FCC RF Test Report

APPLICANT	:	Texas Instruments Incorporated
EQUIPMENT	:	WiFi and Bluetooth Module
BRAND NAME	:	Texas Instruments
MODEL NAME	:	WL18MODGB
FCC ID	:	Z64-WL18SBMOD
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Nov. 27, 2013 and testing was completed on Dec. 20, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant 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: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

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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APPENDIX A. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3N2752-01C	Rev. 01	Initial issue of report	Jan. 27, 2014

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	≥ 0.5MHz	Pass	-
3.1	-	RSS-Gen 4.6.1	99% Bandwidth	-	Pass	-
3.2	15.247(b)	RSS-210 A8.4	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	RSS-210 A8.2(b)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	RSS-210 A8.5	Conducted Band Edges	≤ 20dBc	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 2.30 dB at 2483.950 MHz
3.6	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 8.50 dB at 0.350 MHz
3.7	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Texas Instruments Incorporated
12500 TI Boulevard, M/S 8751, Dallas, TX 75243, USA

1.2 Manufacturer

Jorjin Technologies Inc.
17F, No.239, Sec. 1, Datong Rd, Xizhi Dist. New Taipei City 221, Taiwan. R.O.C.

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	WiFi and Bluetooth Module
Brand Name	Texas Instruments
Model Name	WL18MODGB
FCC ID	Z64-WL18SBMOD
EUT supports Radios application	WLAN 11b/g/n HT20/HT40 Bluetooth v3.0 + EDR Bluetooth v4.0 + LE
EUT Stage	Production Unit

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

<table>
<tr><th colspan="2">Product Specification subjective to this standard</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>802.11b/g/n : 2412 MHz ~ 2462 MHz</td></tr>
<tr><td>Maximum Output Power to antenna</td><td><Ant. 1>
802.11b : 17.96 dBm (0.0625 W)
802.11g : 20.59 dBm (0.1146 W)
802.11n HT20 : 20.56 dBm (0.1138 W)
802.11n HT40 : 20.22 dBm (0.1052 W)
<MIMO Ant. 1+2>
802.11n HT20 : 23.87 dBm (0.2438 W)</td></tr>
<tr><td>99% Occupied Bandwidth</td><td><Ant. 1>
802.11b : 14.90MHz
802.11g : 19.55MHz
802.11n HT20 : 19.55MHz
802.11n HT40 : 36.80MHz
<MIMO Ant. 1+2>
802.11n HT20 : 19.65MHz</td></tr>
<tr><td>Antenna Type</td><td><Ant 1>
Chip Antenna type with gain -0.36 dBi
<Ant 2>
Chip Antenna type with gain 1.22 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11b : DSSS (DBPSK / DQPSK / CCK)
802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)</td></tr>
<tr><td>Antenna Function for Transmitter</td><td>
<table>
<tr><th></th><th>Chain
Ant. 1</th><th>Chain
Ant. 2</th></tr>
<tr><td>802.11 b</td><td>V</td><td>-</td></tr>
<tr><td>802.11 g</td><td>V</td><td>-</td></tr>
<tr><td>802.11 n HT20
SISO</td><td>V</td><td>-</td></tr>
<tr><td>802.11 n HT20
MIMO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n HT40
SISO</td><td>V</td><td>-</td></tr>
</table>
</td></tr>
</table>

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Site

Test Site	SPORTON INTERNATIONAL INC.			
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH02-HY	CO05-HY	03CH07-HY	722060/4086B-1

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

1.7 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 v03r01
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.4-2003

Remark:

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

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: conducted emission (150 kHz to 30 MHz) and 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 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test shown in the following tables.

<Ant. 1>

802.11b				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	17.96	17.95	17.93	17.95

802.11g								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Peak Power (dBm)	20.59	20.57	20.55	20.58	20.56	20.53	20.44	20.44

2.4GHz 802.11n HT20								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	20.56	20.42	20.43	20.46	20.32	20.38	20.33	20.17

2.4GHz 802.11n HT40								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	20.22	20.10	20.10	20.18	20.18	20.19	19.97	20.15

MIMO <Ant. 1+2>

2.4GHz 802.11n HT20								
Data Rate (MHz)	MCS8	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
Peak Power (dBm)	23.87	23.83	23.84	23.85	23.78	23.87	23.52	23.48

Note: MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.

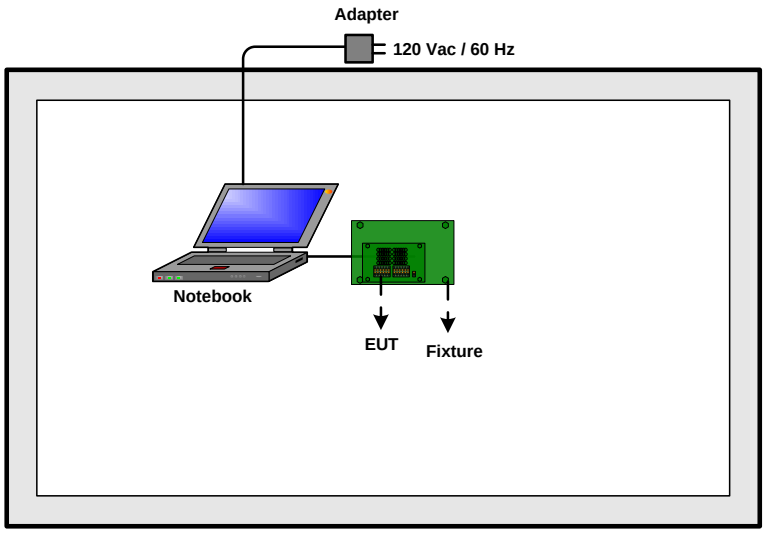
2.3 Test Mode

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

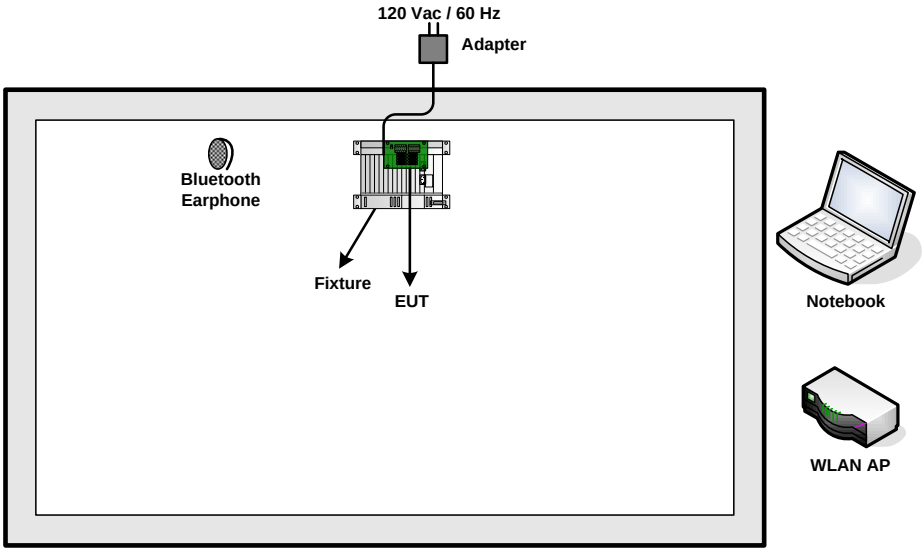
Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB and 99% BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		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 SISO	6.5 Mbps	11
		802.11n HT20 MIMO	6.5 Mbps	1/11
		802.11n HT40 SISO	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 SISO	6.5 Mbps	11
		802.11n HT20 MIMO	6.5 Mbps	1/6/11
		802.11n HT40 SISO	13.5 Mbps	3/6/9
AC Conducted Emission	**Mode 1** : WLAN Link + Bluetooth Link + Adapter			

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	Fixture	N/A	WG7XXXT01	N/A	N/A	N/A
6.	Adapter	Aviv Energy	HK-IP15-A05	N/A	N/A	Unshielded, 1.8 m

2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, “HCT Tester” installed in the notebook make the EUT provides functions like channel selection and power level for continuous transmitting and receiving signals.

2.7 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.

Example:

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.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

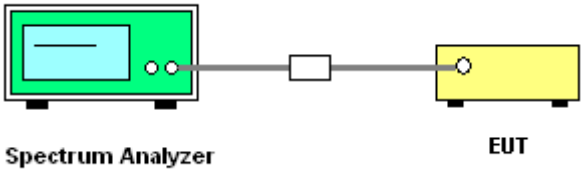
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r01.
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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

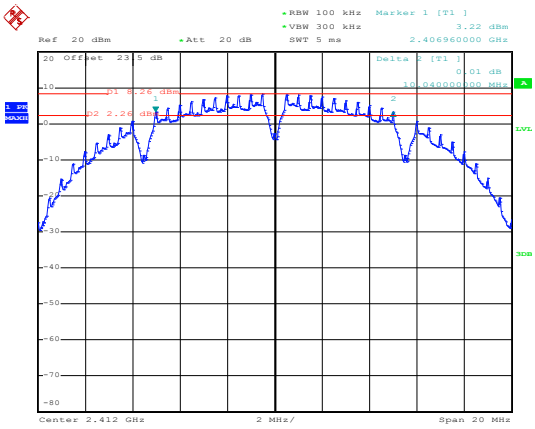
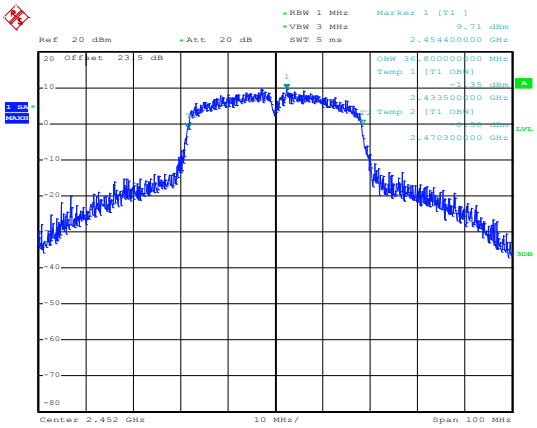
3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Test Band :	2.4GHz	Temperature :	21~25℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	99% Bandwidth (MHz)		6dB Bandwidth (MHz)		6dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant. 1	Ant. 2	Ant. 1	Ant. 2		
11b	1Mbps	1	1	2412	14.90	-	10.04	-	0.5	Pass
11b	1Mbps	1	6	2437	14.90	-	10.08	-	0.5	Pass
11b	1Mbps	1	11	2462	14.90	-	10.04	-	0.5	Pass
11g	6Mbps	1	1	2412	17.25	-	15.08	-	0.5	Pass
11g	6Mbps	1	6	2437	19.55	-	15.08	-	0.5	Pass
11g	6Mbps	1	11	2462	17.30	-	15.08	-	0.5	Pass
HT20	MCS0	1	1	2412	18.35	-	15.12	-	0.5	Pass
HT20	MCS0	1	6	2437	19.55	-	15.08	-	0.5	Pass
HT20	MCS0	1	11	2462	18.20	-	15.08	-	0.5	Pass
HT40	MCS0	1	3	2422	36.10	-	35.04	-	0.5	Pass
HT40	MCS0	1	6	2437	36.70	-	35.04	-	0.5	Pass
HT40	MCS0	1	9	2452	36.80	-	35.12	-	0.5	Pass
HT20	MCS8	2	1	2412	18.30	18.15	15.08	15.08	0.5	Pass
HT20	MCS8	2	6	2437	19.65	19.05	15.08	15.08	0.5	Pass
HT20	MCS8	2	11	2462	18.20	18.10	15.08	15.08	0.5	Pass

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	
Date: 9.DEC.2013 20:48:13	Date: 9.DEC.2013 21:49:04

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.

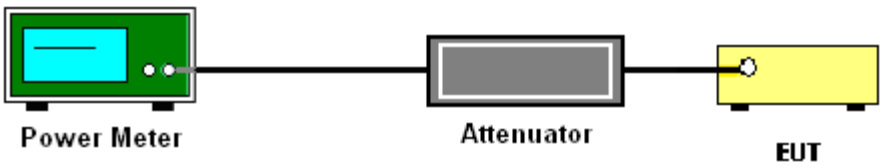
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 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 v03r01.
2. The RF output of EUT was connected to the power meter 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.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Band :	2.4GHz	Temperature :	21~25℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Max. Limit (dBm)		DG (dBi)		Pass/Fail
					Ant. 1	Ant. 2	SUM	Ant. 1	Ant. 2	Ant. 1	Ant. 2	
11b	1Mbps	1	1	2412	17.58	-	-	30.00	30.00	-0.36	1.22	Pass
11b	1Mbps	1	6	2437	17.96	-		30.00	30.00	-0.36	1.22	Pass
11b	1Mbps	1	11	2462	17.62	-		30.00	30.00	-0.36	1.22	Pass
11g	6Mbps	1	1	2412	20.23	-		30.00	30.00	-0.36	1.22	Pass
11g	6Mbps	1	6	2437	20.59	-		30.00	30.00	-0.36	1.22	Pass
11g	6Mbps	1	11	2462	19.92	-		30.00	30.00	-0.36	1.22	Pass
HT20	MCS0	1	1	2412	19.95	-		30.00	30.00	-0.36	1.22	Pass
HT20	MCS0	1	6	2437	20.56	-		30.00	30.00	-0.36	1.22	Pass
HT20	MCS0	1	11	2462	20.32	-		30.00	30.00	-0.36	1.22	Pass
HT40	MCS0	1	3	2422	19.98	-		30.00	30.00	-0.36	1.22	Pass
HT40	MCS0	1	6	2437	20.22	-		30.00	30.00	-0.36	1.22	Pass
HT40	MCS0	1	9	2452	19.98	-		30.00	30.00	-0.36	1.22	Pass
HT20	MCS8	2	1	2412	19.82	21.06	23.49	30.00		3.48		Pass
HT20	MCS8	2	6	2437	19.95	21.61	23.87	30.00		3.48		Pass
HT20	MCS8	2	11	2462	19.55	21.46	23.62	30.00		3.48		Pass

Note: Measured power (dBm) has offset with cable loss.

