7.7.2. Radiation measurement for 30MHz~6GHz frequency range

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. For 30MHz to 6GHz frequency range, EUT was set at 3 meters away from the receiving antenna which was mounted on a antenna tower. The antenna moved up and down between 1 to 4 meters for 30MHz to 6GHz frequency range to find out the maximum emission level. Broadband antenna such as calibrated biconical and log- periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4-1992 regulation.

The bandwidth of test receiver was set at 120KHz and resolution bandwidth of spectrum analyzer was set at 1MHz.

7.8. Test Results

PASSED. Please refer to the following pages.

Radiation measurement for channel center attenuation and all the test results were shown on section 7.9.1.

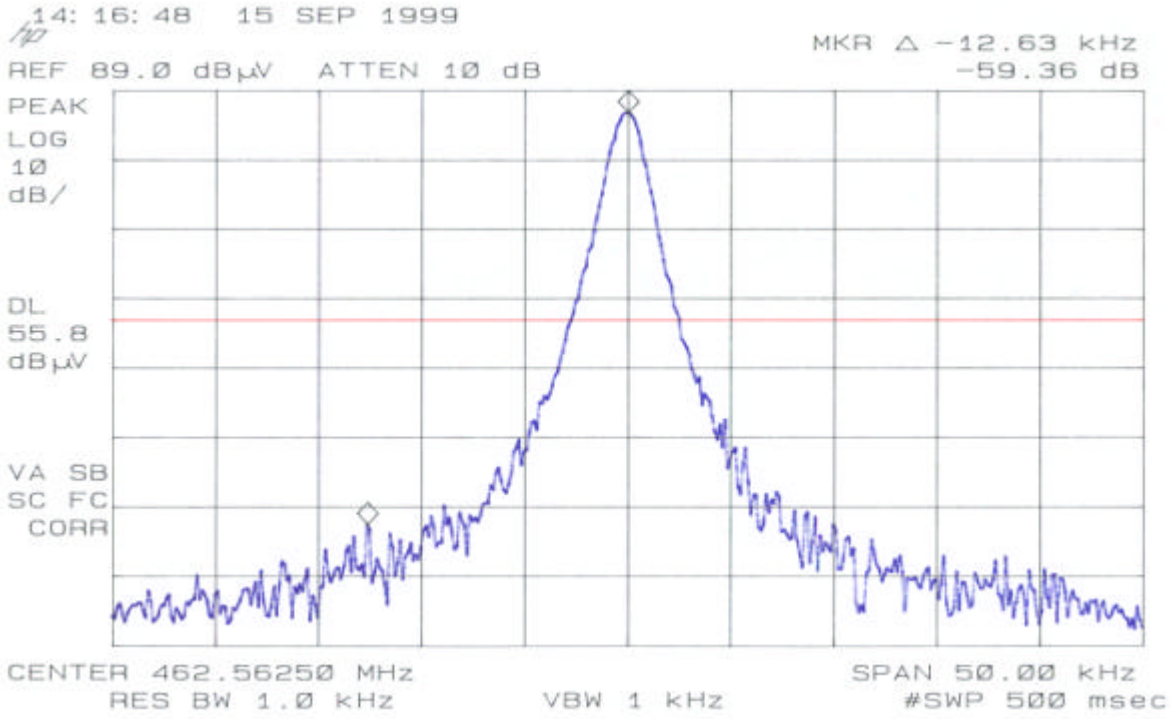
EUT with transmitting mode were done during radiated measurement (30MHz~6GHz frequency range, at No.1 Open Test Site) and all the test results were shown on section 7.9.2.

