

FCC RF Test Report

APPLICANT : D-Link Co.
EQUIPMENT : HSUPA 3.75G Mobile Communication Router
BRAND NAME : D-Link
MODEL NAME : DIR-455U
FCC ID : KA2IR455UA1
Q78-ZTEMF210V (Contain WWAN Module)
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : Digital Transmission System (DTS)

The product was received on Oct. 15, 2010 and completely tested on Nov. 27, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

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

Reviewed by:



Anderson Chiu / Deputy Manager



SPORTON INTERNATIONAL INC.

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



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR001547	Rev. 01	Initial issue of report	Dec. 03, 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	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	A8.4	Power Output	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(d)	A8.5	Frequency Band Edges	$\leq 20\text{dBc}$	Pass	-
3.4	15.247(d)	A8.5	Spurious Emission	$< 20\text{ dBc}$	Pass	-
3.5	15.247(e)	A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}$	Pass	-
3.6	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 8.2 dB at 23.126 MHz
3.7	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 5.5 dB at 71.04 MHz
3.8	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

D-Link Co.

No. 289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan

1.2 Manufacturer

Advance Multimedia Internet Technology Inc.

No. 28, Lane 31, Sec. 1, Huandong Rd., Sinshih Township, Tainan County 74146, Taiwan

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	HSUPA 3.75G Mobile Communication Router
Brand Name	D-Link
Model Name	DIR-455U
FCC ID	KA2IR455UA1 Q78-ZTEMF210V (Contain WWAN Module)
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 : 18.78 dBm (0.076 W) 802.11g : 21.09 dBm (0.129 W)
Antenna Type	PIFA Antenna with gain 2.83 dBi
HW Version	A1
SW Version	V1.00
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g : OFDM (BPSK / QPSK / 16QAM / 64QAM)
EUT Stage	Production Unit

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Transmission System (DTS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH06-HY	722060/4086B-1

1.5 Applied Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 (Measurement Guidelines of DTS)
- ♦ ANSI C63.4-2003
- ♦ IC RSS-210 Issue 7

Remark:

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

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Phone	HTT	HTT-198	N/A	N/A	N/A

2 Test Configuration of Equipment Under Test

2.1 RF Power

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

Channel	Frequency	2.4GHz 802.11b RF Power (dBm)			
		DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	18.78	18.75	18.74	18.76
CH 06	2437 MHz	18.06	-	-	-
CH 11	2462 MHz	18.24	-	-	-

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	21.09	20.01	21.05	21.01	21.07	20.96	20.99	20.93
CH 06	2437 MHz	20.20	-	-	-	-	-	-	-
CH 11	2462 MHz	20.65	-	-	-	-	-	-	-

Remark:

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

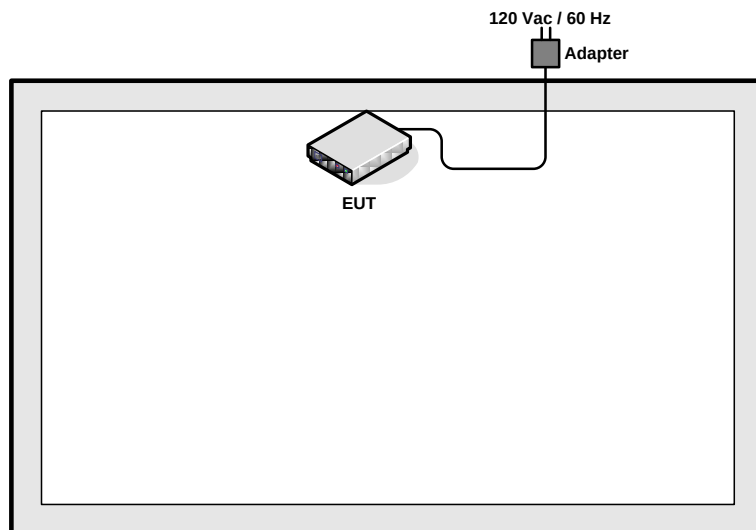
The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz), radiated emission (30 MHz to the 10th harmonic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

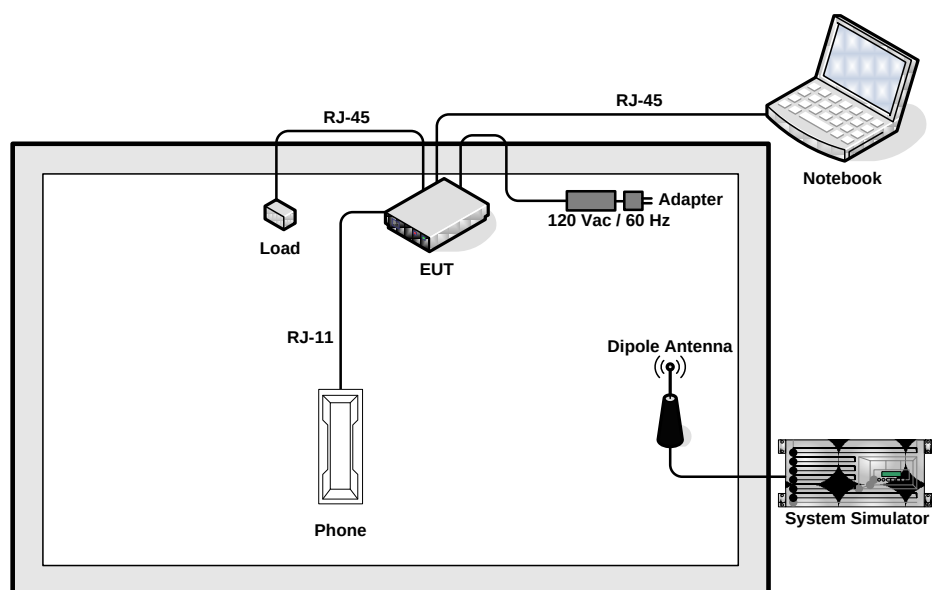
Test Cases		
Test Item	802.11b	802.11g
Conducted TCs	Mode 1 : 802.11b CH01_2412 MHz	Mode 4 : 802.11g CH01_2412 MHz
	Mode 2 : 802.11b CH06_2437 MHz	Mode 5 : 802.11g CH06_2437 MHz
	Mode 3 : 802.11b CH11_2462 MHz	Mode 6 : 802.11g CH11_2462 MHz
Radiated TCs	Mode 1 : 802.11b CH01_2412 MHz	Mode 4 : 802.11g CH01_2412 MHz
	Mode 2 : 802.11b CH06_2437 MHz	Mode 5 : 802.11g CH06_2437 MHz
	Mode 3 : 802.11b CH11_2462 MHz	Mode 6 : 802.11g CH11_2462 MHz
AC Conducted Emission	Mode 1 : GSM850 Idle + WLAN Link + RJ-45 Link + Adapter + RJ-11 Idle	

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 notebook 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.

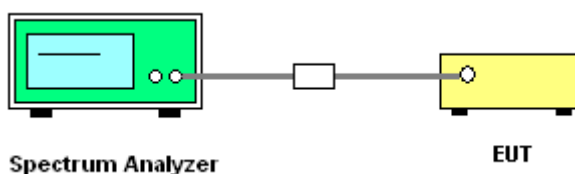
3.1.2 Measuring Instruments

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

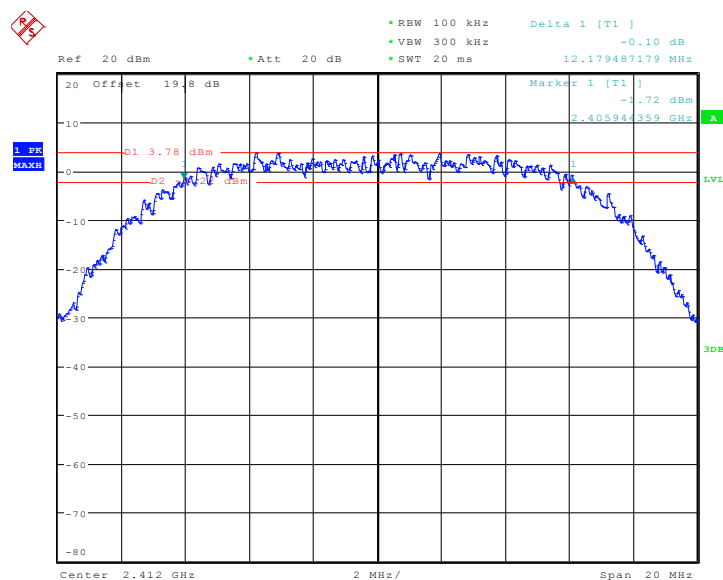


3.1.5 Test Result of 6dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	12.18	0.5	Pass
06	2437	12.16	0.5	Pass
11	2462	12.18	0.5	Pass

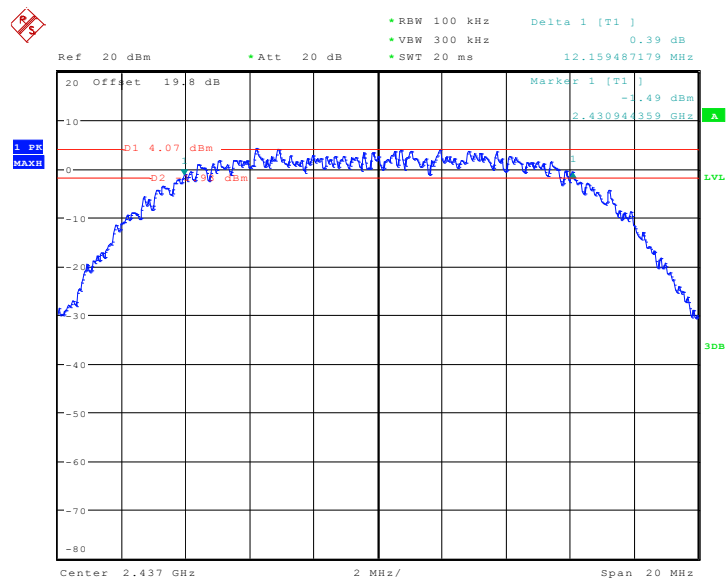
Mode 1 : 6 dB Bandwidth Plot on 802.11b Channel 01



