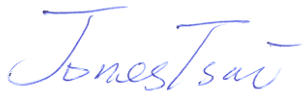
FCC RF Test Report

APPLICANT	:	Essential Products Inc.
EQUIPMENT	:	Smartphone
BRAND NAME	:	Essential Products
MODEL NAME	:	A11
FCC ID	:	2ALBB-A11
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Apr. 08, 2017 and testing was completed on Jun. 13, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL INC.

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

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR740822C	Rev. 01	Initial issue of report	Jun. 16, 2017
FR740822C	Rev. 02	Add the test results description of radiated spurious emission below 30MHz in section 3.5.5.	Jun. 20, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 1.47 dB at 7311.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 9.40 dB at 0.478 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Essential Products Inc.
380 Portage Ave., Palo Alto, CA 94306

1.2 Manufacturer

FIH Mobile Limited
No. 4, Mingsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan

1.3 Product Feature of Equipment Under Test

GSM/WCDMA/CDMA2000/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, NFC, and GPS.

Product Specification subjective to this standard	
Antenna Type	WWAN: PIFA Antenna WLAN: Monopole Antenna Bluetooth: Monopole Antenna GPS/Glonass/Galileo/Beidou : Monopole Antenna NFC: Loop Antenna

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 1st 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.**
	03CH12-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 (Y 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

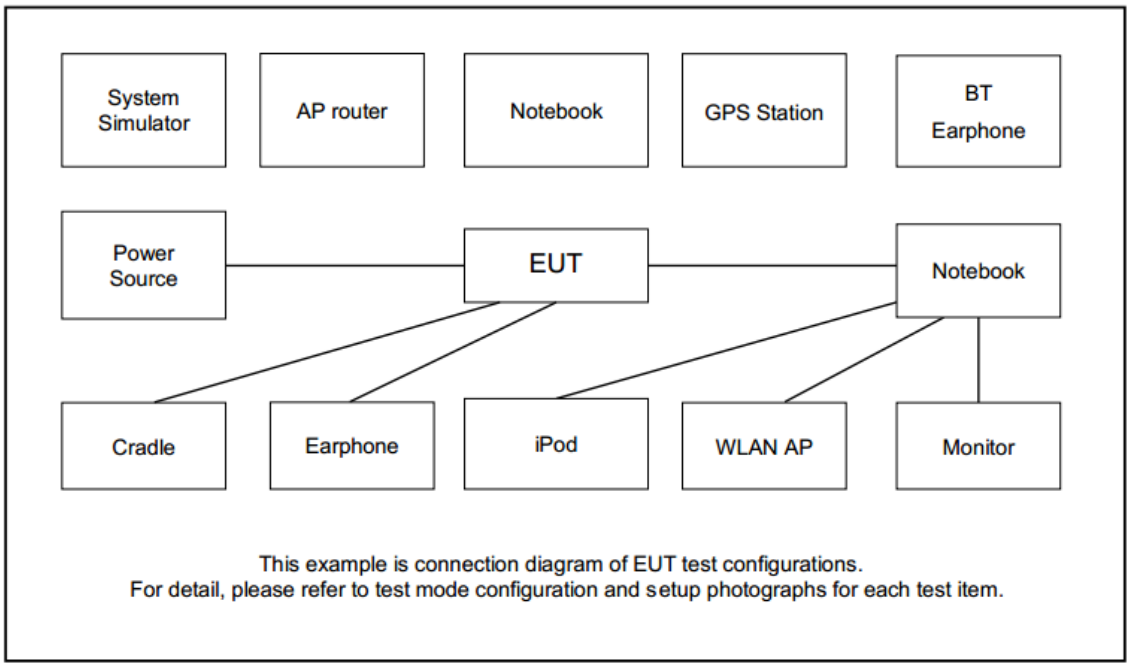
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

MIMO Antenna

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

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

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.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	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
4.	Notebook	Lenovo	G480	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	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.

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

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

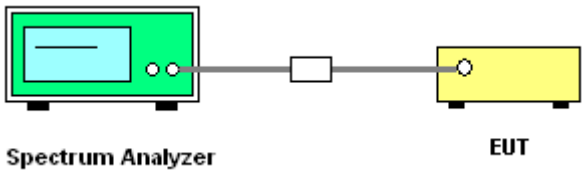
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

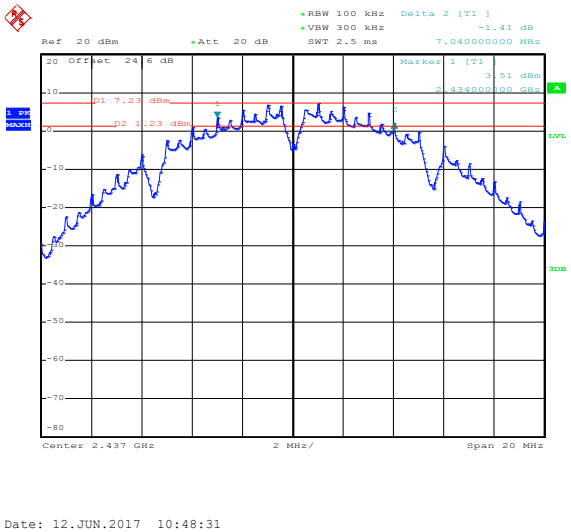
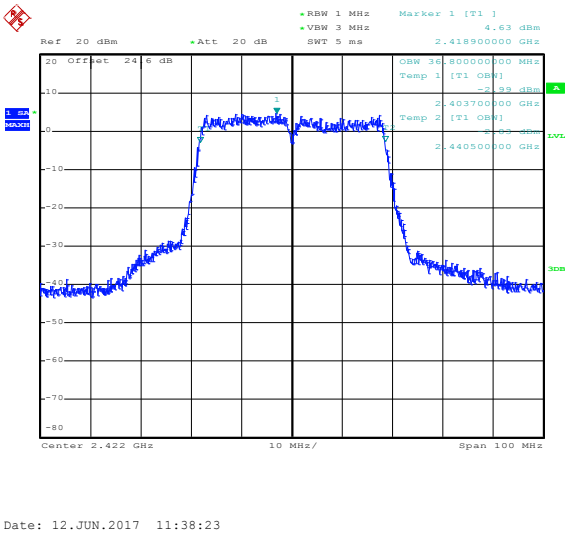
1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit 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.

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

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.

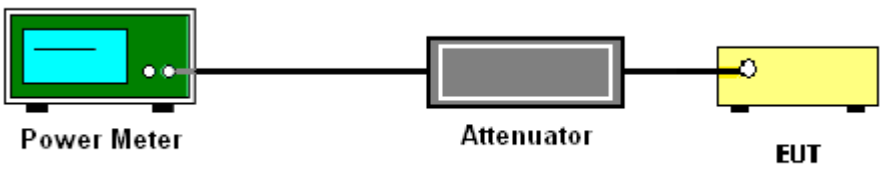
3.2.2 Measuring Instruments

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.

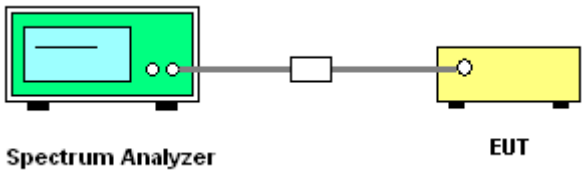
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   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)

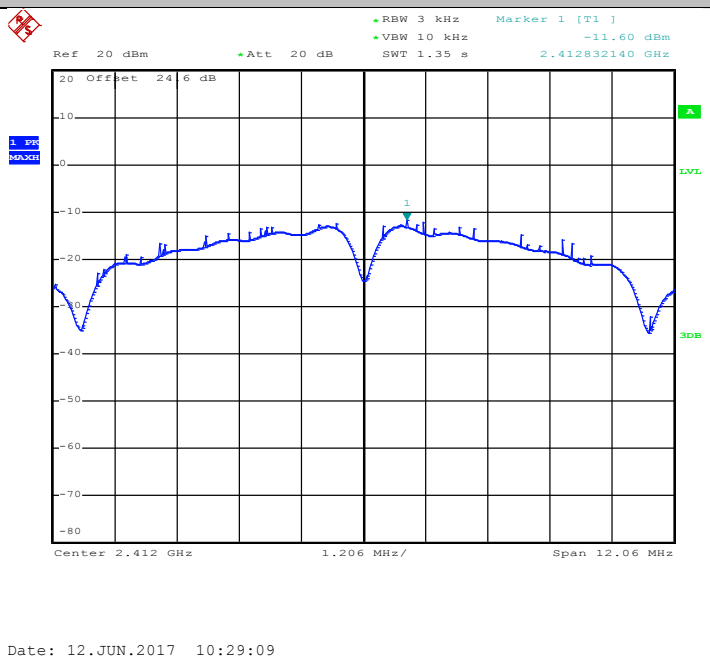
3.3.4 Test Setup



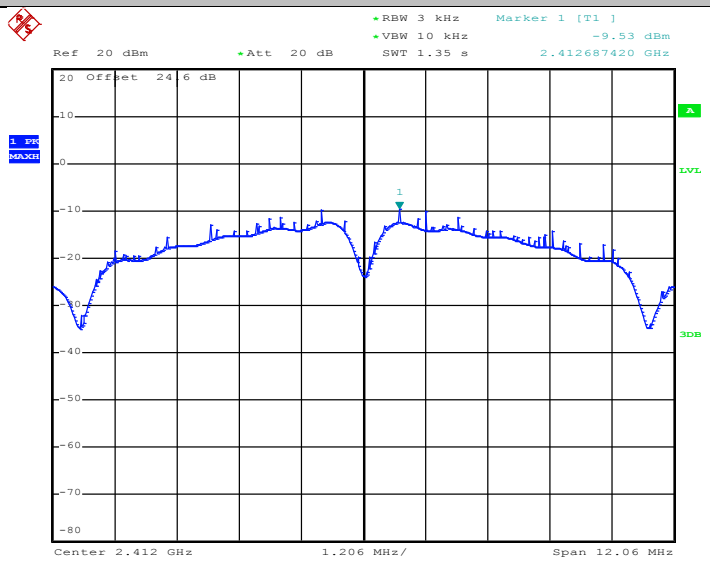
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/3kHz) for MIMO Ant. 1



Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2



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

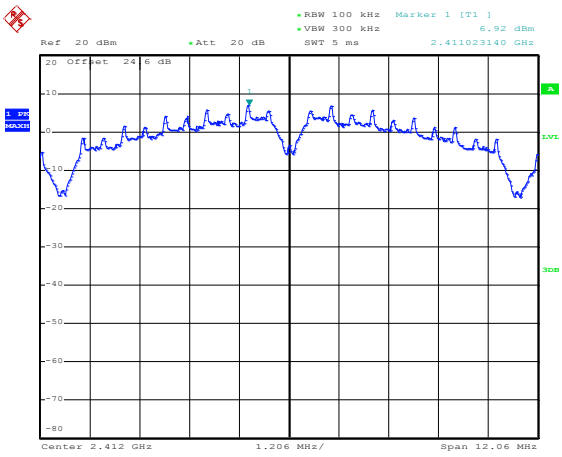
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

Number of TX	2	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Shiming Liu and Bill Kuo

WLAN 802.11b Channel 01

100kHz PSD reference Level



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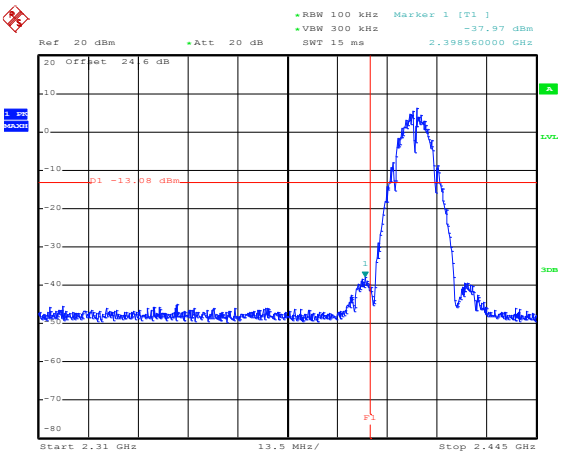
Low Channel Plot



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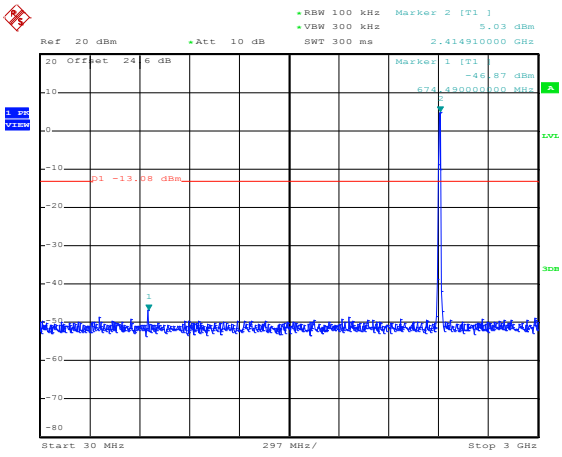
Spurious Emission 30MHz~3GHz



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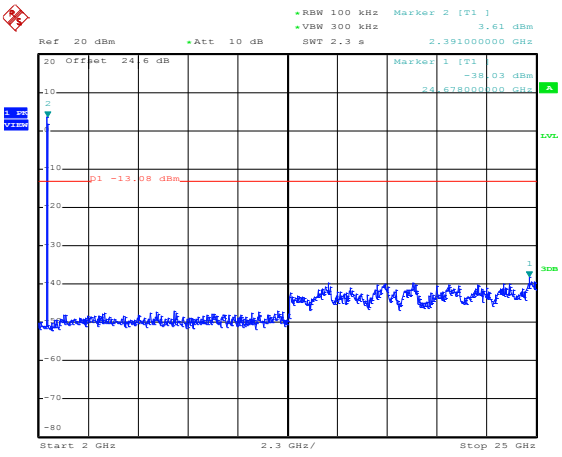
Spurious Emission 2GHz~25GHz



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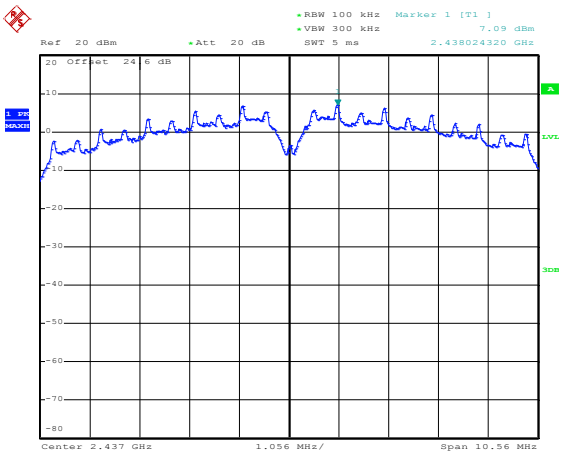
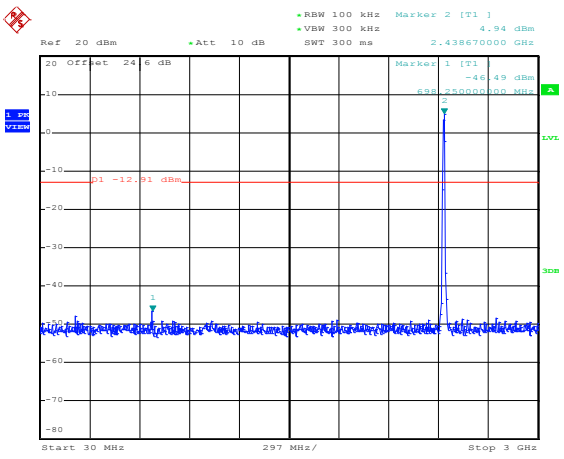
Number of TX	2	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Shiming Liu and Bill Kuo

WLAN 802.11b Channel 06

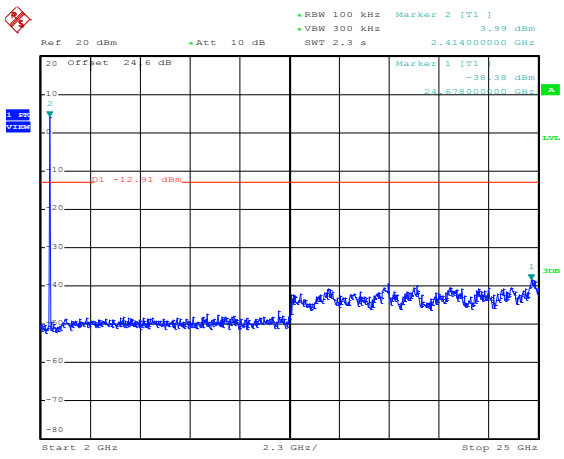
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



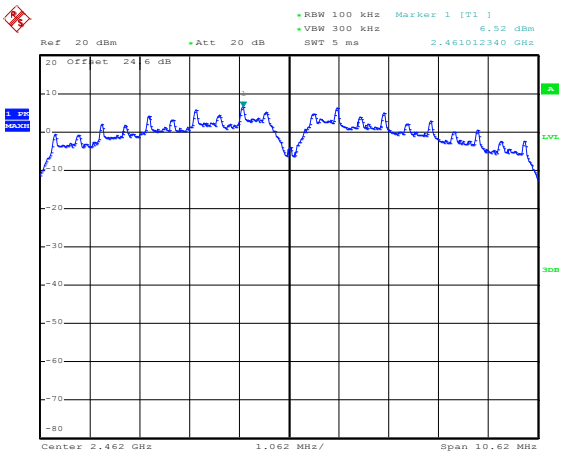
Spurious Emission 2GHz~25GHz



Number of TX	2	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Shiming Liu and Bill Kuo

WLAN 802.11b Channel 11

100kHz PSD reference Level



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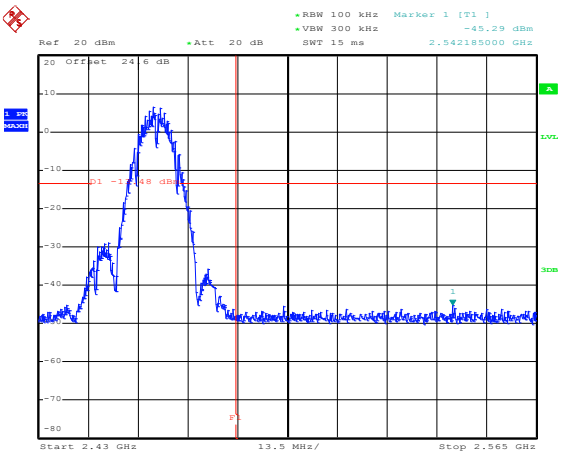
High Channel Plot



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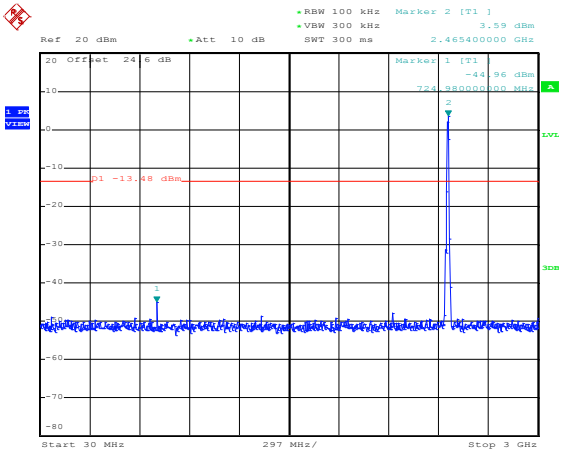
Spurious Emission 30MHz~3GHz



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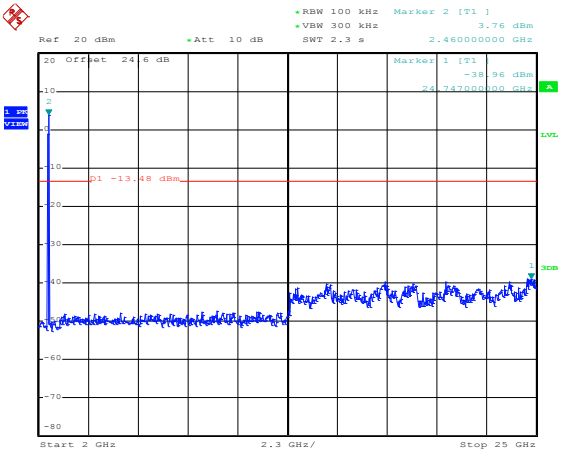
Spurious Emission 2GHz~25GHz



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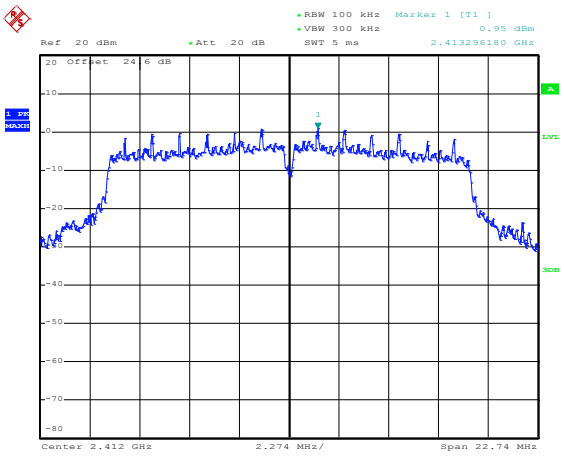
Number of TX	2	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Shiming Liu and Bill Kuo

WLAN 802.11g Channel 01

100kHz PSD reference Level



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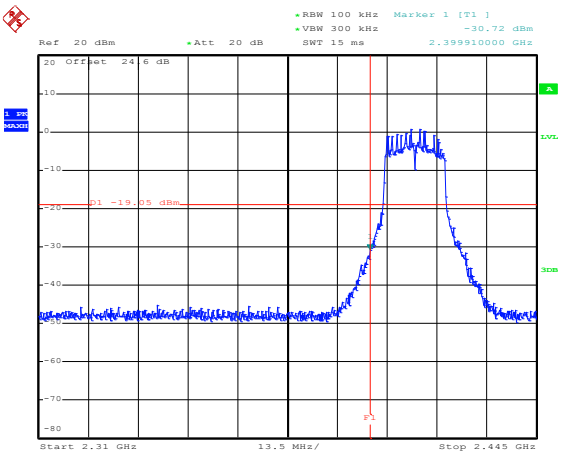
Low Channel Plot



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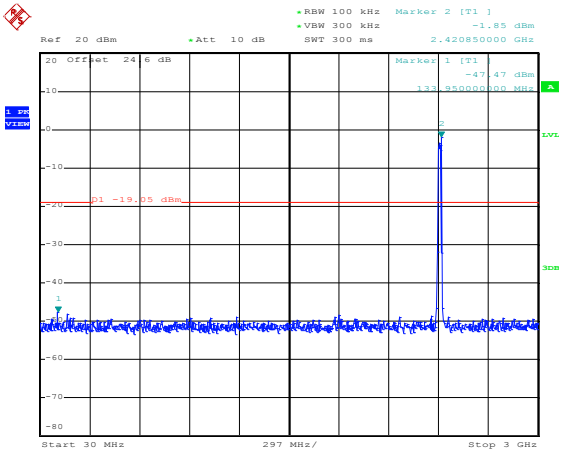
Spurious Emission 30MHz~3GHz



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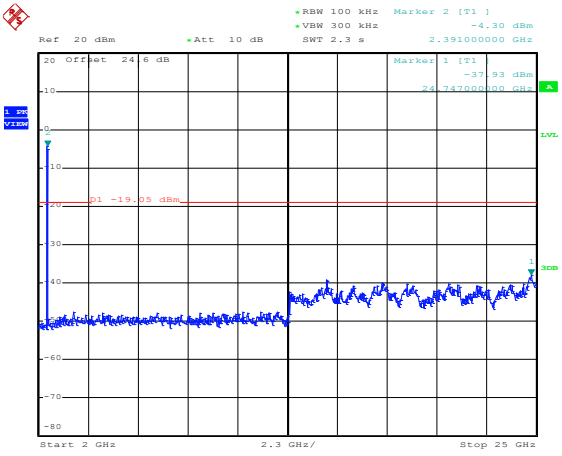
Spurious Emission 2GHz~25GHz



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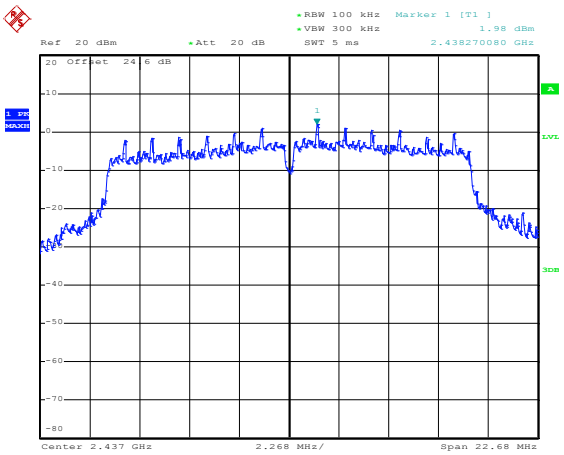
Number of TX	2	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Shiming Liu and Bill Kuo

