

7 - PEAK POWER SPECTRAL DENSITY

7.1 Standard Applicable

According to §15.247 (d), digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.2 Measurement Procedure

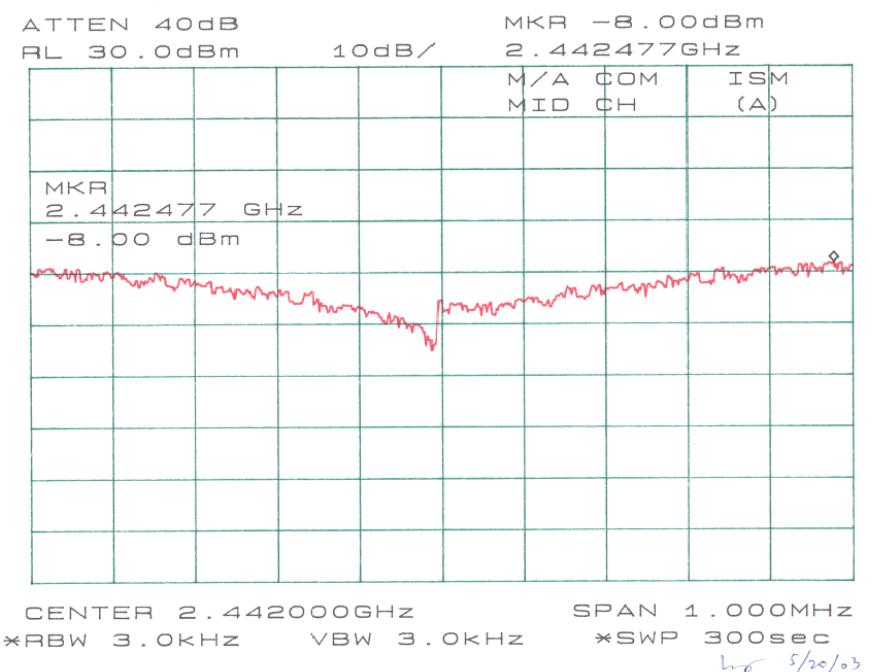
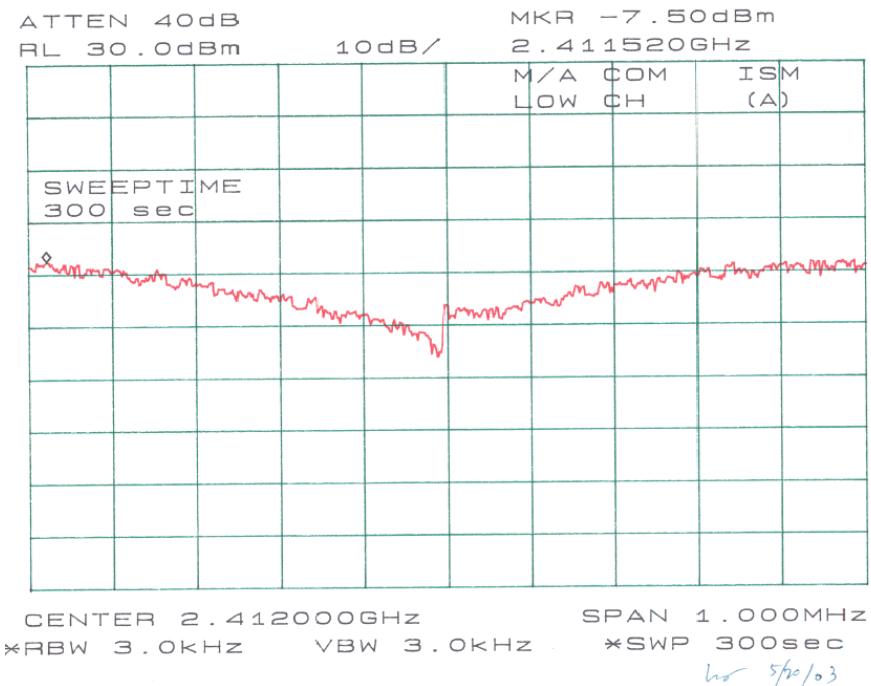
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 6MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Repeat above procedures until all frequencies measured were complete.

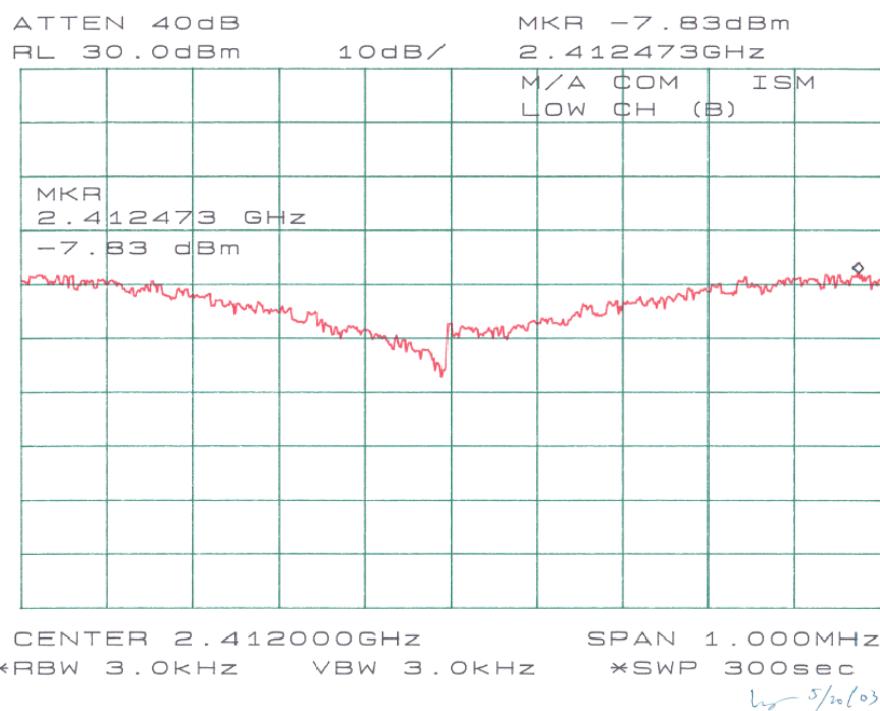
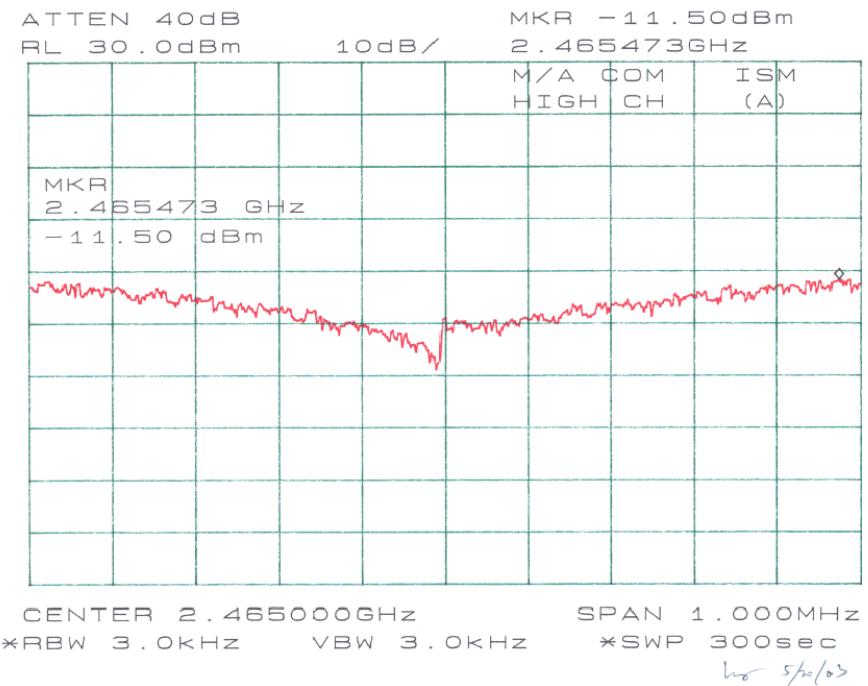
7.3 Test Equipment

