



FCC RF Test Report

APPLICANT : ASUSTeK COMPUTER INC.
EQUIPMENT : ASUS Phone(Mobile phone)
BRAND NAME : ASUS
MODEL NAME : ASUS_Z01GS
FCC ID : MSQZ01GS
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Aug. 25, 2017 and testing was completed on Sep. 21, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR740843C	Rev. 01	Initial issue of report	Oct. 05, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	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 2.63 dB at 2483.520 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 19.10 dB at 0.166 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

ASUSTeK COMPUTER INC.

4F, No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.2 Manufacturer

COTEK ELECTRONICS (SUZHOU) CO., LTD.

No.288, Mayun Road, Suzhou Hi-and-New Tech Park, Jiangsu, PRC

1.3 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, WiGig, FM Receiver, NFC, and GPS.

Product Specification subjective to this standard	
Sample 1	EUT with SKU 1
Sample 2	EUT with SKU 2
Sample 3	EUT with SKU 3
Sample 4	EUT with SKU 4
Antenna Type	WWAN: PIFA Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS / Glonass / Galileo / BDS: PIFA Antenna NFC: Loop Antenna FM: Integral Antenna (Earphone acting as FM antenna deemed as an integral antenna)

<Sample Information>

SKU MB	SKU1	SKU2
DDR4X	6G/ Hynix	6G/ Hynix
UFS 2.1	128G/ Toshiba	64G/ Toshiba
CPU	MSM-8998	
TP Module	TIANMA/TA055VVHM09-03 ON CELL	TIANMA/TA055VVHM09-05 ON CELL
Front Camera	CHICONY/CBAH81120003870LH	CHICONY/CBAH81120003871LH
Rear Camera	12M+16M/SEMCO/MOMDM82PG3A	
Battery	ATL POLY/C11P1701/SMP	

SKU MB	SKU3	SKU4
DDR4X	6G/ Samsung	6G/ Hynix
UFS 2.1	256G/ Samsung	64G/ Samsung
CPU	MSM-8998	
TP Module	TIANMA/TA055VVHM08-05	TIANMA/TA055VVHM09-05
Front Camera	CHICONY/CBAH81120003871LH	
Rear Camera	12M+16M/SEMCO/MOMDM82PG3A	
Battery	ATL POLY/C11P1701/SMP	

Remark: All tests were performed with sample 1.

1.4 Modification of EUT

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

1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH010-HY	

Note: The test site complies with ANSI C63.4 2014 requirement.



1.6 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 v04
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

Remark:

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

2 Test Configuration of Equipment Under Test

- a. 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: conduction emission (150 kHz to 30 MHz), radiation 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 (Z plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

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



2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

Single Antenna

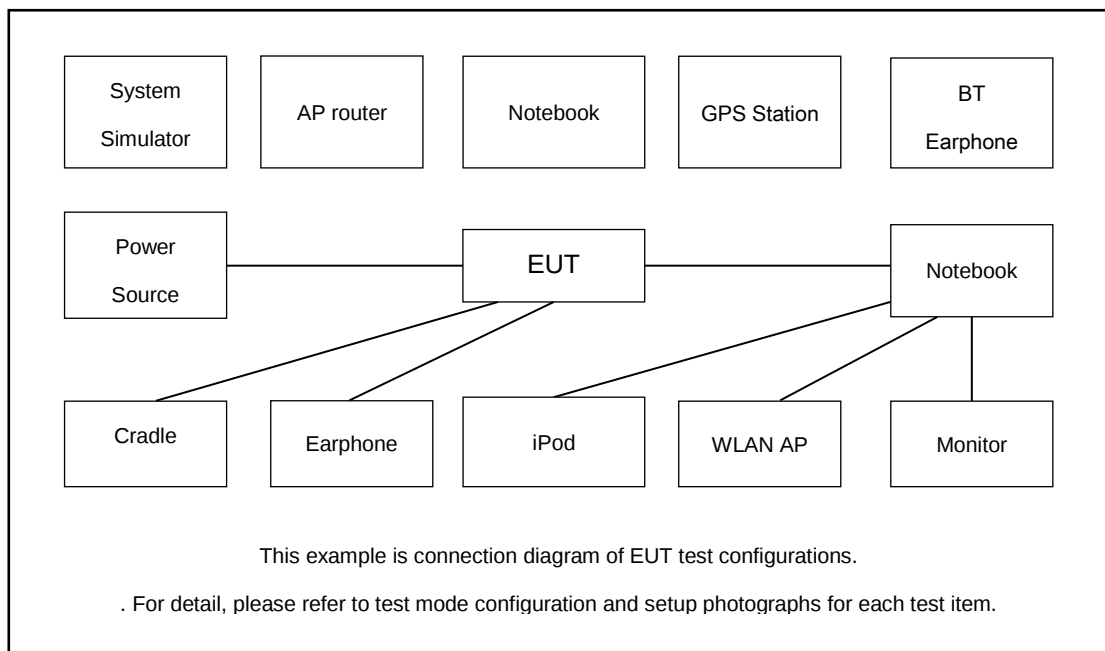
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0

MIMO Antenna

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

Test Cases	
AC Conducted	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (2.4GHz) Link + Camera (front) + NFC On + SD (play
Emission	MP3) + Earphone + USB Cable 1 (Charging from Adapter 1)

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
4.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m
5.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, programmed RF utility, "QRCT" installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.



2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example:

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

Offset = RF cable loss + attenuator factor.

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

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

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

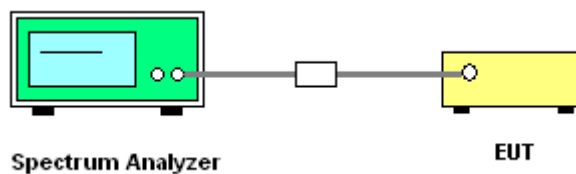
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

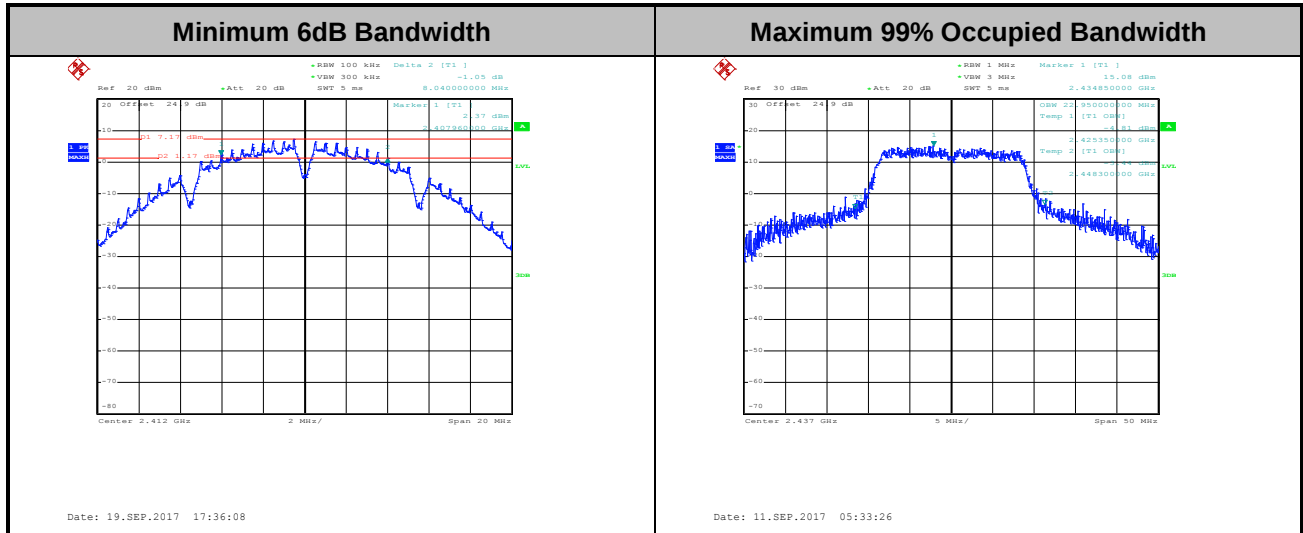
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.



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

3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

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

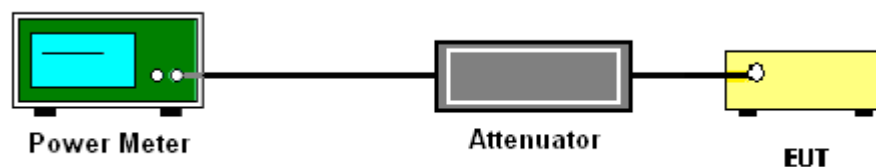
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A

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 v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

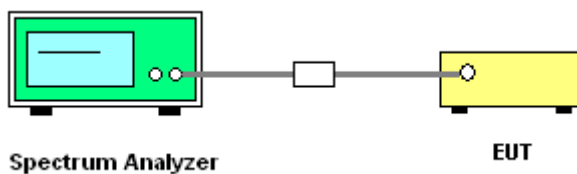
If measurements performed using method (2) plus $10 \log(N)$ exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

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

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

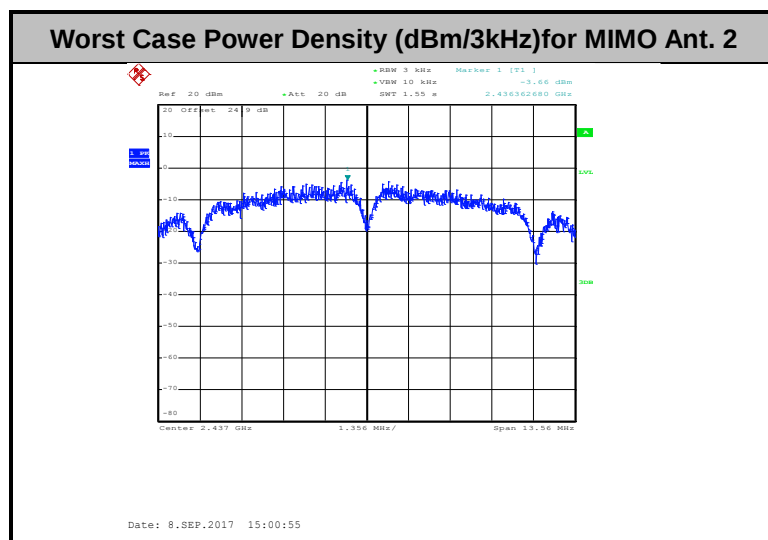
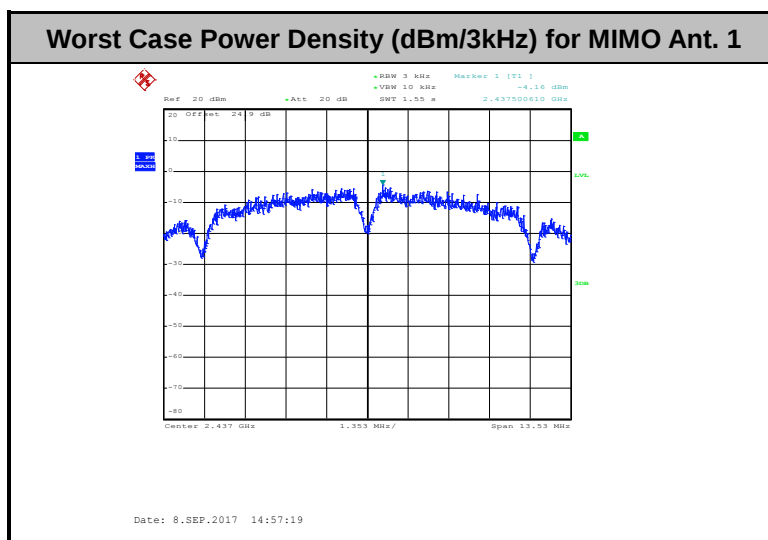
Method (2): Measure and add $10 \log(N)$ dB, where N is the number of outputs. (N=2)

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



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.

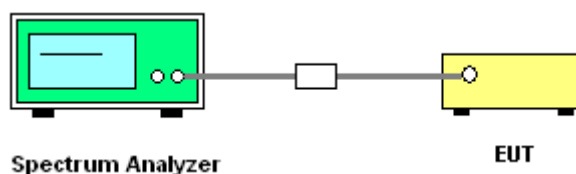
3.4.2 Measuring Instruments

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 v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

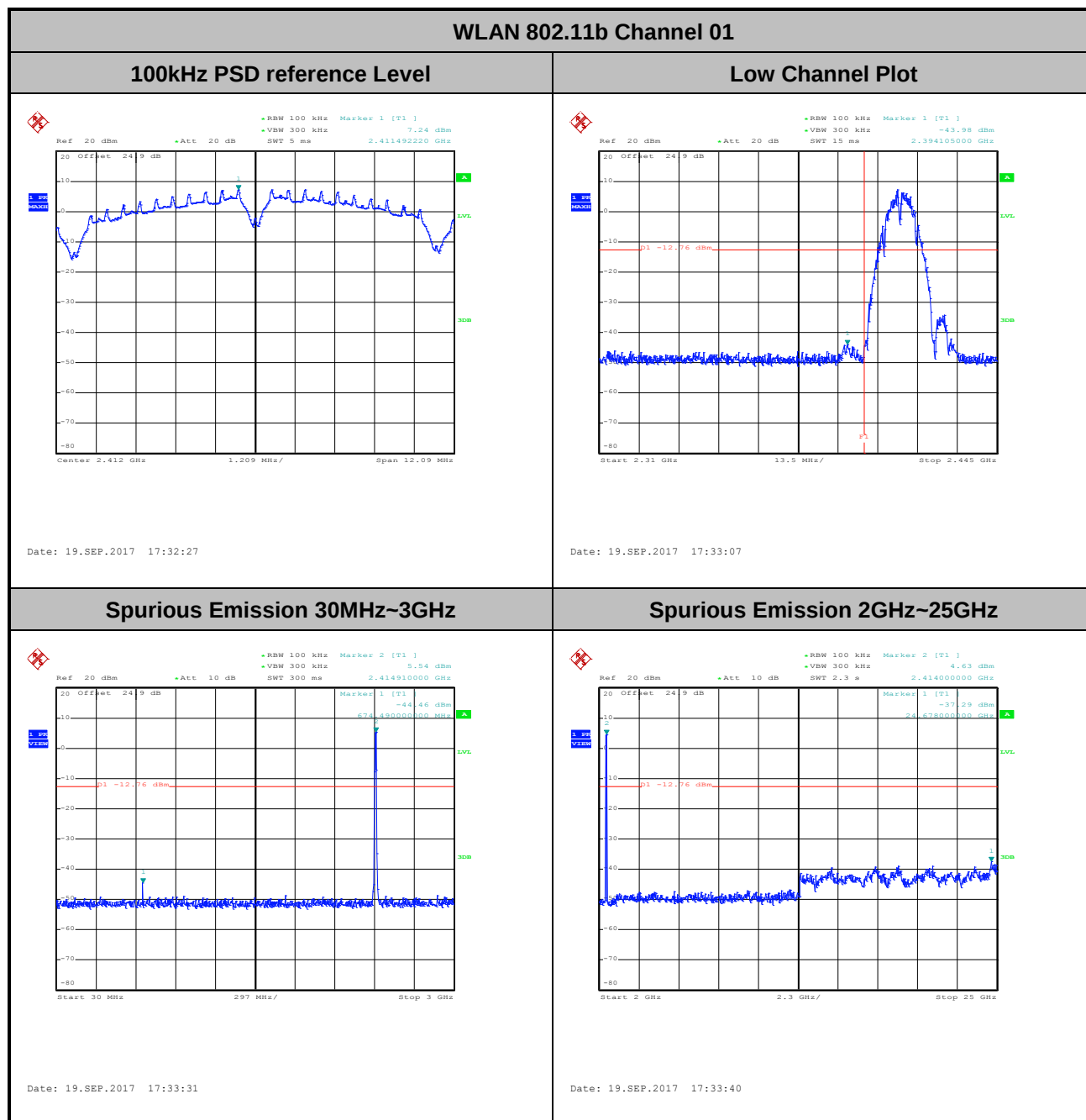




3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

Number of TX	2	Ant. :	1
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Ethan Lin / Allen Lin

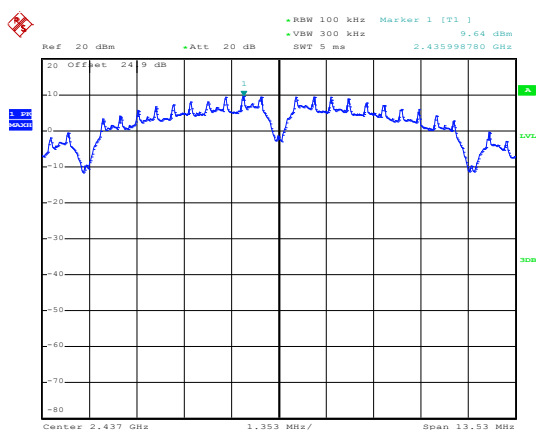




Number of TX :	2	Ant. :	1
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11b Channel 06

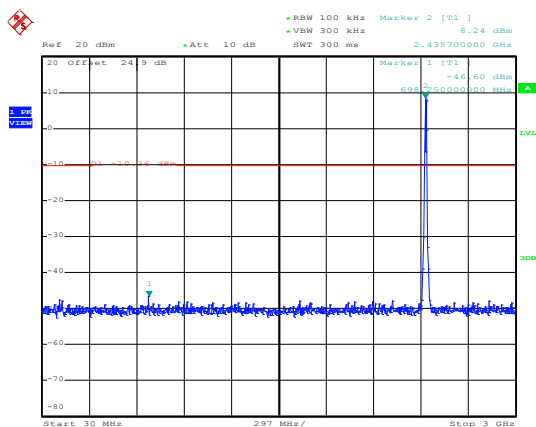
100kHz PSD reference Level



Date: 8.SEP.2017 14:58:12

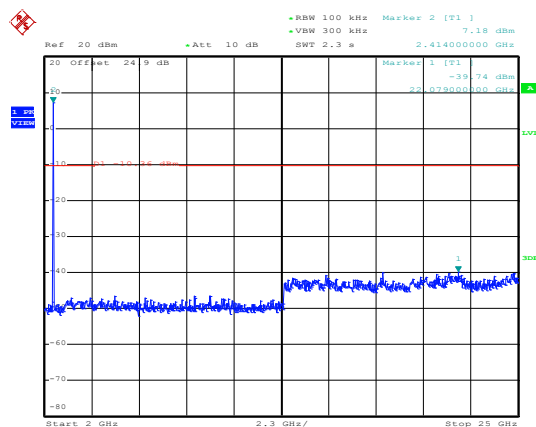
Mid Channel Plot

Spurious Emission 30MHz~3GHz



Date: 8.SEP.2017 14:58:24

Spurious Emission 2GHz~25GHz



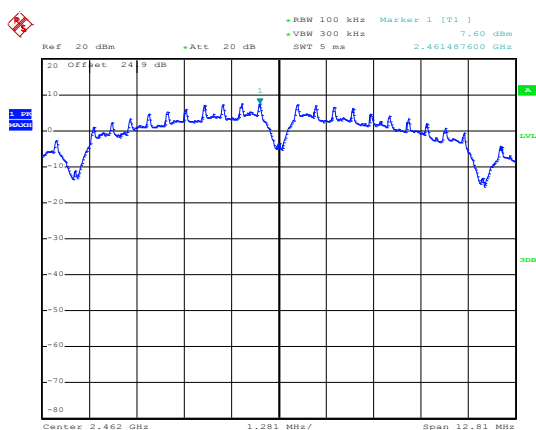
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Number of TX :	2	Ant. :	1
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Ethan Lin / Allen Lin

