TEST REPORT

OF

FCC Part 22, 24, 15 Subpart B

FCC ID : P47SOCL6S07

Equipment Under Test	:	LOOKET LBS
Model Name	:	SOCL6SO7 (the addition of model name : SOCL8S07, SOCL9S07)
Serial No.	:	N/A
Applicant	:	SysOnChip, Inc.
Manufacturer	:	SysOnChip, Inc.
Date of Test(s)	:	2007-11-12 ~ 2007-11-16
Date of Issue	:	2007-11-27

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

Tested By:  **Date** **2007-11-27**

Geoffrey Do

Approved By  **Date** **2007-11-27**

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
www.electrolab.kr.sgs.com
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371

1.2. Details of Applicant

Applicant : SysOnChip, Inc.
Address : 4F., Singwan Bldg., KT Buk-Daejeon Branch, 138 Gajeong-dong, Yuseong-gu, Daejeon, 305-350, Korea
Contact Person : Heon-Il Ahn
Phone No. : +82 +42 864 4665
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1.3. Description of EUT

Kind of Product	LOOKET LBS
Model Name	SOCL6SO7(the addition of model name : SOCL8S07, SOCL9S07)
Serial Number	N/A
GSM module FCC ID	QIPMC56
Power Supply	DC 12 V(Lithium battery : 4.2 V)
Frequency Range	GSM 850(824.2 MHz ~ 869.2 MHz) GSM 1900(1850.2 MHz ~ 1909.8 MHz) GPS(1575.42 MHz)
Modulation Technique	GMSK
Number of Channels	125 CH(GSM 850), 300 CH(GSM 1900)
Operating Conditions	-20℃ ~ 70℃
Type of Antenna	1/4 Whip Monopole Tri-Band Antenna(GSM) Ceramic Patch ANT(GPS-Internal) Patch ANT(GPS-External)

* The product uses only GPRS mode(By using 2 timeslots in the Up-link(GPRS mode 10))
* The test mode is the worst case for DC 12 V

1.4. Details of modification

-N/A

1.5. Test Equipment List

EQUIPMENT	MANUFACTURER	MODEL	CAL DUE.
Signal Generator	Agilent	E4438C	May 2008
Spectrum Analyzer	H.P	8593E	Sep. 2008
DC Power Supply	Agilent	6674A	May 2008
Attenuator	Agilent	8494B	May 2008
Test Receiver	Rohde & Schwarz	ESVS10	May 2008
Test Receiver	Rohde & Schwarz	ESHS10	Aug. 2008
Ultra-Broadband Antenna	Rohde & Schwarz	HL562	Sep. 2009
Horn Antenna	Electro-Metrics	RGA-60	Dec. 2007
Dipole Antenna	VHAP/UHAP	975/958	Jun. 2008
Communication Antenna	AR	AT 4002	N.C.R
Band Reject Filter	Wainwright	WRCG824/849-814/85960/10SS	May 2008
Highpass Filter	Wainwright	WHK3.0/18G-10SS	Dec.2007
Biconcai 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 6.5 x 3.5 x 3.5	Aug. 2008

