



FCC TEST REPORT

for

2.4G WIRELESS RECEIVER

MODEL: 2.4G Mini Receiver

Brand Name: N/A

Test Report Number:

SZ090716B04-RP

Issued for

Shenzhen Sunspring Technology Co., Ltd.

63 Fang Keng Road, Ping Hu Town, Long Gang District, Shenzhen China.

Issued by:

COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.

**No10-1, Mingkeda Logistics Park, No.18 Huanguan South RD. Guan lan Town,
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Issued Date: August 17, 2009



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 17, 2009	Initial Issue	ALL	Clinton Kao



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1 TEST CERTIFICATION

Product: 2.4G WIRELESS RECEIVER**Model:** 2.4G Mini Receiver**Brand:** N/A**Tested:** July 16-August 17, 2009**Applicant:** Shenzhen Sunspring Technology Co., Ltd.

63 Fang Keng Road, Ping Hu Town, Long Gang District, Shenzhen China.

Manufacturer: Shenzhen Sunspring Technology Co., Ltd.

63 Fang Keng Road, Ping Hu Town, Long Gang District, Shenzhen China.

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
DEVIATION FROM APPLICABLE STANDARD	
None	

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.249.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:**Reviewed by:**

Clinton Kao
Manager
Compliance Certification Service Inc.

Vincent Yao
Assistant manager
Compliance Certification Service Inc.



2 EUT DESCRIPTION

Product	2.4G WIRELESS RECEIVER
Brand Name	N/A
Model Number	2.4G Mini Receiver
Model Discrepancy	N/A
Serial Number	SZ090716B04-RP
Power Supply	DC5V supplied by the Notebook
Frequency Range	2402.8-2478.0MHz
Transmit Power	79.83dBuV/m (Max.)
Modulation Technique	FSK
Number of Channels	88 Channel
Antenna Specification	PCB antenna with -3 dBi gain(Max)

Note: 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for FCC ID: WTBRF-MINIRX24G filing to comply with Section 15.207, 15.209 and 15.249 of the FCC Part 15, Subpart C Rules.



3 TEST METHODOLOGY

3.1. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only, and powerline conducted emission below 30MHz, which worst case was in normal link mode with charging only.

Channel Low (2402.8MHz), Channel Mid (2439.6MHz) and Channel High (2478.0MHz) were chosen for the final testing.



4 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4:2003 and FCC CFR 15.207, 15.209 and 15.249.

4.1. EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.107 and 15.109 under the FCC Rules Part 15 Subpart B and Section 15.207, 15.209, 15.249 under the FCC Rules Part 15 Subpart C.

4.2. FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



5 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

6 SETUP OF EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	Notebook	Studio 1435	53154486836549	DoC	DELL	N/A	Shielded, 1.75m
2	2.4G WIRELESS KEYBOARD & MOUSE COMBO(Keyboard)	CG-RF116I	N/A	WTBRF-116I24G	N/A	N/A	N/A
3	2.4G WIRELESS KEYBOARD & MOUSE COMBO(Mouse)	RFOP02MS	N/A	WTBRF-OP0224G	N/A	N/A	N/A

Note:

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.2. CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.



7 FACILITIES AND ACCREDITATIONS

7.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

☒ **No10-1, Mingkeda Logistics Park, No.18 Huanguan South RD. Guan lan Town, Baoan District, Shenzhen China**

The sites are constructed in conformance with the requirements of ANSI C63.4:2003, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

7.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan **TAF**

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	FCC
Japan	VCCI
Canada	INDUSTRY CANADA
Taiwan	BSMI
Norway	Nemko

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>

7.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	+/- 3.18dB
Radiated emissions	30MHz ~ 200MHz	+/- 3.79dB
	200MHz ~1000MHz	+/- 3.62dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

The measured result is above (below) the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance (non-compliance) is more probable than non-compliance) with the specification limit.



