

Partial FCC RF Test Report

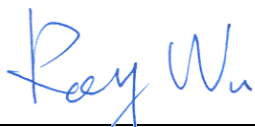
APPLICANT : LG Electronics INC
EQUIPMENT : NoteBook Computer
BRAND NAME : LG
MODEL NAME : LGX14, LGX14A, X140, XB140, XD140
FCC ID : BEJNT-LGX14A
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : Digital Spread Spectrum (DSS)

This is a partial report which is only valid combined with the Bluetooth Module report (Brand Name: Broadcom / Model Name: BCM92070MD_REF, FCC ID: QDS-BRCM1043).

The product was received on Mar. 05, 2010 and completely tested on Mar. 13, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



Roy Wu / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Feature of Equipment Under Test	5
1.4 Testing Site	6
1.5 Applied Standards	6
1.6 Ancillary Equipment List	6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	7
2.1 Test Mode	7
2.2 Connection Diagram of Test System	8
2.3 RF Utility	8
3 TEST RESULT	9
3.1 Band Edges Measurement	9
3.2 AC Conducted Emission Measurement	12
3.3 Radiated Emission Measurement	16
3.4 Antenna Requirements	25
4 LIST OF MEASURING EQUIPMENT	26
5 UNCERTAINTY OF EVALUATION	27
APPENDIX A. PHOTOGRAPHS OF EUT	
APPENDIX B. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR030509B	Rev. 01	Initial issue of report	Mar. 26, 2010



SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.2	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 12.1 dB at 0.198 MHz
3.3	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.16 dB at 370.00 MHz
3.4	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

LG Electronics INC

19-1, Cheongho-ri, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea

1.2 Manufacturer

LG Electronics INC

19-1, Cheongho-ri, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	NoteBook Computer
Brand Name	LG
Model Name	LGX14, LGX14A, X140, XB140, XD140
FCC ID	BEJNT-LGX14A
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Channel Spacing	1 MHz
Antenna Type	PCB Antenna
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Production Unit

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
4. The EUT parts listed with * were all in the test configuration which were used for the test.

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH07-HY	TW1022/4086B-1

1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC Public Notice DA 00-705
- ♦ ANSI C63.4-2003
- ♦ IC RSS-210 Issue 7

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B (DoC), recorded in a separate test report.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
3.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
4.	Earphone	Ergotech	ET-E200	FCC DoC	Unshielded, 1.8 m	N/A
5.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A

2 Test Configuration of Equipment Under Test

2.1 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

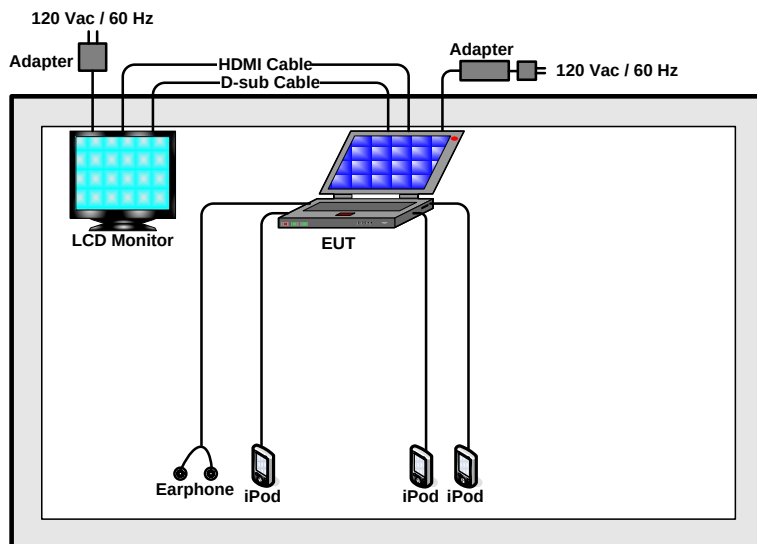
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

The following tables are showing the test modes as the worst cases and recorded in this report.

