



Spectrum Research  
& Testing Lab., Inc.  
No.167, Ln. 780, Shan-Tong Rd.  
Ling 8, Shan-Tong Li, Chung-Li  
City, Taoyuan County 320,  
Taiwan (R.O.C.)

# TEST REPORT

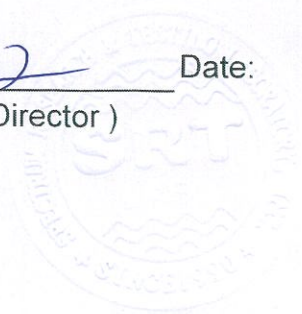
Reference No.: A12111001  
Report No.: FCCA12111001  
FCC ID: FSUGMZKB  
Page: 1 of 42  
Date: Nov 20, 2012

Product Name: Touch Mouse 6000  
Model No.: GM-120017/T  
Applicant: KYE Systems Corp. (Genius)  
No. 492, Sec. 5, Chongxin Rd., Sanchong Dist.,  
New Taipei City, 24160, Taiwan (R.O.C.)  
Date of Receipt: Nov. 10, 2012  
Finished date of Test: Nov. 20, 2012  
Applicable Standards: 47 CFR Part 15, Subpart B  
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.

Tested By: Paul Huang Date: 11/20/2012  
(Paul Huang)

Approved By: Johnson Ho Date: 11/20/2012  
(Johnson Ho, Director)





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Reference No.: A12111001  
Report No.: FCCA12111001  
FCC ID: FSUGMZKB  
Page: 2 of 42  
Date: Nov 20, 2012

## Revisions History

Report No.	Issue Date	Revisions
FCCA12111001	Nov. 20, 2012	Initial issue



## Table of Contents

1: DOCUMENT POLICY AND TEST STATEMENT .....	4
1.1: DOCUMENT POLICY .....	4
1.2: TEST STATEMENT .....	4
1.3: EUT MODIFICATION.....	4
2: DESCRIPTION OF EUT AND TEST MODE .....	5
2.1: GENERAL DESCRIPTION OF EUT .....	5
2.2: DESCRIPTION OF EUT INTERNAL DEVICES.....	5
2.3: TEST MODES .....	6
2.4: CHANNEL AND FREQUENCY TABLE .....	6
2.5: SUPPORT UNITS.....	7
2.6: EUT OPERATING CONDITION.....	7
3: DESCRIPTION OF APPLIED STANDARDS.....	8
3.1: SUMMARY OF TEST RESULTS .....	8
4: TECHNICAL CHARACTERISTICS TEST.....	9
4.1: RADIATED EMISSION TEST .....	9
4.1.1: LIMITS .....	9
4.1.2: TEST EQUIPMENT.....	10
4.1.3: TEST SET-UP .....	11
4.1.4: TEST PROCEDURE .....	12
4.1.5: TEST RESULTS: 9 K – 30 MHZ.....	13
4.1.6: TEST RESULTS: 30 -1000 MHZ.....	16
4.1.7: TEST RESULTS: 1 - 25 GHZ.....	21
4.2: BAND EDGE TEST .....	29
4.2.1: LIMIT.....	29
4.2.2: TEST EQUIPMENT.....	30
4.2.3: TEST SET-UP .....	31
4.2.4: TEST PROCEDURE .....	32
4.2.5: EUT OPERATING CONDITION.....	32
4.2.6: TEST RESULTS: RADIATED.....	33
5: ANTENNA APPLICATION.....	35
5.1: ANTENNA REQUIREMENT .....	35
5.2: RESULT.....	35
6: PHOTOS OF TESTING .....	36



## 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.

### 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.

Power source from AA battery x2 (in parallel).

### 1.3: EUT MODIFICATION

No modification in SRT Lab.

 <b>Spectrum Research &amp; Testing Lab., Inc.</b> No.167, Ln. 780, Shan-Tong Rd. Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)	<h1>TEST REPORT</h1>	Reference No.: A12111001 Report No.: FCCA12111001 FCC ID: FSUGMZKB Page: 5 of 42 Date: Nov 20, 2012
---	----------------------	---

## 2: DESCRIPTION OF EUT AND TEST MODE

### 2.1: GENERAL DESCRIPTION OF EUT

PRODUCT	Touch Mouse 6000
MODEL NO.	GM-120017/T
POWER SUPPLY	DC 1.6 V, 50 mAh from AA battery x2 (in parallel)
CABLE	N/A
FREQUENCY BAND	2.400GHz ~ 2.4835 GHz
CARRIER FREQUENCY	2.402GHz ~ 2.479 GHz
NUMBER OF CHANNEL	8
RATED RF OUTPUT POWER	85.25 dBuV ( -21.74 dBm, 0.0066993 mW)
MODULATION TYPE	
MODE OF OPERATION	Duplex
ANTENNA TYPE	Printed PCB Antenna
ANTENNA GAIN	-0.22 dBi
OPERATING TEMPERATURE RANGE	-20 ~ 50 °C

**NOTE:**

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

### 2.2: DESCRIPTION OF EUT INTERNAL DEVICES

DEVICE	BRAND /MAKER	MODEL #	FCC ID / DOC	REMARK
USB Dongle	Genius	GM-090028/R	FSUGMZJD	N/A

### 2.3: TEST MODES

Total of 8 channels are provided; low, medium and high channels were chosen for test. Test modes shown below:

TEST MODE	CHANNEL	FREQUENCY (MHZ)
1	Ch 1 (TX)	2402
2	Ch 5 (TX)	2443
3	Ch 8 (TX)	2479
4	Standby	N/A
5	Link (RX + TX)	N/A

**NOTE :** The axis X, Y and Z we evaluate in chamber, the X axis is worst case.

X axis



Y axis



Z axis



### 2.4: CHANNEL AND FREQUENCY TABLE

CHANNEL	FREQUENCY
CH01	2402
CH02	2414
CH03	2426
CH04	2435
CH05	2443
CH06	2450
CH07	2462
CH08	2479

## 2.5: SUPPORT UNITS

The EUT was configured by the requirement of ANSI C63.4:2003. 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 Computer	Acer	Acer power M8	DoC	1.8 m unshielded power cord
2	Keyboard	Dell	SK-8110	DoC	1.2 m unshielded data cable
3	Mouse	Logitech	M-SBM96B	DoC	1.2 m unshielded data cable
4	Monitor	Samsung	PG17IS	DoC	1.8 m unshielded power cord 1.5 m shielded data cable
5	Printer	Epson	Stylus C20SX	N/A	1.5 m unshielded power cord 1.2 m shielded data cable
6	Modem	Aceex	DM-1414	DoC	1.5 m unshielded power cord 1.2 m shielded data cable

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

## 2.6: EUT OPERATING CONDITION

1. Setup the EUT and all peripheral devices.
2. Turn on the power of all equipments and EUT.
3. Set the EUT under continuous transmission condition, standby or linked to the USB dongle for testing.
4. Set the EUT to the highest available power level.

