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Report On

FCC Testing of the
Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular
Phone with Bluetooth, WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00158

Document 75914914 Report 11 Issue 1

October 2011



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COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC Testing of the
Sharp CDMA SH113, Tri Band CDMA (BC0, BC3 and BC6) Cellular
Phone with Bluetooth, WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22

Document 75914914 Report 11 Issue 1

October 2011

PREPARED FOR

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PREPARED BY

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APPROVED BY

Mark Jenkins
Authorised Signatory

DATED

18 October 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 FCC CFR 47 Part 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 SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular Phone with Bluetooth,
WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22



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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular Phone with Bluetooth, WLAN, FeliCa and GPS to the requirements of FCC CFR 47 Part 2 and FCC CFR 47 Part 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 SHI13
Serial Number(s)	SSHFN000861
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2 and FCC CFR 47 Part 22 (2010 and 2010)
Incoming Release Date	Application Form 10 August 2011
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	8723 05 September 2011
Start of Test	15 September 2011
Finish of Test	23 September 2011
Name of Engineer(s)	R Henley G Lawler
Related Document(s)	ANSI C63.4: 2009



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 22 is shown below.

Section	Spec Clause	Test Description	Result	Comments/Base Standard
CDMA 2000 – Loopback Service				
2.1	2.1051 and 22.905	Spurious Emissions at Band Edge	Pass	
2.2	22.913 (a)	Effective Radiated Power	Pass	
2.3	2.1046 and 22.913 (a)	Maximum Peak Output Power - Conducted	Pass	
2.4	22.917	Emission Limitations for Cellular Equipment	Pass	
2.5	2.1051 and 22.917 (a)	Conducted Spurious Emissions	Pass	
2.6	2.1049 (h) and 22.917 (b)	Occupied Bandwidth	Pass	
2.7	2.1055 and 22.355	Frequency Stability	Pass	



Section	Spec Clause	Test Description	Result	Comments/Base Standard
CDMA 2000 – Test Data Service				
2.1	2.1051 and 22.905	Spurious Emissions at Band Edge	Pass	
2.2	22.913 (a)	Effective Radiated Power	Pass	
2.3	2.1046 and 22.913 (a)	Maximum Peak Output Power - Conducted	Pass	
2.4	22.917	Emission Limitations for Cellular Equipment	Pass	
2.5	2.1051 and 22.917 (a)	Conducted Spurious Emissions	Pass	
2.6	2.1049 (h) and 22.917 (b)	Occupied Bandwidth	Pass	
2.7	2.1055 and 22.355	Frequency Stability	Pass	



Product Service

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 SHI13	Identification number	APYHRO00158
<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	824.7MHz to 848.31 MHz	Channel spacing	(if channelized)
Designated test frequencies:			
Bottom: 824.7 MHz	Middle: 836.52 MHz	Top: 848.31MHz	
<u>Power characteristics:</u>			
Maximum transmitter power	0.25W(24dBm)	Minimum transmitter power	 W
		(if variable)	
☒	Continuous transmission		
☐	Intermittent transmission	State duty cycle	
If intermittent, can transmitter be set to continuous transmit test mode? Y/N			
<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?		Y/N	
ITU Class of emission:			
<u>Extreme conditions:</u>			
Maximum temperature	60 °C	Minimum temperature	-20 °C
Maximum supply voltage	4.0 V	Minimum supply voltage	3.7 V

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

Signature : Yasuhiro Kawauchi
 Name : Yasuhiro Kawauchi
 Position held : Manager
 Date : 10 August 2011



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular Phone with Bluetooth, WLAN, FeliCa and GPS. 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 4.0 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

Modification 0 - No modifications were made to the test sample during testing.



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SECTION 2

TEST DETAILS

FCC Testing of the
Sharp CDMA SHI13, Tri Band CDMA (BC0, BC3 and BC6) Cellular Phone with Bluetooth,
WLAN, FeliCa and GPS
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22



Product Service

2.1 SPURIOUS EMISSIONS AT BAND EDGE

2.1.1 Specification Reference

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

2.1.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000861 - Modification State 0

2.1.3 Date of Test

15 September 2011

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

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 $-13 \text{ dBm} (43 + 10 \log (P))$, limit. The EUT was operated at maximum power WCDMA modulation schemes.

2.1.6 Environmental Conditions

Ambient Temperature	24.2°C
Relative Humidity	37.8%



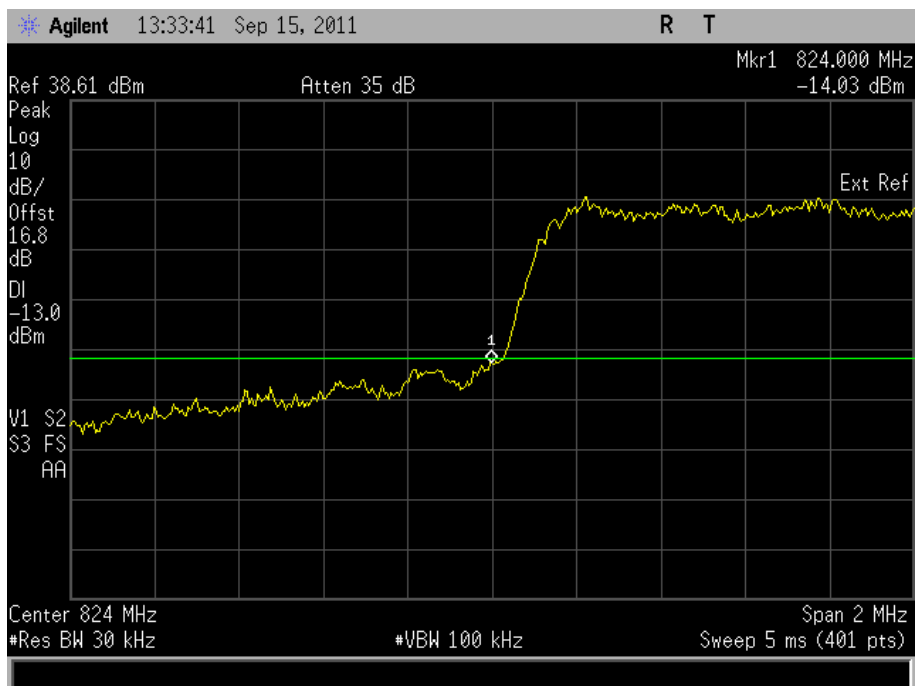
2.1.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

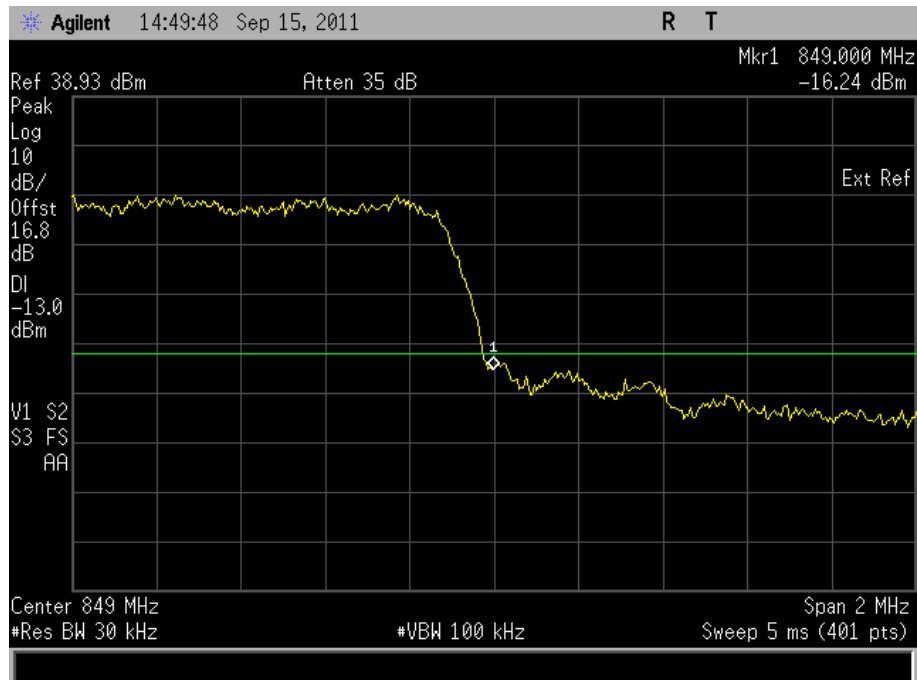
Frequency Block (MHz)	Mode	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A : (824.0 – 835.0)	SO55, RC1	Channel : 1016 Frequency : 824.79 MHz	N/A
B : (846.5 – 849.0)	SO55, RC1	N/A	Channel : 775 Frequency : 848.25 MHz

Frequency Block A





Product Service

Frequency Block BLimit Clause

-13 dBm at block edge.

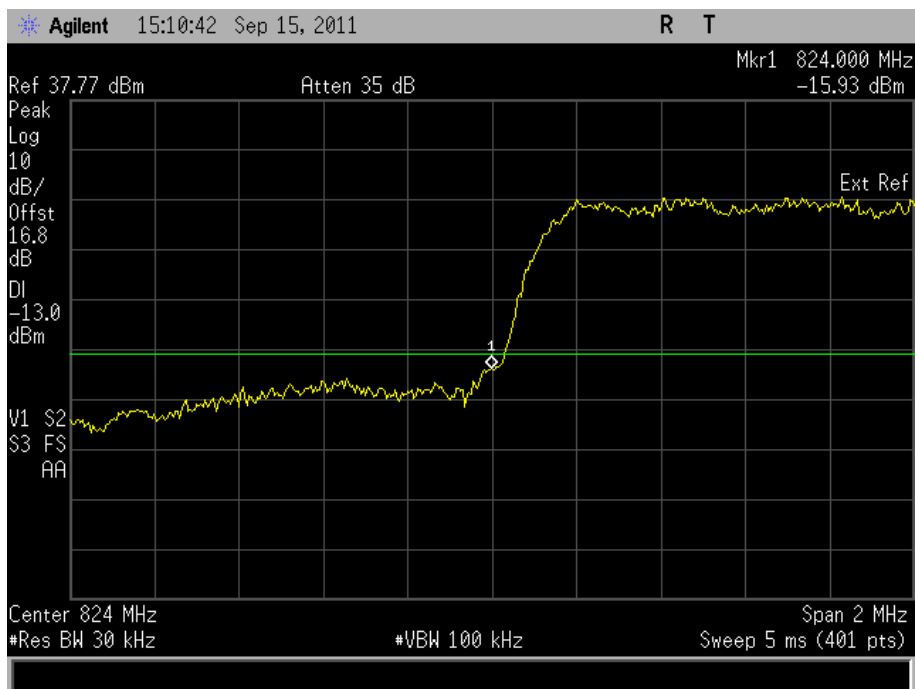


Product Service

CDMA 2000 - Test Data Service

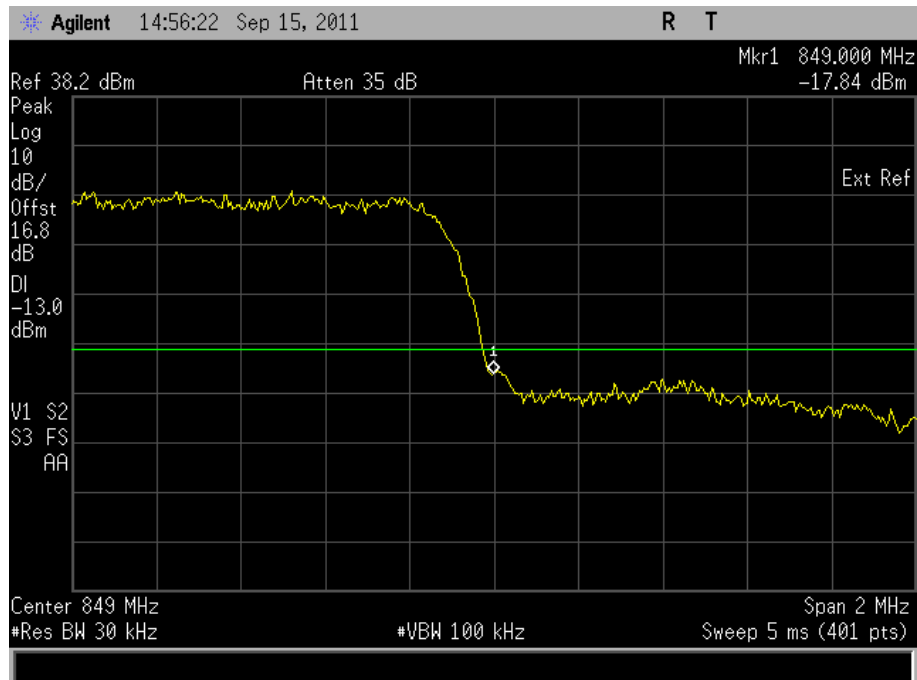
4.0 V DC Supply

Frequency Block (MHz)	Mode	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A : (824.0 – 835.0)	TDSO32, FCH + SCH	Channel : 1015 Frequency : 824.76 MHz	N/A
B : (846.5 – 849.0)	TDSO32, FCH + SCH	N/A	Channel : 775 Frequency : 848.25 MHz

Frequency Block A



Product Service

Frequency Block BLimit Clause

-13 dBm at block edge.



