FCC RF Test Report

APPLICANT	:	LG Electronics Mobile Comm USA
EQUIPMENT	:	Smart phone
BRAND NAME	:	LG
MODEL NAME	:	LG-X180g, X180g, LGX180g
FCC ID	:	ZNFX180G
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Aug. 19, 2015 and testing was completed on Sep. 16, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

James Huang

Prepared by: James Huang / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

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2627

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APPENDIX A. CONDUCTED TEST RESULTS

APPENDIX B. RADIATED TEST RESULTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR581902C	Rev. 01	Initial issue of report	Nov. 13, 2015
FR581902C	Rev. 02	Added the test plots for duty cycle and Radiated Spurious Emission.	Nov. 17, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 8.76 dB at 30.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.97 dB at 0.760 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

LG Electronics Mobile Comm USA
1000 Sylvan Avenue Englewood Cliffs, NJ 07632

1.2 Manufacturer

Arima Communications Corp.
6F, No.866, Jhongjheng Rd., Jhonghe Dist., New Taipei City 23586, Taiwan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart phone
Brand Name	LG
Model Name	LG-X180g, X180g, LGX180g
FCC ID	ZNFX180G
EUT supports Radios application	GSM/GPRS/EGPRS(Downlink Only)/ WCDMA/HSPA/HSPA+(Downlink Only) WLAN2.4GHz 802.11b/g/n HT20/HT40/ Bluetooth v3.0+EDR/Bluetooth v4.0 LE
IMEI Code	Conducted:354597070000044 Conduction: 354597070000093 Radiation: 354597070000036
HW Version	5528MB-005
SW Version	V08a
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 subjective to this standard

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 19.56 dBm (0.0904 W) 802.11g : 22.09 dBm (0.1618 W) 802.11n HT20 : 22.47 dBm (0.1766 W) 802.11n HT40 : 21.52 dBm (0.1419 W)
Antenna Type	802.11b/g/n : IFA Antenna with gain 0.72 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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

1.6 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	Sporton Site No.			FCC Registration No.
	TH01-KS	03CH02-KS	CO01-KS	418269

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
- 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 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: 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). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases were recorded in this report.

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 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.

2.4GHz 802.11b RF Output Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate 1Mbps	Channel	2Mbps	5.5Mbps	11Mbps
CH 01	2412 MHz	19.52	CH 11	19.48	18.91	19.41
CH 06	2437 MHz	19.47				
CH 11	2462 MHz	**19.56**				

2.4GHz 802.11g RF Output Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412 MHz	21.64	CH 11	19.71	21.92	21.98	20.61	20.76	22.01	22.07
CH 06	2437 MHz	21.28								
CH 11	2462 MHz	**22.09**								

2.4GHz 802.11n HT20 RF Output Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412 MHz	20.14	CH 11	20.15	20.64	19.98	19.94	20.94	22.22	21.45
CH 06	2437 MHz	20.31							22.16	
CH 11	2462 MHz	20.47							**22.47**	

2.4GHz 802.11n HT40 RF Output Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422 MHz	20.22	CH 03	20.15	20.37	20.95	20.89	**21.52**	20.64	20.46
CH 06	2437 MHz	20.03						21.34		
CH 09	2452 MHz	19.72						21.03		

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.

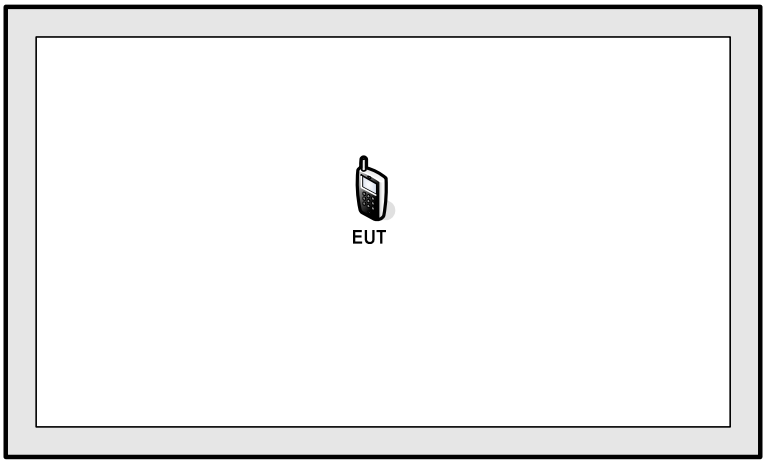
<2.4GHz>

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS6
802.11n HT40	MCS5

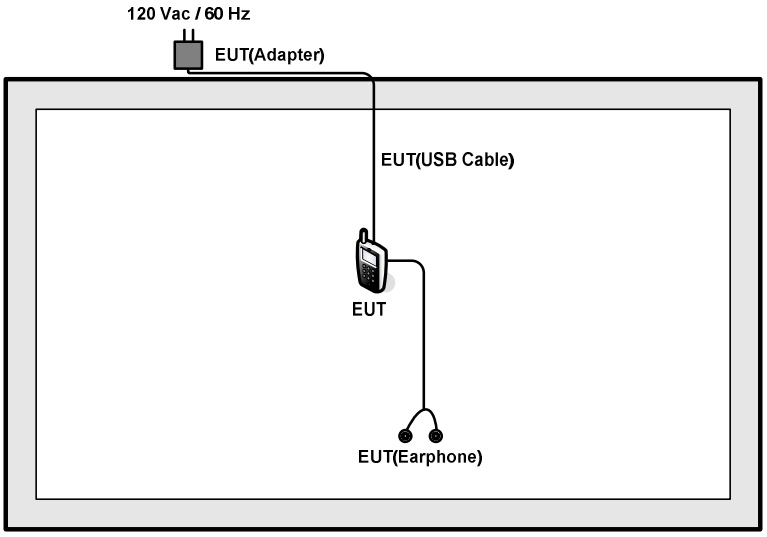
Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter)
Remark: For Radiated Test Cases, The tests were performance with Adapter, Earphone and USB Cable.	

2.4 Connection Diagram of Test System

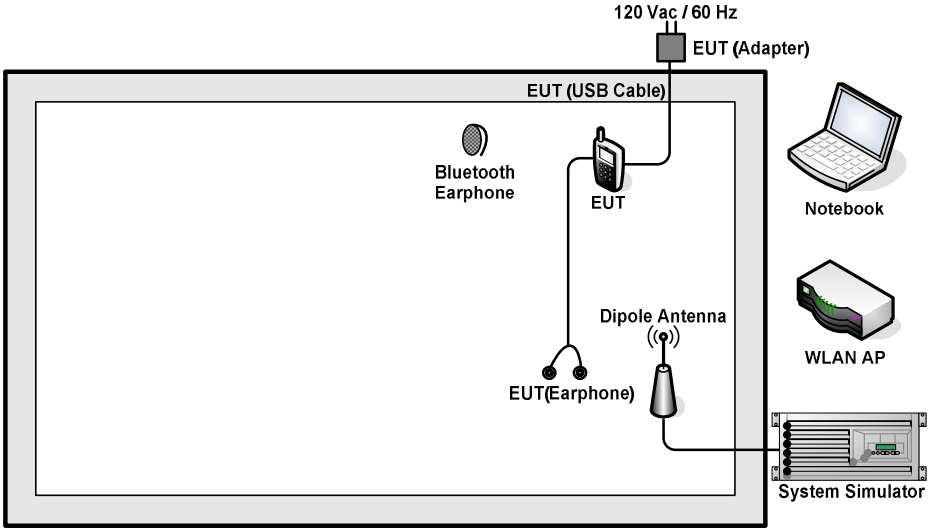
<WLAN2.4GHz 802.11b Tx Mode>



<WLAN2.4GHz 802.11g/n HT20/HT40 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.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-106	QTLBH-106	N/A	N/A

2.6 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

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 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.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 5.5 dB.

Offset(dB) = RF cable loss(dB).

= 5.5 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

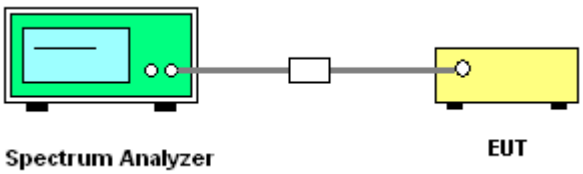
3.1.2 Measuring Instruments

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 v03r03.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

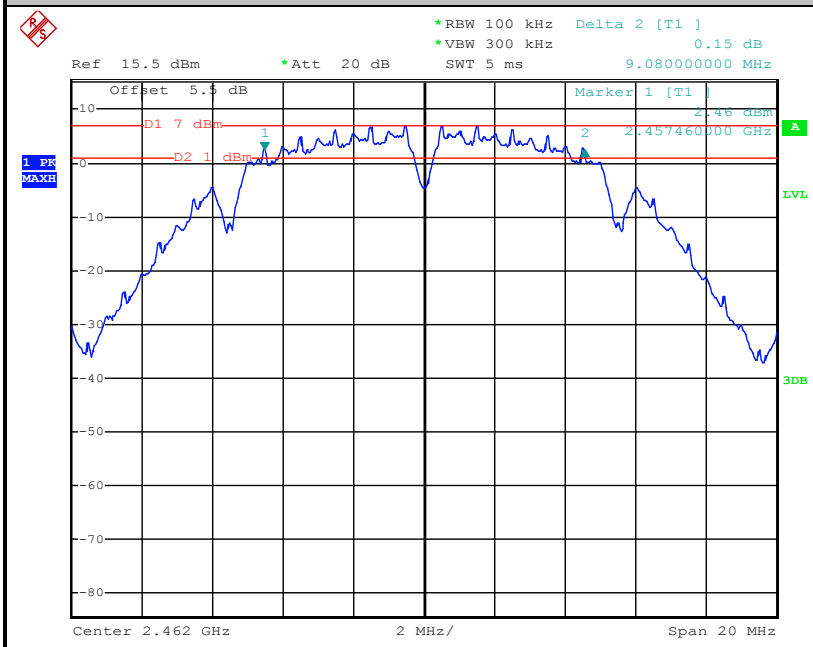
3.1.4 Test Setup



3.1.5 Test Result of 6dB Occupied Bandwidth

Please refer to Appendix A of this test report.

Minimum 6dB Bandwidth



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Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting Antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the Antenna exceeds 6dBi.

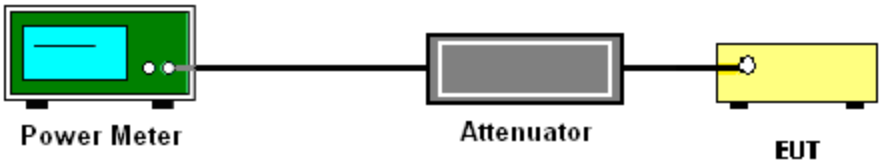
3.2.2 Measuring Instruments

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 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.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A of this test report.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A of this test report.

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.

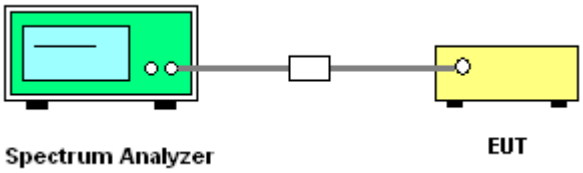
3.3.2 Measuring Instruments

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 v03r03
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.

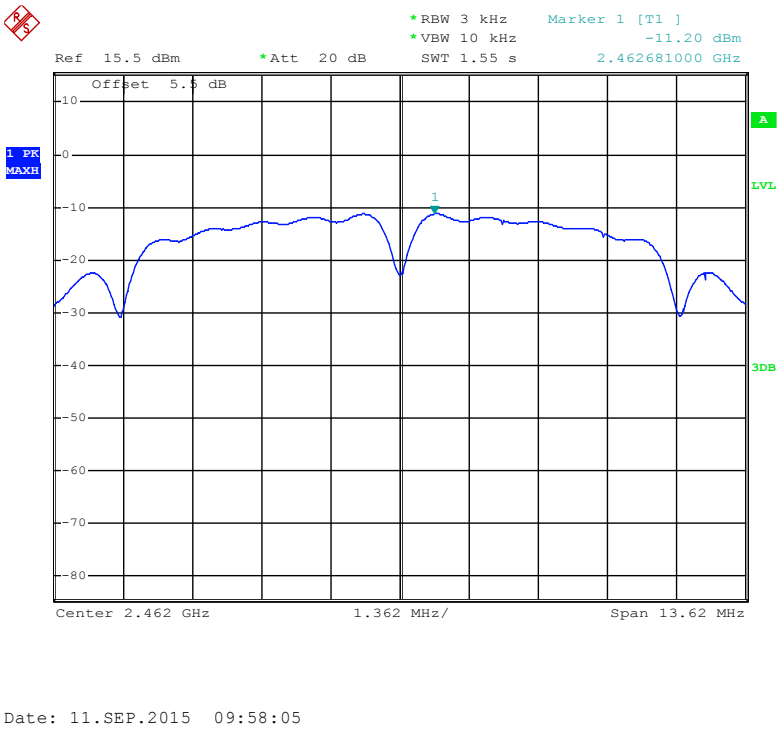
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.

Worst Case Power Density (dBm/3kHz)



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).

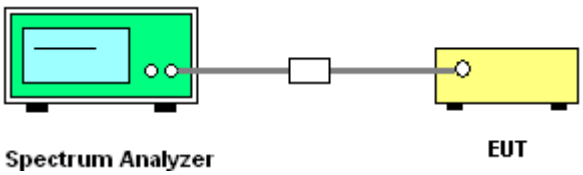
3.4.2 Measuring Instruments

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 v03r03.
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

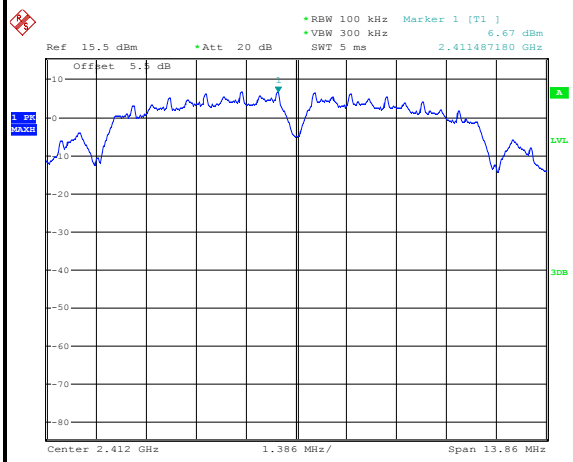


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Lvan Zhang

WLAN 802.11b Channel 01

100kHz PSD reference Level



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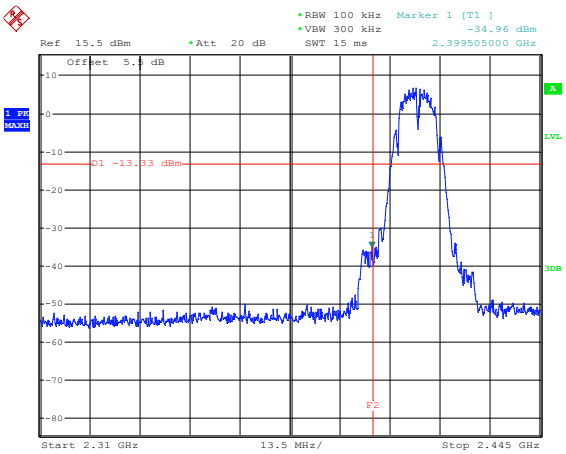
Low Channel Plot



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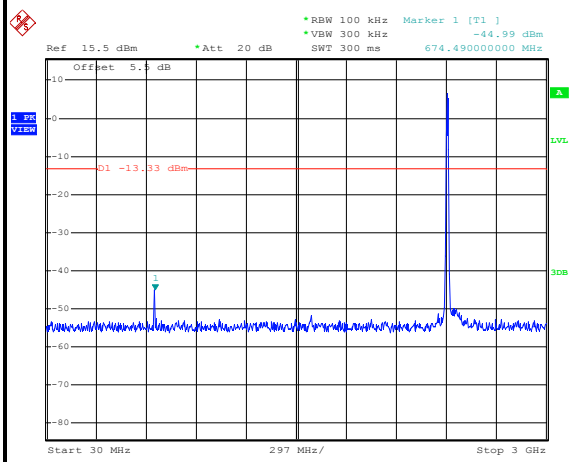
Spurious Emission 30MHz~3GHz



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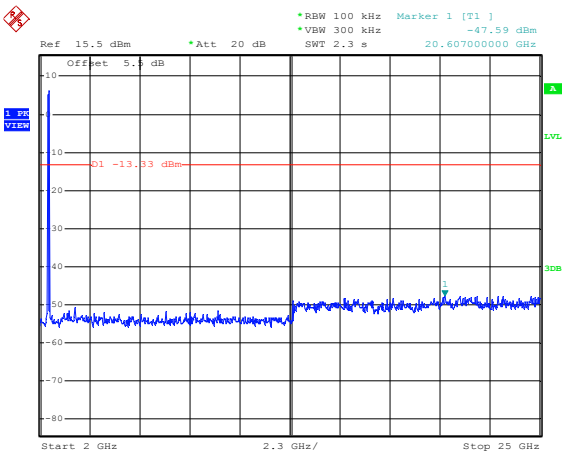
Spurious Emission 2GHz~25GHz

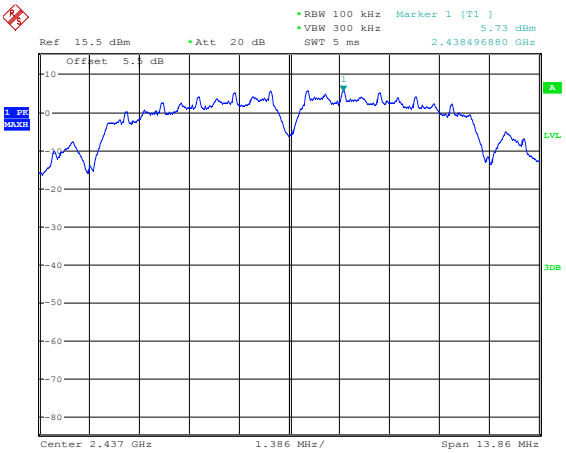


Date: 11.SEP.2015 09:44:45

Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Lvan Zhang

WLAN 802.11b Channel 06

100kHz PSD reference Level



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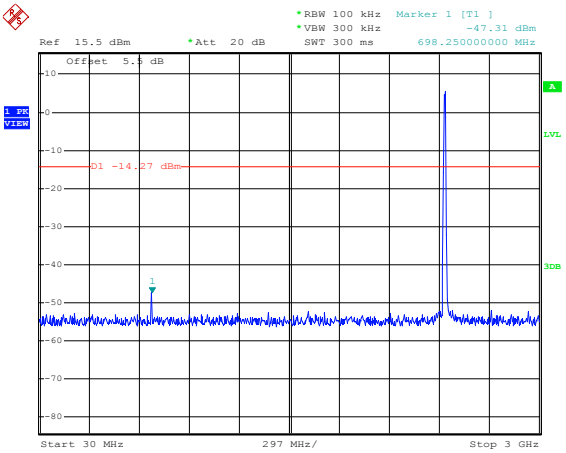
Spurious Emission 30MHz~3GHz



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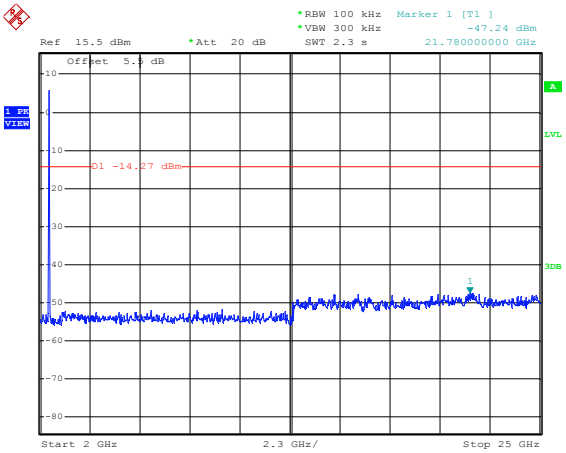
Spurious Emission 2GHz~25GHz

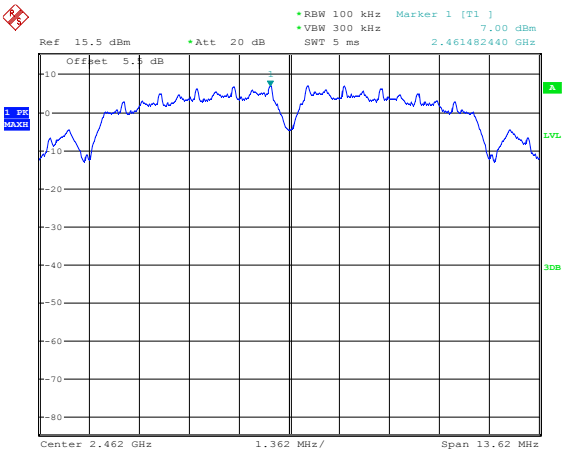


Date: 11.SEP.2015 09:56:06

Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Lvan Zhang

WLAN 802.11b Channel 11

100kHz PSD reference Level



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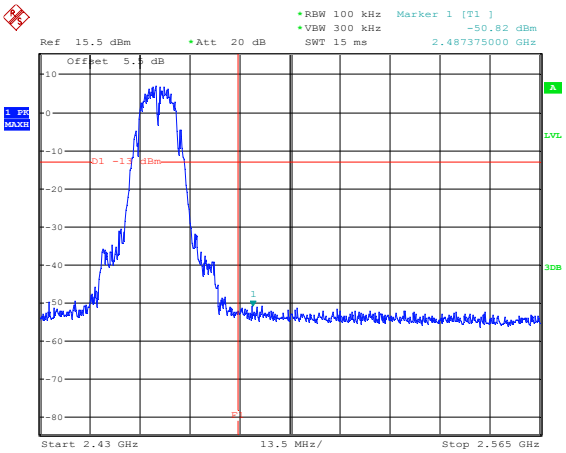
High Channel Plot



