FCC RF Test Report

APPLICANT	:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	Portable Tablet Computer
BRAND NAME	:	Lenovo
MODEL NAME	:	Lenovo YB1-X91F
FCC ID	:	O57YB1X91F
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Mar. 21, 2016 and testing was completed on Apr. 26, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Prepared by: James Huang / Manager

Approved by: Jones Tsai / Manager

Testing Laboratory 2627

SPORTON INTERNATIONAL (KUNSHAN) INC.
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TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR631602-01C	Rev. 01	Initial issue of report	Apr. 28, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-247 5.2(1)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	RSS-Gen 6.6	99% Bandwidth	-	Pass	-
3.2	15.247(b)	RSS-247 A5.4(4)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	RSS-247 5.2(2)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	RSS-247 5.5	Conducted Band Edges	≤ 20dBc	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	RSS-247 5.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.19 dB at 122.070 MHz
3.6	15.207	RSS-GEN 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 3.71 dB at 0.590 MHz
3.7	15.203 & 15.247(b)	N/A	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Lenovo(Shanghai) Electronics Technology Co., Ltd.
NO.68 BUILDING, 199 FENJU RD., China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

1.2 Manufacturer

Lenovo PC HK Limited
23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Portable Tablet Computer
Brand Name	Lenovo
Model Name	Lenovo YB1-X91F
FCC ID	O57YB1X91F
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/ WLAN 5GHz 802.11a/n HT20/HT40/ WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
HW Version	Lenovopad YB1-X91F
SW Version	LenovoYETI_W10_S100_160301_001
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Standards-related Product Specification</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>802.11b/g/n : 2412 MHz ~ 2462 MHz.</td></tr>
<tr><td>Maximum (Peak) Output Power to antenna</td><td>802.11b : 20.08 dBm (0.1019 W)
802.11g : 23.03 dBm (0.2009 W)
802.11n HT20 : 25.33 dBm (0.3412 W)</td></tr>
<tr><td>99% Occupied Bandwidth</td><td>802.11b : 11.59MHz
802.11g : 17.78MHz
802.11n HT20 : 19.13MHz</td></tr>
<tr><td>Antenna Type / Gain</td><td>WLAN for Chain Port 1: PIFA Antenna with gain -1.73 dBi
WLAN for Chain Port 2: PIFA Antenna with gain 0.57 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11b : DSSS (DBPSK / DQPSK / CCK)
802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)</td></tr>
<tr><td>Antenna Function for Transmitter</td><td>
<table>
<tr><th></th><th>Chain
Port 1</th><th>Chain
Port 2</th></tr>
<tr><td>802.11 b</td><td>V</td><td>V</td></tr>
<tr><td>802.11 g</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n
SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n
MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
</table>

1.5 Component List

Note: there are two types of EUT, the details refer the following table. According to the difference, we evaluate it is not affect RF performance, so only choose sample 1 to perform RF test.

Component	Sample 1	Sample 2
CPU	Intel Intel® Atom™ x5-Z8550 Processor	Intel Intel® Atom™ x5-Z8550 Processor
Flash	Semtech W25Q64FWZPIG	Semtech W25Q64FWZPIG
eMMC	Samsung KLMCG8WEBD-B031	Samsung KLMCG4JENB-B041
DDR	Samsung K3QF2F20EM-AGCE	Micron MT52L256M64D2PP-107WT
LCD	INX P101KDA-AK0;10.1;IPS;1200×1920;MIPI;2.5	AUO B101UAN07.1;10.1;IPS1200×1920MIPI;2.5
TP	O-Film TP_GFF_OF/MCF-101-2292	GIS TP_GFF_GIS/TC101GFL11 V.A
Front Camera	Primax CCM L202V 2M OV2740 COB 24PIN BtoB	Primax CCM L202V 2M OV2740 COB 24PIN BtoB
Back Camera	Ofilm CCM L8858A20 8M OV8858 COB 31PIN ZIF	Ofilm CCM L8858A20 8M OV8858 COB 31PIN ZIF
Battery	CELXPERT L15C2P31 3.8V;32.3Wh;8500mAh; 2cell bty	CELXPERT L15C2P31 3.8V;32.3Wh;8500mAh; 2cell bty

1.6 Modification of EUT

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

1.7 Testing Location

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

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.	FCC/IC Registration No.
	03CH12-HY	TW1022/4086H

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

1.8 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 v03r05
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013
- IC RSS-247 Issue 1
- IC RSS-Gen Issue 4

Remark:

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

2 Test Configuration of Equipment Under Test

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

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency and Channel

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

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test shown in the following tables.

2.4GHz 802.11b Peak Power (dBm)							
Power vs. Channel				Power vs. Data Rate			
Channel	Frequency (MHz)	Chain Port	Data Rate 1Mbps	Channel	2Mbps	5.5Mbps	11Mbps
CH 01	2412	1	19.65	CH11	20.01	20.06	20.04
CH 06	2437	1	19.93				
CH 11	2462	1	**20.08**				
CH 01	2412	2	18.85	CH11	19.45	19.42	19.41
CH 06	2437	2	18.93				
CH 11	2462	2	**19.48**				

2.4GHz 802.11g Peak Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	1	20.34	CH06	20.91	20.71	20.70	22.93	22.98	22.99	22.21
CH 06	2437	1	20.96								**23.03**
CH 11	2462	1	20.76								22.73
CH 01	2412	2	19.82	CH01	19.54	19.71	19.73	21.42	21.58	21.52	**21.71**
CH 06	2437	2	19.78								21.65
CH 11	2462	2	19.78								21.52

2.4GHz 802.11n HT20 Peak Power (dBm)											
Power vs. Channel				Power vs. MCS Index							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	1	21.62	CH11	22.03	22.05	24.05	24.03	23.99	24.08	23.31
CH 06	2437	1	22.01								24.00
CH 11	2462	1	22.07								**24.13**
CH 01	2412	2	21.26	CH11	22.08	22.01	24.24	23.93	24.14	24.21	22.96
CH 06	2437	2	21.53								23.82
CH 11	2462	2	22.15								**24.29**
Channel	Frequency (MHz)	Chain Port	MCS Index MCS8	Channel	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 01	2412	1+2(1)	19.53	CH11	19.65	19.91	22.31	22.27	22.26	22.30	22.17
CH 06	2437	1+2(1)	19.91								22.28
CH 11	2462	1+2(1)	20.11								22.43
CH 01	2412	1+2(2)	19.45	CH11	19.89	19.98	22.09	22.07	21.93	22.12	21.59
CH 06	2437	1+2(2)	19.81								22.08
CH 11	2462	1+2(2)	20.03								22.21
CH 01	2412	1+2	22.50	CH11	22.78	22.96	25.21	25.18	25.11	25.22	24.90
CH 06	2437	1+2	22.87								25.19
CH 11	2462	1+2	23.08								**25.33**

Note: Chain Port 1+2 is a calculated result from sum of the power Chain Port 1+2(1) and Chain Port 1+2(2).

2.3 Test Mode

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

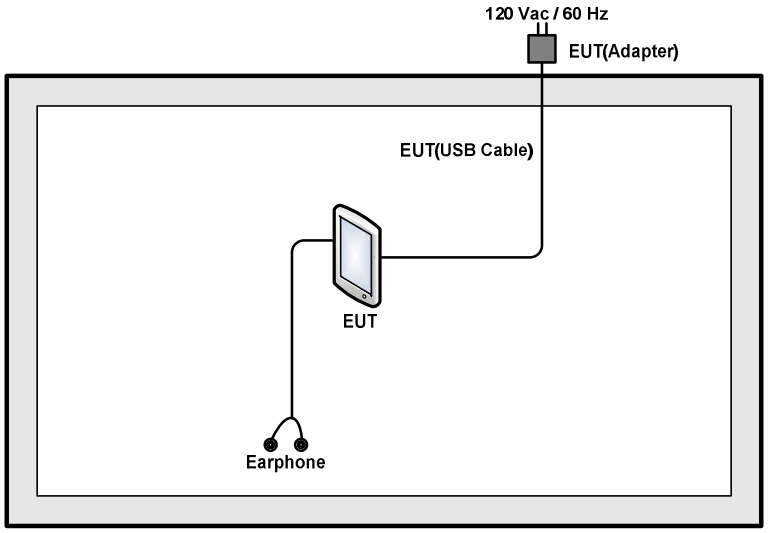
<2.4GHz>

Modulation	Data Rate
802.11b	1 Mbps
802.11g	54 Mbps
802.11n HT20	MCS7/MCS15

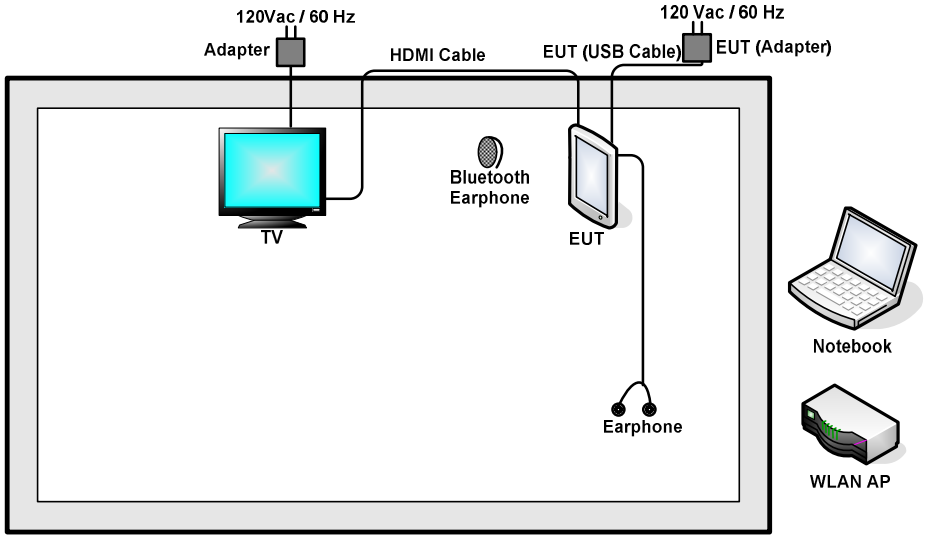
Test Cases	
AC Conducted Emission	Mode 1 :**Bluetooth Link + WLAN Link + USB Cable(Charging from Adapter12V) + Earphone + HDMI Cable for Sample 1** Mode 2 Bluetooth Link + WLAN Link + USB Cable(Charging from Adapter5.2V) + Earphone + HDMI Cable for Sample 2
Remark: **1.** The worst case of conducted emission is mode 1; only the test data of it was reported. **2.** For radiated test cases, the tests were performed with adapter, earphone, and USB cable for sample 1.	

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
2.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
4.	Earphone	Lenovo	LH102	N/A	Unshielded,1.2m	N/A
5.	Earphone	Lenovo	TS300-01MS21-8S	N/A	Unshielded,1.2m	N/A
6.	HDMI Cable	N/A	N/A	N/A	Shielded,1.5m	N/A
7.	TV	Sony	KLV32V300A	FCC DoC	N/A	Unshielded, 1.8 m

2.6 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

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

2.7 Measurement Results Explanation Example

For all conducted test items:

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

Example:
The spectrum analyzer offset is derived from RF cable loss.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 5.5 dB.

Offset(dB) = RF cable loss(dB).
= 5.5 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

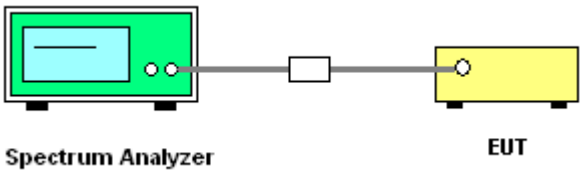
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

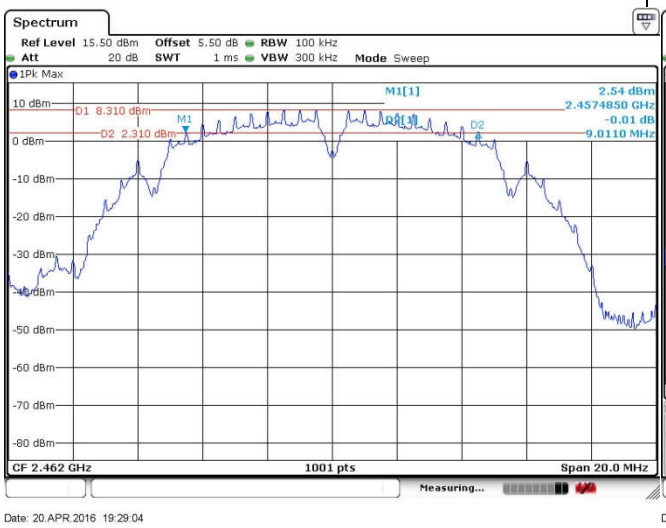
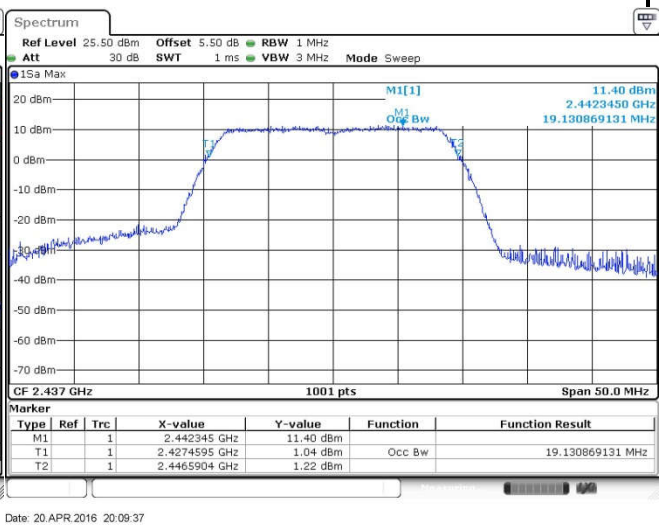
1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit 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 of this test report.

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

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

3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

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

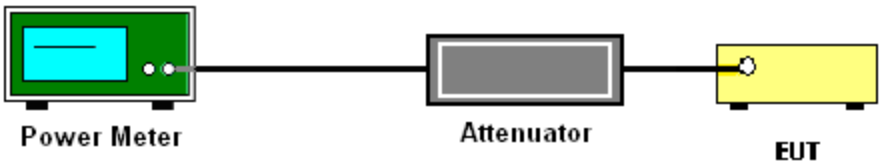
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A of this test report.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A of this test report.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
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.

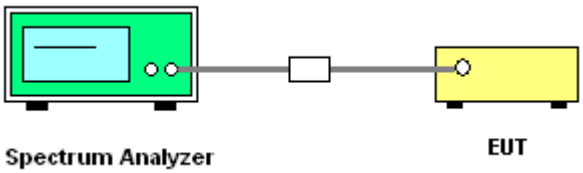
   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   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)

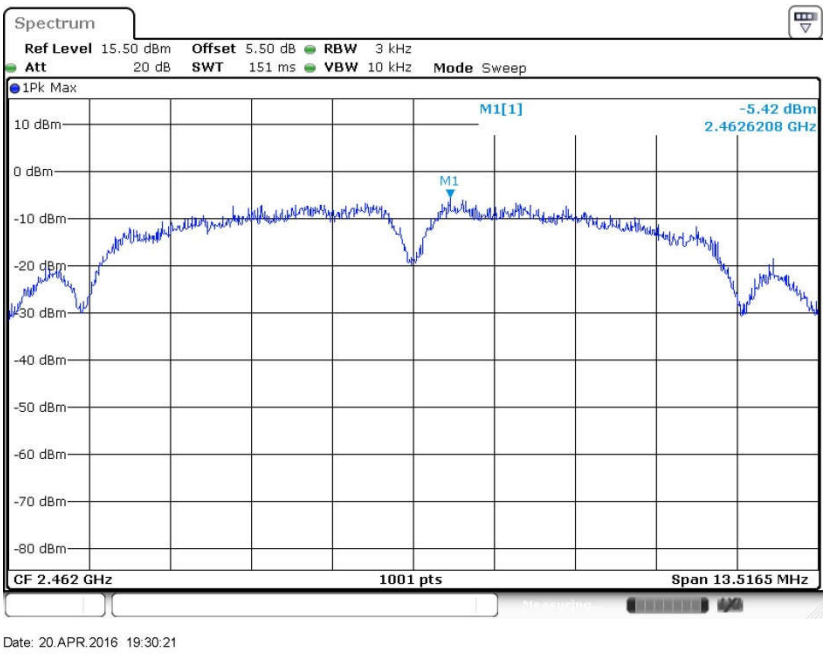
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.

