

FCC RF Test Report

APPLICANT : Quanta Computer Inc
EQUIPMENT : 802.11b/g, PCI-E Half-sized mini card
BRAND NAME : QMI
MODEL NAME : EM113-MV
FCC ID : T5U-EM113MV
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : Digital Transmission System (DTS)

The product was installed into Laptop Computer (Brand Name: OLPC, Model Name: XO-1.75; XO-1.75HS) during test.

The product was received on Nov. 16, 2011 and completely tested on Dec. 07, 2011. 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:



Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.



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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	Power Output	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(d)	Frequency Band Edges	$\leq 20\text{dBc}$	Pass	-
3.4	15.247(d)	Spurious Emission	$< 20\text{ dBc}$	Pass	-
3.5	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}$	Pass	-
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 9.94 dB at 0.15 MHz
3.7	15.247(d)	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 2.67 dB at 215.22 MHz
3.8	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Quanta Computer Inc

No.188, Wen Hwa 2nd Rd., Kuei Shan Hsiang, Tao Yuan Shien, TaiWan

1.2 Manufacturer

Quanta Computer Inc

No.188, Wen Hwa 2nd Rd., Kuei Shan Hsiang, Tao Yuan Shien, TaiWan

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	802.11b/g, PCI-E Half-sized mini card
Model Name	EM113-MV
FCC ID	T5U-EM113MV
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 : 18.85 dBm (0.077 W) 802.11g : 22.31 dBm (0.170 W)
Antenna Type	PIFA Antenna with gain 3.15 dBi
HW Version	N/A
SW Version	N/A
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : 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.
3. The difference between sample 1(XO-1.75HS) and sample 2 (XO-1.75) is only for keyboard. The others are the same including circuit design, PCB board, structure and all components. It is special to declare. After pre-scan two types of EUT, there is no any difference for RF performance, so we only choose sample 1 (XO-1.75HS) to all test.

List of Accessory:

Specification of Accessory		
AC Adapter 1	Brand Name	DARFON
	Model Name	BB0J-C
AC Adapter 2	Brand Name	Bestec
	Model Name	NA0241WAA
AC Adapter 3	Brand Name	DARFON
	Model Name	BU24-1203
AC Adapter 4	Brand Name	Bestec
	Model Name	BT-AG250SDF
Battery	Brand Name	OLPC
	Model Name	CL1

Remark: 1, For accessories equipped with this EUT, please refer to Appendix A.

2, The accessories will affect EMC test items, and we evaluation all tests on 15B report. Only choose the worst case to evaluation RF test.

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.		
	TH01-KS	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

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.	DC Power Supply	GW	GPS-30300	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-855	KA2DIR5855A2	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	P08S	QDS-BRCM1030	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	SD Card	Kingston	SD8/8GB	N/A	N/A	N/A
5.	Earphone	INTOPIC	Jazz-278	FCC DoC	Shielded, 2.2 m	N/A
6.	iPod	Apple	A1199	FCC DoC	Shielded, 1.0 m	N/A
7.	iPod	Apple	A1199	FCC DoC	Shielded, 1.0 m	N/A
8.	iPod	Apple	A1199	FCC DoC	Shielded, 1.0 m	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	17.38	17.27	16.92	16.86
CH 06	2437 MHz	16.19	16.15	15.87	15.68
CH 11	2462 MHz	18.85	18.62	18.32	18.12

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	20.16	19.91	19.57	19.42	19.86	19.72	19.55	19.61
CH 06	2437 MHz	21.68	21.25	20.81	20.65	20.96	20.69	20.31	20.63
CH 11	2462 MHz	22.31	22.13	21.63	21.43	22.02	21.86	21.24	21.59

Remark:

1. The data rates of WLAN 802.11b/g were set in 1Mbps for 802.11b, 6Mbps 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

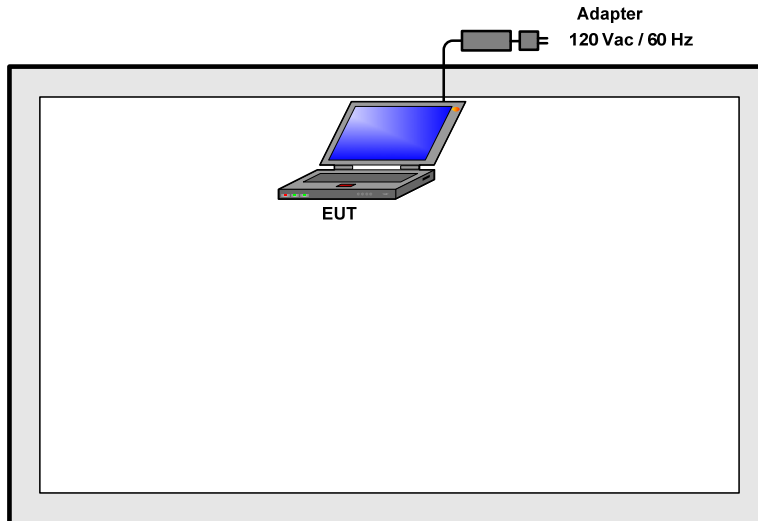
The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz), radiated emission (30 MHz to the 10th harmonic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

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

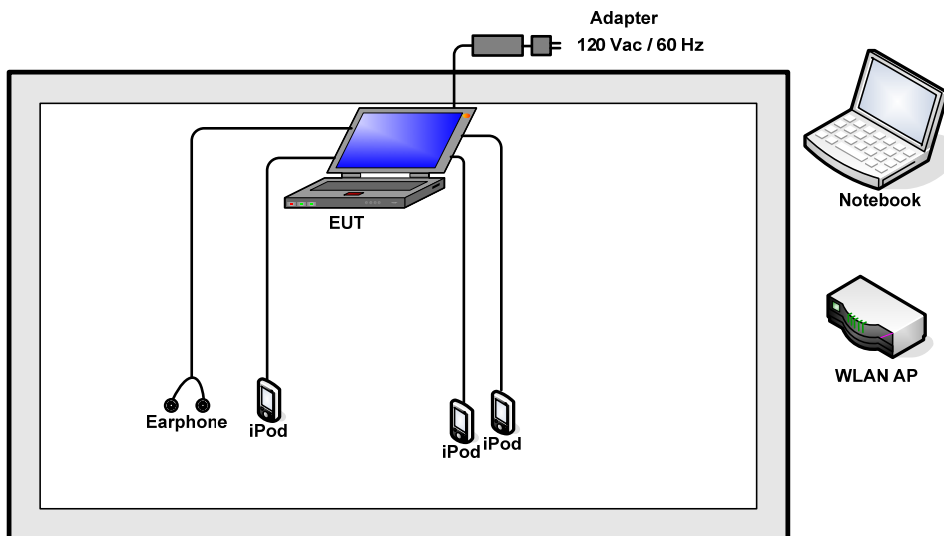
Test Cases		
Test Item	802.11b (Modulation : DSSS)	802.11g (Modulation : OFDM)
Conducted TCs	Mode 1 : 802.11b CH01_2412 MHz Mode 2 : 802.11b CH06_2437 MHz Mode 3 : 802.11b CH11_2462 MHz	Mode 4: 802.11g_CH01_2412 MHz Mode 5: 802.11g_CH06_2437 MHz Mode 6: 802.11g_CH11_2462 MHz
Radiated TCs	Mode 1 : 802.11b CH01_2412 MHz in Laptop Mode Mode 2 : 802.11b CH06_2437 MHz in Laptop Mode Mode 3 : 802.11b CH11_2462 MHz in Laptop Mode Mode 4 : 802.11b CH06_2437 MHz in Tablet Mode	Mode 5: 802.11g_CH01_2412 MHz in Laptop Mode Mode 6: 802.11g_CH06_2437 MHz in Laptop Mode Mode 7: 802.11g_CH11_2462 MHz in Laptop Mode Mode 8: 802.11g_CH11_2462 MHz in Tablet Mode
AC Conducted Emission	Mode 1 : WLAN Link + Adapter 4 + TC	
Remark: TC stands for Test Configuration, and consists of iPods and earphone.		

2.3 Connection Diagram of Test System

<Radiation>



<Conduction>



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.

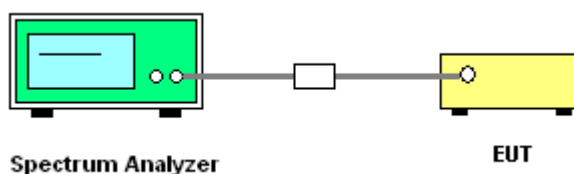
3.1.2 Measuring Instruments

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

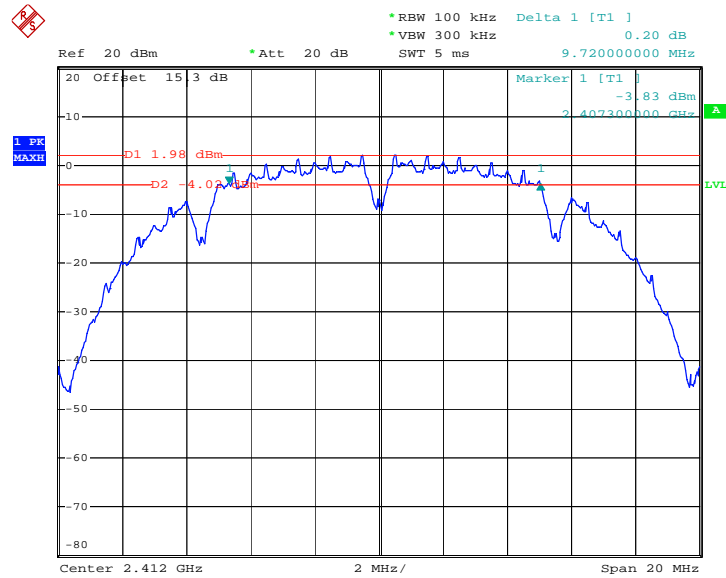


3.1.5 Test Result of 6dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	24~25°C
Test Engineer :	Zhi Lu	Relative Humidity :	46~47%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	9.72	0.5	Pass
06	2437	9.72	0.5	Pass
11	2462	10.04	0.5	Pass

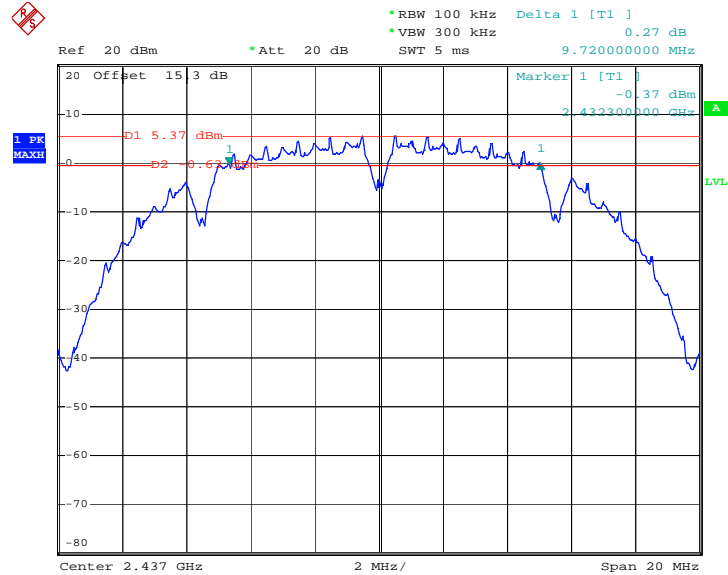
Mode 1 : 6 dB Bandwidth Plot on 802.11b Channel 01