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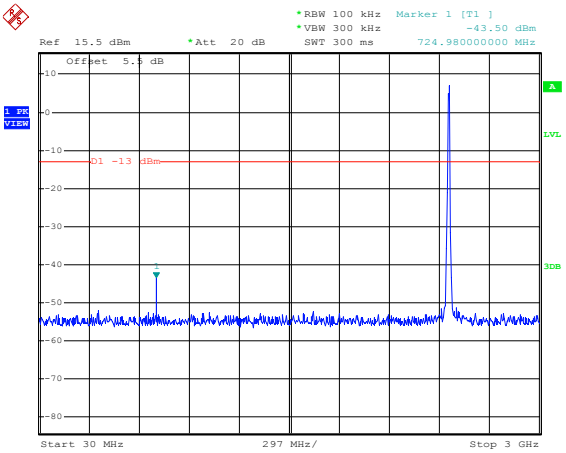
Spurious Emission 30MHz~3GHz



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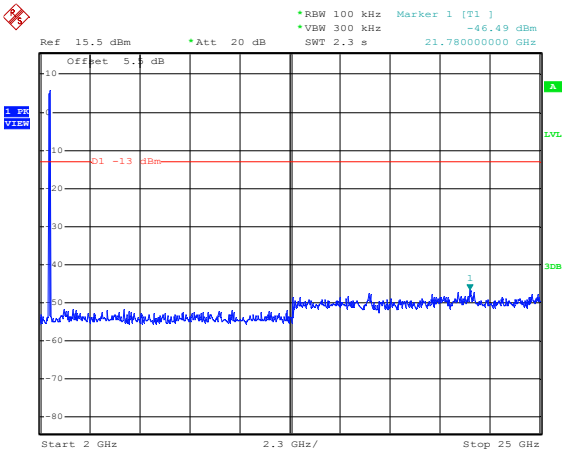
Spurious Emission 2GHz~25GHz

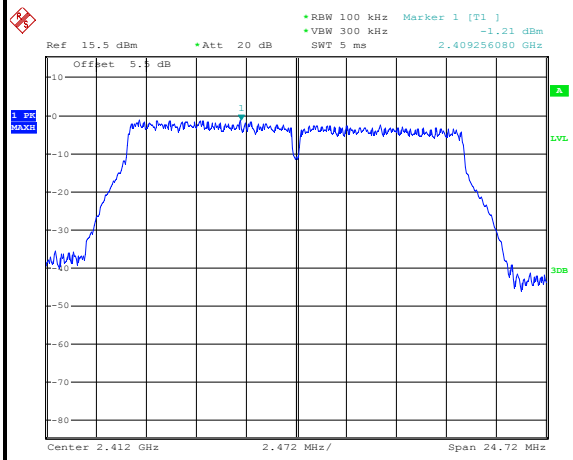


Date: 11.SEP.2015 09:59:35

Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Lvan Zhang

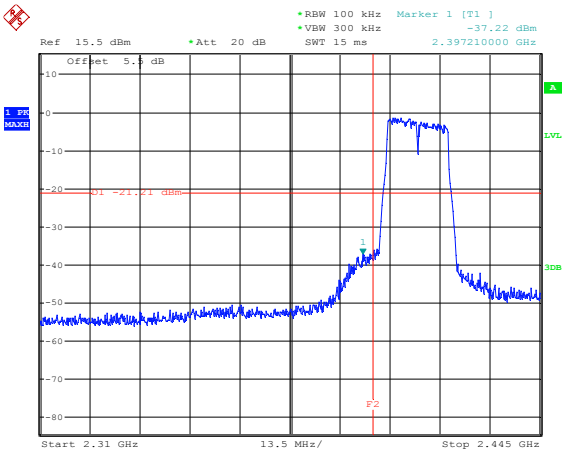
WLAN 802.11g Channel 01

100kHz PSD reference Level



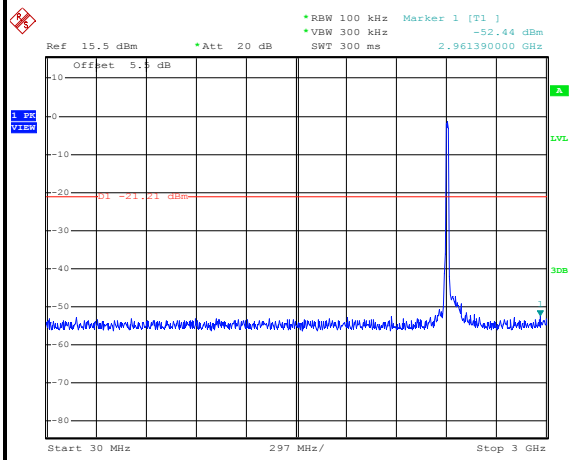
Date: 11.SEP.2015 10:03:24

Low Channel Plot



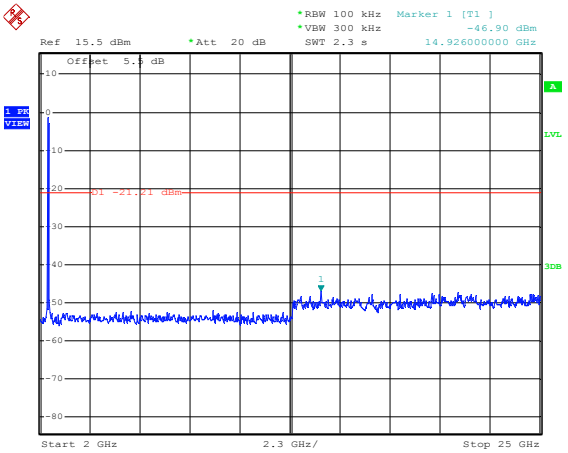
Date: 11.SEP.2015 10:03:43

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 10:04:09

Spurious Emission 2GHz~25GHz

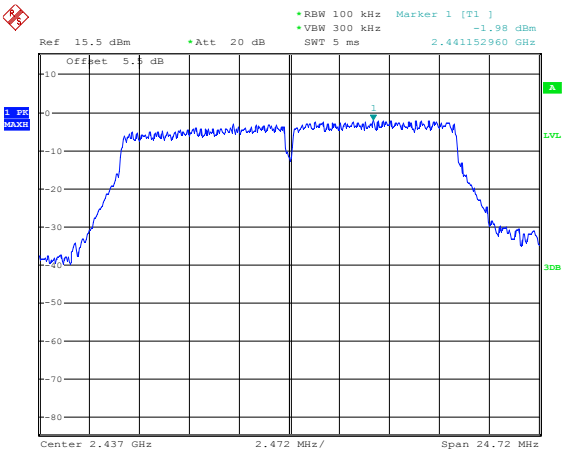


Date: 11.SEP.2015 10:04:27

Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Lvan Zhang

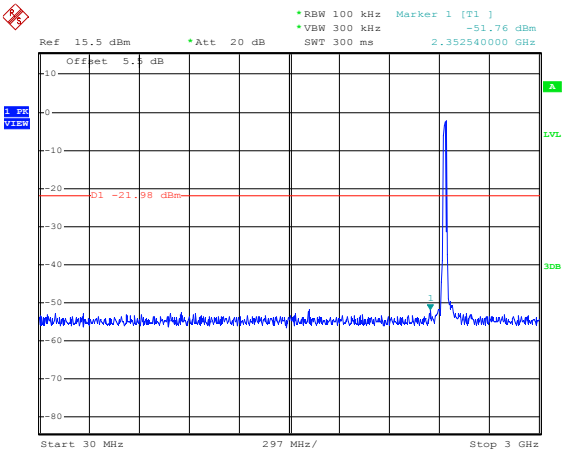
WLAN 802.11g Channel 06

100kHz PSD reference Level



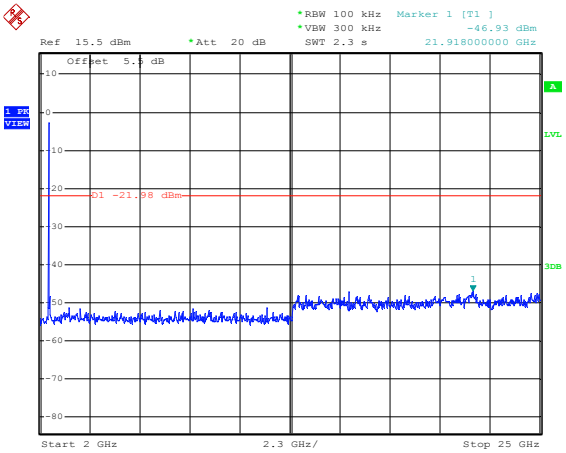
Date: 11.SEP.2015 10:07:42

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 10:08:13

Spurious Emission 2GHz~25GHz

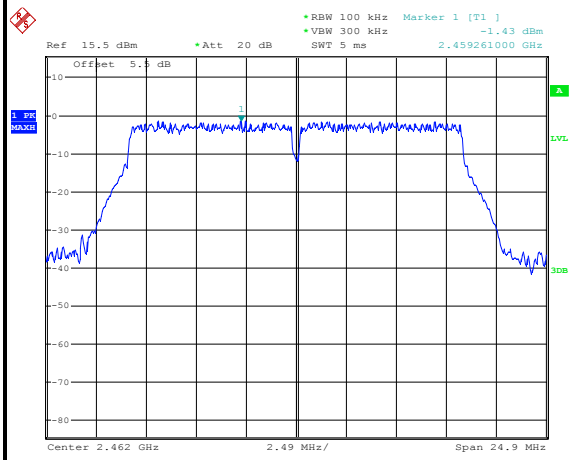


Date: 11.SEP.2015 10:08:31

Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Lvan Zhang

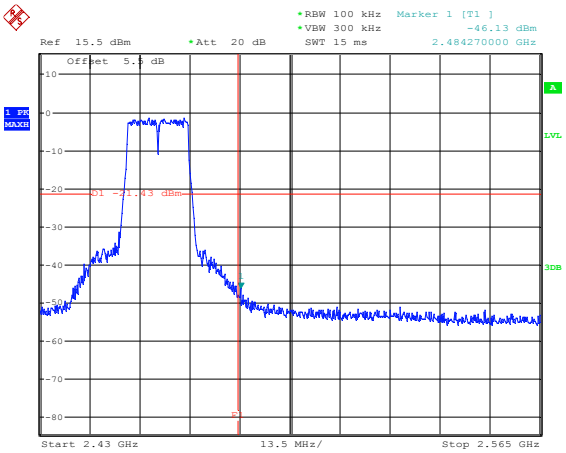
WLAN 802.11g Channel 11

100kHz PSD reference Level



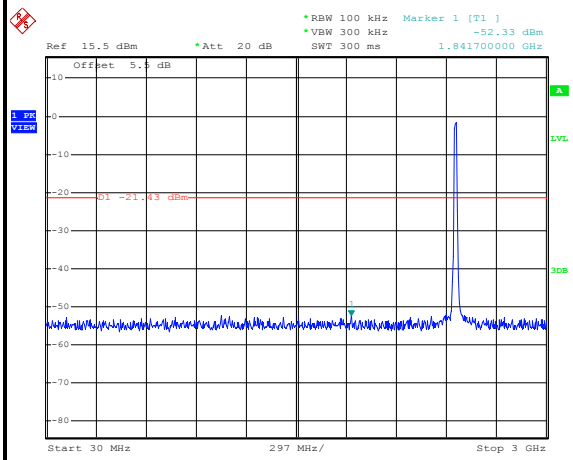
Date: 11.SEP.2015 10:11:16

High Channel Plot



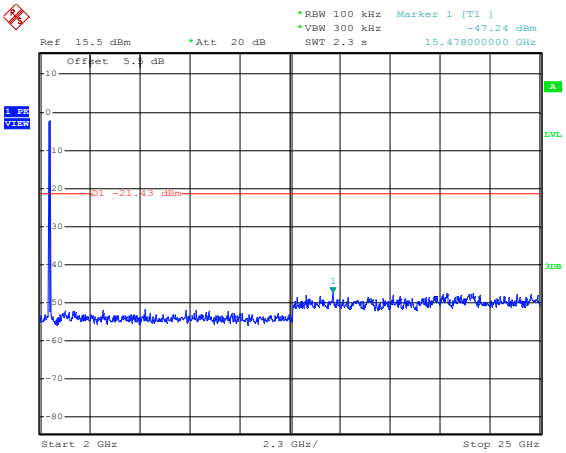
Date: 11.SEP.2015 10:12:35

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 10:13:05

Spurious Emission 2GHz~25GHz

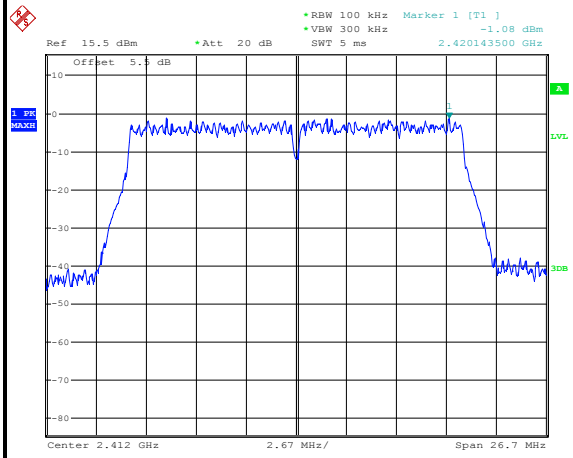


Date: 11.SEP.2015 10:13:22

Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Lvan Zhang

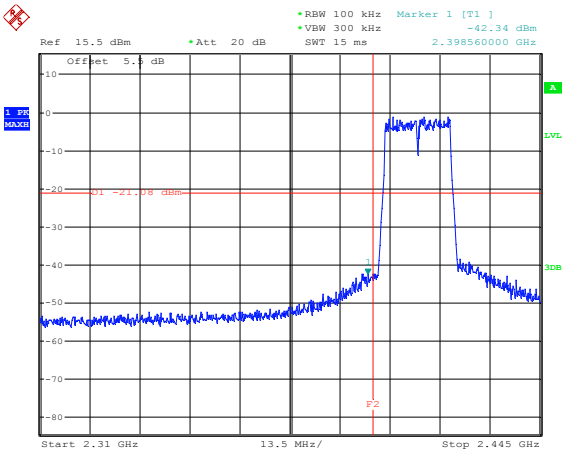
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



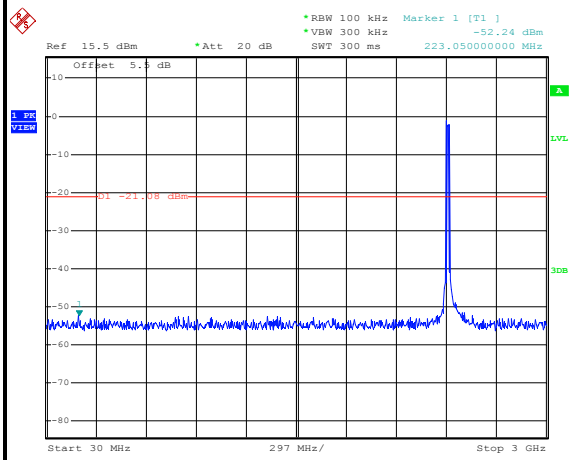
Date: 11.SEP.2015 18:34:57

Low Channel Plot



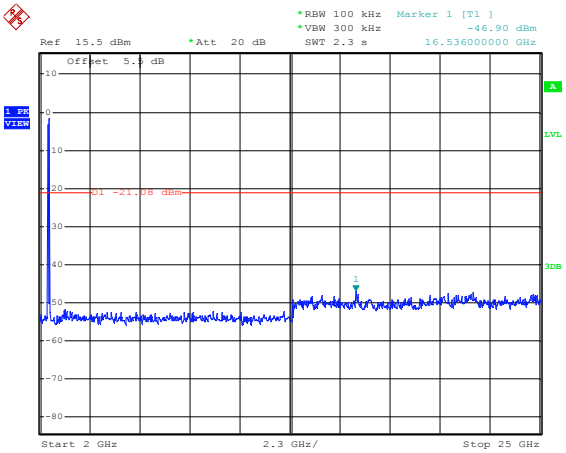
Date: 11.SEP.2015 18:35:28

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 18:37:17

Spurious Emission 2GHz~25GHz

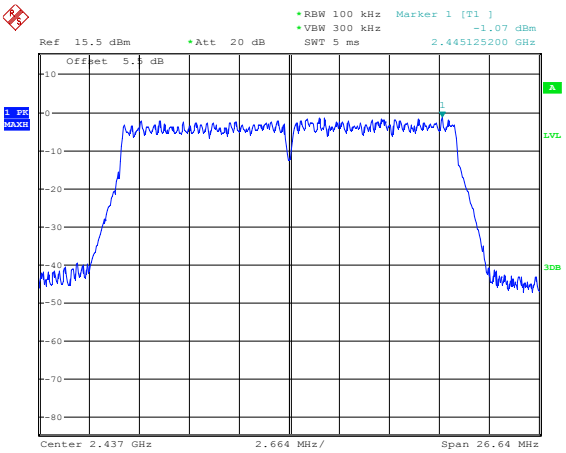


Date: 11.SEP.2015 18:37:35

Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Lvan Zhang

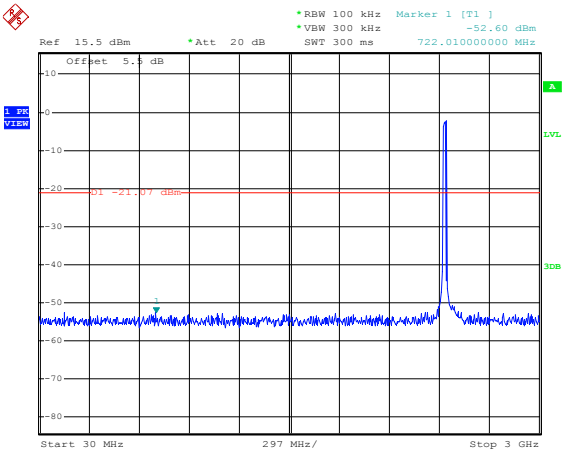
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



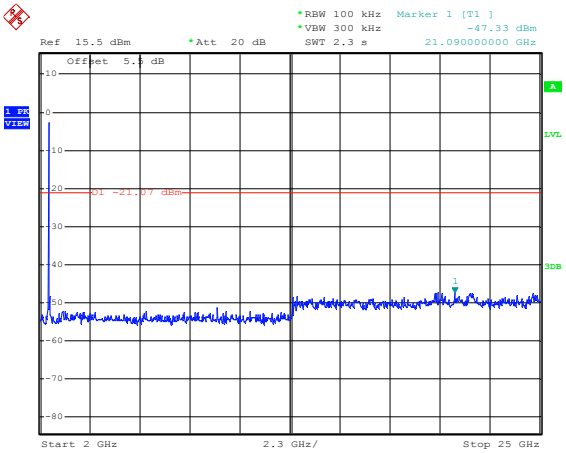
Date: 11.SEP.2015 18:47:17

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 18:47:45

Spurious Emission 2GHz~25GHz

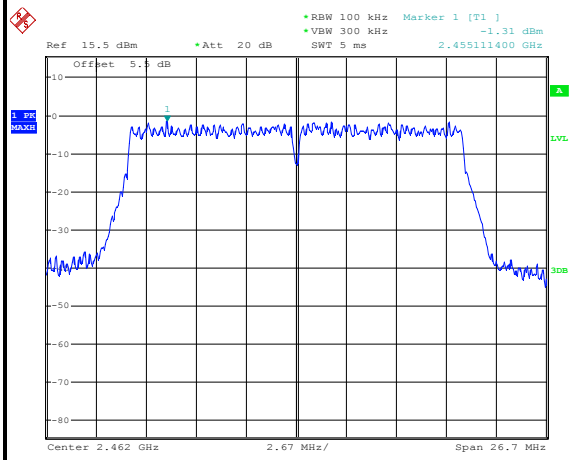


Date: 11.SEP.2015 18:48:02

Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Lvan Zhang

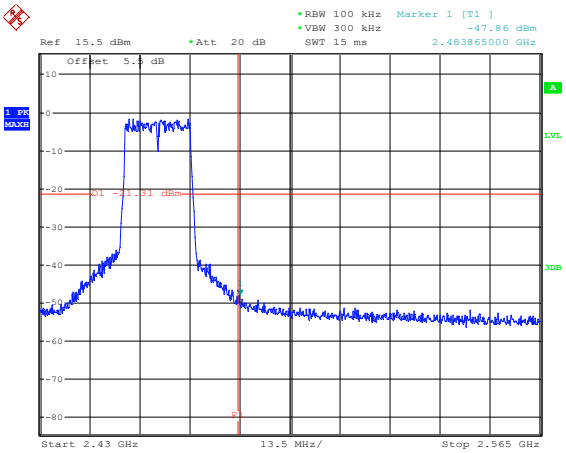
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



