



# SPORTON International Inc.

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## FCC RADIO TEST REPORT

Applicant's company	LOGITECH FAR EAST LTD.
Applicant Address	#2 Creation Rd. 4, Science-Based Ind. Park Hsinchu Taiwan, R.O.C.
FCC ID	JNZYR0006
Manufacturer's company	LOGITECH TECHNOLOGY (SUZHOU) CO., LTD.
Manufacturer Address	NO.3 SONGSHAN ROAD, SUZHOU NEW DISTRICT,P.R.CHINA

Product Name	Cordless Keyboard
Brand Name	LOGITECH
Model Name	Y-R0006
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.249
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	May 11, 2009
Final Test Date	May 15, 2009
Submission Type	Original Equipment

### Statement

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart C**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.



Testing Laboratory  
1190

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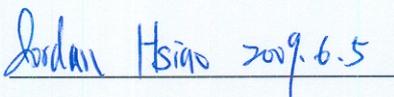
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## 1. CERTIFICATE OF COMPLIANCE

Product Name : Cordless Keyboard  
Brand Name : LOGITECH  
Model Name : Y-R0006  
Applicant : LOGITECH FAR EAST LTD.  
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.249

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on May 11, 2009 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

  
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Reviewed By:

Jordan Hsiao

## 2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	Rule Section	Description of Test	Result	Under Limit
4.1	15.207	AC Power Line Conducted Emissions	-	-
4.2	15.249(a)	Field Strength of Fundamental Emissions	Complies	10.16 dB
4.3	15.215(c)	20dB Spectrum Bandwidth	Complies	-
4.4	15.249(a)/(d)	Radiated Emissions	Complies	4.31 dB
4.5	15.249(d)	Band Edge Emissions	Complies	4.13 dB
4.6	15.203	Antenna Requirements	Complies	-

**Note:**

Due to the Power Supply of this EUT is from DC Power Supply. (DC voltage), Conducted Powerline tests are not applicable for this EUT.

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Field Strength of Fundamental Emissions	±0.8dB	Confidence levels of 95%
20dB Spectrum Bandwidth	±8.5×10 <sup>-8</sup>	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7°C	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

### 3. GENERAL INFORMATION

#### 3.1. Product Details

Items	Description
Power Type	From Battery
Modulation	GFSK
Frequency Range	2400 ~ 2483.5MHz
Channel Number	24
Channel Band Width (99%)	1.88 MHz
Max. Field Strength	103.84 dBuV/m at 3m (Peak)
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

#### 3.2. Accessories

Others
Battery*2

#### 3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	Printed Antenna	NA	3.3

#### 3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400 ~ 2483.5MHz	1	2405 MHz	13	2441 MHz
	2	2408 MHz	14	2444 MHz
	3	2411 MHz	15	2447 MHz
	4	2414 MHz	16	2450 MHz
	5	2417 MHz	17	2453 MHz
	6	2420 MHz	18	2456 MHz
	7	2423 MHz	19	2459 MHz
	8	2426 MHz	20	2462 MHz
	9	2429 MHz	21	2465 MHz
	10	2432 MHz	22	2468 MHz
	11	2435 MHz	23	2471 MHz
	12	2438 MHz	24	2474 MHz

### 3.5. Table for Test Modes

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Channel	Antenna
AC Power Line Conducted Emissions	-	-	-
Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth	CTX	1/15/24	1
Radiated Emissions 9kHz~1GHz	CTX	-	1
Radiated Emissions 1GHz~10 <sup>th</sup> Harmonic	CTX	1/15/24	1
Band Edge Emissions	CTX	1/15/24	1

Note: CTX=continuously transmitting

### 3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH03-HY	SAC	Hwa Ya	101377	IC 4088	-
TH01-HY	OVEN Room	Hwa Ya	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 6 for Test Site Address.

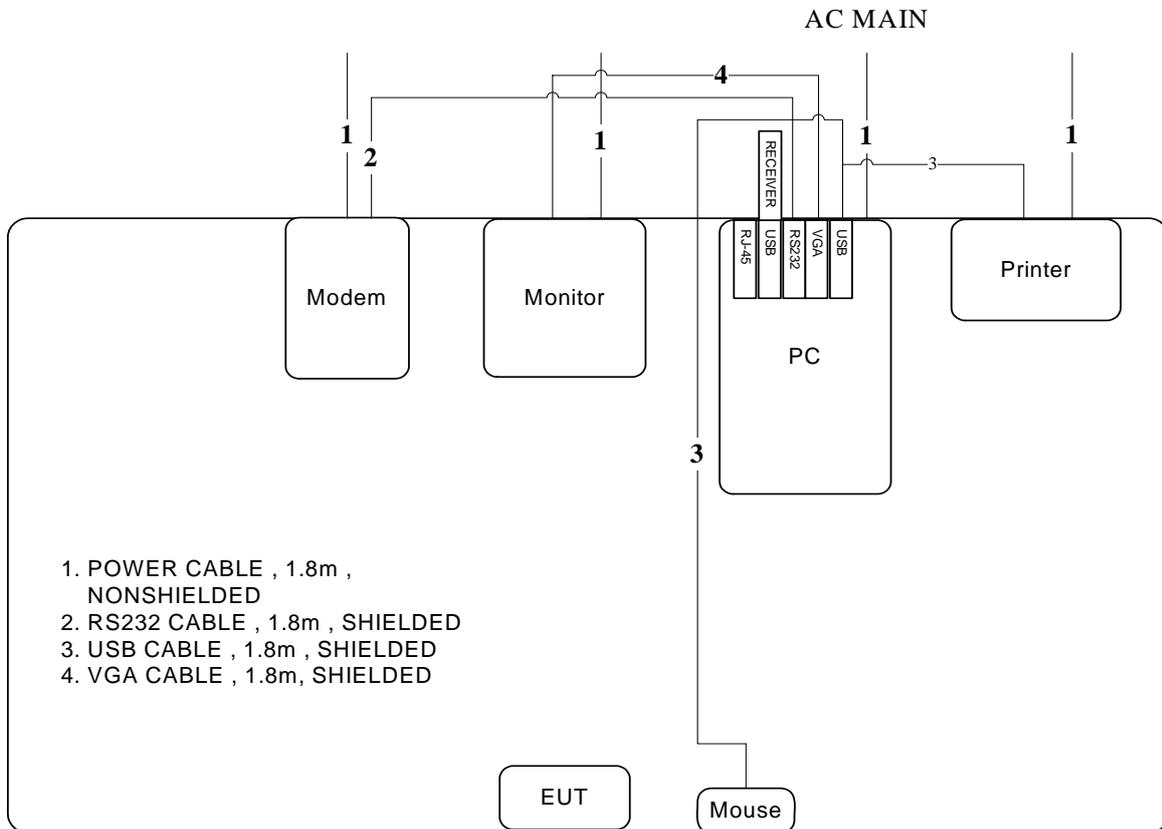
### 3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
PC	DELL	T3400	DoC
LCD Monitor	HP	HSTND-2511-T	DoC
Mouse	icooby	AMS0706W	DoC
Modem	ACEEX	DM1414	IFAXDM1414
Printer	EPSON	LQ-300+	DoC
USB Dongle	Logitech	C-UBC34	DZLCUBC34

