



FCC RF Test Report

APPLICANT : Texas Instruments Incorporated
EQUIPMENT : WiFi and Bluetooth Module
BRAND NAME : Texas Instruments
MODEL NAME : WL18MODGB
MARKETING NAME : WL18xxMOD WiLink™ 8 Single-Band
Combo Module –Wi-Fi®, Bluetooth®,
and Bluetooth Low Energy (LE)
FCC ID : Z64-WL18SBMOD
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

This is a variant report. The product was received on Apr. 13, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in 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: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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



TABLE OF CONTENTS

REVISION HISTORY..... 3

1 GENERAL DESCRIPTION 4

 1.1 Applicant 4

 1.2 Manufacturer 4

 1.3 Product Feature of Equipment Under Test..... 4

 1.4 Product Specification subjective to this standard 5

 1.5 Modification of EUT 5

APPENDIX A. ORIGINAL REPORT

APPENDIX B. ORIGINAL REPORT OF FR402349C



1 General Description

1.1 Applicant

Texas Instruments Incorporated
12500 TI BLVD., Dallas Texas, 75243

1.2 Manufacturer

Texas Instruments Incorporated
12500 TI BLVD., Dallas Texas, 75243

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	WiFi and Bluetooth Module
Brand Name	Texas Instruments
Model Name	WL18MODGB
Marketing Name	WL18xxMOD WiLink™ 8 Single-Band Combo Module – Wi-Fi®, Bluetooth®, and Bluetooth Low Energy (LE)
FCC ID	Z64-WL18SBMOD
EUT supports Radios application	WLAN 11b/g/n HT20/HT40 Bluetooth BR/EDR/LE v4.2
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This is a variant report by adding antenna in antenna information. All the test cases were performed on the Sporton variant report, FR402349C.
3. The EUT module has performed with the WL18MODGB Test grade 35 placed on the WL1837MODCOM8I evaluation board. It is verified that an additional 1dB cable loss was included in the measurements and it has shown no measurement difference in output power as the original configuration (original: WL18MODGB placed on the WL1835MOCOM8B evaluation board). Hence, the change does not degrade any EMC parameters. This is also described in the operational description document.



1.4 Product Specification subjective to this standard

Product Specification subjective to this standard			
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz		
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)		
Antenna Function for Transmitter		Chain Port 0 Ant. 1	Chain Port 1 Ant. 2
	802.11 b	V	-
	802.11 g	V	-
	802.11 n SISO	V	-
	802.11 n MIMO	V	V

Antenna information				
	Brand	Antenna Type	Model	2.4GHz ~2.5GHz Gain
1	Ethertronics	PCB	1000423	-0.6dBi
2	LSR	Rubber Whip / Dipole	001-0012	2dBi
3			080-0013	2dBi
4			080-0014	2dBi
5		PIFA	001-0016	2.5dBi
6	001-0021		2.5dBi	
7	Laird	PCB	CAF94504	2dBi
8			CAF94505	2dBi
9	Pulse	Chip	W3006	3.2dBi
10	TDK	CHIP	ANT016008	2.4dBi

1.5 Modification of EUT

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



Appendix A. Original Report

Please refer to Sporton report number FR4O2349C as below.



Variant 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 Oct. 23, 2014 and testing was completed on Aug. 14, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in 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: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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TABLE OF CONTENTS

REVISION HISTORY 3

SUMMARY OF TEST RESULT 4

1 GENERAL DESCRIPTION 5

 1.1 Applicant 5

 1.2 Manufacturer 5

 1.3 Product Feature of Equipment Under Test 5

 1.4 Product Specification subjective to this standard 6

 1.5 Modification of EUT 6

 1.6 Testing Location 7

 1.7 Applicable Standards 7

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST 8

 2.1 Carrier Frequency and Channel 8

 2.2 Pre-Scanned RF Power 9

 2.3 Test Mode 10

 2.4 Connection Diagram of Test System 11

 2.5 Support Unit used in test configuration and system 11

 2.6 EUT Operation Test Setup 11

 2.7 Measurement Results Explanation Example 12

3 TEST RESULT 13

 3.1 Peak Output Power Measurement 13

 3.2 Radiated Band Edges and Spurious Emission Measurement 15

 3.3 Antenna Requirements 19

4 LIST OF MEASURING EQUIPMENT 20

5 UNCERTAINTY OF EVALUATION 21

APPENDIX A. TEST RESULT OF CONDUCTED POWER

APPENDIX B. TEST RESULT OF CONDUCTED SPURIOUS EMISSION

APPENDIX C. TEST RESULT OF RADIATED SPURIOUS EMISSION

APPENDIX D. SETUP PHOTOGRAPHS



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.02 dB at 51.330 MHz
3.3	15.203 & 15.247(b)	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

1.3 Product 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 v4.0 EDR/LE
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 subjective to this standard

Product Specification subjective to this standard																	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz																
Maximum Output Power to antenna	<Ant. 1> 802.11b : 17.93 dBm (0.0607 W) 802.11g : 20.58 dBm (0.1143 W) 802.11n HT40 : 20.18 dBm (0.1042 W) SISO<Ant. 1> 802.11n HT20 : 20.55 dBm (0.1135 W) MIMO<Ant. 1 + 2> 802.11n HT20 : 23.52 dBm (0.2249 W)																
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)																
Antenna Function for Transmitter	<table border="1"> <thead> <tr> <th></th> <th>Chain Port 0 Ant. 1</th> <th>Chain Port 1 Ant. 2</th> </tr> </thead> <tbody> <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 SISO</td> <td>V</td> <td>-</td> </tr> <tr> <td>802.11 n MIMO</td> <td>V</td> <td>V</td> </tr> </tbody> </table>			Chain Port 0 Ant. 1	Chain Port 1 Ant. 2	802.11 b	V	-	802.11 g	V	-	802.11 n SISO	V	-	802.11 n MIMO	V	V
	Chain Port 0 Ant. 1	Chain Port 1 Ant. 2															
802.11 b	V	-															
802.11 g	V	-															
802.11 n SISO	V	-															
802.11 n MIMO	V	V															

Antenna Information		
Antenna Type	Brand	2.4GHz~2.5GHz
PCB	Ethertronics	-0.6
Dipole	LSR	2
PCB	Laird	2
Chip	Pulse	3.2
PIFA	LSR	2
Chip	TDK	2.4

1.5 Modification of EUT

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



1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. TH05-HY

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 58 , Aly. 75, Ln. 564, Wenhua 3rd Rd., Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH10

Note: The test site complies with ANSI C63.4 2009 requirement.

1.7 Applicable 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 v03r03
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2009

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. FCC permits the use of the 1.5 meter table for frequency above 1GHz as an alternative in C63.10-2013 through inquiry tracking number 961829.
3. 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: 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		
Channel	CH 01	CH 06	CH 11
Peak Power (dBm)	17.93	17.73	17.51

802.11g			
Data Rate (MHz)	6Mbps		
Channel	CH 01	CH 06	CH 11
Peak Power (dBm)	20.17	20.58	19.82

2.4GHz 802.11n HT40			
Data Rate (MHz)	MCS0		
Channel	CH 03	CH 06	CH 09
Peak Power (dBm)	19.21	20.18	18.91

SISO<Ant. 1>

2.4GHz 802.11n HT20			
Data Rate (MHz)	MCS0		
Channel	CH 01	CH 06	CH 11
Peak Power (dBm)	20.15	20.55	19.66

MIMO<Ant. 1 + 2>

2.4GHz 802.11n HT20			
Data Rate (MHz)	MCS12		
Channel	CH 01	CH 06	CH 11
Peak Power (dBm)	23.33	23.52	23.14

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 test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

Single Antenna

<2.4GHz>

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

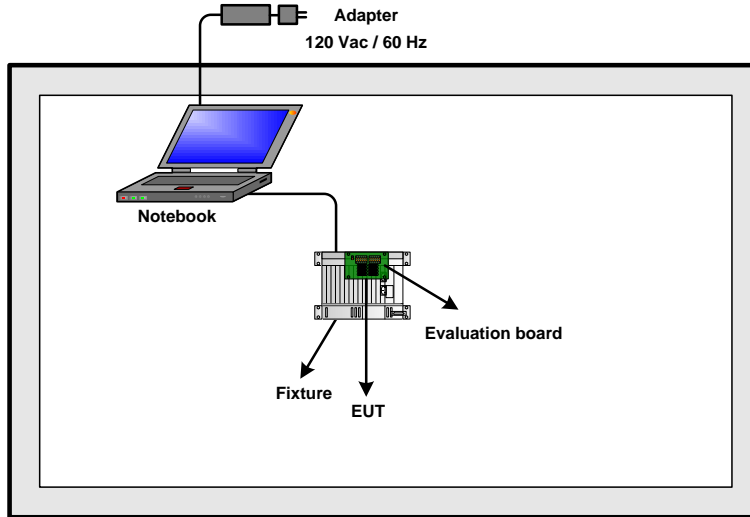
MIMO Antenna

<2.4GHz>

Modulation	Data Rate
802.11n HT20	MCS12

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	E335 (with WiFi module TP00034A)	FCC DoC/ Contains FCC ID:QDS-BRCM1058	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, "Rttt" installed in the EUT make the EUT provide 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.

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

3 Test Result

3.1 Peak Output Power Measurement

3.1.1 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.

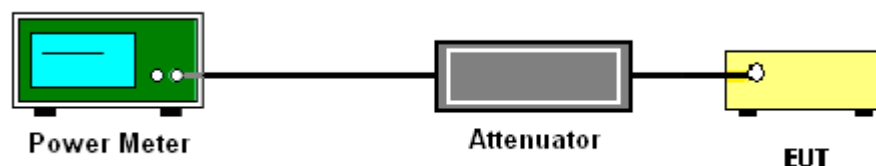
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r03 section 9.1.2 PKPM1 Peak power meter method.
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.

3.1.4 Test Setup





3.1.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.1.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A.



3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 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

3.2.2 Measuring Instruments

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



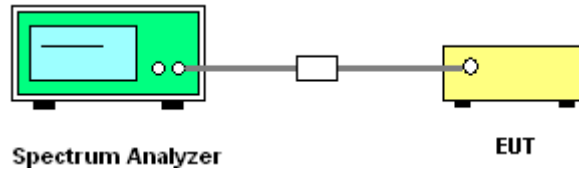
3.2.3 Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r03.
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 for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively 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 $f < 1 \text{ GHz}$; $\text{VBW} \geq \text{RBW}$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1 \text{ GHz}$ for peak measurement.
 For average measurement:
 - $\text{VBW} = 10 \text{ Hz}$, when duty cycle is no less than 98 percent.
 - $\text{VBW} \geq 1/T$, 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.

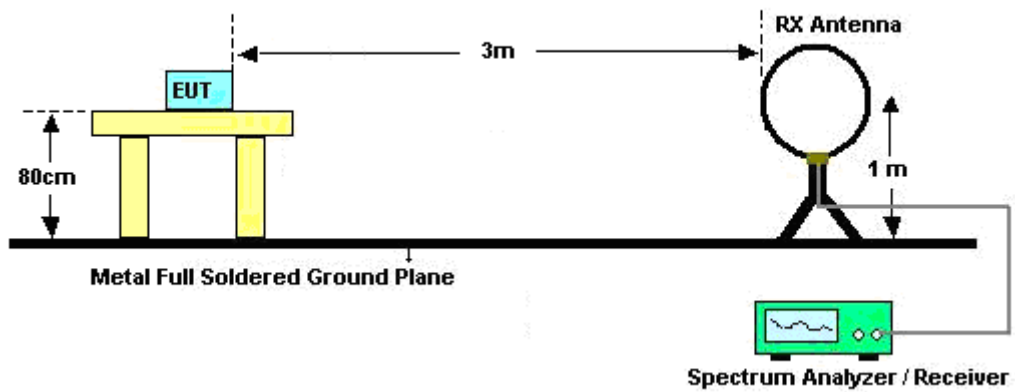
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11b	40.76	640	1.5625	3kHz
1	802.11g	32.69	340	2.94	3kHz
1	2.4GHz 802.11n HT20	33.02	350	2.86	3kHz
1	2.4GHz 802.11n HT40	30.39	310	3.23	10kHz
1+2	2.4GHz 802.11n HT20 for Ant 1	30.88	210	4.76	10kHz
1+2	2.4GHz 802.11n HT20 for Ant 2	30.88	210	4.76	10kHz

3.2.4 Test Setup

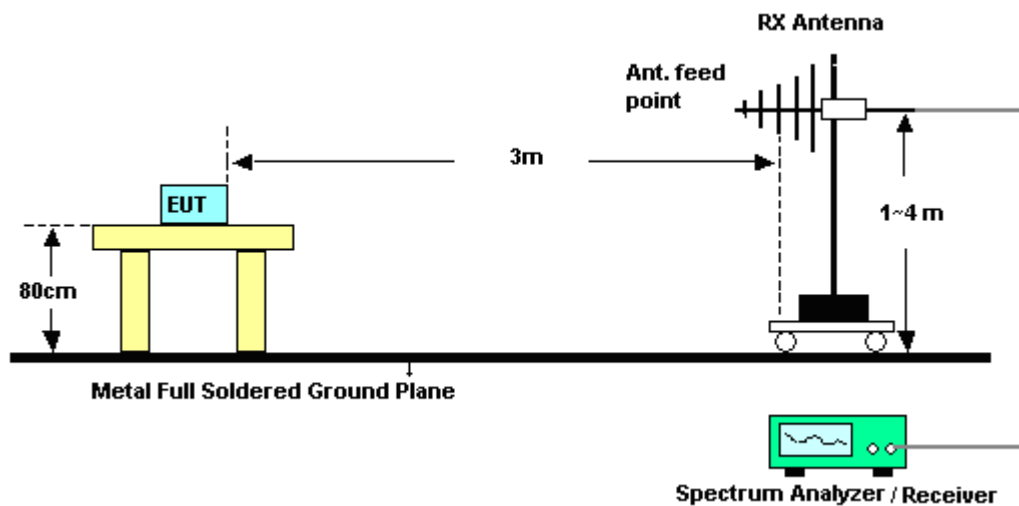
For Conducted Measurement Setup:



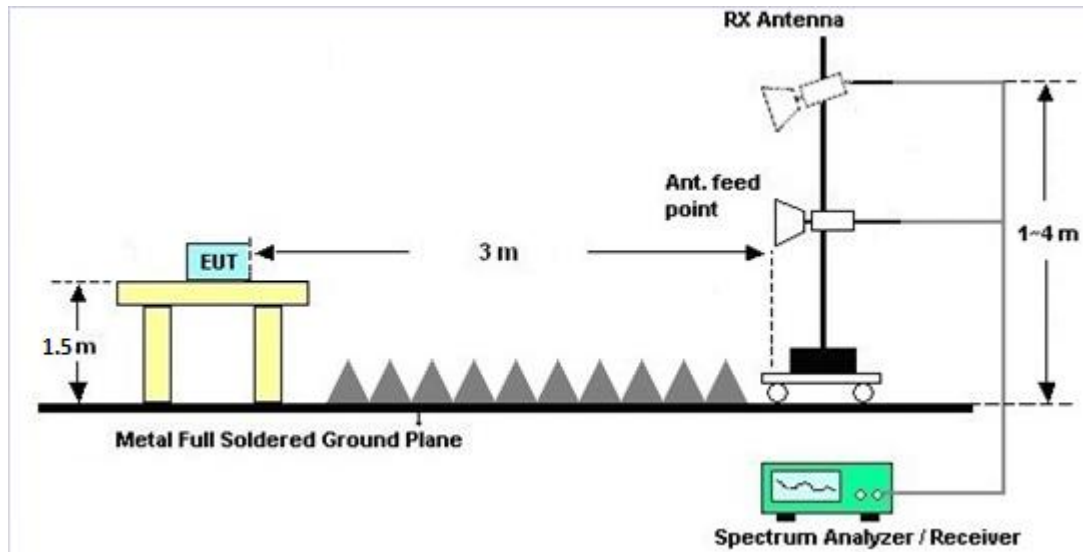
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 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.

3.2.6 Test Result of Conducted Spurious at Band Edges in the Restricted Band

Please refer to Appendix B.

3.2.7 Test Result of Conducted Spurious Emission in the Restricted Band

Please refer to Appendix B.

3.2.8 Test Result of Cabinet Radiated Spurious at Band Edges

Please refer to Appendix C.

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

Please refer to Appendix C.



3.3 Antenna Requirements

3.3.1 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.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.3.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

For CDD transmissions, directional gain is calculated as

Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = $10 \log(N_{ANT}/N_{SS}=1)$ dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

The EUT supports only MCS 12-15 for MIMO mode, hence $N_{ss}=2$.

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.

			DG	DG	Power	PSD
	Ant. 1	Ant. 2	for	for	Limit	Limit
	(dBi)	(dBi)	Power	PSD	Reduction	Reduction
			(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	3.20	3.20	3.20	3.20	0.00	0.00

Power Limit Reduction = $DG(\text{Power}) - 6\text{dBi}$, (min = 0)

PSD Limit Reduction = $DG(\text{PSD}) - 6\text{dBi}$, (min = 0)



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1218006	300MHz~40GHz	Oct. 18, 2014	Aug. 07, 2015~ Aug. 13, 2015	Oct. 17, 2015	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1126017	300MHz~40GHz	Oct. 18, 2014	Aug. 07, 2015~ Aug. 13, 2015	Oct. 17, 2015	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jun. 18, 2015	Aug. 07, 2015~ Aug. 13, 2015	Jun. 17, 2016	Conducted (TH05-HY)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 584	18GHz- 40GHz	Nov. 03, 2014	Aug. 13, 2015~ Aug. 14, 2015	Nov. 02, 2015	Radiation (03CH10-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9kHz~30MHz	Feb. 02, 2015	Aug. 13, 2015~ Aug. 14, 2015	Feb. 01, 2016	Radiation (03CH10-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Nov. 24, 2014	Aug. 13, 2015~ Aug. 14, 2015	Nov. 23, 2015	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D	35413	30MHz~1GHz	Oct. 24, 2014	Aug. 13, 2015~ Aug. 14, 2015	Oct. 23, 2015	Radiation (03CH10-HY)
EMI Test Receiver	Keysight	N9038A	MY541300 85	20Hz ~ 8.4GHz	Nov. 05, 2014	Aug. 13, 2015~ Aug. 14, 2015	Nov. 04, 2015	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-132 5	1GHz ~ 18GHz	Oct. 03, 2014	Aug. 13, 2015~ Aug. 14, 2015	Oct. 02, 2015	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY532700 78	1GHz~26.5GHz	Nov. 20, 2014	Aug. 13, 2015~ Aug. 14, 2015	Nov. 19, 2015	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY542004 85	10Hz ~ 44GHZ	Oct. 14, 2014	Aug. 13, 2015~ Aug. 14, 2015	Oct. 13, 2015	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 13, 2015~ Aug. 14, 2015	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500- B	N/A	1~4m	N/A	Aug. 13, 2015~ Aug. 14, 2015	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0-360 degree	N/A	Aug. 13, 2015~ Aug. 14, 2015	N/A	Radiation (03CH10-HY)
Preamplifier	MITEQ	JS44-180040 00-33-8P	1840917	18GHz ~ 40GHz	Jun. 02, 2015	Aug. 13, 2015~ Aug. 14, 2015	Jun. 01, 2016	Radiation (03CH10-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.90
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APPENDIX A. TEST RESULT OF CONDUCTED POWER

Test Engineer:	Bill Kuo	Temperature:	21~25	°C
Test Date:	2015/8/12	Relative Humidity:	51~54	%

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	17.93			30.00	30.00	3.20	3.20	21.13		36.00	36.00	Pass
11b	1Mbps	1	6	2437	17.73			30.00	30.00	3.20	3.20	20.93		36.00	36.00	Pass
11b	1Mbps	1	11	2462	17.51			30.00	30.00	3.20	3.20	20.71		36.00	36.00	Pass
11g	6Mbps	1	1	2412	20.17			30.00	30.00	3.20	3.20	23.37		36.00	36.00	Pass
11g	6Mbps	1	6	2437	20.58			30.00	30.00	3.20	3.20	23.78		36.00	36.00	Pass
11g	6Mbps	1	11	2462	19.82			30.00	30.00	3.20	3.20	23.02		36.00	36.00	Pass
HT20	MCS0	1	1	2412	20.15			30.00	30.00	3.20	3.20	23.35		36.00	36.00	Pass
HT20	MCS0	1	6	2437	20.55			30.00	30.00	3.20	3.20	23.75		36.00	36.00	Pass
HT20	MCS0	1	11	2462	19.66			30.00	30.00	3.20	3.20	22.86		36.00	36.00	Pass
HT40	MCS0	1	3	2422	19.21			30.00	30.00	3.20	3.20	22.41		36.00	36.00	Pass
HT40	MCS0	1	6	2437	20.18			30.00	30.00	3.20	3.20	23.38		36.00	36.00	Pass
HT40	MCS0	1	9	2452	18.91			30.00	30.00	3.20	3.20	22.11		36.00	36.00	Pass
HT20	MCS12	2	1	2412	19.89	20.71	23.33	30.00		3.20		26.53		36.00		Pass
HT20	MCS12	2	6	2437	20.12	20.87	23.52	30.00		3.20		26.72		36.00		Pass
HT20	MCS12	2	11	2462	19.48	20.69	23.14	30.00		3.20		26.34		36.00		Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	1	1	2412	3.90		16.01		
11b	1Mbps	1	6	2437	3.90		15.92		
11b	1Mbps	1	11	2462	3.90		15.69		
11g	6Mbps	1	1	2412	4.86		12.01		
11g	6Mbps	1	6	2437	4.86		16.48		
11g	6Mbps	1	11	2462	4.86		11.81		
HT20	MCS0	1	1	2412	4.81		12.22		
HT20	MCS0	1	6	2437	4.81		15.71		
HT20	MCS0	1	11	2462	4.81		11.72		
HT40	MCS0	1	3	2422	5.17		10.22		
HT40	MCS0	1	6	2437	5.17		14.33		
HT40	MCS0	1	9	2452	5.17		9.89		
HT20	MCS12	2	1	2412	5.10	5.10	11.82	12.91	15.41
HT20	MCS12	2	6	2437	5.10	5.10	13.35	13.55	16.46
HT20	MCS12	2	11	2462	5.10	5.10	11.35	12.78	15.14

