



No.L1659

FCC TEST REPORT

of

CDMA 1X Digital Mobile Phone

FCC ID: SG70606HC-D1600

Brand Name: Haier

Model No.: HC-D1600

Serial No.: N.A.

Report No.: FCC06-8046

Date: August 17, 2006

Prepared for

Qingdao Haier Telecom Co., Ltd.

No.1, Haier Road Hi-tech Zone, Qingdao, P.R.China

Prepared by

ShenZhen Electronic Product Quality Testing Center

Electronic Testing Building, Shahe Road, Xili, Nanshan District, ShenZhen, 518055, P.R.China

Tel: 86 755 26627338 Fax: 86 755 26627238

This test report consists of **54** pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by SET. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver.

Table of Contents

1	Test Report Certification	5
2	General Information	6
2.1	Description of EUT	6
2.2	Objective	7
2.3	Test Standards and Results	7
2.4	List of Equipments Used	8
2.5	Test Facility	8
2.6	Environmental conditions	8
3	Conducted Emission Measurement	9
3.1	Limits of Conducted Emission	9
3.2	Test Procedure	9
3.3	Test Setup	10
3.4	EUT Setup and Operating Conditions	10
3.5	Test Results	11
4	Radiated Emission Test	15
4.1	Limits of Radiated Emission	15
4.2	Test Procedure	15
4.3	Test Setup	16
4.4	EUT Setup and Operating Conditions	16
4.5	Test Results	16
5	Frequencies	20
5.1	Frequency Blocks Available for Cellular Service	20
5.2	Test Procedure	20
5.3	Test Setup	20
5.4	EUT Setup and Operating Conditions	20
5.5	Test Results	21
6	Conducted RF Output Power Test	22
6.1	RF Power Output Test Requirement	22

6.2 Test Procedure	22
6.3 Test Setup	22
6.4 EUT Setup and Operating Conditions.....	22
6.5 Test Results	23
7 Occupied Bandwidth Test	25
7.1 Definition	25
7.2 Test Procedure	25
7.3 Test Setup	25
7.4 EUT Setup and Operating Conditions.....	25
7.5 Test Results	26
8 Conducted Spurious Emission Test.....	28
8.1 Limits of Conducted Spurious Emission.....	28
8.2 Test Procedure	28
8.3 Test Setup	28
8.4 EUT Setup and Operating Conditions.....	28
8.5 Test Results	29
9 Transmitter Radiated Power (EIRP/ERP) Test.....	33
9.1 Limits of EIRP/ERP	33
9.2 Test Procedure	33
9.3 Test Setup	34
9.4 EUT Setup and Operating Conditions.....	34
9.5 Test Results	35
10 Radiated Spurious Emission Test.....	37
10.1 Limits of Radiated Spurious Emission.....	37
10.2 Test Procedure	37
10.3 Test Setup	37
10.4 EUT Setup and Operating Conditions.....	37
10.5 Test Results	38
11 Frequency Stability Test	42
11.1 Requirement of Frequency Stability.....	42



11.2 Test Procedure	42
11.3 Test Setup	42
11.4 EUT Setup and Operating Conditions.....	42
11.5 Test Results.....	42
Appendix I : Photographs of the EUT.....	42
Appendix II : Photographs of the Test Configuration	42

1 Test Report Certification

Product: CDMA 1X Digital Mobile Phone

FCC ID: SG70606HC-D1600

Model No.: HC-D1600

Applicant: Qingdao Haier Telecom Co., Ltd.

Applicant Address: No.1, Haier Road Hi-tech Zone, Qingdao, P.R.China

Manufacturer: Qingdao Haier Telecom Co., Ltd.

Manufacturer Address: No.1, Haier Road Hi-tech Zone, Qingdao, P.R.China

Test Standards: 47 CFR Part 2

47 CFR Part 15, Subpart B

47 CFR Part 22, Subpart H

Test Result: PASS

We, Shenzhen Electronic Product Quality Testing Center, hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Tested by: Lin Xingsun, Date: Aug. 17, 2006
Lin Xingsun

Checked by: Smart Li, Date: Aug. 17, 2006
Smart Li

Approved by: Wu Li An, Date: Aug. 17, 2006
Wu Li An



2 General Information

2.1 Description of EUT

EUT1	
Description:	CDMA 1X Digital Mobile Phone
Model No.:	HC-D1600
Emission Designator:	1M25F9W
Modulation:	CDMA 1X
Frequency:	Tx: 825.25-847.75MHz; Rx: 870.25-892.75MHz
Rated Power:	N.A.
Serial No.:	N.A.
Hardware Version:	P1
Software Version:	HA1600MR01
EUT2	
Description:	Lithium-ion Battery
Model No.:	H11103
Serial No.:	EB03M000000E364T6111
Manufacturer:	BYD COMPANY LIMITED
Capacitance:	800mAh
Rated Voltage:	3.7V
Charge Limit:	4.2V
EUT3	
Description:	AC/DC Adaptor (Charger)
Model No.:	H24103
Serial No.:	N.A.
Manufacturer:	NINGBO LISHUNDA ELECTRON CO., LTD.
Rated Input:	a.c. 100-240V, 50/60Hz
Rated Output:	d.c. 4.8V, 500mA
Length of DC cable:	140cm

NOTE:

1. The EUT is a model of CDMA 1X mobile station operating in Cellular 850MHz band.
2. The EUT consists of Hand Telephone Set and normal options: Lithium Battery and Charger, as listed above.
3. The EUT provides an USB port (shared with the Charger port) to connect to a computer.
4. Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.

2.2 Objective

Perform EMC test according to FCC rules Part 2, Part 15, and Part 22 for FCC ID Certification.

2.3 Test Standards and Results

The EUT has been tested according to 47 CFR

- Part 2 Frequency Allocations and Radio Treaty Matters: General Rules and Regulations
- Part 15 Radio Frequency Devices
- Part 22 Public Mobile Services

Test items and the results are as bellow:

Nº	FCC Rules	Test Type	Result
1	§15.107	Conducted Emission (Mobile mode)	PASS
2		Conducted Emission (USB mode)	PASS
3	§15.109	Radiated Emission (Mobile mode)	PASS
4		Radiated Emission (USB mode)	PASS
5	§2.106 §22.905	Frequencies	PASS
6	§2.1046	Conducted RF Output Power at Antenna Terminal	PASS
7	§2.1049	Occupied Bandwidth	PASS
8	§2.1051 §2.1057 §22.917	Conducted Spurious Emission at Antenna Terminal	PASS
9	§22.913	Transmitter Radiated Power (EIRP/ERP)	PASS
10	§2.1053 §2.1057 §22.917	Radiated Spurious Emission	PASS
11	§2.1055	Frequency Stability	PASS

2.4 List of Equipments Used

Description	Manufacturer	Model No.	Cal. Due Date	Serial No.
Test Receiver	Schwarzbeck	FCKL1528	2007.06.05	A0304230
Test Receiver	Rohde & Schwarz	ESIB26	2007.06.05	A0304218
LISN	Schwarzbeck	NSLK8127	2007.06.05	A0304233
Loop Antenna	Rohde & Schwarz	HFH2-Z2	2007.06.05	A0304220
Ultra Broadband Ant.	Rohde & Schwarz	HL562	2007.06.05	A0304224
Horn Ant.	Rohde & Schwarz	HF906	2007.06.05	100150
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	2007.06.05	A0304212
Mobile Phone Tester	Willtek	4403	2007.02.10	0811211
3G Communication Antenna	European Antennas	PSA 75301R/170	2007.05.10	A0304213
Temperature Chamber	JAPAN TABAI	PSL-4G	2007.02.05	A8708056
Regulated DC Power Supply	Jiangbo	JB-305	--	A0412374
Shield Room	Nanbo Tech	Site 3	2007.03.18	A9901141
Shield Room	Nanbo Tech	Site 1	2007.01.17	A0304188
Anechoic Chamber	Albatross	EMC12.8×6.8×6.4(m)	2007.04.10	A0304210

2.5 Test Facility

Shenzhen Electronic Product Quality Testing Center (SET) is a third party testing organization accredited by China National Accreditation Committee for Laboratories (CNACL) according to ISO/IEC 17025. The accreditation certificate number is **L1659**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)), and the radiated and conducted Emission test equipments of SET are constructed and calibrated to meet the FCC requirements ANSI C63.4:2001 and CISPR 22/EN 55022. The FCC Registration Number is **261302**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)) also complies with Canada standard RSS 212, and acceptable to Industry Canada for the performance of radiated measurements. The Industry Canada Registration Number is **IC 5915**.

2.6 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3 Conducted Emission Measurement

3.1 Limits of Conducted Emission

According to FCC §15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V), Class B digital device	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

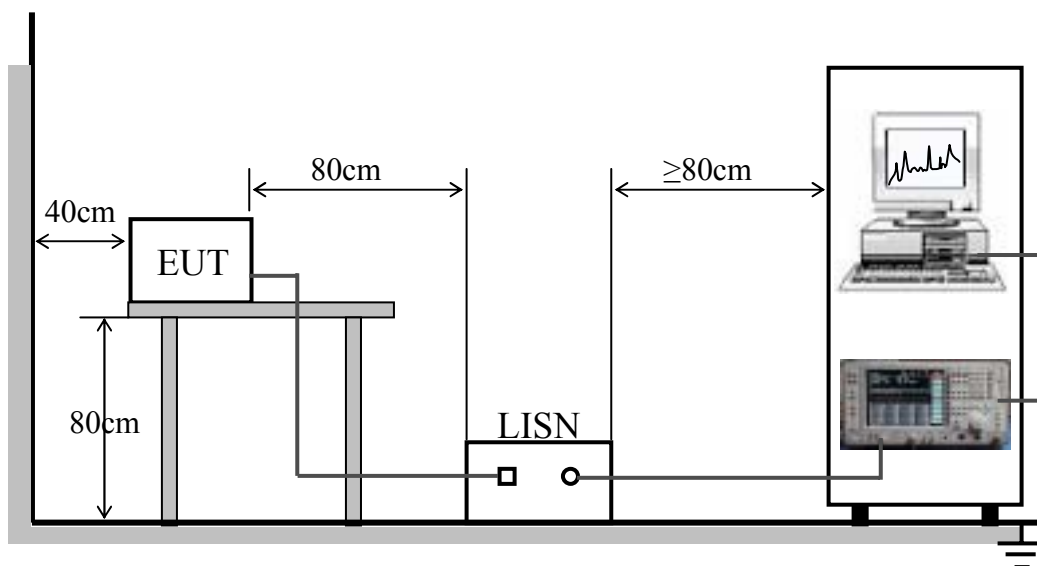
NOTE:

1. The lower limit shall apply at the band edges.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

3.2 Test Procedure

- a. The EUT was placed on a 0.8m high insulating table and kept 0.4 meters from the conducting wall of shielded room.
- b. The EUT was connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50 Ω /50 μ H of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150 kHz to 30 MHz was searched using CISPR Quasi-Peak and Average detector.

3.3 Test Setup



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

3.4 EUT Setup and Operating Conditions

The EUT was tested both at Mobile mode and USB mode.

Mobile mode: At this mode the EUT served as a mobile phone. The EUT configuration of the emission tests was MS + Battery + Charger. During the measurement, the EUT was charging empty battery. The charger was powered by 120V 60Hz AC mains supply. A communication link was also established between the MS and a System Simulator (SS). The MS operated at maximum output power.

USB mode: At this mode the EUT served as a computer peripheral. The EUT was connected to a USB port of a personal computer. During the measurement, the EUT was transmitting and receiving files continuously. The charger of the computer was powered by 120V 60Hz AC mains supply.

3.5 Test Results

I. Mobile mode

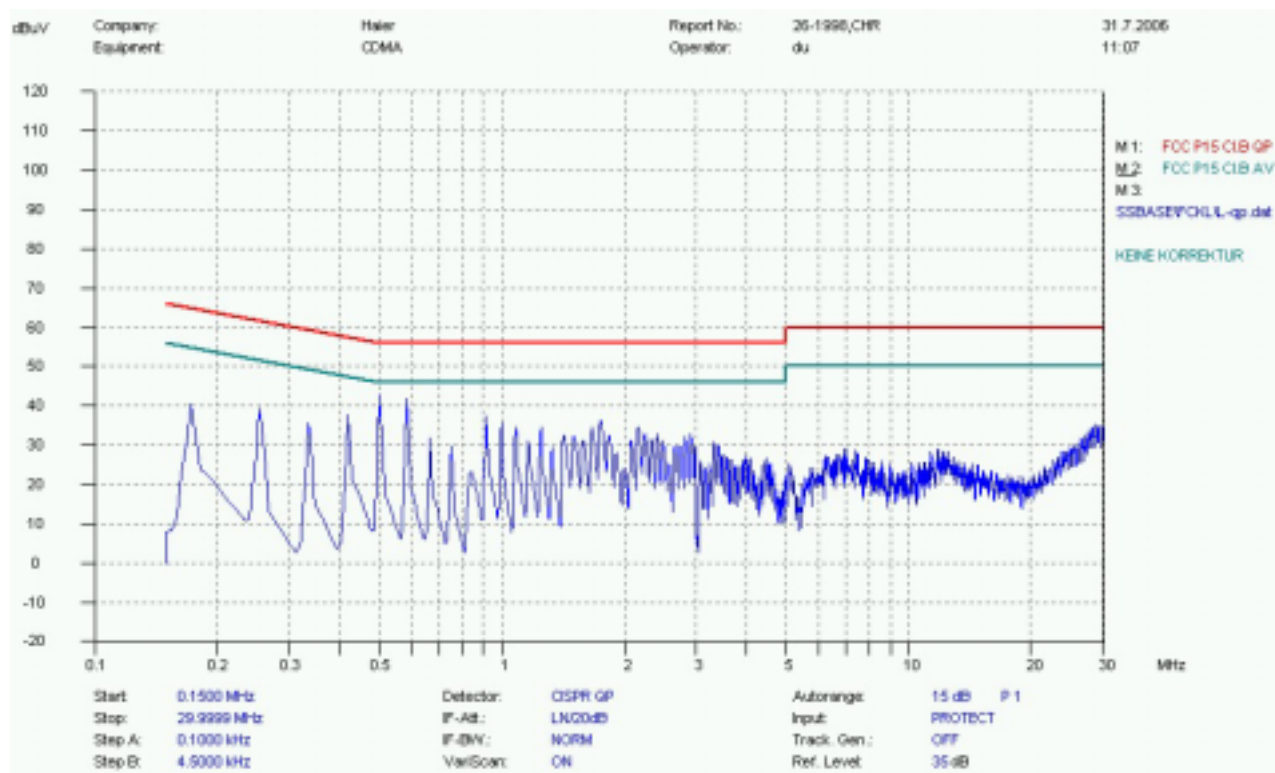
No.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
1	0.1725	64.8	54.8	40.4	--
2	0.4200	57.4	47.4	37.6	--
3	0.5010	56.0	46.0	43.0	--
4	0.5820	56.0	46.0	41.8	--
5	0.9150	56.0	46.0	37.2	--
6	1.7475	56.0	46.0	36.5	--

NOTE:

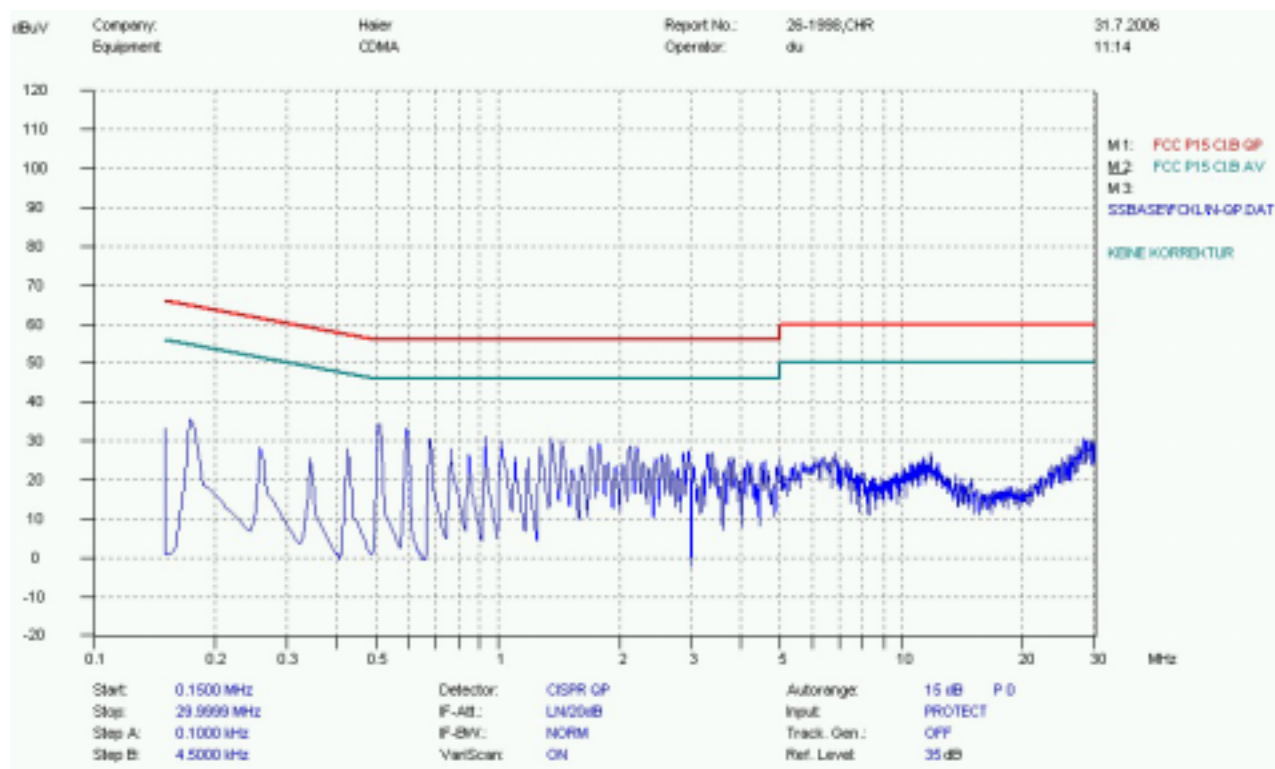
1. QP and AV are abbreviations of the quasi-peak and average individually.
2. If the emission levels measured with QP detector are lower than AV limits, there is unnecessary to measure with AV detector.
3. The emission levels recorded above is the larger ones of both L phase and N phase.

