FCC RF Test Report

APPLICANT	**:**	**Planet Avvio LLC**
EQUIPMENT	**:**	**router**
BRAND NAME	**:**	**Avvio**
MODEL NAME	**:**	**RT400**
FCC ID	**:**	**2ALTART400X**
STANDARD	**:**	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	**:**	**(NII) Unlicensed National Information Infrastructure**

The product was received on May 25, 2018 and testing was completed on Jun. 01, 2018. We, Sporton International (Shenzhen) 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 (Shenzhen) Inc., the test report shall not be reproduced except in full.

Eric Shih

Approved by: Eric Shih / Manager

NVLAP TESTING
NVLAP LAB CODE 600156-0

Sporton International (Shenzhen) Inc.
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TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR852504B	Rev. 01	Initial issue of report	Jun. 11, 2018

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 & 15.403(i)	26dB & 99% Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm for Band 1	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 17 dBm for Band 1	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b) & 15.209(a)	Pass	Under limit 1.36 dB at 5150.00 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 10.68 dB at 0.34 MHz
3.6	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.7	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Planet Avvio LLC
9725 NW 117th Ave., Medley, FL 33178, United States

1.2 Manufacturer

MeiG Smart Technology Co., Ltd
#5 Lingxia Road, Fenghuang the 4th Industrial Park, Fuyong Street, Bao'an District, Shenzhen

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	router
Brand Name	Avvio
Model Name	RT400
FCC ID	2ALTART400X
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/ HSPA+(16QAM uplink is not supported)/LTE WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80
IMEI Code	Conducted: 869715033008171 Conduction: NA Radiation: NA
HW Version	SLT768_V1.03_PCB
SW Version	SLT768-TAQ_1.0.5_EQ103
EUT Stage	Production Unit

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

1.4 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Standards-related Product Specification</th></tr>
<tr><td>Tx/Rx Frequency Range</td><td>5180 MHz ~ 5240 MHz</td></tr>
<tr><td>Maximum Output Power to Antenna</td><td><5180 MHz ~ 5240 MHz>
MIMO <Ant. 1+2>
802.11a : 16.34 dBm / 0.0431 W
802.11n HT20 : 16.14 dBm / 0.0411 W
802.11n HT40 : 16.65 dBm / 0.0462 W
802.11ac VHT20 : 14.28 dBm / 0.0268 W
802.11ac VHT40 : 13.35 dBm / 0.0216 W
802.11ac VHT80 : 13.11 dBm / 0.0205 W</td></tr>
<tr><td>99% Occupied Bandwidth</td><td><5180 MHz ~ 5240 MHz>
<Ant. 1+2(1)>
802.11a : 16.78 MHz
802.11n HT20 : 17.73 MHz
802.11n HT40 : 36.06 MHz
802.11ac VHT80 : 75.04 MHz
<Ant. 1+2(2)>
802.11a : 16.88 MHz
802.11n HT20 : 17.78 MHz
802.11n HT40 : 35.96 MHz
802.11ac VHT80 : 75.04 MHz</td></tr>
<tr><td>Antenna Type / Gain</td><td><5180 MHz ~ 5240 MHz>
<Ant. 1> : External PCB Antenna with gain 4.10 dBi
<Ant. 2> : External PCB Antenna with gain 4.10 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)</td></tr>
<tr><td>Antenna Function Description</td><td>
<table>
<tr><td></td><td>Ant. 1</td><td>Ant. 2</td></tr>
<tr><td>802.11 a/n/ac SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 a/n/ac MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
</table>

Note:

1. MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.
2. For 802.11n HT20/11ac VHT20 and 802.11n HT40/11ac VHT40 mode, the test was assessed by referring to the higher conducted power.
3. For SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to the higher conducted power.

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No are CN5018 and CN5019.

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	**Sporton Site No.**		**FCC Test Firm Registration No.**
	TH01-SZ	CO01-SZ	251365

Test Site	Sporton International (Shenzhen) Inc.	
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District Shenzhen City Guangdong Province 518055 China TEL: +86-755-3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	577730

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

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

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

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5180-5240 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	42#	5210		

Note:

1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "#" were 802.11ac VHT80.

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

MIMO Mode

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT80	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + LAN Link + WLAN Link(5GHz) + Telephone Link
Remark: For Radiated Test Cases, The tests were performance with Adapter.	

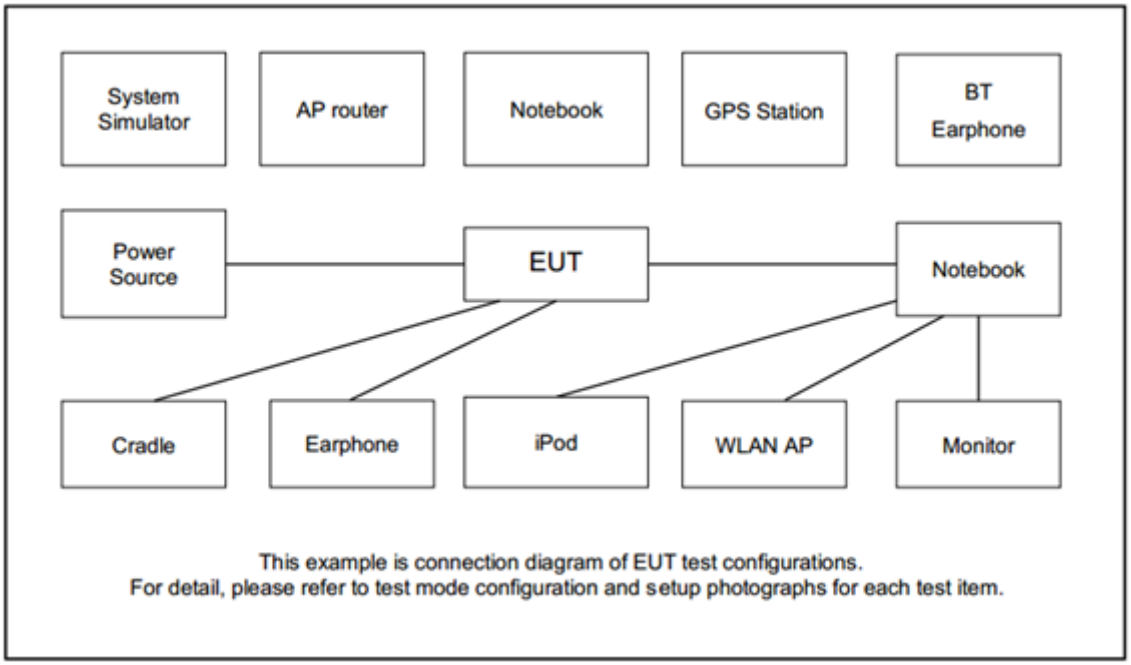
Ch. #		Band I : 5180-5240 MHz
		802.11a
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I : 5180-5240 MHz
		802.11n HT20
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I : 5180-5240 MHz
		802.11n HT40
L	Low	38
M	Middle	-
H	High	46

Ch. #		Band I : 5180-5240 MHz
		802.11ac VHT80
L	Low	-
M	Middle	42
H	High	-

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	iPod	Apple	MC69029/A	FCC DoC	N/A	N/A
5.	Telephone	bossini	HCD133TSD	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an 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.

