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Report On

FCC Testing of the
Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00171

Document 75917027 Report 09 Issue 1 June 2012

Product Service

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Fareham, Hampshire, United Kingdom, PO15 5RL
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REPORT ON

FCC Testing of the
Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22

Document 75917027 Report 09 Issue 1

June 2012

PREPARED FOR

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Azure House
Bagshot Road
Bracknell
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RG12 7QY

PREPARED BY

Natalie Bennett
Senior Administrator (Technical)

APPROVED BY

Mark Jenkins
Authorised Signatory

DATED 21 June 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 22. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler S Bennett

UKAS TESTING 0141

Product Service

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SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC Testing of the Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN 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 SHI15
Serial Number(s)	IMEI 004401114000181
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2 (2011) FCC CFR 47 Part 22 (2011)
Incoming Release Date	Application Form 02 May 2012
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	9100 02 April 2012
Start of Test	23 May 2012
Finish of Test	19 June 2012
Name of Engineer(s)	G Lawler S Bennett
Related Document(s)	ANSI C63.4: 2009

Product Service

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
	Pt2	Pt22			
CDMA 2000 – Loopback Service					
2.1	2.1051	22.905	Spurious Emissions at Band Edge	Pass	
2.2	-	22.913 (a)	Effective Radiated Power	Pass	
2.3	2.1046	22.913 (a)	Maximum Peak Output Power - Conducted	Pass	
2.4	-	22.917	Emission Limitations for Cellular Equipment	Pass	
2.5	2.1051	22.917 (a)	Conducted Spurious Emissions	Pass	
2.6	2.1049 (h)	22.917 (b)	Occupied Bandwidth	Pass	
2.7	2.1055	22.355	Frequency Stability	Pass	
CDMA 2000 - Test Data Service					
2.1	2.1051	22.905	Spurious Emissions at Band Edge	Pass	
2.2	-	22.913 (a)	Effective Radiated Power	Pass	
2.3	2.1046	22.913 (a)	Maximum Peak Output Power - Conducted	Pass	
2.4	-	22.917	Emission Limitations for Cellular Equipment	Pass	
2.5	2.1051	22.917 (a)	Conducted Spurious Emissions	Pass	
2.6	2.1049 (h)	22.917 (b)	Occupied Bandwidth	Pass	
2.7	2.1055	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

Equipment designator:
Model name/number CDMA SHI15 Identification number APYHRO00171

Supply Voltage:
[ ] AC mains State AC voltage …… V and AC frequency …… Hz
[ ] DC (external) State DC voltage …… V and DC current …… A
[X] DC (internal) State DC voltage …3.7 V and Battery type…Li-Ion.

Frequency characteristics:
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

Power characteristics:
Maximum transmitter power 0.316W(25dBm) Minimum transmitter power …… W
(if variable)
[X] Continuous transmission
[ ] Intermittent transmission State duty cycle ……
If intermittent, can transmitter be set to continuous transmit test mode? Y/N

Antenna characteristics:
[X] Antenna connector State impedance 50 ohm
[ ] Temporary antenna connector State impedance …… ohm
[ ] Integral antenna State gain …… dBi

Modulation characteristics:
[ ] Amplitude [ ] Other
[ ] Frequency Details: ……..
[X] Phase
Can the transmitter operate un-modulated? ~~Y~~/N
ITU Class of emission: ……

Extreme conditions:
Maximum temperature 60 ºC Minimum temperature -20 ºC
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 : Satomi Amaki
Name : Satomi Amaki
Position held : Manager
Date : 02 May 2012

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN 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 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
Sharp CDMA SHI15 Dual Band CDMA (BC0 and BC6) and Tri Band GSM (900, 1800 and 1900 MHz) Dual Mode Cellular Phone with Bluetooth, FeliCa, WLAN and GPS
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 22

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 and Modification State

CDMA SHI15 S/N: IMEI 004401114000181 - Modification State 0

2.1.3 Date of Test

18 June 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

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 WCDMA modulation schemes.

2.1.6 Environmental Conditions

Ambient Temperature	21.2 - 22.4°C
Relative Humidity	37.7 - 40.6%

Product Service

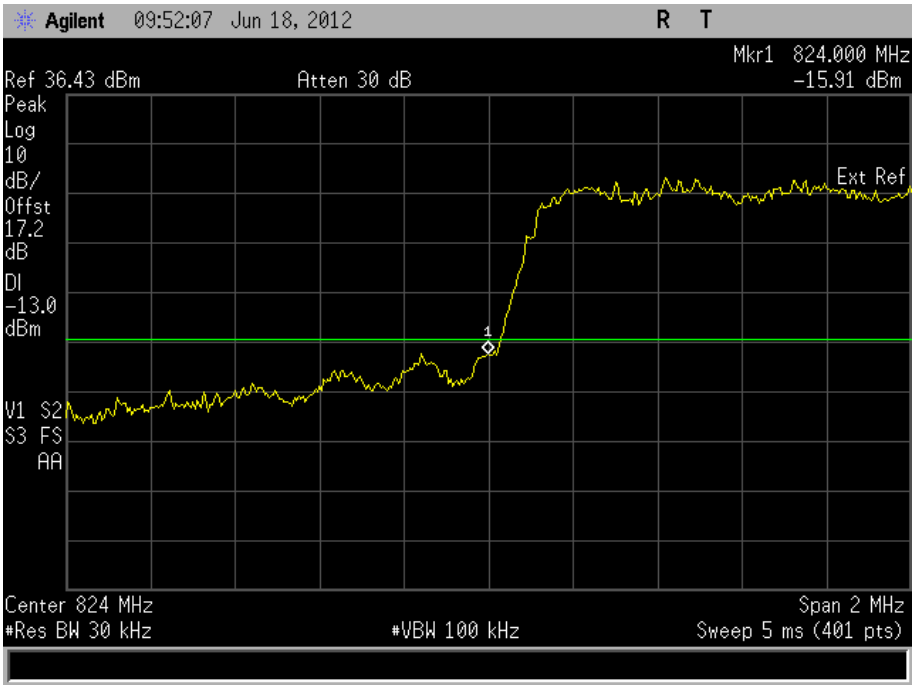
2.1.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

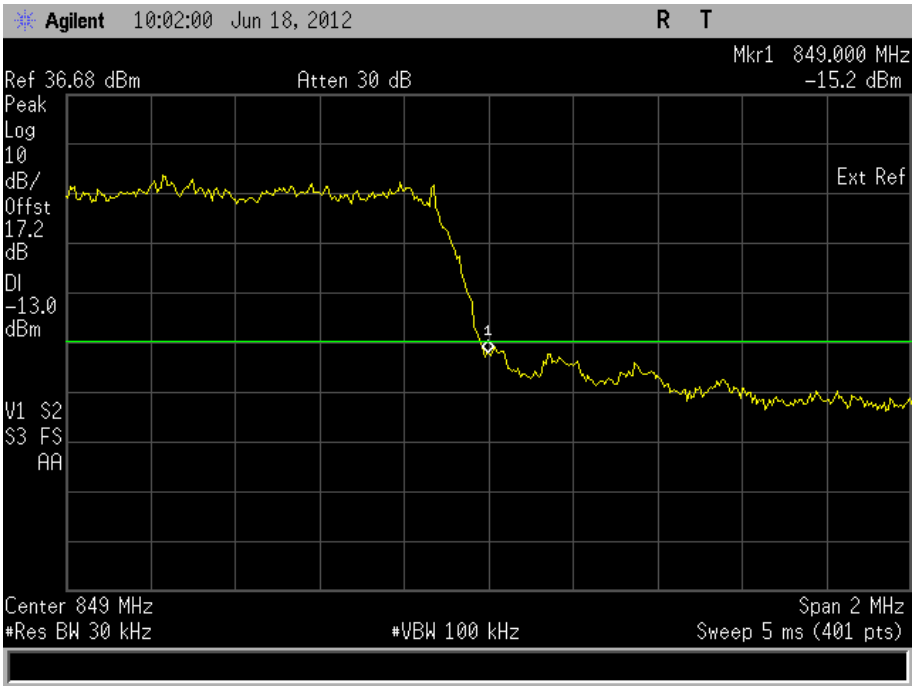
Frequency Block (MHz)	Mode	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A :(824.0 – 835.0)	SO55, RC1	Channel : 1015 Frequency : 824.76 MHz	N/A
B :(846.5 – 849.0)	SO55, RC1	N/A	Channel : 775 Frequency : 848.25MHz

Frequency Block A



Product Service

Frequency Block B



Limit Clause

-13 dBm at block edge.

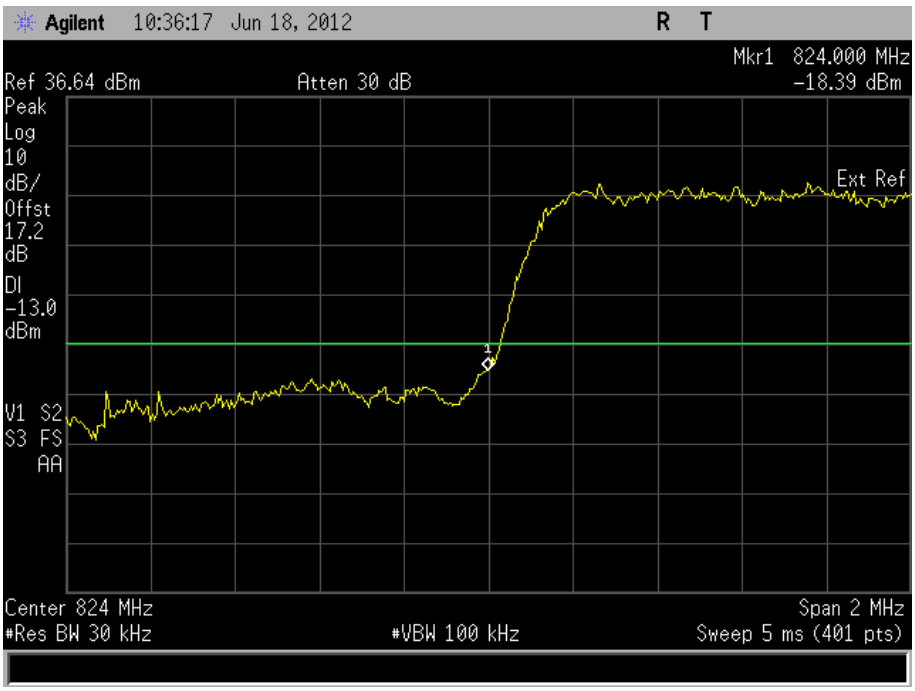
Product Service

CDMA 2000 - Test Data Service

4.0 V DC Supply

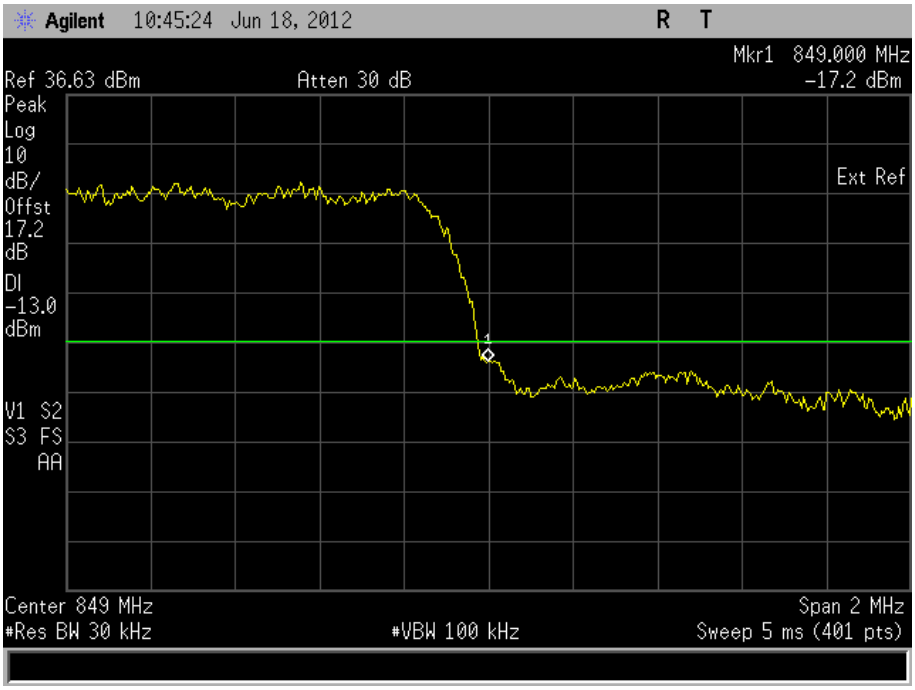
Frequency Block (MHz)	Mode	Lower Block Edge Test Channels/Frequencies	Upper Block Edge Test Channels/Frequencies
A :(824.0 – 835.0)	SO55, RC1	Channel : 1015 Frequency : 824.76 MHz	N/A
B :(846.5 – 849.0)	SO55, RC1	N/A	Channel : 775 Frequency : 848.25MHz

Frequency Block A



Product Service

Frequency Block B



Limit Clause

-13 dBm at block edge.

