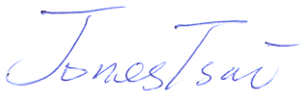
FCC RF Test Report

APPLICANT	:	Nest Labs Inc.
EQUIPMENT	:	Nest Cam IQ
MODEL NAME	:	A0053
FCC ID	:	ZQANC31
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

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

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

Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager

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

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR630207-02C	Rev. 01	Initial issue of report	Apr. 19, 2017
FR630207-02C	Rev. 02	Add remark description of test mode in section 2.2, and revising the test procedures description of peak output power in section 3.2.3 and antenna information in section 1.2, and add loop antenna information in section 4, and add description of radiated spurious emissions below 30MHz in section 3.5.5.	May 05, 2017
FR630207-02C	Rev. 03	Add Zigbee information in section 1.2 and revising connection diagram of test system in section 2.3.	May 09, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result
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
3.6	15.207	AC Conducted Emission	15.207(a)	Pass
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass

1 General Description

1.1 Applicant

Nest Labs Inc.
3400 Hillview Ave.Palo Alto, CA 94304 USA

1.2 Product Feature of Equipment Under Test

Bluetooth- LE, Wi-Fi 2.4GHz 802.11b/g/n/ac, Wi-Fi 5GHz 802.11a/n/ac, Zigbee

Product Specification subjective to this standard	
Antenna Type	ANT FPC 1 2.4G/5G : Fixed Internal Antenna ANT FPC 2 2.4G/5G : Fixed Internal Antenna ANT FPC 15.4 2.4G : Fixed Internal Antenna

1.3 Modification of EUT

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

1.4 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 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 (SHENZHEN) INC.	
Test Site Location	No. 101, Complex Building C, Guanlong Village, Xili Town, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755-8637-9589 (TAF Code: 2353)	
Test Site No.	**Sporton Site No.**	**FCC Registration No.**
	03CH02-SZ	566869

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

1.5 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.
- FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01
- ANSI C63.10-2013

Remark:

All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X back plane) were recorded in this report.

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
802.11ac VHT20	MCS0

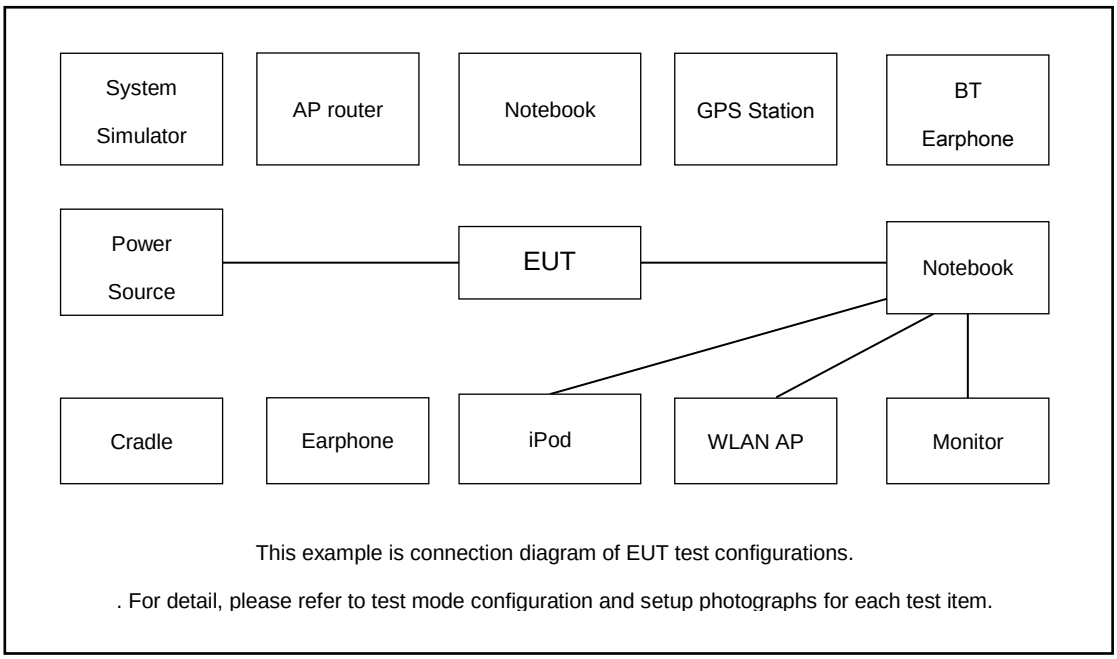
MIMO Antenna

Modulation	Data Rate
802.11g	6 Mbps
802.11n HT20	MCS0
802.11ac VHT20	MCS0

Remark : WLAN (STBC) only support MIMO mode operation.

Test Cases	
AC Conducted Emission	Mode 1 :WLAN Tx + Bluetooth Tx + Zigbee Idle + Y Cable + USB Cable (Charging from Adapter 1) Mode 2 : WLAN Tx + Bluetooth Idle + Zigbee Tx + Y Cable + USB Cable (Charging from Adapter 1)
Remark: The worst case of conducted emission is mode 1; only the test data of it was reported.	

2.3 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Latitude E3340	FCC DoC/ Contains FCC ID: PD97260NGU	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A

2.5 EUT Operation Test Setup

The RF test items, programmed RF utility, “ADB” 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.

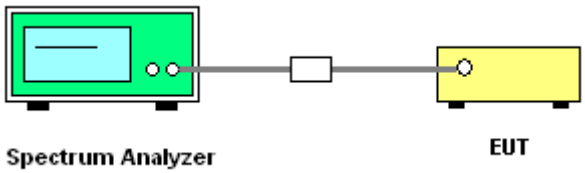
3.1.2 Measuring Instruments

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.

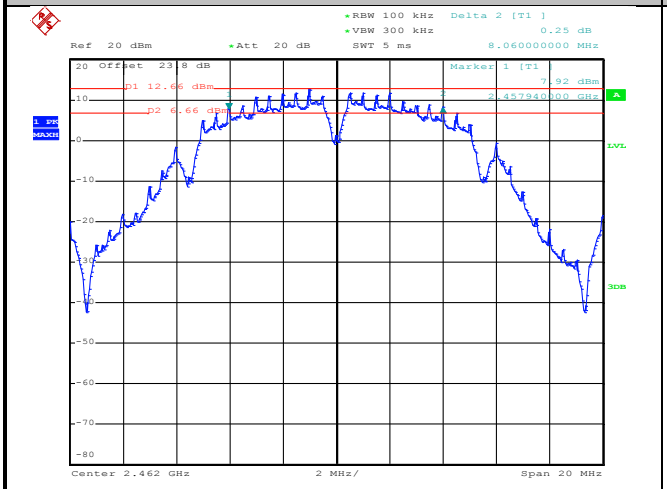
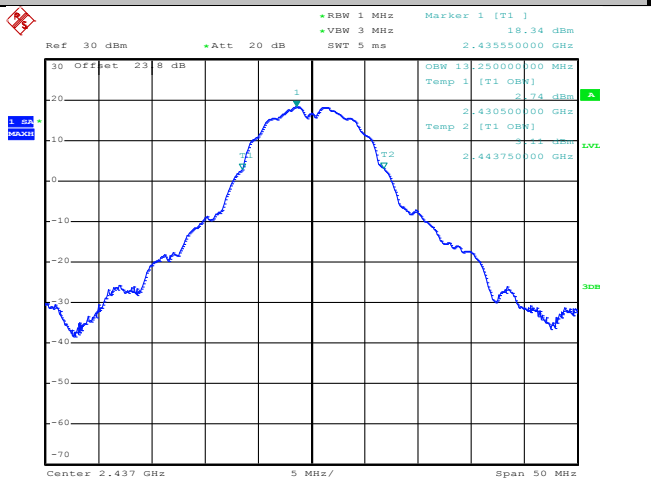
3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.

<SISO>

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	
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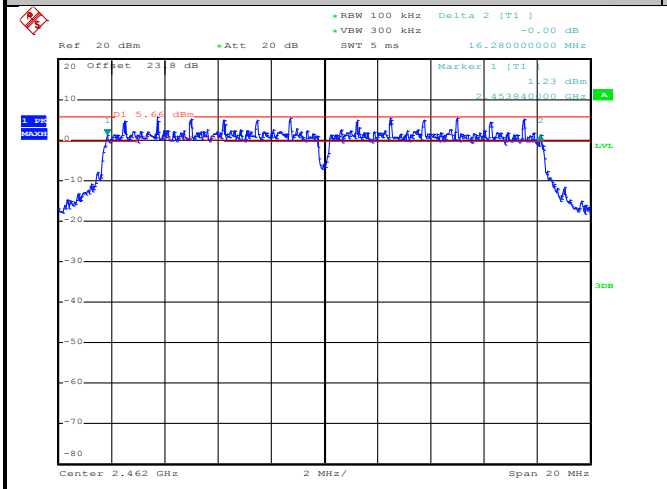
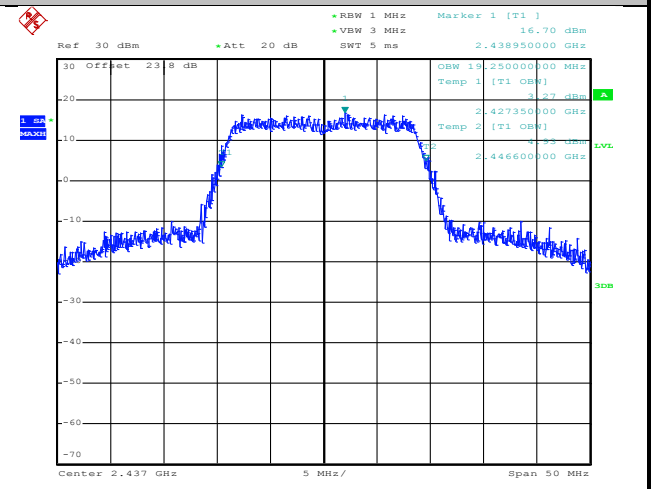
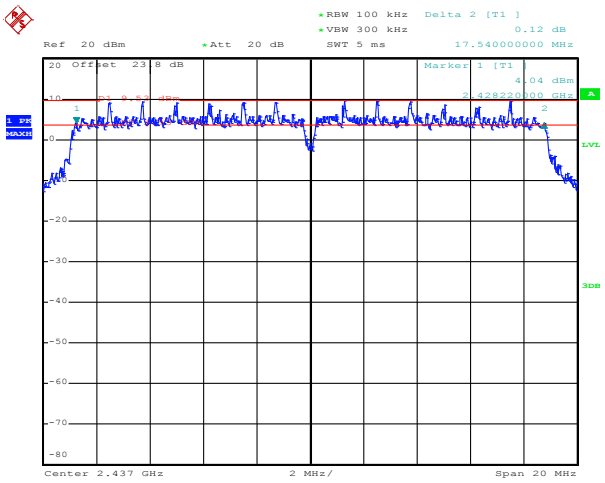
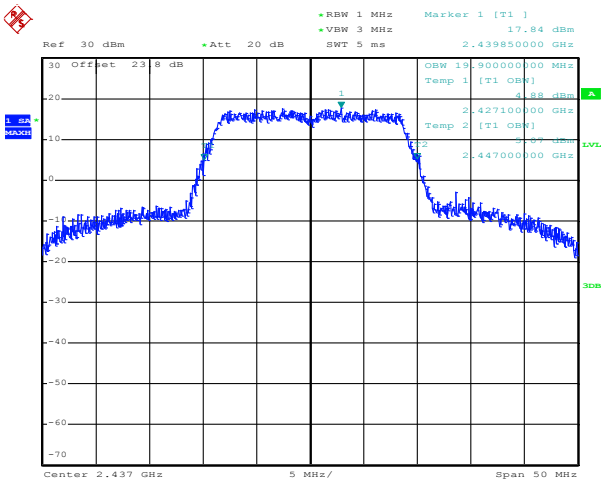
<CDD>

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	
Date: 12.JAN.2017 02:55:45	Date: 12.JAN.2017 03:07:20

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

<STBC>

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	
Date: 12.JAN.2017 04:07:55	Date: 12.JAN.2017 04:09:09

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.

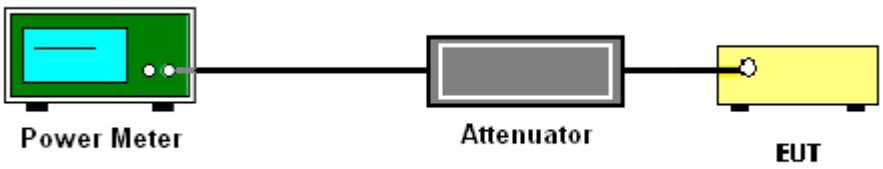
3.2.2 Measuring Instruments

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 9.1.3 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.

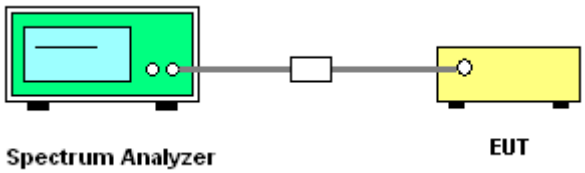
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   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

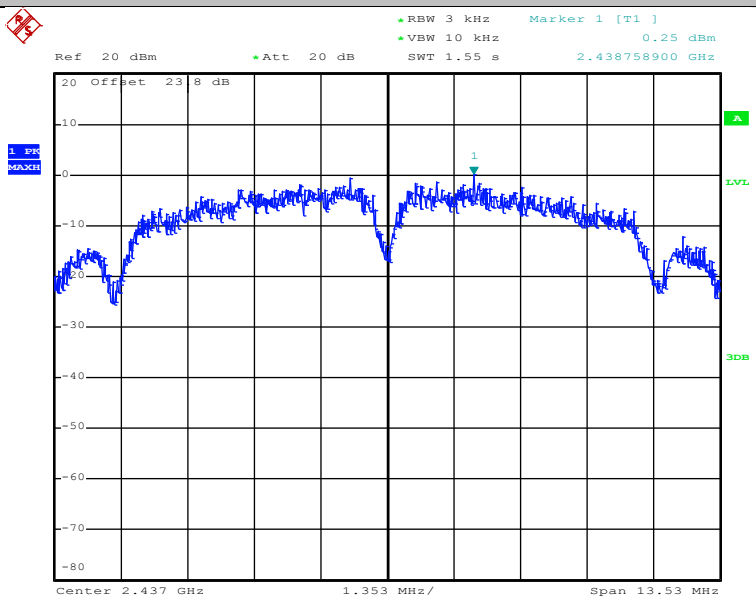


3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

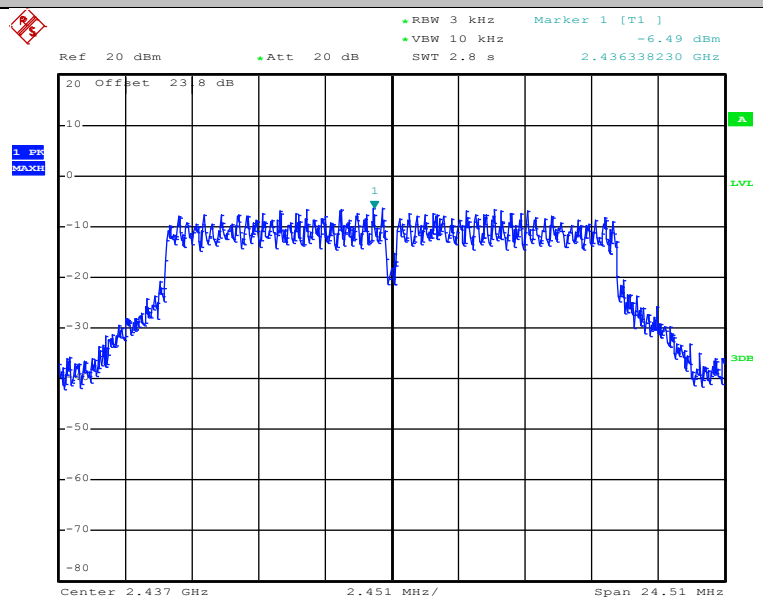
<SISO>

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



<CDD>

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



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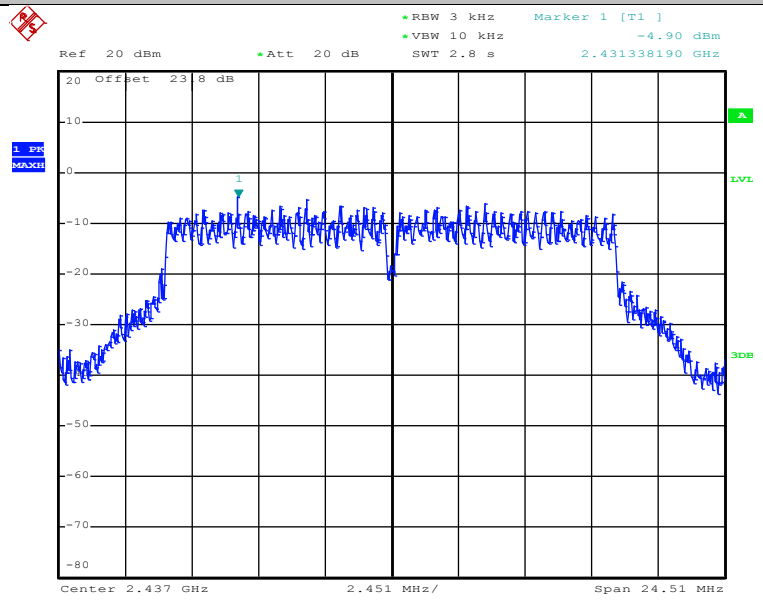
Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2



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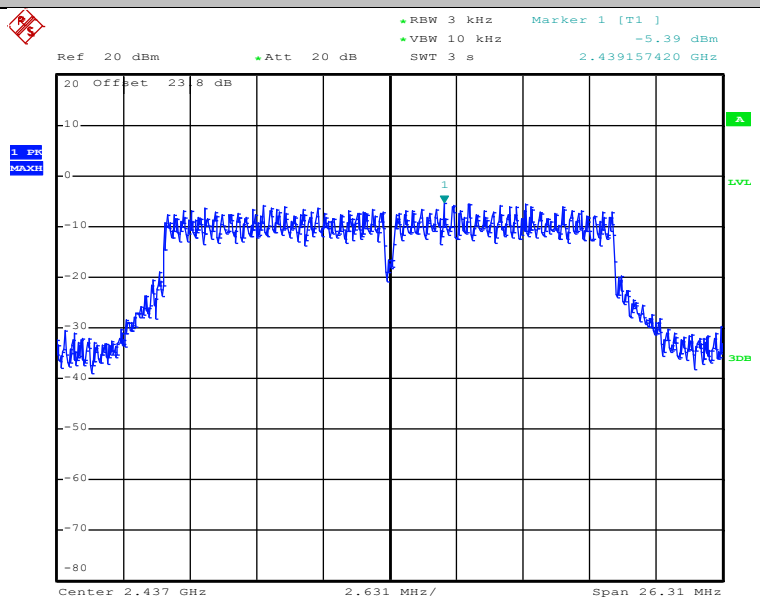
<STBC>

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



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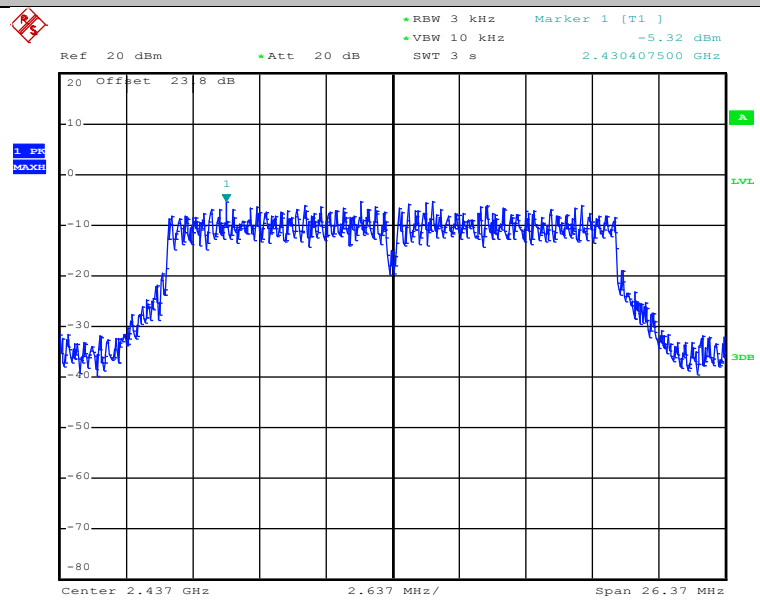
Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2



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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.

