

# Partial FCC RF Test Report

APPLICANT : Getac Technology Corporation  
EQUIPMENT : Notebook PC  
BRAND NAME : Getac  
MODEL NAME : E100  
FCC ID : QYLEA02  
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 Integrated Bluetooth Module (Brand name: CastleNet / Model name: BTC04R, FCC ID: RK9-BTC04R) Report.

The product was received on May 03, 2010 and completely tested on May 30, 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.

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FCC ID : QYLEA02

Page Number : 1 of 29

Report Issued Date : Aug. 27, 2010

Report Version : Rev. 01



# 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 RF Output Power ..... 7

    2.2 Test Mode..... 8

    2.3 Connection Diagram of Test System..... 9

    2.4 RF Utility ..... 9

**3 TEST RESULT ..... 10**

    3.1 Band Edges Measurement ..... 10

    3.2 AC Conducted Emission Measurement..... 13

    3.3 Radiated Emission Measurement..... 17

    3.4 Antenna Requirements ..... 26

**4 LIST OF MEASURING EQUIPMENT..... 27**

**5 UNCERTAINTY OF EVALUATION..... 28**

**APPENDIX A. PHOTOGRAPHS OF EUT**

**APPENDIX B. SETUP PHOTOGRAPHS**



### REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR050315-05A	Rev. 01	Initial issue of report	Aug. 27, 2010



### SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.2	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 15.8 dB at 13.502 MHz
3.3	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 1.25 dB at 4804.00 MHz
3.4	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

# 1 General Description

## 1.1 Applicant

**Getac Technology Corporation**

5F., Building A, No. 209, Sec.1, Nangang Rd., Nangang Dist., Taipei City 11568, Taiwan, R.O.C.

## 1.2 Manufacturer

**GeTAC Technology (Kunshan) Co., LTD.**

No. 269, 2nd Road, Export Processing Zone, Changjiang South Road, Kunshan, Jiangsu, P.R.C.

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
<b>Equipment</b>	Notebook PC
<b>Brand Name</b>	Getac
<b>Model Name</b>	E100
<b>FCC ID</b>	QYLEA02
<b>Tx/Rx Frequency Range</b>	2400 MHz ~ 2483.5 MHz
<b>Number of Channels</b>	79
<b>Carrier Frequency of Each Channel</b>	2402+n*1 MHz; n=0~78
<b>Channel Spacing</b>	1 MHz
<b>Maximum Output Power to Antenna</b>	Bluetooth (1Mbps) : 2.68 dBm (1.85 mW) Bluetooth EDR (2Mbps) : 0.99 dBm (1.26 mW) Bluetooth EDR (3Mbps) : 1.22 dBm (1.32 mW)
<b>Antenna Type</b>	PIFA Antenna with gain 1.29 dBi
<b>Type of Modulation</b>	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
<b>EUT Stage</b>	Identical Prototype

**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.

## 1.4 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL INC.		
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	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.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	Modem	ACEEX	DM1414	IFAXDM1414	Shielded, 1.15 m	N/A

## 2 Test Configuration of Equipment Under Test

### 2.1 RF Output Power

Preliminary tests were performed in different data rate and recorded the RF output power in the following table:

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	$\pi$ /4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	2.68 dBm	0.99 dBm	1.22 dBm
Ch39	2441MHz	1.69 dBm	-0.46 dBm	0.04 dBm
Ch78	2480MHz	0.03 dBm	-2.28 dBm	-1.99 dBm

**Remark:**

1. The data rate was set in 1Mbps for all the test items due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.



## 2.2 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).

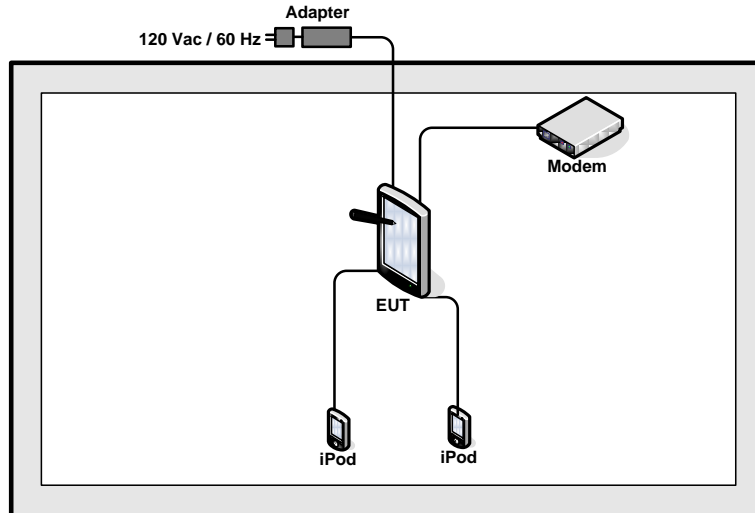
Pre-scanned tests were conducted to determine the final configuration from all possible combinations. The following tables are showing the test modes as the worst cases and recorded in this report.

Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth 1Mbps (Modulation : GFSK)
Radiated TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz
AC Conducted Emission	Mode 1 :WLAN Link + Bluetooth Link + TC + Adapter
<b>Remark:</b> <ol style="list-style-type: none"><li>1. TC stands for Test Configuration, and consists of modem, mouse, earphone, keyboard, RJ-45 and GPS Rx.</li><li>2. For radiated TCs, the data rate was set in 1Mbps due to the highest RF output power; only the data of these modes was reported.</li><li>3. Only the radiated emission and conducted emission tests were performed in this report and the conducted test cases can be referred to the Bluetooth module (Brand name: CastleNet / Model name: BTC04R, FCC ID: RK9-BTC04R, ADT Report Number: RF970806A01) report.</li></ol>	

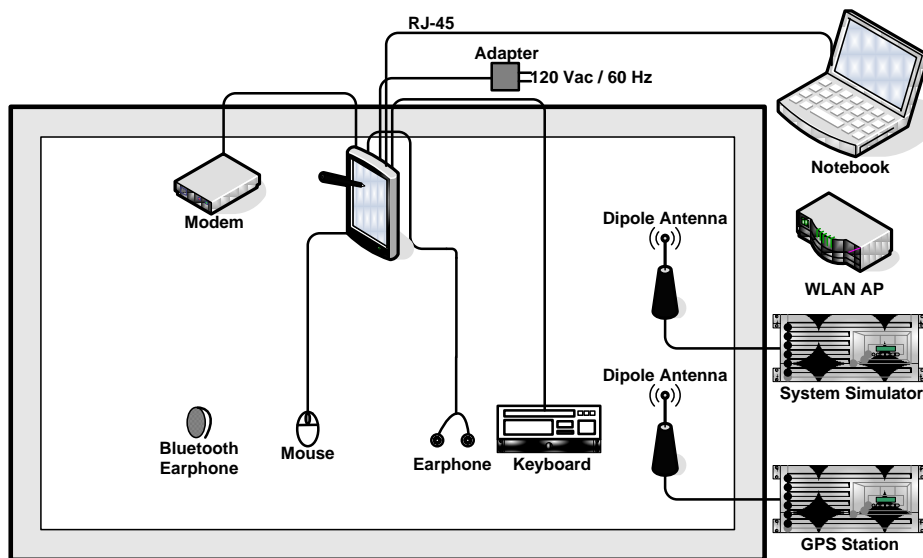


## 2.3 Connection Diagram of Test System

### <Bluetooth Tx Mode>



### <EUT with TC Mode>



## 2.4 RF Utility

For Bluetooth function, the RF utility, "BLUE TEST" 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.