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 and Modification State

CDMA SHI15 S/N: IMEI 004401114000181 - Modification State 0

2.2.3 Date of Test

28 May 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

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	20.2°C
Relative Humidity	55.0%

Product Service

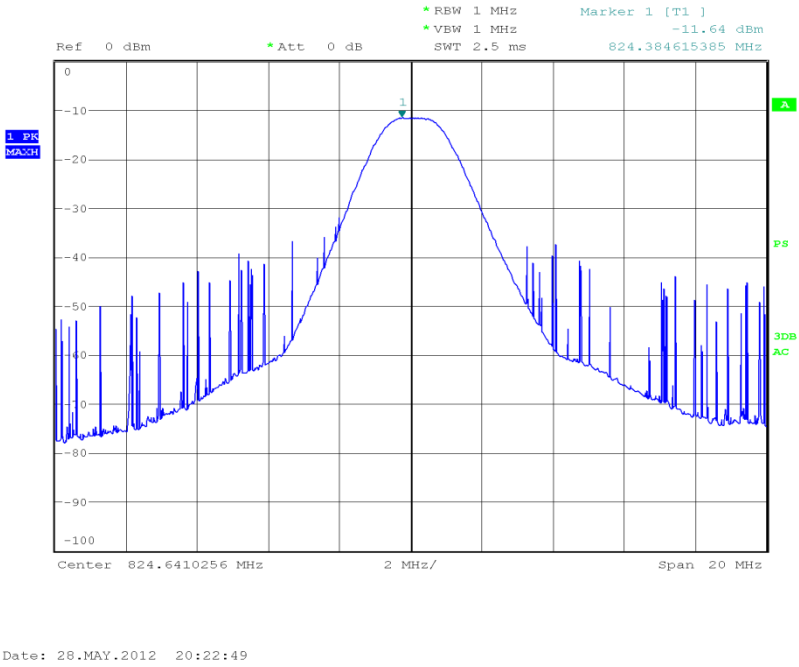
2.2.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

824.70 MHz

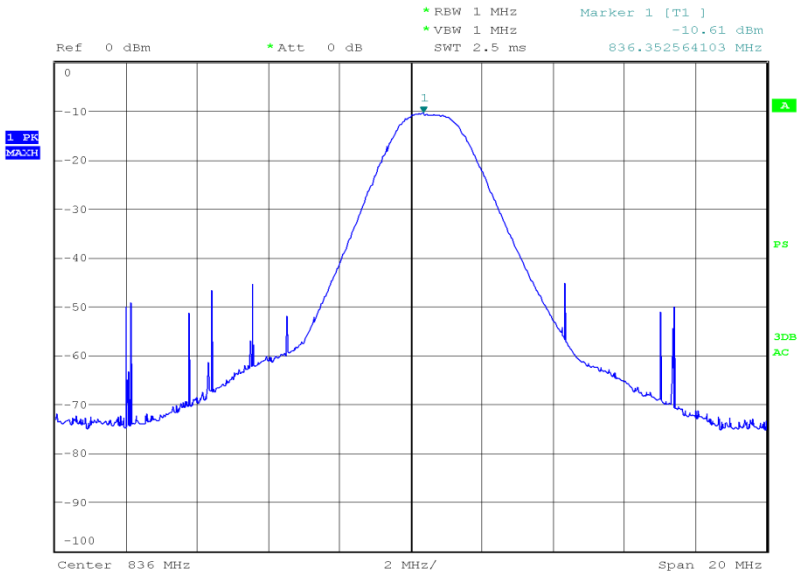
Result (dBm)	Result (W)
22.91	0.195



Product Service

836.52 MHz

Result (dBm)	Result (W)
23.71	0.235

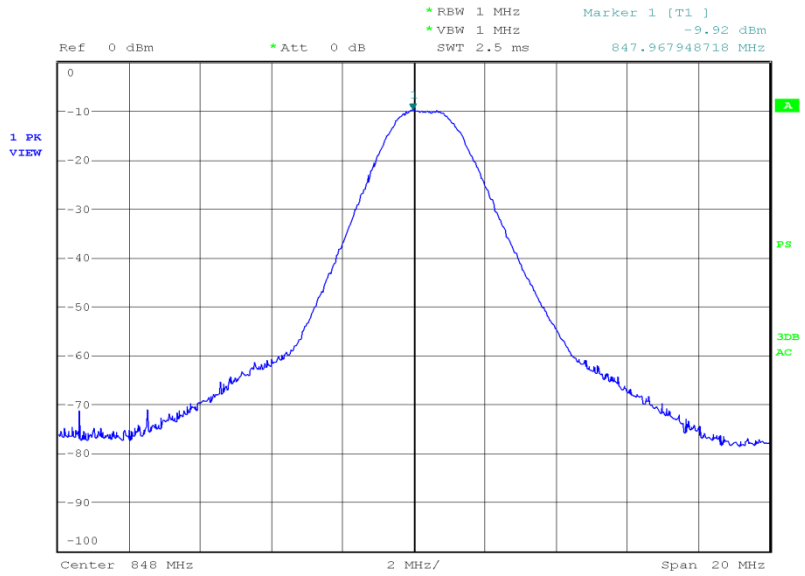


Date: 28.MAY.2012 20:30:33

Product Service

848.31 MHz

Result (dBm)	Result (W)
24.23	0.265



Limit Clause

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

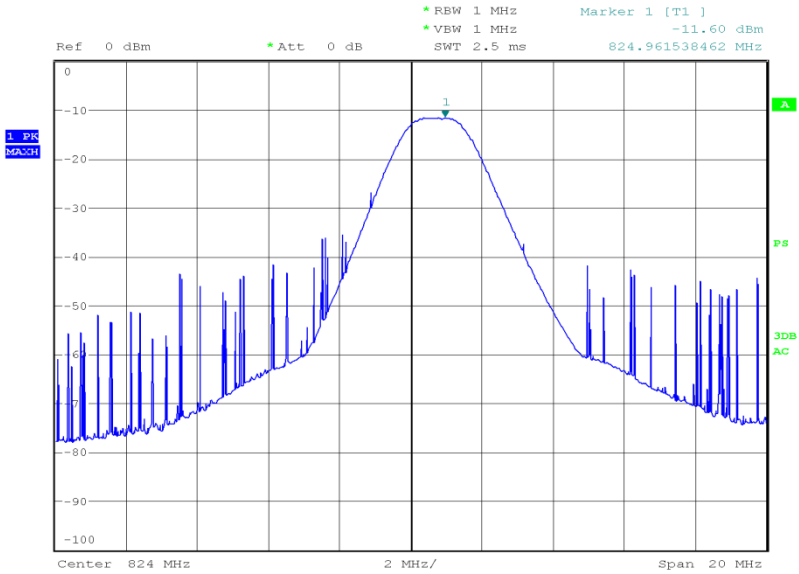
Product Service

CDMA 2000 - Test Data Service

4.0 V DC Supply

824.70 MHz

Result (dBm)	Result (W)
22.95	0.197



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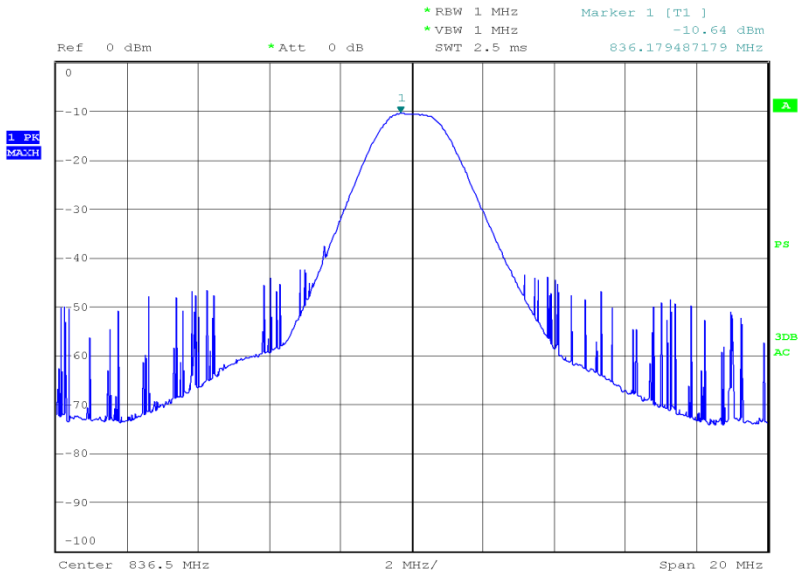
Product Service

836.52 MHz

Result (dBm)	Result (W)
23.68	0.233

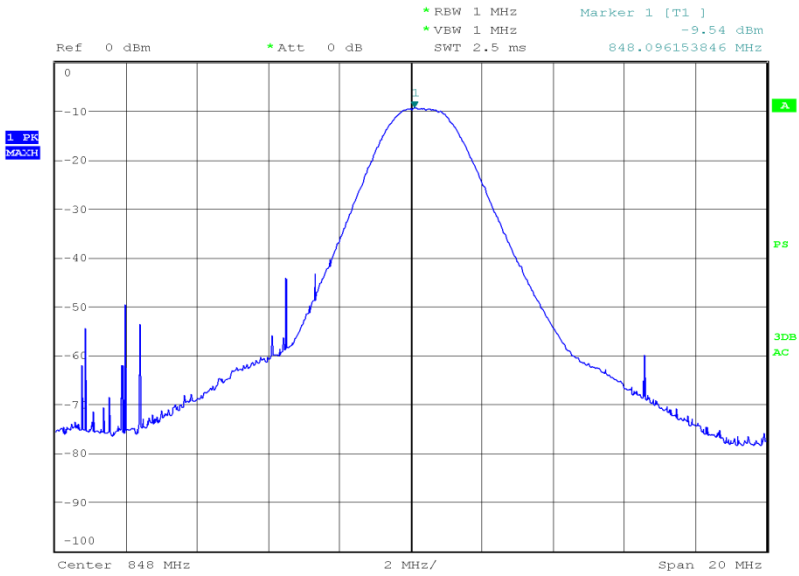


Date: 28.MAY.2012 20:07:14

Product Service

848.31 MHz

Result (dBm)	Result (W)
24.61	0.289



Limit Clause

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

2.3 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.3.1 Specification Reference

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

2.3.2 Equipment Under Test and Modification State

CDMA SHI15 S/N: IMEI 004401114000181 - Modification State 0

2.3.3 Date of Test

18 June 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

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	21.2 - 22.4°C
Relative Humidity	37.7 - 40.6%

