Product Name:	GPS Logger
Model No.:	GT-820 Series
Applicant:	Mobile Action Technology Inc. 5F., No. 205-2, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 23143, Taiwan
Date of Receipt:	Aug. 30, 2012
Finished date of Test:	Oct. 09, 2012
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.

Tested By: Paul Huang Date: 10/26/2012
(Paul Huang)

Approved By: Date: 10/26/2012
(Johnson Ho, Director)

Revisions History

Report No.	Issue Date	Revisions
FCCA12083001	Oct. 15, 2012	Initial Issue
FCCA12083001	Oct. 19, 2012	EUT descriptions updated: Bluetooth
FCCA12083001	Oct. 26, 2012	Add frequency hopping requirements

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.

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 internal battery: DC 3.7 V or from USB port: 5.0 V.

1.3: EUT MODIFICATION

No modification in SRT Lab.

2: DESCRIPTION OF EUT AND TEST MODE

2.1: GENERAL DESCRIPTION OF EUT

PRODUCT	GPS Logger
MODEL NO.	GT-820 Series
POWER SUPPLY	DC 3.7 V, 650 mA from rechargeable Li-ion battery DC 5 V power from PC USB port
CABLE	1.0 shielded USB Cable
FREQUENCY BAND	2.400GHz ~ 2.4835 GHz
CARRIER FREQUENCY	2.402GHz ~ 2.480 GHz
NUMBER OF CHANNEL	40
RATED RF OUTPUT POWER	-1.18 dBm
MODULATION TYPE	GFSK
MODE OF OPERATION	Duplex
ANTENNA TYPE	Mono Pole Antenna
ANTENNA GAIN	-2.58 dBi
OPERATING TEMPERATURE RANGE	-10 ~ 50 °C

NOTE:
The EUT operates in single mode Bluetooth Low Energy, therefore, no BR/EDR tests were performed. 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
Li-ion Battery	Wansglory	F-O-000999-SY	N/A	3.7 V, 650 mAh
GPS Module	SiRF	GPSM-02	N/A	N/A
Mono LCD Screen	Dastek	DG128128-30	N/A	128X128 dots
USB Cable	N/A	N/A	N/A	1.0 m shielded cable

2.3: DESCRIPTION OF TEST MODES

The EUT operates in single mode Bluetooth Low Energy, therefore, no BR/EDR tests were performed. Total of 40 channels are provided; low, medium and high channels were chosen for test. Test modes shown below:

Test Mode	Channel	Frequency (MHz)
1	Ch 00 (TX)	2402
2	Ch 20 (TX)	2442
3	Ch 39 (TX)	2480
4	Standby	N/A
5	Link (RX + TX)	N/A
6	Charge (Battery)	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	Channel	Frequency
CH 00	2402 MHz	CH 20	2442 MHz
CH 01	2404 MHz	CH 21	2444 MHz
CH 02	2406 MHz	CH 22	2446 MHz
CH 03	2408 MHz	CH 23	2448 MHz
CH 04	2410 MHz	CH 24	2450 MHz
CH 05	2412 MHz	CH 25	2452 MHz
CH 06	2414 MHz	CH 26	2454 MHz
CH 07	2416 MHz	CH 27	2456 MHz
CH 08	2418 MHz	CH 28	2458 MHz
CH 09	2420 MHz	CH 29	2460 MHz
CH 10	2422 MHz	CH 30	2462 MHz
CH 11	2424 MHz	CH 31	2464 MHz
CH 12	2426 MHz	CH 32	2466 MHz
CH 13	2428 MHz	CH 33	2468 MHz
CH 14	2430 MHz	CH 34	2470 MHz
CH 15	2432 MHz	CH 35	2472 MHz
CH 16	2434 MHz	CH 36	2474 MHz
CH 17	2436 MHz	CH 37	2476 MHz
CH 18	2438 MHz	CH 38	2478 MHz
CH 19	2440 MHz	CH 39	2480 MHz

2.5: DESCRIPTION OF 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	VT7600	DoC	1.8 m unshielded power cord
2	Keyboard	Wintek	WM530	DoC	1.2 m unshielded data cable
3	Mouse	Wintek	WSS30	DoC	1.2 m unshielded data cable
4	LCD Monitor	Asus	VS228	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
7	COM Cable	iomega	N/A	N/A	1.0 m shielded data cable
8	Bluetooth Heart Rate Monitor	Dayton	HRMBLE	DoC	N/A

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

2.6: EUT OPERATING CONDITION

Setup the EUT and all peripheral devices .

Turn on the power of all equipment and EUT.

Set the EUT under continuous transmission condition, standby or connect to PC for battery charging mode.

Set the EUT to the highest available power level.

3: DESCRIPTION OF APPLIED STANDARDS

The EUT is a Bluetooth Low Energy 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
Public Notice DA 00-705 (March 2000)

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
15.247(a)	6 dB Bandwidth Limit: minimum of 500 kHz	PASS
15.247(b)	Peak Power Test: Limit: 21 dBm	PASS
15.247(d)	Band Edge Measurement: Limit: 20dB less than the peak value of fundamental frequency	PASS
15.247(e)	Power Density: Limit: 8dBm/3kHz	PASS
15.247(a)	Time of Occupancy (Dwell Time) Limit: less than 0.4 seconds	PASS
15.247(a)	Channel Separation Test Limit: minimum of 25 kHz or the 20 dB bandwidth	PASS
15.247(a)(b)	Quantity of Hopping Channel Test Limit: 15 non-overlapping hopping channels	PASS
15.207	Conducted Emission Limit: Section 4.1.1	PASS
15.33(a) 15.249	Transmitter Radiated Emissions Limit: Section 4.2.1	PASS
15.203	Antenna requirement Limit: max. 6dBi	PASS

4: TECHNICAL CHARACTERISTICS TEST

4.1: CONDUCTED EMISSION TEST

4.1.1: LIMIT

FCC Part15, Subpart C Section 15.207:

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.

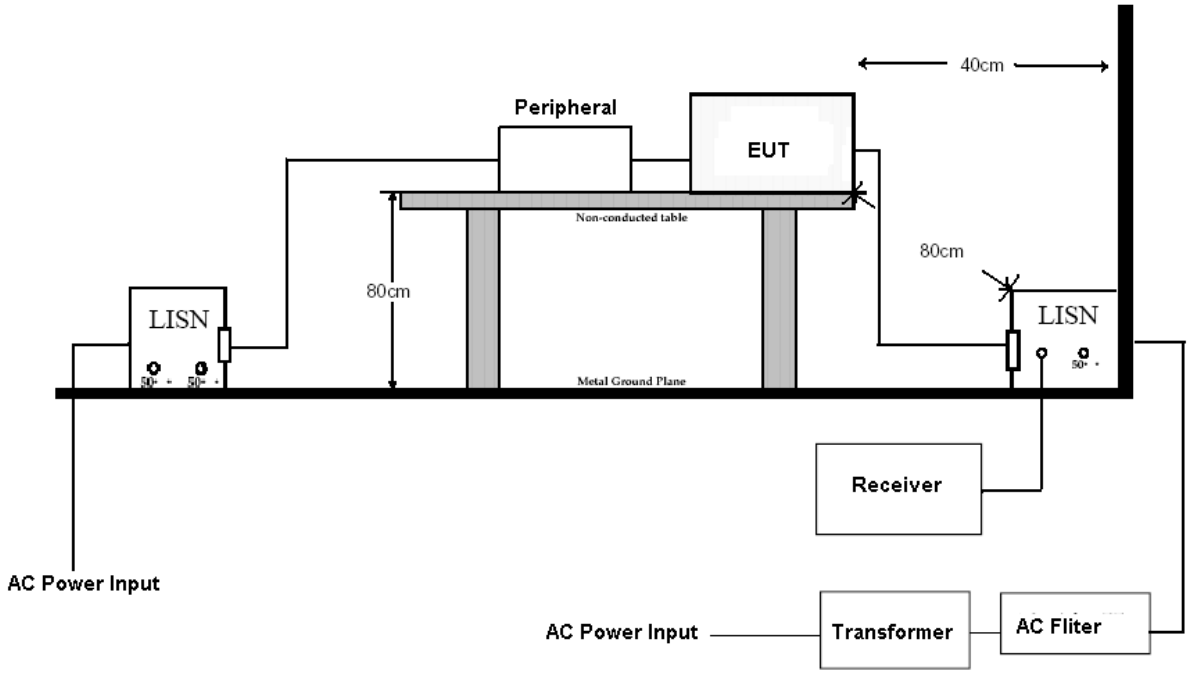
4.1.2: TEST EQUIPMENT

The following test equipment was used for the test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER	9kHz TO 2.75 GHz	ROHDE & SCHWARZ	ESCS30 / 100376	DEC. 27, 2012 ETC
LISN	50 μH, 50 ohm	FCC	FCC-LISN-50-25-2 / 01017	JUN. 21, 2013 ETC
LISN	50μH, 50 ohm	SOLAR	9252-50-R24-BNC / 951315	OCT. 28, 2012 ETC
50 OHM TERMINATOR	50 ohm	HP	11593A / #1	JUN. 24, 2013 ETC
COAXIAL CABLE	5M	TIMES	LMR-400 / #5M(L3TCAB003)	MAY. 29, 2013 ETC
Filter	2 LINE, 30A	FIL.COIL	FC-943 / 771	NCR
GROUND PLANE	2M (H) x 3M (W)	SRT	N/A	NCR
GROUND PLANE	2.5M (H) x 3M (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.

4.1.3: 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.

4.1.4: TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4:2003 and CISPR22:2003. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm/50μH as specified. All readings were quasi-peak and average values with 10 kHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. Both lines of the power mains of EUT were measured and the cables connected to EUT and support units were moved to find the maximum emission levels for each frequency. First, find the margin or higher points at least 6 points by software, then use manual to find the maximum data. The procedure is referred on the test procedure of SRT LAB.

4.1.5: TEST RESULTS

Temperature:	27 °C	Humidity:	58 %RH
Frequency Range:	0.15 – 30 MHz	Tested Mode:	6 (Charge)
Receiver Detector:	Q.P. and AV.	Modulation Type:	N/A
Tested By:	Paul Huang	Tested Channel:	N/A
		Tested Date:	Sep 07, 2012

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.
0.378	0.03	31.94	26.45	31.97	26.48	58.33	48.33	-26.36	-21.85
1.134	-0.01	29.19	25.76	29.18	25.75	56.00	46.00	-26.82	-20.25
4.239	0.05	31.79	28.44	31.84	28.49	56.00	46.00	-24.16	-17.51
4.467	0.06	30.95	25.39	31.01	25.45	56.00	46.00	-24.99	-20.55
8.552	0.13	34.26	28.00	34.39	28.13	60.00	50.00	-25.61	-21.87
17.685	0.29	35.62	26.63	35.91	26.92	60.00	50.00	-24.09	-23.08

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.
0.378	0.07	31.70	30.38	31.77	30.45	58.33	48.33	-26.56	0.378
1.138	0.07	28.56	22.46	28.63	22.53	56.00	46.00	-27.37	1.138
4.160	0.15	32.61	31.66	32.76	31.81	56.00	46.00	-23.24	4.160
4.992	0.17	32.59	31.66	32.76	31.83	56.00	46.00	-23.24	4.992
8.776	0.26	33.89	31.78	34.15	32.04	60.00	50.00	-25.85	8.776
22.739	0.59	39.11	24.50	39.70	25.09	60.00	50.00	-20.30	22.739

NOTE :
1. Measurement uncertainty is ±3.61dB. 2. Emission level = Reading valus + Correction factor
Correction Factor = Cable loss + Insertion loss of LISN. 3. Margin value = Emission level - Limit
The emission of other frequencies was very low against the limit. 4. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

4.2: RADIATED EMISSION TEST

4.2.1: 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	
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*log(specific distance / test distance (dB)
30 uV/m (at 30m) = 20*log(30uV) + 40*log(30m/3m) = 70 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 radiated emission for frequency below1000MHz (Average):

FREQUENCY (MHz)	field strength of fundamental (millivolts/meter)	field strength of harmonics (millivolts/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.
Distance refers to the distance between measuring instrument, antemma, and the closest point of any part of the device or system.
50 mV/m = 94 dBuV/m

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

4.2.2: TEST EQUIPMENT

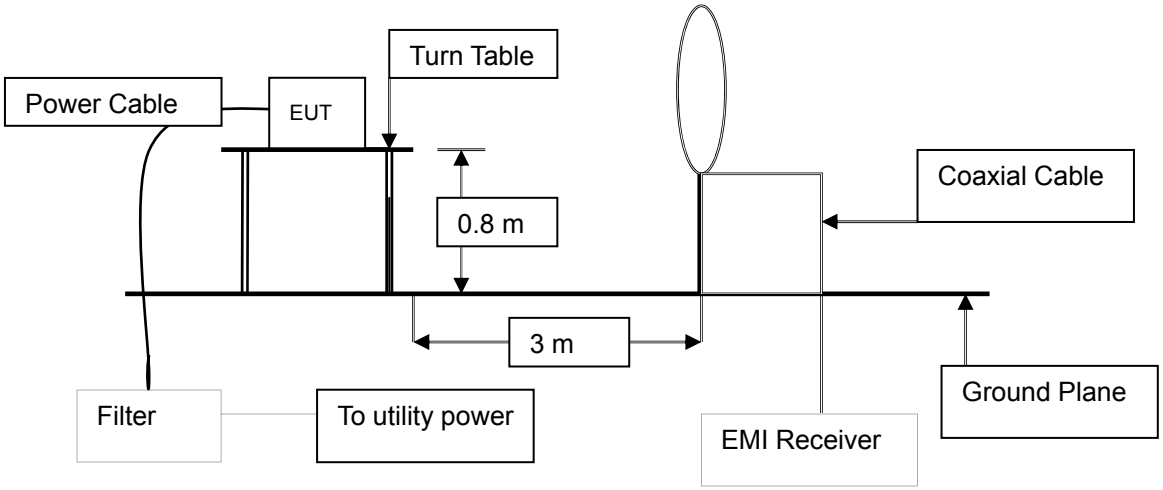
The following test equipment was used during the radiated emission test:

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. 03, 2012 ETC
BI-LOG ANTENNA	30 MHz ~ 2 GHz	SCHAFFNER	CBL6141A / 4181	JUN. 25, 2013 ETC
OPEN AREA TEST SITE	3 – 10 M MEASUREMENT	SRT	A02 / SRT002	APR. 12, 2013 SRT
COAXIAL CABLE	30 M	TIMES	LMR-400 / #30M (L1TCAB014)	MAY. 31, 2013 ETC
FILTER	2 LINE, 30 A	FIL.COIL	FC-943 / 869	NCR
SPECTRUM ANALYZER	9 kHz ~ 40GHz	ROHDE & SCHWARZ	FSP40 / 100093	DEC. 29, 2012 ETC
PRE-AMPLIFIER	1 GHz ~ 26.5 GHz	AGILENT	8449B/ 3008A01995	JAN. 03, 2013 ETC
HORN ANTENNA	1 GHz ~ 18 GHz	EMC TEST	3115/ 6881	OCT. 25, 2012 ETC
HORN ANTENNA	18 GHz TO 40 GHz	EMCO	3116/ 00032255	JAN. 18, 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
ANECHOIC CHAMBER	3 M MEASUREMENT	SRT	A01 / SRT001	NOV. 2012 SRT
LOOP ANTENNA	9 kHz ~ 30 MHz	ETS.LINDGREN	HFH2-Z2/ 860605/002(1162 1/2)	MAR 06, 2013 ETC