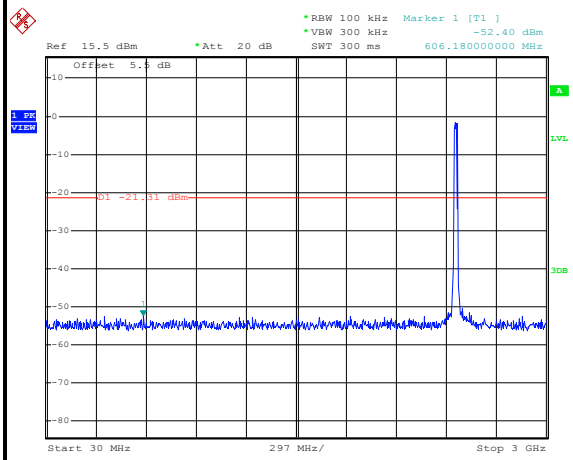
Date: 11.SEP.2015 18:53:34

High Channel Plot



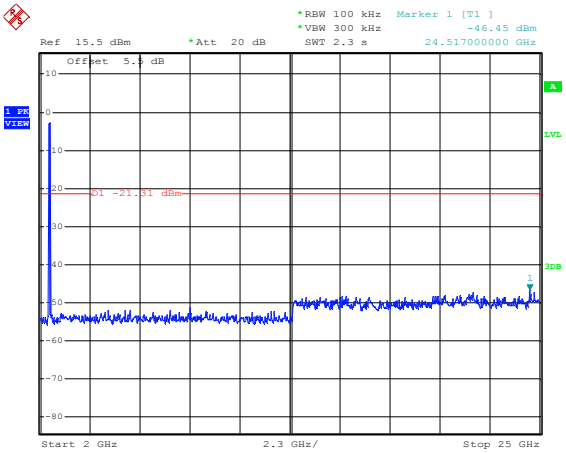
Date: 11.SEP.2015 18:53:54

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 18:54:24

Spurious Emission 2GHz~25GHz

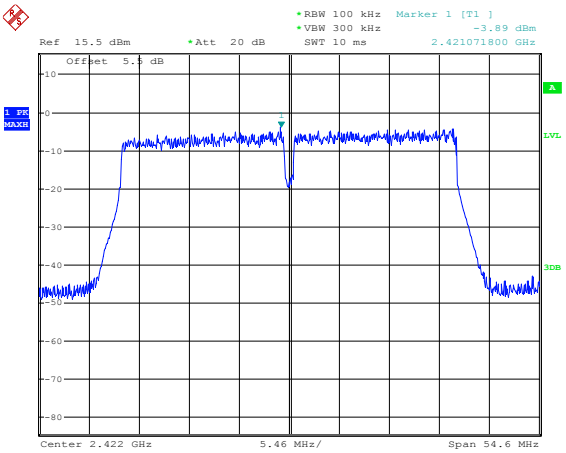


Date: 11.SEP.2015 18:54:41

Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	03	**Test Engineer :**	Lvan Zhang

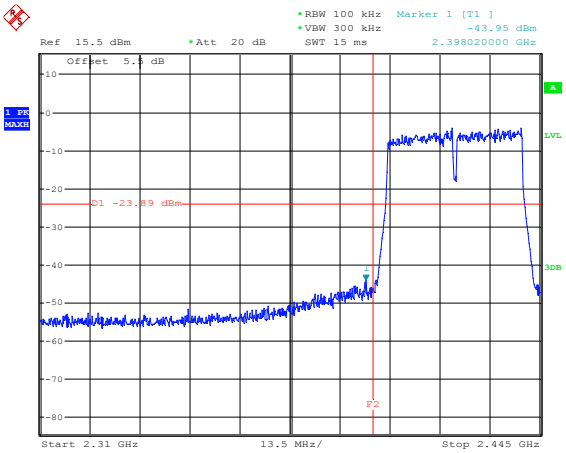
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



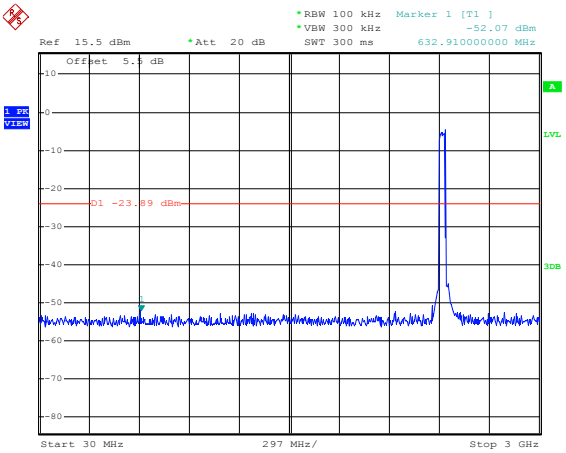
Date: 11.SEP.2015 19:01:15

Low Channel Plot



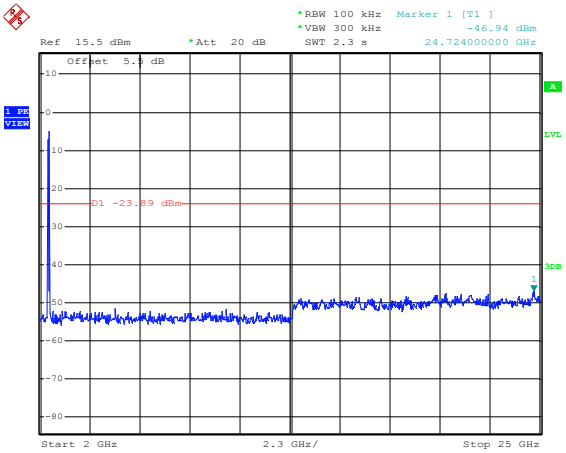
Date: 11.SEP.2015 19:02:44

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 19:03:09

Spurious Emission 2GHz~25GHz

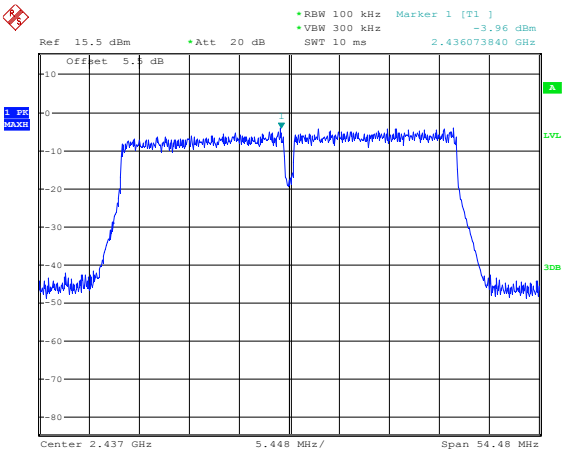


Date: 11.SEP.2015 19:03:26

Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Lvan Zhang

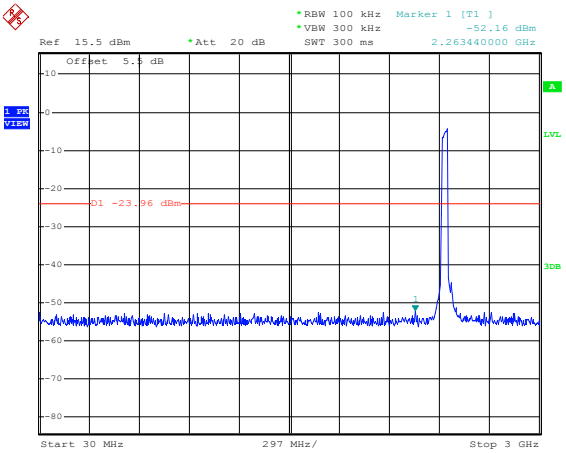
WLAN 802.11n HT40 Channel 06

100kHz PSD reference Level



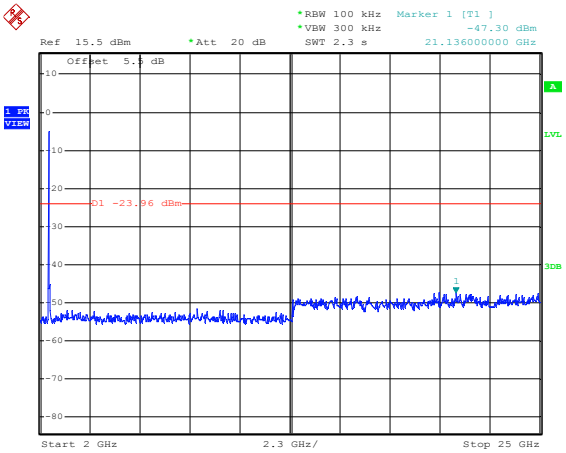
Date: 11.SEP.2015 19:11:11

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 19:11:35

Spurious Emission 2GHz~25GHz

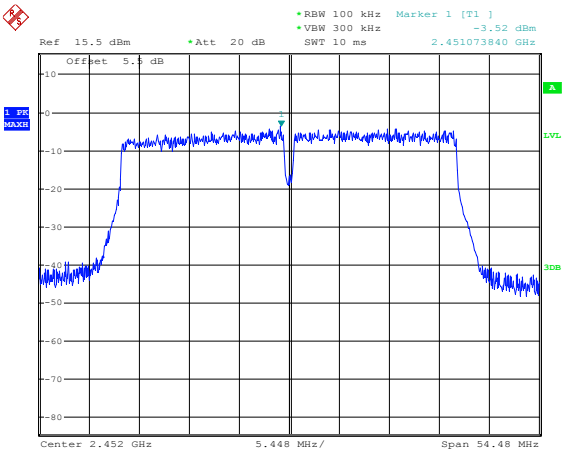


Date: 11.SEP.2015 19:11:53

Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	09	**Test Engineer :**	Lvan Zhang

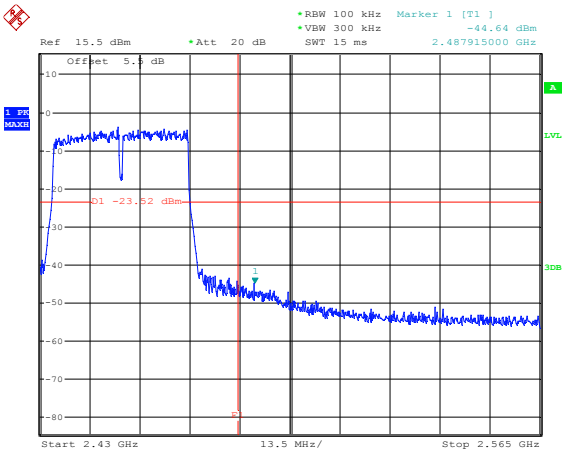
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



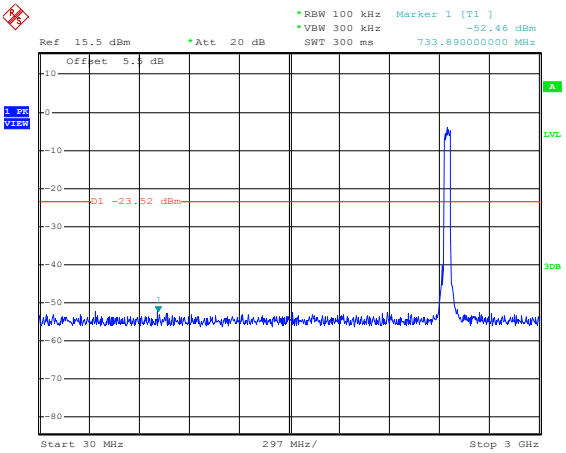
Date: 11.SEP.2015 19:15:39

High Channel Plot



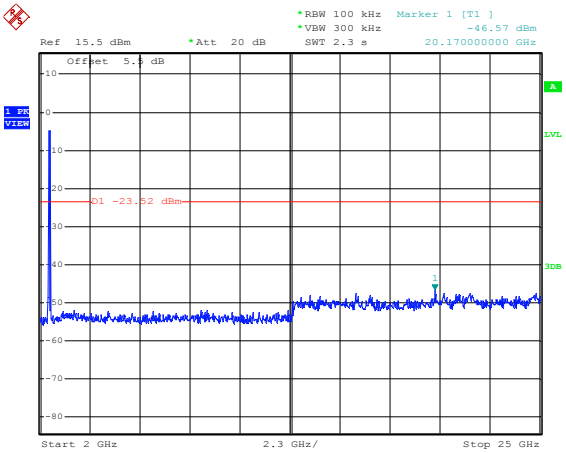
Date: 11.SEP.2015 19:16:19

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2015 19:17:46

Spurious Emission 2GHz~25GHz



Date: 11.SEP.2015 19:18:04

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.

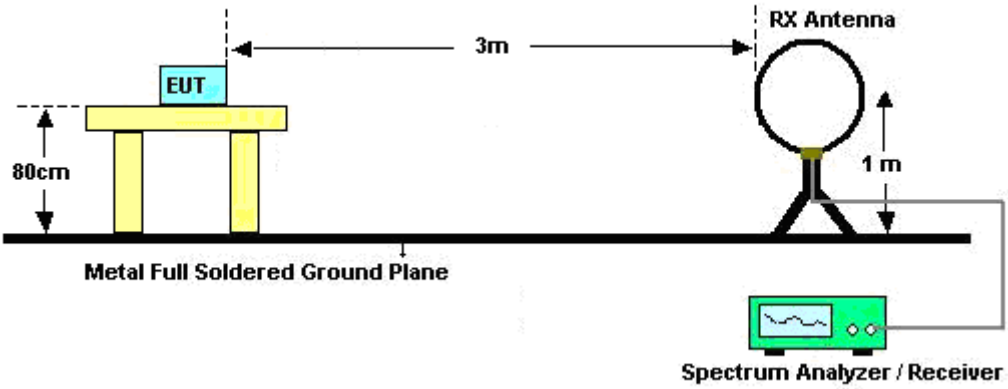
3.5.3 Test Procedures

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 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.

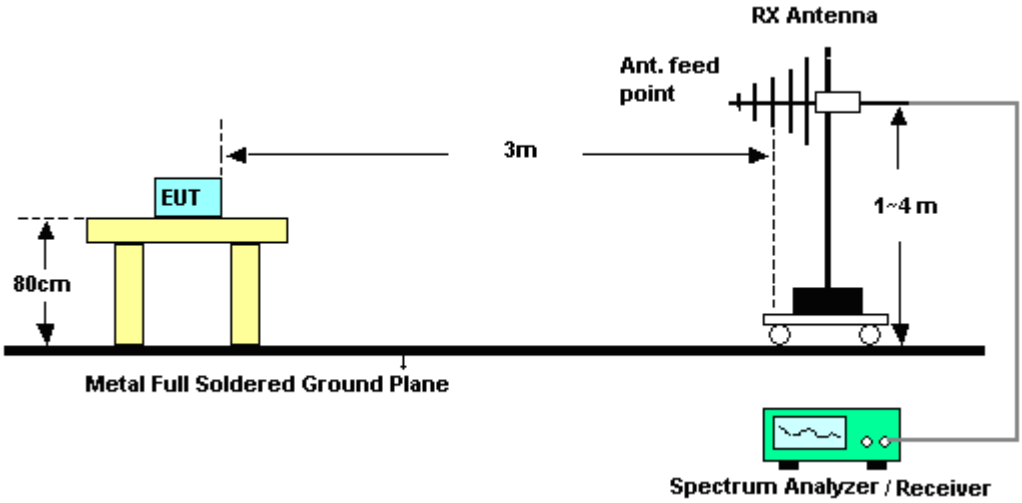
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100.00	-	-	10Hz
802.11g	100.00	-	-	10Hz
2.4GHz 802.11n HT20	100.00	-	-	10Hz
2.4GHz 802.11n HT40	100.00	-	-	10Hz

3.5.4 Test Setup

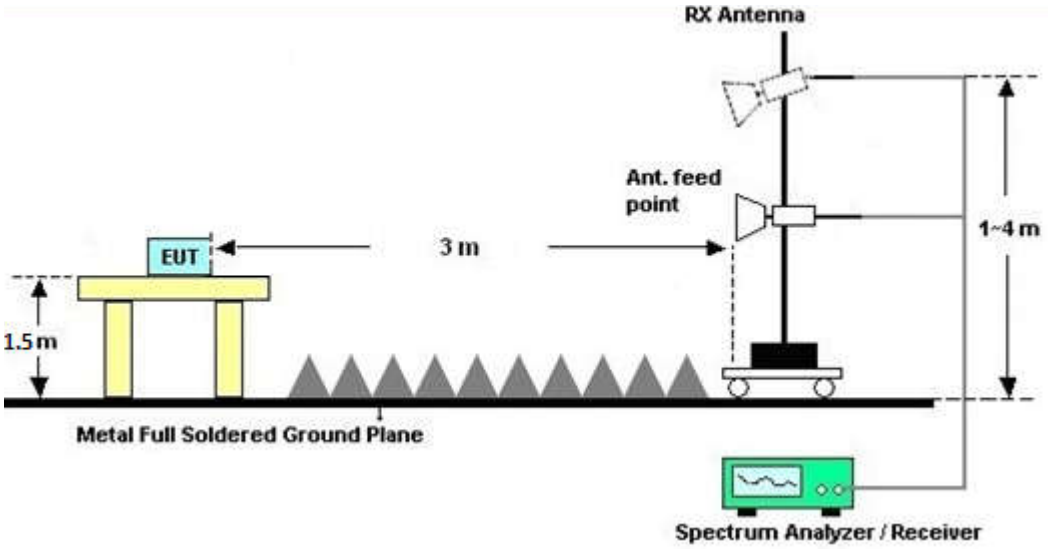
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

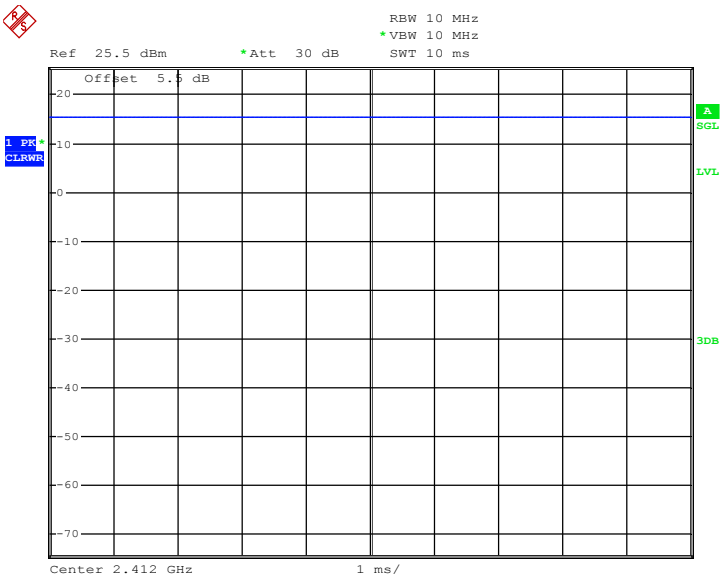
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