2.6 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 5.3 dB and 10dB attenuator.

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

= 5.3 + 10 = 15.3 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Description of 26dB & 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

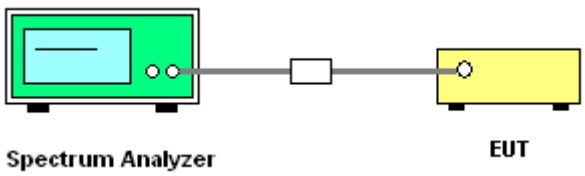
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

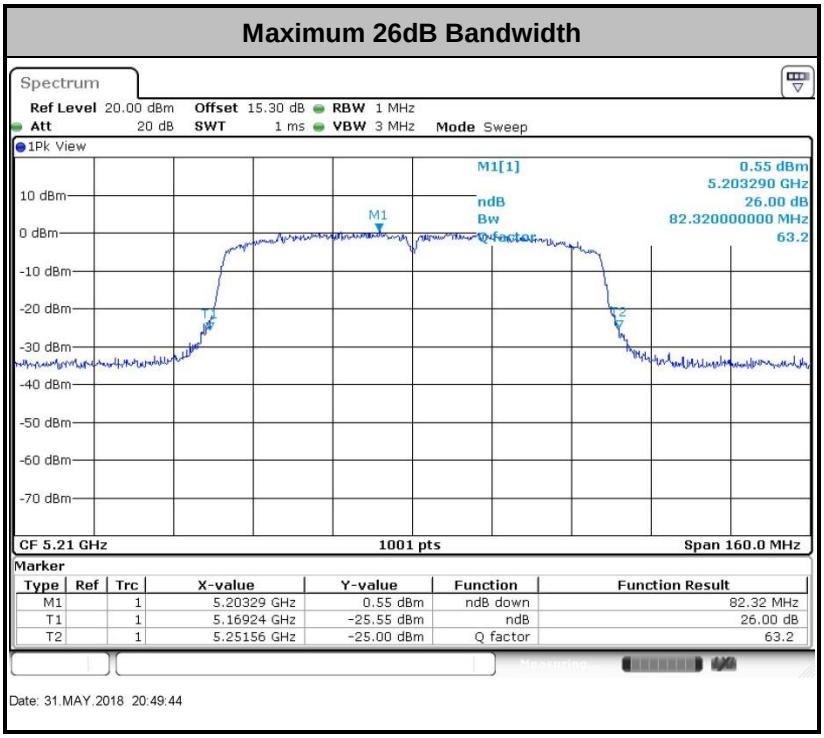
3.1.4 Test Setup



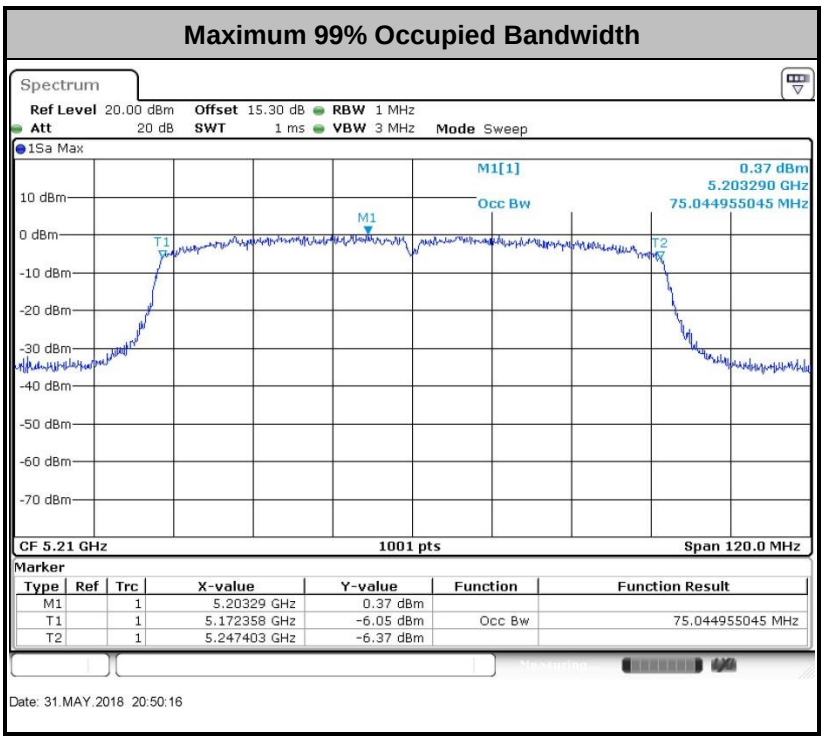
3.1.5 Test Result of 26dB & 99% Occupied Bandwidth

Please refer to Appendix A.

Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth



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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

3.2.2 Measuring Instruments

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

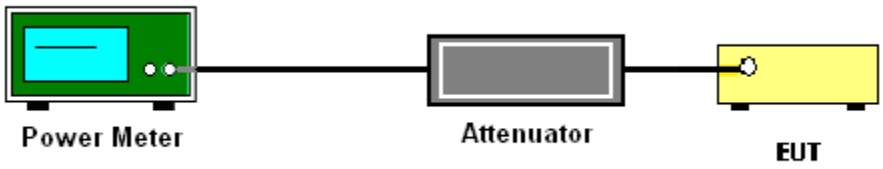
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section F) Maximum power spectral density.

 # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

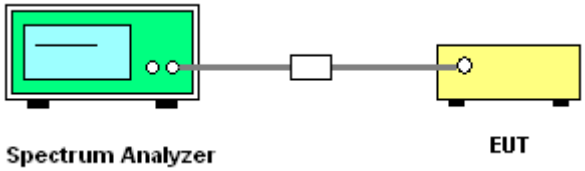
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
3. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

   Method (a): 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.

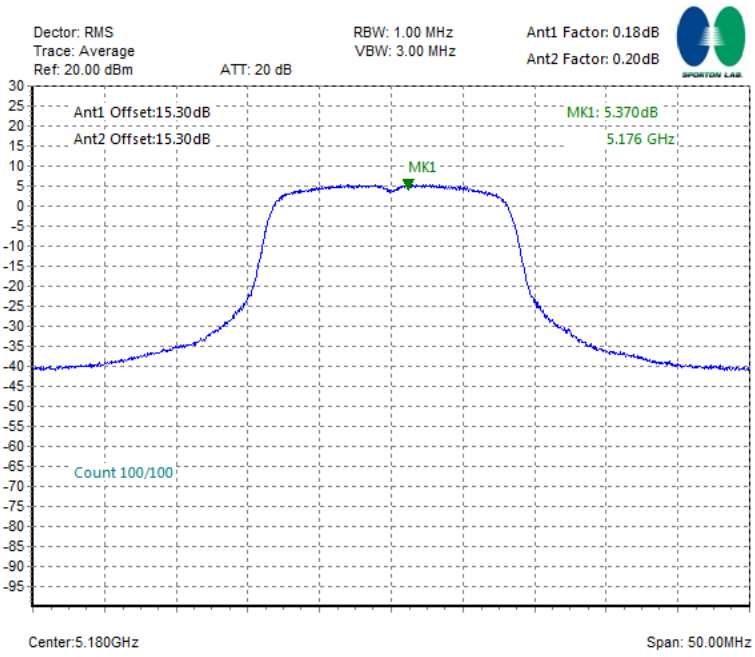
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/MHz)



Note: Average Power Density (dB) = Measured value+ Duty Factor

3.4 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

(2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

(3) Frequency (4) (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

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

(3) KDB789033 D01 v02r01 G)2)c)

(i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.[3]

(ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.[4]

Note 3: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

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 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.