Test Plots

1. Mains terminal disturbance voltage, L phase



2. Mains terminal disturbance voltage, N phase



II. USB mode

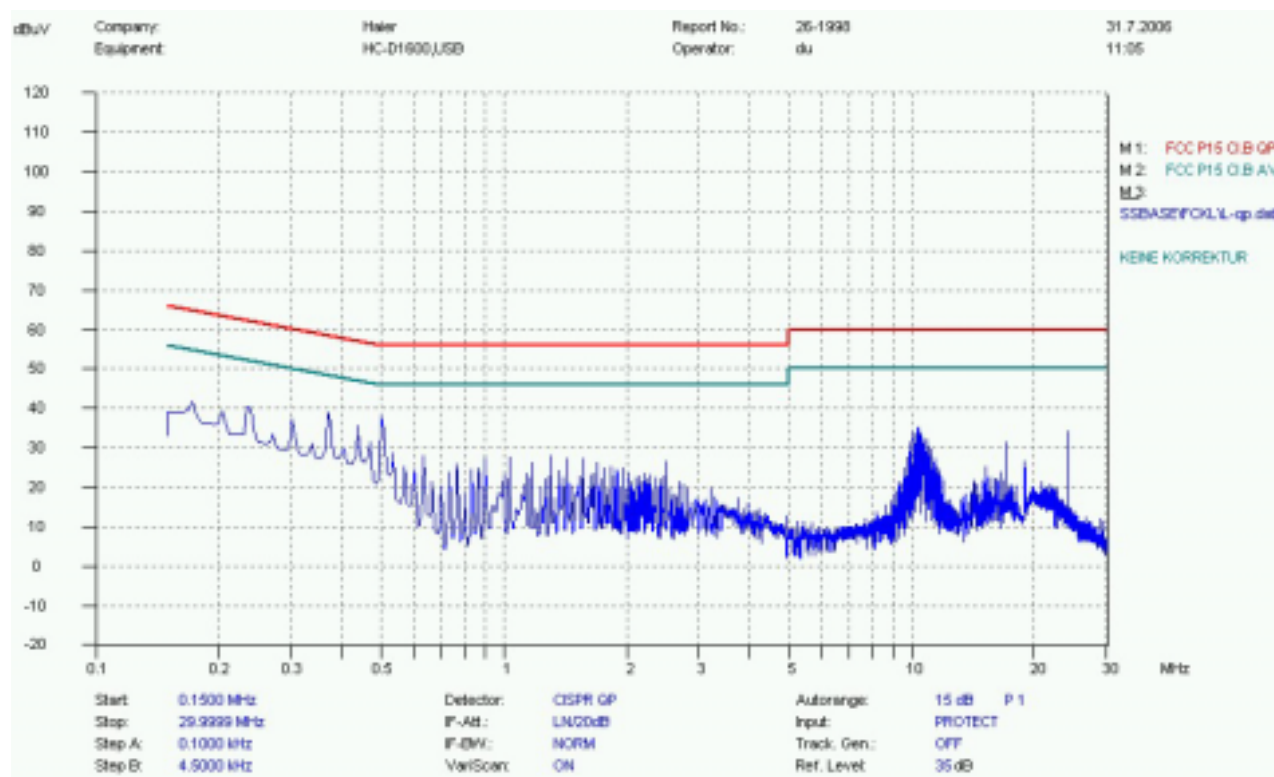
No.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
1	0.1725	64.8	54.8	41.5	--
2	0.3030	60.2	50.2	37.0	--
3	0.3705	58.5	48.5	39.0	--
4	0.5010	56.0	46.0	38.5	--
5	10.4505	60.0	50.0	38.1	--
6	24.0990	60.0	50.0	33.0	--

NOTE:

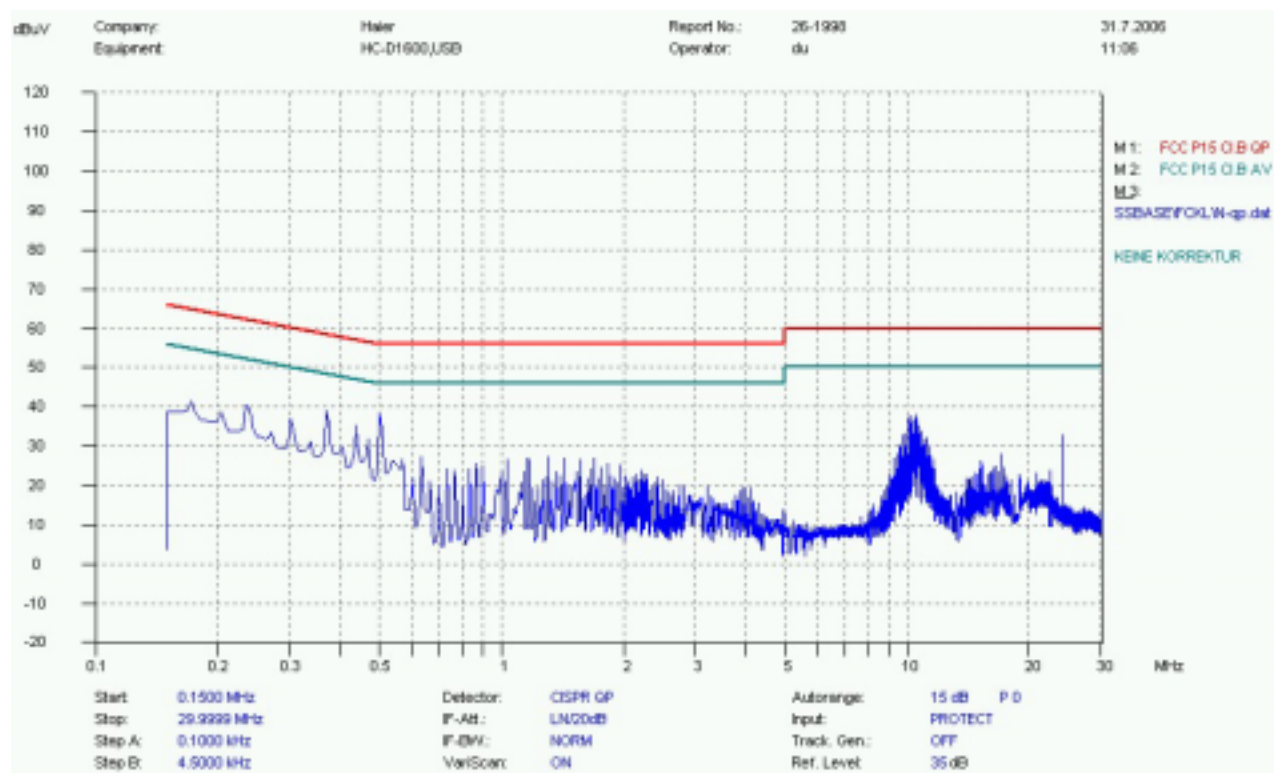
1. QP and AV are abbreviations of the quasi-peak and average individually.
2. If the emission levels measured with QP detector are lower than AV limits, there is unnecessary to measure with AV detector.
3. The emission levels recorded above is the larger ones of both L phase and N phase.

Test Plots

1. Mains terminal disturbance voltage, L phase



2. Mains terminal disturbance voltage, N phase



4 Radiated Emission Test

4.1 Limits of Radiated Emission

According to FCC §15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

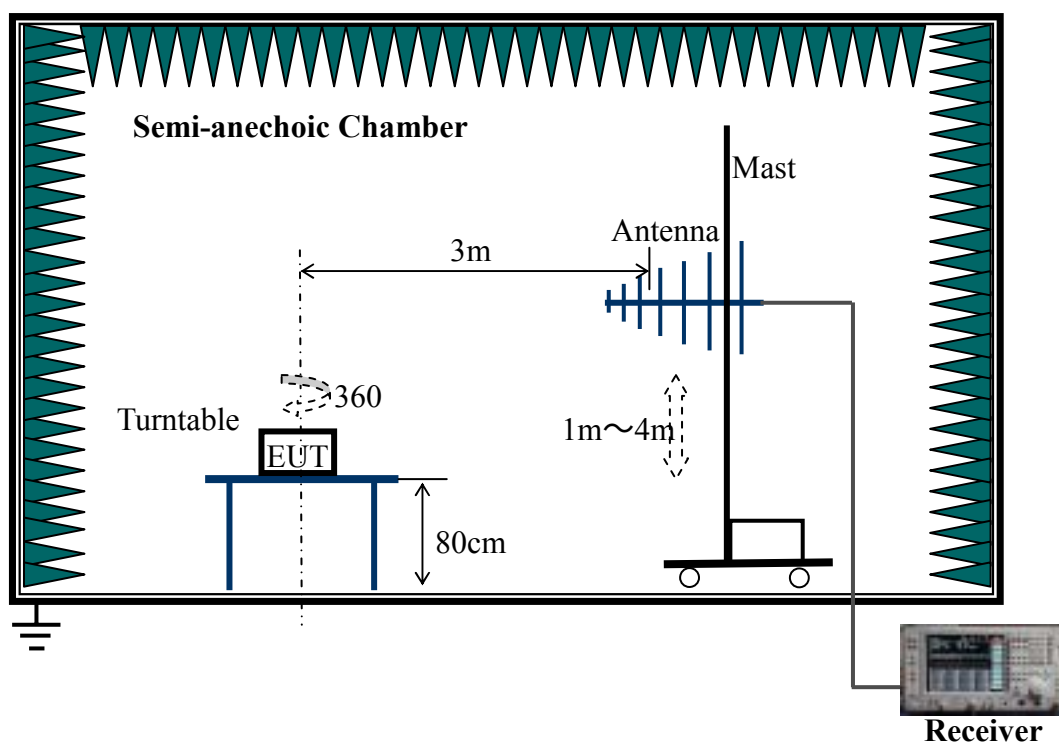
NOTE:

1. Field Strength (dB $\mu\text{V/m}$) = $20\log$ Field Strength ($\mu\text{V/m}$).
2. In the emission tables above, the tighter limit applies at the band edges.

4.2 Test Procedure

- a. The EUT was placed on the top of a ratable 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 meters and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10 dB margins would be retested one by one using the quasi-peak method.

4.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

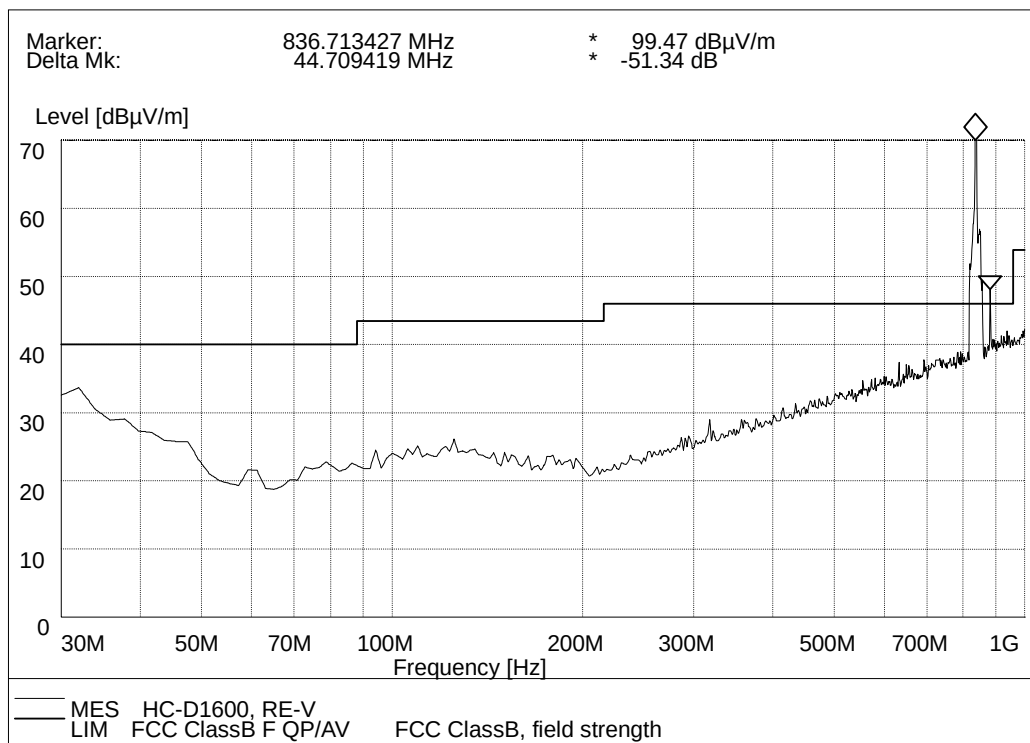
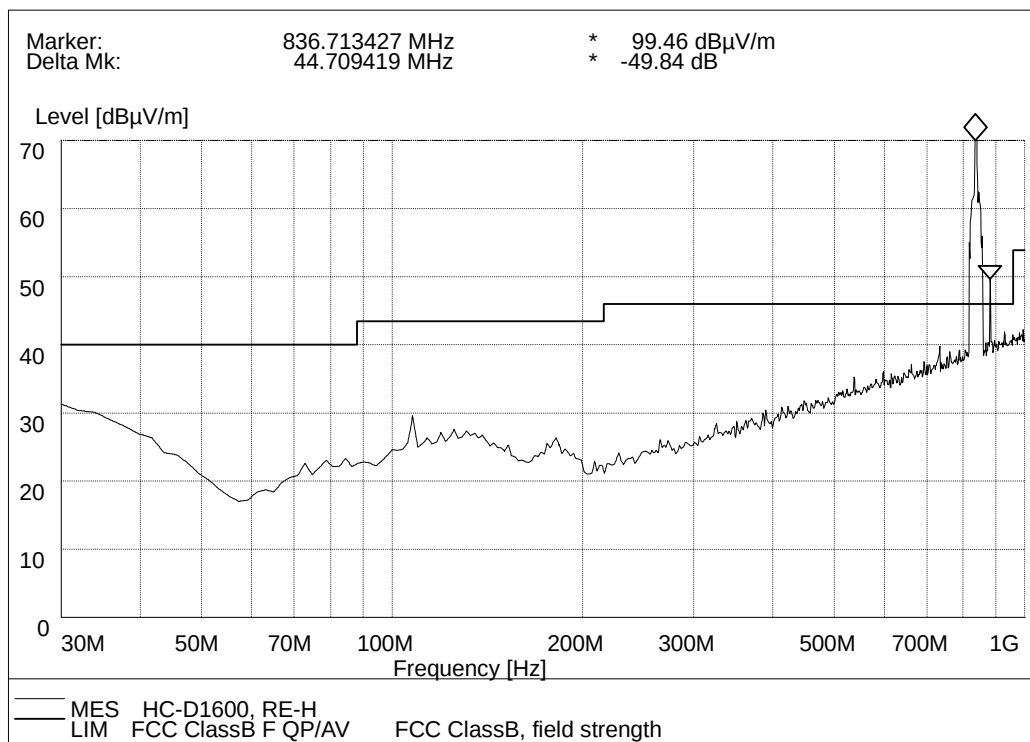
4.4 EUT Setup and Operating Conditions