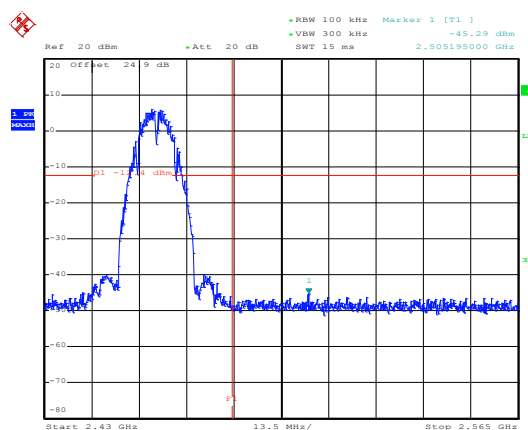
WLAN 802.11b Channel 11

100kHz PSD reference Level



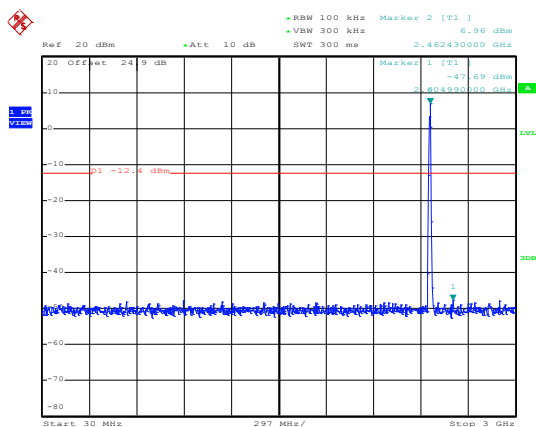
Date: 15.SEP.2017 10:48:24

High Channel Plot



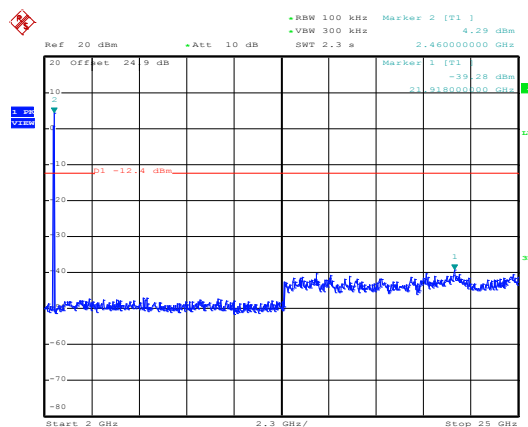
Date: 15.SEP.2017 10:48:43

Spurious Emission 30MHz~3GHz



Date: 15.SEP.2017 10:49:28

Spurious Emission 2GHz~25GHz



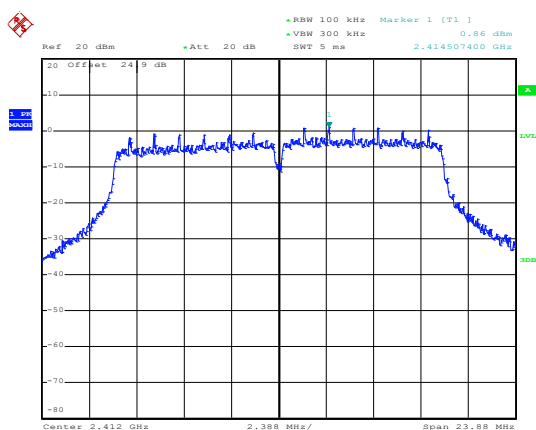
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Number of TX :	2	Ant. :	1
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Ethan Lin / Allen Lin

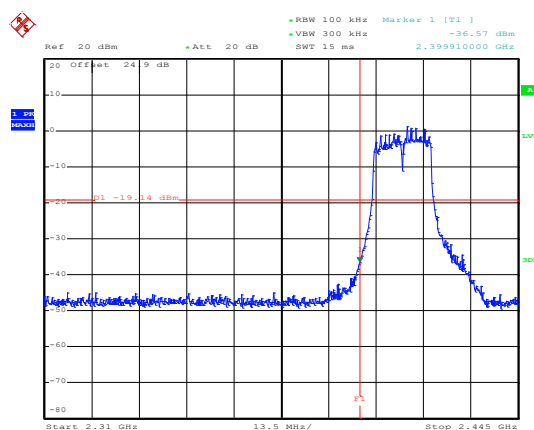
WLAN 802.11g Channel 01

100kHz PSD reference Level



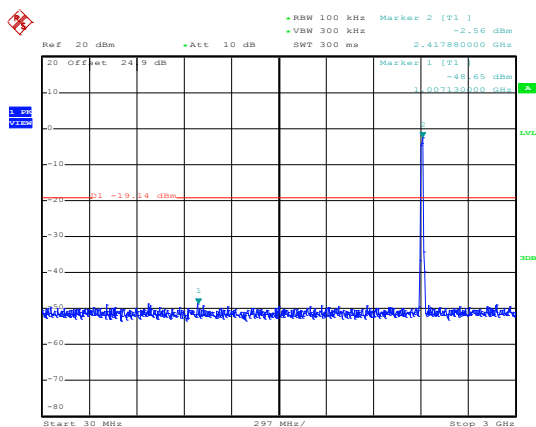
Date: 19.SEP.2017 17:39:46

Low Channel Plot



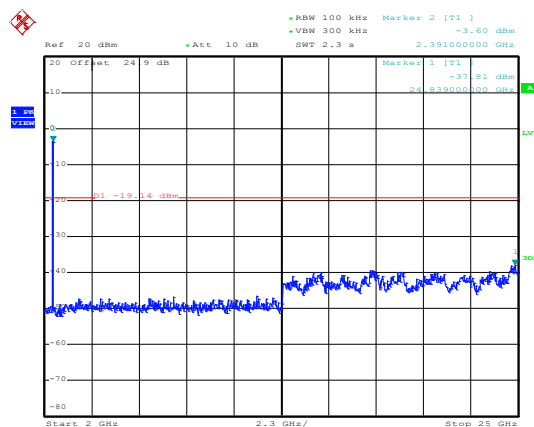
Date: 19.SEP.2017 17:40:07

Spurious Emission 30MHz~3GHz



Date: 19.SEP.2017 17:40:19

Spurious Emission 2GHz~25GHz



Date: 19.SEP.2017 17:40:27

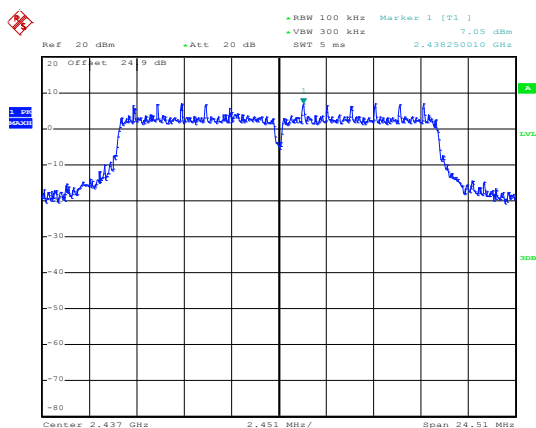


Number of TX :	2	Ant. :	1
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11g Channel 06

100kHz PSD reference Level

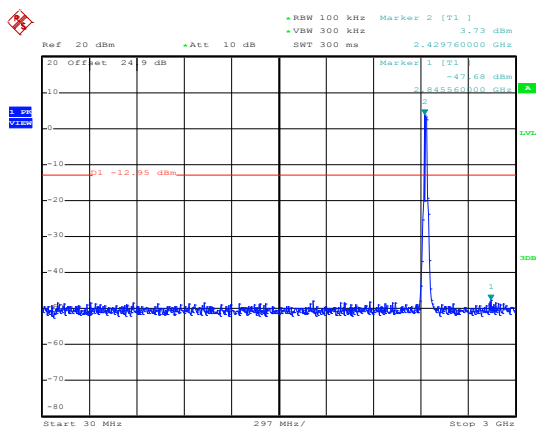
Mid Channel Plot



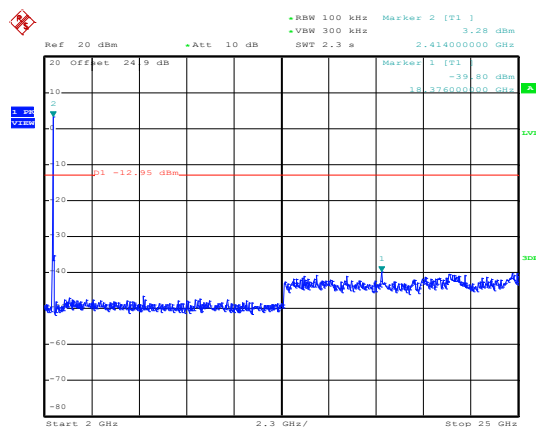
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Spurious Emission 30MHz~3GHz

Spurious Emission 2GHz~25GHz



Date: 10.SEP.2017 23:40:51



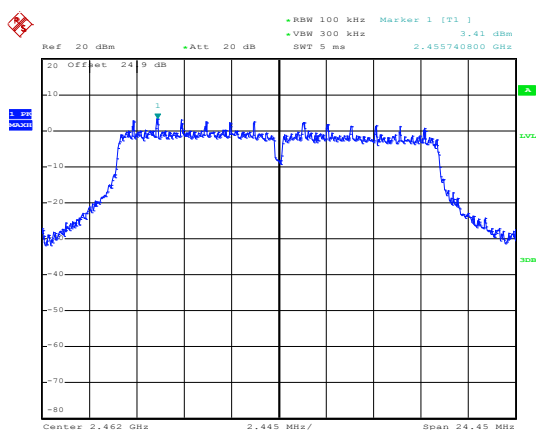
Date: 10.SEP.2017 23:41:00



Number of TX :	2	Ant. :	1
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Ethan Lin / Allen Lin

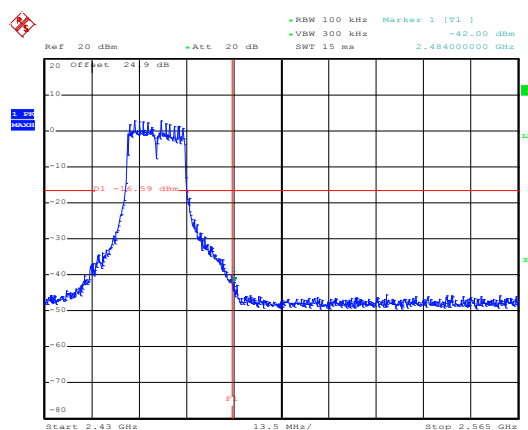
WLAN 802.11g Channel 11

100kHz PSD reference Level



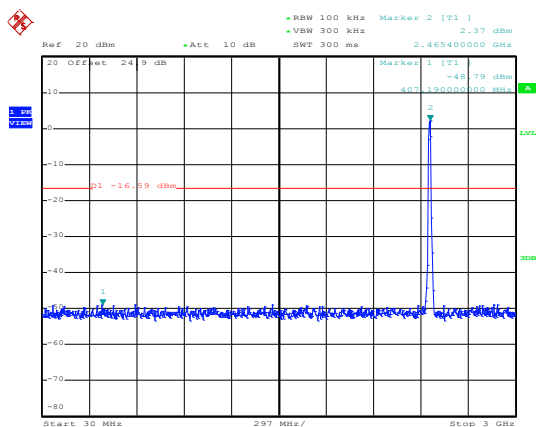
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High Channel Plot



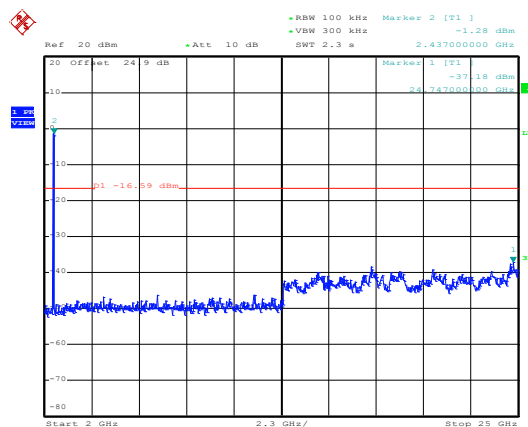
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Spurious Emission 30MHz~3GHz



Date: 19.SEP.2017 17:47:48

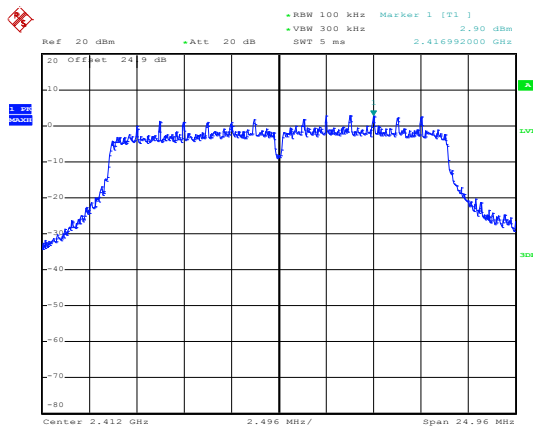
Spurious Emission 2GHz~25GHz



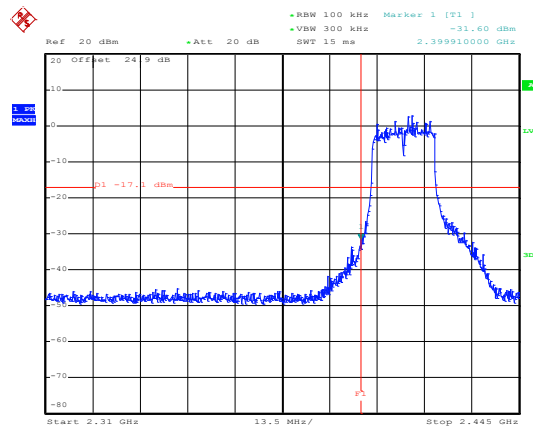
Date: 19.SEP.2017 17:47:56



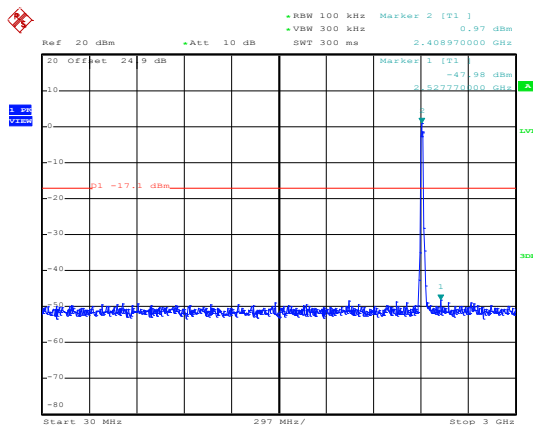
Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11n HT20 Channel 01**100kHz PSD reference Level**

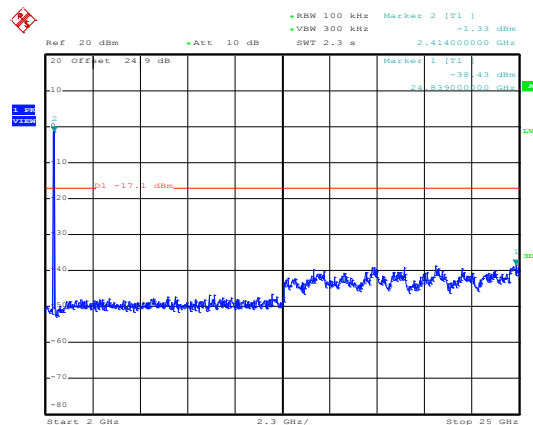
Date: 19.SEP.2017 18:02:34

Low Channel Plot

Date: 19.SEP.2017 18:03:30

Spurious Emission 30MHz~3GHz

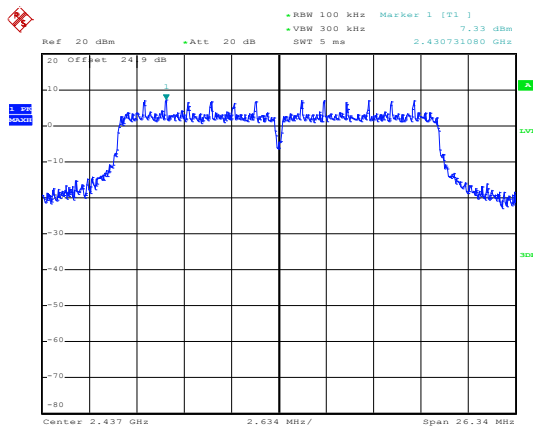
Date: 19.SEP.2017 18:03:43

Spurious Emission 2GHz~25GHz

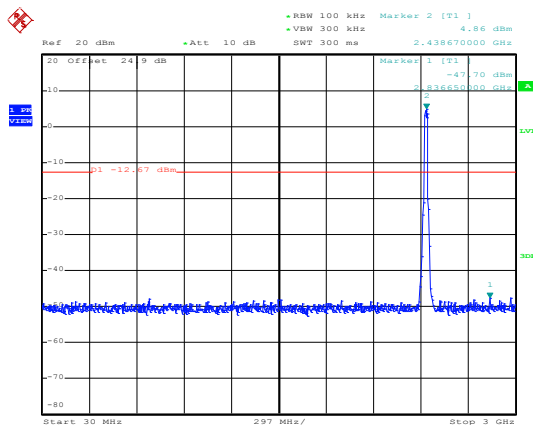
Date: 19.SEP.2017 18:03:52



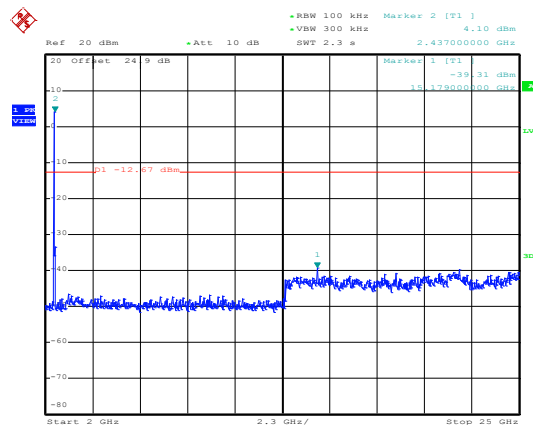
Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11n HT20 Channel 06**100kHz PSD reference Level**