Date: 2.DEC.2011 16:59:47

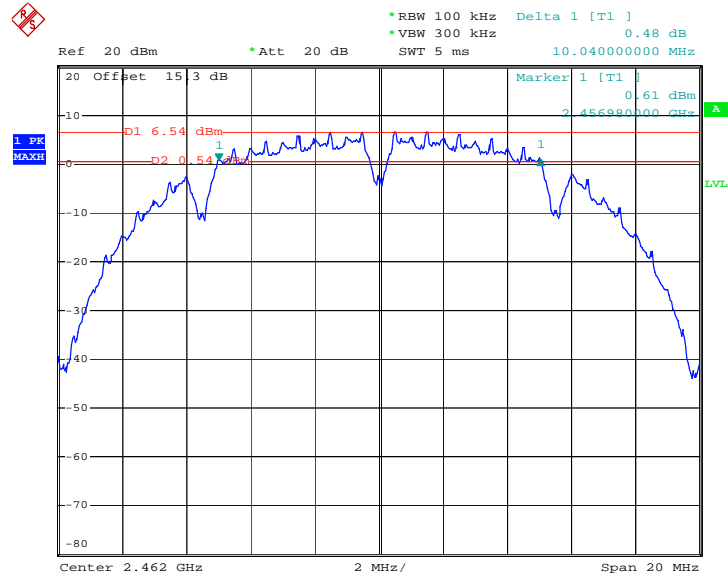


Mode 2 : 6 dB Bandwidth Plot on 802.11b Channel 06



Date: 2.DEC.2011 17:15:46

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



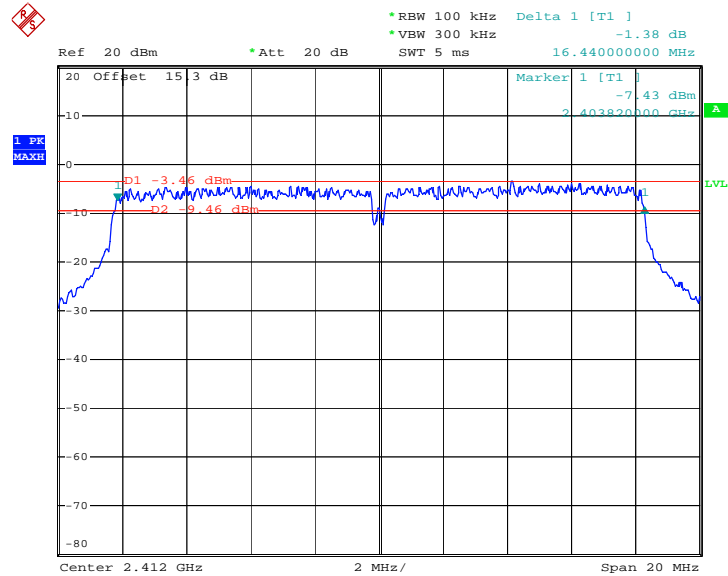
Date: 2.DEC.2011 17:30:30



Test Mode :	Mode 4, 5, 6	Temperature :	24~25°C
Test Engineer :	Zhi Lu	Relative Humidity :	46~47%

Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.44	0.5	Pass
06	2437	16.48	0.5	Pass
11	2462	16.52	0.5	Pass

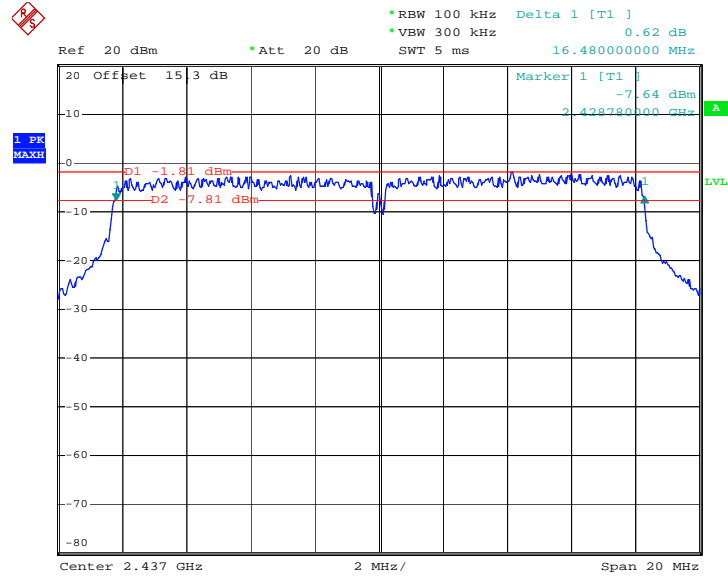
Mode 4 : 6 dB Bandwidth Plot on 802.11g Channel 01



Date: 2.DEC.2011 18:03:19

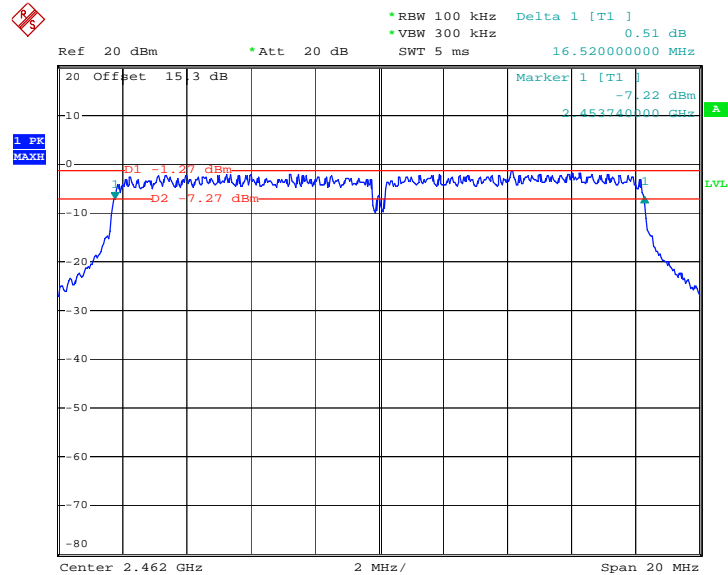


Mode 5 : 6 dB Bandwidth Plot on 802.11g Channel 06



Date: 2.DEC.2011 18:27:39

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



Date: 2.DEC.2011 18:44:07

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.

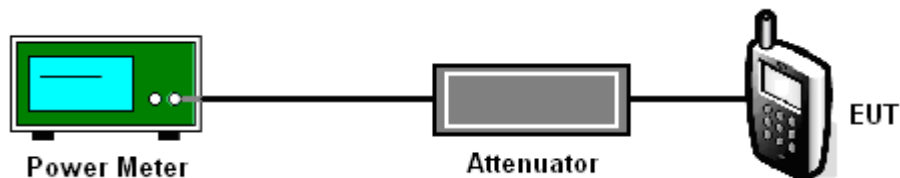
3.2.2 Measuring Instruments

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 :	24~25°C
Test Engineer :	Zhi Lu	Relative Humidity :	46~47%

Channel	Frequency (MHz)	802.11b Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	17.38	30	Pass
06	2437	16.19	30	Pass
11	2462	18.85	30	Pass

Test Mode :	Mode 4, 5, 6	Temperature :	24~25°C
Test Engineer :	Zhi Lu	Relative Humidity :	46~47%

Channel	Frequency (MHz)	802.11g Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	20.16	30	Pass
06	2437	21.68	30	Pass
11	2462	22.31	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

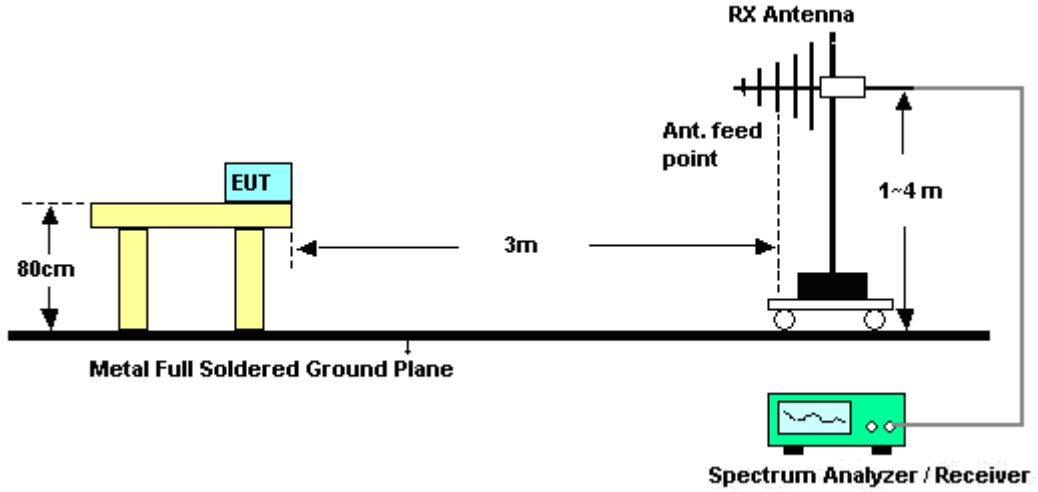
See list of measuring instruments of this test report.

3.3.3 Test Procedures

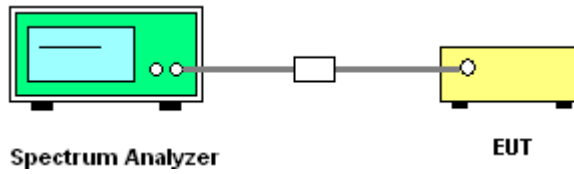
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW) \geq RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized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

802.11b CH01_2412 MHz in Laptop Mode

Test Mode :	Mode 1	Temperature :	20~21°C
Test Band :	802.11b	Relative Humidity :	41~42%
Test Channel :	01	Test Engineer :	Jack Li

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
2386.38	54.94	-19.06	74	52.66	32.86	3.47	34.05	127	57	Peak
2386.38	43.52	-10.48	54	41.24	32.86	3.47	34.05	127	57	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
2386.76	56.28	-17.72	74	54	32.86	3.47	34.05	160	360	Peak
2386.76	44.48	-9.52	54	42.2	32.86	3.47	34.05	160	360	Average

802.11b CH11_2462 MHz in Laptop Mode

Test Mode :	Mode 3	Temperature :	20~21°C
Test Band :	802.11b	Relative Humidity :	41~42%
Test Channel :	11	Test Engineer :	Jack Li

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
2487.84	57.93	-16.07	74	55.39	33.05	3.72	34.23	116	0	Peak
2487.84	43.68	-10.32	54	41.14	33.05	3.72	34.23	116	0	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
2484.61	58.08	-15.92	74	55.59	33.01	3.68	34.2	100	354	Peak
2484.61	47.89	-6.11	54	45.4	33.01	3.68	34.2	100	354	Average



802.11b CH06_2437 MHz in Tablet Mode

Test Mode :	Mode 4	Temperature :	20~21°C
Test Band :	802.11b	Relative Humidity :	41~42%
Test Channel :	06	Test Engineer :	Jack Li

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
2485.94	53.21	-20.79	74	50.72	33.01	3.68	34.2	101	339	Peak
2485.94	41.48	-12.52	54	38.99	33.01	3.68	34.2	101	339	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
2485.75	59.26	-14.74	74	56.77	33.01	3.68	34.2	100	15	Peak
2485.75	46.55	-7.45	54	44.06	33.01	3.68	34.2	100	15	Average

802.11g_CH01_2412 MHz in Laptop Mode

Test Mode :	Mode 5	Temperature :	20~21°C
Test Band :	802.11g	Relative Humidity :	41~42%
Test Channel :	01	Test Engineer :	Jack Li

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
2390	56.65	-17.35	74	54.37	32.86	3.47	34.05	100	36	Peak
2390	43.93	-10.07	54	41.65	32.86	3.47	34.05	100	36	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
2390	55.54	-18.46	74	53.26	32.86	3.47	34.05	100	278	Peak
2390	42.72	-11.28	54	40.44	32.86	3.47	34.05	100	278	Average