Same as 3.4

4.5 Test Results

I. Mobile mode

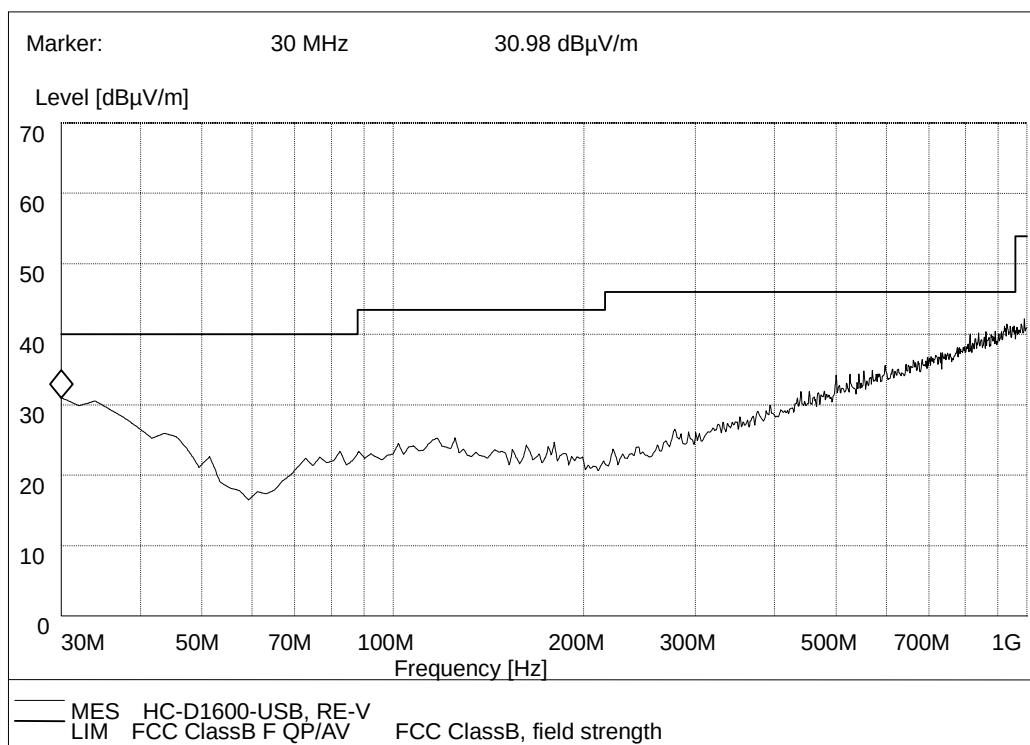
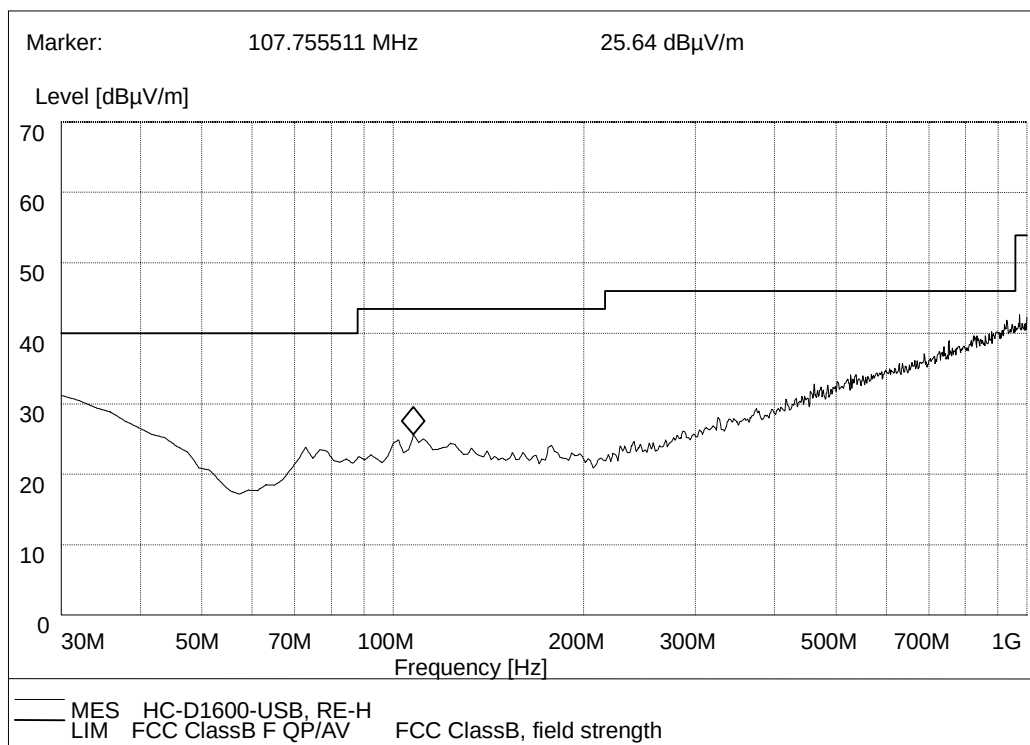
No.	Frequency (MHz)	Antenna Polarization	QP Limits (dB μ V/m)	Emission Level (dB μ V/m)
1	30.04	Vertical	40	27.84
2	32.08	Vertical	40	30.31
3	48.60	Vertical	40	22.06
4	31.60	Horizontal	40	22.28
5	73.28	Horizontal	40	21.26
6	108.20	Horizontal	43.5	27.33

Test Plots**1. Radiation disturbances, maxpeak detector, antenna polarization: Vertical****2. Radiation disturbances, maxpeak detector, antenna polarization: Horizontal**

(Note: The marker points are the MS and BS transmitting frequencies which should be ignored.)

II. USB mode

No.	Frequency (MHz)	Antenna Polarization	QP Limits (dB μ V/m)	Emission Level (dB μ V/m)
1	44.52	Vertical	40	21.63
2	72.94	Vertical	40	20.41
3	178.72	Vertical	43.5	20.59
4	32.09	Horizontal	40	20.68
5	72.46	Horizontal	40	21.11
6	109.12	Horizontal	43.5	22.46

Test Plots**1. Radiation disturbances, maxpeak detector, antenna polarization: Vertical****2. Radiation disturbances, maxpeak detector, antenna polarization: Horizontal**

5 Frequencies

5.1 Frequency Blocks Available for Cellular Service

According to FCC §22.905, the frequencies blocks assignment for the Cellular Radiotelephone Service are listed as bellow.

Block A: Mobile 824-835 MHz, Base 869-880 MHz;

Mobile 845-846.5 MHz, Base 891.5-894 MHz;

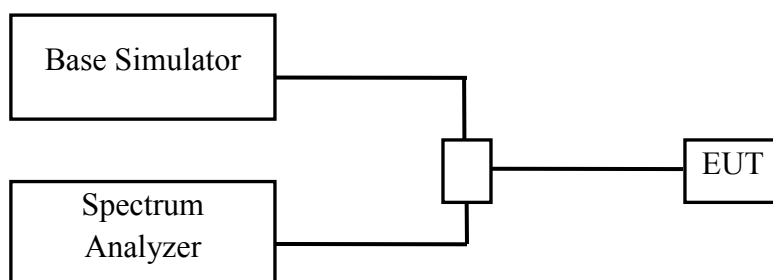
Block B: Mobile 835-845 MHz, Base 880-890 MHz;

Mobile 846.5-849 MHz, Base 891.5-894 MHz.

5.2 Test Procedure

- The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth of the fundamental emission of the transmitter. For GSM signal, VBW=RBW=3 kHz; for CDMA signal, VBW=RBW=30 kHz.

5.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

5.4 EUT Setup and Operating Conditions

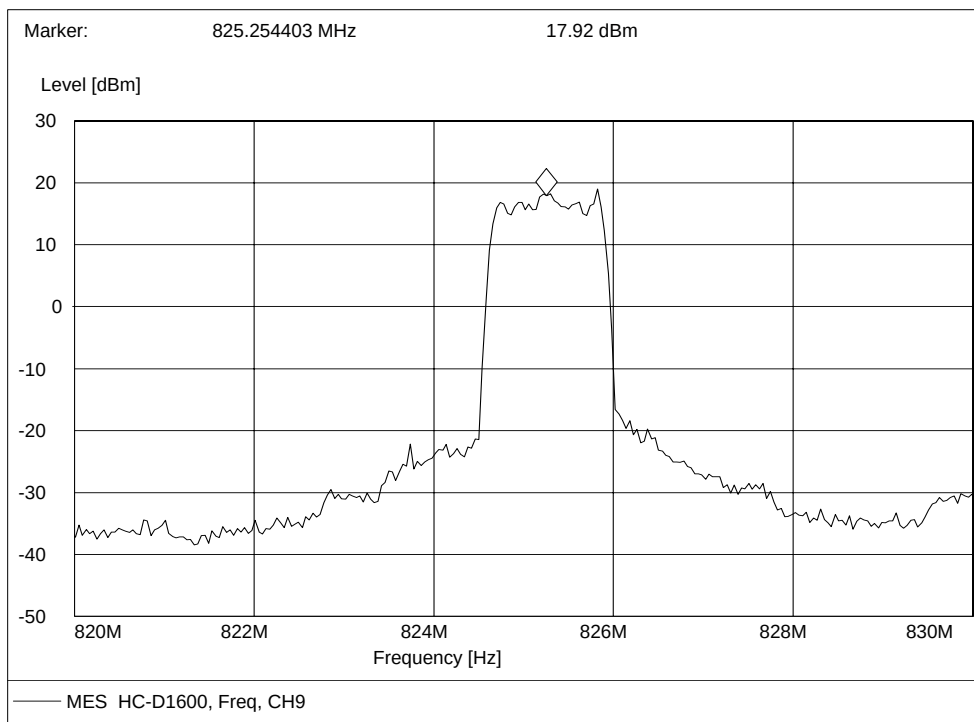
The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS). The MS operated at the maximum output power. The CDMA 1X (Cellular band) channel No.9 (lowest) and 758 (highest) were measured respectively.

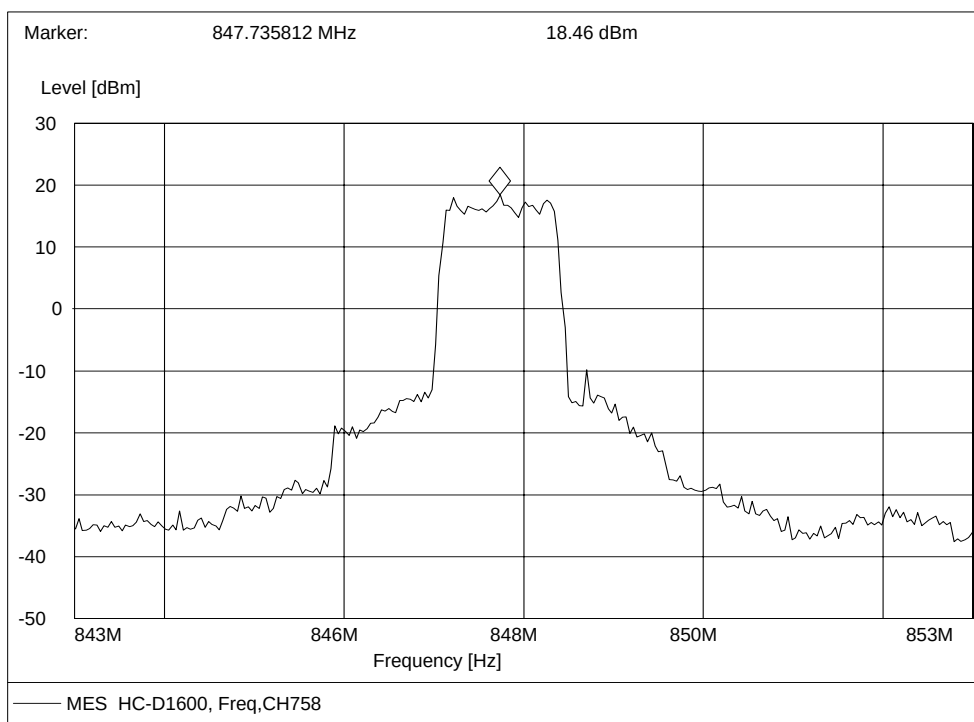
5.5 Test Results

The frequencies of the lowest channel and the highest channel are as the following figures.

1. Lowest channel No.9



2. Highest channel No.758



6 Conducted RF Output Power Test

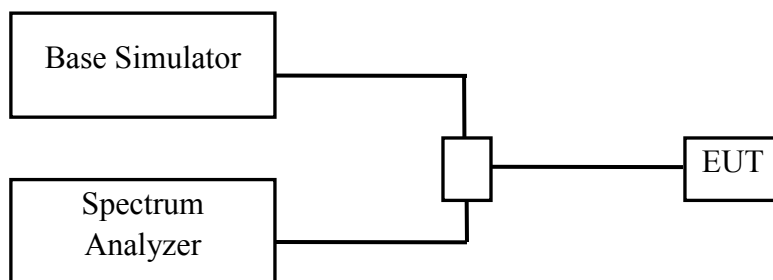
6.1 RF Power Output Test Requirement

According to FCC §2.1046 (a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

6.2 Test Procedure

- The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was comparable to the emission bandwidth. For GSM signal, VBW=RBW=1 MHz; for CDMA signal, VBW=RBW=3 MHz.

6.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

6.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

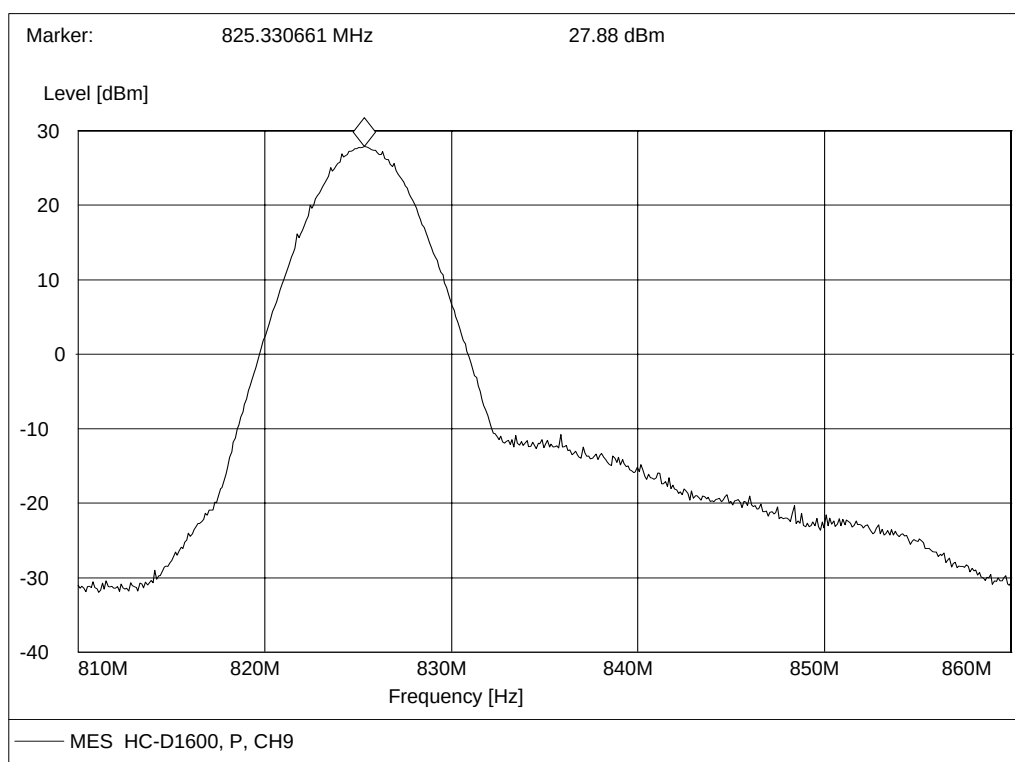
The MS operated at the maximum output power. The CDMA 1X (Cellular band) channel No.9 (lowest), 384(middle) and 758 (highest) were measured respectively.