### 3: DESCRIPTION OF APPLIED STANDARDS

The EUT is a wireless product. According to the specifications provided by the applicant, it must comply with the requirements of the following standards:

47 CFR Part 15, Subpart C

47 CFR Part 15, Subpart B

ANSI C63.4: 2003

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

#### 3.1: SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

STANDARD SECTION	TEST TYPE AND LIMIT RESULTS	RESULTS
15.33(a) 15.249	Transmitter Radiated Emissions Limit: Section 4.1.1	PASS
15.203	Antenna requirement Limit: max. 6dBi	PASS
15.247(d)	Band Edge Measurement (for reference only): Limit: 20dB less than the peak value of fundamental frequency	PASS



## 4: TECHNICAL CHARACTERISTICS TEST

### 4.1: RADIATED EMISSION TEST

#### 4.1.1: LIMITS

FCC Part15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000MHz. The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Distance (m)	Field Strength	
0.009 - 0.490	300	2400/F(KHz)	uV/m
0.490 - 1.705	30	24000/F(KHz)	
1.705 – 30	30	30	
30 – 88	3	40.0	dBuV/m
88 – 216	3	43.5	
216 – 960	3	46.0	
Above 960	3	54.0	

**Note :**

- Distance extrapolation factor =  $40 \cdot \log(\text{specific distance} / \text{test distance (dB)})$
- $30 \text{ uV/m (at 30m)} = 20 \cdot \log(30\text{uV}) + 40 \cdot \log(30\text{m}/3\text{m}) = 70 \text{ dBuV/m (at 3m)}$ .
- Transmitters that require Crystal Controlled Oscillators with values below 30 MHz requires the Test Report to show "Spurious Radiated Emissions" results below 30 MHz per FCC Part 15.33(a).

FCC Part15, Subpart C Section 15.249, limit of intentional radiators (average):

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928	50	500
2400 - 2483.5	50	500
5725 - 5875	50	500
24000 - 24250	250	2500

**NOTE :**

- In the emission tables above , the tighter limit applies at the band edges.
- $50 \text{ mV/m} = 94 \text{ dBuV/m}$
- $500 \text{ uV/m} = 54 \text{ dBuV/m}$

FCC Part 15, Section15.35(b) limit of radiated emission for frequency above 1000 MHz. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit.

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

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#### 4.1.2: 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
EMI TEST RECEIVER	20 MHz ~ 1000 MHz	ROHDE & SCHWARZ	ESVS30 / 841977/003	DEC. 2012 ETC
BI-LOG ANTENNA	30 MHz ~ 2 GHz	SCHAFFNER	CBL6141A / 4181	JUN. 2013 ETC
OPEN AREA TEST SITE	3 – 10 M MEASUREMENT	SRT	A02 / SRT002	APR. 2013 SRT
COAXIAL CABLE	30 M	TIMES	LMR-400 / #30M (L1TCAB014)	MAY. 2013 ETC
FILTER	2 LINE, 30 A	FIL.COIL	FC-943 / 869	NCR
CDN	0.15 MHz ~ 300 MHz	LUTHI	CDN L-801 M2/M3 / 2790	MAY. 2013 ETC
SPECTRUM ANALYZER	9 kHz ~ 40GHz	ROHDE & SCHWARZ	FSP40 / 100093	DEC. 2012 ETC
PRE-AMPLIFIER	1 GHz ~ 26.5 GHz	AGILENT	8449B/ 3008A01995	JAN. 2013 ETC
HORN ANTENNA	1 GHz ~ 18 GHz	EMC TEST	3115/ 6881	JAN. 2013 ETC
HORN ANTENNA	18 GHz ~ 40 GHz	EMCO	3116 / 00032255	JAN. 2013 ETC
CABLE	UP TO 18 GHz	JYE BAO	G1.5m / 001	JAN. 2013 ETC
CABLE	UP TO 18 GHz	JYE BAO	G3.5m / 002	JAN. 2013 ETC
K-TYPE CABLE	UP TO 40 GHz	HUBER+SUHNER	SF 102-40/2*11/ 23934/2	OCT. 2013 ETC
ANECHOIC CHAMBER	3 M MEASUREMENT	SRT	A01 / SRT001	MAY. 2013 SRT
FILTER	2 LINE, 30 A	FIL.COIL	FC-943/ 869	NCR