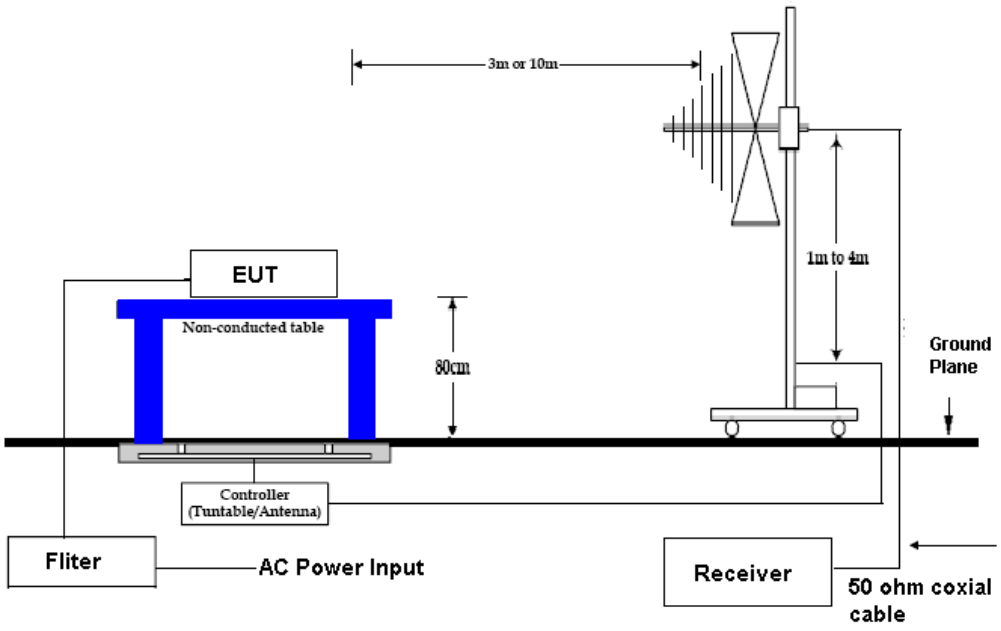
NOTE:
The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3: TEST SET-UP

9 kHz – 30 MHz

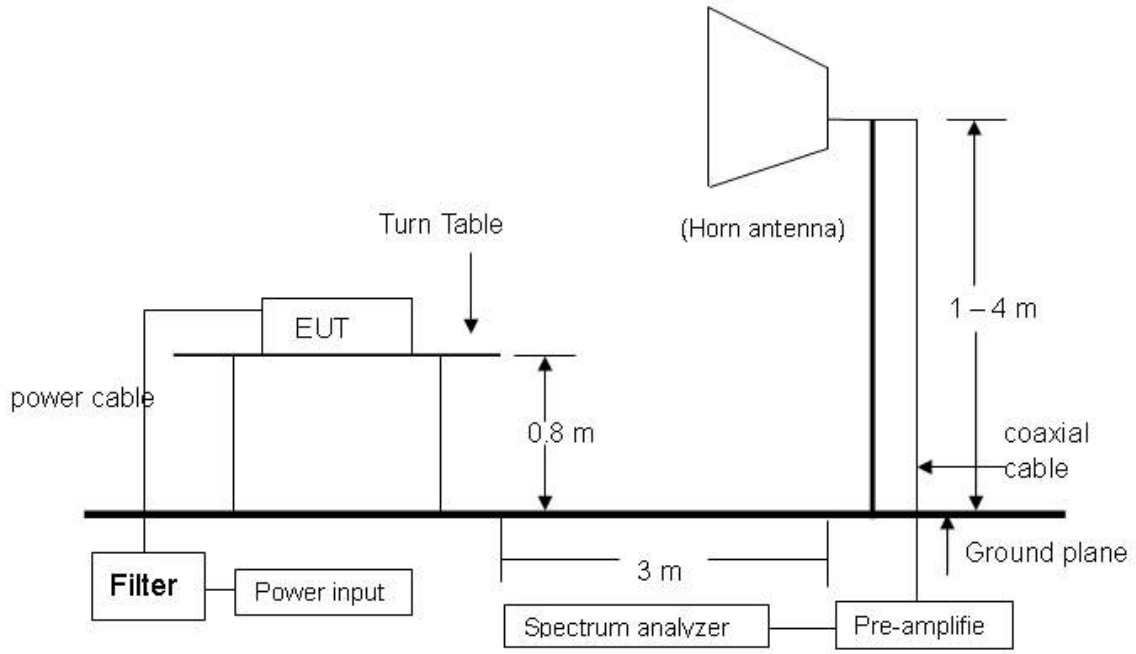


30 MHz~1000 MHz:



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.

4.2.4: 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.

4.2.5: TEST RESULTS: 9 k – 30 MHz

Temperature:	29 °C	Humidity:	61 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	1 (Ch00)
Tested By:	Paul Huang	Tested Date:	Sep. 08, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5.20	0.42	20.31	27.29	48.01	69.54	-21.53
7.00	0.47	20.38	31.07	51.92	69.54	-17.62
9.61	0.55	20.48	29.73	50.76	69.54	-18.78
11.14	0.58	20.56	27.19	48.33	69.54	-21.21
21.60	0.79	21.08	28.42	50.29	69.54	-19.26
25.02	0.84	21.25	25.88	47.97	69.54	-21.57

Temperature:	29 °C	Humidity:	61 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	2 (Ch20)
Tested By:	Paul Huang	Tested Date:	Sep. 08, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5.05	0.41	20.30	29.31	50.02	70	-19.52
6.55	0.46	20.36	30.67	51.49	70	-18.05
9.16	0.53	20.47	33.89	54.89	70	-14.65
11.32	0.59	20.57	27.97	49.12	70	-20.42
21.30	0.78	21.06	28.63	50.48	70	-19.07
23.73	0.82	21.19	26.36	48.37	70	-21.18

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.

Temperature:	29 °C	Humidity:	61 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	3 (Ch39)
Tested By:	Paul Huang	Tested Date:	Sep. 08, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4.96	0.41	20.30	30.78	51.48	70	-18.06
7.15	0.47	20.39	31.72	52.58	70	-16.96
8.68	0.52	20.45	31.18	52.15	70	-17.40
12.79	0.62	20.64	27.70	48.96	70	-20.58
14.79	0.66	20.74	27.67	49.07	70	-20.47
21.21	0.78	21.06	29.80	51.64	70	-17.90

Temperature:	29 °C	Humidity:	61 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:	Sep. 08, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4.96	0.41	20.30	30.52	51.22	70	-18.32
7.21	0.48	20.39	32.14	53.00	70	-16.54
9.16	0.53	20.47	35.09	56.09	70	-13.45
21.93	0.79	21.10	28.60	50.49	70	-19.06
23.01	0.81	21.15	27.59	49.55	70	-19.99
28.14	0.88	21.41	27.47	49.76	70	-19.78

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.

Temperature:	29 °C	Humidity:	61 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:	Sep. 08, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4.96	0.41	20.30	29.09	49.79	70	-19.75
7.66	0.49	20.41	31.65	52.55	70	-17.00
6.91	0.47	20.38	31.52	52.36	70	-17.18
9.46	0.54	20.48	31.18	52.20	70	-17.34
21.93	0.79	21.10	28.96	50.85	70	-18.70
28.20	0.88	21.41	28.17	50.46	70	-19.08

Temperature:	29 °C	Humidity:	61 RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	6 (Charge)
Tested By:	Paul Huang	Tested Date:	Sep. 08, 2012

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5.05	0.41	20.30	28.49	49.20	70	-20.34
6.73	0.46	20.37	31.35	52.18	70	-17.36
9.70	0.55	20.49	28.18	49.22	70	-20.32
23.07	0.81	21.15	26.38	48.34	70	-21.20
26.79	0.87	21.34	26.39	48.59	70	-20.95
29.25	0.90	21.46	27.34	49.70	70	-19.84

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.

4.2.6: TEST RESULTS: 30 – 1000 MHz

Temperature:	30 °C	Humidity:	61 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	1 (CH00)
Tested By:	Paul Huang	Tested Date:	Sep. 06, 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)
166.29	1.94	11.32	18.48	31.74	43.5	-11.76	60	3.68
200.25	2.13	11.60	17.56	31.29	43.5	-12.21	137	3.57
299.78	2.70	13.56	22.17	38.43	46.0	-7.57	76	3.52
365.27	3.06	15.39	15.50	33.95	46.0	-12.05	101	3.16
533.83	3.88	18.26	19.04	41.18	46.0	-4.82	148	2.80
799.10	4.99	21.70	8.86	35.54	46.0	-10.46	301	2.58

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)
366.77	3.06	15.42	12.73	31.21	46.0	-14.79	346	1.05
533.83	3.88	18.26	14.57	36.71	46.0	-9.29	294	1.12
598.46	4.12	19.46	5.46	29.04	46.0	-16.96	212	2.23
797.60	4.98	21.69	5.18	31.85	46.0	-14.15	326	2.49
933.23	5.46	23.59	3.47	32.52	46.0	-13.48	188	2.55
997.56	5.69	24.19	9.52	39.40	54.0	-14.60	195	2.80

NOTE :
1. Measurement uncertainty is ±4.73dB.
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:	30 °C	Humidity:	61 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	2 (CH20)
Tested By:	Paul Huang	Tested Date:	Sep. 06, 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)
166.70	1.94	11.32	18.03	31.29	43.5	-12.21	255	3.58
200.84	2.13	11.60	19.33	33.06	43.5	-10.44	335	3.54
300.59	2.71	13.60	21.15	37.46	46.0	-8.54	47	3.51
365.09	3.06	15.39	12.28	30.73	46.0	-15.27	121	3.12
500.33	3.71	18.00	9.38	31.09	46.0	-14.91	268	2.79
799.25	4.99	21.70	6.51	33.19	46.0	-12.81	84	2.54

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)
82.43	1.39	8.10	13.97	23.46	40.0	-16.54	93	1.01
368.41	3.07	15.47	10.95	29.49	46.0	-16.51	159	1.13
500.33	3.71	18.00	8.58	30.29	46.0	-15.71	91	2.31
533.82	3.88	18.26	7.63	29.77	46.0	-16.23	79	2.49
868.08	5.23	22.86	5.89	33.99	46.0	-12.01	211	2.52
998.02	5.69	24.19	8.78	38.67	54.0	-15.33	311	2.77

NOTE :
1. Measurement uncertainty is ±4.73dB.
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:	30 °C	Humidity:	61 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	3 (CH39)
Tested By:	Paul Huang	Tested Date:	Sep. 06, 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)
119.34	1.64	11.61	14.48	27.73	43.5	-15.77	130	3.66
166.67	1.94	11.32	17.67	30.93	43.5	-12.57	347	3.53
199.96	2.13	11.50	18.47	32.09	43.5	-11.41	149	3.17
300.81	2.71	13.60	17.54	33.85	46.0	-12.15	294	3.10
534.41	3.88	18.27	8.45	30.60	46.0	-15.40	170	2.66
800.61	4.99	21.70	3.46	30.15	46.0	-15.85	300	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)
83.14	1.39	8.15	15.36	24.90	40.0	-15.10	32	1.10
118.87	1.64	11.52	12.95	26.11	43.5	-17.39	175	1.34
300.81	2.71	13.60	11.03	27.34	46.0	-18.66	328	1.51
599.30	4.13	19.48	4.31	27.91	46.0	-18.09	172	1.90
800.61	4.99	21.70	2.76	29.45	46.0	-16.55	349	1.94
997.52	5.69	24.19	8.81	38.69	54.0	-15.31	275	2.28

NOTE :
1. Measurement uncertainty is ±4.73dB.
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:	30 °C	Humidity:	61 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	4 (Standby)
Tested By:	Paul Huang	Tested Date:	Sep. 06, 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)
71.99	1.31	7.73	19.14	28.18	40.0	-11.82	329	3.58
165.76	1.93	11.40	14.01	27.34	43.5	-16.16	209	3.57
200.23	2.13	11.60	17.24	30.97	43.5	-12.53	33	3.14
300.36	2.71	13.60	16.07	32.38	46.0	-13.62	178	3.09
533.41	3.88	18.26	6.66	28.80	46.0	-17.20	181	2.69
799.50	4.99	21.70	7.73	34.41	46.0	-11.59	216	2.50

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)
79.85	1.36	7.97	14.83	24.16	40.0	-15.84	23	1.12
223.98	2.27	13.02	10.62	25.91	46.0	-20.09	66	1.34
532.98	3.87	18.26	4.74	26.87	46.0	-19.13	52	1.46
598.19	4.12	19.46	6.16	29.74	46.0	-16.26	193	1.91
801.94	4.99	21.72	4.86	31.58	46.0	-14.42	108	1.94
998.18	5.69	24.19	5.46	35.35	54.0	-18.65	107	2.29

NOTE :
1. Measurement uncertainty is ±4.73dB.
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:	30 °C	Humidity:	61 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	5 (Link)
Tested By:	Paul Huang	Tested Date:	Sep. 06, 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)
56.84	1.18	11.98	6.46	19.62	40.0	-20.38	83	3.63
499.95	3.71	17.98	5.92	27.61	46.0	-18.39	283	3.57
534.31	3.88	18.27	3.79	25.94	46.0	-20.06	358	3.17
600.98	4.13	19.50	3.21	26.84	46.0	-19.16	151	3.02
749.86	4.78	21.48	3.58	29.83	46.0	-16.17	64	2.73
816.90	5.05	22.08	3.22	30.35	46.0	-15.65	83	2.50

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)
57.20	1.19	11.61	5.04	17.84	40.0	-22.16	15	1.04
79.51	1.36	7.97	8.17	17.50	40.0	-22.50	156	1.36
298.33	2.70	13.52	10.63	26.85	46.0	-19.15	279	1.44
749.86	4.78	21.48	3.98	30.23	46.0	-15.77	21	1.84
845.64	5.16	22.78	3.51	31.45	46.0	-14.55	321	1.99
892.54	5.31	22.82	4.08	32.20	46.0	-13.80	186	2.26

NOTE :
1. Measurement uncertainty is ±4.73dB.
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:	30 °C	Humidity:	61 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	6 (Charge)
Tested By:	Paul Huang	Tested Date:	Sep. 06, 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)
156.25	1.88	12.00	11.76	25.64	43.5	-17.86	357	3.59
168.15	1.95	11.16	12.85	25.96	43.5	-17.54	95	3.57
312.63	2.78	13.94	12.91	29.62	46.0	-16.38	342	3.14
337.29	2.92	14.64	10.98	28.53	46.0	-17.47	171	3.00
455.20	3.49	17.10	8.96	29.55	46.0	-16.45	151	2.66
527.69	3.85	18.22	6.81	28.87	46.0	-17.13	226	2.41

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)
57.62	1.19	11.61	6.71	19.51	40.0	-20.49	78	1.11
312.63	2.78	13.94	12.19	28.90	46.0	-17.10	53	1.41
337.29	2.92	14.64	8.60	26.15	46.0	-19.85	157	1.49
444.88	3.44	16.92	6.55	26.91	46.0	-19.09	147	1.89
468.00	3.56	17.36	5.09	26.01	46.0	-19.99	345	1.95
576.29	4.05	18.97	2.14	25.16	46.0	-20.84	199	2.32

NOTE :
1. Measurement uncertainty is ±4.73dB.
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.