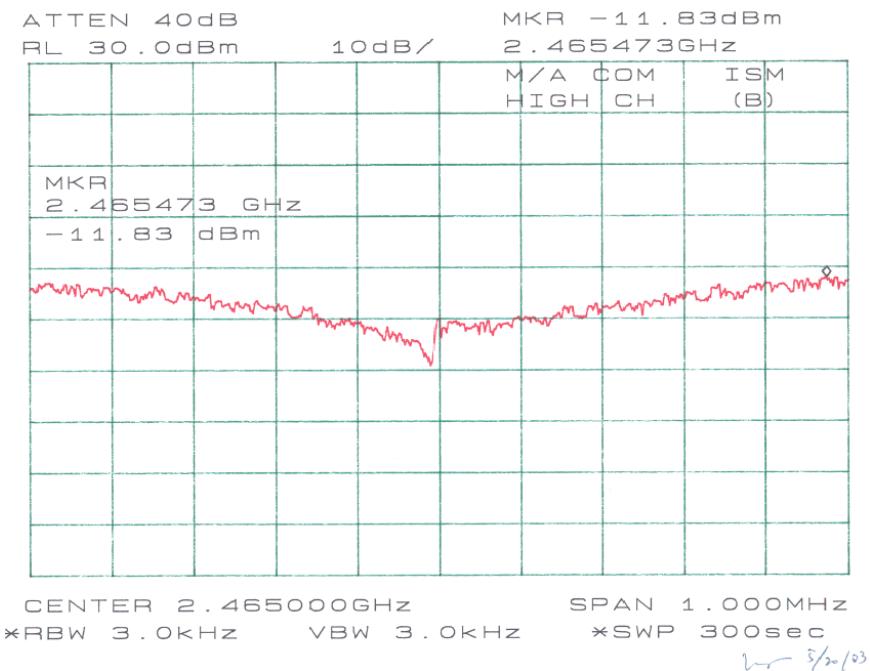
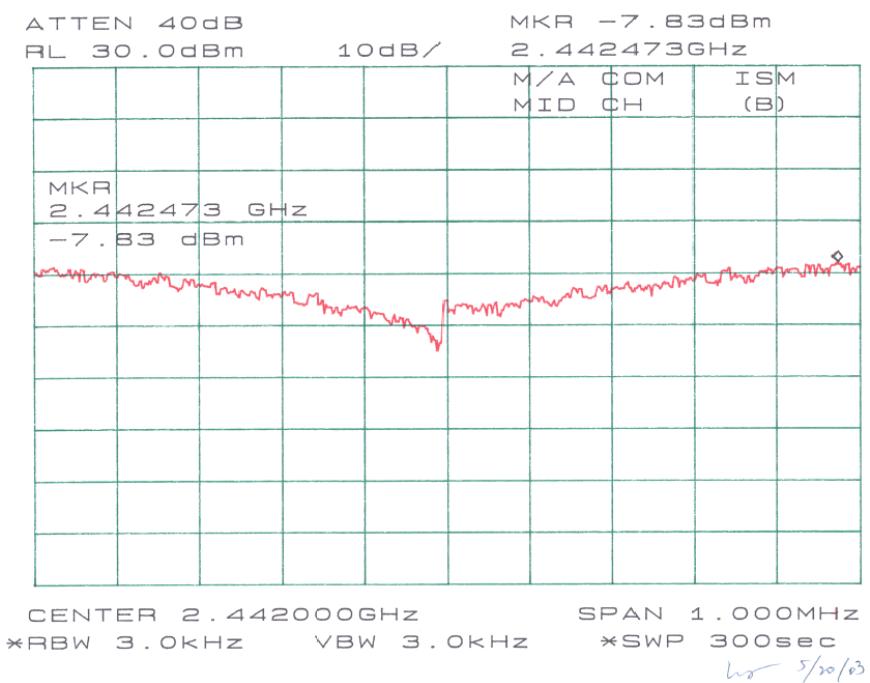
Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8564E	Spectrum Analyzer	2003-12-06

7.4 Measurement Results

	Frequency (MHz)	Peak Power Spectral Density	Standard (dBm)	Result
Port A	2412	-7.5	≤ 8	Compliant
	2442	-8.0	≤ 8	Compliant
	2465	-11.50	≤ 8	Compliant
Port B	2412	-7.83	≤ 8	Compliant
	2442	-7.83	≤ 8	Compliant
	2465	-11.83	≤ 8	Compliant







8 - 100 KHZ BANDWIDTH OF BAND EDGES

8.1 Standard Applicable

According to §15.247(c), in *any* 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) see §15.205(c)).

8.2 Measurement Procedure

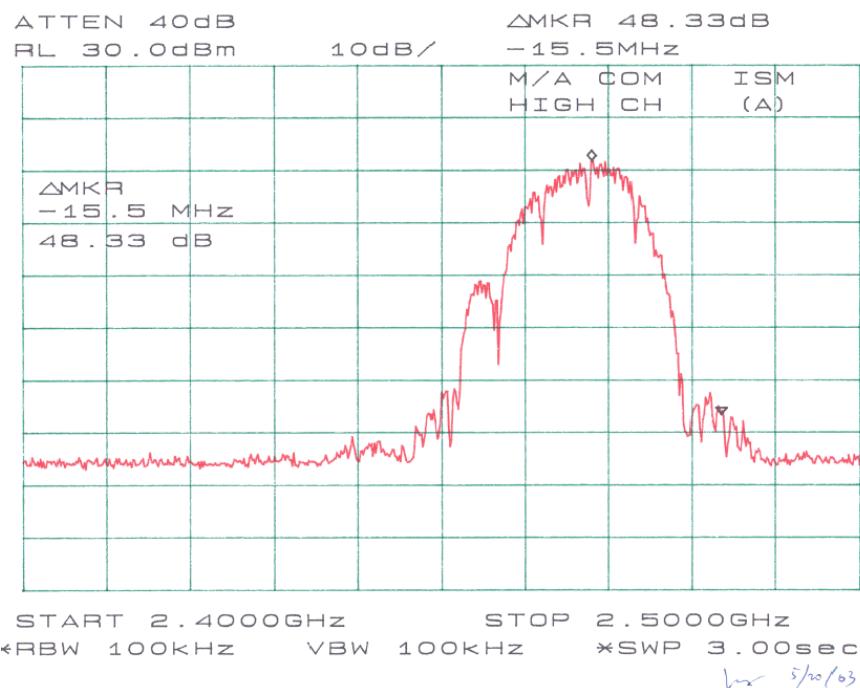
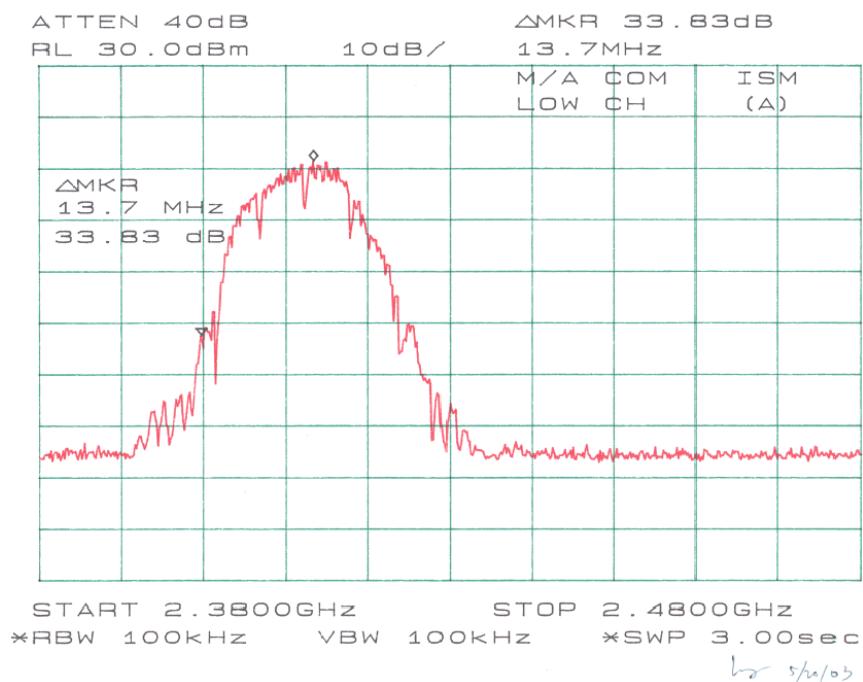
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