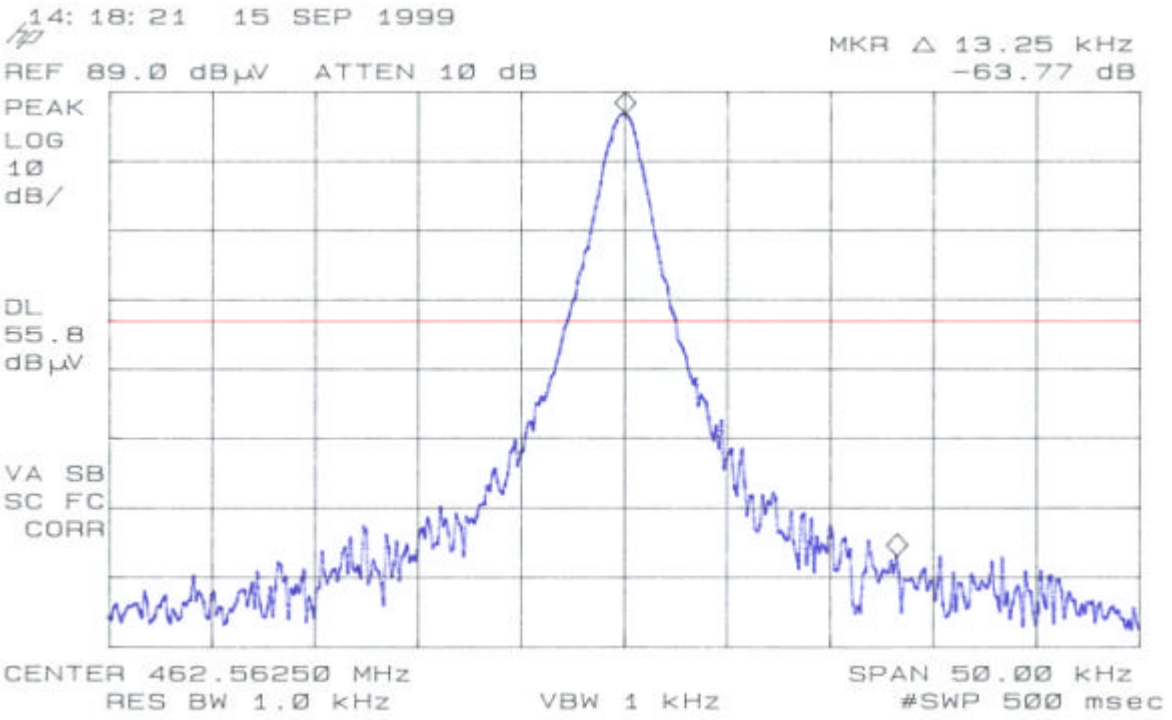
EUT with receiving mode were done during radiated measurement (30MHz~6GHz frequency range, at No.1 Open Test Site) and all the test results were shown on section 7.9.3.