802.11g_CH06_2437 MHz in Laptop Mode

Test Mode :	Mode 6	Temperature :	20~21°C
Test Band :	802.11g	Relative Humidity :	41~42%
Test Channel :	06	Test Engineer :	Jack Li

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
2498.67	56.8	-17.2	74	54.26	33.05	3.72	34.23	100	338	Peak
2498.67	44.62	-9.38	54	42.08	33.05	3.72	34.23	100	338	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
2492.21	57.2	-16.8	74	54.66	33.05	3.72	34.23	147	7	Peak
2492.21	44.12	-9.88	54	41.58	33.05	3.72	34.23	147	7	Average

802.11g_CH11_2462 MHz in Tablet Mode

Test Mode :	Mode 8	Temperature :	20~21°C
Test Band :	802.11g	Relative Humidity :	41~42%
Test Channel :	11	Test Engineer :	Jack Li

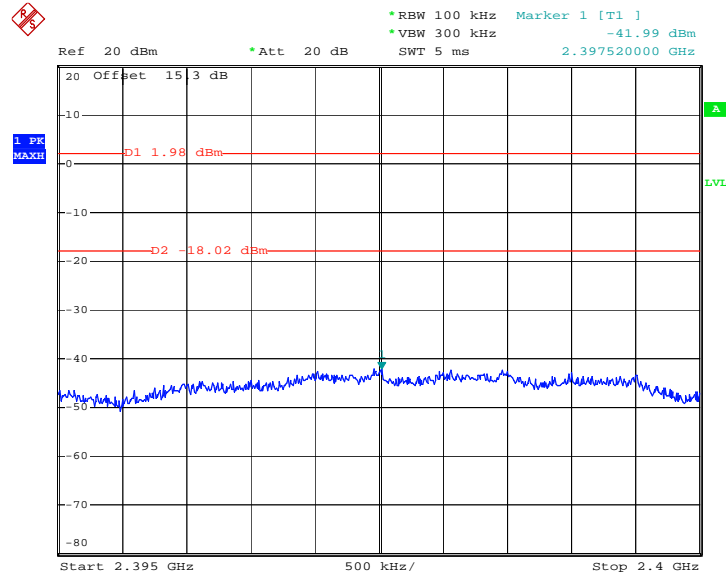
ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2486.89	60.11	-13.89	74	57.62	33.01	3.68	34.2	100	339	Peak
2486.89	43.2	-10.8	54	40.71	33.01	3.68	34.2	100	339	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
2483.5	66.3	-7.7	74	63.81	33.01	3.68	34.2	100	337	Peak
2483.5	50.36	-3.64	54	47.87	33.01	3.68	34.2	100	337	Average

3.3.6 Test Plots of Conducted Band Edges

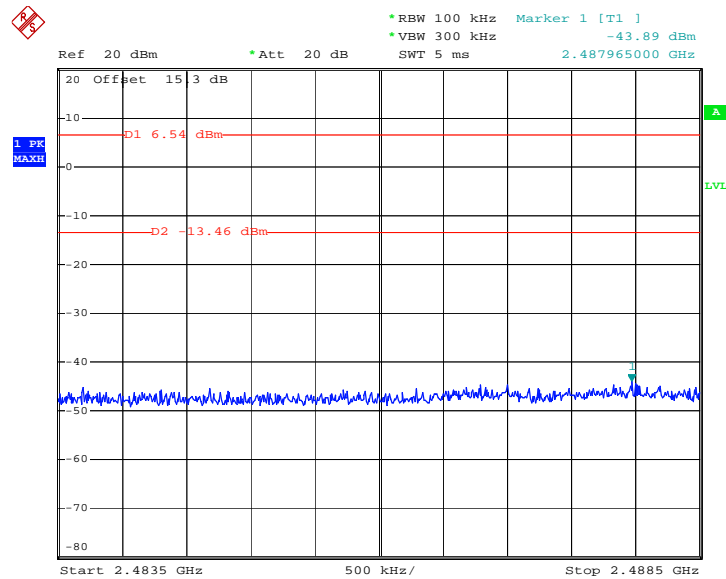
Test Mode :	Mode 1 and 3	Temperature :	24~25°C
Test Band :	802.11b	Relative Humidity :	46~47%
Test Channel :	01 and 11	Test Engineer :	Zhi Lu

Low Band Edge Plot on 802.11b Channel 01



Date: 2.DEC.2011 17:01:04

High Band Edge Plot on 802.11b Channel 11

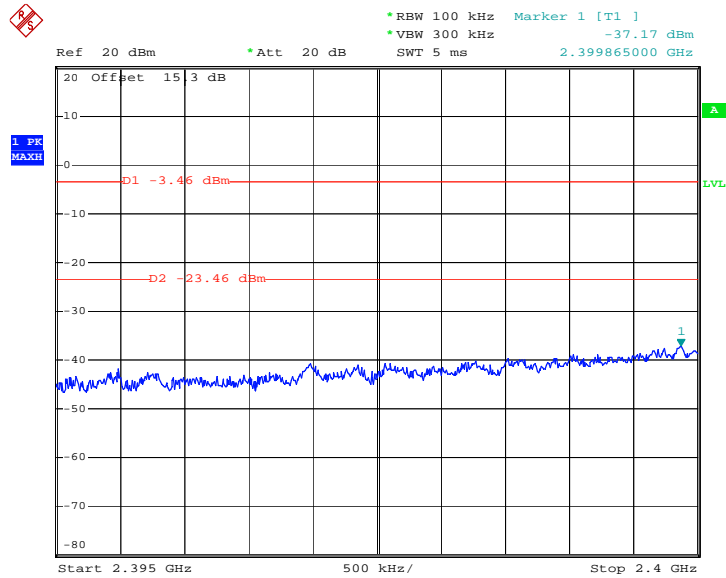


Date: 2.DEC.2011 17:31:24



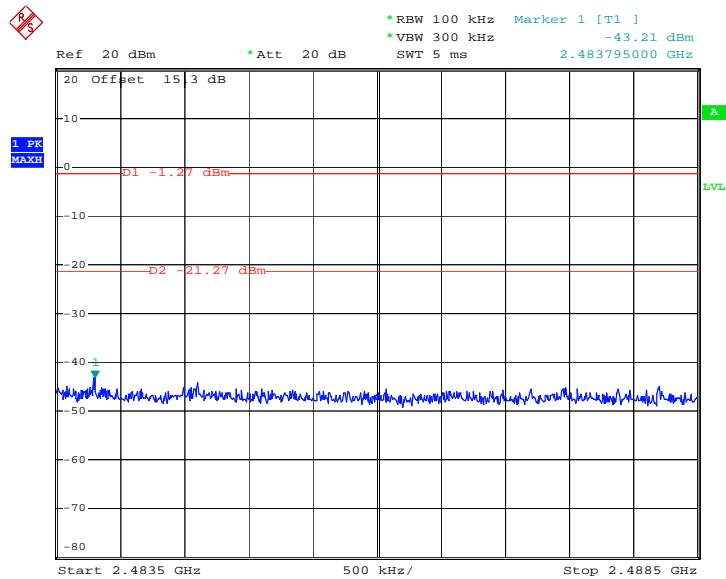
Test Mode :	Mode 4 and 6	Temperature :	24~25°C
Test Band :	802.11g	Relative Humidity :	46~47%
Test Channel :	01 and 11	Test Engineer :	Zhi Lu

Low Band Edge Plot on 802.11g Channel 01



Date: 2.DEC.2011 18:04:49

High Band Edge Plot on 802.11g Channel 11



Date: 2.DEC.2011 18:45:01

3.4 Spurious Emission Measurement

3.4.1 Limit of Spurious Emission Measurement

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

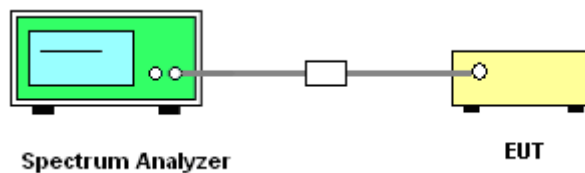
3.4.2 Measuring Instruments

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 loss cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW) \geq 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.

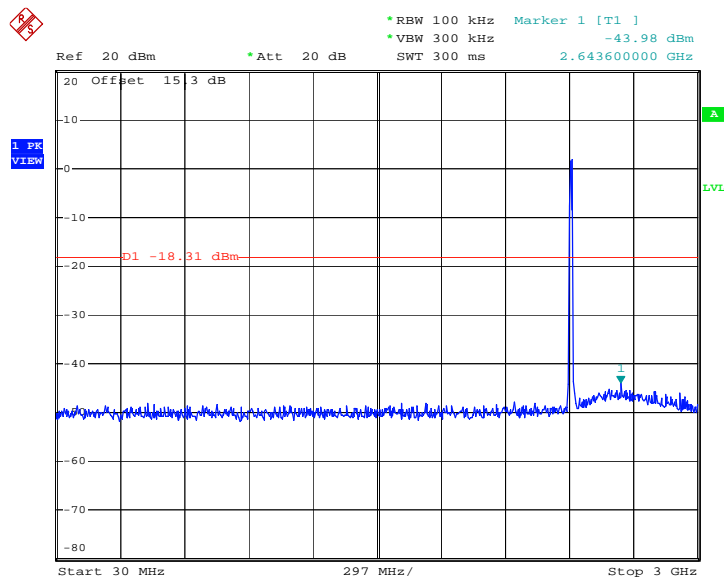
3.4.4 Test Setup



3.4.5 Test Plots of Spurious Emission

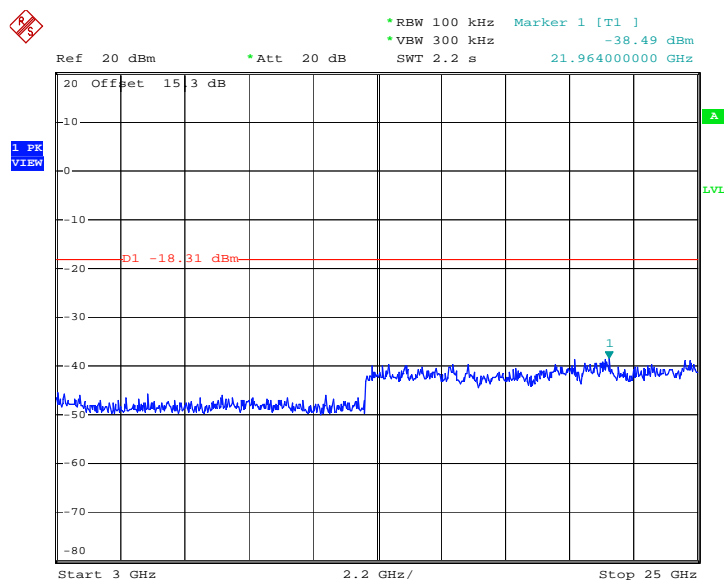
Test Mode :	Mode 1	Temperature :	24~25°C
Test Band :	802.11b	Relative Humidity :	46~47%
Test Channel :	01	Test Engineer :	Zhi Lu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 2.DEC.2011 17:02:28

