

## 4.5. Radiated Emissions Measurement

### 4.5.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

### 4.5.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1000KHz / 1000KHz for peak

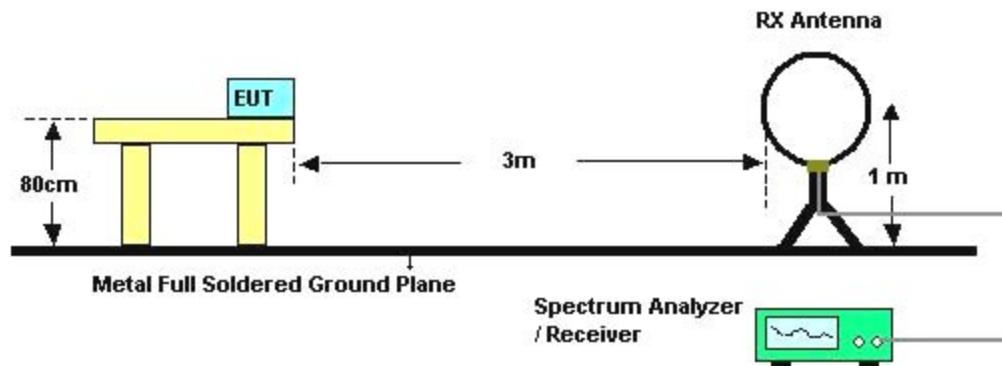
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

#### 4.5.3. Test Procedures

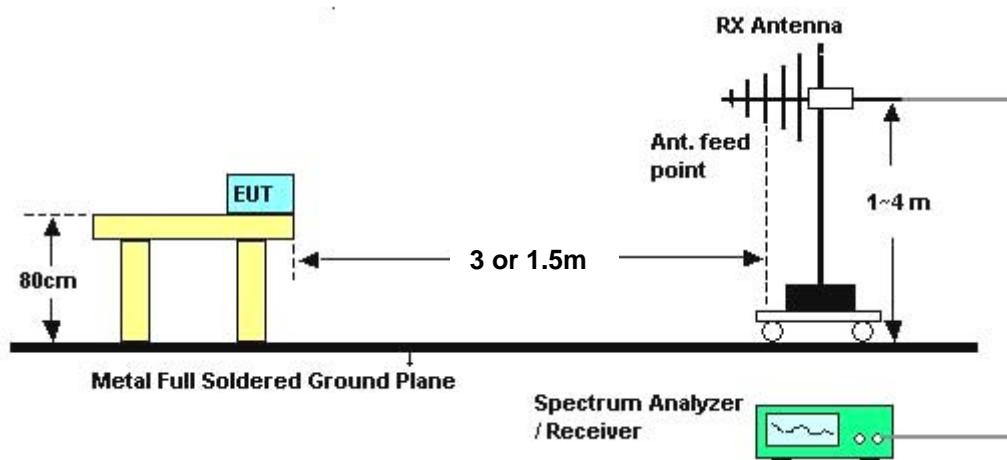
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

#### 4.5.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m.

Distance extrapolation factor =  $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

#### 4.5.5. Test Deviation

There is no deviation with the original standard.

#### 4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 4.5.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	26°C	Humidity	62%	
Test Engineer	Roy Huang			

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

**Note:**

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

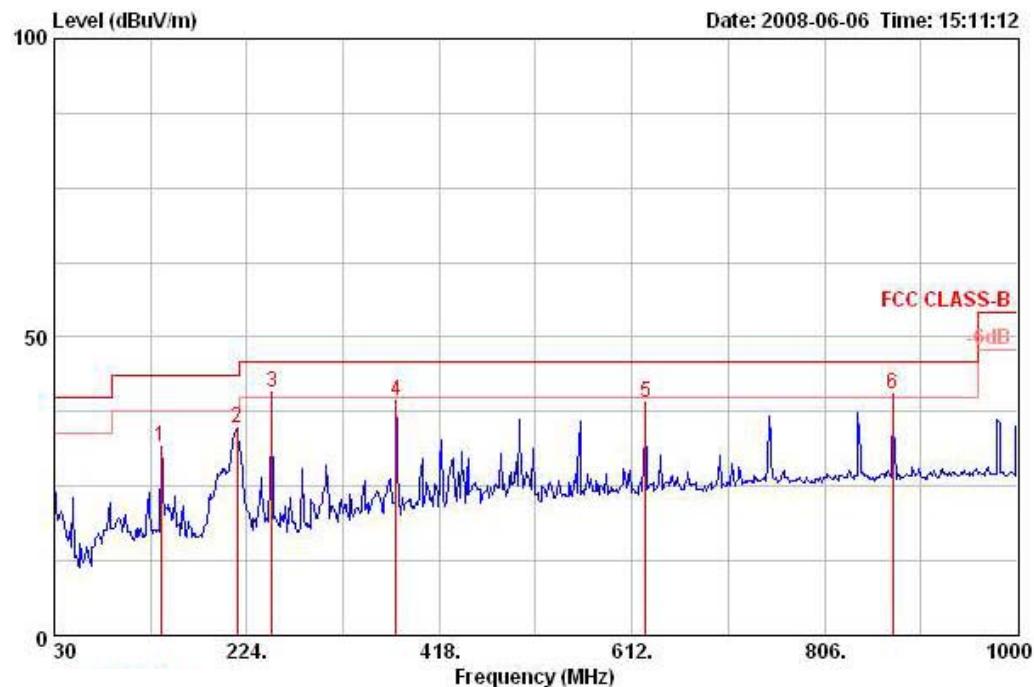
Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

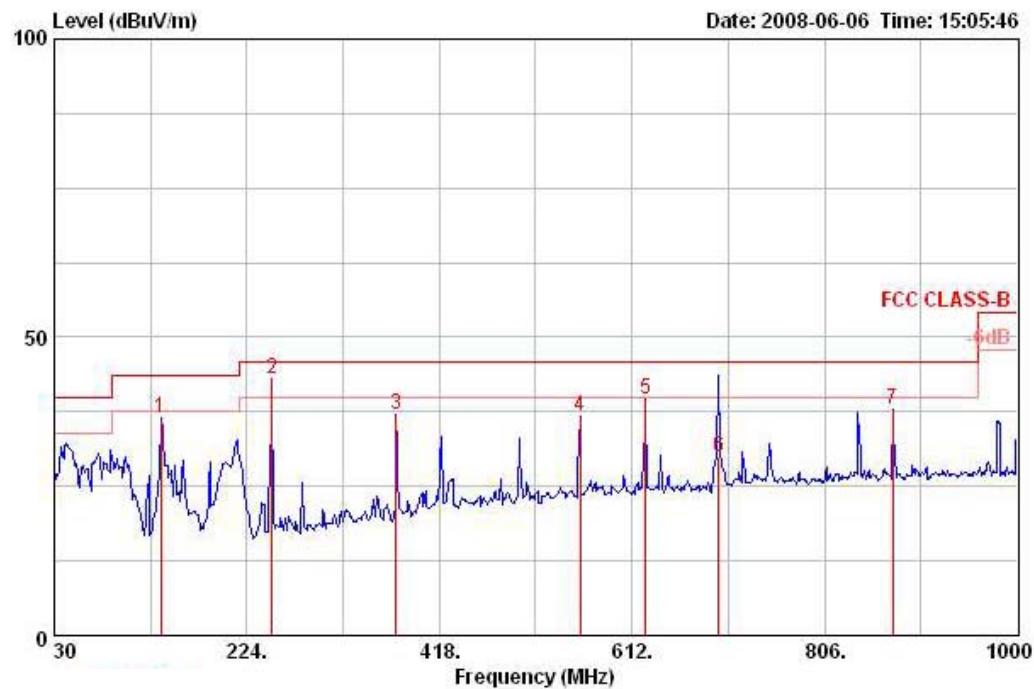
#### 4.5.8. Results of Radiated Emissions (30MHz~1GHz)

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Normal Link

##### Horizontal



Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Table	Ant		
		Limit	Line	Level	Factor	Factor	Loss			Pos	Pol/Phase
1	137.670	31.68	-11.82	43.50	46.96	10.76	27.41	1.38	Peak	0	100 HORIZONTAL
2	214.300	34.74	-8.76	43.50	51.62	8.43	27.07	1.76	Peak	0	100 HORIZONTAL
3 !	249.220	40.69	-5.31	46.00	54.24	11.56	27.00	1.90	Peak	0	100 HORIZONTAL
4	374.350	39.44	-6.56	46.00	49.82	14.79	27.42	2.25	Peak	0	100 HORIZONTAL
5	625.580	38.92	-7.08	46.00	44.89	19.05	28.07	3.05	Peak	0	100 HORIZONTAL
6 !	874.870	40.35	-5.65	46.00	43.89	20.42	27.45	3.50	Peak	0	100 HORIZONTAL

**Vertical**


Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Table	Ant		
		Limit	Line	Level	Factor	Factor	Loss			Pos	Pol/Phase
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	137.670	36.51	-6.99	43.50	51.78	10.76	27.41	1.38 Peak	0	400	VERTICAL
2 @	249.220	42.90	-3.10	46.00	56.44	11.56	27.00	1.90 Peak	125	110	VERTICAL
3	374.350	37.17	-8.83	46.00	47.55	14.79	27.42	2.25 Peak	0	400	VERTICAL
4	559.620	36.82	-9.18	46.00	43.55	18.55	28.10	2.82 Peak	0	400	VERTICAL
5	625.580	39.73	-6.27	46.00	45.70	19.05	28.07	3.05 Peak	0	400	VERTICAL
6	699.300	29.81	-16.19	46.00	35.21	19.30	28.00	3.30 QP	256	100	VERTICAL
7	874.870	37.76	-8.24	46.00	41.29	20.42	27.45	3.50 Peak	0	400	VERTICAL