8 FCC PART 15.249 REQUIREMENTS

8.1. BAND EDGES MEASUREMENT

LIMIT

1. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (μ V/m at 3-meter)	Field Strength (dB μ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

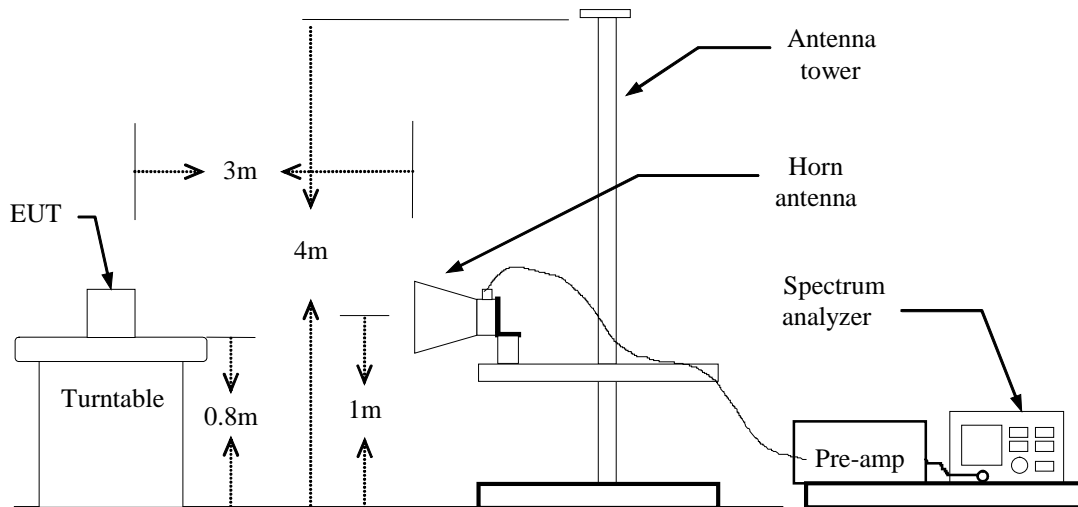
2. As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.
3. As shown in Section 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

MEASUREMENT EQUIPMENT USED

966 RF CHAMBER (2)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
ESCI EMI TEST RECEIVE.ESCI	ROHDE&SCHWARZ	1166.5950 03	100783	03/20/2009	03/20/2010
Spectrum Analyzer	Agilent	E4446A	US44300399	03/01/2009	03/01/2010
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	02/06/2009	02/06/2010
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
High Noise Amplifier	Agilent	8449B	3008A01838	05/29/2009	05/29/2010
Site NSA	C&C	N/A	N/A	N.C.R	N.C.R
BILOG ANTENNA	SCHAFFNER	CBL6143	5082	06/08/2009	06/09/2010
Horn Antenna	SCHAFFNER	BBHA9120D	1201	03/19/2009	03/19/2010
Signal Generator	Anritsu	MG3694A	#050125	03/01/2009	03/01/2010

Remark: Each piece of equipment is scheduled for calibration once a year.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

TEST RESULTS

Refer to attach spectrum analyzer data chart.



Test Data

Band Edges (CH-Low)

Detector mode: Peak

Polarity: Vertical

Agilent 15:01:27 15 Aug 2009

R T

Mkr1 2.402 8 GHz

82.02 dBμV

Ref 115 dBμV

Atten 20 dB

#Peak

Log

10

dB/

DI

74.0

dBμV

LgAv

M1 S2

Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.402 8 GHz	82.02 dBμV
2	(1)	Freq	2.398 2 GHz	49.64 dBμV

Detector mode: Average

Polarity: Vertical

Agilent 15:02:50 15 Aug 2009

R T

Mkr1 2.402 8 GHz

51.29 dBμV

Ref 115 dBμV

Atten 20 dB

#Peak

Log

10

dB/

DI

54.0

dBμV

LgAv

W1 S2

Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 9.357 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.402 8 GHz	51.29 dBμV
2	(1)	Freq	2.398 2 GHz	37.11 dBμV

**Detector mode: Peak****Polarity: Horizontal**

* Agilent 15:05:25 15 Aug 2009

R T

Mkr1 2.402 8 GHz

79.44 dB μ VRef 115 dB μ V

Atten 20 dB

#Peak

Log

10

dB/

DI

74.0

dB μ V

LgAv

M1 S2

Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.402 8 GHz	79.44 dB μ V
2	(1)	Freq	2.390 2 GHz	48.90 dB μ V

Detector mode: Average**Polarity: Horizontal**

* Agilent 15:06:30 15 Aug 2009

R T

Mkr1 2.402 8 GHz

51.03 dB μ VRef 115 dB μ V

Atten 20 dB

#Peak

Log

10

dB/

DI

54.0

dB μ V

LgAv

W1 S2

Start 2.310 0 GHz

Stop 2.430 0 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 9.357 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.402 8 GHz	51.03 dB μ V
2	(1)	Freq	2.390 2 GHz	37.12 dB μ V



Band Edges (CH-High)