Worst Case Power Density (dBm/3kHz)



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

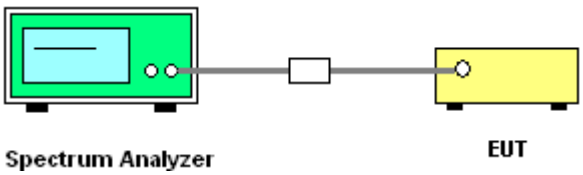
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



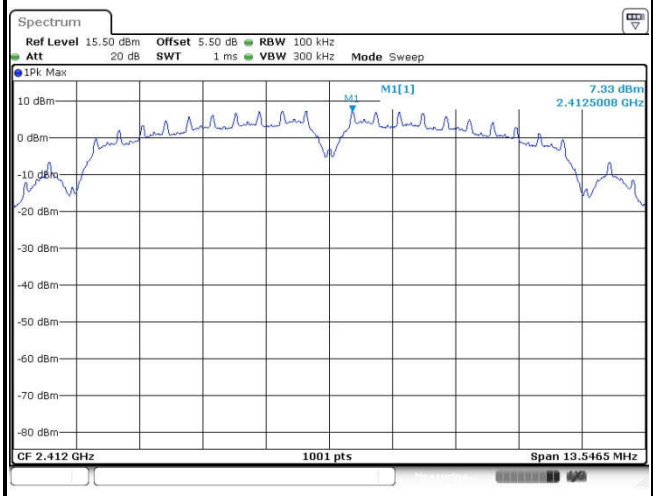
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Number of TX = 1, Chain Port 1 (Measured)

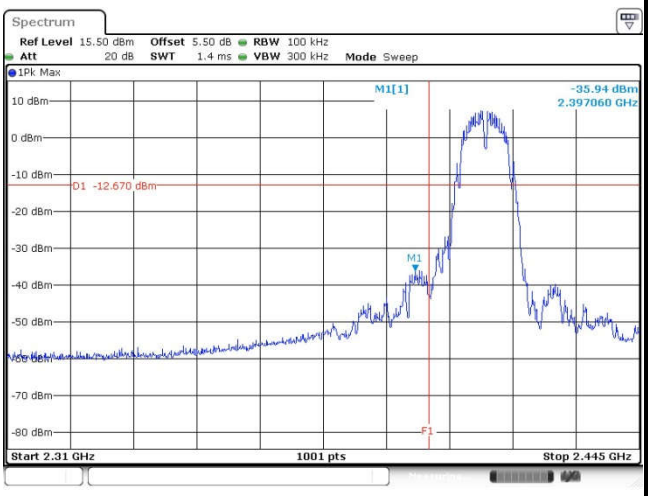
Number of TX	1	**Chain Port :**	1
Test Mode :	802.11b	**Temperature :**	24~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	01	**Test Engineer :**	Issac Song

WLAN 802.11b Channel 01

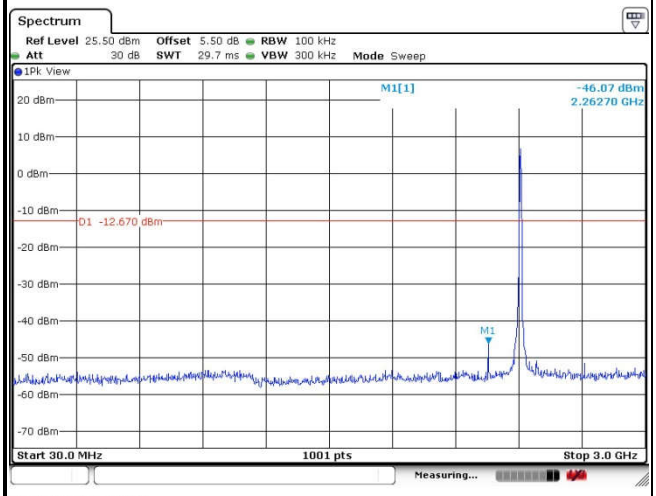
100kHz PSD reference Level



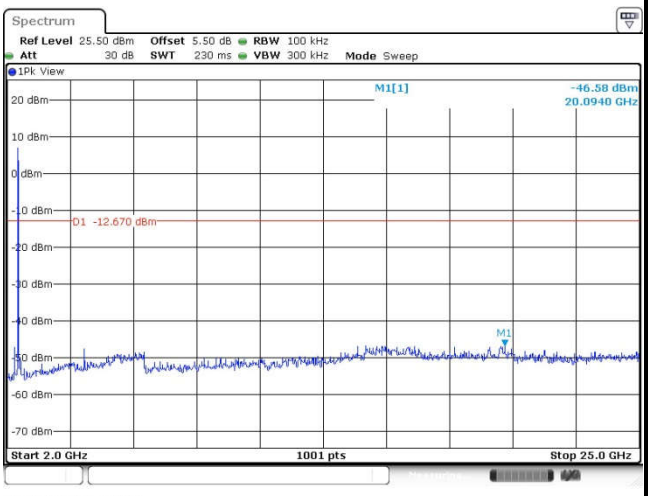
Low Channel Plot



Spurious Emission 30MHz~3GHz



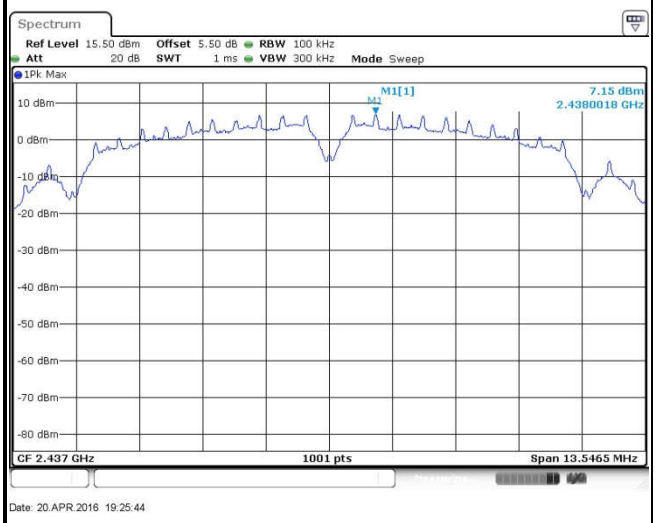
Spurious Emission 2GHz~25GHz



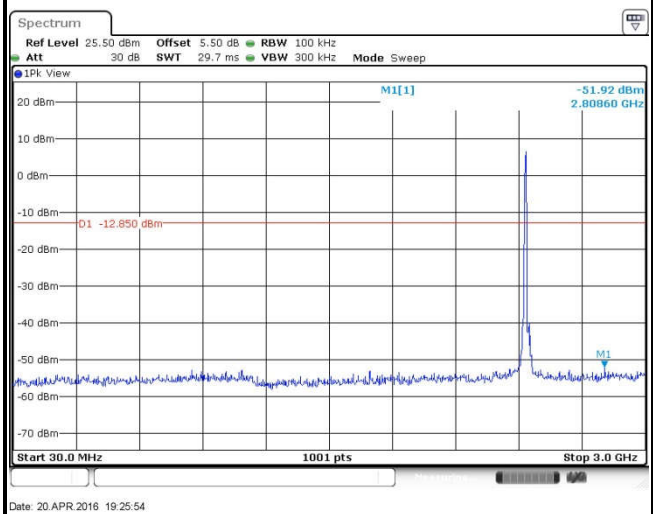
Number of TX :	1	**Chain Port :**	1
Test Mode :	802.11b	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11b Channel 06

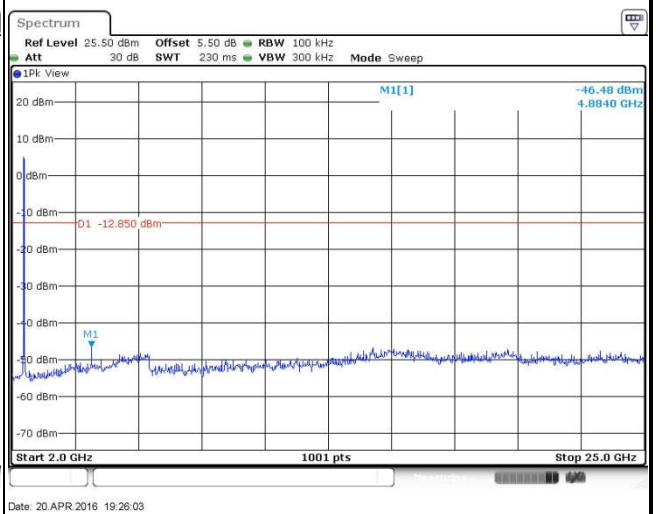
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



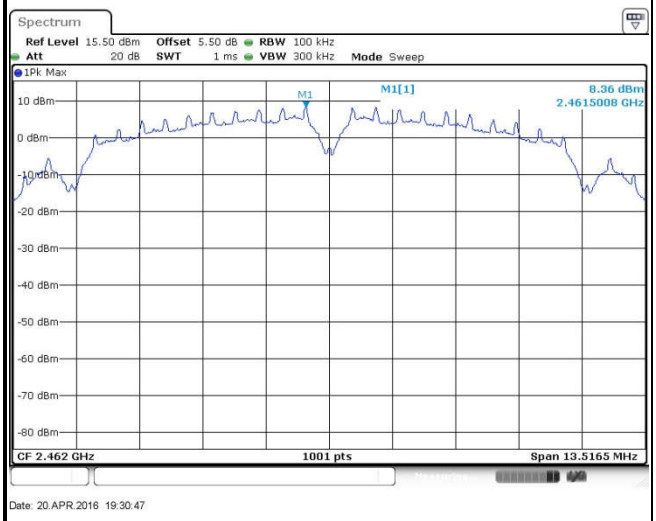
Spurious Emission 2GHz~25GHz



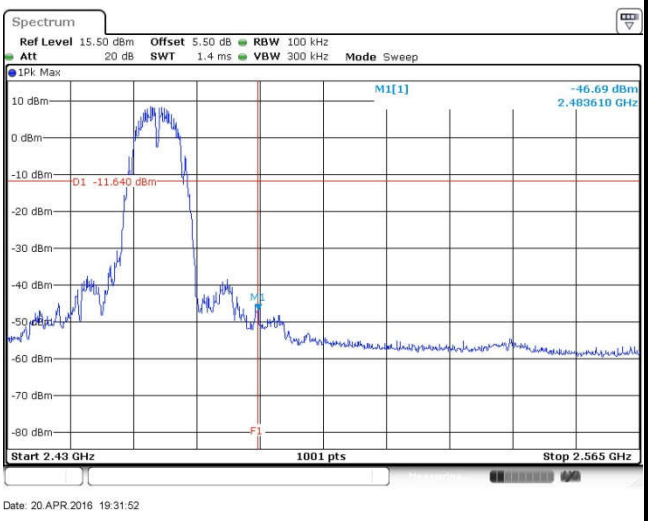
Number of TX :	1	**Chain Port :**	1
Test Mode :	802.11b	**Temperature :**	24~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	49~51%
Test Channel :	11	**Test Engineer :**	Issac Song

WLAN 802.11b Channel 11

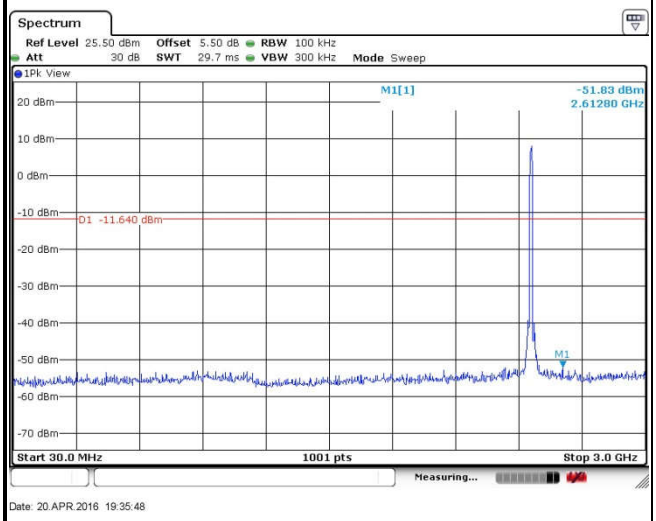
100kHz PSD reference Level



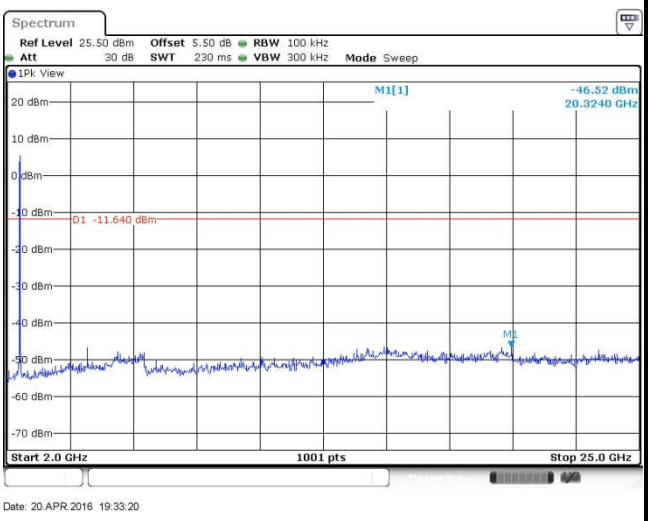
High Channel Plot



Spurious Emission 30MHz~3GHz



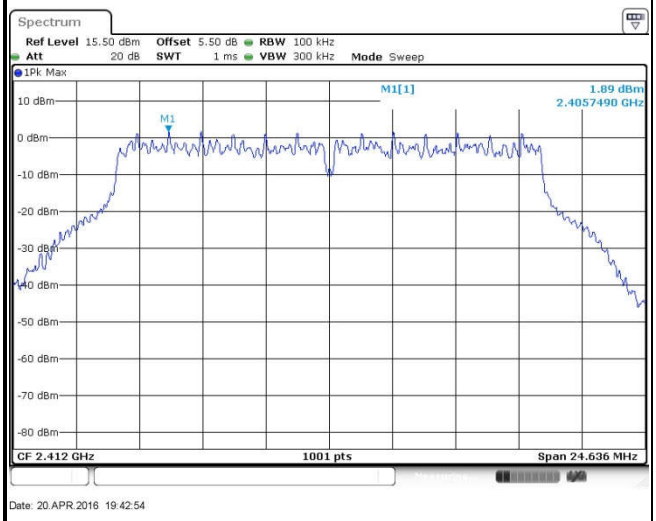
Spurious Emission 2GHz~25GHz



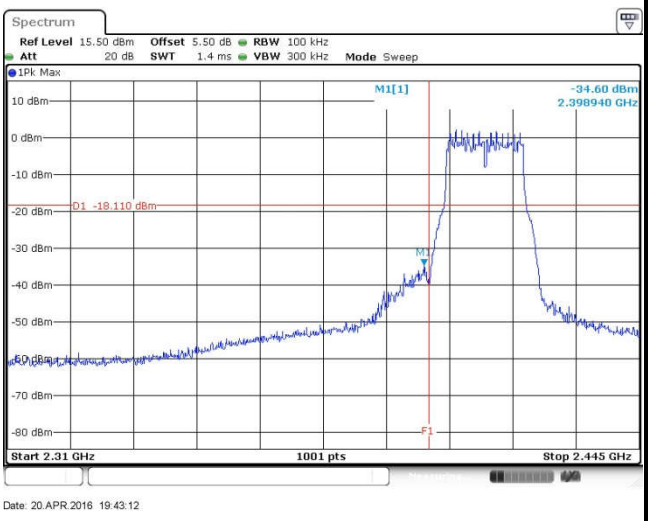
Number of TX :	1	**Chain Port :**	1
Test Mode :	802.11g	**Temperature :**	24~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	01	**Test Engineer :**	Issac Song

WLAN 802.11g Channel 01

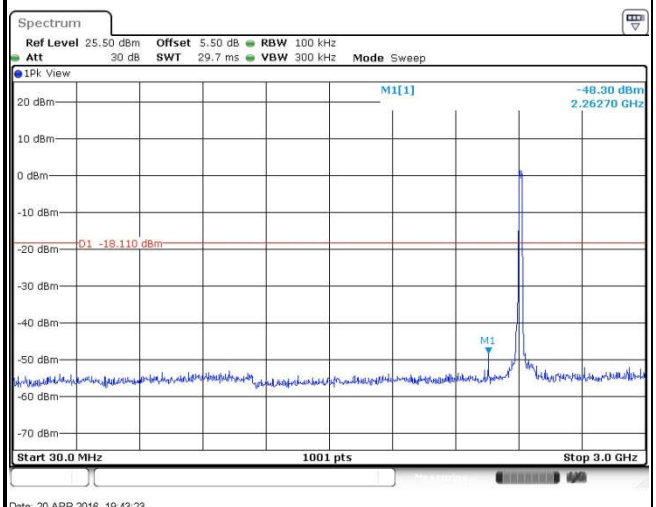
100kHz PSD reference Level



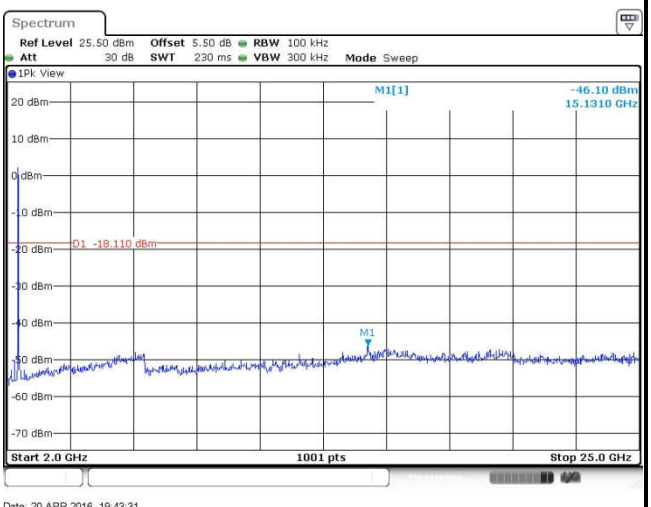
Low Channel Plot



Spurious Emission 30MHz~3GHz



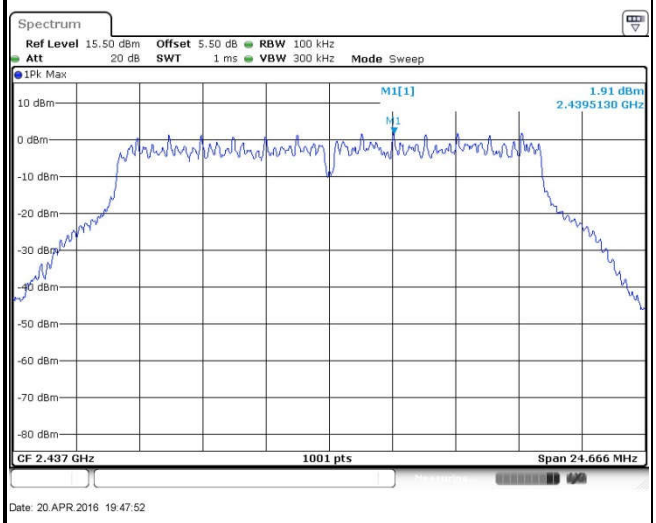
Spurious Emission 2GHz~25GHz



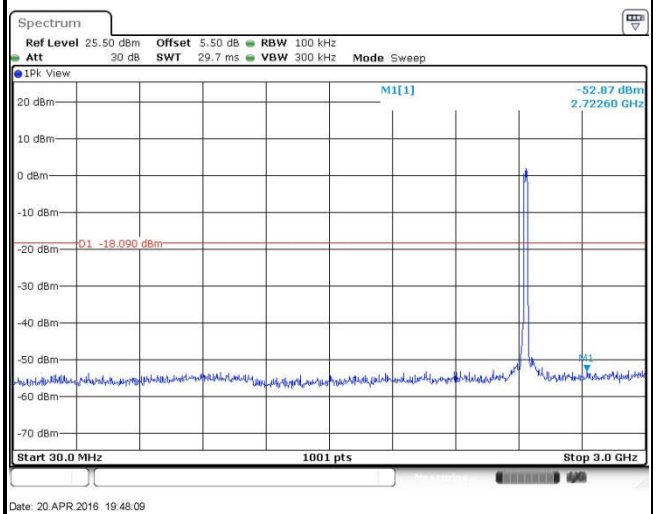
Number of TX :	1	**Chain Port :**	1
Test Mode :	802.11g	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11g Channel 06

