



# SPORTON International Inc.

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## FCC RADIO TEST REPORT

Applicant's company	<b>Good Mind Industries Co Ltd</b>
Applicant Address	22 Ta Yeou 2 Street Ta Fa Industrial District Ta Liau Shi Kaohsiung Hsien, Taiwan
FCC ID	<b>C2SLF30STX</b>
Manufacturer's company	<b>GOOD MIND ELECTRONICS CO., LTD</b>
Manufacturer Address	Lou Gang Tour, Tung Fang Village, Sung Kang Jim, Baoan District, Shenzhen, Guangdong, P.R. China

Product Name	Wireless A/V Transmitter and Receiver System
Brand Name	TERK
Model Name	LF-30S
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.249
Test Freq. Range	2400 ~ 2483.5MHz
Receive Date	Jul. 3, 2006
Final Test Date	Jul. 13, 2006
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.

**NVLAP**<sup>®</sup>

Lab Code: 200079-0

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## History of This Test Report

Original Issue Date: Jul. 13, 2006

Report No.: FR661704-AB

■ No additional attachment.

Additional attachment were issued as following record:



## 1. CERTIFICATE OF COMPLIANCE

Product Name : Wireless A/V Transmitter and Receiver System  
Brand Name : TERK  
Model Name : LF-30S  
Applicant : Good Mind Industries Co Ltd  
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.249

Sportun International as requested by the applicant to evaluate the EMC performance of the product sample received on Jul. 3, 2006 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.

Mandy Liang 14.8.2006

Prepared By:

Mandy Liang / Specialist

Steven Lu 14.8.2006

Tested By:

Steven Lu / Engineer

Wayne Hsu 14.8.2006

Reviewed By:

Wayne Hsu

## 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	Complies	29.28 dB
4.2	15.249(a)	Field Strength of Fundamental Emissions	Complies	9.51 dB
4.3	15.215(c)	20dB Spectrum Bandwidth	Complies	-
4.4	15.249(a)/(d)	Radiated Emissions	Complies	0.25 dB
4.5	15.249(d)	Band Edge Emissions	Complies	10.75 dB
4.6	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.26dB	Confidence levels of 95%
Field Strength of Fundamental Emissions	±3.72dB	Confidence levels of 95%
20dB Spectrum Bandwidth	±6.25×10-7	Confidence levels of 95%
Radiated Emissions/ Band Edge Emissions	±3.72dB	Confidence levels of 95%

### 3. GENERAL INFORMATION

#### 3.1. Product Details

Items	Description
Power Type	Power Adapter
Modulation	FM
Frequency Range	2400 ~ 2483.5MHz
Channel Number	4
Channel Band Width (99%)	7.78 MHz
Max. Field Strength	84.49 dBuV/m at 3m (Average)
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

#### 3.2. Accessories

Power	Brand	Model	Rating
Adapter 1	KTEC	KA12D090030033U	INPUT: 120VAC, 60Hz, 75mA OUTPUT: 9VDC, 300mA
Product Name	Brand	Model	Remark
Leapfrog	TERK	LF30S-RX	433.92MHz Receiver

#### 3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	Patch Antenna	NA	0

#### 3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency
2400 ~ 2483.5MHz	1	2414 MHz
	2	2432 MHz
	3	2450 MHz
	4	2468 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	Normal Link	-	1
Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth	CTX	1/2/4	1
Radiated Emissions 9kHz~1GHz	Normal Link	4	1
Radiated Emissions 1GHz~10 <sup>th</sup> Harmonic	CTX	1/2/4	1
Band Edge Emissions	CTX	1/4	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	-
CO04-HY	Conduction	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.

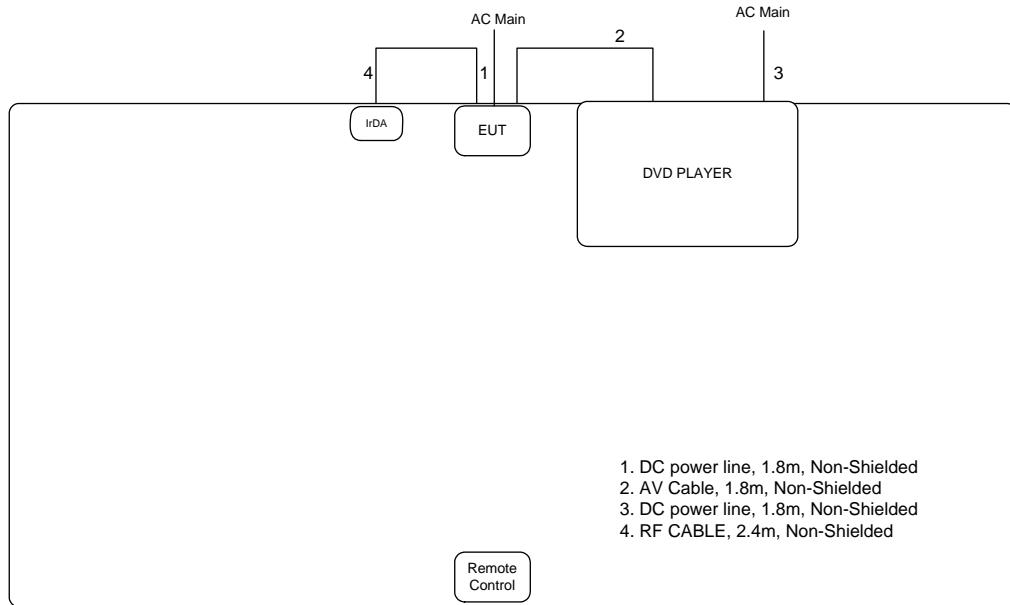
### 3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
DVD PLAYER	Withe-Westinghouse	WDV-5250PK	DOC
Remote Control	TECO	TZRM67G	DOC

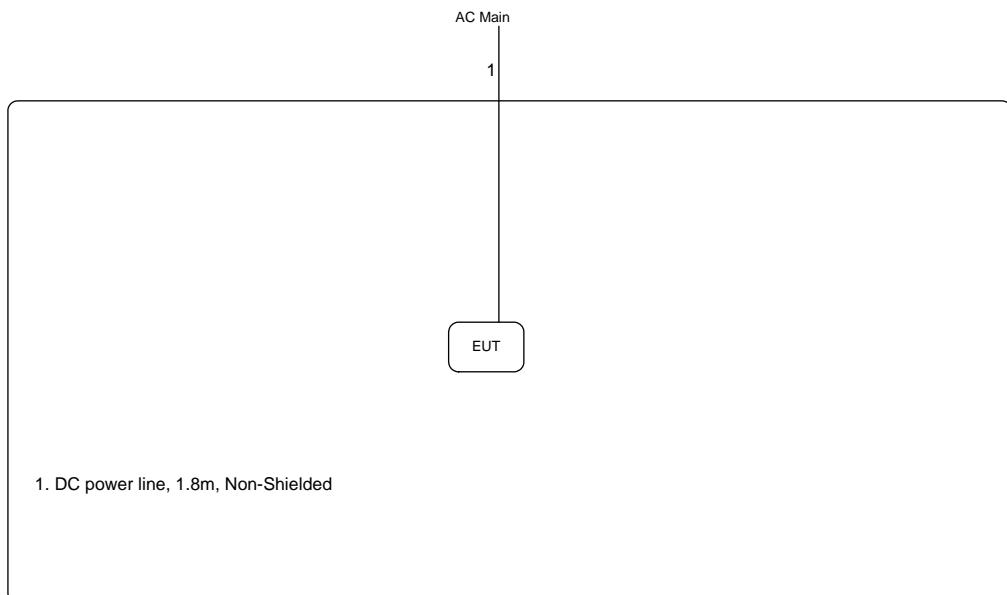
### 3.8. Test Configurations

#### 3.8.1. Radiation Emissions Test Configuration

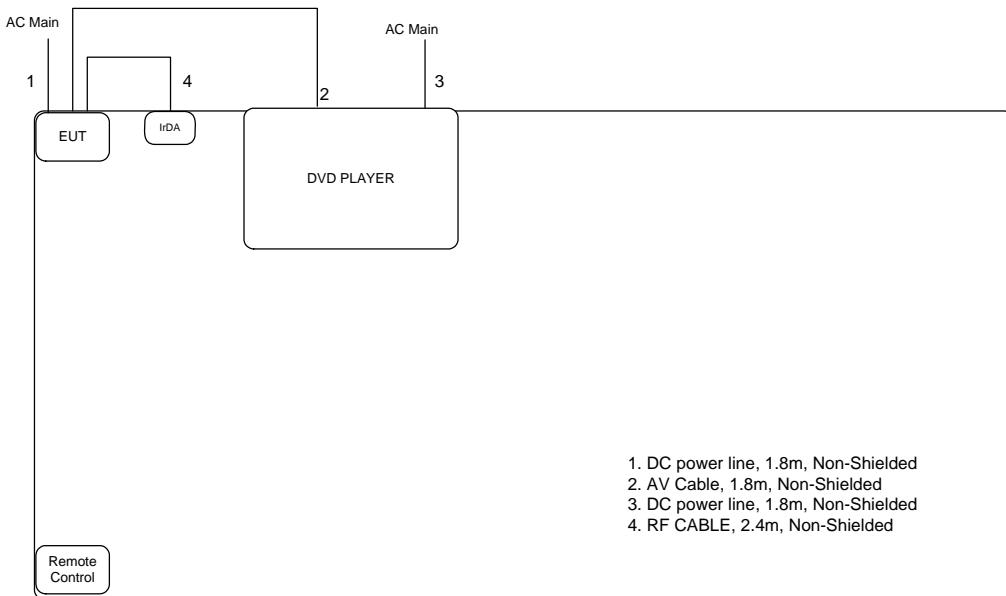
##### 9kHz~1GHZ (Normal Link)



##### Above 1GHz (CRX)



### 3.8.2. AC Power Line Conduction Emissions Test Configuration



## 4. TEST RESULT

### 4.1. AC Power Line Conducted Emissions Measurement

#### 4.1.1. Limit

For a Low-power Radio-frequency Device which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

