Variant FCC RF Test Report

APPLICANT	:	Acer Incorporated
EQUIPMENT	:	Tablet Computer
BRAND NAME	:	Acer
MODEL NAME	:	A500
FCC ID	:	HLZTMDMA500
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	Digital Transmission System (DTS)

This is a variant report which is only valid together with the original test report. The product was received on May 27, 2011 and completely tested on May 28, 2011. 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:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory 1190

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APPENDIX A. PHOTOGRAPHS OF EUT

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR112908-04B	Rev. 01	This is a variant report. The original report which can be referred to Sporton Report No. FR112908B as appendix C. Detail changes list as below : 1. Add Docking 2. eMMC added Scandisk 64G and Samsung 64G 3. LPDDR2 add Hynix 8Gb 4. Change Bluetooth and WLAN Antenna (module, antenna gain and antenna type are same as the original) 5. Camera add Liteon / 11P2BA501 6. Battery add SANYO GC02001FU00 7. Touch +LCD add AUO + Cando GC02001D610 8. USB cable added ICT(DC081001A00) and MEC(DC081001A00) For the changes, the test case was verified.	Jun. 21, 2011

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 10.6 dB at 3.59 MHz
3.3	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.84 dB at 2389.99 MHz
3.4	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Acer Incorporated
8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22181, Taiwan (R.O.C)

1.2 Manufacturer

1. **Compal Electronics, Inc.**
   No. 581, Ruiguang Rd., Neihu District, Taipei City 11492, Taiwan
2. **Compal Electronics Technology (Kunshan) Co., Ltd.**
   No. 25, Third Avenue, A Zone, Kunshan Comprehensive Free Trade Zone, Kunshan, Jiangsu, China
3. **Compal Information (Kunshan) Co., Ltd.**
   No. 15, Third Avenue, A Zone, Kunshan Comprehensive Free Trade Zone, Kunshan, Jiangsu, China
4. **Compal Information Technology (Kunshan) Co., Ltd.**
   No. 58, First Avenue, A Zone, Kunshan Comprehensive Free Trade Zone, Kunshan, Jiangsu, China
5. **Compalead Eletrônica Do Brasil Indústria E Comércio Ltda**
   Rua Kanebo 175, Galpões C1, C2, C3, C4, C5 C6 E C12, Bairro Distrito Industrial Jundiaí Business Park, Cep 13213-090, Jundiaí - São Paulo, Brasil
6. **Compal (Vietnam) Co., Ltd.**
   Ba Thien Industrial Zone, Ba Hien Commune, Binh Xuyen County, Vinh Phuc Province, Vietnam

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Tablet Computer
Brand Name	Acer
Model Name	A500
Sample 1	EUT with LCM Main, eMMC 1, Carema Main and LP DDR2 1
Sample 2	EUT with LCM 2nd, eMMC 2, Carema 2nd and LP DDR2 2
Sample 3	EUT with LCM 2nd, eMMC 3, Carema 2nd and LP DDR2 2
FCC ID	HLZTMDMA500
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Number of Channels	11
Carrier Frequency of Each Channel	2412+(n-1)*5 MHz; n=1~11
Channel Spacing	5 MHz
Maximum Output Power to Antenna	802.11b : 15.10 dBm 802.11g : 22.72 dBm 802.11n (BW 20MHz) : 20.94 dBm
Antenna Type	PIFA Antenna with gain 1.75 dBi
HW Version	LA-6872P Rev. 3
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
EUT Stage	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 Transmission System (DTS).
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

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st 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	722060/4086B-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 KDB Publication No. 558074 (Measurement Guidelines of DTS)
- ANSI C63.4-2003
- IC RSS-210 Issue 8

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.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
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.	LCD Monitor	Dell	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
6.	iPod Earphone	Apple	N/A	N/A	shielded, 1.0 m	N/A
7.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
8.	iPod	Apple	A1199	FCC DoC	Shielded, 1.0 m	N/A
9.	Controller	Acer	IR28012AC3	N/A	N/A	N/A

2 Test Configuration of Equipment Under Test

2.1 RF Power

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

Channel	Frequency	2.4GHz 802.11b RF Power (dBm)			
		DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	**15.10**	14.95	14.94	15.03
CH 06	2437 MHz	14.66	-	-	-
CH 11	2462 MHz	14.22	-	-	-

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 01	2412 MHz	22.01	-	-	-	-	-	-	-
CH 06	2437 MHz	**22.72**	22.62	22.43	22.45	22.39	22.34	22.36	22.55
CH 11	2462 MHz	18.17	-	-	-	-	-	-	-

Channel	Frequency	2.4GHz 802.11n (BW 20MHz) RF Power (dBm)							
		OFDM Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412 MHz	18.62	-	-	-	-	-	-	-
CH 06	2437 MHz	**20.94**	20.20	19.42	19.63	19.67	19.68	20.13	19.79
CH 11	2462 MHz	14.00	-	-	-	-	-	-	-

Remark:

1. The data rates of WLAN 802.11b/g/n were set in 1Mbps for 802.11b, 6Mbps for 802.11g, and MCS0 for 802.11n (BW 20MHz) for all the test cases due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

2.2 Test Mode

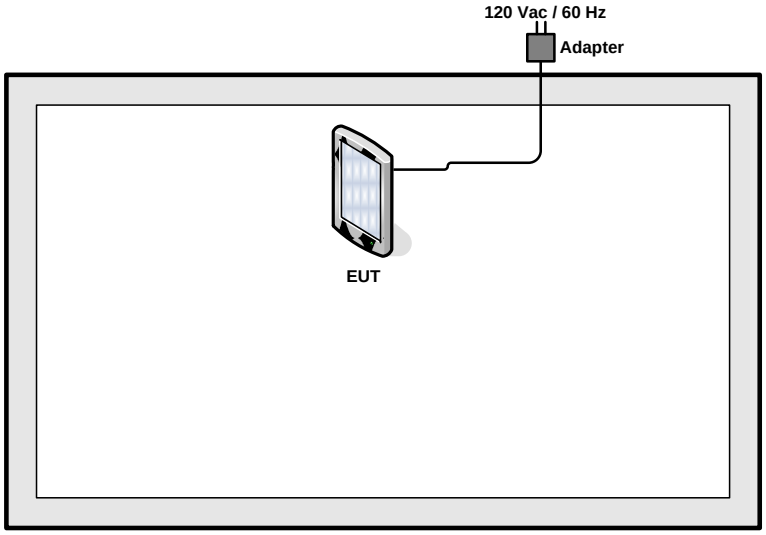
The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz), radiated emission (30 MHz to the 10th harmonic 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.

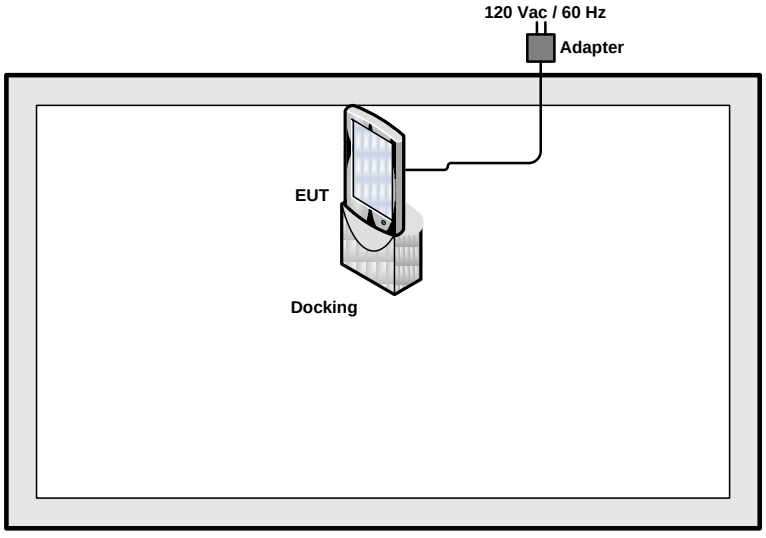
Test Cases		
Test Item	**802.11b (Modulation : DSSS)**	**802.11g/n (Modulation : OFDM)**
Radiated TCs	N/A	Mode 1: 802.11n (BW 20M)_CH01_2412 MHz (E1 Plane) for Sample 2 Mode 2: 802.11n (BW 20M)_CH01_2412 MHz (Docking) for Sample 2 Mode 3: 802.11n (BW 20M)_CH01_2412 MHz (E1 Plane) for Sample 3 Mode 4: 802.11n (BW 20M)_CH01_2412 MHz (Docking) for Sample 3
AC Conducted Emission	Mode 1 : WLAN Link + Bluetooth Link + GPS Rx + TC + Docking + USB Cable 2 (Link with Notebook) for Sample 2 Mode 2 : WLAN Link + Bluetooth Link + GPS Rx + TC + Docking + USB Cable 3 (Link with Notebook) for Sample 3	
Remark: **1.** TC stands for Test Configuration, and consists of iPod, HDMI cable, and monitor. **2.** The worst case of conducted emission is mode 2; only the test data of it was reported.		

