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No.E1659

FCC Part 24 TEST REPORT

of

900/1800/1900 Tri-Band Mobile Phone

FCC ID: RXSCT5888

Model No.: Philips 588

Serial No.: 600000200 004345880001

Report No.: FCC06-8017

Date: May 25, 2006

Prepared for

CEC Wireless R&D Ltd.

West M5 Building, No.1 East Road,
Jiuxianqiao, Chaoyang District, Beijing, P.R.China

Prepared by

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1 Test Report Certification

Product: 900/1800/1900 Tri-Band Mobile Phone

FCC ID: RXSCT5888

Model No.: Philips 588

Applicant: CEC Wireless R&D Ltd.

Applicant Address: West M5 Building, No.1 East Road, Jiuxianqiao, Chaoyang District, Beijing, P.R.China

Manufacturer: Philips (China) Investment Co., Ltd.

Manufacturer Address: 27 Floor, Tower 1 Office Building Kerry Everbright City, 218 Tianmuxi Road, Shanghai, P.R.China

Test Standards: 47 CFR Part 2

47 CFR Part 24, Subpart E

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: May 25, 2006
Lin Xingsun 

Lin Xingsun

Checked by: Smart Li Date: May 21, 2006

Smart Li

Approved by: Wu Li An, Date: May. 28. 2020

Wu Li An



2 General Information

2.1 Description of EUT

EUT1	
Description:	900/1800/1900 Tri-Band Mobile Phone
Model No.:	Philips 588
Emission Designator:	200KGXW
Modulation:	GSM
Frequency:	Tx: 1850.20-1909.80MHz; Rx: 1930.20MHz-1989.80MHz
Power:	1W
IMEI No.:	359172000000194
Serial No.:	6000000200 004345880001
Hardware Version:	P3
Software Version:	T017
EUT2	
Description:	Lithium-ion Battery
Model No.:	MS511179/72911
Serial No.:	20060304
Manufacturer:	Philips (China) Investment Co., Ltd.
Capacitance:	580mAh
Rated Voltage:	3.7V
Extreme Voltage:	High, 4.2V; Low, 3.4V
EUT3	
Description:	AC/DC Adapter (Charger)
Model No.:	DSA-0051-05C FEU
Serial No.:	12NC 4339 008 72751
Manufacturer:	Philips (China) Investment Co., Ltd.
Rated Input:	a.c. 100-240V, 50/60Hz
Rated Output:	d.c. 5.1Vdc, 550mA
Length of DC cable:	130cm

NOTE:

1. The EUT consists of Hand Telephone Set and normal options: Lithium Battery and Charger, as listed above.
2. The EUT supports GSM 900MHz, 1800 MHz and 1900 MHz bands. Only PCS 1900MHz band

was tested in this report.

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 and Part 24 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 24 Personal Communications Services

Test items and the results are as bellow:

Nº	FCC Rules	Test Type	Result
1	§2.106 §24. 229	Frequencies	PASS
2	§2.1046	Conducted RF Output Power at Antenna Terminal	PASS
3	§2.1049	Occupied Bandwidth	PASS
4	§2.1051 §2.1057 §24.238	Conducted Spurious Emission at Antenna Terminal	PASS
5	§24.232	Transmitter Radiated Power (EIRP/ERP)	PASS
6	§2.1053 §2.1057 §24.238	Radiated Spurious Emission	PASS
7	§2.1055 §24.235	Frequency Stability	PASS

2.4 List of Equipments Used

Description	Manufacturer	Model No.	Cal. Due Date	Serial No.
Test Receiver	Rohde & Schwarz	ESIB26	2006.06.10	A0304218
Ultra Broadband Ant.	Rohde & Schwarz	HL562	2006.06.05	A0304224
Horn Ant.	Rohde & Schwarz	HF906	2006.06.05	100150
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	2006.05.31	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 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 Board for Laboratories (CNAL) 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 Frequencies

3.1 Frequency Blocks Available for Broadband PCS

According to FCC §24.229, the frequencies available in the Broadband PCS service are listed as below, in accordance with the frequency allocations table of FCC §2.106.

(a) The following frequency blocks are available for assignment on an MTA basis:

Block A: Mobile 1850–1865 MHz, Base 1930–1945 MHz;

Block B: Mobile 1870–1885 MHz, Base 1950–1965 MHz.

(b) The following frequency blocks are available for assignment on a BTA basis:

Block C: Mobile 1895–1910 MHz, Base 1975–1990 MHz;

Block D: Mobile 1865–1870 MHz, Base 1945–1950 MHz;

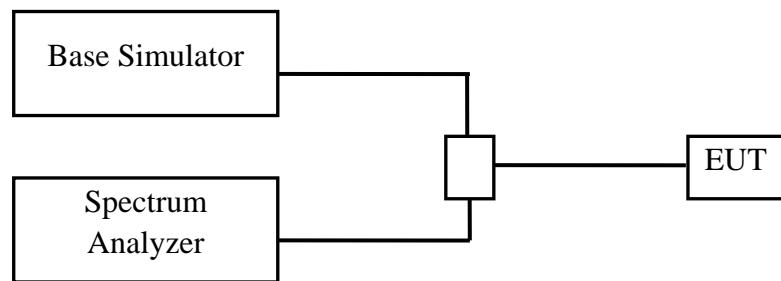
Block E: Mobile 1885–1890 MHz, Base 1965–1970 MHz;

Block F: Mobile 1890–1895 MHz, Base 1970–1975 MHz.

3.2 Test Procedure

- a. 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.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. 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.

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 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 PCS band channel No.512 (lowest) and 810 (highest) were measured respectively.

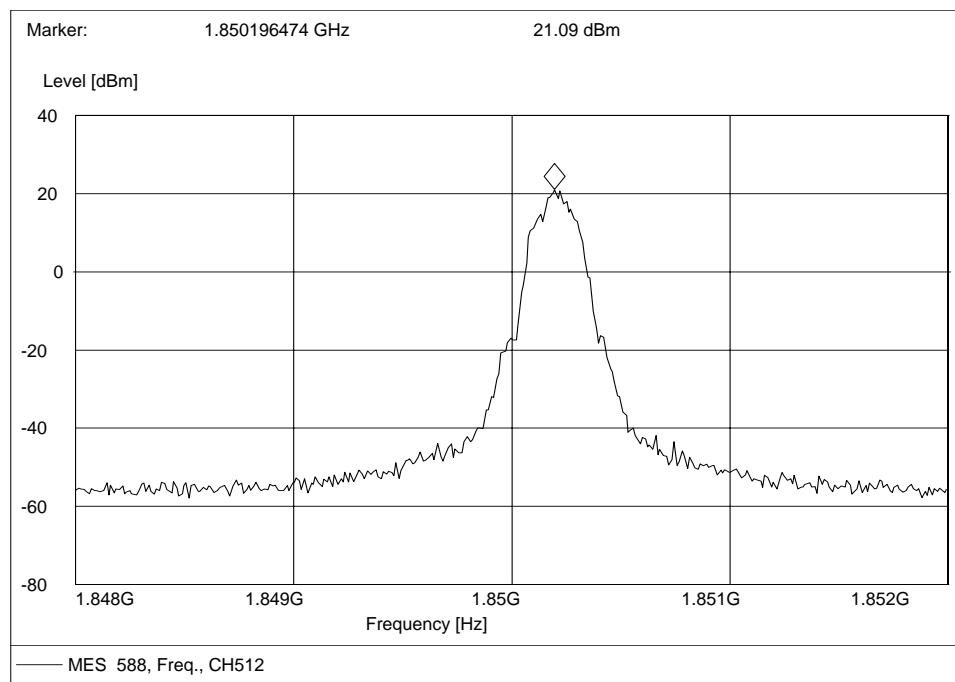
3.5 Test Results

The mobile transmitter frequency arrangement of the PCS1900 band is

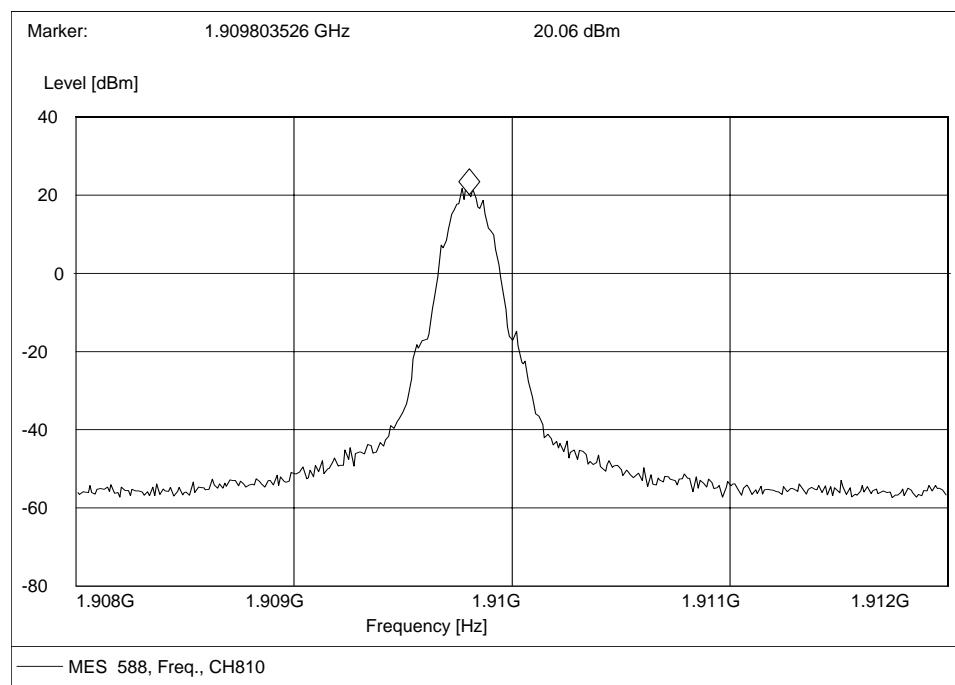
$$FI(n) = 1850.2 + 0.2*(n-512), 512 \leq n \leq 810$$

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

1. Lowest channel No.512



2. Highest channel No.810



4 Conducted RF Output Power Test

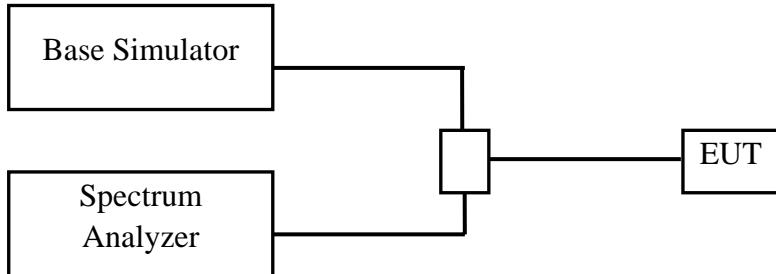
4.1 RF Power Output Test Requirement

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.