3.2.6 Test Result of Average output Power (Reporting Only)

Test Band :	2.4GHz	Temperature :	21~25℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant. 1	Ant. 2	Ant. 1	Ant. 2	Sum Power
11b	1Mbps	1	1	2412	0.10	-	15.84	-	-
11b	1Mbps	1	6	2437	0.10	-	16.15	-	
11b	1Mbps	1	11	2462	0.10	-	15.92	-	
11g	6Mbps	1	1	2412	0.59	-	13.22	-	
11g	6Mbps	1	6	2437	0.59	-	16.22	-	
11g	6Mbps	1	11	2462	0.59	-	12.92	-	
HT20	MCS0	1	1	2412	0.64	-	13.02	-	
HT20	MCS0	1	6	2437	0.64	-	15.40	-	
HT20	MCS0	1	11	2462	0.64	-	13.59	-	
HT40	MCS0	1	3	2422	1.21	-	11.37	-	
HT40	MCS0	1	6	2437	1.21	-	13.99	-	
HT40	MCS0	1	9	2452	1.21	-	13.66	-	
HT20	MCS8	2	1	2412	1.15	1.17	12.52	13.76	16.19
HT20	MCS8	2	6	2437	1.15	1.17	14.76	16.49	18.72
HT20	MCS8	2	11	2462	1.15	1.17	12.45	13.90	16.24

Note: Measured power (dBm) has offset with cable loss and duty factor.

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

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
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. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

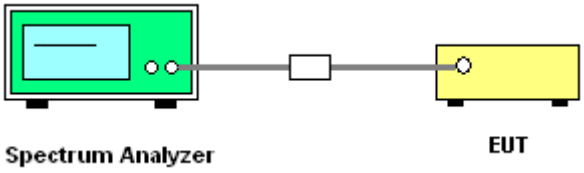
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   Method (1): Measure and sum the spectra across the outputs.

   The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

   Method (2): Measure and add 10 log (N) dB, where N is the number of outputs. (N=2)

3.3.4 Test Setup



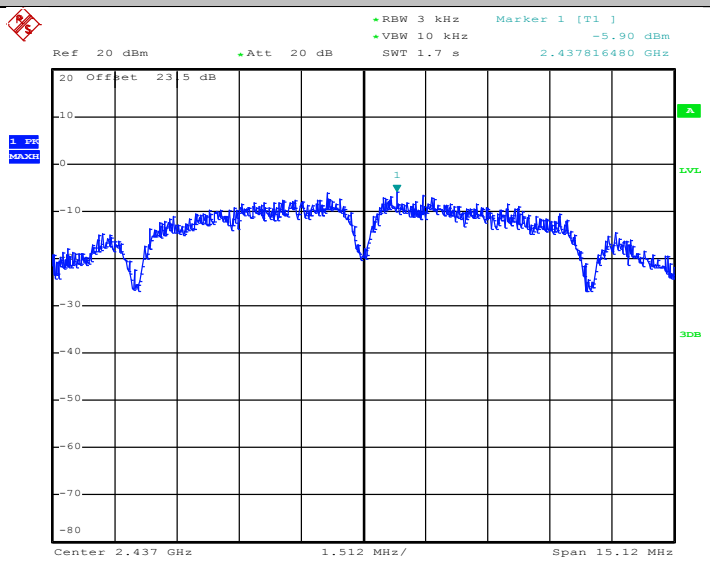
3.3.5 Test Result of Power Spectral Density

Test Band :	2.4GHz	Temperature :	21~25℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak Power Density (dBm/3kHz)			Max. Limit (dBm/3kHz)		DG (dBi)		Pass/Fail
					Ant. 1	Ant. 2	Worst +10log(2)	Ant. 1	Ant. 2	Ant. 1	Ant. 2	
11b	1Mbps	1	1	2412	-5.97	-	-	8.00	8.00	-0.36	1.22	Pass
11b	1Mbps	1	6	2437	-5.90	-		8.00	8.00	-0.36	1.22	Pass
11b	1Mbps	1	11	2462	-6.29	-		8.00	8.00	-0.36	1.22	Pass
11g	6Mbps	1	1	2412	-11.06	-		8.00	8.00	-0.36	1.22	Pass
11g	6Mbps	1	6	2437	-7.54	-		8.00	8.00	-0.36	1.22	Pass
11g	6Mbps	1	11	2462	-10.64	-		8.00	8.00	-0.36	1.22	Pass
HT20	MCS0	1	1	2412	-10.43	-		8.00	8.00	-0.36	1.22	Pass
HT20	MCS0	1	6	2437	-8.07	-		8.00	8.00	-0.36	1.22	Pass
HT20	MCS0	1	11	2462	-9.16	-		8.00	8.00	-0.36	1.22	Pass
HT40	MCS0	1	3	2422	-15.33	-		8.00	8.00	-0.36	1.22	Pass
HT40	MCS0	1	6	2437	-12.61	-		8.00	8.00	-0.36	1.22	Pass
HT40	MCS0	1	9	2452	-12.62	-		8.00	8.00	-0.36	1.22	Pass
HT20	MCS8	2	1	2412	-12.82	-11.74	-8.73	8.00		3.48		Pass
HT20	MCS8	2	6	2437	-10.69	-9.07	-6.06	8.00		3.48		Pass
HT20	MCS8	2	11	2462	-12.75	-10.26	-7.25	8.00		3.48		Pass

Note: Measured power density (dBm) has offset with cable loss.

Worst Case Power Density (dBm/3kHz)



Date: 9.DEC.2013 20:37:42

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).

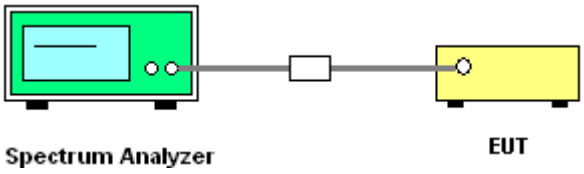
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
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



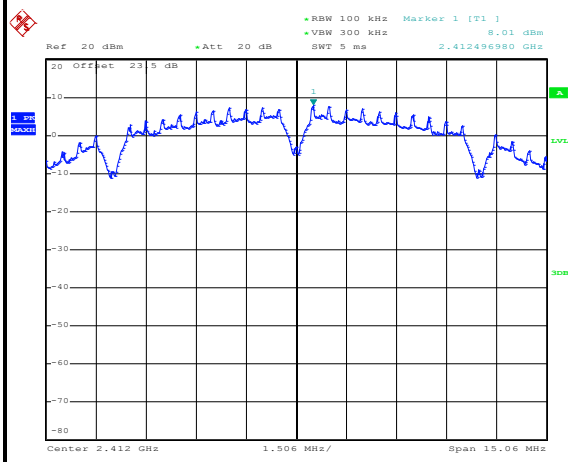
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Number of TX = 1, Ant. 1 (Measured)