6.5 Test Results

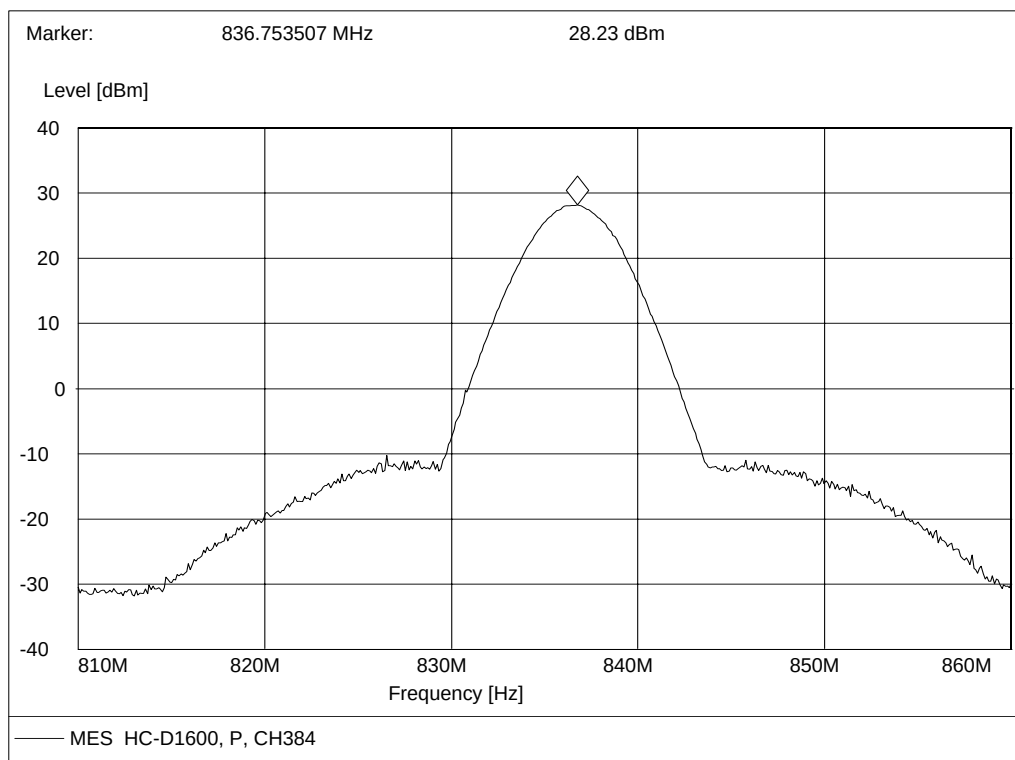
No.	CDMA 1X Channel No.	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)
1	9	825.27	27.88	N.A.
2	384	836.52	28.23	N.A.
3	758	847.74	27.51	N.A.

Test Plots

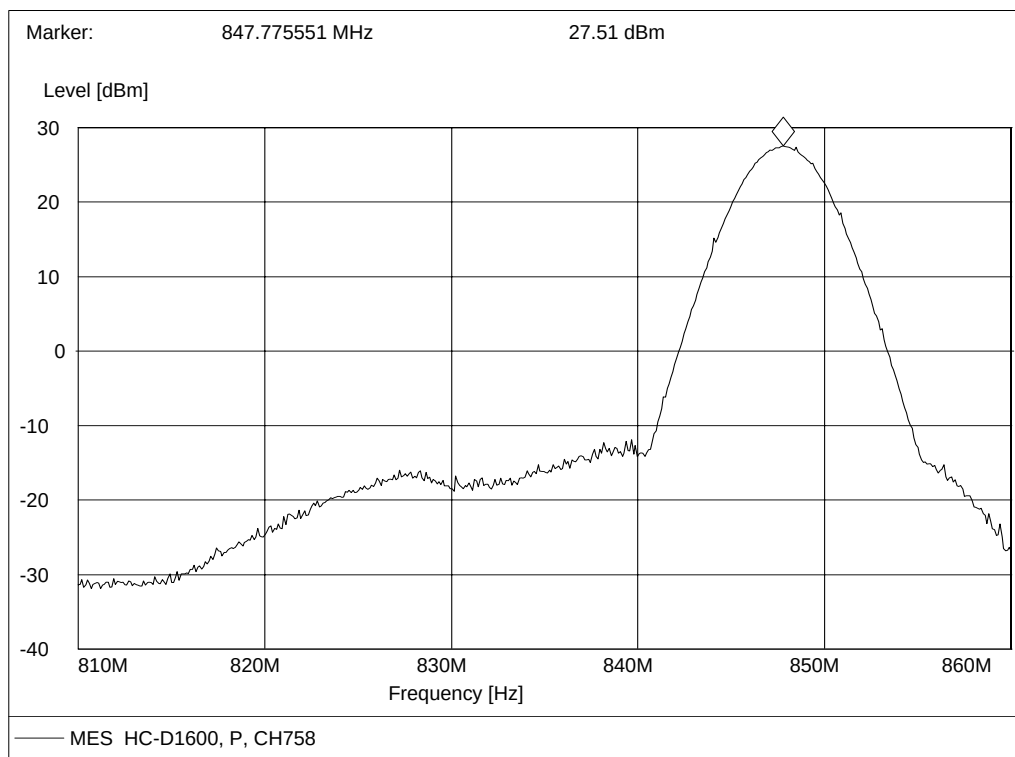
1. Lowest channel No.9



2. Middle channel No.384



3. Highest channel No.758



7 Occupied Bandwidth Test

7.1 Definition

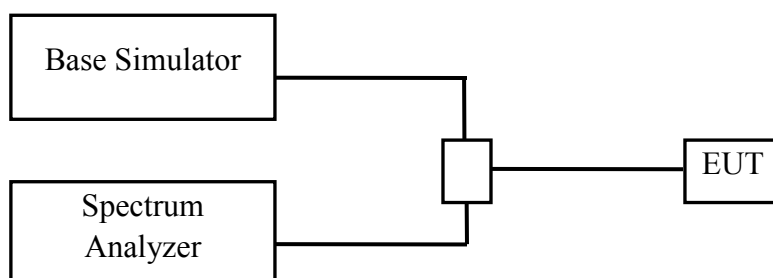
According to FCC §2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as the 99% emission bandwidth, or 20dB bandwidth ($10\log 1\%=20\text{dB}$) taking the total RF output power as reference.

7.2 Test Procedure

- The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The loss of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth. For GSM signal, $\text{VBW}=\text{RBW}=3\text{ kHz}$; for CDMA signal, $\text{VBW}=\text{RBW}=30\text{ kHz}$.

7.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

7.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

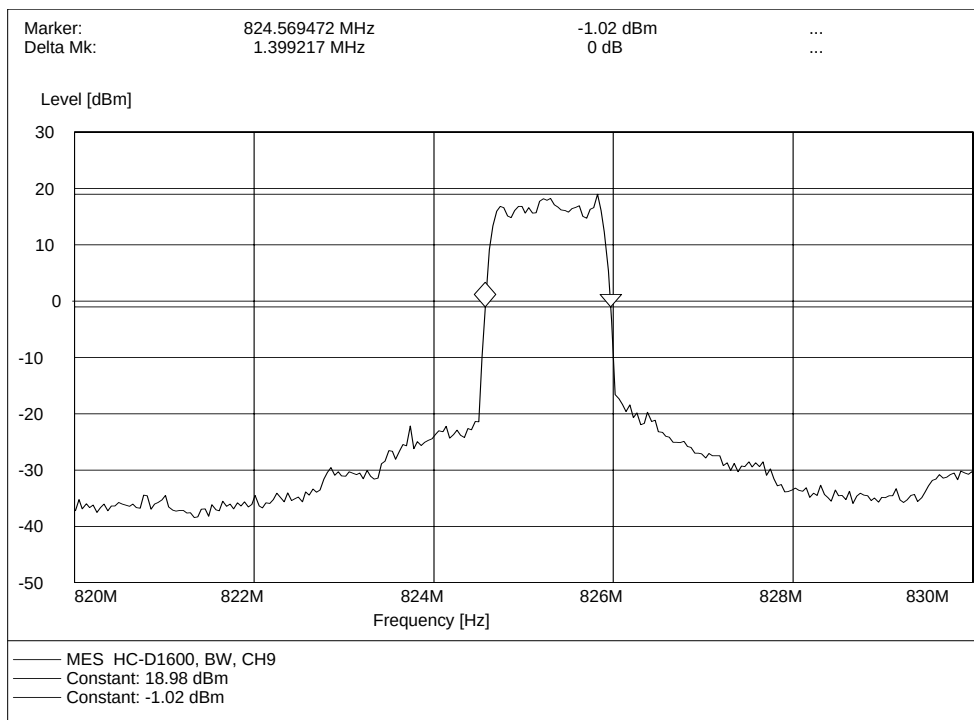
The MS operated at the maximum output power.

The CDMA 1X (Cellular band) channel No.9 (lowest), 384(middle) and 758 (highest) were measured respectively.

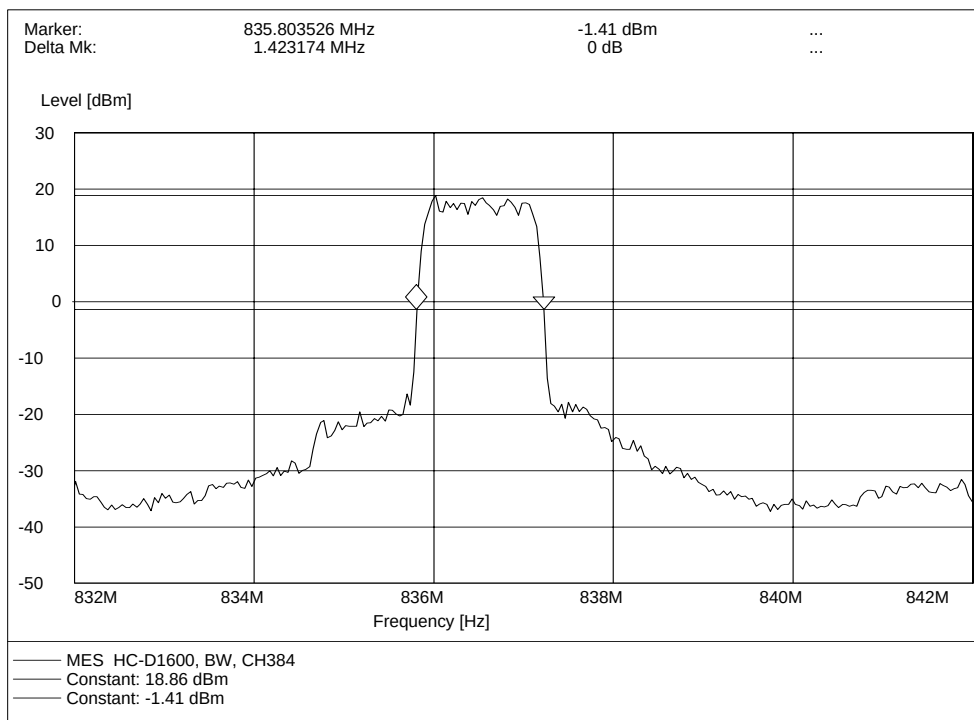
7.5 Test Results

The occupied bandwidth was measured to be about 1.4MHz. Refer to the following plots.

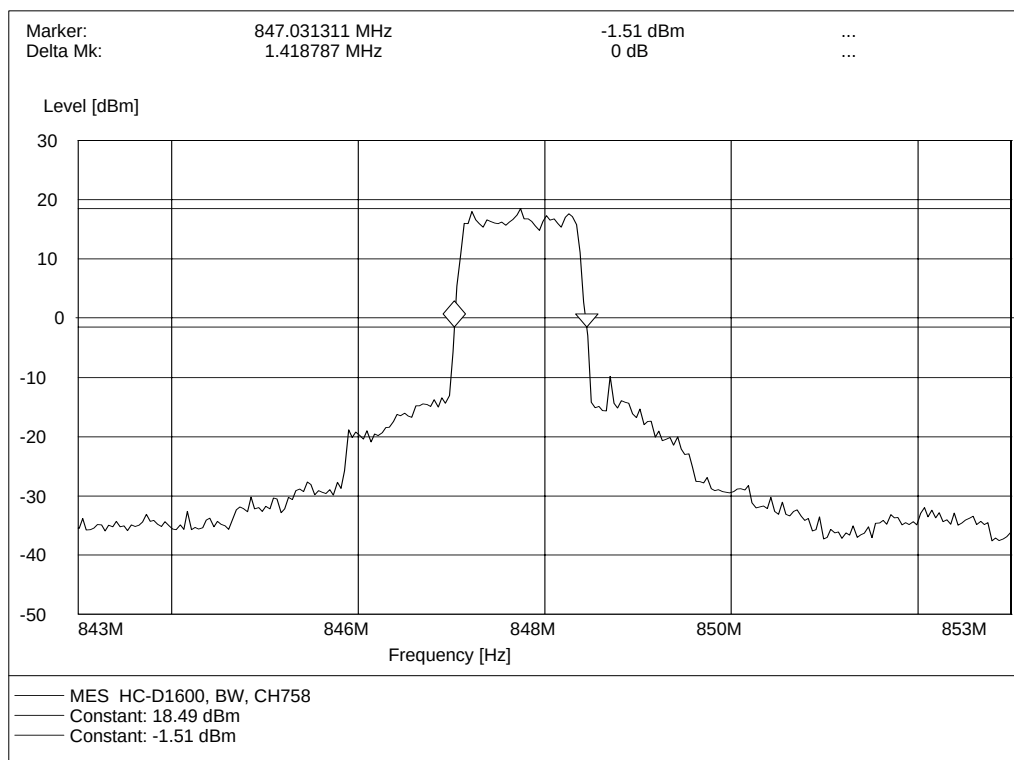
1. Lowest channel No.9



2. Middle channel No.384



3. Highest channel No.758



8 Conducted Spurious Emission Test

8.1 Limits of Conducted Spurious Emission

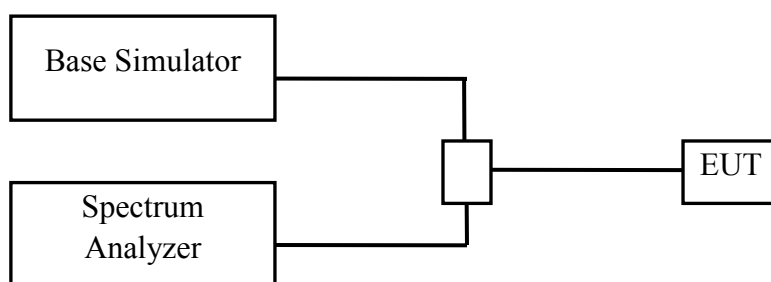
According to FCC §22.917 (a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB. This calculated to be -13dBm.

According to FCC §22.917 (b), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. Thus the 26dB emission bandwidth is measurement for showing compliance at the band-edges

8.2 Test Procedure

- The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode. The resolution bandwidth was set to 1MHz. The measuring frequencies are from 9 kHz to 10th harmonic of the fundamental frequency.
- In the 1 MHz bands immediately outside and adjacent to the frequency block, the resolution bandwidth of the spectrum analyzer was set to at least 1% of the emission bandwidth of the fundamental emission of the transmitter. For GSM signal, the resolution bandwidth was 3 kHz; for CDMA signal, the resolution bandwidth was 30 kHz.

8.3 Test Setup



8.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

The MS operated at the maximum output power. The CDMA 1X (Cellular band) channel No.9 (lowest), 384 (middle) and 758 (highest) were measured respectively.