#### 4.1.2. Measuring Instruments and Setting

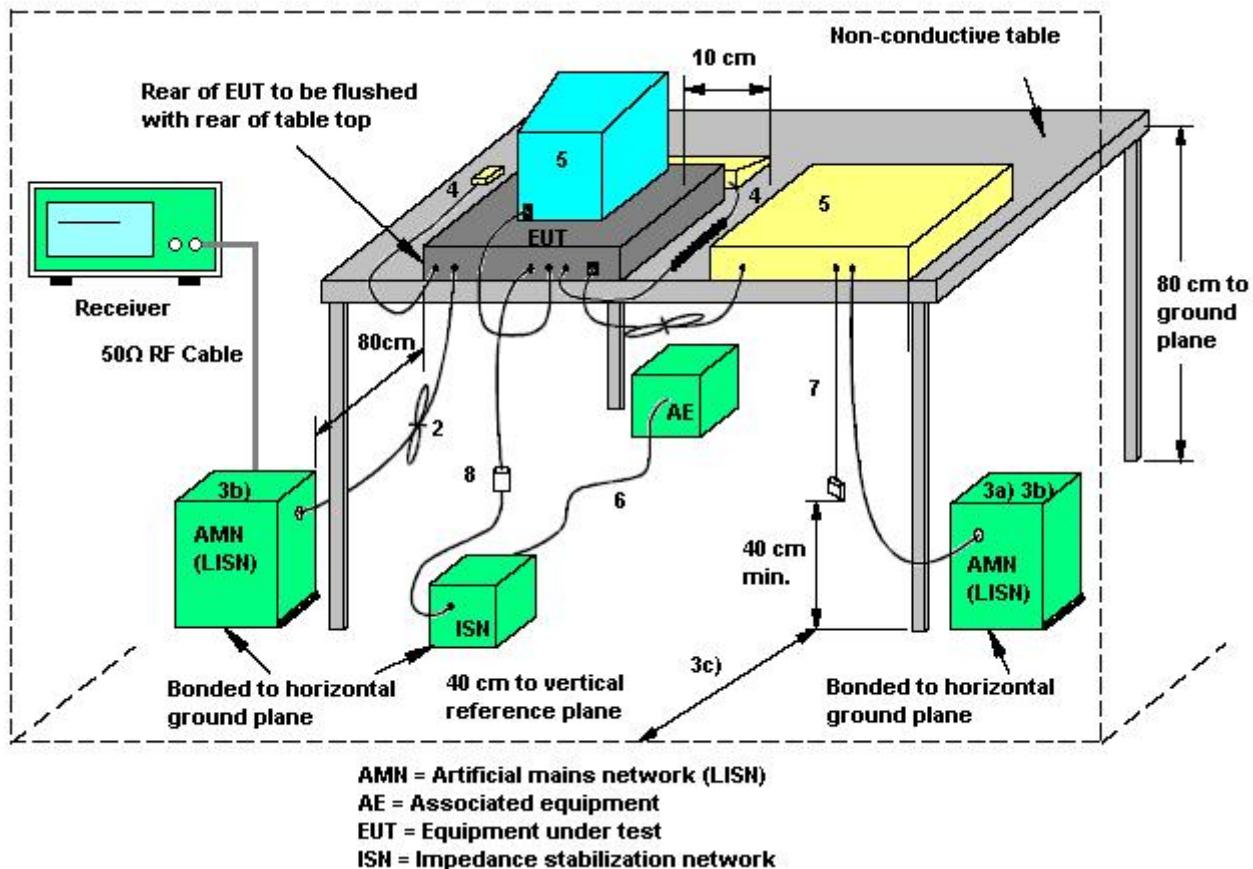
Please refer to section 5 in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

#### 4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

#### 4.1.4. Test Setup Layout



1. If cables, which hang closer than 40 cm to the horizontal metal groundplane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
2. Excess mains cord shall be bundled in the centre or shortened to appropriate length.
3. EUT is connected to one artificial mains network (AMN). All AMNs and ISNs may alternatively be connected to a vertical reference plane or metal wall.
4. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
5. AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.
6. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
7. Cables of hand operated devices, such as keyboards, mouses, etc. shall be placed as for normal usage.
8. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
9. I/O signal cable intended for external connection.
10. The end of the I/O signal cables which are not connected to an AE may be terminated, if required, using correct terminating impedance.
11. If used, the current probe shall be placed at 0,1 m from the ISN.

#### 4.1.5. Test Deviation

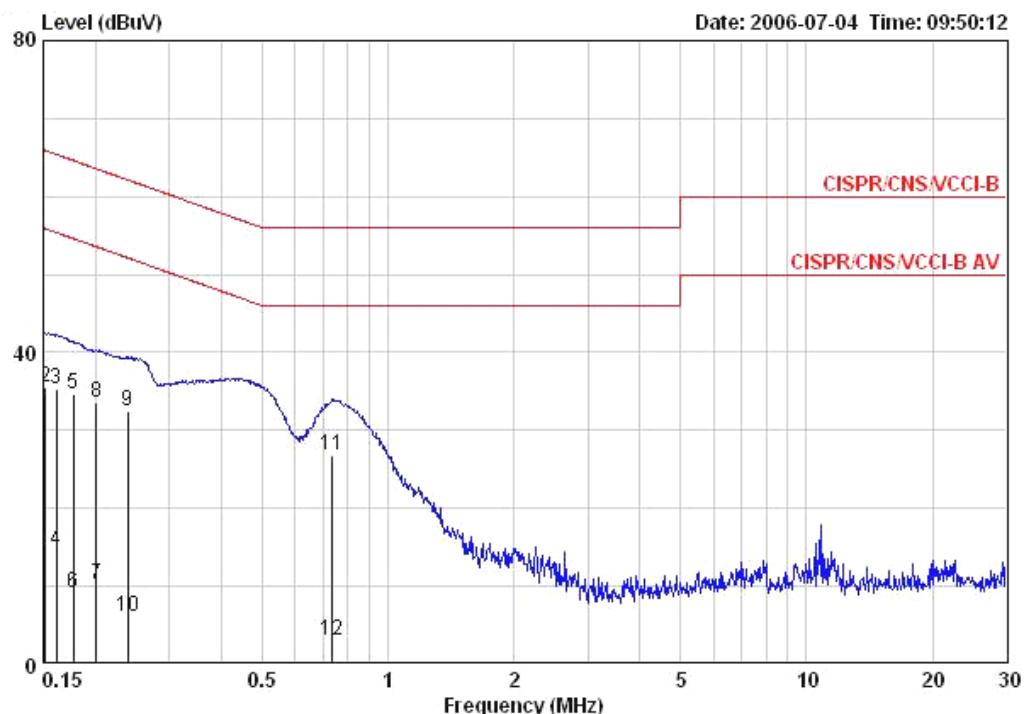
There is no deviation with the original standard.

#### 4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

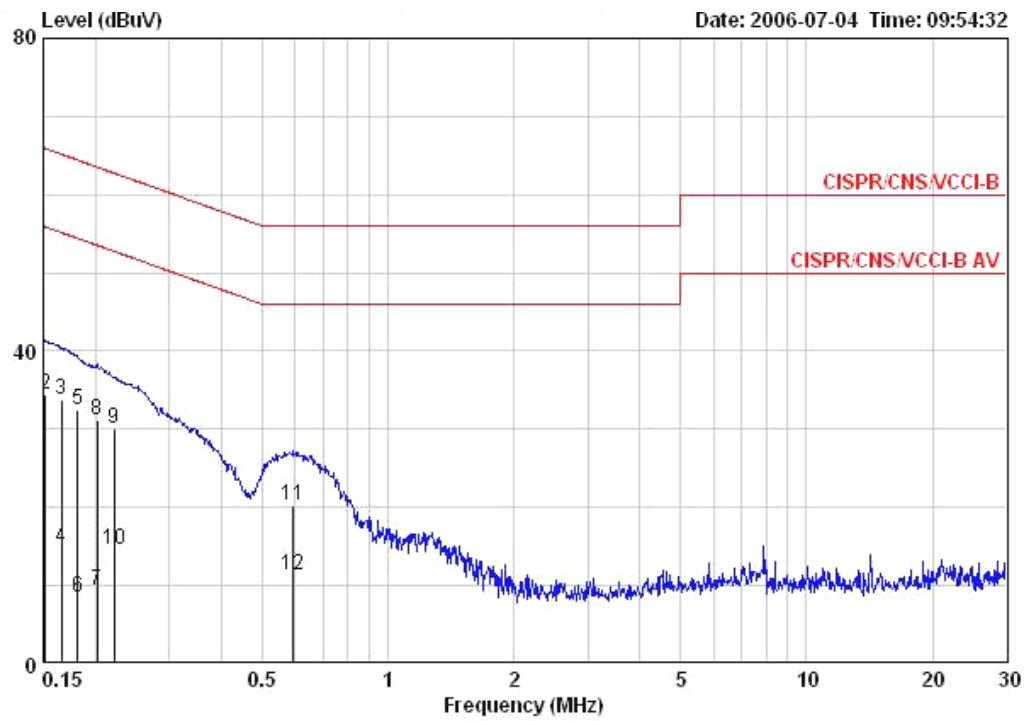
#### 4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Phase	Line
Configuration	Normal Link		



Freq	Level	Over	Limit	Read	LISN	Cable	Remark
		Limit	Line	Level	Factor	Loss	
MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15160	13.85	-42.07	55.91	11.63	2.02	0.20 AVERAGE
2	0.15160	35.64	-30.28	65.91	33.42	2.02	0.20 QP
3	0.16155	35.34	-30.05	65.38	33.07	2.07	0.20 QP
4	0.16155	14.51	-40.88	55.38	12.24	2.07	0.20 AVERAGE
5	0.17678	34.60	-30.04	64.64	32.64	1.76	0.20 QP
6	0.17678	9.10	-45.54	54.64	7.14	1.76	0.20 AVERAGE
7	0.20075	10.32	-43.26	53.58	8.83	1.29	0.20 AVERAGE
8	0.20075	33.47	-30.11	63.58	31.98	1.29	0.20 QP
9	0.23910	32.55	-29.58	62.13	31.35	1.00	0.20 QP
10	0.23910	6.06	-46.07	52.13	4.86	1.00	0.20 AVERAGE
11	0.73519	26.72	-29.28	56.00	26.12	0.40	0.20 QP
12	0.73519	2.95	-43.05	46.00	2.35	0.40	0.20 AVERAGE

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Phase	Neutral
Configuration	Normal Link		



Freq	Level	Over Limit	Limit Line	Read Level		LISN Factor	Cable Loss	Remark
				MHz	dBuV			
1	0.15160	13.11	-42.80	55.91	11.01	1.90	0.20	AVERAGE
2	0.15160	34.40	-31.51	65.91	32.30	1.90	0.20	QP
3	0.16589	33.69	-31.47	65.16	31.71	1.78	0.20	QP
4	0.16589	14.89	-40.27	55.16	12.91	1.78	0.20	AVERAGE
5	0.18152	32.38	-32.04	64.42	30.77	1.41	0.20	QP
6	0.18152	8.50	-45.92	54.42	6.89	1.41	0.20	AVERAGE
7	0.20181	9.40	-44.14	53.54	8.02	1.18	0.20	AVERAGE
8	0.20181	31.22	-32.32	63.54	29.84	1.18	0.20	QP
9	0.22201	30.10	-32.65	62.74	28.92	0.98	0.20	QP
10	0.22201	14.71	-38.04	52.74	13.53	0.98	0.20	AVERAGE
11	0.59164	20.24	-35.76	56.00	19.74	0.30	0.20	QP
12	0.59164	11.41	-34.59	46.00	10.91	0.30	0.20	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