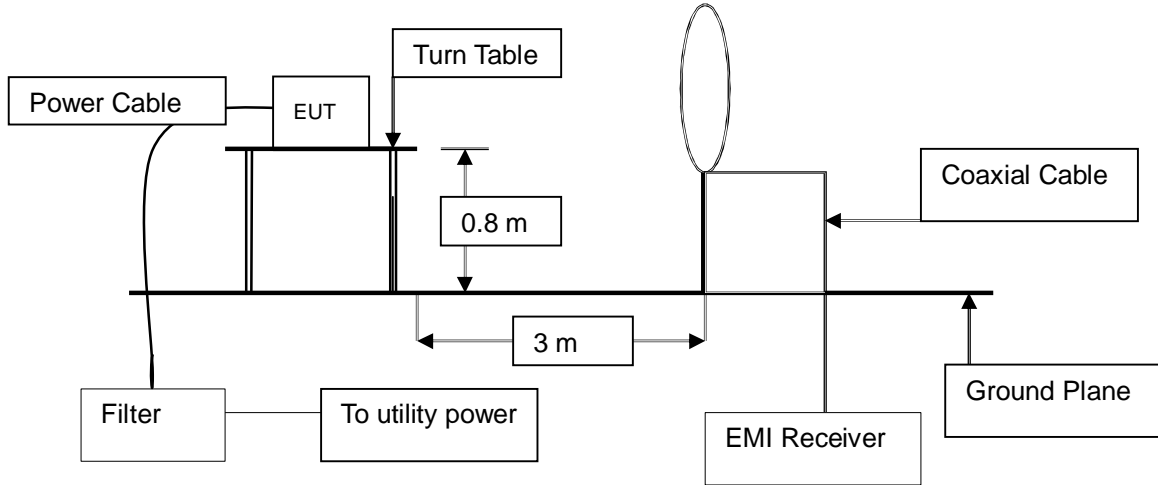
**NOTE:**

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

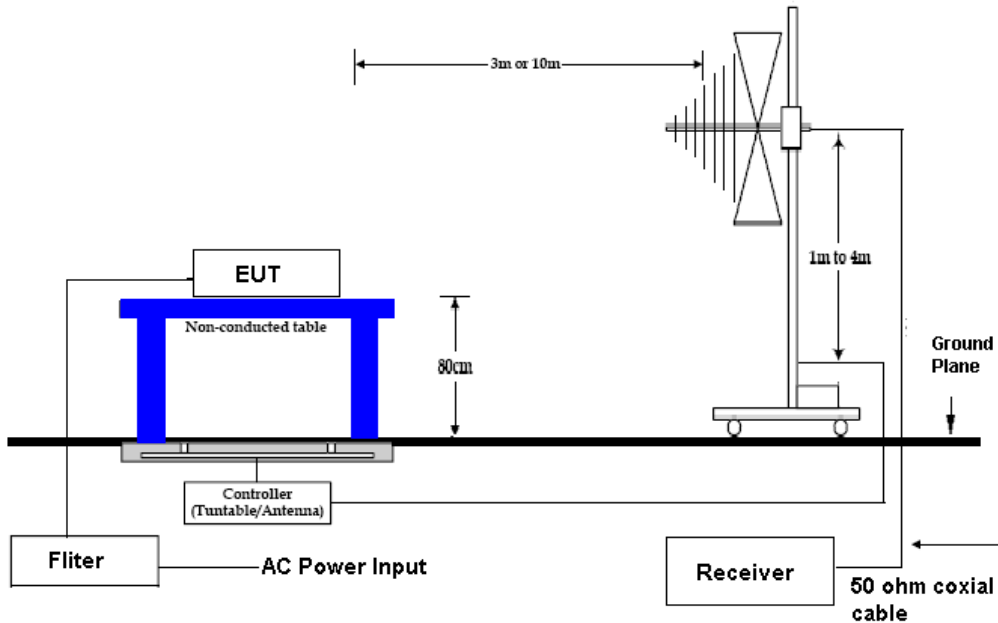


### 4.1.3: TEST SET-UP

9 kHz – 30 MHz



30 MHz - 1000 MHz:

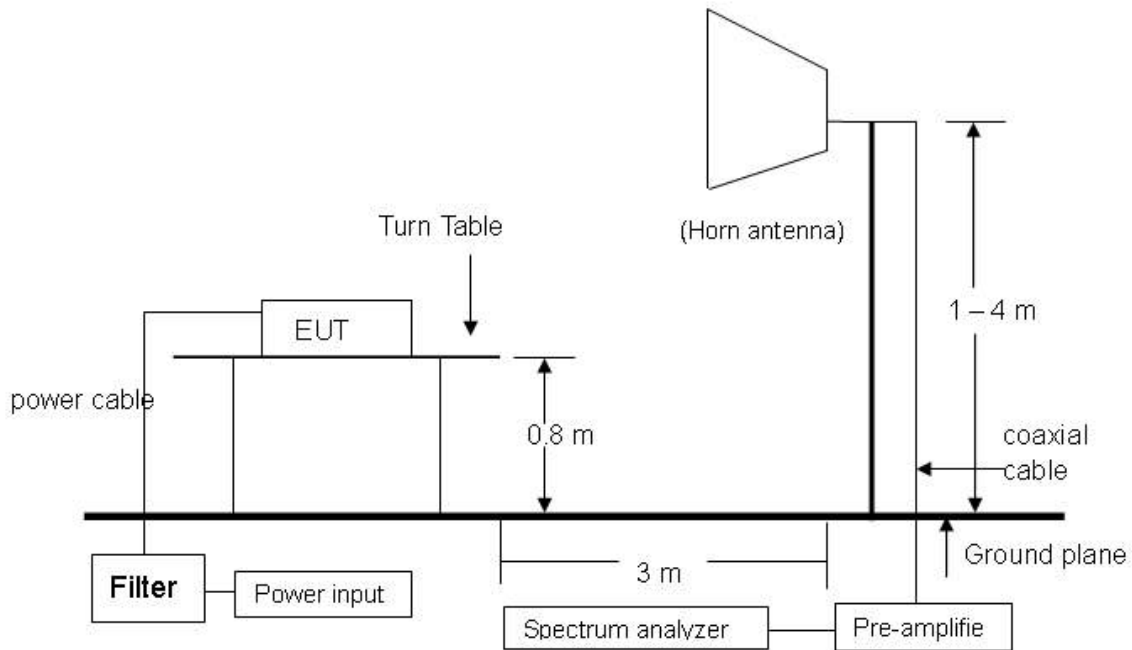


**NOTE :**

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



1 GHz – 25 GHz:



**NOTE :**

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

#### 4.1.4: TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4:2003 and CISPR 22:2008. The measurements were made at an open area test site with 3 meters measurement distance. The frequency spectrum measured started from 9 kHz. 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 or average values with 1 MHz resolution bandwidth of the test receiver. The EUT system was operated in typical methods by users. The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency. First, note the margin of 6 highest frequencies, then manually find the maximum data. This procedure can be referred from the SRT LAB test procedures.

#### 4.1.5: TEST RESULTS: 9 k – 30 MHz

Temperature:	24 °C	Humidity:	62 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	1 (Ch1)
Tested By:	Paul Huang	Tested Date:	Nov. 19, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2.35	0.28	20.20	9.87	30.35	70	-39.20
5.09	0.41	20.30	9.53	30.24	70	-39.30
9.97	0.56	20.50	10.22	31.27	70	-38.27
18.33	0.73	20.91	8.31	29.95	70	-39.59
23.96	0.82	21.20	7.66	29.68	70	-39.86
28.84	0.89	21.44	9.04	31.38	70	-38.17

Temperature:	24 °C	Humidity:	62 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	2 (Ch5)
Tested By:	Paul Huang	Tested Date:	Nov. 19, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2.86	0.30	20.20	11.23	31.73	70	-37.81
7.45	0.48	20.40	11.13	32.01	70	-37.53
12.46	0.61	20.62	10.14	31.38	70	-38.16
14.74	0.66	20.74	11.44	32.84	70	-36.71
19.17	0.74	20.95	9.59	31.29	70	-38.25
24.01	0.82	21.20	9.46	31.49	70	-38.05

**NOTE :**

The emission limits for the bands other than 9-90 kHz and 110-490 kHz are based on measurements employing a quasi-peak detector.



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# TEST REPORT

Reference No.: A12111001  
Report No.: FCCA12111001  
FCC ID: FSUGMZKB  
Page: 14 of 42  
Date: Nov 20, 2012

Temperature:	24 °C	Humidity:	62 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	3 (Ch8)
Tested By:	Paul Huang	Tested Date:	Nov. 19, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5.03	0.41	20.30	11.18	31.89	70	-37.65
13.88	0.65	20.69	10.21	31.54	70	-38.00
15.24	0.67	20.76	10.28	31.71	70	-37.83
18.71	0.74	20.93	9.29	30.96	70	-38.58
28.24	0.89	21.41	9.83	32.13	70	-37.41
28.75	0.89	21.44	10.05	32.38	70	-37.16

Temperature:	24 °C	Humidity:	62 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	4 (Standby)
Tested By:	Paul Huang	Tested Date:	Nov. 19, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3.90	0.36	20.24	10.87	31.47	70	-38.07
4.89	0.40	20.29	11.45	32.15	70	-37.39
8.76	0.52	20.45	10.95	31.92	70	-37.62
11.88	0.60	20.59	10.07	31.27	70	-38.28
17.54	0.72	20.87	9.43	31.02	70	-38.52
27.09	0.87	21.35	10.61	32.83	70	-36.71

**NOTE :**

The emission limits for the bands other than 9-90 kHz and 110-490 kHz are based on measurements employing a quasi-peak detector.



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# TEST REPORT

Reference No.: A12111001  
Report No.: FCCA12111001  
FCC ID: FSUGMZKB  
Page: 15 of 42  
Date: Nov 20, 2012

Temperature:	24 °C	Humidity:	62 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	5 (Link)
Tested By:	Paul Huang	Tested Date:	Nov. 19, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dB $\mu$ V)	Emission Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
7.54	0.49	20.40	10.85	31.74	70	-37.80
9.83	0.55	20.49	10.83	31.88	70	-37.67
19.66	0.75	20.98	10.57	32.30	70	-37.24
25.69	0.85	21.28	9.67	31.81	70	-37.73
27.04	0.87	21.35	10.24	32.45	70	-37.09
28.23	0.89	21.41	8.47	30.77	70	-38.78



## 4.1.6: TEST RESULTS: 30 -1000 MHz

Temperature:	26 °C	Humidity:	60 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	1 (CH1)
Tested By:	Paul Huang	Tested Date:	Nov. 14, 2012

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)
57.21	1.19	11.61	3.90	16.70	40.0	-23.30	319	3.60
154.17	1.86	12.10	3.79	17.75	43.5	-25.75	20	3.57
168.47	1.95	11.16	4.16	17.27	43.5	-26.23	58	3.18
222.65	2.26	13.08	4.63	19.97	46.0	-26.03	234	3.05
500.40	3.71	18.00	3.18	24.89	46.0	-21.11	288	2.73
572.08	4.03	18.88	3.21	26.13	46.0	-19.87	54	2.49

