



FCC RF Test Report

APPLICANT : Inseego Corp.
EQUIPMENT : wireless device
BRAND NAME : Inseego
MODEL NAME : FG20003
FCC ID : PKRISGFG20003
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Aug. 28, 2020 and testing was completed on Oct. 05, 2020. 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.

This report contains data that were produced under subcontract by Sporton International (ShenZhen) Inc.

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.

Jason Jia

Reviewed by: Jason Jia / Supervisor

James Huang

Approved by: James Huang / Manager



Sporton International (Kunshan) Inc.

**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
FR082811C	Rev. 01	Initial issue of report	Nov. 25, 2020



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 & 15.403(i)	26dB & 99% Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 17 dBm	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b) & 15.209(a)	Pass	Under limit 0.10 dB at 5145.920 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 9.06 dB at 0.532 MHz
3.6	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.7	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
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

Inseego Corp.
9710 Scranton Road, Suite 200 San Diego, CA 92121

1.2 Manufacturer

MeiG Smart Technology Co., Ltd
Floor 2, Office Building No.5, Lingxia Road, Fenghuang Community, Fuyong Street, Bao 'an District, Shenzhen

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	wireless device
Brand Name	Inseego
Model Name	FG20003
FCC ID	PKRISGFG20003
EUT supports Radios application	WCDMA/LTE/5G NR/GNSS WLAN 2.4GHz 802.11b/g/n (HT20/HT40) WLAN 2.4GHz 802.11ax (HE20/HE40) WLAN 5GHz 802.11a/n/ac (HT20/HT40/VHT20/VHT40/VHT80) WLAN 5GHz 802.11ax (HE20/HE40/HE80) Bluetooth LE
IMEI Code	Conducted: 990016260006166 Conduction: 990016260003130 Radiation: N/A
HW Version	FG20003_SRT860H_V2.1
SW Version	1
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																					
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz																				
Maximum Output Power to Antenna	<5180 MHz ~ 5240 MHz> <SISO Ant. 2> 802.11a : 18.99 dBm / 0.0793 W <MIMO Ant. 1+2+3+4> 802.11n HT20 : 24.82 dBm / 0.3034 W 802.11n HT40 : 24.71 dBm / 0.2958 W 802.11ac VHT20 : 22.93 dBm / 0.1963 W 802.11ac VHT40 : 22.87 dBm / 0.1936 W 802.11ac VHT80 : 22.80 dBm / 0.1905 W 802.11ax HE20 : 20.77 dBm / 0.1194 W 802.11ax HE 40 : 20.79 dBm / 0.1199 W 802.11ax HE 80 : 19.79 dBm / 0.0953 W																				
99% Occupied Bandwidth	<5180 MHz ~ 5240 MHz> <SISO> 802.11a : 16.43 MHz <MIMO Ant. 1+2+3+4> 802.11n HT20 : 17.68 MHz 802.11n HT40 : 36.36 MHz 802.11ac VHT80 : 76.24 MHz 802.11ax HE20 : 19.03 MHz 802.11ax HE40 : 38.16 MHz 802.11ax HE80 : 78.04 MHz																				
Antenna Type / Gain	<5180 MHz ~ 5240 MHz> <Ant. 1> : PCB Antenna with gain 2.96 dBi <Ant. 2> : PCB Antenna with gain 2.70 dBi <Ant. 3> : PCB Antenna with gain 4.57 dBi <Ant. 4> : PCB Antenna with gain 4.30 dBi																				
Type of Modulation	802.11a/n/ac/ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)																				
Antenna Function Description	<table border="1"> <thead> <tr> <th></th> <th>Ant. 1</th> <th>Ant. 2</th> <th>Ant. 3</th> <th>Ant. 4</th> </tr> </thead> <tbody> <tr> <td>802.11a/n/ac/ax SISO</td> <td>V</td> <td>V</td> <td>V</td> <td>V</td> </tr> <tr> <td>802.11n/ac/ax MIMO</td> <td colspan="4">V</td> </tr> <tr> <td>802.11ac/ax Beamforming</td> <td colspan="4">V</td> </tr> </tbody> </table>		Ant. 1	Ant. 2	Ant. 3	Ant. 4	802.11a/n/ac/ax SISO	V	V	V	V	802.11n/ac/ax MIMO	V				802.11ac/ax Beamforming	V			
	Ant. 1	Ant. 2	Ant. 3	Ant. 4																	
802.11a/n/ac/ax SISO	V	V	V	V																	
802.11n/ac/ax MIMO	V																				
802.11ac/ax Beamforming	V																				

Note:

1. The Tx Power of EUT will less than or equal to non-beamforming power when Beamforming mode is active. So we only evaluate RSE testing is verified.
2. Only 802.11ac/ax mode supports Beamforming mode and 802.11a mode supports SISO mode only.
3. For WLAN SISO & MIMO mode for 802.11n/ac/ax mode, the whole testing has assessed only MIMO mode by referring to their higher conducted power.
4. For 802.11n HT20 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing have assessed only 802.11n HT20/ HT40 by referring to their maximum conducted power.



- 5. For 802.11ax mode, Partial RU combinations were verified for conducted power/PSD/Radiated Band edge which is lower conducted power than full RU mode.
- 6. When Partial RU running, such as 26-tones, transmits start 0+1 combination together only which were referred to power table of the appendix A. For this reason, 11ax HE40/HE80 is covered by 11ax HE20 for partial RU, we only evaluate full RU for 11ax HE40/HE80 and 484-tones, start 65+66 of HE80.

1.5 Modification of EUT

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

1.6 Testing Location

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

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	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		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS 03CH05-KS	CN1257	314309

Sporton International (Shenzhen) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	TH01-SZ	CN1256	421272

Note: Test data subcontracted: all conducted test data of this report.



1.7 Test Software

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

1.8 Applicable Standards

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

- ♦ 47 CFR Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ 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)
5180-5240 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	42#	5210		

Note:

- 1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40 and 802.11ax HE 40
- 2. The above Frequency and Channel in "#" 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.

SISO Mode

Modulation	Data Rate
802.11a	6 Mbps

MIMO Mode

Modulation	Data Rate
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT80	MCS0
802.11ax HE20	MCS0
802.11ax HE40	MCS0
802.11ax HE 80	MCS0