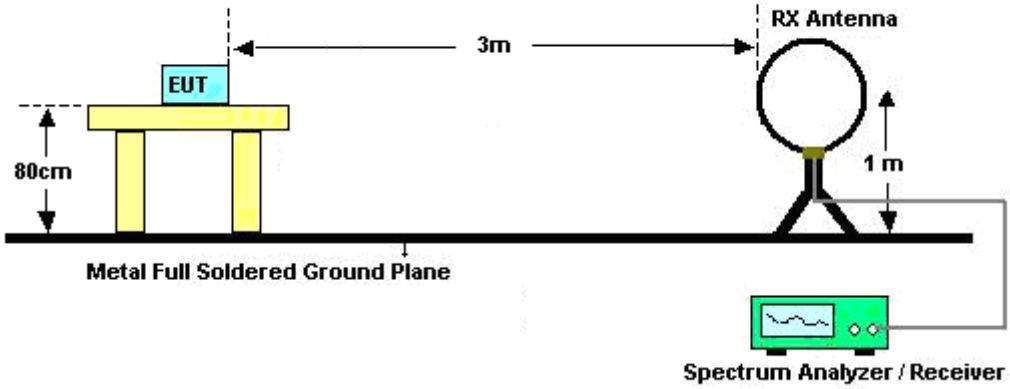
   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

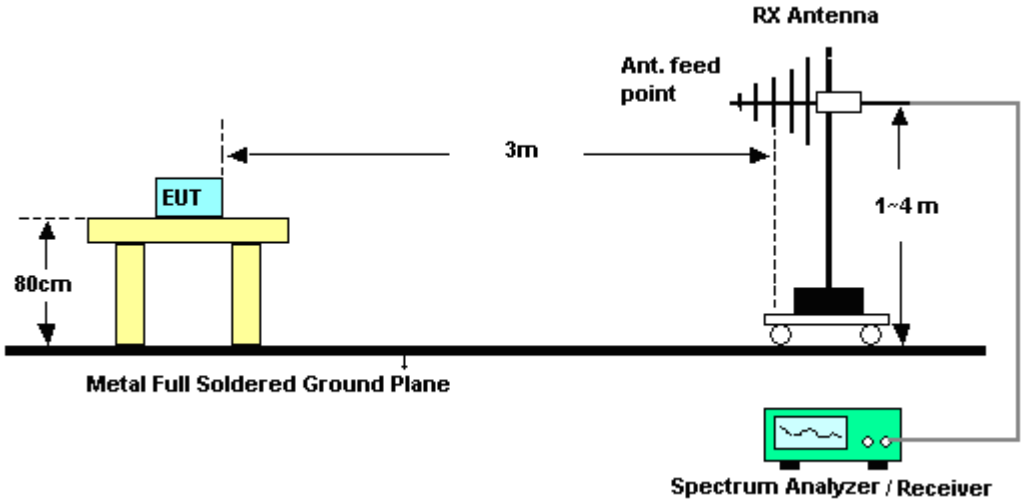
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. 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.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
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.

3.4.4 Test Setup

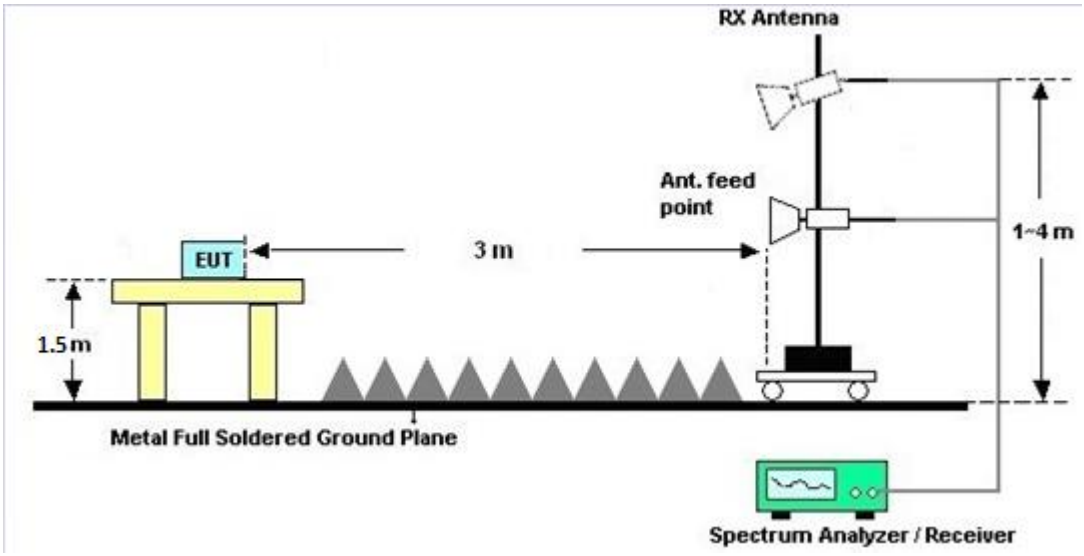
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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.

3.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.4.7 Duty Cycle

Please refer to Appendix D.

3.4.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix C.

3.5 AC Conducted Emission Measurement

3.5.1 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.

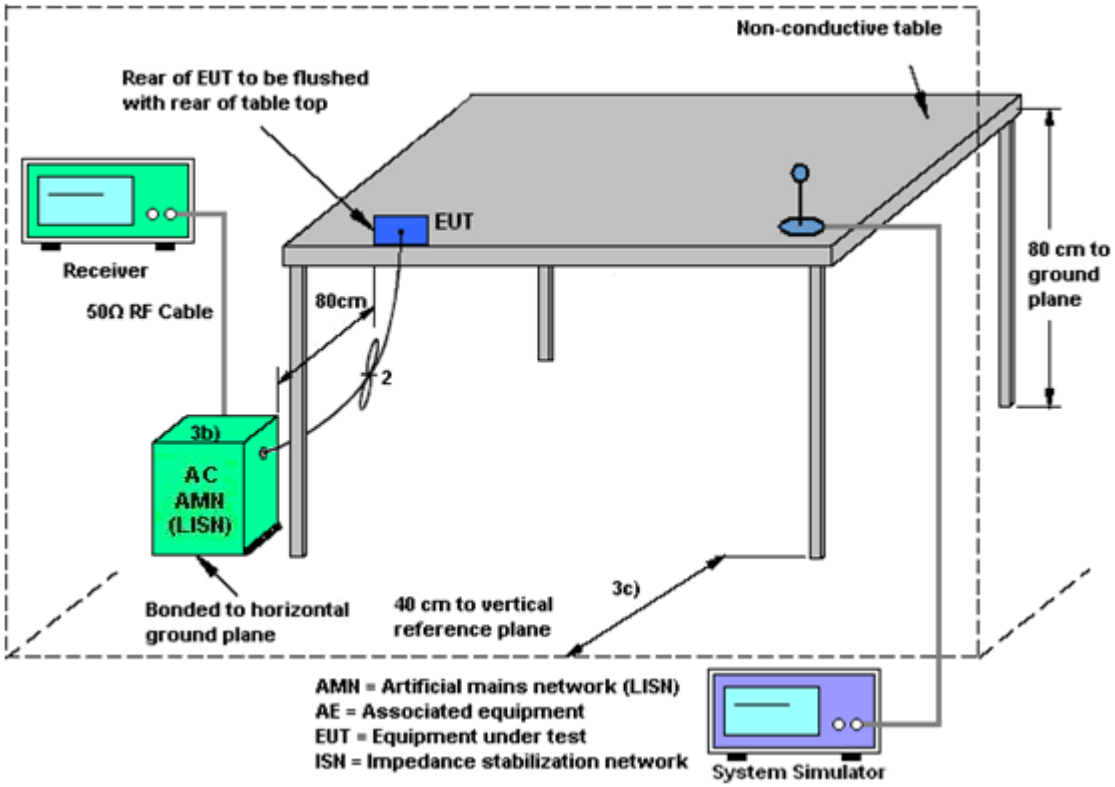
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room 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 with Maximum Hold Mode.