Product Service

2.2 EFFECTIVE RADIATED POWER

2.2.1 Specification Reference

FCC CFR 47 Part 2 and FCC CFR 47 Part 22, Clause 22.913 (a)

2.2.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000861 - Modification State 0

2.2.3 Date of Test

18 September 2011

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

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.

2.2.6 Environmental Conditions

Ambient Temperature	20.7 - 20.8°C
Relative Humidity	46.0 - 47.0%



Product Service

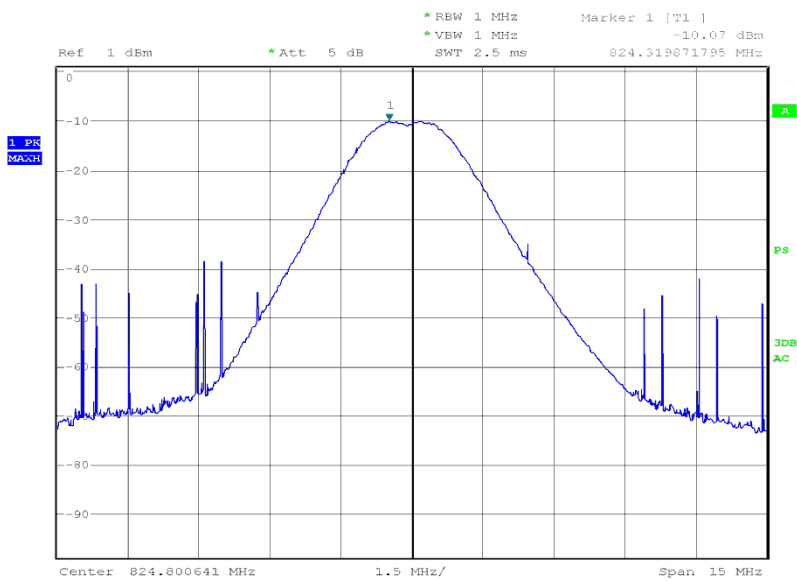
2.2.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

824.70 MHz

Result (dBm)	Result (W)
21.97	0.157



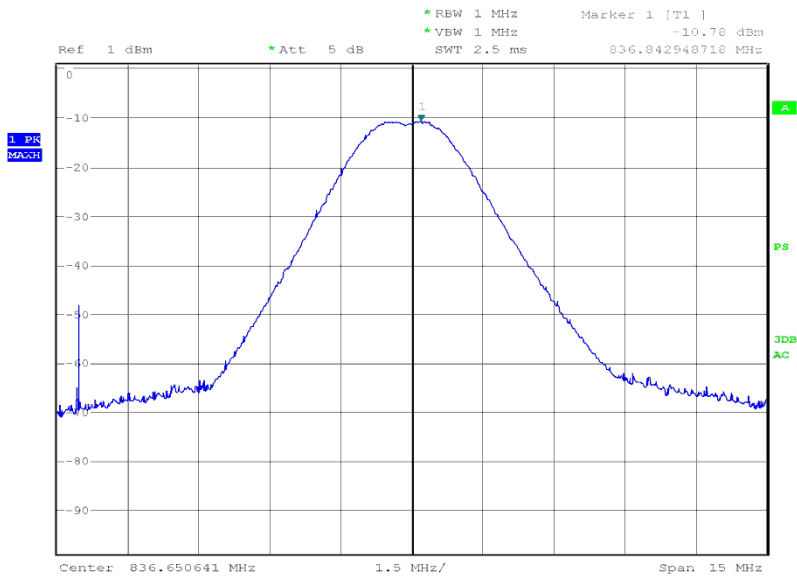
Date: 18.SEP.2011 09:41:00



Product Service

836.52 MHz

Result (dBm)	Result (W)
21.82	0.152



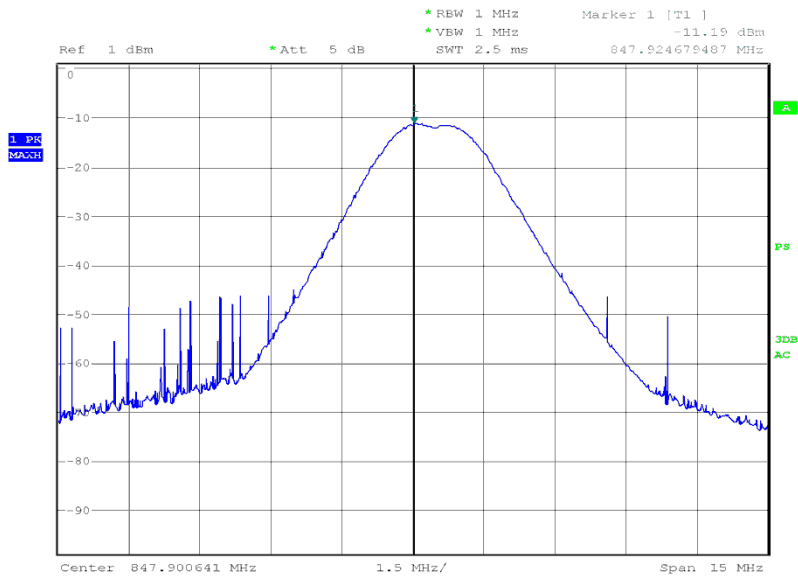
Date: 18.SEP.2011 09:02:16



Product Service

848.31 MHz

Result (dBm)	Result (W)
22.83	0.192



Date: 18.SEP.2011 08:56:02

Limit Clause

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



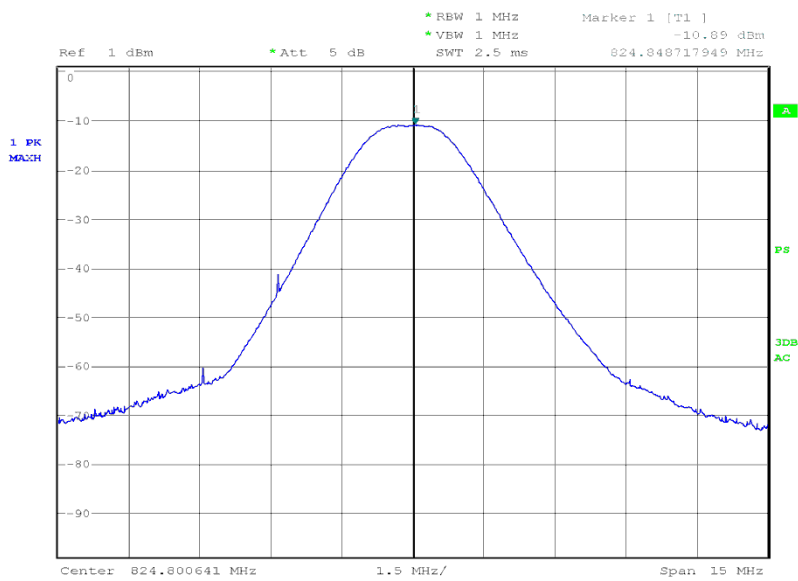
Product Service

CDMA 2000 - Test Data Service

4.0 V DC Supply

824.70 MHz

Result (dBm)	Result (W)
22.01	0.159



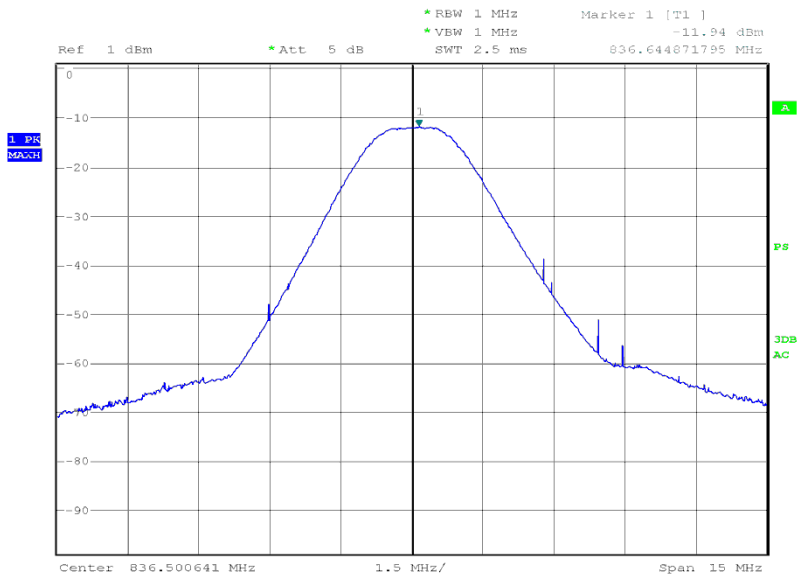
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Product Service

836.52 MHz

Result (dBm)	Result (W)
20.66	0.116



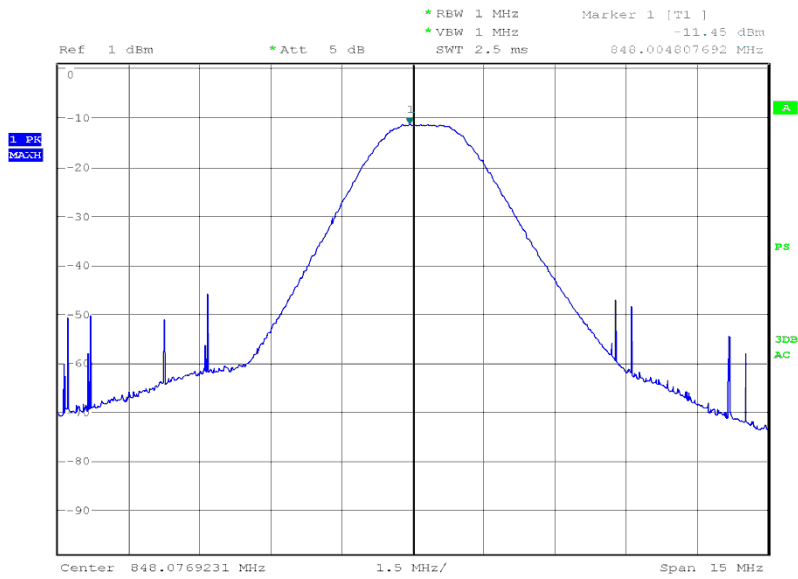
Date: 18.SEP.2011 10:16:09



Product Service

848.31 MHz

Result (dBm)	Result (W)
21.71	0.148



Date: 18.SEP.2011 10:40:33

Limit Clause

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



Product Service

2.3 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.3.1 Specification Reference

FCC CFR 47 Part 2 and FCC CFR 47 Part 22, Clause 2.1046 and 22.913 (a)

2.3.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000861 - Modification State 0

2.3.3 Date of Test

15 September 2011

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

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

The EUT supports CDMA 2000 and was tested in two modes of operation. There were loopback service – SO55, RC1 with 64-Ray orthogonal modulation and Test Data Service – TD5032, FCH+SCH with BPSK modulation.

2.3.6 Environmental Conditions

Ambient Temperature	24.2°C
Relative Humidity	37.8%



2.3.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

824.70 MHz

Mode	Result (dBm)	Result (W)
SO55, RC1	29.09	0.811

836.52 MHz

Mode	Result (dBm)	Result (W)
SO55, RC1	29.08	0.809

848.31 MHz

Mode	Result (dBm)	Result (W)
SO55, RC1	28.85	0.767

Limit Clause

Mobile – 7 W or 38.45 dBm

Base Stations – 500 W or 57 dBm

CDMA 2000 - Test Data Service

4.0 V DC Supply

824.70 MHz

Mode	Result (dBm)	Result (W)
TDSO32, FCH + SCH	28.59	0.723

836.52 MHz

Mode	Result (dBm)	Result (W)
TDSO32, FCH + SCH	28.36	0.685

848.31 MHz

Mode	Result (dBm)	Result (W)
TDSO32, FCH + SCH	28.49	0.706

Limit Clause

Mobile – 7 W or 38.45 dBm

Base Stations – 500 W or 57 dBm



2.4 EMISSION LIMITATIONS FOR CELLULAR EQUIPMENT

2.4.1 Specification Reference

FCC CFR 47 Part 2 and FCC CFR 47 Part 22, Clause 22.917

2.4.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000861 - Modification State 0

2.4.3 Date of Test

18 September 2011

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

A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

The EUT was set to transmit on maximum power with 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.