2.3.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

824.70 MHz

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

836.52 MHz

Mode	Result (dBm)	Result (W)
SO55, RC1	28.93	0.782

848.31 MHz

Mode	Result (dBm)	Result (W)
SO55, RC1	29.02	0.798

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)
SO55, RC1	28.69	0.740

836.52 MHz

Mode	Result (dBm)	Result (W)
SO55, RC1	28.15	0.653

848.31 MHz

Mode	Result (dBm)	Result (W)
SO55, RC1	28.40	0.692

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 22, Clause 22.917

2.4.2 Equipment Under Test and Modification State

CDMA SHI15 S/N: IMEI 004401114000181 - Modification State 0

2.4.3 Date of Test

28 May 2012

2.4.4 Test Equipment Used

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

2.4.5 Test Procedure

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

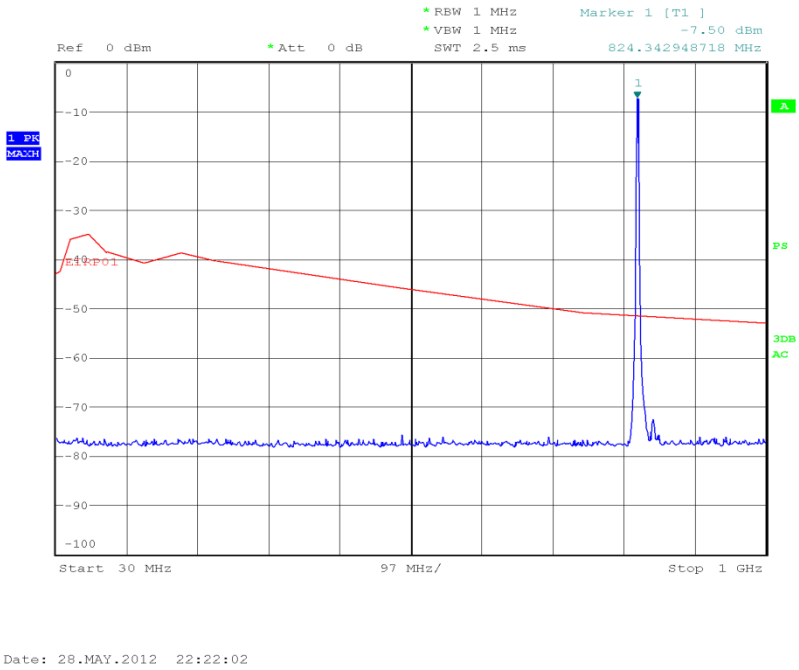
Ambient Temperature	20.2°C
Relative Humidity	55.0%

2.4.7 Test Results

CDMA 2000 - Loopback Service

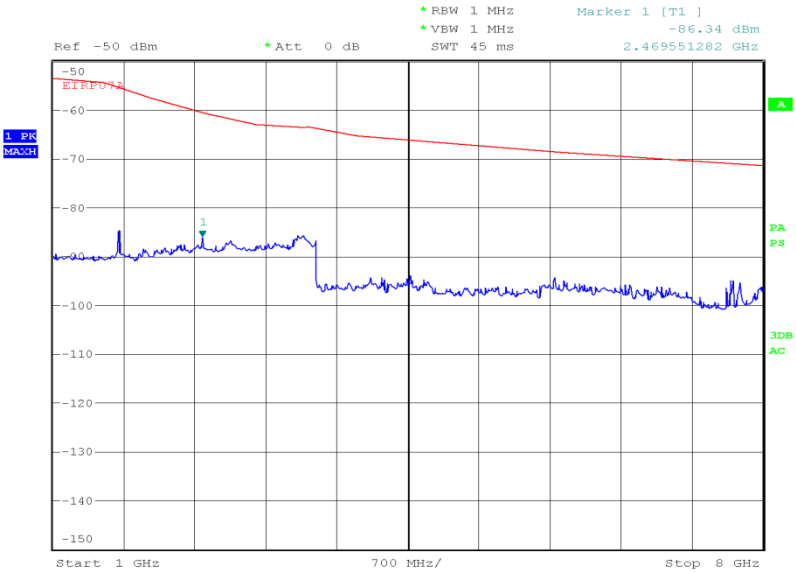
824.70 MHz

30 MHz to 1 GHz



Product Service

1 GHz to 8 GHz



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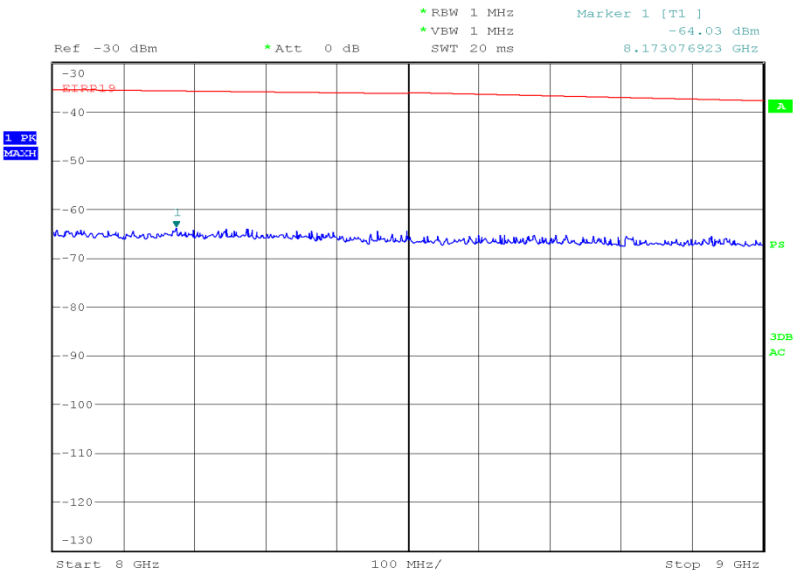
8 GHz to 9 GHz



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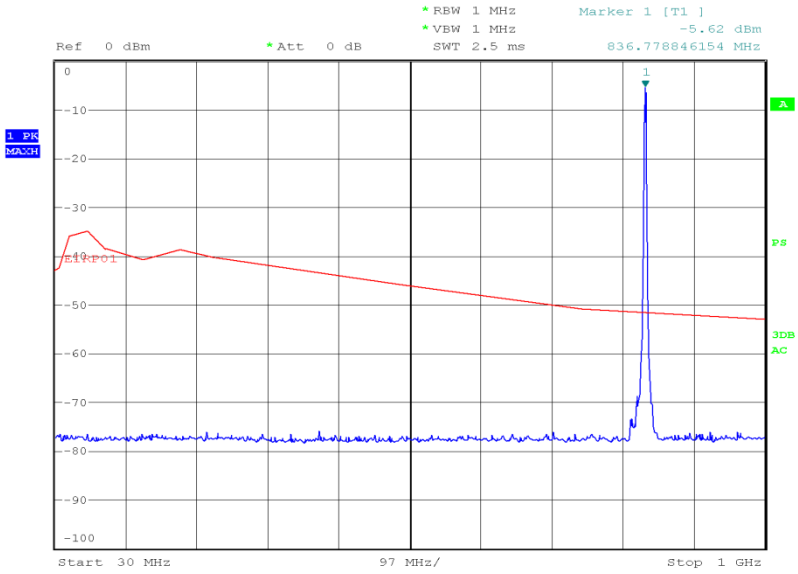
Product Service

836.52 MHz

30 MHz to 1 GHz



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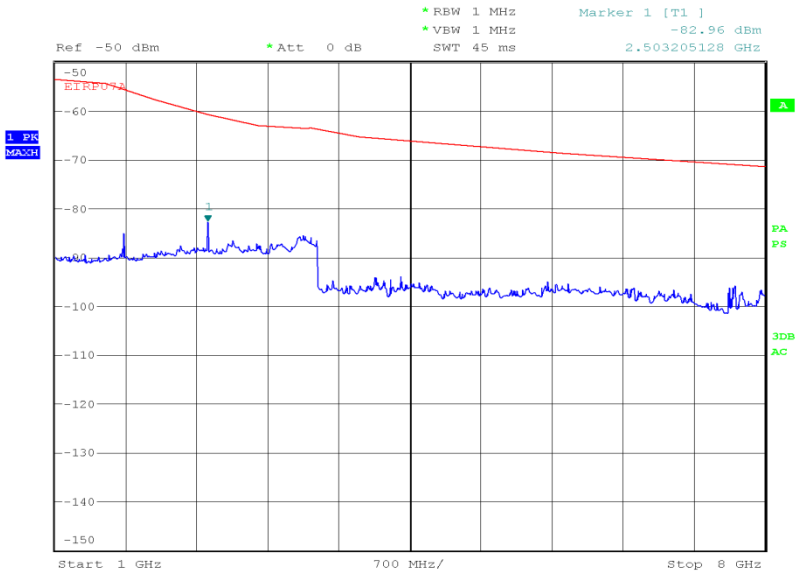
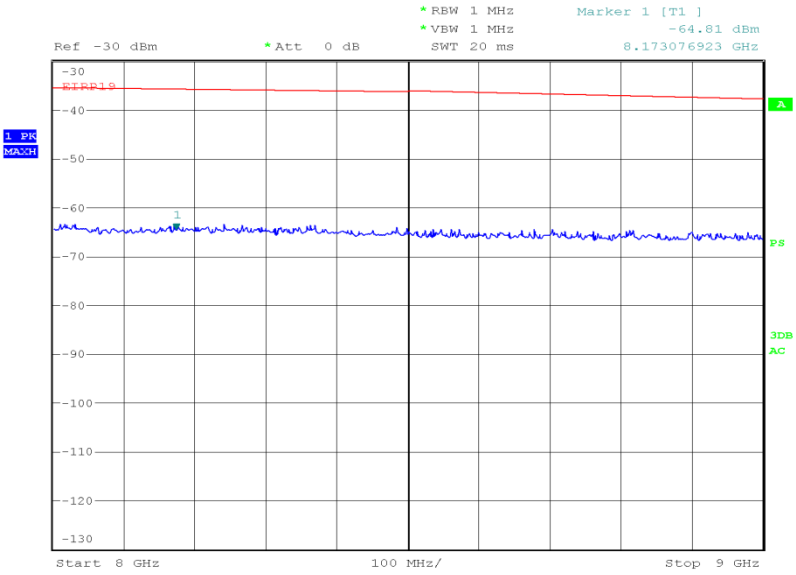
1 GHz to 8 GHz



Date: 28.MAY.2012 19:33:29

Product Service

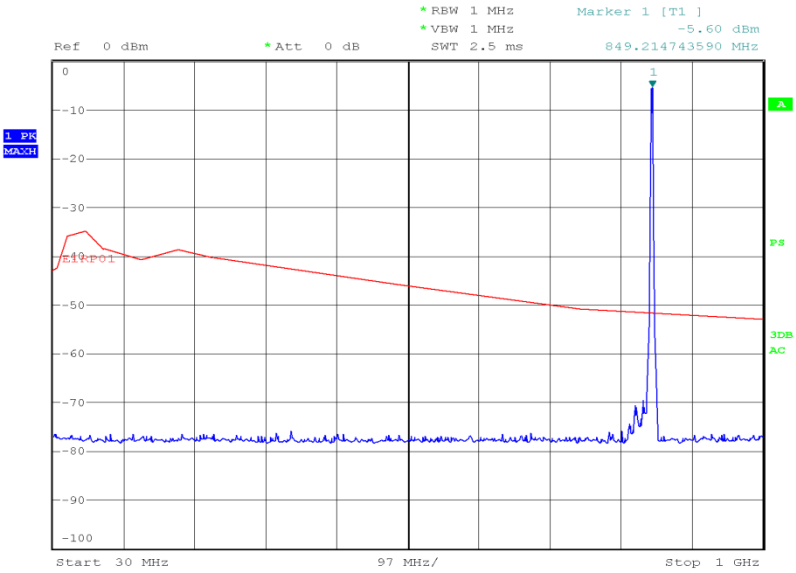
8 GHz to 9 GHz



Date: 28.MAY.2012 21:33:01

848.31 MHz

30 MHz to 1 GHz



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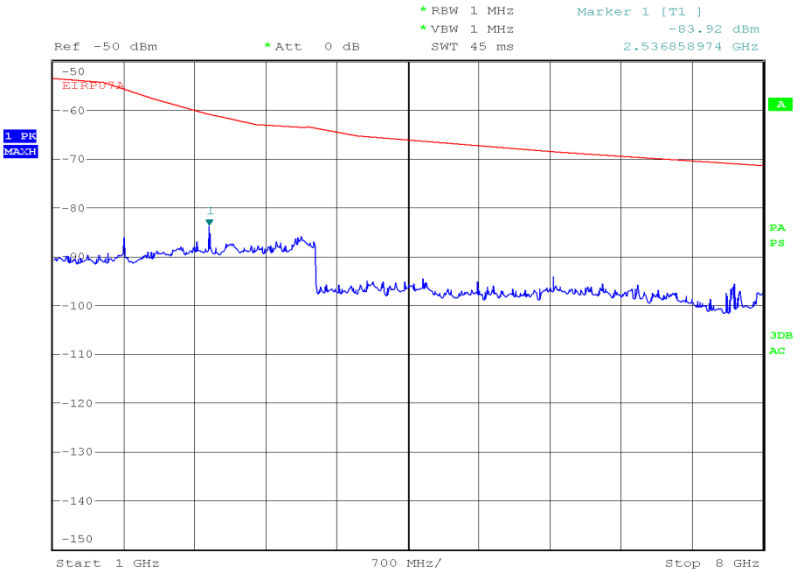
Product Service

