



# FCC RF Test Report

**APPLICANT** : Motorola Mobility LLC  
**EQUIPMENT** : Mobile Cellular Phone  
**BRAND NAME** : Motorola  
**FCC ID** : IHDT56XJ1  
**STANDARD** : FCC Part 15 Subpart E §15.407  
**CLASSIFICATION** : (NII) Unlicensed National Information Infrastructure

The product was received on May 15, 2018 and testing was completed on May 27, 2018. 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.

Approved by: James Huang / Manager



**Sporton International (Kunshan) Inc.**

**No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China**



# TABLE OF CONTENTS

**REVISION HISTORY.....3**

**SUMMARY OF TEST RESULT .....4**

**1 GENERAL DESCRIPTION .....5**

    1.1 Applicant .....5

    1.2 Manufacturer .....5

    1.3 Product Feature of Equipment Under Test.....5

    1.4 Product Specification of Equipment Under Test.....6

    1.5 Specification of Accessory.....6

    1.6 Modification of EUT .....6

    1.7 Testing Location .....7

    1.8 Applicable Standards.....7

**2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST .....8**

    2.1 Carrier Frequency and Channel .....8

    2.2 Test Mode.....9

    2.3 Connection Diagram of Test System.....10

    2.4 Support Unit used in test configuration and system .....10

    2.5 EUT Operation Test Setup .....11

    2.6 Measurement Results Explanation Example.....11

**3 TEST RESULT .....12**

    3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement .....12

    3.2 Maximum Conducted Output Power Measurement .....15

    3.3 Power Spectral Density Measurement .....16

    3.4 Unwanted Emissions Measurement.....18

    3.5 AC Conducted Emission Measurement.....22

    3.6 Automatically Discontinue Transmission .....24

    3.7 Antenna Requirements .....25

**4 LIST OF MEASURING EQUIPMENT .....26**

**5 UNCERTAINTY OF EVALUATION .....27**

**APPENDIX A. CONDUCTED TEST RESULTS**

**APPENDIX B. AC CONDUCTED EMISSION TEST RESULT**

**APPENDIX C. RADIATED SPURIOUS EMISSION**

**APPENDIX D. DUTY CYCLE PLOTS**

**APPENDIX E. SETUP PHOTOGRAPHS**





### 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 8.29 dB at 42.61 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.20 dB at 0.233 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
FCC ID	IHDT56XJ1
EUT supports Radios application	CDMA/EV-DO/GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM is not supported)/LTE/NFC WLAN2.4GHz 802.11b/g/n HT20/ WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth v3.0 + EDR / Bluetooth v4.2 LE/ Bluetooth v5.0 LE
IMEI Code	Conducted:355550090015855 Conduction: 355550090016408 Radiation: 355550090015608
HW Version	DVT2
SW Version	fastboot_messi_verizon_oem_vzw_userdebug_8.1.0_O DX28.56_50ee_intcfg-test-keys_vzw
EUT Stage	Identical Prototype

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



### 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx/Rx Channel Frequency Range</b>	5745 MHz ~ 5825 MHz
<b>Maximum Output Power</b>	<5745 MHz ~ 5825 MHz> 802.11a : 16.89 dBm / 0.0489 W 802.11n HT20 : 16.96 dBm / 0.0497 W 802.11n HT40 : 15.44 dBm / 0.0350 W 802.11ac VHT20: 17.08 dBm / 0.0511 W 802.11ac VHT40: 15.45 dBm / 0.0351 W 802.11ac VHT80: 14.06 dBm / 0.0255 W
<b>99% Occupied Bandwidth</b>	802.11a : 18.23 MHz 802.11ac VHT20 : 19.23 MHz 802.11ac VHT40 : 37.26 MHz 802.11ac VHT80 : 76.12 MHz
<b>Type of Modulation</b>	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
<b>Antenna Type / Gain</b>	Fixed internal Antenna with gain 0.20 dBi

### 1.5 Specification of Accessory

Specification of Accessory				
AC Adapter 1	<b>Brand Name</b>	Motorola (Salom)	<b>Model Name</b>	SC-22
	<b>Power Rating</b>	I/P: 100-240 Vac, 500mA, O/P: 5Vdc,3000mA or 9Vdc,1600mA or 12Vdc,1200mA		
AC Adapter 2	<b>Brand Name</b>	Motorola (Chenyang)	<b>Model Name</b>	SC-22
	<b>Power Rating</b>	I/P: 100-240 Vac, 500mA, O/P: 5Vdc,3000mA or 9Vdc,1600mA or 12Vdc,1200mA		
AC Adapter 3	<b>Brand Name</b>	Motorola (Salom)	<b>Model Name</b>	SC-51
	<b>Power Rating</b>	I/P: 100-240 Vac, 600mA, O/P: 5Vdc,3000mA or 9Vdc,2000mA or 12Vdc,1500mA		
AC Adapter 4	<b>Brand Name</b>	Motorola (Chenyang)	<b>Model Name</b>	SC-51
	<b>Power Rating</b>	I/P: 100-240 Vac, 600mA, O/P: 5Vdc,3000mA or 9Vdc,2000mA or 12Vdc,1500mA		
Battery	<b>Brand Name</b>	Motorola (Sunwoda)	<b>Model Name</b>	JS40
	<b>Power Rating</b>	3.8Vdc,3000mAh	<b>Type</b>	Li-ion
USB Cable 1	<b>Brand Name</b>	Motorola (Cabletech)	<b>Model Name</b>	SKN6473A
	<b>Signal Line Type</b>	1.0 meter, shielded cable, without ferrite core		
USB Cable 2	<b>Brand Name</b>	Motorola (Luxshare)	<b>Model Name</b>	SKN6473A
	<b>Signal Line Type</b>	1.0 meter, shielded cable, without ferrite core		
Audio Cable	<b>Brand Name</b>	Motorola (Luxshare)	<b>Model Name</b>	SC18C27844
	<b>Signal Line Type</b>	0.08 meter, shielded cable, without ferrite core		

### 1.6 Modification of EUT

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



### 1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No is CN5013.

<b>Test Site</b>	Sporton International (Kunshan) Inc.			
<b>Test Site Location</b>	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958			
<b>Test Site No.</b>	<b>Sporton Site No.</b>			<b>FCC Test Firm Registration No.</b>
	TH01-KS	03CH02-KS	CO01-KS	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:

- FCC 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

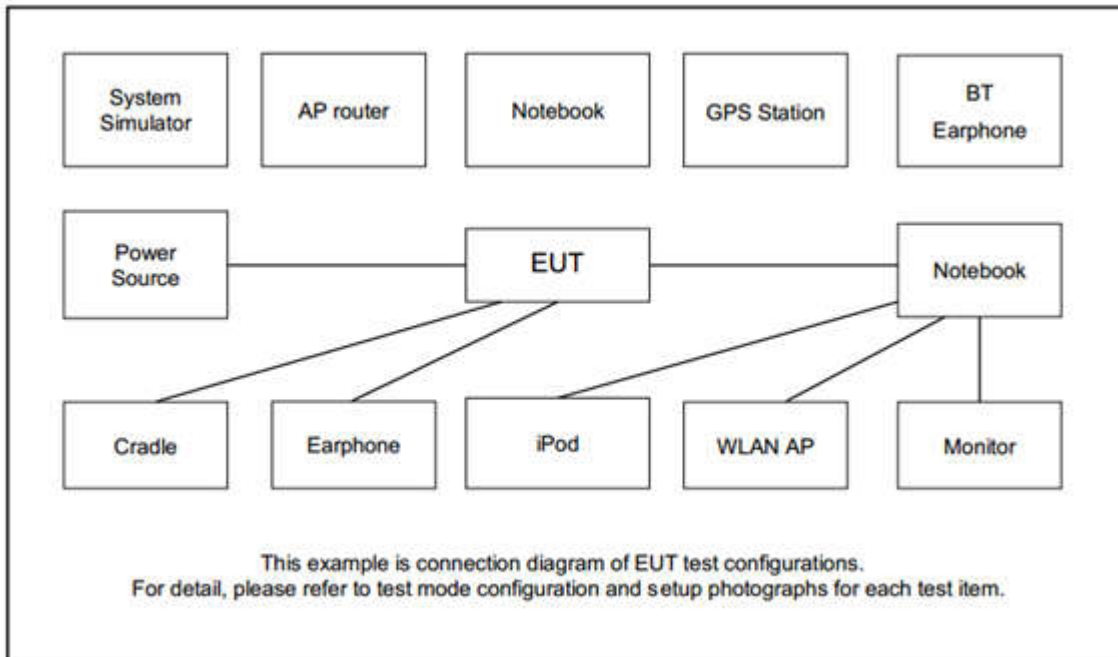
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

<b>AC Conducted Emission</b>	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link(5G) + USB Cable4 (Charging from Adapter2)
<b>Remark:</b>	
1. For Radiated Test Cases, The tests were performance with Adapter, Earphone, USB Cable.	

