FCC RF Test Report

APPLICANT	:	Group Sense Limited
EQUIPMENT	:	eBook Reader
MODEL NAME	:	eBook Reader
FCC ID	:	K2WSPJL10
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	Digital Transmission System (DTS)

The product was received on Aug. 19, 2010 and completely tested on Oct. 20, 2010. We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:

Anderson Chiu

Anderson Chiu / Deputy Manager

Testing Laboratory
1190

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR081921	Rev. 01	Initial issue of report	Oct. 22, 2010

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	A8.2(a)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	A8.4	Power Output	≤ 30dBm	Pass	-
3.3	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.4	15.247(d)	A8.5	Spurious Emission	< 20 dBc	Pass	-
3.5	15.247(e)	A8.2(b)	Power Spectral Density	≤ 8dBm	Pass	-
3.6	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 14.58 dB at 2.00 MHz
3.7	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 5.87 dB at 4924 MHz
3.8	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Group Sense Limited
6/F., Enterprise Building, No. 5, Science Park West Avenue, Hong Kong Science Park, Shatin, N.T. Hong Kong

1.2 Manufacturer

Group Sense Limited
6/F., Enterprise Building, No. 5, Science Park West Avenue, Hong Kong Science Park, Shatin, N.T. Hong Kong

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	eBook Reader
Model Name	eBook Reader
FCC ID	K2WSPJL10
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 : 16.17 dBm (0.041 W) 802.11g : 21.96 dBm (0.157 W)
Antenna Type	Chip Antenna with gain 0.2 dBi
HW Version	v1.0
SW Version	v0.9
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g : OFDM (BPSK / QPSK / 16QAM / 64QAM)
EUT Stage	Identical Prototype

Remark:

1. This test report recorded only product characteristics and test results of Digital Transmission System (DTS).
2. 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 (KUNSHAN) INC.	
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958	
Test Site No.	Sporton Site No.	
	CO01-KS	03CH01-KS

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 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.	Router	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
2.	Notebook	Dell	P08S	QDS-BRCM1030	N/A	AC I/P: Unshielded, 1.84m DC O/P: Shielded, 0.9m

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)			
		At DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	15.80	15.73	15.64	15.78
CH 06	2437 MHz	13.27	15.67	16.03	15.70
CH 11	2462 MHz	15.76	15.79	**16.17**	15.85

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		At OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 01	2412 MHz	21.95	21.60	21.76	21.71	21.95	21.87	21.84	21.75
CH 06	2437 MHz	21.94	21.66	21.79	21.79	21.93	**21.96**	21.88	21.70
CH 11	2462 MHz	20.82	20.78	20.75	20.75	20.84	21.01	20.89	20.64

Remark:

1. The data rates of 802.11b/g were set in 5.5Mbps for 802.11b and 36Mbps for 802.11g, for all the test cases due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

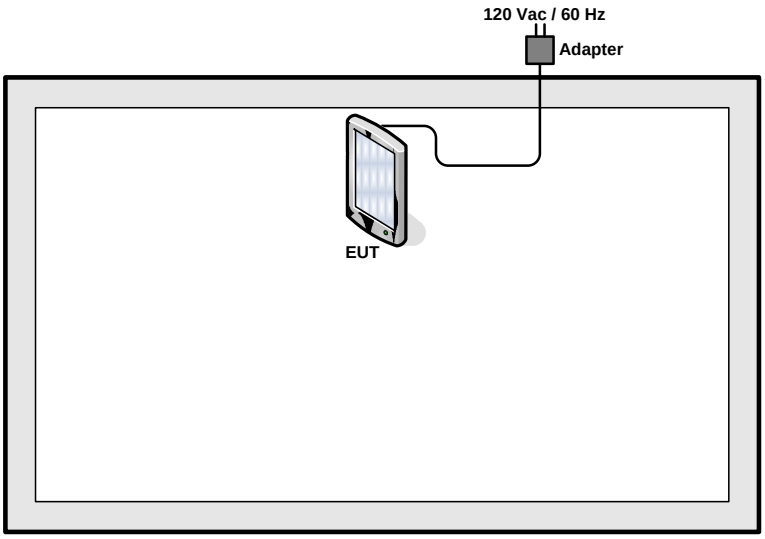
2.2 Test Mode

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.

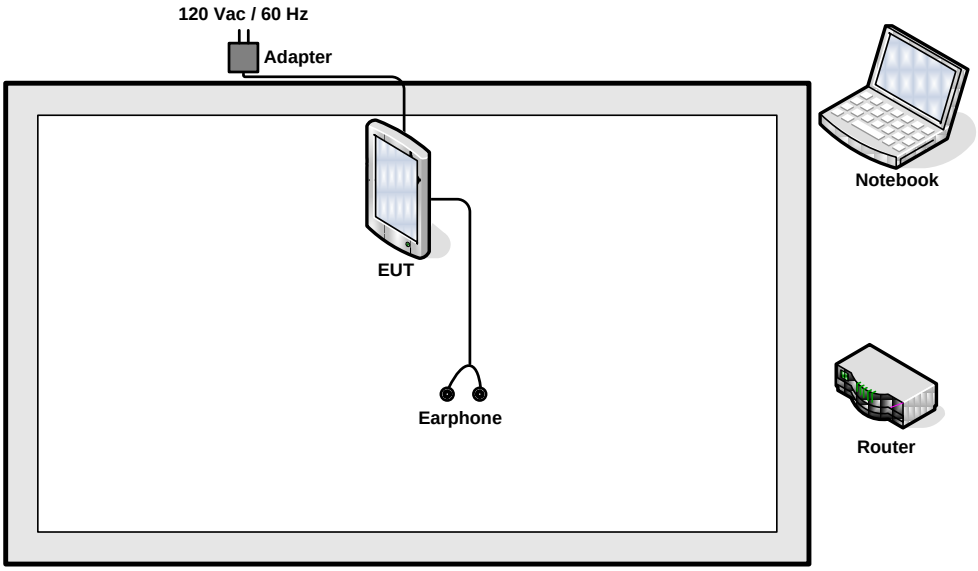
Test Cases		
Test Item	**802.11b**	**802.11g**
Conducted TCs	Mode 1 : 802.11b CH01_2412 MHz Mode 2 : 802.11b CH06_2437 MHz Mode 3 : 802.11b CH11_2462 MHz	Mode 4 : 802.11g CH01_2412 MHz Mode 5 : 802.11g CH06_2437 MHz Mode 6 : 802.11g CH11_2462 MHz
Radiated TCs	Mode 1 : 802.11b CH01_2412 MHz Mode 2 : 802.11b CH06_2437 MHz Mode 3 : 802.11b CH11_2462 MHz	Mode 4 : 802.11g CH01_2412 MHz Mode 5 : 802.11g CH06_2437 MHz Mode 6 : 802.11g CH11_2462 MHz
AC Conducted Emission	Mode 1 :WLAN Link + Earphone + Adapter	

2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<EUT with Adapter Mode>



2.4 RF Utility

The programmed RF utility 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 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

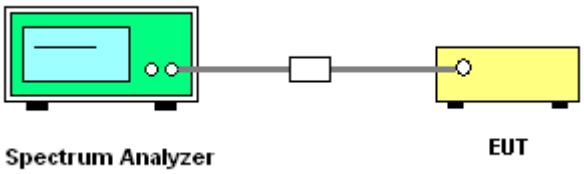
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

3.1.4 Test Setup

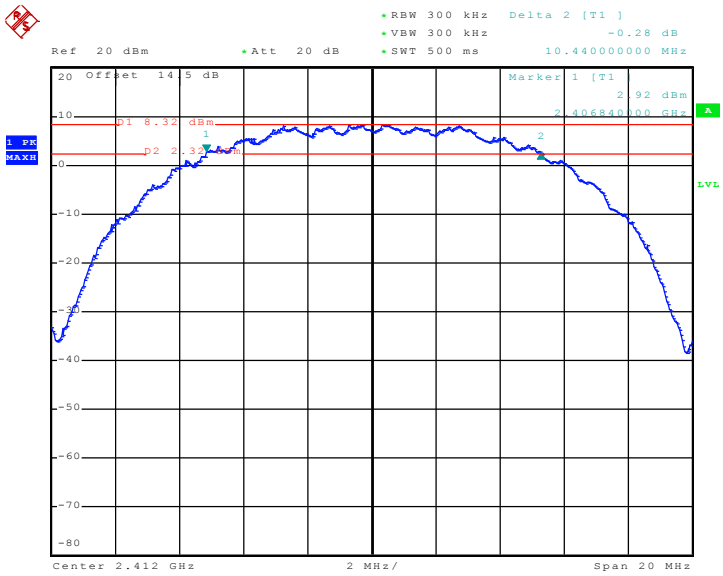


3.1.5 Test Result of 6dB Bandwidth

Test Mode :	Mode 1, 2, 3	**Temperature :**	22~23℃
Test Engineer :	Lewis Lu	**Relative Humidity :**	41~42%

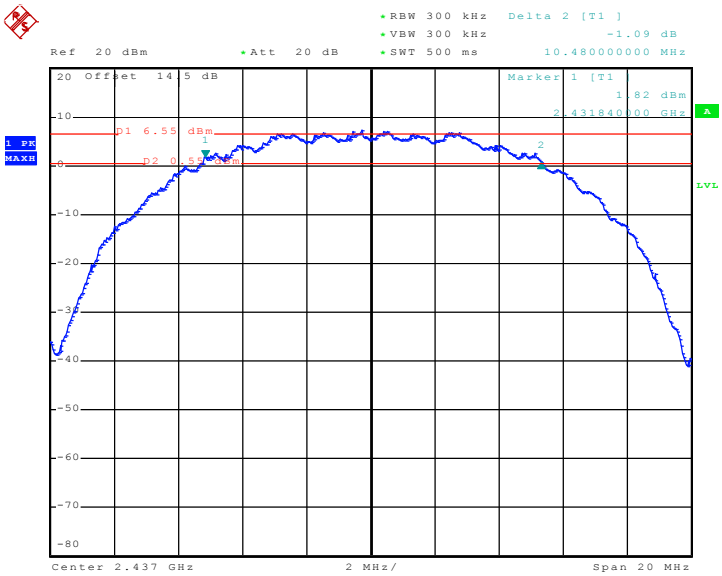
Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	10.44	0.5	Pass
06	2437	10.48	0.5	Pass
11	2462	10.20	0.5	Pass