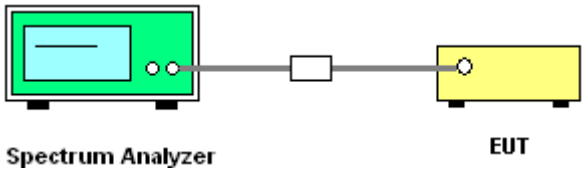
3.4.2 Measuring Instruments

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.
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

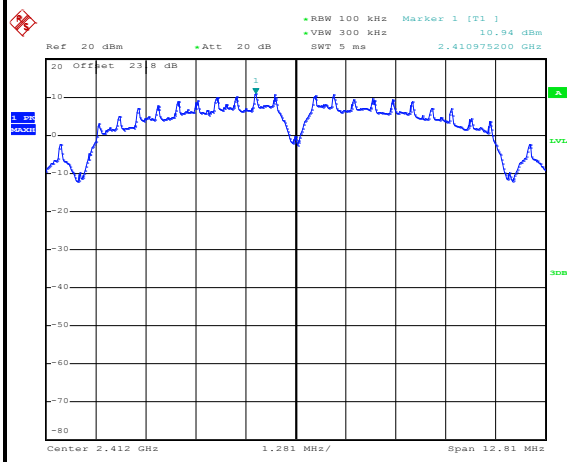
<SISO>

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

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

WLAN 802.11b Channel 01

100kHz PSD reference Level



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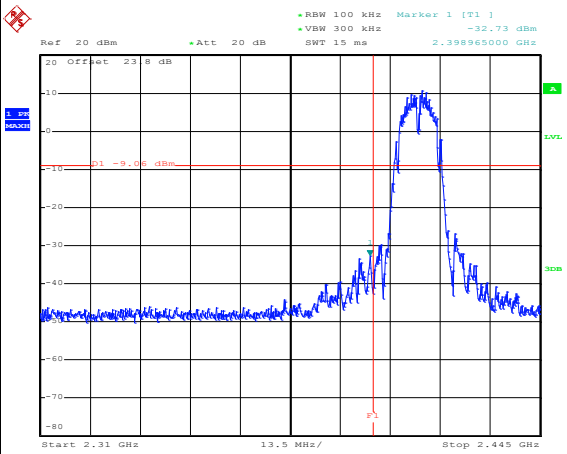
Low Channel Plot



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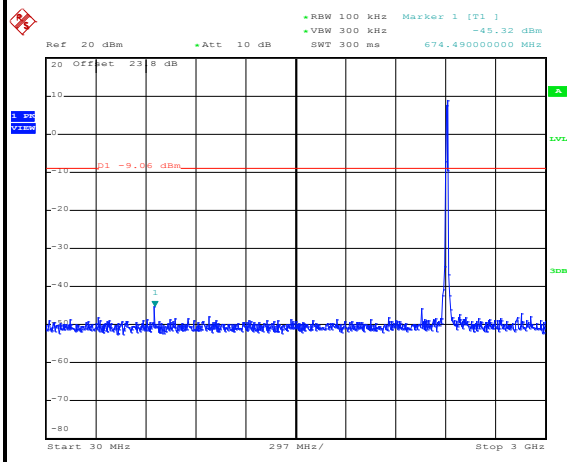
Spurious Emission 30MHz~3GHz



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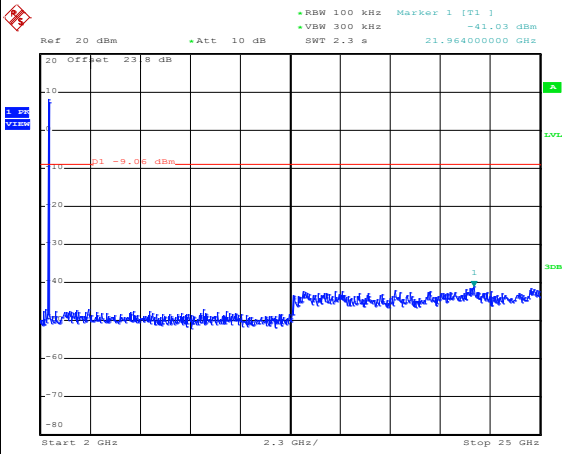
Spurious Emission 2GHz~25GHz



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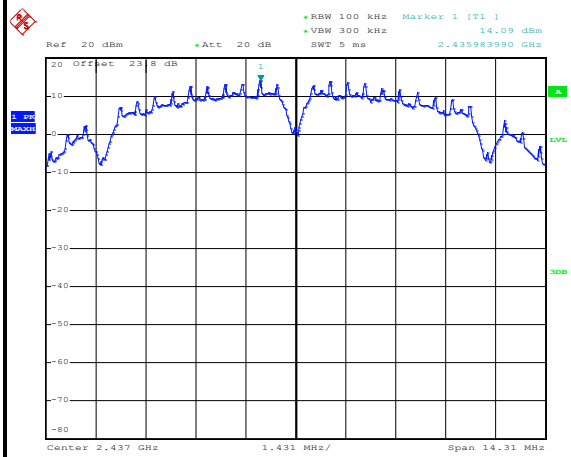
Number of TX :	1	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Derek Hsu

WLAN 802.11b Channel 06

100kHz PSD reference Level



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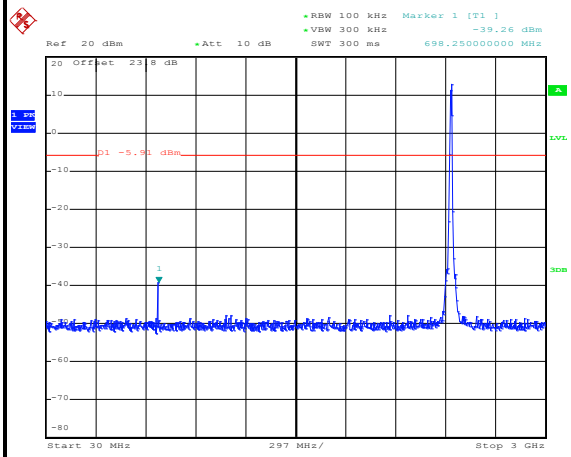
Spurious Emission 30MHz~3GHz



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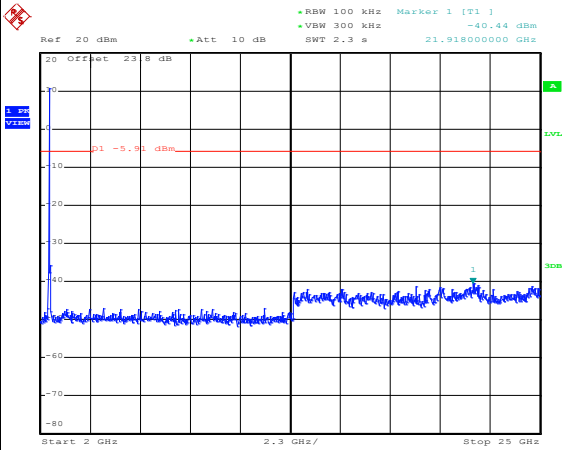
Spurious Emission 2GHz~25GHz



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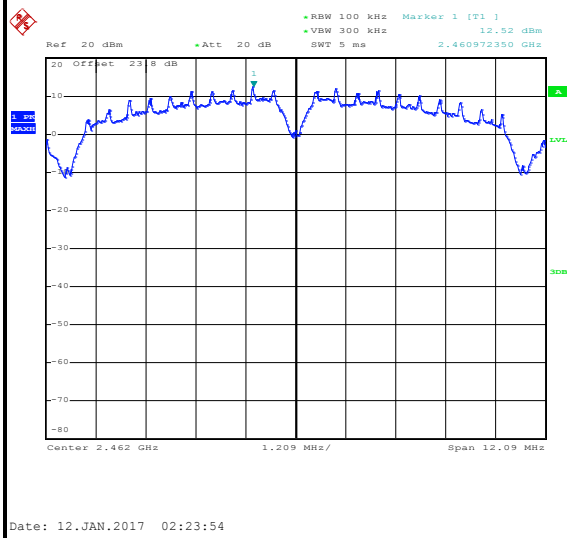
Number of TX :	1	**Ant. :**	1
Test Mode :	802.11b	**Temperature :**	21~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	51~54%
Test Channel :	11	**Test Engineer :**	Derek Hsu

WLAN 802.11b Channel 11

100kHz PSD reference Level



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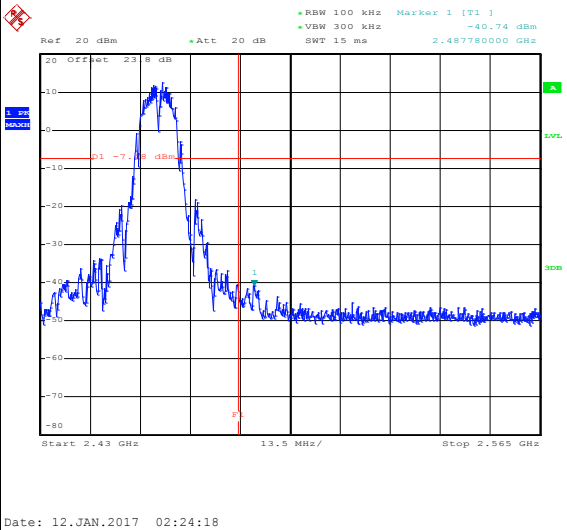
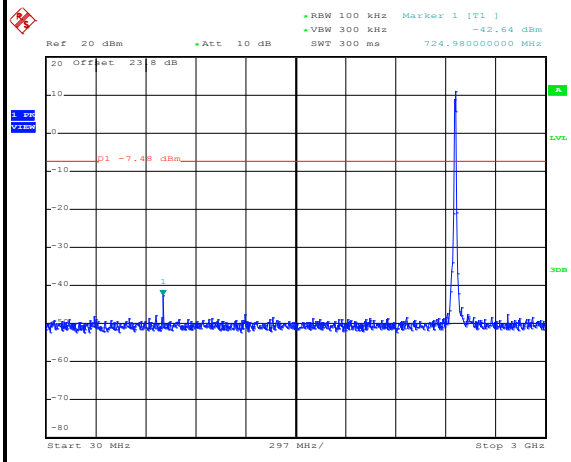
High Channel Plot