WLAN 802.11g Channel 06

100kHz PSD reference Level



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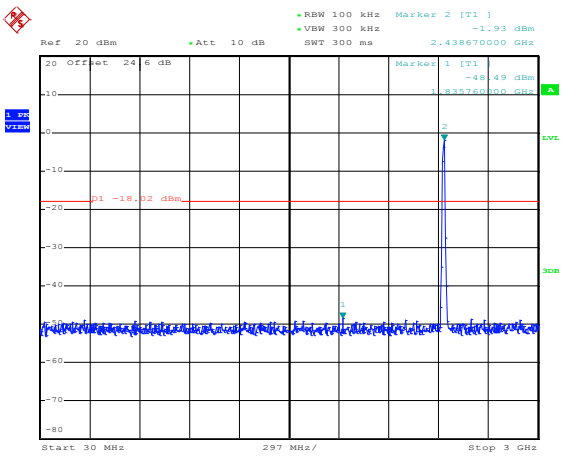
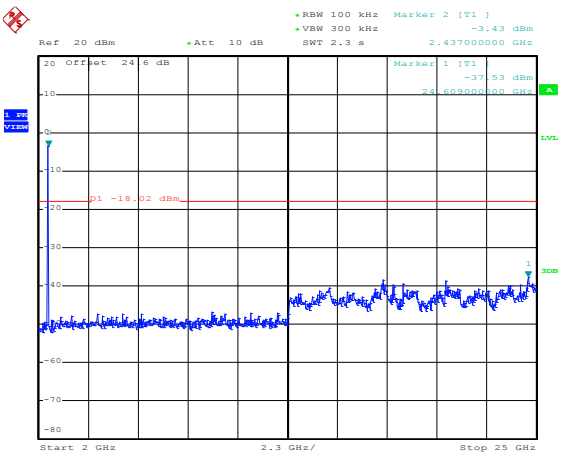
Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:08:56

Spurious Emission 2GHz~25GHz

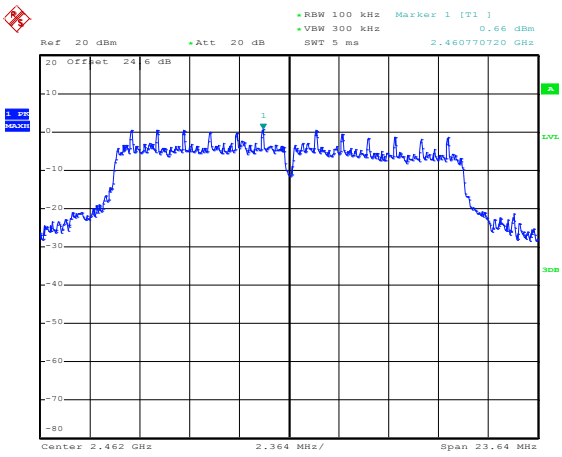


Date: 12.JUN.2017 11:09:04

Number of TX	2	**Ant. :**	1
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Shiming Liu and Bill Kuo

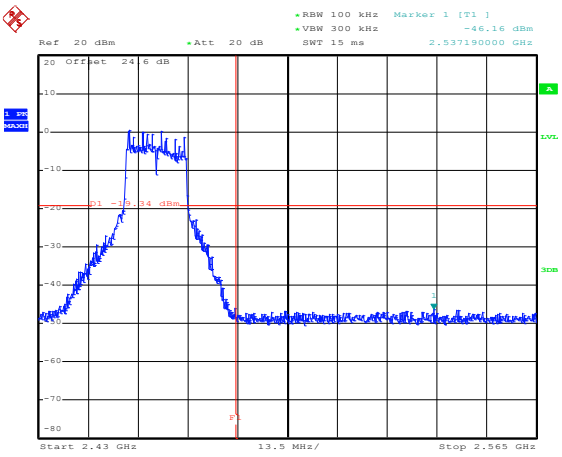
WLAN 802.11g Channel 11

100kHz PSD reference Level



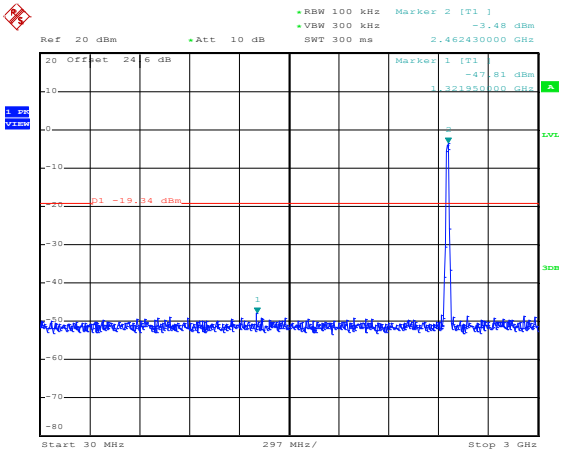
Date: 12.JUN.2017 11:14:07

High Channel Plot



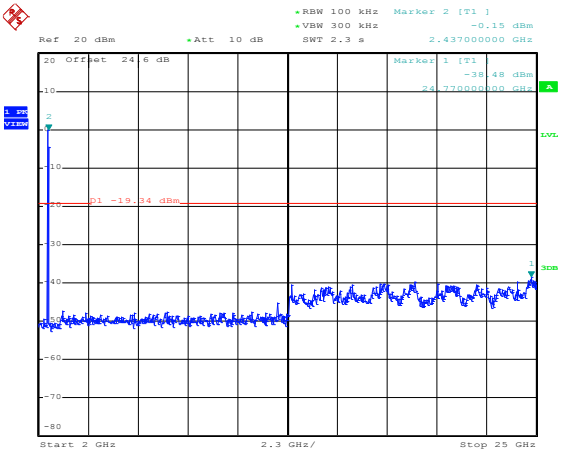
Date: 12.JUN.2017 11:14:44

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:14:56

Spurious Emission 2GHz~25GHz

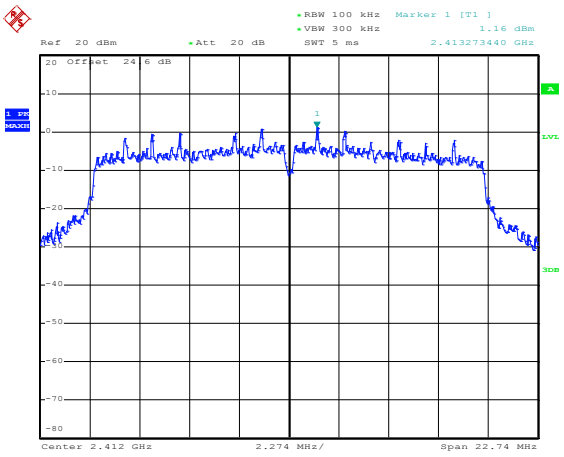


Date: 12.JUN.2017 11:15:04

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

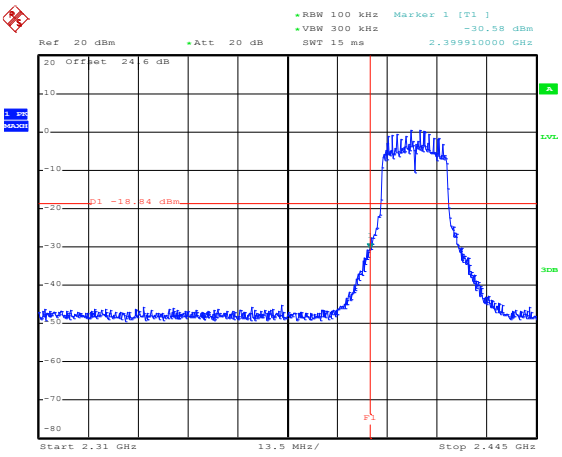
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



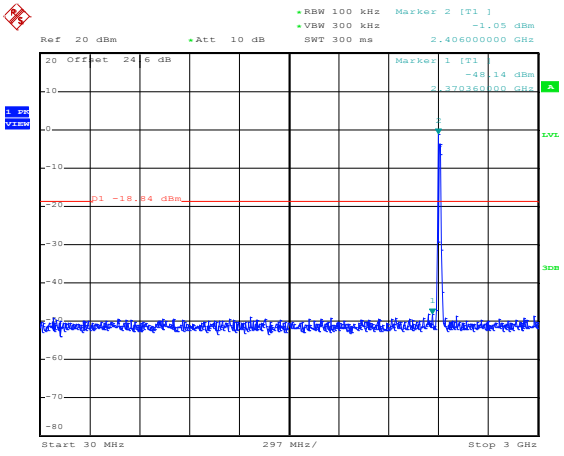
Date: 12.JUN.2017 11:24:36

Low Channel Plot



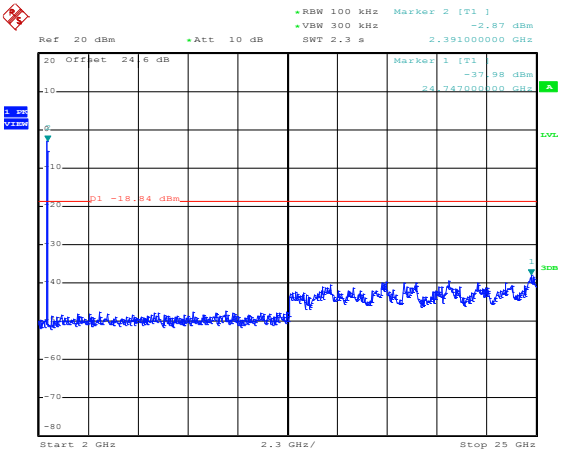
Date: 12.JUN.2017 11:24:55

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:25:06

Spurious Emission 2GHz~25GHz

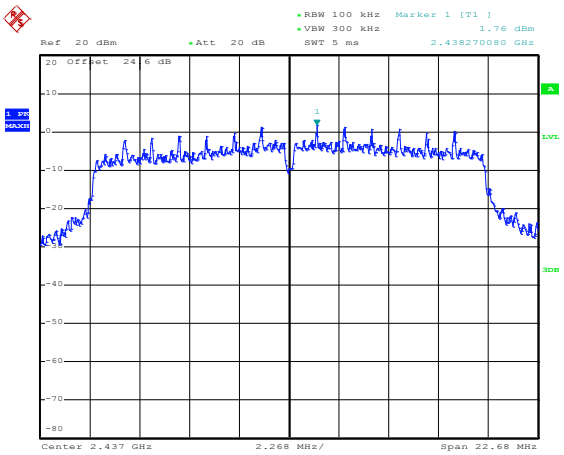


Date: 12.JUN.2017 11:25:14

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

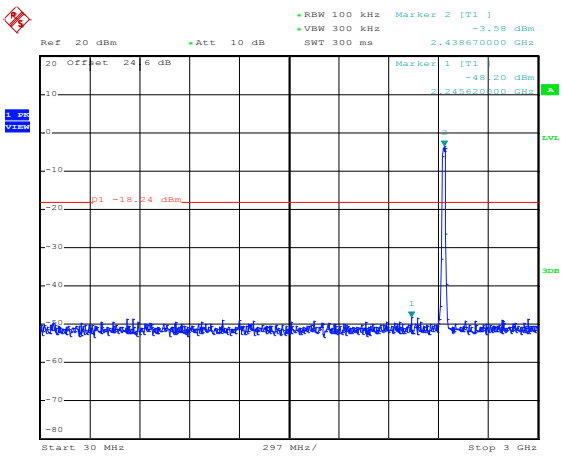
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



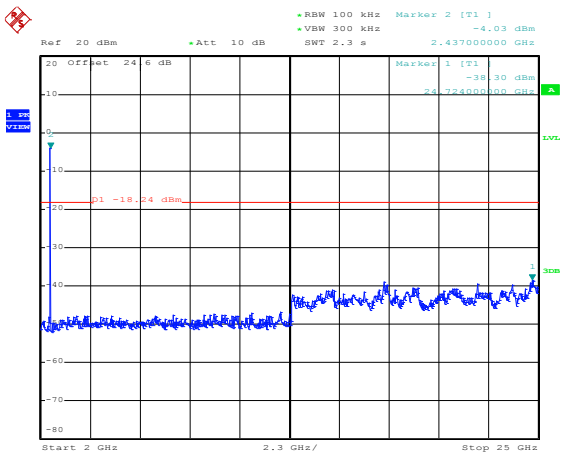
Date: 12.JUN.2017 11:27:32

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:27:44

Spurious Emission 2GHz~25GHz

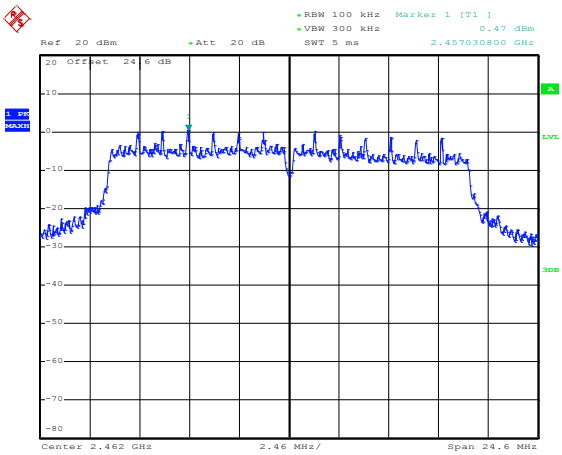


Date: 12.JUN.2017 11:27:52

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

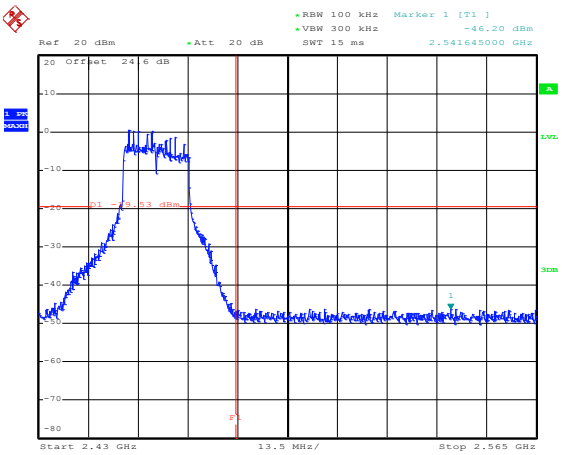
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



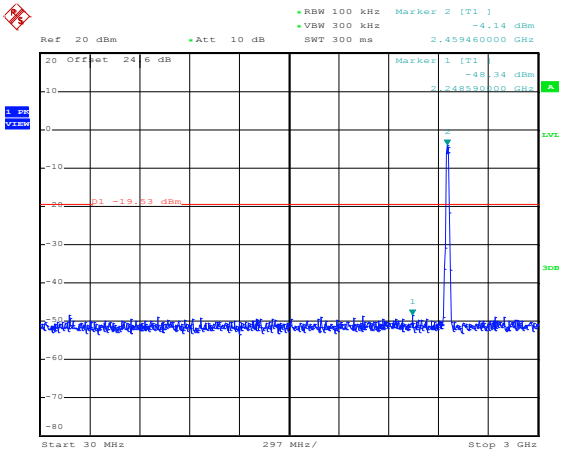
Date: 12.JUN.2017 11:34:33

High Channel Plot



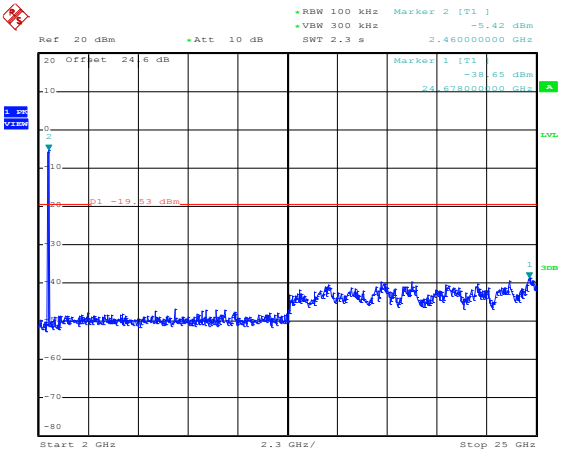
Date: 12.JUN.2017 11:34:47

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:35:37

Spurious Emission 2GHz~25GHz

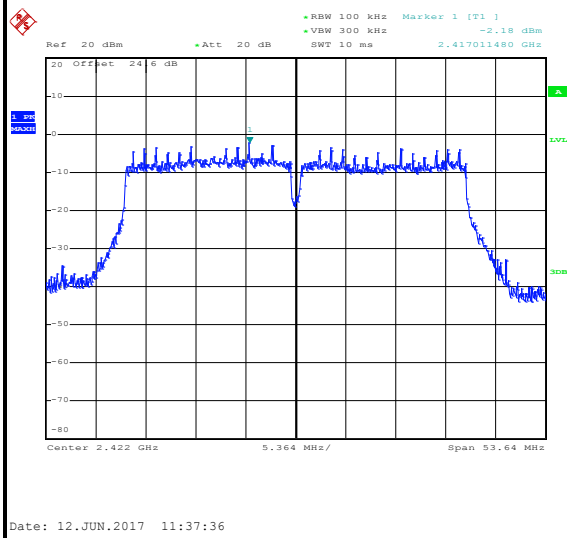


Date: 12.JUN.2017 11:35:46

Number of TX	2	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	03	**Test Engineer :**	Shiming Liu and Bill Kuo

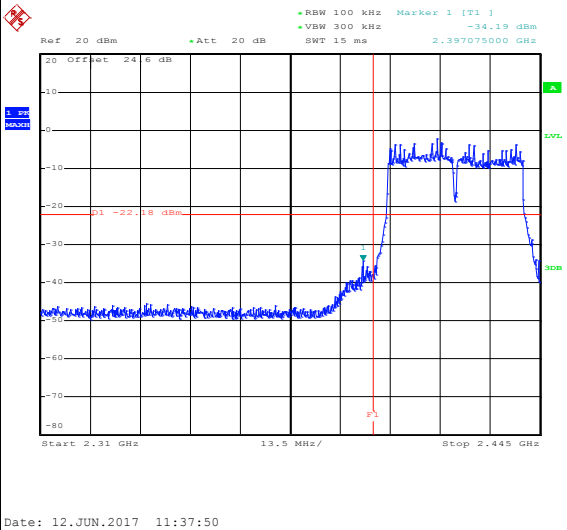
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



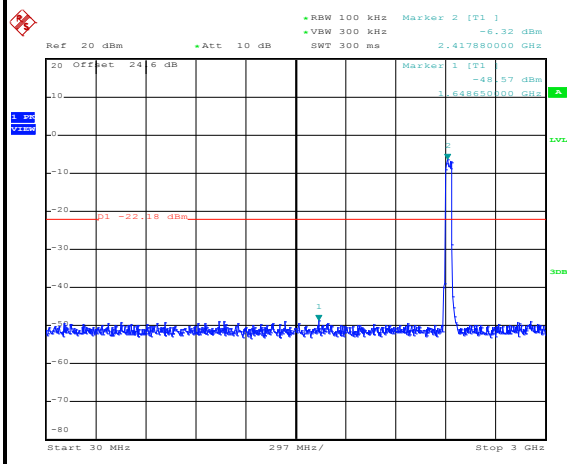
Date: 12.JUN.2017 11:37:36

Low Channel Plot



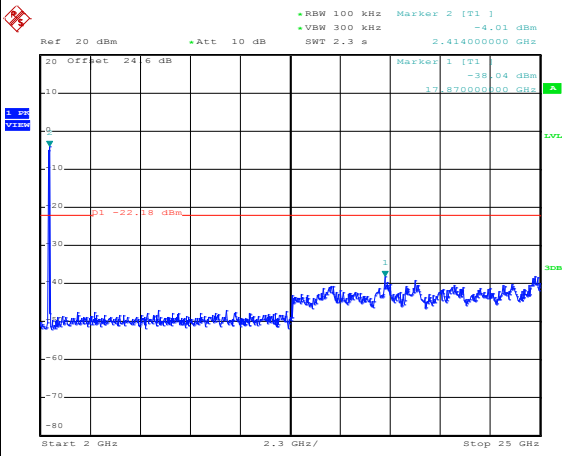
Date: 12.JUN.2017 11:37:50

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:38:01

Spurious Emission 2GHz~25GHz

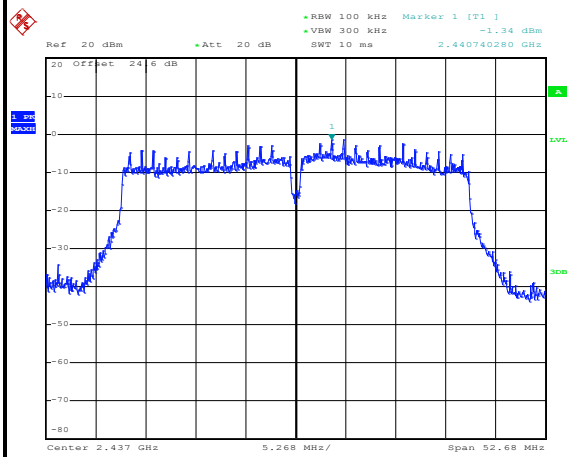


Date: 12.JUN.2017 11:38:09

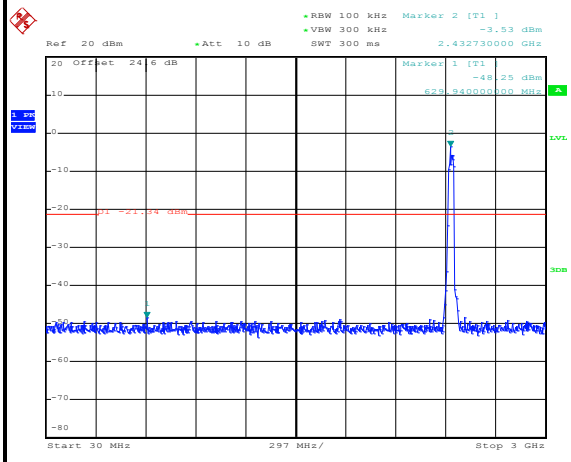
Number of TX	2	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Shiming Liu and Bill Kuo

WLAN 802.11n HT40 Channel 06

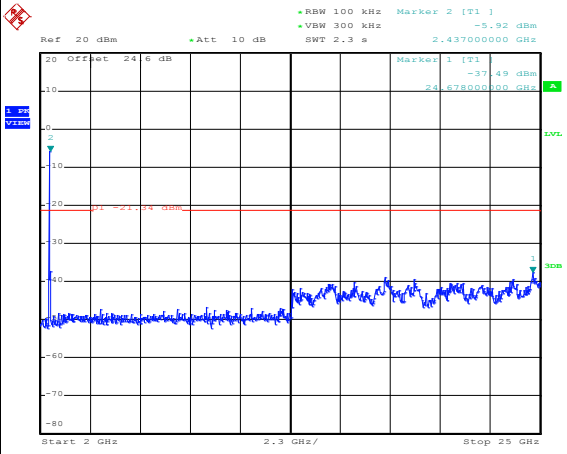
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



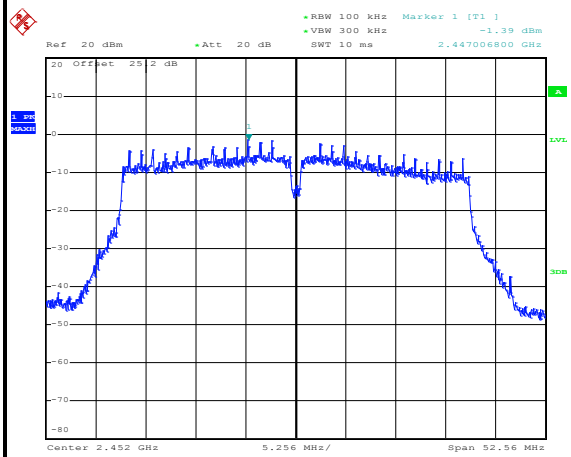
Spurious Emission 2GHz~25GHz



Number of TX	2	**Ant. :**	1
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	09	**Test Engineer :**	Shiming Liu and Bill Kuo

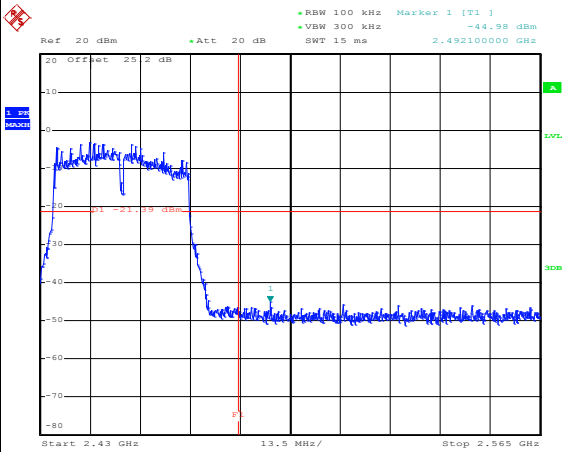
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