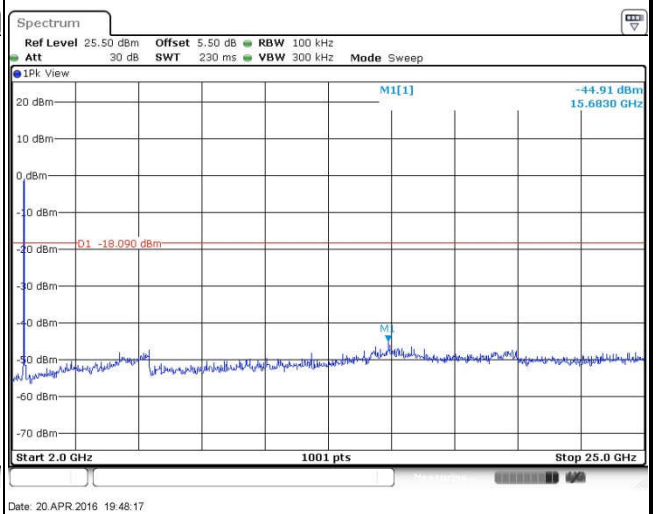
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



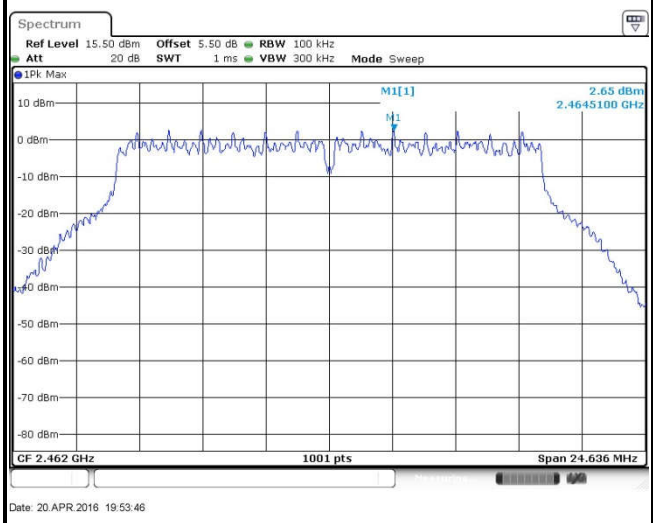
Spurious Emission 2GHz~25GHz



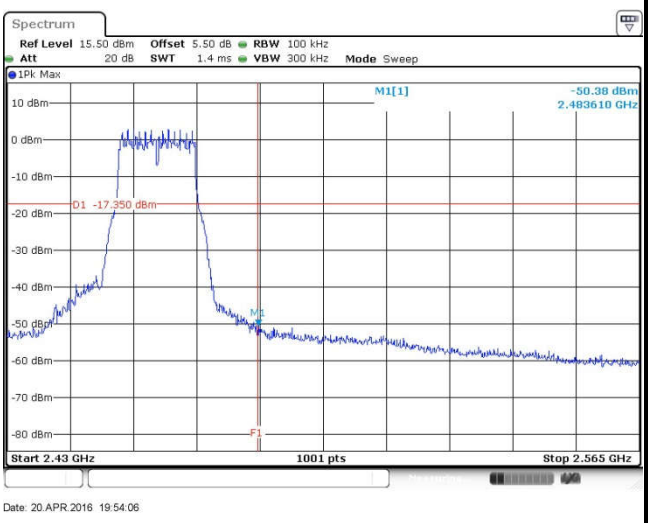
Number of TX :	1	**Chain Port :**	1
Test Mode :	802.11g	**Temperature :**	24~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	49~51%
Test Channel :	11	**Test Engineer :**	Issac Song

WLAN 802.11g Channel 11

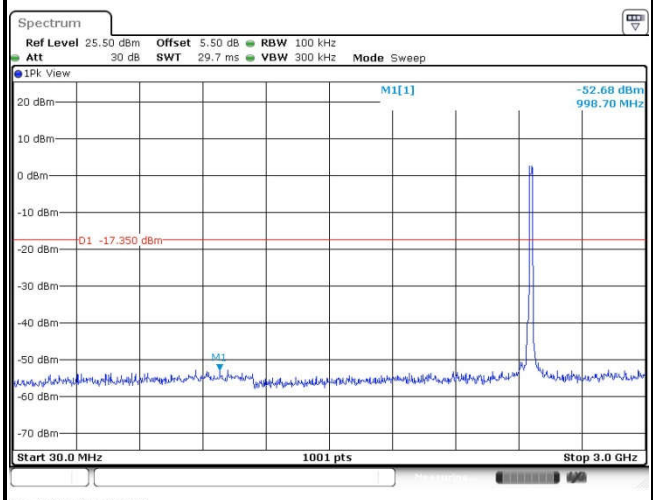
100kHz PSD reference Level



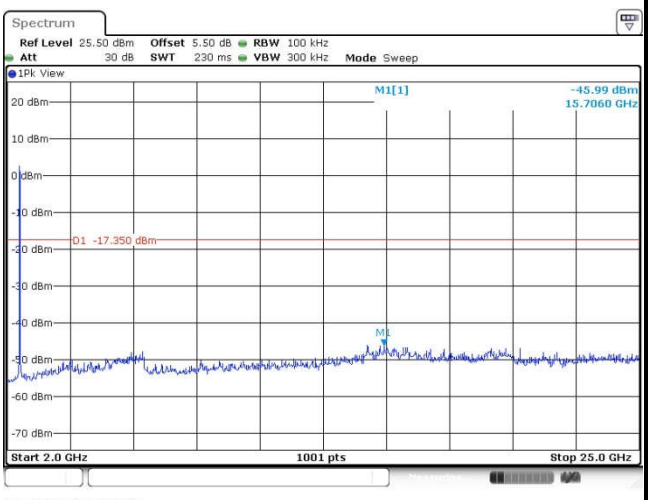
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

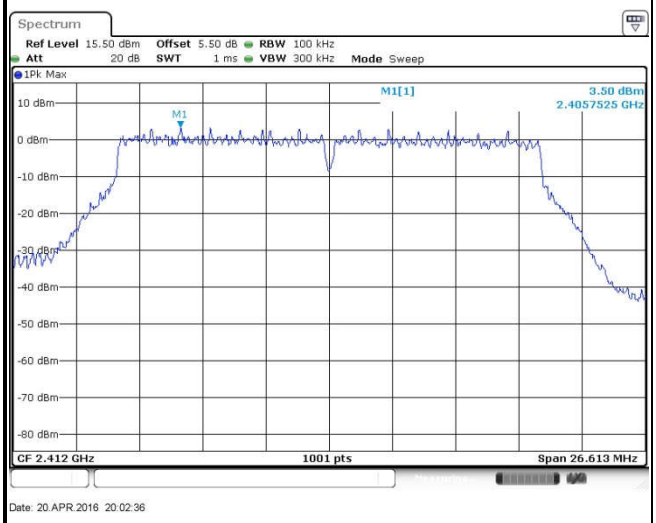


Number of TX = 1, Chain Port 2 (Measured)

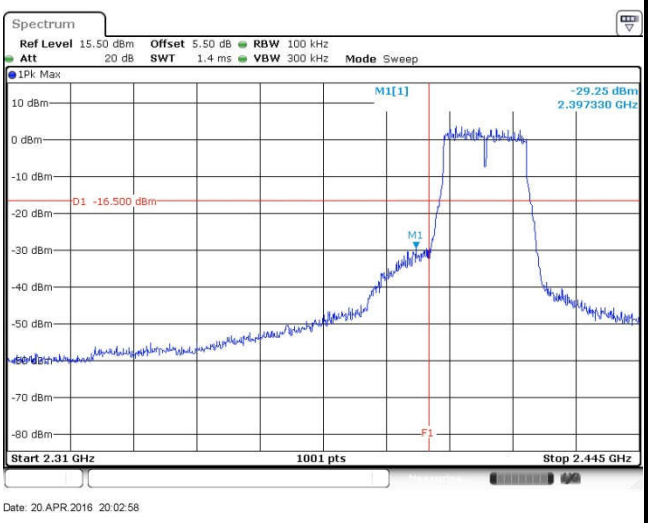
Number of TX :	1	**Chain Port :**	2
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	01	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 01

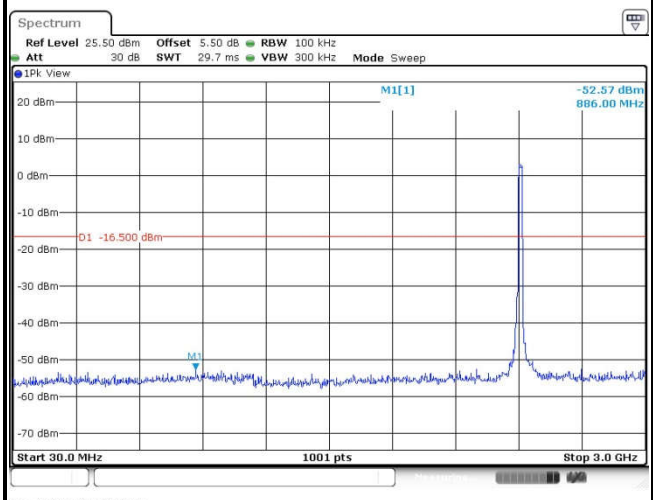
100kHz PSD reference Level



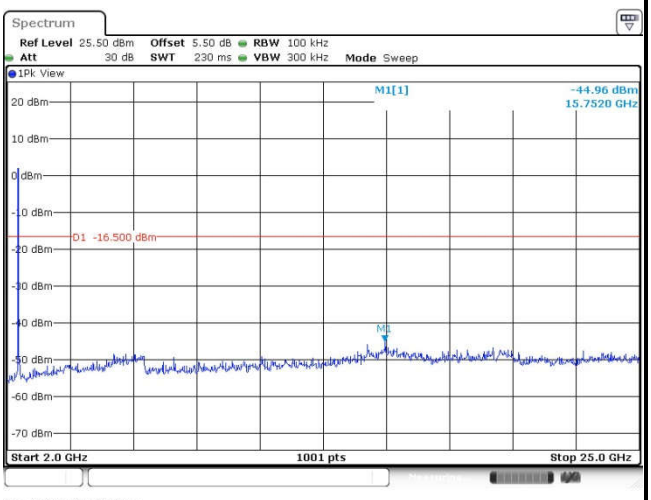
Low Channel Plot



Spurious Emission 30MHz~3GHz



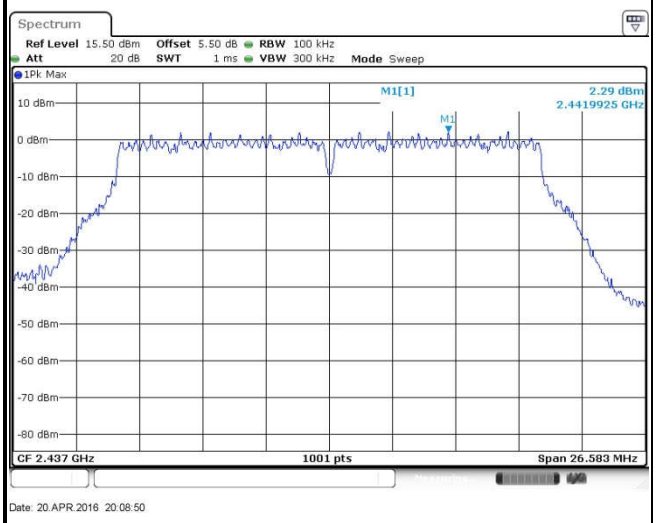
Spurious Emission 2GHz~25GHz



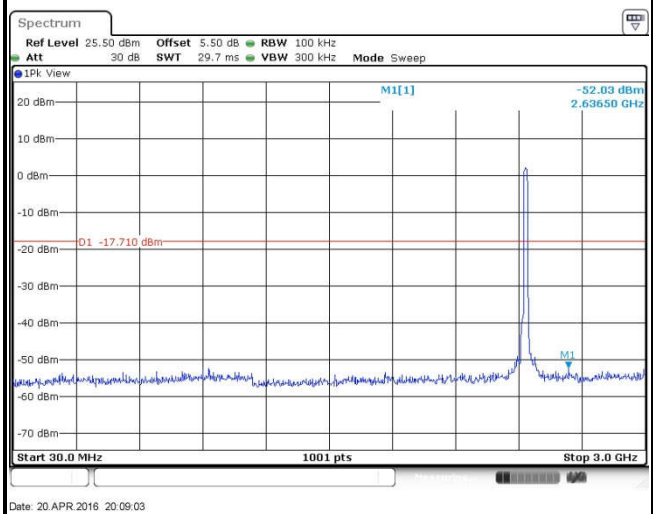
Number of TX :	1	**Chain Port :**	2
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 06

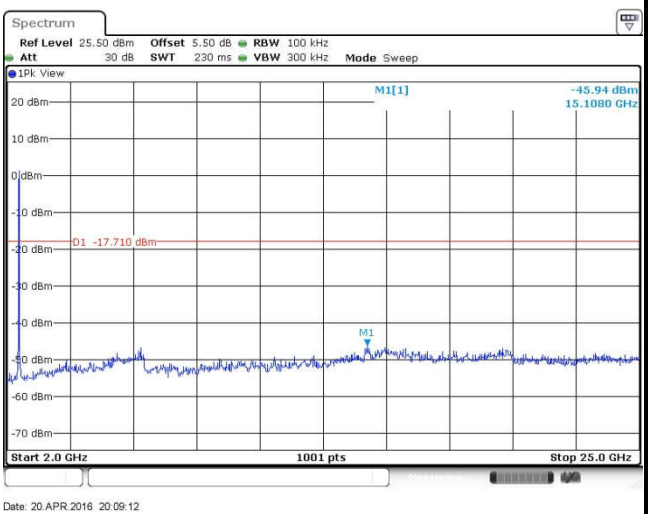
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



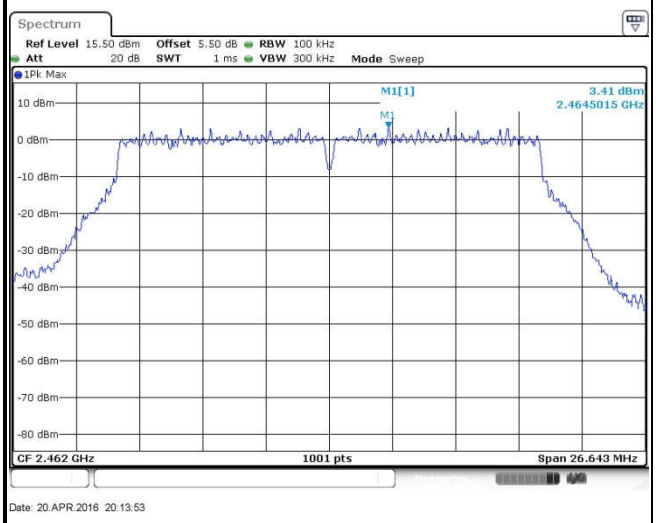
Spurious Emission 2GHz~25GHz



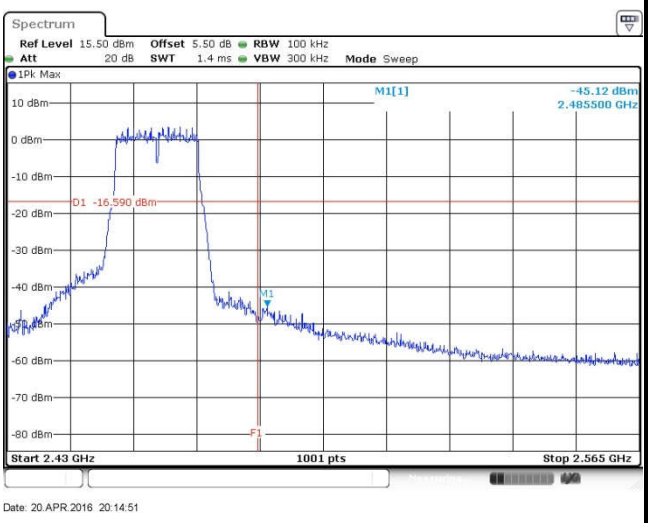
Number of TX :	1	**Chain Port :**	2
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	49~51%
Test Channel :	11	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 11

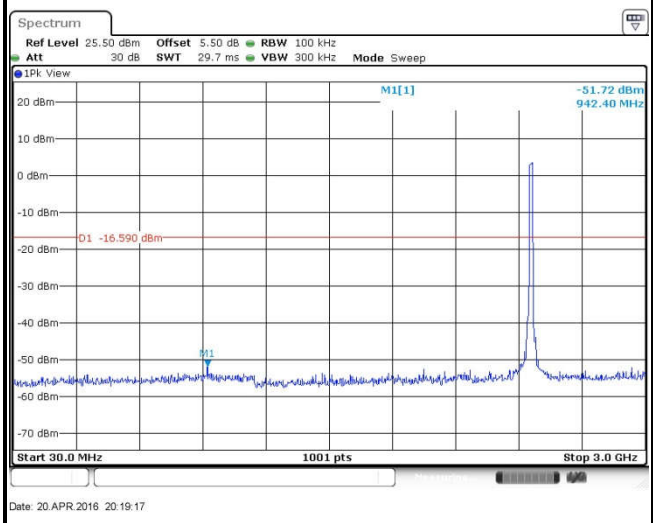
100kHz PSD reference Level



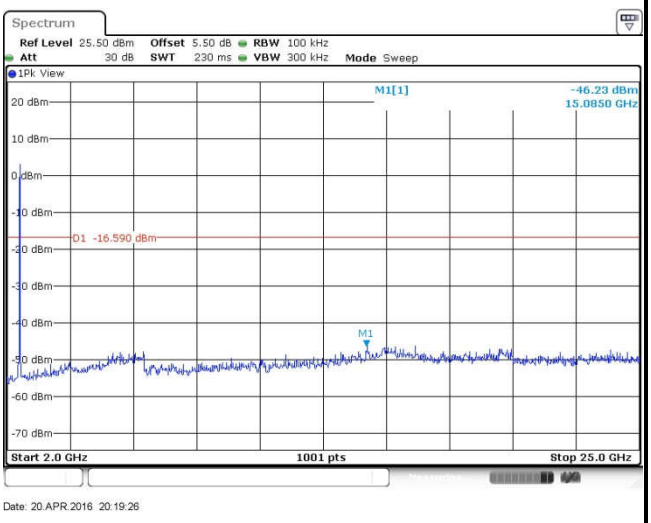
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