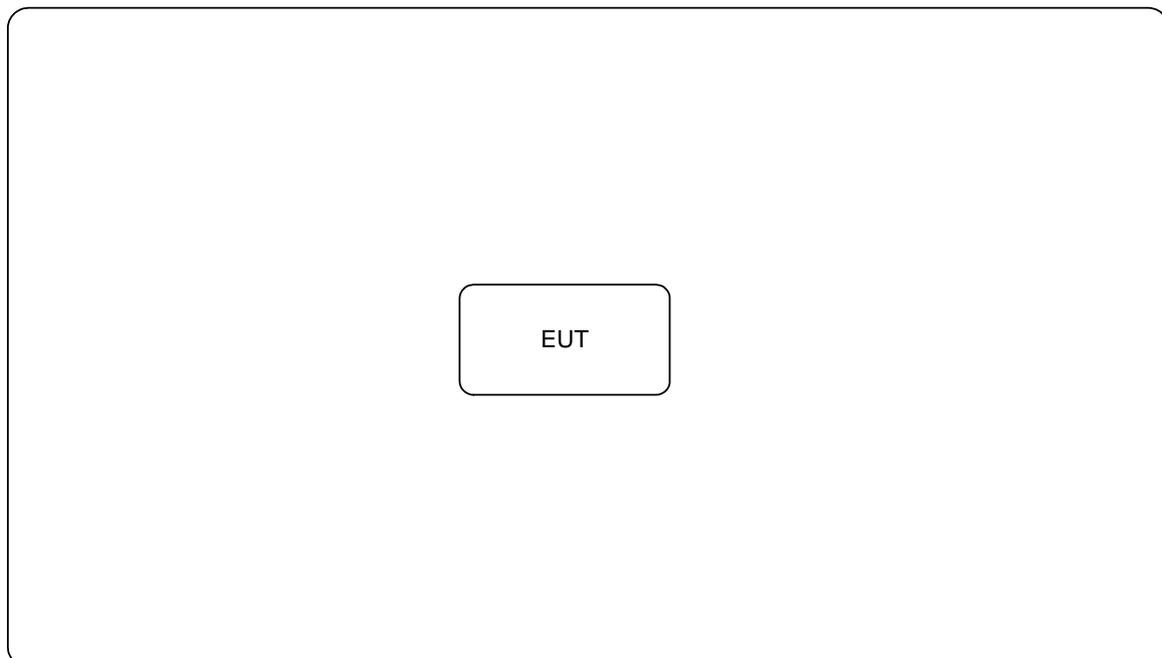
### 3.8. Test Configurations

#### 3.8.1. Radiation Emissions Test Configuration

Test Configuration: 30KHz~1GHz



Test Configuration: above 1GHz



## 4. TEST RESULT

### 4.1. Field Strength of Fundamental Emissions Measurement

#### 4.1.1. Limit

The field strength of fundamental emissions within these bands specified at a distance of 3 meters (measurement instrumentation employing an average detector) shall comply with the following table.

Frequency Band (MHz)	Fundamental Emissions Limit (dBuV/m) at 3m
2400-2483.5	94

#### 4.1.2. Measuring Instruments and Setting

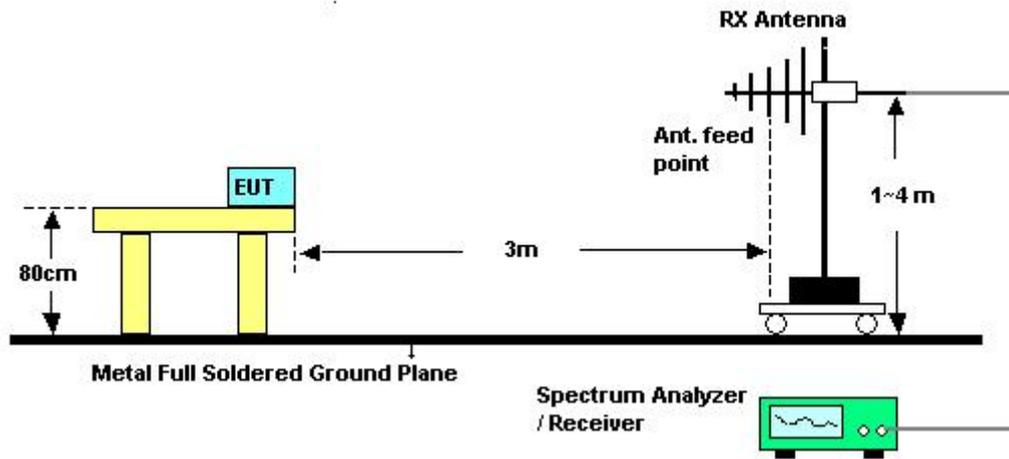
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Power Meter Parameter	Setting
RB	1 MHz Peak / 1MHz Average
VB	1 MHz Peak / 10Hz Average
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 4.1.3. 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. For Fundamental emissions, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
6. 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.

#### 4.1.4. Test Setup Layout



#### 4.1.5. Test Deviation

There is no deviation with the original standard.

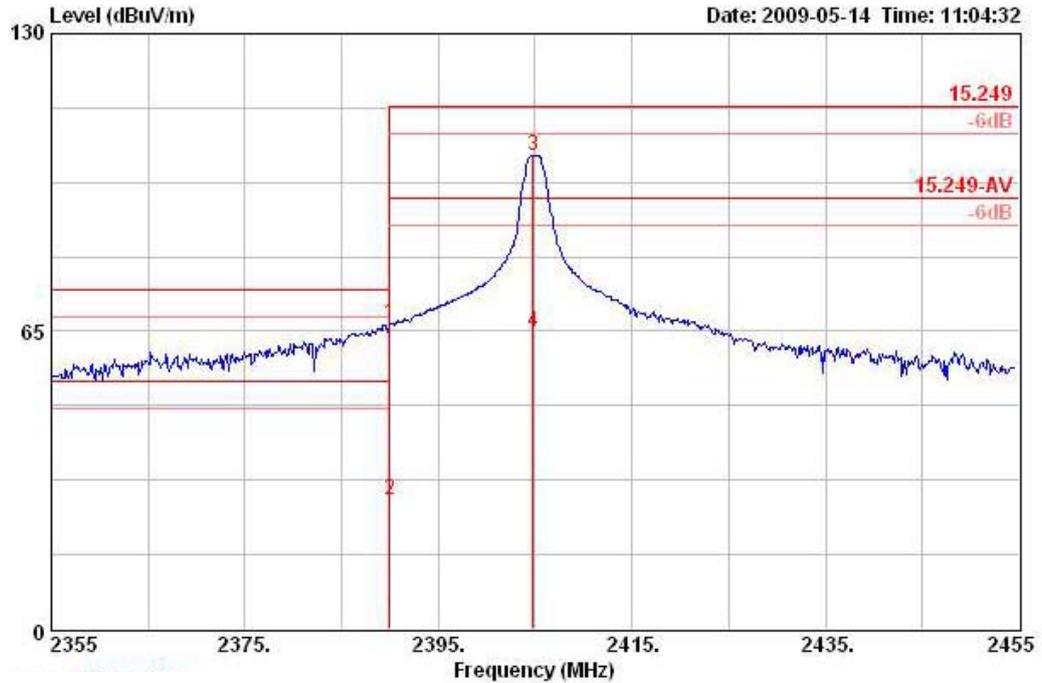
#### 4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.7. Test Result of Field Strength of Fundamental Emissions

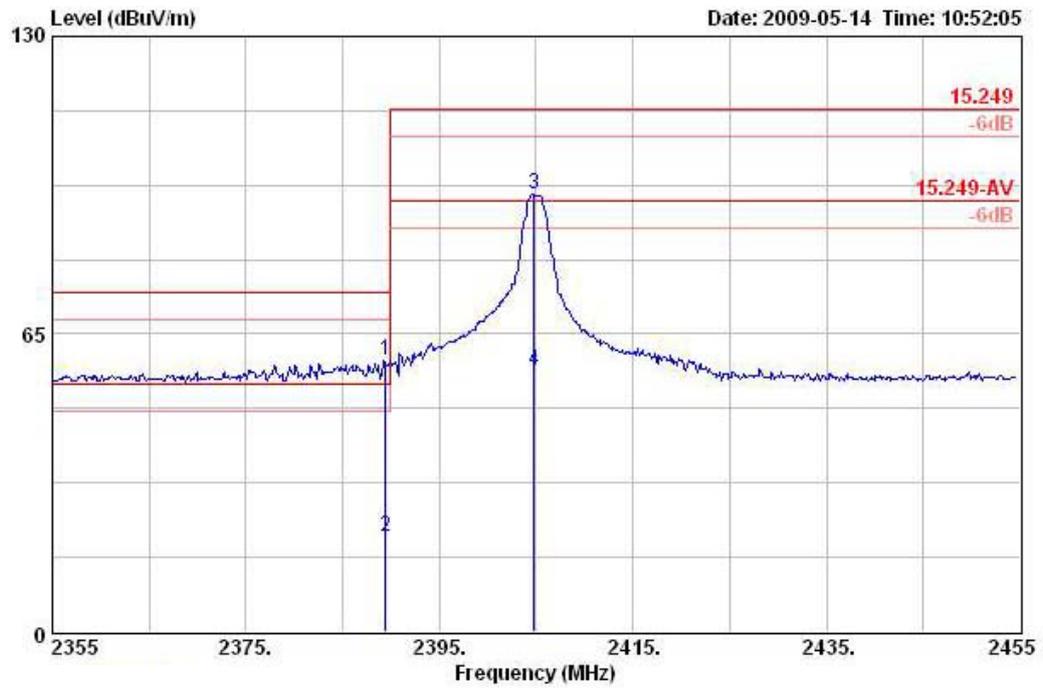
Temperature	24°C	Humidity	55%
Test Engineer	Allen Liu	Configurations	Channel 1