4.2 Test Procedure

- a. 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.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. 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.

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

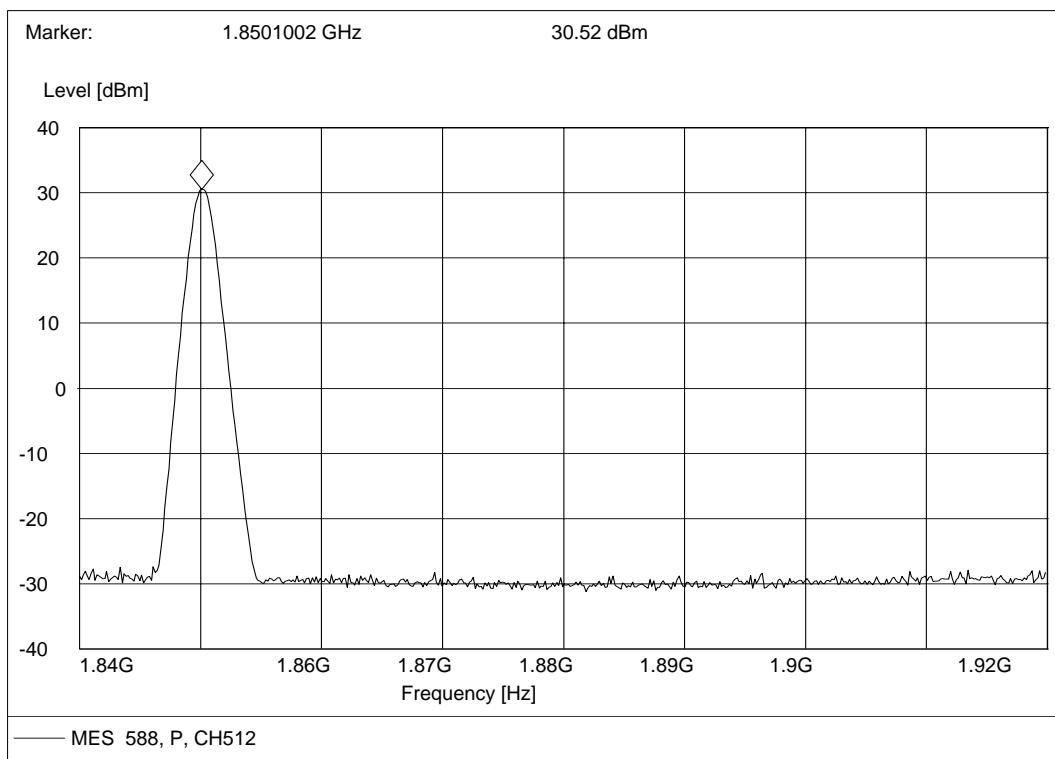
The EUT configuration of the emission tests was MS + Battery.
 A communication link was established between the MS and a System Simulator (SS).
 The MS operated at the maximum output power.
 The PCS 1900MHz band channel No.512 (lowest), 661 (middle) and 810 (highest) were measured respectively.

4.5 Test Results

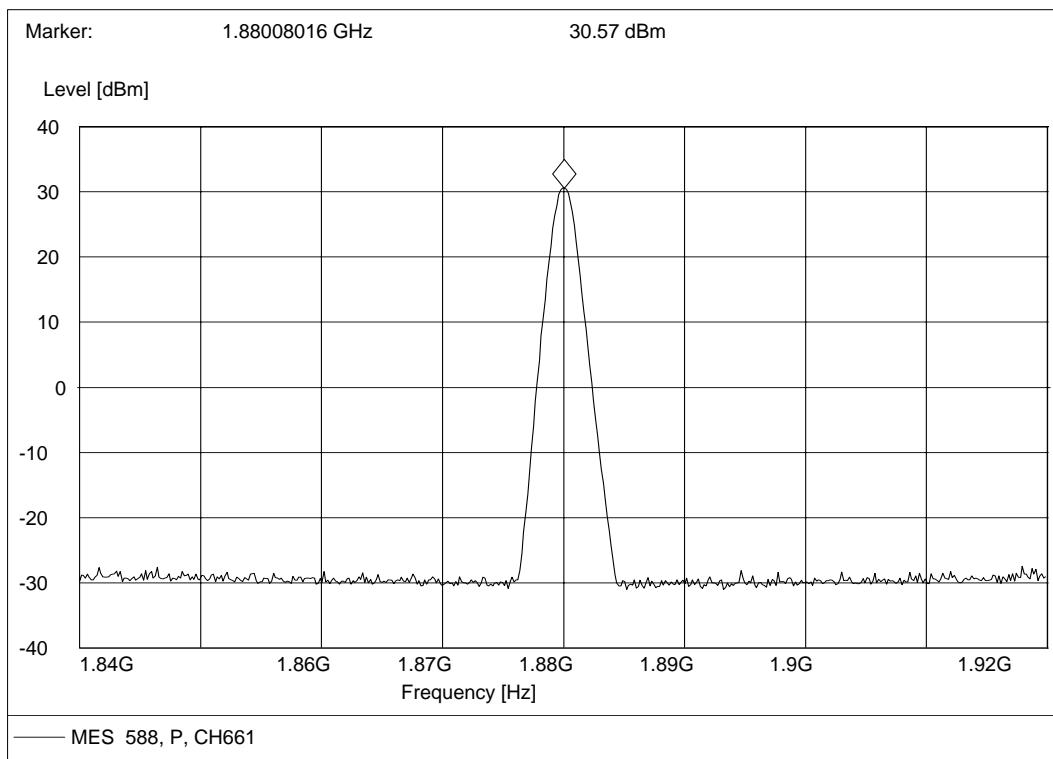
No.	PCS 1900 Channel No.	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)
1	512	1850.20	30.52	30
2	661	1880.00	30.57	30
3	810	1909.80	30.15	30

Test Plots

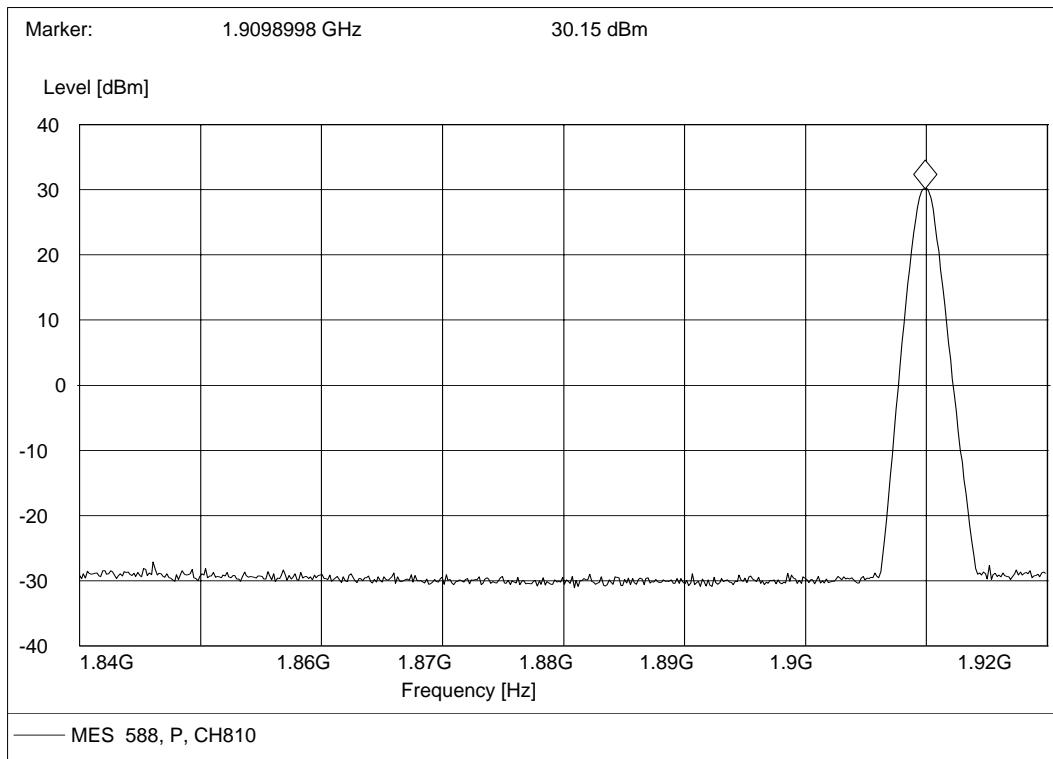
1. Lowest channel No.512



2. Middle channel No.661



3. Highest channel No.810



5 Occupied Bandwidth Test

5.1 Definition

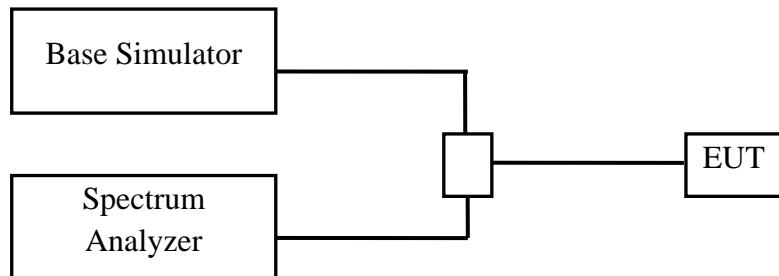
According to FCC §2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

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.