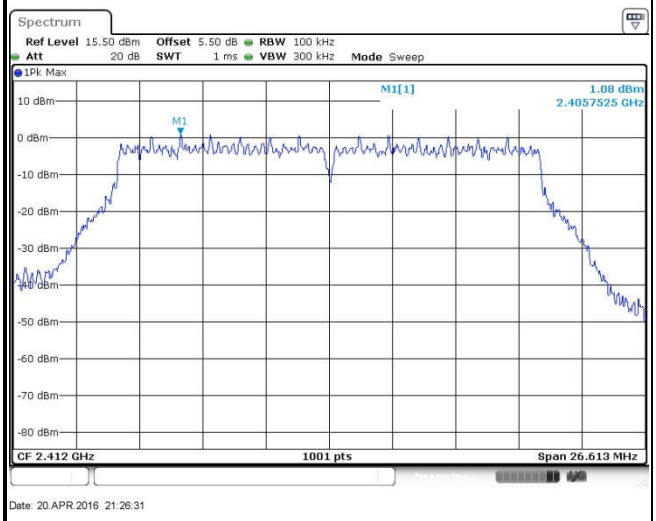


Number of TX = 2, Chain Port 1+2(1) (Measured)

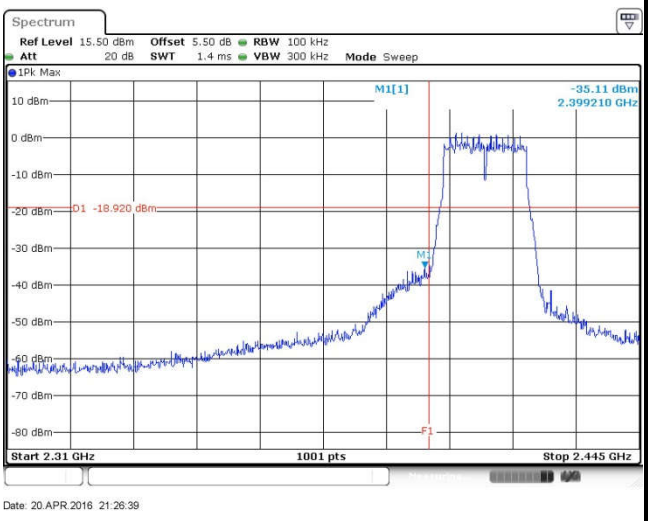
Number of TX :	2	**Chain Port :**	1+2(1)
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	01	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 01

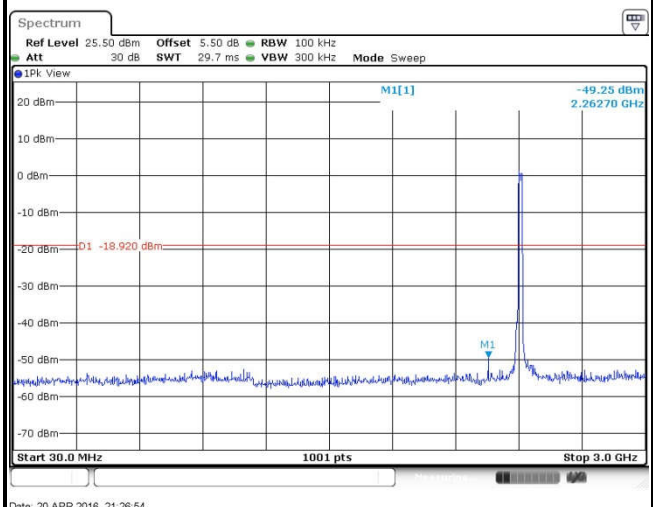
100kHz PSD reference Level



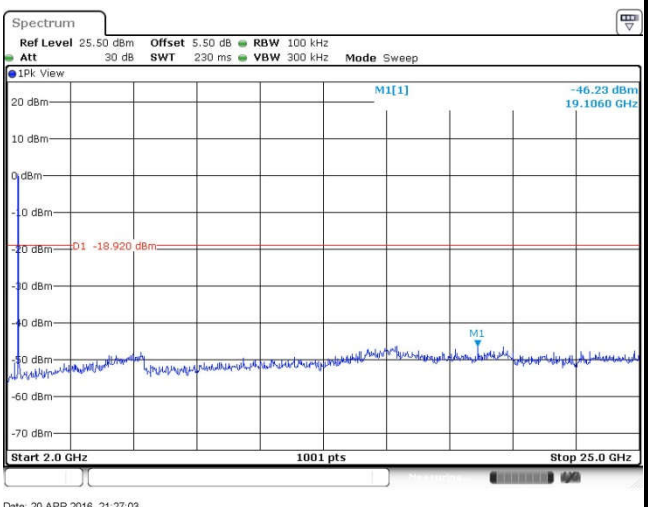
Low Channel Plot



Spurious Emission 30MHz~3GHz



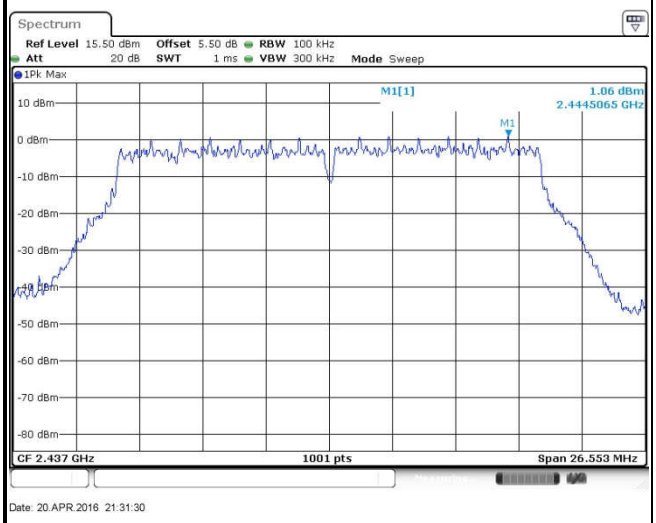
Spurious Emission 2GHz~25GHz



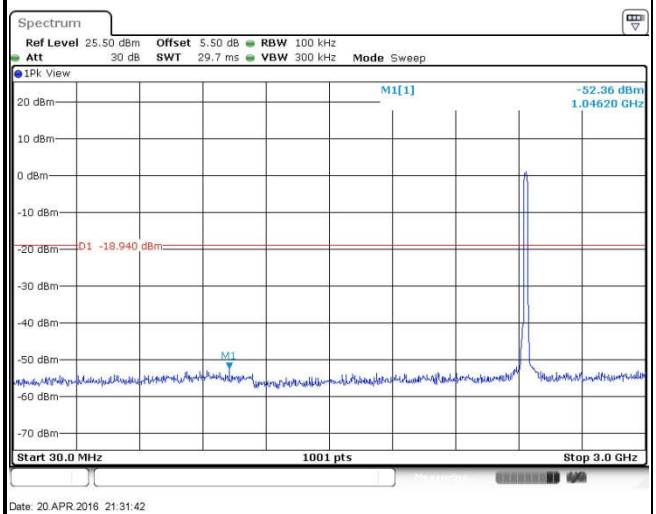
Number of TX :	2	**Chain Port :**	1+2(1)
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	49~51%
Test Channel :	06	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 06

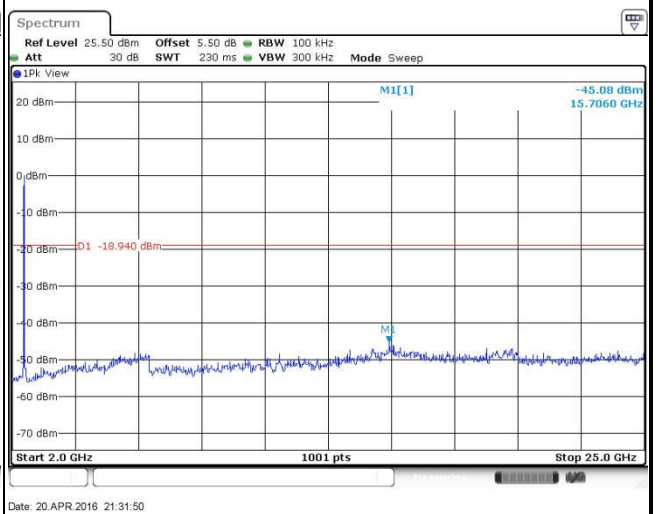
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



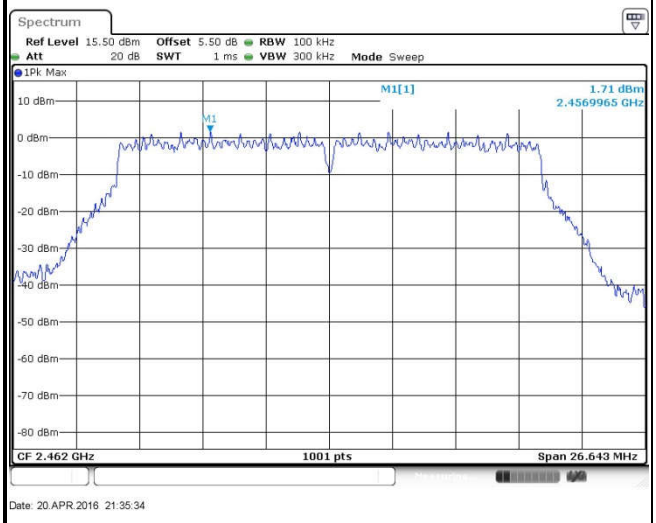
Spurious Emission 2GHz~25GHz



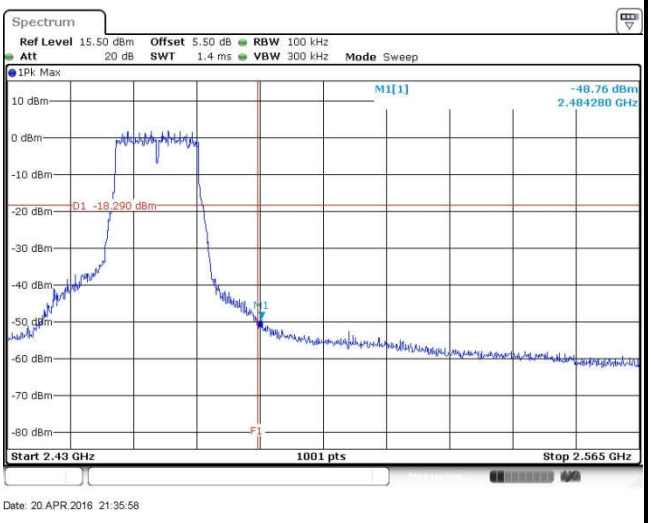
Number of TX :	2	**Chain Port :**	1+2(1)
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	49~51%
Test Channel :	11	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 11

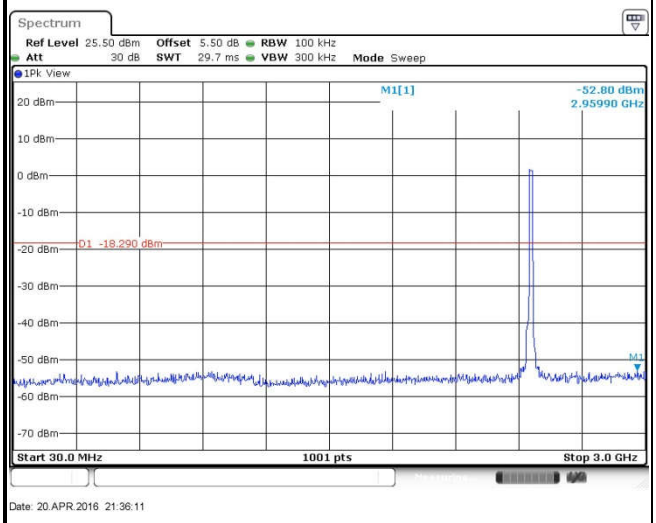
100kHz PSD reference Level



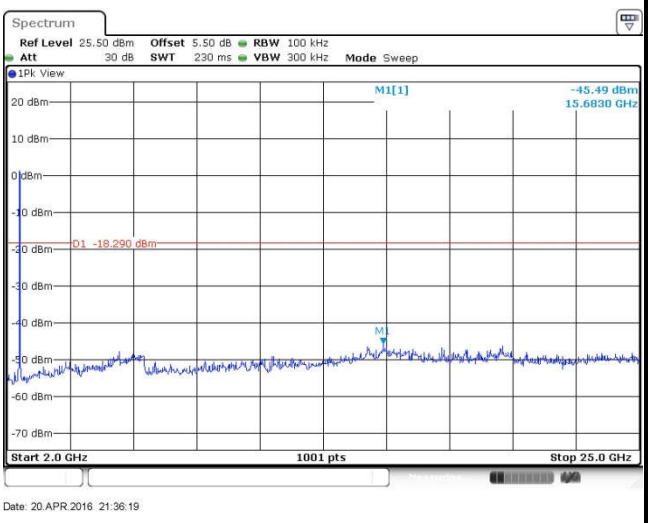
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

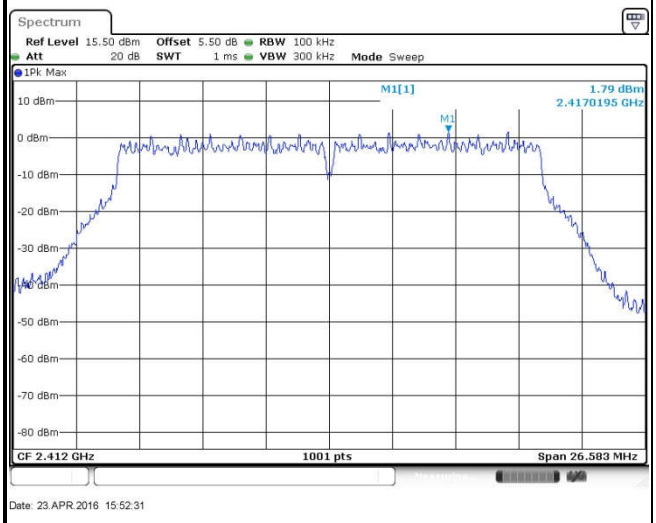


Number of TX = 2, Chain Port 1+2(2) (Measured)

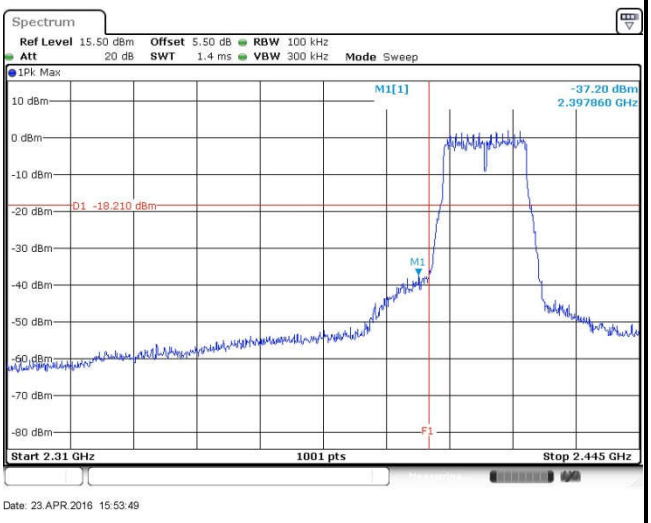
Number of TX :	2	**Chain Port :**	1+2(2)
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz Low	**Relative Humidity :**	49~51%
Test Channel :	01	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 01