1 GHz to 8 GHz



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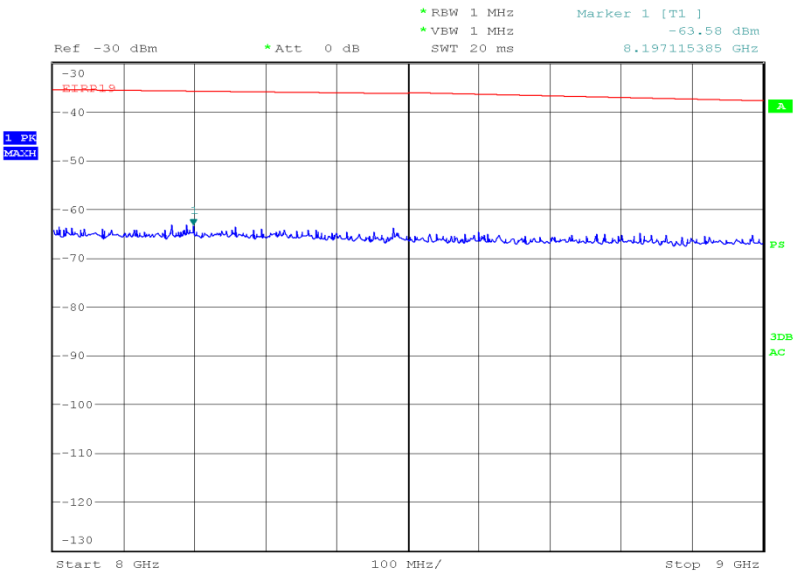
8 GHz to 9 GHz



Date: 28.MAY.2012 21:34:54

Limit Clause

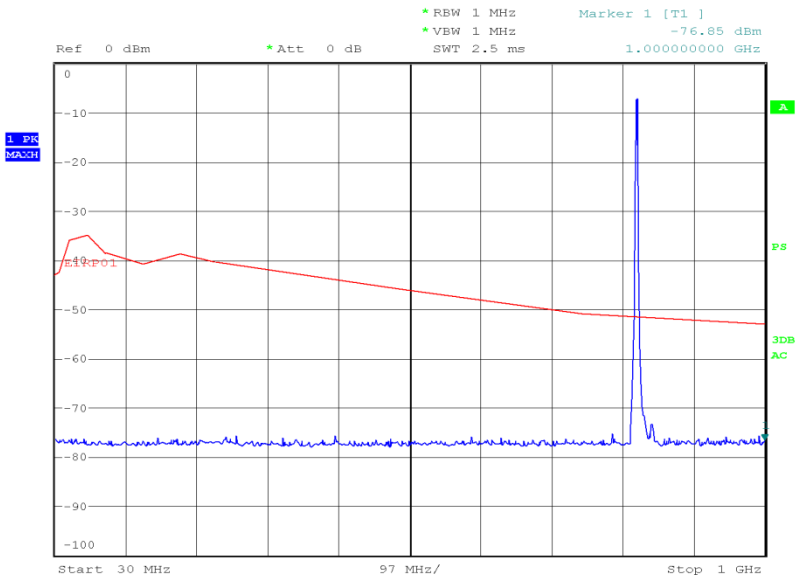
43+10log(P) or -13 dBm

Product Service

CDMA 2000 - Test Data Service

824.70 MHz

30 MHz to 1 GHz



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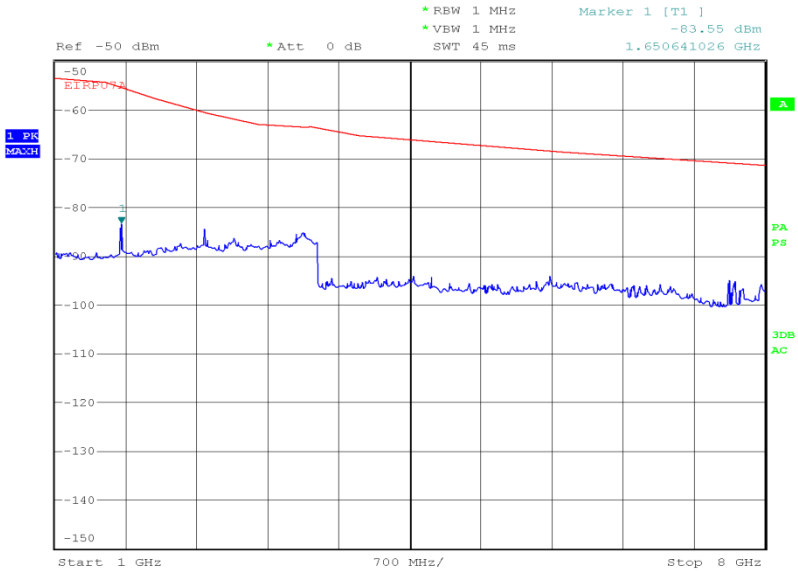
1 GHz to 8 GHz



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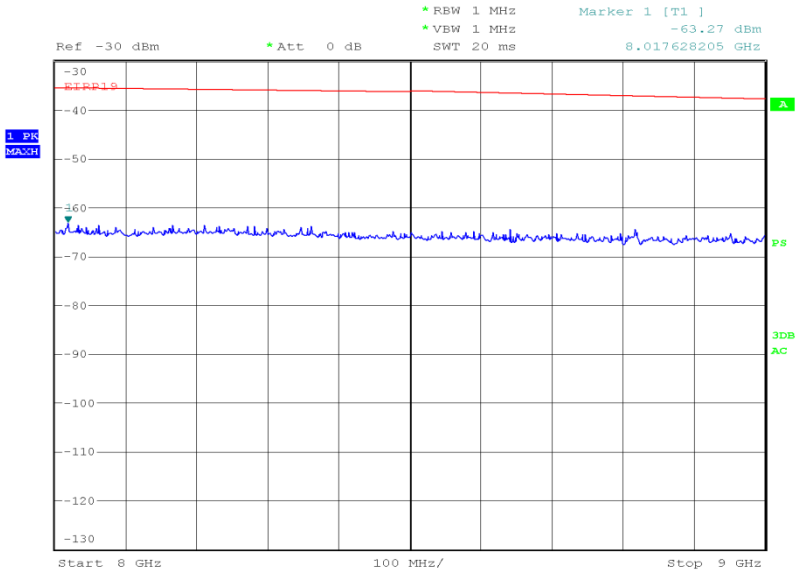
Product Service

8 GHz to 9 GHz



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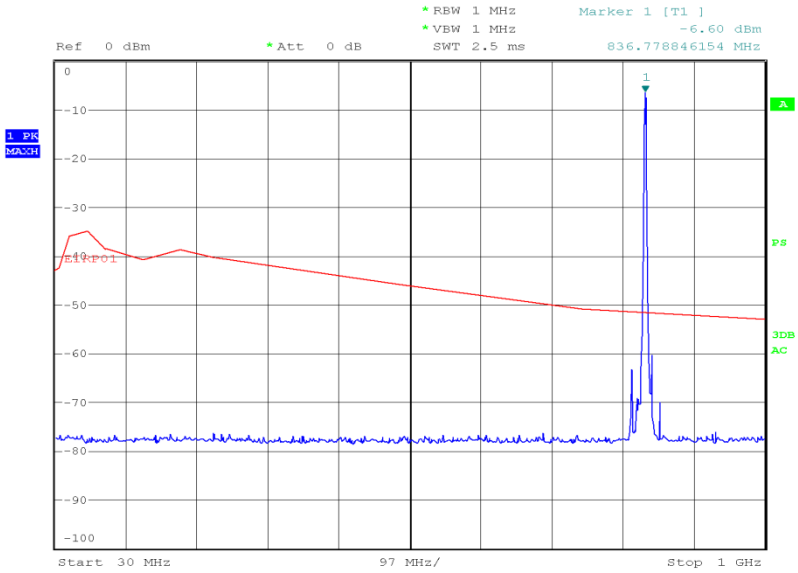
836.52 MHz

30 MHz to 1 GHz



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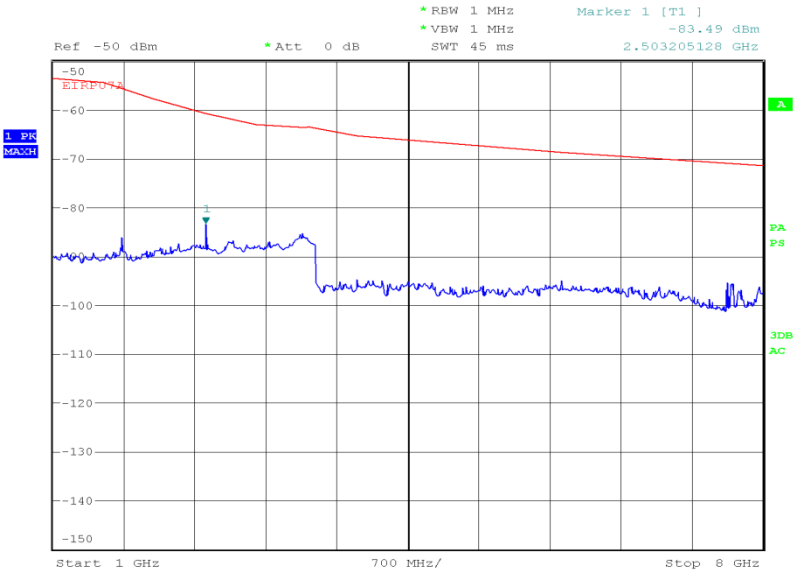
Product Service

1 GHz to 8 GHz



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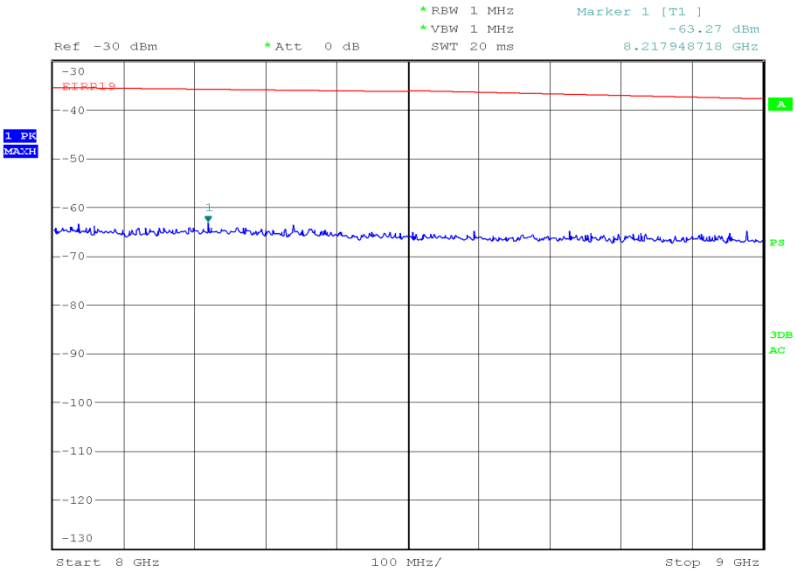
8 GHz to 9 GHz

