

7 Transmitter Radiated Power (EIRP/ERP) Test

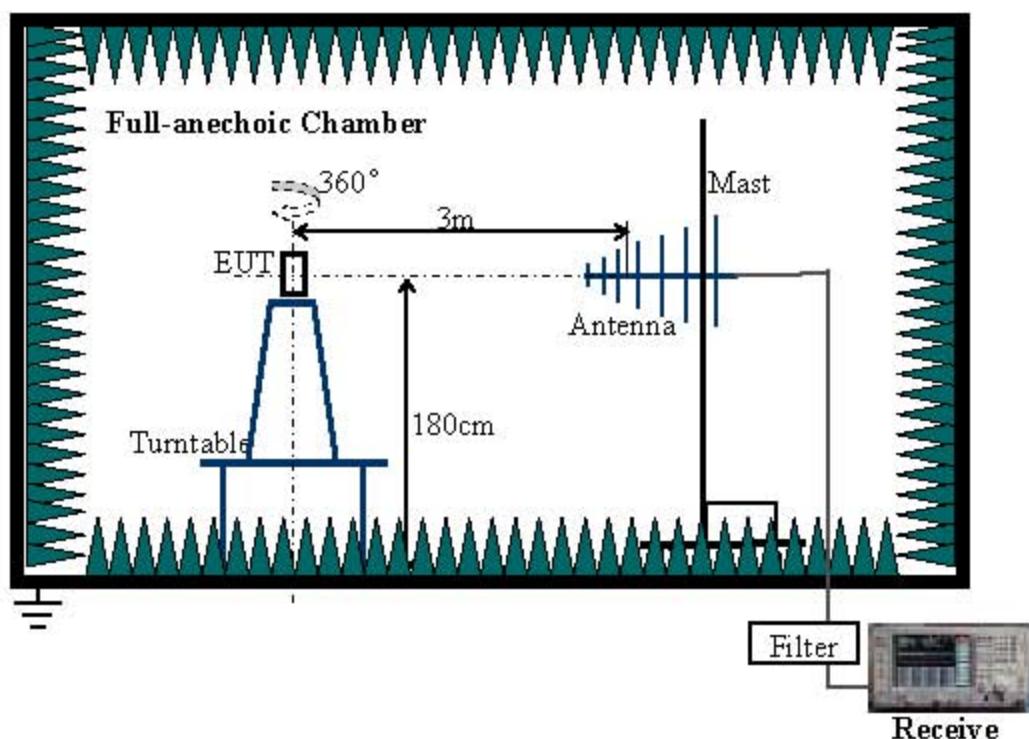
7.1 Limits of EIRP/ERP

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 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 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.

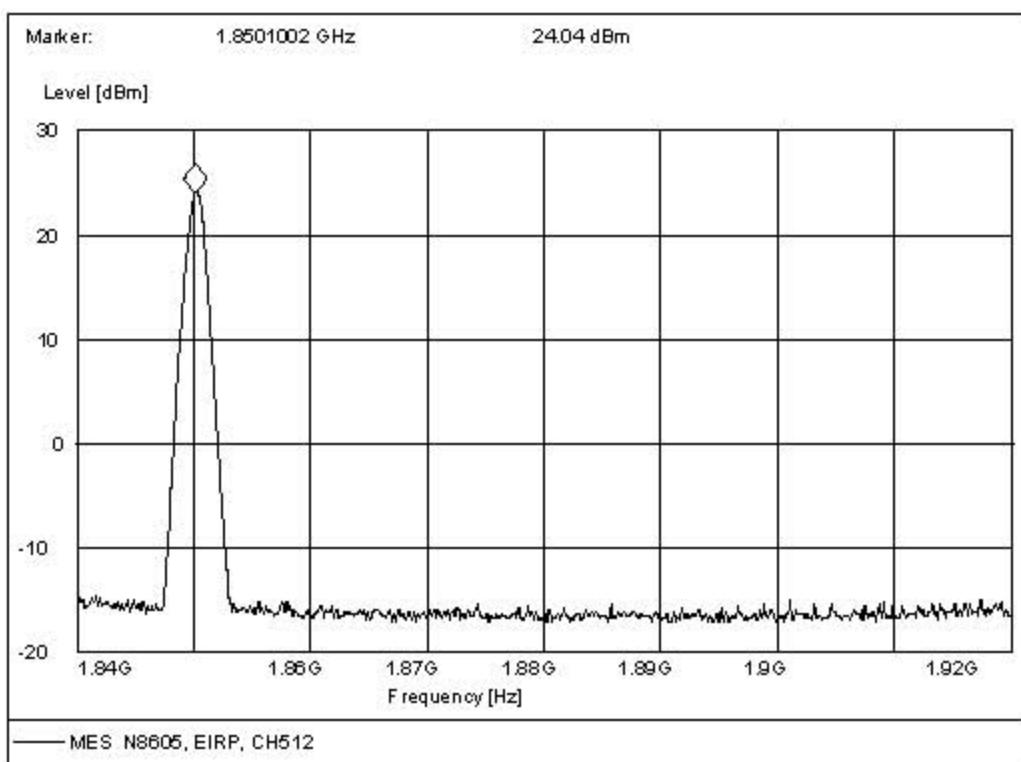
The PCS 1900MHz band channel No.512 (lowest), 661 (middle) and 810 (highest) were measured respectively.

