8 Conducted Spurious Emission Test

8.1 Limits of Conducted Spurious Emission

According to FCC §22.917 (a) and §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 §22.917 (b) and §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

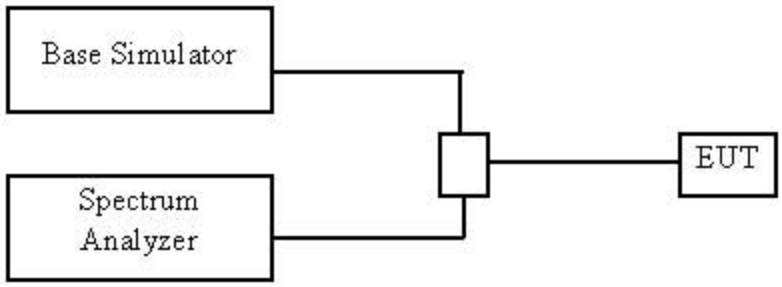
8.2 Test Procedure

a. 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.

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.

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: level 5 for GSM 850 MHz; level 0 for PCS 1900. The lowest channel and the highest channel were measured respectively: channel No.128 (low) and 251 (high) for GSM 850 MHz; channel No.512 (low) and 810 (high) for PCS 1900 MHz.

8.5 Test Results

I. GSM850MHz Band

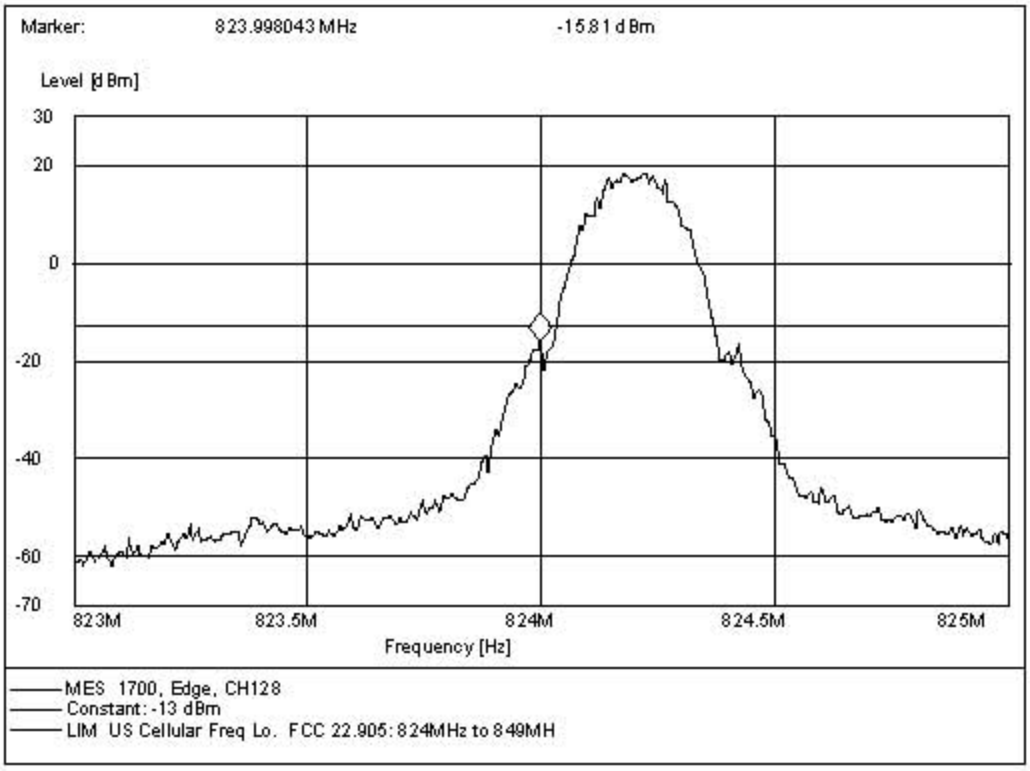
No.	Frequency (MHz)	Emission Power (dBm)	Limit (dBm)
GSM850 MHz: Channel No. 128 (824.20 MHz)			
1	1648.40	-43.47	-13
2	2472.60	-46.16	-13
3	3296.80	-55.42	-13
4	4121.00	-46.87	-13
5	4945.20	-46.54	-13
6	5769.40	--	-13
7	6593.60	--	-13
8	7417.80	--	-13
9	8242.00	--	-13
GSM850 MHz: Channel No. 190 (836.60 MHz)			
10	1673.20	-40.30	-13
11	2509.80	-52.74	-13
12	3346.40	-55.51	-13
13	4183.00	-42.34	-13
14	5019.60	--	-13
15	5856.20	--	-13
16	6692.80	--	-13
17	7529.40	--	-13
18	8366.00	--	-13
GSM850 MHz: Channel No. 251 (848.80 MHz)			
19	1697.60	-39.68	-13
20	2546.40	-50.29	-13
21	3395.20	-51.45	-13
22	4244.00	-46.15	-13
23	5092.80	--	-13
24	5941.60	--	-13
25	6790.40	--	-13
26	7639.20	--	-13
27	8488.00	--	-13

NOTE:

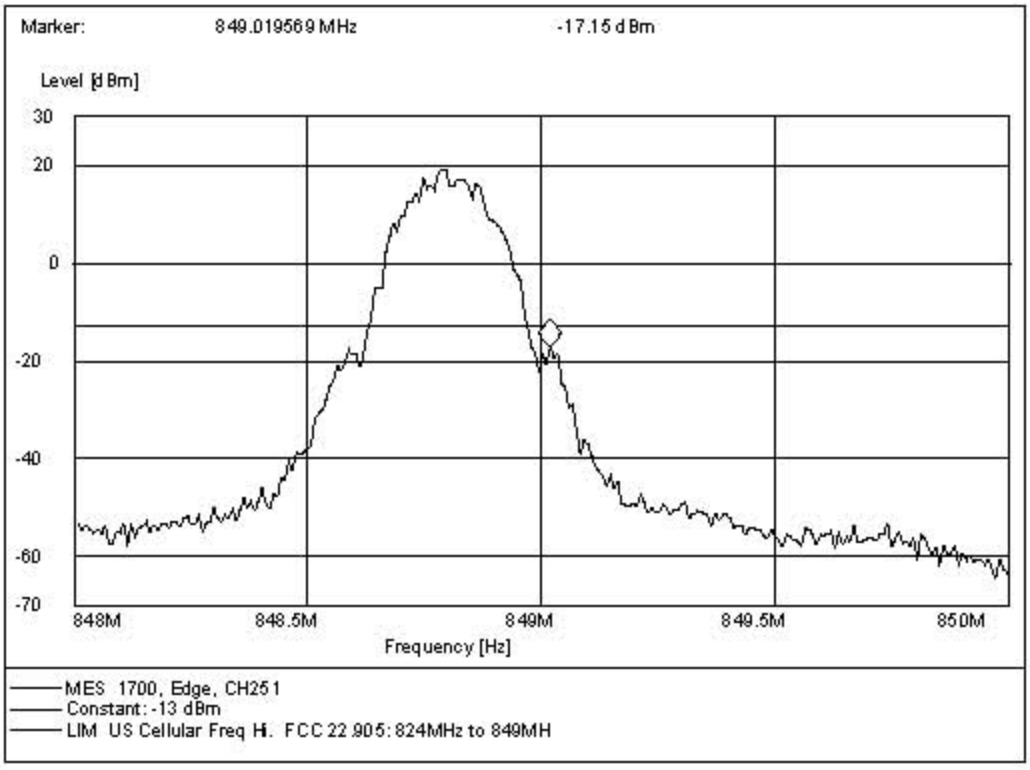
1. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
2. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

