Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan	**TEST REPORT**	Reference No.: A08072402 Report No.: FCCA08072402 FCCID: WMX01WISENSING Page:1 of 48 Date : Aug. 27, 2008

Product Name:	Digital Input Wireless transmitter
Model Number:	DIR-100
Applicant:	Sensing Tek Co.,Ltd. 4F-1, No.63, Chen Gung 5 st., ChuBei City, Hsinchu County, Taiwan, 302
Date of Receipt:	Jul. 31, 2008
Finished date of Test:	Aug. 08, 2008
Applicable Standards:	47 CFR Part 15, Subpart C ANSI C63.4:2003

We, **Spectrum Research & Testing Laboratory Inc.**, hereby certify that one sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Checked By : Shunm Wang (Shunm Wang), Date: Aug. 27. 2008

Approved By : (Johnson Ho, Director), Date: 8/27/2008

NVLAP

Lab Code: 200099-0

TABLE OF CONTENTS

1. DOCUMENT POLICY AND TEST STATEMENT

1.1 DOCUMENT POLICY

- The report shall not be reproduced except in full, without the written approval of SRT Lab, Inc.
- The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

1.2 TEST STATEMENT

- The test results in the report apply only to the unit tested by SRT Lab.
- There was no deviation from the requirements of test standards during the test.
- AC power source, 120 VAC/60 Hz, was used during the test.

1.3 EUT MODIFICATION

- Attach a insulating mylar in inner of antenna hole.

2. DESCRIPTION OF EUT AND TEST MODE

2.1 GENERAL DESCRIPTION OF EUT

Product	Digital Input Wireless transmitter
Model No.	DIR-100
Power Supply	DC7V~DC15V , 0.12A
Frequency Band	2402-2472 MHz
Number of Channel	71
Channel Spacing	1 MHz
Rated RF Output Power	1 dBm
Modulation Type	GFSK
Bit Rate of Transmission	250Kp/s
Mode of Operation	half duplex
Antenna Gain	2 dBi
Operating Temperature Range	-40 ~ 75 °C
Channel Bandwidth	1 MHz
Antenna Type	Reverse SAM Antenna
Duty Cycle	10 %
Carrier Frequency	2402-2472 MHz

NOTE：

For more detailed information, please refer to the EUT's specification or user's manual provided by manufacturer.

2.2 DESCRIPTION OF SUPPORT UNIT

The transmitter part of EUT was tested with a PC system and configured by the requirement of ANSI C63.4. All interface ports were connected to the appropriate support units via specific cables. The support units and cables are listed below.

No	Device	Brand	Model #	FCC ID/DoC	Cable
1	PC	ACER	Aspire SA85	DOC	1.8m unshielded power cord
2	Monitor	SAMSUNG	PG17IS	DOC	1.8m unshielded power cord 1.5m shielded data cord
3	Keyboard	IBM	KB-0225	DOC	1.8m shielded data cord
4	Mouse	LOGITECH	M-S34	DZL211029	1.5m shielded data cord
5	Print	EPSON	STYLUS C20SX	DOC	1.5m unshielded power cord 1.2m shielded data cord
6	Modem	ACEEX	DM-1414	DOC	1.5m unshielded power cord 1.2m shielded data cord

NOTE : For the actual test configuration, please refer to the photos of testing.

2.3 DESCRIPTION OF TEST MODE

72 channels are provided by EUT. Three channels of lower, medium and higher were chosen for test.

Channel	Frequency (MHz)
01	2402
37	2437
71	2472

NOTE :

1. Below 1 GHz, the channel 01, 37 and 71 were pre-tested in chamber. The channel 71, worst case one, was chosen for conducted and radiated emission test.
2. Above 1 GHz, the channel 01, 37 and 71 were tested individually.

3. DESCRIPTION OF APPLIED STANDARDS

The EUT is a kind of wireless product and to be connected with a PC system for normal use. According to the specifications provided by the applicant, it must comply with the requirements of the following standards:

47 CFR Part 15, Subpart C
ANSI C63.4: 2003

All tests have been performed and recorded as the above standards.

4. TECHNICAL CHARACTERISTICS TEST

4.1 6dB Bandwidth

4.1.1 LIMIT

Frequency Range (MHz)	Limit(kHz)				
	Quantity of Hopping Channel	50	25	15	75
902-928		<250	>250	NA	NA
2400-2483.5		NA	NA	>1000	<1000

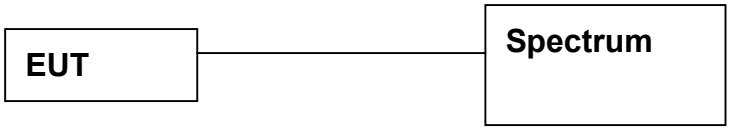
4.1.2 TEST EQUIPMENT

The following test equipment was used during the test:

Equipment/ Facilities	Specifications	Manufacturer	Model#/ Serial#	Due Date of Cal. & Cal. center
SPECTRUM	9kHz-40GHz	ROHDE & SCHWARZ	FSP40/ 100093	SEP. 2008 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.1.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

4.1.4 TEST PROCEDURE

The EUT was operated in hopping mode or any specific channel.
Printed out the test result from the spectrum by hard copy function.

4.1.5 EUT OPERATING CONDITION

Under Windows XP ran “EMI TEST”, and ”NuSens Server” program or accessed the following peripherals directly or via EUT:

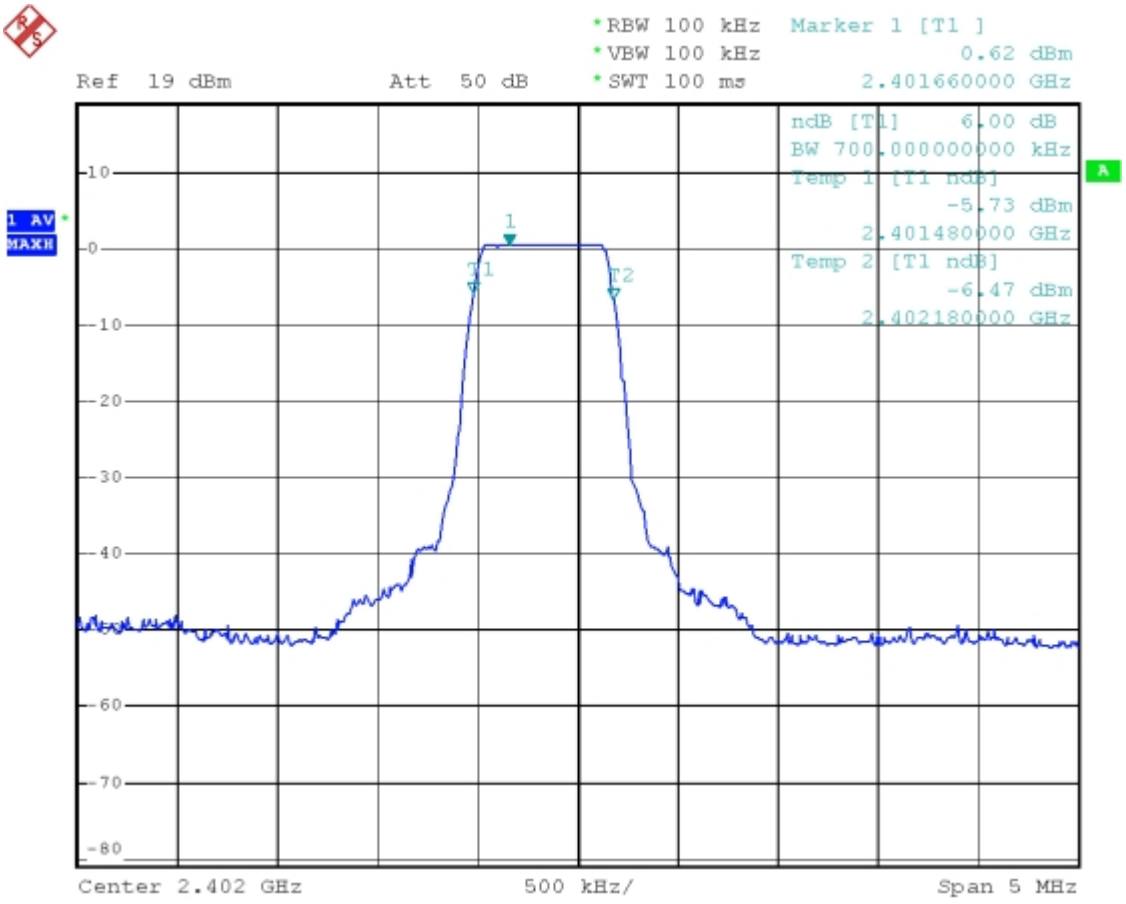
- Notebook

4.1.5 TEST RESULT

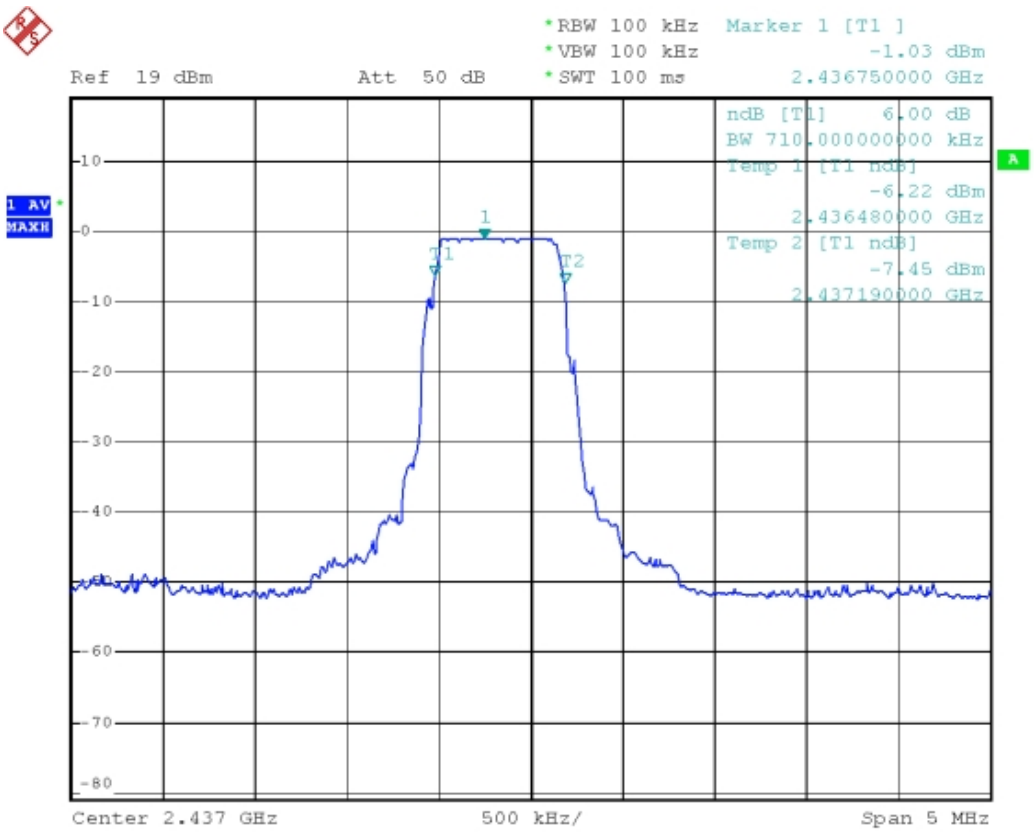
Temperature:	24°C	Humidity:	61%RH
Spectrum Detector:	PK	Tested by:	Shunm Wang
Test Result:	PASS	Tested Date:	Aug. 07, 2008