1.6. Summary of Test Results

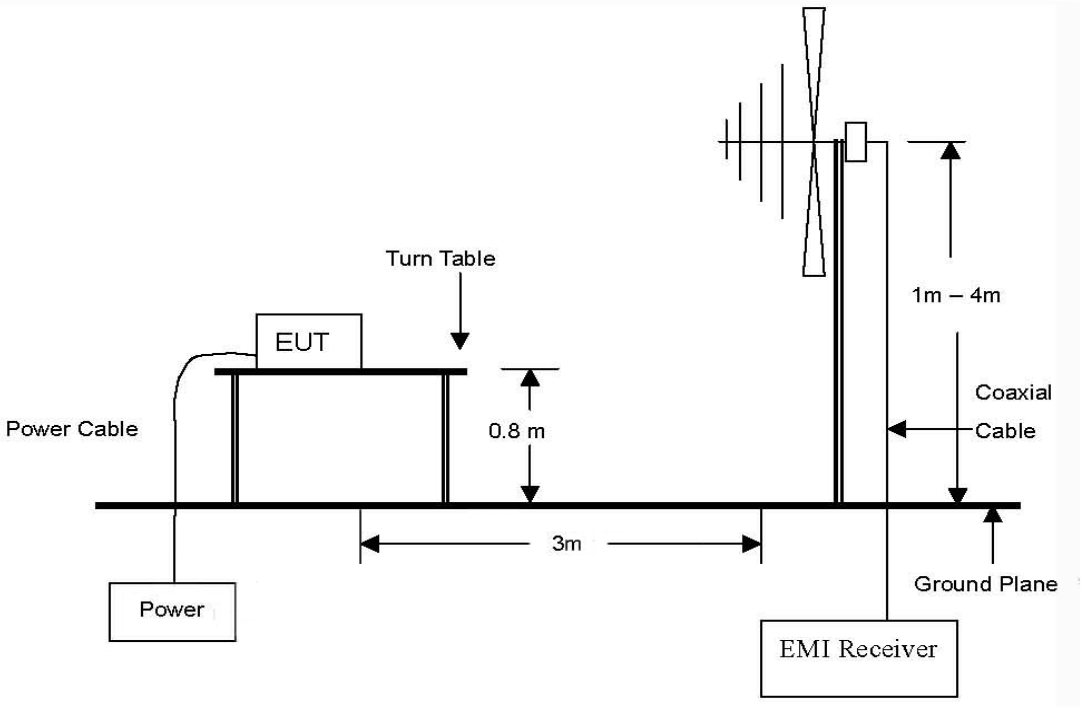
The EUT has been tested according to the following specifications:

APPLIED STANDARD:FCC Part 22, 24,15 Subpart B		
Standard Section	**Test Item**	**Result**
15.109(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

