FCC RF Test Report

APPLICANT	:	**Motorola Mobility LLC**
EQUIPMENT	:	**Mobile Cellular Phone**
BRAND NAME	:	**Motorola**
MODEL NAME	:	**XT1970-1,XT1970-2**
FCC ID	:	**IHDT56XT1**
STANDARD	:	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	:	**(NII) Unlicensed National Information Infrastructure**

The product was received on Dec. 20, 2018 and testing was completed on Jan. 30, 2019. 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.

James Huang

NVLAP TESTING
NVLAP LAB CODE 600155-0

Approved by: James Huang / Manager

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR8D2002E	Rev. 01	Initial issue of report	Mar. 01, 2019

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) &15.209(a)	Pass	Under limit 8.64 dB at 38.73 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.57 dB at 0.158 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

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT1970-1, XT1970-2
FCC ID	IHDT56XT1
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ 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 Bluetooth BR/EDR/LE NFC/GNSS/FM Receiver
IMEI Code	Radiation: N/A Conducted: 352170100017578/352170100017586 Conduction: 352170100023196/352170100023204
HW Version	DVT2
SW Version	PSA29.76
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples are only for SIM slot, sample 1(model name XT1970-1) is dual SIM slot, sample 2(model name XT1970-2) is single SIM slot. According to the difference, we evaluate is not affect RF performance, so only choose sample 1 to perform RF test.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power	**<5745 MHz ~ 5825 MHz>** 802.11a : 18.30 dBm / 0.0676 W 802.11n HT20 : 18.32 dBm / 0.0679 W 802.11n HT40 : 17.06 dBm / 0.0508 W 802.11ac VHT20: 18.41 dBm / 0.0693 W 802.11ac VHT40: 17.03 dBm / 0.0505 W 802.11ac VHT80: 15.13 dBm / 0.0326 W
99% Occupied Bandwidth	802.11a : 18.88 MHz 802.11n HT40 : 41.66 MHz 802.11n VHT20 : 20.18 MHz 802.11ac VHT80 : 80.20 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Antenna Type / Gain	Monopole Antenna with gain -4.50 dBi

Note: For 802.11n HT20 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing have assessed only 802.11an HT40/ 802.11ac VHT20 by referring to their maximum conducted power.

1.5 Modification of EUT

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

1.6 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	Brand Name	Motorola (Salom)	Model Name	SC-51
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 1(EU)	Brand Name	Motorola (Salom)	Model Name	SC-52
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 1(UK)	Brand Name	Motorola (Salom)	Model Name	SC-53
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 1(IN)	Brand Name	Motorola (Salom)	Model Name	SC-54
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 1(AU)	Brand Name	Motorola (Salom)	Model Name	SC-55
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 1(AR)	Brand Name	Motorola (Salom)	Model Name	SC-56
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 1(BR)	Brand Name	Motorola (Salom)	Model Name	SC-57
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 1(PRC)	Brand Name	Motorola (Salom)	Model Name	SC-58
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 1(Chile)	Brand Name	Motorola (Salom)	Model Name	SC-52
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 2(US)	Brand Name	Motorola (Chenyang)	Model Name	SC-51
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 2(EU)	Brand Name	Motorola (Chenyang)	Model Name	SC-52
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 2(UK)	Brand Name	Motorola (Chenyang)	Model Name	SC-53
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 2(AU)	Brand Name	Motorola (Chenyang)	Model Name	SC-55
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 2(AR)	Brand Name	Motorola (Chenyang)	Model Name	SC-56
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		

AC Adapter 2(PRC)	**Brand Name**	Motorola (Chenyang)	**Model Name**	SC-58
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 3(BR)	**Brand Name**	Motorola (Salom/Flex)	**Model Name**	SC-57
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
AC Adapter 4(BR)	**Brand Name**	Motorola (Tenpao/Cliptech)	**Model Name**	SC-57
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 5Vdc,3000mA; 9Vdc,2000mA; 12Vdc,1500mA		
Battery	**Brand Name**	Motorola (ATL)	**Model Name**	KR40
	Power Rating	3.8Vdc,3500mAh	**Type**	Li-ion, Polymer
Earphone 1	**Brand Name**	Motorola (Lyand)	**Model Name**	SH38C37773
	Signal Line	1.1 meter, non-shielded cable, without ferrite core		
Earphone 2	**Brand Name**	Motorola (jiahe)	**Model Name**	SH38C44959
	Signal Line	1.1 meter, non-shielded cable, without ferrite core		
USB Cable 1	**Brand Name**	Motorola (LiQi)	**Model Name**	L32B-053000100/L32B-053000100L
	Signal Line	1.0 meter, shielded cable, without ferrite core		
USB Cable 2	**Brand Name**	Motorola (Saibao)	**Model Name**	S32B-053000100/S32B-053000100L
	Signal Line	1.0 meter, shielded cable, without ferrite core		
USB Cable 3	**Brand Name**	Motorola (I SHENG)	**Model Name**	SC18C28955
	Signal Line	1.0 meter, shielded cable, without ferrite core		

1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : 86-512-57900158 FAX : 86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	TH01-KS CO01-KS 03CH05-KS	CN5013	630927

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:

- 47 CFR Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ANSI C63.10-2013

Remark:

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

2 Test Configuration of Equipment Under Test

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

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

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155#	5775	165	5825

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

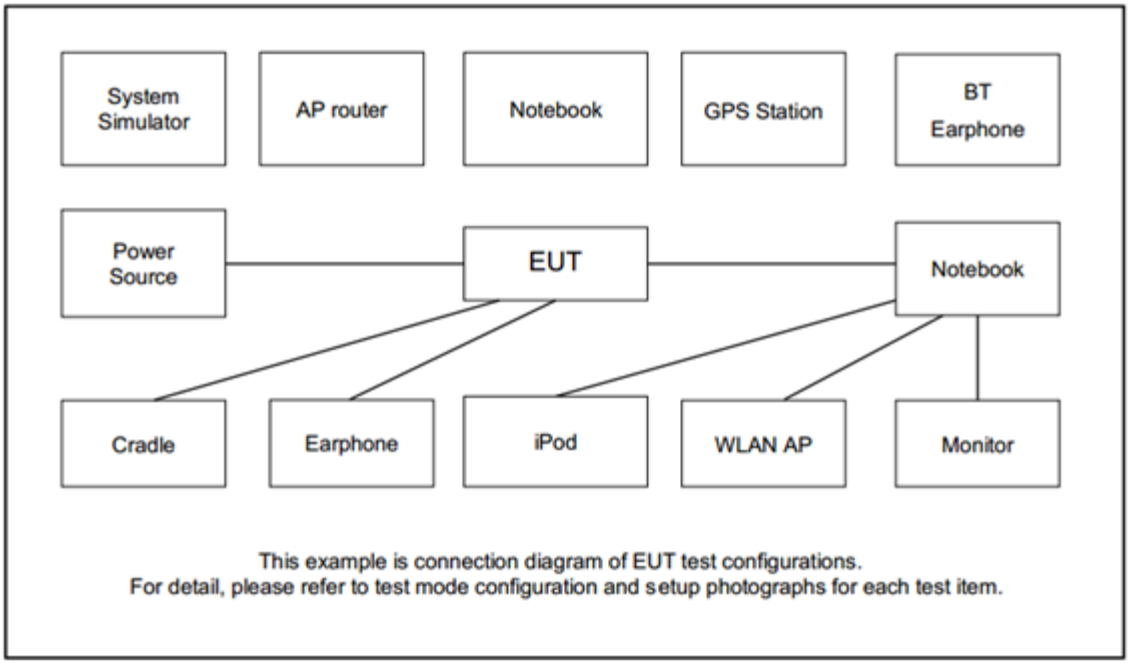
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT80	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : GSM 850 Idle + Bluetooth Link + WLAN Link (5G) + Earphone 2 + USB Cable 2(Charging from adapter 4)
Remark: For Radiated Test Cases, The tests were performance with Adapter 4, Earphone 2, USB Cable 2 .	