Date: 11.SEP.2017 05:14:06

Mid Channel Plot**Spurious Emission 30MHz~3GHz**

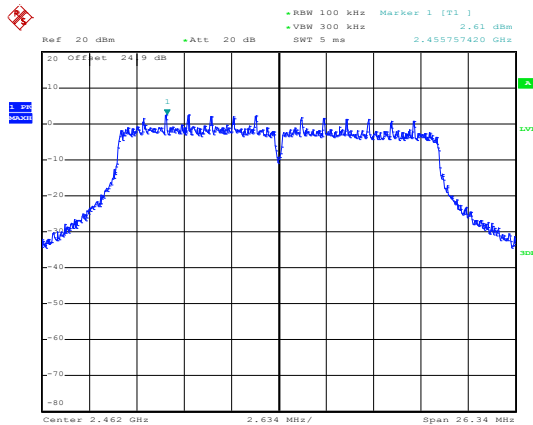
Date: 11.SEP.2017 05:16:08

Spurious Emission 2GHz~25GHz

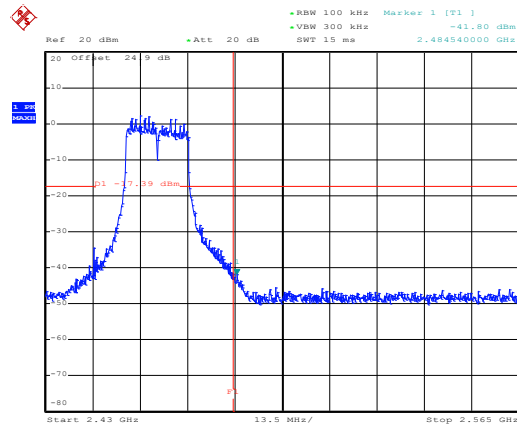
Date: 11.SEP.2017 05:16:17



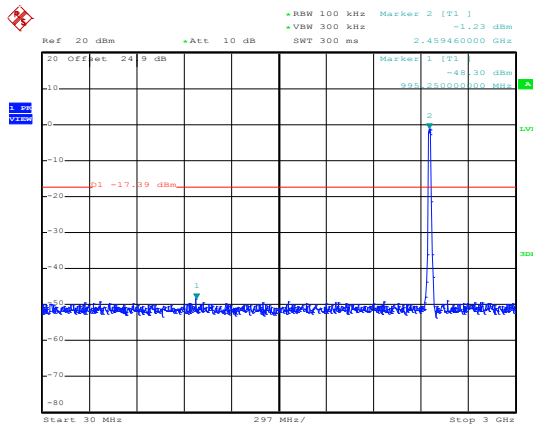
Number of TX :	2	Ant. :	1
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11n HT20 Channel 11**100kHz PSD reference Level**

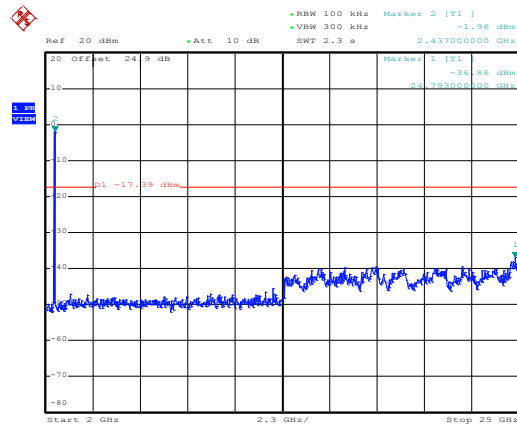
Date: 19.SEP.2017 18:08:44

High Channel Plot

Date: 19.SEP.2017 18:09:18

Spurious Emission 30MHz~3GHz

Date: 19.SEP.2017 18:09:30

Spurious Emission 2GHz~25GHz

Date: 19.SEP.2017 18:09:38

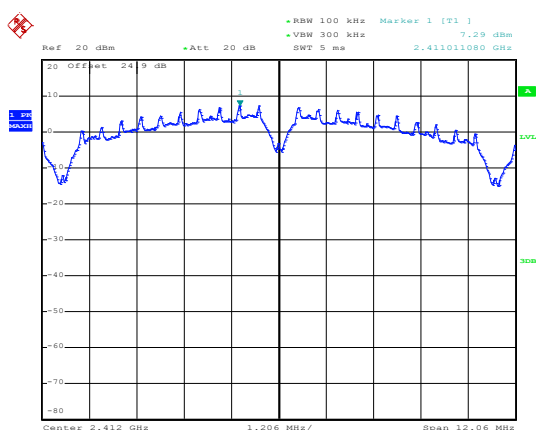


Number of TX = 2, Ant. 2 (Measured)

Number of TX :	2	Ant. :	2
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Ethan Lin / Allen Lin

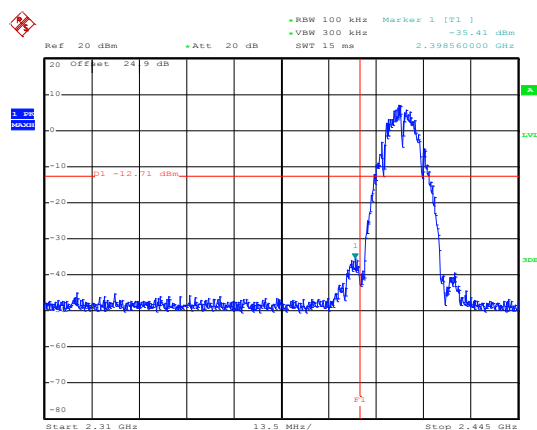
WLAN 802.11b Channel 01

100kHz PSD reference Level



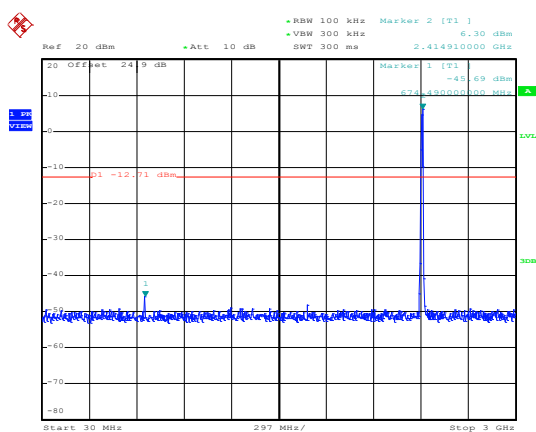
Date: 19.SEP.2017 17:36:39

Low Channel Plot



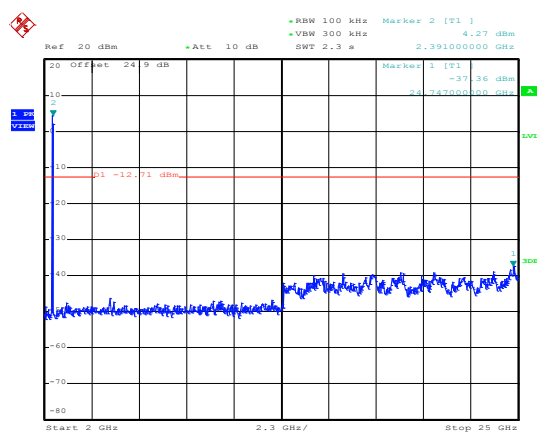
Date: 19.SEP.2017 17:36:49

Spurious Emission 30MHz~3GHz



Date: 19.SEP.2017 17:37:02

Spurious Emission 2GHz~25GHz



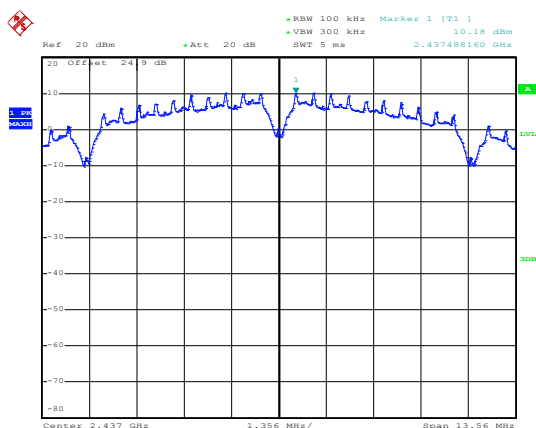
Date: 19.SEP.2017 17:37:10



Number of TX :	2	Ant. :	2
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11b Channel 06

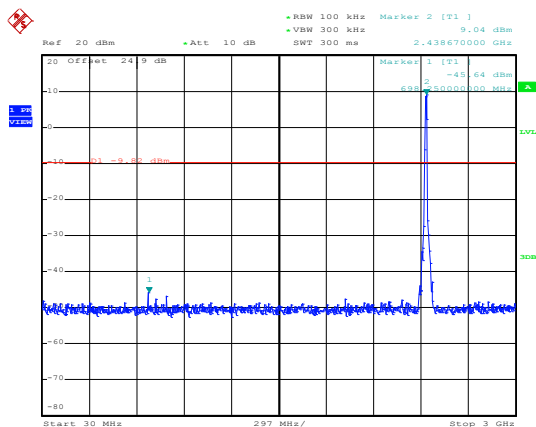
100kHz PSD reference Level



Date: 8.SEP.2017 15:04:02

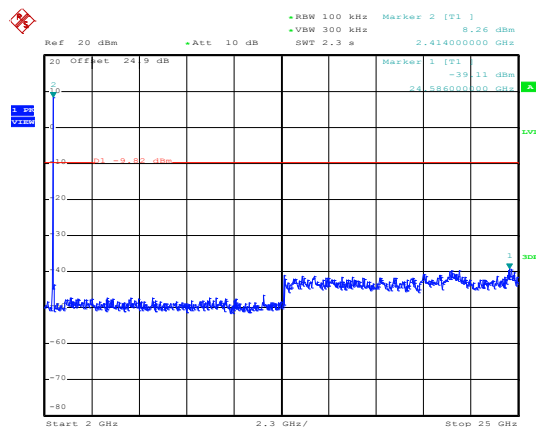
Mid Channel Plot

Spurious Emission 30MHz~3GHz



Date: 8.SEP.2017 15:28:00

Spurious Emission 2GHz~25GHz



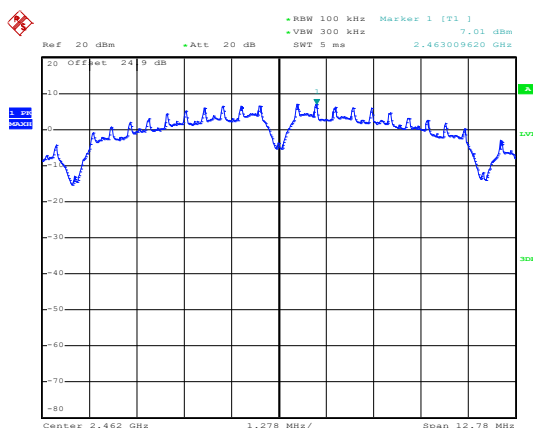
Date: 8.SEP.2017 15:28:09



Number of TX :	2	Ant. :	2
Test Mode :	802.11b	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Ethan Lin / Allen Lin

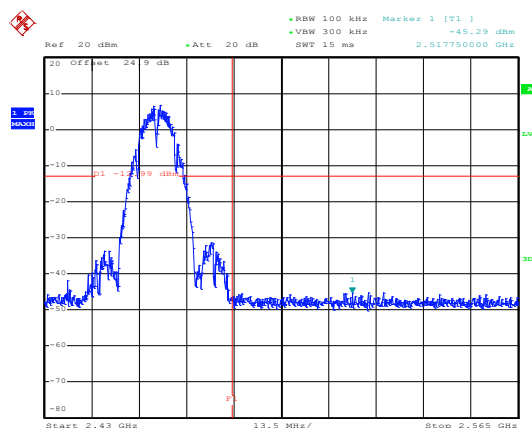
WLAN 802.11b Channel 11

100kHz PSD reference Level



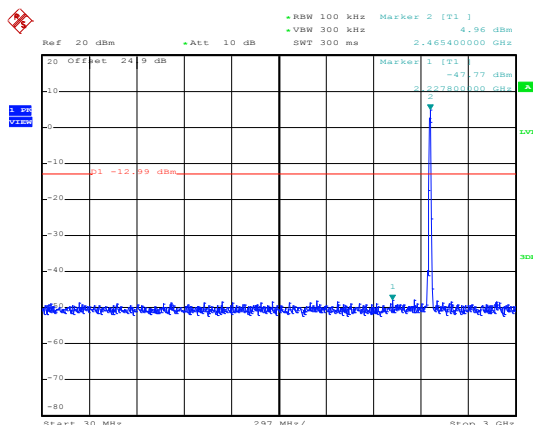
Date: 15.SEP.2017 10:53:06

High Channel Plot



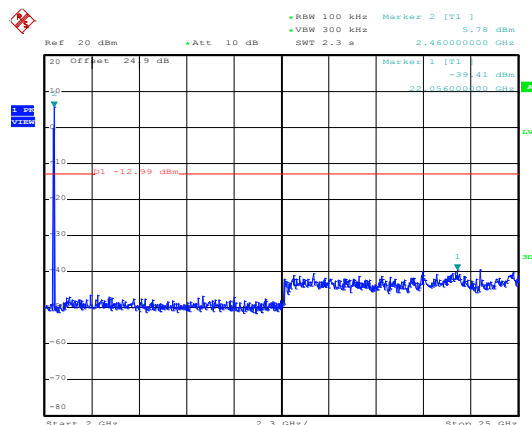
Date: 15.SEP.2017 10:53:30

Spurious Emission 30MHz~3GHz



Date: 15.SEP.2017 10:53:42

Spurious Emission 2GHz~25GHz



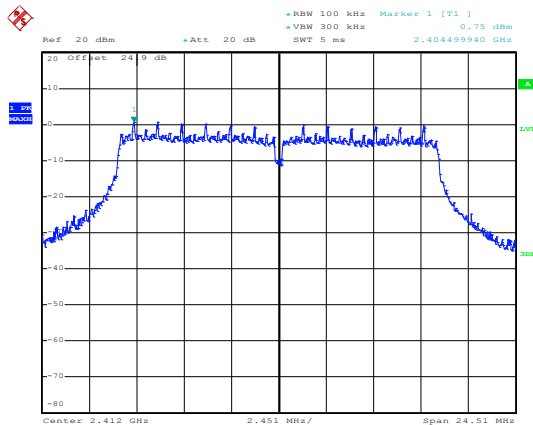
Date: 15.SEP.2017 10:53:51



Number of TX :	2	Ant. :	2
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Ethan Lin / Allen Lin

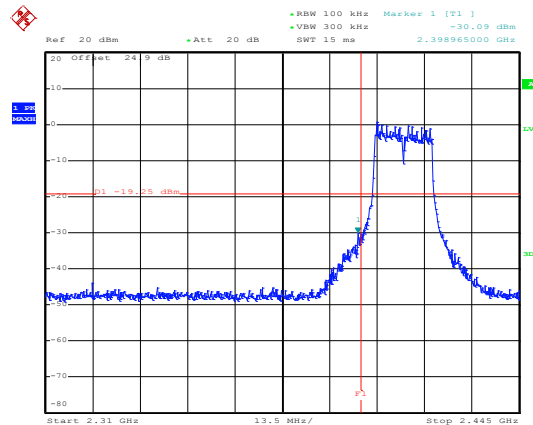
WLAN 802.11g Channel 01

100kHz PSD reference Level



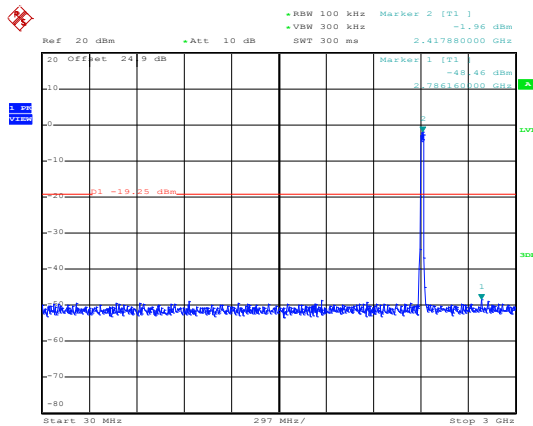
Date: 19.SEP.2017 17:42:19

Low Channel Plot



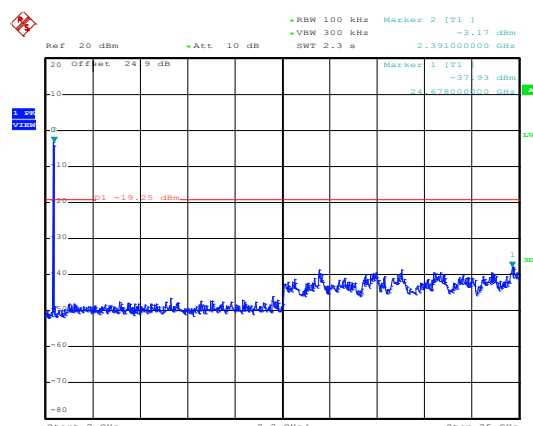
Date: 19.SEP.2017 17:42:40

Spurious Emission 30MHz~3GHz



Date: 19.SEP.2017 17:42:51

Spurious Emission 2GHz~25GHz



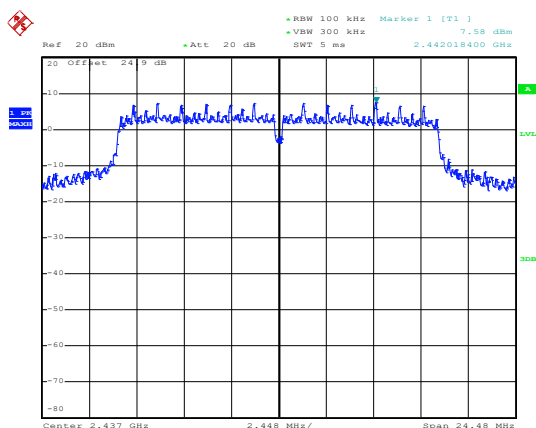
Date: 19.SEP.2017 17:42:59



Number of TX :	2	Ant. :	2
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11g Channel 06

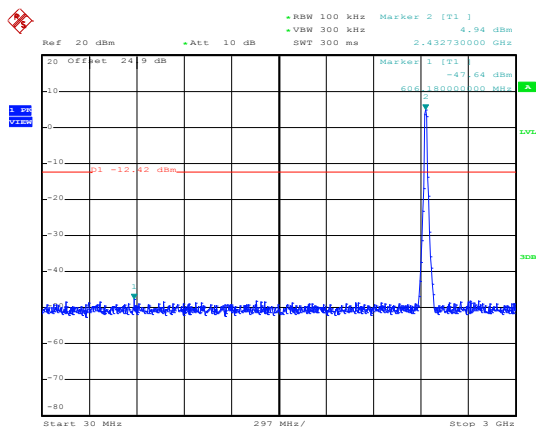
100kHz PSD reference Level



Date: 11.SEP.2017 04:46:20

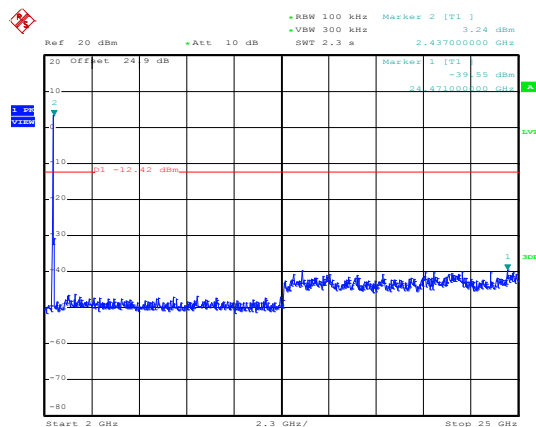
Mid Channel Plot

Spurious Emission 30MHz~3GHz



Date: 11.SEP.2017 04:46:52

Spurious Emission 2GHz~25GHz



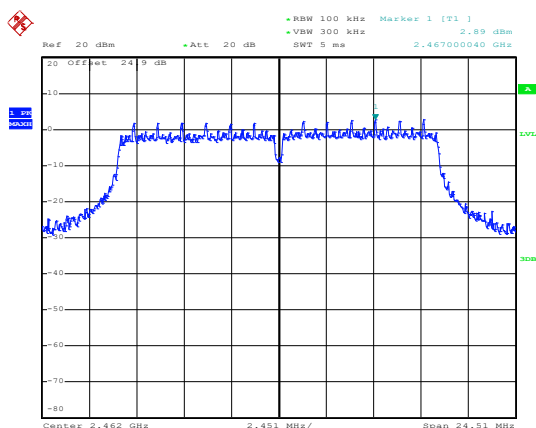
Date: 11.SEP.2017 04:47:01



Number of TX :	2	Ant. :	2
Test Mode :	802.11g	Temperature :	21~25°C
Test Band :	2.4GHz High	Relative Humidity :	51~54%
Test Channel :	11	Test Engineer :	Ethan Lin / Allen Lin

