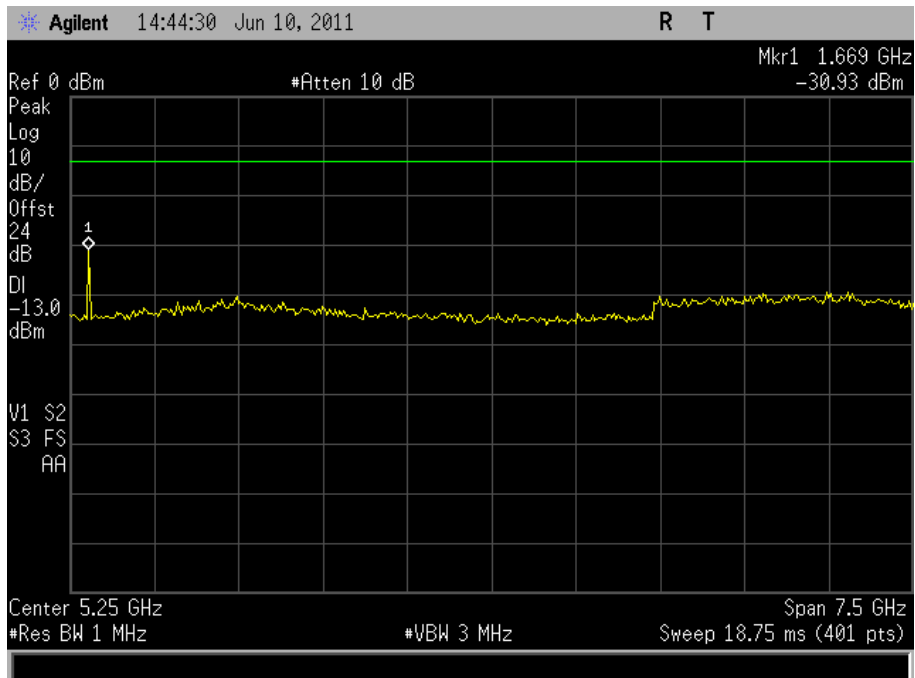
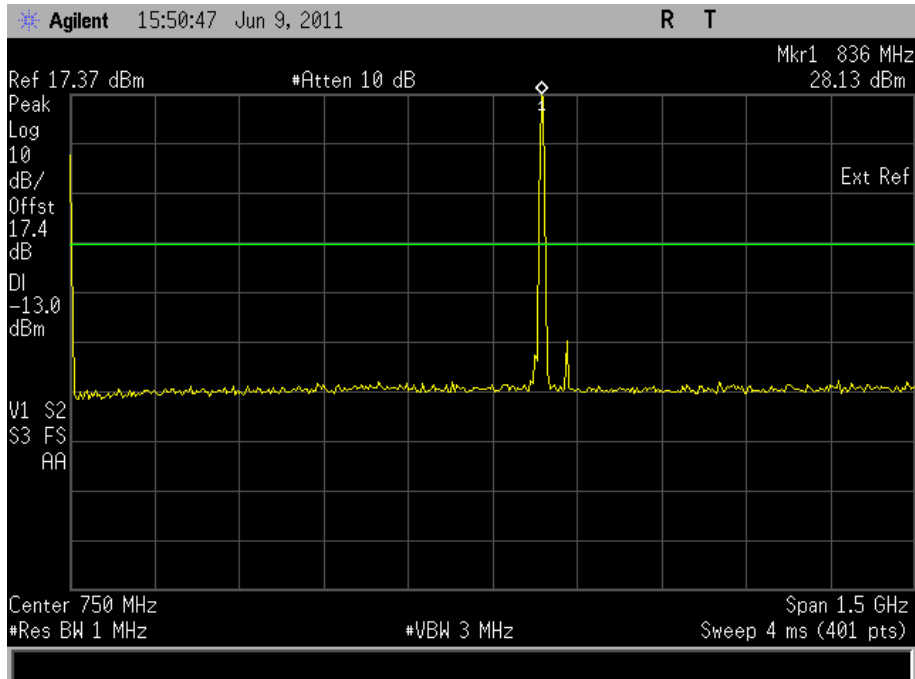