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.6 Automatically Discontinue Transmission

3.6.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.6.2 Measuring Instruments

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

3.6.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used. (For Internal PCB Antenna)

A non-standard SMA connector antenna is used. (For External PCB Antenna)

3.7.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = GANT + Array Gain, where Array Gain is as follows.

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

Array Gain = 10 log(NANT/NSS=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 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.

For power, the directional gain GANT 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.

<CDD Modes>

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
Band I	4.10	4.10	4.10	7.11	0.00	1.11

PSD limit reduction = Composite gain + PSD Array gain – 6dBi = 1.11dB

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	Apr. 19, 2018	May 30, 2018~ May 31, 2018	Apr. 18, 2019	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2017	May 30, 2018~ May 31, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	May 30, 2018~ May 31, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Apr. 19, 2018	May 30, 2018~ Jun. 01, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 19, 2018	May 30, 2018~ Jun. 01, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2018	May 30, 2018~ Jun. 01, 2018	May 13, 2019	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Aug. 29, 2017	May 30, 2018~ Jun. 01, 2018	Aug. 28, 2018	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	May 30, 2018~ Jun. 01, 2018	Dec. 12, 2018	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Apr. 20, 2018	May 30, 2018~ Jun. 01, 2018	Apr. 19, 2019	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2017	May 30, 2018~ Jun. 01, 2018	Oct. 18, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1989346	1GHz~18GHz	Jul. 27, 2017	May 30, 2018~ Jun. 01, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1988315	18GHz~40GHz	Jul. 27, 2017	May 30, 2018~ Jun. 01, 2018	Jul. 26, 2018	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY53270156	500MHz~26.5GHz	Apr. 19, 2018	May 30, 2018~ Jun. 01, 2018	Apr. 18, 2019	Radiation (03CH04-SZ)
AC Power Source	Chroma	61601	N/A	N/A	NCR	May 30, 2018~ Jun. 01, 2018	NCR	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	May 30, 2018~ Jun. 01, 2018	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	May 30, 2018~ Jun. 01, 2018	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2017	May 31, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Dec. 26, 2017	May 31, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Nov. 01, 2017	May 31, 2018	Oct. 31, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 19, 2017	May 31, 2018	Jul. 18, 2018	Conduction (CO01-SZ)

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))	**2.6 dB**

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.8 dB**

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

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

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Wilson chen	Temperature:	24~26	°C
Test Date:	2018/5/30~2018/5/31	Relative Humidity:	50~53	%

Report Number : FR852504B

TEST RESULTS DATA
26dB and 99% OBW

Band I														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26 dB Bandwidth (MHz)		IC 99% Bandwidth Power Limit (dBm)		IC 99% Bandwidth EIRP Limit (dBm)			Note
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	2	36	5180	16.68	16.88	20.53	20.08	-		22.22			
11a	6Mbps	2	44	5220	16.73	16.83	20.68	20.28	-		22.24			
11a	6Mbps	2	48	5240	16.78	16.83	20.63	20.23	-		22.25			
HT20	MCS0	2	36	5180	17.73	17.78	21.68	21.38	-		22.49			
HT20	MCS0	2	44	5220	17.73	17.78	21.58	21.43	-		22.49			
HT20	MCS0	2	48	5240	17.73	17.78	21.63	21.53	-		22.49			
HT40	MCS0	2	38	5190	36.06	35.96	41.54	41.27	-		23.01			
HT40	MCS0	2	46	5230	35.96	35.96	41.54	41.54	-		23.01			
VHT80	MCS0	2	42	5210	75.04	75.04	82.32	82.32	-		23.01			

TEST RESULTS DATA
Average Power Table

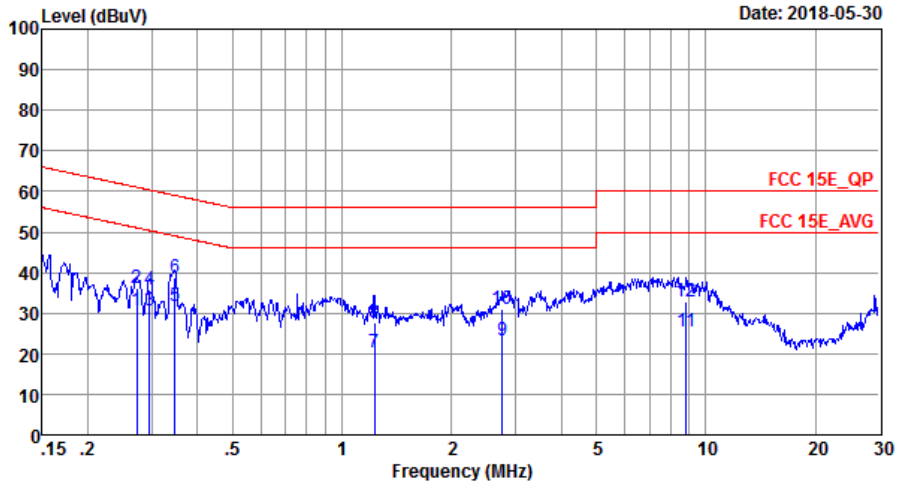
FCC Band I															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)			Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	2	36	5180	0.18	0.20	13.11	13.54	16.34	30.00		3.10			Pass
11a	6Mbps	2	44	5220	0.18	0.20	12.80	13.51	16.18	30.00		3.10			Pass
11a	6Mbps	2	48	5240	0.18	0.20	12.71	13.43	16.09	30.00		3.10			Pass
HT20	MCS0	2	36	5180	0.19	0.21	12.90	13.34	16.14	30.00		3.10			Pass
HT20	MCS0	2	44	5220	0.19	0.21	12.61	13.38	16.02	30.00		3.10			Pass
HT20	MCS0	2	48	5240	0.19	0.21	12.50	13.24	15.90	30.00		3.10			Pass
HT40	MCS0	2	38	5190	0.38	0.38	13.41	13.86	16.65	30.00		3.10			Pass
HT40	MCS0	2	46	5230	0.38	0.38	13.17	13.88	16.55	30.00		3.10			Pass
VHT20	MCS0	2	36	5180	0.19	0.19	11.08	11.44	14.28	30.00		3.10			Pass
VHT20	MCS0	2	44	5220	0.19	0.19	10.80	11.49	14.17	30.00		3.10			Pass
VHT20	MCS0	2	48	5240	0.19	0.19	10.68	11.38	14.06	30.00		3.10			Pass
VHT40	MCS0	2	38	5190	0.41	0.43	10.16	10.50	13.35	30.00		3.10			Pass
VHT40	MCS0	2	46	5230	0.41	0.43	9.88	10.45	13.19	30.00		3.10			Pass
VHT80	MCS0	2	42	5210	0.76	0.78	9.77	10.40	13.11	30.00		3.10			Pass