Ch. #		Band IV：5725-5850 MHz			
		802.11a	802.11ac VHT20	802.11n HT40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

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.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	WLAN AP	D-link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
4.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.8m DC O/P: Shielded, 1.8 m
5.	SD Card	Kingston	8GB	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 continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the Notebook 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.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 7.7 dB

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

=7.7 (dB)

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

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

26dB and 99% Occupied bandwidth are reporting only.

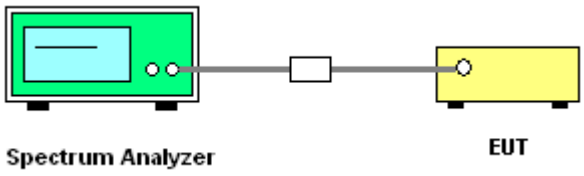
3.1.2 Measuring Instruments

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 for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

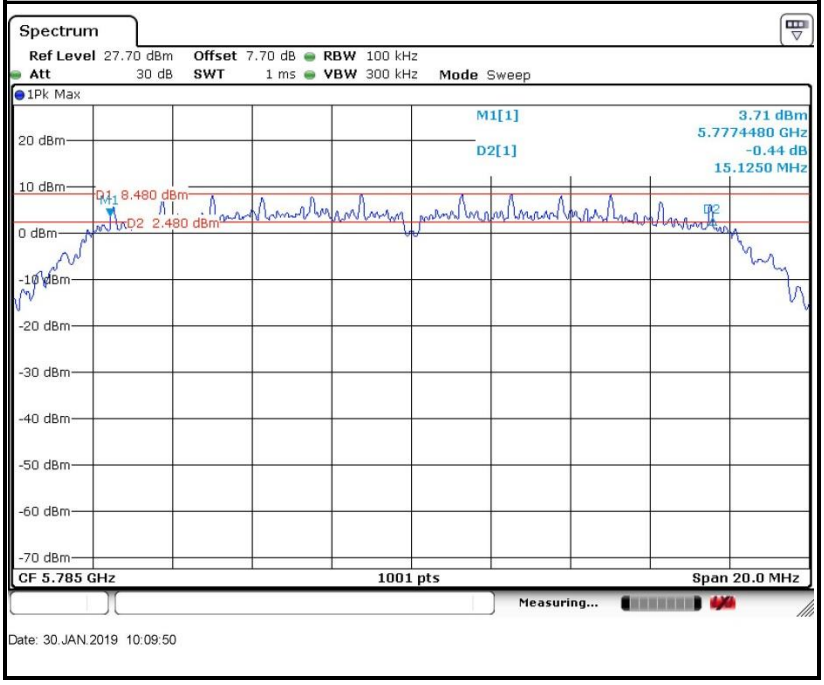
3.1.4 Test Setup



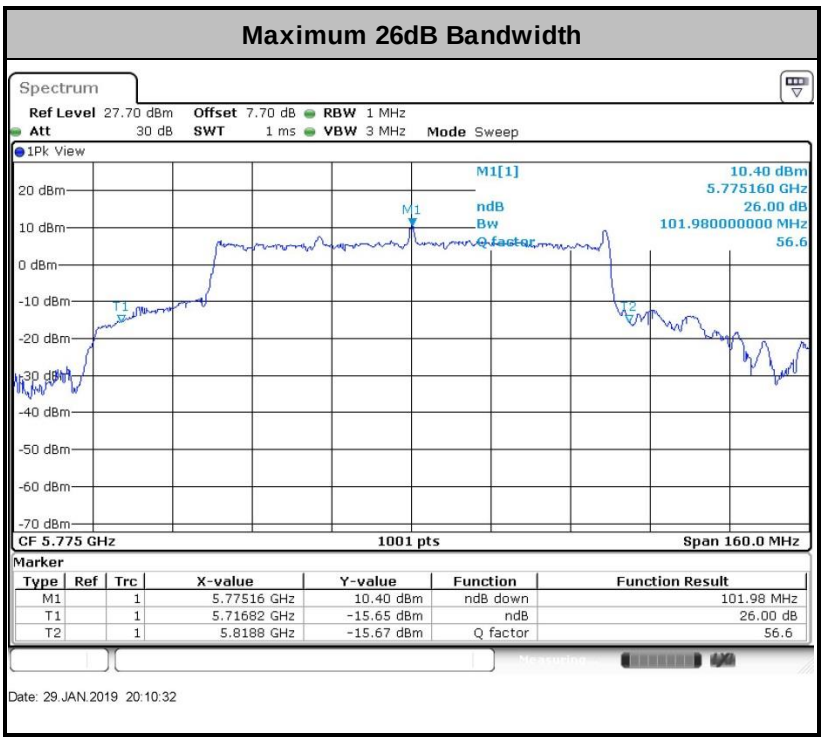
3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

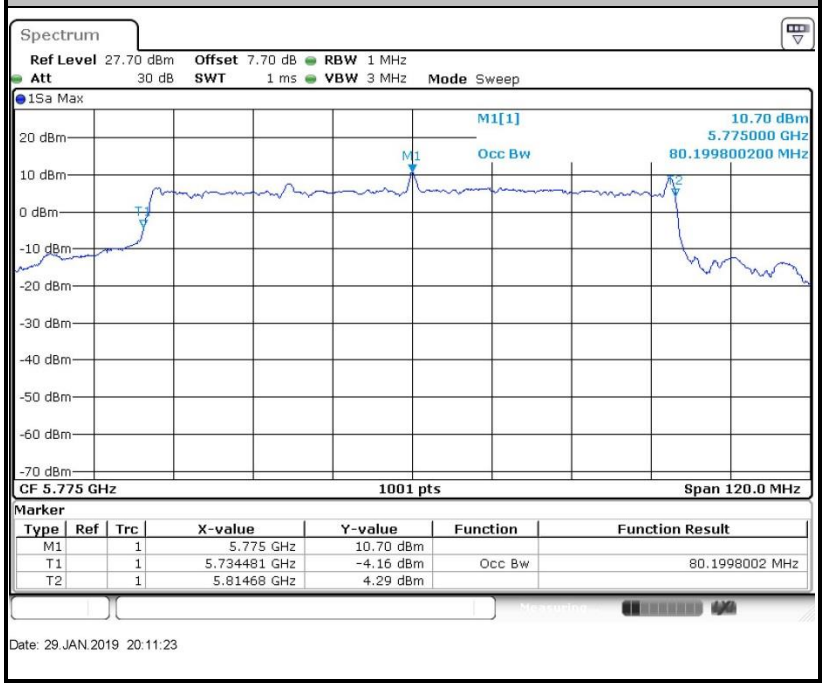
Minimum 6dB Bandwidth



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

For the band 5.725–5.85 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.