Ch. #		Band IV : 5725-5850 MHz			
		802.11a	802.11ac VHT20	802.11ac VHT40	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.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
3.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
4.	Router	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded,1.8m
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 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 6.9 dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 6.9 \text{ (dB)} \end{aligned}$$

### 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.

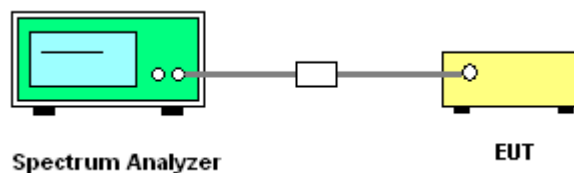
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

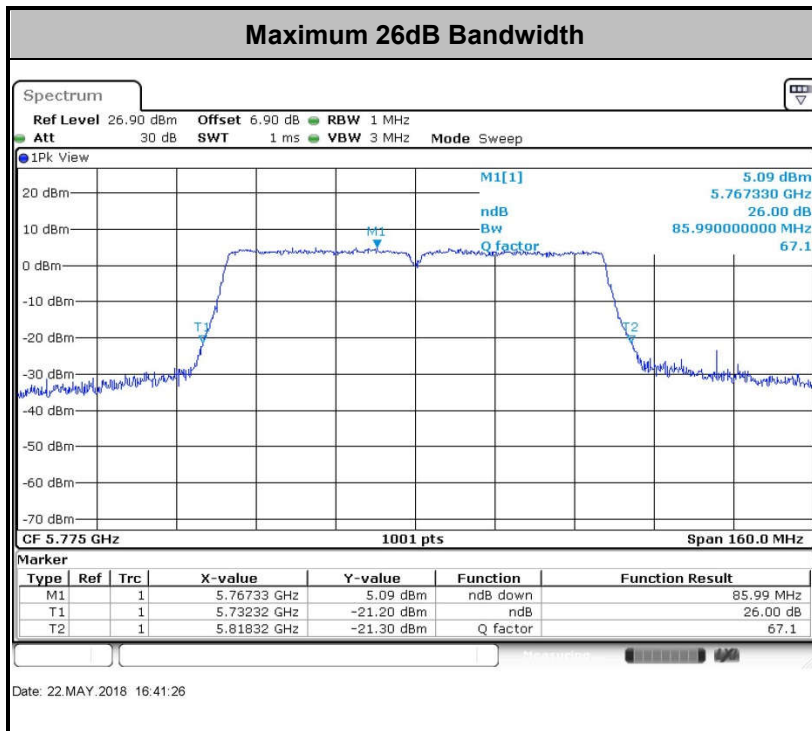
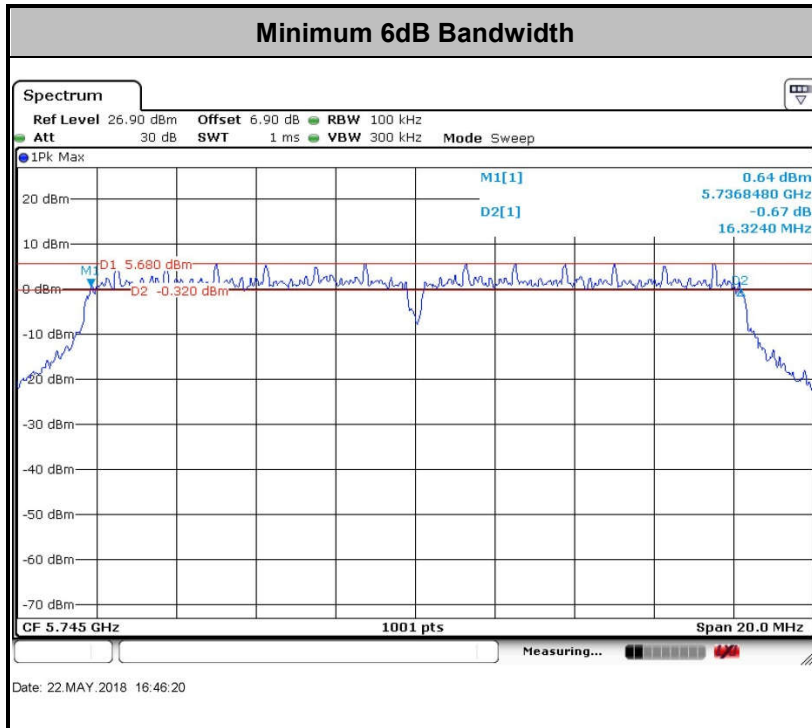
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

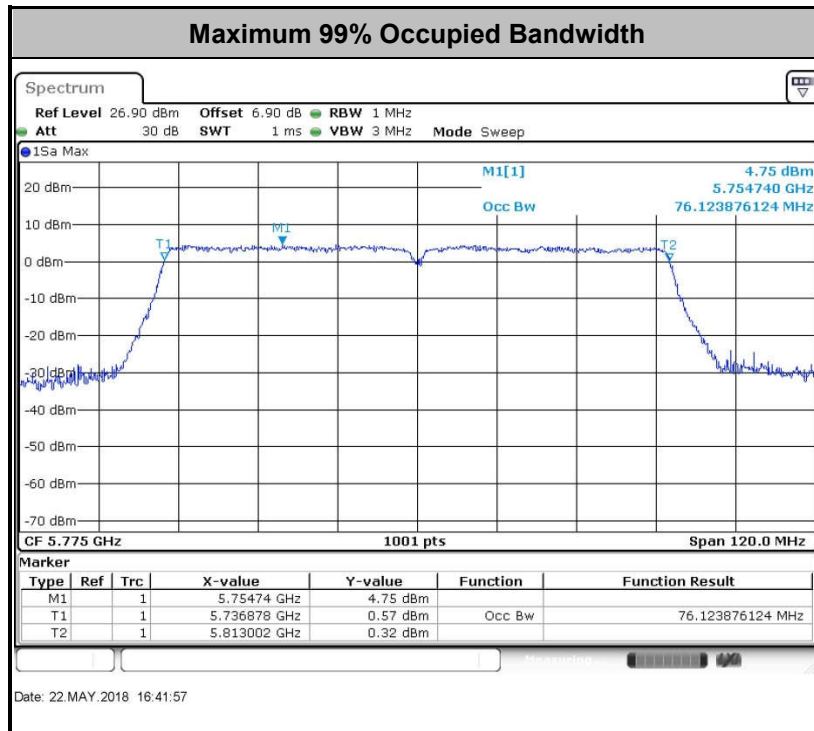
##### 3.1.4 Test Setup



##### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.





**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.

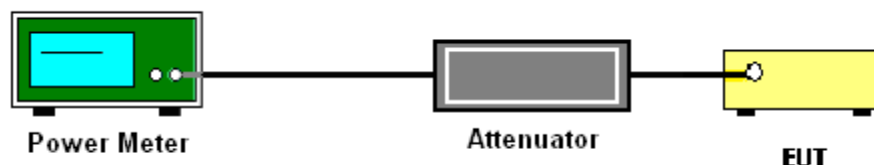
### 3.2.3 Test Procedures

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

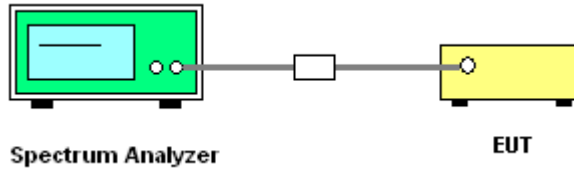
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section F) Maximum power spectral density.