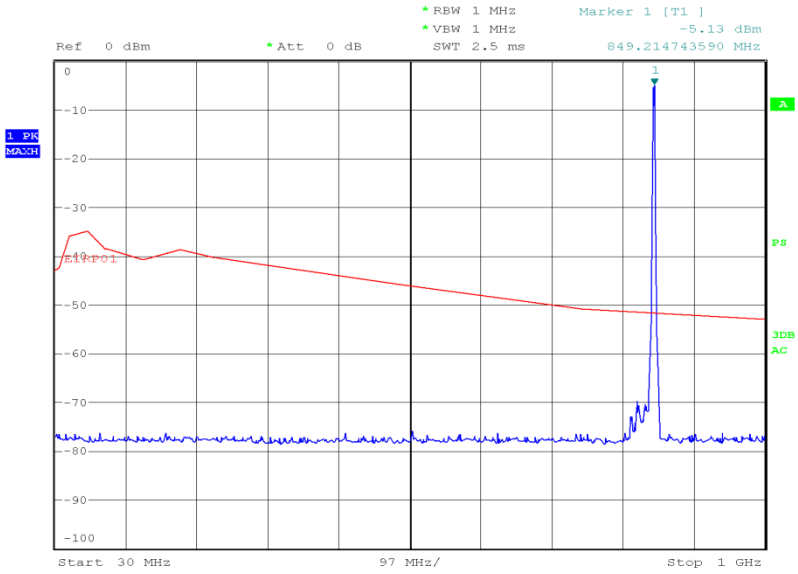


Date: 28.MAY.2012 21:42:48

Product Service

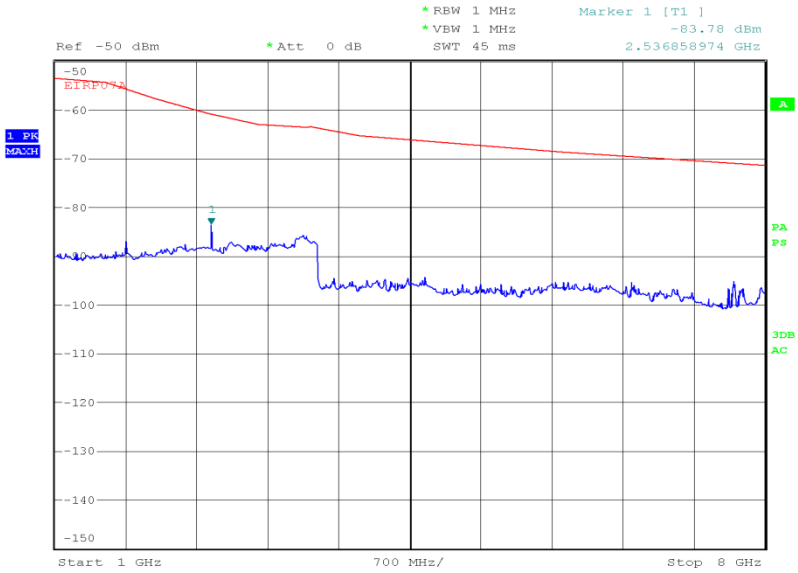
848.31 MHz

30 MHz to 1 GHz



Date: 28.MAY.2012 22:15:38

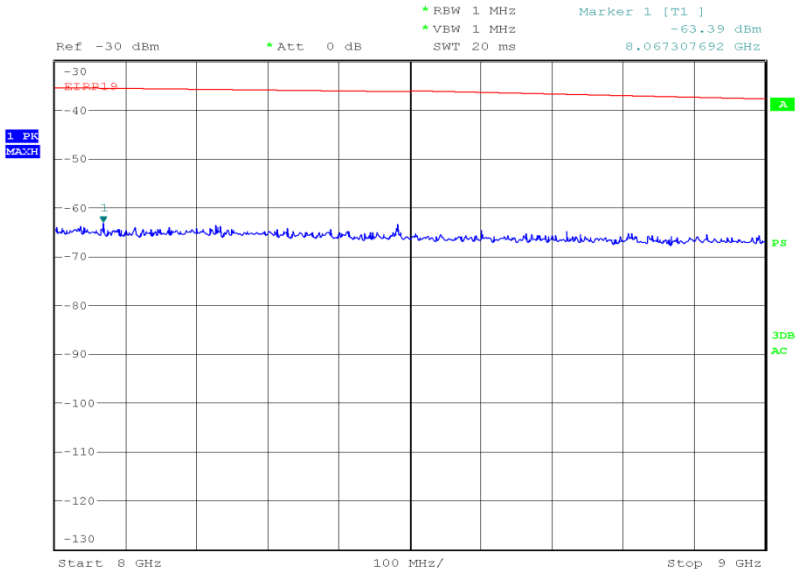
1 GHz to 8 GHz



Date: 28.MAY.2012 19:41:13

Product Service

8 GHz to 9 GHz



Limit Clause

43+10log(P) or -13 dBm

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 and Modification State

CDMA SHI15 S/N: IMEI 004401114000181 - Modification State 0

2.5.3 Date of Test

18 June 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

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 1.5 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	21.2 - 22.4°C
Relative Humidity	37.7 - 40.6%

Product Service

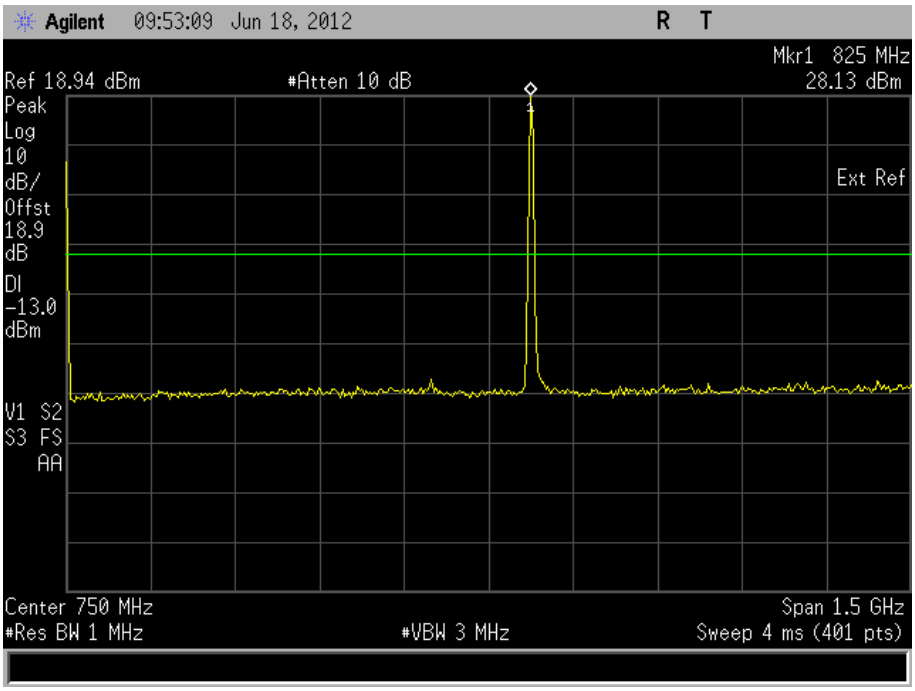
2.5.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