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

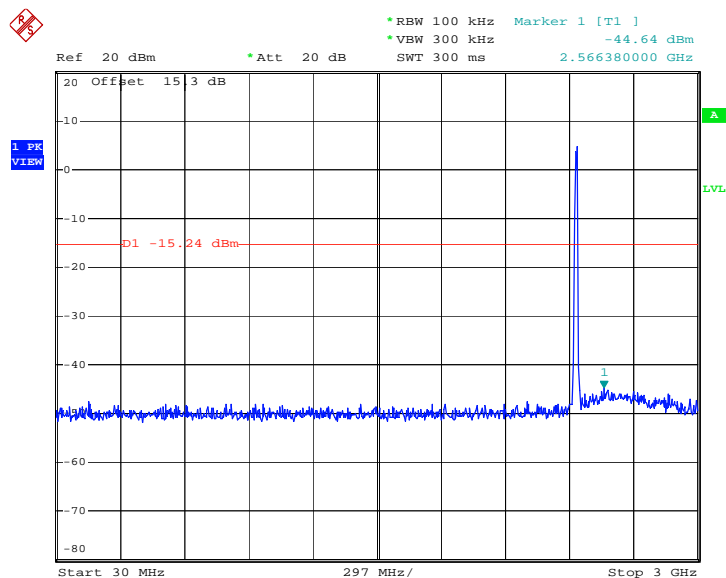


Date: 2.DEC.2011 17:02:45



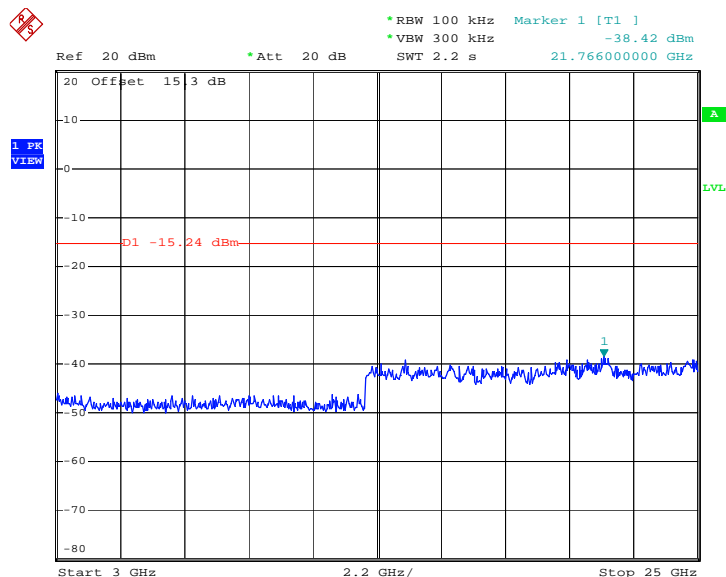
Test Mode :	Mode 2	Temperature :	24~25°C
Test Band :	802.11b	Relative Humidity :	46~47%
Test Channel :	06	Test Engineer :	Zhi Lu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 2.DEC.2011 17:16:44

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

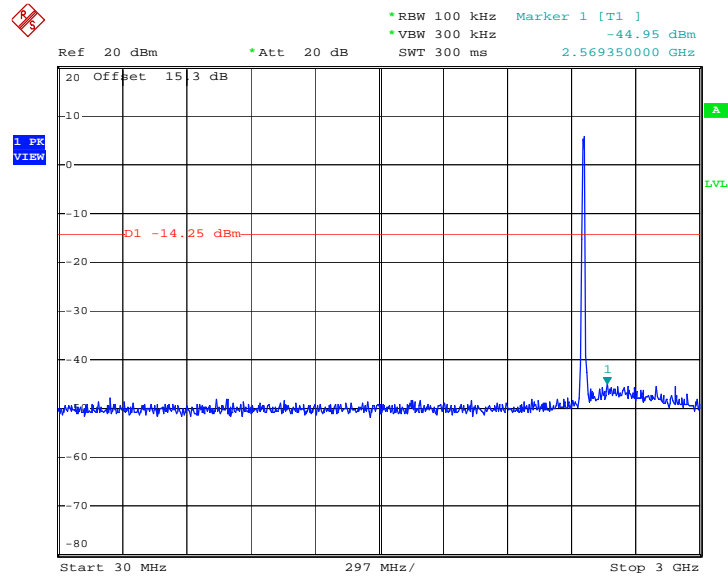


Date: 2.DEC.2011 17:17:01



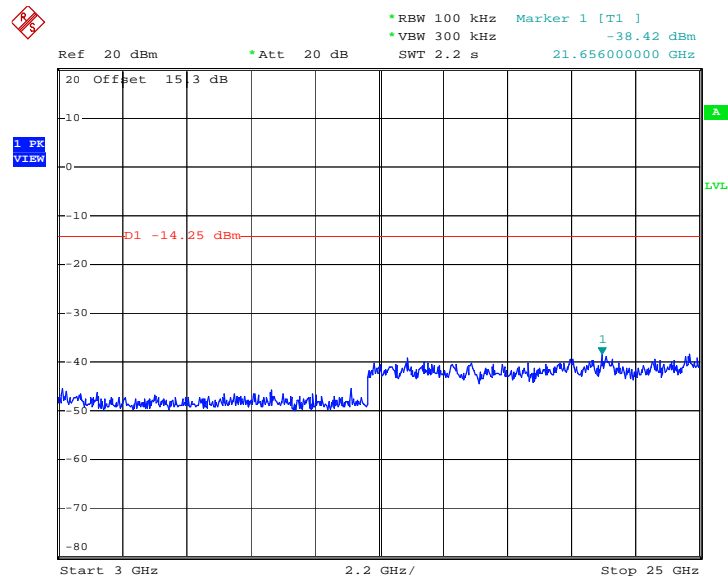
Test Mode :	Mode 3	Temperature :	24~25°C
Test Band :	802.11b	Relative Humidity :	46~47%
Test Channel :	11	Test Engineer :	Zhi Lu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 2.DEC.2011 17:33:02

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

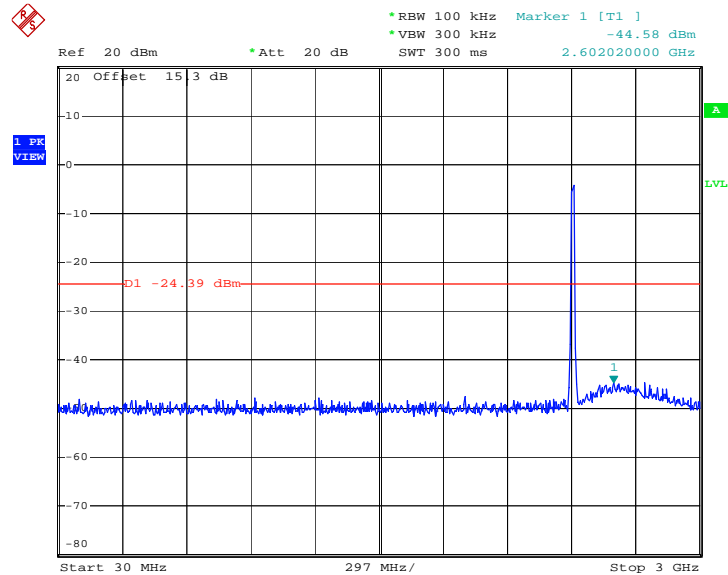


Date: 2.DEC.2011 17:33:18



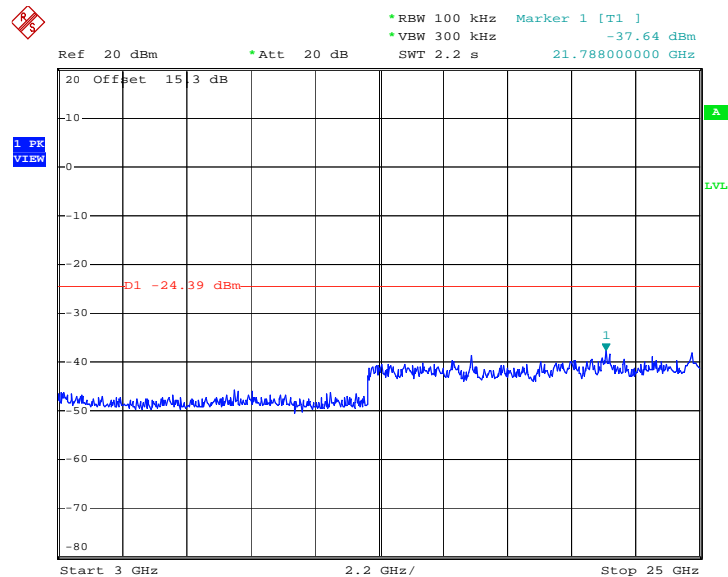
Test Mode :	Mode 4	Temperature :	24~25°C
Test Band :	802.11g	Relative Humidity :	46~47%
Test Channel :	01	Test Engineer :	Zhi Lu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 2.DEC.2011 18:06:59

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

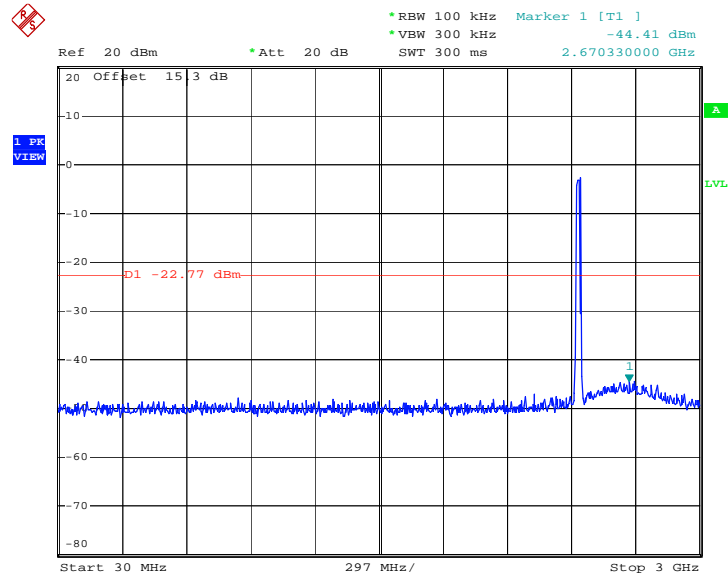


Date: 2.DEC.2011 18:07:16



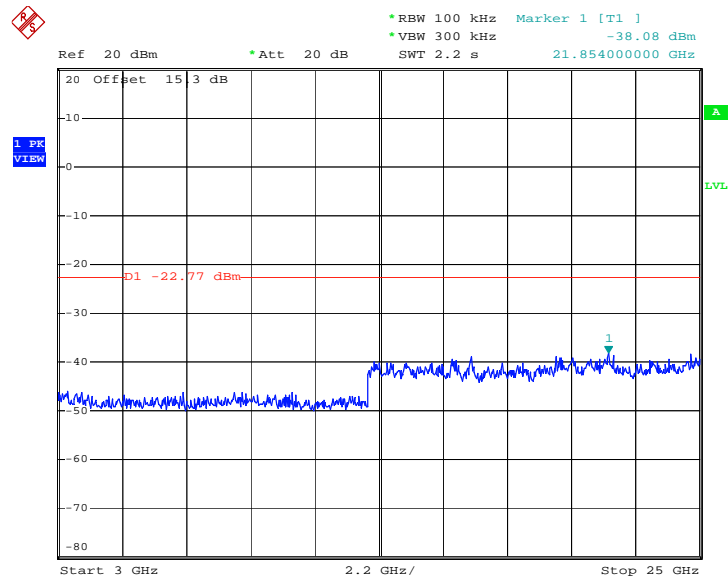
Test Mode :	Mode 5	Temperature :	24~25
Test Band :	802.11g	Relative Humidity :	46~47
Test Channel :	06	Test Engineer :	Zhi Lu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 2.DEC.2011 18:29:54

