



# FCC RF Test Report

**APPLICANT** : Motorola Mobility LLC  
**EQUIPMENT** : Mobile Cellular Phone  
**BRAND NAME** : Motorola  
**MODEL NAME** : XT2203-1  
**FCC ID** : IHDT56AE6  
**STANDARD** : FCC Part 15 Subpart E §15.407  
**CLASSIFICATION** : (NII) Unlicensed National Information Infrastructure  
**TEST DATE(S)** : Jan. 20, 2022 ~ Feb. 24, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

Alex Wang

Approved by: Alex Wang / Manager



**Sporton International Inc. (Kunshan)**

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300  
People's Republic of China**



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**REVISION HISTORY**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR1D2901F	Rev. 01	Initial issue of report	Mar. 01, 2022



### 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 3.76 dB at 5646.800 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 11.41 dB at 0.233 MHz
3.6	15.203 & 15.407(a)	Antenna Requirement	15.203 & 15.407(a)	Pass	-

<b>Declaration of Conformity:</b>
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
<b>Comments and Explanations:</b>
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



# 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	XT2203-1
FCC ID	IHDT56AE6
IMEI Code	Conducted: 354596750030032/354596750030040 Conduction: 354596750032137/354596750032145 Radiation: 354596750032137/354596750032145
HW Version	DVT2
SW Version	S1RD32.41
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>	<p>&lt;MIMO Ant. 1+2&gt;            &lt;5745 MHz ~ 5825 MHz&gt;            802.11a : 21.18 dBm / 0.1312 W            802.11n HT20 : 20.86 dBm / 0.1219 W            802.11n HT40 : 19.19 dBm / 0.0830 W            802.11ac VHT20: 20.92 dBm / 0.1236 W            802.11ac VHT40: 19.27 dBm / 0.0845 W            802.11ac VHT80: 18.97 dBm / 0.0789 W            802.11ax HE20: 21.06 dBm / 0.1276 W            802.11ax HE40: 19.42 dBm / 0.0875 W            802.11ax HE80: 19.02 dBm / 0.0798 W</p>
<b>99% Occupied Bandwidth</b>	802.11a : 16.38 MHz 802.11ax HE20 : 18.93 MHz 802.11ax HE40 : 38.26 MHz 802.11ax HE80 : 77.20 MHz
<b>Type of Modulation</b>	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) 802.11ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)
<b>Antenna Type / Gain</b>	<Ant. 1> : PIFA Antenna with gain -8.5 dBi <Ant. 2> : PIFA Antenna with gain -8.5 dBi

Note:

1. The device supports for MIMO only.
2. For 802.11n/ac & 11ax mode, the whole testing have assessed only 802.11ax mode by referring to the higher output power.
3. 802.11ax support OFDMA full RU tone and partial RU tone, both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) test output power, the full RU power > partial RU, thus the full RU perform full test to cover partial RU.
4. Ant.1 corresponding to EUT photo Antenna 6, Ant.2 corresponding to EUT photo Antenna 5.

### 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 (Salcomp)	Model Name	MC-331
AC Adapter 1(EU)	Brand Name	Motorola (Salcomp)	Model Name	MC-332
AC Adapter 1(UK)	Brand Name	Motorola (Salcomp)	Model Name	MC-333
AC Adapter 1(IN)	Brand Name	Motorola (Salcomp)	Model Name	MC-334
AC Adapter 1(AU)	Brand Name	Motorola (Salcomp)	Model Name	MC-335
AC Adapter 1(AR)	Brand Name	Motorola (Salcomp)	Model Name	MC-336
AC Adapter 1(BR)	Brand Name	Motorola (Salcomp)	Model Name	MC-337
AC Adapter 1(CHILE)	Brand Name	Motorola (Salcomp)	Model Name	MC-339
AC Adapter 2(US)	Brand Name	Motorola (Acbel)	Model Name	MC-331
AC Adapter 2(EU)	Brand Name	Motorola (Acbel)	Model Name	MC-332
AC Adapter 2(UK)	Brand Name	Motorola (Acbel)	Model Name	MC-333
AC Adapter 3(US)	Brand Name	Motorola (AOHAI)	Model Name	MC-331
AC Adapter 3(EU)	Brand Name	Motorola (AOHAI)	Model Name	MC-332
AC Adapter 3(UK)	Brand Name	Motorola (AOHAI)	Model Name	MC-333
Battery 1	Brand Name	Motorola (ATL)	Model Name	ND40
Battery 2	Brand Name	Motorola (SCUD)	Model Name	ND40
Earphone	Brand Name	Motorola (Lyand)	Model Name	MI181C
USB Cable 1	Brand Name	Motorola (Saibao)	Model Name	SC18D22297
USB Cable 2	Brand Name	Motorola (Cabletech)	Model Name	SC18D22298
USB Cable 3	Brand Name	Motorola (Luxshare)	Model Name	SC18D22299



### 1.7 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

<b>Test Firm</b>	Sporton International Inc. (Kunshan)		
<b>Test Site Location</b>	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	CO01-KS 03CH05-KS TH01-KS	CN1257	314309

### 1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH05-KS	AUDIX	E3	6.2009-8-24al
2.	CO01-KS	AUDIX	E3	6.2009-8-24

### 1.9 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.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

**Remark:**

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





## 2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y 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)
5745-5825 MHz 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 and 802.11ax HE 40
2. The above Frequency and Channel in "#n" were 802.11ac VHT80 and 802.11ax HE 80



## 2.2 Test Mode

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

### MIMO Mode

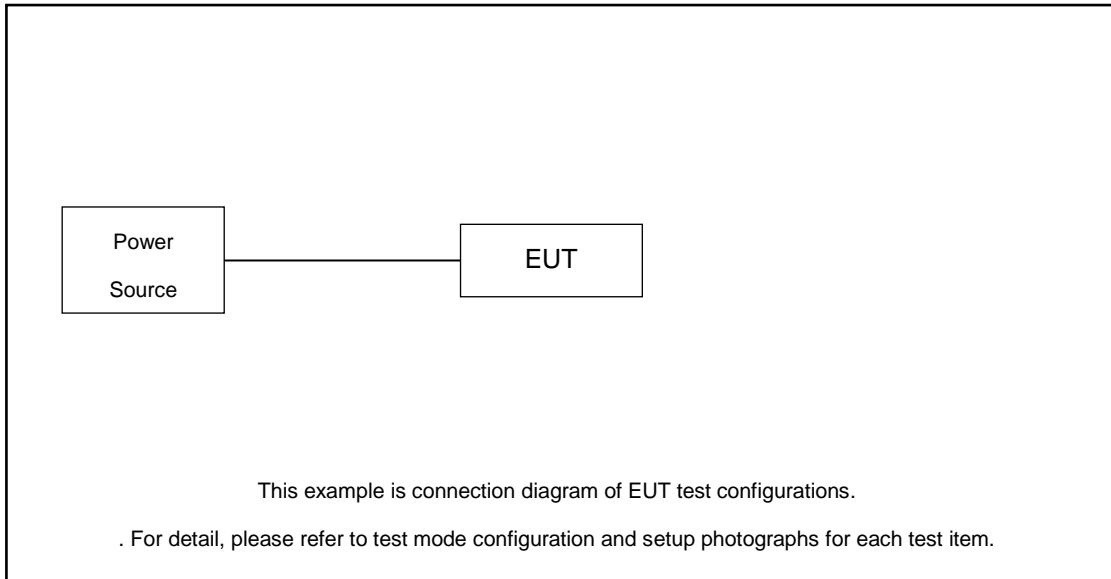
Modulation	Data Rate
802.11a	6 Mbps
802.11ax HE20	MCS0
802.11ax HE40	MCS0
802.11ax HE80	MCS0

<b>AC Conducted Emission</b>	Mode 1 : GSM 850 Idle+Bluetooth Link+WLAN Link(5G)+USB Cable 1(Charging from Adapter1)
<b>Remark:</b>	
<ol style="list-style-type: none"> <li>For Radiated Test Cases, The tests were performed with Adapter 1 and USB Cable 1.</li> <li>All test modes of the Radiated Spurious Emission (RSE) were tested; only the test worse data were reported, test mode as below, <ol style="list-style-type: none"> <li>802.11ax HE20 full RU ch165_5825MHz and Partial RU ch165_106/54_5825MHz</li> <li>802.11ax HE40 full RU ch151_5755MHz and Partial RU ch151_242/61_5755MHz</li> <li>802.11ax HE80 full RU ch155_5775MHz and Partial RU ch155_484/65_5775MHz</li> </ol> </li> </ol>	

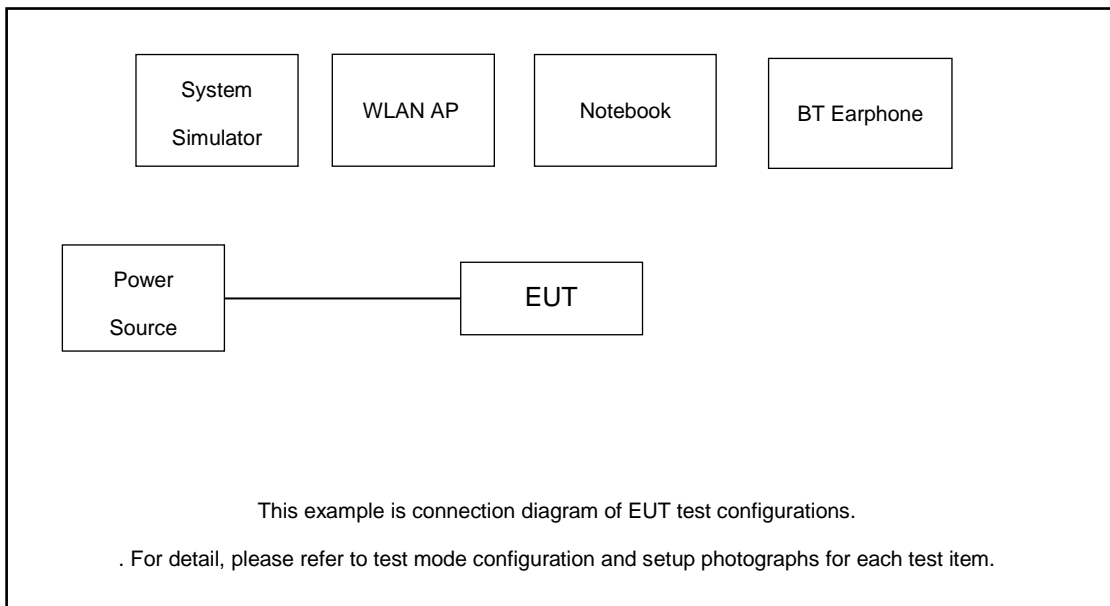
Ch. #	U-NII-3 : 5745-5825 MHz			
	802.11a	802.11ax HE20	802.11ax HE40	802.11ax HE80
L Low	149	149	151	-
M Middle	157	157	-	155
H High	165	165	159	-