Mode 1 : 6 dB Bandwidth Plot on 802.11b Channel 01



Date: 20.AUG.2010 13:31:51

Mode 2 : 6 dB Bandwidth Plot on 802.11b Channel 06



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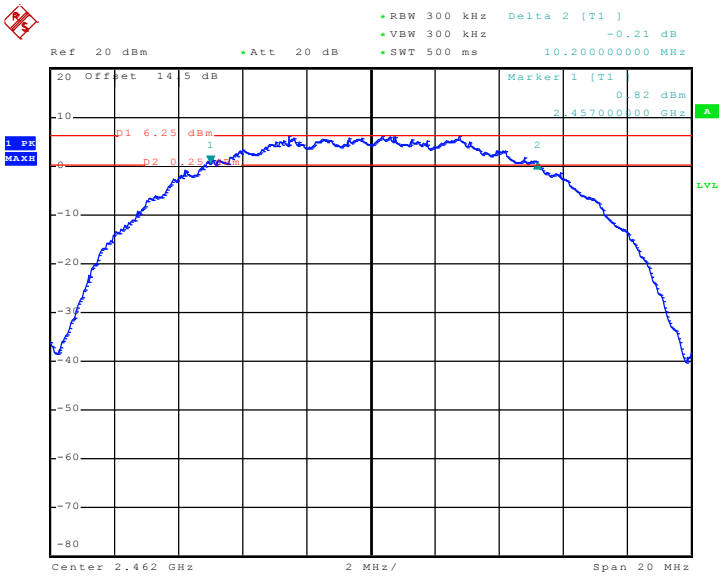
Mode 3 : 6 dB Bandwidth Plot on 802.11b Channel 11

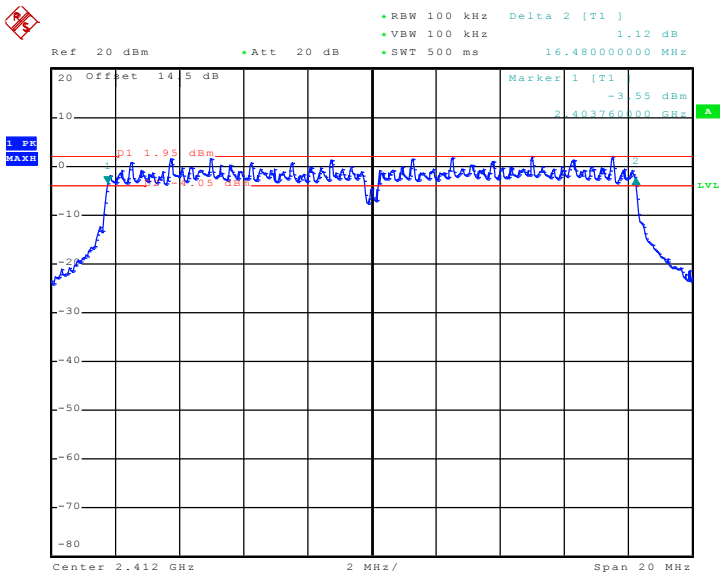


Date: 20.AUG.2010 13:41:02

Test Mode :	Mode 4, 5, 6	**Temperature :**	22~23℃
Test Engineer :	Lewis Lu	**Relative Humidity :**	41~42%

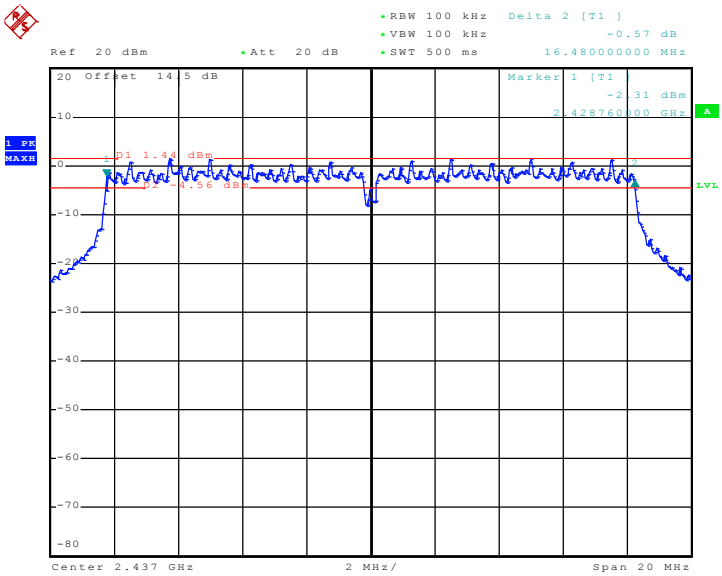
Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.48	0.5	Pass
06	2437	16.48	0.5	Pass
11	2462	16.52	0.5	Pass

Mode 4 : 6 dB Bandwidth Plot on 802.11g Channel 01



Date: 23.AUG.2010 08:22:46

Mode 5 : 6 dB Bandwidth Plot on 802.11g Channel 06



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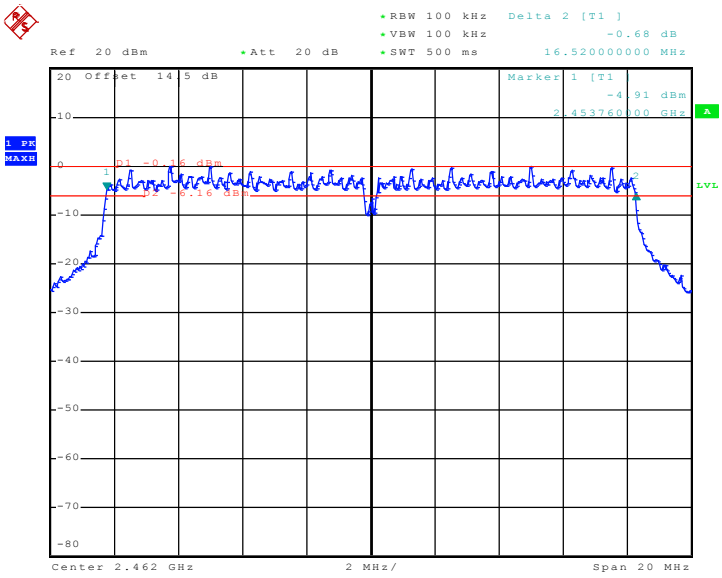
Mode 6 : 6 dB Bandwidth Plot on 802.11g Channel 11



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3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

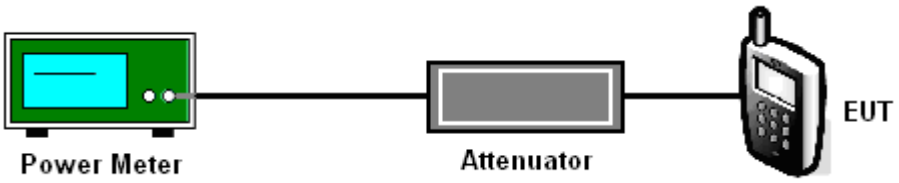
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the power meter by a low loss cable.
3. Measure the power by power meter.

3.2.4 Test Setup



3.2.5 Test Result of Output Power

Test Mode :	Mode 1, 2, 3	**Temperature :**	22~23℃
Test Engineer :	Lewis Lu	**Relative Humidity :**	41~42%

Channel	Frequency (MHz)	802.11b Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	15.64	30	Pass
06	2437	16.03	30	Pass
11	2462	16.17	30	Pass

Test Mode :	Mode 4, 5, 6	**Temperature :**	22~23℃
Test Engineer :	Lewis Lu	**Relative Humidity :**	41~42%

Channel	Frequency (MHz)	802.11g Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	21.87	30	Pass
06	2437	21.96	30	Pass
11	2462	21.01	30	Pass

3.3 Band Edges Measurement

3.3.1 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.

3.3.2 Measuring Instruments

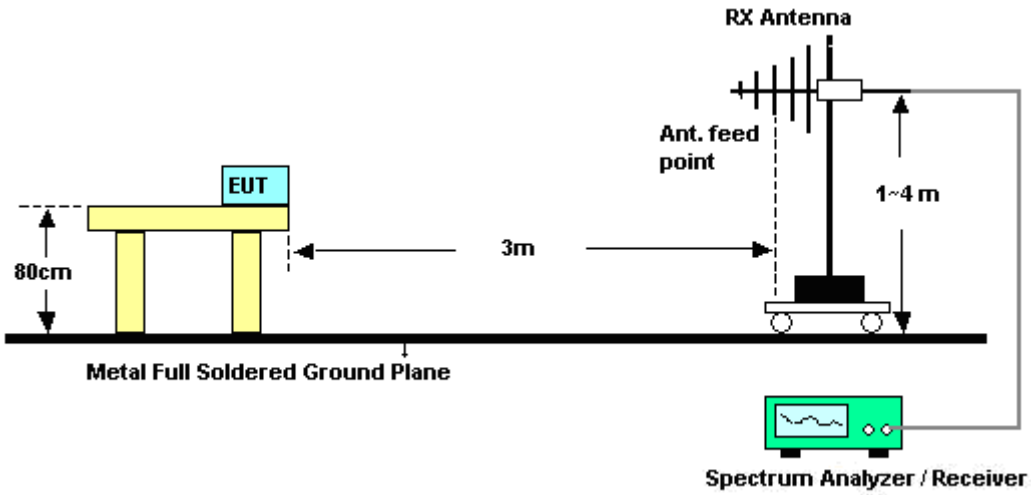
See list of measuring instruments of this test report.

3.3.3 Test Procedures

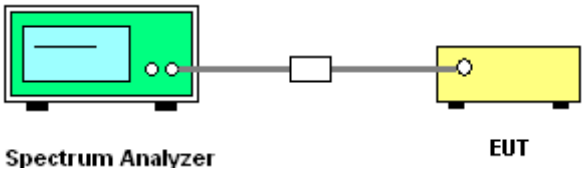
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW) ≥ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized 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).

