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FCC TEST REPORT

of

PCS Mobile Station

FCC ID: S5D-KMP6J1BD1

Brand Name: NEC

Model No.: N6602

Serial No.: N.A.

Report No.: FCC05-8009

Date: Jun. 22, 2005

Prepared for

Wuhan NEC Mobile Communication Co., Ltd.

2/F No.1 workshop, No.2 Industrial District,
GuanDong Science and Technology Industrial Park, Wuhan, PRC

Prepared by

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1 Test Report Certification

Product: PCS Mobile Station

FCC ID: S5D-KMP6J1BD1

Model No.: N6602

Applicant: Wuhan NEC Mobile Communication Co., Ltd.

Applicant Address: 2/F No.1 workshop, No.2 Industrial District, GuanDong Science and Technology Industrial Park, Wuhan, PRC

Manufacturer: Wuhan NEC Mobile Communication Co., Ltd.

Manufacturer Address: 2/F No.1 workshop, No.2 Industrial District, GuanDong Science and Technology Industrial Park, Wuhan, PRC

Test Standards: 47 CFR Part 2

47 CFR Part 24, Subpart E

47 CFR Part 15, Subpart B & Subpart C

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: Jun. 22, 2005
Lin Xingsun

Checked by: Smart Li, Date: Jun. 22, 2005
Smart Li

Approved by: Wang Keqin, Date: Jun. 23, 2005
Wang Keqin



2 General Information

2.1 Description of EUT

EUT1	
Description:	PCS Mobile Station
Model No.:	N6602
Emission Designator:	200KGXW
Modulation:	GSM
Frequency:	Tx: 1850.20-1909.80MHz; Rx: 1930.20MHz-1989.80MHz
Power:	1W
Serial No.:	N.A.
Hardware Version:	P2
Software Version:	*929#
EUT2	
Description:	Lithium-ion Battery
Model No.:	MAW-BT0002
Serial No.:	B5DAU0106A
Manufacturer:	SANYO Energy (Hong Kong) Co., Ltd. Beijing Rep. Office
Capacitance:	720mAh
Rated Voltage:	3.7V
Charge Limit:	4.2V
EUT3	
Description:	AC Adaptor (Charger)
Model No.:	901.0078
Serial No.:	41277505
Manufacturer:	Friwo Electrical (shenzhen) Co., Ltd.
Rated Input:	a.c. 100-240V, 50/60Hz, 0.2A
Rated Output:	d.c. 5.2V, 550mA
Length DC cable:	180cm

NOTE:

1. The EUT is a model of PCS 1900MHz band GSM Mobile Station. It consists of Hand Telephone Set and normal options: Lithium Battery and Charger, as listed above.
2. 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 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 15 Radio Frequency Devices
- Part 24 Personal Communications Services

Test items and the results are as bellow:

Nº	FCC Rules	Test Type	Result
1	§15.107 §15.207	Conducted Emission	PASS
2	§15.109	Radiated Emission	PASS
3	§2.106 §24.229	Frequencies	PASS
4	§2.1046 §24.232	Equivalent Isotropically Radiated Power (EIRP)	PASS
5	§2.1049	Occupied Bandwidth	PASS
6	§2.1053 §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	Schwarzbeck	FCKL1528	2006.06.10	A0304230
Test Receiver	Rohde & Schwarz	ESIB26	2006.06.10	A0304218
LISN	Schwarzbeck	NSLK8127	2006.06.10	A0304233
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	2007.2.10	0811211
3G Communication Antenna	European Antennas	PSA 75301R/170	2006.04.10	A0304213
Temperature Chamber	JAPAN TABAI	PSL-4G	2006.02.05	A8708056
Regulated DC Power Supply	Jiangbo	JB-305	--	A0412374
Shield Room	Nanbo Tech	Site 3	2006.03.18	A9901141
Shield Room	Nanbo Tech	Site 1	2006.01.17	A0304188
Anechoic Chamber	Albatross	H-249	2006.04.18	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, 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 Registration Number is 261302.

3 Conducted Emission Measurement

3.1 Limits of Conducted Emission

According to FCC §15.107 and §15.207, 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

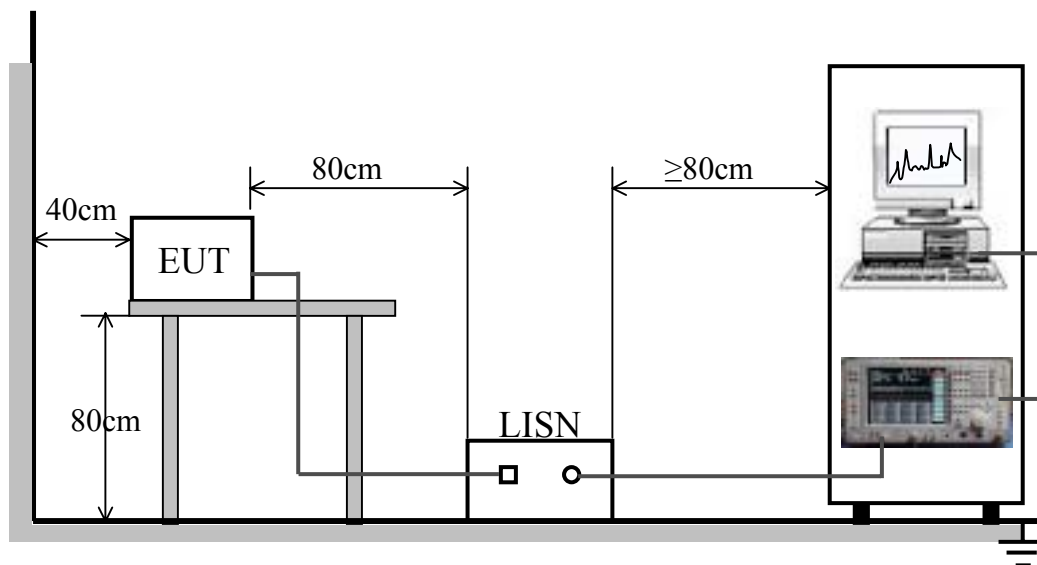
NOTE:

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 configuration of the emission tests was MS + Battery + Charger.

Before the measurement, the battery was completely discharge.

During the measurement, the lithium battery and the charger were installed, and the MS were in charging state. A communication link was established between the MS and a System Simulator (SS). The MS operated at PCS 1900MHz mid ARFCN (661) and maximum output power (level 0).

The charger was powered by 120V 60Hz AC mains supply.

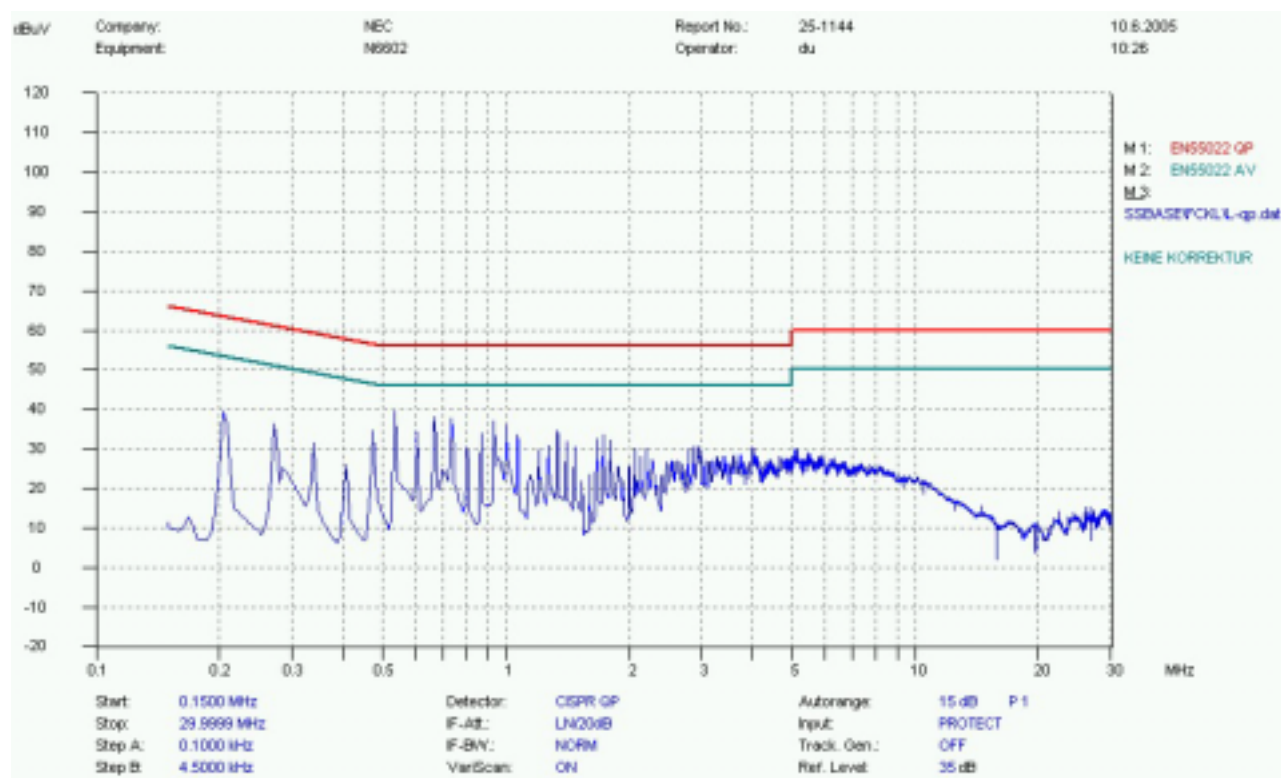
3.5 Test Results

No.	Freq. (MHz)	Limit Value (dB μ V)		Emission Level (dB μ V)	
		QP	AV	QP	AV
1	0.2040	63.4	53.4	39.3	--
2	0.2715	61.1	51.1	36.2	--
3	0.5370	56.0	46.0	39.5	--
4	0.6720	56.0	46.0	38.0	--
5	0.7350	56.0	46.0	37.9	--
6	0.9375	56.0	46.0	36.9	--

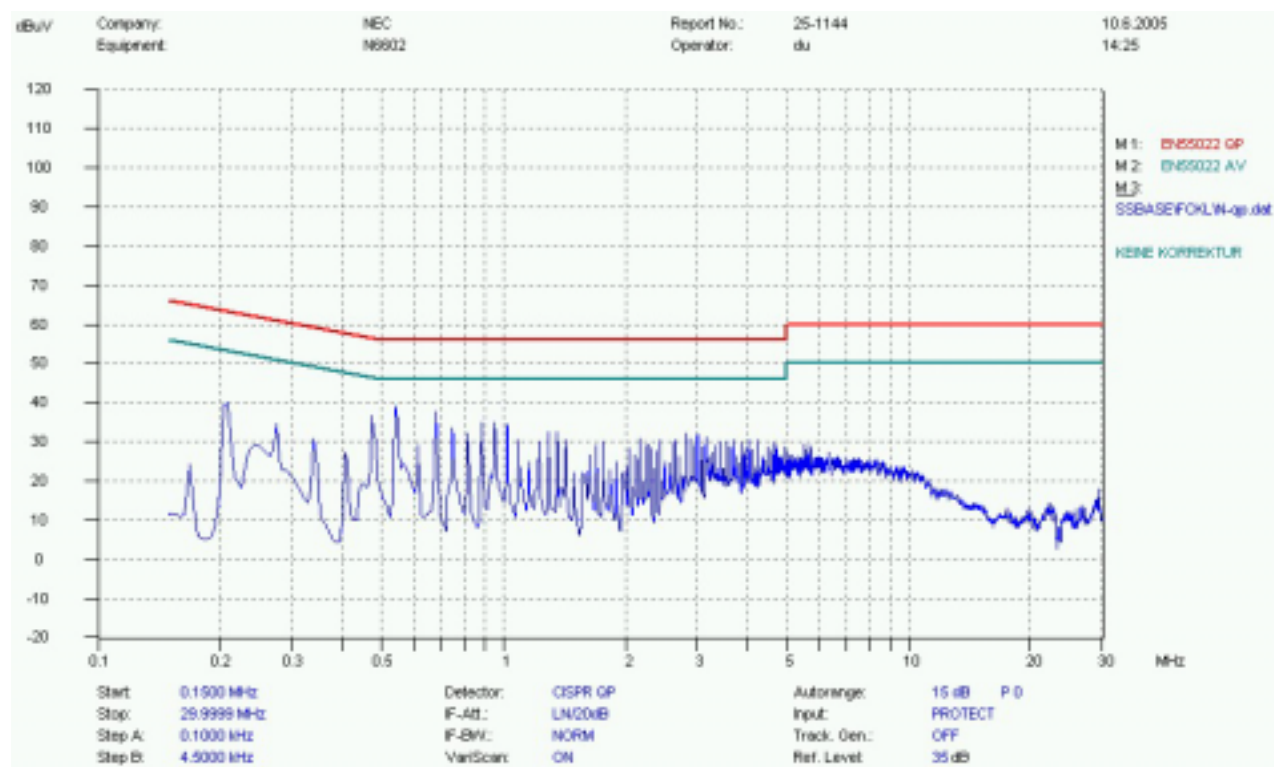
NOTE:

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.