Plot of Band Edge

1. Lowest channel No.128



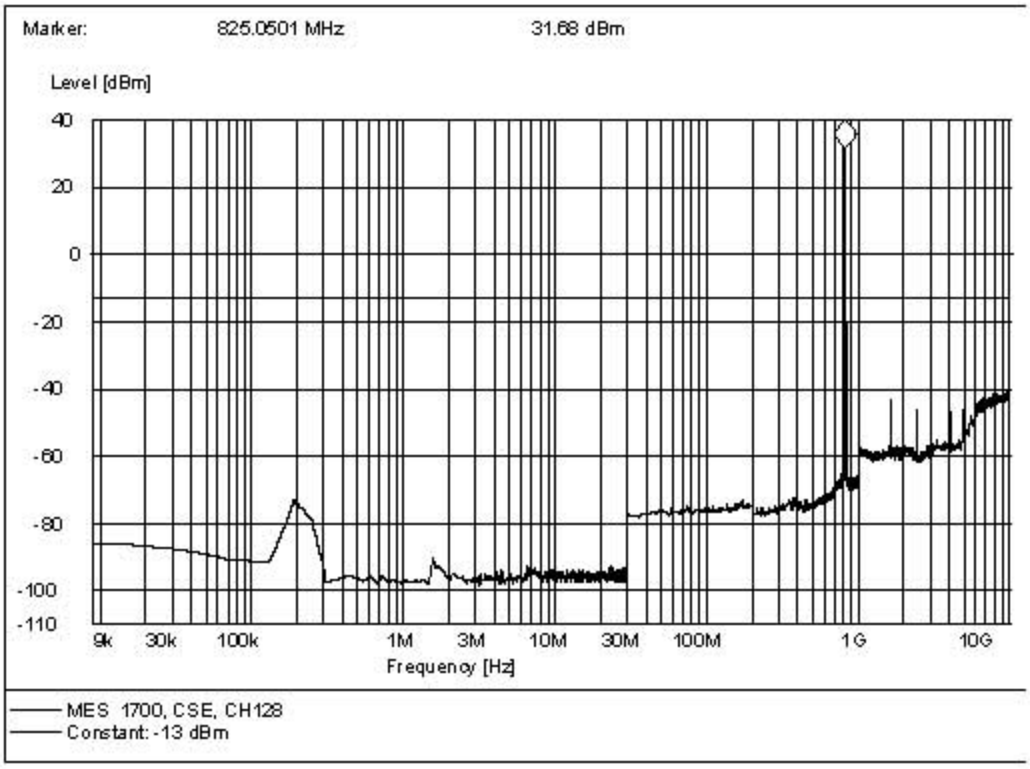
2. Highest channel No.251



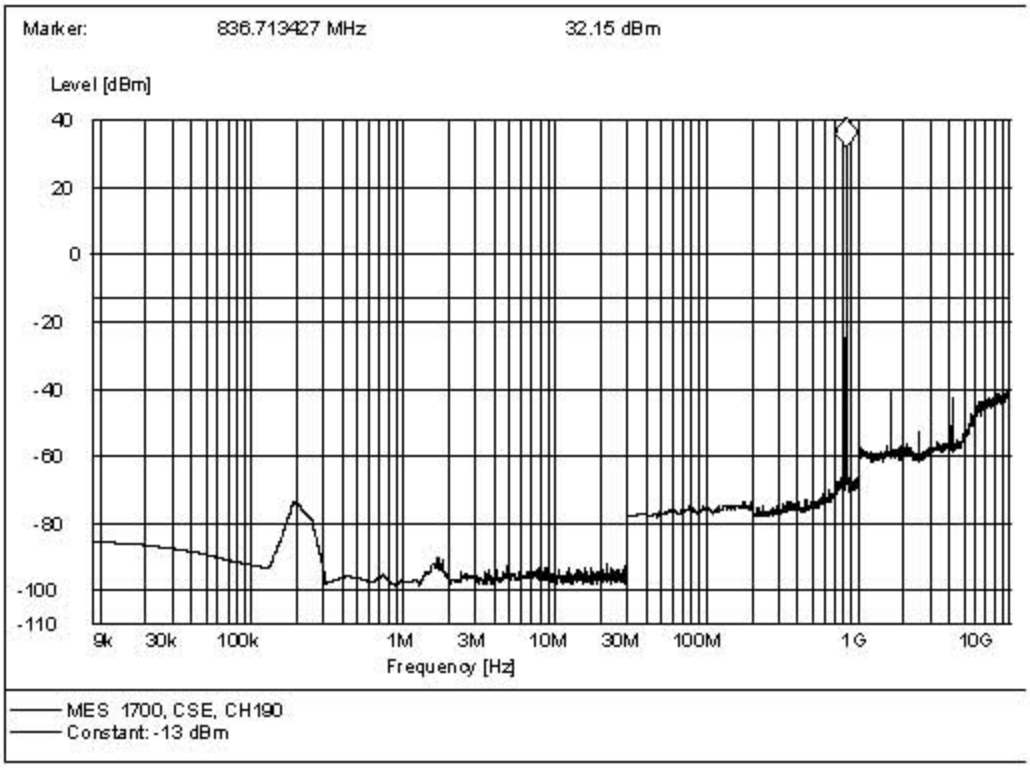
Plot of Spurious Emission

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

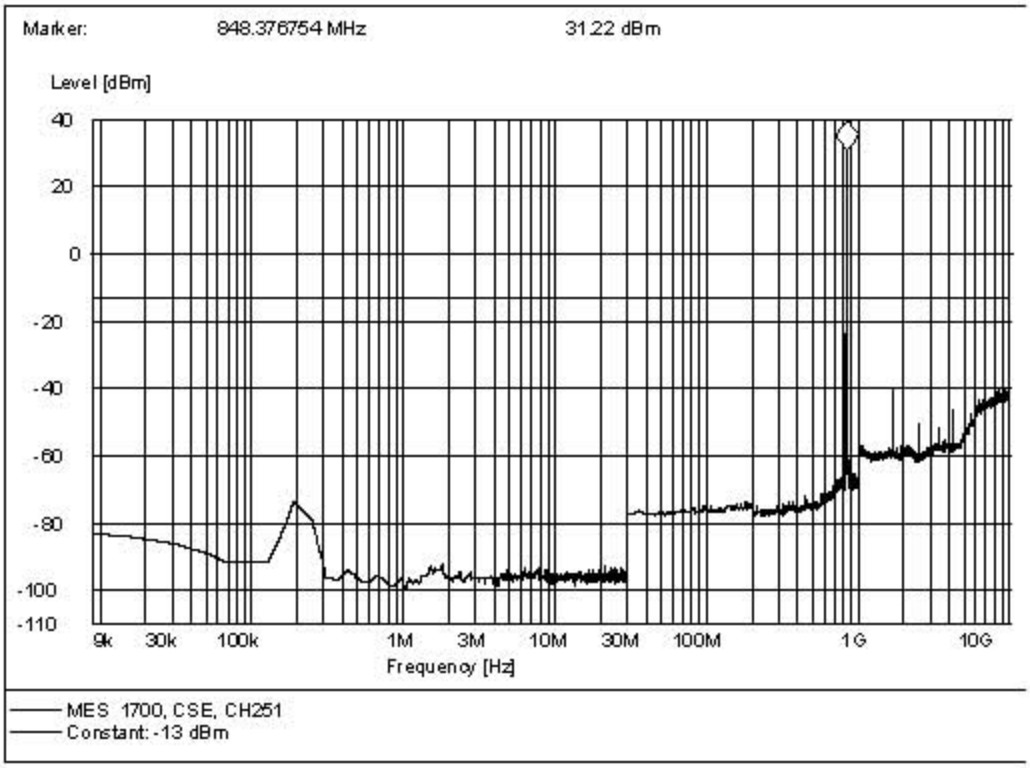
1. Lowest channel No.128



2. Middle channel No.190



3. Highest channel No.251



II. PCS 1900MHz Band

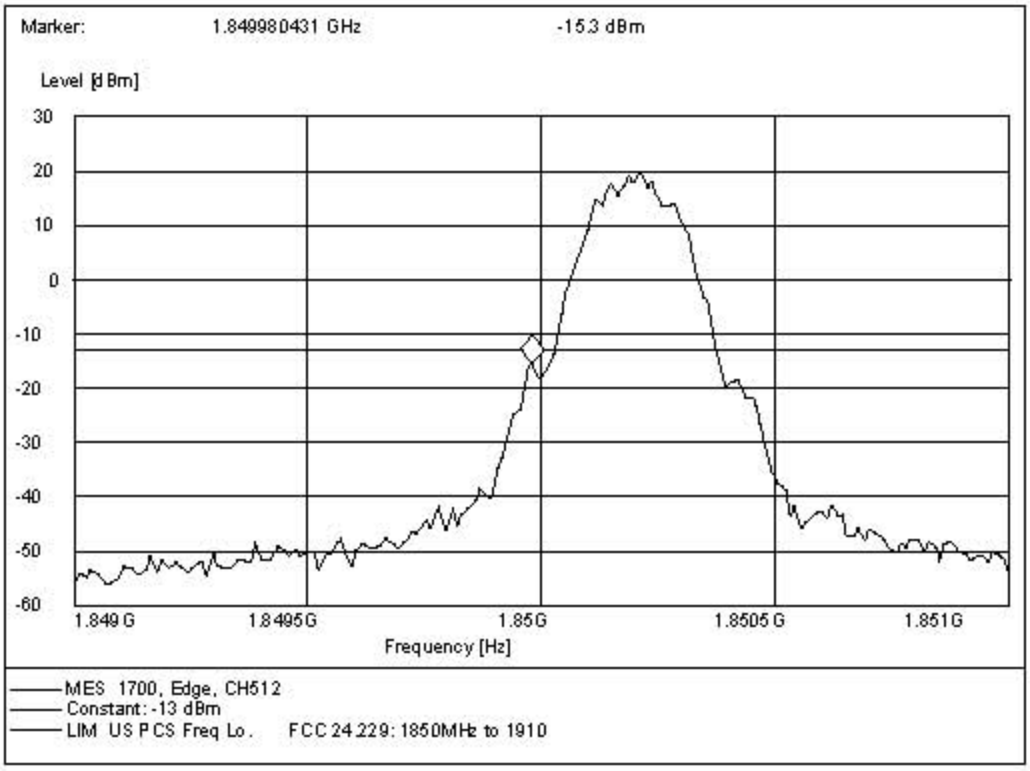
No.	Frequency (MHz)	Emission Power (dBm)	Limit (dBm)
PCS 1900 MHz: Channel No. 512 (1850.20 MHz)			
1	3700.40	-36.53	-13
2	5550.60	-37.68	-13
3	7400.80	--	-13
4	9251.00	--	-13
5	11101.20	--	-13
6	12951.40	--	-13
7	14801.60	--	-13
8	16651.80	--	-13
9	18502.00	--	-13
PCS 1900 MHz: Channel No. 661 (1880.00 MHz)			
10	3760.00	-38.19	-13
11	5640.00	-43.16	-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	-38.80	-13
20	5729.40	-34.37	-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:

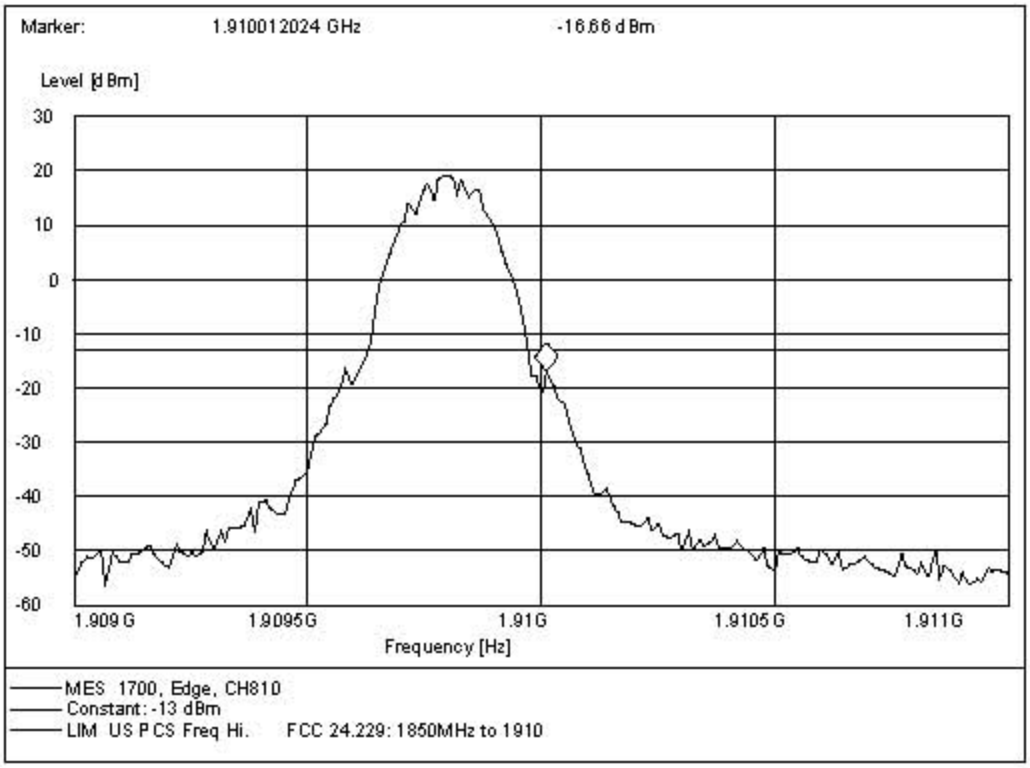
1. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
2. "--" in the table above means that the emissions are too small to be measured and are at least 12 dB below the limit.