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



Appendix B. Test Result of Conducted Spurious

Test Result of Conducted Spurious at Band Edges in the Restricted Band

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Avg
1		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(P/A)
802.11b CH 01 2412MHz		2389.94	-44.12	-22.92	-21.2	-48.59	3.2	1.27	0	P
		2389.96	-50.90	-9.7	-41.2	-55.37	3.2	1.27	0	A
	*	2413.277	13.70	-	-	9.23	3.2	1.27	0	P
	*	2411.272	9.73	-	-	5.26	3.2	1.27	0	A
802.11b CH 06 2437MHz		2389.54	-48.47	-27.27	-21.2	-52.94	3.2	1.27	0	P
		2389.66	-55.60	-14.4	-41.2	-60.07	3.2	1.27	0	A
	*	2438.326	13.30	-	-	8.82	3.2	1.28	0	P
	*	2436.323	9.42	-	-	4.94	3.2	1.28	0	A
		2484.60	-47.37	-26.17	-21.2	-51.85	3.2	1.28	0	P
	2484.96	-54.85	-13.65	-41.2	-59.33	3.2	1.28	0	A	
802.11b CH 11 2462MHz	*	2460.872	13.3	-	-	8.82	3.2	1.28	0	P
	*	2461.289	9.40	-	-	4.92	3.2	1.28	0	A
		2483.72	-43.01	-21.81	-21.2	-47.49	3.2	1.28	0	P
		2483.84	-50.73	-9.53	-41.2	-55.21	3.2	1.28	0	A



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Avg
1		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(P/A)
802.11g CH 01 2412MHz		2389.92	-29.96	-8.76	-21.2	-34.43	3.2	1.27	0	P
		2389.66	-48.13	-6.93	-41.2	-52.6	3.2	1.27	0	A
	*	2410.521	15.8	-	-	11.33	3.2	1.27	0	P
	*	2413.611	6.34	-	-	1.87	3.2	1.27	0	A
802.11g CH 06 2437MHz		2389.48	-38.28	-17.08	-21.2	-42.75	3.2	1.27	0	P
		2389.38	-51.67	-10.47	-41.2	-56.14	3.2	1.27	0	A
	*	2435.571	20.06	-	-	15.58	3.2	1.28	0	P
	*	2435.154	11.05	-	-	6.57	3.2	1.28	0	A
		2485.28	-40.64	-19.44	-21.2	-45.12	3.2	1.28	0	P
		2483.52	-53.66	-12.46	-41.2	-58.14	3.2	1.28	0	A
802.11g CH 11 2462MHz	*	2460.287	15.4	-	-	10.92	3.2	1.28	0	P
	*	2460.872	6.09	-	-	1.61	3.2	1.28	0	A
		2483.56	-33.19	-11.99	-21.2	-37.67	3.2	1.28	0	P
		2483.54	-47.97	-6.77	-41.2	-52.45	3.2	1.28	0	A



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Avg
1		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(P/A)
802.11n		2390.00	-33.65	-12.45	-21.2	-38.12	3.2	1.27	0	P
HT20		2389.96	-45.96	-4.76	-41.2	-50.43	3.2	1.27	0	A
CH 01	*	2413.444	12.64	-	-	8.17	3.2	1.27	0	P
2412MHz	*	2413.861	3.56	-	-	-0.91	3.2	1.27	0	A
802.11n		2389.74	-37.35	-16.15	-21.2	-41.82	3.2	1.27	0	P
		2390.00	-54.28	-13.08	-41.2	-58.75	3.2	1.27	0	A
HT20	*	2438.41	16.06	-	-	11.58	3.2	1.28	0	P
CH 06	*	2438.94	7.24	-	-	2.76	3.2	1.28	0	A
2437MHz		2483.54	-39.78	-18.58	-21.2	-44.26	3.2	1.28	0	P
		2483.52	-53.87	-12.67	-41.2	-58.35	3.2	1.28	0	A
802.11n	*	2460.287	13.41	-	-	8.93	3.2	1.28	0	P
HT20	*	2460.872	3.5	-	-	-0.98	3.2	1.28	0	A
CH 11		2483.54	-31.24	-10.04	-21.2	-35.72	3.2	1.28	0	P
2462MHz		2483.50	-47.07	-5.87	-41.2	-51.55	3.2	1.28	0	A



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Avg
1		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(P/A)
802.11n		2389.92	-27.55	-6.35	-21.2	-32.02	3.2	1.27	0	P
HT40		2389.72	-43.88	-2.68	-41.2	-48.35	3.2	1.27	0	A
CH 03	*	2409.853	8.66	-	-	4.19	3.2	1.27	0	P
2422MHz	*	2413.945	-1.33	-	-	-5.8	3.2	1.27	0	A
802.11n		2389.82	-24.37	-3.17	-21.2	-28.84	3.2	1.27	0	P
		2389.88	-41.4	-0.20	-41.2	-45.87	3.2	1.27	0	A
HT40	*	2424.96	13.08	-	-	8.6	3.2	1.27	0	P
CH 06	*	2425.46	2.92	-	-	-1.56	3.2	1.27	0	A
2437MHz		2483.62	-24.85	-3.65	-21.2	-29.33	3.2	1.28	0	P
		2483.52	-41.96	-0.76	-41.2	-46.44	3.2	1.28	0	A
802.11n	*	2444.673	8.69	-	-	4.21	3.2	1.28	0	P
HT40	*	2444.088	-0.93	-	-	-5.41	3.2	1.28	0	A
CH 09		2484.16	-29.37	-8.17	-21.2	-33.85	3.2	1.28	0	P
2452MHz		2483.54	-44.42	-3.22	-41.2	-48.9	3.2	1.28	0	A



15C 2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 MIMO (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	MIMO	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Factor	Avg
1+2(1)		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(dB)	(P/A)
802.11n		2389.86	-24.03	-2.83	-21.2	-31.51	3.2	1.27	0	3.01	P
HT20		2390.00	-44.11	-2.91	-41.2	-51.59	3.2	1.27	0	3.01	A
CH 01	*	2413.11	16.08	-	-	8.6	3.2	1.27	0	3.01	P
2412MHz	*	2410.68	6.66	-	-	-0.82	3.2	1.27	0	3.01	A
802.11n		2389.78	-24.2	-3	-21.2	-31.68	3.2	1.27	0	3.01	P
		2390.00	-44.19	-2.99	-41.2	-51.67	3.2	1.27	0	3.01	A
HT20	*	2434.15	17.69	-	-	10.2	3.2	1.27	0	3.01	P
CH 06	*	2435.82	7.19	-	-	-0.3	3.2	1.27	0	3.01	A
2437MHz		2483.56	-41.91	-20.71	-21.2	-49.4	3.2	1.28	0	3.01	P
		2483.56	-53.79	-12.59	-41.2	-61.28	3.2	1.28	0	3.01	A
802.11n	*	2463.126	16.55	-	-	9.06	3.2	1.28	0	3.01	P
HT20	*	2461.039	5.52	-	-	-1.97	3.2	1.28	0	3.01	A
CH 11		2483.58	-26.09	-4.89	-21.2	-33.58	3.2	1.28	0	3.01	P
2462MHz		2483.52	-43.8	-2.6	-41.2	-51.29	3.2	1.28	0	3.01	A
1+2(2)											
802.11n		2389.62	-25.33	-4.13	-21.2	-32.81	3.2	1.27	0	3.01	P
HT20		2389.94	-42.06	-0.86	-41.2	-49.54	3.2	1.27	0	3.01	A
CH 01	*	2412.00	15.98	-	-	8.5	3.2	1.27	0	3.01	P
2412MHz	*	2411.00	5.89	-	-	-1.59	3.2	1.27	0	3.01	A
802.11n		2389.92	-41.96	-20.76	-21.2	-49.44	3.2	1.27	0	3.01	P
		2389.98	-54.32	-13.12	-41.2	-61.8	3.2	1.27	0	3.01	A
HT20	*	2435.00	18.08	-	-	10.59	3.2	1.27	0	3.01	P
CH 06	*	2436.00	7.98	-	-	0.49	3.2	1.27	0	3.01	A
2437MHz		2483.66	-42.14	-20.94	-21.2	-49.63	3.2	1.28	0	3.01	P
		2483.50	-54.8	-13.6	-41.2	-62.29	3.2	1.28	0	3.01	A
802.11n	*	2463.00	18.46	-	-	10.97	3.2	1.28	0	3.01	P
HT20	*	2462.00	5.99	-	-	-1.5	3.2	1.28	0	3.01	A
CH 11		2483.94	-22.38	-1.18	-21.2	-29.87	3.2	1.28	0	3.01	P
2462MHz		2483.60	-41.6	-0.40	-41.2	-49.09	3.2	1.28	0	3.01	A



1.1.1 Test Result of Conducted Spurious Emission in the Restricted Band

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Avg
1		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(P/A)
802.11b CH 01 2412MHz		105.66	-80.91	-29.21	-51.7	-89.03	3.2	0.22	4.7	P
		213.33	-80.47	-28.77	-51.7	-88.72	3.2	0.35	4.7	P
		281.23	-80.92	-31.72	-49.2	-89.21	3.2	0.39	4.7	P
		396.66	-81.13	-31.93	-49.2	-89.46	3.2	0.43	4.7	P
		631.4	-80.12	-30.92	-49.2	-88.55	3.2	0.53	4.7	P
		846.74	-79.57	-30.37	-49.2	-88.07	3.2	0.6	4.7	P
		4826	-68.5	-47.3	-21.2	-73.37	3.2	1.67	0	P
		7246	-65.41	-44.21	-21.2	-70.66	3.2	2.05	0	P
802.11b CH 06 2437MHz		173.56	-80.47	-28.77	-51.7	-88.67	3.2	0.3	4.7	P
		242.43	-80.95	-31.75	-49.2	-89.23	3.2	0.38	4.7	P
		473.29	-80.3	-31.1	-49.2	-88.67	3.2	0.47	4.7	P
		634.31	-80.76	-31.56	-49.2	-89.19	3.2	0.53	4.7	P
		755.56	-80.34	-31.14	-49.2	-88.83	3.2	0.59	4.7	P
		980.6	-80.77	-39.57	-41.2	-89.33	3.2	0.66	4.7	P
		4892	-67.99	-46.79	-21.2	-72.88	3.2	1.69	0	P
		7312	-66.19	-44.99	-21.2	-71.38	3.2	1.99	0	P
802.11b CH 11 2462MHz		44.55	-80.44	-25.24	-55.2	-88.53	3.2	0.19	4.7	P
		246.31	-80.69	-31.49	-49.2	-88.97	3.2	0.38	4.7	P
		418.97	-80.3	-31.1	-49.2	-88.63	3.2	0.43	4.7	P
		580.96	-80.24	-31.04	-49.2	-88.65	3.2	0.51	4.7	P
		712.88	-80.88	-31.68	-49.2	-89.35	3.2	0.57	4.7	P
		981.57	-80.12	-38.92	-41.2	-88.68	3.2	0.66	4.7	P
		4936	-64.58	-43.38	-21.2	-72.49	3.2	1.7	0	P
		7400	-68.27	-47.07	-21.2	-76.41	3.2	1.93	0	P



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Avg
1		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(P/A)
802.11g CH 01 2412MHz		34.85	-80.38	-25.18	-55.2	-88.45	3.2	0.17	4.7	P
		216.24	-80.72	-31.52	-49.2	-88.97	3.2	0.35	4.7	P
		450.98	-80.34	-31.14	-49.2	-88.68	3.2	0.44	4.7	P
		644.01	-80.26	-31.06	-49.2	-88.7	3.2	0.54	4.7	P
		782.72	-81.19	-31.99	-49.2	-89.67	3.2	0.58	4.7	P
		991.27	-79.89	-38.69	-41.2	-88.48	3.2	0.69	4.7	P
		4738	-72.99	-51.79	-21.2	-77.85	3.2	1.66	0	P
		7246	-67.74	-46.54	-21.2	-72.99	3.2	2.05	0	P
802.11g CH 06 2437MHz		74.62	-80.02	-24.82	-55.2	-88.13	3.2	0.21	4.7	P
		217.21	-80.78	-31.58	-49.2	-89.03	3.2	0.35	4.7	P
		409.27	-80.6	-31.4	-49.2	-88.93	3.2	0.43	4.7	P
		529.55	-79.5	-30.3	-49.2	-87.87	3.2	0.47	4.7	P
		787.57	-79.75	-30.55	-49.2	-88.22	3.2	0.57	4.7	P
		925.31	-80.57	-39.37	-41.2	-89.1	3.2	0.63	4.7	P
		4870	-68.01	-46.81	-21.2	-72.89	3.2	1.68	0	P
		7312	-60.76	-39.56	-21.2	-65.95	3.2	1.99	0	P
802.11g CH 11 2462MHz		76.56	-79.68	-24.48	-55.2	-87.79	3.2	0.21	4.7	P
		296.75	-80.44	-31.24	-49.2	-88.73	3.2	0.39	4.7	P
		527.61	-80.67	-31.47	-49.2	-89.04	3.2	0.47	4.7	P
		599.39	-80.31	-31.11	-49.2	-88.74	3.2	0.53	4.7	P
		787.57	-80.42	-31.22	-49.2	-88.89	3.2	0.57	4.7	P
		996.12	-80.79	-39.59	-41.2	-89.38	3.2	0.69	4.7	P
		4936	-70.75	-49.55	-21.2	-75.65	3.2	1.7	0	P
		7400	-72.08	-50.88	-21.2	-77.21	3.2	1.93	0	P



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Avg
1		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(P/A)
802.11n HT20 CH 01 2412MHz		41.64	-80.01	-24.81	-55.2	-88.1	3.2	0.19	4.7	P
		352.04	-79.77	-30.57	-49.2	-88.06	3.2	0.39	4.7	P
		518.88	-80.35	-31.15	-49.2	-88.72	3.2	0.47	4.7	P
		727.43	-80.55	-31.35	-49.2	-89.02	3.2	0.57	4.7	P
		831.22	-79.69	-30.49	-49.2	-88.18	3.2	0.59	4.7	P
		935.98	-79.8	-38.6	-41.2	-88.33	3.2	0.63	4.7	P
		4298	-72.99	-51.79	-21.2	-77.84	3.2	1.65	0	P
	7246	-70.1	-48.9	-21.2	-75.35	3.2	2.05	0	P	
802.11n HT20 CH 06 2437MHz		166.77	-80.14	-28.44	-51.7	-88.34	3.2	0.3	4.7	P
		296.75	-80.85	-31.65	-49.2	-89.14	3.2	0.39	4.7	P
		496.57	-79.69	-30.49	-49.2	-88.03	3.2	0.44	4.7	P
		699.3	-79.77	-30.57	-49.2	-88.22	3.2	0.55	4.7	P
		850.62	-80.53	-31.33	-49.2	-89.03	3.2	0.6	4.7	P
		959.26	-81.05	-39.85	-41.2	-89.58	3.2	0.63	4.7	P
		4892	-70.15	-48.95	-21.2	-75.04	3.2	1.69	0	P
	7312	-63.04	-41.84	-21.2	-68.23	3.2	1.99	0	P	
802.11n HT20 CH 11 2462MHz		142.52	-80.64	-28.94	-51.7	-88.81	3.2	0.27	4.7	P
		307.42	-80.2	-31	-49.2	-88.49	3.2	0.39	4.7	P
		438.37	-79.65	-30.45	-49.2	-87.99	3.2	0.44	4.7	P
		648.86	-80.94	-31.74	-49.2	-89.38	3.2	0.54	4.7	P
		741.01	-81.09	-31.89	-49.2	-89.58	3.2	0.59	4.7	P
		988.36	-80.15	-38.95	-41.2	-88.74	3.2	0.69	4.7	P
		4936	-70.93	-49.73	-21.2	-75.83	3.2	1.7	0	P
	7400	-69.56	-48.36	-21.2	-74.69	3.2	1.93	0	P	



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Avg
1		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(P/A)
802.11n HT40 CH 03 2422MHz		124.09	-70.51	-18.81	-51.7	-78.67	3.2	0.26	4.7	P
		324.88	-70.36	-21.16	-49.2	-78.64	3.2	0.38	4.7	P
		428.67	-71.39	-22.19	-49.2	-79.72	3.2	0.43	4.7	P
		592.6	-71.75	-22.55	-49.2	-80.18	3.2	0.53	4.7	P
		715.79	-71.83	-22.63	-49.2	-80.3	3.2	0.57	4.7	P
		892.33	-71.33	-22.13	-49.2	-79.86	3.2	0.63	4.7	P
		4826	-72.92	-51.72	-21.2	-77.79	3.2	1.67	0	P
	7026	-70.18	-48.98	-21.2	-75.5	3.2	2.12	0	P	
802.11n HT40 CH 06 2437MHz		127.97	-70.8	-19.1	-51.7	-78.96	3.2	0.26	4.7	P
		214.3	-70.84	-21.64	-49.2	-79.09	3.2	0.35	4.7	P
		471.35	-71.15	-21.95	-49.2	-79.52	3.2	0.47	4.7	P
		604.24	-71.87	-22.67	-49.2	-80.3	3.2	0.53	4.7	P
		771.08	-71.17	-21.97	-49.2	-79.65	3.2	0.58	4.7	P
		913.67	-71.35	-22.15	-49.2	-79.88	3.2	0.63	4.7	P
		4870	-73.17	-51.97	-21.2	-78.05	3.2	1.68	0	P
	7290	-66.88	-45.68	-21.2	-72.09	3.2	2.01	0	P	
802.11n HT40 CH 09 2452MHz		167.74	-70.89	-19.19	-51.7	-79.09	3.2	0.3	4.7	P
		350.1	-71.08	-21.88	-49.2	-79.37	3.2	0.39	4.7	P
		417.03	-70.83	-21.63	-49.2	-79.16	3.2	0.43	4.7	P
		662.44	-71.4	-22.2	-49.2	-79.85	3.2	0.55	4.7	P
		870.99	-71.31	-22.11	-49.2	-79.83	3.2	0.62	4.7	P
		908.82	-70.94	-21.74	-49.2	-79.47	3.2	0.63	4.7	P
		4826	-72.5	-51.3	-21.2	-77.37	3.2	1.67	0	P
	7312	-71.99	-50.79	-21.2	-77.18	3.2	1.99	0	P	



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 MIMO (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	MIMO	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Factor	Avg
1+2(1)		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(dB)	(P/A)
802.11n HT20 CH 01 2412MHz		44.85	-58.61	-3.41	-55.2	-65.01	3.2	0.19	4.7	3.01	P
		171.48	-59.28	-7.58	-51.7	-65.88	3.2	0.39	4.7	3.01	P
		226.02	-58.54	-9.34	-49.2	-65.22	3.2	0.47	4.7	3.01	P
		421.1	-58.2	-9	-49.2	-64.98	3.2	0.57	4.7	3.01	P
		741	-56.91	-7.71	-49.2	-63.71	3.2	0.59	4.7	3.01	P
		871.9	-57.48	-8.28	-49.2	-64.32	3.2	0.63	4.7	3.01	P
		4824	-38.88	-17.68	-21.2	-46.74	3.2	1.65	0	3.01	P
	4824	-42.47	-1.27	-41.2	-50.33	3.2	1.65	0	3.01	A	
802.11n HT20 CH 06 2437MHz		97.5	-59.61	-7.91	-51.7	-66.12	3.2	0.3	4.7	3.01	P
		152.58	-59.54	-7.84	-51.7	-66.14	3.2	0.39	4.7	3.01	P
		206.31	-59.15	-7.45	-51.7	-65.8	3.2	0.44	4.7	3.01	P
		367.2	-57.89	-8.69	-49.2	-64.65	3.2	0.55	4.7	3.01	P
		627.6	-56.02	-6.82	-49.2	-62.83	3.2	0.6	4.7	3.01	P
		799.8	-56.22	-7.02	-49.2	-63.06	3.2	0.63	4.7	3.01	P
		4875	-39.47	-18.27	-21.2	-47.37	3.2	1.69	0	3.01	P
	4875	-45.12	-3.92	-41.2	-53.02	3.2	1.69	0	3.01	A	
	7311	-53.69	-32.49	-21.2	-61.89	3.2	1.99	0	3.01	P	
802.11n HT20 CH 11 2462MHz		78.33	-59.49	-4.29	-55.2	-65.97	3.2	0.27	4.7	3.01	P
		118.29	-60.22	-8.52	-51.7	-66.82	3.2	0.39	4.7	3.01	P
		170.94	-59.68	-7.98	-51.7	-66.33	3.2	0.44	4.7	3.01	P
		462.4	-58.42	-9.22	-49.2	-65.17	3.2	0.54	4.7	3.01	P
		618.5	-57.4	-8.2	-49.2	-64.2	3.2	0.59	4.7	3.01	P
		779.5	-57.77	-8.57	-49.2	-64.67	3.2	0.69	4.7	3.01	P
		4926	-42.09	-20.89	-21.2	-50	3.2	1.7	0	3.01	P
	7386	-54.07	-32.87	-21.2	-62.21	3.2	1.93	0	3.01	P	



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 MIMO (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Grounding	MIMO	Peak
Ant.				Limit	Line	Level	Gain	Loss	Factor	Factor	Avg
1+2(2)		(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dBi)	(dB)	(dB)	(dB)	(P/A)
802.11n HT20 CH 01 2412MHz		78.6	-61.56	-6.36	-55.2	-68.04	3.2	0.27	4.7	3.01	P
		105.33	-61.16	-9.46	-51.7	-67.73	3.2	0.36	4.7	3.01	P
		291.63	-60.62	-11.42	-49.2	-67.3	3.2	0.47	4.7	3.01	P
		332.9	-58.68	-9.48	-49.2	-65.46	3.2	0.57	4.7	3.01	P
		517.7	-58.25	-9.05	-49.2	-65.05	3.2	0.59	4.7	3.01	P
		643.7	-57.6	-8.4	-49.2	-64.44	3.2	0.63	4.7	3.01	P
		4824	-37.69	-16.49	-21.2	-45.55	3.2	1.65	0	3.01	P
	4824	-41.59	-0.39	-41.2	-49.45	3.2	1.65	0	3.01	A	
802.11n HT20 CH 06 2437MHz		47.55	-60.06	-4.86	-55.2	-66.46	3.2	0.19	4.7	3.01	P
		152.58	-59.54	-7.84	-51.7	-66.14	3.2	0.39	4.7	3.01	P
		252.75	-59.09	-9.89	-49.2	-65.77	3.2	0.47	4.7	3.01	P
		472.9	-58.99	-9.79	-49.2	-65.77	3.2	0.57	4.7	3.01	P
		513.5	-58.87	-9.67	-49.2	-65.67	3.2	0.59	4.7	3.01	P
		949.6	-58.74	-9.54	-49.2	-65.68	3.2	0.73	4.7	3.01	P
		4875	-38.01	-16.81	-21.2	-45.91	3.2	1.69	0	3.01	P
	4875	-44.89	-3.69	-41.2	-52.79	3.2	1.69	0	3.01	A	
	7311	-52.99	-31.79	-21.2	-61.19	3.2	1.99	0	3.01	P	
802.11n HT20 CH 11 2462MHz		46.47	-60.24	-5.04	-55.2	-66.64	3.2	0.19	4.7	3.01	P
		154.74	-59.82	-8.12	-51.7	-66.42	3.2	0.39	4.7	3.01	P
		270.57	-60.28	-11.08	-49.2	-66.93	3.2	0.44	4.7	3.01	P
		345.5	-59.72	-10.52	-49.2	-66.47	3.2	0.54	4.7	3.01	P
		534.5	-58.74	-9.54	-49.2	-65.54	3.2	0.59	4.7	3.01	P
		826.4	-58.17	-8.97	-49.2	-65.07	3.2	0.69	4.7	3.01	P
		4924	-41.85	-20.65	-21.2	-49.76	3.2	1.7	0	3.01	P
	7386	-53.89	-32.69	-21.2	-62.03	3.2	1.93	0	3.01	P	