## 2.3 Connection Diagram of Test System

For Radiated Emission



For Conducted Emission





### 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded,1.8m
2.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
3.	Notebook	Lenovo	G480	QDS-BRCM10501	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
4.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m

### 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 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.*

Following shows an offset computation example with cable loss 7.0 dB.

$$\begin{aligned}
 \text{Offset(dB)} &= \text{RF cable loss(dB)}. \\
 &= 7.0 \text{ (dB)}
 \end{aligned}$$

### 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.

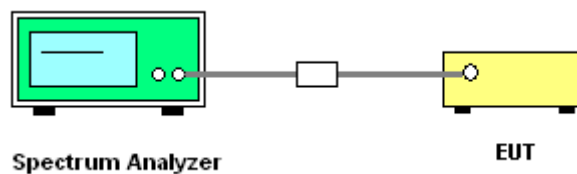
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

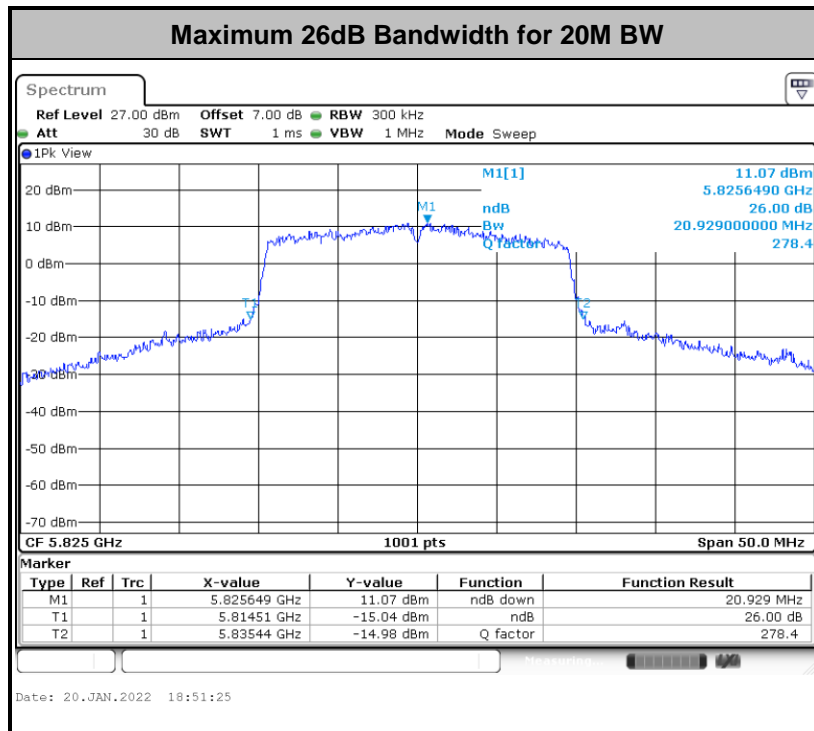
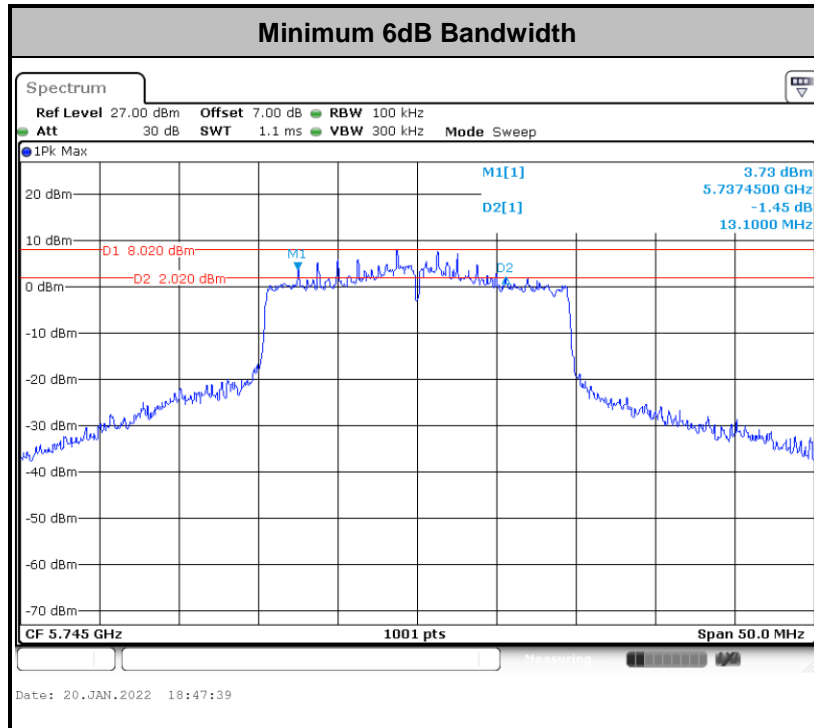
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. For 6dB BW, Set RBW = 100kHz.  
For 26dB BW, Set RBW = approximately 1% of the emission bandwidth.  
For 99% OBW, Set RBW = 1% to 5% of the OBW.
3. For 26dB BW, Set the VBW > RBW.  
For 6dB BW & 99% OBW, 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.

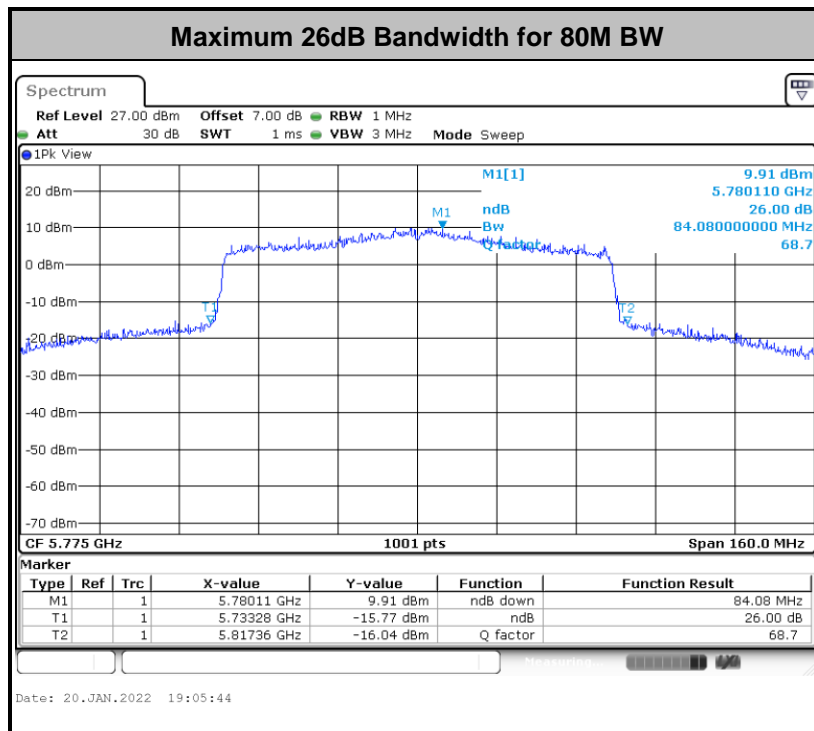
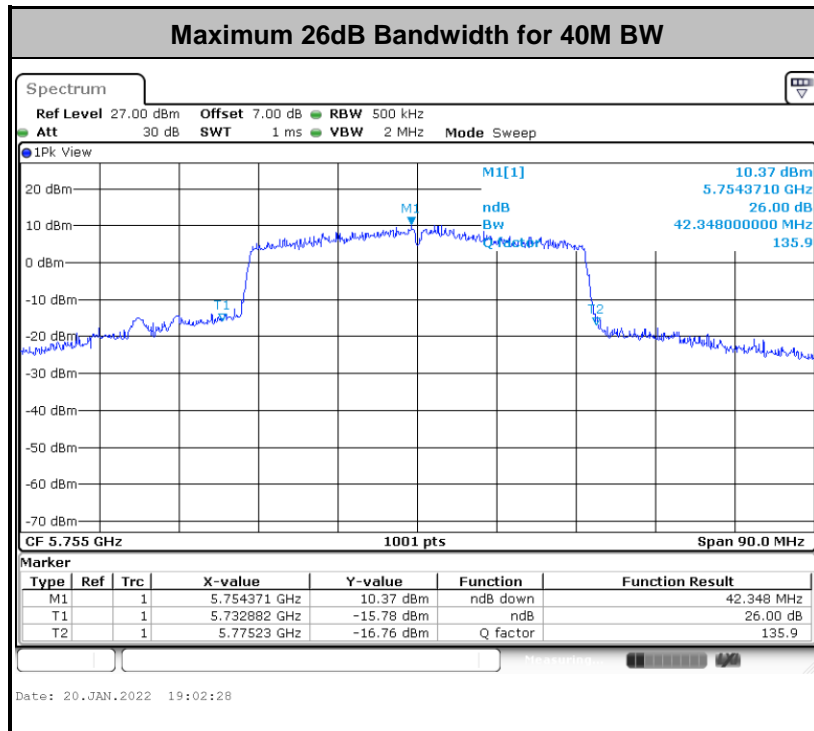
##### 3.1.4 Test Setup