3.2.2 Measuring Instruments

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

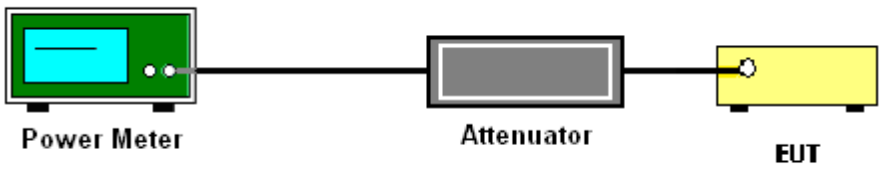
3.2.3 Test Procedures

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

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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

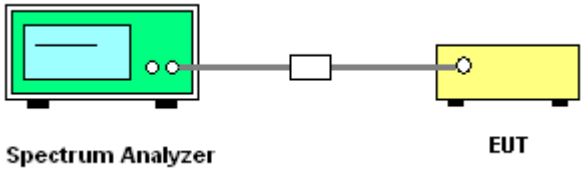
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section F) Maximum power spectral density.

 # 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 = 300 kHz.
- Set VBW ≥ 1 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(500kHz/RBW) to the test result.
- 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.

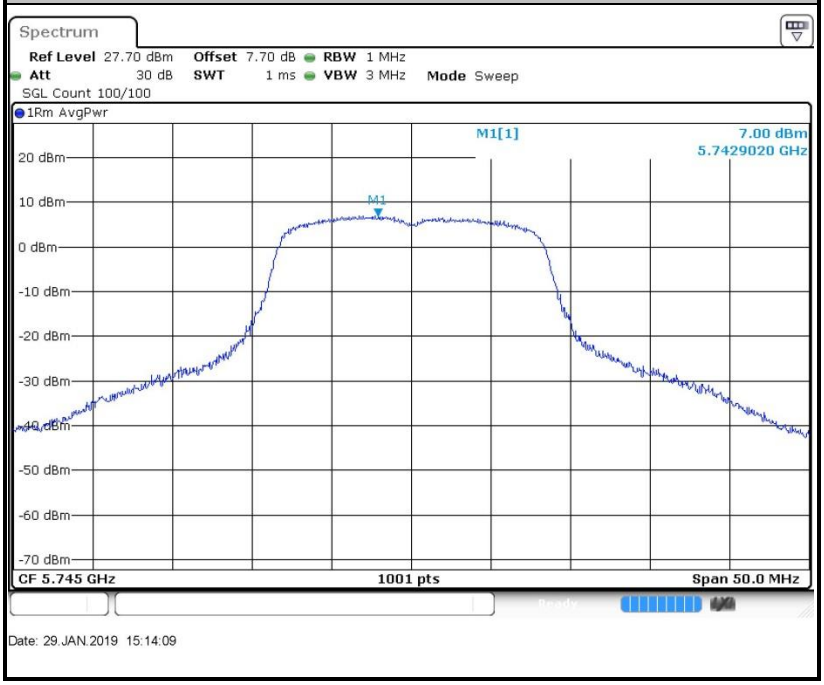
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/MHz)



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 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

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

EIRP (dBm)	Field Strength at 3m (dBµV/m)
- 27	68.2

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

$$EIRP = E_{Meas} + 20\log(d_{Meas}) - 104.7$$

where

EIRP is the equivalent isotropically radiated power, in dBm

E_{Meas} is the field strength of the emission at the measurement distance, in dBµV/m

d_{Meas} is the measurement distance, in m

(3) ANSI C63.10-2013 clause 12.7.3 note 97

As specified by regulatory requirements, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit. However, an out-of-band emission that complies with both the average and peak general regulatory limits is not required to satisfy the peak emission limit.

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.

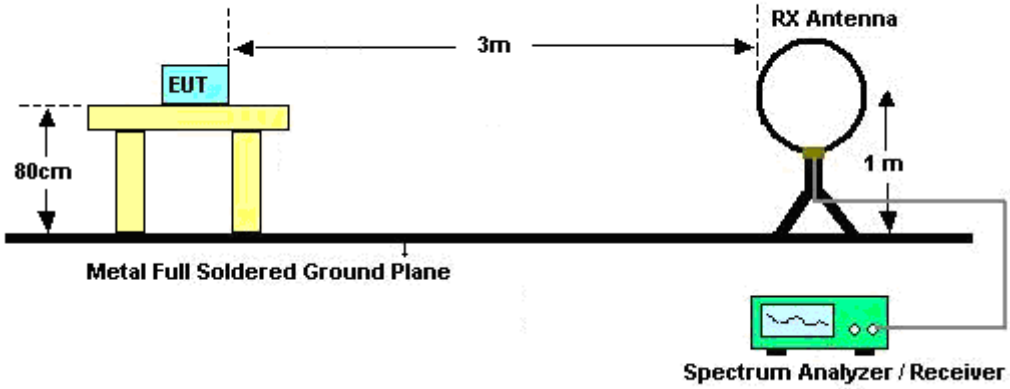
   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (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

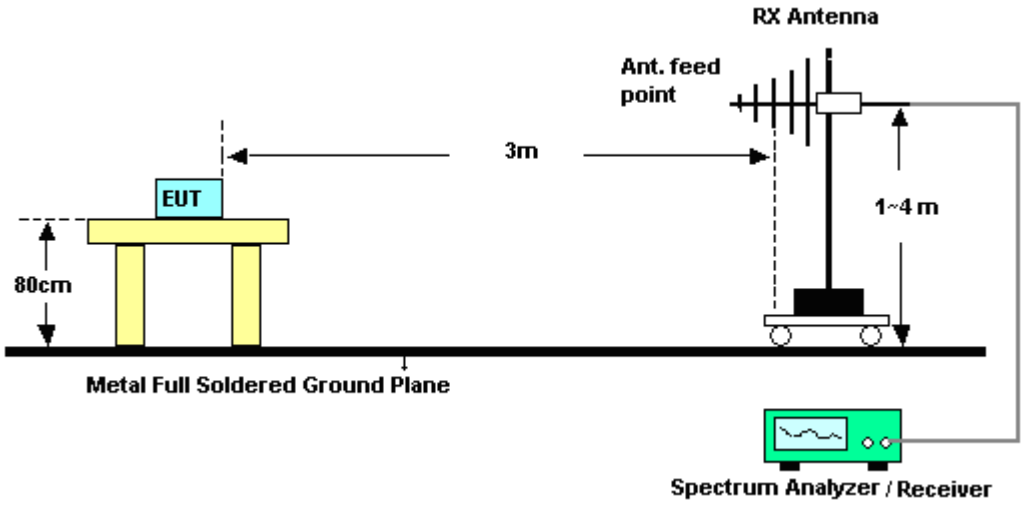
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting 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