Number of TX	1	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

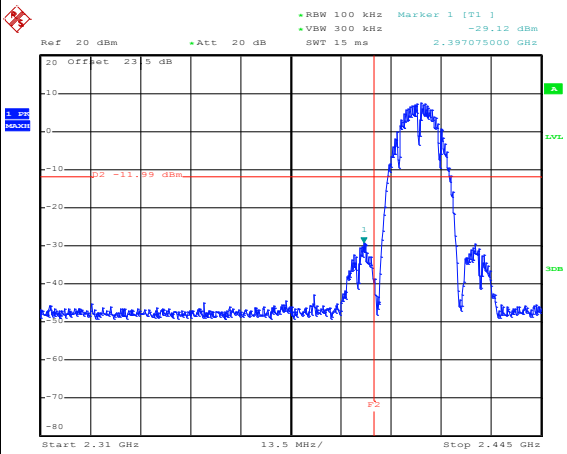
WLAN 802.11b Channel 01

100kHz PSD reference Level



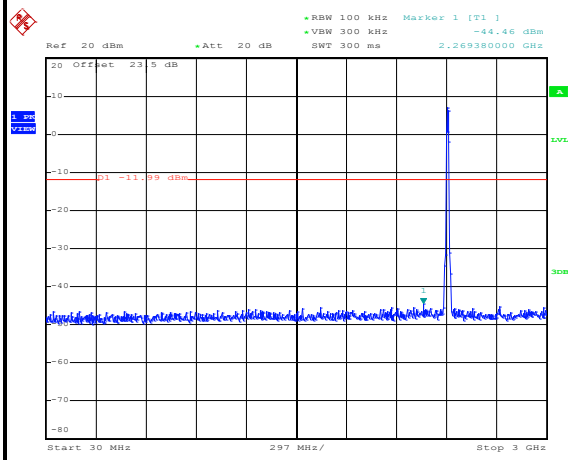
Date: 9.DEC.2013 20:48:43

Low Channel Plot



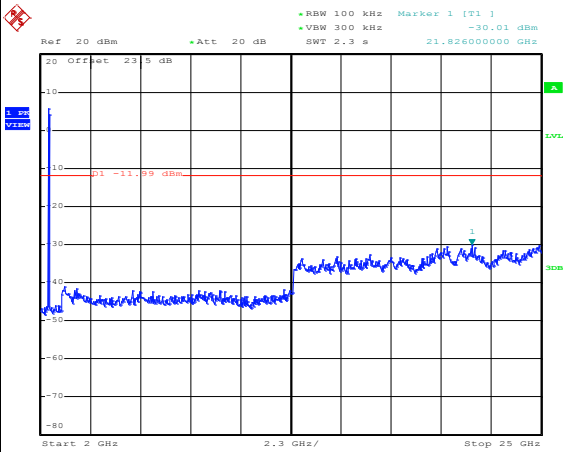
Date: 9.DEC.2013 20:48:57

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 20:49:16

Spurious Emission 2GHz~25GHz

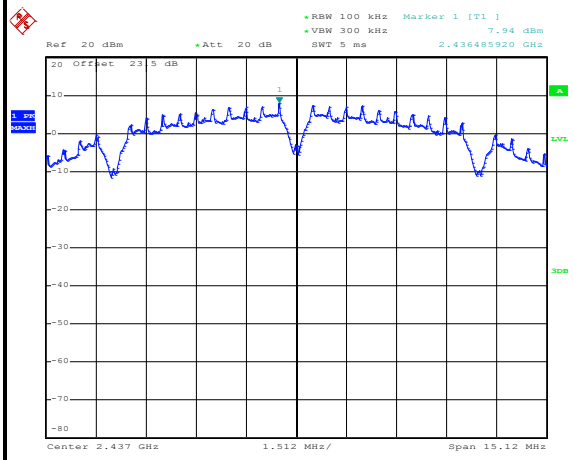


Date: 9.DEC.2013 20:49:35

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

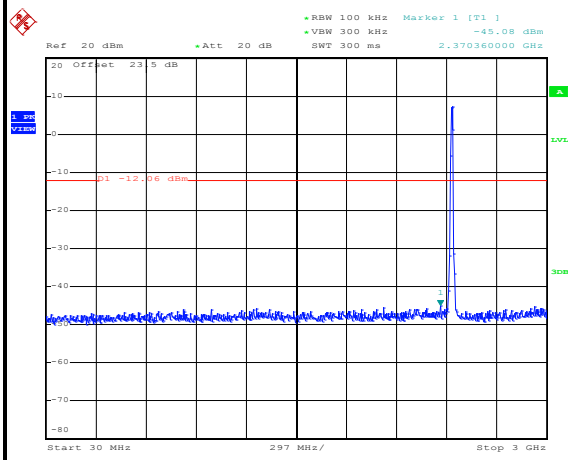
WLAN 802.11b Channel 06

100kHz PSD reference Level



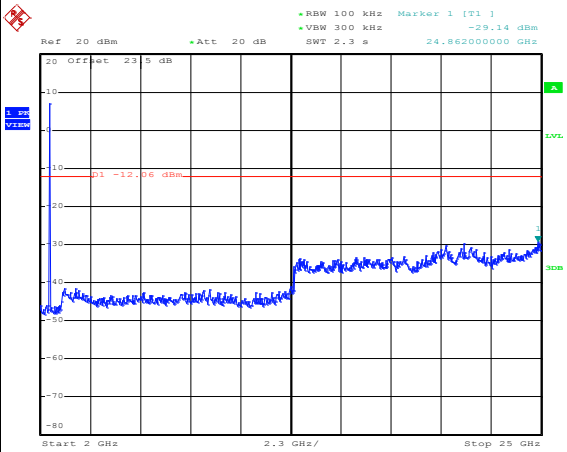
Date: 9.DEC.2013 20:37:51

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:16:04

Spurious Emission 2GHz~25GHz

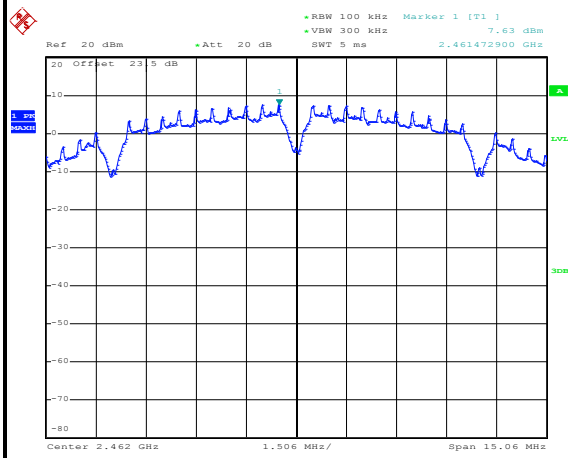


Date: 9.DEC.2013 21:16:23

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

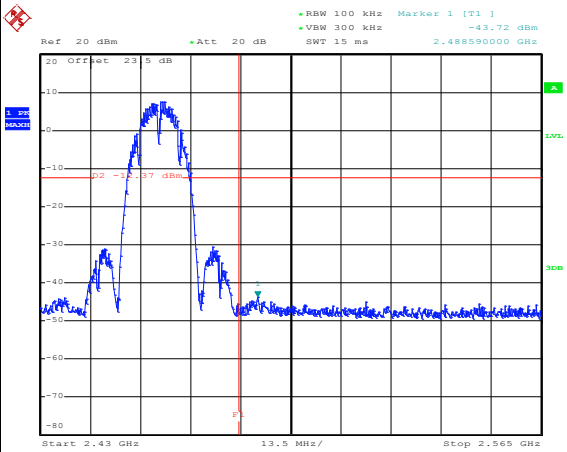
WLAN 802.11b Channel 11

100kHz PSD reference Level



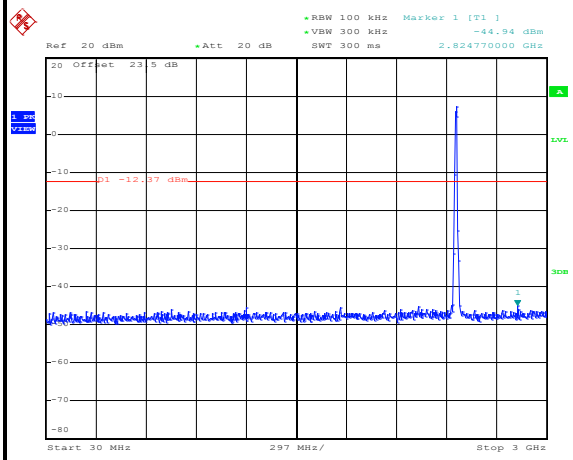
Date: 9.DEC.2013 20:55:01

High Channel Plot



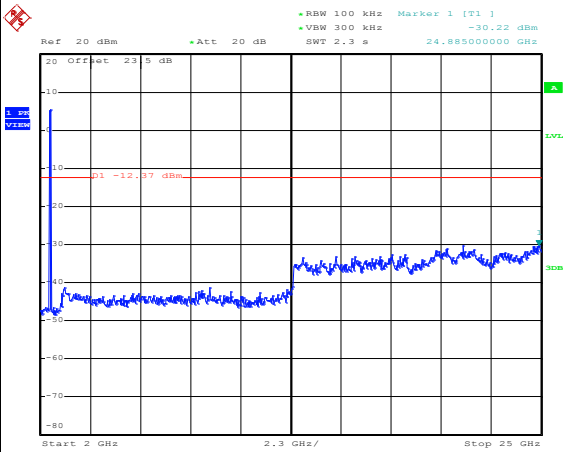
Date: 9.DEC.2013 20:55:15

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 20:55:34

Spurious Emission 2GHz~25GHz

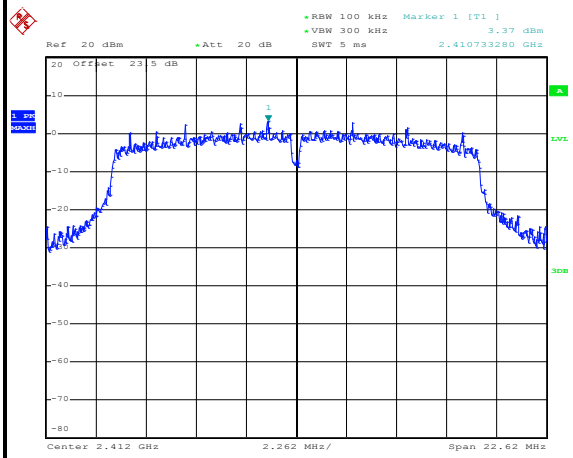


Date: 9.DEC.2013 20:55:53

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

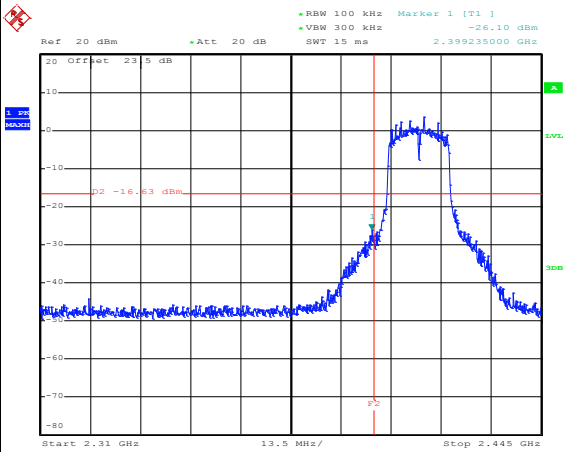
WLAN 802.11g Channel 01

100kHz PSD reference Level



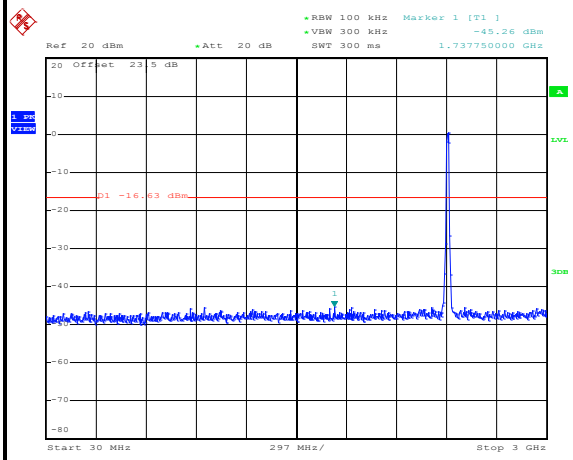
Date: 9.DEC.2013 21:10:50

Low Channel Plot



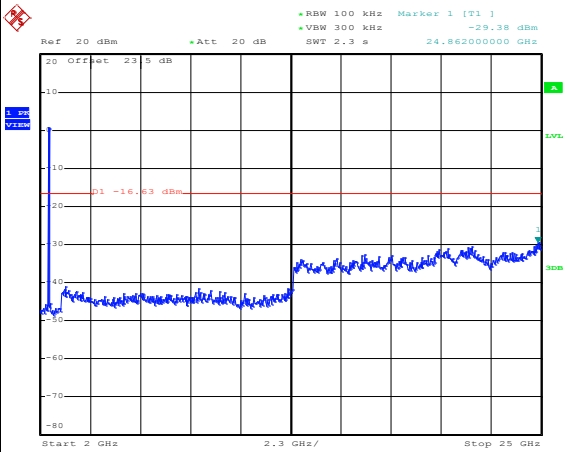
Date: 9.DEC.2013 21:11:04

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:11:23

Spurious Emission 2GHz~25GHz

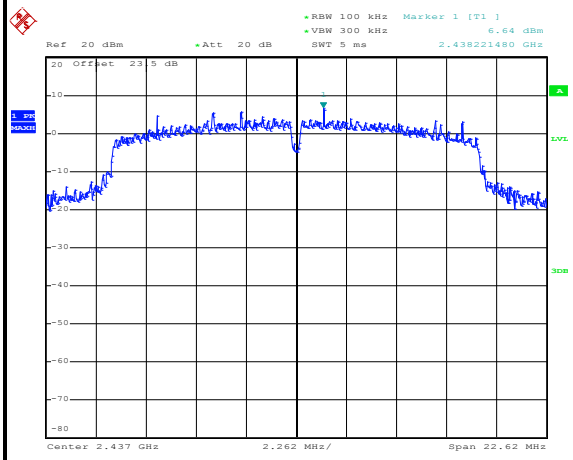


Date: 9.DEC.2013 21:11:42

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

WLAN 802.11g Channel 06

100kHz PSD reference Level



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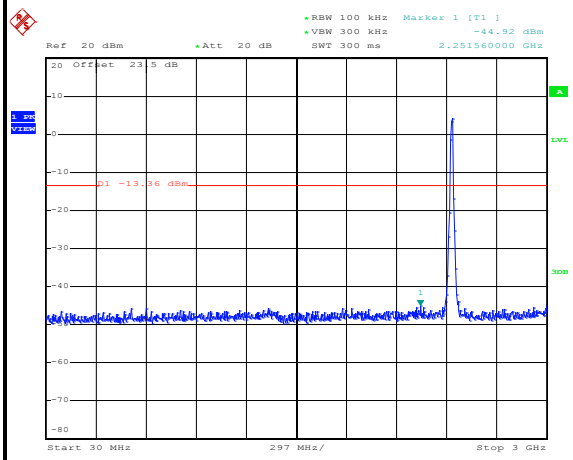
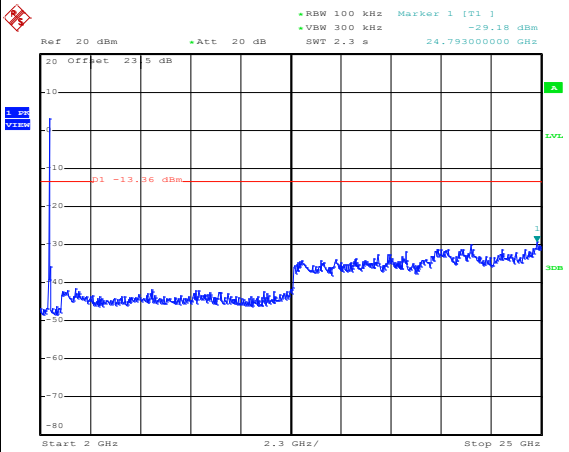
Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:07:10

Spurious Emission 2GHz~25GHz

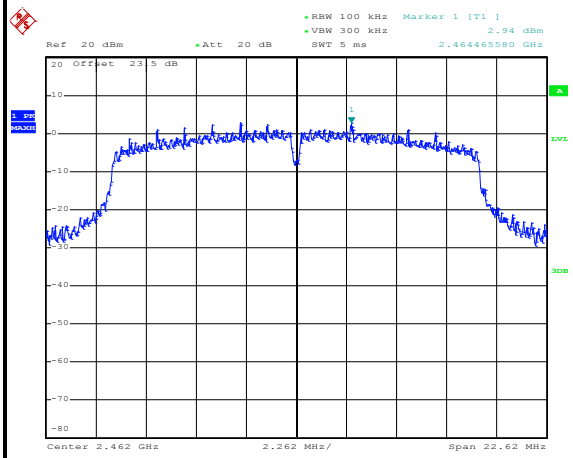


Date: 9.DEC.2013 21:07:29

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

WLAN 802.11g Channel 11

100kHz PSD reference Level



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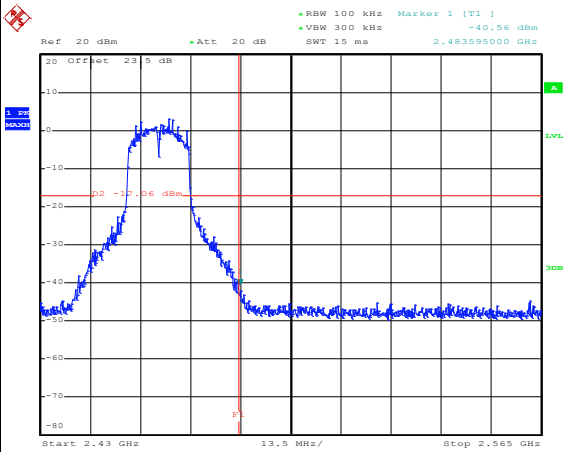
High Channel Plot



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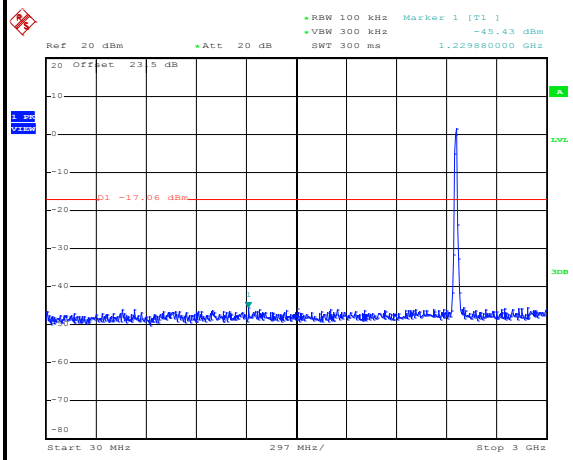
Spurious Emission 30MHz~3GHz



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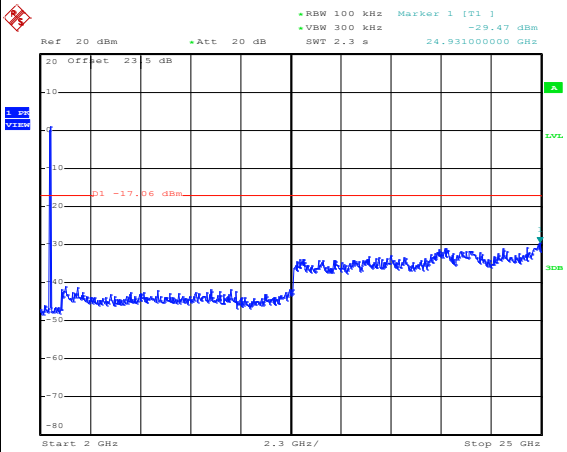
Spurious Emission 2GHz~25GHz

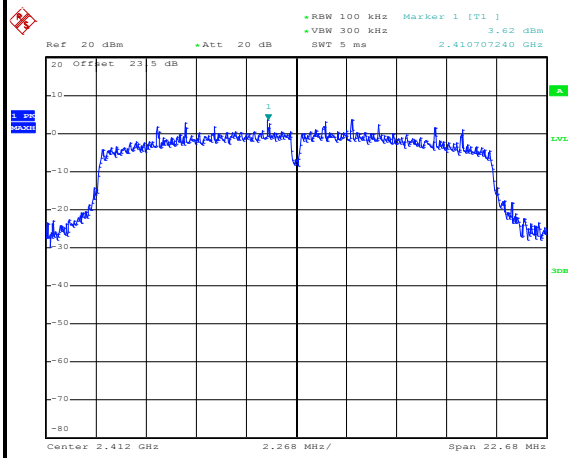


Date: 9.DEC.2013 21:01:45

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

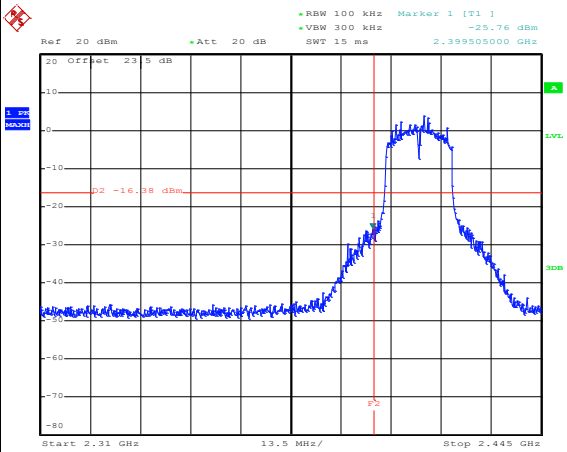
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