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)
47.85	1.10	15.67	3.51	20.28	40.0	-19.72	209	1.05
67.15	1.28	8.54	10.91	20.73	40.0	-19.27	248	1.42
84.84	1.40	8.20	8.42	18.02	40.0	-21.98	324	1.52
154.17	1.86	12.10	8.20	22.16	43.5	-21.34	158	1.89
163.70	1.92	11.56	7.33	20.81	43.5	-22.69	350	2.00
641.01	4.32	19.99	3.12	27.43	46.0	-18.57	268	2.29

### NOTE :

1. Measurement uncertainty is ±4.73dB.
2. "": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.





Temperature:	26 °C	Humidity:	60 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	2 (CH5)
Tested By:	Paul Huang	Tested Date:	Nov. 14, 2012

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)
46.80	1.09	16.16	3.58	20.83	40.0	-19.17	86	3.60
57.39	1.19	11.61	3.69	16.49	40.0	-23.51	214	3.59
154.19	1.86	12.10	5.61	19.57	43.5	-23.93	307	3.09
162.40	1.91	11.64	5.28	18.83	43.5	-24.67	95	3.01
579.40	4.06	19.04	3.77	26.87	46.0	-19.13	151	2.69
663.42	4.41	20.18	3.19	27.78	46.0	-18.22	254	2.48

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)
46.80	1.09	16.16	4.01	21.26	40.0	-18.74	216	1.06
67.27	1.28	8.54	10.61	20.43	40.0	-19.57	313	1.38
85.63	1.41	8.25	8.26	17.92	40.0	-22.08	135	1.52
154.19	1.86	12.10	9.77	23.73	43.5	-19.77	23	1.84
196.57	2.11	11.20	4.02	17.33	43.5	-26.17	318	2.00
530.41	3.86	18.24	3.78	25.88	46.0	-20.12	40	2.32

**NOTE :**

1. Measurement uncertainty is ±4.73dB.
2. "": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



Temperature:	26 °C	Humidity:	60 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	3 (CH8)
Tested By:	Paul Huang	Tested Date:	Nov. 14, 2012

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)
57.25	1.19	11.61	4.38	17.18	40.0	-22.82	31	3.58
85.41	1.41	8.25	4.10	13.76	40.0	-26.24	192	3.56
155.54	1.87	12.05	5.23	19.15	43.5	-24.35	38	3.15
169.01	1.95	11.08	4.98	18.01	43.5	-25.49	267	3.03
223.07	2.27	13.02	5.61	20.90	46.0	-25.10	63	2.69
563.18	4.00	18.69	3.53	26.22	46.0	-19.78	261	2.44

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)
48.13	1.11	15.18	3.87	20.16	40.0	-19.84	75	1.06
66.95	1.27	8.82	10.51	20.60	40.0	-19.40	1	1.41
85.41	1.41	8.25	8.82	18.48	40.0	-21.52	218	1.49
155.54	1.87	12.05	10.66	24.58	43.5	-18.92	353	1.85
490.78	3.66	17.80	3.57	25.03	46.0	-20.97	352	1.94
605.67	4.15	19.56	3.19	26.90	46.0	-19.10	158	2.24

**NOTE :**

1. Measurement uncertainty is ±4.73dB.
2. "": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



Temperature:	26 °C	Humidity:	60 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	4 (Standby)
Tested By:	Paul Huang	Tested Date:	Nov. 14, 2012

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)
46.75	1.09	16.16	3.37	20.62	40.0	-19.38	21	3.57
57.98	1.19	11.61	4.65	17.45	40.0	-22.55	231	3.56
154.73	1.86	12.10	4.84	18.80	43.5	-24.70	143	3.08
169.60	1.95	11.08	5.17	18.20	43.5	-25.30	102	3.06
542.23	3.92	18.34	3.55	25.81	46.0	-20.19	59	2.70
617.92	4.21	19.70	3.18	27.09	46.0	-18.91	81	2.46

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)
46.75	1.09	16.16	3.15	20.40	40.0	-19.60	332	1.05
66.64	1.27	8.82	10.15	20.24	40.0	-19.76	56	1.36
85.88	1.41	8.25	7.75	17.41	40.0	-22.59	126	1.45
161.43	1.91	11.72	10.33	23.96	43.5	-19.54	140	1.84
493.67	3.68	17.86	3.17	24.71	46.0	-21.29	299	1.92
670.30	4.44	20.22	3.09	27.75	46.0	-18.25	203	2.26

**NOTE :**

1. Measurement uncertainty is ±4.73dB.
2. "": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



Temperature:	26 °C	Humidity:	60 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	5 (Link)
Tested By:	Paul Huang	Tested Date:	Nov. 14, 2012

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)
576.26	4.05	18.97	6.22	29.24	46.0	-16.76	321	3.59
588.46	4.09	19.24	10.55	33.88	46.0	-12.12	187	3.56
744.75	4.75	21.37	4.42	30.54	46.0	-15.46	347	3.08
838.74	5.13	22.61	5.92	33.67	46.0	-12.33	91	3.04
880.14	5.27	22.84	3.24	31.35	46.0	-14.65	263	2.69
986.64	5.65	24.14	8.89	38.69	54.0	-15.31	230	2.44

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)
67.03	1.28	8.54	10.16	19.98	40.0	-20.02	48	1.03
475.48	3.59	17.50	4.58	25.67	46.0	-20.33	239	1.43
668.12	4.43	20.21	3.88	28.52	46.0	-17.48	295	1.51
767.37	4.85	21.57	4.35	30.77	46.0	-15.23	84	1.86
856.02	5.20	22.89	3.31	31.40	46.0	-14.60	192	1.92
924.05	5.43	23.38	3.57	32.37	46.0	-13.63	296	2.31

**NOTE :**

1. Measurement uncertainty is ±4.73dB.
2. "": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



## 4.1.7: TEST RESULTS: 1 - 25 GHz

Temperature:	25 °C	Humidity:	57 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	1 (CH1)
Tested By:	Paul Huang	Tested Channel:	2402 MHz
Tested Date:	Nov. 14, 2012	Modulation Type:	GFSK

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1999.50	-31.63	27.30	45.40	37.20	41.06	32.86	74.00	54.00	-32.94	-21.14	311	2.33
2900.71	-30.76	29.76	44.62	36.16	43.62	35.17	74.00	54.00	-30.38	-18.83	203	1.98
3199.85	-30.32	30.50	45.88	37.13	46.06	37.31	74.00	54.00	-27.94	-16.69	140	1.70
3764.08	-29.52	31.84	45.49	37.46	47.81	39.78	74.00	54.00	-26.19	-14.22	316	1.44
4185.94	-29.09	32.54	42.76	34.43	46.21	37.88	74.00	54.00	-27.79	-16.12	138	1.32
5325.44	-27.34	33.90	40.78	32.03	47.34	38.58	74.00	54.00	-26.66	-15.42	255	1.25

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2499.15	-31.03	28.40	45.32	37.21	42.69	34.57	74.00	54.00	-31.31	-19.43	18	1.13
3029.94	-30.64	30.16	45.15	36.51	44.67	36.03	74.00	54.00	-29.33	-17.97	325	1.41
3670.37	-29.60	31.58	45.07	36.54	47.04	38.52	74.00	54.00	-26.96	-15.48	223	1.87
4419.97	-28.81	32.58	42.23	33.86	46.00	37.63	74.00	54.00	-28.00	-16.37	11	1.98
5229.86	-27.63	33.84	39.81	31.54	46.02	37.74	74.00	54.00	-27.98	-16.26	105	2.18
5495.35	-26.83	34.00	39.78	30.91	46.95	38.08	74.00	54.00	-27.05	-15.92	79	2.35

### NOTE :

1. Measurement uncertainty is  $\pm 4.73$ dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission 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 strength of fundamental frequency.