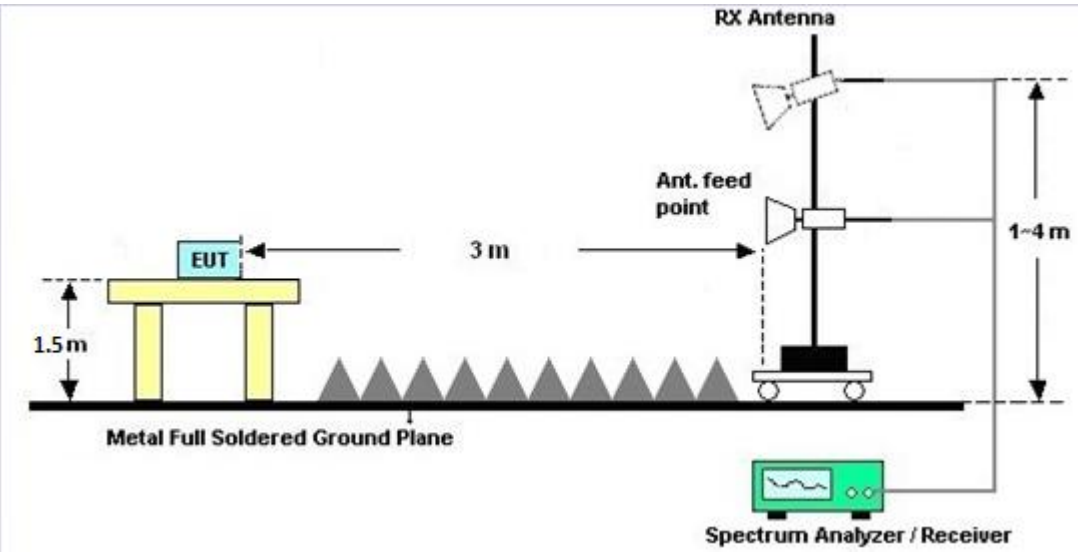
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 Test Results of Radiated 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 Band Edges

Please refer to Appendix C.

3.4.7 Duty Cycle

Please refer to Appendix D.

3.4.8 Test Result of Unwanted Radiated Emission (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.

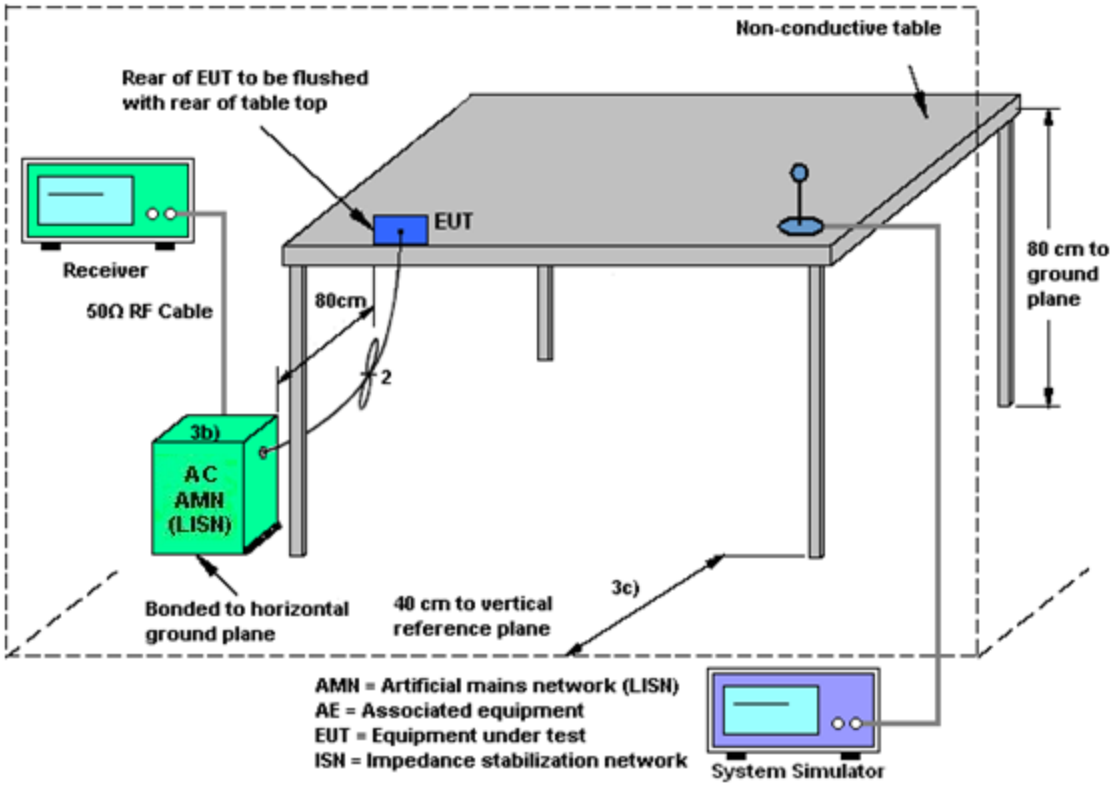
3.5.2 Measuring Instruments

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.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 07, 2018	Jan. 29, 2019~ Jan. 30, 2019	Aug. 06, 2019	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 14, 2019	Jan. 29, 2019~ Jan. 30, 2019	Jan. 13, 2020	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Jan. 29, 2019~ Jan. 30, 2019	Jan. 13, 2020	Conducted (TH01-KS)
Thermal Chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jun. 27, 2018	Jan. 29, 2019~ Jan. 30, 2019	Jun. 26, 2019	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz;Max 30dBm	Jun. 25.2018	Jan. 28, 2019	Jun. 24. 2019	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Apr. 17, 2018	Jan. 28, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Jan. 28, 2019	Oct. 18, 2019	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Jun. 12, 2018	Jan. 28, 2019	Jun. 11, 2019	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Mar. 16, 2018	Jan. 28, 2019	Mar. 15, 2019	Radiation (03CH05-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	Jan. 28, 2019	Feb. 06, 2019	Radiation (03CH05-KS)
Amplifier	com-power	PA-103A	161069	1MHz ~1000MHz / 32 dB	Apr. 17, 2018	Jan. 28, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Feb. 8, 2018	Jan. 28, 2019	Feb. 7, 2019	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Apr. 17. 2018	Jan. 28, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jan. 28, 2019	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jan. 28, 2019	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jan. 28, 2019	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	Jan. 18, 2019	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Jan. 18, 2019	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	Jan. 18, 2019	Nov. 18, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Jan. 18, 2019	Oct. 11, 2019	Conduction (CO01-KS)

5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.9 dB**

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

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

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

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

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

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

Appendix A. Conducted Test Results

Report Number : FR8D2002E

Test Engineer:	iron yao	Temperature:	21~25	°C
Test Date:	2019/1/29~2019/1/30	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 26dB EBW and 99% OBW

Band IV									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	18.88	23.676	15.145	0.5	Pass
11a	6Mbps	1	157	5785	18.48	24.026	15.125	0.5	Pass
11a	6Mbps	1	165	5825	18.08	25.175	15.125	0.5	Pass
HT40	MCS 0	1	151	5755	41.66	63.387	38.162	0.5	Pass
HT40	MCS 0	1	159	5795	40.56	63.387	38.162	0.5	Pass
VHT20	MCS 0	1	149	5745	20.18	27.622	16.044	0.5	Pass
VHT20	MCS 0	1	157	5785	19.93	29.021	15.125	0.5	Pass
VHT20	MCS 0	1	165	5825	19.73	26.673	15.125	0.5	Pass
VHT80	MCS 0	1	155	5775	80.20	101.98	78.002	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6M bps	1	149	5745	0.21	17.87	30.00	-1.30		Pass
11a	6Mbps	1	157	5785	0.21	18.24	30.00	-1.30		Pass
11a	6Mbps	1	165	5825	0.21	18.30	30.00	-1.30		Pass
HT20	MCS 0	1	149	5745	0.23	18.30	30.00	-1.30		Pass
HT20	MCS 0	1	157	5785	0.23	18.32	30.00	-1.30		Pass
HT20	MCS 0	1	165	5825	0.23	18.29	30.00	-1.30		Pass
HT40	MCS 0	1	151	5755	0.55	16.83	30.00	-1.30		Pass
HT40	MCS 0	1	159	5795	0.55	17.06	30.00	-1.30		Pass
VHT20	MCS 0	1	149	5745	0.19	18.10	30.00	-1.30		Pass
VHT20	MCS 0	1	157	5785	0.19	18.41	30.00	-1.30		Pass
VHT20	MCS 0	1	165	5825	0.19	18.30	30.00	-1.30		Pass
VHT40	MCS 0	1	151	5755	0.57	16.65	30.00	-1.30		Pass
VHT40	MCS 0	1	159	5795	0.57	17.03	30.00	-1.30		Pass
VHT80	MCS 0	1	155	5775	1.17	15.13	30.00	-1.30		Pass