Channel Number	Channel Frequency (MHz)	6dB Down Bandwidth (KHz)
1	2402	700
37	2437	710
71	2472	640

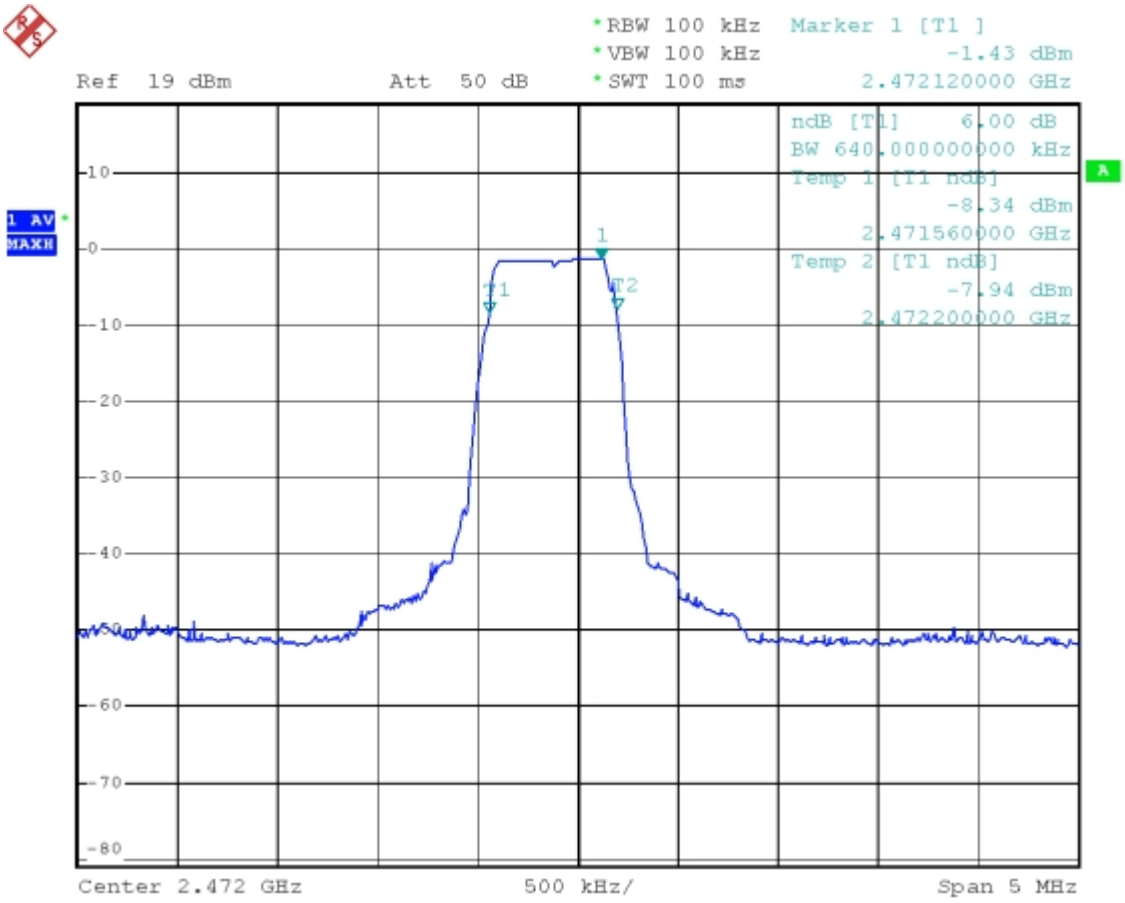
CH02:



CH37:


*RBW 100 kHz
*VBW 100 kHz
*SWT 100 ms
Marker 1 [T1]
-1.03 dBm
2.436750000 GHz
Ref 19 dBm
Att 50 dB
ndB [T1] 6.00 dB
BW 710.000000000 kHz
Temp 1 [T1 ndB]
-6.22 dBm
2.436480000 GHz
Temp 2 [T1 ndB]
-7.45 dBm
2.437190000 GHz
1 AV
MAXH
10
0
-10
-20
-30
-40
-50
-60
-70
-80
T1
T2
Center 2.437 GHz
500 kHz/
Span 5 MHz

CH72:


*RBW 100 kHz
*VBW 100 kHz
*SWT 100 ms
Marker 1 [T1]
-1.43 dBm
2.472120000 GHz
Ref 19 dBm
Att 50 dB
ndB [T1] 6.00 dB
BW 640.000000000 kHz
Temp 1 [T1 ndB]
-8.34 dBm
2.471560000 GHz
Temp 2 [T1 ndB]
-7.94 dBm
2.472200000 GHz
1 AV
MAXH
A
T1
T2
Center 2.472 GHz
500 kHz/
Span 5 MHz

4.2 PEAK POWER TEST

4.2.1 LIMIT

FCC Part15, Subpart C Section 15.247.

Frequency Range (MHz)	Limit(w)				
	Quantity of Hopping Channel	50	25	15	75
902-928		1(30dBm)	0.125(21dBm)	NA	NA
2400-2483.5		NA	NA	0.125(21dBm)	1(30dBm)
5725-5850		NA	NA	NA	1(30dBm)

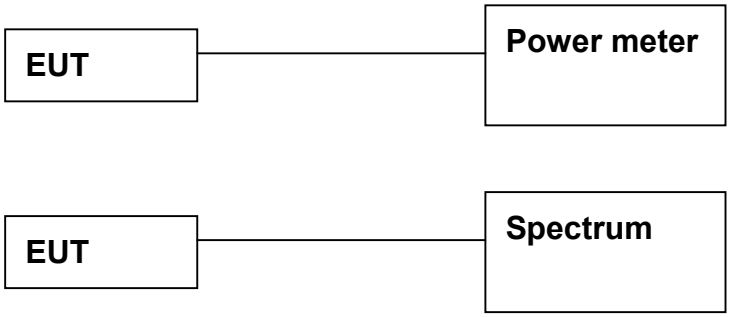
4.2.2 TEST EQUIPMENT

The following test equipment was used during the test：

Equipment/ Facilities	Specifications	Manufacturer	Model#/ Serial#	Due Date of Cal. & Cal. Center
SPECTRUM	9kHz-40GHz	ROHDE & SCHWARZ	FSP40/ 100093	SEP. 2008 ETC
POWER METER	N/A	BOONTON	4232A/ 29001	MAY 2009 ETC
POWER SENSOR	DC-8GHz 50 Ω	BOONTON	51011EMC/ 31181	JUN. 2009 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

4.2.4 TEST PROCEDURE

The EUT was operating in hopping mode or could control its channel.
Printed out the test result from the spectrum by hard copy function.
Recorded the read value of the power meter.

4.2.5 EUT OPERATING CONDITION

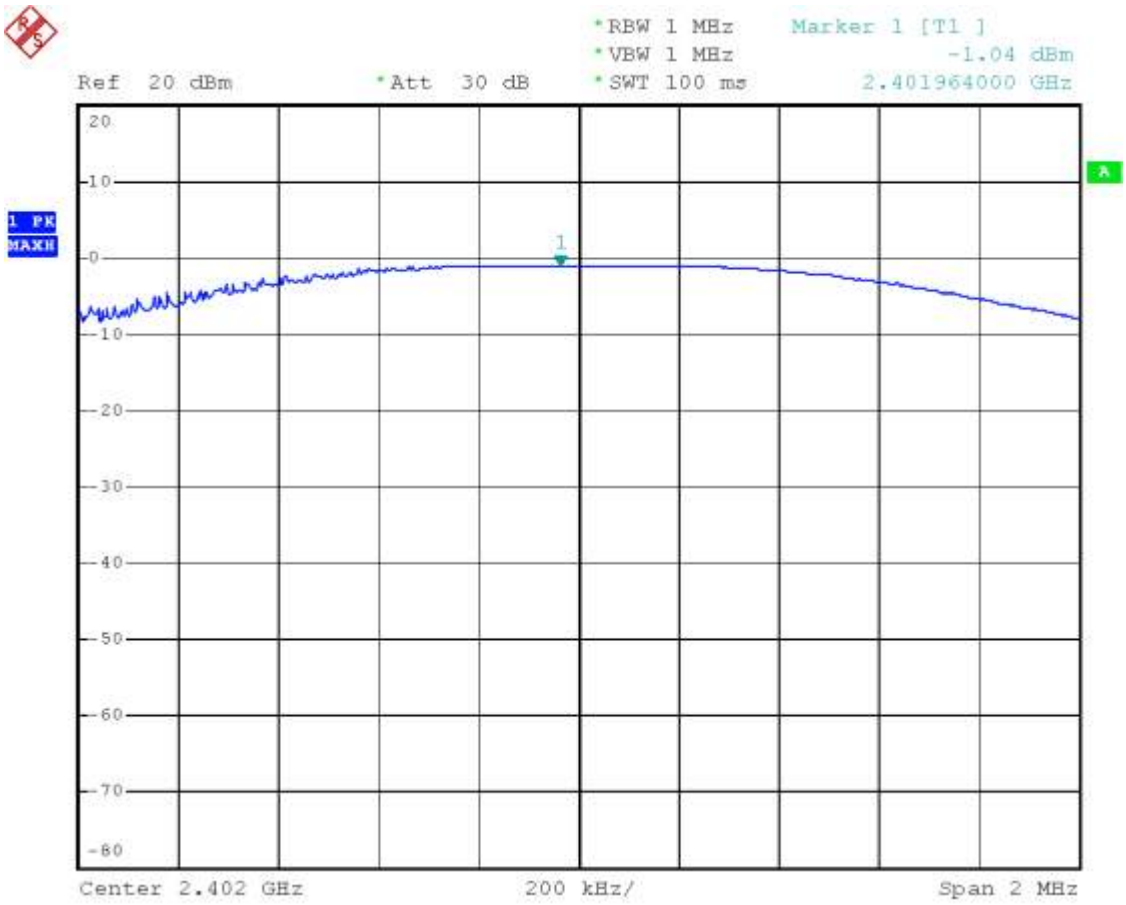
Same as section 4.1.5 of this report.