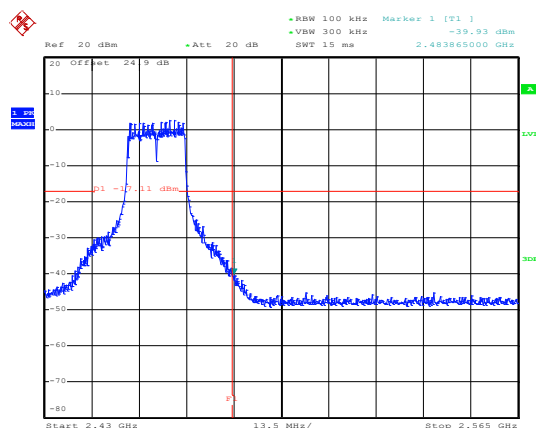
WLAN 802.11g Channel 11

100kHz PSD reference Level



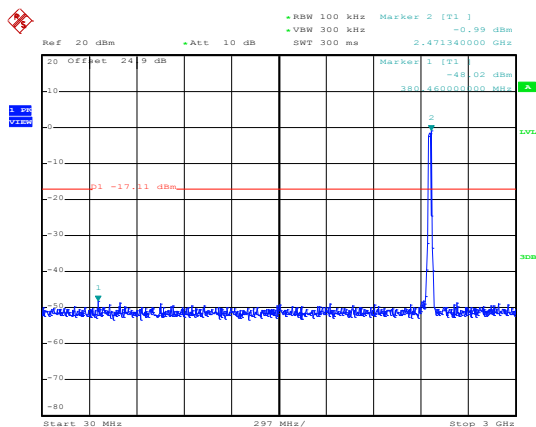
Date: 19.SEP.2017 17:59:13

High Channel Plot



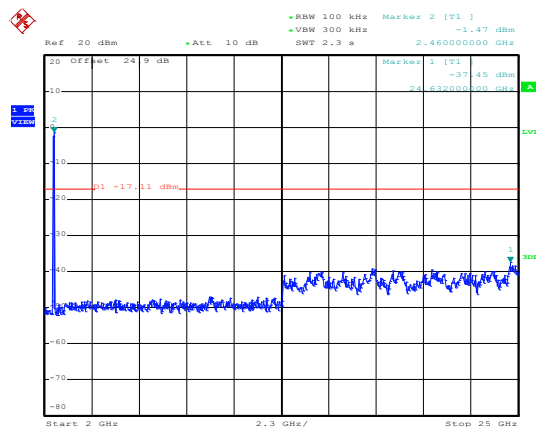
Date: 19.SEP.2017 17:59:43

Spurious Emission 30MHz~3GHz



Date: 19.SEP.2017 18:00:03

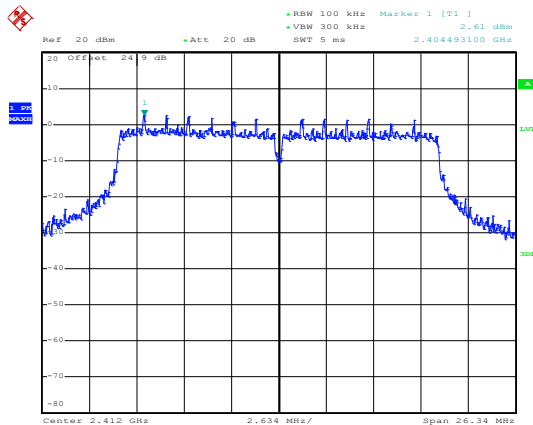
Spurious Emission 2GHz~25GHz



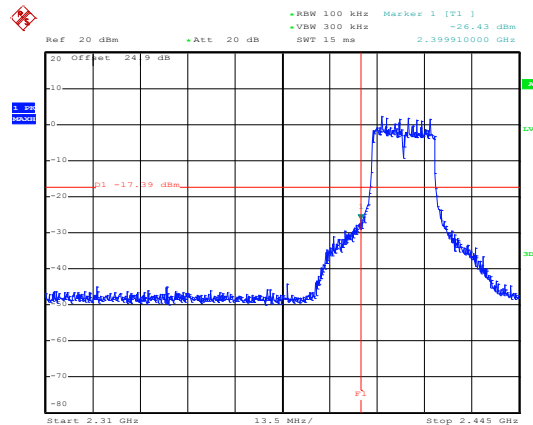
Date: 19.SEP.2017 18:00:11



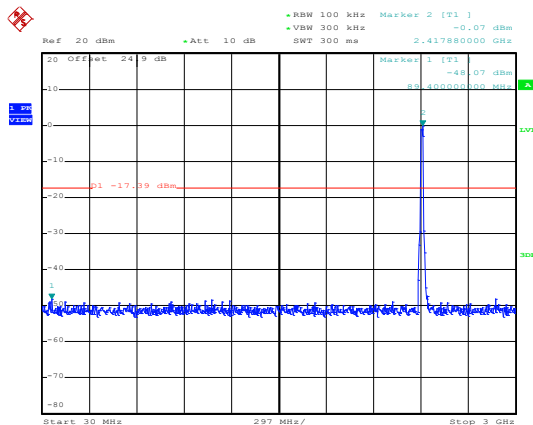
Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Low	Relative Humidity :	51~54%
Test Channel :	01	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11n HT20 Channel 01**100kHz PSD reference Level**

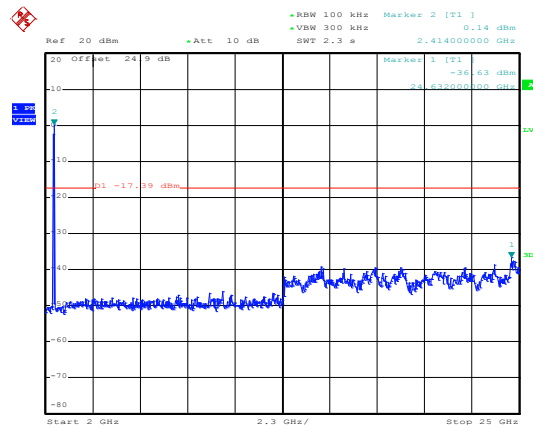
Date: 19.SEP.2017 18:05:57

Low Channel Plot

Date: 19.SEP.2017 18:06:11

Spurious Emission 30MHz~3GHz

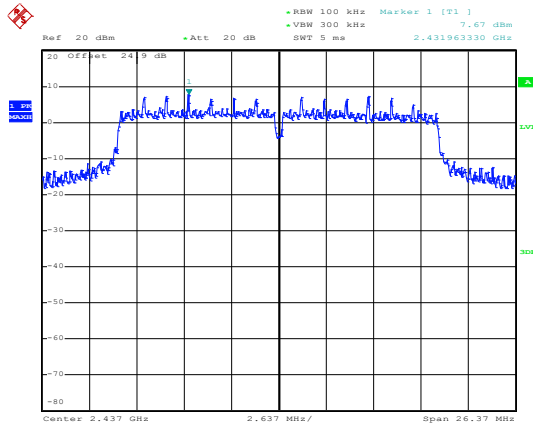
Date: 19.SEP.2017 18:06:54

Spurious Emission 2GHz~25GHz

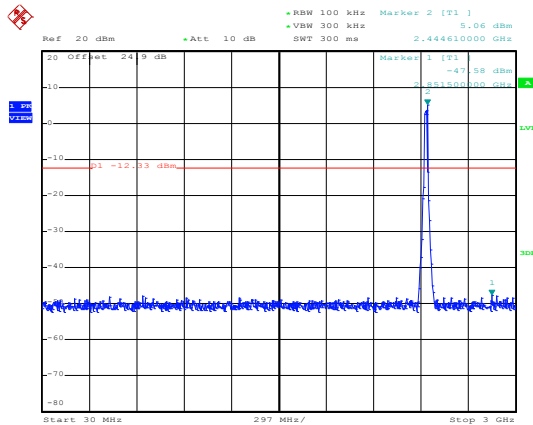
Date: 19.SEP.2017 18:07:03



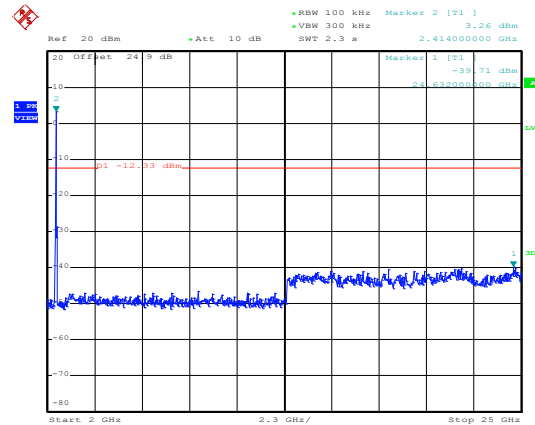
Number of TX :	2	Ant. :	2
Test Mode :	802.11n HT20	Temperature :	21~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	51~54%
Test Channel :	06	Test Engineer :	Ethan Lin / Allen Lin

WLAN 802.11n HT20 Channel 06**100kHz PSD reference Level****Mid Channel Plot**

Date: 11.SEP.2017 05:32:50

Spurious Emission 30MHz~3GHz**Spurious Emission 2GHz~25GHz**

Date: 11.SEP.2017 05:33:02



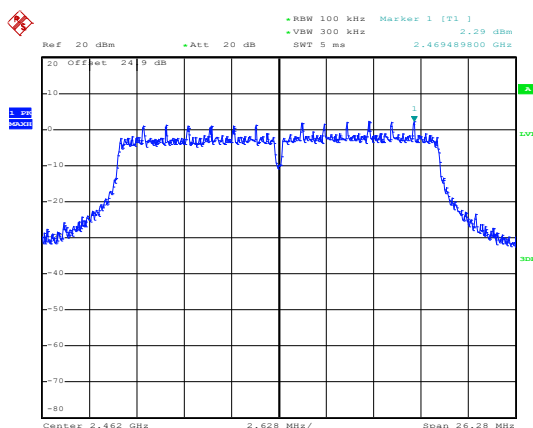
Date: 11.SEP.2017 05:33:10



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

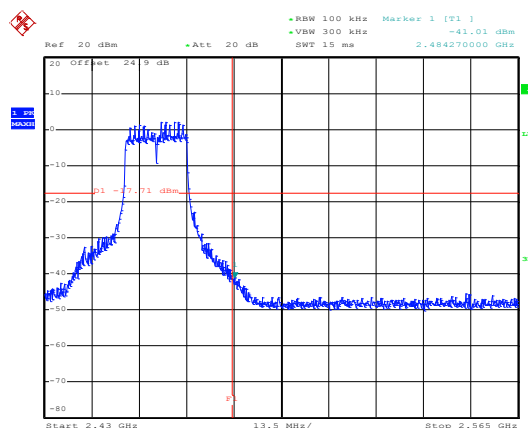
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



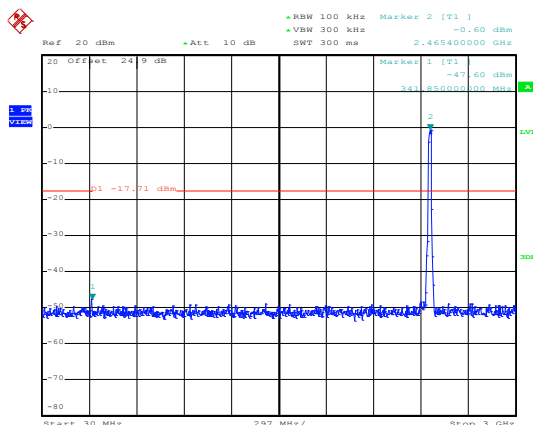
Date: 19.SEP.2017 18:11:22

High Channel Plot



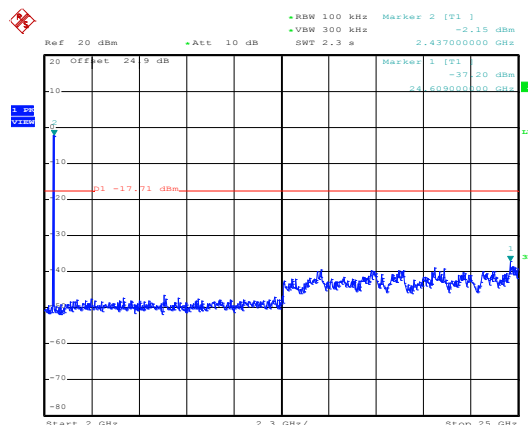
Date: 19.SEP.2017 18:11:36

Spurious Emission 30MHz~3GHz



Date: 19.SEP.2017 18:12:08

Spurious Emission 2GHz~25GHz



Date: 19.SEP.2017 18:12:16



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 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

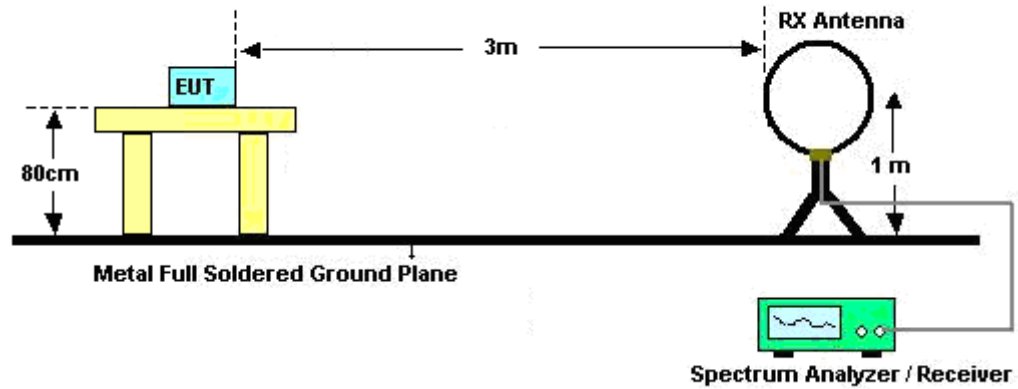
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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 $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

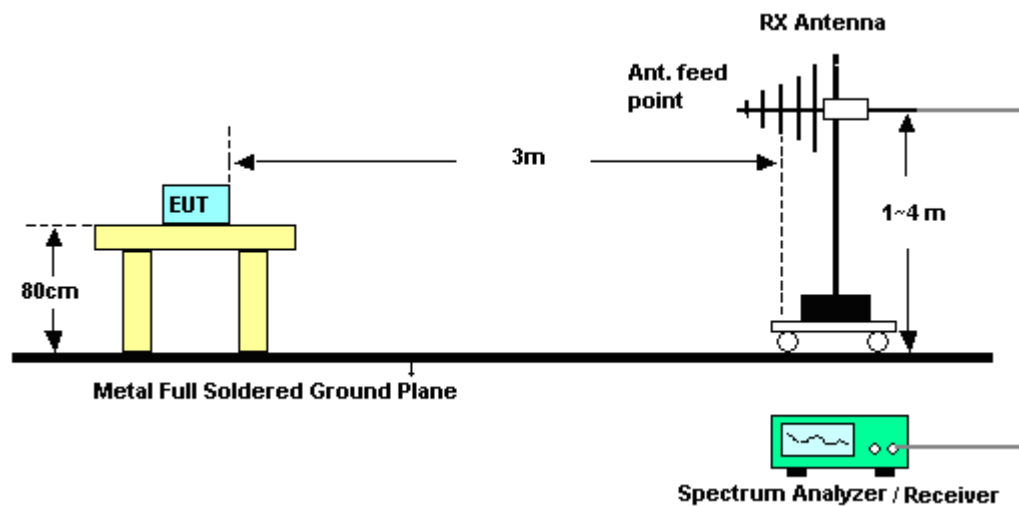
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

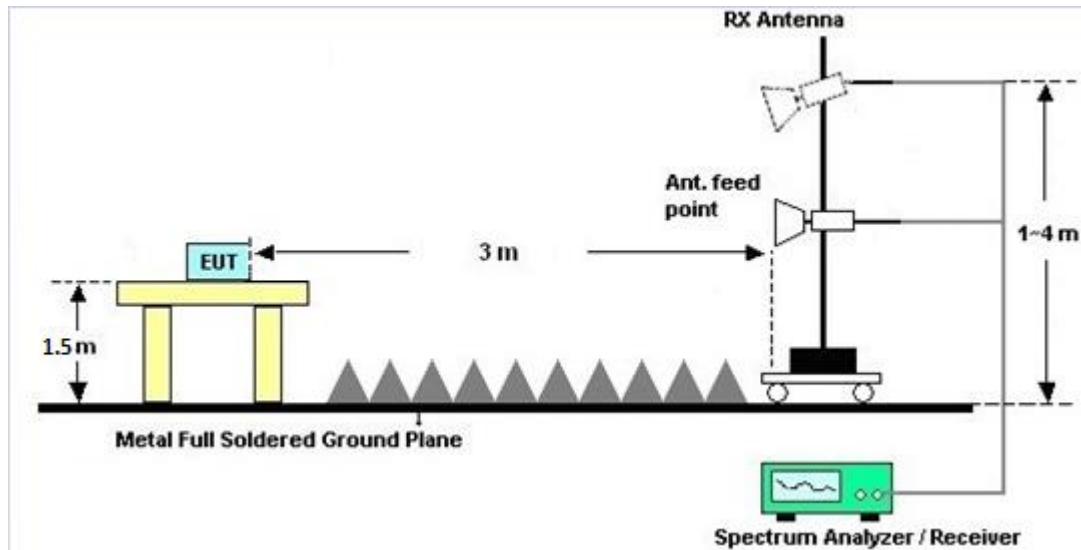
For radiated emissions below 30MHz



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 was not reported.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.5.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