2.3 Connection Diagram of Test System

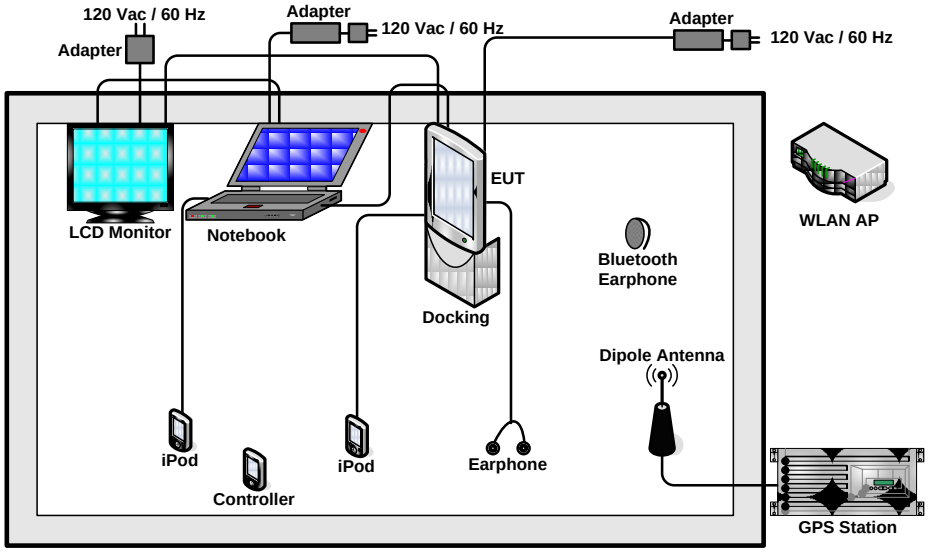
<EUT without Docking in WLAN Tx Mode>



<EUT with Docking in WLAN Tx Mode>



<AC Conducted Emission Mode>



2.4 RF Utility

The programmed RF utility “Command” is installed in EUT to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

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. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB.

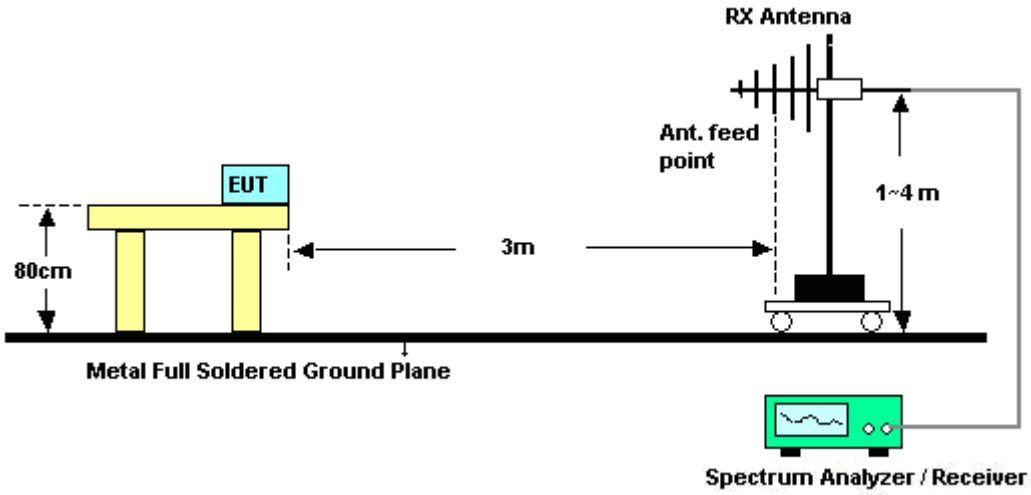
3.1.2 Measuring Instruments

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 KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW) ≥ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz 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: Apply 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 = 10 Hz, Sweep=Auto. 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 as in FCC Section 15.35(b) and (c).

3.1.4 Test Setup



3.1.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	21~23℃
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	45~48%
Test Channel :	01	Test Engineer :	David Yang

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
2389.99	70.16	-3.84	74	65.8	32.18	6.03	33.85	132	240	Peak
2389.99	47.43	-6.57	54	43.07	32.18	6.03	33.85	132	240	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
2389.99	66.29	-7.71	74	61.93	32.18	6.03	33.85	104	276	Peak
2389.99	44.29	-9.71	54	39.93	32.18	6.03	33.85	104	276	Average

Test Mode :	Mode 2	Temperature :	21~23℃
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	45~48%
Test Channel :	01	Test Engineer :	David Yang

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
2389.61	65.12	-8.88	74	60.76	32.18	6.03	33.85	100	357	Peak
2389.61	42.2	-11.8	54	37.84	32.18	6.03	33.85	100	357	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
2389.61	69.04	-4.96	74	64.68	32.18	6.03	33.85	100	166	Peak
2389.61	46.08	-7.92	54	41.72	32.18	6.03	33.85	100	166	Average

Test Mode :	Mode 3	Temperature :	21~23℃
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	45~48%
Test Channel :	01	Test Engineer :	David Yang

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
2389.42	68.47	-5.53	74	64.11	32.18	6.03	33.85	138	236	Peak
2389.42	46.36	-7.64	54	42	32.18	6.03	33.85	138	236	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
2389.61	65.23	-8.77	74	60.87	32.18	6.03	33.85	104	275	Peak
2389.61	42.65	-11.35	54	38.29	32.18	6.03	33.85	104	275	Average

Test Mode :	Mode 4	Temperature :	21~23℃
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	45~48%
Test Channel :	01	Test Engineer :	David Yang

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
2389.99	65.55	-8.45	74	61.19	32.18	6.03	33.85	100	357	Peak
2389.99	43.08	-10.92	54	38.72	32.18	6.03	33.85	100	357	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
2389.61	68.34	-5.66	74	63.98	32.18	6.03	33.85	100	165	Peak
2389.61	46.3	-7.7	54	41.94	32.18	6.03	33.85	100	165	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.