5.2 Test Procedure

- a. 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.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. 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, $\text{VBW}=\text{RBW}=30\text{ kHz}$.

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).

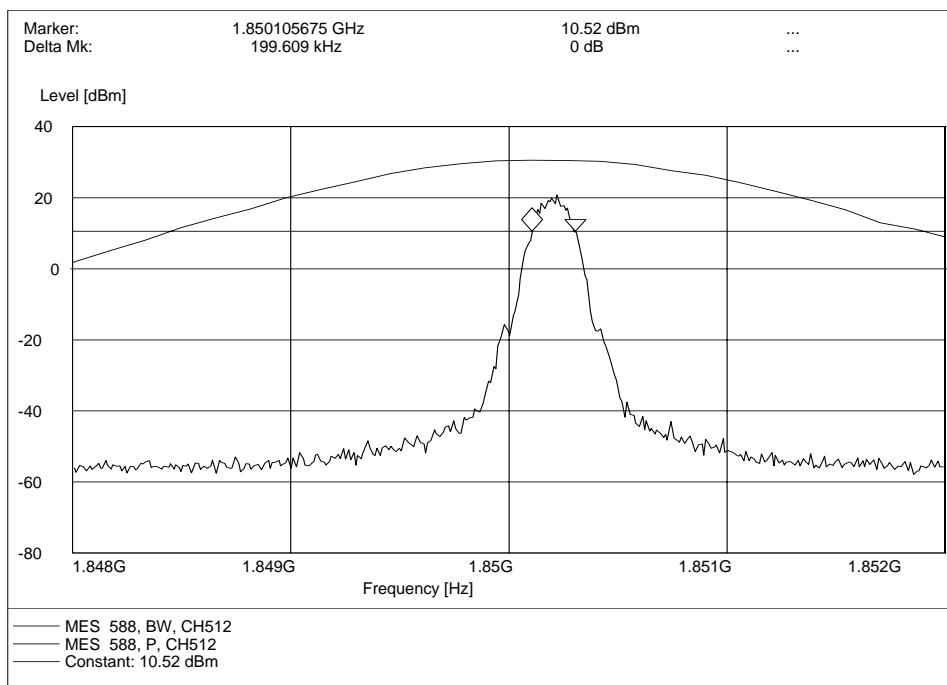
The MS operated at the maximum output power.

The PCS 1900MHz band channel No.512 (lowest), 661 (middle) and 810 (highest) were measured respectively.

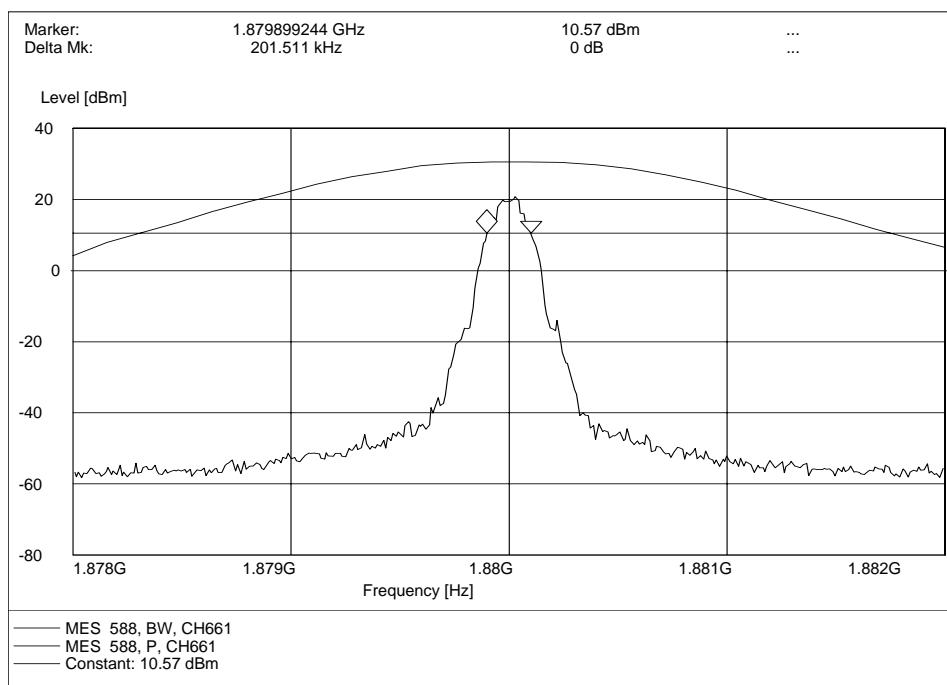
5.5 Test Results

The occupied bandwidth was measured to be about 200 kHz. Refer to the following plots. The 20dB reference trace is the RF output power measurement results in chapter 6.5 of this report.

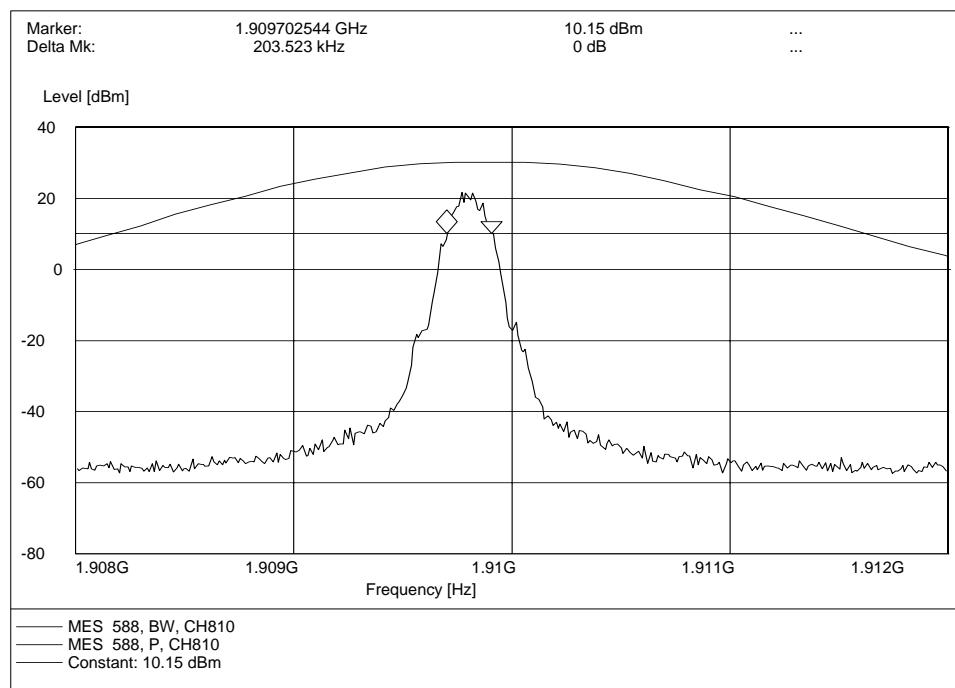
1. PCS 1900MHz band, lowest channel No.512



2. PCS 1900MHz band, middle channel No.661



3. PCS 1900MHz band, highest channel No.810



6 Conducted Spurious Emission Test

6.1 Limits of Conducted Spurious Emission

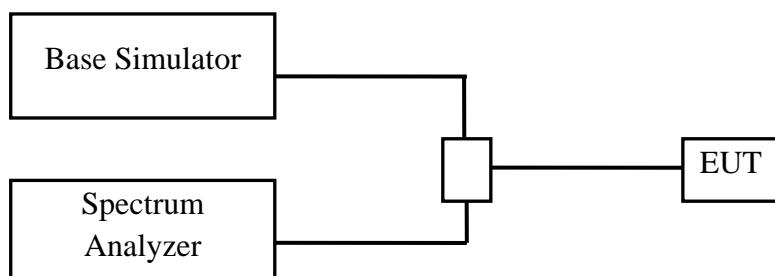
According to FCC §24.238 (a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB. This calculated to be -13dBm.

According to FCC §24.238 (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

6.2 Test Procedure

- a. 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.
- b. 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.
- c. 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.

6.3 Test Setup



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 PCS 1900MHz band channel No.512 (lowest) and 810 (highest) were measured respectively.