7.5 Test Results

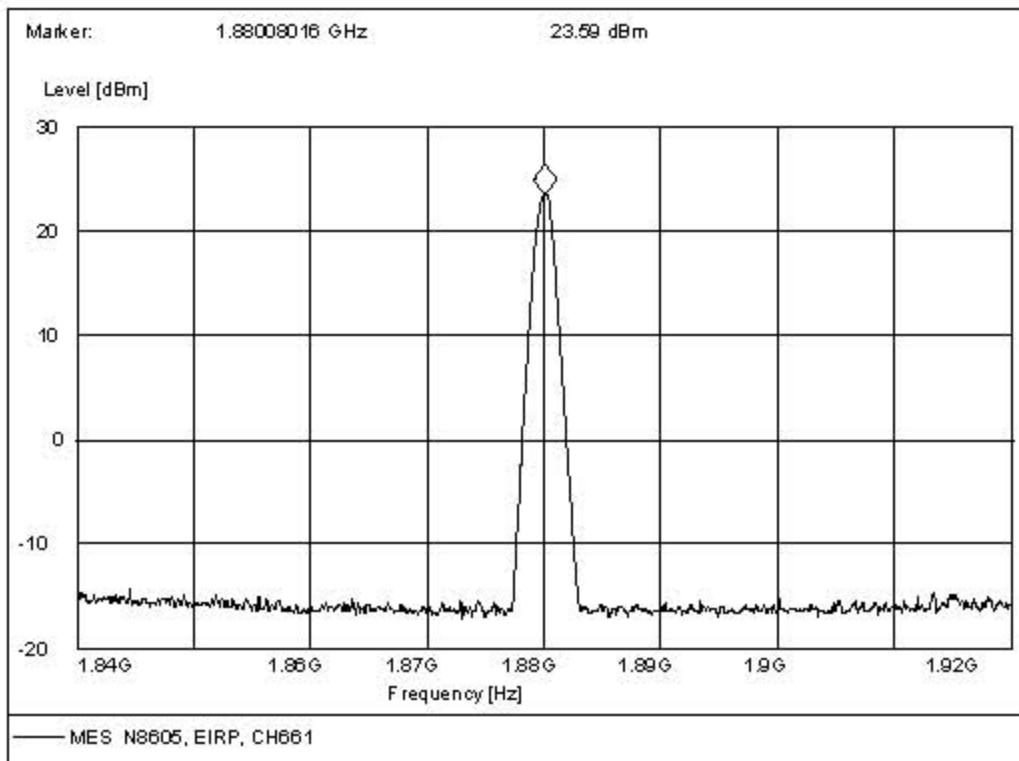
No.	PCS 1900 Channel No.	Frequency (MHz)	EIRP (dBm)	EIRP (W)	Limit EIRP (W)
1	512	1850.20	24.04	0.254	2
2	661	1880.00	23.59	0.229	2
3	810	1909.80	23.46	0.222	2

Test Plots

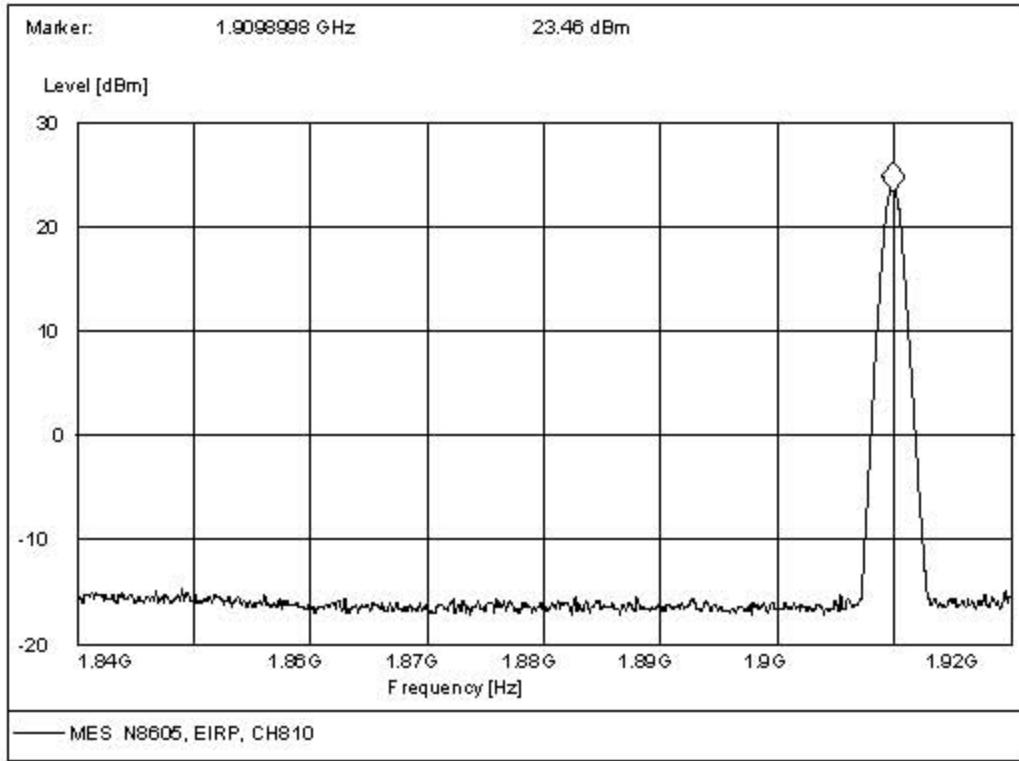
1. Lowest channel No.512



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.
- 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), 661 (middle) and 810 (highest) were measured respectively.

8.5 Test Results

No.	Frequency (MHz)	ERP (dBm)		Limit (dBm)
		Antenna: <u>Vertical</u>	Antenna: <u>Horizontal</u>	
PCS 1900 MHz: Channel No. 512 (1850.20 MHz)				
1	3700.40	-51.29	-50.25	-13
2	5550.60	-44.65	-43.86	-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. 661 (1880.00 MHz)				
10	3760.00	-52.33	-49.21	-13
11	5640.00	-45.07	-45.61	-13
12	7520.00	--	--	-13
13	9400.00	--	--	-13
14	11280.00	--	--	-13
15	13160.00	--	--	-13
16	15040.00	--	--	-13
17	16920.00	--	--	-13
18	18800.00	--	--	-13
PCS 1900 MHz: Channel No. 810 (1909.80 MHz)				
19	3819.60	-50.39	-50.64	-13
20	5729.40	-40.30	-42.10	-13
21	7639.20	--	--	-13
22	9549.00	--	--	-13
23	11458.80	--	--	-13
24	13368.60	--	--	-13
25	15278.40	--	--	-13
26	17188.20	--	--	-13
27	19098.00	--	--	-13

NOTE:

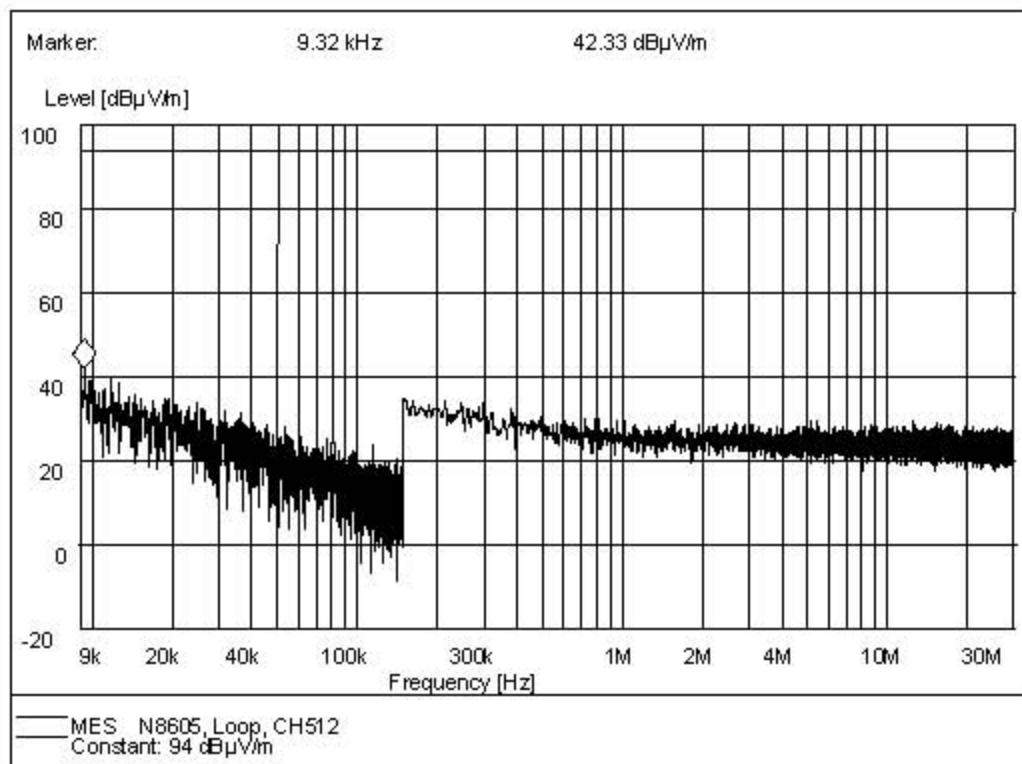
1. V and H are the antenna polarizations: Vertical and Horizontal.
2. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
3. “--” in the table above means that the emissions are too small to be measured and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

Plot of Spurious Emission

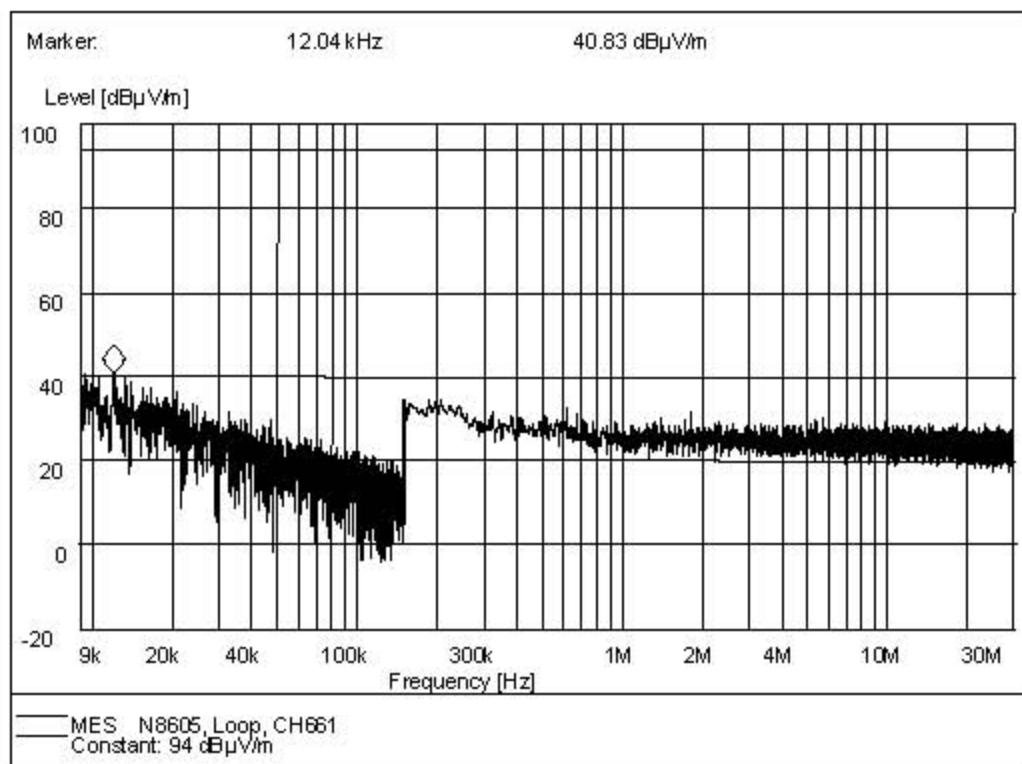
(Note: The marker points are the MS and BS transmitting frequencies which should be ignored.)

