



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.: A12053104
Report No.: FCCA12053104
FCC ID : R5M4U-BK1201B
Page: 1 of 38
Date: Dec. 21, 2012

Product Name: 4U-GFSK RF Module
Model No.: 4U-BK1201B
Applicant: 4U Health Technology Inc.
Fl 2, No. 116, Sangshi Road, Siton, Taichun, Taiwan
Date of Receipt: May. 31, 2012
Finished date of Test: Dec. 21, 2012
Applicable Standards: 47 CFR Part 15, Subpart C
47 CFR Part 15, Subpart B
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 :

Jeff Lo

(Jeff Lo)

Date:

12/21/2012

Approved By :

Johnson Ho

(Johnson Ho, Director)

Date:

12/21/2012





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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.
- DC power source, 9.0Vdc of battery or 9Vdc adapter (Tx) and AC 120 V/60Hz for PC (Rx, from USB port), was used during the test.

1.3 EUT MODIFICATION

- No modification in SRT Lab.



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2. DESCRIPTION OF EUT AND TEST MODE

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	4U-GFSK RF Module
MODEL NO.	4U-BK1201B
POWER SUPPLY	DC 9V power source from battery or power adapter
CABLE	NA
FREQUENCY BAND	2.400 GHz ~ 2.4835 GHz
CARRIER FREQUENCY	2.410 GHz
NUMBER OF CHANNEL	1
RATED RF OUTPUT POWER	75.90 dBuV/m
MODULATION TYPE	GFSK
MODE OF OPERATION	Simplex
ANTENNA TYPE	Printed PCB Antenna
ANTENNA GAIN	2 dBi
OPERATING TEMPERATURE RANGE	-40 ~ 85°C

NOTE:

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

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2.3 DESCRIPTION OF EUT INTERNAL DEVICE

DEVICE	BRAND / MAKER	MODEL #	FCC ID / DOC	REMARK

2.4 EUT OPERATING CONDITION

1. Setup the EUT and all peripheral devices .
2. Turn on the power of all equipment and EUT.
3. Set the EUT under continuous transmission condition, standby and link mode.
4. The EUT was set to the highest available power level.

2.5 DESCRIPTION OF TEST MODE

Mode			Frequency
1	TX	TX	2410 MHz
2		Standby	N/A
3	RX	Link	N/A

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2.6 DESCRIPTION OF SUPPORT UNIT

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	ACER	Aspire SA85	DoC	1.5m unshielded power cable
2	LCD Monitor	ASUS	VS228H	DoC	1.8m unshielded power cord 1.5m shielded data cable. with one core.
3	Keyboard	WinTEK	WM530	DoC	1.8m unshielded data cable.
4	Mouse	WinTEK	WSS30	DoC	1.5m unshielded data cable.
5	Modem	ACEEX	DM-1414	DoC	1.5m unshielded power cord 1.5m shielded data cable.
6	Printer	EPSON	STYLUS C20SX	N/A	1.5m unshielded power cord 1.2m shielded data cable.
7	USB dongle	4U Health Technology Inc	4U-BK1201A	N/A	USB dongle

NOTE:

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



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
15.203	Antenna requirement Limit : max. 6dBi	PASS
15.207	AC Power Conducted Emission	PASS
15.33(a) 15.249	Transmitter Radiated Emissions Limit: Table 15.209	PASS

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4.1 CONDUCTED EMISSION TEST

4.1.1 LIMIT

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

NOTE:

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

4.1.2 TEST EQUIPMENT

The following test equipment was used for the test:

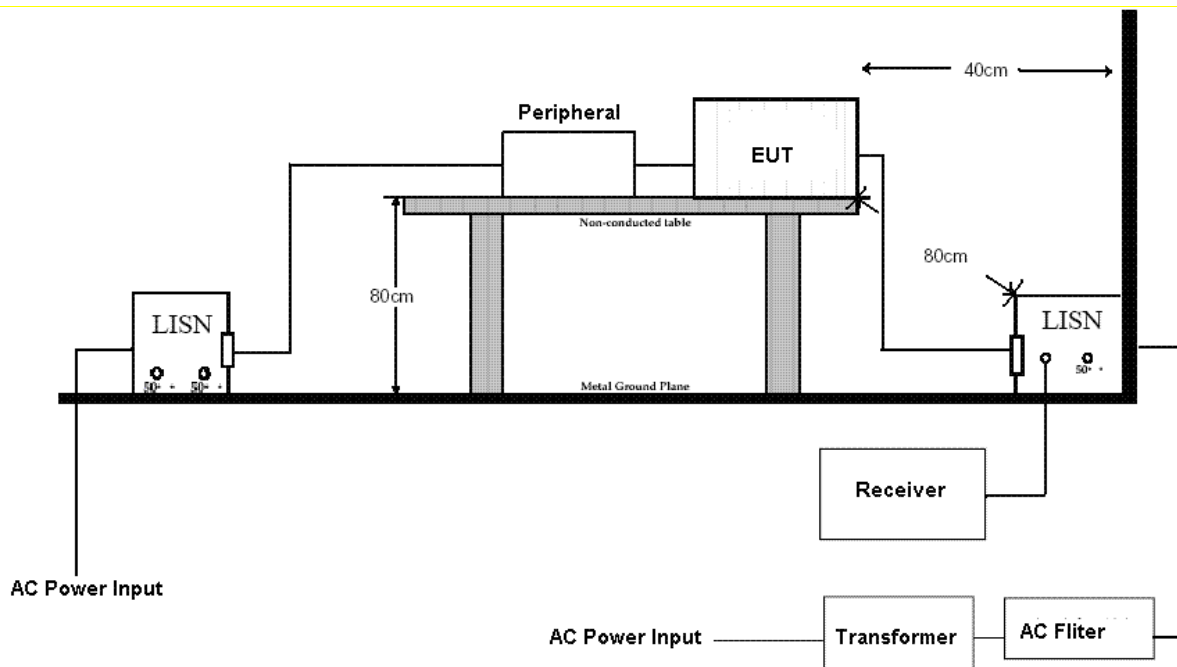
EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER	9 kHz ~ 2.75 GHz	ROHDE & SCHWARZ	ESCS30 / 100376	DEC. 27, 2012 ETC
EMI TEST RECEIVER	9 kHz ~ 30 MHz	ROHDE & SCHWARZ	ESHS30 / 826003/008	FEB. 14, 2013 ETC
LISN	50 μH, 50 ohm	FCC	FCC-LISN-50-25-2 / 01017	JUN. 21, 2013 ETC
LISN	50 μH, 50 ohm	SOLAR	9252-50-R-24-BNC/ 951315	OCT. 28, 2012 ETC
LISN	50 μH, 50 ohm	EMCO	3825/2/ 9204-1952	JUN. 6, 2013 ETC
50Ω BNC TYPE Terminal	50 ohm	N/A	B00-CD-204/ L1TEQU008	JUN. 24, 2013 ETC
50Ω BNC TYPE Terminal	50 ohm	N/A	B00-CD-357/ L1TEQU009	JUN. 24, 2013 ETC
COAXIAL CABLE	5 M	HUBER+ SUHNER	RG214/U / #5M(L1TCAB013)	MAY. 29, 2013 ETC
Filter	2 LINE, 30 A	FIL.COIL	FC-943 / 771	NCR
GROUND PLANE	2 M (H) x 3 M (W)	SRT	N/A	NCR
GROUND PLANE	2.5 M (H) x 3 M (W)	SRT	N/A	NCR
PULSE LIMITER	0 MHz ~ 30 MHz	ROHDE & SCHWARZ	ESH3Z2/ 357.8810.52	MAR. 20, 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.