Appendix C. Radiated Spurious Emission

<For Ant. 1>

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11b CH 01 2412MHz		2334.48	53.45	-20.55	74	54.33	27.05	5.33	33.26	142	229	P	H	
		2385.96	43.76	-10.24	54	44.38	27.23	5.39	33.24	142	229	A	H	
	*	2410.688	94.5	-	-	95.02	27.28	5.42	33.22	142	229	P	H	
	*	2410.855	91.89	-	-	92.41	27.28	5.42	33.22	142	229	A	H	
													H	
														H
			2344.29	53.09	-20.91	74	53.91	27.1	5.33	33.25	345	360	P	V
			2388.57	43.29	-10.71	54	43.91	27.23	5.39	33.24	345	360	A	V
	*		2413.193	91.79	-	-	92.31	27.28	5.42	33.22	345	360	P	V
	*		2413.277	89.11	-	-	89.63	27.28	5.42	33.22	345	360	A	V
														V
														V
802.11b CH 06 2437MHz		2381.82	53.06	-20.94	74	53.72	27.19	5.39	33.24	117	211	P	H	
		2359.05	43.35	-10.65	54	44.13	27.14	5.33	33.25	117	211	A	H	
	*	2435.738	90.84	-	-	91.31	27.32	5.42	33.21	117	211	P	H	
	*	2435.822	88.31	-	-	88.78	27.32	5.42	33.21	117	211	A	H	
			2487.64	53.33	-20.67	74	53.55	27.5	5.46	33.18	117	211	P	H
			2489.8	43.53	-10.47	54	43.75	27.5	5.46	33.18	117	211	A	H
			2389.38	53.52	-20.48	74	54.14	27.23	5.39	33.24	337	331	P	V
			2388.57	43.28	-10.72	54	43.9	27.23	5.39	33.24	337	331	A	V
	*		2435.655	89.23	-	-	89.7	27.32	5.42	33.21	337	331	P	V
	*		2435.905	86.62	-	-	87.09	27.32	5.42	33.21	337	331	A	V
			2491.44	53.69	-20.31	74	53.91	27.5	5.46	33.18	337	331	P	V
			2499.68	43.37	-10.63	54	43.58	27.5	5.46	33.17	337	331	A	V



802.11b CH 11 2462MHz	*	2460.621	89.66	-	-	90.01	27.41	5.44	33.2	144	210	P	H
	*	2460.872	87.06	-	-	87.41	27.41	5.44	33.2	144	210	A	H
		2485.08	53.42	-20.58	74	53.68	27.46	5.46	33.18	144	210	P	H
		2488.4	43.6	-10.4	54	43.82	27.5	5.46	33.18	144	210	A	H
													H
													H
	*	2460.872	86.76	-	-	87.11	27.41	5.44	33.2	369	360	P	V
	*	2460.788	84.19	-	-	84.54	27.41	5.44	33.2	369	360	A	V
		2485.08	53.27	-20.73	74	53.53	27.46	5.46	33.18	369	360	P	V
		2488.64	43.52	-10.48	54	43.74	27.5	5.46	33.18	369	360	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	44.33	-29.67	74	65.9	31.46	7.58	60.61	100	0	P	H
													H
													H
													H
		4824	46.94	-27.06	74	68.51	31.46	7.58	60.61	100	0	P	V
													V
													V
802.11b CH 06 2437MHz		4872	42.95	-31.05	74	64.21	31.56	7.7	60.52	100	0	P	H
		7308	45.28	-28.72	74	60.54	36.18	9.49	60.93	100	0	P	H
													H
													H
		4872	46.48	-27.52	74	67.74	31.56	7.7	60.52	100	0	P	V
		7308	44.42	-29.58	74	59.68	36.18	9.49	60.93	100	0	P	V
													V
802.11b CH 11 2462MHz		4926	47.24	-26.76	74	68.07	31.66	7.93	60.42	100	0	P	H
		7386	42.7	-31.3	74	57.99	36.37	9.53	61.19	100	0	P	H
													H
													H
		4926	50.07	-23.93	74	70.9	31.66	7.93	60.42	100	0	P	V
		7386	43.87	-30.13	74	59.16	36.37	9.53	61.19	100	0	P	V
													V
Remark	1. No other spurious found.												
	2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11g CH 01 2412MHz		2361.57	53.31	-20.69	74	54.09	27.14	5.33	33.25	147	207	P	H	
		2365.35	43.32	-10.68	54	44.03	27.14	5.39	33.24	147	207	A	H	
	*	2410.35	80.03	-	-	80.55	27.28	5.42	33.22	147	207	P	H	
	*	2410.27	72.84	-	-	73.36	27.28	5.42	33.22	147	207	A	H	
													H	
														H
			2327.28	53.8	-20.2	74	54.68	27.05	5.33	33.26	105	154	P	V
			2359.59	43.29	-10.71	54	44.07	27.14	5.33	33.25	105	154	A	V
	*		2410.1	75.69	-	-	76.21	27.28	5.42	33.22	105	154	P	V
	*		2410.35	67.89	-	-	68.41	27.28	5.42	33.22	105	154	A	V
														V
														V
802.11g CH 06 2437MHz		2372.19	53.92	-20.08	74	54.58	27.19	5.39	33.24	116	228	P	H	
		2361.93	43.22	-10.78	54	44	27.14	5.33	33.25	116	228	A	H	
	*	2435.4	77.15	-	-	77.62	27.32	5.42	33.21	116	228	P	H	
	*	2435.49	69.99	-	-	70.46	27.32	5.42	33.21	116	228	A	H	
			2497.4	52.88	-21.12	74	53.09	27.5	5.46	33.17	116	228	P	H
			2484.08	43.58	-10.42	54	43.84	27.46	5.46	33.18	116	228	A	H
			2345.28	52.97	-21.03	74	53.79	27.1	5.33	33.25	100	156	P	V
			2387.76	43.37	-10.63	54	43.99	27.23	5.39	33.24	100	156	A	V
	*		2435.4	72.74	-	-	73.21	27.32	5.42	33.21	100	156	P	V
	*		2435.07	65.49	-	-	65.96	27.32	5.42	33.21	100	156	A	V
			2487.2	53.19	-20.81	74	53.45	27.46	5.46	33.18	100	156	P	V
			2486.84	43.57	-10.43	54	43.83	27.46	5.46	33.18	100	156	A	V



802.11g CH 11 2462MHz	*	2460.2	77.1	-	-	77.45	27.41	5.44	33.2	164	43	P	H
	*	2460.45	69.86	-	-	70.21	27.41	5.44	33.2	164	43	A	H
		2489.44	53.26	-20.74	74	53.48	27.5	5.46	33.18	164	43	P	H
		2483.72	43.63	-10.37	54	43.89	27.46	5.46	33.18	164	43	A	H
													H
													H
	*	2460.54	73.24	-	-	73.59	27.41	5.44	33.2	227	191	P	V
	*	2460.79	65.13	-	-	65.48	27.41	5.44	33.2	227	191	A	V
		2491.16	52.91	-21.09	74	53.13	27.5	5.46	33.18	227	191	P	V
		2487.2	43.7	-10.3	54	43.96	27.46	5.46	33.18	227	191	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11g CH 01 2412MHz		4824	38.95	-35.05	74	60.52	31.46	7.58	60.61	100	0	P	H	
													H	
													H	
													H	
			4824	39.44	-34.56	74	61.01	31.46	7.58	60.61	100	0	P	V
														V
														V
802.11g CH 06 2437MHz		4874	38.08	-35.92	74	59.34	31.56	7.7	60.52	100	0	P	H	
		7311	42.32	-31.68	74	57.58	36.18	9.49	60.93	100	0	P	H	
													H	
													H	
			4874	39.69	-34.31	74	60.95	31.56	7.7	60.52	100	0	P	V
			7311	42.61	-31.39	74	57.87	36.18	9.49	60.93	100	0	P	V
														V
802.11g CH 11 2462MHz		4924	38.95	-35.05	74	59.78	31.66	7.93	60.42	100	0	P	H	
		7386	41.43	-32.57	74	56.72	36.37	9.53	61.19	100	0	P	H	
													H	
													H	
			4924	41.64	-32.36	74	62.47	31.66	7.93	60.42	100	0	P	V
			7386	41.2	-32.8	74	56.49	36.37	9.53	61.19	100	0	P	V
														V
Remark	1. No other spurious found.													
	2. All results are PASS against Peak and Average limit line.													



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 06 2437MHz		2375.97	53.69	-20.31	74	54.35	27.19	5.39	33.24	201	56	P	H
		2385.87	43.79	-10.21	54	44.41	27.23	5.39	33.24	201	56	A	H
	*	2435.404	93.88	-	-	94.35	27.32	5.42	33.21	201	56	P	H
	*	2435.488	86.66	-	-	87.13	27.32	5.42	33.21	201	56	A	H
		2494.52	53.77	-20.23	74	53.98	27.5	5.46	33.17	201	56	P	H
		2483.72	44.04	-9.96	54	44.3	27.46	5.46	33.18	201	56	A	H
		2355.27	53.41	-20.59	74	54.19	27.14	5.33	33.25	375	331	P	V
		2360.49	43.6	-10.4	54	44.38	27.14	5.33	33.25	375	331	A	V
	*	2435.404	91.89	-	-	92.36	27.32	5.42	33.21	375	331	P	V
	*	2435.655	84.72	-	-	85.19	27.32	5.42	33.21	375	331	A	V
		2491.96	54.61	-19.39	74	54.82	27.5	5.46	33.17	375	331	P	V
	2486.52	43.99	-10.01	54	44.25	27.46	5.46	33.18	375	331	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11n HT20 CH 06 2437MHz		4872	39.38	-34.62	74	60.64	31.56	7.7	60.52	100	0	P	H	
		7308	44.44	-29.56	74	59.7	36.18	9.49	60.93	100	0	P	H	
													H	
													H	
			4878	45.35	-28.65	74	66.61	31.56	7.7	60.52	100	0	P	V
			7308	46.34	-27.66	74	61.6	36.18	9.49	60.93	100	0	P	V
														V
													V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.													



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2327.82	53.04	-20.96	74	53.92	27.05	5.33	33.26	125	228	P	H
		2386.86	43.83	-10.17	54	44.45	27.23	5.39	33.24	125	228	A	H
	*	2419.7	75.18	-	-	75.65	27.32	5.42	33.21	125	228	P	H
	*	2419.62	68.14	-	-	68.61	27.32	5.42	33.21	125	228	A	H
		2489.2	53.81	-20.19	74	54.03	27.5	5.46	33.18	125	228	P	H
		2495.76	44.07	-9.93	54	44.28	27.5	5.46	33.17	125	228	A	H
		2332.41	53.05	-20.95	74	53.93	27.05	5.33	33.26	113	156	P	V
		2364.45	43.8	-10.2	54	44.51	27.14	5.39	33.24	113	156	A	V
	*	2419.12	70.43	-	-	70.94	27.28	5.42	33.21	113	156	P	V
	*	2419.46	63.15	-	-	63.66	27.28	5.42	33.21	113	156	A	V
		2499.72	52.9	-21.1	74	53.11	27.5	5.46	33.17	113	156	P	V
		2488	44.18	-9.82	54	44.4	27.5	5.46	33.18	113	156	A	V
802.11n HT40 CH 06 2437MHz		2386.59	53.33	-20.67	74	53.95	27.23	5.39	33.24	115	227	P	H
		2387.85	43.83	-10.17	54	44.45	27.23	5.39	33.24	115	227	A	H
	*	2434.98	73.78	-	-	74.25	27.32	5.42	33.21	115	227	P	H
	*	2434.57	66.42	-	-	66.89	27.32	5.42	33.21	115	227	A	H
		2496.96	53.51	-20.49	74	53.72	27.5	5.46	33.17	115	227	P	H
		2498.32	44.28	-9.72	54	44.49	27.5	5.46	33.17	115	227	A	H
		2317.47	53.26	-20.74	74	54.24	27.01	5.27	33.26	100	156	P	V
		2389.38	43.61	-10.39	54	44.23	27.23	5.39	33.24	100	156	A	V
	*	2434.15	68.94	-	-	69.41	27.32	5.42	33.21	100	156	P	V
	*	2434.4	61.78	-	-	62.25	27.32	5.42	33.21	100	156	A	V
		2499.96	53.64	-20.36	74	53.85	27.5	5.46	33.17	100	156	P	V
		2483.76	44.01	-9.99	54	44.27	27.46	5.46	33.18	100	156	A	V



802.11n HT40 CH 09 2452MHz		2325.12	52.68	-21.32	74	53.56	27.05	5.33	33.26	108	210	P	H
		2371.11	43.76	-10.24	54	44.42	27.19	5.39	33.24	108	210	A	H
	*	2450.02	72.69	-	-	73.08	27.37	5.44	33.2	108	210	P	H
	*	2453.94	65.74	-	-	66.09	27.41	5.44	33.2	108	210	A	H
		2494	52.93	-21.07	74	53.14	27.5	5.46	33.17	108	210	P	H
		2484.32	44.14	-9.86	54	44.4	27.46	5.46	33.18	108	210	A	H
		2334.39	53.01	-20.99	74	53.89	27.05	5.33	33.26	170	190	P	V
		2382.36	43.92	-10.08	54	44.58	27.19	5.39	33.24	170	190	A	V
	*	2449.85	67.54	-	-	67.93	27.37	5.44	33.2	170	190	P	V
	*	2449.01	60.12	-	-	60.51	27.37	5.44	33.2	170	190	A	V
		2498	53.23	-20.77	74	53.44	27.5	5.46	33.17	170	190	P	V
		2491.56	44.08	-9.92	54	44.3	27.5	5.46	33.18	170	190	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11n HT40 CH 03 2422MHz		4824	37.88	-36.12	74	59.45	31.46	7.58	60.61	100	0	P	H	
													H	
													H	
													H	
			4824	38.23	-35.77	74	59.8	31.46	7.58	60.61	100	0	P	V
														V
														V
802.11n HT40 CH 06 2437MHz		4874	37.96	-36.04	74	59.22	31.56	7.7	60.52	100	0	P	H	
		7311	41.87	-32.13	74	57.13	36.18	9.49	60.93	100	0	P	H	
													H	
													H	
			4874	38.51	-35.49	74	59.77	31.56	7.7	60.52	100	0	P	V
			7311	41.6	-32.4	74	56.86	36.18	9.49	60.93	100	0	P	V
														V
802.11n HT40 CH 09 2452MHz		4904	39.12	-34.88	74	60.13	31.63	7.82	60.46	100	0	P	H	
		7356	41.75	-32.25	74	57.03	36.3	9.51	61.09	100	0	P	H	
													H	
													H	
			4904	38.98	-35.02	74	59.99	31.63	7.82	60.46	100	0	P	V
			7356	41.15	-32.85	74	56.43	36.3	9.51	61.09	100	0	P	V
														V
Remark	1. No other spurious found.													
	2. All results are PASS against Peak and Average limit line.													



Emission below 1GHz

2.4GHz WIFI 802.11b (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.	
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz 802.11b LF		108.03	28.53	-14.97	43.5	48.83	11.2	1.14	32.64			P	H	
		192.81	37.83	-5.67	43.5	59.46	9.61	1.48	32.72	100	326	P	H	
		241.14	32.4	-13.6	46	51.45	12.06	1.62	32.73			P	H	
		385.4	31.48	-14.52	46	46.05	16.12	2.13	32.82			P	H	
		602.4	34.91	-11.09	46	45.75	19.62	2.57	33.03			P	H	
		825	29.88	-16.12	46	37.25	22.3	3.07	32.74			P	H	
														H
														H
														H
														H
														H
														H
			51.06	31.71	-8.29	40	54.67	8.89	0.93	32.78	114	2	P	V
			99.66	23.2	-20.3	43.5	44.29	10.4	1.14	32.63			P	V
			192.81	30.39	-13.11	43.5	52.02	9.61	1.48	32.72			P	V
			400.1	25.7	-20.3	46	39.89	16.52	2.13	32.84			P	V
			506.5	28.9	-17.1	46	41.24	18.26	2.33	32.93			P	V
			699	28.53	-17.47	46	38.11	20.59	2.82	32.99			P	V
														V
														V
													V	
													V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



<For MIMO Ant. 1 + 2>

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11n HT20 CH 01 2412MHz		2387.04	53.34	-20.66	74	53.96	27.23	5.39	33.24	115	315	P	H	
		2365.35	43.66	-10.34	54	44.37	27.14	5.39	33.24	115	315	A	H	
	*	2410.1	87.04	-	-	87.56	27.28	5.42	33.22	115	315	P	H	
	*	2413.95	80.09	-	-	80.61	27.28	5.42	33.22	115	315	A	H	
													H	
														H
			2387.31	52.88	-21.12	74	53.5	27.23	5.39	33.24	361	269	P	V
			2389.92	43.91	-10.09	54	44.51	27.23	5.39	33.22	361	269	A	V
		*	2410.35	86.18	-	-	86.7	27.28	5.42	33.22	361	269	P	V
		*	2413.86	79.17	-	-	79.69	27.28	5.42	33.22	361	269	A	V
													V	
													V	
802.11n HT20 CH 06 2437MHz		2389.47	53.57	-20.43	74	54.19	27.23	5.39	33.24	225	315	P	H	
		2379.93	43.65	-10.35	54	44.31	27.19	5.39	33.24	225	315	A	H	
	*	2435.15	87.2	-	-	87.67	27.32	5.42	33.21	225	315	P	H	
	*	2435.49	79.85	-	-	80.32	27.32	5.42	33.21	225	315	A	H	
			2485.56	53.16	-20.84	74	53.42	27.46	5.46	33.18	225	315	P	H
			2489	44	-10	54	44.22	27.5	5.46	33.18	225	315	A	H
			2389.74	52.84	-21.16	74	53.46	27.23	5.39	33.24	370	269	P	V
			2389.56	43.88	-10.12	54	44.5	27.23	5.39	33.24	370	269	A	V
		*	2435.32	87.97	-	-	88.44	27.32	5.42	33.21	370	269	P	V
		*	2435.74	80.65	-	-	81.12	27.32	5.42	33.21	370	269	A	V
		2491.48	53.59	-20.41	74	53.81	27.5	5.46	33.18	370	269	P	V	
		2487.32	44.2	-9.8	54	44.46	27.46	5.46	33.18	370	269	A	V	



802.11n HT20 CH 11 2462MHz	*	2463.54	88.07	-	-	88.42	27.41	5.44	33.2	136	312	P	H
	*	2463.54	79.73	-	-	80.08	27.41	5.44	33.2	136	312	A	H
		2499.4	53.01	-20.99	74	53.22	27.5	5.46	33.17	136	312	P	H
		2484.44	44.15	-9.85	54	44.41	27.46	5.46	33.18	136	312	A	H
													H
													H
	*	2460.45	87.48	-	-	87.83	27.41	5.44	33.2	351	266	P	V
	*	2460.87	80.32	-	-	80.67	27.41	5.44	33.2	351	266	A	V
		2485.72	53.37	-20.63	74	53.63	27.46	5.46	33.18	351	266	P	V
		2484.8	44.12	-9.88	54	44.38	27.46	5.46	33.18	351	266	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11n HT20 CH 01 2412MHz		4824	38.81	-35.19	74	60.38	31.46	7.58	60.61	100	0	P	H	
													H	
													H	
													H	
			4824	38.42	-35.58	74	59.99	31.46	7.58	60.61	100	0	P	V
														V
														V
802.11n HT20 CH 06 2437MHz		4874	38.72	-35.28	74	59.98	31.56	7.7	60.52	100	0	P	H	
		7311	43.02	-30.98	74	58.28	36.18	9.49	60.93	100	0	P	H	
													H	
													H	
			4874	38.1	-35.9	74	59.36	31.56	7.7	60.52	100	0	P	V
			7311	42.5	-31.5	74	57.76	36.18	9.49	60.93	100	0	P	V
														V
802.11n HT20 CH 11 2462MHz		4924	38.69	-35.31	74	59.52	31.66	7.93	60.42	100	0	P	H	
		7386	41.16	-32.84	74	56.45	36.37	9.53	61.19	100	0	P	H	
													H	
													H	
			4924	39.08	-34.92	74	59.91	31.66	7.93	60.42	100	0	P	V
			7386	41.79	-32.21	74	57.08	36.37	9.53	61.19	100	0	P	V
														V
Remark	1. No other spurious found.													
	2. All results are PASS against Peak and Average limit line.													



Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.	
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz 802.11n HT20 LF		99.66	23.31	-20.19	43.5	44.4	10.4	1.14	32.63			P	H	
		192.81	36.15	-7.35	43.5	57.78	9.61	1.48	32.72	163	174	P	H	
		216.84	34.25	-11.75	46	55.1	10.26	1.62	32.73			P	H	
		433.7	29.15	-16.85	46	42.82	17.04	2.16	32.87			P	H	
		626.9	32.14	-13.86	46	42.62	19.92	2.62	33.02			P	H	
		795.6	30.92	-15.08	46	38.78	22.05	2.97	32.88			P	H	
														H
														H
														H
														H
														H
														H
														H
			51.33	35.98	-4.02	40	58.94	8.89	0.93	32.78	199	221	P	V
			86.43	19.4	-20.6	40	42.21	8.72	1.14	32.67			P	V
			192.81	26.5	-17	43.5	48.13	9.61	1.48	32.72			P	V
			398.7	27.95	-18.05	46	42.19	16.47	2.13	32.84			P	V
			495.3	27.68	-18.32	46	40.16	18.11	2.33	32.92			P	V
			722.8	24.42	-21.58	46	33.51	21.05	2.82	32.96			P	V
													V	
													V	
													V	
													V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H
2412MHz													

- Level(dBμV/m) =
Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
- Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

- Level(dBμV/m)
= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

- Level(dBμV/m)
= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.