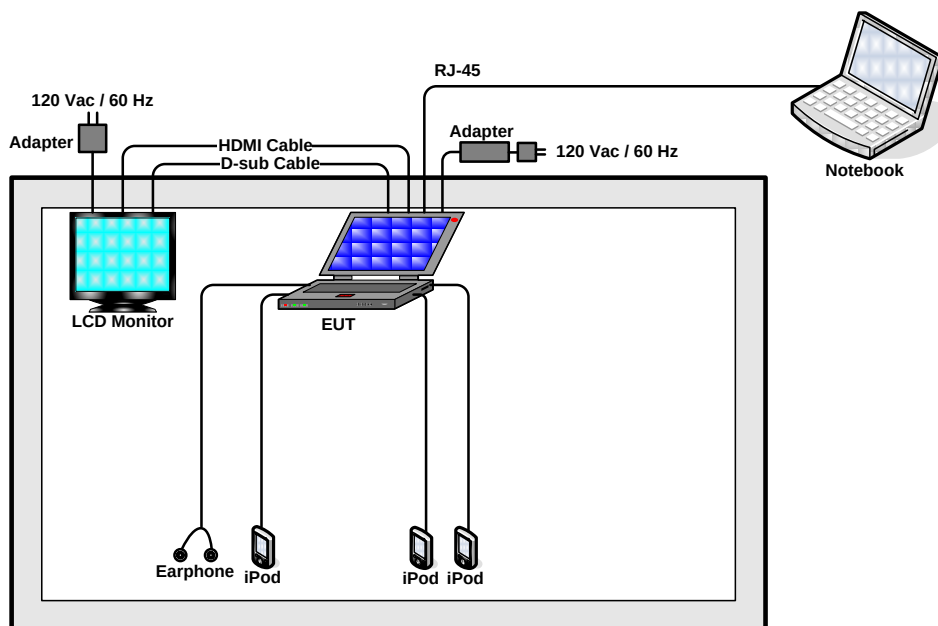
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps π /4-DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Radiated TCs	N/A	N/A	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz
AC Conducted Emission	Mode 1 :GPRS850 Idle + Bluetooth Link + TC + Adapter		
Remark:			
1. TC stands for Test Configuration, and consists of iPod, monitor, earphone, and RJ-45.			
2. Only the radiated emission and conducted emission of the laptop computer was performed in this report, and the conducted test cases can be referred to Broadcom module report (FCC ID: QDS-BRCM1043).			

2.2 Connection Diagram of Test System

<Bluetooth Tx Mode>



<EUT with TC Mode>



2.3 RF Utility

For Bluetooth function, the RF utility, “Blue Tool” was installed in EUT which was programmed in order to make the EUT transmitting and receiving signals continuously.

3 Test Result

3.1 Band Edges Measurement

3.1.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

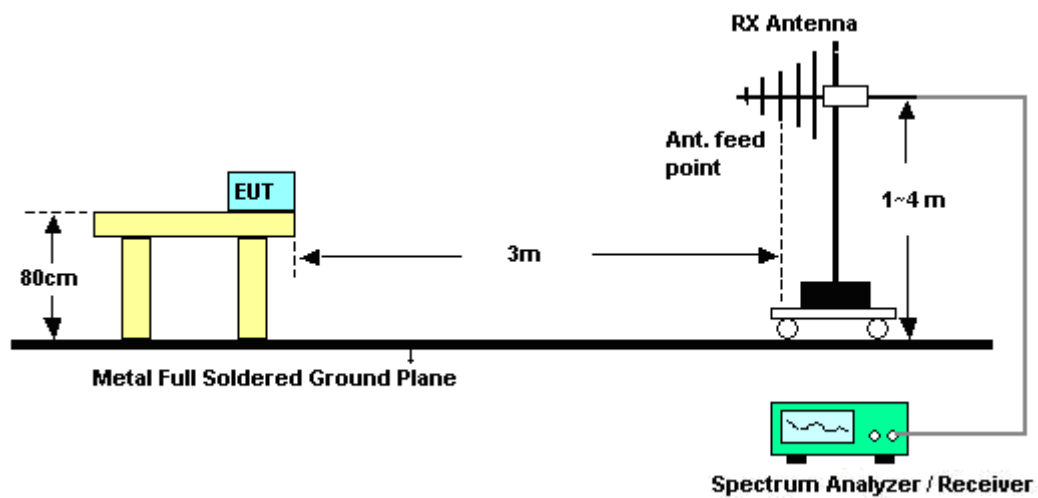
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) $\geq$ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