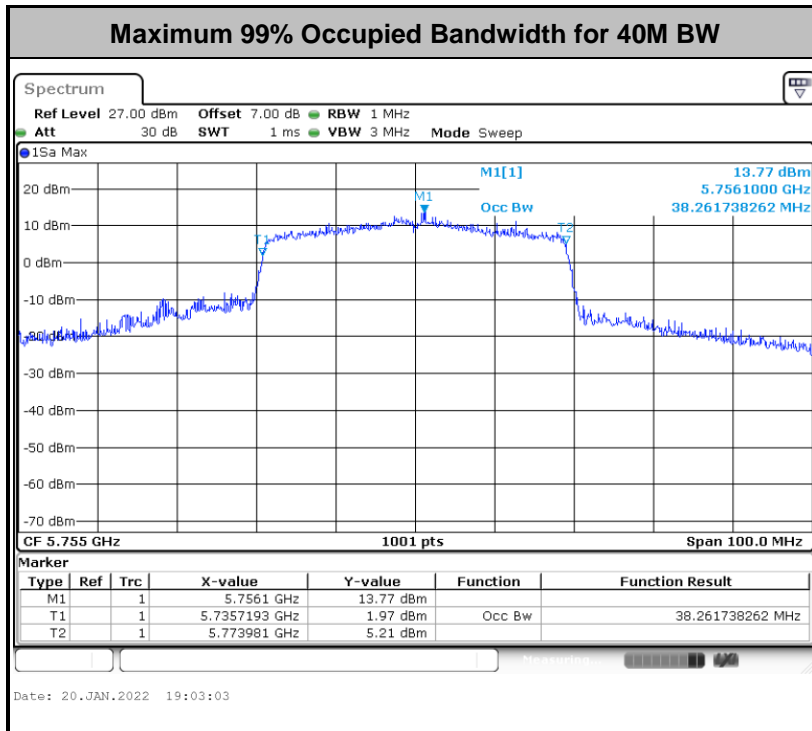
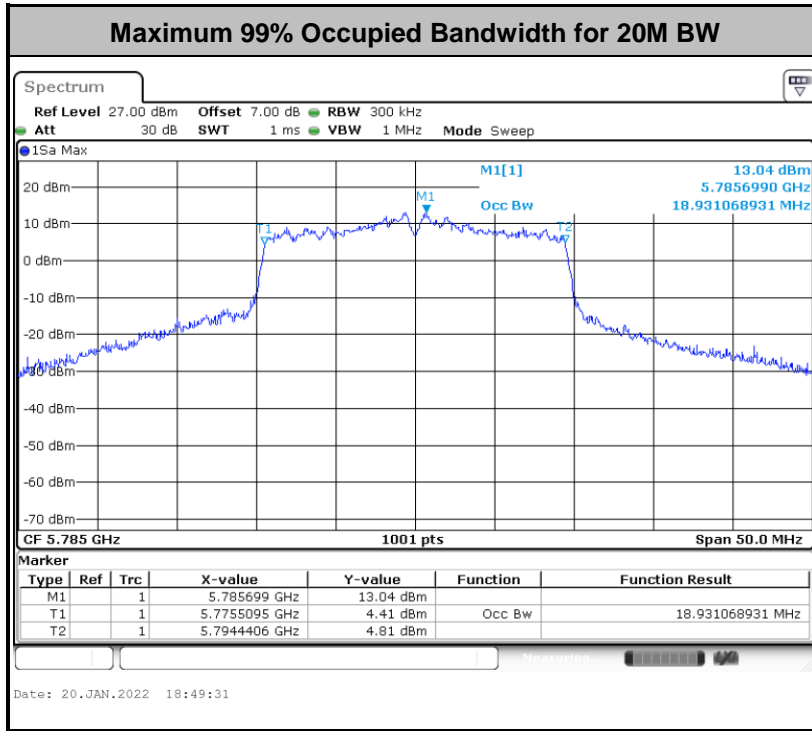


##### 3.1.5 Test Result of 6dB Bandwidth

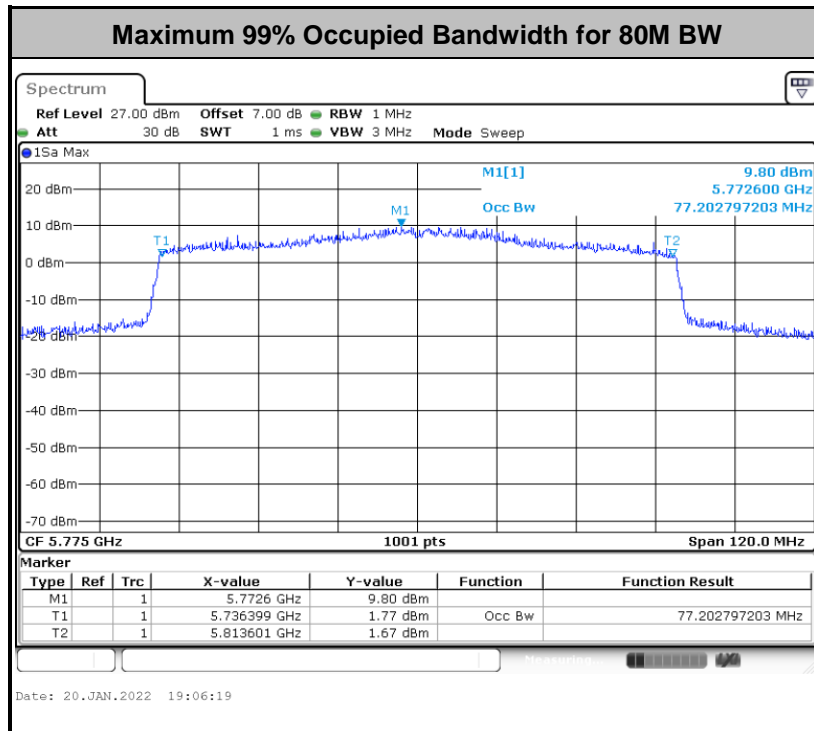
Please refer to Appendix A.











**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.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

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.

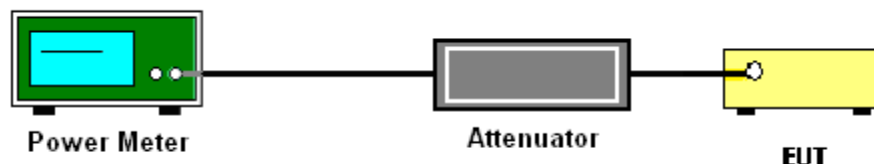
### 3.2.3 Test Procedures

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.
4. For MIMO mode, the measure-and-sum technique should be used for measuring the in-band transmit power of a device.

### 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.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

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).

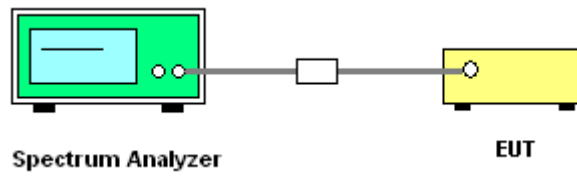
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz.
- Set VBW  $\geq$  1 MHz.
- Number of points in sweep  $\geq$  2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add  $10 \log(500\text{kHz}/\text{RBW})$  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. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (c): Measure and add  $10 \log(N_{\text{ANT}})$  dB.

With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity  $10 \log(N_{\text{ANT}})$  dB is added to each spectrum value before comparing to the emission limit. The addition of  $10 \log(N_{\text{ANT}})$  dB serves to apportion the emission limit among the  $N_{\text{ANT}}$  outputs so that each output is permitted to contribute no more than  $1/N_{\text{ANT}}^{\text{th}}$  of the PSD limit.

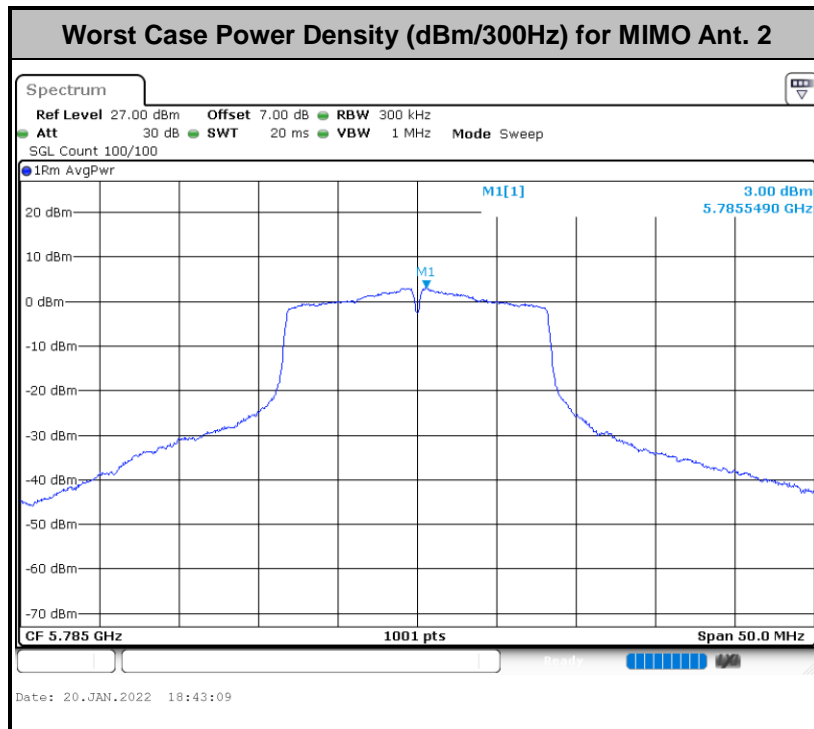
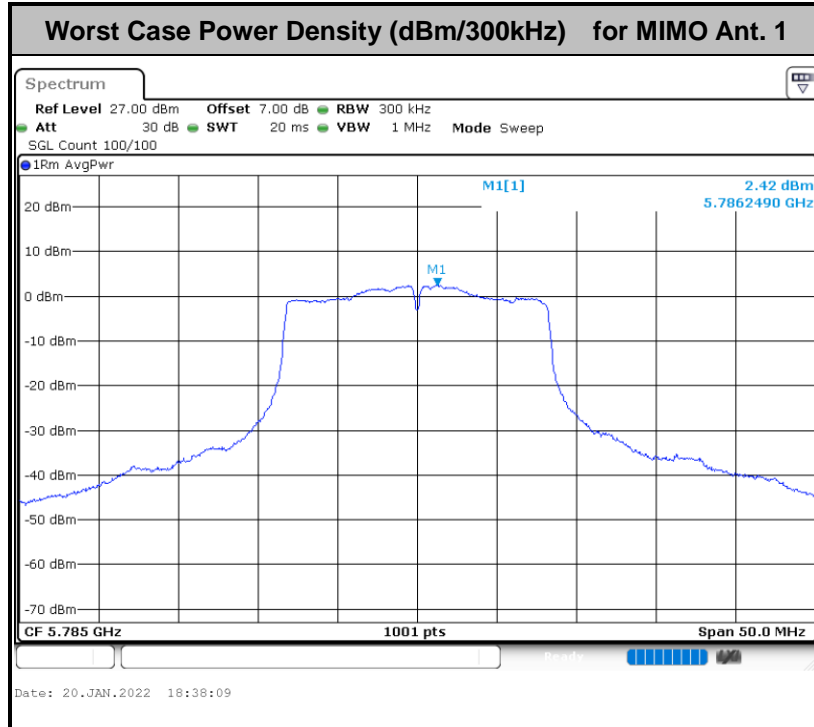
### 3.3.4 Test Setup