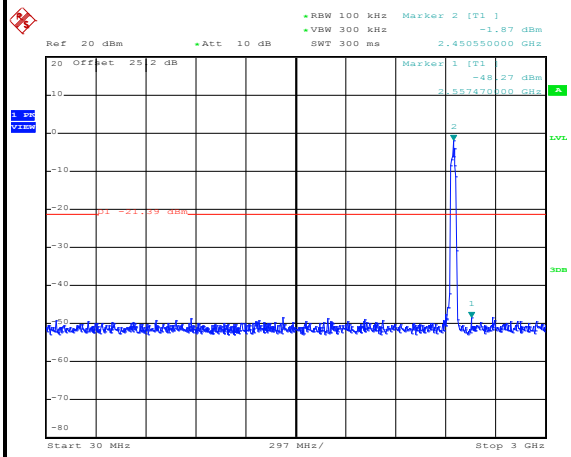
Date: 15.JUN.2017 19:13:15

High Channel Plot



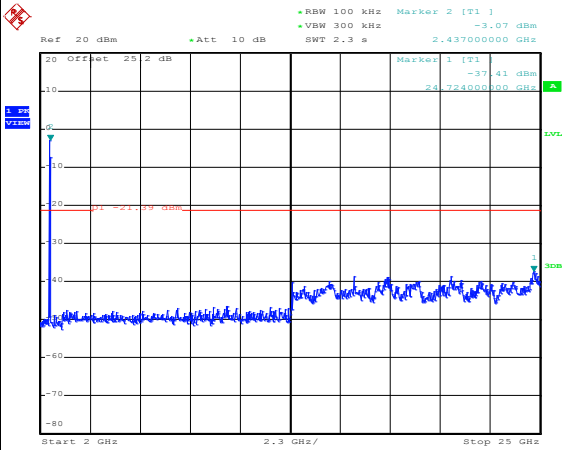
Date: 15.JUN.2017 19:13:25

Spurious Emission 30MHz~3GHz



Date: 15.JUN.2017 19:13:36

Spurious Emission 2GHz~25GHz



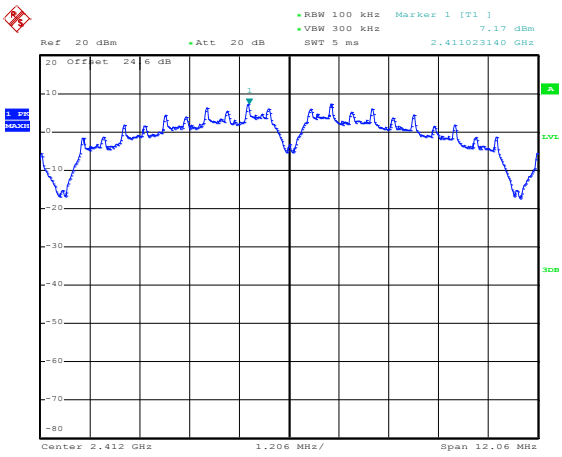
Date: 15.JUN.2017 19:13:44

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

Number of TX	2	**Ant. :**	2
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Shiming Liu and Bill Kuo

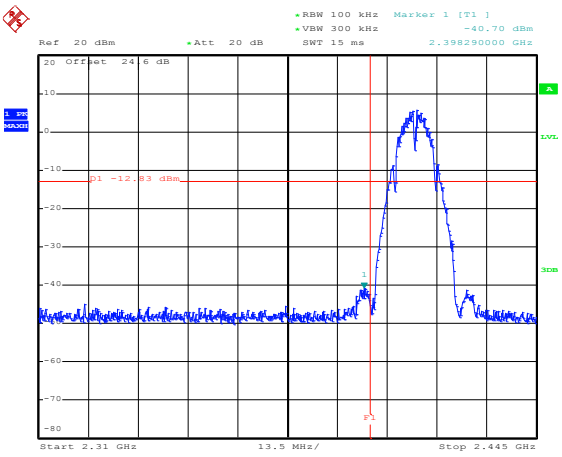
WLAN 802.11b Channel 01

100kHz PSD reference Level



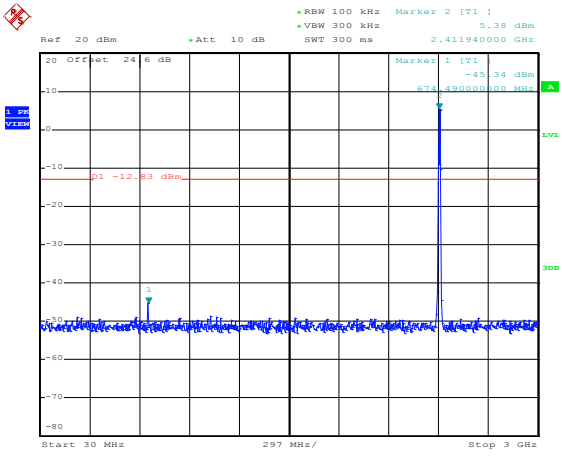
Date: 12.JUN.2017 10:33:02

Low Channel Plot



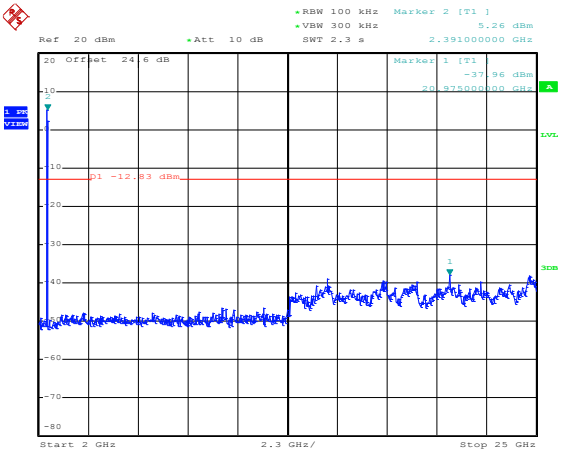
Date: 12.JUN.2017 10:33:15

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 10:33:27

Spurious Emission 2GHz~25GHz

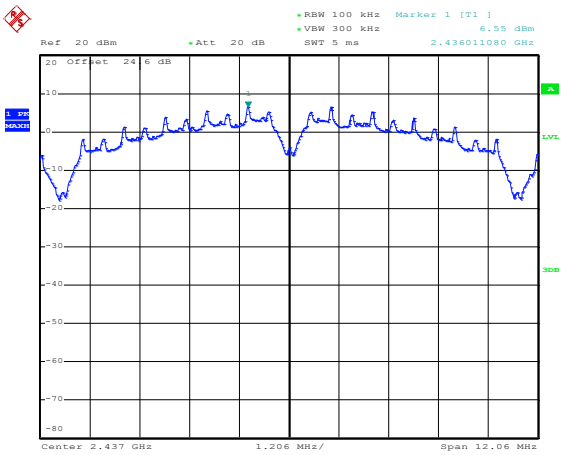


Date: 12.JUN.2017 10:33:36

Number of TX	2	**Ant. :**	2
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Shiming Liu and Bill Kuo

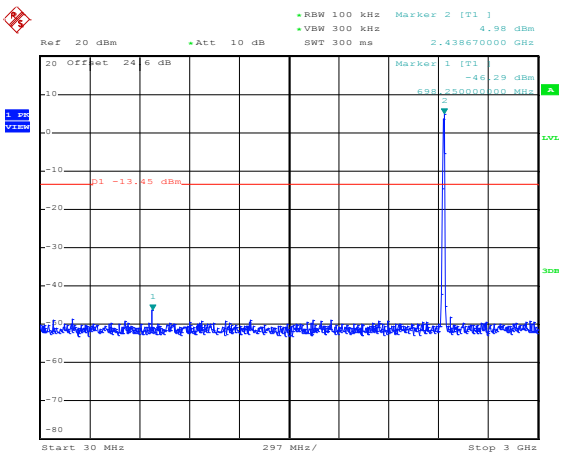
WLAN 802.11b Channel 06

100kHz PSD reference Level



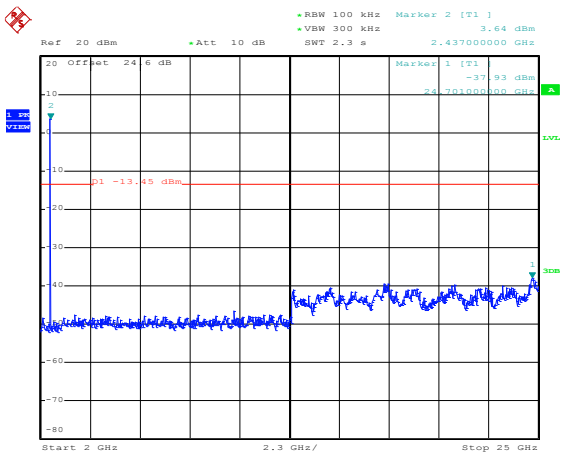
Date: 12.JUN.2017 10:46:49

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 10:47:00

Spurious Emission 2GHz~25GHz

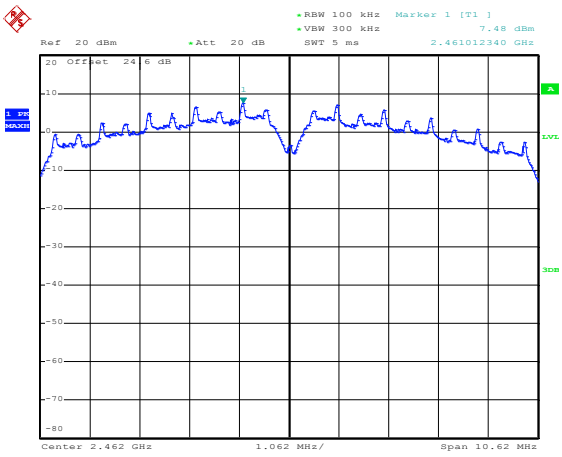


Date: 12.JUN.2017 10:47:09

Number of TX	2	**Ant. :**	2
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Shiming Liu and Bill Kuo

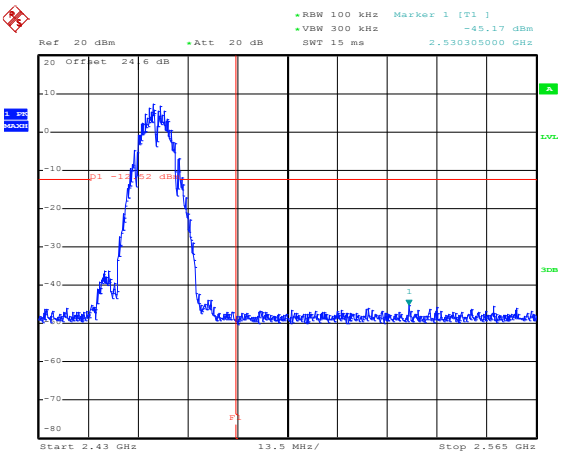
WLAN 802.11b Channel 11

100kHz PSD reference Level



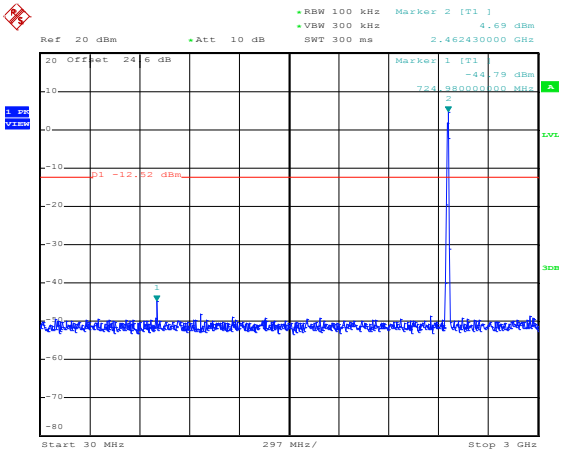
Date: 12.JUN.2017 10:54:41

High Channel Plot



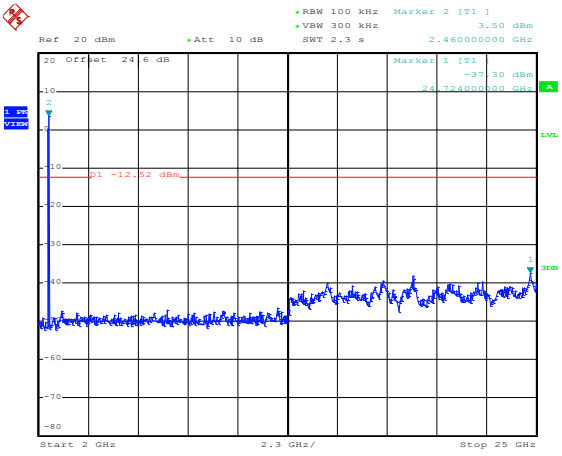
Date: 12.JUN.2017 10:54:56

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 10:55:08

Spurious Emission 2GHz~25GHz

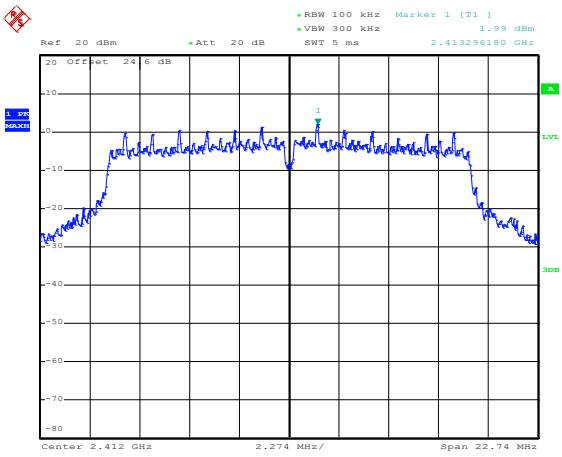


Date: 12.JUN.2017 10:55:16

Number of TX	2	**Ant. :**	2
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	01	**Test Engineer :**	Shiming Liu and Bill Kuo

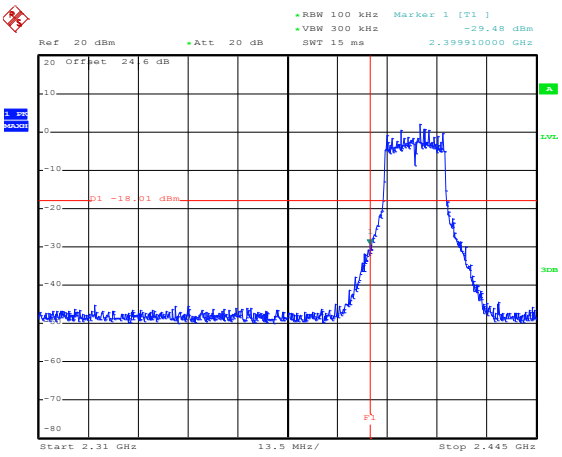
WLAN 802.11g Channel 01

100kHz PSD reference Level



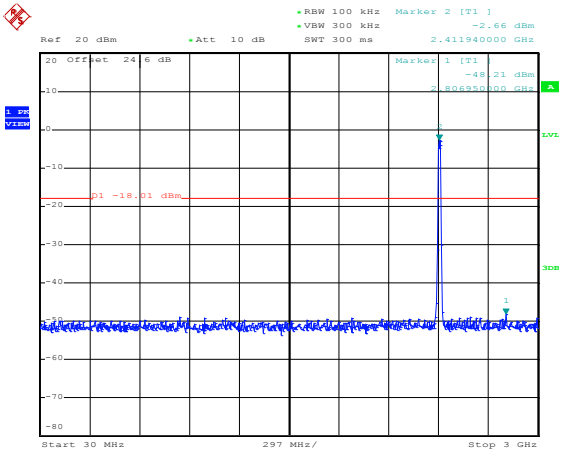
Date: 12.JUN.2017 11:01:10

Low Channel Plot



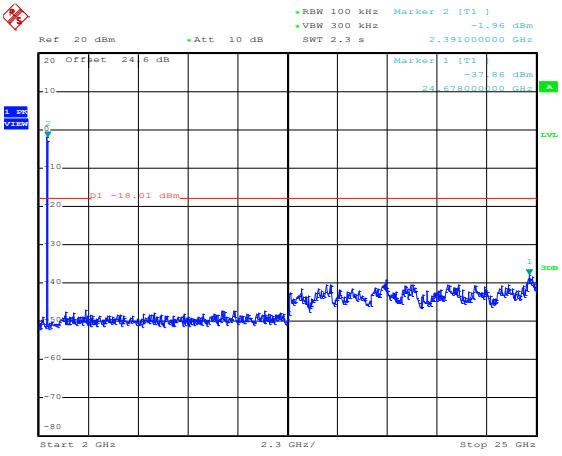
Date: 12.JUN.2017 11:01:22

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:01:34

Spurious Emission 2GHz~25GHz

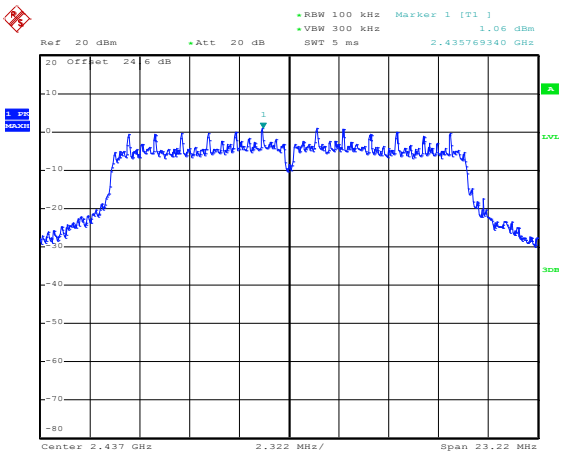


Date: 12.JUN.2017 11:01:42

Number of TX	2	**Ant. :**	2
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Shiming Liu and Bill Kuo

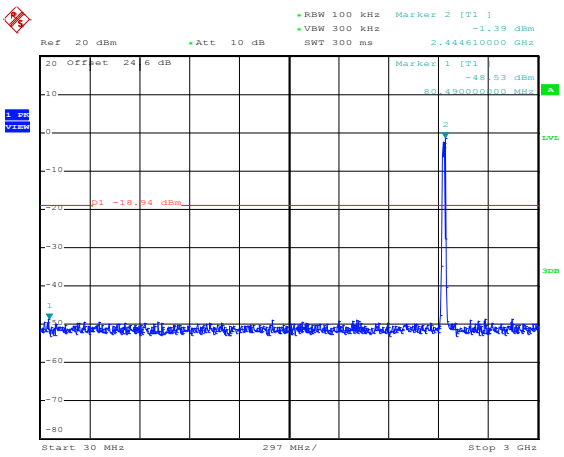
WLAN 802.11g Channel 06

100kHz PSD reference Level



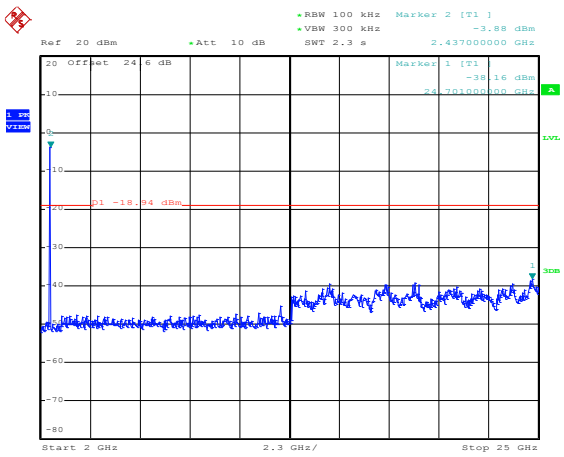
Date: 12.JUN.2017 11:06:03

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:06:18

Spurious Emission 2GHz~25GHz

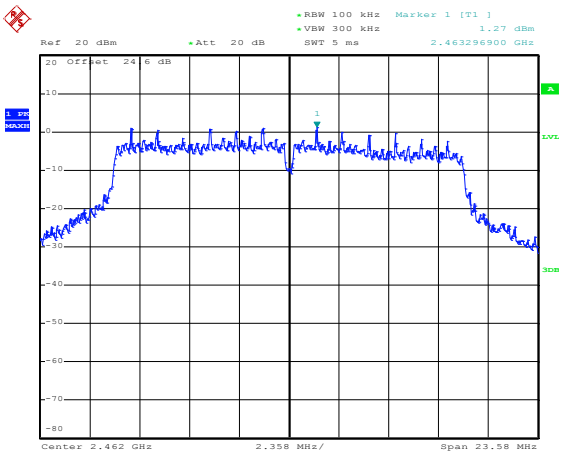


Date: 12.JUN.2017 11:06:26

Number of TX	2	**Ant. :**	2
Test Mode :	802.11g	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Shiming Liu and Bill Kuo

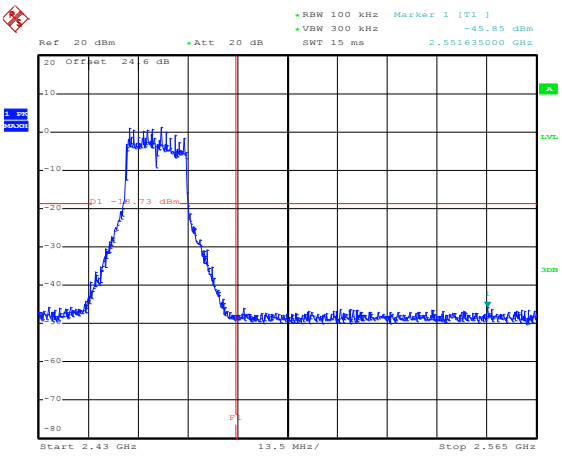
WLAN 802.11g Channel 11

100kHz PSD reference Level



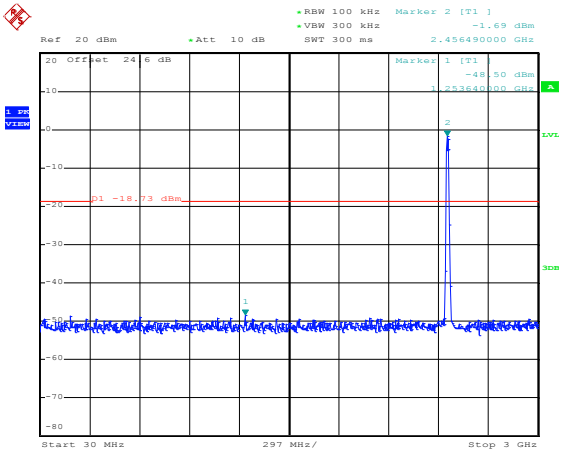
Date: 12.JUN.2017 11:18:19

High Channel Plot



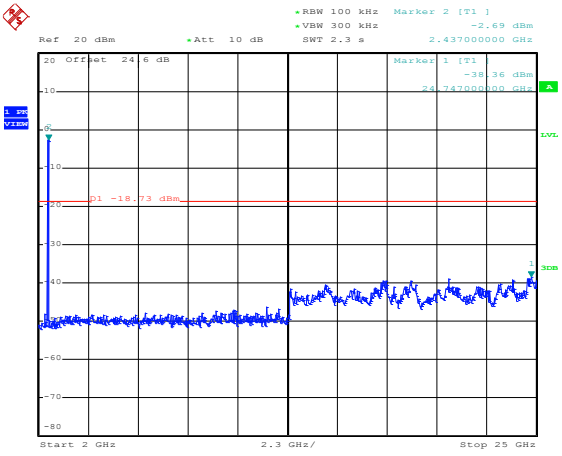
Date: 12.JUN.2017 11:18:33

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:19:05

Spurious Emission 2GHz~25GHz

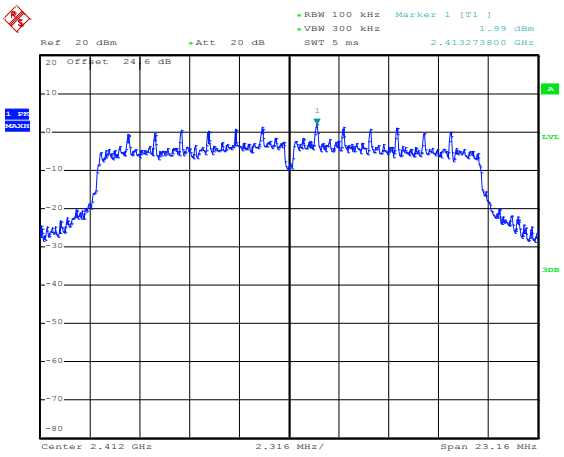


Date: 12.JUN.2017 11:19:13

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

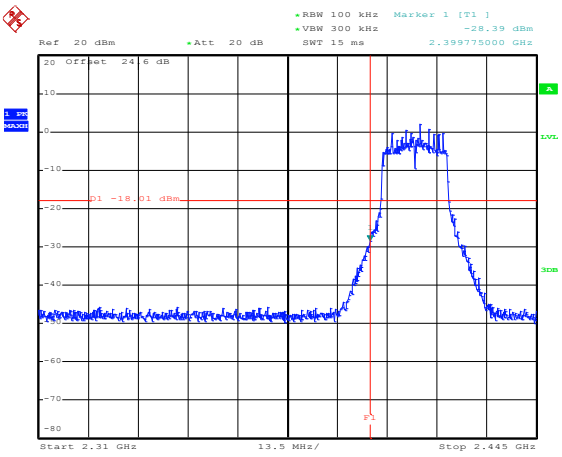
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



