

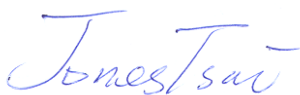
Variant FCC/IC RF Test Report

APPLICANT : Qualcomm Atheros, Inc.
EQUIPMENT : 1X1 802.11b/g/n - BT4.0 Combo PCIe minicard
BRAND NAME : Qualcomm Atheros
MODEL NAME : QCWB335
FCC ID : PPD-QCWB335
IC : 4104A-QCWB335
STANDARD : FCC Part 15 Subpart C §15.247
IC RSS-210 issue 8
CLASSIFICATION : (DTS) Digital Transmission System

This is a variant report which is only valid together with the original test report. The WiFi + Bluetooth module was tested on extended card inserted to a host laptop PC. The product was received on Oct. 17, 2012 and completely tested on Jan. 29, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:



Jones Tsai / 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
FR240322-08C	Rev. 01	This is a variant report. All the test cases were performed on original report which can be referred to Sporton Report No. FR240322B. Detail changes list as below : 1. Shielding change 2. Minor layout change. 3. BOM change (Rx path) Based on the changes, only the 6dB Bandwidth, Peak Output Power, Power Spectral Density, Conducted Band Edges, Conducted Spurious Emission, Radiated Band Edges, and Radiated Spurious Emission test cases were verified.	Feb. 07, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-210 A8.2(a)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	RSS-210 A8.4	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	RSS-210 A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	RSS-210 A8.5	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	RSS-210 A8.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.34 dB at 2389.740 MHz
3.6	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Qualcomm Atheros, Inc.
1700 Technology Drive, San Jose, CA95110

1.2 Manufacturer

Qualcomm Atheros, Inc.
1700 Technology Drive, San Jose, CA95110

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	1X1 802.11b/g/n - BT4.0 Combo PCIe minicard
Brand Name	Qualcomm Atheros
Model Name	QCWB335
FCC ID	PPD-QCWB335
IC	4104A-QCWB335
EUT supports Radios application	WLAN 11bgn / Bluetooth 2.1/3.0 /4.0
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	2400 MHz ~ 2483.5 MHz
Transfer Rate	802.11b: 11 / 5.5 / 2 / 1Mbps 802.11g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps 802.11n HT20 (Guard Interval: 800ns): 65 / 58.5 / 52 / 39 / 26 / 19.5 / 13 / 6.5Mbps 802.11n HT40 (Guard Interval: 800ns): 135 / 121.5 / 108 / 81 / 54 / 40.5 / 27 / 13.5 Mbps 802.11n HT20 (Guard Interval: 400ns): 72.2 / 65 / 57.8 / 43.3 / 28.9 / 21.7 / 14.4 / 7.2Mbps 802.11n HT40 (Guard Interval: 400ns): 150 / 135 / 120 / 90 / 60 / 45 / 30 / 15Mbps
Maximum Output Power to Antenna	802.11b : 19.93 dBm (0.0984 W) 802.11g : 24.54 dBm (0.2844 W) 802.11n HT20 : 23.97 dBm (0.2495 W) 802.11n HT40 : 23.15 dBm (0.2065 W)
Duty Cycle	802.11b : 100.00% 802.11g : 98.02% 802.11n HT20 : 98.92% 802.11n HT40 : 99.08%
Antenna Type	Antenna 1 : PIFA Antenna with gain 3.62 dBi Antenna 2 : Dipole Antenna with gain 3.20 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 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.
	TH02-HY	03CH06-HY	722060/4086B-1

The test site complies with ANSI C63.4 2003 requirement.

1.6 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 D01 DTS Meas. Guidance v02
- ♦ ANSI C63.10-2009
- ♦ IC RSS-210 Issue 8
- ♦ IC RSS-Gen Issue 3
- ♦ NOTICE 2012-DRS0126

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, recorded in a separate test report.
3. Per the section 2.2.3 of Notice of 2012-DRS0126, " Receivers Excluded from Industry Canada Requirements", only radiocommunication receivers operating in stand-alone mode within the band 30-960 MHz and scanner receivers are subject to Industry Canada requirements.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiated emission (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Maximum Peak Conducted Output Power

<Ant. 1>

Band	2.4GHz 802.11b RF Power (dBm)			2.4GHz 802.11g RF Power (dBm)		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Peak Power	19.61	19.93	19.84	23.36	24.54	23.29

Band	2.4GHz 802.11n HT20 RF Power (dBm) (Guard Interval: 800 ns)		
Channel	1	6	11
Frequency (MHz)	2412	2437	2462
Peak Power	22.68	23.97	22.76

Band	2.4GHz 802.11n HT40 RF Power (dBm) (Guard Interval: 800 ns)		
Channel	3	6	9
Frequency (MHz)	2422	2437	2452
Peak Power	21.40	23.15	21.68

<Ant. 2>

Band	2.4GHz 802.11b RF Power (dBm)			2.4GHz 802.11g RF Power (dBm)		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Peak Power	19.61	19.93	19.84	21.69	24.54	23.29

Band	2.4GHz 802.11n HT20 RF Power (dBm) (Guard Interval: 800 ns)		
Channel	1	6	11
Frequency (MHz)	2412	2437	2462
Peak Power	20.91	23.97	22.76

Band	2.4GHz 802.11n HT40 RF Power (dBm) (Guard Interval: 800 ns)		
Channel	3	6	9
Frequency (MHz)	2422	2437	2452
Peak Power	21.40	23.15	22.08

Remark:

The data rates of WLAN 802.11b/g/n were set in 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n HT20 with Guard Interval setting = 800 ns, 13.5Mbps for 802.11n HT40 with Guard Interval setting = 800 ns for all the test cases due to the highest RF output power.

2.3 Maximum Average Conducted Output Power:

<Ant. 1>

Band	2.4GHz 802.11b RF Power (dBm)			2.4GHz 802.11g RF Power (dBm)		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Average Power	17.28	17.98	17.73	14.67	17.89	14.93

Band	2.4GHz 802.11n HT20 RF Power (dBm) (Guard Interval: 800 ns)		
Channel	1	6	11
Frequency (MHz)	2412	2437	2462
Average Power	13.24	16.31	13.64

Band	2.4GHz 802.11n HT40 RF Power (dBm) (Guard Interval: 800 ns)		
Channel	3	6	9
Frequency (MHz)	2422	2437	2452
Average Power	11.06	14.28	11.93

<Ant. 2>

Band	2.4GHz 802.11b RF Power (dBm)			2.4GHz 802.11g RF Power (dBm)		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Average Power	17.28	17.98	17.73	11.78	17.89	14.93

Band	2.4GHz 802.11n HT20 RF Power (dBm) (Guard Interval: 800 ns)		
Channel	1	6	11
Frequency (MHz)	2412	2437	2462
Average Power	10.87	16.31	13.64

Band	2.4GHz 802.11n HT40 RF Power (dBm) (Guard Interval: 800 ns)		
Channel	3	6	9
Frequency (MHz)	2422	2437	2452
Average Power	11.06	14.28	13.12

Remark:

1. The average power, which is used by the test method, Option 3 (average power meter method), in DTS Meas. Guidance v02, is reporting only.
2. The EUT is programmed to transmit signals continuously.

2.4 Antenna Information

Brand / Model Name	Type	Frequency Range (MHz)	Antenna Gain (dBi)
Wistron Neweb Corporation / EBJ Aux	PIFA	2400 ~ 2483.5	3.62
INPAQ / DAMA1BM30000402	Dipole	2400 ~ 2483.5	3.20

	Antenna port 0	Antenna port 1
Single antenna	WLAN/BT timely coexistence	RX diversity or terminated
Dual antenna	WLAN TX/RX	Bluetooth TX/RX

2.5 Test Mode

For radiated: The EUT's antenna was pre-tested under the following modes:

Test Mode	Description
Mode A	X-Y axis
Mode B	Y-Z axis
Mode C	X-Z axis

From the above modes, the worst case was found in Mode A. Therefore only the test data of the mode was recorded in this report.

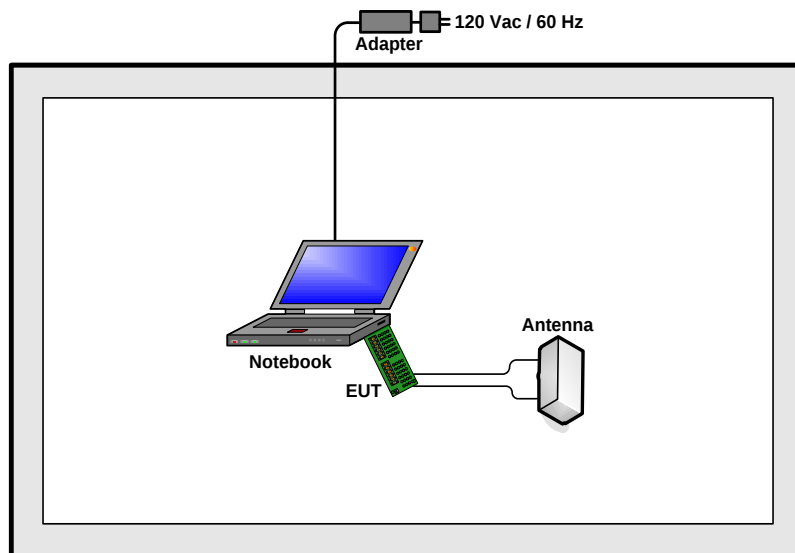
The details of test channels and bandwidth were for RF conductive measurement.

Mode	Tested Channel	6dB Bandwidth	Output Power	Band Edges	Spurious Emission	Power Spectral Density	Radiated Emission
802.11b	1, 6, 11	✓	✓	✓	✓	✓	✓
802.11g	1, 6, 11	✓	✓	✓	✓	✓	✓
802.11n HT20	1, 6, 11	✓	✓	✓	✓	✓	✓
802.11n HT40	3, 6, 9	✓	✓	✓	✓	✓	✓

Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
Conducted TCs	Test Items	Mode	Data Rate	Test Channel
	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
	Conducted Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	6.5 Mbps	1/11
		802.11n HT40	13.5 Mbps	3/9
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	6.5 Mbps	1/11
		802.11n HT40	13.5 Mbps	3/9
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
Remark: For Radiated TCs, all the tests were performance with Antenna 1 and Antenna 2				

2.6 Connection Diagram of Test System



2.7 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	0769	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.8 Description of RF Function Operation Test Setup

The programmed RF utility "artgui.exe" is installed in notebook make the 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.

2.9 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

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.

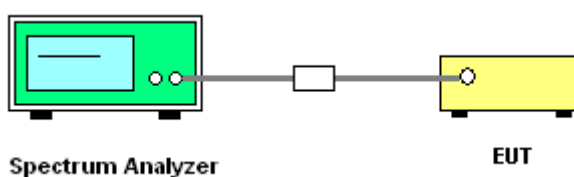
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 KHz.
5. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Test Mode :	802.11b	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	10.09	0.5	Pass
06	2437	10.04	0.5	Pass
11	2462	10.06	0.5	Pass

Test Mode :	802.11g	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.35	0.5	Pass
06	2437	16.33	0.5	Pass
11	2462	16.37	0.5	Pass

Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	17.56	0.5	Pass
06	2437	17.56	0.5	Pass
11	2462	17.56	0.5	Pass

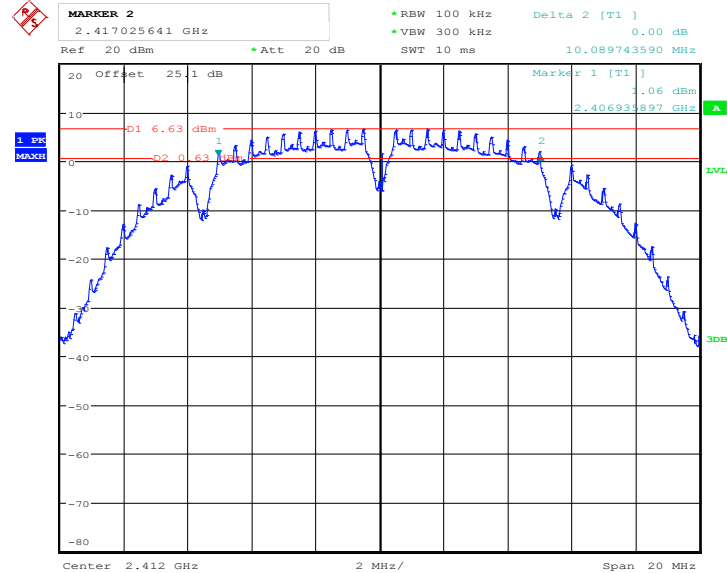
Test Mode :	802.11n HT40	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT40 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
03	2422	36.28	0.5	Pass
06	2437	36.38	0.5	Pass
09	2452	36.38	0.5	Pass



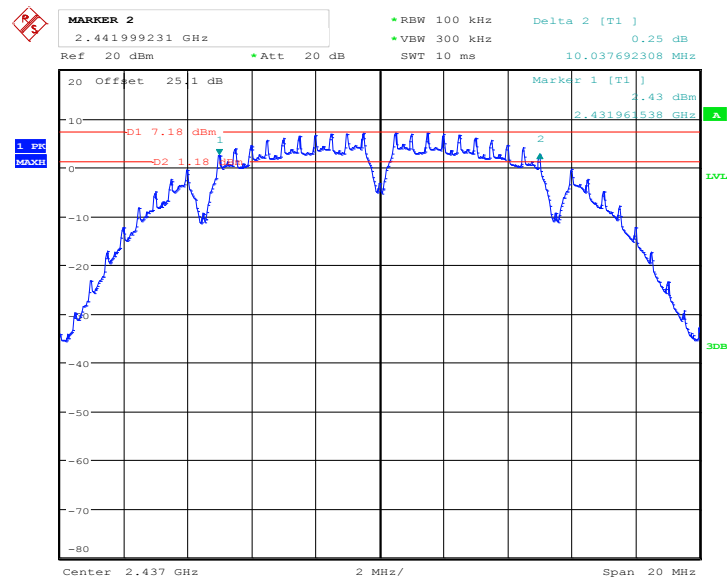
3.1.6 Test Result of 6dB Bandwidth Plots

802.11b 6 dB Bandwidth Plot on Channel 01



Date: 28.JAN.2013 16:24:02

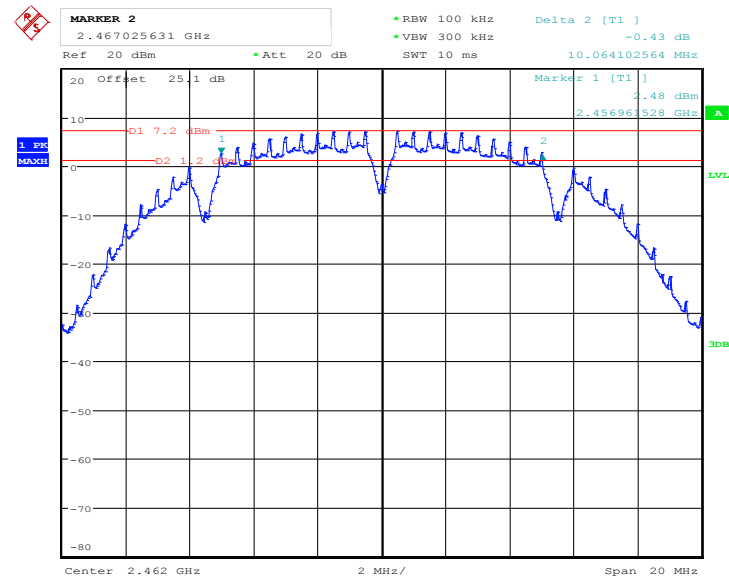
802.11b 6 dB Bandwidth Plot on Channel 06