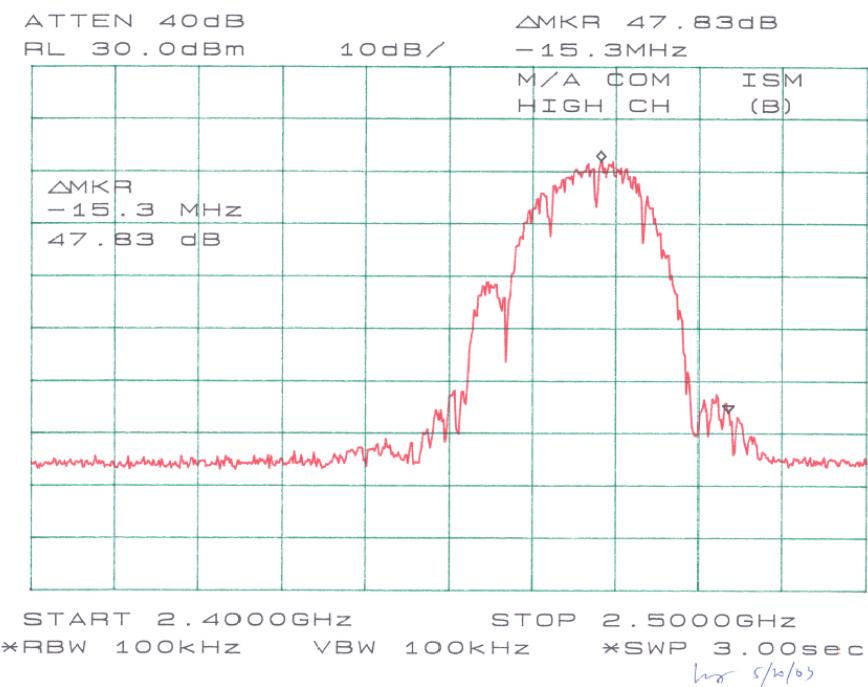
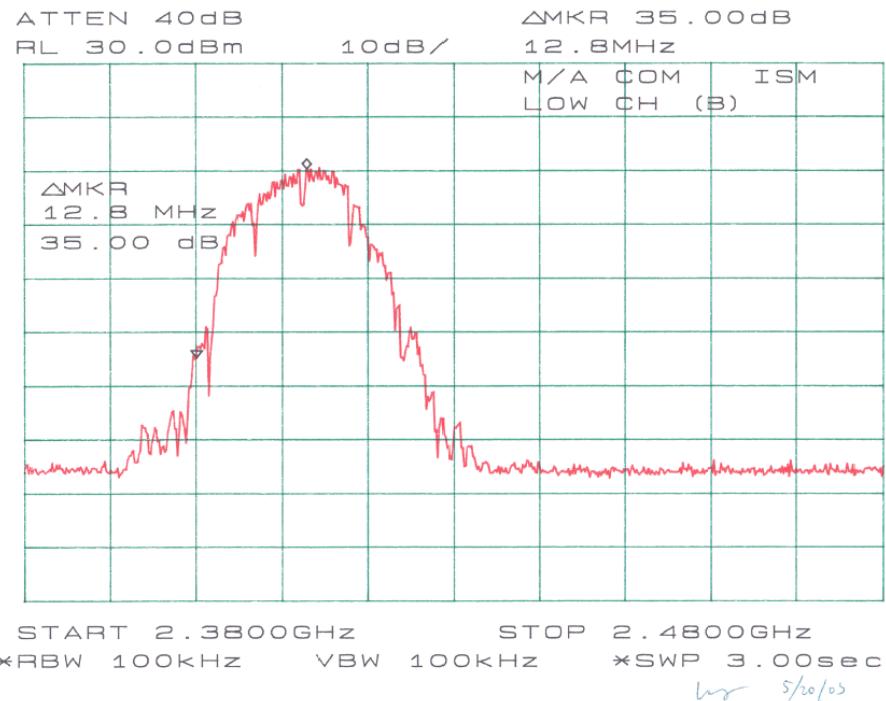
8.3 Test Equipment

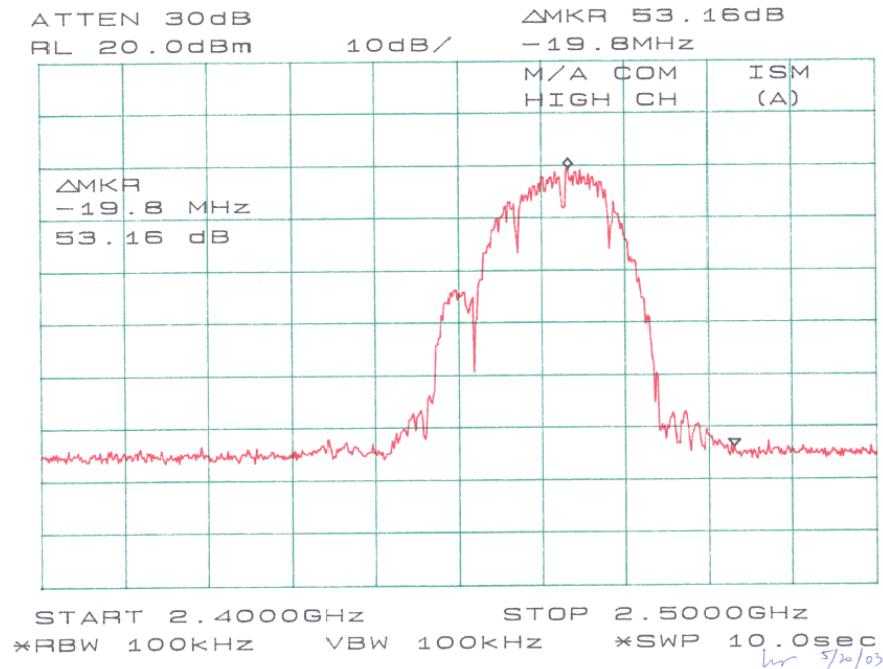
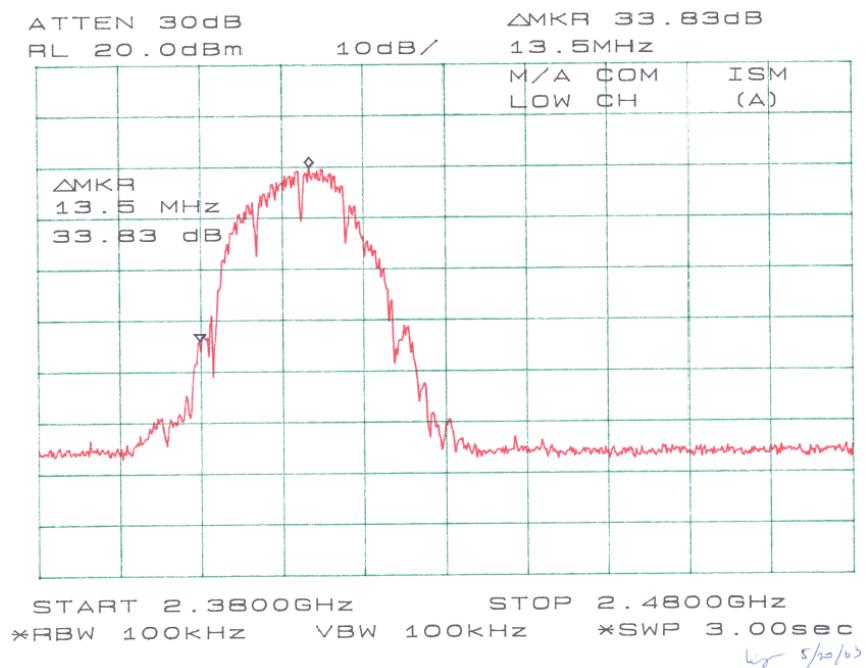
Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8564E	Spectrum Analyzer	2003-12-06

