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TEST REPORT

OF

FCC Part 22, 24, 15 Subpart B

FCC ID: SS4BM150RE

Equipment Under Test : PDA

Model Name : BM-150R

Serial No. : N/A

Applicant : Bluebird Soft, Inc.

Manufacturer : Bluebird Soft, Inc.

Date of Test(s) : $2007-09-10 \sim 2007-11-09$

Date of Issue : 2007-12-20

In the configuration tested, the EUT complied with the standards specified above.

Tested By:

Geoffrey Do

Approved By

Date

2007-12-20

Denny Ham



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1. General Information

1.1. Testing Laboratory

SGS Testing Korea Co., Ltd.

-Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

- 705, Dongchun-Dong Sooji-Gu, Yongin-Shi, Kyungki-Do, South Korea.

www.electrolab.kr.sgs.com

Telephone : +82 +31 428 5700 FAX : +82 +31 427 2371

1.2. Details of Applicant

Applicant : Bluebird Soft, Inc.

Address : 558-5, Sinsa-dong, Kangnam-gu, seoul, Korea

Contact Person : Gi-Cheol Sung Phone No. : 82-2-541-4002 Fax No. : 82-2-548-0870

1.3. Description of EUT

Kind of Product	PDA
Model Name	BM-150R
Serial Number	N/A
Power Supply	DC 3.7 V
CDMA Module FCC ID	T42ICM-E600
Frequency Range	824.70 MHz ~ 848.31 MHz(CDMA - 1xRTT & EVDO Release0) 2412 MHz ~ 2462 MHz(11b/g), 2402 MHz ~ 2480 MHz(Bluetooth) 88.1 MHz ~ 107.9 MHz(FM Transmitter)
Modulation Technique	DSSS(11b), OFDM(11g), FHSS(Bluetooth), DQPSK(CDMA - 1xRTT & EVDO Release0), FM(FM Transmitter)
Number of Channels	11 CH(11b/g), 79 CH(Bluetooth), 20 CH(CDMA - 1xRTT & EVDO Release0), 199 CH(FM Transmitter)
Operating Conditions	-20 °C ~ 55 °C
Antenna Type	Fixed Type(11b/g, Bluetooth), Inverted F Type(CDMA), Pannel ANT(FM Transmitter)
Antenna Gain	-3.72 dBi(WLAN), -1.93 dBi(Bluetooth), -0.48 dBi(CDMA - 1xRTT & EVDO Release0)

1.4. Details of modification

-N/A



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1.5. Test Equipment List

EQUIPMENT	MANUFACTURER	MODEL	CAL DUE.
Signal Generator	Agilent	E4438C	May 2008
Spectrum Analyzer	Agilent	E4440A	May 2008
Spectrum Analyzer	H.P.	8593E	Sep. 2008
DC Power Supply	Agilent	6674A	May 2008
DC Power Supply	Agilent	E3631A	May 2008
Attenuator	Agilent	8494B	May 2008
Two-Line V-Network	NNB 41	Schaffner	Sep. 2008
Test Receiver	Test Receiver Rohde & Schwarz		May 2008
Test Receiver	Rohde & Schwarz	ESHS10	Aug. 2008
Ultra-Broadband Antenna	Rohde & Schwarz	HL562	Sep. 2008
Horn Antenna	Electro-Metrics	RGA-60	Dec. 2008
Log Periodic Antenna	Rohde & Schwarz	HL223	Sep. 2009
Communication Antenna	AR	AT 4002	N.C.R
Band Reject Filter	Wainwright	WRCG824/849-814/85960/10SS	May 2008



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EQUIPMENT	MANUFACTURER	MODEL	CAL DUE.
Highpass Filter	Wainwright	WHK3.0/18G-10SS	Dec.2008
Biconcai Antenna	concai Antenna R&S HK116		May 2009
Log-Periodic Antenna	R&S	HL223	May 2009
Mobile Test Unit	Agilent	E5515C	May 2008
Anechoic Chamber	SY Corporation	L x W x H 9.6 x 6.4 x 6.4	Aug. 2008



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1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