3.3.4 Test Setup

<Radiated Band Edges>



<Conducted Band Edges>



3.3.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	**Temperature :**	23~24℃
Test Band :	802.11b	**Relative Humidity :**	43~44%
Test Channel :	01	**Test Engineer :**	Feixiang Rui

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
2335.27	47.03	-26.97	74	46.08	32.78	3.1	34.93	120	351	Peak
2335.27	36.23	-17.77	54	35.28	32.78	3.1	34.93	120	351	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
2341.16	46.85	-27.15	74	45.91	32.78	3.12	34.96	141	125	Peak
2341.16	29.3	-24.7	54	28.36	32.78	3.12	34.96	141	125	Average

Test Mode :	Mode 3	**Temperature :**	23~24℃
Test Band :	802.11b	**Relative Humidity :**	43~44%
Test Channel :	11	**Test Engineer :**	Feixiang Rui

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
2483.69	50.16	-23.84	74	48.89	33.01	3.2	34.94	176	121	Peak
2483.69	38.35	-15.65	54	37.08	33.01	3.2	34.94	176	121	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
2488	48.65	-25.35	74	47.34	33.05	3.2	34.94	133	267	Peak
2488	38.06	-15.94	54	36.75	33.05	3.2	34.94	133	267	Average

Test Mode :	Mode 4	**Temperature :**	23~24℃
Test Band :	802.11g	**Relative Humidity :**	43~44%
Test Channel :	01	**Test Engineer :**	Feixiang Rui

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
2389.8	51.71	-22.29	74	50.68	32.86	3.15	34.98	166	120	Peak
2389.8	32.63	-21.37	54	31.6	32.86	3.15	34.98	166	120	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
2388.47	50.94	-23.06	74	49.92	32.86	3.13	34.97	160	101	Peak
2388.47	36.59	-17.41	54	35.57	32.86	3.13	34.97	160	101	Average

Test Mode :	Mode 6	**Temperature :**	23~24℃
Test Band :	802.11g	**Relative Humidity :**	43~44%
Test Channel :	11	**Test Engineer :**	Feixiang Rui

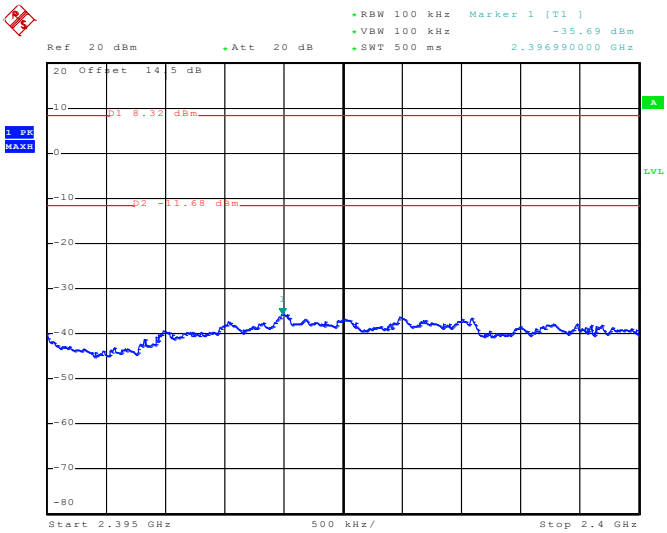
ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.85	55.71	-18.29	74	54.44	33.01	3.2	34.94	101	15	Peak
2483.85	33.49	-20.51	54	32.22	33.01	3.2	34.94	101	15	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
2484.8	54.19	-19.81	74	52.92	33.01	3.2	34.94	124	73	Peak
2484.8	33.88	-20.12	54	32.61	33.01	3.2	34.94	124	73	Average

3.3.6 Test Plots of Conducted Band Edges

Test Mode :	Mode 1 and 3	**Temperature :**	22~23℃
Test Band :	802.11b	**Relative Humidity :**	41~42%
Test Channel :	01 and 11	**Test Engineer :**	Lewis Lu

Low Band Edge Plot on 802.11b Channel 01



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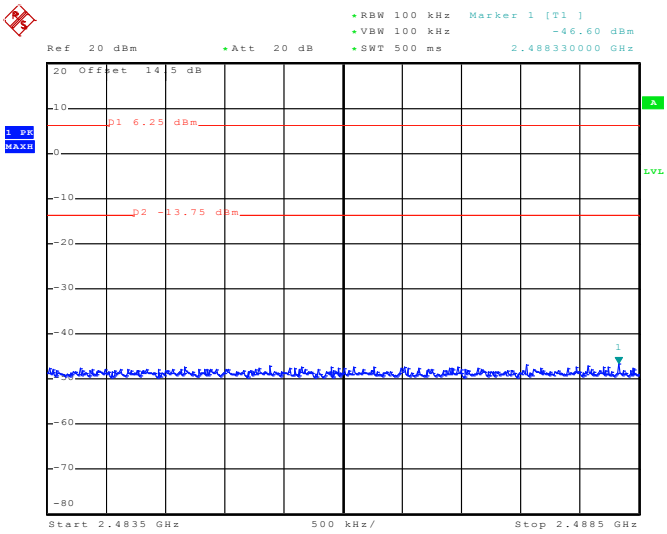
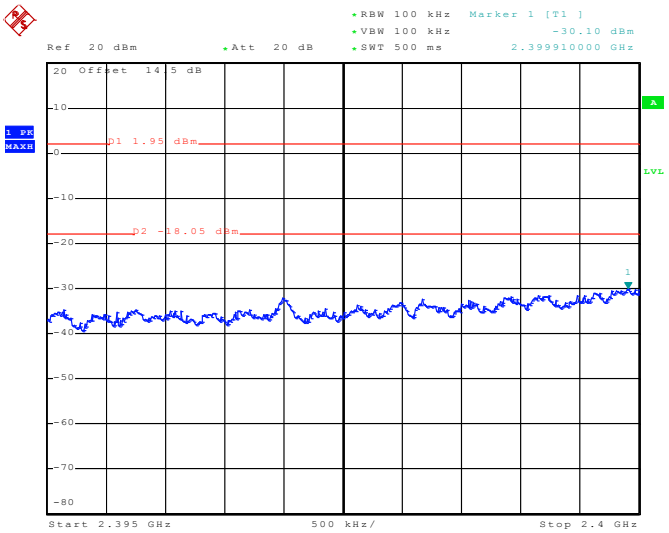
High Band Edge Plot on 802.11b Channel 11



Date: 20.AUG.2010 13:42:35

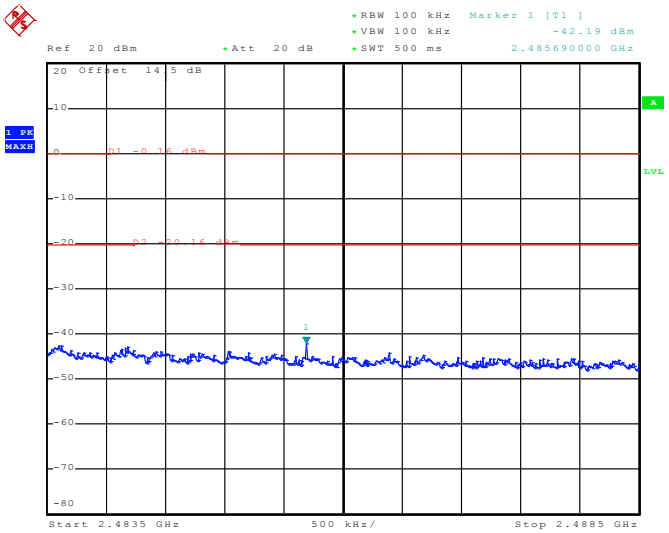
Test Mode :	Mode 4 and 6	**Temperature :**	22~23℃
Test Band :	802.11g	**Relative Humidity :**	41~42%
Test Channel :	01 and 11	**Test Engineer :**	Lewis Lu

Low Band Edge Plot on 802.11g Channel 01



Date: 23.AUG.2010 08:25:37

High Band Edge Plot on 802.11g Channel 11



Date: 23.AUG.2010 08:32:38

3.4 Spurious Emission Measurement

3.4.1 Limit of Spurious Emission Measurement

All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedure

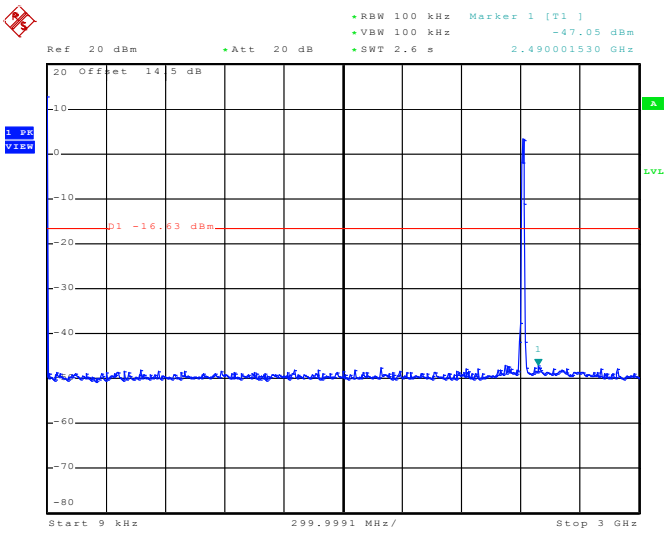
1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW) ≥ RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

3.4.4 Test Setup

3.4.5 Test Plots of Spurious Emission

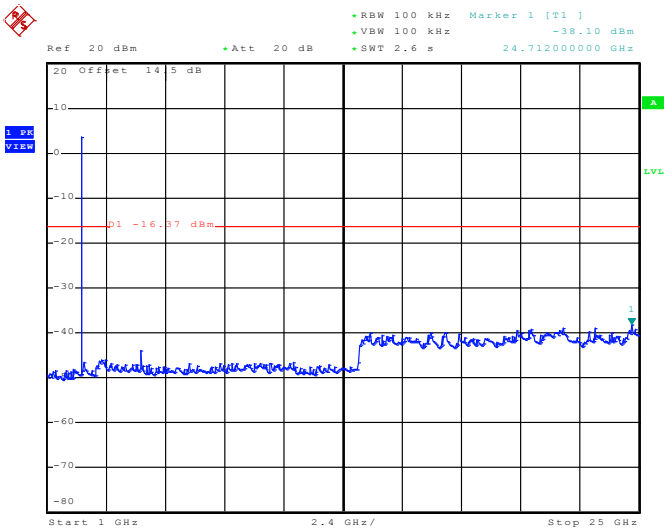
Test Mode :	Mode 1	**Temperature :**	22~23℃
Test Band :	802.11b	**Relative Humidity :**	41~42%
Test Channel :	01	**Test Engineer :**	Lewis Lu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 23.AUG.2010 09:40:13

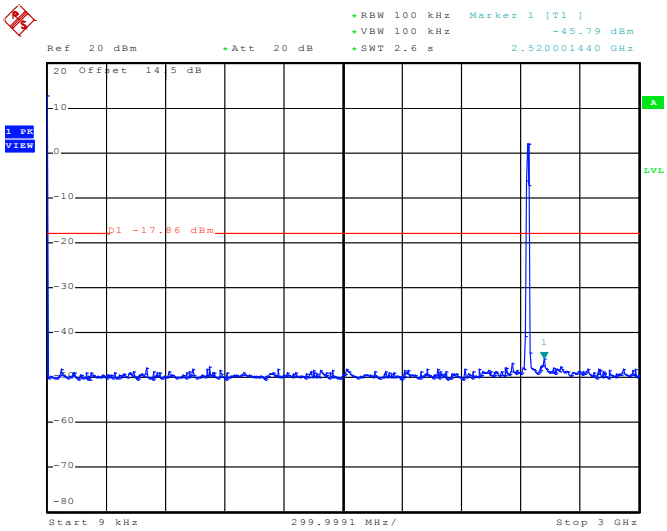
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 23.AUG.2010 09:41:22