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
3	2404.773	103.40	-10.60	114.00	72.43	28.09	0.00	2.88	PERK	HORIZONTAL	185	100
4	2404.773	65.00	-49.00	114.00	34.03	28.09	0.00	2.88	Average	HORIZONTAL	185	100

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
3	2404.773	95.54	-18.46	114.00	64.57	28.09	0.00	2.88	PEAK	VERTICAL	307	104
4	2404.773	57.14	-36.86	94.00	26.17	28.09	0.00	2.88	Average	VERTICAL	307	104

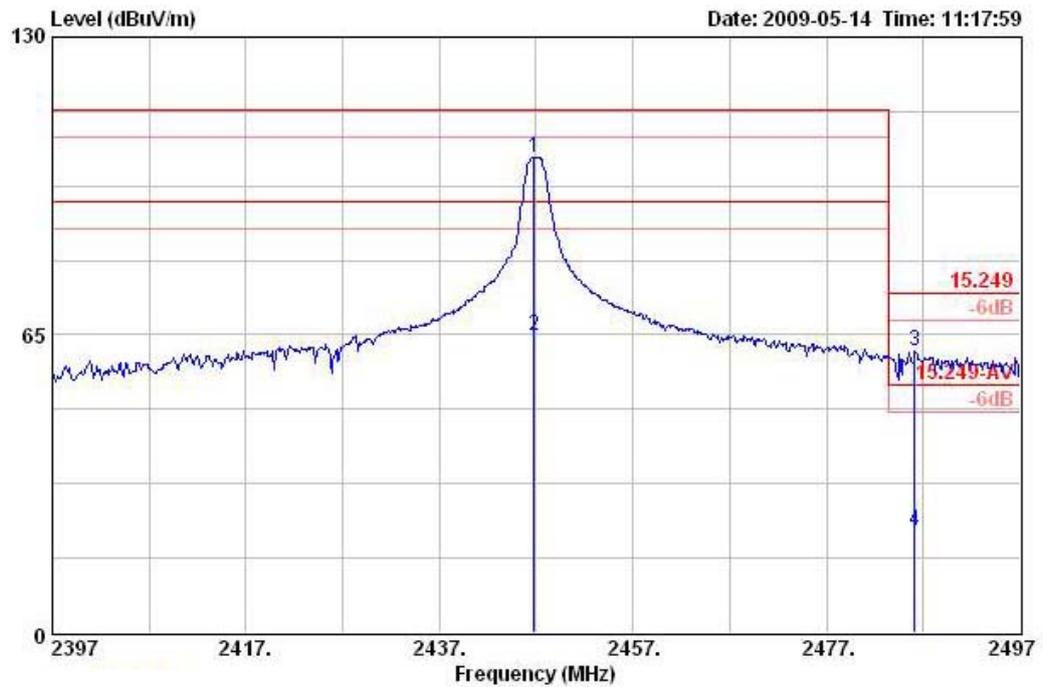
Note:

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

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

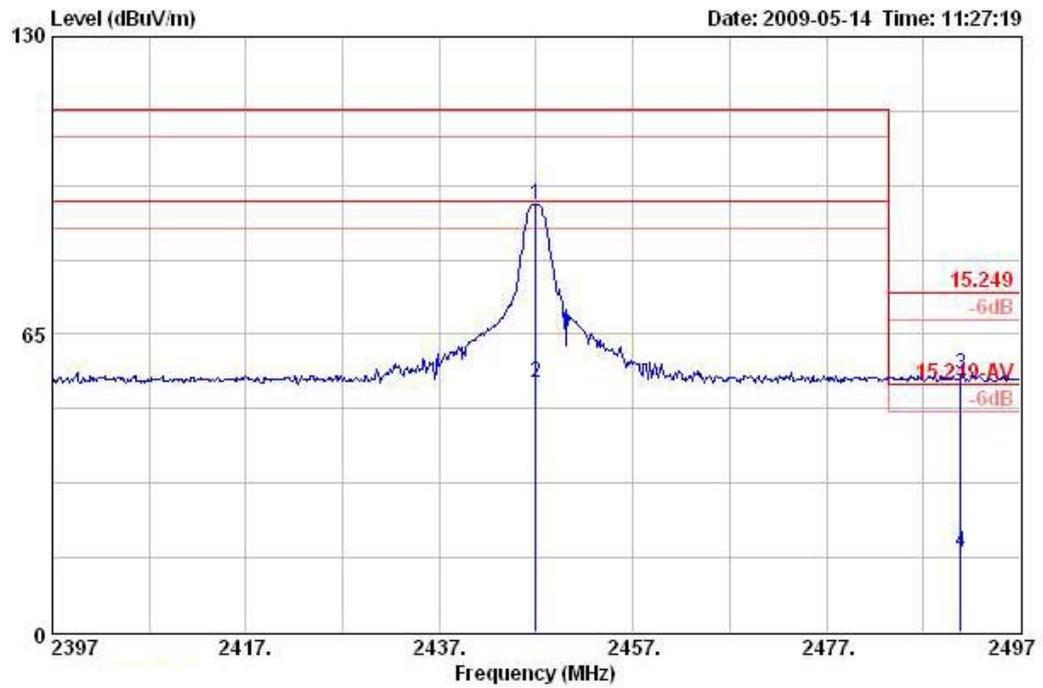
Temperature	24°C	Humidity	55%
Test Engineer	Allen Liu	Configurations	Channel 15

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna	Preamp	Cable	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB			deg	cm
1	2446.800	103.84	-10.16	114.00	72.76	28.18	0.00	2.91 PERK	HORIZONTAL	206	100
2	2446.800	64.74	-29.26	94.00	33.65	28.18	0.00	2.91 Average	HORIZONTAL	206	100

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	2447.000	93.42	-20.58	114.00	62.33	28.18	0.00	2.91	PEAK	VERTICAL	26	100
2	2447.000	54.32	-39.68	94.00	23.23	28.18	0.00	2.91	Average	VERTICAL	26	100

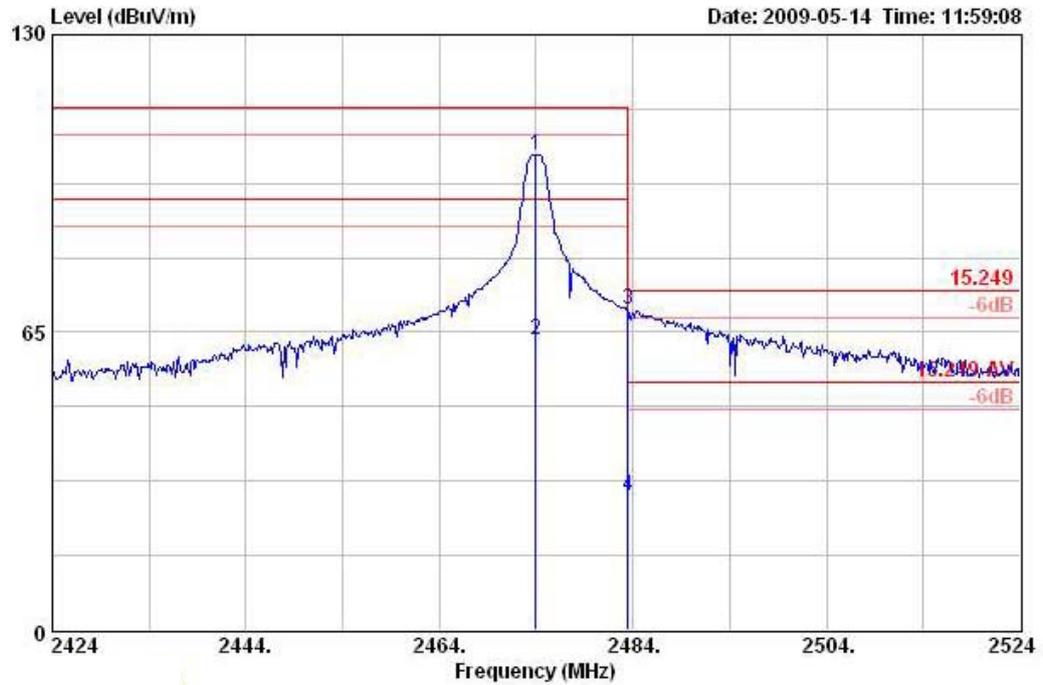
Note:

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

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

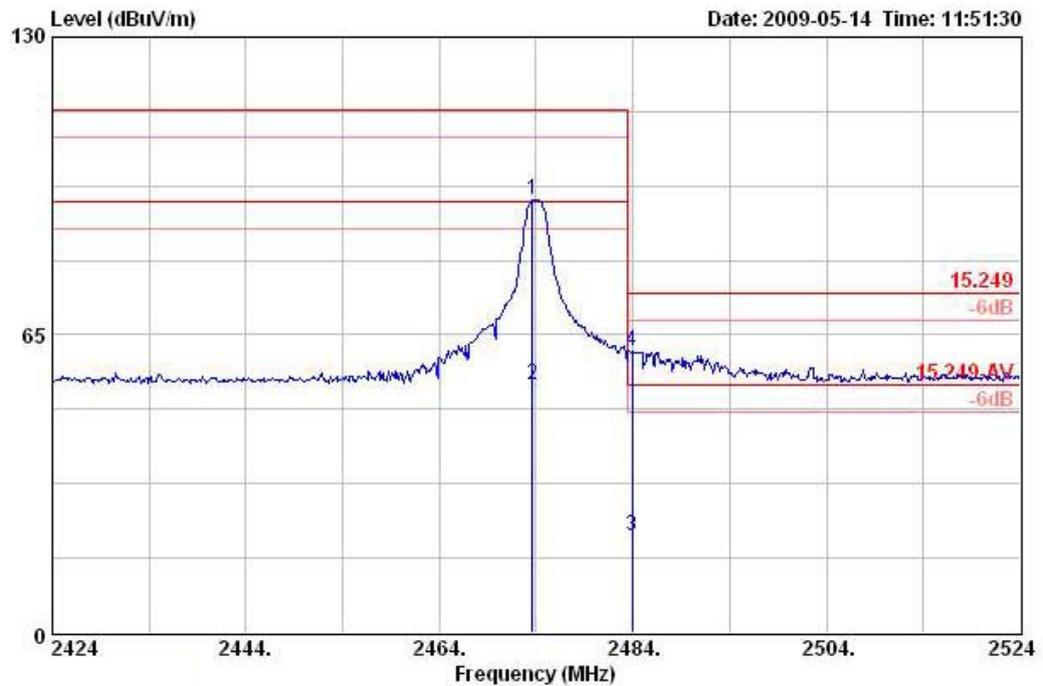
Temperature	24°C	Humidity	55%
Test Engineer	Allen Liu	Configurations	Channel 24

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	2474.000	103.78	-10.22	114.00	72.59	28.26	0.00	2.93	PEAK	HORIZONTAL	206	100
2	2474.000	63.34	-30.66	94.00	32.16	28.26	0.00	2.93	Average	HORIZONTAL	206	100

Vertical



	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Remark	Pol/Phase	Table	Ant
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			Pos	Pos
											deg	cm
1	2473.600	94.44	-19.56	114.00	63.26	28.26	0.00	2.93	PEAK	VERTICAL	316	100
2	2473.600	54.00	-40.00	94.00	22.82	28.26	0.00	2.93	Average	VERTICAL	316	100

Note:

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

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

## 4.2. 20dB Spectrum Bandwidth Measurement

### 4.2.1. Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (2400 ~ 2483.5MHz).

### 4.2.2. Measuring Instruments and Setting

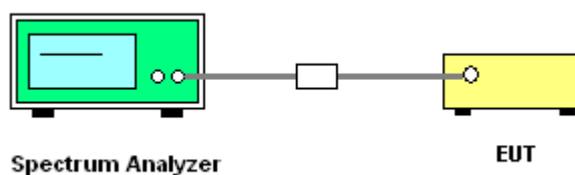
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

### 4.2.4. Test Setup Layout



#### 4.2.5. Test Deviation

There is no deviation with the original standard.

#### 4.2.6. EUT Operation during Test

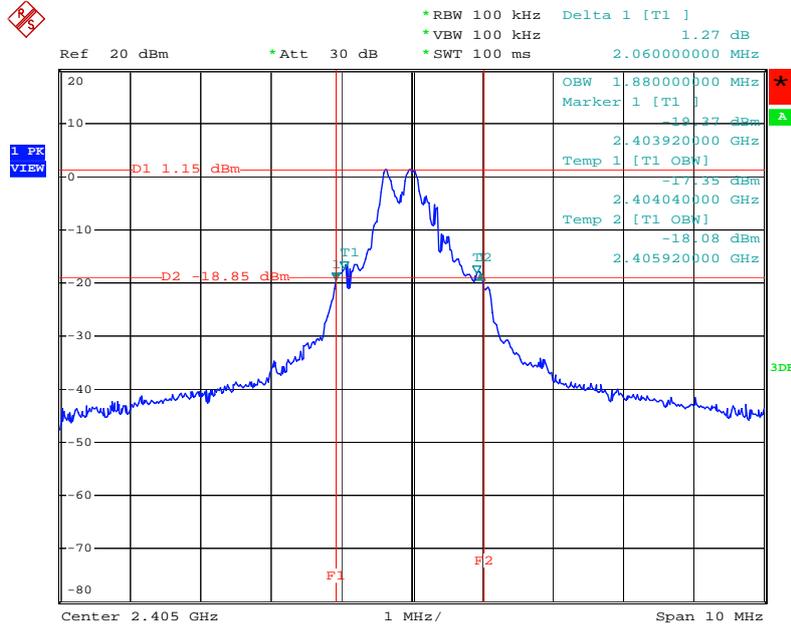
The EUT was programmed to be in continuously transmitting mode.

#### 4.2.7. Test Result of 20dB Spectrum Bandwidth

<b>Temperature</b>	23°C	<b>Humidity</b>	56%
<b>Test Engineer</b>	Alan Huang	<b>Configurations</b>	Channel 1/15/24
<b>Test Date</b>	May 13, 2009		

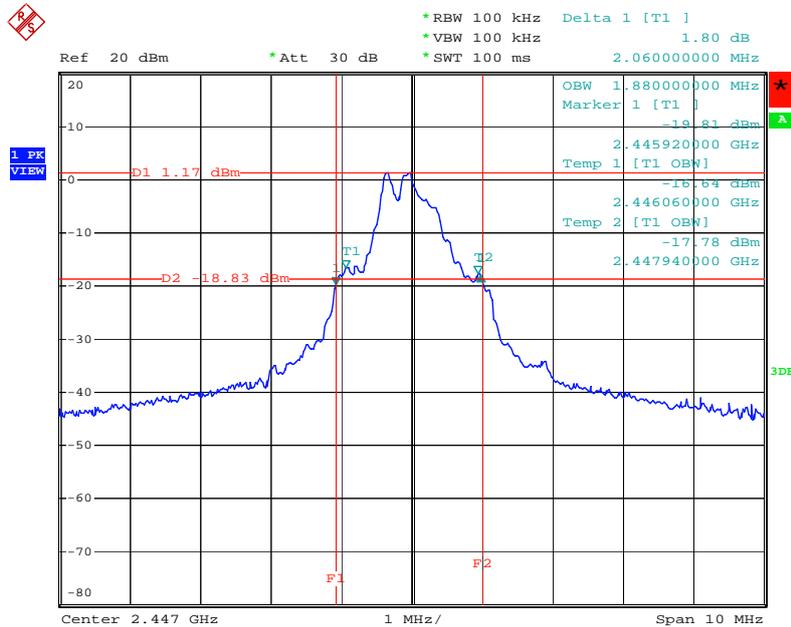
Frequency	20dB BW (MHz)	99% OBW (MHz)	Frequency range (MHz)	Frequency range (MHz)	Test Result
			$f_L > 2400\text{MHz}$	$f_H < 2483.5\text{MHz}$	
2405 MHz	2.06	1.88	2403.9200	-	Complies
2447 MHz	2.06	1.88	-	-	Complies
2474 MHz	2.08	1.84	-	2472.9200	Complies

### 20 dB/99% Bandwidth Plot on 2405 MHz



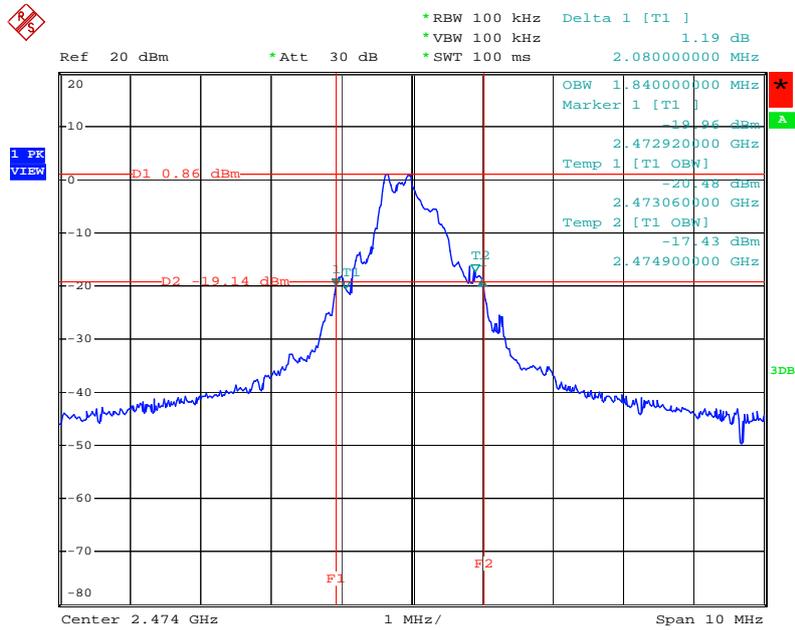
Date: 13.MAY.2009 16:12:28

### 20 dB/99% Bandwidth Plot on 2447MHz



Date: 13.MAY.2009 16:17:18

### 20 dB/99% Bandwidth Plot on 2474 MHz



Date: 13.MAY.2009 16:21:19

### 4.3. Radiated Emissions Measurement

#### 4.3.1. Limit

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/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