**Note:**

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

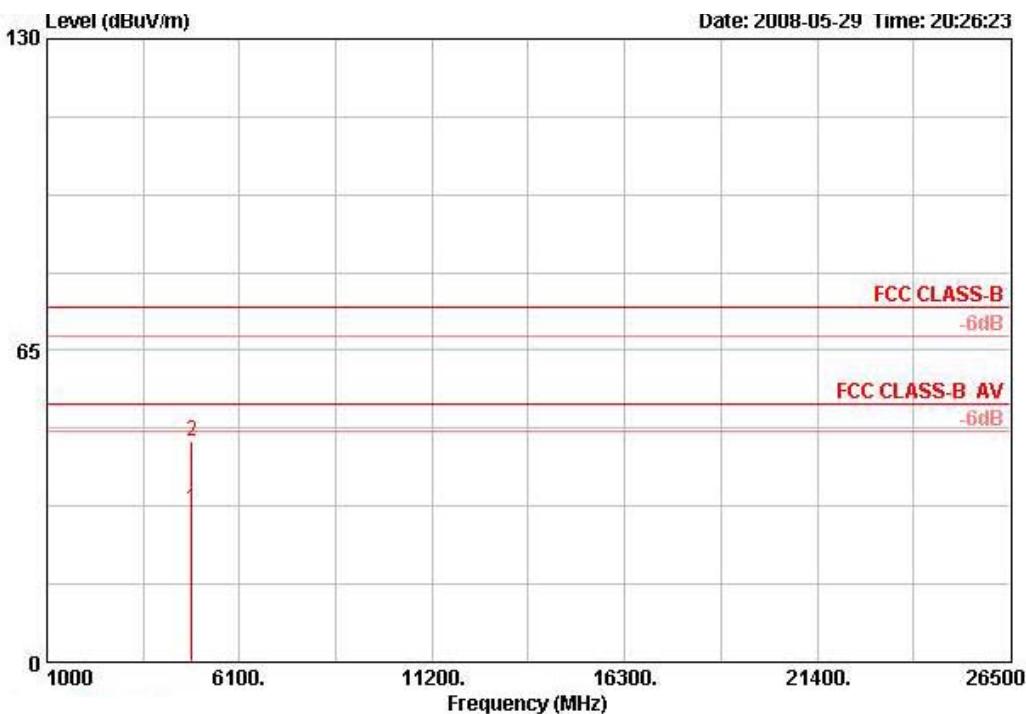
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

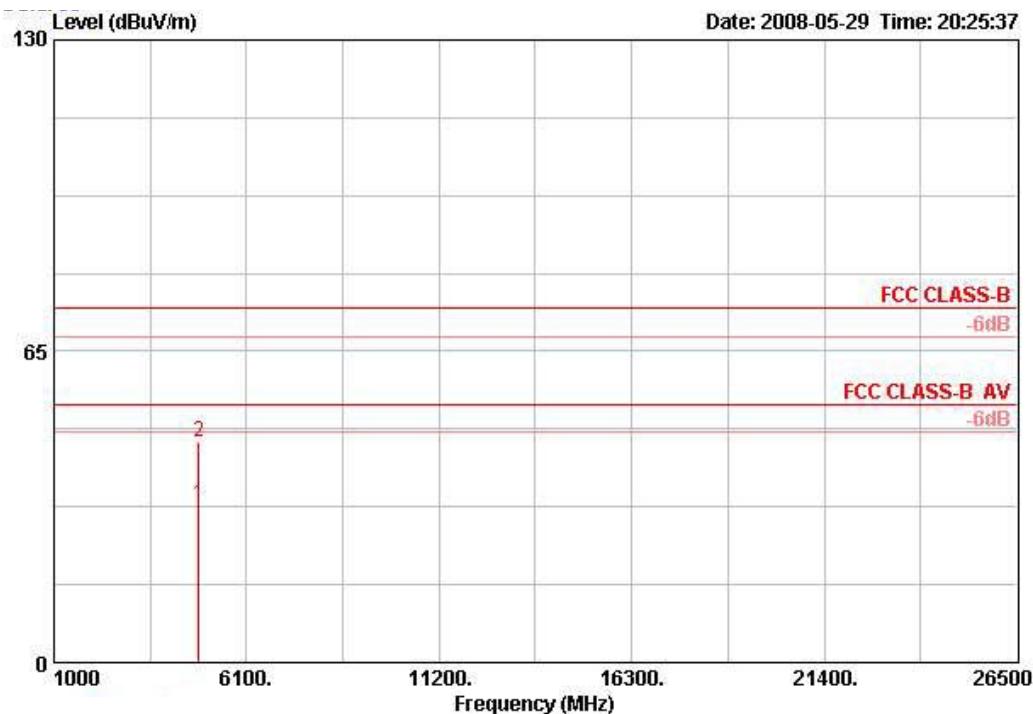
4.5.9. Results for Radiated Emissions (1GHz~10<sup>th</sup> Harmonic)

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 20MHz Ch 1 / Ant. A + Ant. C

## Horizontal

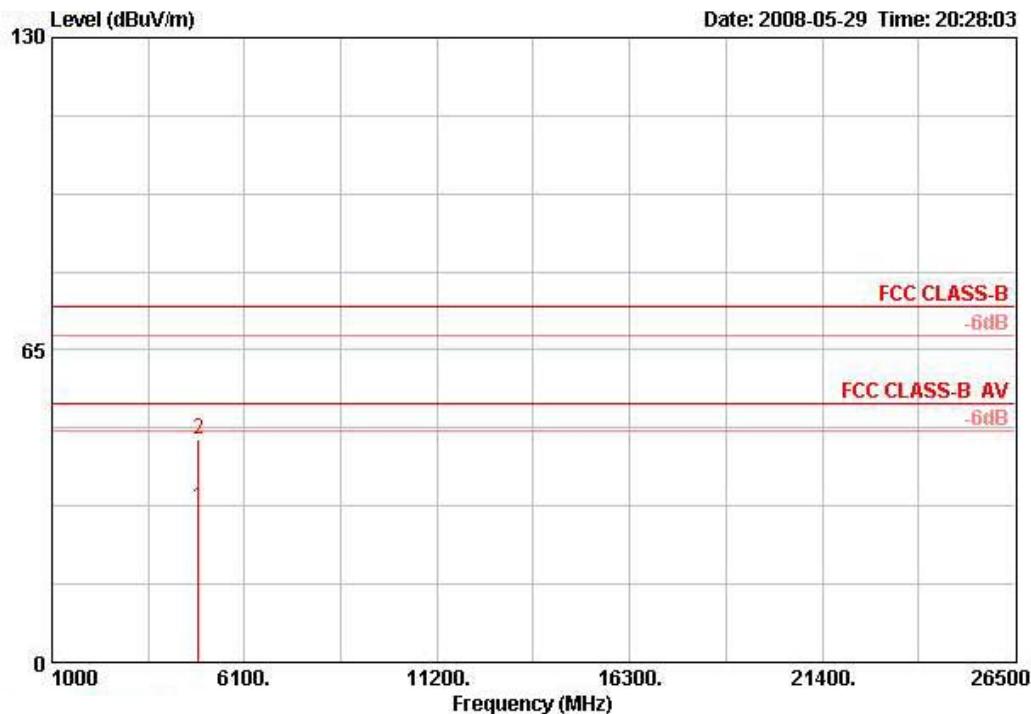


Freq	Level	Over Limit	Limit	Read		Ant	Table	Pos	Pos
				Antenna	Cable				
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	4825.120	32.01	-21.99	54.00	30.50	33.39	3.37	35.25	AVERAGE
2	4826.960	45.95	-28.05	74.00	44.44	33.39	3.37	35.25	PEAK

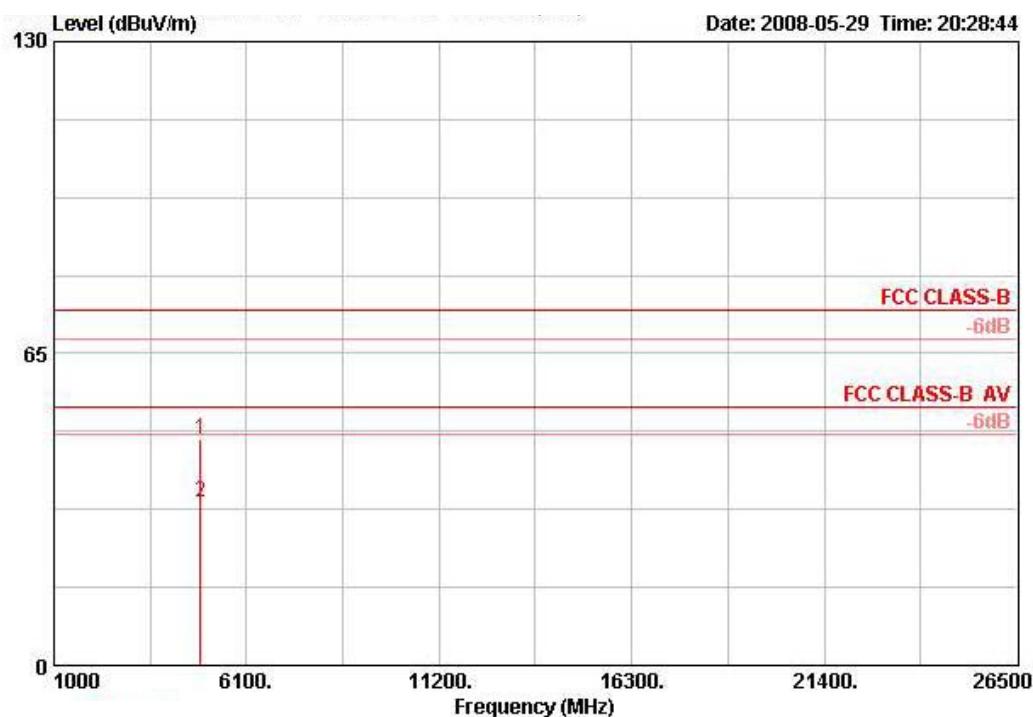
**Vertical**


Freq	Level	Over Limit	Limit	Read	Antenna	Cable	Preamp			Ant	Table
								Line	Factor		
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			cm	deg
1	4824.080	32.84	-21.16	54.00	31.33	33.39	3.37	35.25	AVERAGE	2575	284 VERTICAL
2	4825.020	46.16	-27.84	74.00	44.65	33.39	3.37	35.25	PEAK	100	284 VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 20MHz Ch 6 / Ant. A + Ant. C

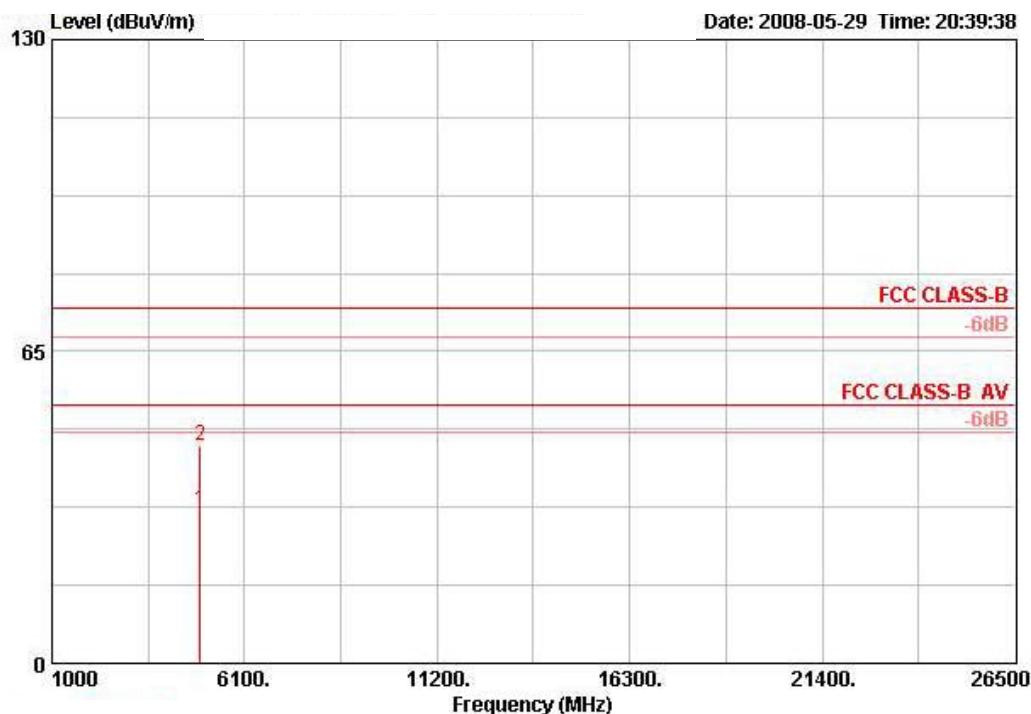
**Horizontal**


Freq	Level	Over Limit	Limit Line	ReadAntenna		Cable Preamp		Remark	Ant Pos	Table Pos	Table Pol/Phase
				Level	Factor	Level	Factor				
4875.100	32.22	-21.78	54.00	30.60	33.48	3.38	35.25	AVERAGE	100	197	HORIZONTAL
4875.620	46.39	-27.61	74.00	44.77	33.48	3.38	35.25	PEAK	100	197	HORIZONTAL