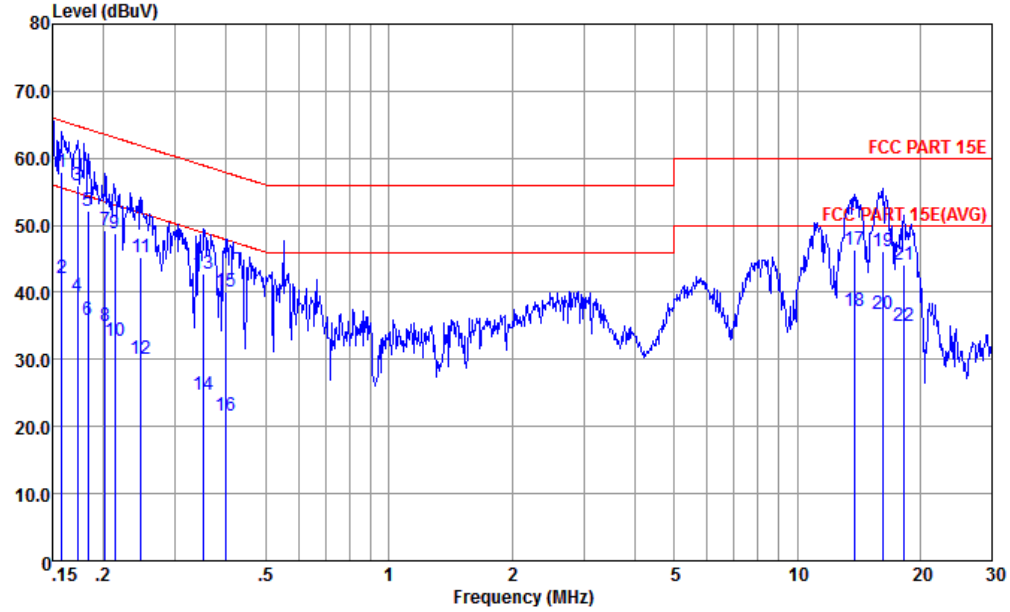
Report Number : FR8D2002E

TEST RESULTS DATA
Power Spectral Density

Band IV										
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.21	2.22	9.43	30.00	-1.30	Pass
11a	6Mbps	1	157	5785	0.21	2.22	5.19	30.00	-1.30	Pass
11a	6Mbps	1	165	5825	0.21	2.22	5.50	30.00	-1.30	Pass
HT20	MCS 0	1	149	5745	0.23	2.22	2.45	30.00	-1.30	Pass
HT20	MCS 0	1	157	5785	0.23	2.22	2.45	30.00	-1.30	Pass
HT20	MCS 0	1	165	5825	0.23	2.22	2.45	30.00	-1.30	Pass
HT40	MCS 0	1	151	5755	0.55	2.22	0.07	30.00	-1.30	Pass
HT40	MCS 0	1	159	5795	0.55	2.22	0.66	30.00	-1.30	Pass
VHT20	MCS 0	1	149	5745	0.19	2.22	5.21	30.00	-1.30	Pass
VHT20	MCS 0	1	157	5785	0.19	2.22	5.54	30.00	-1.30	Pass
VHT20	MCS 0	1	165	5825	0.19	2.22	5.39	30.00	-1.30	Pass
VHT80	MCS 0	1	155	5775	1.17	2.22	-3.62	30.00	-1.30	Pass

Appendix B. AC Conducted Emission Test Results

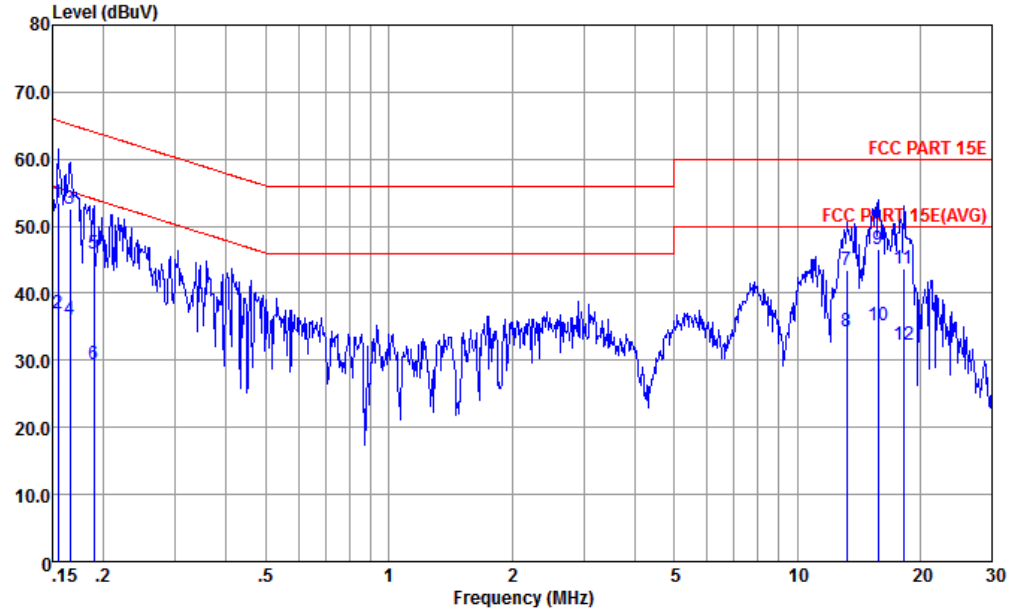
Test Engineer :	Amos Zhao	**Temperature :**	23.3~24.2℃
		Relative Humidity :	38~40 %
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : FCC PART 15E LISN-L-181013-060103 LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	*	0.158	57.99	-7.57	65.56	47.30	0.23	10.46	QP
2		0.158	42.19	-13.37	55.56	31.50	0.23	10.46	Average
3		0.173	55.85	-8.96	64.81	45.20	0.23	10.42	QP
4		0.173	39.45	-15.36	54.81	28.80	0.23	10.42	Average
5		0.183	52.12	-12.21	64.33	41.50	0.22	10.40	QP
6		0.183	35.82	-18.51	54.33	25.20	0.22	10.40	Average
7		0.202	49.18	-14.36	63.54	38.60	0.22	10.36	QP
8		0.202	35.08	-18.46	53.54	24.50	0.22	10.36	Average
9		0.213	48.78	-14.32	63.10	38.20	0.22	10.36	QP
10		0.213	32.78	-20.32	53.10	22.20	0.22	10.36	Average
11		0.247	45.16	-16.70	61.86	34.60	0.22	10.34	QP
12		0.247	30.16	-21.70	51.86	19.60	0.22	10.34	Average
13		0.352	42.71	-16.20	58.91	32.20	0.23	10.28	QP
14		0.352	24.71	-24.20	48.91	14.20	0.23	10.28	Average
15		0.400	40.09	-17.77	57.86	29.59	0.23	10.27	QP
16		0.400	21.69	-26.17	47.86	11.19	0.23	10.27	Average
17		13.768	46.32	-13.68	60.00	35.61	0.33	10.38	QP
18		13.768	37.32	-12.68	50.00	26.61	0.33	10.38	Average
19		16.226	46.02	-13.98	60.00	35.20	0.40	10.42	QP
20		16.226	36.72	-13.28	50.00	25.90	0.40	10.42	Average
21		18.232	44.12	-15.88	60.00	33.20	0.46	10.46	QP
22		18.232	35.02	-14.98	50.00	24.10	0.46	10.46	Average