Appendix D. Setup Photographs

<Radiated Emission>

LF



HF





Appendix B. Original Report of FR4O2349C

Please refer to Sporton report number FR3N2752-01C as below.

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



SPORTON INTERNATIONAL INC.

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



TABLE OF CONTENTS

REVISION HISTORY 3

SUMMARY OF TEST RESULT 4

1 GENERAL DESCRIPTION 5

 1.1 Applicant 5

 1.2 Manufacturer 5

 1.3 Feature of Equipment Under Test 5

 1.4 Product Specification of Equipment Under Test 6

 1.5 Modification of EUT 6

 1.6 Testing Site 7

 1.7 Applied Standards 7

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST 8

 2.1 Carrier Frequency and Channel 8

 2.2 Pre-Scanned RF Power 9

 2.3 Test Mode 10

 2.4 Connection Diagram of Test System 11

 2.5 Support Unit used in test configuration and system 12

 2.6 EUT Operation Test Setup 12

 2.7 Measurement Results Explanation Example 12

3 TEST RESULT 13

 3.1 6dB and 99% Bandwidth Measurement 13

 3.2 Peak Output Power Measurement 16

 3.3 Power Spectral Density Measurement 19

 3.4 Conducted Band Edges and Spurious Emission Measurement 22

 3.5 Radiated Band Edges and Spurious Emission Measurement 41

 3.6 AC Conducted Emission Measurement 64

 3.7 Antenna Requirements 68

4 LIST OF MEASURING EQUIPMENT 70

5 UNCERTAINTY OF EVALUATION 71

APPENDIX A. SETUP PHOTOGRAPHS



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

Product Specification subjective to this standard			
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz		
Maximum Output Power to antenna	<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)		
99% Occupied Bandwidth	<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		
Antenna Type	<Ant 1> Chip Antenna type with gain -0.36 dBi <Ant 2> Chip Antenna type with gain 1.22 dBi		
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)		
Antenna Function for Transmitter		Chain Ant. 2	
		Chain Ant. 1	
	802.11 b	V	-
	802.11 g	V	-
	802.11 n HT20 SISO	V	-
	802.11 n HT20 MIMO	V	V
802.11 n HT40 SISO	V	-	

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 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	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.

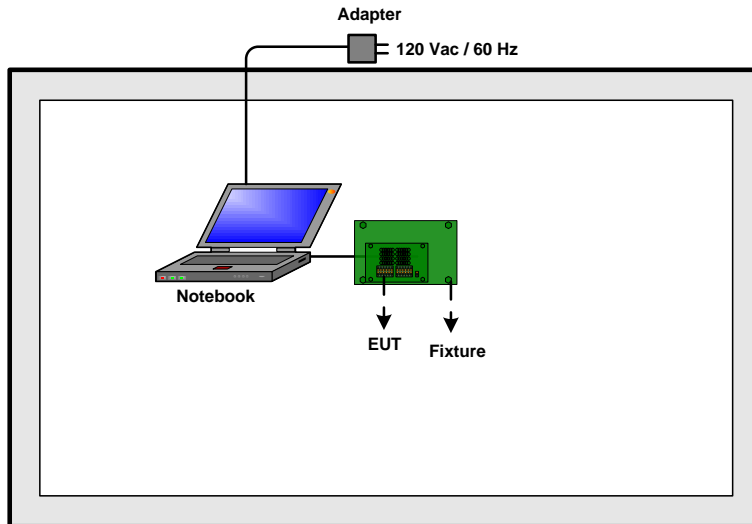
2.3 Test Mode

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

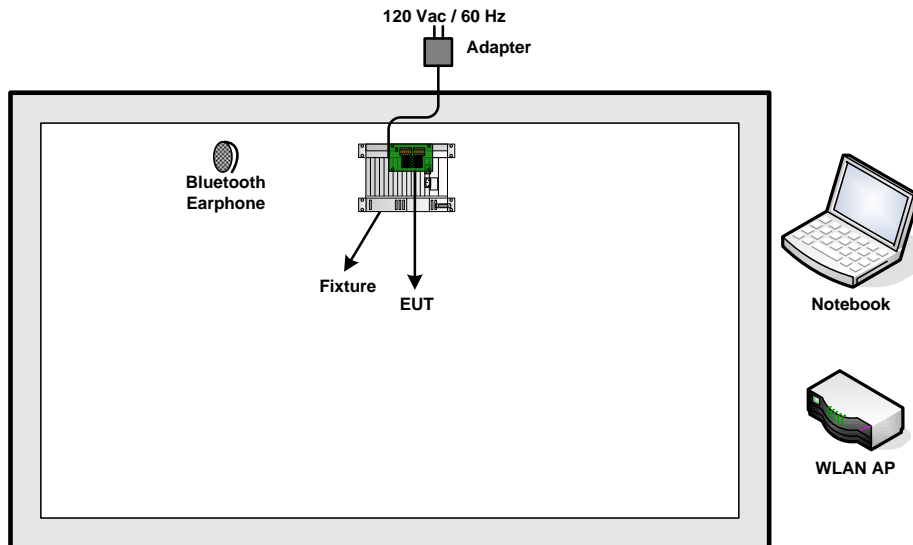
Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB and 99% BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		802.11n HT40	13.5 Mbps	3/6/9
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
		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.

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

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

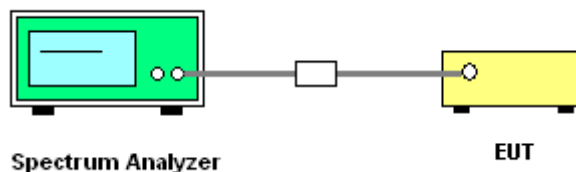
3.1.2 Measuring Instruments

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

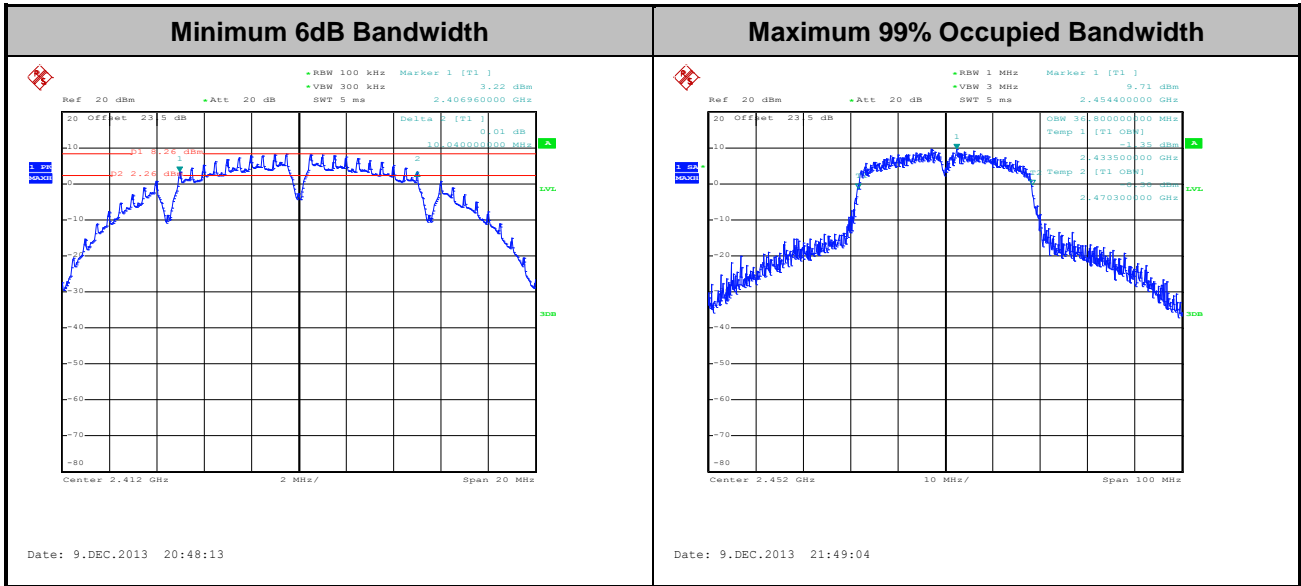




3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Test Band :	2.4GHz	Temperature :	21~25°C
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



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.

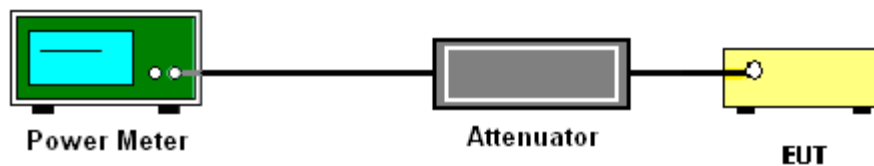
3.2.2 Measuring Instruments

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°C
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°C
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	
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.

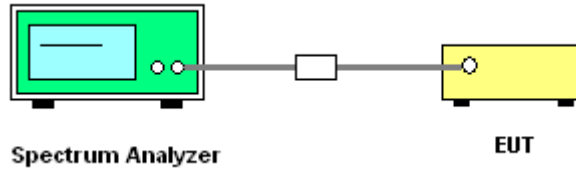
If measurements performed using method (2) plus $10 \log(N)$ exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

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

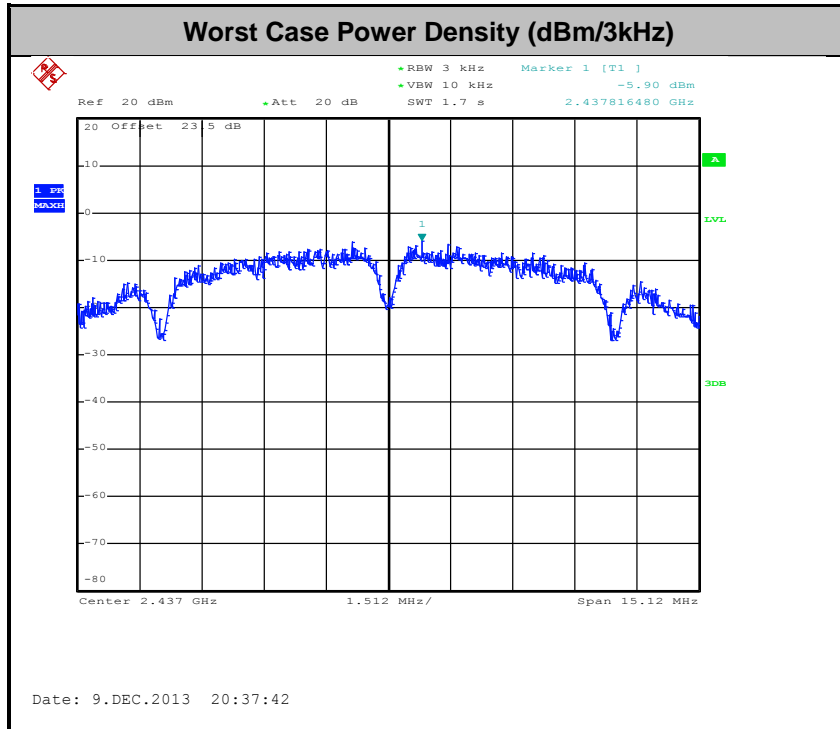


3.3.5 Test Result of Power Spectral Density

Test Band :	2.4GHz	Temperature :	21~25°C
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	8.00	3.48	3.48	Pass
HT20	MCS8	2	6	2437	-10.69	-9.07	-6.06	8.00	8.00	3.48	3.48	Pass
HT20	MCS8	2	11	2462	-12.75	-10.26	-7.25	8.00	8.00	3.48	3.48	Pass

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



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

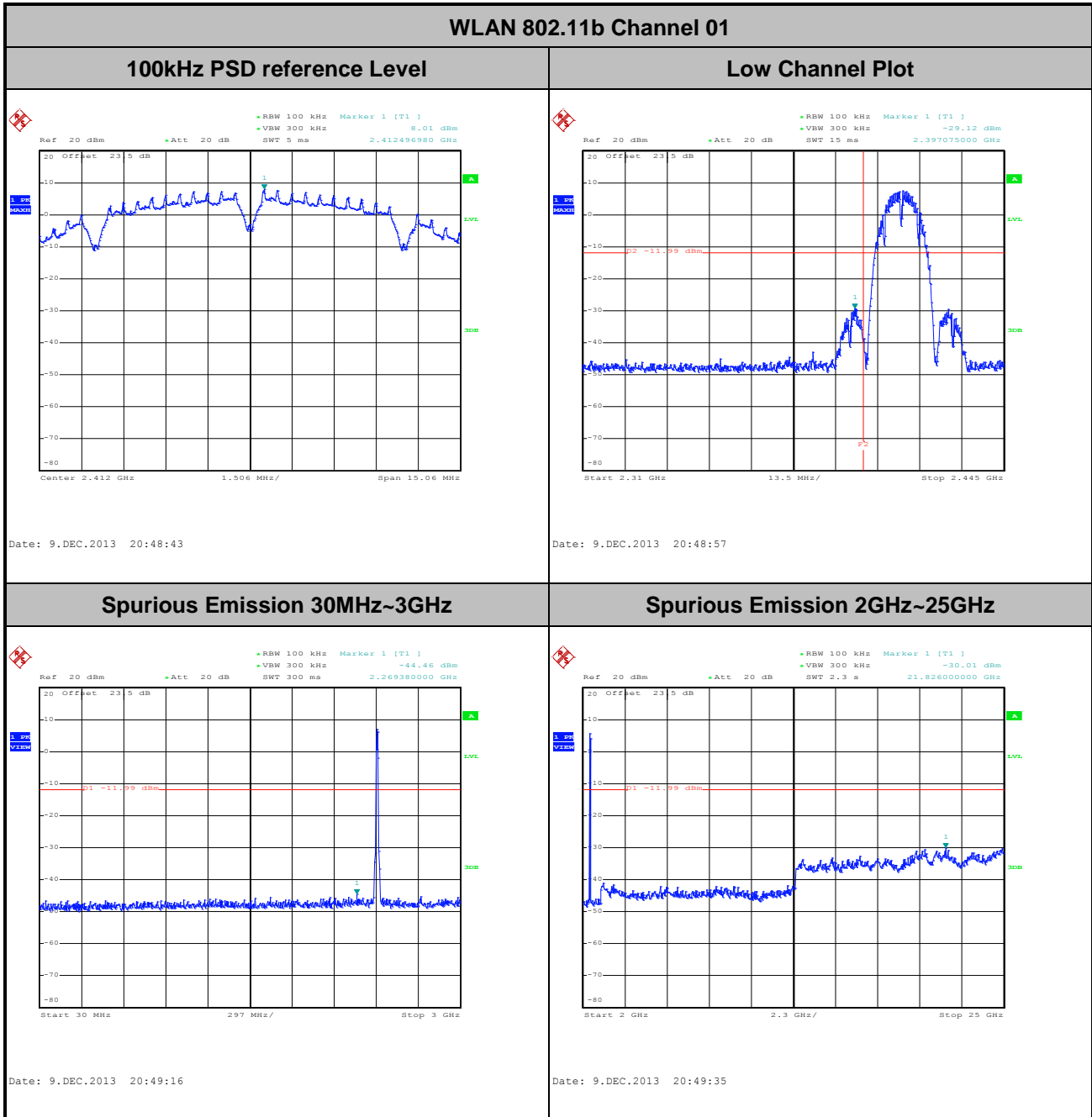




3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

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

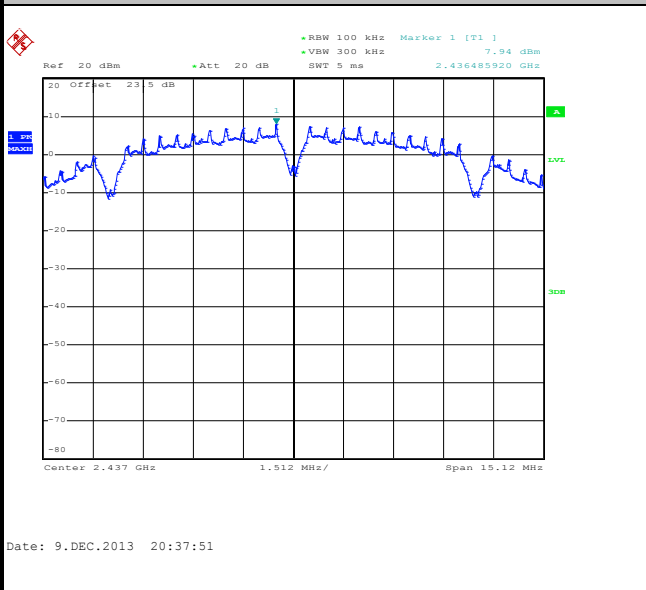




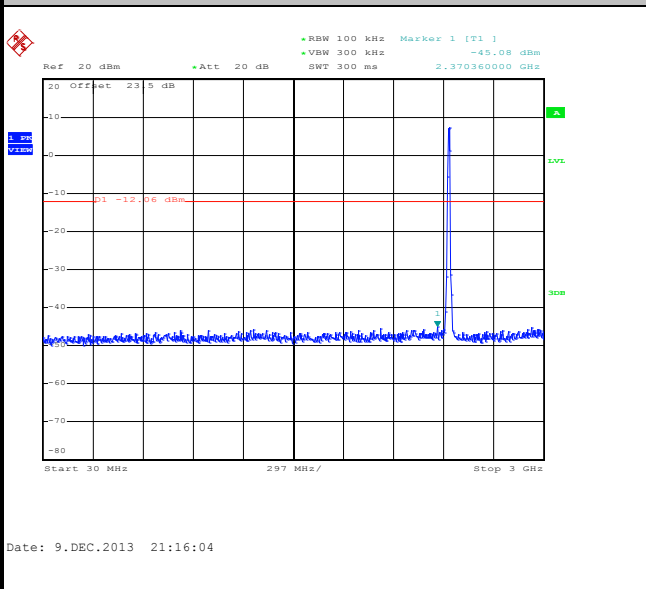
Number of TX :	1	Ant. :	1
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Alex Lee

WLAN 802.11b Channel 06

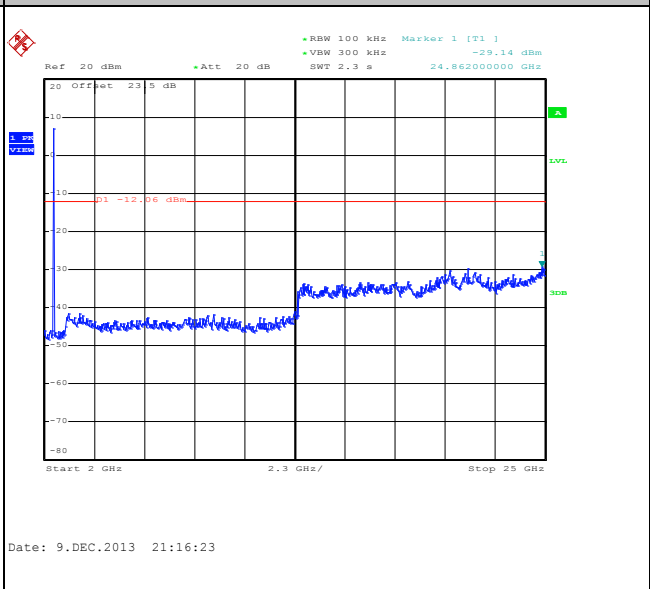
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

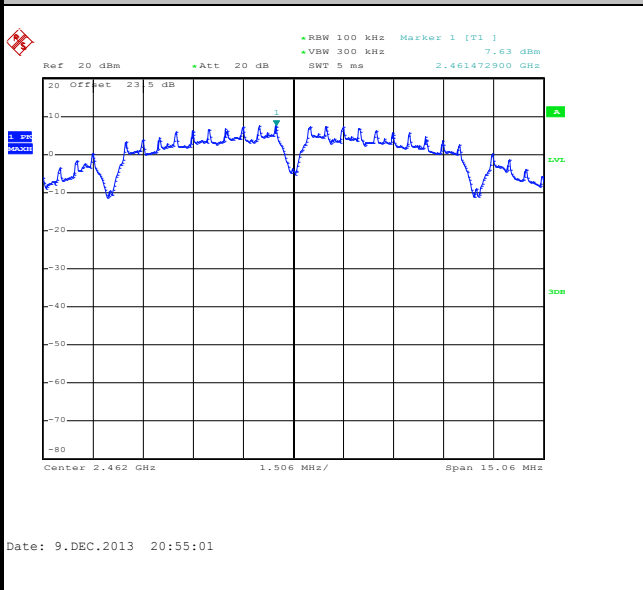




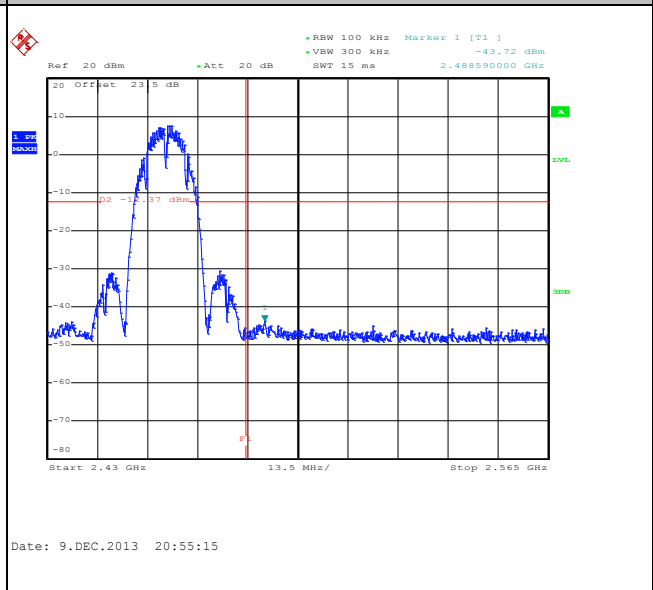
Number of TX :	1	Ant. :	1
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Alex Lee