I. 9kHz to 30MHz

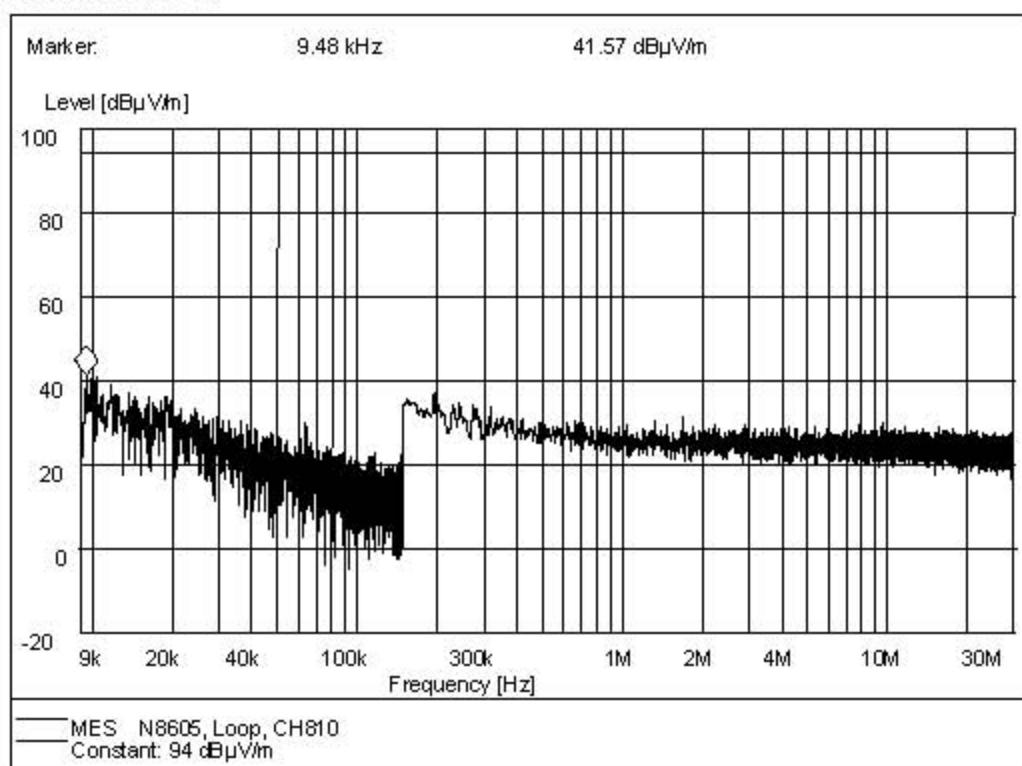
1. Lowest channel No.512



2. Middle channel No.661

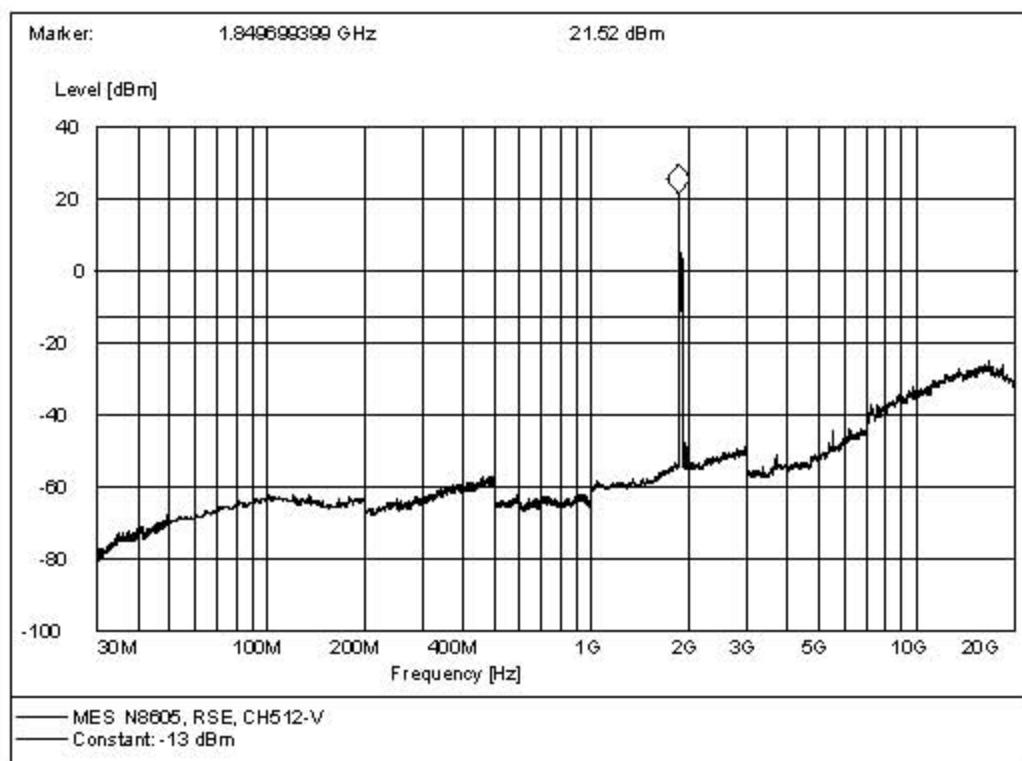


3. Highest channel No.810

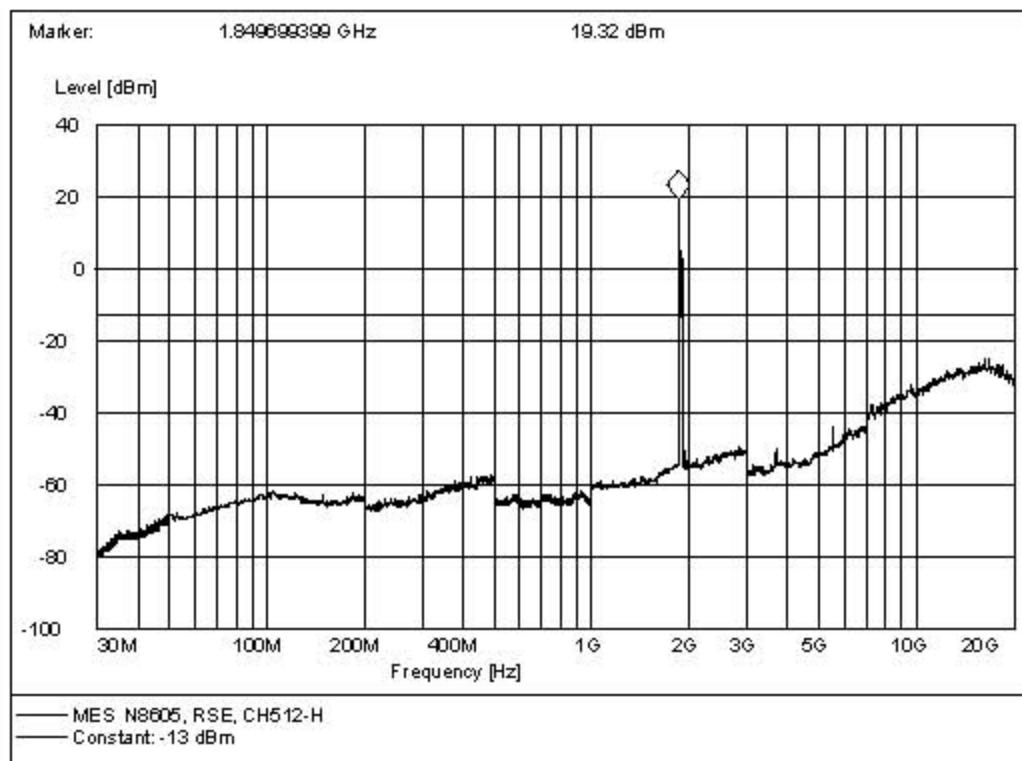