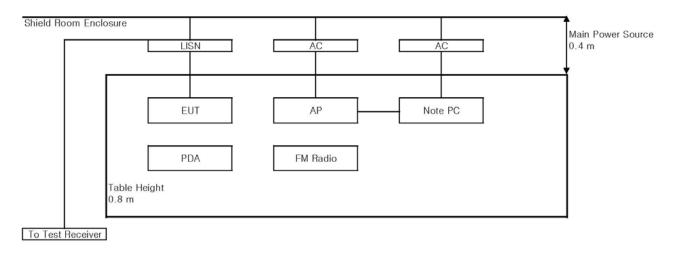
APPLIED STANDARD: FCC Part 22, 24,15 Subpart B						
Standard Section	Test Item	Result				
15.107(a)	AC Power Conducted Emission	Complied				
15.109(a)	Field Strength of Radiated Emission	Complies				
22.913(a) 24.232(c)	RF Radiated Output Power	Complied				
22.917(a) 24.238(a)	Spurious Radiated Emission	Complied				



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2. Conducted Power Line Test

2.1. Test Setup



2.2. Limit

According to §15.107(a) 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 uH/50 ohm line impedance stabilization network(LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Enguency of Emission (MHz)	Conducted limit (dBμV)				
Frequency of Emission (MHz)	Qausi-peak	Average			
0.15 – 0.50	66-56*	56-46*			
0.50 - 5.00	56	46			
5.00 – 30.0	60	50			

^{*} Decreases with the logarithm of the frequency.



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2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

- 1. The test procedure is performed in a $6.5m \times 3.6m \times 3.6m \times 3.6m$ (L×W×H) shielded room. The EUT along with its peripherals were placed on a $1.0m(W) \times 1.5m(L)$ and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
- 2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
- 3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
- 4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.



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2.4. Test Results

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : 23 $^{\circ}$ C Relative humidity : 42 $^{\circ}$

Frequency range : 0.15 MHz - 30 MHz

Measured Bandwidth : 9 kHz

FREQ.	LEVEL	(dBuV)	LINE	LIMIT((dBuV)	MARG	IN(dB)
(MHz)	Q-Peak	Average	LINE	Q-Peak	Average	Q-Peak	Average
0.19	51.90	32.20	N	64.04	54.04	12.14	21.84
0.20	58.30	29.60	N	63.61	53.61	5.31	24.01
0.24	53.00	24.20	N	62.10	52.10	9.10	27.90
1.31	32.00	20.90	N	56.00	46.00	24.00	25.10
1.56	28.70	18.60	N	56.00	46.00	27.30	27.40
6.70	38.40	29.30	N	60.00	50.00	21.60	20.70
0.15	56.20	30.50	Н	66.00	56.00	9.80	25.50
0.20	49.50	25.80	Н	63.61	53.61	14.11	27.81
0.37	34.10	18.90	Н	58.50	48.50	24.40	29.60
1.31	39.50	26.30	Н	56.00	46.00	16.50	19.70
1.56	36.60	24.10	Н	56.00	46.00	19.40	21.90
6.70	40.40	31.80	Н	60.00	50.00	19.60	18.20

Note;

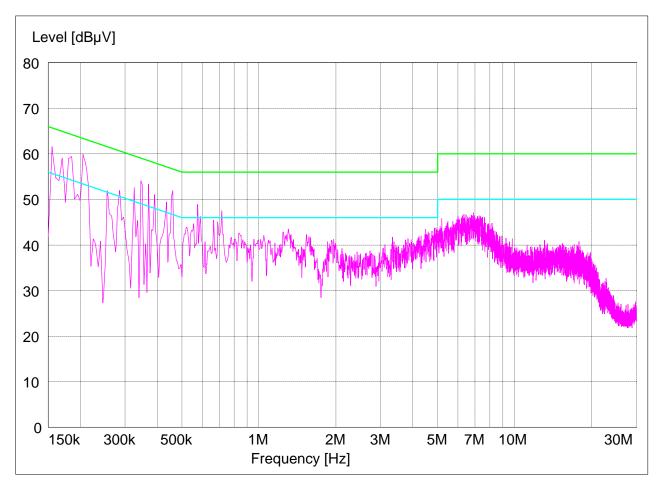
Line (H) : Hot Line (N) : Neutral



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Plot of Conducted Power line