WLAN 802.11b Channel 11

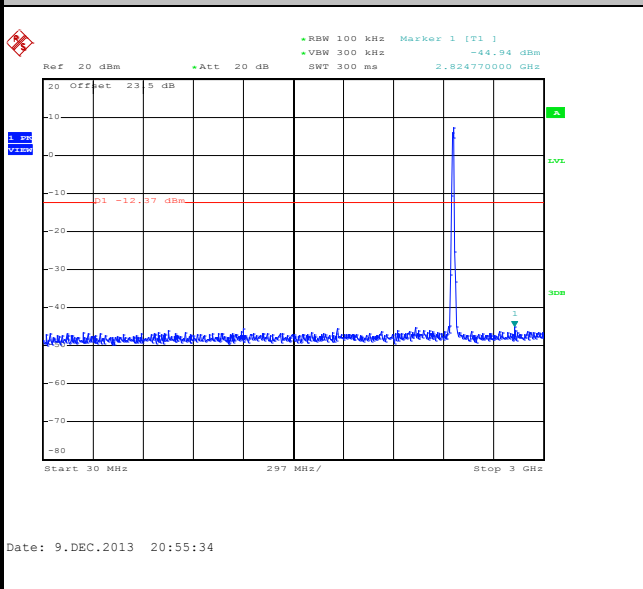
100kHz PSD reference Level



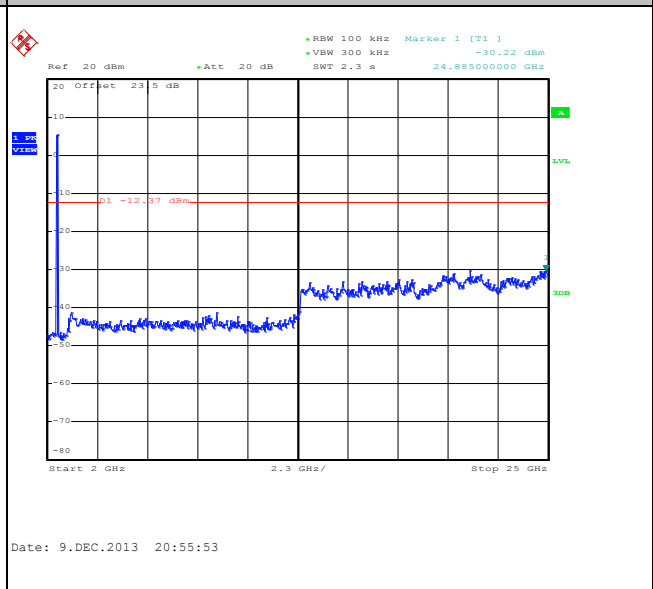
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

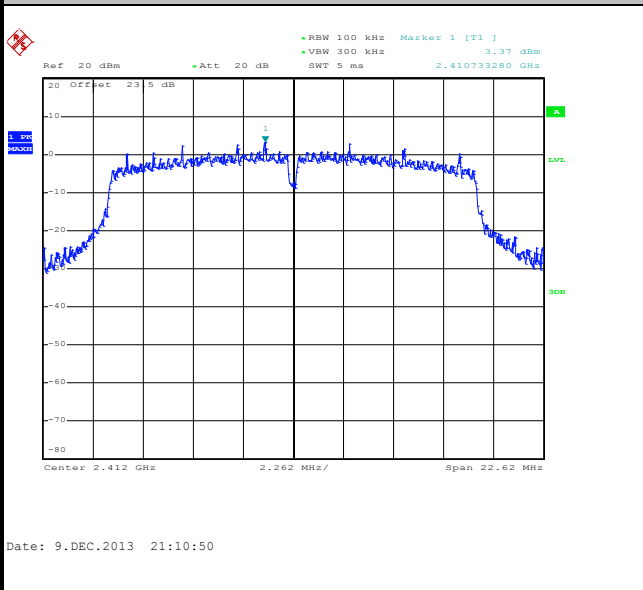




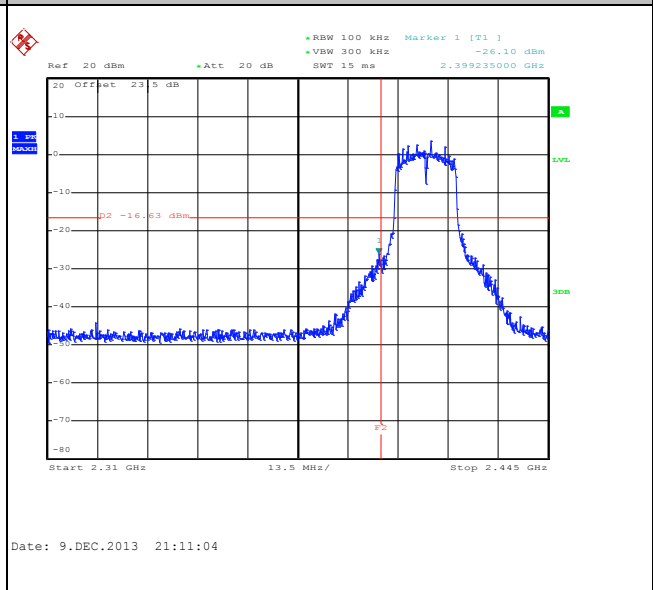
Number of TX :	1	Ant. :	1
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Alex Lee

WLAN 802.11g Channel 01

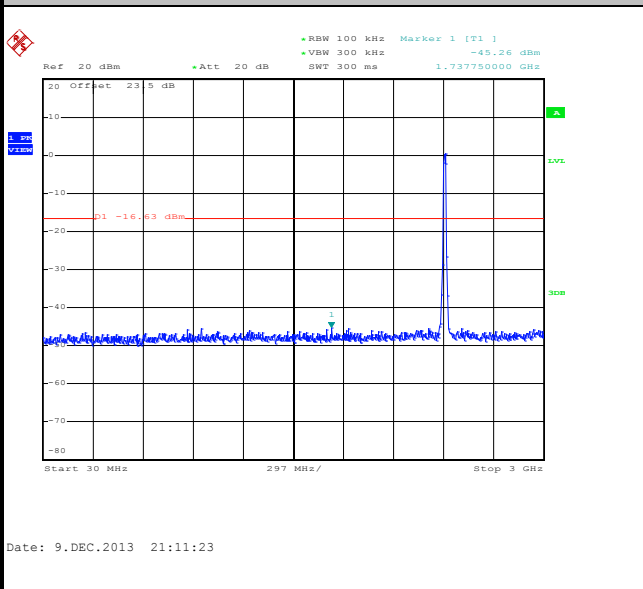
100kHz PSD reference Level



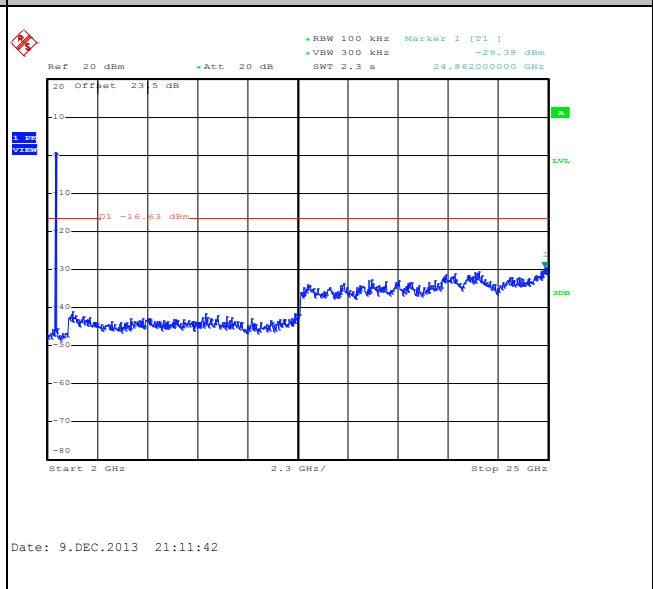
Low Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

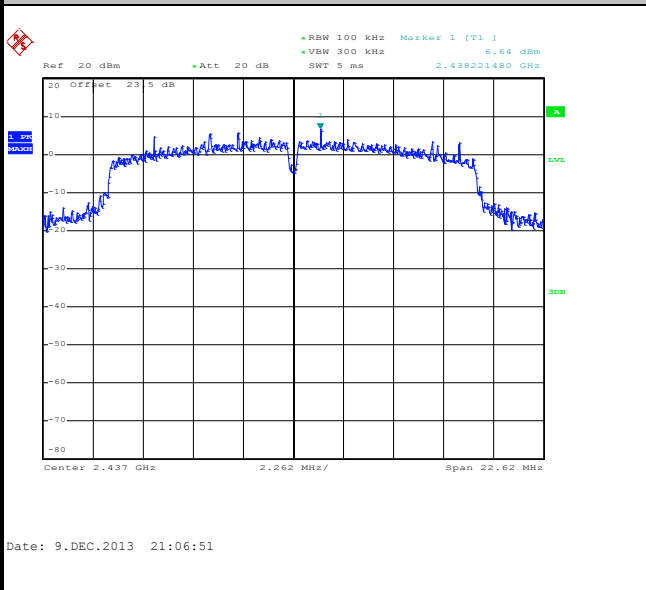




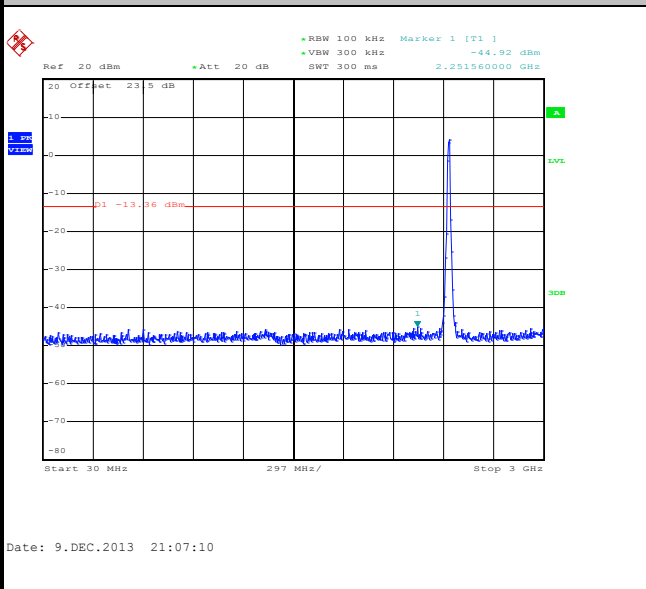
Number of TX :	1	Ant. :	1
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Alex Lee

WLAN 802.11g Channel 06

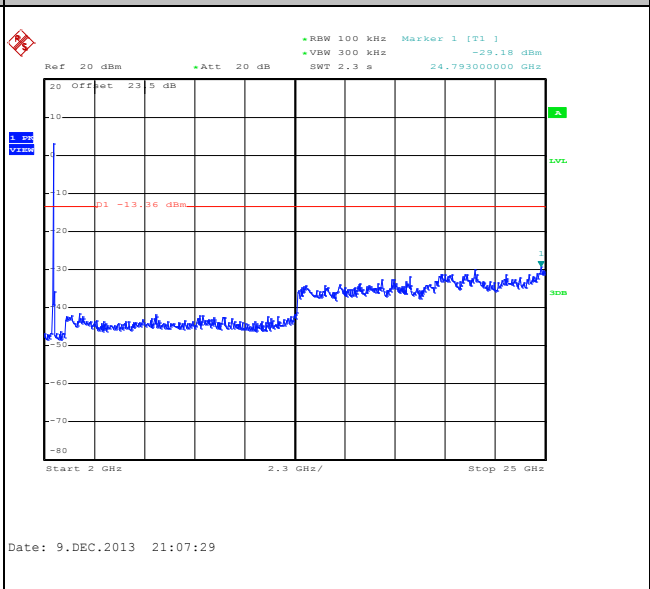
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

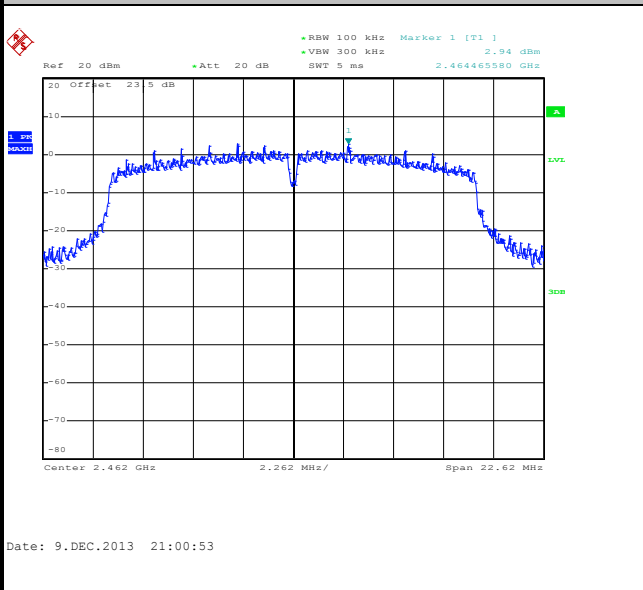




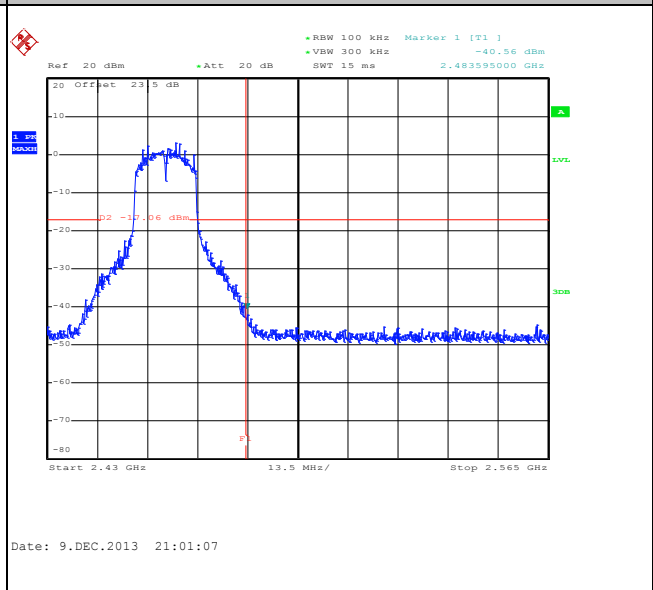
Number of TX :	1	Ant. :	1
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Alex Lee

WLAN 802.11g Channel 11

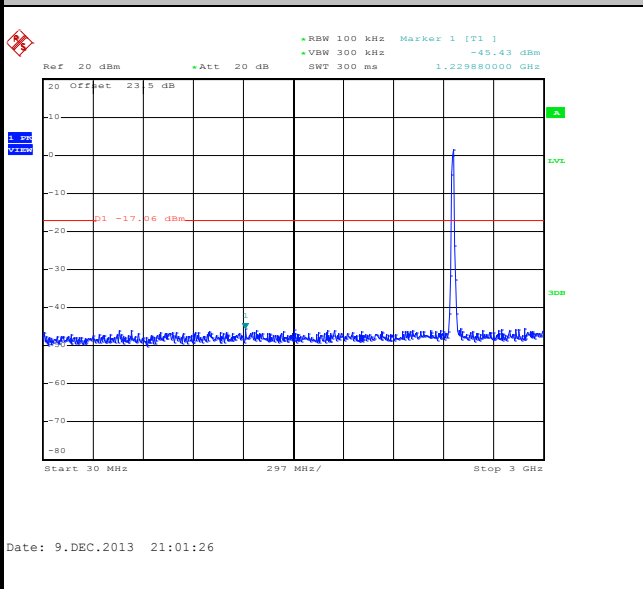
100kHz PSD reference Level



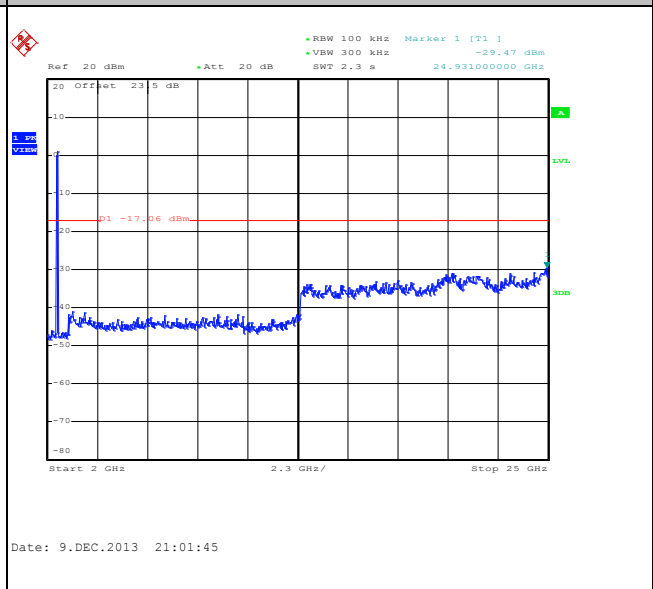
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

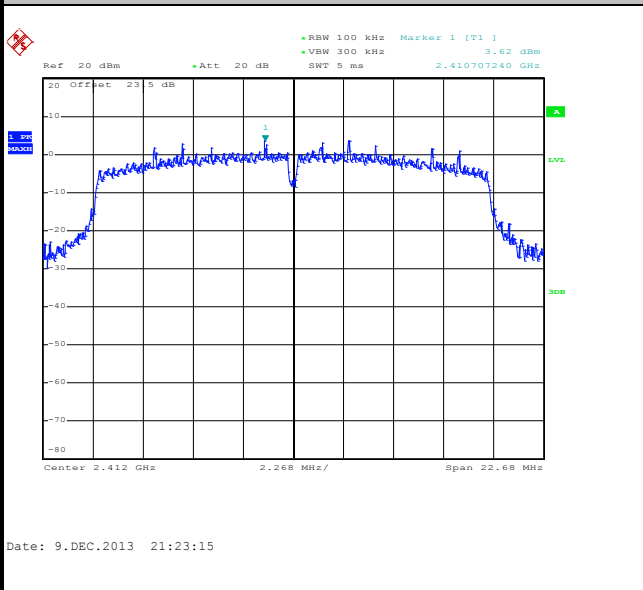




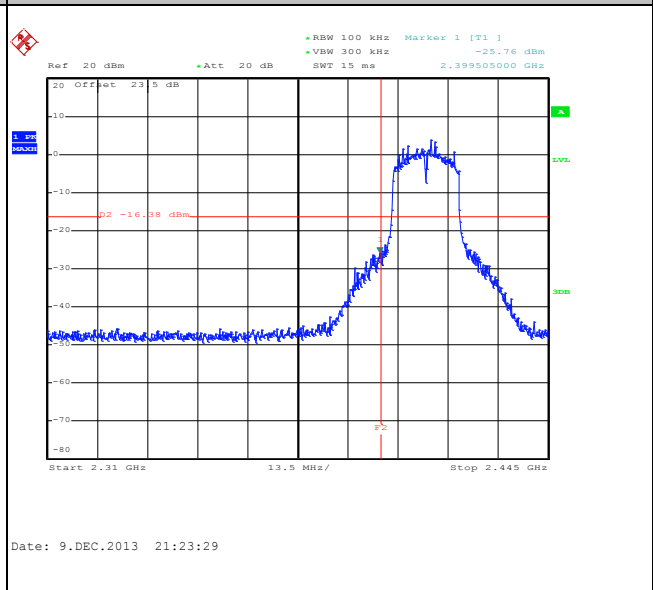
Number of TX :	1	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 01

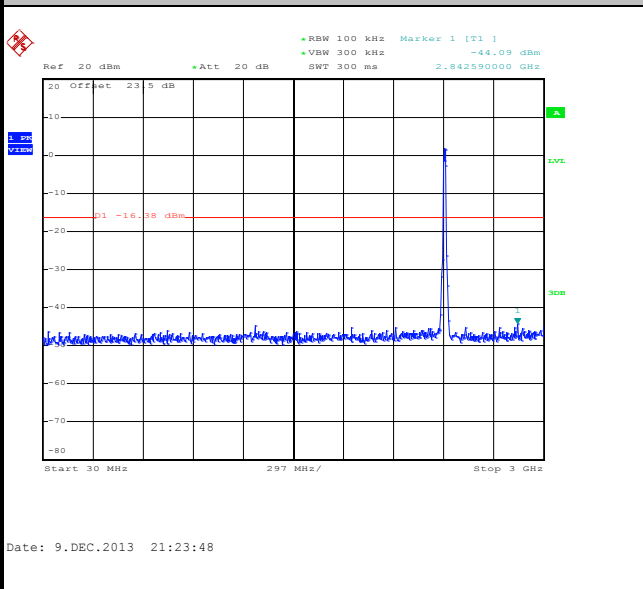
100kHz PSD reference Level



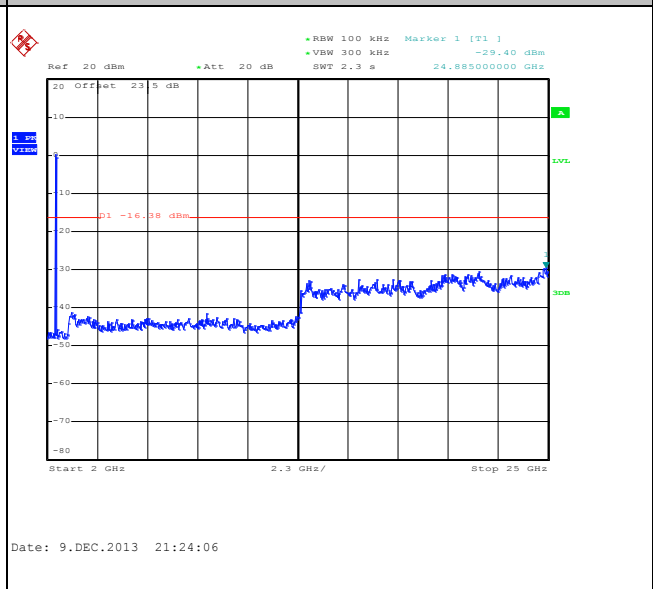
Low Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