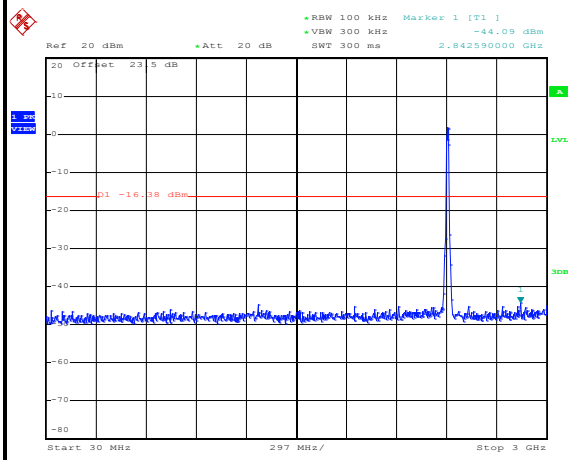
Date: 9.DEC.2013 21:23:15

Low Channel Plot



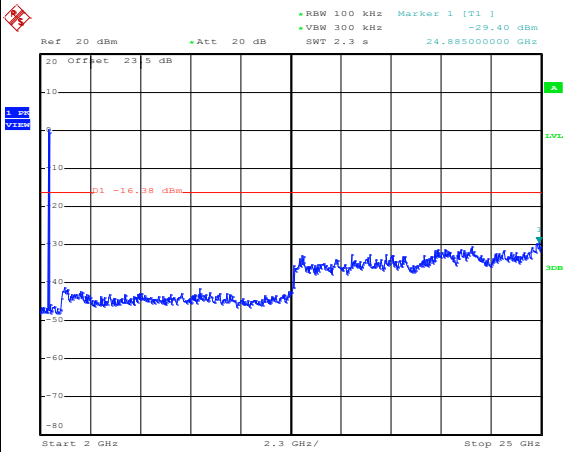
Date: 9.DEC.2013 21:23:29

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:23:48

Spurious Emission 2GHz~25GHz

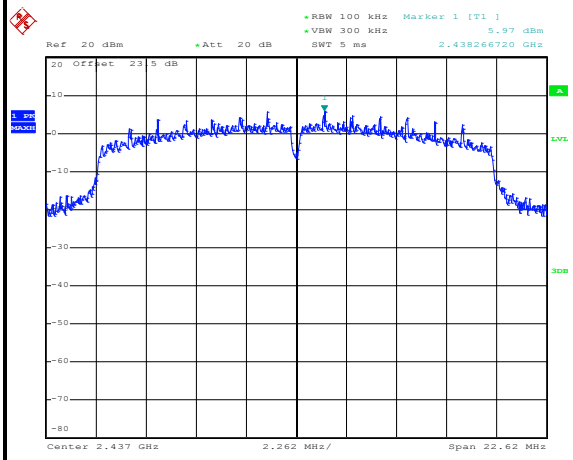


Date: 9.DEC.2013 21:24:06

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

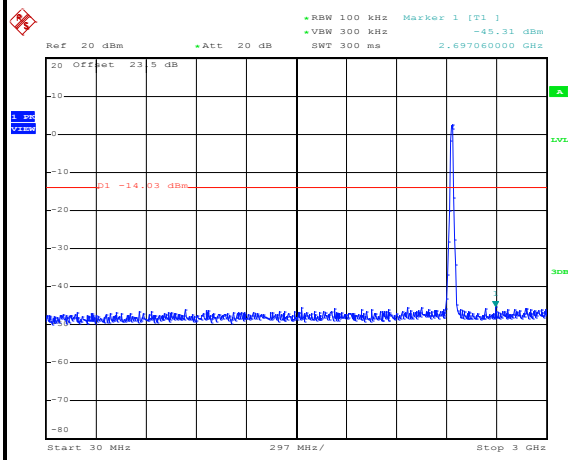
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



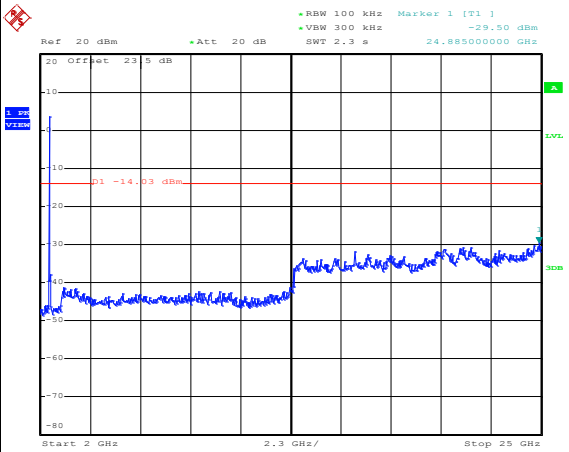
Date: 9.DEC.2013 21:27:41

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:28:01

Spurious Emission 2GHz~25GHz

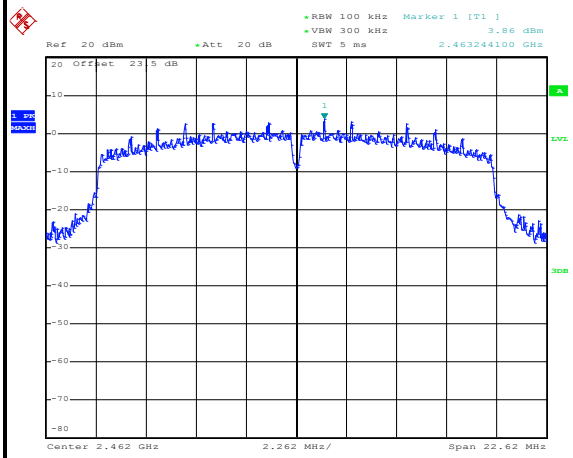


Date: 9.DEC.2013 21:28:20

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

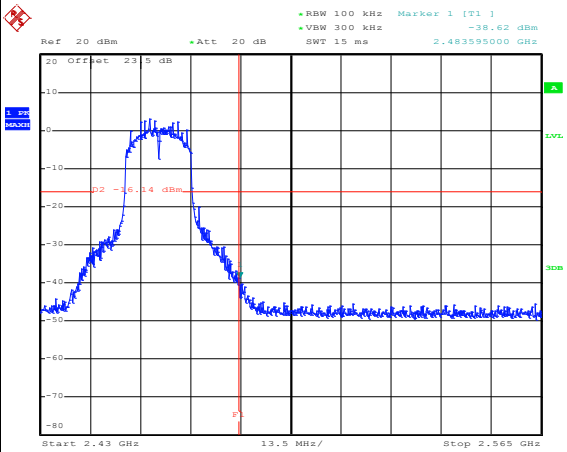
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



Date: 9.DEC.2013 21:31:45

High Channel Plot



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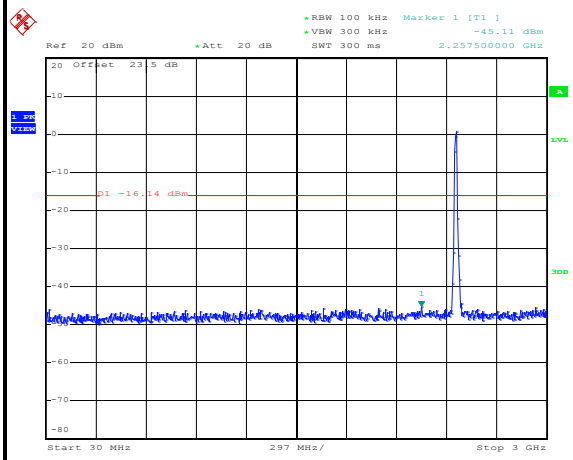
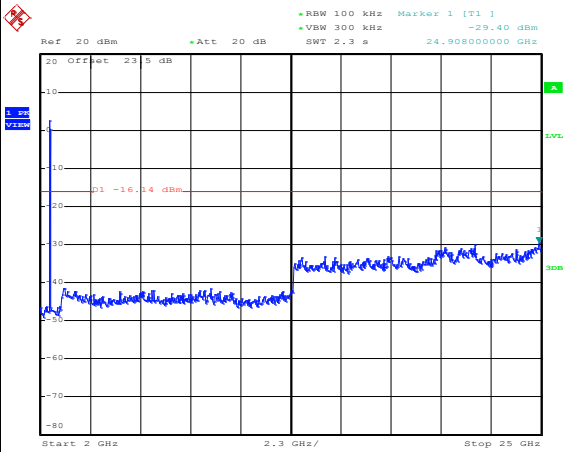
Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:32:19

Spurious Emission 2GHz~25GHz

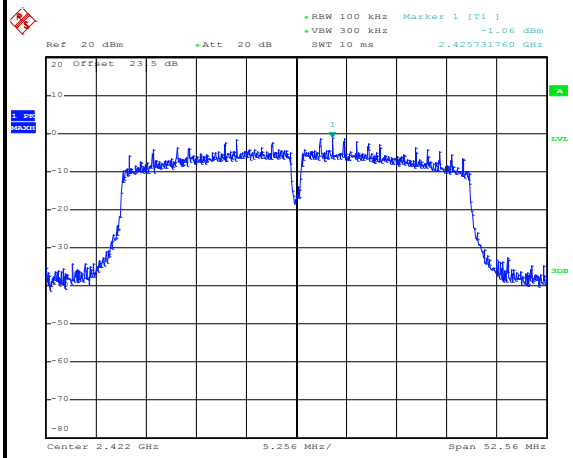


Date: 9.DEC.2013 21:32:37

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	03	**Test Engineer :**	Alex Lee

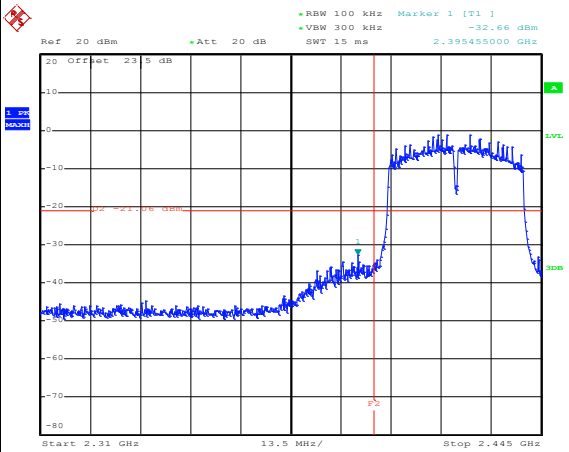
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



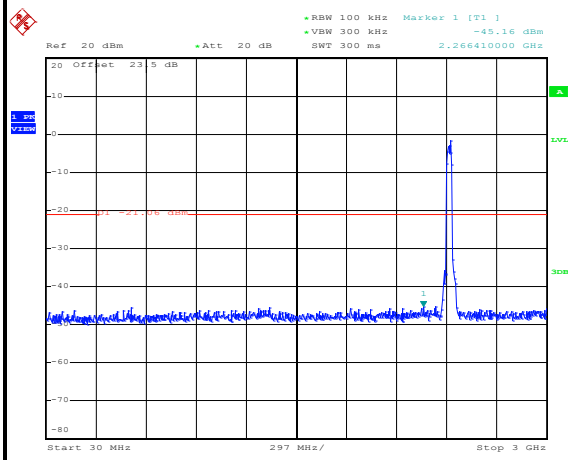
Date: 9.DEC.2013 21:38:58

Low Channel Plot



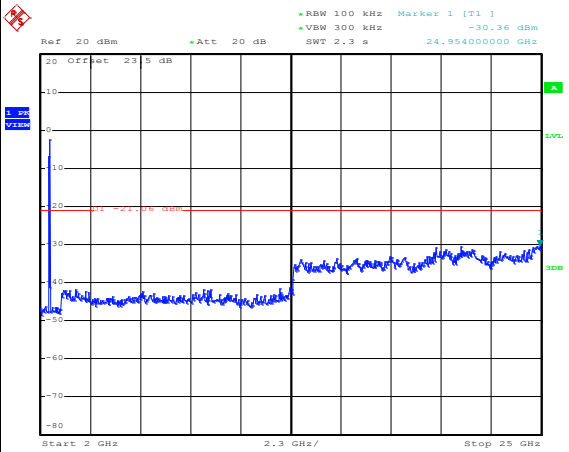
Date: 9.DEC.2013 21:39:12

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:39:31

Spurious Emission 2GHz~25GHz

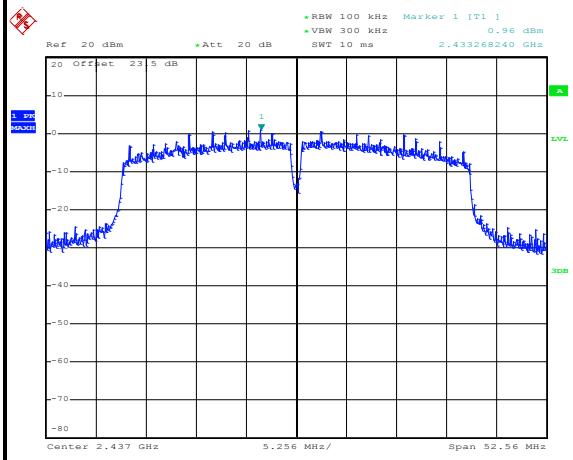


Date: 9.DEC.2013 21:39:50

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

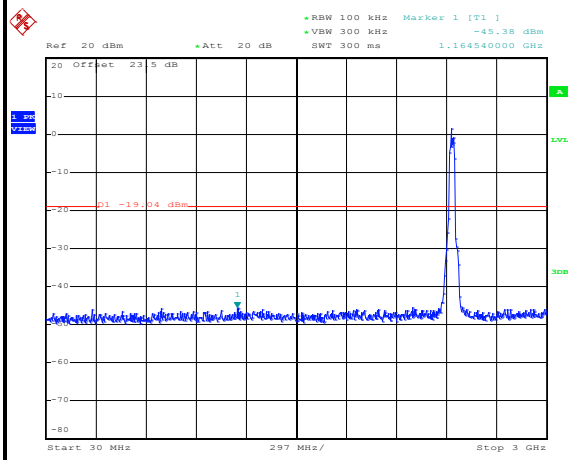
WLAN 802.11n HT40 Channel 06

100kHz PSD reference Level



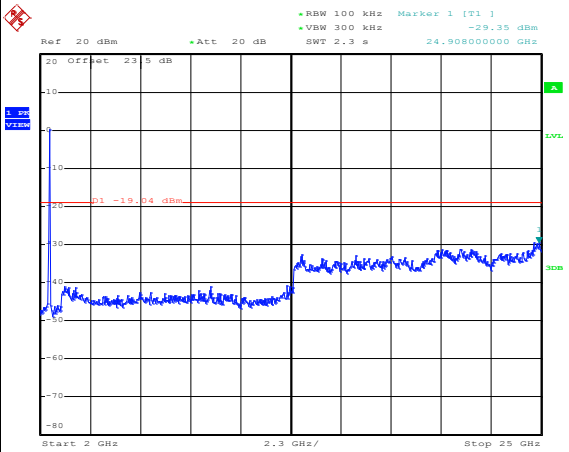
Date: 9.DEC.2013 21:44:15

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:45:31

Spurious Emission 2GHz~25GHz

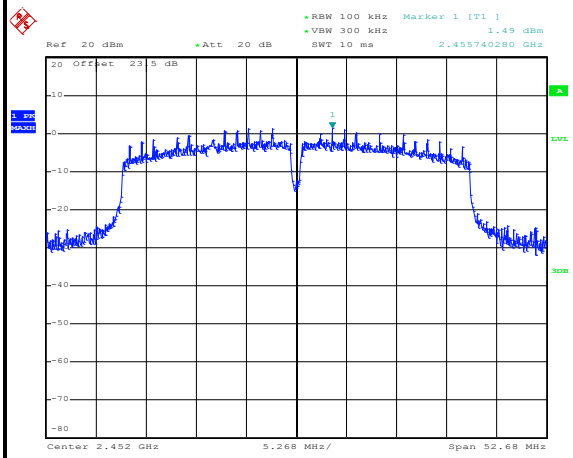


Date: 9.DEC.2013 21:45:50

Number of TX :	1	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	09	**Test Engineer :**	Alex Lee