Product Service



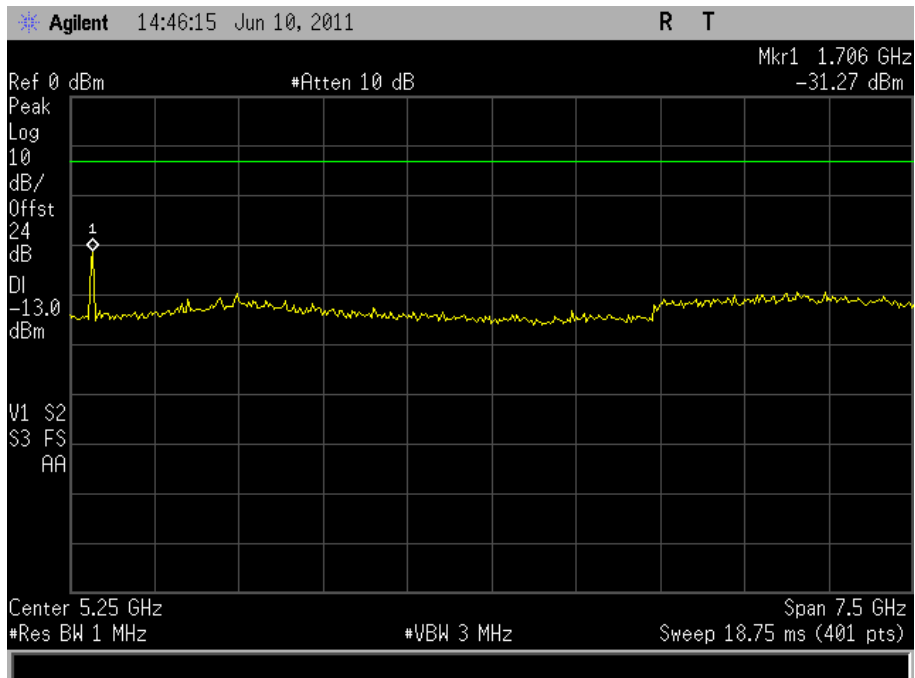
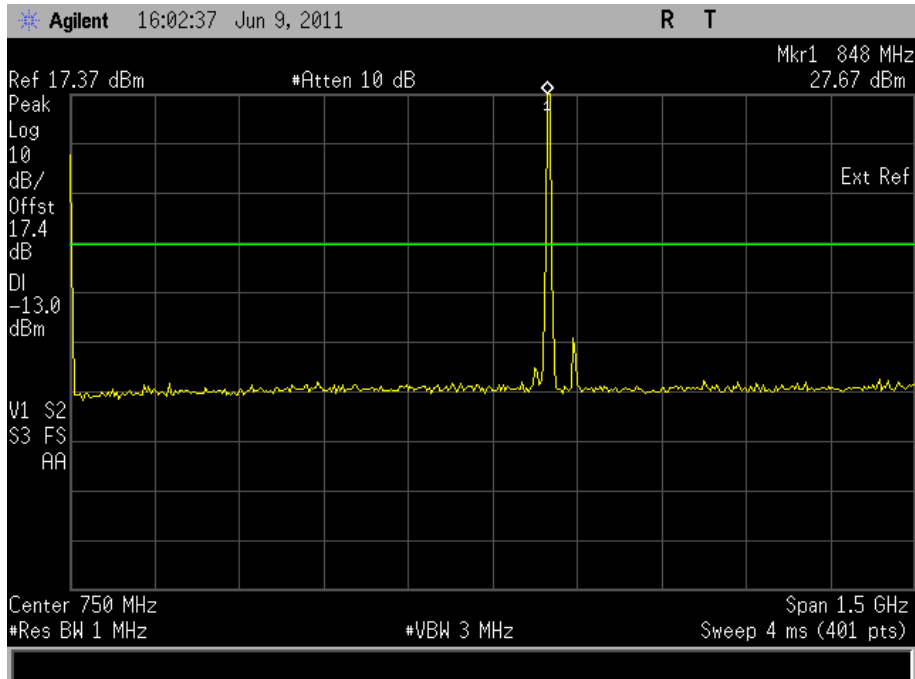


Product Service

Configuration 1 - Mode 29 kHz to 9 GHz

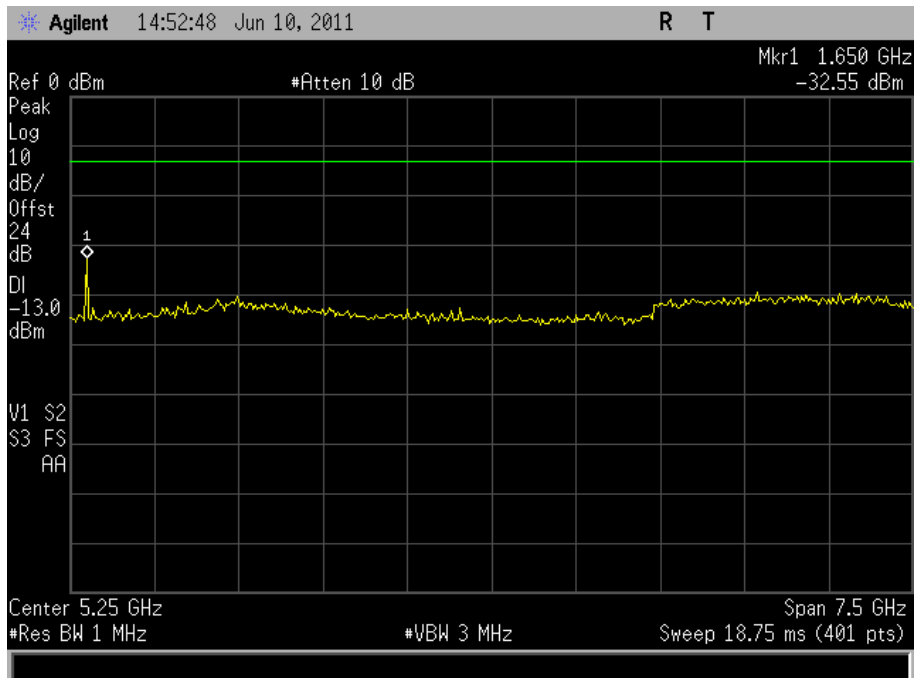
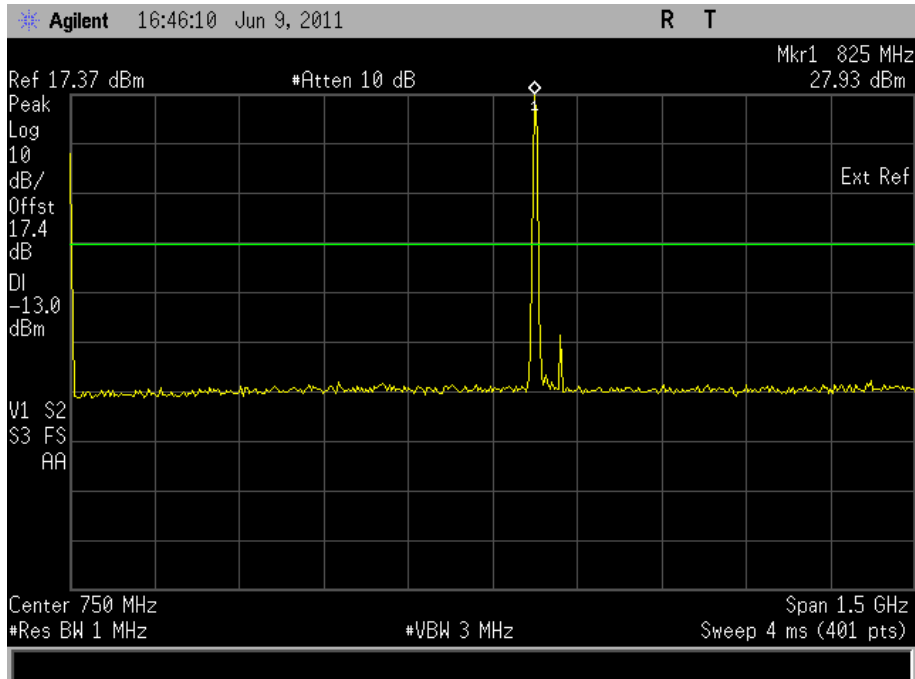