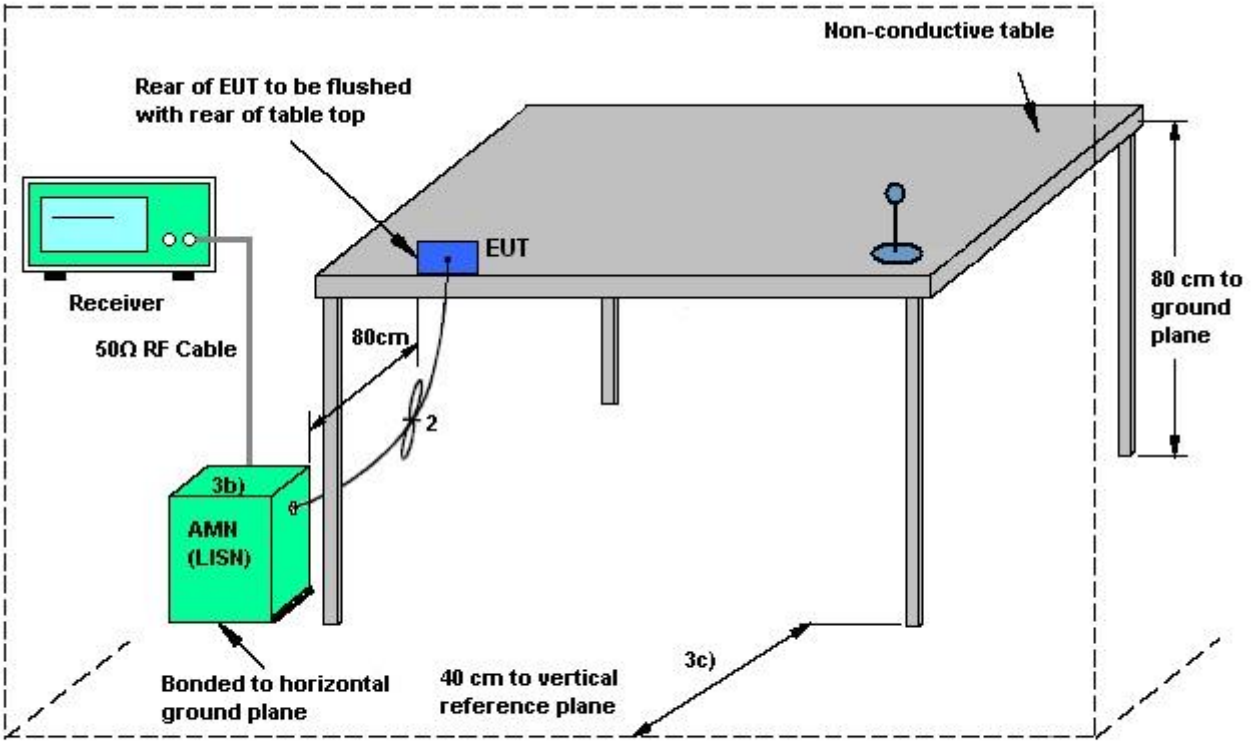
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

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

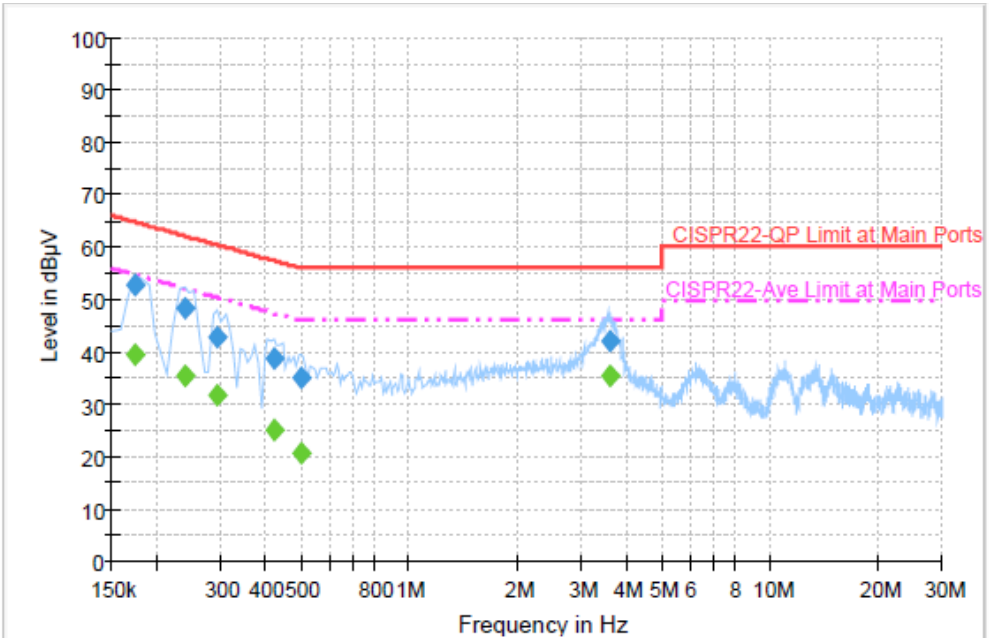
3.2.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.2.5 Test Result of AC Conducted Emission