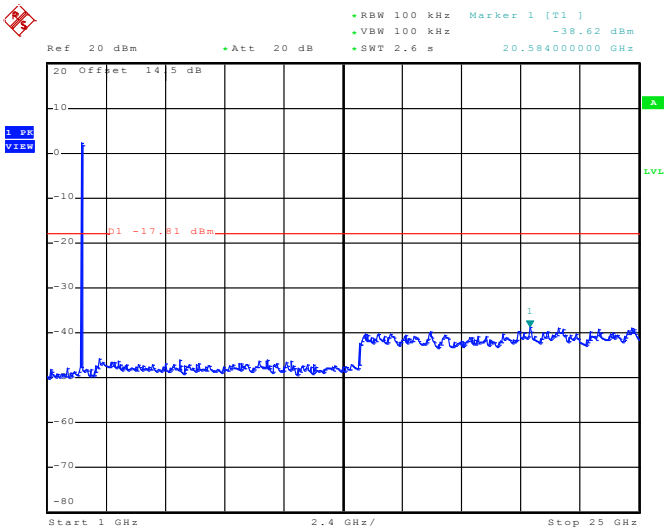
Test Mode :	Mode 2	**Temperature :**	22~23℃
Test Band :	802.11b	**Relative Humidity :**	41~42%
Test Channel :	06	**Test Engineer :**	Lewis Lu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 23.AUG.2010 09:43:21

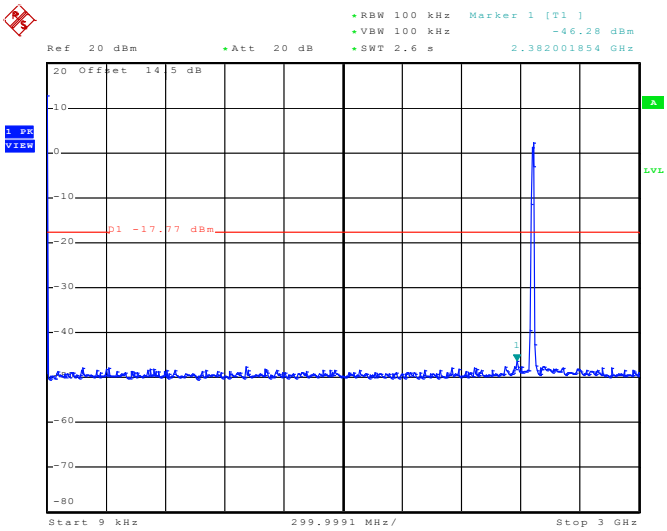
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 23.AUG.2010 09:42:08

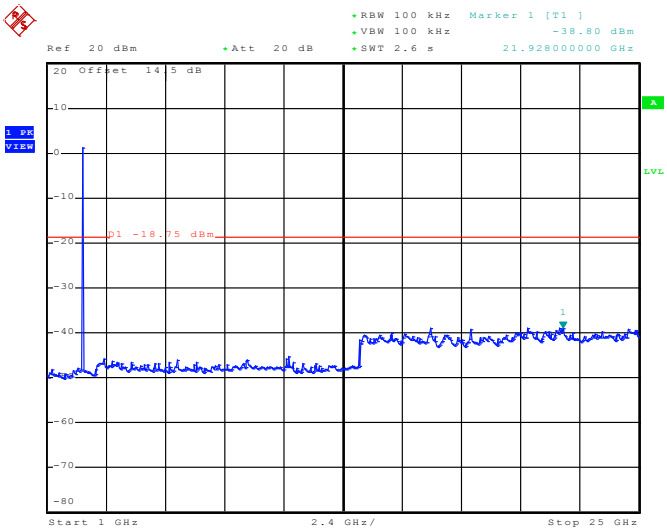
Test Mode :	Mode 3	**Temperature :**	22~23℃
Test Band :	802.11b	**Relative Humidity :**	41~42%
Test Channel :	11	**Test Engineer :**	Lewis Lu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 23.AUG.2010 09:44:51

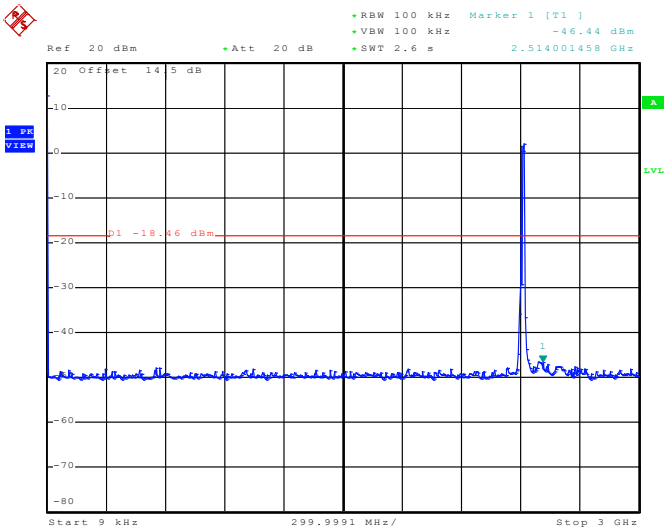
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 23.AUG.2010 09:46:09

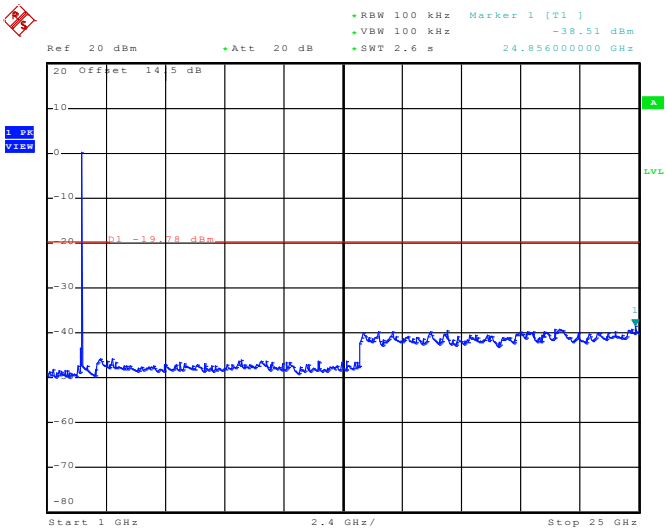
Test Mode :	Mode 4	**Temperature :**	22~23℃
Test Band :	802.11g	**Relative Humidity :**	41~42%
Test Channel :	01	**Test Engineer :**	Lewis Lu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 23.AUG.2010 09:27:29

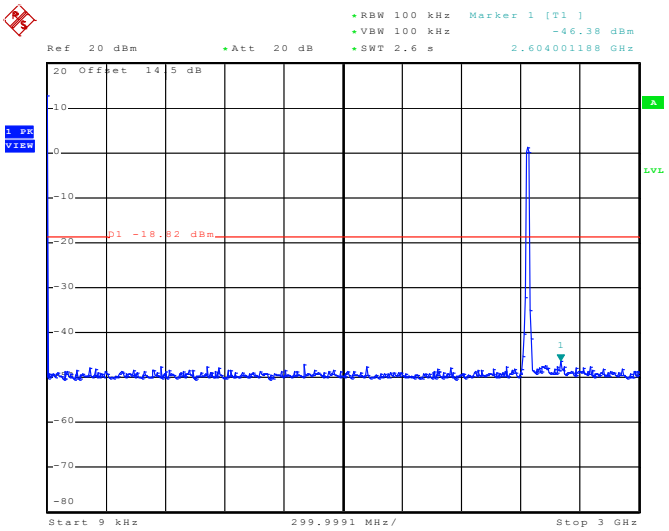
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 23.AUG.2010 09:36:02

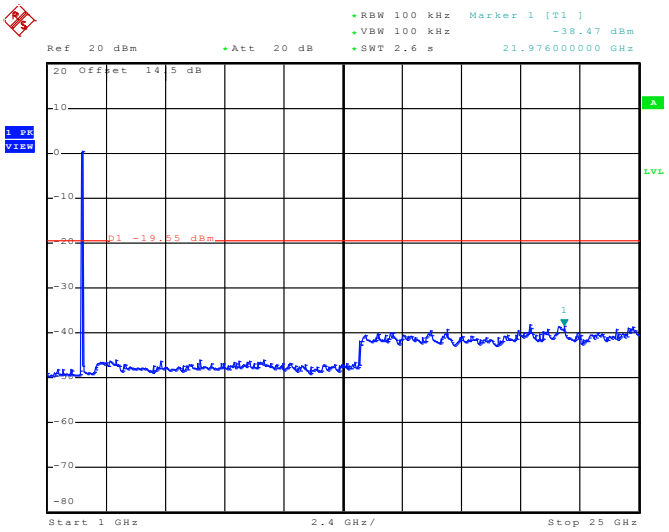
Test Mode :	Mode 5	**Temperature :**	22~23℃
Test Band :	802.11g	**Relative Humidity :**	41~42%
Test Channel :	06	**Test Engineer :**	Lewis Lu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 23.AUG.2010 09:26:13

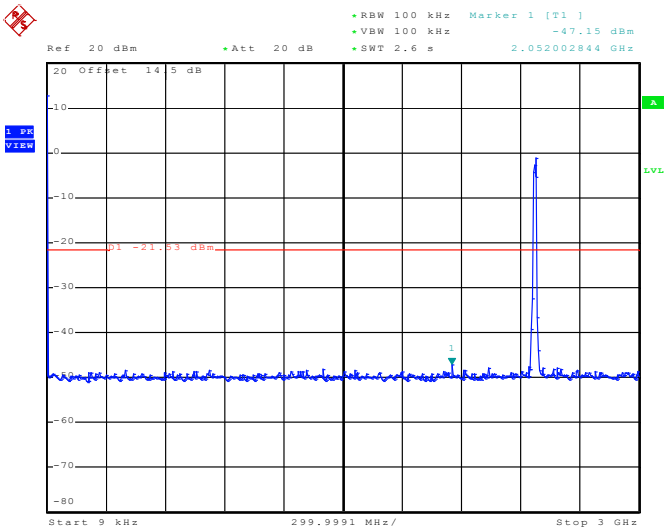
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 23.AUG.2010 09:34:02

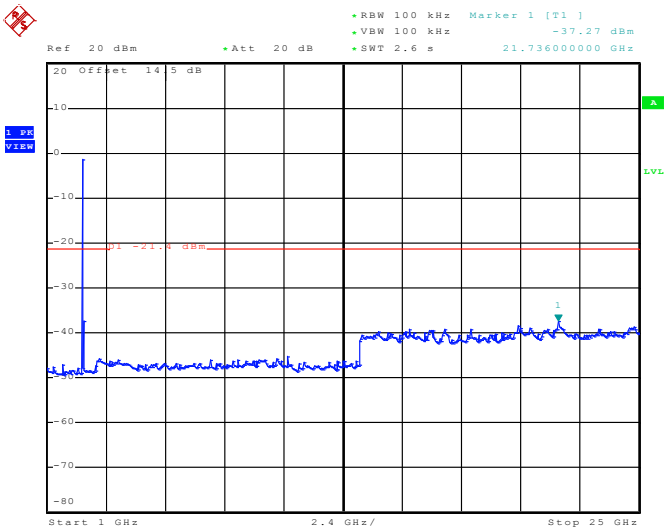
Test Mode :	Mode 6	**Temperature :**	22~23℃
Test Band :	802.11g	**Relative Humidity :**	41~42%
Test Channel :	11	**Test Engineer :**	Lewis Lu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 23.AUG.2010 09:28:32

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 23.AUG.2010 09:32:31

3.5 Power Spectral Density Measurement

3.5.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

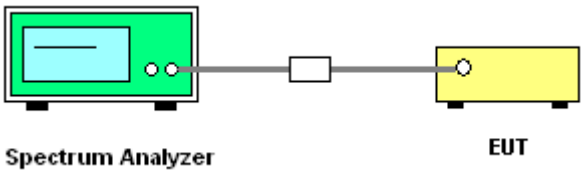
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The test follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Take the measured data from spectrum analyzer.