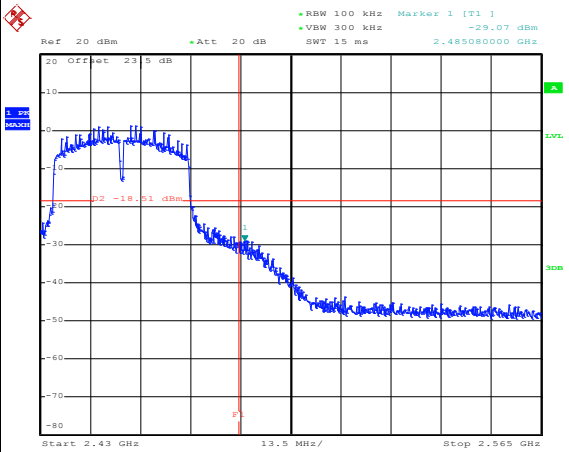
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



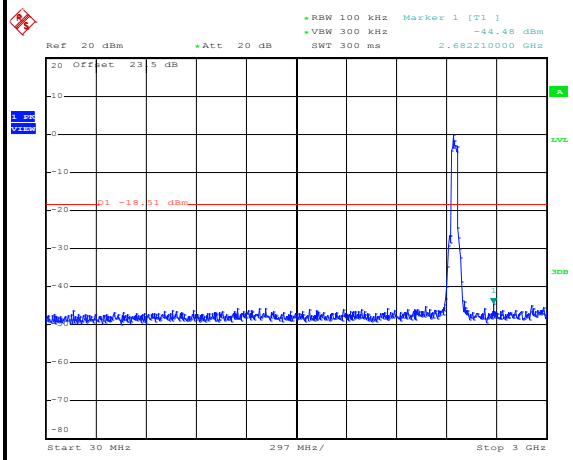
Date: 9.DEC.2013 21:48:02

High Channel Plot



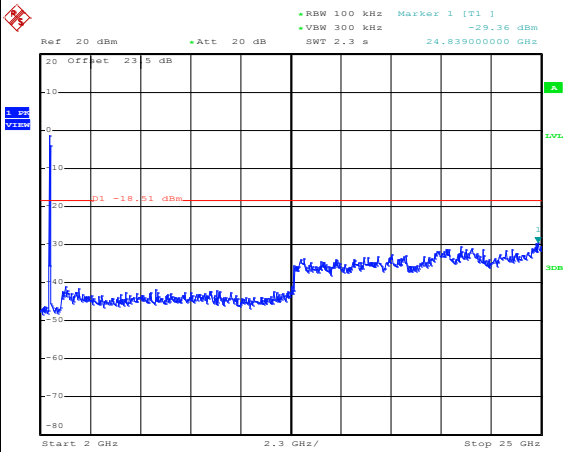
Date: 9.DEC.2013 21:48:16

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:49:33

Spurious Emission 2GHz~25GHz



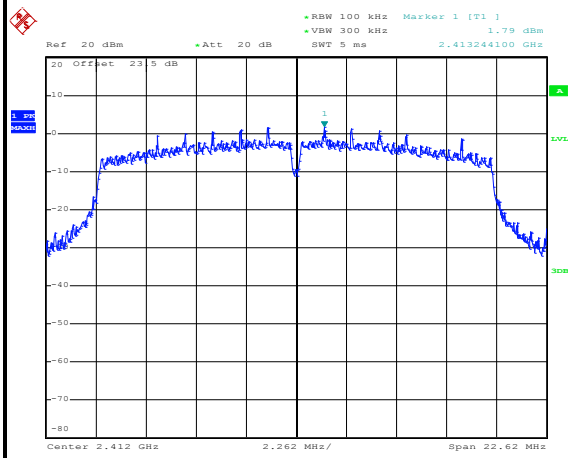
Date: 9.DEC.2013 21:49:52

Number of TX = 2, Ant. 1 (Measured)

Number of TX :	2	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

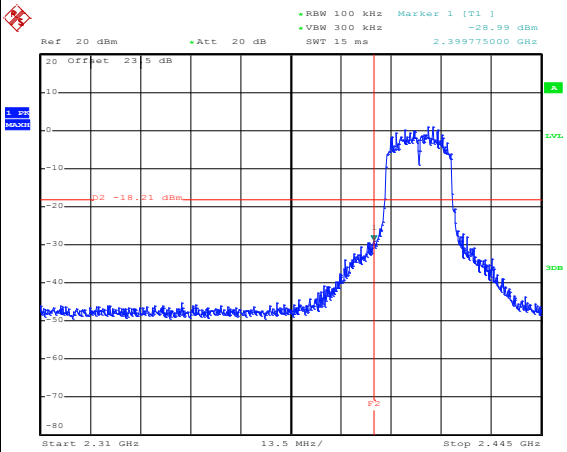
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



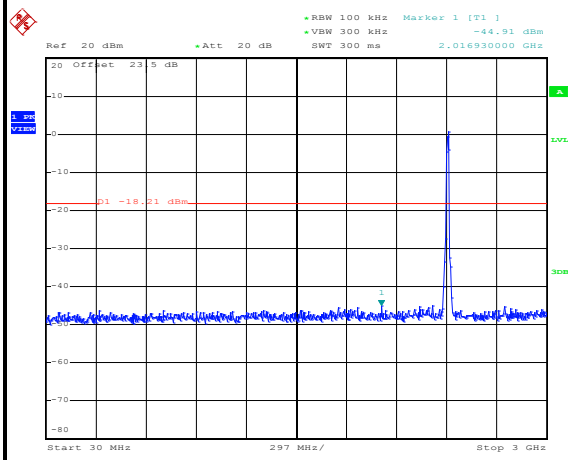
Date: 9.DEC.2013 21:56:25

Low Channel Plot



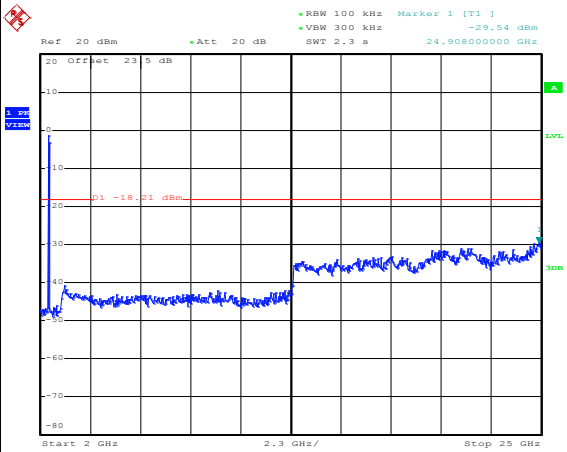
Date: 9.DEC.2013 21:56:39

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 21:56:58

Spurious Emission 2GHz~25GHz

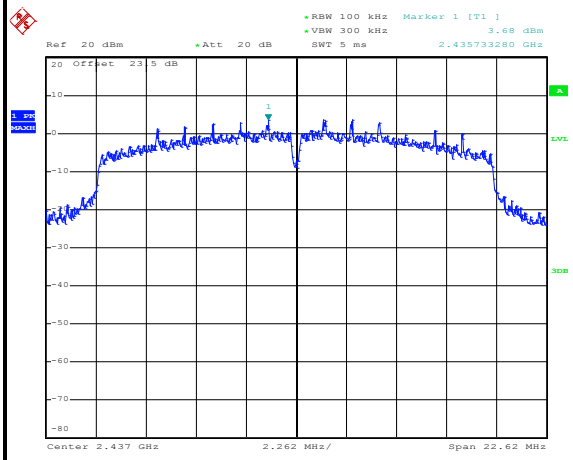


Date: 9.DEC.2013 21:57:17

Number of TX :	2	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

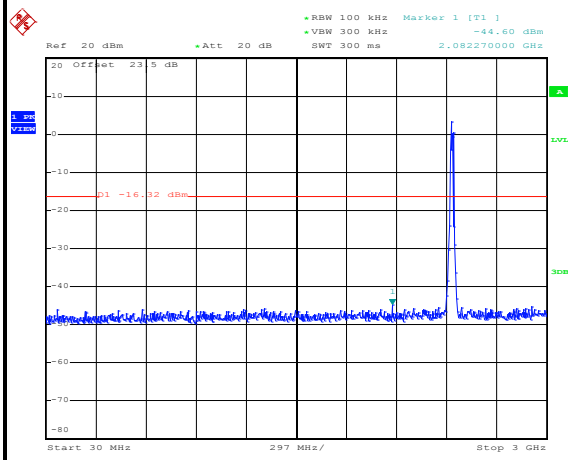
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



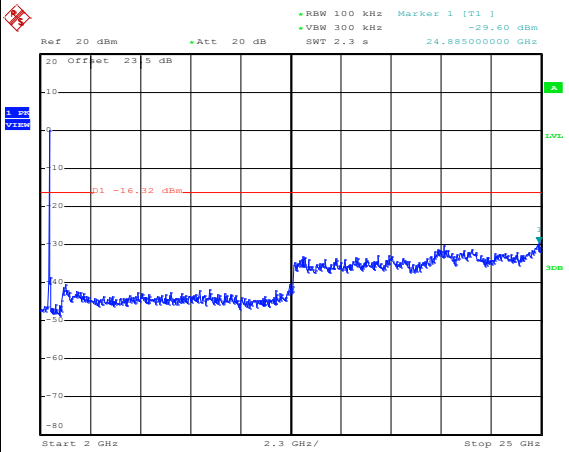
Date: 9.DEC.2013 21:59:44

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 22:00:04

Spurious Emission 2GHz~25GHz

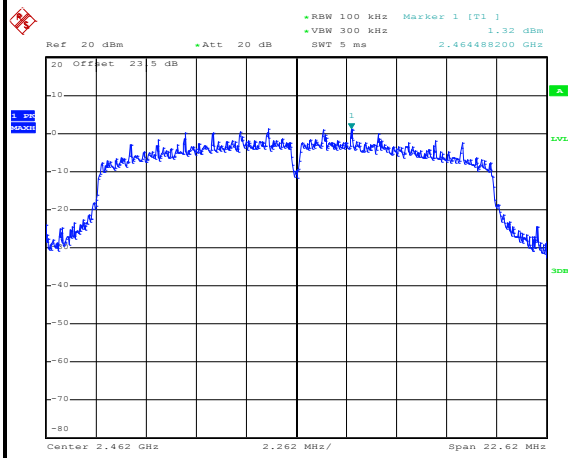


Date: 9.DEC.2013 22:00:23

Number of TX :	2	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

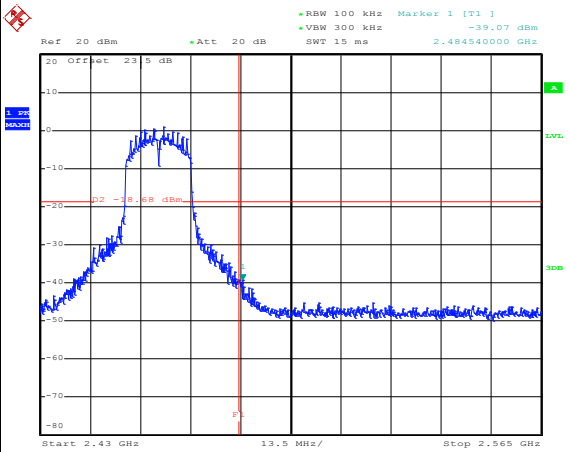
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