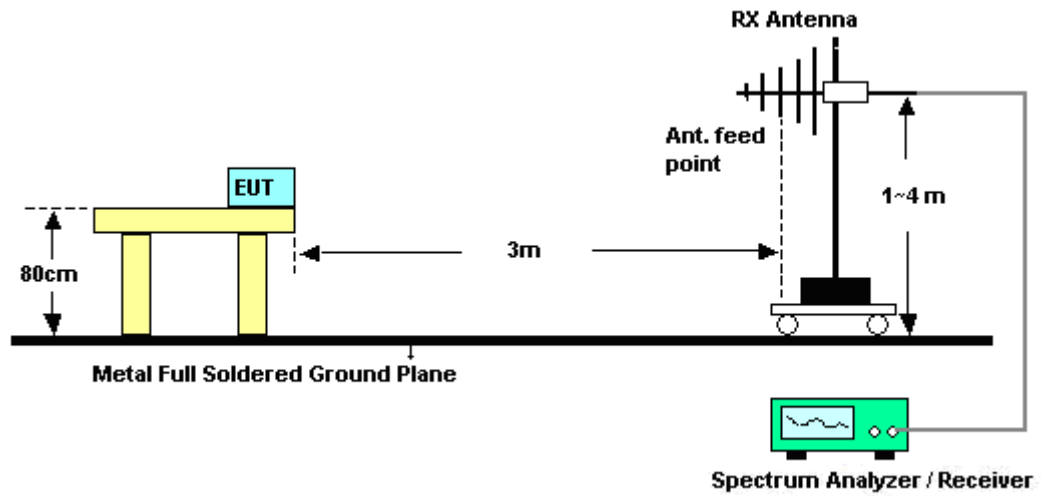
#### **3.1.2 Measuring Instruments**

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 :	24~25°C
Test Channel :	00	Relative Humidity :	43~44%
		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
2369.85	45.48	-28.52	74.00	42.05	32.11	5.47	34.15	165	336	Peak
2369.85	33.26	-20.74	54.00	29.83	32.11	5.47	34.15	165	336	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
2319.69	45.88	-28.12	74.00	42.48	32.02	5.51	34.13	187	51	Peak
2319.69	33.25	-20.75	54.00	29.85	32.02	5.51	34.13	187	51	Average

Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	43~44%
		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
2483.50	61.81	-12.19	74.00	58.35	32.27	5.38	34.19	103	336	Peak
2483.50	50.89	-3.11	54.00	47.43	32.27	5.38	34.19	103	336	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
2483.50	56.52	-17.48	74.00	53.06	32.27	5.38	34.19	190	354	Peak
2483.50	46.82	-7.18	54.00	43.36	32.27	5.38	34.19	190	354	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.

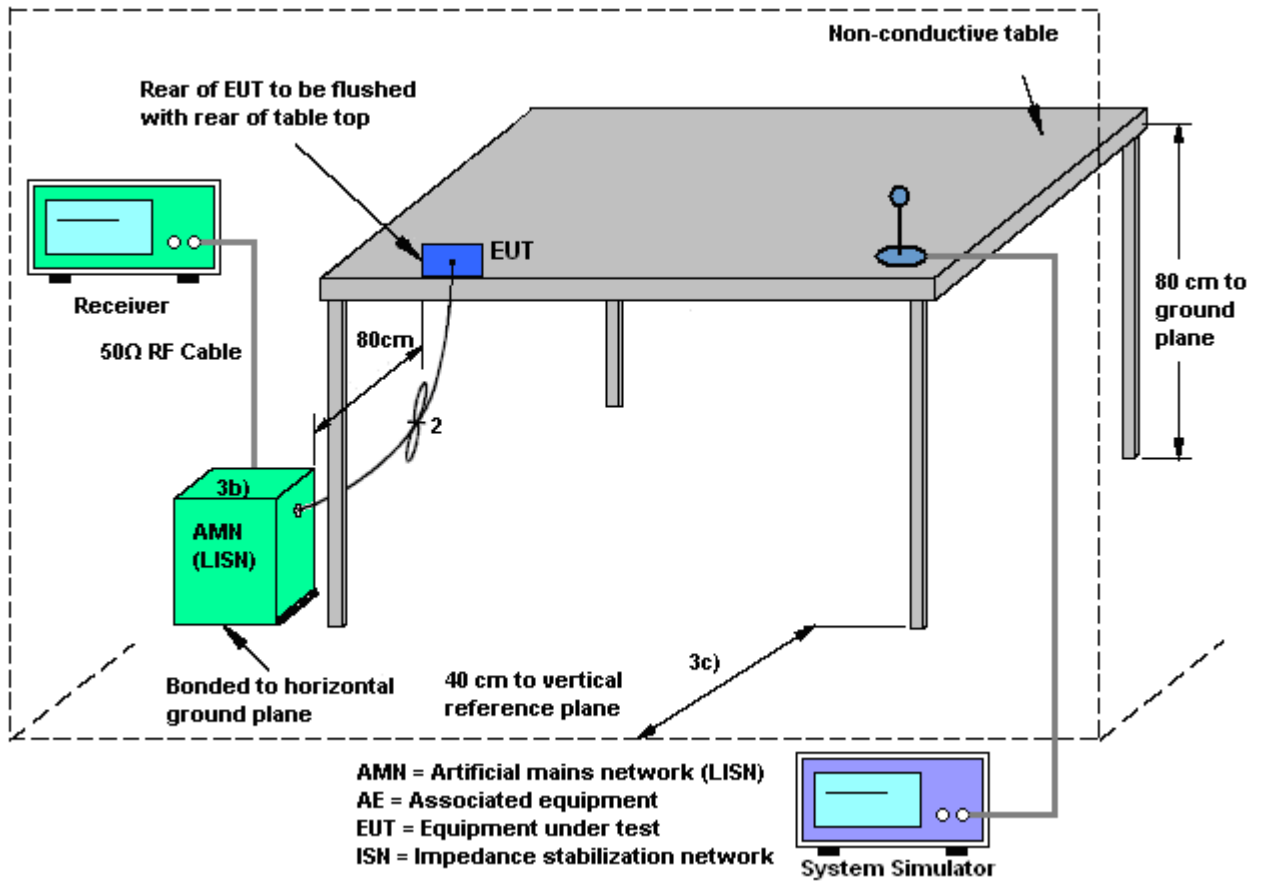
#### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.2.3 Test Procedures