7.9. Radiated Emission Measurement Results

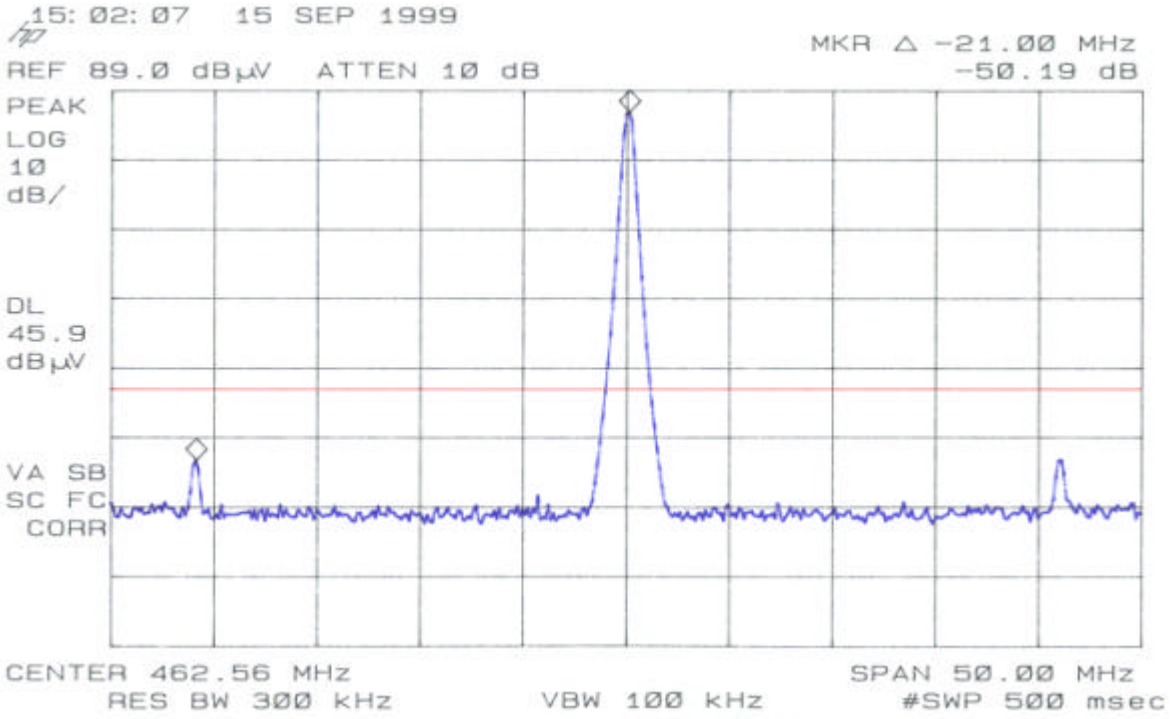
7.9.1. Channel Center Attenuation Measurement Results

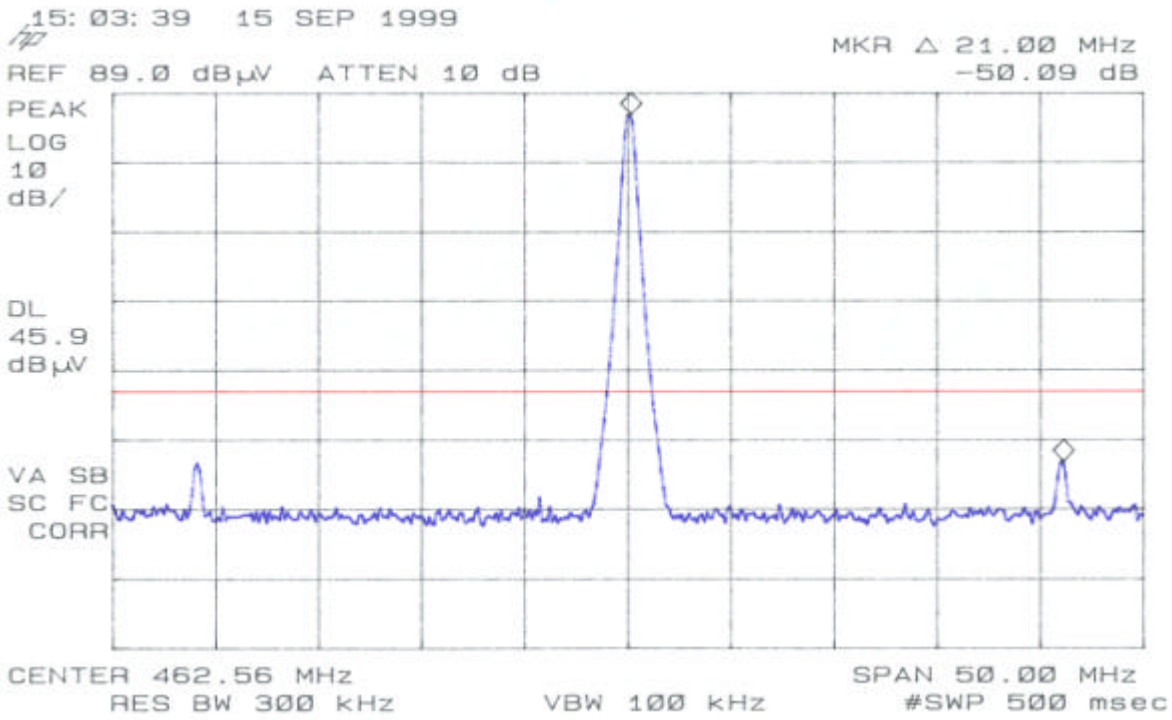
Channel 1 : 462.5625MHz





Channel 1 : 462.5625MHz





7.9.2. Transmitter, 30MHz ~ 6GHz Frequency Range Measurement Results

The frequency spectrum from 30 MHz to 6GHz MHz was investigated. All the emissions not reported below are too low against the FCC officinal limit.