2.4.6 Environmental Conditions

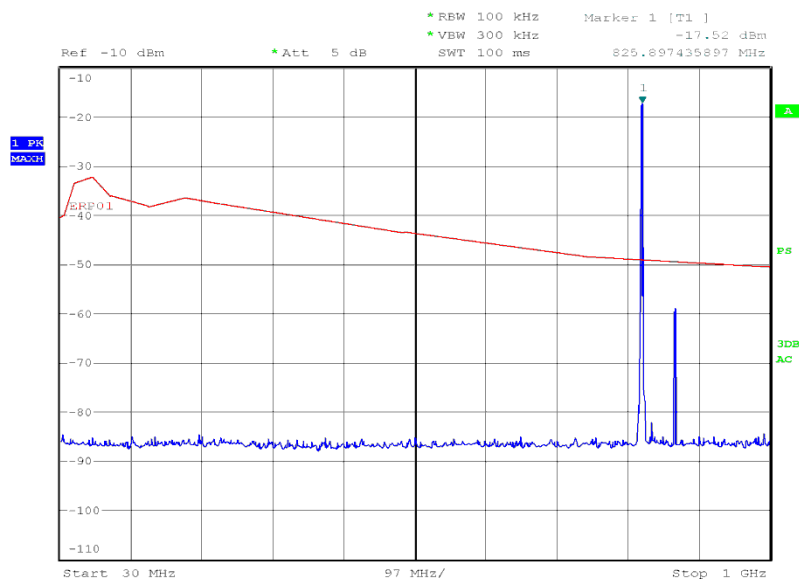
Ambient Temperature	20.7°C
Relative Humidity	46.0%