#### 4.3.2. 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 and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

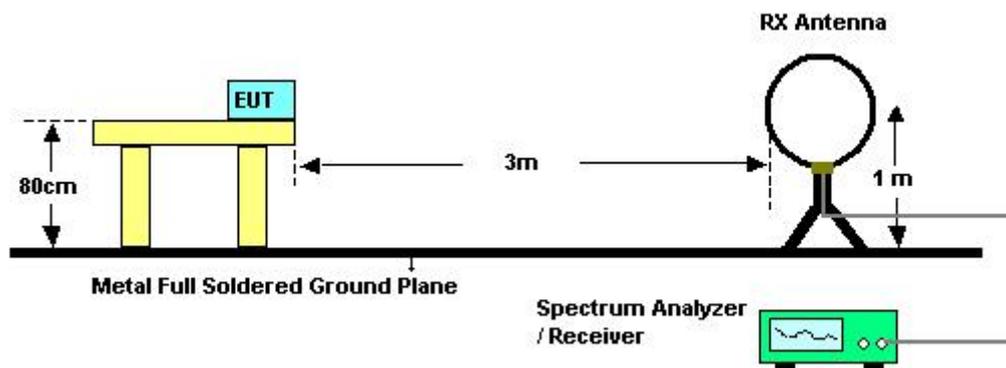
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

#### 4.3.3. Test Procedures

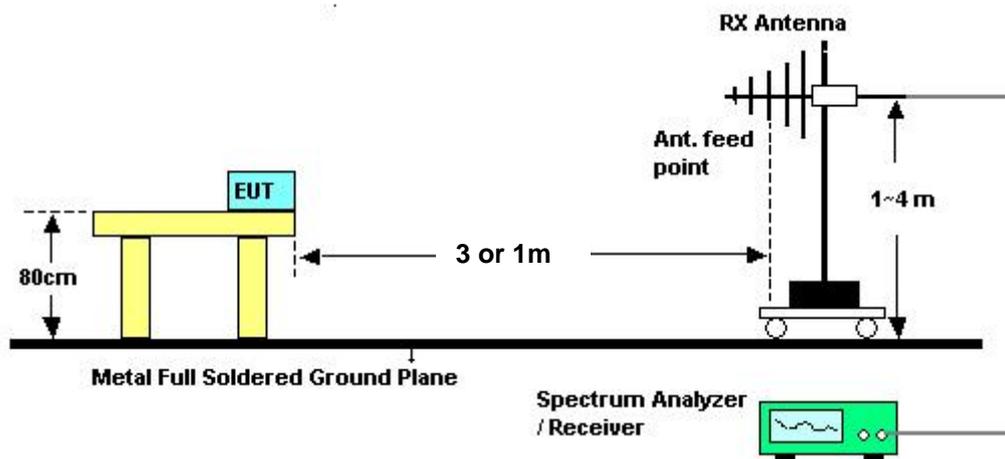
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

#### 4.3.4. 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 1m.

Distance extrapolation factor =  $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

#### 4.3.5. Test Deviation

There is no deviation with the original standard.

#### 4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

<b>Temperature</b>	24°C	<b>Humidity</b>	55%
<b>Test Engineer</b>	Johnson Chang		

<b>Freq. (MHz)</b>	<b>Level (dBuV)</b>	<b>Over Limit (dB)</b>	<b>Limit Line (dBuV)</b>	<b>Remark</b>
-	-	-	-	See Note

Note:

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

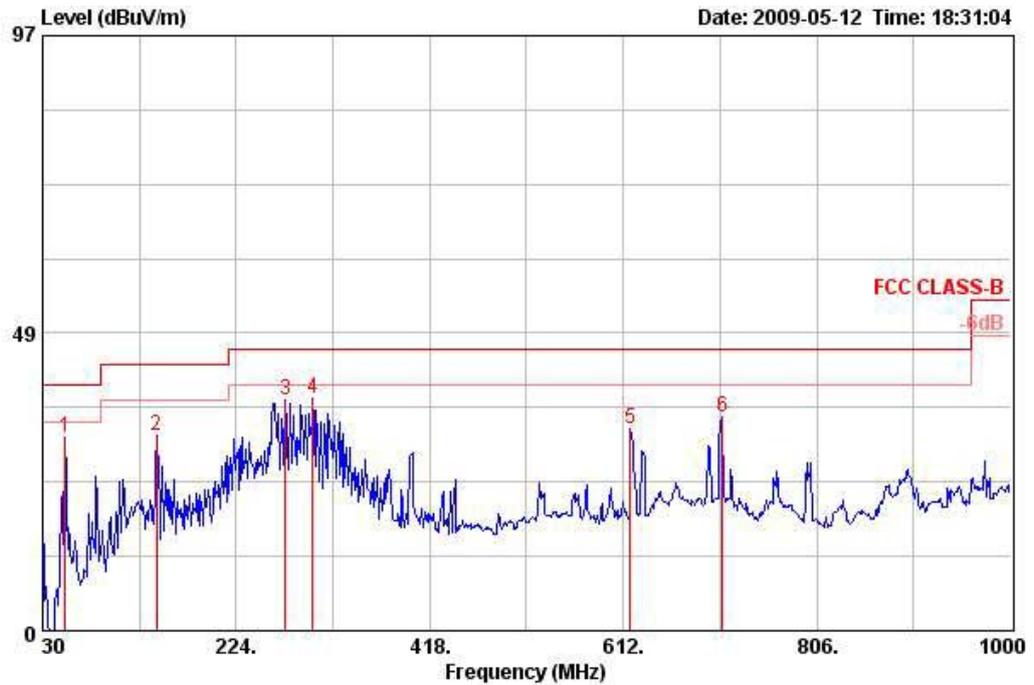
Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);

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

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

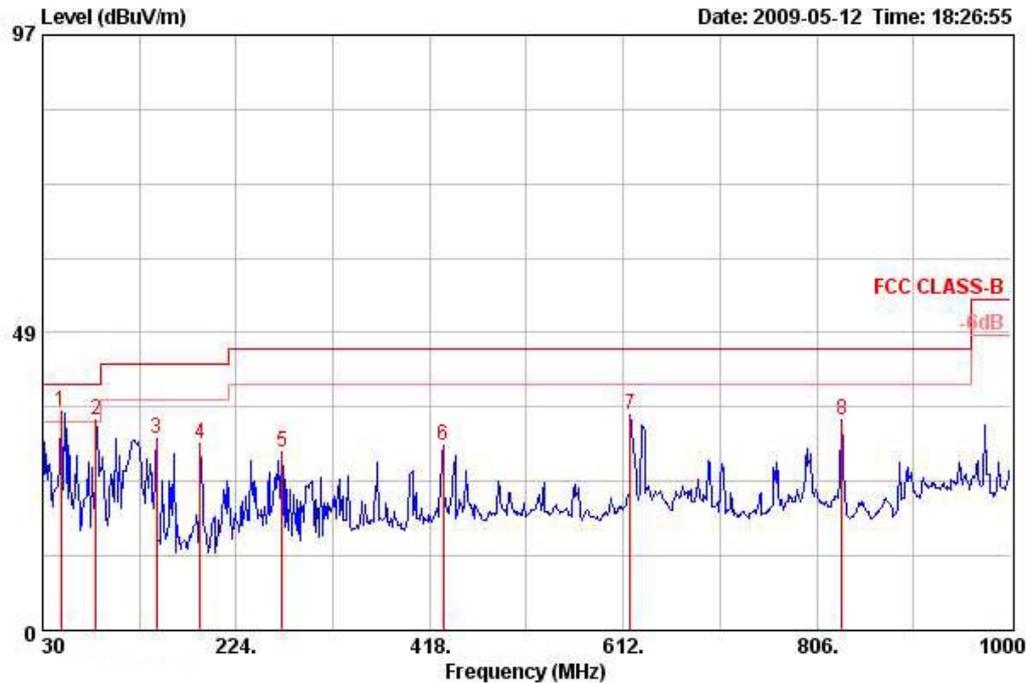
Temperature	24°C	Humidity	55%
Test Engineer	Johnson Chang	Configurations	CTX