3.5.4 Test Setup

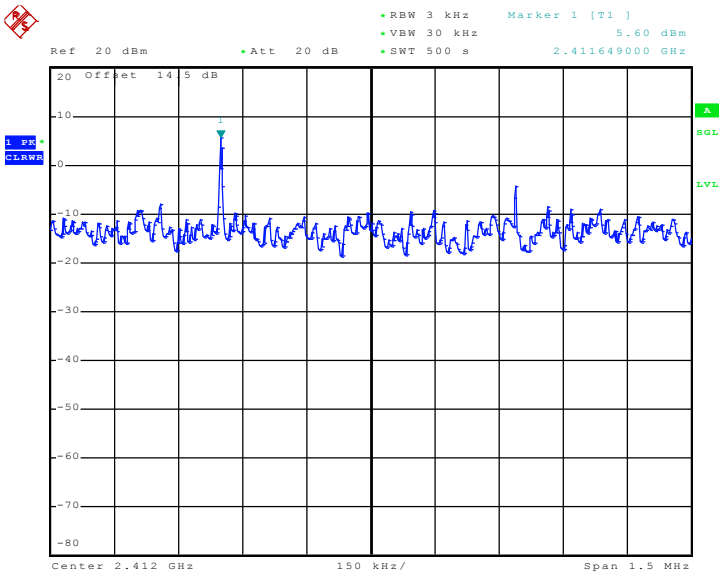


3.5.5 Test Result of Power Spectral Density

Test Mode :	Mode 1, 2, 3	**Temperature :**	22~23℃
Test Engineer :	Lewis Lu	**Relative Humidity :**	41~42%

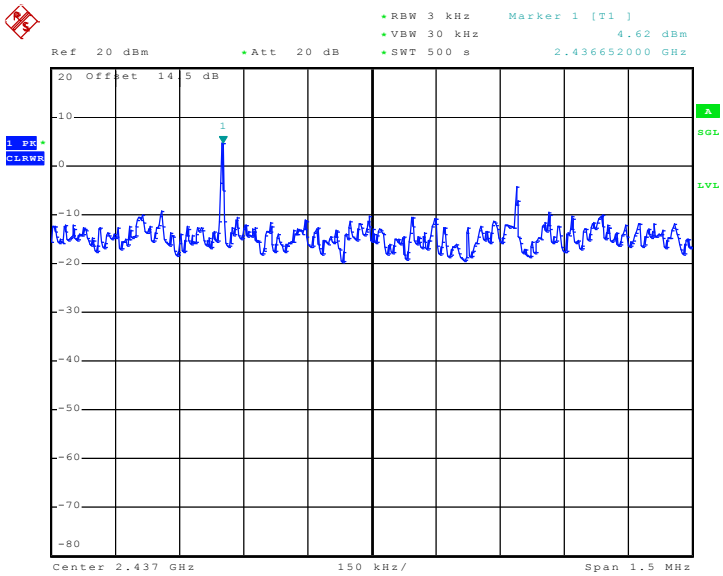
Channel	Frequency (MHz)	802.11b Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	5.60	8	Pass
06	2437	4.62	8	Pass
11	2462	4.19	8	Pass

Mode 1 : PSD Plot on 802.11b Channel 01



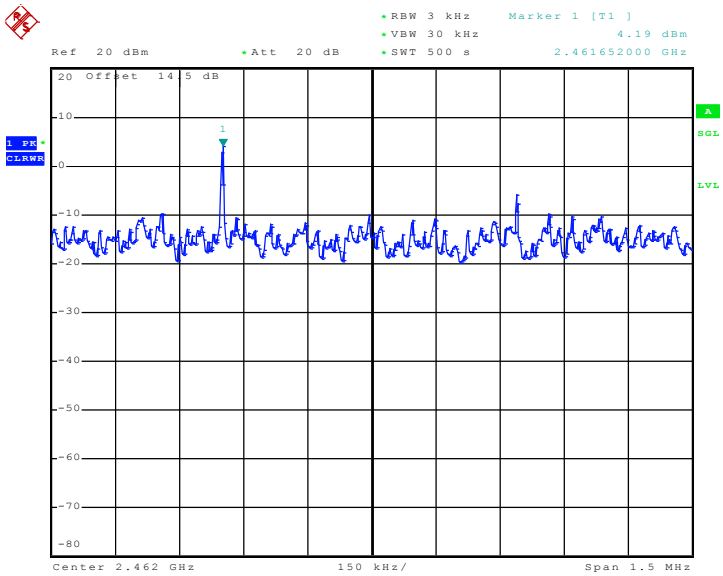
Date: 20.AUG.2010 14:38:54

Mode 2 : PSD Plot on 802.11b Channel 06



Date: 20.AUG.2010 14:21:10

Mode 3 : PSD Plot on 802.11b Channel 11

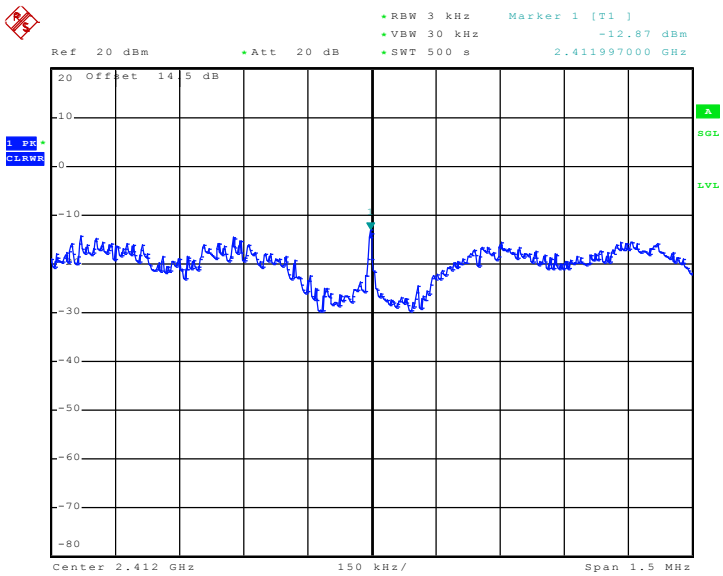


Date: 20.AUG.2010 14:10:02

Test Mode :	Mode 4, 5, 6	**Temperature :**	22~23℃
Test Engineer :	Lewis Lu	**Relative Humidity :**	41~42%

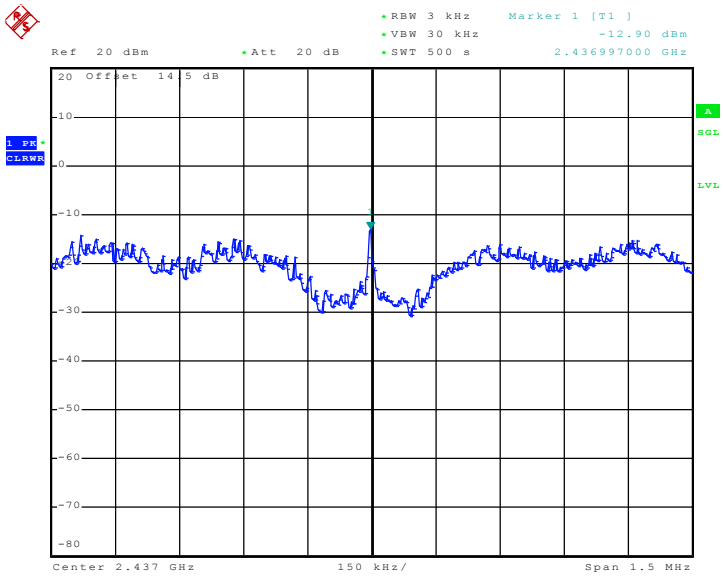
Channel	Frequency (MHz)	802.11g Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-12.87	8	Pass
06	2437	-12.90	8	Pass
11	2462	-16.06	8	Pass

Mode 4 : PSD Plot on 802.11g Channel 01



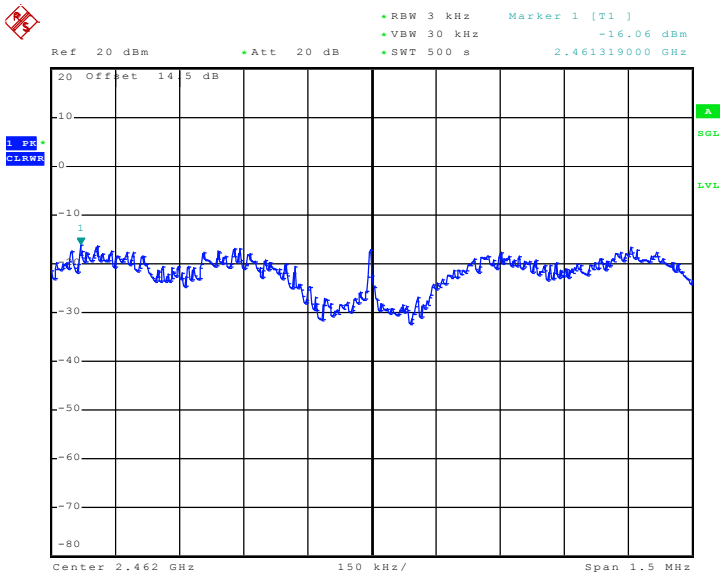
Date: 23.AUG.2010 09:14:40

Mode 5 : PSD Plot on 802.11g Channel 06



Date: 23.AUG.2010 09:24:07

Mode 6 : PSD Plot on 802.11g Channel 11



Date: 23.AUG.2010 08:52:21

3.6 AC Conducted Emission Measurement

3.6.1 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.