## 4.2. Field Strength of Fundamental Emissions Measurement

### 4.2.1. Limit

The field strength of 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

### 4.2.2. Measuring Instruments and Setting

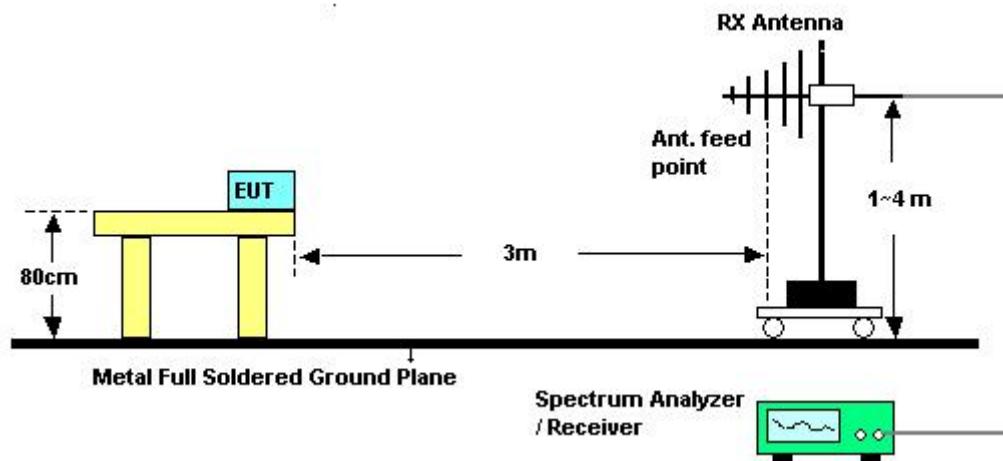
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

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

### 4.2.3. 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.

#### 4.2.4. Test Setup Layout



#### 4.2.5. Test Deviation

There is no deviation with the original standard.

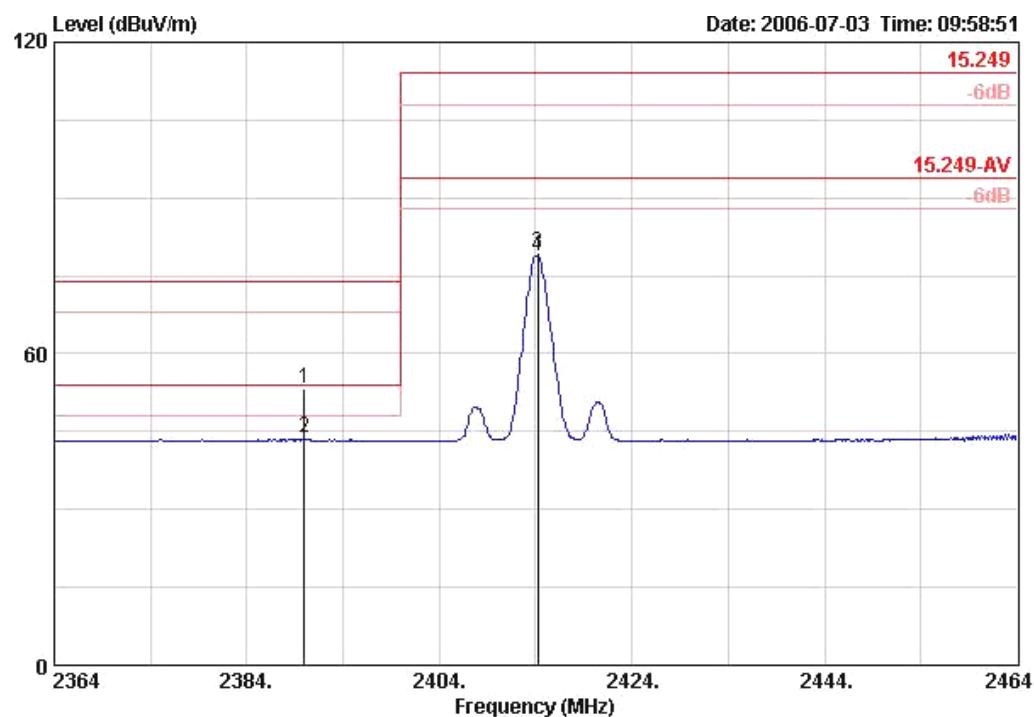
#### 4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

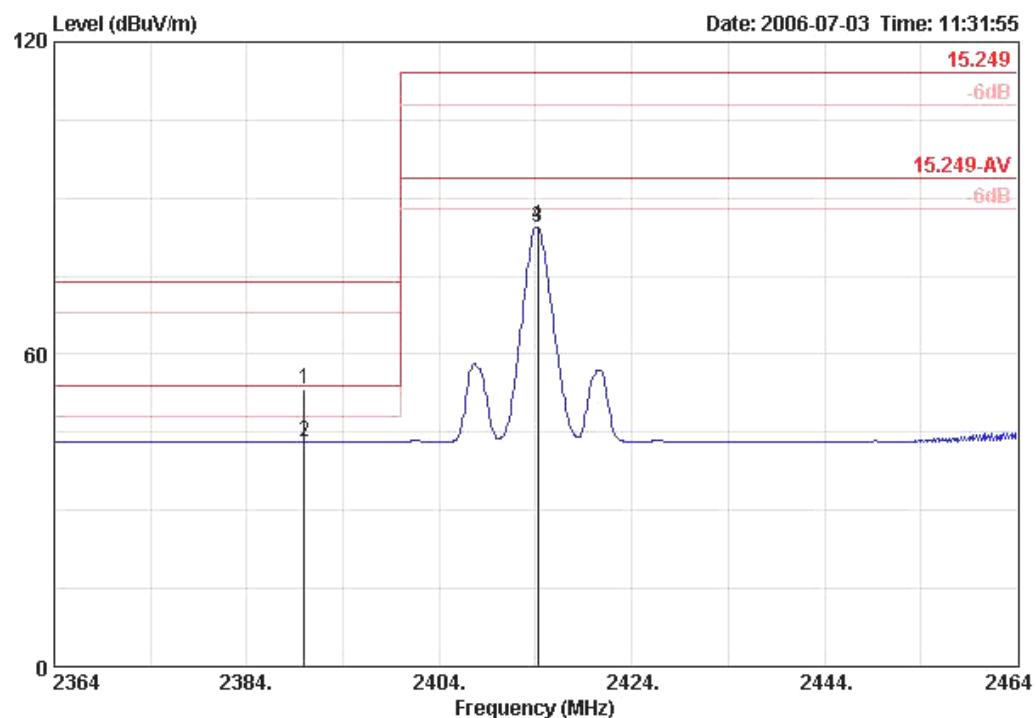
#### 4.2.7. Test Result of Field Strength of Fundamental Emissions

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 1

Vertical



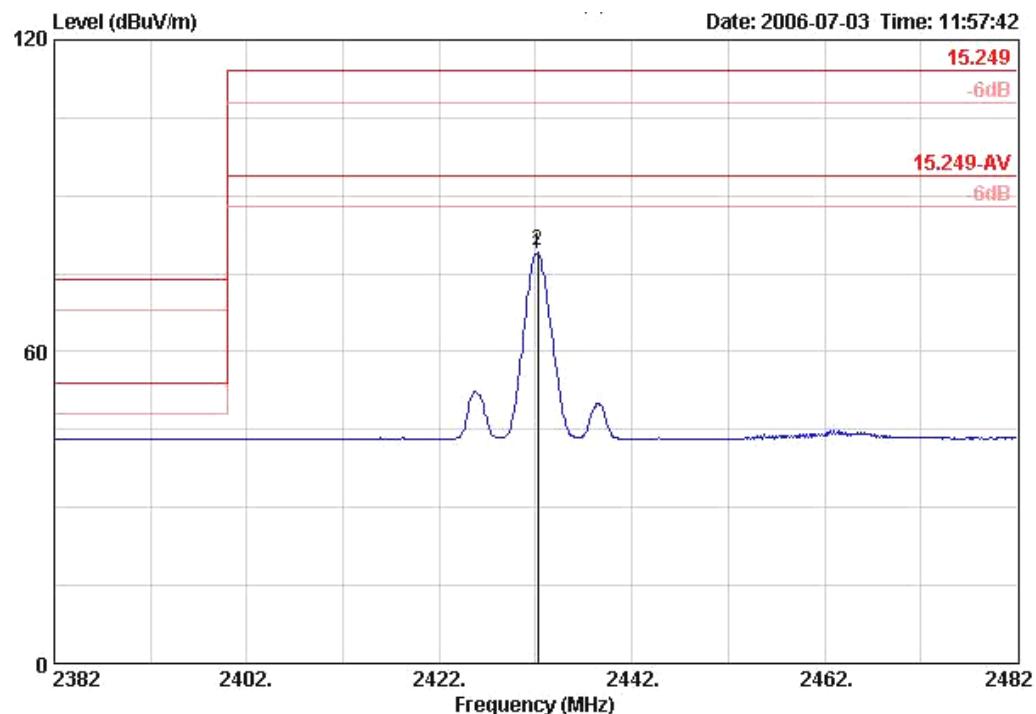
Freq	Level	Over Limit		Read		Antenna	Cable	Preamp	Remark	Pol/Phase	Distance
		Limit	Line	Level	Factor						
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	dB			m
3	2414.200	79.36	-34.64	114.00	47.68	28.90	2.79	0.00	PERK	VERTICAL	3
4	2414.200	78.95	-15.05	94.00	47.26	28.90	2.79	0.00	AVERAGE	VERTICAL	3

**Horizontal**


Freq	Level	Over Limit	Limit Line	Read		Antenna Factor	Cable Loss	Preamp Factor	Remark	Pol/Phase	Distance
				MHz	dBuV/m		dB	dBuV/m	dBuV	dB/m	dB
3	2414.200	84.49	-9.51	94.00	52.80	28.90	2.79	0.00	AVERAGE	HORIZONTAL	3
4	2414.200	84.84	-29.16	114.00	53.16	28.90	2.79	0.00	PEAK	HORIZONTAL	3