Product Service

Configuration 1 - Mode 39 kHz to 9 GHz

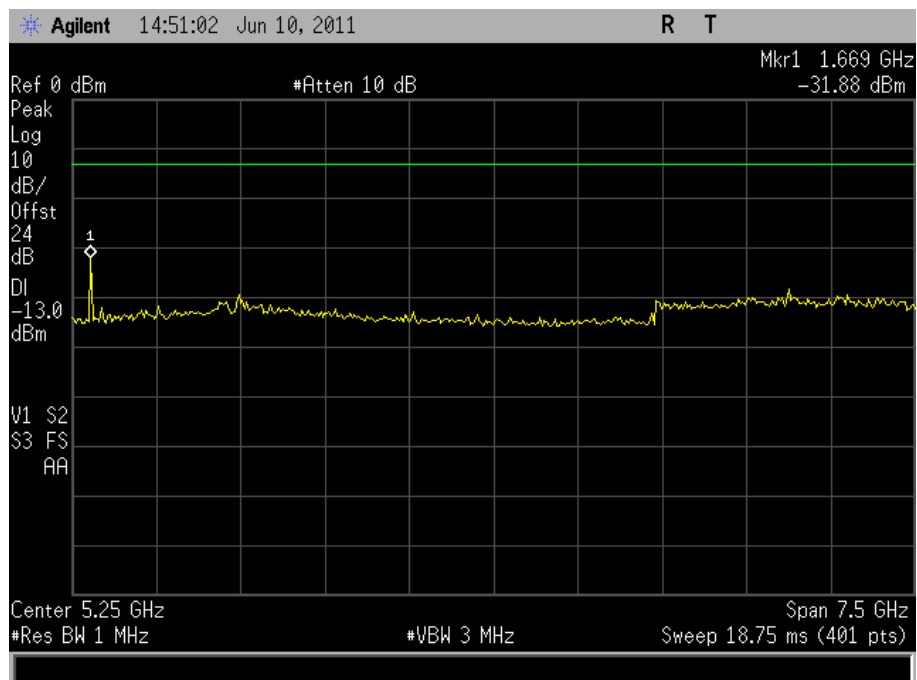
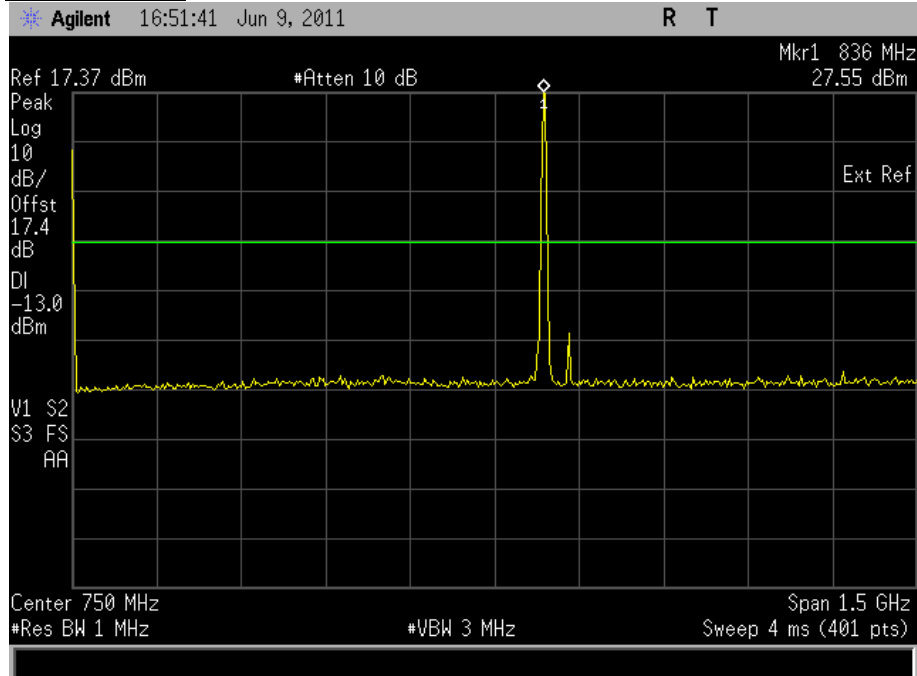