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

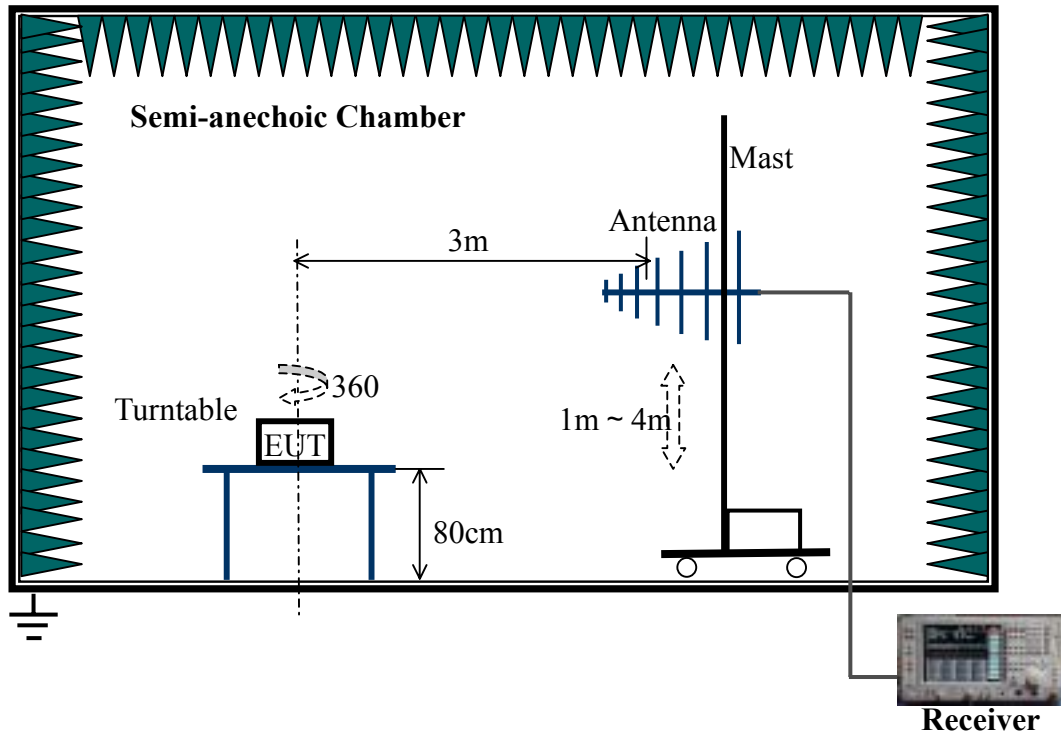
NOTE:

1. Field Strength ($\text{dB}\mu\text{V/m}$) = $20\log$ 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

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

Before the measurement, the lithium battery was completely discharge.

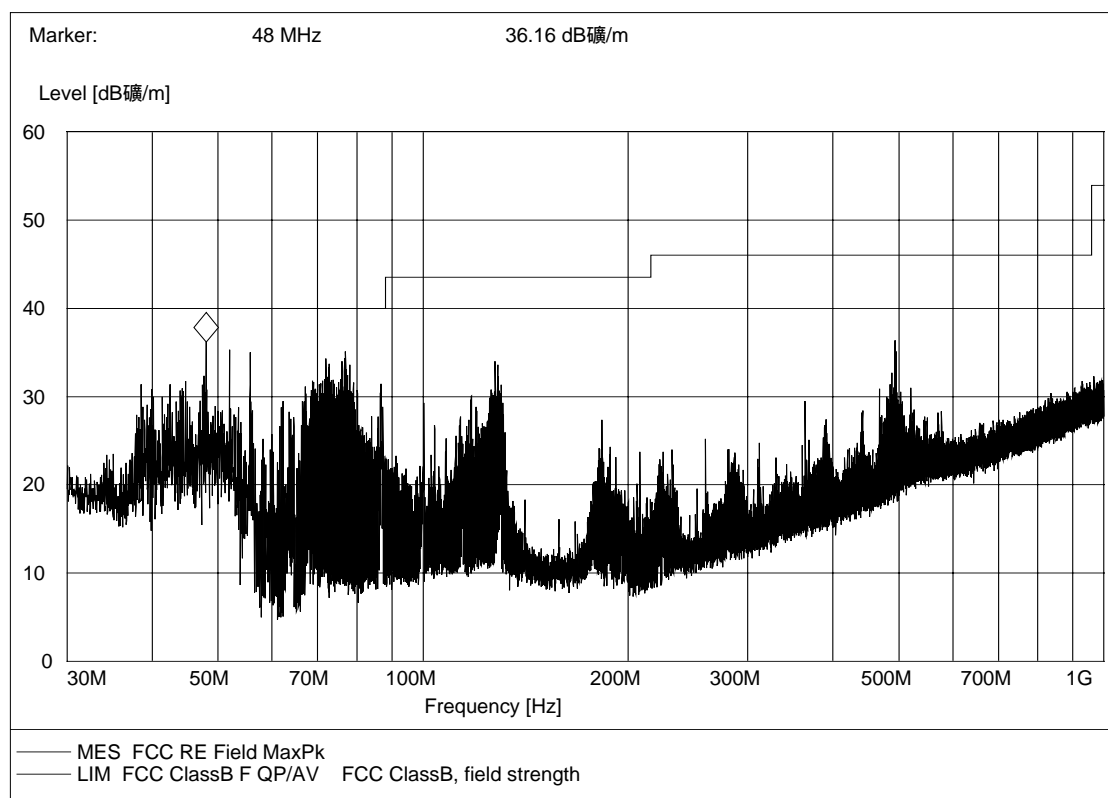
During the measurement, the lithium battery and the charger were installed, and the MS were in charging state. A communication link was established between the MS and a System Simulator (SS). The MS operated at PCS 1900MHz mid ARFCN (661) and maximum output power (level 0).

The charger was powered by 120V 60Hz AC mains supply.

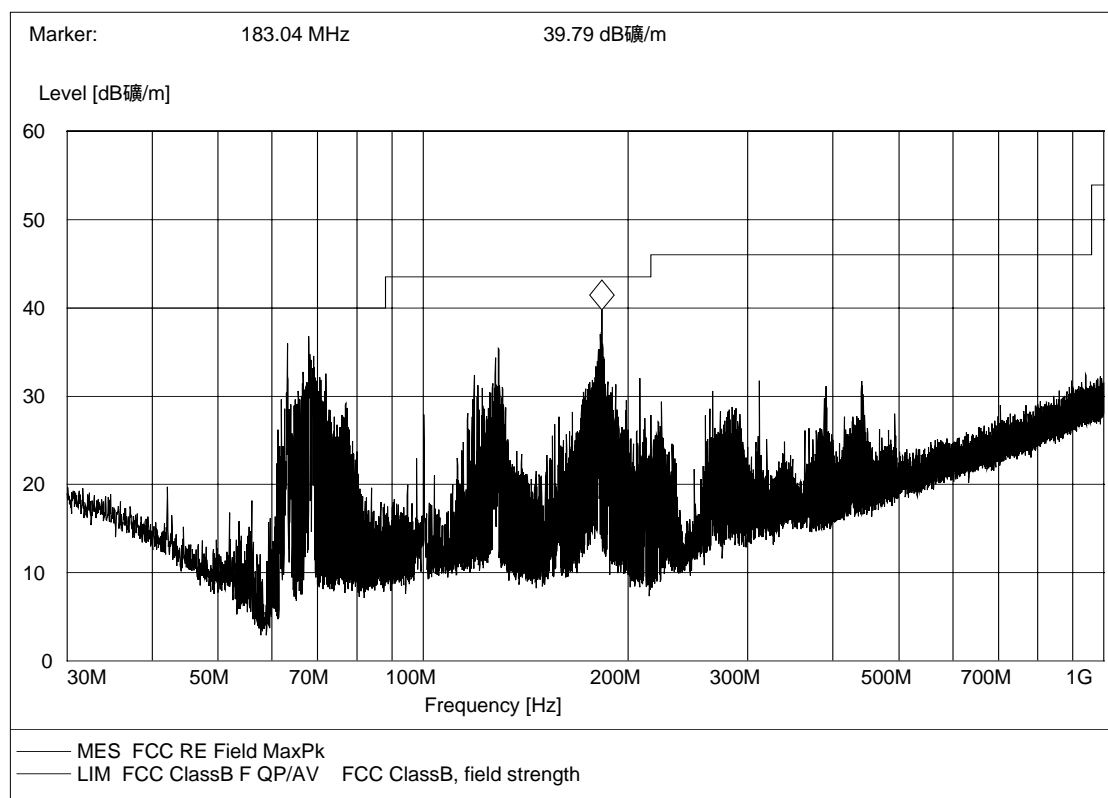
4.5 Test Results

No.	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	QP Limits (dB μ V/m)	Emission Level (dB μ V/m)
1	48.00	Vertical	100	10	40	33.16
2	51.96	Vertical	100	0	40	32.33
3	76.92	Vertical	100	0	40	30.11
4	127.60	Vertical	100	0	43.5	31.02
5	67.88	Horizontal	240	260	40	33.77
6	129.12	Horizontal	250	310	43.5	32.43
7	183.04	Horizontal	250	300	43.5	34.61

1. Radiation disturbances, maxpeak detector, antenna polarization: Vertical



2. Radiation disturbances, maxpeak detector, antenna polarization: Horizontal



5 Frequencies

5.1 Frequency Blocks Available for Broadband PCS

According to FCC §24.229, the frequencies available in the Broadband PCS service are listed as bellow, 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: 1850–1865 MHz paired with 1930–1945 MHz; and

Block B: 1870–1885 MHz paired with 1950–1965 MHz.