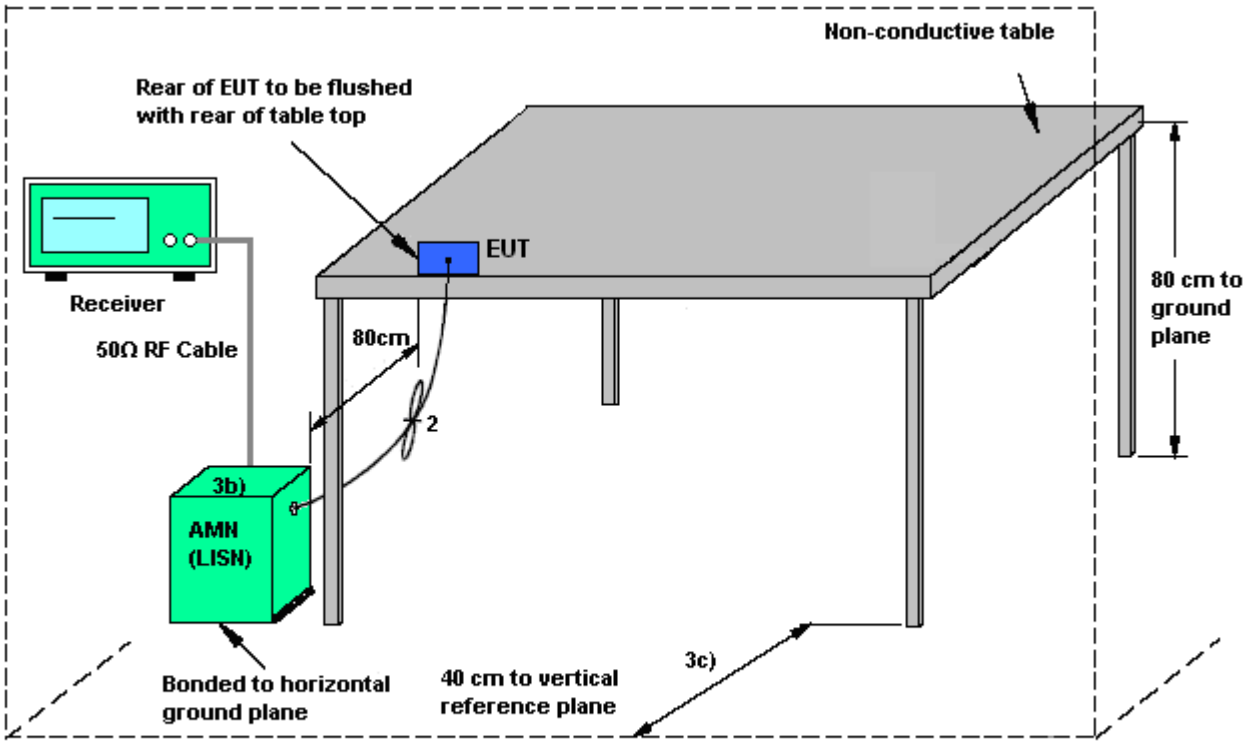
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 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.

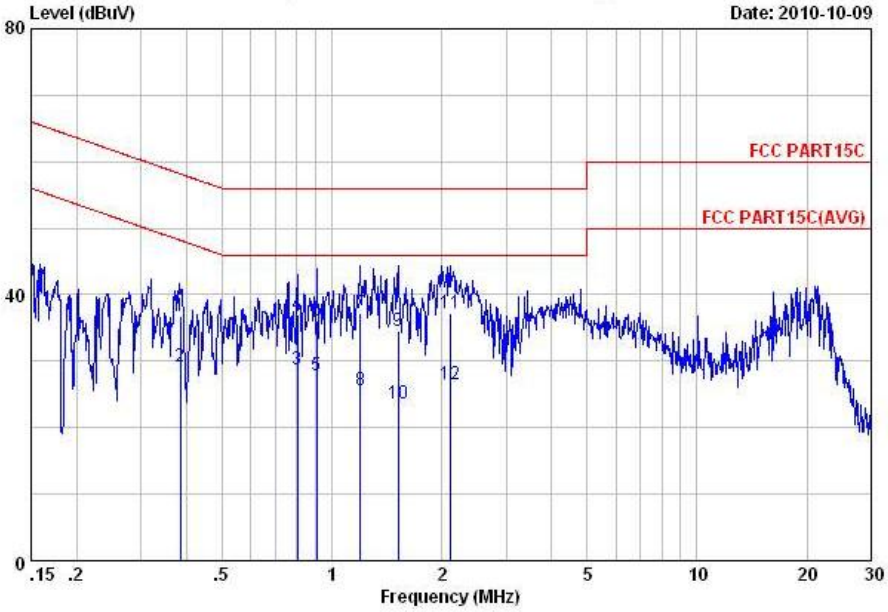
3.6.4 Test Setup



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

3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	22~23℃
Test Engineer :	Sky Liu	**Relative Humidity :**	43~44%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WLAN Link + Earphone + Adapter		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

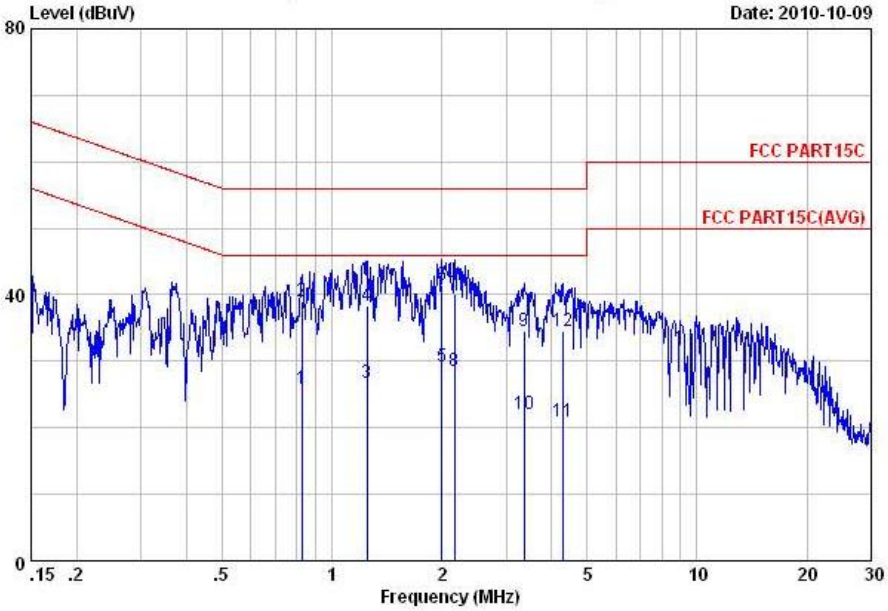


Site : C001-KS
Condition: FCC PART15C LISN-100807 LINE

mode : mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.38	36.81	-21.38	58.19	26.70	-0.08	10.19	QP
2	0.38	29.11	-19.08	48.19	19.00	-0.08	10.19	Average
3	0.81	28.65	-17.35	46.00	18.49	-0.09	10.25	Average
4	0.81	36.95	-19.05	56.00	26.79	-0.09	10.25	QP
5	0.91	27.96	-18.04	46.00	17.80	-0.10	10.26	Average
6	0.91	36.06	-19.94	56.00	25.90	-0.10	10.26	QP
7	1.20	37.28	-18.72	56.00	27.10	-0.10	10.28	QP
8	1.20	25.68	-20.32	46.00	15.50	-0.10	10.28	Average
9	1.52	34.50	-21.50	56.00	24.31	-0.11	10.30	QP
10	1.52	23.70	-22.30	46.00	13.51	-0.11	10.30	Average
11	2.11	37.22	-18.78	56.00	26.99	-0.11	10.34	QP
12	2.11	26.42	-19.58	46.00	16.19	-0.11	10.34	Average

Test Mode :	Mode 1	**Temperature :**	22~23℃
Test Engineer :	Sky Liu	**Relative Humidity :**	43~44%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WLAN Link + Earphone + Adapter		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : C001-KS
Condition: FCC PART15C LISN-100807 NEUTRAL

mode : mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.83	25.86	-20.14	46.00	15.69	-0.08	10.25	Average
2	0.83	39.06	-16.94	56.00	28.89	-0.08	10.25	QP
3	1.25	26.79	-19.21	46.00	16.60	-0.09	10.28	Average
4	1.25	38.39	-17.61	56.00	28.20	-0.09	10.28	QP
5	2.00	29.22	-16.78	46.00	19.00	-0.11	10.33	Average
6	2.00	41.42	-14.58	56.00	31.20	-0.11	10.33	QP
7	2.17	40.03	-15.97	56.00	29.80	-0.11	10.34	QP
8	2.17	28.43	-17.57	46.00	18.20	-0.11	10.34	Average
9	3.37	34.45	-21.55	56.00	24.19	-0.12	10.38	QP
10	3.37	21.95	-24.05	46.00	11.69	-0.12	10.38	Average
11	4.29	20.86	-25.14	46.00	10.60	-0.13	10.39	Average
12	4.29	34.46	-21.54	56.00	24.20	-0.13	10.39	QP

3.7 Radiated Emission Measurement

3.7.1 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

3.7.2 Measuring Instruments

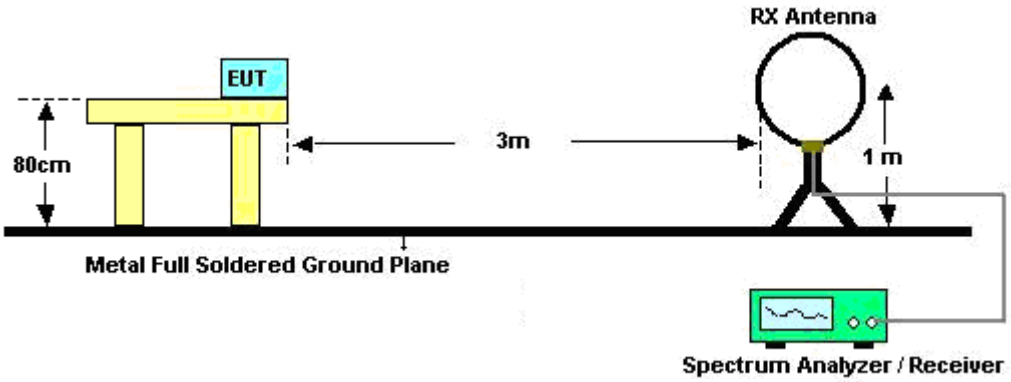
See list of measuring instruments of this test report.