II Above 30 MHz

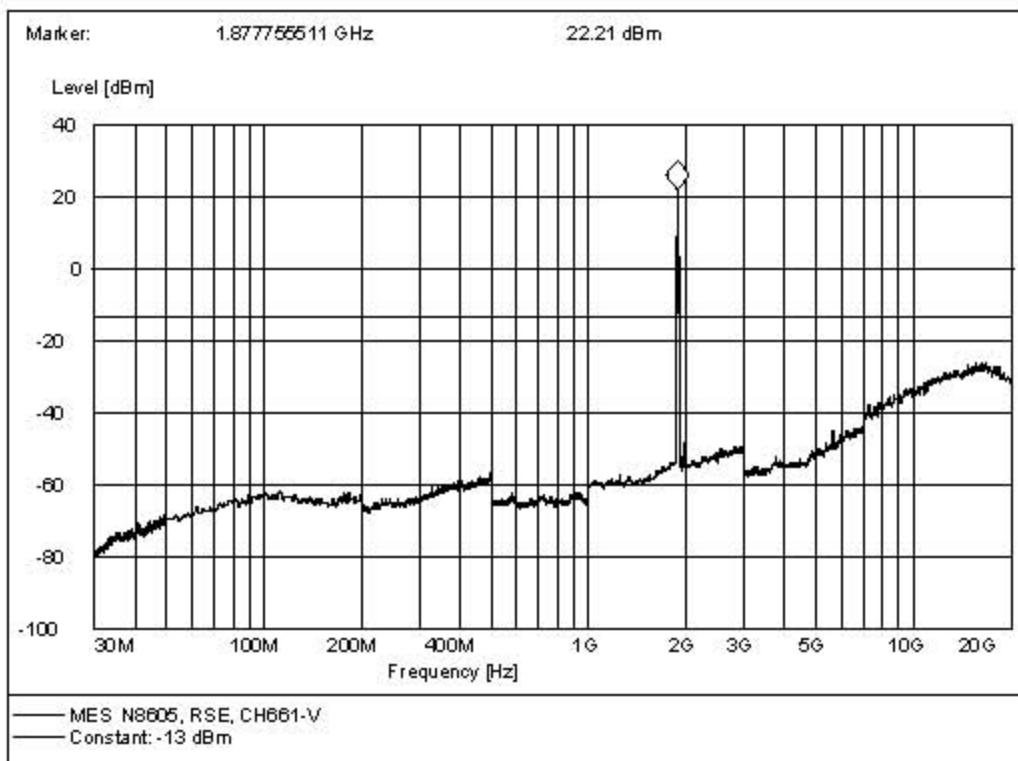
1. Lowest channel No.512, antenna vertical



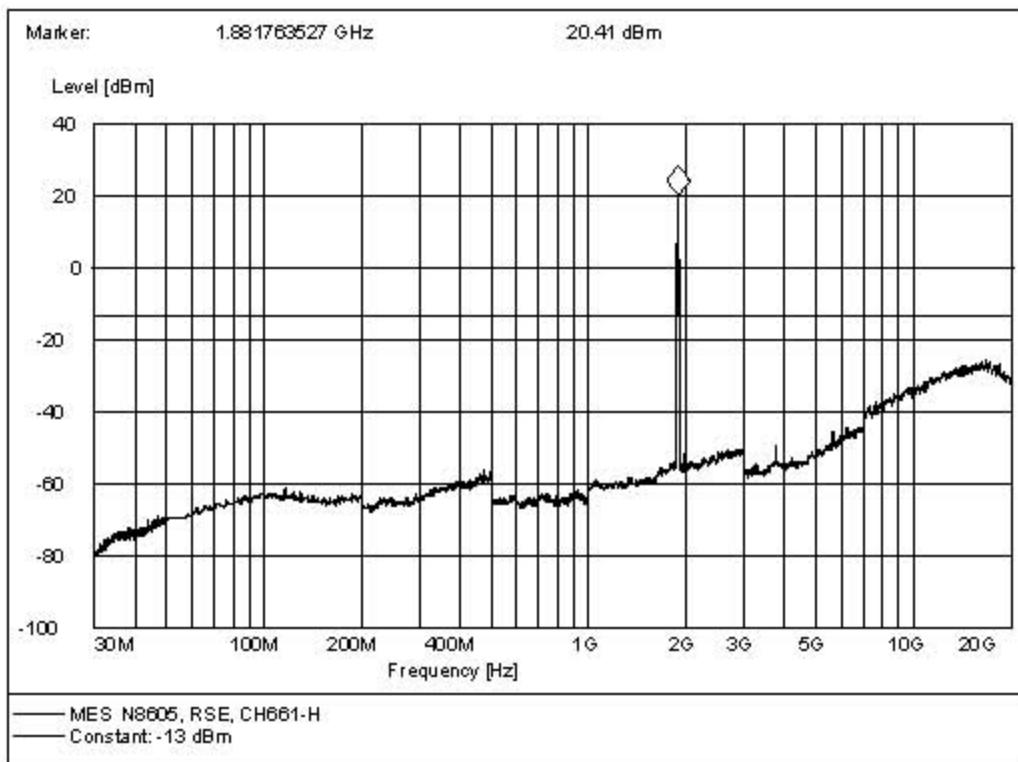
2. Lowest channel No.512, antenna horizontal