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

Block C: 1895–1910 MHz paired with 1975–1990 MHz;

Block D: 1865–1870 MHz paired with 1945–1950 MHz;

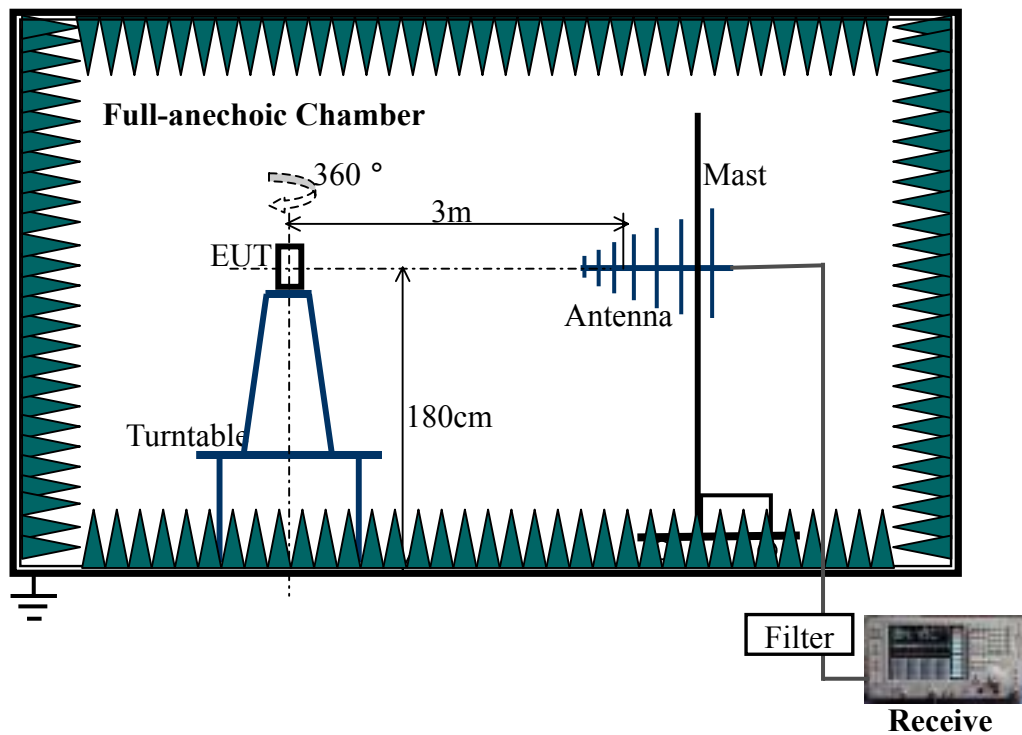
Block E: 1885–1890 MHz paired with 1965–1970 MHz; and

Block F: 1890–1895 MHz paired with 1970–1975 MHz.

5.2 Test Procedure

- a. The frequency measurement was performed in a full anechoic chamber using radiation measurement method. 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.
- c. For the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. For 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.
- d. The spectrum analyzer was set to Maxpeak Detector and Maximum Hold mode. The resolution bandwidth was set to at least 1% of the emission bandwidth. For GSM signal, VBW=RBW=3kHz; for CDMA signal, VBW=RBW=30kHz.

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 (level 0). The PCS 1900 channel No.512 (low) and 810 (high) were measured respectively.

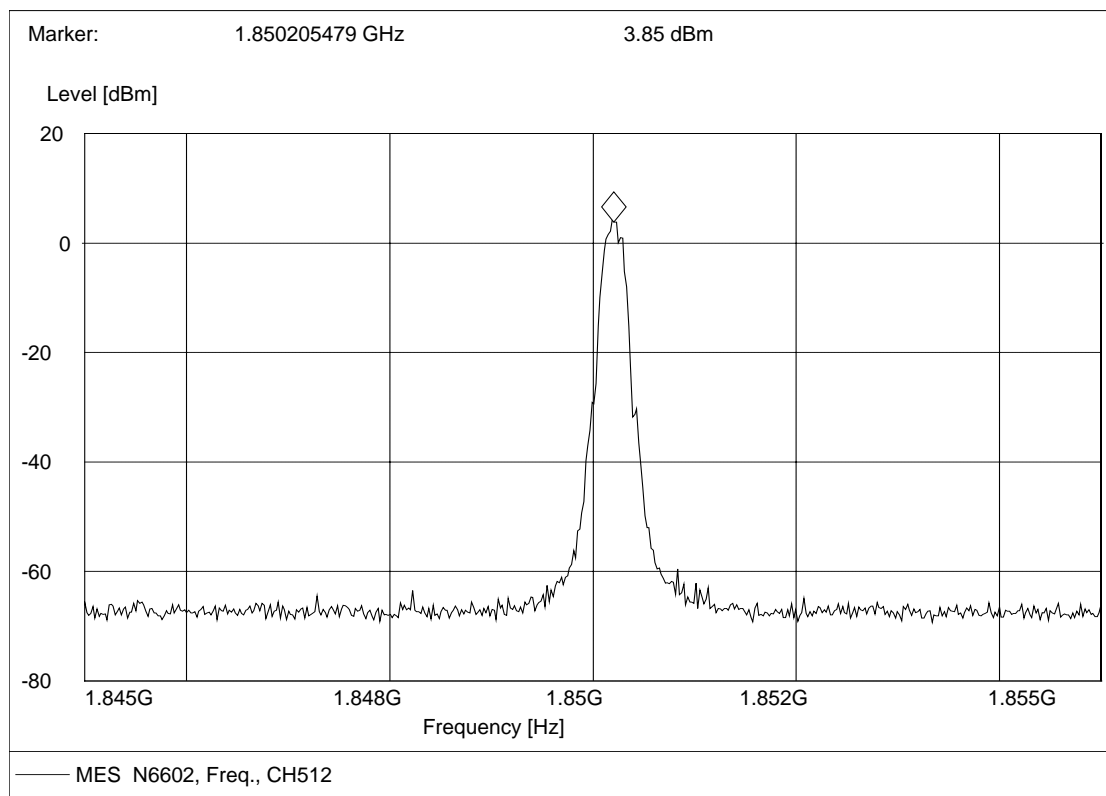
5.5 Test Results

The transmitter frequency arrangement of the PCS1900 band is

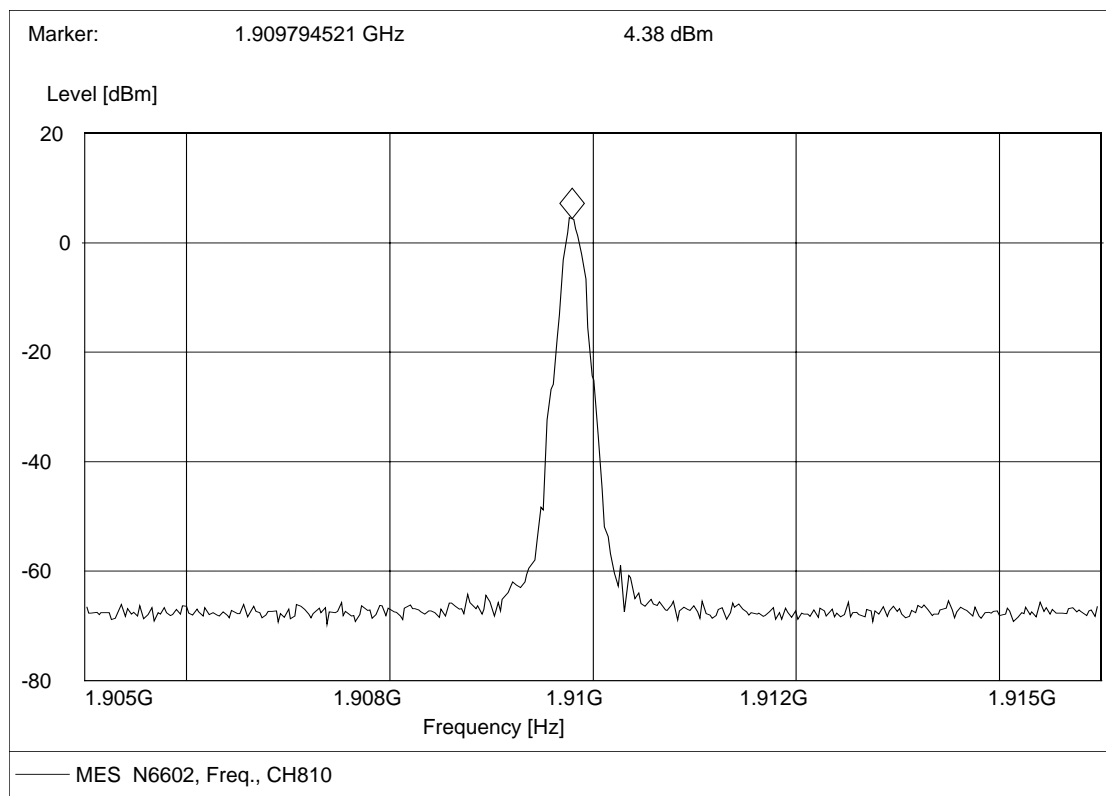
$$f(n) = 1850.2 + 0.2 \cdot (n - 512), \quad 512 \leq n \leq 810$$

The band edges of the lowest channel and the highest channel are as the following plots.

1. Lowest channel No.512



2. Highest channel No.810



6 Equivalent Isotropically Radiated Power (EIRP) Test

6.1 Limits of EIRP

According to FCC §24.232, the broadband PCS mobile stations are limited to 2 watts EIRP peak power.

6.2 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.
- e. 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.

6.3 Test Setup

Same as 5.3

6.4 EUT Setup and Operating Conditions

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

The EUT was in stand-up position.

A communication link was established between the MS and a System Simulator (SS). The MS operated at the maximum output power (level 0). The PCS 1900 channel No.512 (low), 661 (mid), and 810 (high) were measured respectively.

6.5 Test Results

No.	PCS 1900 Channel No.	Frequency (MHz)	EIRP (dBm)	Limit (dBm)
1	512	1850.20	22.73	33
2	661	1880.00	22.65	33
3	810	1909.80	21.00	33

7 Occupied Bandwidth

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. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

7.2 Test Procedure

- a. The occupied bandwidth measurement was performed in a full anechoic chamber using radiation measurement method. The air loss 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.
- c. For the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. For the frequency range above 3 GHz, horn antenna was used. The antenna was at the same height as the EUT. Since 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.
- d. The spectrum analyzer was set to Maxpeak Detector and Maximum Hold mode. The resolution bandwidth was set to at least 1% of the emission bandwidth. For GSM signal, VBW=RBW=3kHz; for CDMA signal, VBW=RBW=30kHz.

7.3 Test Setup

Same as 5.3

7.4 EUT Setup and Operating Conditions

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

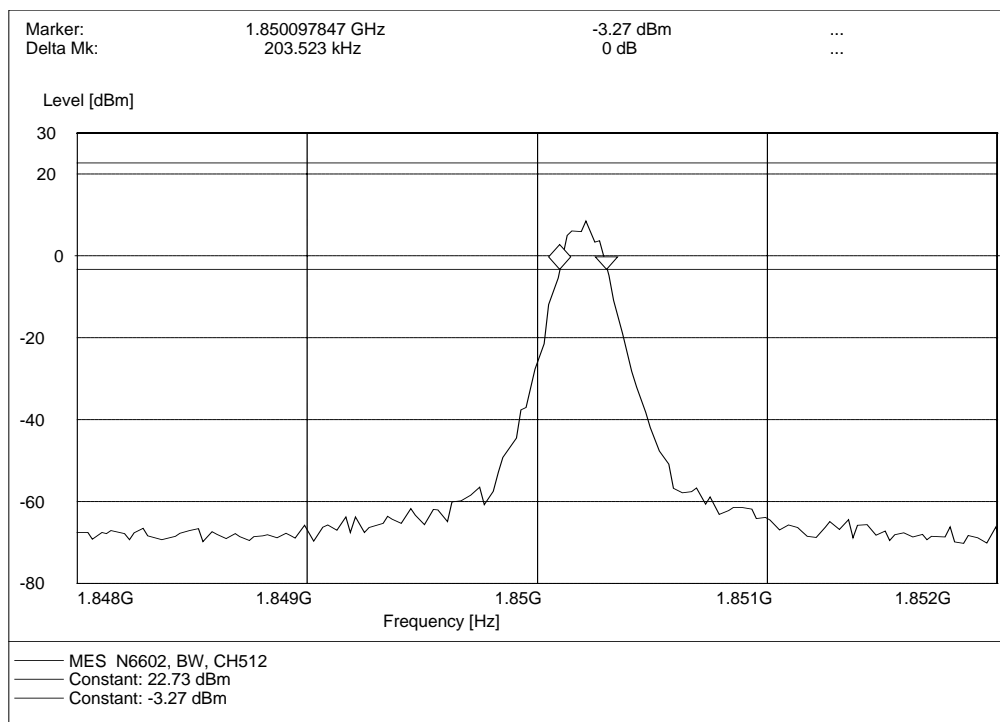
A communication link was established between the MS and a System Simulator (SS). The MS operated at the maximum output power (level 0). The PCS 1900 channel No.512 (low) and 810 (high) were measured respectively.