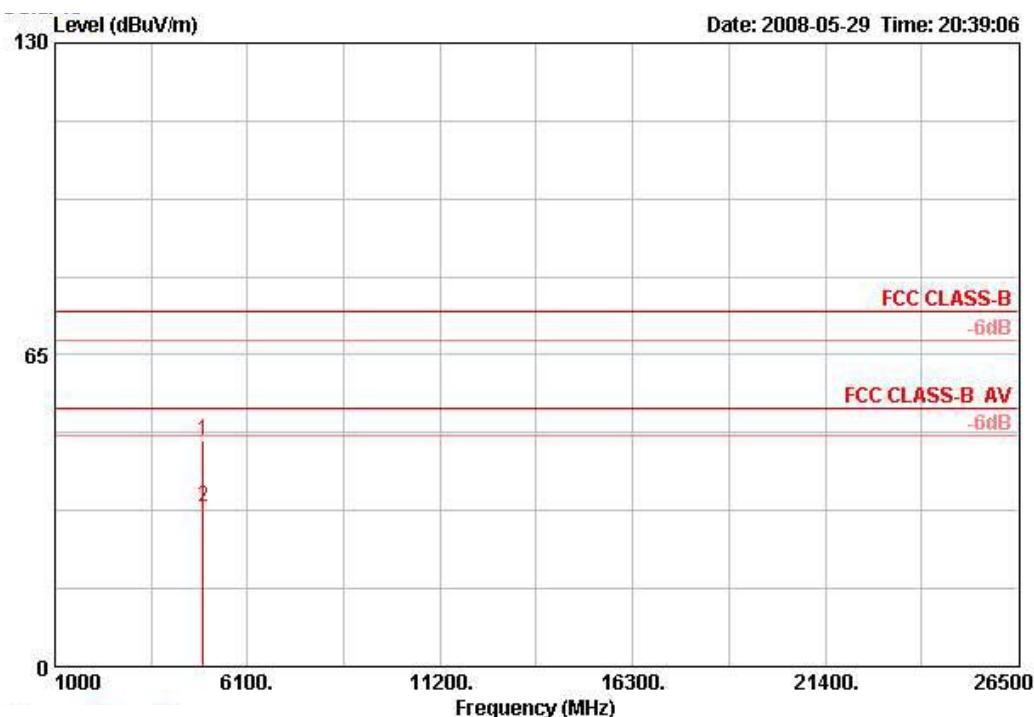
**Vertical**


Freq	Level	Over Limit	Limit	Read		Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Table Pol/Phase
				Antenna Line	Antenna Factor						
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4874.340	47.28	-26.72	74.00	45.66	33.48	3.38	35.25 PEAK	100	221	VERTICAL
2	4874.860	34.08	-19.92	54.00	32.46	33.48	3.38	35.25 AVERAGE	100	221	VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 20MHz Ch11 / Ant. A + Ant. C

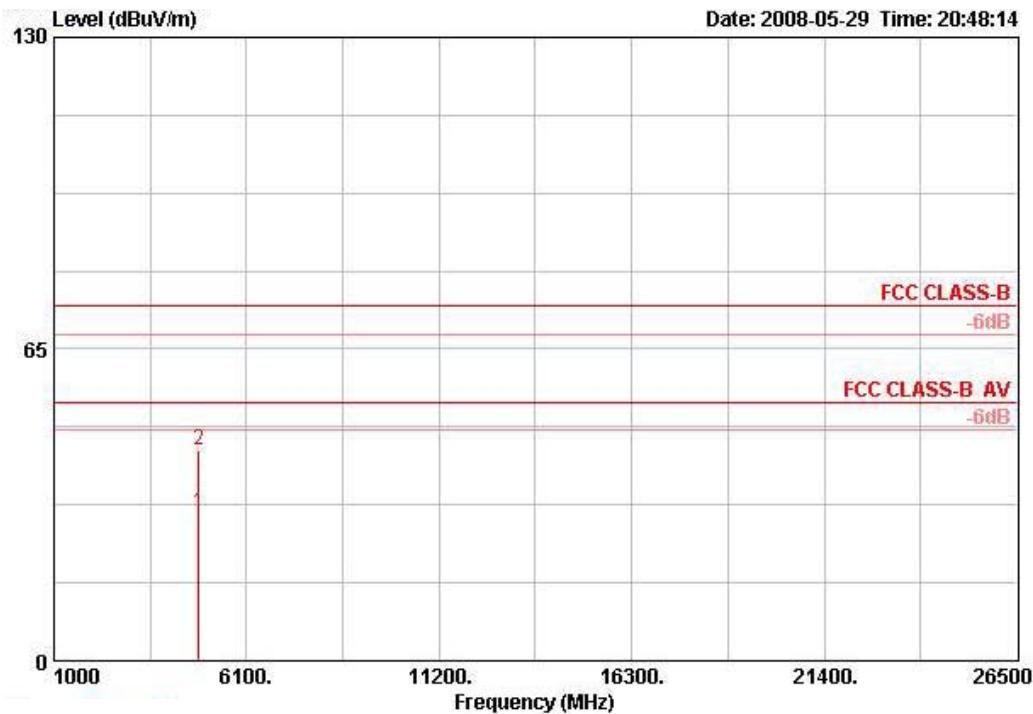
**Horizontal**


Freq	Level	Over Limit	Limit Line	ReadAntenna		Cable Preamp		Ant Pos	Table Pos	Table Pol/Phase	
				Level	Factor	dBuV	dB/m				
1	4922.940	31.83	-22.17	54.00	30.10	33.58	3.40	35.24	AVERAGE	100	201 HORIZONTAL
2	4923.260	45.43	-28.57	74.00	43.70	33.58	3.40	35.24	PEAK	100	201 HORIZONTAL

*Vertical*


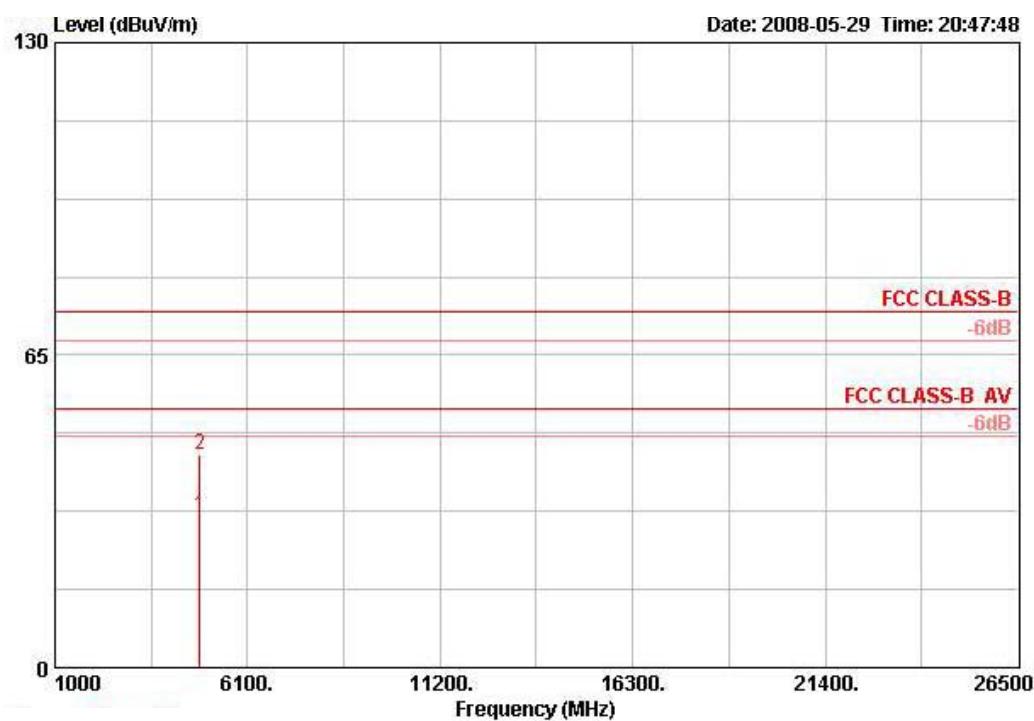
Freq	Level	Over Limit	Limit	Read		Ant	Table			
				Antenna Line	Antenna Factor			Pos	Pos	Pol/Phase
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	4922.040	47.28	-26.72	74.00	45.55	33.58	3.40	35.24	PEAK	100
2	4923.190	33.28	-20.72	54.00	31.55	33.58	3.40	35.24	AVERAGE	100

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 40MHz Ch 3 / Ant. A + Ant. C