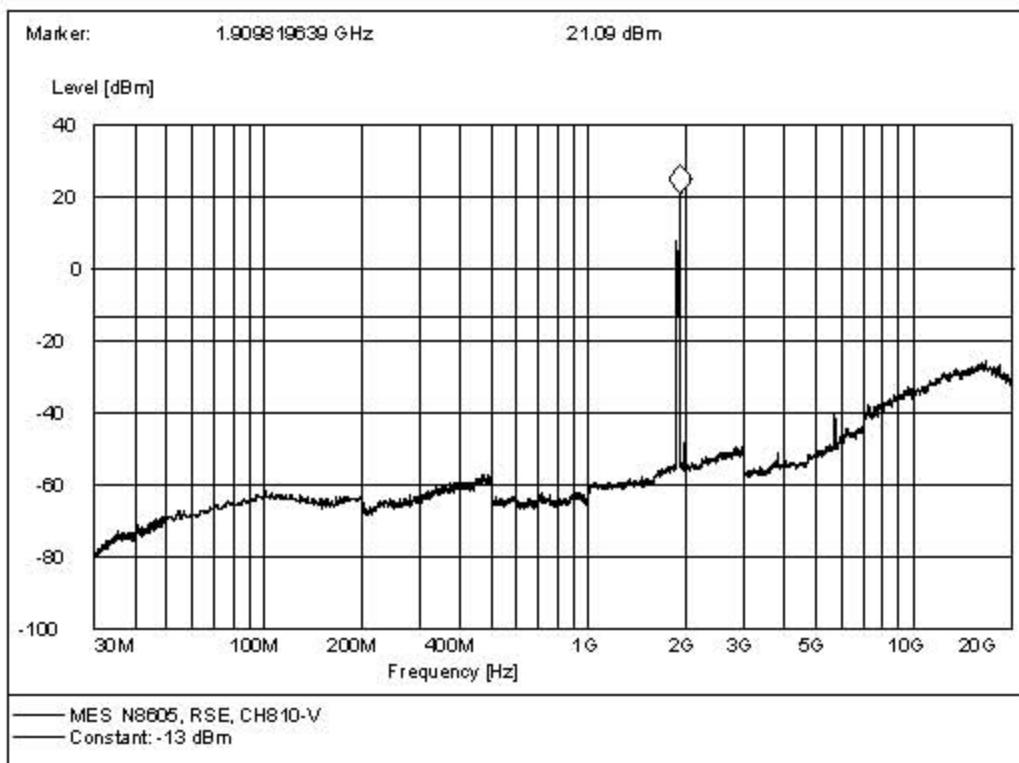
3. Middle channel No.661, antenna vertical



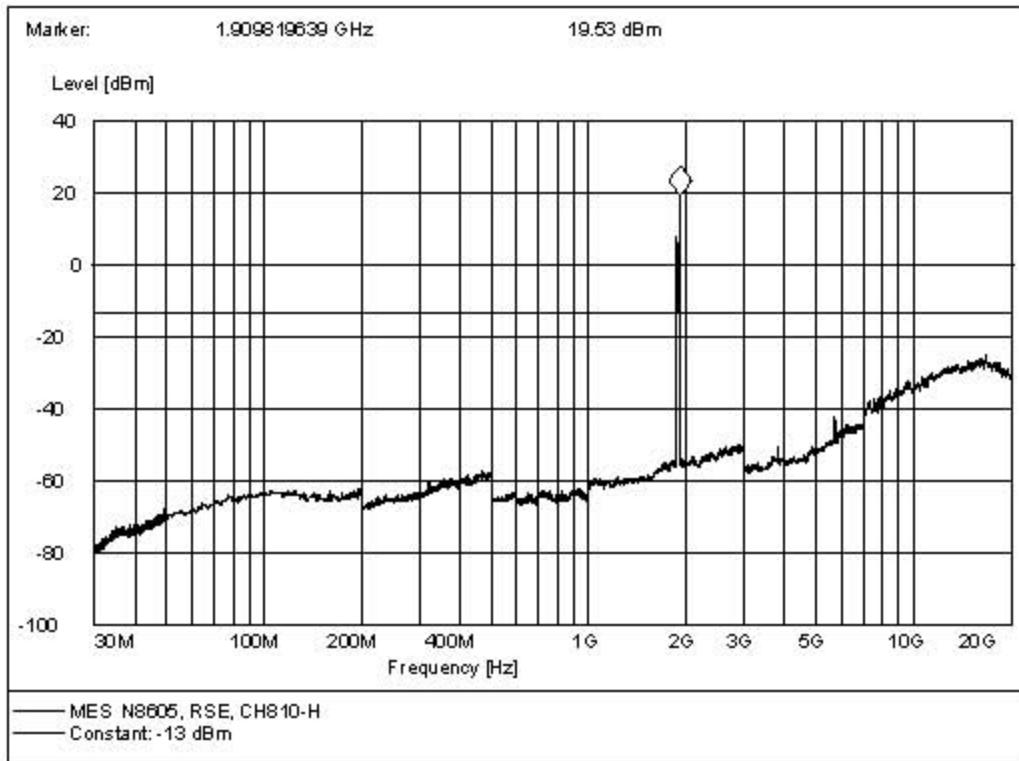
4. Middle channel No.661, antenna horizontal



5. Highest channel No.810, antenna vertical



6. 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 $\pm 0.1\text{ppm}$.