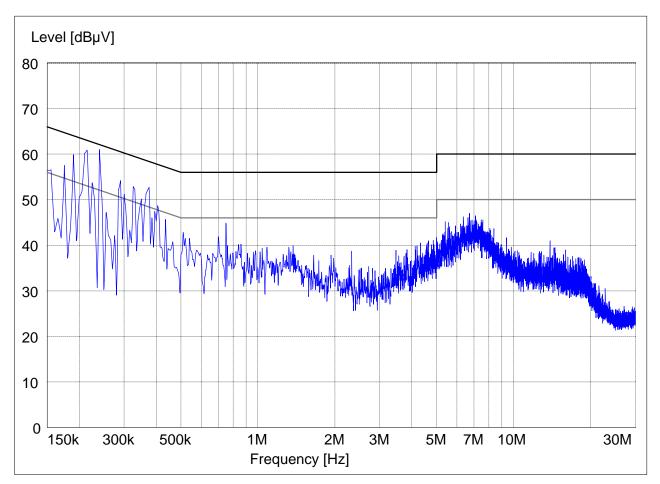
Test mode: (Hot)





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Test mode: (Neutral)



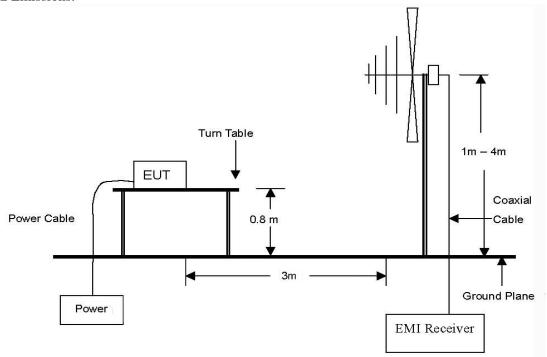


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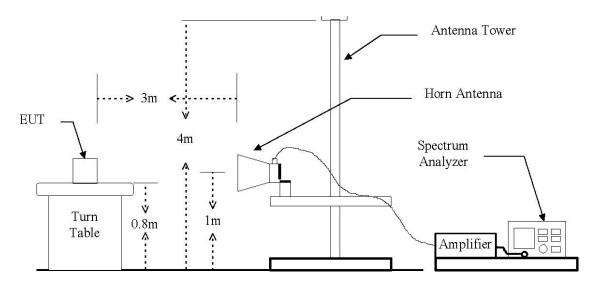
3. RF Radiated Output Power

3.1. Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



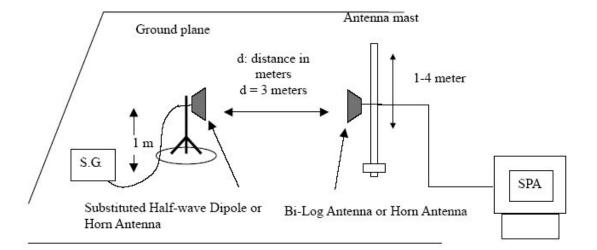
The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.





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The diagram below shows the test setup for substituted method





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3.2. Limit

FCC §22.913(a), the ERP of mobile transmitters must not exceed 7 watts. FCC §24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

3.3. Test Procedure: Based on TIA-603C 2004

- 1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position closest to normal use as declared by the applicant.
- 2. The test antenna shall be oriented initially for vertical polarization located 4m from EUT to correspond to the frequency of the transmitter.
- 3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
- 4. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
- 5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 6. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 8. The maximum signal level detected by the measuring receiver shall be noted.
- 9. The transmitter shall be replaced by a horn (substitution antenna).
- 10. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- 11. The substitution antenna shall be connected to a calibrated signal generator.
- 12. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase he sensitivity of the measuring receiver.
- 13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- 14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- 15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- 17. The measure of the effective radiated power is the large of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- 18. The ERP/EIPR test under RC5/SO55.



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3.4. Test Results

Ambient temperature : 21°C Relative humidity : 43%

CDMA 2000(1xRTT)

Frequency	Ant. Pol.	Amp- C.L	S.G Power Level	Antenna Gain	Е. І	R. P.
(MHz)	(H/V)	(dB)	(dBm)	(dBd)	(dBm)	(mW)
824.70	Н	33.30	-14.30	4.59	23.09	203
836.52	Н	33.30	-14.79	4.58	23.64	231
848.31	Н	33.30	-13.97	4.57	24.87	271

CDMA 2000(1xEVDO) Release 0.