Detector mode: Peak

Polarity: Vertical

Agilent 15:19:22 15 Aug 2009

R T

Mkr2 2.483 50 GHz

Ref 115 dBμV

Atten 20 dB

49.78 dBμV

#Peak

Log

10

dB/

DI

74.0

dBμV

LgAv

M1 S2

Start 2.470 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.478 15 GHz	78.85 dBμV
2	(1)	Freq	2.483 50 GHz	49.78 dBμV

Detector mode: Average

Polarity: Vertical

Agilent 15:22:23 15 Aug 2009

R T

Mkr2 2.483 50 GHz

Ref 115 dBμV

Atten 20 dB

36.98 dBμV

#Peak

Log

10

dB/

DI

54.0

dBμV

LgAv

W1 S2

Start 2.470 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 2.339 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.478 15 GHz	58.57 dBμV
2	(1)	Freq	2.483 50 GHz	36.98 dBμV



Detector mode: Peak

Polarity: Horizontal

Agilent 15:11:37 15 Aug 2009

R T

Mkr2 2.483 50 GHz

55.22 dBμV

Ref 115 dBμV

Atten 20 dB

#Peak

Log

10

dB/

DI

74.0

dBμV

LgAv

M1 S2

Start 2.470 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.478 15 GHz	79.45 dBμV
2	(1)	Freq	2.483 50 GHz	55.22 dBμV

Detector mode: Average

Polarity: Horizontal

Agilent 15:23:53 15 Aug 2009

R T

Mkr2 2.483 50 GHz

37.03 dBμV

Ref 115 dBμV

Atten 20 dB

#Peak

Log

10

dB/

DI

54.0

dBμV

LgAv

M1 S2

Start 2.470 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Sweep 2.339 s (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.478 15 GHz	50.94 dBμV
2	(1)	Freq	2.483 50 GHz	37.03 dBμV



8.2. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

8.2.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	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.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

TEST INSTRUMENTS

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
ESCI EMI TEST RECEIVE.ESCI	ROHDE&SCHWARZ	1166.5950 03	100145	03/20/2009	03/20/2010
LISN	FCC	FCC-LISN-50-50-2-M	01068	03/01/2009	03/01/2010
LISN	EMCO	3825/2	8901-1459	03/01/2009	03/01/2010
CDN	FCC	FCC-TILISN-T4	20182	03/01/2009	03/01/2010
CDN	FCC	FCC-TLISN-T8-02	20183	03/01/2009	03/01/2010
CDN	FCC	FCC-TLISN-T4-02	20382	03/01/2009	03/01/2010
CDN	FCC	FCC-TLISN-T4-02	20383	03/01/2009	03/01/2010
CDN	FCC	FCC-801-T8-RJ45	04030	03/01/2009	03/01/2010
Current Probe	STODDART AIRCRAFT	91550-1	345-73	03/01/2009	03/01/2010

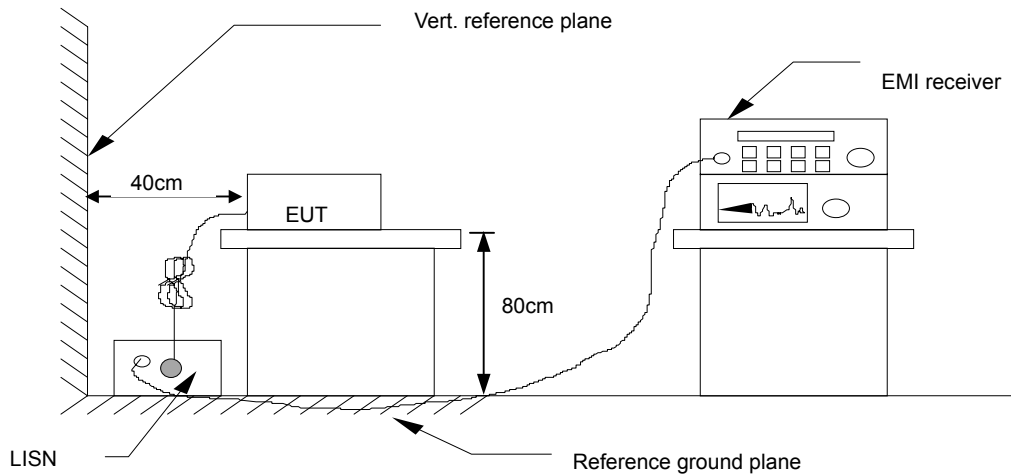
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.