Date: 28.JAN.2013 16:29:23

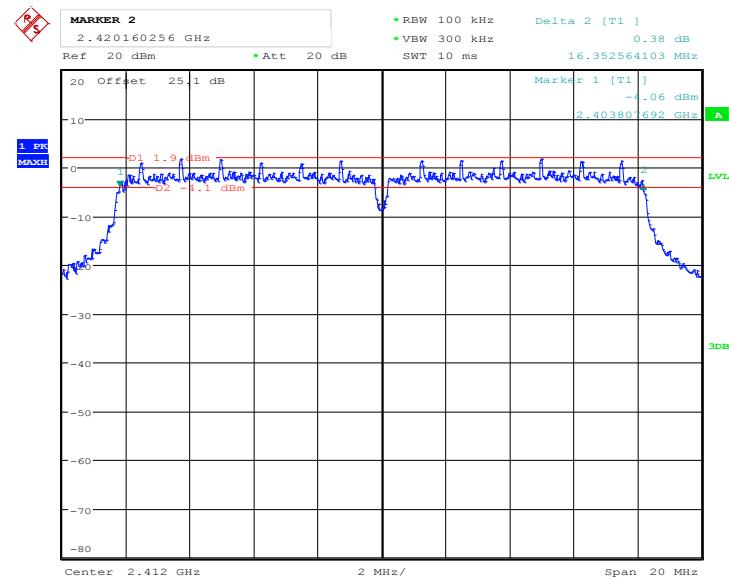


802.11b 6 dB Bandwidth Plot on Channel 11



Date: 28.JAN.2013 16:34:58

802.11g 6 dB Bandwidth Plot on Channel 01



Date: 28.JAN.2013 16:41:35



MARKER 2
2.445160256 GHz

Ref 20 dBm Att 20 dB

RBW 100 kHz VBW 300 kHz SWT 10 ms

Delta 2 [T1] -0.67 dB

16.333333333 MHz

Marker 1 [T1] -0.00 dBm 2.42882923 GHz

Marker 2 [T1] -0.67 dBm 2.445160256 GHz

Center 2.437 GHz 2 MHz/ Span 20 MHz

Date: 28.JAN.2013 16:51:31

MARKER 2
2.470160256 GHz

Ref 20 dBm Att 20 dB

RBW 100 kHz Delta 2 [T1] 0.20 dB
VBW 300 kHz
SWT 10 ms 16.365384615 MHz

Marker 1 [T1] -1.26 dBm
2.453794872 GHz

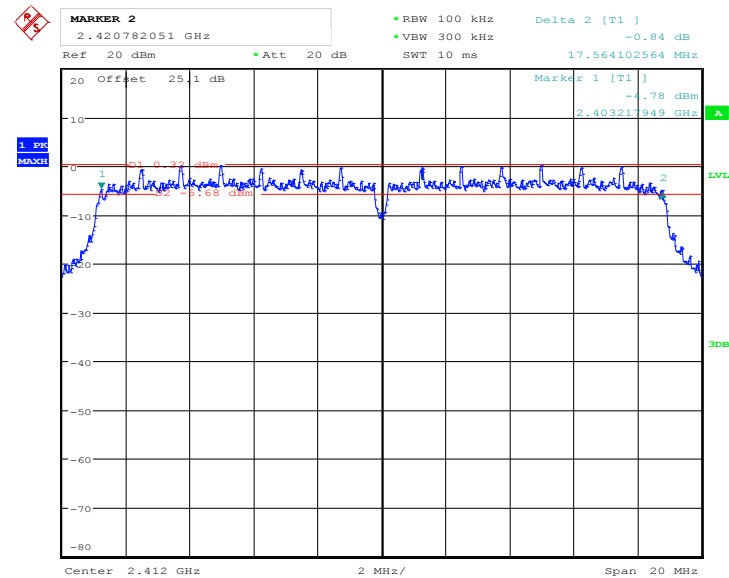
D1 2.52 dBm
D2 1.77 dBm

Center 2.462 GHz 2 MHz/ Span 20 MHz

Date: 28.JAN.2013 16:55:20

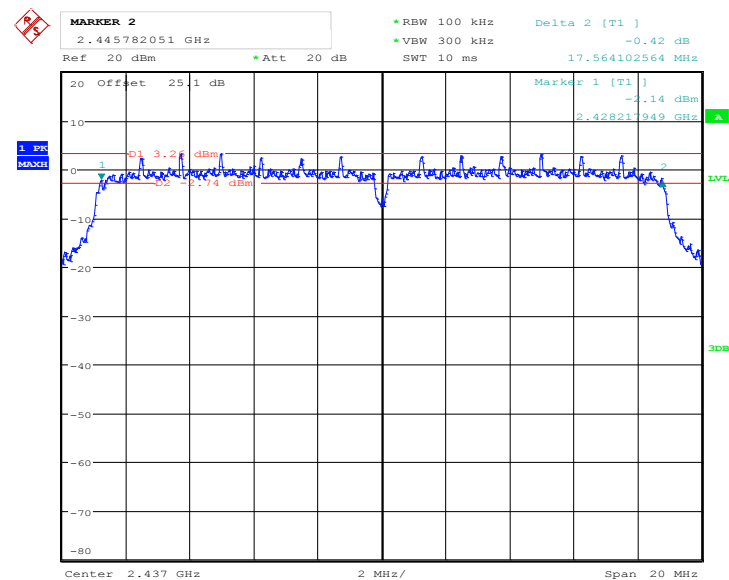


802.11n HT20 6 dB Bandwidth Plot on Channel 01



Date: 28.JAN.2013 17:01:25

802.11n HT20 6 dB Bandwidth Plot on Channel 06



Date: 28.JAN.2013 17:06:06

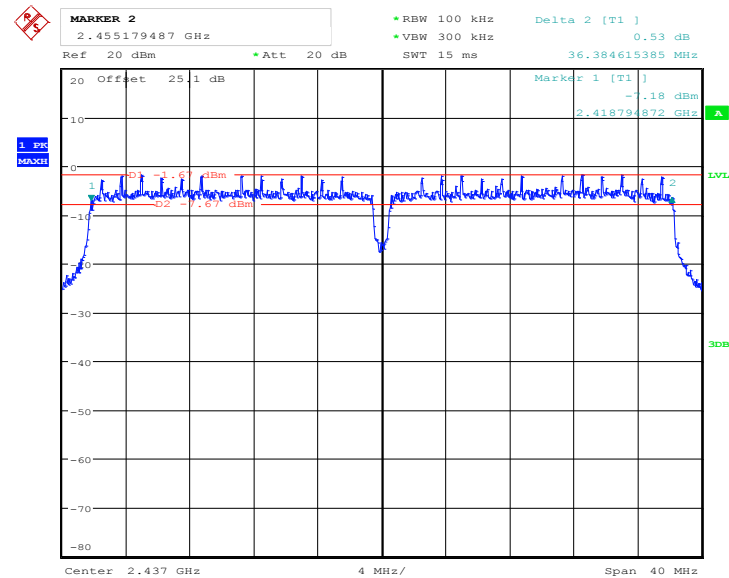


802.11n HT40 6 dB Bandwidth Plot on Channel 03



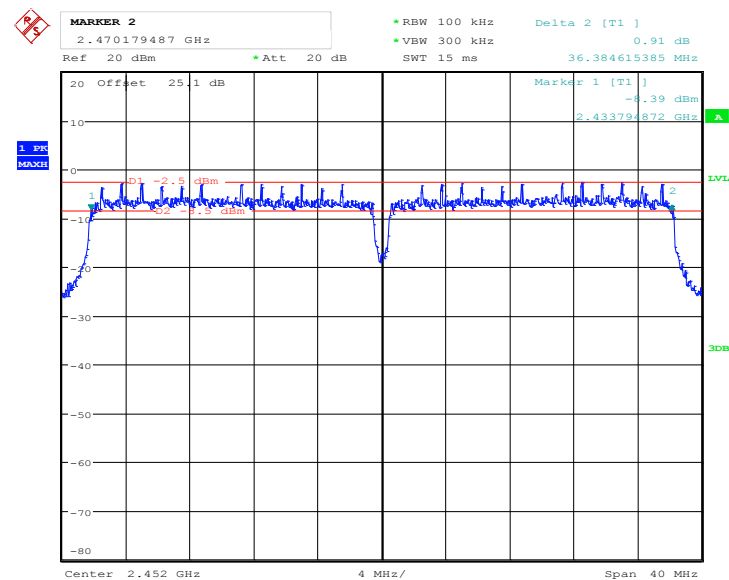


802.11n HT40 6 dB Bandwidth Plot on Channel 06



Date: 28.JAN.2013 17:28:25

802.11n HT40 6 dB Bandwidth Plot on Channel 09



Date: 28.JAN.2013 17:55:57

3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is 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.

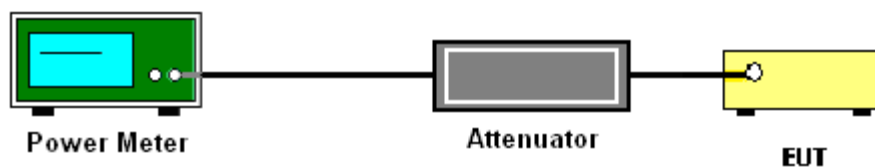
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Mode :	802.11b	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)		Max. Limits (dBm)	Pass/Fail
		Ant. 1	Ant. 2		
01	2412	19.61	19.61	30	Pass
06	2437	19.93	19.93	30	Pass
11	2462	19.84	19.84	30	Pass

Test Mode :	802.11g	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)		Max. Limits (dBm)	Pass/Fail
		Ant. 1	Ant. 2		
01	2412	23.36	21.69	30	Pass
06	2437	24.54	24.54	30	Pass
11	2462	23.29	23.29	30	Pass

Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n HT20 Peak Output Power (dBm)		Max. Limits (dBm)	Pass/Fail
		Ant. 1	Ant. 2		
01	2412	22.68	20.91	30	Pass
06	2437	23.97	23.97	30	Pass
11	2462	22.76	22.76	30	Pass



Test Mode :	802.11n HT40	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n HT40 Peak Output Power (dBm)		Max. Limits (dBm)	Pass/Fail
		Ant. 1	Ant. 1		
03	2422	21.40	21.40	30	Pass
06	2437	23.15	23.15	30	Pass
09	2452	21.68	22.08	30	Pass

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	802.11b	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%
Duty Cycle:	100.00%	Duty Factor:	0.00dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)	
		Ant. 1	Ant. 2
01	2412	17.28	17.28
06	2437	17.98	17.98
11	2462	17.73	17.73

Test Mode :	802.11g	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%
Duty Cycle:	98.02%	Duty Factor:	0.09dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)	
		Ant. 1	Ant. 2
01	2412	14.67	11.78
06	2437	17.89	17.89
11	2462	14.93	14.93

Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%
Duty Cycle:	98.92%	Duty Factor:	0.05dB

Channel	Frequency (MHz)	802.11n HT20 Average Output Power (dBm)	
		Ant. 1	Ant. 2
01	2412	13.24	10.87
06	2437	16.31	16.31
11	2462	13.64	13.64



Test Mode :	802.11n HT40	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%
Duty Cycle:	99.08%	Duty Factor:	0.04dB

Channel	Frequency (MHz)	802.11n HT40 Average Output Power (dBm)	
		Ant. 1	Ant. 2
03	2422	11.06	11.06
06	2437	14.28	14.28
09	2452	11.93	13.12

3.3 Power Spectral Density Measurement

3.3.1 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.

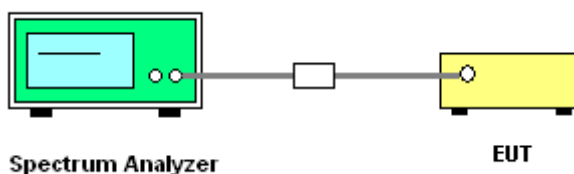
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 9.1 Option 1 of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. The Measured power density (dBm)/ 100KHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Test Mode :	802.11b	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Power Density		Max. Limits (dBm/3KHz)	Pass /Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	6.15	-8.08	8	Pass
06	2437	6.92	-6.78	8	Pass
11	2462	6.97	-7.14	8	Pass

Test Mode :	802.11g	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Power Density		Max. Limits (dBm/3KHz)	Pass /Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	1.16	-11.36	8	Pass
06	2437	4.77	-8.81	8	Pass
11	2462	2.36	-11.04	8	Pass

Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n HT20 Power Density		Max. Limits (dBm/3KHz)	Pass /Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	-0.40	-13.66	8	Pass
06	2437	3.12	-11.21	8	Pass
11	2462	0.94	-12.97	8	Pass

Test Mode :	802.11n HT40	Temperature :	24~26°C
Test Engineer :	Rover Lee	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n HT40 Power Density		Max. Limits (dBm/3KHz)	Pass /Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
03	2422	-5.47	-19.85	8	Pass
06	2437	-1.81	-15.76	8	Pass
09	2452	-2.48	-16.34	8	Pass

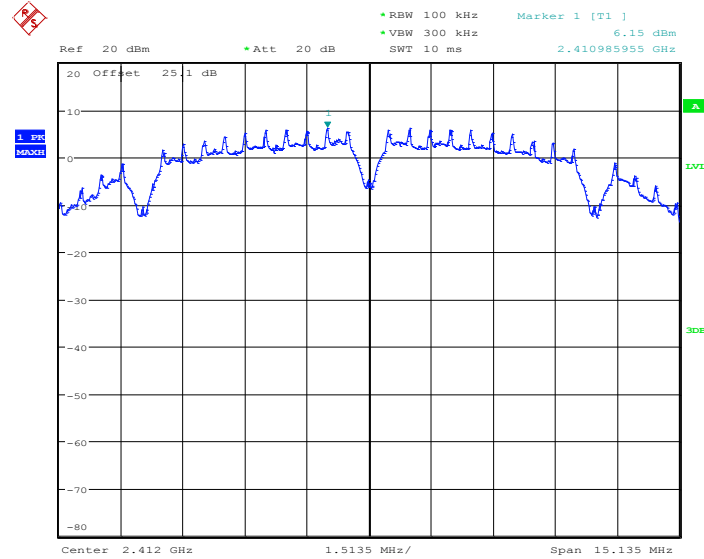
Note:

1. Measured power density (dBm) has offset with cable loss.
2. The Measured power density (dBm)/ 100KHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.



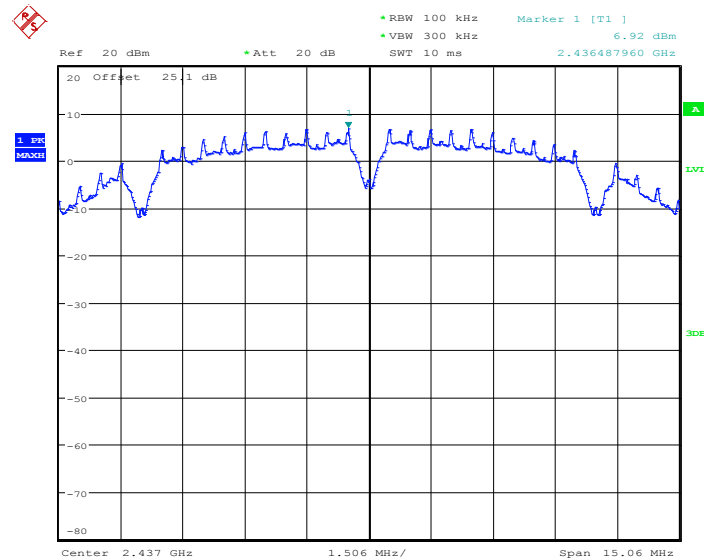
3.3.6 Test Result of Power Spectral Density Plots (100kHz)