**Horizontal**


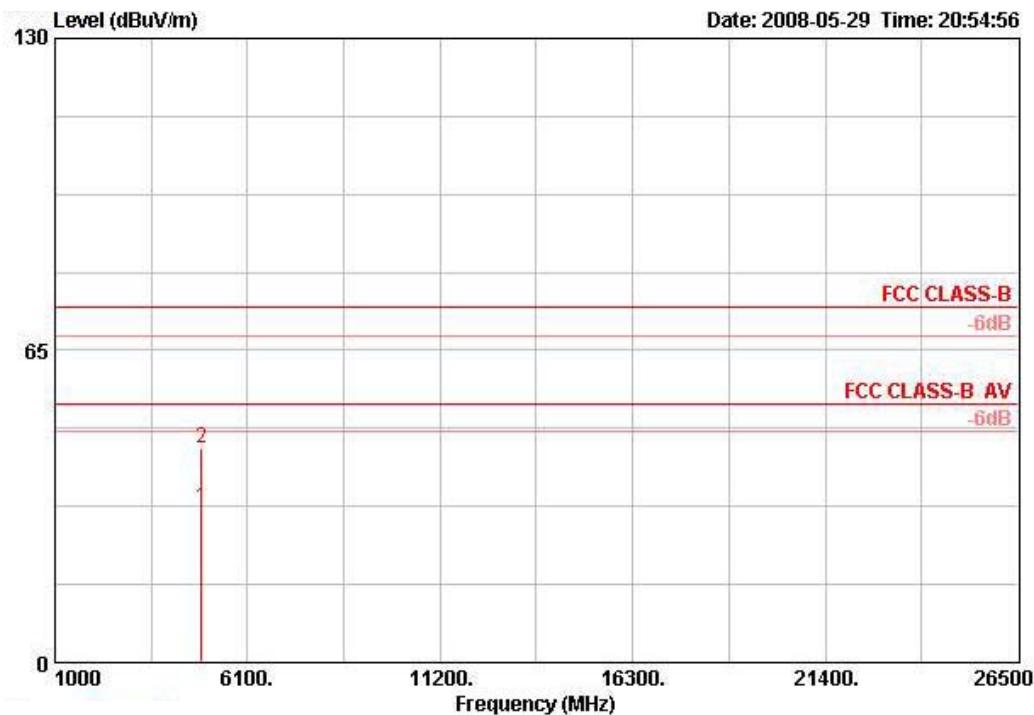
Freq	Level	Over Limit	Line	Read	Antenna	Cable	Preamp	Ant Table			
								Pos	Pos	Pol/Phase	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg		
1	4839.380	30.70	-23.30	54.00	29.15	33.42	3.38	35.25	AVERAGE	100	245 HORIZONTAL
2	4843.740	43.91	-30.09	74.00	42.36	33.42	3.38	35.25	PEAK	100	245 HORIZONTAL

## Vertical

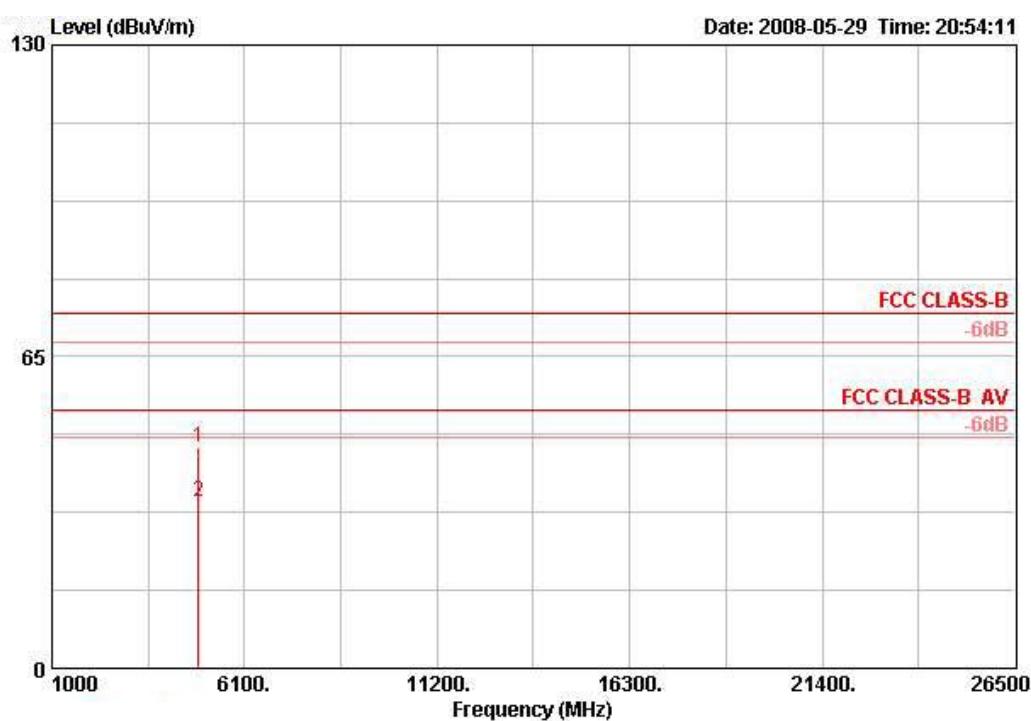


Freq	Level	Over Limit	Limit	Read		Ant	Table		
				Antenna Line	Level Factor			Pos	Pos Pol/Phase
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	4839.200	31.44	-22.56	54.00	29.89	33.42	3.38	35.25	AVERAGE
2	4842.360	44.26	-29.74	74.00	42.71	33.42	3.38	35.25	PEAK
								100	284 VERTICAL
								100	284 VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 40MHz Ch 6 / Ant. A + Ant. C

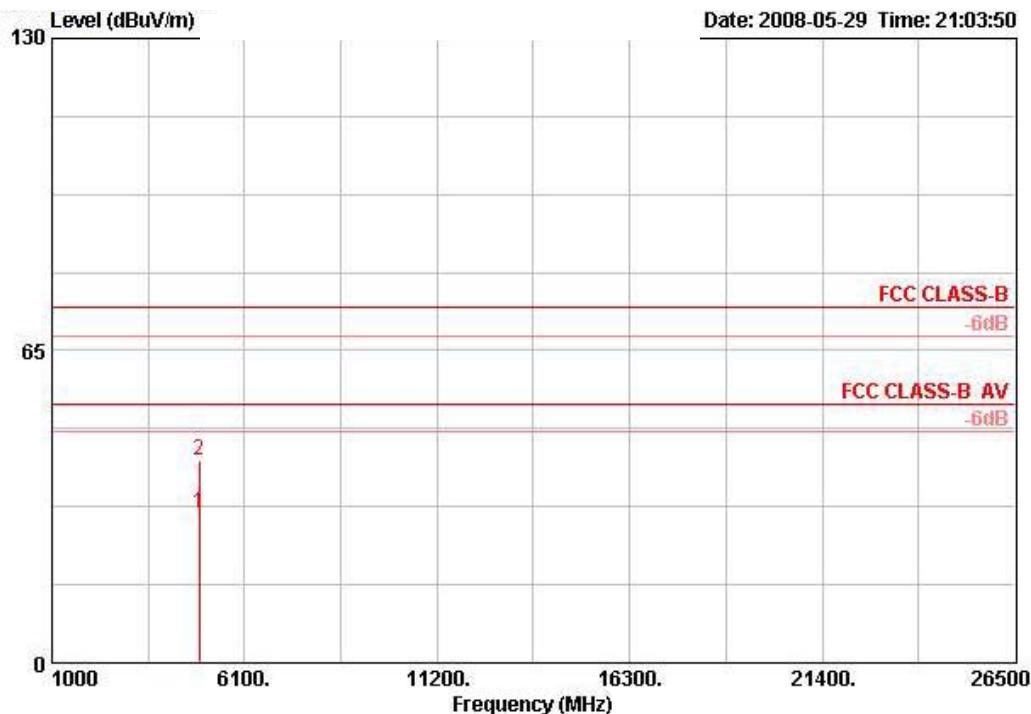
**Horizontal**


Freq	Level	Over Limit	Limit Line	Read	Antenna	Cable	Preamp	Table			
								Pos	Pos	Pol/Phase	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg		
1	4875.110	32.40	-21.60	54.00	30.78	33.48	3.38	35.25	AVERAGE	100	227 HORIZONTAL
2	4875.280	44.77	-29.23	74.00	43.15	33.48	3.38	35.25	PEAK	100	227 HORIZONTAL

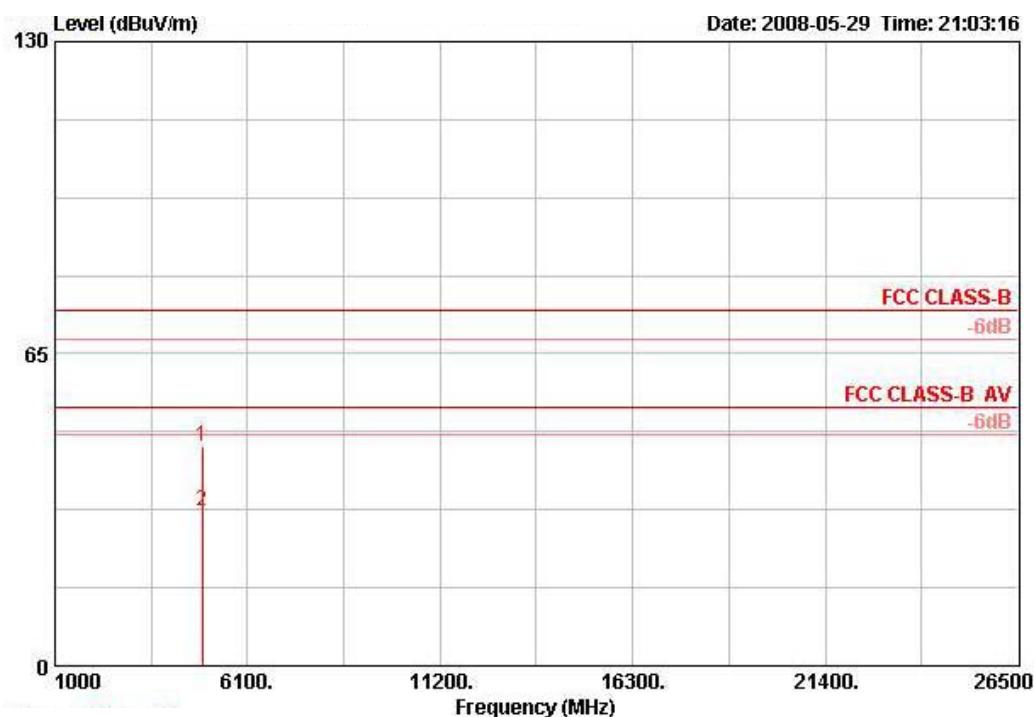
**Vertical**


Freq	Level	Over Limit	Limit	Read		Ant	Table		
				Antenna Line	Antenna Factor			Pos	Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	4874.992	45.99	-28.01	74.00	44.37	33.48	3.38	35.25	PEAK
2	4875.000	34.54	-19.46	54.00	32.92	33.48	3.38	35.25	AVERAGE
								100	246 VERTICAL
								100	246 VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 40MHz Ch 9 / Ant. A + Ant. C