4.2.6 TEST RESULT

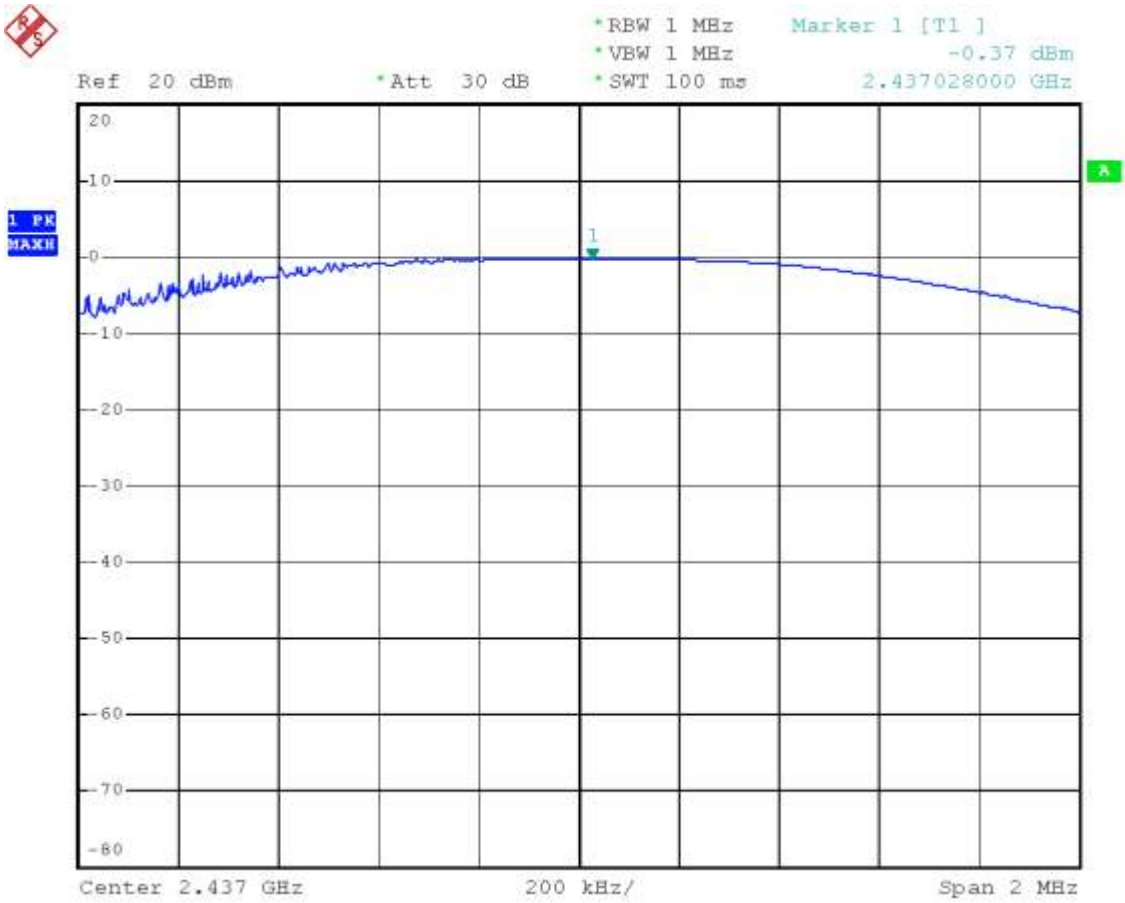
Temperature:	24°C	Humidity:	61%RH
Spectrum Detector:	PK	Tested by:	Shunm Wang
Test Result:	PASS	Tested Date:	Aug. 07, 2008

Channel Number	Channel Frequency (MHz)	Peak Output Power (dBm)	Peak Power Limit (dBm)
1	2402	-1.04	30
37	2437	-0.37	30
71	2472	0.72	30

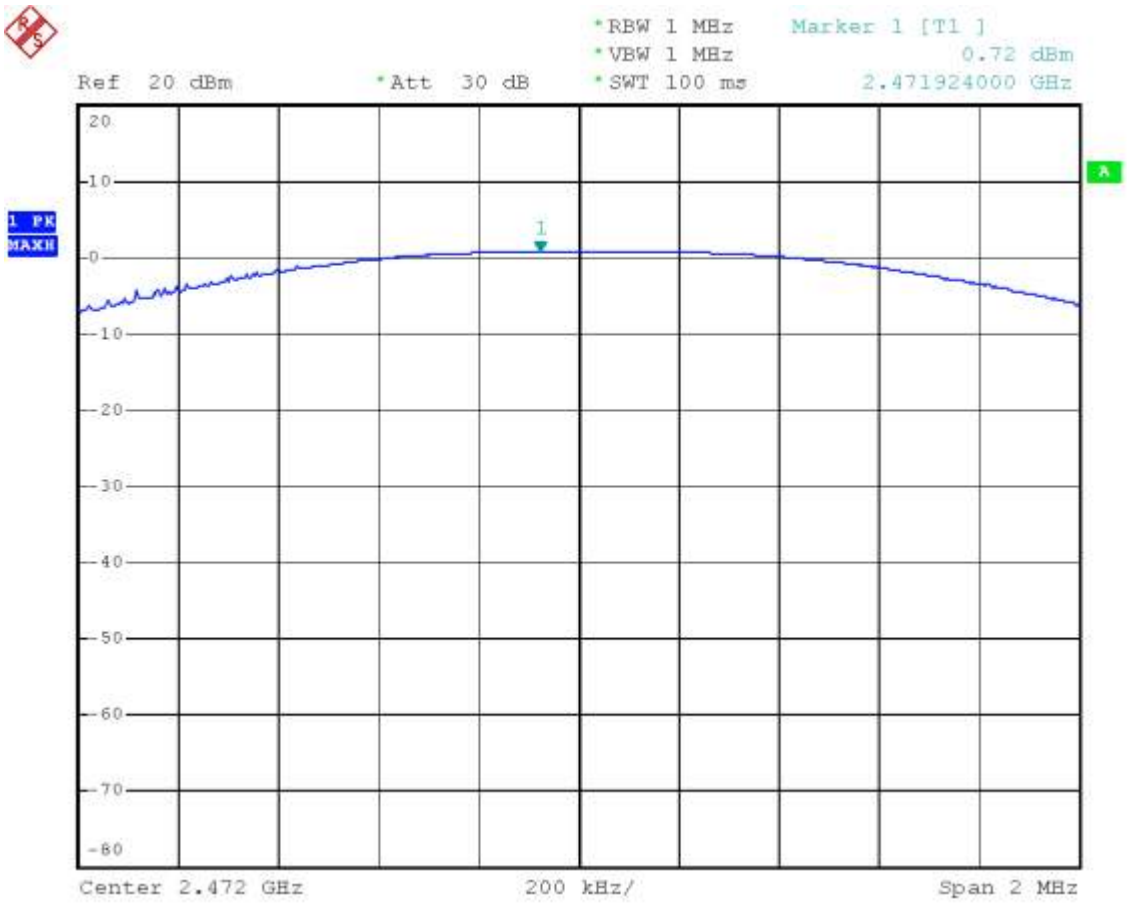
CH01:


*RBW 1 MHz
*VBW 1 MHz
*SWT 100 ms
Marker 1 [T1]
-1.04 dBm
2.401964000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
MAXH
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.402 GHz
200 kHz/
Span 2 MHz

CH37:


*RBW 1 MHz
*VBW 1 MHz
*SWT 100 ms
Marker 1 [T1]
-0.37 dBm
2.437028000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
MAXH
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.437 GHz
200 kHz/
Span 2 MHz

CH71:


*RBW 1 MHz
*VBW 1 MHz
*SWT 100 ms
Marker 1 [T1]
0.72 dBm
2.471924000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
MAXH
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.472 GHz
200 kHz/
Span 2 MHz

4.3 BAND EDGE TEST

4.3.1 LIMIT

FCC Part15, Subpart C Section 15.249 (c), Emission radiated outside of the specified frequency bands, except for harmonics, shall attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Operating Frequency Range (MHz)	Limit (dBμV/m)	
	Peak	Average
902-928	74	54
2400-2483.5		
5725-5850		

FCC Part15, Subpart C Section 15.247. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

OPERATING FREQUENCY RANGE (MHz)	SPURIOUS EMISSION FREQUENCY (MHz)	LIMIT	
		Peak power ration to emission(dBc)	Emission level(dBuV/m)
902 - 928	<902	>20	NA
	>928	>20	NA
	960-1240	NA	54
2400 - 2483.5	<2400	>20	NA
	>2483.5-2500	NA	54
5725 - 5850	<5350-5460	NA	54
	<5725	>20	NA
	>5850	>20	NA

4.3.2 TEST EQUIPMENT

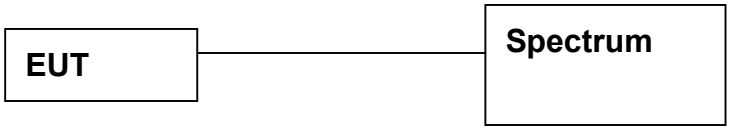
The following test equipment was used during the test：

Equipment/ Facilities	Specification	Manufacturer	Model#/ Serial#	Due Date of Cal. & Cal. Center
SPECTRUM	9kHz-40GHz	ROHDE & SCHWARZ	FSP40/ 100093	SEP. 2008 ETC
EMI TEST RECEIVER	9 kHz TO 2750 MHz	ROHDE & SCHWARZ	ESCS30/ 830245/012	OCT. 2008 ETC
SPECTRUM	9KHz-26.5GHz	HP	8953E/ 3710A03220	MAY 2009 ETC
PRE-AMPLIFIER	1GHz-26.5GHz Gain:30dB	HP	8449B/ 3008A01019	NOV. 2008 ETC
BI-LOG ANTENNA	25 MHz TO 2 GHz	EMCO	3142/ 9701-1124	FEB. 2009 SRT
HORN ANTENNA	1GHz to 18GHz	EMCO	3115/ 9602-4681	DEC. 2008 ETC
OATS	3 - 10 M measurement	SRT	SRT-1	APR. 2009 SRT