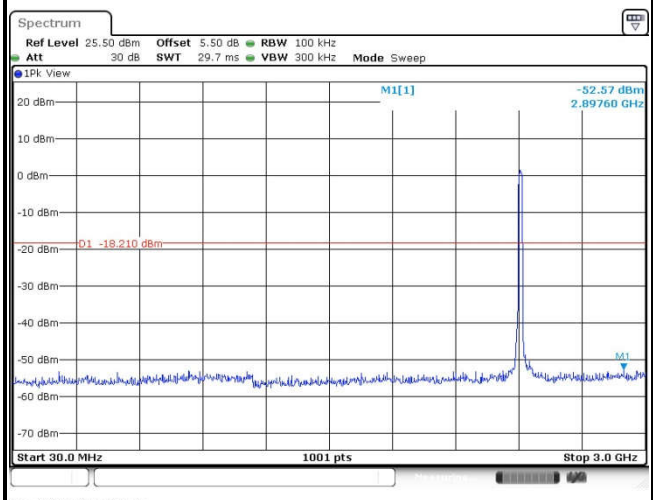
100kHz PSD reference Level



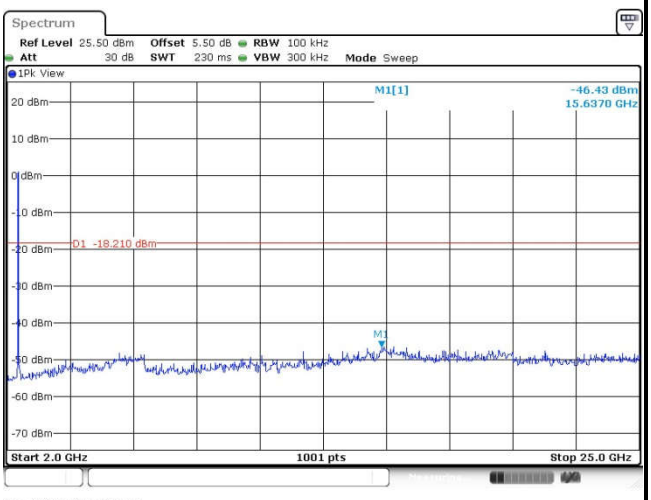
Low Channel Plot



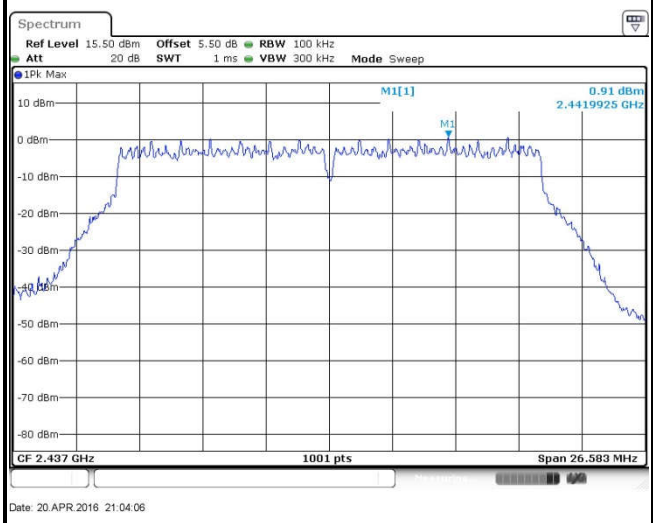
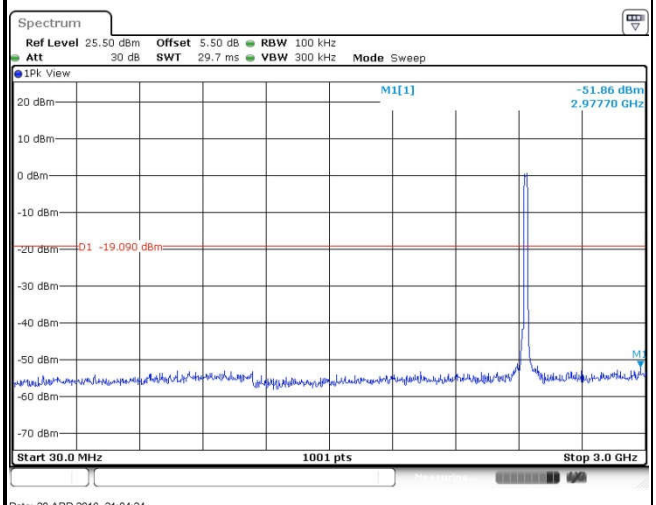
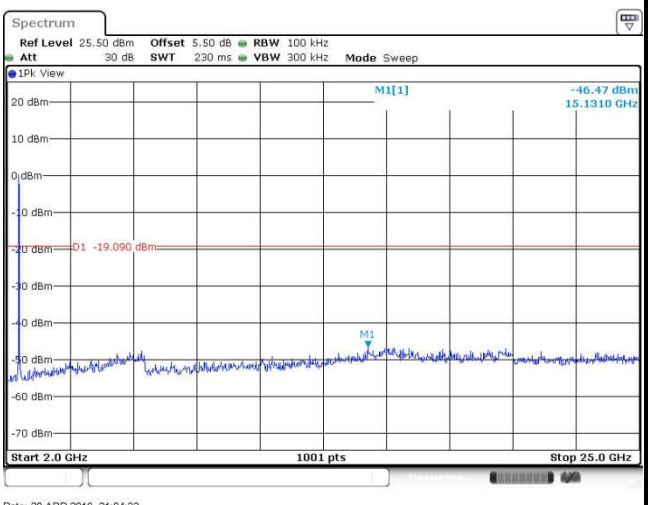
Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



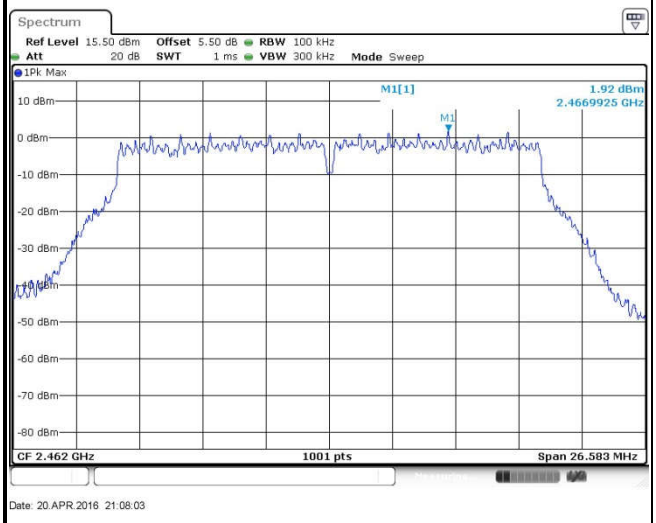
Number of TX :	2	Chain Port :	1+2(2)
Test Mode :	802.11n HT20	Temperature :	24~25℃
Test Band :	2.4GHz Mid	Relative Humidity :	49~51%
Test Channel :	06	Test Engineer :	Issac Song

WLAN 802.11n HT20 Channel 06	
100kHz PSD reference Level	
	
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

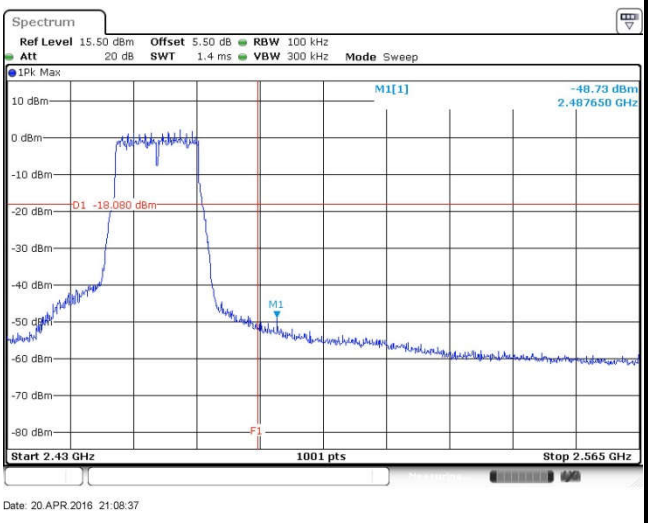
Number of TX :	2	**Chain Port :**	1+2(2)
Test Mode :	802.11n HT20	**Temperature :**	24~25℃
Test Band :	2.4GHz High	**Relative Humidity :**	49~51%
Test Channel :	11	**Test Engineer :**	Issac Song

WLAN 802.11n HT20 Channel 11

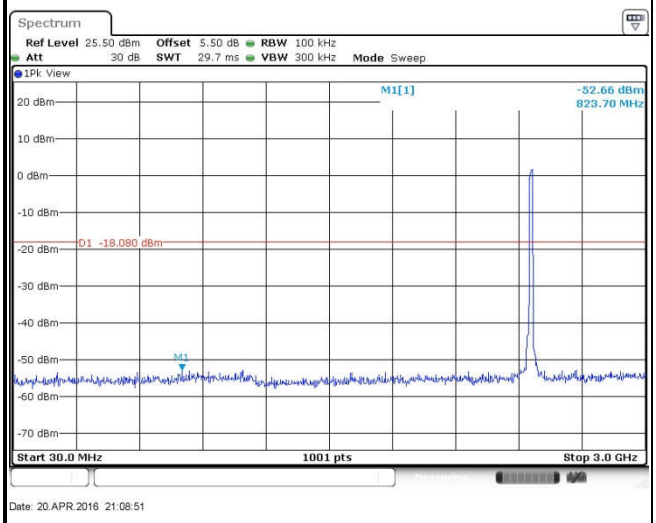
100kHz PSD reference Level



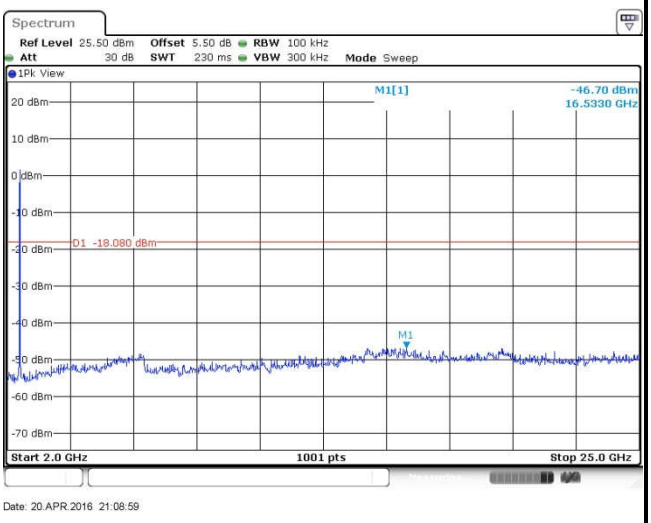
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

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

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

3.5.2 Measuring Instruments

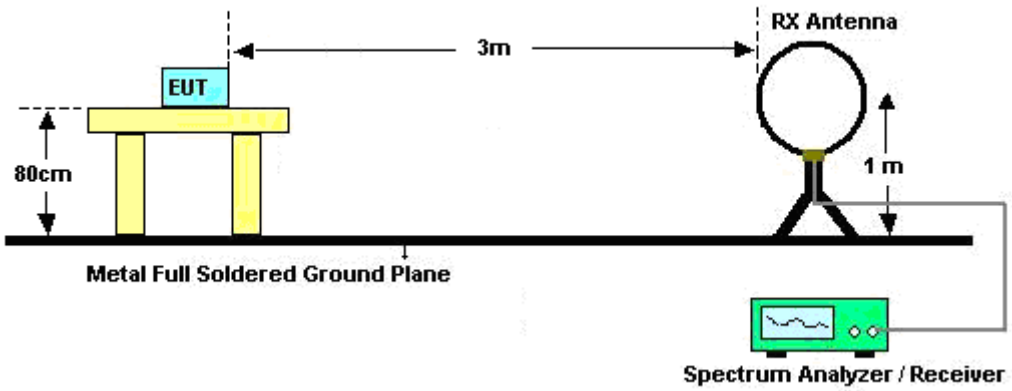
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedure

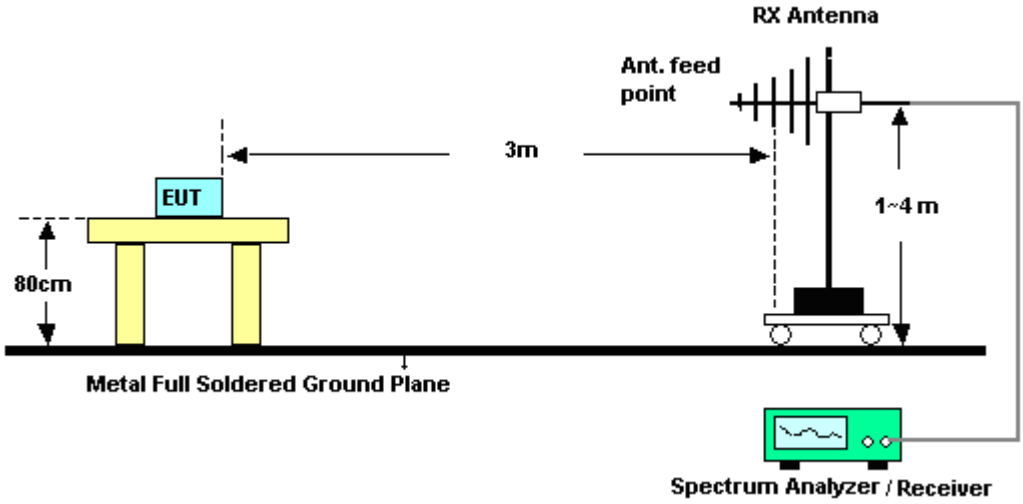
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

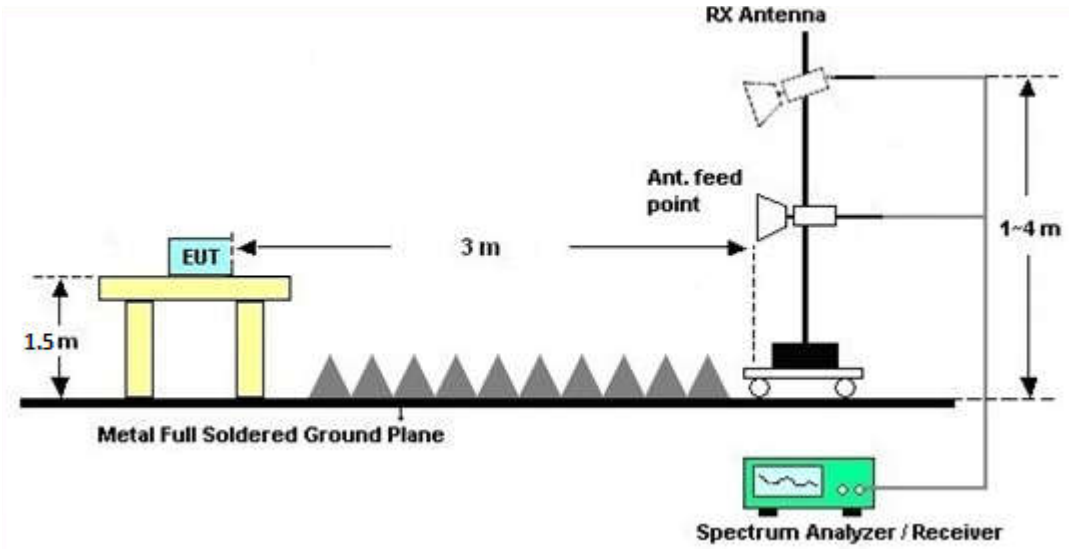
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B of this test report.

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

Please refer to Appendix B of this test report.

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.

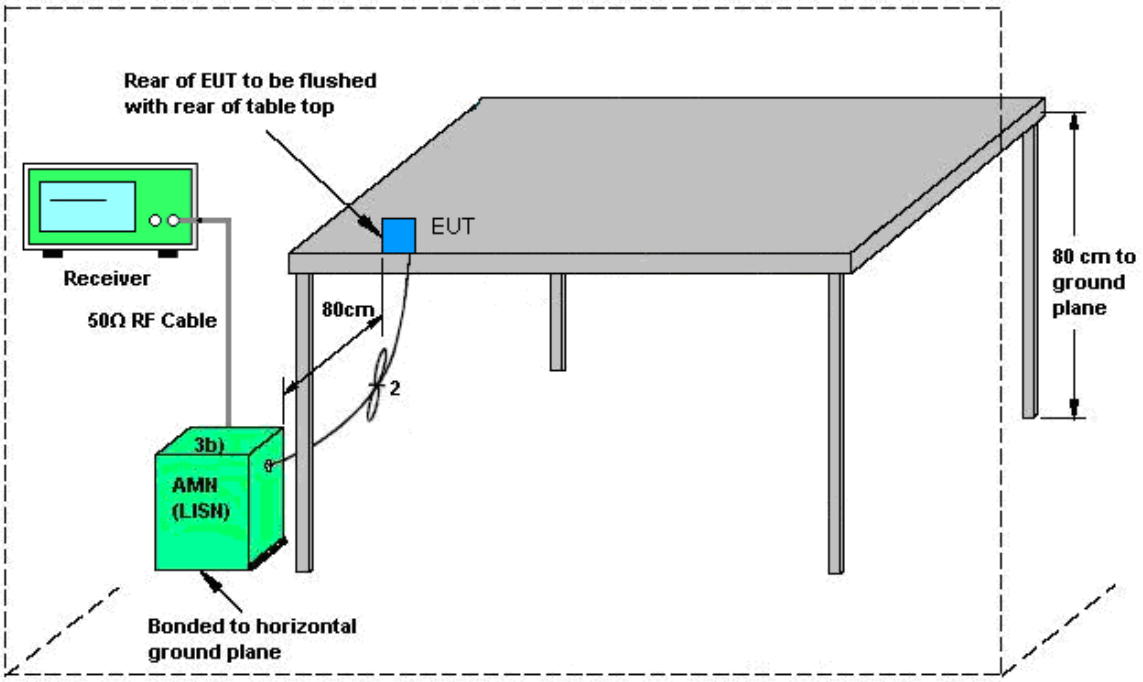
3.6.2 Measuring Instruments

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.