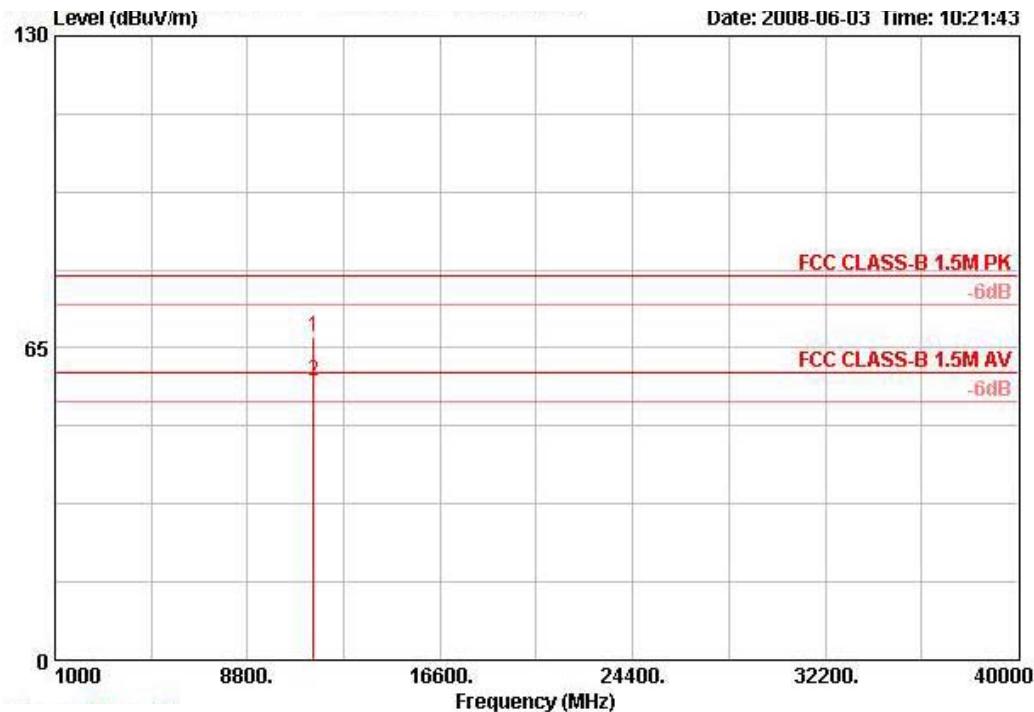
**Horizontal**


Freq	Level	Over Limit	Limit Line	Read Antenna		Cable Preamp		Ant Pos	Table Pos	Table Pol/Phase			
				Level	Factor	Level	Factor						
				MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	4906.420	31.25	-22.75	54.00	29.56	33.54	3.39	35.24	AVERAGE	100	235	HORIZONTAL	
2	4906.420	42.03	-31.97	74.00	40.34	33.54	3.39	35.24	PEAK	100	235	HORIZONTAL	

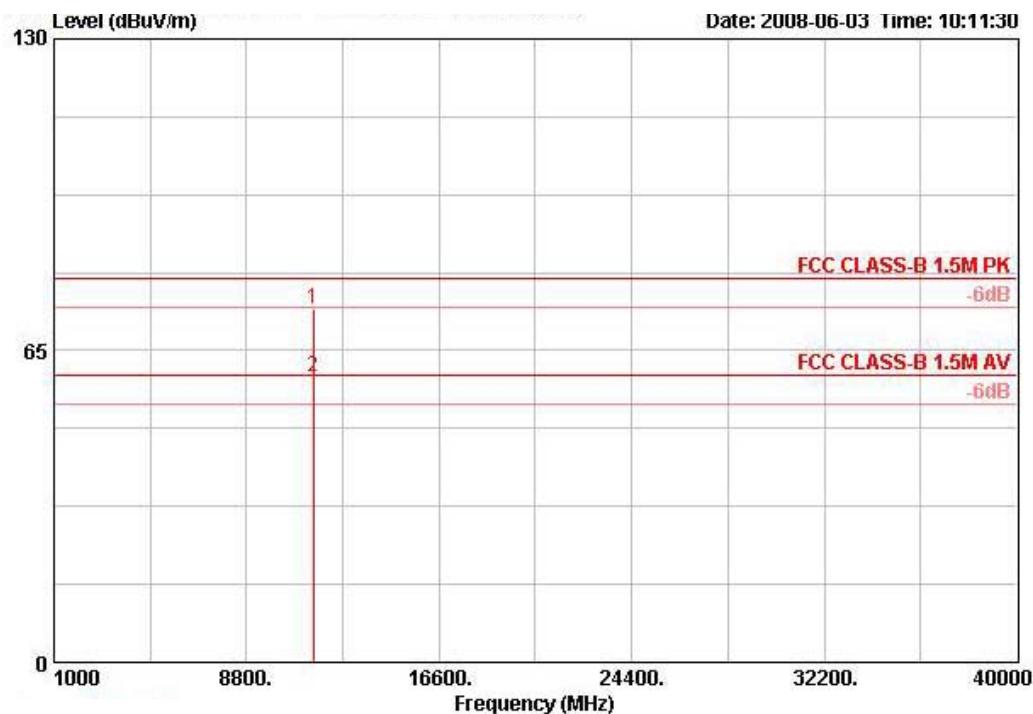
**Vertical**


Freq	Level	Over Limit	Limit	Read		Ant	Table		
				Antenna Line	Antenna Factor			Pos	Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	4902.920	45.86	-28.14	74.00	44.17	33.54	3.39	35.24	PEAK
2	4906.280	32.16	-21.84	54.00	30.47	33.54	3.39	35.24	AVERAGE
								100	220 VERTICAL
								100	220 VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 20MHz CH 149 / Ant. A + Ant. C

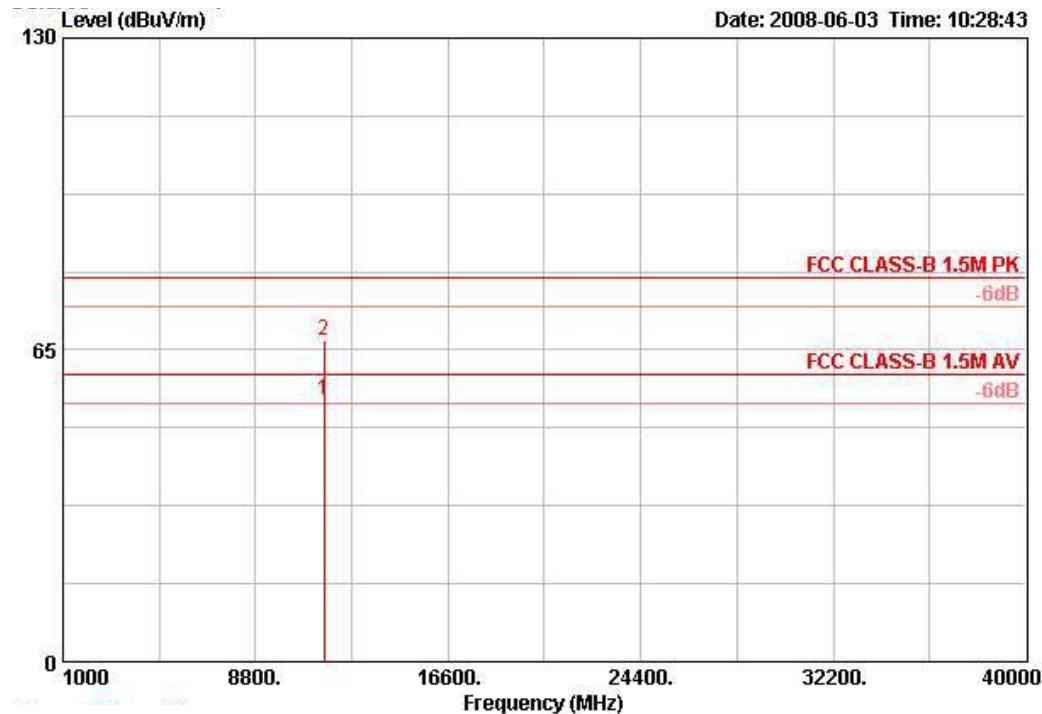
**Horizontal**


Freq	Level	Over Limit	Limit Line	Read	Antenna	Cable	Preamp	Ant	Table	
									Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	11488.660	67.22	-12.78	80.00	57.53	39.50	5.14	34.95	PEAK	114
2 @	11489.080	58.05	-1.95	60.00	48.36	39.50	5.14	34.95	AVERAGE	114

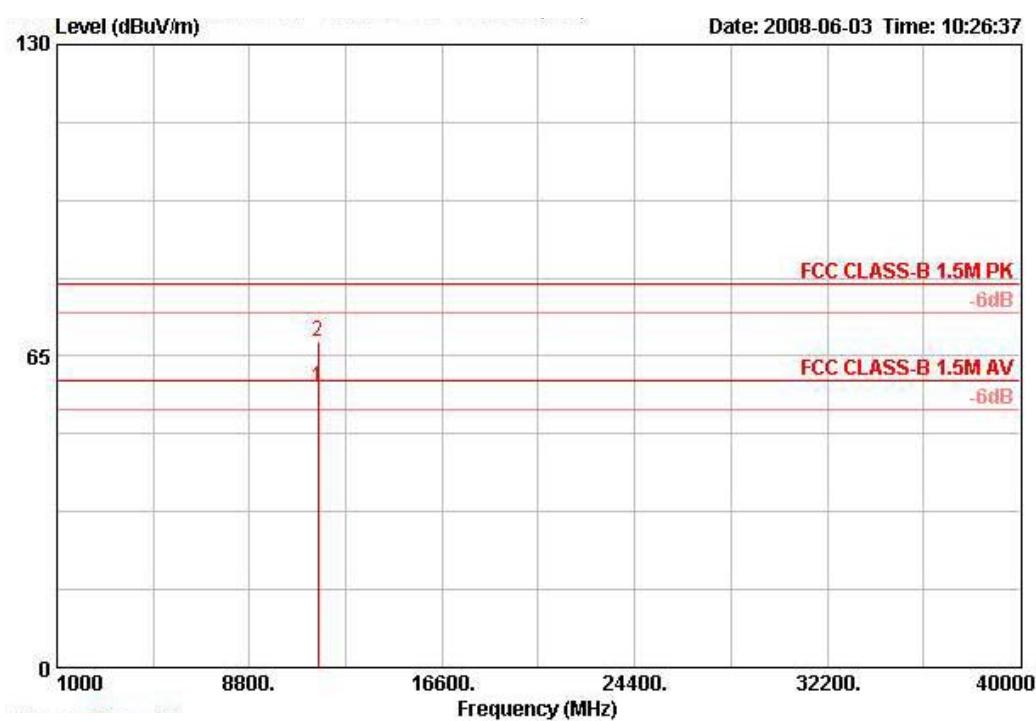
**Vertical**


Freq	Level	Over Limit	Limit	Read		Ant	Table		
				Antenna Line	Antenna Factor			Pos	Pos Pol/Phase
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	11490.360	73.57	-6.43	80.00	63.88	39.50	5.14	34.95	PEAK
2 @	11491.960	59.37	-0.63	60.00	49.68	39.50	5.14	34.95	AVERAGE
								100	272 VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 20MHz CH 157 / Ant. A + Ant. C