3.7.3 Test Procedures

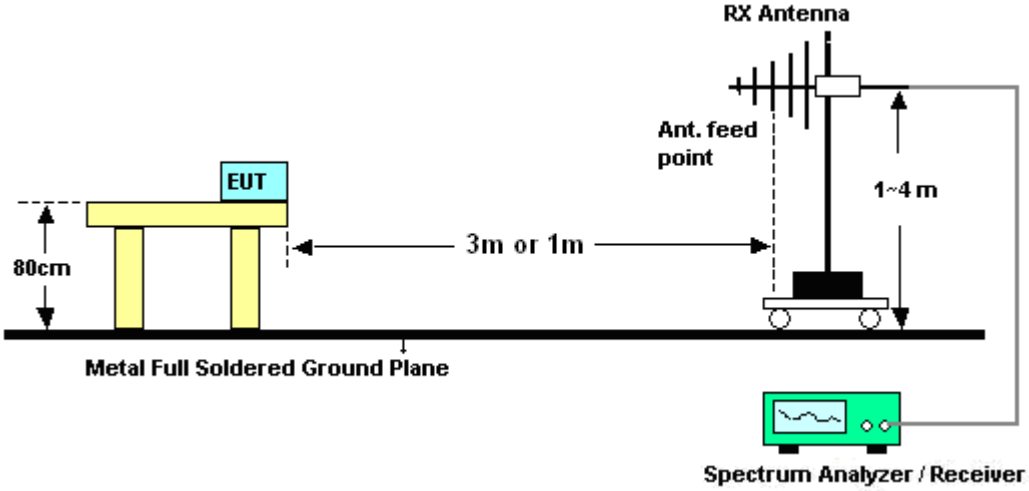
1. The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto;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

3.7.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

Test Engineer :	Feixiang Rui	**Temperature :**	23~24℃
		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 (specific distance / test distance) (dB);

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

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

Test Mode :	Mode 1	**Temperature :**	23~24℃
Test Channel :	01	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**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
77.25	19.35	-20.65	40	42.02	6.2	0.38	29.25	-	-	Peak
143.94	24.93	-18.57	43.5	43.18	10.55	0.57	29.37	-	-	Peak
192	26.64	-16.86	43.5	46.83	8.59	0.65	29.43	-	-	Peak
359.5	37.72	-8.28	46	51.92	14.72	0.85	29.77	158	154	Peak
394.5	32.87	-13.13	46	45.91	15.89	0.88	29.81	-	-	Peak
677.3	26.72	-19.28	46	35.87	19.12	1.13	29.4	-	-	Peak
2335.27	47.03	-26.97	74	46.08	32.78	3.1	34.93	120	351	Peak
2335.27	36.23	-17.77	54	35.28	32.78	3.1	34.93	120	351	Average
2412	97.48	-	-	96.42	32.89	3.15	34.98	181	24	Peak
2412	83.16	-	-	82.1	32.89	3.15	34.98	181	24	Average
2489.85	53.94	-20.06	74	52.63	33.05	3.2	34.94	146	139	Peak
2489.85	41.05	-12.95	54	39.74	33.05	3.2	34.94	146	139	Average
4826	58.26	-15.74	74	52.98	35.17	4.68	34.57	100	356	Peak
4826	40.61	-13.39	54	35.33	35.17	4.68	34.57	100	356	Average

Test Mode :	Mode 1	**Temperature :**	23~24℃
Test Channel :	01	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**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
51.33	26.32	-13.68	40	48.03	7.21	0.31	29.23	-	-	Peak
81.03	30.59	-9.41	40	52.59	6.87	0.39	29.26	147	184	Peak
203.61	20.81	-22.69	43.5	40.46	9.16	0.66	29.47	-	-	Peak
316.8	34.43	-11.57	46	49.86	13.45	0.79	29.67	-	-	Peak
557.6	26.13	-19.87	46	36.47	18.51	1.03	29.88	-	-	Peak
711.6	26.47	-19.53	46	35.11	19.41	1.15	29.2	-	-	Peak
2341.16	46.85	-27.15	74	45.91	32.78	3.12	34.96	141	125	Peak
2341.16	29.3	-24.7	54	28.36	32.78	3.12	34.96	141	125	Average
2412	96.69	-	-	95.63	32.89	3.15	34.98	100	250	Peak
2412	87.56	-	-	86.5	32.89	3.15	34.98	100	250	Average
2488.41	50.9	-23.1	74	49.59	33.05	3.2	34.94	165	189	Peak
2488.41	32.84	-21.16	54	31.53	33.05	3.2	34.94	165	189	Average
4824.1	43.16	-10.84	54	37.88	35.17	4.68	34.57	163	360	Average
4826	54.38	-19.62	74	49.1	35.17	4.68	34.57	-	-	Peak

Test Mode :	Mode 2	**Temperature :**	23~24℃
Test Channel :	06	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**Polarization :**	Horizontal
Remark :	2437 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
74.82	23.58	-16.42	40	46.66	5.8	0.37	29.25	-	-	Peak
143.94	25.03	-18.47	43.5	43.28	10.55	0.57	29.37	-	-	Peak
240.06	36.56	-9.44	46	53.88	11.56	0.71	29.59	-	-	Peak
407.8	36.72	-9.28	46	49.63	16.03	0.88	29.82	154	147	Peak
445.6	33.96	-12.04	46	46.67	16.28	0.92	29.91	-	-	Peak
703.2	32.64	-13.36	46	41.4	19.33	1.14	29.23	-	-	Peak
2355.41	47.08	-26.92	74	46.11	32.81	3.12	34.96	140	21	Peak
2355.41	38.48	-15.52	54	37.51	32.81	3.12	34.96	140	21	Average
2437	97.07	-	-	95.92	32.95	3.17	34.97	150	140	Peak
2437	88.24	-	-	87.09	32.95	3.17	34.97	150	140	Average
2489.36	51.89	-22.11	74	50.58	33.05	3.2	34.94	120	35	Peak
2489.36	37.51	-16.49	54	36.2	33.05	3.2	34.94	120	35	Average
4873.95	40.2	-13.8	54	34.88	35.18	4.71	34.57	159	333	Average
4873.95	55.64	-18.36	74	50.32	35.18	4.71	34.57	159	333	Peak

Test Mode :	Mode 2	**Temperature :**	23~24℃
Test Channel :	06	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**Polarization :**	Vertical
Remark :	2437 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
51.33	28.69	-11.31	40	50.4	7.21	0.31	29.23	-	-	Peak
77.25	31.38	-8.62	40	54.05	6.2	0.38	29.25	154	257	Peak
240.06	25.97	-20.03	46	43.29	11.56	0.71	29.59	-	-	Peak
411.3	28.54	-17.46	46	41.43	16.05	0.89	29.83	-	-	Peak
600.3	29.9	-16.1	46	39.97	18.6	1.06	29.73	-	-	Peak
703.9	33.06	-12.94	46	41.82	19.33	1.14	29.23	-	-	Peak
2362.06	47.05	-26.95	74	46.08	32.81	3.12	34.96	140	240	Peak
2362.06	36.09	-17.91	54	35.12	32.81	3.12	34.96	140	240	Average
2437	97.07	-	-	95.92	32.95	3.17	34.97	200	96	Peak
2437	87.24	-	-	86.09	32.95	3.17	34.97	200	96	Average
2495.25	48.08	-25.92	74	46.75	33.05	3.21	34.93	141	85	Peak
2495.25	38.49	-15.51	54	37.16	33.05	3.21	34.93	141	85	Average
4873.97	42.97	-11.03	54	37.65	35.18	4.71	34.57	175	4	Average
4874	54.8	-19.2	74	49.48	35.18	4.71	34.57	-	-	Peak

Test Mode :	Mode 3	**Temperature :**	23~24℃
Test Channel :	11	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**Polarization :**	Horizontal
Remark :	2462 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
75.09	23.6	-16.4	40	46.68	5.8	0.37	29.25	-	-	Peak
240.06	33.02	-12.98	46	50.34	11.56	0.71	29.59	-	-	Peak
264.09	32.77	-13.23	46	49.4	12.23	0.75	29.61	-	-	Peak
359.5	38.45	-7.55	46	52.65	14.72	0.85	29.77	114	102	Peak
407.8	31.33	-14.67	46	44.24	16.03	0.88	29.82	-	-	Peak
677.3	28.51	-17.49	46	37.66	19.12	1.13	29.4	-	-	Peak
2385.24	48.47	-25.53	74	47.48	32.83	3.13	34.97	178	140	Peak
2385.24	37.18	-16.82	54	36.19	32.83	3.13	34.97	178	140	Average
2462	99.6	-	-	98.39	32.98	3.18	34.95	175	31	Peak
2462	90.33	-	-	89.12	32.98	3.18	34.95	175	31	Average
2483.69	50.16	-23.84	74	48.89	33.01	3.2	34.94	176	121	Peak
2483.69	38.35	-15.65	54	37.08	33.01	3.2	34.94	176	121	Average
4926.03	54.56	-19.44	74	49.19	35.19	4.75	34.57	156	325	Peak
4926.03	42.22	-11.78	54	36.85	35.19	4.75	34.57	156	325	Average

Test Mode :	Mode 3	**Temperature :**	23~24℃
Test Channel :	11	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**Polarization :**	Vertical
Remark :	2462 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
51.33	29.66	-10.34	40	51.37	7.21	0.31	29.23	-	-	Peak
76.98	30.87	-9.13	40	53.68	6.06	0.38	29.25	150	256	Peak
282.99	24.53	-21.47	46	40.67	12.72	0.76	29.62	-	-	Peak
359.5	28.45	-17.55	46	42.65	14.72	0.85	29.77	-	-	Peak
617.1	27.19	-18.81	46	37.13	18.68	1.07	29.69	-	-	Peak
711.6	27.26	-18.74	46	35.9	19.41	1.15	29.2	-	-	Peak
2389.23	48.21	-25.79	74	47.19	32.86	3.13	34.97	142	210	Peak
2389.23	36.48	-17.52	54	35.46	32.86	3.13	34.97	142	210	Average
2462	98.68	-	-	97.47	32.98	3.18	34.95	123	58	Peak
2462	90.1	-	-	88.89	32.98	3.18	34.95	123	58	Average
2488	48.65	-25.35	74	47.34	33.05	3.2	34.94	133	267	Peak
2488	38.06	-15.94	54	36.75	33.05	3.2	34.94	133	267	Average
4924	48.13	-5.87	54	42.76	35.19	4.75	34.57	110	8	Average
4924	58.13	-15.87	74	52.76	35.19	4.75	34.57	100	8	Peak