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

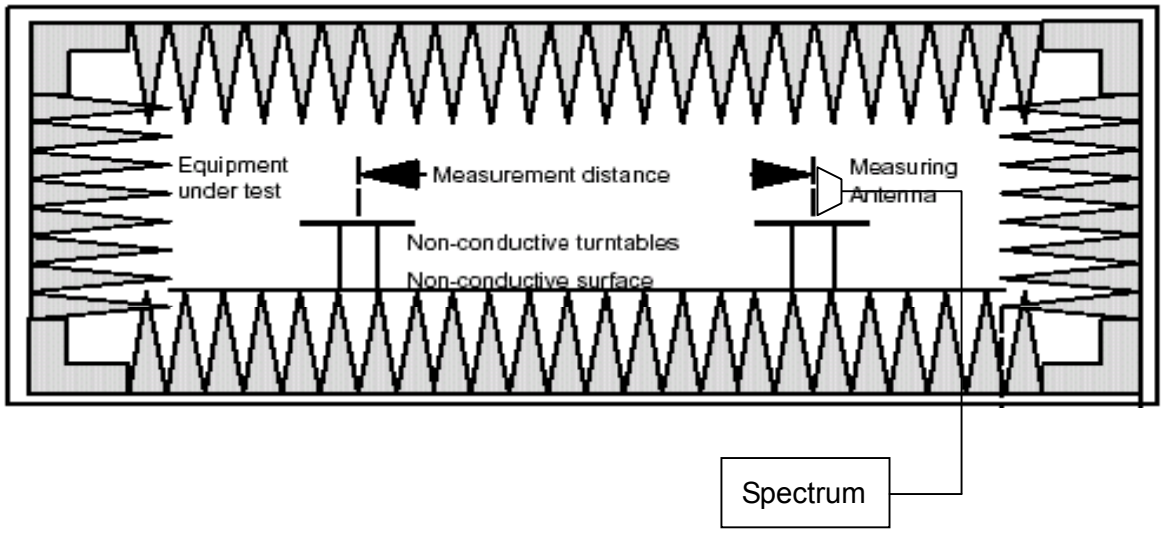
4.3.3 TEST SET-UP

FOR RF CONDUCTED TEST (dBc)



The EUT was connected to the spectrum through a 50Ω RF cable.

FOR RADIATED EMISSION TEST



NOTE :

1. The EUT system was put on a wooden table with 0.8m heights above a ground plane.
2. For the actual test configuration, please refer to the photos of testing.

4.3.4 TEST PROCEDURE

1. The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.
2. The EUT was tested according to the requirement of ANSI C63.4 and CISPR 22. The measurements were made at an open area test site with 10 meter measurement distance under 1 GHz and with 3m distance above 1GHz. The frequency spectrum measured started from 30 MHz. Under 1 GHz. All readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver. Above 1 GHz, the measurements were made at an open area test site with 3 meter measurement distance and all readings were peak and average values with 1 MHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency.

4.3.5 EUT OPERATING CONDITION

Same as section 4.1.5 of this report.

4.3.6 TEST RESULT

Temperature:	24°C	Humidity:	61%RH
Spectrum Detector:	PK & AV	Tested by:	Shunm Wang
Test Result:	PASS	Tested Date:	Aug. 07, 2008

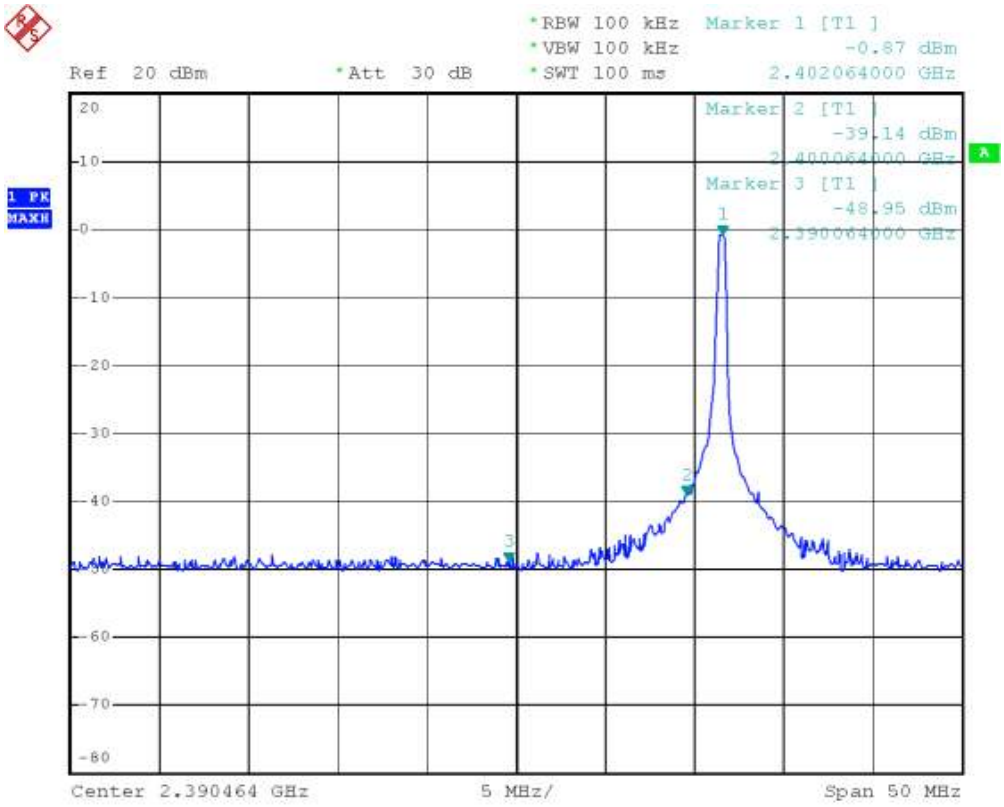
1.Conducted emission test

Frequency (MHz)	PEAK POWER OUTPUT (dBm)	Emission read Value (dBm)	Result of Band edge (dBc)	Band edge LIMIT (dBc)
<2400	-0.87	-39.14	38.27	>20dBc
>2483.5	0.99	-49.01	50.00	>20dBc

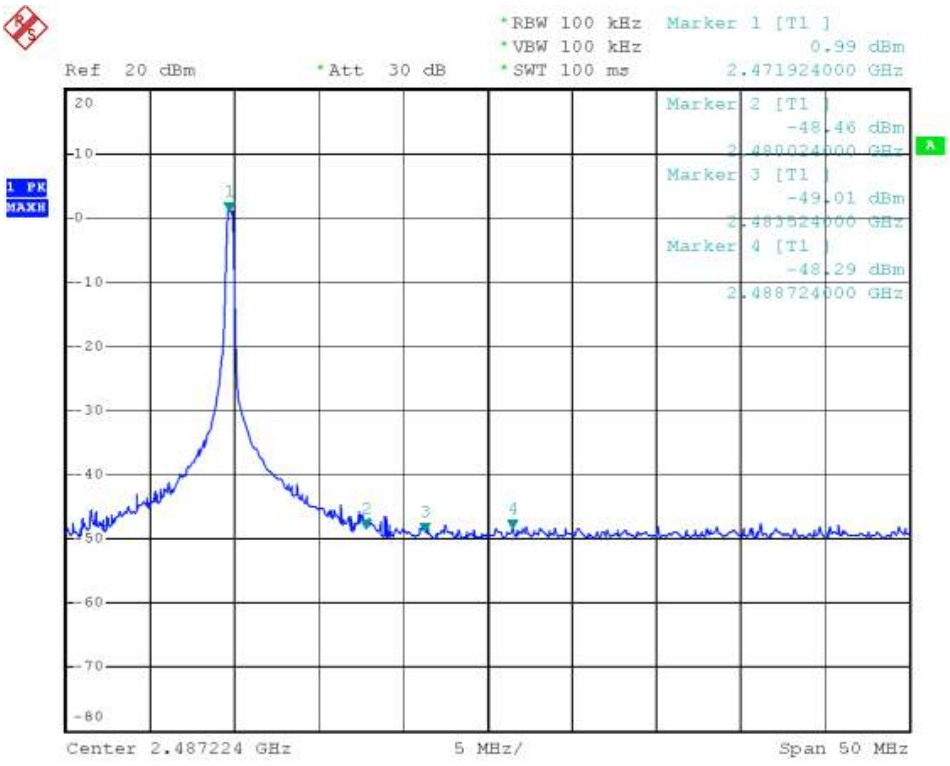
2.Radiated emission test

Frequency (MHz)	Antenna polarization (H/V)	Reading (dBuV)	Emission (dBuV/m)	Band edge Limit (dBuV)
		Strength	Strength	Strength
<2400	H	44.9	40.7	54.0
<2400	V	43.2	39.0	54.0
>2483.5	H	40.6	38.5	54.0
>2483.5	V	37.9	35.8	54.0

Ch01:


*RBW 100 kHz
*VBW 100 kHz
*SWT 100 ms
Marker 1 [T1]
-0.87 dBm
2.402064000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-39.14 dBm
2.400064000 GHz
Marker 3 [T1]
-48.95 dBm
2.390064000 GHz
1 PK
MAXH
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.390464 GHz
5 MHz/
Span 50 MHz

Ch71:


*RBW 100 kHz
*VBW 100 kHz
*SWT 100 ms
Marker 1 [T1]
0.99 dBm
2.471924000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-48.46 dBm
2.480024000 GHz
Marker 3 [T1]
-49.01 dBm
2.483524000 GHz
Marker 4 [T1]
-48.29 dBm
2.488724000 GHz
1 PK
MAXH
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.487224 GHz
5 MHz/
Span 50 MHz

4.4 POWER DENSITY TEST

4.4.1 LIMIT

FCC Part15, Subpart C Section 15.247

FREQUENCY RANGE (MHz)	Limit(dBm/kHz)
902-928	8dBm/3kHz
2400-2483.5	
5725-5850	

4.4.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
SPECTRUM	9kHz-40GHz	ROHDE & SCHWARZ	FSP40/ 100093	SEP. 2008 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST SET-UP

The EUT was connected to a spectrum through a 50Ω RF cable.

4.4.4 TEST PROCEDURE

The EUT was operating in transmitter mode and could be controlled its channel.
Printed out the test result from the spectrum by hard copy function.