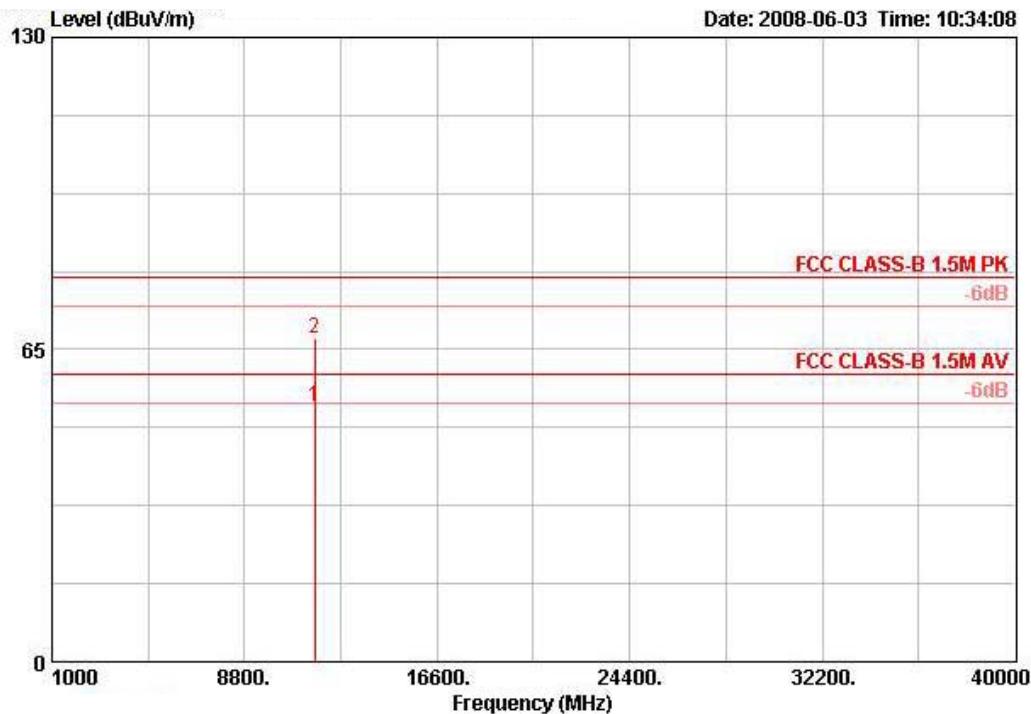
**Horizontal**


Freq	Level	Over Limit	Limit	Read		Ant	Table		
				Antenna	Cable	Preamp		Pos	Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 !	11569.200	54.72	-5.28	60.00	45.04	39.47	5.17	34.96	AVERAGE
2	11571.020	67.01	-12.99	80.00	57.32	39.47	5.18	34.96	PEAK
								111	64 HORIZONTAL
								111	64 HORIZONTAL

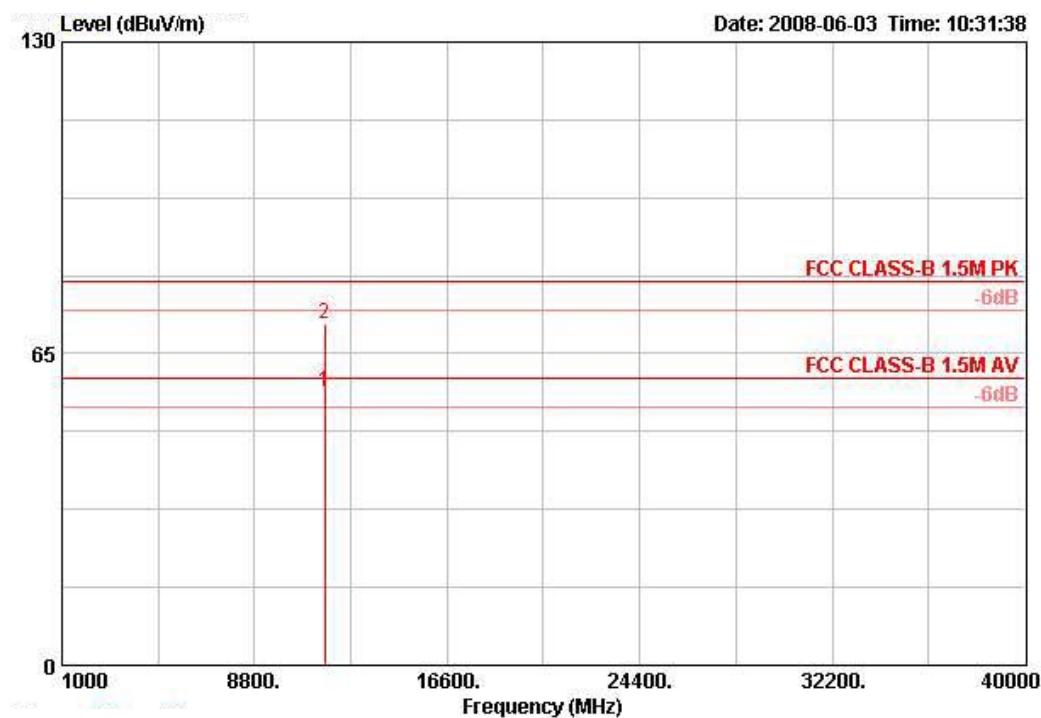
**Vertical**


Freq	Level	Over Limit	Limit	Read		Ant Pos	Table Pos	Table Pol/Phase		
				Antenna Line	Antenna Factor					
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @ 11569.080	58.48	-1.52	60.00	48.81	39.47	5.17	34.96	AVERAGE	104	316 VERTICAL
2 @ 11570.560	67.94	-12.06	80.00	58.26	39.47	5.18	34.96	PEAK	104	316 VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 20MHz CH 165 / Ant. A + Ant. C

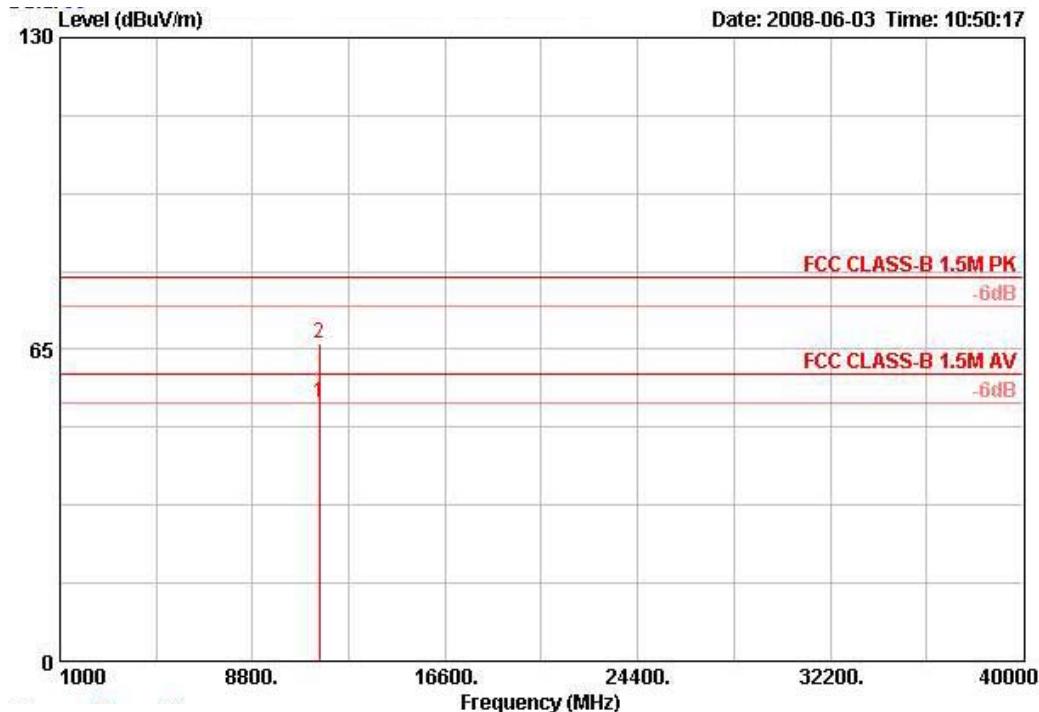
**Horizontal**


Freq	Level	Over Limit	Limit Line	ReadAntenna		Cable Preamp		Ant Pos	Table Pos	Table Pol/Phase
				Level	Factor	dBuV	dB/m			
11648.800	53.06	-6.94	60.00	43.38	39.44	5.20	34.97	AVERAGE	110	54 HORIZONTAL
11650.480	67.24	-12.76	80.00	57.55	39.44	5.20	34.97	PEAK	110	54 HORIZONTAL

**Vertical**


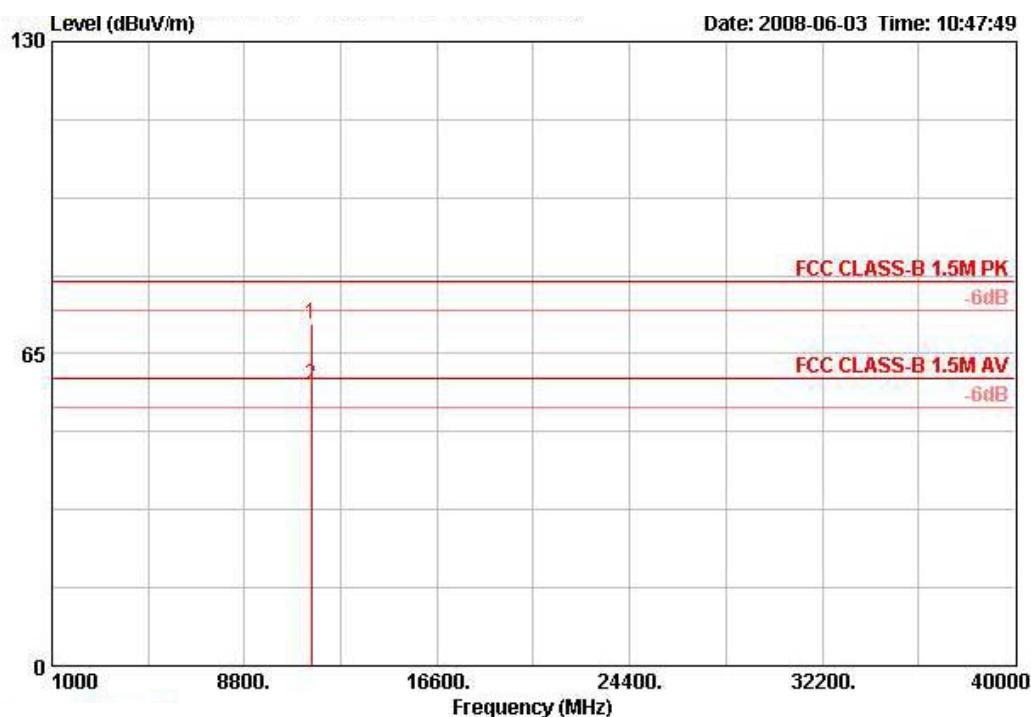
Freq	Level	Over Limit	Limit	Read		Ant Pos	Table Pos	Table Pol/Phase		
				Antenna Line	Antenna Factor					
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @ 11648.900	57.18	-2.82	60.00	47.50	39.44	5.20	34.97	AVERAGE	100	313 VERTICAL
2 @ 11650.480	71.15	-8.85	80.00	61.47	39.44	5.20	34.97	PEAK	100	313 VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 40MHz CH 151 / Ant. A + Ant. C