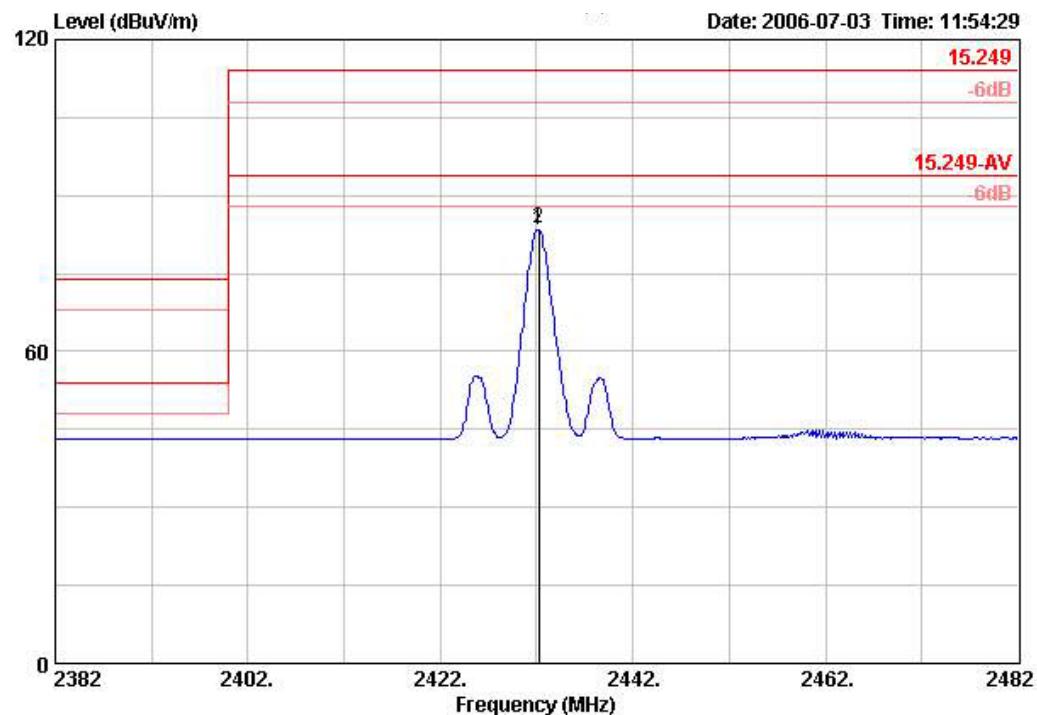
Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 2

Vertical



Freq	Level	Over Limit	Limit Line	ReadAntenna		Cable Loss	Preamp Factor	Remark	Pol/Phase	Distance	
				MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	m
1 ①	2432.200	78.92	-15.08	94.00	47.21	28.92	2.79	0.00	AVERAGE	VERTICAL	3
2 ②	2432.200	79.35	-34.65	114.00	47.65	28.92	2.79	0.00	PERK	VERTICAL	3

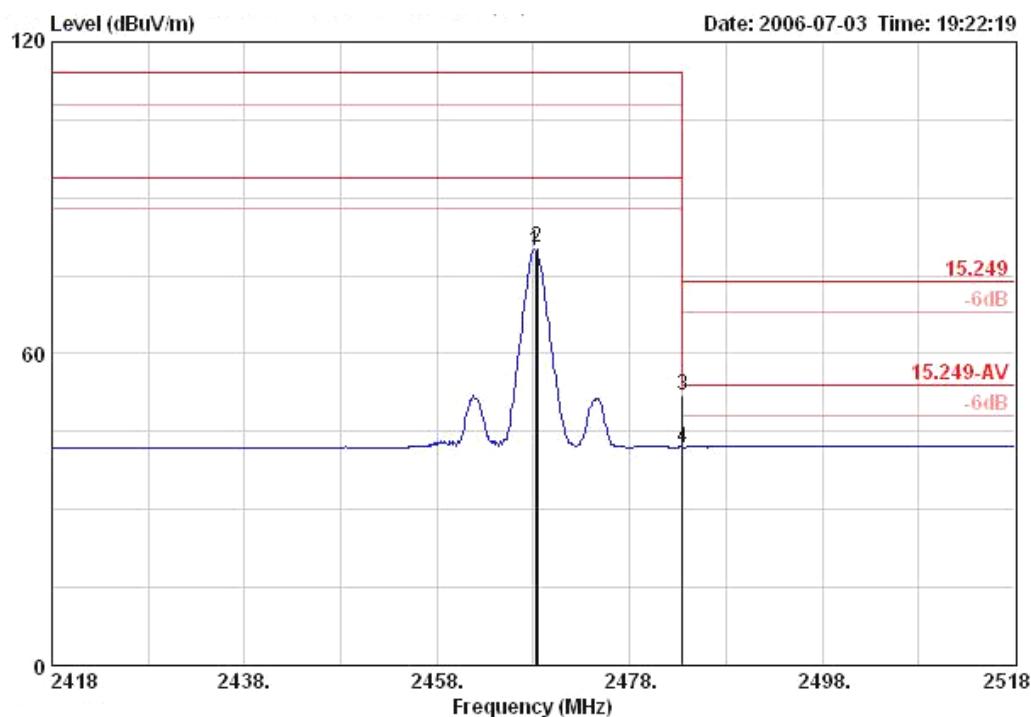
Horizontal



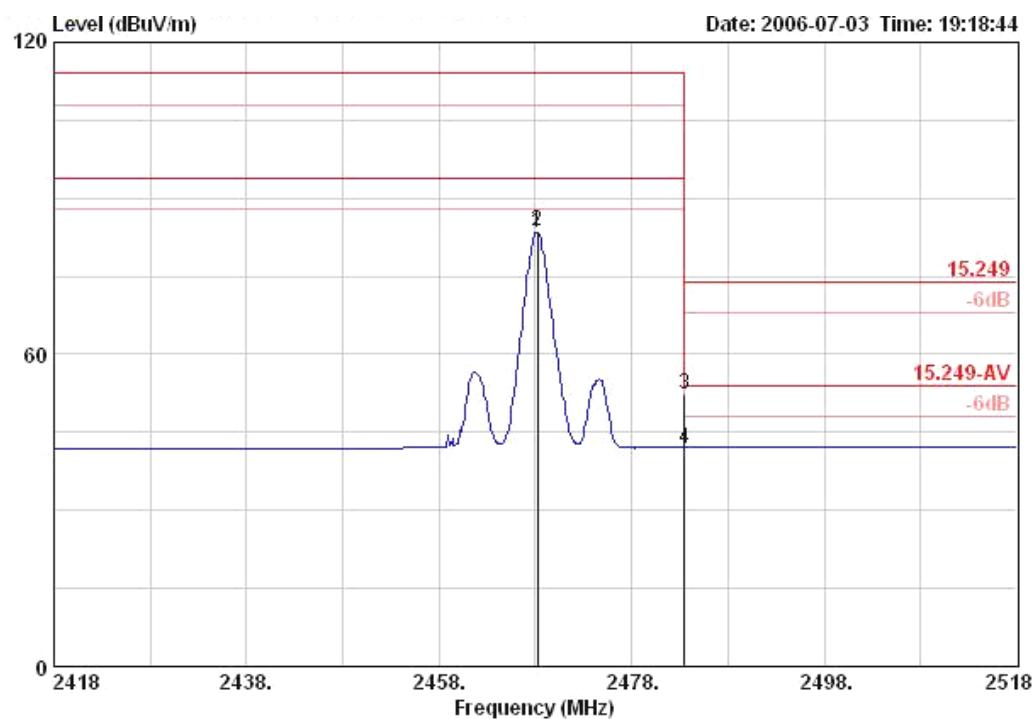
Freq	Level	Over Limit		Read	Antenna	Cable Preamp		Remark	Pol/Phase	Distance
		Limit	Line			Level	Factor			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			m
1 0	2432.200	83.31	-10.69	94.00	51.61	28.92	2.79	0.00	AVERAGE	HORIZONTAL
2 0	2432.200	83.71	-30.29	114.00	52.00	28.92	2.79	0.00	PERK	HORIZONTAL

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 4

Vertical



Freq	Level	Over Limit	Antenna Line	Cable Factor	Preamp Loss	Read Factor	Level	Remark	Ant	Table
									Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV		
1	2468.200	79.94	-14.06	94.00	28.31	2.62	0.00	49.01	AVERAGE	155 227
2	2468.400	80.28	-33.72	114.00	28.31	2.62	0.00	49.35	PEAK	155 227

**Horizontal**


Freq	Level	Over Limit	Antenna Line Factor	Cable Loss Factor	Preamp Factor	Read Level	Remark	Ant	Table
								Pos	Pos
MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV	cm	deg
1	2468.200	83.34	-10.66	94.00	28.31	2.62	0.00	52.41	AVERAGE
2	2468.200	83.61	-30.39	114.00	28.31	2.62	0.00	52.68	PEAK

**Note:**

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

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

Receiving maximum fundamental emissions are Horizontal Polarization.

## 4.3. 20dB Spectrum Bandwidth Measurement

### 4.3.1. Limit

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

### 4.3.2. Measuring Instruments and Setting

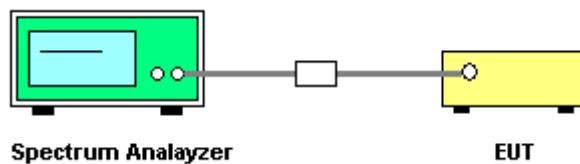
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

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

### 4.3.3. 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.

### 4.3.4. Test Setup Layout



#### 4.3.5. Test Deviation

There is no deviation with the original standard.

#### 4.3.6. EUT Operation during Test

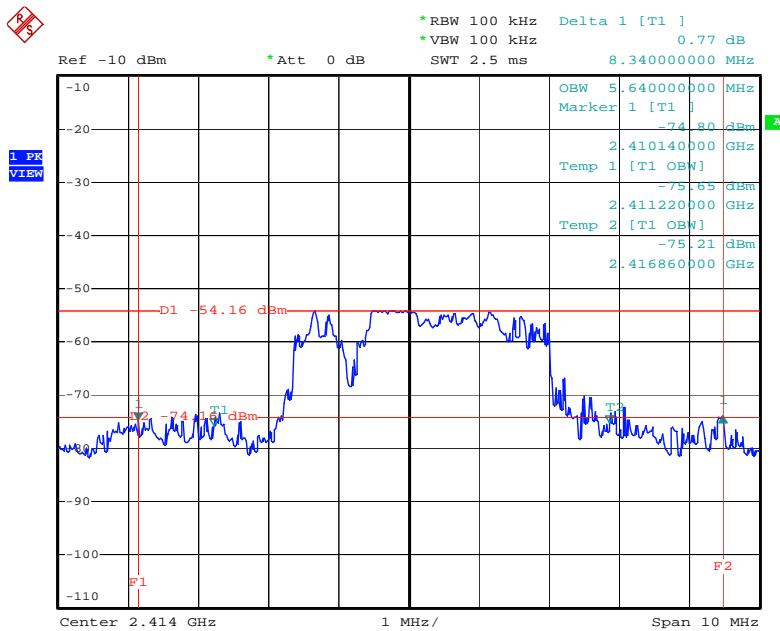
The EUT was programmed to be in continuously transmitting mode.