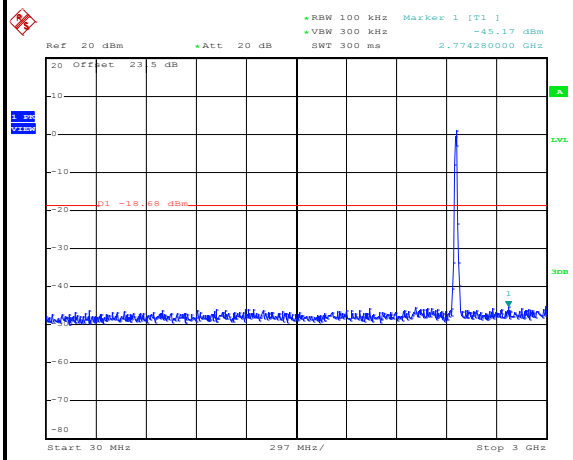
Date: 9.DEC.2013 22:03:19

High Channel Plot



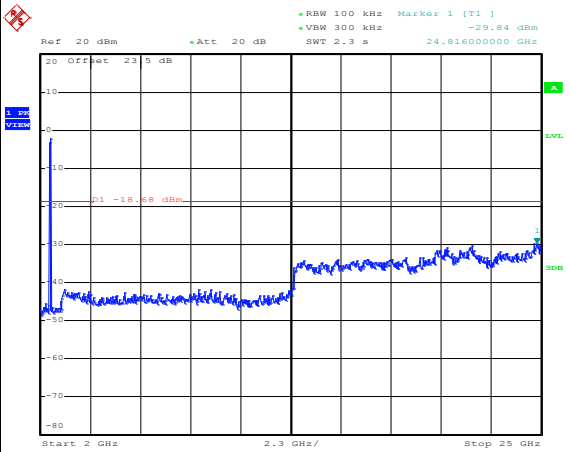
Date: 9.DEC.2013 22:03:32

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 22:03:52

Spurious Emission 2GHz~25GHz



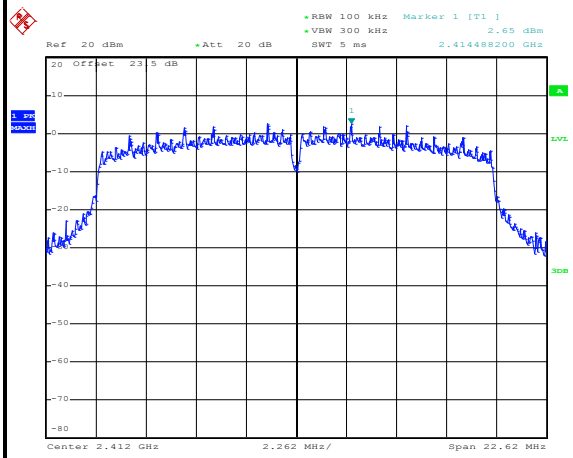
Date: 9.DEC.2013 22:04:10

Number of TX = 2, Ant. 2 (Measured)

Number of TX :	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Alex Lee

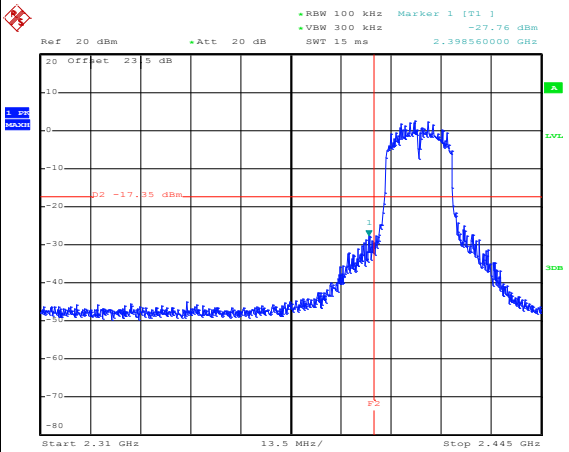
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



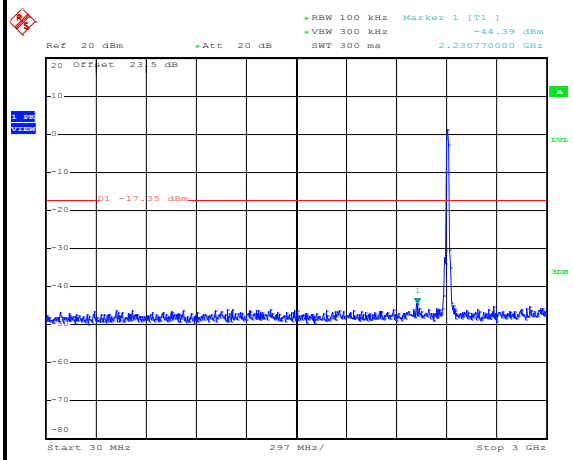
Date: 9.DEC.2013 22:18:47

Low Channel Plot



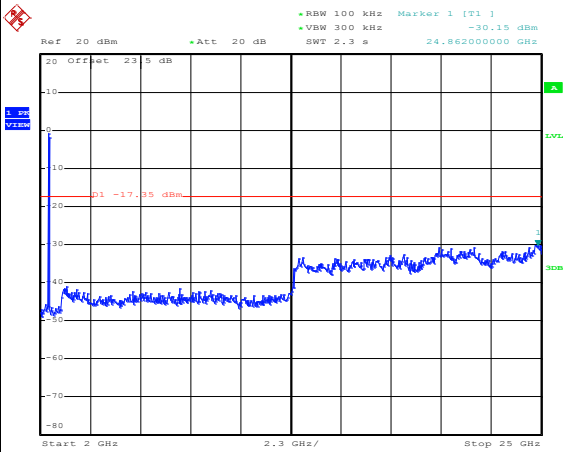
Date: 9.DEC.2013 22:19:01

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 22:19:21

Spurious Emission 2GHz~25GHz

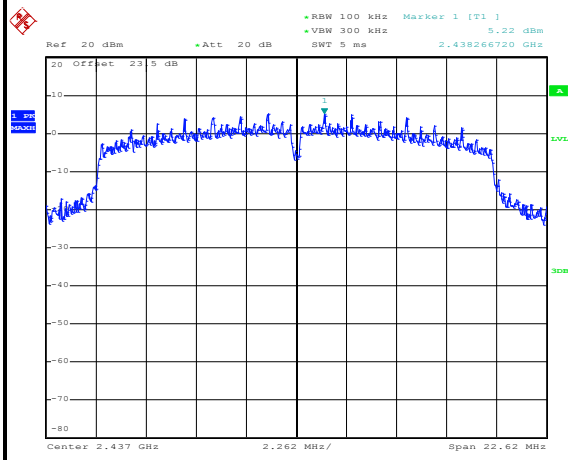


Date: 9.DEC.2013 22:19:39

Number of TX :	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Alex Lee

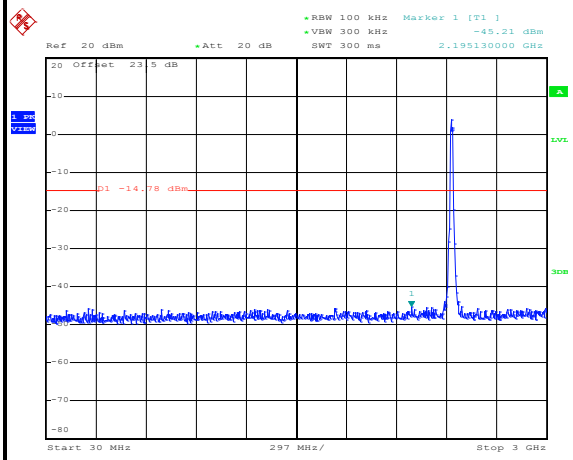
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



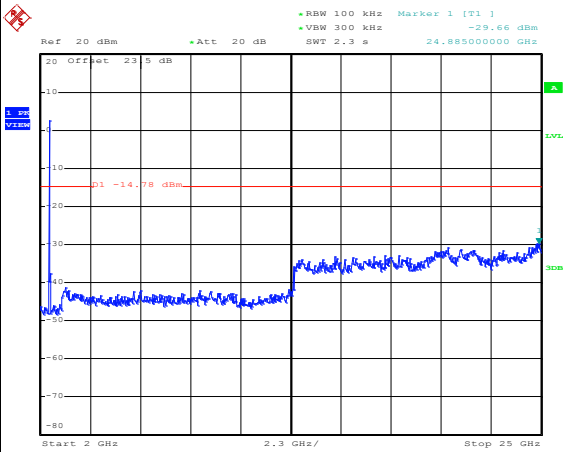
Date: 9.DEC.2013 22:10:30

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 22:10:50

Spurious Emission 2GHz~25GHz

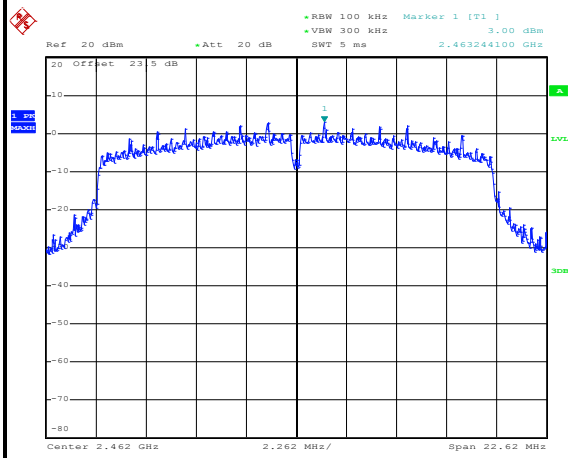


Date: 9.DEC.2013 22:11:09

Number of TX :	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Alex Lee

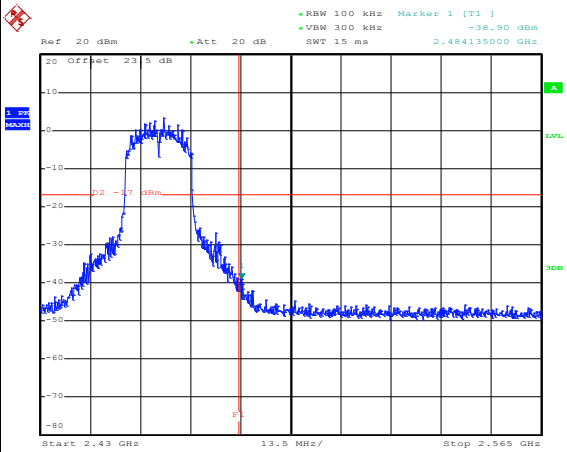
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



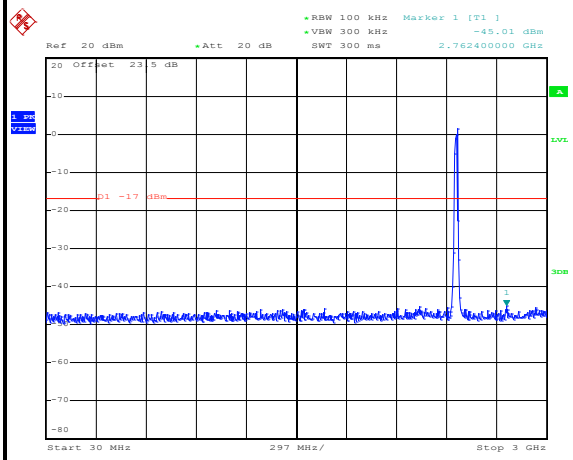
Date: 9.DEC.2013 22:07:36

High Channel Plot



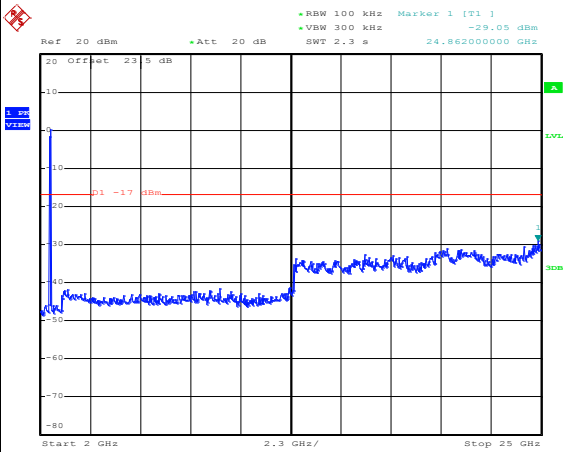
Date: 9.DEC.2013 22:07:50

Spurious Emission 30MHz~3GHz



Date: 9.DEC.2013 22:08:09

Spurious Emission 2GHz~25GHz



Date: 9.DEC.2013 22:08:28

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

The measuring equipment is listed in the section 4 of this test report.

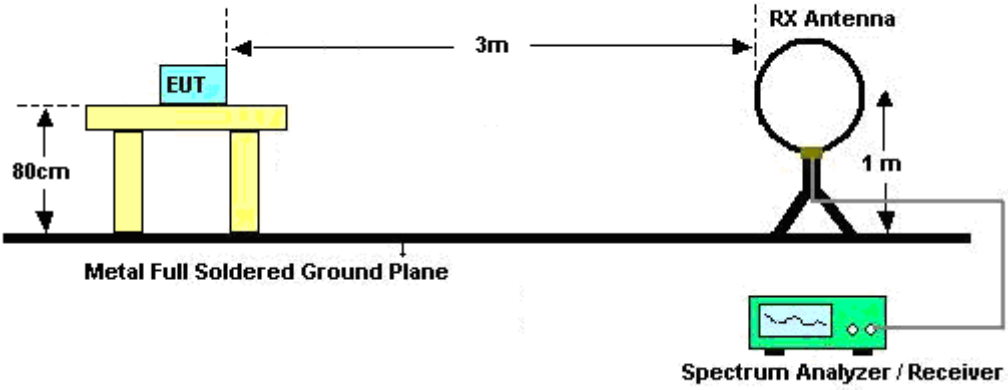
3.5.3 Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
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 ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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.