TXBF Mode

Modulation	Data Rate
802.11ax HE20	MCS0
802.11ax HE40	MCS0
802.11ax HE 80	MCS0

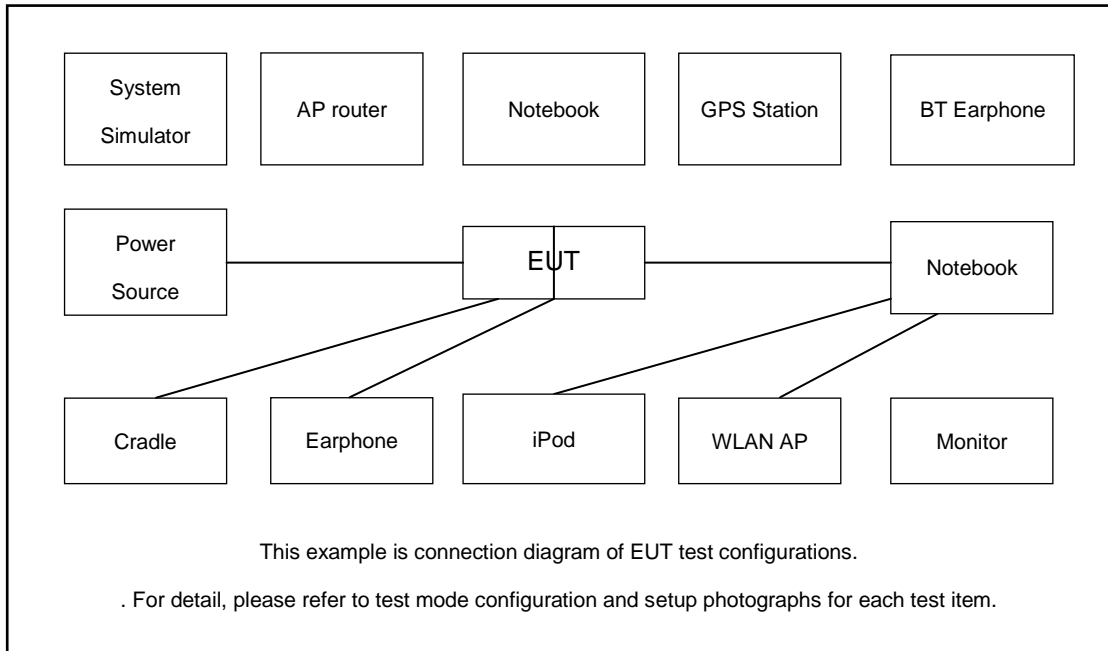
Test Cases	
AC Conducted Emission	Mode 1 : WCDMA Band V Idle + BT Link + WLAN Link(5G) + WAN Link + 5Gbps LAN Link + LAN 1 Link + LAN 2 Link + Adaptor
Remark: For Radiated Test Cases, The tests were performed with Adapter.	



Ch. #		Band I : 5180-5240 MHz			
		802.11a	802.11n HT20	802.11n HT40	802.11ac VHT80
L	Low	36	36	38	-
M	Middle	44	44	-	42
H	High	48	48	46	-

Ch. #		Band I : 5180-5240 MHz		
		802.11ax HE20	802.11ax HE40	802.11ax HE80
L	Low	36	38	-
M	Middle	44	-	42
H	High	48	46	-

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.	Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded,1.8m
2.	Phone	MOTO	XT1952-1	N/A	N/A	N/A
3.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
4.	Notebook *2	Lenovo	V130-15IKB005	N/A	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
5.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
6.	Hard DISK*2	WD	C6B	N/A	N/A	N/A
7.	Earphone*2	Lenovo	P121	N/A	N/A	Unshielded,1.2m
8.	PC	Dell	D12M	Fcc DoC	N/A	Unshielded,1.8m
9.	Monitor	PHLIPS	BDM3275UP	Fcc DoC	N/A	Unshielded,1.8m
10.	(USB)Mouse	Lenovo	OEUJUA	Fcc DoC	Shielded, 1.8m	N/A
11.	(USB)Keyboard	Lenovo	SK-8821	Fcc DoC	Shielded, 1.8m	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 notebook under large package sizes transmission.

For TXBF mode, the EUT was tested under normal operation and link to another EUT with power, modulation modes and data rates controlled by engineer mode command lines.

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 2.5 dB and 20dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 2.5 + 20 = 22.50 \text{ (dB)} \end{aligned}$$

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Description of 26dB & 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

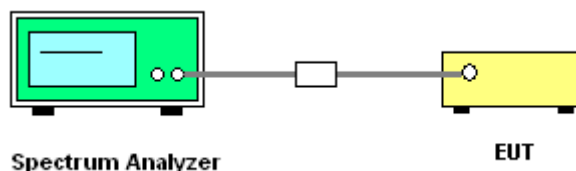
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

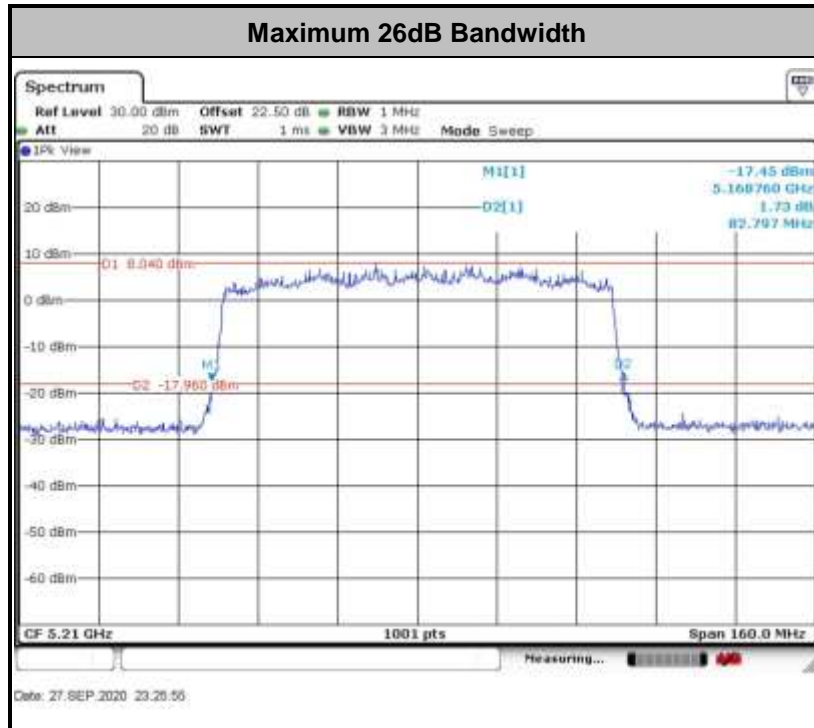
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB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

3.1.4 Test Setup



3.1.5 Test Result of 26dB & 99% Occupied Bandwidth

Please refer to Appendix A.



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



3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

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

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

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.

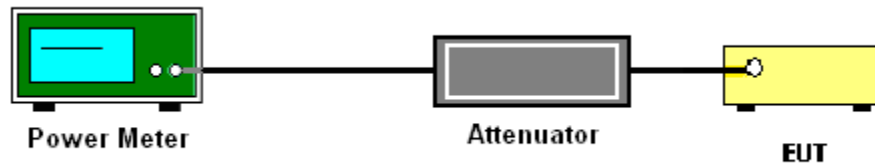
<TXBF Modes>

The testing follows Method PM-G of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 for TXBF modes.

Method PM-G (Measurement using a gated RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit at its maximum power control level.
3. Measure the average power of the transmitter
4. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

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

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

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

Method SA-2

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

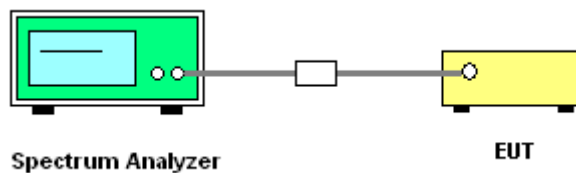
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW \geq 3 MHz.
- Number of points in sweep \geq 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add $10 \log(1/x)$,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

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

Method (a): Measure and sum the spectra across the outputs.