802.11b PSD 100kHz Plot on Channel 01



Date: 28.JAN.2013 16:25:30

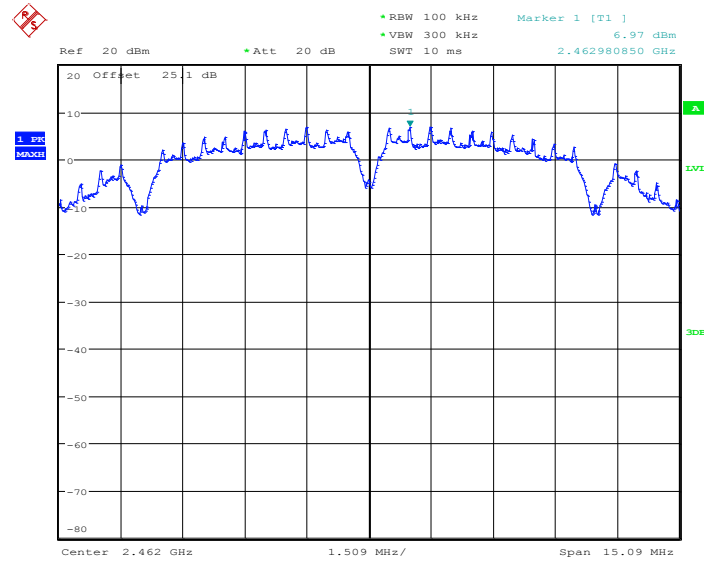
802.11b PSD 100kHz Plot on Channel 06



Date: 28.JAN.2013 16:30:37

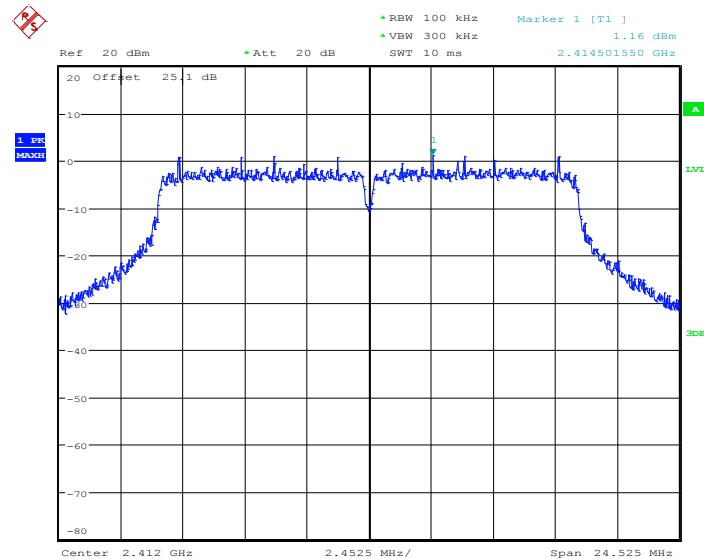


802.11b PSD 100kHz Plot on Channel 11



Date: 28.JAN.2013 16:35:58

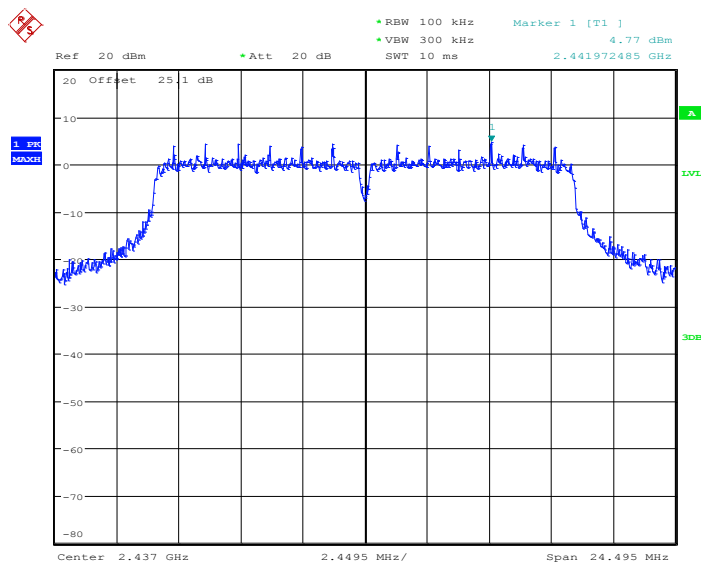
802.11g PSD 100kHz Plot on Channel 01



Date: 28.JAN.2013 16:42:59

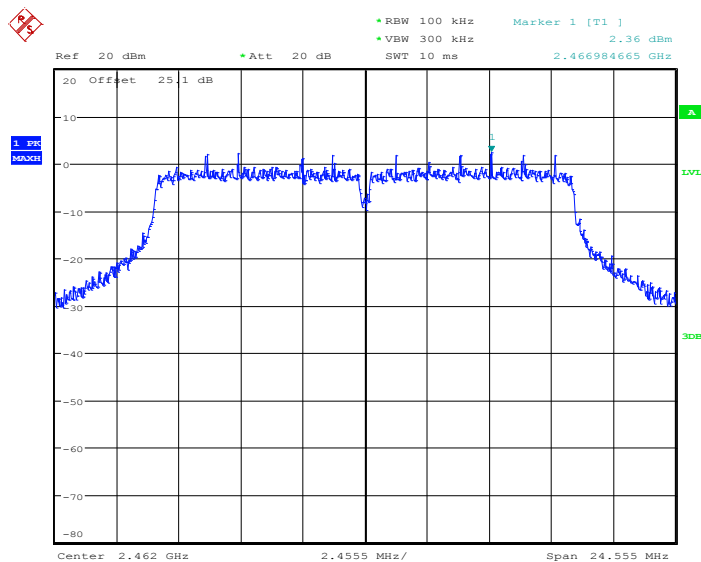


802.11g PSD 100kHz Plot on Channel 06



Date: 28.JAN.2013 16:52:34

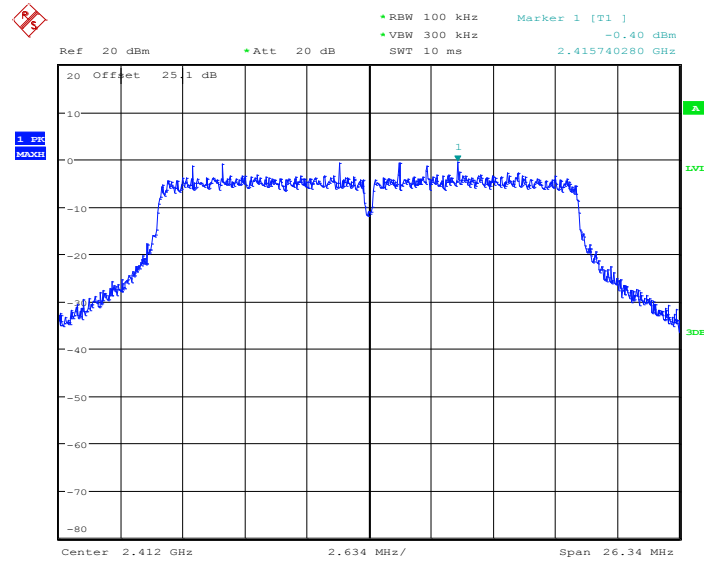
802.11g PSD 100kHz Plot on Channel 11



Date: 28.JAN.2013 16:56:15

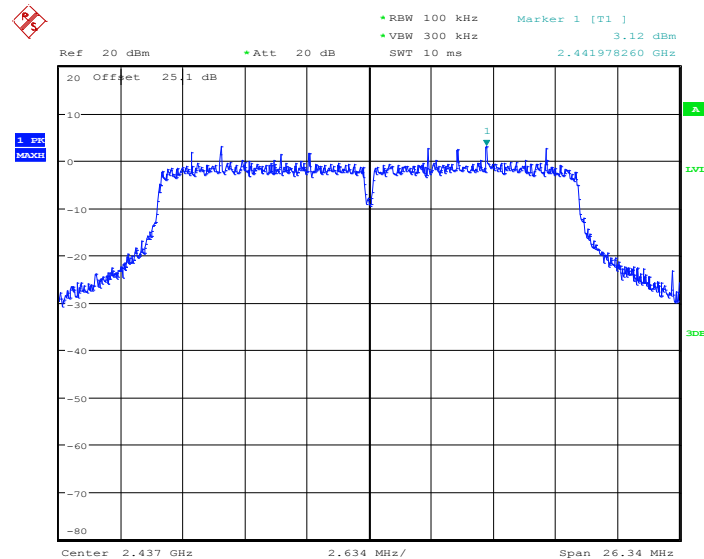


802.11n HT20 PSD 100kHz Plot on Channel 01



Date: 28.JAN.2013 17:02:24

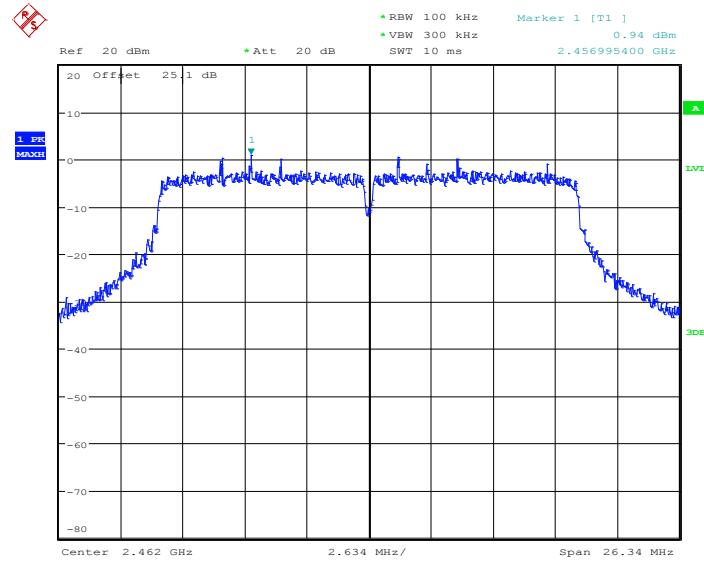
802.11n HT20 PSD 100kHz Plot on Channel 06



Date: 28.JAN.2013 17:07:08

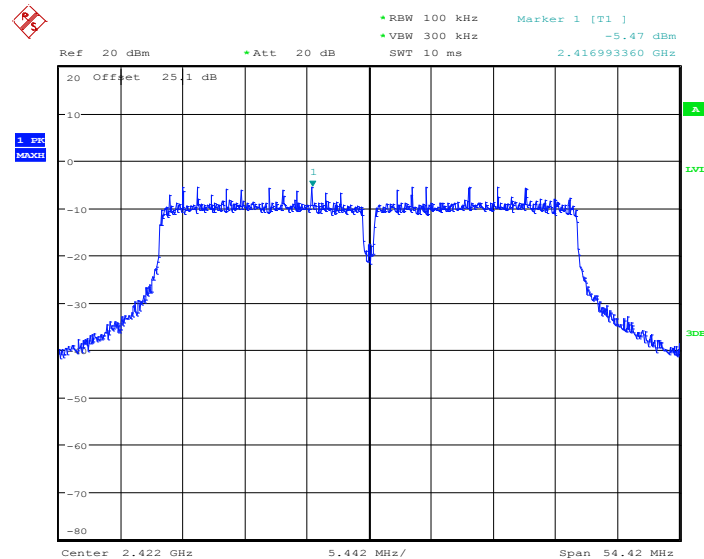


802.11n HT20 PSD 100kHz Plot on Channel 11



Date: 28.JAN.2013 17:11:55

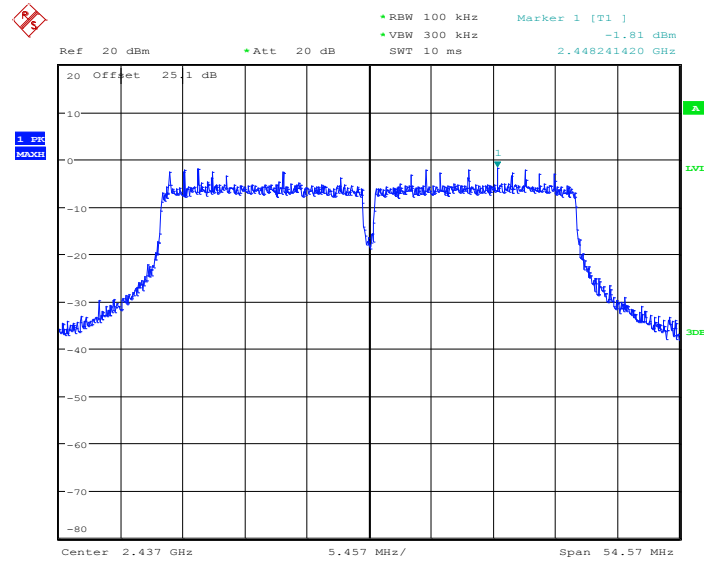
802.11n HT40 PSD 100kHz Plot on Channel 03



Date: 28.JAN.2013 17:22:14

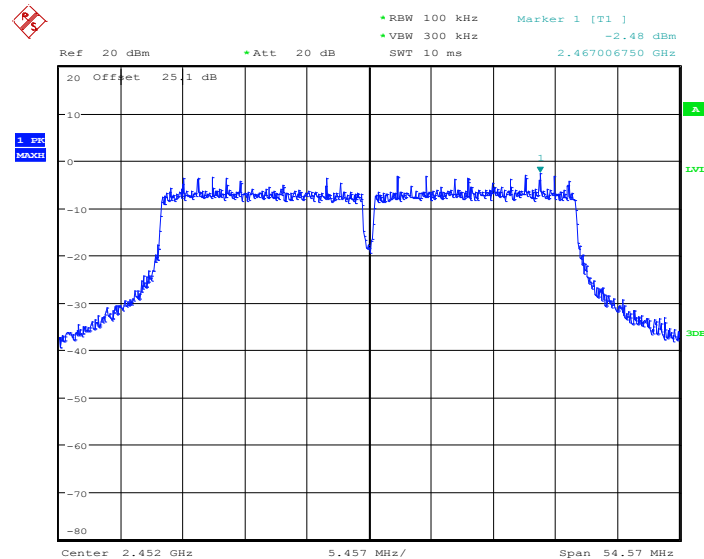


802.11n HT40 PSD 100kHz Plot on Channel 06



Date: 28.JAN.2013 17:29:24

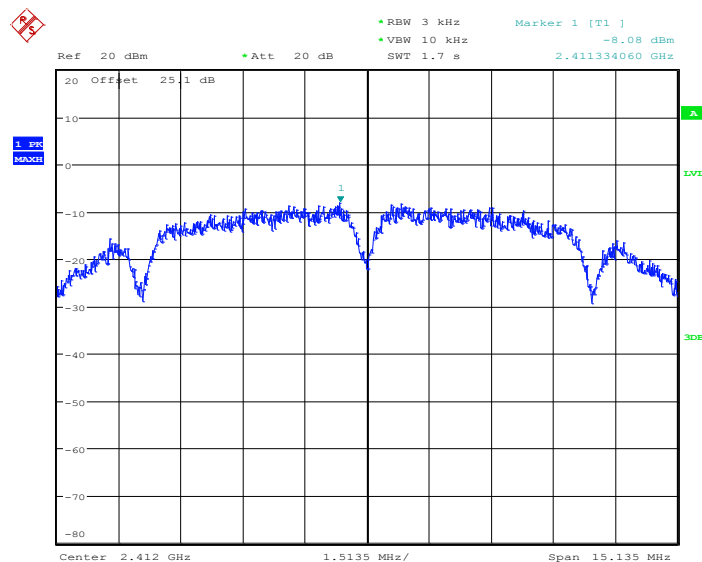
802.11n HT40 PSD 100kHz Plot on Channel 09



Date: 28.JAN.2013 17:57:06

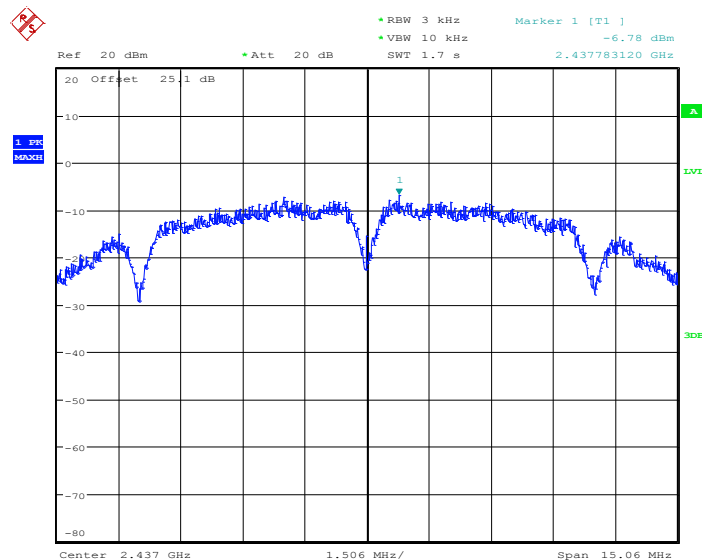
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