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

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 1/2/4

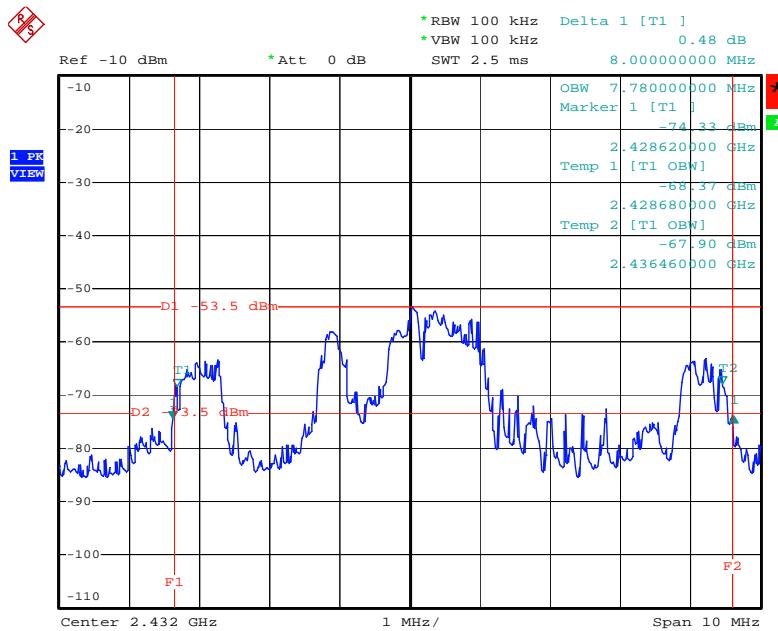
Frequency	20dB BW (MHz)	99% OBW (MHz)	Frequency range (MHz) $f_L > 2400\text{MHz}$	Frequency range (MHz) $f_H < 2483.5\text{MHz}$	Test Result
2414 MHz	8.34	5.64	2410.1400	-	Complies
2432 MHz	8.00	7.78	-	-	Complies
2468 MHz	8.14	7.72	-	2472.5600	Complies

#### 20 dB/99% Bandwidth Plot on 2414 MHz



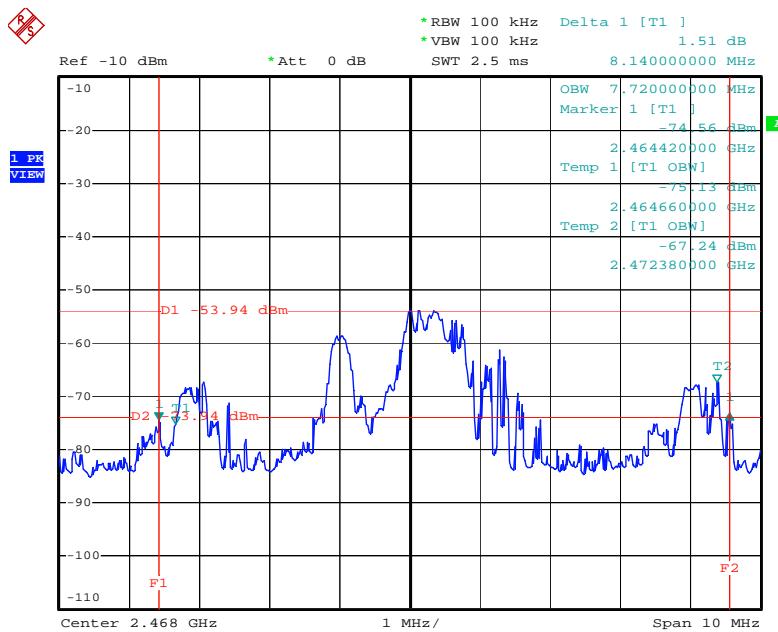
Date: 15.JUL.2006 09:36:43

## 20 dB/99% Bandwidth Plot on 2432 MHz



Date: 15.JUL.2006 09:38:16

## 20 dB/99% Bandwidth Plot on 2468 MHz



Date: 15.JUL.2006 09:40:20

## 4.4. Radiated Emissions Measurement

### 4.4.1. 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 (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 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 (other emission)	100KHz / 100KHz for peak

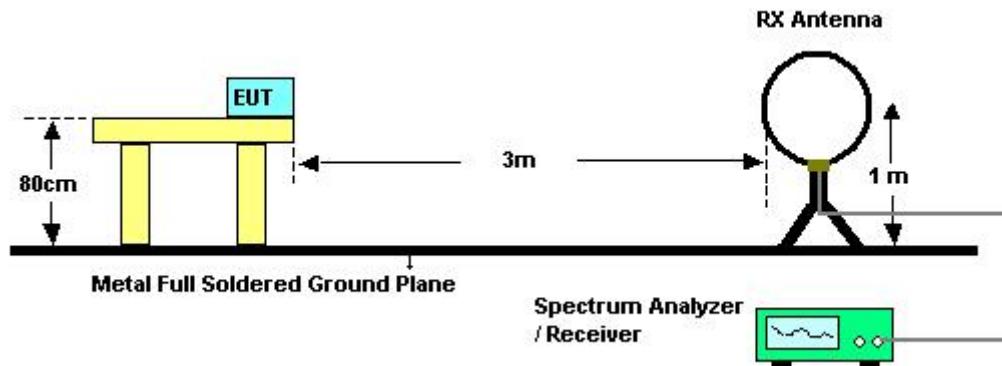
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

#### 4.4.3. Test Procedures

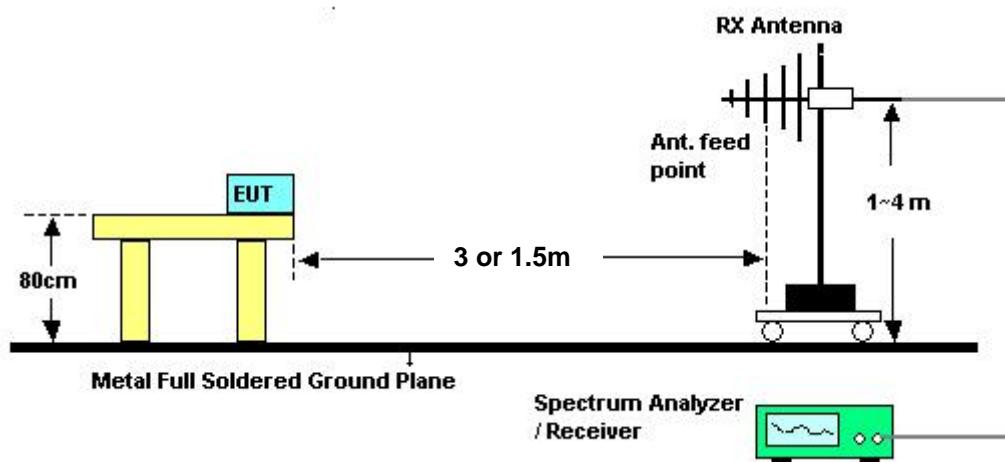
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

#### 4.4.4. 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].

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

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 4

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.

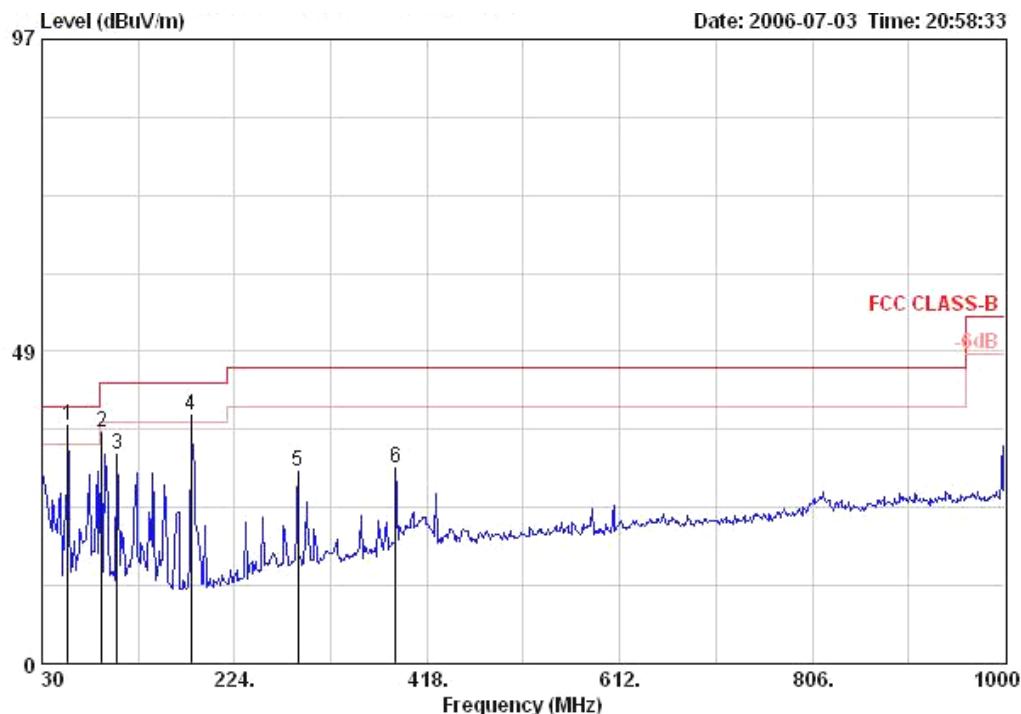
Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