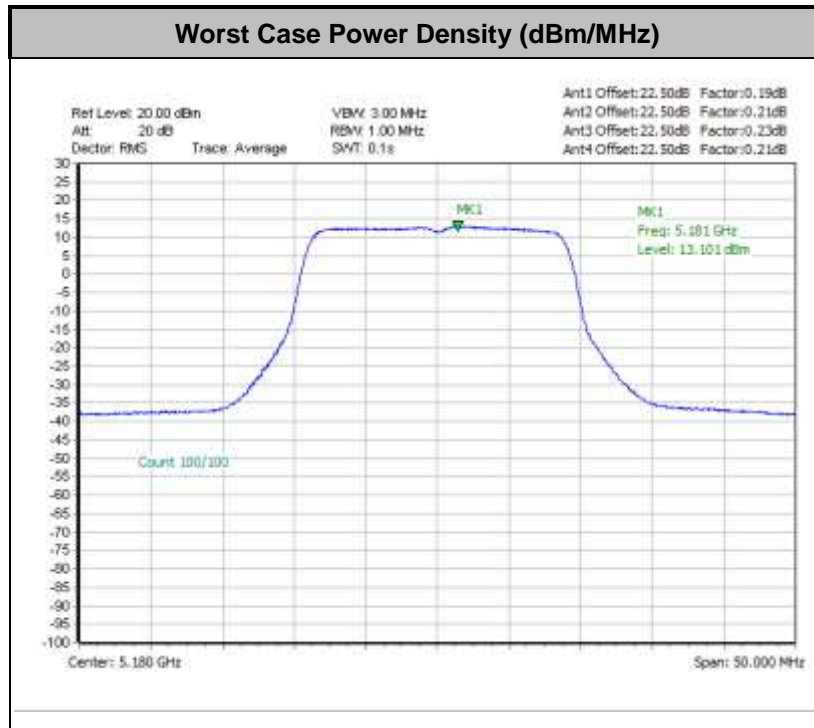
The total final Power Spectral Density is from a device with 4 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2, output 3 and output 4 to obtain the value for the first frequency bin of the summed spectrum.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.





3.4 Unwanted Emissions Measurement

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

3.4.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.
- (2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

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.

$$EIRP = E_{Meas} + 20\log (d_{Meas}) -104.8$$

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.

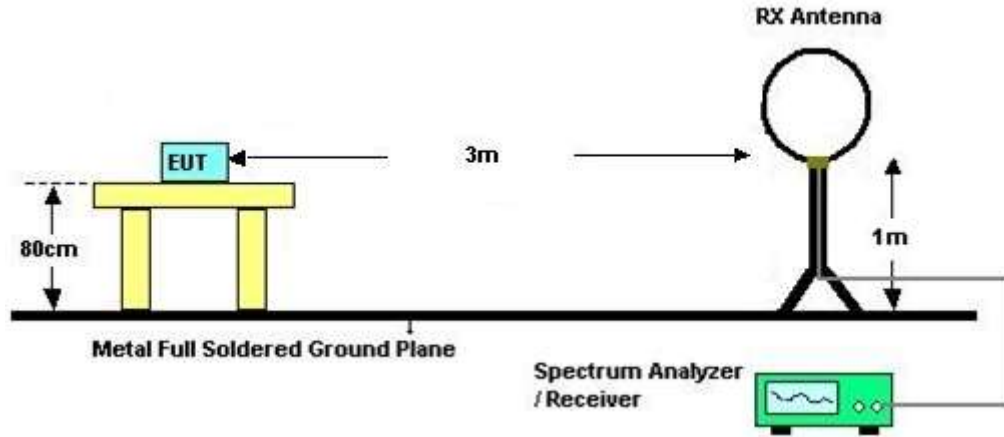


3.4.3 Test Procedures

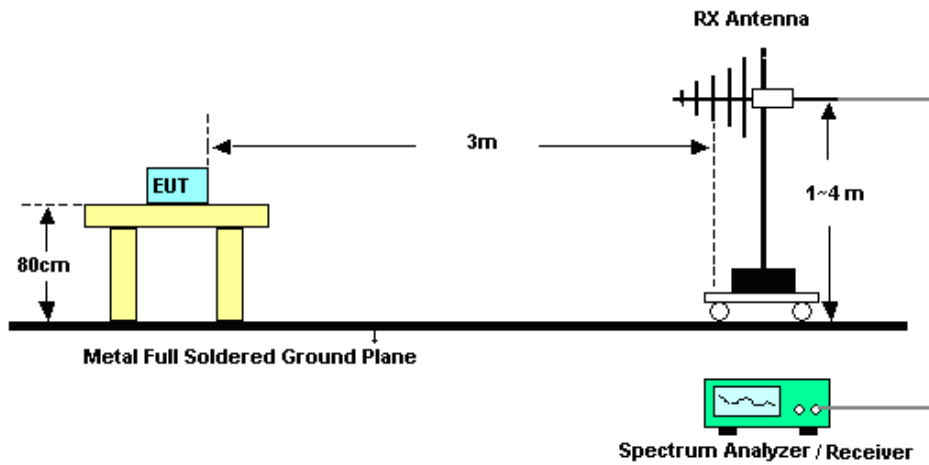
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak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

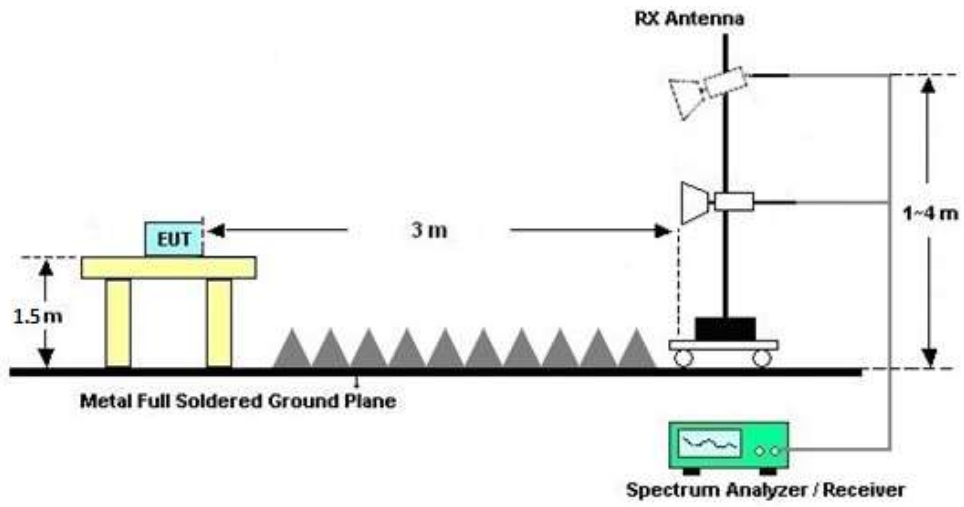
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz

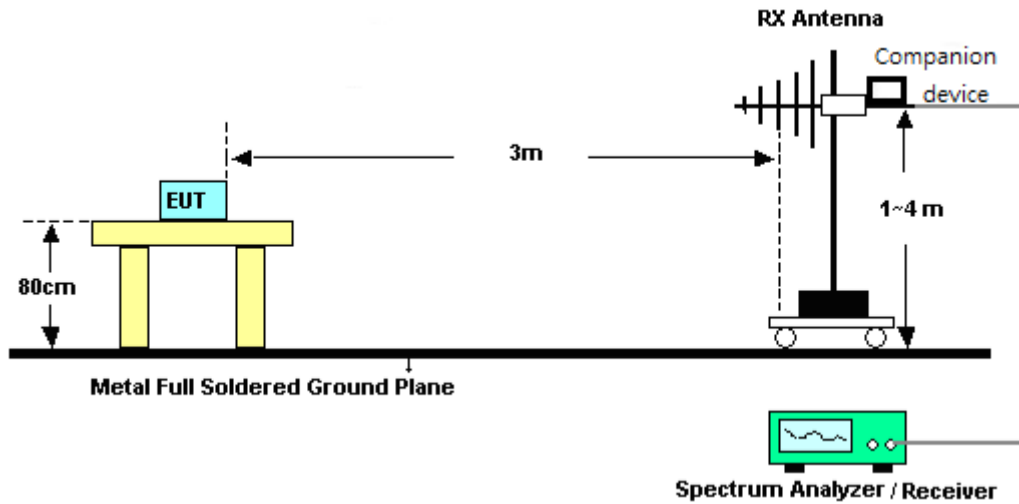


For radiated emissions above 1GHz

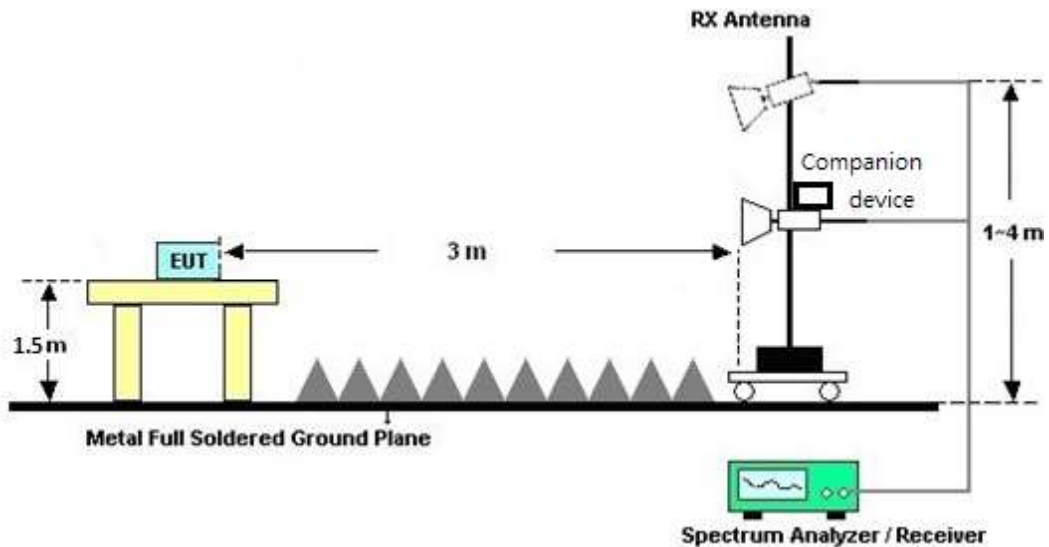


<TXBF Modes>

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.



3.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.4.7 Duty Cycle

Please refer to Appendix D.

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

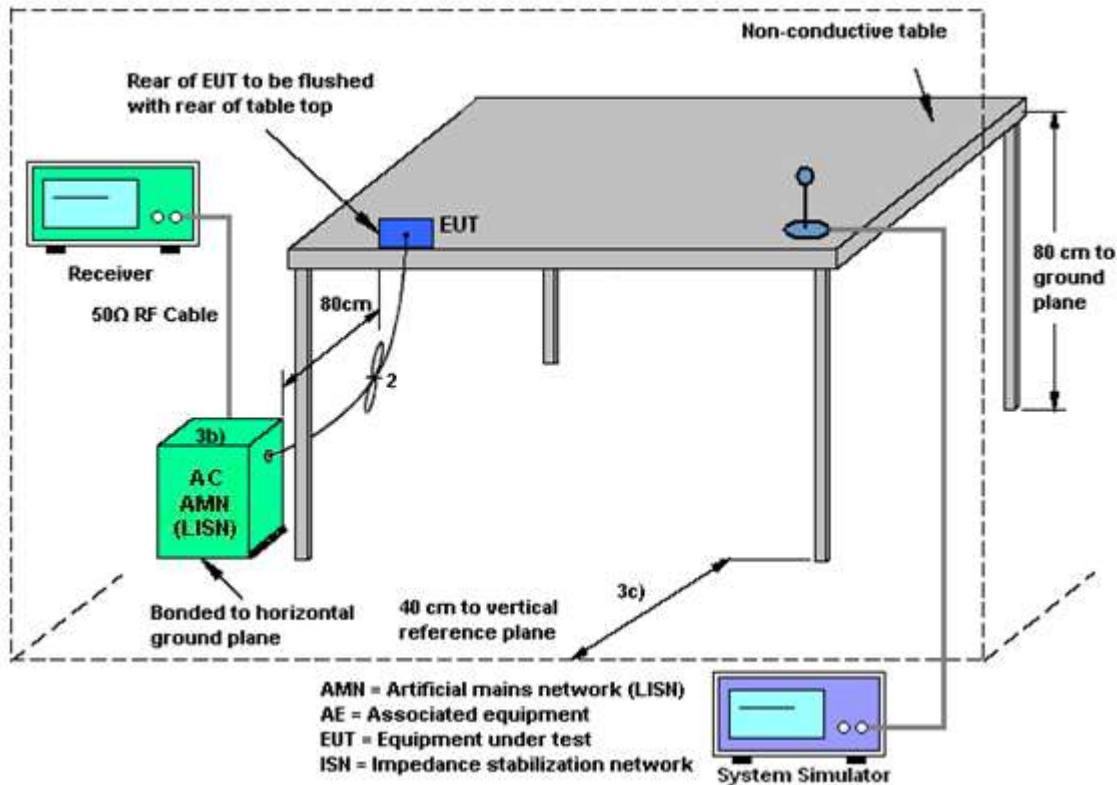
3.5.2 Measuring Instruments

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 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

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

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

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

For power measurements on IEEE 802.11 devices,

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

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

The EUT supports CDD mode.

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

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

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

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

<CDD Modes>								
	Ant. 1	Ant. 2	Ant. 3	Ant. 4	DG for Power	DG for PSD	Power Limit Reduction	PSD Limit Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
Band I	2.96	2.70	4.57	4.30	4.57	9.69	0.00	3.69



TXBF modes

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k / 20}$ if the k th antenna is being fed by spatial stream j , or zero if it is not;
 G_k is the gain in dBi of the k th antenna.

The directional gain calculation is following F)2)e)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.

					DG for Power	DG for PSD	Power Limit Reduction	PSD Limit Reduction
	Ant 1 (dBi)	Ant 2 (dBi)	Ant 3 (dBi)	Ant 4 (dBi)	(dBi)	(dBi)	(dB)	(dB)
Band I	2.96	2.70	4.57	4.30	9.69	9.69	3.69	3.69