3.1.4 Test Setup



3.1.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	00	Relative Humidity :	42~43%
		Test Engineer :	Kay Wu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2333.37	44	-30	74	40.6	32.02	5.51	34.13	100	237	Peak
2333.37	32.4	-21.6	54	29	32.02	5.51	34.13	100	237	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2327.29	46.31	-27.69	74	42.91	32.02	5.51	34.13	100	172	Peak
2327.29	32.83	-21.17	54	29.43	32.02	5.51	34.13	100	172	Average

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	42~43%
		Test Engineer :	Kay Wu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	50.14	-23.86	74	46.68	32.27	5.38	34.19	122	229	Peak
2483.5	39.89	-14.11	54	36.43	32.27	5.38	34.19	122	229	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2490.69	46.35	-27.65	74	42.87	32.3	5.37	34.19	100	164	Peak
2490.69	36.79	-17.21	54	33.31	32.3	5.37	34.19	100	164	Average

3.2 AC Conducted Emission Measurement

3.2.1 Limit of AC Conducted Emission

For equipment 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.

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

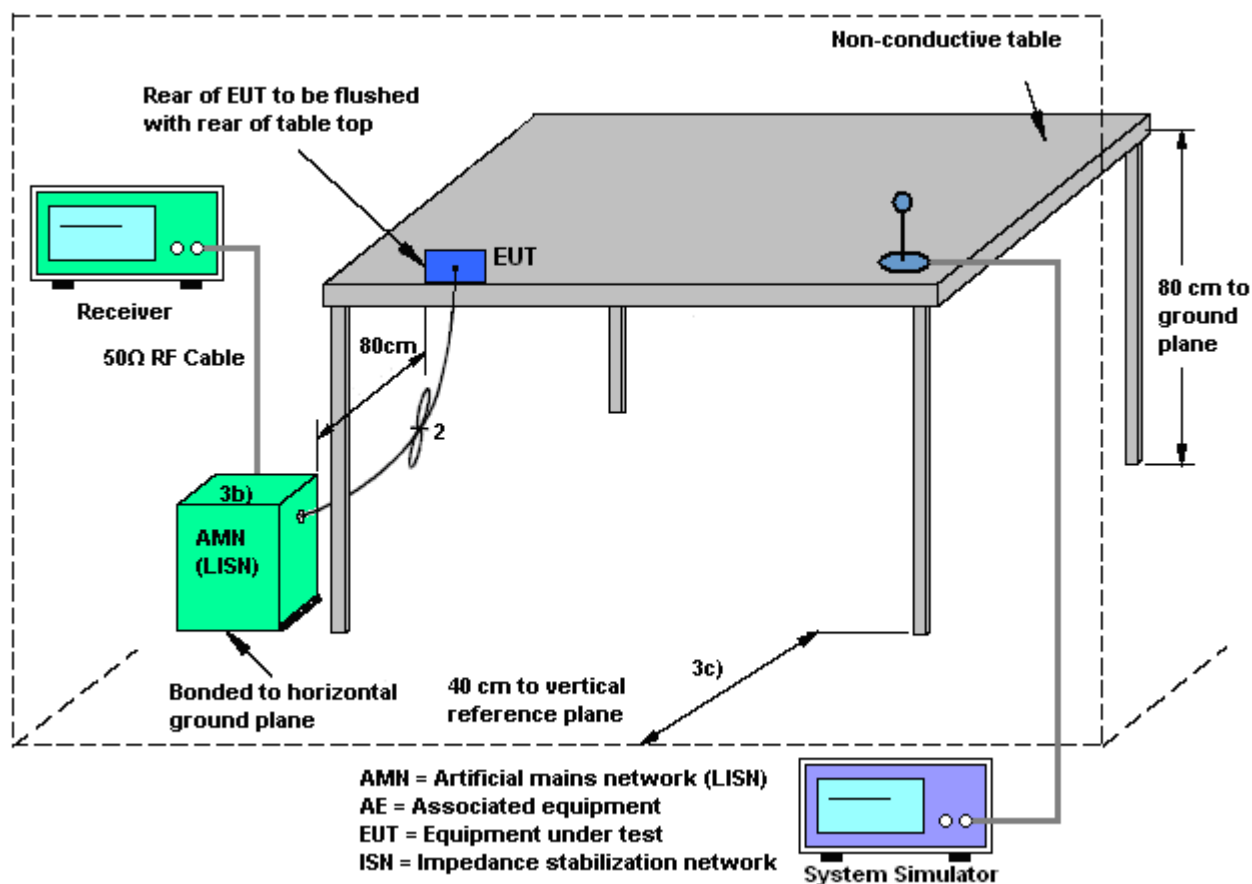
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