Date: 25.NOV.2010 18:06:23

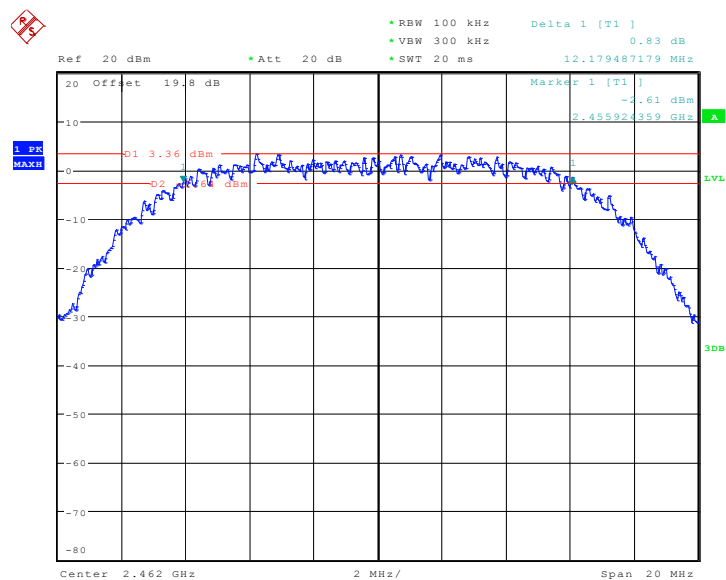


Mode 2 : 6 dB Bandwidth Plot on 802.11b Channel 06



Date: 25.NOV.2010 18:28:45

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



Date: 25.NOV.2010 18:41:25



Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.44	0.5	Pass
06	2437	16.43	0.5	Pass
11	2462	16.44	0.5	Pass

1.95
MAX

Ref 20 dBm • Att 20 dB • RBW 100 kHz Delta 1 {T1} 0.04 dB
 • VBW 300 kHz • SWT 20 ms 16.442307692 MHz

20 Offset 19.8 dB Marker 1 {T1} -0.27 dBm 2.40381333 GHz

-10 -0.1 -1.57 dBm -0.2 -1.57 dBm 1

-20 1

-30 1

-40 1

-50 1

-60 1

-70 1

-80 1

Center 2.412 GHz 2 MHz/ Span 20 MHz

Date: 25.NOV.2010 19:19:11



The screenshot shows a Spectrum Analyzer interface with the following details:

- Top Left:** A red square icon with a white 'X' and a blue square icon with a white 'X'.
- Top Right:**
 - Delta 1 [T1] 0.98 dB
 - 16.43435974 MHz
- Settings (Top Center):**
 - Ref 20 dBm
 - Att 20 dB
 - RBW 100 kHz
 - VBW 300 kHz
 - SWT 20 ms
- Grid and Signal:**
 - The grid has a vertical center line at 2.437 GHz and a horizontal reference line at -10 dBm.
 - A blue trace shows a noisy signal with a sharp dip at the center frequency.
 - Red horizontal lines are at -10 dBm and -20 dBm.
 - Blue horizontal lines are at -10 dBm and -20 dBm.
- Bottom:**
 - Center 2.437 GHz
 - 2 MHz/
 - Span 20 MHz
- Other Labels:**
 - Marker 1 [T1] -1.75 dBm 2.42881795 GHz
 - 1. PK
 - MAXH
 - LVL
 - 3DB

Date: 25.NOV.2010 19:35:39

Ref 20 dBm • Att 20 dB • RBW 100 kHz Delta 1 [T1] -0.01 dB
 • VBW 300 kHz • SWT 20 ms 16.443846154 MHz

20 Offset 19.8 dB Marker 1 [T1] -0.41 dBm 2.45381795 GHz

1. VSW MAXH

Center 2.462 GHz 2 MHz/ Span 20 MHz

Date: 25.NOV.2010 19:47:39

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.

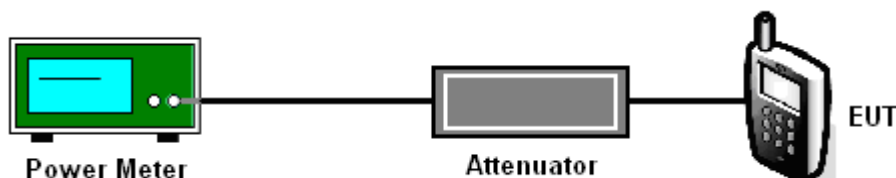
3.2.2 Measuring Instruments

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 :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	18.78	30	Pass
06	2437	18.06	30	Pass
11	2462	18.24	30	Pass

Test Mode :	Mode 4, 5, 6	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	21.09	30	Pass
06	2437	20.20	30	Pass
11	2462	20.65	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

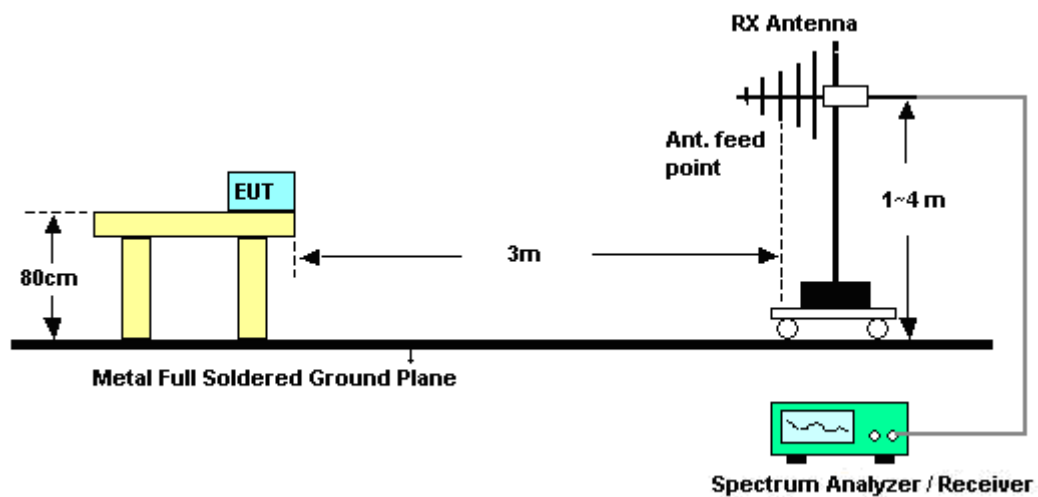
See list of measuring instruments of this test report.

3.3.3 Test Procedures

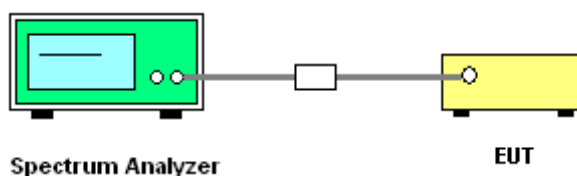
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW) $\geq$ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized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

Test Mode :	Mode 1	Temperature :	21~23℃
Test Band :	802.11b	Relative Humidity :	45~47%
Test Channel :	01	Test Engineer :	Elvis Chen

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
2388.66	59.22	-14.78	74	57.21	32.48	3.92	34.39	100	125	Peak
2388.66	46.81	-7.19	54	44.8	32.48	3.92	34.39	100	125	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.99	56.51	-17.49	74	54.5	32.48	3.92	34.39	100	116	Peak
2389.99	43.81	-10.19	54	41.8	32.48	3.92	34.39	100	116	Average

Test Mode :	Mode 3	Temperature :	21~23℃
Test Band :	802.11b	Relative Humidity :	45~47%
Test Channel :	11	Test Engineer :	Elvis Chen

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	59.42	-14.58	74	57.16	32.58	4.05	34.37	100	124	Peak
2483.5	47.85	-6.15	54	45.59	32.58	4.05	34.37	100	124	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
2485.18	58.96	-15.04	74	56.7	32.58	4.05	34.37	100	119	Peak
2485.18	46.83	-7.17	54	44.57	32.58	4.05	34.37	100	119	Average



Test Mode :	Mode 4	Temperature :	21~23℃
Test Band :	802.11g	Relative Humidity :	45~47%
Test Channel :	01	Test Engineer :	Elvis Chen

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.61	59.69	-14.31	74	57.68	32.48	3.92	34.39	100	123	Peak
2389.61	45.43	-8.57	54	43.42	32.48	3.92	34.39	100	123	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.42	56.68	-17.32	74	54.67	32.48	3.92	34.39	100	117	Peak
2389.42	42.44	-11.56	54	40.43	32.48	3.92	34.39	100	117	Average

Test Mode :	Mode 6	Temperature :	21~23℃
Test Band :	802.11g	Relative Humidity :	45~47%
Test Channel :	11	Test Engineer :	Elvis Chen

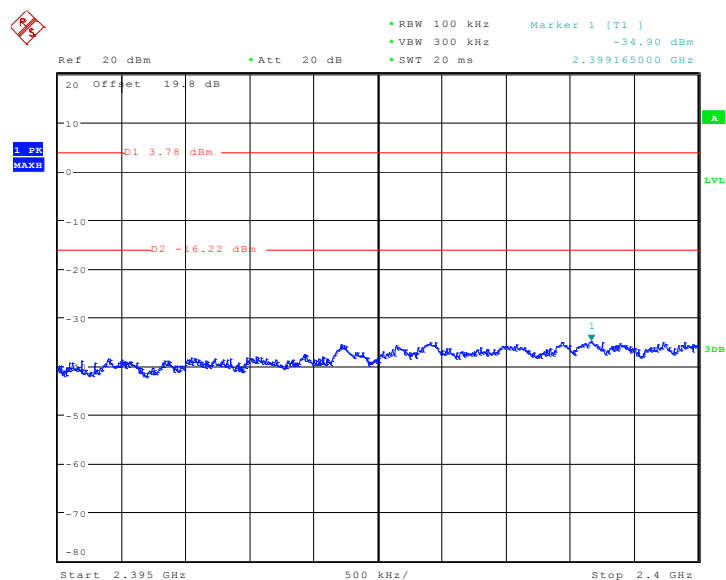
ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	60.18	-13.82	74	57.92	32.58	4.05	34.37	100	124	Peak
2483.5	44.85	-9.15	54	42.59	32.58	4.05	34.37	100	124	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	59.3	-14.7	74	57.04	32.58	4.05	34.37	100	119	Peak
2483.5	43.62	-10.38	54	41.36	32.58	4.05	34.37	100	119	Average