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 17, 2020	Sep. 27, 2020~ Oct. 05, 2020	Apr. 16, 2021	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2019	Sep. 27, 2020~ Oct. 05, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2019	Sep. 27, 2020~ Oct. 05, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
EMI Test Receiver	Keysight	N9038A	MY564000 04	3Hz~8.5GHz;M ax 30dBm	Oct. 18, 2019	Oct. 05, 2020	Oct. 17, 2020	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY551502 44	10Hz~44G,MAX 30dB	Apr. 15, 2020	Oct. 05, 2020	Apr. 14, 2021	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 10, 2019	Oct. 05, 2020	Nov. 09, 2020	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz~1GHz	May 30, 2020	Oct. 05, 2020	May 29, 2021	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 26, 2020	Oct. 05, 2020	Apr. 25, 2021	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 10, 2019	Oct. 05, 2020	Nov. 09, 2020	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	187289	9KHz~1GHz	Apr. 14, 2020	Oct. 05, 2020	Apr. 13, 2021	Radiation (03CH05-KS)
Amplifier	MITEQ	EM18G40GG A	060728	18~40GHz	Jan. 08, 2020	Oct. 05, 2020	Jan. 07, 2021	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2012228	1Ghz~18Ghz	Oct. 18, 2019	Oct. 05, 2020	Oct. 17, 2020	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY532703 16	500MHz~26.5G Hz	Oct. 18, 2019	Oct. 05, 2020	Oct. 17, 2020	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Oct. 05, 2020	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Oct. 05, 2020	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Oct. 05, 2020	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 14, 2020	Sep. 30, 2020	Apr. 13, 2021	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 18, 2019	Sep. 30, 2020	Oct. 17, 2020	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Oct. 28, 2019	Sep. 30, 2020	Oct. 27, 2020	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 18, 2019	Sep. 30, 2020	Oct. 17, 2020	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))	2.9dB
---	-------

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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Appendix A. Conducted Test Results

Test Engineer:	Zhang Jiang	Temperature:	21~25	°C
Test Date:	2020/9/27~2020/10/05	Relative Humidity:	51~54	%

TEST RESULTS DATA
26dB and 99% OBW

Band I																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	26 dB Bandwidth (MHz)				99% Bandwidth (MHz)				IC 99% Bandwidth EIRP Limit (dBm)			
					Ant 1	Ant 2	Ant 3	Ant 4	Ant 1	Ant 2	Ant 3	Ant 4	Ant 1	Ant 2	Ant 3	Ant 4
11a	6Mbps	1	36	5180	21.228				16.43				22.16			
11a	6Mbps	1	44	5220	21.128				16.43				22.16			
11a	6Mbps	1	48	5240	21.328				16.43				22.16			
11a	6Mbps	1	36	5180		21.08				16.43				22.16		
11a	6Mbps	1	44	5220		21.23				16.43				22.16		
11a	6Mbps	1	48	5240		21.13				16.43				22.16		
11a	6Mbps	1	36	5180			21.08				16.43				22.16	
11a	6Mbps	1	44	5220			21.23				16.43				22.16	
11a	6Mbps	1	48	5240			21.33				16.43				22.16	
11a	6Mbps	1	36	5180				21.18				16.43				22.16
11a	6Mbps	1	44	5220				21.18				16.43				22.16
11a	6Mbps	1	48	5240				21.23				16.43				22.16

Band I																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	26 dB Bandwidth (MHz)				99% Bandwidth (MHz)				IC 99% Bandwidth EIRP Limit (dBm)			
					Ant 1	Ant 2	Ant 3	Ant 4	Ant 1	Ant 2	Ant 3	Ant 4	Ant 1	Ant 2	Ant 3	Ant 4
HT20	MCS0	4	36	5180	21.828	21.98	21.78	21.98	17.68	17.58	17.58	17.63	22.48	22.45	22.45	22.46
HT20	MCS0	4	44	5220	22.227	21.73	21.98	21.83	17.63	17.53	17.53	17.58	22.46	22.44	22.44	22.45
HT20	MCS0	4	48	5240	21.778	21.88	21.88	21.88	17.63	17.58	17.63	17.53	22.46	22.45	22.46	22.44
HT40	MCS0	4	38	5190	41.538	41.18	41.18	41.09	36.36	36.36	36.36	36.36	23.01	23.01	23.01	23.01
HT40	MCS0	4	46	5230	41.718	41.09	41.09	40.82	36.26	36.36	36.36	36.36	23.01	23.01	23.01	23.01
VHT80	MCS0	4	42	5210	82.318	81.84	81.68	81.04	76.00	76.00	76.12	76.24	23.01	23.01	23.01	23.01

TEST RESULTS DATA
Average Power Table

FCC Band I															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Ant	Average Conducted Power with duty factor (dBm)					FCC Power Limit (dBm)	DG (dBi)	FCC EIRP Power (dBm)	FCC EIRP Power Limit (dBm)	Pass/Fail
						Ant 1	Ant 2	Ant 3	Ant 4	SUM					
11a	6Mbps	1	36	5180	1	18.76				18.76	30.00	2.96	21.72	-	Pass
11a	6Mbps	1	44	5220	1	18.74				18.74	30.00	2.96	21.70	-	Pass
11a	6Mbps	1	48	5240	1	18.73				18.73	30.00	2.96	21.69	-	Pass
11a	6Mbps	1	36	5180	2		18.96			18.96	30.00	2.70	21.66	-	Pass
11a	6Mbps	1	44	5220	2		18.92			18.92	30.00	2.70	21.62	-	Pass
11a	6Mbps	1	48	5240	2		18.99			18.99	30.00	2.70	21.69	-	Pass
11a	6Mbps	1	36	5180	3			18.79		18.79	30.00	4.57	23.36	-	Pass
11a	6Mbps	1	44	5220	3			18.76		18.76	30.00	4.57	23.33	-	Pass
11a	6Mbps	1	48	5240	3			18.73		18.73	30.00	4.57	23.30	-	Pass
11a	6Mbps	1	36	5180	4				18.88	18.88	30.00	4.30	23.18	-	Pass
11a	6Mbps	1	44	5220	4				18.80	18.80	30.00	4.30	23.10	-	Pass
11a	6Mbps	1	48	5240	4				18.92	18.92	30.00	4.30	23.22	-	Pass

FCC Band I															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Ant	Average Conducted Power with duty factor (dBm)					FCC Power Limit (dBm)	DG (dBi)	FCC EIRP Power (dBm)	FCC EIRP Power Limit (dBm)	Pass/Fail
						Ant 1	Ant 2	Ant 3	Ant 4	SUM					
HT20	MCS0	4	36	5180	1+2+3+4	18.90	18.95	18.58	18.75	24.82	30.00	4.57	29.39	-	Pass
HT20	MCS0	4	44	5220	1+2+3+4	18.59	18.96	18.59	18.58	24.70	30.00	4.57	29.27	-	Pass
HT20	MCS0	4	48	5240	1+2+3+4	18.85	18.93	18.53	18.65	24.76	30.00	4.57	29.33	-	Pass
HT40	MCS0	4	38	5190	1+2+3+4	18.63	18.93	18.53	18.68	24.71	30.00	4.57	29.28	-	Pass
HT40	MCS0	4	46	5230	1+2+3+4	18.56	18.86	18.54	18.54	24.65	30.00	4.57	29.22	-	Pass
VHT20	MCS0	4	36	5180	1+2+3+4	16.54	16.98	16.96	16.86	22.86	30.00	4.57	27.43	-	Pass
VHT20	MCS0	4	44	5220	1+2+3+4	16.69	16.91	16.57	16.56	22.71	30.00	4.57	27.28	-	Pass
VHT20	MCS0	4	48	5240	1+2+3+4	16.75	16.96	16.95	16.97	22.93	30.00	4.57	27.50	-	Pass
VHT40	MCS0	4	38	5190	1+2+3+4	16.79	16.96	16.75	16.90	22.87	30.00	4.57	27.44	-	Pass
VHT40	MCS0	4	46	5230	1+2+3+4	16.85	16.93	16.66	16.82	22.84	30.00	4.57	27.41	-	Pass
VHT80	MCS0	4	42	5210	1+2+3+4	16.80	16.94	16.64	16.74	22.80	30.00	4.57	27.37	-	Pass