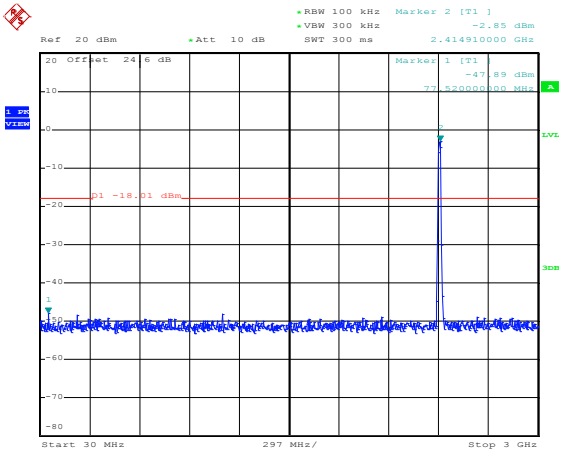
Date: 12.JUN.2017 11:22:12

Low Channel Plot



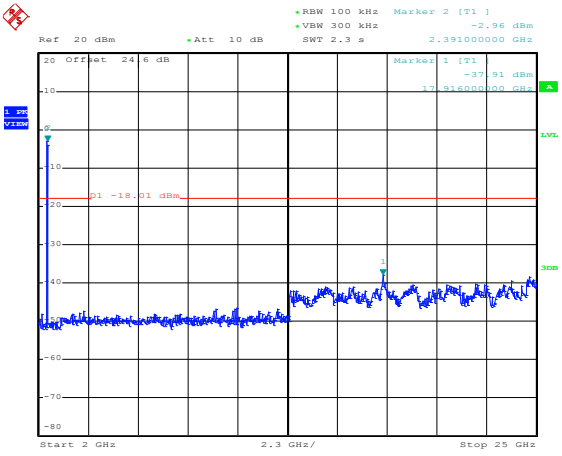
Date: 12.JUN.2017 11:22:35

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:22:47

Spurious Emission 2GHz~25GHz

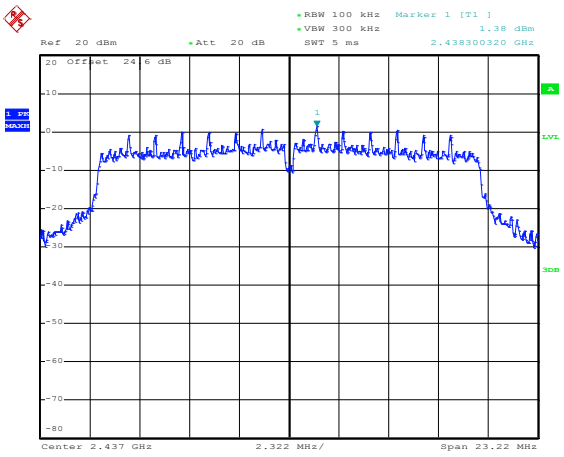


Date: 12.JUN.2017 11:22:55

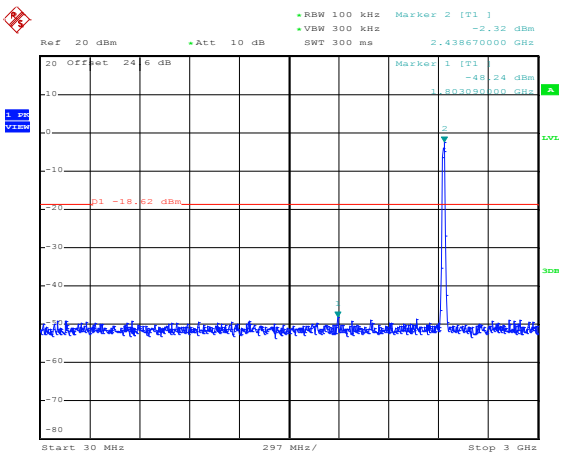
Number of TX	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Shiming Liu and Bill Kuo

WLAN 802.11n HT20 Channel 06

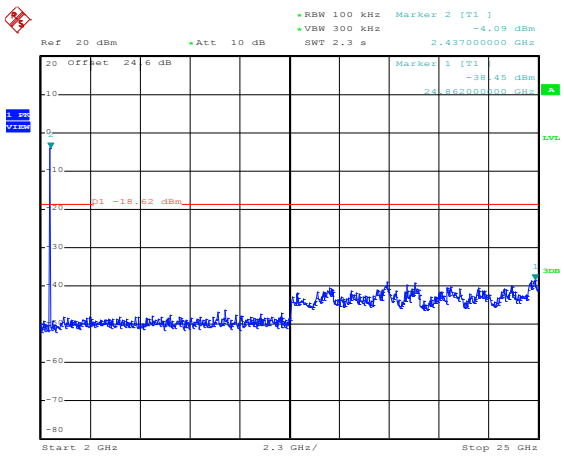
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



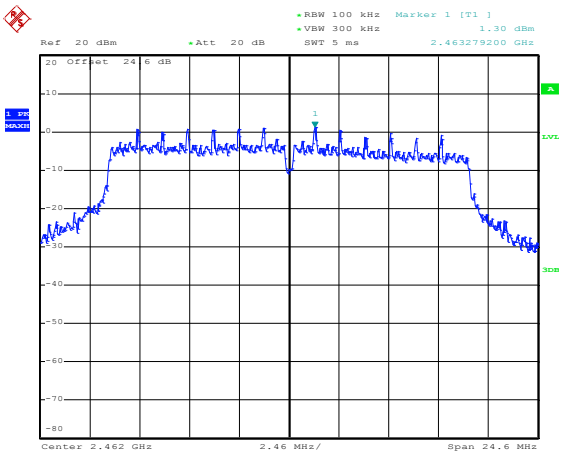
Spurious Emission 2GHz~25GHz



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

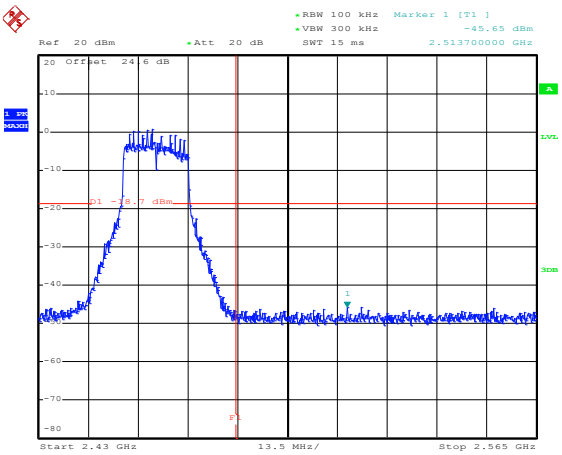
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



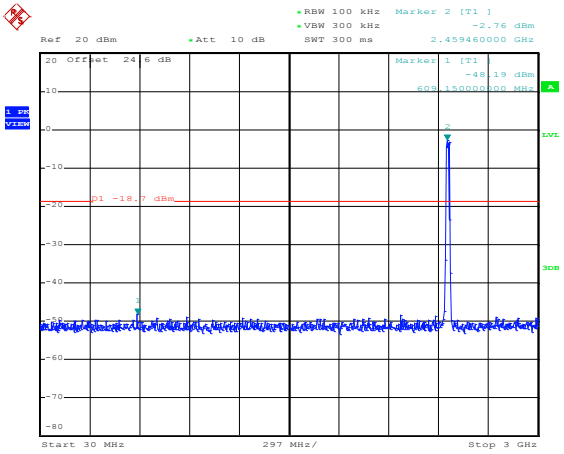
Date: 12.JUN.2017 11:32:10

High Channel Plot



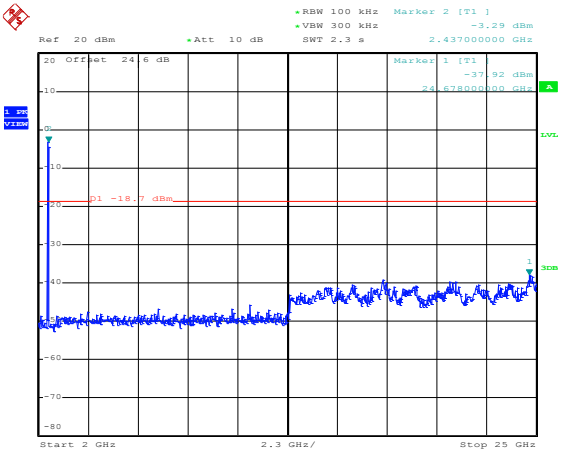
Date: 12.JUN.2017 11:32:22

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:32:53

Spurious Emission 2GHz~25GHz

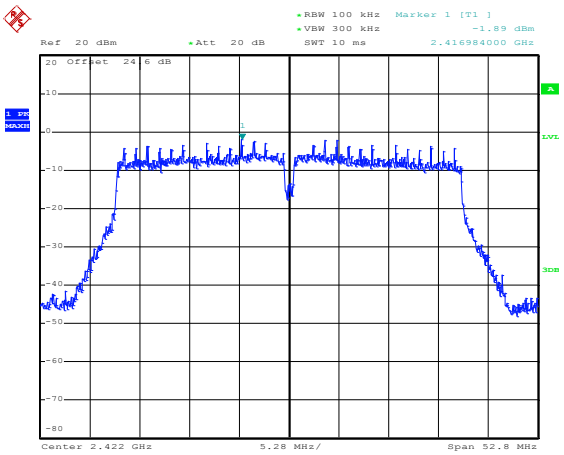


Date: 12.JUN.2017 11:33:01

Number of TX	2	**Ant. :**	2
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	51~54%
Test Channel :	03	**Test Engineer :**	Shiming Liu and Bill Kuo

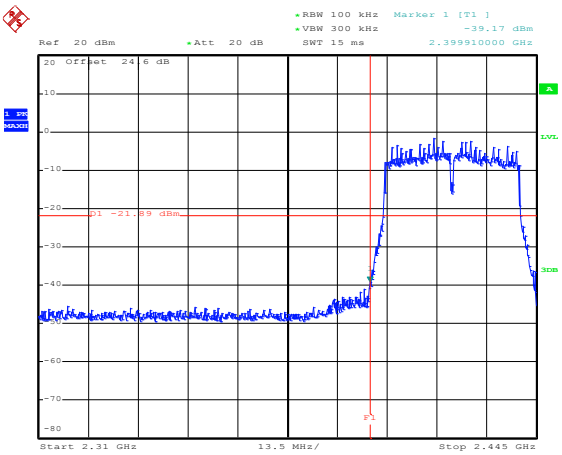
WLAN 802.11n HT40 Channel 03

100kHz PSD reference Level



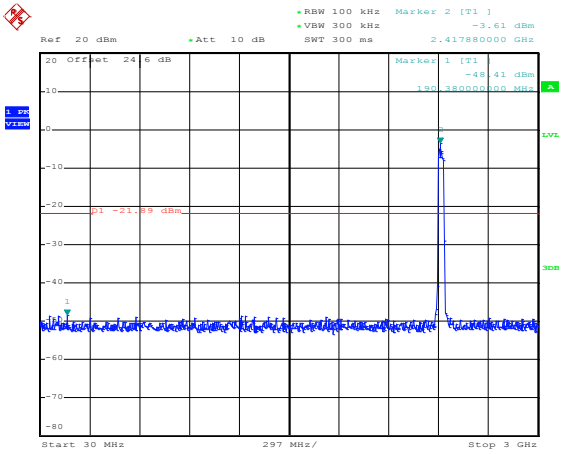
Date: 12.JUN.2017 11:39:53

Low Channel Plot



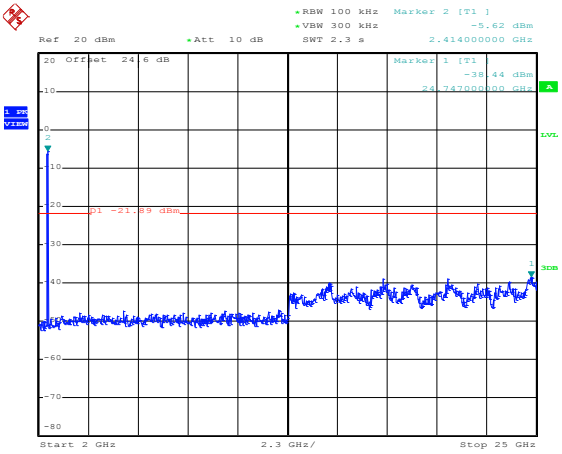
Date: 12.JUN.2017 11:40:22

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:41:01

Spurious Emission 2GHz~25GHz

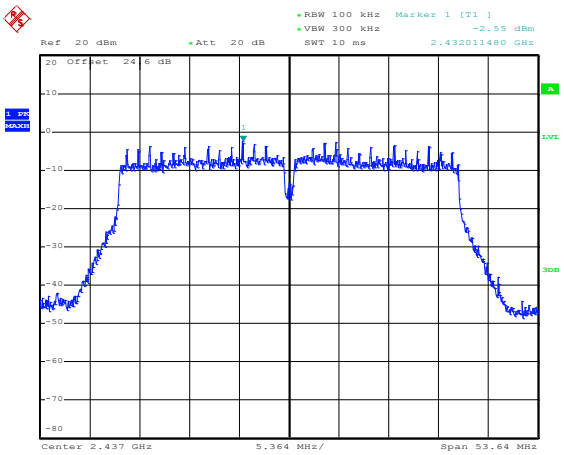


Date: 12.JUN.2017 11:41:09

Number of TX	2	**Ant. :**	2
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Shiming Liu and Bill Kuo

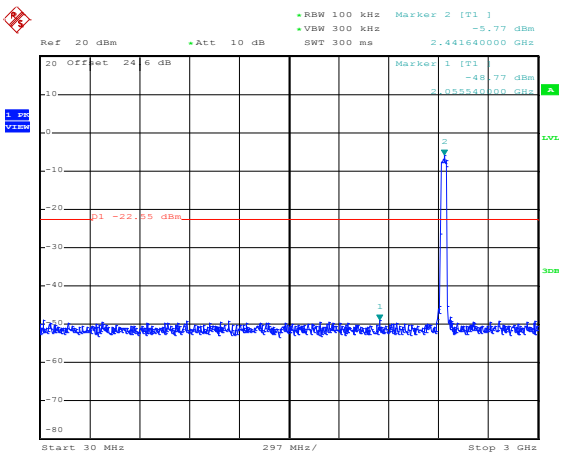
WLAN 802.11n HT40 Channel 06

100kHz PSD reference Level



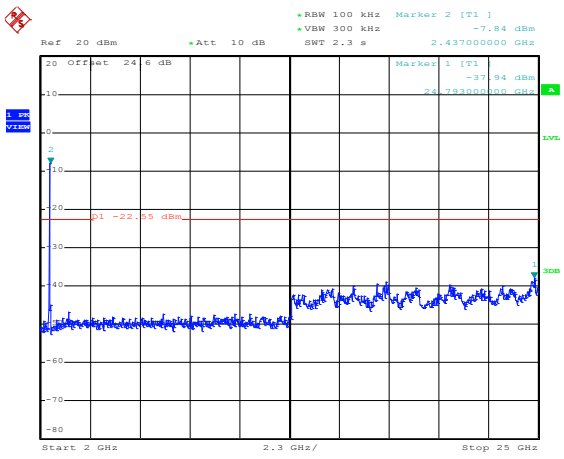
Date: 12.JUN.2017 11:43:25

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:43:36

Spurious Emission 2GHz~25GHz

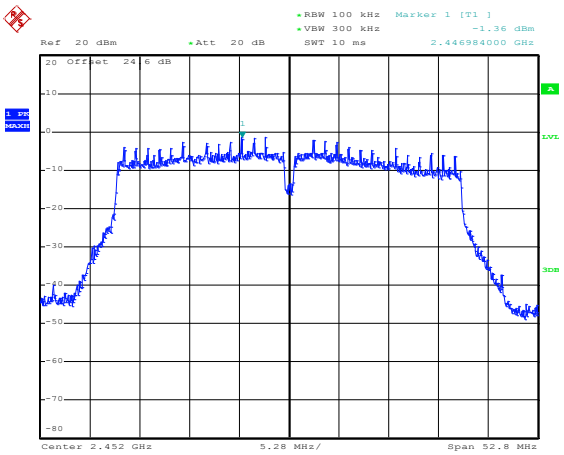


Date: 12.JUN.2017 11:43:45

Number of TX	2	**Ant. :**	2
Test Mode :	802.11n HT40	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	09	**Test Engineer :**	Shiming Liu and Bill Kuo

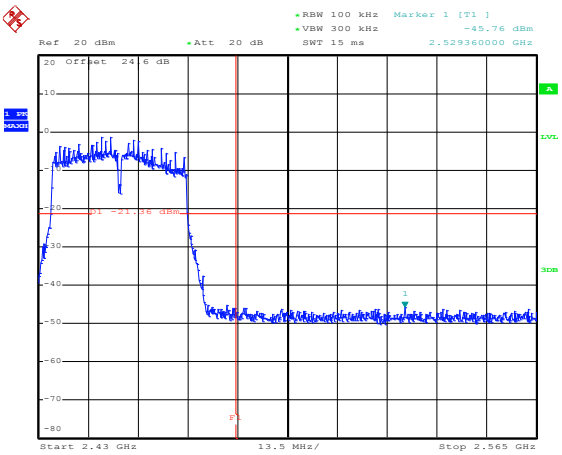
WLAN 802.11n HT40 Channel 09

100kHz PSD reference Level



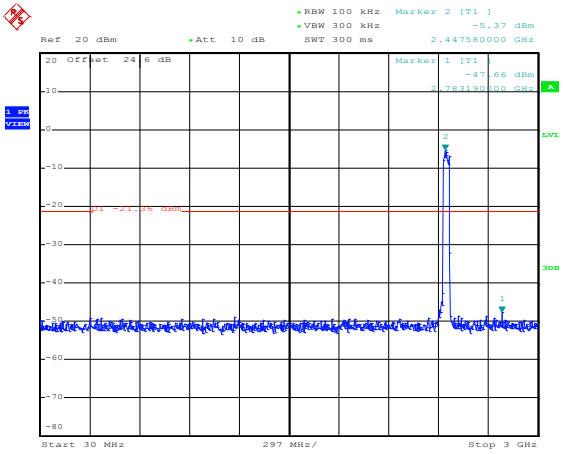
Date: 12.JUN.2017 11:50:36

High Channel Plot



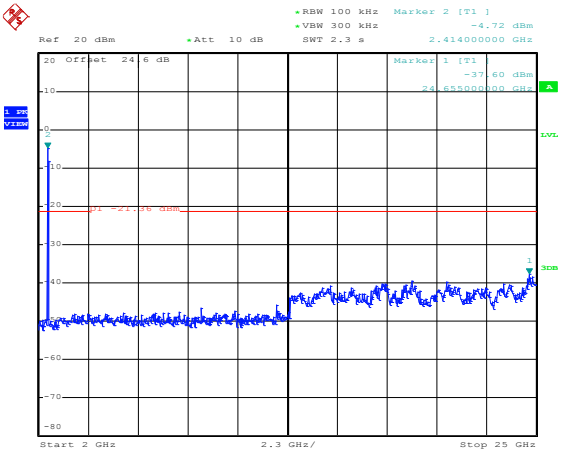
Date: 12.JUN.2017 11:50:50

Spurious Emission 30MHz~3GHz



Date: 12.JUN.2017 11:51:02

Spurious Emission 2GHz~25GHz



Date: 12.JUN.2017 11:51:10

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

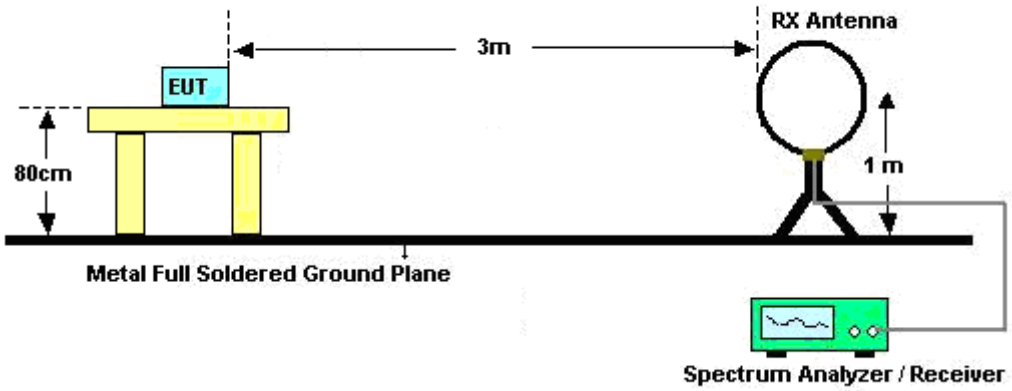
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

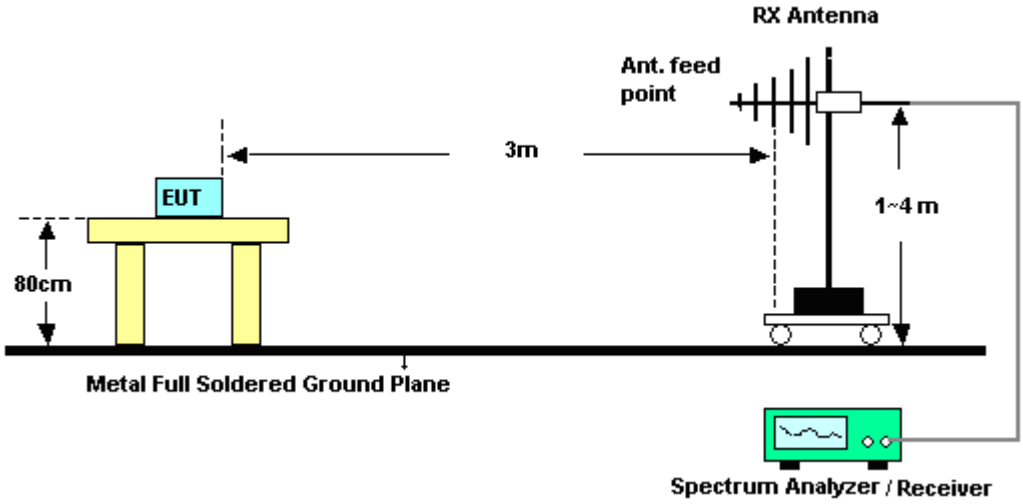
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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 ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

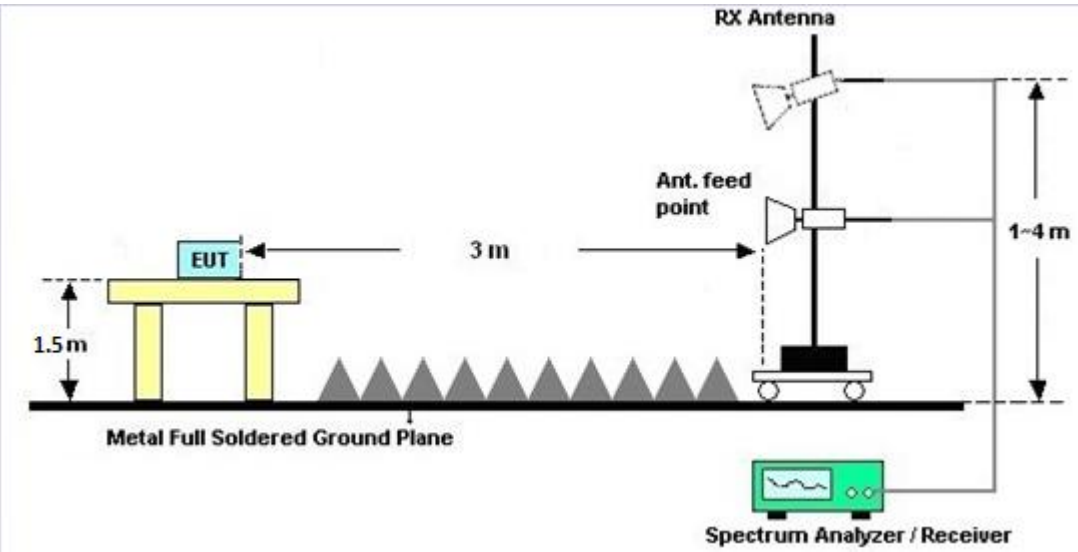
For radiated emissions below 30MHz



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.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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 (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