Date of Test： Oct. 28, 1999 Temperature： 23.1℃

EUT： FRS Radio Transceiver Humidity： 67%

Test Mode： Transmitter / Transmitting Mode

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBµV	Emission Level Horizontal dBµV/m	Limits dBµV/m	Margin dB
462.564	16.86	4.32	87.43	108.61	Fundamental Freq.	
925.130	23.07	6.23	31.97	61.27	85.60	24.33
1387.000	25.65	4.68	33.91	64.24	85.60	21.36
1850.000	26.56	5.49	31.82	63.87	85.60	21.73
2312.000	27.77	6.14	32.95	66.86	85.60	18.74
2775.000	29.61	6.77	21.53	57.91	85.60	27.69
3237.000	31.04	7.44	13.14	51.63	85.60	33.98

Remark： 1. All readings are Peak values.

2. Measurement up to 10th harmonic (6GHz) but the emission level above 3GHz were too low against the official limit and not reported.
2. Harmonic limits is
= max. emission level – 43+10 log (carrier power in watts)
= 113.34 –43+10 log (0.029785) = 85.60dB.

Date of Test： Oct. 28, 1999 Temperature： 23.1℃

EUT： FRS Radio Transceiver Humidity： 67%

Test Mode： Transmitter / Transmitting Mode

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
462.565	16.90	4.32	92.12	113.34	Fundamental	Freq.
925.127	23.53	6.23	39.86	69.62	85.60	15.98
1387.000	25.65	4.68	33.08	63.41	85.60	22.19
1850.000	26.56	5.49	28.11	60.16	85.60	25.44
2312.000	27.77	6.14	30.80	64.71	85.60	20.89
2775.000	29.61	6.77	21.74	58.12	85.60	27.48
3237.000	31.04	7.44	19.40	57.88	85.60	27.72

Remark： 1. All readings are Peak values.

3. Measurement up to 10th harmonic but the emission level above 3GHz were too low against the official limit and not reported.

4. Harmonic limits is
= max. emission level – 43+10 log (carrier power in watts)
= 113.34 –43+10 log (0.029785) = 85.60dB.

7.9.3. Receiver, 30MHz ~ 6GHz Frequency Range Measurement Results

The frequency spectrum from 30 MHz to 6GHz was investigated. All the emissions not reported below are too low against the FCC officinal limit.

Date of Test： Oct. 28, 1999 Temperature： 23.1℃

EUT： FRS Radio Transceiver Humidity： 67%

Test Mode： Receiver / Receiving Mode

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dBμV	Emission Level Horizontal dBμV/m	Limits dBμV/m	Margin dB
30.368	26.17	1.26	-4.51	22.92	40.00	17.08
46.943	18.70	1.51	-3.70	16.51	40.00	23.49
57.039	14.73	1.65	0.19	16.57	40.00	23.43
65.318	12.09	1.76	-2.09	11.76	40.00	28.24
85.547	14.12	1.88	-0.22	15.78	40.00	24.22
119.815	19.25	2.07	-1.90	19.42	43.50	24.08
143.811	20.36	2.30	-1.23	21.43	43.50	22.07
189.563	22.03	2.77	-0.73	24.07	43.50	19.43
247.311	23.81	3.21	-1.45	25.57	46.00	20.43
316.790	13.99	3.68	-1.23	16.44	46.00	29.56
333.870	14.77	3.88	0.74	19.39	46.00	26.61
368.068	15.94	3.85	-0.93	18.86	46.00	27.14
413.645	15.91	4.20	-0.11	20.00	46.00	26.00
464.924	17.00	4.43	-1.12	20.31	46.00	25.69
509.869	17.36	4.59	1.24	23.19	46.00	22.81

Remark： 1. All readings are Quasi-Peak values.
2. Measurement up to 6GHz but the emission level above 1GHz were too low against the official limit and not reported.