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

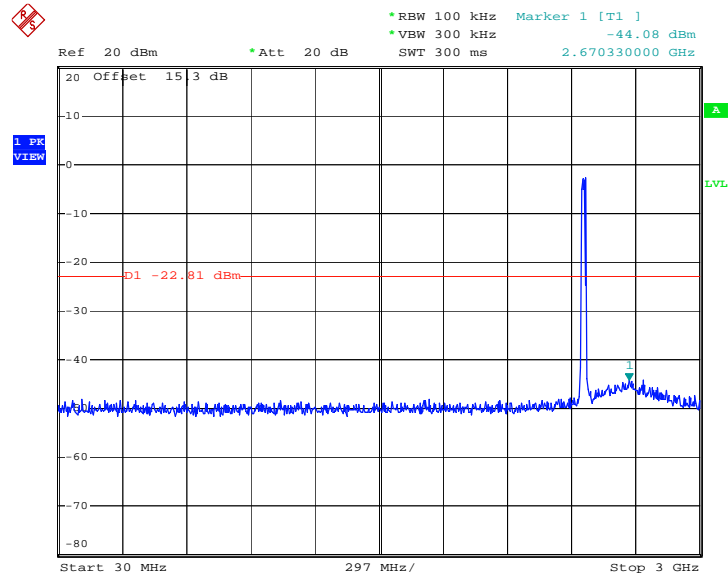


Date: 2.DEC.2011 18:30:11



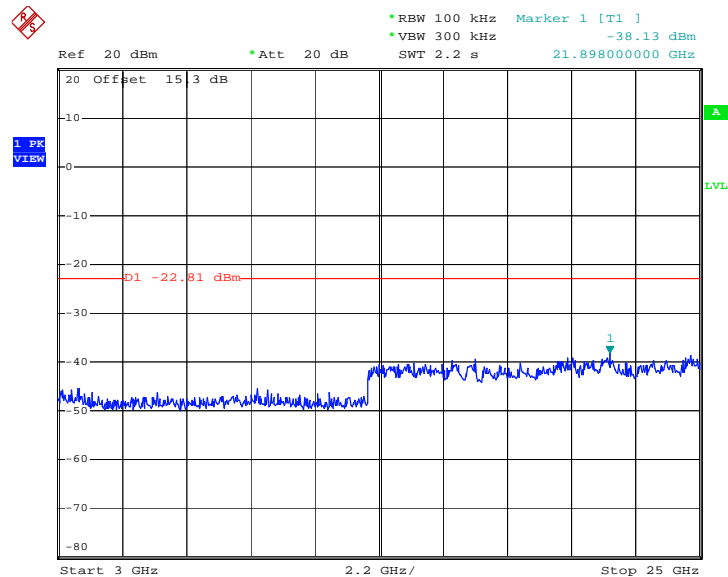
Test Mode :	Mode 6	Temperature :	24~25°C
Test Band :	802.11g	Relative Humidity :	46~47%
Test Channel :	11	Test Engineer :	Zhi Lu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 2.DEC.2011 18:46:23

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 2.DEC.2011 18:46:40

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.

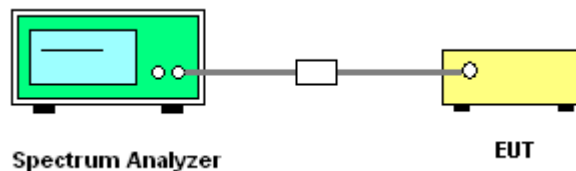
3.5.2 Measuring Instruments

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



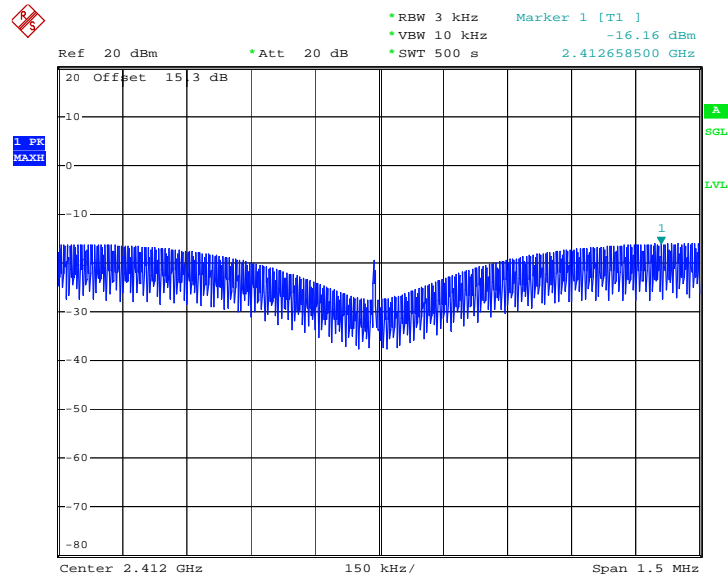


3.5.5 Test Result of Power Spectral Density

Test Mode :	Mode 1, 2, 3	Temperature :	24~25°C
Test Engineer :	Zhi Lu	Relative Humidity :	46~47%

Channel	Frequency (MHz)	802.11b Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-16.16	8	Pass
06	2437	-13.37	8	Pass
11	2462	-12.09	8	Pass

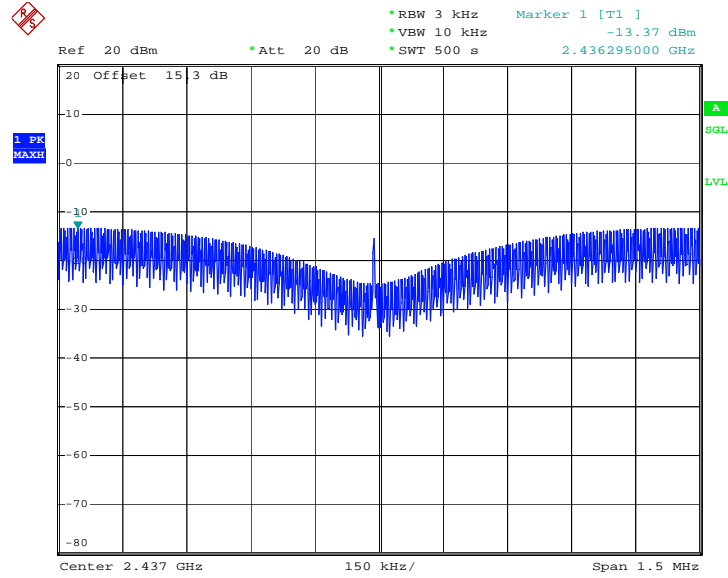
Mode 1 : PSD Plot on 802.11b Channel 01



Date: 2.DEC.2011 17:11:29

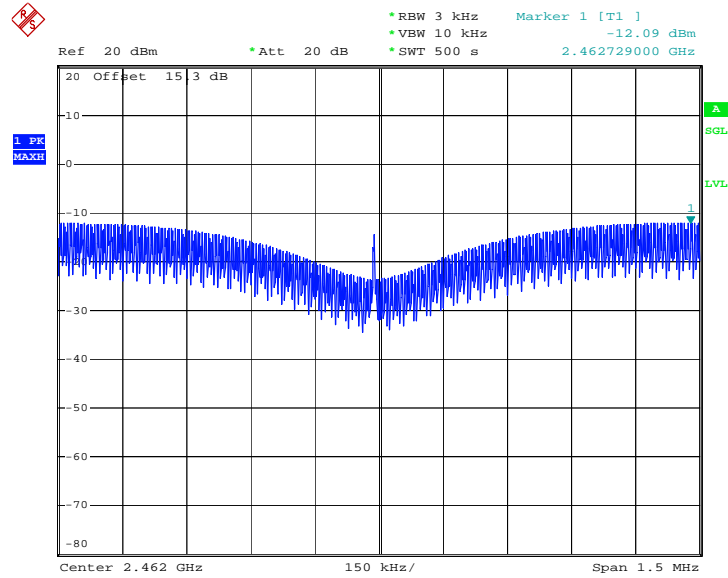


Mode 2 : PSD Plot on 802.11b Channel 06



Date: 2.DEC.2011 17:26:40

Mode 3 : PSD Plot on 802.11b Channel 11



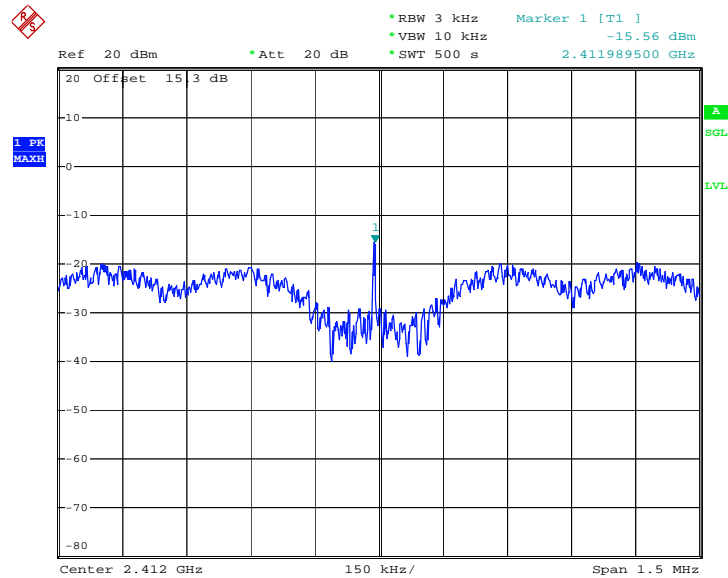
Date: 2.DEC.2011 17:58:03



Test Mode :	Mode 4, 5, 6	Temperature :	24~25°C
Test Engineer :	Zhi Lu	Relative Humidity :	46~47%

Channel	Frequency (MHz)	802.11g Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-15.56	8	Pass
06	2437	-12.48	8	Pass
11	2462	-13.61	8	Pass

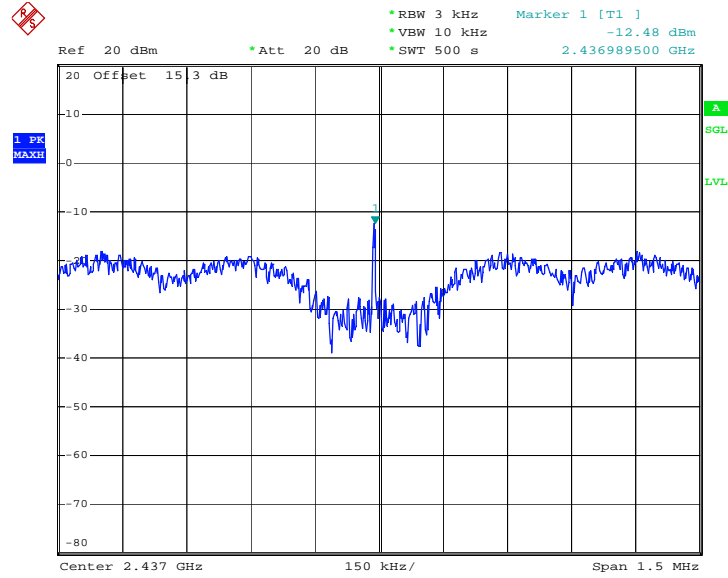
Mode 4 : PSD Plot on 802.11g Channel 01



Date: 2.DEC.2011 18:23:55

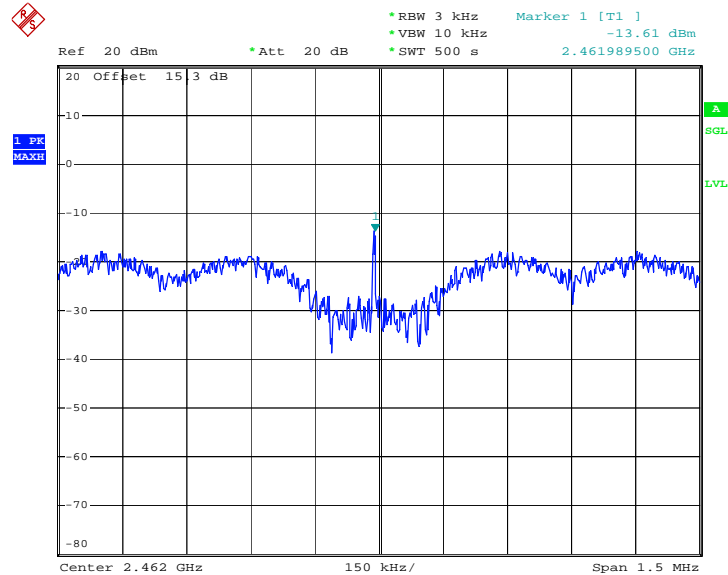


Mode 5 : PSD Plot on 802.11g Channel 06



Date: 2.DEC.2011 18:39:16

Mode 6 : PSD Plot on 802.11g Channel 11



Date: 2.DEC.2011 18:57:17

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.