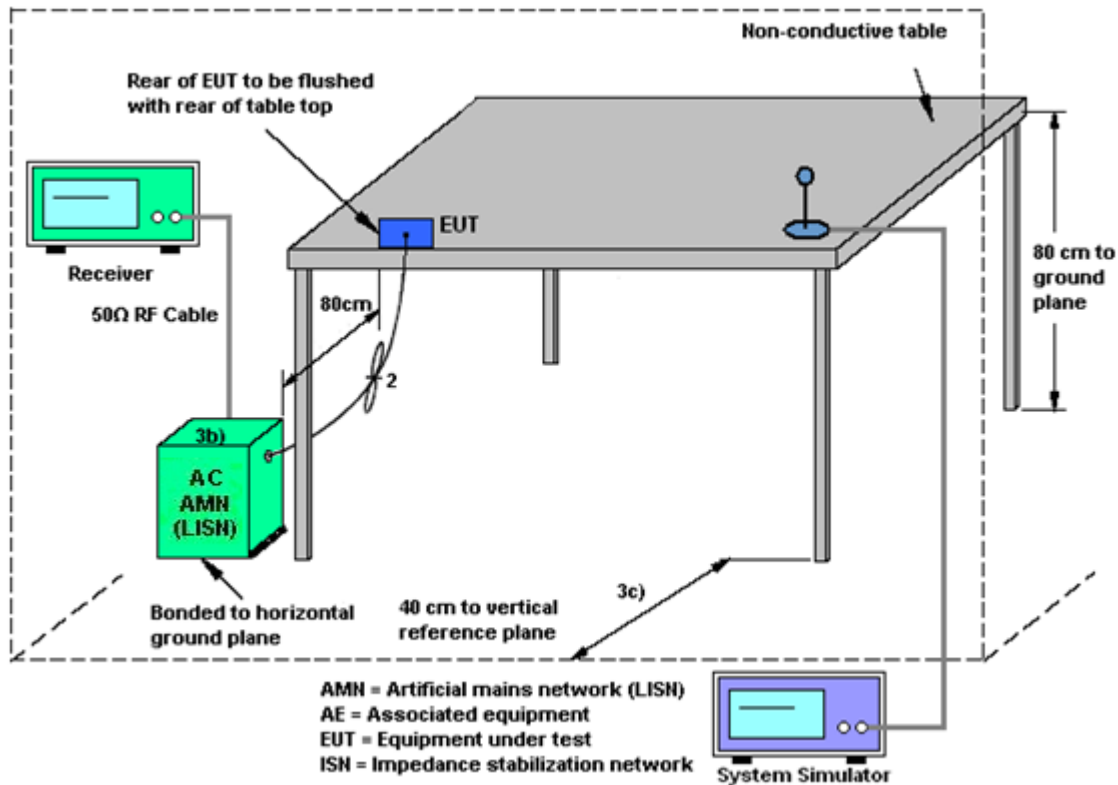
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

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

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



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. 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 rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

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

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

For power measurements on IEEE 802.11 devices,

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

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	0932001	300MHz~40GHz	Sep. 29, 2016	Aug.29, 2017 ~ Sep.19, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	0846202	300MHz~40GHz	Sep. 29, 2016	Aug.29, 2017 ~ Sep.19, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz ~ 30GHz	Nov. 17, 2016	Aug.29, 2017 ~ Sep.19, 2017	Nov. 16, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Sep. 21, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 20, 2017	Sep. 21, 2017	Sep. 19, 2018	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Sep. 21, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 06, 2016	Sep. 21, 2017	Dec. 05, 2017	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	May 15, 2017	Sep. 14, 2017 ~ Sep. 19, 2017	May 14, 2019	Radiation (03CH10-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Oct. 26, 2016	Sep. 14, 2017 ~ Sep. 19, 2017	Oct. 25, 2017	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	35413&02	30MHz~1GHz	Jan. 07, 2017	Sep. 14, 2017 ~ Sep. 19, 2017	Jan. 06, 2018	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz ~ 18GHz	Sep. 30, 2016	Sep. 14, 2017 ~ Sep. 19, 2017	Sep. 29, 2017	Radiation (03CH10-HY)
Preamplifier	Keysight	83017A	MY53270078	1GHz~26.5GHz	Oct. 26, 2016	Sep. 14, 2017 ~ Sep. 19, 2017	Oct. 25, 2017	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz ~ 44GHz	Oct. 17, 2016	Sep. 14, 2017 ~ Sep. 19, 2017	Oct. 16, 2017	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Sep. 14, 2017 ~ Sep. 19, 2017	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Sep. 14, 2017 ~ Sep. 19, 2017	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	Sep. 14, 2017 ~ Sep. 19, 2017	N/A	Radiation (03CH10-HY)
Preamplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz,V SWR : 2.5:1 max	Jul. 21, 2017	Sep. 14, 2017 ~ Sep. 19, 2017	Jul. 20, 2018	Radiation (03CH10-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 08, 2016	Sep. 14, 2017 ~ Sep. 19, 2017	Nov. 07, 2017	Radiation (03CH10-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290045	20Hz to 8.4GHz	Jan. 19, 2017	Sep. 14, 2017 ~ Sep. 19, 2017	Jan. 18, 2018	Radiation (03CH10-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1815698	1GHz~18GHz	Dec. 01, 2016	Sep. 14, 2017 ~ Sep. 19, 2017	Nov. 30, 2018	Radiation (03CH10-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.70
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.60
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.90
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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Appendix A. Conducted Test Results

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Ethan Lin / Allen Lin	Temperature:	21~25	°C
Test Date:	2017/8/29~2017/9/19	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
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	2	1	2412	13.75	14.10	8.06	8.04	0.50	Pass
11b	1Mbps	2	6	2437	14.30	14.80	9.02	9.04	0.50	Pass
11b	1Mbps	2	11	2462	14.00	14.00	8.54	8.52	0.50	Pass
11g	6Mbps	2	1	2412	17.70	17.75	15.92	16.34	0.50	Pass
11g	6Mbps	2	6	2437	19.05	21.55	16.34	16.32	0.50	Pass
11g	6Mbps	2	11	2462	17.80	17.95	16.30	16.34	0.50	Pass
HT20	MCS0	2	1	2412	18.90	19.10	16.64	17.56	0.50	Pass
HT20	MCS0	2	6	2437	19.95	22.95	17.56	17.58	0.50	Pass
HT20	MCS0	2	11	2462	18.90	18.95	17.56	17.52	0.50	Pass

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	17.86	17.67		30.00	30.00	-3.00	-3.00	14.86	14.67	36.00	36.00	Pass
11b	1Mbps	1	6	2437	21.00	20.80		30.00	30.00	-3.00	-3.00	18.00	17.80	36.00	36.00	Pass
11b	1Mbps	1	11	2462	18.21	18.27		30.00	30.00	-3.00	-3.00	15.21	15.27	36.00	36.00	Pass
11g	6Mbps	1	1	2412	20.62	20.50		30.00	30.00	-3.00	-3.00	17.62	17.50	36.00	36.00	Pass
11g	6Mbps	1	6	2437	24.40	22.80		30.00	30.00	-3.00	-3.00	21.40	19.80	36.00	36.00	Pass
11g	6Mbps	1	11	2462	22.20	21.81		30.00	30.00	-3.00	-3.00	19.20	18.81	36.00	36.00	Pass
HT20	MCS0	1	1	2412	21.88	21.10		30.00	30.00	-3.00	-3.00	18.88	18.10	36.00	36.00	Pass
HT20	MCS0	1	6	2437	24.22	22.70		30.00	30.00	-3.00	-3.00	21.22	19.70	36.00	36.00	Pass
HT20	MCS0	1	11	2462	22.11	21.44		30.00	30.00	-3.00	-3.00	19.11	18.44	36.00	36.00	Pass
11b	1Mbps	2	1	2412	17.94	18.40	21.19	30.00		-3.00		18.19		36.00		Pass
11b	1Mbps	2	6	2437	21.05	20.81	23.94	30.00		-3.00		20.94		36.00		Pass
11b	1Mbps	2	11	2462	18.35	18.39	21.38	30.00		-3.00		18.38		36.00		Pass
11g	6Mbps	2	1	2412	20.28	20.71	23.51	30.00		-3.00		20.51		36.00		Pass
11g	6Mbps	2	6	2437	24.43	22.81	26.71	30.00		-3.00		23.71		36.00		Pass
11g	6Mbps	2	11	2462	21.87	21.75	24.82	30.00		-3.00		21.82		36.00		Pass
HT20	MCS0	2	1	2412	21.70	21.30	24.51	30.00		-3.00		21.51		36.00		Pass
HT20	MCS0	2	6	2437	24.27	22.74	26.58	30.00		-3.00		23.58		36.00		Pass
HT20	MCS0	2	11	2462	22.25	21.45	24.88	30.00		-3.00		21.88		36.00		Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	1	1	2412	0.04	0.08	15.62	15.55	
11b	1Mbps	1	6	2437	0.04	0.08	18.71	18.86	
11b	1Mbps	1	11	2462	0.04	0.08	15.89	16.04	
11g	6Mbps	1	1	2412	0.59	0.60	12.08	11.94	
11g	6Mbps	1	6	2437	0.59	0.60	18.71	18.70	
11g	6Mbps	1	11	2462	0.59	0.60	14.05	14.25	
HT20	MCS0	1	1	2412	0.63	0.63	14.43	13.94	
HT20	MCS0	1	6	2437	0.63	0.63	18.61	18.78	
HT20	MCS0	1	11	2462	0.63	0.63	14.08	13.73	
11b	1Mbps	2	1	2412	0.10	0.10	15.76	15.89	18.84
11b	1Mbps	2	6	2437	0.10	0.10	18.90	18.88	21.90
11b	1Mbps	2	11	2462	0.10	0.10	16.17	16.11	19.15
11g	6Mbps	2	1	2412	0.59	0.59	12.10	12.39	15.26
11g	6Mbps	2	6	2437	0.59	0.59	18.92	18.74	21.84
11g	6Mbps	2	11	2462	0.59	0.59	14.25	14.54	17.41
HT20	MCS0	2	1	2412	0.63	0.63	14.45	14.18	17.33
HT20	MCS0	2	6	2437	0.63	0.63	18.89	18.80	21.86
HT20	MCS0	2	11	2462	0.63	0.63	14.23	13.97	17.11

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

TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	2	1	2412	-7.37	-6.99	-3.98	0.01		8.00		Pass
11b	1Mbps	2	6	2437	-4.16	-3.66	-0.65	0.01		8.00		Pass
11b	1Mbps	2	11	2462	-6.66	-7.22	-3.65	0.01		8.00		Pass
11g	6Mbps	2	1	2412	-14.76	-14.93	-11.75	0.01		8.00		Pass
11g	6Mbps	2	6	2437	-8.13	-8.01	-5.00	0.01		8.00		Pass
11g	6Mbps	2	11	2462	-12.73	-12.18	-9.17	0.01		8.00		Pass
HT20	MCS0	2	1	2412	-12.18	-13.12	-9.17	0.01		8.00		Pass
HT20	MCS0	2	6	2437	-7.56	-7.52	-4.51	0.01		8.00		Pass
HT20	MCS0	2	11	2462	-12.86	-13.50	-9.85	0.01		8.00		Pass

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



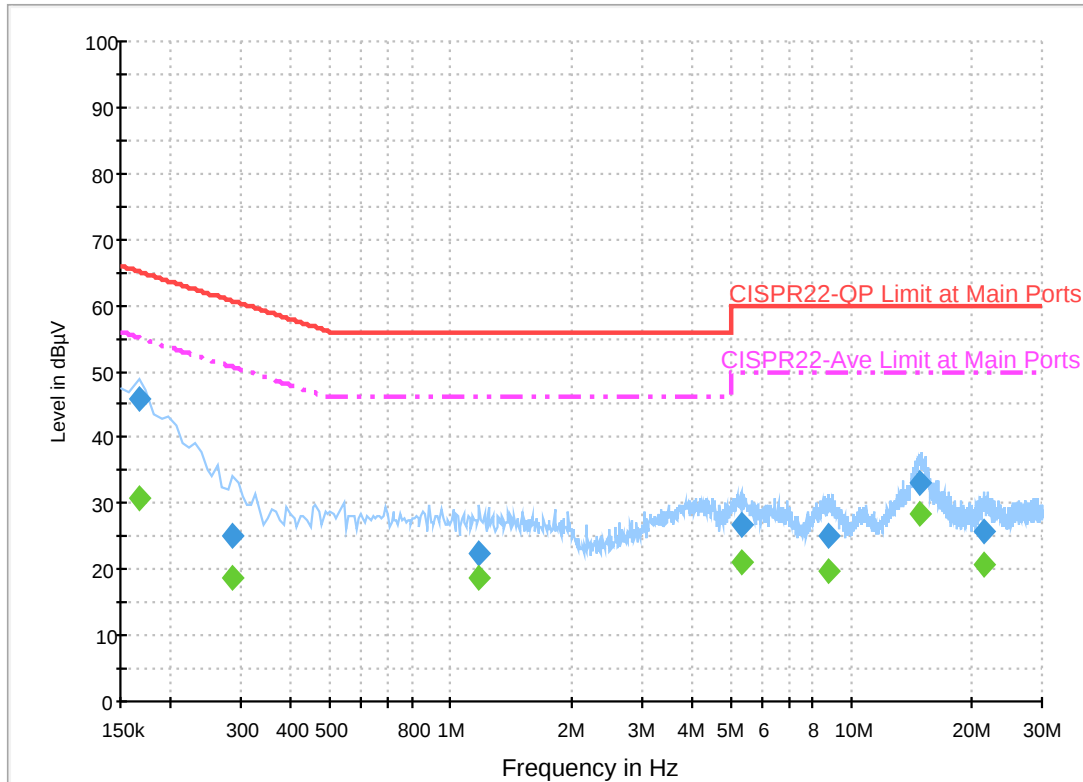
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Shareef Yu	Temperature :	26~27°C
		Relative Humidity :	58~62%

EUT Information

Report NO : 740843
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Line

ENV216 Auto Test FCC Power Bar - L



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	45.9	Off	L1	19.6	19.3	65.2
0.286000	25.1	Off	L1	19.6	35.5	60.6
1.182000	22.3	Off	L1	19.6	33.7	56.0
5.310000	26.7	Off	L1	19.8	33.3	60.0
8.814000	25.2	Off	L1	20.0	34.8	60.0
14.934000	33.3	Off	L1	20.3	26.7	60.0
21.558000	25.6	Off	L1	20.7	34.4	60.0

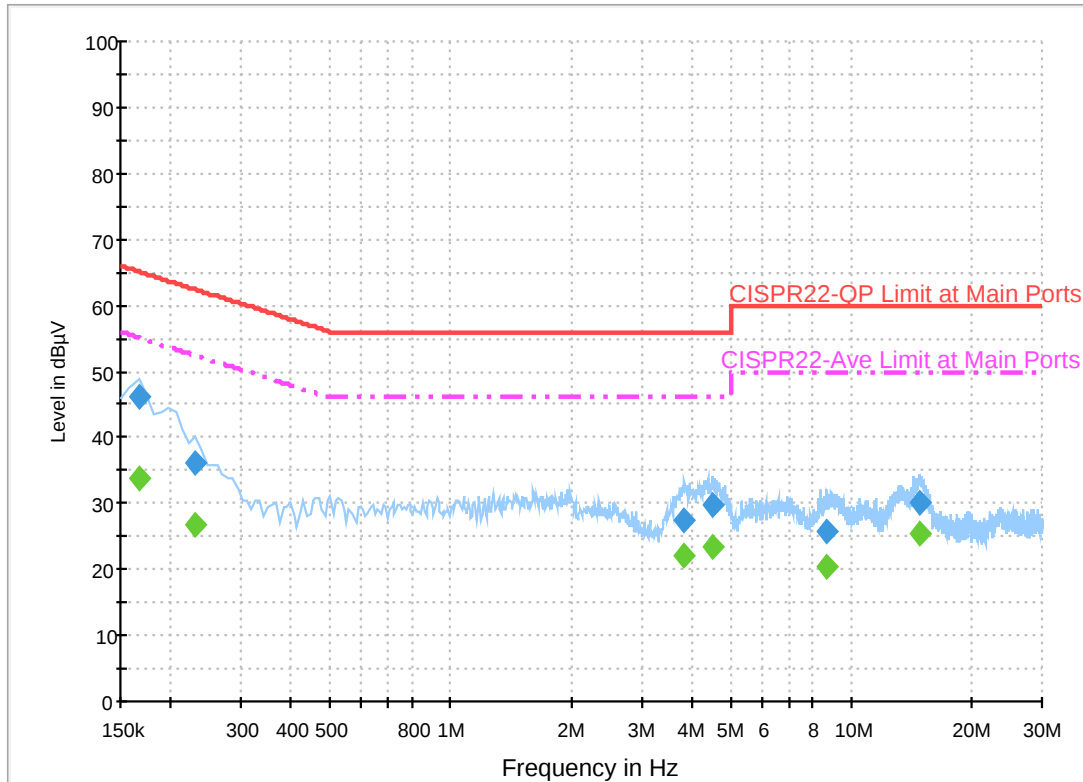
Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	30.9	Off	L1	19.6	24.3	55.2
0.286000	18.8	Off	L1	19.6	31.8	50.6
1.182000	18.8	Off	L1	19.6	27.2	46.0
5.310000	21.2	Off	L1	19.8	28.8	50.0
8.814000	19.8	Off	L1	20.0	30.2	50.0
14.934000	28.5	Off	L1	20.3	21.5	50.0
21.558000	20.8	Off	L1	20.7	29.2	50.0

EUT Information

Report NO : 740843
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Neutral

ENV216 Auto Test FCC Power Bar - N



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.166000	46.1	Off	N	19.5	19.1	65.2
0.230000	36.2	Off	N	19.5	26.2	62.4
3.846000	27.4	Off	N	19.7	28.6	56.0
4.518000	29.7	Off	N	19.7	26.3	56.0
8.718000	25.9	Off	N	20.0	34.1	60.0
14.910000	30.0	Off	N	20.4	30.0	60.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.166000	33.7	Off	N	19.5	21.5	55.2
0.230000	26.9	Off	N	19.5	25.5	52.4
3.846000	22.1	Off	N	19.7	23.9	46.0
4.518000	23.4	Off	N	19.7	22.6	46.0
8.718000	20.5	Off	N	20.0	29.5	50.0
14.910000	25.3	Off	N	20.4	24.7	50.0



Appendix C. Radiated Spurious Emission

Test Engineer :	Tsung Lee / Kyle Jhuang	Temperature :	22~24°C
		Relative Humidity :	43~44%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2359.35	51.73	-22.27	74	43.76	26.8	4.42	33.23	382	134	P	H
		2386.23	44.29	-9.71	54	36.17	26.93	4.43	33.22	382	134	A	H
	*	2412	97.41	-	-	89.18	26.99	4.47	33.21	382	134	P	H
	*	2412	94.11	-	-	85.88	26.99	4.47	33.21	382	134	A	H
													H
													H
		2386.755	55.17	-18.83	74	47.05	26.93	4.43	33.22	146	292	P	V
		2386.44	51.35	-2.65	54	43.23	26.93	4.43	33.22	146	292	A	V
	*	2412	104.02	-	-	95.79	26.99	4.47	33.21	146	292	P	V
	*	2412	100.7	-	-	92.47	26.99	4.47	33.21	146	292	A	V
													V
													V
802.11b CH 06 2437MHz		2338.84	50.71	-23.29	74	42.84	26.74	4.38	33.23	101	38	P	H
		2389.52	40.13	-13.87	54	32.01	26.93	4.43	33.22	101	38	A	H
	*	2440	100.74	-	-	92.36	27.11	4.48	33.19	101	38	P	H
	*	2440	98.52	-	-	90.14	27.11	4.48	33.19	101	38	A	H
		2485.3	53.1	-20.9	74	44.52	27.24	4.53	33.17	101	38	P	H
		2498.25	41.23	-12.77	54	32.58	27.3	4.53	33.16	101	38	A	H
		2389.24	52.53	-21.47	74	44.41	26.93	4.43	33.22	121	298	P	V
		2389.24	46.43	-7.57	54	38.31	26.93	4.43	33.22	121	298	A	V
	*	2437	108.63	-	-	100.25	27.11	4.48	33.19	121	298	P	V
	*	2437	105.3	-	-	96.92	27.11	4.48	33.19	121	298	A	V
		2484.6	52.78	-21.22	74	44.2	27.24	4.53	33.17	121	298	P	V
		2484.67	46.89	-7.11	54	38.31	27.24	4.53	33.17	121	298	A	V