3.3.6 Test Plots of Conducted Band Edges

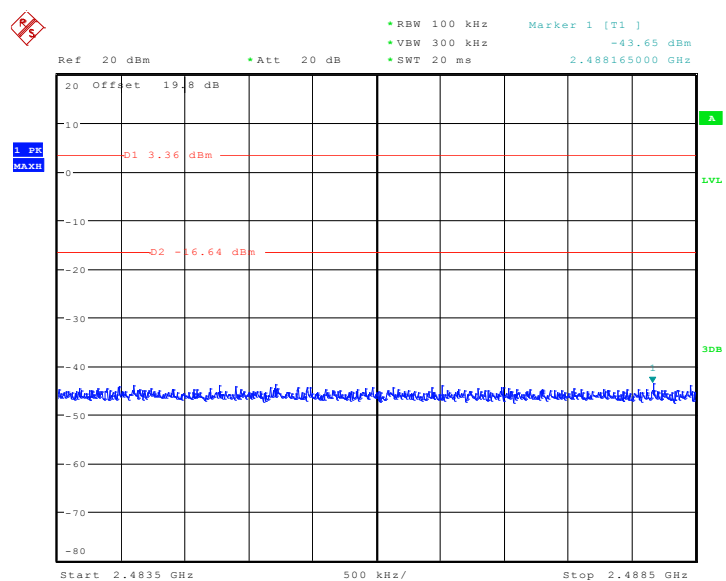
Test Mode :	Mode 1 and 3	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Alan Liu

Low Band Edge Plot on 802.11b Channel 01



Date: 25.NOV.2010 18:08:19

High Band Edge Plot on 802.11b Channel 11

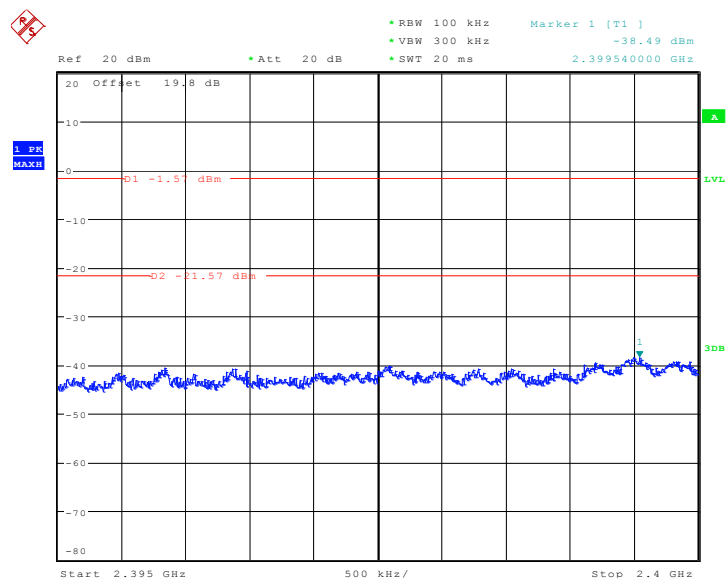


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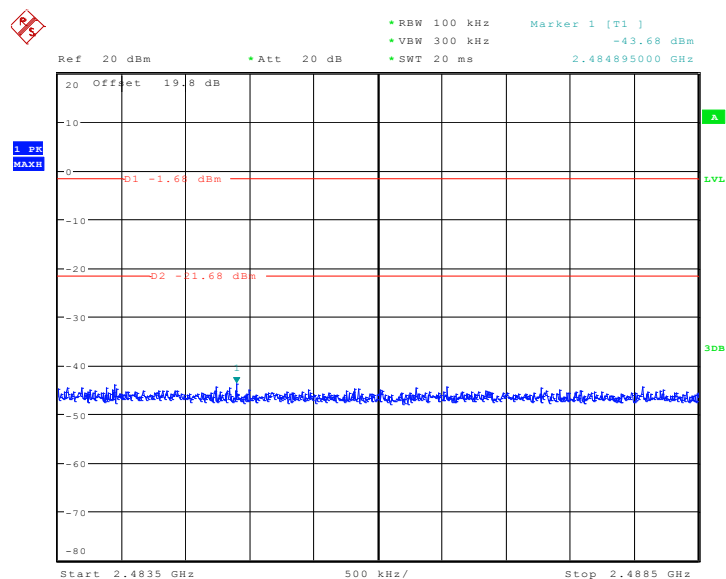
Test Mode :	Mode 4 and 6	Temperature :	24~26℃
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Alan Liu

Low Band Edge Plot on 802.11g Channel 01



Date: 25.NOV.2010 19:20:51

High Band Edge Plot on 802.11g Channel 11



Date: 25.NOV.2010 19:48:46

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.

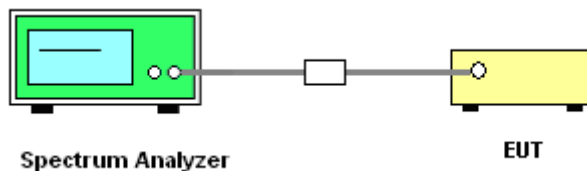
3.4.2 Measuring Instruments

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) $\geq$ 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.

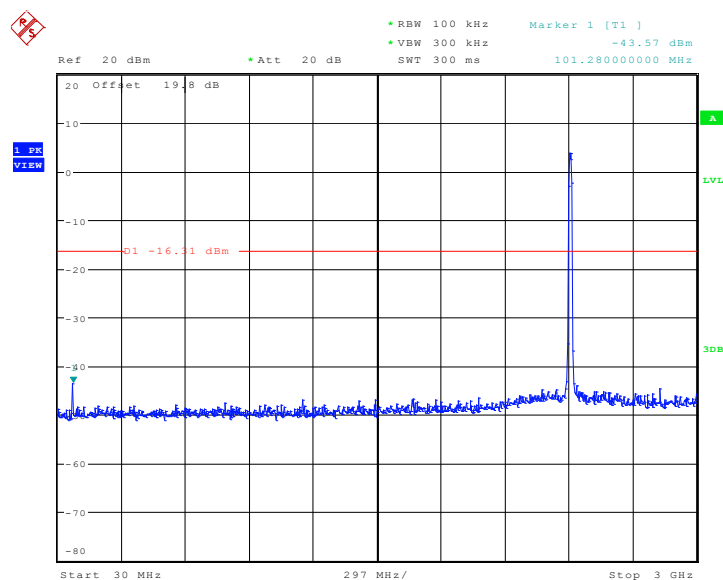
3.4.4 Test Setup



3.4.5 Test Plots of Spurious Emission

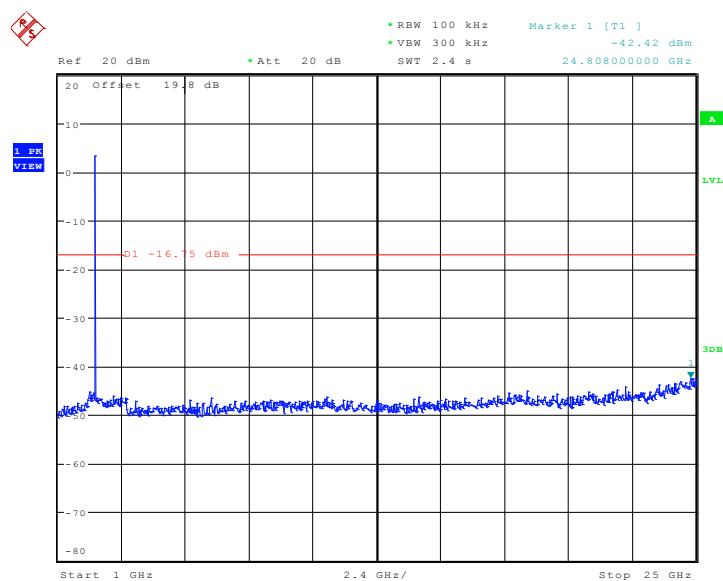
Test Mode :	Mode 1	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30 MHz ~ 3 GHz



Date: 25.NOV.2010 18:16:48

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz

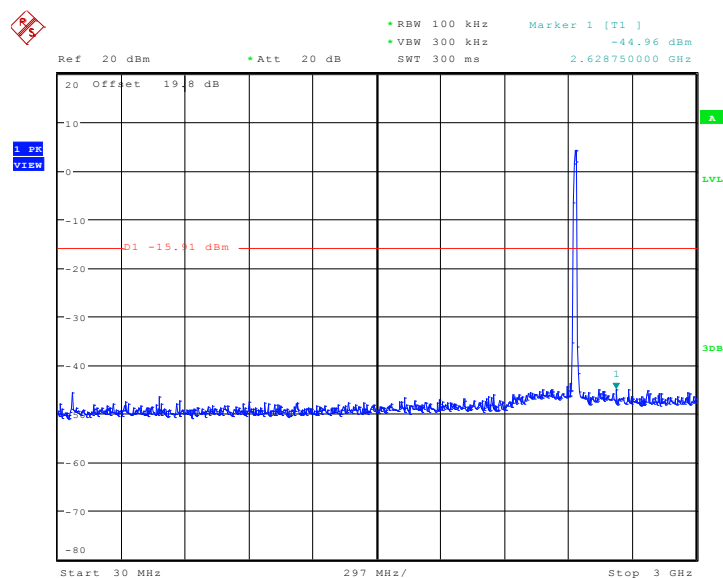


Date: 25.NOV.2010 18:17:05



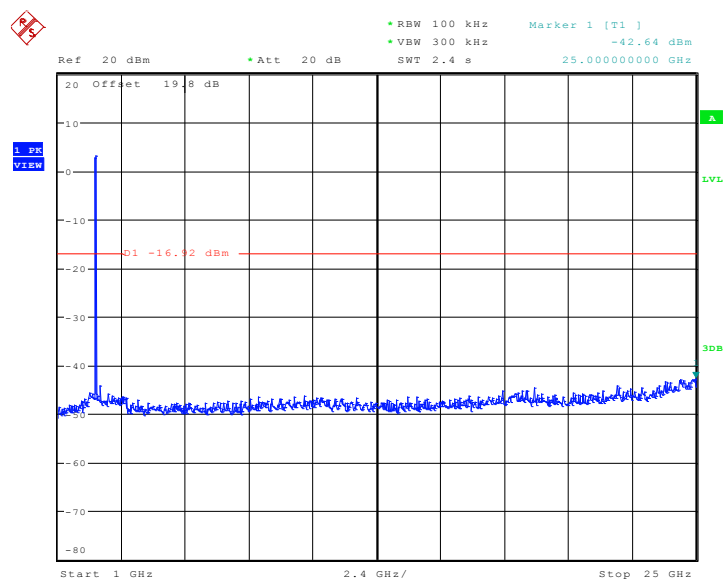
Test Mode :	Mode 2	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30 MHz ~ 3 GHz