6.5 Test Results

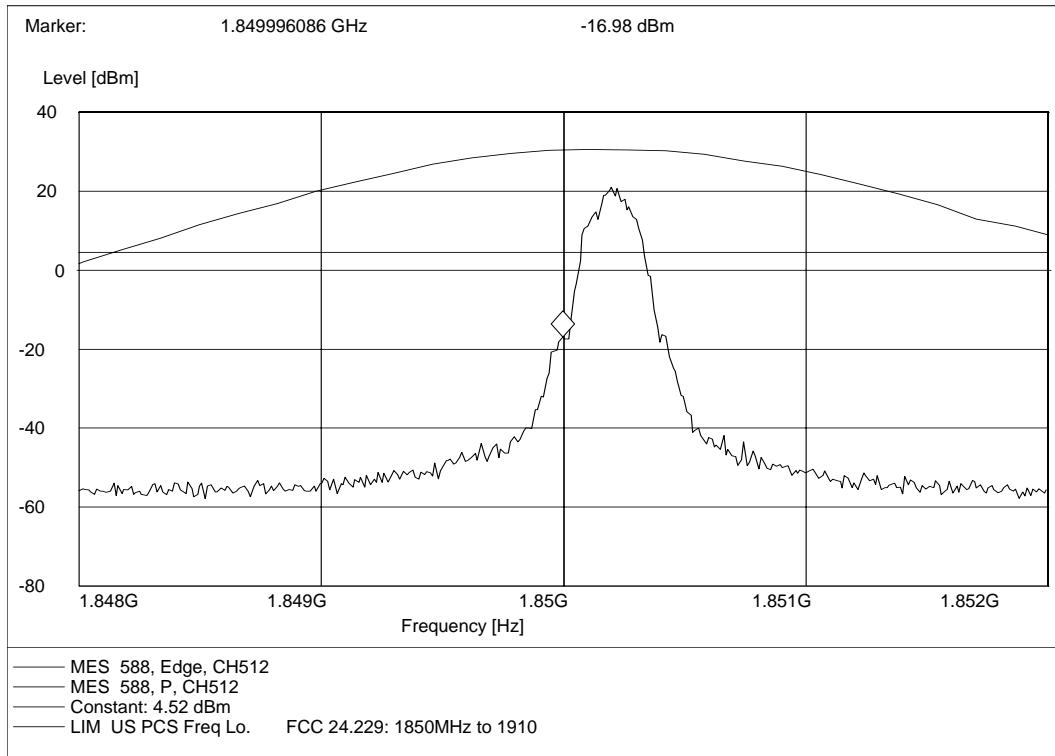
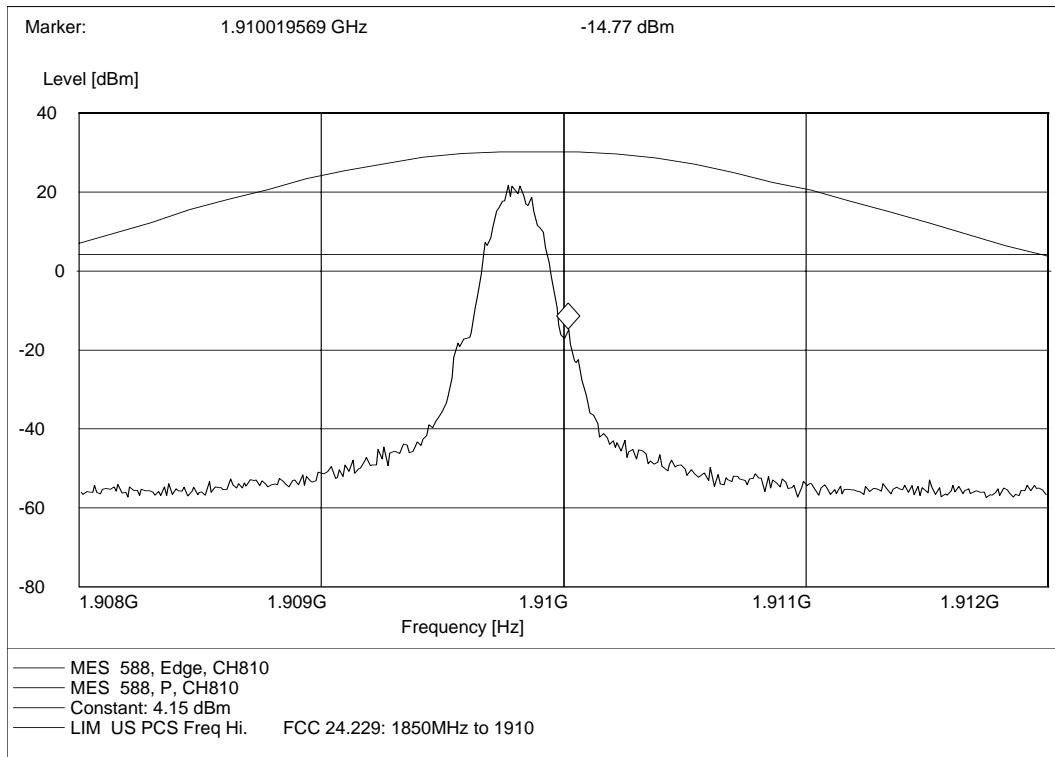
No.	Frequency (MHz)	Emission Power (dBm)	Limit (dBm)
PCS 1900 MHz: Channel No. 512 (1850.20 MHz)			
1	3700.40	-36.85	-13
2	5550.60	-47.18	-13
3	7400.80	--	-13
4	9251.00	--	-13
5	11101.20	--	-13
6	12951.40	--	-13
7	14801.60	--	-13
8	16651.80	--	-13
9	18502.00	--	-13
PCS 1900 MHz: Channel No. 810 (1909.80 MHz)			
10	3819.60	-38.25	-13
11	5729.40	-46.19	-13
12	7639.20	--	-13
13	9549.00	--	-13
14	11458.80	--	-13
15	13368.60	--	-13
16	15278.40	--	-13
17	17188.20	--	-13
18	19098.00	--	-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

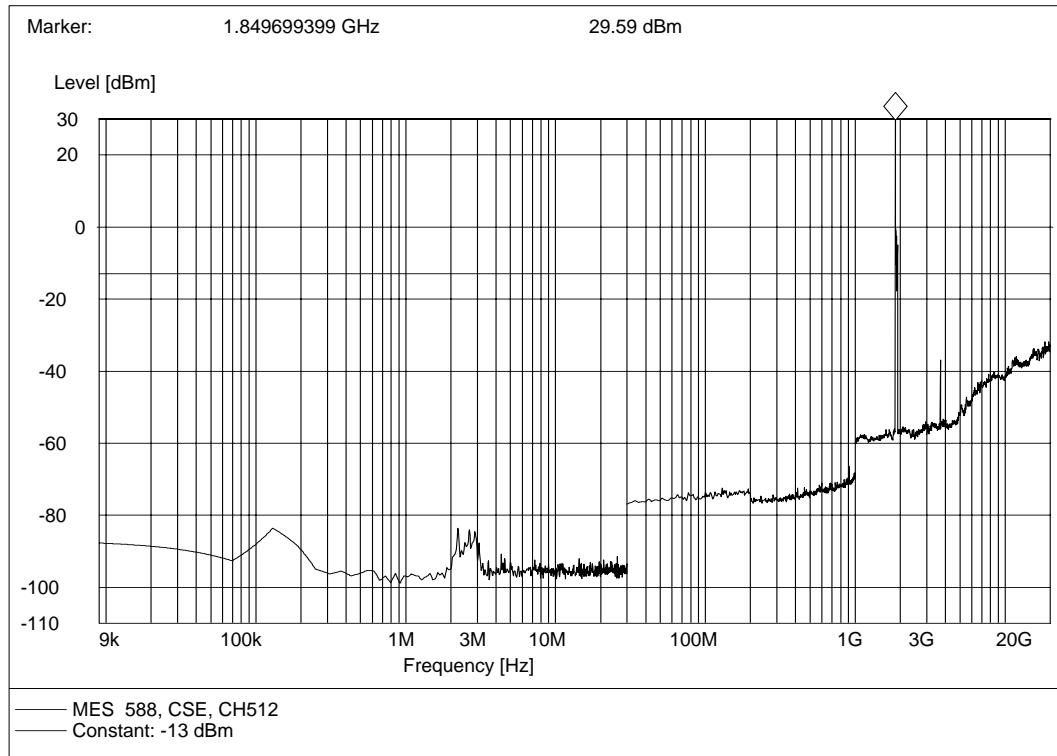
(Note: The 26dB reference trace is the RF output power measurement results in chapter 6.5)