4.4.5 EUT OPERATING CONDITION

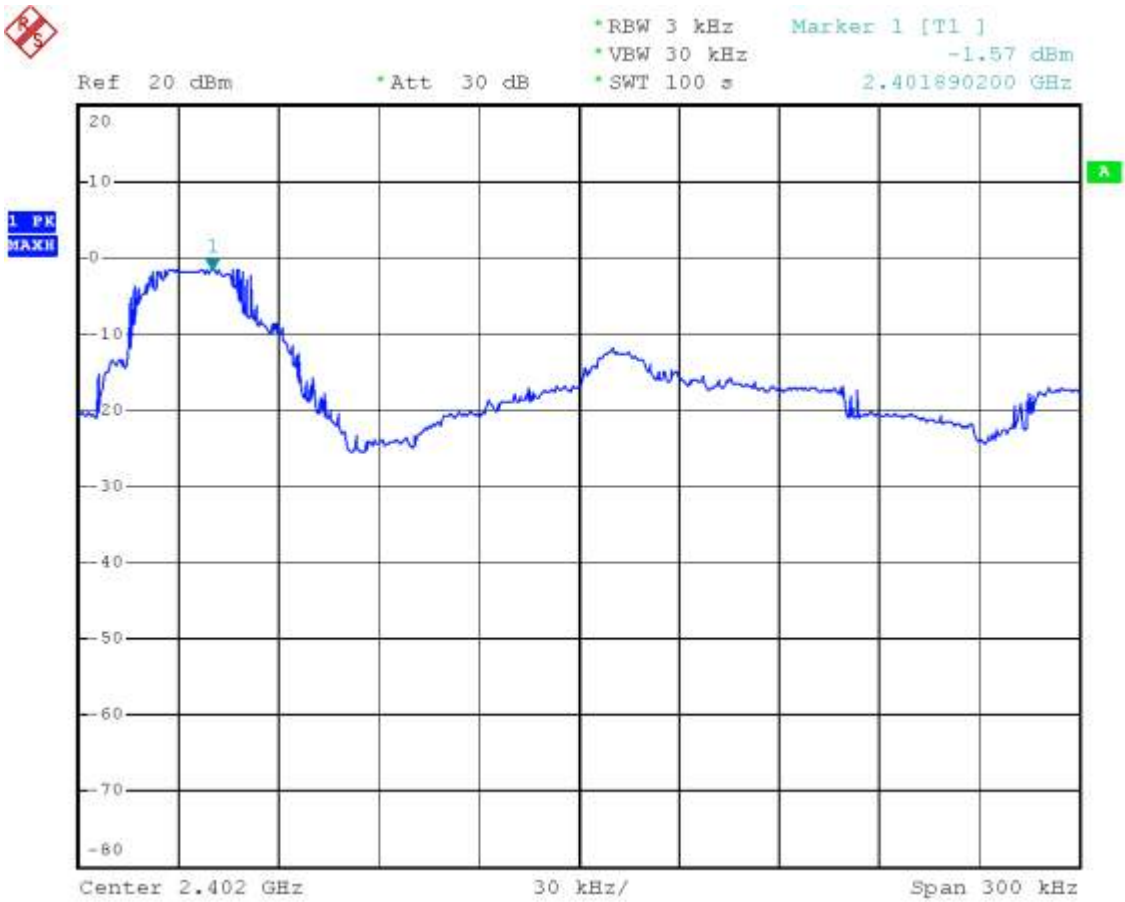
Same as section 4.1.5 of this report.

4.4.6 TEST RESULT

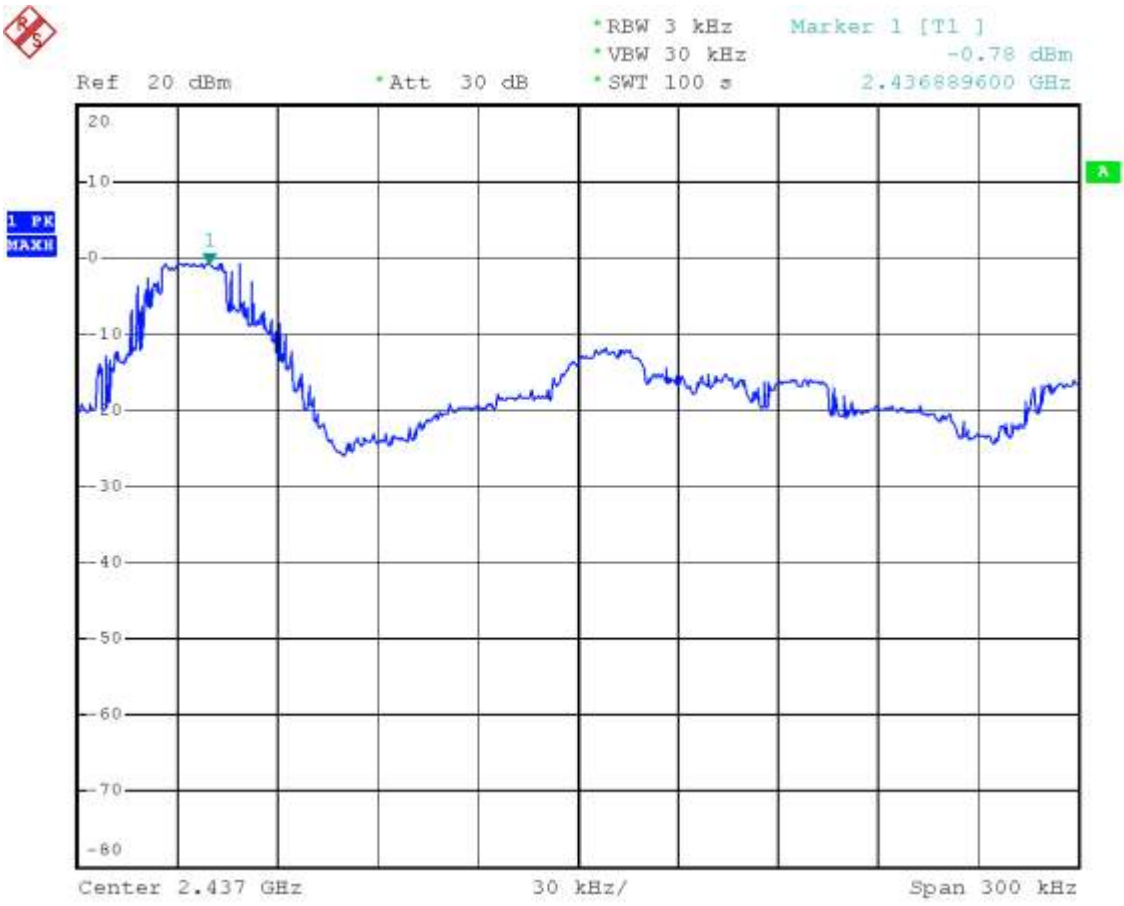
Temperature:	24°C	Humidity:	61%RH
Spectrum Detector:	PK.	Modulation Type:	GFSK
Tested By:	Shunm Wang	Tested Date:	Aug. 07, 2008

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3KHz BW (dBm/3kHz)	MAXIMUM LIMIT (dBm/3kHz)
1	2402	-1.57	8
37	2437	-0.78	8
71	2472	0.28	8

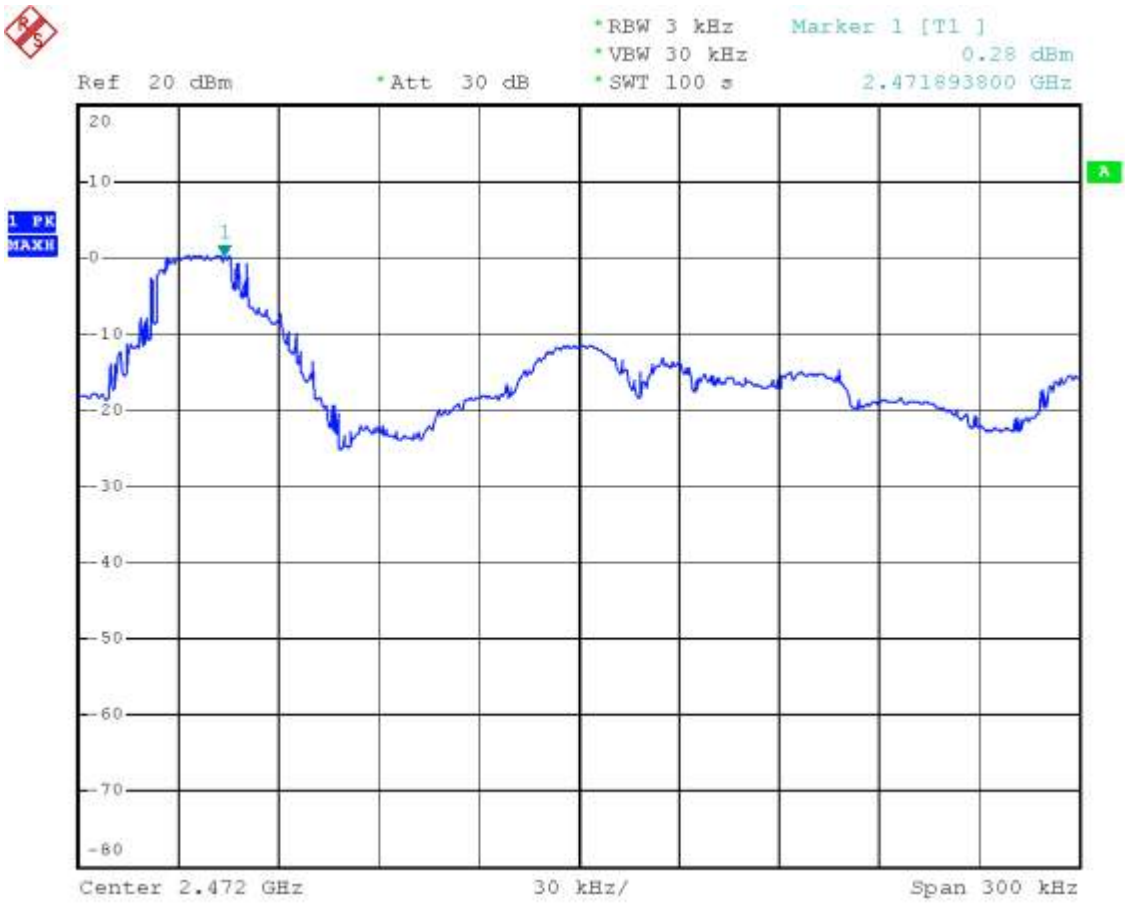
CH 2:



CH 37:


*RBW 3 kHz
*VBW 30 kHz
*SWT 100 s
Marker 1 [T1]
-0.78 dBm
2.436889600 GHz
Ref 20 dBm
*Att 30 dB
1 PK
MAXH
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.437 GHz
30 kHz/
Span 300 kHz

CH 72:


*RBW 3 kHz
*VBW 30 kHz
*SWT 100 s
Marker 1 [T1]
0.28 dBm
2.471893800 GHz
Ref 20 dBm
*Att 30 dB
1 PK MAXH
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.472 GHz
30 kHz/
Span 300 kHz

4.4 FUNDERMENTAL & SPURIOUS RADIATED EMISSION TEST

4.4.1 LIMIT

FCC Part15, Subpart C Section 15.209 limit of radiated emission for frequency below1000MHz. The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Distance (m)	Field Strength (dBμV/m)
30 - 88	3	40.0
88 - 216	3	43.5
216 - 960	3	46.0
ABOVE 960	3	54.0

NOTE : 1. In the emission tables above , the tighter limit applies at the band edges.
2. Distance refers to the distance between measuring instrument , antenna , and the closest point of any part of the device or system.