### 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	68.3

**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

### 3.4.2 Measuring Instruments

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



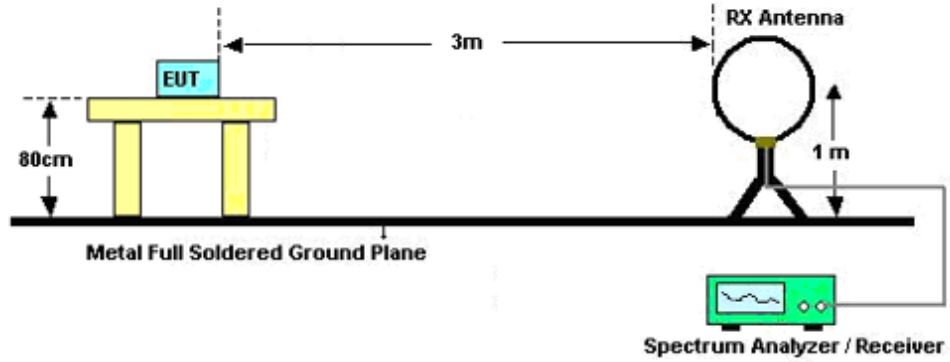
### 3.4.3 Test Procedures

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 peak 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.

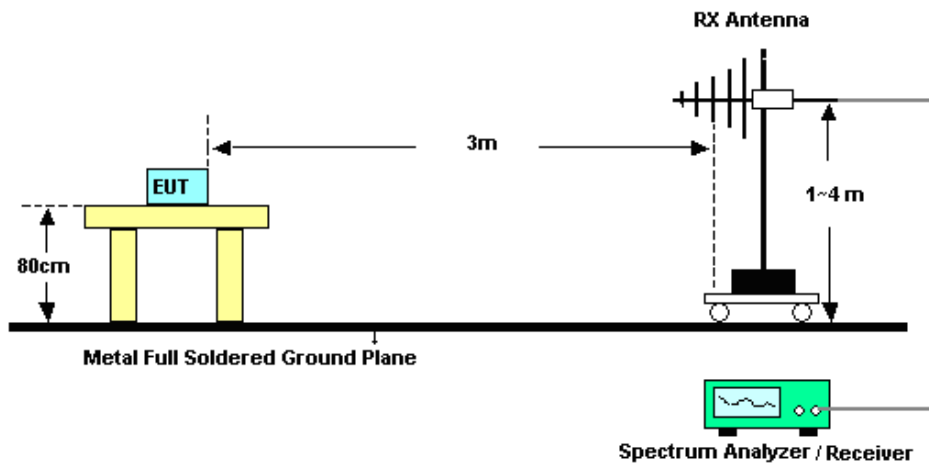


### 3.4.4 Test Setup

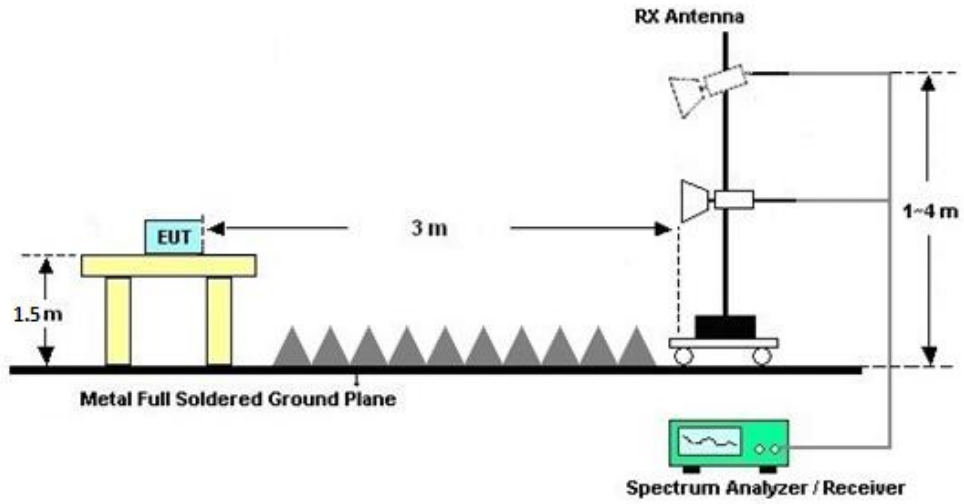
For radiated emissions below 30MHz



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 or 40GHz, whichever is lower)**

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.

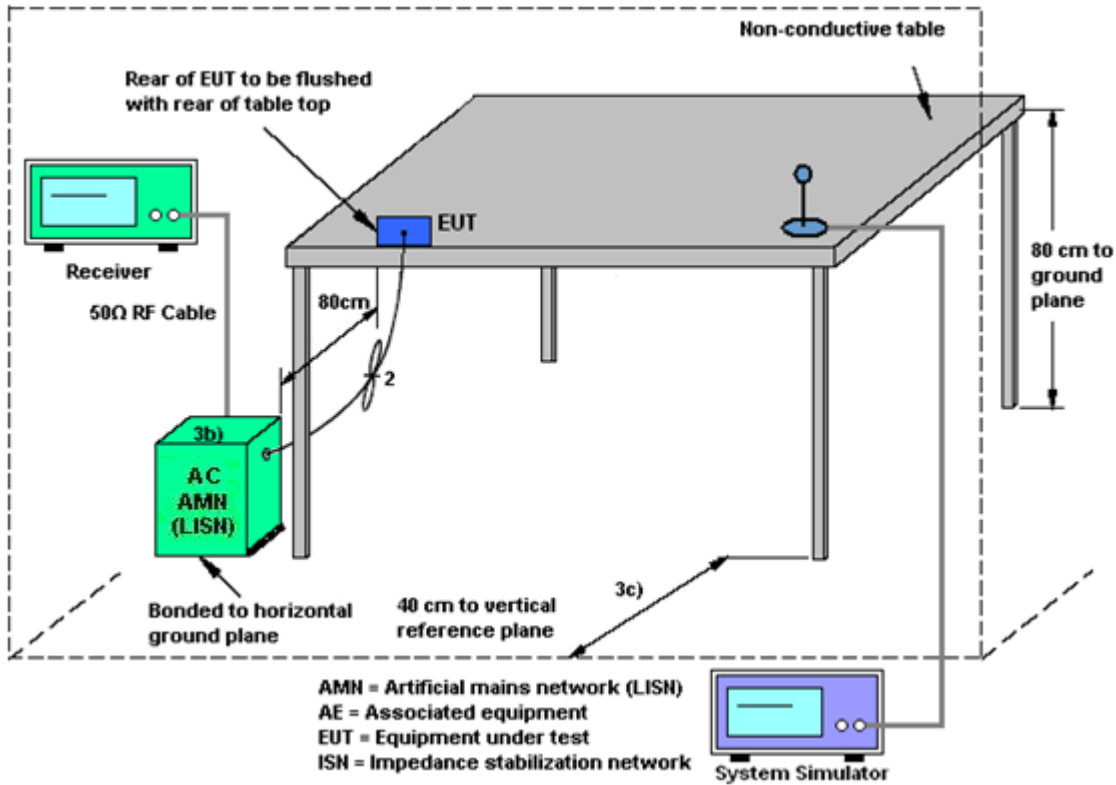
#### 3.5.2 Measuring Instruments

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 Antenna Requirements

#### 3.6.1 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.

#### 3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

#### 3.6.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

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

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

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

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

The directional gain "DG" is calculated as following table.