7.5 Test Results

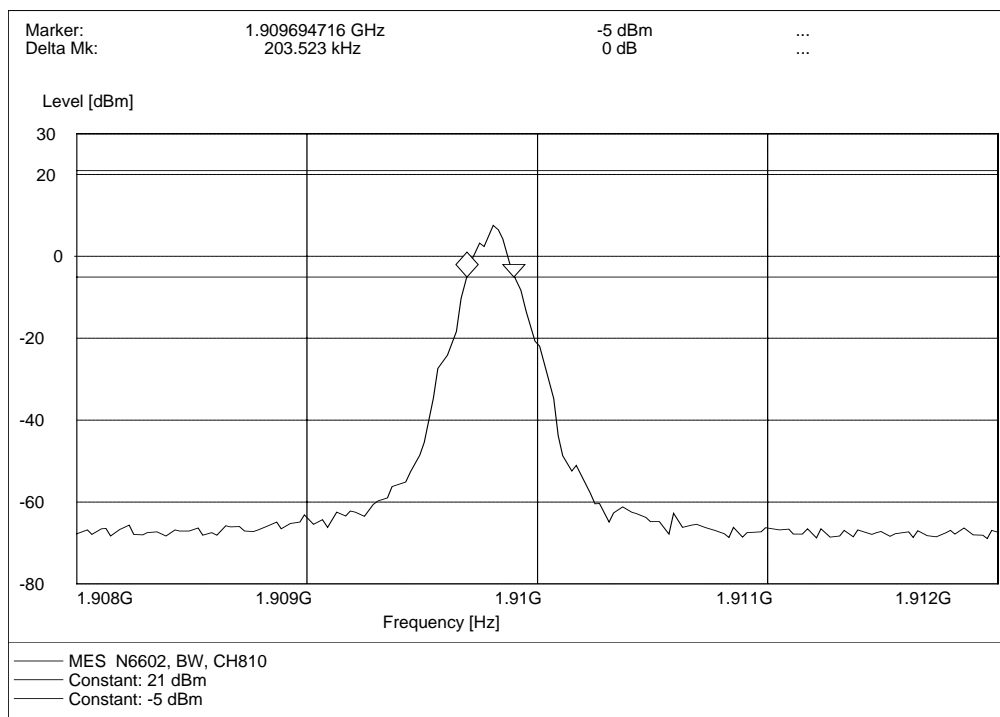
The transmitter occupied bandwidth of the GSM system is 200 kHz.

The measured 26dB emission bandwidths at the lowest and the highest channel are as the following plots.

1. Lowest channel No.512



2. Highest channel No.810



8 Radiated Spurious Emission Test

8.1 Limits of Radiated Spurious Emission

According to FCC §24.238, on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

8.2 Test Procedure

- a. The radiated power measurement was performed in a full anechoic chamber. The air loss 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.
- 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 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 5.3

8.4 EUT Setup and Operating Conditions

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

The EUT was tested in stand-up and lie-on position respectively.

A communication link was established between the MS and a System Simulator (SS). The MS operated at the maximum output power (level 0). The PCS 1900 channel No.512 (low), 661 (mid), and 810 (high) were measured respectively.

8.5 Test Results

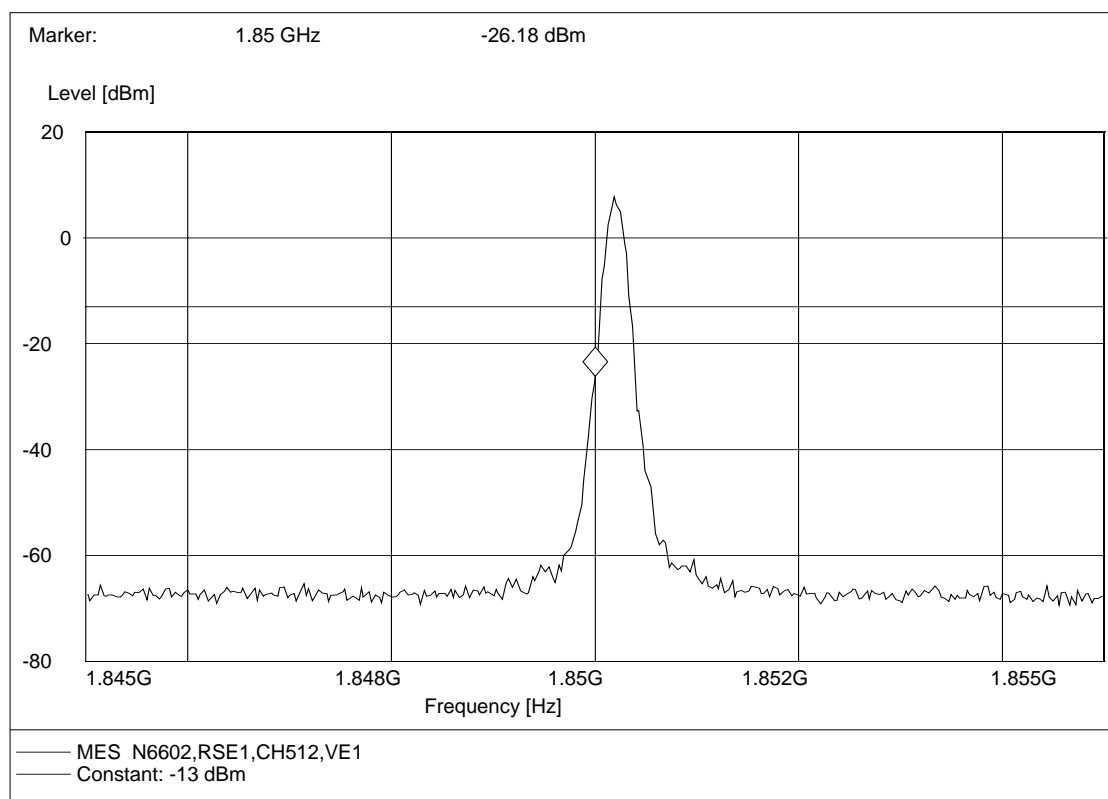
No.	Frequency (MHz)	EIRP (dBm) V – E1	EIRP (dBm) V – E2	EIRP (dBm) H – E1	EIRP (dBm) H – E2	Limit (dBm)
PCS 1900 Channel No. 512 (1850.20 MHz)						
1	3700.40	-43.53	-47.08	-41.48	-49.71	-13
2	5550.60	-39.93	-41.22	-43.55	-41.35	-13
3	7400.80	--	--	--	--	-13
4	9251.00	--	--	--	--	-13
5	11101.20	--	--	--	--	-13
6	12951.40	--	--	--	--	-13
7	14801.60	--	--	--	--	-13
8	16651.80	--	--	--	--	-13
9	18502.00	--	--	--	--	-13
PCS 1900 Channel No. 810 (1909.80 MHz)						
10	3819.60	-39.71	-42.63	-41.62	-42.72	-13
11	5729.40	-42.37	-43.74	-39.59	-41.87	-13
12	7639.20	-32.89	--	-34.87	--	-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:

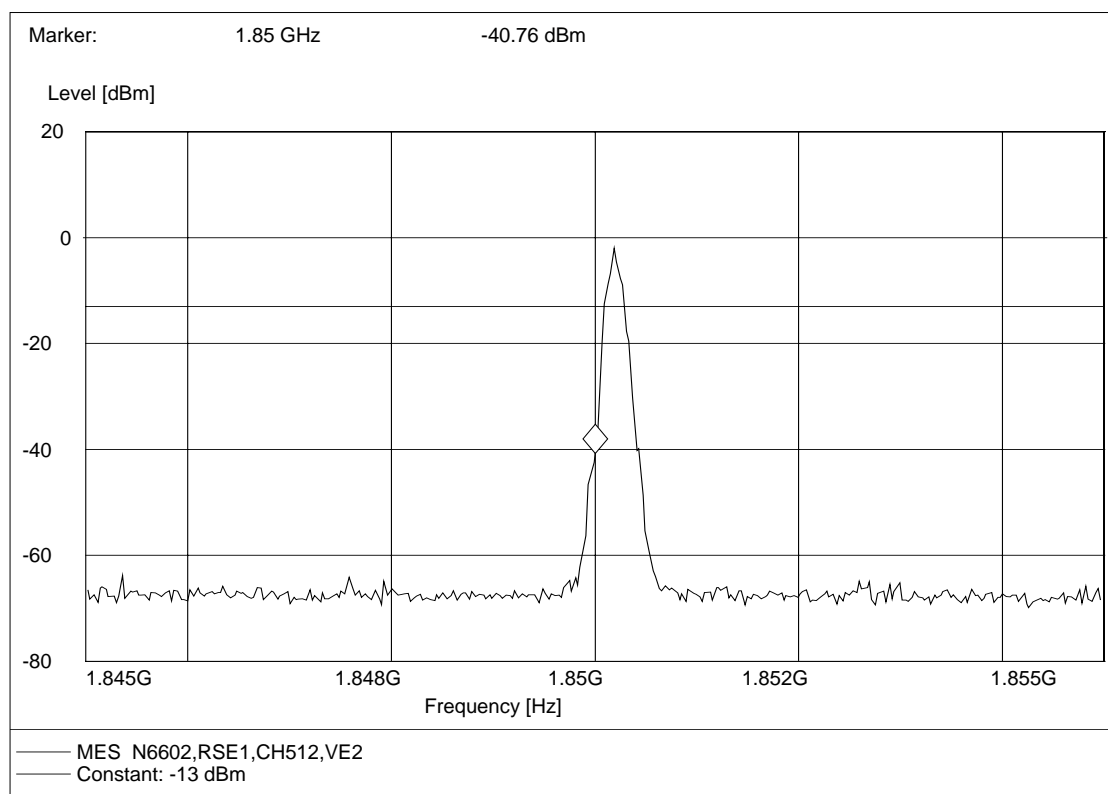
1. V and H are the antenna polarizations: Vertical and Horizontal. E1 and E2 mean the EUT positions: stand-up and lie-on.
2. The spurious radiations from 30 MHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
3. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