4.1.3 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.



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4.1.5 TEST RESULT

Temperature:	23 °C	Humidity:	57 %RH
Tested By:	Jeff Lo	Tested Mode:	TX
Receiver Detector:	Q.P. and AV.	Modulation Type:	GFSK
Frequency Range:	0.15 – 30 MHz	Tested Date:	Sep. 10, 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.
0.150	0.14	54.35	51.63	54.49	51.77	66.00	56.00	-11.51	-4.23
0.153	0.14	53.19	50.25	53.33	50.39	65.91	55.91	-12.58	-5.52
0.606	-0.03	32.36	25.56	32.33	25.53	56.00	46.00	-23.67	-20.47
3.329	0.02	35.76	31.37	35.78	31.39	56.00	46.00	-20.22	-14.61
3.378	0.02	35.18	28.87	35.20	28.89	56.00	46.00	-20.80	-17.11
25.035	0.46	36.23	23.43	36.69	23.89	60.00	50.00	-23.31	-26.11

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.
0.150	0.52	55.27	52.34	55.79	52.86	66.00	56.00	-10.21	-3.14
0.153	0.52	54.03	51.02	54.55	51.54	65.91	55.91	-11.36	-4.37
0.529	0.40	34.76	33.58	35.16	33.98	56.00	46.00	-20.84	-12.02
3.309	0.38	38.40	33.96	38.78	34.34	56.00	46.00	-17.22	-11.66
3.378	0.38	38.82	33.51	39.20	33.89	56.00	46.00	-16.80	-12.11
27.536	0.95	38.13	22.71	39.08	23.66	60.00	50.00	-20.92	-26.34

NOTE :

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



4.2 RADIATED EMISSION TEST

4.2.1 LIMIT

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 (dB μ V/m)
0.009 - 0.490	300	2400/F(KHz)
0.490 - 1.705	30	24000/F(KHz)
1.705 - 30	30	30
30 - 88	3	40.0
88 - 216	3	43.5
216 - 960	3	46.0
Above 960	3	54.0

NOTE:

1. 30 dB μ V (in 30m) = 70 dB μ V (in 3m).
2. 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 below 1000MHz (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:

1. In the emission tables above, the tighter limit applies at the band edges.
2. Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.
3. 50mV = 94dB μ V

FCC Part 15, Section 15.35(b) limit of radiated emission for frequency above 1000 MHz

FREQUENCY (MHz)	Class A (dB μ V/m) (at 3m)		Class B (dB μ V/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

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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 ~ 1 GHz	ROHDE & SCHWARZ	ESVS30 / 841977/003	NOV. 2012 ETC
SPECTRUM ANALYZER	9 kHz ~ 7GHz	ROHDE & SCHWARZ	FSP7 / 100289	APR. 2013 ETC
SPECTRUM ANALYZER	9 kHz ~ 40GHz	ROHDE & SCHWARZ	FSP40 / 100093	DEC. 2012 ETC
BI-LOG ANTENNA	30 MHz ~ 2 GHz	SCHAFFNER	CBL6141A / 4181	JUN. 2013 ETC
HORN ANTENNA	1 GHz ~ 18 GHz	EMCO TEST	3115 / 6881	OCT. 2012 ETC
HORN ANTENNA	18 GHz ~ 40 GHz	ETS-LINDGREN	3116/00032255	Jan. 2013 ETC
LOOP ANTENNA	9 kHz ~ 30 MHz	ROHDE & SCHWARZ	HFH2-Z2 / 860 605/002	MAR. 2013 ETC
PRE-AMPLIFIER	1 GHz ~ 26.5 GHz	AGILENT	8449B / 3008A01995	JAN. 2013 ETC
OPEN AREA TEST SITE	3 – 10 M MEASUREMENT	SRT	A02 / SRT002	JUN. 2013 SRT
ANECHOIC CHAMBER	3 M MEASUREMENT	SRT	A01 / SRT001	NOV. 2012 SRT
COAXIAL CABLE	30 M	TIMES	LMR-400 / #30M (L1TCAB014)	MAY. 2013 ETC
RF CABLE	UP TO 18 GHz	JYEBAO	A30A30-L 142 / EQF-0035(001)	JAN. 2013 ETC
RF CABLE	UP TO 18 GHz	JYEBAO	A30A30-L 142 / EQF-0036(002)	JAN. 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

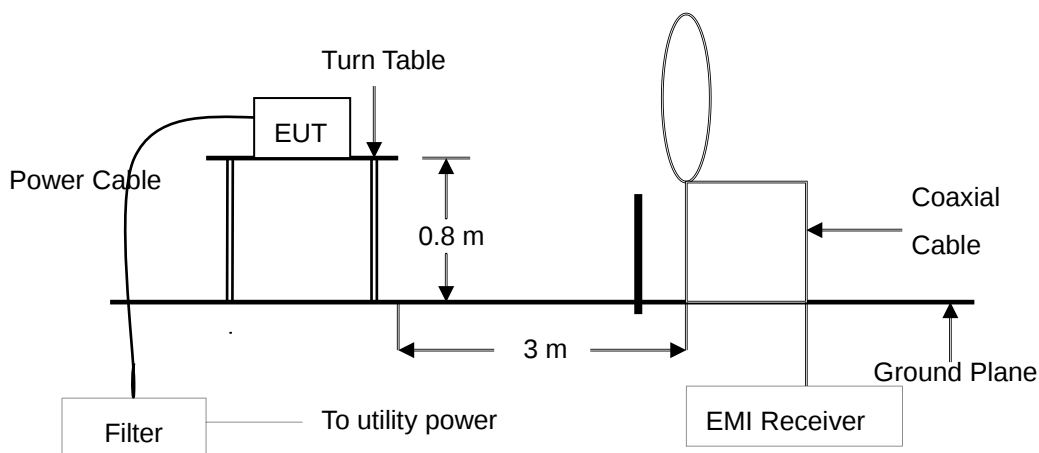
NOTE:

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

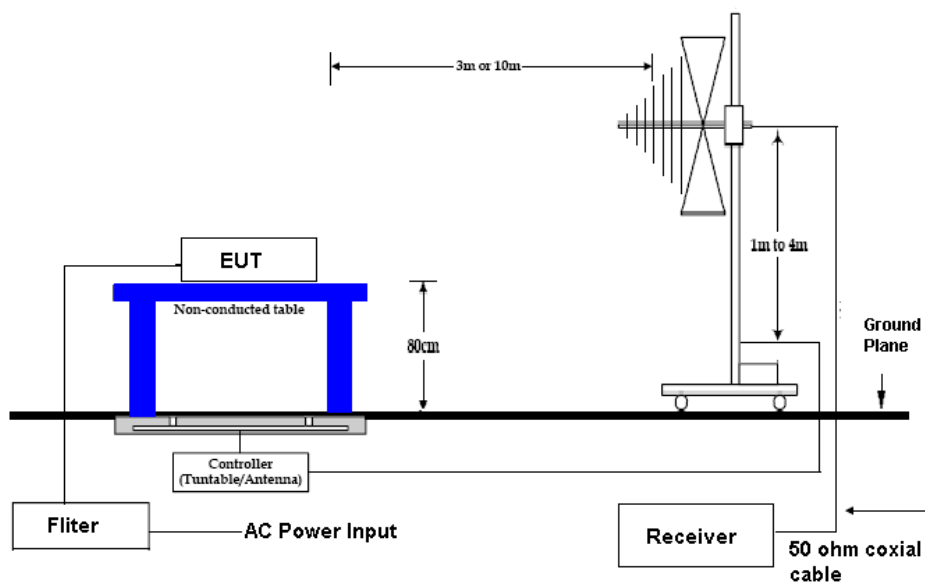


4.2.3 TEST SET-UP

9 kHz ~ 30 MHz

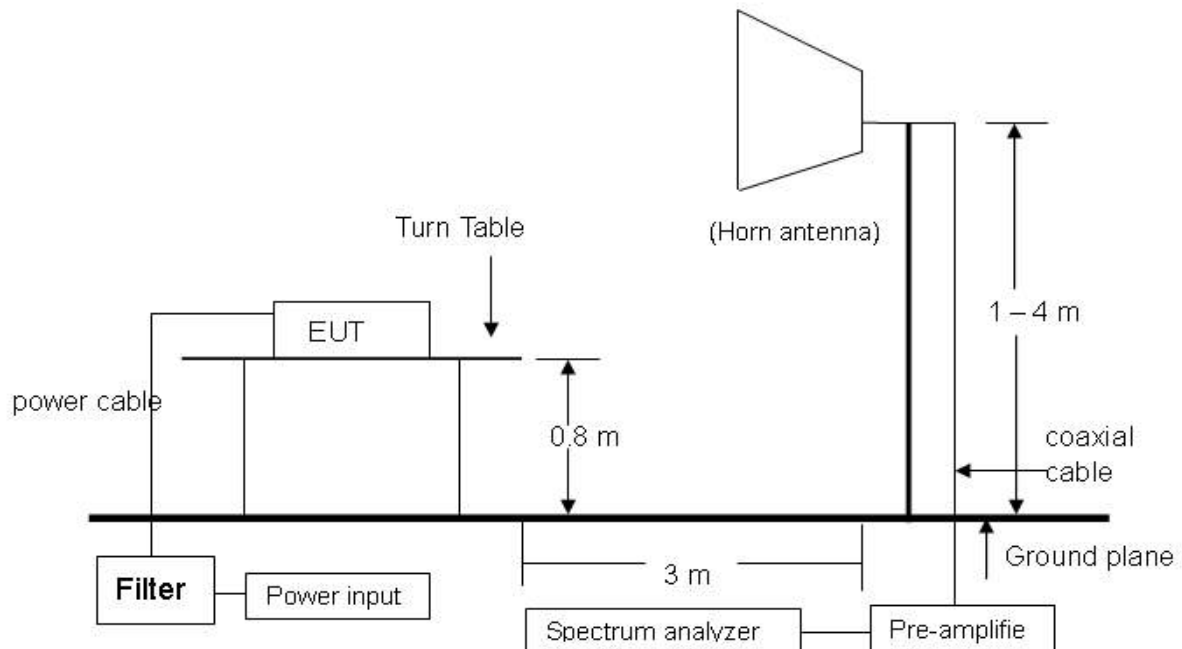


30 MHz ~ 1 GHz





Above 1 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.

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4.2.4 TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4:2003 and CISPR 22:2003.

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 9kHz to 30MHz and 30 MHz to 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 all typical methods by users.

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.



TEST REPORT

4.2.5 TEST RESULT

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	TX
Tested By:	Jeff Lo	Tested Date:	Sep. 10, 2012

Frequency (MHz)	Cable Loss (dB)	Ant. Fac. (dB/m)	Reading (dBμV)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5.6173	0.66	-6.87	35.01	28.80	70.00	-41.20
6.7870	0.67	-6.79	31.51	25.39	70.00	-44.61
9.1563	0.69	-6.65	35.45	29.49	70.00	-40.51
11.4356	0.71	-6.52	34.06	28.25	70.00	-41.75
22.0524	0.82	-5.88	28.69	23.63	70.00	-46.37
28.6804	0.89	-5.48	29.39	24.80	70.00	-45.20

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	Standby
Tested By:	Jeff Lo	Tested Date:	Sep. 10, 2012

Frequency (MHz)	Cable Loss (dB)	Ant. Fac. (dB/m)	Reading (dBμV)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4.9875	0.65	-6.90	33.93	27.68	70.00	-42.32
6.5770	0.67	-6.81	32.65	26.51	70.00	-43.49
9.3362	0.69	-6.64	34.39	28.44	70.00	-41.56
11.4956	0.72	-6.52	32.06	26.26	70.00	-43.75
14.9145	0.75	-6.30	26.50	20.95	70.00	-49.05
21.8424	0.82	-5.89	27.11	22.04	70.00	-47.96



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Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	Q.P.	Tested Mode:	Link
Tested By:	Jeff Lo	Tested Date:	Sep. 10, 2012