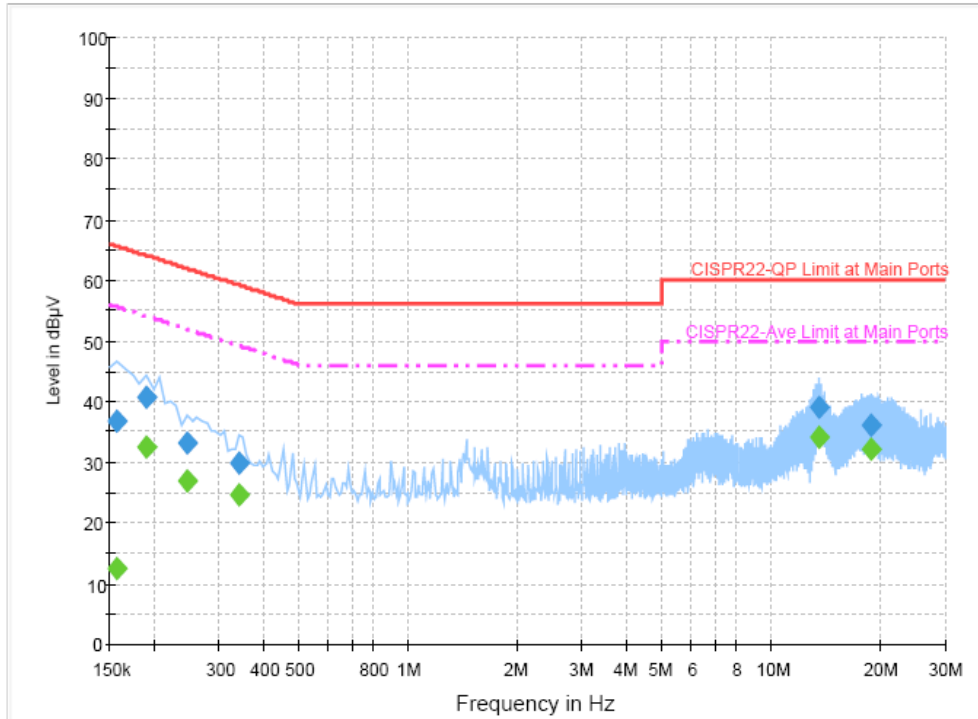
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
  1. Connect EUT to the power mains through a line impedance stabilization network (LISN).
  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 :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + Bluetooth Link + TC + Adapter		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