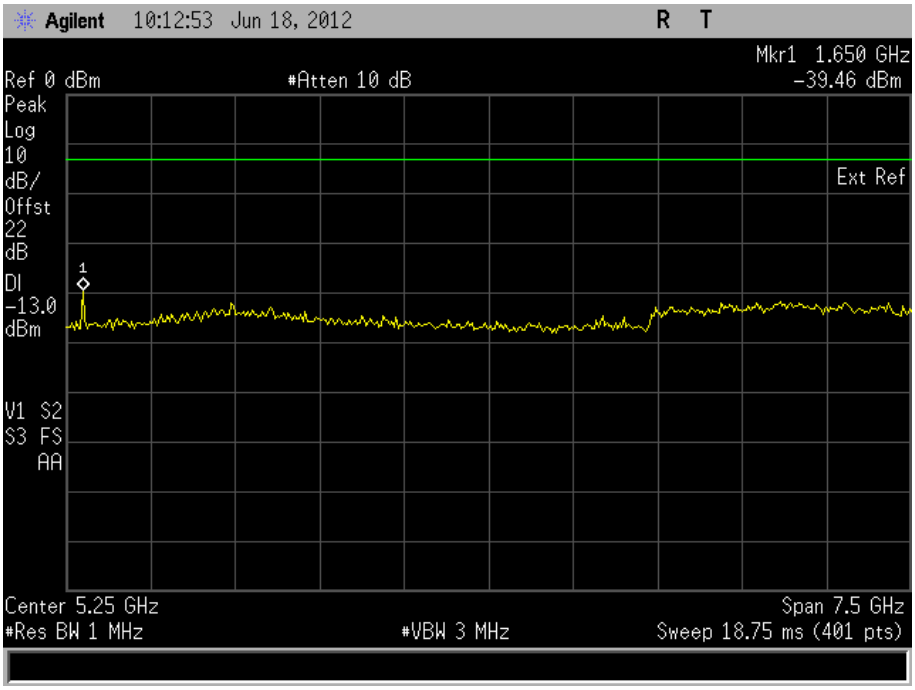
824.70 MHz

9 kHz to 1.5 GHz



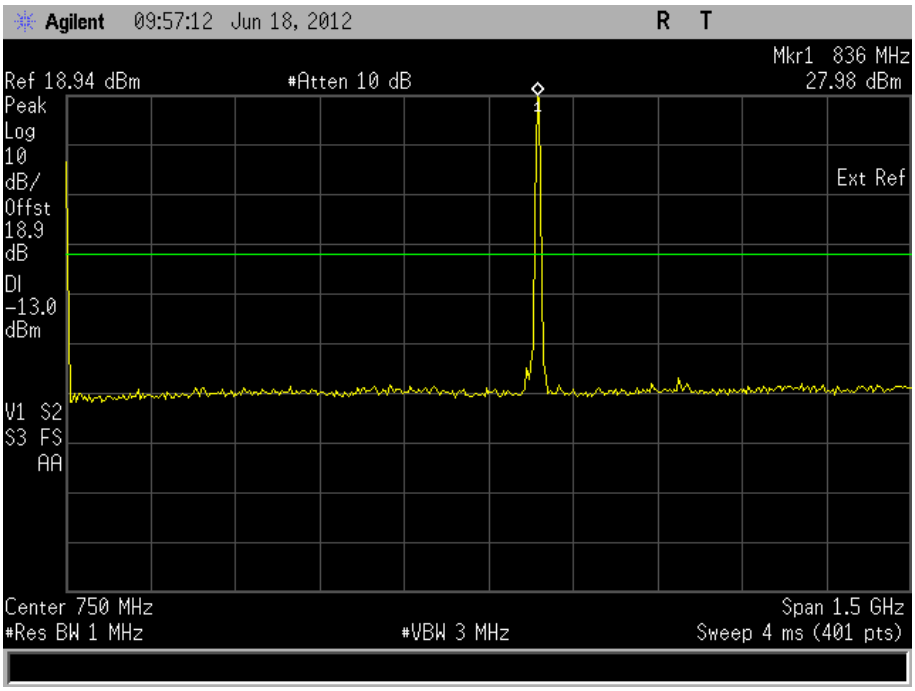
Product Service

1.5 GHz to 9 GHz



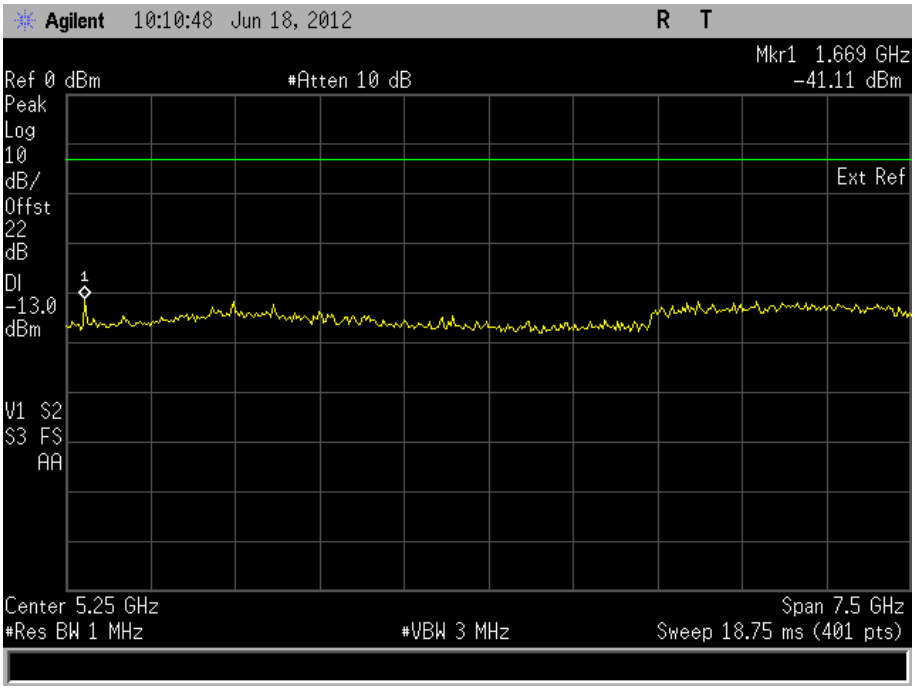
836.52 MHz

9 kHz to 1.5 GHz



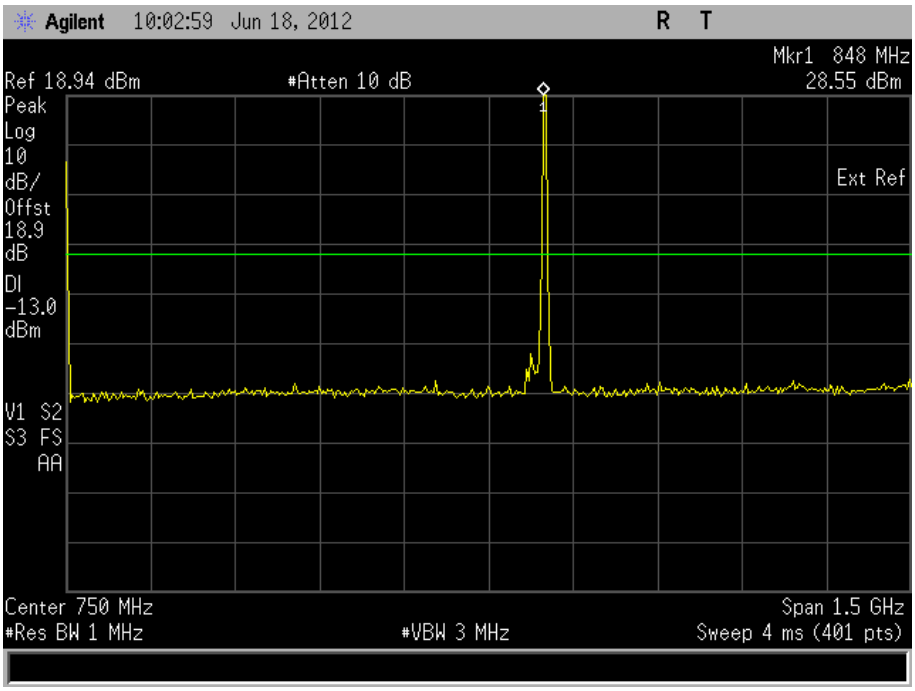
Product Service

1.5 GHz to 9 GHz



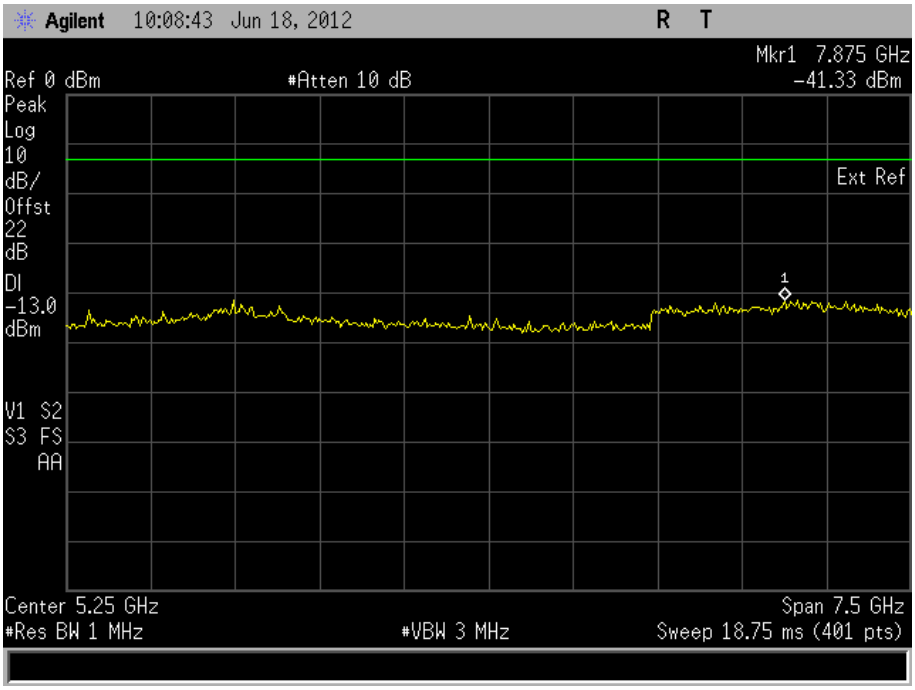
848.31 MHz

9 kHz to 1.5 GHz



Product Service

1.5 GHz to 9 GHz



Limit Clause

43+10log(P) or -13 dBm

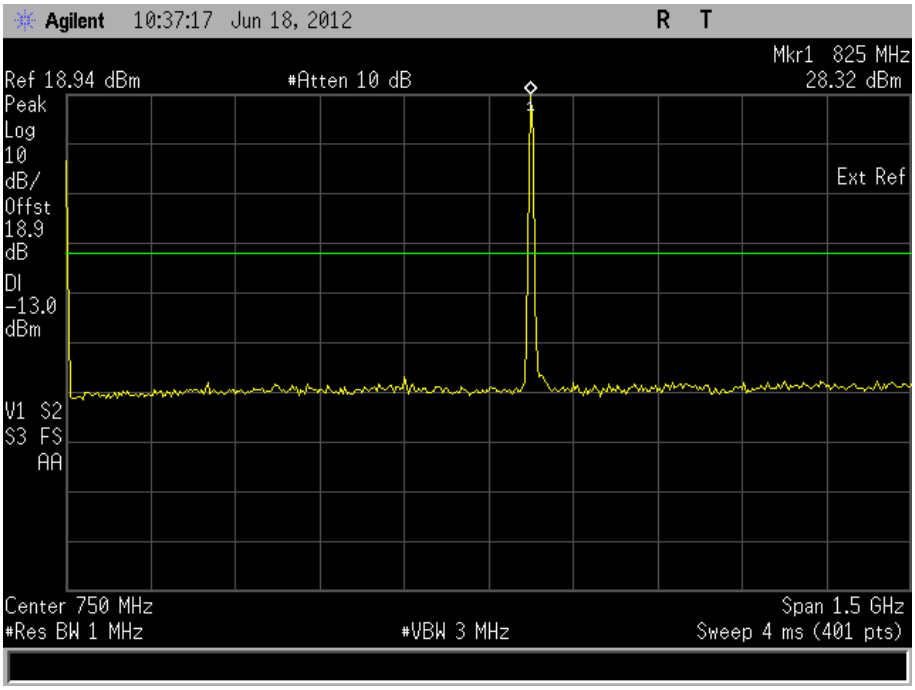
Product Service

CDMA 2000 - Test Data Service

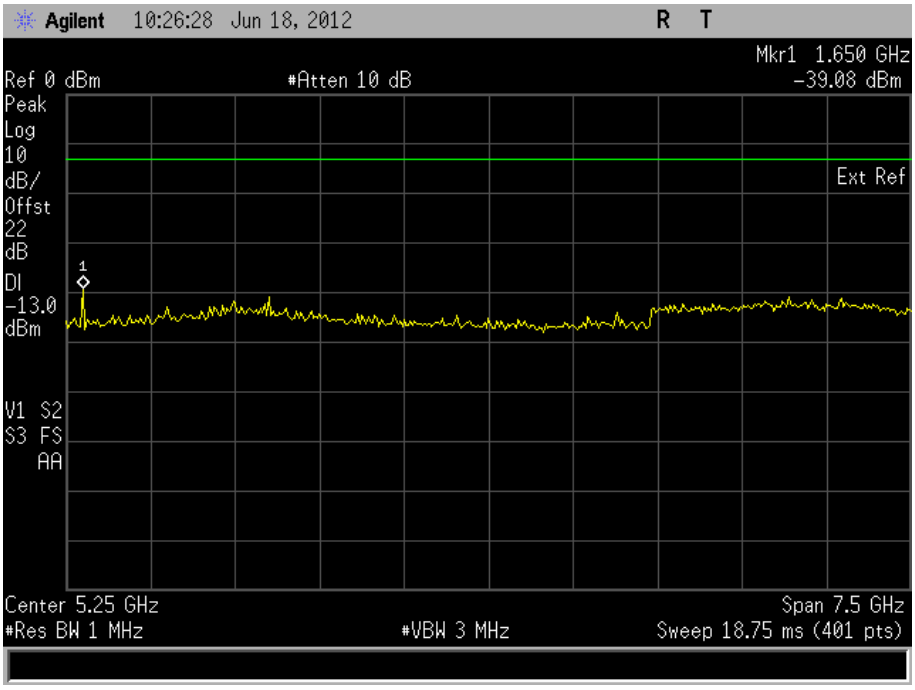
4.0 V DC Supply

824.70 MHz

9 kHz to 1.5 GHz



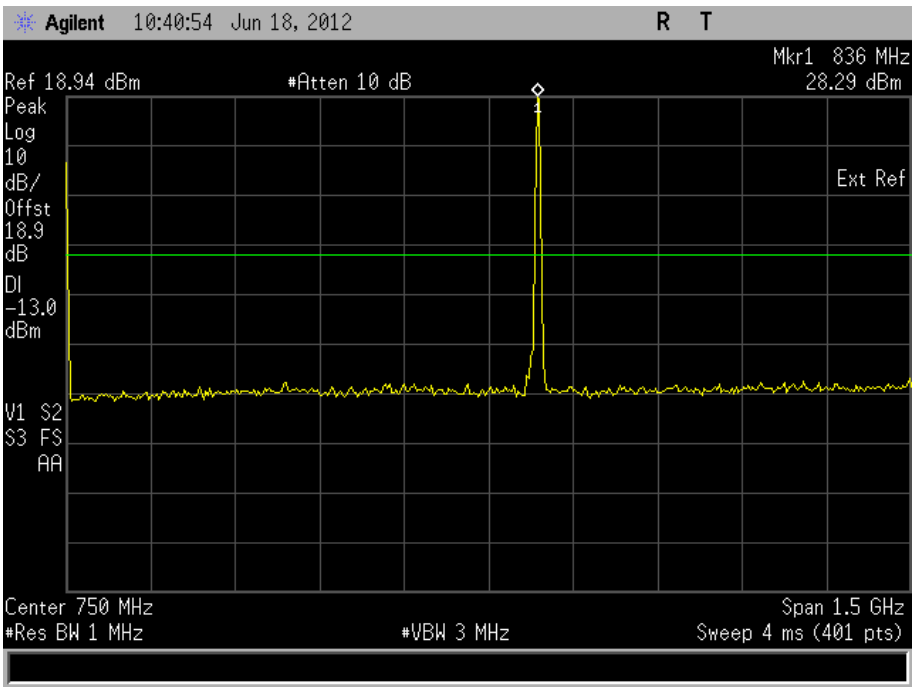
1.5 GHz to 9 GHz



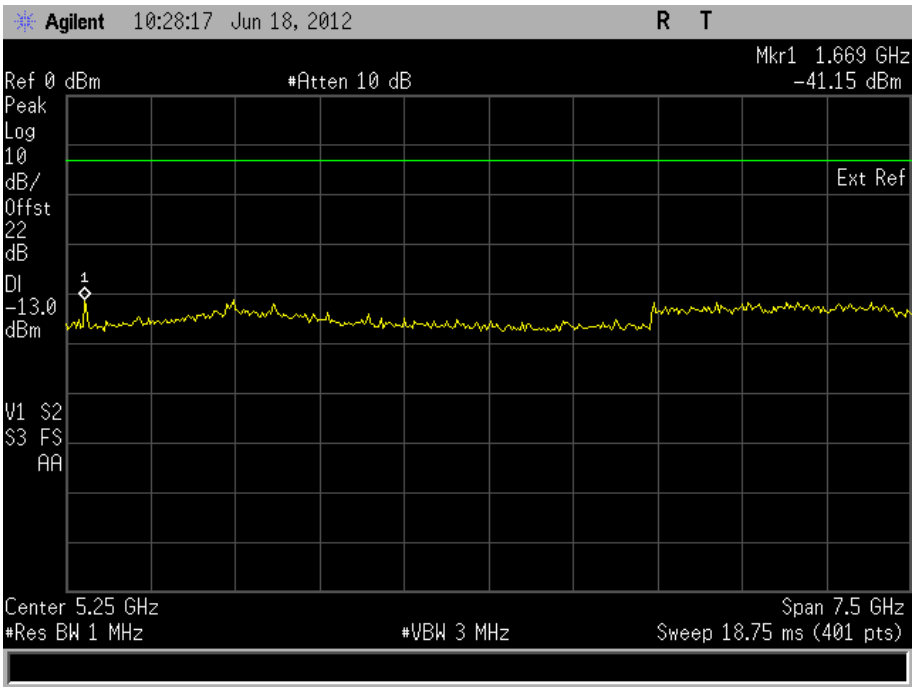
Product Service

836.52 MHz

9 kHz to 1.5 GHz



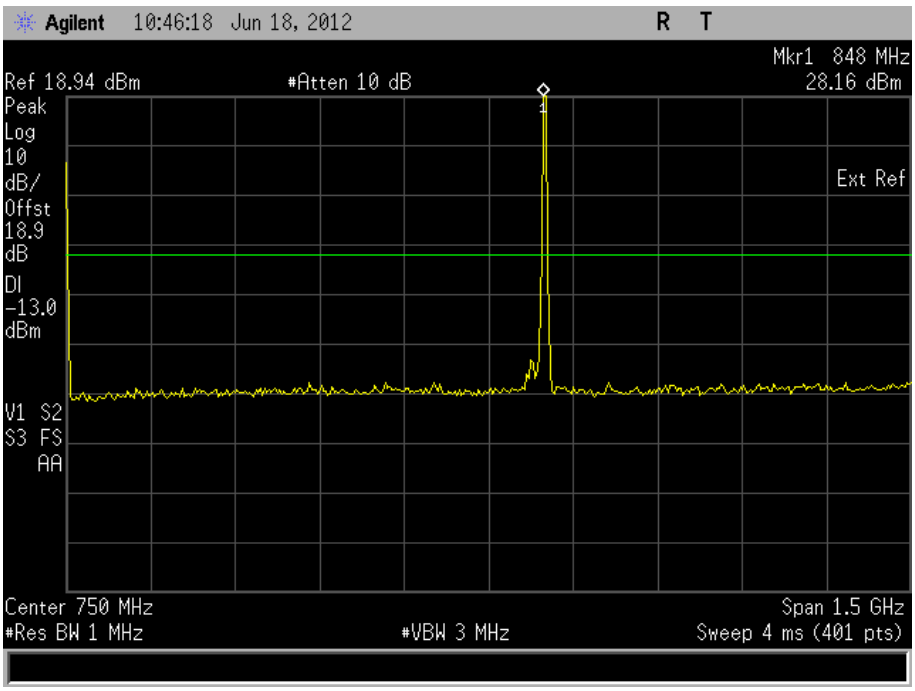
1.5 GHz to 9 GHz



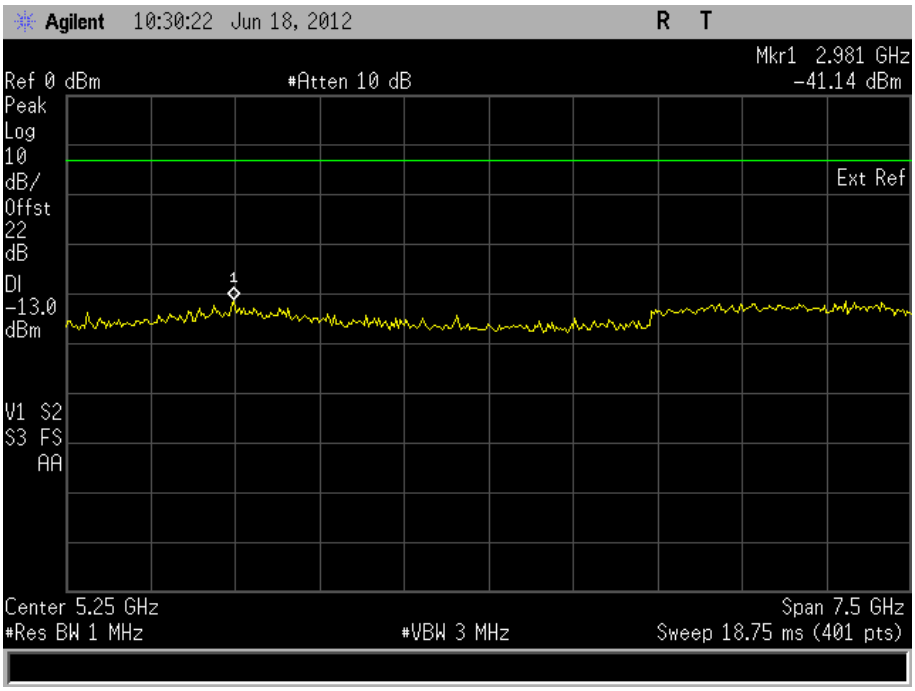