Frequency (MHz)	Cable Loss (dB)	Ant. Fac. (dB/m)	Reading (dBμV)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3.5180	0.64	-6.99	30.70	24.35	70.00	-45.66
5.2574	0.65	-6.88	31.66	25.43	70.00	-44.57
6.9370	0.67	-6.78	31.74	25.63	70.00	-44.37
9.0963	0.69	-6.66	35.40	29.43	70.00	-40.57
11.0457	0.71	-6.54	31.45	25.62	70.00	-44.38
13.9548	0.74	-6.36	29.52	23.90	70.00	-46.10



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Temperature:	23 °C	Humidity:	59 %RH
Tested By:	Jeff Lo	Tested Mode:	TX
Receiver Detector:	Q.P. or AV.	Modulation Type:	GFSK
Frequency Range:	30 M – 1 GHz	Tested Date:	Sep. 10, 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)
66.7700	1.24	8.82	23.5	33.6	40.0	-6.4	11	3.89
196.7500	2.03	11.20	22.1	35.3	43.5	-8.2	359	3.48
453.8000	3.25	17.06	13.1	33.4	46.0	-12.6	188	2.69
530.4300	3.57	18.24	18.8	40.6	46.0	-5.4	101	2.45
895.4200	4.91	22.81	5.5	33.2	46.0	-12.8	209	1.32
799.1200	4.54	21.70	16.4	42.6	46.0	-3.4	288	1.62

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)
45.4300	1.06	16.65	19.6	37.3	40.0	-2.7	233	1.05
65.8000	1.24	9.10	24.5	34.8	40.0	-5.2	260	1.11
196.7800	2.03	11.20	13.7	26.9	43.5	-16.6	263	1.52
531.4000	3.58	18.25	5.1	26.9	46.0	-19.1	191	2.55
796.2100	4.53	21.68	2.2	28.4	46.0	-17.6	37	3.37
893.2100	4.90	22.81	2.3	30.0	46.0	-16.0	134	3.67

NOTE :

1. Measurement uncertainty is +/- 4.73dB.
2. "N/A": 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.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Tested By:	Jeff Lo	Tested Mode:	Standby
Receiver Detector:	Q.P. or AV.	Modulation Type:	GFSK
Frequency Range:	30 M – 1 GHz	Tested Date:	Sep. 10, 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)
65.8000	1.24	9.10	20.4	30.7	40.0	-9.3	325	3.89
151.1600	1.80	12.25	7.9	21.9	43.5	-21.6	215	3.63
627.4300	3.92	19.82	2.5	26.2	46.0	-19.8	144	2.15
794.2700	4.52	21.68	2.3	28.5	46.0	-17.5	159	1.64
870.9000	4.79	22.86	2.9	30.5	46.0	-15.5	241	1.40
910.6700	4.94	23.04	2.8	30.8	46.0	-15.2	213	1.28

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)
40.5800	1.01	19.10	13.2	33.3	40.0	-6.7	11	1.03
65.8400	1.24	9.10	22.3	32.6	40.0	-7.4	311	1.11
151.1900	1.80	12.25	8.5	22.5	43.5	-21.0	109	1.37
755.4700	4.39	21.52	2.4	28.3	46.0	-17.7	41	3.24
835.9800	4.65	22.54	2.5	29.7	46.0	-16.3	11	3.49
900.9700	4.93	22.80	2.8	30.5	46.0	-15.5	111	3.69

NOTE :

1. Measurement uncertainty is +/- 4.73dB.
2. "N/A": 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.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Tested By:	Jeff Lo	Tested Mode:	Link
Receiver Detector:	Q.P. or AV.	Modulation Type:	GFSK
Frequency Range:	30 M – 1 GHz	Tested Date:	Sep. 10, 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)
66.7700	1.24	8.82	23.2	33.3	40.0	-6.7	213	3.89
297.6300	2.55	13.48	19.9	35.9	46.0	-10.1	111	3.17
497.7900	3.43	17.94	19.6	41.0	46.0	-5.0	244	2.55
530.4300	3.57	18.24	20.0	41.8	46.0	-4.2	159	2.45
799.1600	4.54	21.70	16.1	42.3	46.0	-3.7	23	1.62
931.0400	4.97	23.54	9.1	37.6	46.0	-8.4	38	1.21

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)
47.3700	1.08	15.67	19.8	36.6	40.0	-3.5	107	1.05
129.8200	1.66	12.33	12.3	26.3	43.5	-17.2	49	1.31
497.7500	3.43	17.94	7.5	28.9	46.0	-17.1	199	2.45
797.1800	4.53	21.69	2.6	28.8	46.0	-17.2	293	3.37
866.0900	4.77	22.87	3.1	30.7	46.0	-15.3	254	3.59
931.0800	4.97	23.54	2.4	30.9	46.0	-15.1	328	3.79

NOTE :

1. Measurement uncertainty is +/- 4.73dB.
2. "N/A": 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.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Receiver Detector:	PK. or AV.	Tested Mode:	TX
Frequency Range:	1 GHz – 25 GHz	Modulation Type:	GFSK
Tested By:	Jeff Lo	Tested Date:	Sep. 10, 2012

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.		
1735.38	-37.29	26.24	51.6	41.4	40.6	30.3	74.0	54.0	-33.4	-23.7	244	2.48
2205.61	-37.24	27.75	47.1	37.1	37.6	27.6	74.0	54.0	-36.4	-26.4	343	2.44
3175.27	-37.58	30.45	45.1	35.7	37.9	28.6	74.0	54.0	-36.1	-25.4	141	2.36
3755.59	-37.70	31.81	44.9	34.2	39.0	28.3	74.0	54.0	-35.0	-25.7	41	2.34
4410.28	-37.84	32.58	42.6	31.3	37.3	26.0	74.0	54.0	-36.7	-28.0	304	2.18
5410.92	-38.98	33.95	39.4	29.8	34.4	24.8	74.0	54.0	-39.6	-29.2	293	1.97

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.		
1755.64	-37.28	26.32	51.5	41.4	40.6	30.4	74.0	54.0	-33.4	-23.6	128	1.04
2760.88	-37.48	29.28	48.5	38.8	40.3	30.6	74.0	54.0	-33.7	-23.4	121	1.12
2955.13	-37.52	29.95	45.9	35.9	38.4	28.3	74.0	54.0	-35.6	-25.7	113	1.25
3705.29	-37.69	31.67	43.8	33.3	37.8	27.3	74.0	54.0	-36.2	-26.7	188	1.53
4175.97	-37.78	32.54	42.0	31.9	36.8	26.7	74.0	54.0	-37.2	-27.3	277	1.83
5360.24	-38.86	33.92	39.2	28.6	34.3	23.7	74.0	54.0	-39.7	-30.3	351	2.33

NOTE :

1. Measurement uncertainty is +/- 4.73dB.
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:	23 °C	Humidity:	59 %RH
Receiver Detector:	PK. or AV.	Tested Mode:	Tx(Fundamental)
Frequency Range:	1 GHz – 25 GHz	Modulation Type:	GFSK
Tested By:	Jeff Lo	Tested Date:	Sep. 10, 2012