Date: 25.NOV.2010 18:38:30

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz

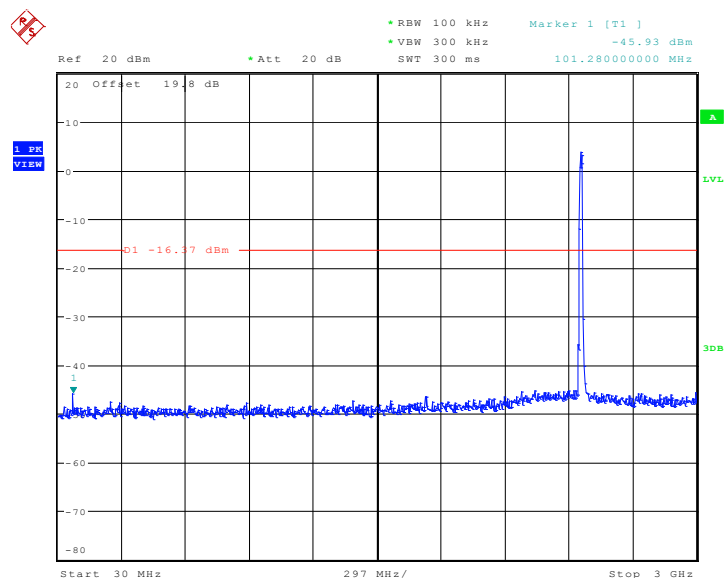


Date: 25.NOV.2010 18:38:46



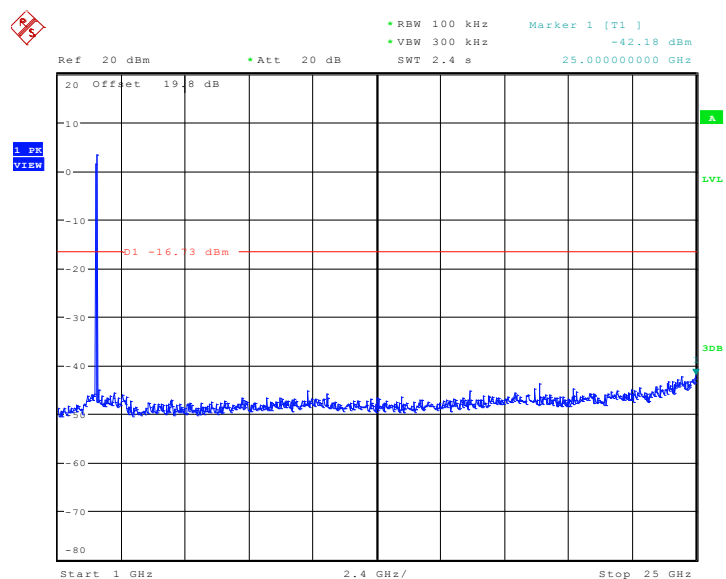
Test Mode :	Mode 3	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30 MHz ~ 3 GHz



Date: 25.NOV.2010 18:43:21

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz

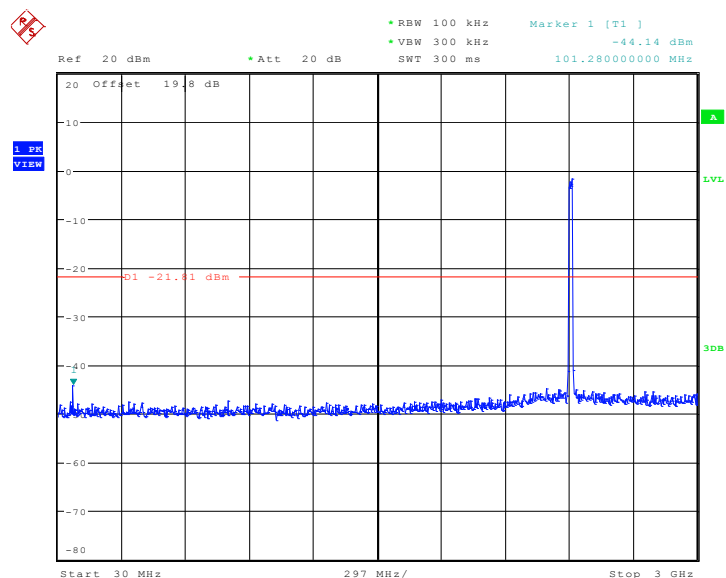


Date: 25.NOV.2010 18:43:37



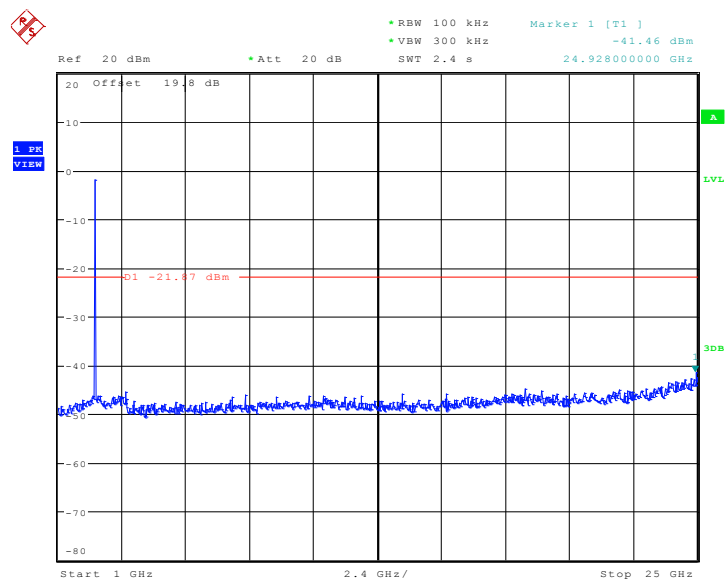
Test Mode :	Mode 4	Temperature :	24~26°C
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30 MHz ~ 3 GHz



Date: 25.NOV.2010 19:23:44

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz

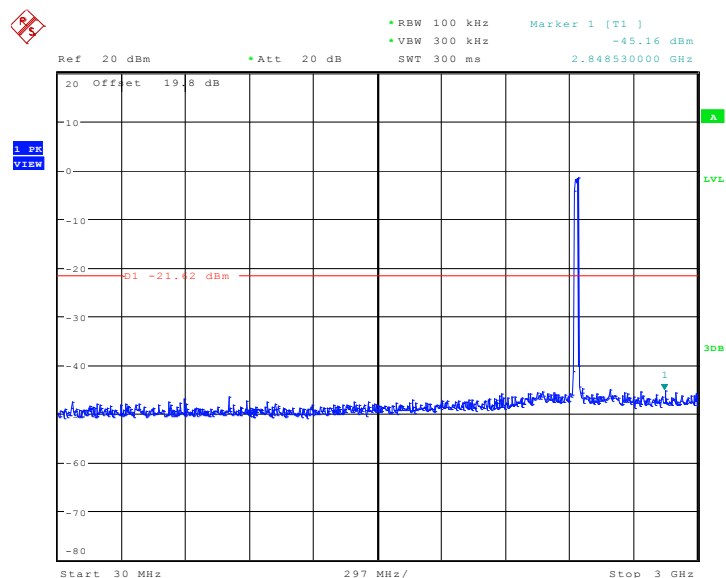


Date: 25.NOV.2010 19:24:01



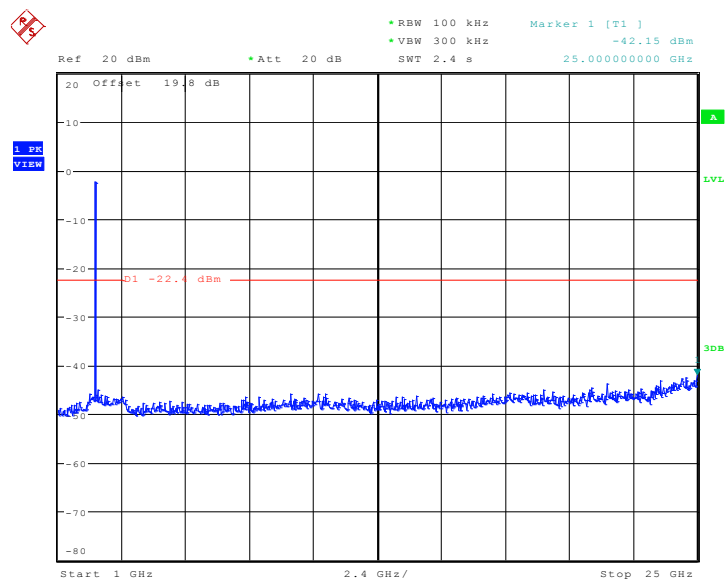
Test Mode :	Mode 5	Temperature :	24~26°C
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30 MHz ~ 3 GHz