Product Service

848.31 MHz

9 kHz to 1.5 GHz



1.5 GHz to 9 GHz



Limit Clause

43+10log(P) or -13 dBm

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 and Modification State

CDMA SHI15 S/N: IMEI 004401114000181 - Modification State 0

2.6.3 Date of Test

18 June 2012

2.6.4 Test Equipment Used

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

2.6.5 Test Procedure

The 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	21.2 - 22.4°C
Relative Humidity	37.7 - 40.6%

Product Service

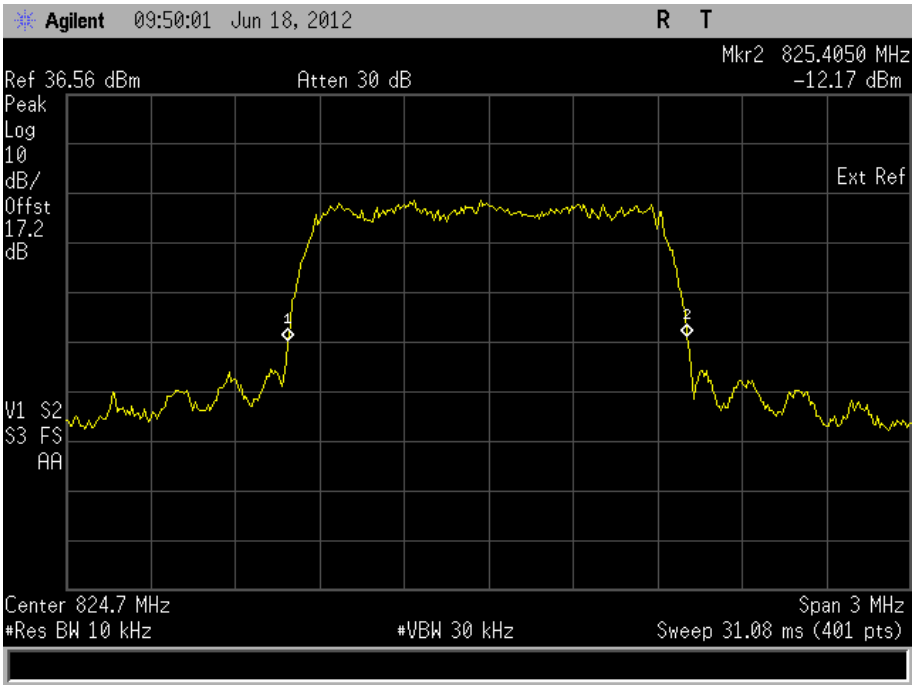
2.6.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

824.70 MHz

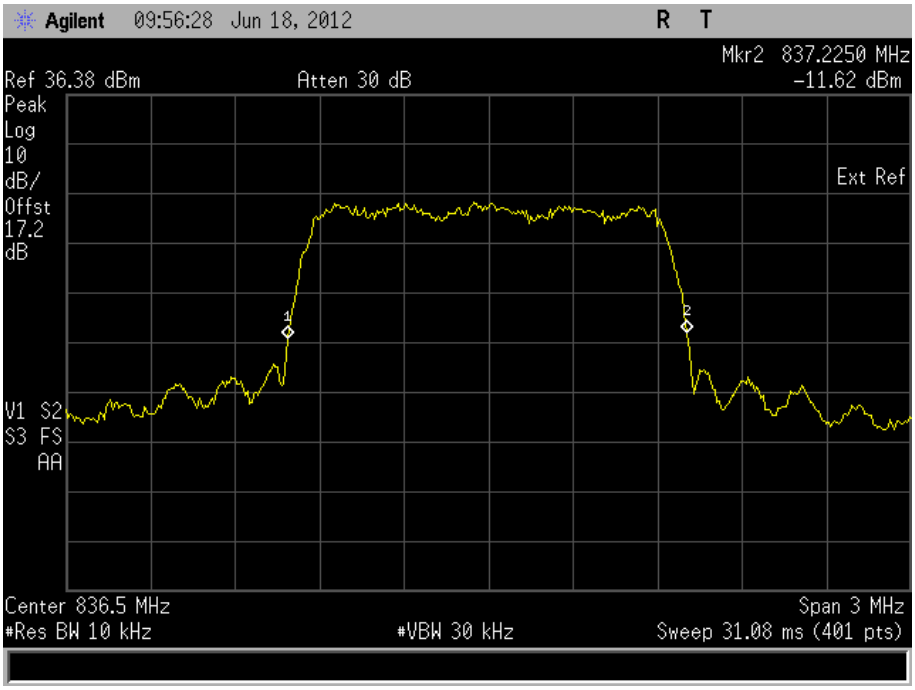
Mode	Occupied Bandwidth (kHz)
SO55, RC1	1417.5



Product Service

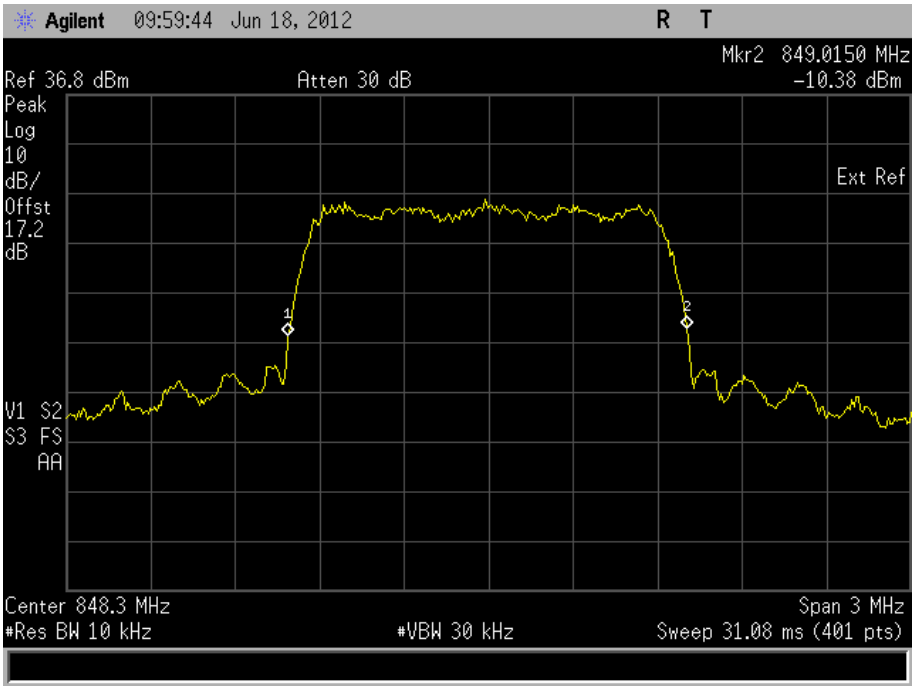
836.52 MHz

Mode	Occupied Bandwidth (kHz)
SO55, RC1	1417.5



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.