802.11b CH 11 2462MHz	*	2462	100.42	-	-	91.94	27.18	4.5	33.18	100	130	P	H
	*	2462	97.37	-	-	88.89	27.18	4.5	33.18	100	130	A	H
		2490.6	52.99	-21.01	74	44.35	27.3	4.53	33.17	100	130	P	H
		2487.8	45.07	-8.93	54	36.43	27.3	4.53	33.17	100	130	A	H
													H
													H
	*	2462	105.15	-	-	96.67	27.18	4.5	33.18	122	298	P	V
	*	2462	101.64	-	-	93.16	27.18	4.5	33.18	122	298	A	V
		2487.7	55.82	-18.18	74	47.18	27.3	4.53	33.17	122	298	P	V
		2487.6	50.88	-3.12	54	42.24	27.3	4.53	33.17	122	298	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	39.83	-34.17	74	64.86	32.09	7.13	64.74	100	0	P	H
													H
													H
													H
		4824	40.32	-33.68	74	65.35	32.09	7.13	64.74	100	0	P	V
													V
													V
													V
802.11b CH 06 2437MHz		4874	41.94	-32.06	74	66.75	32.21	7.2	64.7	100	0	P	H
		7311	48.23	-25.77	74	66.8	36.86	8.99	64.82	100	0	P	H
													H
													H
		4874	42.65	-31.35	74	67.46	32.21	7.2	64.7	100	0	P	V
		7311	45.03	-28.97	74	63.6	36.86	8.99	64.82	100	0	P	V
													V
													V
802.11b CH 11 2462MHz		4924	39.78	-34.22	74	64.4	32.33	7.24	64.66	100	0	P	H
		7386	44.39	-29.61	74	62.7	37.15	9.05	64.86	100	0	P	H
													H
													H
		4924	38.52	-35.48	74	63.14	32.33	7.24	64.66	100	0	P	V
		7386	43.36	-30.64	74	61.67	37.15	9.05	64.86	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.275	53.43	-20.57	74	45.31	26.93	4.43	33.22	384	134	P	H
		2390	45.52	-8.48	54	37.39	26.93	4.43	33.21	384	134	A	H
	*	2412	97.82	-	-	89.59	26.99	4.47	33.21	384	134	P	H
	*	2412	90.23	-	-	82	26.99	4.47	33.21	384	134	A	H
													H
													H
		2389.485	61.82	-12.18	74	53.7	26.93	4.43	33.22	147	284	P	V
		2390	51.32	-2.68	54	43.19	26.93	4.43	33.21	147	284	A	V
	*	2412	104.11	-	-	95.88	26.99	4.47	33.21	147	284	P	V
	*	2412	96.5	-	-	88.27	26.99	4.47	33.21	147	284	A	V
													V
													V
802.11g CH 06 2437MHz		2387.14	51.31	-22.69	74	43.19	26.93	4.43	33.22	297	39	P	H
		2380.84	40.86	-13.14	54	32.8	26.87	4.43	33.22	297	39	A	H
	*	2437	103.76	-	-	95.38	27.11	4.48	33.19	297	39	P	H
	*	2437	96.27	-	-	87.89	27.11	4.48	33.19	297	39	A	H
		2495.59	51.45	-22.55	74	42.8	27.3	4.53	33.16	297	39	P	H
		2483.97	41.96	-12.04	54	33.38	27.24	4.53	33.17	297	39	A	H
		2386.86	53.72	-20.28	74	45.6	26.93	4.43	33.22	121	310	P	V
		2389.8	46.93	-7.07	54	38.8	26.93	4.43	33.21	121	310	A	V
	*	2437	110.15	-	-	101.77	27.11	4.48	33.19	121	310	P	V
	*	2437	103	-	-	94.62	27.11	4.48	33.19	121	310	A	V
		2486.49	54.59	-19.41	74	46.01	27.24	4.53	33.17	121	310	P	V
		2483.5	45.8	-8.2	54	37.22	27.24	4.53	33.17	121	310	A	V



802.11g CH 11 2462MHz	*	2462	99.31	-	-	90.83	27.18	4.5	33.18	100	146	P	H
	*	2462	91.68	-	-	83.2	27.18	4.5	33.18	100	146	A	H
		2483.8	60.18	-13.82	74	51.6	27.24	4.53	33.17	100	146	P	H
		2483.52	45.61	-8.39	54	37.03	27.24	4.53	33.17	100	146	A	H
													H
													H
	*	2462	105.35	-	-	96.87	27.18	4.5	33.18	100	303	P	V
	*	2462	98.08	-	-	89.6	27.18	4.5	33.18	100	303	A	V
		2483.6	63.96	-10.04	74	55.38	27.24	4.53	33.17	100	303	P	V
		2483.52	51.34	-2.66	54	42.76	27.24	4.53	33.17	100	303	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.695	54.95	-19.05	74	46.83	26.93	4.43	33.22	382	139	P	H
		2389.905	42.72	-11.28	54	34.59	26.93	4.43	33.21	382	139	P	H
	*	2412	99.36	-	-	91.13	26.99	4.47	33.21	382	139	P	H
	*	2412	91.79	-	-	83.56	26.99	4.47	33.21	382	139	A	H
													H
													H
		2389.905	64.23	-9.77	74	56.1	26.93	4.43	33.21	106	311	P	V
		2390	51.21	-2.79	54	43.08	26.93	4.43	33.21	106	311	A	V
	*	2412	106.47	-	-	98.24	26.99	4.47	33.21	106	311	P	V
	*	2412	98.73	-	-	90.5	26.99	4.47	33.21	106	311	A	V
													V
													V
802.11n HT20 CH 06 2437MHz		2389.94	55.06	-18.94	74	46.93	26.93	4.43	33.21	297	40	P	H
		2389.66	42.2	-11.8	54	34.08	26.93	4.43	33.22	297	40	A	H
	*	2437	103.34	-	-	94.96	27.11	4.48	33.19	297	40	P	H
	*	2437	95.5	-	-	87.12	27.11	4.48	33.19	297	40	A	H
		2486.77	52.3	-21.7	74	43.72	27.24	4.53	33.17	297	39	P	H
		2485.58	41.36	-12.64	54	32.78	27.24	4.53	33.17	297	39	A	H
		2389.66	61.91	-12.09	74	53.79	26.93	4.43	33.22	121	310	P	V
		2389.94	49.88	-4.12	54	41.75	26.93	4.43	33.21	121	310	A	V
	*	2437	110.28	-	-	101.9	27.11	4.48	33.19	121	310	P	V
	*	2437	103.13	-	-	94.75	27.11	4.48	33.19	121	310	A	V
		2484.04	56.22	-17.78	74	47.64	27.24	4.53	33.17	121	310	P	V
		2483.83	45.98	-8.02	54	37.4	27.24	4.53	33.17	121	310	A	V



802.11n HT20 CH 11 2462MHz	*	2462	99.16	-	-	90.68	27.18	4.5	33.18	100	146	P	H
	*	2462	91.4	-	-	82.92	27.18	4.5	33.18	100	146	A	H
		2484.72	57.04	-16.96	74	48.46	27.24	4.53	33.17	100	146	P	H
		2484.76	44.26	-9.74	54	35.68	27.24	4.53	33.17	100	146	A	H
													H
													H
	*	2462	105.6	-	-	97.12	27.18	4.5	33.18	100	303	P	V
	*	2462	97.66	-	-	89.18	27.18	4.5	33.18	100	303	A	V
		2483.72	66.6	-7.4	74	58.02	27.24	4.53	33.17	100	303	P	V
		2483.52	51.37	-2.63	54	42.79	27.24	4.53	33.17	100	303	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	39.23	-34.77	74	64.26	32.09	7.13	64.74	100	0	P	H
													H
													H
													H
		4824	41.08	-32.92	74	66.11	32.09	7.13	64.74	100	0	P	V
													V
													V
													V
802.11n HT20 CH 06 2437MHz		4874	39.89	-34.11	74	64.7	32.21	7.2	64.7	100	0	P	H
		7311	44.81	-29.19	74	63.38	36.86	8.99	64.82	100	0	P	H
													H
													H
		4874	39.6	-34.4	74	64.41	32.21	7.2	64.7	100	0	P	V
		7311	43.21	-30.79	74	61.78	36.86	8.99	64.82	100	0	P	V
													V
													V
802.11n HT20 CH 11 2462MHz		4924	39.64	-34.36	74	64.26	32.33	7.24	64.66	100	0	P	H
		7386	42.92	-31.08	74	61.23	37.15	9.05	64.86	100	0	P	H
													H
													H
		4924	39.95	-34.05	74	64.57	32.33	7.24	64.66	100	0	P	V
		7386	43.43	-30.57	74	61.74	37.15	9.05	64.86	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT20 LF		30.54	21.58	-18.42	40	29.95	23.78	0.53	32.76			P	H
		100.2	24.78	-18.72	43.5	40.29	16.05	0.97	32.77			P	H
		215.76	22.81	-20.69	43.5	38.58	15.14	1.44	32.74			P	H
		556.9	26.09	-19.91	46	30.34	25.93	2.18	32.95			P	H
		724.2	28.75	-17.25	46	31.17	27.48	2.48	32.97			P	H
		890.8	33.33	-12.67	46	33.12	29.11	2.74	32.34	100	0	P	H
													H
													H
													H
													H
													H
		39.72	29.41	-10.59	40	41.93	19.43	0.69	32.75	100	0	P	V
		67.26	25.63	-14.37	40	45.38	12.07	0.77	32.75			P	V
		99.93	24.72	-18.78	43.5	40.23	16.05	0.97	32.77			P	V
		542.9	25.08	-20.92	46	30.65	24.6	2.18	32.93			P	V
		741.7	29.78	-16.22	46	31.44	28.18	2.51	32.95			P	V
		885.9	31.4	-14.6	46	31.21	29.13	2.74	32.38			P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

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



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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		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”.



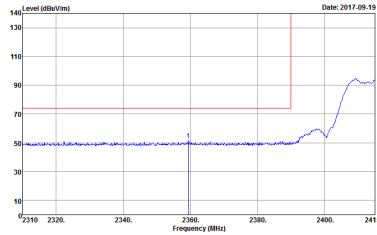
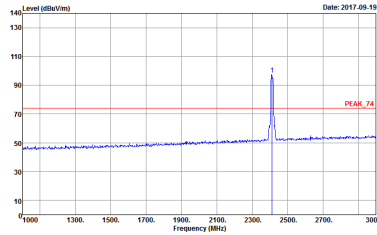
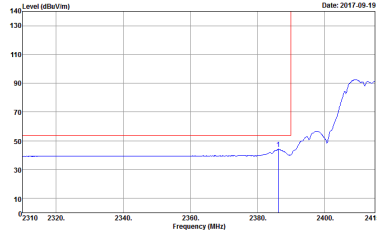
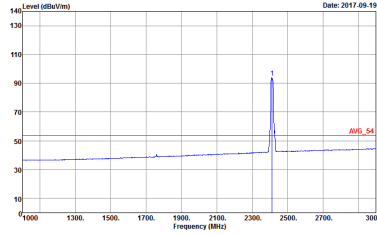
Appendix D. Radiated Spurious Emission Plots

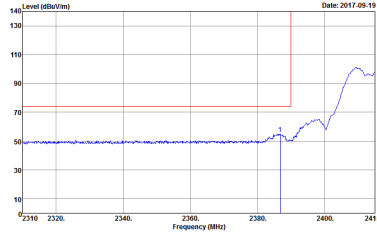
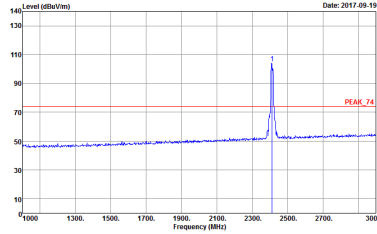
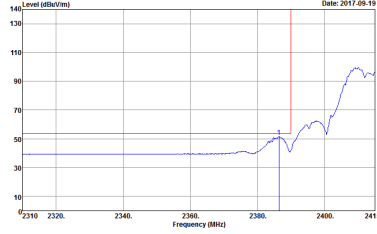
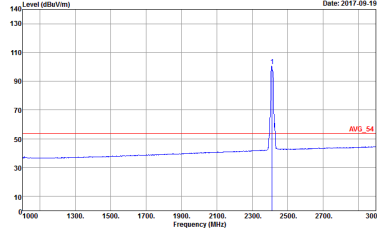
Test Engineer :	Tsung Lee / Kyle Jhuang	Temperature :	22~24°C
		Relative Humidity :	43~44%

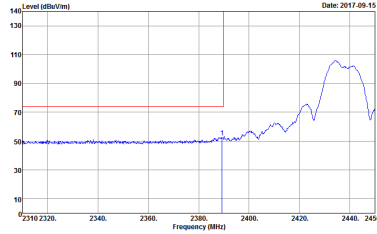
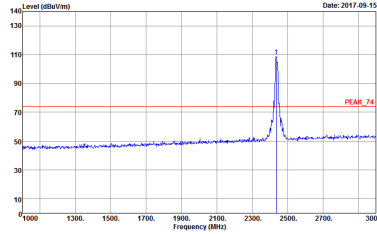
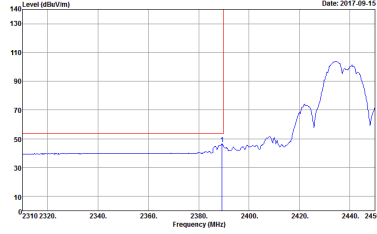
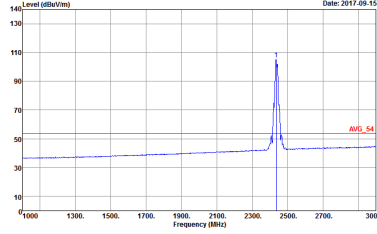
Note symbol

-L	Low channel location
-R	High channel location

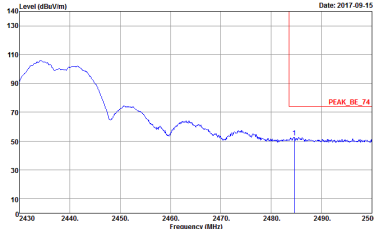
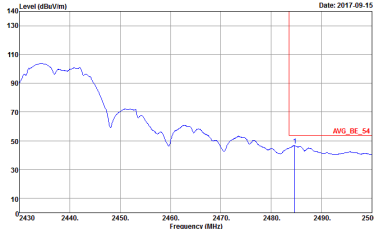
2.4GHz 2400~2483.5MHz
WIFI 802.11b (Band Edge @ 3m)

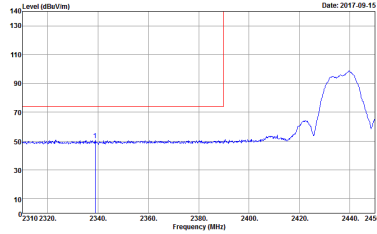
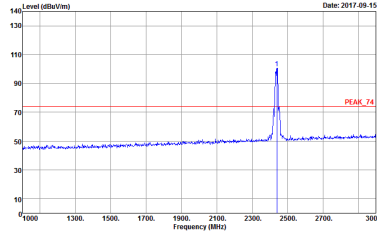
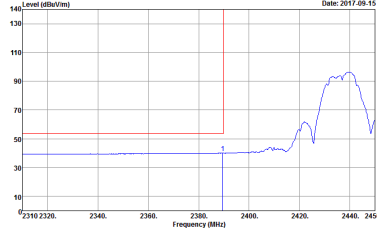
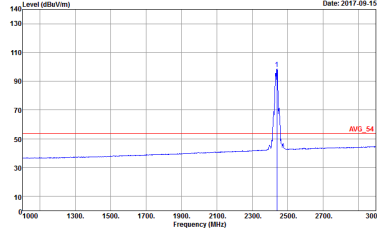
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 10	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 10
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 10	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 10

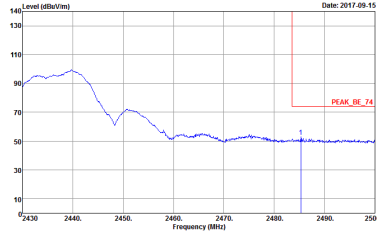
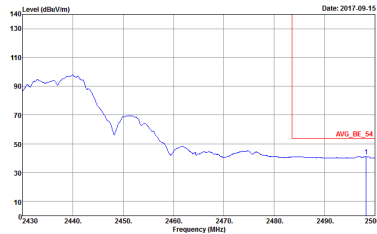
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 740843 Date: 2017-09-19	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 740843 Date: 2017-09-19
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL Detector : RBW:1000.000KHz VBW:0.100KHz SWT:Auto Project : Peak Mode : 740843 Date: 2017-09-19	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF VERTICAL Detector : RBW:1000.000KHz VBW:0.100KHz SWT:Auto Project : Peak Mode : 740843 Date: 2017-09-19

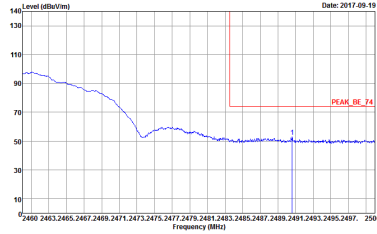
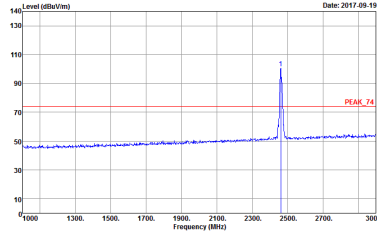
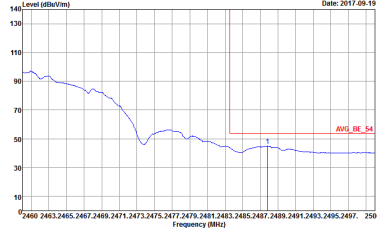
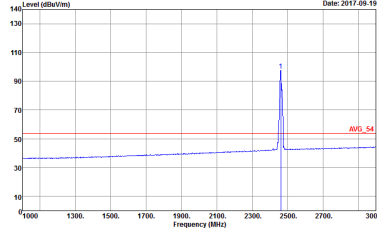
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HV Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11	 Site : 03CH10-HV Condition : PEAK_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11
Avg.	 Site : 03CH10-HV Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:0.100KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11	 Site : 03CH10-HV Condition : AVG_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:0.100KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11