8.5 Test Results

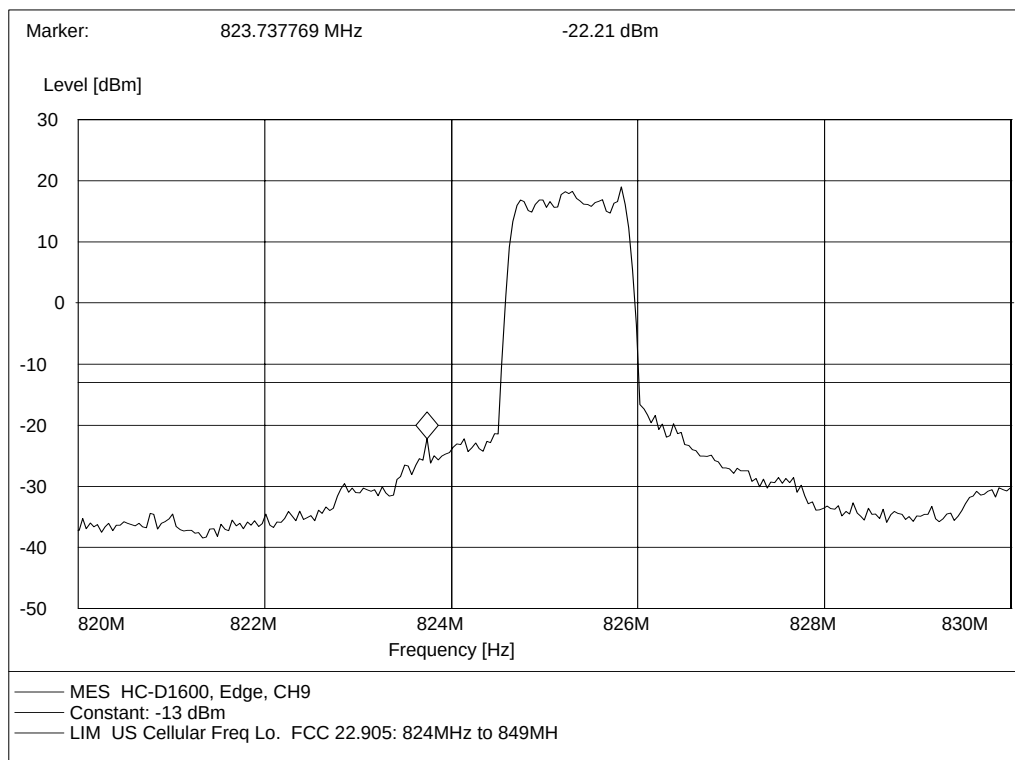
No.	Frequency (MHz)	Emission Power (dBm)	Limit (dBm)
Channel No. 9 (825.27 MHz)			
1	1650.54	-54.32	-13
2	2475.81	-54.40	-13
3	3301.08	--	-13
4	4126.35	--	-13
5	4951.62	--	-13
6	5776.89	--	-13
7	6602.16	--	-13
8	7427.43	--	-13
9	8252.70	--	-13
Channel No. 384 (836.52 MHz)			
10	1673.04	-50.39	-13
11	2509.56	-53.51	-13
12	3346.08	--	-13
13	4182.60	--	-13
14	5019.12	--	-13
15	5855.64	--	-13
16	6692.16	--	-13
17	7528.68	--	-13
18	8365.20	--	-13
Channel No. 758 (847.74 MHz)			
19	1695.48	-54.24	-13
20	2543.22	-52.07	-13
21	3390.96	--	-13
22	4238.70	--	-13
23	5086.44	--	-13
24	5934.18	--	-13
25	6781.92	--	-13
26	7629.66	--	-13
27	8477.40	--	-13

NOTE:

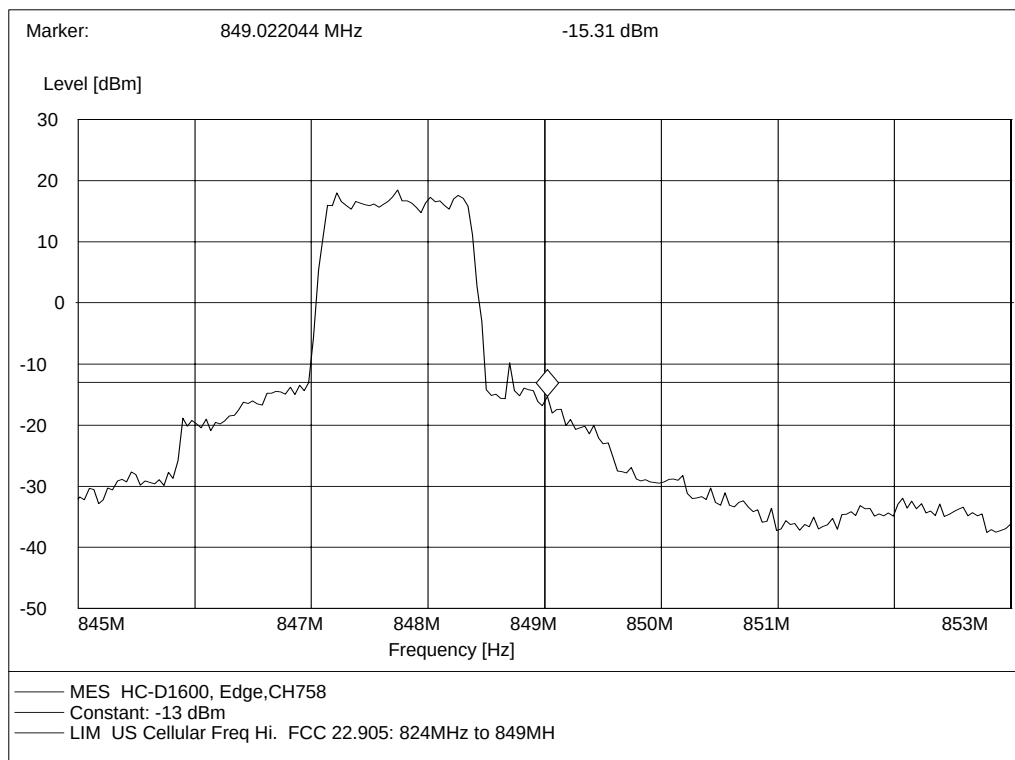
1. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
2. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

Plot of Band Edge

1. Lowest channel No.9



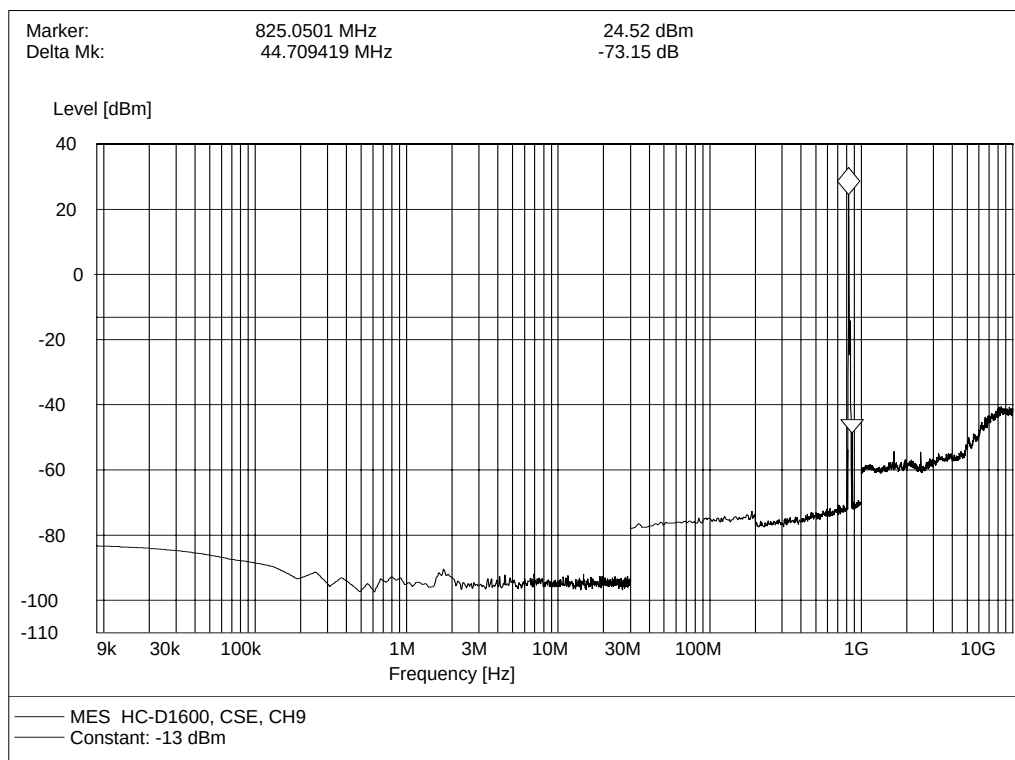
2. Highest channel No.758



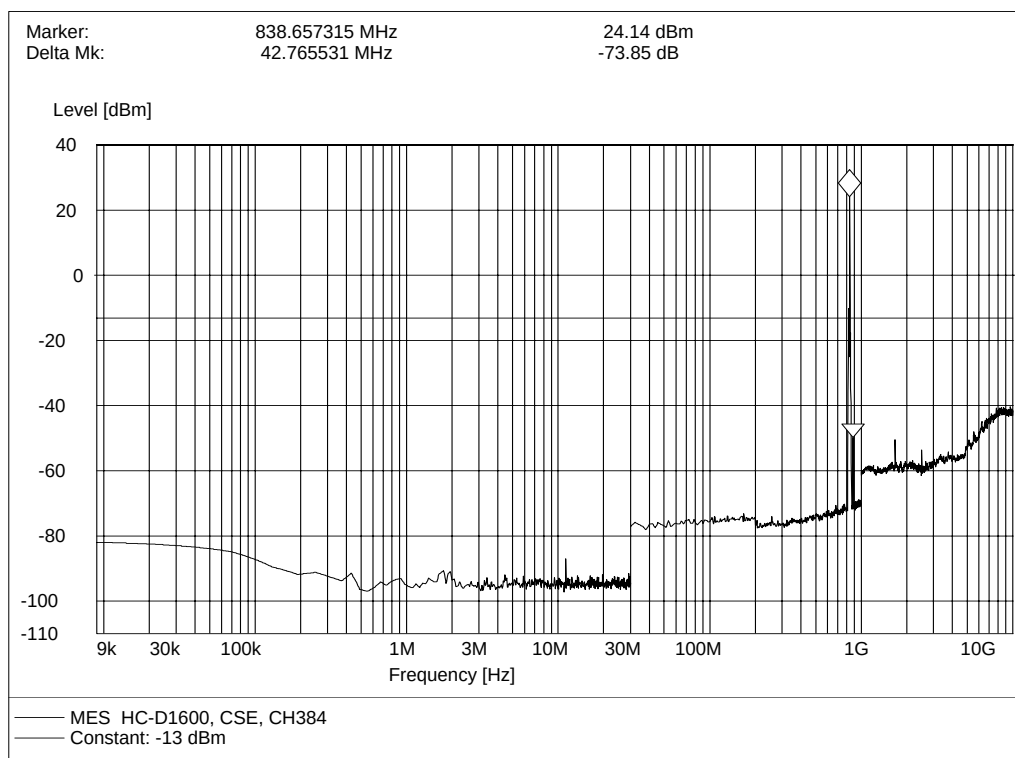
Plot of Spurious Emission

(Note: The marker point is the MS transmitting frequency which should be ignored.)

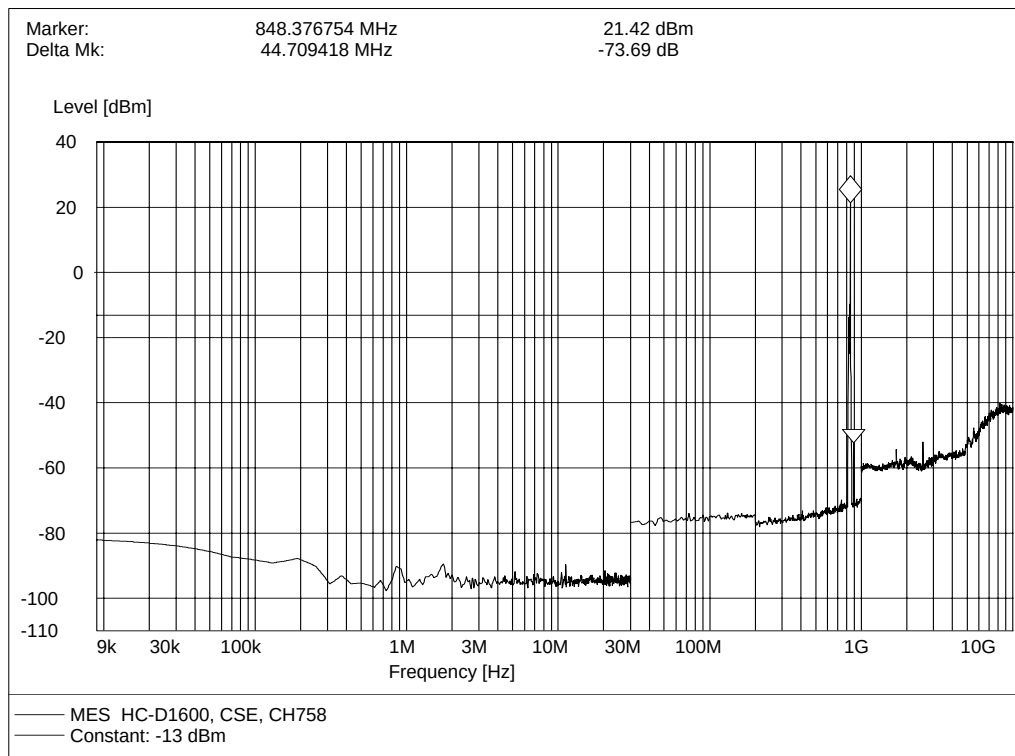
1. Lowest channel No.9



2. Middle channel No.384



3. Highest channel No.758



9 Transmitter Radiated Power (EIRP/ERP) Test

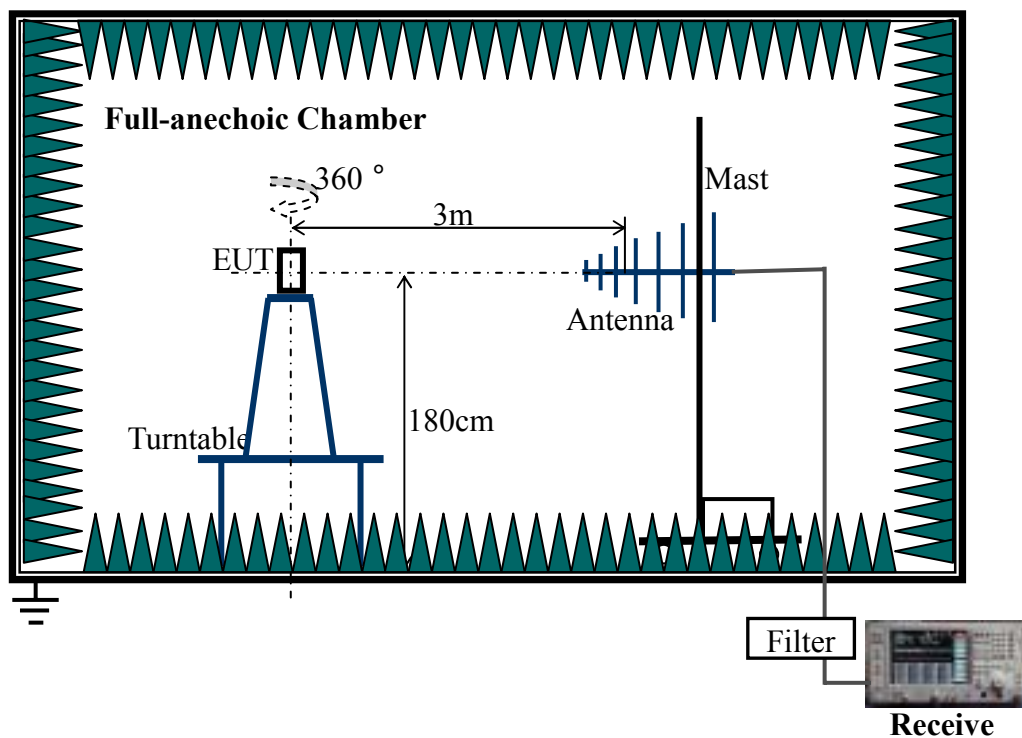
9.1 Limits of EIRP/ERP

According to FCC §22.913, the **ERP** of Cellular mobile transmitters must not exceed 7 Watts (38.5dBm).