Product Service

Configuration 1 - Mode 49 kHz to 9 GHz

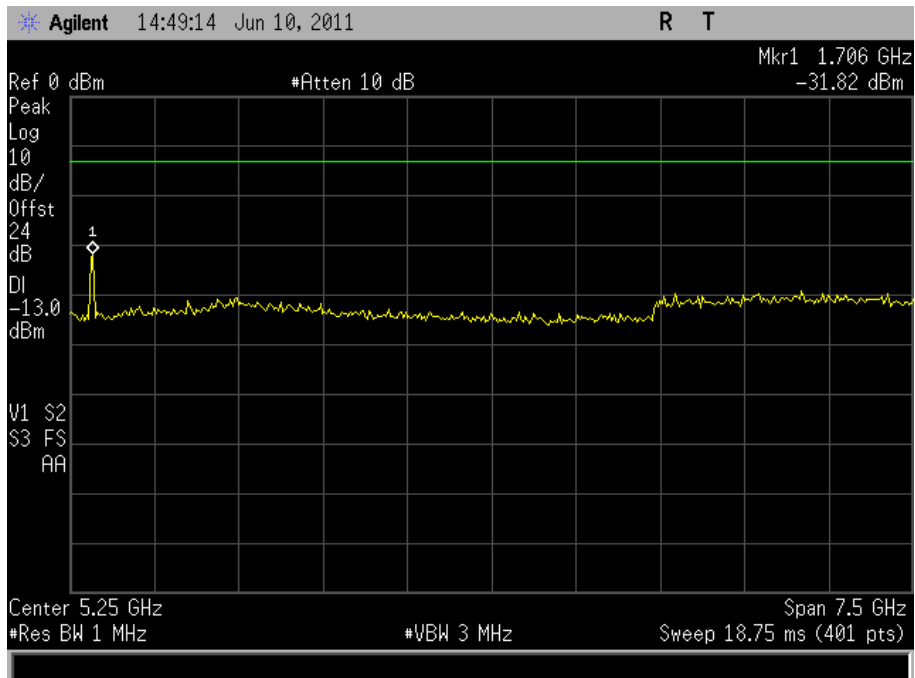
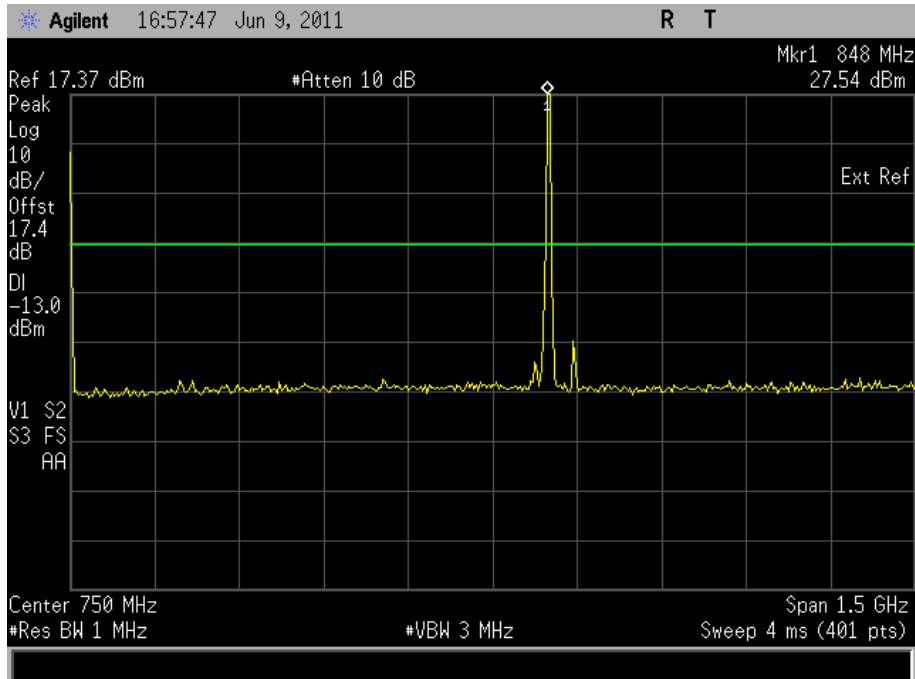


Product Service

Configuration 1 - Mode 59 kHz to 9 GHz



Product Service

Configuration 1 - Mode 69 kHz to 9 GHzLimit Clause

43+10log(P) or -13 dBm



Product Service

2.6 OCCUPIED BANDWIDTH

2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 (h)
FCC CFR 47 Part 22, Clause 22.917(b)

2.6.2 Equipment Under Test

CDMA SH111, S/N: SSHFL000934

2.6.3 Date of Test and Modification State

9 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and 22.

The EUT was transmitting at maximum power, with 64-Ray Orthogonal and BPSK modulation schemes. 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.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 4
 - Mode 5
 - Mode 6

2.6.6 Environmental Conditions

9 June 2011

Ambient Temperature 24.2°C

Relative Humidity 33.9%



Product Service

2.6.7 Test Results

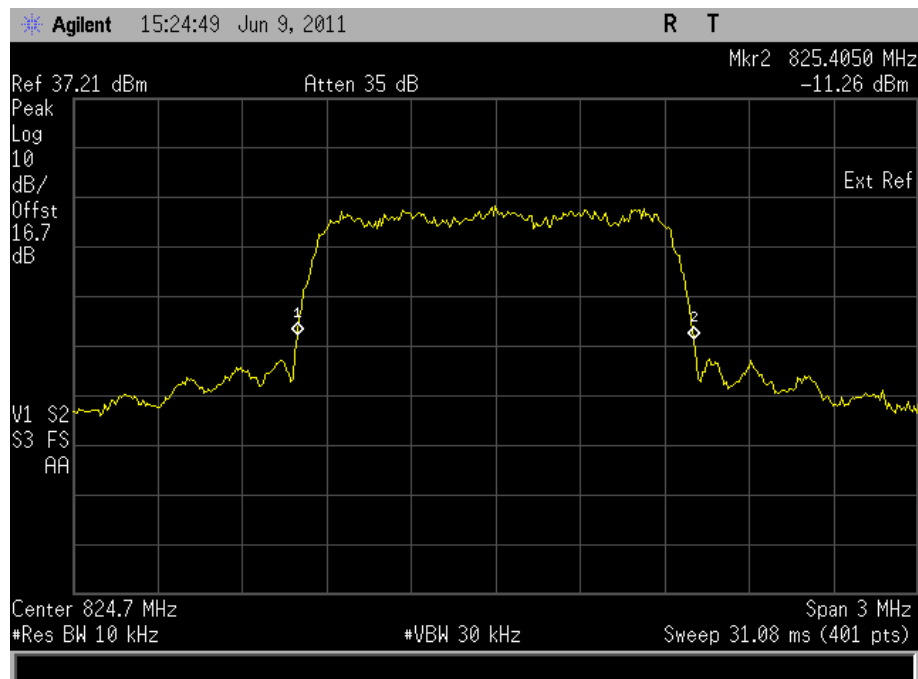
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and 22 for Occupied Bandwidth.