# TEST REPORT

Temperature:	25 °C	Humidity:	57 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	1 (CH1 Fundamental)
Tested By:	Paul Huang	Tested Channel:	2402 MHz
Tested Date:	Nov. 14, 2012	Modulation Type:	GFSK

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2402.00	-31.15	28.18	81.35	73.04	78.39	70.07	114.00	94.00	-35.61	-23.93	253	2.39
4804.00	-28.48	33.27	40.60	32.54	45.39	37.34	74.00	54.00	-28.61	-16.66	196	2.00
7206.00	-27.05	35.74	39.49	30.91	48.17	39.60	74.00	54.00	-25.83	-14.40	278	1.70
9608.00	-25.66	37.79	39.69	31.41	51.81	43.54	74.00	54.00	-22.19	-10.46	299	1.50
12010.00	-23.89	39.19	40.78	32.48	56.08	47.78	74.00	54.00	-17.92	-6.22	292	1.31
14412.00	-21.16	42.03	33.47	24.54	54.34	45.41	74.00	54.00	-19.66	-8.59	254	1.25

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2402.00	-31.15	28.18	76.13	68.01	73.17	65.04	114.00	94.00	-40.83	-28.96	25	1.18
4804.00	-28.48	33.27	40.22	32.05	45.01	36.84	74.00	54.00	-28.99	-17.16	22	1.48
7206.00	-27.05	35.74	40.51	32.48	49.19	41.16	74.00	54.00	-24.81	-12.84	338	1.90
9608.00	-25.66	37.79	40.67	32.59	52.79	44.71	74.00	54.00	-21.21	-9.29	249	1.99
12010.00	-23.89	39.19	40.20	32.04	55.50	47.34	74.00	54.00	-18.50	-6.66	77	2.22
14412.00	-21.16	42.03	32.49	24.36	53.36	45.24	74.00	54.00	-20.64	-8.76	162	2.37

**NOTE :**

1. Measurement uncertainty is  $\pm 4.73$ dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission 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 strength of fundamental frequency.



Temperature:	25 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	2 (CH05)
Tested By:	Paul Huang	Tested Channel:	2443 MHz
Tested Date:	Nov. 14, 2012	Modulation Type:	GFSK

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
3050.25	-30.60	30.20	45.60	37.58	45.20	37.19	74.00	54.00	-28.80	-16.81	315	2.38
3269.54	-30.19	30.64	46.03	37.24	46.48	37.69	74.00	54.00	-27.52	-16.31	254	2.02
3755.70	-29.53	31.81	44.61	35.95	46.90	38.24	74.00	54.00	-27.10	-15.76	294	1.76
4189.67	-29.08	32.54	42.71	34.10	46.17	37.56	74.00	54.00	-27.83	-16.44	214	1.52
5274.03	-27.49	33.86	40.70	32.13	47.07	38.50	74.00	54.00	-26.93	-15.50	359	1.36
5694.55	-27.23	34.04	38.06	29.24	44.87	36.05	74.00	54.00	-29.13	-17.95	167	1.26

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2000.39	-31.63	27.30	43.47	34.89	39.14	30.56	74.00	54.00	-34.86	-23.44	188	1.15
3004.03	-30.68	30.11	45.44	36.56	44.87	35.98	74.00	54.00	-29.13	-18.02	94	1.48
3239.87	-30.25	30.58	44.60	36.55	44.93	36.88	74.00	54.00	-29.07	-17.12	312	1.88
3715.88	-29.56	31.70	44.53	36.26	46.67	38.40	74.00	54.00	-27.33	-15.60	306	2.07
4170.05	-29.10	32.53	43.08	34.57	46.51	38.01	74.00	54.00	-27.49	-15.99	326	2.18
5274.45	-27.49	33.86	40.03	31.94	46.40	38.31	74.00	54.00	-27.60	-15.69	139	2.38

**NOTE :**

1. Measurement uncertainty is  $\pm 4.73$ dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission 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 strength of fundamental frequency.



Temperature:	25 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	2 (CH5 Fundamental)
Tested By:	Paul Huang	Tested Channel:	2443 MHz
Tested Date:	Nov. 14, 2012	Modulation Type:	GFSK

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m).
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2443.00	-31.10	28.27	62.08	53.10	59.26	50.27	114.00	94.00	-54.74	-43.73	222	2.30
4886.00	-28.41	33.45	40.62	32.38	45.66	37.42	74.00	54.00	-28.34	-16.58	179	2.05
7329.00	-26.97	36.06	38.36	29.59	47.44	38.67	74.00	54.00	-26.56	-15.33	25	1.72
9772.00	-25.41	37.92	40.10	31.36	52.61	43.87	74.00	54.00	-21.39	-10.13	215	1.47
12215.00	-23.35	39.07	39.18	30.72	54.90	46.44	74.00	54.00	-19.10	-7.56	74	1.34
14658.00	-21.28	41.44	30.36	21.27	50.52	41.43	74.00	54.00	-23.48	-12.57	232	1.29

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2443.00	-31.10	28.27	59.48	51.00	56.66	48.17	114.00	94.00	-57.34	-45.83	20	1.19
4886.00	-28.41	33.45	38.98	30.66	44.02	35.70	74.00	54.00	-29.98	-18.30	93	1.43
7329.00	-26.97	36.06	39.69	30.83	48.77	39.91	74.00	54.00	-25.23	-14.09	210	1.94
9772.00	-25.41	37.92	40.53	31.78	53.04	44.29	74.00	54.00	-20.96	-9.71	30	2.07
12215.00	-23.35	39.07	39.90	31.34	55.62	47.07	74.00	54.00	-18.38	-6.93	146	2.21
14658.00	-21.28	41.44	31.07	22.60	51.23	42.76	74.00	54.00	-22.77	-11.24	154	2.34

**NOTE :**

1. Measurement uncertainty is  $\pm 4.73$  dB.
2. \*\*: The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission 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 strength of fundamental frequency.





Temperature:	25 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	3 (CH8)
Tested By:	Paul Huang	Tested Channel:	2479 MHz
Tested Date:	Nov. 14, 2012	Modulation Type:	GFSK

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2944.46	-30.73	29.91	45.41	37.31	44.59	36.49	74.00	54.00	-29.41	-17.51	211	2.33
3224.01	-30.27	30.55	44.94	36.24	45.21	36.52	74.00	54.00	-28.79	-17.48	206	2.05
3960.40	-29.34	32.39	44.11	36.10	47.16	39.15	74.00	54.00	-26.84	-14.85	261	1.77
4530.06	-28.70	32.67	42.83	34.38	46.80	38.35	74.00	54.00	-27.20	-15.65	184	1.53
5360.92	-27.23	33.92	40.66	32.30	47.34	38.99	74.00	54.00	-26.66	-15.01	236	1.30
5649.60	-27.13	34.03	38.78	30.14	45.67	37.04	74.00	54.00	-28.33	-16.96	13	1.25

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2904.07	-30.76	29.77	46.50	37.70	45.52	36.72	74.00	54.00	-28.48	-17.28	325	1.14
3194.04	-30.33	30.49	45.13	36.17	45.29	36.33	74.00	54.00	-28.71	-17.67	152	1.49
3724.45	-29.55	31.73	44.26	35.32	46.43	37.49	74.00	54.00	-27.57	-16.51	171	1.90
4155.15	-29.12	32.53	42.52	33.98	45.93	37.40	74.00	54.00	-28.07	-16.60	64	2.05
4475.82	-28.75	32.60	43.06	34.30	46.91	38.15	74.00	54.00	-27.09	-15.85	52	2.19
5224.49	-27.64	33.83	41.48	32.94	47.67	39.13	74.00	54.00	-26.33	-14.87	295	2.41

**NOTE :**

1. Measurement uncertainty is  $\pm 4.73$  dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission 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 strength of fundamental frequency.