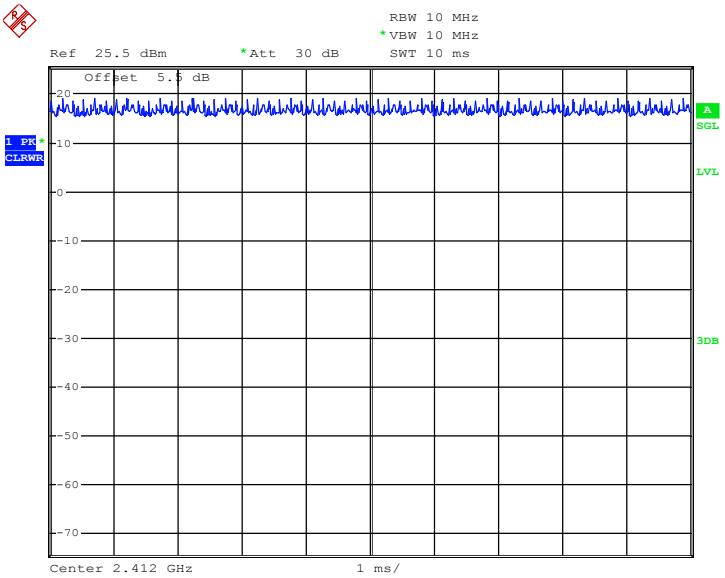
3.5.7 Duty Cycle Plot

802.11b



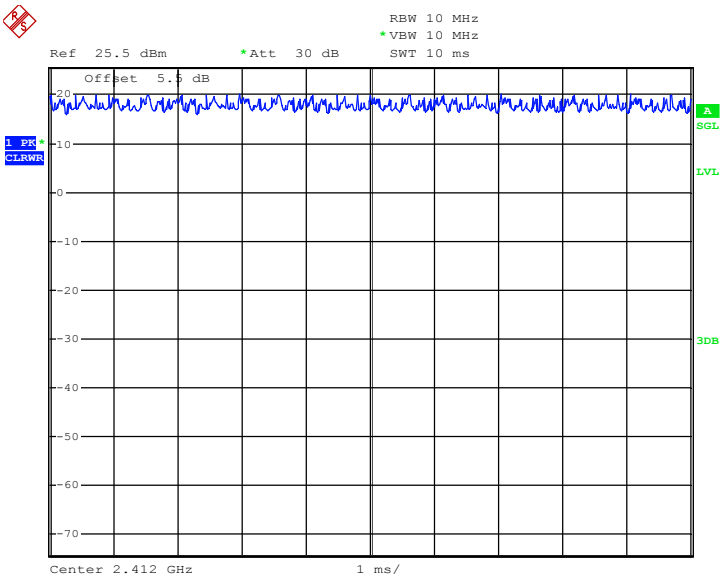
Date: 9.SEP.2015 19:55:58

802.11g



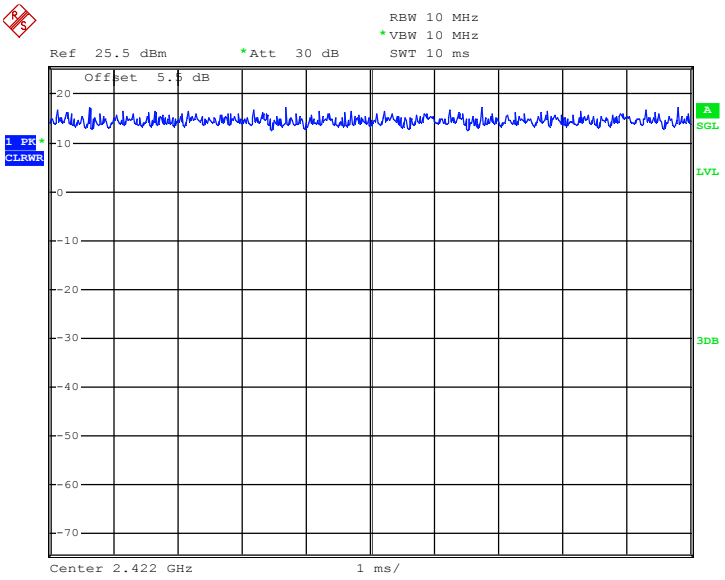
Date: 9.SEP.2015 19:58:00

802.11n HT20



Date: 9.SEP.2015 20:02:10

802.11n HT40



Date: 9.SEP.2015 20:04:57

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

Please refer to Appendix B.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

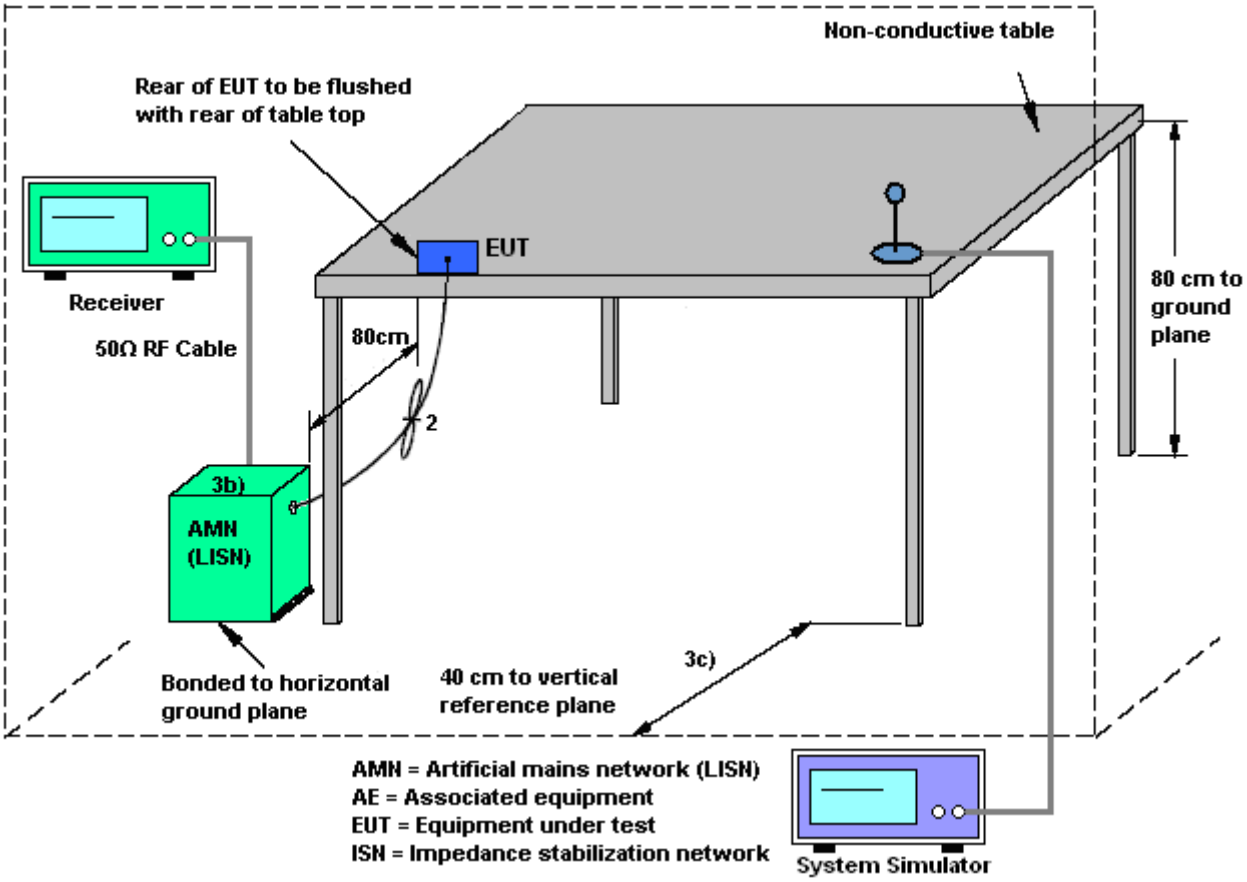
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

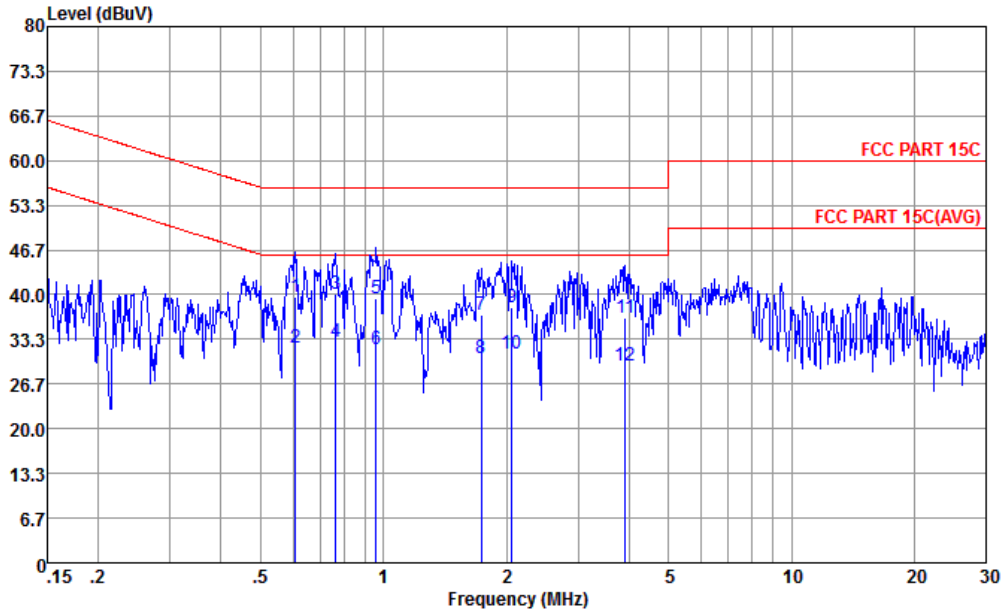
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Jacky Yang	**Relative Humidity :**	41~43%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter)		

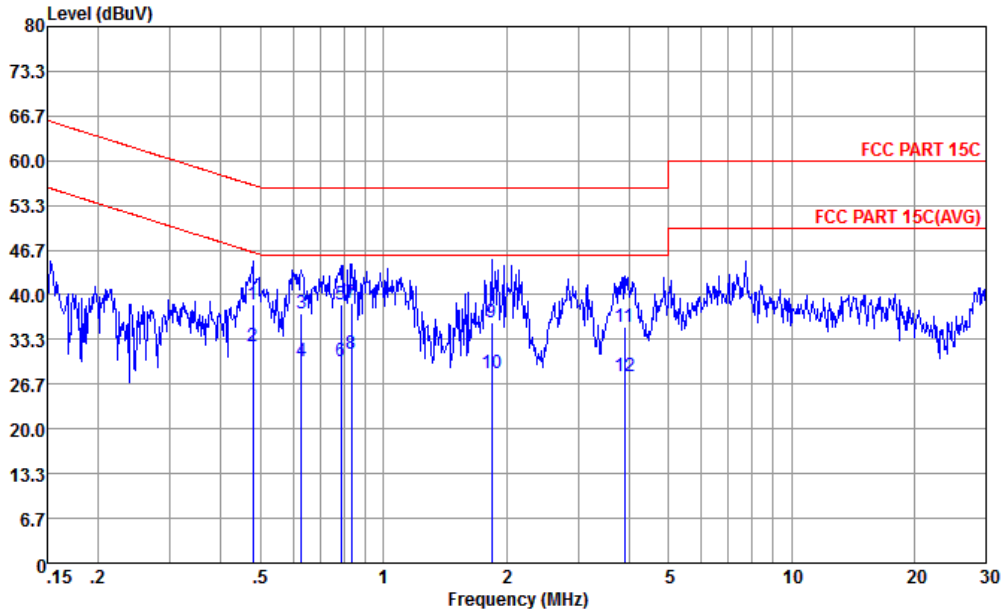


Site : CO01-KS
Condition : FCC PART 15C LISN-L20140306 LINE

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.61	39.63	-16.37	56.00	28.80	0.20	10.63	QP
2	0.61	32.13	-13.87	46.00	21.30	0.20	10.63	Average
3	0.76	40.13	-15.87	56.00	29.31	0.18	10.64	QP
4 *	0.76	33.03	-12.97	46.00	22.21	0.18	10.64	Average
5	0.96	39.36	-16.64	56.00	28.60	0.11	10.65	QP
6	0.96	31.96	-14.04	46.00	21.20	0.11	10.65	Average
7	1.73	37.09	-18.91	56.00	26.30	0.10	10.69	QP
8	1.73	30.59	-15.41	46.00	19.80	0.10	10.69	Average
9	2.07	38.01	-17.99	56.00	27.21	0.10	10.70	QP
10	2.07	31.31	-14.69	46.00	20.51	0.10	10.70	Average
11	3.92	36.51	-19.49	56.00	25.50	0.18	10.83	QP
12	3.92	29.31	-16.69	46.00	18.30	0.18	10.83	Average

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Jacky Yang	Relative Humidity :	41~43%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + USB Cable (Charging from Adapter)		



Site : CO01-KS
Condition : FCC PART 15C LISN-N20140306 NEUTRAL

mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.48	38.64	-17.72	56.36	27.70	0.32	10.62	QP
2	*	0.48	32.24	-14.12	46.36	21.30	0.32	10.62	Average
3		0.63	37.16	-18.84	56.00	26.30	0.23	10.63	QP
4		0.63	30.16	-15.84	46.00	19.30	0.23	10.63	Average
5		0.79	38.52	-17.48	56.00	27.70	0.17	10.65	QP
6		0.79	30.12	-15.88	46.00	19.30	0.17	10.65	Average
7		0.83	38.70	-17.30	56.00	27.90	0.15	10.65	QP
8		0.83	31.10	-14.90	46.00	20.30	0.15	10.65	Average
9		1.84	35.90	-20.10	56.00	25.10	0.10	10.70	QP
10		1.84	28.30	-17.70	46.00	17.50	0.10	10.70	Average
11		3.90	35.31	-20.69	56.00	24.30	0.18	10.83	QP
12		3.90	27.91	-18.09	46.00	16.90	0.18	10.83	Average

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

An embedded-in antenna design is used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 28, 2014	Sep. 11, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Jan. 23, 2015	Sep. 11, 2015	Jan. 22, 2016	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 23, 2015	Sep. 11, 2015	Jan. 22, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Sep. 10, 2015	Sep. 16, 2015	Sep. 09, 2016	Radiation (03CH02-KS)
Spectrum Analyzer	R&S	FSV40	101040	10kHz~40GHz; Max 30dBm	Sep. 10, 2015	Sep. 16, 2015	Sep. 09, 2016	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 13, 2014	Sep. 16, 2015	Nov. 12, 2015	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	25MHz-2GHz	Jan. 17, 2015	Sep. 16, 2015	Jan. 16, 2016	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2014	Sep. 16, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 08, 2014	Sep. 16, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz ~40GHz	Mar. 03, 2015	Sep. 16, 2015	Mar. 02, 2016	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz ~1000MHz / 32 dB	May 04, 2015	Sep. 16, 2015	May 03, 2016	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1GHz~26.5GHz	Oct. 28, 2014	Sep. 16, 2015	Oct. 27, 2015	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Sep. 16, 2015	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Sep. 16, 2015	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Sep. 16, 2015	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	May 04, 2015	Sep. 01, 2015	May 03, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 25, 2014	Sep. 01, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 25, 2014	Sep. 01, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 25, 2014	Sep. 01, 2015	Oct. 24, 2015	Conduction (CO01-KS)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.3dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1dB

Appendix A. Conducted Test Results

Test Engineer:	Lvan Zhang	Temperature:	21~25	°C
Test Date:	2015/9/11	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	12.60	9.24	0.50	Pass
11b	1Mbps	1	6	2437	12.55	9.24	0.50	Pass
11b	1Mbps	1	11	2462	12.55	9.08	0.50	Pass
11g	6Mbps	1	1	2412	17.75	16.48	0.50	Pass
11g	6Mbps	1	6	2437	17.70	16.48	0.50	Pass
11g	6Mbps	1	11	2462	17.85	16.60	0.50	Pass
HT20	MCS6	1	1	2412	18.50	17.80	0.50	Pass
HT20	MCS6	1	6	2437	18.50	17.76	0.50	Pass
HT20	MCS6	1	11	2462	18.50	17.80	0.50	Pass
HT40	MCS5	1	3	2422	36.50	36.40	0.50	Pass
HT40	MCS5	1	6	2437	36.60	36.32	0.50	Pass
HT40	MCS5	1	9	2452	36.50	36.32	0.50	Pass

TEST RESULTS DATA
Peak Power Table

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
11b	1Mbps	1	1	2412	19.52	30.00	0.72	20.24	36.00	Pass
11b	1Mbps	1	6	2437	19.47	30.00	0.72	20.19	36.00	Pass
11b	1Mbps	1	11	2462	19.56	30.00	0.72	20.28	36.00	Pass
11g	6Mbps	1	1	2412	21.64	30.00	0.72	22.36	36.00	Pass
11g	6Mbps	1	6	2437	21.28	30.00	0.72	22.00	36.00	Pass
11g	6Mbps	1	11	2462	22.09	30.00	0.72	22.81	36.00	Pass
HT20	MCS6	1	1	2412	22.22	30.00	0.72	22.94	36.00	Pass
HT20	MCS6	1	6	2437	22.16	30.00	0.72	22.88	36.00	Pass
HT20	MCS6	1	11	2462	22.47	30.00	0.72	23.19	36.00	Pass
HT40	MCS5	1	3	2422	21.52	30.00	0.72	22.24	36.00	Pass
HT40	MCS5	1	6	2437	21.34	30.00	0.72	22.06	36.00	Pass
HT40	MCS5	1	9	2452	21.03	30.00	0.72	21.75	36.00	Pass

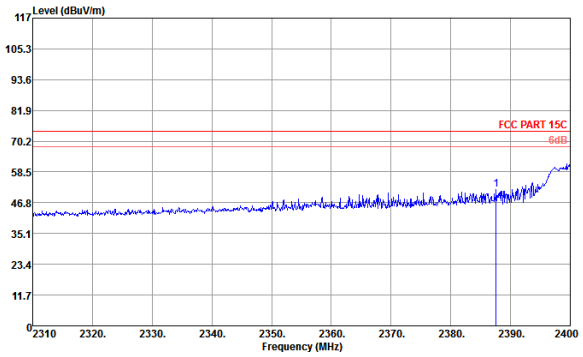
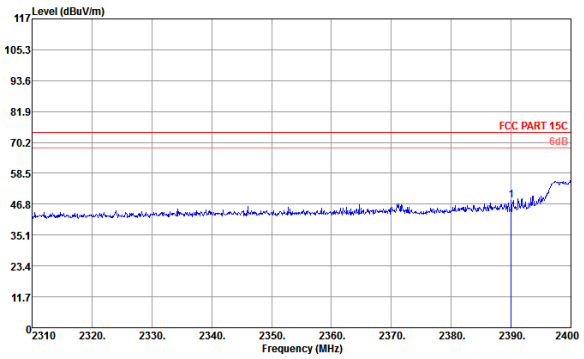
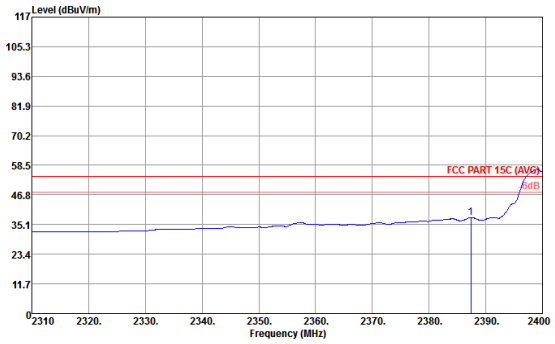
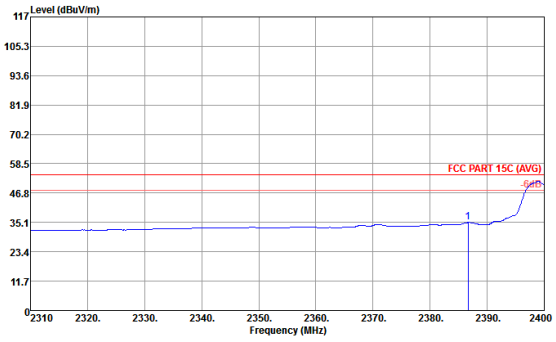
TEST RESULTS DATA
Average Power Table
(Reporting Only)

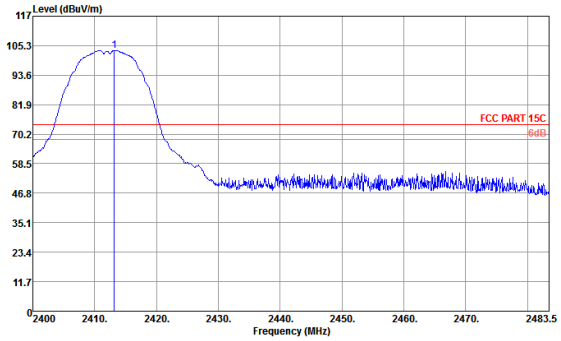
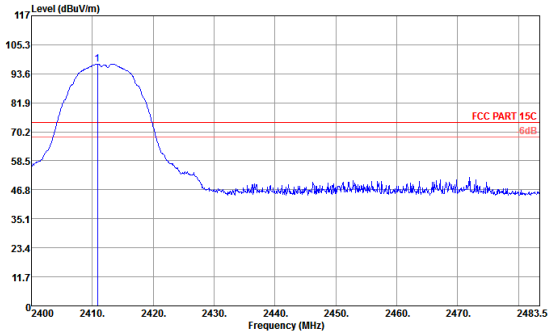
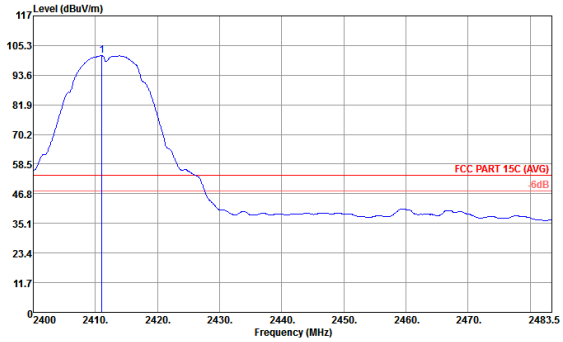
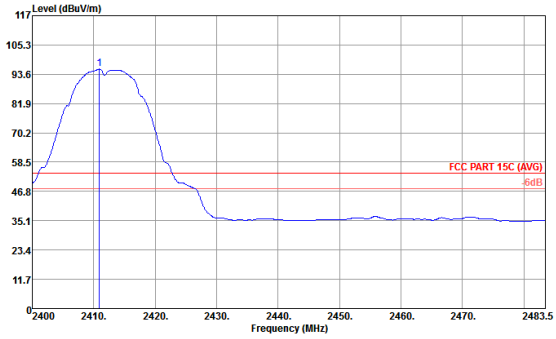
2.4GHz Band						
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.00	16.61
11b	1Mbps	1	6	2437	0.00	16.48
11b	1Mbps	1	11	2462	0.00	16.76
11g	6Mbps	1	1	2412	0.00	12.26
11g	6Mbps	1	6	2437	0.00	12.17
11g	6Mbps	1	11	2462	0.00	12.76
HT20	MCS6	1	1	2412	0.00	11.51
HT20	MCS6	1	6	2437	0.00	11.38
HT20	MCS6	1	11	2462	0.00	11.67
HT40	MCS5	1	3	2422	0.00	11.15
HT40	MCS5	1	6	2437	0.00	11.07
HT40	MCS5	1	9	2452	0.00	10.89