TEST RESULTS DATA
Power Spectral Density

FCC Band I															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Power Density (dBm/MHz)			Average PSD Limit (dBm/MHz)		DG (dBi)			Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	2	36	5180	0.18	0.20			5.37	15.89		7.11			Pass
11a	6Mbps	2	44	5220	0.18	0.20			5.21	15.89		7.11			Pass
11a	6Mbps	2	48	5240	0.18	0.20			4.97	15.89		7.11			Pass
HT20	MCS0	2	36	5180	0.19	0.21			4.79	15.89		7.11			Pass
HT20	MCS0	2	44	5220	0.19	0.21			4.80	15.89		7.11			Pass
HT20	MCS0	2	48	5240	0.19	0.21			4.82	15.89		7.11			Pass
HT40	MCS0	2	38	5190	0.38	0.38			2.41	15.89		7.11			Pass
HT40	MCS0	2	46	5230	0.38	0.38			2.21	15.89		7.11			Pass
VHT80	MCS0	2	42	5210	0.76	0.78			-4.50	15.89		7.11			Pass

Appendix B. AC Conducted Emission Test Results

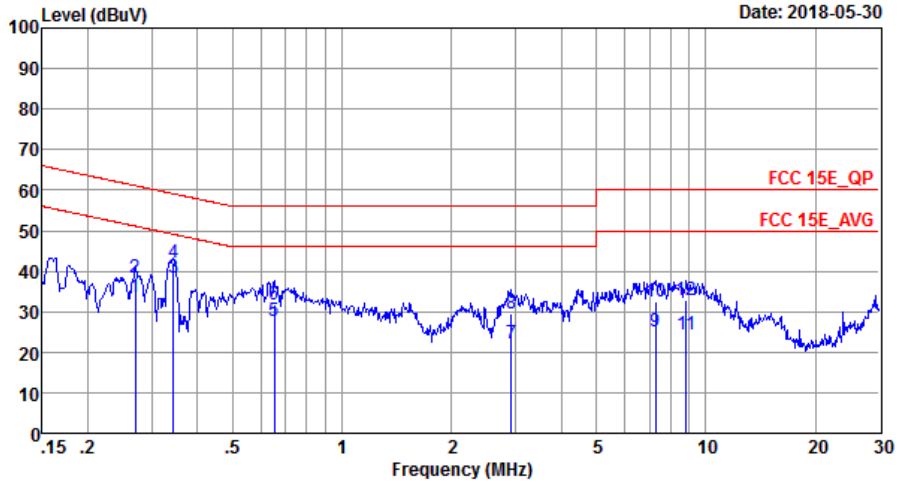
Test Engineer :	Zhang Xu	**Temperature :**	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line



Site : CO01-SZ
Condition: FCC 15E_QP LISN_20170907_L LINE
Project : 852504
Mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.27	30.81	-20.22	51.03	20.70	0.03	10.08	Average
2		0.27	36.21	-24.82	61.03	26.10	0.03	10.08	QP
3		0.30	30.71	-19.66	50.37	20.60	0.03	10.08	Average
4		0.30	35.91	-24.46	60.37	25.80	0.03	10.08	QP
5	*	0.35	31.91	-17.14	49.05	21.80	0.03	10.08	Average
6		0.35	38.71	-20.34	59.05	28.60	0.03	10.08	QP
7		1.23	20.18	-25.82	46.00	10.01	0.08	10.09	Average
8		1.23	27.68	-28.32	56.00	17.51	0.08	10.09	QP
9		2.76	23.38	-22.62	46.00	13.10	0.15	10.13	Average
10		2.76	30.88	-25.12	56.00	20.60	0.15	10.13	QP
11		8.82	25.42	-24.58	50.00	14.80	0.31	10.31	Average
12		8.82	32.92	-27.08	60.00	22.30	0.31	10.31	QP

Test Engineer :	Zhang Xu	Temperature :	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-SZ
Condition: FCC 15E_QP LISN_20170907_N NEUTRAL
Project : 852504
Mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.27	33.71	-17.41	51.12	23.60	0.03	10.08	Average
2		0.27	38.21	-22.91	61.12	28.10	0.03	10.08	QP
3	*	0.34	38.41	-10.68	49.09	28.30	0.03	10.08	Average
4		0.34	41.91	-17.18	59.09	31.80	0.03	10.08	QP
5		0.65	27.80	-18.20	46.00	17.70	0.02	10.08	Average
6		0.65	31.90	-24.10	56.00	21.80	0.02	10.08	QP
7		2.92	21.97	-24.03	46.00	11.80	0.03	10.14	Average
8		2.92	29.37	-26.63	56.00	19.20	0.03	10.14	QP
9		7.29	24.94	-25.06	50.00	14.60	0.08	10.26	Average
10		7.29	32.54	-27.46	60.00	22.20	0.08	10.26	QP
11		8.82	24.43	-25.57	50.00	13.99	0.13	10.31	Average
12		8.82	32.93	-27.07	60.00	22.49	0.13	10.31	QP

Appendix C. Radiated Spurious Emission

Band 1 - 5150~5250MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		5082.68	53.62	-20.38	74	42.74	32.22	6.05	27.39	174	34	P	H
		5050.7	42.88	-11.12	54	32.05	32.21	6.05	27.43	174	34	A	H
	*	5180	98.01	-	-	86.96	32.25	6.04	27.24	174	34	P	H
	*	5180	91.7	-	-	80.65	32.25	6.04	27.24	174	34	A	H
		5147.16	53.31	-20.69	74	42.31	32.24	6.04	27.28	276	291	P	V
		5147.68	45.1	-8.9	54	34.1	32.24	6.04	27.28	276	291	A	V
	*	5180	107.69	-	-	96.64	32.25	6.04	27.24	276	291	P	V
	*	5180	102.19	-	-	91.14	32.25	6.04	27.24	276	291	A	V
802.11a CH 44 5220MHz		5077.22	52.61	-21.39	74	41.73	32.22	6.05	27.39	160	33	P	H
		5024.7	42.78	-11.22	54	31.97	32.21	6.06	27.46	160	33	A	H
	*	5220	98.12	-	-	87.04	32.26	6.03	27.21	160	33	P	H
	*	5220	91.61	-	-	80.53	32.26	6.03	27.21	160	33	A	H
		5408.2	51.52	-22.48	74	40.1	32.32	6.01	26.91	160	33	P	H
		5457.76	42.37	-11.63	54	30.81	32.34	6.06	26.84	160	33	A	H
		5073.06	51.84	-22.16	74	40.96	32.22	6.05	27.39	256	295	P	V
		5124.02	43.93	-10.07	54	32.97	32.24	6.04	27.32	256	295	A	V
	*	5220	107.45	-	-	96.37	32.26	6.03	27.21	256	295	P	V
	*	5220	101.48	-	-	90.4	32.26	6.03	27.21	256	295	A	V
		5411.56	51.59	-22.41	74	40.16	32.33	6.01	26.91	256	295	P	V
		5412.12	42.65	-11.35	54	31.22	32.33	6.01	26.91	256	295	A	V