8.2.2. TEST PROCEDURES (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.

8.2.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.2.4. Data Sample:

Freq. (MHz)	Q.P. Raw (dBuV)	Average Raw (dBuV)	Q.P. Limit (dBuV)	Average Limit (dBuV)	Q.P. Margin (dB)	Average Margin (dB)	Note
x.xx	43.95	33.00	56.00	46.00	-12.05	-13.00	L1

Frequency (MHz) = Emission frequency in MHz
 Reading (dBuV) = Uncorrected Analyzer/Receiver reading
 Correction factor (dB) = Insertion loss of LISN
 Limit (dBuV) = Limit stated in standard
 Margin (dB) = Reading (dBuV) – Limit (dBuV)
 Note = Current carrying line of reading

**8.2.5. TEST RESULTS**

Test No.	2.4G Mini Receiver	Test Mode	Normal Link
Environmental Conditions	25deg.C,60% RH, 992 hPa	RBW,VBW	9 kHz
Tested by:	Firetree		

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.201	33.91	---	---	64.52	54.52	---	-20.61	L1
0.261	36.41	---	---	62.82	52.82	---	-16.41	L1
0.413	33.97	---	---	58.48	48.48	---	-14.51	L1
2.448	31.19	---	---	56.00	46.00	---	-14.81	L1
2.809	30.40	---	---	56.00	46.00	---	-15.60	L1
4.140	31.71	---	---	56.00	46.00	---	-14.29	L1
0.150	39.70	---	---	66.00	56.00	---	-16.30	L2
0.190	37.30	---	---	64.83	54.83	---	-17.53	L2
0.213	36.95	---	---	64.20	54.20	---	-17.25	L2
0.405	34.53	---	---	58.69	48.69	---	-14.16	L2
2.713	28.68	---	---	56.00	46.00	---	-17.32	L2
4.124	30.66	---	---	56.00	46.00	---	-15.34	L2

REMARKS: L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)



8.3. SPURIOUS EMISSIONS MEASUREMENT

8.3.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

1. In the section 15.249(a):

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental Field Strength (mV/m)	Field Strength of Harmonics (µV/m)
902-928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

2. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

3. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

**8.3.2. TEST INSTRUMENTS**

966 RF CHAMBER (2)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL. DUE
ESCI EMI TEST RECEIVE.ESCI	ROHDE&SCHWARZ	1166.5950 03	100783	03/20/2009	03/20/2010
Spectrum Analyzer	Agilent	E4446A	US44300399	03/01/2009	03/01/2010
Low Noise Amplifier	MITEQ	AM-1604-3000	1123808	02/06/2009	02/06/2010
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
High Noise Amplifier	Agilent	8449B	3008A01838	05/29/2009	05/29/2010
Site NSA	C&C	N/A	N/A	N.C.R	N.C.R
BILOG ANTENNA	SCHAFFNER	CBL6143	5082	06/08/2009	06/09/2010
Horn Antenna	SCHAFFNER	BBHA9120D	1201	03/19/2009	03/19/2010
Signal Generator	Anritsu	MG3694A	#050125	03/01/2009	03/01/2010

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 101879.

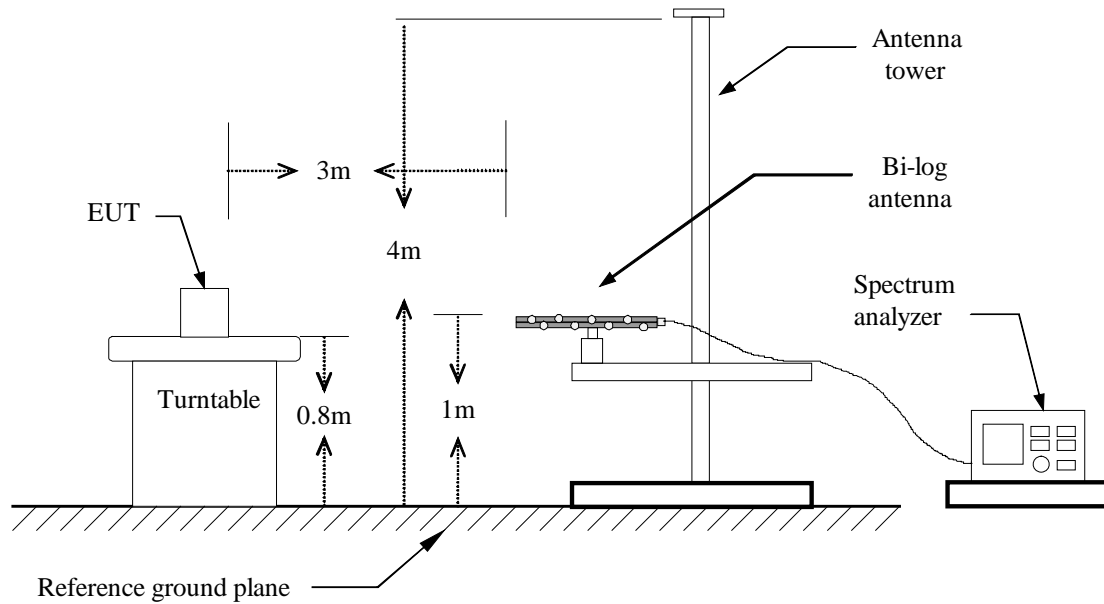
4. N.C.R = No Calibration Required.