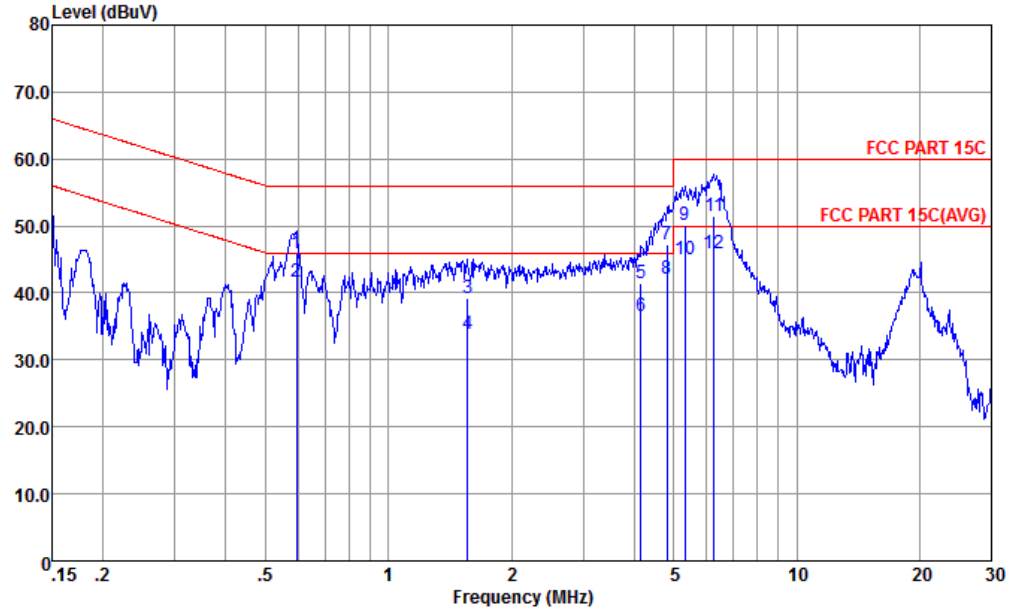
3.6.4 Test Setup



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 :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	43~45%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN Link + USB Cable(Charging from Adapter12V) + Earphone + HDMI Cable for Sample 1		

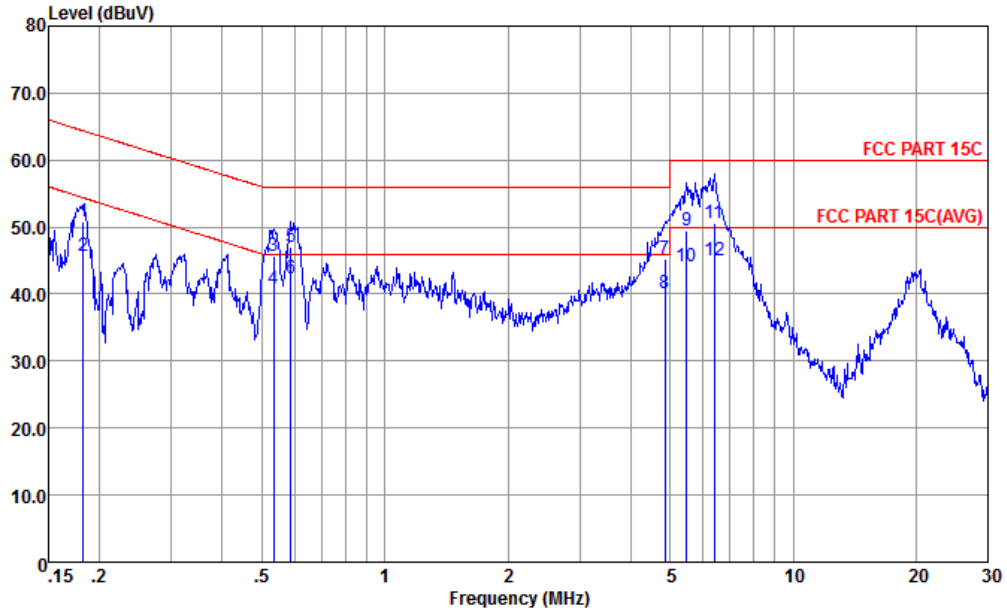


Site : CO01-KS
Condition : FCC PART 15C LISN-L-20151024 LINE

mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.59	45.99	-10.01	56.00	35.59	0.24	10.16	QP
2		0.59	41.69	-4.31	46.00	31.29	0.24	10.16	Average
3		1.56	39.24	-16.76	56.00	28.90	0.20	10.14	QP
4		1.56	33.94	-12.06	46.00	23.60	0.20	10.14	Average
5		4.16	41.46	-14.54	56.00	31.10	0.19	10.17	QP
6		4.16	36.66	-9.34	46.00	26.30	0.19	10.17	Average
7		4.82	47.17	-8.83	56.00	36.80	0.19	10.18	QP
8	*	4.82	42.17	-3.83	46.00	31.80	0.19	10.18	Average
9		5.33	50.19	-9.81	60.00	39.80	0.20	10.19	QP
10		5.33	44.99	-5.01	50.00	34.60	0.20	10.19	Average
11		6.29	51.52	-8.48	60.00	41.09	0.22	10.21	QP
12		6.29	45.82	-4.18	50.00	35.39	0.22	10.21	Average

Test Mode :	Mode 1	**Temperature :**	22~24℃
Test Engineer :	Amos Zhang	**Relative Humidity :**	43~45%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	Bluetooth Link + WLAN Link + USB Cable(Charging from Adapter12V) + Earphone + HDMI Cable for Sample 1		



Site : CO01-KS
Condition : FCC PART 15C LISN-N-20151024 NEUTRAL

mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.18	50.73	-13.64	64.37	40.30	0.31	10.12	QP
2		0.18	45.63	-8.74	54.37	35.20	0.31	10.12	Average
3		0.53	45.69	-10.31	56.00	35.21	0.32	10.16	QP
4		0.53	40.79	-5.21	46.00	30.31	0.32	10.16	Average
5		0.59	46.99	-9.01	56.00	36.50	0.33	10.16	QP
6	*	0.59	42.29	-3.71	46.00	31.80	0.33	10.16	Average
7		4.85	45.34	-10.66	56.00	34.80	0.36	10.18	QP
8		4.85	40.14	-5.86	46.00	29.60	0.36	10.18	Average
9		5.48	49.43	-10.57	60.00	38.90	0.34	10.19	QP
10		5.48	44.03	-5.97	50.00	33.50	0.34	10.19	Average
11		6.42	50.62	-9.38	60.00	40.10	0.31	10.21	QP
12		6.42	45.02	-4.98	50.00	34.50	0.31	10.21	Average

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the Antenna exceeds 6 dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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 GANT set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

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

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

	Chain Port 1 (dBi)	Chain Port 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	-1.73	0.57	0.57	2.51	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
Spectrum Analyzer	R&S	FSV30	101338	9kHz~30GHz	May 04, 2015	Mar. 31, 2016~ Apr. 23, 2016	May 03, 2016	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 24, 2015	Mar. 31, 2016~ Apr. 23, 2016	Oct. 23, 2016	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Jan. 20, 2016	Mar. 31, 2016~ Apr. 23, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Mar. 31, 2016~ Apr. 23, 2016	Jan. 19, 2017	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2015	Apr. 26, 2016	May 03, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	Apr. 26, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	Apr. 26, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	Apr. 26, 2016	Oct. 23, 2016	Conduction (CO01-KS)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Mar. 31, 2016~ Apr. 26, 2016	Sep. 01, 2016	Radiation (03CH12-HY)
Loop Cable	Rohde & Schwarz	N/A	N/A	9KHz~30MHz	Dec. 03, 2015	Mar. 31, 2016~ Apr. 26, 2016	Dec. 02, 2016	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D	37059	30MHz~1GHz	Dec. 29, 2015	Mar. 31, 2016~ Apr. 26, 2016	Dec. 28, 2016	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 21, 2015	Mar. 31, 2016~ Apr. 26, 2016	Dec. 20, 2016	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Nov. 02, 2015	Mar. 31, 2016~ Apr. 26, 2016	Nov. 01, 2016	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 02, 2015	Mar. 31, 2016~ Apr. 26, 2016	Nov. 01, 2016	Radiation (03CH12-HY)
Hygrometer	TECPEL	DTM-303B	TP140349	N/A	Nov. 17, 2015	Mar. 31, 2016~ Apr. 26, 2016	Nov. 16, 2016	Radiation (03CH12-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 20, 2015	Mar. 31, 2016~ Apr. 26, 2016	Nov. 19, 2016	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1815698	1GHz~18GHz	Dec. 14, 2015	Mar. 31, 2016~ Apr. 26, 2016	Dec. 13, 2016	Radiation (03CH12-HY)
Preamplifier	Keysight	83017A	MY53270148	1GHz~26.5GHz	Jan. 30, 2016	Mar. 31, 2016~ Apr. 26, 2016	Jan. 29, 2017	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24958/4,MY28653/4,MY9839/4PE	26GHz~40GHz	Jan. 12, 2016	Mar. 31, 2016~ Apr. 26, 2016	Jan. 11, 2017	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24958/4,MY28653/4,MY9839/4PE	1GHz~26GHz	Jan. 12, 2016	Mar. 31, 2016~ Apr. 26, 2016	Jan. 11, 2017	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24958/4,MY28653/4,MY9839/4PE	30MHz~1GHz	Jan. 12, 2016	Mar. 31, 2016~ Apr. 26, 2016	Jan. 11, 2017	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24958/4,MY28653/4,MY9839/4PE	9K~30MHz	Jan. 12, 2016	Mar. 31, 2016~ Apr. 26, 2016	Jan. 11, 2017	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	NCR	Mar. 31, 2016~ Apr. 26, 2016	NCR	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	NCR	Mar. 31, 2016~ Apr. 26, 2016	NCR	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0-360 degre	NCR	Mar. 31, 2016~ Apr. 26, 2016	NCR	Radiation (03CH12-HY)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.4dB**

Appendix A. Conducted Test Results

Test Engineer:	Issac Song	Temperature:	24~25	°C
Test Date:	2016/3/31 ~ 2016/4/23	Relative Humidity:	49~51	%

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
					Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2		
11b	1Mbps	1	1	2412	11.54	-	9.03	-	0.50	Pass
11b	1Mbps	1	6	2437	11.59	-	9.03	-	0.50	Pass
11b	1Mbps	1	11	2462	11.59	-	9.01	-	0.50	Pass
11g	54Mbps	1	1	2412	17.78	-	16.42	-	0.50	Pass
11g	54Mbps	1	6	2437	17.68	-	16.44	-	0.50	Pass
11g	54Mbps	1	11	2462	17.63	-	16.42	-	0.50	Pass
HT20	MCS7	1	1	2412	-	19.08	-	17.74	0.50	Pass
HT20	MCS7	1	6	2437	-	19.13	-	17.72	0.50	Pass
HT20	MCS7	1	11	2462	-	19.03	-	17.76	0.50	Pass
HT20	MCS15	2	1	2412	19.03	19.08	17.74	17.72	0.50	Pass
HT20	MCS15	2	6	2437	19.03	19.08	17.70	17.72	0.50	Pass
HT20	MCS15	2	11	2462	18.98	19.08	17.76	17.72	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
					Chain Port 1	Chain Port 2	SUM	Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2	
11b	1Mbps	1	1	2412	19.65	18.85		30.00	30.00	-1.73	0.57	17.92	19.42	36.00	36.00	Pass
11b	1Mbps	1	6	2437	19.93	18.93		30.00	30.00	-1.73	0.57	18.20	19.50	36.00	36.00	Pass
11b	1Mbps	1	11	2462	20.08	19.48		30.00	30.00	-1.73	0.57	18.35	20.05	36.00	36.00	Pass
11g	54Mbps	1	1	2412	22.21	21.71		30.00	30.00	-1.73	0.57	20.48	22.28	36.00	36.00	Pass
11g	54Mbps	1	6	2437	23.03	21.65	-	30.00	30.00	-1.73	0.57	21.30	22.22	36.00	36.00	Pass
11g	54Mbps	1	11	2462	22.73	21.52		30.00	30.00	-1.73	0.57	21.00	22.09	36.00	36.00	Pass
HT20	MCS7	1	1	2412	23.31	22.96		30.00	30.00	-1.73	0.57	21.58	23.53	36.00	36.00	Pass
HT20	MCS7	1	6	2437	24.00	23.82		30.00	30.00	-1.73	0.57	22.27	24.39	36.00	36.00	Pass
HT20	MCS7	1	11	2462	24.13	24.29		30.00	30.00	-1.73	0.57	22.40	24.86	36.00	36.00	Pass
HT20	MCS15	2	1	2412	22.17	21.59	24.90	30.00		0.57		25.47		36.00		Pass
HT20	MCS15	2	6	2437	22.28	22.08	25.19	30.00		0.57		25.76		36.00		Pass
HT20	MCS15	2	11	2462	22.43	22.21	25.33	30.00		0.57		25.90		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)		
					Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2	SUM
11b	1Mbps	1	1	2412	0.04	0.05	16.28	15.37	-
11b	1Mbps	1	6	2437	0.04	0.05	16.52	15.44	
11b	1Mbps	1	11	2462	0.04	0.05	16.64	15.93	
11g	54Mbps	1	1	2412	1.95	1.92	13.49	12.85	
11g	54Mbps	1	6	2437	1.95	1.92	13.96	12.74	
11g	54Mbps	1	11	2462	1.95	1.92	13.85	12.63	
HT20	MCS7	1	1	2412	2.06	2.06	14.50	14.34	
HT20	MCS7	1	6	2437	2.06	2.06	14.66	14.57	
HT20	MCS7	1	11	2462	2.06	2.06	14.70	14.85	
HT20	MCS15	2	1	2412	2.06	2.06	11.99	11.73	14.87
HT20	MCS15	2	6	2437	2.06	2.06	12.16	11.91	15.05
HT20	MCS15	2	11	2462	2.06	2.06	12.37	12.25	15.32

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
					Chain Port 1	Chain Port 2	Worse + 3.01	Chain Port 1	Chain Port 2	Chain Port 1	Chain Port 2	
11b	1Mbps	1	1	2412	-6.34	-		-1.73	0.57	8.00	8.00	Pass
11b	1Mbps	1	6	2437	-6.79	-		-1.73	0.57	8.00	8.00	Pass
11b	1Mbps	1	11	2462	-5.42	-		-1.73	0.57	8.00	8.00	Pass
11g	54Mbps	1	1	2412	-13.93	-		-1.73	0.57	8.00	8.00	Pass
11g	54Mbps	1	6	2437	-14.23	-	-	-1.73	0.57	8.00	8.00	Pass
11g	54Mbps	1	11	2462	-12.80	-		-1.73	0.57	8.00	8.00	Pass
HT20	MCS7	1	1	2412	-	-11.93		-1.73	0.57	8.00	8.00	Pass
HT20	MCS7	1	6	2437	-	-13.10		-1.73	0.57	8.00	8.00	Pass
HT20	MCS7	1	11	2462	-	-10.73		-1.73	0.57	8.00	8.00	Pass
HT20	MCS15	2	1	2412	-14.51	-14.88	-11.50	2.51		8.00		Pass
HT20	MCS15	2	6	2437	-14.98	-15.26	-11.97	2.51		8.00		Pass
HT20	MCS15	2	11	2462	-14.12	-13.88	-10.87	2.51		8.00		Pass

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

Appendix B. Radiated Spurious Emission

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.
Chain Port				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		2387.13	56.82	-17.18	74	53.81	27.05	7.45	31.49	104	73	P	H
		2387.22	45.38	-8.62	54	42.37	27.05	7.45	31.49	104	73	A	H
	*	2412	104.7	-	-	101.65	27.09	7.45	31.49	104	73	P	H
	*	2412	99.75	-	-	96.7	27.09	7.45	31.49	104	73	A	H
		2375.25	56.21	-17.79	74	53.32	27.01	7.37	31.49	400	150	P	V
		2387.13	44.92	-9.08	54	41.91	27.05	7.45	31.49	400	150	A	V
	*	2412	101.57	-	-	98.52	27.09	7.45	31.49	400	150	P	V
	*	2412	96.66	-	-	93.61	27.09	7.45	31.49	400	150	A	V
802.11b CH 06 2437MHz		2388.75	56.36	-17.64	74	53.35	27.05	7.45	31.49	136	73	P	H
		2387.94	43.95	-10.05	54	40.94	27.05	7.45	31.49	136	73	A	H
	*	2437	104.71	-	-	101.52	27.18	7.49	31.48	136	73	P	H
	*	2437	99.58	-	-	96.39	27.18	7.49	31.48	136	73	A	H
		2496.92	57.39	-16.61	74	54.02	27.3	7.53	31.46	136	73	P	H
		2488.04	44.5	-9.5	54	41.14	27.3	7.53	31.47	136	73	A	H
		2369.85	55.82	-18.18	74	52.93	27.01	7.37	31.49	363	95	P	V
		2389.38	43.68	-10.32	54	40.67	27.05	7.45	31.49	363	95	A	V
	*	2437	101.45	-	-	98.26	27.18	7.49	31.48	363	95	P	V
	*	2437	96.42	-	-	93.23	27.18	7.49	31.48	363	95	A	V
		2490.72	56.08	-17.92	74	52.72	27.3	7.53	31.47	363	95	P	V
		2486.24	44.23	-9.77	54	40.91	27.26	7.53	31.47	363	95	A	V

802.11b CH 11 2462MHz	*	2462	105.55	-	-	102.27	27.22	7.53	31.47	100	72	P	H
	*	2462	100.8	-	-	97.52	27.22	7.53	31.47	100	72	A	H
		2488.2	56.94	-17.06	74	53.58	27.3	7.53	31.47	100	72	P	H
		2483.52	46.48	-7.52	54	43.16	27.26	7.53	31.47	100	72	A	H
	*	2462	102.2	-	-	98.92	27.22	7.53	31.47	400	93	P	V
	*	2462	97.09	-	-	93.81	27.22	7.53	31.47	400	93	A	V
		2488.76	56.32	-17.68	74	52.96	27.3	7.53	31.47	400	93	P	V
		2483.52	45.42	-8.58	54	42.1	27.26	7.53	31.47	400	93	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Chain Port 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	44.32	-29.68	74	60.46	31.26	10.74	58.14	100	0	P	H
		4824	39.22	-34.78	74	55.36	31.26	10.74	58.14	100	0	P	V
802.11b CH 06 2437MHz		4872	44.13	-29.87	74	60.01	31.33	10.89	58.1	100	0	P	H
		7311	41.64	-32.36	74	50.48	36.07	14.18	59.09	100	0	P	H
		4872	39.3	-34.7	74	55.18	31.33	10.89	58.1	100	0	P	V
		7311	41.41	-32.59	74	50.25	36.07	14.18	59.09	100	0	P	V
802.11b CH 11 2462MHz		4926	44.53	-29.47	74	60.15	31.4	11.04	58.06	100	0	P	H
		7386	42.46	-31.54	74	51.02	36.31	14.27	59.14	100	0	P	H
		4926	38.54	-35.46	74	54.16	31.4	11.04	58.06	100	0	P	V
		7386	42.43	-31.57	74	50.99	36.31	14.27	59.14	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Chain Port 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2388.75	59.37	-14.63	74	56.36	27.05	7.45	31.49	100	73	P	H
		2389.92	49.58	-4.42	54	46.57	27.05	7.45	31.49	100	73	A	H
	*	2412	103.75	-	-	100.7	27.09	7.45	31.49	100	73	P	H
	*	2412	94.58	-	-	91.53	27.09	7.45	31.49	100	73	A	H
		2369.85	56.91	-17.09	74	54.02	27.01	7.37	31.49	400	152	P	V
		2389.2	47.19	-6.81	54	44.18	27.05	7.45	31.49	400	152	A	V
	*	2412	100	-	-	96.95	27.09	7.45	31.49	400	152	P	V
	*	2412	90.77	-	-	87.72	27.09	7.45	31.49	400	152	A	V
802.11g CH 06 2437MHz		2344.74	56.65	-17.35	74	53.85	26.93	7.37	31.5	100	72	P	H
		2386.68	47.01	-6.99	54	44	27.05	7.45	31.49	100	72	A	H
	*	2437	103.29	-	-	100.1	27.18	7.49	31.48	100	72	P	H
	*	2437	94.09	-	-	90.9	27.18	7.49	31.48	100	72	A	H
		2484.24	56.98	-17.02	74	53.66	27.26	7.53	31.47	100	72	P	H
		2487.52	47.88	-6.12	54	44.52	27.3	7.53	31.47	100	72	A	H
		2372.46	56.08	-17.92	74	53.19	27.01	7.37	31.49	371	90	P	V
		2367.96	46.46	-7.54	54	43.61	26.97	7.37	31.49	371	90	A	V
	*	2437	100.91	-	-	97.72	27.18	7.49	31.48	371	90	P	V
	*	2437	91.69	-	-	88.5	27.18	7.49	31.48	371	90	A	V
		2485.88	57.22	-16.78	74	53.9	27.26	7.53	31.47	371	90	P	V
		2499.28	47.2	-6.8	54	43.83	27.3	7.53	31.46	371	90	A	V