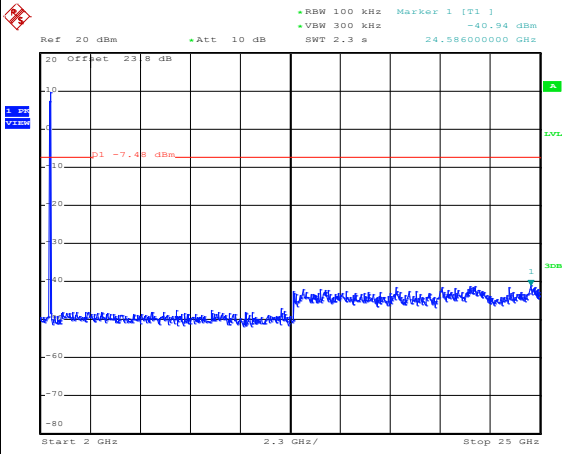
Date: 12.JAN.2017 02:24:18

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:24:32

Spurious Emission 2GHz~25GHz



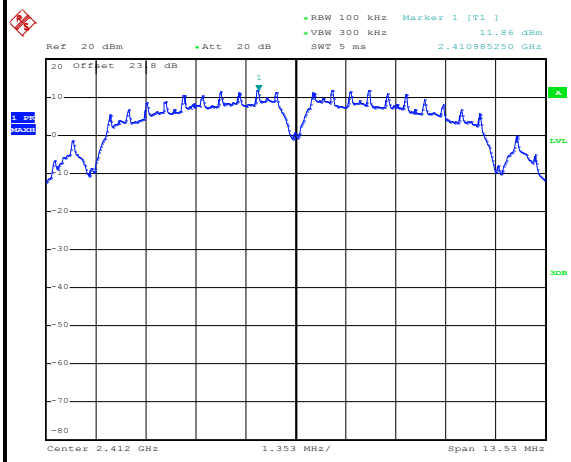
Date: 12.JAN.2017 02:24:40

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

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

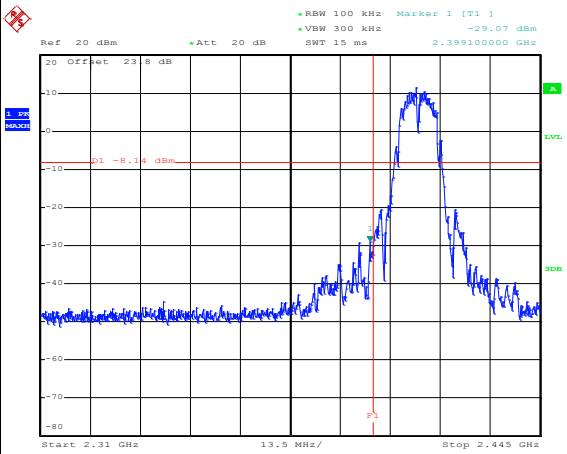
WLAN 802.11b Channel 01

100kHz PSD reference Level



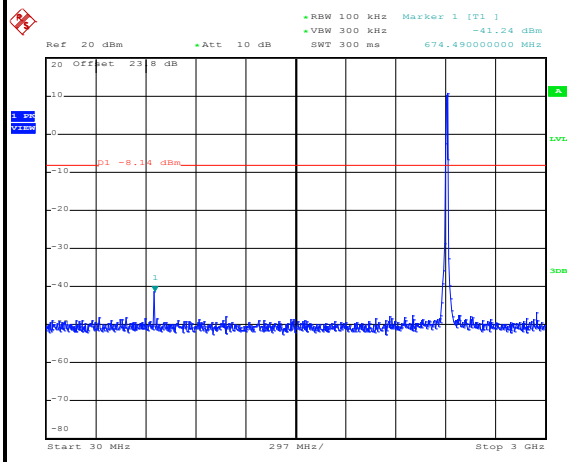
Date: 12.JAN.2017 02:30:41

Low Channel Plot



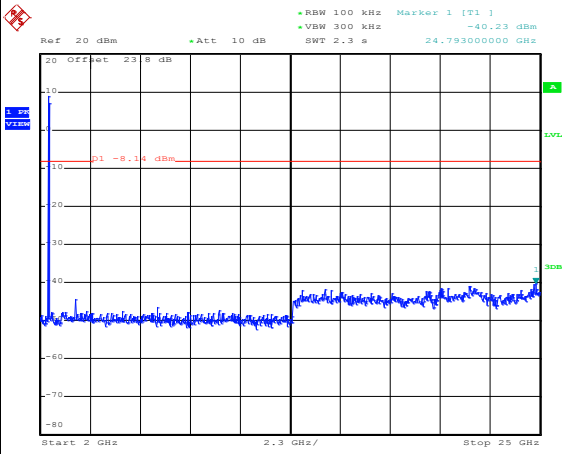
Date: 12.JAN.2017 02:31:07

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:31:20

Spurious Emission 2GHz~25GHz

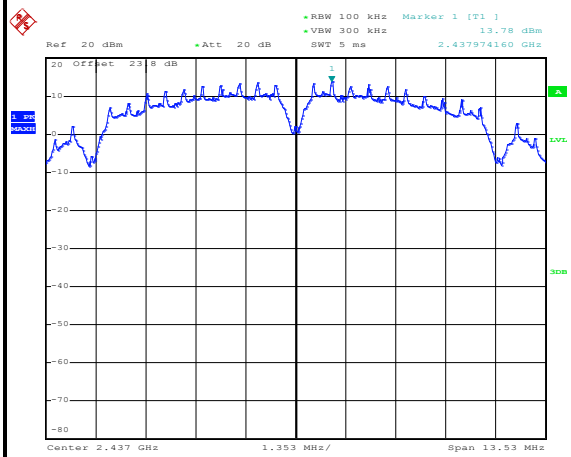


Date: 12.JAN.2017 02:31:28

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

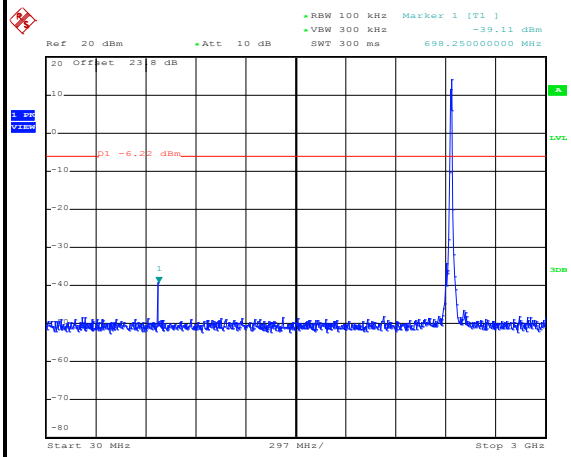
WLAN 802.11b Channel 06

100kHz PSD reference Level



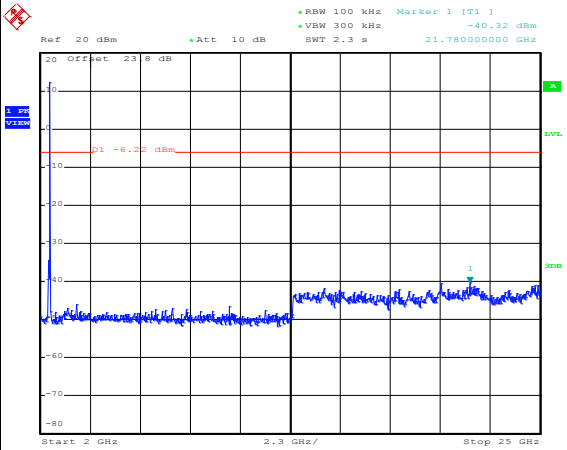
Date: 12.JAN.2017 02:32:58

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:33:09

Spurious Emission 2GHz~25GHz

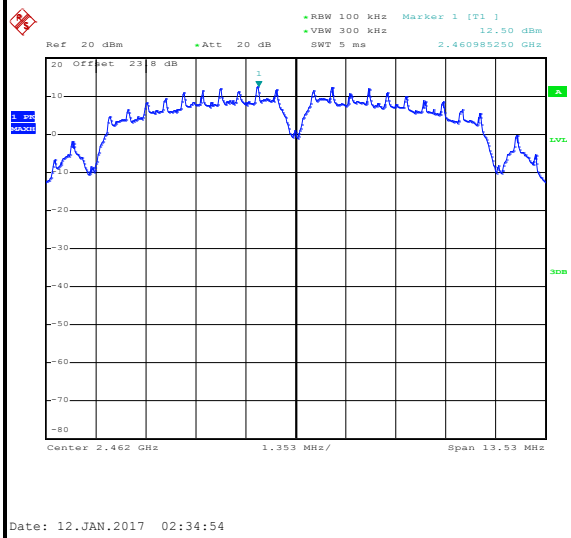


Date: 12.JAN.2017 02:33:18

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

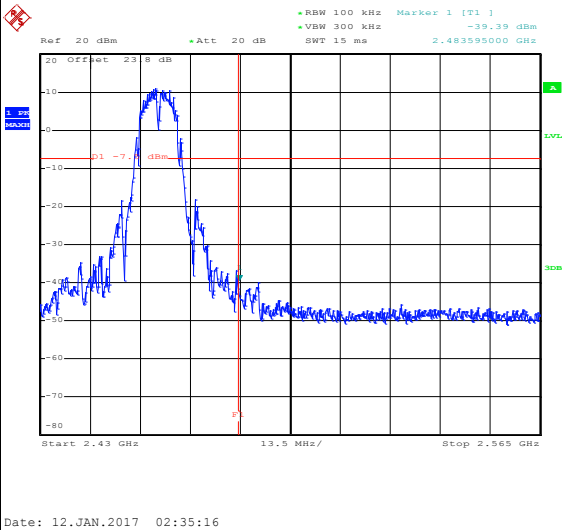
WLAN 802.11b Channel 11

100kHz PSD reference Level



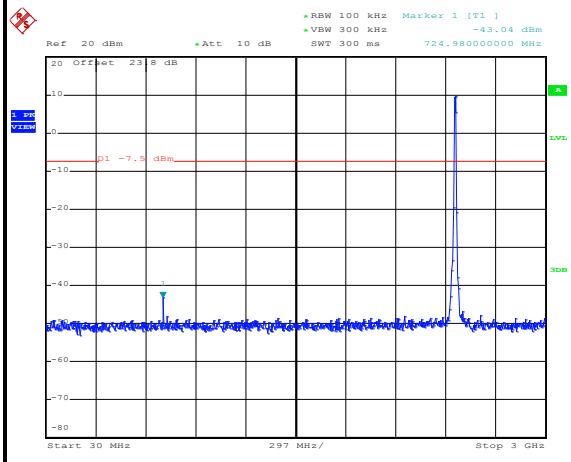
Date: 12.JAN.2017 02:34:54

High Channel Plot



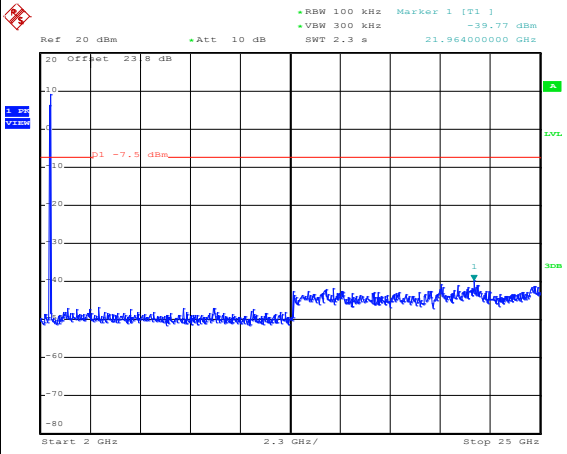
Date: 12.JAN.2017 02:35:16

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:35:27

Spurious Emission 2GHz~25GHz



Date: 12.JAN.2017 02:35:35

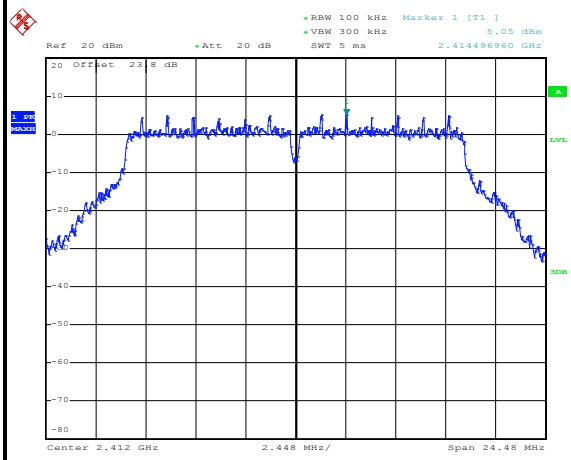
<CDD>

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

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 :**	Derek Hsu

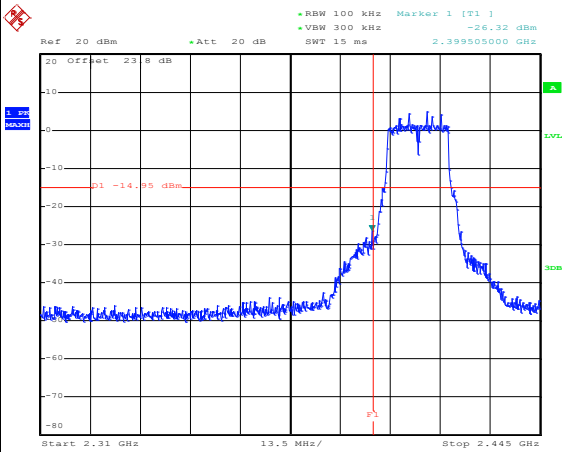
WLAN 802.11g Channel 01

100kHz PSD reference Level



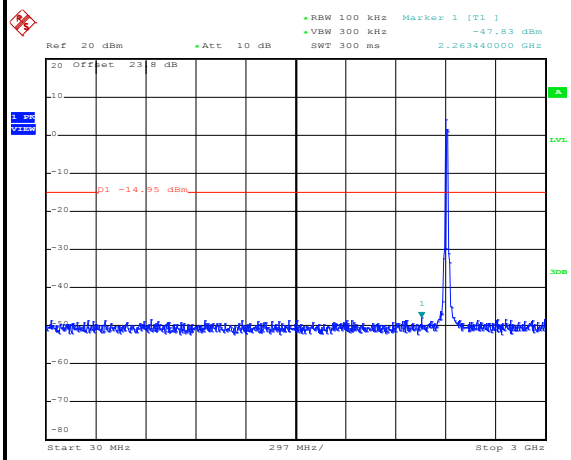
Date: 12.JAN.2017 02:41:54

Low Channel Plot



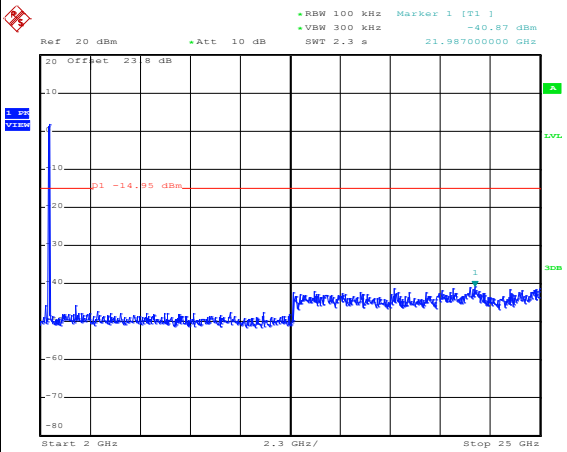
Date: 12.JAN.2017 02:42:09

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:42:22

Spurious Emission 2GHz~25GHz

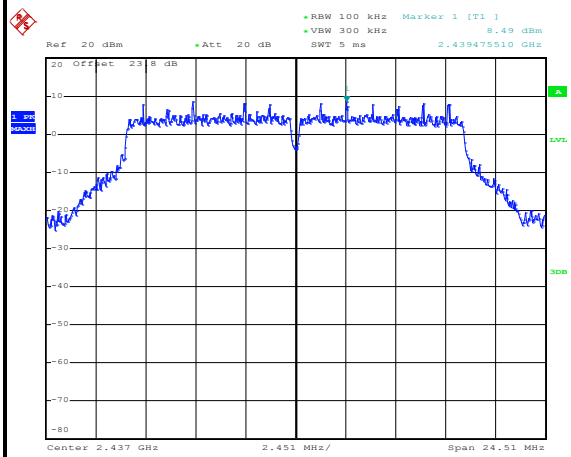


Date: 12.JAN.2017 02:42:31

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 :**	Derek Hsu

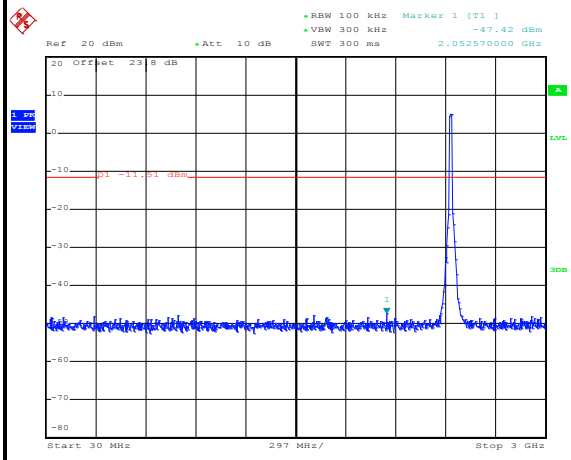
WLAN 802.11g Channel 06

100kHz PSD reference Level



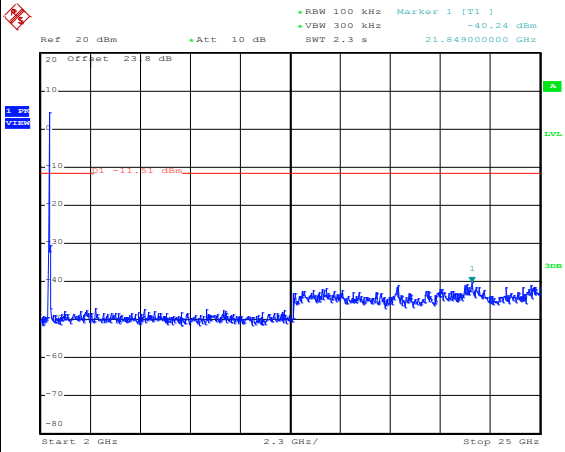
Date: 12.JAN.2017 02:51:56

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:52:10

Spurious Emission 2GHz~25GHz

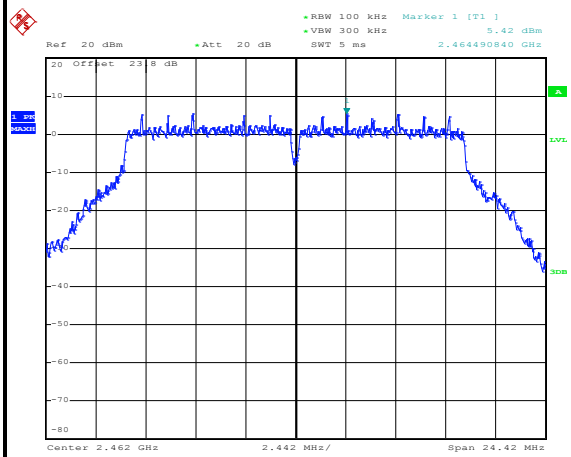


Date: 12.JAN.2017 02:52:18

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 :**	Derek Hsu

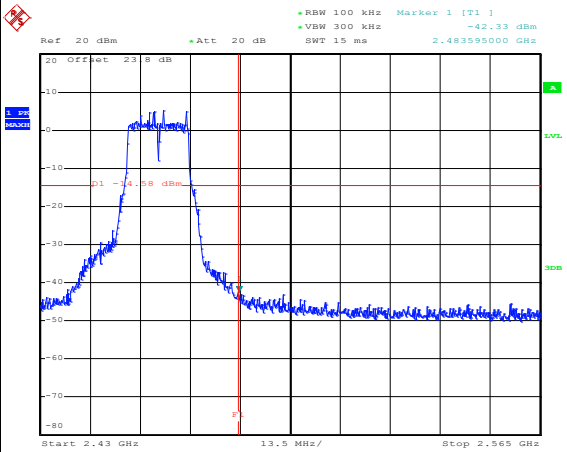
WLAN 802.11g Channel 11

100kHz PSD reference Level



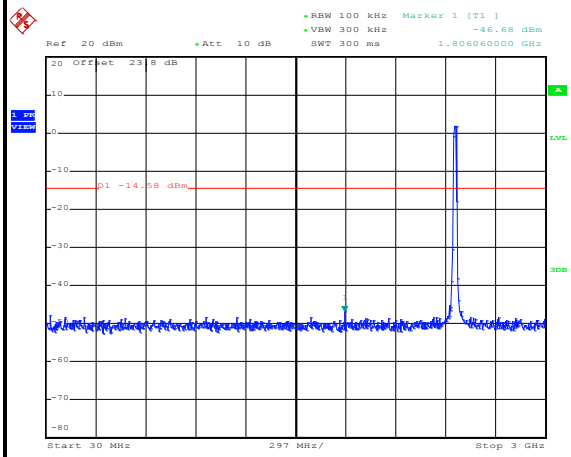
Date: 12.JAN.2017 02:56:28

High Channel Plot



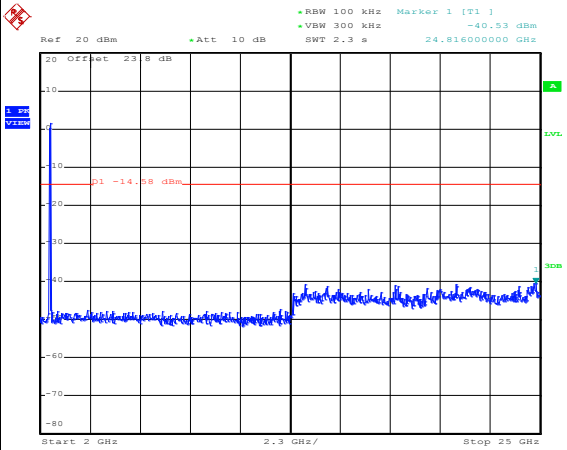
Date: 12.JAN.2017 02:56:39

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:56:51

Spurious Emission 2GHz~25GHz

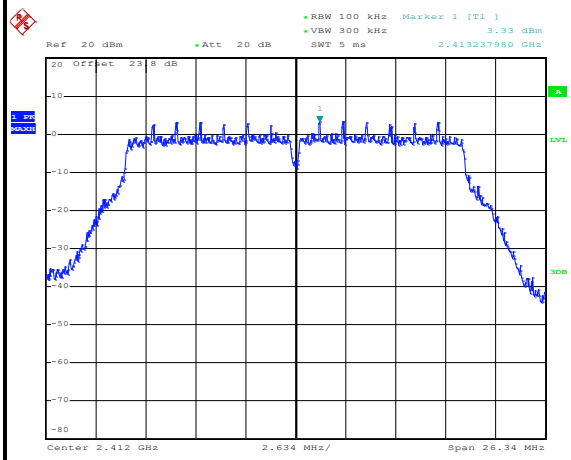


Date: 12.JAN.2017 02:56:59

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 :**	Derek Hsu

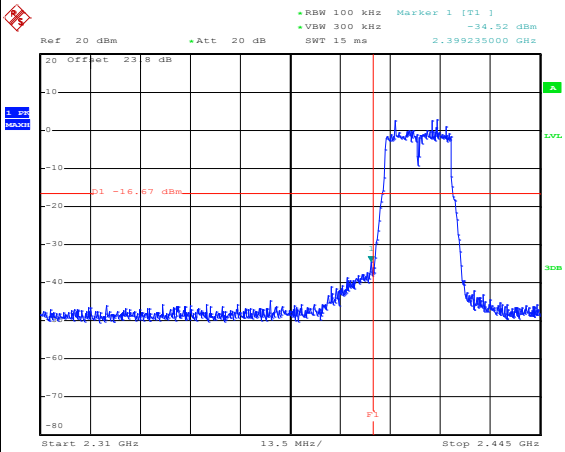
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



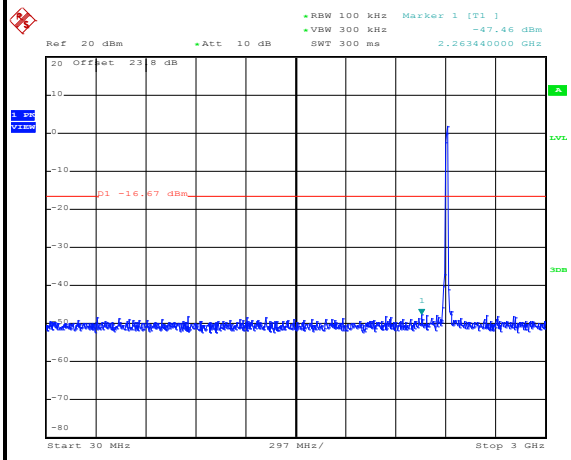
Date: 12.JAN.2017 03:01:16

Low Channel Plot



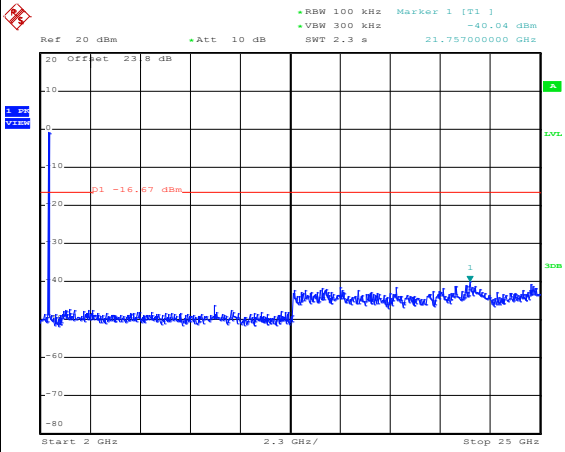
Date: 12.JAN.2017 03:01:25

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 03:01:38

Spurious Emission 2GHz~25GHz

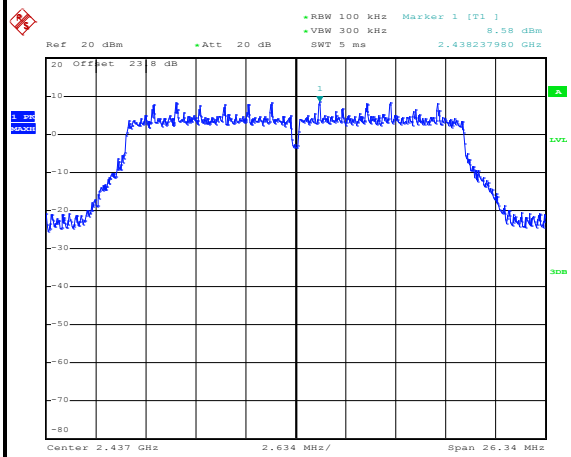


Date: 12.JAN.2017 03:01:46

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 :**	Derek Hsu

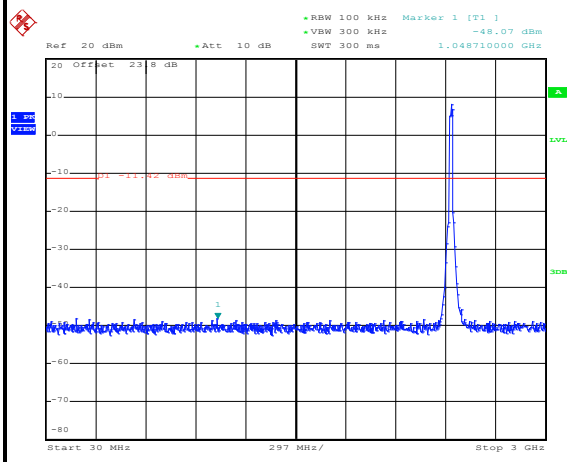
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level



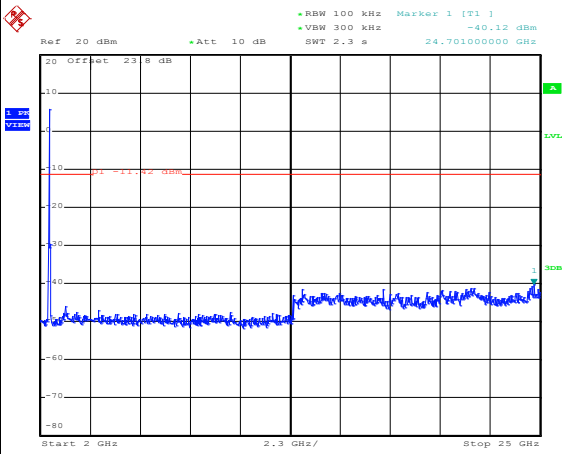
Date: 12.JAN.2017 03:06:49

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 03:07:00

Spurious Emission 2GHz~25GHz

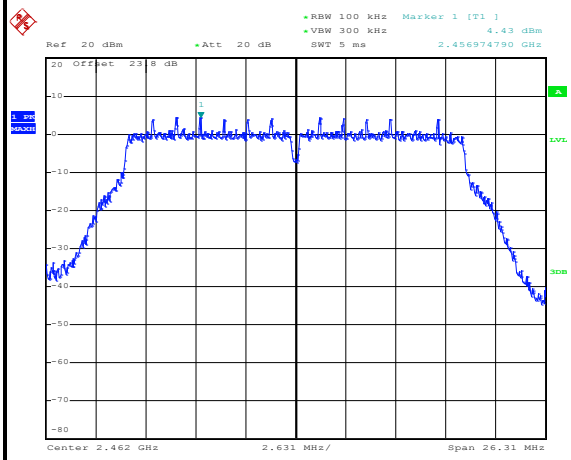


Date: 12.JAN.2017 03:07:09

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 :**	Derek Hsu

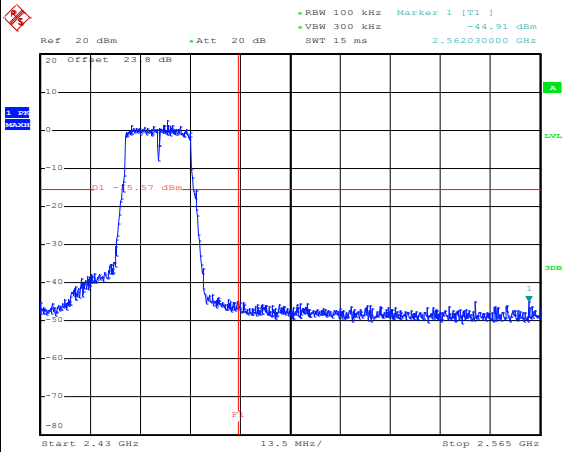
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