Test Mode :	Mode 4	**Temperature :**	23~24℃
Test Channel :	01	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**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
77.79	20.27	-19.73	40	42.94	6.2	0.38	29.25	-	-	Peak
143.94	24.94	-18.56	43.5	43.19	10.55	0.57	29.37	-	-	Peak
192	26.72	-16.78	43.5	46.91	8.59	0.65	29.43	-	-	Peak
359.5	37.16	-8.84	46	51.36	14.72	0.85	29.77	178	265	Peak
407.8	29.03	-16.97	46	41.94	16.03	0.88	29.82	-	-	Peak
677.3	25.88	-20.12	46	35.03	19.12	1.13	29.4	-	-	Peak
2389.8	51.71	-22.29	74	50.68	32.86	3.15	34.98	166	120	Peak
2389.8	32.63	-21.37	54	31.6	32.86	3.15	34.98	166	120	Average
2412	98.51	-	-	97.45	32.89	3.15	34.98	200	119	Peak
2412	39.78	-	-	38.72	32.89	3.15	34.98	200	119	Average
2490.5	51.52	-22.48	74	50.21	33.05	3.2	34.94	120	141	Peak
2490.5	33.36	-20.64	54	32.05	33.05	3.2	34.94	120	141	Average
7239.7	57.21	-21.3	78.51	49.72	36.18	5.91	34.6	-	-	Peak

Test Mode :	Mode 4	**Temperature :**	23~24℃
Test Channel :	01	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**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
51.33	26.88	-13.12	40	48.59	7.21	0.31	29.23	-	-	Peak
76.98	32.06	-7.94	40	54.87	6.06	0.38	29.25	150	122	Peak
192	23.89	-19.61	43.5	44.08	8.59	0.65	29.43	-	-	Peak
334.3	33.27	-12.73	46	48.07	14.12	0.81	29.73	-	-	Peak
585.6	25.78	-20.22	46	35.92	18.58	1.05	29.77	-	-	Peak
707.4	26.12	-19.88	46	34.84	19.36	1.14	29.22	-	-	Peak
2388.47	36.59	-17.41	54	35.57	32.86	3.13	34.97	160	101	Average
2388.47	50.94	-23.06	74	49.92	32.86	3.13	34.97	160	101	Peak
2412	97.32	-	-	96.26	32.89	3.15	34.98	200	339	Peak
2412	43.39	-	-	42.33	32.89	3.15	34.98	200	339	Average
2494.49	51.06	-22.94	74	49.73	33.05	3.21	34.93	147	90	Peak
2494.49	38.02	-15.98	54	36.69	33.05	3.21	34.93	147	90	Average
4824	51.47	-22.53	74	46.19	35.17	4.68	34.57	185	360	Peak
4824	35.03	-18.97	54	29.75	35.17	4.68	34.57	185	360	Average
7226.4	57.58	-19.74	77.32	50.08	36.17	5.92	34.59	-	-	Peak

Test Mode :	Mode 5	**Temperature :**	23~24℃
Test Channel :	06	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**Polarization :**	Horizontal
Remark :	2437 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
75.63	21.64	-18.36	40	44.59	5.93	0.37	29.25	-	-	Peak
143.94	24.85	-18.65	43.5	43.1	10.55	0.57	29.37	-	-	Peak
282.99	31.97	-14.03	46	48.11	12.72	0.76	29.62	-	-	Peak
359.5	33.13	-12.87	46	47.33	14.72	0.85	29.77	-	-	Peak
377	37.18	-8.82	46	50.77	15.34	0.86	29.79	145	287	Peak
651.4	28.34	-17.66	46	37.92	18.91	1.1	29.59	-	-	Peak
2366.05	45.82	-28.18	74	44.85	32.81	3.13	34.97	150	148	Peak
2366.05	31.76	-22.24	54	30.79	32.81	3.13	34.97	150	148	Average
2437	96	-	-	94.85	32.95	3.17	34.97	151	142	Peak
2437	39.74	-	-	38.59	32.95	3.17	34.97	151	142	Average
2490.31	48.52	-25.48	74	47.21	33.05	3.2	34.94	154	174	Peak
2490.31	33.59	-20.41	54	32.28	33.05	3.2	34.94	154	174	Average
7312	58.96	-15.04	74	51.49	36.2	5.91	34.64	100	355	Peak
7312	44.64	-9.36	54	37.17	36.2	5.91	34.64	100	355	Average

Test Mode :	Mode 5	**Temperature :**	23~24℃
Test Channel :	06	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**Polarization :**	Vertical
Remark :	2437 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
51.33	26.37	-13.63	40	48.08	7.21	0.31	29.23	-	-	Peak
77.25	32.57	-7.43	40	55.24	6.2	0.38	29.25	166	320	Peak
199.83	20.57	-22.93	43.5	40.37	9	0.66	29.46	-	-	Peak
394.5	27.22	-18.78	46	40.26	15.89	0.88	29.81	-	-	Peak
617.1	27.76	-18.24	46	37.7	18.68	1.07	29.69	-	-	Peak
704.6	26.63	-19.37	46	35.39	19.33	1.14	29.23	-	-	Peak
2366.24	45.77	-28.23	74	44.8	32.81	3.13	34.97	100	60	Peak
2366.24	32.07	-21.93	54	31.1	32.81	3.13	34.97	100	60	Average
2437	95.56	-	-	94.41	32.95	3.17	34.97	134	117	Peak
2437	39.46	-	-	38.31	32.95	3.17	34.97	134	117	Average
2495.82	46.88	-27.12	74	45.55	33.05	3.21	34.93	150	140	Peak
2495.82	33.9	-20.1	54	32.57	33.05	3.21	34.93	150	140	Average
7312	59.77	-14.23	74	52.3	36.2	5.91	34.64	166	320	Peak
7312	44.8	-9.2	54	37.33	36.2	5.91	34.64	166	320	Average

Test Mode :	Mode 6	**Temperature :**	23~24℃
Test Channel :	11	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**Polarization :**	Horizontal
Remark :	2462 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
75.63	20.58	-19.42	40	43.53	5.93	0.37	29.25	-	-	Peak
143.94	23.89	-19.61	43.5	42.14	10.55	0.57	29.37	-	-	Peak
192	25.41	-18.09	43.5	45.6	8.59	0.65	29.43	-	-	Peak
359.5	38.54	-7.46	46	52.74	14.72	0.85	29.77	150	211	Peak
411.3	26.53	-19.47	46	39.42	16.05	0.89	29.83	-	-	Peak
677.3	26.54	-19.46	46	35.69	19.12	1.13	29.4	-	-	Peak
2385.81	47.02	-26.98	74	46	32.86	3.13	34.97	150	143	Peak
2385.81	32.29	-21.71	54	31.27	32.86	3.13	34.97	150	143	Average
2462	98.08	-	-	96.87	32.98	3.18	34.95	157	143	Peak
2462	40.27	-	-	39.06	32.98	3.18	34.95	157	143	Average
2483.85	55.71	-18.29	74	54.44	33.01	3.2	34.94	101	15	Peak
2483.85	33.49	-20.51	54	32.22	33.01	3.2	34.94	101	15	Average
7388	60.47	-13.53	74	53	36.24	5.9	34.67	107	46	Peak
7388	37.68	-16.32	54	30.21	36.24	5.9	34.67	107	46	Average

Test Mode :	Mode 6	**Temperature :**	23~24℃
Test Channel :	11	**Relative Humidity :**	43~44%
Test Engineer :	Feixiang Rui	**Polarization :**	Vertical
Remark :	2462 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
51.33	26.52	-13.48	40	48.23	7.21	0.31	29.23	-	-	Peak
77.25	31.79	-8.21	40	54.46	6.2	0.38	29.25	144	11	Peak
119.91	24.48	-19.02	43.5	41.23	11.8	0.46	29.01	-	-	Peak
316.8	26.53	-19.47	46	41.96	13.45	0.79	29.67	-	-	Peak
360.2	29.35	-16.65	46	43.55	14.72	0.85	29.77	-	-	Peak
608.7	27.71	-18.29	46	37.72	18.64	1.06	29.71	-	-	Peak
2372.13	46.55	-27.45	74	45.56	32.83	3.13	34.97	142	83	Peak
2372.13	33.25	-20.75	54	32.26	32.83	3.13	34.97	142	83	Average
2462	40.46	-	-	39.25	32.98	3.18	34.95	200	318	Average
2462	97.88	-	-	96.67	32.98	3.18	34.95	200	318	Peak
2484.8	54.19	-19.81	74	52.92	33.01	3.2	34.94	124	73	Peak
2484.8	33.88	-20.12	54	32.61	33.01	3.2	34.94	124	73	Average
4925.5	54.42	-19.58	74	49.05	35.19	4.75	34.57	121	6	Peak
4925.5	36.01	-17.99	54	30.64	35.19	4.75	34.57	121	6	Average
7388	63.48	-10.52	74	56.01	36.24	5.9	34.67	200	61	Peak
7388	37.07	-16.93	54	29.6	36.24	5.9	34.67	200	61	Average

3.8 Antenna Requirements

3.8.1 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.

3.8.2 Antenna Connected Construction

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

3.8.3 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	100319	9kHz~40GHz	Jan. 18, 2010	Jan. 17, 2011	Conducted (TH01-KS)
Power Meter	Agilent	E4416A	MY45101555	N/A	Aug. 24, 2010	Aug. 23, 2011	Conducted (TH01-KS)
Power Sensor	Agilent	E9327A	MY44421198	N/A	Aug. 24, 2010	Aug. 23, 2011	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 17, 2009	Nov. 16, 2010	Conduction (CO01-KS)
LISN	MessTec	AN3016	60103	9kHz~30MHz	Jan. 18, 2010	Jan. 17, 2011	Conduction (CO01-KS)
LISN	MessTec	AN3016	60105	9kHz~30MHz	Jan. 18, 2010	Jan. 17, 2011	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	N/A	Nov. 26, 2009	Nov. 25, 2010	Conduction (CO01-KS)
EMI Test Receiver	R&S	ESCI	100724	9kHz – 2.75GHz	Mar. 09, 2010	Mar. 08, 2011	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Jan. 18, 2010	Jan. 17, 2011	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Jan. 18, 2010	Jan. 17, 2011	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 18, 2010	Jan. 17, 2011	Radiation (03CH01-KS)
Amplifier	Wireless	FPA-6592G	060004	30MHz~2GHz	Feb. 02, 2010	Feb. 01, 2011	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Jan. 18, 2010	Jan. 17, 2011	Radiation (03CH01-KS)
Actice hore antenna	com-power	AHA-118	701023	1G-18GHz	Nov. 18, 2009	Nov. 17, 2010	Radiation (03CH01-KS)
Signal Generator	R&S	SMR40	100455	10MHz~40GHz	Jan. 18, 2010	Jan. 17, 2011	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15-40GHz	Oct. 22, 2009	Oct. 21, 2010	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH01-KS)

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 EP081921 as below.