1. Lowest channel No.512**2. Highest channel No.810**

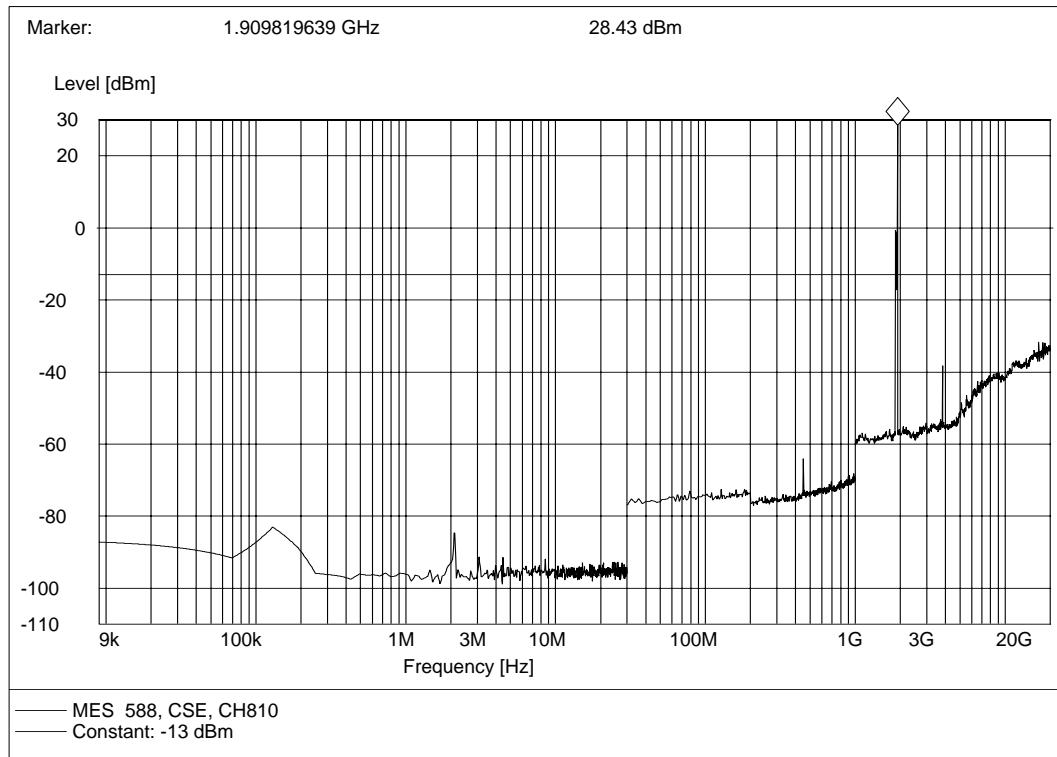
Plot of Spurious Emission

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

1. Lowest channel No.512



2. Highest channel No.810



7 Transmitter Radiated Power (EIRP/ERP) Test

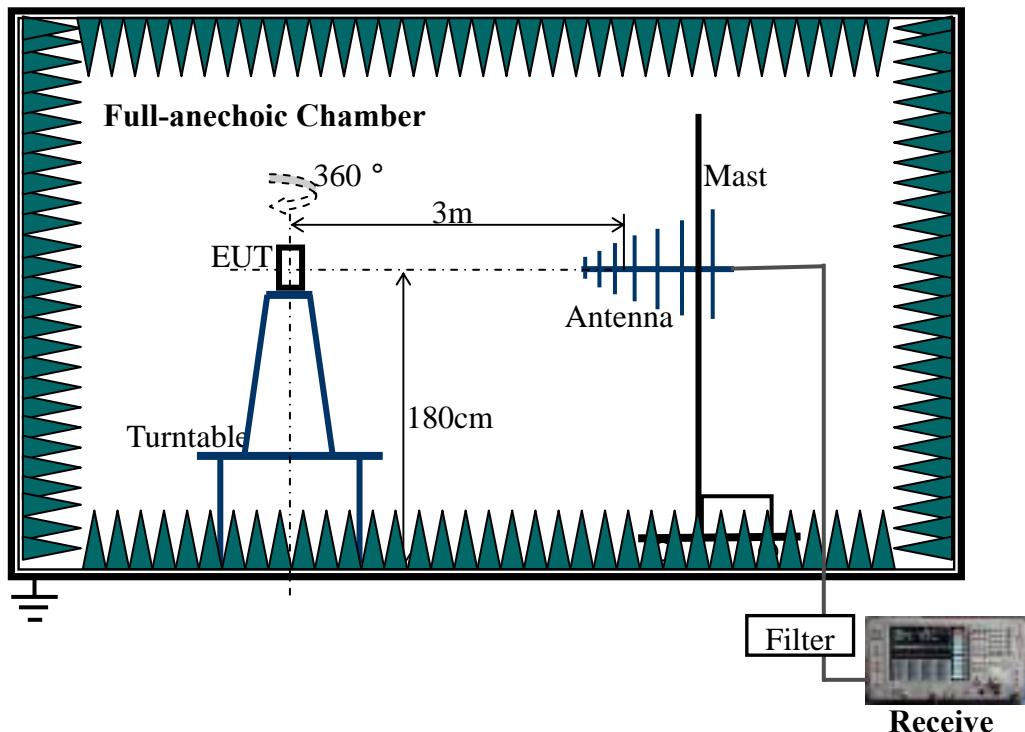
7.1 Limits of EIRP/ERP

According to FCC §24.232, the broadband PCS mobile stations are limited to 2 watts (33dBm) **EIRP** peak power.

7.2 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. See Appendix III for details.
- 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, $VBW=RBW=3MHz$.

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.

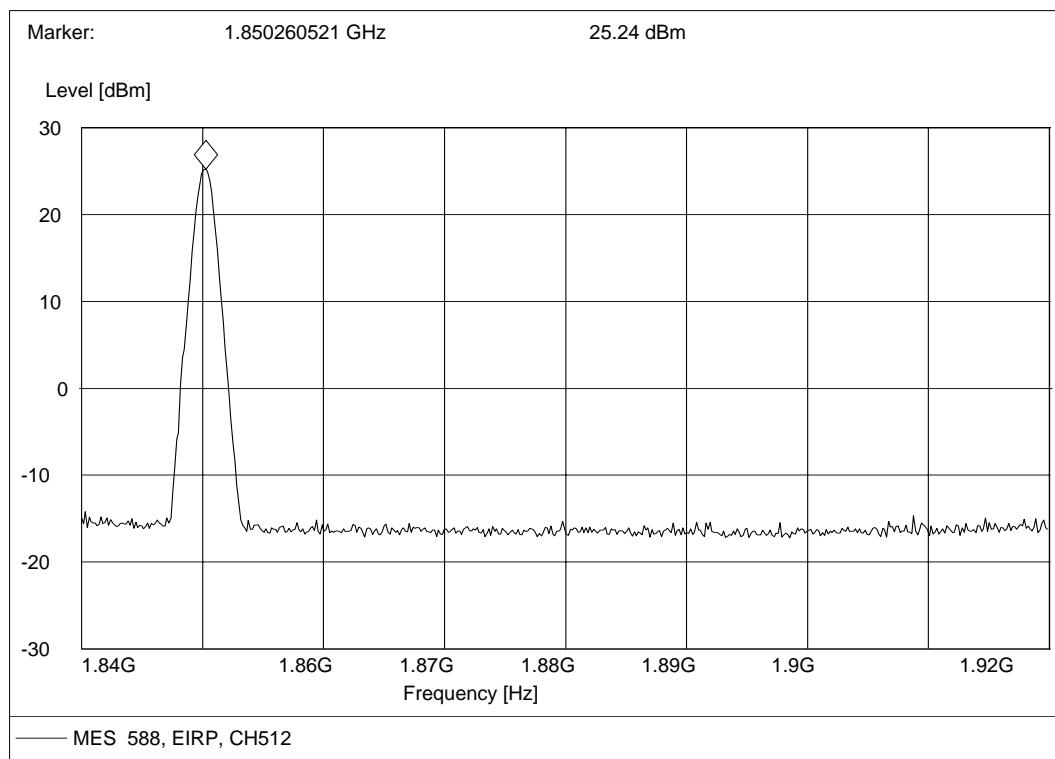
The PCS 1900MHz band channel No.512 (lowest), 661 (middle) and 810 (highest) were measured respectively.

7.5 Test Results

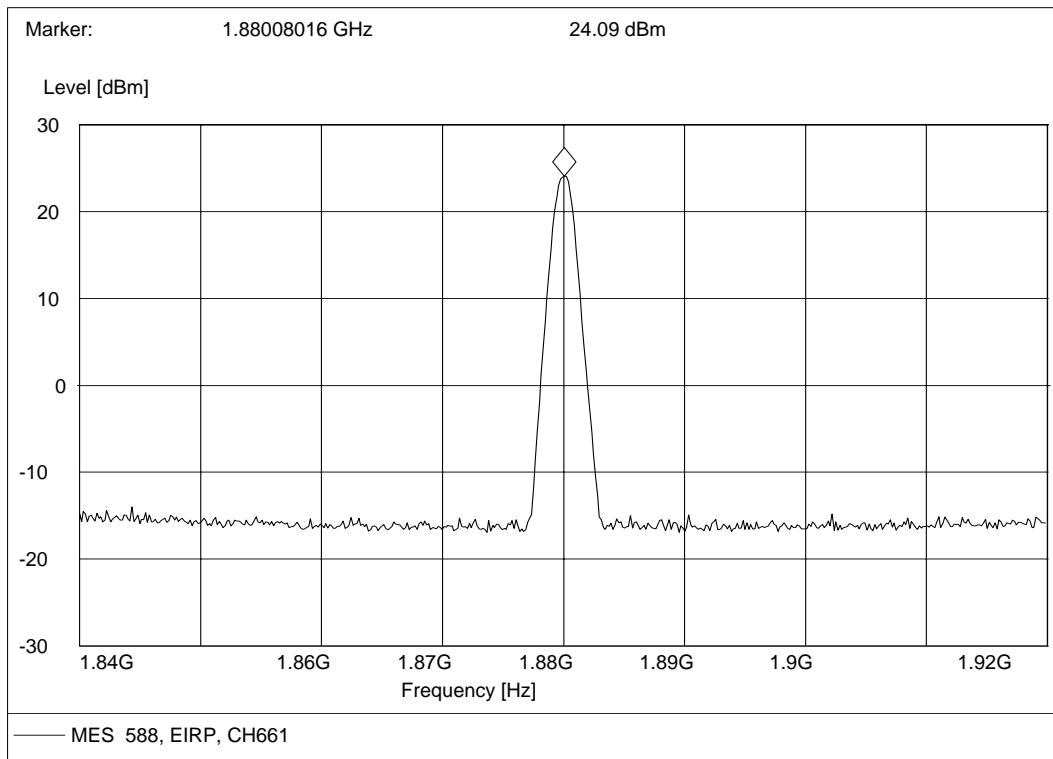
No.	PCS 1900 Channel No.	Frequency (MHz)	EIRP (dBm)	EIRP (W)	Limit EIRP (W)
1	512	1850.20	25.24	0.334	2
2	661	1880.00	24.09	0.256	2
3	810	1909.80	23.78	0.239	2