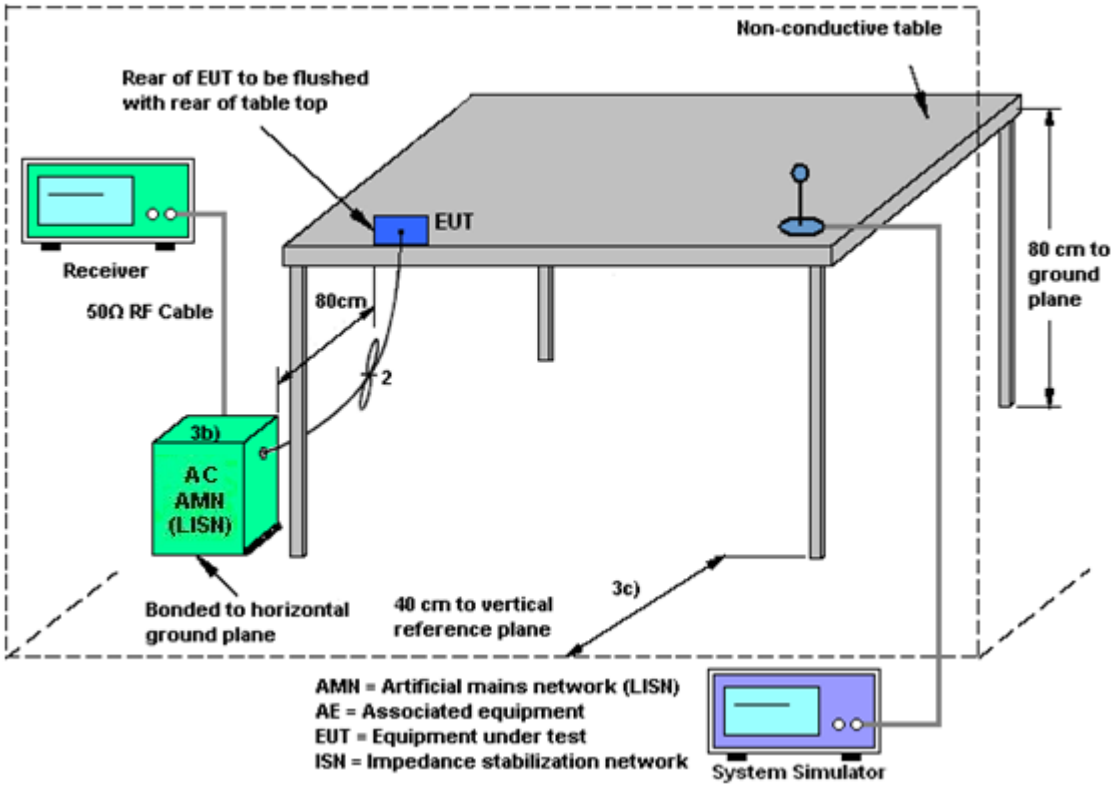
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

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

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

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. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the Antenna exceeds 6 dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the 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.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

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

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

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	-2.50	-4.90	-2.50	-0.61	0.00	0.00

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

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	0932001	300MHz~40GHz	Sep. 29, 2016	May 26, 2017 ~ Jun.11, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	0846202	300MHz~40GHz	Sep. 29, 2016	May 26, 2017 ~ Jun.11, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jul. 17, 2016	May 26, 2017 ~ Jun.11, 2017	Jul. 16, 2017	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 11, 2016	May 26, 2017 ~ Jun.11, 2017	Oct. 10, 2017	Conducted (TH05-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 23, 2017	Jun. 09, 2017 ~ Jun. 13, 2017	Mar. 22, 2018	Radiation (03CH12-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Oct. 20, 2016	Jun. 09, 2017 ~ Jun. 13, 2017	Oct. 19, 2018	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	37059&01	30MHz~1GHz	Oct. 15, 2016	Jun. 09, 2017 ~ Jun. 13, 2017	Oct. 14, 2017	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 23, 2016	Jun. 09, 2017 ~ Jun. 13, 2017	Dec. 22, 2017	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Oct. 25, 2016	Jun. 09, 2017 ~ Jun. 13, 2017	Oct. 24, 2017	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1815698	1GHz~18GHz	Dec. 01, 2016	Jun. 09, 2017 ~ Jun. 13, 2017	Nov. 30, 2017	Radiation (03CH12-HY)
Preamplifier	Keysight	83017A	MY53270148	1GHz~26.5GHz	Jan. 12, 2017	Jun. 09, 2017 ~ Jun. 13, 2017	Jan. 11, 2018	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jun. 09, 2017 ~ Jun. 13, 2017	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jun. 09, 2017 ~ Jun. 13, 2017	N/A	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz ~ 40GHz	Apr. 27, 2017	Jun. 09, 2017 ~ Jun. 13, 2017	Apr. 26, 2018	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1815698	1GHz~18GHz	Dec. 01, 2016	Jun. 09, 2017 ~ Jun. 13, 2017	Nov. 30, 2017	Radiation (03CH12-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Mar. 23, 2017	Jun. 09, 2017 ~ Jun. 13, 2017	Mar. 22, 2018	Radiation (03CH12-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jun. 06, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Jun. 06, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Jun. 06, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 06, 2016	Jun. 06, 2017	Dec. 05, 2017	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.70**

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

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

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.7**

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Shiming Liu/Bill Kuo	Temperature:	21~25	°C
Test Date:	2017/5/26~6/11	Relative Humidity:	51~54	%

Report Number : FR740822C

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	13.05	12.70	8.04	8.04	0.50	Pass
11b	1Mbps	2	6	2437	13.15	12.95	7.04	8.04	0.50	Pass
11b	1Mbps	2	11	2462	13.70	12.75	7.08	7.08	0.50	Pass
11g	6Mbps	2	1	2412	17.45	17.50	15.16	15.16	0.50	Pass
11g	6Mbps	2	6	2437	17.50	17.60	15.12	15.48	0.50	Pass
11g	6Mbps	2	11	2462	18.10	17.65	15.76	15.72	0.50	Pass
HT20	MCS0	2	1	2412	18.50	18.60	15.16	15.44	0.50	Pass
HT20	MCS0	2	6	2437	18.55	18.75	15.12	15.48	0.50	Pass
HT20	MCS0	2	11	2462	19.15	18.90	16.40	16.40	0.50	Pass
HT40	MCS0	2	3	2422	36.80	36.50	35.76	35.20	0.50	Pass
HT40	MCS0	2	6	2437	36.50	36.60	35.12	35.76	0.50	Pass
HT40	MCS0	2	9	2452	36.40	36.30	28.88	35.20	0.50	Pass

Report Number : FR740822C

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	17.26	18.31		30.00	30.00	-2.50	-4.90	14.76	13.41	36.00	36.00	Pass
11b	1Mbps	1	6	2437	17.30	18.00		30.00	30.00	-2.50	-4.90	14.80	13.10	36.00	36.00	Pass
11b	1Mbps	1	11	2462	15.85	18.28		30.00	30.00	-2.50	-4.90	13.35	13.38	36.00	36.00	Pass
11g	6Mbps	1	1	2412	13.61	15.96		30.00	30.00	-2.50	-4.90	11.11	11.06	36.00	36.00	Pass
11g	6Mbps	1	6	2437	13.63	15.97		30.00	30.00	-2.50	-4.90	11.13	11.07	36.00	36.00	Pass
11g	6Mbps	1	11	2462	12.17	15.87		30.00	30.00	-2.50	-4.90	9.67	10.97	36.00	36.00	Pass
HT20	MCS0	1	1	2412	13.64	15.98		30.00	30.00	-2.50	-4.90	11.14	11.08	36.00	36.00	Pass
HT20	MCS0	1	6	2437	13.65	16.05		30.00	30.00	-2.50	-4.90	11.15	11.15	36.00	36.00	Pass
HT20	MCS0	1	11	2462	12.29	16.01		30.00	30.00	-2.50	-4.90	9.79	11.11	36.00	36.00	Pass
HT40	MCS0	1	3	2422	15.00	17.16		30.00	30.00	-2.50	-4.90	12.50	12.26	36.00	36.00	Pass
HT40	MCS0	1	6	2437	14.64	17.00		30.00	30.00	-2.50	-4.90	12.14	12.10	36.00	36.00	Pass
HT40	MCS0	1	9	2452	13.47	16.77		30.00	30.00	-2.50	-4.90	10.97	11.87	36.00	36.00	Pass
11b	1Mbps	2	1	2412	17.66	18.89	21.33	30.00		-2.50		18.83		36.00		Pass
11b	1Mbps	2	6	2437	17.22	17.42	20.33	30.00		-2.50		17.83		36.00		Pass
11b	1Mbps	2	11	2462	17.10	18.08	20.63	30.00		-2.50		18.13		36.00		Pass
11g	6Mbps	2	1	2412	15.85	16.88	19.41	30.00		-2.50		16.91		36.00		Pass
11g	6Mbps	2	6	2437	16.33	16.02	19.19	30.00		-2.50		16.69		36.00		Pass
11g	6Mbps	2	11	2462	15.43	16.30	18.90	30.00		-2.50		16.40		36.00		Pass
HT20	MCS0	2	1	2412	15.88	16.95	19.46	30.00		-2.50		16.96		36.00		Pass
HT20	MCS0	2	6	2437	16.38	16.07	19.24	30.00		-2.50		16.74		36.00		Pass
HT20	MCS0	2	11	2462	15.54	16.25	18.92	30.00		-2.50		16.42		36.00		Pass
HT40	MCS0	2	3	2422	17.34	18.04	20.71	30.00		-2.50		18.21		36.00		Pass
HT40	MCS0	2	6	2437	17.60	17.00	20.32	30.00		-2.50		17.82		36.00		Pass
HT40	MCS0	2	9	2452	17.49	17.70	20.61	30.00		-2.50		18.11		36.00		Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	1	1	2412	0.00	0.00	14.45	15.49	
11b	1Mbps	1	6	2437	0.00	0.00	14.44	15.25	
11b	1Mbps	1	11	2462	0.00	0.00	12.98	15.23	
11g	6Mbps	1	1	2412	0.21	0.20	8.45	11.35	
11g	6Mbps	1	6	2437	0.21	0.20	8.43	11.26	
11g	6Mbps	1	11	2462	0.21	0.20	7.26	11.11	
HT20	MCS0	1	1	2412	0.18	0.21	8.46	11.36	
HT20	MCS0	1	6	2437	0.18	0.21	8.44	11.28	
HT20	MCS0	1	11	2462	0.18	0.21	7.29	11.16	
HT40	MCS0	1	3	2422	0.36	0.41	8.48	11.48	
HT40	MCS0	1	6	2437	0.36	0.41	8.46	11.33	
HT40	MCS0	1	9	2452	0.36	0.41	7.31	11.31	
11b	1Mbps	2	1	2412	0.00	0.00	14.76	15.88	18.37
11b	1Mbps	2	6	2437	0.00	0.00	14.67	14.77	17.73
11b	1Mbps	2	11	2462	0.00	0.00	14.55	15.55	18.09
11g	6Mbps	2	1	2412	0.17	0.17	10.77	12.02	14.45
11g	6Mbps	2	6	2437	0.17	0.17	11.22	11.18	14.21
11g	6Mbps	2	11	2462	0.17	0.17	10.74	11.52	14.16
HT20	MCS0	2	1	2412	0.21	0.21	10.81	12.06	14.49
HT20	MCS0	2	6	2437	0.21	0.21	11.21	11.33	14.28
HT20	MCS0	2	11	2462	0.21	0.21	10.86	11.46	14.18
HT40	MCS0	2	3	2422	0.36	0.37	10.56	11.92	14.30
HT40	MCS0	2	6	2437	0.36	0.37	11.13	11.37	14.26
HT40	MCS0	2	9	2452	0.36	0.37	11.11	11.35	14.24

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

Report Number : FR740822C

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	-11.60	-9.53	-6.52	-0.61		8.00		Pass
11b	1Mbps	2	6	2437	-10.51	-11.04	-7.50	-0.61		8.00		Pass
11b	1Mbps	2	11	2462	-11.62	-10.11	-7.10	-0.61		8.00		Pass
11g	6Mbps	2	1	2412	-17.32	-16.04	-13.03	-0.61		8.00		Pass
11g	6Mbps	2	6	2437	-15.73	-17.03	-12.72	-0.61		8.00		Pass
11g	6Mbps	2	11	2462	-17.25	-15.92	-12.91	-0.61		8.00		Pass
HT20	MCS0	2	1	2412	-16.96	-16.06	-13.05	-0.61		8.00		Pass
HT20	MCS0	2	6	2437	-15.73	-15.28	-12.27	-0.61		8.00		Pass
HT20	MCS0	2	11	2462	-16.58	-15.97	-12.96	-0.61		8.00		Pass
HT40	MCS0	2	3	2422	-17.84	-18.24	-14.83	-0.61		8.00		Pass
HT40	MCS0	2	6	2437	-17.54	-18.44	-14.53	-0.61		8.00		Pass
HT40	MCS0	2	9	2452	-16.96	-18.16	-13.95	-0.61		8.00		Pass

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

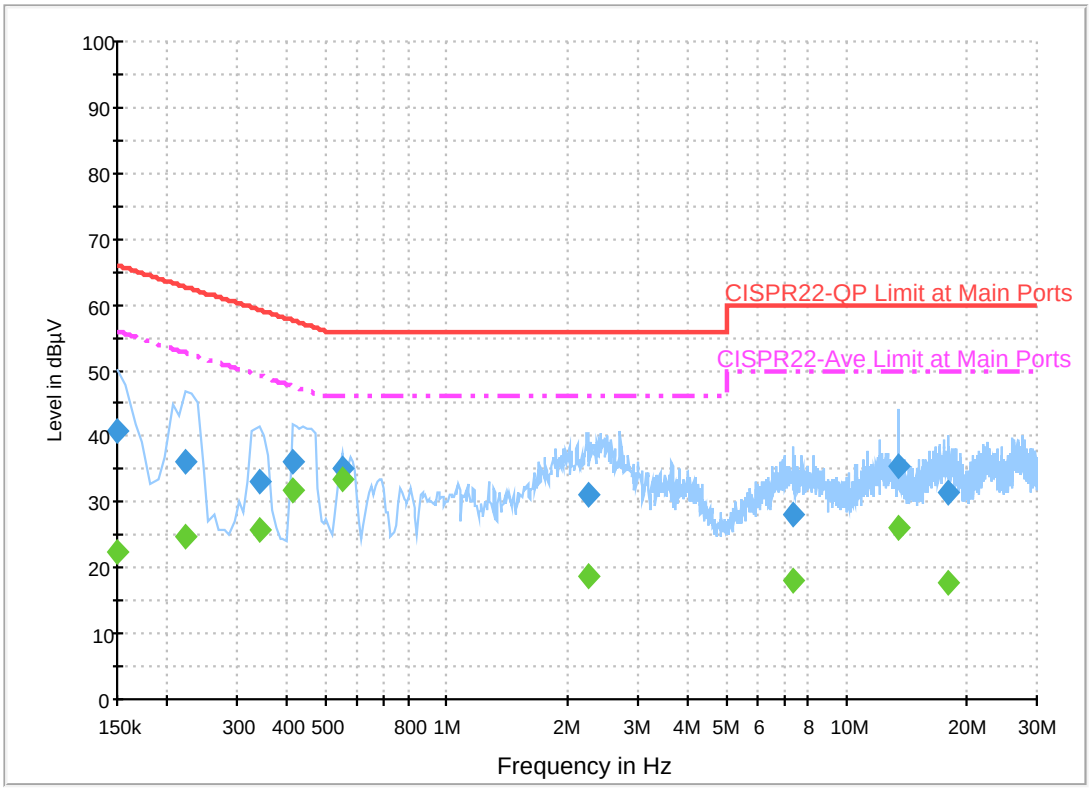
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Marlowe Ho	**Temperature :**	24~26℃
		Relative Humidity :	50~52%

EUT Information

Report NO :	740822
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)
0.150000	40.8	Off	L1	19.6	25.2	66.0
0.222000	36.0	Off	L1	19.6	26.7	62.7
0.342000	33.2	Off	L1	19.6	26.0	59.2
0.414000	36.1	Off	L1	19.6	21.5	57.6
0.550000	35.0	Off	L1	19.6	21.0	56.0
2.254000	31.2	Off	L1	18.7	24.8	56.0
7.342000	28.2	Off	L1	19.9	31.8	60.0
13.558000	35.4	Off	L1	20.2	24.6	60.0
17.942000	31.5	Off	L1	20.5	28.5	60.0

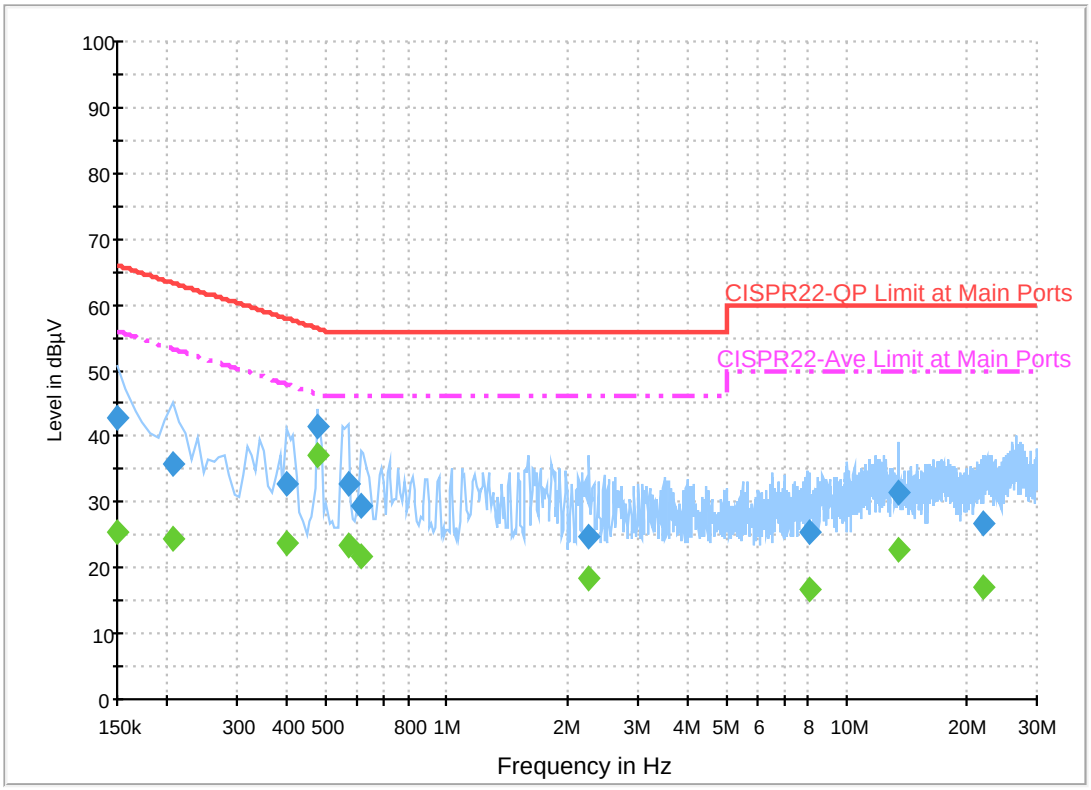
Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	22.6	Off	L1	19.6	33.4	56.0
0.222000	24.8	Off	L1	19.6	27.9	52.7
0.342000	25.6	Off	L1	19.6	23.6	49.2
0.414000	31.7	Off	L1	19.6	15.9	47.6
0.550000	33.5	Off	L1	19.6	12.5	46.0
2.254000	18.8	Off	L1	18.7	27.2	46.0
7.342000	18.1	Off	L1	19.9	31.9	50.0
13.558000	26.0	Off	L1	20.2	24.0	50.0
17.942000	17.7	Off	L1	20.5	32.3	50.0

EUT Information

Report NO :	740822
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

ENV216 Auto Test FCC Power Bar - N



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	42.7	Off	N	19.5	23.3	66.0
0.206000	35.9	Off	N	19.5	27.5	63.4
0.398000	32.7	Off	N	19.5	25.2	57.9
0.478000	41.3	Off	N	19.5	15.1	56.4
0.566000	32.8	Off	N	19.5	23.2	56.0
0.614000	29.5	Off	N	19.5	26.5	56.0
2.278000	24.7	Off	N	18.8	31.3	56.0
8.078000	25.5	Off	N	19.9	34.5	60.0
13.558000	31.6	Off	N	20.3	28.4	60.0
22.038000	26.8	Off	N	20.8	33.2	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	25.4	Off	N	19.5	30.6	56.0
0.206000	24.4	Off	N	19.5	29.0	53.4
0.398000	23.6	Off	N	19.5	24.3	47.9
0.478000	37.0	Off	N	19.5	9.4	46.4
0.566000	23.5	Off	N	19.5	22.5	46.0
0.614000	21.9	Off	N	19.5	24.1	46.0
2.278000	18.4	Off	N	18.8	27.6	46.0
8.078000	16.7	Off	N	19.9	33.3	50.0

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.558000	22.6	Off	N	20.3	27.4	50.0
22.038000	17.2	Off	N	20.8	32.8	50.0

Appendix C. Radiated Spurious Emission

Test Engineer :	Peter Liao and Nick Yu	Temperature :	22~23°C
		Relative Humidity :	54~56%

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		2353.89	53.29	-20.71	74	43.8	26.96	4	31.5	200	342	P	H
		2389.275	41.24	-12.76	54	31.6	27.07	4.03	31.49	200	342	A	H
	*	2412	103.89	-	-	94.16	27.14	4.05	31.49	200	342	P	H
	*	2412	99.53	-	-	89.8	27.14	4.05	31.49	200	342	A	H
													H
													H
		2357.67	54.63	-19.37	74	45.12	26.97	4.01	31.5	282	274	P	V
		2388.225	41.23	-12.77	54	31.6	27.06	4.03	31.49	282	274	A	V
	*	2412	102.92	-	-	93.19	27.14	4.05	31.49	282	274	P	V
	*	2412	98.75	-	-	89.02	27.14	4.05	31.49	282	274	A	V
													V
													V
802.11b CH 06 2437MHz		2357.32	53.49	-20.51	74	43.98	26.97	4.01	31.5	223	330	P	H
		2385.74	41.21	-12.79	54	31.58	27.06	4.03	31.49	223	330	A	H
	*	2437	104.66	-	-	94.83	27.21	4.07	31.48	223	330	P	H
	*	2437	100.17	-	-	90.34	27.21	4.07	31.48	223	330	A	H
		2496.15	53.83	-20.17	74	43.76	27.39	4.11	31.46	223	330	P	H
		2499.93	41.54	-12.46	54	31.46	27.4	4.11	31.46	223	330	A	H
		2360.68	54.17	-19.83	74	44.65	26.98	4.01	31.5	388	254	P	V
		2387.98	41.21	-12.79	54	31.58	27.06	4.03	31.49	388	254	A	V
	*	2437	100.74	-	-	90.91	27.21	4.07	31.48	388	254	P	V
	*	2437	96.12	-	-	86.29	27.21	4.07	31.48	388	254	A	V
		2497.62	53.73	-20.27	74	43.66	27.39	4.11	31.46	388	254	P	V
		2496.29	41.53	-12.47	54	31.46	27.39	4.11	31.46	388	254	A	V

802.11b CH 11 2462MHz	*	2462	102.78	-	-	92.85	27.29	4.08	31.47	383	333	P	H
	*	2462	98.69	-	-	88.76	27.29	4.08	31.47	383	333	A	H
		2488.52	53.44	-20.56	74	43.4	27.37	4.11	31.47	383	333	P	H
		2499.96	41.59	-12.41	54	31.51	27.4	4.11	31.46	383	333	A	H
													H
													H
	*	2462	101.06	-	-	91.13	27.29	4.08	31.47	280	262	P	V
	*	2462	97.1	-	-	87.17	27.29	4.08	31.47	280	262	A	V
		2497.24	54.19	-19.81	74	44.12	27.39	4.11	31.46	280	262	P	V
		2498.88	41.55	-12.45	54	31.47	27.4	4.11	31.46	280	262	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	41.23	-32.77	74	60.66	32.18	6.17	58.31	100	0	P	H
													H
													H
													H
		4824	41.39	-32.61	74	60.82	32.18	6.17	58.31	100	0	P	V
													V
													V
													V
802.11b CH 06 2437MHz		4874	41.72	-32.28	74	60.96	32.27	6.21	58.24	100	0	P	H
		7311	59.02	-14.98	74	73.07	36.97	7.72	59.09	218	8	P	H
		7311	52.53	-1.47	54	66.58	36.97	7.72	59.09	218	8	A	H
													H
		4874	41.44	-32.56	74	60.68	32.27	6.21	58.24	100	0	P	V
		7311	58.64	-15.36	74	72.69	36.97	7.72	59.09	207	51	P	V
		7311	52.1	-1.9	54	66.15	36.97	7.72	59.09	207	51	A	V
													V
802.11b CH 11 2462MHz		4924	42.1	-31.9	74	61.19	32.36	6.23	58.18	100	0	P	H
		7386	57.47	-16.53	74	71.42	37.18	7.72	59.14	218	10	P	H
		7386	50.92	-3.08	54	64.87	37.18	7.72	59.14	218	10	A	H
													H
		4924	40.6	-33.4	74	59.69	32.36	6.23	58.18	100	0	P	V
		7386	56.26	-17.74	74	70.21	37.18	7.72	59.14	195	49	P	V
		7386	49.41	-4.59	54	63.36	37.18	7.72	59.14	195	49	A	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)
		2389.695	56.29	-17.71	74	46.65	27.07	4.03	31.49	199	340	P	H
		2390	43.92	-10.08	54	34.28	27.07	4.03	31.49	199	340	A	H
	*	2412	103.74	-	-	94.01	27.14	4.05	31.49	199	340	P	H
	*	2412	93.86	-	-	84.13	27.14	4.05	31.49	199	340	A	H
802.11n													H
HT20													H
CH 01		2390	56.09	-17.91	74	46.45	27.07	4.03	31.49	264	254	P	V
2412MHz		2390	43.84	-10.16	54	34.2	27.07	4.03	31.49	264	254	A	V
	*	2412	100.24	-	-	90.51	27.14	4.05	31.49	264	254	P	V
	*	2412	90.18	-	-	80.45	27.14	4.05	31.49	264	254	A	V
													V
													V
		2361.24	53.28	-20.72	74	43.76	26.98	4.01	31.5	170	334	P	H
		2386.58	42.09	-11.91	54	32.46	27.06	4.03	31.49	170	334	A	H
	*	2437	101.99	-	-	92.16	27.21	4.07	31.48	170	334	P	H
	*	2437	91.85	-	-	82.02	27.21	4.07	31.48	170	334	A	H
802.11n		2488.45	53.34	-20.66	74	43.3	27.37	4.11	31.47	170	334	P	H
HT20		2487.4	42.35	-11.65	54	32.32	27.36	4.11	31.47	170	334	A	H
CH 06		2338.7	53.28	-20.72	74	43.86	26.92	3.98	31.51	279	262	P	V
2437MHz		2382.24	42.15	-11.85	54	32.53	27.05	4.03	31.49	279	262	A	V
	*	2437	99.19	-	-	89.36	27.21	4.07	31.48	279	262	P	V
	*	2437	89.06	-	-	79.23	27.21	4.07	31.48	279	262	A	V
		2485.93	54.19	-19.81	74	44.16	27.36	4.11	31.47	279	262	P	V
		2497.48	42.32	-11.68	54	32.25	27.39	4.11	31.46	279	262	A	V