Plot of Out-of-Band Emission

1. Lowest channel No.512



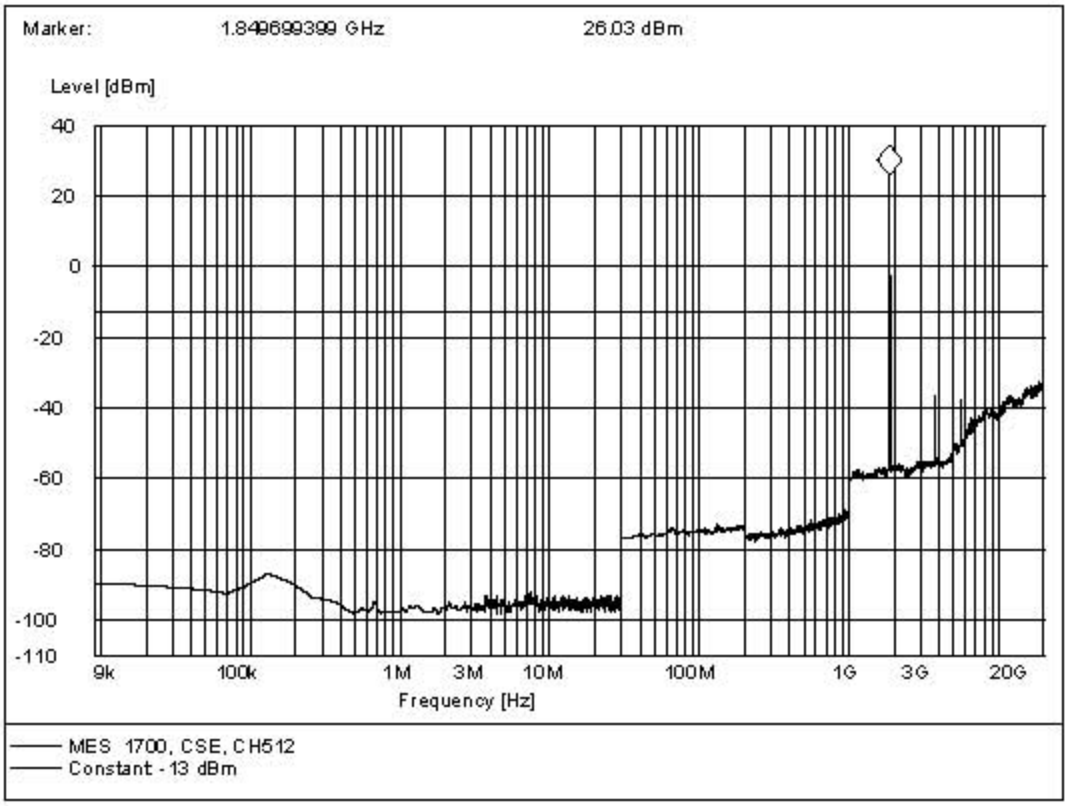
2. Highest channel No.810



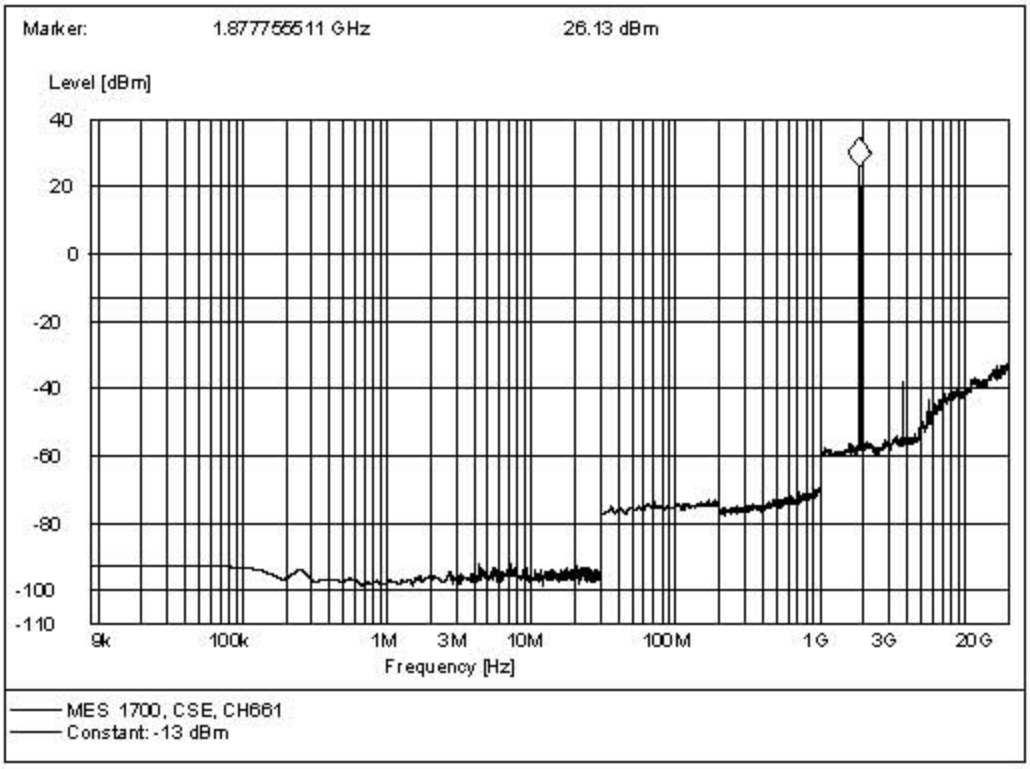
Plot of Spurious Emission

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

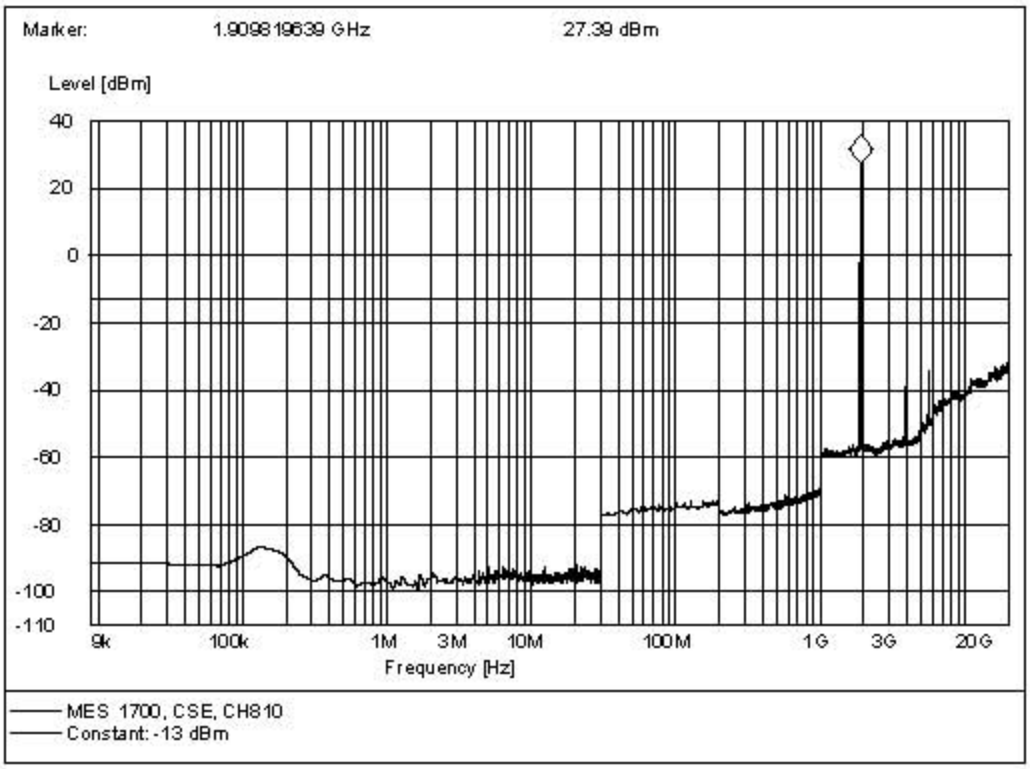
1. Lowest channel No.512



2. Middle channel No.661



3. Highest channel No.810



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).

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

9.2 Test Procedure

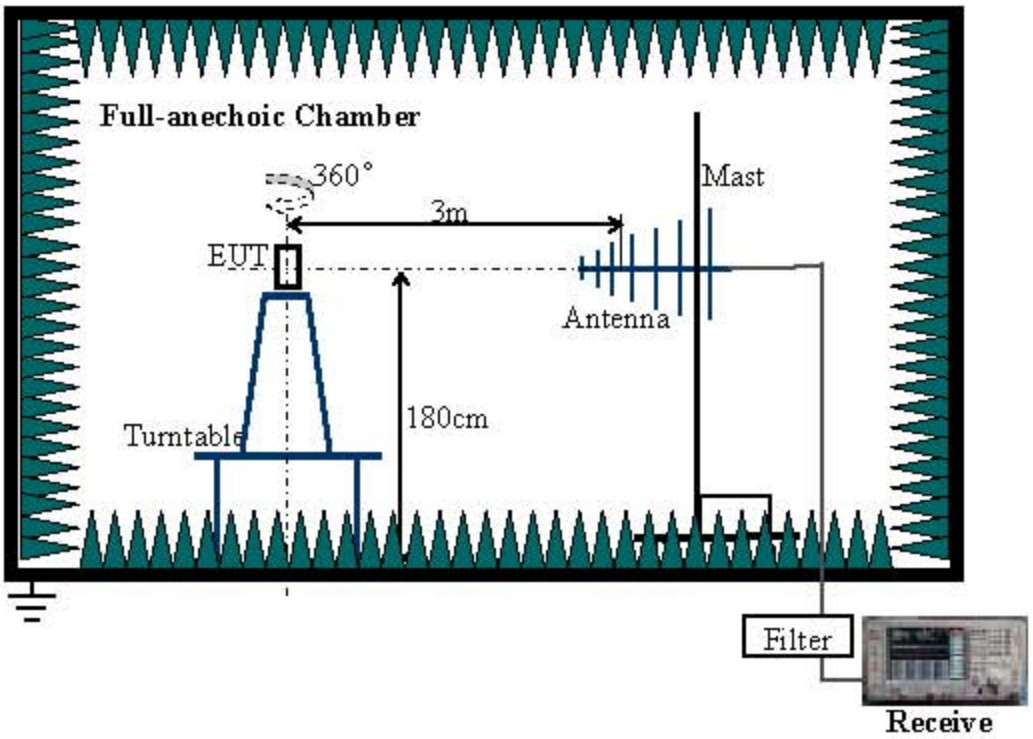
a. The radiated power measurement was performed in a full anechoic chamber. The air lost of the site and the factors of the test system is pre-calibrated using substitution method.

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: level 5 for GSM 850 MHz; level 0 for PCS 1900.

The low, middle and high channels were measured respectively: channel No.128 (low), 190 (middle) and 251 (high) for GSM 850 MHz; channel No.512 (low), 661 (middle) and 810 (high) for PCS 1900.