#### Final Result 1

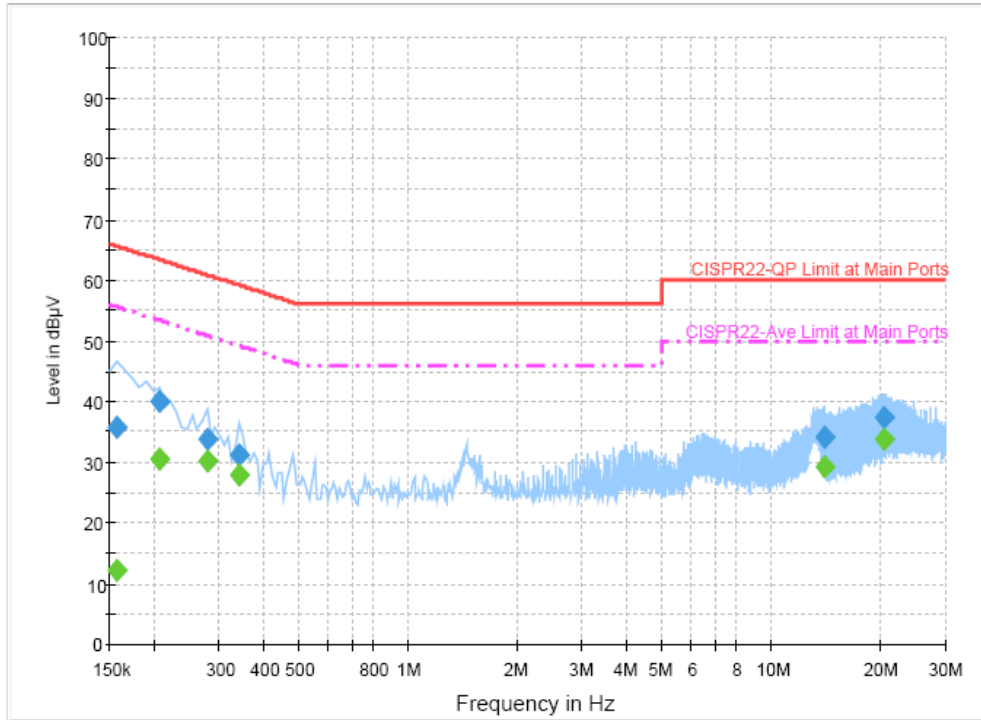
Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	36.7	Off	L1	19.5	28.9	65.6
0.190000	40.5	Off	L1	19.6	23.5	64.0
0.246000	33.2	Off	L1	19.5	28.7	61.9
0.342000	29.8	Off	L1	19.5	29.4	59.2
13.502000	39.0	Off	L1	19.6	21.0	60.0
18.670000	36.1	Off	L1	19.7	23.9	60.0

#### Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	12.6	Off	L1	19.5	43.0	55.6
0.190000	32.3	Off	L1	19.6	21.7	54.0
0.246000	27.0	Off	L1	19.5	24.9	51.9
0.342000	24.7	Off	L1	19.5	24.5	49.2
13.502000	34.2	Off	L1	19.6	15.8	50.0
18.670000	32.2	Off	L1	19.7	17.8	50.0



Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + 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)
0.158000	35.8	Off	N	19.5	29.8	65.6
0.206000	40.0	Off	N	19.5	23.4	63.4
0.278000	33.6	Off	N	19.5	27.3	60.9
0.342000	31.3	Off	N	19.4	27.9	59.2
13.918000	34.2	Off	N	19.7	25.8	60.0
20.262000	37.5	Off	N	19.8	22.5	60.0

**Final Result 2**

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	12.2	Off	N	19.5	43.4	55.6
0.206000	30.6	Off	N	19.5	22.8	53.4
0.278000	30.2	Off	N	19.5	20.7	50.9
0.342000	27.8	Off	N	19.4	21.4	49.2
13.918000	29.2	Off	N	19.7	20.8	50.0
20.262000	33.8	Off	N	19.8	16.2	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

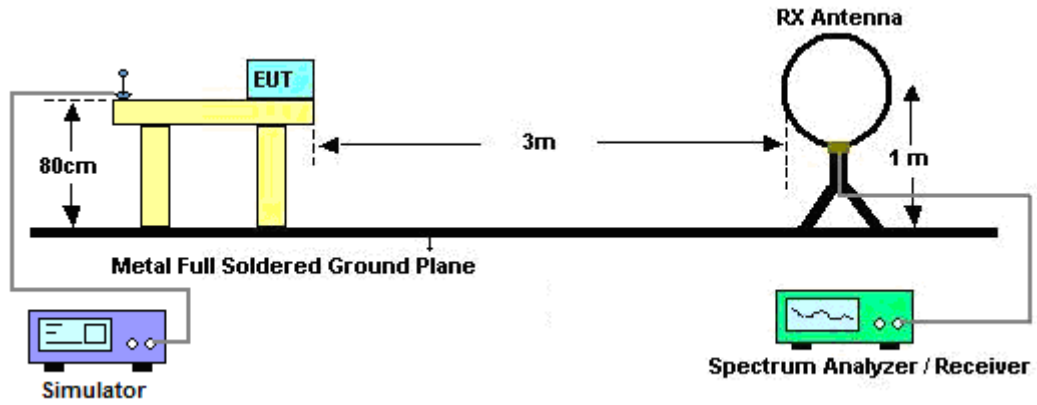
See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