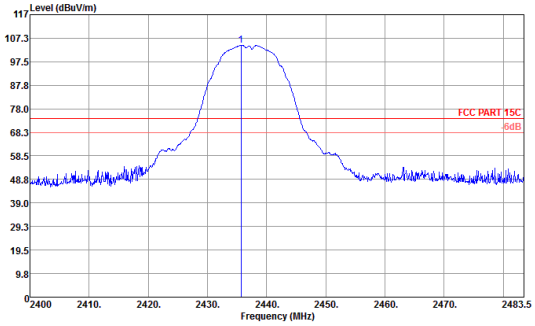
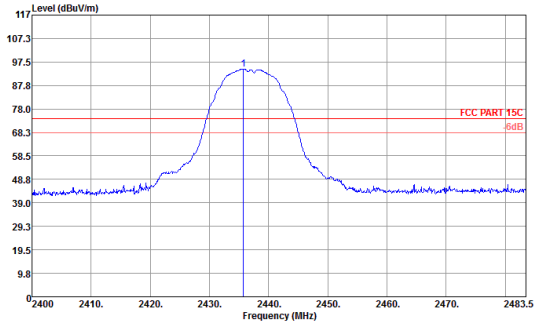
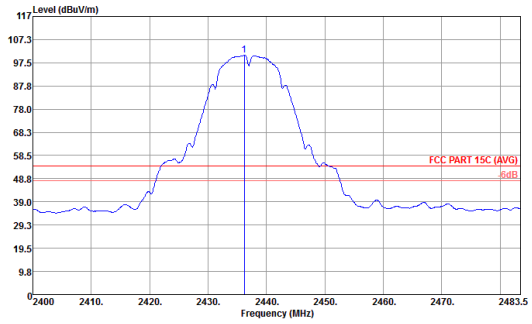
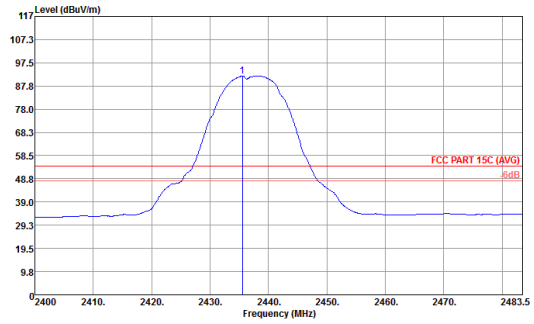
TEST RESULTS DATA
Peak Power Density

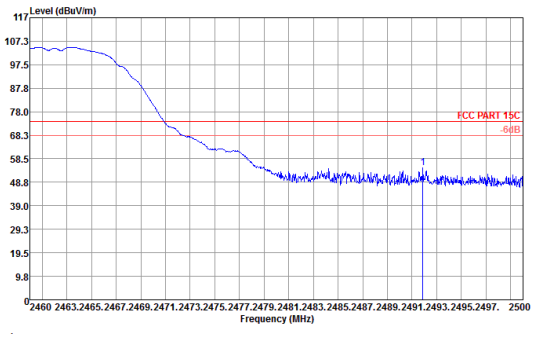
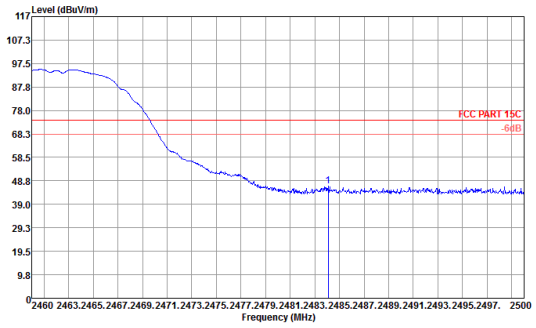
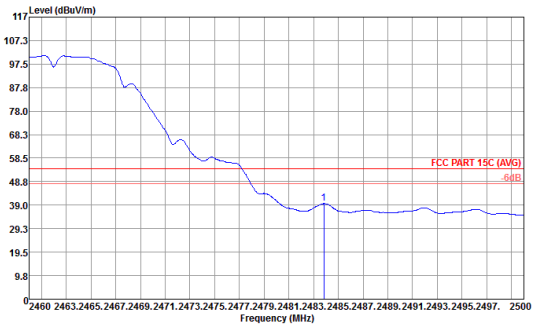
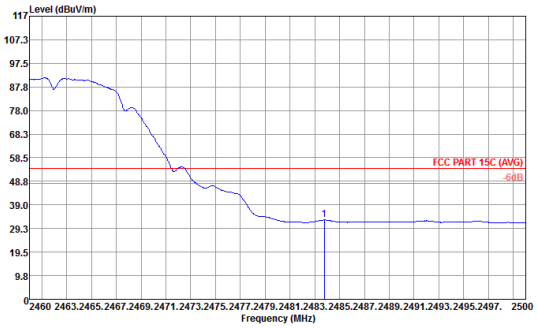
2.4GHz Band								
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-11.47	0.72	8.00	Pass
11b	1Mbps	1	6	2437	-12.45	0.72	8.00	Pass
11b	1Mbps	1	11	2462	-11.20	0.72	8.00	Pass
11g	6Mbps	1	1	2412	-15.04	0.72	8.00	Pass
11g	6Mbps	1	6	2437	-16.18	0.72	8.00	Pass
11g	6Mbps	1	11	2462	-15.34	0.72	8.00	Pass
HT20	MCS6	1	1	2412	-13.78	0.72	8.00	Pass
HT20	MCS6	1	6	2437	-14.04	0.72	8.00	Pass
HT20	MCS6	1	11	2462	-13.60	0.72	8.00	Pass
HT40	MCS5	1	3	2422	-18.28	0.72	8.00	Pass
HT40	MCS5	1	6	2437	-17.77	0.72	8.00	Pass
HT40	MCS5	1	9	2452	-17.59	0.72	8.00	Pass

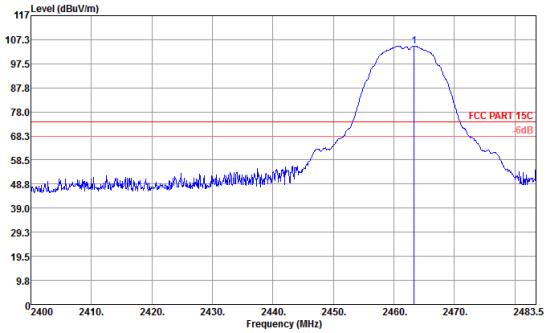
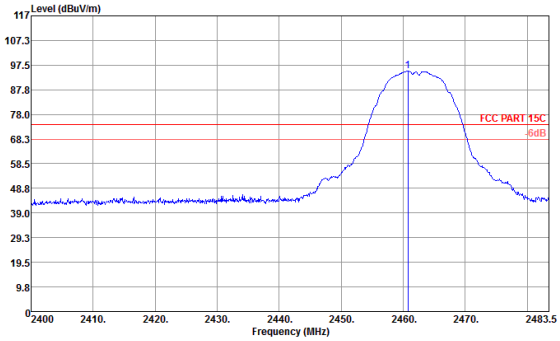
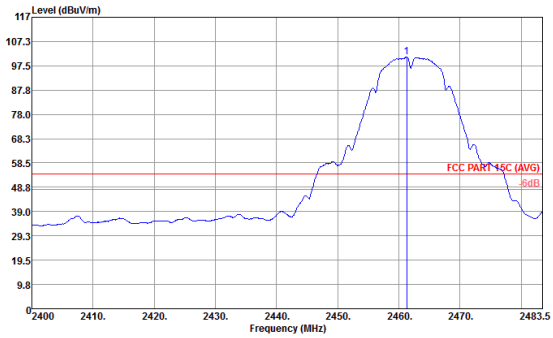
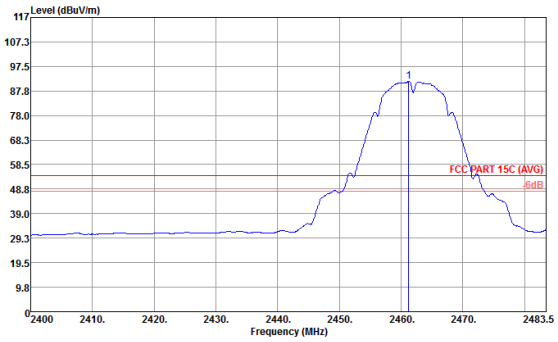
Appendix B. Radiated Test Results

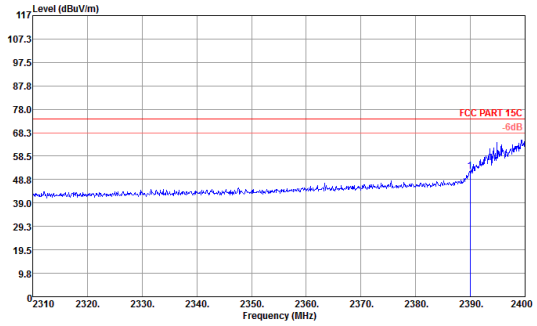
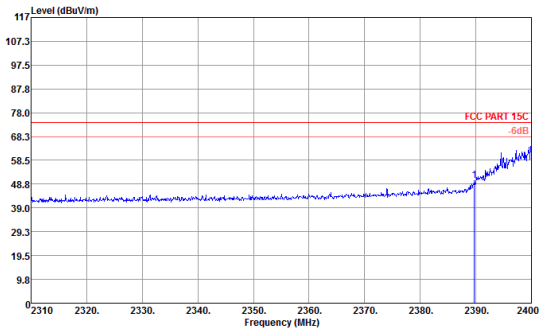
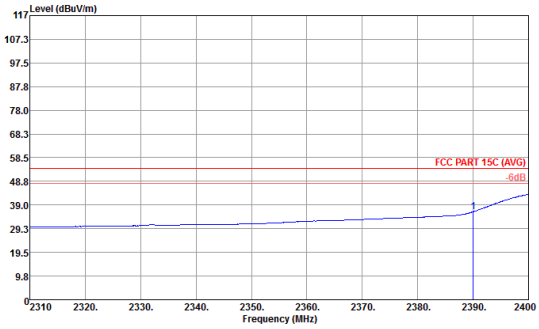
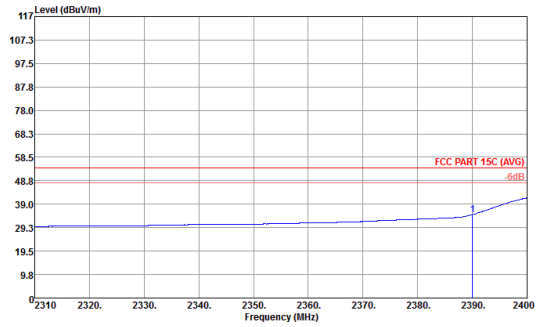
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11b (Band Edge @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		
Average		

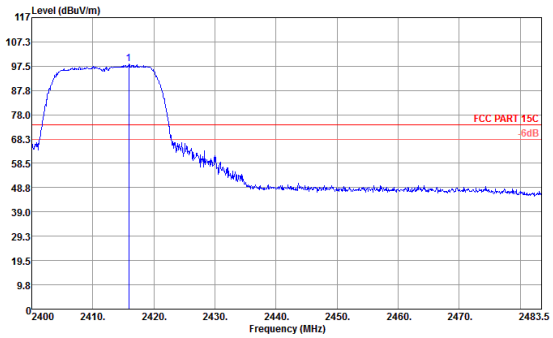
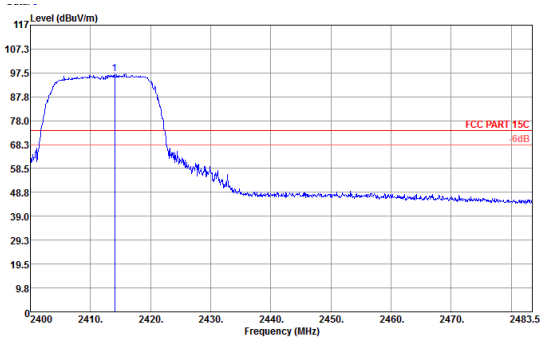
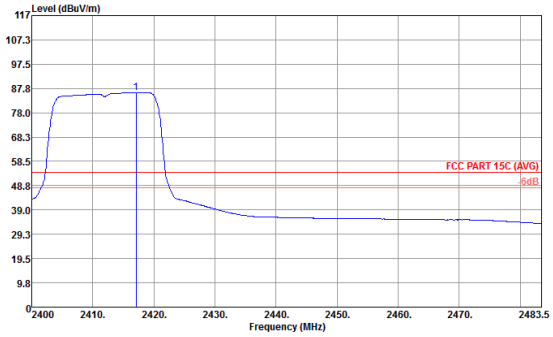
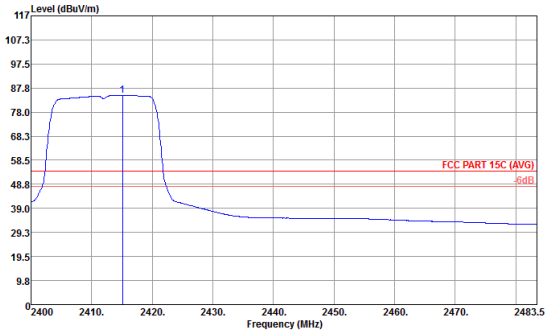
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11b (Fundamental Emission @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		
Average		

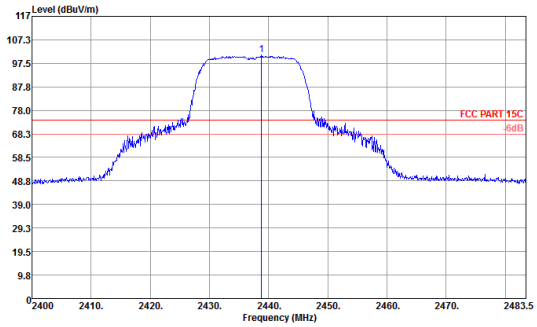
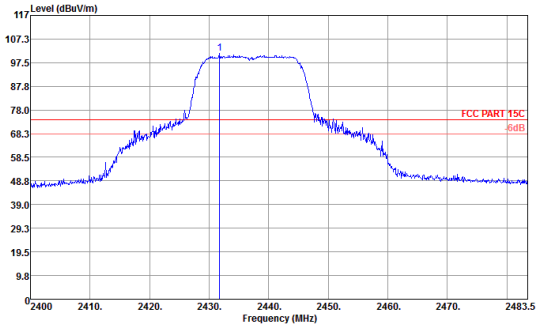
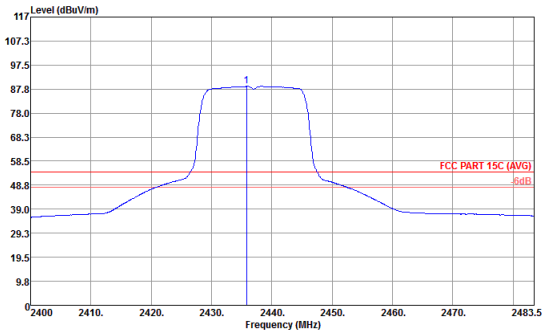
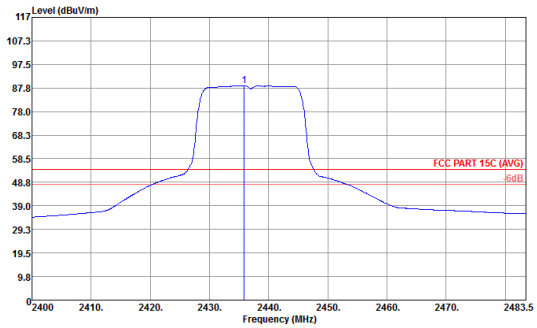
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11b (Fundamental Emission @ 3m)	
ANT	CH06 2437MHz	
1	Horizontal	Vertical
Peak		
Average		

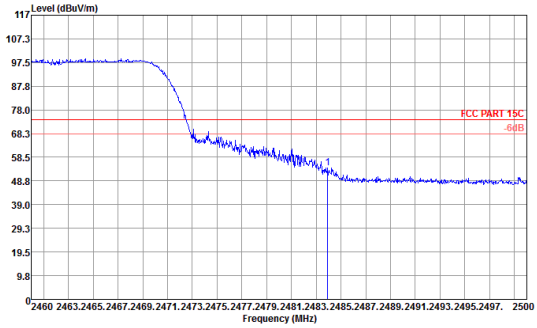
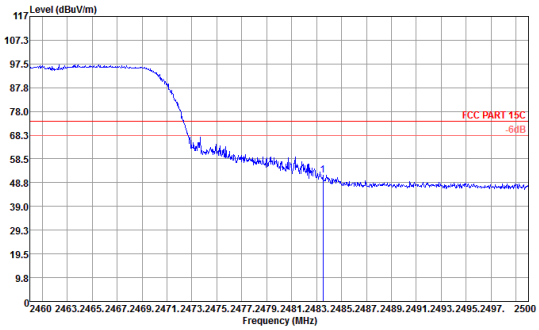
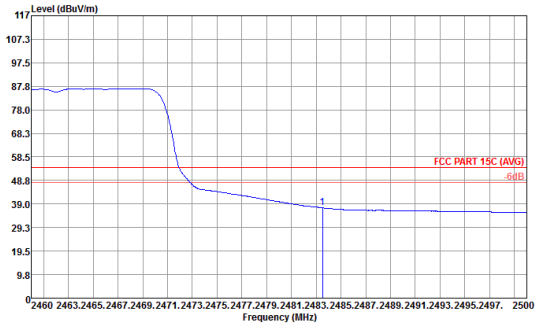
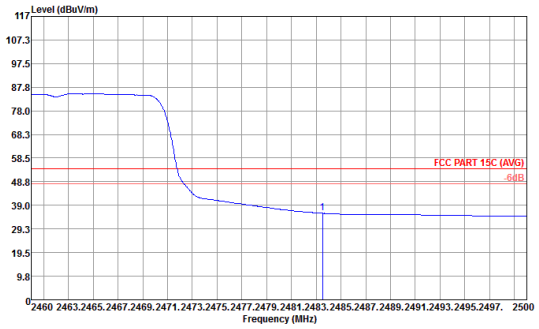
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11b (Band Edge @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		
Average		

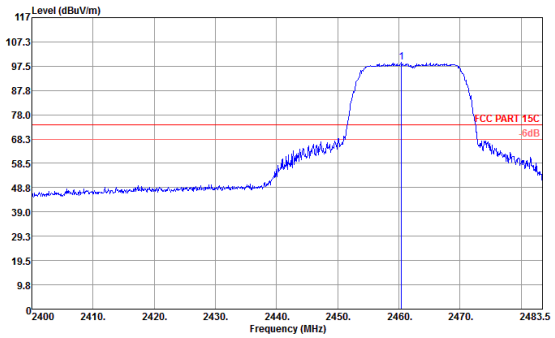
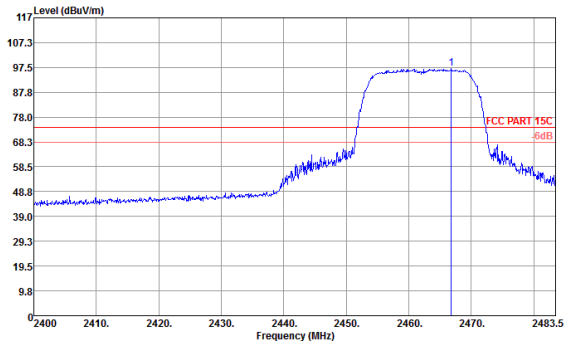
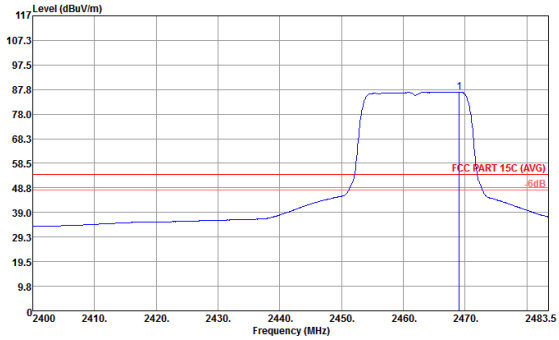
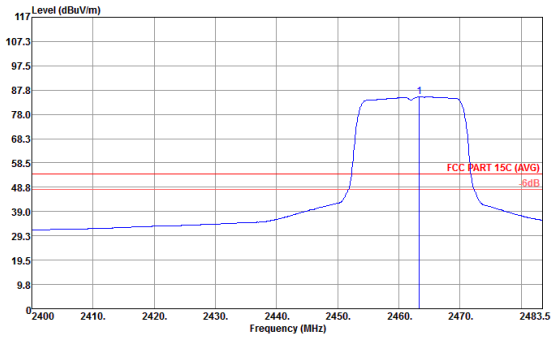
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11b (Fundamental Emission @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		
Average		