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

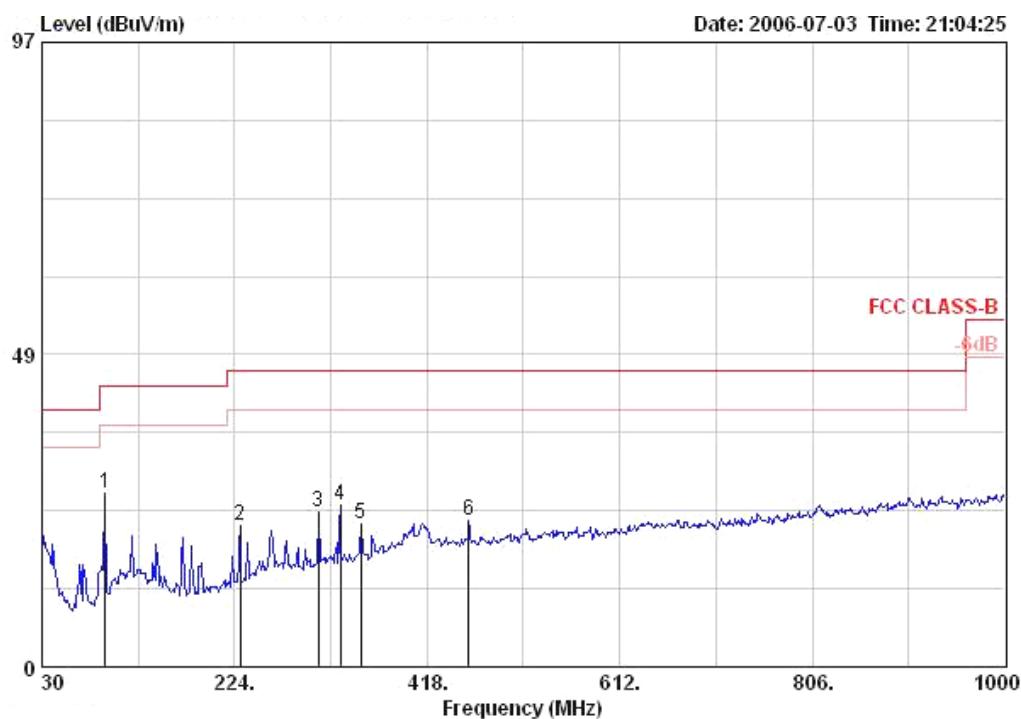
## 4.4.8. Results of Radiated Emissions (30MHz~1GHz)

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 4

Vertical



Freq	Level	Over Limit		Antenna Line Factor	Cable Loss Factor	Preamp	Read Level		Ant Pos	Table Pos
		MHz	dBuV/m		dB	dBuV/m	dB	dB		
1 @	56.190	37.10	-2.90	40.00	7.82	0.63	29.82	58.47	Peak	---
2	90.140	35.91	-7.59	43.50	9.30	0.78	30.09	55.92	Peak	---
3	105.660	32.61	-10.89	43.50	11.98	0.82	30.08	49.88	Peak	---
4 @	180.350	38.48	-5.02	43.50	9.70	1.06	30.05	57.77	Peak	---
5	288.020	29.94	-16.06	46.00	13.66	1.34	30.04	44.97	Peak	---
6	385.990	30.42	-15.58	46.00	16.17	1.56	30.46	43.15	Peak	---

**Horizontal**


Freq	Level	Over Limit	Antenna Line Factor	Cable Loss Factor	Preamp Factor	Read Level	Remark	Ant	Table	
								Pos	Pos	
								cm	deg	
1	94.020	26.95	-16.55	43.50	10.06	0.79	30.11	46.22 Peak	---	---
2	229.820	21.82	-24.18	46.00	11.30	1.20	30.07	39.39 Peak	---	---
3	308.390	23.93	-22.07	46.00	14.14	1.39	30.26	38.66 Peak	---	---
4	330.700	25.13	-20.87	46.00	14.76	1.43	30.50	39.44 Peak	---	---
5	351.070	22.31	-23.69	46.00	15.32	1.48	30.58	36.09 Peak	---	---
6	459.710	22.83	-23.17	46.00	17.32	1.70	30.47	34.28 Peak	---	---

**Note:**

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

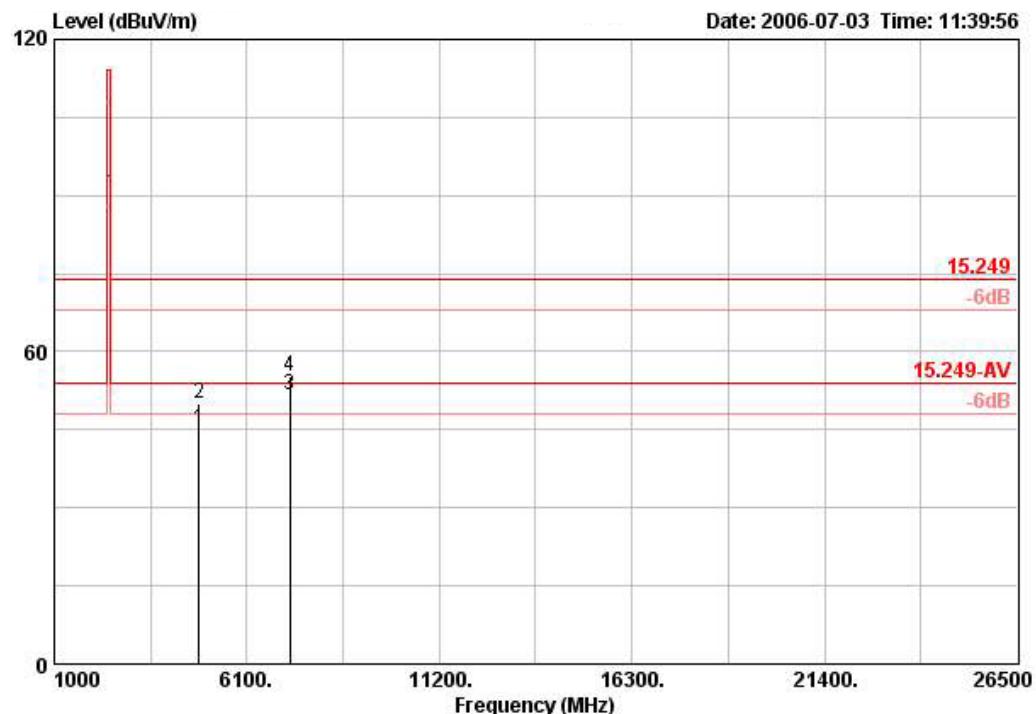
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

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

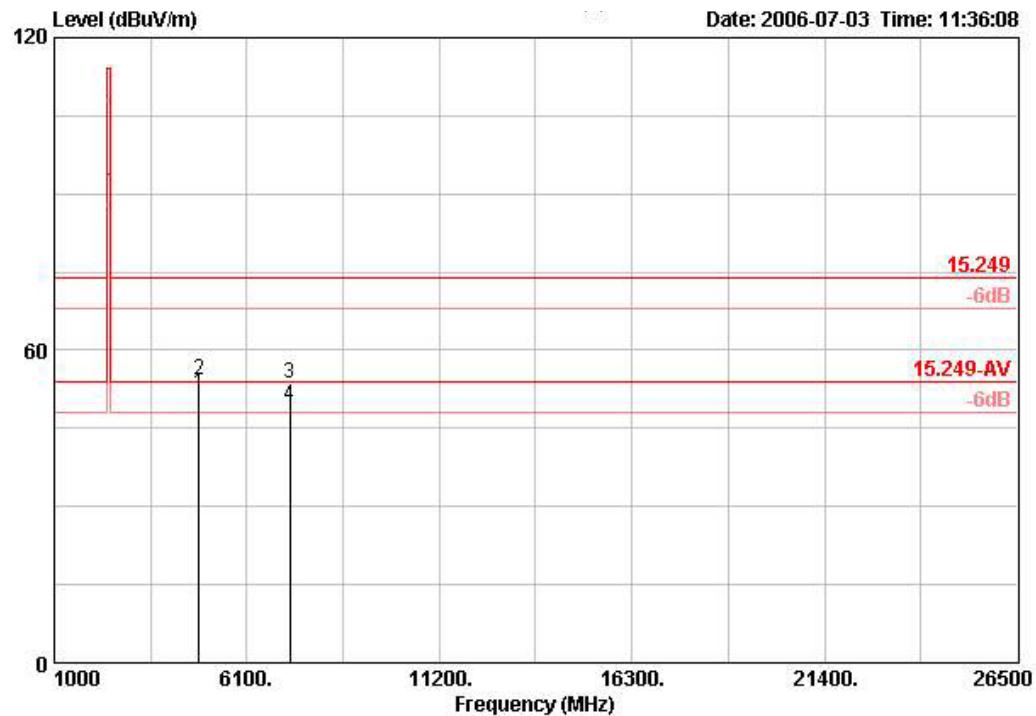
Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 1

Vertical



Freq	Level	Over Limit	Limit	Read		Antenna	Cable		Preamp	Remark	Pol/Phase	Distance
				Line	Level		Factor	Loss	Factor			
1	4828.360	45.20	-8.80	54.00	43.23	32.83	4.30	35.16	Average	VERTICAL		3
2	4828.520	50.12	-23.88	74.00	48.16	32.83	4.30	35.16	PERK	VERTICAL		3
3	7242.490	51.63	-2.37	54.00	45.35	35.98	5.51	35.20	AVERAGE	VERTICAL		3
4	7242.520	55.15	-18.85	74.00	48.87	35.98	5.51	35.20	PERK	VERTICAL		3

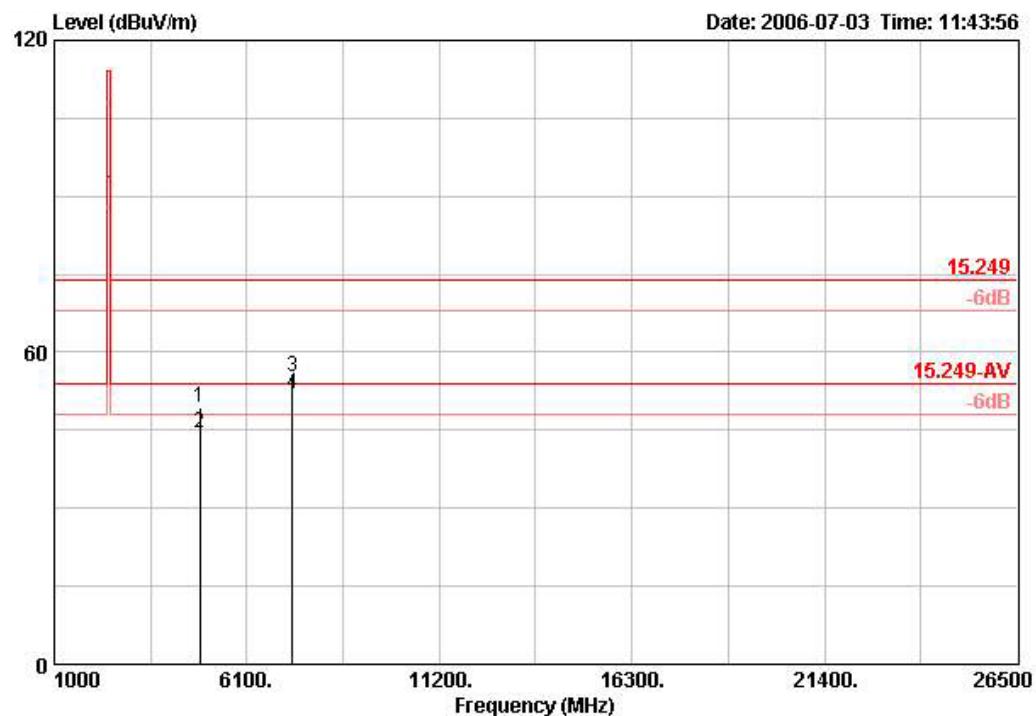
## Horizontal



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Pol/Phase	Distance	
		Limit	Line	Level	Factor	Loss	Factor				
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			m	
1 0	4828.330	51.55	-2.45	54.00	49.59	32.83	4.30	35.16	AVERAGE	HORIZONTAL	3
2 0	4828.390	54.25	-19.75	74.00	52.28	32.83	4.30	35.16	PERK	HORIZONTAL	3
3 0	7242.440	53.71	-20.29	74.00	47.42	35.98	5.51	35.20	PERK	HORIZONTAL	3
4 0	7242.540	49.33	-4.67	54.00	43.05	35.98	5.51	35.20	AVERAGE	HORIZONTAL	3