Date: 25.NOV.2010 19:36:41

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz

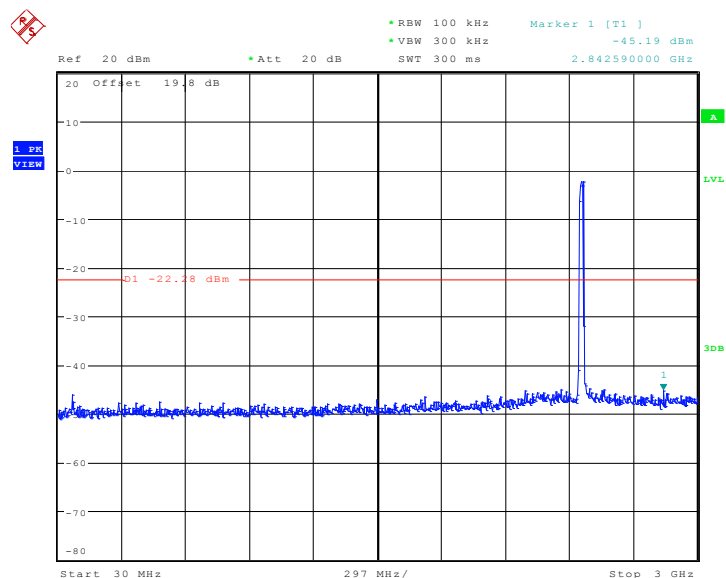


Date: 25.NOV.2010 19:36:58



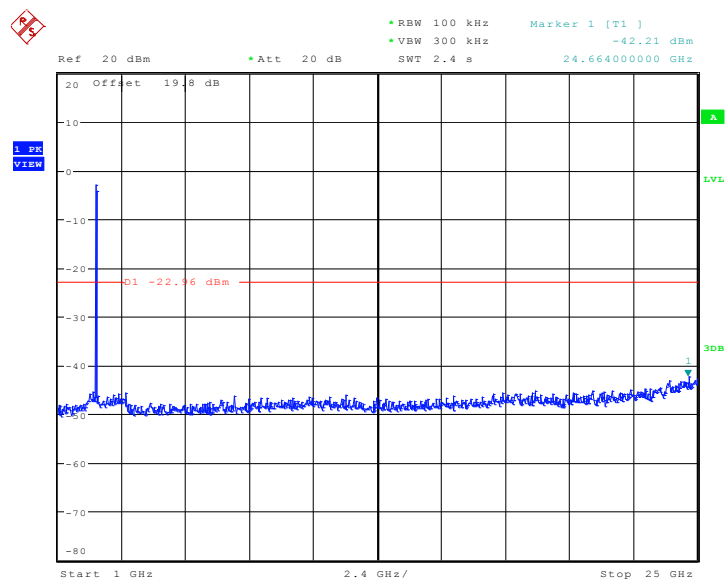
Test Mode :	Mode 6	Temperature :	24~26°C
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30 MHz ~ 3 GHz



Date: 25.NOV.2010 19:49:32

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 25.NOV.2010 19:49:49

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.

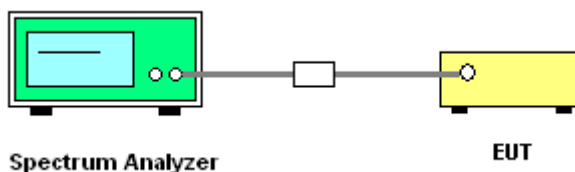
3.5.2 Measuring Instruments

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

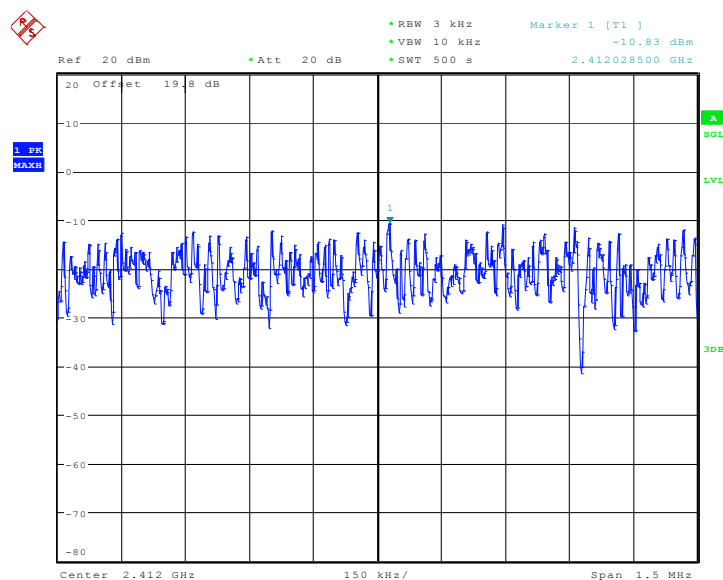


3.5.5 Test Result of Power Spectral Density

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-10.83	8	Pass
06	2437	-10.51	8	Pass
11	2462	-11.34	8	Pass

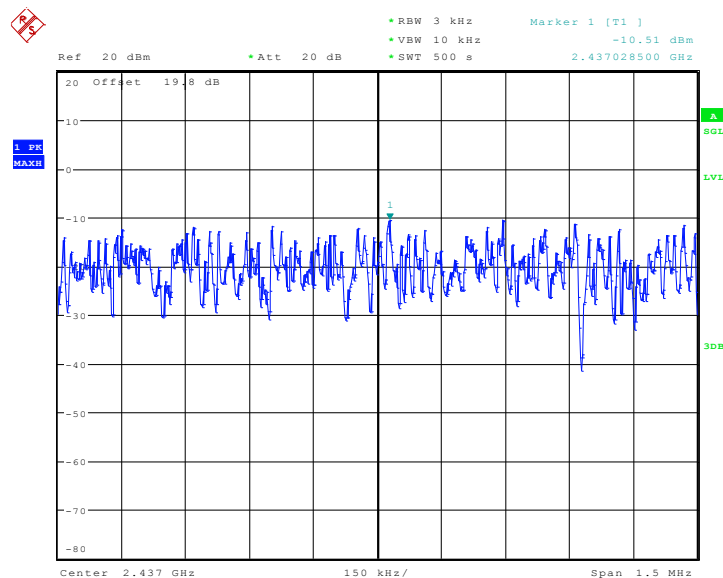
Mode 1 : PSD Plot on 802.11b Channel 01



Date: 25.NOV.2010 18:25:26

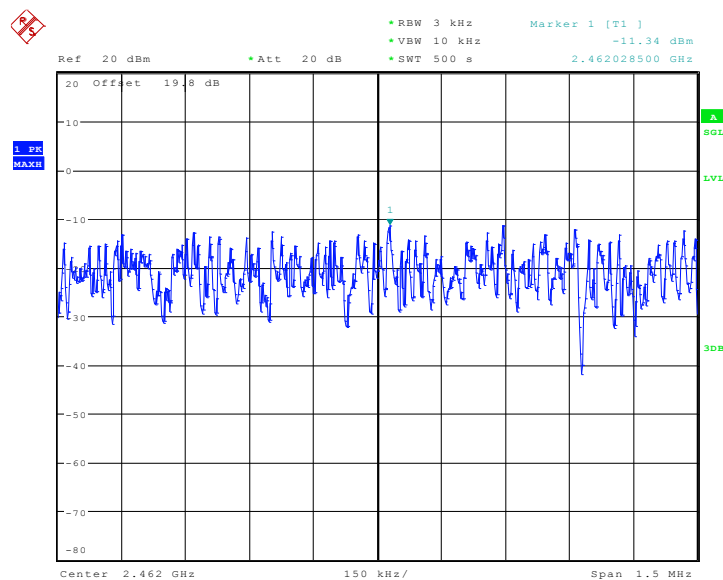


Mode 2 : PSD Plot on 802.11b Channel 06



Date: 25.NOV.2010 18:38:07

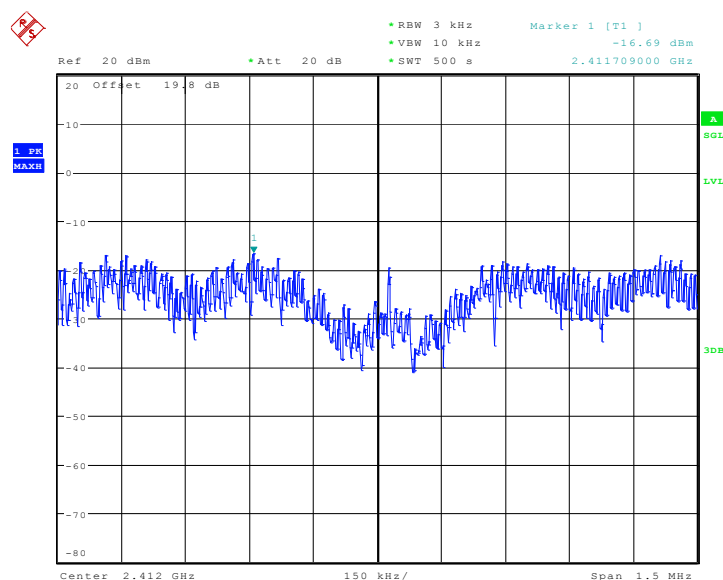
Mode 3 : PSD Plot on 802.11b Channel 11



Date: 25.NOV.2010 19:13:30

Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

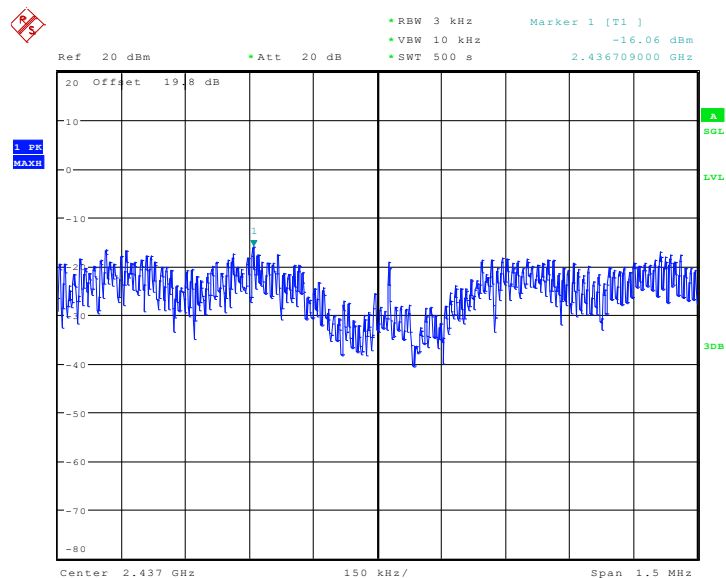
Channel	Frequency (MHz)	802.11g Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-16.69	8	Pass
06	2437	-16.06	8	Pass
11	2462	-16.93	8	Pass