802.11b PSD 3kHz Plot on Channel 01



Date: 28.JAN.2013 16:25:22

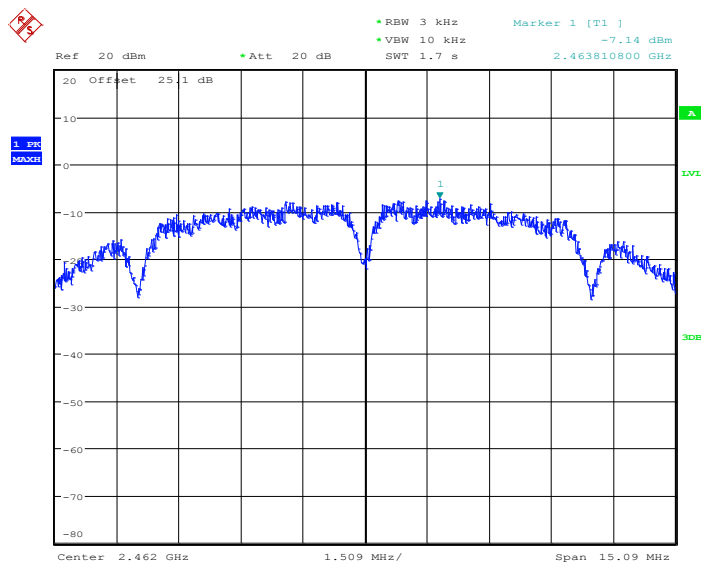
802.11b PSD 3kHz Plot on Channel 06



Date: 28.JAN.2013 16:30:29

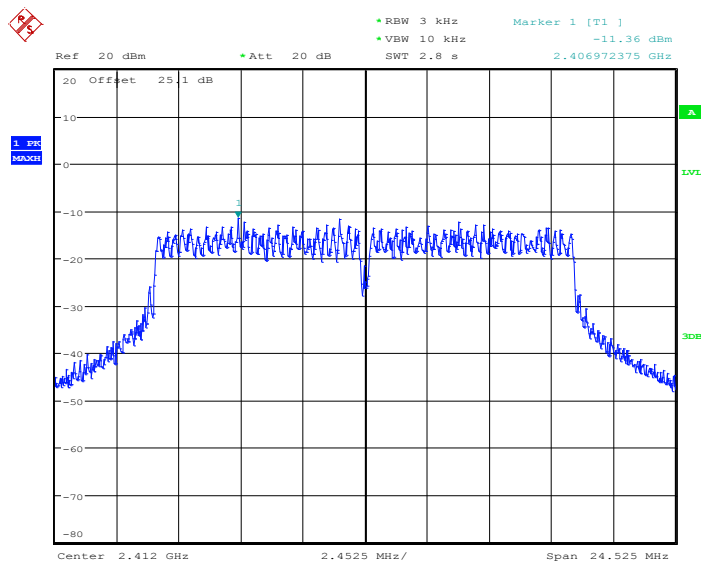


802.11b PSD 3kHz Plot on Channel 11



Date: 28.JAN.2013 16:35:50

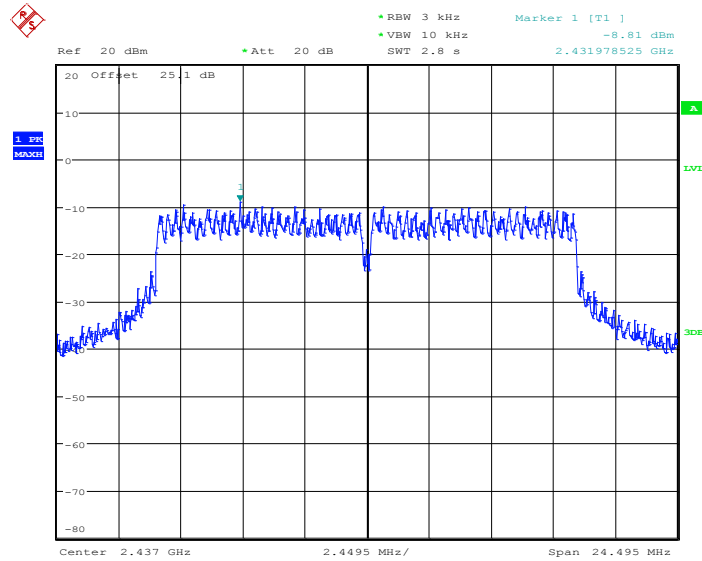
802.11g PSD 3kHz Plot on Channel 01



Date: 28.JAN.2013 16:42:52

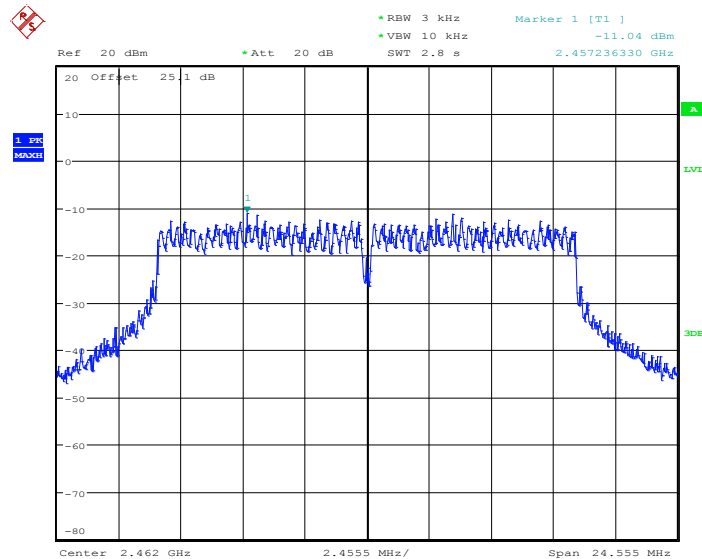


802.11g PSD 3kHz Plot on Channel 06



Date: 28.JAN.2013 16:52:26

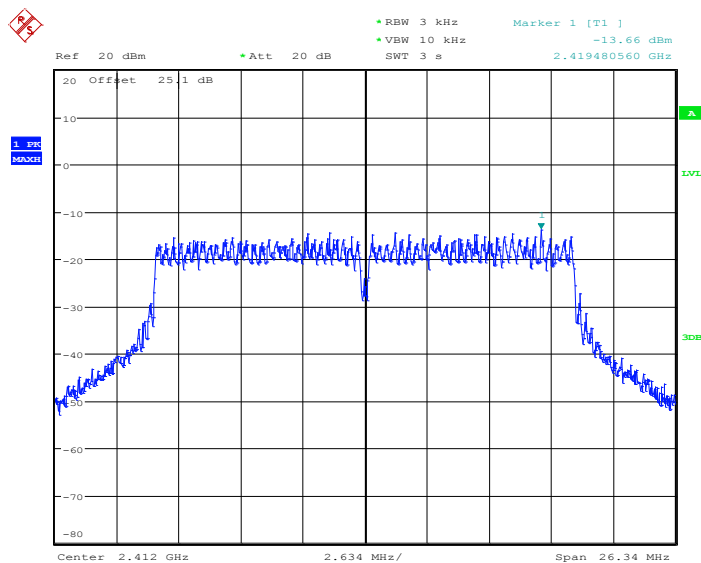
802.11g PSD 3kHz Plot on Channel 11



Date: 28.JAN.2013 16:56:07

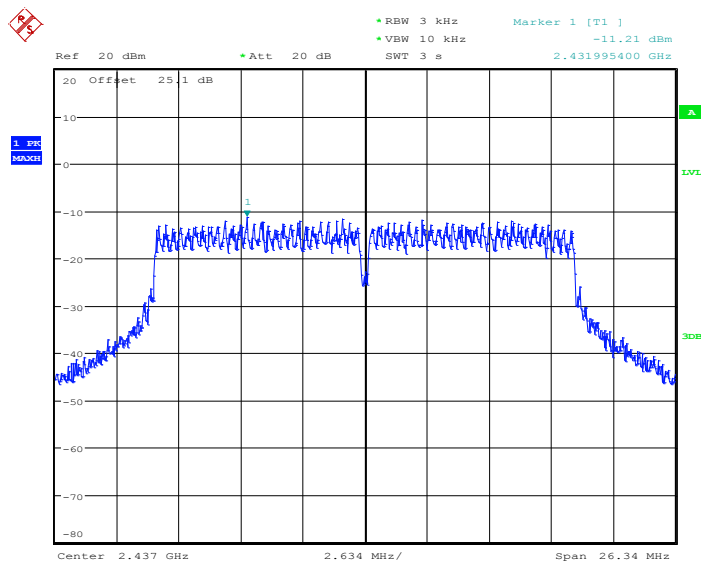


802.11n HT20 PSD 3kHz Plot on Channel 01



Date: 28.JAN.2013 17:02:16

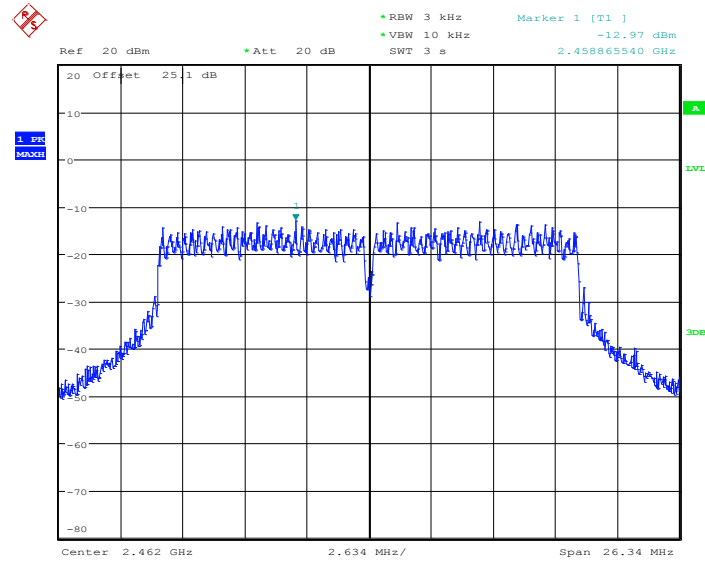
802.11n HT20 PSD 3kHz Plot on Channel 06



Date: 28.JAN.2013 17:07:00

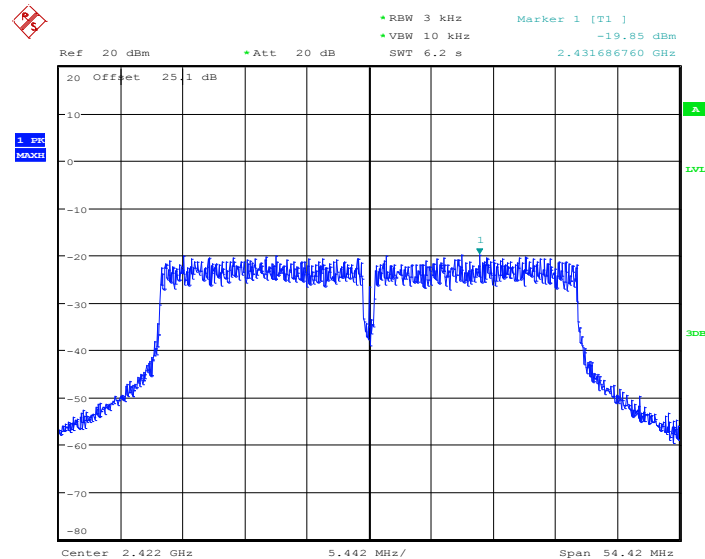


802.11n HT20 PSD 3kHz Plot on Channel 11



Date: 28.JAN.2013 17:11:47

802.11n HT40 PSD 3kHz Plot on Channel 03



Date: 28.JAN.2013 17:22:06



802.11n HT40 PSD 3kHz Plot on Channel 09



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

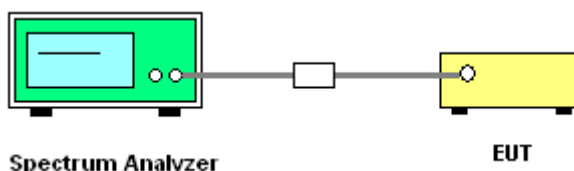
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 KHz, VBW=300 KHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

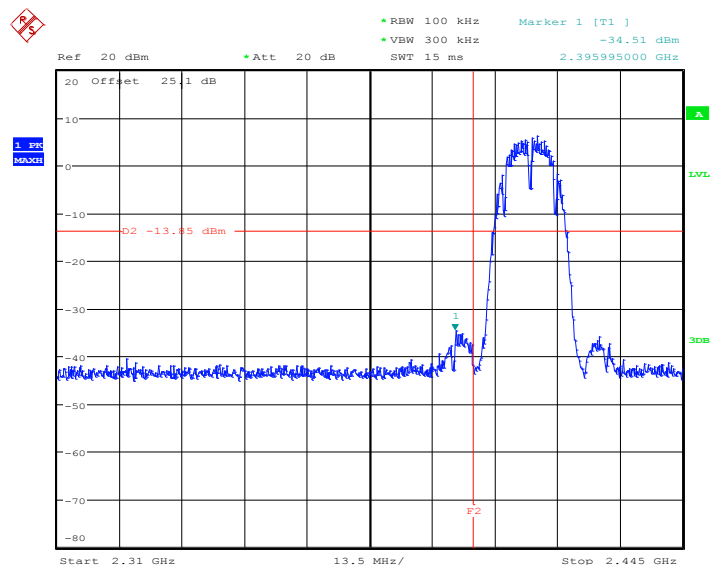


3.4.5 Test Result of Conducted Spurious at Band Edges

Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Rover Lee

802.11b

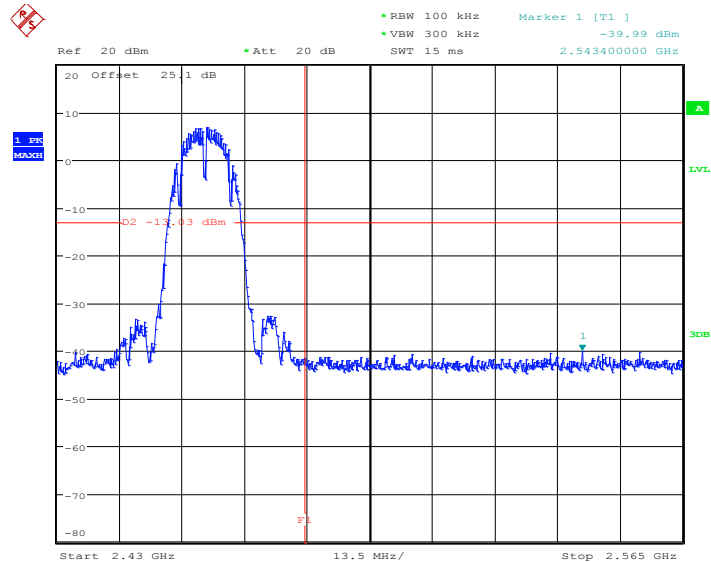
Low Band Edge Plot on Channel 01



Date: 28.JAN.2013 16:25:43

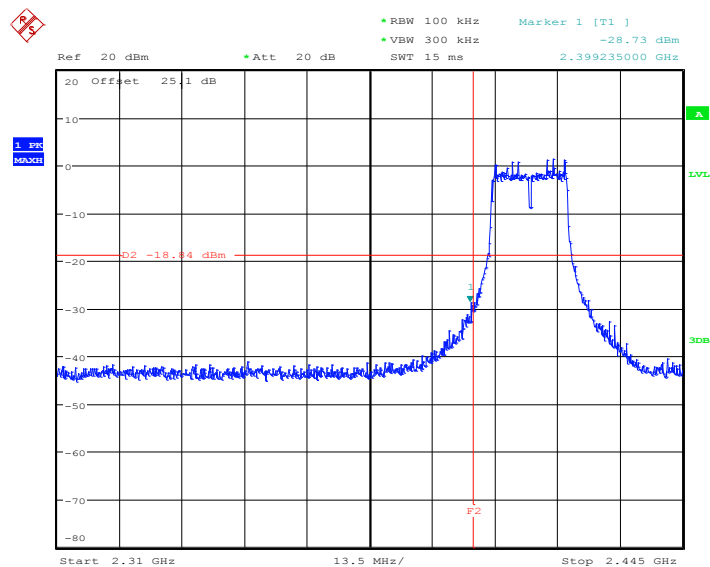
802.11b

High Band Edge Plot on Channel 11



Date: 28.JAN.2013 16:36:11

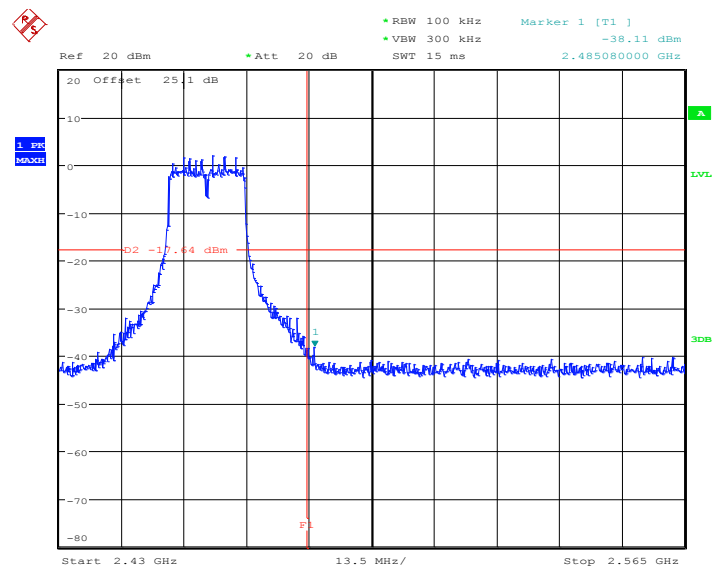
Test Mode :	802.11g	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Rover Lee

802.11g
Low Band Edge Plot on Channel 01


Date: 28.JAN.2013 16:43:12

802.11g

High Band Edge Plot on Channel 11



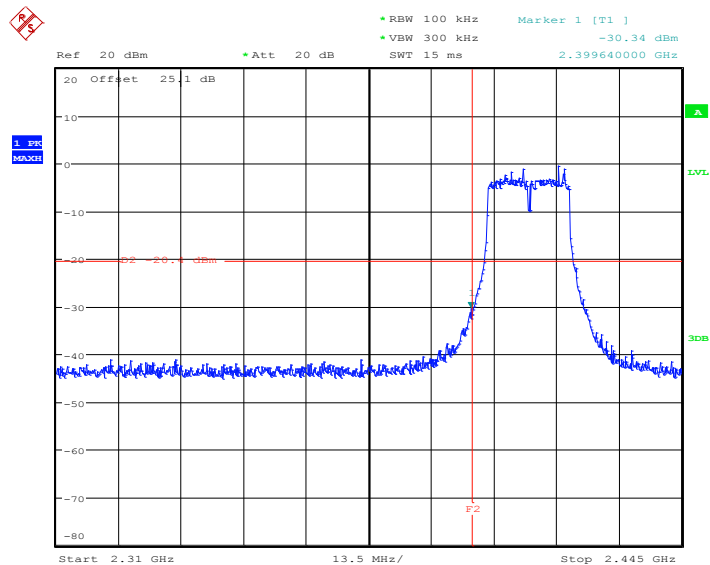
Date: 28.JAN.2013 16:56:28



Test Mode :	802.11n HT20	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Rover Lee

802.11n HT20

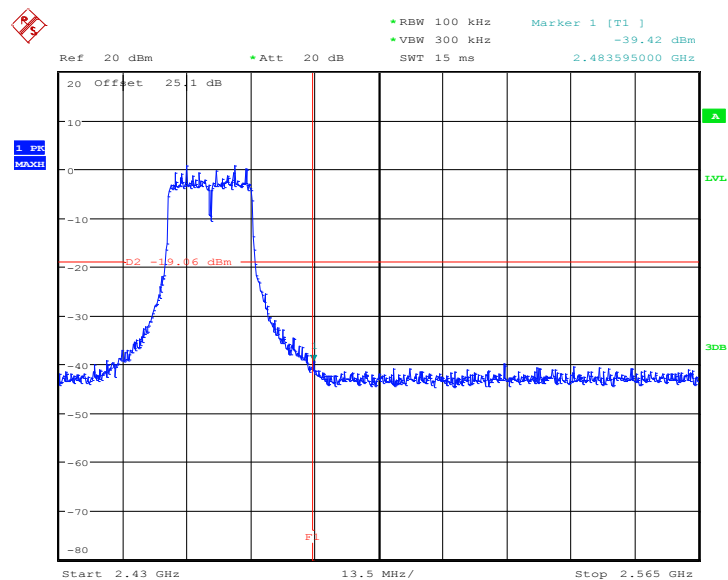
Low Band Edge Plot on Channel 01



Date: 28.JAN.2013 17:02:37

802.11n HT20

High Band Edge Plot on Channel 11



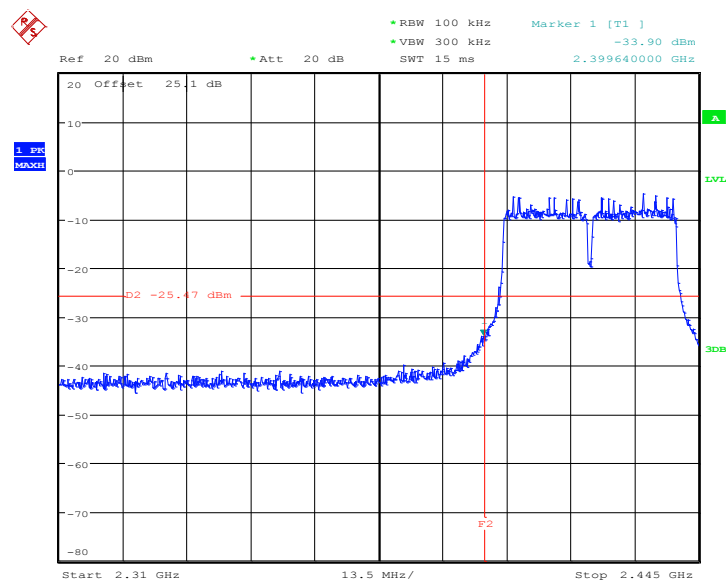
Date: 28.JAN.2013 17:12:08



Test Mode :	802.11n HT40	Temperature :	24~26°C
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	03 and 09	Test Engineer :	Rover Lee