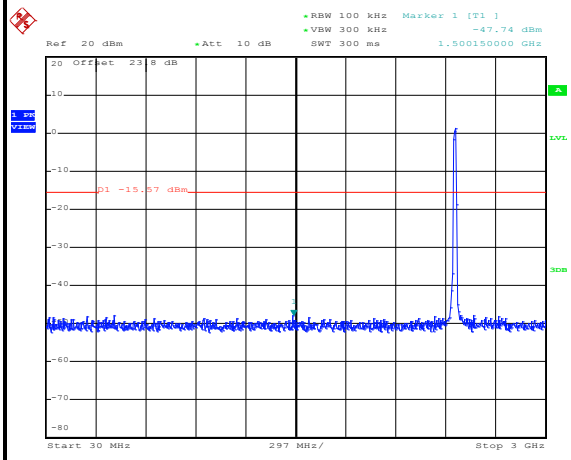
Date: 12.JAN.2017 03:11:43

High Channel Plot



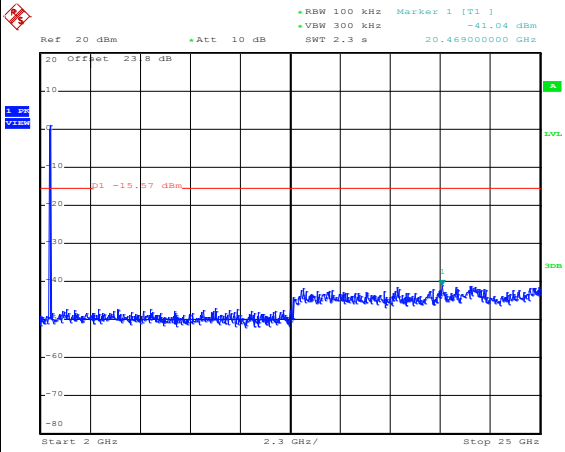
Date: 12.JAN.2017 03:11:53

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 03:12:04

Spurious Emission 2GHz~25GHz



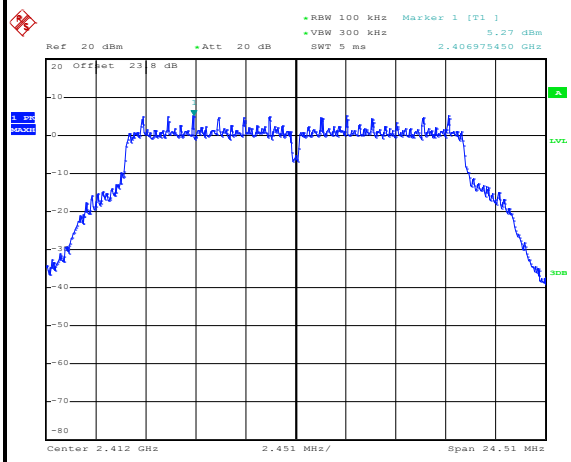
Date: 12.JAN.2017 03:12:13

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

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 :**	Derek Hsu

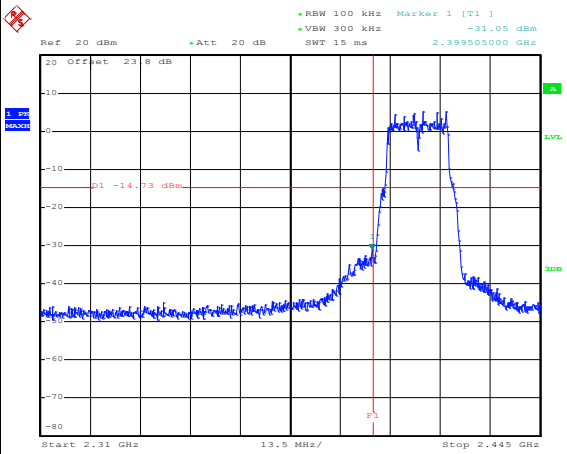
WLAN 802.11g Channel 01

100kHz PSD reference Level



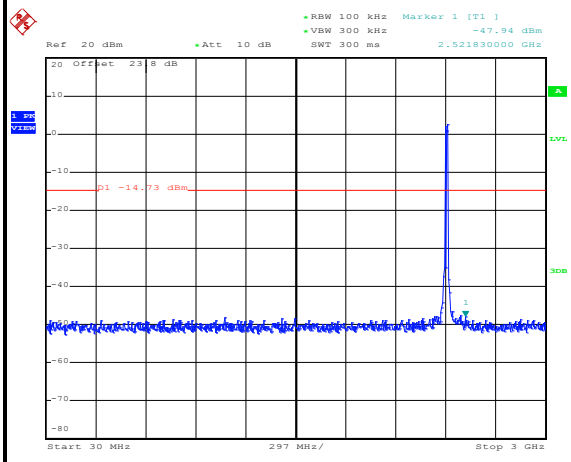
Date: 12.JAN.2017 02:46:49

Low Channel Plot



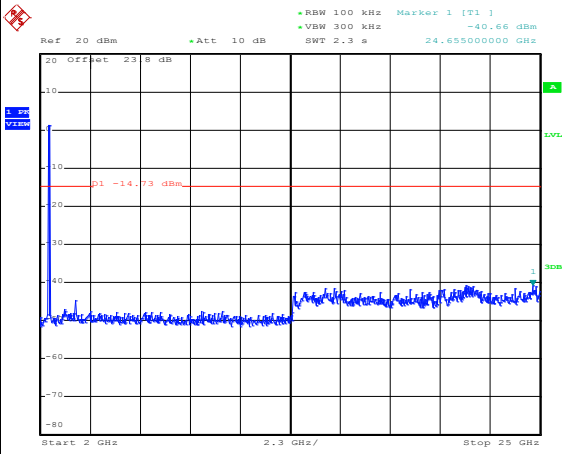
Date: 12.JAN.2017 02:47:04

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:47:15

Spurious Emission 2GHz~25GHz

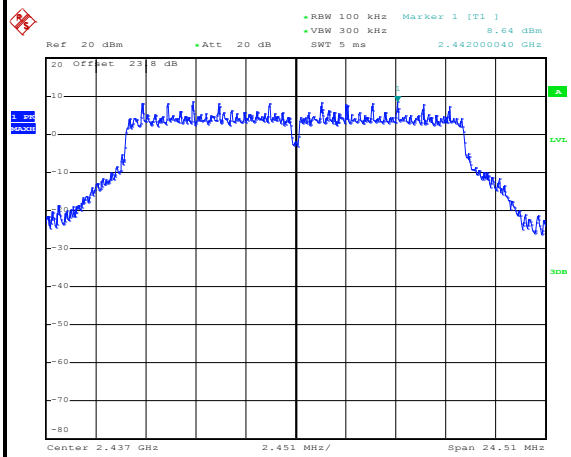


Date: 12.JAN.2017 02:47:24

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 :**	Derek Hsu

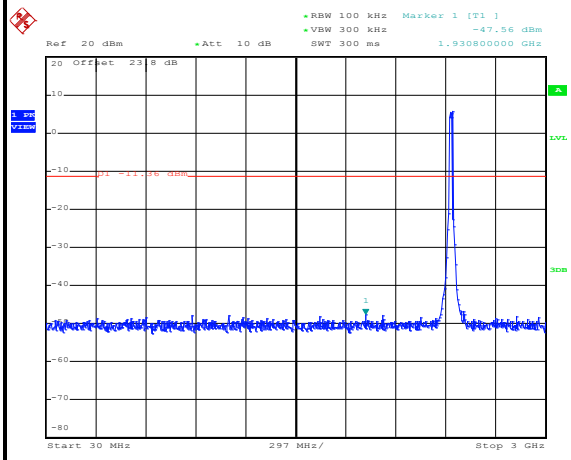
WLAN 802.11g Channel 06

100kHz PSD reference Level



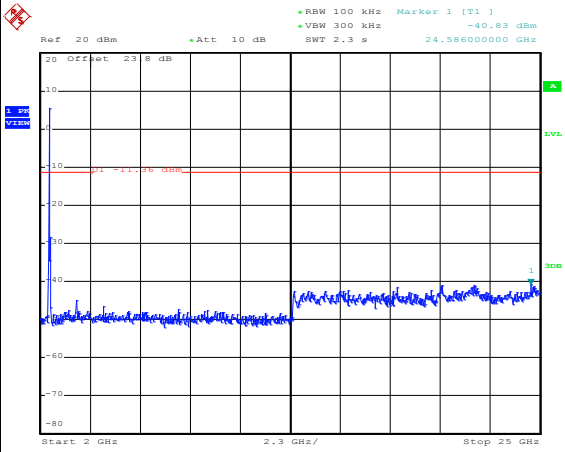
Date: 12.JAN.2017 02:54:03

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:54:14

Spurious Emission 2GHz~25GHz

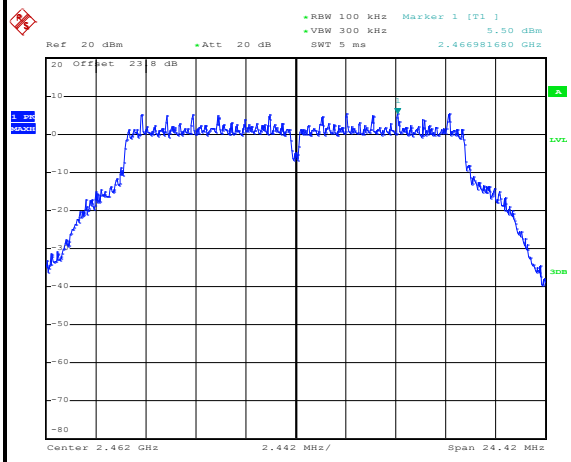


Date: 12.JAN.2017 02:54:22

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 :**	Derek Hsu

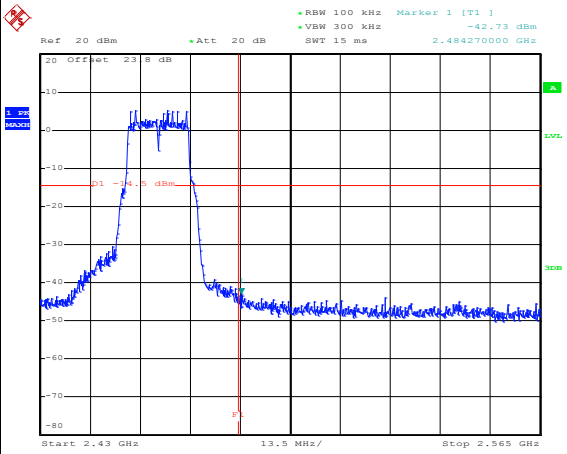
WLAN 802.11g Channel 11

100kHz PSD reference Level



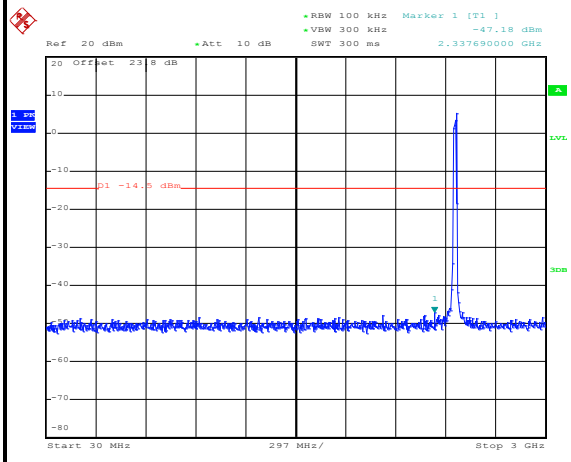
Date: 12.JAN.2017 02:58:12

High Channel Plot



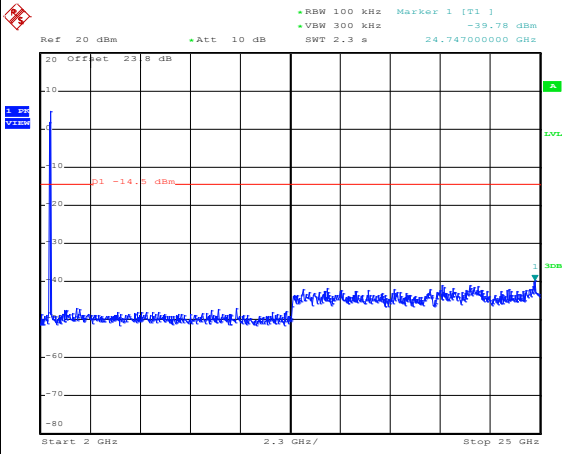
Date: 12.JAN.2017 02:58:24

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 02:58:36

Spurious Emission 2GHz~25GHz

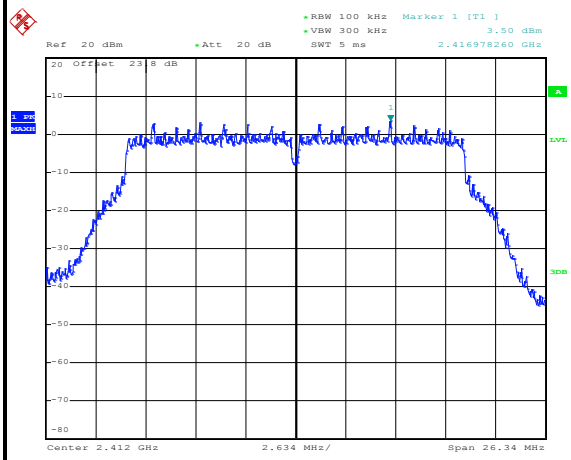


Date: 12.JAN.2017 02:58:44

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 :**	Derek Hsu

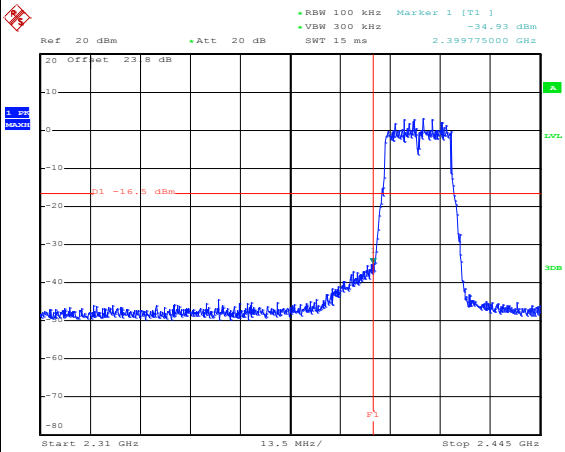
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



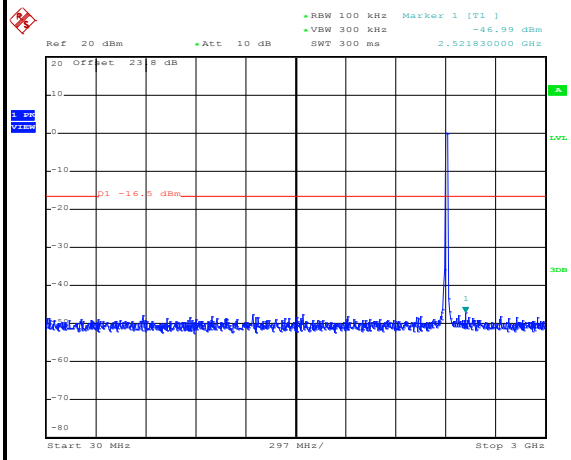
Date: 12.JAN.2017 03:03:51

Low Channel Plot



Date: 12.JAN.2017 03:04:05

Spurious Emission 30MHz~3GHz



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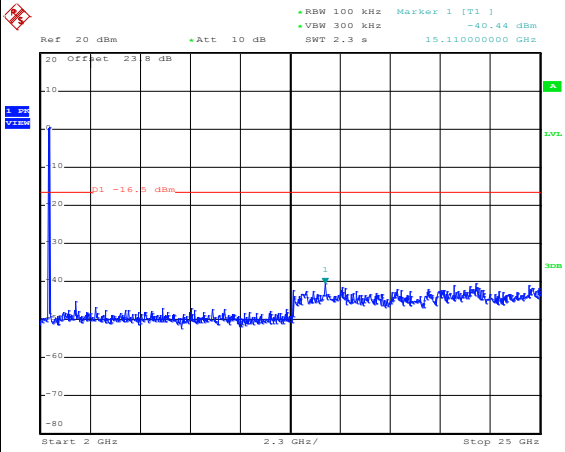
Spurious Emission 2GHz~25GHz

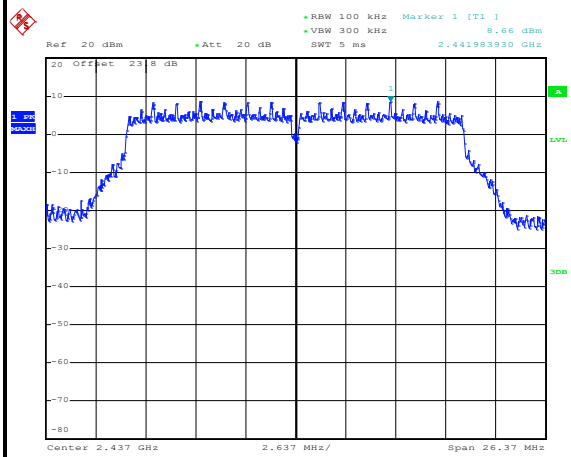


Date: 12.JAN.2017 03:04:27

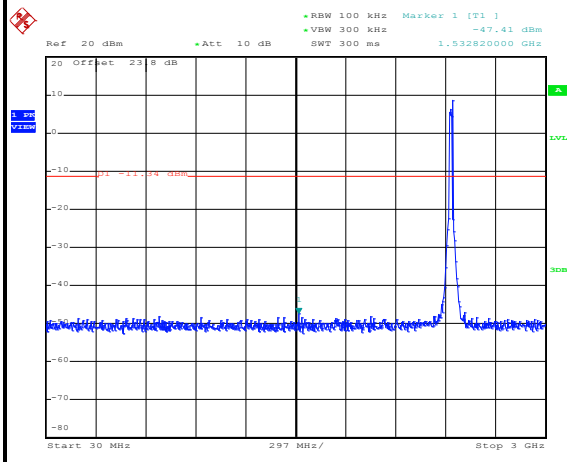
Number of TX :	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Derek Hsu

WLAN 802.11n HT20 Channel 06

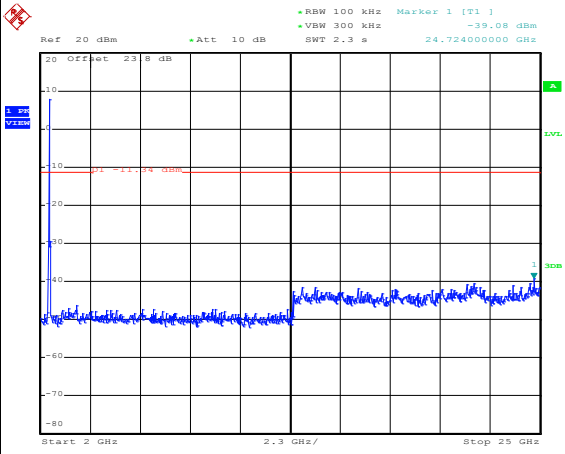
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



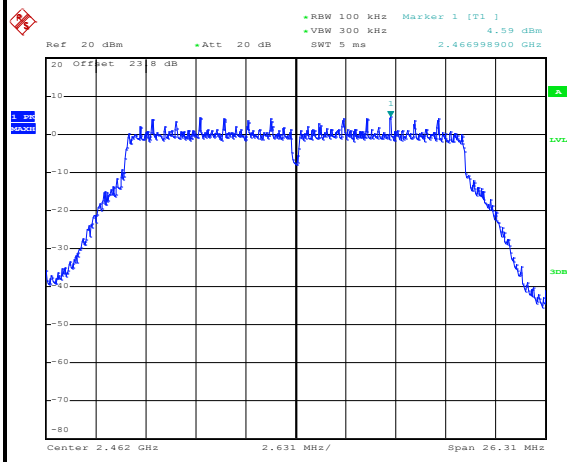
Spurious Emission 2GHz~25GHz



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 :**	Derek Hsu

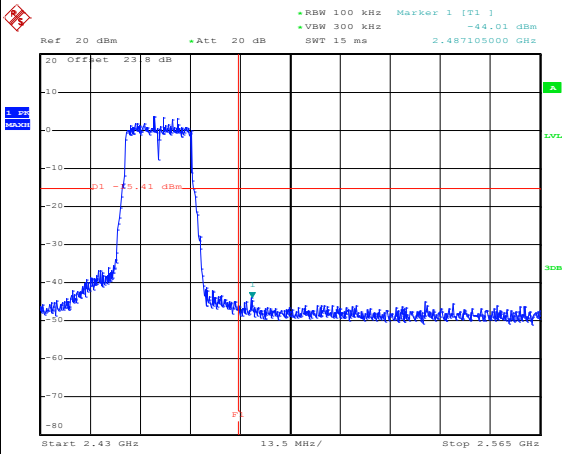
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