Mode 4 : PSD Plot on 802.11g Channel 01


Date: 25.NOV.2010 19:33:11

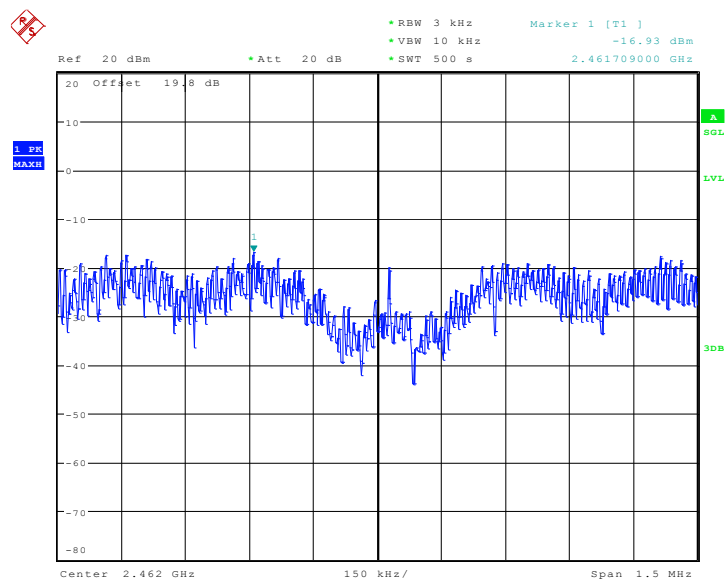


Mode 5 : PSD Plot on 802.11g Channel 06



Date: 25.NOV.2010 19:45:46

Mode 6 : PSD Plot on 802.11g Channel 11



Date: 25.NOV.2010 20:08:25

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.

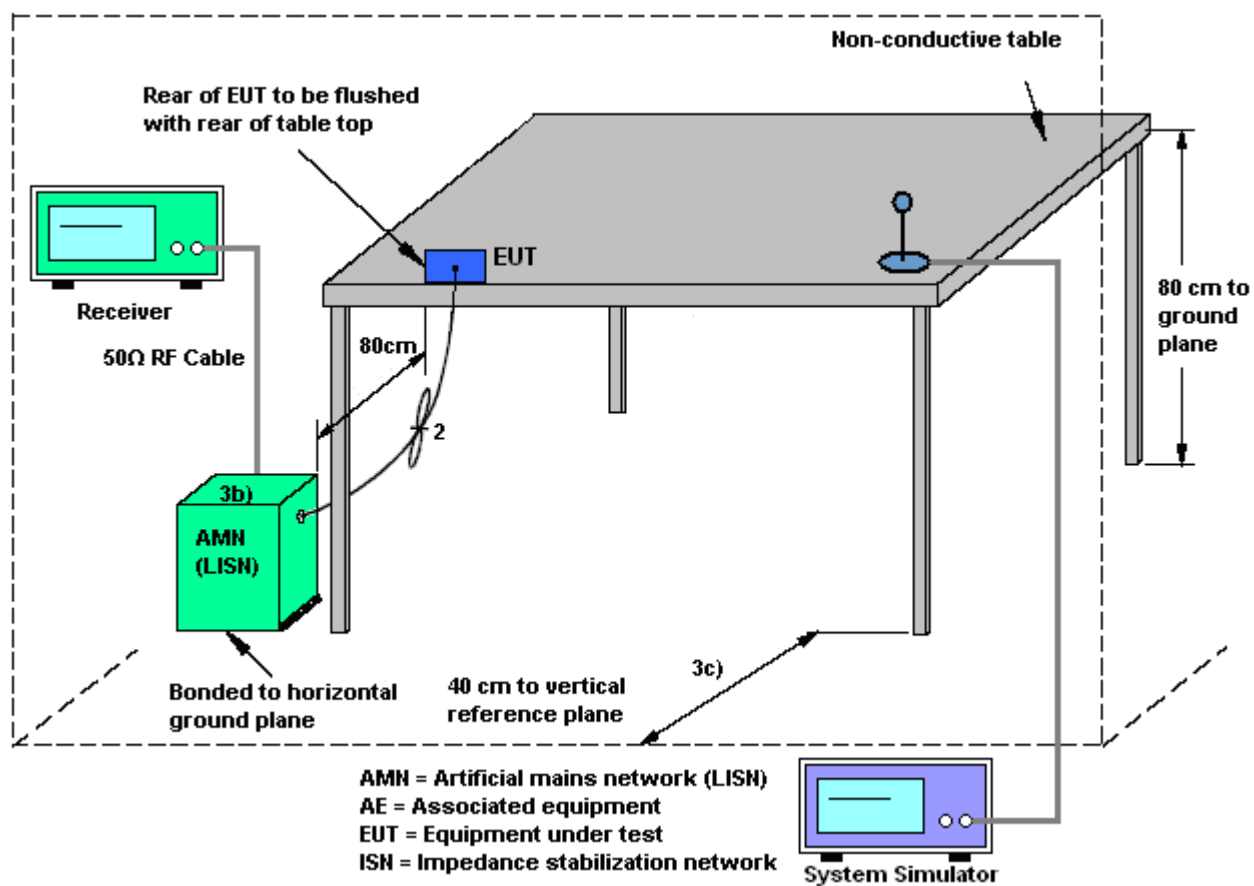
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

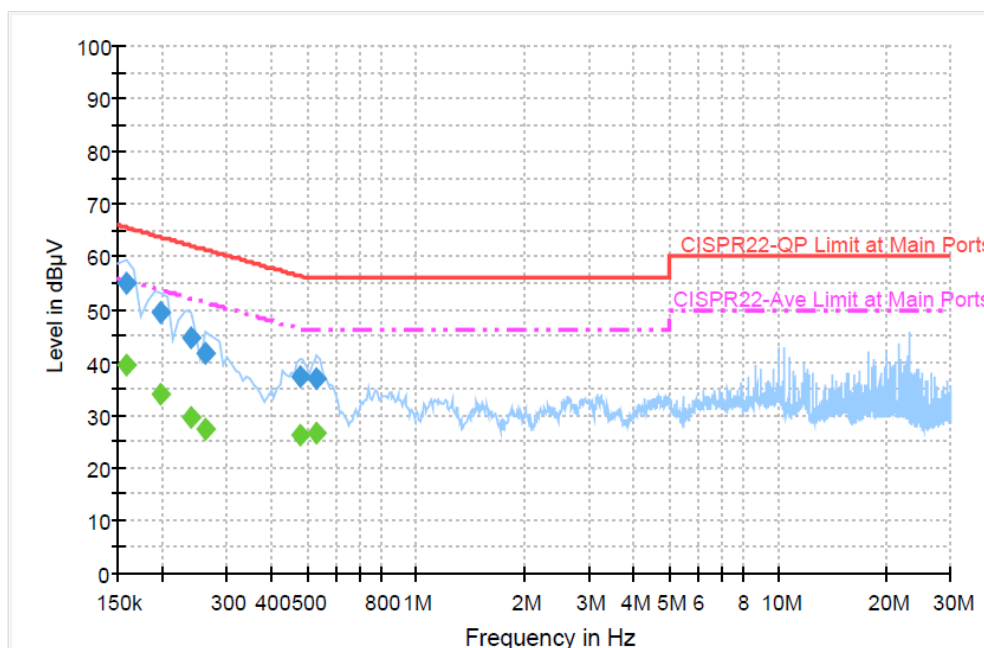
1. The testing follows the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (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 :	20~22°C
Test Engineer :	Novic Chiang	Relative Humidity :	42~44%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + WLAN Link + RJ-45 Link + Adapter + RJ-11 Idle		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



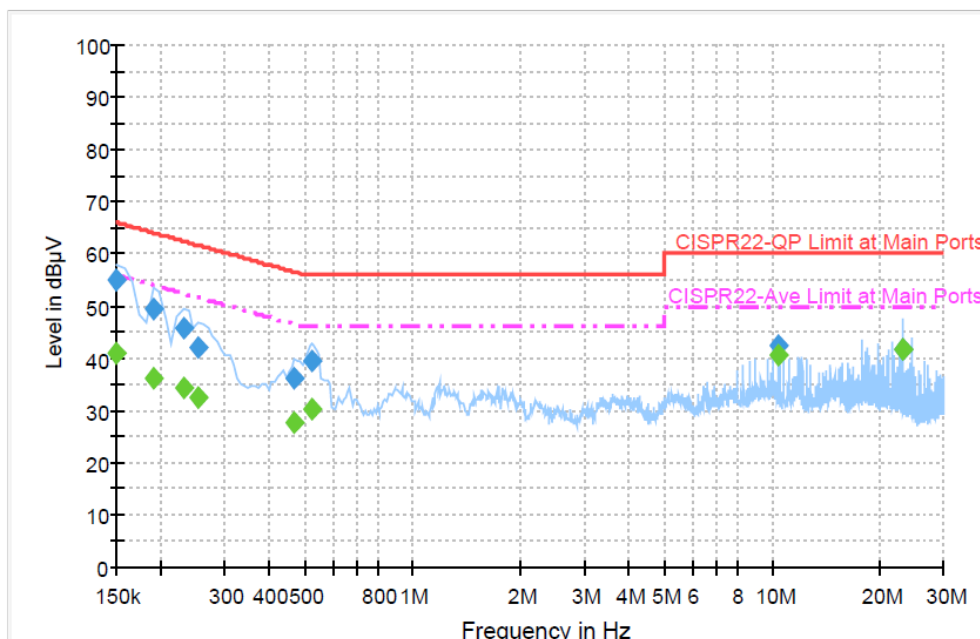
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	54.9	Off	L1	19.3	10.7	65.6
0.198000	49.5	Off	L1	19.3	14.2	63.7
0.238000	44.7	Off	L1	19.4	17.5	62.2
0.262000	41.8	Off	L1	19.3	19.6	61.4
0.478000	37.4	Off	L1	19.4	19.0	56.4
0.534000	36.8	Off	L1	19.3	19.2	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	39.5	Off	L1	19.3	16.1	55.6
0.198000	33.9	Off	L1	19.3	19.8	53.7
0.238000	29.6	Off	L1	19.4	22.6	52.2
0.262000	27.4	Off	L1	19.3	24.0	51.4
0.478000	26.3	Off	L1	19.4	20.1	46.4
0.534000	26.4	Off	L1	19.3	19.6	46.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Chiang	Relative Humidity :	42~44%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + WLAN Link + RJ-45 Link + Adapter + RJ-11 Idle		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		


Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	55.0	Off	N	19.4	11.0	66.0
0.190000	49.5	Off	N	19.4	14.5	64.0
0.230000	45.8	Off	N	19.4	16.6	62.4
0.254000	42.1	Off	N	19.4	19.5	61.6
0.470000	36.0	Off	N	19.4	20.5	56.5
0.526000	39.4	Off	N	19.3	16.6	56.0
10.390000	42.4	Off	N	19.7	17.6	60.0
23.126000	41.7	Off	N	19.9	18.3	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	41.0	Off	N	19.4	15.0	56.0
0.190000	36.2	Off	N	19.4	17.8	54.0
0.230000	34.3	Off	N	19.4	18.1	52.4
0.254000	32.5	Off	N	19.4	19.1	51.6
0.470000	27.8	Off	N	19.4	18.7	46.5
0.526000	30.1	Off	N	19.3	15.9	46.0
10.390000	40.7	Off	N	19.7	9.3	50.0
23.126000	41.8	Off	N	19.9	8.2	50.0

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

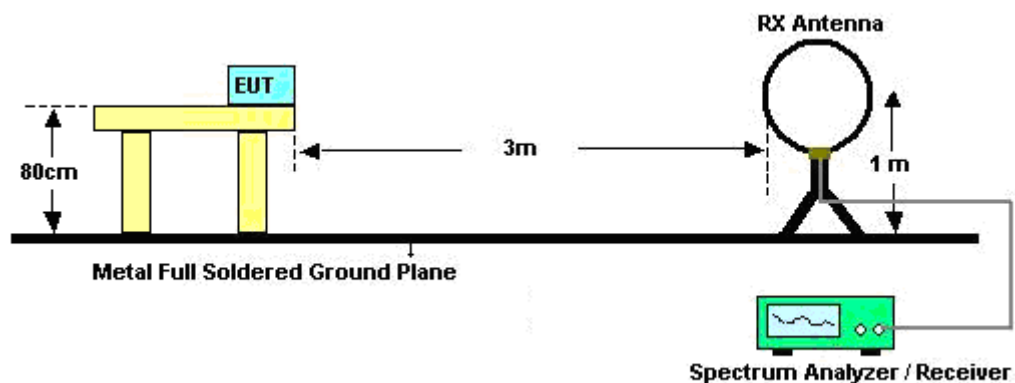
See list of measuring instruments of this test report.

3.7.3 Test Procedures

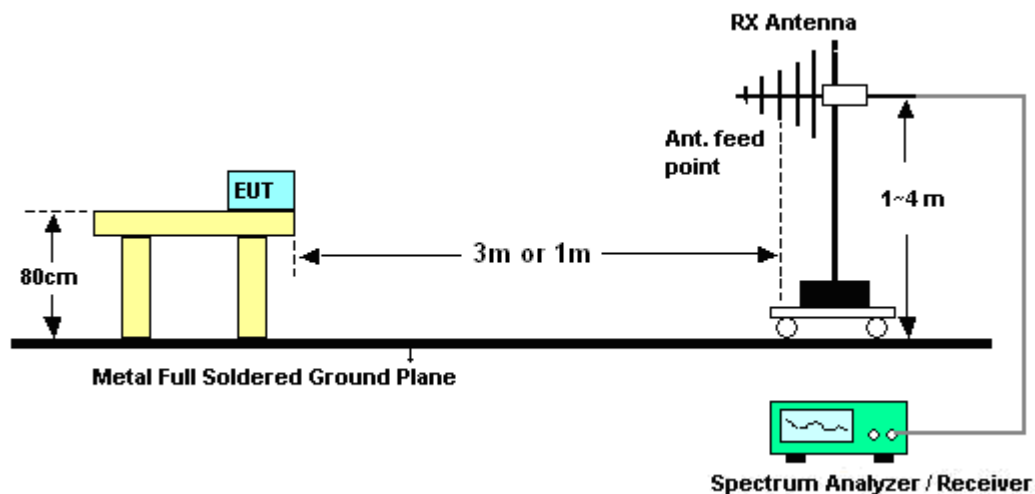
- The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
- Use the following spectrum analyzer settings:
 - Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
 - 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)
- 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 :	Elvis Chen	Temperature :	21~23℃	
		Relative Humidity :	45~47%	

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

Note:

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

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

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

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

Test Mode :	Mode 1	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
149.88	21.85	-21.65	43.5	41.07	10.7	1.46	31.38	-	-	Peak
239.79	28.45	-17.55	46	46.13	11.97	1.81	31.46	-	-	Peak
292.98	33.26	-12.74	46	49.36	13.35	2.03	31.48	100	97	Peak
346.9	31.4	-14.6	46	45.99	14.55	2.22	31.36	-	-	Peak
399.4	31.53	-14.47	46	44.82	15.76	2.41	31.46	-	-	Peak
799.8	32.35	-13.65	46	39.71	20.77	3.36	31.49	-	-	Peak
2388.66	46.81	-7.19	54	44.8	32.48	3.92	34.39	100	125	Average
2388.66	59.22	-14.78	74	57.21	32.48	3.92	34.39	100	125	Peak
2412	102.28	-	-	100.22	32.5	3.95	34.39	100	125	Average
2412	109.84	-	-	107.78	32.5	3.95	34.39	100	125	Peak
2484	54.85	-19.15	74	52.59	32.58	4.05	34.37	100	125	Peak
2484	42.3	-11.7	54	40.04	32.58	4.05	34.37	100	125	Average



Test Mode :	Mode 1	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
72.39	26.52	-13.48	40	50.57	6.49	1.06	31.6	100	222	Peak
156.09	26.98	-16.52	43.5	46.6	10.33	1.47	31.42	-	-	Peak
239.79	21.98	-24.02	46	39.66	11.97	1.81	31.46	-	-	Peak
399.4	27.66	-18.34	46	40.95	15.76	2.41	31.46	-	-	Peak
532.4	30.55	-15.45	46	41.05	18.26	2.79	31.55	-	-	Peak
666.8	31.86	-14.14	46	41.06	19.32	3.12	31.64	-	-	Peak
2389.99	43.81	-10.19	54	41.8	32.48	3.92	34.39	100	116	Average
2389.99	56.51	-17.49	74	54.5	32.48	3.92	34.39	100	116	Peak
2412	106.29	-	-	104.23	32.5	3.95	34.39	100	116	Peak
2412	98.53	-	-	96.47	32.5	3.95	34.39	100	116	Average
2484	40.18	-13.82	54	37.92	32.58	4.05	34.37	100	116	Average
2484	51.03	-22.97	74	48.77	32.58	4.05	34.37	100	116	Peak

Test Mode :	Mode 2	Temperature :	21~23℃
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
133.14	22.26	-21.24	43.5	40.74	11.66	1.4	31.54	-	-	Peak
239.79	28.54	-17.46	46	46.22	11.97	1.81	31.46	-	-	Peak
292.98	32.42	-13.58	46	48.52	13.35	2.03	31.48	100	317	Peak
399.4	31.08	-14.92	46	44.37	15.76	2.41	31.46	-	-	Peak
532.4	28.18	-17.82	46	38.68	18.26	2.79	31.55	-	-	Peak
799.8	32.24	-13.76	46	39.6	20.77	3.36	31.49	-	-	Peak
2382	56.61	-17.39	74	54.62	32.46	3.92	34.39	100	124	Peak
2382	45.16	-8.84	54	43.17	32.46	3.92	34.39	100	124	Average
2437	111.71	-	-	109.56	32.54	3.99	34.38	100	124	Peak
2437	103.94	-	-	101.79	32.54	3.99	34.38	100	124	Average
2484	41.93	-12.07	54	39.67	32.58	4.05	34.37	100	124	Average
2484	54.36	-19.64	74	52.1	32.58	4.05	34.37	100	124	Peak
4874	48.84	-25.16	74	64.61	34.9	5.82	56.49	100	0	Peak



Test Mode :	Mode 2	Temperature :	21~23℃
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
63.48	29.03	-10.97	40	53.23	6.4	0.98	31.58	100	57	Peak
158.79	26.39	-17.11	43.5	46.2	10.14	1.48	31.43	-	-	Peak
292.98	24.29	-21.71	46	40.39	13.35	2.03	31.48	-	-	Peak
532.4	30.36	-15.64	46	40.86	18.26	2.79	31.55	-	-	Peak
666.8	31.04	-14.96	46	40.24	19.32	3.12	31.64	-	-	Peak
901.3	33.79	-12.21	46	39.34	21.63	3.76	30.94	-	-	Peak
2390	54.2	-19.8	74	52.19	32.48	3.92	34.39	100	116	Peak
2390	42.06	-11.94	54	40.05	32.48	3.92	34.39	100	116	Average
2437	108.48	-	-	106.33	32.54	3.99	34.38	100	116	Peak
2437	100.68	-	-	98.53	32.54	3.99	34.38	100	116	Average
2484	40.17	-13.83	54	37.91	32.58	4.05	34.37	100	116	Average
2484	51.81	-22.19	74	49.55	32.58	4.05	34.37	100	116	Peak
4874	49.25	-24.75	74	65.02	34.9	5.82	56.49	100	0	Peak



Test Mode :	Mode 3	Temperature :	21~23℃
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
133.14	22.06	-21.44	43.5	40.54	11.66	1.4	31.54	-	-	Peak
239.79	28.45	-17.55	46	46.13	11.97	1.81	31.46	-	-	Peak
292.98	33.17	-12.83	46	49.27	13.35	2.03	31.48	-	-	Peak
399.4	33.24	-12.76	46	46.53	15.76	2.41	31.46	-	-	Peak
469.4	31.88	-14.12	46	43.61	17.19	2.57	31.49	-	-	Peak
871.9	34.3	-11.7	46	40.35	21.39	3.64	31.08	100	27	Peak
2390	57	-17	74	54.99	32.48	3.92	34.39	100	124	Peak
2390	44.83	-9.17	54	42.82	32.48	3.92	34.39	100	124	Average
2462	106.83	-	-	104.63	32.56	4.02	34.38	100	124	Peak
2462	99.19	-	-	96.99	32.56	4.02	34.38	100	124	Average
2483.5	59.42	-14.58	74	57.16	32.58	4.05	34.37	100	124	Peak
2483.5	47.85	-6.15	54	45.59	32.58	4.05	34.37	100	124	Average