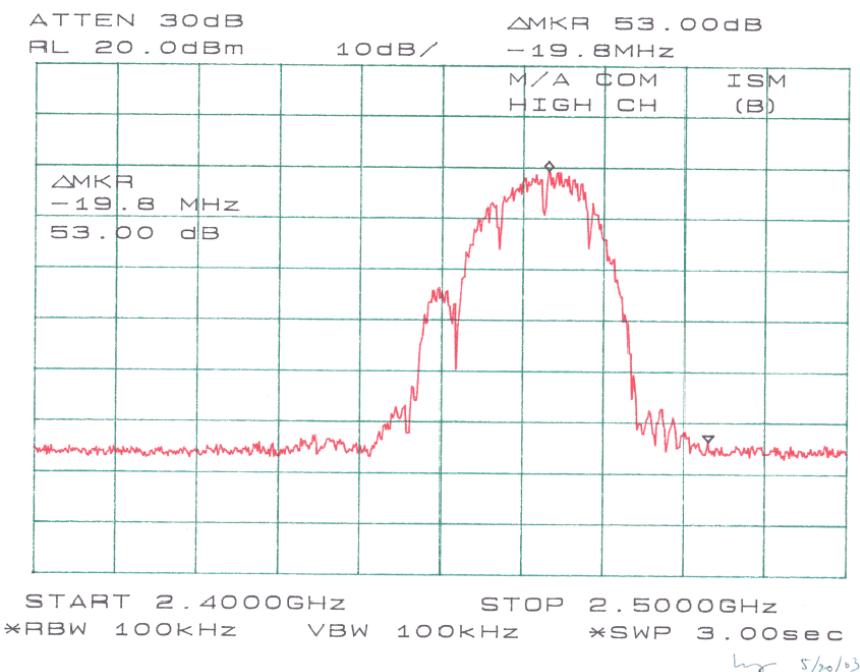
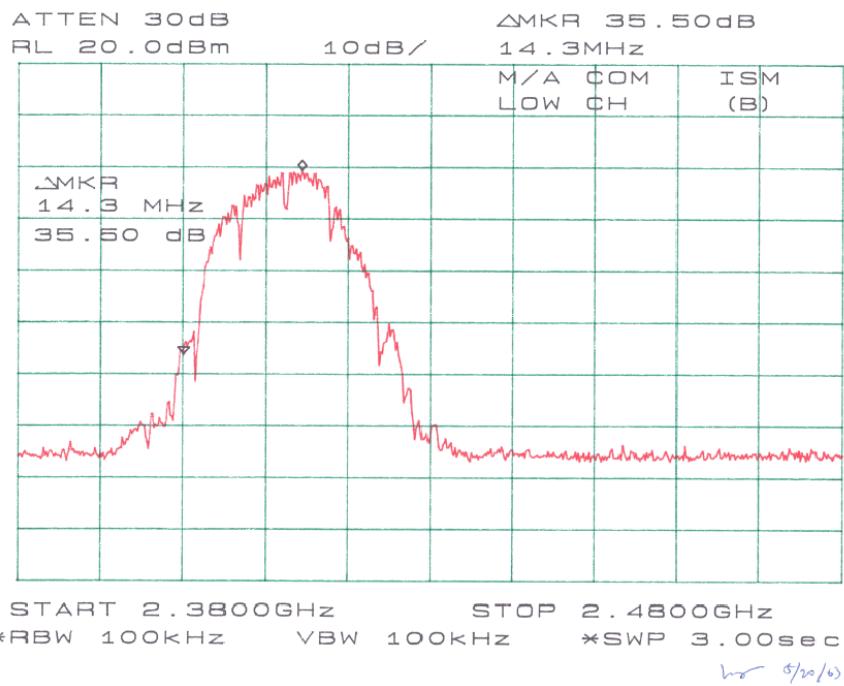
8.4 Measure Results

Please refer to following pages for plots of band edge.

100kHz Bandwidth of Band Edge Plots for All Other Antennas



100kHz Bandwidth of Band Edge Plots for 24dBi Directional Antenna



9 - ANTENNA REQUIREMENT

9.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to §15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

9.2 Antenna Connected Construction

The antenna connector is designed with SMA connector. The gain of the antenna used for transmitting is shown in following table:

Part Number	Antenna Type	Gain
PMANT25-HD-PF1	Directional	24dBi
ANAD-159W-A-10-SM	Directional	16dBi
MFB24006	Omni	6dBi
MFB24008	Omni	8dBi
MFB24010	Omni	10dBi

10 - SPURIOUS RADIATED EMISSION

10.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

10.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-2001. The specification used was the IC RSS210 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The host PC system was connected with 120Vac/60Hz power source.

10.3 Spectrum Analyzer Setup

According to ANSI C63.4-2001, the system was tested to 25000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

<u>Frequency Range</u>	<u>RBW</u>	<u>Video B/W</u>
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

10.4 Test Procedure

For the radiated emissions test, the Notebook power cord was connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB μ V of specification limits), and are distinguished with a "Qp" in the data table.

10.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for Subpart C. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Subpart C Limit}$$

10.6 Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8564E	Spectrum Analyzer	2003-12-06

10.7 Summary of Test Results

According to the data in section 10.8, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207 and 15.247, and had the worst margin of:

For 16dBi Directional Patch Antenna:

- 7.2 dB at 2390.00 MHz** in the **Vertical** polarization, Low Channel
- 15.6 dB at 7326.00 MHz** in the **Vertical** polarization, Middle Channel
- 2.2 dB at 2483.50 MHz** in the **Vertical** polarization, High Channel
- 6.1 dB at 429.55 MHz** in the **Vertical** polarization, Unintentional Emission

For 24dBi Directional Dish Antenna:

- 10.6 dB at 2390.00 MHz** in the **Vertical** polarization, Low Channel
- 14.5 dB at 7326.00 MHz** in the **Horizontal** polarization, Middle Channel
- 14.5 dB at 7386.00 MHz** in the **Vertical** polarization, High Channel
- 6.3 dB at 270.34 MHz** in the **Horizontal** polarization, Unintentional Emission

For 10dBi Omni Whip Antenna:

- 8.4 dB at 2390.00 MHz** in the **Vertical** polarization, Low Channel
- 14.7 dB at 7326.00 MHz** in the **Vertical** polarization, Middle Channel
- 14.5 dB at 7395.00 MHz** in the **Vertical** polarization, High Channel
- 6.5 dB at 430.20 MHz** in the **Vertical** polarization, Unintentional Emission