Plot of Out-of-Band Emission

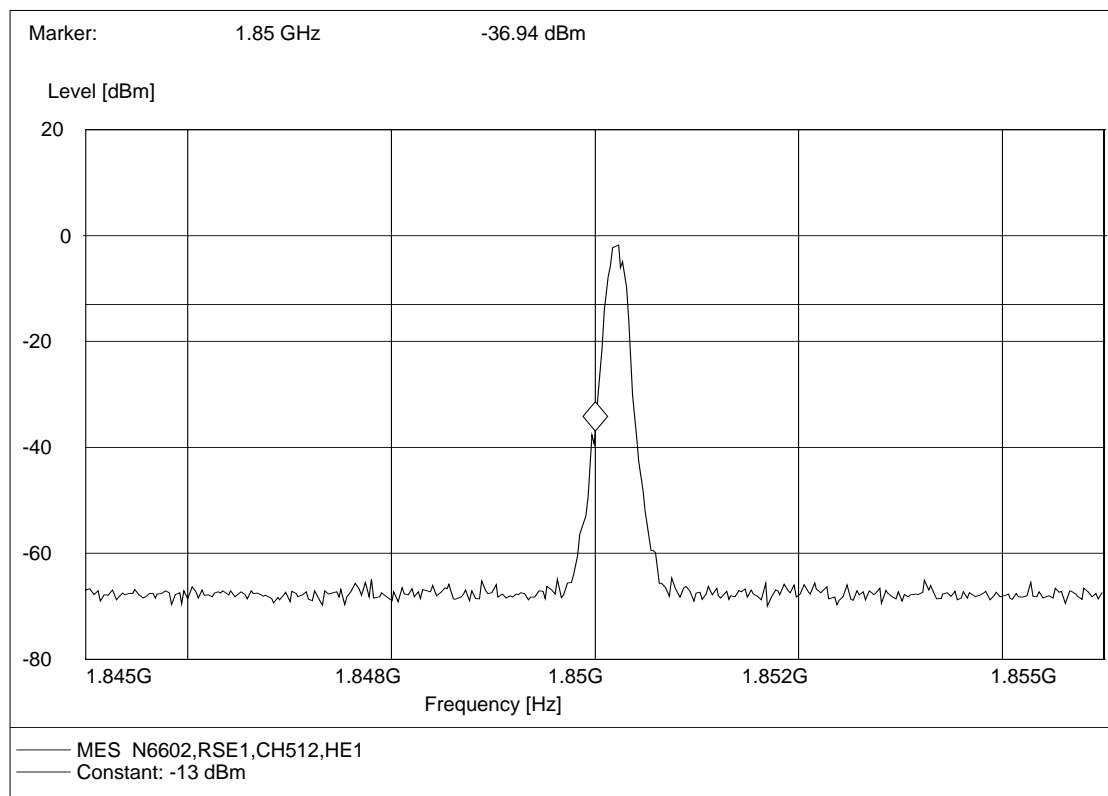
1. Lowest channel No.512, V-E1



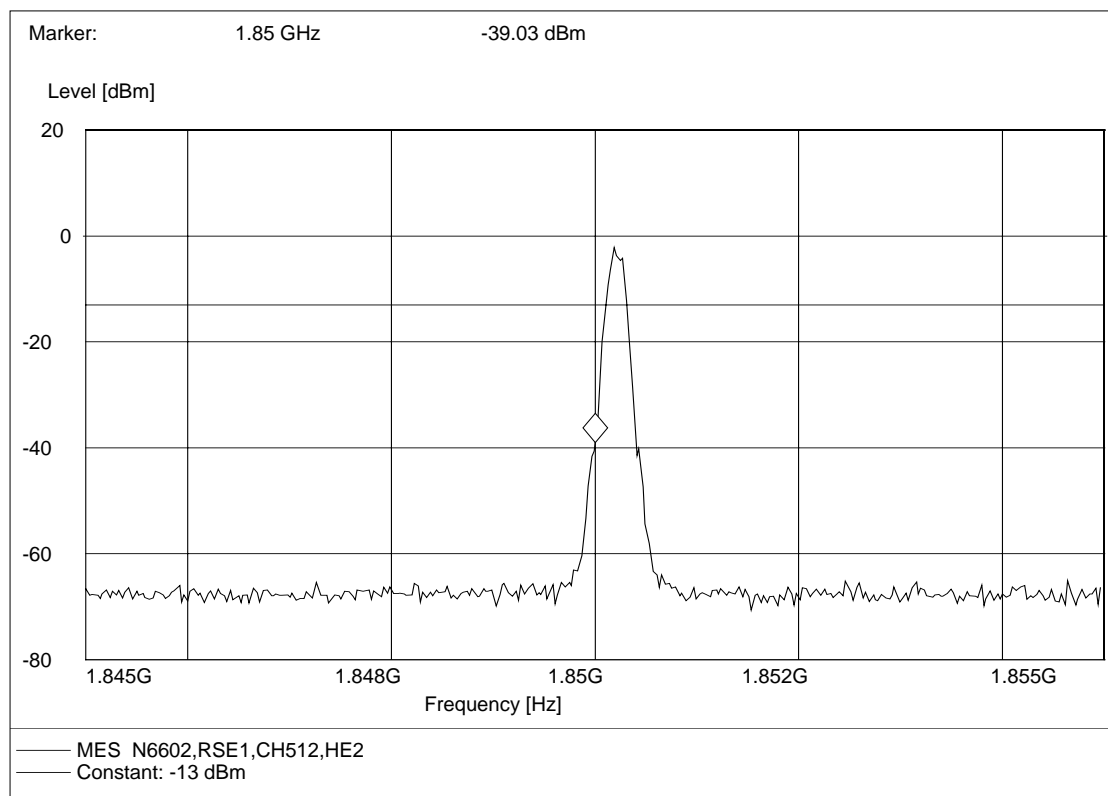
2. Lowest channel No.512, V-E2



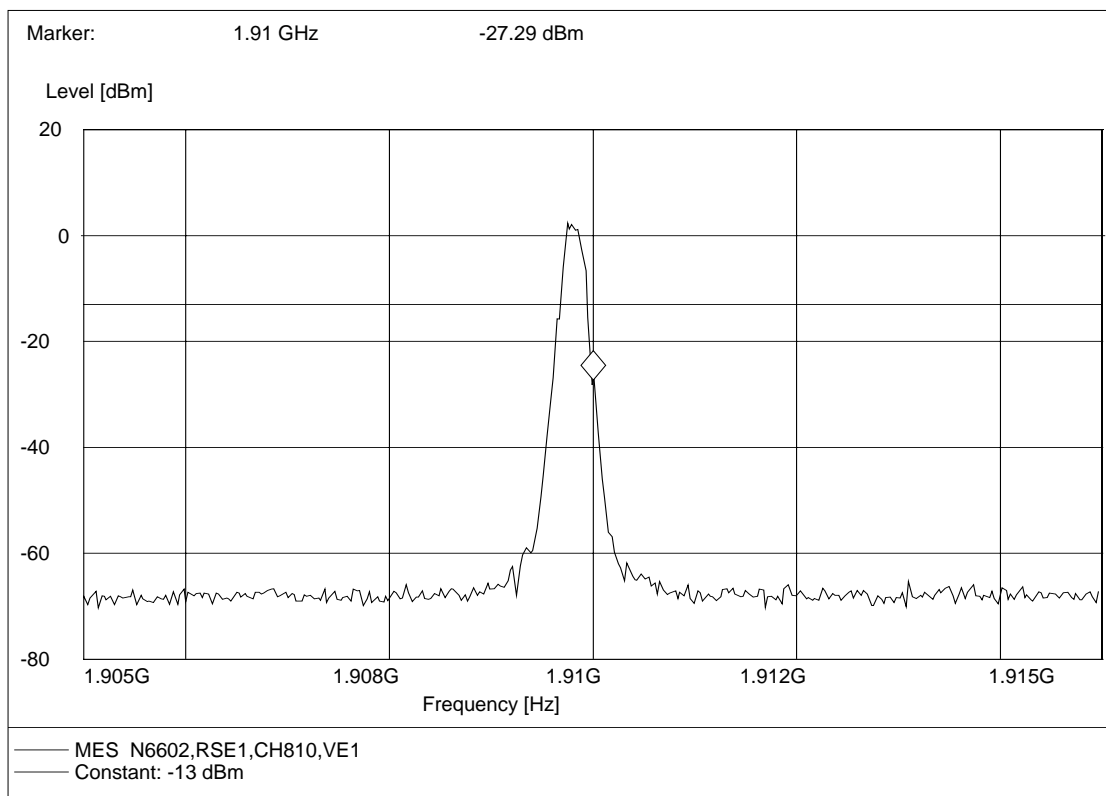
3. Lowest channel No.512, H-E1



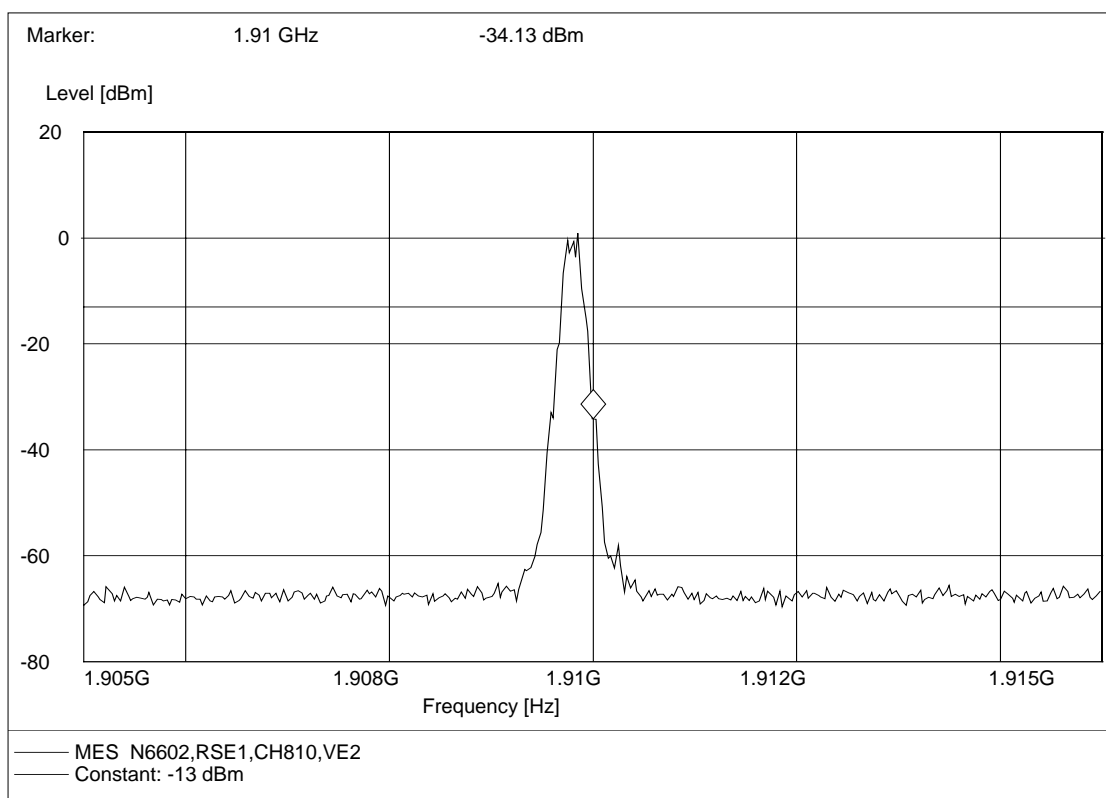
4. Lowest channel No.512, H-E2



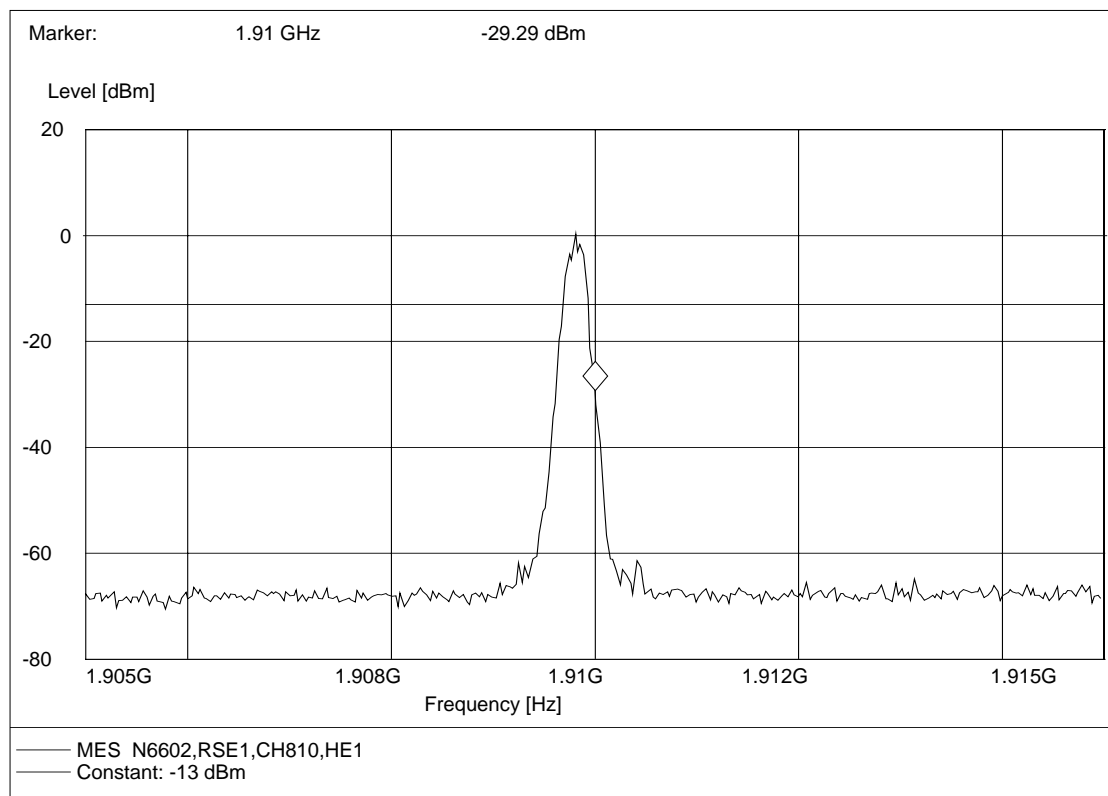
5. Highest channel No.810, V-E1



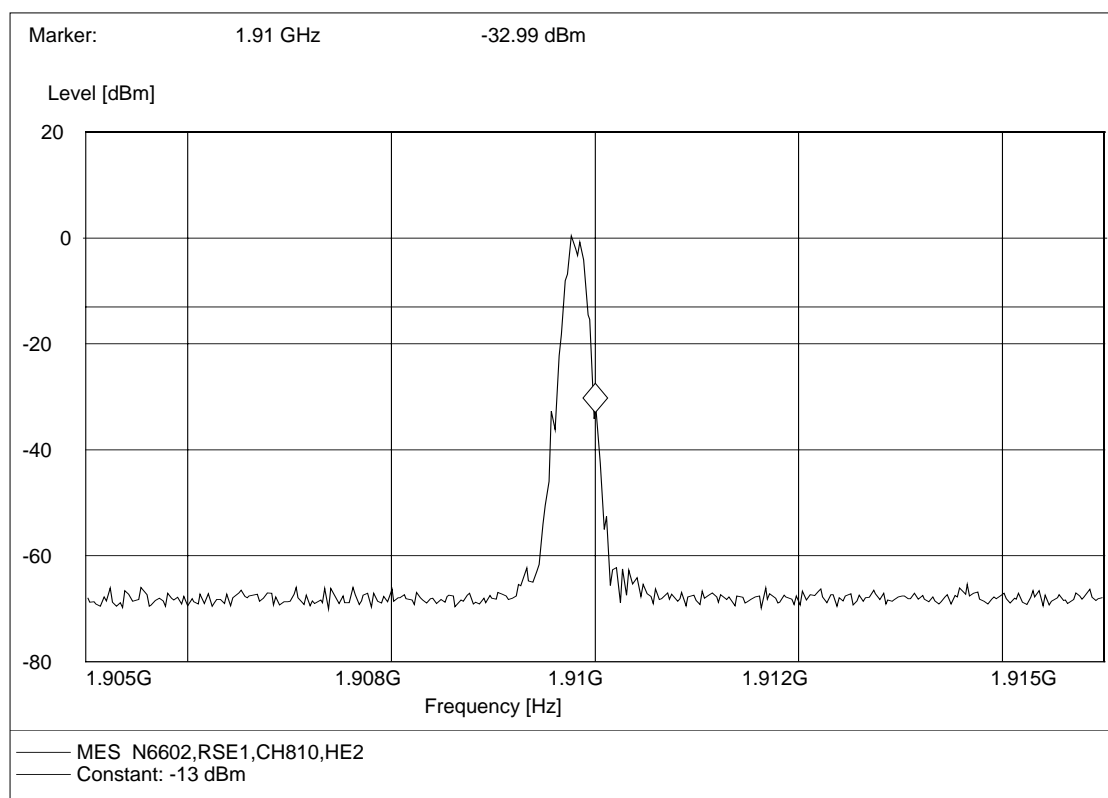
6. Highest channel No.810, V-E2



7. Highest channel No.810, H-E1



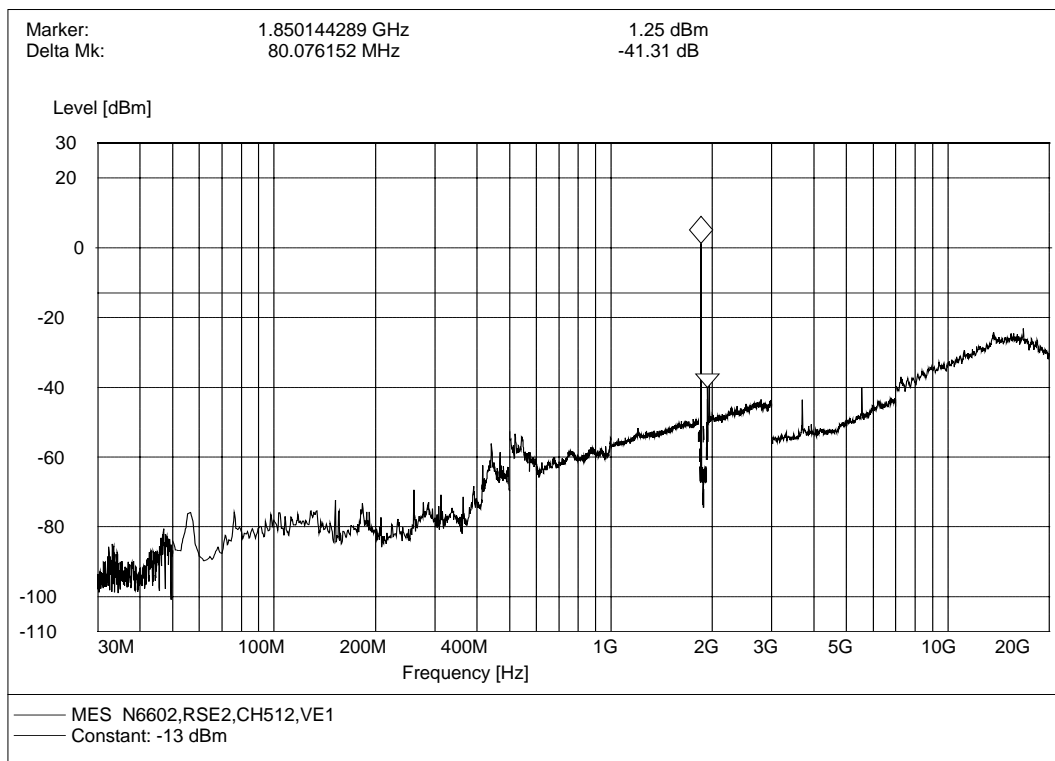
8. Highest channel No.810, H-E2



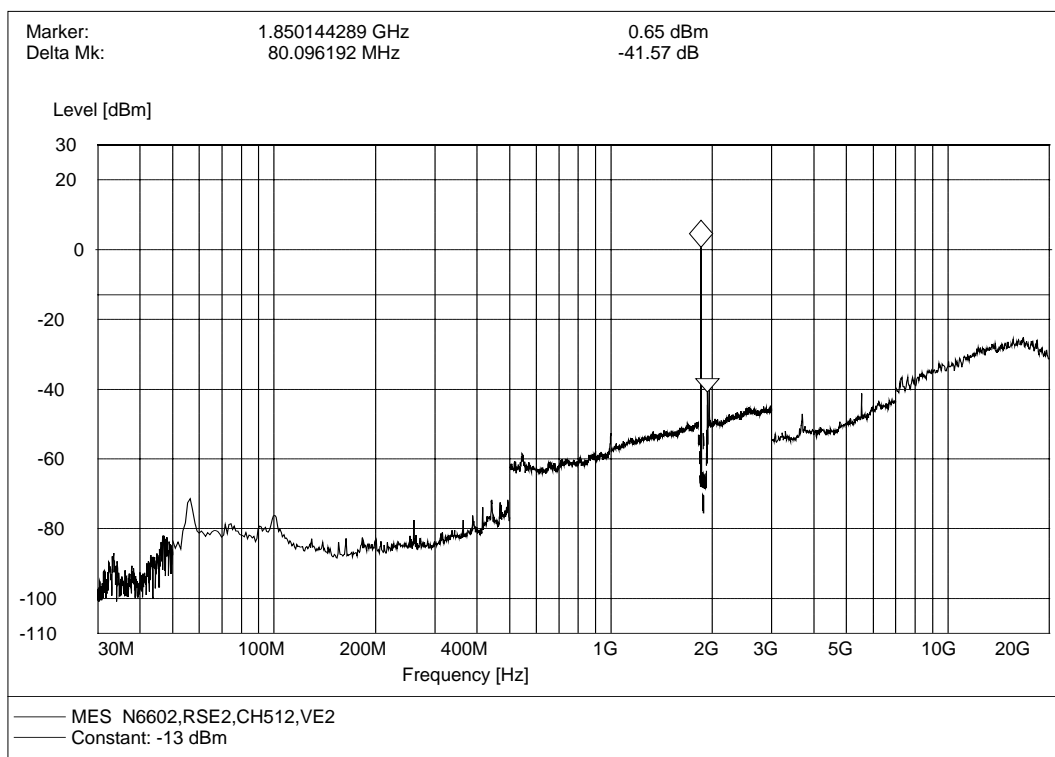