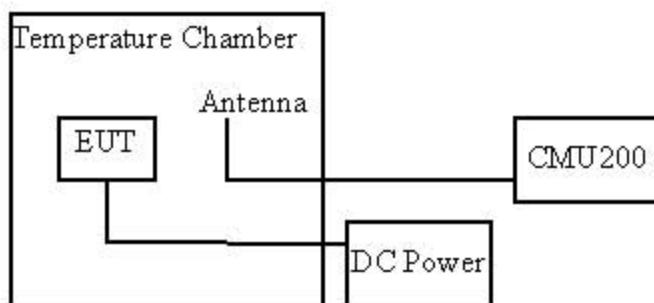
According to FCC §2.1055, the test conditions are:

- **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 hours.
- 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 (°C)	512CH	661CH	810CH	
1	3.7V (V_{nom})	-30	+13	-7	-7	512CH, $\pm 185\text{Hz}$ 661CH, $\pm 188\text{Hz}$ 810CH, $\pm 191\text{Hz}$
2		-20	+9	+17	-17	
3		-10	+7	+13	+2	
4		0	+16	0	+5	
5		+10	-9	+12	-1	
6		+20	-15	+12	+17	
7		+30	+4	+14	+5	
8		+40	-12	+1	-8	
9		+50	-13	-13	+11	
10	4.2V (V_{max})	+22	+14	-7	+9	
11	3.6V (V_{min})	+22	-8	-14	+16	