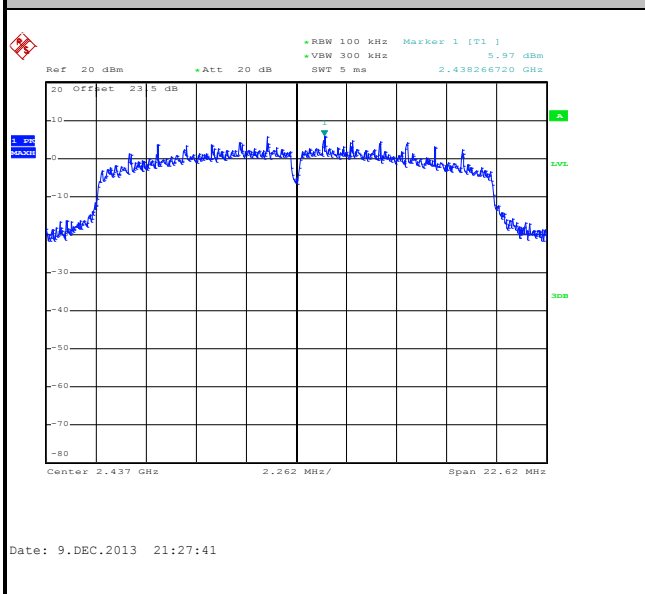




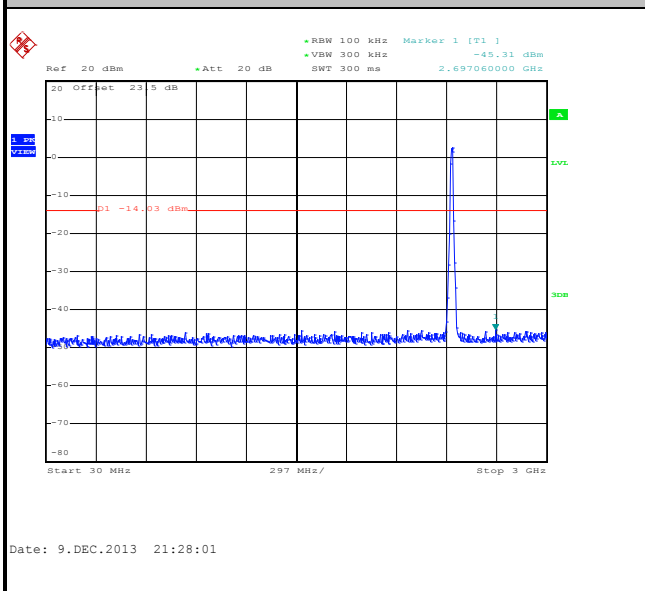
Number of TX :	1	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 06

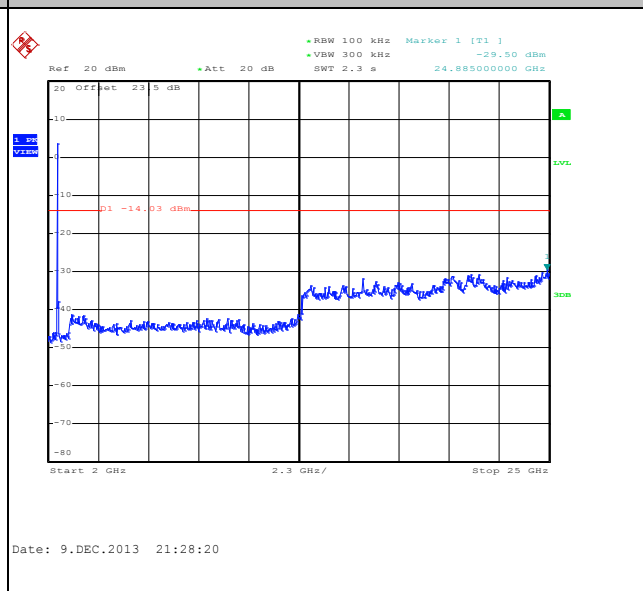
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

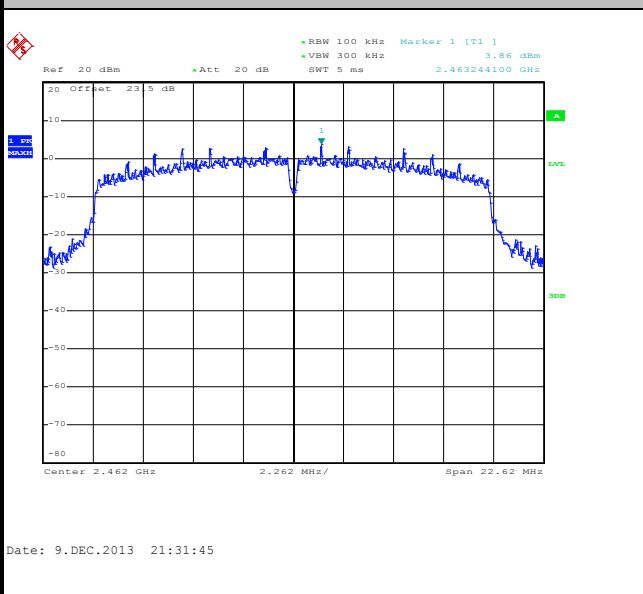




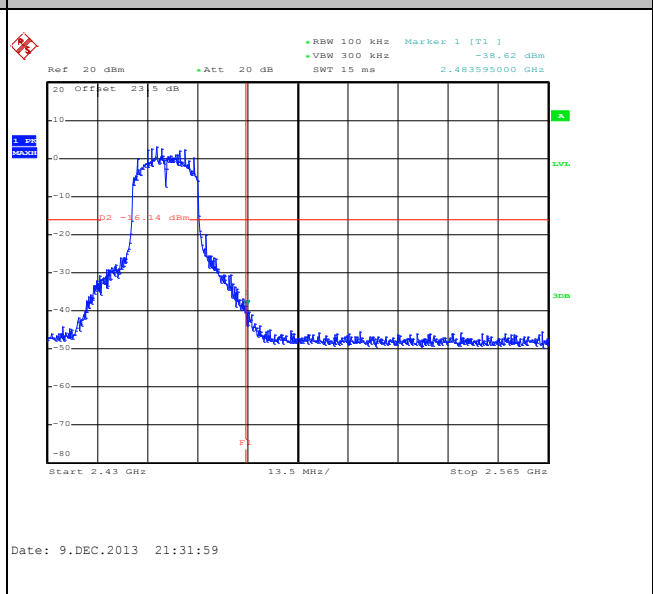
Number of TX :	1	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 11

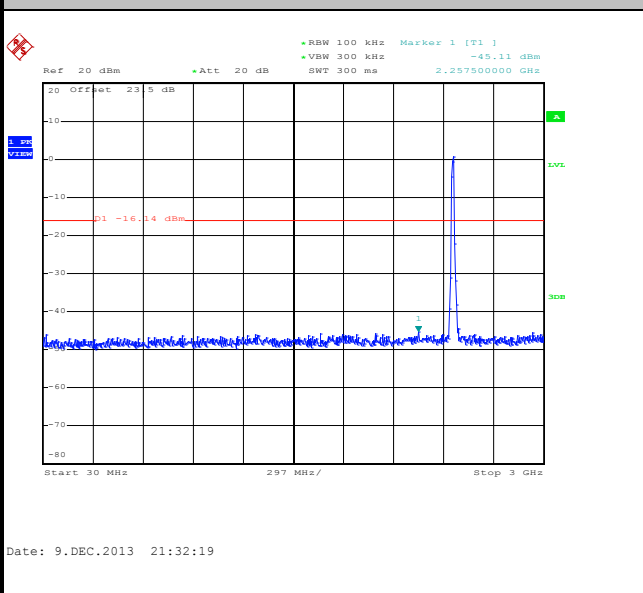
100kHz PSD reference Level



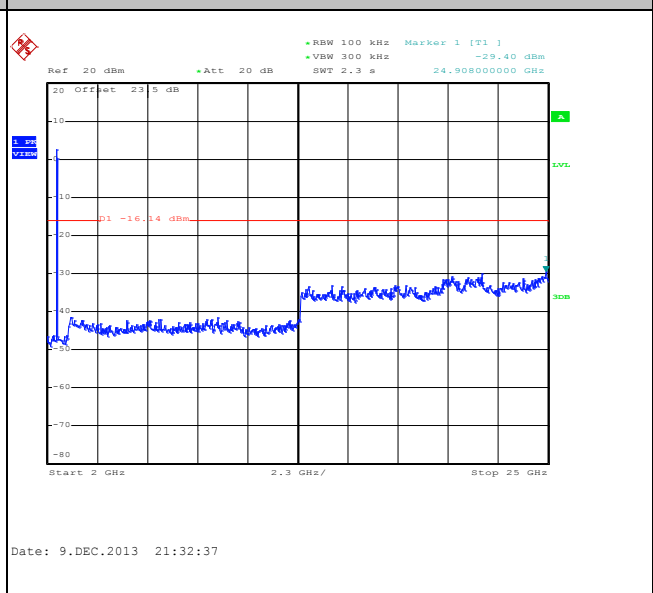
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

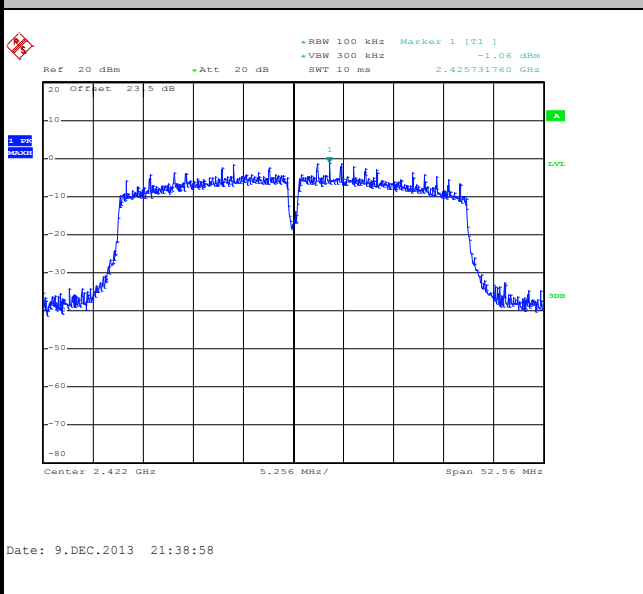




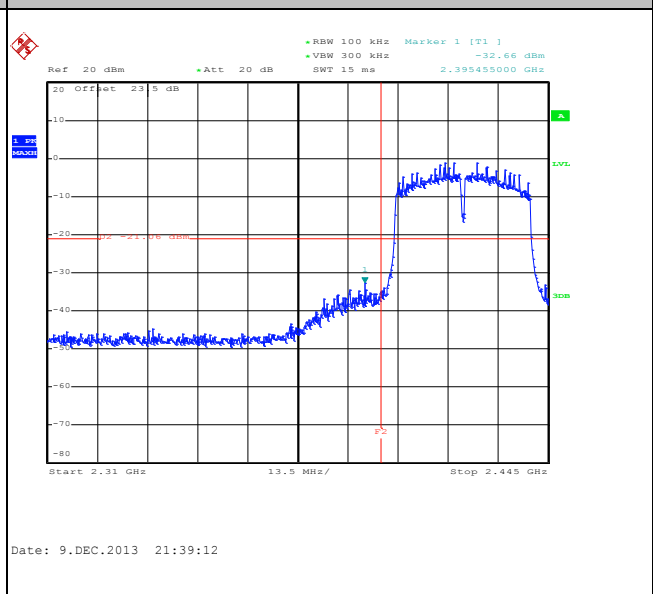
Number of TX :	1	Ant. :	1
Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	03	Test Engineer :	Alex Lee

WLAN 802.11n HT40 Channel 03

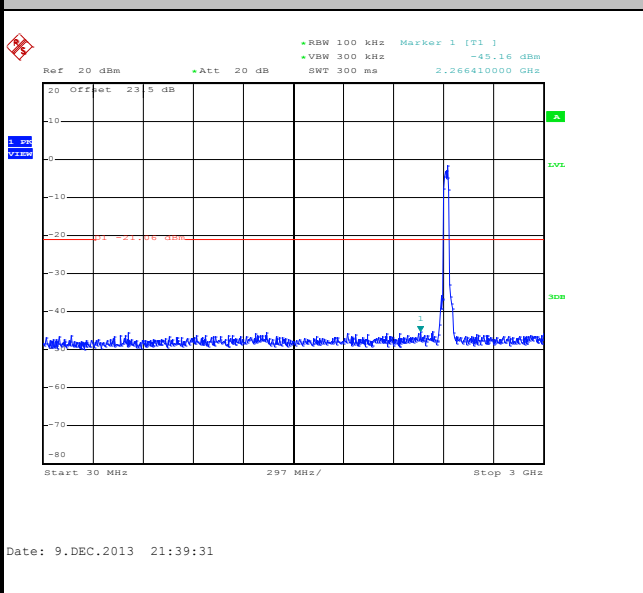
100kHz PSD reference Level



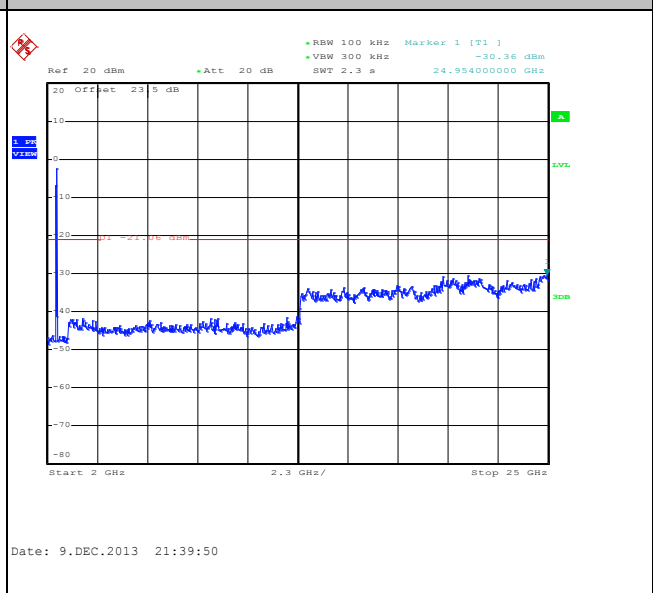
Low Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

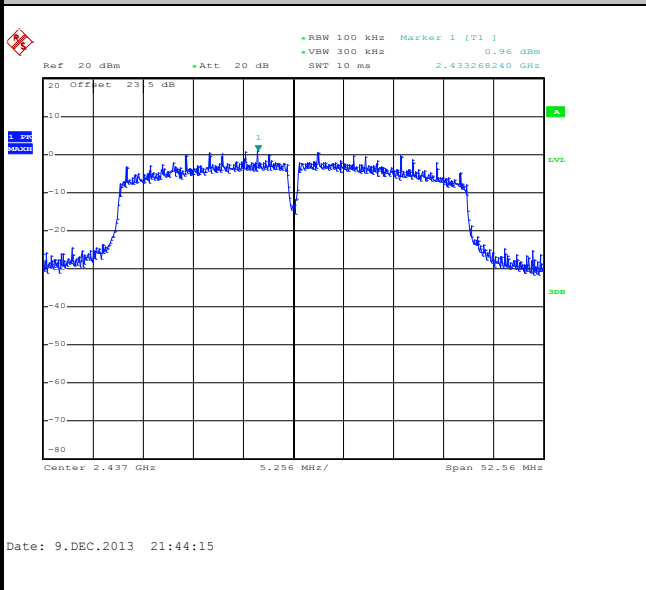




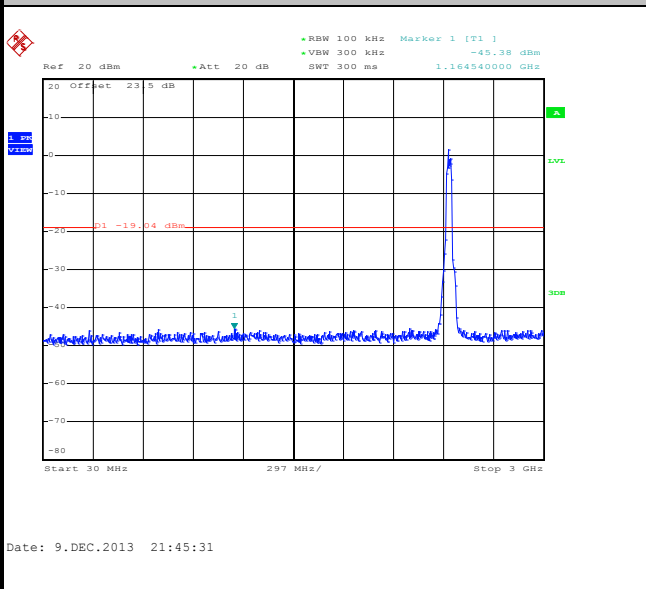
Number of TX :	1	Ant. :	1
Test Mode :	802.11n HT40	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Alex Lee

WLAN 802.11n HT40 Channel 06

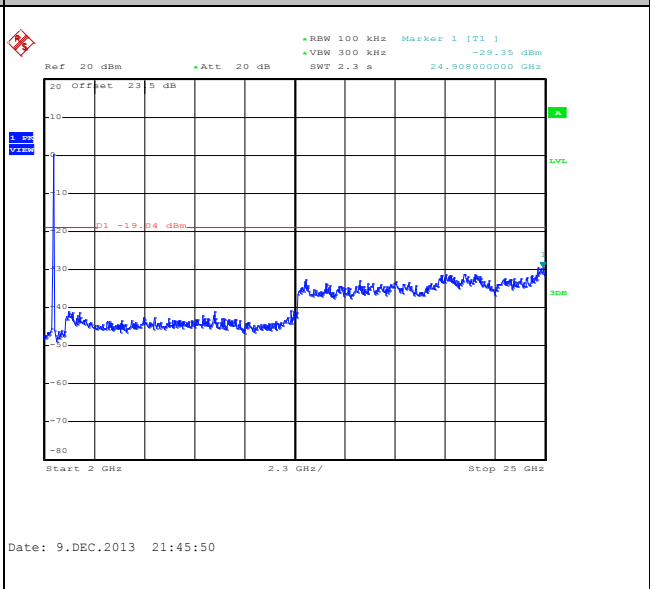
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

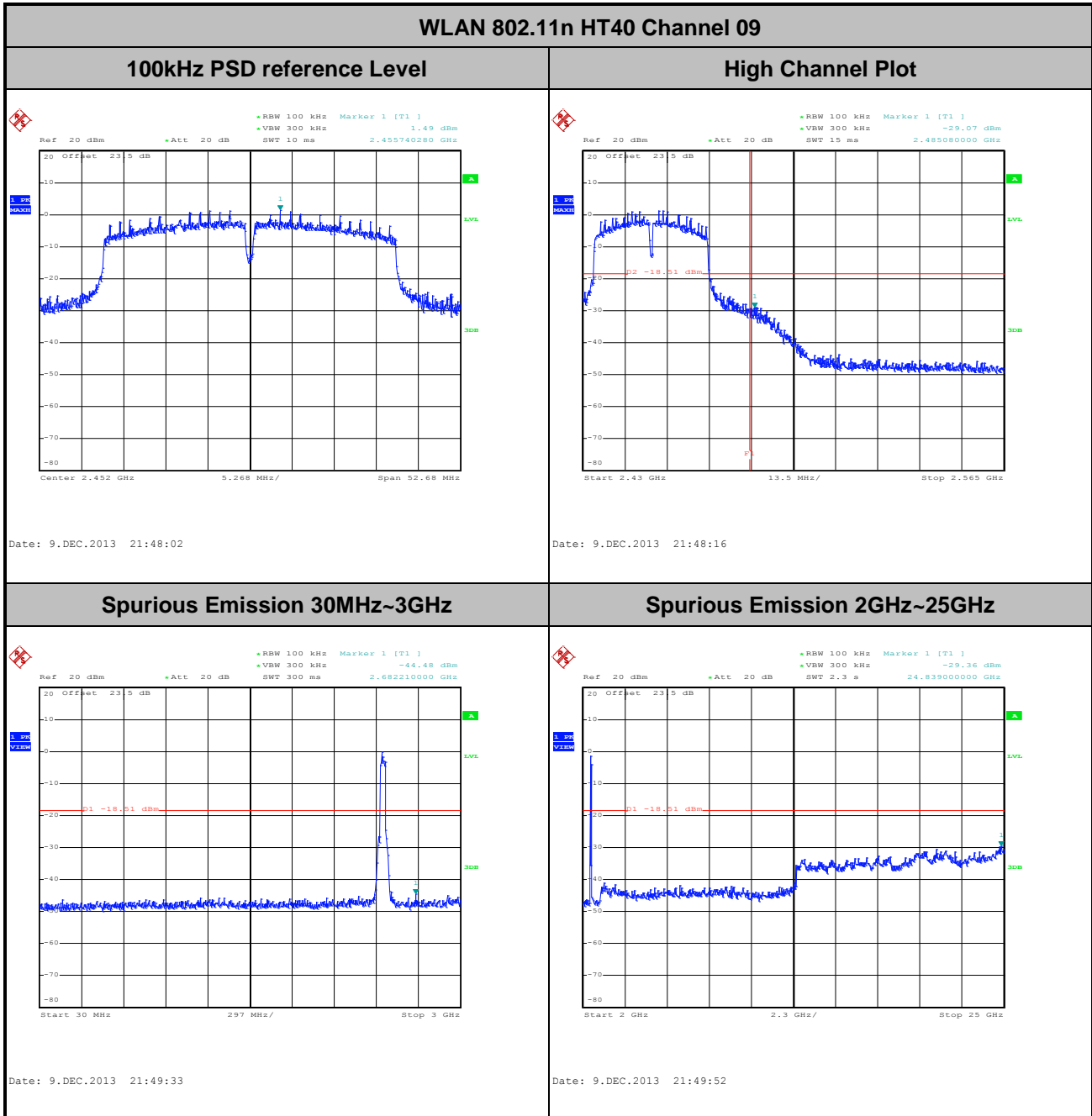


Spurious Emission 2GHz~25GHz





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



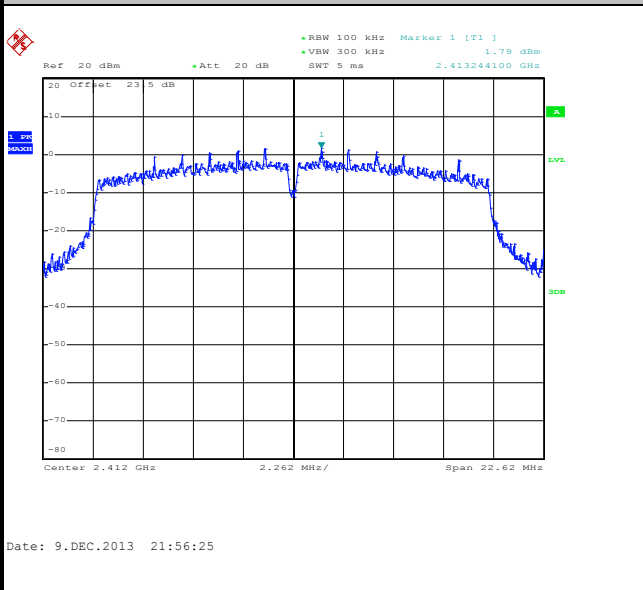


Number of TX = 2, Ant. 1 (Measured)