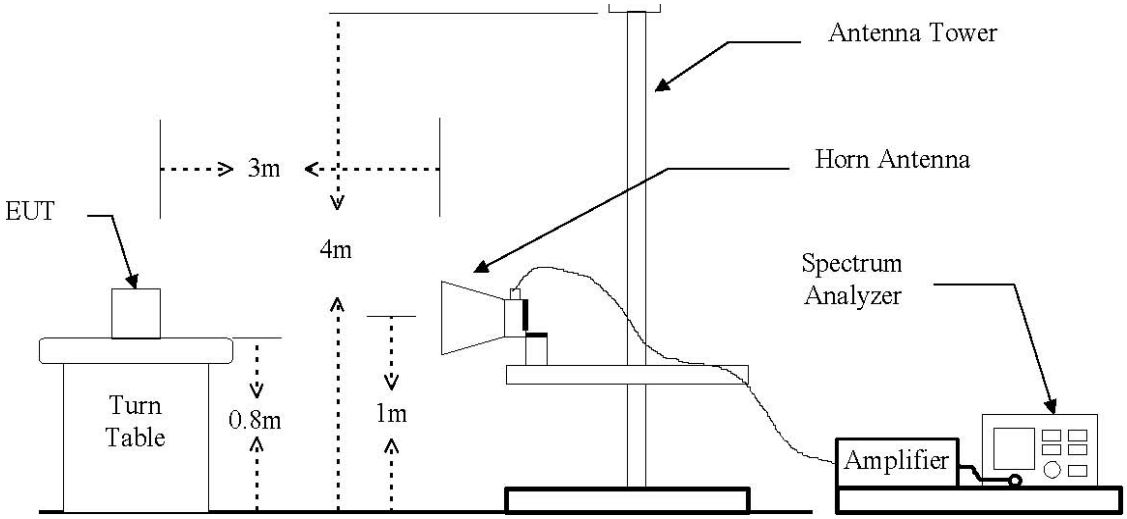
2. RF Radiated Output Power

2.1. Test Setup

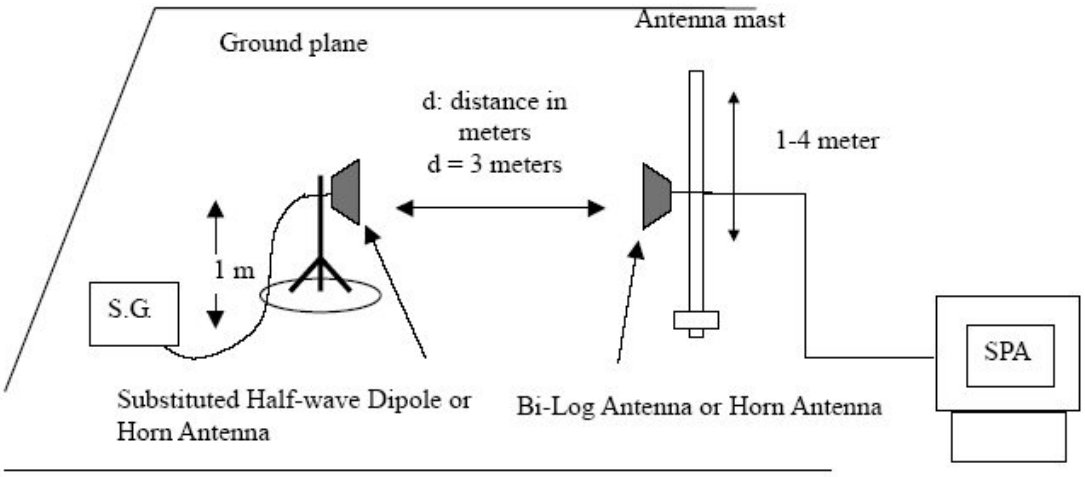
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



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



The diagram below shows the test setup for substituted method



2.2. 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.

2.3. Test Procedure

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 3m from EUT to correspond to the fundamental 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. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. 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.
7. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. 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.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole(824~849 MHz) or horn antenna(1851.25~1910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase he sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. 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.
14. 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.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
16. The spectrum analyzer reading was recorded and ERP/EIRP was calculated as follows:
    ERP = S.G.output(dBm) + Antenna Gain(dBd) - Cable(dB)
    EIRP = S.G.output(dBm) + Antenna Gain(dBi) - Cable(dB)

2.4. Test Results

Ambient temperature : 20 ℃ Relative humidity : 50 %

GPRS 850

Frequency (MHz)	Ant. Pol. (H/V)	Amp (dB)	C.L (dB)	S.G. Power Level (dBm)	Antenna Gain (dBd)	E. R. P.	
						(dBm)	(mW)
824.2	V	20.24	0.67	17.78	-10.44	26.91	490.95
836.6	V	20.18	0.68	16.39	-10.48	25.41	347.38
848.8	V	20.13	0.65	17.10	-10.53	26.05	402.48

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

GPRS 1900

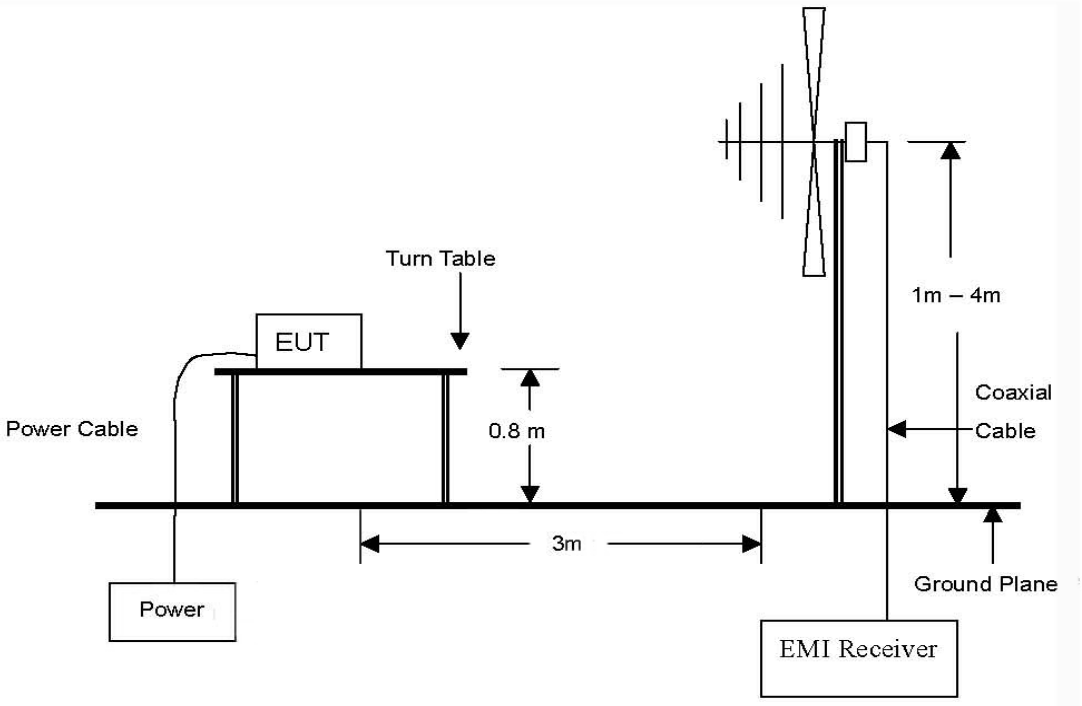
Frequency (MHz)	Ant. Pol. (H/V)	Amp (dB)	C.L (dB)	S.G. Power Level (dBm)	Antenna Gain (dBi)	E. I. R. P.	
						(dBm)	(mW)
1850.2	V	36.68	1.25	-13.07	8.79	31.15	1302.55
1880.0	V	36.64	1.28	-13.88	8.90	30.37	1089.43
1909.8	V	36.59	1.30	-13.94	9.00	30.36	1085.44