802.11n HT40

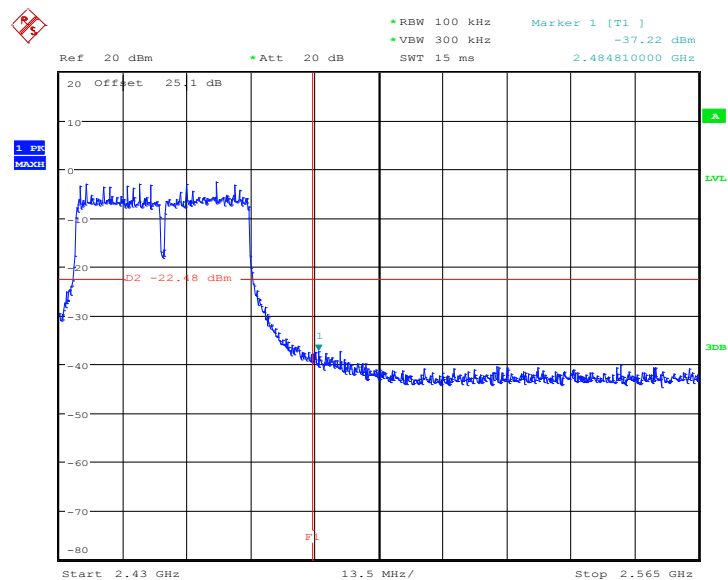
Low Band Edge Plot on Channel 03



Date: 28.JAN.2013 17:22:27

802.11n HT40

High Band Edge Plot on Channel 09



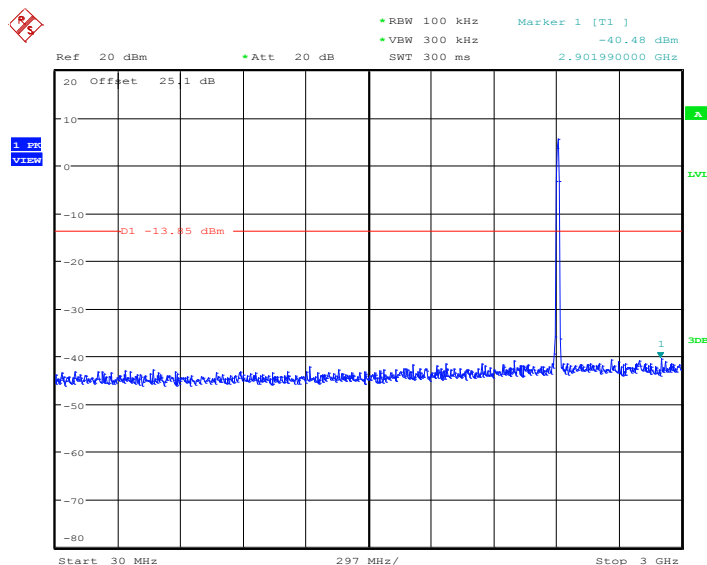
Date: 28.JAN.2013 17:57:19

3.4.5 Test Result of Conducted Spurious Emission

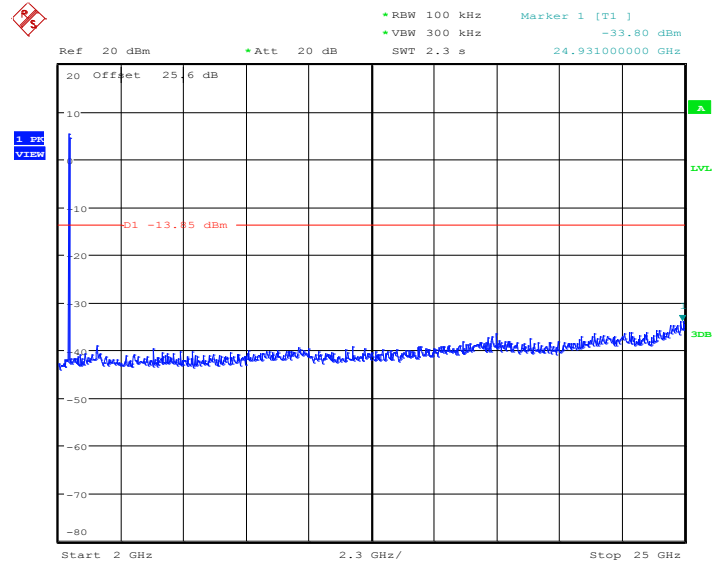
Test Mode :	802.11b	Temperature :	24~26°C
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Rover Lee

802.11b 30 MHz~3 GHz

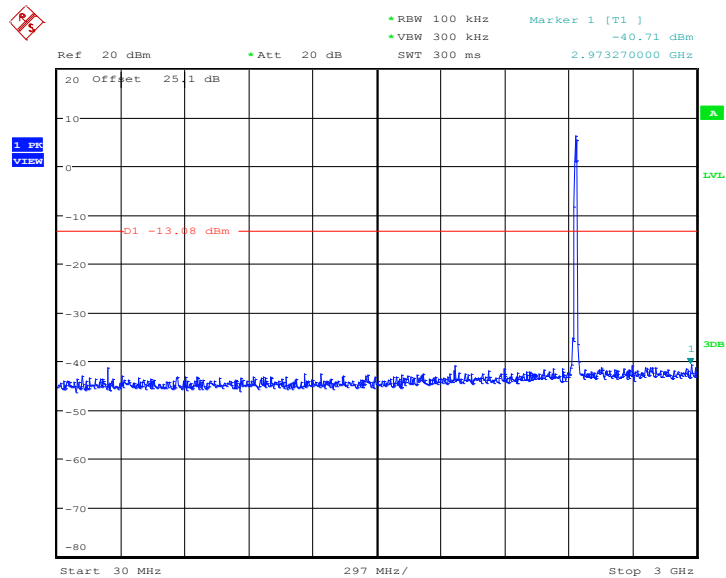
Conducted Spurious Emission Plot on Channel 01



Date: 28.JAN.2013 16:26:01

802.11b 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 01


Date: 28.JAN.2013 16:26:19

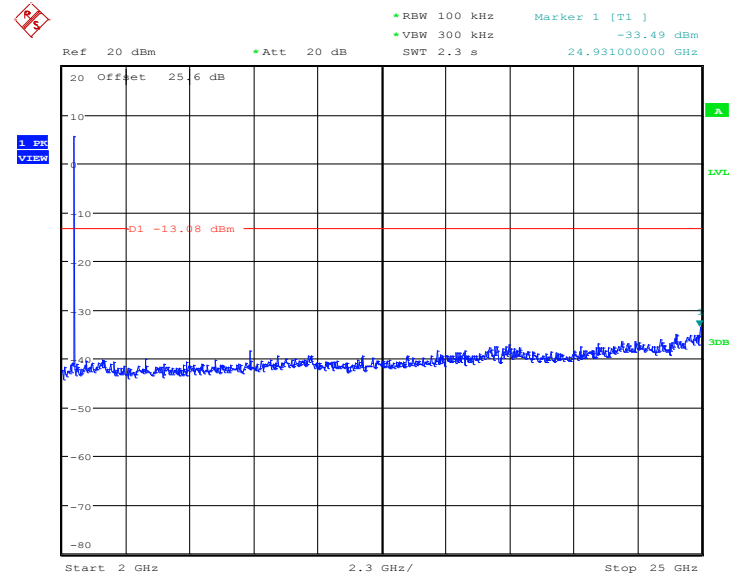
802.11b 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 06


Date: 28.JAN.2013 16:30:55



802.11b 2 GHz~25 GHz

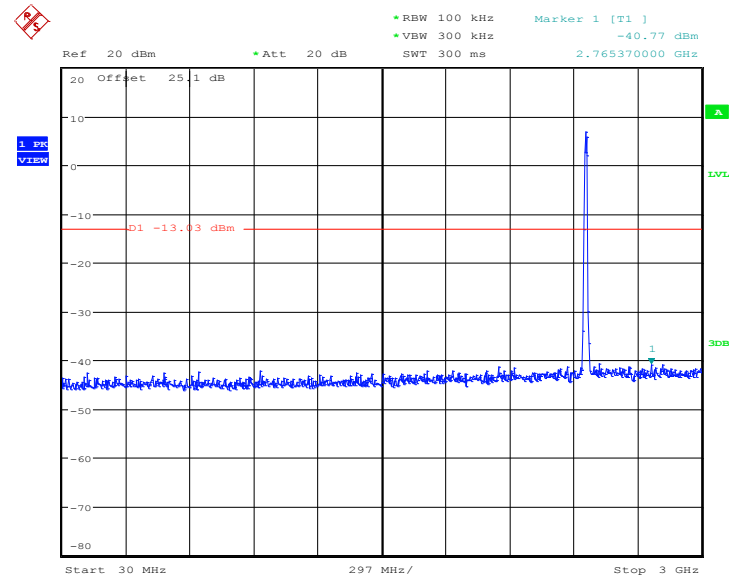
Conducted Spurious Emission Plot on Channel 06



Date: 28.JAN.2013 16:31:13

802.11b 30 MHz~3 GHz

Conducted Spurious Emission Plot on Channel 11

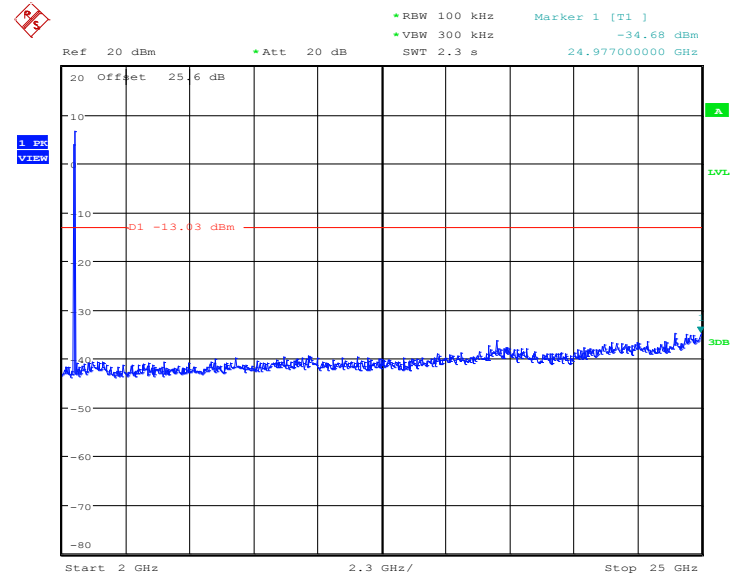


Date: 28.JAN.2013 16:36:29



802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11



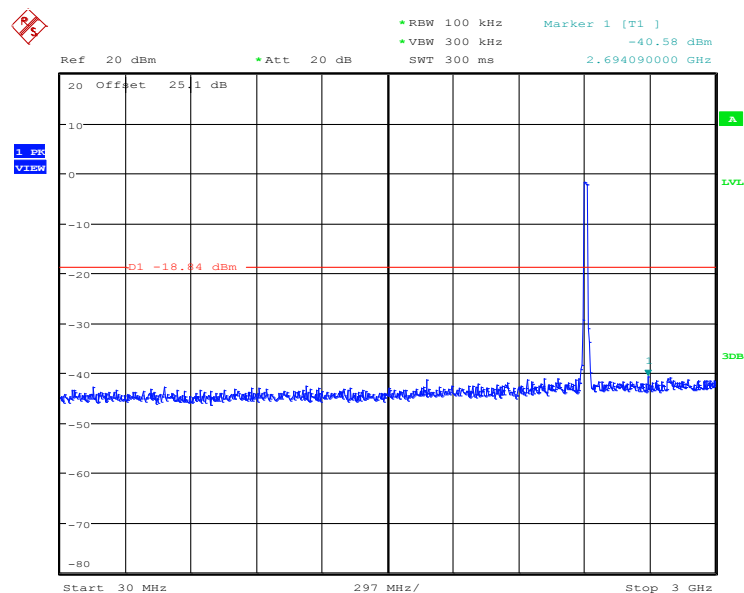
Date: 28.JAN.2013 16:36:47



Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Rover Lee

802.11g 30 MHz~3 GHz

Conducted Spurious Emission Plot on Channel 01

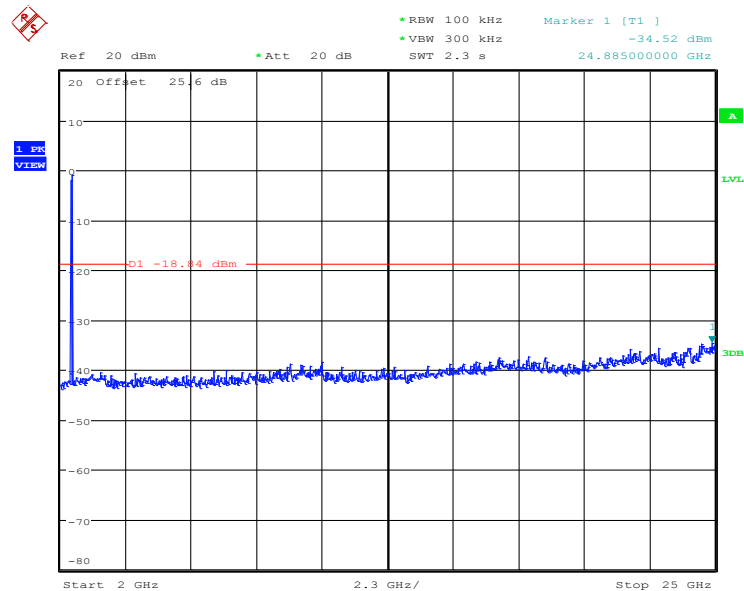


Date: 28.JAN.2013 16:43:31



802.11g 2 GHz~25 GHz

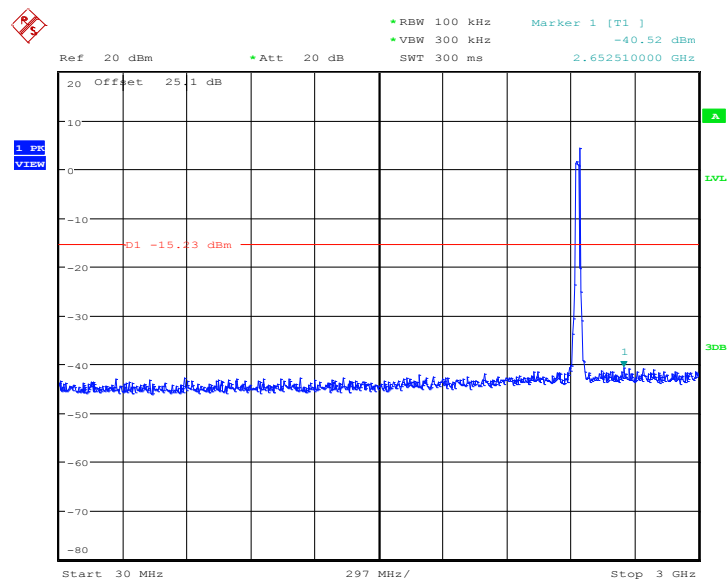
Conducted Spurious Emission Plot on Channel 01



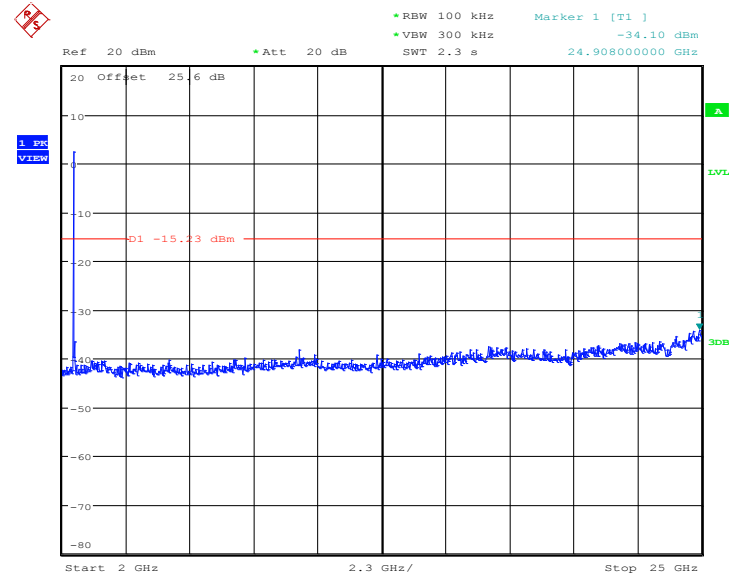
Date: 28.JAN.2013 16:43:49

802.11g 30 MHz~3 GHz

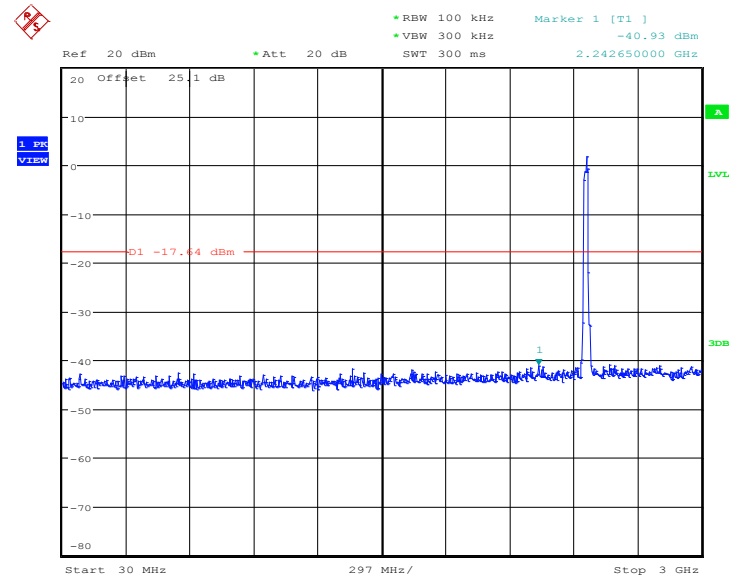
Conducted Spurious Emission Plot on Channel 06



Date: 28.JAN.2013 16:52:52

802.11g 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 06


Date: 28.JAN.2013 16:53:10

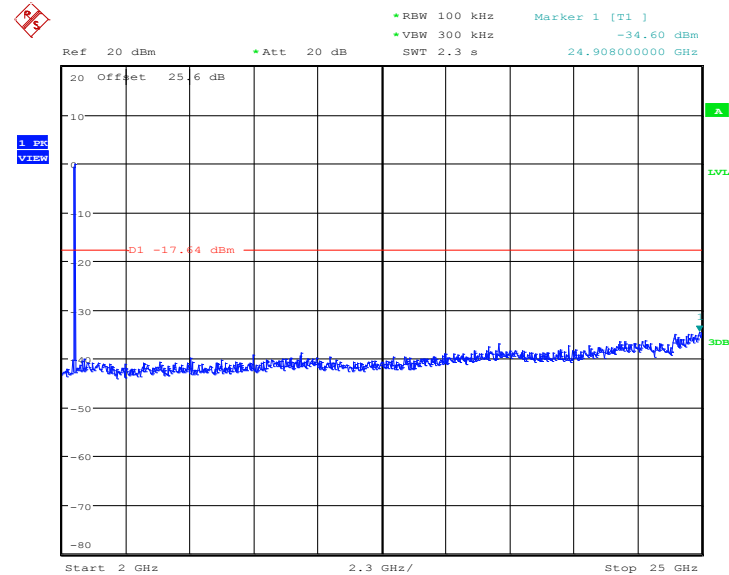
802.11g 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 11