<b>&lt;CDD Modes&gt;</b>						
	<b>Ant. 1</b>	<b>Ant. 2</b>	<b>DG for Power</b>	<b>DG for PSD</b>	<b>Power Limit Reduction</b>	<b>PSD Limit Reduction</b>
	<b>(dBi)</b>	<b>(dBi)</b>	<b>(dBi)</b>	<b>(dBi)</b>	<b>(dB)</b>	<b>(dB)</b>
<b>Band IV</b>	-8.50	-8.50	-8.50	-5.49	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, ( min = 0 )

PSD Limit Reduction = DG(PSD) – 6dBi, ( min = 0 )



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 14, 2021	Jan. 20, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 07, 2022	Jan. 20, 2022	Jan. 06, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 07, 2022	Jan. 20, 2022	Jan. 06, 2023	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 16, 2021	Feb. 24, 2022	Oct. 15, 2022	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44G,MAX 30dB	Apr. 13, 2021	Feb. 24, 2022	Apr. 12, 2022	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	Feb. 24, 2022	Oct. 29, 2022	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz~1GHz	May 30, 2021	Feb. 24, 2022	May 29, 2022	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 25, 2021	Feb. 24, 2022	Apr. 24, 2022	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	Feb. 24, 2022	Jan. 04, 2023	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	187289	9KHz~1GHz	Jan. 05, 2022	Feb. 24, 2022	Jan. 04, 2023	Radiation (03CH05-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	Feb. 24, 2022	Jan. 04, 2023	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2012228	1Ghz-18Ghz	Oct. 16, 2021	Feb. 24, 2022	Oct. 15, 2022	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY53270316	500MHz~26.5GHz	Oct. 16, 2021	Feb. 24, 2022	Oct. 15, 2022	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Feb. 24, 2022	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Feb. 24, 2022	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Feb. 24, 2022	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESC17	100768	9kHz~7GHz;	Apr. 21, 2021	Feb. 02, 2022	Apr. 20, 2022	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Feb. 02, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	R&S	ENV216	100334	9kHz~30MHz	Oct. 14, 2021	Feb. 02, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Feb. 02, 2022	Oct. 13, 2022	Conduction (CO01-KS)

NCR: No Calibration Required



## 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))	2.94dB
---	--------

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

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

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

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

----- THE END -----





## Appendix A. Conducted Test Results

## A1. Conducted Test Results

Test Engineer:	Jacob Zhang	Temperature:	21~25	°C
Test Date:	2022.1.20	Relative Humidity:	51~54	%

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

U-NII-3 MIMO												
Mod.	Data Rate	Nrx	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	2	149	5745	16.33	16.38	19.03	19.53	15.30	14.45	0.5	Pass
11a	6Mbps	2	157	5785	16.33	16.38	18.88	19.68	15.25	15.30	0.5	Pass
11a	6Mbps	2	165	5825	16.33	16.33	18.88	19.48	15.10	15.10	0.5	Pass

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

U-NII-3 MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power with duty factor (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	2	149	5745	17.83	17.94	20.90	30.00		-8.50	Pass	
11a	6Mbps	2	157	5785	17.87	18.21	21.06	30.00		-8.50	Pass	
11a	6Mbps	2	165	5825	18.06	18.28	21.18	30.00		-8.50	Pass	
HT20	MCS0	2	149	5745	17.46	17.74	20.61	30.00		-8.50	Pass	
HT20	MCS0	2	157	5785	17.57	18.12	20.86	30.00		-8.50	Pass	
HT20	MCS0	2	165	5825	17.76	17.94	20.86	30.00		-8.50	Pass	
HT40	MCS0	2	151	5755	15.93	15.82	18.89	30.00		-8.50	Pass	
HT40	MCS0	2	159	5795	16.17	16.19	19.19	30.00		-8.50	Pass	
VHT20	MCS0	2	149	5745	17.56	17.80	20.69	30.00		-8.50	Pass	
VHT20	MCS0	2	157	5785	17.61	18.19	20.92	30.00		-8.50	Pass	
VHT20	MCS0	2	165	5825	17.80	18.00	20.91	30.00		-8.50	Pass	
VHT40	MCS0	2	151	5755	16.01	15.88	18.95	30.00		-8.50	Pass	
VHT40	MCS0	2	159	5795	16.26	16.27	19.27	30.00		-8.50	Pass	
VHT80	MCS0	2	155	5775	15.87	16.05	18.97	30.00		-8.50	Pass	

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

U-NII-3 single antenna																
U-NII-3 MIMO																
Mod.	Data Rate	Nrx	CH.	Freq. (MHz)	Duty Factor (dB)		10log (500kHz /RBW) Factor (dB)		Average Power Density with Duty Factor (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	2	149	5745	0.24	0.23	2.22		4.80	5.24	8.25	30.00		-5.49		Pass
11a	6Mbps	2	157	5785	0.24	0.23	2.22		4.88	5.45	8.46	30.00		-5.49		Pass
11a	6Mbps	2	165	5825	0.24	0.23	2.22		5.16	5.21	8.22	30.00		-5.49		Pass

Note: PSD Sum = Max PSD(Ant. 1, Ant. 2) + 10 log (n)

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

U-NII-3 MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
						Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
HE20	MCS0	2	149	5745	Full	18.83	18.88	20.68	20.73	15.10	13.10	0.5	Pass
HE20	MCS0	2	157	5785	Full	18.83	18.93	20.73	20.58	17.40	15.35	0.5	Pass
HE20	MCS0	2	165	5825	Full	18.93	18.83	20.93	20.43	15.55	15.10	0.5	Pass
HE40	MCS0	2	151	5755	Full	37.66	38.26	40.19	42.35	35.10	35.10	0.5	Pass
HE40	MCS0	2	159	5795	Full	37.66	37.76	40.19	40.37	35.10	35.10	0.5	Pass
HE80	MCS0	2	155	5775	Full	76.84	77.20	81.52	84.08	75.20	61.44	0.5	Pass

U-NII-3 MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power with duty factor (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
						Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
HE20	MCS0	2	149	5745	Full	17.70	17.92	20.82	30.00		-8.50	Pass	
HE20	MCS0	2	149	5745	26/0	9.47	8.91	12.21	30.00		-8.50	Pass	
HE20	MCS0	2	149	5745	52/37	12.18	11.58	14.90	30.00		-8.50	Pass	
HE20	MCS0	2	149	5745	106/53	14.89	14.51	17.71	30.00		-8.50	Pass	
HE20	MCS0	2	157	5785	Full	17.76	18.32	21.06	30.00		-8.50	Pass	
HE20	MCS0	2	157	5785	26/4	9.40	9.58	12.50	30.00		-8.50	Pass	
HE20	MCS0	2	157	5785	52/38	11.98	11.91	14.95	30.00		-8.50	Pass	
HE20	MCS0	2	157	5785	106/53	14.83	14.57	17.71	30.00		-8.50	Pass	
HE20	MCS0	2	165	5825	Full	17.92	18.14	21.04	30.00		-8.50	Pass	
HE20	MCS0	2	165	5825	26/8	8.67	9.29	12.00	30.00		-8.50	Pass	
HE20	MCS0	2	165	5825	52/40	11.41	11.62	14.52	30.00		-8.50	Pass	
HE20	MCS0	2	165	5825	106/54	14.55	14.51	17.54	30.00		-8.50	Pass	
HE40	MCS0	2	151	5755	Full	16.14	16.01	19.09	30.00		-8.50	Pass	
HE40	MCS0	2	151	5755	242/61	13.92	13.55	16.75	30.00		-8.50	Pass	
HE40	MCS0	2	159	5795	Full	16.40	16.41	19.42	30.00		-8.50	Pass	
HE40	MCS0	2	159	5795	242/62	14.01	13.80	16.92	30.00		-8.50	Pass	
HE80	MCS0	2	155	5775	Full	15.96	16.06	19.02	30.00		-8.50	Pass	
HE80	MCS0	2	155	5775	484/65	12.27	12.01	15.15	30.00		-8.50	Pass	
HE80	MCS0	2	155	5775	484/66	12.29	12.11	15.21	30.00		-8.50	Pass	

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

U-NII-3 MIMO																	
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		10log (500kHz /RBW) Factor (dB)		Average Power Density with Duty Factor (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
						Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
HE20	MCS0	2	149	5745	Full	0.26	0.26	2.22	4.48	4.51	7.52	30.00		-5.49		Pass	
HE20	MCS0	2	149	5745	26/0	0.26	0.26	2.22	4.00	3.46	7.01	30.00		-5.49		Pass	
HE20	MCS0	2	149	5745	52/37	0.26	0.26	2.22	3.87	3.35	6.88	30.00		-5.49		Pass	
HE20	MCS0	2	149	5745	106/53	0.26	0.26	2.22	3.92	3.29	6.93	30.00		-5.49		Pass	
HE20	MCS0	2	157	5785	Full	0.26	0.26	2.22	3.94	4.50	7.51	30.00		-5.49		Pass	
HE20	MCS0	2	157	5785	26/4	0.26	0.26	2.22	4.19	4.22	7.23	30.00		-5.49		Pass	
HE20	MCS0	2	157	5785	52/38	0.26	0.26	2.22	4.16	3.68	7.17	30.00		-5.49		Pass	
HE20	MCS0	2	157	5785	106/53	0.26	0.26	2.22	3.87	3.49	6.88	30.00		-5.49		Pass	
HE20	MCS0	2	165	5825	Full	0.26	0.26	2.22	3.93	4.20	7.21	30.00		-5.49		Pass	
HE20	MCS0	2	165	5825	26/8	0.26	0.26	2.22	3.28	3.95	6.96	30.00		-5.49		Pass	
HE20	MCS0	2	165	5825	52/40	0.26	0.26	2.22	3.26	3.79	6.80	30.00		-5.49		Pass	
HE20	MCS0	2	165	5825	106/54	0.26	0.26	2.22	3.43	3.57	6.58	30.00		-5.49		Pass	
HE40	MCS0	2	151	5755	Full	0.28	0.28	2.22	-0.38	-0.30	2.71	30.00		-5.49		Pass	
HE40	MCS0	2	151	5755	242/61	0.28	0.28	2.22	-0.52	-1.29	2.49	30.00		-5.49		Pass	
HE40	MCS0	2	159	5795	Full	0.28	0.28	2.22	-0.35	0.24	3.25	30.00		-5.49		Pass	
HE40	MCS0	2	159	5795	242/62	0.28	0.28	2.22	-0.39	-1.04	2.62	30.00		-5.49		Pass	
HE80	MCS0	2	155	5775	Full	0.29	0.31	2.22	-2.82	-2.74	0.27	30.00		-5.49		Pass	
HE80	MCS0	2	155	5775	484/65	0.08	0.08	2.22	-6.22	-6.08	-3.03	30.00		-5.49		Pass	
HE80	MCS0	2	155	5775	484/66	0.08	0.08	2.22	-5.98	-6.59	-2.93	30.00		-5.49		Pass	