Test Mode :	Mode 2	**Temperature :**	20~22℃
Test Engineer :	Novic Chiang	**Relative Humidity :**	40~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WLAN Link + Bluetooth Link + GPS Rx + TC + Docking + USB Cable 3 (Link with Notebook) for Sample 3		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



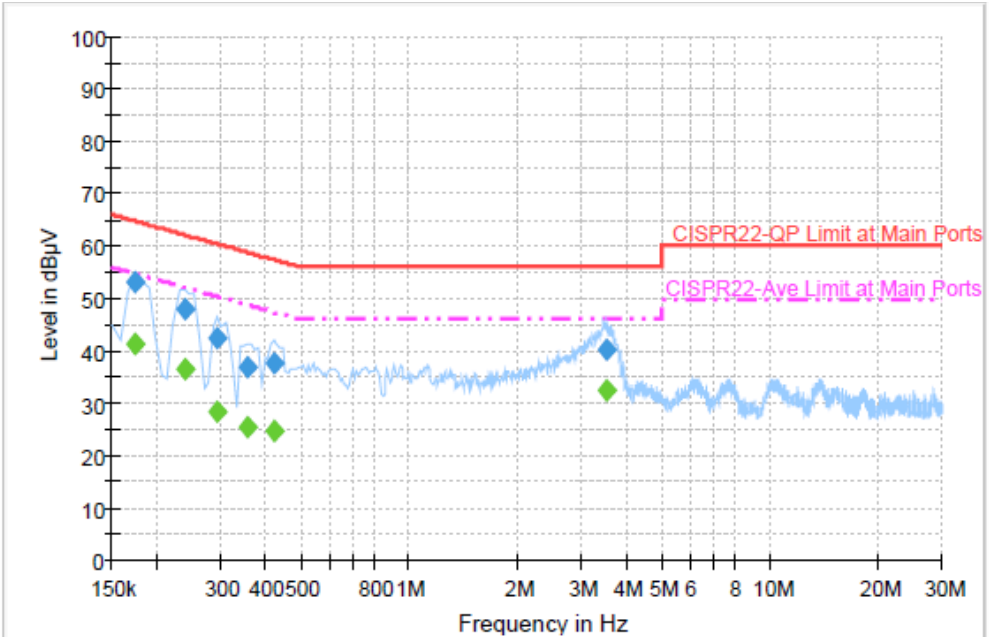
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	52.8	Off	L1	19.4	12.0	64.8
0.238000	48.4	Off	L1	19.4	13.8	62.2
0.294000	42.9	Off	L1	19.4	17.5	60.4
0.422000	38.9	Off	L1	19.5	18.5	57.4
0.502000	35.2	Off	L1	19.4	20.8	56.0
3.598000	42.2	Off	L1	19.5	13.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	39.3	Off	L1	19.4	15.5	54.8
0.238000	35.4	Off	L1	19.4	16.8	52.2
0.294000	31.8	Off	L1	19.4	18.6	50.4
0.422000	25.2	Off	L1	19.5	22.2	47.4
0.502000	20.8	Off	L1	19.4	25.2	46.0
3.598000	35.4	Off	L1	19.5	10.6	46.0

Test Mode :	Mode 2	**Temperature :**	20~22℃
Test Engineer :	Novic Chiang	**Relative Humidity :**	40~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WLAN Link + Bluetooth Link + GPS Rx + TC + Docking + USB Cable 3 (Link with Notebook) for Sample 3		
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)
0.174000	53.0	Off	N	19.4	11.8	64.8
0.238000	48.0	Off	N	19.4	14.2	62.2
0.294000	42.5	Off	N	19.4	17.9	60.4
0.358000	36.8	Off	N	19.4	22.0	58.8
0.422000	37.5	Off	N	19.5	19.9	57.4
3.542000	40.2	Off	N	19.5	15.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	41.3	Off	N	19.4	13.5	54.8
0.238000	36.7	Off	N	19.4	15.5	52.2
0.294000	28.4	Off	N	19.4	22.0	50.4
0.358000	25.5	Off	N	19.4	23.3	48.8
0.422000	24.7	Off	N	19.5	22.7	47.4
3.542000	32.6	Off	N	19.5	13.4	46.0

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. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. 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