9.2 Test Procedure

- a. The radiated power measurement was performed in a full anechoic chamber. The air lost of the site and the factors of the test system is pre-calibrated using substitution method.
- b. The EUT was placed on the vertical axis of a turntable 1.8 meters above the ground. The table was turned from 0 degrees to 360 degrees to find the maximum reading.
- d. In the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. In the frequency range above 3 GHz, horn antenna was used. The antenna was at the same height as the EUT. Since the there was no reflection from the chamber floor and the site was pre-calibrated, the antenna height need not to be changed as the open site method. The polarization of the receiving antenna was the same as that of the EUT transmitting antenna.
- c. The spectrum analyzer was set to Maxpeak Detector and Maximum Hold mode. The resolution bandwidth was comparable to the emission bandwidth. For GSM signal, VBW=RBW=1MHz; for CDMA signal, VBW=RBW=3MHz.

9.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

9.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

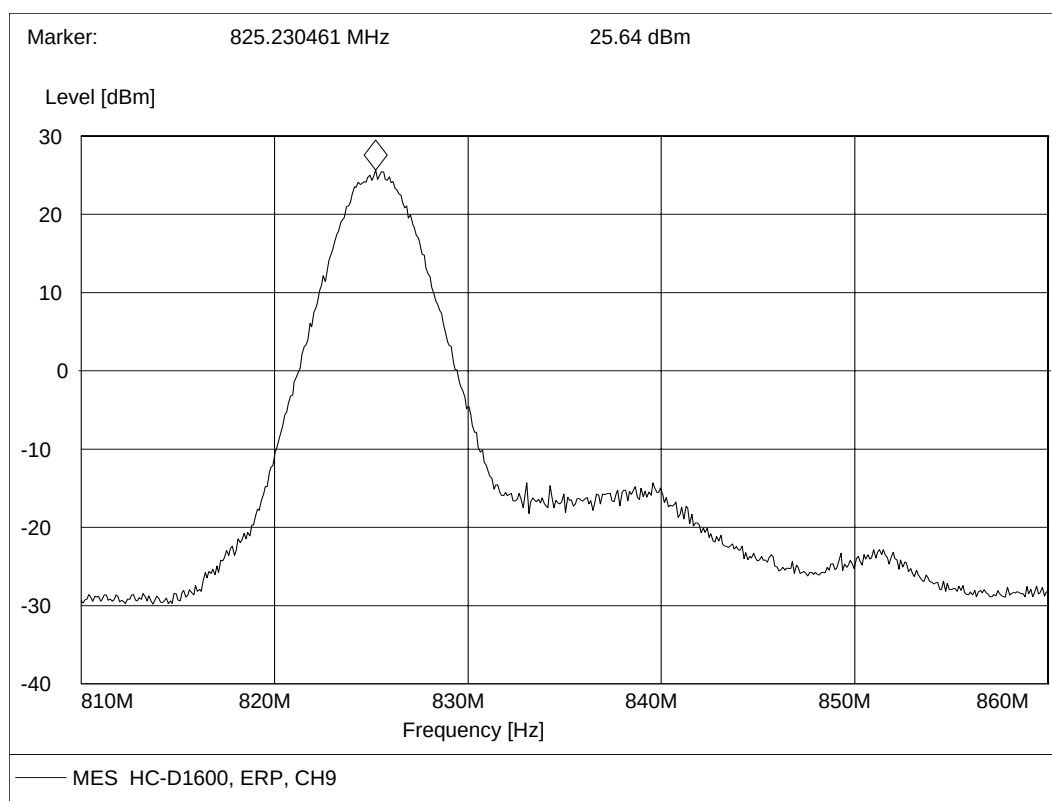
The MS operated at the maximum output power. The CDMA 1X (Cellular band) channel No.9 (lowest), 384(middle) and 758 (highest) were measured respectively.

9.5 Test Results

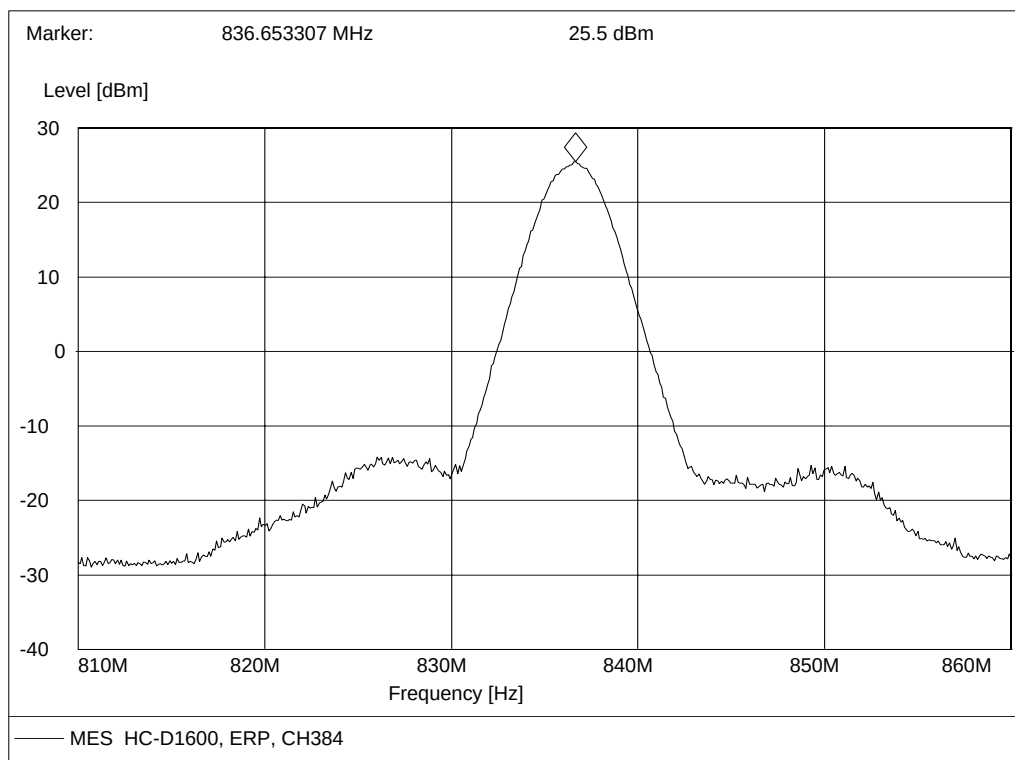
No.	CDMA 1X Channel No.	Frequency (MHz)	ERP (dBm)	ERP (W)	Limit ERP (W)
1	9	825.27	25.64	0.366	7
2	384	836.52	25.50	0.355	7
3	758	847.74	25.33	0.341	7

Test Plots

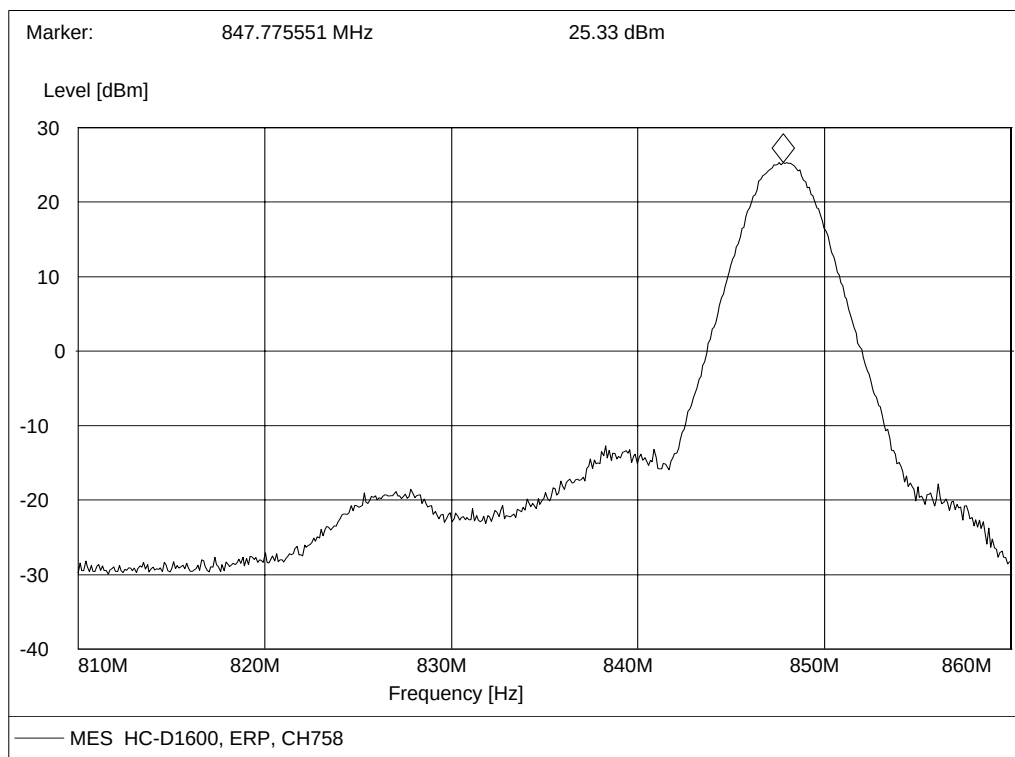
1. Lowest channel No.9



2. Middle channel No.384



3. Highest channel No.758



10 Radiated Spurious Emission Test

10.1 Limits of Radiated Spurious Emission

According to FCC §22.917 (a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB. This calculated to be -13dBm.

10.2 Test Procedure

- a. In the frequency range of 9 kHz to 30 MHz, magnetic field was measured with loop antenna. The antenna was positioned with its plane vertical at 1 m distance from the EUT. The center of the loop was 1 m above the ground. During the measurement the loop antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.
- b. In the frequency range above 30MHz, the radiated power measurement was performed in a full anechoic chamber. The air lost of the site and the factors of the test system is pre-calibrated using substitution method.
- c. The EUT was placed on the vertical axis of a turntable 1.8 meters above the ground. The table was turned from 0 degrees to 360 degrees to find the maximum reading.
- d. In the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. In the frequency range above 3 GHz, horn antenna was used. The antenna was at the same height as the EUT. Since the there was no reflection from the chamber floor and the site was pre-calibrated, the antenna height need not to be changed as the open site method. The measurement was performed with the antenna at horizontal and vertical polarization respectively.
- e. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode. The resolution bandwidth was set to 1MHz. The measuring frequencies are from 30 MHz to 10th harmonic of the fundamental frequency.

10.3 Test Setup

Same as 9.3

10.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery.

A communication link was established between the MS and a System Simulator (SS).

The MS operated at the maximum output power. The CDMA 1X (Cellular band) channel No.9 (lowest), 384 (middle) and 758 (highest) were measured respectively.

10.5 Test Results

No.	Frequency (MHz)	ERP (dBm)	ERP (dBm)	Limit (dBm)
		Antenna: <u>V</u> ertical	Antenna: <u>H</u> orizontal	
Channel No. 9 (825.27 MHz)				
1	1650.54	-35.04	-43.47	-13
2	2475.81	-42.89	-37.90	-13
3	3301.08	-34.08	-35.90	-13
4	4126.35	-53.14	-44.06	-13
5	4951.62	-49.10	-45.58	-13
6	5776.89	--	-46.61	-13
7	6602.16	--	-43.87	-13
8	7427.43	--	--	-13
9	8252.70	--	--	-13
Channel No. 384 (836.52 MHz)				
10	1673.04	-36.03	-43.78	-13
11	2509.56	-33.57	-33.98	-13
12	3346.08	-29.32	-38.19	-13
13	4182.60	-45.27	-42.43	-13
14	5019.12	-42.25	-41.93	-13
15	5855.64	-47.87	-47.10	-13
16	6692.16	-46.61	-46.23	-13
17	7528.68	--	--	-13
18	8365.20	--	--	-13
Channel No. 758 (847.74 MHz)				
19	1695.48	-39.14	-43.86	-13
20	2543.22	-36.18	-35.09	-13
21	3390.96	-28.71	-37.25	-13
22	4238.70	-45.39	-42.55	-13
23	5086.44	-44.57	-42.23	-13
24	5934.18	--	-45.84	-13
25	6781.92	--	-45.05	-13
26	7629.66	--	--	-13
27	8477.40	--	--	-13

NOTE:

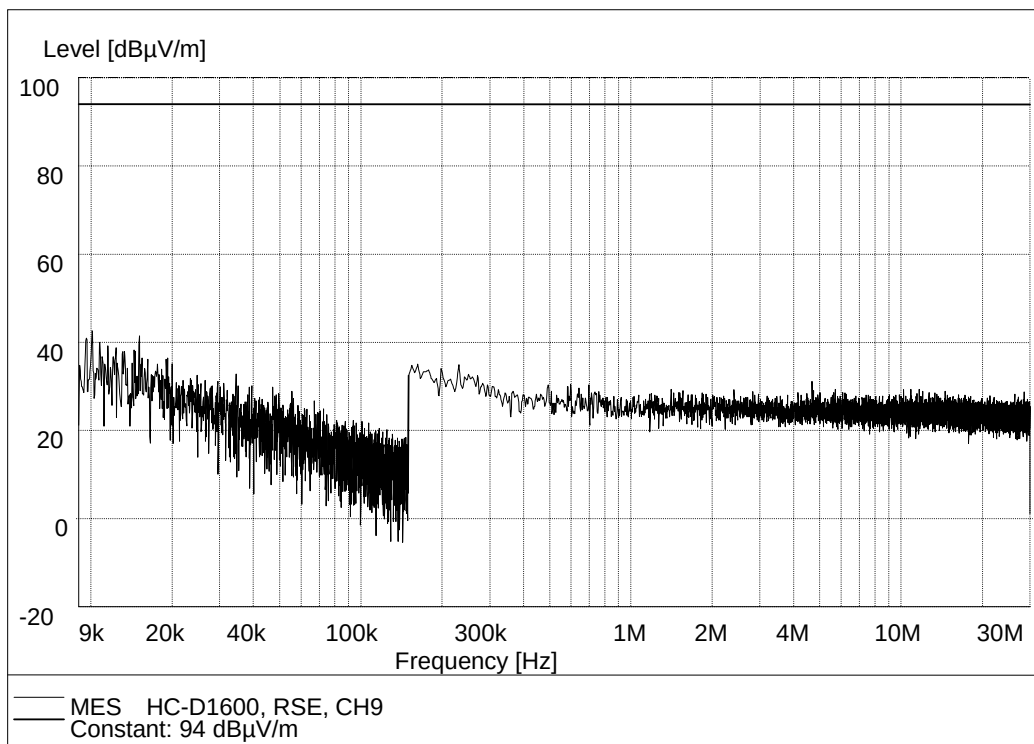
1. V and H are the antenna polarizations: Vertical and Horizontal.
2. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
3. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

Plot of Spurious Emission

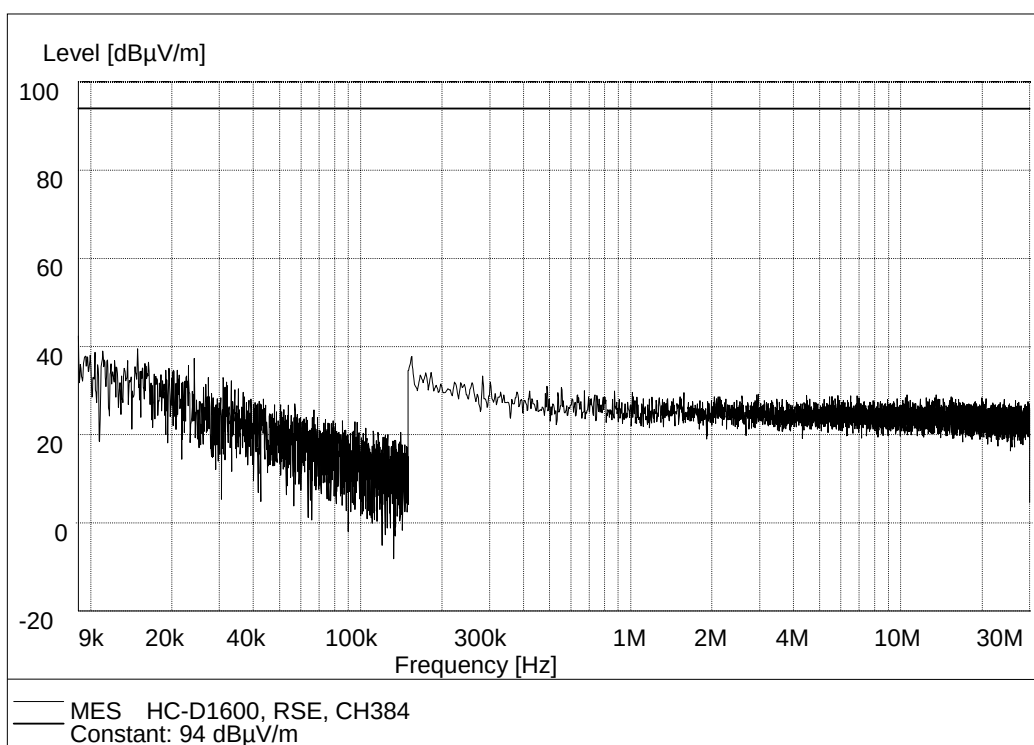
(Note: The marker point is the MS transmitting frequency which should be ignored.)