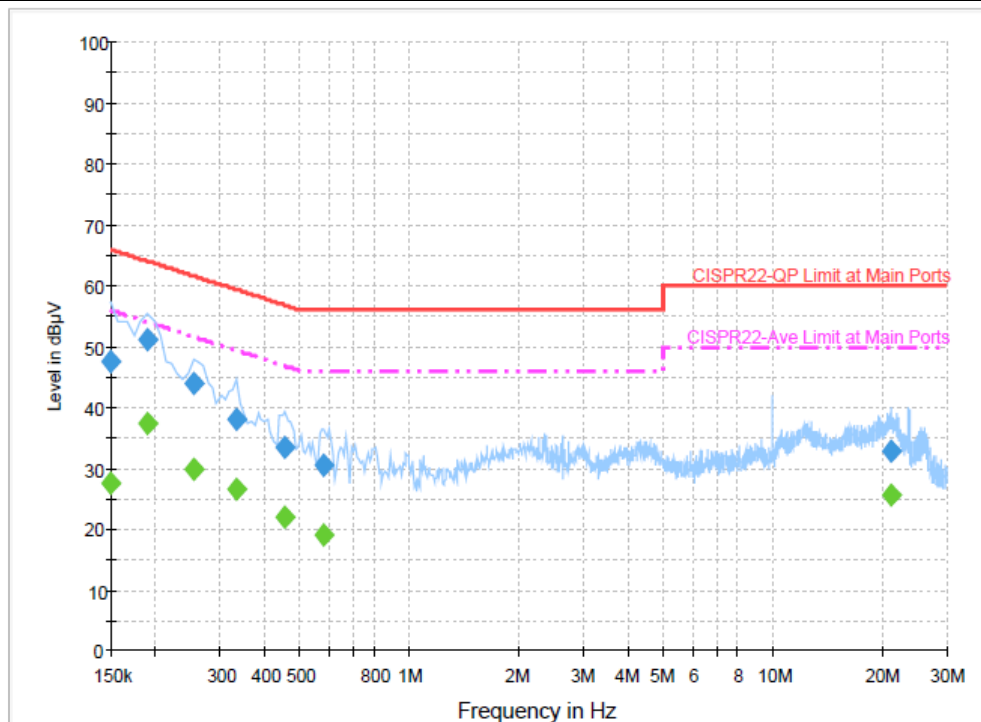
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
1. Connect EUT to the power mains through a line impedance stabilization network (LISN).
2. All the support units are connecting to the other LISN.
3. The LISN provides 50 ohm coupling impedance for the measuring instrument.
4. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.2.4 Test Setup



3.2.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	39~41%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GPRS850 Idle + Bluetooth Link + TC + Adapter		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