TEST RESULTS DATA
26dB and 99% OBW

Band I MIMO 4Tx Mode Ant 1 + 2 + 3 + 4														
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	RU Config.	26 dB Bandwidth (MHz)				99% Bandwidth (MHz)				IC 99% Bandwidth EIRP Limit (dBm)
						Ant 1	Ant 2	Ant 3	Ant 4	Ant 1	Ant 2	Ant 3	Ant 4	
HE20	MCS0	4	36	5180	Full	22.63	22.68	22.48	22.38	19.03	18.88	18.93	18.93	22.76
HE20	MCS0	4	44	5220	Full	22.53	22.48	22.58	22.83	18.83	18.88	18.98	18.98	22.75
HE20	MCS0	4	48	5240	Full	22.53	22.53	22.63	22.63	18.78	18.88	18.93	18.93	22.74
HE40	MCS0	4	38	5190	Full	41.63	41.72	41.90	41.72	38.16	38.06	37.96	37.86	23.01
HE40	MCS0	4	46	5230	Full	41.72	41.54	41.81	41.54	38.06	37.96	37.96	37.96	23.01
HE80	MCS0	4	42	5210	Full	82.80	82.00	82.16	81.84	78.04	77.80	77.92	77.80	23.01

TEST RESULTS DATA
Average Power Table

FCC Band I MIMO 4Tx Mode Ant 1 + 2 + 3 + 4													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)					FCC Power Limit (dBm)	DG (dBi)	Pass /Fail
						Ant 1	Ant 2	Ant 3	Ant 4	SUM			
HE20	MCS0	4	36	5180	Full	14.92	14.83	14.52	14.70	20.77	30.00	4.57	Pass
HE20	MCS0	4	36	5180	26/(0+1)	8.68	8.21	8.08	7.98	14.27	30.00	4.57	Pass
HE20	MCS0	4	36	5180	52/(37+38)	11.17	10.25	11.03	10.95	16.89	30.00	4.57	Pass
HE20	MCS0	4	36	5180	106/(53+54)	14.56	14.24	14.16	14.20	20.31	30.00	4.57	Pass
HE20	MCS0	4	44	5220	Full	14.81	14.81	14.50	14.55	20.69	30.00	4.57	Pass
HE20	MCS0	4	48	5240	Full	14.75	14.76	14.26	14.62	20.62	30.00	4.57	Pass
HE20	MCS0	4	48	5240	26/(7+8)	9.09	8.43	9.23	8.95	14.96	30.00	4.57	Pass
HE20	MCS0	4	48	5240	52/(39+40)	11.30	10.85	10.83	11.65	17.19	30.00	4.57	Pass
HE20	MCS0	4	48	5240	106/(53+54)	14.37	14.68	14.54	14.62	20.57	30.00	4.57	Pass
HE40	MCS0	4	38	5190	Full	14.73	14.97	14.63	14.74	20.79	30.00	4.57	Pass
HE40	MCS0	4	46	5230	Full	14.80	14.98	14.62	14.67	20.79	30.00	4.57	Pass
HE80	MCS0	4	42	5210	Full	13.82	13.90	13.69	13.65	19.79	30.00	4.57	Pass
HE80	MCS0	4	42	5210	484/(65+66)	13.15	13.56	13.22	13.38	19.35	30.00	4.57	Pass

TEST RESULTS DATA
Power Spectral Density

FCC Band I MIMO 4Tx Mode Ant 1 + 2 + 3 + 4									
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	RU Config.	Average Power Density (dBm/MHz)	Average PSD Limit (dBm/MHz)	DG (dBi)	Pass /Fail
						Ant 1 + 2 + 3 + 4	Ant 1 + 2 + 3 + 4	Ant 1 + 2 + 3 + 4	
HE20	MCS0	4	36	5180	Full	8.19	13.31	9.69	Pass
HE20	MCS0	4	36	5180	26/(0+1)	7.84	13.31	9.69	Pass
HE20	MCS0	4	36	5180	52/(37+38)	7.71	13.31	9.69	Pass
HE20	MCS0	4	36	5180	106/(53+54)	8.06	13.31	9.69	Pass
HE20	MCS0	4	44	5220	Full	8.43	13.31	9.69	Pass
HE20	MCS0	4	48	5240	Full	8.79	13.31	9.69	Pass
HE20	MCS0	4	48	5240	26/(7+8)	8.34	13.31	9.69	Pass
HE20	MCS0	4	48	5240	52/(39+40)	7.87	13.31	9.69	Pass
HE20	MCS0	4	48	5240	106/(53+54)	8.50	13.31	9.69	Pass
HE40	MCS0	4	38	5190	Full	5.69	13.31	9.69	Pass
HE40	MCS0	4	46	5230	Full	5.51	13.31	9.69	Pass
HE80	MCS0	4	42	5210	Full	1.33	13.31	9.69	Pass
HE80	MCS0	4	42	5210	484/(65+66)	0.82	13.31	9.69	Pass

TEST RESULTS DATA
Power Spectral Density

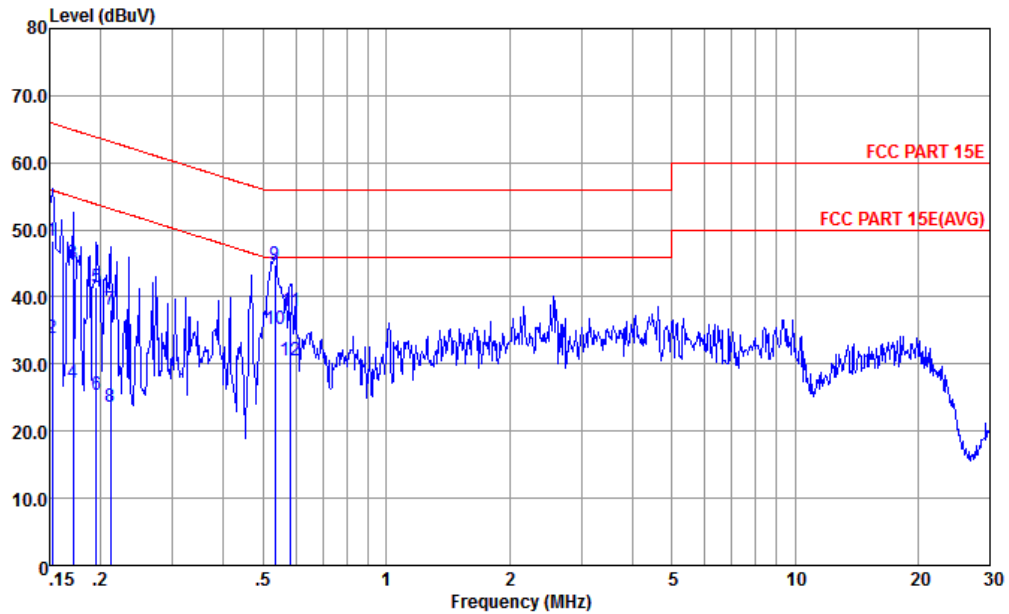
FCC Band I														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Ant	Duty Factor (dB)				Average PSD with Duty Factor (dBm/MHz)	PSD Limit (dBm/MHz)	DG (dBi)		Pass /Fail
						Ant 1	Ant 2	Ant 3	Ant 4					
11a	6Mbps	1	36	5180	1	0.36				7.61	17.00	2.96		Pass
11a	6Mbps	1	44	5220	1	0.36				7.55	17.00	2.96		Pass
11a	6Mbps	1	48	5240	1	0.36				7.36	17.00	2.96		Pass
11a	6Mbps	1	36	5180	2		0.36			7.70	17.00	2.70		Pass
11a	6Mbps	1	44	5220	2		0.36			7.63	17.00	2.70		Pass
11a	6Mbps	1	48	5240	2		0.36			7.63	17.00	2.70		Pass
11a	6Mbps	1	36	5180	3			0.38		7.59	17.00	4.57		Pass
11a	6Mbps	1	44	5220	3			0.38		7.42	17.00	4.57		Pass
11a	6Mbps	1	48	5240	3			0.38		7.33	17.00	4.57		Pass
11a	6Mbps	1	36	5180	4				0.34	7.77	17.00	4.30		Pass
11a	6Mbps	1	44	5220	4				0.34	7.43	17.00	4.30		Pass
11a	6Mbps	1	48	5240	4				0.34	7.45	17.00	4.30		Pass