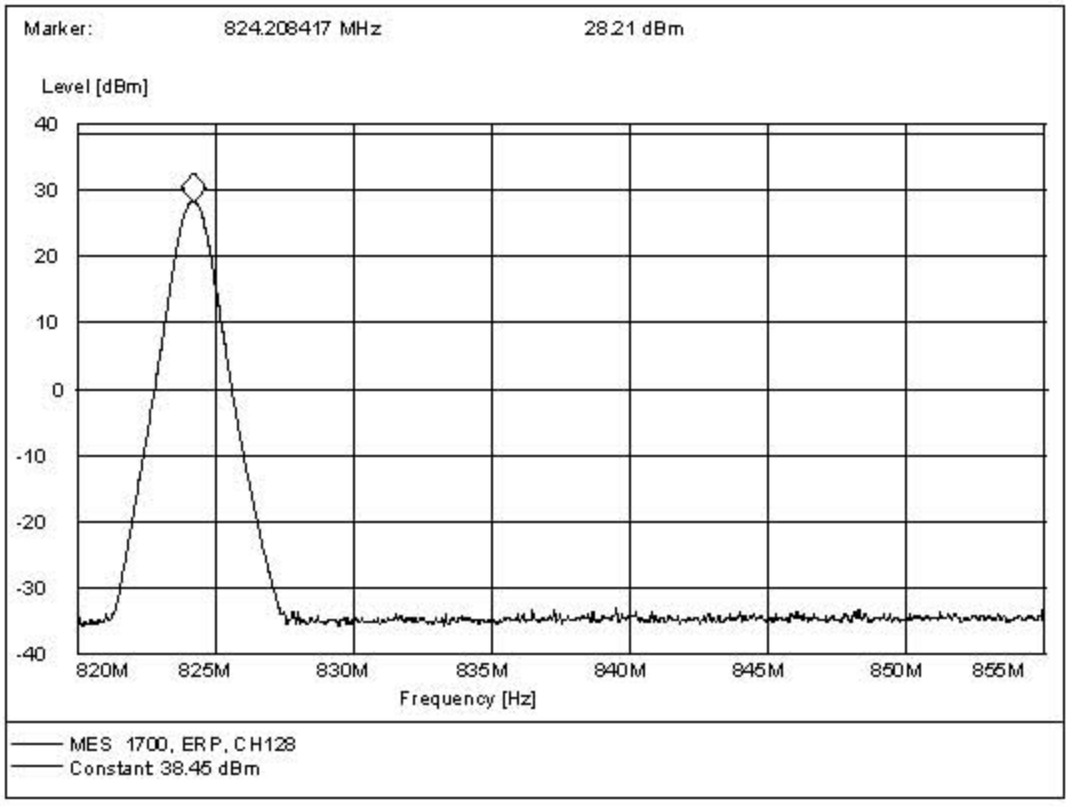
9.5 Test Results

I. GSM850MHz Band

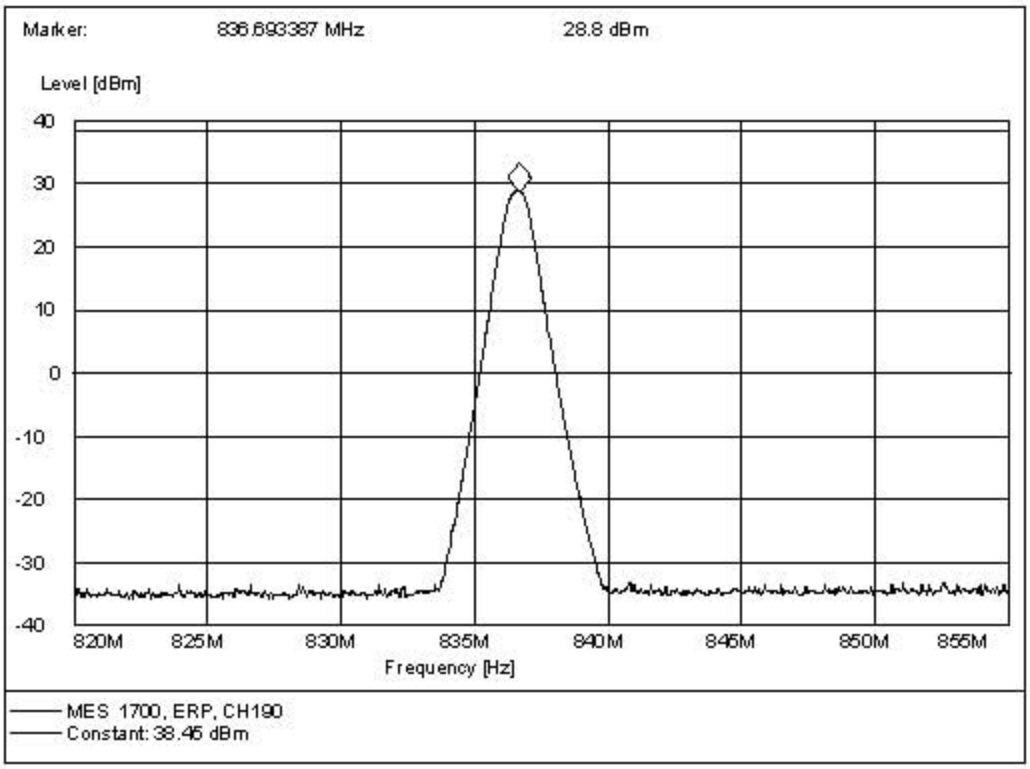
No.	GSM850 Channel No.	Frequency (MHz)	ERP (dBm)	ERP (W)	Limit ERP (W)
1	128	824.20	28.21	0.662	7
2	190	836.60	28.80	0.758	7
3	251	848.80	28.32	0.679	7

Test Plots

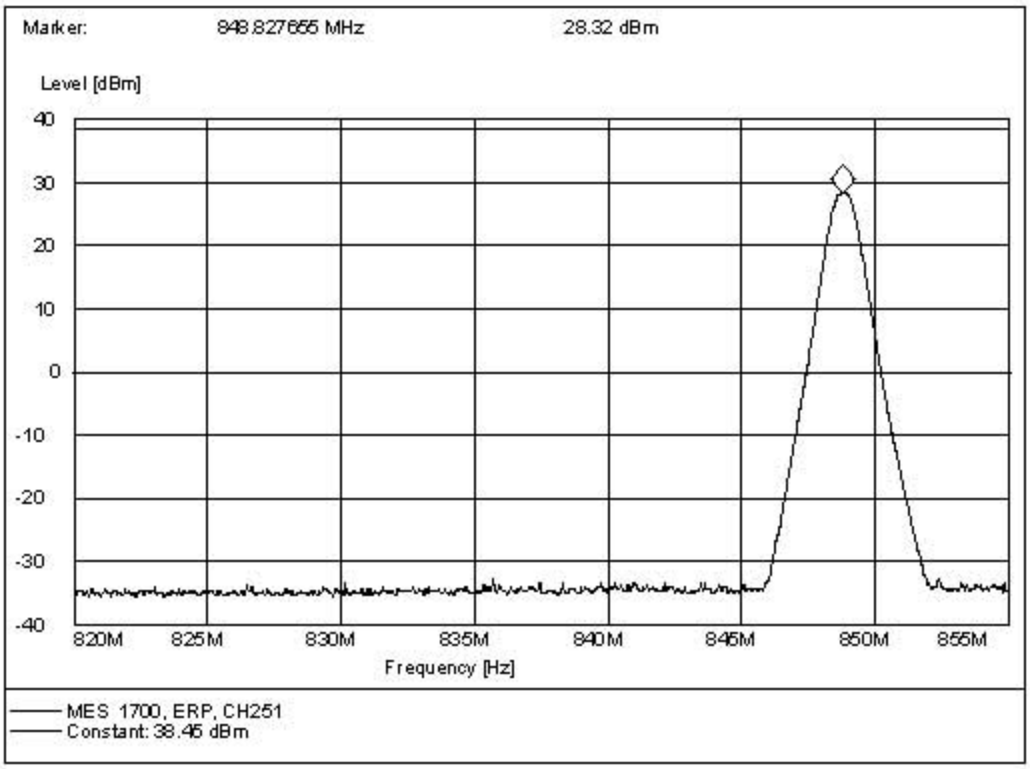
1. Lowest channel No.128



2. Middle channel No.190



3. Highest channel No.251

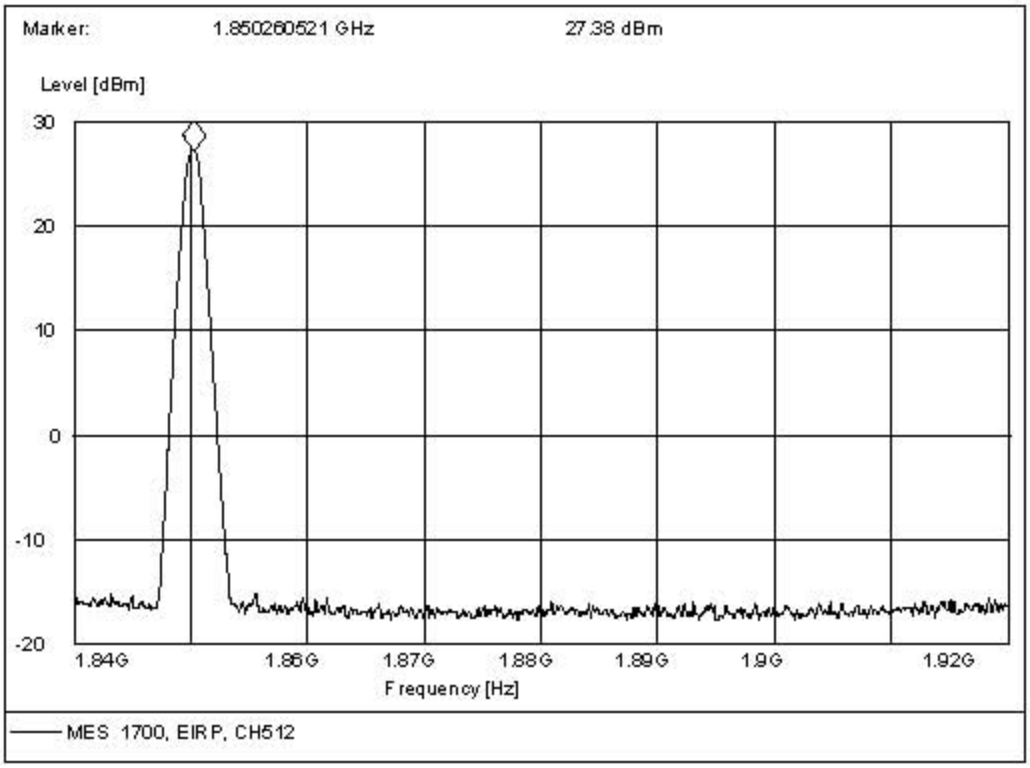


II. PCS 1900MHz Band

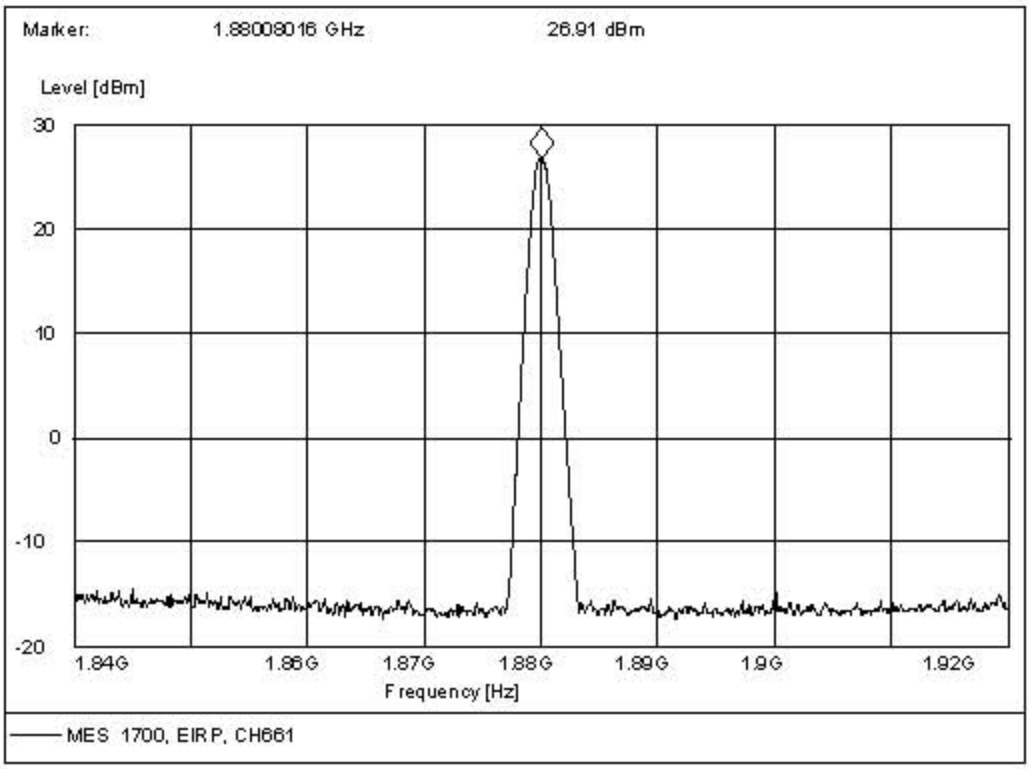
No.	PCS 1900 Channel No.	Frequency (MHz)	EIRP (dBm)	EIRP (W)	Limit EIRP (W)
1	512	1850.20	27.38	0.547	2
2	661	1880.00	26.91	0.490	2
3	810	1909.80	26.07	0.404	2