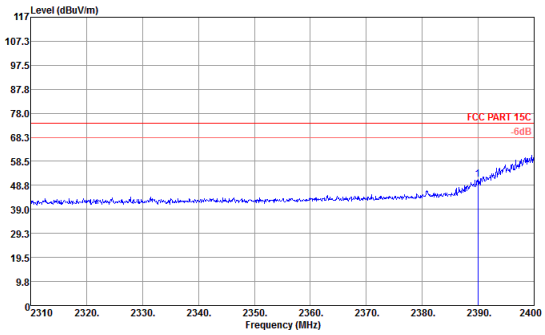
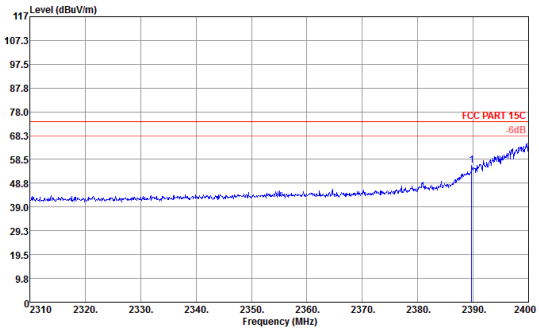
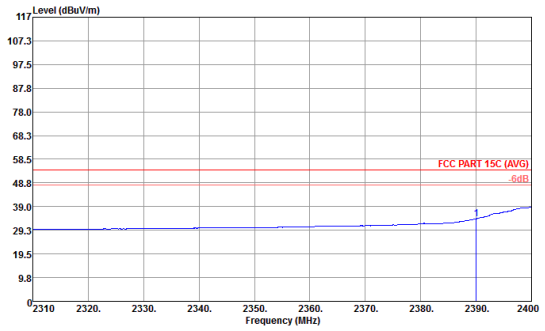
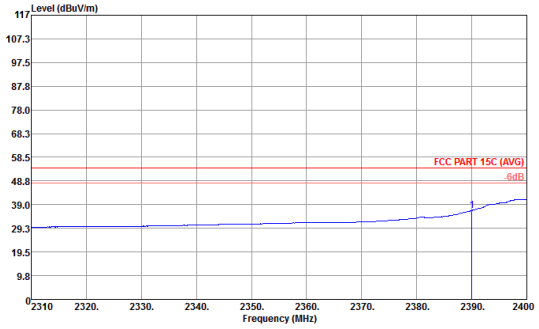
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11g (Band Edge @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		
Average		

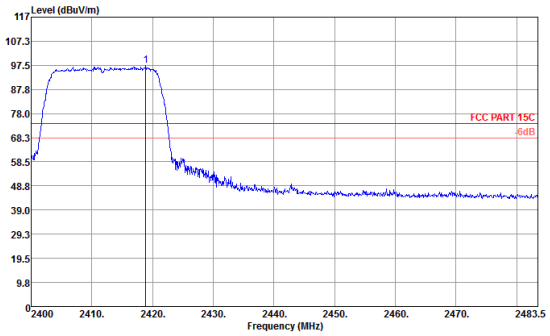
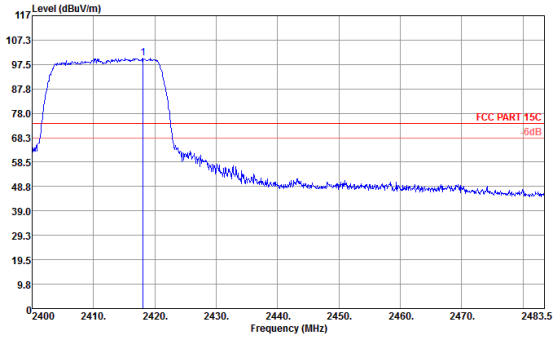
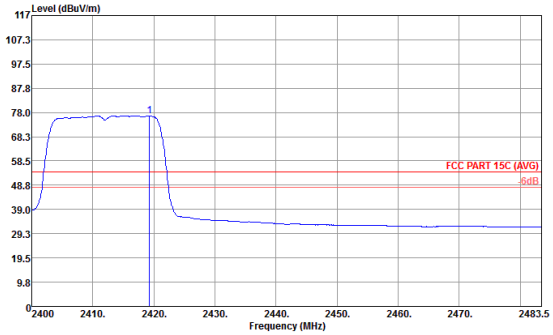
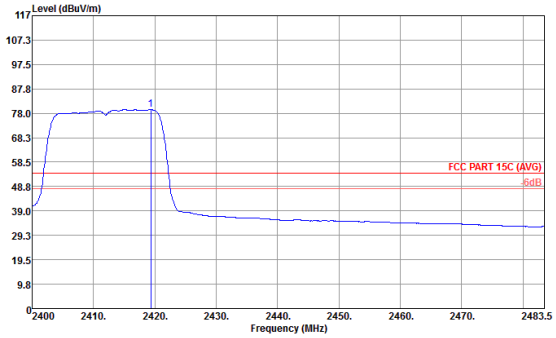
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11g (Fundamental Emission @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		
Average		

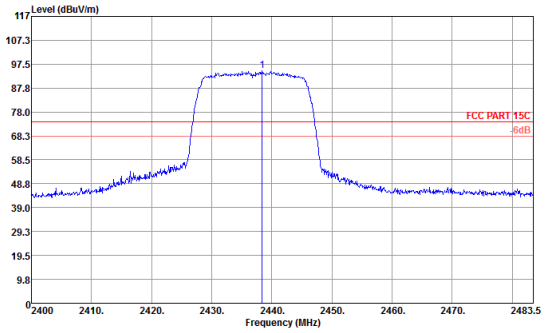
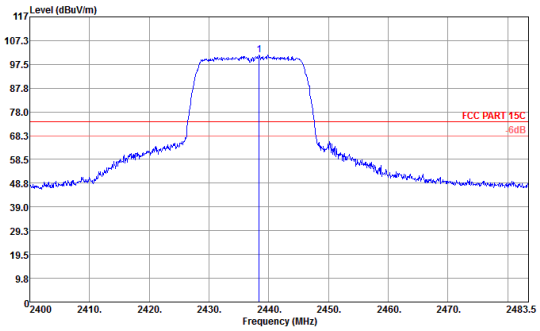
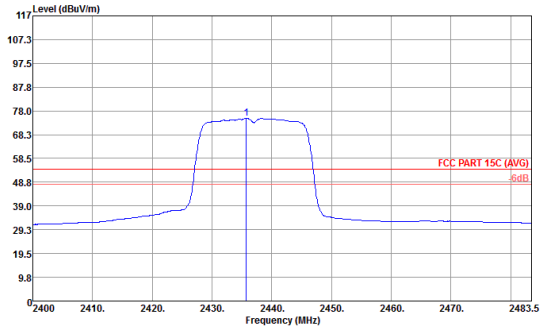
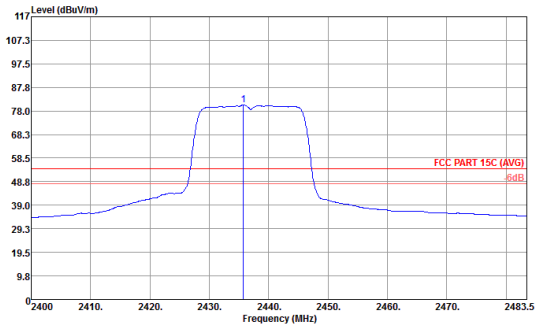
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11g (Fundamental Emission @ 3m)	
ANT	CH06 2437MHz	
1	Horizontal	Vertical
Peak		
Average		

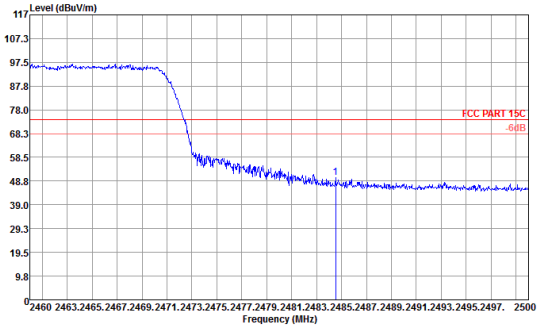
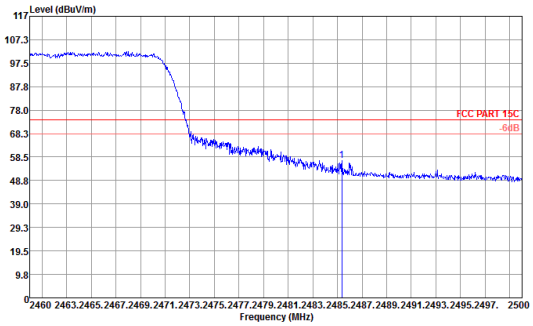
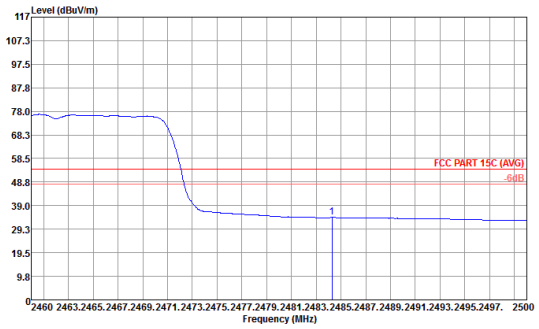
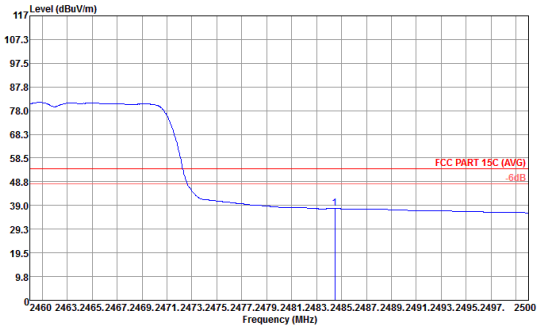
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11g (Band Edge @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		
Average		

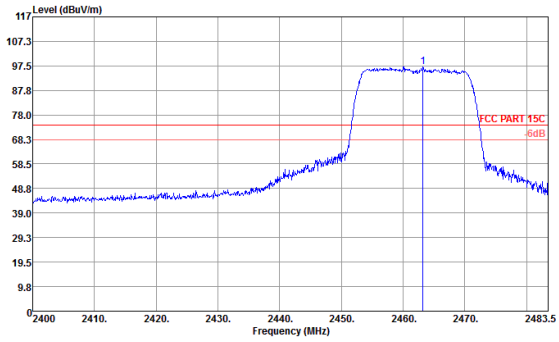
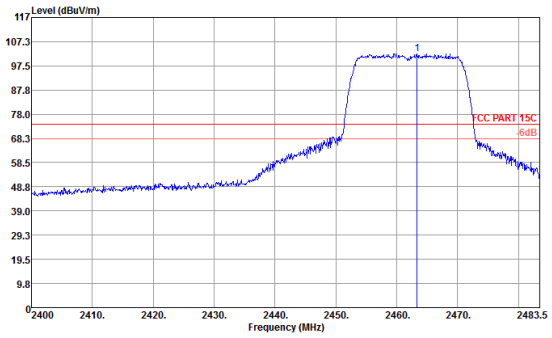
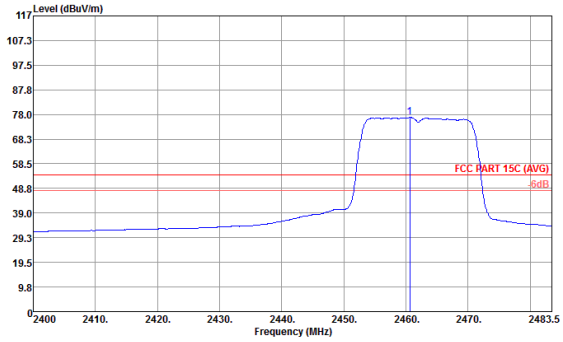
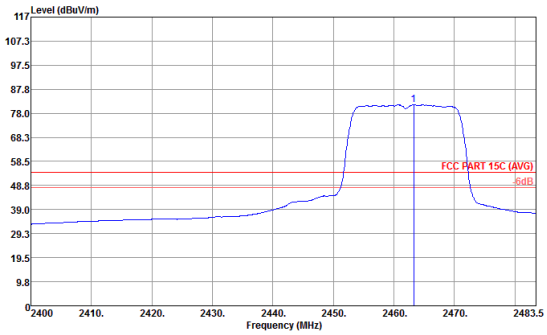
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11g (Fundamental Emission @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		
Average		

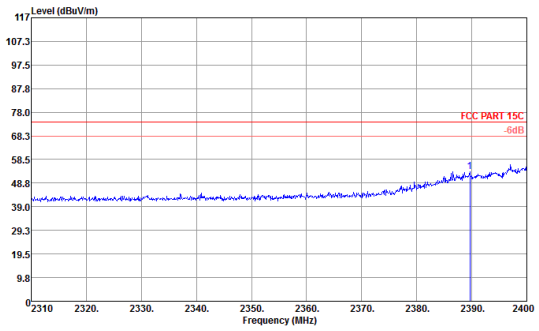
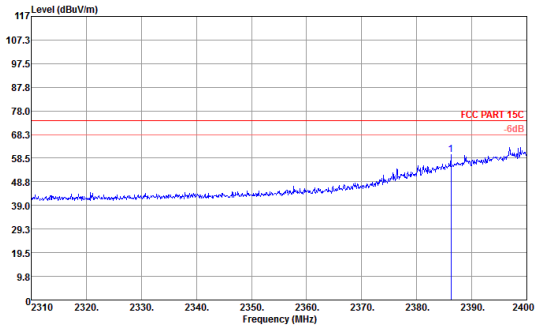
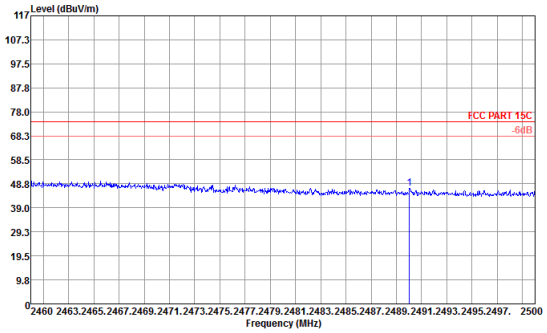
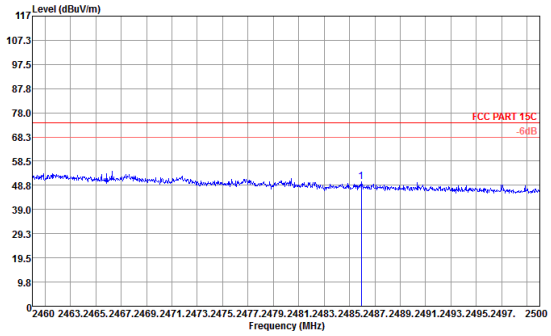
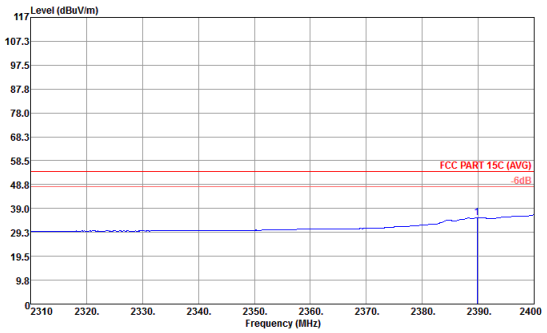
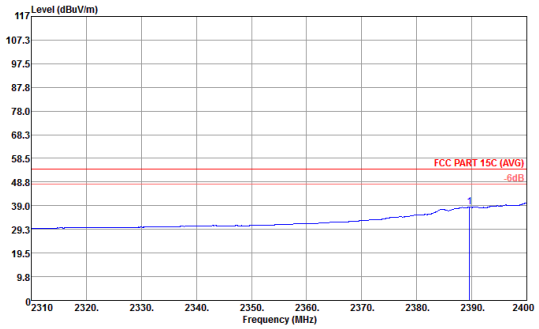
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT20 (Band Edge @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		
Average		

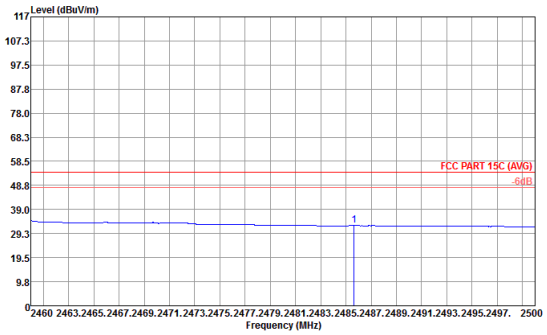
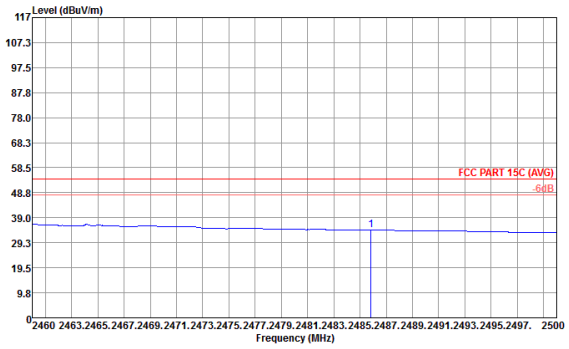
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT20 (Fundamental Emission @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		
Average		

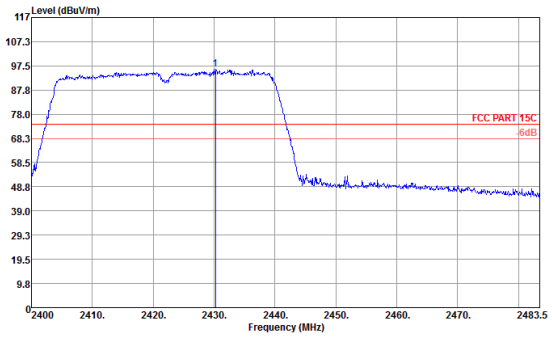
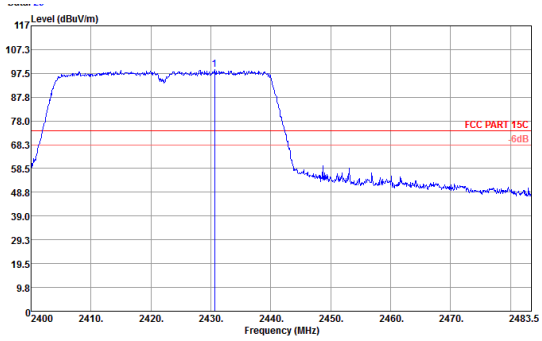
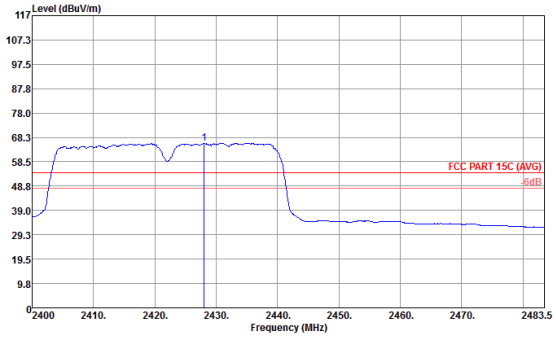
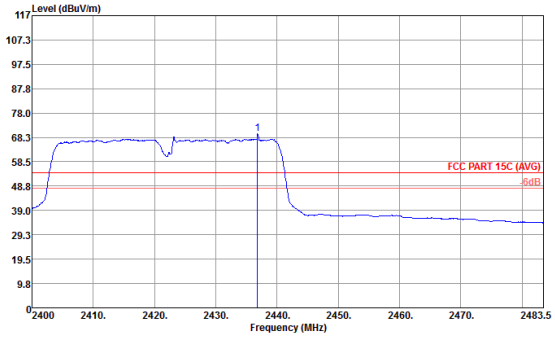
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT20 (Fundamental Emission @ 3m)	
ANT	CH06 2437MHz	
1	Horizontal	Vertical
Peak		
Average		

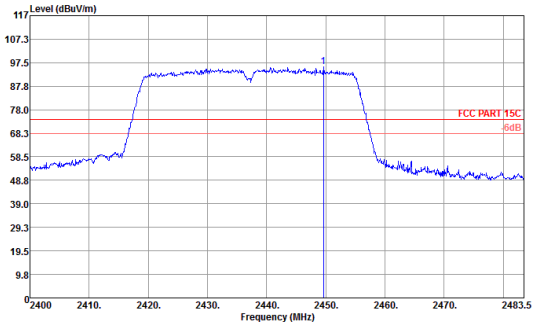
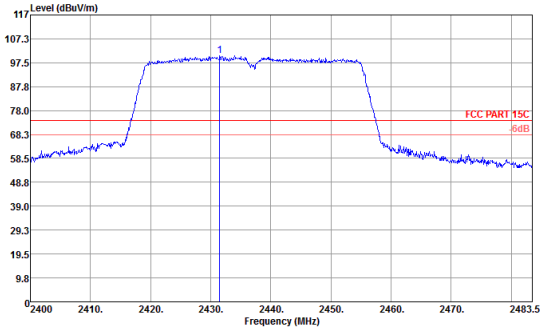
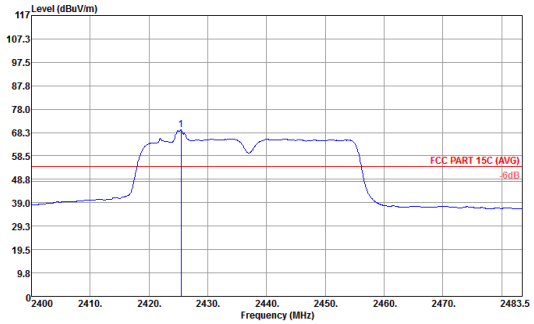
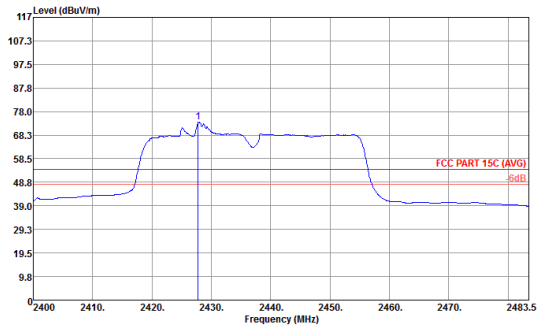
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT20 (Band Edge @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		
Average		