802.11a CH 48 5240MHz		5007.8	51.87	-22.13	74	41.11	32.2	6.06	27.5	171	31	P	H
		5059.54	42.71	-11.29	54	31.87	32.22	6.05	27.43	171	31	A	H
	*	5240	98.31	-	-	87.18	32.27	6.03	27.17	171	31	P	H
	*	5240	91.76	-	-	80.63	32.27	6.03	27.17	171	31	A	H
		5432.84	50.65	-23.35	74	39.12	32.34	6.06	26.87	171	31	P	H
		5450.76	42.54	-11.46	54	30.98	32.34	6.06	26.84	171	31	A	H
		5033.02	53.12	-20.88	74	42.31	32.21	6.06	27.46	262	293	P	V
		5143.78	44.07	-9.93	54	33.07	32.24	6.04	27.28	262	293	A	V
	*	5240	107.18	-	-	96.05	32.27	6.03	27.17	262	293	P	V
	*	5240	101.89	-	-	90.76	32.27	6.03	27.17	262	293	A	V
		5439	52.12	-21.88	74	40.59	32.34	6.06	26.87	262	293	P	V
		5432	42.82	-11.18	54	31.29	32.34	6.06	26.87	262	293	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11a (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)
802.11a CH 36 5180MHz		10360	47.65	-26.35	74	56.02	38.25	9.23	55.85	152	260	P	H
		15540	48.68	-25.32	74	54.54	38.94	11.93	56.73	189	238	P	H
		10360	48.29	-25.71	74	56.66	38.25	9.23	55.85	121	225	P	V
		15540	49.57	-24.43	74	55.43	38.94	11.93	56.73	185	210	P	V
802.11a CH 44 5220MHz		10440	48.24	-25.76	74	56.56	38.31	9.25	55.88	150	230	P	H
		15660	48.48	-25.52	74	54.36	38.54	12.07	56.49	160	225	P	H
		10440	47.88	-26.12	74	56.2	38.31	9.25	55.88	110	230	P	V
		15660	49.14	-24.86	74	55.02	38.54	12.07	56.49	160	228	P	V
802.11a CH 48 5240MHz		10480	46.89	-27.11	74	55.17	38.36	9.26	55.9	189	12	P	H
		15720	49.18	-24.82	74	55.11	38.31	12.11	56.35	198	226	P	H
		10480	46.87	-27.13	74	55.15	38.36	9.26	55.9	150	120	P	V
		15720	48.5	-25.5	74	54.43	38.31	12.11	56.35	200	89	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5054.86	52.41	-21.59	74	41.57	32.22	6.05	27.43	108	31	P	H
		5037.44	43.54	-10.46	54	32.74	32.21	6.05	27.46	108	31	A	H
802.11n	*	5180	98.78	-	-	87.73	32.25	6.04	27.24	108	31	P	H
HT20	*	5180	92.43	-	-	81.38	32.25	6.04	27.24	108	31	A	H
CH 36		5090.74	54.1	-19.9	74	43.21	32.23	6.05	27.39	150	38	P	V
5180MHz		5148.46	46.3	-7.7	54	35.3	32.24	6.04	27.28	150	38	A	V
	*	5180	107.69	-	-	96.64	32.25	6.04	27.24	150	38	P	V
	*	5180	101.94	-	-	90.89	32.25	6.04	27.24	150	38	A	V
		5113.1	53.5	-20.5	74	42.57	32.23	6.05	27.35	105	35	P	H
		5027.04	43.62	-10.38	54	32.81	32.21	6.06	27.46	105	35	A	H
	*	5220	98.16	-	-	87.08	32.26	6.03	27.21	105	35	P	H
	*	5220	92.09	-	-	81.01	32.26	6.03	27.21	105	35	A	H
802.11n		5425.44	51.01	-22.99	74	39.54	32.33	6.01	26.87	105	35	P	H
HT20		5451.36	42.95	-11.05	54	31.39	32.34	6.06	26.84	105	35	A	H
CH 44		5128.7	52.93	-21.07	74	41.97	32.24	6.04	27.32	160	44	P	V
5220MHz		5124.02	44.96	-9.04	54	34	32.24	6.04	27.32	160	44	A	V
	*	5220	107.85	-	-	96.77	32.26	6.03	27.21	160	44	P	V
	*	5220	101.47	-	-	90.39	32.26	6.03	27.21	160	44	A	V
		5460	52.24	-21.76	74	40.68	32.34	6.06	26.84	160	44	P	V
		5455.92	43.38	-10.62	54	31.82	32.34	6.06	26.84	160	44	A	V

		5078.52	52.73	-21.27	74	41.85	32.22	6.05	27.39	100	35	P	H
		5054.34	43.65	-10.35	54	32.82	32.21	6.05	27.43	100	35	A	H
	*	5240	98.26	-	-	87.13	32.27	6.03	27.17	100	35	P	H
	*	5240	92.96	-	-	81.83	32.27	6.03	27.17	100	35	A	H
802.11n		5450.16	51.33	-22.67	74	39.77	32.34	6.06	26.84	100	35	P	H
HT20		5440.56	43.01	-10.99	54	31.48	32.34	6.06	26.87	100	35	A	H
CH 48		5093.6	52.05	-21.95	74	41.12	32.23	6.05	27.35	157	45	P	V
5240MHz		5144.04	45.24	-8.76	54	34.24	32.24	6.04	27.28	157	45	A	V
	*	5240	107.07	-	-	95.94	32.27	6.03	27.17	157	45	P	V
	*	5240	101.06	-	-	89.93	32.27	6.03	27.17	157	45	A	V
		5352	51.44	-22.56	74	40.1	32.31	6.01	26.98	157	45	P	V
		5431.92	43.59	-10.41	54	32.06	32.34	6.06	26.87	157	45	A	V