I. 9kHz to 30MHz

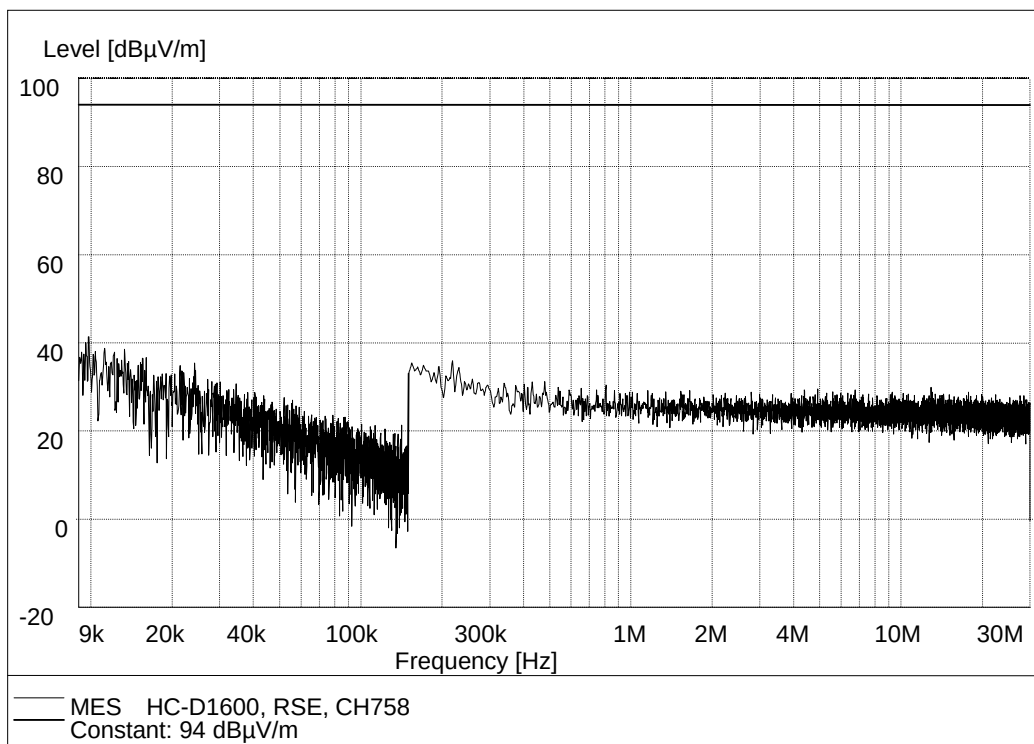
1. Lowest channel No.9,



2. Middle channel No.384

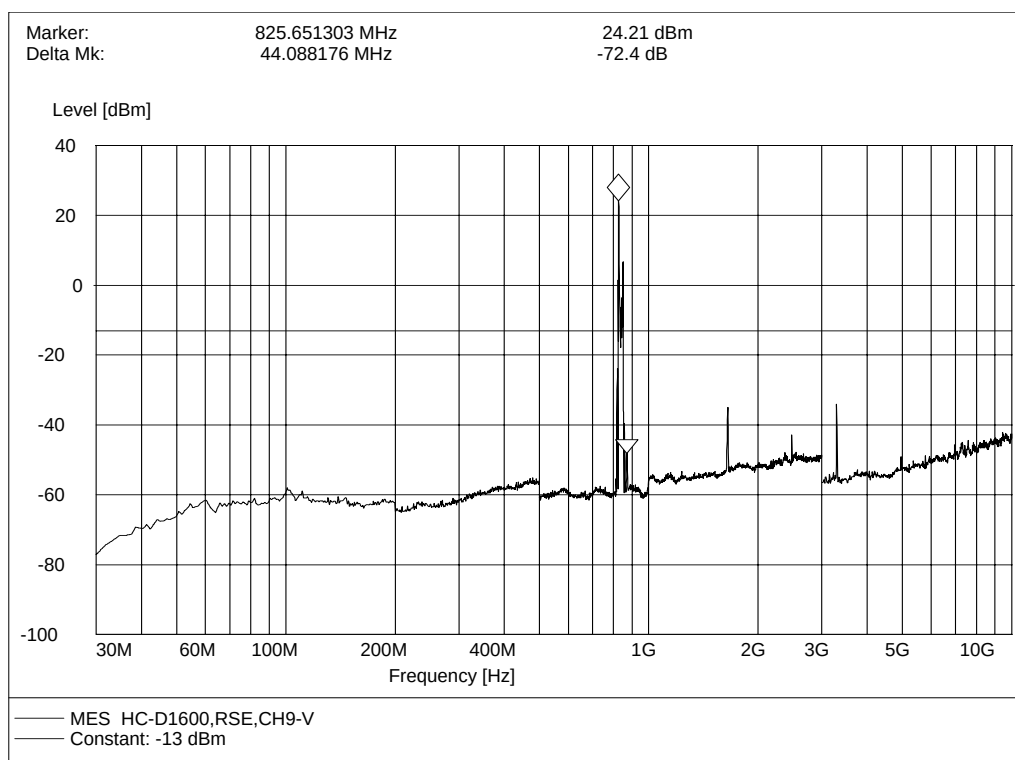


3. Highest channel No.758

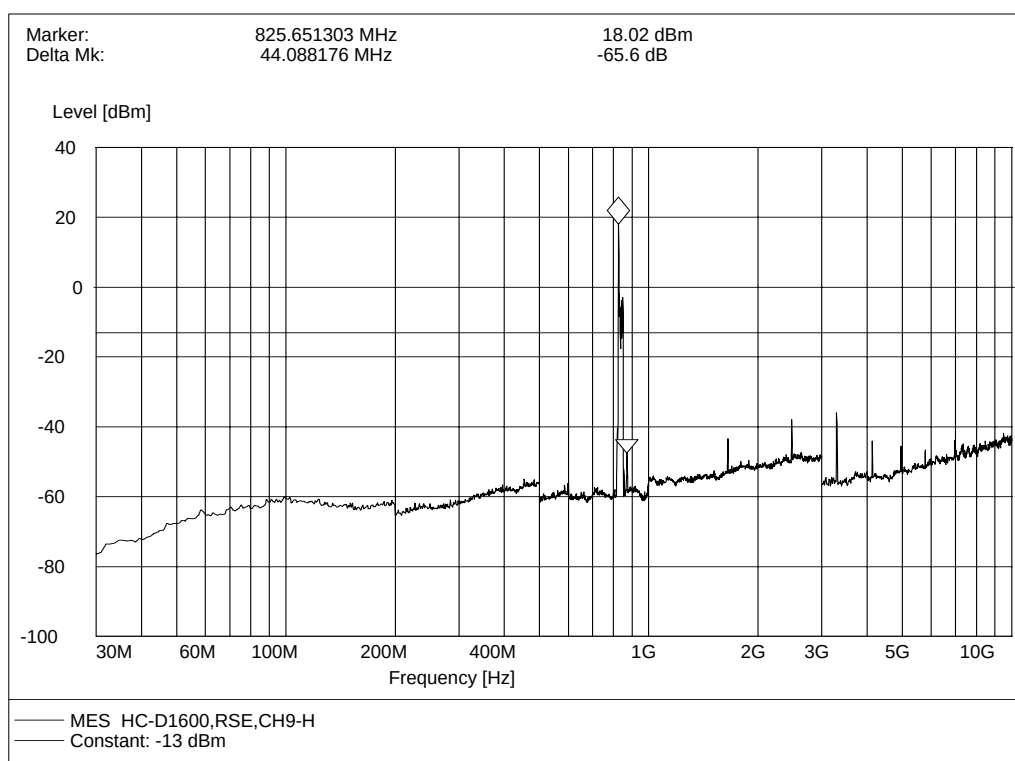


II. Above 30 MHz

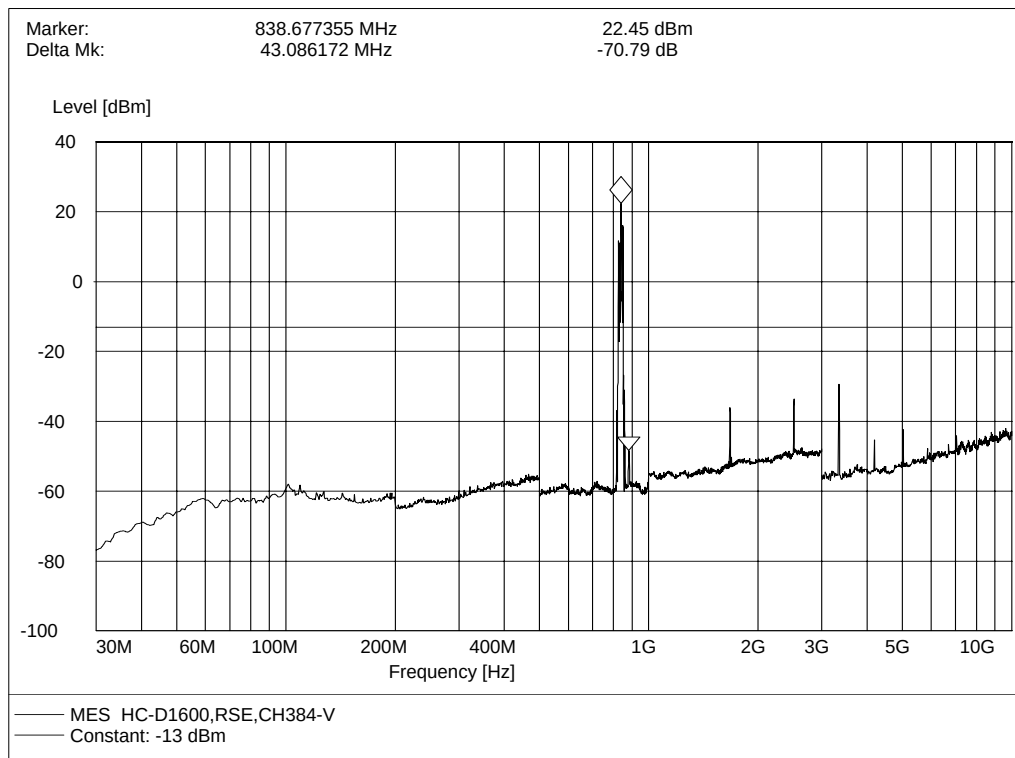
1. Lowest channel No.9, antenna vertical



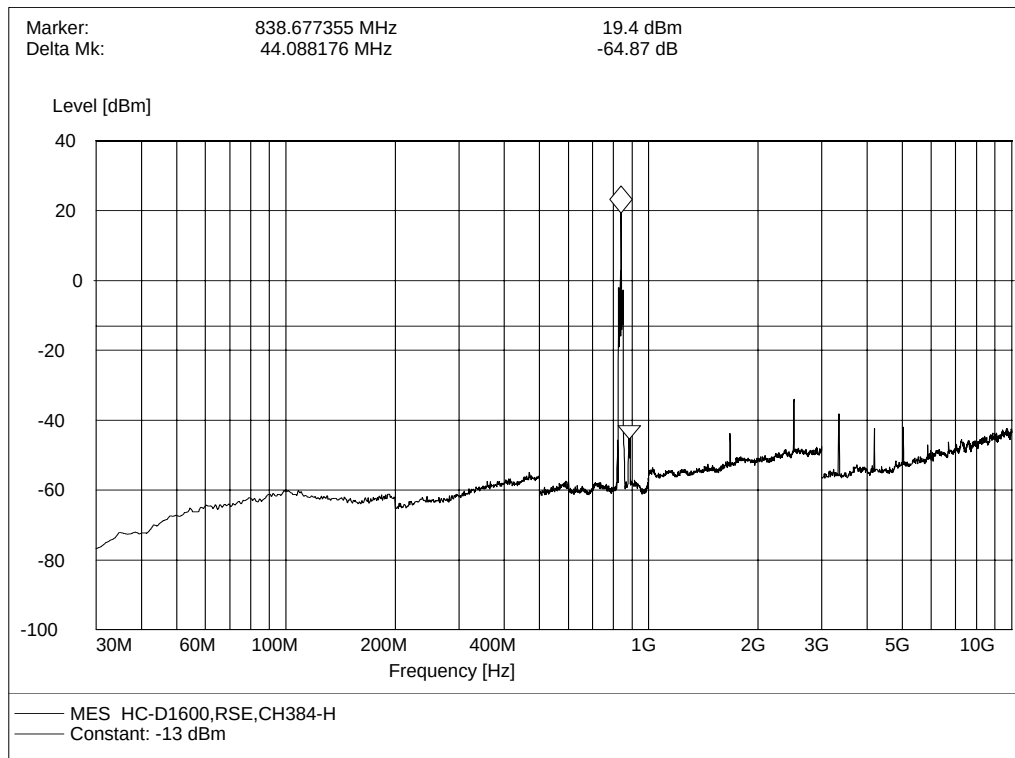
2. Lowest channel No.9, antenna horizontal



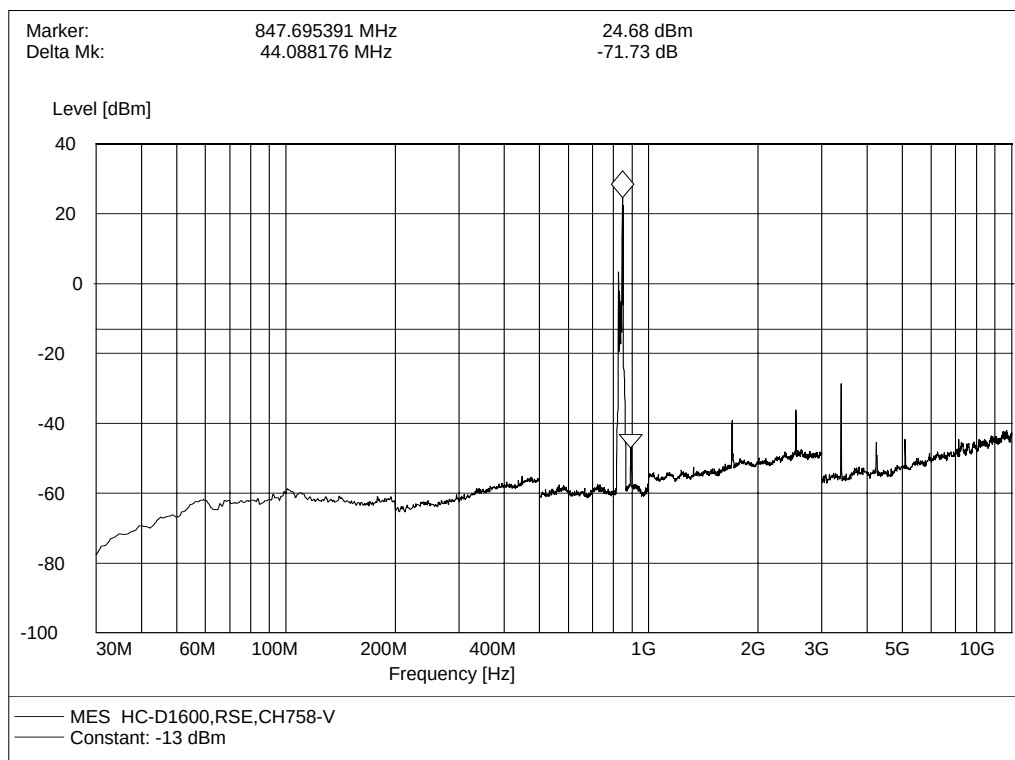
3. Middle channel No.384, antenna vertical