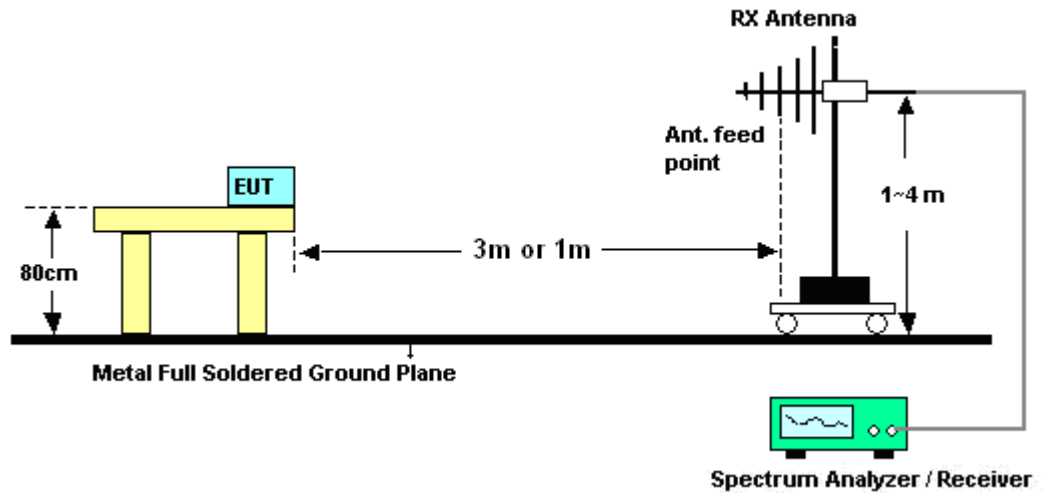
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
  - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = 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 :	24~25°C	
		Relative Humidity :	43~44%	
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 ~ 10<sup>th</sup> Harmonic)

Test Mode :	Mode 1	Temperature :	24~25°C
Test Channel :	00	Relative Humidity :	43~44%
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
30.00	28.80	-11.20	40.00	40.22	19.51	0.53	31.46	-	-	Peak
157.17	29.68	-13.82	43.50	49.36	10.63	1.22	31.53	-	-	Peak
196.05	25.55	-17.95	43.50	46.89	8.85	1.30	31.49	-	-	Peak
365.80	35.92	-10.08	46.00	49.90	15.21	2.07	31.26	100	215	Peak
598.90	25.36	-20.64	46.00	33.57	20.03	2.68	30.92	-	-	Peak
719.30	27.16	-18.84	46.00	33.83	21.11	2.99	30.77	-	-	Peak
2369.85	33.26	-20.74	54.00	29.83	32.11	5.47	34.15	165	336	Average
2369.85	45.48	-28.52	74.00	42.05	32.11	5.47	34.15	165	336	Peak
2402.00	90.51	-	-	87.07	32.16	5.44	34.16	165	336	Peak
2402.00	77.84	-	-	74.41	32.13	5.46	34.16	165	336	Average
2500.00	32.73	-21.27	54.00	29.26	32.30	5.37	34.20	165	336	Average
2500.00	43.82	-30.18	74.00	40.35	32.30	5.37	34.20	165	336	Peak
4804.00	59.65	-14.35	74.00	52.04	34.32	7.79	34.50	136	303	Peak
4804.00	52.75	-1.25	54.00	45.14	34.32	7.79	34.50	136	303	Average
8445.00	54.64	-19.36	74.00	43.60	36.00	10.14	35.10	100	221	Peak
8445.00	40.67	-13.33	54.00	29.63	36.00	10.14	35.10	100	221	Average