4.2.7: TEST RESULTS: 1 – 25 GHz

Temperature:	27 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	1 (CH00)
Tested By:	Paul Huang	Tested Channel:	2402 MHz
Tested Date:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
1315.43	-33.05	25.08	52.48	42.77	44.51	34.80	74.00	54.00	-29.49	-19.20	268	2.38
1769.84	-31.98	26.38	52.47	42.67	46.86	37.06	74.00	54.00	-27.14	-16.94	232	2.04
2805.04	-30.82	29.44	48.75	39.28	47.36	37.89	74.00	54.00	-26.64	-16.11	72	1.76
3094.50	-30.52	30.29	45.00	35.19	44.77	34.96	74.00	54.00	-29.23	-19.04	285	1.47
3499.10	-29.76	31.10	44.09	34.17	45.43	35.51	74.00	54.00	-28.57	-18.49	348	1.31
4005.04	-29.29	32.50	43.33	33.83	46.54	37.03	74.00	54.00	-27.46	-16.97	89	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.		
1804.39	-31.93	26.52	47.54	37.90	42.13	32.49	74.00	54.00	-31.87	-21.51	91	1.18
2205.46	-31.38	27.75	47.62	37.51	43.99	33.88	74.00	54.00	-30.01	-20.12	24	1.41
2844.42	-30.80	29.57	44.33	34.08	43.10	32.85	74.00	54.00	-30.90	-21.15	91	1.92
3285.66	-30.16	30.67	44.69	34.74	45.20	35.25	74.00	54.00	-28.80	-18.75	194	1.99
3954.57	-29.34	32.37	43.29	33.74	46.32	36.77	74.00	54.00	-27.68	-17.23	218	2.23
5224.59	-27.64	33.83	40.49	31.17	46.68	37.36	74.00	54.00	-27.32	-16.64	107	2.35

NOTE :

1. Measurement uncertainty is ± 4.73 dB.
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:	27 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	1 (CH00 Fundamental)
Tested By:	Paul Huang	Tested Channel:	2402 MHz
Tested Date:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
2402.00	-31.15	28.18	76.57	66.58	73.61	63.61	114.00	94.00	-40.39	-30.39	263	2.37
4804.00	-28.48	33.27	39.08	28.68	43.87	33.47	74.00	54.00	-30.13	-20.53	326	2.01
7206.00	-27.05	35.74	38.21	28.34	46.90	37.02	74.00	54.00	-27.10	-16.98	32	1.78
9608.00	-25.66	37.79	39.60	29.76	51.72	41.88	74.00	54.00	-22.28	-12.12	317	1.45
12010.00	-23.89	39.19	39.82	29.85	55.12	45.15	74.00	54.00	-18.88	-8.85	231	1.34
14412.00	-21.16	42.03	41.55	31.47	62.42	52.34	74.00	54.00	-11.58	-1.66	180	1.29

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.		
2402.00	-31.15	28.18	77.43	68.01	74.47	65.04	114.00	94.00	-39.53	-28.96	69	1.11
4804.00	-28.48	33.27	40.51	30.42	45.30	35.21	74.00	54.00	-28.70	-18.79	276	1.40
7206.00	-27.05	35.74	39.01	28.94	47.69	37.62	74.00	54.00	-26.31	-16.38	220	1.94
9608.00	-25.66	37.79	39.22	29.57	51.35	41.69	74.00	54.00	-22.65	-12.31	217	2.01
12010.00	-23.89	39.19	39.46	29.93	54.76	45.23	74.00	54.00	-19.24	-8.77	149	2.17
14412.00	-21.16	42.03	41.34	31.37	62.21	52.24	74.00	54.00	-11.79	-1.76	302	2.37

NOTE :

1. Measurement uncertainty is ± 4.73 dB.
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:	27 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	2 (CH20)
Tested By:	Paul Huang	Tested Channel:	2442 MHz
Tested Date:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
1344.63	-32.95	25.11	52.53	43.23	44.70	35.40	74.00	54.00	-29.30	-18.60	247	2.33
2729.44	-30.87	29.18	46.55	36.31	44.85	34.61	74.00	54.00	-29.15	-19.39	83	1.96
3164.75	-30.38	30.43	44.00	34.34	44.04	34.38	74.00	54.00	-29.96	-19.62	157	1.77
3875.30	-29.42	32.15	42.80	32.86	45.54	35.60	74.00	54.00	-28.47	-18.41	113	1.43
4424.09	-28.81	32.58	41.96	32.44	45.74	36.22	74.00	54.00	-28.26	-17.78	25	1.33
5235.72	-27.61	33.84	38.49	28.72	44.72	34.95	74.00	54.00	-29.28	-19.05	148	1.24

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.		
2000.60	-31.63	27.30	42.82	33.49	38.49	29.16	74.00	54.00	-35.51	-24.84	151	1.15
2205.07	-31.38	27.75	46.86	36.83	43.23	33.20	74.00	54.00	-30.77	-20.80	39	1.46
3020.84	-30.65	30.14	43.75	33.54	43.24	33.03	74.00	54.00	-30.76	-20.97	100	1.86
3715.09	-29.56	31.70	43.60	33.45	45.74	35.59	74.00	54.00	-28.26	-18.41	347	1.99
3964.33	-29.33	32.40	42.87	32.79	45.94	35.86	74.00	54.00	-28.06	-18.14	160	2.17
5174.83	-27.79	33.80	40.44	30.49	46.45	36.50	74.00	54.00	-27.55	-17.50	19	2.41

NOTE :

1. Measurement uncertainty is ±4.73 dB.
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:	27 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	2 (CH20 Fundamental)
Tested By:	Paul Huang	Tested Channel:	2442 MHz
Tested Date:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
2442.00	-31.10	28.27	81.36	72.74	78.53	69.91	114.00	94.00	-35.47	-24.09	107	2.38
4884.00	-28.41	33.44	39.16	29.86	44.19	34.89	74.00	54.00	-29.81	-19.11	234	1.98
7326.00	-26.97	36.05	37.40	27.99	46.47	37.06	74.00	54.00	-27.53	-16.94	318	1.72
9768.00	-25.42	37.91	39.10	29.74	51.60	42.24	74.00	54.00	-22.40	-11.76	120	1.45
12210.00	-23.36	39.07	38.13	29.34	53.84	45.05	74.00	54.00	-20.16	-8.95	48	1.31
14652.00	-21.27	41.46	39.07	30.17	59.26	50.36	74.00	54.00	-14.74	-3.64	62	1.29

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.		
2442.00	-31.10	28.27	82.36	73.83	79.53	71.00	114.00	94.00	-34.47	-23.00	133	1.13
4884.00	-28.41	33.44	37.81	29.06	42.84	34.10	74.00	54.00	-31.16	-19.90	78	1.46
7326.00	-26.97	36.05	37.60	28.14	46.67	37.21	74.00	54.00	-27.33	-16.79	2	1.93
9768.00	-25.42	37.91	39.41	30.14	51.91	42.64	74.00	54.00	-22.09	-11.36	120	2.04
12210.00	-23.36	39.07	38.61	29.12	54.33	44.83	74.00	54.00	-19.67	-9.17	275	2.16
14652.00	-21.27	41.46	39.11	29.88	59.30	50.07	74.00	54.00	-14.70	-3.93	265	2.33

NOTE :

1. Measurement uncertainty is ±4.73 dB.
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:	27 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	3 (CH39)
Tested By:	Paul Huang	Tested Channel:	2480 MHz
Tested Date:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
1215.32	-33.40	24.96	51.11	41.40	42.66	32.95	74.00	54.00	-31.34	-21.05	183	2.32
2205.67	-31.38	27.75	48.59	39.29	44.96	35.66	74.00	54.00	-29.04	-18.34	266	2.00
3260.43	-30.21	30.62	43.55	33.77	43.96	34.18	74.00	54.00	-30.04	-19.82	151	1.72
3954.14	-29.34	32.37	41.94	32.63	44.97	35.66	74.00	54.00	-29.03	-18.34	148	1.50
4650.29	-28.60	32.93	40.17	30.77	44.50	35.10	74.00	54.00	-29.50	-18.90	346	1.29
5439.71	-26.99	33.96	37.41	27.80	44.38	34.77	74.00	54.00	-29.62	-19.23	60	1.25

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.		
1200.33	-33.46	24.94	51.52	41.69	43.00	33.17	74.00	54.00	-31.00	-20.83	61	1.13
1695.96	-32.09	26.08	49.28	39.85	43.27	33.84	74.00	54.00	-30.73	-20.16	98	1.41
2805.89	-30.82	29.44	48.43	39.37	47.04	37.98	74.00	54.00	-26.96	-16.02	251	1.88
3289.65	-30.15	30.68	43.62	34.03	44.15	34.56	74.00	54.00	-29.85	-19.44	226	2.06
4090.34	-29.20	32.52	42.49	33.02	45.81	36.34	74.00	54.00	-28.19	-17.66	221	2.16
4619.06	-28.62	32.86	41.00	31.44	45.24	35.67	74.00	54.00	-28.76	-18.33	43	2.37

NOTE :

1. Measurement uncertainty is ±4.73 dB.
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:	27 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	3 (CH39 Fundamental)
Tested By:	Paul Huang	Tested Channel:	2480 MHz
Tested Date:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
2480.00	-31.05	28.36	82.26	72.59	79.56	69.89	114.00	94.00	-34.44	-24.11	103	2.33
4960.00	-28.35	33.61	39.52	29.80	44.78	35.06	74.00	54.00	-29.22	-18.94	182	1.99
7440.00	-26.90	36.34	38.92	28.65	48.36	38.09	74.00	54.00	-25.64	-15.91	45	1.75
9920.00	-25.18	38.04	40.13	29.98	52.98	42.83	74.00	54.00	-21.02	-11.17	269	1.50
12400.00	-22.86	38.96	39.83	30.08	55.93	46.18	74.00	54.00	-18.07	-7.82	296	1.32
14880.00	-21.45	40.50	41.07	31.38	60.12	50.43	74.00	54.00	-13.88	-3.57	319	1.22

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.		
2480.00	-31.05	28.36	85.31	75.77	82.61	73.07	114.00	94.00	-31.39	-20.93	251	1.18
4960.00	-28.35	33.61	37.51	27.05	42.77	32.31	74.00	54.00	-31.23	-21.69	85	1.45
7440.00	-26.90	36.34	38.94	28.56	48.38	38.00	74.00	54.00	-25.62	-16.00	21	1.95
9920.00	-25.18	38.04	40.51	30.33	53.36	43.18	74.00	54.00	-20.64	-10.82	79	2.01
12400.00	-22.86	38.96	40.32	29.84	56.42	45.94	74.00	54.00	-17.58	-8.06	324	2.21
14880.00	-21.45	40.50	41.76	32.08	60.81	51.13	74.00	54.00	-13.19	-2.87	15	2.37

NOTE :

1. Measurement uncertainty is ±4.73 dB.
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:	27 °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:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
3294.56	-30.14	30.69	43.63	34.05	44.17	34.59	74.00	54.00	-29.83	-19.41	134	2.34
3670.87	-29.60	31.58	43.25	33.50	45.22	35.47	74.00	54.00	-28.78	-18.53	110	2.00
3919.05	-29.37	32.27	42.87	32.86	45.77	35.76	74.00	54.00	-28.23	-18.24	211	1.74
4284.98	-28.97	32.56	41.62	31.74	45.21	35.33	74.00	54.00	-28.79	-18.67	270	1.52
4999.29	-28.32	33.70	38.15	28.58	43.53	33.96	74.00	54.00	-30.47	-20.04	187	1.29
5539.90	-26.90	34.01	38.11	27.61	45.22	34.72	74.00	54.00	-28.78	-19.28	330	1.22

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.		
3499.95	-29.76	31.10	42.20	32.11	43.54	33.45	74.00	54.00	-30.46	-20.55	317	1.19
3675.32	-29.60	31.59	43.83	33.60	45.82	35.59	74.00	54.00	-28.18	-18.41	147	1.43
4235.23	-29.03	32.55	41.29	31.16	44.81	34.68	74.00	54.00	-29.19	-19.32	60	1.86
4579.96	-28.66	32.77	40.42	30.81	44.54	34.93	74.00	54.00	-29.46	-19.07	264	2.01
5169.59	-27.81	33.80	39.96	29.83	45.95	35.82	74.00	54.00	-28.05	-18.18	151	2.15
5439.49	-26.99	33.96	37.72	28.19	44.69	35.16	74.00	54.00	-29.31	-18.84	74	2.39

NOTE :

1. Measurement uncertainty is ±4.73 dB.
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:	27 °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:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
2980.80	-30.70	30.03	45.95	36.37	45.28	35.70	74.00	54.00	-28.72	-18.30	314	2.31
3249.11	-30.23	30.60	45.80	35.91	46.17	36.28	74.00	54.00	-27.83	-17.72	272	1.99
3764.46	-29.52	31.84	45.24	35.49	47.56	37.81	74.00	54.00	-26.44	-16.19	33	1.77
4105.70	-29.18	32.52	43.65	33.41	46.99	36.75	74.00	54.00	-27.01	-17.25	21	1.47
4569.98	-28.66	32.75	42.85	32.93	46.94	37.02	74.00	54.00	-27.06	-16.98	210	1.28
5280.32	-27.47	33.87	40.80	31.30	47.19	37.69	74.00	54.00	-26.81	-16.31	150	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.		
1499.72	-32.39	25.30	52.91	43.21	45.82	36.12	74.00	54.00	-28.18	-17.88	185	1.12
3385.89	-29.97	30.87	44.87	35.28	45.77	36.18	74.00	54.00	-28.23	-17.82	5	1.49
3995.00	-29.30	32.49	43.75	33.86	46.93	37.04	74.00	54.00	-27.07	-16.96	172	1.92
4519.95	-28.70	32.64	43.03	32.87	46.97	36.81	74.00	54.00	-27.03	-17.19	150	1.99
4999.96	-28.32	33.70	42.13	32.71	47.51	38.09	74.00	54.00	-26.49	-15.91	169	2.20
5464.03	-26.92	33.98	39.61	29.77	46.67	36.83	74.00	54.00	-27.33	-17.17	201	2.37

NOTE :

1. Measurement uncertainty is ±4.73 dB.
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:	27 °C	Humidity:	56 %RH
Frequency Range:	1 – 25 GHz	Measured Distance:	3 m
Receiver Detector:	PK. or AV.	Tested Mode:	6 (Charge)
Tested By:	Paul Huang	Tested Channel:	N/A
Tested Date:	Sep. 08, 2012	Modulation Type:	GFSK

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.		
3105.80	-30.49	30.31	45.13	35.13	44.95	34.95	74.00	54.00	-29.05	-19.05	140	2.35
3444.55	-29.86	30.99	44.35	34.69	45.47	35.81	74.00	54.00	-28.53	-18.19	340	2.01
3860.54	-29.43	32.11	44.32	34.19	47.00	36.87	74.00	54.00	-27.00	-17.13	140	1.71
4115.12	-29.17	32.52	43.02	33.54	46.38	36.90	74.00	54.00	-27.62	-17.10	119	1.50
4575.24	-28.66	32.77	42.68	32.61	46.79	36.72	74.00	54.00	-27.21	-17.28	160	1.27
5005.39	-28.30	33.70	41.07	31.39	46.47	36.79	74.00	54.00	-27.53	-17.21	185	1.25

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.		
1499.61	-32.39	25.30	53.14	43.68	46.05	36.59	74.00	54.00	-27.95	-17.41	260	1.20
2839.67	-30.80	29.55	45.03	34.87	43.78	33.62	74.00	54.00	-30.22	-20.38	98	1.48
3779.27	-29.50	31.88	44.56	34.36	46.94	36.74	74.00	54.00	-27.06	-17.26	322	1.95
4599.53	-28.64	32.82	42.16	32.63	46.34	36.81	74.00	54.00	-27.66	-17.19	283	2.03
5005.39	-28.30	33.70	42.44	32.57	47.84	37.97	74.00	54.00	-26.16	-16.03	159	2.17
5474.65	-26.89	33.98	40.51	30.50	47.61	37.60	74.00	54.00	-26.39	-16.40	236	2.42

NOTE :

1. Measurement uncertainty is ±4.73 dB.
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.

4.3: 6 DB BANDWIDTH TEST

4.3.1: LIMIT

FCC Part15, Subpart C Section 15.247 (a)(2). The minimum 6dB bandwidth shall be at least 500 kHz.