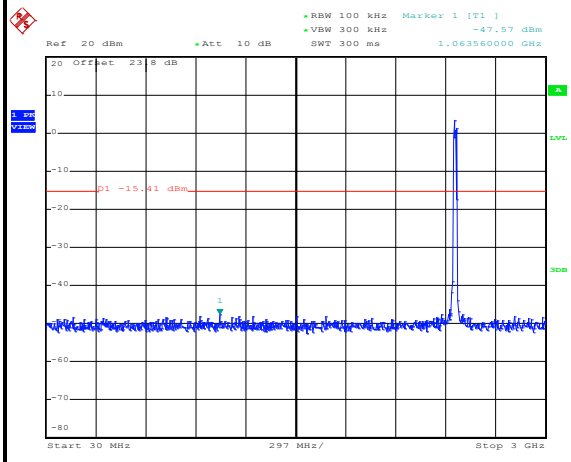
Date: 12.JAN.2017 03:13:53

High Channel Plot



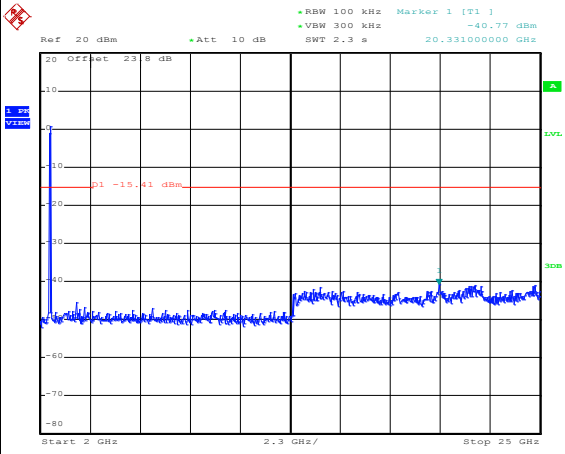
Date: 12.JAN.2017 03:14:03

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 03:14:17

Spurious Emission 2GHz~25GHz



Date: 12.JAN.2017 03:14:25

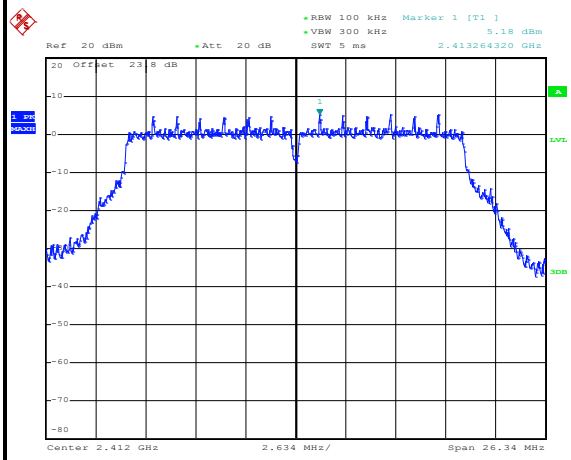
<STBC>

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

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

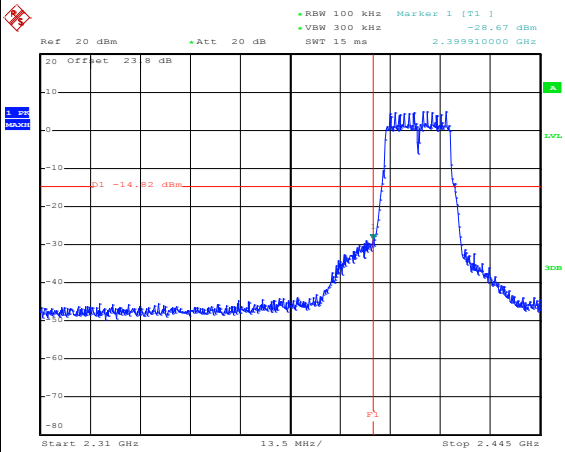
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



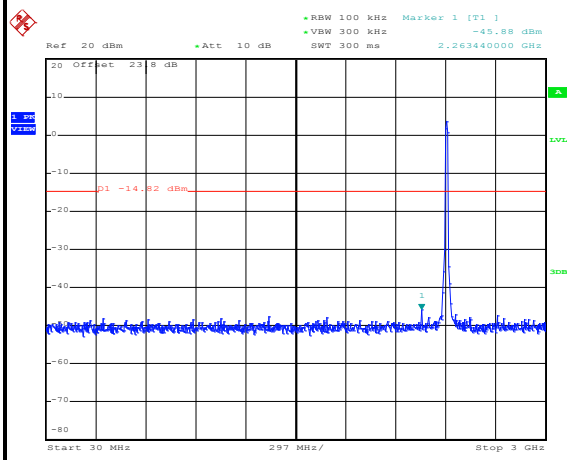
Date: 12.JAN.2017 04:02:10

Low Channel Plot



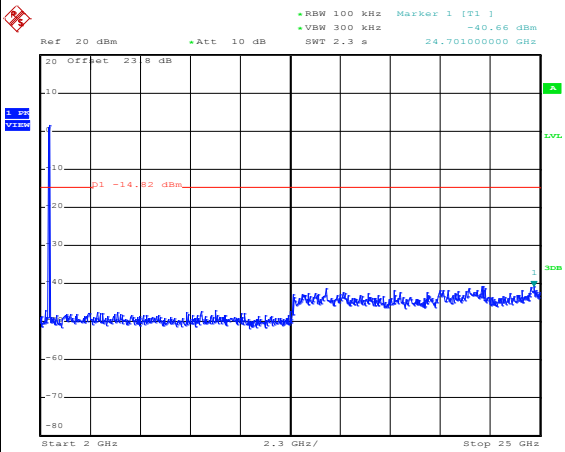
Date: 12.JAN.2017 04:02:47

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 04:03:00

Spurious Emission 2GHz~25GHz

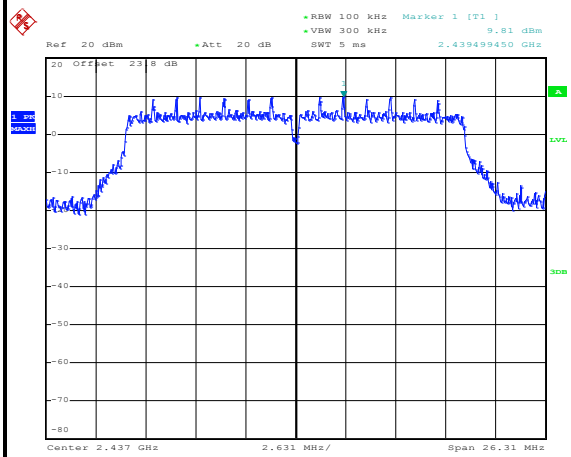


Date: 12.JAN.2017 04:03:08

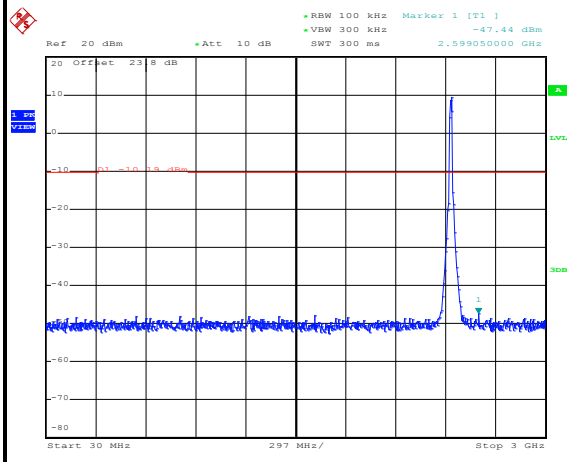
Number of TX :	2	**Ant. :**	1
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Derek Hsu

WLAN 802.11n HT20 Channel 06

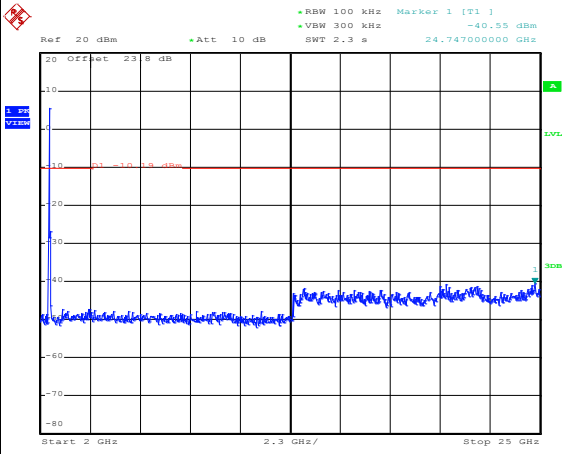
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



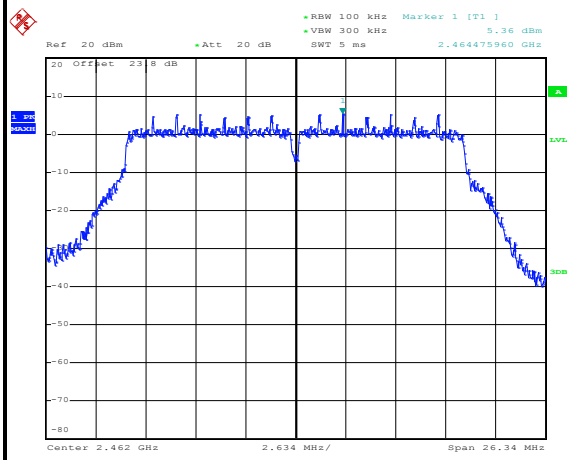
Spurious Emission 2GHz~25GHz



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

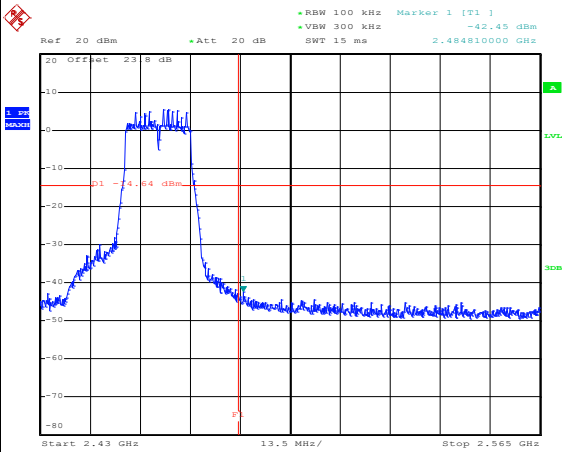
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



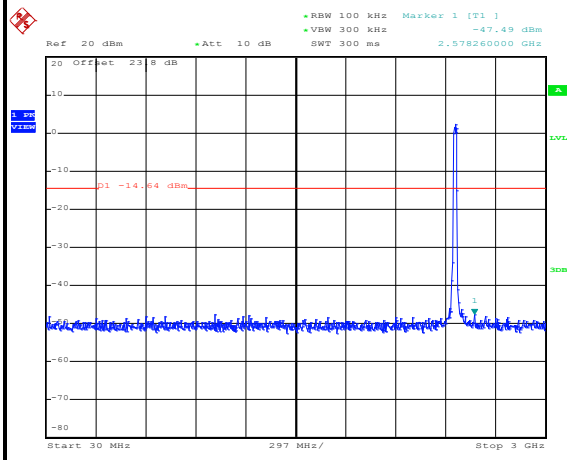
Date: 12.JAN.2017 04:12:36

High Channel Plot



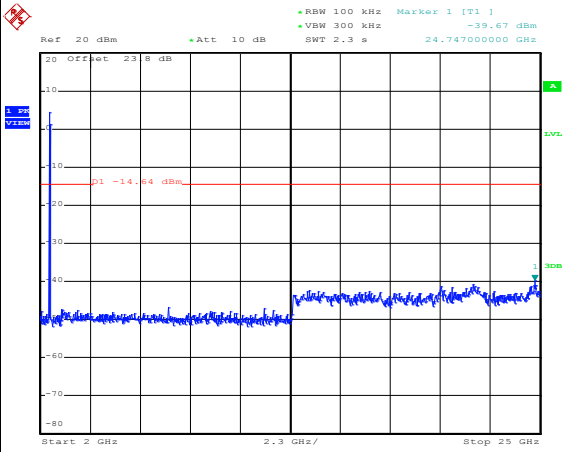
Date: 12.JAN.2017 04:12:52

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 04:13:02

Spurious Emission 2GHz~25GHz



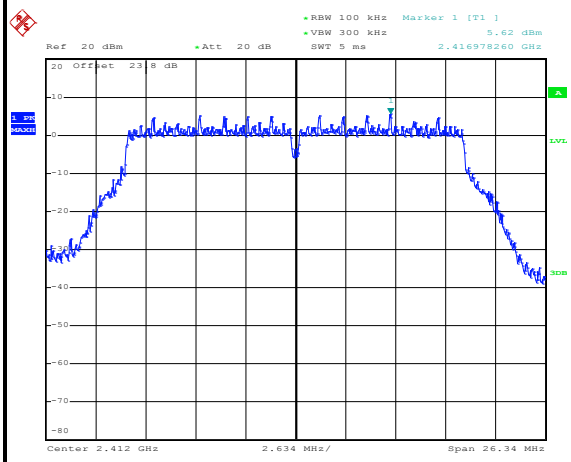
Date: 12.JAN.2017 04:13:11

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

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

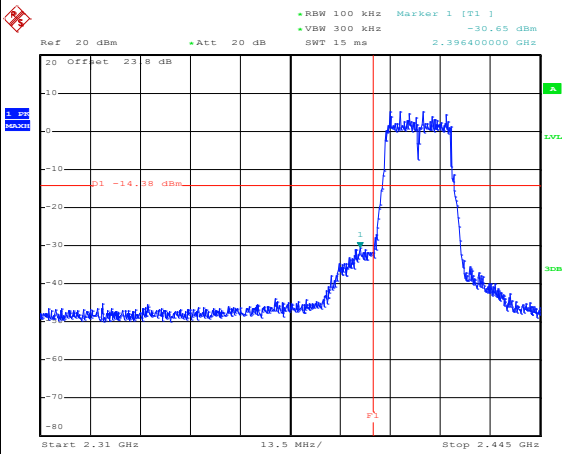
WLAN 802.11n HT20 Channel 01

100kHz PSD reference Level



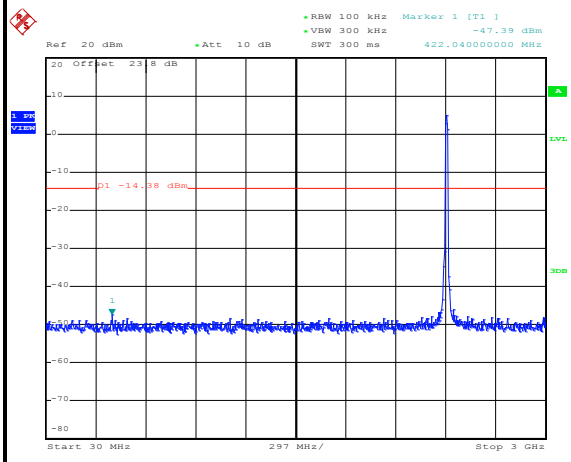
Date: 12.JAN.2017 04:05:36

Low Channel Plot



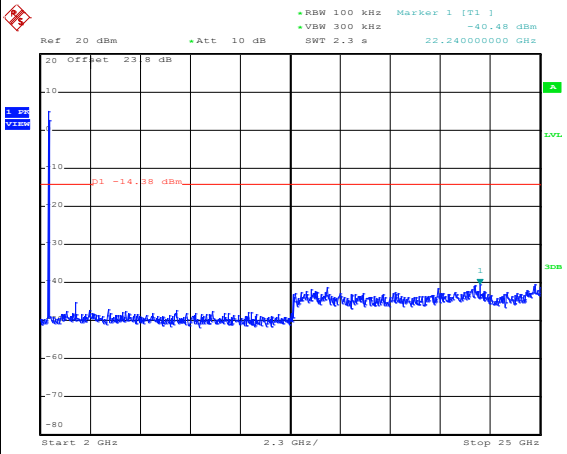
Date: 12.JAN.2017 04:05:59

Spurious Emission 30MHz~3GHz



Date: 12.JAN.2017 04:06:32

Spurious Emission 2GHz~25GHz

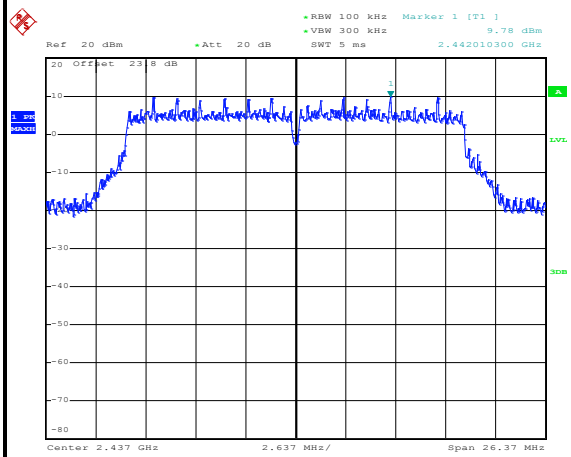


Date: 12.JAN.2017 04:06:40

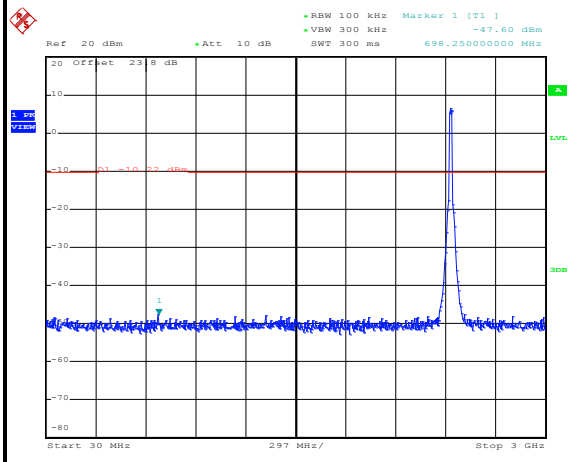
Number of TX :	2	**Ant. :**	2
Test Mode :	802.11n HT20	**Temperature :**	21~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	51~54%
Test Channel :	06	**Test Engineer :**	Derek Hsu

WLAN 802.11n HT20 Channel 06

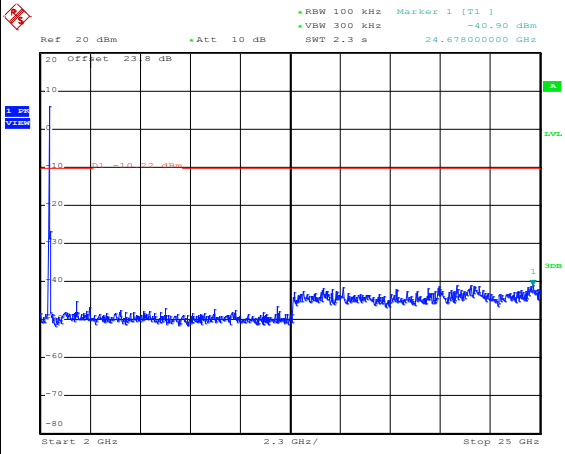
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



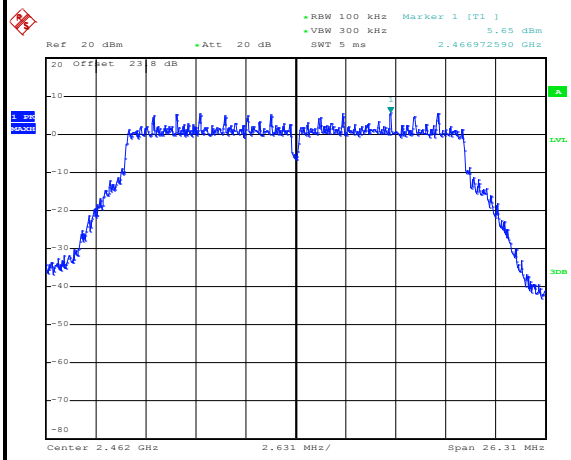
Spurious Emission 2GHz~25GHz



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 :**	Derek Hsu

WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



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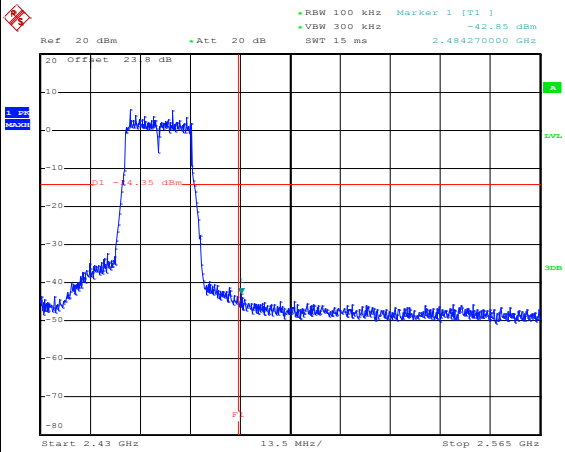
High Channel Plot