Date: 28.JAN.2013 16:56:46



802.11g 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11

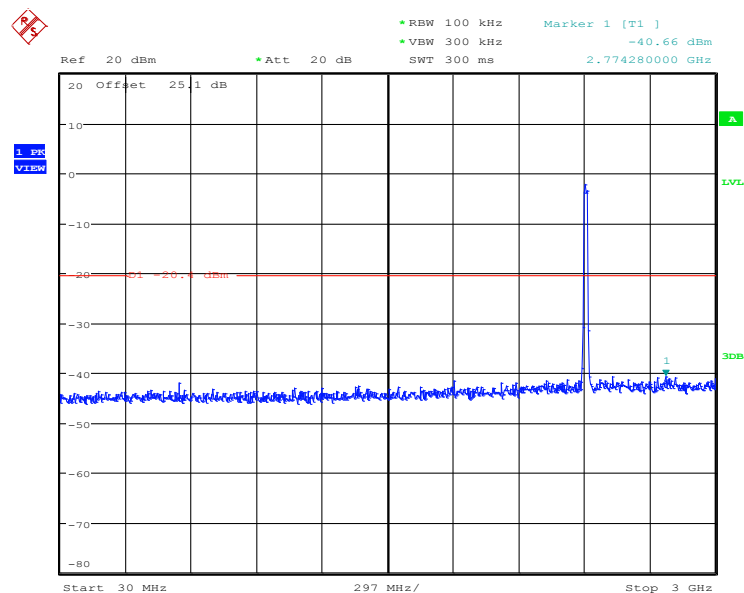


Date: 28.JAN.2013 16:57:04

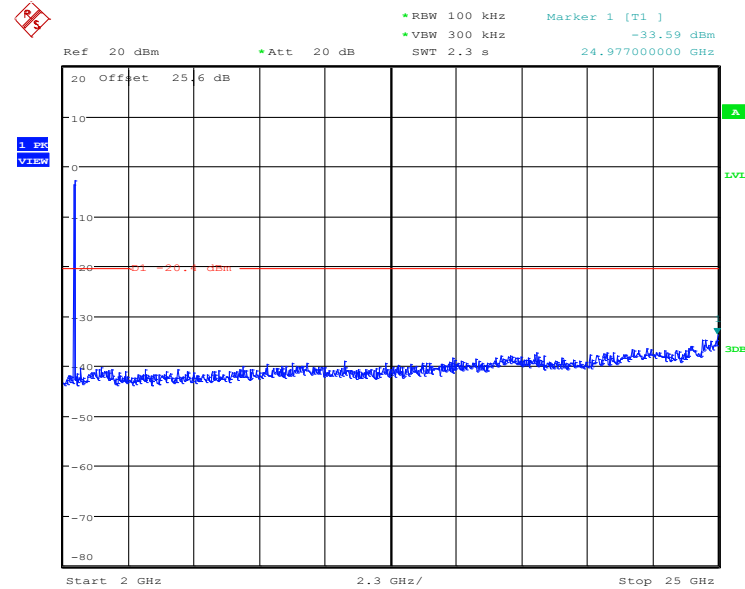


Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Rover Lee

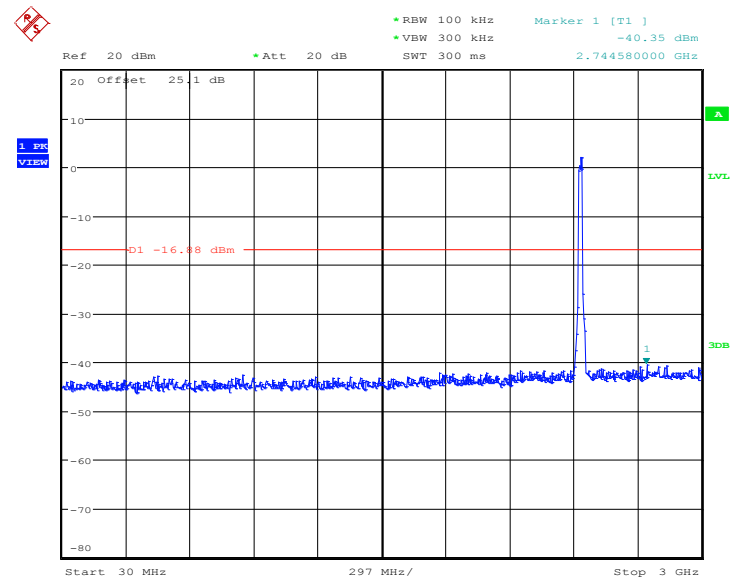
Conducted Spurious Emission Plot on Channel 01



Date: 28.JAN.2013 17:02:55

802.11n HT20 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 01


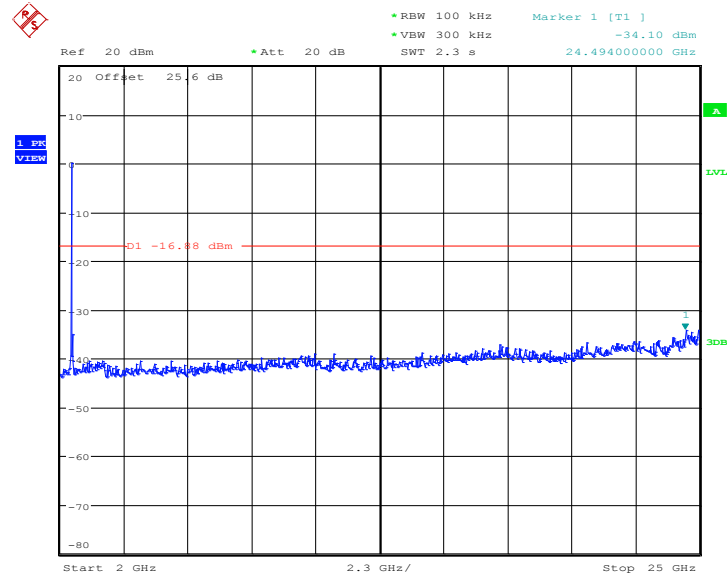
Date: 28.JAN.2013 17:03:13

802.11n HT20 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 06


Date: 28.JAN.2013 17:07:27

802.11n HT20 2 GHz~25 GHz

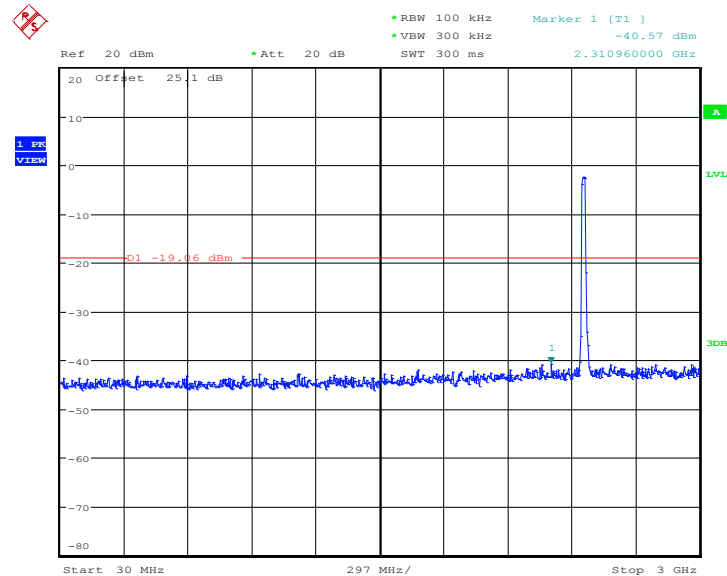
Conducted Spurious Emission Plot on Channel 06



Date: 28.JAN.2013 17:07:45

802.11n HT20 30 MHz~3 GHz

Conducted Spurious Emission Plot on Channel 11

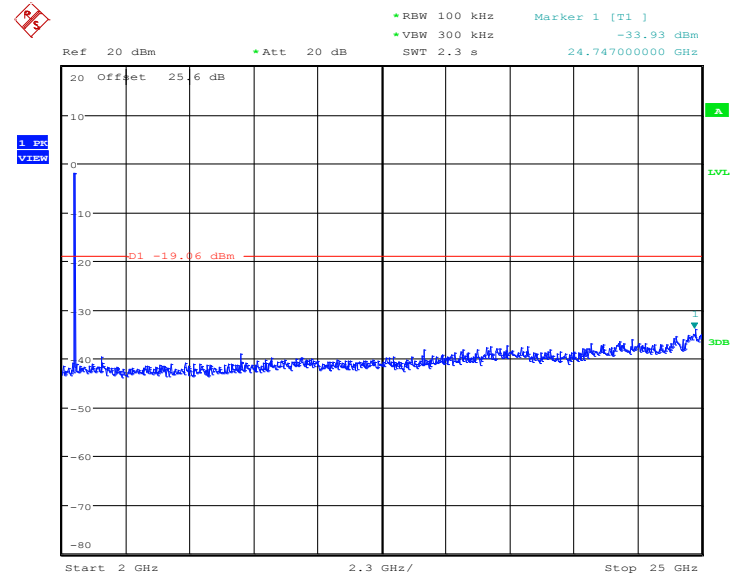


Date: 28.JAN.2013 17:12:26



802.11n HT20 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11



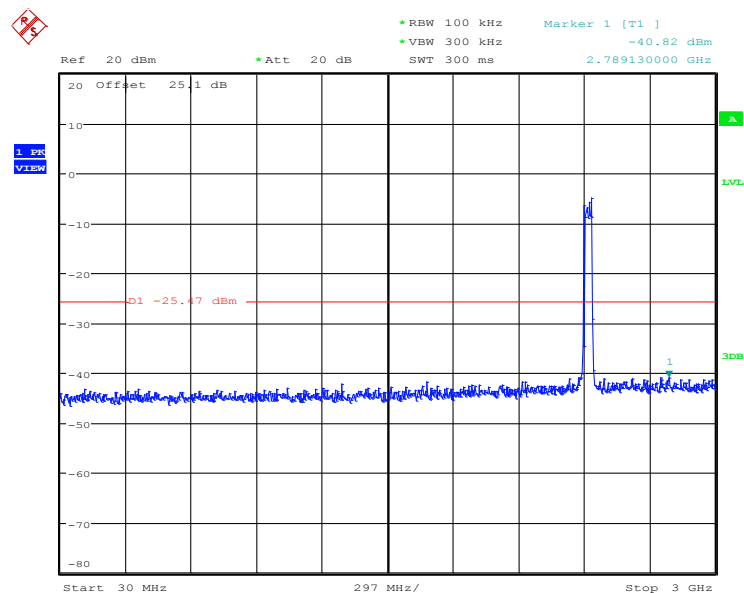
Date: 28.JAN.2013 17:12:44



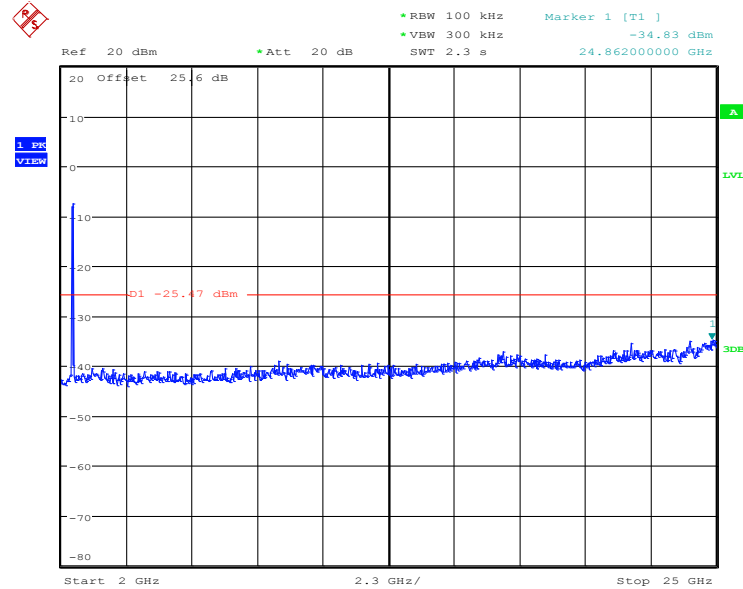
Test Mode :	802.11n HT40	Temperature :	24~26°C
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	03, 06, 09	Test Engineer :	Rover Lee

802.11n HT40 30 MHz~3 GHz

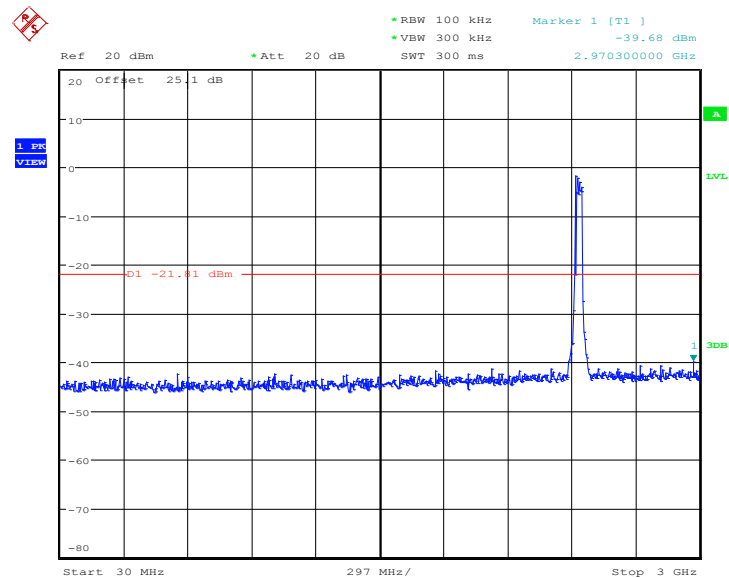
Conducted Spurious Emission Plot on Channel 03



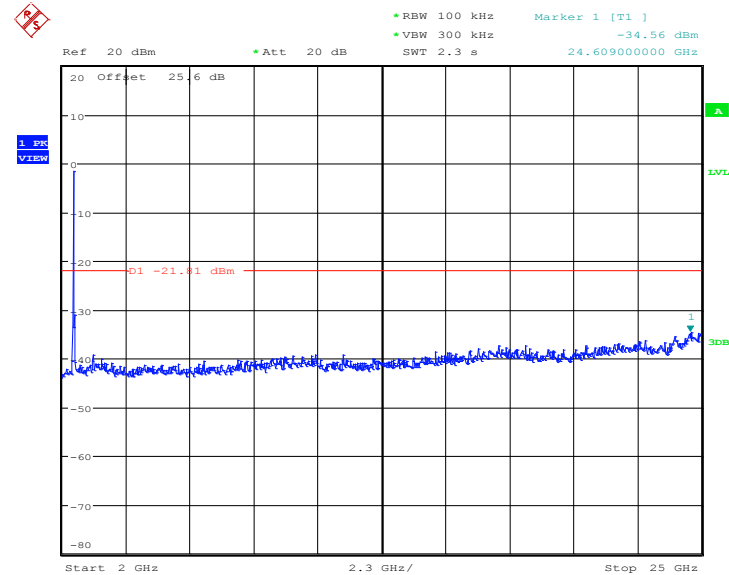
Date: 29.JAN.2013 07:57:40

802.11n HT40 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 03


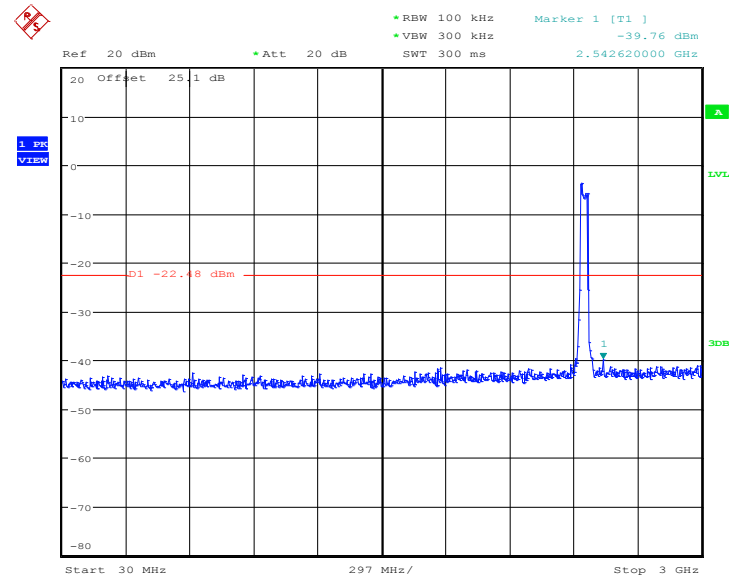
Date: 29.JAN.2013 07:57:57

802.11n HT40 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 06


Date: 29.JAN.2013 07:59:09

802.11n HT40 2 GHz~25 GHz
Conducted Spurious Emission Plot on Channel 06


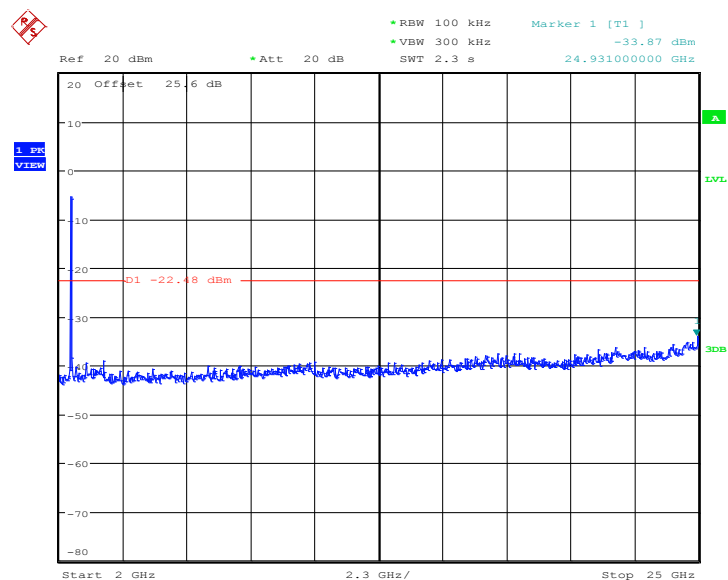
Date: 29.JAN.2013 07:59:27

802.11n HT40 30 MHz~3 GHz
Conducted Spurious Emission Plot on Channel 09


Date: 28.JAN.2013 17:57:37

802.11n HT40 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 09



Date: 28.JAN.2013 17:57:55

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedure

1. The testing follows the guidelines in ANSI C63.10-2009.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 KHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, $VBW = 3$ MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