Test Plots

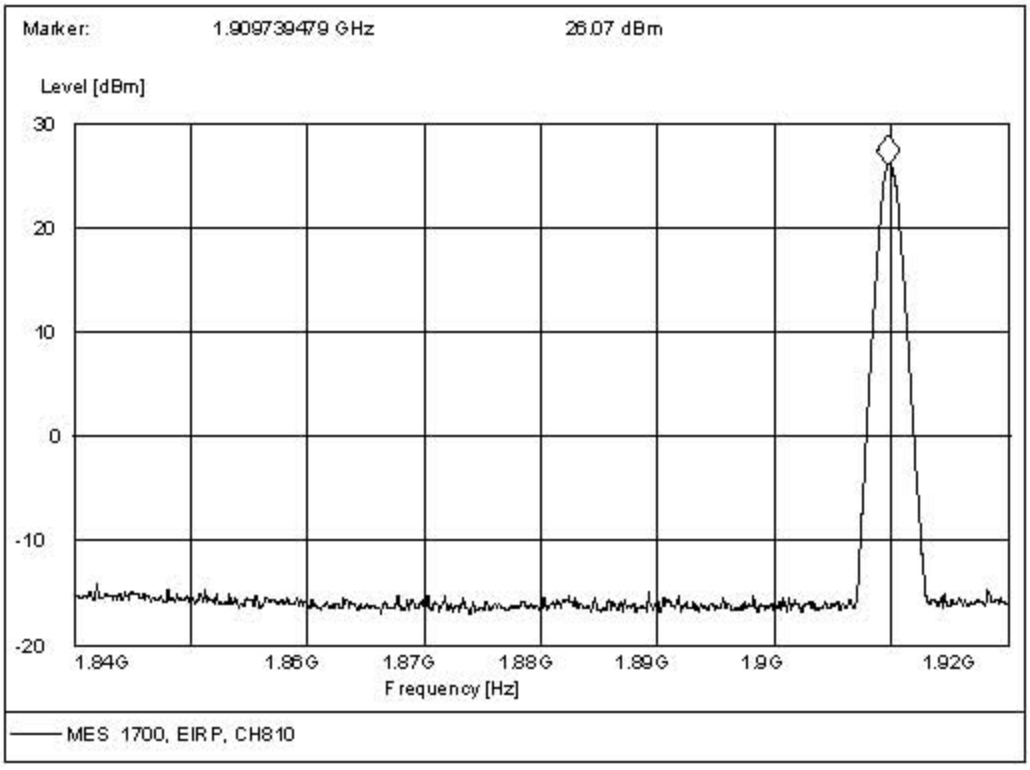
1. Lowest channel No.512



2. Middle channel No.661



3. Highest channel No.810



10 Radiated Spurious Emission Test

10.1 Limits of Radiated Spurious Emission

According to FCC §22.917 (a) and §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.

10.2 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.

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: level 5 for GSM 850 MHz; level 0 for PCS 1900.

The low, middle and high channels were measured respectively: channel No.128 (low) and 251 (high) for GSM 850 MHz; channel No.512 (low) and 810 (high) for PCS 1900.

10.5 Test Results

I. GSM 850MHz Band

No.	Frequency (MHz)	ERP (dBm) Antenna: Vertical	ERP (dBm) Antenna: Horizontal	Limit (dBm)
GSM 850 MHz: Channel No. 128 (824.20 MHz)				
1	1648.40	-45.38	-43.65	-13
2	2472.60	-50.29	-52.51	-13
3	3296.80	-55.14	-55.90	-13
4	4121.00	-53.56	-50.60	-13
5	4945.20	--	--	-13
6	5769.40	--	--	-13
7	6593.60	--	--	-13
8	7417.80	--	--	-13
9	8242.00	--	--	-13
GSM 850 MHz: Channel No. 190 (836.60 MHz)				
10	1673.20	-43.61	-43.18	-13
11	2509.80	-51.18	-50.75	-13
12	3346.40	-53.64	-54.73	-13
13	4183.00	-52.52	-49.15	-13
14	5019.60	--	--	-13
15	5856.20	--	--	-13
16	6692.80	--	--	-13
17	7529.40	--	--	-13
18	8366.00	--	--	-13
GSM 850 MHz: Channel No. 251 (848.80 MHz)				
19	1697.60	-42.90	-42.58	-13
20	2546.40	-50.69	-50.91	-13
21	3395.20	-54.26	-56.43	-13
22	4244.00	-50.84	-48.12	-13
23	5092.80	--	--	-13
24	5941.60	--	--	-13
25	6790.40	--	--	-13
26	7639.20	--	--	-13
27	8488.00	--	--	-13

NOTE:

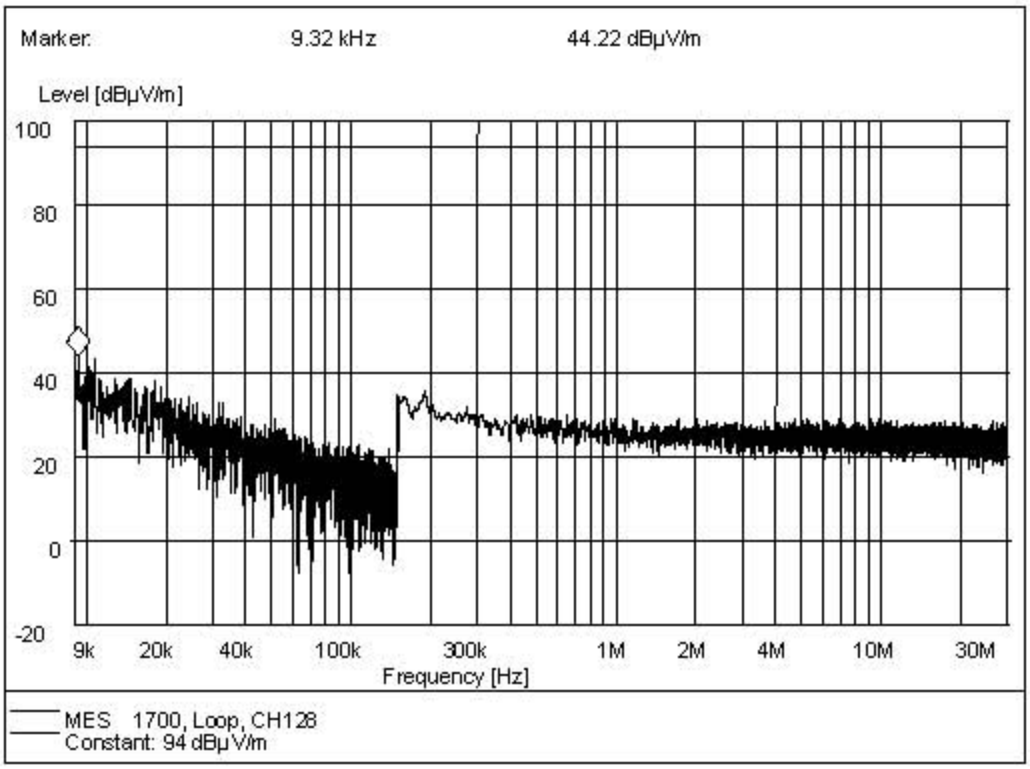
1. V and H are the antenna polarizations: Vertical and Horizontal.
2. The spurious radiations from 9 kHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
3. "--" in the table above means that the emissions are too small to be measured and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

Plot of Spurious Emission

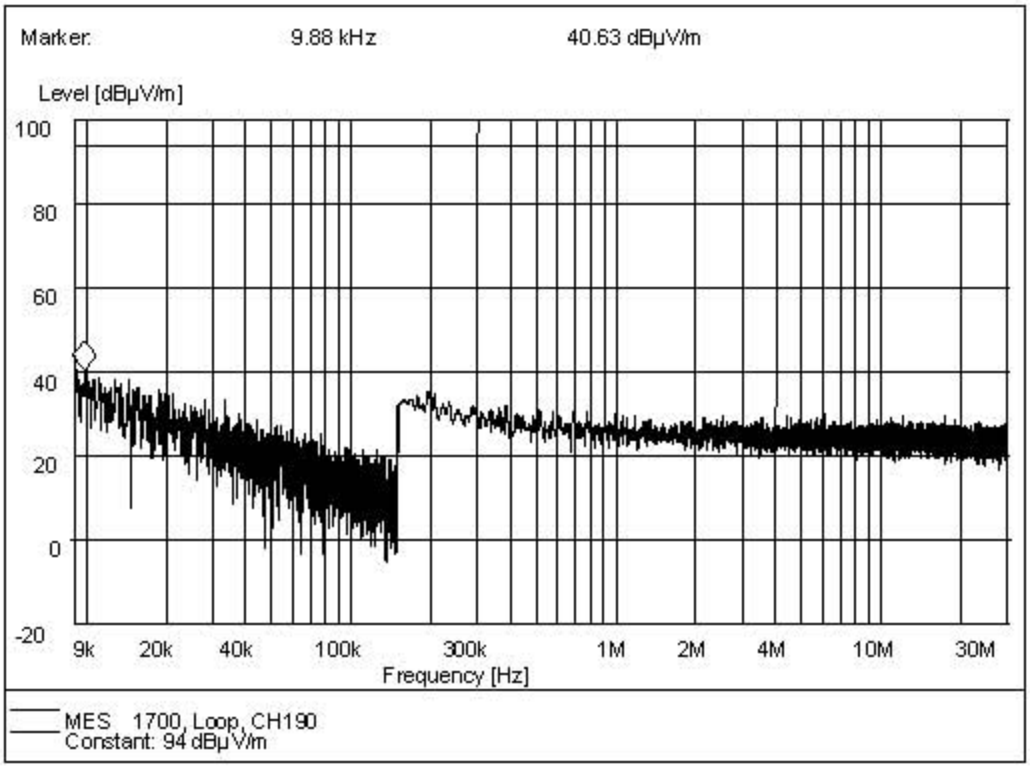
(Note: The marker point is the MS transmitting frequency which should be ignored.)