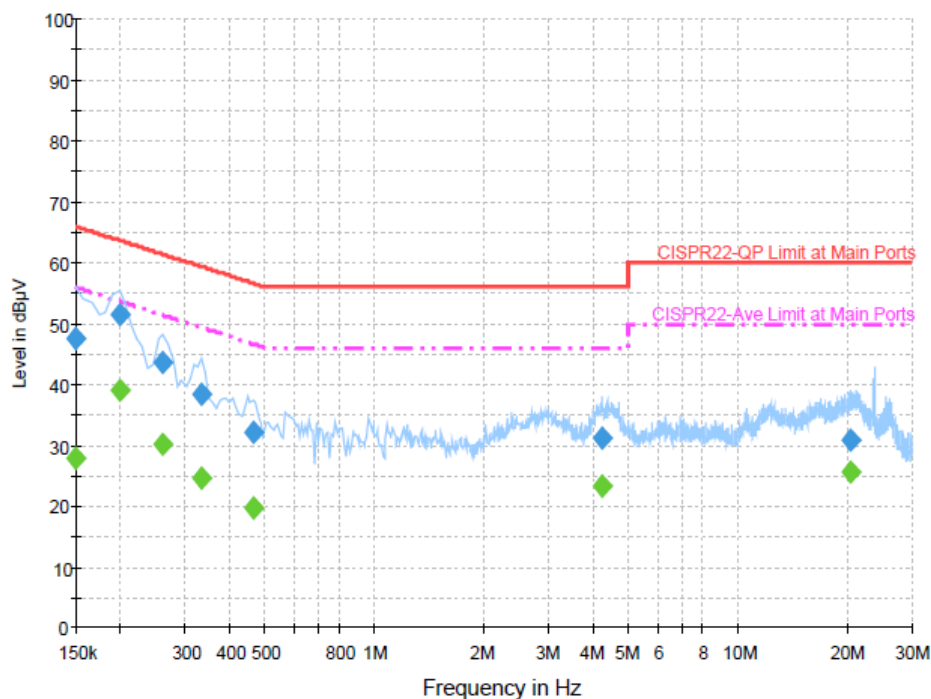
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	47.4	Off	L1	19.5	18.6	66.0
0.190000	51.0	Off	L1	19.6	13.0	64.0
0.254000	43.8	Off	L1	19.4	17.8	61.6
0.334000	38.0	Off	L1	19.5	21.4	59.4
0.454000	33.4	Off	L1	19.4	23.4	56.8
0.582000	30.4	Off	L1	19.5	25.6	56.0
20.990000	32.7	Off	L1	19.7	27.3	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	27.4	Off	L1	19.5	28.6	56.0
0.190000	37.3	Off	L1	19.6	16.7	54.0
0.254000	29.8	Off	L1	19.4	21.8	51.6
0.334000	26.6	Off	L1	19.5	22.8	49.4
0.454000	22.0	Off	L1	19.4	24.8	46.8
0.582000	19.1	Off	L1	19.5	26.9	46.0
20.990000	25.6	Off	L1	19.7	24.4	50.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	39~41%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GPRS850 Idle + Bluetooth Link + TC + Adapter		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		


Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	47.5	Off	N	19.5	18.5	66.0
0.198000	51.6	Off	N	19.5	12.1	63.7
0.262000	43.6	Off	N	19.4	17.8	61.4
0.334000	38.5	Off	N	19.5	20.9	59.4
0.462000	32.1	Off	N	19.4	24.6	56.7
4.214000	31.2	Off	N	19.6	24.8	56.0
20.302000	30.8	Off	N	19.8	29.2	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	28.0	Off	N	19.5	28.0	56.0
0.198000	39.1	Off	N	19.5	14.6	53.7
0.262000	30.0	Off	N	19.4	21.4	51.4
0.334000	24.4	Off	N	19.5	25.0	49.4
0.462000	19.6	Off	N	19.4	27.1	46.7
4.214000	23.2	Off	N	19.6	22.8	46.0
20.302000	25.7	Off	N	19.8	24.3	50.0