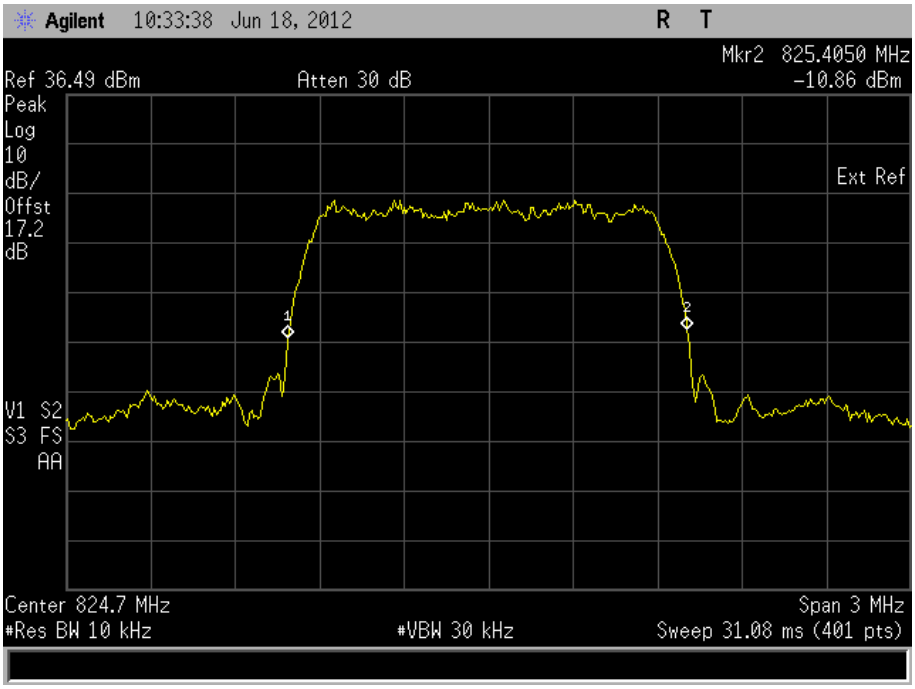
Product Service

CDMA 2000 - Test Data Service

4.0 V DC Supply

824.70 MHz

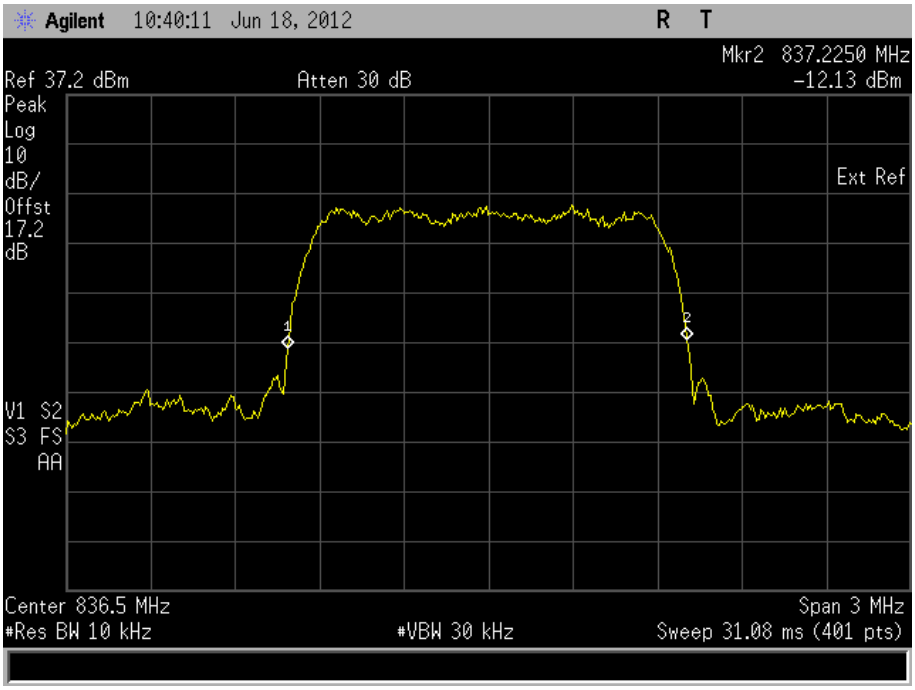
Mode	Occupied Bandwidth (kHz)
SO55, RC1	1417.5



Product Service

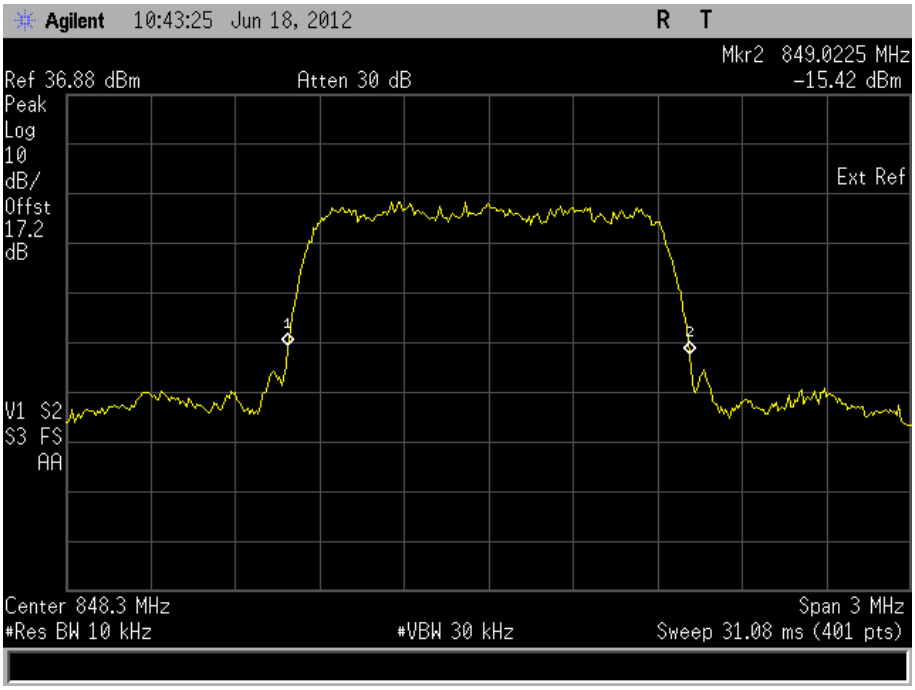
836.52 MHz

Mode	Occupied Bandwidth (kHz)
SO55, RC1	1417.5



848.31 MHz

Mode	Occupied Bandwidth (kHz)
SO55, RC1	1425.0



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, Clause 2.1055
FCC CFR 47 Part 22, Clause 22.355

2.7.2 Equipment Under Test and Modification State

CDMA SHI15 S/N: IMEI 004401114000181 - Modification State 0

2.7.3 Date of Test

19 June 2012

2.7.4 Test Equipment Used

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

2.7.5 Test Procedure

The EUT was set to transmit on maximum power with modulation. A Radio Communications 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	22.7°C
Relative Humidity	33.9%

Product Service

2.7.7 Test Results

CDMA 2000 - Loopback Service

4.0 V DC Supply

Under Temperature Variations

836.52 MHz

Temperature Interval (ºC)	Mode	Modulation	Deviation (ppm)
-30	SO55, RC1	64-Ray Orthogonal	0.0010
-20	SO55, RC1	64-Ray Orthogonal	0.0046
-10	SO55, RC1	64-Ray Orthogonal	-0.0047
0	SO55, RC1	64-Ray Orthogonal	-0.0121
+10	SO55, RC1	64-Ray Orthogonal	-0.0066
+20	SO55, RC1	64-Ray Orthogonal	-0.0053
+30	SO55, RC1	64-Ray Orthogonal	-0.0160
+40	SO55, RC1	64-Ray Orthogonal	0.0131
+50	SO55, RC1	64-Ray Orthogonal	-0.0113

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	-	-

Under Voltage Variations

836.52 MHz

DC Voltage (V)	Mode	Modulation	Deviation (ppm)
4.0 V DC	SO55, RC1	64-Ray Orthogonal	-0.0053
3.7 V DC	SO55, RC1	64-Ray Orthogonal	-0.0111

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

CDMA 2000 - Test Data Service

4.0 V DC Supply

Under Temperature Variations

836.52 MHz

Temperature Interval (ºC)	Mode	Modulation	Deviation (ppm)
-30	SO55, RC1	64-Ray Orthogonal	0.0046
-20	SO55, RC1	64-Ray Orthogonal	-0.0031
-10	SO55, RC1	64-Ray Orthogonal	-0.0042
0	SO55, RC1	64-Ray Orthogonal	-0.0048
+10	SO55, RC1	64-Ray Orthogonal	-0.0055
+20	SO55, RC1	64-Ray Orthogonal	-0.0050
+30	SO55, RC1	64-Ray Orthogonal	-0.0045
+40	SO55, RC1	64-Ray Orthogonal	0.0038
+50	SO55, RC1	64-Ray Orthogonal	0.0061

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	-	-

Under Voltage Variations

836.52 MHz

DC Voltage (V)	Mode	Modulation	Deviation (ppm)
4.0 V DC	SO55, RC1	64-Ray Orthogonal	-0.0050
3.7 V DC	SO55, RC1	64-Ray Orthogonal	-0.0043

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

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1- Spurious Emissions at Band Edge					
Dual programable power supply	Thurlby	T-1000	418	-	TU
Multimeter	Fluke	75 Mk3	455	12	16-Jan-2013
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2012
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2013
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	21-Sep-2012
Power Divider	Weinschel	1506A	604	12	19-Mar-2013
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	28-Jun-2012
Rubidium Standard	Rohde & Schwarz	XSRM	1316	12	13-Sep-2012
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	7-Oct-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Mar-2013
Temperature Humidity Meter	Radio Spares	1260	4020	12	23-Nov-2012
Section 2.2 – Effective Radiated Power					
Peak Power Analyser	Hewlett Packard	8990A	107	12	10-Feb-2013
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	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2012
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	29-Sep-2012
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
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3703	-	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					
Dual programable power supply	Thurlby	T-1000	418	-	TU
Multimeter	Fluke	75 Mk3	455	12	16-Jan-2013
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2012
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2013
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	21-Sep-2012
Power Divider	Weinschel	1506A	604	12	19-Mar-2013
Power Splitter	Weinschel	1506A	606	12	19-Dec-2012
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	28-Jun-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	12	13-Sep-2012
Rubidium Standard	Rohde & Schwarz	XSRM	1316	12	13-Sep-2012
Hygromer	Rotronic	A1	2677	12	7-Feb-2013
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	7-Oct-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Mar-2013
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3696	12	27-Jan-2013
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-2012
P-Series Power Meter	Agilent	N1911A	3981	12	12-Sep-2012
50 MHz-18 GHz Wideband Power Sensor	Agilent	N1921A	3983	12	12-Sep-2012
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Temperature Humidy Meter	Radio Spares	1260	4020	12	23-Nov-2012
Section 2.4 – Emission Limitations for Cellular Equipment					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	13-Sep-2013
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
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	PSO4-0087	1534	12	26-Sep-2012
Screened Room (5)	Rainford	Rainford	1545	36	3-Feb-2014
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	20-Dec-2012
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
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3694	-	TU
'2.92mm' - '2.92mm' RF Cable (2m)	Rhophase	KPS-1503-2000-KPS	3695	-	TU
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3702	12	27-Jan-2013
'3.5mm' - '3.5mm' RF Cable (2m)	Rhophase	3PS-1803-2000-3PS	3703	-	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
Low Noise Amplifier	Wright Technologies	APS04-0085	3969	12	8-Jul-2012

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.5 - Conducted Spurious Emissions					
Dual programable power supply	Thurlby	T-1000	418	-	TU
Multimeter	Fluke	75 Mk3	455	12	16-Jan-2013
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2012
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2013
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	21-Sep-2012
Power Divider	Weinschel	1506A	604	12	19-Mar-2013
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	28-Jun-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	12	13-Sep-2012
Rubidium Standard	Rohde & Schwarz	XSRM	1316	12	13-Sep-2012
Hygromer	Rotronic	A1	2677	12	7-Feb-2013
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
Attenuator (20dB, 20W)	Weinschel	1	3032	-	TU
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	7-Oct-2012
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	22-Aug-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Mar-2013
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3696	12	27-Jan-2013
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-2012
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Temperature Humidy Meter	Radio Spares	1260	4020	12	23-Nov-2012
Section 2.6 - Occupied Bandwidth					
Dual programable power supply	Thurlby	T-1000	418	-	TU
Multimeter	Fluke	75 Mk3	455	12	16-Jan-2013
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	23-Jun-2012
Attenuator (10dB)	Weinschel	47-10-34	481	12	27-Mar-2013
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	21-Sep-2012
Power Divider	Weinschel	1506A	604	12	19-Mar-2013
Power Splitter	Weinschel	1506A	606	12	19-Dec-2012
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	28-Jun-2012
GPS Frequency Standard	Rapco	GPS-804/3	1312	12	13-Sep-2012
Rubidium Standard	Rohde & Schwarz	XSRM	1316	12	13-Sep-2012
Hygromer	Rotronic	A1	2677	12	7-Feb-2013
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	7-Oct-2012
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	13-Mar-2013
'3.5mm' - '3.5mm' RF Cable (1m)	Rhophase	3PS-1803-1000-3PS	3696	12	27-Jan-2013
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	24-Jun-2012
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Temperature Humidity Meter	Radio Spares	1260	4020	12	23-Nov-2012

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.7 - Frequency Stability					
Digital Temperature Indicator + T/C	Fluke	51	412	12	6-Jan-2013
Dual programable power supply	Thurlby	T-1000	418	-	TU
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	12	13-Sep-2012
Attenuator (20dB, 2W)	Pasternack	PE 7004-20	2943	12	27-Mar-2013
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	7-Oct-2012
True RMS Multimeter	Fluke	179	4007	12	16-Feb-2013
Temperature Humidity Meter	Radio Spares	1260	4020	12	23-Nov-2012
Radio Communications Test Set	Rohde & Schwarz	CMU 200	-	-	TU
Power Supply	Iso-Tech	IPS302A	-	-	TU

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

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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 (Not UKAS Accredited).

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