i. 9kHz to 30MHz

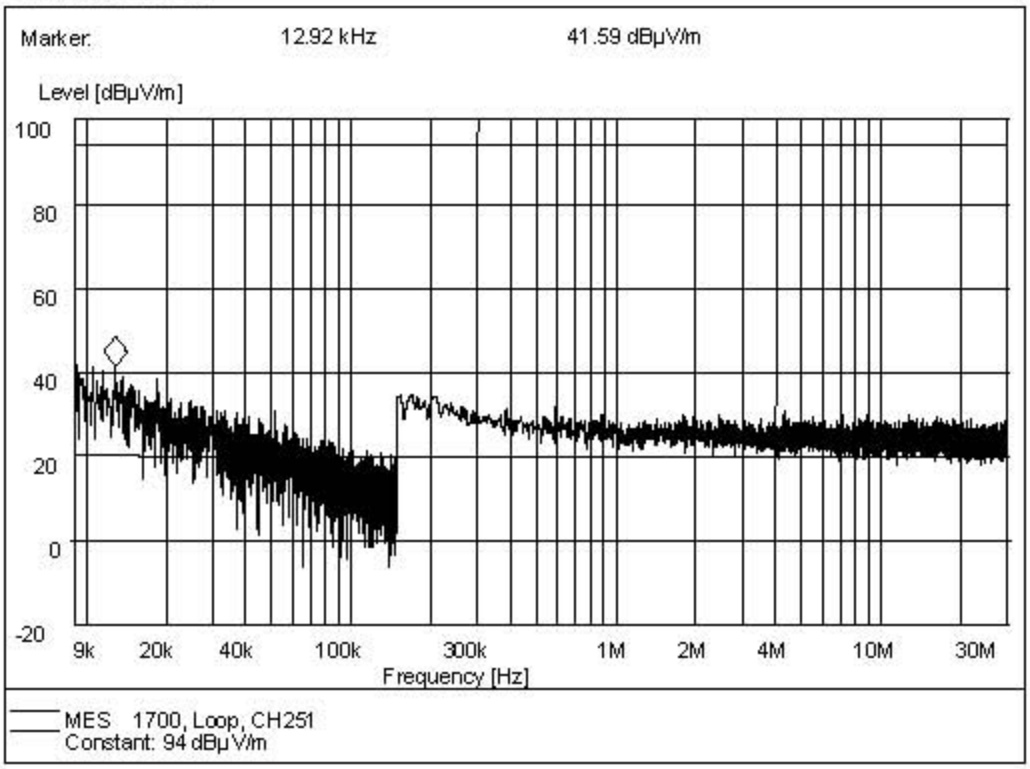
1. Lowest channel No.128



2. Middle channel No.190

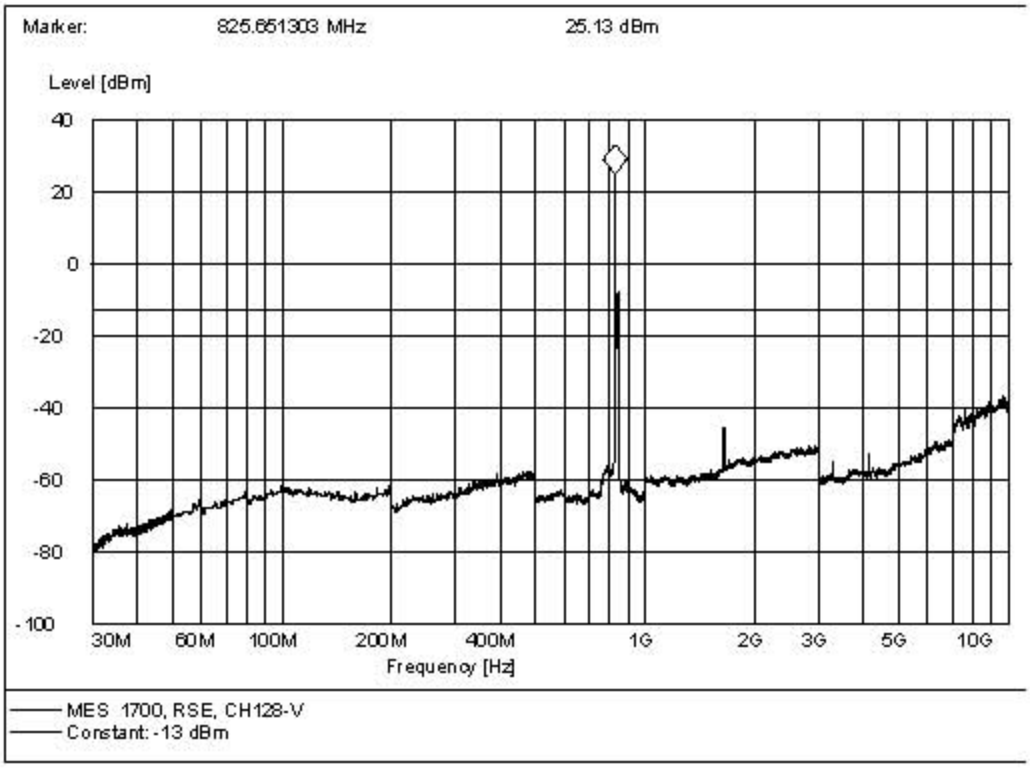


3. Highest channel No.251

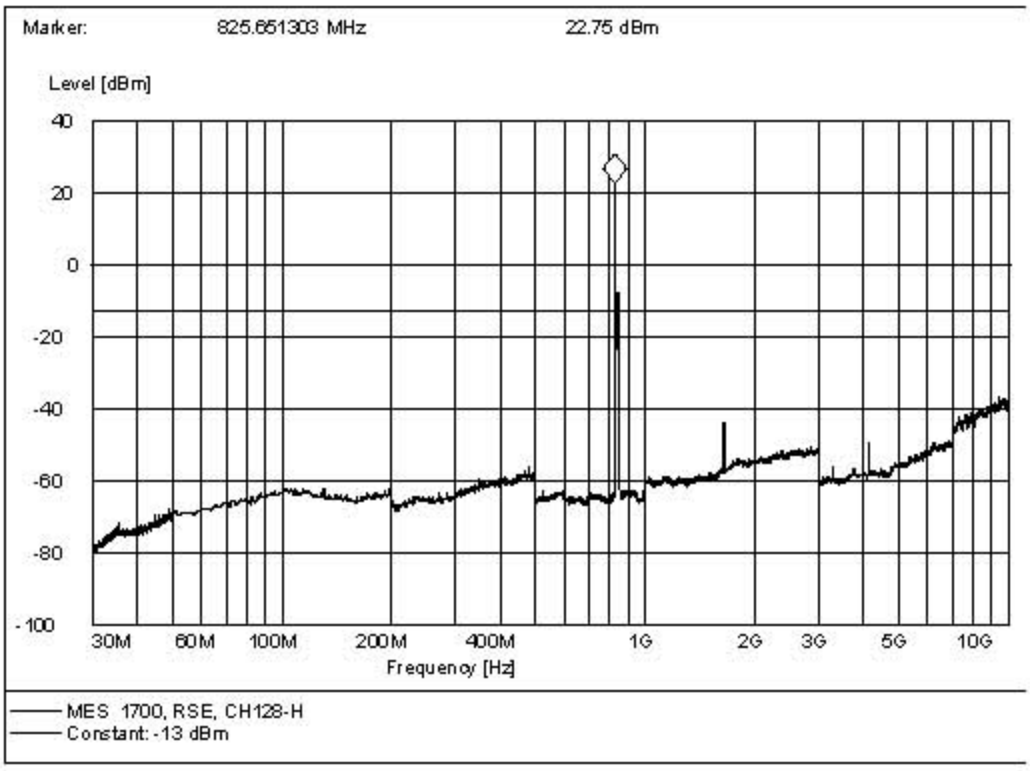


ii. Above 30MHz

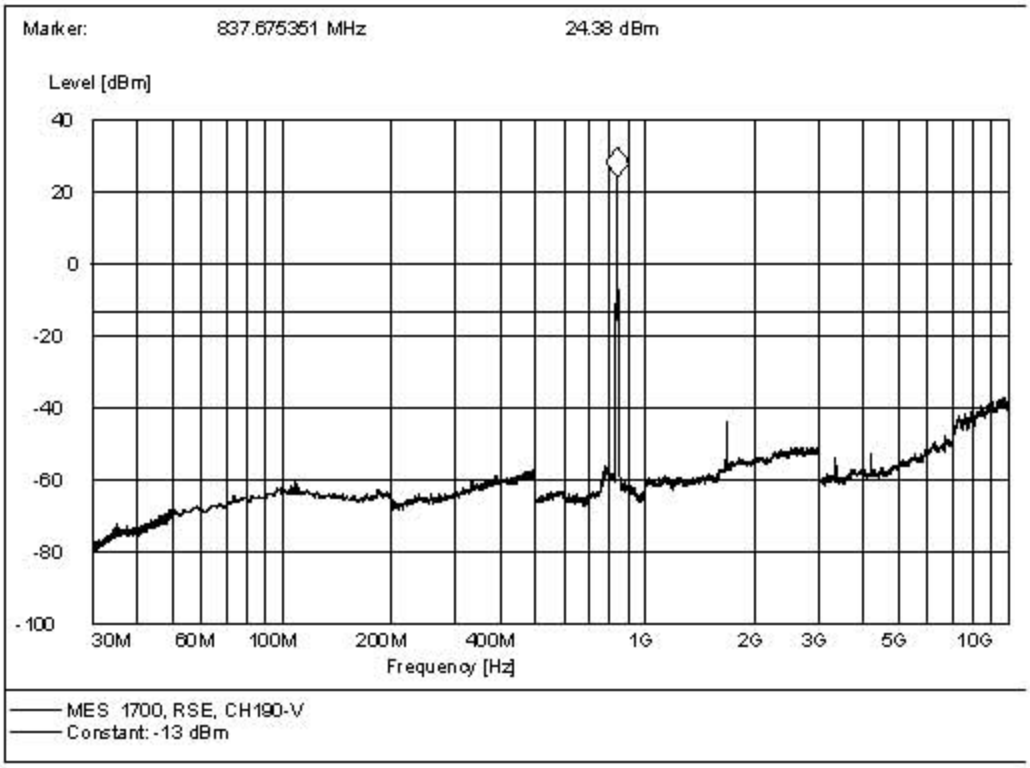
1. Lowest channel No.128, antenna vertical



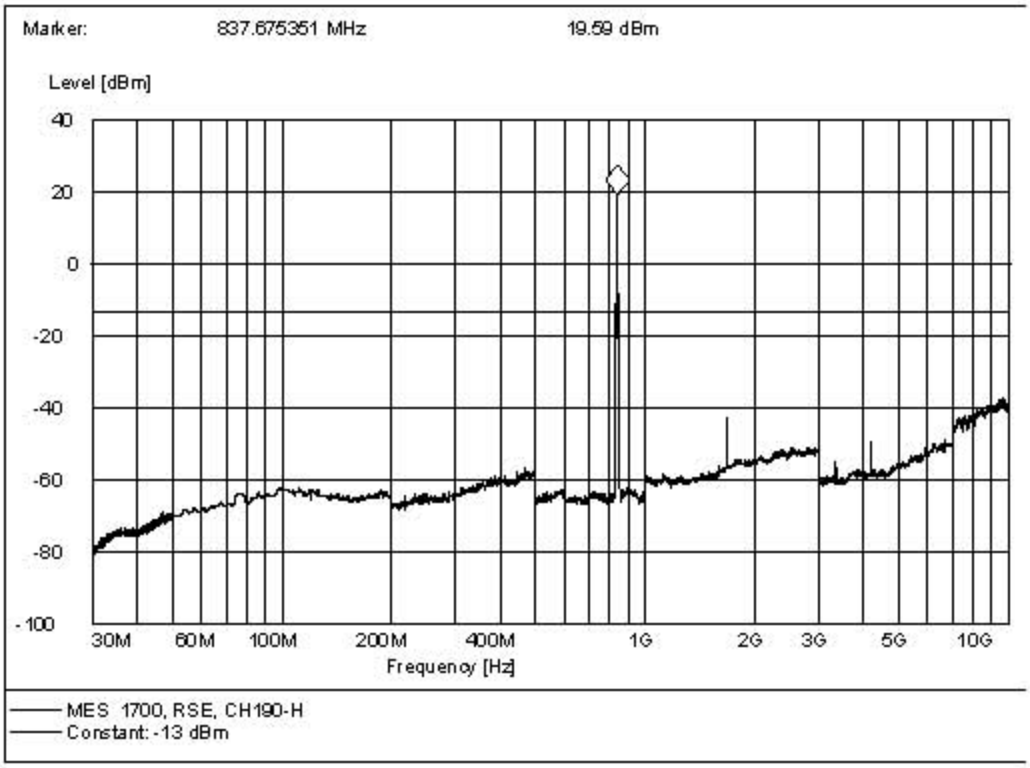
2. Lowest channel No.128, antenna horizontal