##### # Method SA-2 #

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

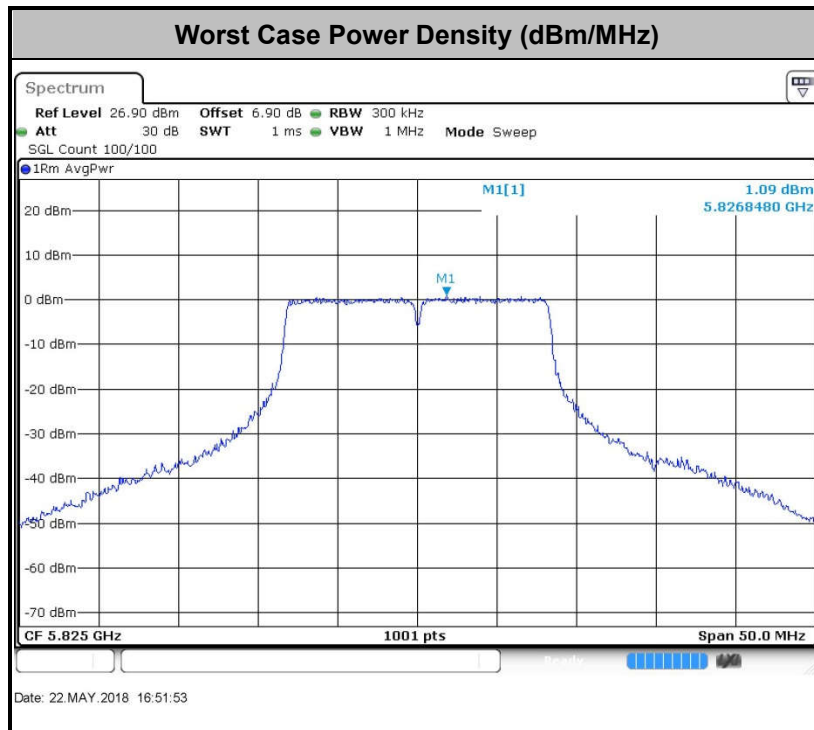
- Measure the duty cycle.
  - Set span to encompass the entire emission bandwidth (EBW) of the signal.
  - Set RBW = 300 kHz.
  - Set VBW  $\geq$  1 MHz.
  - Number of points in sweep  $\geq$  2 Span / RBW.
  - Sweep time = auto.
  - Detector = RMS
  - Trace average at least 100 traces in power averaging mode.
  - Add  $10 \log(500\text{kHz}/\text{RBW})$  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.
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.

### 3.3.4 Test Setup



### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.





### 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<sub>Meas</sub> is the field strength of the emission at the measurement distance, in dBµV/m

d<sub>Meas</sub> is the measurement distance, in m

#### 3.4.2 Measuring Instruments

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

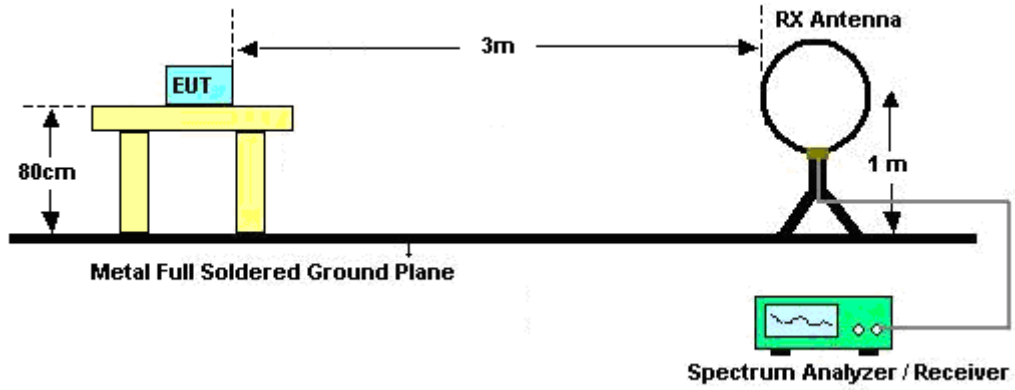


### 3.4.3 Test Procedures

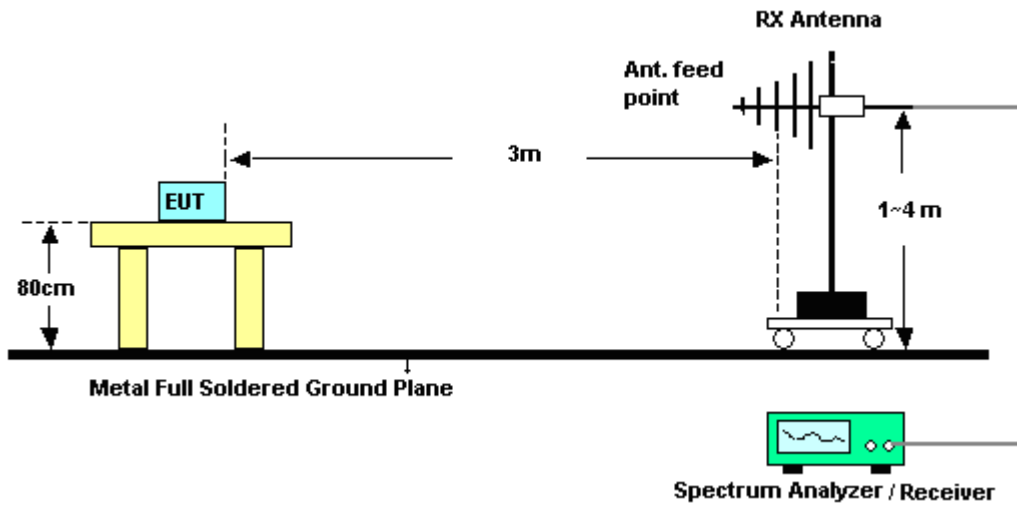
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.
  - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
    - RBW = 120 kHz
    - VBW = 300 kHz
    - Detector = Peak
    - Trace mode = max hold
  - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
    - RBW = 1 MHz
    - VBW  $\geq$  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  $\geq$  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

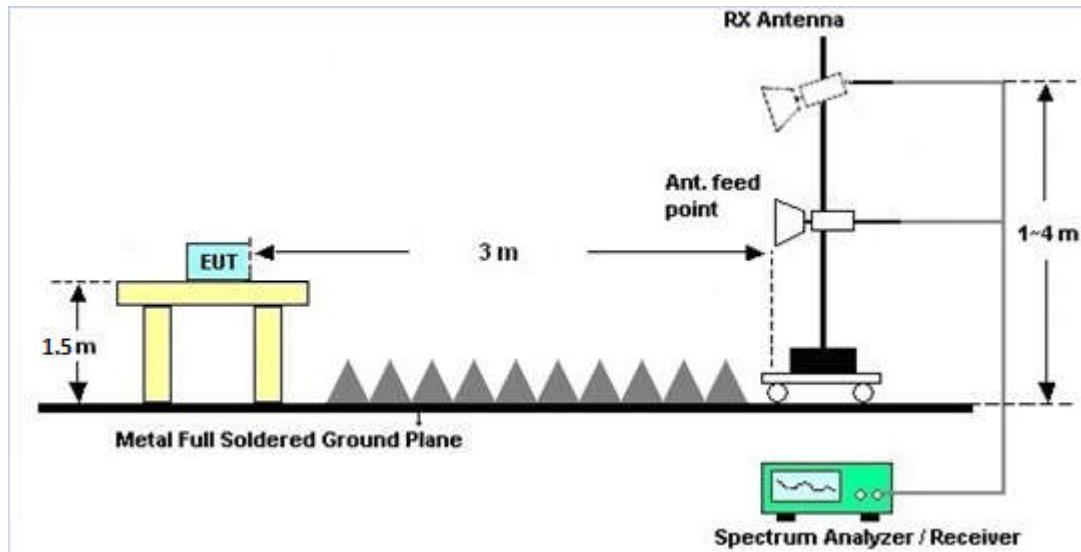
For radiated emissions below 30MHz



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.