Test Engineer :	Amos Zhao	**Temperature :**	23.3~24.2℃
		Relative Humidity :	38~40 %
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : FCC PART 15E LISN-N-181013-060103 NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.155	53.57	-12.17	65.74	42.89	0.21	10.47	QP
2	0.155	36.97	-18.77	55.74	26.29	0.21	10.47	Average
3	0.166	52.55	-12.61	65.16	41.90	0.21	10.44	QP
4	0.166	36.15	-19.01	55.16	25.50	0.21	10.44	Average
5	0.189	45.89	-18.17	64.06	35.31	0.20	10.38	QP
6	0.189	29.49	-24.57	54.06	18.91	0.20	10.38	Average
7	13.197	43.53	-16.47	60.00	32.90	0.25	10.38	QP
8	13.197	34.23	-15.77	50.00	23.60	0.25	10.38	Average
9	15.801	46.60	-13.40	60.00	35.90	0.29	10.41	QP
10	15.801	35.30	-14.70	50.00	24.60	0.29	10.41	Average
11	18.232	43.68	-16.32	60.00	32.91	0.31	10.46	QP
12	18.232	32.38	-17.62	50.00	21.61	0.31	10.46	Average

Appendix C. Radiated Spurious Emission

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5636.4	52.08	-16.22	68.3	41.44	34.67	8.55	32.58	285	321	P	H
		5674.4	51.45	-34.95	86.4	40.73	34.7	8.58	32.56	285	321	P	H
		5716.4	51.02	-58.87	109.89	40.19	34.73	8.61	32.51	285	321	P	H
		5723.6	51.16	-67.95	119.11	40.29	34.77	8.61	32.51	285	321	P	H
		5748	87.69	-	-	76.74	34.8	8.64	32.49	285	321	P	H
		5748	80.27	-	-	69.32	34.8	8.64	32.49	285	321	A	H
		5620.8	52.24	-16.06	68.3	41.67	34.63	8.52	32.58	100	2	P	V
		5687.2	52.24	-43.62	95.86	41.5	34.7	8.58	32.54	100	2	P	V
		5719.6	54.94	-55.85	110.79	44.07	34.77	8.61	32.51	100	2	P	V
		5724	53.49	-66.53	120.02	42.62	34.77	8.61	32.51	100	2	P	V
		5742	95.08	-	-	84.13	34.8	8.64	32.49	100	2	P	V
		5742	87.98	-	-	77.03	34.8	8.64	32.49	100	2	A	V

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)
802.11a CH 165 5825MHz		5820	91.62	-	-	80.35	34.97	8.72	32.42	304	285	P	H
		5820	84.47	-	-	73.2	34.97	8.72	32.42	304	285	A	H
		5852	52.4	-65.34	117.74	41.08	35	8.72	32.4	304	285	P	H
		5872.4	53.44	-52.59	106.03	42.02	35.07	8.77	32.42	304	285	P	H
		5875.1	53.19	-52.04	105.23	41.77	35.07	8.77	32.42	304	285	P	H
		5937.6	53.79	-14.51	68.3	42.2	35.17	8.88	32.46	304	285	P	H
		5822	95.81	-	-	84.54	34.97	8.72	32.42	100	185	P	V
		5822	88.57	-	-	77.3	34.97	8.72	32.42	100	185	A	V
		5853.6	54.7	-59.39	114.09	43.35	35.03	8.72	32.4	100	185	P	V
		5856.8	54.23	-56.17	110.4	42.83	35.03	8.77	32.4	100	185	P	V
		5901.6	53.7	-31.88	85.58	42.21	35.1	8.82	32.43	100	185	P	V
		5964.8	53.52	-14.78	68.3	41.89	35.23	8.88	32.48	100	185	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		11490	44.3	-29.7	74	56.31	38.08	12.74	62.83	150	360	P	H
		11490	44.26	-29.74	74	56.27	38.08	12.74	62.83	150	360	P	V
802.11a CH 157 5785MHz		11570	43.69	-30.31	74	55.55	38.17	12.79	62.82	150	360	P	H
		11570	43.73	-30.27	74	55.59	38.17	12.79	62.82	150	360	P	V
802.11a CH 165 5825MHz		11650	43.68	-30.32	74	55.4	38.24	12.85	62.81	150	360	P	H
		11650	45.07	-28.93	74	56.79	38.24	12.85	62.81	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5600.11	52.39	-15.91	68.3	41.85	34.6	8.52	32.58	312	281	P	H
		5698.8	52.21	-52.21	104.42	41.47	34.7	8.58	32.54	312	281	P	H
		5704.4	52.79	-53.74	106.53	41.99	34.73	8.61	32.54	312	281	P	H
		5724.8	53.23	-68.61	121.84	42.36	34.77	8.61	32.51	312	281	P	H
802.11ac		5750	87.76	-	-	76.81	34.8	8.64	32.49	312	281	P	H
VHT20		5750	80.9	-	-	69.95	34.8	8.64	32.49	312	281	A	H
CH 149		5633.2	52.59	-15.71	68.3	41.95	34.67	8.55	32.58	100	2	P	V
5745MHz		5660.8	52.98	-23.34	76.32	42.26	34.7	8.58	32.56	100	2	P	V
		5702.8	52.49	-53.6	106.09	41.69	34.73	8.61	32.54	100	2	P	V
		5722.4	54.13	-62.24	116.37	43.26	34.77	8.61	32.51	100	2	P	V
		5740	94.72	-	-	83.77	34.8	8.64	32.49	100	2	P	V
		5740	87.54	-	-	76.59	34.8	8.64	32.49	100	2	A	V