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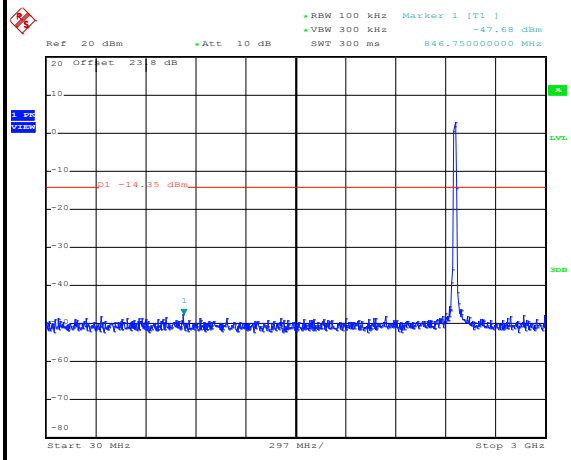
Spurious Emission 30MHz~3GHz



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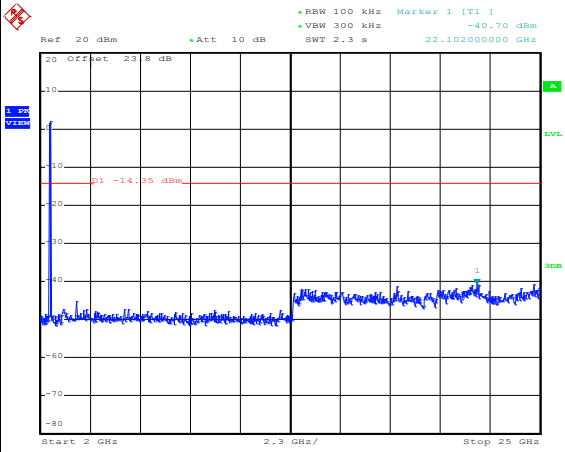
Spurious Emission 2GHz~25GHz



Date: 12.JAN.2017 04:15:05

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

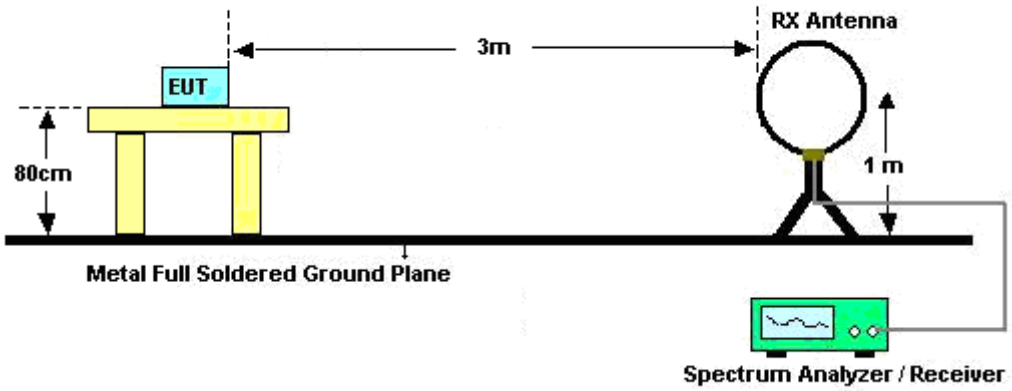
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

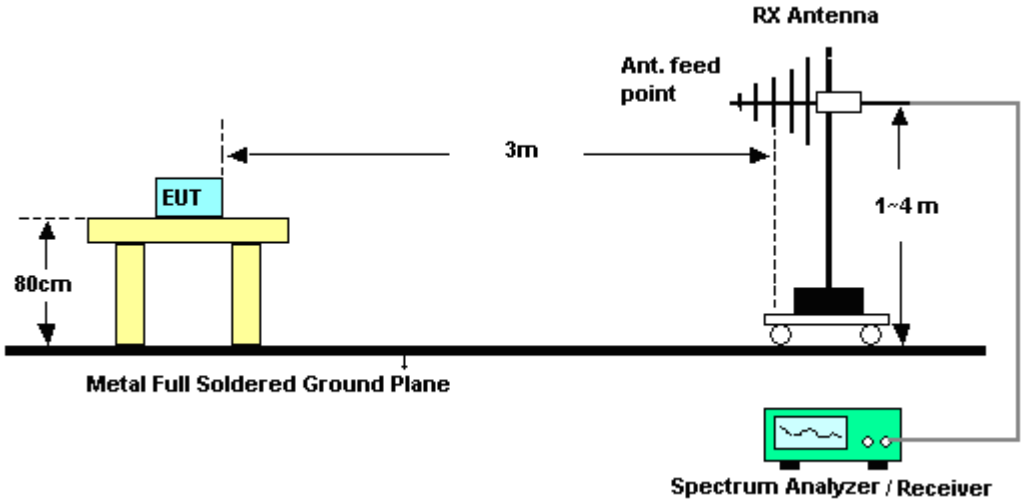
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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 testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. 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

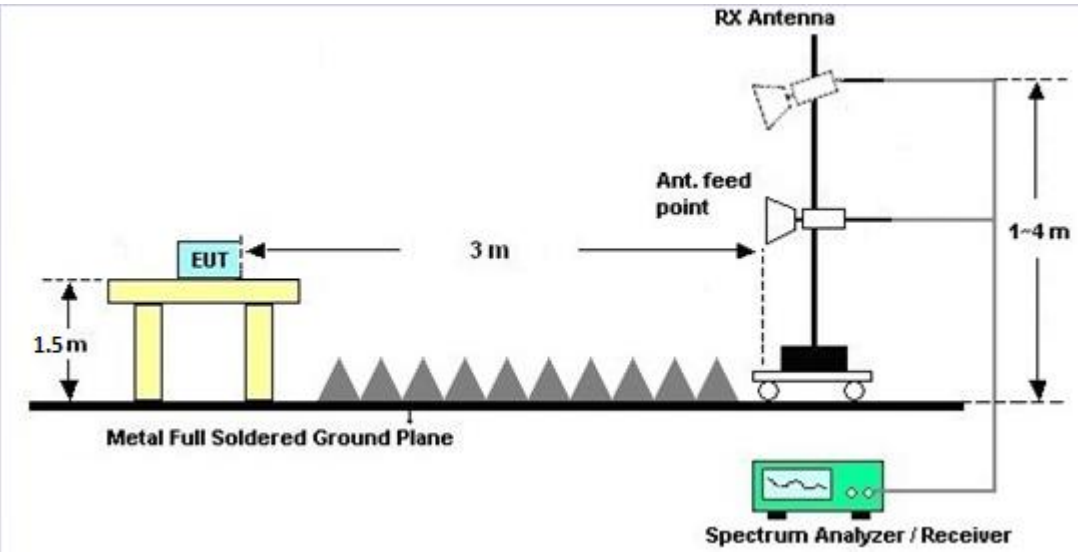
For radiated emissions below 30MHz



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 B and C.

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B and C.

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.

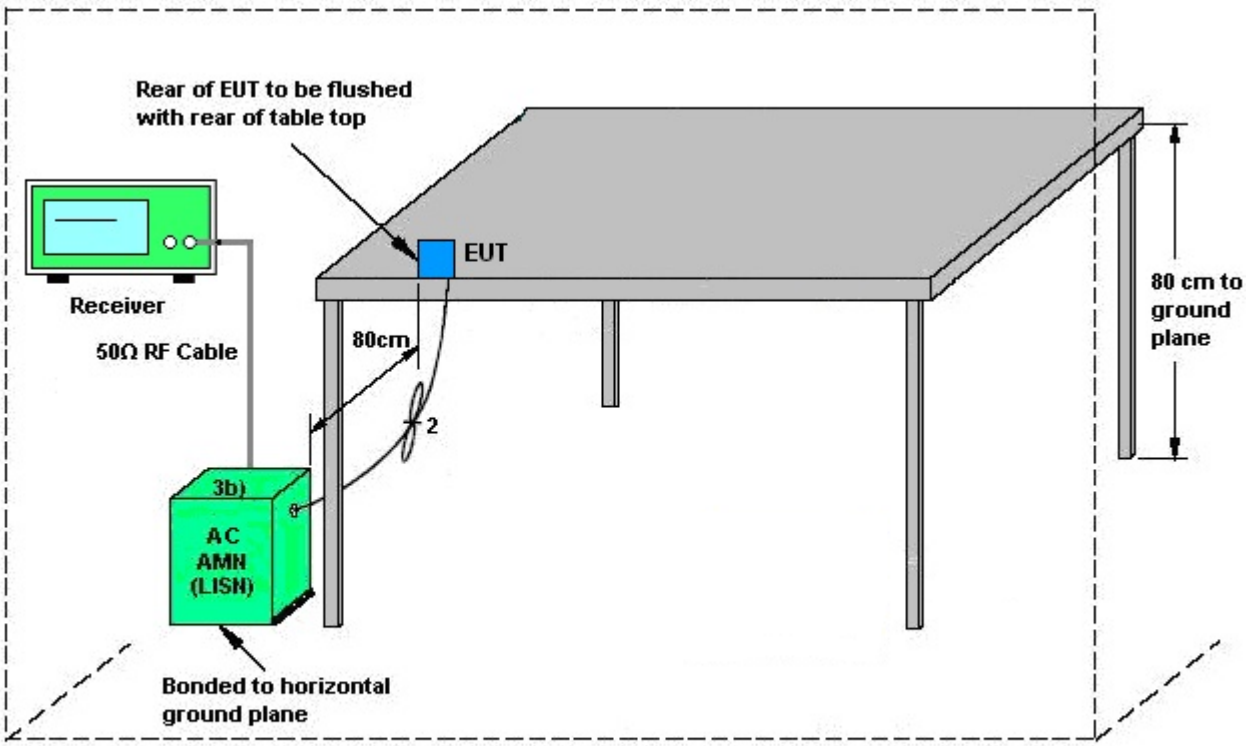
3.6.2 Measuring Instruments

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.

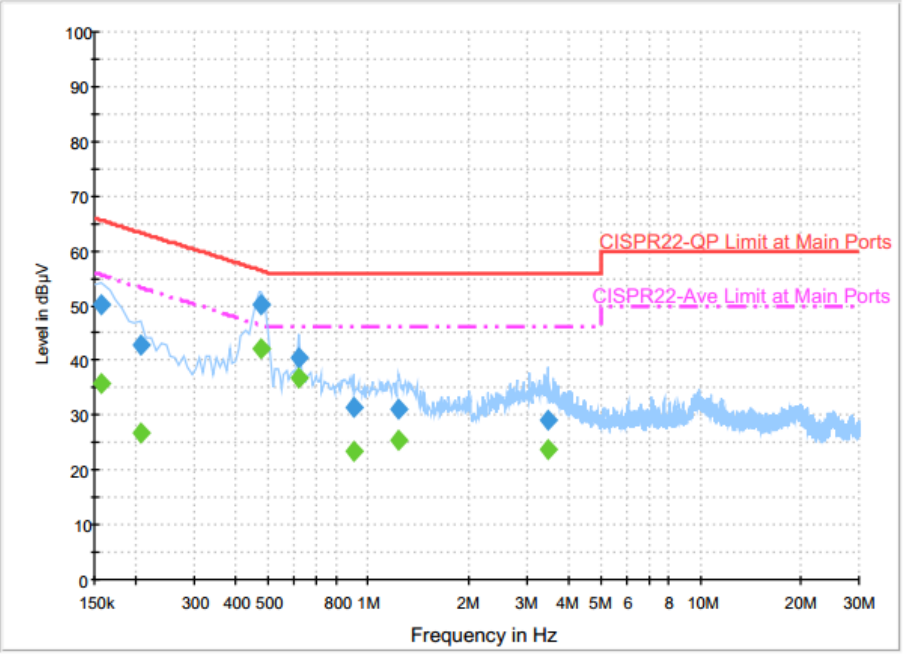
3.6.4 Test Setup



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

3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	48~49%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Tx + Bluetooth Tx + Zigbee Idle + Y Cable + USB Cable (Charging from Adapter 1)		



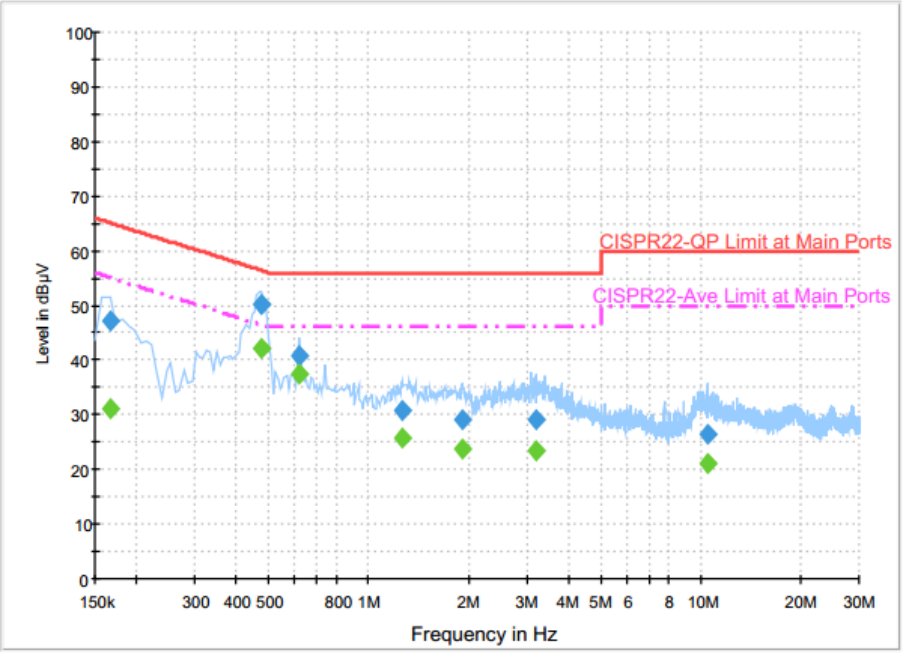
Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	50.3	Off	L1	19.6	15.3	65.6
0.206000	42.6	Off	L1	19.6	20.8	63.4
0.478000	50.3	Off	L1	19.6	6.1	56.4
0.622000	40.6	Off	L1	19.6	15.4	56.0
0.902000	31.6	Off	L1	19.6	24.4	56.0
1.238000	31.0	Off	L1	19.6	25.0	56.0
3.470000	29.0	Off	L1	19.6	27.0	56.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	35.7	Off	L1	19.6	19.9	55.6
0.206000	26.7	Off	L1	19.6	26.7	53.4
0.478000	42.0	Off	L1	19.6	4.4	46.4
0.622000	36.8	Off	L1	19.6	9.2	46.0
0.902000	23.4	Off	L1	19.6	22.6	46.0
1.238000	25.3	Off	L1	19.6	20.7	46.0
3.470000	23.6	Off	L1	19.6	22.4	46.0

Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	48~49%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Tx + Bluetooth Tx + Zigbee Idle + Y Cable + USB Cable (Charging from Adapter 1)		



Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	47.0	Off	N	19.6	18.2	65.2
0.478000	50.3	Off	N	19.6	6.1	56.4
0.622000	41.0	Off	N	19.6	15.0	56.0
1.262000	30.9	Off	N	19.6	25.1	56.0
1.910000	29.2	Off	N	19.6	26.8	56.0
3.190000	29.0	Off	N	19.6	27.0	56.0
10.526000	26.3	Off	N	20.1	33.7	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	31.0	Off	N	19.6	24.2	55.2
0.478000	42.1	Off	N	19.6	4.3	46.4
0.622000	37.6	Off	N	19.6	8.4	46.0
1.262000	25.9	Off	N	19.6	20.1	46.0
1.910000	23.8	Off	N	19.6	22.2	46.0
3.190000	23.5	Off	N	19.6	22.5	46.0
10.526000	21.2	Off	N	20.1	28.8	50.0

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the Antenna exceeds 6 dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the 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	0.58	0.73	0.73	3.67	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	Dec. 30, 2016~ Mar. 08, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	0846202	300MHz~40GHz	Sep. 29, 2016	Dec. 30, 2016~ Mar. 08, 2017	Sep. 28, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jul. 17, 2016	Dec. 30, 2016~ Mar. 08, 2017	Jul. 16, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jan. 24, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Jan. 24, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Jan. 24, 2017	Nov. 28, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Dec. 06, 2016	Jan. 24, 2017	Dec. 05, 2017	Conduction (CO05-HY)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150 246	10Hz~44GHz;	May 07, 2016	Jan. 06, 2017~ Jan. 21, 2017	May 06, 2017	Radiation (03CH02-SZ
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450 083	20Hz~8.4GHz	Ma .07, 2016	Jan. 06, 2017~ Jan. 21, 2017	May 06, 2017	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	May 21, 2016	Jan. 06, 2017~ Jan. 21, 2017	May 20, 2017	Radiation (03CH02-SZ)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1355	1GHz~18GHz	May 07, 2016	Jan. 06, 2017~ Jan. 21, 2017	May 06, 2017	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 16, 2016	Jan. 06, 2017~ Jan. 21, 2017	Jul. 15, 2017	Radiation (03CH02-SZ
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Aug. 10, 2016	Jan. 06, 2017~ Jan. 21, 2017	Aug. 09, 2017	Radiation (03CH02-SZ)
Amplifier	Agilent Technologies	83017A	MY39501 302	500MHz~26.5GHz	Jan. 06, 2017	Jan. 06, 2017~ Jan. 21, 2017	Jan. 05, 2018	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	AMF-7D-00101 800-30-10P-R	1707137	1GHz~18GHz	Oct. 11, 2016	Jan. 06, 2017~ Jan. 21, 2017	Oct. 10, 2017	Radiation (03CH02-SZ)
Amplifier	Burgeon	BPA-530	102210	0.01Hz ~3000MHz	Oct. 11, 2016	Jan. 06, 2017~ Jan. 21, 2017	Oct. 10, 2017	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	N/A	Jan. 06, 2017~ Jan. 21, 2017	N/A	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	N/A	Jan. 06, 2017~ Jan. 21, 2017	N/A	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	N/A	Jan. 06, 2017~ Jan. 21, 2017	N/A	Radiation (03CH02-SZ)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100321	9kHz~30MHz	Oct. 23, 2016	Jan. 06, 2017~ Jan. 21, 2017	Oct. 22, 2017	Radiation (03CH02-SZ)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.7**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0**

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

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

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

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

Appendix A. Test Result of Conducted Test Items

<CDD>

Test Engineer:	Derek Hsu	Temperature:	21~25	°C
Test Date:	2016/12/30~2017/03/08	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	SISO	1	2412	11.85	11.95	8.54	9.02	0.50	Pass
11b	1Mbps	SISO	6	2437	13.25	12.50	9.54	9.02	0.50	Pass
11b	1Mbps	SISO	11	2462	11.85	11.90	8.06	9.02	0.50	Pass
11g	6Mbps	CDD	1	2412	18.30	18.05	16.32	16.34	0.50	Pass
11g	6Mbps	CDD	6	2437	18.30	18.30	16.34	16.34	0.50	Pass
11g	6Mbps	CDD	11	2462	18.15	18.10	16.28	16.28	0.50	Pass
HT20	MCS0	CDD	1	2412	18.90	18.80	17.56	17.56	0.50	Pass
HT20	MCS0	CDD	6	2437	19.25	19.20	17.56	17.58	0.50	Pass
HT20	MCS0	CDD	11	2462	18.95	18.95	17.54	17.54	0.50	Pass