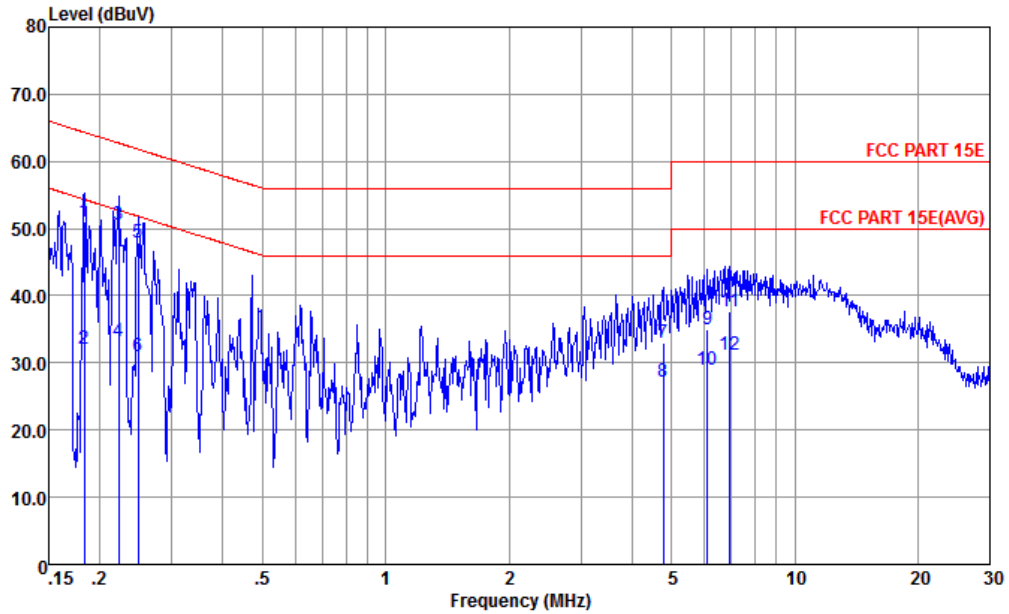
Note: PSD Sum = Max PSD(Ant. 1, Ant. 2) + 10 log (n)





## Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line

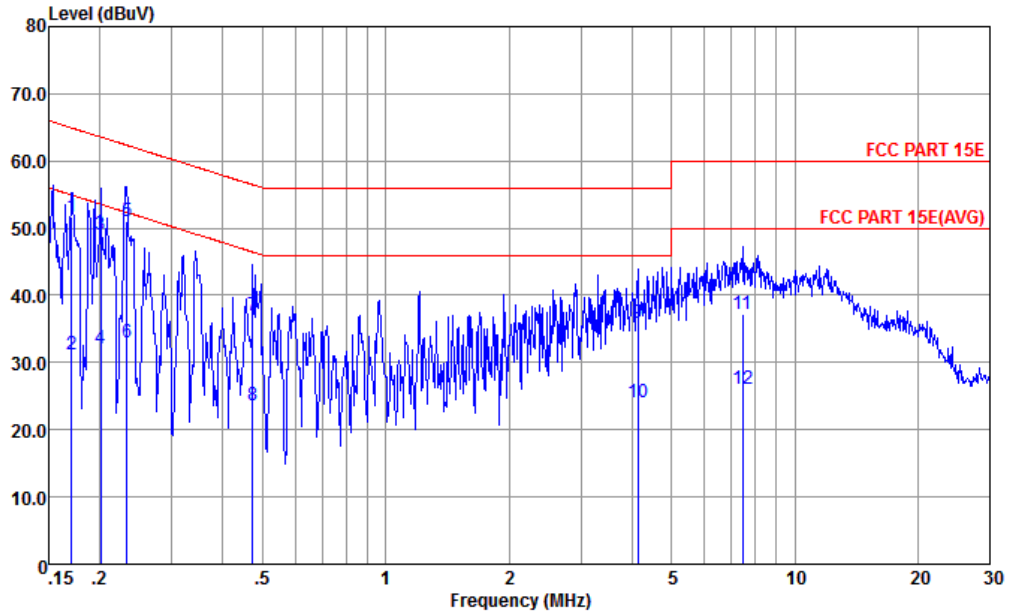


Site : CO01-KS  
 Condition : FCC PART 15E LISN-060105-L LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.183	50.93	-13.40	64.33	40.50	0.03	10.40	QP
2	0.183	32.03	-22.30	54.33	21.60	0.03	10.40	Average
3 *	0.222	50.60	-12.14	62.74	40.20	0.05	10.35	QP
4	0.222	33.30	-19.44	52.74	22.90	0.05	10.35	Average
5	0.248	47.89	-13.93	61.82	37.50	0.06	10.33	QP
6	0.248	30.99	-20.83	51.82	20.60	0.06	10.33	Average
7	4.772	33.04	-22.96	56.00	22.59	0.18	10.27	QP
8	4.772	27.24	-18.76	46.00	16.79	0.18	10.27	Average
9	6.121	34.97	-25.03	60.00	24.49	0.19	10.29	QP
10	6.121	29.07	-20.93	50.00	18.59	0.19	10.29	Average
11	6.951	37.69	-22.31	60.00	27.20	0.19	10.30	QP
12	6.951	31.09	-18.91	50.00	20.60	0.19	10.30	Average



Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-KS  
 Condition : FCC PART 15E LISN-060105-N NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.170	51.73	-13.21	64.94	41.19	0.11	10.43	QP
2	0.170	31.13	-23.81	54.94	20.59	0.11	10.43	Average
3	0.201	49.06	-14.52	63.58	38.60	0.10	10.36	QP
4	0.201	32.06	-21.52	53.58	21.60	0.10	10.36	Average
5 *	0.233	50.94	-11.41	62.35	40.50	0.10	10.34	QP
6	0.233	33.04	-19.31	52.35	22.60	0.10	10.34	Average
7	0.474	36.95	-19.50	56.45	26.60	0.11	10.24	QP
8	0.474	23.55	-22.90	46.45	13.20	0.11	10.24	Average
9	4.136	35.92	-20.08	56.00	25.50	0.17	10.25	QP
10	4.136	24.02	-21.98	46.00	13.60	0.17	10.25	Average
11	7.446	37.11	-22.89	60.00	26.60	0.20	10.31	QP
12	7.446	26.01	-23.99	50.00	15.50	0.20	10.31	Average

Note:

- Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
- Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)



## Appendix C. Radiated Spurious Emission

### UNII-3 - 5725~5850MHz

#### WIFI 802.11ax HE20\_Full (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11ax HE20 Full CH 165 5825MHz		5850	60.32	-61.98	122.3	49.84	35.87	11.33	36.72	100	42	P	H
		5854.8	57.79	-53.57	111.36	47.29	35.9	11.34	36.74	100	42	P	H
		5924.4	50.96	-17.78	68.74	40.5	35.87	11.4	36.81	100	42	P	H
		5971.2	50.49	-17.81	68.3	40.03	35.85	11.45	36.84	100	42	P	H
		5824	112.93	-	-	102.48	35.84	11.31	36.7	100	42	P	H
		5824	102.33	-	-	91.88	35.84	11.31	36.7	100	42	A	H
		5850.8	63.1	-57.38	120.48	52.62	35.87	11.33	36.72	309	354	P	V
		5854.8	60.36	-51	111.36	49.86	35.9	11.34	36.74	309	354	P	V
		5878.4	51.19	-51.58	102.77	40.7	35.89	11.36	36.76	309	354	P	V
		5976.8	50.1	-18.2	68.3	39.67	35.84	11.45	36.86	309	354	P	V
		5824	112.86	-	-	102.41	35.84	11.31	36.7	309	354	P	V
	5824	102.54	-	-	92.09	35.84	11.31	36.7	309	354	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

### UNII-3 5725~5850MHz

#### WIFI 802.11ax HE20\_Full (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11ax HE20 Full CH 165 5825MHz		11653	46.8	-27.2	74	57.8	38.88	16.46	66.34	300	0	P	H
		11653	46.04	-27.96	74	57.04	38.88	16.46	66.34	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-3 5725~5850MHz
WIFI 802.11ax HE20\_Partial 106 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include frequency measurements from 5854.8 to 5830 MHz and a Remark section.



**UNII-3 5725~5850MHz**  
**WIFI 802.11ax HE40\_Full (Band Edge @ 3m)**

WIFI Ant. 1+2	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ax HE40 Full CH 151 5755MHz		5646.4	52.96	-15.34	68.3	42.89	35.5	11.08	36.51	100	59	P	H
		5696.8	61.58	-41.36	102.94	51.42	35.59	11.13	36.56	100	59	P	H
		5717.2	73.54	-36.58	110.12	63.34	35.62	11.16	36.58	100	59	P	H
		5720.8	72.35	-40.37	112.72	62.14	35.65	11.16	36.6	100	59	P	H
		5853.6	51.08	-63.01	114.09	40.59	35.9	11.33	36.74	100	59	P	H
		5870.4	51.08	-55.51	106.59	40.58	35.9	11.34	36.74	100	59	P	H
		5884	50.83	-47.79	98.62	40.34	35.89	11.36	36.76	100	59	P	H
		5944.8	50.16	-18.14	68.3	39.71	35.86	11.42	36.83	100	59	P	H
		5758	109.05	-	-	98.75	35.72	11.21	36.63	100	59	P	H
		5758	101.06	-	-	90.76	35.72	11.21	36.63	100	59	A	H
		5630.8	53.35	-14.95	68.3	43.31	35.48	11.05	36.49	300	318	P	V
		5700	63.82	-41.48	105.3	53.66	35.59	11.13	36.56	300	318	P	V
		5714.8	72.64	-36.81	109.45	62.44	35.62	11.16	36.58	300	318	P	V
		5721.2	74.26	-39.38	113.64	64.05	35.65	11.16	36.6	300	318	P	V
		5853.6	51.78	-62.31	114.09	41.29	35.9	11.33	36.74	300	318	P	V
		5855.2	52.58	-58.26	110.84	42.08	35.9	11.34	36.74	300	318	P	V
		5880.4	51.52	-49.77	101.29	41.03	35.89	11.36	36.76	300	318	P	V
		5928.4	50.6	-17.7	68.3	40.14	35.87	11.4	36.81	300	318	P	V
		5752	108.34	-	-	98.04	35.72	11.21	36.63	300	318	P	V
		5752	100.97	-	-	90.67	35.72	11.21	36.63	300	318	A	V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-3 5725~5850MHz
WIFI 802.11ax HE40\_Full (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). It contains two rows of test data and a Remark section.