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)
802.11ac VHT20 CH 165 5825MHz		5822	90.96	-	-	79.69	34.97	8.72	32.42	284	322	P	H
		5822	83.29	-	-	72.02	34.97	8.72	32.42	284	322	A	H
		5852	52.97	-64.77	117.74	41.65	35	8.72	32.4	284	322	P	H
		5863.2	52.7	-55.9	108.6	41.32	35.03	8.77	32.42	284	322	P	H
		5894	53.1	-38.1	91.2	41.66	35.1	8.77	32.43	284	322	P	H
		5934.4	53.64	-14.66	68.3	42.05	35.17	8.88	32.46	284	322	P	H
		5828	95.59	-	-	84.32	34.97	8.72	32.42	105	200	P	V
		5828	88.28	-	-	77.01	34.97	8.72	32.42	105	200	A	V
		5853.2	53.24	-61.76	115	41.92	35	8.72	32.4	105	200	P	V
		5857.2	53.84	-56.44	110.28	42.44	35.03	8.77	32.4	105	200	P	V
		5924.4	53.25	-15.49	68.74	41.71	35.17	8.82	32.45	105	200	P	V
		5948.4	55.86	-12.44	68.3	44.24	35.2	8.88	32.46	105	200	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT20 CH 149 5745MHz		11490	43.2	-30.8	74	55.21	38.08	12.74	62.83	150	360	P	H
		11490	43.66	-30.34	74	55.67	38.08	12.74	62.83	150	360	P	V
802.11ac VHT20 CH 157 5785MHz		11570	44.04	-29.96	74	55.9	38.17	12.79	62.82	150	360	P	H
		11570	44.21	-29.79	74	56.07	38.17	12.79	62.82	150	360	P	V
802.11ac VHT20 CH 165 5825MHz		11650	42.77	-31.23	74	54.49	38.24	12.85	62.81	150	360	P	H
		11650	44.81	-29.19	74	56.53	38.24	12.85	62.81	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5621.6	51.86	-16.44	68.3	41.26	34.63	8.55	32.58	332	283	P	H
		5686.4	52.99	-42.28	95.27	42.25	34.7	8.58	32.54	332	283	P	H
		5701.2	52.44	-53.2	105.64	41.64	34.73	8.61	32.54	332	283	P	H
		5724.8	56.93	-64.91	121.84	46.06	34.77	8.61	32.51	332	283	P	H
		5750	85.51	-	-	74.56	34.8	8.64	32.49	332	283	P	H
		5750	78.07	-	-	67.12	34.8	8.64	32.49	332	283	A	H
		5850.8	52.13	-68.35	120.48	40.81	35	8.72	32.4	332	283	P	H
		5870.8	52.95	-53.52	106.47	41.53	35.07	8.77	32.42	332	283	P	H
802.11n		5915.2	54.22	-21.31	75.53	42.72	35.13	8.82	32.45	332	283	P	H
HT40		5945.2	54.25	-14.05	68.3	42.63	35.2	8.88	32.46	332	283	P	H
CH 151		5612.8	53.24	-15.06	68.3	42.7	34.6	8.52	32.58	100	360	P	V
5755MHz		5662.8	53.64	-24.16	77.8	42.92	34.7	8.58	32.56	100	360	P	V
		5720	53.94	-56.96	110.9	43.07	34.77	8.61	32.51	100	360	P	V
		5724.4	67.05	-53.88	120.93	56.18	34.77	8.61	32.51	100	360	P	V
		5740	90.24	-	-	79.29	34.8	8.64	32.49	100	360	P	V
		5740	83.25	-	-	72.3	34.8	8.64	32.49	100	360	A	V
		5853.6	51.63	-62.46	114.09	40.28	35.03	8.72	32.4	100	360	P	V
		5865.6	52.52	-55.41	107.93	41.14	35.03	8.77	32.42	100	360	P	V
		5884.4	53.24	-45.08	98.32	41.83	35.07	8.77	32.43	100	360	P	V
		5966.8	53.54	-14.76	68.3	41.91	35.23	8.88	32.48	100	360	P	V

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)
802.11n HT40 CH 159 5795MHz		5615.6	52.39	-15.91	68.3	41.82	34.63	8.52	32.58	324	288	P	H
		5697.2	53.31	-49.93	103.24	42.57	34.7	8.58	32.54	324	288	P	H
		5714.8	52.07	-57.38	109.45	41.24	34.73	8.61	32.51	324	288	P	H
		5720.8	51.68	-61.04	112.72	40.81	34.77	8.61	32.51	324	288	P	H
		5812	86	-	-	74.82	34.93	8.67	32.42	324	288	P	H
		5812	78.54	-	-	67.36	34.93	8.67	32.42	324	288	A	H
		5854.4	53.05	-59.22	112.27	41.7	35.03	8.72	32.4	324	288	P	H
		5856.4	53.49	-57.02	110.51	42.09	35.03	8.77	32.4	324	288	P	H
		5883.2	53.22	-45.99	99.21	41.8	35.07	8.77	32.42	324	288	P	H
		5948	53.6	-14.7	68.3	41.98	35.2	8.88	32.46	324	288	P	H
		5649.6	52.72	-15.58	68.3	42.05	34.7	8.55	32.58	100	354	P	V
		5684	52.45	-41.05	93.5	41.71	34.7	8.58	32.54	100	354	P	V
		5705.2	53.72	-53.04	106.76	42.89	34.73	8.61	32.51	100	354	P	V
		5722.4	52.33	-64.04	116.37	41.46	34.77	8.61	32.51	100	354	P	V
		5780	91.08	-	-	80.01	34.87	8.67	32.47	100	354	P	V
		5780	83.96	-	-	72.89	34.87	8.67	32.47	100	354	A	V
		5851.6	52.67	-65.98	118.65	41.35	35	8.72	32.4	100	354	P	V
		5856.4	53.75	-56.76	110.51	42.35	35.03	8.77	32.4	100	354	P	V
		5896.4	53.57	-35.86	89.43	42.08	35.1	8.82	32.43	100	354	P	V
		5944	53.76	-14.54	68.3	42.14	35.2	8.88	32.46	100	354	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz		11510	43.78	-30.22	74	55.77	38.1	12.74	62.83	150	360	P	H
		11510	43.63	-30.37	74	55.62	38.1	12.74	62.83	150	360	P	V
802.11n HT40 CH 159 5795MHz		11590	43.25	-30.75	74	55.06	38.18	12.82	62.81	150	360	P	H
		11590	43.56	-30.44	74	55.37	38.18	12.82	62.81	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5602	52.93	-15.37	68.3	42.39	34.6	8.52	32.58	299	282	P	H
		5654.4	52.3	-19.27	71.57	41.61	34.7	8.55	32.56	299	282	P	H
		5719.6	59.94	-50.85	110.79	49.07	34.77	8.61	32.51	299	282	P	H
		5721.2	62.23	-51.41	113.64	51.36	34.77	8.61	32.51	299	282	P	H
		5756	84.6	-	-	73.6	34.83	8.64	32.47	299	282	P	H
		5756	77.33	-	-	66.33	34.83	8.64	32.47	299	282	A	H
		5851.2	52.36	-67.2	119.56	41.04	35	8.72	32.4	299	282	P	H
		5865.6	54.09	-53.84	107.93	42.71	35.03	8.77	32.42	299	282	P	H
802.11ac		5903.6	53.39	-30.71	84.1	41.9	35.1	8.82	32.43	299	282	P	H
VHT80		5942	53.78	-14.52	68.3	42.16	35.2	8.88	32.46	299	282	P	H
CH 155		5610.4	52.3	-16	68.3	41.76	34.6	8.52	32.58	100	358	P	V
5775MHz		5664.4	52.01	-26.98	78.99	41.29	34.7	8.58	32.56	100	358	P	V
		5719.99	68.06	-42.84	110.9	57.19	34.77	8.61	32.51	100	358	P	V
		5721.6	69.83	-44.72	114.55	58.96	34.77	8.61	32.51	100	358	P	V
		5776	89.26	-	-	78.22	34.87	8.64	32.47	100	358	P	V
		5776	82.07	-	-	71.03	34.87	8.64	32.47	100	358	A	V
		5853.2	56.77	-58.23	115	45.45	35	8.72	32.4	100	358	P	V
		5871.2	54.68	-51.68	106.36	43.26	35.07	8.77	32.42	100	358	P	V
		5876.4	53.85	-50.41	104.26	42.43	35.07	8.77	32.42	100	358	P	V
		5964	53.14	-15.16	68.3	41.51	35.23	8.88	32.48	100	358	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT80 CH 155 5775MHz		11550	43.56	-30.44	74	55.44	38.15	12.79	62.82	150	360	P	H
		11550	45.17	-28.83	74	57.05	38.15	12.79	62.82	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