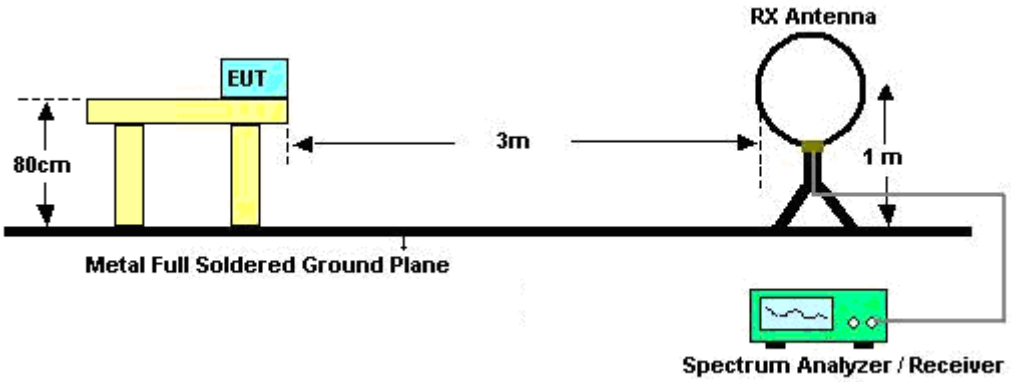
See list of measuring instruments of this test report.

3.3.3 Test Procedures

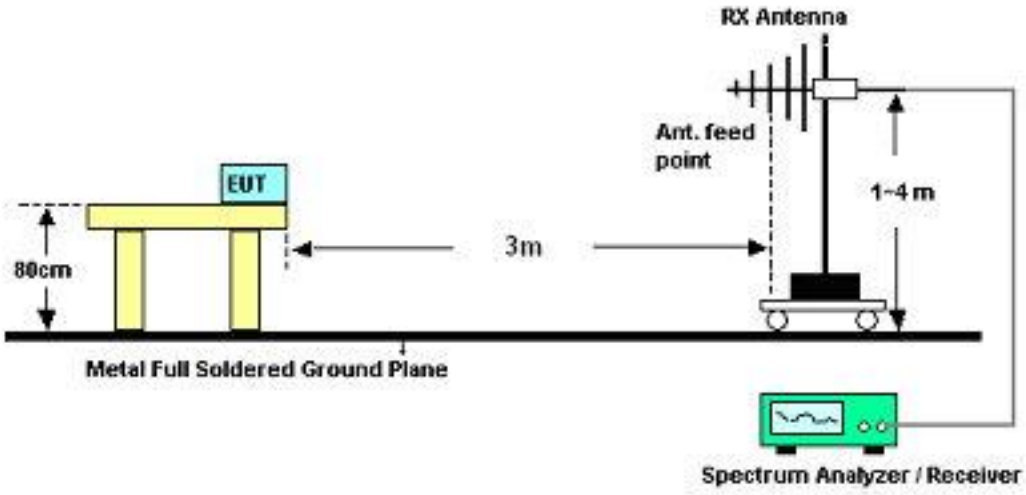
1. The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; 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 (specific distance [3m] / 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

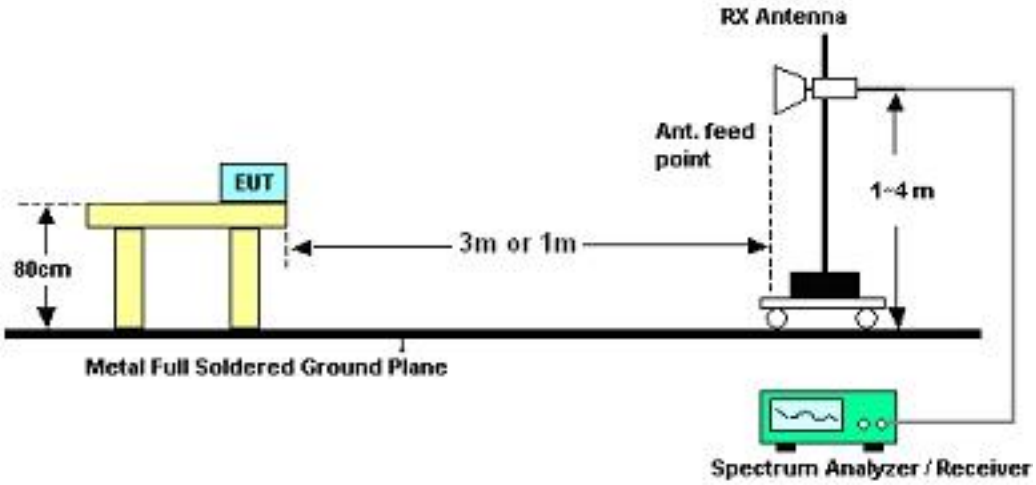
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