Test Plots

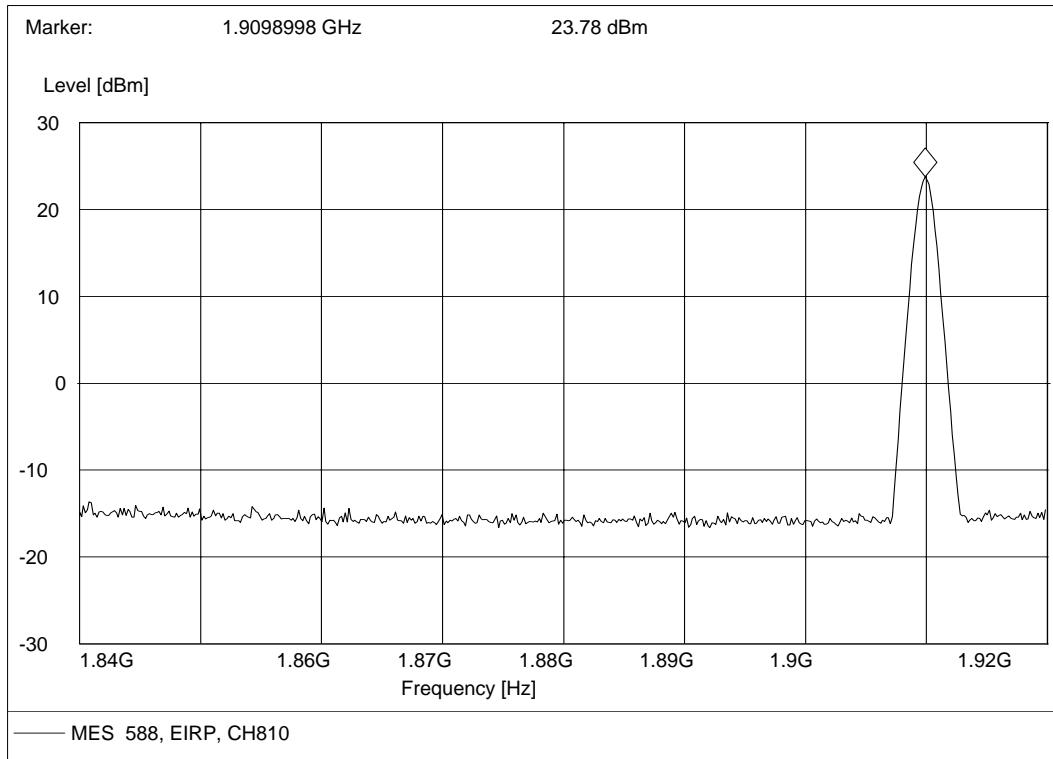
1. Lowest channel No.512



2. Middle channel No.661



3. Highest channel No.810



8 Radiated Spurious Emission Test

8.1 Limits of Radiated Spurious Emission

According to FCC §24.238 (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.

8.2 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. See Appendix III for details.
- 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.
- c. 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.
- d. 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.
- e. 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 3kHz; for CDMA signal, the resolution bandwidth was 30kHz.

8.3 Test Setup

Same as 7.3

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 PCS 1900MHz band channel No.512 (lowest) and 810 (highest) were measured respectively.

8.5 Test Results

No.	Frequency (MHz)	ERP (dBm)	ERP (dBm)	Limit (dBm)
		Antenna: <u>Vertical</u>	Antenna: <u>Horizontal</u>	
PCS 1900 MHz: Channel No. 512 (1850.20 MHz)				
1	3700.40	-34.50	-34.87	-13
2	5550.60	-43.30	-46.99	-13
3	7400.80	--	--	-13
4	9251.00	--	--	-13
5	11101.20	--	--	-13
6	12951.40	--	--	-13
7	14801.60	--	--	-13
8	16651.80	--	--	-13
9	18502.00	--	--	-13
PCS 1900 MHz: Channel No. 810 (1909.80 MHz)				
10	3819.60	-35.06	-39.74	-13
11	5729.40	-43.01	-4.45	-13
12	7639.20	--	--	-13
13	9549.00	--	--	-13
14	11458.80	--	--	-13
15	13368.60	--	--	-13
16	15278.40	--	--	-13
17	17188.20	--	--	-13
18	19098.00	--	--	-13

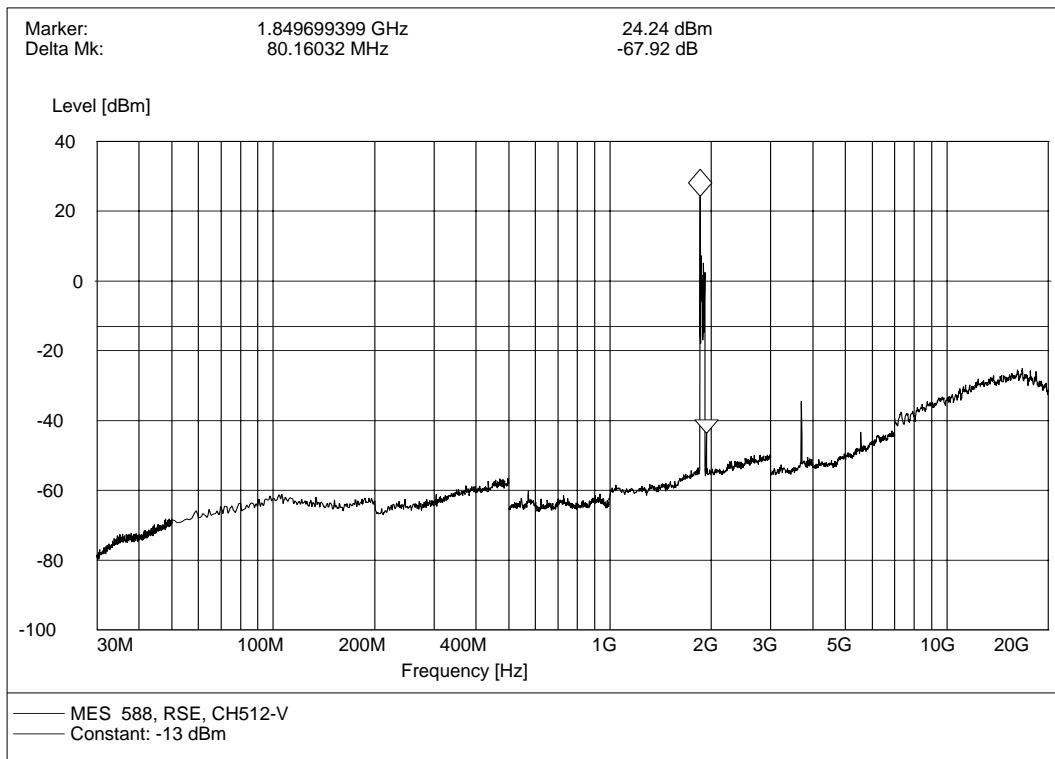
NOTE:

1. V and H are the antenna polarizations: Vertical and Horizontal.
2. The spurious radiations from 30 MHz 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.