10.8.1 Test Data for 16dBi Directional Patch Antenna, 30MHz to 25GHz, 3 meters

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SubpartC	
Frequency MHz	Ampl. dB μ V/m	Comments	Angle Degree	Height Meter	Polar H/V	Antenna dB μ V/m	Cable DB	Amp. DB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
Low Channel											
2412.00	120.8	FUND/PEAK	0	1.5	V	28.1	3.4	35.2	117.1		
2412.00	106.2	FUND/PEAK	0	1.4	H	28.1	3.4	35.2	102.5		
2412.00	116.8	FUND/AVE	0	1.5	V	28.1	3.4	35.2	113.1		
2412.00	102.0	FUND/AVE	0	1.4	H	28.1	3.4	35.2	98.3		
2390.00	15.3	AVE	0	1.5	V	28.1	3.4	0.0	46.8	54	-7.2
2390.00	11.7	AVE	0	1.4	H	28.1	3.4	0.0	43.2	54	-10.9
2400.00	52.7	PEAK	0	1.5	V	28.1	3.4	0.0	84.1	97.1	-13.0
2400.00	47.0	AVE	0	1.5	V	28.1	3.4	0.0	78.5	93.1	-14.7
7236.00	31.2	AVE	0	1.4	H	35.1	5.6	33.5	38.4	54	-15.6
7236.00	31.0	AVE	0	1.5	V	35.1	5.6	33.5	38.2	54	-15.8
2400.00	34.3	PEAK	0	1.4	H	28.1	3.4	0.0	65.8	82.5	-16.8
2400.00	28.7	AVE	0	1.4	H	28.1	3.4	0.0	60.1	78.3	-18.2
2390.00	23.5	PEAK	0	1.5	V	28.1	3.4	0.0	55.0	74	-19.1
4824.00	27.2	AVE	0	1.5	V	32.5	4.9	33.0	31.6	54	-22.4
2390.00	20.0	PEAK	0	1.4	H	28.1	3.4	0.0	51.5	74	-22.6
7236.00	44.0	PEAK	0	1.5	V	35.1	5.6	33.5	51.2	74	-22.8
4824.00	26.7	AVE	0	1.3	H	32.5	4.9	33.0	31.1	54	-22.9
7236.00	43.5	PEAK	0	1.4	H	35.1	5.6	33.5	50.7	74	-23.3
4824.00	40.5	PEAK	0	1.5	V	32.5	4.9	33.0	44.9	74	-29.1
4824.00	39.7	PEAK	0	1.3	H	32.5	4.9	33.0	44.1	74	-29.9
MIDDLE CHANNEL											
2442.00	119.0	FUND/PEAK	0	1.6	V	28.1	3.4	35.2	115.3		
2442.00	103.7	FUND/PEAK	0	1.4	H	28.1	3.4	35.2	100.0		
2442.00	114.8	FUND/AVE	0	1.6	V	28.1	3.4	35.2	111.1		
2442.00	100.0	FUND/AVE	0	1.4	H	28.1	3.4	35.2	96.3		
7326.00	31.2	AVE	0	1.4	V	35.1	5.6	33.5	38.4	54	-15.6
7326.00	31.0	AVE	0	1.4	H	35.1	5.6	33.5	38.2	54	-15.8
4884.00	27.2	AVE	0	1.5	V	32.5	4.9	33.0	31.6	54	-22.4
4884.00	27.0	AVE	0	1.5	H	32.5	4.9	33.0	31.4	54	-22.6
7326.00	44.2	PEAK	0	1.4	V	35.1	5.6	33.5	51.4	74	-22.6
7326.00	43.7	PEAK	0	1.4	H	35.1	5.6	33.5	50.9	74	-23.1
4884.00	39.7	PEAK	0	1.5	V	32.5	4.9	33.0	44.1	74	-29.9
4884.00	39.2	PEAK	0	1.5	H	32.5	4.9	33.0	43.6	74	-30.4

Test Data for 16dBi Directional Patch Antenna, 30MHz to 25GHz, 3 meters (Continued)

Frequency MHz	INDICATED		TABLE Angle Degree	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE Corr. Ampl. dB μ V/m	FCC 15 Subpart C	
	Ampl. dB μ V/m	Comments		Height Meter	Polar H/V	Antenna dB μ V/m	Cable DB	Amp. DB		Limit dB μ V/m	Margin dB
High Channel											
2465.00	118.7	FUND/PEAK	0	1.6	V	28.1	3.4	35.2	115.0		
2465.00	101.7	FUND/PEAK	0	1.5	H	28.1	3.4	35.2	98.0		
2465.00	118.2	FUND/AVE	0	1.6	V	28.1	3.4	35.2	114.5		
2465.00	98.5	FUND/AVE	0	1.5	H	28.1	3.4	35.2	94.8		
2483.50	20.3	AVE	0	1.6	V	28.1	3.4	0.0	51.8	54	-2.2
2483.50	11.0	AVE	0	1.2	H	28.1	3.4	0.0	42.5	54	-11.6
2483.50	29.3	PEAK	0	1.6	V	28.1	3.4	0.0	60.8	74	-13.3
7395.00	31.3	AVE	0	1.2	V	35.1	5.6	33.5	38.6	54	-15.4
7395.00	31.1	AVE	0	1.5	H	35.1	5.6	33.5	38.3	54	-15.7
2483.50	22.0	PEAK	0	1.2	H	28.1	3.4	0.0	53.5	74	-20.6
4930.00	27.0	AVE	0	1.5	V	32.5	4.9	33.0	31.4	54	-22.6
7395.00	44.0	PEAK	0	1.2	V	35.1	5.6	33.5	51.2	74	-22.8
4930.00	26.7	AVE	0	1.5	H	32.5	4.9	33.0	31.1	54	-22.9
7395.00	43.7	PEAK	0	1.5	H	35.1	5.6	33.5	50.9	74	-23.1
4930.00	39.8	PEAK	0	1.5	V	32.5	4.9	33.0	44.2	74	-29.8
4930.00	39.5	PEAK	0	1.5	H	32.5	4.9	33.0	43.9	74	-30.1

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart B	
	Ampl. dB μ V/m	Direction Degree		Polar H/V	Antenna dB μ V/m	Cable Loss dB μ V/m	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
429.55	45.7	0	1.8	V	16.5	2.7	25.0	39.9	46	-6.1
233.26	48.8	0	1.2	V	12.6	2.2	25.0	38.6	46	-7.4
270.00	46.7	0	1.5	H	13.3	2.2	25.0	37.2	46	-8.8
171.70	42.6	0	1.5	H	13.0	1.9	25.0	32.5	43.5	-11.0
338.69	39.2	0	1.2	V	15.8	2.3	25.0	32.3	46	-13.7
321.70	37.3	0	1.8	V	15.5	2.3	25.0	30.2	46	-15.8

Note:

AVG = average

10.8.2 Test Data for 24dBi Directional Dish Antenna, 30MHz to 25GHz, 3 meters

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 Subpart C	
Frequency MHz	Ampl. dB μ V/m	Comments	Angle Degree	Height Meter	Polar H/V	Antenna dB μ V/m	Cable DB	Amp. DB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
Low Channel											
2412.00	116.83	FUND/PEAK	0	1.0	V	28.1	3.4	35.2	113.1		
2412.00	93.5	FUND/PEAK	0	1.0	H	28.1	3.4	35.2	89.8		
2412.00	112.17	FUND/AVE	0	1.0	V	28.1	3.4	35.2	108.5		
2412.00	88.8	FUND/AVE	0	1.0	H	28.1	3.4	35.2	85.1		
2390.00	12.0	AVE	0	1.0	V	28.1	3.4	0.0	43.5	54	-10.6
2390.00	10.5	AVE	0	1.0	H	28.1	3.4	0.0	42.0	54	-12.1
2400.00	23.3	PEAK	0	1.0	H	28.1	3.4	0.0	54.8	69.8	-15.0
7236.00	31.5	AVE	0	1.5	V	35.1	5.6	33.5	38.7	54	-15.3
7236.00	31.3	AVE	0	1.2	H	35.1	5.6	33.5	38.6	54	-15.4
2390.00	23.7	PEAK	0	1.0	V	28.1	3.4	0.0	55.2	74	-18.9
2400.00	12.8	AVE	0	1.0	H	28.1	3.4	0.0	44.3	65.1	-20.8
2400.00	40.7	PEAK	0	1.0	V	28.1	3.4	0.0	72.1	93.1	-21.0
2390.00	21.2	PEAK	0	1.0	H	28.1	3.4	0.0	52.6	74	-21.4
2400.00	35.2	AVE	0	1.0	V	28.1	3.4	0.0	66.6	88.5	-21.9
7236.00	44.2	PEAK	0	1.5	V	35.1	5.6	33.5	51.4	74	-22.6
4824.00	26.8	AVE	0	1.5	V	32.5	4.9	33.0	31.2	54	-22.8
4824.00	26.8	AVE	0	1.2	H	32.5	4.9	33.0	31.2	54	-22.8
7236.00	43.5	PEAK	0	1.2	H	35.1	5.6	33.5	50.7	74	-23.3
4824.00	40.2	PEAK	0	1.5	V	32.5	4.9	33.0	44.6	74	-29.4
4824.00	39.5	PEAK	0	1.2	H	32.5	4.9	33.0	43.9	74	-30.1
MIDDLE CHANNEL											
2442.00	118.17	FUND/PEAK	0	1.0	V	28.1	3.4	35.2	114.5		
2442.00	94.8	FUND/PEAK	0	1.0	H	28.1	3.4	35.2	91.1		
2442.00	114.33	FUND/AVE	0	1.0	V	28.1	3.4	35.2	110.6		
2442.00	90.3	FUND/AVE	0	1.0	H	28.1	3.4	35.2	86.6		
7326.00	32.3	AVE	0	1.4	H	35.1	5.6	33.5	39.5	54	-14.5
7326.00	32.1	AVE	0	1.4	V	35.1	5.6	33.5	39.3	54	-14.7
4884.00	27.7	AVE	0	1.5	V	32.5	4.9	33.0	32.1	54	-21.9
4884.00	27.5	AVE	0	1.2	H	32.5	4.9	33.0	31.9	54	-22.1
7326.00	44.5	PEAK	0	1.4	V	35.1	5.6	33.5	51.7	74	-22.3
7326.00	44.2	PEAK	0	1.4	H	35.1	5.6	33.5	51.4	74	-22.6
4884.00	40.3	PEAK	0	1.5	V	32.5	4.9	33.0	44.7	74	-29.3
4884.00	39.7	PEAK	0	1.2	H	32.5	4.9	33.0	44.1	74	-29.9

Test Data for 24dBi Directional Dish Antenna, 30MHz to 25GHz, 3 meters (Continued)

Frequency MHz	INDICATED		TABLE Angle Degree	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE Corr. Ampl. dB μ V/m	FCC 15 Subpart C	
	Ampl. dB μ V/m	Comments		Height Meter	Polar H/V	Antenna dB μ V/m	Cable DB	Amp. DB		Limit dB μ V/m	Margin dB
High Channel											
2462.00	117.8	FUND/PEAK	0	1.2	V	28.1	3.4	35.2	114.1		
2462.00	98.3	FUND/PEAK	0	1.0	H	28.1	3.4	35.2	94.6		
2462.00	114.2	FUND/AVE	0	1.2	V	28.1	3.4	35.2	110.5		
2462.00	94.7	FUND/AVE	0	1.0	H	28.1	3.4	35.2	91.0		
7386.00	32.3	AVE	0	1.0	V	35.1	5.6	33.5	39.5	54	-14.5
7386.00	32.2	AVE	0	1.0	H	35.1	5.6	33.5	39.4	54	-14.6
4924.00	28.5	AVE	0	1.2	V	32.5	4.9	33.0	32.9	54	-21.1
2483.50	21.8	PEAK	0	1.0	H	28.1	3.4	0.0	53.3	74.6	-21.3
4924.00	28.2	AVE	0	1.2	H	32.5	4.9	33.0	32.6	54	-21.4
7386.00	44.9	PEAK	0	1.0	V	35.1	5.6	33.5	52.1	74	-21.9
7386.00	44.4	PEAK	0	1.0	H	35.1	5.6	33.5	51.6	74	-22.4
4924.00	40.7	PEAK	0	1.2	V	32.5	4.9	33.0	45.1	74	-28.9
2483.50	10.3	AVE	0	1.0	H	28.1	3.4	0.0	41.8	71	-29.2
4924.00	40.3	PEAK	0	1.2	H	32.5	4.9	33.0	44.7	74	-29.3
2483.50	25.6	PEAK	0	1.2	V	28.1	3.4	0.0	57.1	94.1	-37.0
2483.50	18.3	AVE	0	1.2	V	28.1	3.4	0.0	49.8	90.5	-40.7

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart B	
	Ampl. dB μ V/m	Direction Degree		Polar H/V	Antenna dB μ V/m	Cable Loss dB μ V/m	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
270.34	49.2	0	1.5	H	13.3	2.2	25.0	39.7	46	-6.3
429.58	44.2	0	1.0	V	16.5	2.7	25.0	38.4	46	-7.6
233.86	47.8	0	1.2	V	12.6	2.2	25.0	37.6	46	-8.4
171.00	43.0	0	1.5	H	13.0	1.9	25.0	32.9	43.5	-10.6
338.69	40.0	0	1.2	V	15.8	2.3	25.0	33.1	46	-12.9
321.72	36.8	0	1.0	V	15.5	2.3	25.0	29.7	46	-16.3

Note:

AVG = average

10.8.3 Test Data for 10dBi Omni Whip Antenna, 30MHz to 25GHz, 3 meters

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 Subpart C	
Frequency MHz	Ampl. dB μ V/m	Comments	Angle Degree	Height Meter	Polar H/V	Antenna dB μ V/m	Cable DB	Amp. DB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
Low Channel											
2412.00	114.0	FUND/PEAK	30	1.5	V	28.1	3.4	35.2	110.3		
2412.00	99.8	FUND/PEAK	270	1.2	H	28.1	3.4	35.2	96.1		
2412.00	109.7	FUND/AVE	30	1.5	V	28.1	3.4	35.2	106.0		
2412.00	95.8	FUND/AVE	270	1.2	H	28.1	3.4	35.2	92.1		
2390.00	14.2	AVE	30	1.5	V	28.1	3.4	0.0	45.7	54	-8.4
2390.00	12.7	AVE	270	1.2	H	28.1	3.4	0.0	44.2	54	-9.9
7236.00	32.2	AVE	0	1.2	V	35.1	5.6	33.5	39.4	54	-14.6
7236.00	32.0	AVE	60	1.4	H	35.1	5.6	33.5	39.2	54	-14.8
2400.00	43.3	PEAK	30	1.5	V	28.1	3.4	0.0	74.8	90.3	-15.5
2390.00	26.2	PEAK	30	1.5	V	28.1	3.4	0.0	57.7	74	-16.4
2400.00	37.8	AVE	30	1.5	V	28.1	3.4	0.0	69.3	86	-16.7
2400.00	26.8	PEAK	270	1.2	H	28.1	3.4	0.0	58.3	76.1	-17.8
2390.00	24.8	PEAK	270	1.2	H	28.1	3.4	0.0	56.3	74	-17.8
2400.00	19.7	AVE	270	1.2	H	28.1	3.4	0.0	51.1	72.1	-21.0
4824.00	27.5	AVE	45	1.4	V	32.5	4.9	33.0	31.9	54	-22.1
4824.00	27.3	AVE	90	1.5	H	32.5	4.9	33.0	31.7	54	-22.3
7236.00	44.5	PEAK	0	1.2	V	35.1	5.6	33.5	51.7	74	-22.3
7236.00	43.8	PEAK	60	1.4	H	35.1	5.6	33.5	51.1	74	-22.9
4824.00	39.7	PEAK	45	1.4	V	32.5	4.9	33.0	44.1	74	-29.9
4824.00	39.5	PEAK	90	1.5	H	32.5	4.9	33.0	43.9	74	-30.1
MIDDLE CHANNEL											
2442.00	117.0	FUND/PEAK	0	1.6	V	28.1	3.4	35.2	113.3		
2442.00	104.2	FUND/PEAK	300	1.5	H	28.1	3.4	35.2	100.5		
2442.00	113.2	FUND/AVE	0	1.6	V	28.1	3.4	35.2	109.5		
2442.00	99.2	FUND/AVE	300	1.5	H	28.1	3.4	35.2	95.5		
7326.00	32.1	AVE	45	1.6	V	35.1	5.6	33.5	39.3	54	-14.7
7326.00	31.9	AVE	330	1.4	H	35.1	5.6	33.5	39.1	54	-14.9
7326.00	45.2	PEAK	45	1.6	V	35.1	5.6	33.5	52.4	74	-21.6
7326.00	44.5	PEAK	330	1.4	H	35.1	5.6	33.5	51.7	74	-22.3
4884.00	27.2	AVE	30	1.4	V	32.5	4.9	33.0	31.6	54	-22.4
4884.00	27.0	AVE	180	1.2	H	32.5	4.9	33.0	31.4	54	-22.6
4884.00	40.5	PEAK	30	1.4	V	32.5	4.9	33.0	44.9	74	-29.1
4884.00	39.7	PEAK	180	1.2	H	32.5	4.9	33.0	44.1	74	-29.9

Test Data for 10dBi Omni Whip Antenna, 30MHz to 25GHz, 3 meters (Continued)

Frequency MHz	INDICATED		TABLE Angle Degree	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE Corr. Ampl. dB μ V/m	FCC 15 Subpart C	
	Ampl. dB μ V/m	Comments		Height Meter	Polar H/V	Antenna dB μ V/m	Cable DB	Amp. DB		Limit dB μ V/m	Margin dB
High Channel											
2465.00	116.0	FUND/PEAK	30	1.6	V	28.1	3.4	35.2	112.3		
2465.00	102.8	FUND/PEAK	330	1.5	H	28.1	3.4	35.2	99.1		
2465.00	118.2	FUND/AVE	30	1.6	V	28.1	3.4	35.2	114.5		
2465.00	98.2	FUND/AVE	330	1.5	H	28.1	3.4	35.2	94.5		
7395.00	32.3	AVE	60	1.6	V	35.1	5.6	33.5	39.5	54	-14.5
7395.00	32.1	AVE	180	1.4	H	35.1	5.6	33.5	39.3	54	-14.7
7395.00	45.0	PEAK	60	1.6	V	35.1	5.6	33.5	52.2	74	-21.8
7395.00	44.6	PEAK	180	1.4	H	35.1	5.6	33.5	51.8	74	-22.2
4930.00	27.0	AVE	0	1.4	V	32.5	4.9	33.0	31.4	54	-22.6
4930.00	27.0	AVE	300	1.2	H	32.5	4.9	33.0	31.4	54	-22.6
2483.50	23.3	PEAK	330	1.5	H	28.1	3.4	0.0	79.1	74	-24.3
4930.00	39.9	PEAK	0	1.4	V	32.5	4.9	33.0	44.3	74	-29.7
4930.00	39.7	PEAK	300	1.2	H	32.5	4.9	33.0	44.1	74	-29.9
2483.50	11.2	AVE	330	1.5	H	28.1	3.4	0.0	42.6	74.5	-31.9
2483.50	28.0	PEAK	30	1.6	V	28.1	3.4	0.0	59.5	92.3	-32.8
2483.50	17.7	AVE	30	1.6	V	28.1	3.4	0.0	49.1	94.5	-45.4

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart B	
	Ampl. dB μ V/m	Direction Degree		Polar H/V	Antenna dB μ V/m	Cable Loss dB μ V/m	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
430.20	44.8	90	1.5	V	16.9	2.8	25.0	39.5	46	-6.5
270.54	46.0	0	1.5	H	13.3	2.2	25.0	36.5	46	-9.5
234.10	45.5	270	1.4	V	12.6	2.2	25.0	35.3	46	-10.7
171.00	42.6	30	1.5	H	13.0	1.9	25.0	32.5	43.5	-11.0
338.17	40.1	30	1.2	V	15.8	2.3	25.0	33.2	46	-12.8
321.27	38.2	180	1.2	V	15.5	2.3	25.0	31.0	46	-15.0

Note:

AVG = average

11 - CONDUCTED EMISSIONS

11.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

11.2 EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2001 measurement procedure. The specification used was FCC Part15 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The host PC system was connected with 120Vac/60Hz power source.

11.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency.....	150 kHz
Stop Frequency.....	30 MHz
Sweep Speed.....	Auto
IF Bandwidth.....	10 kHz
Video Bandwidth.....	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode.....	Normal

11.4 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dB μ V of specification limits). Quasi-peak readings are distinguished with a "Qp".

11.5 Test Equipment

Manufacturer	Description	Serial No.	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	1147 8007 07	2003-12-03

11.6 Summary of Test Results

According to the data in section 11.7, the EUT complies with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

-4.5 dB μ V at 4.9 MHz in the Line mode

11.7 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC PART15	
Frequency MHz	Amplitude dB μ V	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dB μ V	Margin dB
4.900	41.5	AVG	Line	46	-4.5
4.900	49.6	QP	Line	56	-6.4
4.900	49.3	QP	Neutral	56	-6.7
4.900	33.0	AVG	Neutral	46	-13.0
0.150	52.5	QP	Line	66	-13.5
0.150	52.0	QP	Neutral	66	-14.0
1.190	21.7	AVG	Neutral	46	-24.3
1.190	26.4	QP	Neutral	56	-29.6
0.150	21.8	AVG	Line	56	-34.2
0.150	21.8	AVG	Neutral	56	-34.2
27.500	7.6	AVG	Line	50	-42.4
27.500	15.8	QP	Line	60	-44.2

11.8 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented hereinafter as reference.