Frequency	Ant. Pol.	Amp- C.L	S.G Power Level	Antenna Gain	Е. Н	E. R. P.	
(MHz)	(H/V)	(dB)	(dBm)	(dBd)	(dBm)	(mW)	
824.70	Н	33.27	-14.29	4.59	23.57	227	
836.52	Н	33.27	-14.74	4.58	23.11	204	
848.31	Н	33.27	-13.99	4.57	23.85	242	

Remake: 1. ERP= SG Power Level +Amp-C.L. +Antenna Gain

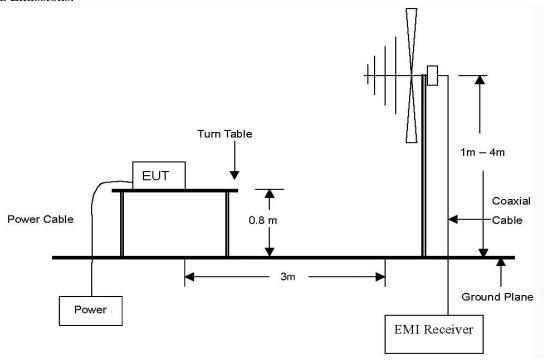


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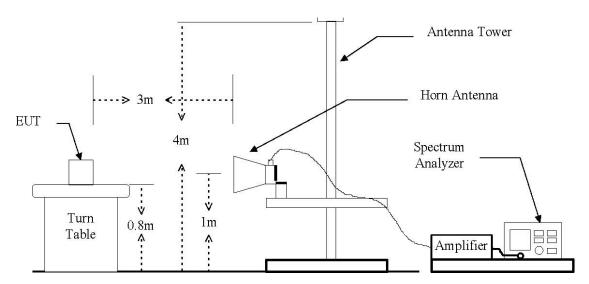
4. Spurious Radiated Emission

4.1. Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



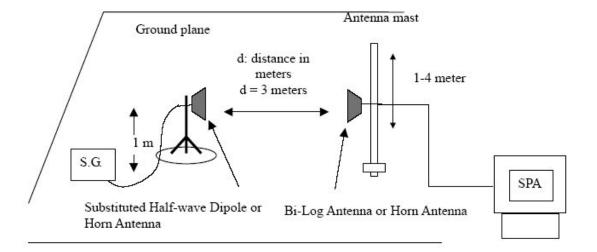
The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.





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The diagram below shows the test setup for substituted method





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4.2. Limit

§ 22.917(a) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least 43+10log(P)dB.

4.3. Test Procedure

- 1. On a test site, the EUT shall be placed at 0.8cm height on a turn table, and in the position closest to normal use as declared by the applicant.
- 2. The test antenna shall be oriented initially for vertical polarization located 4m from EUT to correspond to the frequency of the transmitter.
- 3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
- 4. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
- 5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 6. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 8. The maximum signal level detected by the measuring receiver shall be noted.
- 9. The transmitter shall be replaced by a horn (substitution antenna).
- 10. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- 11. The substitution antenna shall be connected to a calibrated signal generator.
- 12. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase he sensitivity of the measuring receiver.
- 13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- 14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- 15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- 17. The measure of the effective radiated power is the large of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary
- 18. Spurious radiated emission was tested under RC5/SO55.



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4.4. Test Results

Ambient temperature : 21 °C Relative humidity : 43%

CDMA 2000(1xRTTT)

Frequency (MHz)	Ant.Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	E.I.R.P. (dBm)	Limit (dBm)	Margin (dB)
	channel MHz)						
1649.40	V	-33.31	1.02	8.08	-26.25	-13.00	13.25
2474.10	Н	-35.61	1.06	9.91	-26.76	-13.00	13.76
3298.80	Н	-39.33	1.06	10.84	-29.55	-13.00	16.55
	Channel 2 MHz)						
1673.04	V	-35.44	1.02	8.17	-28.29	-13.00	15.29
2509.56	Н	-37.81	1.06	9.96	-28.91	-13.00	15.91
3346.08	V	-39.31	1.06	10.88	-29.49	-13.00	16.49
_	I Channel MHz)						
1696.62	Н	-33.87	1.02	8.25	-26.64	-13.00	13.64
2544.93	Н	-35.97	1.06	10.00	-27.03	-13.00	14.03
3393.24	V	-39.67	1.06	10.92	-29.81	-13.00	16.81

Remake: 1. No more harmonic above 3rd harmonic for all channel.