	*	2462	102.31	-	-	92.38	27.29	4.08	31.47	118	329	P	H
	*	2462	92.84	-	-	82.91	27.29	4.08	31.47	118	329	A	H
		2483.56	57.88	-16.12	74	47.86	27.35	4.11	31.47	118	329	P	H
		2483.52	44.83	-9.17	54	34.81	27.35	4.11	31.47	118	329	A	H
802.11n													H
HT20													H
CH 11	*	2462	99.97	-	-	90.04	27.29	4.08	31.47	281	264	P	V
2462MHz	*	2462	89.86	-	-	79.93	27.29	4.08	31.47	281	264	A	V
		2483.76	56.62	-17.38	74	46.6	27.35	4.11	31.47	281	264	P	V
		2483.8	44.15	-9.85	54	34.13	27.35	4.11	31.47	281	264	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)
		4824	46.01	-27.99	74	65.44	32.18	6.17	58.31	100	0	P	H
													H
802.11n													H
HT20													H
CH 01		4824	40.53	-33.47	74	59.96	32.18	6.17	58.31	100	0	P	V
2412MHz													V
													V
													V
		4874	41.74	-32.26	74	60.98	32.27	6.21	58.24	100	0	P	H
		7311	58.57	-15.43	74	72.62	36.97	7.72	59.09	218	8	P	H
802.11n		7311	41.84	-12.16	54	55.89	36.97	7.72	59.09	218	8	A	H
HT20													H
CH 06		4874	41.4	-32.6	74	60.64	32.27	6.21	58.24	100	0	P	V
2437MHz		7311	58.24	-15.76	74	72.29	36.97	7.72	59.09	227	25	P	V
		7311	41.38	-12.62	54	55.43	36.97	7.72	59.09	227	25	A	V
													V
		4924	40.5	-33.5	74	59.59	32.36	6.23	58.18	100	0	P	H
		7386	56.18	-17.82	74	70.13	37.18	7.72	59.14	214	8	P	H
802.11n		7386	39.27	-14.73	54	53.22	37.18	7.72	59.14	214	8	A	H
HT20													H
CH 11		4924	40.13	-33.87	74	59.22	32.36	6.23	58.18	100	0	P	V
2462MHz		7386	55.08	-18.92	74	69.03	37.18	7.72	59.14	221	25	P	V
		7386	38.79	-15.21	54	52.74	37.18	7.72	59.14	221	25	A	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1+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)
		2389.52	60.02	-13.98	74	50.38	27.07	4.03	31.49	200	332	P	H
		2389.94	48.86	-5.14	54	39.22	27.07	4.03	31.49	200	332	A	H
	*	2422	99.84	-	-	90.07	27.17	4.05	31.48	200	332	P	H
	*	2422	90.1	-	-	80.33	27.17	4.05	31.48	200	332	A	H
802.11n		2495.38	53.72	-20.28	74	43.65	27.39	4.11	31.46	200	332	P	H
HT40		2484.46	43.02	-10.98	54	33	27.35	4.11	31.47	200	332	A	H
CH 03		2388.54	56.26	-17.74	74	46.62	27.07	4.03	31.49	232	285	P	V
2422MHz		2389.94	45.84	-8.16	54	36.2	27.07	4.03	31.49	232	285	A	V
	*	2422	95.76	-	-	85.99	27.17	4.05	31.48	232	285	P	V
	*	2422	86.7	-	-	76.93	27.17	4.05	31.48	232	285	A	V
		2485.16	54.44	-19.56	74	44.41	27.36	4.11	31.47	232	285	P	V
		2488.59	43.23	-10.77	54	33.19	27.37	4.11	31.47	232	285	A	V
		2336.32	53.09	-20.91	74	43.68	26.91	3.98	31.51	221	333	P	H
		2389.8	42.65	-11.35	54	33.01	27.07	4.03	31.49	221	333	A	H
	*	2437	100.33	-	-	90.5	27.21	4.07	31.48	221	333	P	H
	*	2437	89.83	-	-	80	27.21	4.07	31.48	221	333	A	H
802.11n		2484.53	54.01	-19.99	74	43.99	27.35	4.11	31.47	221	333	P	H
HT40		2483.62	43.3	-10.7	54	33.28	27.35	4.11	31.47	221	333	A	H
CH 06		2366.14	53.87	-20.13	74	44.32	27	4.01	31.49	243	285	P	V
2437MHz		2389.94	42.36	-11.64	54	32.72	27.07	4.03	31.49	243	285	A	V
	*	2437	96.72	-	-	86.89	27.21	4.07	31.48	243	285	P	V
	*	2437	86.85	-	-	77.02	27.21	4.07	31.48	243	285	A	V
		2499.37	54.14	-19.86	74	44.06	27.4	4.11	31.46	243	285	P	V
		2483.51	42.8	-11.2	54	32.78	27.35	4.11	31.47	243	285	A	V

		2321.2	53.35	-20.65	74	43.99	26.86	3.98	31.51	195	331	P	H
		2378.04	42.1	-11.9	54	32.5	27.03	4.03	31.49	195	331	A	H
	*	2452	99.5	-	-	89.6	27.26	4.08	31.47	195	331	P	H
	*	2452	89.52	-	-	79.62	27.26	4.08	31.47	195	331	A	H
802.11n		2484.74	56.31	-17.69	74	46.29	27.35	4.11	31.47	195	331	P	H
HT40		2484.11	44.54	-9.46	54	34.52	27.35	4.11	31.47	195	331	A	H
CH 09		2334.5	53.27	-20.73	74	43.87	26.9	3.98	31.51	278	288	P	V
2452MHz		2363.62	42.1	-11.9	54	32.57	26.99	4.01	31.5	278	288	A	V
	*	2452	97.11	-	-	87.21	27.26	4.08	31.47	278	288	P	V
	*	2452	87.13	-	-	77.23	27.26	4.08	31.47	278	288	A	V
		2484.46	54.3	-19.7	74	44.28	27.35	4.11	31.47	278	288	P	V
		2483.76	43.87	-10.13	54	33.85	27.35	4.11	31.47	278	288	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11b (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11b LF		95.34	29.13	-14.37	43.5	43.25	15.42	0.8	30.4	-	-	P	H
		165.54	29.15	-14.35	43.5	42.1	16.12	1.09	30.32	-	-	P	H
		213.6	28.69	-14.81	43.5	42.37	15.24	1.19	30.25	-	-	P	H
		612.9	28.65	-17.35	46	30.15	26.08	1.97	29.64	-	-	P	H
		748.7	30.91	-15.09	46	29.87	28.17	2.21	29.44	-	-	P	H
		957.3	34.25	-11.75	46	29.53	31.02	2.51	29.05	100	0	P	H
													H
													H
													H
													H
													H
													H
		32.43	36.02	-3.98	40	42.83	22.96	0.48	30.22	-	-	P	V
		69.96	36.17	-3.83	40	53.45	12.42	0.68	30.43	100	0	P	V
		118.83	27.49	-16.01	43.5	39.46	17.49	0.89	30.38	-	-	P	V
		583.5	30.41	-15.59	46	32.32	25.73	1.95	29.68	-	-	P	V
		729.8	32.13	-13.87	46	31.67	27.65	2.18	29.47	-	-	P	V
		953.1	34.4	-11.6	46	29.8	30.92	2.49	29.05	-	-	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	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBµV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBµV/m)

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

= 32.22(dB/m) + 4.58(dB) + 54.51(dBµV) – 35.86 (dB)

= 55.45 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 55.45(dBµV/m) – 74(dBµV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBµV/m)

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

= 32.22(dB/m) + 4.58(dB) + 42.6(dBµV) – 35.86 (dB)

= 43.54 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 43.54(dBµV/m) – 54(dBµV/m)

= -10.46(dB)

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

Appendix D. Radiated Spurious Emission Plots

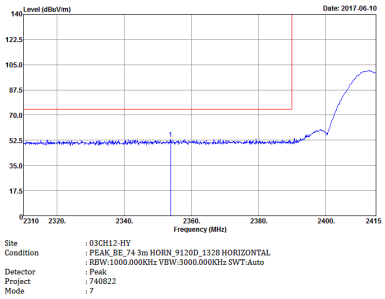
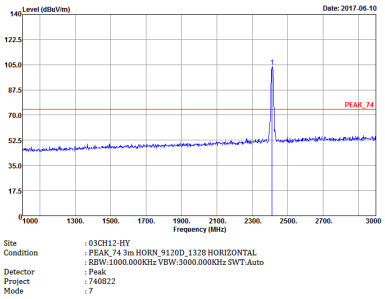
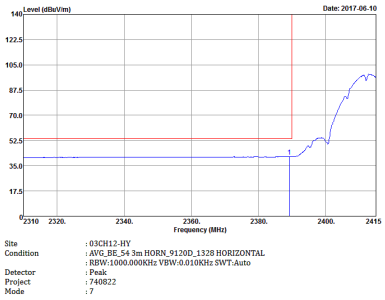
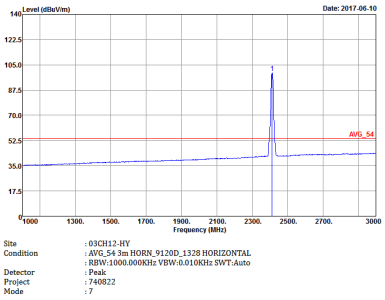
Test Engineer :	Peter Liao and Nick Yu	**Temperature :**	22~23°C
		Relative Humidity :	54~56%

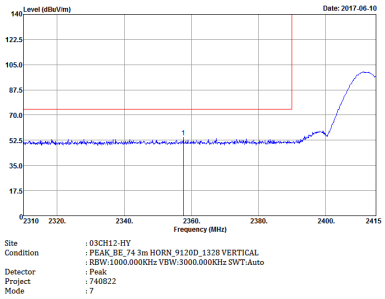
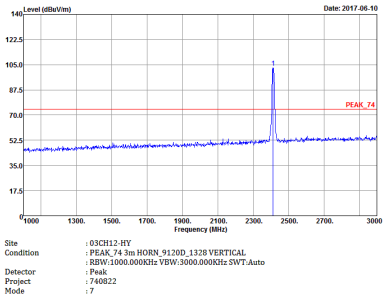
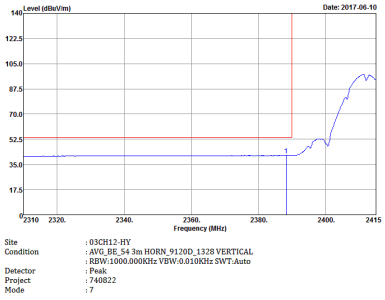
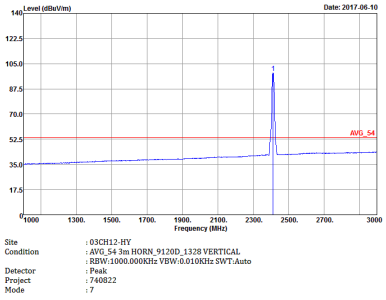
Note symbol

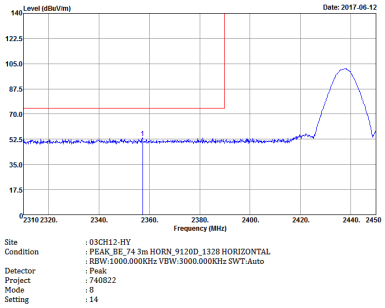
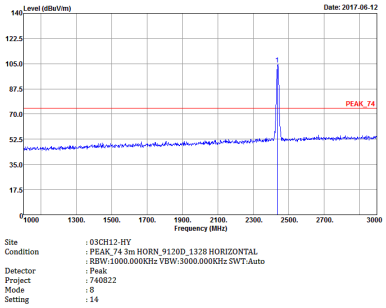
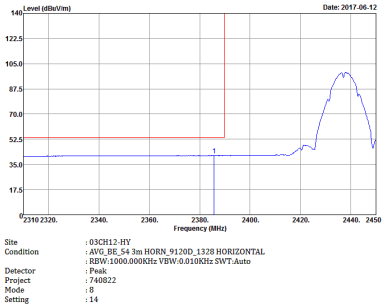
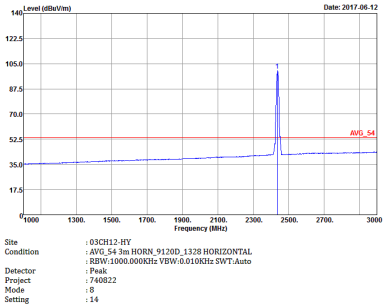
-L	**Low channel location**
-R	**High channel location**

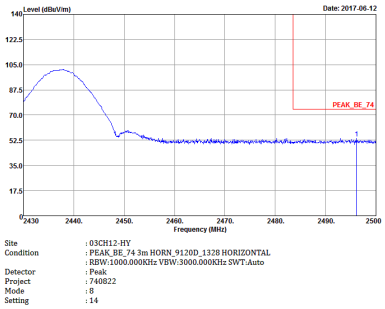
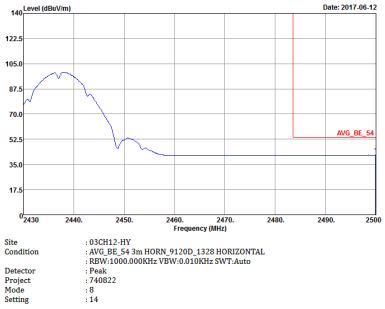
2.4GHz 2400~2483.5MHz

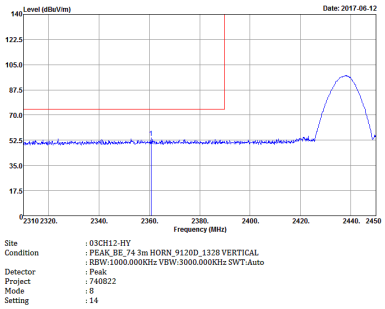
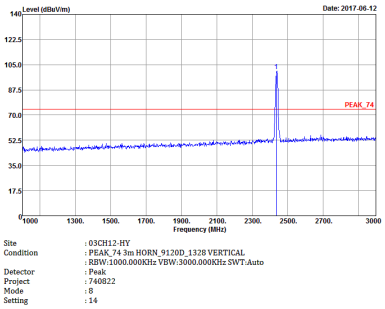
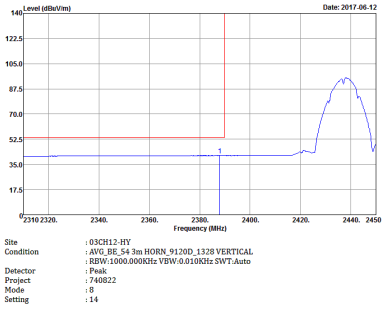
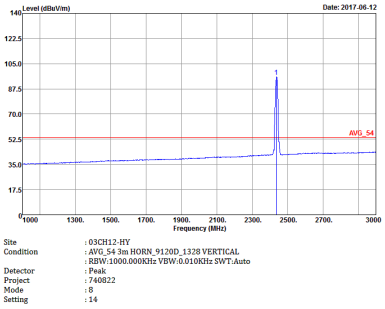
WIFI 802.11b (Band Edge @ 3m)

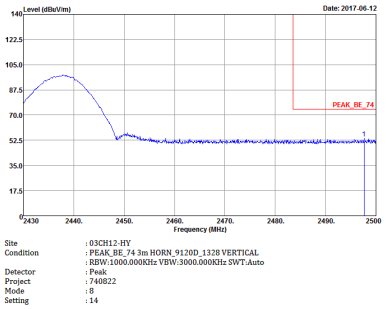
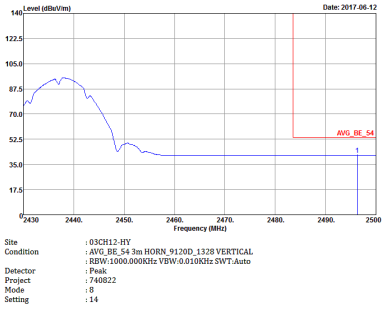
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

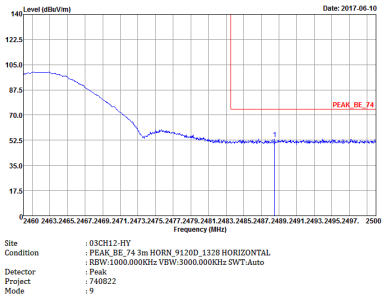
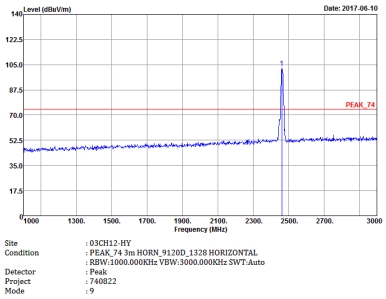
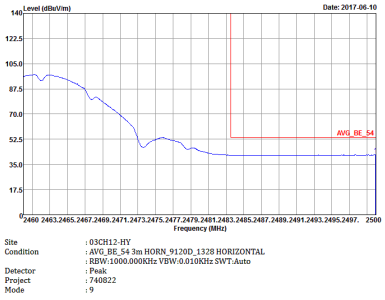
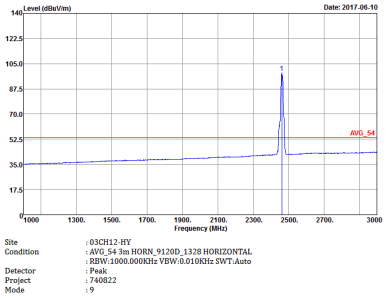
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

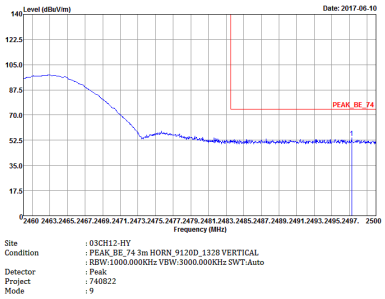
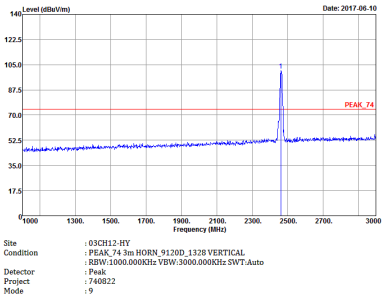
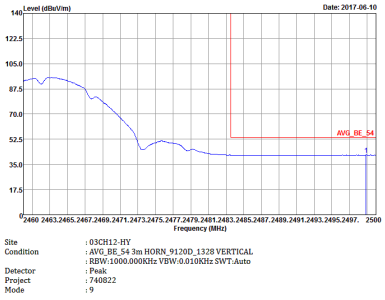
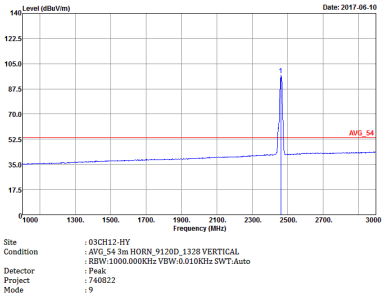
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

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

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 8 Setting : 14	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 8 Setting : 14
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Detector : Peak Project : 740822 Mode : 8 Setting : 14	 Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Detector : Peak Project : 740822 Mode : 8 Setting : 14

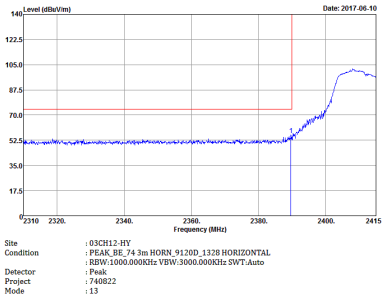
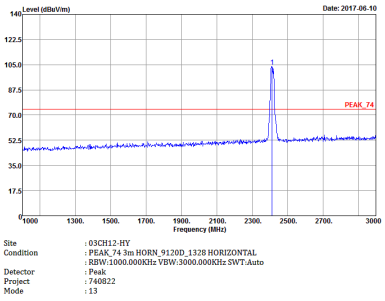
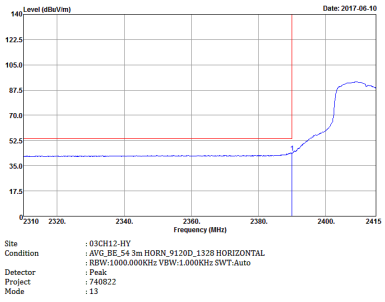
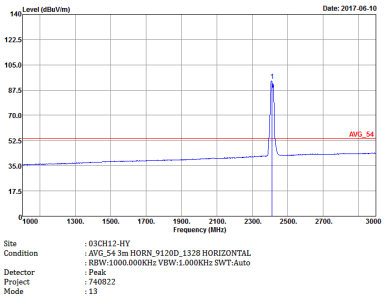
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

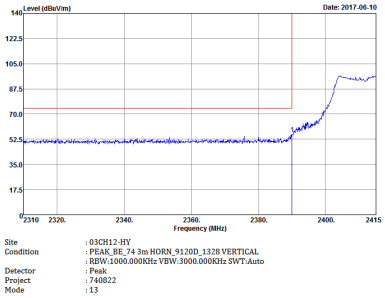
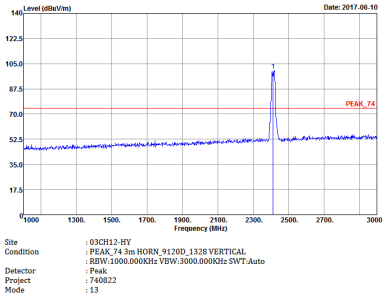
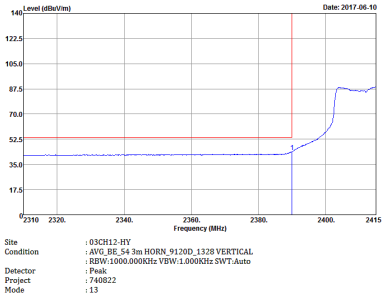
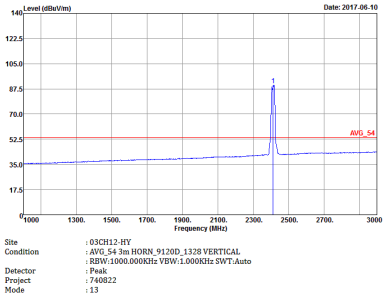
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

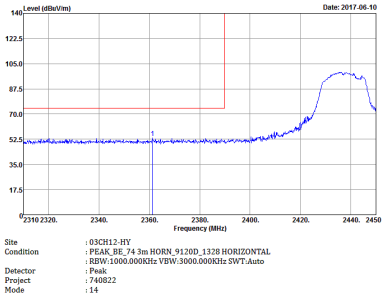
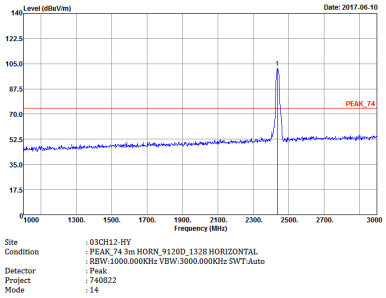
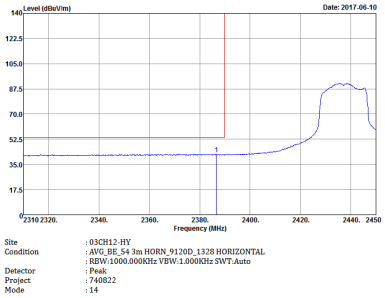
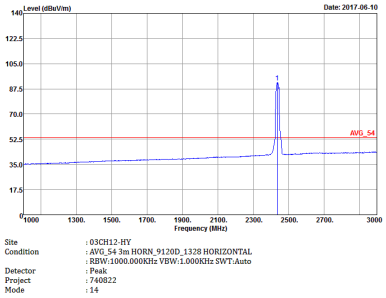
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