The test results are shown below.

4 V DC Supply

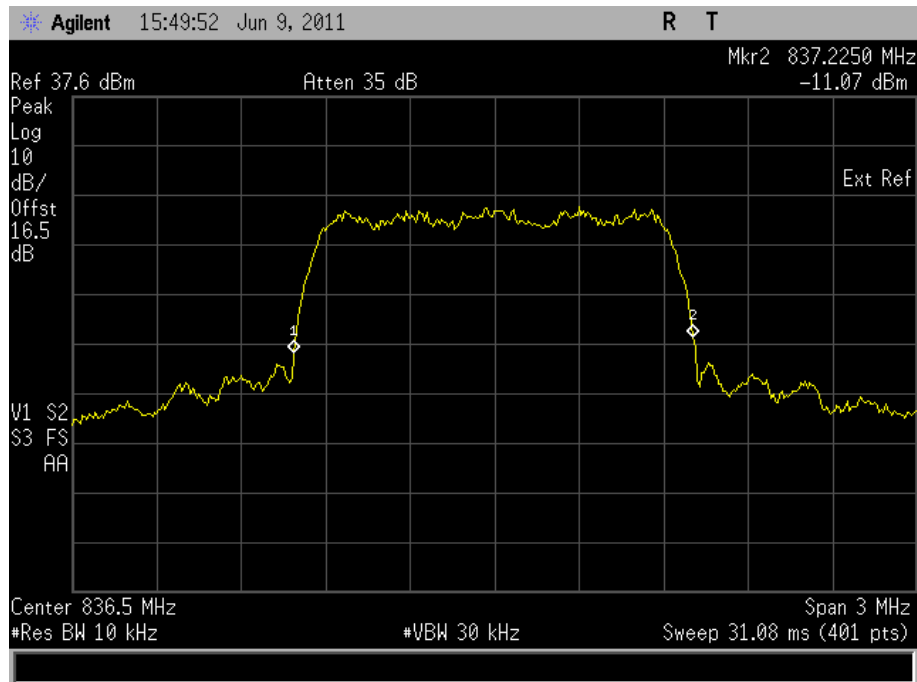
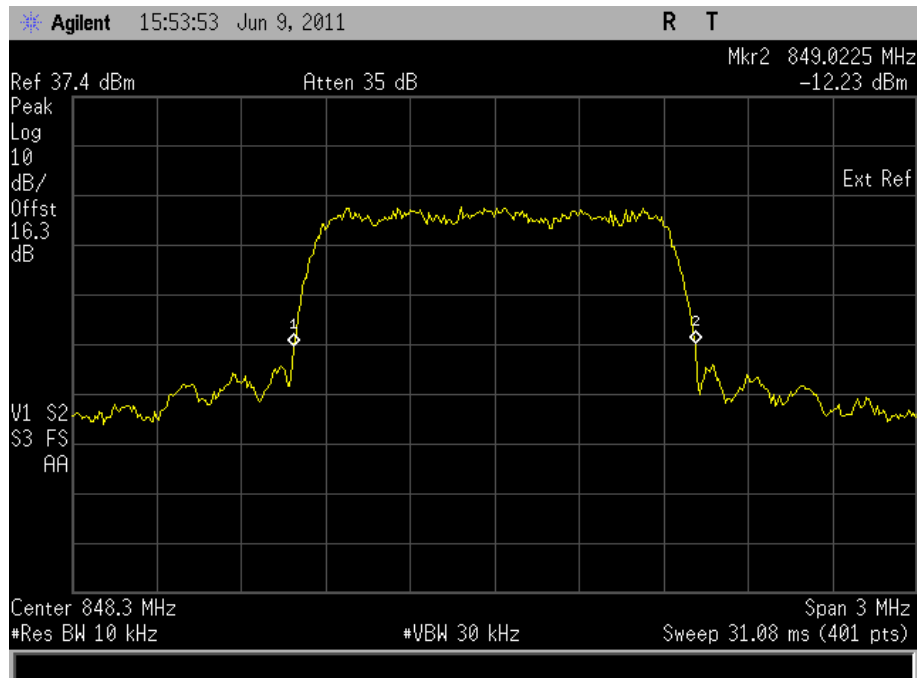
Frequency (MHz)	Mode	Modulation	Occupied Bandwidth (kHz)
824.7	SO55, RC1	64-Ray Orthogonal	1410.0
836.52	SO55, RC1	64-Ray Orthogonal	1417.5
848.37	SO55, RC1	64-Ray Orthogonal	1425.0
824.7	TDSO32, FCH + SCH	BPSK	1417.5
836.52	TDSO32, FCH + SCH	BPSK	1417.5
848.37	TDSO32, FCH + SCH	BPSK	1417.5