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna	Preamp	Cable	Table	Ant
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	deg	cm
1	52.310	31.46	-8.54	40.00	54.15	8.68	31.78	0.42	100
2	144.460	31.72	-11.78	43.50	51.12	11.53	31.56	0.63	100
3	273.470	37.49	-8.51	46.00	54.48	13.44	31.34	0.91	100
4	300.630	37.98	-8.02	46.00	54.36	14.03	31.32	0.91	100
5	618.790	32.86	-13.14	46.00	42.84	19.29	30.58	1.32	100
6	710.940	34.69	-11.31	46.00	43.81	19.91	30.47	1.44	100

**Vertical**



	Freq	Level	Over Limit	Limit Line	ReadAntenna	Preamp	Cable	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB			deg	cm
1	48.430	35.69	-4.31	40.00	57.19	9.93	31.83	0.40 Peak	VERTICAL	197	100
2	83.350	34.33	-5.67	40.00	57.41	8.14	31.73	0.51 Peak	VERTICAL	0	400
3	144.460	31.21	-12.29	43.50	50.61	11.53	31.56	0.63 Peak	VERTICAL	0	400
4	188.110	30.46	-13.04	43.50	51.67	9.62	31.56	0.72 Peak	VERTICAL	0	400
5	269.590	28.90	-17.10	46.00	45.95	13.40	31.34	0.89 Peak	VERTICAL	0	400
6	431.580	30.24	-15.76	46.00	43.10	16.98	30.96	1.12 Peak	VERTICAL	0	400
7	618.790	35.03	-10.97	46.00	45.00	19.29	30.58	1.32 Peak	VERTICAL	0	400
8	831.220	34.28	-11.72	46.00	41.78	21.08	30.14	1.57 Peak	VERTICAL	0	400

**Note:**

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

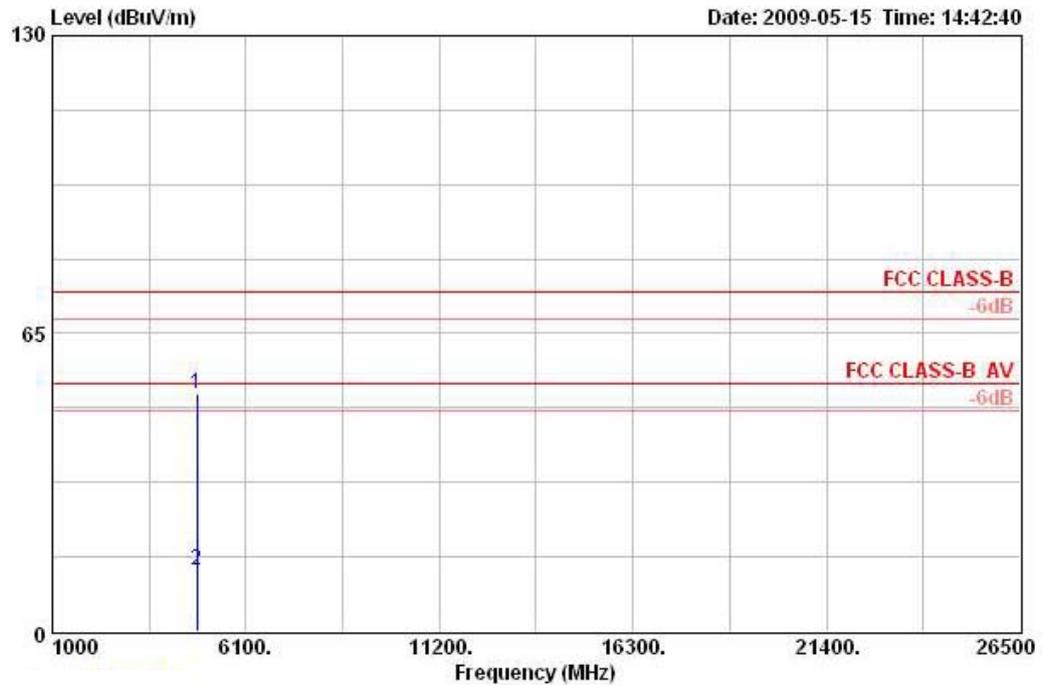
Emission level (dBUV/m) = 20 log Emission level (uV/m).

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

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

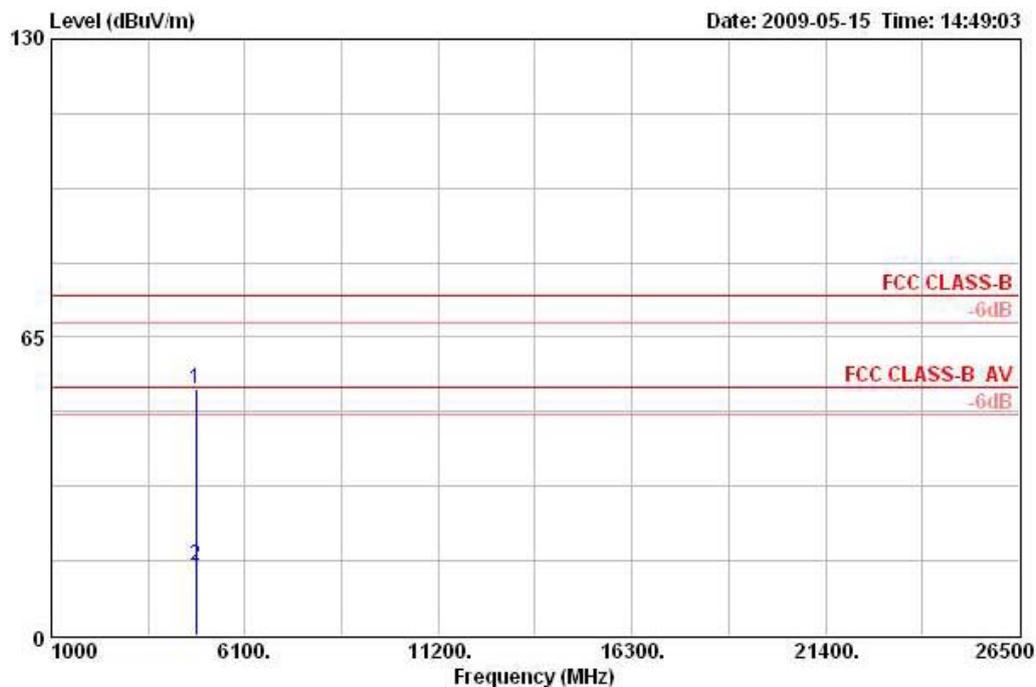
Temperature	24°C	Humidity	55%
Test Engineer	Allen Liu	Configurations	Channel 1

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	4809.210	51.82	-22.18	74.00	47.36	33.36	35.20	6.30	PEAK	HORIZONTAL	79	175
2	4809.210	13.42	-40.58	54.00	8.96	33.36	35.20	6.30	Average	HORIZONTAL	79	175