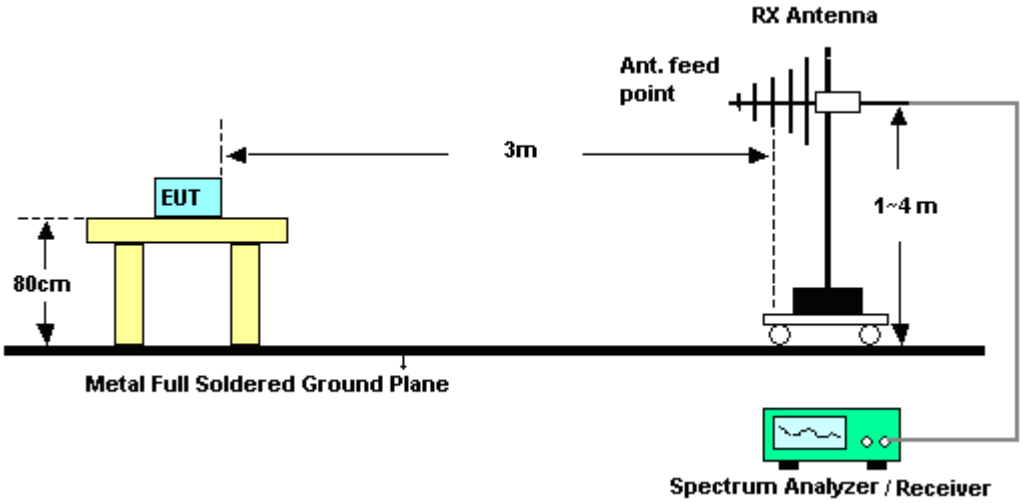
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11b	97.62	16480	0.06	100Hz
1	802.11g	87.24	2736	0.37	1kHz
1	2.4GHz 802.11n HT20	86.26	2548	0.39	1kHz
1	2.4GHz 802.11n HT40	75.73	1248	0.80	1kHz
1+2	2.4GHz 802.11n HT20	76.78	1296	0.77	1kHz

3.5.4 Test Setup

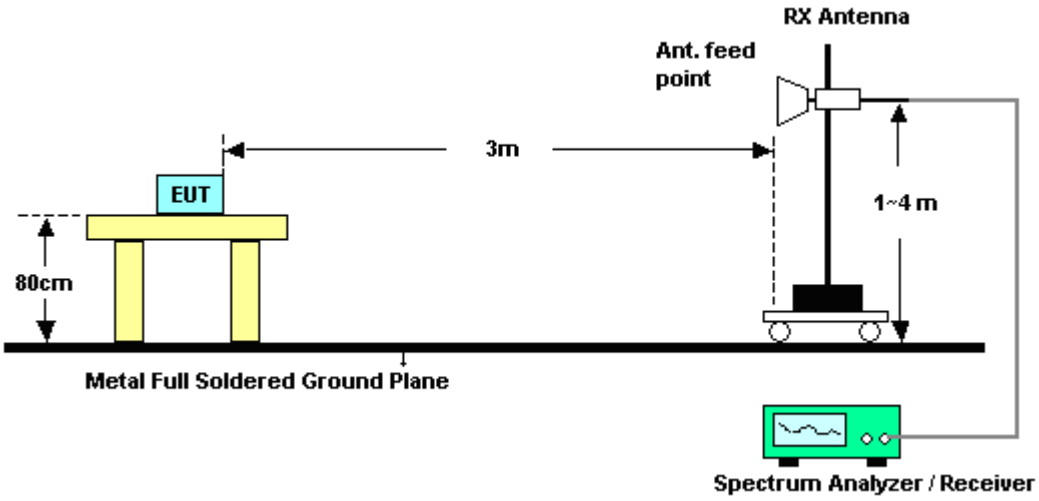
For radiated emissions below 30MHz



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 :**	22~23°C
Test Band :	Low	**Relative Humidity :**	52~53%
Test Channel :	01	**Test Engineer :**	Eric Shih

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
2385.78	53.94	-20.06	74	50.75	32.86	3.59	33.26	150	181	Peak
2386.86	46.57	-7.43	54	43.38	32.86	3.59	33.26	150	181	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
2386.41	52.69	-21.31	74	49.5	32.86	3.59	33.26	100	167	Peak
2386.86	43.64	-10.36	54	40.45	32.86	3.59	33.26	100	167	Average

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Band :	High	**Relative Humidity :**	52~53%
Test Channel :	11	**Test Engineer :**	Eric Shih

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
2487.64	55.28	-18.72	74	51.87	33.05	3.66	33.3	138	221	Peak
2490.31	47.66	-6.34	54	44.25	33.05	3.66	33.3	138	221	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
2487.64	53.04	-20.96	74	49.63	33.05	3.66	33.3	182	169	Peak
2488.69	44.84	-9.16	54	41.43	33.05	3.66	33.3	182	169	Average

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Band :	Low	**Relative Humidity :**	52~53%
Test Channel :	01	**Test Engineer :**	Eric Shih

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
2389.74	63.45	-10.55	74	60.26	32.86	3.59	33.26	180	189	Peak
2389.92	42.21	-11.79	54	39.02	32.86	3.59	33.26	180	189	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
2389.92	61.2	-12.8	74	58.01	32.86	3.59	33.26	100	329	Peak
2389.92	40.26	-13.74	54	37.07	32.86	3.59	33.26	100	329	Average

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Band :	High	**Relative Humidity :**	52~53%
Test Channel :	11	**Test Engineer :**	Eric Shih

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
2483.8	62.95	-11.05	74	59.58	33.01	3.65	33.29	144	73	Peak
2483.5	40.89	-13.11	54	37.52	33.01	3.65	33.29	144	73	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
2483.56	67.22	-6.78	74	63.85	33.01	3.65	33.29	125	328	Peak
2483.59	42.65	-11.35	54	39.28	33.01	3.65	33.29	125	328	Average

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Band :	High	**Relative Humidity :**	52~53%
Test Channel :	11	**Test Engineer :**	Eric Shih

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
2483.74	65.08	-8.92	74	61.71	33.01	3.65	33.29	117	348	Peak
2483.59	42.2	-11.8	54	38.83	33.01	3.65	33.29	117	348	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	62.24	-11.76	74	58.87	33.01	3.65	33.29	100	57	Peak
2483.5	42.59	-11.41	54	39.22	33.01	3.65	33.29	100	57	Average

Test Mode :	802.11n HT40	**Temperature :**	22~23°C
Test Band :	Low	**Relative Humidity :**	52~53%
Test Channel :	03	**Test Engineer :**	Eric Shih

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
2387.31	66.55	-7.45	74	63.36	32.86	3.59	33.26	119	296	Peak
2389.74	46.62	-7.38	54	43.43	32.86	3.59	33.26	119	296	Average
2485.57	52.74	-21.26	74	49.37	33.01	3.65	33.29	119	296	Peak
2488.15	35.09	-18.91	54	31.68	33.05	3.66	33.3	119	296	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
2389.2	65.51	-8.49	74	62.32	32.86	3.59	33.26	186	238	Peak
2389.92	45.08	-8.92	54	41.89	32.86	3.59	33.26	186	238	Average
2486.65	52.11	-21.89	74	48.74	33.01	3.65	33.29	186	238	Peak
2489.47	34.59	-19.41	54	31.18	33.05	3.66	33.3	186	238	Average

Test Mode :	802.11n HT40	**Temperature :**	22~23°C
Test Band :	High	**Relative Humidity :**	52~53%
Test Channel :	09	**Test Engineer :**	Eric Shih

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	48.01	-25.99	74	44.82	32.86	3.59	33.26	180	297	Peak
2390	36.34	-17.66	54	33.15	32.86	3.59	33.26	180	297	Average
2485.84	64.28	-9.72	74	60.91	33.01	3.65	33.29	145	223	Peak
2483.71	50.32	-3.68	54	46.95	33.01	3.65	33.29	145	223	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
2389.65	49.64	-24.36	74	46.45	32.86	3.59	33.26	121	258	Peak
2389.92	36.72	-17.28	54	33.53	32.86	3.59	33.26	121	258	Average
2483.95	71.7	-2.3	74	68.33	33.01	3.65	33.29	121	258	Peak
2485.09	50.87	-3.13	54	47.5	33.01	3.65	33.29	121	258	Average

<MIMO Ant. 1+2>

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Band :	Low	**Relative Humidity :**	52~53%
Test Channel :	01	**Test Engineer :**	Eric Shih

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
2389.29	63.48	-10.52	74	60.29	32.86	3.59	33.26	180	186	Peak
2390	44.64	-9.36	54	41.45	32.86	3.59	33.26	180	186	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
2389.92	66.18	-7.82	74	62.99	32.86	3.59	33.26	100	333	Peak
2389.92	45.04	-8.96	54	41.85	32.86	3.59	33.26	100	333	Average

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Band :	High	**Relative Humidity :**	52~53%
Test Channel :	11	**Test Engineer :**	Eric Shih

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
2483.68	69.28	-4.72	74	65.91	33.01	3.65	33.29	114	295	Peak
2483.56	44.64	-9.36	54	41.27	33.01	3.65	33.29	114	295	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	64.57	-9.43	74	61.2	33.01	3.65	33.29	100	286	Peak
2483.5	41.31	-12.69	54	37.94	33.01	3.65	33.29	100	286	Average

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

Note: Pre-scanned all test modes and only choose the worst case mode recorded in the test report for radiated spurious emission below 1GHz.

<Ant. 1>

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2412 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
2412	99.3	-	-	96.07	32.89	3.61	33.27	116	318	Peak
2412	94.14	-	-	90.91	32.89	3.61	33.27	116	318	Average
4824	45.89	-28.11	74	39.27	35.17	5.25	33.8	100	151	Peak

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2412 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
2412	98.84	-	-	95.61	32.89	3.61	33.27	100	333	Peak
2412	93.83	-	-	90.6	32.89	3.61	33.27	100	333	Average
4824	47.16	-26.84	74	40.54	35.17	5.25	33.8	100	26	Peak

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2437 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
2437	100.93	-	-	97.63	32.95	3.63	33.28	153	76	Peak
2437	96.31	-	-	93.01	32.95	3.63	33.28	153	76	Average
4874	45.93	-28.07	74	39.27	35.18	5.28	33.8	100	26	Peak
7312	48.05	-25.95	74	39.37	36.2	6.61	34.13	100	145	Peak

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2437 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
2437	100.53	-	-	97.23	32.95	3.63	33.28	134	332	Peak
2437	95.42	-	-	92.12	32.95	3.63	33.28	134	332	Average
4874	47.3	-26.7	74	40.64	35.18	5.28	33.8	100	169	Peak
7312	47.4	-26.6	74	38.72	36.2	6.61	34.13	100	41	Peak

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2462 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
2462	100.48	-	-	97.15	32.98	3.64	33.29	114	88	Peak
2462	95.5	-	-	92.17	32.98	3.64	33.29	114	88	Average
4924	46.11	-27.89	74	39.41	35.19	5.31	33.8	100	18	Peak
7386	47.72	-26.28	74	38.94	36.24	6.7	34.16	100	154	Peak

Test Mode :	802.11b	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2462 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
2462	101.05	-	-	97.72	32.98	3.64	33.29	155	330	Peak
2462	96.21	-	-	92.88	32.98	3.64	33.29	155	330	Average
4924	46.59	-27.41	74	39.89	35.19	5.31	33.8	100	26	Peak
7386	48.71	-25.29	74	39.93	36.24	6.7	34.16	100	92	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2412 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
2412	99.6	-	-	96.37	32.89	3.61	33.27	147	78	Peak
2412	88.45	-	-	85.22	32.89	3.61	33.27	147	78	Average
4824	46.6	-27.4	74	39.98	35.17	5.25	33.8	100	48	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2412 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
2412	99.63	-	-	96.4	32.89	3.61	33.27	100	334	Peak
2412	88.21	-	-	84.98	32.89	3.61	33.27	100	334	Average
4824	46.27	-27.73	74	39.65	35.17	5.25	33.8	100	29	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2437 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
2437	103.4	-	-	100.1	32.95	3.63	33.28	155	79	Peak
2437	92.35	-	-	89.05	32.95	3.63	33.28	155	79	Average
4874	47.4	-26.6	74	40.74	35.18	5.28	33.8	100	145	Peak
7312	49.56	-24.44	74	40.88	36.2	6.61	34.13	100	51	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2437 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
2437	102.74	-	-	99.44	32.95	3.63	33.28	134	333	Peak
2437	92.26	-	-	88.96	32.95	3.63	33.28	134	333	Average
4874	47.85	-26.15	74	41.19	35.18	5.28	33.8	100	81	Peak
7312	49.05	-24.95	74	40.37	36.2	6.61	34.13	100	59	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2462 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
2462	101.15	-	-	97.82	32.98	3.64	33.29	116	86	Peak
2462	90.19	-	-	86.86	32.98	3.64	33.29	116	86	Average
4924	44.99	-29.01	74	38.29	35.19	5.31	33.8	100	85	Peak
7386	47	-27	74	38.22	36.24	6.7	34.16	100	8	Peak

Test Mode :	802.11g	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2462 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
2462	101.46	-	-	98.13	32.98	3.64	33.29	154	330	Peak
2462	90.29	-	-	86.96	32.98	3.64	33.29	154	330	Average
4924	45.72	-28.28	74	39.02	35.19	5.31	33.8	100	41	Peak
7386	48.07	-25.93	74	39.29	36.24	6.7	34.16	100	263	Peak

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2462 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
2462	96.2	-	-	92.87	32.98	3.64	33.29	117	348	Peak
2462	84.98	-	-	81.65	32.98	3.64	33.29	117	348	Average
4924	49.71	-24.29	74	43.01	35.19	5.31	33.8	100	252	Peak
7386	48.74	-25.26	74	39.96	36.24	6.7	34.16	100	152	Peak

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2462 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
2462	96.49	-	-	93.16	32.98	3.64	33.29	100	57	Peak
2462	85.11	-	-	81.78	32.98	3.64	33.29	100	57	Average
4924	60.21	-13.79	74	53.51	35.19	5.31	33.8	100	329	Peak
4924	44.98	-9.02	54	38.28	35.19	5.31	33.8	100	329	Average
7386	49.89	-24.11	74	41.11	36.24	6.7	34.16	100	26	Peak

Test Mode :	802.11n HT40	**Temperature :**	22~23°C
Test Channel :	03	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2422 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
2422	96.06	-	-	92.8	32.92	3.62	33.28	119	296	Peak
2422	84.88	-	-	81.62	32.92	3.62	33.28	119	296	Average
4844	47.43	-26.57	74	40.79	35.18	5.26	33.8	100	195	Peak
7266	48.67	-25.33	74	40.03	36.19	6.56	34.11	100	16	Peak

Test Mode :	802.11n HT40	**Temperature :**	22~23°C
Test Channel :	03	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2422 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
2422	94.94	-	-	91.68	32.92	3.62	33.28	186	238	Peak
2422	84.56	-	-	81.3	32.92	3.62	33.28	186	238	Average
4844	46.55	-27.45	74	39.91	35.18	5.26	33.8	100	26	Peak
7266	49.03	-24.97	74	40.39	36.19	6.56	34.11	100	82	Peak

Test Mode :	802.11n HT40	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2437 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
2437	100.03	-	-	96.73	32.95	3.63	33.28	115	301	Peak
2437	89.68	-	-	86.38	32.95	3.63	33.28	115	301	Average
4874	47.68	-26.32	74	41.02	35.18	5.28	33.8	100	26	Peak
7312	48.43	-25.57	74	39.75	36.2	6.61	34.13	100	256	Peak

Test Mode :	802.11n HT40	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2437 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
2437	99.23	-	-	95.93	32.95	3.63	33.28	154	259	Peak
2437	88.94	-	-	85.64	32.95	3.63	33.28	154	259	Average
4874	45.92	-28.08	74	39.26	35.18	5.28	33.8	100	21	Peak
7312	49.05	-24.95	74	40.37	36.2	6.61	34.13	100	41	Peak