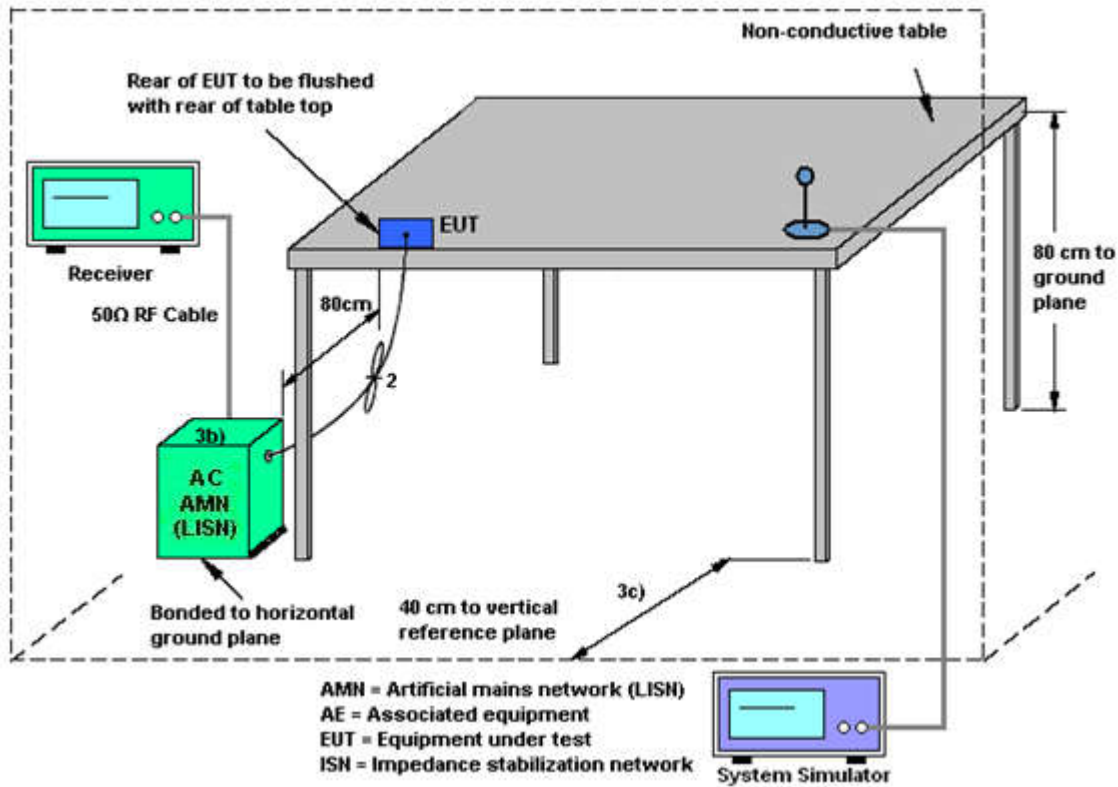
#### 3.5.2 Measuring Instruments

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. 08, 2017	May 22, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 18, 2018	May 22, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 18, 2018	May 22, 2018	Jan. 17, 2019	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Aug.08, 2017	May 27, 2018	Aug.07, 2018	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz-44G,MAX 30dB	Apr.17, 2018	May 27, 2018	Apr. 16, 2019	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 22, 2017	May 27, 2018	Oct.21, 2018	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-2GHz	Jan. 29, 2018	May 27, 2018	Jan. 28, 2019	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 21, 2017	May 27, 2018	Oct. 20, 2018	Radiation (03CH02-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	May 27, 2018	Feb.06, 2019	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug.07,2017	May 27, 2018	Aug.06,2018	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1GHz~26.5GHz	Oct. 12, 2017	May 27, 2018	Oct. 11, 2018	Radiation (03CH02-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	100MHz-18GHz	Apr.17,2018	May 27, 2018	Apr.16,2019	Radiation (03CH02-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Oct. 12, 2017	May 27, 2018	Oct. 11, 2018	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	May 27, 2018	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 27, 2018	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 27, 2018	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	May 25, 2018	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2017	May 25, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2017	May 25, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2017	May 25, 2018	Oct. 11, 2018	Conduction (CO01-KS)

NCR: No Calibration Required



## 5 Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.2 dB
---	--------

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.2 dB
---	--------

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

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

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2018/5/25	Relative Humidity:	51~55	%

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

Band IV									
Mod.	Data Rate	N <sub>TX</sub>	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	18.23	24.925	16.324	0.5	Pass
11a	6Mbps	1	157	5785	18.18	25.624	16.324	0.5	Pass
11a	6Mbps	1	165	5825	18.18	24.476	16.324	0.5	Pass
VHT20	MCS 0	1	149	5745	19.23	25.924	17.562	0.5	Pass
VHT20	MCS 0	1	157	5785	19.23	25.974	17.562	0.5	Pass
VHT20	MCS 0	1	165	5825	19.23	25.874	17.562	0.5	Pass
VHT40	MCS 0	1	151	5755	37.26	43.247	36.284	0.5	Pass
VHT40	MCS 0	1	159	5795	37.26	43.516	36.324	0.5	Pass
VHT80	MCS 0	1	155	5775	76.12	85.99	76.244	0.5	Pass

**TEST RESULTS DATA**  
**Average Power Table**

Band IV										
Mod.	Data Rate	N <sub>TX</sub>	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	0.08	16.86	30.00	0.20		Pass
11a	6Mbps	1	157	5785	0.08	16.89	30.00	0.20		Pass
11a	6Mbps	1	165	5825	0.08	16.81	30.00	0.20		Pass
HT20	MCS 0	1	149	5745	0.08	16.87	30.00	0.20		Pass
HT20	MCS 0	1	157	5785	0.08	16.96	30.00	0.20		Pass
HT20	MCS 0	1	165	5825	0.08	16.82	30.00	0.20		Pass
HT40	MCS 0	1	151	5755	0.16	15.34	30.00	0.20		Pass
HT40	MCS 0	1	159	5795	0.16	15.44	30.00	0.20		Pass
VHT20	MCS 0	1	149	5745	0.08	16.89	30.00	0.20		Pass
VHT20	MCS 0	1	157	5785	0.08	17.08	30.00	0.20		Pass
VHT20	MCS 0	1	165	5825	0.08	16.83	30.00	0.20		Pass
VHT40	MCS 0	1	151	5755	0.16	15.29	30.00	0.20		Pass
VHT40	MCS 0	1	159	5795	0.16	15.45	30.00	0.20		Pass
VHT80	MCS 0	1	155	5775	0.33	14.06	30.00	0.20		Pass

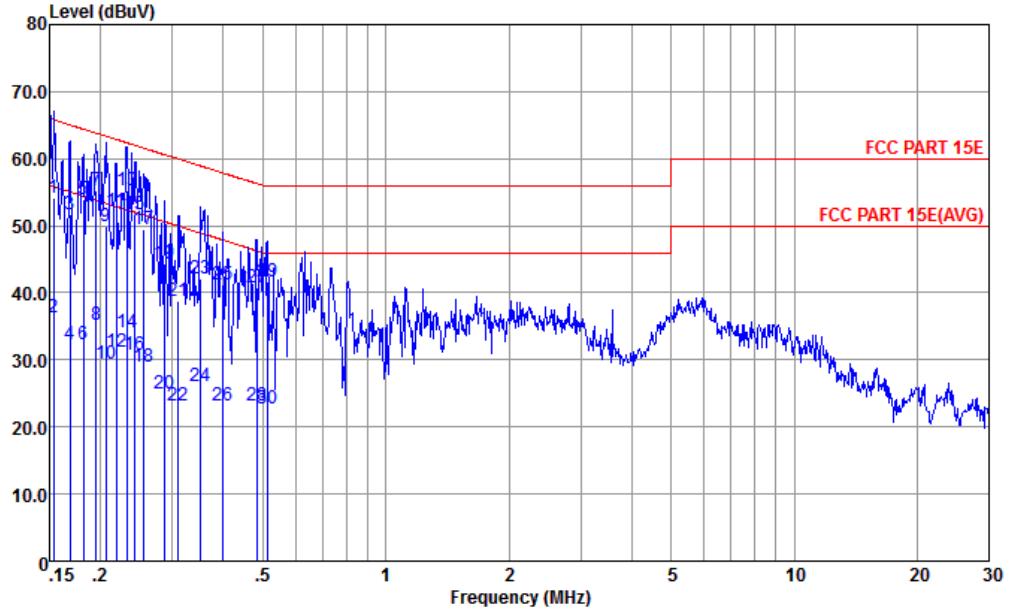
***TEST RESULTS DATA***  
***Power Spectral Density***

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	0.08	2.22	2.99	30.00	0.20	Pass
11a	6Mbps	1	157	5785	0.08	2.22	2.95	30.00	0.20	Pass
11a	6Mbps	1	165	5825	0.08	2.22	3.38	30.00	0.20	Pass
VHT20	MCS 0	1	149	5745	0.08	2.22	2.61	30.00	0.20	Pass
VHT20	MCS 0	1	157	5785	0.08	2.22	2.87	30.00	0.20	Pass
VHT20	MCS 0	1	165	5825	0.08	2.22	2.66	30.00	0.20	Pass
VHT40	MCS 0	1	151	5755	0.16	2.22	-1.64	30.00	0.20	Pass
VHT40	MCS 0	1	159	5795	0.16	2.22	-1.51	30.00	0.20	Pass
VHT80	MCS 0	1	155	5775	0.33	2.22	-5.80	30.00	0.20	Pass



## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	Temperature :	26.1~26.2°C
		Relative Humidity :	59~60%
Test Voltage :	120Vac / 60Hz	Phase :	Line