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB μ V)		Emission Level (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2410.00	-37.37	28.20	83.8	73.2	74.6	64.0	114.0	94.0	-39.4	-30.0	346	2.08
4820.00	-37.96	33.30	39.0	29.8	34.4	25.1	74.0	54.0	-39.6	-28.9	67	2.03
7230.00	-39.16	35.80	36.2	26.1	32.9	22.7	74.0	54.0	-41.1	-31.3	37	1.97
9640.00	-41.63	37.81	40.2	30.4	36.4	26.6	74.0	54.0	-37.6	-27.4	12	1.91
12050.00	-41.79	39.17	37.8	27.2	35.2	24.6	74.0	54.0	-38.8	-29.4	17	1.83
14460.00	-41.65	42.07	40.1	30.5	40.5	30.9	74.0	54.0	-33.5	-23.1	41	1.75

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dB μ V)		Emission Level (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2410.00	-37.37	28.20	85.1	74.3	75.9	65.1	114.0	94.0	-38.1	-28.9	227	1.42
4820.00	-37.96	33.30	38.8	27.4	34.1	22.7	74.0	54.0	-39.9	-31.3	258	2.15
7230.00	-39.16	35.80	37.0	25.2	33.6	21.8	74.0	54.0	-40.4	-32.2	328	2.87
9640.00	-41.63	37.81	40.0	29.9	36.2	26.1	74.0	54.0	-37.8	-27.9	303	3.59
12050.00	-41.79	39.17	36.4	25.7	33.8	23.1	74.0	54.0	-40.2	-30.9	273	3.82
14460.00	-41.65	42.07	35.8	25.8	36.2	26.2	74.0	54.0	-37.8	-27.8	248	3.91

NOTE:

1. Measurement uncertainty is +/- 4.73dB.
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:	23 °C	Humidity:	59 %RH
Receiver Detector:	PK. or AV.	Tested Mode:	Standby
Frequency Range:	1 GHz – 25 GHz	Modulation Type:	GFSK
Tested By:	Jeff Lo	Tested Date:	Sep. 10, 2012

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.		
2805.44	-37.49	29.44	47.2	37.4	39.1	29.3	74.0	54.0	-34.9	-24.7	132	2.45
3755.68	-37.70	31.81	43.7	32.8	37.8	26.9	74.0	54.0	-36.2	-27.1	222	2.32
3960.94	-37.73	32.39	45.2	35.2	39.8	29.9	74.0	54.0	-34.2	-24.1	15	1.81
4570.59	-37.88	32.75	41.3	31.3	36.2	26.2	74.0	54.0	-37.8	-27.8	91	1.67
5270.37	-38.65	33.86	38.8	27.9	34.0	23.1	74.0	54.0	-40.0	-30.9	214	1.39
5565.48	-39.05	34.01	37.2	26.6	32.2	21.6	74.0	54.0	-41.8	-32.4	38	1.20

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.		
2205.51	-37.24	27.75	48.9	38.5	39.4	29.0	74.0	54.0	-34.6	-25.0	111	1.49
3010.48	-37.53	30.12	44.6	34.4	37.2	27.0	74.0	54.0	-36.8	-27.0	208	1.71
3705.41	-37.69	31.67	43.8	32.7	37.7	26.7	74.0	54.0	-36.3	-27.3	304	1.96
3985.83	-37.74	32.46	41.3	30.9	36.0	25.6	74.0	54.0	-38.0	-28.4	109	2.14
4530.47	-37.87	32.67	41.1	31.5	35.9	26.3	74.0	54.0	-38.1	-27.7	234	2.30
5280.18	-38.68	33.87	38.8	28.2	34.0	23.4	74.0	54.0	-40.0	-30.6	59	2.43

NOTE :

1. Measurement uncertainty is +/- 4.73dB.
2. "F": 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.



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TEST REPORT

Reference No.: A12053104
Report No.: FCCA12053104
FCC ID : R5M4U-BK1201B
Page: 24 of 38
Date: Dec. 21, 2012

Temperature:	23 °C	Humidity:	59 %RH
Receiver Detector:	PK. or AV.	Tested Mode:	Link
Frequency Range:	1 GHz – 25 GHz	Modulation Type:	GFSK
Tested By:	Jeff Lo	Tested Date:	Sep. 10, 2012

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.		
1695.11	-37.32	26.08	55.0	45.4	43.7	34.2	74.0	54.0	-30.3	-19.8	124	2.47
2800.49	-37.49	29.42	50.4	39.8	42.3	31.7	74.0	54.0	-31.7	-22.3	159	2.45
3710.88	-37.69	31.69	44.3	33.7	38.3	27.7	74.0	54.0	-35.7	-26.3	247	1.69
4065.99	-37.76	32.51	42.9	31.1	37.7	25.9	74.0	54.0	-36.3	-28.1	56	1.55
4820.24	-37.96	33.30	50.4	40.6	45.7	35.9	74.0	54.0	-28.3	-18.1	244	1.36
5170.81	-38.42	33.80	40.7	30.2	36.1	25.6	74.0	54.0	-37.9	-28.4	101	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.		
1675.17	-37.33	26.00	52.5	42.8	41.1	31.5	74.0	54.0	-32.9	-22.5	78	1.12
2140.47	-37.20	27.61	49.1	39.4	39.5	29.8	74.0	54.0	-34.5	-24.2	178	1.25
3885.18	-37.72	32.18	45.4	35.2	39.9	29.7	74.0	54.0	-34.1	-24.3	278	1.53
4410.69	-37.84	32.58	42.5	31.7	37.3	26.4	74.0	54.0	-36.7	-27.6	305	1.76
5170.78	-38.42	33.80	40.4	30.3	35.8	25.7	74.0	54.0	-38.2	-28.3	15	1.84
5650.84	-38.87	34.03	39.2	30.5	34.3	25.7	74.0	54.0	-39.7	-28.3	44	1.98

NOTE :

1. Measurement uncertainty is +/- 4.73dB.
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.



4.3 BAND EDGE TEST

4.3.1 LIMIT

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

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

 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.: A12053104 Report No.: FCCA12053104 FCC ID : R5M4U-BK1201B Page: 26 of 38 Date: Dec. 21, 2012
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4.3.2 TEST EQUIPMENT

The following test equipment was used during the test:

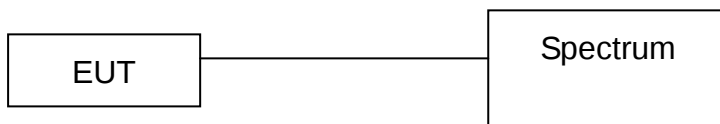
EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
SPECTRUM	9kHz-40GHz	ROHDE & SCHWARZ	FSP40/ 100093	Dec. 2013 ETC
EMI Test Receiver	9kHz-6GHz	ROHDE & SCHWARZ	ESL/ 100176	Mar. 2013 R&S
SPECTRUM	9KHz-26.5GHz	HP	8953E/ 3710A03220	Nov. 2013 ETC
PRE-AMPLIFIER	1GHz-26.5GHz Gain:30dB	HP	8449B/ 3008A01019	Nov. 2013 ETC
HORN ANTENNA	1GHz to 18GHz	EMCO	3115/ 6881	Nov. 2013 ETC
K-TYPE CABLE	1M	HUBER SUHNER	SF102-40/2*11 / 28934/2	May. 2013 ETC
RF CABLE	1.5M	JYEBAO	A30A30-L 142 / EQF-0035	Dec. 2013 ETC
RF CABLE	3.5M	JYEBAO	A30A30-L 142 (G3.5M)/ EQF-0036(002)	Dec. 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.



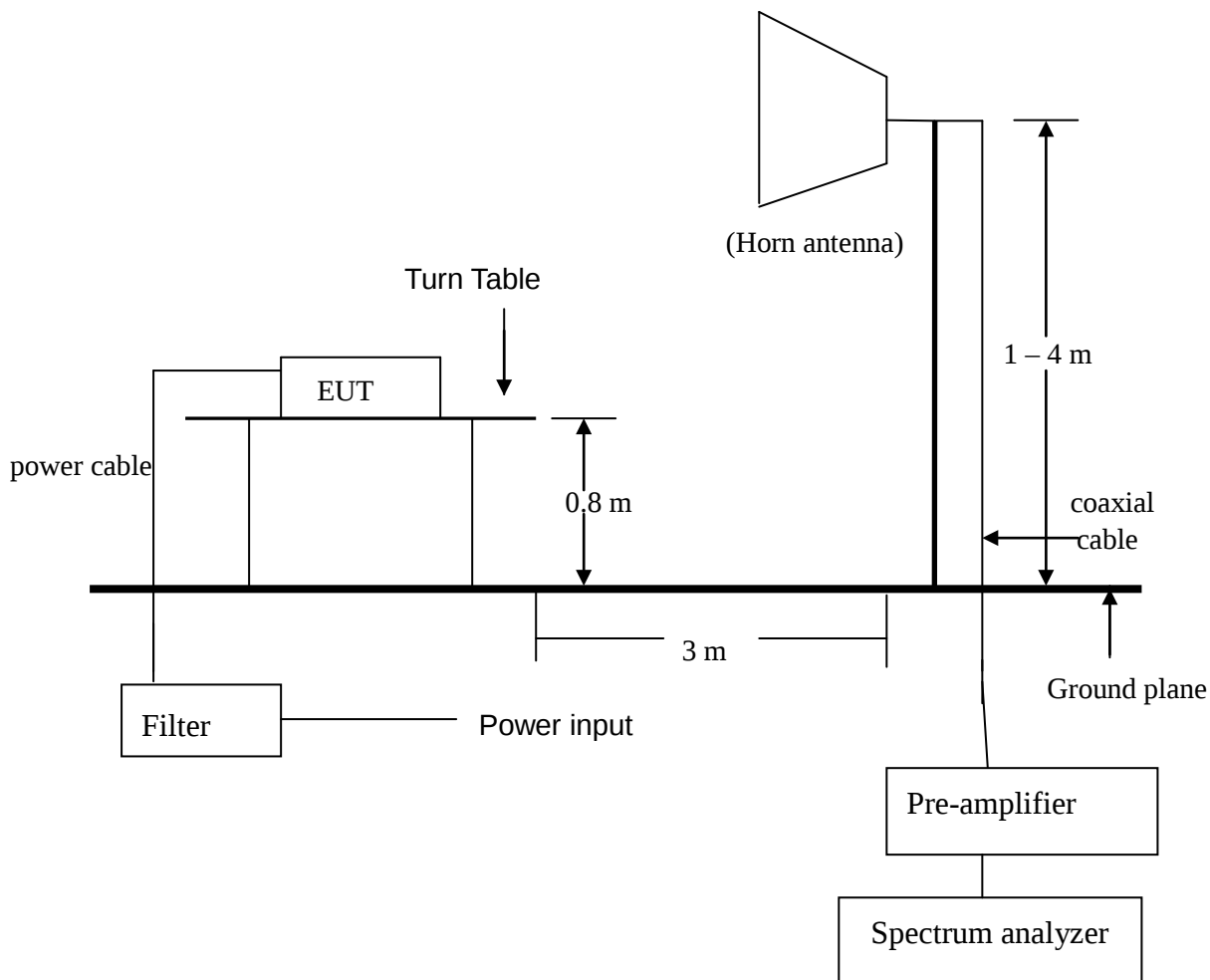
4.3.3 TEST SET-UP

FOR RF CONDUCTED TEST (dBc)



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

FOR RADIATED EMISSION TEST



NOTE :

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



4.3.4 TEST PROCEDURE

1. The EUT was operating in 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.

4.3.5 EUT OPERATING CONDITION

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



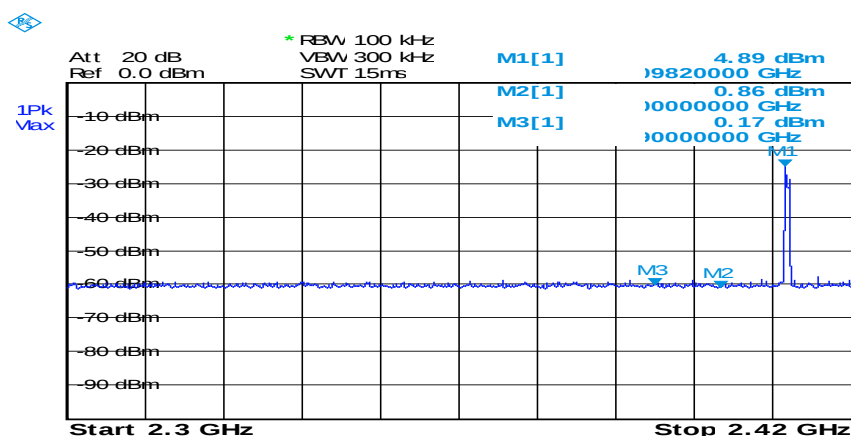
4.3.6 TEST RESULT

Temperature:	22°C	Humidity:	51%RH
Spectrum Detector:	PK. or AV.	Tested Mode:	CH01
Tested By:	Jeff Lo	Modulation Type:	QPSK
Tested Date:	Dec. 21, 2012		