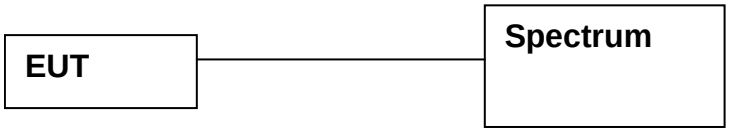
4.3.2: TEST EQUIPMENT

The following test equipment was used during the test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE oF CAL. & CAL. CENTER
SPECTRUM ANALYZER	9 kHz-40 GHz	ROHDE & SCHWARZ	FSP40/ 100093	DEC. 07, 2012 ETC

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

4.3.3: TEST SET-UP



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

4.3.4: TEST PROCEDURE

The EUT was operated in continuous transmission mode or any specific channel.

Record the test result from the spectrum analyzer screen.

4.3.5: EUT OPERATING CONDITION

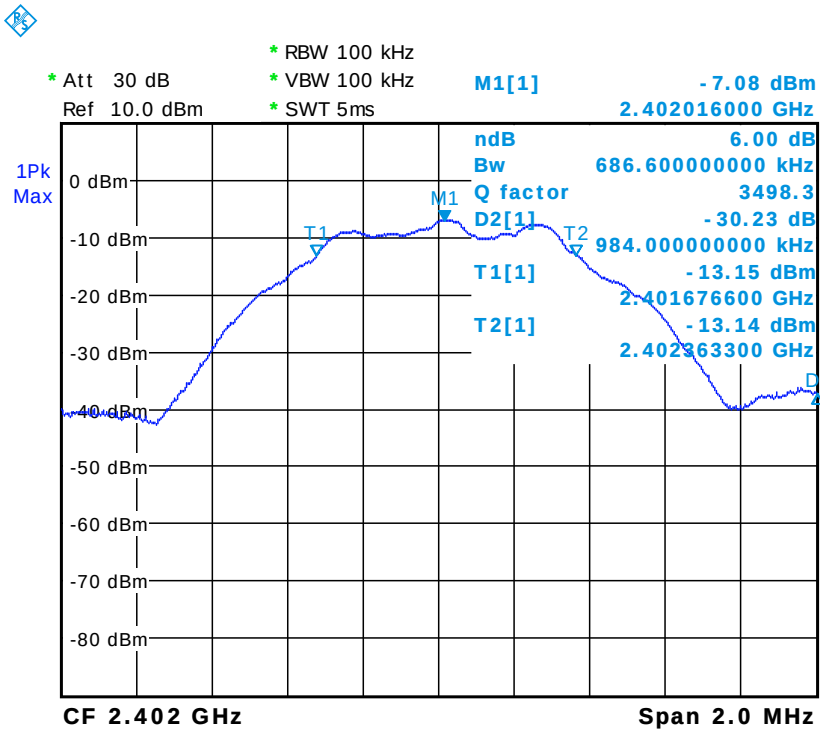
1. Set the EUT under continuous transmission condition.
2. The EUT was set to the highest available power level.

4.3.6: TEST RESULTS

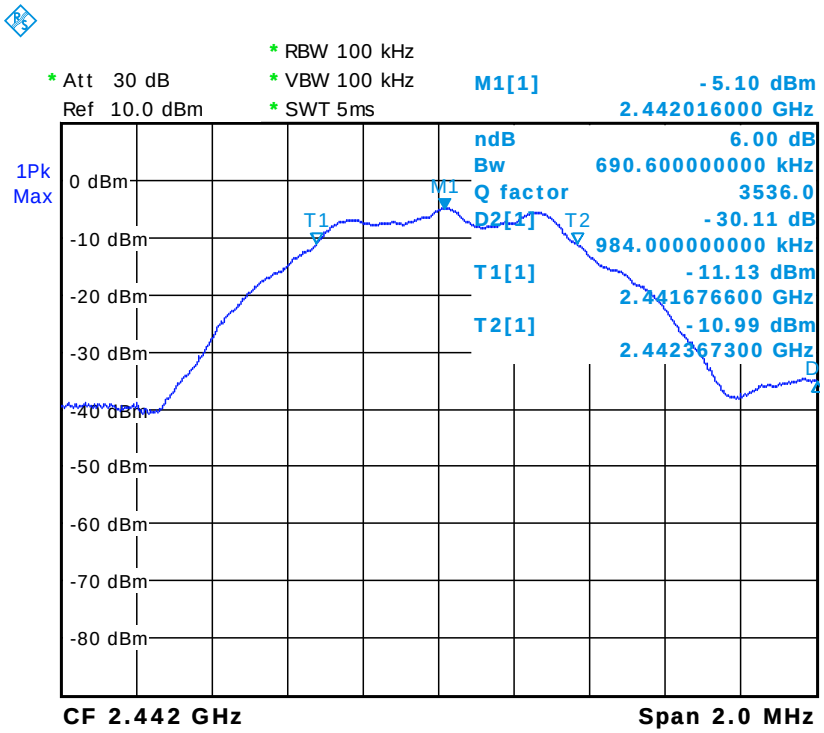
Temperature:	27 °C	Humidity:	58 %RH
Spectrum Detector:	PK.	Tested By:	Paul Huang
		Tested Date:	Oct. 09, 2012

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	LIMIT (kHz)	6 dB DOWN BW (kHz)
0	2402	>500	686.6
20	2442	>500	690.6
39	2480	>500	690.6

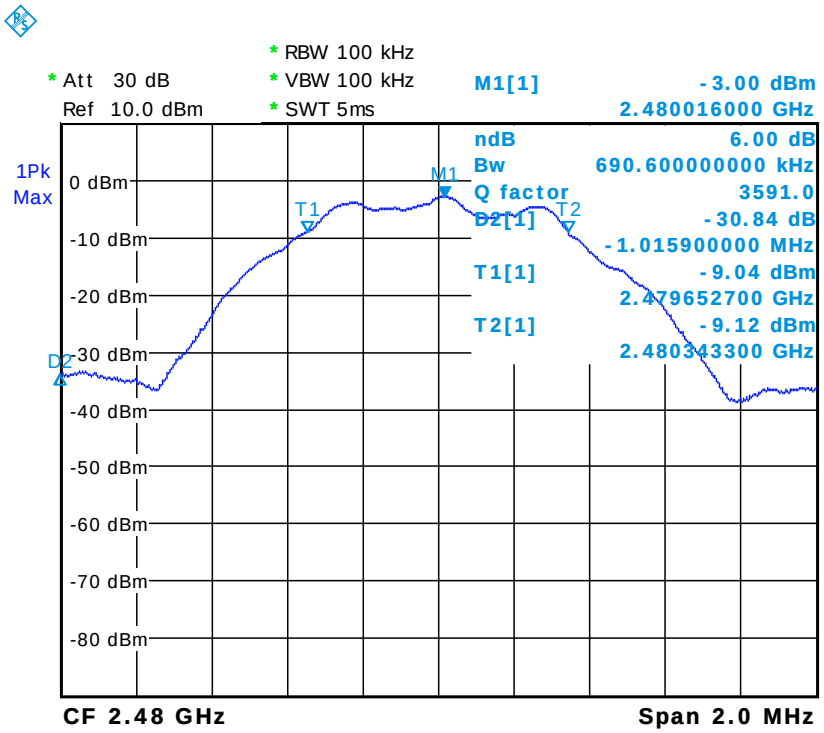
CH00:



CH 20:


* RBW 100 kHz
* Att 30 dB
* VBW 100 kHz
Ref 10.0 dBm
* SWT 5ms
M1[1] -5.10 dBm
2.442016000 GHz
ndB 6.00 dB
Bw 690.600000000 kHz
Q factor 3536.0
D2[1] -30.11 dB
984.000000000 kHz
T1[1] -11.13 dBm
2.441676600 GHz
T2[1] -10.99 dBm
2.442367300 GHz
1Pk
Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
T1
T2
D2
CF 2.442 GHz
Span 2.0 MHz

CH 39:


* RBW 100 kHz
* Att 30 dB
* VBW 100 kHz
Ref 10.0 dBm
* SWT 5ms
M1[1] -3.00 dBm
2.480016000 GHz
ndB 6.00 dB
Bw 690.600000000 kHz
Q factor 3591.0
D2[1] -30.84 dB
-1.015900000 MHz
T1[1] -9.04 dBm
2.479652700 GHz
T2[1] -9.12 dBm
2.480343300 GHz
1Pk
Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
T1
T2
D2
CF 2.48 GHz
Span 2.0 MHz

4.4: PEAK POWER TEST

4.4.1: LIMIT

FCC Part15, Subpart C Section 15.247(b).

Frequency Range (MHz)	The maximum (peak) conducted output power 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)

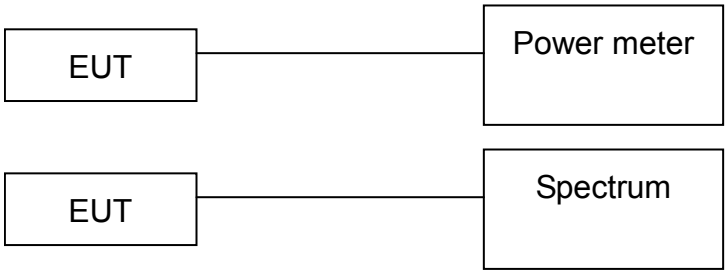
4.4.2: TEST EQUIPMENT

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. 07, 2012 ETC
POWER METER	N/A	BOONTON	4532 77601	NOV. 12, 2012 ETC
POWER SENSOR	DC-18GHz 0.3μW-100mW 50Ω	BOONTON	51011-EMC/ 31184	NOV. 12, 2012 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 continuous transmission mode for each channel.

Record on screen test results.

4.4.5: EUT OPERATING CONDITION

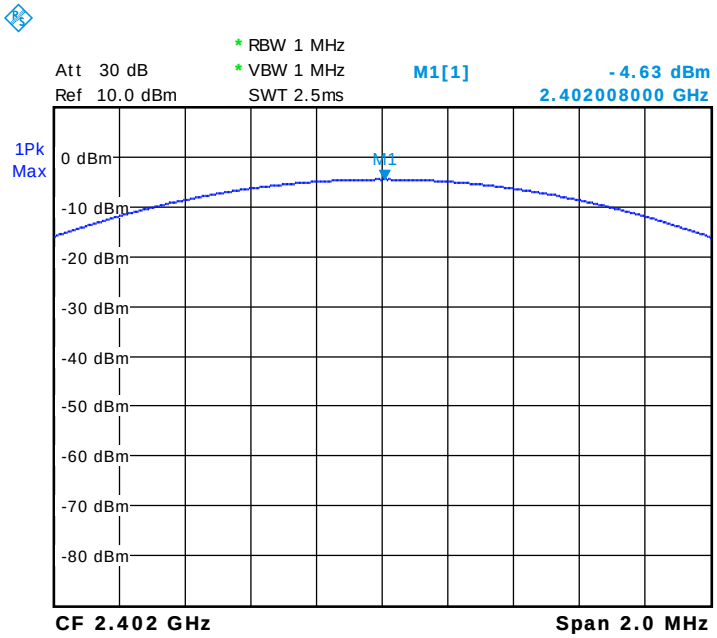
1. Set up the EUT under continuous transmission mode.
2. Configure the EUT to the highest available power level.

4.4.6: TEST RESULT

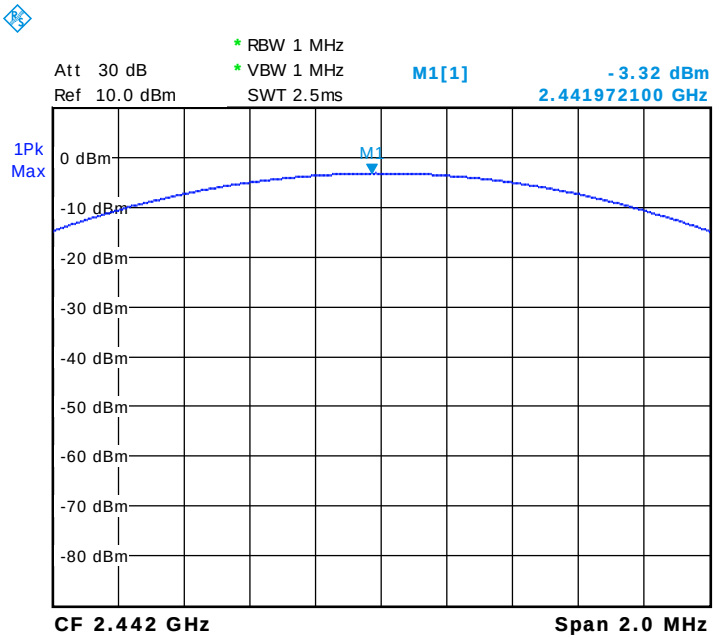
Temperature:	27 ˚C	Humidity:	58 %RH
Spectrum Detector:	PK.	Tested Mode:	See below
Tested By:	Paul Huang	Modulation Type:	GFSK
Tested Date:	Sep. 06, 2012		

Channel Number	Channel Frequency (MHz)	Output Power (dBm)	Power Limit (dBm)
00	2402	-4.63	21
20	2442	-3.32	21
39	2480	-1.18	21

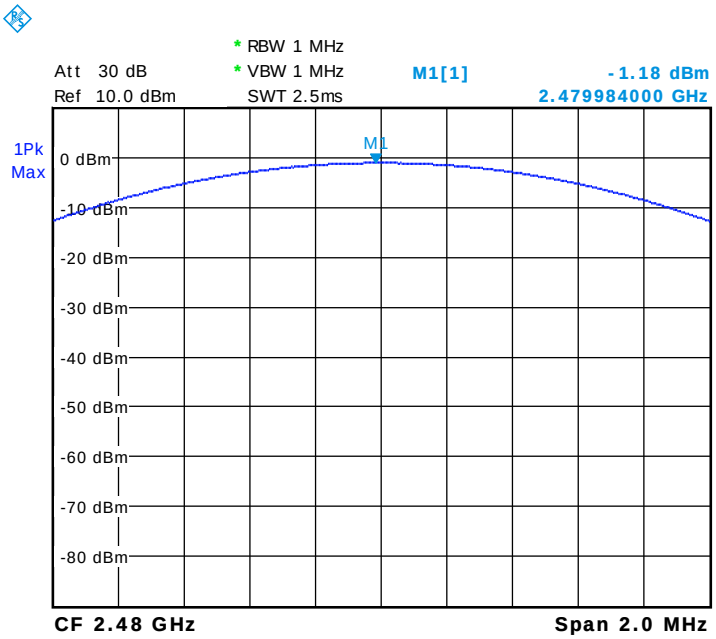
CH00:



CH20:


* RBW 1 MHz
Att 30 dB
* VBW 1 MHz
M1[1]
-3.32 dBm
Ref 10.0 dBm
SWT 2.5ms
2.441972100 GHz
1Pk
Max
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.442 GHz
Span 2.0 MHz

CH39:


* RBW 1 MHz
Att 30 dB
* VBW 1 MHz
M1[1]
-1.18 dBm
Ref 10.0 dBm
SWT 2.5ms
2.479984000 GHz
1Pk
Max
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.48 GHz
Span 2.0 MHz

4.5: BAND EDGE TEST

4.5.1: LIMIT

FCC Part15, Subpart C Section 15.247(d). 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

4.5.2: TEST EQUIPMENT

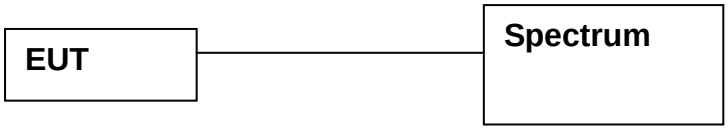
The following test equipment was used during the test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE oF CAL. & CAL. CENTER
SPECTRUM ANALYZER	9kHz-40GHz	ROHDE & SCHWARZ	FSP40/ 100093	DEC. 07, 2012 ETC
EMI TEST RECEIVER	9kHz-6GHz	ROHDE & SCHWARZ	ESL/ 100176	APR. 04, 2013 ETC
SPECTRUM	9kHz-40GHz	ROHDE & SCHWARZ	FSP40/ 100093	DEC. 07, 2012 ETC
HORN ANTENNA	1 GHz - 18 GHz	EMCO	3115/ 6881	JAN. 19, 2013 ETC
PRE-AMPLIFIER	1 GHz - 26.5 GHz	HP	8449B/ 3008A01995	JAN. 11, 2013 ETC
K-TYPE CABLE	1 m	HUBER SUHNER	SF 102-40/2*11/ 23934/2	OCT. 27, 2012 ETC
RF CABLE	1.5M	JYEBAO	A30A30-L 142 / EQF-0035	JAN. 04,2013 ETC
RF CABLE	3.5M	JYEBAO	A30A30-L 142 (G3.5M)/ EQF-0036(002)	JAN. 04,2013 ETC

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

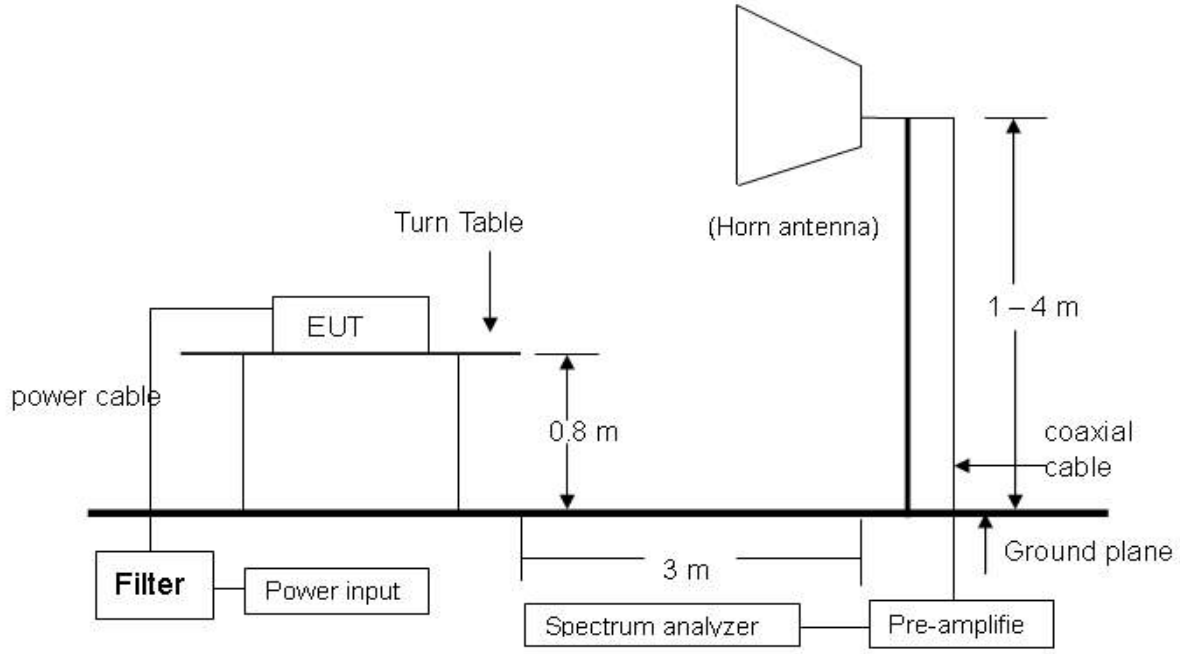
4.5.3: TEST SET-UP

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.

4.5.4: 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.

4.5.5: EUT OPERATING CONDITION

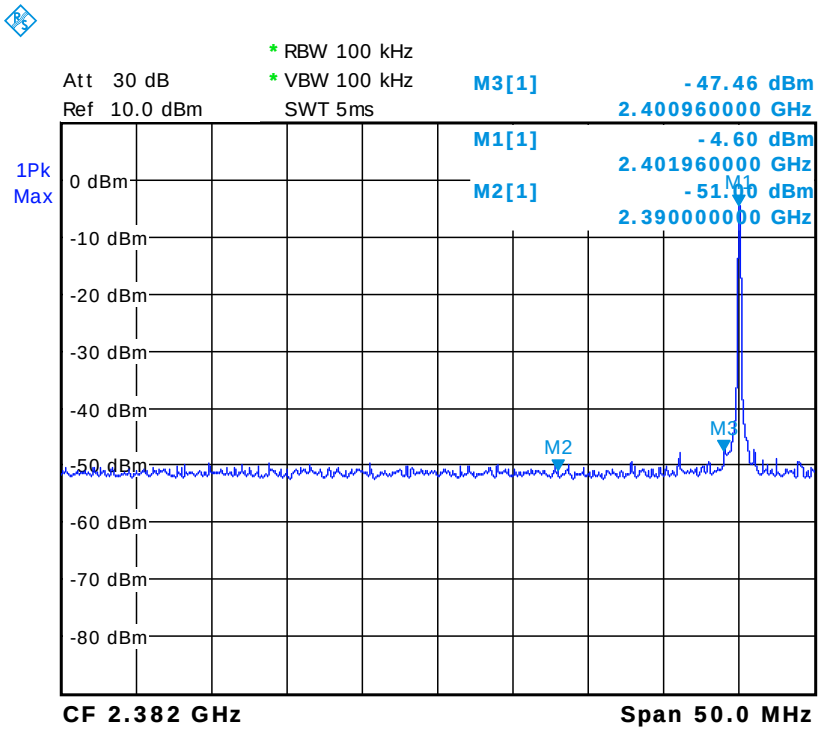
1. Set the EUT under continuous transmission condition.
2. The EUT was set to the highest available power level.

4.5.6: TEST RESULTS: CONDUCTED

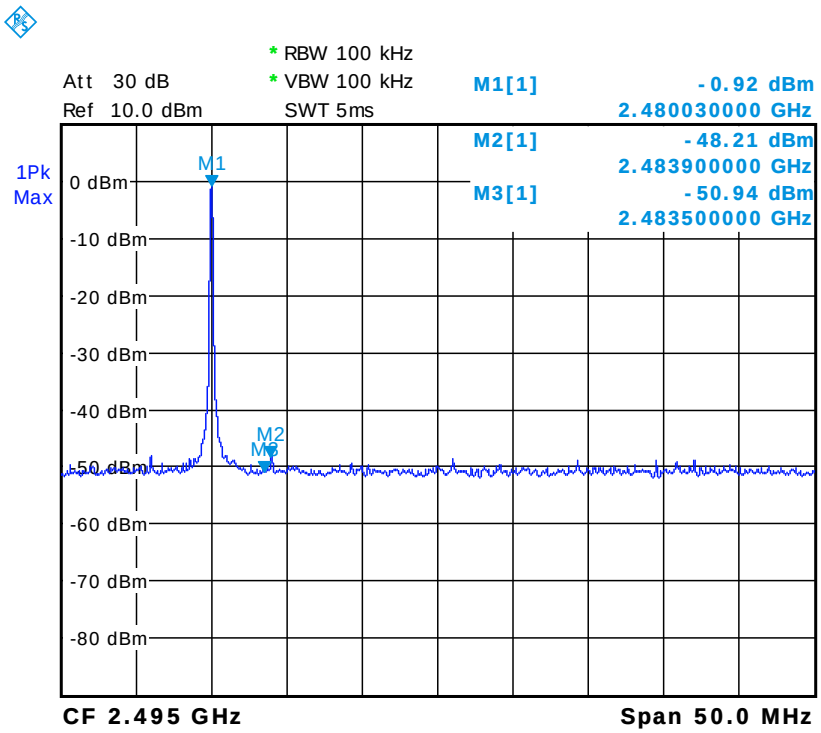
Temperature:	27˚C	Humidity:	59%RH
Spectrum Detector:	PK. or AV.	Tested Mode:	N/A
Tested By:	Paul Huang	Modulation Type:	GFSK
Tested Date:	Sep. 6, 2012		

Frequency (MHz)	Peak Power Output (dBm)	Emission read Value(dBm)	Result of Band edge (dBc)	Band edge LIMIT (dBc)
<2400	-4.60	-51.00	46.40	>20dBc
>2484	-0.92	-48.21	47.29	>20dBc

Below 2400MHz (CH00):



Above 2483.5 MHz (CH39):

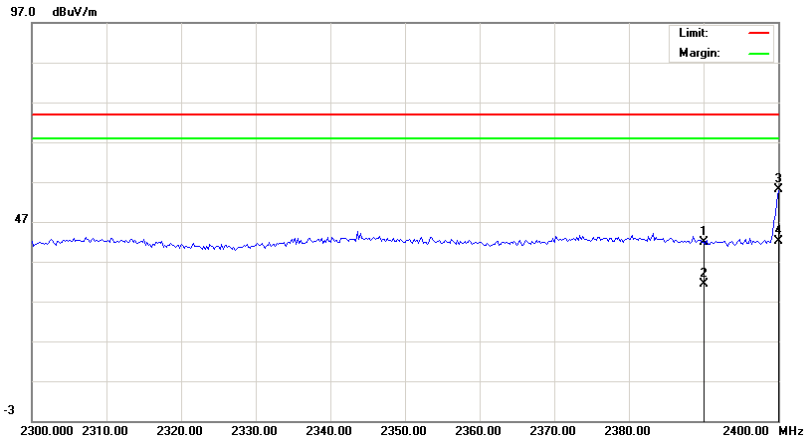


4.5.7: TEST RESULTS: RADIATED

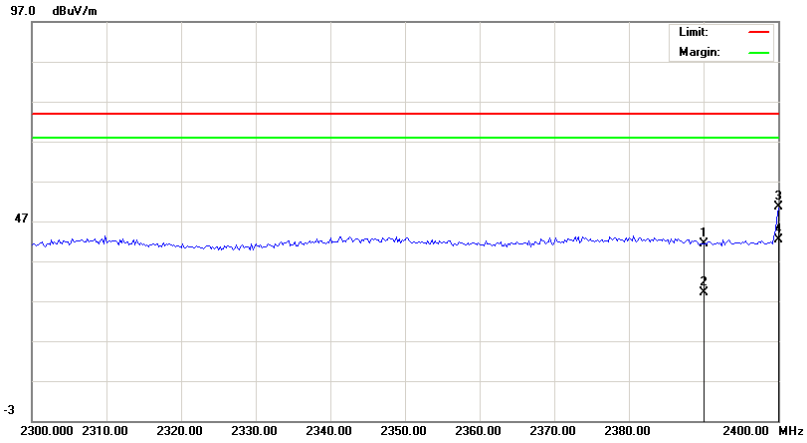
Temperature:	27 ˚C	Humidity:	58 %RH
Spectrum Detector:	PK. or AV.	Tested Mode:	N/A
Tested By:	Paul Huang	Modulation Type:	GFSK
Tested Date:	Sep. 6, 2012		

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
2400.00	-31.15	28.18	H	58.11	45.14	55.14	42.17	74.00	54.00	-18.86	-11.83
2400.00	-31.15	28.18	V	53.57	45.38	50.60	42.41	74.00	54.00	-23.40	-11.59
2390.00	-31.16	28.16	H	41.81	31.32	38.81	28.32	74.00	54.00	-35.19	-25.68
2390.00	-31.16	28.16	V	44.29	32.17	41.29	29.17	74.00	54.00	-32.71	-24.83

Horizontal:

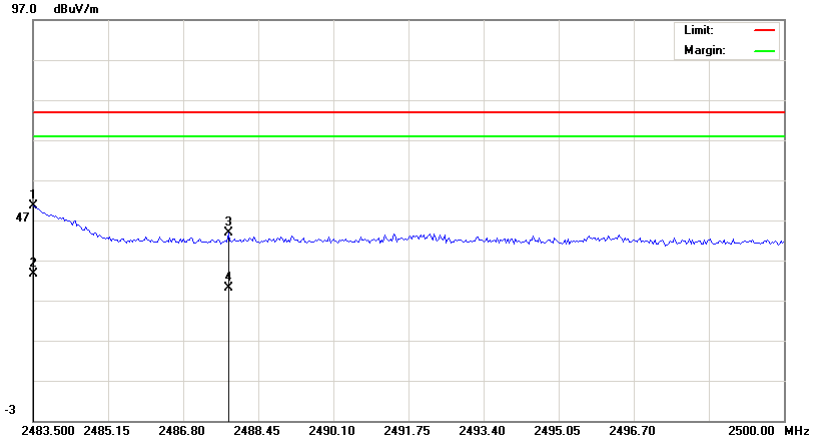


Vertical:

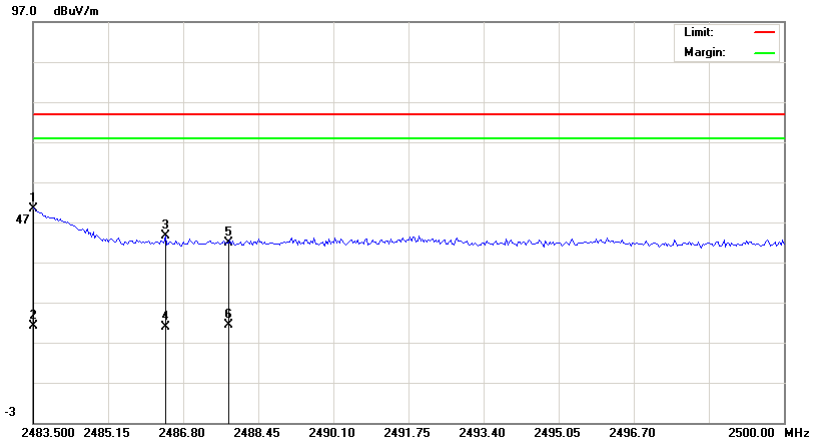


Above 2483.5 MHz											
Frequency (MHz)	Ant. Pol. (H/V)	Correct Factor (dB)	Ant. Fac. (dB)	Reading (dBuV)		Emission (dBuV/m)		Limit Line (dBuV/m)		Over Limit (dBuV/m)	
				PK	AV	PK	AV	PK	AV	PK	AV
2483.50	-31.05	28.36	H	53.31	36.23	50.62	33.54	74.00	54.00	-23.38	-20.46
2483.50	-31.05	28.36	V	53.19	23.70	50.50	21.01	74.00	54.00	-23.50	-32.99
2487.79	-31.05	28.37	H	46.58	32.71	43.91	30.04	74.00	54.00	-30.09	-23.96
2487.79	-31.05	28.37	V	44.47	24.11	41.80	21.44	74.00	54.00	-32.20	-32.56

Horizontal:



Vertical:



4.6: POWER DENSITY TEST

4.6.1: LIMIT

FCC Part15, Subpart C Section 15.247(e)

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

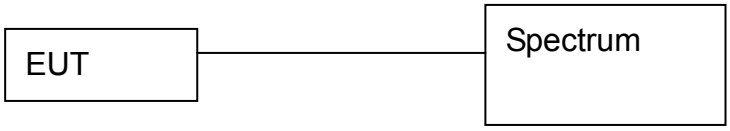
4.6.2: TEST EQUIPMENT

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

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
SPECTRUM ANALYZER	9K TO 40GHz	ROHDE & SCHWARZ	FSP40 / 100093	DEC. 07, 2012 ETC

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

4.6.3: TEST SET-UP



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

4.6.4: TEST PROCEDURE

The EUT was operating in continuous transmission mode for each channel.