Product Service

2.4.7 Test Results

CDMA 2000 - Loopback Service

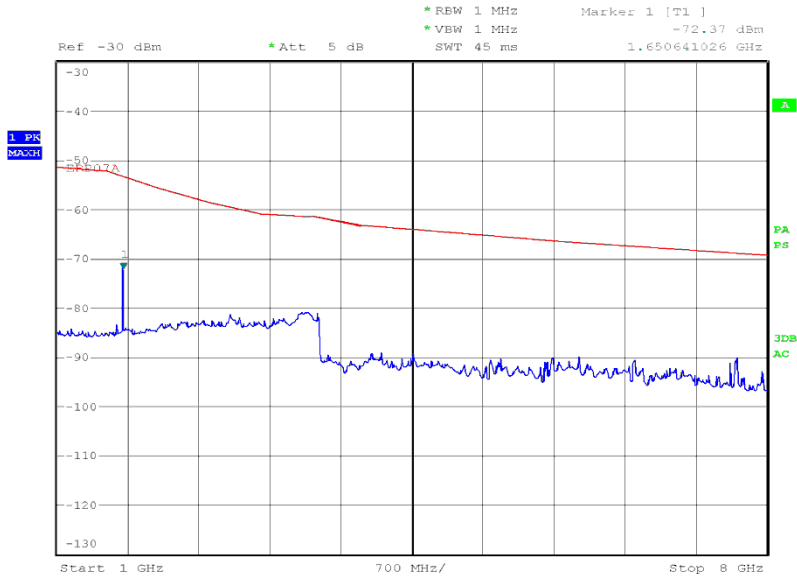
824.70 MHz30 MHz to 1 GHz

Date: 18.SEP.2011 08:15:23



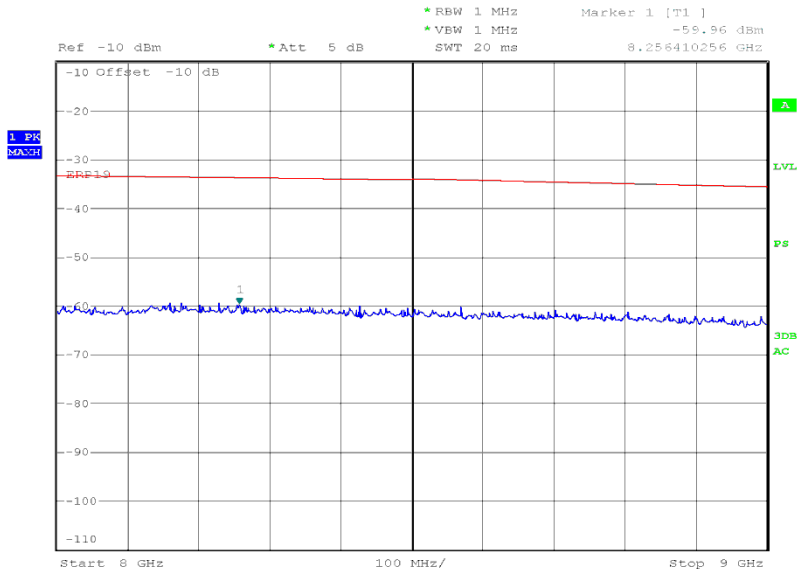
Product Service

1 GHz to 8 GHz



Date: 18.SEP.2011 10:55:35

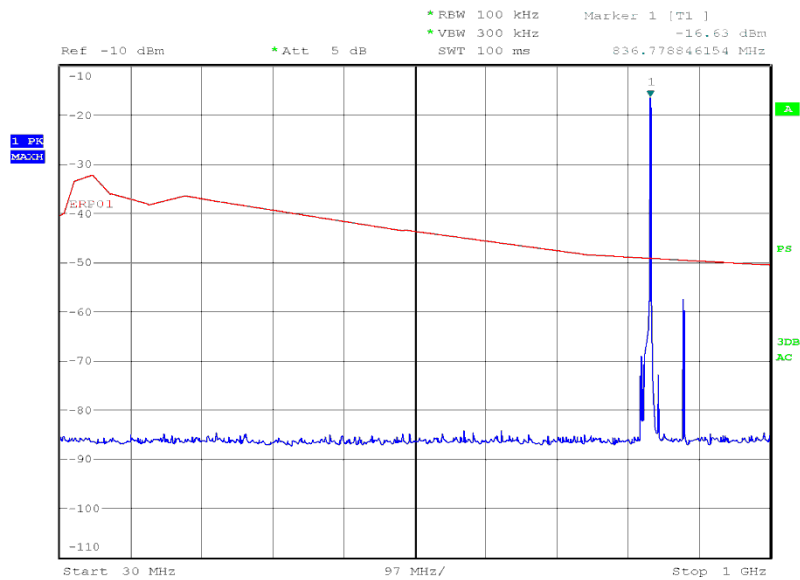
8 GHz to 9 GHz



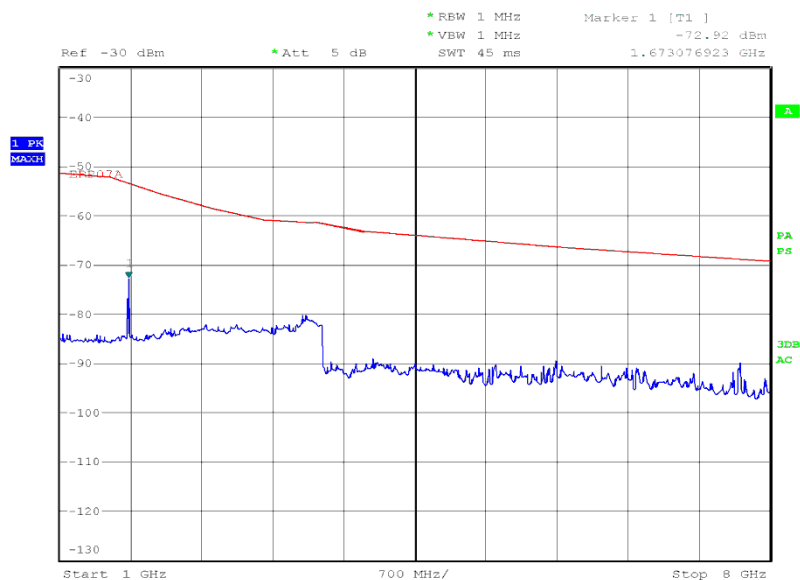
Date: 18.SEP.2011 13:56:04



Product Service

836.52 MHz30 MHz to 1 GHz

Date: 18.SEP.2011 08:18:41

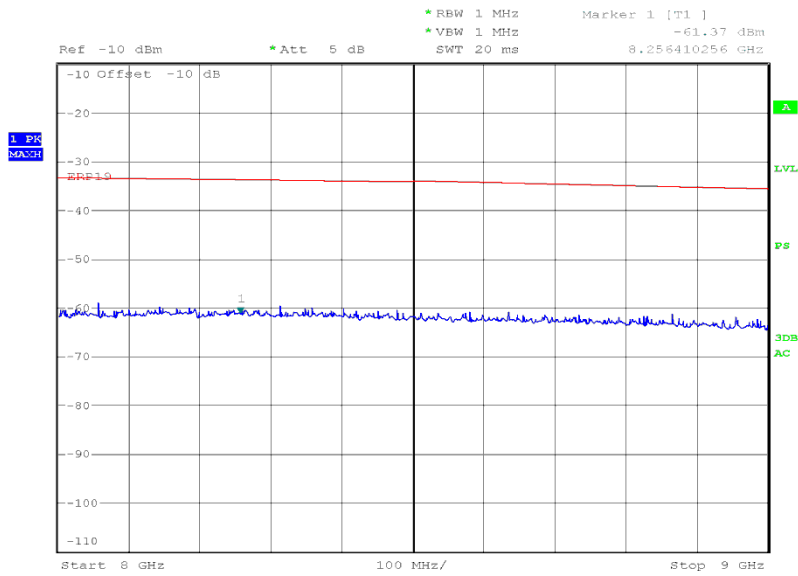
1 GHz to 8 GHz

Date: 18.SEP.2011 11:03:42



Product Service

8 GHz to 9 GHz



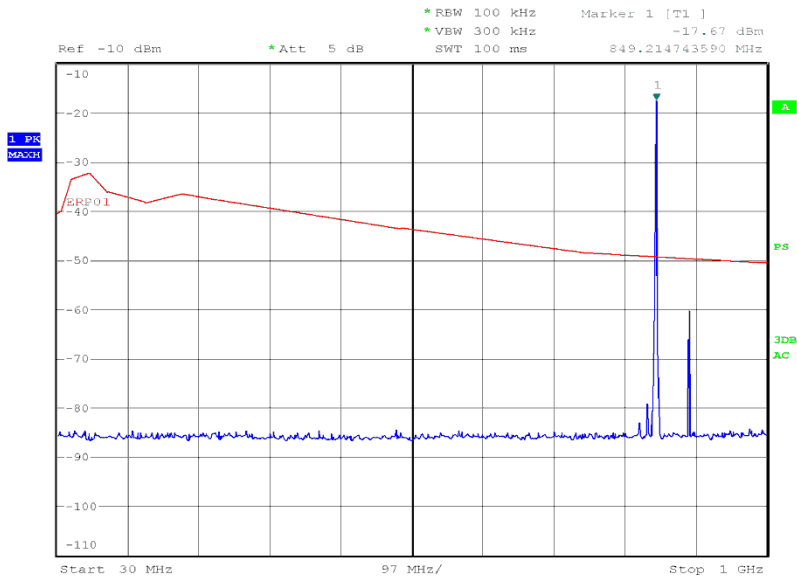
Date: 18.SEP.2011 13:58:11



Product Service

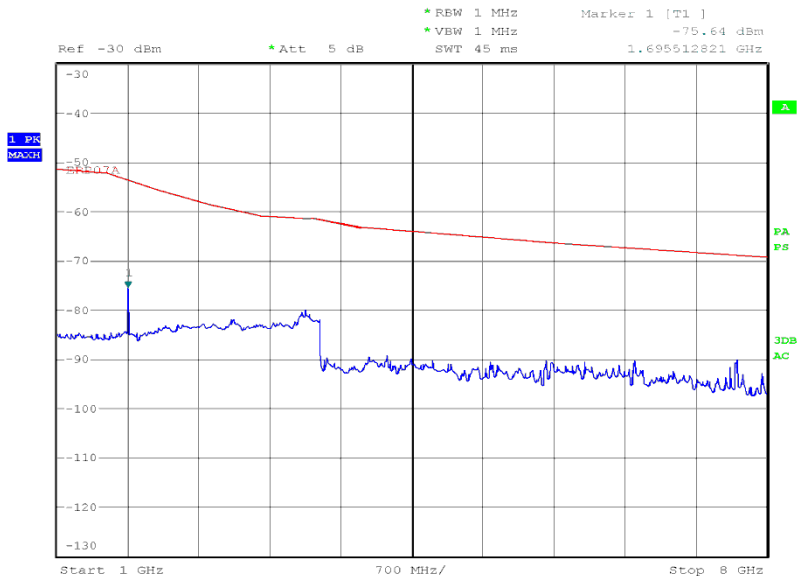
848.31 MHz

30 MHz to 1 GHz



Date: 18.SEP.2011 08:29:22

1 GHz to 8 GHz

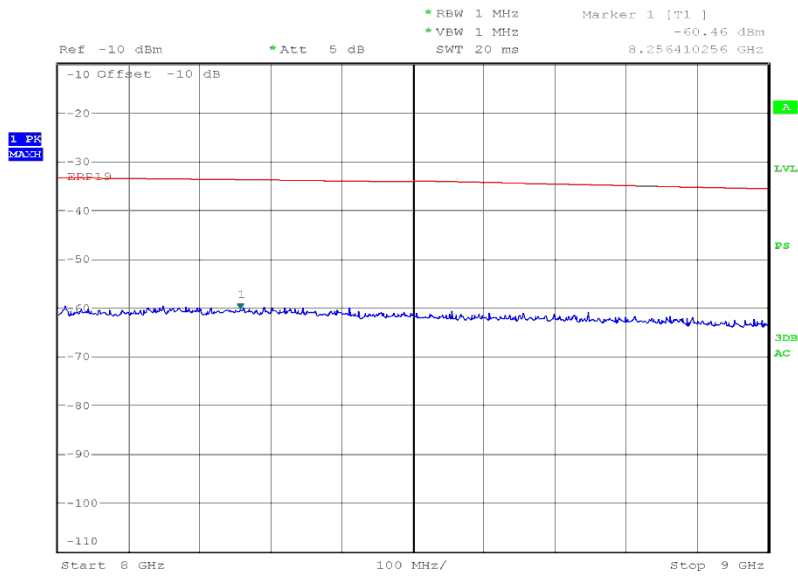


Date: 18.SEP.2011 11:09:15



Product Service

8 GHz to 9 GHz



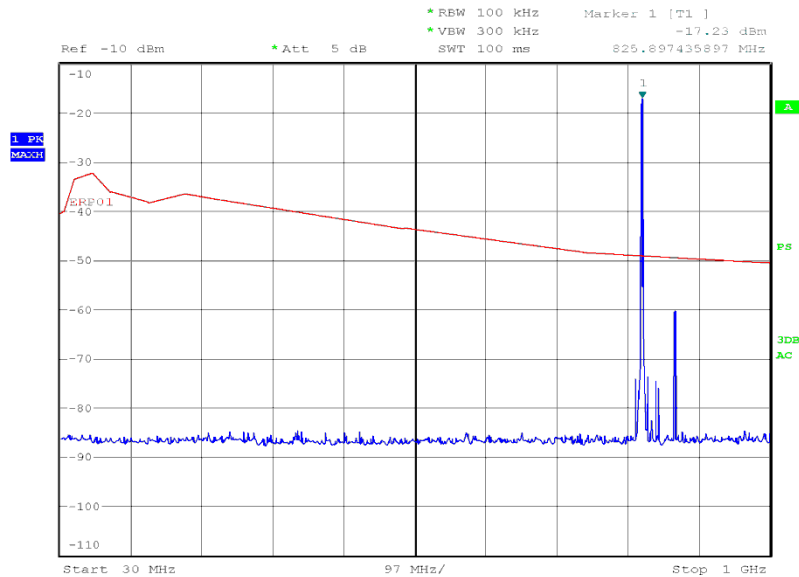
Date: 18.SEP.2011 14:04:35

Limit Clause

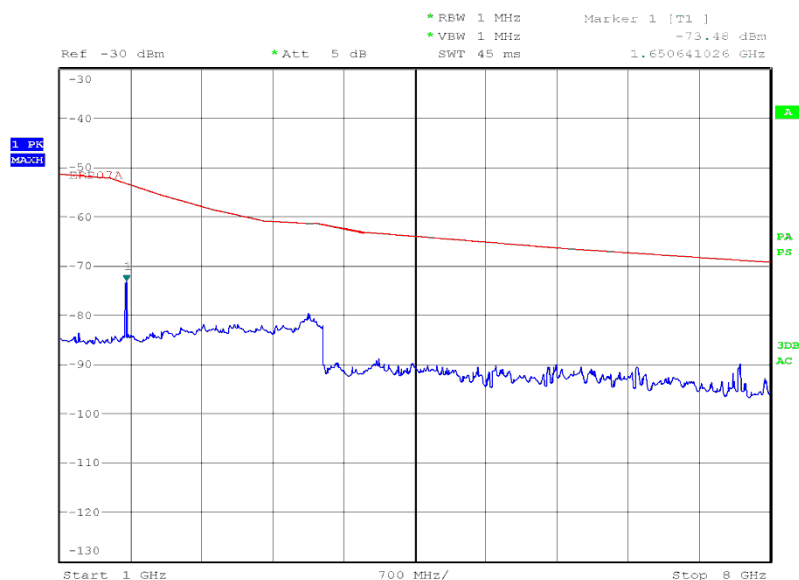
43+10log(P) or -13 dBm



Product Service

CDMA 2000 - Test Data Service824.70 MHz30 MHz to 1 GHz

Date: 18.SEP.2011 08:04:47

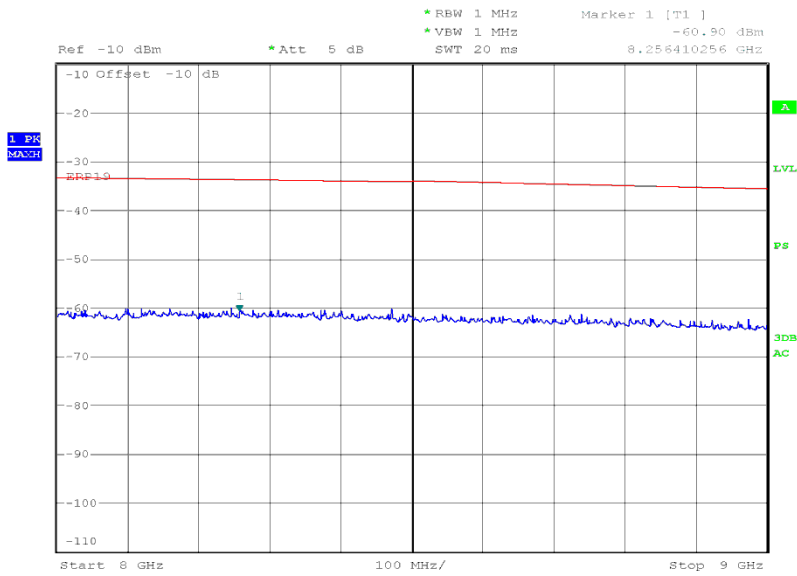
1 GHz to 8 GHz

Date: 18.SEP.2011 10:47:46



Product Service

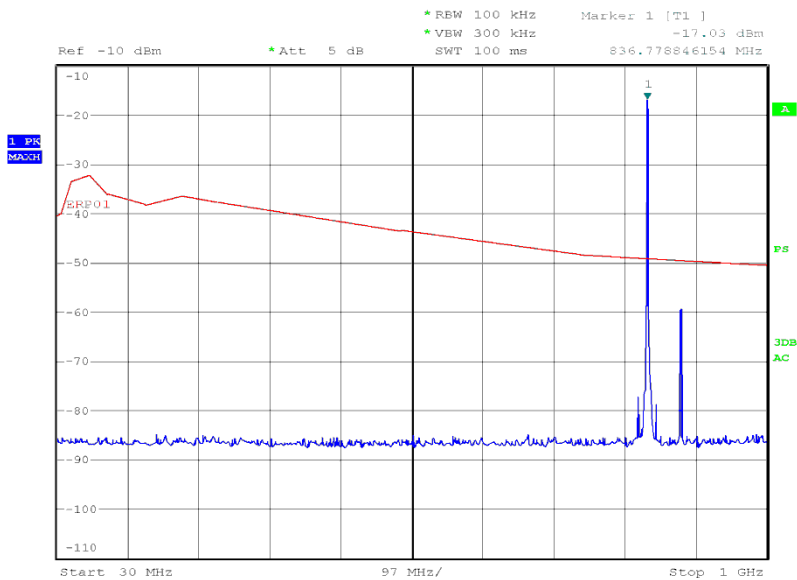
8 GHz to 9 GHz



Date: 18.SEP.2011 14:06:38

836.52 MHz

30 MHz to 1 GHz

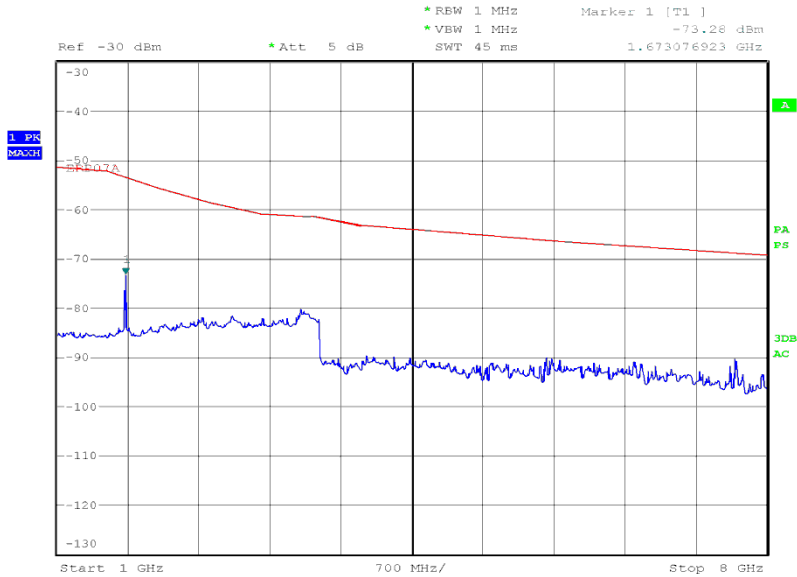