WIFI 802.11ax HE40\_Partial 242 (Band Edge @ 3m)

WIFI Ant. 5+6	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ax HE40 Partial 242/61 CH 151 5755MHz		5626.8	62.64	-5.66	68.3	53.24	34.84	11.05	36.49	101	62	P	H
		5693.2	69.12	-31.17	100.29	59.62	34.93	11.13	36.56	101	62	P	H
		5717.2	76.74	-33.38	110.12	67.21	34.95	11.16	36.58	101	62	P	H
		5724.8	82.18	-39.66	121.84	72.63	34.97	11.18	36.6	101	62	P	H
		5852.8	48.31	-67.61	115.92	38.59	35.11	11.33	36.72	101	62	P	H
		5861.2	54.31	-54.85	109.16	44.58	35.13	11.34	36.74	101	62	P	H
		5894.8	52.68	-37.93	90.61	42.89	35.18	11.38	36.77	101	62	P	H
		5990	49.04	-19.26	68.3	39.15	35.3	11.47	36.88	101	62	P	H
		5746	107.71	-	-	98.13	34.99	11.21	36.62	101	62	P	H
		5746	99.55	-	-	89.97	34.99	11.21	36.62	101	62	A	H
		5614.4	60.95	-7.35	68.3	51.58	34.82	11.03	36.48	396	322	P	V
		5699.6	68.23	-36.78	105.01	58.73	34.93	11.13	36.56	396	322	P	V
		5717.6	75.91	-34.32	110.23	66.38	34.97	11.16	36.6	396	322	P	V
		5724	81.51	-38.51	120.02	71.96	34.97	11.18	36.6	396	322	P	V
		5850.8	63.11	-57.37	120.48	53.39	35.11	11.33	36.72	396	322	P	V
		5863.2	61.64	-46.96	108.6	51.91	35.13	11.34	36.74	396	322	P	V
		5902.8	51.68	-33.01	84.69	41.89	35.18	11.38	36.77	396	322	P	V
		5926.8	49.56	-18.74	68.3	39.75	35.22	11.4	36.81	396	322	P	V
		5746	106.75	-	-	97.17	34.99	11.21	36.62	396	322	P	V
	5746	100.83	-	-	91.25	34.99	11.21	36.62	396	322	A	V	

**Remark**

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



**UNII-3 5725~5850MHz**  
**WIFI 802.11ax HE80\_Full (Band Edge @ 3m)**

WIFI Ant. 1+2	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ax HE80 Full CH 155 5775MHz		5644.8	51.98	-16.32	68.3	41.94	35.5	11.05	36.51	100	38	P	H
		5698	70.83	-33	103.83	60.67	35.59	11.13	36.56	100	38	P	H
		5720	78.4	-32.5	110.9	68.19	35.65	11.16	36.6	100	38	P	H
		5722.8	77.96	-39.32	117.28	67.73	35.65	11.18	36.6	100	38	P	H
		5850	75.31	-46.99	122.3	64.83	35.87	11.33	36.72	100	38	P	H
		5855.2	73.29	-37.55	110.84	62.79	35.9	11.34	36.74	100	38	P	H
		5875.6	65.78	-39.07	104.85	55.29	35.89	11.36	36.76	100	38	P	H
		5981.2	51.56	-16.74	68.3	41.13	35.84	11.45	36.86	100	38	P	H
		5776	107.84	-	-	97.5	35.75	11.24	36.65	100	38	P	H
		5776	99.33	-	-	88.99	35.75	11.24	36.65	100	38	A	H
		5645.2	53.04	-15.26	68.3	43	35.5	11.05	36.51	240	360	P	V
		5700	72.47	-32.83	105.3	62.31	35.59	11.13	36.56	240	360	P	V
		5716.8	77.8	-32.21	110.01	67.6	35.62	11.16	36.58	240	360	P	V
		5722.8	78.48	-38.8	117.28	68.25	35.65	11.18	36.6	240	360	P	V
		5850	78.19	-44.11	122.3	67.71	35.87	11.33	36.72	240	360	P	V
		5857.2	73.71	-36.57	110.28	63.21	35.9	11.34	36.74	240	360	P	V
		5875.3	65.86	-39.22	105.08	55.37	35.89	11.36	36.76	240	360	P	V
		5925.2	51.63	-16.67	68.3	41.17	35.87	11.4	36.81	240	360	P	V
		5776	107.99	-	-	97.65	35.75	11.24	36.65	240	360	P	V
	5776	99.36	-	-	89.02	35.75	11.24	36.65	240	360	A	V	
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												





UNII-3 5725~5850MHz
WIFI 802.11ax HE80\_Full (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for 802.11ax HE80 Full CH 155 5775MHz and a Remark section.



WIFI 802.11ax HE80\_Partial 484 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11ax HE80 Partial 484/65 CH 155 5775MHz		5646.8	64.54	-3.76	68.3	55.1	34.87	11.08	36.51	101	62	P	H
		5677.2	70.2	-18.27	88.47	60.73	34.91	11.11	36.55	101	62	P	H
		5712.8	81.84	-27.05	108.89	72.31	34.95	11.16	36.58	101	62	P	H
		5722.4	79.08	-37.29	116.37	69.53	34.97	11.18	36.6	101	62	P	H
		5851.2	68.28	-51.28	119.56	58.56	35.11	11.33	36.72	101	62	P	H
		5869.6	72.18	-34.63	106.81	62.45	35.13	11.34	36.74	101	62	P	H
		5880.4	68.27	-33.02	101.29	58.51	35.16	11.36	36.76	101	62	P	H
		5944.4	61.7	-6.6	68.3	51.87	35.24	11.42	36.83	101	62	P	H
		5758	104.06	-	-	94.47	35.01	11.21	36.63	101	62	P	H
		5758	95.71	-	-	86.12	35.01	11.21	36.63	101	62	A	H
		5644.4	63.91	-4.39	68.3	54.5	34.87	11.05	36.51	322	351	P	V
		5689.2	68.75	-28.59	97.34	59.25	34.93	11.13	36.56	322	351	P	V
		5717.2	76	-34.12	110.12	66.47	34.95	11.16	36.58	322	351	P	V
		5722.4	80.81	-35.56	116.37	71.26	34.97	11.18	36.6	322	351	P	V
		5851.2	71.03	-48.53	119.56	61.31	35.11	11.33	36.72	322	351	P	V
		5868.4	73.62	-33.53	107.15	63.89	35.13	11.34	36.74	322	351	P	V
		5883.6	69.14	-29.77	98.91	59.38	35.16	11.36	36.76	322	351	P	V
		5937.6	58.12	-10.18	68.3	48.29	35.22	11.42	36.81	322	351	P	V
		5758	103.7	-	-	94.11	35.01	11.21	36.63	322	351	P	V
	5758	96.02	-	-	86.43	35.01	11.21	36.63	322	351	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

WIFI 802.11ax HE80\_Partial 484(LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	(dBμV)	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)
WIFI 802.11ax HE80_Partial 484 LF		72.68	33.96	-6.04	40	52.87	12.4	1.09	32.4	-	-	P	H
		216.24	37.88	-8.12	46	53.25	14.88	2.15	32.4	-	-	P	H
		240.49	39.59	-6.41	46	52.43	17.3	2.26	32.4	-	-	P	H
		531.49	39.62	-6.38	46	44.77	23.9	3.35	32.4	-	-	P	H
		719.67	34.67	-11.33	46	36.11	27	3.92	32.36	-	-	P	H
		836.07	28.24	-17.76	46	27.45	28.54	4.2	31.95	-	-	P	H
		72.68	29.76	-10.24	40	48.67	12.4	1.09	32.4	-	-	P	V
		184.23	27.92	-15.58	43.5	43.74	14.6	1.98	32.4	-	-	P	V
		239.52	31.81	-14.19	46	44.76	17.2	2.25	32.4	-	-	P	V
		263.77	28.46	-17.54	46	38.49	20	2.37	32.4	-	-	P	V
	534.4	34.38	-11.62	46	39.52	23.9	3.36	32.4	-	-	P	V	
	719.67	31.03	-14.97	46	32.47	27	3.92	32.36	-	-	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	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
5+6		( 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

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path 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:**