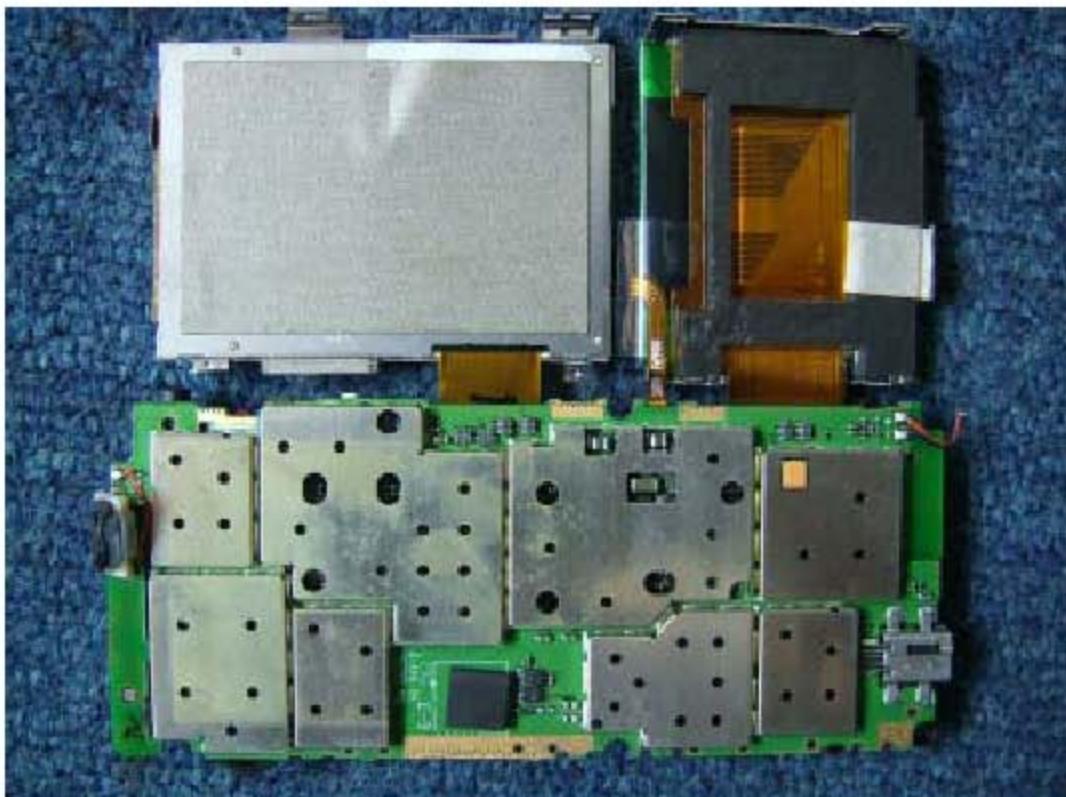
Appendix I: Photographs of the EUT

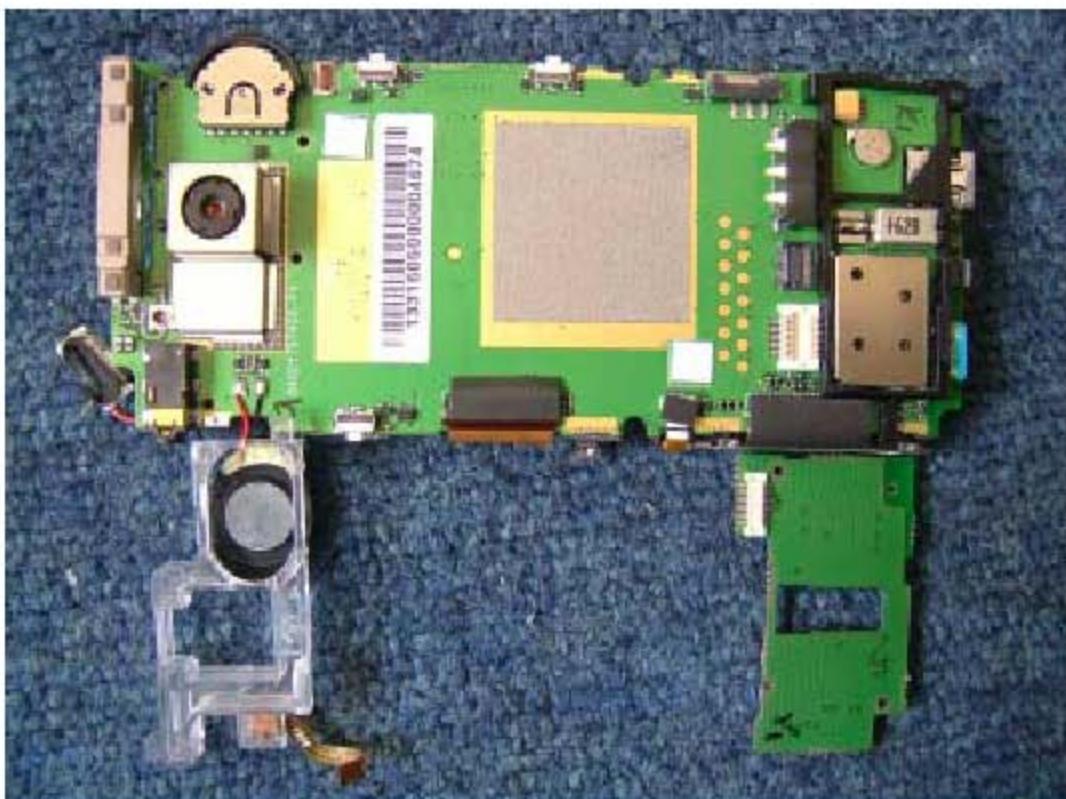
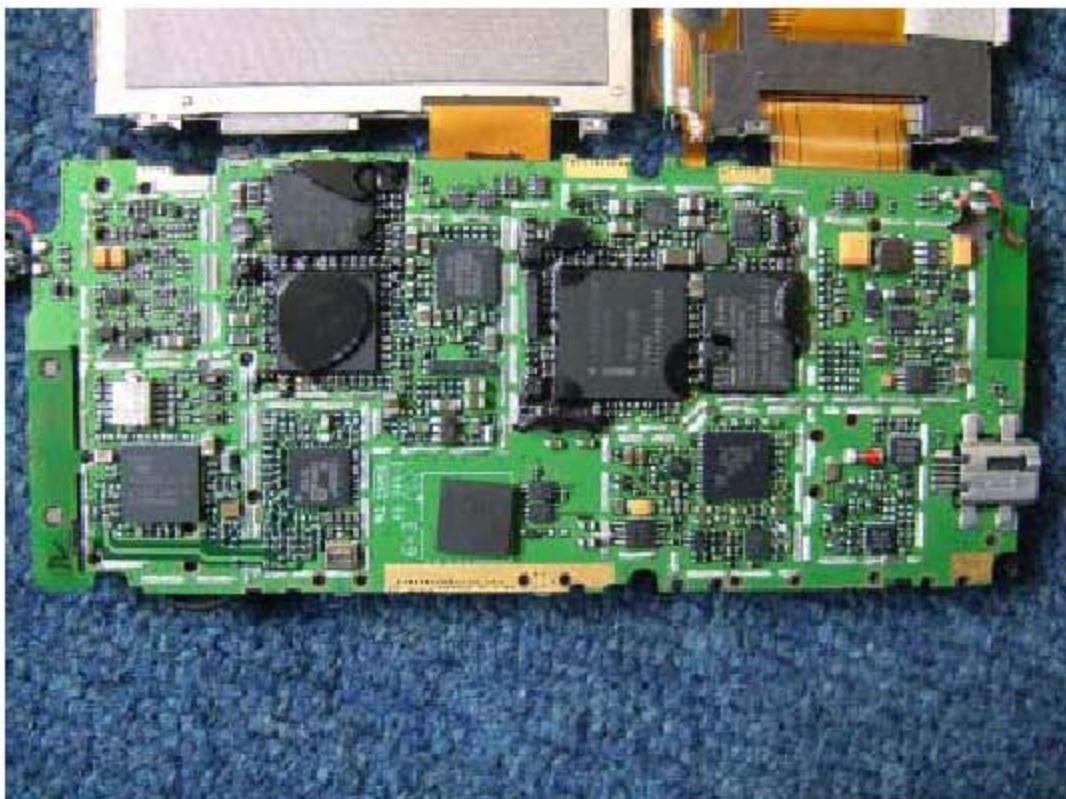
1. Appearance of the MS

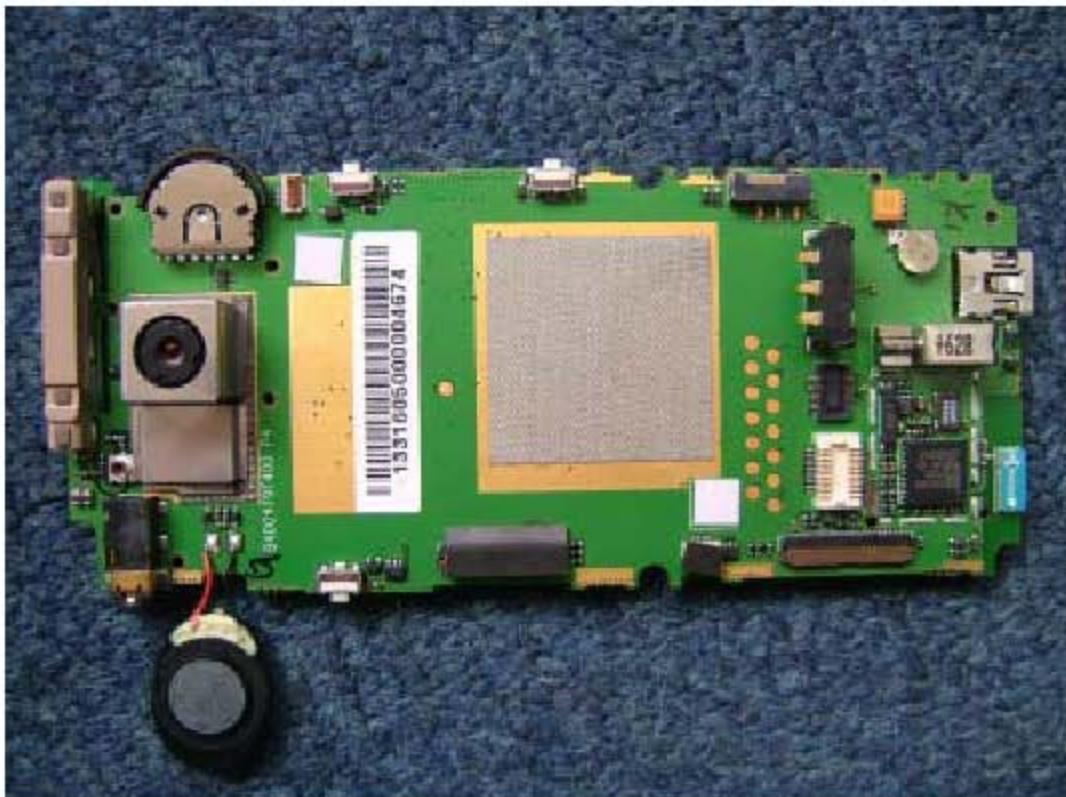


2. Inside of the MS









Appendix II: Photographs of the Test Configuration

1. Conducted RF Test



2. Radiated RF Test



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