Remake: E.I.R.P.= S.G. Power Level +Amp-C.L. +Antenna Gain

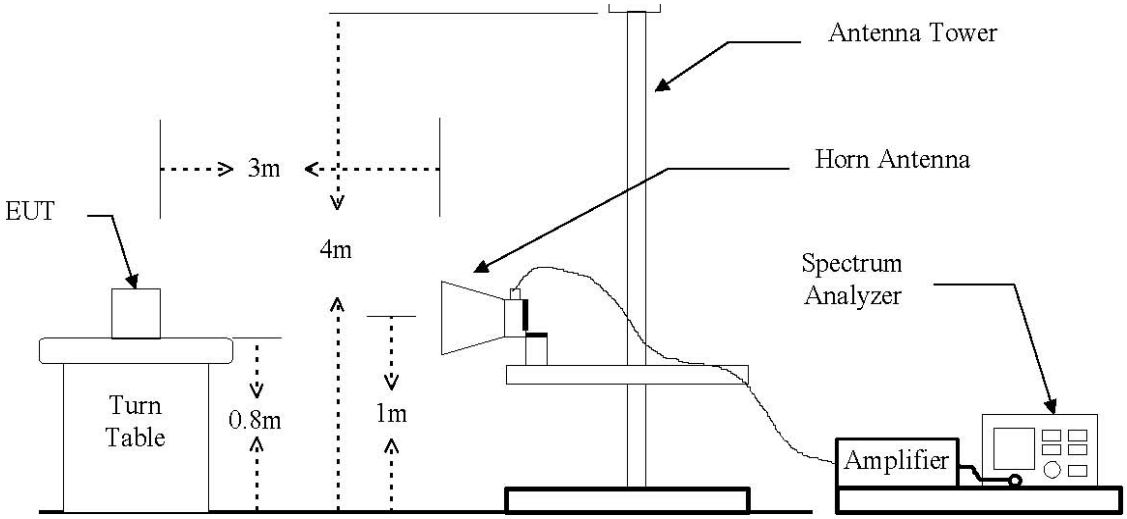
3. Spurious Radiated Emission

3.1. Test Setup

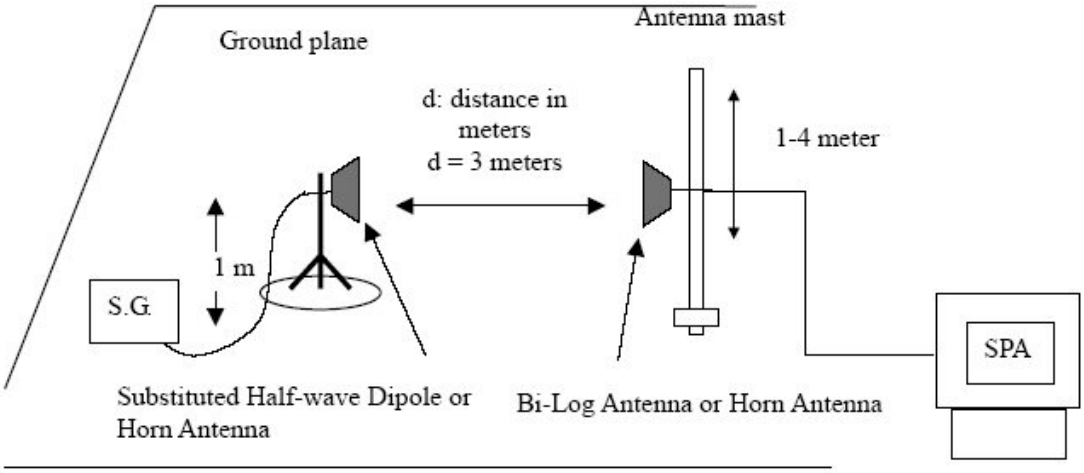
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



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



The diagram below shows the test setup for substituted method



3.2. 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.