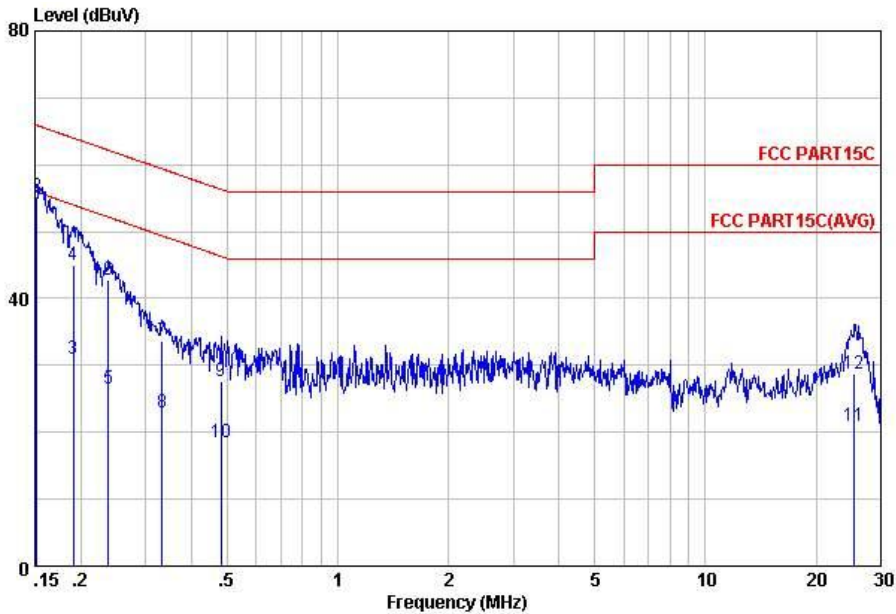
3.6.4 Test Setup





3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~21°C
Test Engineer :	Jack Li	Relative Humidity :	42~43%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + Adapter 4 + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



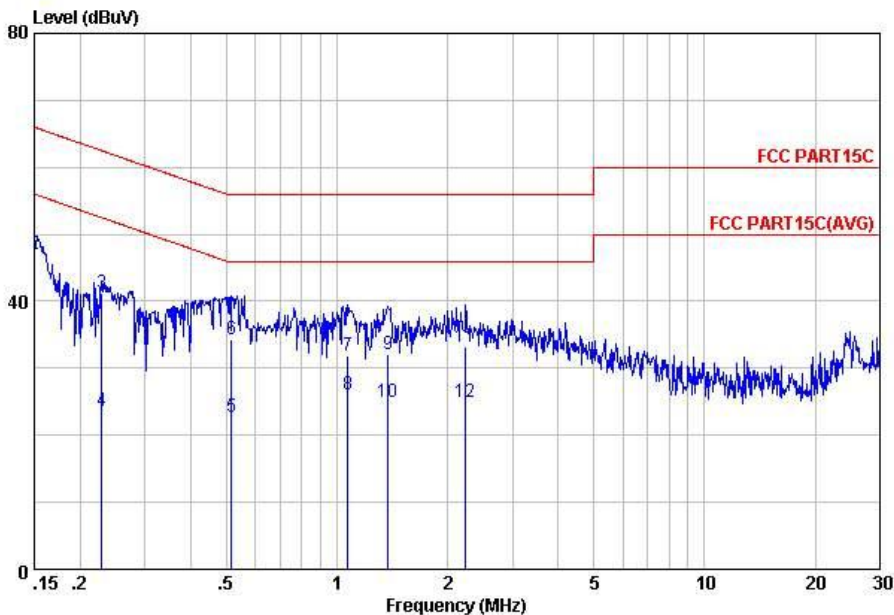
Site : C001-KS
 Condition: FCC PART15C LISN-100807 LINE
 Project : (FR) 172910
 mode : Mode 1

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.15	45.97	-9.94	55.91	35.90	-0.07	10.14	Average
2	0.15	55.27	-10.64	65.91	45.20	-0.07	10.14	QP
3	0.19	30.98	-23.04	54.02	20.90	-0.07	10.15	Average
4	0.19	45.08	-18.94	64.02	35.00	-0.07	10.15	QP
5	0.24	26.59	-25.58	52.17	16.50	-0.07	10.16	Average
6	0.24	42.69	-19.48	62.17	32.60	-0.07	10.16	QP
7	0.33	33.60	-25.80	59.40	23.50	-0.08	10.18	QP
8	0.33	23.00	-26.40	49.40	12.90	-0.08	10.18	Average
9	0.48	27.73	-28.59	56.32	17.60	-0.08	10.21	QP
10	0.48	18.53	-27.79	46.32	8.40	-0.08	10.21	Average
11	25.46	20.95	-29.05	50.00	10.09	0.20	10.66	Average
12	25.46	28.75	-31.25	60.00	17.89	0.20	10.66	QP



Test Mode :	Mode 1	Temperature :	20~21°C
Test Engineer :	Jack Li	Relative Humidity :	42~43%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + Adapter 4 + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

Data: 2



Site : C001-KS
 Condition: FCC PART15C LISN-100807 NEUTRAL
 Project : (FR) 172910
 mode : Mode 1

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.15	26.73	-39.27	66.00	16.68	-0.09	10.14	Average
2	0.15	46.98	-19.02	66.00	36.93	-0.09	10.14	QP
3	0.23	41.27	-21.21	62.48	31.18	-0.07	10.16	QP
4	0.23	23.65	-38.83	62.48	13.56	-0.07	10.16	Average
5	0.52	22.69	-33.31	56.00	12.56	-0.08	10.21	Average
6	0.52	34.23	-21.77	56.00	24.10	-0.08	10.21	QP
7	1.07	31.78	-24.22	56.00	21.60	-0.09	10.27	QP
8	1.07	25.98	-30.02	56.00	15.80	-0.09	10.27	Average
9	1.37	31.98	-24.02	56.00	21.79	-0.10	10.29	QP
10	1.37	25.01	-30.99	56.00	14.82	-0.10	10.29	Average
11	2.24	33.26	-22.74	56.00	23.03	-0.11	10.34	QP
12	2.24	24.93	-31.07	56.00	14.70	-0.11	10.34	Average

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

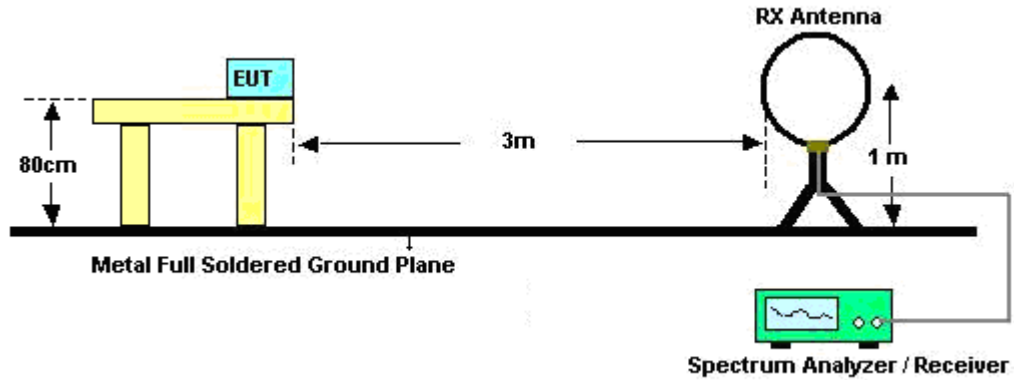
See list of measuring instruments of this test report.

3.7.3 Test Procedures

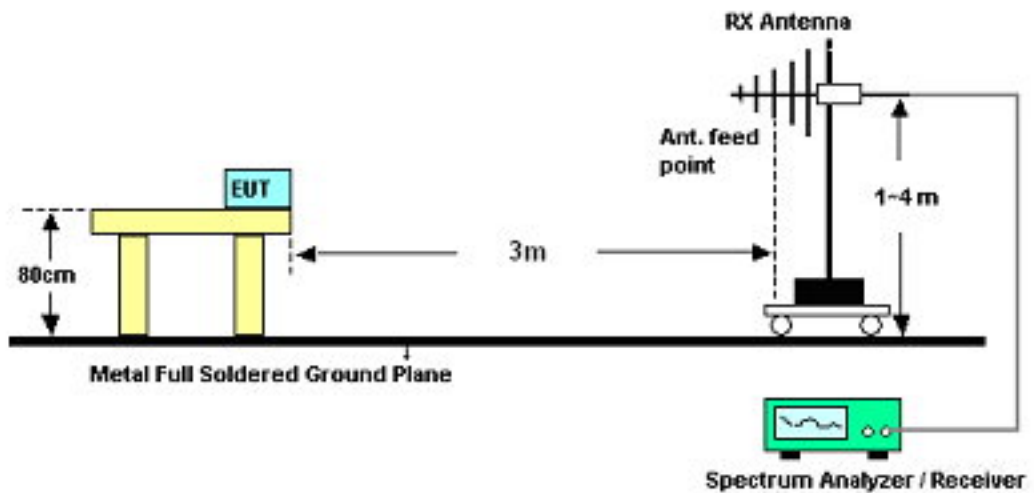
1. The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Use the following spectrum analyzer settings:
 - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz; VBW \geq RBW; Sweep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

3.7.4 Test Setup

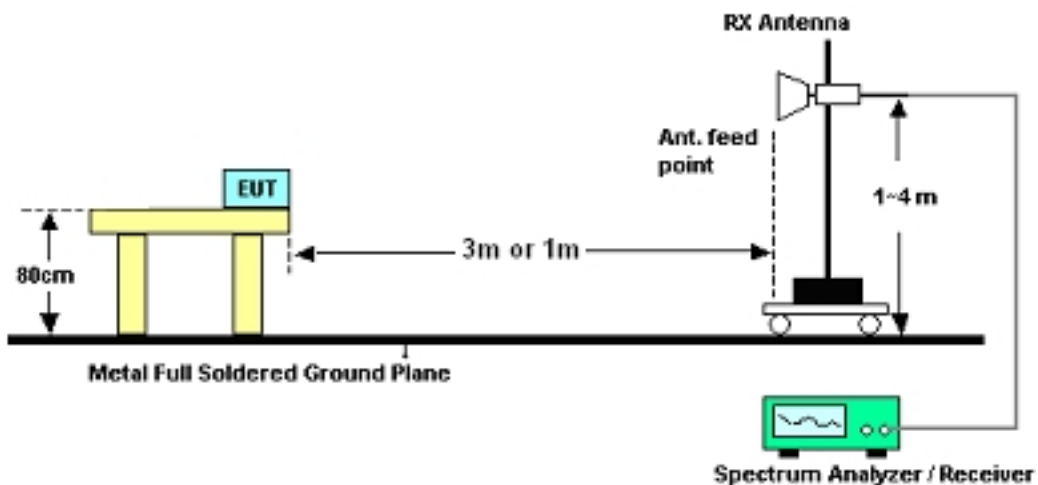
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