Temperature:	25 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	3 (CH8 Fundamental)
Tested By:	Paul Huang	Tested Channel:	2479 MHz
Tested Date:	Nov. 14, 2012	Modulation Type:	GFSK

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2479.00	-31.06	28.35	85.25	76.72	82.55	74.02	114.00	94.00	-31.45	-19.98	75	2.36
4958.00	-28.35	33.61	38.38	30.13	43.63	35.38	74.00	54.00	-30.37	-18.62	310	1.99
7437.00	-26.90	36.34	39.85	31.78	49.28	41.21	74.00	54.00	-24.72	-12.79	160	1.72
9916.00	-25.19	38.03	39.67	31.04	52.51	43.88	74.00	54.00	-21.49	-10.12	55	1.53
12395.00	-22.87	38.96	39.43	30.85	55.52	46.94	74.00	54.00	-18.48	-7.06	270	1.35
14874.00	-21.45	40.53	33.18	23.89	52.26	42.97	74.00	54.00	-21.74	-11.03	186	1.26

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2479.00	-31.06	28.35	84.48	76.13	81.78	73.43	114.00	94.00	-32.22	-20.57	132	1.20
4958.00	-28.35	33.61	40.03	31.84	45.28	37.09	74.00	54.00	-28.72	-16.91	51	1.41
7437.00	-26.90	36.34	41.18	32.27	50.61	41.70	74.00	54.00	-23.39	-12.30	102	1.89
9916.00	-25.19	38.03	42.29	33.71	55.13	46.55	74.00	54.00	-18.87	-7.45	351	2.01
12395.00	-22.87	38.96	40.50	32.01	56.59	48.10	74.00	54.00	-17.41	-5.90	313	2.21
14874.00	-21.45	40.53	32.77	23.59	51.85	42.67	74.00	54.00	-22.15	-11.33	259	2.34

**NOTE :**

1. Measurement uncertainty is  $\pm 4.73$  dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission 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 strength of fundamental frequency.



Temperature:	25 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	4 (Standby)
Tested By:	Paul Huang	Tested Channel:	N/A
Tested Date:	Nov. 14, 2012	Modulation Type:	GFSK

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
3019.34	-30.65	30.14	45.37	36.98	44.85	36.46	74.00	54.00	-29.15	-17.54	105	2.39
3930.50	-29.36	32.30	44.14	35.85	47.08	38.79	74.00	54.00	-26.92	-15.21	182	2.02
4360.39	-28.88	32.57	42.33	33.82	46.02	37.50	74.00	54.00	-27.98	-16.50	159	1.72
4710.30	-28.55	33.06	41.26	32.82	45.77	37.33	74.00	54.00	-28.23	-16.67	162	1.44
5310.53	-27.38	33.89	40.99	32.65	47.49	39.15	74.00	54.00	-26.51	-14.85	312	1.35
5880.96	-27.64	34.08	38.63	29.91	45.07	36.35	74.00	54.00	-28.93	-17.65	86	1.21

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
3160.03	-30.39	30.42	45.43	37.09	45.46	37.12	74.00	54.00	-28.54	-16.88	243	1.13
3680.09	-29.59	31.60	45.98	37.36	47.99	39.37	74.00	54.00	-26.01	-14.63	310	1.40
3809.39	-29.48	31.97	44.98	36.95	47.47	39.44	74.00	54.00	-26.53	-14.56	37	1.95
4409.12	-28.83	32.58	42.98	34.21	46.74	37.96	74.00	54.00	-27.26	-16.04	296	1.98
5310.53	-27.38	33.89	41.58	33.08	48.08	39.58	74.00	54.00	-25.92	-14.42	120	2.20
5680.58	-27.20	34.04	38.57	30.30	45.40	37.13	74.00	54.00	-28.60	-16.87	252	2.36

**NOTE :**

1. Measurement uncertainty is  $\pm 4.73$  dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission 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 strength of fundamental frequency.



Temperature:	25 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	5 (Link)
Tested By:	Paul Huang	Tested Channel:	All
Tested Date:	Nov. 14, 2012	Modulation Type:	GFSK

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1500.42	-32.39	25.30	53.76	45.44	46.67	38.35	74.00	54.00	-27.33	-15.65	268	2.30
3960.10	-29.34	32.39	44.53	36.25	47.58	39.31	74.00	54.00	-26.42	-14.69	229	2.04
4190.35	-29.08	32.54	42.80	34.57	46.26	38.02	74.00	54.00	-27.74	-15.98	32	1.75
4569.23	-28.66	32.75	41.90	33.18	45.99	37.27	74.00	54.00	-28.01	-16.73	281	1.51
5210.87	-27.69	33.83	40.60	32.37	46.74	38.51	74.00	54.00	-27.26	-15.49	274	1.32
5530.82	-26.88	34.01	39.57	30.59	46.70	37.72	74.00	54.00	-27.30	-16.28	201	1.21

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB $\mu$ V)		Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1029.25	-34.07	24.73	55.50	46.61	46.17	37.28	74.00	54.00	-27.83	-16.72	251	1.12
1799.97	-31.94	26.50	52.08	43.63	46.64	38.19	74.00	54.00	-27.36	-15.81	62	1.47
3769.32	-29.51	31.85	44.61	35.63	46.95	37.98	74.00	54.00	-27.05	-16.02	17	1.88
4410.89	-28.82	32.58	42.94	34.25	46.70	38.01	74.00	54.00	-27.30	-15.99	174	2.01
4999.61	-28.32	33.70	41.25	32.96	46.63	38.34	74.00	54.00	-27.37	-15.66	58	2.23
5520.44	-26.85	34.00	39.82	31.15	46.97	38.30	74.00	54.00	-27.03	-15.70	343	2.40

**NOTE :**

1. Measurement uncertainty is  $\pm 4.73$  dB.
2. "": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission 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 strength of fundamental frequency.



## 4.2: BAND EDGE TEST

### 4.2.1: LIMIT

This test is for reference only.