3.3. Test Procedure

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 3m from EUT to correspond to the frequency of the transmitter.
3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle, high channels).
4. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
5. During the measurement of the EUT, the resolution bandwidth was to 0.1 MHz(<1 GHz) or 1 MHz(>1 GHz)
7. 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.
8. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
9. 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.
10. The maximum signal level detected by the measuring receiver shall be noted.
11. The EUT was replaced by half-wave dipole or horn antenna connected to a 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.
16. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emission frequency.

    ERP = S.G.output(dBm) + Antenna Gain(dBd) - Cable(dB)
    EIRP = S.G.output(dBm) + Antenna Gain(dBi) - Cable(dB)

3.4. Test Results

Ambient temperature : 20 ℃ Relative humidity : 50 %

GPRS 850

Low Ch.(824.2 MHz)

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	C.L. (dB)	Gain (dBi)	E.I.R.P. (dBm)	Limit (dBm)	Margin (dB)
TX Low Channel (824.2 MHz)							
1648.4	H	-38.69	1.15	8.08	-31.76	-13.00	18.76
2472.6	V	-49.45	1.50	9.91	-41.04	-13.00	28.04
TX Mid Channel (836.6 MHz)							
1673.2	V	-35.72	1.10	8.17	-28.65	-13.00	15.65
2509.8	V	-47.24	1.50	9.96	-38.78	-13.00	25.78
TX High Channel (848.8 MHz)							
1697.6	H	-34.40	1.17	8.25	-27.32	-13.00	14.32
2546.4	H	-52.04	1.53	10.00	-43.57	-13.00	30.57

Remake: 1. No more harmonic above 3rd harmonic for all channel.
2. E.I.R.P.= S.G. Level –Cable Loss +Gain
3. The effective radiated power record the largest level between the two levels with Ant.Pol.(H/V)

GPRS 1900

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	C.L. (dB)	Gain (dBi)	E.I.R.P. (dBm)	Limit (dBm)	Margin (dB)
TX LOW channel (1850.2 MHz)							
3700.4	H	-37.96	2.32	11.20	-29.08	-13.00	16.08
5550.6	V	-46.99	2.76	11.50	-38.25	-13.00	25.25
TX MID Channel (1880.0 MHz)							
3760	H	-42.10	2.26	11.25	-33.11	-13.00	20.11
5640	V	-51.47	2.96	11.56	-42.87	-13.00	29.87
TX HIGH Channel (1909.8 MHz)							
3819.6	H	-42.48	2.46	11.31	-33.63	-13.00	20.63
5729.4	V	-46.48	3.02	11.63	-37.87	-13.00	24.87

Remake: 1. No more harmonic above 3rd harmonic for all channel.
2. E.I.R.P.= S.G. Level –Cable Loss +Gain
3. The effective radiated power record the largest level between the two levels with Ant.Pol.(H/V)