Test Engineer :	Jack Li	Temperature :	20~21°C	
		Relative Humidity :	41~42%	
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 :	20~21°C
Test Channel :	01	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
135.3	33.16	-10.34	43.5	51.46	11.21	0.48	29.99	-	-	Peak
238.44	33.33	-12.67	46	51.04	11.46	0.66	29.83	-	-	Peak
297.57	36.21	-9.79	46	52.47	12.97	0.72	29.95	-	-	Peak
519.8	37.9	-8.1	46	48.97	17.67	0.97	29.71	100	342	Peak
598.2	37.5	-8.5	46	47.45	18.6	1.07	29.62	-	-	Peak
659.1	35.71	-10.29	46	45.31	18.96	1.1	29.66	-	-	Peak
2386.38	54.94	-19.06	74	52.66	32.86	3.47	34.05	127	57	Peak
2386.38	43.52	-10.48	54	41.24	32.86	3.47	34.05	127	57	Average
2412	103.12	-	-	100.79	32.89	3.52	34.08	180	54	Average
2412	107.42	-	-	105.09	32.89	3.52	34.08	180	54	Peak
2483.5	56.46	-17.54	74	53.97	33.01	3.68	34.2	200	55	Peak
2483.5	43.14	-10.86	54	40.65	33.01	3.68	34.2	200	55	Average
4826	52.02	-21.98	74	44.15	35.17	4.97	32.27	100	0	Peak
4826	46.14	-7.86	54	38.27	35.17	4.97	32.27	100	0	Average



Test Mode :	Mode 1	Temperature :	20~21°C
Test Channel :	01	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
55.38	32.16	-7.84	40	55.8	6.2	0.29	30.13	102	360	QP
95.34	28.51	-14.99	43.5	48.28	9.8	0.4	29.97	-	-	Peak
233.31	39.25	-6.75	46	57.29	11.17	0.65	29.86	-	-	Peak
519.8	35.47	-10.53	46	46.54	17.67	0.97	29.71	-	-	Peak
659.1	34.71	-11.29	46	44.31	18.96	1.1	29.66	-	-	Peak
797.7	34.64	-11.36	46	43.13	19.85	1.25	29.59	-	-	Peak
2386.76	56.28	-17.72	74	54	32.86	3.47	34.05	160	360	Peak
2386.76	44.48	-9.52	54	42.2	32.86	3.47	34.05	160	360	Average
2412	105.54	-	-	103.21	32.89	3.52	34.08	153	0	Average
2412	109.83	-	-	107.5	32.89	3.52	34.08	153	0	Peak
2483.5	57.79	-16.21	74	55.3	33.01	3.68	34.2	176	360	Peak
2483.5	46.59	-7.41	54	44.1	33.01	3.68	34.2	176	360	Average
4826	57.97	-16.03	74	50.1	35.17	4.97	32.27	134	30	Peak
4826	50.6	-3.4	54	42.73	35.17	4.97	32.27	134	30	Average



Test Mode :	Mode 2	Temperature :	20~21°C
Test Channel :	06	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
136.38	31.62	-11.88	43.5	50.01	11.13	0.48	30	-	-	Peak
232.23	34.02	-11.98	46	52.22	11.04	0.64	29.88	-	-	Peak
297.3	35.11	-10.89	46	51.37	12.97	0.72	29.95	-	-	Peak
516.3	37.57	-8.43	46	48.77	17.55	0.97	29.72	194	0	Peak
657.7	36.16	-9.84	46	45.78	18.95	1.09	29.66	-	-	Peak
728.4	33.65	-12.35	46	42.43	19.67	1.16	29.61	-	-	Peak
2390	51.03	-22.97	74	48.75	32.86	3.47	34.05	100	0	Peak
2390	42.15	-11.85	54	39.87	32.86	3.47	34.05	100	0	Average
2437	101.91	-	-	99.51	32.95	3.6	34.15	177	47	Average
2437	109.13	-	-	106.73	32.95	3.6	34.15	177	47	Peak
2483.5	55.65	-18.35	74	53.16	33.01	3.68	34.2	100	52	Peak
2483.5	46.33	-7.67	54	43.84	33.01	3.68	34.2	100	52	Average
4876	52.56	-21.44	74	44.67	35.18	4.98	32.27	100	0	Peak
4876	46.65	-7.35	54	38.76	35.18	4.98	32.27	100	0	Average



Test Mode :	Mode 2	Temperature :	20~21°C
Test Channel :	06	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
55.65	33.18	-6.82	40	56.82	6.2	0.29	30.13	200	0	Peak
235.74	38.88	-7.12	46	56.79	11.29	0.65	29.85	-	-	Peak
291.9	34.75	-11.25	46	51.1	12.89	0.71	29.95	-	-	Peak
332.9	36.69	-9.31	46	51.79	14.05	0.79	29.94	-	-	Peak
728.4	36.46	-9.54	46	45.24	19.67	1.16	29.61	-	-	Peak
797.7	38.45	-7.55	46	46.94	19.85	1.25	29.59	-	-	Peak
2390	53.04	-20.96	74	50.76	32.86	3.47	34.05	100	0	Peak
2390	41.88	-12.12	54	39.6	32.86	3.47	34.05	100	0	Average
2437	105.6	-	-	103.2	32.95	3.6	34.15	100	357	Average
2437	109.91	-	-	107.51	32.95	3.6	34.15	100	357	Peak
2483.5	56.47	-17.53	74	53.98	33.01	3.68	34.2	100	0	Peak
2483.5	46.3	-7.7	54	43.81	33.01	3.68	34.2	100	0	Average
4874	56.91	-17.09	74	49.02	35.18	4.98	32.27	182	305	Peak
4874	48.25	-5.75	54	40.36	35.18	4.98	32.27	182	305	Average
7314	49.56	-24.44	74	41.81	36.2	6.6	35.05	100	0	Peak
7314	44.31	-9.69	54	36.56	36.2	6.6	35.05	100	0	Average



Test Mode :	Mode 3	Temperature :	20~21°C
Test Channel :	11	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
133.95	33.44	-10.06	43.5	51.56	11.39	0.48	29.99	-	-	Peak
240.33	35.7	-10.3	46	53.3	11.56	0.66	29.82	-	-	Peak
298.65	36.98	-9.02	46	53.22	12.99	0.72	29.95	164	328	Peak
518.4	34.14	-11.86	46	45.24	17.64	0.97	29.71	-	-	Peak
650	35.4	-10.6	46	45.06	18.9	1.09	29.65	-	-	Peak
660.5	35.26	-10.74	46	44.85	18.97	1.1	29.66	-	-	Peak
2390	52.94	-21.06	74	50.66	32.86	3.47	34.05	100	0	Peak
2390	42.26	-11.74	54	39.98	32.86	3.47	34.05	100	0	Average
2462	103.61	-	-	101.16	32.98	3.64	34.17	123	52	Average
2462	107.77	-	-	105.32	32.98	3.64	34.17	123	52	Peak
2487.84	57.93	-16.07	74	55.39	33.05	3.72	34.23	116	0	Peak
2487.84	43.68	-10.32	54	41.14	33.05	3.72	34.23	116	0	Average
4924	55.18	-18.82	74	47.26	35.19	4.99	32.26	100	107	Peak
4924	45.54	-8.46	54	37.62	35.19	4.99	32.26	100	107	Average
7386	52.63	-21.37	74	44.95	36.24	6.66	35.22	100	249	Peak
7386	44.65	-9.35	54	36.97	36.24	6.66	35.22	100	249	Average



Test Mode :	Mode 3	Temperature :	20~21°C
Test Channel :	11	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
49.98	35.84	-4.16	40	58.29	7.4	0.28	30.13	100	360	Peak
55.65	34.53	-5.47	40	58.17	6.2	0.29	30.13	-	-	Peak
226.29	34.54	-11.46	46	53.26	10.59	0.63	29.94	-	-	Peak
337.8	36.94	-9.06	46	51.88	14.2	0.8	29.94	-	-	Peak
659.1	35.01	-10.99	46	44.61	18.96	1.1	29.66	-	-	Peak
797.7	37.9	-8.1	46	46.39	19.85	1.25	29.59	-	-	Peak
2390	53.16	-20.84	74	50.88	32.86	3.47	34.05	100	70	Peak
2390	42.87	-11.13	54	40.59	32.86	3.47	34.05	100	70	Average
2462	109.3	-	-	106.85	32.98	3.64	34.17	100	360	Peak
2462	104.23	-	-	101.78	32.98	3.64	34.17	100	360	Average
2484.61	47.89	-6.11	54	45.4	33.01	3.68	34.2	100	354	Average
2484.61	58.08	-15.92	74	55.59	33.01	3.68	34.2	100	354	Peak
4924	60.2	-13.8	74	52.28	35.19	4.99	32.26	100	49	Peak
4924	50.84	-3.16	54	42.92	35.19	4.99	32.26	100	49	Average
7388	50.94	-23.06	74	43.26	36.24	6.66	35.22	100	0	Peak
7388	46.57	-7.43	54	38.89	36.24	6.66	35.22	100	0	Average



Test Mode :	Mode 4	Temperature :	20~21°C
Test Channel :	06	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
135.03	36.63	-6.87	43.5	54.84	11.3	0.48	29.99	102	122	Peak
146.64	34.9	-8.6	43.5	54.09	10.29	0.5	29.98	-	-	Peak
242.22	37.51	-8.49	46	55.02	11.66	0.66	29.83	-	-	Peak
377	36.21	-9.79	46	49.92	15.34	0.83	29.88	-	-	Peak
520.5	32.34	-13.66	46	43.37	17.7	0.98	29.71	-	-	Peak
962.2	32.48	-21.52	54	39.87	20.8	1.35	29.54	-	-	Peak
2389.23	52.12	-21.88	74	49.84	32.86	3.47	34.05	112	132	Peak
2389.23	39.96	-14.04	54	37.68	32.86	3.47	34.05	112	132	Average
2437	102.84	-	-	100.44	32.95	3.6	34.15	121	45	Peak
2437	101.84	-	-	99.44	32.95	3.6	34.15	121	45	Average
2485.94	53.21	-20.79	74	50.72	33.01	3.68	34.2	101	339	Peak
2485.94	41.48	-12.52	54	38.99	33.01	3.68	34.2	101	339	Average



Test Mode :	Mode 4	Temperature :	20~21°C
Test Channel :	06	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
56.19	34.34	-5.66	40	58.2	5.98	0.3	30.14	100	360	QP
147.72	31.24	-12.26	43.5	50.51	10.21	0.5	29.98	-	-	Peak
216.57	30.09	-15.91	46	49.64	9.83	0.61	29.99	-	-	Peak
519.8	33.19	-12.81	46	44.26	17.67	0.97	29.71	-	-	Peak
701.8	34.62	-11.38	46	43.89	19.32	1.13	29.72	-	-	Peak
797.7	38.58	-7.42	46	47.07	19.85	1.25	29.59	-	-	Peak
2388.28	56.13	-17.87	74	53.85	32.86	3.47	34.05	106	21	Peak
2388.28	41.95	-12.05	54	39.67	32.86	3.47	34.05	106	21	Average
2437	111.31	-	-	108.91	32.95	3.6	34.15	101	16	Peak
2437	106.39	-	-	103.99	32.95	3.6	34.15	101	16	Average
2485.75	59.26	-14.74	74	56.77	33.01	3.68	34.2	100	15	Peak
2485.75	46.55	-7.45	54	44.06	33.01	3.68	34.2	100	15	Average