Date: 18.SEP.2011 08:07:00



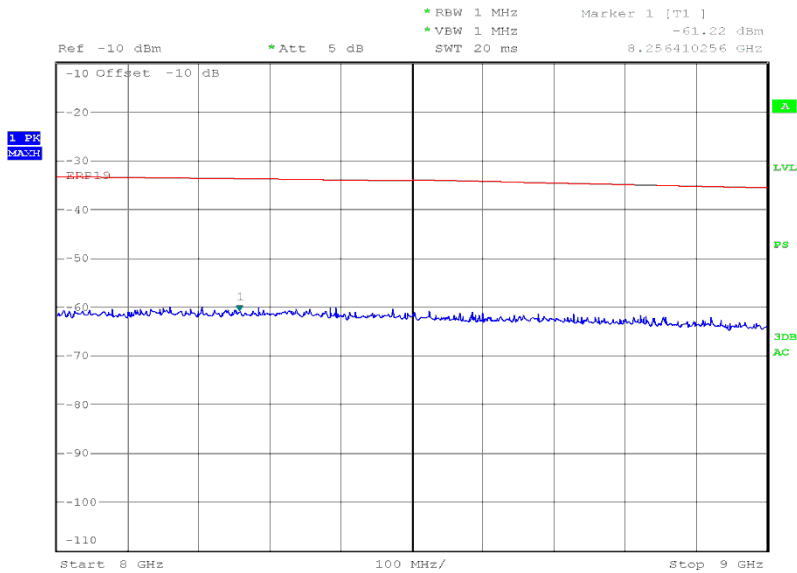
Product Service

1 GHz to 8 GHz



Date: 18.SEP.2011 10:43:43

8 GHz to 9 GHz



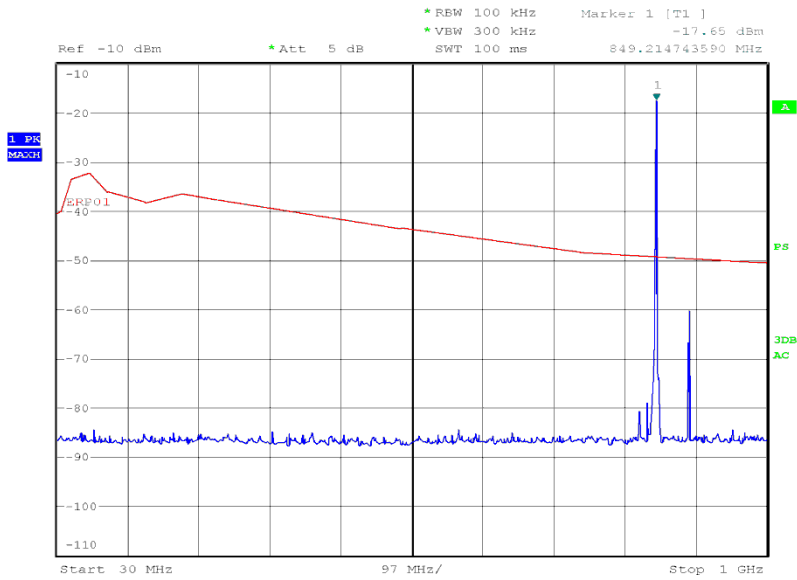
Date: 18.SEP.2011 14:08:41



Product Service

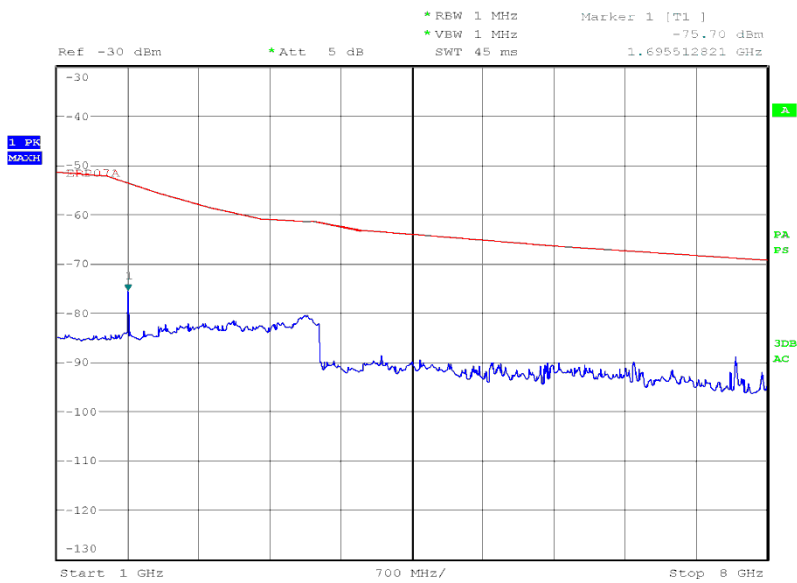
848.31 MHz

30 MHz to 1 GHz



Date: 18.SEP.2011 08:08:47

1 GHz to 8 GHz

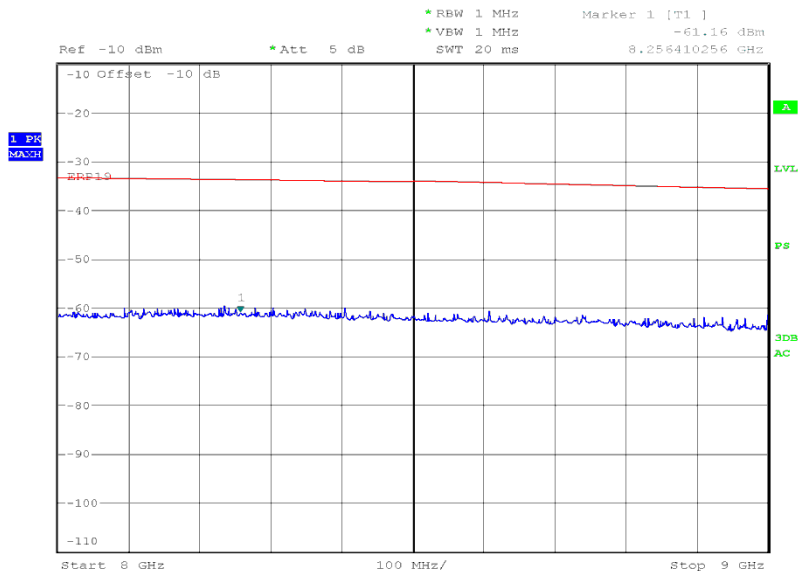


Date: 18.SEP.2011 10:28:50



Product Service

8 GHz to 9 GHz



Date: 18.SEP.2011 14:10:41

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

2.5.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000861 - Modification State 0

2.5.3 Date of Test

22 September 2011

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

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 the 10th harmonic. The EUT was set to transmit on full power with 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 bands were used as reference level offsets to ensure worst case.

2.5.6 Environmental Conditions

Ambient Temperature	22.6°C
Relative Humidity	49.5%



Product Service

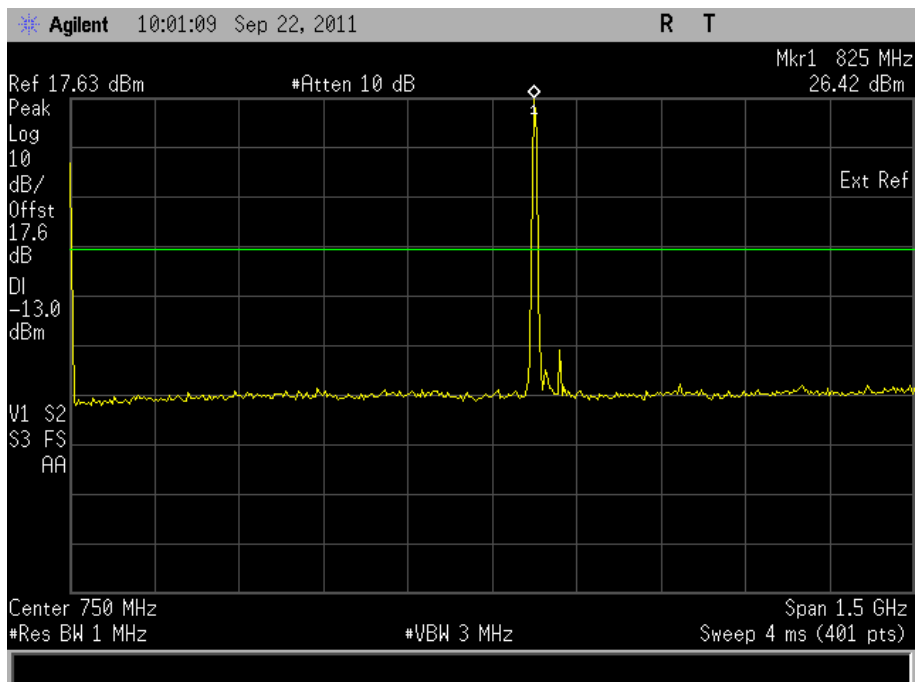
2.5.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

824.70 MHz

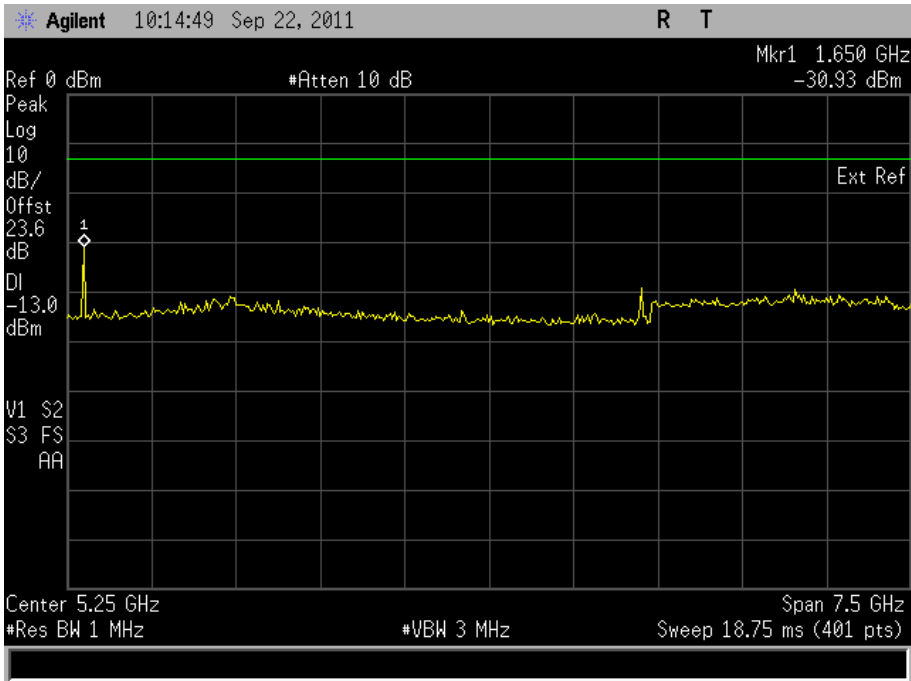
9 kHz to 1.5 GHz





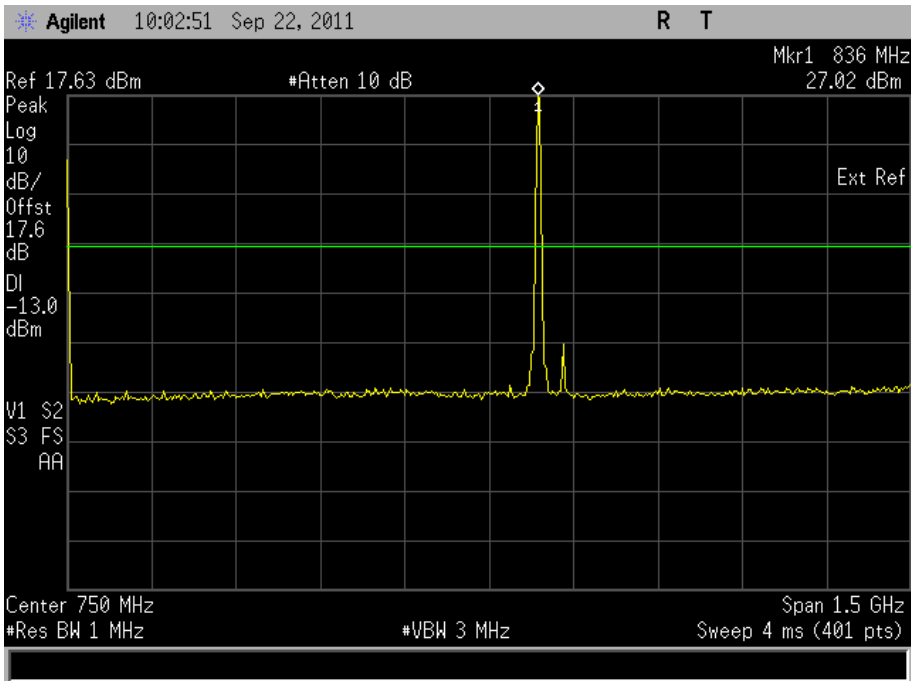
Product Service

1.5 GHz to 9 GHz



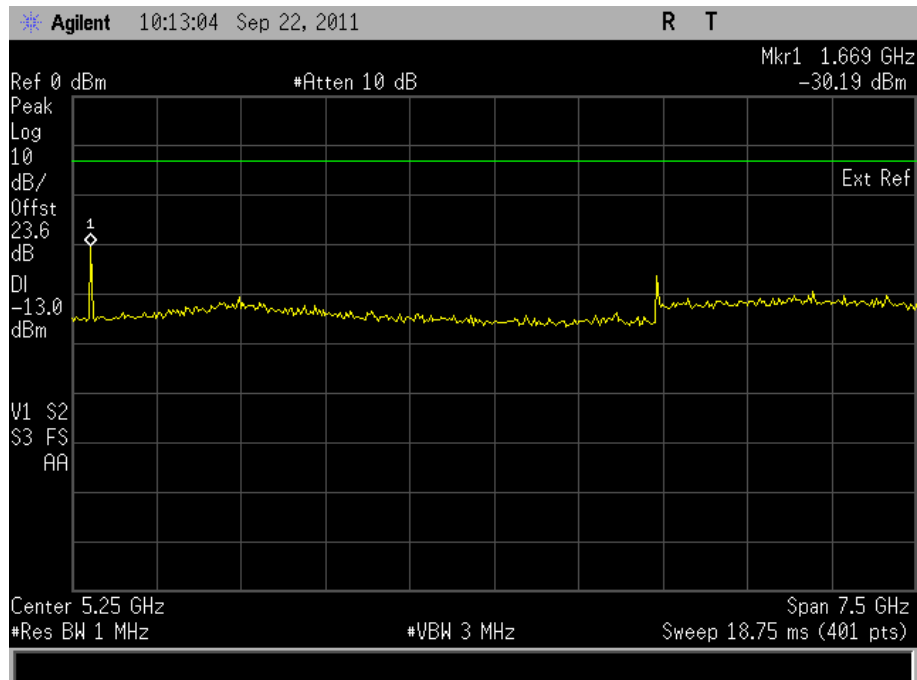
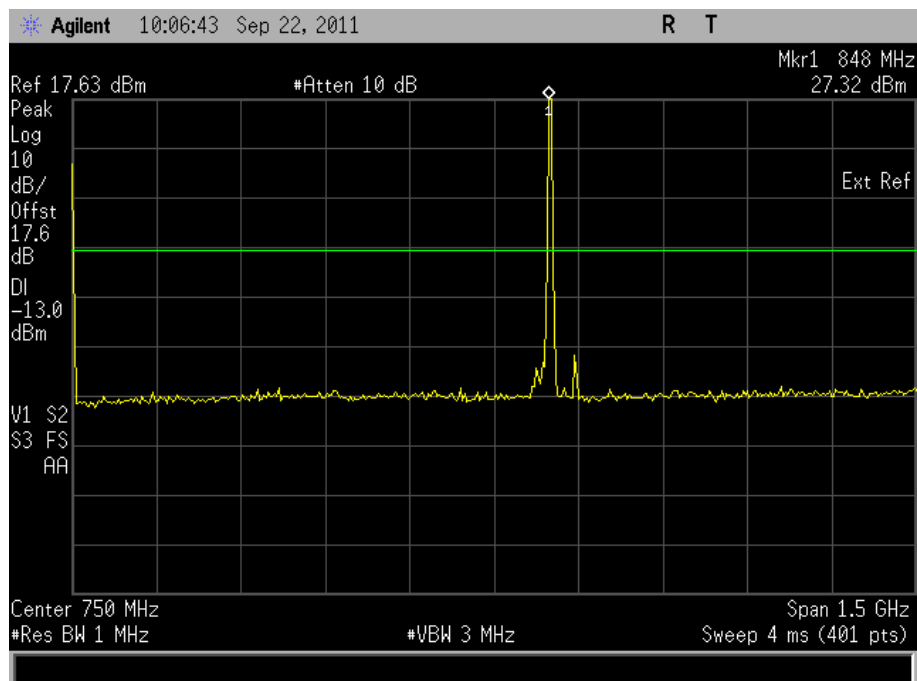
836.52 MHz