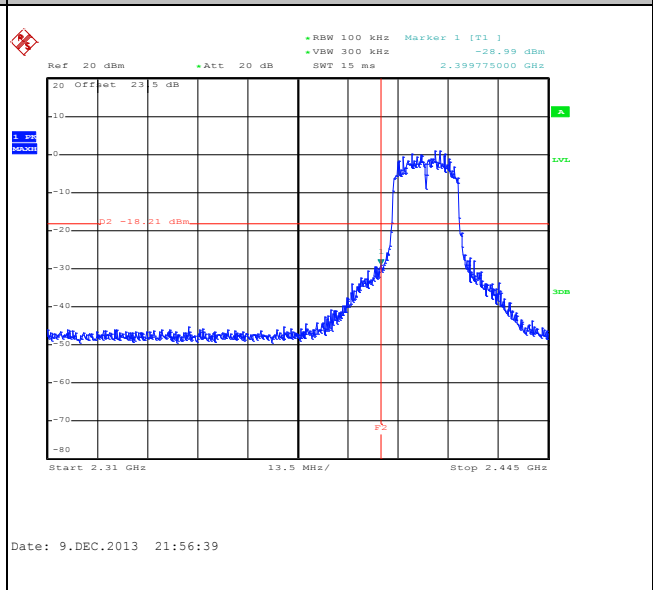
Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 01

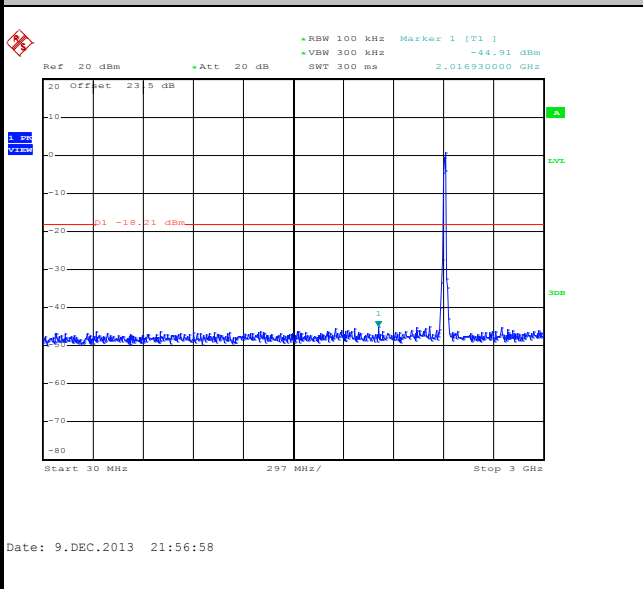
100kHz PSD reference Level



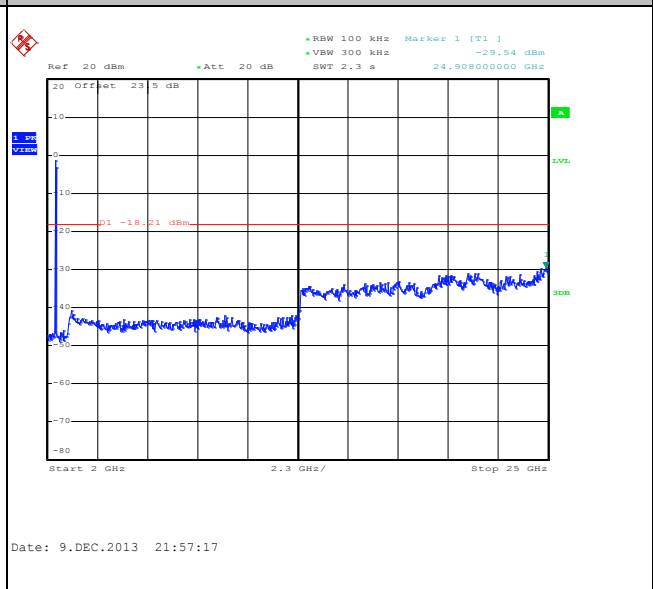
Low Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

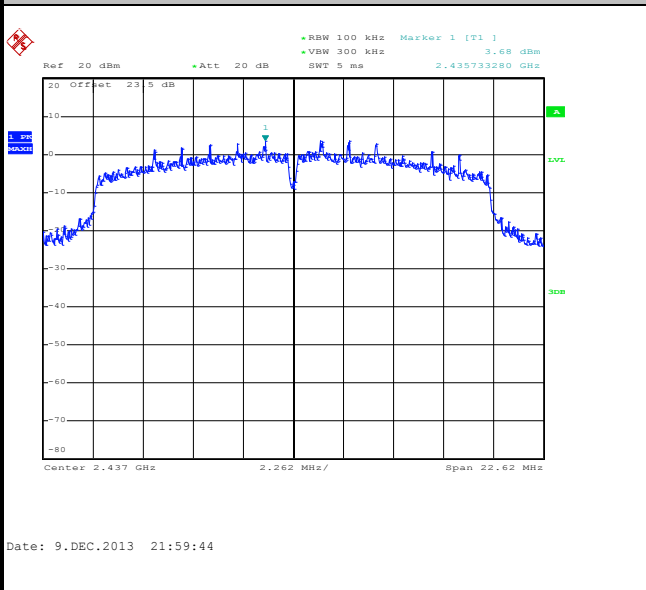




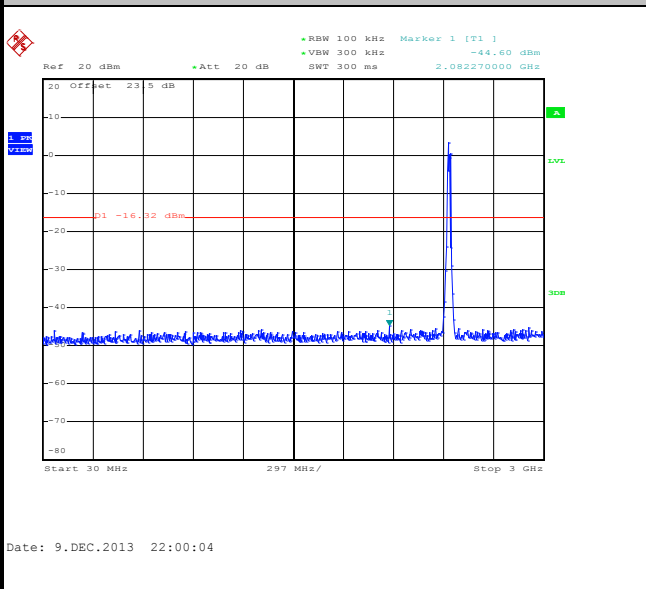
Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 06

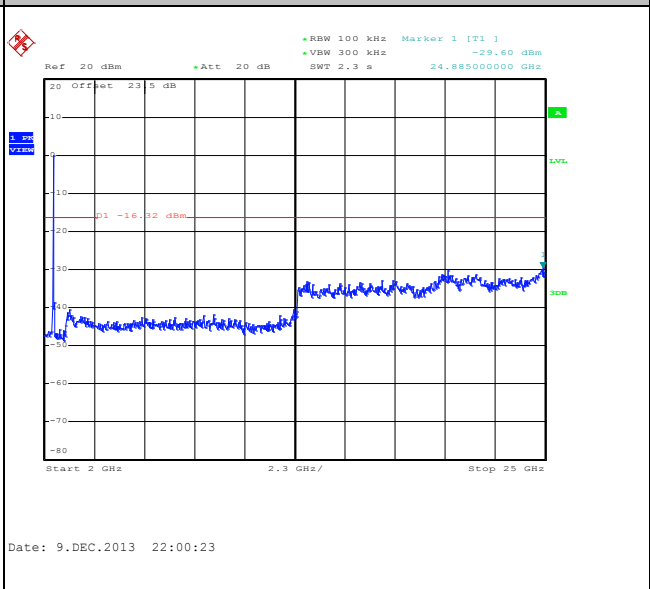
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

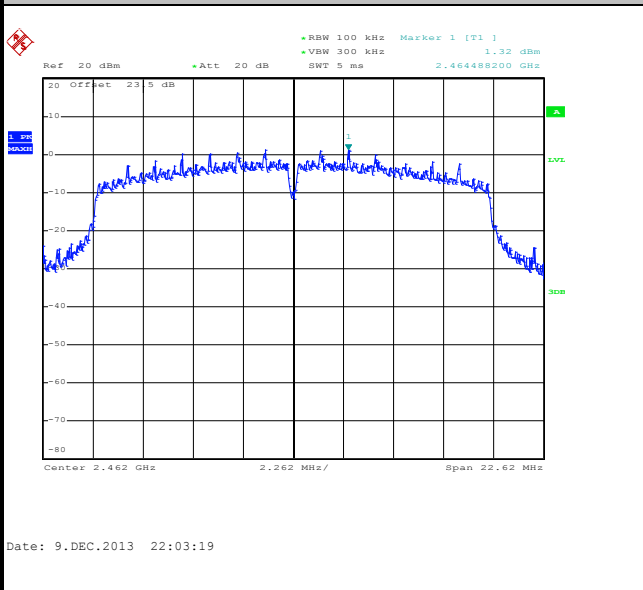




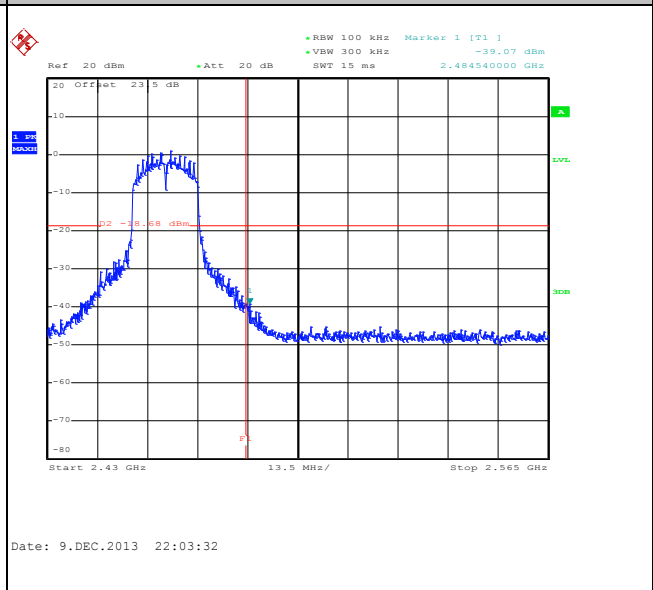
Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 11

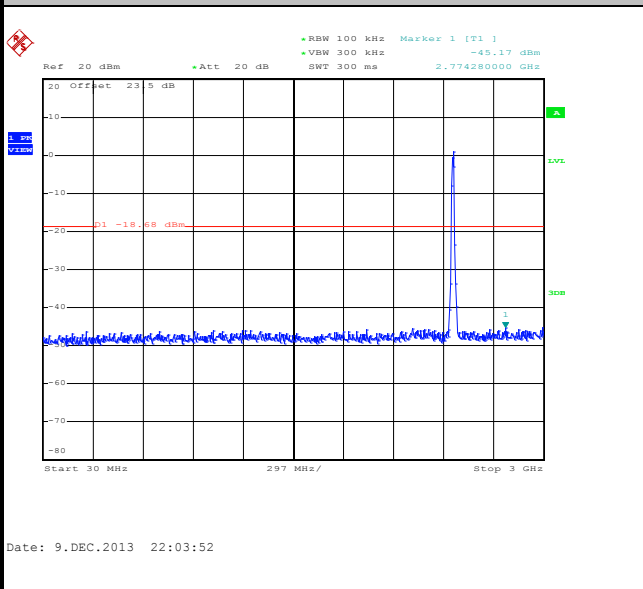
100kHz PSD reference Level



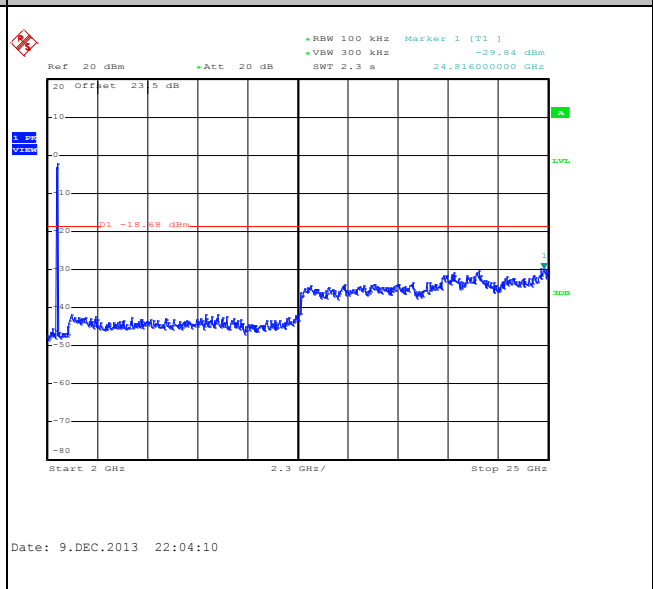
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



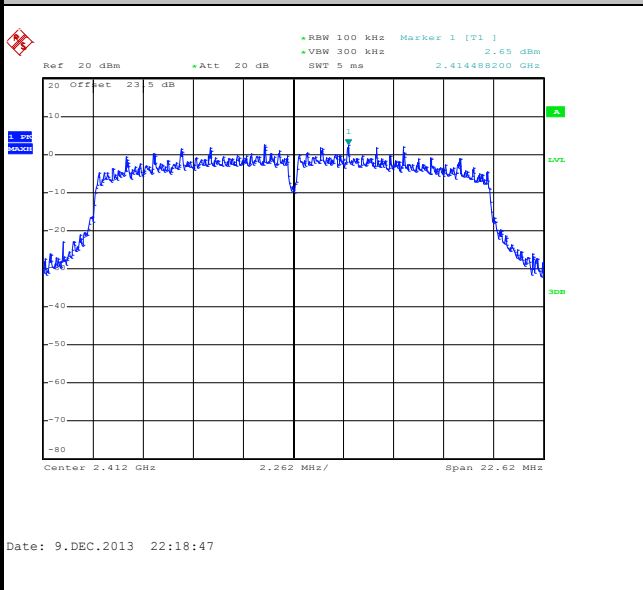


Number of TX = 2, Ant. 2 (Measured)

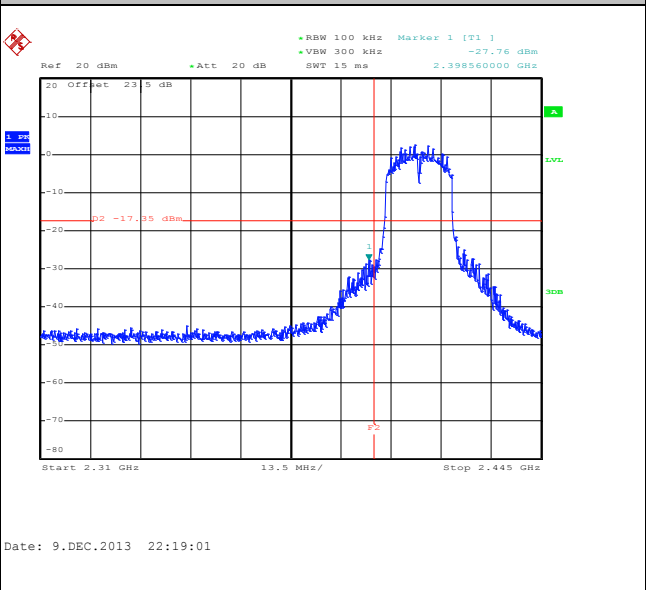
Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 01

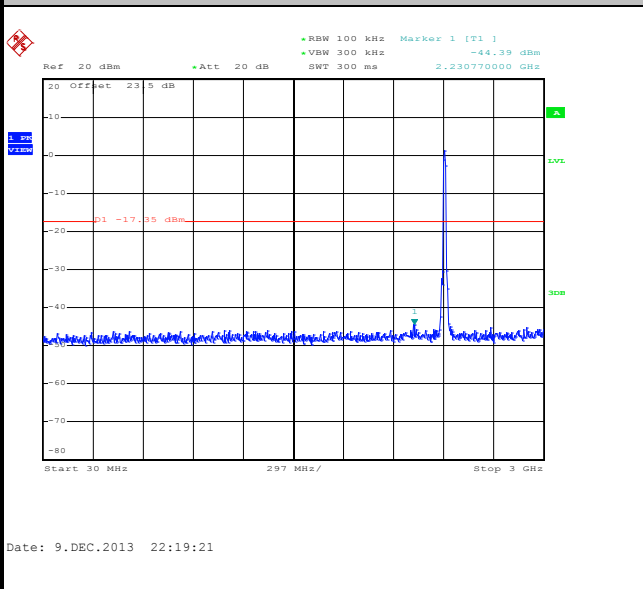
100kHz PSD reference Level



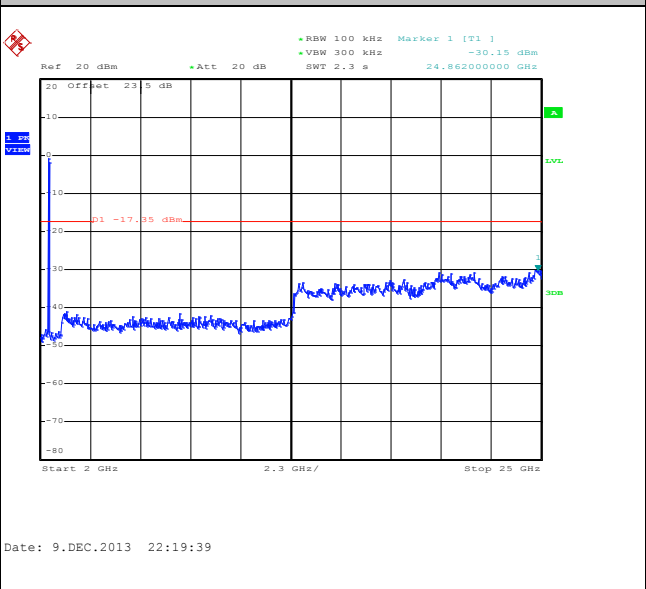
Low Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

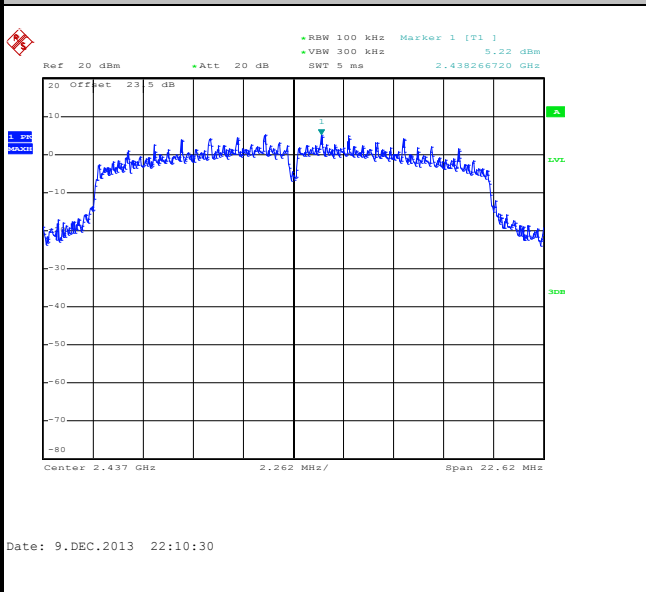




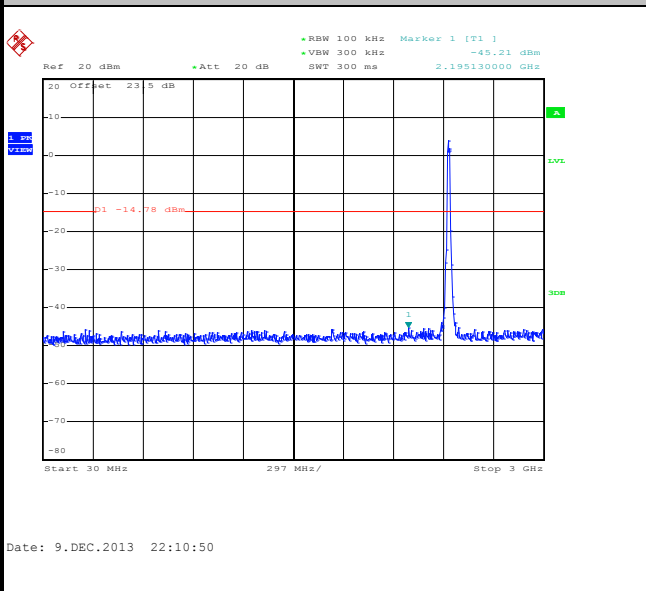
Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 06

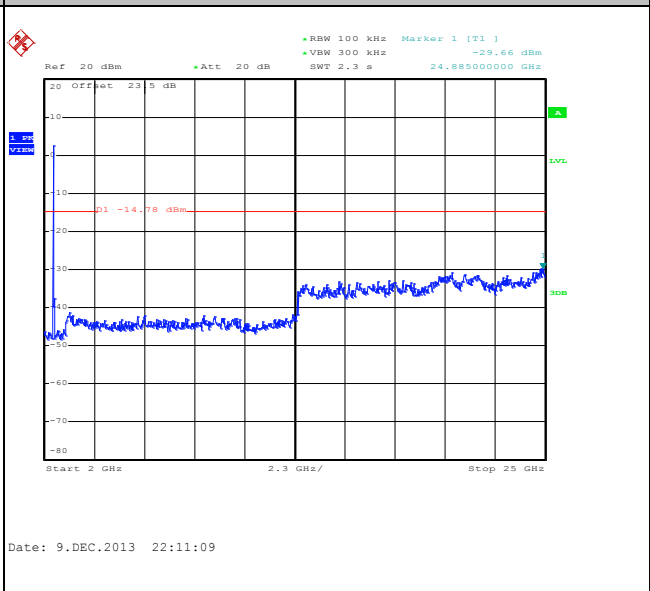
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