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	SISO	1	2412	22.50	23.77		30.00	30.00	0.58	0.73	23.08	24.50	36.00	36.00	Pass
11b	1Mbps	SISO	6	2437	24.67	24.88		30.00	30.00	0.58	0.73	25.25	25.61	36.00	36.00	Pass
11b	1Mbps	SISO	11	2462	23.68	23.94		30.00	30.00	0.58	0.73	24.26	24.67	36.00	36.00	Pass
11g	6Mbps	SISO	1	2412	23.15	23.51		30.00	30.00	0.58	0.73	23.73	24.24	36.00	36.00	Pass
11g	6Mbps	SISO	6	2437	24.70	24.80		30.00	30.00	0.58	0.73	25.28	25.53	36.00	36.00	Pass
11g	6Mbps	SISO	11	2462	23.66	23.72		30.00	30.00	0.58	0.73	24.24	24.45	36.00	36.00	Pass
HT20	MCS0	SISO	1	2412	21.82	21.79		30.00	30.00	0.58	0.73	22.40	22.52	36.00	36.00	Pass
HT20	MCS0	SISO	6	2437	24.71	24.72		30.00	30.00	0.58	0.73	25.29	25.45	36.00	36.00	Pass
HT20	MCS0	SISO	11	2462	22.90	22.92		30.00	30.00	0.58	0.73	23.48	23.65	36.00	36.00	Pass
VHT20	MCS0	SISO	1	2412	21.77	21.77		30.00	30.00	0.58	0.73	22.35	22.50	36.00	36.00	Pass
VHT20	MCS0	SISO	6	2437	24.70	24.71		30.00	30.00	0.58	0.73	25.28	25.44	36.00	36.00	Pass
VHT20	MCS0	SISO	11	2462	22.89	22.91		30.00	30.00	0.58	0.73	23.47	23.64	36.00	36.00	Pass
11g	6Mbps	CDD	1	2412	23.26	23.83	26.56	30.00		0.73		27.29		36.00		Pass
11g	6Mbps	CDD	6	2437	24.68	24.91	27.81	30.00		0.73		28.54		36.00		Pass
11g	6Mbps	CDD	11	2462	23.58	23.83	26.72	30.00		0.73		27.45		36.00		Pass
HT20	MCS0	CDD	1	2412	21.84	21.78	24.82	30.00		0.73		25.55		36.00		Pass
HT20	MCS0	CDD	6	2437	24.60	24.81	27.72	30.00		0.73		28.45		36.00		Pass
HT20	MCS0	CDD	11	2462	22.91	22.90	25.92	30.00		0.73		26.65		36.00		Pass
VHT20	MCS0	CDD	1	2412	21.71	21.80	24.77	30.00		0.73		25.50		36.00		Pass
VHT20	MCS0	CDD	6	2437	24.56	24.84	27.71	30.00		0.73		28.44		36.00		Pass
VHT20	MCS0	CDD	11	2462	22.90	22.90	25.91	30.00		0.73		26.64		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	SISO	1	2412	0.23	0.23	19.16	20.58	
11b	1Mbps	SISO	6	2437	0.23	0.23	22.43	22.45	
11b	1Mbps	SISO	11	2462	0.23	0.23	20.67	20.65	
11g	6Mbps	SISO	1	2412	0.63	0.63	16.43	16.63	
11g	6Mbps	SISO	6	2437	0.63	0.63	19.84	19.85	
11g	6Mbps	SISO	11	2462	0.63	0.63	16.80	16.80	
HT20	MCS0	SISO	1	2412	0.60	0.67	14.43	14.44	
HT20	MCS0	SISO	6	2437	0.60	0.67	19.52	19.63	
HT20	MCS0	SISO	11	2462	0.60	0.67	15.66	15.66	
VHT20	MCS0	SISO	1	2412	0.67	0.67	14.41	14.43	
VHT20	MCS0	SISO	6	2437	0.67	0.67	19.51	19.60	
VHT20	MCS0	SISO	11	2462	0.67	0.67	15.64	15.64	
11g	6Mbps	CDD	1	2412	0.63	0.57	16.53	16.73	19.64
11g	6Mbps	CDD	6	2437	0.63	0.57	19.84	19.92	22.89
11g	6Mbps	CDD	11	2462	0.63	0.57	16.83	16.78	19.81
HT20	MCS0	CDD	1	2412	0.60	0.60	14.35	14.51	17.45
HT20	MCS0	CDD	6	2437	0.60	0.60	19.50	19.74	22.64
HT20	MCS0	CDD	11	2462	0.60	0.60	15.61	15.68	18.66
VHT20	MCS0	CDD	1	2412	0.67	0.67	14.28	14.57	17.44
VHT20	MCS0	CDD	6	2437	0.67	0.67	19.53	19.64	22.60
VHT20	MCS0	CDD	11	2462	0.67	0.67	15.61	15.67	18.65

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

TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	SISO	1	2412	-3.35	-2.77	-	0.58	0.73	8.00	8.00	Pass
11b	1Mbps	SISO	6	2437	-1.14	0.25		0.58	0.73	8.00	8.00	Pass
11b	1Mbps	SISO	11	2462	-0.55	-2.89		0.58	0.73	8.00	8.00	Pass
11g	6Mbps	CDD	1	2412	-9.01	-9.17	-6.00	3.67		8.00		Pass
11g	6Mbps	CDD	6	2437	-6.49	-4.90	-1.89	3.67		8.00		Pass
11g	6Mbps	CDD	11	2462	-7.63	-8.64	-4.62	3.67		8.00		Pass
HT20	MCS0	CDD	1	2412	-10.22	-12.25	-7.21	3.67		8.00		Pass
HT20	MCS0	CDD	6	2437	-5.48	-5.28	-2.27	3.67		8.00		Pass
HT20	MCS0	CDD	11	2462	-10.92	-9.98	-6.97	3.67		8.00		Pass

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

<STBC>

Test Engineer:	Derek Hsu	Temperature:	21~25	°C
Test Date:	2016/12/30~2017/03/08	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
HT20	MCS0	STBC	1	2412	19.00	18.90	17.56	17.56	0.50	Pass
HT20	MCS0	STBC	6	2437	19.90	19.35	17.54	17.58	0.50	Pass
HT20	MCS0	STBC	11	2462	18.95	19.10	17.56	17.54	0.50	Pass

TEST RESULTS DATA
Peak Output Power

2.4GHz Band															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
HT20	MCS0	STBC	1	2412	23.45	23.69	26.58	30.00		0.73		27.31		36.00		Pass
HT20	MCS0	STBC	6	2437	24.94	25.00	27.98	30.00		0.73		28.71		36.00		Pass
HT20	MCS0	STBC	11	2462	23.56	23.81	26.70	30.00		0.73		27.43		36.00		Pass
VHT20	MCS0	STBC	1	2412	23.31	23.68	26.51	30.00		0.73		27.24		36.00		Pass
VHT20	MCS0	STBC	6	2437	24.91	25.00	27.97	30.00		0.73		28.70		36.00		Pass
VHT20	MCS0	STBC	11	2462	23.55	23.75	26.66	30.00		0.73		27.39		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
HT20	MCS0	STBC	1	2412	0.60	0.66	16.46	16.75	19.62
HT20	MCS0	STBC	6	2437	0.60	0.66	20.52	20.77	23.66
HT20	MCS0	STBC	11	2462	0.60	0.66	16.71	16.77	19.75
VHT20	MCS0	STBC	1	2412	0.60	0.60	16.45	16.60	19.54
VHT20	MCS0	STBC	6	2437	0.60	0.60	20.57	20.66	23.63
VHT20	MCS0	STBC	11	2462	0.60	0.60	16.68	16.77	19.74

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

TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
HT20	MCS0	STBC	1	2412	-9.97	-8.19	-5.18	0.73		8.00		Pass
HT20	MCS0	STBC	6	2437	-5.39	-5.32	-2.31	0.73		8.00		Pass
HT20	MCS0	STBC	11	2462	-9.23	-8.63	-5.62	0.73		8.00		Pass

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

Appendix B. Radiated Spurious Emission

Test Engineer :	Taigong Lin	Temperature :	20~24°C
		Relative Humidity :	48~50%

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		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2387.175	49.88	-24.12	74	52.11	27.29	3.81	33.33	153	330	P	H
		2387.07	44.3	-9.7	54	46.53	27.29	3.81	33.33	153	330	A	H
	*	2412	103.73	-	-	105.88	27.33	3.84	33.32	153	330	P	H
	*	2412	100.57	-	-	102.72	27.33	3.84	33.32	153	330	A	H
													H
													H
		2386.755	54.81	-19.19	74	57.04	27.29	3.81	33.33	108	127	P	V
		2386.965	49.59	-4.41	54	51.82	27.29	3.81	33.33	108	127	A	V
	*	2412	108.04	-	-	110.19	27.33	3.84	33.32	108	127	P	V
	*	2412	104.18	-	-	106.33	27.33	3.84	33.32	108	127	A	V
													V
													V
802.11b CH 06 2437MHz		2389.94	47.02	-26.98	74	49.24	27.29	3.81	33.32	160	329	P	H
		2389.94	40.14	-13.86	54	42.36	27.29	3.81	33.32	160	329	A	H
	*	2437	106.38	-	-	108.45	27.4	3.84	33.31	160	329	P	H
	*	2437	102.88	-	-	104.95	27.4	3.84	33.31	160	329	A	H
		2485.79	46.25	-27.75	74	48.21	27.47	3.88	33.31	160	329	P	H
		2483.5	37.63	-16.37	54	39.59	27.47	3.88	33.31	160	329	A	H
		2389.94	51.57	-22.43	74	53.79	27.29	3.81	33.32	130	108	P	V
		2389.94	44.58	-9.42	54	46.8	27.29	3.81	33.32	130	108	A	V
	*	2437	108.42	-	-	110.49	27.4	3.84	33.31	130	108	P	V
	*	2437	104.81	-	-	106.88	27.4	3.84	33.31	130	108	A	V
		2484.74	48.36	-25.64	74	50.32	27.47	3.88	33.31	130	108	P	V
		2483.5	39.89	-14.11	54	41.85	27.47	3.88	33.31	130	108	A	V

802.11b CH 11 2462MHz	*	2462	105.07	-	-	107.07	27.43	3.88	33.31	181	329	P	H
	*	2462	101.91	-	-	103.91	27.43	3.88	33.31	181	329	A	H
		2483.52	53.92	-20.08	74	55.88	27.47	3.88	33.31	181	329	P	H
		2483.52	49.92	-4.08	54	51.88	27.47	3.88	33.31	181	329	A	H
													H
													H
	*	2462	108.23	-	-	110.23	27.43	3.88	33.31	108	64	P	V
	*	2462	104.36	-	-	106.36	27.43	3.88	33.31	108	64	A	V
		2483.56	57.21	-16.79	74	59.17	27.47	3.88	33.31	108	64	P	V
		2483.52	53.46	-0.54	54	55.42	27.47	3.88	33.31	108	64	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	48.97	-25.03	74	67.1	32.55	5.92	56.6	100	360	P	H
													H
													H
													H
		4824	45.13	-28.87	74	63.26	32.55	5.92	56.6	100	6	P	V
													V
													V
													V
802.11b CH 06 2437MHz		4874	48.46	-25.54	74	66.73	32.66	5.98	56.91	400	0	P	H
		7311	48.74	-25.26	74	62.16	37.66	6.92	58	400	0	P	H
													H
													H
		4874	46.32	-27.68	74	64.59	32.66	5.98	56.91	400	0	P	V
		7311	48.42	-25.58	74	61.84	37.66	6.92	58	400	0	P	V
													V
													V
802.11b CH 11 2462MHz		4924	49.06	-24.94	74	66.35	32.76	6.03	56.08	400	0	P	H
		7386	45.71	-28.29	74	59.11	37.68	6.93	58.01	400	0	P	H
													H
													H
		4924	47.79	-26.21	74	65.08	32.76	6.03	56.08	400	0	P	V
		7386	45.09	-28.91	74	58.49	37.68	6.93	58.01	400	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11b (LF)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
2.4GHz 802.11b LF		49.17	19.7	-20.3	40	34.58	15.72	0.65	31.25	-	-	P	H
		150.69	29.21	-14.29	43.5	41.22	18	1.08	31.09	100	0	P	H
		211.71	29.97	-13.53	43.5	43.81	15.72	1.27	30.83	-	-	P	H
		327.3	28.05	-17.95	46	37.61	19.82	1.44	30.82	-	-	P	H
		519.8	26.84	-19.16	46	32.44	23.57	1.8	30.97	-	-	P	H
		710.9	29.31	-16.69	46	32.75	25.84	2.1	31.38	-	-	P	H
													H
													H
													H
													H
													H
													H
		49.44	27.17	-12.83	40	42.05	15.72	0.65	31.25	100	0	P	V
		151.5	21.92	-21.58	43.5	33.99	17.94	1.08	31.09	-	-	P	V
		202.26	23.36	-20.14	43.5	37.77	15.26	1.17	30.84	-	-	P	V
		494.6	24.87	-21.13	46	31.09	22.92	1.8	30.94	-	-	P	V
		638.1	27.19	-18.81	46	31.32	25.08	1.98	31.19	-	-	P	V
		832.7	29.77	-16.23	46	31.31	27.57	2.26	31.37	-	-	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		(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".

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.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2386.335	54.33	-19.67	74	56.56	27.29	3.81	33.33	137	56	P	H
		2387.175	49.87	-4.13	54	52.1	27.29	3.81	33.33	137	56	A	H
	*	2412	106.11	-	-	108.26	27.33	3.84	33.32	137	56	P	H
	*	2412	102.52	-	-	104.67	27.33	3.84	33.32	137	56	A	H
													H
													H
		2385.915	55.51	-18.49	74	57.74	27.29	3.81	33.33	151	201	P	V
		2387.07	51.46	-2.54	54	53.69	27.29	3.81	33.33	151	201	A	V
	*	2412	106.47	-	-	108.62	27.33	3.84	33.32	151	201	P	V
	*	2412	102.86	-	-	105.01	27.33	3.84	33.32	151	201	A	V
													V
													V
802.11b CH 06 2437MHz		2389.38	46.68	-27.32	74	48.91	27.29	3.81	33.33	134	55	P	H
		2389.94	39.5	-14.5	54	41.72	27.29	3.81	33.32	134	55	A	H
	*	2437	107.4	-	-	109.47	27.4	3.84	33.31	134	55	P	H
	*	2437	103.57	-	-	105.64	27.4	3.84	33.31	134	55	A	H
		2483.83	48.13	-25.87	74	50.09	27.47	3.88	33.31	134	55	P	H
		2483.76	40	-14	54	41.96	27.47	3.88	33.31	134	55	A	H
		2389.94	50.81	-23.19	74	53.03	27.29	3.81	33.32	112	203	P	V
		2389.94	43	-11	54	45.22	27.29	3.81	33.32	112	203	A	V
	*	2437	108.15	-	-	110.22	27.4	3.84	33.31	112	203	P	V
	*	2437	104.63	-	-	106.7	27.4	3.84	33.31	112	203	A	V
		2483.83	50.45	-23.55	74	52.41	27.47	3.88	33.31	112	203	P	V
		2483.9	42.37	-11.63	54	44.33	27.47	3.88	33.31	112	203	A	V

802.11b CH 11 2462MHz	*	2462	106.44	-	-	108.44	27.43	3.88	33.31	132	49	P	H
	*	2462	103.09	-	-	105.09	27.43	3.88	33.31	132	49	A	H
		2488.56	54.52	-19.48	74	56.42	27.5	3.91	33.31	132	49	P	H
		2488.48	49.85	-4.15	54	51.75	27.5	3.91	33.31	132	49	A	H
													H
													H
	*	2462	107.22	-	-	109.22	27.43	3.88	33.31	234	19	P	V
	*	2462	103.47	-	-	105.47	27.43	3.88	33.31	234	19	A	V
		2488.52	55.94	-18.06	74	57.84	27.5	3.91	33.31	234	19	P	V
		2488.6	51.3	-2.7	54	53.2	27.5	3.91	33.31	234	19	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. 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	44.75	-29.25	74	62.88	32.55	5.92	56.6	100	360	P	H
													H
													H
													H
		4824	46.7	-27.3	74	64.83	32.55	5.92	56.6	100	100	P	V
													V
													V
													V
802.11b CH 06 2437MHz		4874	43.28	-30.72	74	61.55	32.66	5.98	56.91	400	0	P	H
		7311	46.29	-27.71	74	59.71	37.66	6.92	58	400	0	P	H
													H
													H
		4874	44.85	-29.15	74	63.12	32.66	5.98	56.91	400	0	P	V
		7311	47.82	-26.18	74	61.24	37.66	6.92	58	400	0	P	V
													V
													V
802.11b CH 11 2462MHz		4924	45.01	-28.99	74	62.3	32.76	6.03	56.08	100	360	P	H
		7386	45.21	-28.79	74	58.61	37.68	6.93	58.01	100	360	P	H
													H
													H
		4924	48.92	-25.08	74	66.21	32.76	6.03	56.08	100	18	P	V
		7386	44.56	-29.44	74	57.96	37.68	6.93	58.01	100	18	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11b (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11b LF		49.44	19.27	-20.73	40	34.15	15.72	0.65	31.25	-	-	P	H
		149.88	29.31	-14.19	43.5	41.32	18	1.08	31.09	-	-	P	H
		209.01	29.65	-13.85	43.5	43.69	15.62	1.17	30.83	100	0	P	H
		316.1	27.79	-18.21	46	37.45	19.7	1.44	30.8	-	-	P	H
		542.9	27.02	-18.98	46	32.02	24.14	1.86	31	-	-	P	H
		822.9	29.38	-16.62	46	31.06	27.42	2.26	31.36	-	-	P	H
													H
													H
													H
													H
													H
													H
		40.26	26.3	-13.7	40	37.24	19.64	0.65	31.23	-	-	P	V
		49.44	27.67	-12.33	40	42.55	15.72	0.65	31.25	100	0	P	V
		149.34	22.8	-20.7	43.5	34.84	17.97	1.08	31.09	-	-	P	V
		502.3	25.07	-20.93	46	31.07	23.15	1.8	30.95	-	-	P	V
		685.7	27.75	-18.25	46	31.44	25.6	2.05	31.34	-	-	P	V
		805.4	28.25	-17.75	46	30.21	27.17	2.2	31.33	-	-	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		(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".

2.4GHz 2400~2483.5MHz

WIFI 802.11g CDD (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.275	57.44	-16.56	74	59.67	27.29	3.81	33.33	318	234	P	H
		2388.96	46	-8	54	48.23	27.29	3.81	33.33	318	234	A	H
	*	2412	106.16	-	-	108.31	27.33	3.84	33.32	318	234	P	H
	*	2412	99	-	-	101.15	27.33	3.84	33.32	318	234	A	H
													H
													H
		2389.275	62.53	-11.47	74	64.76	27.29	3.81	33.33	100	193	P	V
		2388.855	51.36	-2.64	54	53.59	27.29	3.81	33.33	100	193	A	V
	*	2412	109.7	-	-	111.85	27.33	3.84	33.32	100	193	P	V
	*	2412	102.97	-	-	105.12	27.33	3.84	33.32	100	193	A	V
													V
													V
802.11g CH 06 2437MHz		2389.52	60.18	-13.82	74	62.41	27.29	3.81	33.33	111	315	P	H
		2389.24	48.07	-5.93	54	50.3	27.29	3.81	33.33	111	315	A	H
	*	2437	109.8	-	-	111.87	27.4	3.84	33.31	111	315	P	H
	*	2437	102.56	-	-	104.63	27.4	3.84	33.31	111	315	A	H
		2484.18	58.03	-15.97	74	59.99	27.47	3.88	33.31	111	315	P	H
		2483.55	48.41	-5.59	54	50.37	27.47	3.88	33.31	111	315	A	H
		2388.4	62.13	-11.87	74	64.36	27.29	3.81	33.33	114	194	P	V
		2388.82	51.72	-2.28	54	53.95	27.29	3.81	33.33	114	194	P	V
	*	2437	111.32	-	-	113.39	27.4	3.84	33.31	189	360	P	V
	*	2437	104.4	-	-	106.47	27.4	3.84	33.31	189	360	A	V
		2484.6	64.29	-9.71	74	66.25	27.47	3.88	33.31	189	360	P	V
		2483.5	53.36	-0.64	54	55.32	27.47	3.88	33.31	189	360	A	V