9 kHz to 1.5 GHz



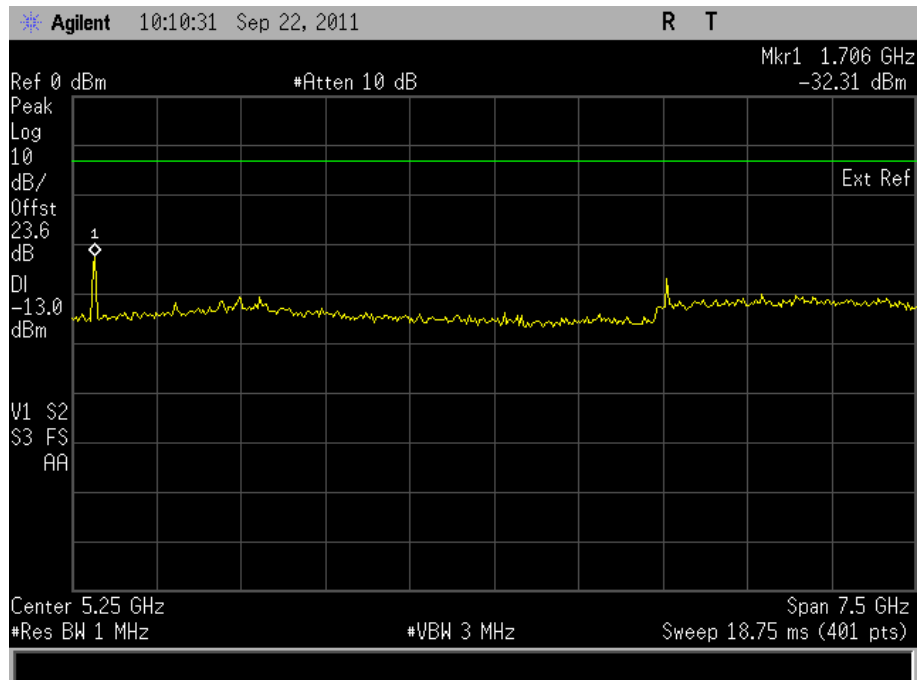


Product Service

1.5 GHz to 9 GHz848.31 MHz9 kHz to 1.5 GHz



Product Service

1.5 GHz to 9 GHzLimit Clause

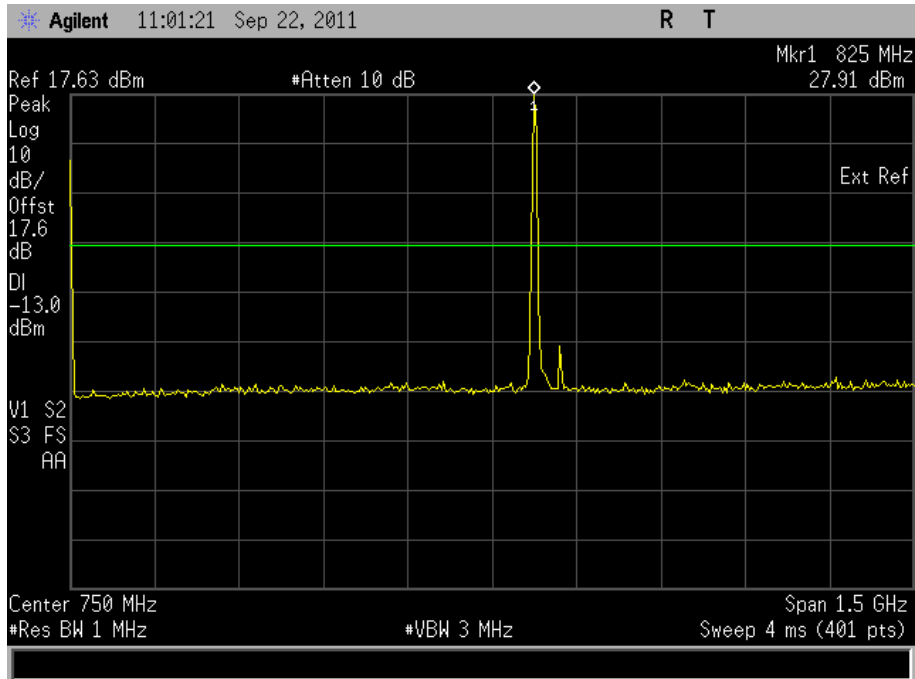
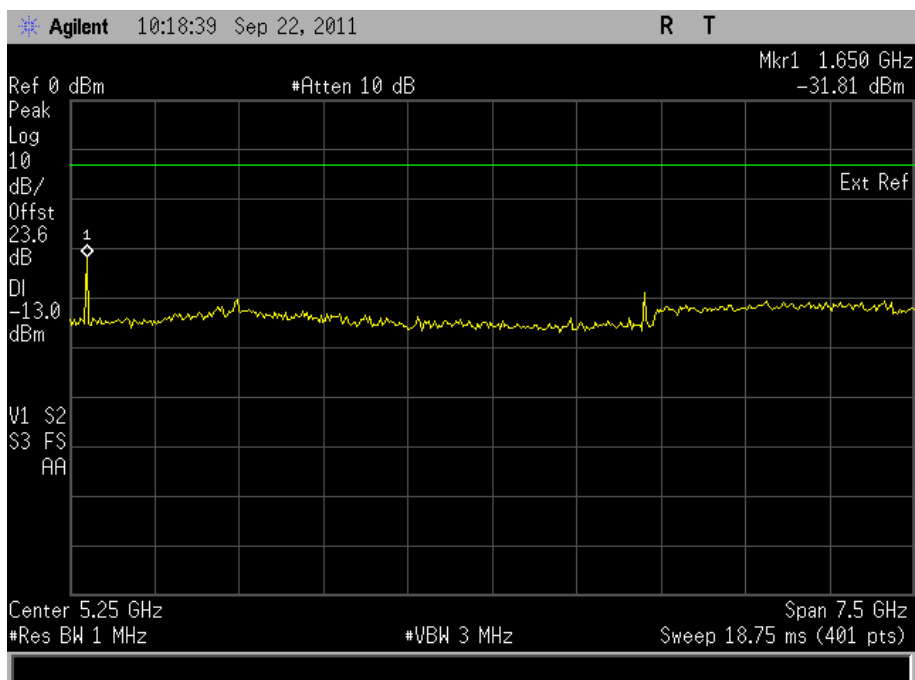
$$43 + 10 \log(P) \text{ or } -13 \text{ dBm}$$



Product Service

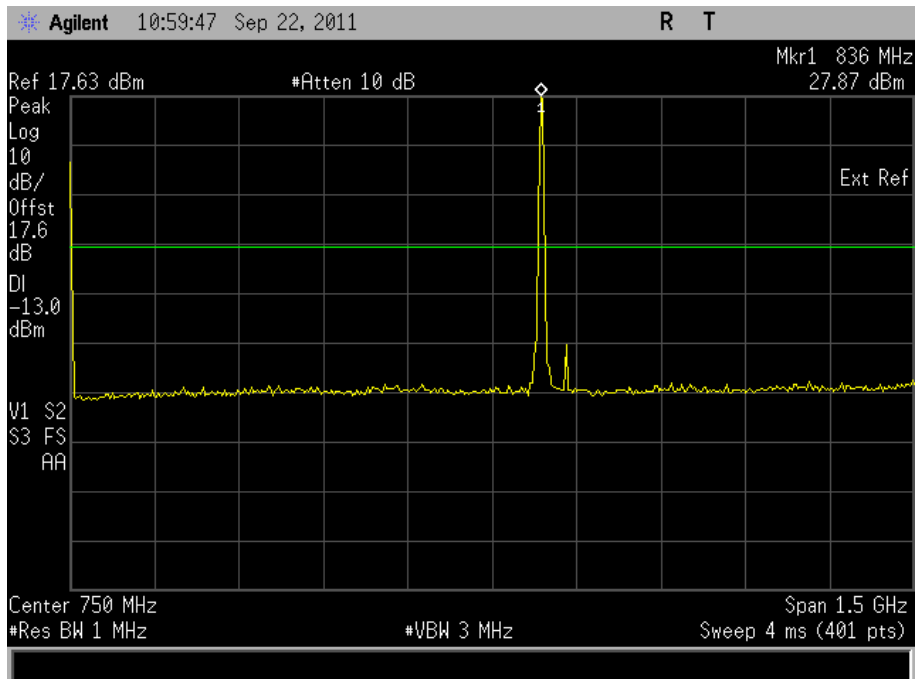
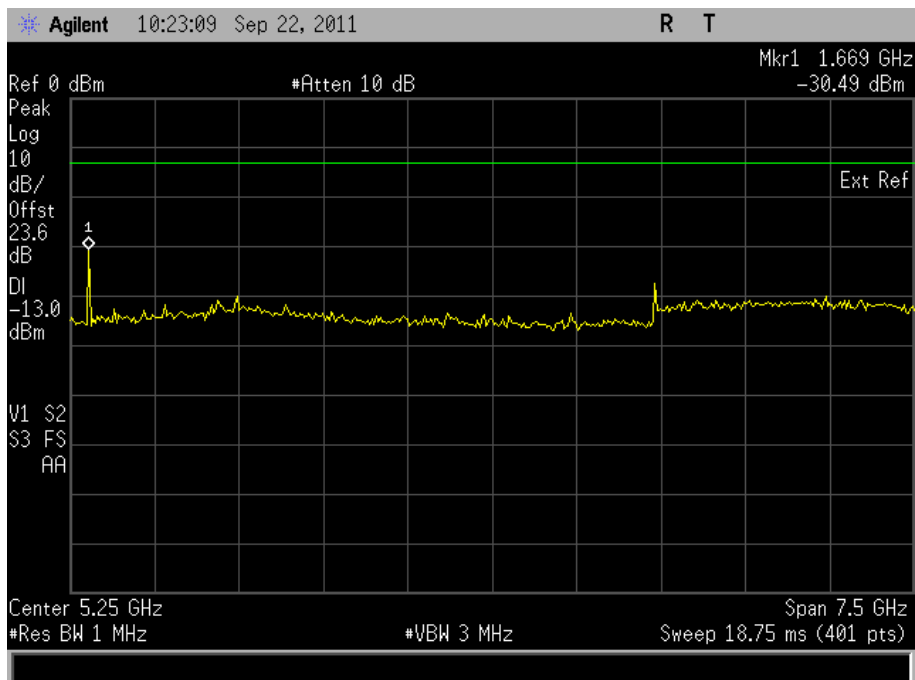
CDMA 2000 - Test Data Service