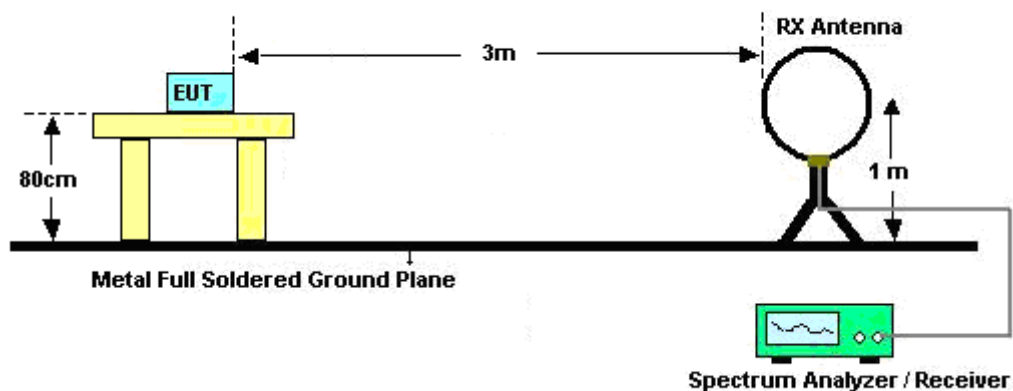
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(μ s)	1/T(KHz)	VBW Setting
802.11b	100	-	-	10Hz
802.11g	98.02	-	-	
2.4G 802.11n HT20	98.92	-	-	
2.4G 802.11n HT40	99.08	-	-	

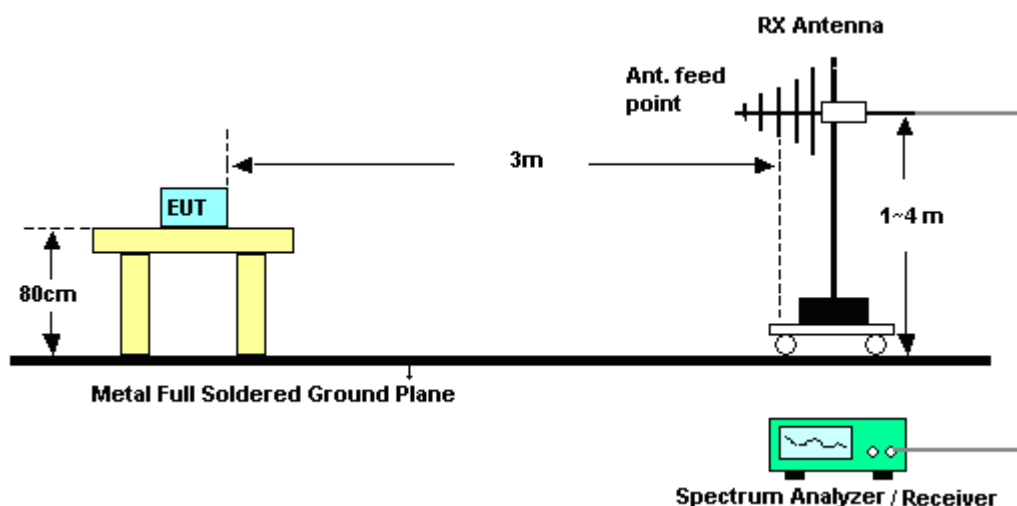
Note: For average measurement with duty cycle < 98%, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

3.5.4 Test Setup

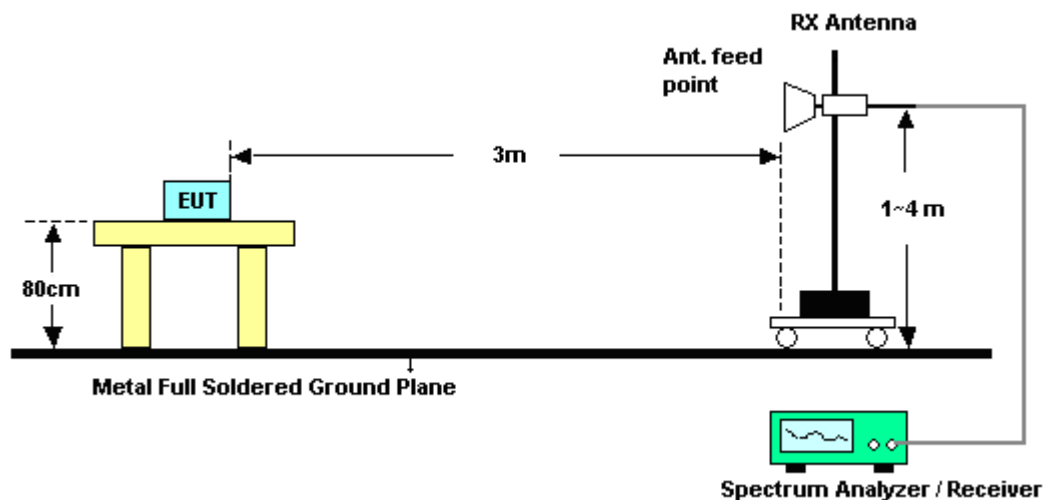
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Emissions (9KHz ~ 30MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result of Radiated Spurious at Band Edges

<Ant. 1>

Test Mode :	802.11b	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2386.32	55.3	-18.7	74	51.05	32.36	6.45	34.56	100	85	Peak
2386.23	49.17	-4.83	54	44.92	32.36	6.45	34.56	100	85	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2386.77	54.28	-19.72	74	50.03	32.36	6.45	34.56	106	314	Peak
2387.13	47.59	-6.41	54	43.34	32.36	6.45	34.56	106	314	Average

Test Mode :	802.11b	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2488.06	56.15	-17.85	74	51.61	32.5	6.59	34.55	100	50	Peak
2487.73	49.09	-4.91	54	44.55	32.5	6.59	34.55	100	50	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2488.27	54.7	-19.3	74	50.16	32.5	6.59	34.55	185	312	Peak
2487.73	47.38	-6.62	54	42.84	32.5	6.59	34.55	185	312	Average



Test Mode :	802.11g	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2388.84	70.23	-3.77	74	65.98	32.36	6.45	34.56	100	81	Peak
2390	52.07	-1.93	54	47.82	32.36	6.45	34.56	100	81	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2385.87	66.81	-7.19	74	62.56	32.36	6.45	34.56	135	276	Peak
2390	48.53	-5.47	54	44.28	32.36	6.45	34.56	135	276	Average

Test Mode :	802.11g	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	69.21	-4.79	74	64.69	32.48	6.59	34.55	100	47	Peak
2483.5	51.1	-2.9	54	46.58	32.48	6.59	34.55	100	47	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.68	69.83	-4.17	74	65.31	32.48	6.59	34.55	108	321	Peak
2483.5	50.61	-3.39	54	46.09	32.48	6.59	34.55	108	321	Average



Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.83	71.18	-2.82	74	66.93	32.36	6.45	34.56	100	49	Peak
2390	51.55	-2.45	54	47.3	32.36	6.45	34.56	100	49	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2386.14	63.43	-10.57	74	59.18	32.36	6.45	34.56	100	287	Peak
2390	44.45	-9.55	54	40.2	32.36	6.45	34.56	100	287	Average

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.89	72.84	-1.16	74	68.32	32.48	6.59	34.55	100	34	Peak
2483.5	49.78	-4.22	54	45.26	32.48	6.59	34.55	100	34	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2484.13	72.59	-1.41	74	68.07	32.48	6.59	34.55	100	320	Peak
2483.5	49.37	-4.63	54	44.85	32.48	6.59	34.55	100	320	Average



Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	53~55%
Test Channel :	03	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.92	65.15	-8.85	74	60.9	32.36	6.45	34.56	100	30	Peak
2390	49.03	-4.97	54	44.78	32.36	6.45	34.56	100	30	Average
2485.18	51.97	-22.03	74	47.45	32.48	6.59	34.55	100	30	Peak
2495.83	38.48	-15.52	54	33.94	32.5	6.59	34.55	100	30	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	64.66	-9.34	74	60.41	32.36	6.45	34.56	100	222	Peak
2390	47.52	-6.48	54	43.27	32.36	6.45	34.56	100	222	Average
2490.16	48.27	-25.73	74	43.73	32.5	6.59	34.55	100	222	Peak
2489.83	33.97	-20.03	54	29.43	32.5	6.59	34.55	100	222	Average



Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	53~55%
Test Channel :	09	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2387.4	53.61	-20.39	74	49.36	32.36	6.45	34.56	100	32	Peak
2381.19	38.18	-15.82	54	33.96	32.33	6.45	34.56	100	32	Average
2483.56	69.9	-4.1	74	65.38	32.48	6.59	34.55	100	32	Peak
2483.5	51.11	-2.89	54	46.59	32.48	6.59	34.55	100	32	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2384.88	51.86	-22.14	74	47.64	32.33	6.45	34.56	100	236	Peak
2389.83	36.4	-17.6	54	32.15	32.36	6.45	34.56	100	236	Average
2487.07	65.98	-8.02	74	61.46	32.48	6.59	34.55	100	236	Peak
2483.5	45.86	-8.14	54	41.34	32.48	6.59	34.55	100	236	Average

<Ant. 2>

Test Mode :	802.11b	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2386.32	52.78	-21.22	74	48.53	32.36	6.45	34.56	100	329	Peak
2385.78	45.14	-8.86	54	40.89	32.36	6.45	34.56	100	329	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	62.85	-11.15	74	58.6	32.36	6.45	34.56	100	197	Peak
2385.78	50.28	-3.72	54	46.03	32.36	6.45	34.56	100	197	Average

Test Mode :	802.11b	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2487.01	56.35	-17.65	74	51.83	32.48	6.59	34.55	137	236	Peak
2487.73	50.16	-3.84	54	45.62	32.5	6.59	34.55	137	236	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2488.12	56.81	-17.19	74	52.27	32.5	6.59	34.55	100	187	Peak
2487.73	50.81	-3.19	54	46.27	32.5	6.59	34.55	100	187	Average



Test Mode :	802.11g	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	60.04	-13.96	74	55.79	32.36	6.45	34.56	142	233	Peak
2390	44.78	-9.22	54	40.53	32.36	6.45	34.56	142	233	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2387.22	73.24	-0.76	74	68.99	32.36	6.45	34.56	100	188	Peak
2390	46.47	-7.53	54	42.22	32.36	6.45	34.56	100	188	Average

Test Mode :	802.11g	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.65	66.81	-7.19	74	62.29	32.48	6.59	34.55	135	237	Peak
2483.5	49.99	-4.01	54	45.47	32.48	6.59	34.55	135	237	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	67.63	-6.37	74	63.11	32.48	6.59	34.55	100	190	Peak
2483.5	49.65	-4.35	54	45.13	32.48	6.59	34.55	100	190	Average

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.47	63.47	-10.53	74	59.22	32.36	6.45	34.56	140	232	Peak
2390	44.41	-9.59	54	40.16	32.36	6.45	34.56	140	232	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.74	73.66	-0.34	74	69.41	32.36	6.45	34.56	100	186	Peak
2390	46.81	-7.19	54	42.56	32.36	6.45	34.56	100	186	Average

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2487.07	65.36	-8.64	74	60.84	32.48	6.59	34.55	100	55	Peak
2483.5	43.31	-10.69	54	38.79	32.48	6.59	34.55	100	55	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.86	68.78	-5.22	74	64.26	32.48	6.59	34.55	100	195	Peak
2483.5	46.59	-7.41	54	42.07	32.48	6.59	34.55	100	195	Average



Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	53~55%
Test Channel :	03	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2387.49	60.66	-13.34	74	56.41	32.36	6.45	34.56	100	312	Peak
2390	48.39	-5.61	54	44.14	32.36	6.45	34.56	100	312	Average
2497.63	47.89	-26.11	74	43.35	32.5	6.59	34.55	100	312	Peak
2497.51	35.66	-18.34	54	31.12	32.5	6.59	34.55	100	312	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2387.22	68.54	-5.46	74	64.29	32.36	6.45	34.56	100	192	Peak
2390	53.16	-0.84	54	48.91	32.36	6.45	34.56	100	192	Average
2485.63	51.61	-22.39	74	47.09	32.48	6.59	34.55	100	192	Peak
2497.21	39.46	-14.54	54	34.92	32.5	6.59	34.55	100	192	Average



Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	53~55%
Test Channel :	09	Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	56.48	-17.52	74	52.23	32.36	6.45	34.56	108	240	Peak
2379.03	41.52	-12.48	54	37.33	32.33	6.42	34.56	108	240	Average
2483.92	64.54	-9.46	74	60.02	32.48	6.59	34.55	108	240	Peak
2483.5	49.45	-4.55	54	44.93	32.48	6.59	34.55	108	240	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2385.87	58.25	-15.75	74	54	32.36	6.45	34.56	126	189	Peak
2381.37	42.6	-11.4	54	38.38	32.33	6.45	34.56	126	189	Average
2484.79	64.17	-9.83	74	59.65	32.48	6.59	34.55	126	189	Peak
2483.71	48.99	-5.01	54	44.47	32.48	6.59	34.55	126	189	Average

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

<Ant. 1>

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 2397.12 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 108.22dBμV/m - 20dB = 88.22 dBμV/m. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2397.12	66.16	-22.06	88.22	61.91	32.36	6.45	34.56	100	85	Peak
2412	104.36	-	-	100.05	32.38	6.49	34.56	100	85	Average
2412	108.22	-	-	103.91	32.38	6.49	34.56	100	85	Peak

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2412 MHz is Fundamental signal which can be ignored. 2. 2396.94 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2396.94	70.08	-17.13	87.21	65.83	32.36	6.45	34.56	106	314	Peak
2412	103.35	-	-	99.04	32.38	6.49	34.56	106	314	Average
2412	107.21	-	-	102.9	32.38	6.49	34.56	106	314	Peak

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2439 MHz and 2440 MHz are Fundamental signals which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
143.94	37.14	-6.36	43.5	56.42	10.63	1.36	31.27	-	-	Peak
179.85	41.94	-1.56	43.5	62.3	9.35	1.51	31.22	135	296	Peak
179.85	41.89	-1.61	43.5	62.25	9.35	1.51	31.22	135	296	QP
215.76	37.98	-5.52	43.5	58.37	9.1	1.63	31.12	-	-	Peak
323.1	38	-8	46	53.42	13.53	1.98	30.93	-	-	Peak
798.4	39.63	-6.37	46	48.66	19.8	3.09	31.92	-	-	Peak
896.4	42.87	-3.13	46	50.54	20.56	3.24	31.47	-	-	Peak
2439	104.49	-	-	100.1	32.43	6.52	34.56	100	92	Average
2440	108.52	-	-	104.13	32.43	6.52	34.56	100	92	Peak
4875	48.23	-25.77	74	58.88	34.85	10.18	55.68	100	0	Peak
7311	48.72	-5.28	54	57.92	36.14	10.94	56.28	103	54	Average
7311	54.66	-19.34	74	63.86	36.14	10.94	56.28	103	54	Peak

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2438 MHz is Fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
38.64	23.47	-16.53	40	40.64	13.66	0.67	31.5	-	-	Peak
179.85	34.43	-9.07	43.5	54.79	9.35	1.51	31.22	-	-	Peak
214.95	32.56	-10.94	43.5	52.96	9.1	1.63	31.13	-	-	Peak
499.5	32.89	-13.11	46	44.74	17.69	2.46	32	-	-	Peak
798.4	30.69	-15.31	46	39.72	19.8	3.09	31.92	-	-	Peak
900.6	39.61	-6.39	46	47.26	20.6	3.24	31.49	100	286	Peak
2438	102.95	-	-	98.56	32.43	6.52	34.56	192	312	Average
2438	106.84	-	-	102.45	32.43	6.52	34.56	192	312	Peak
4875	49.01	-24.99	74	59.66	34.85	10.18	55.68	100	0	Peak
7311	49.15	-4.85	54	58.35	36.14	10.94	56.28	100	39	Average
7311	55.11	-18.89	74	64.31	36.14	10.94	56.28	100	39	Peak

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2460	104.96	-	-	100.51	32.45	6.56	34.56	100	50	Average
2460	109.07	-	-	104.62	32.45	6.56	34.56	100	50	Peak

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	103.07	-	-	98.62	32.45	6.56	34.56	185	312	Average
2462	106.96	-	-	102.51	32.45	6.56	34.56	185	312	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. 2399.19 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.19	82.19	-6.05	88.24	77.94	32.36	6.45	34.56	100	81	Peak
2414	97.08	-	-	92.77	32.38	6.49	34.56	100	81	Average
2414	108.24	-	-	103.93	32.38	6.49	34.56	100	81	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. 2399.91 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.91	76.85	-8.51	85.36	72.6	32.36	6.45	34.56	135	276	Peak
2414	94.05	-	-	89.74	32.38	6.49	34.56	135	276	Average
2414	105.36	-	-	101.05	32.38	6.49	34.56	135	276	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2440 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2352	39.63	-14.37	54	35.5	32.31	6.38	34.56	100	88	Average
2352	54.42	-19.58	74	50.29	32.31	6.38	34.56	100	88	Peak
2440	99.64	-	-	95.25	32.43	6.52	34.56	100	88	Average
2440	111.29	-	-	106.9	32.43	6.52	34.56	100	88	Peak
4875	47.63	-26.37	74	58.28	34.85	10.18	55.68	200	0	Peak
7311	45.74	-8.26	54	54.94	36.14	10.94	56.28	103	55	Average
7311	57.73	-16.27	74	66.93	36.14	10.94	56.28	103	55	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2439 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2439	99.01	-	-	94.62	32.43	6.52	34.56	130	314	Average
2439	110.79	-	-	106.4	32.43	6.52	34.56	130	314	Peak
4875	47.95	-26.05	74	58.6	34.85	10.18	55.68	100	0	Peak
7311	45.56	-8.44	54	54.76	36.14	10.94	56.28	147	61	Average
7311	58.69	-15.31	74	67.89	36.14	10.94	56.28	147	61	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2380	38.5	-15.5	54	34.28	32.33	6.45	34.56	100	47	Average
2380	53.56	-20.44	74	49.34	32.33	6.45	34.56	100	47	Peak
2460	97.81	-	-	93.36	32.45	6.56	34.56	100	47	Average
2460	108.63	-	-	104.18	32.45	6.56	34.56	100	47	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2380	37.81	-16.19	54	33.59	32.33	6.45	34.56	108	321	Average
2380	53.46	-20.54	74	49.24	32.33	6.45	34.56	108	321	Peak
2464	99.07	-	-	94.62	32.45	6.56	34.56	108	321	Average
2464	107.91	-	-	103.46	32.45	6.56	34.56	108	321	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2408 MHz and 2410 MHz are fundamental signals which can be ignored. 2. 2399.82 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.82	87.59	-0.93	88.52	83.34	32.36	6.45	34.56	100	49	Peak
2408	108.52	-	-	104.21	32.38	6.49	34.56	100	49	Peak
2410	97.22	-	-	92.91	32.38	6.49	34.56	100	49	Average