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

Band 1 5150~5250MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		10360	47.01	-26.99	74	55.38	38.25	9.23	55.85	152	260	P	H
HT20		15540	48.39	-25.61	74	54.25	38.94	11.93	56.73	189	238	P	H
CH 36		10360	47.34	-26.66	74	55.71	38.25	9.23	55.85	121	225	P	V
5180MHz		15540	48.85	-25.15	74	54.71	38.94	11.93	56.73	185	210	P	V
802.11n		10440	47.27	-26.73	74	55.59	38.31	9.25	55.88	110	230	P	H
HT20		15660	48.86	-25.14	74	54.74	38.54	12.07	56.49	160	228	P	H
CH 44		10440	48.6	-25.4	74	56.92	38.31	9.25	55.88	150	230	P	V
5220MHz		15660	48.54	-25.46	74	54.42	38.54	12.07	56.49	160	225	P	V
802.11n		10480	47.03	-26.97	74	55.31	38.36	9.26	55.9	189	12	P	H
HT20		15720	48.91	-25.09	74	54.84	38.31	12.11	56.35	198	226	P	H
CH 48		10480	47.03	-26.97	74	55.31	38.36	9.26	55.9	189	12	P	V
5240MHz		15720	48.61	-25.39	74	54.54	38.31	12.11	56.35	198	226	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5082.94	53.62	-20.38	74	42.74	32.22	6.05	27.39	100	36	P	H
		5149.76	47.1	-6.9	54	36.1	32.24	6.04	27.28	100	36	A	H
	*	5190	97.08	-	-	86.03	32.25	6.04	27.24	100	36	P	H
	*	5190	91.17	-	-	80.12	32.25	6.04	27.24	100	36	A	H
802.11n		5431.44	51.34	-22.66	74	39.81	32.34	6.06	26.87	100	36	P	H
HT40		5444.6	43.69	-10.31	54	32.16	32.34	6.06	26.87	100	36	A	H
CH 38		5149.24	58.2	-15.8	74	47.2	32.24	6.04	27.28	126	38	P	V
5190MHz		5150	52.64	-1.36	54	41.64	32.24	6.04	27.28	126	38	A	V
	*	5190	106.03	-	-	94.98	32.25	6.04	27.24	126	38	P	V
	*	5190	99.81	-	-	88.76	32.25	6.04	27.24	126	38	A	V
		5385.8	51.2	-22.8	74	39.82	32.32	6.01	26.95	126	38	P	V
		5456.64	43.9	-10.1	54	32.34	32.34	6.06	26.84	126	38	A	V
		5145.08	53.59	-20.41	74	42.59	32.24	6.04	27.28	100	36	P	H
		5000.26	43.92	-10.08	54	33.2	32.16	6.06	27.5	100	36	A	H
	*	5230	97.48	-	-	86.35	32.27	6.03	27.17	100	36	P	H
	*	5230	91.36	-	-	80.23	32.27	6.03	27.17	100	36	A	H
802.11n		5357.04	51.09	-22.91	74	39.75	32.31	6.01	26.98	100	36	P	H
HT40		5433.12	43.47	-10.53	54	31.94	32.34	6.06	26.87	100	36	A	H
CH 46		5124.02	53.36	-20.64	74	42.4	32.24	6.04	27.32	144	37	P	V
5230MHz		5149.5	45.4	-8.6	54	34.4	32.24	6.04	27.28	144	37	A	V
	*	5230	106.19	-	-	95.06	32.27	6.03	27.17	144	37	P	V
	*	5230	99.82	-	-	88.69	32.27	6.03	27.17	144	37	A	V
		5354.4	58.03	-15.97	74	46.69	32.31	6.01	26.98	144	37	P	V
		5449.68	43.96	-10.04	54	32.43	32.34	6.06	26.87	144	37	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		10380	47.61	-26.39	74	55.97	38.26	9.24	55.86	150	178	P	H
HT40		15570	49	-25	74	54.86	38.82	11.98	56.66	155	360	P	H
CH 38		10380	47.36	-26.64	74	55.72	38.26	9.24	55.86	150	360	P	V
5190MHz		15570	48.25	-25.75	74	54.11	38.82	11.98	56.66	155	147	P	V
802.11n		10460	46.97	-27.03	74	55.27	38.32	9.26	55.88	150	360	P	H
HT40		15690	48.91	-25.09	74	54.8	38.42	12.11	56.42	150	225	P	H
CH 46		10460	46.98	-27.02	74	55.28	38.32	9.26	55.88	151	360	P	V
5230MHz		15690	49.43	-24.57	74	55.32	38.42	12.11	56.42	159	241	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11ac VHT80 (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)
		5122.2	52	-22	74	41.05	32.23	6.04	27.32	108	33	P	H
		5146.9	44.1	-9.9	54	33.1	32.24	6.04	27.28	108	33	A	H
	*	5210	88.75	-	-	77.67	32.26	6.03	27.21	108	33	P	H
	*	5210	82.59	-	-	71.51	32.26	6.03	27.21	108	33	A	H
802.11ac		5418	51.16	-22.84	74	39.73	32.33	6.01	26.91	108	33	P	H
VHT80		5435.28	43.18	-10.82	54	31.65	32.34	6.06	26.87	108	33	A	H
CH 42		5148.2	55.06	-18.94	74	44.06	32.24	6.04	27.28	242	99	P	V
5210MHz		5148.2	48.02	-5.98	54	37.02	32.24	6.04	27.28	242	99	A	V
	*	5210	97.46	-	-	86.38	32.26	6.03	27.21	242	99	P	V
	*	5210	90.94	-	-	79.86	32.26	6.03	27.21	242	99	A	V
		5351.76	51.8	-22.2	74	40.46	32.31	6.01	26.98	242	99	P	V
		5353.44	43.68	-10.32	54	32.34	32.31	6.01	26.98	242	99	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11ac VHT80 (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)
802.11ac		10420	46.04	-27.96	74	54.37	38.29	9.25	55.87	150	360	P	H
VHT80		15630	49.1	-24.9	74	55.01	38.59	12.02	56.52	155	360	P	H
CH 42		10420	47.12	-26.88	74	55.45	38.29	9.25	55.87	150	360	P	V
5210MHz		15630	48.46	-25.54	74	54.37	38.59	12.02	56.52	155	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

WIFI 802.11n HT40 (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 LF		30	24.68	-15.32	40	31.5	24.9	0.25	31.97	-	-	P	H
		127.97	18.59	-24.91	43.5	31.49	17.54	1.18	31.62	-	-	P	H
		266.68	20.86	-25.14	46	30.4	19.93	1.76	31.23	-	-	P	H
		602.3	28.28	-17.72	46	31.03	25.82	2.7	31.27	-	-	P	H
		827.34	32.04	-13.96	46	31.29	28.72	3.21	31.18	-	-	P	H
		954.41	33.08	-12.92	46	30.99	29.95	3.48	31.34	183	26	P	H
		30	24.16	-15.84	40	30.98	24.9	0.25	31.97	-	-	P	V
		59.1	25.37	-14.63	40	44.3	12.16	0.82	31.91	-	-	P	V
		145.43	19.61	-23.89	43.5	32.66	17.26	1.25	31.56	-	-	P	V
		317.12	23.11	-22.89	46	32.55	19.84	1.94	31.22	-	-	P	V
		693.48	29.87	-16.13	46	31.56	26.64	2.92	31.25	-	-	P	V
		954.41	32.99	-13.01	46	30.9	29.95	3.48	31.34	100	0	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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