4.0 V DC Supply

824.70 MHz9 kHz to 1.5 GHz1.5 GHz to 9 GHz

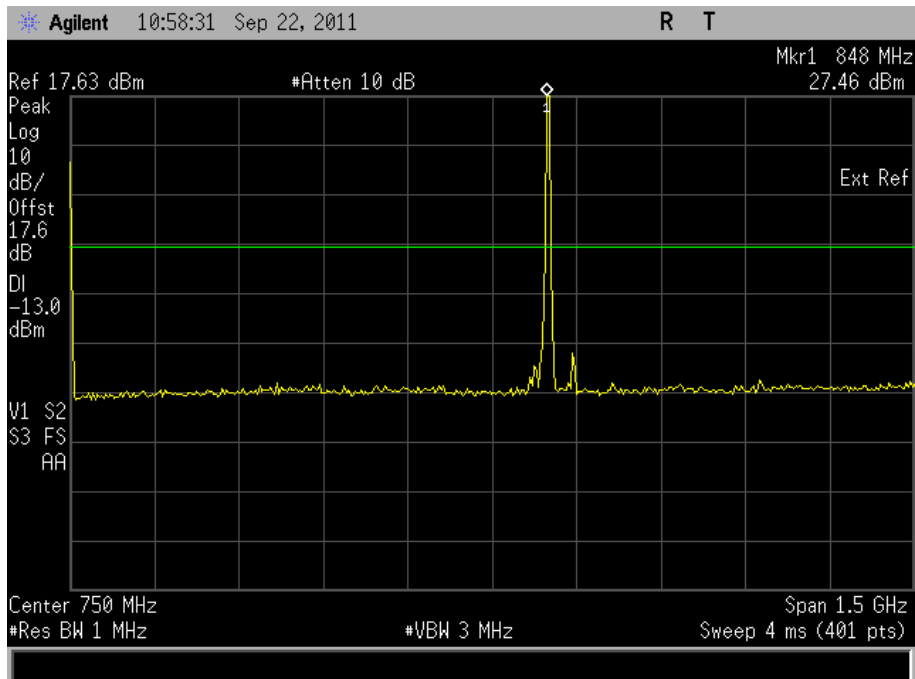
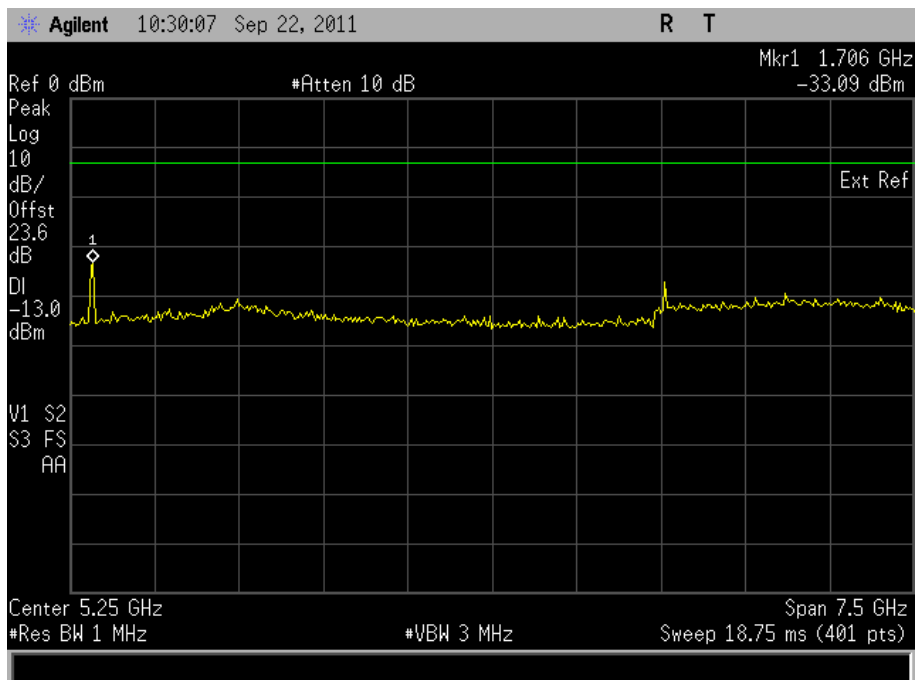


Product Service

836.52 MHz9 kHz to 1.5 GHz1.5 GHz to 9 GHz



Product Service

848.31 MHz9 kHz to 1.5 GHz1.5 GHz 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 and FCC CFR 47 Part 22, Clause 2.1049 (h) and 22.917 (b)

2.6.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000861 - Modification State 0

2.6.3 Date of Test

15 September 2011

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 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.

2.6.6 Environmental Conditions

Ambient Temperature	24.2°C
Relative Humidity	37.8%



Product Service

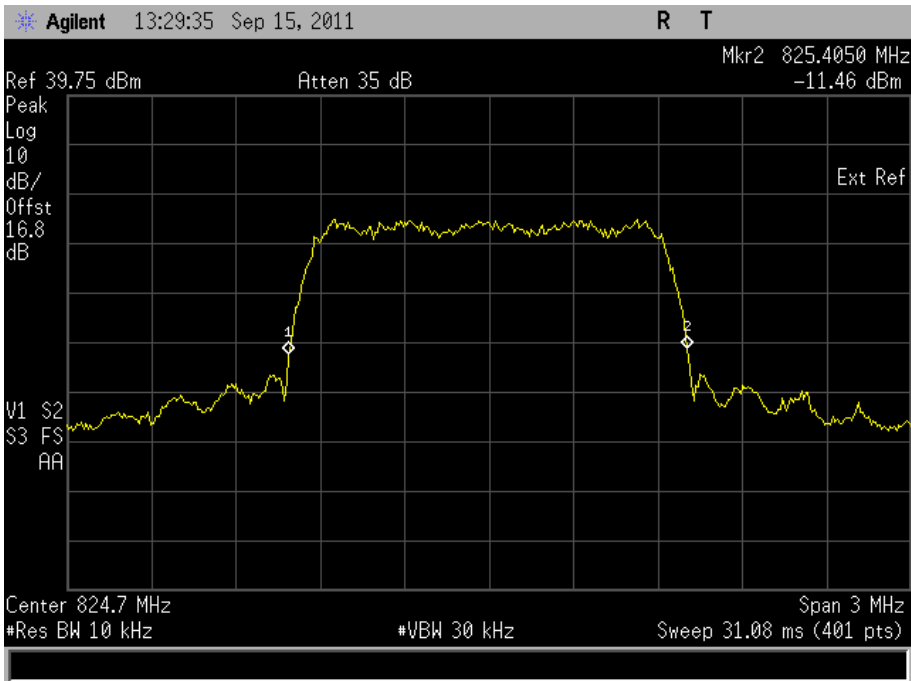
2.6.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

824.70 MHz

Mode	Occupied Bandwidth (kHz)
SO55, RC1	1417.5

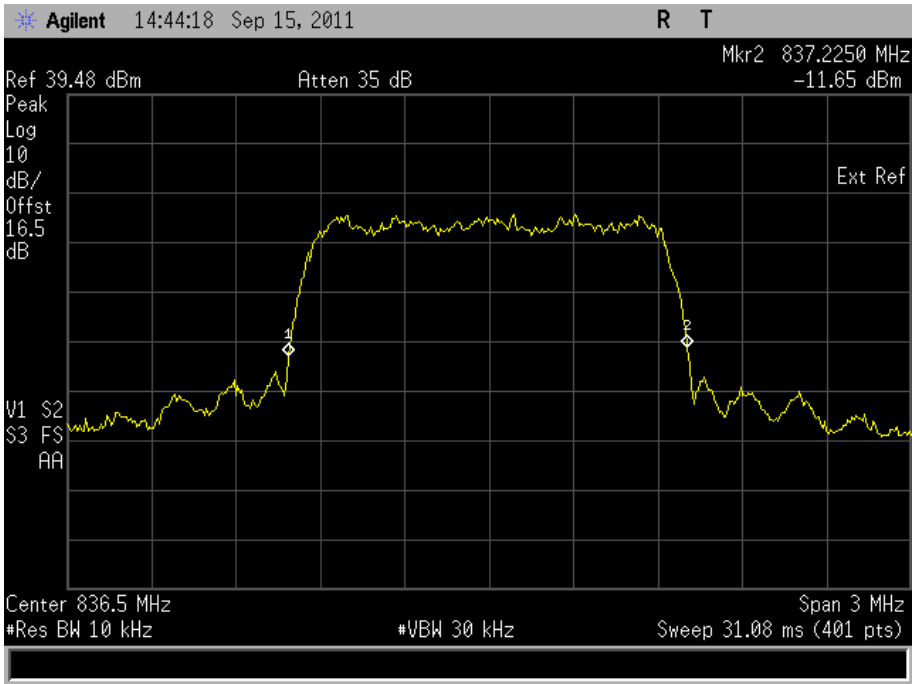




Product Service

836.52 MHz

Mode	Occupied Bandwidth (kHz)
SO55, RC1	1417.5

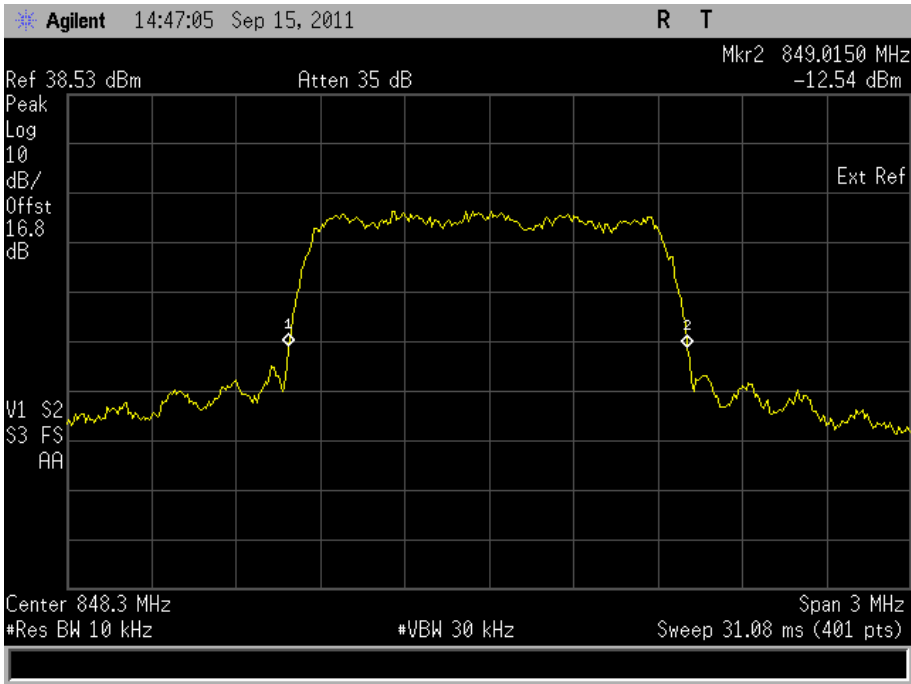




Product Service

848.31 MHz

Mode	Occupied Bandwidth (kHz)
SO55, RC1	1417.5



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.