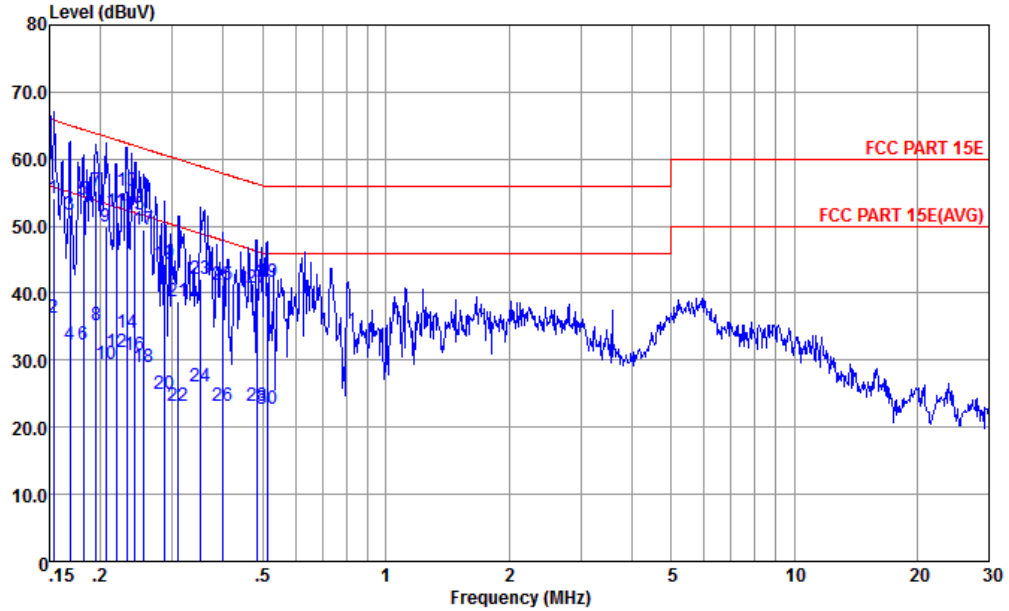


Site : CO01-KS  
 Condition : FCC PART 15E LISN-L-171013-060103 LINE  
 mode : Mode 1  
 : 355550090016408 #18

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.153	54.07	-11.75	65.82	43.30	0.16	10.61	QP
2	0.153	36.37	-19.45	55.82	25.60	0.16	10.61	Average
3	0.169	51.63	-13.40	65.03	40.90	0.18	10.55	QP
4	0.169	32.33	-22.70	55.03	21.60	0.18	10.55	Average
5	0.182	53.90	-10.52	64.42	43.20	0.19	10.51	QP
6	0.182	32.30	-22.12	54.42	21.60	0.19	10.51	Average
7	0.195	55.16	-8.64	63.80	44.49	0.20	10.47	QP
8	0.195	35.26	-18.54	53.80	24.59	0.20	10.47	Average
9	0.206	49.96	-13.40	63.36	39.31	0.20	10.45	QP
10	0.206	29.46	-23.90	53.36	18.81	0.20	10.45	Average
11	0.219	52.15	-10.73	62.88	41.49	0.21	10.45	QP
12	0.219	31.25	-21.63	52.88	20.59	0.21	10.45	Average
13 *	0.233	55.15	-7.20	62.35	44.50	0.21	10.44	QP
14	0.233	34.15	-18.20	52.35	23.50	0.21	10.44	Average
15	0.243	51.75	-10.25	62.00	41.10	0.21	10.44	QP
16	0.243	30.85	-21.15	52.00	20.20	0.21	10.44	Average
17	0.255	49.45	-12.15	61.60	38.79	0.22	10.44	QP



Test Engineer :	Amos Zhang	Temperature :	26.1~26.2°C
		Relative Humidity :	59~60%
Test Voltage :	120Vac / 60Hz	Phase :	Line

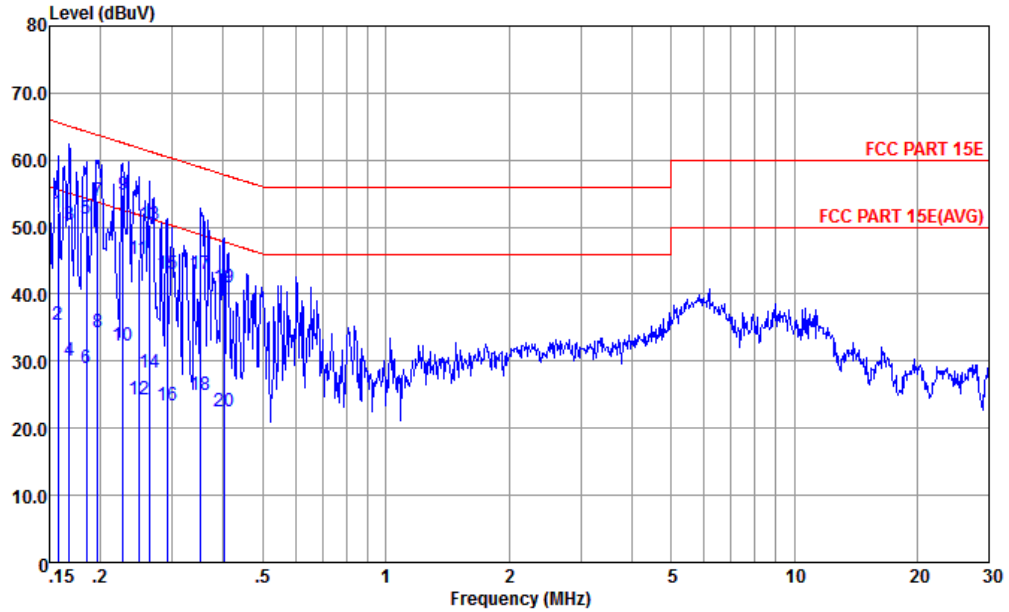


Site : CO01-KS  
 Condition : FCC PART 15E LISN-L-171013-060103 LINE  
 mode : Mode 1  
 : 355550090016408 #18

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.255	28.95	-22.65	51.60	18.29	0.22	10.44	Average
19	0.288	44.25	-16.34	60.59	33.60	0.22	10.43	QP
20	0.288	24.85	-25.74	50.59	14.20	0.22	10.43	Average
21	0.310	38.85	-21.12	59.97	28.20	0.23	10.42	QP
22	0.310	23.25	-26.72	49.97	12.60	0.23	10.42	Average
23	0.352	42.15	-16.76	58.91	31.49	0.24	10.42	QP
24	0.352	26.15	-22.76	48.91	15.49	0.24	10.42	Average
25	0.400	41.25	-16.61	57.86	30.59	0.25	10.41	QP
26	0.400	23.15	-24.71	47.86	12.49	0.25	10.41	Average
27	0.484	40.88	-15.39	56.27	30.30	0.26	10.32	QP
28	0.484	23.08	-23.19	46.27	12.50	0.26	10.32	Average
29	0.513	41.75	-14.25	56.00	31.20	0.26	10.29	QP
30	0.513	22.78	-23.22	46.00	12.23	0.26	10.29	Average



Test Engineer :	Amos Zhang	Temperature :	26.1~26.2°C
		Relative Humidity :	59~60%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

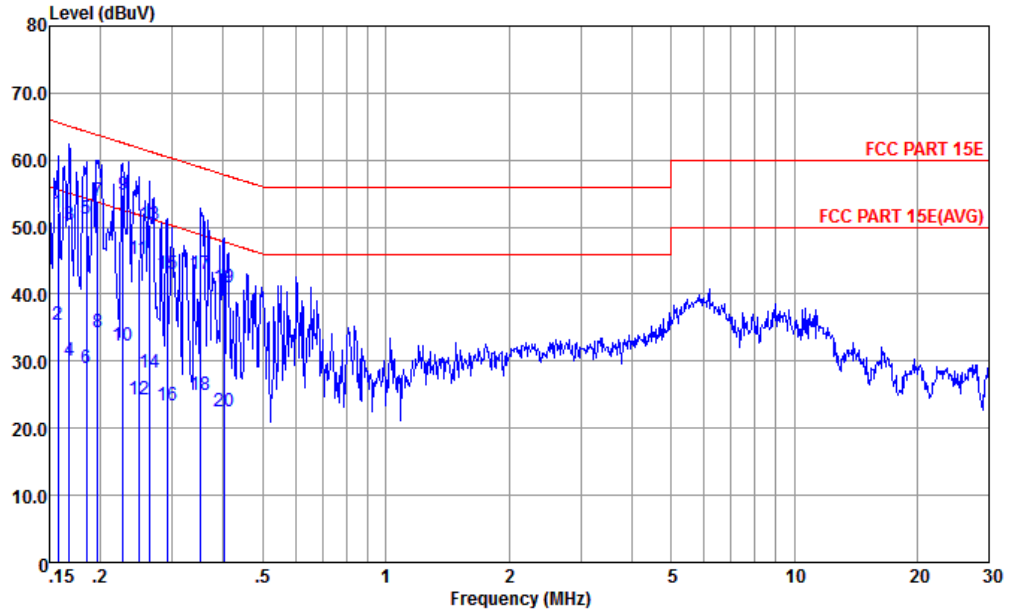


Site : CO01-KS  
 Condition : FCC PART 15E LISN-N-171013-060103 NEUTRAL  
 mode : Mode 1  
 : 355550090016408 #18