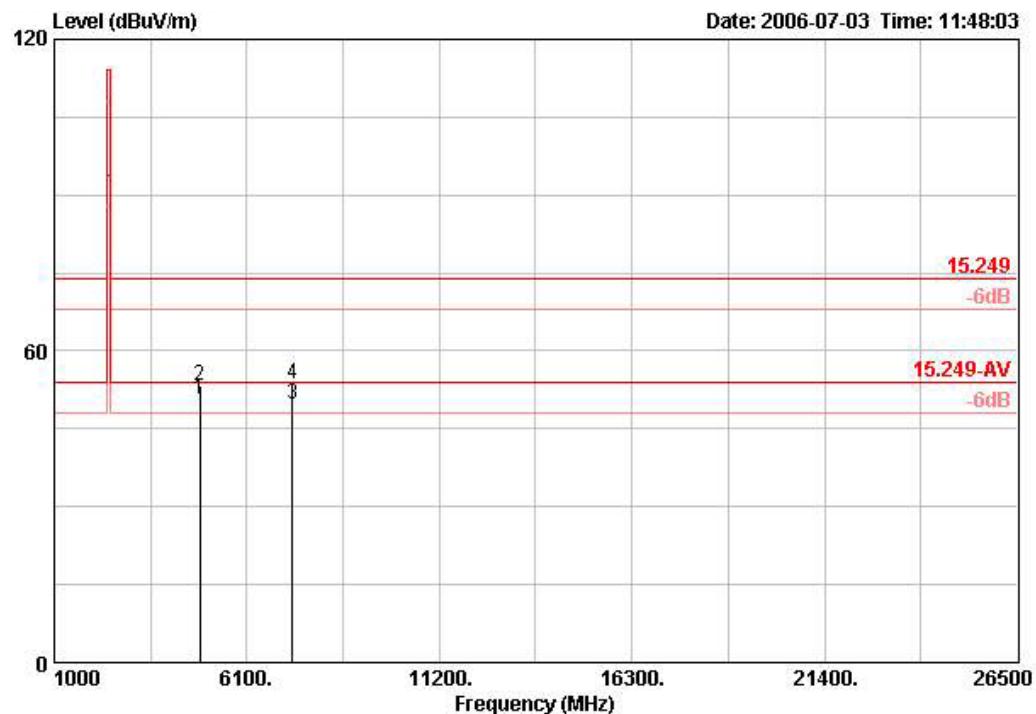
Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 2

Vertical



Freq	Level	Over Limit	Limit Line	Read		Antenna Factor	Cable		Preamp Factor	Remark	Pol/Phase	Distance
				dBuV/m	dB		dBuV	dB/m				
1 0	4864.320	49.29	-24.71	74.00	47.28	32.86	4.30	35.15	PERK	VERTICAL		3
2 0	4864.330	44.35	-9.65	54.00	42.34	32.86	4.30	35.15	AVERAGE	VERTICAL		3
3 0	7296.540	55.18	-18.82	74.00	48.69	36.12	5.56	35.19	PERK	VERTICAL		3
4 0	7296.560	51.89	-2.11	54.00	45.40	36.12	5.56	35.19	AVERAGE	VERTICAL		3

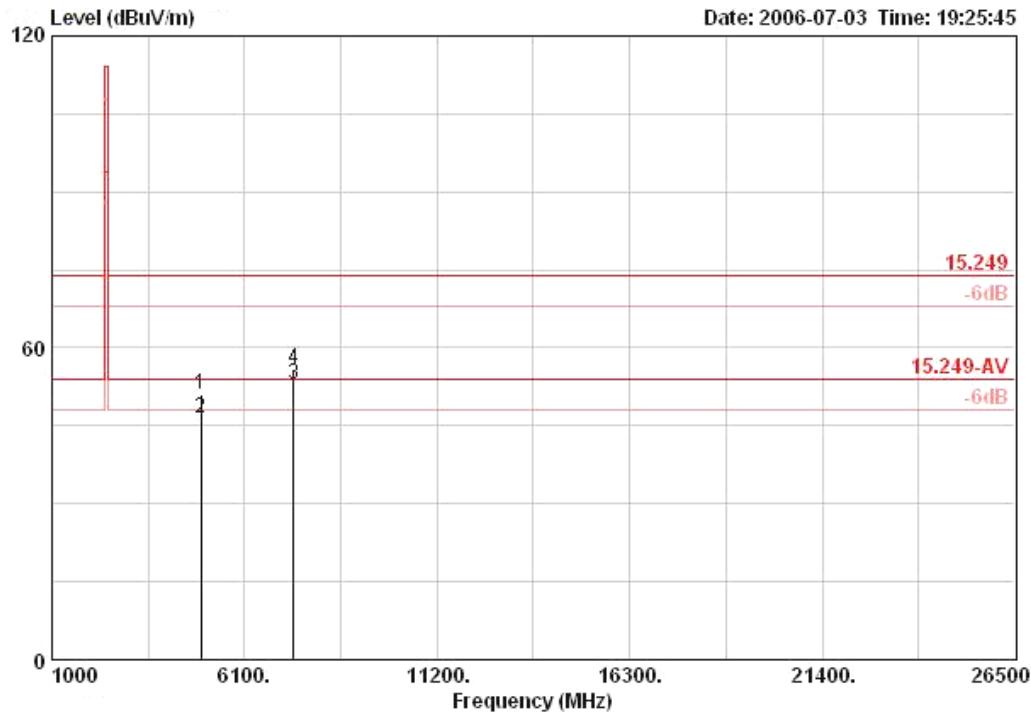
## Horizontal



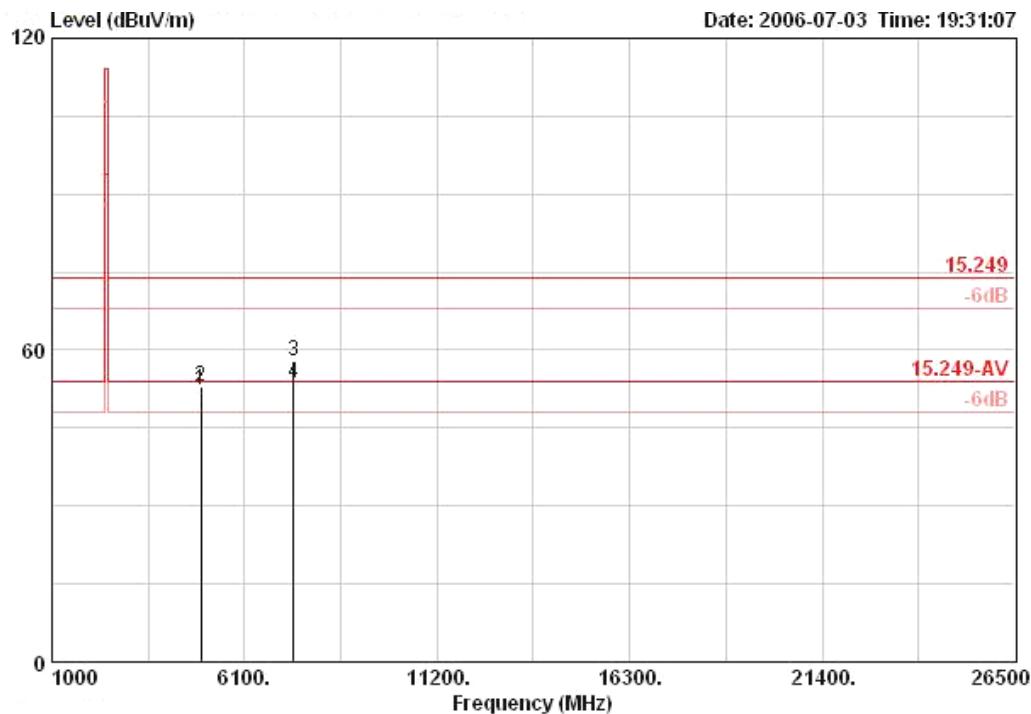
Freq	Level	Over Limit		Read	Antenna	Cable		Preamp	Remark	Pol/Phase	Distance
		MHz	dBuV/m			dB	dBuV/m	dBuV	dB/m	dB	
1 0	4864.360	50.55	-3.45	54.00	48.54	32.86	4.30	35.15	AVERAGE	HORIZONTAL	3
2 0	4864.500	53.22	-20.78	74.00	51.21	32.86	4.30	35.15	PERK	HORIZONTAL	3
3 0	7296.510	49.69	-4.31	54.00	43.19	36.12	5.56	35.19	AVERAGE	HORIZONTAL	3
4 0	7296.710	53.71	-20.29	74.00	47.22	36.12	5.56	35.19	PERK	HORIZONTAL	3

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	Channel 4

Vertical



Freq	Level	Over Limit	Antenna Line	Cable		Read Level	Remark	Ant Pos	Table Pos
				dB	dBuV/m				
1	4936.300	50.96	-23.04	74.00	33.49	4.73	33.22	45.96	PEAK 117 50
2	4936.420	46.33	-7.67	54.00	33.49	4.73	33.22	41.33	AVERAGE 117 50
3 @	7404.480	53.01	-0.99	54.00	36.49	5.48	33.46	44.49	AVERAGE 124 71
4	7404.520	56.03	-17.97	74.00	36.49	5.48	33.46	47.51	PEAK 124 71

**Horizontal**


Freq	Level	Over Limit	Antenna Line Factor	Cable Loss Factor	Preamp Factor	Read Level	Remark	Ant	Table
								Pos	Pos
MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	dBuV	cm	deg
1 @	4936.380	52.19	-1.81	54.00	33.49	4.73	33.22	47.19	AVERAGE
2	4936.500	53.11	-20.89	74.00	33.49	4.73	33.22	48.11	PEAK
3	7404.560	57.88	-16.12	74.00	36.49	5.48	33.46	49.37	PEAK
4 @	7404.620	53.75	-0.25	54.00	36.49	5.48	33.46	45.24	AVERAGE

**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.

## 4.5. Band Edge Emissions Measurement

### 4.5.1. 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

### 4.5.2. Measuring Instruments and Setting

Please refer to section 5 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 (other emission)	100 KHz /100 KHz for Peak

### 4.5.3. 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.

### 4.5.4. Test Setup Layout

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

### 4.5.5. Test Deviation

There is no deviation with the original standard.