Configuration 1 – Mode 1



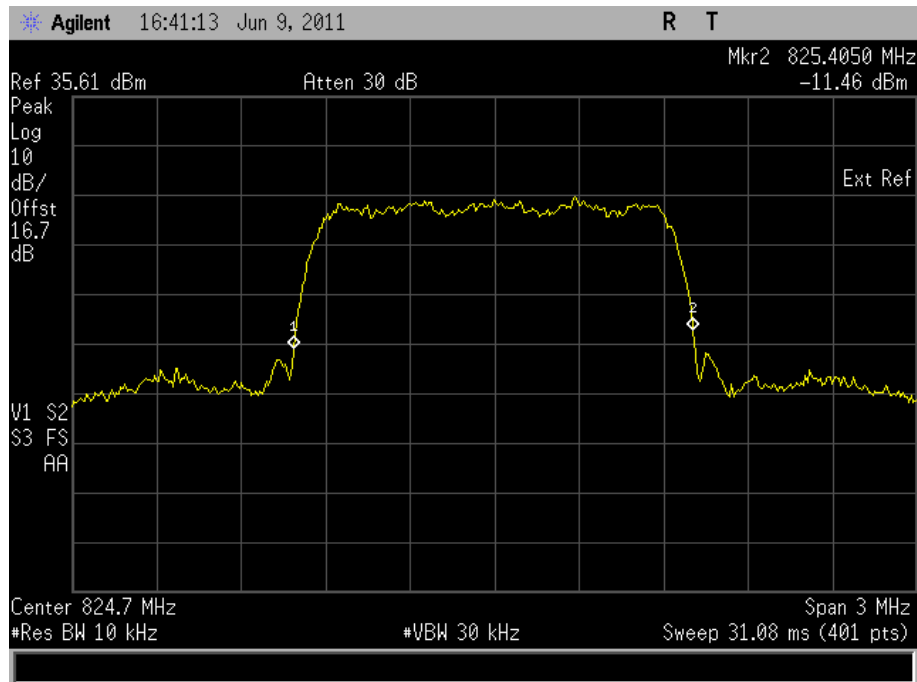
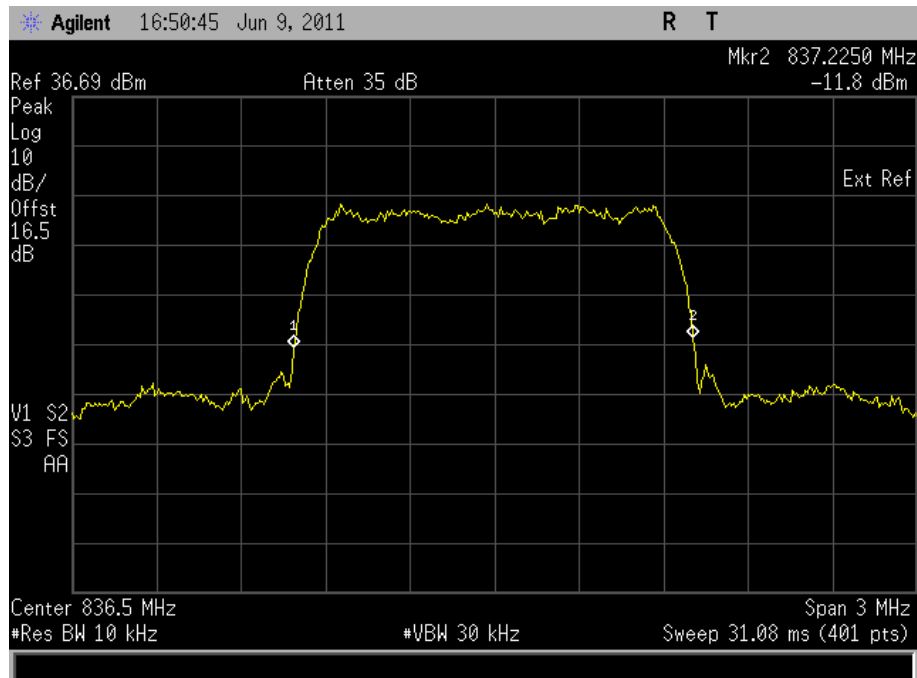


Product Service

Configuration 1 - Mode 2Configuration 1 - Mode 3

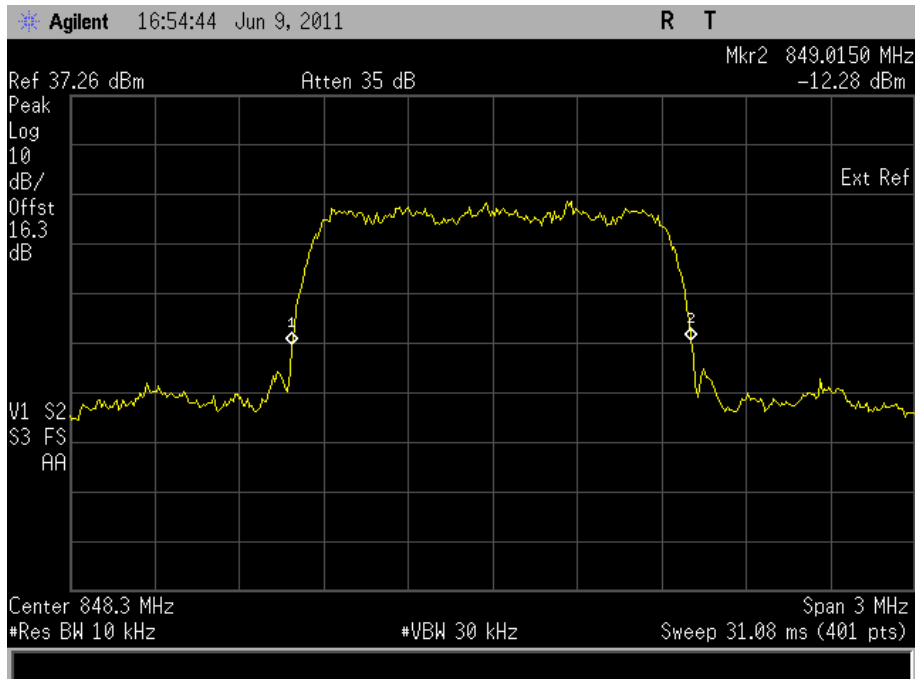


Product Service

Configuration 1 - Mode 4Configuration 1 - Mode 5Configuration 1 - Mode 6



Product Service



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

2.7 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS**2.7.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 22, Clause 22.355

2.7.2 Equipment Under Test

CDMA SH111, S/N: SSHFL000934

2.7.3 Date of Test and Modification State

9 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and 22.