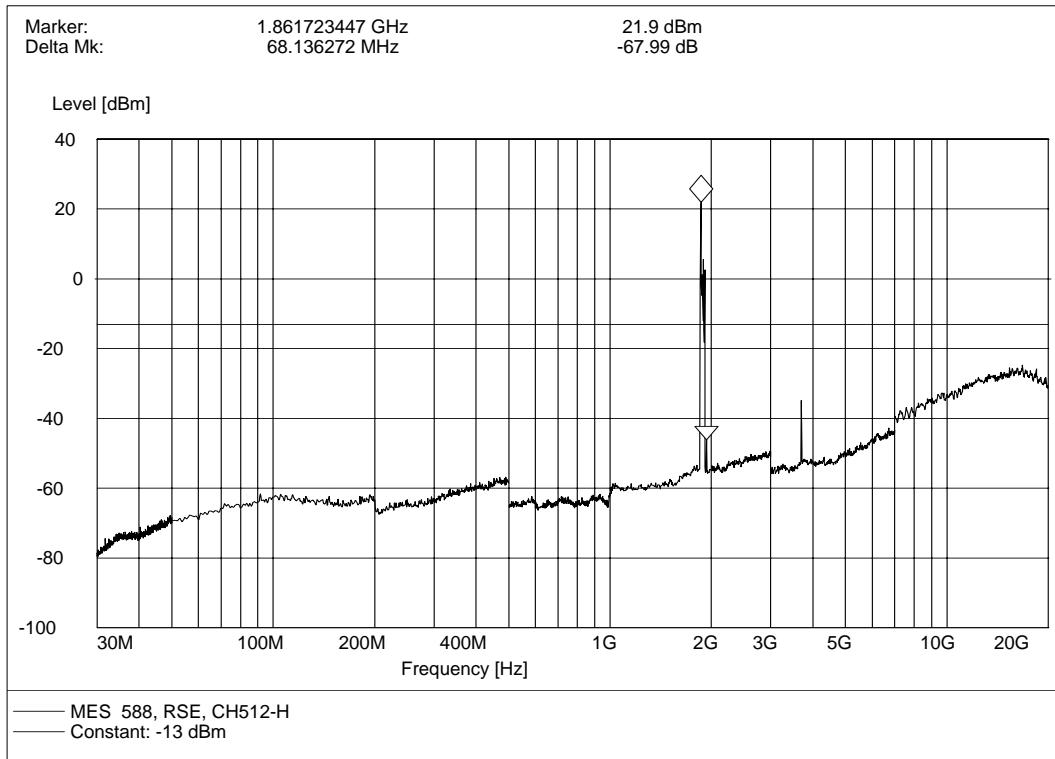
Plot of Spurious Emission

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

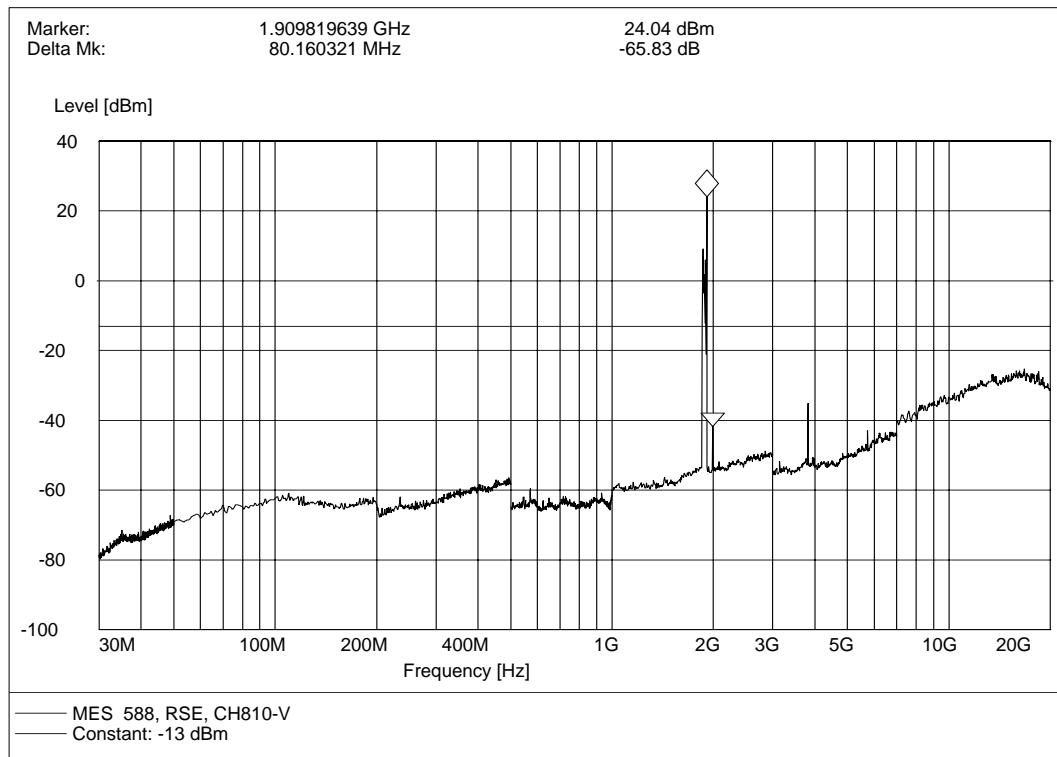
1. Lowest channel No.512, antenna vertical



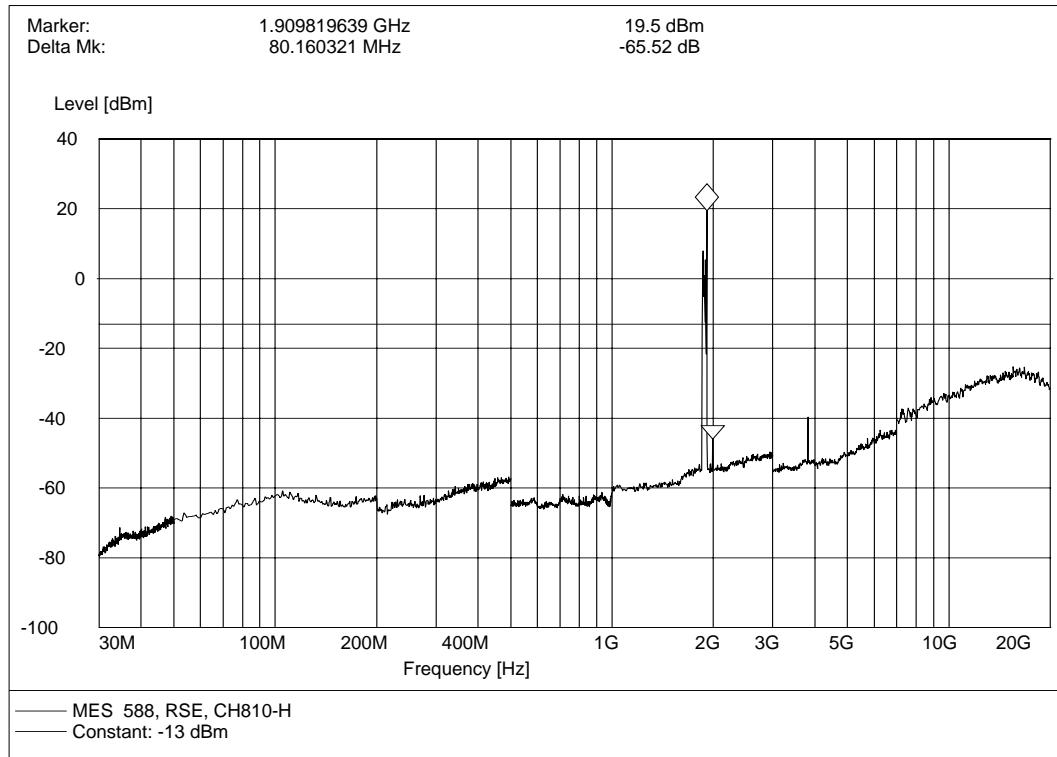
2. Lowest channel No.512, antenna horizontal



3. Highest channel No.810, antenna vertical



4. Highest channel No.810, antenna horizontal



9 Frequency Stability Test

9.1 Requirement of Frequency Stability

According to FCC §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

The frequency stability of the transmitter shall be maintained within $\pm 0.1\text{ppm}$.

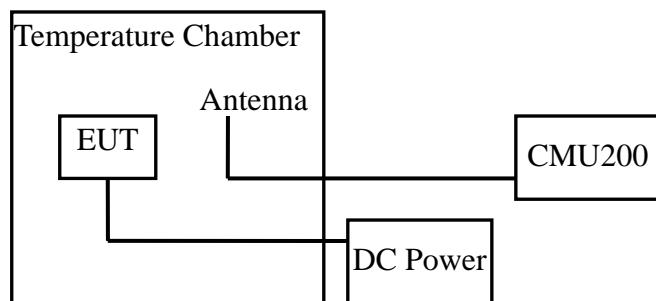
According to FCC §2.1055, the test conditions are:

- **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 manufacturer. 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.

9.2 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.

9.3 Test Setup



9.4 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 PCS 1900 channel No.512 (lowest), 661 (middle), and 810 (highest) were measured respectively.

9.5 Test Results

No.	Test Conditions		Frequency Deviation (Hz)			Limit ($\pm 0.1\text{ppm}$)
	Volatage	Temperature ($^{\circ}\text{C}$)	512CH	661CH	810CH	
1	3.7V (V_{nom})	-30	+12	-12	-10	512CH, $\pm 185\text{Hz}$ 661CH, $\pm 188\text{Hz}$ 810CH, $\pm 191\text{Hz}$
2		-20	+17	-3	-14	
3		-10	-12	-3	-6	
4		0	+9	-5	-7	
5		+10	+17	-11	0	
6		+20	-9	+3	-21	
7		+30	+11	-20	+3	
8		+40	0	-3	-19	
9		+50	+11	+10	+8	
10	4.2V (V_{max})	+22	-16	-21	+9	
11	3.4V (V_{min})	+22	-10	-15	+1	