Test Mode :	802.11n HT40	**Temperature :**	22~23°C
Test Channel :	09	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2452 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
2452	97.93	-	-	94.63	32.95	3.63	33.28	100	297	Peak
2452	86.48	-	-	83.18	32.95	3.63	33.28	100	297	Average
4924	45.8	-28.2	74	39.1	35.19	5.31	33.8	100	296	Peak
7386	49.03	-24.97	74	40.25	36.24	6.7	34.16	100	25	Peak

Test Mode :	802.11n HT40	**Temperature :**	22~23°C
Test Channel :	09	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2452 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
2452	97.48	-	-	94.18	32.95	3.63	33.28	186	257	Peak
2452	86.64	-	-	83.34	32.95	3.63	33.28	186	257	Average
4924	46.49	-27.51	74	39.79	35.19	5.31	33.8	100	195	Peak
7386	49.69	-24.31	74	40.91	36.24	6.7	34.16	100	52	Peak

<MIMO Ant. 1+2>

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	2412 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
2412	100	-	-	96.77	32.89	3.61	33.27	148	72	Peak
2412	88.53	-	-	85.3	32.89	3.61	33.27	148	72	Average
4824	54.87	-19.13	74	48.25	35.17	5.25	33.8	100	55	Peak
4824	40.4	-13.6	54	33.78	35.17	5.25	33.8	100	55	Average

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Channel :	01	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	2412 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
2412	101.47	-	-	98.24	32.89	3.61	33.27	100	336	Peak
2412	89.17	-	-	85.94	32.89	3.61	33.27	100	336	Average
4824	58.01	-15.99	74	51.39	35.17	5.25	33.8	100	261	Peak
4824	41.36	-12.64	54	34.74	35.17	5.25	33.8	100	261	Average

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2437 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
2437	103.66	-	-	100.36	32.95	3.63	33.28	119	298	Peak
2437	92.42	-	-	89.12	32.95	3.63	33.28	119	298	Average
4874	56.28	-17.72	74	49.62	35.18	5.28	33.8	100	313	Peak
4874	39.01	-14.99	54	32.35	35.18	5.28	33.8	100	313	Average
7312	48.79	-25.21	74	40.11	36.2	6.61	34.13	100	200	Peak

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Channel :	06	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2437 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
2437	103.91	-	-	100.61	32.95	3.63	33.28	180	255	Peak
2437	91.99	-	-	88.69	32.95	3.63	33.28	180	255	Average
4874	60.21	-13.79	74	53.55	35.18	5.28	33.8	100	327	Peak
4874	41.16	-12.84	54	34.5	35.18	5.28	33.8	100	327	Average
7312	49.25	-24.75	74	40.57	36.2	6.61	34.13	121	156	Peak

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Horizontal
Remark :	1. 2462 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
2462	103.19	-	-	99.86	32.98	3.64	33.29	114	295	Peak
2462	91.08	-	-	87.75	32.98	3.64	33.29	114	295	Average
4924	49.13	-24.87	74	42.43	35.19	5.31	33.8	135	263	Peak
7386	49.46	-24.54	74	40.68	36.24	6.7	34.16	100	145	Peak

Test Mode :	802.11n HT20	**Temperature :**	22~23°C
Test Channel :	11	**Relative Humidity :**	52~53%
Test Engineer :	Eric Shih	**Polarization :**	Vertical
Remark :	1. 2462 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
2462	99.55	-	-	96.22	32.98	3.64	33.29	100	286	Peak
2462	87.3	-	-	83.97	32.98	3.64	33.29	100	286	Average
4924	59.96	-14.04	74	53.26	35.19	5.31	33.8	100	330	Peak
4924	40.77	-13.23	54	34.07	35.19	5.31	33.8	100	330	Average
7386	48.73	-25.27	74	39.95	36.24	6.7	34.16	151	298	Peak

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

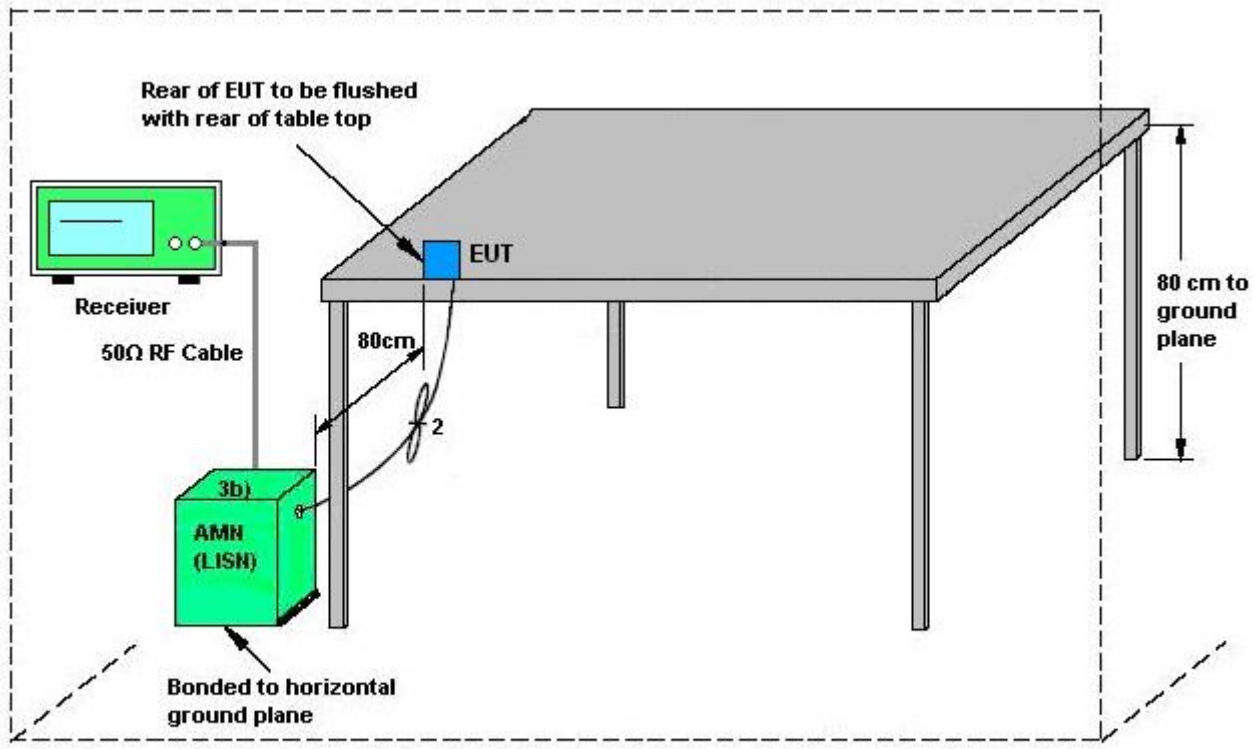
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

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

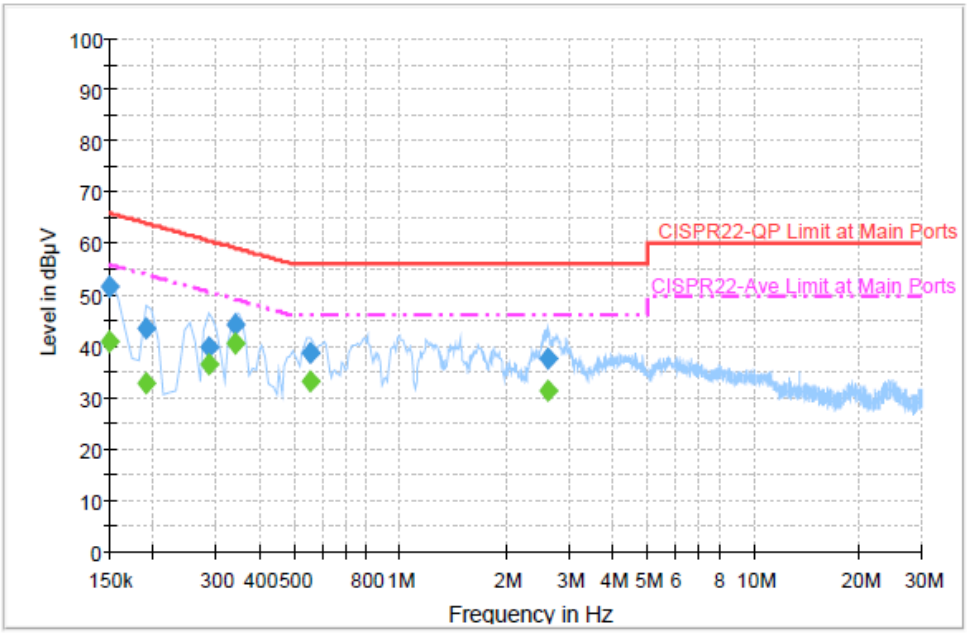
3.6.4 Test Setup



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

3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Cosmo Xu	**Relative Humidity :**	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WLAN Link + Bluetooth Link + Adapter		



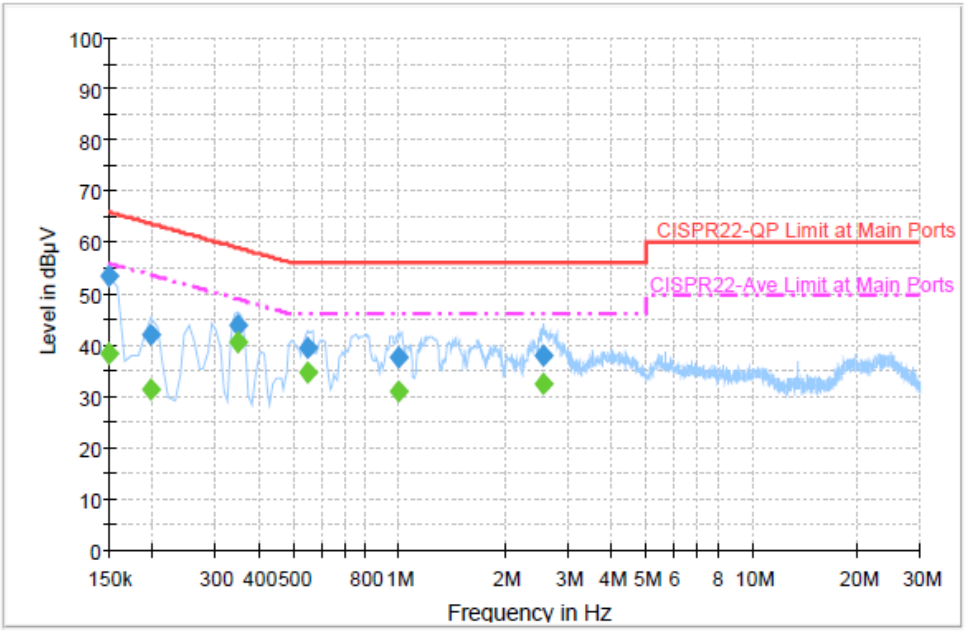
Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	51.8	Off	L1	19.4	14.2	66.0
0.190000	43.4	Off	L1	19.4	20.6	64.0
0.286000	40.0	Off	L1	19.4	20.6	60.6
0.342000	44.2	Off	L1	19.4	15.0	59.2
0.558000	38.7	Off	L1	19.4	17.3	56.0
2.630000	37.5	Off	L1	19.6	18.5	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	41.1	Off	L1	19.4	14.9	56.0
0.190000	32.8	Off	L1	19.4	21.2	54.0
0.286000	36.5	Off	L1	19.4	14.1	50.6
0.342000	40.5	Off	L1	19.4	8.7	49.2
0.558000	33.2	Off	L1	19.4	12.8	46.0
2.630000	31.4	Off	L1	19.6	14.6	46.0

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Cosmo Xu	**Relative Humidity :**	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WLAN Link + Bluetooth Link + Adapter		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	53.5	Off	N	19.4	12.5	66.0
0.198000	42.2	Off	N	19.3	21.5	63.7
0.350000	43.8	Off	N	19.4	15.2	59.0
0.550000	39.7	Off	N	19.4	16.3	56.0
0.990000	37.8	Off	N	19.4	18.2	56.0
2.574000	38.2	Off	N	19.6	17.8	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	38.4	Off	N	19.4	17.6	56.0
0.198000	31.5	Off	N	19.3	22.2	53.7
0.350000	40.5	Off	N	19.4	8.5	49.0
0.550000	34.9	Off	N	19.4	11.1	46.0
0.990000	30.9	Off	N	19.4	15.1	46.0
2.574000	32.6	Off	N	19.6	13.4	46.0

3.7 Antenna Requirements

3.7.1 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.

3.7.2 Antenna Anti-Replacement Construction

Non-standard antenna connector is used.

3.7.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

For CDD transmissions, directional gain is calculated as

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

The EUT supports CDD mode.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	-0.36	1.22	3.48	3.48	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Dec. 03, 2013 ~ Dec. 09, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 17, 2013	Dec. 03, 2013 ~ Dec. 09, 2013	Aug. 16, 2014	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 17, 2013	Dec. 03, 2013 ~ Dec. 09, 2013	Aug. 16, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 15, 2013	Dec. 10, 2013	Nov. 14, 2014	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	Dec. 10, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 04, 2013	Dec. 10, 2013	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	APC	APC-1000 W	N/A	N/A	N/A	Dec. 10, 2013	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9 kHz~7 GHz	Sep. 06, 2013	Dec. 20, 2013	Sep. 05, 2014	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9 kHz ~ 30 GHz	Nov. 20, 2013	Dec. 20, 2013	Nov. 19, 2014	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 Mhz	Jul. 03, 2012	Dec. 20, 2013	Jul. 03, 2014	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30 MHz ~ 1 GHz	Oct. 10, 2013	Dec. 20, 2013	Oct. 09, 2014	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1 GHz~18 GHz	Aug. 22, 2013	Dec. 20, 2013	Aug. 21, 2014	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15 GHz- 40 GHz	Oct. 03, 2013	Dec. 20, 2013	Oct. 02, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	30 MHz~1 GHz	Feb. 26, 2013	Dec. 20, 2013	Feb. 25, 2014	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A01917	1 GHz~26.5 GHz	Aug. 12, 2013	Dec. 20, 2013	Aug. 11, 2014	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	159088	DC~18 G High Gain	Feb. 27, 2013	Dec. 20, 2013	Feb. 26, 2014	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Dec. 20, 2013	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Dec. 20, 2013	N/A	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.26

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.50