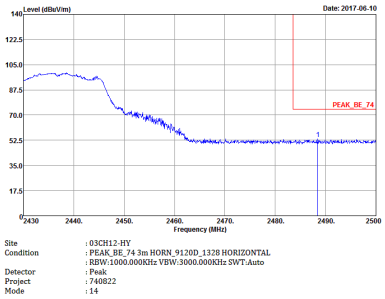
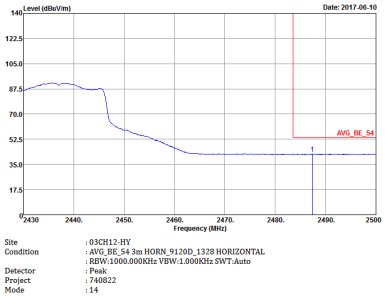
2.4GHz 2400~2483.5MHz

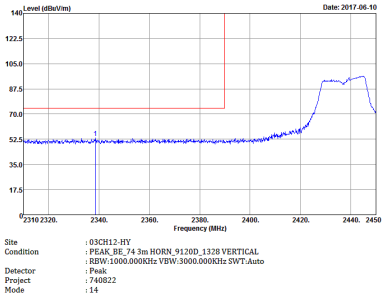
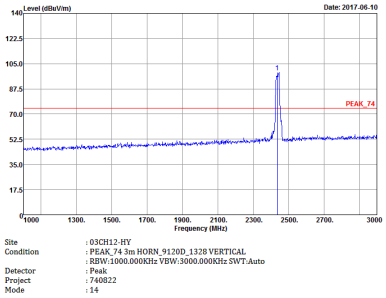
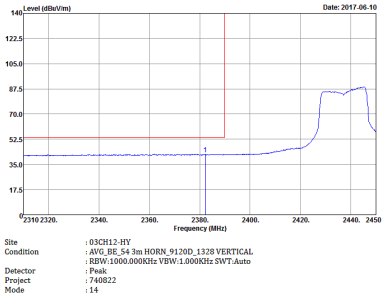
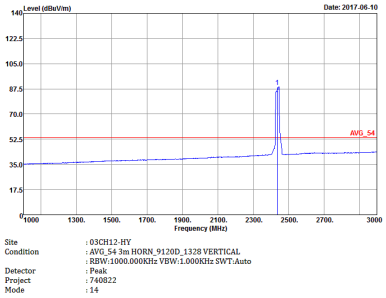
WIFI 802.11n HT20 (Band Edge @ 3m)

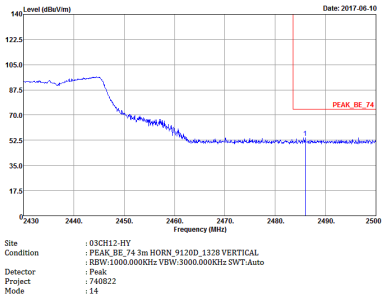
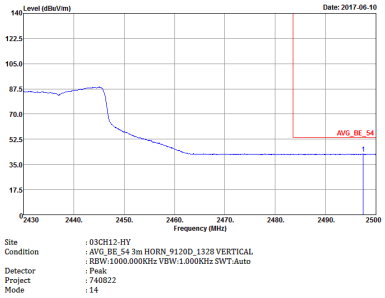
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

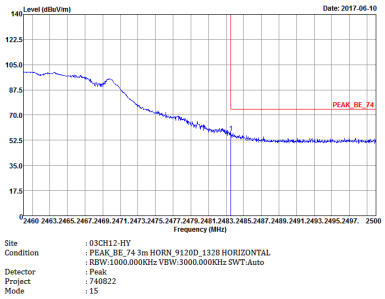
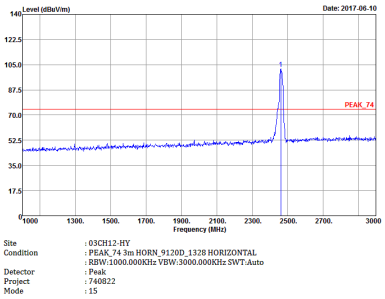
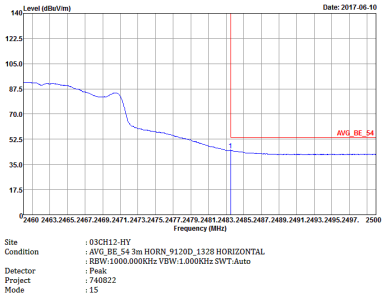
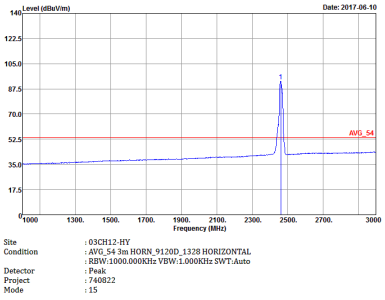
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

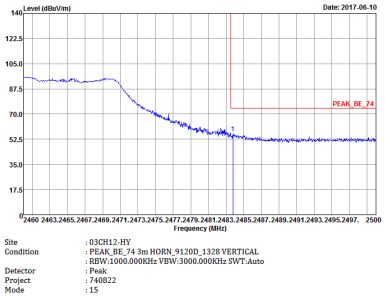
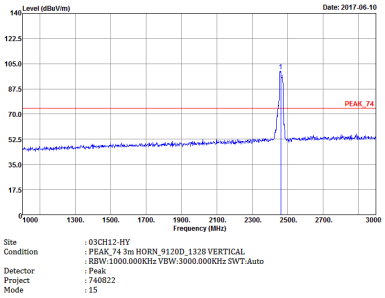
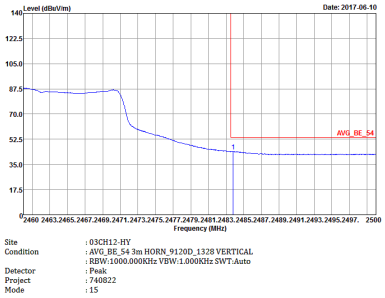
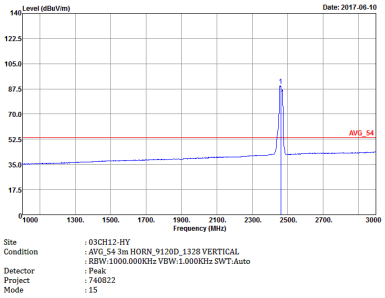
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak		
Avg.		

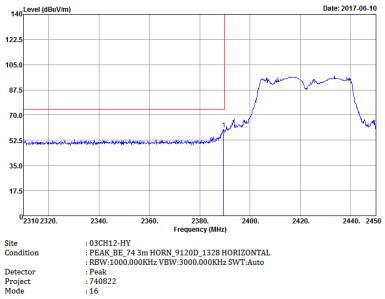
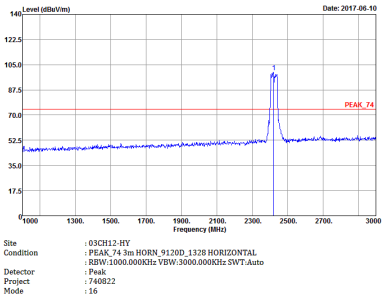
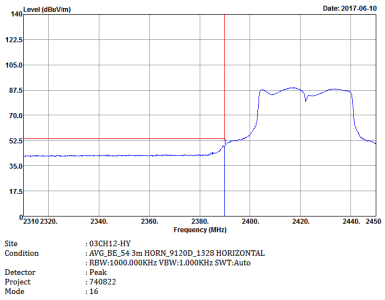
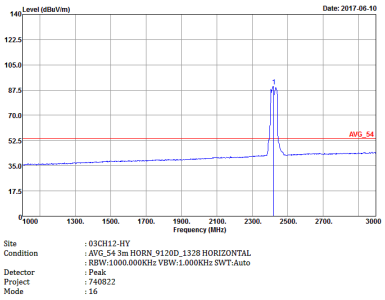
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak		Left Blank
Avg.		Left Blank

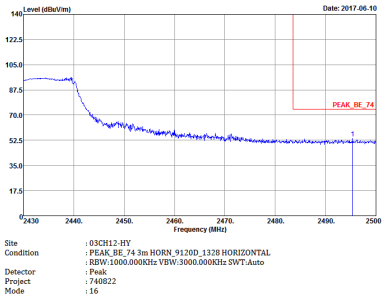
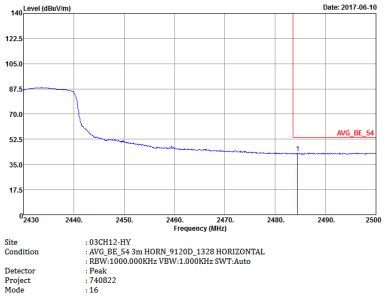
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

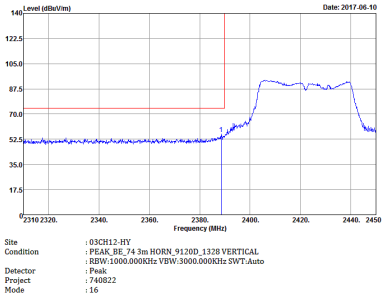
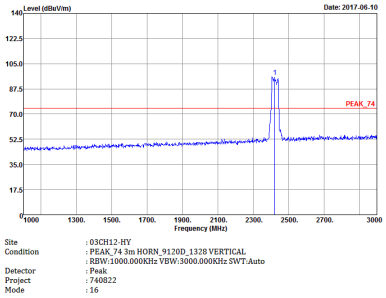
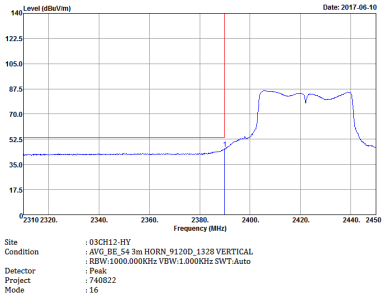
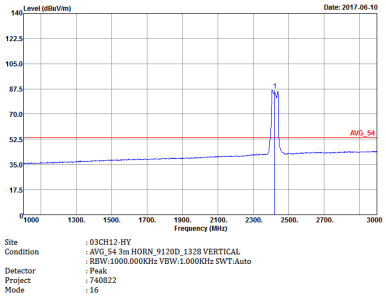
WIFI	2.4GHz 2400~2483.5MHz Fundamental @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

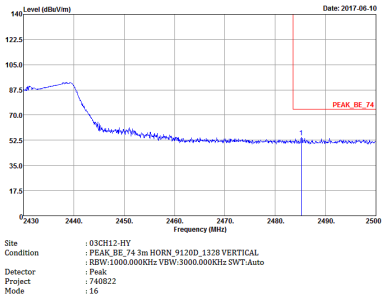
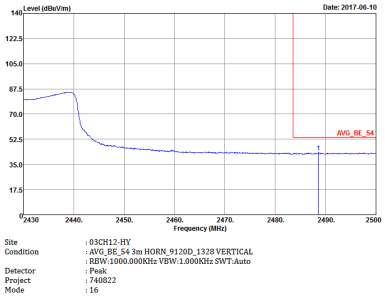
2.4GHz 2400~2483.5MHz

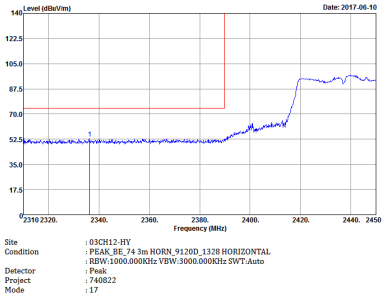
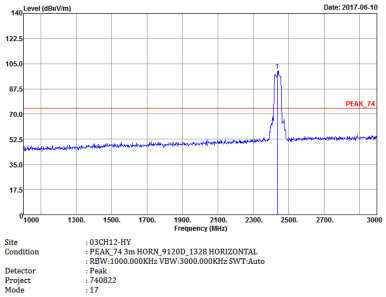
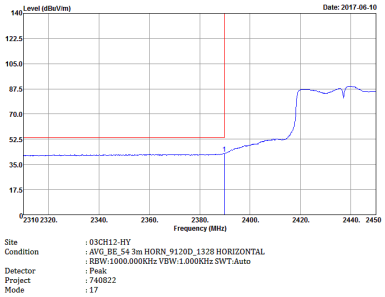
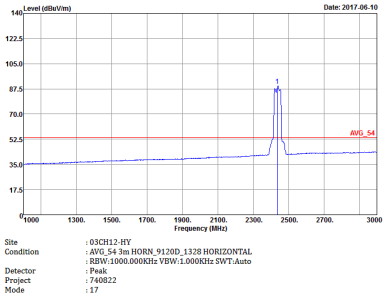
WIFI 802.11n HT40 (Band Edge @ 3m)

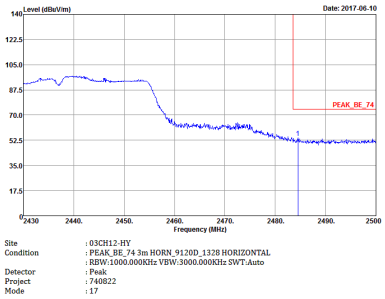
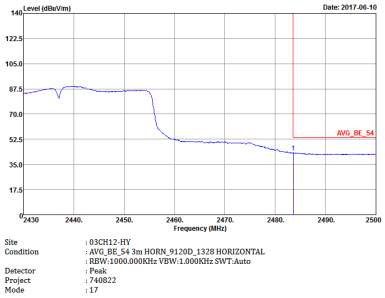
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

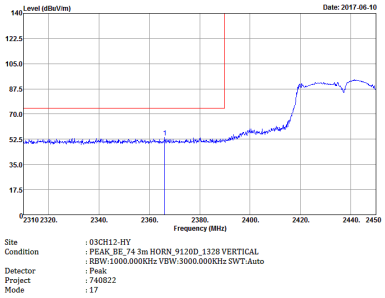
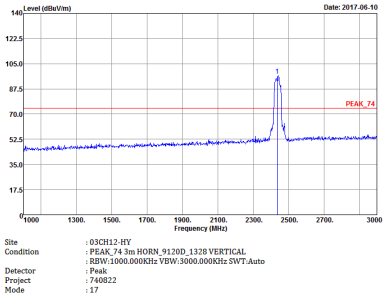
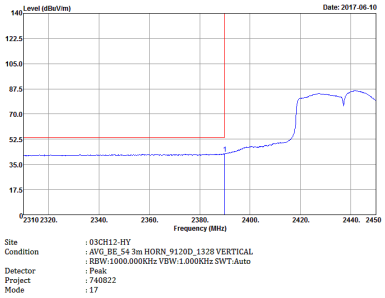
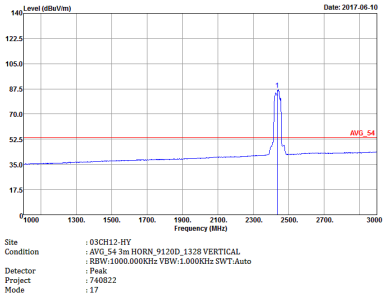
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1+2	Horizontal	Fundamental
Peak		Left Blank
Avg.		Left Blank

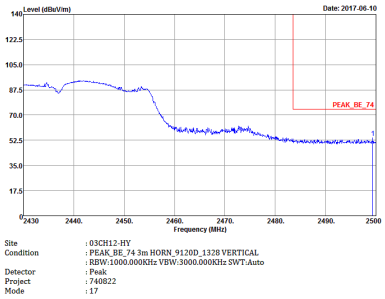
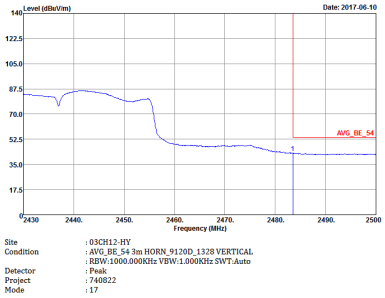
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1+2	Vertical	Fundamental
Peak		
Avg.		

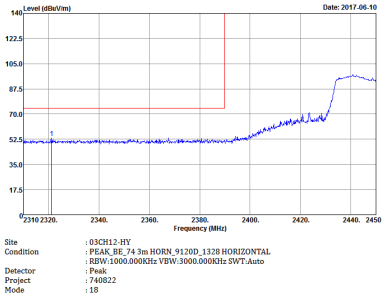
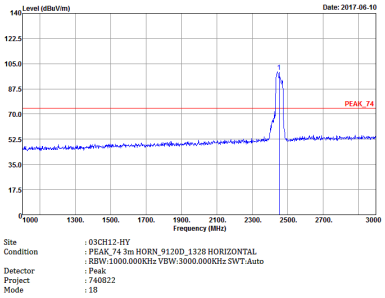
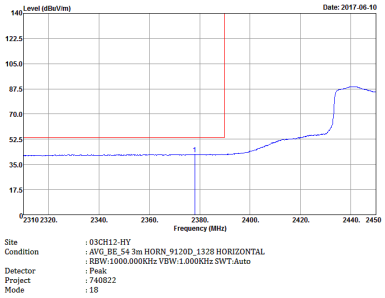
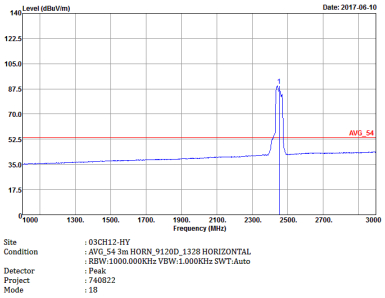
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1+2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

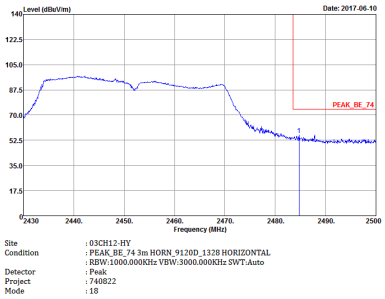
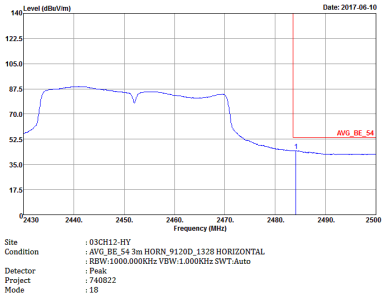
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

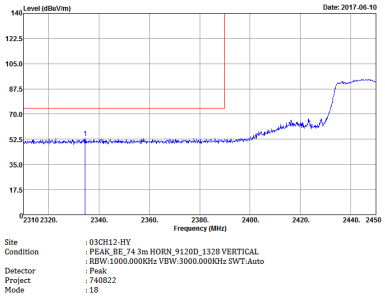
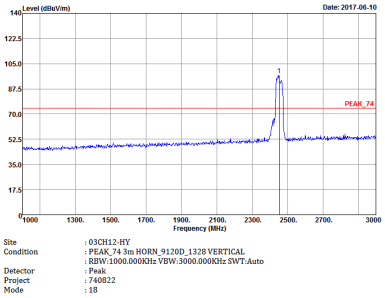
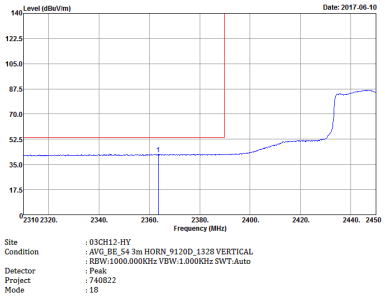
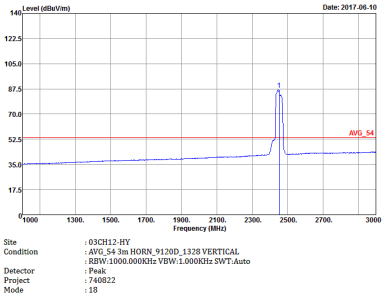
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

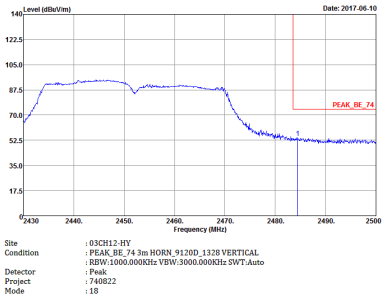
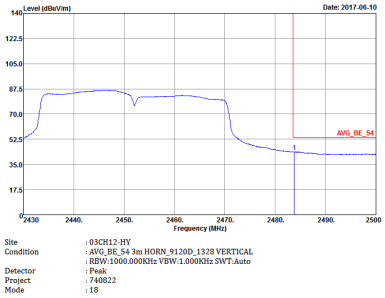
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 17	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 17
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 17	 Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 17

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 18	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 18
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 18	 Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 18

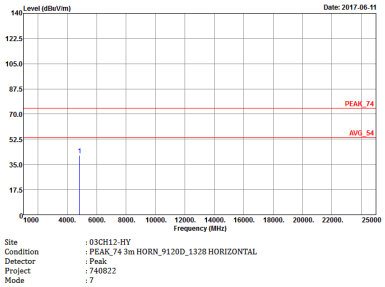
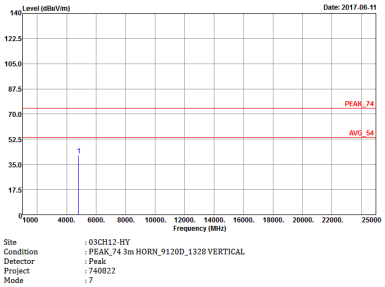
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1+2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

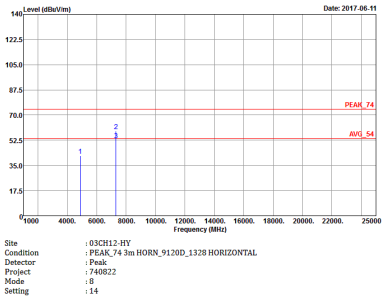
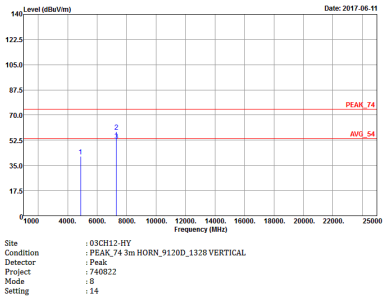
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH12-HY Condition : PEAK_BE_74 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 18	 Site : 03CH12-HY Condition : PEAK_74 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 18
Avg.	 Site : 03CH12-HY Condition : AVG_BE_54 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 18	 Site : 03CH12-HY Condition : AVG_54 3m HORN_9120D_1328 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 740822 Mode : 18

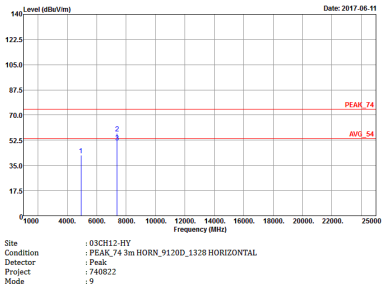
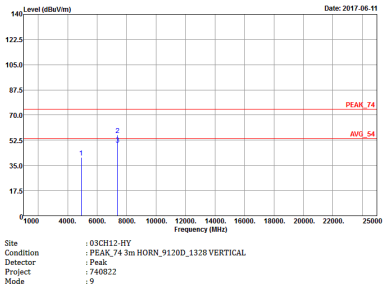
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1+2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

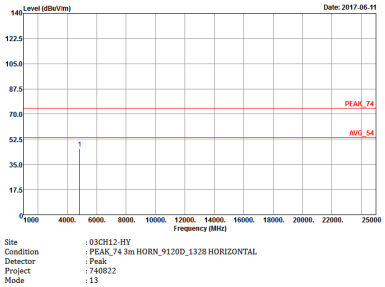
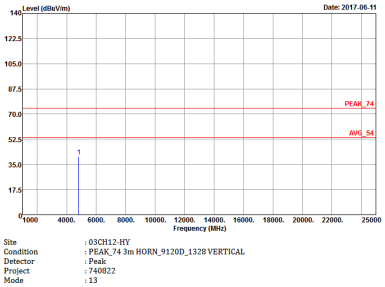
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.		

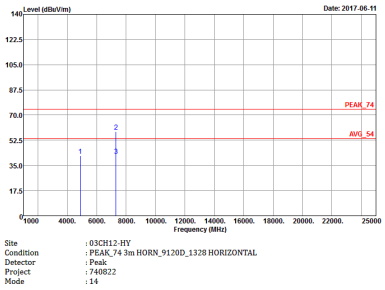
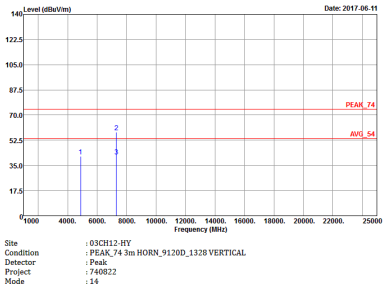
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.		