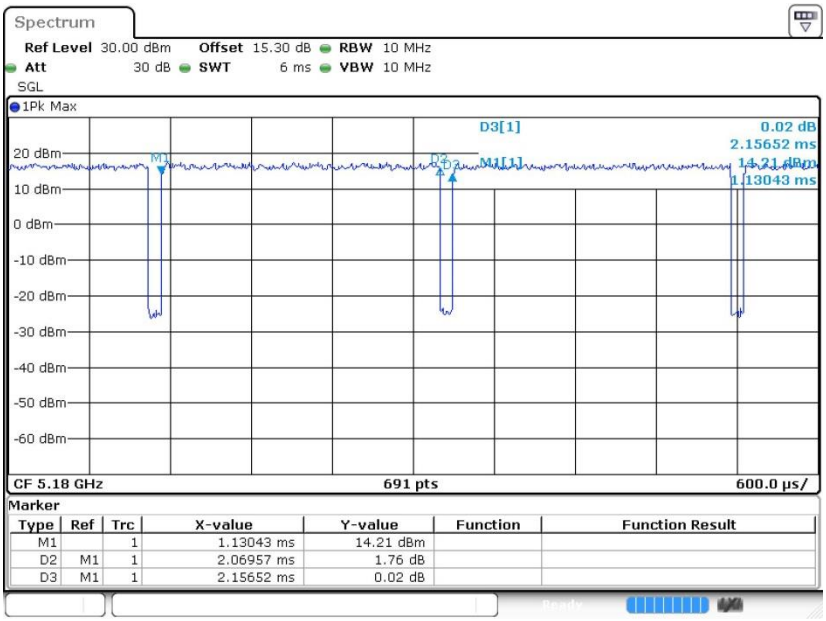
Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1+2	802.11a	95.97	2.070	0.483	1kHz
1+2	802.11n HT20	95.69	1.930	0.518	1kHz
1+2	802.11n HT40	91.60	0.948	1.055	3kHz
1+2	802.11ac VHT80	84.03	0.465	2.150	3kHz

Ant.1+2

802.11a



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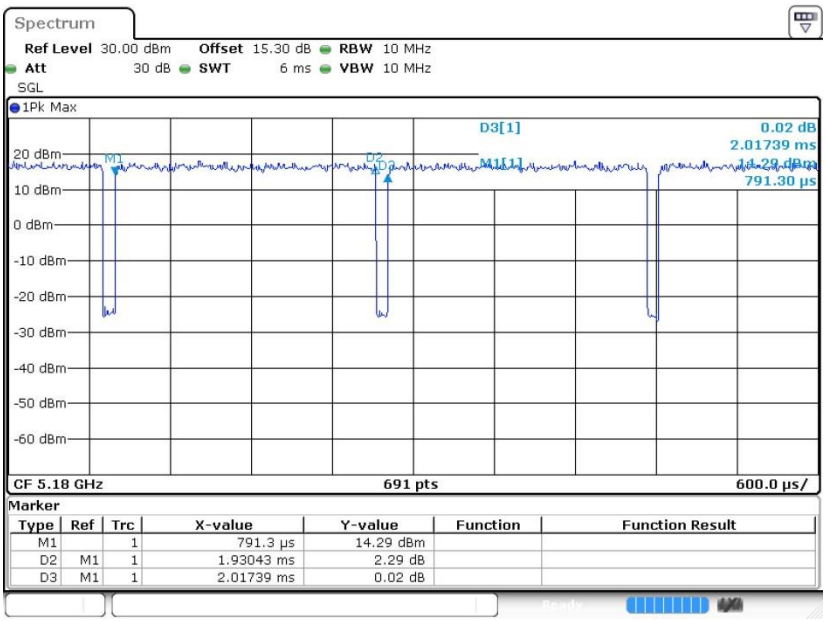
Ant.1+2

802.11n HT20



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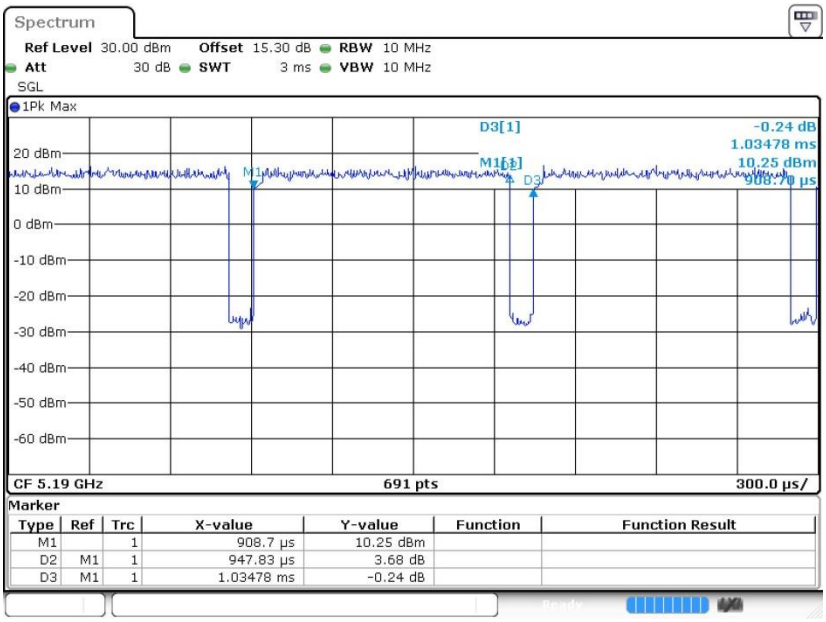
802.11n HT40



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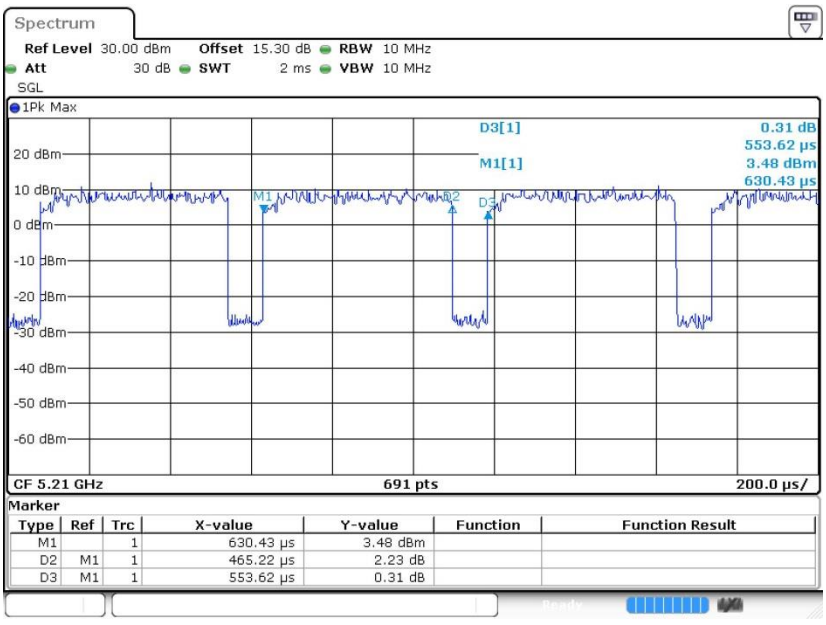
802.11ac VHT80



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