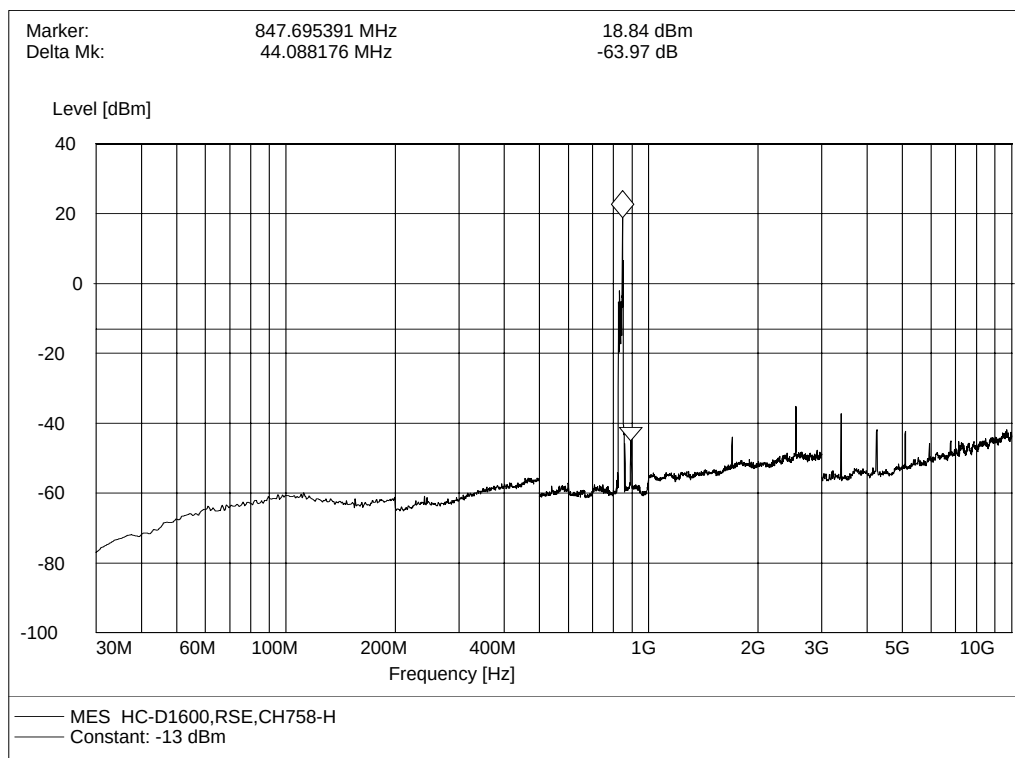
4. Middle channel No.384, antenna horizontal



5. Highest channel No.758, antenna vertical



6. Highest channel No.758, antenna horizontal



11 Frequency Stability Test

11.1 Requirement of Frequency Stability

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

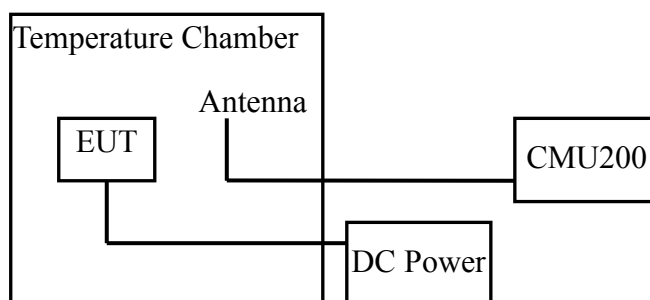
According to FCC §2.1055, the test conditions are:

- **Temperature:** The temperature is varied from -30°C to $+50^{\circ}\text{C}$ at intervals of not more than 10°C .
- **Primary Supply Voltage:** For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

11.2 Test Procedure

- a. The temperature was varied from -30°C to $+50^{\circ}\text{C}$ at intervals of 10°C . At each temperature level, the EUT was powered off and put in the temperature chamber for 2 hour.
- b. After sufficient stabilization, the EUT was turned on and a communication link was established. The frequency was measured within three minutes.
- c. For extreme supply voltage measurement, the EUT was tested at room temperature.

11.3 Test Setup



11.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + DC power supply.

A communication link was established between the MS and a System Simulator (SS). The MS operated at the maximum output power. The CDMA 1X channel No.9 (low), 384 (mid), and 758 (high) were measured respectively.

11.5 Test Results

No.	Test Conditions		Frequency Deviation (Hz)			
	Volatage	Temperature (°C)	9CH	384CH	758CH	Limit
1	3.7V (V _{nom})	-30	-5	-2	+14	±300Hz
2		-20	-6	+11	-4	
3		-10	-5	+12	+17	
4		0	+2	+8	-4	
5		+10	+6	+10	+13	
6		+20	+15	+11	+4	
7		+30	+11	+14	-11	
8		+40	+10	-5	-2	
9		+50	+4	+19	+7	
10	4.2V (V _{max})	+22	+3	+17	+18	
11	3.6V (V _{min})	+22	+1	+16	+19	

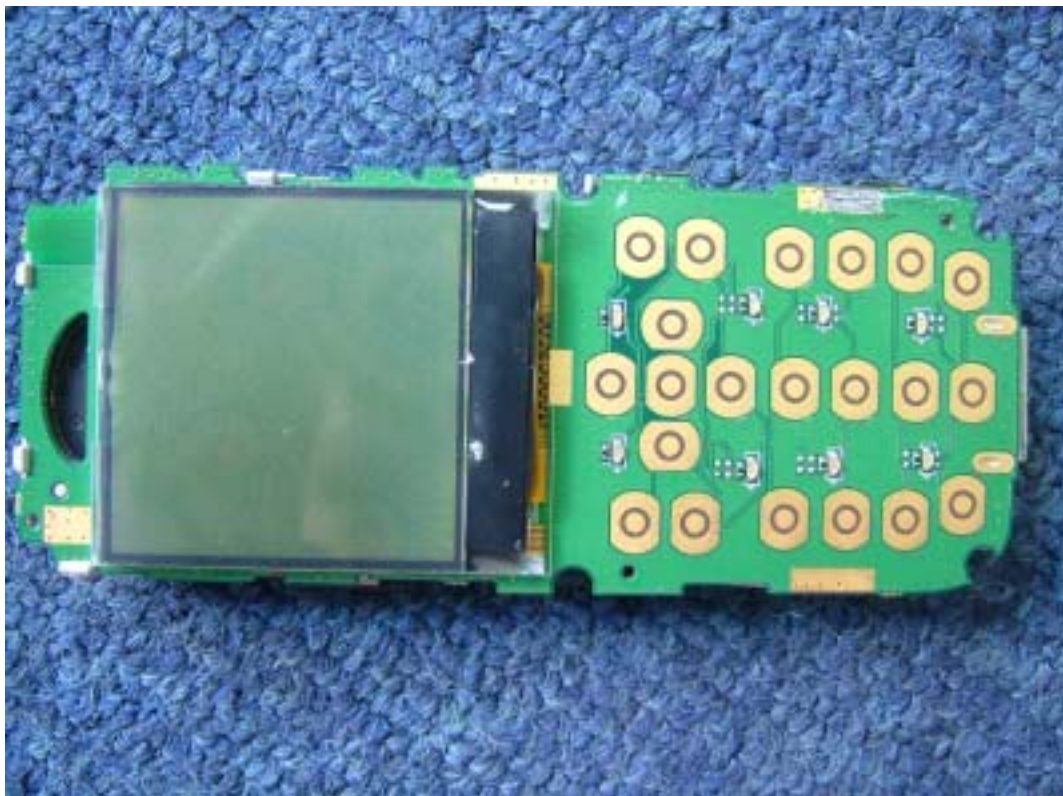
Appendix I : Photographs of the EUT

1. Appearance of the MS



2. Inside of the MS



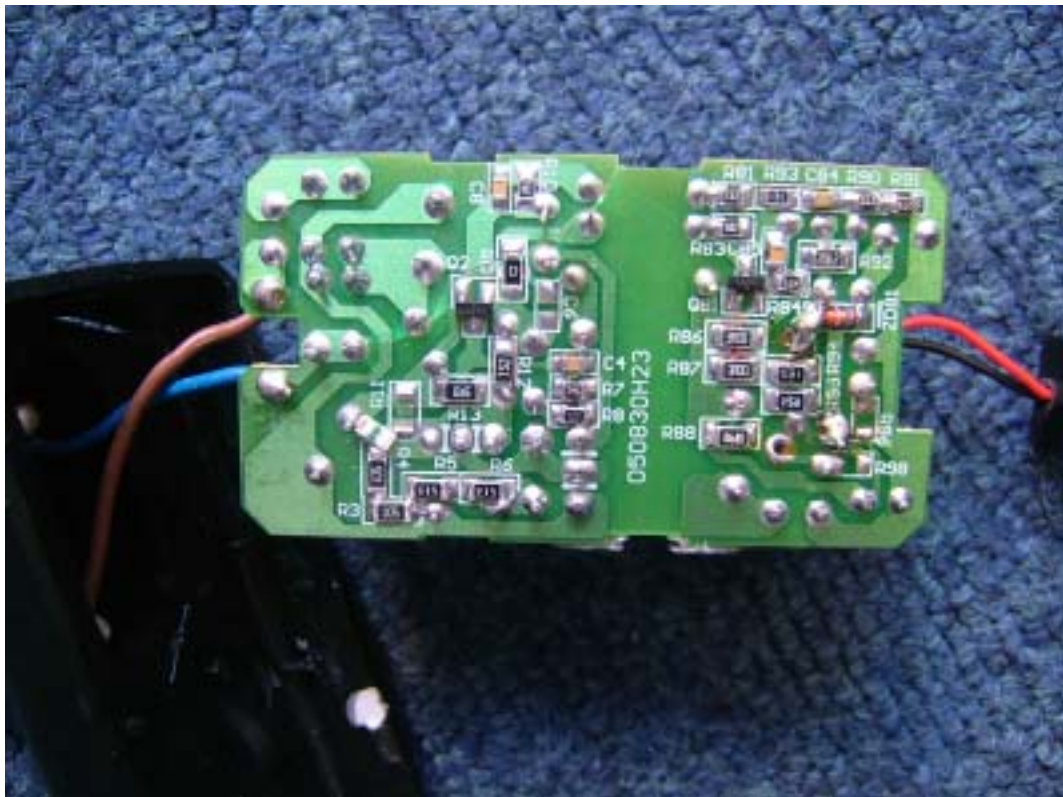
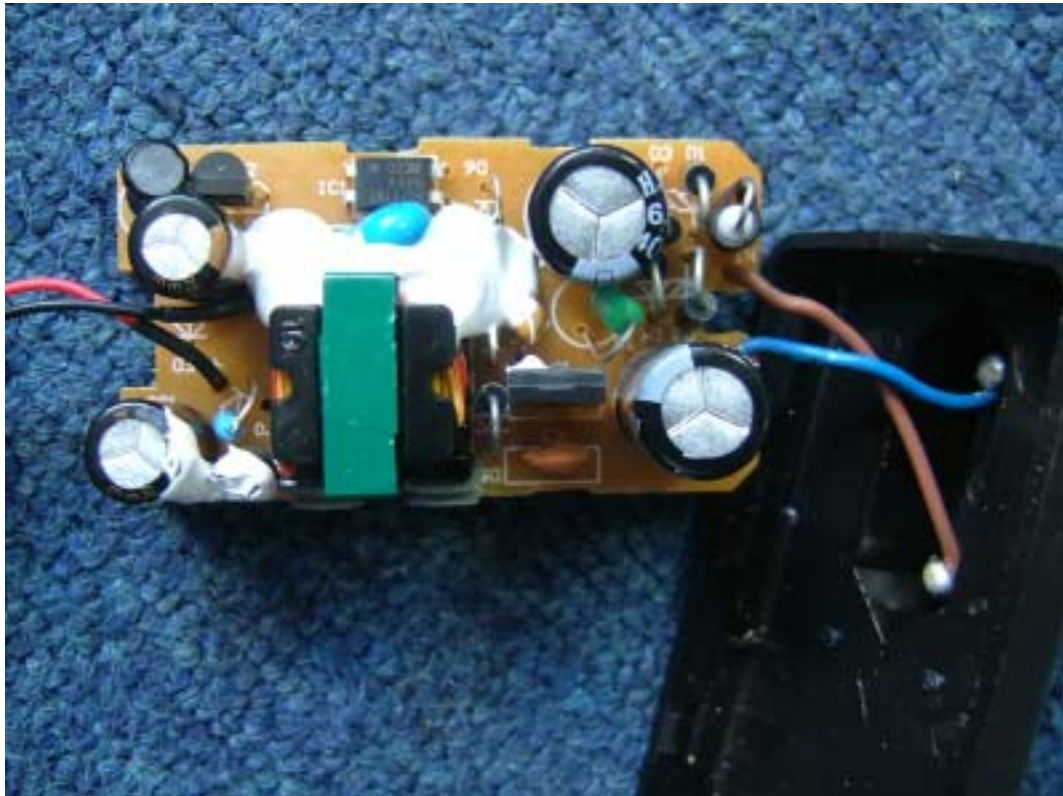




3. Appearance of the Charger



4. Inside of the Charger

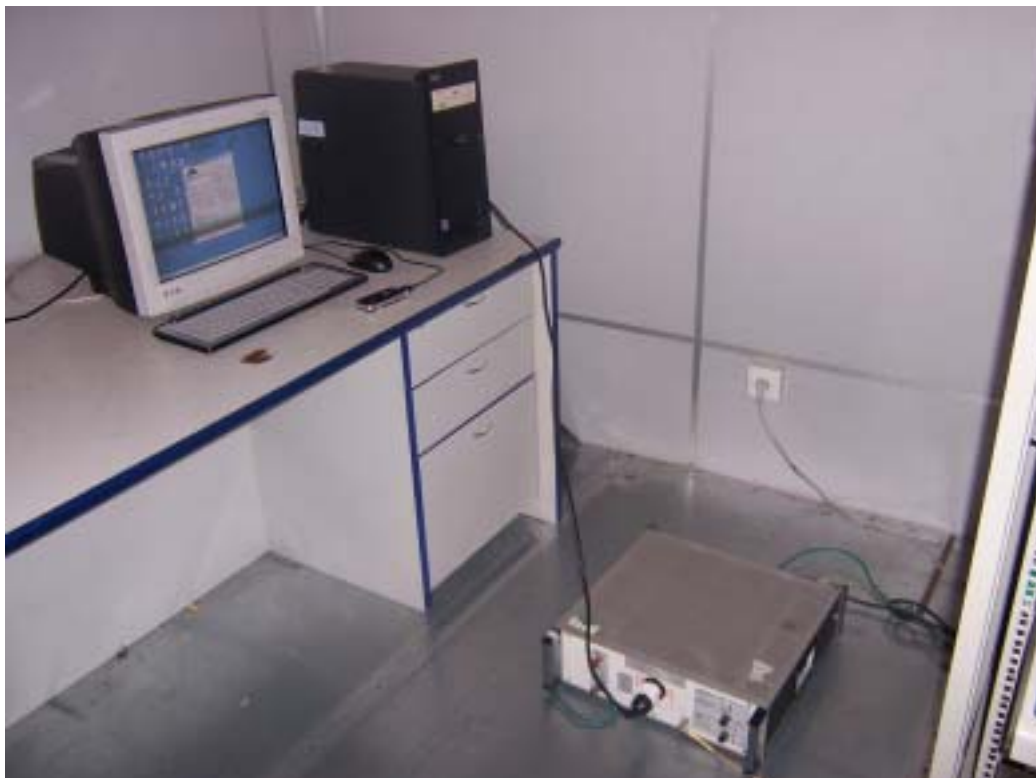


Appendix II : Photographs of the Test Configuration

1. Conducted Emission Test, Mobile Mode



2. Conducted Emission Test, USB Mode



3. Radiated Emission Test, Mobile Mode



4. Radiated Emission Test, USB Mode



5. Conducted RF Test



6. Radiated RF Test



7. Radiated RF Test (9kHz~30MHz)