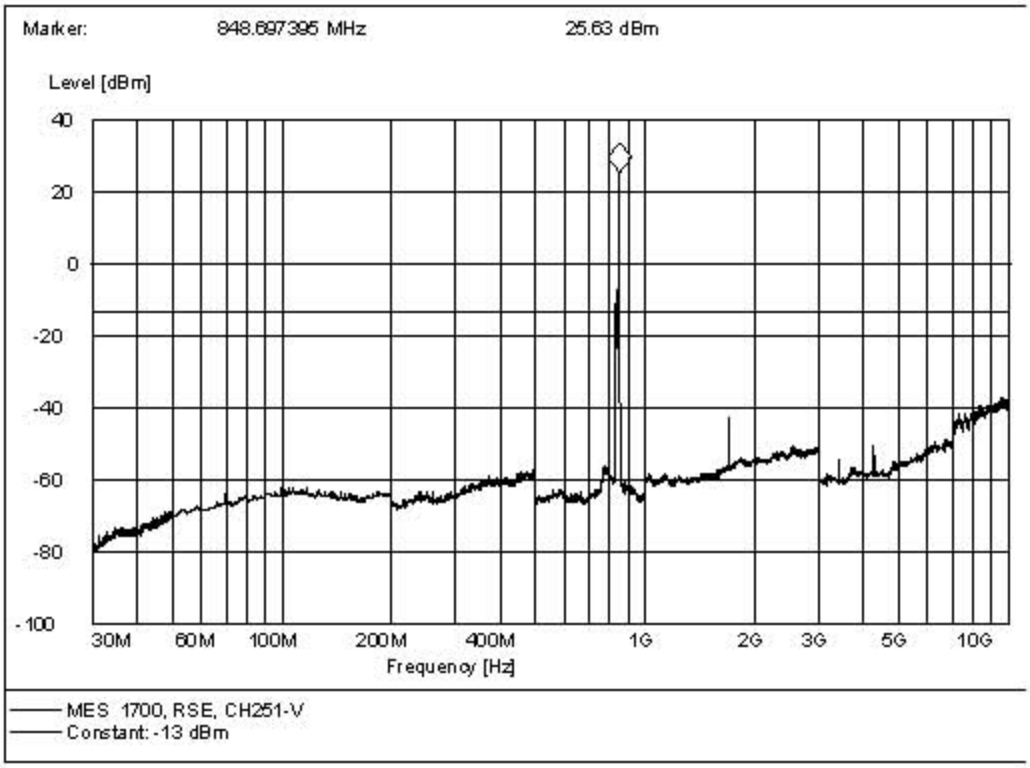
3. Middle channel No.190, antenna vertical



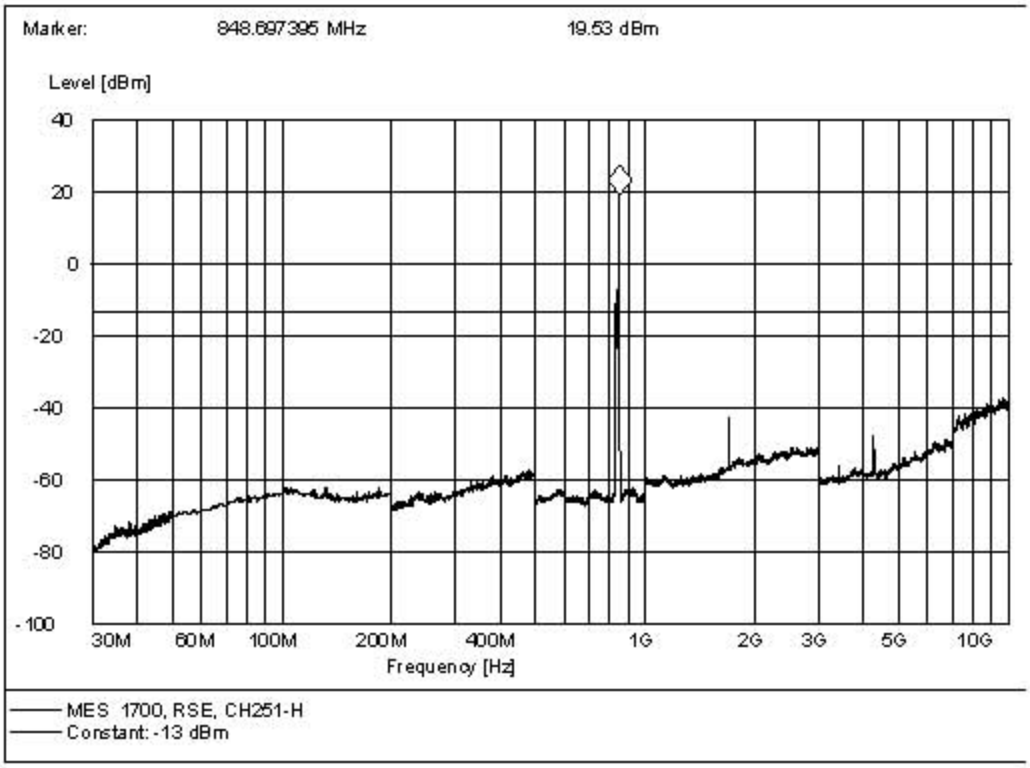
4. Middle channel No.190, antenna horizontal



5. Highest channel No.251, antenna vertical



6. Highest channel No.251, antenna horizontal



II. PCS 1900MHz Band

No.	Frequency (MHz)	ERP (dBm) Antenna: Vertical	ERP (dBm) Antenna: Horizontal	Limit (dBm)
PCS 1900 MHz: Channel No. 512 (1850.20 MHz)				
1	3700.40	-28.62	-35.54	-13
2	5550.60	-44.77	-45.07	-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	-35.17	-38.44	-13
11	5640.00	-41.19	-43.45	-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	-29.57	-39.10	-13
20	5729.40	-41.06	-42.63	-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:

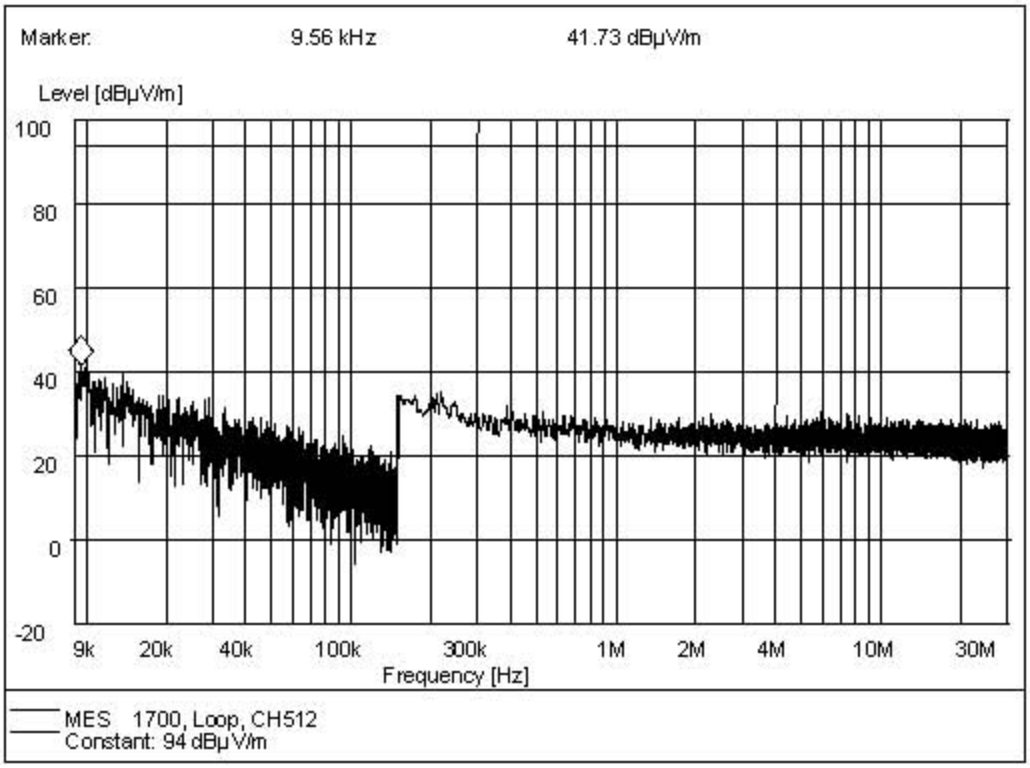
1. V and H are the antenna polarizations: Vertical and Horizontal.
2. The spurious radiations from 30 MHz to 10th harmonic of the fundamental frequency are researched. Only the harmonics are record in the table above.
3. "--" in the table above means that the emissions are too small to be measured and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

Plot of Spurious Emission

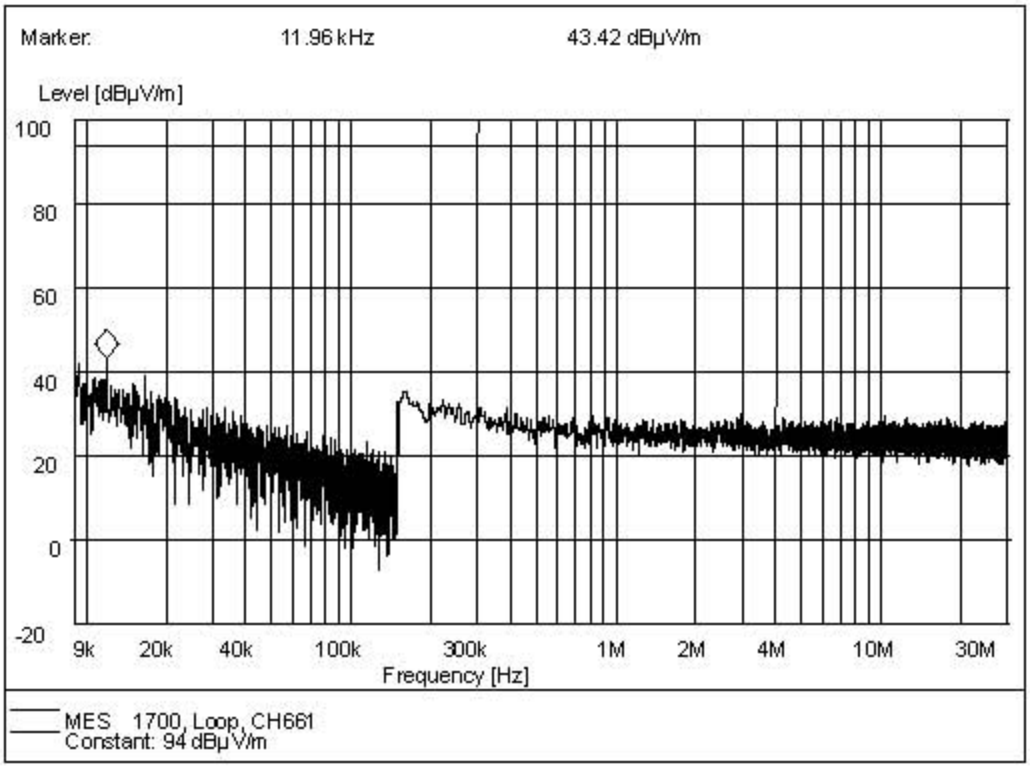
(Note: The marker point is the MS transmitting frequency which should be ignored.)