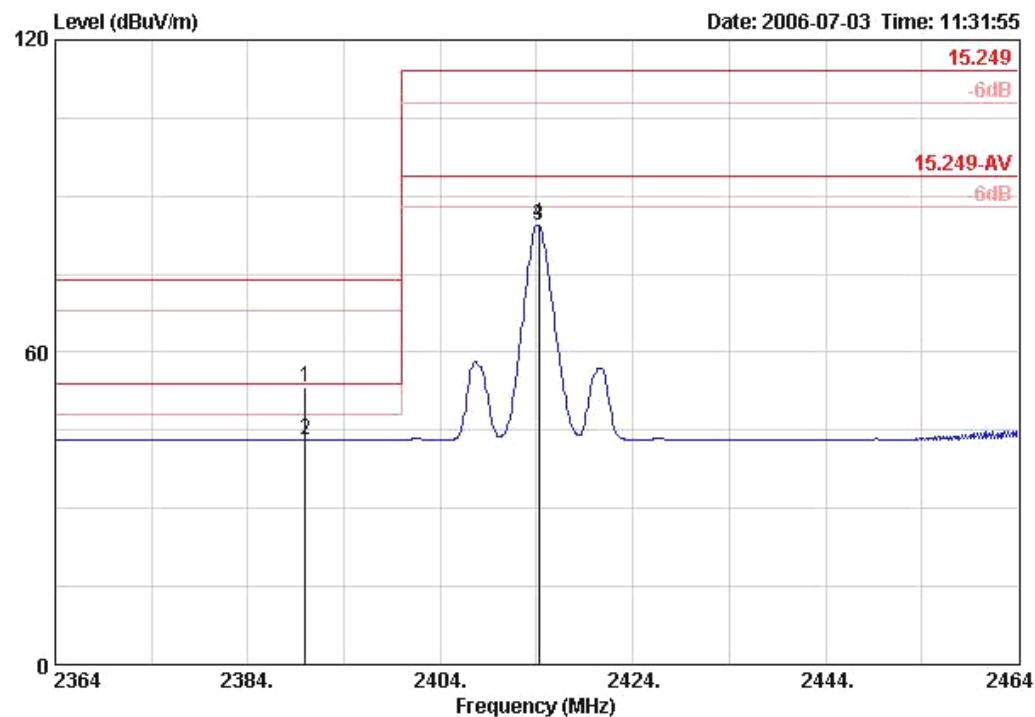
### 4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 4.5.7. Test Result of Band Edge and Emissions

Temperature	24°C	Humidity	64%
Test Engineer	Leo Hung	Configurations	X axis / Channel 1, 4

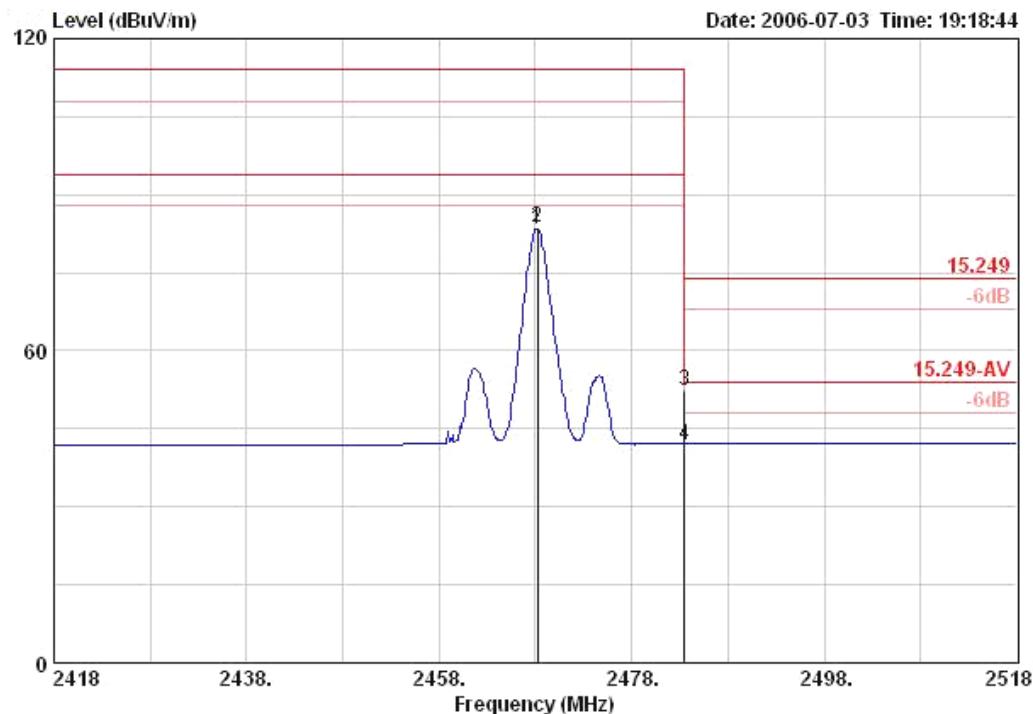
## Channel 1



Freq	Level	Over Limit	Line	Read		Antenna	Cable		Preamp	Remark	Pol/Phase	Distance
				Level	Factor		Level	Factor				
1 @	2390.000	53.31	-20.69	74.00	21.67	28.88	2.76	0.00	PERK	HORIZONTAL		3
2 @	2390.000	43.25	-10.75	54.00	11.61	28.88	2.76	0.00	AVERAGE	HORIZONTAL		3

Item 1, 2 are Band Edge.

## Channel 4



Freq	Level	Over Limit	Antenna Line Factor	Cable Loss Factor	Preamp Factor	Read Level	Remark	Ant	Table
								Pos	Pos
								cm	deg
3	2483.500	52.21	-21.79	74.00	28.36	2.62	0.00	21.24	PEAK
4	2483.500	41.99	-12.01	54.00	28.36	2.62	0.00	11.01	AVERAGE

Item 3, 4 are Band Edge.

Note:

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

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

Receiving maximum band edge emissions are Horizontal Polarization.

## 4.6. Antenna Requirements

### 4.6.1. 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.

### 4.6.2. Antenna Connector Construction

Please refer to section 3.3 in this test report, all antenna connectors comply 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	Feb. 22, 2006	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Dec. 19, 2005	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9708-1839	9kHz – 30MHz	Mar. 18, 2006	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2006	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. 15, 2006	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	CPA9231A	3565	9 kHz - 2 GHz	Jan. 18, 2006	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	May 29, 2006	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	923364	26.5 GHz - 40 GHz	Jan. 24, 2006*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100004/040	9 kHz - 40 GHz	Sep. 30, 2005	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	May 23, 2006*	Radiation (03CH03-HY)
Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30 MHz - 200 MHz	Jul. 22, 2005	Radiation (03CH03-HY)
Log Antenna	SCHWARZBECK	VUSLP 9111	221	200 MHz - 1 GHz	Jul. 22, 2005	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6903	1GHz ~ 18GHz	Mar. 15, 2006	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	NCR	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Dec.02, 2005	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Dec.02, 2005	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	FSP30	100023	9kHz ~ 30GHz	Nov. 26, 2005	Conducted (TH01-HY)
AC power source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Apr. 21, 2005*	Conducted (TH01-HY)
DC power source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Dec. 28, 2005	Conducted (TH01-HY)
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2005	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 30, 2005	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 30, 2005	Conducted (TH01-HY)
Oscilloscope	Tektronix	TDS1012	CO38515	100MHz / 1GS/s	Jun. 20, 2006	Conducted (TH01-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Dec. 30, 2005	Conducted (TH01-HY)
Data Generator	Tektronix	DG2030	063-2920-50	0.1Hz~400MHz	Jun. 16, 2006	Conducted (TH01-HY)

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

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

Note: NCR means Non-Calibration required.

## 6. SPORTON COMPANY PROFILE

SPORTON Lab. was established in 1986 with one shielded room: the first private EMI test facility, offering local manufacturers an alternative EMI test familial apart from ERSO. In 1988, one 3M and 10M/3M open area test site were setup and also obtained official accreditation from FCC, VCCI and NEMKO. In 1993, a Safety laboratory was founded and obtained accreditation from UL of USA, CSA of Canada and TUV (Rhineland & PS) of Germany. In 1995, one EMC lab, including EMI and EMS test facilities was setup. In 1997, SPORTON Group has provided financial expense to relocate the headquarter to Orient Scientific Park in Taipei Hsien to offer more comprehensive, more qualified and better service to local suppliers and manufacturers. In 1999, Safety Group and Component Group were setup. In 2001, SPORTON has established 3M/10M chamber in Hwa Ya Technology Park.

### 6.1. Test Location

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 02-2696-2468 FAX : 02-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 03-327-3456 FAX : 03-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 02-2601-1640 FAX : 02-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 02-2631-4739 FAX : 02-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 02-8227-2020 FAX : 02-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 <sup>nd</sup> Rd., Taipei 114, Taiwan, R.O.C. TEL : 02-2794-8886 FAX : 02-2794-9777
JHUBEI	ADD : No.8, Lane 728, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C. TEL : 03-656-9065 FAX : 03-656-9085



## 7. NVLAP CERTIFICATE OF ACCREDITATION

United States Department of Commerce  
National Institute of Standards and Technology



### Certificate of Accreditation to ISO/IEC 17025:1999

NVLAP LAB CODE: 200079-0

**Sportun International, Inc. Hwa Ya EMC Laboratory**

Tao Yuan Hsien 333  
TAIWAN

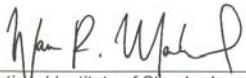
*is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in  
NIST Handbook 150:2001 and all requirements of ISO/IEC 17025:1999.  
Accreditation is granted for specific services, listed on the Scope of Accreditation, for:*

### ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

2006-01-01 through 2006-12-31

*Effective dates*



  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2005-05-19)