3.3 Radiated Emission Measurement

3.3.1 Limit of Radiated Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.3.2 Measuring Instruments

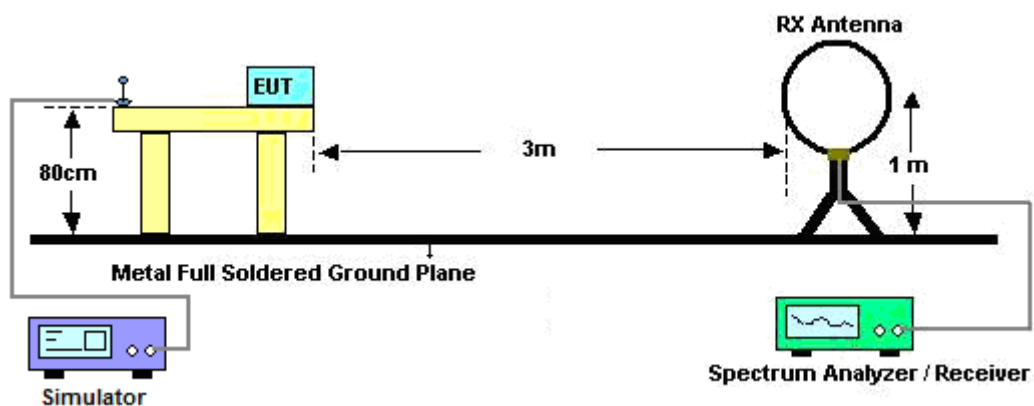
See list of measuring instruments of this test report.

3.3.3 Test Procedures

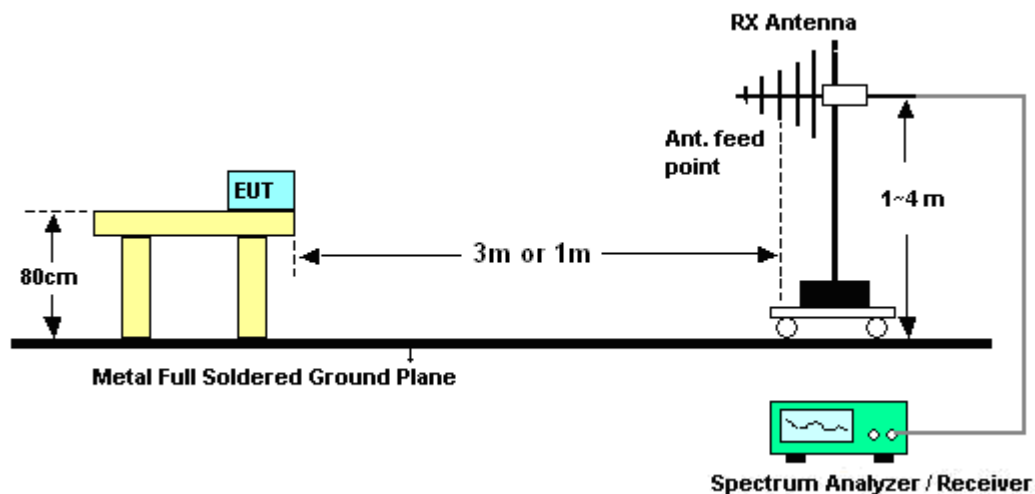
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
 - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
 - (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

3.3.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.3.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

Test Engineer :	Kay Wu	Temperature :	23~24°C	
		Relative Humidity :	42~43%	

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

3.3.6 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	00	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Horizontal
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
79.41	20.37	-19.63	40	43.59	7.48	1	31.7	-	-	Peak
193.89	23.71	-19.79	43.5	44.77	8.87	1.68	31.61	-	-	Peak
292.17	39.61	-6.39	46	55.59	13.35	2.09	31.42	-	-	Peak
370	42.28	-3.72	46	55.76	15.34	2.44	31.26	100	38	Peak
531	28.32	-17.68	46	37.61	18.75	3.03	31.07	-	-	Peak
872.6	34.1	-11.9	46	37.83	22.92	4.05	30.7	-	-	Peak
2333.37	32.4	-21.6	54	29	32.02	5.51	34.13	100	237	Average
2333.37	44	-30	74	40.6	32.02	5.51	34.13	100	237	Peak
2402	88.17	-	-	84.73	32.16	5.44	34.16	100	237	Peak
2402	72.5	-	-	69.07	32.13	5.46	34.16	100	237	Average
2486	31.28	-22.72	54	27.82	32.27	5.38	34.19	100	237	Average
2486	43.33	-30.67	74	39.87	32.27	5.38	34.19	100	237	Peak
8370	53.27	-20.73	74	42.27	36	10.1	35.1	100	217	Peak
8370	40.15	-13.85	54	29.15	36	10.1	35.1	100	217	Average

Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	00	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Vertical
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.62	25.99	-14.01	40	38.63	18.4	0.66	31.7	-	-	Peak
92.37	24.62	-18.88	43.5	46.03	9.17	1.12	31.7	-	-	Peak
166.62	22.42	-21.08	43.5	42.62	9.89	1.54	31.63	-	-	Peak
370.7	41.56	-4.44	46	55.04	15.34	2.44	31.26	100	67	Peak
475.7	30.91	-15.09	46	41.52	17.66	2.85	31.12	-	-	Peak
808.2	36.62	-9.38	46	41.16	22.29	3.87	30.7	-	-	Peak
2327.29	32.83	-21.17	54	29.43	32.02	5.51	34.13	100	172	Average
2327.29	46.31	-27.69	74	42.91	32.02	5.51	34.13	100	172	Peak
2402	83.01	-	-	79.57	32.16	5.44	34.16	100	172	Peak
2402	68.7	-	-	65.27	32.13	5.46	34.16	100	172	Average
2494	31.11	-22.89	54	27.64	32.3	5.37	34.2	100	172	Average
2494	44.15	-29.85	74	40.68	32.3	5.37	34.2	100	172	Peak
8349	54.37	-19.63	74	43.4	36	10.07	35.1	100	12	Peak
8349	40.43	-13.57	54	29.46	36	10.07	35.1	100	12	Average

Test Mode :	Mode 2	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Horizontal
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30.27	21.88	-18.12	40	33.43	19.51	0.64	31.7	-	-	Peak
79.41	20.36	-19.64	40	43.58	7.48	1	31.7	-	-	Peak
292.17	38.43	-7.57	46	54.41	13.35	2.09	31.42	-	-	Peak
302.1	38.3	-7.7	46	54.01	13.54	2.14	31.39	-	-	Peak
370	42.84	-3.16	46	56.32	15.34	2.44	31.26	100	34	Peak
872.6	32.56	-13.44	46	36.29	22.92	4.05	30.7	-	-	Peak
2350	44.94	-29.06	74	41.53	32.05	5.5	34.14	124	236	Peak
2350	32.33	-21.67	54	28.92	32.05	5.5	34.14	124	236	Average
2441	86.51	-	-	83.06	32.22	5.41	34.18	124	236	Peak
2441	72.41	-	-	68.96	32.22	5.41	34.18	124	236	Average
2492	31.33	-22.67	54	27.86	32.3	5.37	34.2	124	236	Average
2492	44.47	-29.53	74	41	32.3	5.37	34.2	124	236	Peak
8454	53.66	-20.34	74	42.62	36	10.14	35.1	100	227	Peak
8454	40.79	-13.21	54	29.75	36	10.14	35.1	100	227	Average

Test Mode :	Mode 2	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Vertical
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30.54	25.91	-14.09	40	38.01	18.95	0.65	31.7	-	-	Peak
92.37	25.04	-18.46	43.5	46.45	9.17	1.12	31.7	-	-	Peak
294.06	31.03	-14.97	46	46.96	13.38	2.1	31.41	-	-	Peak
369.3	42.2	-3.8	46	55.71	15.31	2.44	31.26	100	67	Peak
637.4	33.29	-12.71	46	40.53	20.35	3.37	30.96	-	-	Peak
808.2	35.51	-10.49	46	40.05	22.29	3.87	30.7	-	-	Peak
2326	45.38	-28.62	74	41.98	32.02	5.51	34.13	100	172	Peak
2326	32.94	-21.06	54	29.54	32.02	5.51	34.13	100	172	Average
2441	82.92	-	-	79.47	32.22	5.41	34.18	100	172	Peak
2441	68.26	-	-	64.81	32.22	5.41	34.18	100	172	Average
2494	31.87	-22.13	54	28.4	32.3	5.37	34.2	100	172	Average
2494	45.25	-28.75	74	41.78	32.3	5.37	34.2	100	172	Peak
8325	53.43	-20.57	74	42.47	36	10.06	35.1	100	117	Peak
8325	40.62	-13.38	54	29.66	36	10.06	35.1	100	117	Average