802.11g CH 11 2462MHz	*	2462	105.23	-	-	101.95	27.22	7.53	31.47	100	72	P	H
	*	2462	96.08	-	-	92.8	27.22	7.53	31.47	100	72	A	H
		2483.6	57.1	-16.9	74	53.78	27.26	7.53	31.47	100	72	P	H
		2485.2	48.23	-5.77	54	44.91	27.26	7.53	31.47	100	72	A	H
	*	2462	101.43	-	-	98.15	27.22	7.53	31.47	400	89	P	V
	*	2462	92.14	-	-	88.86	27.22	7.53	31.47	400	89	A	V
		2494.2	56.77	-17.23	74	53.4	27.3	7.53	31.46	400	89	P	V
		2499.24	47.35	-6.65	54	43.98	27.3	7.53	31.46	400	89	A	V

Remark

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

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Chain Port 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	39.3	-34.7	74	55.44	31.26	10.74	58.14	100	0	P	H
		4824	37.04	-36.96	74	53.18	31.26	10.74	58.14	100	0	P	V
802.11g CH 06 2437MHz		4874	38.96	-35.04	74	54.84	31.33	10.89	58.1	100	0	P	H
		7311	41.96	-32.04	74	50.8	36.07	14.18	59.09	100	0	P	H
		4874	37.57	-36.43	74	53.45	31.33	10.89	58.1	100	0	P	V
		7311	41.6	-32.4	74	50.44	36.07	14.18	59.09	100	0	P	V
802.11g CH 11 2462MHz		4924	38.41	-35.59	74	54.03	31.4	11.04	58.06	100	0	P	H
		7386	41.98	-32.02	74	50.54	36.31	14.27	59.14	100	0	P	H
		4924	37.85	-36.15	74	53.47	31.4	11.04	58.06	100	0	P	V
		7386	42.73	-31.27	74	51.29	36.31	14.27	59.14	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Chain Port 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)
		2389.02	60.23	-13.77	74	57.22	27.05	7.45	31.49	105	73	P	H
		2389.2	50.34	-3.66	54	47.33	27.05	7.45	31.49	105	73	A	H
802.11n	*	2414	103.94	-	-	100.89	27.09	7.45	31.49	105	73	P	H
HT20	*	2414	94.53	-	-	91.48	27.09	7.45	31.49	105	73	A	H
CH 01		2335.83	56.54	-17.46	74	53.82	26.93	7.3	31.51	400	153	P	V
2412MHz		2389.92	47.21	-6.79	54	44.2	27.05	7.45	31.49	400	153	A	V
	*	2413	99.68	-	-	96.63	27.09	7.45	31.49	400	153	P	V
	*	2413	90.37	-	-	87.32	27.09	7.45	31.49	400	153	A	V
		2388.66	55.95	-18.05	74	52.94	27.05	7.45	31.49	105	69	P	H
		2389.74	47.32	-6.68	54	44.31	27.05	7.45	31.49	105	69	A	H
	*	2439	103.92	-	-	100.73	27.18	7.49	31.48	105	69	P	H
	*	2439	94.55	-	-	91.36	27.18	7.49	31.48	105	69	A	H
802.11n		2485.48	57.81	-16.19	74	54.49	27.26	7.53	31.47	105	69	P	H
HT20		2484.52	47.73	-6.27	54	44.41	27.26	7.53	31.47	105	69	A	H
CH 06		2356.98	56.4	-17.6	74	53.56	26.97	7.37	31.5	318	93	P	V
2437MHz		2342.58	46.73	-7.27	54	43.93	26.93	7.37	31.5	318	93	A	V
	*	2439	99.61	-	-	96.42	27.18	7.49	31.48	318	93	P	V
	*	2439	89.86	-	-	86.67	27.18	7.49	31.48	318	93	A	V
		2496.96	56.46	-17.54	74	53.09	27.3	7.53	31.46	318	93	P	V
		2498.92	47.19	-6.81	54	43.82	27.3	7.53	31.46	318	93	A	V

	*	2464	105.85	-	-	102.57	27.22	7.53	31.47	100	69	P	H
	*	2464	96.48	-	-	93.2	27.22	7.53	31.47	100	69	A	H
802.11n		2493.8	57.31	-16.69	74	53.94	27.3	7.53	31.46	100	69	P	H
HT20		2489.56	47.99	-6.01	54	44.63	27.3	7.53	31.47	100	69	A	H
CH 11	*	2464	101.75	-	-	98.47	27.22	7.53	31.47	359	92	P	V
2462MHz	*	2464	92.03	-	-	88.75	27.22	7.53	31.47	359	92	A	V
		2494.12	57.53	-16.47	74	54.16	27.3	7.53	31.46	359	92	P	V
		2487.88	47.88	-6.12	54	44.52	27.3	7.53	31.47	359	92	A	V

Remark

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

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Chain Port 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	39.74	-34.26	74	55.88	31.26	10.74	58.14	100	0	P	H
		4824	36.67	-37.33	74	52.81	31.26	10.74	58.14	100	0	P	V
802.11n HT20 CH 06 2437MHz		4874	40.29	-33.71	74	56.17	31.33	10.89	58.1	100	0	P	H
		7311	42.99	-31.01	74	51.83	36.07	14.18	59.09	100	0	P	H
		4874	37.17	-36.83	74	53.05	31.33	10.89	58.1	100	0	P	V
		7311	42.18	-31.82	74	51.02	36.07	14.18	59.09	100	0	P	V
802.11n HT20 CH 11 2462MHz		4924	39.17	-34.83	74	54.79	31.4	11.04	58.06	100	0	P	H
		7386	42.49	-31.51	74	51.05	36.31	14.27	59.14	100	0	P	H
		4924	38.8	-35.2	74	54.42	31.4	11.04	58.06	100	0	P	V
		7386	41.73	-32.27	74	50.29	36.31	14.27	59.14	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Chain Port				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT20 LF		57	25.32	-14.68	40	44.27	12.73	0.78	32.46	-	-	P	H
		136.92	26.08	-17.42	43.5	39.21	17.86	1.43	32.42	-	-	P	H
		240.6	32.11	-13.89	46	44.94	17.68	1.83	32.34	-	-	P	H
		314	34.1	-11.9	46	44.08	19.93	2.34	32.25	100	12	P	H
		481.3	29.42	-16.58	46	35.08	23.65	3.08	32.39	-	-	P	H
		600.3	28.47	-17.53	46	31.97	25.4	3.5	32.4	-	-	P	H
		90.75	29.85	-13.65	43.5	46.31	14.92	1.06	32.44	-	-	P	V
		198.48	39.57	-3.93	43.5	54.53	15.75	1.7	32.41	155	56	P	V
		218.73	34.89	-11.11	46	49.56	16.01	1.7	32.38	-	-	P	V
		316.8	31.13	-14.87	46	41.02	20.02	2.34	32.25	-	-	P	V
		481.3	29.52	-16.48	46	35.18	23.65	3.08	32.39	-	-	P	V
		839.7	31	-15	46	30.23	28.44	4.28	31.95	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

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.
Chain Port				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		2386.23	55.83	-18.17	74	52.82	27.05	7.45	31.49	105	252	P	H
		2387.22	44.98	-9.02	54	41.97	27.05	7.45	31.49	105	252	A	H
	*	2412	105.21	-	-	102.16	27.09	7.45	31.49	105	252	P	H
	*	2412	100.16	-	-	97.11	27.09	7.45	31.49	105	252	A	H
		2389.56	55.81	-18.19	74	52.8	27.05	7.45	31.49	301	277	P	V
		2387.22	44.34	-9.66	54	41.33	27.05	7.45	31.49	301	277	A	V
	*	2412	101.59	-	-	98.54	27.09	7.45	31.49	301	277	P	V
	*	2412	96.49	-	-	93.44	27.09	7.45	31.49	301	277	A	V
802.11b CH 06 2437MHz		2376.15	56.63	-17.37	74	53.74	27.01	7.37	31.49	129	248	P	H
		2389.56	43.89	-10.11	54	40.88	27.05	7.45	31.49	129	248	A	H
	*	2437	105.72	-	-	102.53	27.18	7.49	31.48	129	248	P	H
	*	2437	100.67	-	-	97.48	27.18	7.49	31.48	129	248	A	H
		2484.96	56.41	-17.59	74	53.09	27.26	7.53	31.47	129	248	P	H
		2483.96	44.22	-9.78	54	40.9	27.26	7.53	31.47	129	248	A	H
		2326.74	55.75	-18.25	74	53.07	26.89	7.3	31.51	325	270	P	V
		2389.56	43.67	-10.33	54	40.66	27.05	7.45	31.49	325	270	A	V
	*	2437	102.97	-	-	99.78	27.18	7.49	31.48	325	270	P	V
	*	2437	98.09	-	-	94.9	27.18	7.49	31.48	325	270	A	V
		2484.76	56.21	-17.79	74	52.89	27.26	7.53	31.47	325	270	P	V
		2485.12	44.07	-9.93	54	40.75	27.26	7.53	31.47	325	270	A	V

802.11b CH 11 2462MHz	*	2462	106.55	-	-	103.27	27.22	7.53	31.47	138	252	P	H
	*	2462	101.59	-	-	98.31	27.22	7.53	31.47	138	252	A	H
		2486.96	57.81	-16.19	74	54.49	27.26	7.53	31.47	138	252	P	H
		2483.52	48.29	-5.71	54	44.97	27.26	7.53	31.47	138	252	A	H
	*	2462	103.41	-	-	100.13	27.22	7.53	31.47	289	277	P	V
	*	2462	98.31	-	-	95.03	27.22	7.53	31.47	289	277	A	V
		2483.72	57.09	-16.91	74	53.77	27.26	7.53	31.47	289	277	P	V
		2483.52	46.42	-7.58	54	43.1	27.26	7.53	31.47	289	277	A	V

Remark

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

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Chain Port 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	44.67	-29.33	74	60.81	31.26	10.74	58.14	100	0	P	H
		4824	39.9	-34.1	74	56.04	31.26	10.74	58.14	100	0	P	V
802.11b CH 06 2437MHz		4874	47.24	-26.76	74	63.12	31.33	10.89	58.1	100	0	P	H
		7311	42.42	-31.58	74	51.26	36.07	14.18	59.09	100	0	P	H
		4874	41.21	-32.79	74	57.09	31.33	10.89	58.1	100	0	P	V
		7311	41.93	-32.07	74	50.77	36.07	14.18	59.09	100	0	P	V
802.11b CH 11 2462MHz		4924	47.17	-26.83	74	62.79	31.4	11.04	58.06	100	0	P	H
		7386	42.53	-31.47	74	51.09	36.31	14.27	59.14	100	0	P	H
		4924	41.72	-32.28	74	57.34	31.4	11.04	58.06	100	0	P	V
		7386	42.22	-31.78	74	50.78	36.31	14.27	59.14	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Chain Port 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		2389.56	57.23	-16.77	74	54.22	27.05	7.45	31.49	127	249	P	H
		2389.56	48.34	-5.66	54	45.33	27.05	7.45	31.49	127	249	A	H
	*	2412	103.81	-	-	100.76	27.09	7.45	31.49	127	249	P	H
	*	2412	94.04	-	-	90.99	27.09	7.45	31.49	127	249	A	H
		2346.63	56.4	-17.6	74	53.6	26.93	7.37	31.5	337	269	P	V
		2388.75	47.44	-6.56	54	44.43	27.05	7.45	31.49	337	269	A	V
	*	2412	102.43	-	-	99.38	27.09	7.45	31.49	337	269	P	V
	*	2412	92.91	-	-	89.86	27.09	7.45	31.49	337	269	A	V
802.11g CH 06 2437MHz		2381.73	56.74	-17.26	74	53.77	27.01	7.45	31.49	164	249	P	H
		2381.1	46.83	-7.17	54	43.86	27.01	7.45	31.49	164	249	A	H
	*	2437	103.84	-	-	100.65	27.18	7.49	31.48	164	249	P	H
	*	2437	94.14	-	-	90.95	27.18	7.49	31.48	164	249	A	H
		2484.52	56.44	-17.56	74	53.12	27.26	7.53	31.47	164	249	P	H
		2487.6	47.01	-6.99	54	43.65	27.3	7.53	31.47	164	249	A	H
		2361.03	56.08	-17.92	74	53.24	26.97	7.37	31.5	324	270	P	V
		2375.61	46.89	-7.11	54	44	27.01	7.37	31.49	324	270	A	V
	*	2437	103.46	-	-	100.27	27.18	7.49	31.48	324	270	P	V
	*	2437	93.31	-	-	90.12	27.18	7.49	31.48	324	270	A	V
		2496.76	56.39	-17.61	74	53.02	27.3	7.53	31.46	324	270	P	V
		2494.92	46.81	-7.19	54	43.44	27.3	7.53	31.46	324	270	A	V

802.11g CH 11 2462MHz	*	2462	104.31	-	-	101.03	27.22	7.53	31.47	115	249	P	H
	*	2462	94.33	-	-	91.05	27.22	7.53	31.47	115	249	A	H
		2499.16	56.46	-17.54	74	53.09	27.3	7.53	31.46	115	249	P	H
		2486.36	47.56	-6.44	54	44.24	27.26	7.53	31.47	115	249	A	H
	*	2462	102.72	-	-	99.44	27.22	7.53	31.47	363	269	P	V
	*	2462	93.04	-	-	89.76	27.22	7.53	31.47	363	269	A	V
		2495.32	56.63	-17.37	74	53.26	27.3	7.53	31.46	363	269	P	V
		2496.48	47.22	-6.78	54	43.85	27.3	7.53	31.46	363	269	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Chain Port 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	40.02	-33.98	74	56.16	31.26	10.74	58.14	100	0	P	H
		4824	36.18	-37.82	74	52.32	31.26	10.74	58.14	100	0	P	V
802.11g CH 06 2437MHz		4874	41.56	-32.44	74	57.44	31.33	10.89	58.1	100	0	P	H
		7311	42.17	-31.83	74	51.01	36.07	14.18	59.09	100	0	P	H
		4874	36.66	-37.34	74	52.54	31.33	10.89	58.1	100	0	P	V
		7311	42.71	-31.29	74	51.55	36.07	14.18	59.09	100	0	P	V
802.11g CH 11 2462MHz		4924	42.13	-31.87	74	57.75	31.4	11.04	58.06	100	0	P	H
		7386	41.9	-32.1	74	50.46	36.31	14.27	59.14	100	0	P	H
		4924	37.7	-36.3	74	53.32	31.4	11.04	58.06	100	0	P	V
		7386	42.3	-31.7	74	50.86	36.31	14.27	59.14	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Chain Port 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)
		2389.74	60.89	-13.11	74	57.88	27.05	7.45	31.49	128	250	P	H
		2389.92	50.4	-3.6	54	47.39	27.05	7.45	31.49	128	250	A	H
802.11n	*	2412	104.58	-	-	101.53	27.09	7.45	31.49	128	250	P	H
HT20	*	2412	94.99	-	-	91.94	27.09	7.45	31.49	128	250	A	H
CH 01		2388.84	61.86	-12.14	74	58.85	27.05	7.45	31.49	301	280	P	V
2412MHz		2389.65	50.5	-3.5	54	47.49	27.05	7.45	31.49	301	280	A	V
	*	2412	103.09	-	-	100.04	27.09	7.45	31.49	301	280	P	V
	*	2412	93.26	-	-	90.21	27.09	7.45	31.49	301	280	A	V
		2389.74	57.31	-16.69	74	54.3	27.05	7.45	31.49	151	251	P	H
		2384.61	46.77	-7.23	54	43.8	27.01	7.45	31.49	151	251	A	H
	*	2437	105.98	-	-	102.79	27.18	7.49	31.48	151	251	P	H
	*	2437	96.3	-	-	93.11	27.18	7.49	31.48	151	251	A	H
802.11n		2486.28	56.86	-17.14	74	53.54	27.26	7.53	31.47	151	251	P	H
HT20		2487.52	47.74	-6.26	54	44.38	27.3	7.53	31.47	151	251	A	H
CH 06		2324.94	56.04	-17.96	74	53.36	26.89	7.3	31.51	323	271	P	V
2437MHz		2380.38	46.77	-7.23	54	43.8	27.01	7.45	31.49	323	271	A	V
	*	2437	104.37	-	-	101.18	27.18	7.49	31.48	323	271	P	V
	*	2437	94.37	-	-	91.18	27.18	7.49	31.48	323	271	A	V
		2490.12	56.51	-17.49	74	53.15	27.3	7.53	31.47	323	271	P	V
		2484.44	47.05	-6.95	54	43.73	27.26	7.53	31.47	323	271	A	V