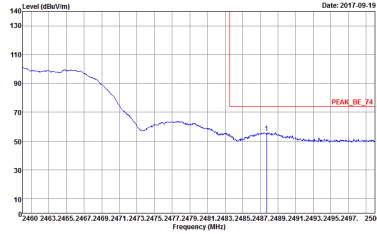
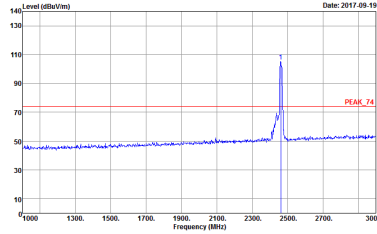
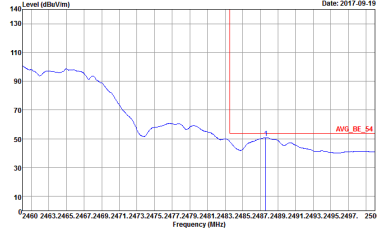
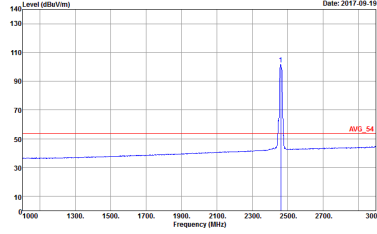
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11	Left blank
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11	Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:0.100KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:0.100KHz SWT:Auto Detector : Peak Project : 740843 Mode : 11

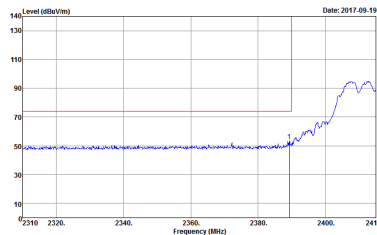
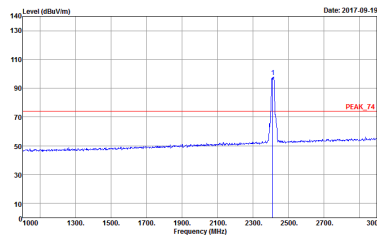
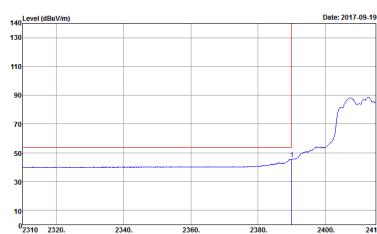
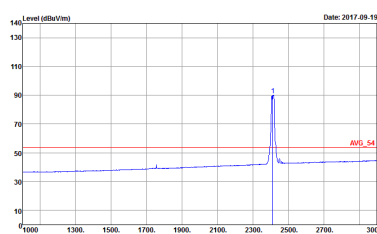
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 740843 Mode : 11	Left blank
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 740843 Mode : 11	Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 12	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 12
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:0.100KHz SWT:Auto Detector : Peak Project : 740843 Mode : 12	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:0.100KHz SWT:Auto Detector : Peak Project : 740843 Mode : 12



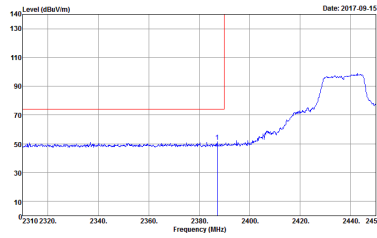
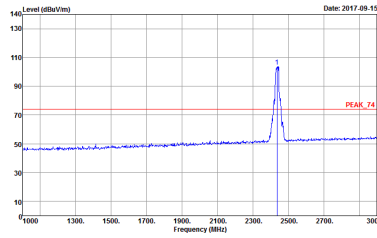
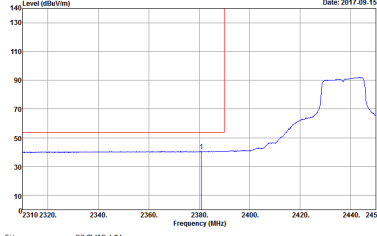
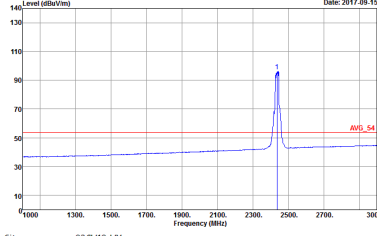
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 12	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 12 Setting :
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:0.100KHz SWT:Auto Detector : Peak Project : 740843 Mode : 12	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:0.100KHz SWT:Auto Detector : Peak Project : 740843 Mode : 12

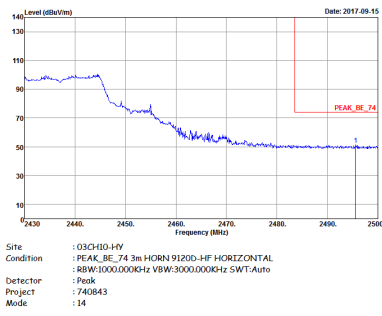
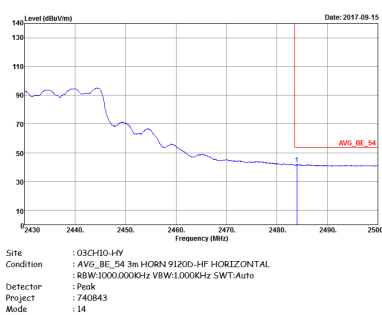
2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 13	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 13
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 13	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL : RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 13

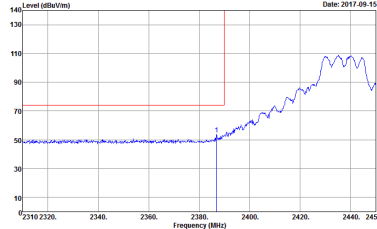
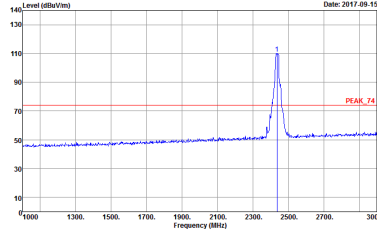
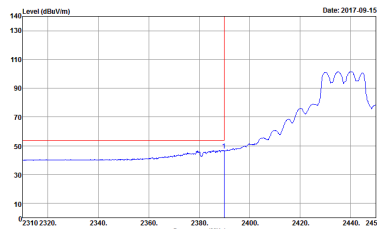
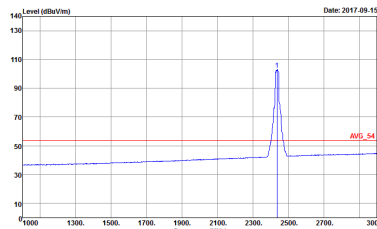


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1+2	Vertical	Fundamental
Peak	Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL Detector : Peak Project : 740843 Mode : 13	Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF VERTICAL Detector : Peak Project : 740843 Mode : 13
Avg.	Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL Detector : Peak Project : 740843 Mode : 13	Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF VERTICAL Detector : Peak Project : 740843 Mode : 13

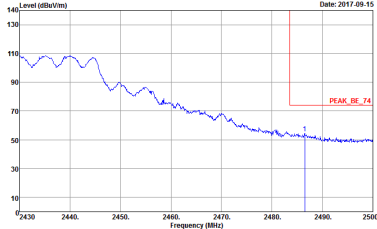
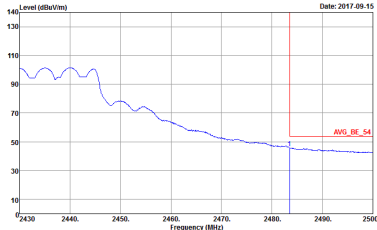
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 14	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 14
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 14	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 14

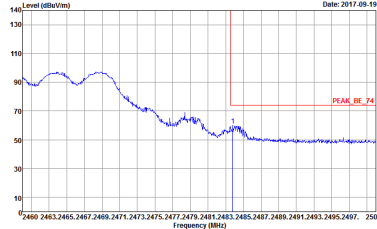
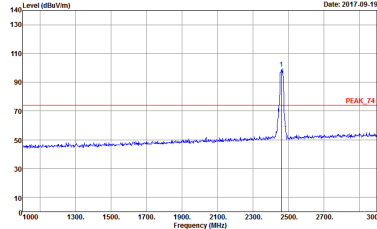
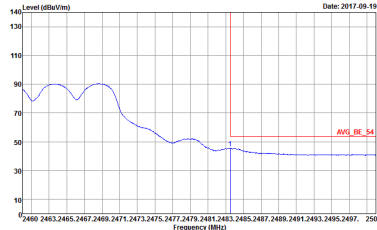
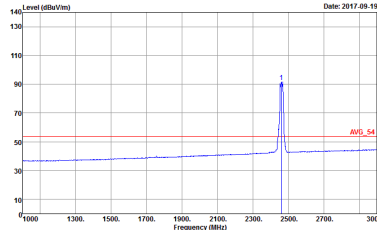
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank



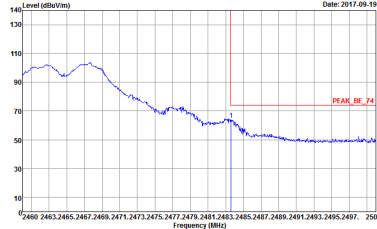
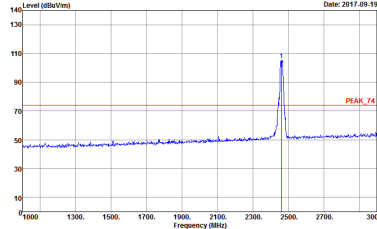
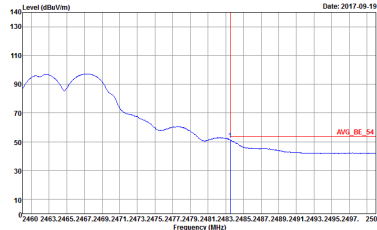
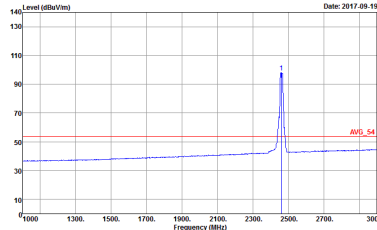
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL Detector : Peak Project : 740843 Mode : 14	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF VERTICAL Detector : Peak Project : 740843 Mode : 14
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL Detector : Peak Project : 740843 Mode : 14	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF VERTICAL Detector : Peak Project : 740843 Mode : 14



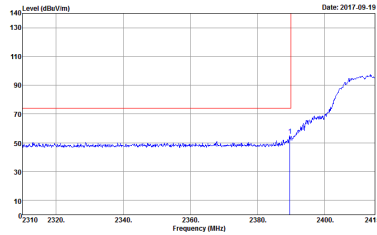
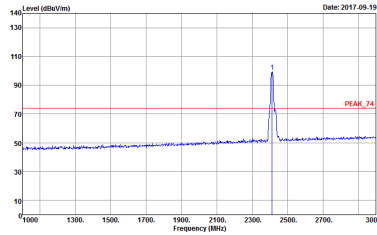
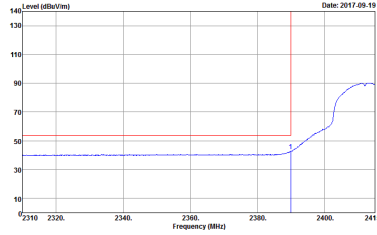
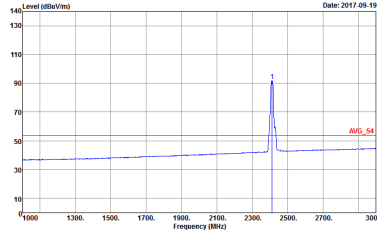
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH100-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 14	Left Blank
Avg.	 Site : 03CH100-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 14	Left Blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 740843 Mode : 15	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 740843 Mode : 15
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 740843 Mode : 15	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 740843 Mode : 15

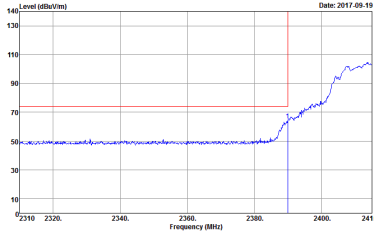
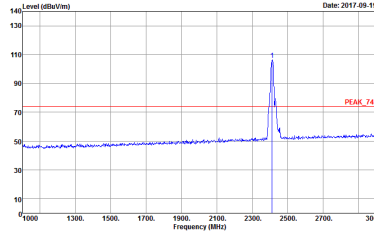
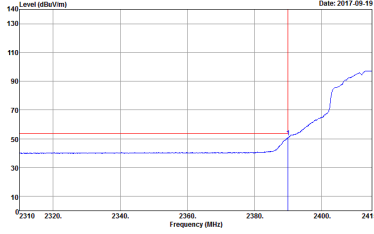
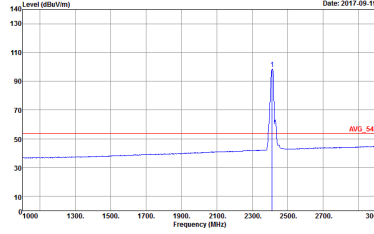


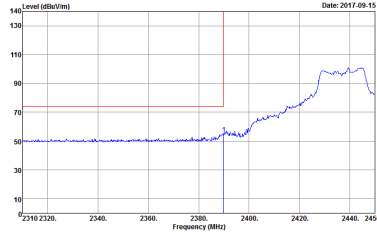
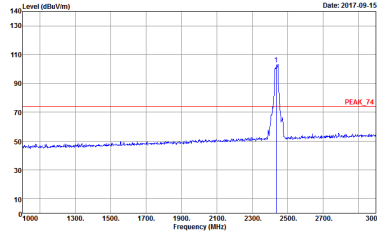
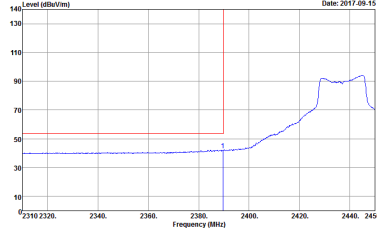
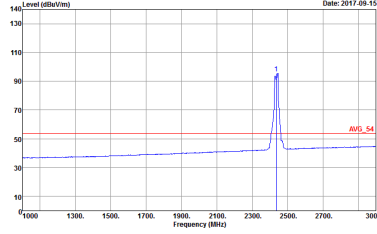
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 15	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 15
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 15	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 15

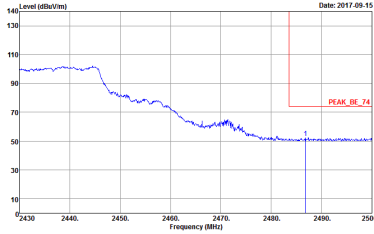
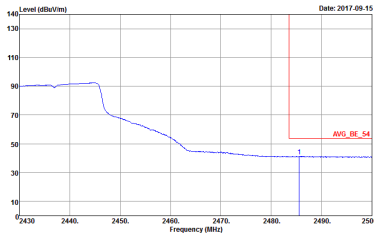
2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

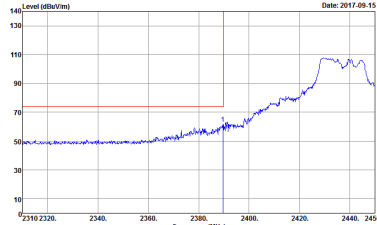
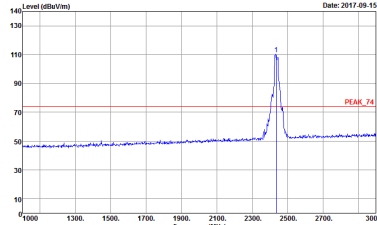
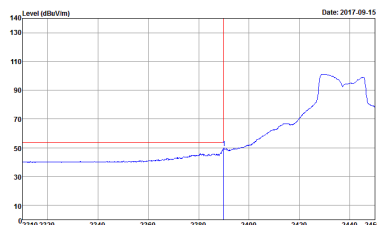
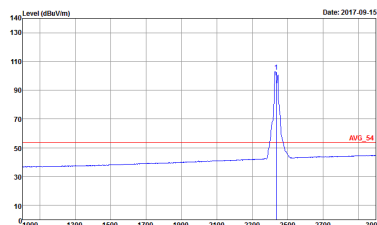
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 16	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 16
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 16	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 16



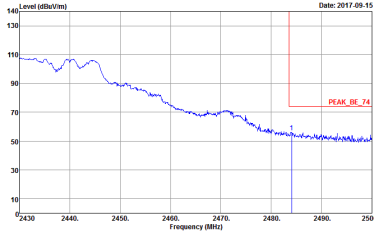
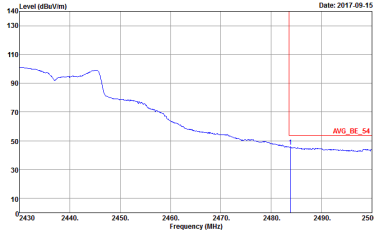
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 16	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 16
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 16	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 16

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 17	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 17
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 17	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 17

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 740843 Mode : 17	Left blank
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 740843 Mode : 17	Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 740843 : 17	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : Peak Mode : 740843 : 17
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL Detector : RBW:1000.000KHz VBW:1000KHz SWT:Auto Project : Peak Mode : 740843 : 17	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF VERTICAL Detector : RBW:1000.000KHz VBW:1000KHz SWT:Auto Project : Peak Mode : 740843 : 17

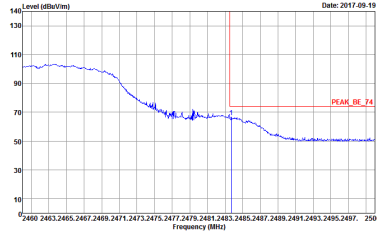
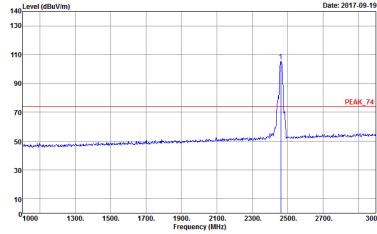
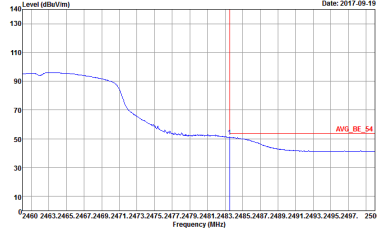
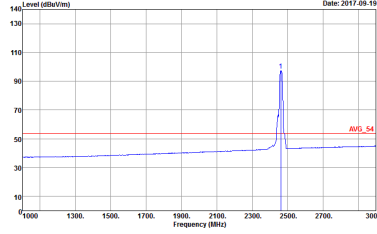


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 17	Left Blank
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 17	Left Blank

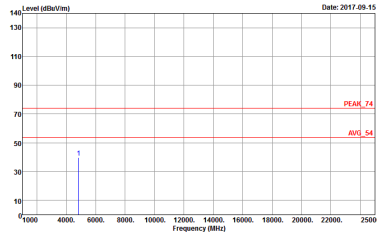
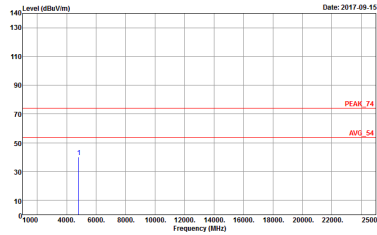


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak	Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 18	Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 18
Avg.	Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 18	Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 18