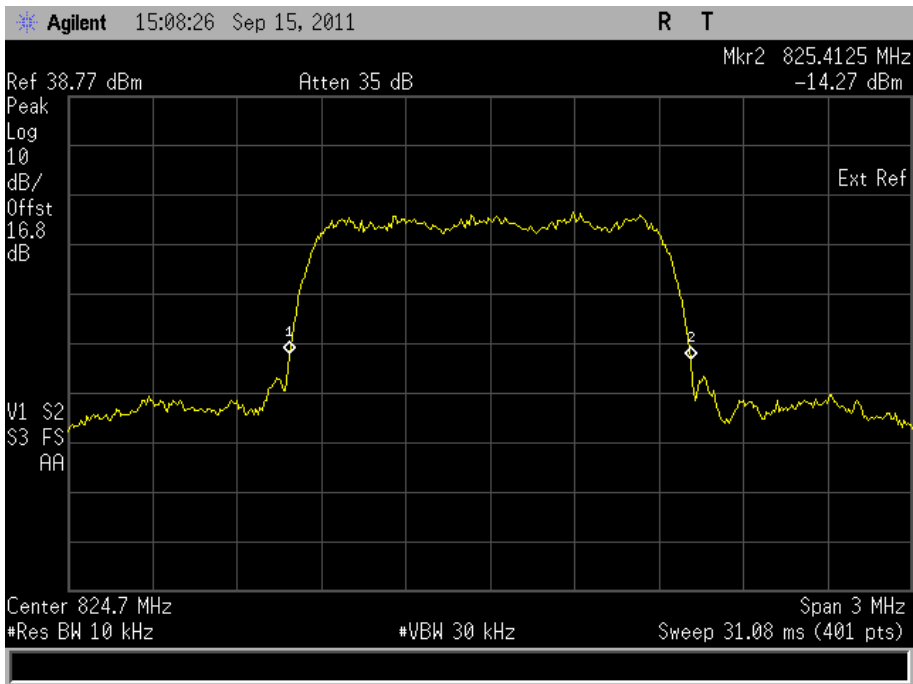
Product Service

CDMA 2000 - Test Data Service

4.0 V DC Supply

824.70 MHz

Mode	Occupied Bandwidth (kHz)
TDSO32, FCH + SCH	1425.0

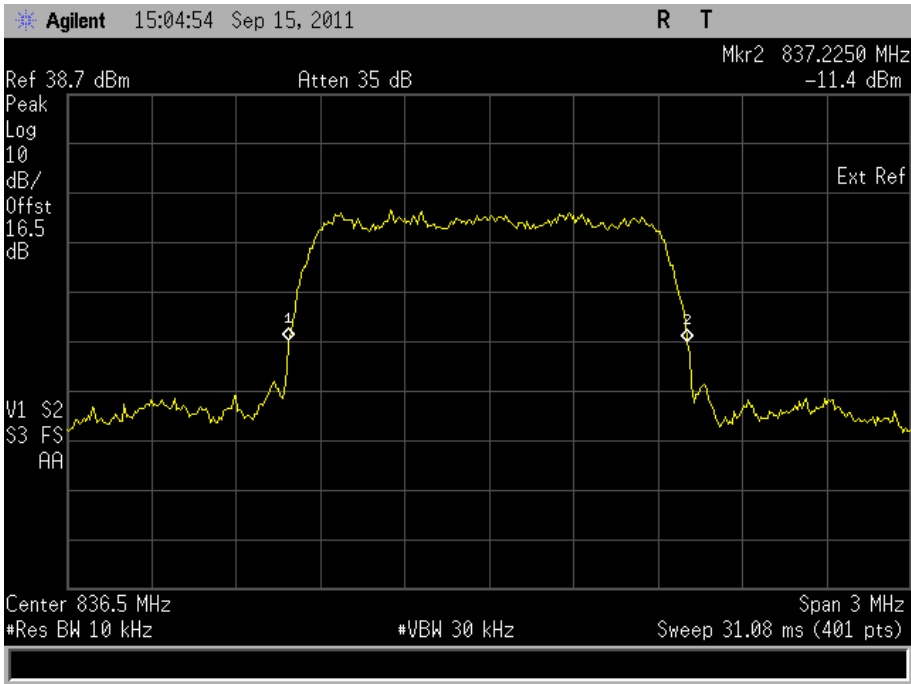




Product Service

836.52 MHz

Mode	Occupied Bandwidth (kHz)
TDSO32, FCH + SCH	1417.5

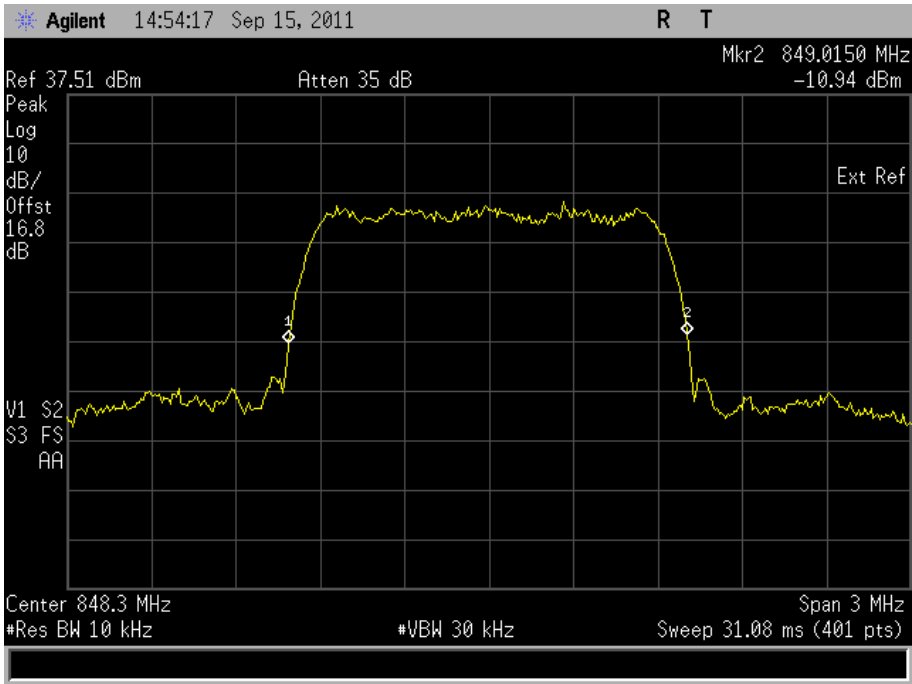




Product Service

848.31 MHz

Mode	Occupied Bandwidth (kHz)
TDSO32, FCH + SCH	1417.5



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

2.7.1 Specification Reference

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

2.7.2 Equipment Under Test and Modification State

CDMA SHI13 S/N: SSHFN000861 - Modification State 0

2.7.3 Date of Test

23 September 2011

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Procedure

The EUT was set to transmit on maximum power with modulation. 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 and the frequency error was measured at each temperature.

2.7.6 Environmental Conditions

Ambient Temperature	22.6 - 24.3°C
Relative Humidity	43.3 - 44.0%



2.7.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

Under Temperature Variations

836.52 MHz

Temperature Interval (°C)	Mode	Modulation	Deviation (ppm)
-30	SO55, RC1	64-Ray Orthogonal	-0.0371
-20	SO55, RC1	64-Ray Orthogonal	-0.0406
-10	SO55, RC1	64-Ray Orthogonal	-0.0323
0	SO55, RC1	64-Ray Orthogonal	-0.0323
+10	SO55, RC1	64-Ray Orthogonal	-0.0406
+20	SO55, RC1	64-Ray Orthogonal	-0.0311
+30	SO55, RC1	64-Ray Orthogonal	+0.0179
+40	SO55, RC1	64-Ray Orthogonal	+0.0155
+50	SO55, RC1	64-Ray Orthogonal	-0.0430

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	-	-
929 to 960	1.5	-	-
2110 to 2220	10	-	-



Product Service

Under Voltage Variations836.52 MHz

DC Voltage (V)	Mode	Modulation	Deviation (ppm)
4.0 V DC	SO55, RC1	64-Ray Orthogonal	-0.0311
3.7 V DC	SO55, RC1	64-Ray Orthogonal	-0.0383

Limit Clause

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile $\leq$ 3 watts (ppm)	Mobile $\leq$ 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

CDMA 2000 - Test Data Service

4.0 V DC Supply

Under Temperature Variations836.52 MHz

Temperature Interval (°C)	Mode	Modulation	Deviation (ppm)
-30	TDSO32, FCH + SCH	BPSK	-0.0299
-20	TDSO32, FCH + SCH	BPSK	-0.0203
-10	TDSO32, FCH + SCH	BPSK	-0.0084
0	TDSO32, FCH + SCH	BPSK	-0.0120
+10	TDSO32, FCH + SCH	BPSK	-0.0167
+20	TDSO32, FCH + SCH	BPSK	+0.0060
+30	TDSO32, FCH + SCH	BPSK	-0.0167
+40	TDSO32, FCH + SCH	BPSK	-0.0526
+50	TDSO32, FCH + SCH	BPSK	-0.0574

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	-	-
929 to 960	1.5	-	-
2110 to 2220	10	-	-



Product Service

Under Voltage Variations836.52 MHz

DC Voltage (V)	Mode	Modulation	Deviation (ppm)
4.0 V DC	TDSO32, FCH + SCH	BPSK	+0.0060
3.7 V DC	TDSO32, FCH + SCH	BPSK	+0.0131

Limit Clause

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile $\leq$ 3 watts (ppm)	Mobile $\leq$ 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 2.1 - Spurious Emission at Band Edge					
Signal Generator	Hewlett Packard	ESG4000A	61	12	18-May-2012
30V/5A Power Supply	Farnell	L30-5	191	-	O/P Mon
Multimeter	Iso-tech	IDM101	2419	12	14-Sep-2012
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Power Divider	Weinschel	1506A	3345	12	4-May-2012
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	6-Jun-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
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3697	12	28-Jan-2012
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-2012
CMU	Rohde & Schwarz	CMU 200	107980	-	-
Section 2.2 - Effective Radiated Power					
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
Screened Room (5)	Rainford	Rainford	1545	36	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2011
Signal Generator, 9kHz to 3GHz	Rohde & Schwarz	SMA 100A	3494	12	25-Jan-2012
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	19-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	26-Aug-2012
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
Section 2.3 - Maximum Peak Output Power - Conducted					
Antenna (Double Ridge Guide)	EMCO	3115	34	12	22-Jul-2012
Spectrum Analyser	Rohde & Schwarz	FSEM	37	12	18-Apr-2012
Signal Generator	Hewlett Packard	ESG4000A	38	12	18-May-2012
Signal Generator	Hewlett Packard	ESG4000A	61	12	18-May-2012
Multimeter	White Gold	WG022	190	12	26-Oct-2011
30V/5A Power Supply	Farnell	L30-5	191	-	O/P Mon
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Broadband Resistive Power Divider	Weinschel	1506A	605	12	6-Sep-2012
Multimeter	Fluke	79 Series III	611	12	5-Aug-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	13-Mar-2012
Screened Room (8)	Rainford	Rainford	1548	-	TU
Multimeter	Iso-tech	IDM101	2419	12	14-Sep-2012
Power Supply Unit	Weir	460	2754	-	TU
Hygrometer	Rotronic	I-1000	2882	12	5-Aug-2012
Antenna (DRG Horn)	ETS-LINDGREN	3115	3125	12	27-Apr-2012
Thermocouple Thermometer	Fluke	51	3172	12	23-Jul-2012
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Power Divider	Weinschel	1506A	3345	12	4-May-2012
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	6-Jun-2012
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2011
Power Meter	Rohde & Schwarz	NRP	3491	12	19-Apr-2012
Wideband Power Sensor, 50MHz - 18GHz	Rohde & Schwarz	NRP-Z81	3492	12	19-Apr-2012
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3697	12	28-Jan-2012
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3701	12	11-Jan-2012
DC - 12.4 GHz 10 dB Attenuator 1 W	Suhner	6810.17.A	3964	12	24-Jun-2012
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-2012
P-Series Power Meter	Agilent	N1911A	3980	12	12-Sep-2012
P-Series Power Meter	Agilent	N1911A	3981	12	12-Sep-2012
50 MHz-18 GHz Wideband Power Sensor	Agilent	N1921A	3982	12	12-Sep-2012
50 MHz-18 GHz Wideband Power Sensor	Agilent	N1921A	3983	12	12-Sep-2012
CMU	Rohde & Schwarz	CMU 200	107980	-	-



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 – Emissions Limitations for Cellular Equipment					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	12-Nov-2011
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	22-Sep-2011
Screened Room (5)	Rainford	Rainford	1545	36	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Test Receiver	Rohde & Schwarz	ESIB26	2085	12	14-Dec-2011
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
Amplifier (1 - 8GHz)	Phase One	PS06-0060	3175	12	5-Jul-2012
Amplifier (8 - 18GHz)	Phase One	PS06-0061	3176	12	5-Jul-2012
Compliance 5 Emissions	Schaffner	C5e Software V.5.00.00	3275	-	N/A - Software
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2011
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	19-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	26-Aug-2012
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU
Low Noise Amplifier	Wright Technologies	APS04-0085	3969	12	8-Jul-2012
Section 2.5 - Conducted Spurious Emissions					
Multimeter	White Gold	WG022	190	12	26-Oct-2011
30V/5A Power Supply	Farnell	L30-5	191	-	O/P Mon
Broadband Resistive Power Divider	Weinschel	1506A	605	12	6-Sep-2012
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	28-Jun-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	13-Mar-2012
4GHz HPF	Sematron	F-100-4000-5-R	2245	-	TU
Multimeter	Iso-tech	IDM101	2419	12	14-Sep-2012
Power Supply Unit	Weir	460	2754	-	TU
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Power Divider	Weinschel	1506A	3345	12	4-May-2012
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	6-Jun-2012
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2011
Power Meter	Rohde & Schwarz	NRP	3491	12	19-Apr-2012
Wideband Power Sensor, 50MHz - 18GHz	Rohde & Schwarz	NRP-Z81	3492	12	19-Apr-2012
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	23-Feb-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	8-Feb-2012
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3697	12	28-Jan-2012
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-2012
CMU	Rohde & Schwarz	CMU 200	107980	-	-



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.6- Occupied Bandwidth					
Signal Generator	Hewlett Packard	ESG4000A	61	12	18-May-2012
Multimeter	White Gold	WG022	190	12	26-Oct-2011
30V/5A Power Supply	Farnell	L30-5	191	-	O/P Mon
Broadband Resistive Power Divider	Weinschel	1506A	605	12	6-Sep-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	13-Mar-2012
Multimeter	Iso-tech	IDM101	2419	12	14-Sep-2012
Power Supply Unit	Weir	460	2754	-	TU
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
Power Divider	Weinschel	1506A	3345	12	4-May-2012
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	6-Jun-2012
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2011
Power Meter	Rohde & Schwarz	NRP	3491	12	19-Apr-2012
Wideband Power Sensor, 50MHz - 18GHz	Rohde & Schwarz	NRP-Z81	3492	12	19-Apr-2012
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	23-Feb-2012
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3697	12	28-Jan-2012
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-2012
CMU	Rohde & Schwarz	CMU 200	107980	-	-
Section 2.7 - Frequency Stability					
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
30V/5A Power Supply	Farnell	L30-5	191	-	O/P Mon
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	28-Jun-2012
Multimeter	Iso-tech	IDM101	2419	12	14-Sep-2012
Thermocouple Thermometer	Fluke	51	3172	12	23-Jul-2012
Hygrometer	Rotronic	I-1000	3220	12	3-May-2012
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3697	12	28-Jan-2012

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
Effective Radiated Power	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB
Spurious Emissions at Band Edge	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB
Maximum Peak Output Power - Conducted	± 0.70 dB
Emission Limitations for Cellular Equipment	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB
Conducted Spurious Emissions	± 3.454 dB
Occupied Bandwidth	± 16.74 kHz
Frequency Stability	± 46.70 Hz



Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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