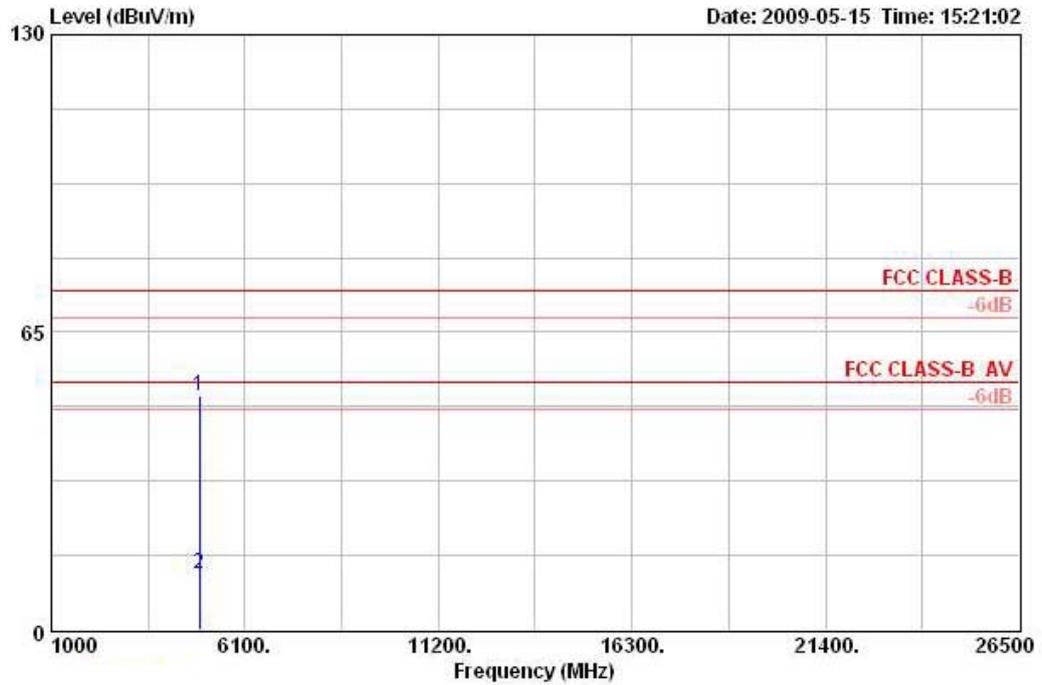
**Vertical**



	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Remark	Pol/Phase	Table	Ant
	MHz	dBuV/m	Limit	Line	Level	Factor	Factor	Loss			Pos	Pos
			dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	4809.070	53.71	-20.29	74.00	49.25	33.36	35.20	6.30	PEAK	VERTICAL	102	100
2	4809.070	15.31	-38.69	54.00	10.85	33.36	35.20	6.30	Average	VERTICAL	102	100

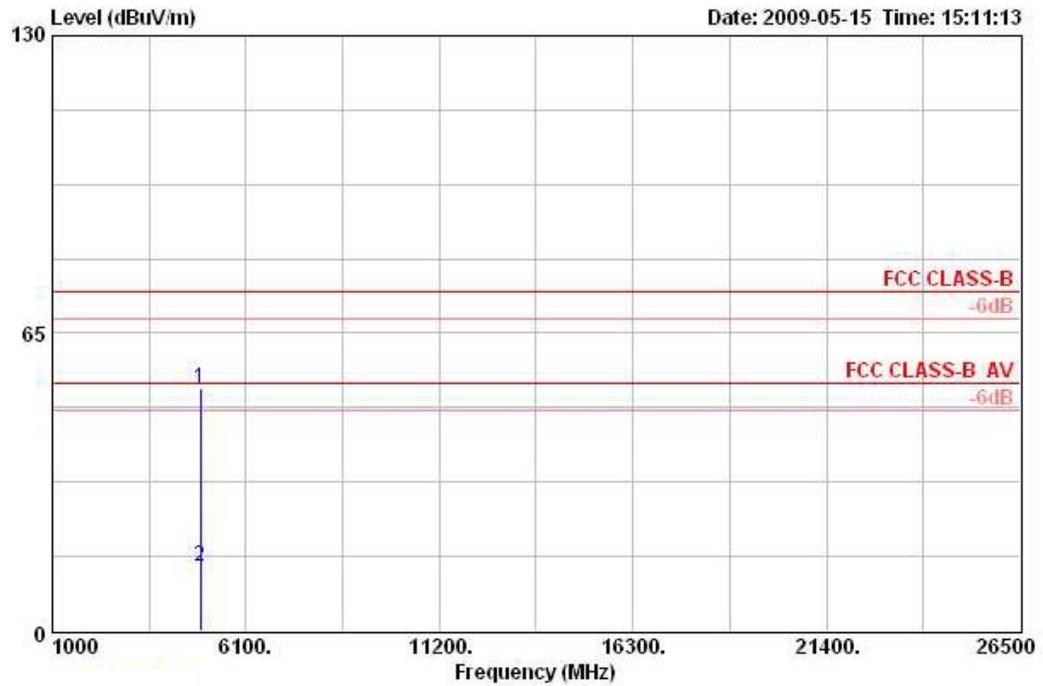
Temperature	24°C	Humidity	55%
Test Engineer	Allen Liu	Configurations	Channel 15

**Horizontal**



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	4893.697	51.20	-22.80	74.00	46.24	33.51	35.20	6.65	PEAK	HORIZONTAL	324	100
2	4893.697	12.10	-41.90	54.00	7.14	33.51	35.20	6.65	Average	HORIZONTAL	324	100

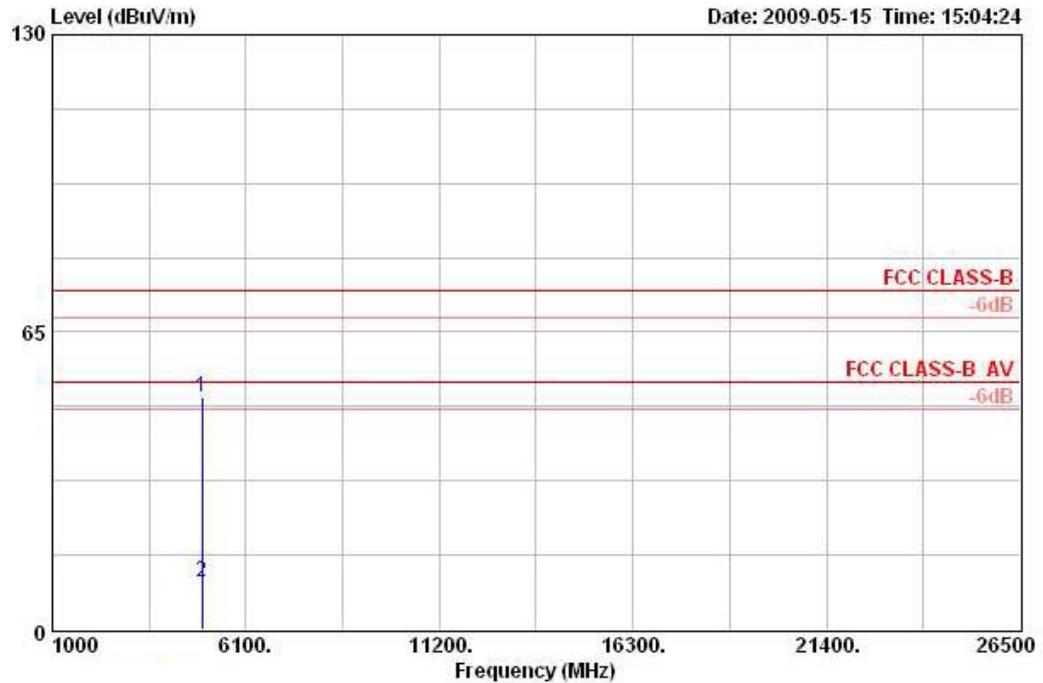
**Vertical**



	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Remark	Pol/Phase	Table	Ant
	MHz	dBuV/m	dB	dBuV/m	Level	Factor	Factor	Loss			Pos	Pos
					dBuV	dB/m	dB	dB			deg	cm
1	4893.677	53.07	-20.93	74.00	48.11	33.51	35.20	6.65	PEAK	VERTICAL	101	100
2	4893.677	13.97	-60.03	74.00	9.01	33.51	35.20	6.65	Average	VERTICAL	101	100

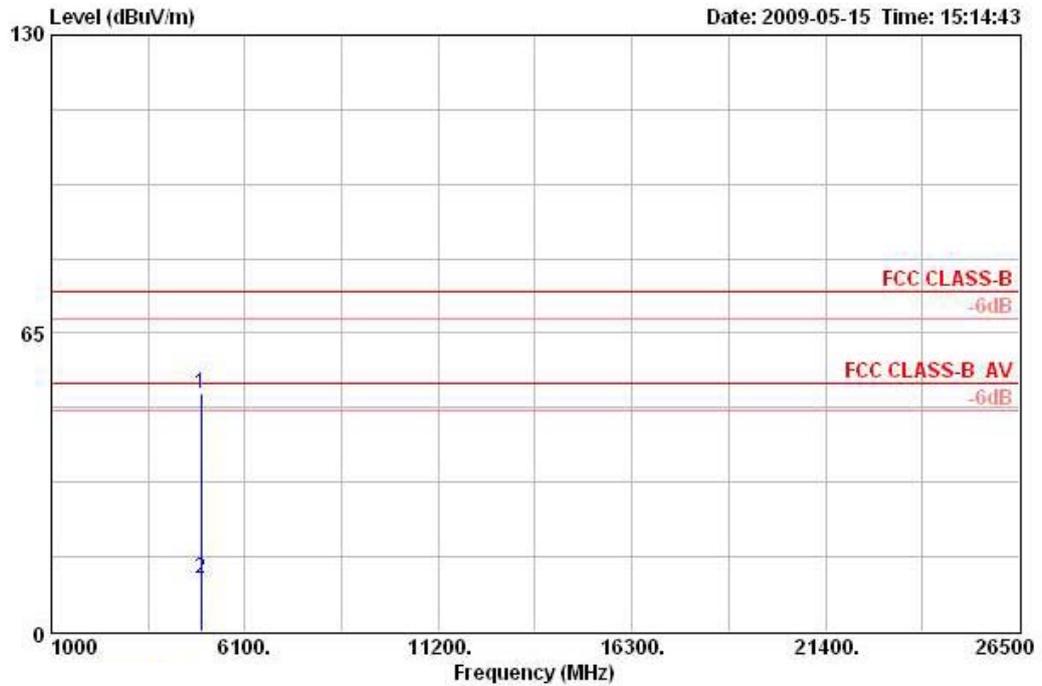
Temperature	24°C	Humidity	55%
Test Engineer	Allen Liu	Configurations	Channel 24