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.157	52.07	-13.53	65.60	41.20	0.28	10.59	QP
2	0.157	35.37	-20.23	55.60	24.50	0.28	10.59	Average
3	0.168	50.33	-14.75	65.08	39.50	0.28	10.55	QP
4	0.168	30.03	-25.05	55.08	19.20	0.28	10.55	Average
5	0.184	51.28	-13.00	64.28	40.50	0.28	10.50	QP
6	0.184	28.98	-25.30	54.28	18.20	0.28	10.50	Average
7	0.197	53.95	-9.81	63.76	43.20	0.28	10.47	QP
8	0.197	34.35	-19.41	53.76	23.60	0.28	10.47	Average
9 *	0.227	54.93	-7.64	62.57	44.20	0.28	10.45	QP
10	0.227	32.33	-20.24	52.57	21.60	0.28	10.45	Average
11	0.248	45.32	-16.50	61.82	34.60	0.28	10.44	QP
12	0.248	24.22	-27.60	51.82	13.50	0.28	10.44	Average
13	0.263	50.32	-11.02	61.34	39.60	0.28	10.44	QP
14	0.263	28.22	-23.12	51.34	17.50	0.28	10.44	Average
15	0.291	43.01	-17.49	60.50	32.30	0.28	10.43	QP
16	0.291	23.31	-27.19	50.50	12.60	0.28	10.43	Average
17	0.352	42.90	-16.01	58.91	32.19	0.29	10.42	QP



Test Engineer :	Amos Zhang	Temperature :	26.1~26.2°C
		Relative Humidity :	59~60%
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-171013-060103 NEUTRAL  
 mode : Mode 1  
 : 355550090016408 #18

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.352	24.90	-24.01	48.91	14.19	0.29	10.42	Average
19	0.402	40.89	-16.92	57.81	30.20	0.29	10.40	QP
20	0.402	22.59	-25.22	47.81	11.90	0.29	10.40	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		5643.8	51.82	-16.38	68.2	40.09	32.54	8.84	29.65	100	360	P	H
		5692.4	52.82	-46.78	99.6	41.07	32.59	8.83	29.67	100	360	P	H
		5719.4	59.02	-51.61	110.63	47.26	32.62	8.82	29.68	100	360	P	H
		5724.6	65.65	-55.64	121.29	53.89	32.62	8.82	29.68	100	360	P	H
	*	5745	104.66	-	-	92.9	32.64	8.81	29.69	100	360	P	H
	*	5745	97.11	-	-	85.35	32.64	8.81	29.69	100	360	A	H
		5603.2	52.21	-15.99	68.2	40.5	32.5	8.85	29.64	400	120	P	V
		5699.4	53.67	-51.09	104.76	41.92	32.59	8.83	29.67	400	120	P	V
		5719.4	60.02	-50.61	110.63	48.26	32.62	8.82	29.68	400	120	P	V
		5724	66.73	-53.19	119.92	54.97	32.62	8.82	29.68	400	120	P	V
	*	5745	106.44	-	-	94.68	32.64	8.81	29.69	400	120	P	V
	*	5745	98.7	-	-	86.94	32.64	8.81	29.69	400	120	A	V



WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		5625	50.87	-17.33	68.2	39.14	32.52	8.85	29.64	100	358	P	H
		5653	51.63	-18.8	70.43	39.88	32.56	8.84	29.65	100	358	P	H
		5715	51.55	-57.85	109.4	39.8	32.61	8.82	29.68	100	358	P	H
		5722	50.54	-64.82	115.36	38.78	32.62	8.82	29.68	100	358	P	H
	*	5785	105.31	-	-	93.55	32.68	8.8	29.72	100	358	P	H
	*	5785	98.06	-	-	86.3	32.68	8.8	29.72	100	358	A	H
		5851.6	51.4	-67.15	118.55	39.55	32.74	8.85	29.74	100	358	P	H
		5872.2	52.01	-53.97	105.98	40.11	32.78	8.87	29.75	100	358	P	H
		5878.2	53.21	-49.61	102.82	41.31	32.78	8.87	29.75	100	358	P	H
		5931.8	50.59	-17.61	68.2	38.62	32.83	8.91	29.77	100	358	P	H
802.11a CH 157 5785MHz		5613	51.24	-16.96	68.2	39.53	32.5	8.85	29.64	398	119	P	V
		5676.6	51.11	-36.81	87.92	39.37	32.57	8.83	29.66	398	119	P	V
		5719.2	51.86	-58.72	110.58	40.1	32.62	8.82	29.68	398	119	P	V
		5722.4	50.79	-65.48	116.27	39.03	32.62	8.82	29.68	398	119	P	V
	*	5785	105.77	-	-	94.01	32.68	8.8	29.72	398	119	P	V
	*	5785	98.29	-	-	86.53	32.68	8.8	29.72	398	119	A	V
		5850.8	51.7	-68.68	120.38	39.85	32.74	8.85	29.74	398	119	P	V
		5869.2	51.28	-55.54	106.82	39.4	32.76	8.87	29.75	398	119	P	V
		5915.2	51.99	-23.44	75.43	40.04	32.81	8.91	29.77	398	119	P	V
		5942.8	50.46	-17.74	68.2	38.46	32.85	8.93	29.78	398	119	P	V



WIFI Ant. 2	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz	*	5825	105.23	-	-	93.41	32.73	8.82	29.73	100	336	P	H
	*	5825	97.71	-	-	85.89	32.73	8.82	29.73	100	336	A	H
		5851.8	58.72	-59.38	118.1	46.87	32.74	8.85	29.74	100	336	P	H
		5856.6	55.42	-54.93	110.35	43.55	32.76	8.85	29.74	100	336	P	H
		5892.6	52.96	-39.18	92.14	41.04	32.8	8.88	29.76	100	336	P	H
		5931.8	51.12	-17.08	68.2	39.15	32.83	8.91	29.77	100	336	P	H
	*	5825	105.6	-	-	93.78	32.73	8.82	29.73	391	118	P	V
	*	5825	98.02	-	-	86.2	32.73	8.82	29.73	391	118	A	V
		5852.4	59.23	-57.5	116.73	47.38	32.74	8.85	29.74	391	118	P	V
		5858.2	52.47	-57.43	109.9	40.61	32.76	8.85	29.75	391	118	P	V
		5882.4	51.73	-47.97	99.7	39.82	32.78	8.88	29.75	391	118	P	V
		5935.2	52.04	-16.16	68.2	40.06	32.83	8.93	29.78	391	118	P	V
	<b>Remark</b>	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 Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11a CH 149		11490	47	-27	74	60.15	39.29	12.91	65.35	100	360	P	H
5745MHz		11490	47.7	-26.3	74	60.85	39.29	12.91	65.35	100	360	P	V
802.11a CH 157		11570	46.91	-27.09	74	60.14	39.37	12.84	65.44	100	360	P	H
5785MHz		11570	45.99	-28.01	74	59.22	39.37	12.84	65.44	100	360	P	V
802.11a CH 165		11650	45.12	-28.88	74	58.44	39.44	12.78	65.54	100	360	P	H
5825MHz		11650	45.18	-28.82	74	58.5	39.44	12.78	65.54	100	360	P	V
<b>Remark</b>	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 Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT20 CH 149 5745MHz		5637	52.5	-15.7	68.2	40.77	32.54	8.84	29.65	100	359	P	H
		5693.4	52.01	-48.32	100.33	40.26	32.59	8.83	29.67	100	359	P	H
		5718.4	59.52	-50.83	110.35	47.76	32.62	8.82	29.68	100	359	P	H
		5724.4	70.75	-50.08	120.83	58.99	32.62	8.82	29.68	100	359	P	H
	*	5745	104.65	-	-	92.89	32.64	8.81	29.69	100	359	P	H
	*	5745	97.13	-	-	85.37	32.64	8.81	29.69	100	359	A	H
		5646.2	53.03	-15.17	68.2	41.3	32.54	8.84	29.65	400	119	P	V
		5669.2	52.1	-30.35	82.45	40.36	32.57	8.83	29.66	400	119	P	V
		5715.4	58.09	-51.42	109.51	46.34	32.61	8.82	29.68	400	119	P	V
		5724.2	69.13	-51.25	120.38	57.37	32.62	8.82	29.68	400	119	P	V
	*	5745	106.26	-	-	94.5	32.64	8.81	29.69	400	119	P	V
	*	5745	98.73	-	-	86.97	32.64	8.81	29.69	400	119	A	V



WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		5610.4	51.88	-16.32	68.2	40.17	32.5	8.85	29.64	106	359	P	H
		5671.4	51.29	-32.79	84.08	39.55	32.57	8.83	29.66	106	359	P	H
		5716	51.55	-58.13	109.68	39.8	32.61	8.82	29.68	106	359	P	H
		5721.6	51.1	-63.35	114.45	39.34	32.62	8.82	29.68	106	359	P	H
	*	5785	104.83	-	-	93.07	32.68	8.8	29.72	106	359	P	H
	*	5785	97.33	-	-	85.57	32.68	8.8	29.72	106	359	A	H
		5852	51.47	-66.17	117.64	39.62	32.74	8.85	29.74	106	359	P	H
		5870	51.03	-55.57	106.6	39.15	32.76	8.87	29.75	106	359	P	H
802.11ac		5913.2	51.56	-25.34	76.9	39.62	32.81	8.9	29.77	106	359	P	H
VHT20		5944	51.36	-16.84	68.2	39.36	32.85	8.93	29.78	106	359	P	H
CH 157		5621.2	51.7	-16.5	68.2	39.97	32.52	8.85	29.64	398	119	P	V
5785MHz		5679.4	50.51	-39.49	90	38.78	32.57	8.83	29.67	398	119	P	V
		5717.8	50.82	-59.36	110.18	39.06	32.62	8.82	29.68	398	119	P	V
		5720.4	50.71	-61	111.71	38.95	32.62	8.82	29.68	398	119	P	V
	*	5785	105.59	-	-	93.83	32.68	8.8	29.72	398	119	P	V
	*	5785	98.06	-	-	86.3	32.68	8.8	29.72	398	119	A	V
		5852.4	51.06	-65.67	116.73	39.21	32.74	8.85	29.74	398	119	P	V
		5869.4	53.36	-53.41	106.77	41.48	32.76	8.87	29.75	398	119	P	V
		5916.2	51.57	-23.12	74.69	39.62	32.81	8.91	29.77	398	119	P	V
		5933.8	50.95	-17.25	68.2	38.96	32.83	8.93	29.77	398	119	P	V



WiFi Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT20 CH 165 5825MHz	*	5825	104.72	-	-	92.9	32.73	8.82	29.73	100	360	P	H
	*	5825	97.27	-	-	85.45	32.73	8.82	29.73	100	360	A	H
		5850.2	60.71	-61.03	121.74	48.86	32.74	8.85	29.74	100	360	P	H
		5855.4	54.37	-56.32	110.69	42.5	32.76	8.85	29.74	100	360	P	H
		5896.2	52.15	-37.32	89.47	40.23	32.8	8.88	29.76	100	360	P	H
		5929.2	50.82	-17.38	68.2	38.85	32.83	8.91	29.77	100	360	P	H
	*	5825	105.01	-	-	93.19	32.73	8.82	29.73	391	119	P	V
	*	5825	97.62	-	-	85.8	32.73	8.82	29.73	391	119	A	V
		5850.2	58.39	-63.35	121.74	46.54	32.74	8.85	29.74	391	119	P	V
		5855.4	54.31	-56.38	110.69	42.44	32.76	8.85	29.74	391	119	P	V
	5899.4	52.3	-34.8	87.1	40.36	32.8	8.9	29.76	391	119	P	V	
	5948.6	50.08	-18.12	68.2	38.08	32.85	8.93	29.78	391	119	P	V	
<b>Remark</b>	<ol style="list-style-type: none"> <li>No other spurious found.</li> <li>All results are PASS against Peak and Average limit line.</li> </ol>												



**Band 4 5725~5850MHz**  
**WIFI 802.11ac VHT20 (Harmonic @ 3m)**

WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT20		11490	46.15	-27.85	74	59.3	39.29	12.91	65.35	100	360	P	H
CH 149		11490	45.31	-28.69	74	58.46	39.29	12.91	65.35	100	360	P	V
5745MHz													
802.11ac VHT20		11570	46.37	-27.63	74	59.6	39.37	12.84	65.44	100	360	P	H
CH 157		11570	45.69	-28.31	74	58.92	39.37	12.84	65.44	100	360	P	V
5785MHz													
802.11ac VHT20		11650	45.15	-28.85	74	58.47	39.44	12.78	65.54	100	360	P	H
CH 165		11650	46.18	-27.82	74	59.5	39.44	12.78	65.54	100	360	P	V
5825MHz													
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz
WIFI 802.11ac VHT40 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include frequencies from 5606.6 to 5936 MHz.



WIFI Ant. 2	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
		5646.4	51.64	-16.56	68.2	39.91	32.54	8.84	29.65	100	359	P	H
		5676.4	51.14	-36.64	87.78	39.4	32.57	8.83	29.66	100	359	P	H
		5719.4	51.8	-58.83	110.63	40.04	32.62	8.82	29.68	100	359	P	H
		5721	52.24	-60.84	113.08	40.48	32.62	8.82	29.68	100	359	P	H
	*	5795	100.18	-	-	88.41	32.69	8.8	29.72	100	359	P	H
	*	5795	93.66	-	-	81.89	32.69	8.8	29.72	100	359	A	H
		5853.6	57.61	-56.38	113.99	45.74	32.76	8.85	29.74	100	359	P	H
		5858.6	56.09	-53.7	109.79	44.23	32.76	8.85	29.75	100	359	P	H
		5898.4	51.96	-35.89	87.85	40.02	32.8	8.9	29.76	100	359	P	H
		5937.8	51.08	-17.12	68.2	39.1	32.83	8.93	29.78	100	359	P	H
		5619.4	50.87	-17.33	68.2	39.14	32.52	8.85	29.64	398	119	P	V
		5694	51.4	-49.38	100.78	39.65	32.59	8.83	29.67	398	119	P	V
		5715.2	51.36	-58.1	109.46	39.61	32.61	8.82	29.68	398	119	P	V
		5721.6	51.69	-62.76	114.45	39.93	32.62	8.82	29.68	398	119	P	V
	*	5795	100.73	-	-	88.96	32.69	8.8	29.72	398	119	P	V
	*	5795	93.98	-	-	82.21	32.69	8.8	29.72	398	119	A	V
		5850.4	52.16	-69.13	121.29	40.31	32.74	8.85	29.74	398	119	P	V
		5863.8	51.66	-56.67	108.33	39.78	32.76	8.87	29.75	398	119	P	V
		5891.4	51.69	-41.34	93.03	39.77	32.8	8.88	29.76	398	119	P	V
		5925.6	51.2	-17	68.2	39.23	32.83	8.91	29.77	398	119	P	V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Band 4 5725~5850MHz**  
**WIFI 802.11ac VHT40 (Harmonic @ 3m)**