5GHz 802.11ac VHT20 (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		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11ac VHT20 LF		30	19.02	-20.98	40	25.89	24.5	0.61	31.98	100	0	P	H
		144.46	15.15	-28.35	43.5	28.99	16.87	1.23	31.94	-	-	P	H
		186.17	15.36	-28.14	43.5	30.65	15.23	1.39	31.91	-	-	P	H
		225.94	18.11	-27.89	46	32.68	15.76	1.6	31.93	-	-	P	H
		892.33	24.38	-21.62	46	26.53	26.35	3.01	31.51	-	-	P	H
		978.66	24.56	-29.44	54	24.85	27.27	3.16	30.72	-	-	P	H
		38.73	31.36	-8.64	40	43.3	19.37	0.65	31.96	100	0	P	V
		86.26	20.38	-19.62	40	37.08	14.26	0.97	31.93	-	-	P	V
		188.11	14.99	-28.51	43.5	30.26	15.24	1.4	31.91	-	-	P	V
		310.33	16.2	-29.8	46	27.1	19.28	1.84	32.02	-	-	P	V
		840.92	23.79	-22.21	46	26.66	26.04	2.94	31.85	-	-	P	V
		995.15	25.44	-28.56	54	25.37	27.45	3.19	30.57	-	-	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.	
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)

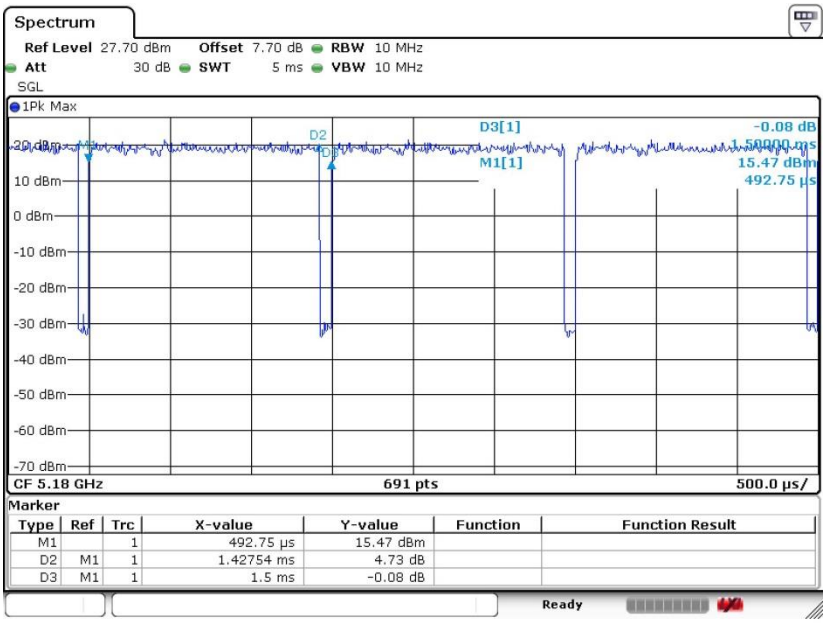
= -10.46(dB)

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

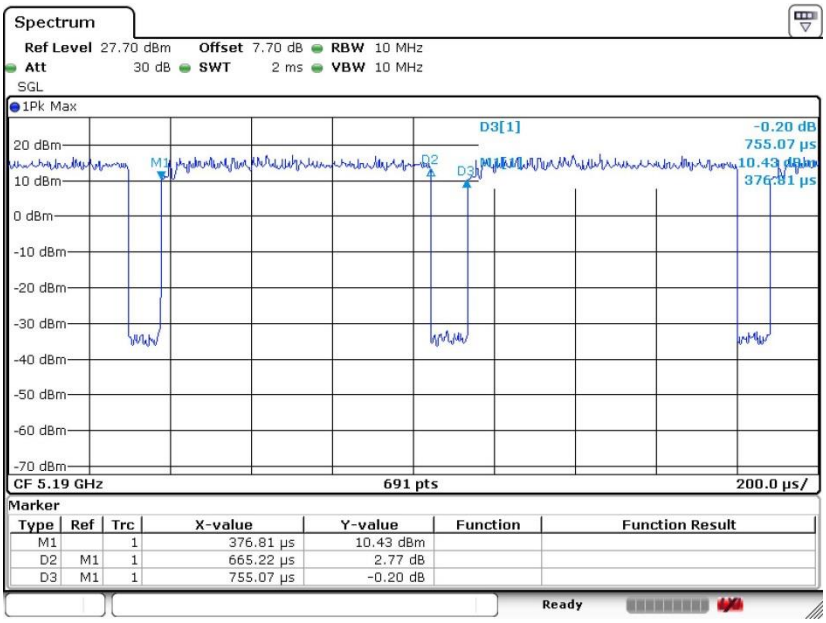
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	95.17	1.428	0.7005	0.75Khz
5GHz 802.11n HT40	88.10	0.665	1.5033	1.6Khz
5GHz 802.11ac VHT20	95.65	1.339	0.7468	0.75Khz
5GHz 802.11ac VHT80	76.35	0.328	3.0531	3.3Khz

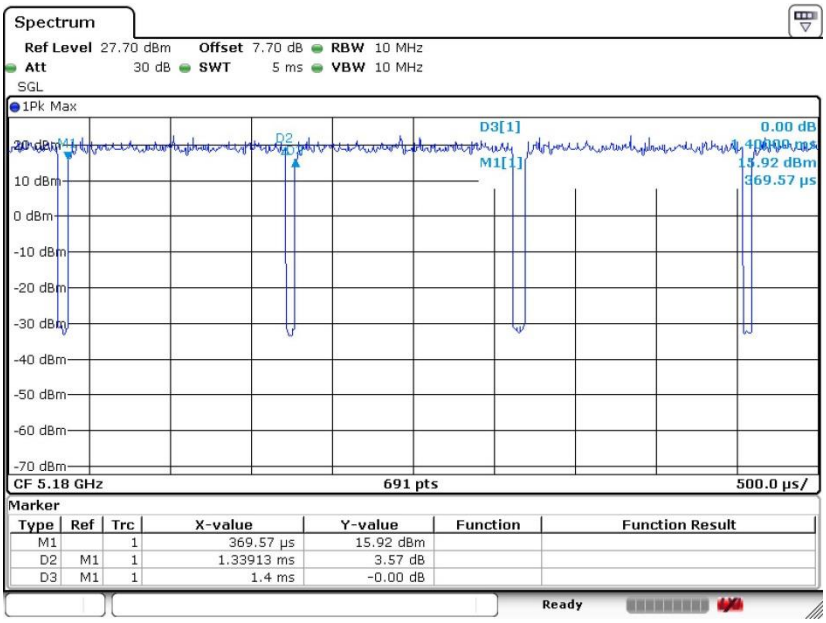
802.11a



802.11n HT40



802.11ac VHT20



802.11ac VHT80