**Horizontal**


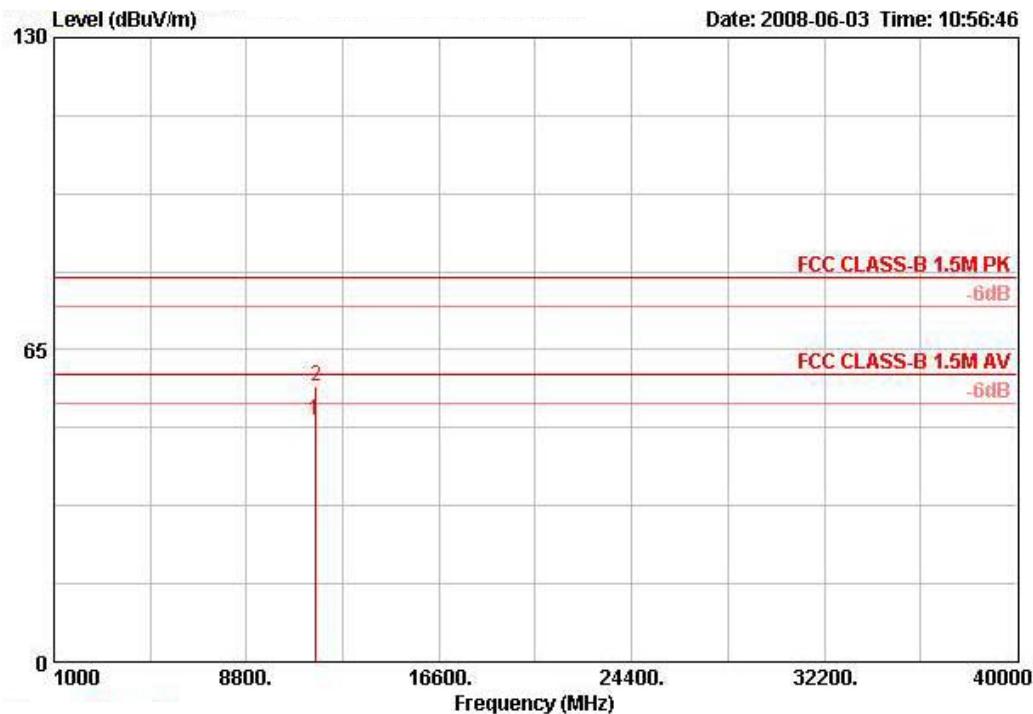
Freq	Level	Over Limit	Limit Line	Read	Antenna	Cable	Preamp	Ant	Table	
									Pos	Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	Pol/Phase
1	11504.600	53.67	-6.33	60.00	43.98	39.50	5.15	34.96	AVERAGE	
2	11507.960	66.10	-13.90	80.00	56.41	39.50	5.15	34.96	PEAK	
									105	277 HORIZONTAL
									105	277 HORIZONTAL

*Vertical*

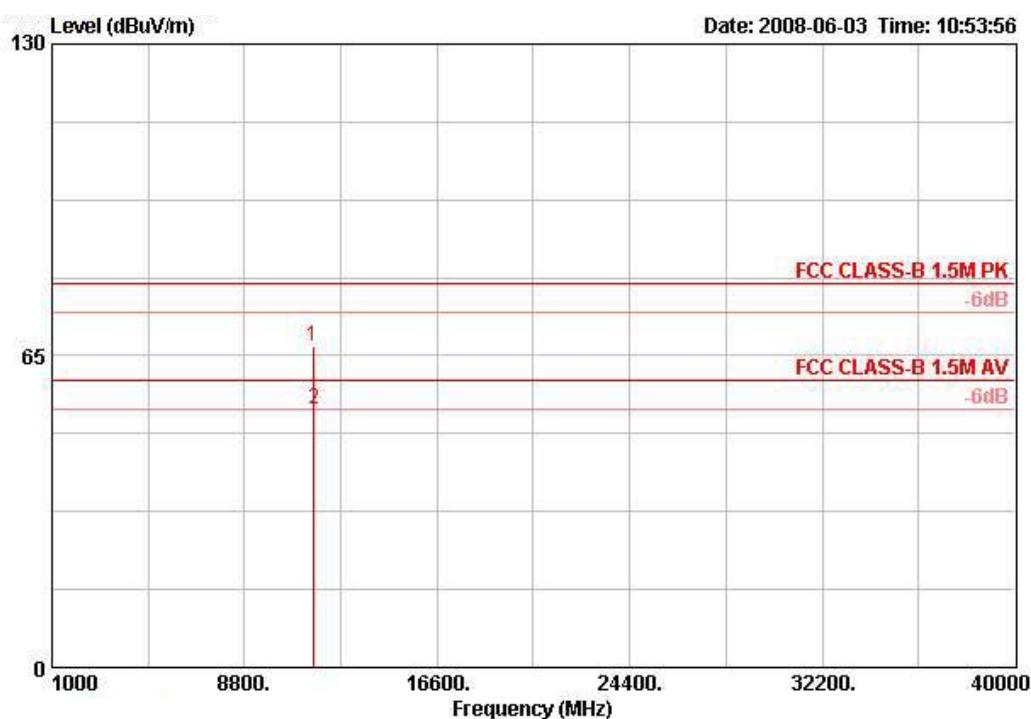


Freq	Level	Over Limit	Limit	Read		Ant Pos	Table Pos	Table Pol/Phase		
				Antenna Line	Antenna Factor					
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
11508.040	71.05	-8.95	80.00	61.36	39.50	5.15	34.96	PEAK	100	305 VERTICAL
11508.480	58.60	-1.40	60.00	48.91	39.50	5.15	34.96	AVERAGE	100	305 VERTICAL

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 40MHz CH 159 / Ant. A + Ant. C

**Horizontal**


Freq	Level	Over Limit	Limit Line	Read		Ant Pos	Table Pos	Table Pol/Phase
				Antenna Factor	Cable Loss Factor			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm deg
1 11584.960	50.27	-9.73	60.00	40.59	39.47	5.18	34.96	AVERAGE 111 62 HORIZONTAL
2 11594.320	57.28	-22.72	80.00	47.60	39.47	5.18	34.96	PEAK 111 62 HORIZONTAL

**Vertical**


VH10	Freq	Level	Over Limit	Limit	Read		Ant Pos	Table Pos	Table Pol/Phase
					Antenna Line	Antenna Factor			
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm deg
1	11589.440	67.06	-12.94	80.00	57.38	39.47	5.18	34.96	PEAK 100 312 VERTICAL
2	11594.400	53.88	-6.12	60.00	44.20	39.47	5.18	34.96	AVERAGE 100 312 VERTICAL

**Note:**

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

## 4.6. Band Edge Emissions Measurement

### 4.6.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

### 4.6.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100 KHz /100 KHz for Peak

### 4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

### 4.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

### 4.6.5. Test Deviation

There is no deviation with the original standard.

### 4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 20MHz Ch 1, 6, 11 / Ant. A + Ant. C
Test Date	May. 29, 2008		

##### Channel 1

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Pos	Pos	Pol/Phase
			Limit	Line	Level	Factor	Loss	Factor		Pos			
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm		deg	
1	2390.000	62.06	-11.94	74.00	31.65	28.05	2.36	0.00	PEAK	100	200	VERTICAL	
2 !	2390.000	50.27	-3.73	54.00	19.86	28.05	2.36	0.00	AVERAGE	100	200	VERTICAL	
3 @	2408.400	99.25			68.79	28.09	2.36	0.00	AVERAGE	100	200	VERTICAL	
4 @	2410.000	110.16			79.70	28.09	2.36	0.00	PEAK	100	200	VERTICAL	

Item 3, 4 are the fundamental frequency at 2412 MHz

##### Channel 6

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Pos	Pos	Pol/Phase
			Limit	Line	Level	Factor	Loss	Factor		Pos			
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm		deg	
1 @	2431.400	110.56			80.05	28.13	2.38	0.00	PEAK	100	201	VERTICAL	
2 @	2433.400	99.93			69.41	28.13	2.38	0.00	AVERAGE	100	201	VERTICAL	

Item 1, 2 are the fundamental frequency at 2437MHz.

##### Channel 11

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Pos	Pos	Pol/Phase
			Limit	Line	Level	Factor	Loss	Factor		Pos			
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm		deg	
1 @	2458.000	110.22			79.60	28.22	2.40	0.00	PEAK	100	208	VERTICAL	
2 @	2458.600	99.47			68.85	28.22	2.40	0.00	AVERAGE	100	208	VERTICAL	
3 !	2483.500	49.44	-4.56	54.00	18.76	28.26	2.41	0.00	AVERAGE	100	208	VERTICAL	

Item 1, 2 are the fundamental frequency at 2462 MHz.

<b>Temperature</b>	26°C	<b>Humidity</b>	62%
<b>Test Engineer</b>	Roy Huang	<b>Configurations</b>	Draft n MCS8 40MHz Ch 3, 6, 9 / Ant. A + Ant. C
<b>Test Date</b>	May. 29, 2008		

### Channel 3

Freq	Level	Over Limit	Line	ReadAntenna		Cable Preamp		Remark	Ant Pos	Table Pos	Table Pol/Phase
				Level	Factor	Loss	Factor				
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	2389.600	64.42	-9.58	74.00	34.02	28.05	2.35	0.00 PEAK	100	200	VERTICAL
2 @	2389.600	53.29	-0.71	54.00	22.90	28.05	2.35	0.00 AVERAGE	100	200	VERTICAL
3 @	2432.000	107.45			76.94	28.13	2.38	0.00 PEAK	100	200	VERTICAL
4 @	2432.800	96.75			66.24	28.13	2.38	0.00 AVERAGE	100	200	VERTICAL

Item 3, 4 are the fundamental frequency at 2422 MHz.

### Channel 6

Freq	Level	Over Limit	Line	ReadAntenna		Cable Preamp		Remark	Ant Pos	Table Pos	Table Pol/Phase
				Level	Factor	Loss	Factor				
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	2390.000	61.11	-12.89	74.00	30.69	28.05	2.36	0.00 PEAK	100	201	VERTICAL
2 !	2390.000	49.17	-4.83	54.00	18.76	28.05	2.36	0.00 AVERAGE	100	201	VERTICAL
3 @	2447.000	107.73			77.15	28.18	2.40	0.00 PEAK	100	201	VERTICAL
4 @	2447.400	96.89			66.32	28.18	2.40	0.00 AVERAGE	100	201	VERTICAL

Item 3, 4 are the fundamental frequency at 2437MHz.

### Channel 9

Freq	Level	Over Limit	Line	ReadAntenna		Cable Preamp		Remark	Ant Pos	Table Pos	Table Pol/Phase
				Level	Factor	Loss	Factor				
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	2456.000	107.97			77.36	28.22	2.40	0.00 PEAK	100	207	VERTICAL
2 @	2461.200	96.99			66.37	28.22	2.40	0.00 AVERAGE	100	207	VERTICAL
3	2484.300	62.39	-11.61	74.00	31.72	28.26	2.41	0.00 PEAK	100	207	VERTICAL
4 !	2484.300	52.65	-1.35	54.00	21.97	28.26	2.41	0.00 AVERAGE	100	207	VERTICAL

Item 1, 2 are the fundamental frequency at 2452 MHz.