8.3.3 TEST PROCEDURE (please refer to measurement standard)

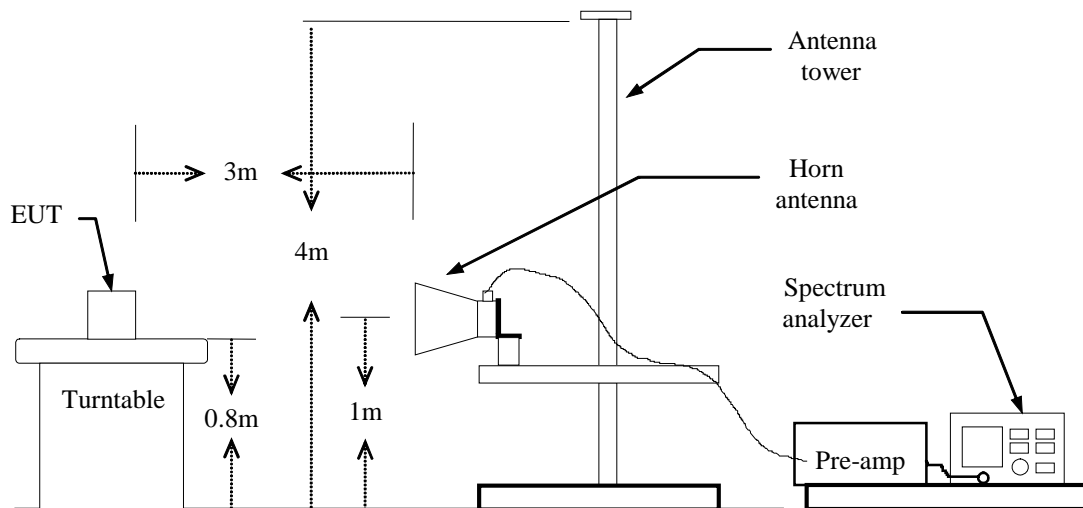
1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz:
RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

8.3.2.1. TEST SETUP

Below 1 GHz



Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**8.3.2.2. Data Sample:****Below 1 GHz**

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Remark) (dBuV)	Correction Factor (dB/m)	Result (Remark) (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (dB)	Remark
xxx	V	12.12	10.21	22.33	40.00	-17.67	Peak

Above 1 GHz

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
xxx	V	65.45	63.00	-11.12	54.33	51.88	74.00	54.00	-2.12	AVG

Frequency (MHz) = Emission frequency in MHz
Ant.Pol. (H/V) = Antenna polarization
Reading (dBuV) = Uncorrected Analyzer / Receiver reading
Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)
Limit (dBuV/m) = Limit stated in standard
Margin (dB) = Remark Result (dBuV/m) – Limit (dBuV/m)
Peak = Peak Reading
QP = Quasi-peak Reading
AVG = Average Reading

**8.3.2.3. TEST RESULTS****Below 1 GHz****Operation Mode:** Normal Link**Test Date:** July 18, 2009**Temperature:** 25°C**Tested by:** Firetree**Humidity:** 60 % RH**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
34.869	V	Peak	46.01	-19.25	26.76	40.00	-13.24
67.875	V	Peak	37.85	-23.62	14.23	40.00	-25.77
217.214	V	Peak	44.37	-20.75	23.62	46.00	-22.38
282.685	V	Peak	40.57	-18.97	21.60	46.00	-24.40
332.264	V	Peak	42.75	-17.87	24.88	46.00	-21.12
466.933	V	Peak	42.09	-13.88	28.21	46.00	-17.79
31.623	H	Peak	45.14	-17.04	28.10	40.00	-11.90
84.649	H	Peak	47.18	-24.03	23.15	40.00	-16.85
111.162	H	Peak	47.25	-24.11	23.14	43.50	-20.36
282.685	H	Peak	53.45	-18.97	34.48	46.00	-11.52
294.589	H	Peak	50.57	-18.68	31.89	46.00	-14.11
532.865	H	Peak	41.70	-12.68	29.02	46.00	-16.98