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 2399.55 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.55	81.88	-1.59	83.47	77.63	32.36	6.45	34.56	100	287	Peak
2410	92.16	-	-	87.85	32.38	6.49	34.56	100	287	Average
2410	103.47	-	-	99.16	32.38	6.49	34.56	100	287	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2439 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2439	99.33	-	-	94.94	32.43	6.52	34.56	100	92	Average
2439	110.5	-	-	106.11	32.43	6.52	34.56	100	92	Peak
4875	48.22	-25.78	74	58.87	34.85	10.18	55.68	100	0	Peak
7311	43.25	-10.75	54	52.45	36.14	10.94	56.28	103	56	Average
7311	57.04	-16.96	74	66.24	36.14	10.94	56.28	103	56	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2439 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2439	95.52	-	-	91.13	32.43	6.52	34.56	100	280	Average
2439	106.56	-	-	102.17	32.43	6.52	34.56	100	280	Peak
4875	48.08	-25.92	74	58.73	34.85	10.18	55.68	100	0	Peak
7311	43.59	-10.41	54	52.79	36.14	10.94	56.28	143	62	Average
7311	57.72	-16.28	74	66.92	36.14	10.94	56.28	143	62	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	96.53	-	-	92.08	32.45	6.56	34.56	100	34	Average
2462	107.81	-	-	103.36	32.45	6.56	34.56	100	34	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	95.28	-	-	90.83	32.45	6.56	34.56	100	320	Average
2464	106.56	-	-	102.11	32.45	6.56	34.56	100	320	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	03	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2426 MHz is fundamental signal which can be ignored. 2. 2399.28 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.28	78.13	-3.92	82.05	73.88	32.36	6.45	34.56	100	30	Peak
2426	90.62	-	-	86.29	32.4	6.49	34.56	100	30	Average
2426	102.05	-	-	97.72	32.4	6.49	34.56	100	30	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	03	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2424 MHz is fundamental signal which can be ignored. 2. 2399.64 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.64	78.1	-0.59	78.69	73.85	32.36	6.45	34.56	100	222	Peak
2424	86.91	-	-	82.58	32.4	6.49	34.56	100	222	Average
2424	98.69	-	-	94.36	32.4	6.49	34.56	100	222	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2435 MHz is fundamental signal which can be ignored. 2. 2396.31 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2396.31	75.15	-11.64	86.79	70.9	32.36	6.45	34.56	100	46	Peak
2435	96.27	-	-	91.91	32.4	6.52	34.56	100	46	Average
2435	106.79	-	-	102.43	32.4	6.52	34.56	100	46	Peak
4875	47.64	-26.36	74	58.29	34.85	10.18	55.68	100	0	Peak
7311	49.54	-24.46	74	58.74	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2439 MHz is fundamental signal which can be ignored. 2. 2396.76 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2396.76	69.57	-11.84	81.41	65.32	32.36	6.45	34.56	100	239	Peak
2439	90.53	-	-	86.14	32.43	6.52	34.56	100	239	Average
2439	101.41	-	-	97.02	32.43	6.52	34.56	100	239	Peak
4875	47.63	-26.37	74	58.28	34.85	10.18	55.68	100	0	Peak
7311	50.01	-23.99	74	59.21	36.14	10.94	56.28	100	0	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	09	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2454 MHz is fundamental signal which can be ignored. 2. 2391.21 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2391.21	54.84	-29.25	84.09	50.59	32.36	6.45	34.56	100	32	Peak
2454	92.69	-	-	88.24	32.45	6.56	34.56	100	32	Average
2454	104.09	-	-	99.64	32.45	6.56	34.56	100	32	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	09	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2454 MHz is fundamental signal which can be ignored. 2. 2396.94 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2396.94	53.73	-25.8	79.53	49.48	32.36	6.45	34.56	100	236	Peak
2454	88.49	-	-	84.04	32.45	6.56	34.56	100	236	Average
2454	99.53	-	-	95.08	32.45	6.56	34.56	100	236	Peak

<Ant. 2>

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. 2397.57 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2397.57	71.63	-17.66	89.29	67.38	32.36	6.45	34.56	100	197	Peak
2412	105.24	-	-	100.93	32.38	6.49	34.56	100	197	Average
2412	109.29	-	-	104.98	32.38	6.49	34.56	100	197	Peak

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2410 MHz is Fundamental signal which can be ignored. 2. 2397.12 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2397.12	63.9	-19.44	83.34	59.65	32.36	6.45	34.56	100	329	Peak
2410	99.18	-	-	94.87	32.38	6.49	34.56	100	329	Average
2410	103.34	-	-	99.03	32.38	6.49	34.56	100	329	Peak



Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2439 MHz is Fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
143.94	29.84	-13.66	43.5	49.33	10.83	1.38	31.7	-	-	Peak
179.04	32.9	-10.6	43.5	53.9	9.15	1.54	31.69	-	-	Peak
216.3	33.01	-12.99	46	54.05	9.02	1.6	31.66	-	-	Peak
324.5	29.05	-16.95	46	45.02	13.65	1.98	31.6	-	-	Peak
499.5	29.4	-16.6	46	41.15	17.6	2.43	31.78	-	-	Peak
898.5	36.55	-9.45	46	44.17	20.7	3.29	31.61	100	248	Peak
2439	104.87	-	-	100.48	32.43	6.52	34.56	100	187	Average
2439	109.17	-	-	104.78	32.43	6.52	34.56	100	187	Peak
4875	50.56	-23.44	74	61.21	34.85	10.18	55.68	100	0	Peak
7311	53.4	-0.6	54	62.6	36.14	10.94	56.28	148	129	Average
7311	59.56	-14.44	74	68.76	36.14	10.94	56.28	148	129	Peak



Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2436 MHz is Fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
143.4	40.23	-3.27	43.5	59.72	10.83	1.38	31.7	126	279	Peak
166.35	39.83	-3.67	43.5	60.09	9.88	1.52	31.66	-	-	Peak
179.85	40.01	-3.49	43.5	61.01	9.15	1.54	31.69	-	-	Peak
399.4	35.18	-10.82	46	48.88	15.9	2.19	31.79	-	-	Peak
798.4	34.17	-11.83	46	43.06	19.98	3.11	31.98	-	-	Peak
896.4	42.19	-3.81	46	49.82	20.7	3.29	31.62	-	-	Peak
2436	99.91	-	-	95.55	32.4	6.52	34.56	106	117	Average
2436	104.13	-	-	99.77	32.4	6.52	34.56	106	117	Peak
4875	48.45	-25.55	74	59.1	34.85	10.18	55.68	100	0	Peak
7311	51.76	-2.24	54	60.96	36.14	10.94	56.28	100	98	Average
7311	58	-16	74	67.2	36.14	10.94	56.28	100	98	Peak

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2460	103.96	-	-	99.51	32.45	6.56	34.56	137	236	Average
2460	108.18	-	-	103.73	32.45	6.56	34.56	137	236	Peak

Test Mode :	802.11b	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2460	104.73	-	-	100.28	32.45	6.56	34.56	100	187	Average
2460	109.31	-	-	104.86	32.45	6.56	34.56	100	187	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 2399 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399	79.01	-7.02	86.03	74.76	32.36	6.45	34.56	100	0	Peak
2410	94.9	-	-	90.59	32.38	6.49	34.56	142	233	Average
2410	106.03	-	-	101.72	32.38	6.49	34.56	142	233	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 2399 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399	85.07	-3.01	88.08	80.82	32.36	6.45	34.56	100	0	Peak
2410	97.11	-	-	92.8	32.38	6.49	34.56	100	188	Average
2410	108.08	-	-	103.77	32.38	6.49	34.56	100	188	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	2439 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2356	49.65	-4.35	54	45.52	32.31	6.38	34.56	100	350	Average
2356	61.48	-12.52	74	57.35	32.31	6.38	34.56	100	350	Peak
2439	101.14	-	-	96.75	32.43	6.52	34.56	100	193	Average
2439	112.26	-	-	107.87	32.43	6.52	34.56	100	193	Peak
4875	38.65	-15.35	54	49.3	34.85	10.18	55.68	141	294	Average
4875	51.41	-22.59	74	62.06	34.85	10.18	55.68	141	294	Peak
7311	48.39	-5.61	54	57.59	36.14	10.94	56.28	147	127	Average
7311	64.34	-9.66	74	73.54	36.14	10.94	56.28	147	127	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2439 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2356	48.17	-5.83	54	44.04	32.31	6.38	34.56	145	230	Average
2356	57.06	-16.94	74	52.93	32.31	6.38	34.56	145	230	Peak
2439	100.28	-	-	95.92	32.4	6.52	34.56	138	235	Average
2439	111.89	-	-	107.53	32.4	6.52	34.56	138	235	Peak
4875	49.69	-24.31	74	60.34	34.85	10.18	55.68	100	0	Peak
7311	47.41	-6.59	54	56.61	36.14	10.94	56.28	100	97	Average
7311	62.58	-11.42	74	71.78	36.14	10.94	56.28	100	97	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2378	42.65	-11.35	54	38.46	32.33	6.42	34.56	135	237	Average
2378	53.12	-20.88	74	48.93	32.33	6.42	34.56	135	237	Peak
2460	96.84	-	-	92.39	32.45	6.56	34.56	135	237	Average
2460	108.07	-	-	103.62	32.45	6.56	34.56	135	237	Peak

Test Mode :	802.11g	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2460 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2382	47.37	-6.63	54	43.15	32.33	6.45	34.56	100	190	Average
2382	59.03	-14.97	74	54.81	32.33	6.45	34.56	100	190	Peak
2460	97.97	-	-	93.52	32.45	6.56	34.56	100	190	Average
2460	109.33	-	-	104.88	32.45	6.56	34.56	100	190	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2410 MHz is fundamental signal which can be ignored. 2. 2399 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399	80.96	-2.3	83.26	76.71	32.36	6.45	34.56	100	0	Peak
2410	92.75	-	-	88.44	32.38	6.49	34.56	140	232	Average
2410	103.26	-	-	98.95	32.38	6.49	34.56	140	232	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	01	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2414 MHz is fundamental signal which can be ignored. 2. 2399 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399	86.42	-1.44	87.86	82.17	32.36	6.45	34.56	100	0	Peak
2414	97	-	-	92.69	32.38	6.49	34.56	100	186	Average
2414	107.86	-	-	103.55	32.38	6.49	34.56	100	186	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2436 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2358	46.21	-7.79	54	42.04	32.31	6.42	34.56	138	238	Average
2358	58.17	-15.83	74	54	32.31	6.42	34.56	138	238	Peak
2436	99.48	-	-	95.12	32.4	6.52	34.56	140	234	Average
2436	110.44	-	-	106.08	32.4	6.52	34.56	140	234	Peak
4875	48.04	-25.96	74	58.69	34.85	10.18	55.68	100	0	Peak
7311	44.98	-9.02	54	54.18	36.14	10.94	56.28	105	277	Average
7311	61.7	-12.3	74	70.9	36.14	10.94	56.28	105	277	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2439 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2354	49.36	-4.64	54	45.23	32.31	6.38	34.56	100	342	Average
2354	60.31	-13.69	74	56.18	32.31	6.38	34.56	100	342	Peak
2439	100.75	-	-	96.36	32.43	6.52	34.56	100	191	Average
2439	111.55	-	-	107.16	32.43	6.52	34.56	100	191	Peak
4875	50.05	-23.95	74	60.7	34.85	10.18	55.68	100	0	Peak
7311	45.41	-8.59	54	54.61	36.14	10.94	56.28	148	127	Average
7311	62.39	-11.61	74	71.56	36.13	10.94	56.24	148	127	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	92.42	-	-	87.97	32.45	6.56	34.56	100	55	Average
2464	103.29	-	-	98.84	32.45	6.56	34.56	100	55	Peak

Test Mode :	802.11n HT20	Temperature :	21~23°C
Test Channel :	11	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2464 MHz is fundamental signal which can be ignored. 2. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2370	44.49	-9.51	54	40.3	32.33	6.42	34.56	100	323	Average
2370	57.16	-16.84	74	52.97	32.33	6.42	34.56	100	323	Peak
2464	95.4	-	-	90.95	32.45	6.56	34.56	100	195	Average
2464	106.57	-	-	102.12	32.45	6.56	34.56	100	195	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	03	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2420 MHz is fundamental signal which can be ignored. 2. 2399.91 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.91	75.36	-2.31	77.67	71.11	32.36	6.45	34.56	100	312	Peak
2420	86.78	-	-	82.45	32.4	6.49	34.56	100	312	Average
2420	97.67	-	-	93.34	32.4	6.49	34.56	100	312	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	03	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2420 MHz is fundamental signal which can be ignored. 2. 2399.91 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.91	83.4	-2.45	85.85	79.15	32.36	6.45	34.56	100	192	Peak
2420	93.58	-	-	89.25	32.4	6.49	34.56	100	192	Average
2420	105.85	-	-	101.52	32.4	6.49	34.56	100	192	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2436 MHz is fundamental signal which can be ignored. 2. 2399.91 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.91	73.04	-13.03	86.07	68.79	32.36	6.45	34.56	140	238	Peak
2436	94.11	-	-	89.75	32.4	6.52	34.56	140	238	Average
2436	106.07	-	-	101.71	32.4	6.52	34.56	140	238	Peak
4875	47.32	-26.68	74	57.97	34.85	10.18	55.68	100	0	Peak
7311	38.91	-15.09	54	48.11	36.14	10.94	56.28	100	97	Average
7311	54.01	-19.99	74	63.18	36.13	10.94	56.24	100	97	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	06	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2435 MHz is fundamental signal which can be ignored. 2. 2397.84 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2397.84	76.91	-9.99	86.9	72.66	32.36	6.45	34.56	100	186	Peak
2435	94.69	-	-	90.33	32.4	6.52	34.56	100	186	Average
2435	106.9	-	-	102.54	32.4	6.52	34.56	100	186	Peak
4875	47.06	-26.94	74	57.71	34.85	10.18	55.68	100	0	Peak
7311	40.26	-13.74	54	49.46	36.14	10.94	56.28	138	128	Average
7311	54.12	-19.88	74	63.32	36.14	10.94	56.28	138	128	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	09	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Horizontal
Remark :	1. 2450 MHz is fundamental signal which can be ignored. 2. 2399.54 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2399.54	61.24	-21.55	82.79	56.99	32.36	6.45	34.56	108	240	Peak
2450	91.59	-	-	87.2	32.43	6.52	34.56	108	240	Average
2450	102.79	-	-	98.4	32.43	6.52	34.56	108	240	Peak

Test Mode :	802.11n HT40	Temperature :	21~23°C
Test Channel :	09	Relative Humidity :	53~55%
Test Engineer :	Hayden Wu, Timberland Lin, and Kai Wang	Polarization :	Vertical
Remark :	1. 2450 MHz is fundamental signal which can be ignored. 2. 2398.47 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Test result of emissions which are 20 dB lower than the limit is not reported per15.31		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2398.47	59.56	-26.01	85.57	55.31	32.36	6.45	34.56	126	189	Peak
2450	94.2	-	-	89.81	32.43	6.52	34.56	126	189	Average
2450	105.57	-	-	101.18	32.43	6.52	34.56	126	189	Peak

3.6 Antenna Requirements

3.6.1 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.

3.6.2 Antenna Connected Construction

The antennas type used in this product are Antenna 1 : PIFA Antenna with IPEX connector and Antenna 2 : Dipole Antenna with Reverse-SMA type RF connector. And it is considered to meet antenna requirement.

3.6.3 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	100055	9kHz~40GHz	Jun. 06, 2012	Jan. 21, 2013 ~ Jan. 29, 2013	Jun. 05, 2013	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Sep. 08, 2012	Jan. 21, 2013 ~ Jan. 29, 2013	Sep. 07, 2013	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Sep. 08, 2012	Jan. 21, 2013 ~ Jan. 29, 2013	Sep. 07, 2013	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP30	101352	9KHz~30GHz	Nov. 07, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Nov. 06, 2013	Radiation (03CH06-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9KHz ~ 26.5GHz	Nov. 26, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Nov. 25, 2013	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/0003	20MHz ~ 1000MHz	May 04, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	May 03, 2013	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 06, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Oct. 05, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Jul. 31, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	COM-POWER	AH-118	071025	1GHz~18GHz	Aug. 09, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Aug. 08, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Sep. 27, 2013	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 13, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Apr. 12, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz ~ 1GHz	Apr. 11, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Apr. 10, 2013	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Jul. 20, 2013	Radiation (03CH06-HY)
Pre Amplifier	MITEQ	AMF-7D-00101800-30-10P	159087	1GHz~18GHz	Feb. 27, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Feb. 26, 2013	Radiation (03CH06-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Jan. 21, 2013 ~ Jan. 25, 2013	Jul. 02, 2013	Radiation (03CH06-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.54
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Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.72
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Appendix A. Photographs of EUT

Please refer to Sporton report number EP240322-08 as below.