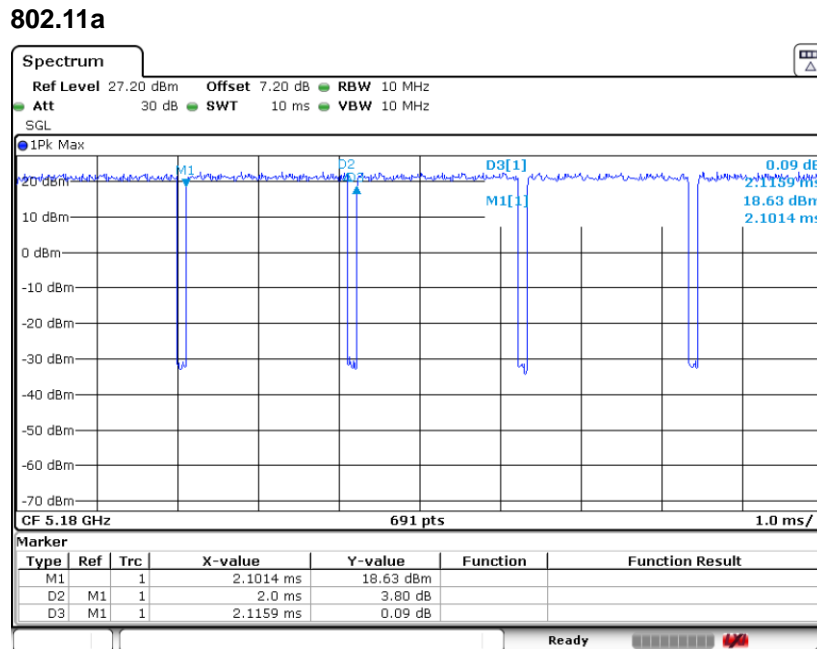
1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)  
= 43.54 (dBμV/m)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

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



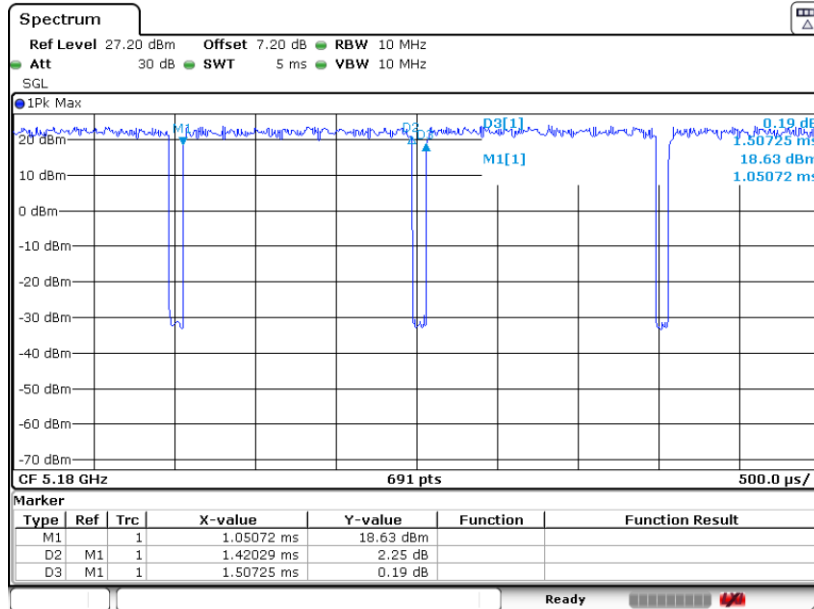
## Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	94.52	2	0.5	0.51KHz
802.11ax HE20	94.23	1.420	0.704	0.75KHz
802.11ax HE40	93.74	0.738	1.356	1.5KHz
802.11ax HE80	93.61	0.552	1.811	2KHz
802.11ax HE20-26-RU	100	-	-	10Hz
802.11ax HE40-242-RU	98.78	-	-	10Hz
802.11ax HE80-484-RU	98.14	-	-	10Hz

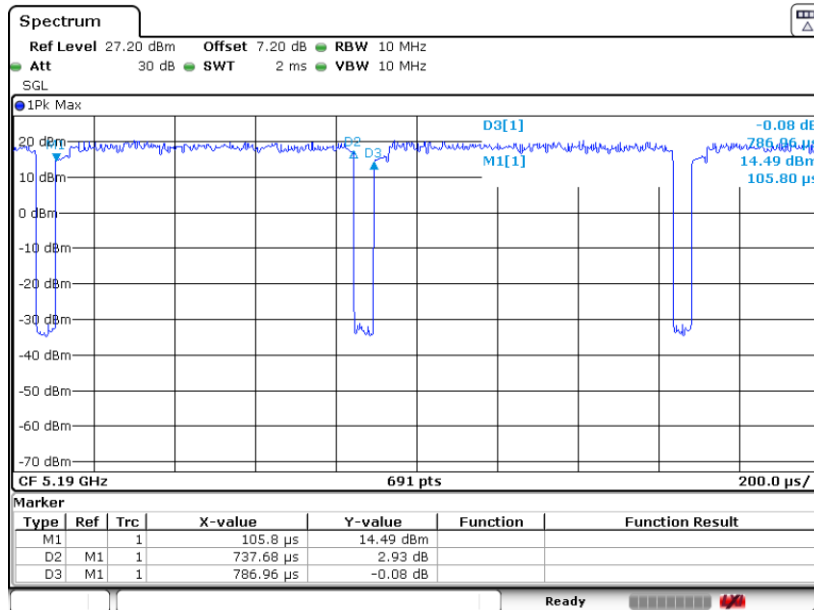




802.11ax HE20

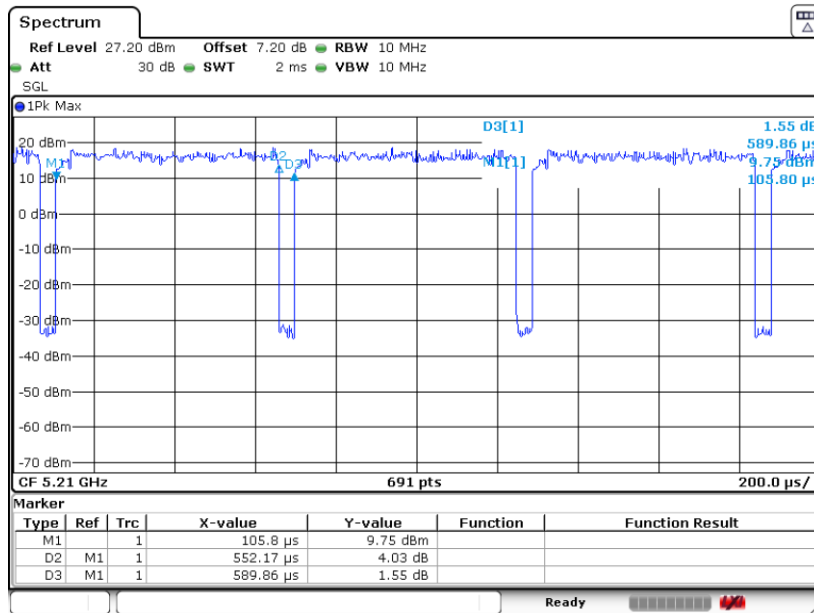


802.11ax HE40

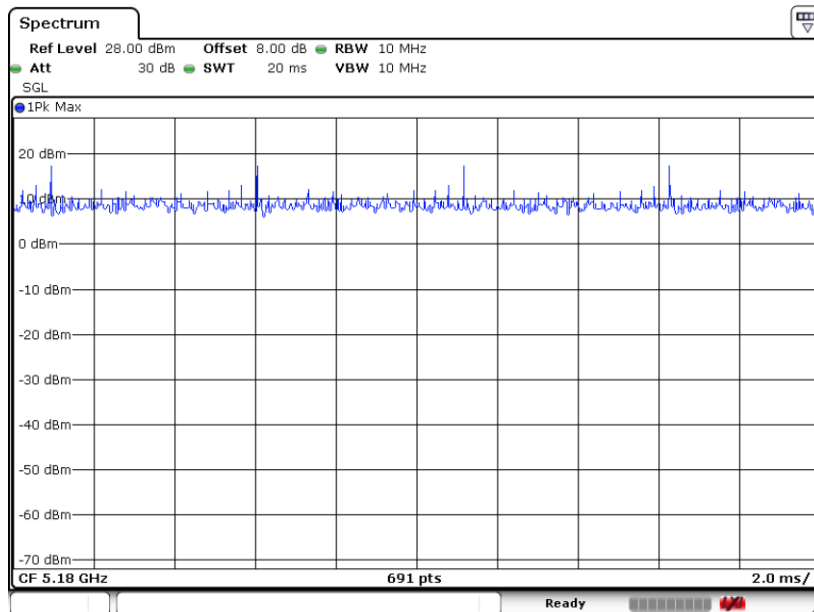




802.11ax HE80

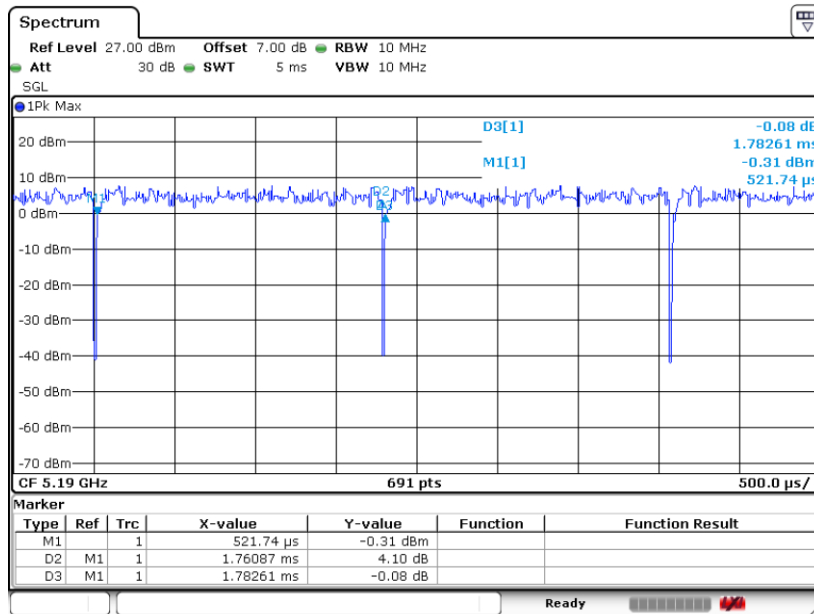


802.11ax HE20-26-RU





802.11ax HE40-242-RU







802.11ax HE80-484-RU