Date of Test： Oct. 28, 1999 Temperature： 23.1℃

EUT： FRS Radio Transceiver Humidity： 67%

Test Mode： Receiver / Receiving Mode

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dBμV	Emission Level Vertical dBμV/m	Limits dBμV/m	Margin dB
49.423	17.02	1.59	4.48	23.09	40.00	16.91
56.948	15.37	1.65	1.83	18.85	40.00	21.15
63.752	13.96	1.72	1.21	16.89	40.00	23.11
85.146	14.39	1.89	6.66	22.94	40.00	17.06
113.766	16.51	2.03	5.59	24.13	43.50	19.37
138.194	21.02	2.24	-2.47	20.79	43.50	22.71
162.454	22.53	2.53	-1.28	23.78	43.50	19.72
227.199	22.99	3.07	0.45	26.51	46.00	19.49
256.447	24.17	3.36	1.45	28.98	46.00	17.02
321.859	13.92	3.87	-0.86	16.93	46.00	29.07
333.254	13.80	3.87	0.27	17.94	46.00	28.06
384.528	14.70	4.04	-1.27	17.47	46.00	28.53
407.316	15.14	4.19	0.35	19.68	46.00	26.32
430.107	15.65	4.23	0.54	20.42	46.00	25.58
441.501	15.91	4.47	3.06	23.44	46.00	22.56

Remark： 1. All readings are Quasi-Peak values.
2. Measurement up to 6GHz but the emission level above 1GHz were too low against the official limit and not reported.

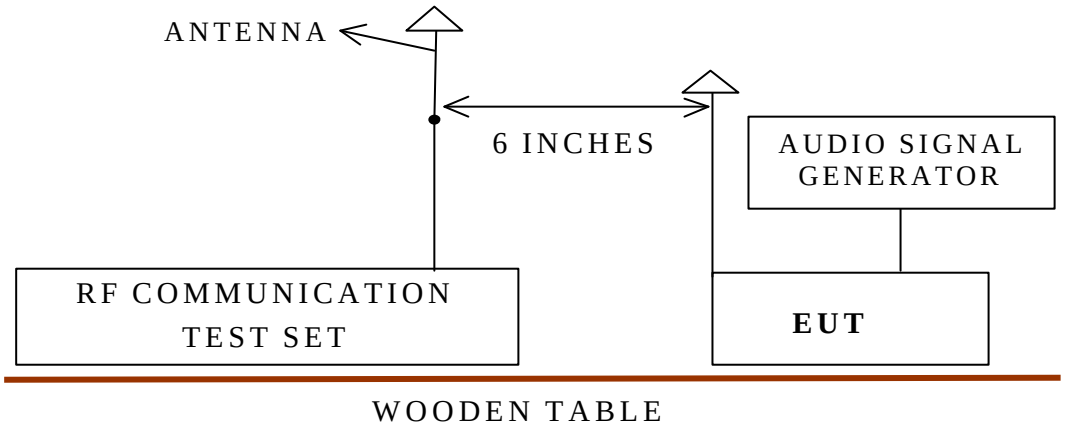
8. PEAK FREQUENCY TEST

8.1. Test Equipment

The following test equipment were used during the Peak Frequency Test：

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Communication Test Set	HP	8920A	3524A07043	Dec. 05, 98’	1 Year
2.	Audio Signal Generator	HP	8904A	3633A08312	Oct. 08, 99’	1 Year
3.	Antenna	EMCO	4610	9410-1274	Dec. 28, 98’	1 Year

8.2. Block Diagram of Test Setup



8.3. Test Rules

CRF 47 Part 95 §95.637 (a)

8.4. Specification Limits

A FRS unit that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 2.5KHz.