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
32.97	30.16	-9.84	40	43.36	17.84	0.66	31.7	-	-	Peak
81.57	20.43	-19.57	40	43.42	7.7	1.01	31.7	-	-	Peak
292.17	38.95	-7.05	46	54.93	13.35	2.09	31.42	-	-	Peak
301.4	36.26	-9.74	46	52.01	13.51	2.14	31.4	-	-	Peak
370	42.31	-3.69	46	55.79	15.34	2.44	31.26	100	117	Peak
872.6	31.42	-14.58	46	35.15	22.92	4.05	30.7	-	-	Peak
2332	44.6	-29.4	74	41.2	32.02	5.51	34.13	122	229	Peak
2332	32.25	-21.75	54	28.85	32.02	5.51	34.13	122	229	Average
2480	86.83	-	-	83.37	32.27	5.38	34.19	122	229	Peak
2480	70.71	-	-	67.25	32.27	5.38	34.19	122	229	Average
2483.5	39.89	-14.11	54	36.43	32.27	5.38	34.19	122	229	Average
2483.5	50.14	-23.86	74	46.68	32.27	5.38	34.19	122	229	Peak
8265	53.71	-20.29	74	42.79	36	10.02	35.1	100	166	Peak
8265	40.37	-13.63	54	29.45	36	10.02	35.1	100	166	Average

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	42~43%
Test Engineer :	Kay Wu	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30.81	25.9	-14.1	40	38	18.95	0.65	31.7	-	-	Peak
92.37	25.04	-18.46	43.5	46.45	9.17	1.12	31.7	-	-	Peak
296.22	32.53	-13.47	46	48.42	13.41	2.11	31.41	-	-	Peak
371.4	42.75	-3.25	46	56.2	15.36	2.45	31.26	100	168	Peak
637.4	32.27	-13.73	46	39.51	20.35	3.37	30.96	-	-	Peak
808.2	36.45	-9.55	46	40.99	22.29	3.87	30.7	-	-	Peak
2326	45.17	-28.83	74	41.77	32.02	5.51	34.13	100	164	Peak
2326	32.47	-21.53	54	29.07	32.02	5.51	34.13	100	164	Average
2480	83.82	-	-	80.36	32.27	5.38	34.19	100	164	Peak
2480	67.13	-	-	63.67	32.27	5.38	34.19	100	164	Average
2490.69	36.79	-17.21	54	33.31	32.3	5.37	34.19	100	164	Average
2490.69	46.35	-27.65	74	42.87	32.3	5.37	34.19	100	164	Peak
8490	53.87	-20.13	74	42.79	36	10.18	35.1	100	285	Peak
8490	40.84	-13.16	54	29.76	36	10.18	35.1	100	285	Average

3.4 Antenna Requirements

3.4.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.4.2 Antenna Connected Construction

The antennas type used in this product is PCB Antenna without connector and it is considered to meet antenna requirement.

3.4.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 23, 2009	Jun. 22, 2010	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 17, 2009	Sep. 16, 2010	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 10, 2009	Sep. 09, 2010	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz ~ 2.75GHz	Aug. 05, 2009	Aug. 04, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9kHz~30MHz	Nov. 30, 2009	Nov. 29, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9kHz~30MHz	Nov. 23, 2009	Nov. 22, 2010	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2009	Oct. 30, 2010	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 04, 2009	Dec. 03, 2010	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 20, 2009	Aug. 19, 2010	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 14, 2009	Oct. 13, 2010	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec.09,2009	Dec. 08, 2010	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32dB.GAIN	Mar. 27, 2009	Mar. 26, 2010	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 KHz~30 MHz	May 22, 2008	May 21, 2010	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
Combined Standard Uncertainty $U_c(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26		

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty $U_c(y)$	1.27		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.54		

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	± 0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	± 1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	± 0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	± 2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	± 1.50	Rectangular	0.87	1	0.87
Site Imperfection	± 2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty $U_c(y)$	2.36				
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.72				



Appendix A. Photographs of EUT

Please refer to Sporton report number EP030509 as below.