Test Mode :	Mode 3	Temperature :	21~23℃
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
58.89	29.11	-10.89	40	53.13	6.63	0.95	31.6	100	287	Peak
157.98	26.87	-16.63	43.5	46.62	10.2	1.48	31.43	-	-	Peak
239.79	21.09	-24.91	46	38.77	11.97	1.81	31.46	-	-	Peak
532.4	30.05	-15.95	46	40.55	18.26	2.79	31.55	-	-	Peak
666.8	31.7	-14.3	46	40.9	19.32	3.12	31.64	-	-	Peak
878.9	32.57	-13.43	46	38.5	21.45	3.67	31.05	-	-	Peak
2380	53.62	-20.38	74	51.63	32.46	3.92	34.39	100	119	Peak
2380	41.61	-12.39	54	39.62	32.46	3.92	34.39	100	119	Average
2462	105.75	-	-	103.55	32.56	4.02	34.38	100	119	Peak
2462	97.74	-	-	95.54	32.56	4.02	34.38	100	119	Average
2485.18	46.83	-7.17	54	44.57	32.58	4.05	34.37	100	119	Average
2485.18	58.96	-15.04	74	56.7	32.58	4.05	34.37	100	119	Peak



Test Mode :	Mode 4	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
133.14	22.64	-20.86	43.5	41.12	11.66	1.4	31.54	-	-	Peak
239.79	28.49	-17.51	46	46.17	11.97	1.81	31.46	-	-	Peak
292.98	33.12	-12.88	46	49.22	13.35	2.03	31.48	-	-	Peak
300	31.67	-14.33	46	47.62	13.46	2.06	31.47	-	-	Peak
399.4	31.4	-14.6	46	44.69	15.76	2.41	31.46	-	-	Peak
836.9	33.99	-12.01	46	40.68	21.09	3.49	31.27	100	274	Peak
2389.61	45.43	-8.57	54	43.42	32.48	3.92	34.39	100	123	Average
2389.61	59.69	-14.31	74	57.68	32.48	3.92	34.39	100	123	Peak
2412	105.59	-	-	103.53	32.5	3.95	34.39	100	123	Peak
2412	95.3	-	-	93.24	32.5	3.95	34.39	100	123	Average
2484	40.98	-13.02	54	38.72	32.58	4.05	34.37	100	123	Average
2484	53.52	-20.48	74	51.26	32.58	4.05	34.37	100	123	Peak

Test Mode :	Mode 4	Temperature :	21~23℃
Test Channel :	01	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
71.04	33.7	-6.3	40	57.86	6.36	1.05	31.57	100	287	Peak
158.79	32.6	-10.9	43.5	52.41	10.14	1.48	31.43	-	-	Peak
247.89	23.27	-22.73	46	40.36	12.54	1.84	31.47	-	-	Peak
532.4	30.74	-15.26	46	41.24	18.26	2.79	31.55	-	-	Peak
600.3	33.71	-12.29	46	43.32	19.17	2.92	31.7	-	-	Peak
666.8	31.33	-14.67	46	40.53	19.32	3.12	31.64	-	-	Peak
2389.42	42.44	-11.56	54	40.43	32.48	3.92	34.39	100	117	Average
2389.42	56.68	-17.32	74	54.67	32.48	3.92	34.39	100	117	Peak
2412	102.04	-	-	99.98	32.5	3.95	34.39	100	117	Peak
2412	91.47	-	-	89.41	32.5	3.95	34.39	100	117	Average
2486	40.43	-13.57	54	38.17	32.58	4.05	34.37	100	117	Average
2486	52.42	-21.58	74	50.16	32.58	4.05	34.37	100	117	Peak



Test Mode :	Mode 5	Temperature :	21~23℃
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
133.14	23.5	-20	43.5	41.98	11.66	1.4	31.54	-	-	Peak
239.79	28.33	-17.67	46	46.01	11.97	1.81	31.46	-	-	Peak
292.98	33.27	-12.73	46	49.37	13.35	2.03	31.48	100	147	Peak
346.9	30.78	-15.22	46	45.37	14.55	2.22	31.36	-	-	Peak
399.4	32.53	-13.47	46	45.82	15.76	2.41	31.46	-	-	Peak
799.8	31.45	-14.55	46	38.81	20.77	3.36	31.49	-	-	Peak
2382	58.08	-15.92	74	56.09	32.46	3.92	34.39	100	123	Peak
2382	46.59	-7.41	54	44.6	32.46	3.92	34.39	100	123	Average
2437	108.72	-	-	106.57	32.54	3.99	34.38	100	123	Peak
2437	94.46	-	-	92.31	32.54	3.99	34.38	100	123	Average
2492	42.32	-11.68	54	40.04	32.6	4.05	34.37	100	123	Average
2492	54.39	-19.61	74	52.11	32.6	4.05	34.37	100	123	Peak

Test Mode :	Mode 5	Temperature :	21~23℃
Test Channel :	06	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
71.04	34.5	-5.5	40	58.66	6.36	1.05	31.57	100	94	Peak
158.79	33.28	-10.22	43.5	53.09	10.14	1.48	31.43	-	-	Peak
239.79	23.47	-22.53	46	41.15	11.97	1.81	31.46	-	-	Peak
399.4	27.16	-18.84	46	40.45	15.76	2.41	31.46	-	-	Peak
633.9	31.56	-14.44	46	40.96	19.24	3.01	31.65	-	-	Peak
878.9	30.6	-15.4	46	36.53	21.45	3.67	31.05	-	-	Peak
2382	55.28	-18.72	74	53.29	32.46	3.92	34.39	100	118	Peak
2382	43.06	-10.94	54	41.07	32.46	3.92	34.39	100	118	Average
2437	106.01	-	-	103.86	32.54	3.99	34.38	100	118	Peak
2437	94.59	-	-	92.44	32.54	3.99	34.38	100	118	Average
2492	40.47	-13.53	54	38.19	32.6	4.05	34.37	100	118	Average
2492	53.21	-20.79	74	50.93	32.6	4.05	34.37	100	118	Peak

Test Mode :	Mode 6	Temperature :	21~23℃
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
71.04	21.46	-18.54	40	45.62	6.36	1.05	31.57	-	-	Peak
239.79	28.64	-17.36	46	46.32	11.97	1.81	31.46	-	-	Peak
292.98	33.57	-12.43	46	49.67	13.35	2.03	31.48	100	79	Peak
346.9	30.89	-15.11	46	45.48	14.55	2.22	31.36	-	-	Peak
399.4	31.79	-14.21	46	45.08	15.76	2.41	31.46	-	-	Peak
799.8	32.06	-13.94	46	39.42	20.77	3.36	31.49	-	-	Peak
2390	56.71	-17.29	74	54.7	32.48	3.92	34.39	100	124	Peak
2390	43.66	-10.34	54	41.65	32.48	3.92	34.39	100	124	Average
2462	103.43	-	-	101.23	32.56	4.02	34.38	100	124	Peak
2462	92.81	-	-	90.61	32.56	4.02	34.38	100	124	Average
2483.5	44.85	-9.15	54	42.59	32.58	4.05	34.37	100	124	Average
2483.5	60.18	-13.82	74	57.92	32.58	4.05	34.37	100	124	Peak



Test Mode :	Mode 6	Temperature :	21~23℃
Test Channel :	11	Relative Humidity :	45~47%
Test Engineer :	Elvis Chen	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
48.63	30.41	-9.59	40	52.42	8.78	0.84	31.63	-	-	Peak
69.69	33.35	-6.65	40	57.56	6.29	1.05	31.55	100	284	Peak
157.98	33.31	-10.19	43.5	53.06	10.2	1.48	31.43	-	-	Peak
532.4	30.12	-15.88	46	40.62	18.26	2.79	31.55	-	-	Peak
666.8	31.46	-14.54	46	40.66	19.32	3.12	31.64	-	-	Peak
878.9	31.25	-14.75	46	37.18	21.45	3.67	31.05	-	-	Peak
2390	52.69	-21.31	74	50.68	32.48	3.92	34.39	100	119	Peak
2390	40.67	-13.33	54	38.66	32.48	3.92	34.39	100	119	Average
2462	101.95	-	-	99.75	32.56	4.02	34.38	100	119	Peak
2462	91.08	-	-	88.88	32.56	4.02	34.38	100	119	Average
2483.5	43.62	-10.38	54	41.36	32.58	4.05	34.37	100	119	Average
2483.5	59.3	-14.7	74	57.04	32.58	4.05	34.37	100	119	Peak

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	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101329	9kHz~30GHz	Apr. 26, 2010	Apr. 25, 2011	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 14, 2010	Sep. 13, 2011	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9kHz~30MHz	Nov. 30, 2009	Nov. 29, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9kHz~30MHz	Nov. 23, 2009	Nov. 22, 2010	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP40	100057	9KHz-40GHz	Oct. 25, 2010	Oct. 24, 2011	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz-1000MHz	Apr. 28, 2010	Apr. 27, 2011	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz -2GHz	Oct. 31, 2010	Oct. 31, 2011	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz~18GHz	Aug. 02, 2010	Aug. 01, 2011	Radiation (03CH06-HY)
Double Ridge Horn Antenna	Training Research	AH-0801	95119	8GHz~18GHz	Oct. 20, 2010	Oct.19, 2011	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH06-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Apr. 15, 2010	Apr. 14, 2011	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz~1GHz	Apr. 15, 2010	Apr. 14, 2011	Radiation (03CH06-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH06-HY)
System Simulator	R&S	CMU200	117995	N/A	Mar. 19, 2009	Mar. 18, 2011	-

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 EP001547 as below.