Test Engineer :	David Yang	Temperature :	21~23℃
		Relative Humidity :	45~48%

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 (specific distance / 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 :	21~23℃
Test Channel :	01	Relative Humidity :	45~48%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	2412 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	18.79	-21.21	40	33.44	16.27	0.54	31.46	132	192	Peak
106.41	18.19	-25.31	43.5	38.34	10.37	1.03	31.55	-	-	Peak
259.77	22.04	-23.96	46	39.05	12.82	1.59	31.42	-	-	Peak
458.2	20.15	-25.85	46	31.39	17.52	2.32	31.08	-	-	Peak
679.4	22.68	-23.32	46	29.97	20.65	2.9	30.84	-	-	Peak
998.6	26.29	-27.71	54	28.48	24.88	3.51	30.58	-	-	Peak
2389.99	70.16	-3.84	74	65.8	32.18	6.03	33.85	132	240	Peak
2389.99	47.43	-6.57	54	43.07	32.18	6.03	33.85	132	240	Average
2412	108.09	-	-	103.69	32.2	6.07	33.87	132	240	Peak
2412	89.5	-	-	85.1	32.2	6.07	33.87	132	240	Average
2486	40.12	-13.88	54	35.56	32.28	6.18	33.9	132	240	Average
2486	53.03	-20.97	74	48.47	32.28	6.18	33.9	132	240	Peak

Test Mode :	Mode 1	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~48%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	2412 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
33.78	26.7	-13.3	40	42.03	15.57	0.57	31.47	-	-	Peak
49.17	28.35	-11.65	40	50.51	8.68	0.69	31.53	109	355	Peak
248.97	25.19	-20.81	46	42.47	12.6	1.53	31.41	-	-	Peak
579.3	21.43	-24.57	46	30.3	19.44	2.63	30.94	-	-	Peak
741	22.79	-23.21	46	28.94	21.53	3.04	30.72	-	-	Peak
920.2	26.42	-19.58	46	29.79	23.89	3.39	30.65	-	-	Peak
2389.99	66.29	-7.71	74	61.93	32.18	6.03	33.85	104	276	Peak
2389.99	44.29	-9.71	54	39.93	32.18	6.03	33.85	104	276	Average
2412	106.05	-	-	101.65	32.2	6.07	33.87	104	276	Peak
2412	87.31	-	-	82.91	32.2	6.07	33.87	104	276	Average
2486	37.4	-16.6	54	32.84	32.28	6.18	33.9	104	276	Average
2486	50.52	-23.48	74	45.96	32.28	6.18	33.9	104	276	Peak

Test Mode :	Mode 2	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~48%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	2412 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
39.18	18.82	-21.18	40	36.29	13.43	0.61	31.51	-	-	Peak
106.41	17.68	-25.82	43.5	37.83	10.37	1.03	31.55	-	-	Peak
259.77	21.47	-24.53	46	38.48	12.82	1.59	31.42	-	-	Peak
430.9	20.25	-25.75	46	32.06	17.07	2.25	31.13	-	-	Peak
685.7	22.82	-23.18	46	30.01	20.73	2.91	30.83	-	-	Peak
934.9	25.69	-20.31	46	28.81	24.07	3.42	30.61	121	173	Peak
2389.61	65.12	-8.88	74	60.76	32.18	6.03	33.85	100	357	Peak
2389.61	42.2	-11.8	54	37.84	32.18	6.03	33.85	100	357	Average
2412	102.23	-	-	97.83	32.2	6.07	33.87	100	357	Peak
2412	85.01	-	-	80.61	32.2	6.07	33.87	100	357	Average
2500	34.99	-19.01	54	30.41	32.3	6.18	33.9	100	357	Average
2500	46.9	-27.1	74	42.32	32.3	6.18	33.9	100	357	Peak

Test Mode :	Mode 2	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~48%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	2412 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
49.17	28.75	-11.25	40	50.91	8.68	0.69	31.53	100	355	Peak
132.33	20.51	-22.99	43.5	39.34	11.58	1.16	31.57	-	-	Peak
271.38	27.05	-18.95	46	43.77	13.01	1.64	31.37	-	-	Peak
699	22.96	-23.04	46	29.96	20.88	2.94	30.82	-	-	Peak
814.5	24.64	-21.36	46	29.51	22.64	3.18	30.69	-	-	Peak
984.6	26.67	-27.33	54	29.07	24.69	3.49	30.58	-	-	Peak
2389.61	69.04	-4.96	74	64.68	32.18	6.03	33.85	100	166	Peak
2389.61	46.08	-7.92	54	41.72	32.18	6.03	33.85	100	166	Average
2412	105.4	-	-	101	32.2	6.07	33.87	100	166	Peak
2412	87.64	-	-	83.24	32.2	6.07	33.87	100	166	Average
2484	37.63	-16.37	54	33.07	32.28	6.18	33.9	100	166	Average
2484	51.08	-22.92	74	46.52	32.28	6.18	33.9	100	166	Peak