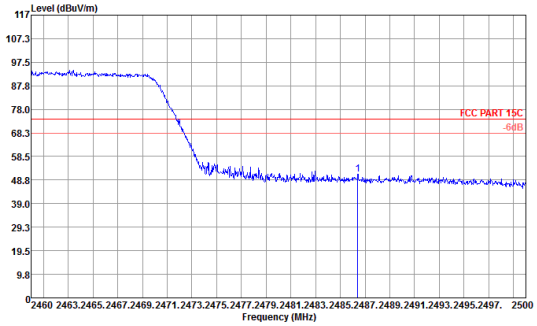
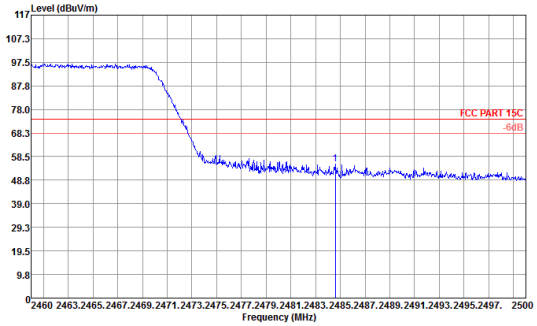
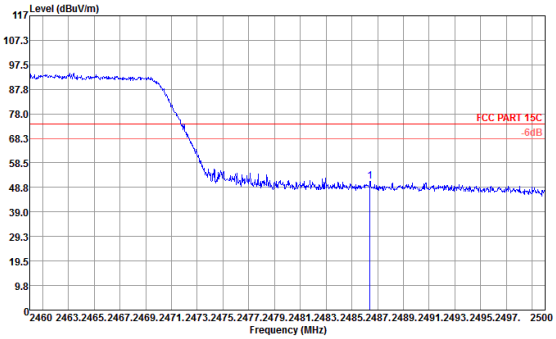
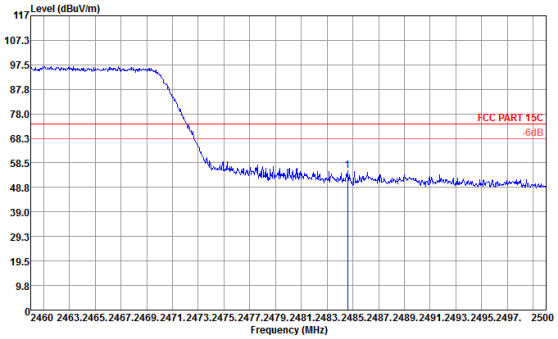
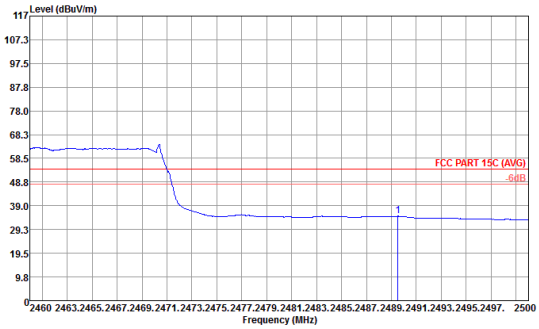
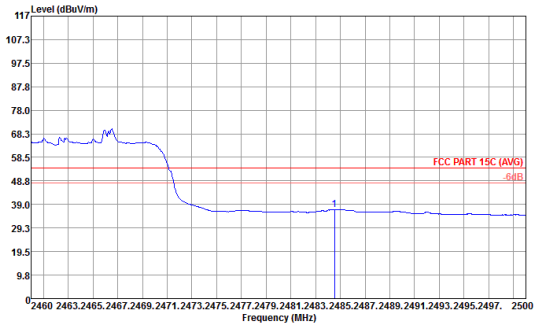
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT20 (Fundamental Emission @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		
Average		

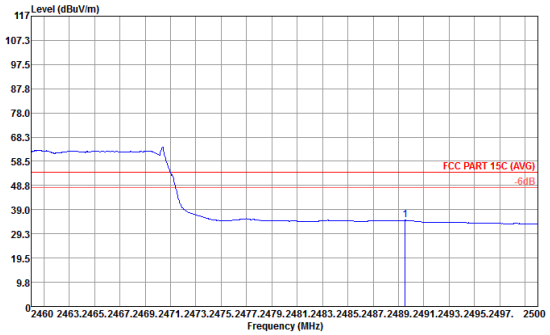
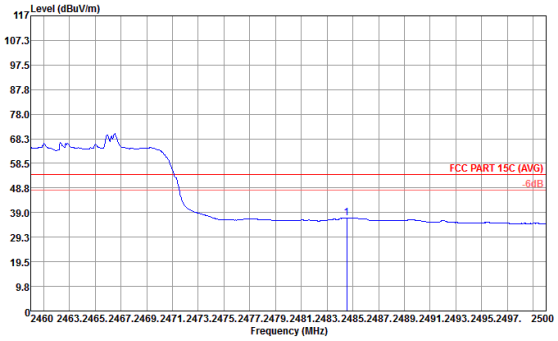
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT40 (Band Edge @ 3m)	
ANT	CH03 2422MHz	
1	Horizontal	Vertical
Peak		
		
Average		

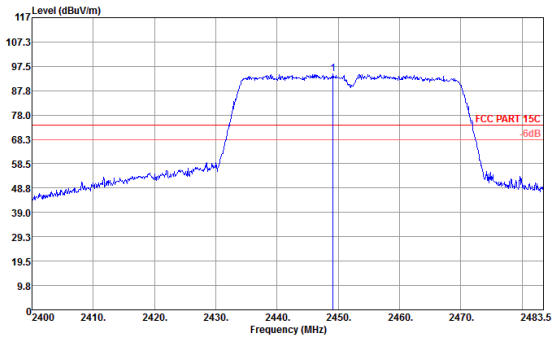
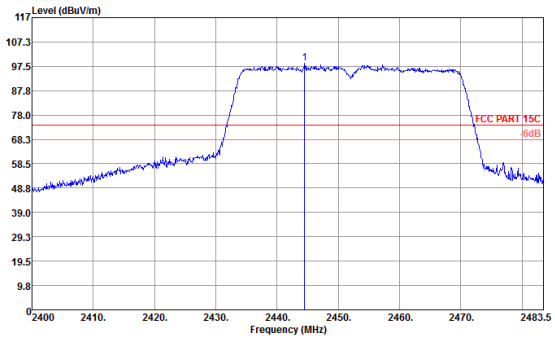
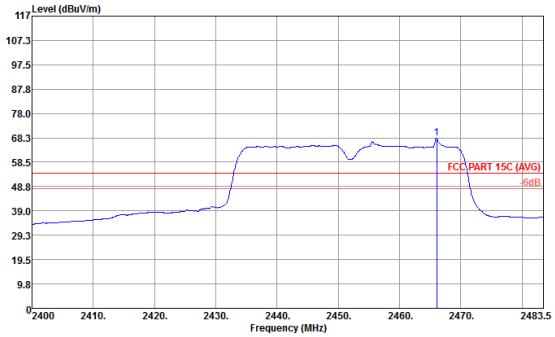
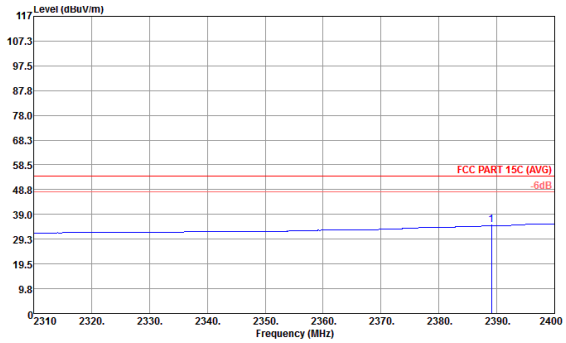
Average	 Level (dBuV/m) 117 107.3 97.5 87.8 78.0 68.3 58.5 48.8 39.0 29.3 19.5 9.8 0 FCC PART 15C (AVG) -6dB 1 2460 2463.2465.2467.2469.2471.2473.2475.2477.2479.2481.2483.2485.2487.2489.2491.2493.2495.2497. 2500 Frequency (MHz)	 Level (dBuV/m) 117 107.3 97.5 87.8 78.0 68.3 58.5 48.8 39.0 29.3 19.5 9.8 0 FCC PART 15C (AVG) -6dB 1 2460 2463.2465.2467.2469.2471.2473.2475.2477.2479.2481.2483.2485.2487.2489.2491.2493.2495.2497. 2500 Frequency (MHz)

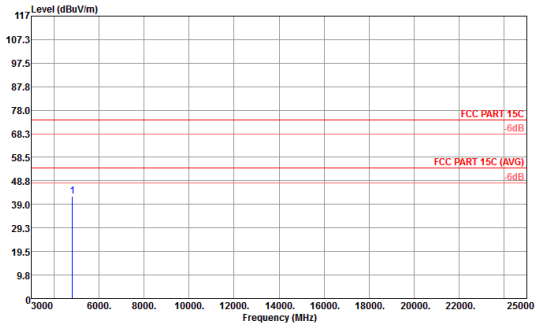
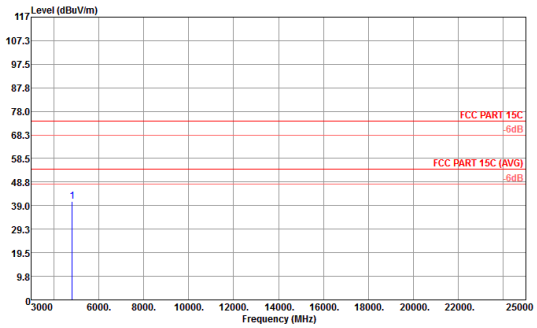
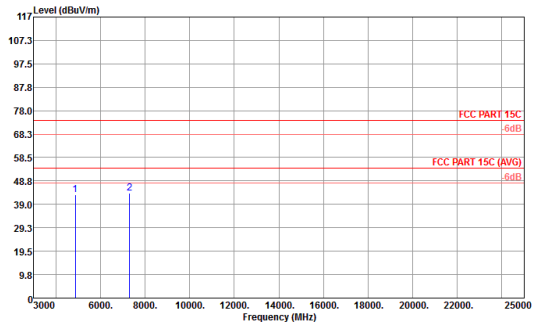
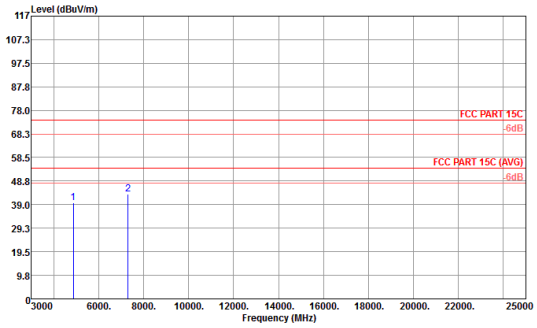
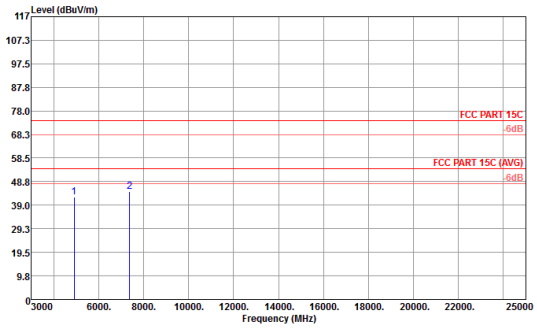
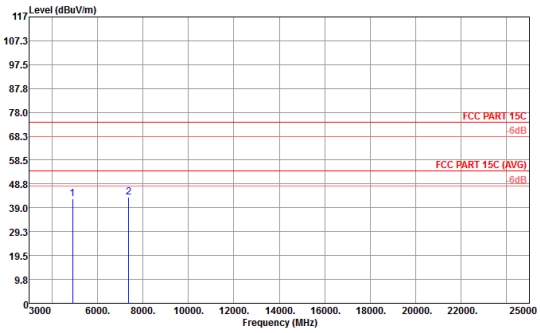
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT40 (Fundamental Emission @ 3m)	
ANT	CH03 2422MHz	
1	Horizontal	Vertical
Peak		
Average		

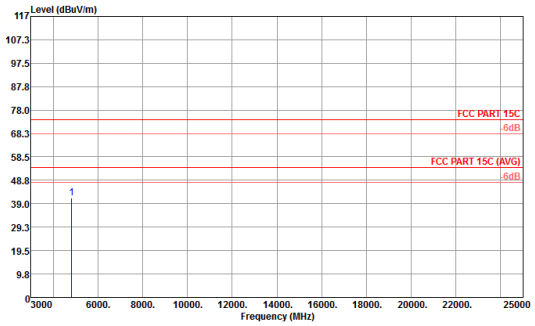
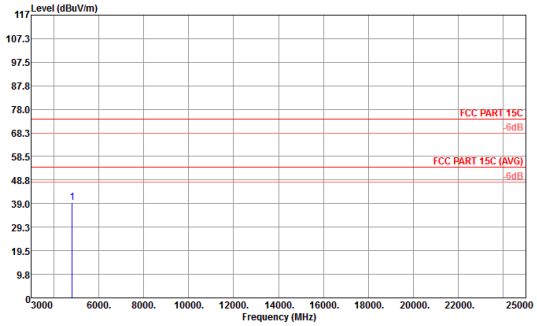
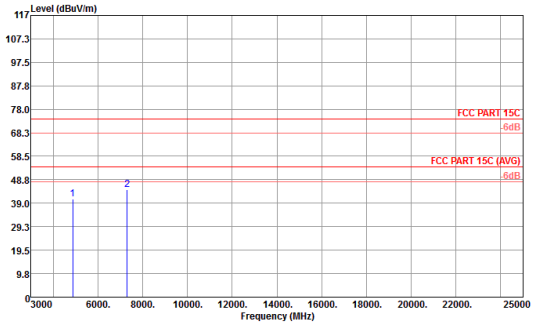
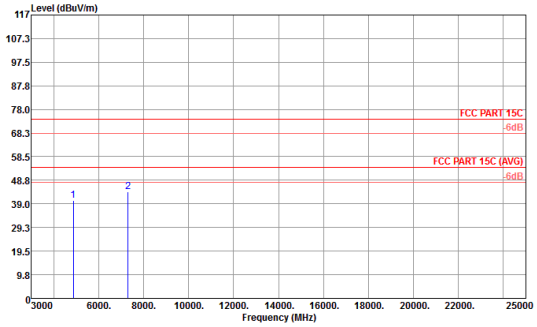
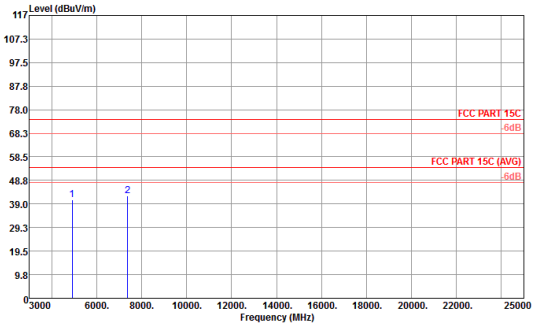
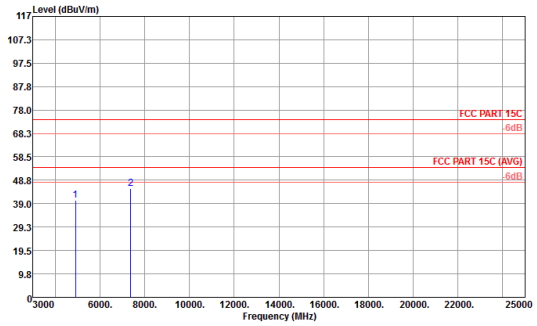
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT40 (Fundamental Emission @ 3m)	
ANT	CH06 2437MHz	
1	Horizontal	Vertical
Peak		
Average		

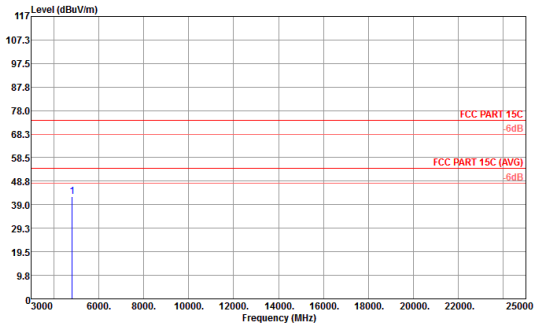
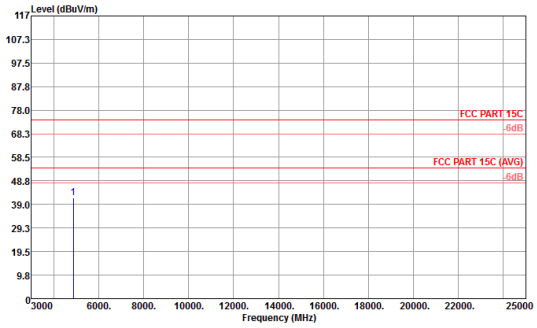
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11 n HT40 (Band Edge @ 3m)	
ANT	CH09 2452MHz	
1	Horizontal	Vertical
Peak		
		
Average		

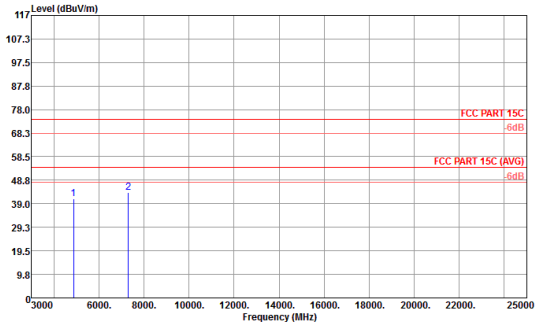
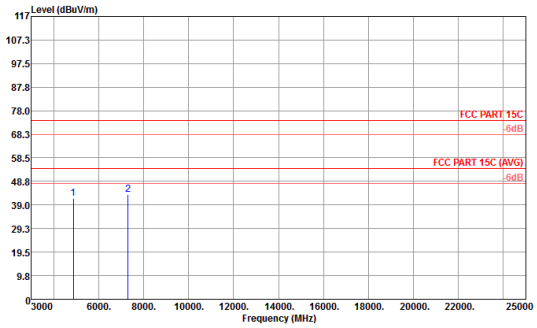
Average	 Level (dBuV/m) 117 107.3 97.5 87.8 78.0 68.3 58.5 48.8 39.0 29.3 19.5 9.8 0 FCC PART 15C (AVG) -6dB 1 2460 2463.2465.2467.2469.2471.2473.2475.2477.2479.2481.2483.2485.2487.2489.2491.2493.2495.2497. 2500 Frequency (MHz)	 Level (dBuV/m) 117 107.3 97.5 87.8 78.0 68.3 58.5 48.8 39.0 29.3 19.5 9.8 0 FCC PART 15C (AVG) -6dB 1 2460 2463.2465.2467.2469.2471.2473.2475.2477.2479.2481.2483.2485.2487.2489.2491.2493.2495.2497. 2500 Frequency (MHz)

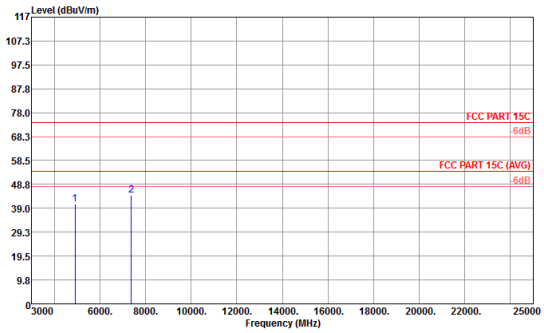
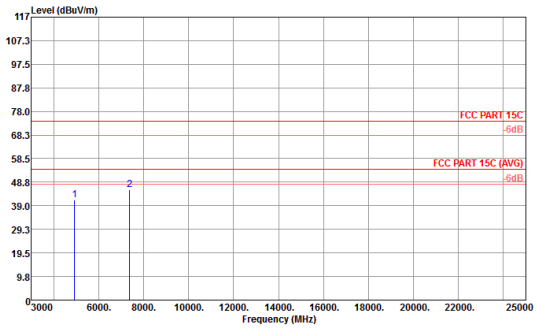
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11 n HT40 (Fundamental Emission @ 3m)	
ANT	CH09 2452MHz	
1	Horizontal	Vertical
Peak		
Average		