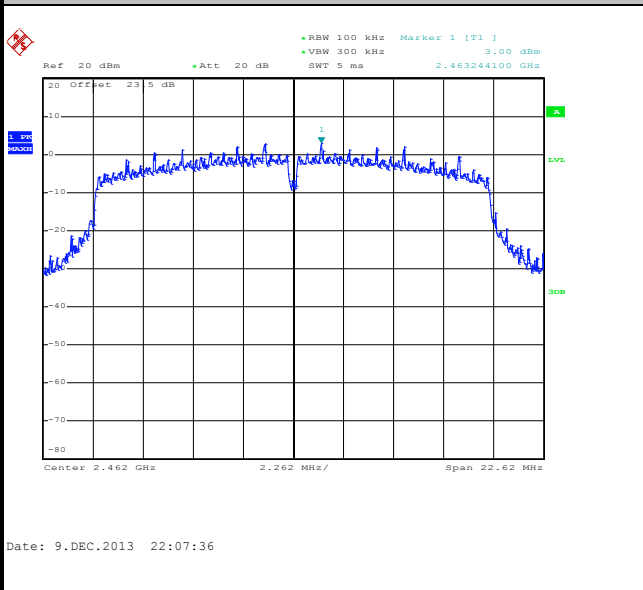




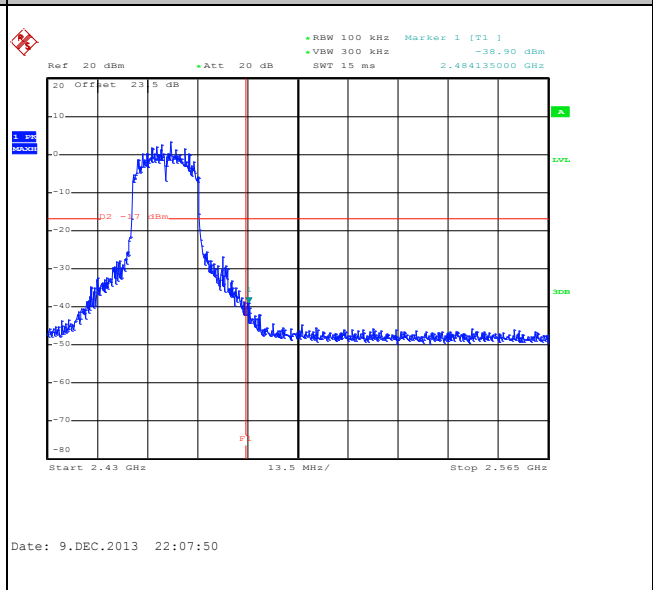
Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Alex Lee

WLAN 802.11n HT20 Channel 11

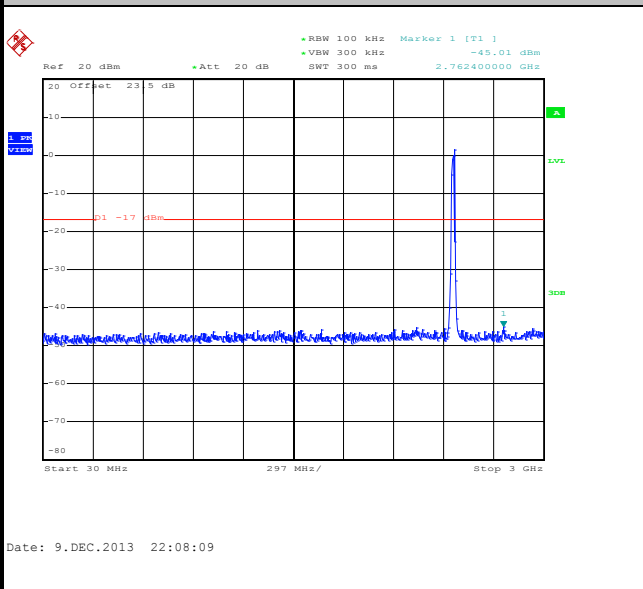
100kHz PSD reference Level



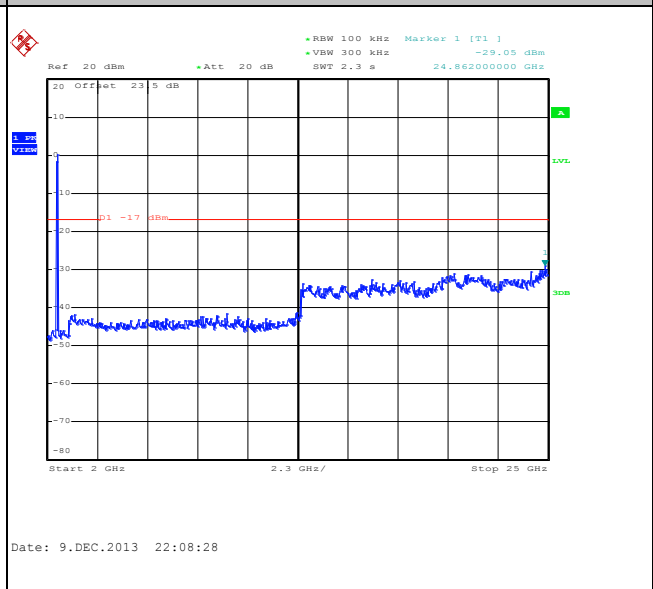
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz





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.

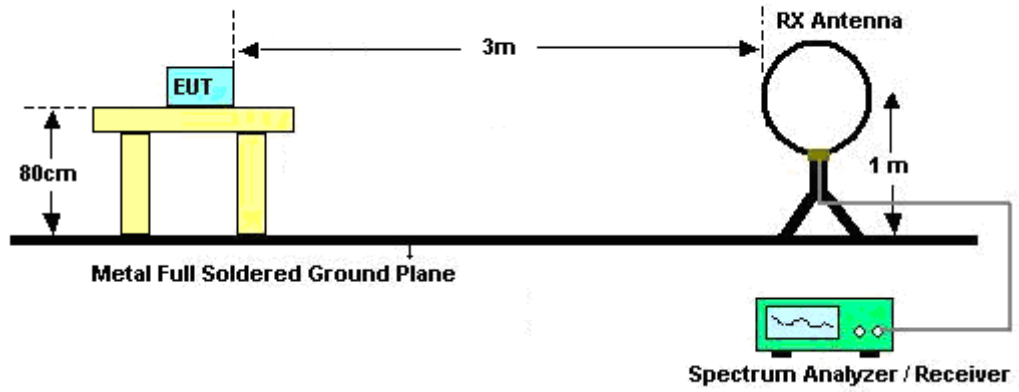
For average measurement:

 - 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.

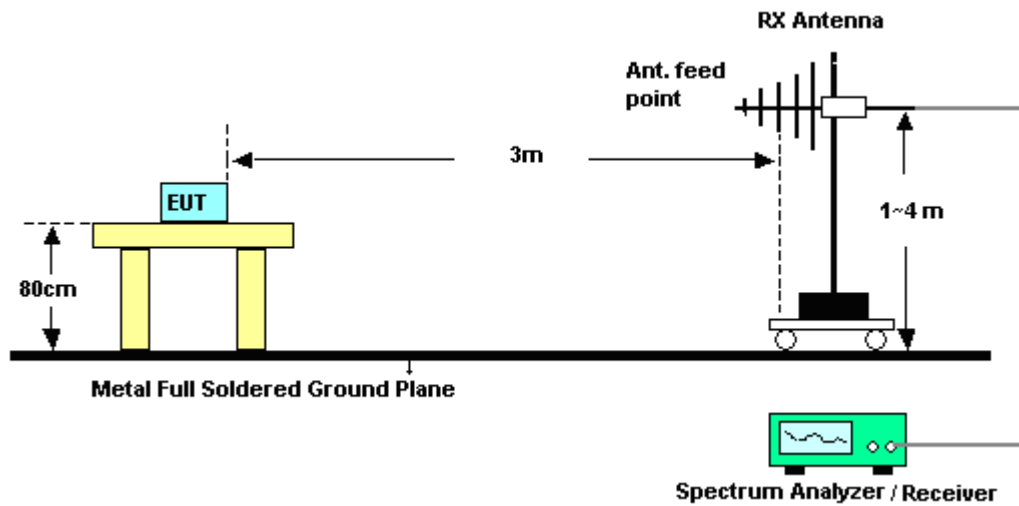
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11b	97.62	16480	0.06	100Hz
1	802.11g	87.24	2736	0.37	1kHz
1	2.4GHz 802.11n HT20	86.26	2548	0.39	1kHz
1	2.4GHz 802.11n HT40	75.73	1248	0.80	1kHz
1+2	2.4GHz 802.11n HT20	76.78	1296	0.77	1kHz

3.5.4 Test Setup

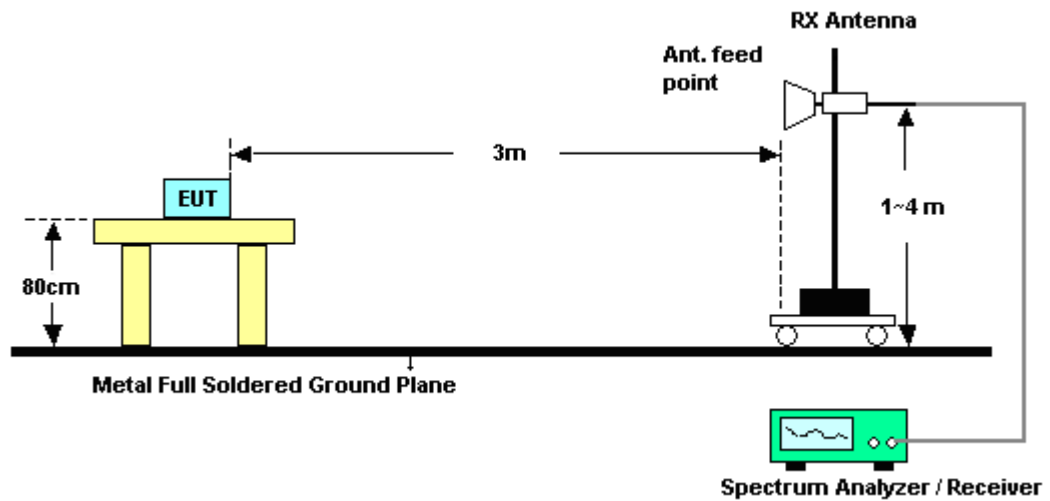
For radiated emissions below 30MHz



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 (dB μ V)	
	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.

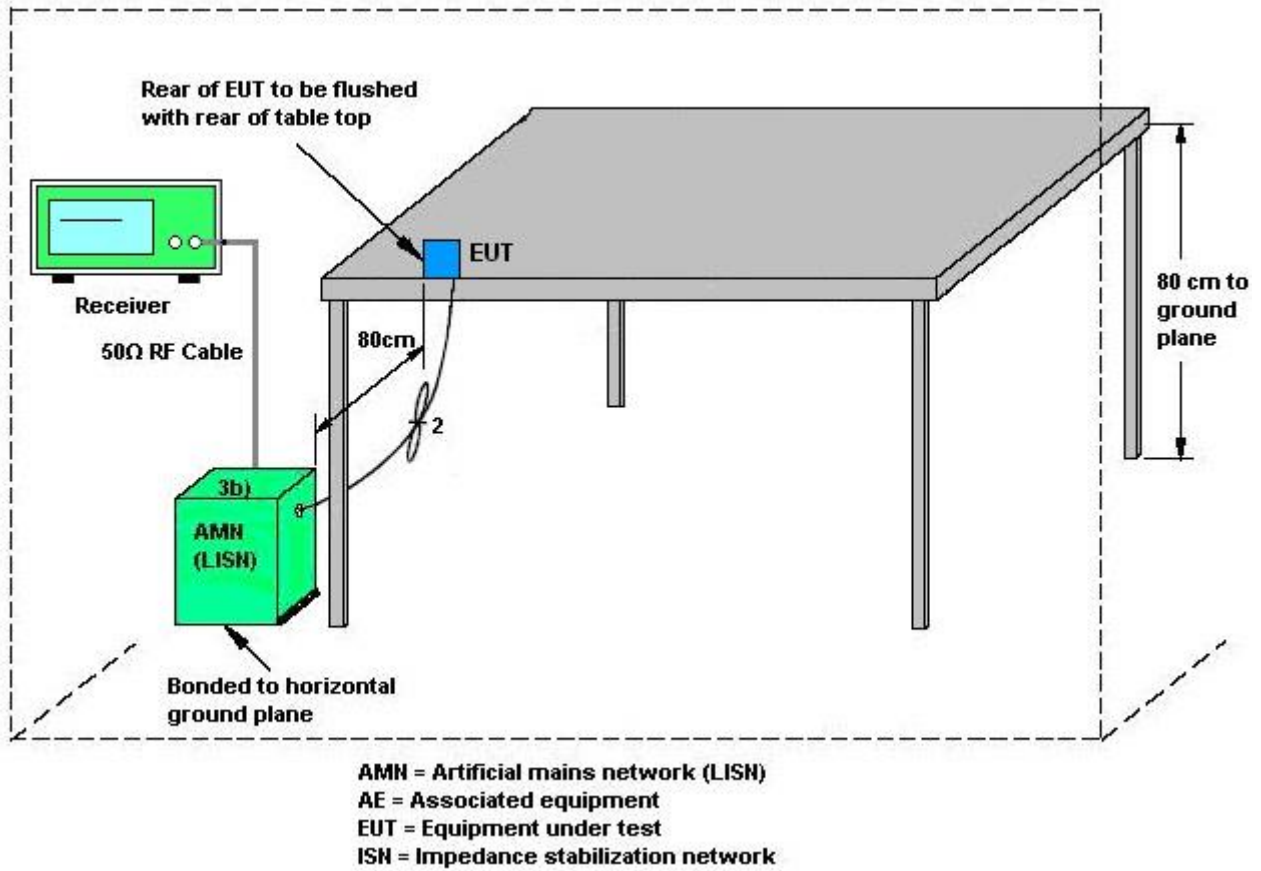
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

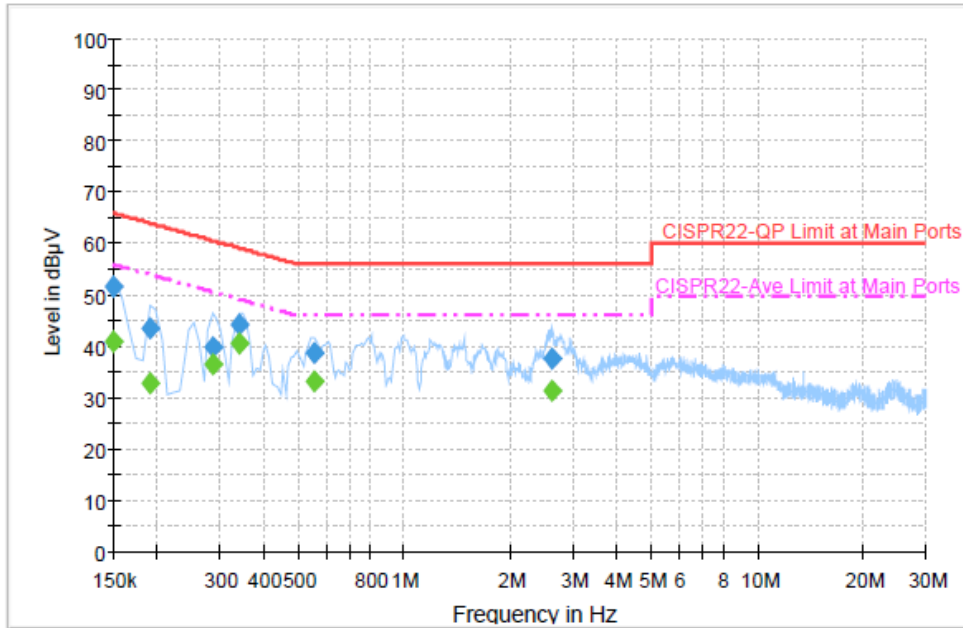
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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



3.6.5 Test Result of AC Conducted Emission

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



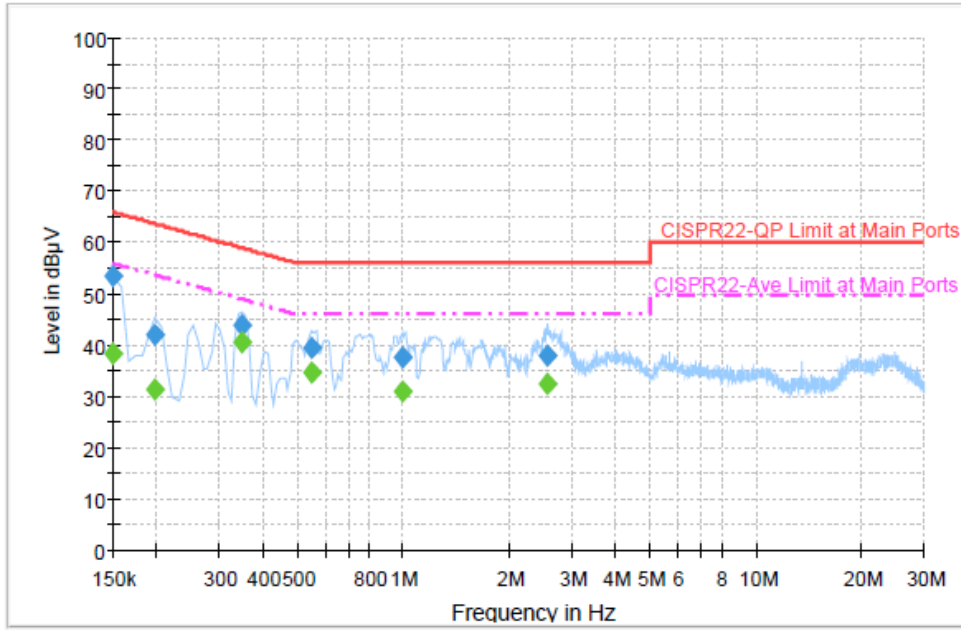
Final Result : QuasiPeak

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°C
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 k th antenna is being fed by spatial stream j , or zero if it is not;

G_k is the gain in dBi of the k th 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.

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

$$\text{Power Limit Reduction} = DG(\text{Power}) - 6\text{dBi}, (\text{min} = 0)$$

$$\text{PSD Limit Reduction} = DG(\text{PSD}) - 6\text{dBi}, (\text{min} = 0)$$



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)

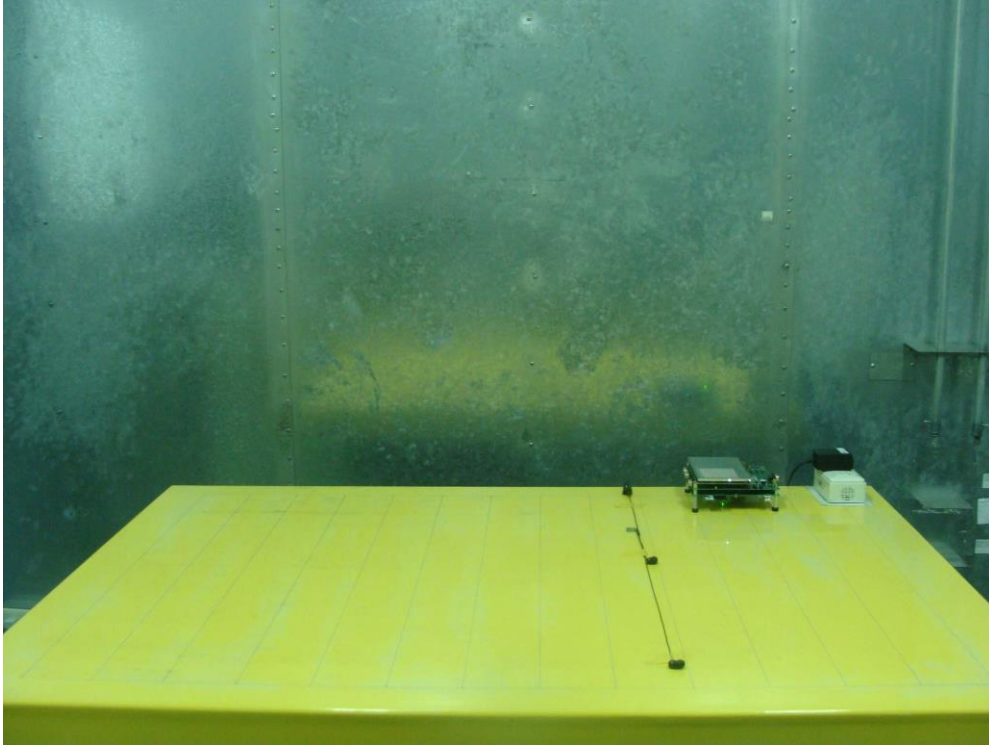
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.26
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.50
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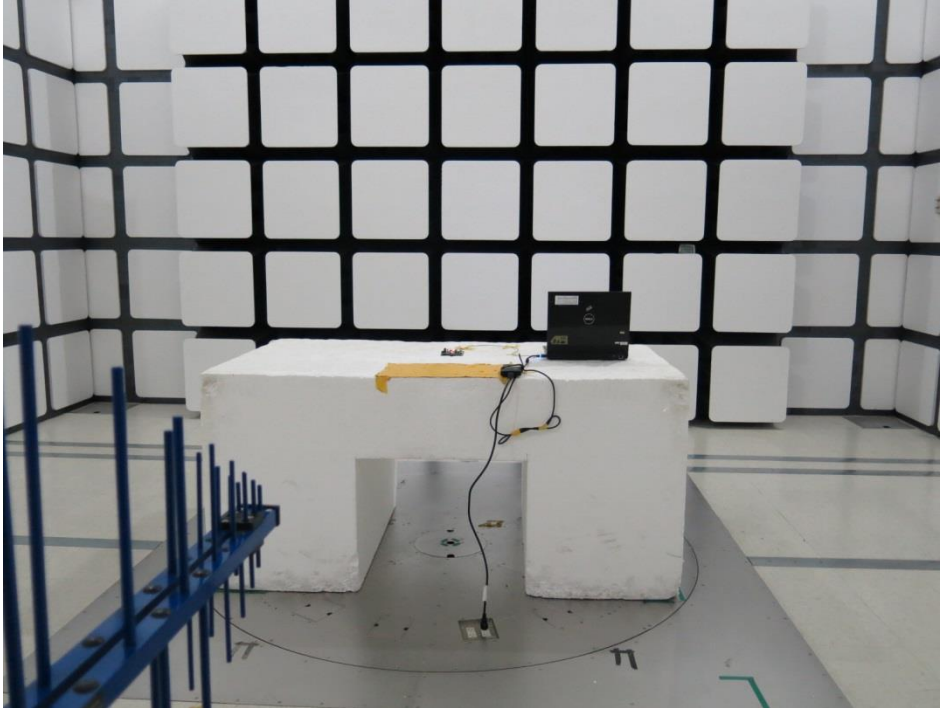
Appendix A. Setup Photographs

<Conducted Emission>



<Radiated Emission>

LF



HF