 $^{2. \} EIRP = S.G.output(dBm) + Antenna \ Gain(dBi) - Cable(dB) \\$

^{3.} The effective radiated power record the largest level between the two levels with Ant.Pol.(H/V)



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CDMA 2000(1xEVDO) Release 0.

Frequency (MHz)	Ant.Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	E.I.R.P. (dBm)	Limit (dBm)	Margin (dB)
	/ channel / MHz)						
1648.4	Н	-33.34	1.02	8.08	-26.28	-13.00	13.28
2472.6	V	-35.79	1.06	9.91	-26.94	-13.00	13.94
3296.5	V	-39.47	1.06	10.84	-29.69	-13.00	16.69
	Channel 2 MHz)						
1673.2	Н	-35.38	1.02	8.17	-28.23	-13.00	15.23
2509.8	Н	-37.85	1.06	9.96	-28.95	-13.00	15.95
3344.6	V	-39.43	1.06	10.88	-29.61	-13.00	16.61
	I Channel MHz)						
1697.6	Н	-33.85	1.02	8.25	-26.62	-13.00	13.62
2546.4	Н	-35.99	1.06	10.00	-27.05	-13.00	14.05
3392.7	V	-39.57	1.06	10.92	-29.71	-13.00	16.71

Remake: 1. No more harmonic above 3^{rd} harmonic for all channel. 2. EIRP = S.G.output(dBm) + Antenna Gain(dBi) - Cable(dB)

^{3.} The effective radiated power record the largest level between the two levels with Ant.Pol.(H/V)



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5. Field Strength of Radiated Emissions

5.1. Limit

According to §15.109(a), Except for Class A digital devices, the field strength of radiated emission from unintentional radiator at a distance of 3 m shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

5.2. Test Procedure

- 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 1 meter away from the interference-receiving antenna.
- 3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

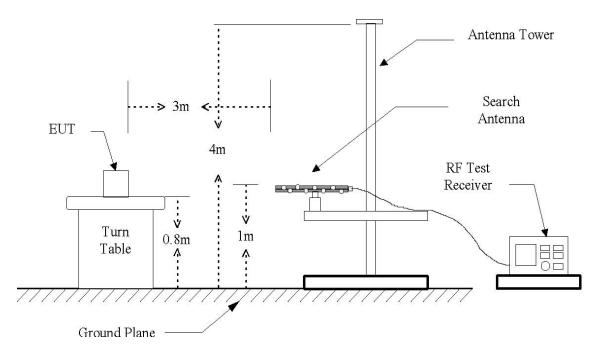
NOTE:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 GHz.
- 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and frequency above 1 GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

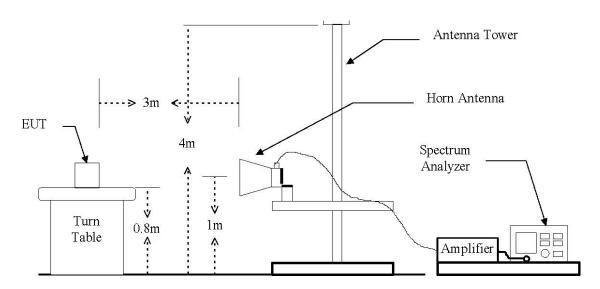


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The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 40 GHz Emissions.



Frequencies measured below 1 GHz configuration



Frequencies measured above 1 GHz configuration



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5.3. Test Results

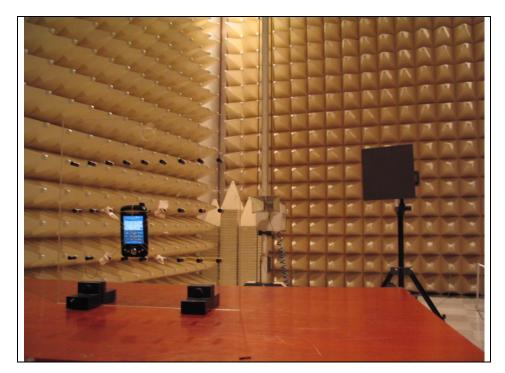
Ambient temperature : 21 °C Relative humidity : 43%