Record on screen test results.

4.6.5: EUT OPERATING CONDITION

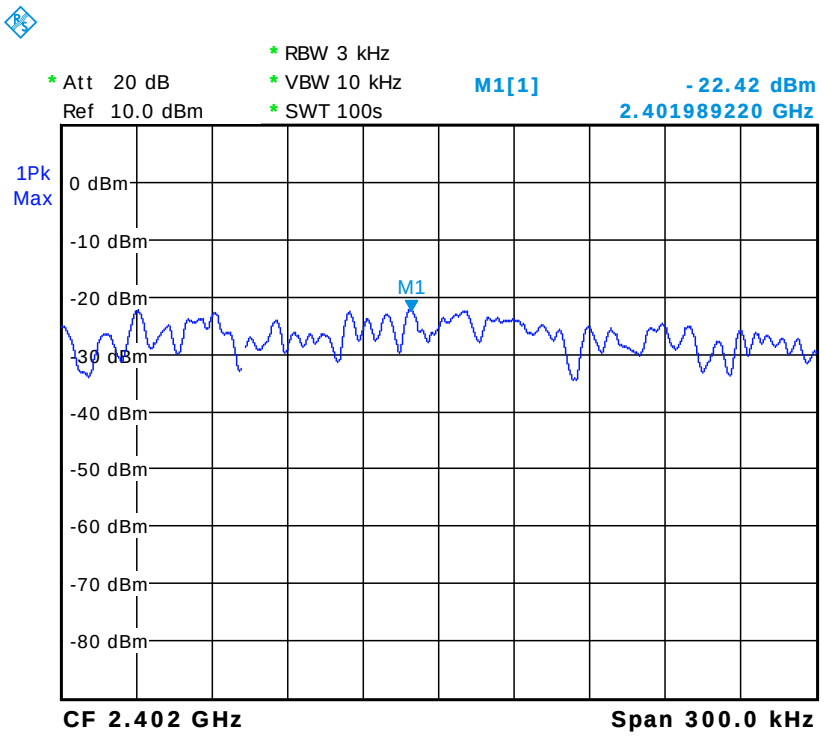
1. Set up the EUT under continuous transmission mode.
2. Configure the EUT to the highest available power level.

4.6.6: TEST RESULT

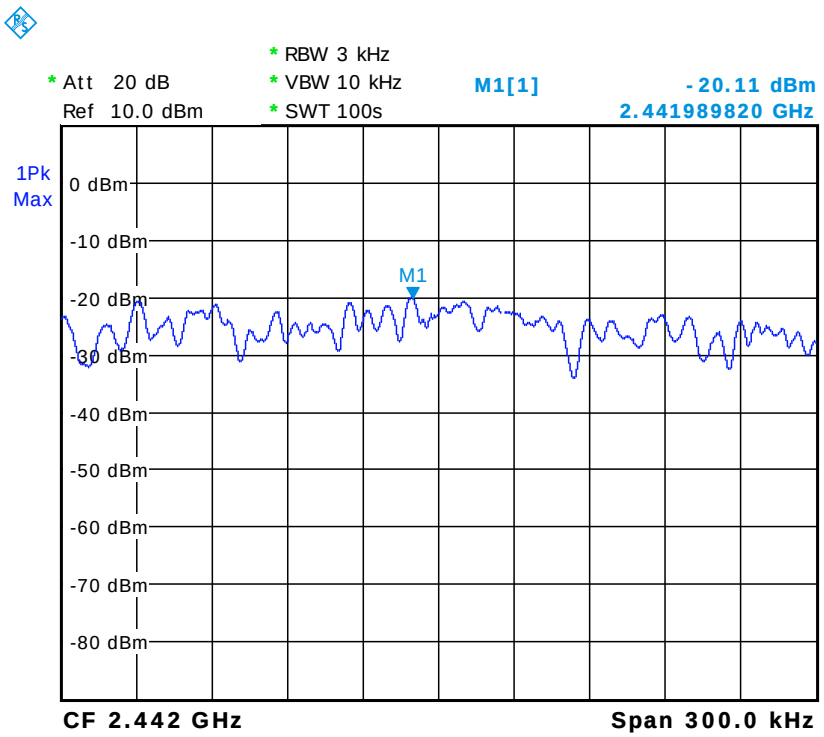
Temperature:	27˚C	Humidity:	57%RH
Spectrum Detector:	PK.	Tested Mode:	See below
Tested By:	Paul Huang	Modulation Type:	GFSK
Tested Date:	Oct. 09, 2012		

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3KHz BW (dBm/3kHz)	MAXIMUM LIMIT (dBm/3kHz)
00	2402	-22.42	8
20	2442	-20.11	8
39	2480	-17.08	8

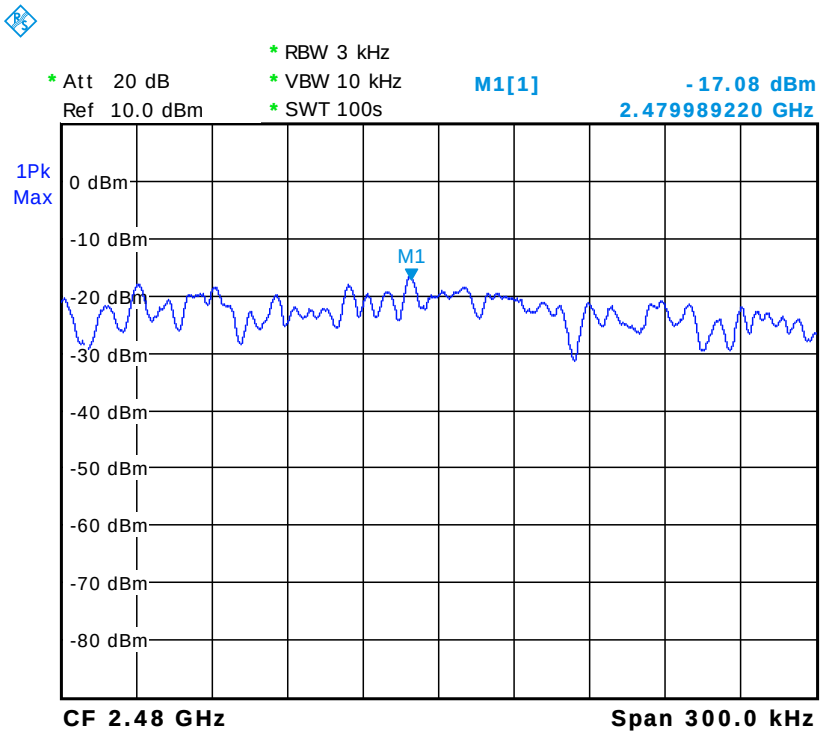
CH 00:



CH20:


* RBW 3 kHz
* Att 20 dB
* VBW 10 kHz
M1[1]
-20.11 dBm
Ref 10.0 dBm
* SWT 100s
2.441989820 GHz
1Pk
Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.442 GHz
Span 300.0 kHz

CH39:


* RBW 3 kHz
* Att 20 dB
* VBW 10 kHz
M1[1]
-17.08 dBm
Ref 10.0 dBm
* SWT 100s
2.479989220 GHz
1Pk
Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.48 GHz
Span 300.0 kHz

4.7: 20 DB BANDWIDTH TEST

4.7.1: LIMIT

None. For reference only.

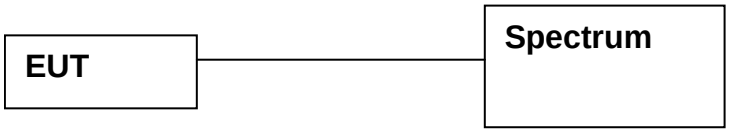
4.7.2: TEST EQUIPMENT

The following test equipment was used during the test:

Equipment/ Facilities	Specifications	Manufacturer	Model#/ Serial#	Due Date Of Cal. & Cal. Center
SPECTRUM ANALYZER	9 kHz-40 GHz	ROHDE & SCHWARZ	FSP40/ 100093	DEC. 07, 2012 ETC

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

4.7.3: TEST SET-UP



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

4.7.4: TEST PROCEDURE

The EUT was operated in continuous transmission mode or any specific channel.

Record the test result from the spectrum analyzer screen.

4.7.5: EUT OPERATING CONDITION

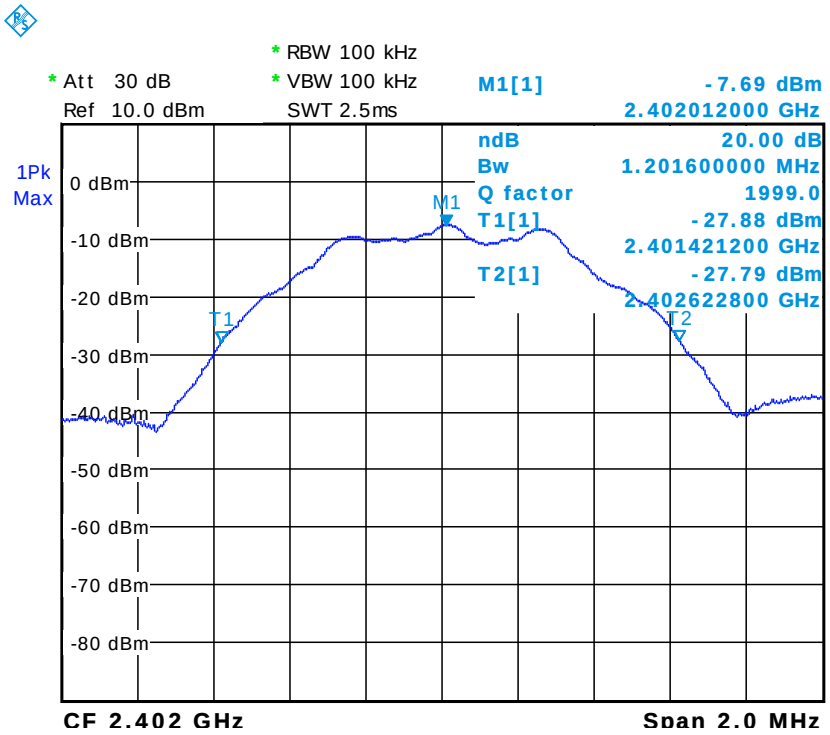
1. Set the EUT under continuous transmission condition.
2. The EUT was set to the highest available power level.

4.7.6: TEST RESULTS

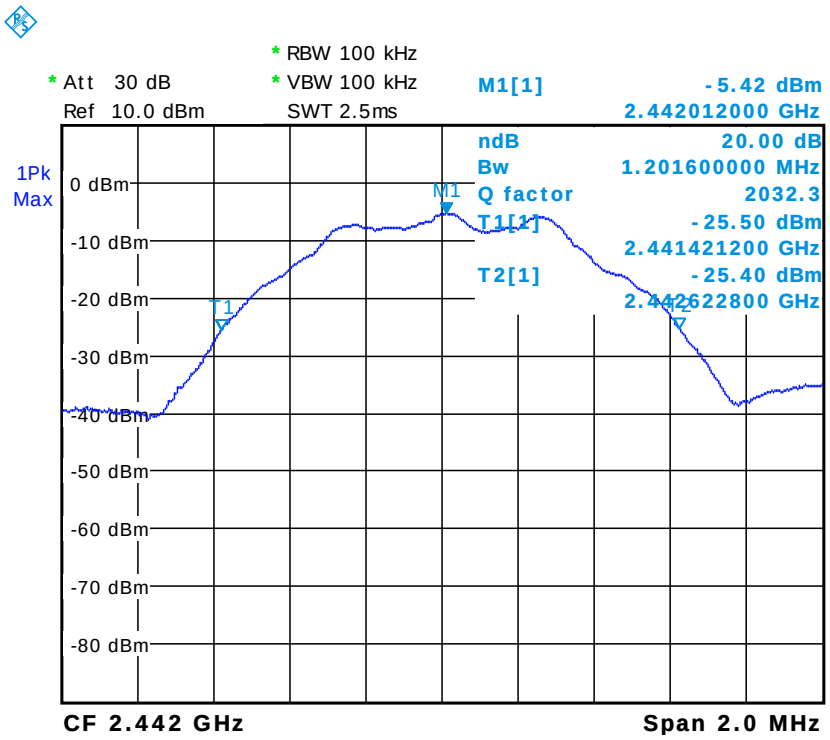
Temperature:	27 °C	Humidity:	58 %RH
Spectrum Detector:	PK.	Tested By:	Paul Huang
		Tested Date:	Oct. 09, 2012

Channel Number	Channel Frequency (MHz)	20 dB Down BW (kHz)
0	2402	1.2016
20	2442	1.2016
39	2480	1.2016

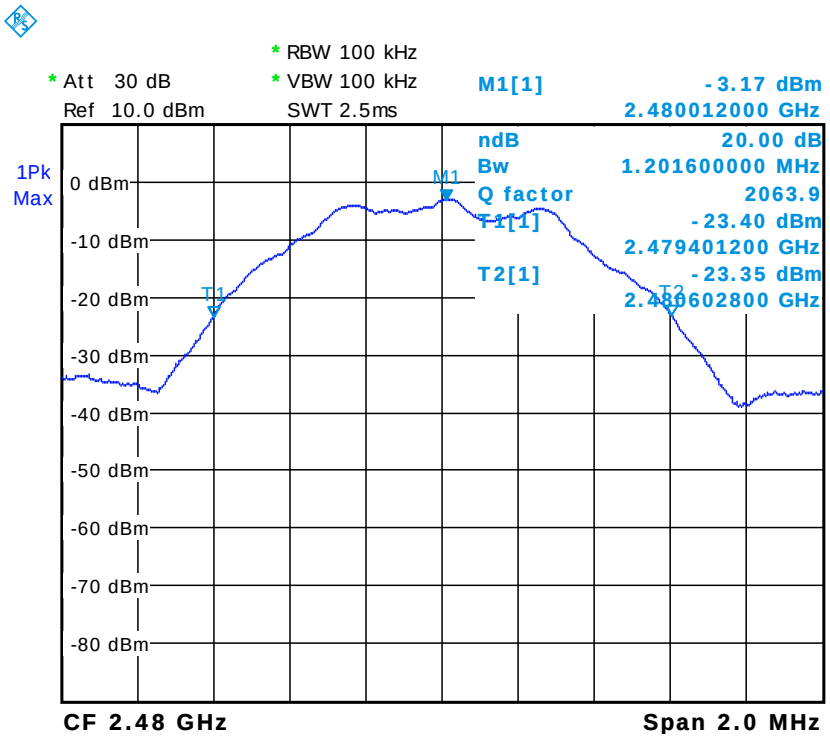
CH00:



CH20:


* RBW 100 kHz
* Att 30 dB
* VBW 100 kHz
Ref 10.0 dBm
SWT 2.5ms
M1[1] -5.42 dBm
2.442012000 GHz
ndB 20.00 dB
Bw 1.201600000 MHz
Q factor 2032.3
T1[1] -25.50 dBm
2.441421200 GHz
T2[1] -25.40 dBm
2.442622800 GHz
1Pk
Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
T1
T2
CF 2.442 GHz
Span 2.0 MHz

CH39:


* RBW 100 kHz
* Att 30 dB
* VBW 100 kHz
Ref 10.0 dBm
SWT 2.5ms
M1[1] -3.17 dBm
2.480012000 GHz
ndB 20.00 dB
Bw 1.201600000 MHz
Q factor 2063.9
T1[1] -23.40 dBm
2.479401200 GHz
T2[1] -23.35 dBm
2.480602800 GHz
1Pk
Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
T1
T2
CF 2.48 GHz
Span 2.0 MHz

4.8: TIME OF OCCUPANCY (DWELL TIME)

4.8.1: LIMIT

FCC Part15, Subpart C Section 15.247(a)(1)(iii).