FCC Band I														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Ant	Duty Factor (dB)				Average PSD with Duty Factor (dBm/MHz)	PSD Limit (dBm/MHz)	DG (dBi)		Pass /Fail
						Ant 1	Ant 2	Ant 3	Ant 4					
HT20	MCS0	4	36	5180	1+2+3+4	0.19	0.21	0.23	0.21	13.10	13.31	9.69		Pass
HT20	MCS0	4	44	5220	1+2+3+4	0.19	0.21	0.23	0.21	12.98	13.31	9.69		Pass
HT20	MCS0	4	48	5240	1+2+3+4	0.19	0.21	0.23	0.21	13.00	13.31	9.69		Pass
HT40	MCS0	4	38	5190	1+2+3+4	0.26	0.23	0.30	0.26	9.75	13.31	9.69		Pass
HT40	MCS0	4	46	5230	1+2+3+4	0.26	0.23	0.30	0.26	9.45	13.31	9.69		Pass
VHT80	MCS0	4	42	5210	1+2+3+4	0.28	0.26	0.23	0.26	4.91	13.31	9.69		Pass



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

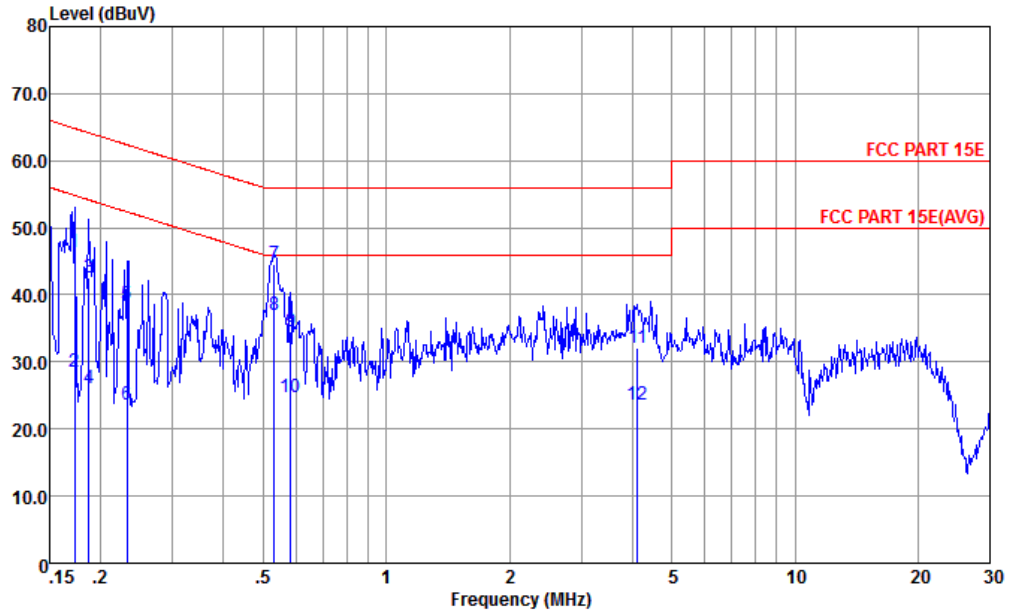


Site : CO01-KS
 Condition : FCC PART 15E LISN-L-191028-060105 LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.152	48.30	-17.57	65.87	37.80	0.03	10.47	QP
2	0.152	33.80	-22.07	55.87	23.30	0.03	10.47	Average
3	0.171	44.96	-19.94	64.90	34.50	0.03	10.43	QP
4	0.171	27.26	-27.64	54.90	16.80	0.03	10.43	Average
5	0.195	41.51	-22.29	63.80	31.10	0.04	10.37	QP
6	0.195	25.51	-28.29	53.80	15.10	0.04	10.37	Average
7	0.212	38.20	-24.94	63.14	27.80	0.04	10.36	QP
8	0.212	23.70	-29.44	53.14	13.30	0.04	10.36	Average
9	0.535	44.90	-11.10	56.00	34.60	0.06	10.24	QP
10 *	0.535	35.20	-10.80	46.00	24.90	0.06	10.24	Average
11	0.582	37.80	-18.20	56.00	27.50	0.06	10.24	QP
12	0.582	30.50	-15.50	46.00	20.20	0.06	10.24	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-N-191028-060105 NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.173	46.40	-18.41	64.81	35.90	0.08	10.42	QP
2	0.173	28.60	-26.21	54.81	18.10	0.08	10.42	Average
3	0.187	42.67	-21.48	64.15	32.20	0.08	10.39	QP
4	0.187	25.97	-28.18	54.15	15.50	0.08	10.39	Average
5	0.232	38.63	-23.76	62.39	28.21	0.08	10.34	QP
6	0.232	23.73	-28.66	52.39	13.31	0.08	10.34	Average
7	0.532	44.54	-11.46	56.00	34.20	0.10	10.24	QP
8 *	0.532	36.94	-9.06	46.00	26.60	0.10	10.24	Average
9	0.582	34.54	-21.46	56.00	24.20	0.10	10.24	QP
10	0.582	24.64	-21.36	46.00	14.30	0.10	10.24	Average
11	4.114	32.01	-23.99	56.00	21.61	0.15	10.25	QP
12	4.114	23.71	-22.29	46.00	13.31	0.15	10.25	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