FCC Part 15, Section15.35(b) limit of radiated emission for frequency above 1000 MHz

Frequency (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	Peak	Average	Peak	Average
Above 1000	80.0	60.0	74.0	54.0

FCC Part 15, Subpart C Section 15.249. The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Filed Strength of Fundamental (dBuV/m) (at 3m)		Field Strength of Harmonics (dBuV/m) (at 3m)	
	Peak	Average	Peak	Average
902-928	114	94	74.0	54.0
2400-2483.5	114	94	74.0	54.0
5725-5875	114	94	74.0	54.0
24000-24250	128	108	88.0	68.0

4.7.2 TEST EQUIPMENT

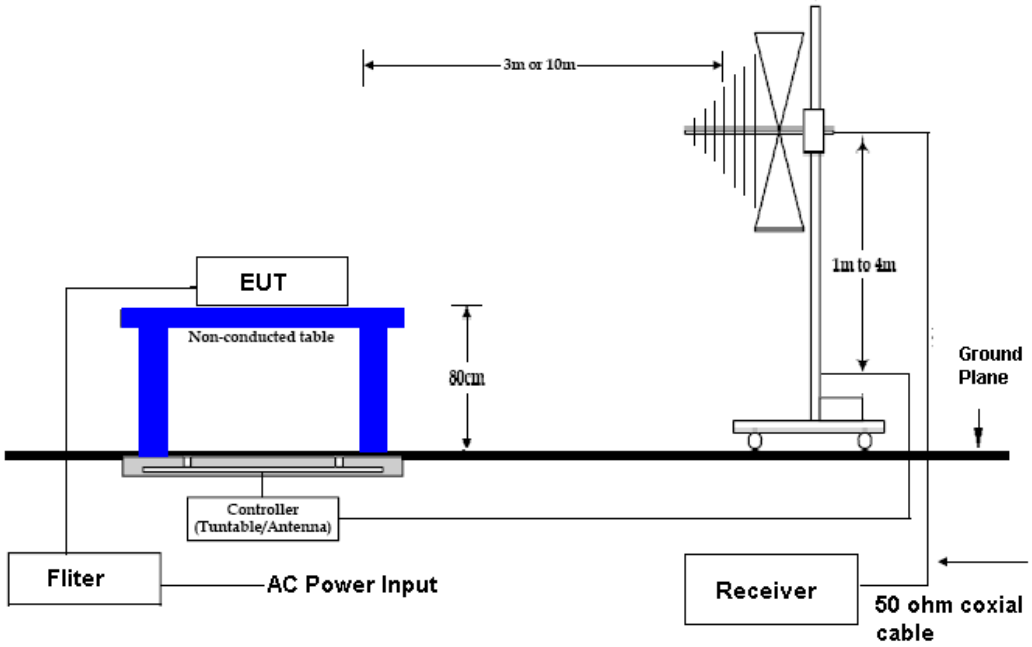
The following test equipment was used during the radiated emission test：

Equipment/ Facilities	Specification	Manufacturer	Model#/ Serial#	Due Date of Cal. & Cal. Center
EMI TEST RECEIVER	9kHz TO 2.75 GHz	ROHDE & SCHWARZ	ESCS30 / 830245/012	OCT. 2008 ETC
BI-LOG ANTENNA	26 MHz TO 2 GHz	EMCO	3142B / 0005-1534	NOV. 2008 ETC
OATS	3 – 10 M MEASUREMENT	SRT	SRT-1	NOV. 2008 SRT
COAXIAL CABLE	25M	TIMES	J400 / #25M	AUG. 2008 ETC
FILTER	2 LINE, 30A	FIL.COIL	FC-943 / 869	NCR
LOOP ANTENNA	9kHz TO 30MHz	ROHDE & SCHWARZ	HFH2-Z2	MAR. 2009

NOTE:

1. The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.
2. The Open Area Test Site (SRT-1) is registered by FCC with No. 90957 and VCCI with No. R-1081.
3. The Open Area Test Site (SRT-2) is registered by FCC with No. 98458 and VCCI with No. R-1168.

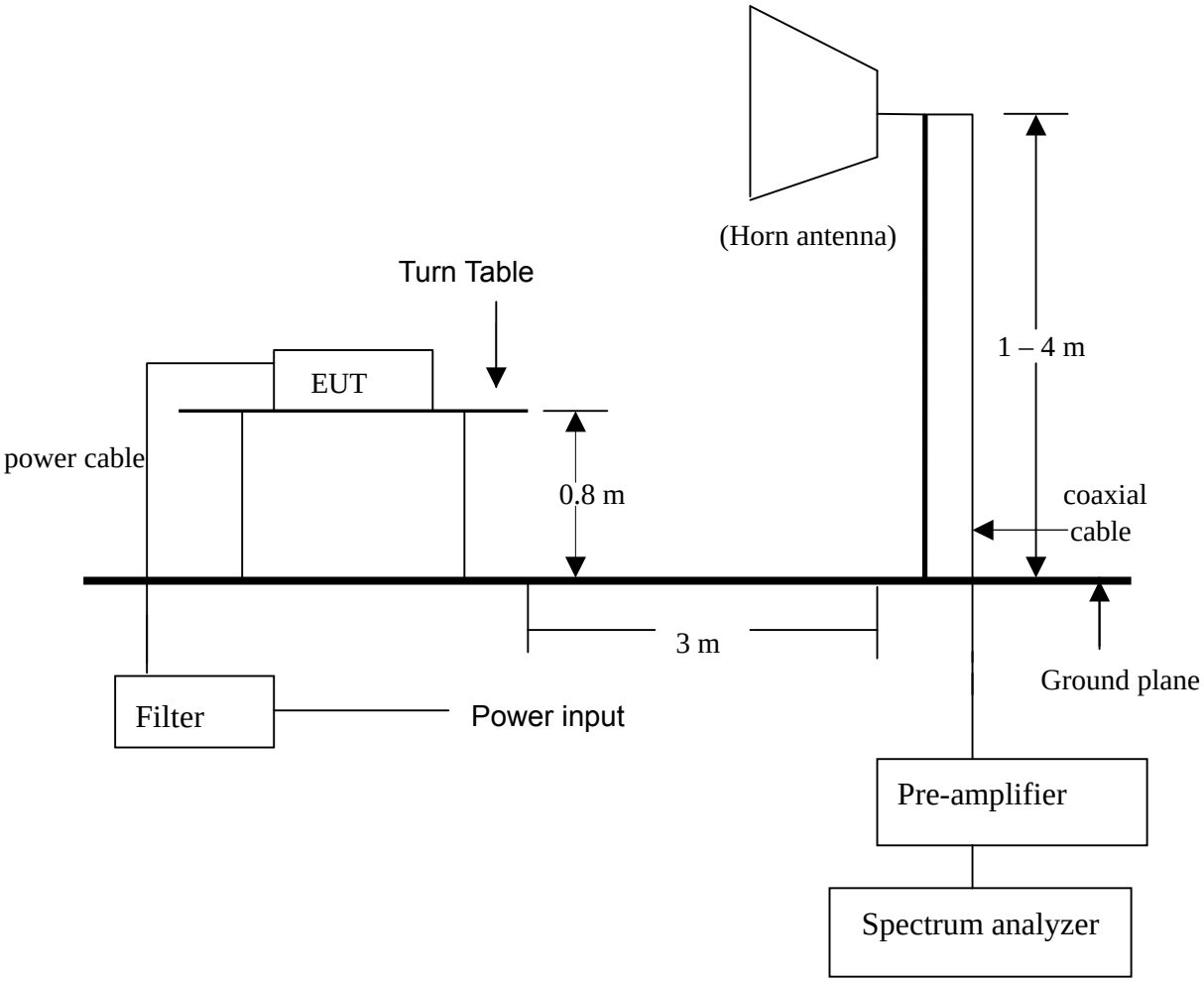
4.7.3 TEST SET-UP



NOTE :

1. The EUT system was put on a wooden table with 0.8m heights above a ground plane.
2. For the actual test configuration, please refer to the photos of testing.

TEST SET- UP (1GHz - 25GHz)



NOTE :

1.The EUT system was put on a wooden table with 0.8m heights above a ground plane.

2.For the actual test configuration, please refer to the photos of testing.

4.7.4 TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4 and CISPR 22. The measurements were made at an open area test site with 10 meter measurement distance under 1 GHz and with 3m distance above 1GHz. The frequency spectrum measured started from 30 MHz. Under 1 GHz. All readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver. Above 1 GHz, the measurements were made at an open area test site with 3 meter measurement distance and all readings were peak and average values with 1 MHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency.

4.7.5 EUT OPERATING CONDITION

Same as section 4.1.5 of this report.