WIFI Ant. 2	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT40		11510	45.39	-28.61	74	58.53	39.3	12.9	65.34	100	360	P	H
CH 151 5755MHz		11510	44.97	-29.03	74	58.11	39.3	12.9	65.34	100	360	P	V
802.11ac VHT40		11590	46.15	-27.85	74	59.41	39.39	12.82	65.47	100	360	P	H
CH 159 5795MHz		11590	45.7	-28.3	74	58.96	39.39	12.82	65.47	100	360	P	V
<b>Remark</b>	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 Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ac VHT80 CH 155 5775MHz		5602	51.97	-16.23	68.2	40.25	32.5	8.85	29.63	100	357	P	H
		5699.6	58.98	-45.93	104.91	47.24	32.59	8.82	29.67	100	357	P	H
		5714.8	63.23	-46.12	109.35	51.48	32.61	8.82	29.68	100	357	P	H
		5720.8	63.74	-48.88	112.62	51.98	32.62	8.82	29.68	100	357	P	H
	*	5775	96.07	-	-	84.3	32.68	8.8	29.71	100	357	P	H
	*	5775	89.36	-	-	77.59	32.68	8.8	29.71	100	357	A	H
		5851.2	57.61	-61.85	119.46	45.76	32.74	8.85	29.74	100	357	P	H
		5859.2	57.54	-52.08	109.62	45.68	32.76	8.85	29.75	100	357	P	H
		5879	54.16	-48.07	102.23	42.26	32.78	8.87	29.75	100	357	P	H
		5931.8	52	-16.2	68.2	40.03	32.83	8.91	29.77	100	357	P	H
		5646.6	51.33	-16.87	68.2	39.6	32.54	8.84	29.65	400	119	P	V
		5694.2	55.15	-45.77	100.92	43.4	32.59	8.83	29.67	400	119	P	V
		5719.2	60.74	-49.84	110.58	48.98	32.62	8.82	29.68	400	119	P	V
		5724.4	62.17	-58.66	120.83	50.41	32.62	8.82	29.68	400	119	P	V
	*	5775	97.42	-	-	85.65	32.68	8.8	29.71	400	119	P	V
	*	5775	91	-	-	79.23	32.68	8.8	29.71	400	119	A	V
		5851.4	58.05	-60.96	119.01	46.2	32.74	8.85	29.74	400	119	P	V
		5856.2	58.62	-51.84	110.46	46.75	32.76	8.85	29.74	400	119	P	V
	5876	53.73	-50.73	104.46	41.83	32.78	8.87	29.75	400	119	P	V	
	5937.6	51.07	-17.13	68.2	39.09	32.83	8.93	29.78	400	119	P	V	

**Remark**

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



Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI Ant. 2	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80		11550	46.46	-27.54	74	59.68	39.35	12.85	65.42	100	360	P	H
CH 155 5775MHz		11550	45.82	-28.18	74	59.04	39.35	12.85	65.42	100	360	P	V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

5GHz WIFI 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		34.85	22.5	-17.5	40	30.42	22.45	0.63	31			P	H
		188.11	23.91	-19.59	43.5	38.48	15	1.48	31.05			P	H
		263.77	33.1	-12.9	46	42.86	19.75	1.77	31.28	100	217	P	H
		330.7	23.14	-22.86	46	32.7	19.95	1.99	31.5			P	H
		467.47	28.58	-17.42	46	34.7	23.08	2.4	31.6			P	H
		782.72	26.91	-19.09	46	26.55	27.97	3.12	30.73			P	H
		32.91	30.12	-9.88	40	37	23.55	0.61	31.04			P	V
		42.61	31.71	-8.29	40	44.15	18.17	0.71	31.32	100	216	P	V
		60.07	30.22	-9.78	40	49.19	11.8	0.83	31.6			P	V
		88.2	25.23	-18.27	43.5	40.59	14.52	1.04	30.92			P	V
		197.81	26.63	-16.87	43.5	41.21	15	1.51	31.09			P	V
	268.62	30.34	-15.66	46	40.42	19.44	1.79	31.31			P	V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>Peak</b> or <b>Average</b>
H/V	<b>Horizontal</b> or <b>Vertical</b>



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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

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

**For Peak Limit @ 2390MHz:**

- 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)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

**For Average Limit @ 2390MHz:**

- 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)
- Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

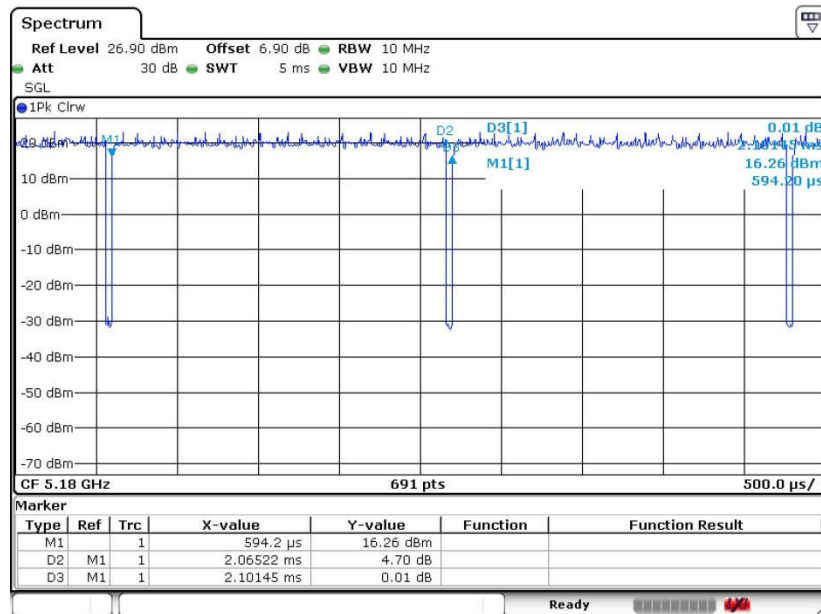
Both peak and average measured complies with the limit line, so test result is “PASS”.



## Appendix D. Duty Cycle Plots

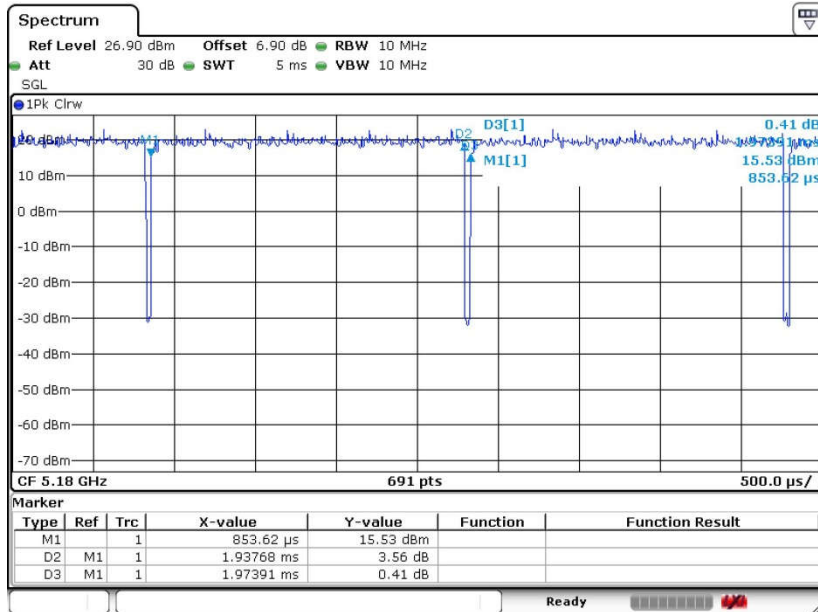
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	98.28	-	-	10Hz
802.11ac VHT20	98.16	-	-	10Hz
802.11ac VHT40	96.35	0.955	1.047	3KHz
802.11ac VHT80	92.75	0.464	2.156	3KHz

### 802.11a

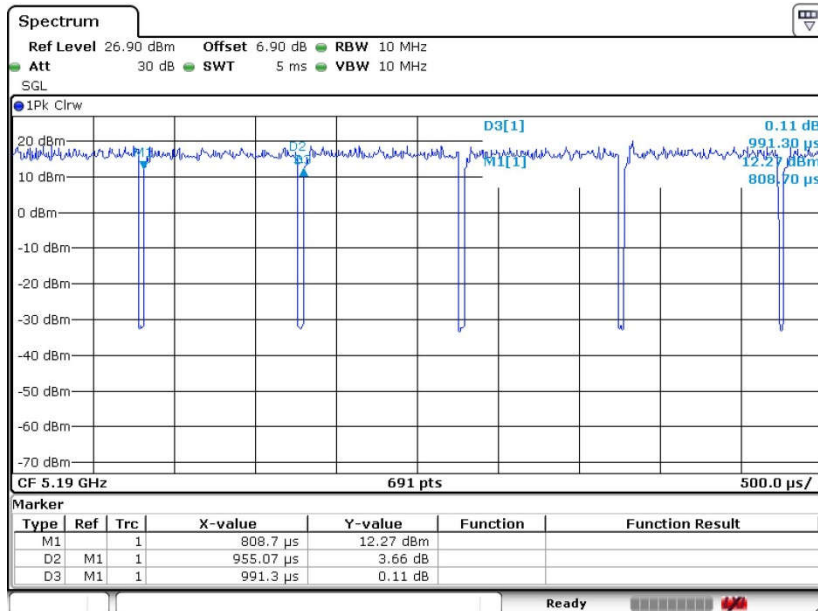




802.11ac VHT20



802.11ac VHT40





802.11ac VHT80