****Remark:** No emission found between lowest internal used/generated frequency to 30 MHz.

REMARKS:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

**Above 1 GHz****Operation Mode:** TX / CH Low**Test Date:** August 15, 2009**Temperature:** 25°C**Tested by:** Firetree**Humidity:** 60% RH**Polarity:** Ver. / Hor.**Fundamental**

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2402.8	V	82.19	52.25	-3.86	78.33	48.39	114	94	-35.67	-45.61
2402.8	H	82.63	50.21	-3.86	78.77	46.35	114	94	-35.23	-47.65

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1373.33	V	49.55	---	-10.12	39.43	---	74.00	54.00	-14.57	Peak
1756.66	V	50.63	---	-7.39	43.24	---	74.00	54.00	-10.76	Peak
3166.66	V	50.91	---	-1.72	49.19	---	74.00	54.00	-4.81	Peak
3541.66	V	48.58	---	-0.75	47.83	---	74.00	54.00	-6.17	Peak
N/A										
1633.33	V	49.88	---	-8.36	41.52	---	74.00	54.00	-12.48	Peak
2053.33	V	50.19	---	-5.25	44.94	---	74.00	54.00	-9.06	Peak
3233.33	V	50.31	---	-2.50	47.81	---	74.00	54.00	-6.19	Peak
3733.33	V	48.98	---	-0.81	48.17	---	74.00	54.00	-5.83	Peak
N/A										

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / CH Mid**Test Date:** August 15, 2009**Temperature:** 25°C**Tested by:** Firetree**Humidity:** 60% RH**Polarity:** Ver. / Hor.**Fundamental**

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2439.6	V	83.55	51.98	-3.72	79.83	48.26	114	94	-34.17	-45.74
2439.6	H	82.40	51.02	-3.72	78.68	47.30	114	94	-35.32	-46.70

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1613.33	V	49.65	---	-8.52	41.13	---	74.00	54.00	-12.87	Peak
1913.33	V	49.33	---	-6.15	43.18	---	74.00	54.00	-10.82	Peak
3141.66	V	49.04	---	-1.77	47.27	---	74.00	54.00	-6.73	Peak
3441.66	V	49.60	---	-1.10	48.50	---	74.00	54.00	-5.50	Peak
N/A										
1350.00	H	50.60	---	-10.24	40.36	---	74.00	54.00	-13.64	Peak
1653.33	H	49.41	---	-8.21	41.20	---	74.00	54.00	-12.80	Peak
3100.00	H	49.48	---	-2.27	47.21	---	74.00	54.00	-6.79	Peak
3733.33	H	50.29	---	-0.81	49.48	---	74.00	54.00	-4.52	Peak
N/A										

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / CH High**Temperature:** 25°C**Humidity:** 60 % RH**Test Date:** August 15, 2009**Tested by:** Firetree**Polarity:** Ver. / Hor.**Fundamental**

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2478.0	V	82.73	51.74	-3.57	79.16	48.17	114	94	-34.84	-45.83
2478.0	H	84.29	50.86	-3.57	80.72	47.29	114	94	-33.28	-46.71

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1306.66	V	50.12	---	-10.48	39.64	---	74.00	54.00	-14.36	Peak
1703.33	V	48.67	---	-7.81	40.86	---	74.00	54.00	-13.14	Peak
3216.66	V	46.13	---	-1.60	44.53	---	74.00	54.00	-9.47	Peak
4166.66	V	45.43	---	1.81	47.24	---	74.00	54.00	-6.76	Peak
N/A										
1539.33	H	49.83	---	-8.68	41.15	---	74.00	54.00	-12.85	Peak
2020.00	H	49.38	---	-5.38	44.00	---	74.00	54.00	-10.00	Peak
3166.66	H	49.64	---	-2.38	47.26	---	74.00	54.00	-6.74	Peak
3700.00	H	49.27	---	-1.12	48.15	---	74.00	54.00	-5.85	Peak
N/A										

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).