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
60.00	15.70	Р	V	4.40	0.99	21.09	40.00	18.91
120.00	15.40	Р	Н	9.91	1.40	26.71	43.50	16.79
126.54	17.50	Р	V	9.37	1.45	28.31	43.50	15.19
240.26	15.20	Р	V	9.12	1.99	26.31	46.00	19.69
322.51	10.40	Р	Н	11.56	2.37	24.33	46.00	21.67
465.32	15.90	Р	Н	15.12	2.89	33.91	46.00	12.09
Above 500	Not Detected							



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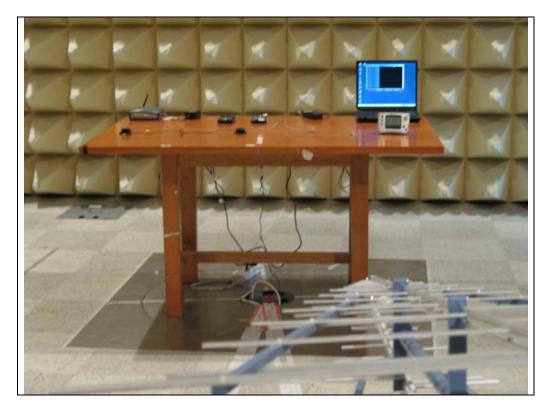
Appendix A. Photo of Radiated Emission Test





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Appendix B. Photos of Field Strength Test







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Appendix C. Photos of Conducted Power Line Test







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Appendix D. Photos of the EUT

Front View of EUT



Rear View of EUT





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Right View of EUT



Left View of EUT



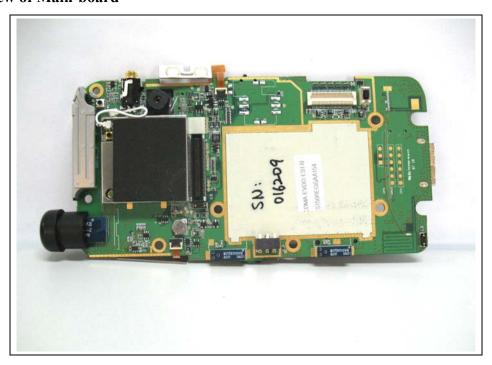


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Inner of EUT



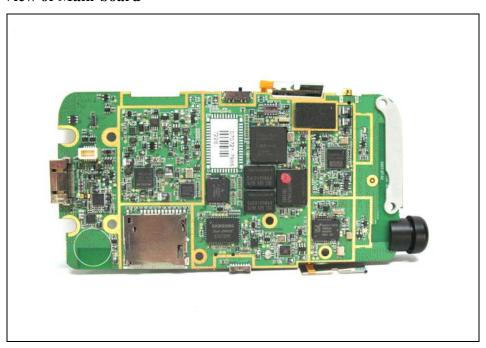
Top View of Main-board



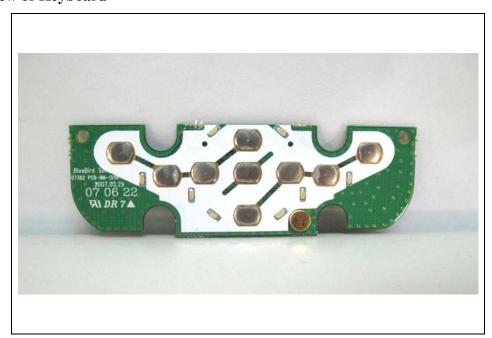


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Bottom View of Main-board



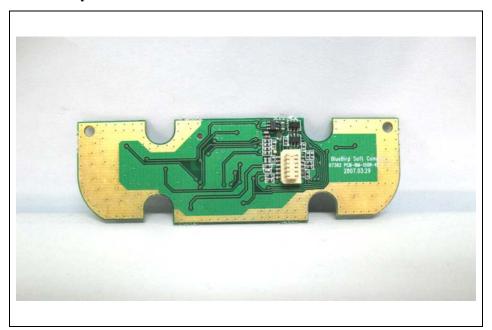
Top View of Keyboard





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Bottom View of Keyboard



Top View of LCD





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Bottom View of LCD



Top View of CDMA





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Bottom View of CDMA