802.11g CH 11 2462MHz	*	2462	107.51	-	-	109.51	27.43	3.88	33.31	130	311	P	H
	*	2462	99.98	-	-	101.98	27.43	3.88	33.31	130	311	A	H
		2486.2	56.16	-17.84	74	58.12	27.47	3.88	33.31	130	311	P	H
		2486.4	45.18	-8.82	54	47.14	27.47	3.88	33.31	130	311	A	H
													H
													H
	*	2462	109.49	-	-	111.49	27.43	3.88	33.31	100	213	P	V
	*	2462	102.72	-	-	104.72	27.43	3.88	33.31	100	213	A	V
		2483.56	63.96	-10.04	74	65.92	27.47	3.88	33.31	100	213	P	V
		2483.52	52.16	-1.84	54	54.12	27.47	3.88	33.31	100	213	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g CDD (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)
802.11g CH 01 2412MHz		4824	46.47	-27.53	74	64.6	32.55	5.92	56.6	400	0	P	H
													H
													H
													H
		4824	42.56	-31.44	74	60.69	32.55	5.92	56.6	400	0	P	V
													V
													V
													V
802.11g CH 06 2437MHz		4874	44.7	-29.3	74	62.97	32.66	5.98	56.91	400	0	P	H
		7311	45.58	-28.42	74	59	37.66	6.92	58	400	0	P	H
													H
													H
		4874	44.06	-29.94	74	62.33	32.66	5.98	56.91	400	0	P	V
		7308	47.17	-26.83	74	60.59	37.66	6.92	58	400	0	P	V
													V
													V
802.11g CH 11 2462MHz		4926	44.53	-29.47	74	61.82	32.76	6.03	56.08	100	360	P	H
		7386	45.91	-28.09	74	59.31	37.68	6.93	58.01	100	360	P	H
													H
													H
		4926	43.33	-30.67	74	60.62	32.76	6.03	56.08	100	0	P	V
		7386	45.26	-28.74	74	58.66	37.68	6.93	58.01	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 CDD (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)
		2389.275	61.3	-12.7	74	63.53	27.29	3.81	33.33	166	134	P	H
		2389.905	49	-5	54	51.22	27.29	3.81	33.32	166	134	A	H
	*	2412	103.11	-	-	105.26	27.33	3.84	33.32	166	134	P	H
	*	2412	95.97	-	-	98.12	27.33	3.84	33.32	166	134	A	H
802.11n													H
HT20													H
CH 01		2389.905	64.2	-9.8	74	66.42	27.29	3.81	33.32	161	18	P	V
2412MHz		2389.695	53.39	-0.61	54	55.62	27.29	3.81	33.33	161	18	A	V
	*	2412	107.77	-	-	109.92	27.33	3.84	33.32	161	18	P	V
	*	2412	100.57	-	-	102.72	27.33	3.84	33.32	161	18	A	V
													V
													V
		2389.24	60.71	-13.29	74	62.94	27.29	3.81	33.33	100	104	P	H
		2389.38	49.7	-4.3	54	51.93	27.29	3.81	33.33	100	104	A	H
	*	2437	106.47	-	-	108.54	27.4	3.84	33.31	100	104	P	H
	*	2437	99.45	-	-	101.52	27.4	3.84	33.31	100	104	A	H
802.11n		2484.32	63.24	-10.76	74	65.2	27.47	3.88	33.31	100	104	P	H
HT20		2483.55	51.32	-2.68	54	53.28	27.47	3.88	33.31	100	104	A	H
CH 06		2389.8	62.89	-11.11	74	65.11	27.29	3.81	33.32	135	15	P	V
2437MHz		2389.38	53.1	-0.9	54	55.33	27.29	3.81	33.33	135	15	A	V
	*	2437	111.64	-	-	113.71	27.4	3.84	33.31	135	15	P	V
	*	2437	104.47	-	-	106.54	27.4	3.84	33.31	135	15	A	V
		2484.32	63.53	-10.47	74	65.49	27.47	3.88	33.31	135	15	P	V
		2484.67	53.02	-0.98	54	54.98	27.47	3.88	33.31	135	15	A	V

	*	2462	105.1	-	-	107.1	27.43	3.88	33.31	159	124	P	H
	*	2462	97.89	-	-	99.89	27.43	3.88	33.31	159	124	A	H
		2484.16	56.84	-17.16	74	58.8	27.47	3.88	33.31	159	124	P	H
		2483.52	44.92	-9.08	54	46.88	27.47	3.88	33.31	159	124	A	H
802.11n													H
HT20													H
CH 11	*	2462	108.45	-	-	110.45	27.43	3.88	33.31	100	213	P	V
2462MHz	*	2462	100.84	-	-	102.84	27.43	3.88	33.31	100	213	A	V
		2483.88	61.72	-12.28	74	63.68	27.47	3.88	33.31	100	213	P	V
		2483.88	48.92	-5.08	54	50.88	27.47	3.88	33.31	100	213	P	V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 CDD (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	42.66	-31.34	74	60.79	32.55	5.92	56.6	400	0	P	H
													H
802.11n													H
HT20													H
CH 01		4824	42.07	-31.93	74	60.2	32.55	5.92	56.6	400	0	P	V
2412MHz													V
													V
													V
		4874	42.54	-31.46	74	60.81	32.66	5.98	56.91	400	0	P	H
		7311	46.67	-27.33	74	60.09	37.66	6.92	58	400	0	P	H
802.11n													H
HT20													H
CH 06		4874	43.78	-30.22	74	62.05	32.66	5.98	56.91	400	0	P	V
2437MHz		7311	46.71	-27.29	74	60.13	37.66	6.92	58	400	0	P	V
													V
													V
		4924	43.44	-30.56	74	60.73	32.76	6.03	56.08	100	360	P	H
		7386	46.18	-27.82	74	59.58	37.68	6.93	58.01	100	360	P	H
802.11n													H
HT20													H
CH 11		4924	43.64	-30.36	74	60.93	32.76	6.03	56.08	100	0	P	V
2462MHz		7386	45.71	-28.29	74	59.11	37.68	6.93	58.01	100	0	P	V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 CDD (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)
		45.66	18.83	-21.17	40	32.05	17.38	0.65	31.25	-	-	P	H
		149.07	30.11	-13.39	43.5	42.15	17.97	1.08	31.09	100	0	P	H
		220.08	30.18	-15.82	46	43.54	16.19	1.27	30.82	-	-	P	H
		328.7	27.99	-18.01	46	37.52	19.85	1.44	30.82	-	-	P	H
		566.7	26.75	-19.25	46	31.39	24.53	1.86	31.03	-	-	P	H
		700.4	29.32	-16.68	46	32.81	25.8	2.1	31.39	-	-	P	H
													H
													H
													H
													H
2.4GHz													H
802.11n													H
HT20		40.26	27.07	-12.93	40	38.01	19.64	0.65	31.23	100	0	P	V
CDD LF		49.44	26.15	-13.85	40	41.03	15.72	0.65	31.25	-	-	P	V
		149.07	22.87	-20.63	43.5	34.91	17.97	1.08	31.09	-	-	P	V
		502.3	25.07	-20.93	46	31.07	23.15	1.8	30.95	-	-	P	V
		622.7	26.95	-19.05	46	31.07	25.05	1.98	31.15	-	-	P	V
		850.2	29.68	-16.32	46	30.97	27.81	2.3	31.4	-	-	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		(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".

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 STBC (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)
		2389.905	58.79	-15.21	74	61.01	27.29	3.81	33.32	134	33	P	H
		2389.905	46.76	-7.24	54	48.98	27.29	3.81	33.32	134	33	A	H
	*	2412	104.87	-	-	107.02	27.33	3.84	33.32	134	33	P	H
	*	2412	95.54	-	-	97.69	27.33	3.84	33.32	134	33	A	H
802.11n													H
HT20													H
CH 01		2389.8	63.97	-10.03	74	66.19	27.29	3.81	33.32	100	229	P	V
2412MHz		2390	52.31	-1.69	54	54.53	27.29	3.81	33.32	100	229	A	V
	*	2412	106.17	-	-	108.32	27.33	3.84	33.32	100	229	P	V
	*	2412	96.94	-	-	99.09	27.33	3.84	33.32	100	229	A	V
													V
													V
		2389.8	59.4	-14.6	74	61.62	27.29	3.81	33.32	163	229	P	H
		2389.94	49.27	-4.73	54	51.49	27.29	3.81	33.32	163	229	A	H
	*	2437	109.77	-	-	111.84	27.4	3.84	33.31	163	229	P	H
	*	2437	100.57	-	-	102.64	27.4	3.84	33.31	163	229	A	H
802.11n		2484.95	60.4	-13.6	74	62.36	27.47	3.88	33.31	163	229	P	H
HT20		2483.69	49.97	-4.03	54	51.93	27.47	3.88	33.31	163	229	A	H
CH 06		2388.54	62.85	-11.15	74	65.08	27.29	3.81	33.33	114	189	P	V
2437MHz		2389.66	53.45	-0.55	54	55.68	27.29	3.81	33.33	114	189	A	V
	*	2437	112.1	-	-	114.17	27.4	3.84	33.31	114	189	P	V
	*	2437	103.29	-	-	105.36	27.4	3.84	33.31	114	189	A	V
		2484.32	63.26	-10.74	74	65.22	27.47	3.88	33.31	114	189	P	V
		2483.5	53.12	-0.88	54	55.08	27.47	3.88	33.31	114	189	A	V

	*	2462	104.9	-	-	106.9	27.43	3.88	33.31	110	230	P	H
	*	2462	96.64	-	-	98.64	27.43	3.88	33.31	110	230	A	H
		2484.28	61.31	-12.69	74	63.27	27.47	3.88	33.31	110	230	P	H
		2483.56	48.48	-5.52	54	50.44	27.47	3.88	33.31	110	230	A	H
802.11n													H
HT20													H
CH 11	*	2462	109.32	-	-	111.32	27.43	3.88	33.31	100	213	P	V
2462MHz	*	2462	100.11	-	-	102.11	27.43	3.88	33.31	100	213	A	V
		2484.96	65.37	-8.63	74	67.33	27.47	3.88	33.31	100	213	P	V
		2483.52	52.06	-1.94	54	54.02	27.47	3.88	33.31	100	213	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 STBC (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	43.6	-30.4	74	61.73	32.55	5.92	56.6	400	0	P	H
													H
802.11n													H
HT20													H
CH 01		4824	43.22	-30.78	74	61.35	32.55	5.92	56.6	400	0	P	V
2412MHz													V
													V
													V
		4874	43.04	-30.96	74	61.31	32.66	5.98	56.91	400	0	P	H
		7311	46.38	-27.62	74	59.8	37.66	6.92	58	400	0	P	H
802.11n													H
HT20													H
CH 06		4874	43.01	-30.99	74	61.28	32.66	5.98	56.91	400	0	P	V
2437MHz		7311	46.4	-27.6	74	59.82	37.66	6.92	58	400	0	P	V
													V
													V
		4924	42.53	-31.47	74	59.82	32.76	6.03	56.08	100	360	P	H
		7386	46.63	-27.37	74	60.03	37.68	6.93	58.01	100	360	P	H
802.11n													H
HT20													H
CH 11		4924	42.4	-31.6	74	59.69	32.76	6.03	56.08	100	35	P	V
2462MHz		7386	45.41	-28.59	74	58.81	37.68	6.93	58.01	100	35	P	V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against Peak and Average limit line.

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 STBC (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)
		38.37	20.94	-19.06	40	31	20.52	0.65	31.23	-	-	P	H
		150.42	29.94	-13.56	43.5	41.95	18	1.08	31.09	-	-	P	H
		207.66	30.39	-13.11	43.5	44.54	15.52	1.17	30.84	100	0	P	H
		329.4	28.3	-17.7	46	37.82	19.86	1.44	30.82	-	-	P	H
		568.1	27.17	-18.83	46	31.79	24.56	1.86	31.04	-	-	P	H
		776.7	28.5	-17.5	46	31.05	26.59	2.2	31.34	-	-	P	H
													H
													H
													H
													H
2.4GHz													H
802.11n													H
HT20		40.26	26.32	-13.68	40	37.26	19.64	0.65	31.23	-	-	P	V
LF		49.17	26.37	-13.63	40	41.25	15.72	0.65	31.25	100	0	P	V
		150.15	23.02	-20.48	43.5	35.03	18	1.08	31.09	-	-	P	V
		437.2	23.5	-22.5	46	31.35	21.4	1.67	30.92	-	-	P	V
		579.3	26.98	-19.02	46	31.39	24.7	1.94	31.05	-	-	P	V
		763.4	28.02	-17.98	46	30.91	26.3	2.15	31.34	-	-	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		(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 C. Radiated Spurious Emission Plots

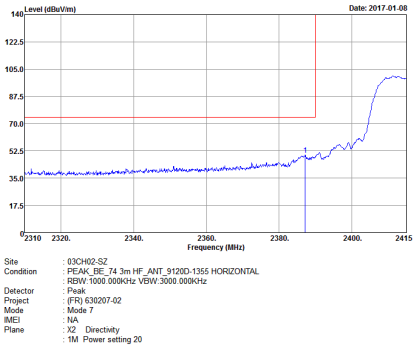
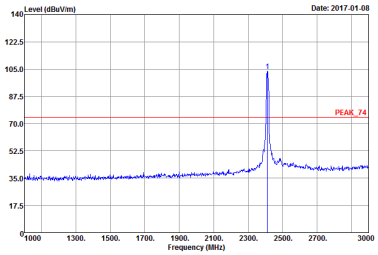
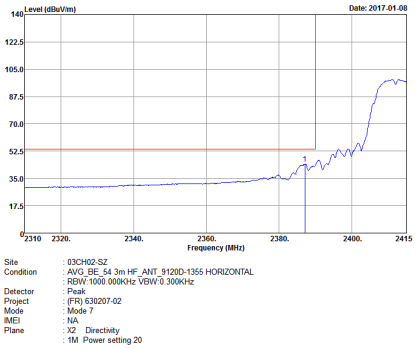
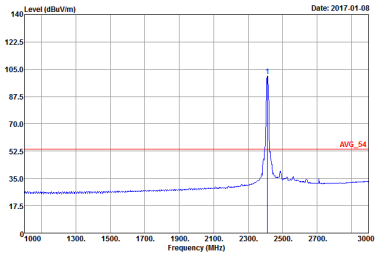
Test Engineer :	Taigong Lin	**Temperature :**	20~24°C
		Relative Humidity :	48~50%

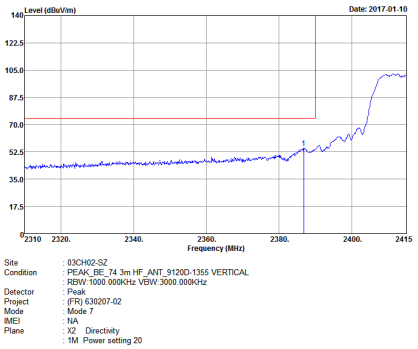
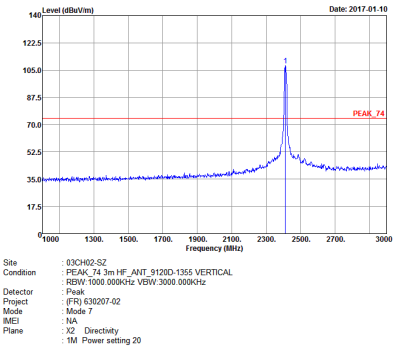
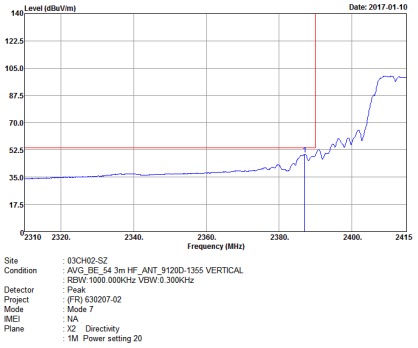
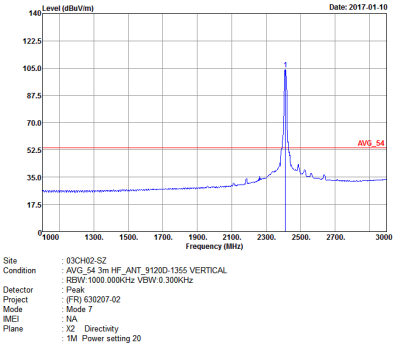
Note symbol

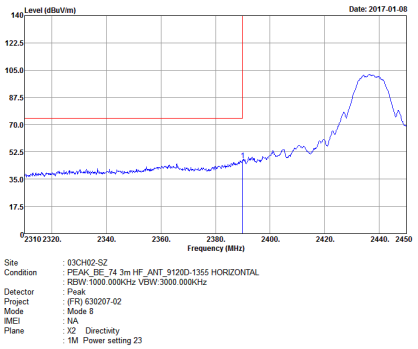
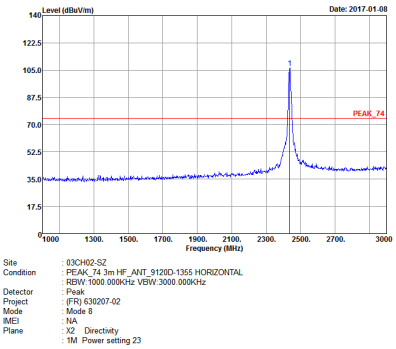
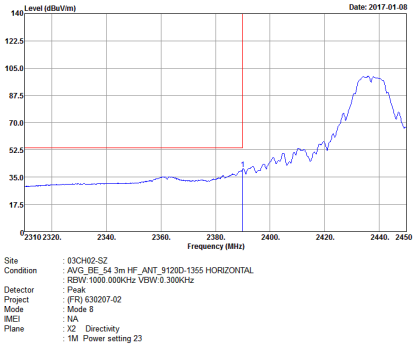
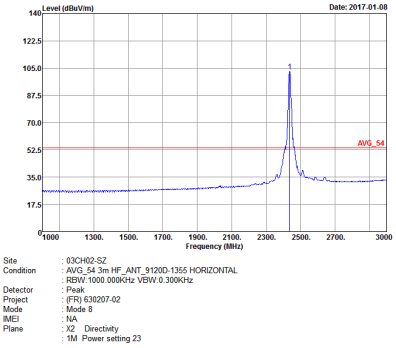
-L	**Low channel location**
-R	**High channel location**

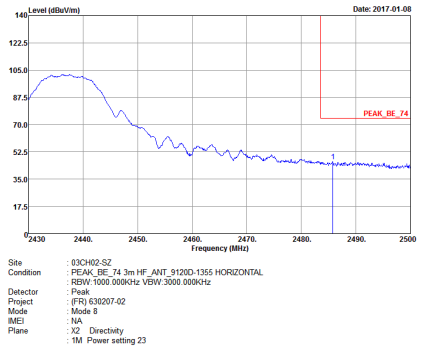
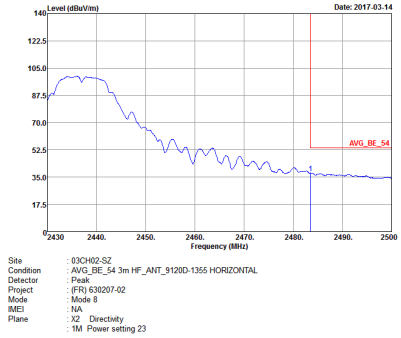
2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1	Horizontal	Fundamental
Peak	 Site : 03CH02-SZ Condition : PEAK_BE_74 3m HF_ANT_9120D-1355 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 7 IMEI : NA Plane : X2 Directivity : 1M Power setting 20	 Site : 03CH02-SZ Condition : PEAK_74 3m HF_ANT_9120D-1355 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 7 IMEI : NA Plane : X2 Directivity : 1M Power setting 20
Avg.	 Site : 03CH02-SZ Condition : AVG_BE_54 3m HF_ANT_9120D-1355 HORIZONTAL : RBW:1000.000KHz VBW:0.300KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 7 IMEI : NA Plane : X2 Directivity : 1M Power setting 20	 Site : 03CH02-SZ Condition : AVG_54 3m HF_ANT_9120D-1355 HORIZONTAL : RBW:1000.000KHz VBW:0.300KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 7 IMEI : NA Plane : X2 Directivity : 1M Power setting 20

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1	Vertical	Fundamental
Peak	 Site : 03CH02-SZ Condition : PEAK_BE_74 3m HF_ANT_9120D-1355 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 7 IMEI : NA Plane : X2 Directivity : 1M Power setting 20	 Site : 03CH02-SZ Condition : PEAK_74 3m HF_ANT_9120D-1355 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 7 IMEI : NA Plane : X2 Directivity : 1M Power setting 20
Avg.	 Site : 03CH02-SZ Condition : AVG_BE_54 3m HF_ANT_9120D-1355 VERTICAL : RBW:1000.000KHz VBW:0.300KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 7 IMEI : NA Plane : X2 Directivity : 1M Power setting 20	 Site : 03CH02-SZ Condition : AVG_54 3m HF_ANT_9120D-1355 VERTICAL : RBW:1000.000KHz VBW:0.300KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 7 IMEI : NA Plane : X2 Directivity : 1M Power setting 20

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak	 Site : 03CH02-SZ Condition : PEAK_BE_74 3m HF_ANT_9120D-1355 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 8 IMEI : NA Plane : X2 Directivity : 1M Power setting 23	 Site : 03CH02-SZ Condition : PEAK_74 3m HF_ANT_9120D-1355 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 8 IMEI : NA Plane : X2 Directivity : 1M Power setting 23
Avg.	 Site : 03CH02-SZ Condition : AVG_BE_54 3m HF_ANT_9120D-1355 HORIZONTAL : RBW:1000.000KHz VBW:0.300KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 8 IMEI : NA Plane : X2 Directivity : 1M Power setting 23	 Site : 03CH02-SZ Condition : AVG_54 3m HF_ANT_9120D-1355 HORIZONTAL : RBW:1000.000KHz VBW:0.300KHz Detector : Peak Project : (FR) 630207-02 Mode : Mode 8 IMEI : NA Plane : X2 Directivity : 1M Power setting 23

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