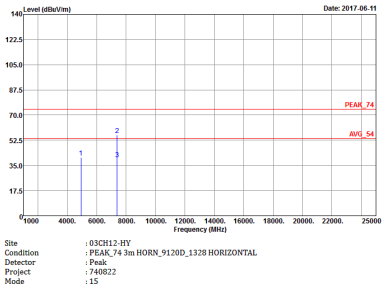
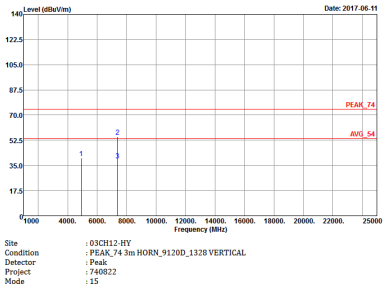
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

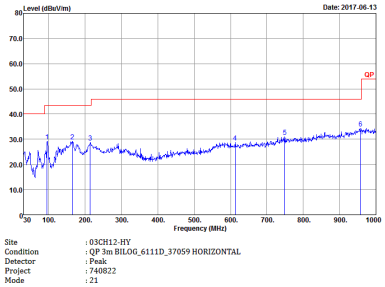
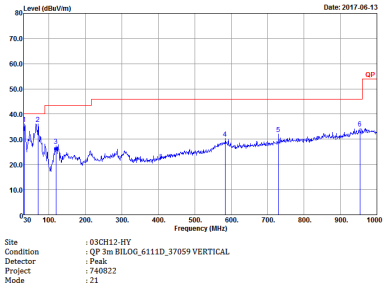
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.		

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.		

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

2.4GHz WIFI 802.11b (LF)

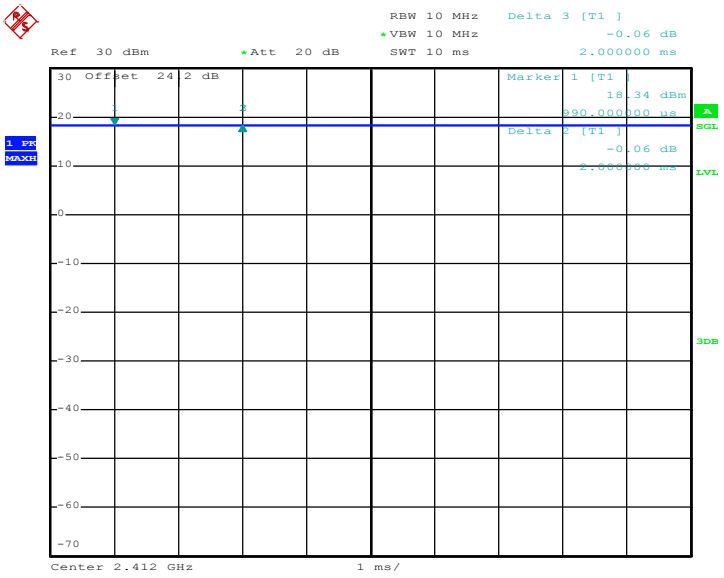
WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11b LF	
1+2	Horizontal	Vertical
QP / Peak		

Appendix E. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11b	100	-	-	10Hz
1	802.11g	95.385	2976	0.34	1kHz
1	2.4GHz 802.11n HT20	95.876	2790	0.36	1kHz
1	2.4GHz 802.11n HT40	91.946	1370	0.73	1kHz
2	802.11b	100	-	-	10Hz
2	802.11g	95.42	3000	0.33	1kHz
2	2.4GHz 802.11n HT20	95.205	2780	0.36	1kHz
2	2.4GHz 802.11n HT40	90.909	1350	0.74	1kHz
1+2	2.4GHz 802.11b for Ant. 1	100	-	-	10Hz
1+2	2.4GHz 802.11g for Ant. 1	96.154	3000	0.33	1kHz
1+2	2.4GHz 802.11n HT20 for Ant. 1	95.205	2780	0.36	1kHz
1+2	2.4GHz 802.11n HT40 for Ant. 1	91.946	1370	0.73	1kHz
1+2	2.4GHz 802.11b for Ant. 2	100	-	-	10Hz
1+2	2.4GHz 802.11g for Ant. 2	96.154	3000	0.33	1kHz
1+2	2.4GHz 802.11n HT20 for Ant. 2	95.205	2780	0.36	1kHz
1+2	2.4GHz 802.11n HT40 for Ant. 2	91.864	1475	0.68	1kHz

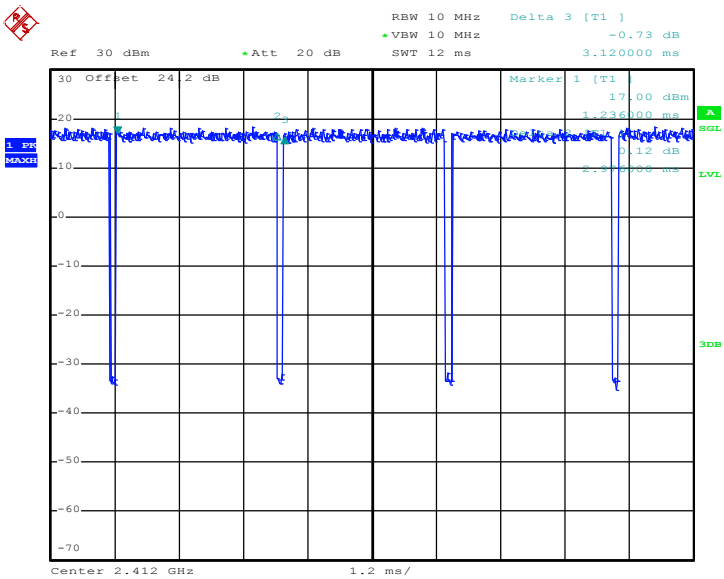
SISO <Ant. 1>

802.11b



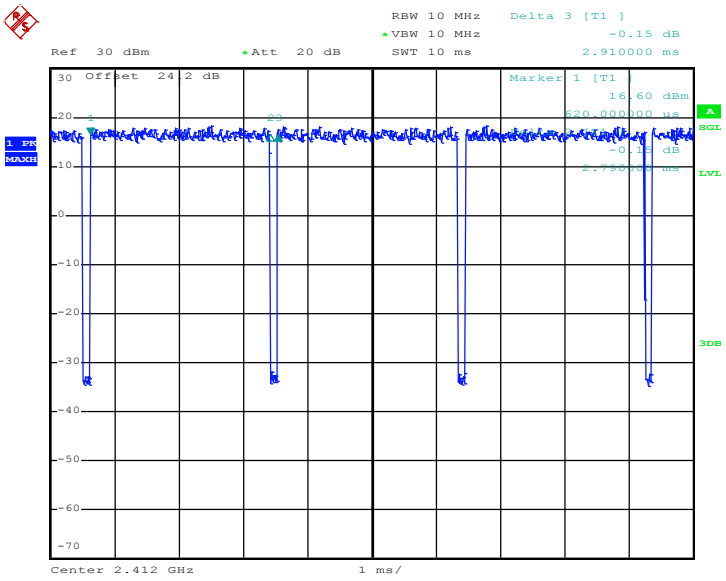
Date: 26.MAY.2017 23:34:48

802.11g



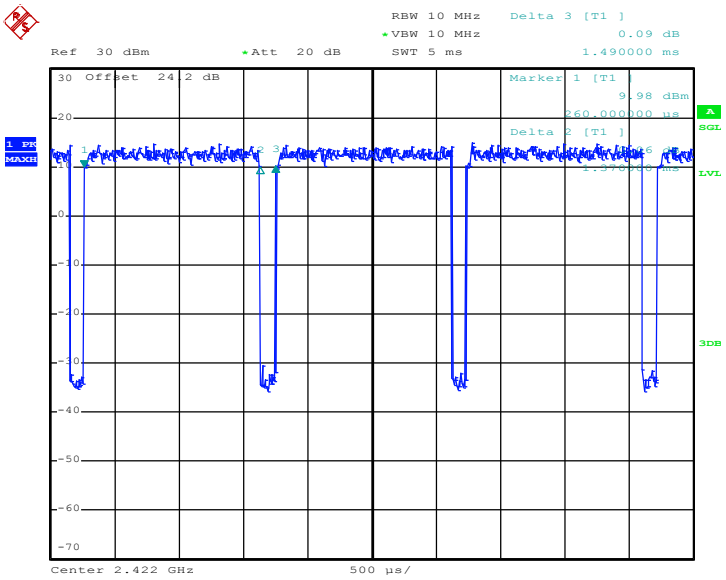
Date: 27.MAY.2017 01:25:14

802.11n HT20



Date: 27.MAY.2017 01:46:37

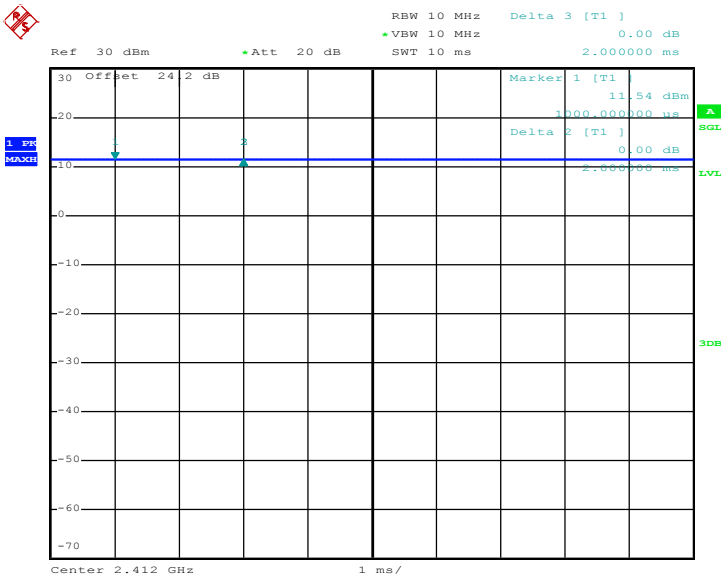
802.11n HT40



Date: 27.MAY.2017 09:15:58

SISO <Ant. 2>

802.11b



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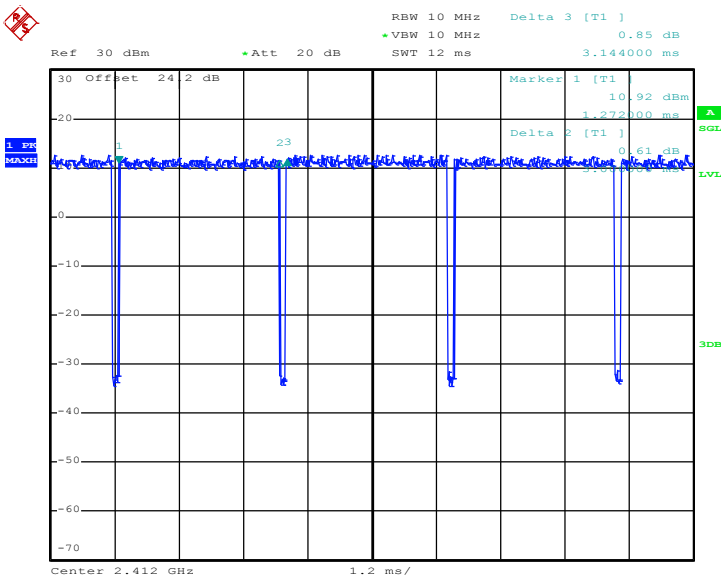
802.11g



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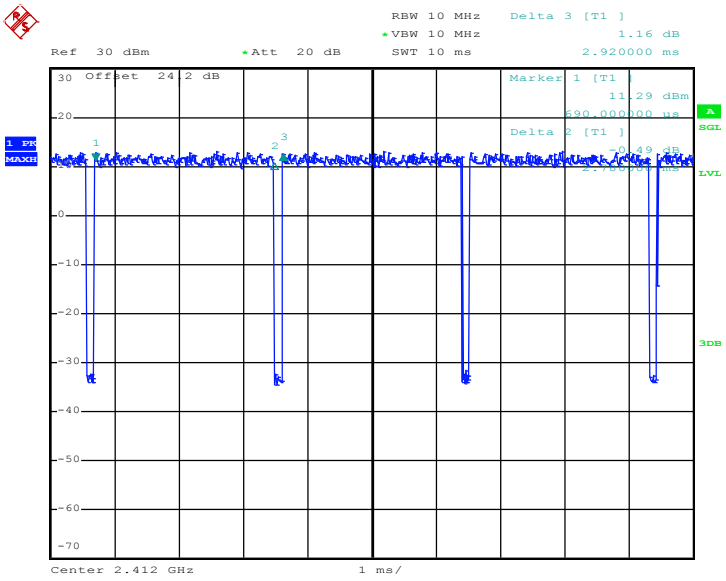
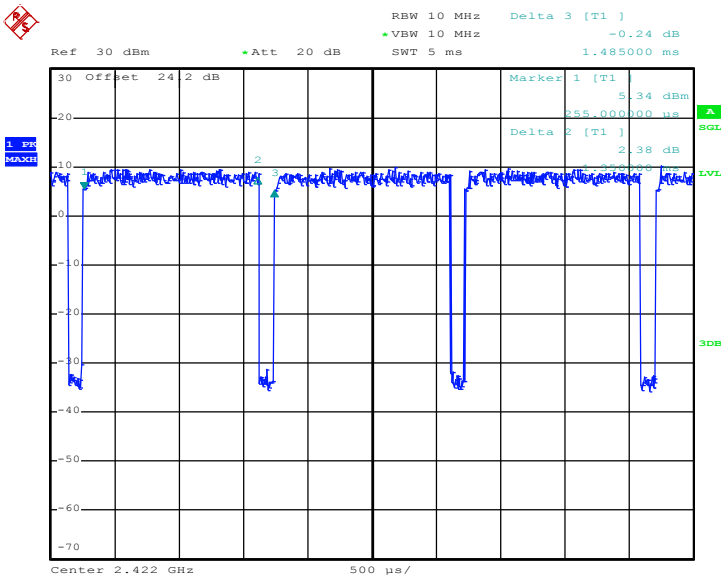
802.11n HT20



Date: 27.MAY.2017 01:43:00

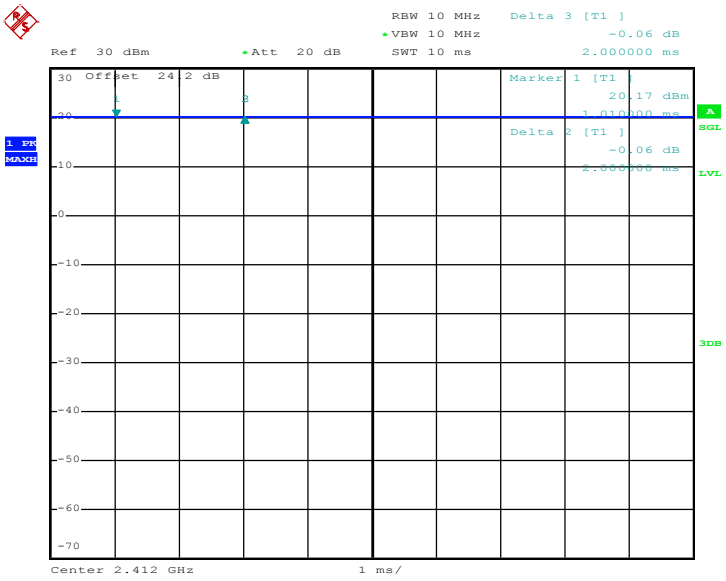
802.11n HT40



Date: 27.MAY.2017 09:10:42

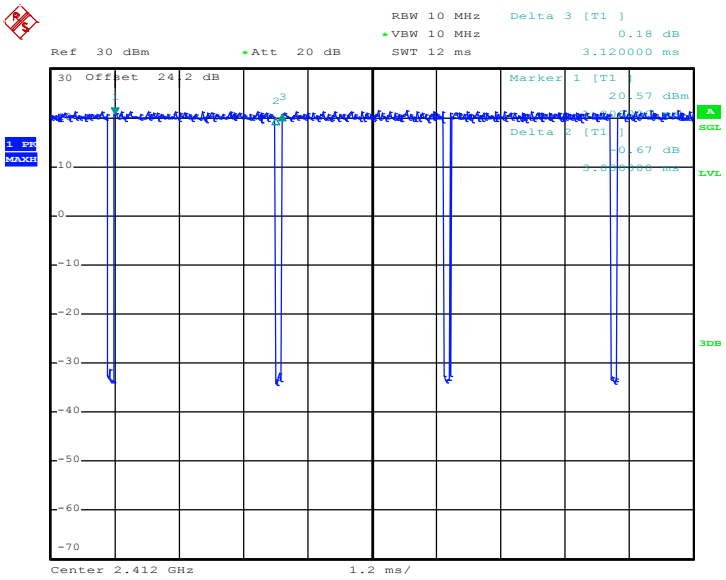
MIMO <Ant. 1>

802.11b



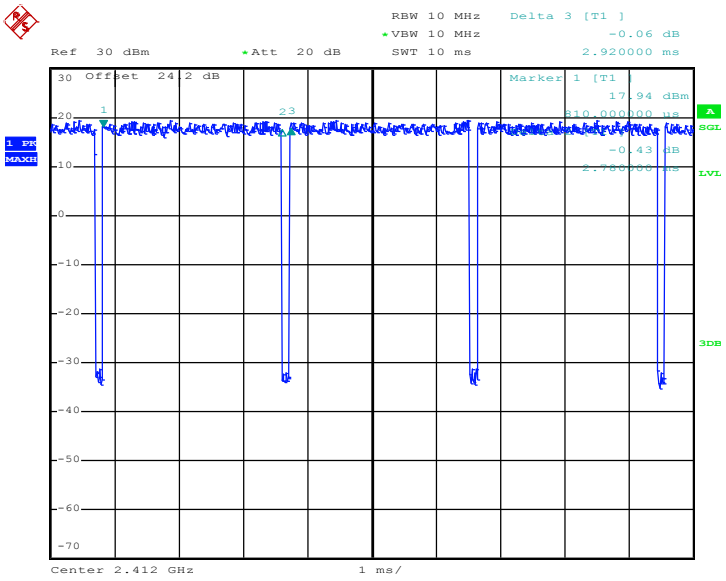
Date: 27.MAY.2017 00:31:43

802.11g



Date: 27.MAY.2017 01:15:40

802.11n HT20



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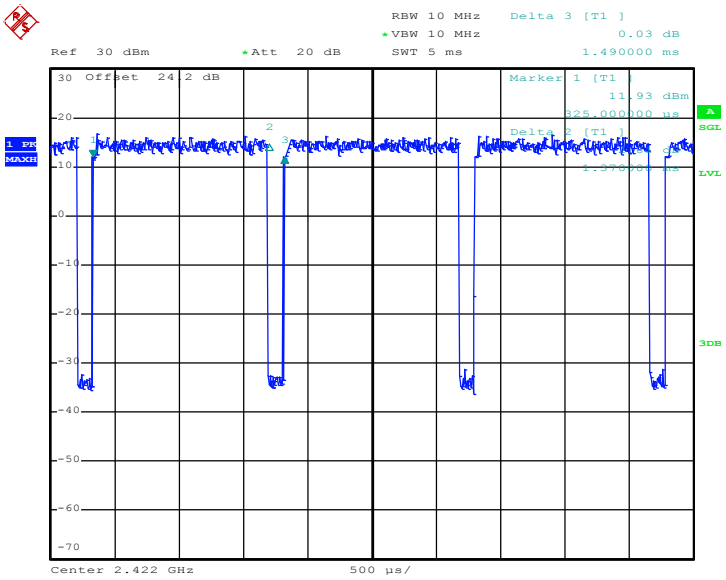
802.11n HT40



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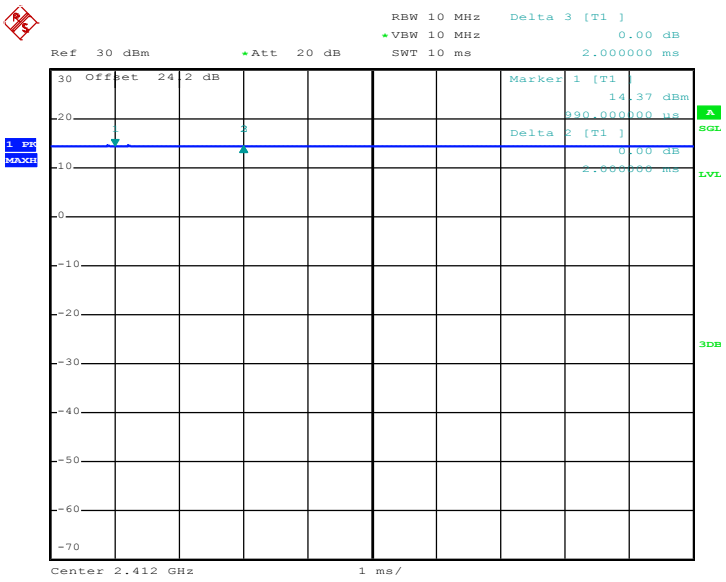

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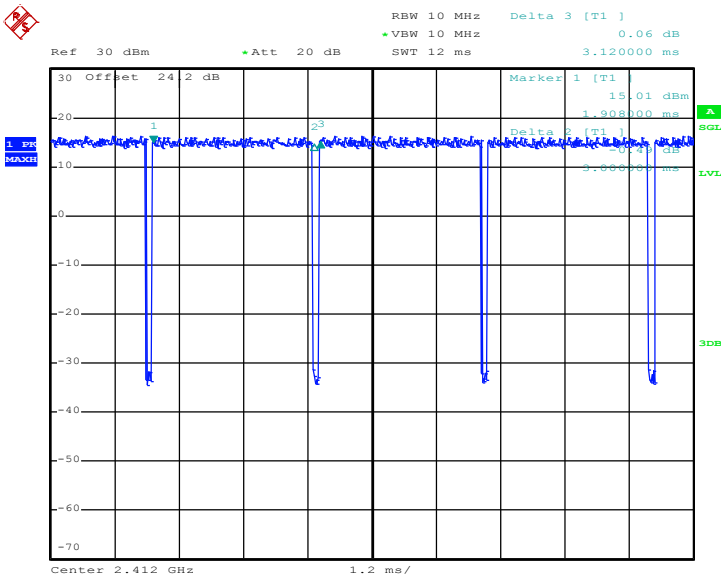

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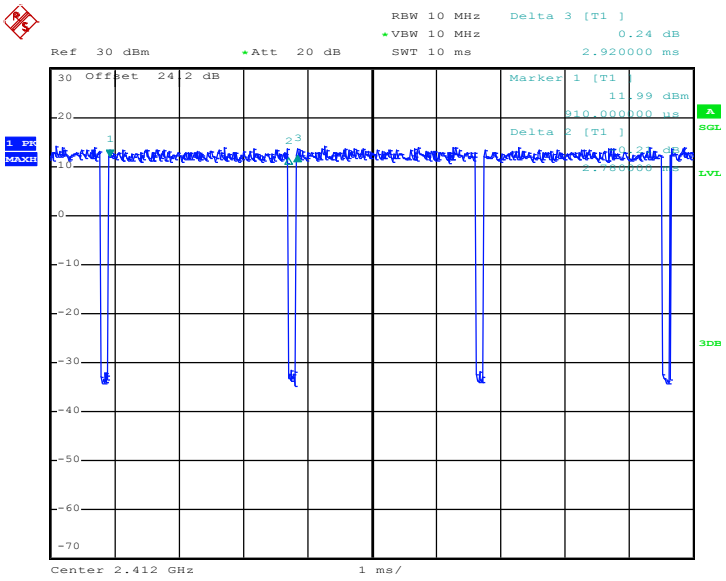

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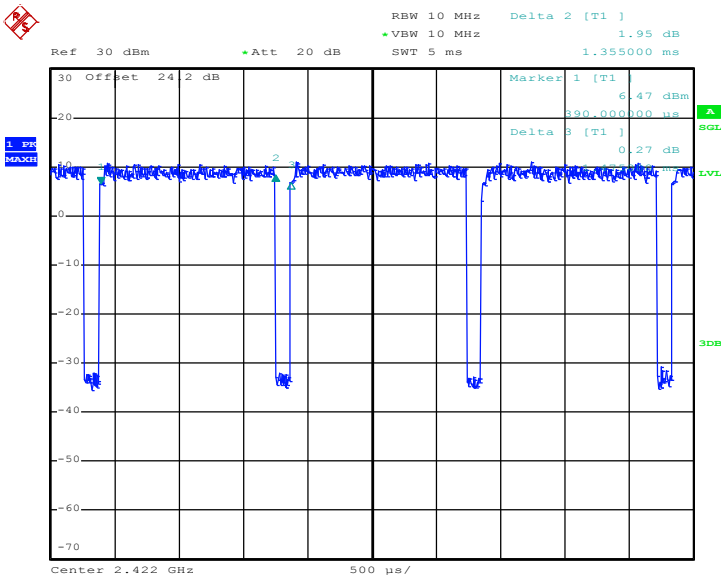

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