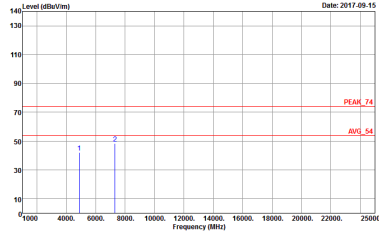
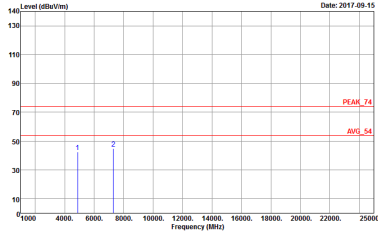


WIFI	2.4GHz 2400~2483.5MHz Fundamental @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH10-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 18	 Site : 03CH10-HY Condition : PEAK_74 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 18
Avg.	 Site : 03CH10-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 18	 Site : 03CH10-HY Condition : AVG_54 3m HORN 91200-HF VERTICAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 740843 Mode : 18

2.4GHz 2400~2483.5MHz
WIFI 802.11b (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH10-11Y Condition : PEAK_74 3m HORN_9170_406_0584 HORIZONTAL Detector : Peak Project : 740843 Mode : 10	 Site : 03CH10-11Y Condition : PEAK_74 3m HORN_9170_406_0584 VERTICAL Detector : Peak Project : 740843 Mode : 10

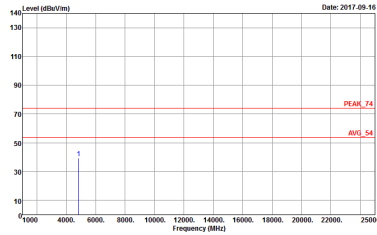
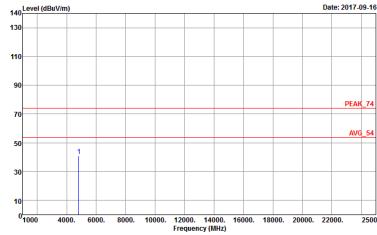


WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH10-I-VY Condition : PEAK_74 3m HORN_9170_406_0584 HORIZONTAL Detector : Peak Project : 740843 Mode : 11	 Site : 03CH10-I-VY Condition : PEAK_74 3m HORN_9170_406_0584 VERTICAL Detector : Peak Project : 740843 Mode : 11



WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.	Site : 03CH10-IHV Condition : PEAK_74 3m HORN_9170_406_0584 HORIZONTAL Detector : Peak Project : 740843 Mode : 12	Site : 03CH10-IHV Condition : PEAK_74 3m HORN_9170_406_0584 VERTICAL Detector : Peak Project : 740843 Mode : 12

2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH10-11Y Condition : PEAK_74 3m HORN_9170_40G_0584 HORIZONTAL Detector : Peak Project : 740843 Mode : 16 Setting : 9	 Site : 03CH10-11Y Condition : PEAK_74 3m HORN_9170_40G_0584 VERTICAL Detector : Peak Project : 740843 Mode : 16 Setting : 9

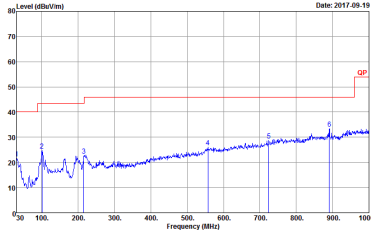
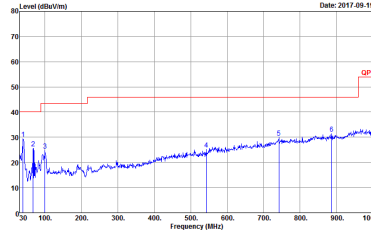


WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.	Site : 03CH10-I-VV Condition : PEAK_74 3m HORN_9170_406_0584 HORIZONTAL Detector : Peak Project : 740843 Mode : 17	Site : 03CH10-I-VV Condition : PEAK_74 3m HORN_9170_406_0584 VERTICAL Detector : Peak Project : 740843 Mode : 17



WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.	Site : 03CH10-IHV Condition : PEAK_74 3m HORN_9170_406_0584 HORIZONTAL Detector : Peak Project : 740843 Mode : IS	Site : 03CH10-IHV Condition : PEAK_74 3m HORN_9170_406_0584 VERTICAL Detector : Peak Project : 740843 Mode : IS

Emission below 1GHz
2.4GHz WIFI 802.11n HT20 (LF)

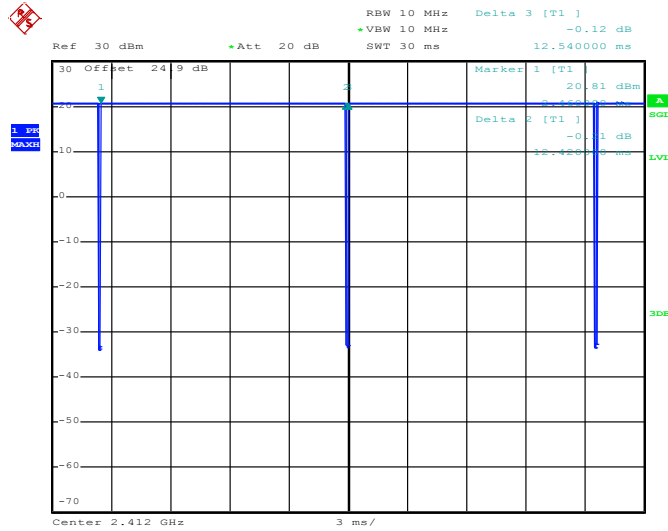
WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11n HT20 LF	
1+2	Horizontal	Vertical
QP / Peak	 Site : 03CH10-HY Condition : QP 3m BT-LOG 6111D-LF HORIZONTAL Detector : Peak Project : 740843 Mode : 22	 Site : 03CH10-HY Condition : QP 3m BT-LOG 6111D-LF VERTICAL Detector : Peak Project : 740843 Mode : 22

Appendix E. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11b	99.04	-	-	10Hz
2	802.11b	98.10	-	-	
1+2	802.11b for Ant. 1	97.64	12420	0.08	100Hz
1+2	802.11b for Ant. 2	97.64	12420	0.08	
1	802.11g	87.29	2060	0.49	1kHz
2	802.11g	87.18	2040	0.49	
1+2	802.11g for Ant. 1	87.29	2060	0.49	
1+2	802.11g for Ant. 2	87.29	2060	0.49	
1	2.4GHz 802.11n HT20 for Ant. 1	86.49	1920	0.52	1kHz
2	2.4GHz 802.11n HT20 for Ant. 2	86.49	1920	0.52	
1+2	2.4GHz 802.11n HT20 for Ant. 1	86.49	1920	0.52	
1+2	2.4GHz 802.11n HT20 for Ant. 2	86.49	1920	0.52	

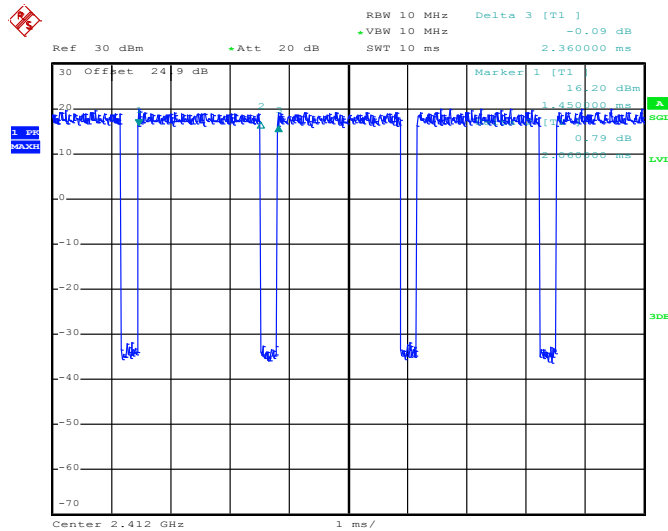
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802.11b



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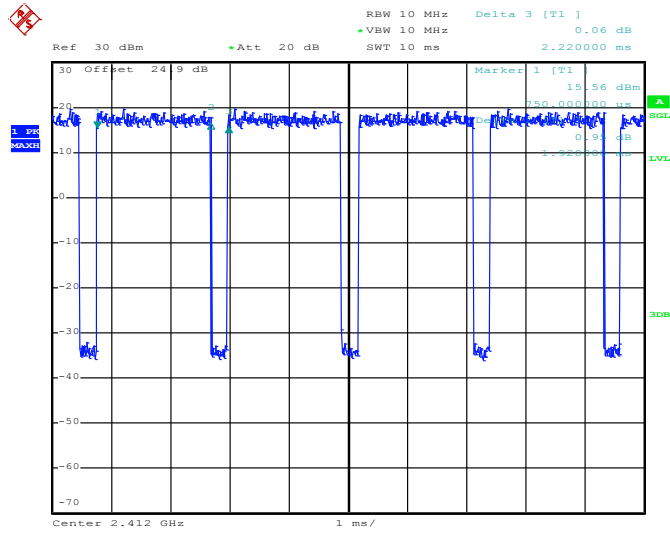
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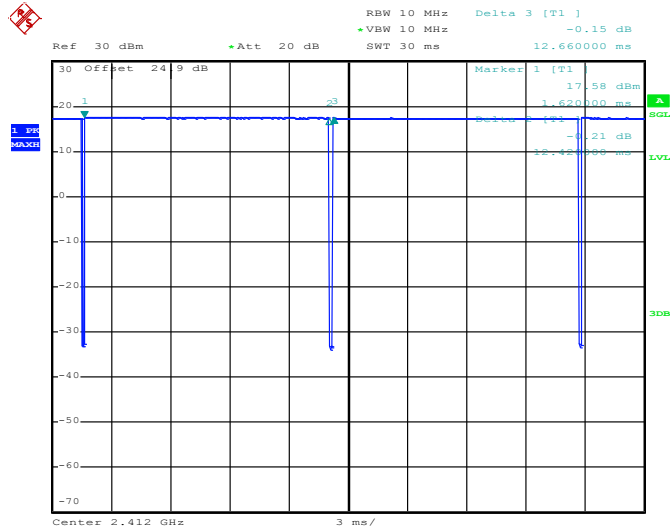
802.11n HT20



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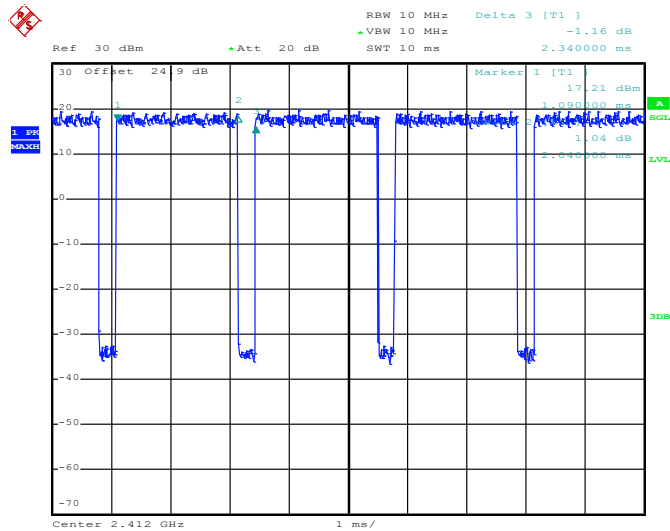
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802.11b



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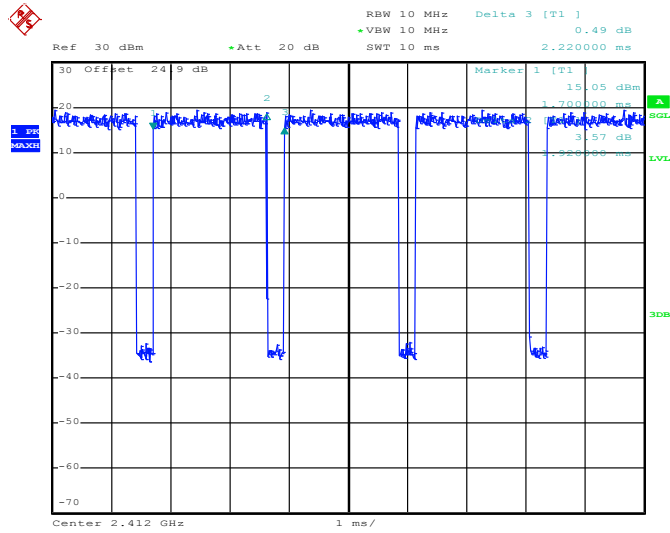
802.11g



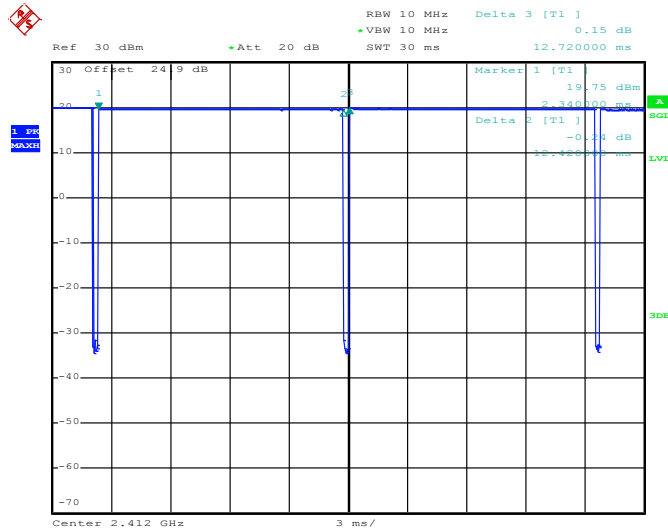
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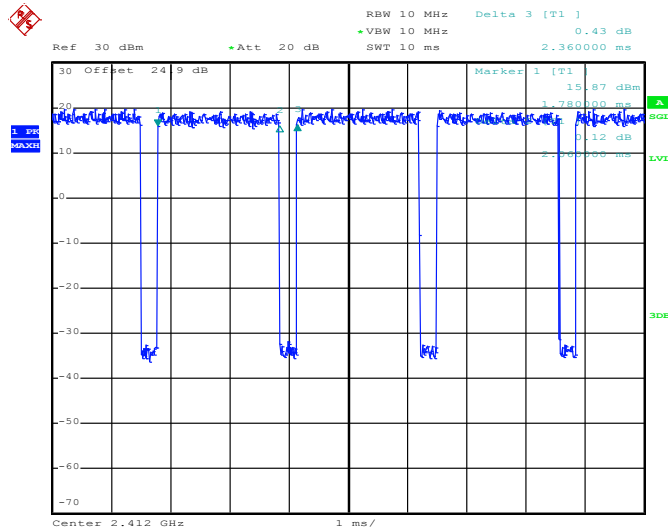
802.11n HT20



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MIMO <Ant. 1>
802.11b


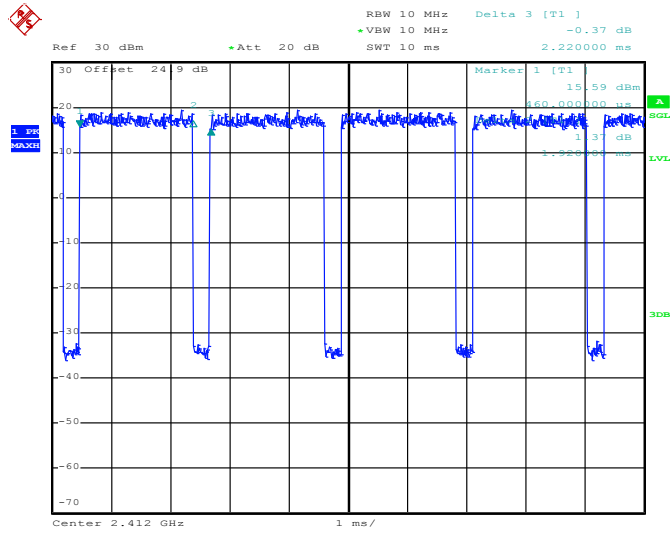
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802.11g


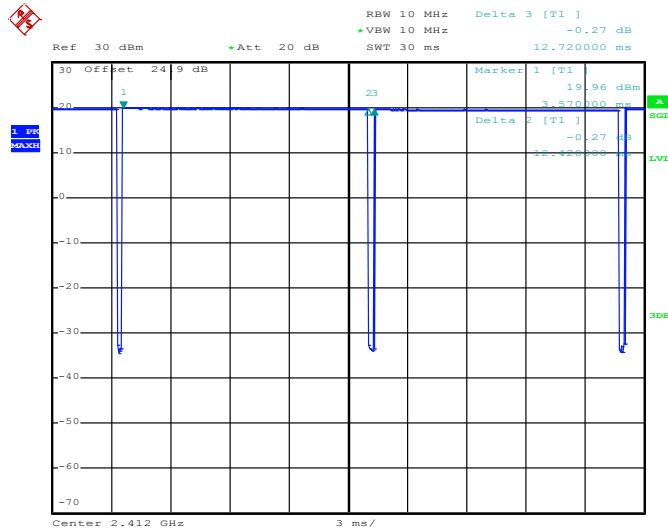
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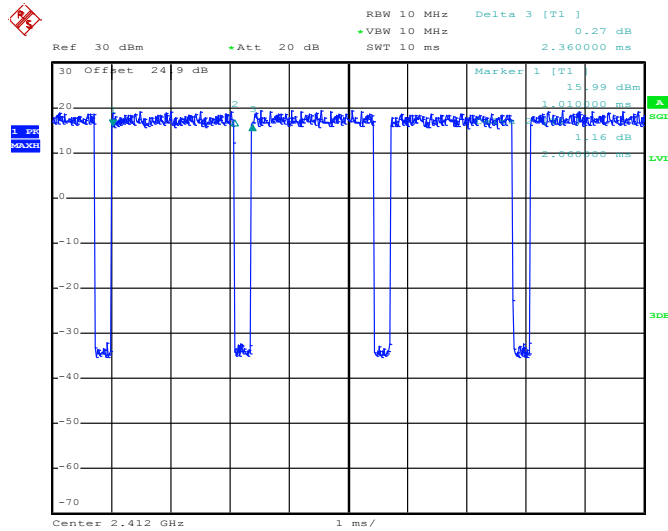
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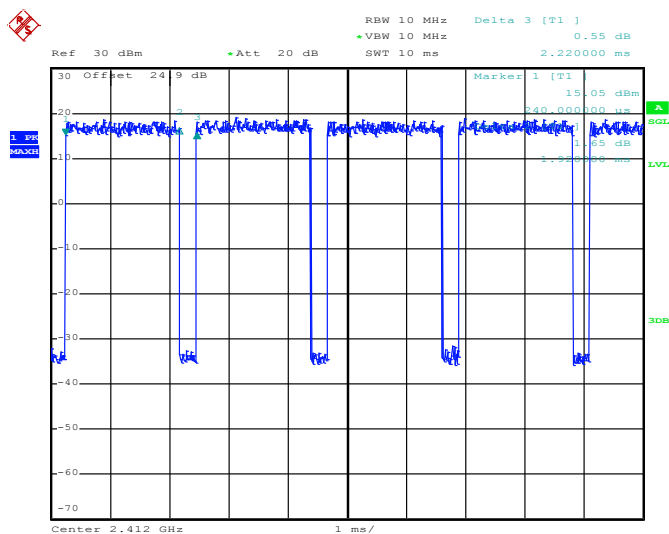
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802.11b


Date: 29.AUG.2017 21:07:07

802.11g


Date: 29.AUG.2017 21:10:25



Date: 29.AUG.2017 21:13:33