Plot of Spurious Radiation

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

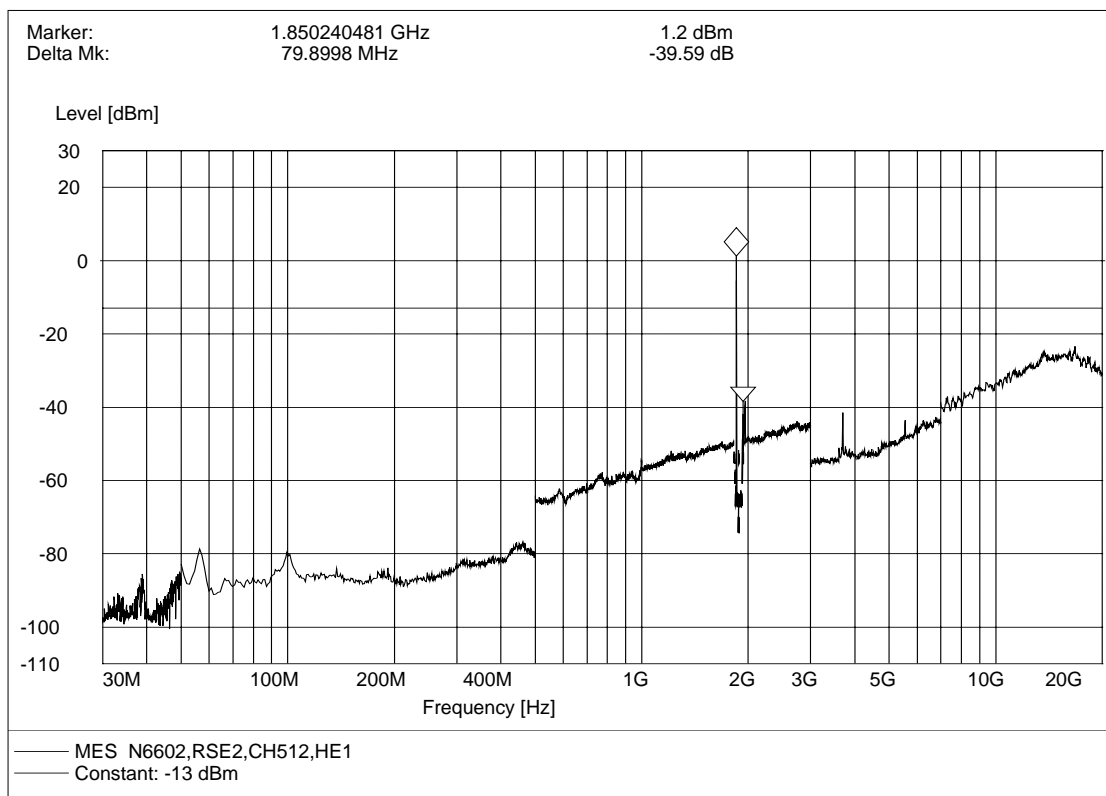
1. Lowest channel No.512, V-E1



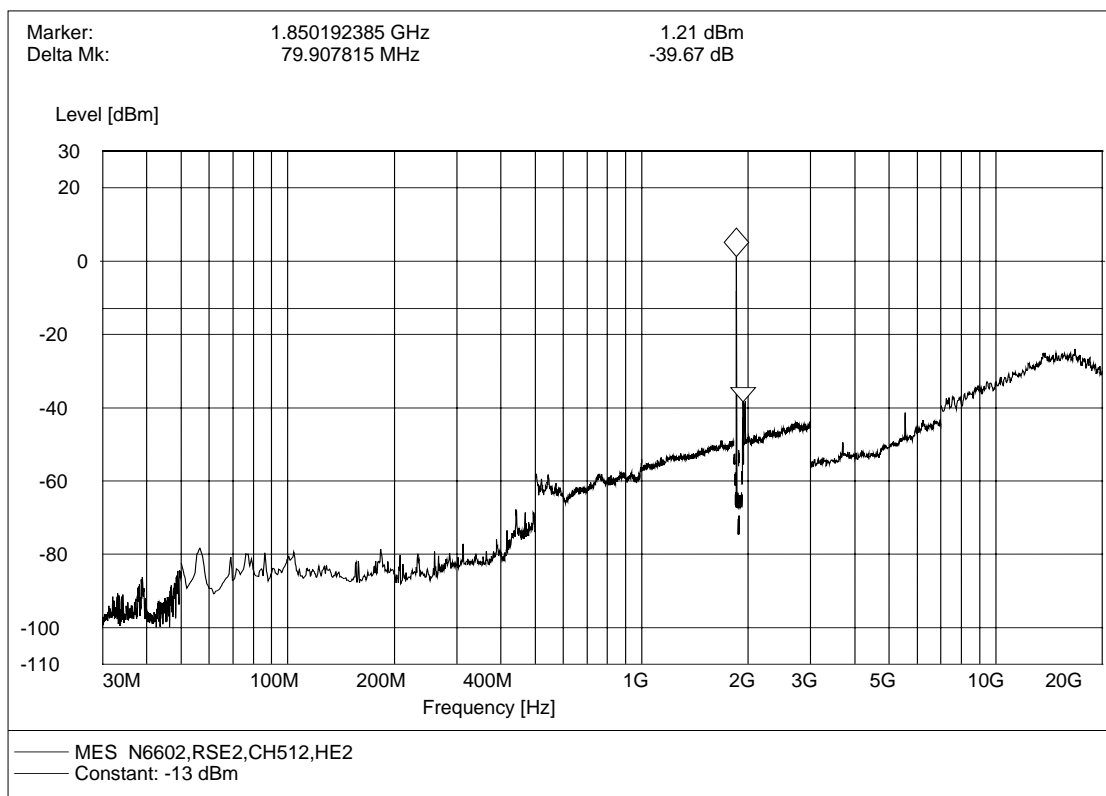
2. Lowest channel No.512, V-E2



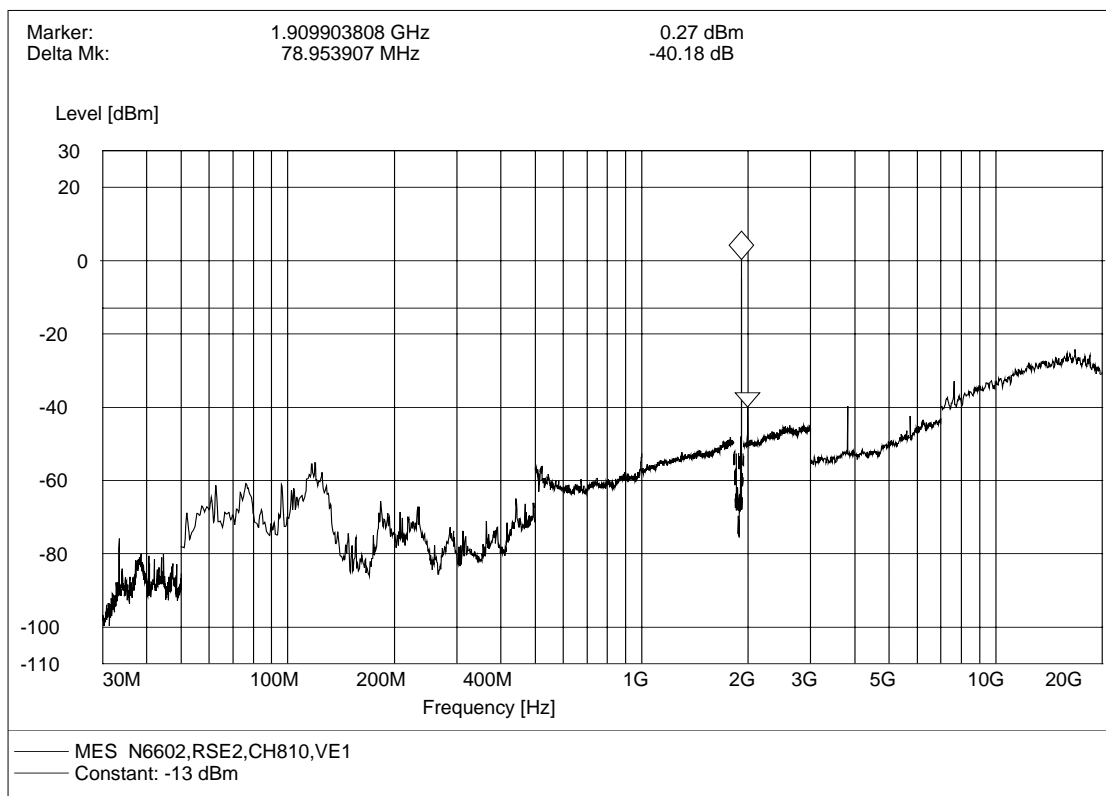
3. Lowest channel No.512, H-E1



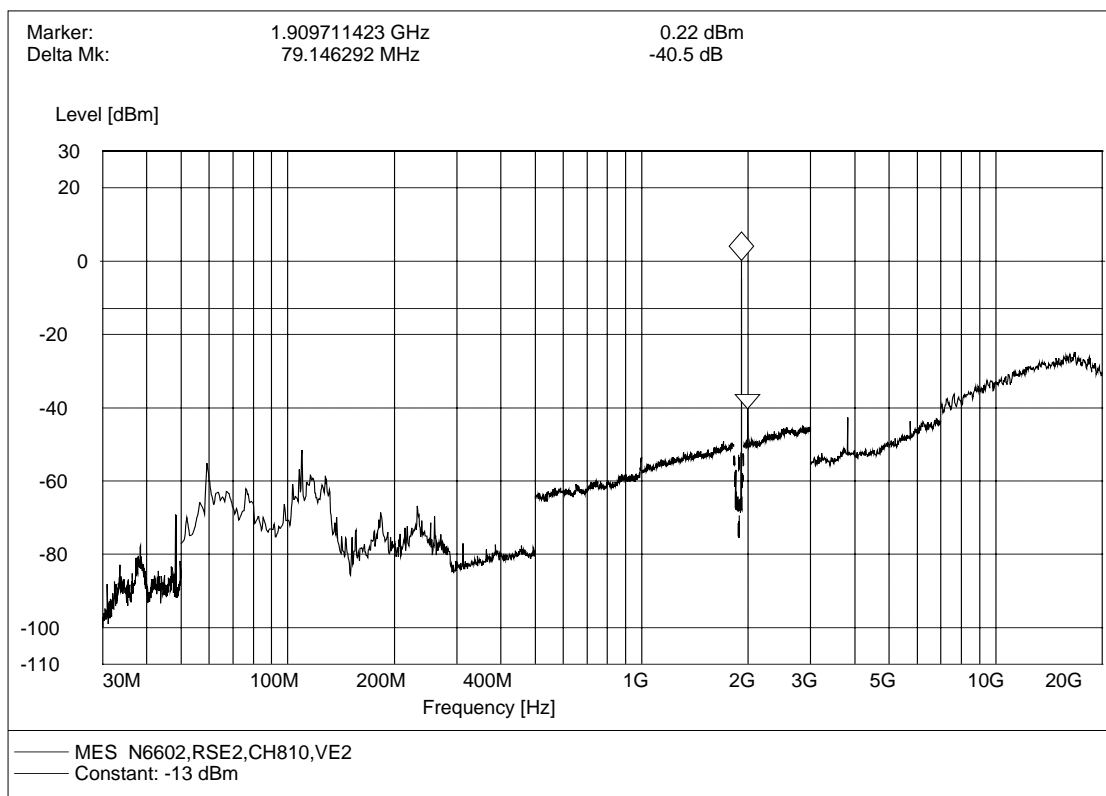
4. Lowest channel No.512, H-E2



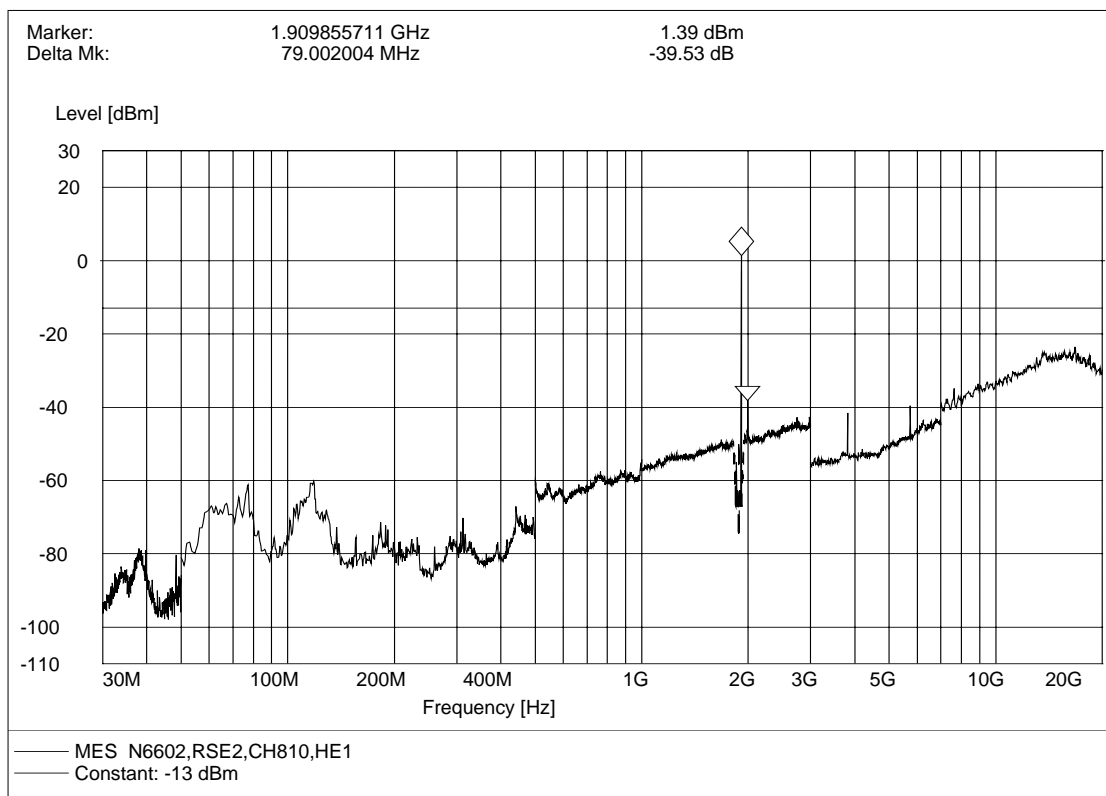
5. Highest channel No.810, V-E1



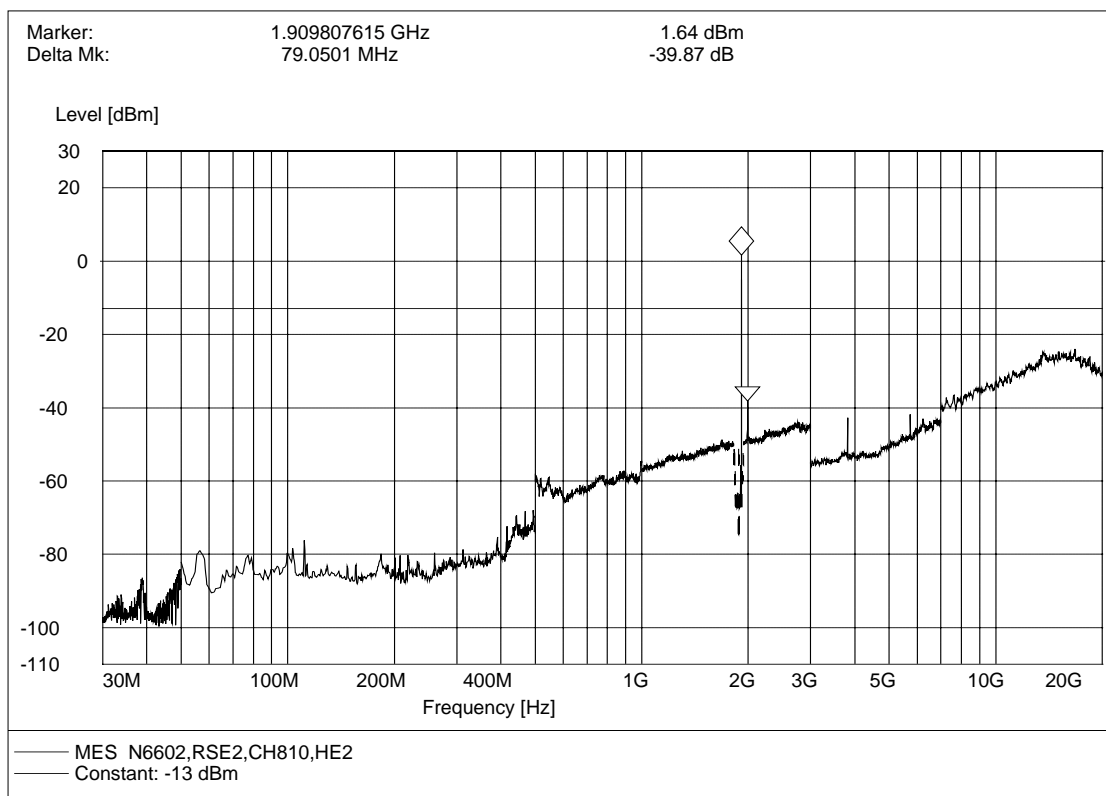
6. Highest channel No.810, V-E2



7. Highest channel No.810, H-E1



8. Highest channel No.810, H-E2