	*	2462	106.97	-	-	103.69	27.22	7.53	31.47	109	250	P	H
	*	2462	96.79	-	-	93.51	27.22	7.53	31.47	109	250	A	H
802.11n		2484.2	61.63	-12.37	74	58.31	27.26	7.53	31.47	109	250	P	H
HT20		2485.24	50.3	-3.7	54	46.98	27.26	7.53	31.47	109	250	A	H
CH 11	*	2462	104.15	-	-	100.87	27.22	7.53	31.47	320	278	P	V
2462MHz	*	2462	94.69	-	-	91.41	27.22	7.53	31.47	320	278	A	V
		2486	61.18	-12.82	74	57.86	27.26	7.53	31.47	320	278	P	V
		2487.04	49.33	-4.67	54	46.01	27.26	7.53	31.47	320	278	A	V

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

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Chain Port 2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	41.87	-32.13	74	58.01	31.26	10.74	58.14	100	0	P	H
		4824	37.71	-36.29	74	53.85	31.26	10.74	58.14	100	0	P	V
802.11n HT20 CH 06 2437MHz		4874	43.09	-30.91	74	58.97	31.33	10.89	58.1	100	0	P	H
		7311	41.97	-32.03	74	50.81	36.07	14.18	59.09	100	0	P	H
		4874	38.05	-35.95	74	53.93	31.33	10.89	58.1	100	0	P	V
		7311	41.84	-32.16	74	50.68	36.07	14.18	59.09	100	0	P	V
802.11n HT20 CH 11 2462MHz		4924	42.13	-31.87	74	57.75	31.4	11.04	58.06	100	0	P	H
		7386	42.31	-31.69	74	50.87	36.31	14.27	59.14	100	0	P	H
		4924	38.72	-35.28	74	54.34	31.4	11.04	58.06	100	0	P	V
		7386	43.47	-30.53	74	52.03	36.31	14.27	59.14	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Chain Port				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 802.11n HT20 LF		55.11	31.1	-8.9	40	49.43	13.35	0.78	32.46	102	93	P	H
		121.53	34.55	-8.95	43.5	47.91	17.64	1.43	32.43	-	-	P	H
		210.09	32.12	-11.38	43.5	46.71	16.1	1.7	32.39	-	-	P	H
		314.7	34.87	-11.13	46	44.82	19.96	2.34	32.25	-	-	P	H
		481.3	30.97	-15.03	46	36.63	23.65	3.08	32.39	-	-	P	H
		884.5	32.37	-13.63	46	30.78	28.81	4.45	31.67	-	-	P	H
		80.49	34.16	-5.84	40	51.84	13.7	1.06	32.44	126	226	P	V
		121.8	30.25	-13.25	43.5	43.57	17.68	1.43	32.43	-	-	P	V
		196.32	29.27	-14.23	43.5	44.38	15.6	1.7	32.41	-	-	P	V
		353.9	30.12	-15.88	46	38.9	21.09	2.44	32.31	-	-	P	V
		447	36.94	-9.06	46	43.38	23.05	2.89	32.38	-	-	P	V
		500.2	29.33	-16.67	46	34.54	24	3.19	32.4	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Chain Port				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)
		2389.74	61.96	-12.04	74	58.95	27.05	7.45	31.49	100	71	P	H
		2388.3	50.38	-3.62	54	47.37	27.05	7.45	31.49	100	71	A	H
802.11n	*	2414	107.38	-	-	104.33	27.09	7.45	31.49	100	71	P	H
HT20	*	2414	98.57	-	-	95.52	27.09	7.45	31.49	100	71	A	H
CH 01		2375.16	56.18	-17.82	74	53.29	27.01	7.37	31.49	400	94	P	V
2412MHz		2389.56	47.26	-6.74	54	44.25	27.05	7.45	31.49	400	94	A	V
	*	2414	99.74	-	-	96.69	27.09	7.45	31.49	400	94	P	V
	*	2414	90.77	-	-	87.72	27.09	7.45	31.49	400	94	A	V
		2363.01	56.36	-17.64	74	53.52	26.97	7.37	31.5	100	59	P	H
		2342.58	46.65	-7.35	54	43.85	26.93	7.37	31.5	100	59	A	H
	*	2439	107.68	-	-	104.49	27.18	7.49	31.48	100	59	P	H
	*	2439	98.71	-	-	95.52	27.18	7.49	31.48	100	59	A	H
802.11n		2483.84	56.7	-17.3	74	53.38	27.26	7.53	31.47	100	59	P	H
HT20		2495.68	47.26	-6.74	54	43.89	27.3	7.53	31.46	100	59	A	H
CH 06		2345.64	56.17	-17.83	74	53.37	26.93	7.37	31.5	400	96	P	V
2437MHz		2372.01	46.6	-7.4	54	43.71	27.01	7.37	31.49	400	96	A	V
	*	2436	102.27	-	-	99.13	27.13	7.49	31.48	400	96	P	V
	*	2436	92.74	-	-	89.6	27.13	7.49	31.48	400	96	A	V
		2497.6	56.44	-17.56	74	53.07	27.3	7.53	31.46	400	96	P	V
		2487.08	47.61	-6.39	54	44.29	27.26	7.53	31.47	400	96	A	V

	*	2461	107.94	-	-	104.66	27.22	7.53	31.47	100	64	P	H
	*	2461	99.23	-	-	95.95	27.22	7.53	31.47	100	64	A	H
802.11n		2484.48	59.7	-14.3	74	56.38	27.26	7.53	31.47	100	64	P	H
HT20		2483.52	50.33	-3.67	54	47.01	27.26	7.53	31.47	100	64	A	H
CH 11	*	2464	103.29	-	-	100.01	27.22	7.53	31.47	393	94	P	V
2462MHz	*	2464	93.87	-	-	90.59	27.22	7.53	31.47	393	94	A	V
		2484	58.56	-15.44	74	55.24	27.26	7.53	31.47	393	94	P	V
		2483.56	48.36	-5.64	54	45.04	27.26	7.53	31.47	393	94	A	V

Remark

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

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Chain Port 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	39.98	-34.02	74	56.12	31.26	10.74	58.14	100	0	P	H
		4824	37.71	-36.29	74	53.85	31.26	10.74	58.14	100	0	P	V
802.11n HT20 CH 06 2437MHz		4874	42.44	-31.56	74	58.32	31.33	10.89	58.1	100	0	P	H
		7311	41.94	-32.06	74	50.78	36.07	14.18	59.09	100	0	P	H
		4874	37.33	-36.67	74	53.21	31.33	10.89	58.1	100	0	P	V
		7311	41.39	-32.61	74	50.23	36.07	14.18	59.09	100	0	P	V
802.11n HT20 CH 11 2462MHz		4924	41.33	-32.67	74	56.95	31.4	11.04	58.06	100	0	P	H
		7386	42.19	-31.81	74	50.75	36.31	14.27	59.14	100	0	P	H
		4924	37.53	-36.47	74	53.15	31.4	11.04	58.06	100	0	P	V
		7386	42.73	-31.27	74	51.29	36.31	14.27	59.14	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT20 LF		79.95	32.93	-7.07	40	50.74	13.57	1.06	32.44	-	-	P	H
		122.07	40.31	-3.19	43.5	53.63	17.68	1.43	32.43	141	198	P	H
		240.87	31.18	-14.82	46	44.01	17.68	1.83	32.34	-	-	P	H
		314.7	34.02	-11.98	46	43.97	19.96	2.34	32.25	-	-	P	H
		481.3	29.52	-16.48	46	35.18	23.65	3.08	32.39	-	-	P	H
		923	33.22	-12.78	46	30.43	29.56	4.6	31.37	-	-	P	H
		32.7	29.03	-10.97	40	36.53	24.18	0.78	32.46	-	-	P	V
		126.12	28.9	-14.6	43.5	42.05	17.84	1.43	32.42	-	-	P	V
		241.68	35.19	-10.81	46	47.93	17.76	1.83	32.33	100	301	P	V
		444.9	33.6	-12.4	46	40.08	23.01	2.89	32.38	-	-	P	V
		481.3	31.18	-14.82	46	36.84	23.65	3.08	32.39	-	-	P	V
		600.3	30.19	-15.81	46	33.69	25.4	3.5	32.4	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

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

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

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

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

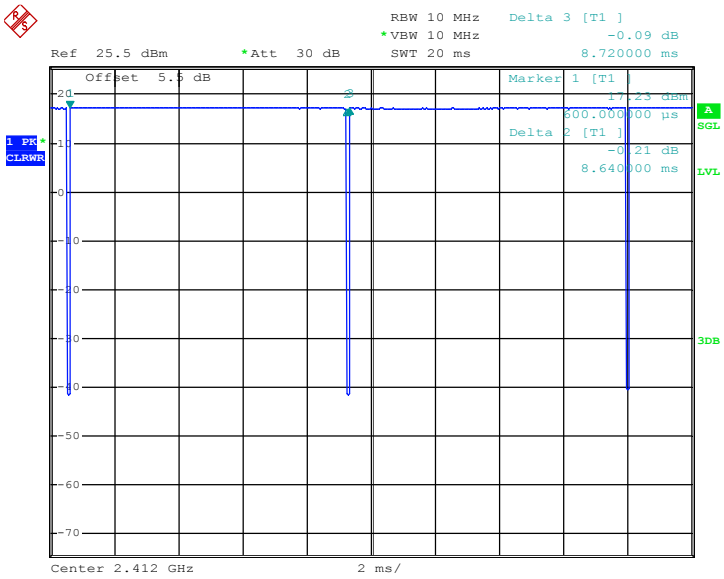
Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11b	99.08	-	-	10Hz
1	802.11g	63.83	180	5.56	10kHz
1	2.4GHz 802.11n HT20	62.22	168	5.95	10kHz
2	802.11b	98.83	-	-	10Hz
2	802.11g	64.29	180	5.56	10kHz
2	2.4GHz 802.11n HT20	62.22	168	5.95	10kHz
1+2	2.4GHz 802.11n HT20	62.22	168	5.95	10kHz

<Ant. 1>

802.11b

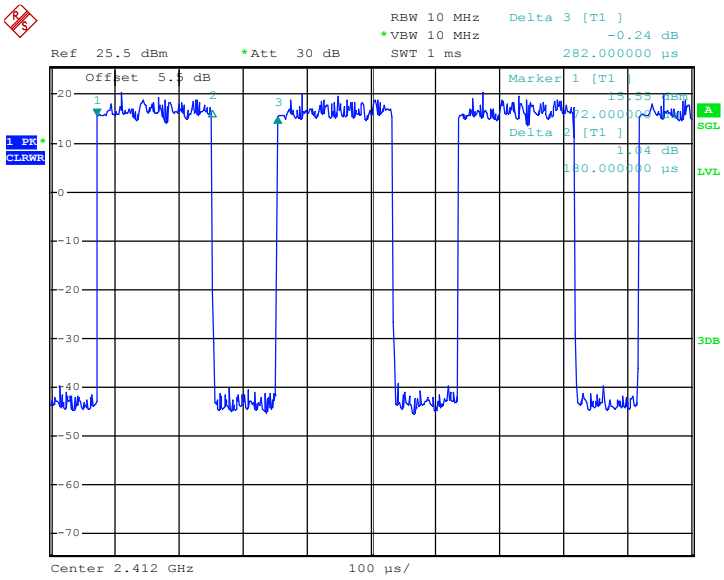
1Mbps



Date: 31.MAR.2016 17:57:20

802.11g

54Mbps



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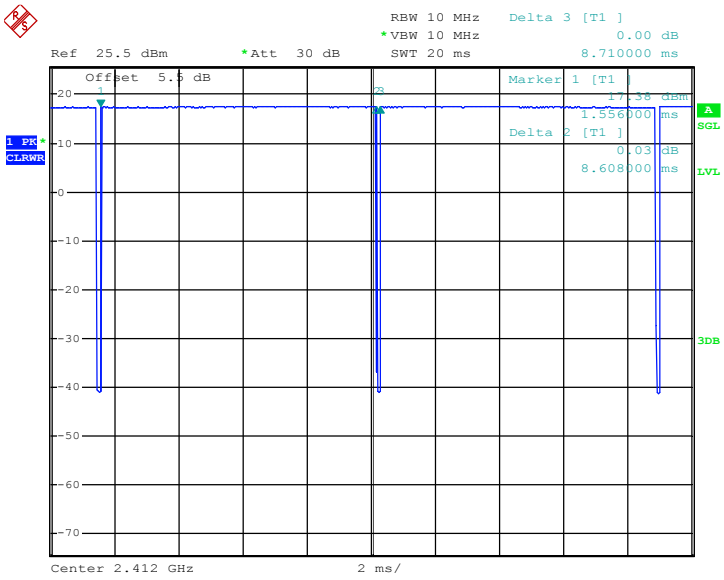
<Ant. 2>

802.11b

1Mbps



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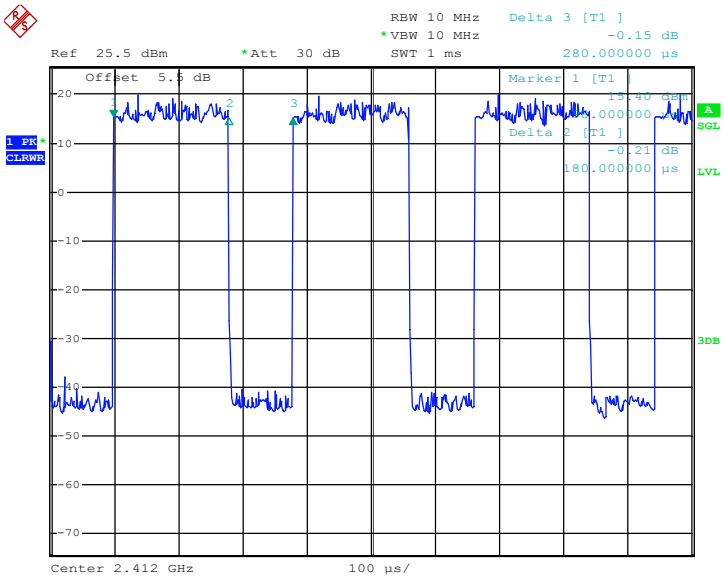
802.11g

54Mbps



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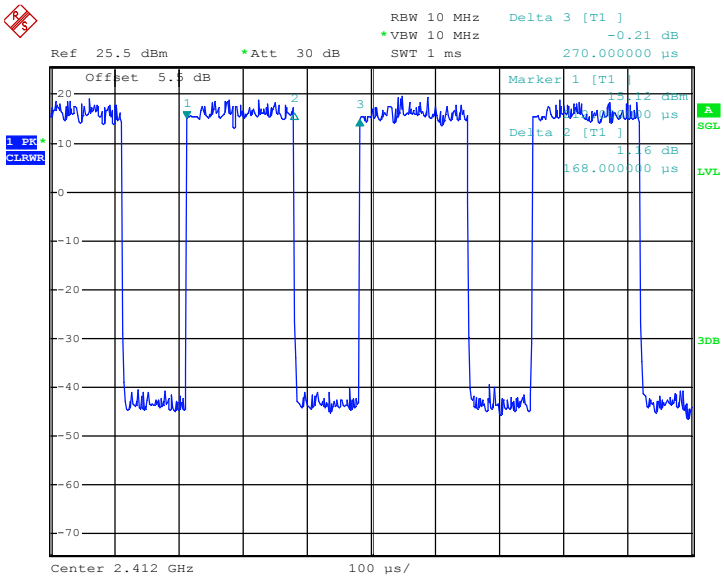
SISO <Ant. 1>

802.11n HT20

MCS7



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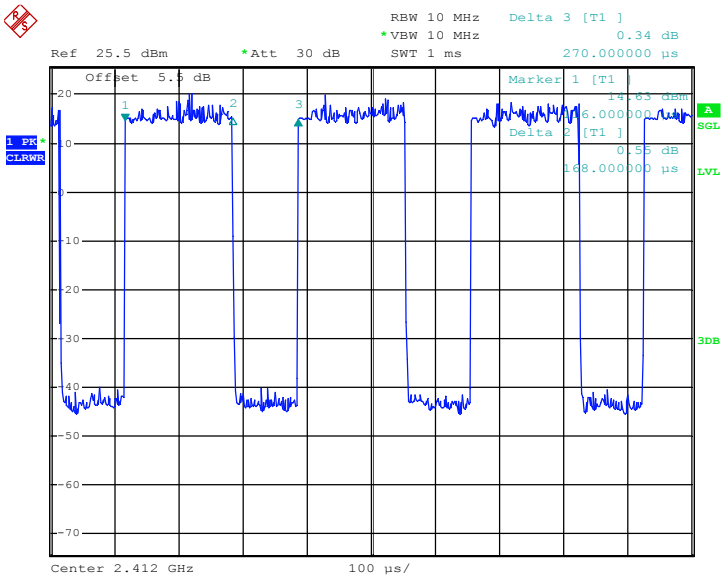
SISO <Ant. 2>

802.11n HT20

MCS7



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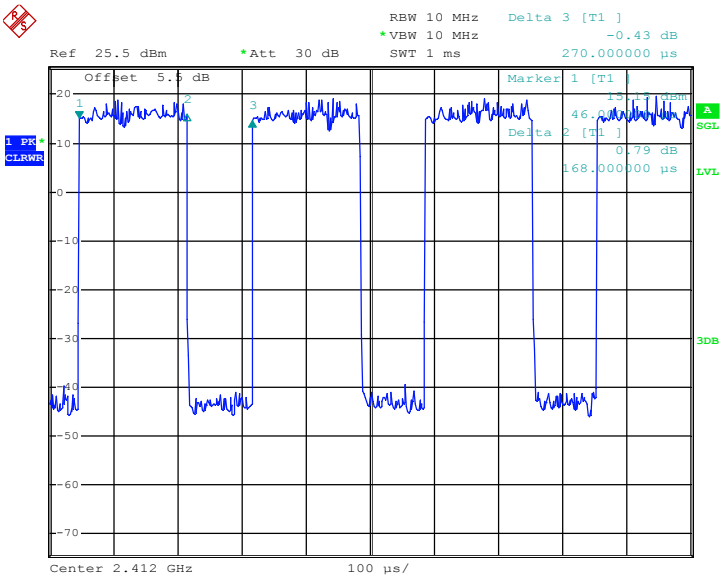
MIMO <Ant. 1+2>

802.11n HT20

MCS15



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