8.5. EUT’s Configuration during Compliance Measurement

The configuration of EUT were same as section 4.5.

8.6. Test Procedure

8.6.1. Setup the EUT and test equipment as shown on 8.2.

8.6.2. Feed 1KHz Signal into audio input terminal with enough field strength to let system to have 50% deviation.

8.6.3. Increasing signal strength up to 16dB and changing the frequency from 300Hz to 3KHz with 300Hz increment for each step.

8.6.4. Recording the peak frequency deviation.

8.7. Frequency Modulation Measurement Results

Date of Test: Oct. 26, 1999

Test Channel No.: Channel 1

Frequency (MHz)	**Peak Frequency Deviation (KHz)**
300 Hz	**0.30**
600 Hz	**1.47**
900 Hz	**2.10**
1200 Hz	**1.77**
1500 Hz	**1.66**
1800 Hz	**1.49**
2100 Hz	**1.39**
2400 Hz	**1.35**
2700 Hz	**1.31**
3000 Hz	**1.29**

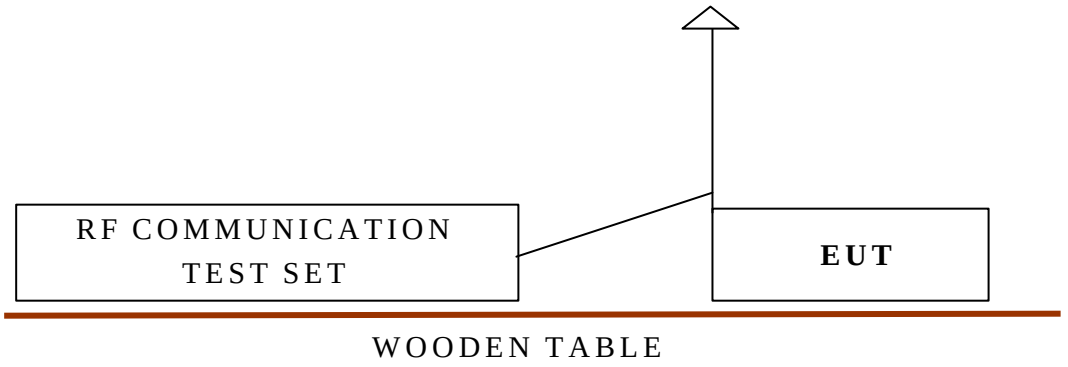
9. MAXIMUM TRANSMITTER POWER TEST

9.1. Test Equipment

The following test equipment were used during the Maximum Transmitter Power Test：

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Communication Test Set	HP	8920A	3524A07043	Dec. 05, 98’	1 Year

9.2. Block Diagram of Test Setup



9.3. Test Rules

CRF 47 Part 95 §95.639 (d)

9.4. Specification Limits

A FRS unit, under any condition of modulation, shall exceed 0.5000W effective radiated power.

9.5. EUT’s Configuration during Compliance Measurement

The configuration of EUT were same as section 3.5.

9.6. Test Procedure

9.6.1. Setup the EUT and test equipment as shown on 9.2.

9.6.2. The EUT was placed on a wooden table and through coaxial cable from EUT's antenna connected to RF Communication Test Set.

9.6.3. Recorded the max. emission power from EUT showing on the RF Communication Test Set.

9.7. Maximum Transmitter Power Measurement Results

Date of Test: Aug. 14, 1999

Test Channel : Channel 1

This FRS unit its maximum transmitter power is 0.029785W (29.785mW).

10.FRS UNIT TRANSMITTER ANTENNA

10.1. Compliance Rules

CRF 47 Part 95 §95.647

10.2. Results

This EUT's transmitter antenna is an integral part of the transmitter , no gain and vertically polarized, please refer to attached EUT photographs .