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 ± 0.1 ppm.

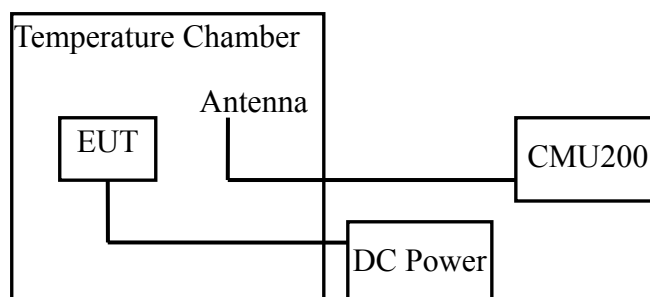
According to FCC §2.1055, the test conditions are:

- **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 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.

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 (level 0). The PCS 1900 channel No.512 (low), 661 (mid), and 810 (high) were measured respectively.

9.5 Test Results

No.	Test Conditions		Frequency Deviation (Hz)			
	Volatage	Temperature (°C)	512CH	661CH	810CH	Limit (± 0.1ppm)
1	3.7V (V _{nom})	-30	-11	-44	37	512CH, ±185Hz 661CH, ±188Hz 810CH, ±191Hz
2		-20	-12	45	17	
3		-10	8	25	-38	
4		0	-40	-40	-2	
5		+10	23	-16	14	
6		+20	-18	27	-21	
7		+30	27	23	-6	
8		+40	-38	-18	-46	
9		+50	-23	42	-44	
10	4.2V (V _{max})	+22	43	-43	-49	
11	3.5V (V _{min})	+22	-2	-33	34	

Appendix I : Photographs of the EUT

1. Appearance of the MS

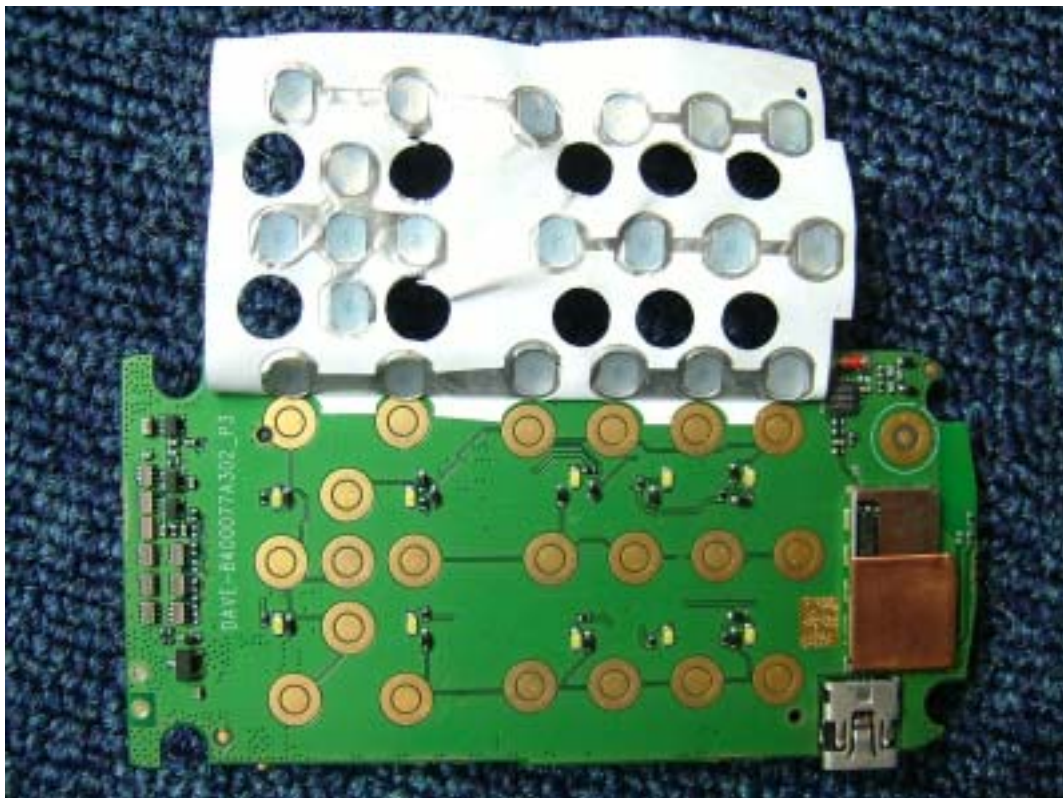




2. Inside of the MS







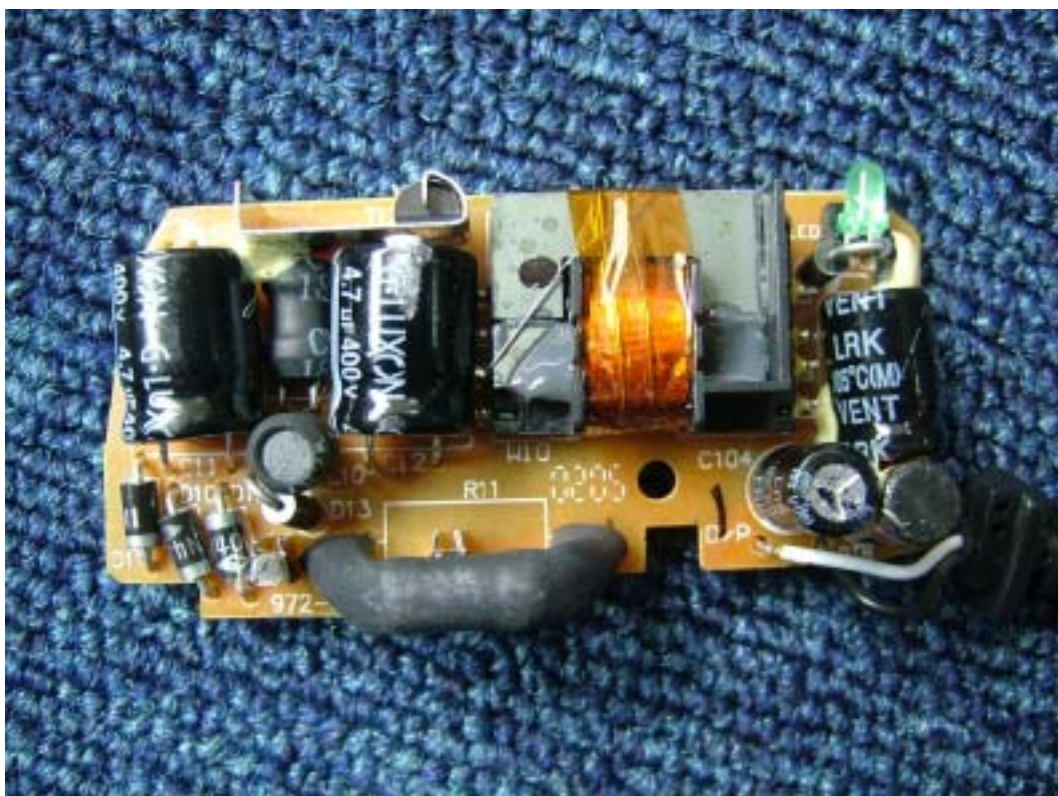


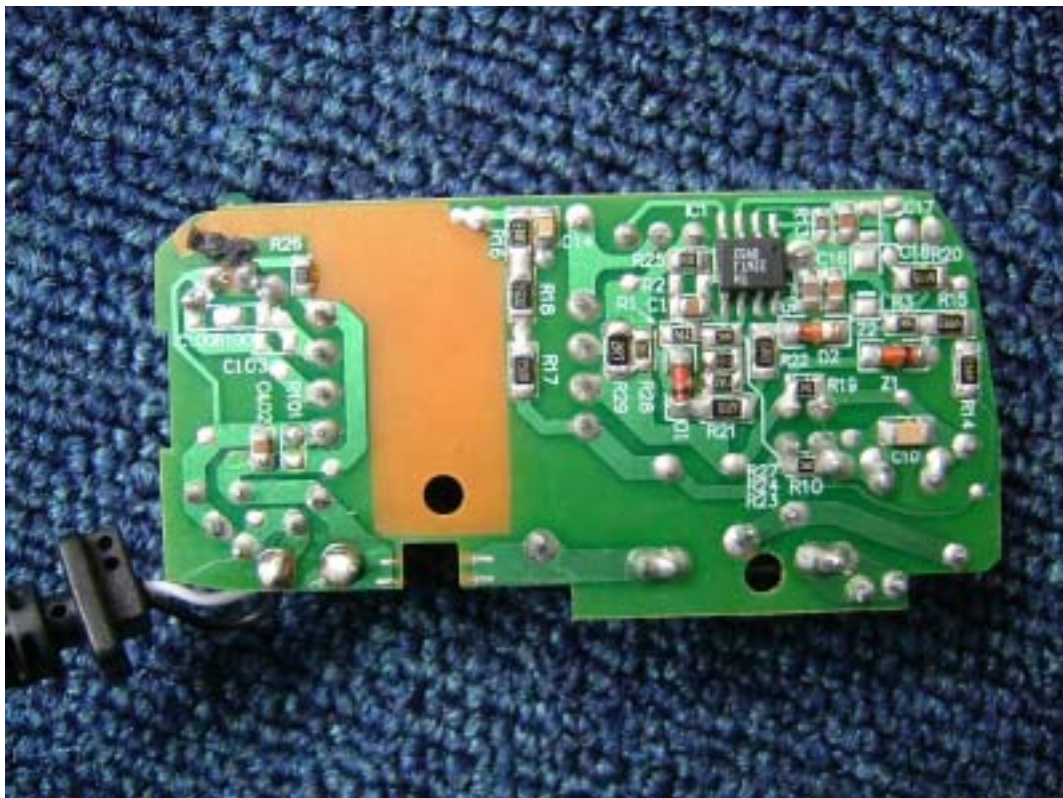
3. Appearance of the Charger





4. Inside of the Charger





Appendix II : Photographs of the Test Configuration

1. Conducted Emission Measurement



2. Radiated Emission Measurement



3. EIRP and Spurious Radiation Measurement