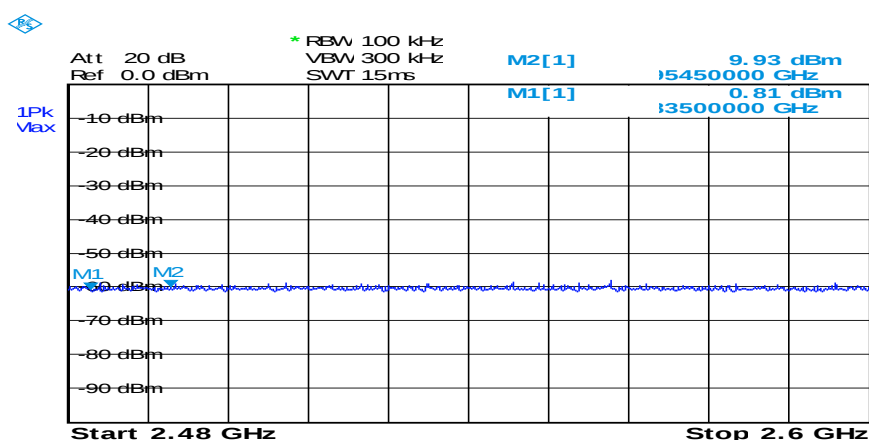
1. Conducted test

Frequency (MHz)	PEAK POWER OUTPUT (dBm)	Emission read Value(dBm)	Result of Band edge (dBc)	Band edge LIMIT (dBc)
<2400	-24.89	-60.17	35.28	>20dBc
>2484	-24.89	-59.93	35.04	>20dBc

Below 2400MHz :



Above 2484 MHz :



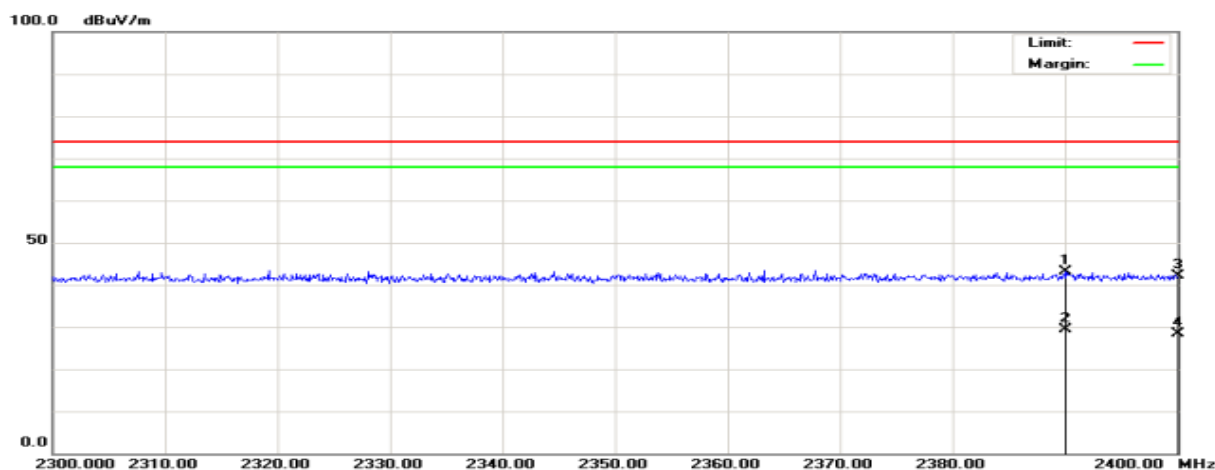


TEST REPORT

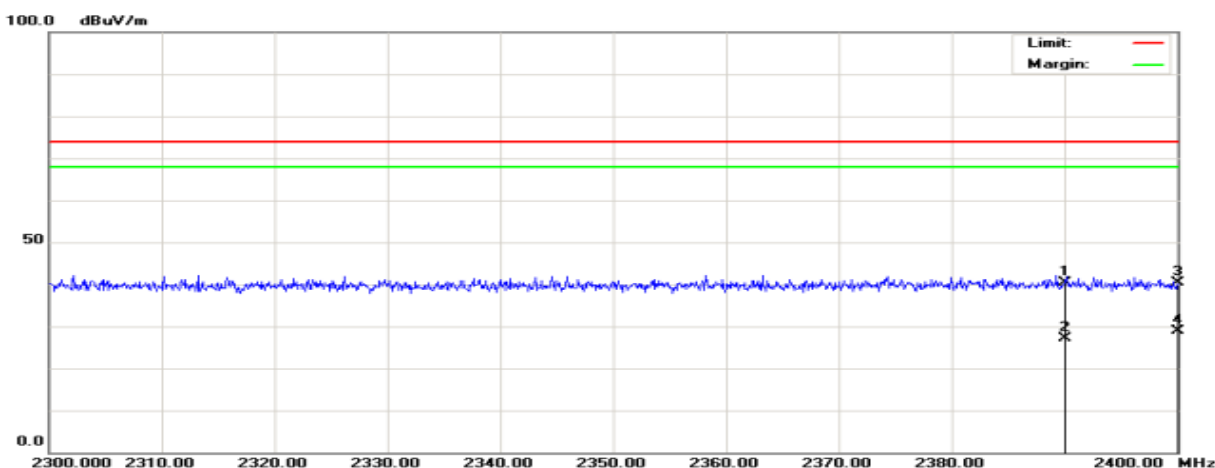
2. Radiated emission test: Below 2400MHz

Frequency (MHz)	Correct Factor (dB)	Ant. Fac. (dB)	Ant. Pol. (H/V)	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	45.01	31.41	42.04	28.44	74.00	54.00	-31.96	-25.56
2400.00	-31.15	28.18	V	43.25	31.91	40.28	28.94	74.00	54.00	-33.72	-25.06
2390.00	-31.16	28.16	H	46.05	32.44	43.05	29.44	74.00	54.00	-30.95	-24.56
2390.00	-31.16	28.16	V	43.38	30.17	40.38	27.17	74.00	54.00	-33.62	-26.83

Horizontal:



Vertical:



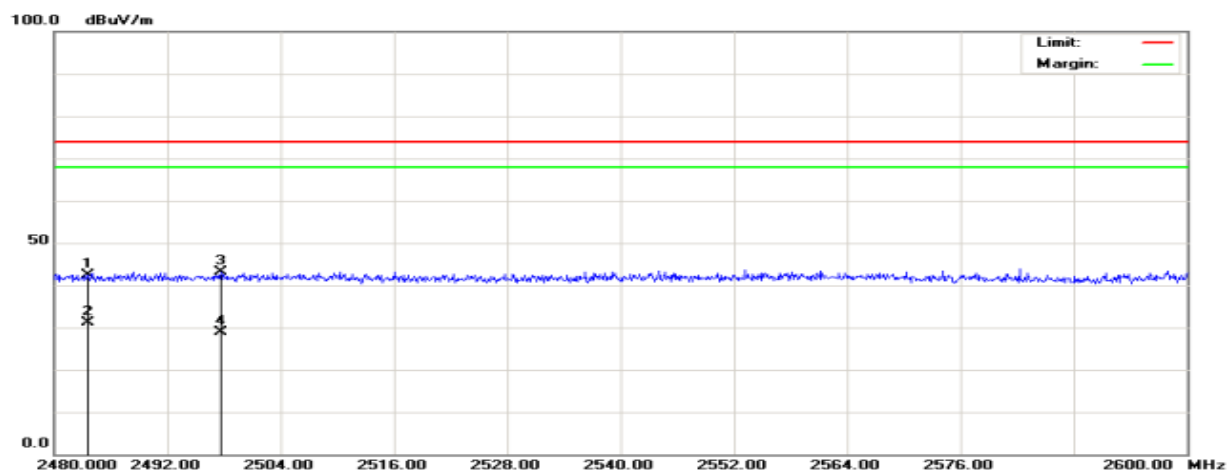


TEST REPORT

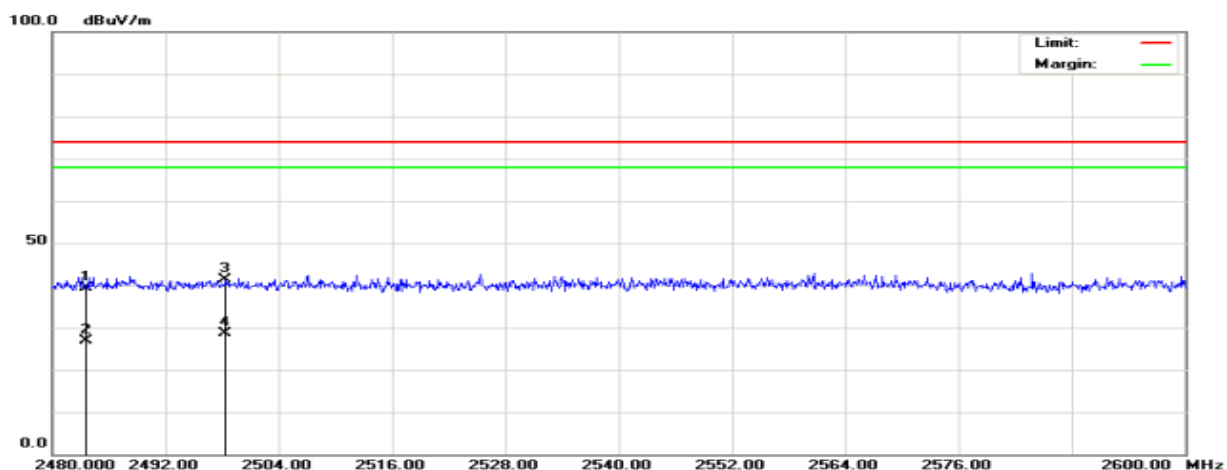
Above 2484 MHz

Frequency (MHz)	Correct Factor (dB)	Ant. Fac. (dB)	Ant. Pol. (H/V)	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	45.08	33.88	42.39	31.19	74.00	54.00	-31.61	-22.81
2483.50	-31.05	28.36	V	42.05	29.58	39.36	26.89	74.00	54.00	-34.64	-27.11
2497.64	-31.03	28.39	H	45.70	31.46	43.06	28.82	74.00	54.00	-30.94	-25.18
2498.36	-31.03	28.40	V	43.98	31.31	41.34	28.67	74.00	54.00	-32.66	-25.33

Horizontal:



Vertical:



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5. Antenna application

5.1 Antenna requirement

The EUT's antenna is met the requirement of FCC Part 15C section 15.203 and 15.204.

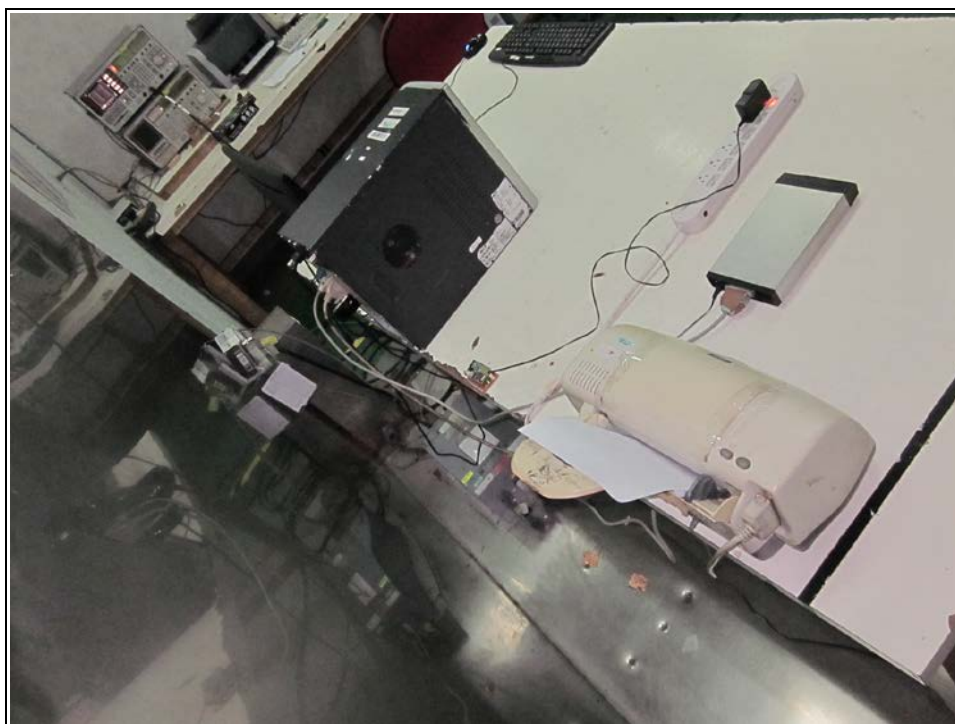
5.2 Result

The EUT's antenna used a Chip antenna. Gain of antenna types is 2 dBi that meet the requirement.



6. PHOTOS OF TESTING

- Conducted test





- Radiated test (below 30M , TX & Standby)





- Radiated test (below 1G , TX & Standby)





- Radiated test (above 1G , TX & Standby)





- Radiated test (above 1G , TX & Standby)



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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