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Frequency Range (MHz)	Limit (ms)		
	20dB Bandwidth <250Khz (50Channel)	20dB Bandwidth >250 kHZ (25Channel)	20dB Bandwidth <1 MHz (75Channel)
902-928	400(20s)	400(10s)	NA
2400-2483.5	NA	NA	400(30s)
5725-5850	NA	NA	400(30s)

NOTE: The "()" is all channel's average time of occupancy.

4.8.2: 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. 07, 2012 ETC

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

4.8.3: TEST SET-UP

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

4.8.4: TEST PROCEDURE

The EUT was operating in hopping mode.

Record the results from spectrum analyzer.

4.8.5: EUT OPERATING CONDITION

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

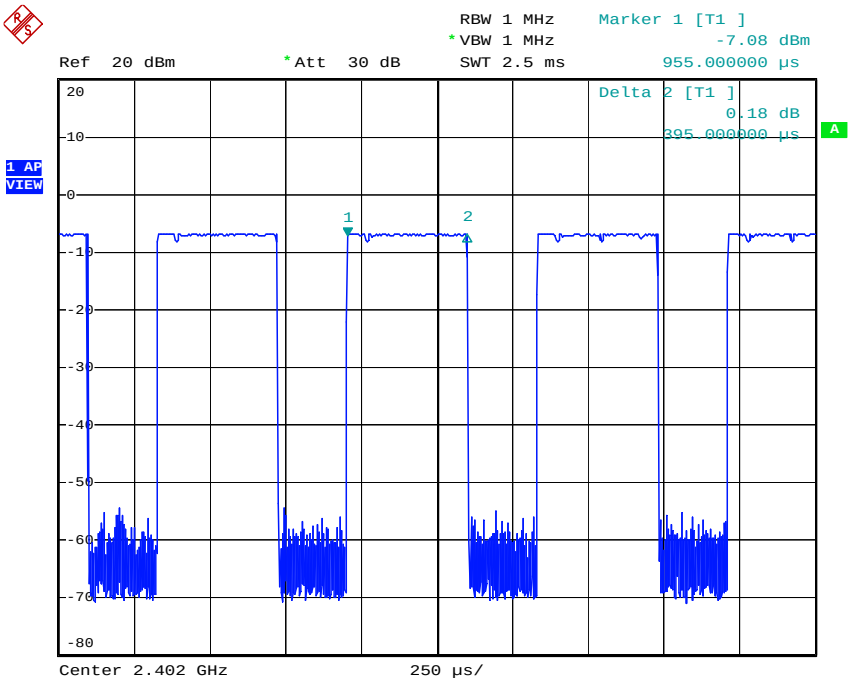
4.8.6: TEST RESULT

Temperature:	28 ˚C	Humidity:	56 %RH
Spectrum Detector:	PK	Tested by:	Paul Huang
Test Result:	PASS	Tested Date:	Sep. 11, 2012

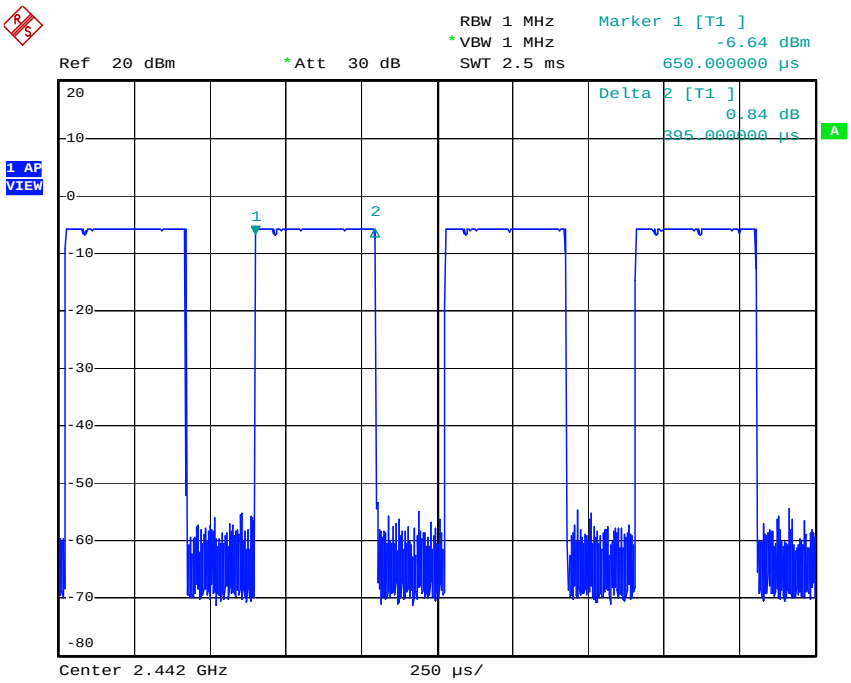
Channel Number	Channel Frequency (MHz)	Pulse Time (μs)	Period Time (s)	Time of Occupancy (Dwell Time) (ms)	Average Time of Occupancy Limit (ms)
0	2402.00	395	16.0	252.8	400
20	2442.00	395	16.0	252.8	400
39	2480.00	395	16.0	252.8	400

Note: Bluetooth Low Energy utilizes 40 channels
Period time = 0.4(ms) x 40 = 16 (s), Hopping number = 1600/s
CH00 = 0.395 (ms) x (1600 / 40) x 16 = 252.8 (ms)
CH20 = 0.395 (ms) x (1600 / 40) x 16 = 252.8 (ms)
CH39 = 0.395 (ms) x (1600 / 40) x 16 = 252.8 (ms)

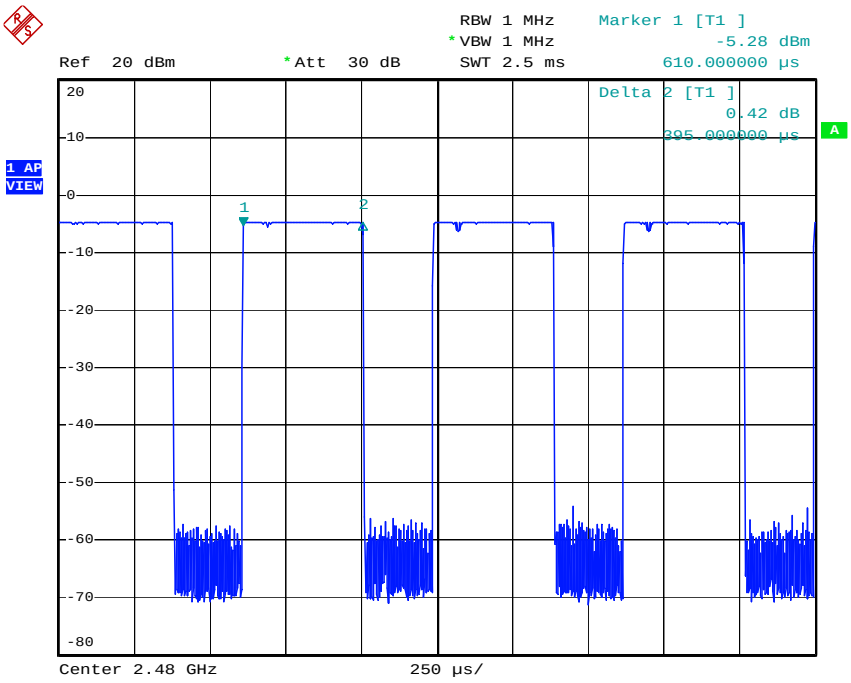
CH00:



CH20:


RBW 1 MHz
*VBW 1 MHz
SWT 2.5 ms
Marker 1 [T1]
-6.64 dBm
650.000000 µs
Ref 20 dBm
*Att 30 dB
Delta 2 [T1]
0.84 dB
395.000000 µs
1 AP
VIEW
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.442 GHz
250 µs/

CH39:


RBW 1 MHz
*VBW 1 MHz
SWT 2.5 ms
Marker 1 [T1]
-5.28 dBm
610.000000 µs
Ref 20 dBm
*Att 30 dB
Delta 2 [T1]
0.42 dB
395.000000 µs
1 AP
VIEW
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.48 GHz
250 µs/

4.9: CHANNEL (CARRIER) FREQUENCY SEPARATION TEST

4.9.1: LIMIT

FCC Part15, Subpart C Section 15.247(a)(1). Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Frequency Range (MHz)	Limit(kHz)
902-928	> 25kHz or 20 dB bandwidth
2400-2483.5	> 25kHz or 20 dB bandwidth
5725-5850	> 25kHz or 20 dB bandwidth

Note: the maximum 20 dB bandwidth measured is 1201.6 kHz

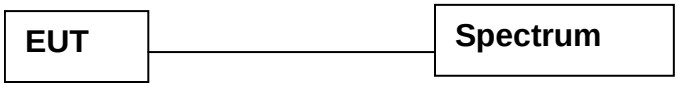
4.9.2: TEST EQUIPMENT

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

Equipment /Facilities	Specification	Manufacture	Model # /Serial #	Due Date of Cal. & Cal. Center
SPECTRUM ANALYZER	9K TO 40GHz	ROHDE & SCHWARZ	FSP40 / 100093	DEC. 07,2012 ETC

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

4.9.3: TEST SET-UP



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

4.9.4: TEST PROCEDURE

The EUT was operating in hopping mode or could be controlled its channel.

Print out the test result from the spectrum by hard copy function.

4.9.5: EUT OPERATING CONDITION

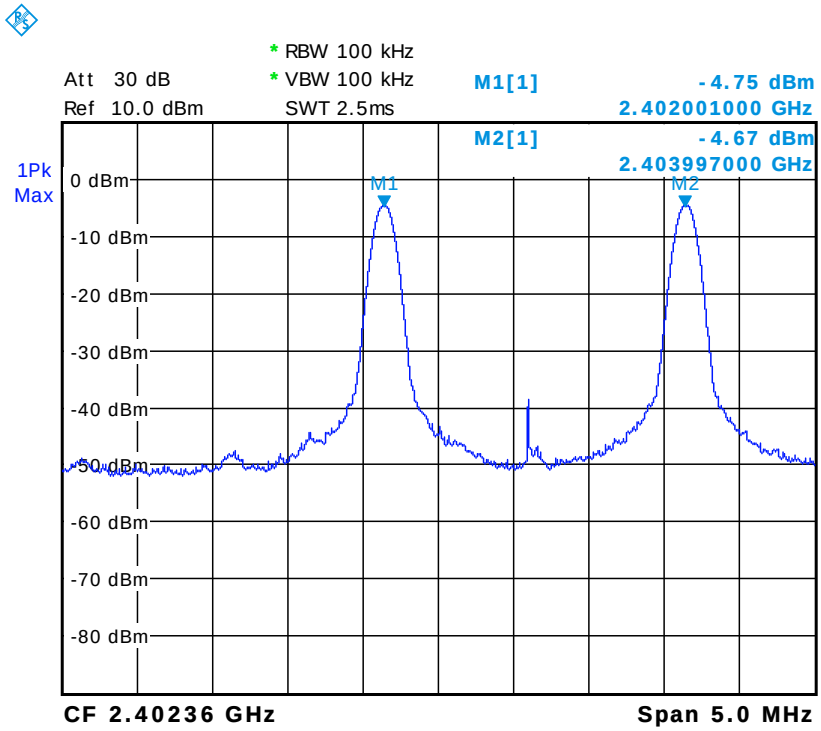
1. Set the EUT under transmission condition continuously at a specific channel frequency.
2. The EUT was set to the highest available power level.

4.9.6: TEST RESULT

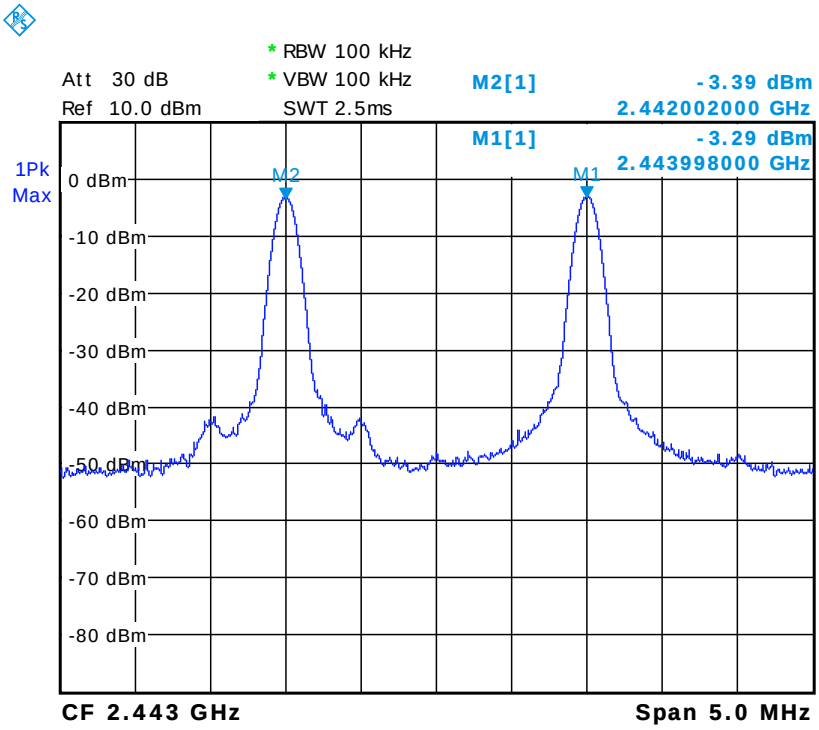
Temperature：	27 °C	Humidity：	57 %RH
Spectrum Detector：	PK	Tested by：	Paul Huang
Test Result：	PASS	Tested Date：	Sep. 06, 2012

Channel Number	Channel Frequency (MHz)	Separation Read Value (kHz)	Minimum Limit (20dB Bandwidth, kHz)
0	2402	1996	1201.6
20	2442	1996	1201.6
39	2480	1996	1201.6

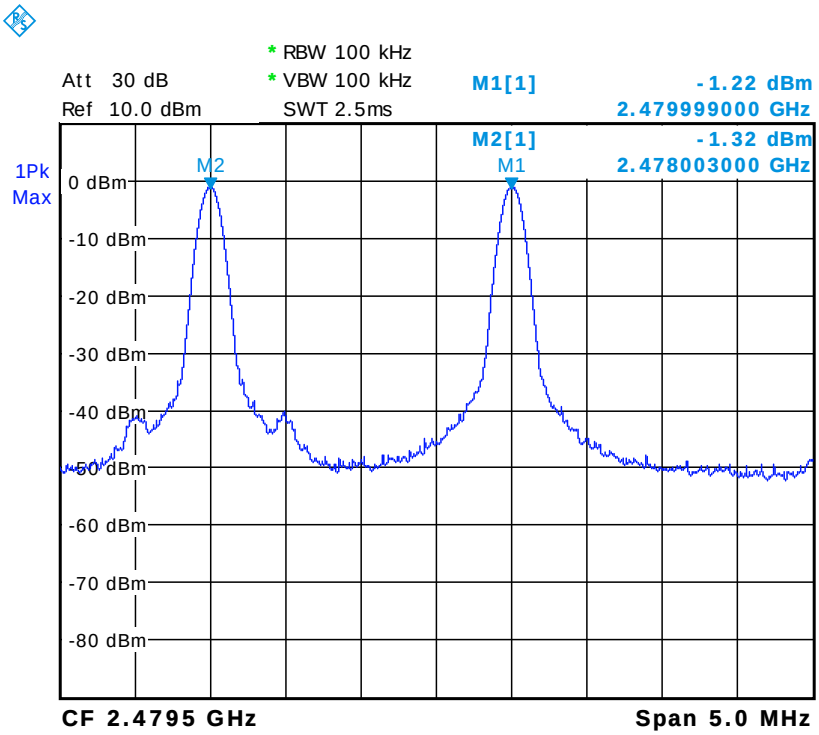
CH00:



CH20:


* RBW 100 kHz
Att 30 dB
* VBW 100 kHz
M2[1]
-3.39 dBm
Ref 10.0 dBm
SWT 2.5ms
2.442002000 GHz
M1[1]
-3.29 dBm
2.443998000 GHz
1Pk
Max
M2
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.443 GHz
Span 5.0 MHz

CH39:


* RBW 100 kHz
Att 30 dB
* VBW 100 kHz
M1[1]
-1.22 dBm
Ref 10.0 dBm
SWT 2.5ms
2.479999000 GHz
M2[1]
-1.32 dBm
2.478003000 GHz
1Pk
Max
M2
M1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4795 GHz
Span 5.0 MHz

4.10: QUANTITY OF HOPPING CHANNELS TEST

4.10.1: LIMIT

FCC Part15, Subpart C Section 15.247(a)(b).

Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels.

Frequency Range (MHz)	Limit (Quantity of Hopping Channel)			
	20dB Bandwidth <250kHZ	20dB Bandwidth >250kHZ	20dB Bandwidth <1MHz	20dB Bandwidth >1MHz
902-928	50	25	N/A	N/A
2400-2483.5	N/A	N/A	75	15
5725-5850	N/A	N/A	75	N/A

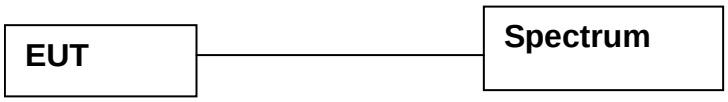
4.10.2: TEST EQUIPMENT

The following test equipment was used during the test：

Equipment /Facilities	Specification	Manufacture	Model # /Serial #	Due Date of Cal. & Cal. Center
SPECTRUM ANALYZER	9K TO 40GHz	ROHDE & SCHWARZ	FSP40 / 100093	DEC. 07, 2012 ETC

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

4.10.3: TEST SET-UP



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

4.10.4: TEST PROCEDURE

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.

4.10.5: EUT OPERATING CONDITION

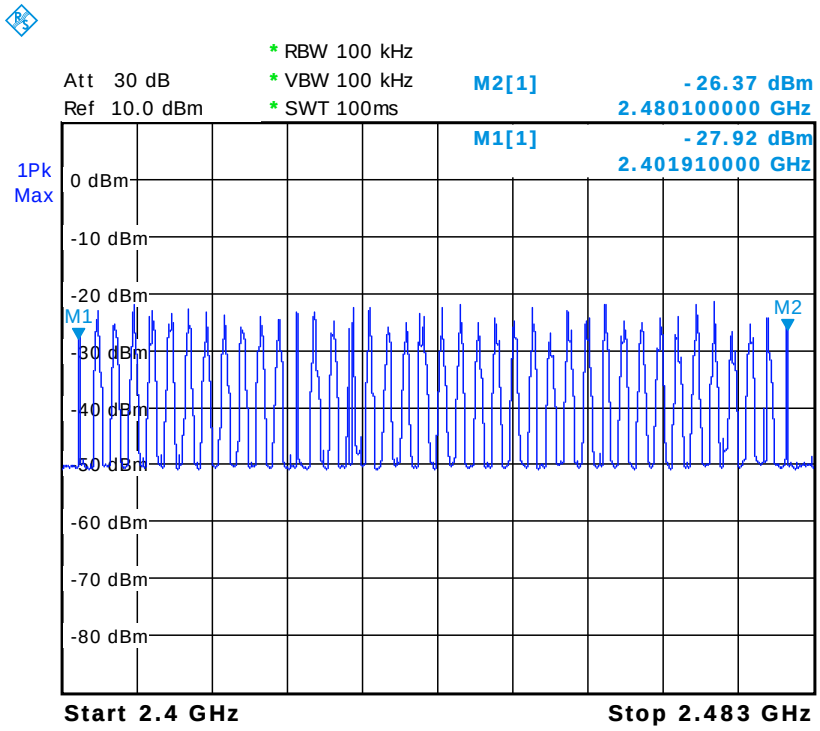
1. Set the EUT under frequency hopping transmission condition.
2. The EUT was set to the highest available power level.

4.10.6: TEST RESULT

Temperature:	27 °C	Humidity:	58 %RH
Spectrum Detector:	PK	Tested by:	Paul Huang
Test Result:	PASS	Tested Date:	Sep. 6, 2012

Hopping Channel Frequency Range(MHz)	Quantity of Hopping Channel Read Value	Quantity of Hopping Channel Limit
2402~2480	40	>15

CH00 ~ CH39 :



5: Antenna application

5.1: ANTENNA REQUIREMENT

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

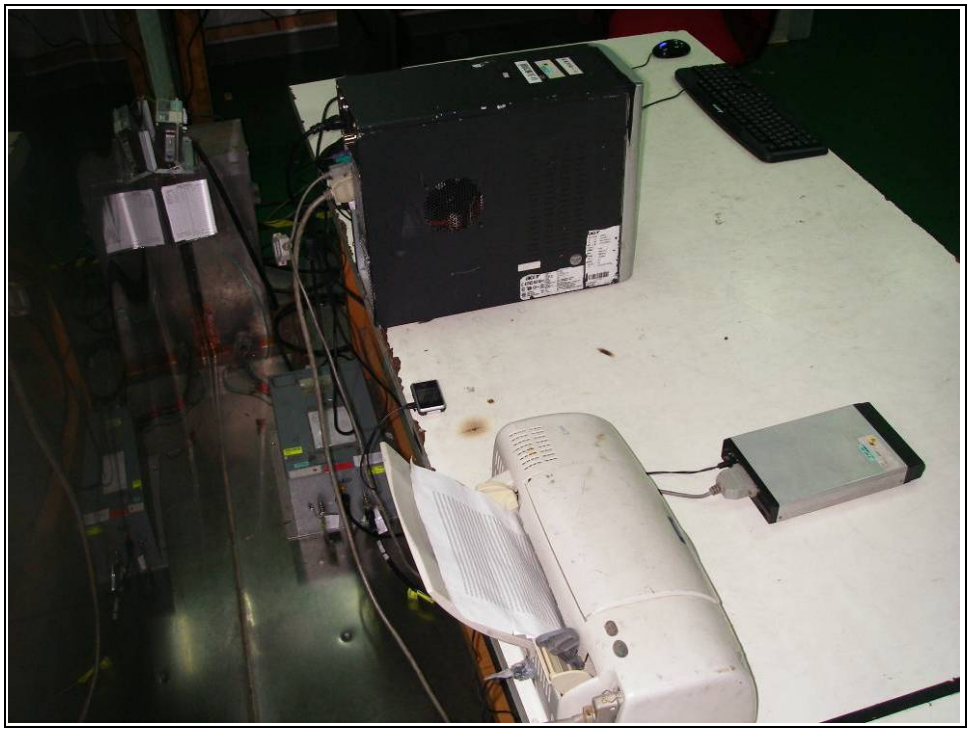
FCC part15C section15.247 requirement:
Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

5.2: RESULT

The EUT has a mono pole antenna. The antenna gain is -2.85 dBi that meets the requirement.

6: PHOTOS OF TESTING

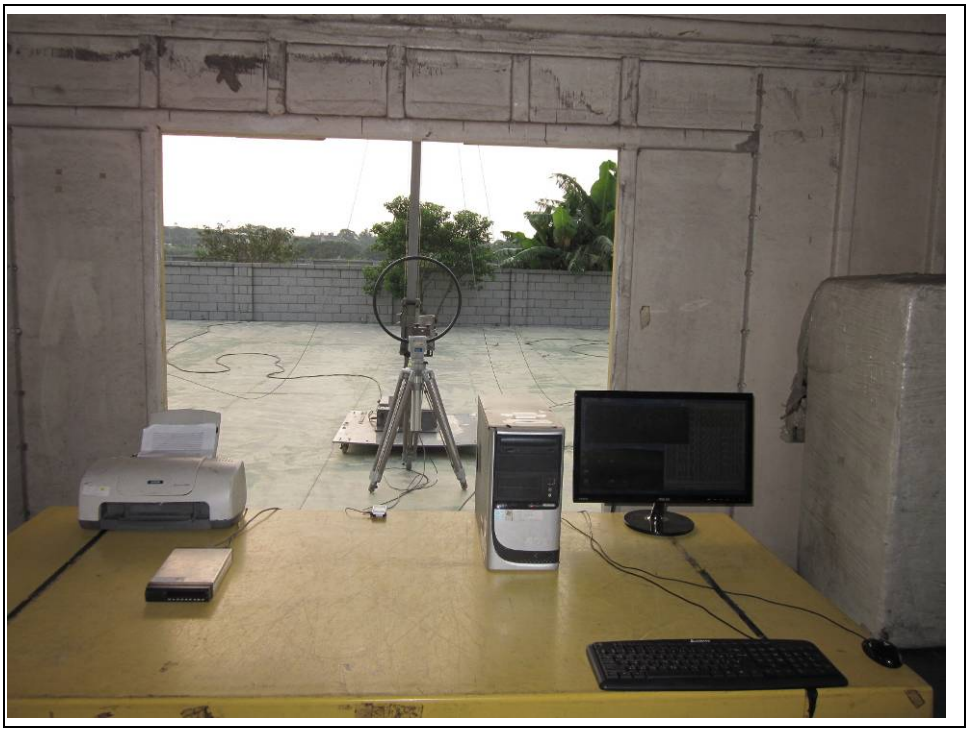
- Conducted test (Charge)



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

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

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

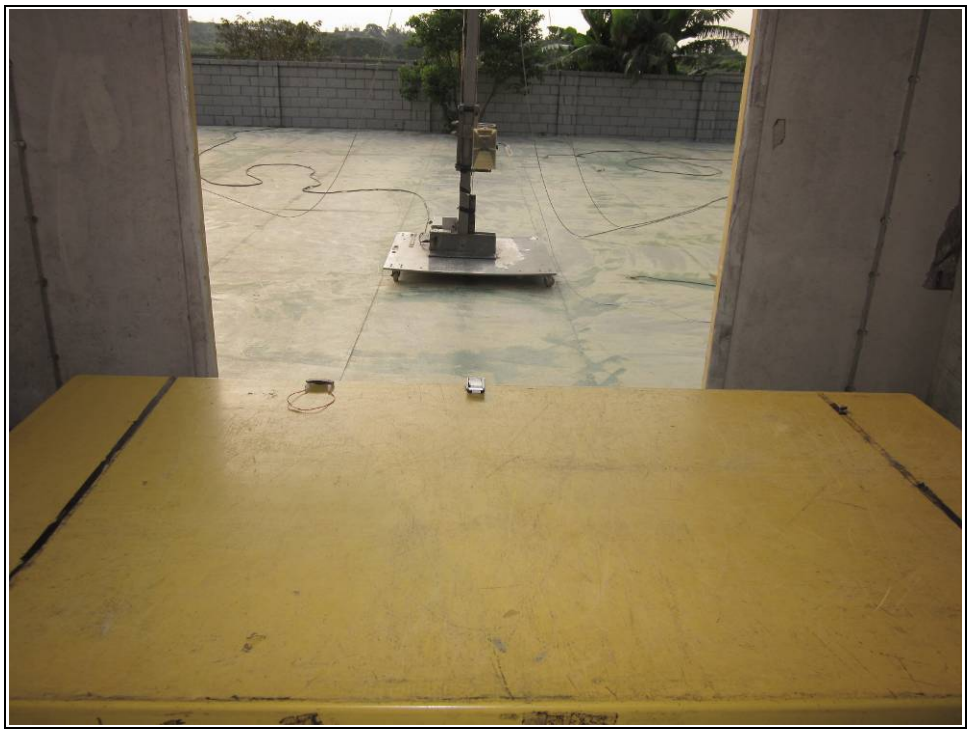


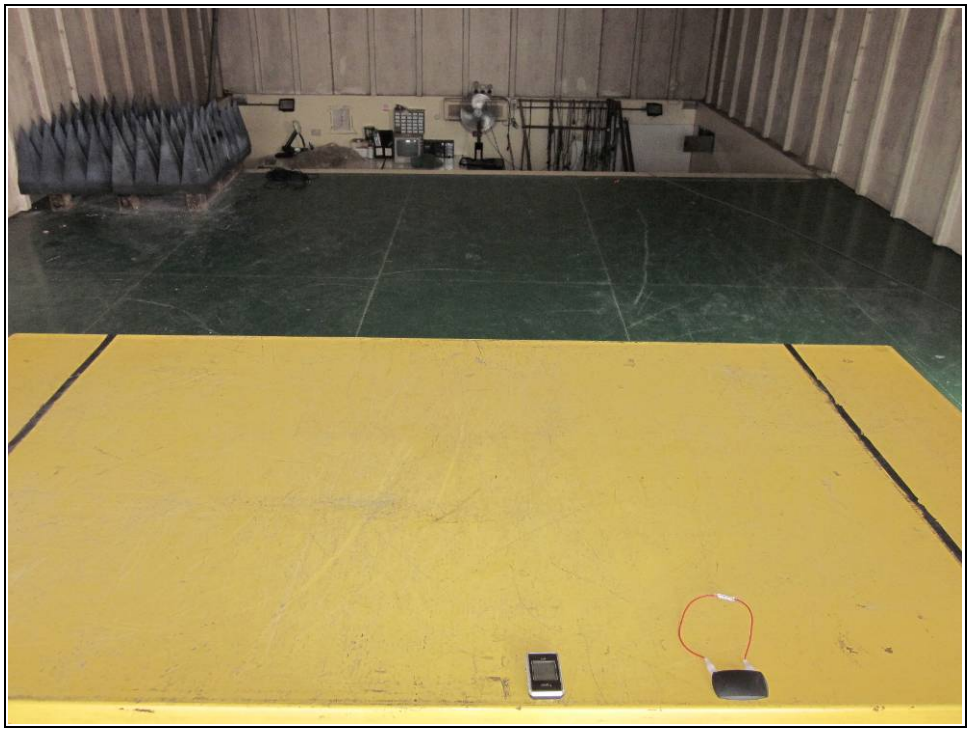
- Radiated test (below 1G ,TX and standby)

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

- Radiated test (below 1G , Link)

- Radiated test (above 1G , Link)





- Radiated test (below 1G , Charge)

- Radiated test (above 1G , charge)

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