Appendix I : Photographs of the EUT

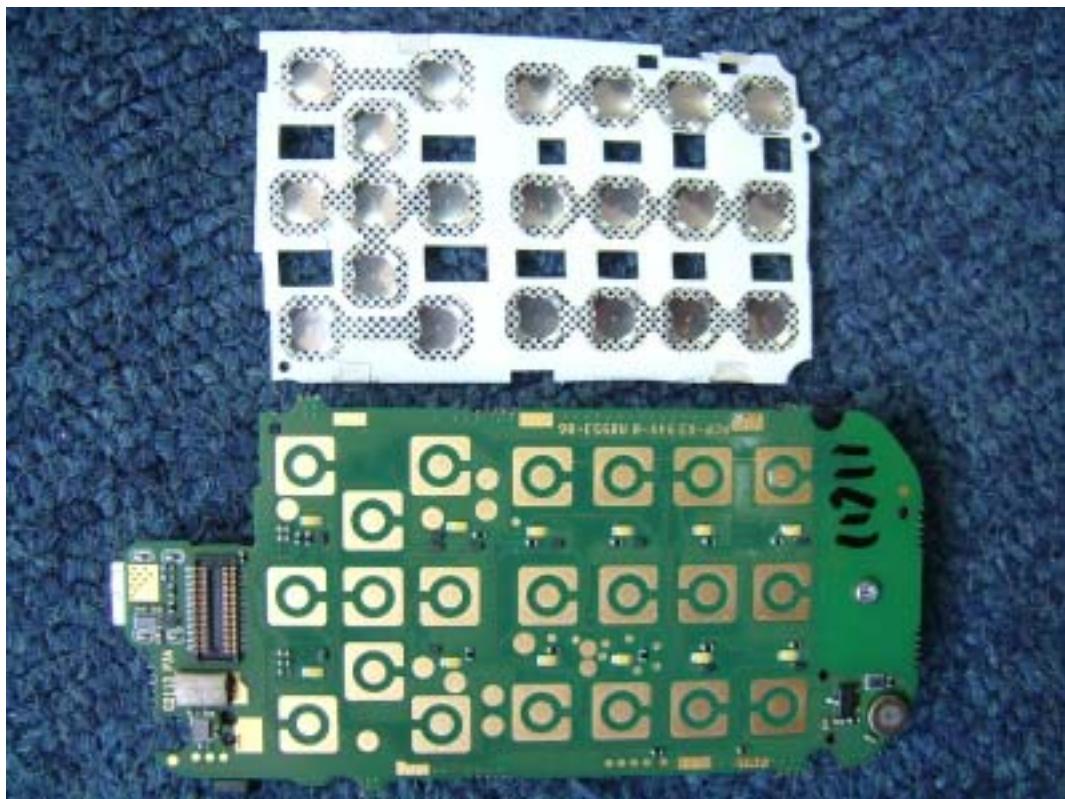
1. Appearance of the MS

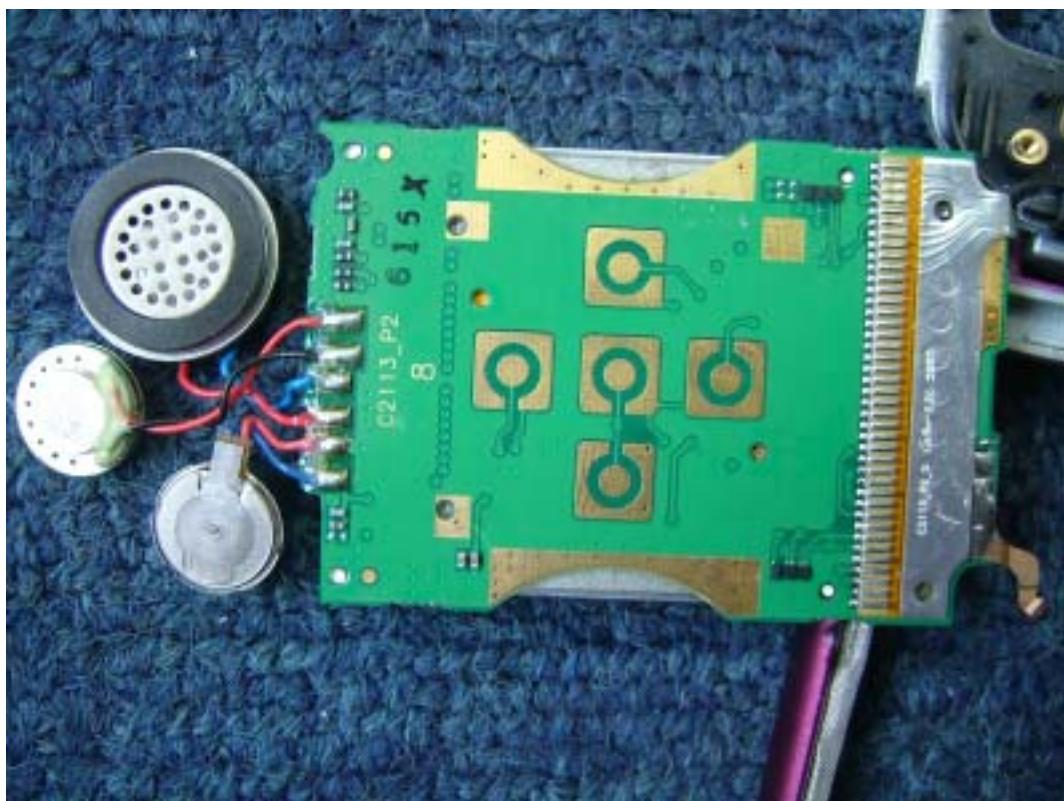


2. Inside of the MS







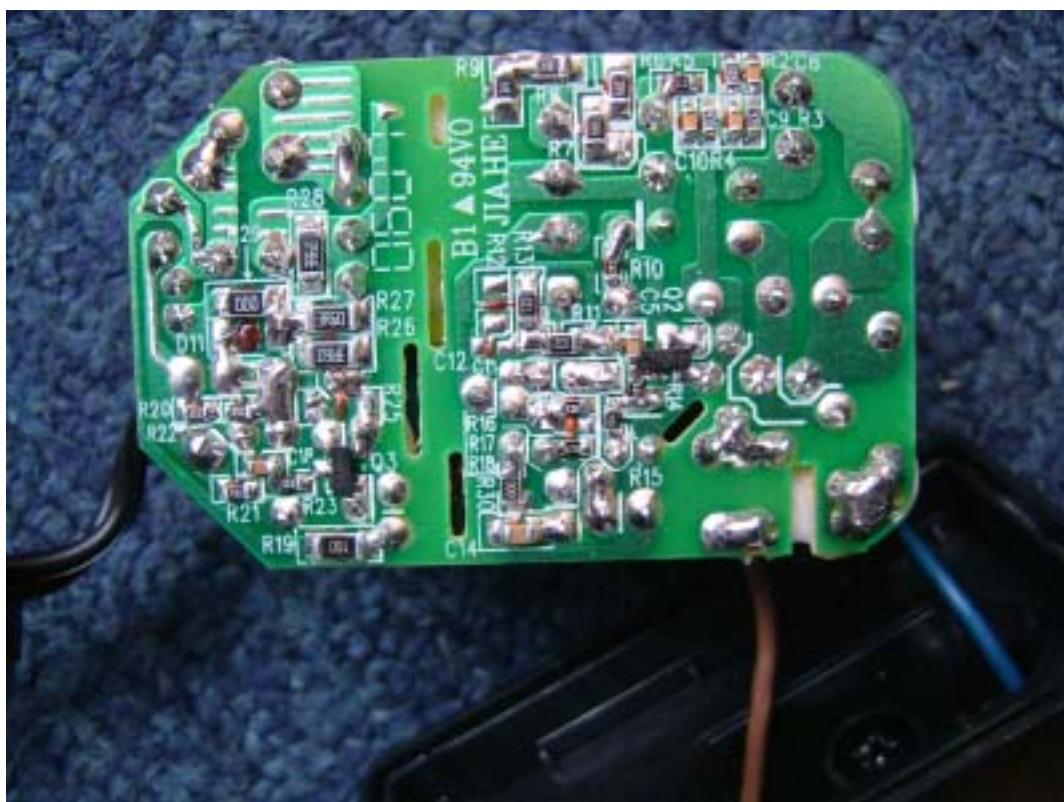




3. Appearance of the Charger



4. Inside of the Charger



Appendix II : Photographs of the Test Configuration

1. Conducted RF Test



2. Radiated RF Test



Appendix III : Calibration for Radiated Power Measurement

TIA/EIA 603-B prescribes the “substitution method” for the measurement of radiated power (transmitter emission: EIRP/ERP; unwanted emission: radiated spurious). Measurement method in this report is according to ETSI standard. It’s also a “substitution method”, but the procedure was slightly different from the FCC standard.

The measurement is performed in a full anechoic chamber. Because the floor absorbers reject floor reflections, the receiving antenna height need not be change and shall be at the same height as the test sample (ETSI TS 151 010-1). The EUT is placed on the vertical axis of a turntable 1.8 meters above the ground. The receiving antenna is also at 1.8 meters height.

The reading of the test receiver in dBm, corrected by a **Transmission Loss** (TL), reflects the radiated power ERP/EIRP of the EUT:

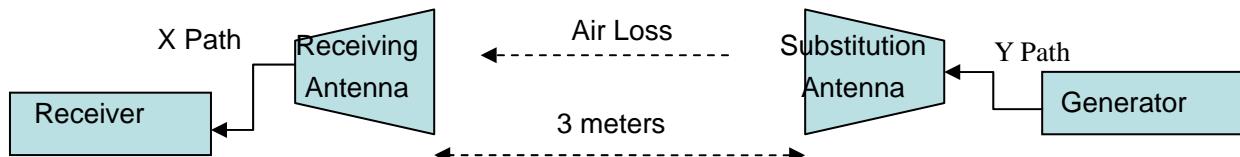
$$P_{EUT} (\text{ERP, dBm}) = P_{\text{Reading}} (\text{dBm}) + TL (\text{dB})$$

$$P_{EUT} (\text{EIRP, dBm}) = P_{EUT} (\text{ERP, dBm}) + 2.15 (\text{dB})$$

The **Transmission Loss** includes the receiving antenna Gain, Cable Loss (CL) between the receiving antenna and the test receiver, Air Loss (AL) between the EUT and the receiving antenna:

$$\text{Transmission Loss (dB)} = G_{\text{Rev. Ant.}} (\text{dBd}) + CL_x (\text{dB}) + AL (\text{dB})$$

Because of a full anechoic chamber and a fixed distance between the EUT and the receiving antenna, the Air Loss is fixed. So the Transmission Loss can be calibrated before a measurement. The setup is as below.



A substitution antenna with known gain relative to an ideal half-wave dipole antenna is put on the sample position of the EUT. The cable loss between the signal generator and the substitution antenna is also known. Then the transmitting power (ERP) of the substitution antenna is:

$$P_{\text{Sub. Ant.}} (\text{ERP, dBm}) = P_{\text{generator}} (\text{dBm}) + CL_y (\text{dB}) + G_{\text{Sub. Ant.}} (\text{dBd})$$

The Transmission Loss is the difference between the ERP of substitution antenna and the reading of receiver.

$$TL (\text{dB}) = P_{\text{Sub. Ant.}} (\text{ERP, dBm}) - P_{\text{Reading}} (\text{dBm})$$

The Transmission Loss of the whole frequency range is thus pre-calibrated and stored in the test system. When scanning the EUT, the test system gives the ERP or EIRP value directly.

Note: Since this is an alternative procedure from FCC rules, when the measured value is near to the standard limit or any dispute arises, the procedure in TIA/EIA 603-B should be adopted!