Test Mode :	Mode 3	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~48%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	2412 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	19.17	-20.83	40	33.82	16.27	0.54	31.46	152	114	Peak
248.97	20.25	-25.75	46	37.53	12.6	1.53	31.41	-	-	Peak
271.38	19.7	-26.3	46	36.42	13.01	1.64	31.37	-	-	Peak
575.8	20.4	-25.6	46	29.33	19.4	2.62	30.95	-	-	Peak
691.3	22.91	-23.09	46	30.03	20.79	2.92	30.83	-	-	Peak
822.2	24.7	-21.3	46	29.47	22.73	3.2	30.7	-	-	Peak
2389.42	68.47	-5.53	74	64.11	32.18	6.03	33.85	138	236	Peak
2389.42	46.36	-7.64	54	42	32.18	6.03	33.85	138	236	Average
2412	107.82	-	-	103.42	32.2	6.07	33.87	138	236	Peak
2412	89.42	-	-	85.02	32.2	6.07	33.87	138	236	Average
2484	36.57	-17.43	54	32.01	32.28	6.18	33.9	138	236	Average
2484	49.67	-24.33	74	45.11	32.28	6.18	33.9	138	236	Peak

Test Mode :	Mode 3	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~48%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	2412 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
49.17	27.8	-12.2	40	49.96	8.68	0.69	31.53	106	82	Peak
130.98	21.83	-21.67	43.5	40.67	11.58	1.15	31.57	-	-	Peak
259.77	27.39	-18.61	46	44.4	12.82	1.59	31.42	-	-	Peak
589.8	22.38	-23.62	46	31.04	19.61	2.66	30.93	-	-	Peak
909.7	25.75	-20.25	46	29.32	23.75	3.36	30.68	-	-	Peak
976.9	26.62	-27.38	54	29.11	24.6	3.49	30.58	-	-	Peak
2389.61	65.23	-8.77	74	60.87	32.18	6.03	33.85	104	275	Peak
2389.61	42.65	-11.35	54	38.29	32.18	6.03	33.85	104	275	Average
2412	105.14	-	-	100.74	32.2	6.07	33.87	104	275	Peak
2412	86.91	-	-	82.51	32.2	6.07	33.87	104	275	Average
2500	36.4	-17.6	54	31.82	32.3	6.18	33.9	104	275	Average
2500	48.98	-25.02	74	44.4	32.3	6.18	33.9	104	275	Peak

Test Mode :	Mode 4	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~48%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	2412 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
44.58	22.14	-17.86	40	42.32	10.67	0.65	31.5	-	-	Peak
51.06	22.58	-17.42	40	45.39	8.02	0.71	31.54	133	142	Peak
248.97	20.57	-25.43	46	37.85	12.6	1.53	31.41	-	-	Peak
508.6	20.57	-25.43	46	30.8	18.35	2.47	31.05	-	-	Peak
791.4	23.97	-22.03	46	29.19	22.33	3.13	30.68	-	-	Peak
995.8	26.99	-27.01	54	29.22	24.84	3.51	30.58	-	-	Peak
2389.99	65.55	-8.45	74	61.19	32.18	6.03	33.85	100	357	Peak
2389.99	43.08	-10.92	54	38.72	32.18	6.03	33.85	100	357	Average
2412	104.55	-	-	100.15	32.2	6.07	33.87	100	357	Peak
2412	86.73	-	-	82.33	32.2	6.07	33.87	100	357	Average
2494	35.65	-18.35	54	31.07	32.3	6.18	33.9	100	357	Average
2494	48.16	-25.84	74	43.58	32.3	6.18	33.9	100	357	Peak

Test Mode :	Mode 4	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~48%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	2412 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
49.17	27.73	-12.27	40	49.89	8.68	0.69	31.53	105	22	Peak
211.98	27.98	-15.52	43.5	48.09	9.99	1.37	31.47	-	-	Peak
265.17	25.34	-20.66	46	42.22	12.9	1.62	31.4	-	-	Peak
584.2	21.53	-24.47	46	30.31	19.52	2.64	30.94	-	-	Peak
738.2	22.97	-23.03	46	29.18	21.49	3.03	30.73	-	-	Peak
939.8	26.01	-19.99	46	29.04	24.13	3.44	30.6	-	-	Peak
2389.61	68.34	-5.66	74	63.98	32.18	6.03	33.85	100	165	Peak
2389.61	46.3	-7.7	54	41.94	32.18	6.03	33.85	100	165	Average
2412	106.53	-	-	102.13	32.2	6.07	33.87	100	165	Peak
2412	88.43	-	-	84.03	32.2	6.07	33.87	100	165	Average
2486	37.02	-16.98	54	32.46	32.28	6.18	33.9	100	165	Average
2486	52.46	-21.54	74	47.9	32.28	6.18	33.9	100	165	Peak

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. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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. 16, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz – 30MHz	Dec. 03, 2010	Dec. 02, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz – 30MHz	Dec. 01, 2010	Nov. 30, 2011	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	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, 2010	Oct. 30, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2010	Aug. 18, 2011	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 06, 2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Mar. 29, 2011	Mar. 28, 2012	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 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
Combined Standard Uncertainty Uc(y)	**1.13**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(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 Uc(y)	**1.27**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(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 Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**				

Appendix A. Photographs of EUT

Please refer to Sporton report number EP112908-04 as below.

Appendix C. Original Report

Please refer to Sporton report number FR112908B as below.