<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	00	<b>Relative Humidity :</b>	43~44%
<b>Test Engineer :</b>	Kay Wu	<b>Polarization :</b>	Vertical
<b>Remark :</b>	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
80.49	29.44	-10.56	40.00	52.52	7.57	0.88	31.53	100	254	Peak
158.25	27.67	-15.83	43.50	47.44	10.54	1.22	31.53	-	-	Peak
192.81	23.95	-19.55	43.50	45.28	8.88	1.29	31.50	-	-	Peak
365.80	32.82	-13.18	46.00	46.80	15.21	2.07	31.26	-	-	Peak
769.00	24.53	-21.47	46.00	30.34	21.79	3.09	30.69	-	-	Peak
915.30	33.04	-12.96	46.00	36.91	23.41	3.38	30.66	-	-	Peak
2319.69	33.25	-20.75	54.00	29.85	32.02	5.51	34.13	187	51	Average
2319.69	45.88	-28.12	74.00	42.48	32.02	5.51	34.13	187	51	Peak
2402.00	87.25	-	-	83.81	32.16	5.44	34.16	187	51	Peak
2402.00	75.07	-	-	71.64	32.13	5.46	34.16	187	51	Average
2500.00	32.78	-21.22	54.00	29.31	32.30	5.37	34.20	187	51	Average
2500.00	43.80	-30.20	74.00	40.33	32.30	5.37	34.20	187	51	Peak
4804.00	56.24	-17.76	74.00	48.63	34.32	7.79	34.50	114	308	Peak
4804.00	50.74	-3.26	54.00	43.13	34.32	7.79	34.50	114	308	Average



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	43~44%
<b>Test Engineer :</b>	Kay Wu	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	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
38.37	35.35	-4.65	40.00	51.65	14.59	0.61	31.50	100	241	Peak
178.77	27.60	-15.90	43.50	48.75	9.13	1.25	31.53	-	-	Peak
287.85	26.01	-19.99	46.00	42.36	13.30	1.68	31.33	-	-	Peak
365.80	35.51	-10.49	46.00	49.49	15.21	2.07	31.26	-	-	Peak
433.70	25.65	-20.35	46.00	37.71	16.81	2.26	31.13	-	-	Peak
719.30	27.30	-18.70	46.00	33.97	21.11	2.99	30.77	-	-	Peak
2334.00	45.21	-28.79	74.00	41.81	32.02	5.51	34.13	130	338	Peak
2334.00	33.41	-20.59	54.00	30.01	32.02	5.51	34.13	130	338	Average
2441.00	94.91	-	-	91.45	32.22	5.41	34.17	130	338	Peak
2441.00	81.63	-	-	78.18	32.22	5.41	34.18	130	338	Average
2484.00	44.85	-29.15	74.00	41.39	32.27	5.38	34.19	130	338	Peak
2484.00	32.90	-21.10	54.00	29.44	32.27	5.38	34.19	130	338	Average
4882.00	58.16	-15.84	74.00	50.46	34.35	7.85	34.50	130	297	Peak
4882.00	52.37	-1.63	54.00	44.67	34.35	7.85	34.50	130	297	Average
8454.00	55.46	-18.54	74.00	44.42	36.00	10.14	35.10	100	117	Peak
8454.00	40.70	-13.30	54.00	29.66	36.00	10.14	35.10	100	117	Average



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	39	<b>Relative Humidity :</b>	43~44%
<b>Test Engineer :</b>	Kay Wu	<b>Polarization :</b>	Vertical
<b>Remark :</b>	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
84.54	29.31	-10.69	40.00	51.86	8.09	0.90	31.54	100	167	Peak
164.73	26.83	-16.67	43.50	47.09	10.03	1.23	31.52	-	-	Peak
246.54	23.62	-22.38	46.00	41.20	12.30	1.53	31.41	-	-	Peak
366.50	32.76	-13.24	46.00	46.71	15.24	2.07	31.26	-	-	Peak
430.90	23.51	-22.49	46.00	35.64	16.75	2.25	31.13	-	-	Peak
811.70	25.16	-20.84	46.00	30.35	22.33	3.17	30.69	-	-	Peak
2332.00	46.99	-27.01	74.00	43.59	32.02	5.51	34.13	200	17	Peak
2332.00	33.42	-20.58	54.00	30.02	32.02	5.51	34.13	200	17	Average
2441.00	89.79	-	-	86.34	32.22	5.41	34.18	200	17	Peak
2441.00	77.42	-	-	73.97	32.22	5.41	34.18	200	17	Average
2494.00	46.42	-27.58	74.00	42.95	32.30	5.37	34.20	200	17	Peak
2494.00	32.91	-21.09	54.00	29.44	32.30	5.37	34.20	200	17	Average
4882.00	54.35	-19.65	74.00	46.65	34.35	7.85	34.50	150	331	Peak
4882.00	47.54	-6.46	54.00	39.84	34.35	7.85	34.50	150	331	Average
8337.00	54.73	-19.27	74.00	43.76	36.00	10.07	35.10	100	196	Peak
8337.00	40.66	-13.34	54.00	29.69	36.00	10.07	35.10	100	196	Average