i. 9kHz to 30MHz

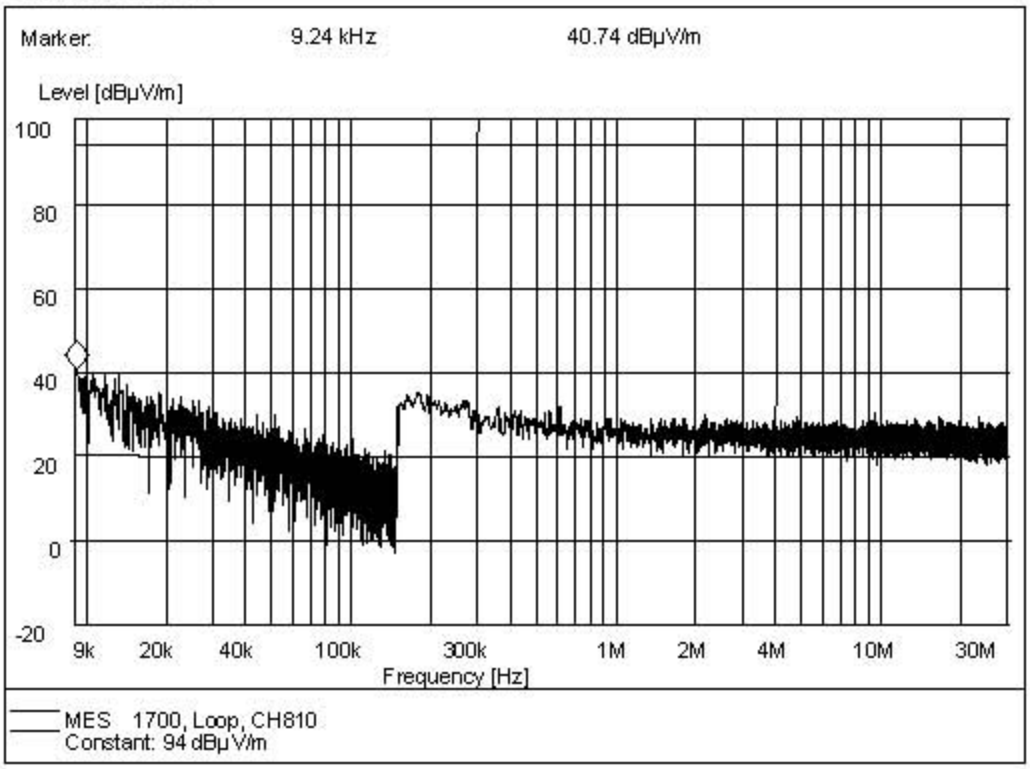
1. Lowest channel No.512



2. Middle channel No.661

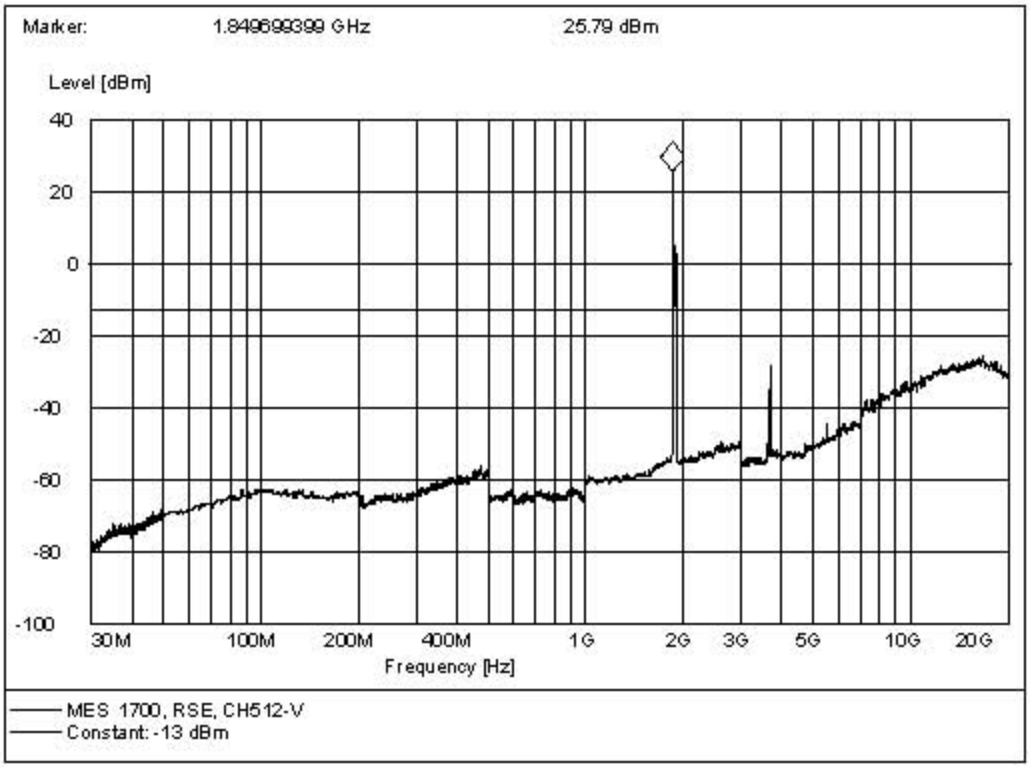


3. Highest channel No.810

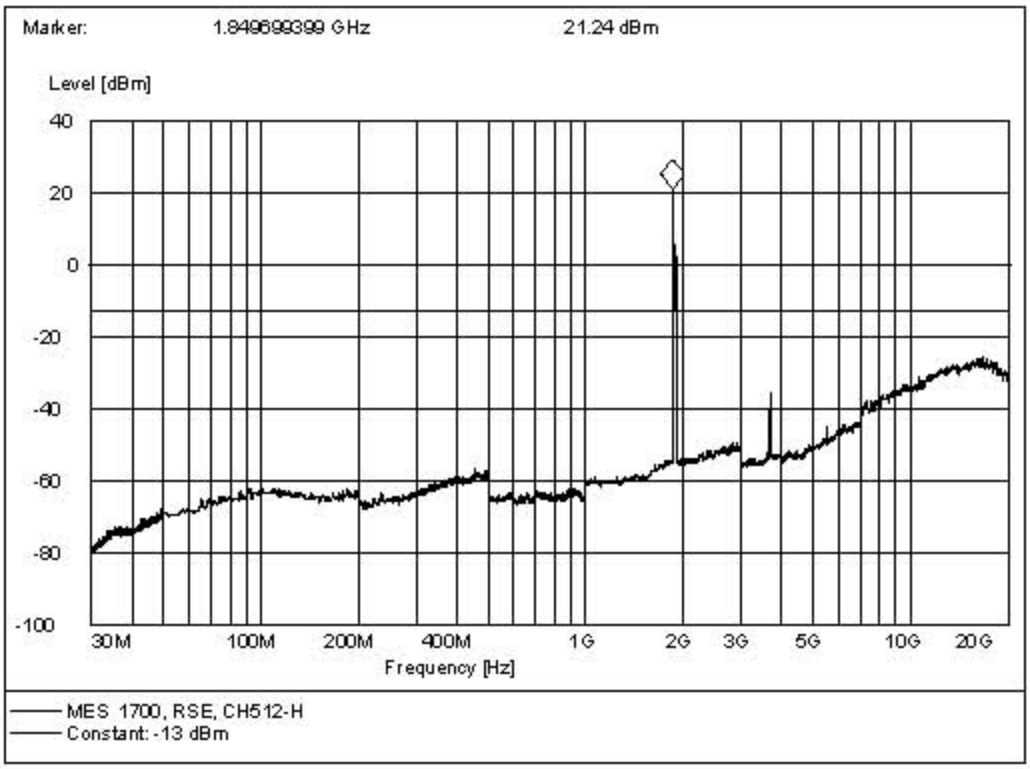


i. Above 30MHz

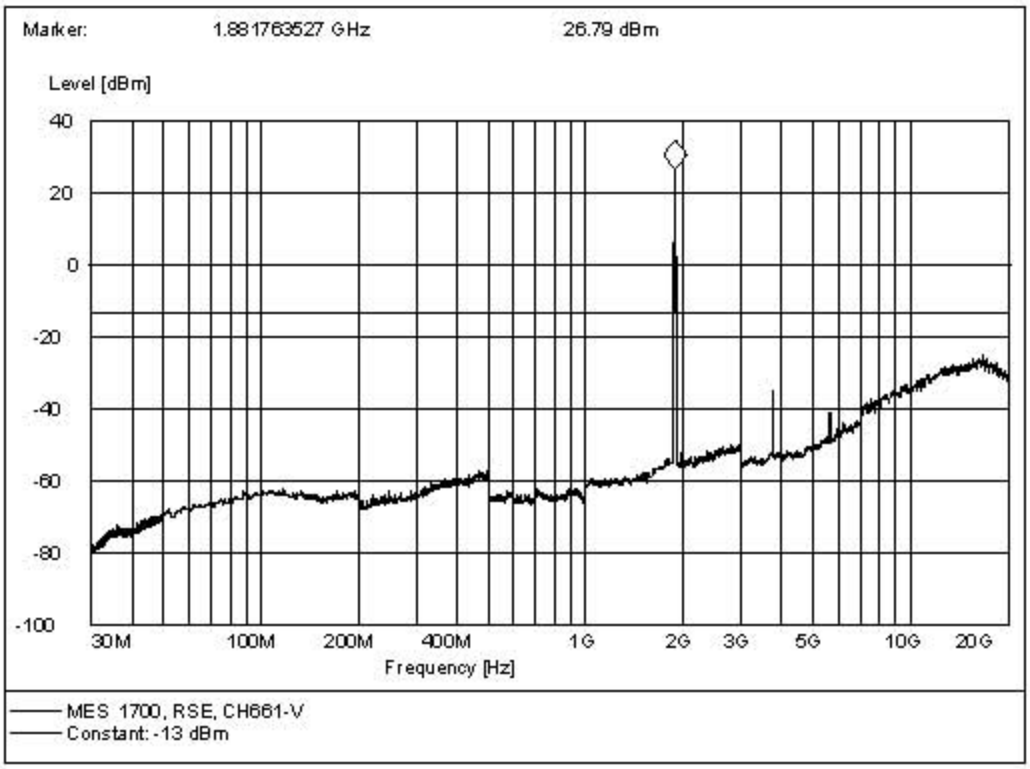
1. Lowest channel No.512, antenna vertical



2. Lowest channel No.512, antenna horizontal



3. Middle channel No.661, antenna vertical



4. Middle channel No.661, antenna horizontal