The EUT was set to transmit on maximum power with 64-Ray Orthogonal and BPSK modulation schemes. An FSQ 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.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

2.7.6 Environmental Conditions

9 June 2011

Ambient Temperature 21.4°C

Relative Humidity 39%



2.7.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and 22 for Frequency Stability Under Temperature Variations.

The test results are shown below.

Configuration 1 - Mode 2

9 V DC Supply

Temperature Interval (°C)	Test Frequency (MHz)	Mode	Modulation	Deviation (Hz)	Limit (kHz)
-30	836.52	SO55, RC1	64-Ray Orthogonal	+19	±1.5ppm or ±1.322
-20	836.52	SO55, RC1	64-Ray Orthogonal	-30	±1.5ppm or ±1.322
-10	836.52	SO55, RC1	64-Ray Orthogonal	+8	±1.5ppm or ±1.322
0	836.52	SO55, RC1	64-Ray Orthogonal	-10	±1.5ppm or ±1.322
+10	836.52	SO55, RC1	64-Ray Orthogonal	-32	±1.5ppm or ±1.322
+20	836.52	SO55, RC1	64-Ray Orthogonal	-5	±1.5ppm or ±1.322
+30	836.52	SO55, RC1	64-Ray Orthogonal	+15	±1.5ppm or ±1.322
+40	836.52	SO55, RC1	64-Ray Orthogonal	-28	±1.5ppm or ±1.322
+50	836.52	SO55, RC1	64-Ray Orthogonal	+11	±1.5ppm or ±1.322
-30	836.52	TDSO32, FCH + SCH	BPSK	+9	±1.5ppm or ±1.322
-20	836.52	TDSO32, FCH + SCH	BPSK	+5	±1.5ppm or ±1.322
-10	836.52	TDSO32, FCH + SCH	BPSK	-15	±1.5ppm or ±1.322
0	836.52	TDSO32, FCH + SCH	BPSK	-17	±1.5ppm or ±1.322
+10	836.52	TDSO32, FCH + SCH	BPSK	-18	±1.5ppm or ±1.322
+20	836.52	TDSO32, FCH + SCH	BPSK	-13	±1.5ppm or ±1.322
+30	836.52	TDSO32, FCH + SCH	BPSK	+10	±1.5ppm or ±1.322
+40	836.52	TDSO32, FCH + SCH	BPSK	+4	±1.5ppm or ±1.322
+50	836.52	TDSO32, FCH + SCH	BPSK	+12	±1.5ppm or ±1.322

Limit Clause

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20	20	50
50 to 450	5	5	50
450 to 512	2.5	5	5
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10	n/a	n/a



Product Service

2.8 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS

2.8.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 22, Clause 22.355

2.8.2 Equipment Under Test

CDMA SHI11, SSHFL000934

2.8.3 Date of Test and Modification State

9 June 2011 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and 22.

The EUT was set to transmit on maximum power on 64-Ray Orthogonal and BPSK modulation schemes. An FSQ Signal Analyser, was used to measure the frequency error. The maximum result was taken over 200 bursts.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 2

2.8.6 Environmental Conditions

9 June 2011

Ambient Temperature 21.4°C

Relative Humidity 41.0%



2.8.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and 22 for Frequency Stability Under Voltage Variations.

The test results are shown below.

Configuration 1 - Mode 2

DC Voltage (V)	Test Frequency (MHz)	Mode	Modulation	Deviation (Hz)	Deviation Limit (kHz)
4.0	836.52	SO55, RC1	64-Ray Orthogonal	+5	
3.7	836.52	SO55, RC1	64-Ray Orthogonal	+12	±1.5ppm or ±1.322
4.0	836.52	TDSO32, FCH + SCH	BPSK	-13	±1.5ppm or ±1.322
3.7	836.52	TDSO32, FCH + SCH	BPSK	+8	±1.5ppm or ±1.322

Limit Clause

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20	20	50
50 to 450	5	5	50
450 to 512	2.5	5	5
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10	n/a	n/a