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	43~44%
<b>Test Engineer :</b>	Kay Wu	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	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
149.61	24.43	-19.07	43.50	43.53	11.25	1.21	31.56	-	-	Peak
281.37	25.79	-20.21	46.00	42.30	13.20	1.64	31.35	-	-	Peak
299.73	28.95	-17.05	46.00	45.05	13.46	1.77	31.33	-	-	Peak
366.50	35.72	-10.28	46.00	49.67	15.24	2.07	31.26	100	328	Peak
528.20	24.55	-21.45	46.00	34.35	18.71	2.51	31.02	-	-	Peak
719.30	27.62	-18.38	46.00	34.29	21.11	2.99	30.77	-	-	Peak
2350.00	45.39	-28.61	74.00	41.98	32.05	5.50	34.14	103	336	Peak
2350.00	33.56	-20.44	54.00	30.15	32.05	5.50	34.14	103	336	Average
2480.00	96.58	-	-	93.12	32.27	5.38	34.19	103	336	Peak
2480.00	83.65	-	-	80.19	32.27	5.38	34.19	103	336	Average
2483.50	61.81	-12.19	74.00	58.35	32.27	5.38	34.19	103	336	Peak
2483.50	50.89	-3.11	54.00	47.43	32.27	5.38	34.19	103	336	Average
4960.00	59.61	-14.39	74.00	51.80	34.39	7.92	34.50	117	307	Peak
4960.00	51.83	-2.17	54.00	44.02	34.39	7.92	34.50	117	307	Average
8433.00	54.49	-19.51	74.00	43.46	36.00	10.13	35.10	100	33	Peak
8433.00	40.69	-13.31	54.00	29.66	36.00	10.13	35.10	100	33	Average





<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	24~25°C
<b>Test Channel :</b>	78	<b>Relative Humidity :</b>	43~44%
<b>Test Engineer :</b>	Kay Wu	<b>Polarization :</b>	Vertical
<b>Remark :</b>	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
38.37	30.20	-9.80	40.00	46.50	14.59	0.61	31.50	100	214	Peak
96.42	27.29	-16.21	43.50	48.08	9.76	0.98	31.53	-	-	Peak
173.10	26.52	-16.98	43.50	47.41	9.39	1.24	31.52	-	-	Peak
366.50	33.23	-12.77	46.00	47.18	15.24	2.07	31.26	-	-	Peak
430.90	24.05	-21.95	46.00	36.18	16.75	2.25	31.13	-	-	Peak
825.00	25.45	-20.55	46.00	30.49	22.46	3.21	30.71	-	-	Peak
2358.00	45.43	-28.57	74.00	42.00	32.08	5.49	34.14	190	354	Peak
2358.00	33.45	-20.55	54.00	30.02	32.08	5.49	34.14	190	354	Average
2480.00	91.29	-	-	87.83	32.27	5.38	34.19	190	354	Peak
2480.00	78.92	-	-	75.46	32.27	5.38	34.19	190	354	Average
2483.50	56.52	-17.48	74.00	53.06	32.27	5.38	34.19	190	354	Peak
2483.50	46.82	-7.18	54.00	43.36	32.27	5.38	34.19	190	354	Average
4960.00	54.81	-19.19	74.00	47.00	34.39	7.92	34.50	100	2	Peak
4960.00	45.54	-8.46	54.00	37.73	34.39	7.92	34.50	100	2	Average
8361.00	54.75	-19.25	74.00	43.76	36.00	10.09	35.10	100	111	Peak
8361.00	41.65	-12.35	54.00	30.66	36.00	10.09	35.10	100	111	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 PIFA 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
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)
System Simulator	R&S	CMU200	105934	N/A	Nov. 11, 2008	Nov. 10, 2010	Conduction (CO05-HY)
GPS Station	T&E	GS-50	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, 2010	Mar. 26, 2011	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
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.13</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.26</b>		

### 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
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.27</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.54</b>		



**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
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>2.36</b>				
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>4.72</b>				



## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP050315-05 as below.