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18. Jun 03 17:59

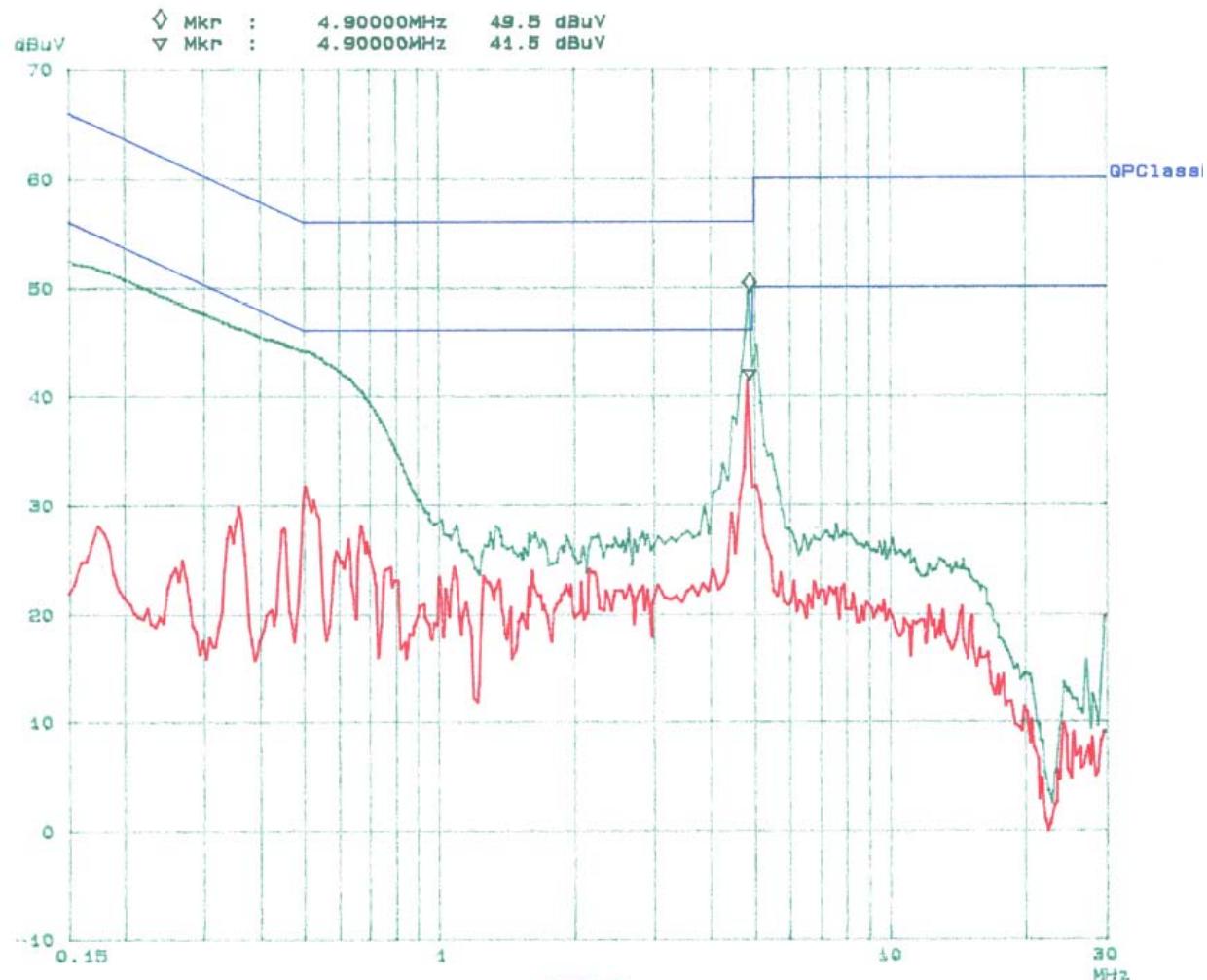
EUT: IBM
Manuf: M/A-COM
Op Cond: Normal
Operator: Ling
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	
150k	1M	5k	9k	QP+AV	20ms	10dBLLN	0dB	
1M	3M	10k	9k	QP+AV	1ms	10dBLLN	0dB	
3M	80M	100k	9k	QP+AV	1ms	10dBLLN	0dB	

Final Measurement: x QP / + AV

Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



[Signature] 6/18/03

Bay Area Compliance Laboratory Corp
CISPR CLASS B

18. Jun 03 17:40

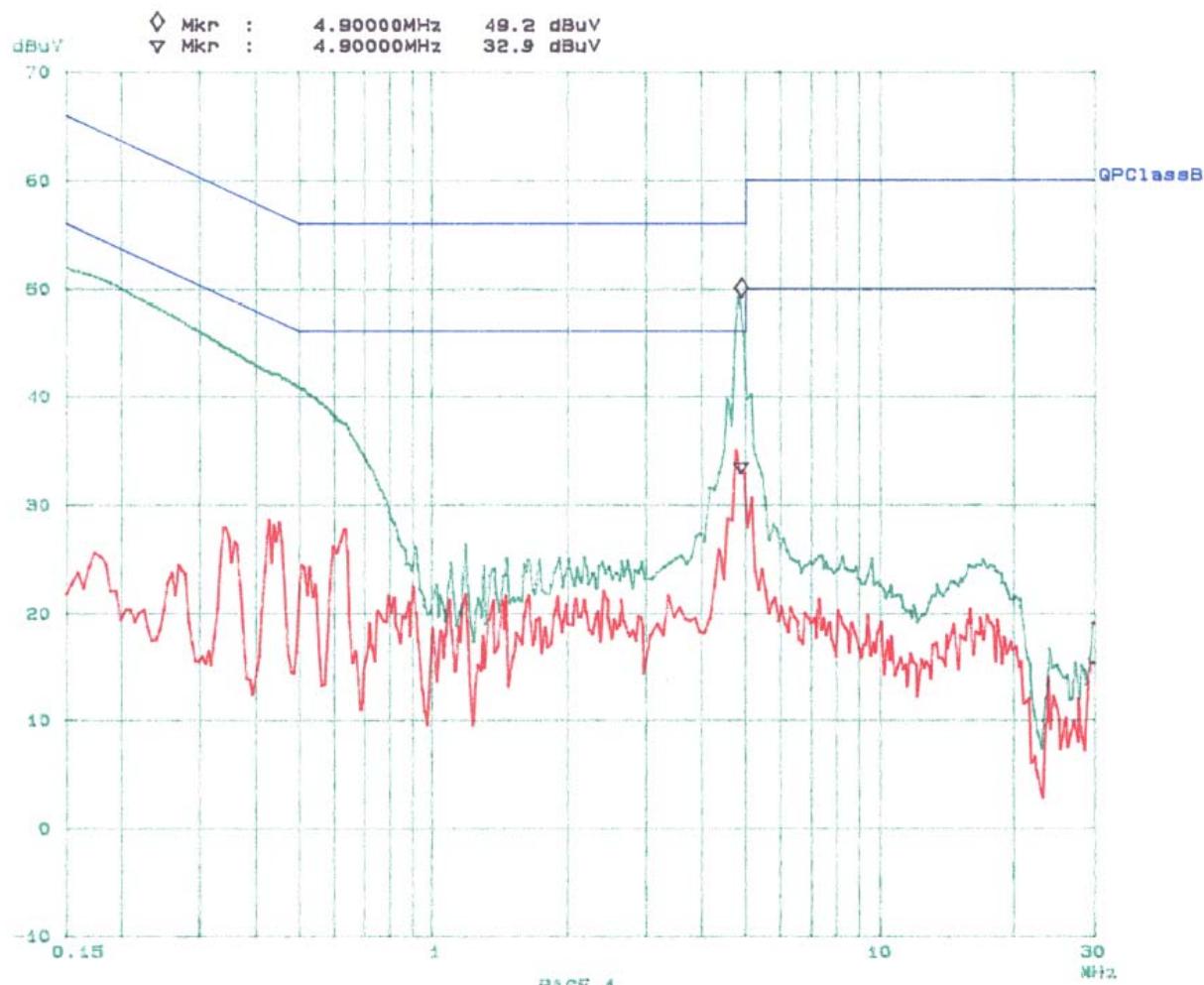
EUT: ISM
Manuf: MACOM
Op Cond: Normal
Operator: Ling
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBLLN	OFF
1M	3M	10k	9k	QP+AV	1ms	10dBLLN	OFF
3M	80M	100k	9k	QP+AV	1ms	10dBLLN	OFF

Final Measurement: x QP / + AV

Meas Time: 1.8
Subranges: 25
Acc Margin: 6dB



no 6/18/03