<b>Temperature</b>	26°C	<b>Humidity</b>	62%
<b>Test Engineer</b>	Roy Huang	<b>Configurations</b>	Draft n MCS8 20MHz CH 149, 157, 165 / Ant. A + Ant. C
<b>Test Date</b>	Jun. 3, 2008		

### Channel 149

Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Pos	Pos
		Limit	Line	Level	Factor	Loss	Factor		Pos		Pol/Phase
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	5737.800	112.81		74.23	34.89	3.69	0.00	AVERAGE	100	190	VERTICAL
2 @	5738.400	123.67		85.09	34.89	3.69	0.00	PEAK	100	190	VERTICAL

Item 1, 2 are the fundamental frequency at 5745 MHz.

### Channel 157

Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Pos	Pos
		Limit	Line	Level	Factor	Loss	Factor		Pos		Pol/Phase
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	5780.800	121.32		82.71	34.92	3.69	0.00	PEAK	100	191	VERTICAL
2 @	5781.400	110.83		72.22	34.92	3.69	0.00	AVERAGE	100	191	VERTICAL

Item 1, 2 are the fundamental frequency at 5785 MHz.

### Channel 165

Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Pos	Pos
		Limit	Line	Level	Factor	Loss	Factor		Pos		Pol/Phase
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 @	5827.000	119.12		80.46	34.96	3.69	0.00	PEAK	130	190	VERTICAL
2 @	5828.800	109.04		70.38	34.96	3.69	0.00	AVERAGE	130	190	VERTICAL

Item 1, 2 are the fundamental frequency at 5825 MHz.

#### Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Temperature	26°C	Humidity	62%
Test Engineer	Roy Huang	Configurations	Draft n MCS8 40MHz CH 151, 159 / Ant. A + Ant. C
Test Date	Jun. 3, 2008		

**Channel 151**

Freq	Level	Over Limit		ReadAntenna		Cable Preamp		Ant Pos	Table Pos	Table Pol/Phase
		Limit	Line	Level	Factor	Loss	Factor			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	5744.600	109.82		71.24	34.89	3.69	0.00	AVERAGE	100	190 VERTICAL
2 @	5746.200	119.73		81.15	34.89	3.69	0.00	PEAK	100	190 VERTICAL

Item 1, 2 are the fundamental frequency at 5755 MHz.

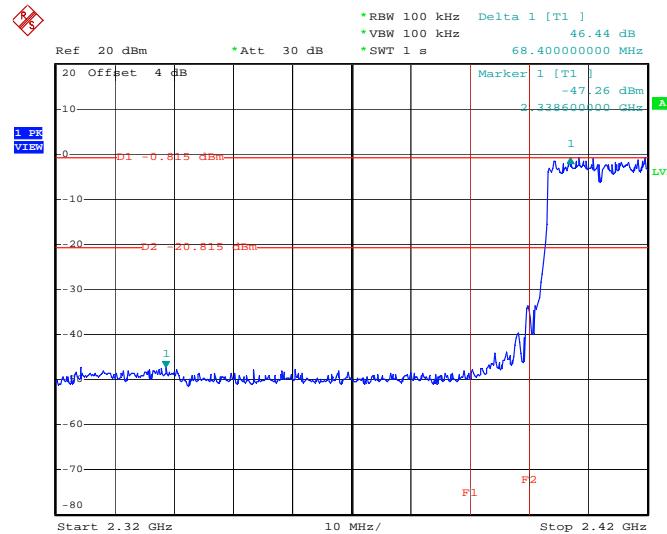
**Channel 159**

Freq	Level	Over Limit		ReadAntenna		Cable Preamp		Ant Pos	Table Pos	Table Pol/Phase
		Limit	Line	Level	Factor	Loss	Factor			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	5783.800	117.28		78.67	34.92	3.69	0.00	PEAK	100	190 VERTICAL
2 @	5785.400	107.32		68.71	34.92	3.69	0.00	AVERAGE	100	190 VERTICAL

Item 1, 2 are the fundamental frequency at 5795 MHz.

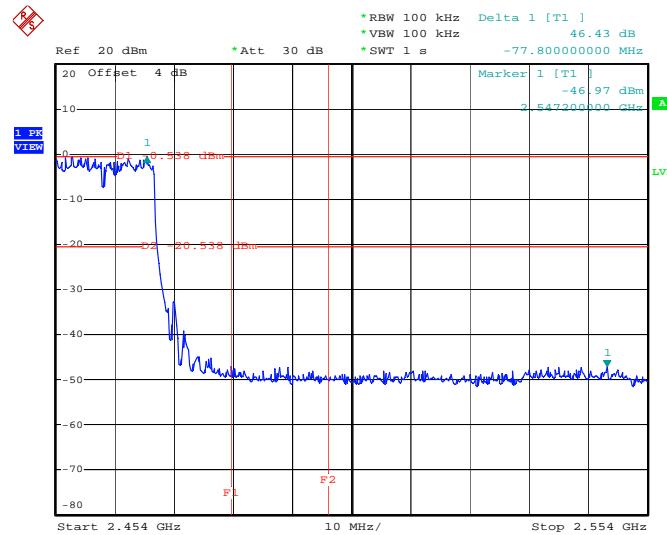
### For Emission not in Restricted Band

#### Low Band Edge Plot on Configuration Draft n MCS8 20MHz Ant. A + Ant. C / 2412 MHz

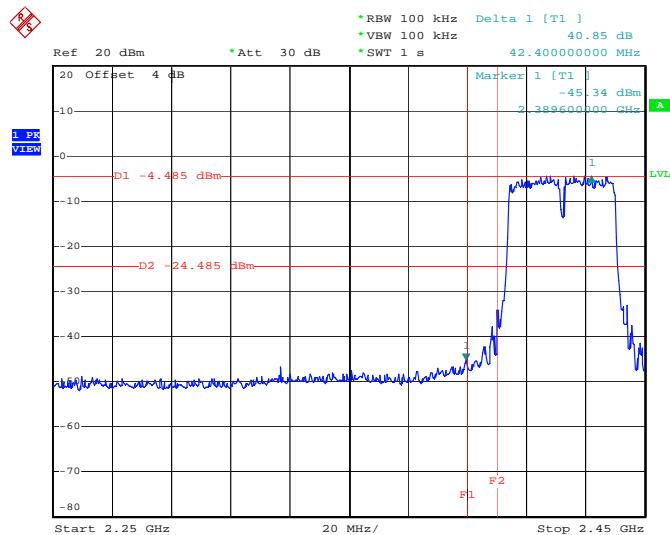


Date: 3.JUN.2008 20:46:22

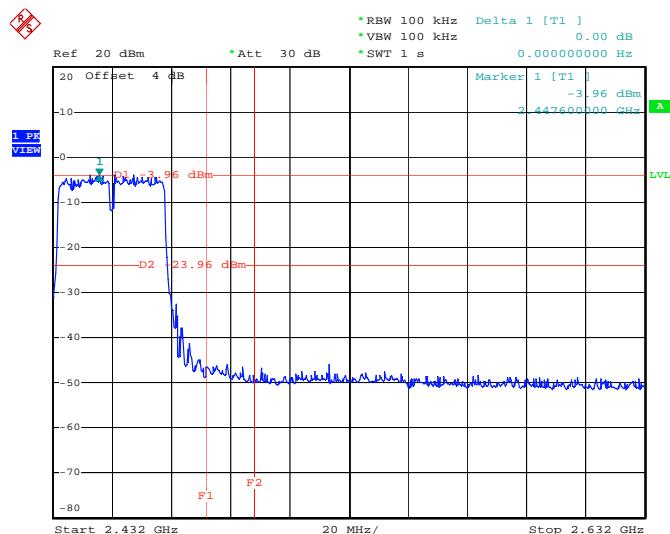
#### High Band Edge Plot on Configuration Draft n MCS8 20MHz Ant. A + Ant. C / 2462 MHz



Date: 3.JUN.2008 20:48:16

**For Emission not in Restricted Band**
**Low Band Edge Plot on Configuration Draft n MCS8 40MHz Ant. A + Ant. C / 2422 MHz**


Date: 3.JUN.2008 20:53:06

**High Band Edge Plot on Configuration Draft n MCS8 40MHz Ant. A + Ant. C / 2452 MHz**


Date: 3.JUN.2008 20:50:14

## 4.7. Antenna Requirements

### 4.7.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### 4.7.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

## 5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Mar. 03, 2008	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Mar. 31, 2008	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 22, 2008	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2008	Conduction (CO04-HY)
ISN	SCHAFFNER	ISN T400	21653	9kHz – 30MHz	Mar. 27, 2008	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 14, 2007	Radiation (03CH03-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 14, 2007	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz - 2 GHz	Jan. 14, 2008	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jun. 07, 2007	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5 GHz - 40 GHz	Jan. 22, 2007*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100305	9 kHz - 40 GHz	Sep. 27, 2007	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	May 23, 2006*	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Jul. 21, 2007	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Mar. 04, 2008	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan. 18, 2008	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Dec. 03, 2007	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Dec. 03, 2007	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	May 04, 2008	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan. 18, 2008	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Dec. 03, 2007	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Dec. 03, 2007	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP30	100023	9kHz ~ 30GHz	Jan. 10, 2008	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jun. 27, 2007	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100458	DC ~ 30GHz	Jun. 27, 2007	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jun. 27, 2007	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	May 04, 2007*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2008	Conducted (TH01-HY)
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2007	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2007	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2007	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Nov. 14, 2007	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 10, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jun. 27, 2007	Conducted (TH01-HY)
AC Power Source	HPC	HPB-500W	HPB-9100024	AC 0 ~ 300V	May 04, 2007*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 03, 2008	Conducted (TH01-HY)
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Jan. 14, 2008	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Jan. 04, 2008	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Jan. 04, 2008	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Nov. 14, 2007	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 07, 2008	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

\* Calibration Interval of instruments listed above is two year.

NCR means Non-Calibration required.

## 6. TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 <sup>nd</sup> Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

## 7. TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-070110

財團法人全國認證基金會  
Taiwan Accreditation Foundation

### Certificate of Accreditation

This is to certify that

**Sportun International Inc.**  
**EMC & Wireless Communications Laboratory**  
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,  
Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria : ISO/IEC 17025:2005  
Accreditation Number : 1190  
Originally Accredited : December 15, 2003  
Effective Period : January 10, 2007 to January 09, 2010  
Accredited Scope : Testing Field, see described in the Appendix  
Specific Accreditation Program : Accreditation Program for Designated Testing Laboratory  
for Commodities Inspection  
Accreditation Program for Telecommunication Equipment  
Testing Laboratory



Jay-San Chen  
President, Taiwan Accreditation Foundation  
Date : January 10, 2007

PI, total 9 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when used without the Appendix.