**Horizontal**



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	4948.220	50.79	-23.21	74.00	45.56	33.61	35.20	6.82	PERK	HORIZONTAL	325	100
2	4948.220	10.35	-43.65	54.00	5.12	33.61	35.20	6.82	Average	HORIZONTAL	325	100

**Vertical**



	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Remark	Pol/Phase	Table	Ant
	MHz	dBuV/m	dB	dBuV/m	Level	Factor	Factor	Loss			Pos	Pos
					dBuV	dB/m	dB	dB			deg	cm
1	4948.059	51.77	-22.23	74.00	46.55	33.61	35.20	6.82	PEAK	VERTICAL	146	100
2	4948.059	11.33	-42.67	54.00	6.11	33.61	35.20	6.82	Average	VERTICAL	146	100

**Note:**

The amplitude of spurious emissions which 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.

## 4.4. Band Edge Emissions Measurement

### 4.4.1. Limit

Band edge emissions radiated outside of the specified frequency bands shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

### 4.4.2. 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	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

### 4.4.3. Test Procedures

1. The test procedure is the same as section 4.2.3, only the frequency range investigated is limited to 2MHz 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.

### 4.4.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.2.4.

### 4.4.5. Test Deviation

There is no deviation with the original standard.

### 4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Band Edge and Fundamental Emissions

Temperature	24°C	Humidity	55%
Test Engineer	Allen Liu	Configurations	Channel 1, 15, 24

Channel 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1 ☐	2390.000	66.56	-7.44	74.00	35.63	28.05	0.00	2.88	PEAK	HORIZONTAL	185	100
2	2390.000	28.16	-25.84	54.00	-2.77	28.05	0.00	2.88	Average	HORIZONTAL	185	100
3	2404.773	103.40			72.43	28.09	0.00	2.88	PEAK	HORIZONTAL	185	100
4	2404.773	65.00			34.03	28.09	0.00	2.88	QP	HORIZONTAL	185	100

Item 3, 4 are the fundamental frequency at 2405 MHz.

Channel 15

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1 ☐	2446.800	103.84			72.76	28.18	0.00	2.91	PEAK	HORIZONTAL	206	100
2	2446.800	64.74			33.65	28.18	0.00	2.91	Average	HORIZONTAL	206	100
3	2486.100	61.46	-12.54	74.00	30.28	28.26	0.00	2.93	PEAK	HORIZONTAL	206	100
4	2486.100	22.36	-31.64	54.00	-8.82	28.26	0.00	2.93	Average	HORIZONTAL	206	100

Item 3, 4 are the fundamental frequency at 2447MHz.

Channel 24

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1 ☐	2474.000	103.78			72.59	28.26	0.00	2.93	PEAK	HORIZONTAL	206	100
2	2474.000	63.34			32.16	28.26	0.00	2.93	Average	HORIZONTAL	206	100
3 ☐	2483.500	69.87	-4.13	74.00	38.69	28.26	0.00	2.93	PEAK	HORIZONTAL	206	100
4	2483.500	29.43	-24.57	54.00	-1.75	28.26	0.00	2.93	Average	HORIZONTAL	206	100

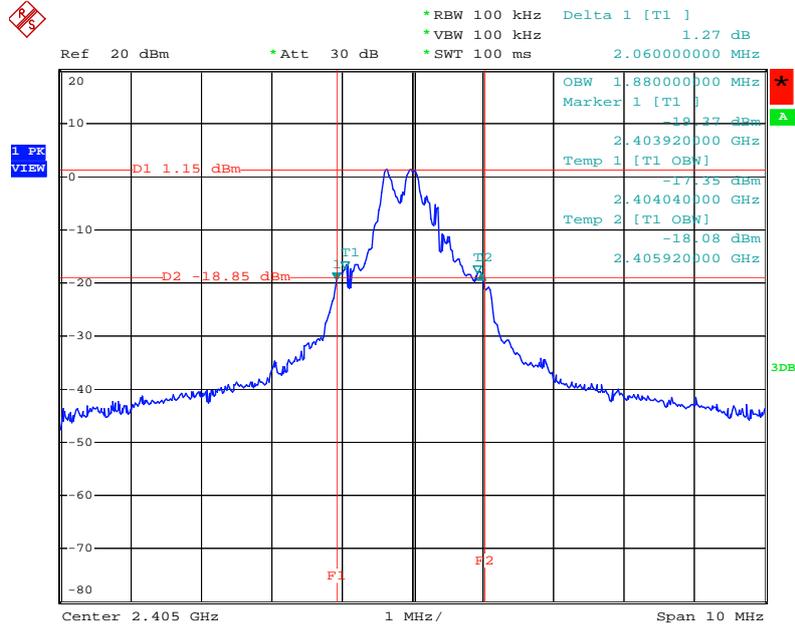
Item 1, 2 are the fundamental frequency at 2474 MHz.

Note:

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

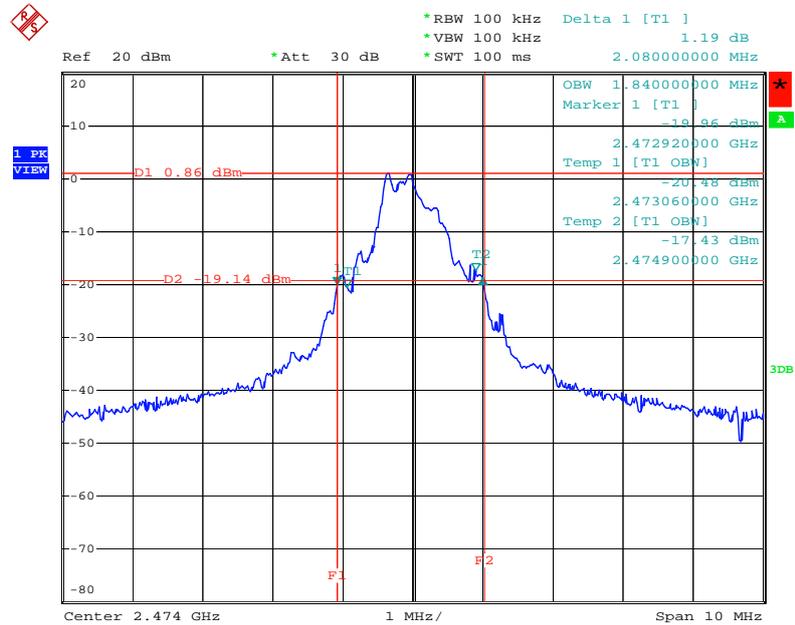
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

### Low Band Edge Plot on 2405 MHz



Date: 13.MAY.2009 16:12:28

### High Band Edge Plot on 2474 MHz



Date: 13.MAY.2009 16:21:19

## 4.5. Antenna Requirements

### 4.5.1. 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.

### 4.5.2. 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
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 14, 2008	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz - 2 GHz	Jan. 23, 2009	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jul. 21, 2008	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5 GHz - 40 GHz	Apr. 06, 2009*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP30	100023	9 kHz - 30 GHz	Feb 02, 2009	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul 28, 2008*	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Jul. 12, 2008	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 29, 2009	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan.16, 2009	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Jan. 05, 2009	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Jan. 05, 2009	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)
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Oct. 29, 2008	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 11, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100458	DC ~ 30GHz	Jul. 11, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jul. 11, 2008	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	May 30, 2008*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2009	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Jul. 18, 2008	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2008	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2008	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Dec. 14, 2008	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 25, 2009	Conducted (TH01-HY)
Oscilloscope	Tektonix	TDS380	B016197	400MHz/ 2GS/s	Jun. 27, 2008	Conducted (TH01-HY)

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

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

## 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 728, 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

**Sporton 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.