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 Ratio 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

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## 4.2.2: TEST EQUIPMENT

The following test equipment was used during the test:

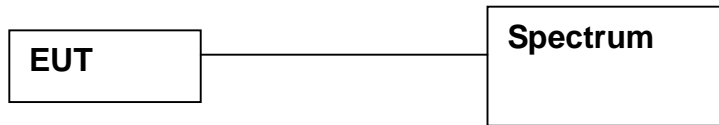
EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE of CAL. & CAL. CENTER
SPECTRUM ANALYZER	9kHz-40GHz	ROHDE & SCHWARZ	FSP40/ 100093	DEC. 2012 ETC
EMI TEST RECEIVER	9kHz-6GHz	ROHDE & SCHWARZ	ESL/ 100176	APR. 2013 ETC
HORN ANTENNA	1 GHz - 18 GHz	EMCO	3115/ 9602-4681	JAN. 2013 ETC
PRE- AMPLIFIER	1 GHz - 26.5 GHz	HP	8449B/ 3008A01995	JAN. 2013 ETC
ANECHOIC CHAMBER	3 M MEASUREMENT	SRT	A01 / SRT001	MAY. 2013 SRT
K-TYPE CABLE	1 m	HUBER SUHNER	SF 102-40/2*11/ 23934/2	OCT. 2013 ETC
RF CABLE	1.5M	JYEBAO	A30A30-L 142 / EQF-0035	JAN. 2013 ETC
RF CABLE	3.5M	JYEBAO	A30A30-L 142 (G3.5M)/ EQF-0036(002)	JAN. 2013 ETC
FILTER	2 LINE, 30 A	FIL.COIL	FC-943/ 869	NCR

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



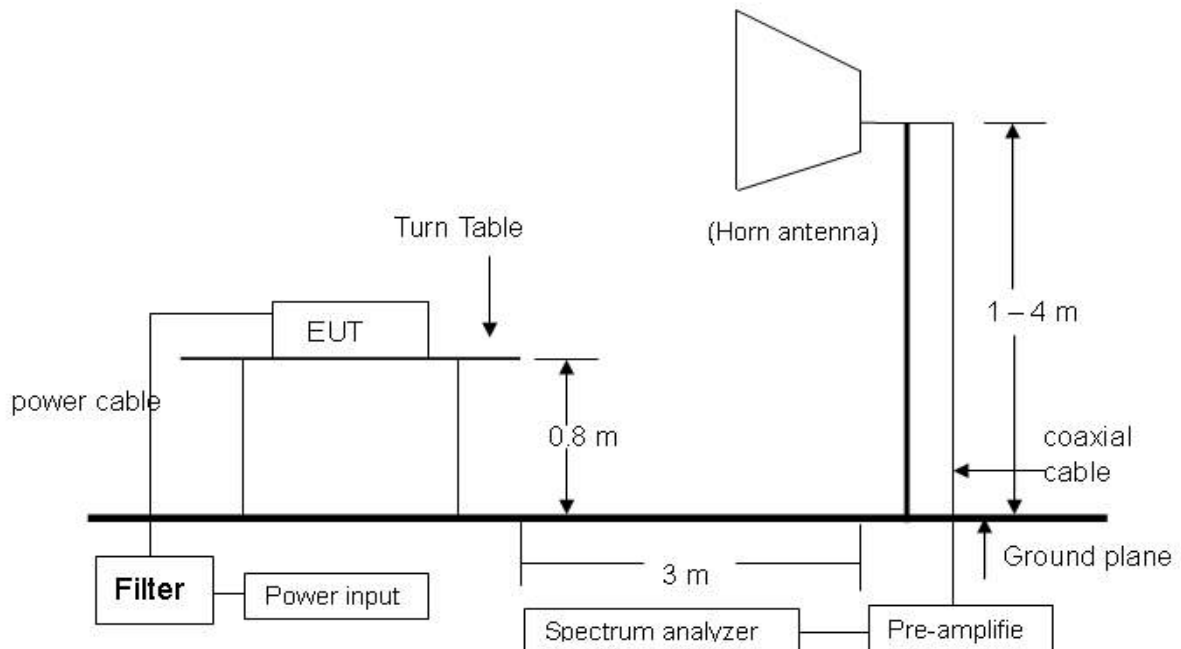
### 4.2.3: TEST SET-UP

For RF Conducted test (dBc)



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

FOR Radiated emission test



**NOTE:**

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



#### **4.2.4: TEST PROCEDURE**

1. The EUT was operating in continuous transmission 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 3 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.

#### **4.2.5: EUT OPERATING CONDITION**

1. Set the EUT under continuous transmission condition.
2. The EUT was set to the highest available power level.

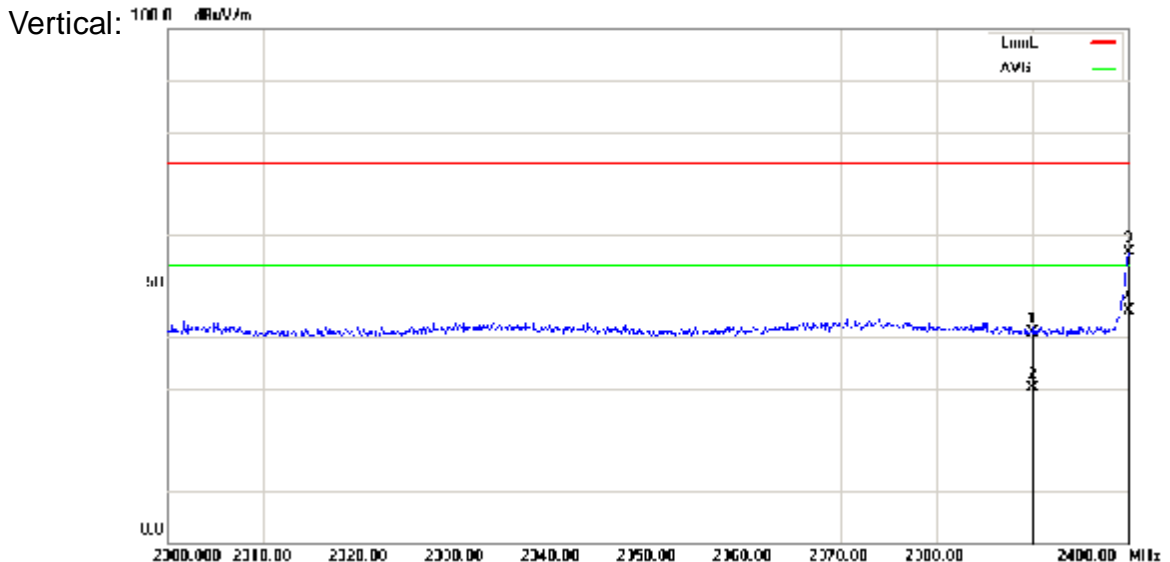
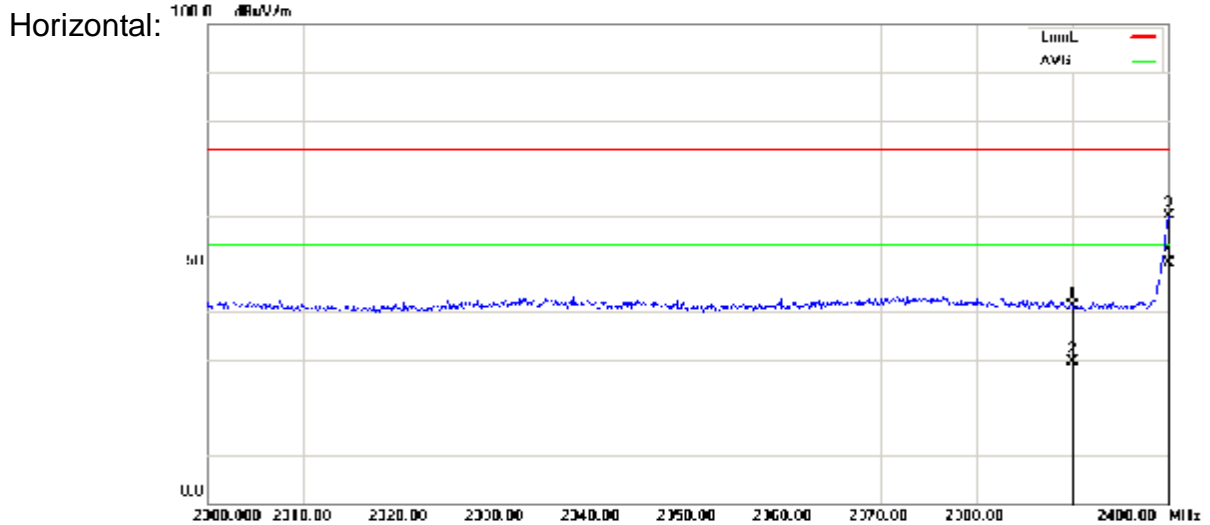