4. Field Strength of Radiated Emissions

4.1. 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

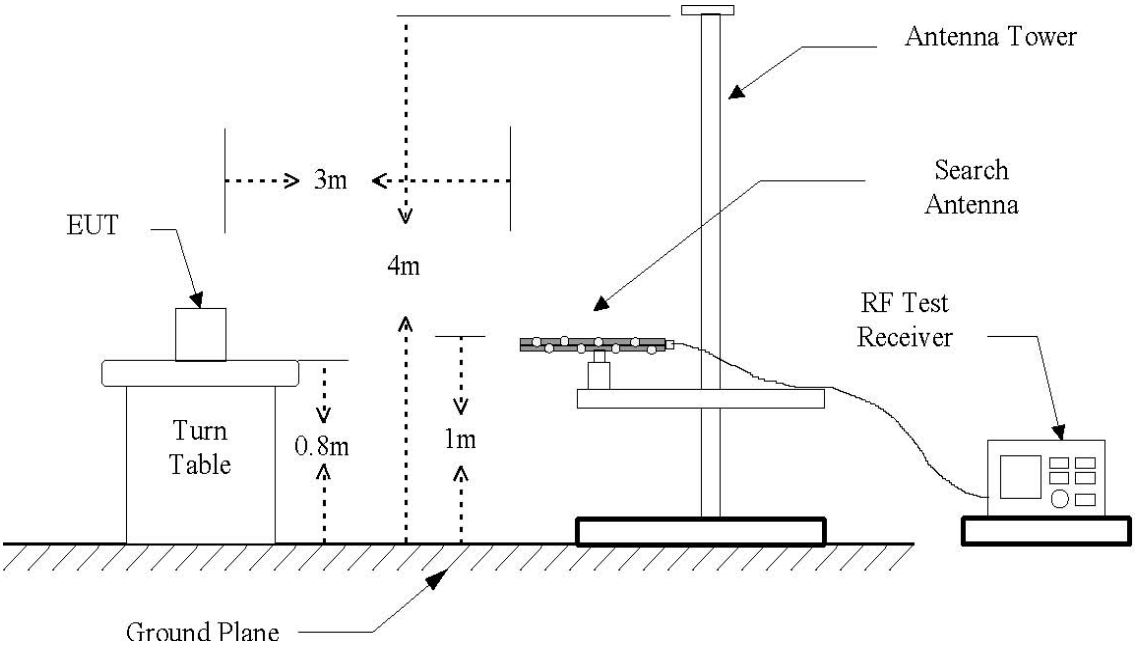
4.2. Test Procedure

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.

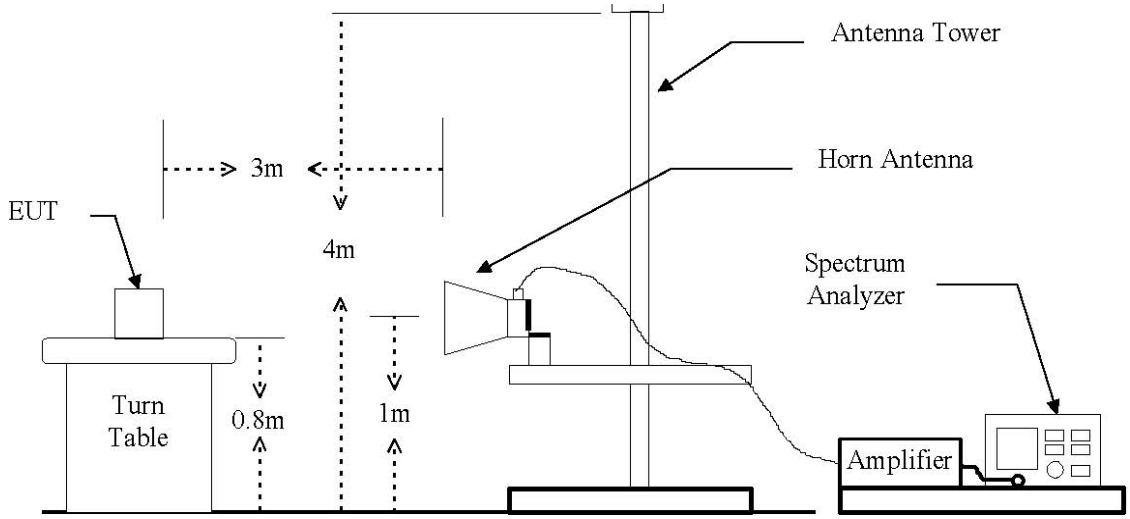
NOTE :

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.

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

4.3. Test Results

Ambient temperature : 20 ℃ Relative humidity : 50 %

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)
62.68	25.80	P	V	4.92	1.01	31.73	40.00	8.27
62.66	19.50	P	H	4.92	1.01	25.42	40.00	14.58
97.31	19.70	P	V	9.01	1.26	29.97	43.50	13.53
146.10	16.10	P	V	7.99	1.57	25.66	43.50	17.84
180.35	16.34	P	H	7.92	1.72	25.98	43.50	17.52
Above 200	Not Detected							

* The test mode is worst case for External ANT(GPS)

Appendix A. Photo of Radiated Emission Test