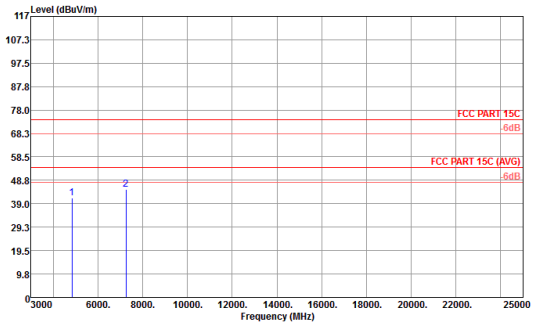
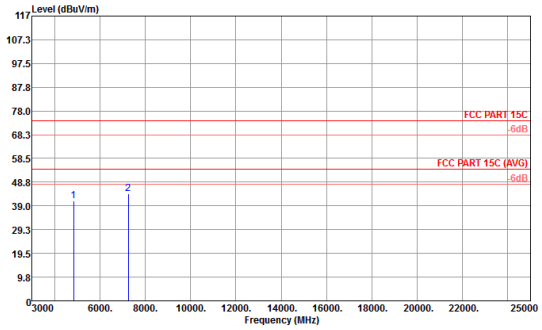
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11b (Harmonic @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11b (Harmonic @ 3m)	
ANT	CH06 2437MHz	
1	Horizontal	Vertical
Peak		
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11b (Harmonic @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		

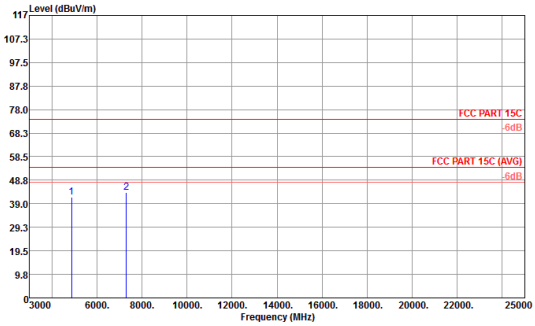
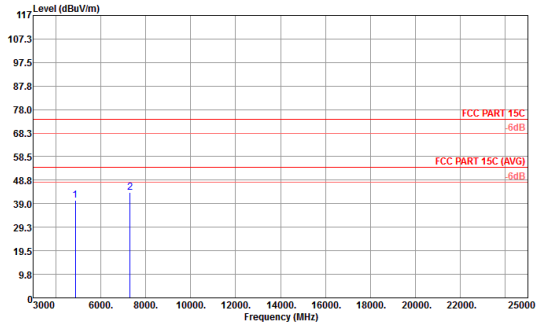
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11g (Harmonic @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11g (Harmonic @ 3m)	
ANT	CH06 2437MHz	
1	Horizontal	Vertical
Peak		
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11g (Harmonic @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		

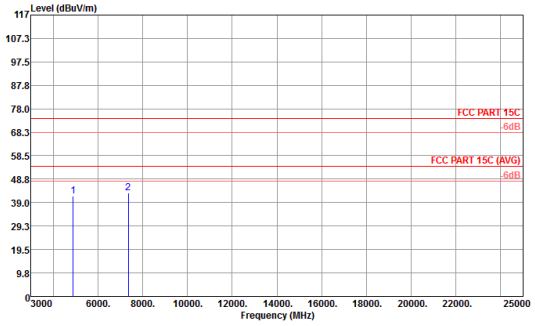
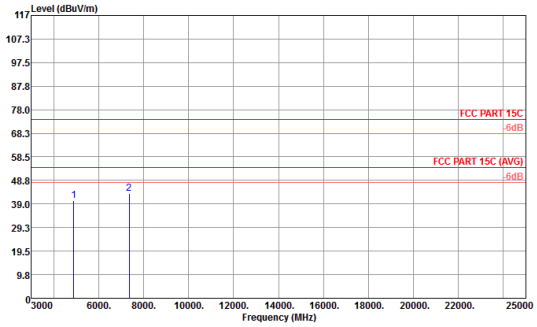
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT20 (Harmonic @ 3m)	
ANT	CH01 2412MHz	
1	Horizontal	Vertical
Peak		

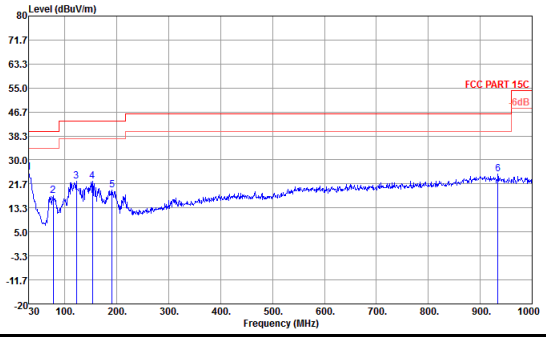
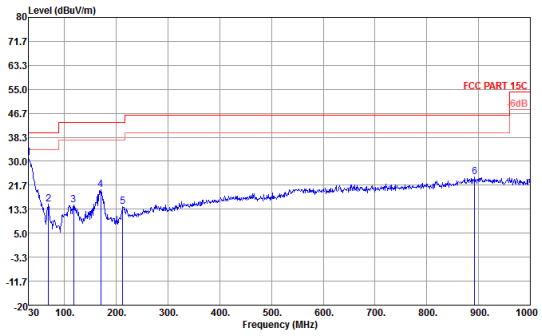
WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT20 (Harmonic @ 3m)	
ANT	CH06 2437MHz	
1	Horizontal	Vertical
Peak		

WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT20 (Harmonic @ 3m)	
ANT	CH11 2462MHz	
1	Horizontal	Vertical
Peak		

WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT40 (Harmonic @ 3m)	
ANT	CH03 2422MHz	
1	Horizontal	Vertical
Peak		

WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT40 (Harmonic @ 3m)	
ANT	CH06 2437MHz	
1	Horizontal	Vertical
Peak		

WIFI	2.4GHz 2400~2483.5MHz WIFI 802.11n HT40 (Harmonic @ 3m)	
ANT	CH09 2452MHz	
1	Horizontal	Vertical
Peak		

WIFI	Emission below 1GHz	
ANT	2.4GHz WIFI 802.11n HT40 (LF)	
1	Horizontal	Vertical
Peak		

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		2387.58	51.77	-22.23	74	57.07	27	4.72	37.02	187	140	P	H
		2387.4	37.88	-16.12	54	43.18	27	4.72	37.02	187	140	A	H
	*	2413.193	103.46	-	-	108.59	27.13	4.74	37	187	140	P	H
	*	2411.022	101.38	-	-	106.51	27.13	4.74	37	187	140	A	H
		2390	48.21	-25.79	74	53.51	27	4.72	37.02	181	184	P	H
		2386.68	35.1	-18.9	54	40.4	27	4.72	37.02	181	184	A	H
	*	2410.855	97.5	-	-	102.63	27.13	4.74	37	181	184	P	V
	*	2410.938	95.69	-	-	100.82	27.13	4.74	37	181	184	A	V
802.11b CH 06 2437MHz	*	2435.655	104.29	-	-	109.26	27.26	4.76	36.99	159	140	P	H
	*	2436.239	100.75	-	-	105.72	27.26	4.76	36.99	159	140	A	H
	*	2435.738	94.63	-	-	99.6	27.26	4.76	36.99	150	120	P	V
	*	2435.571	91.99	-	-	96.96	27.26	4.76	36.99	150	120	A	V
802.11b CH 11 2462MHz	*	2463.376	104.69	-	-	109.35	27.51	4.79	36.96	178	140	P	H
	*	2461.289	100.97	-	-	105.63	27.51	4.79	36.96	178	140	A	H
		2491.88	54.59	-19.41	74	58.93	27.77	4.82	36.93	178	140	P	H
		2483.84	39.63	-14.37	54	44.13	27.64	4.8	36.94	178	140	A	H
	*	2460.788	95.07	-	-	99.73	27.51	4.79	36.96	150	64	P	V
	*	2461.206	91.56	-	-	96.22	27.51	4.79	36.96	150	64	A	V
		2484.08	46.68	-27.32	74	51.18	27.64	4.8	36.94	150	64	P	V
		2483.76	32.76	-21.24	54	37.26	27.64	4.8	36.94	150	64	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 802.11b (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	42.5	-31.5	74	40.84	31.51	6.83	36.68	175	146	P	H
		4824	40.79	-33.21	74	39.13	31.51	6.83	36.68	150	61	P	V
802.11b CH 06 2437MHz		4881	42.97	-31.03	74	41.17	31.59	6.87	36.66	182	137	P	H
		7311	43.72	-30.28	74	37.81	34.03	8.57	36.69	179	142	P	H
		4881	39.89	-34.11	74	38.09	31.59	6.87	36.66	150	67	P	V
		7311	43.4	-30.6	74	37.49	34.03	8.57	36.69	150	71	P	V
802.11b CH 11 2462MHz		4923	42.39	-31.61	74	40.45	31.67	6.92	36.65	180	138	P	H
		7386	44.6	-29.4	74	38.41	34.29	8.68	36.78	172	154	P	H
		4923	42.66	-31.34	74	40.72	31.67	6.92	36.65	150	67	P	V
		7386	43.42	-30.58	74	37.23	34.29	8.68	36.78	150	72	P	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	*	2415.865	98.54	-	-	103.67	27.13	4.74	37	154	205	P	H
	*	2417.117	86.06	-	-	91.19	27.13	4.74	37	154	205	A	H
		2389.92	52.27	-21.73	74	57.57	27	4.72	37.02	154	205	P	H
		2390	36.21	-17.79	54	41.51	27	4.72	37.02	154	205	A	H
	*	2414.028	97.08	-	-	102.21	27.13	4.74	37	202	200	P	V
	*	2415.114	84.74	-	-	89.87	27.13	4.74	37	202	200	A	V
		2389.74	50.08	-23.92	74	55.38	27	4.72	37.02	202	200	P	V
		2390	34.66	-19.34	54	39.96	27	4.72	37.02	202	200	A	V
802.11g CH 06 2437MHz	*	2438.827	101	-	-	105.81	27.39	4.77	36.97	150	345	P	H
	*	2435.822	88.89	-	-	93.86	27.26	4.76	36.99	150	345	A	H
	*	2431.73	101.34	-	-	106.31	27.26	4.76	36.99	194	203	P	V
	*	2435.905	88.66	-	-	93.63	27.26	4.76	36.99	194	203	A	V
802.11g CH 11 2462MHz	*	2460.454	99	-	-	103.66	27.51	4.79	36.96	150	206	P	H
	*	2469.054	86.77	-	-	91.43	27.51	4.79	36.96	150	206	A	H
		2483.92	54.15	-19.85	74	58.65	27.64	4.8	36.94	150	206	P	H
		2483.52	37.39	-16.61	54	41.89	27.64	4.8	36.94	150	206	A	H
	*	2466.8	97.03	-	-	101.69	27.51	4.79	36.96	150	222	P	V
	*	2463.376	85.03	-	-	89.69	27.51	4.79	36.96	150	222	A	V
		2483.52	51.98	-22.02	74	56.48	27.64	4.8	36.94	150	222	P	V
		2483.52	35.71	-18.29	54	40.21	27.64	4.8	36.94	150	222	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 802.11g (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	41.29	-32.71	74	39.63	31.51	6.83	36.68	150	360	P	H
		4824	39.46	-34.54	74	37.8	31.51	6.83	36.68	150	288	P	V
802.11g CH 06 2437MHz		4875	40.65	-33.35	74	38.85	31.59	6.87	36.66	150	360	P	H
		7311	44.58	-29.42	74	38.67	34.03	8.57	36.69	150	111	P	H
		4875	40.42	-33.58	74	38.62	31.59	6.87	36.66	150	288	P	V
		7311	43.85	-30.15	74	37.94	34.03	8.57	36.69	150	82	P	V
802.11g CH 11 2462MHz		4923	40.85	-33.15	74	38.91	31.67	6.92	36.65	150	360	P	H
		7386	42.48	-31.52	74	36.29	34.29	8.68	36.78	150	111	P	H
		4923	40.47	-33.53	74	38.53	31.67	6.92	36.65	150	288	P	V
		7386	45.21	-28.79	74	39.02	34.29	8.68	36.78	150	82	P	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 01 2412MHz		2389.92	51.02	-22.98	74	56.32	27	4.72	37.02	245	190	P	H
		2390	34.01	-19.99	54	39.31	27	4.72	37.02	245	190	A	H
	*	2418.871	97.39	-	-	102.52	27.13	4.74	37	245	190	P	H
	*	2419.289	76.7	-	-	81.83	27.13	4.74	37	245	190	A	H
		2389.74	55.96	-18.04	74	61.26	27	4.72	37.02	190	295	P	V
		2390	36.55	-17.45	54	41.85	27	4.72	37.02	190	295	A	V
	*	2418.119	99.96	-	-	105.09	27.13	4.74	37	190	295	P	V
	*	2419.372	79.51	-	-	84.64	27.13	4.74	37	190	295	A	V
802.11n HT20 CH 06 2437MHz	*	2438.41	94.91	-	-	99.72	27.39	4.77	36.97	161	293	P	H
	*	2435.738	74.94	-	-	79.91	27.26	4.76	36.99	161	293	A	H
	*	2438.41	101.32	-	-	106.13	27.39	4.77	36.97	283	243	P	V
	*	2435.738	80.4	-	-	85.37	27.26	4.76	36.99	283	243	A	V
802.11n HT20 CH 11 2462MHz	*	2463.209	97.05	-	-	101.71	27.51	4.79	36.96	151	204	P	H
	*	2460.621	76.8	-	-	81.46	27.51	4.79	36.96	151	204	A	H
		2484.52	50.06	-23.94	74	54.56	27.64	4.8	36.94	151	204	P	H
		2484.28	34.09	-19.91	54	38.59	27.64	4.8	36.94	151	204	A	H
	*	2463.376	102.32	-	-	106.98	27.51	4.79	36.96	220	236	P	V
	*	2463.293	81.48	-	-	86.14	27.51	4.79	36.96	220	236	A	V
		2485.36	57.04	-16.96	74	61.54	27.64	4.8	36.94	220	236	P	V
		2484.48	37.78	-16.22	54	42.28	27.64	4.8	36.94	220	236	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 01 2412MHz		4824	42.45	-31.55	74	40.79	31.51	6.83	36.68	150	243	P	H
		4875	41.85	-32.15	74	40.05	31.59	6.87	36.66	150	345	P	V
802.11n HT20 CH 06 2437MHz		4875	40.91	-33.09	74	39.11	31.59	6.87	36.66	150	243	P	H
		7311	43.66	-30.34	74	37.75	34.03	8.57	36.69	150	64	P	H
		4875	41.85	-32.15	74	40.05	31.59	6.87	36.66	150	345	P	V
		7311	43.38	-30.62	74	37.47	34.03	8.57	36.69	150	225	P	V
802.11n HT20 CH 11 2462MHz		4923	40.85	-33.15	74	38.91	31.67	6.92	36.65	150	360	P	H
		7386	44.48	-29.52	74	38.29	34.29	8.68	36.78	150	111	P	H
		4924	41.47	-32.53	74	39.53	31.67	6.92	36.65	150	288	P	V
		7386	45.69	-28.31	74	39.5	34.29	8.68	36.78	150	100	P	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		2389.65	53.48	-20.52	74	58.78	27	4.72	37.02	216	136	P	H
		2389.83	35.22	-18.78	54	40.52	27	4.72	37.02	216	136	A	H
	*	2430.227	96.09	-	-	101.06	27.26	4.76	36.99	216	136	P	H
	*	2428.056	65.89	-	-	70.86	27.26	4.76	36.99	216	136	A	H
		2490.04	47.05	-26.95	74	51.39	27.77	4.82	36.93	216	136	P	H
		2485.64	32.49	-21.51	54	36.99	27.64	4.8	36.94	216	136	A	H
		2386.23	59.86	-14.14	74	65.16	27	4.72	37.02	159	291	P	V
		2389.56	38.5	-15.5	54	43.8	27	4.72	37.02	159	291	A	V
	*	2430.645	98.96	-	-	103.93	27.26	4.76	36.99	159	291	P	V
	*	2436.823	69.67	-	-	74.48	27.39	4.77	36.97	159	291	A	V
		2485.92	50.23	-23.77	74	54.73	27.64	4.8	36.94	159	291	P	V
		2485.84	34.34	-19.66	54	38.84	27.64	4.8	36.94	159	291	A	V
802.11n HT40 CH 06 2437MHz		2389.11	49.78	-24.22	74	55.08	27	4.72	37.02	185	106	P	H
		2389.92	35.22	-18.78	54	40.52	27	4.72	37.02	185	106	A	H
	*	2449.599	95.68	-	-	100.49	27.39	4.77	36.97	185	106	P	H
	*	2425.468	69.54	-	-	74.51	27.26	4.76	36.99	185	106	A	H
		2486.2	51.76	-22.24	74	56.26	27.64	4.8	36.94	185	106	P	H
		2484.16	34.07	-19.93	54	38.57	27.64	4.8	36.94	185	106	A	H
		2388.21	52.85	-21.15	74	58.15	27	4.72	37.02	150	307	P	V
		2389.92	37.29	-16.71	54	42.59	27	4.72	37.02	150	307	A	V
	*	2431.479	100.46	-	-	105.43	27.26	4.76	36.99	150	307	P	V
	*	2427.805	73.62	-	-	78.59	27.26	4.76	36.99	150	307	A	V
		2492.44	56.97	-17.03	74	61.31	27.77	4.82	36.93	150	307	P	V
		2483.52	37.06	-16.94	54	41.56	27.64	4.8	36.94	150	307	A	V

802.11n HT40 CH 09 2452MHz		2388.21	45.08	-28.92	74	50.38	27	4.72	37.02	150	144	P	H
		2389.11	33.3	-20.7	54	38.6	27	4.72	37.02	150	144	A	H
	*	2449.181	94.37	-	-	99.18	27.39	4.77	36.97	150	144	P	H
	*	2466.049	68.13	-	-	72.79	27.51	4.79	36.96	150	144	A	H
		2486.4	51.19	-22.81	74	55.69	27.64	4.8	36.94	150	144	P	H
		2489.52	34.72	-19.28	54	39.06	27.77	4.82	36.93	150	144	A	H
		2388.57	47.99	-26.01	74	53.29	27	4.72	37.02	150	272	P	V
		2389.11	34.71	-19.29	54	40.01	27	4.72	37.02	150	272	A	V
	*	2444.506	98.9	-	-	103.71	27.39	4.77	36.97	150	272	P	V
	*	2439.997	74.39	-	-	79.2	27.39	4.77	36.97	150	272	A	V
		2484.6	55.41	-18.59	74	59.91	27.64	4.8	36.94	150	272	P	V
		2484.52	36.96	-17.04	54	41.46	27.64	4.8	36.94	150	272	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		4845	41.4	-32.6	74	39.7	31.53	6.85	36.68	185	248	P	H
HT40		7266	44.92	-29.08	74	39.12	33.93	8.53	36.66	165	184	P	H
CH 03		4845	41.14	-32.86	74	39.44	31.53	6.85	36.68	159	300	P	V
2422MHz		7266	43.88	-30.12	74	38.08	33.93	8.53	36.66	161	295	P	V
802.11n		4875	41.77	-32.23	74	39.97	31.59	6.87	36.66	175	194	P	H
HT40		7311	43.63	-30.37	74	37.72	34.03	8.57	36.69	187	184	P	H
CH 06		4875	40.35	-33.65	74	38.55	31.59	6.87	36.66	154	121	P	V
2437MHz		7311	43.79	-30.21	74	37.88	34.03	8.57	36.69	159	294	P	V
802.11n		4905	41.67	-32.33	74	39.78	31.64	6.9	36.65	181	187	P	H
HT40		7356	42.89	-31.11	74	36.81	34.19	8.64	36.75	172	184	P	H
CH 09		4905	40.54	-33.46	74	38.65	31.64	6.9	36.65	162	121	P	V
2452MHz		7356	43.29	-30.71	74	37.21	34.19	8.64	36.75	162	287	P	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 HT40 (LF)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT40 LF		30	25.8	-14.2	40	41.19	19.1	0.73	35.22	125	275	P	H
		77.53	17.56	-22.44	40	43.17	8.65	1.14	35.4	-	-	P	H
		122.15	22.76	-20.74	43.5	44.85	11.7	1.43	35.22	-	-	P	H
		153.19	22.74	-20.76	43.5	44.98	11.09	1.6	34.93	-	-	P	H
		191.02	19.58	-23.92	43.5	43.1	9.72	1.79	35.03	-	-	P	H
		934.04	25.02	-20.98	46	33.84	21.61	4.12	34.55	-	-	P	H
		30	31.24	-8.76	40	46.63	19.1	0.73	35.22	105	187	P	V
		68.8	15.12	-24.88	40	42.01	6.92	1.07	34.88	-	-	P	V
		117.3	14.94	-28.56	43.5	37.03	11.79	1.4	35.28	-	-	P	V
		169.68	20.01	-23.49	43.5	42.77	10.49	1.68	34.93	-	-	P	V
		212.36	14.29	-29.21	43.5	37.52	9.9	1.9	35.03	-	-	P	V
		892.33	24.68	-21.32	46	33.85	21.35	4.01	34.53	-	-	P	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	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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 CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. 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)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. 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)

2. 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".