4.7.6 TEST RESULT

Temperature:	31°C	Humidity:	62 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3m
Receiver Detector:	Q.P.	Tested Mode:	Link
Tested By:	Shunm Wang	Tested Date:	Aug. 04, 2008

Antenna Polarization: Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
177.4400	1.64	9.14	21.2	32.0	43.5	-11.5	264	2.41
300.6300	2.34	14.10	19.5	35.9	46.0	-10.1	153	1.85
322.9400	2.76	14.56	16.2	33.5	46.0	-12.5	94	1.73
368.5300	3.23	15.53	16.9	35.7	46.0	-10.3	162	1.69
430.5800	3.02	16.59	17.5	37.1	46.0	-8.9	58	1.42
565.5500	3.69	18.61	15.0	37.3	46.0	-8.7	301	1.31

Antenna Polarization: Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
70.0330	1.16	6.00	18.9	26.1	40.0	-13.9	274	1.40
166.7000	1.91	8.53	22.6	33.0	43.5	-10.5	166	1.25
193.6500	2.05	9.37	25.0	36.4	43.5	-7.1	18	1.33
368.5320	3.23	15.53	18.9	37.7	46.0	-8.3	171	1.28
415.0300	3.07	16.40	16.8	36.3	46.0	-9.7	216	1.15
431.3200	3.01	16.60	17.0	36.6	46.0	-9.4	333	1.00

NOTE :

1. Measurement uncertainty is +/-3.7dB.
2. "*": Measurement does not apply for this frequency.
3. Emissiom Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

Temperature:	31°C	Humidity:	62 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3m
Receiver Detector:	Q.P.	Tested Mode:	Standby
Tested By:	Shunm Wang	Tested Date:	Aug. 04, 2008

Antenna Polarization: Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
35.2510	0.63	11.55	16.8	29.0	40.0	-11.0	151	3
46.5640	0.97	7.22	18.5	26.7	40.0	-13.3	39	2.8
65.8981	1.09	4.95	17.6	23.6	40.0	-16.4	305	2.7
80.2256	1.26	7.60	15.3	24.2	40.0	-15.8	274	2.5
180.5510	1.47	9.30	15.9	26.7	43.5	-16.8	169	2.1
332.9100	2.95	14.77	13.5	31.2	46.0	-14.8	83	2

Antenna Polarization: Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
35.2511	0.63	11.55	17.9	30.1	40.0	-9.9	148	1.3
46.5650	0.97	7.22	19.2	27.4	40.0	-12.6	42	1.2
56.2270	1.00	4.62	18.5	24.1	40.0	-15.9	111	1.4
65.8990	1.09	4.95	18.3	24.3	40.0	-15.7	299	1.1
80.2251	1.26	7.60	16.4	25.3	40.0	-14.7	268	1
133.0500	1.59	10.52	14.1	26.2	43.5	-17.3	101	1.1

NOTE :

1. Measurement uncertainty is +/-3.7dB.
2. "*": Measurement does not apply for this frequency.
3. Emissiom Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

Temperature:	31°C	Humidity:	62 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3m
Receiver Detector:	Q.P.	Tested Mode:	TX_2402MHz
Tested By:	Shunm Wang	Tested Date:	Aug. 04, 2008

Antenna Polarization: Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
30.5600	0.31	13.60	16.9	30.8	40.0	-9.2	155	2.30
48.2070	0.97	6.46	22.1	29.5	40.0	-10.5	271	2.20
175.6010	1.76	9.03	21.8	32.6	43.5	-10.9	85	2.42
316.2260	2.64	14.44	15.2	32.3	46.0	-13.7	106	2.19
366.2300	3.24	15.49	17.1	35.8	46.0	-10.2	27	1.80
383.1500	3.18	15.84	14.9	33.9	46.0	-12.1	253	1.75

Antenna Polarization: Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
48.2081	0.97	6.46	20.9	28.3	40.0	-11.7	170	1.62
188.3050	1.90	9.34	17.6	28.8	43.5	-14.7	133	1.54
196.5160	2.09	9.38	16.5	28.0	43.5	-15.5	202	1.38
206.1350	2.00	9.65	14.1	25.8	43.5	-17.7	101	1.48
246.1190	2.38	11.33	15.3	29.0	46.0	-17.0	156	1.61
432.6150	3.01	16.62	13.9	33.5	46.0	-12.5	55	1.22

NOTE :

1. Measurement uncertainty is +/-3.7dB.
2. "*": Measurement does not apply for this frequency.
3. Emissiom Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

Temperature:	31°C	Humidity:	62 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3m
Receiver Detector:	Q.P.	Tested Mode:	TX_2437MHz
Tested By:	Shunm Wang	Tested Date:	Aug. 04, 2008

Antenna Polarization: Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
30.5620	0.31	13.60	16.8	30.7	40.0	-9.3	159	2.32
48.2079	0.97	6.46	22.0	29.4	40.0	-10.6	268	2.21
175.6014	1.76	9.03	21.7	32.5	43.5	-11.0	86	2.41
316.2261	2.64	14.44	15.3	32.4	46.0	-13.6	103	2.20
366.2370	3.24	15.49	17.2	35.9	46.0	-10.1	29	1.81
383.1530	3.18	15.84	15.0	34.0	46.0	-12.0	251	1.74

Antenna Polarization: Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
48.2085	0.97	6.46	20.8	28.2	40.0	-11.8	173	1.61
188.3054	1.90	9.34	17.7	28.9	43.5	-14.6	130	1.55
196.5162	2.09	9.38	16.4	27.9	43.5	-15.6	204	1.39
206.1359	2.00	9.65	14.2	25.9	43.5	-17.6	105	1.47
246.1198	2.38	11.33	15.2	28.9	46.0	-17.1	151	1.62
432.6157	3.01	16.62	13.8	33.4	46.0	-12.6	59	1.21

NOTE :

1. Measurement uncertainty is +/-3.7dB.
2. "*": Measurement does not apply for this frequency.
3. Emissiom Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

Temperature:	31°C	Humidity:	62 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3m
Receiver Detector:	Q.P.	Tested Mode:	TX_2472MHz
Tested By:	Shunm Wang	Tested Date:	Aug. 04, 2008

Antenna Polarization: Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
30.5624	0.31	13.60	17.0	30.9	40.0	-9.1	158	2.29
48.2078	0.97	6.46	22.2	29.6	40.0	-10.4	275	2.22
175.6017	1.76	9.03	21.7	32.5	43.5	-11.0	83	2.43
316.2237	2.64	14.44	15.3	32.4	46.0	-13.6	102	2.18
366.2382	3.24	15.49	17.2	35.9	46.0	-10.1	31	1.83
383.1593	3.18	15.84	14.8	33.8	46.0	-12.2	255	1.74

Antenna Polarization: Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
48.2042	0.97	6.46	21.0	28.4	40.0	-11.6	166	1.60
188.3085	1.90	9.34	17.8	29.0	43.5	-14.5	136	1.52
196.5116	2.09	9.38	16.6	28.1	43.5	-15.4	199	1.39
206.1344	2.00	9.65	14.0	25.7	43.5	-17.8	105	1.47
246.1125	2.38	11.33	15.4	29.1	46.0	-16.9	161	1.60
432.6138	3.01	16.62	14.1	33.7	46.0	-12.3	50	1.23

NOTE :

1. Measurement uncertainty is +/-3.7dB.
2. "*": Measurement does not apply for this frequency.
3. Emissiom Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

Temperature:	31 °C	Humidity:	62 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3m
Receiver Detector:	PK. or AV.	Tested Mode:	TX-2402MHz
Tested By:	Shunm Wang	Tested Date:	Aug. 04, 2008

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2402.06	-32.16	28.54	94.5	90.2	90.9	86.6	114.0	94.0	-23.1	-7.4	251	1.51
4804.13	-30.47	33.64	52.3	45.0	55.5	48.2	74.0	54.0	-18.5	-5.8	266	1.27
7206.18	-28.90	36.26	37.8	*	45.2	*	74.0	54.0	-28.8	*	47	1.33
1001.36	-35.01	24.20	44.9	*	34.1	*	74.0	54.0	-39.9	*	103	1.46
1085.53	-34.68	24.39	50.1	41.2	39.8	30.9	74.0	54.0	-34.2	-23.1	351	1.20
1201.31	-33.88	24.64	48.8	*	39.6	*	74.0	54.0	-34.4	*	110	1.15

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2402.06	-32.16	28.00	96.1	91.5	91.9	87.3	114.0	91.0	-22.1	-3.7	255	1.61
4804.13	-30.47	33.64	53.5	43.9	56.7	47.1	74.0	54.0	-17.3	-6.9	260	1.35
7206.18	-28.90	36.26	40.1	*	47.5	*	74.0	54.0	-26.5	*	137	1.19
1001.35	-35.01	24.20	48.8	*	38.0	*	74.0	54.0	-36.0	*	204	1.38
1205.27	-33.86	24.65	51.6	43.5	42.4	34.3	74.0	54.0	-31.6	-19.7	211	1.27
1276.15	-33.73	24.81	45.9	37.8	37.0	28.9	74.0	54.0	-37.0	-25.1	158	1.00

NOTE :

1. Measurement uncertainty is +/-3.7dB.
2. "*": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emissiom Level = Reading Value + Ant. Factor + Correct Factor (incl.:Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F):The field stregth of fundamental frequency.

Temperature:	31 °C	Humidity:	62 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3m
Receiver Detector:	PK. or AV.	Tested Mode:	TX-2437MHz
Tested By:	Shunm Wang	Tested Date:	Aug. 04, 2008

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2441.05	-32.23	28.62	93.3	91.5	89.7	87.9	114.0	94.0	-24.3	-6.1	104	1.91
4882.10	-30.26	33.71	53.2	45.0	56.6	48.4	74.0	54.0	-17.4	-5.6	150	1.81
7323.15	-29.04	36.36	48.4	39.8	55.7	47.1	74.0	54.0	-18.3	-6.9	36	1.78
1328.45	-33.23	24.92	45.3	40.2	37.0	31.9	74.0	54.0	-37.0	-22.1	253	1.52
1823.51	-33.05	26.53	56.6	46.4	50.1	39.9	74.0	54.0	-23.9	-14.1	243	1.32
1910.22	-32.61	26.86	55.8	45.2	50.0	39.4	74.0	54.0	-24.0	-14.6	14	1.27

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2441.05	-32.23	28.08	95.8	93.9	91.7	89.8	114.0	94.0	-22.3	-4.2	100	1.87
4882.10	-30.26	33.71	54.2	44.7	57.6	48.1	74.0	54.0	-16.4	-5.9	313	1.64
7323.15	-29.04	36.36	46.1	39.9	53.4	47.2	74.0	54.0	-20.6	-6.8	154	1.58
1333.15	-33.13	24.93	48.4	39.6	40.2	31.4	74.0	54.0	-33.8	-22.6	26	1.72
1460.56	-29.94	25.21	47.8	*	43.1	*	74.0	54.0	-30.9	*	253	1.50
1823.56	-33.05	26.53	52.6	42.3	46.1	35.8	74.0	54.0	-27.9	-18.2	45	1.31

NOTE :

1. Measurement uncertainty is +/-3.7dB.
2. "*": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emissiom Level = Reading Value + Ant. Factor + Correct Factor (incl.:Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F):The field stregth of fundamental frequency.