## 4.2.6: TEST RESULTS: RADIATED

Temperature:	25 °C	Humidity:	57 %RH
Spectrum Detector:	PK. or AV.	Tested Mode:	N/A
Tested By:	Paul Huang	Modulation Type:	
Tested Date:	Nov. 13, 2012		

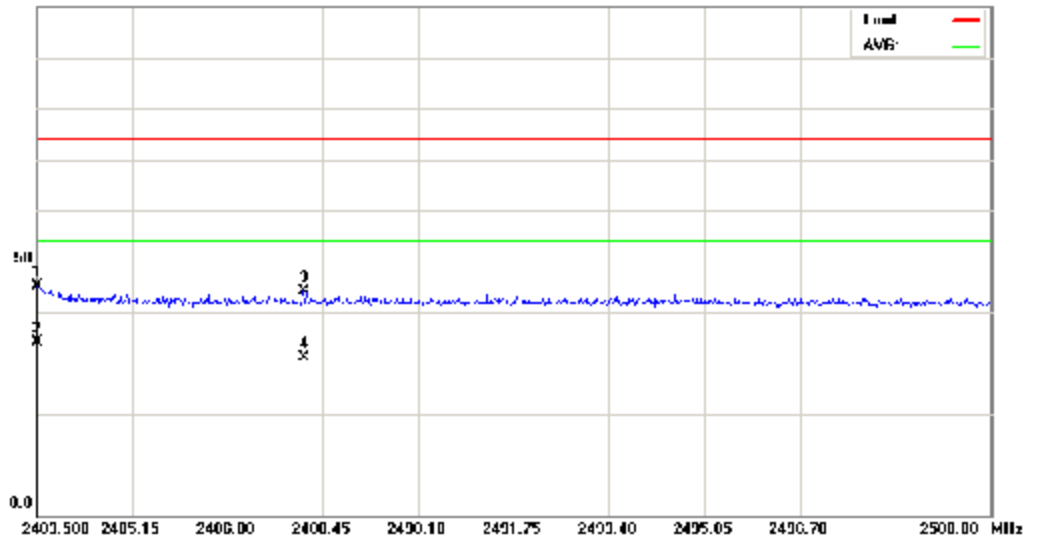
Below 2400MHz											
Frequency (MHz)	Ant. Pol. (H/V)	Correct Factor (dB)	Ant. Fac. (dB)	Reading (dBuV)		Emission (dBuV/m)		Limit Line (dBuV/m)		Over Limit (dBuV/m)	
				PK	AV	PK	AV	PK	AV	PK	AV
2390.00	H	-31.16	28.16	44.15	32.73	41.15	29.73	74.00	54.00	-32.85	-24.27
2400.00	H	-31.15	28.18	63.14	53.14	60.17	50.17	74.00	54.00	-13.83	-3.83
2390.00	V	-31.16	28.16	43.91	33.11	40.91	30.11	74.00	54.00	-33.09	-23.89
2400.00	V	-31.15	28.18	59.57	48.04	56.60	45.07	74.00	54.00	-17.40	-8.93



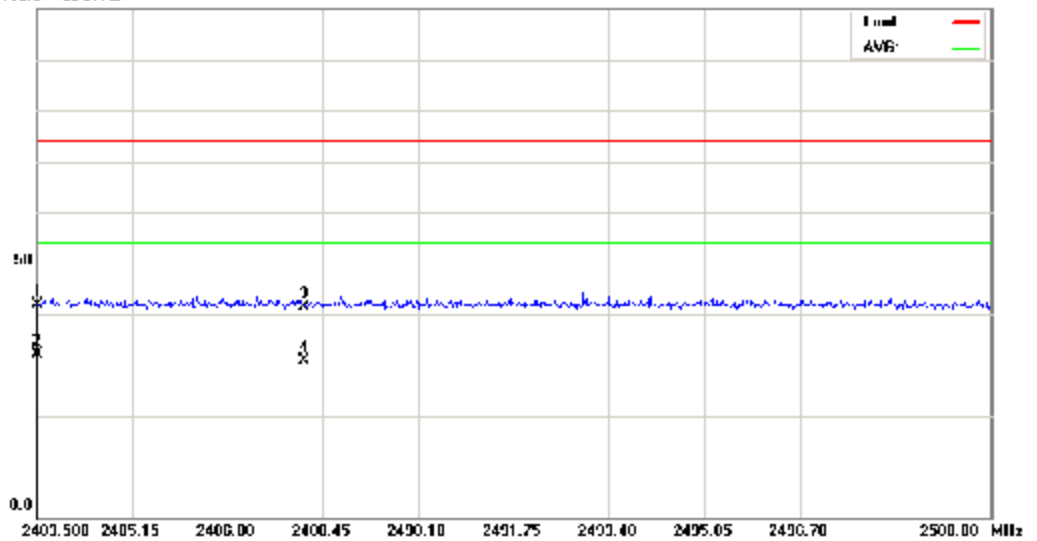


Above 2483.5 MHz											
Frequency (MHz)	Ant. Pol. (H/V)	Correct Factor (dB)	Ant. Fac. (dB)	Reading (dBuV)		Emission (dBuV/m)		Limit Line (dBuV/m)		Over Limit (dBuV/m)	
				PK	AV	PK	AV	PK	AV	PK	AV
2483.50	H	-31.05	28.36	47.93	36.87	45.24	34.18	74.00	54.00	-28.76	-19.82
2488.10	H	-31.04	28.37	46.68	33.81	44.01	31.14	74.00	54.00	-29.99	-22.86
2483.50	V	-31.05	28.36	44.66	34.81	41.97	32.12	74.00	54.00	-32.03	-21.88
2488.10	V	-31.04	28.37	44.09	33.63	41.42	30.96	74.00	54.00	-32.58	-23.04

Horizontal: 100.0 dBuV/m



Vertical: 100.0 dBuV/m



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## 5: ANTENNA APPLICATION

### 5.1: ANTENNA REQUIREMENT

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

### 5.2: RESULT

The EUT has a mono pole antenna. The antenna gain is -0.22 dBi that meets the requirement.



## 6: PHOTOS OF TESTING

- Radiated test (9 k - 30 MHz ,TX and standby)





- Radiated test (9 k - 30 MHz ,link)





- Radiated test (below 1G ,TX and standby)





- Radiated test (below 1G ,Link)





- Radiated test (above 1G , TX and standby)







- Radiated test (above 1G , Link)





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Taiwan (R.O.C.)

# TEST REPORT

Reference No.: A12111001  
Report No.: FCCA12111001  
FCC ID: FSUGMZKB  
Page: 42 of 42  
Date: Nov 20, 2012

## 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