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 2.2 – Effective Radiated Power					
CMU200 Test Set	Rohde & Schwarz	CMU200	N/A	12	02-Feb-2012
Peak Power Analyser	Hewlett Packard	8990A	107	12	11-Feb-2012
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	12-Nov-2011
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	12-Nov-2011
Antenna (Bilog)	Schaffner	CBL6143	287	24	19-Jan-2012
Screened Room (5)	Rainford	Rainford	1545	24	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	12-Aug-2011
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	9-Sep-2011
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	12	10-Aug-2011
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
Section 2.4 – Emissions Limitations for Cellular Equipment					
CMU200 Test Set	Rohde & Schwarz	CMU200	N/A	12	02-Feb-2012
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	12-Nov-2011
Antenna (Bilog)	Schaffner	CBL6143	287	24	19-Jan-2012
Antenna (Double Ridge Guide)	Q-Par Angus Ltd	QSH 180K	1511	24	2-Aug-2012
Pre-Amplifier	Phase One	PS04-0086	1533	12	15-Sep-2011
Pre-Amplifier	Phase One	PS04-0087	1534	12	22-Sep-2011
Screened Room (5)	Rainford	Rainford	1545	24	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	12-Aug-2011
Amplifier (1 - 8GHz)	Phase One	PS06-0060	3175	12	2-Jul-2011
Amplifier (8 - 18GHz)	Phase One	PS06-0061	3176	12	2-Jul-2011
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	9-Sep-2011
3 GHz High Pass Filter	K&L Microwave	11SH10-3000/X18000-O/O	3552	12	14-Apr-2012
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	12	10-Aug-2011
Tilt Antenna Mast	mature GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	mature GmbH	NCD	3917	-	TU
Section 2.5 - Conducted Spurious Emissions					
CMU200 Test Set	Rohde & Schwarz	CMU200	N/A	12	02-Feb-2012
DC Power Supply Unit	Hewlett Packard	6267B	294	-	O/P Mon
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2011
Multimeter	Iso-tech	IDM101	2419	12	3-Sep-2011
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	22-Dec-2011
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Signal Generator, 9kHz to 3GHz	Rohde & Schwarz	SMA 100A	3494	12	25-Jan-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	8-Feb-2012
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	11-Jan-2012
Combiner/Splitter	Weinschel	1506A	3880	12	22-Feb-2012
Section 2.1 – Spurious Emissions at Band Edge					
CMU200 Test Set	Rohde & Schwarz	CMU200	N/A	12	02-Feb-2012
DC Power Supply Unit	Hewlett Packard	6267B	294	-	O/P Mon
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2011
Multimeter	Iso-tech	IDM101	2419	12	3-Sep-2011
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Signal Generator, 9kHz to 3GHz	Rohde & Schwarz	SMA 100A	3494	12	25-Jan-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	8-Feb-2012
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	11-Jan-2012
Combiner/Splitter	Weinschel	1506A	3880	12	22-Feb-2012
Section 2.7 (Tx) - Frequency Stability under Temperature Variations					
CMU200 Test Set	Rohde & Schwarz	CMU200	N/A	12	02-Feb-2012
DC Power Supply Unit	Hewlett Packard	6267B	294	-	O/P Mon
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2011
Multimeter	Iso-tech	IDM101	2419	12	3-Sep-2011
Thermocouple Thermometer	Fluke	51	3172	12	12-Jul-2011
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Signal Generator, 9kHz to 3GHz	Rohde & Schwarz	SMA 100A	3494	12	25-Jan-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	8-Feb-2012
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	11-Jan-2012
Combiner/Splitter	Weinschel	1506A	3880	12	22-Feb-2012
Section 2.8 Radio (Tx) - Frequency Stability under Voltage Variations					
CMU200 Test Set	Rohde & Schwarz	CMU200	N/A	12	02-Feb-2012
DC Power Supply Unit	Hewlett Packard	6267B	294	-	O/P Mon
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2011
Multimeter	Iso-tech	IDM101	2419	12	3-Sep-2011
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Signal Generator, 9kHz to 3GHz	Rohde & Schwarz	SMA 100A	3494	12	25-Jan-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	8-Feb-2012
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	11-Jan-2012
Combiner/Splitter	Weinschel	1506A	3880	12	22-Feb-2012
Section 2.3 (Tx) - Maximum Peak Output Power - Conducted					
Antenna (Double Ridge Guide)	EMCO	3115	34	12	17-Jul-2011
CMU200 Test Set	Rohde & Schwarz	CMU200	N/A	12	02-Feb-2012
Spectrum Analyser	Rohde & Schwarz	FSEM	37	12	18-Apr-2012
Power Meter	Hewlett Packard	436A	94	12	11-Oct-2011
Peak Power Analyser	Hewlett Packard	8990A	107	12	11-Feb-2012
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	12-Nov-2011
Antenna (Double Ridge Guide, 1GHz-	EMCO	3115	235	12	12-Nov-2011



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
18GHz)					
DC Power Supply Unit	Hewlett Packard	6267B	294	-	O/P Mon
Power Sensor	Hewlett Packard	8484A	420	12	6-Sep-2011
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2011
Attenuator	Hewlett Packard	11708A	1507	12	17-Dec-2011
Section 2.6 - Occupied Bandwidth					
CMU200 Test Set	Rohde & Schwarz	CMU200	N/A	12	02-Feb-2012
DC Power Supply Unit	Hewlett Packard	6267B	294	-	O/P Mon
Multimeter	Iso-tech	IDM-101	466	12	2-Mar-2012
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2011
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	17-Jun-2011
Hygrometer	Rotronic	A1	1388	12	10-Jul-2011
Multimeter	Iso-tech	IDM101	2419	12	3-Sep-2011
Power Supply	Iso-tech	IPS 2010	2439	-	O/P Mon
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Power Meter	Rohde & Schwarz	NRP	3491	12	19-Apr-2012
Wideband Power Sensor, 50MHz - 18GHz	Rohde & Schwarz	NRP-Z81	3492	12	19-Apr-2012
Vector Signal Generator	Rohde & Schwarz	SMU 200A	3493	12	10-Aug-2011
Signal Generator, 9kHz to 3GHz	Rohde & Schwarz	SMA 100A	3494	12	25-Jan-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	8-Feb-2012
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	11-Jan-2012
Combiner/Splitter	Weinschel	1506A	3877	12	22-Feb-2012
Combiner/Splitter	Weinschel	1506A	3880	12	22-Feb-2012

TU – Traceability Unscheduled

O/P Mon – Output monitored using calibrated equipment.



3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	10MHz to 6GHz Test Amplitude	2.0dB†
Conducted Susceptibility RF	50kHz to 1000MHz Amplitude	3.1dB•
	EM Clamp Method of Test	1.2dB•
	CDN Method of Test	1.1dB•
	BCI Clamp Method of Test	1.2dB•
Conducted Susceptibility LF	DC to 150kHz	1.0%†
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.4dB*
Magnetic Field/Flux iaw EN 50366	10Hz to 400kHz	2.64%
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—
Compass Safe Distance	Azimuth Accuracy	0.10°
Channel Occupancy/Separation	19.1kHz	N/A
Maximum Output Power	Not Applicable	±0.5dB
Number of Channels	Not Applicable	N/A
20dB Bandwidth	19.1kHz	±0.5dB

Worst case error for both Time and Frequency measurement 12 parts in 10^6 .

- * In accordance with CISPR 16-4-2
- † In accordance with UKAS Lab 34
- In accordance with EN61000-4-6



Product Service

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
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