Temperature:	31 °C	Humidity:	62 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3m
Receiver Detector:	PK. or AV.	Tested Mode:	TX-2472MHz
Tested By:	Shunm Wang	Tested Date:	Aug. 04, 2008

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2472.01	-32.20	28.71	95.2	91.2	91.7	87.7	114.0	94.0	-22.3	-6.3	258	1.50
4944.02	-30.25	33.76	53.1	45.9	56.6	49.4	74.0	54.0	-17.4	-4.6	261	1.26
7416.03	-28.94	36.43	40.0	*	47.5	*	74.0	54.0	-26.5	*	51	1.32
1001.36	-35.01	24.20	44.7	*	33.9	*	74.0	54.0	-40.1	*	109	1.45
1085.53	-34.68	24.39	50.1	41.1	39.8	30.8	74.0	54.0	-34.2	-23.2	349	1.21
1201.31	-33.88	24.64	48.8	*	39.6	*	74.0	54.0	-34.4	*	107	1.14

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2472.01	-32.20	28.14	96.8	92.9	92.7	88.8	114.0	94.0	-21.3	-5.2	259	1.62
4944.02	-30.25	33.76	54.1	44.5	57.6	48.0	74.0	54.0	-16.4	-6.0	266	1.34
7416.03	-28.94	36.43	41.0	*	48.5	*	74.0	54.0	-25.5	*	131	1.20
1001.35	-35.01	24.20	48.8	*	38.0	*	74.0	54.0	-36.0	*	208	1.37
1205.27	-33.86	24.65	51.4	43.7	42.2	34.5	74.0	54.0	-31.8	-19.5	208	1.26
1276.15	-33.73	24.81	45.7	37.8	36.8	28.9	74.0	54.0	-37.2	-25.1	161	1.00

NOTE :

1. Measurement uncertainty is +/-2dB.
2. "*": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emissiom Level = Reading Value + Ant. Factor + Correct Factor (incl.:Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F):The field stregth of fundamental frequency.

5. CONDUCTED EMISSION TEST FOR POWER PORT

5.1 LIMIT

Frequency (MHz)	Class A (dBμV)		Class B (dBμV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE :

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 TEST EQUIPMENT

The following test equipment was used for the test:

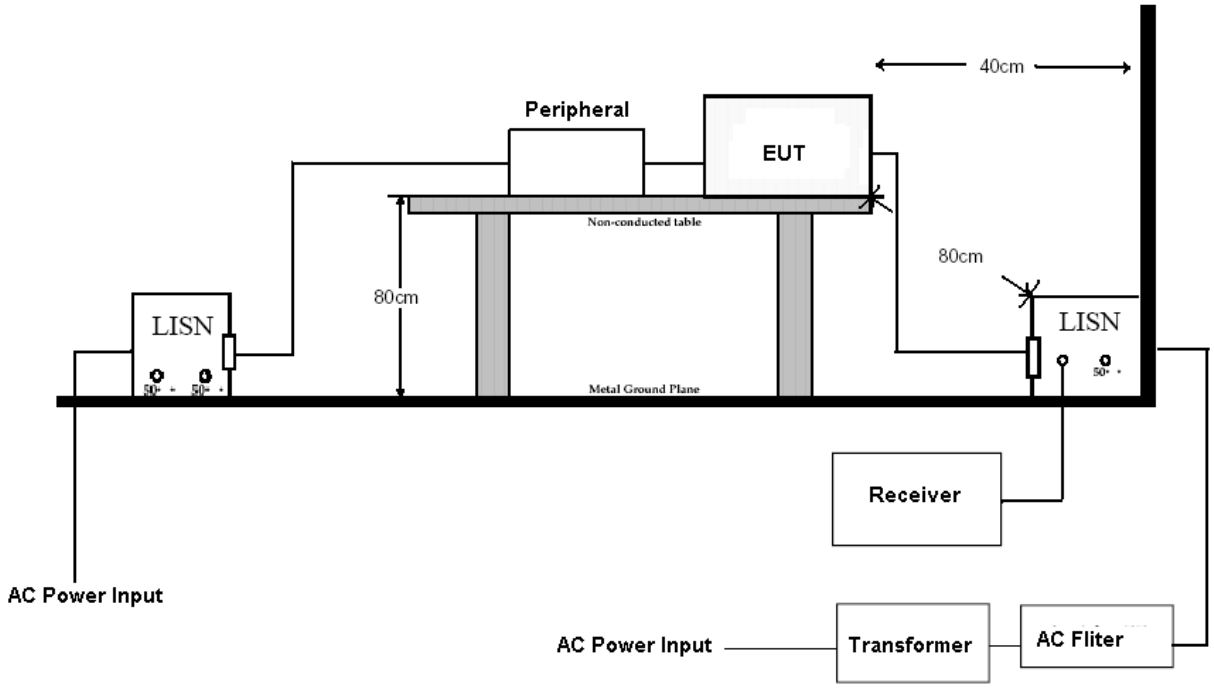
EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER	9 kHz TO 30 MHz	ROHDE & SCHWARZ	ESHS30 / 826003/008	SEP. 2008 ETC
LISN	50 μH, 50 ohm	FCC	FCC-LISN-50-25-2 / 01017	OCT. 2008 ETC
LISN	50μH, 50 ohm	FCC	9252-50-R24-BNC / 951315	JUN. 2009 ETC
50 OHM TERMINATOR	50 ohm	HP	11593A / #2	OCT. 2008 ETC
COAXIAL CABLE	5M	TIMES	EQM-0159 / #5-5m	AUG. 2008 SRT
FILTER	2 LINE, 30A	FIL.COIL	FC-943 / 771	NCR
GROUND PLANE	2.3M (H) x 2.4M (W)	SRT	N/A	NCR
GROUND PLANE	2.4M (H) x 2.4M (W)	SRT	N/A	NCR

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

5.3 TEST PROCEDURE

According to FCC Part15, Subpart C

5.4 TEST SETUP



NOTE:

1. The EUT was put on a wooden table with 0.8m heights above ground plane, and 0.4m away from reference ground plane (> 2mx2m).
2. For the actual test configuration, please refer to the photos of testing.
3. The serial no. of the LISN connected to EUT is 01017.
4. The serial no. of the LISN connected to support units is 01018.

5.5 TEST RESULT

Temperature:	20 °C	Humidity:	52 %RH
Frequency Range:	0.15 – 30 MHz	Tested Mode:	Link
Receiver Detector:	Q.P. and AV.	Modulation Type:	N/A
Tested By:	Shunm Wang	Tested Channel:	N/A
		Tested Date:	Aug. 01, 2008

Power Line Measured : Line

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBμV)		Emission Level (dBμV)		Limit (dBμV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.312	0.27	30.84	22.83	31.11	23.10	59.90	49.90	-28.79	-26.80
0.342	0.27	30.18	21.53	30.45	21.80	59.14	49.14	-28.69	-27.34
0.663	0.22	17.04	3.85	17.26	4.07	56.00	46.00	-38.74	-41.93
10.968	0.23	27.32	21.80	27.55	22.03	60.00	50.00	-32.45	-27.97
11.202	0.23	27.90	22.20	28.13	22.43	60.00	50.00	-31.87	-27.57
28.346	0.46	27.92	23.03	28.38	23.49	60.00	50.00	-31.62	-26.51

Power Line Measured : Neutral

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBμV)		Emission Level (dBμV)		Limit (dBμV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.330	0.27	39.26	16.81	39.53	17.08	59.44	49.44	-19.91	-32.36
0.339	0.27	37.42	26.78	37.69	27.05	59.21	49.21	-21.52	-22.16
0.663	0.22	23.26	6.54	23.48	6.76	56.00	46.00	-32.52	-39.24
11.252	0.23	26.84	21.52	27.07	21.75	60.00	50.00	-32.93	-28.25
11.516	0.24	27.12	21.60	27.36	21.84	60.00	50.00	-32.64	-28.16
27.823	0.31	28.64	24.18	28.95	24.49	60.00	50.00	-31.05	-25.51

NOTE :

1. Measurement uncertainty is +/-2dB
2. Emission level = Reading valus + Correction factor
3. Correction Factor = Cable loss + Insertion loss of LISN
4. Margin value = Emission level - Limit
5. The emission of other frequencies was very low against the limit.
6. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

Temperature:	20 °C	Humidity:	52 %RH
Frequency Range:	0.15 – 30 MHz	Tested Mode:	Standby
Receiver Detector:	Q.P. and AV.	Modulation Type:	N/A
Tested By:	Shunm Wang	Tested Channel:	N/A
		Tested Date:	Aug. 01, 2008

Power Line Measured : Line

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBμV)		Emission Level (dBμV)		Limit (dBμV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.324	0.27	28.58	8.53	28.85	8.80	59.59	49.59	-30.74	-40.79
0.327	0.27	29.88	9.86	30.15	10.13	59.51	49.51	-29.36	-39.38
0.658	0.22	15.72	5.32	15.94	5.54	56.00	46.00	-40.06	-40.46
11.080	0.23	28.16	22.85	28.39	23.08	60.00	50.00	-31.61	-26.92
12.064	0.24	26.84	21.29	27.08	21.53	60.00	50.00	-32.92	-28.47
27.761	0.45	27.62	19.94	28.07	20.39	60.00	50.00	-31.93	-29.61

Power Line Measured : Neutral

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dBμV)		Emission Level (dBμV)		Limit (dBμV)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.324	0.27	37.00	15.29	37.27	15.56	59.59	49.59	-22.32	-34.03
0.327	0.27	38.44	16.36	38.71	16.63	59.51	49.51	-20.80	-32.88
0.653	0.22	27.32	18.66	27.54	18.88	56.00	46.00	-28.46	-27.12
11.323	0.24	27.74	22.52	27.98	22.76	60.00	50.00	-32.02	-27.24
11.219	0.23	27.10	22.14	27.33	22.37	60.00	50.00	-32.67	-27.63
27.505	0.31	21.82	16.43	22.13	16.74	60.00	50.00	-37.88	-33.27

NOTE :

1. Measurement uncertainty is +/-2dB
2. Emission level = Reading valus + Correction factor
3. Correction Factor = Cable loss + Insertion loss of LISN
4. Margin value = Emission level - Limit
5. The emission of other frequencies was very low against the limit.
6. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

6. Antenna application

6.1 Antenna requirement

The EUT's antenna is met the requirement of FCC part15C section15.203 and 15.204.

6.2 Result

The EUT's antenna used a Reverse SAM Antenna. The antenna's gain is 2 dBi and meets the requirement.

7. TERMS OF ABBREVIATION

AV.	Average detection
AZ(°)	Turn table azimuth
Correct.	Correction
EL(m)	Antenna height (meter)
EUT	Equipment Under Test
Horiz.	Horizontal direction
LISN	Line Impedance Stabilization Network
NSA	Normalized Site Attenuation
Q.P.	Quasi-peak detection
SRT Lab	Spectrum Research & Testing Laboratory, Inc.
Vert.	Vertical direction