Test Mode :	Mode 5	Temperature :	20~21°C
Test Channel :	01	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
137.73	29.01	-14.49	43.5	47.47	11.05	0.49	30	-	-	Peak
237.63	35.71	-10.29	46	53.49	11.4	0.65	29.83	-	-	Peak
296.22	36.17	-9.83	46	52.45	12.95	0.72	29.95	200	301	Peak
516.3	34.7	-11.3	46	45.9	17.55	0.97	29.72	-	-	Peak
658.4	35.27	-10.73	46	44.88	18.95	1.1	29.66	-	-	Peak
797.7	34.07	-11.93	46	42.56	19.85	1.25	29.59	-	-	Peak
2390	56.65	-17.35	74	54.37	32.86	3.47	34.05	100	36	Peak
2390	43.93	-10.07	54	41.65	32.86	3.47	34.05	100	36	Average
2412	105.41	-	-	103.08	32.89	3.52	34.08	100	52	Peak
2412	95.68	-	-	93.35	32.89	3.52	34.08	100	52	Average
2495.25	58.28	-15.72	74	55.74	33.05	3.72	34.23	100	166	Peak
2495.25	45.49	-8.51	54	42.95	33.05	3.72	34.23	100	166	Average



Test Mode :	Mode 5	Temperature :	20~21°C
Test Channel :	01	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
55.65	34.7	-5.3	40	58.34	6.2	0.29	30.13	200	355	Peak
234.66	39.99	-6.01	46	57.97	11.23	0.65	29.86	-	-	Peak
296.76	35.09	-10.91	46	51.36	12.96	0.72	29.95	-	-	Peak
309.8	36.5	-9.5	46	52.5	13.22	0.73	29.95	-	-	Peak
728.4	35.03	-10.97	46	43.81	19.67	1.16	29.61	-	-	Peak
797.7	37.28	-8.72	46	45.77	19.85	1.25	29.59	-	-	Peak
2390	55.54	-18.46	74	53.26	32.86	3.47	34.05	100	278	Peak
2390	42.72	-11.28	54	40.44	32.86	3.47	34.05	100	278	Average
2412	105.76	-	-	103.43	32.89	3.52	34.08	100	348	Peak
2412	96.05	-	-	93.72	32.89	3.52	34.08	100	348	Average
2499.43	57.38	-16.62	74	54.84	33.05	3.72	34.23	100	221	Peak
2499.43	43.86	-10.14	54	41.32	33.05	3.72	34.23	100	221	Average



Test Mode :	Mode 6	Temperature :	20~21°C
Test Channel :	06	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
55.92	32.67	-7.33	40	56.53	5.98	0.3	30.14	-	-	Peak
136.11	40.34	-3.16	43.5	58.64	11.21	0.48	29.99	176	360	Peak
223.32	41.27	-4.73	46	60.27	10.33	0.63	29.96	-	-	Peak
514.2	34.1	-11.9	46	45.35	17.5	0.97	29.72	-	-	Peak
650	33.99	-12.01	46	43.65	18.9	1.09	29.65	-	-	Peak
728.4	34.09	-11.91	46	42.87	19.67	1.16	29.61	-	-	Peak
2365.29	53.82	-20.18	74	51.61	32.81	3.38	33.98	110	360	Peak
2365.29	43.44	-10.56	54	41.23	32.81	3.38	33.98	110	360	Average
2437	106.88	-	-	104.48	32.95	3.6	34.15	102	348	Peak
2437	97.28	-	-	94.88	32.95	3.6	34.15	102	348	Average
2498.67	56.8	-17.2	74	54.26	33.05	3.72	34.23	100	338	Peak
2498.67	44.62	-9.38	54	42.08	33.05	3.72	34.23	100	338	Average



Test Mode :	Mode 6	Temperature :	20~21°C
Test Channel :	06	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
55.11	31.76	-8.24	40	55.4	6.2	0.29	30.13	100	54	QP
215.22	40.83	-2.67	43.5	60.44	9.77	0.61	29.99	-	-	Peak
230.34	41.3	-4.7	46	59.58	10.97	0.64	29.89	-	-	Peak
526.1	33.03	-12.97	46	43.86	17.89	0.98	29.7	-	-	Peak
728.4	35.61	-10.39	46	44.39	19.67	1.16	29.61	-	-	Peak
797.7	36.81	-9.19	46	45.3	19.85	1.25	29.59	-	-	Peak
2375.93	53.04	-20.96	74	50.8	32.83	3.42	34.01	116	310	Peak
2375.93	42.55	-11.45	54	40.31	32.83	3.42	34.01	116	310	Average
2437	107.41	-	-	105.01	32.95	3.6	34.15	132	286	Peak
2437	95.96	-	-	93.56	32.95	3.6	34.15	132	286	Average
2492.21	57.2	-16.8	74	54.66	33.05	3.72	34.23	147	7	Peak
2492.21	44.12	-9.88	54	41.58	33.05	3.72	34.23	147	7	Average



Test Mode :	Mode 7	Temperature :	20~21°C
Test Channel :	11	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
55.92	33.15	-6.85	40	57.01	5.98	0.3	30.14	-	-	Peak
135.57	39.78	-3.72	43.5	58.08	11.21	0.48	29.99	163	360	Peak
221.16	41.55	-4.45	46	60.73	10.17	0.62	29.97	-	-	Peak
519.8	33.79	-12.21	46	44.86	17.67	0.97	29.71	-	-	Peak
650	35.13	-10.87	46	44.79	18.9	1.09	29.65	-	-	Peak
797.7	33.72	-12.28	46	42.21	19.85	1.25	29.59	-	-	Peak
2372.7	53.1	-20.9	74	50.86	32.83	3.42	34.01	113	105	Peak
2372.7	42.85	-11.15	54	40.61	32.83	3.42	34.01	113	105	Average
2462	108.08	-	-	105.63	32.98	3.64	34.17	101	47	Peak
2462	97.76	-	-	95.31	32.98	3.64	34.17	101	47	Average
2486.7	63.31	-10.69	74	60.82	33.01	3.68	34.2	100	48	Peak
2486.7	47.35	-6.65	54	44.86	33.01	3.68	34.2	100	48	Average



Test Mode :	Mode 7	Temperature :	20~21°C
Test Channel :	11	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
35.94	35.82	-4.18	40	51.02	14.65	0.23	30.08	-	-	Peak
54.84	31.86	-8.14	40	55.5	6.2	0.29	30.13	102	32	QP
222.78	40.56	-5.44	46	59.56	10.33	0.63	29.96	-	-	Peak
339.2	37	-9	46	51.89	14.25	0.8	29.94	-	-	Peak
728.4	36.25	-9.75	46	45.03	19.67	1.16	29.61	-	-	Peak
797.7	38.13	-7.87	46	46.62	19.85	1.25	29.59	-	-	Peak
2368.33	53.02	-20.98	74	50.81	32.81	3.38	33.98	132	345	Peak
2368.33	42.88	-11.12	54	40.67	32.81	3.38	33.98	132	345	Average
2462	107.04	-	-	104.59	32.98	3.64	34.17	100	328	Peak
2462	97.39	-	-	94.94	32.98	3.64	34.17	100	328	Average
2484.04	63.66	-10.34	74	61.17	33.01	3.68	34.2	148	6	Peak
2484.04	48.96	-5.04	54	46.47	33.01	3.68	34.2	148	6	Average



Test Mode :	Mode 8	Temperature :	20~21°C
Test Channel :	11	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
56.19	25.09	-14.91	40	48.95	5.98	0.3	30.14	-	-	Peak
135.3	34.95	-8.55	43.5	53.25	11.21	0.48	29.99	134	360	Peak
242.76	36.98	-9.02	46	54.49	11.66	0.66	29.83	-	-	Peak
484.8	35.44	-10.56	46	47.28	16.97	0.94	29.75	-	-	Peak
519.8	36.04	-9.96	46	47.11	17.67	0.97	29.71	-	-	Peak
797.7	32.17	-13.83	46	40.66	19.85	1.25	29.59	-	-	Peak
2380.87	51.59	-22.41	74	49.35	32.83	3.42	34.01	164	360	Peak
2380.87	40.18	-13.82	54	37.94	32.83	3.42	34.01	164	360	Average
2462	102.29	-	-	99.84	32.98	3.64	34.17	101	340	Peak
2462	90.97	-	-	88.52	32.98	3.64	34.17	101	340	Average
2486.89	60.11	-13.89	74	57.62	33.01	3.68	34.2	100	339	Peak
2486.89	43.2	-10.8	54	40.71	33.01	3.68	34.2	100	339	Average



Test Mode :	Mode 8	Temperature :	20~21°C
Test Channel :	11	Relative Humidity :	41~42%
Test Engineer :	Jack Li	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
56.19	32.94	-7.06	40	56.8	5.98	0.3	30.14	100	298	QP
146.1	28.82	-14.68	43.5	48.01	10.29	0.5	29.98	-	-	Peak
246.54	31.03	-14.97	46	48.35	11.84	0.67	29.83	-	-	Peak
661.9	32.57	-13.43	46	42.16	18.97	1.1	29.66	-	-	Peak
728.4	33.33	-12.67	46	42.11	19.67	1.16	29.61	-	-	Peak
754.3	34.35	-11.65	46	42.81	19.9	1.18	29.54	-	-	Peak
2374.79	56.33	-17.67	74	54.09	32.83	3.42	34.01	113	311	Peak
2374.79	42.11	-11.89	54	39.87	32.83	3.42	34.01	113	311	Average
2462	109.93	-	-	107.48	32.98	3.64	34.17	124	18	Peak
2462	100.06	-	-	97.61	32.98	3.64	34.17	124	18	Average
2483.5	66.3	-7.7	74	63.81	33.01	3.68	34.2	100	337	Peak
2483.5	50.36	-3.64	54	47.87	33.01	3.68	34.2	100	337	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 PIFA 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	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Jan. 07, 2011	Dec. 02, 2011	Jan. 06, 2012	Conducted (TH01-KS)
System Simulator	R&S	CMU200	837587/066	Full-Band	Jan. 07, 2011	Dec. 02, 2011	Jan. 06, 2012	Conducted (TH01-KS)
DC Power Supply	TOPWARD	GPS-3030D	E1884515	N/A	Aug. 23, 2011	Dec. 02, 2011	Aug. 22, 2012	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	N/A	Jan. 17, 2011	Dec. 02, 2011	Jan. 16, 2012	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	Jun. 02, 2011	Dec. 07, 2011	Jun. 01, 2012	Conduction (CO01-KS)
LISN	MessTec	AN3016	60103	9kHz~30MHz	Jan. 07, 2011	Dec. 07, 2011	Jan. 06, 2012	Conduction (CO01-KS)
LISN	MessTec	AN3016	60105	9kHz~30MHz	Jan. 07, 2011	Dec. 07, 2011	Jan. 06, 2012	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	N/A	Nov. 16, 2011	Dec. 07, 2011	Nov. 15, 2012	Conduction (CO01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 09, 2011	Dec. 07, 2011	Nov. 08, 2012	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Jan. 07, 2011	Dec. 07, 2011	Jan. 06, 2012	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Nov. 16, 2011	Dec. 07, 2011	Nov. 15, 2012	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	860004/00	9 kHz~30 MHz	Jul. 28, 2011	Dec. 07, 2011	Jul. 27, 2012	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 07, 2011	Dec. 07, 2011	Jan. 06, 2012	Radiation (03CH01-KS)
Amplifier	Wireless	FPA-6592G	060004	30MHz~2GHz	Nov. 16, 2011	Dec. 07, 2011	Nov. 15, 2012	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Jan. 07, 2011	Dec. 07, 2011	Jan. 06, 2012	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701023	1GHz -18GHz	Nov. 07, 2011	Dec. 07, 2011	Nov. 06, 2012	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz -40GHz	Oct. 11, 2011	Dec. 07, 2011	Oct.10, 2012	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 $U_c(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26		

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

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

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

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



Appendix A. Photographs of EUT

Please refer to Sporton report number EP172910 as below.