Band 1 - 5150~5250MHz WIFI 802.11a (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		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		5107.2	57.6	-16.4	74	43.02	34.03	11.15	30.6	233	271	P	H
		5149.44	47.53	-6.47	54	32.89	34.07	11.18	30.61	233	271	A	H
		5182	112.06	-	-	97.35	34.12	11.21	30.62	233	271	P	H
		5182	104.68	-	-	89.97	34.12	11.21	30.62	233	271	A	H
		5130.88	56.74	-17.26	74	42.13	34.05	11.16	30.6	134	197	P	V
		5149.44	47.56	-6.44	54	32.92	34.07	11.18	30.61	134	197	A	V
		5182	111.05	-	-	96.34	34.12	11.21	30.62	134	197	P	V
		5182	103.46	-	-	88.75	34.12	11.21	30.62	134	197	A	V
802.11a CH 36 5180MHz		5132.32	56.96	-17.04	74	42.35	34.05	11.16	30.6	299	246	P	H
		5103.36	46.91	-7.09	54	32.37	34.01	11.13	30.6	299	246	A	H
		5182	109.36	-	-	94.65	34.12	11.21	30.62	299	246	P	H
		5182	102.27	-	-	87.56	34.12	11.21	30.62	299	246	A	H
		5120.96	56.4	-17.6	74	41.82	34.03	11.15	30.6	321	282	P	V
		5148.16	46.97	-7.03	54	32.33	34.07	11.18	30.61	321	282	A	V
		5176	109.49	-	-	94.78	34.12	11.21	30.62	321	282	P	V
		5176	102.07	-	-	87.36	34.12	11.21	30.62	321	282	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WiFi Ant. 3	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)
802.11a CH 36 5180MHz		5103.52	57.14	-16.86	74	42.6	34.01	11.13	30.6	117	77	P	H
		5112.96	46.86	-7.14	54	32.28	34.03	11.15	30.6	117	77	A	H
		5176	105.15	-	-	90.44	34.12	11.21	30.62	117	77	P	H
		5176	97.95	-	-	83.24	34.12	11.21	30.62	117	77	A	H
		5132.32	57.6	-16.4	74	42.99	34.05	11.16	30.6	248	64	P	V
		5147.2	47.88	-6.12	54	33.24	34.07	11.18	30.61	248	64	A	V
		5176	112.36	-	-	97.65	34.12	11.21	30.62	248	64	P	V
		5176	104.73	-	-	90.02	34.12	11.21	30.62	248	64	A	V
802.11a CH 36 5180MHz		5133.12	56.76	-17.24	74	42.16	34.05	11.16	30.61	337	140	P	H
		5144.48	47.42	-6.58	54	32.78	34.07	11.18	30.61	337	140	A	H
		5188	112.61	-	-	97.9	34.12	11.21	30.62	337	140	P	H
		5188	105.39	-	-	90.68	34.12	11.21	30.62	337	140	A	H
		5124.64	57.5	-16.5	74	42.89	34.05	11.16	30.6	100	238	P	V
		5112.96	46.94	-7.06	54	32.36	34.03	11.15	30.6	100	238	A	V
		5188	107.69	-	-	92.98	34.12	11.21	30.62	100	238	P	V
		5188	100.25	-	-	85.54	34.12	11.21	30.62	100	238	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1	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)
802.11a CH 36		10358.36	42.56	-25.74	68.3	50.12	37.01	16.11	60.68	300	0	P	H
5180MHz		10358.36	41.94	-26.36	68.3	49.5	37.01	16.11	60.68	300	0	P	V
802.11a CH 44		10440	42.49	-25.81	68.3	49.9	37.06	16.19	60.66	300	0	P	H
5220MHz		10440	42.46	-25.84	68.3	49.87	37.06	16.19	60.66	300	0	P	V
802.11a CH 48		10478.47	42.5	-25.8	68.3	49.82	37.09	16.24	60.65	300	0	P	H
5240MHz		10478.47	42.75	-25.55	68.3	50.07	37.09	16.24	60.65	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11a (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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 36 5180MHz		10358.36	41.95	-26.35	68.3	49.51	37.01	16.11	60.68	300	0	P	H
		10358.36	42.97	-25.33	68.3	50.53	37.01	16.11	60.68	300	0	P	V
802.11a CH 44 5220MHz		10438.44	42.12	-26.18	68.3	49.53	37.06	16.19	60.66	300	0	P	H
		10438.44	43.08	-25.22	68.3	50.49	37.06	16.19	60.66	300	0	P	V
802.11a CH 48 5240MHz		10478.47	43.23	-25.07	68.3	50.55	37.09	16.24	60.65	300	0	P	H
		10478.47	42.37	-25.93	68.3	49.69	37.09	16.24	60.65	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 3	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)
802.11a CH 36		10358.36	42.31	-25.99	68.3	49.87	37.01	16.11	60.68	300	0	P	H
5180MHz		10358.36	43.46	-24.84	68.3	51.02	37.01	16.11	60.68	300	0	P	V
802.11a CH 44		10438.44	41.85	-26.45	68.3	49.26	37.06	16.19	60.66	300	0	P	H
5220MHz		10438.44	43.36	-24.94	68.3	50.77	37.06	16.19	60.66	300	0	P	V
802.11a CH 48		10478.47	42.29	-26.01	68.3	49.61	37.09	16.24	60.65	300	0	P	H
5240MHz		10478.47	43.76	-24.54	68.3	51.08	37.09	16.24	60.65	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11a (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 4, 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 channels 36, 44, and 48 at various frequencies.

Remark

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



Band 1 5150~5250MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. MIMO, 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 test results for 802.11n HT20 CH 36 5180MHz and a Remark section.



Band 1 5150~5250MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. MIMO	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)
802.11n HT20 CH 36 5180MHz		10358.36	42.25	-26.05	68.3	49.81	37.01	16.11	60.68	300	0	P	H
		10358.36	43.7	-24.6	68.3	51.26	37.01	16.11	60.68	300	0	P	V
802.11n HT20 CH 44 5220MHz		10438.44	42.12	-26.18	68.3	49.53	37.06	16.19	60.66	300	0	P	H
		10438.44	44.86	-23.44	68.3	52.27	37.06	16.19	60.66	300	0	P	V
802.11n HT20 CH 48 5240MHz		10478.47	42.56	-25.74	68.3	49.88	37.09	16.24	60.65	300	0	P	H
		10478.47	43.23	-25.07	68.3	50.55	37.09	16.24	60.65	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. MIMO	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)
802.11n HT40 CH 38 5190MHz		5149.92	62.31	-11.69	74	47.67	34.07	11.18	30.61	338	139	P	H
		5149.98	51.25	-2.75	54	36.61	34.07	11.18	30.61	338	139	A	H
	*	5194	113.22	-	-	98.48	34.14	11.23	30.63	338	139	P	H
		5194	105.82	-	-	91.08	34.14	11.23	30.63	338	139	A	H
		5388.66	55.99	-18.01	74	40.89	34.38	11.41	30.69	338	139	P	H
		5364.18	45.43	-8.57	54	30.37	34.35	11.4	30.69	338	139	A	H
		5146.88	59.98	-14.02	74	45.34	34.07	11.18	30.61	112	234	P	V
		5146.24	50.68	-3.32	54	36.04	34.07	11.18	30.61	112	234	A	V
	*	5188	114.68	-	-	99.97	34.12	11.21	30.62	112	234	P	V
		5188	107	-	-	92.29	34.12	11.21	30.62	112	234	A	V
		5382	55.59	-18.41	74	40.49	34.38	11.41	30.69	112	234	P	V
	5398.92	46.22	-7.78	54	31.09	34.4	11.43	30.7	112	234	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. MIMO	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)
802.11n HT40 CH 38		10378.38	42.96	-25.34	68.3	50.45	37.03	16.15	60.67	300	0	P	H
5190MHz		10378.38	42.08	-26.22	68.3	49.57	37.03	16.15	60.67	300	0	P	V
802.11n HT40 CH 46		10458.46	42.36	-25.94	68.3	49.74	37.07	16.21	60.66	300	0	P	H
5230MHz		10458.46	43.33	-24.97	68.3	50.71	37.07	16.21	60.66	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI Ant. MIMO	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)
802.11ac VHT80 CH 42 5210MHz		5133.12	58.86	-15.14	74	44.26	34.05	11.16	30.61	321	140	P	H
		5149.98	49.03	-4.97	54	34.39	34.07	11.18	30.61	321	140	A	H
	*	5212	107.32	-	-	92.54	34.16	11.25	30.63	321	140	P	H
		5212	100.07	-	-	85.29	34.16	11.25	30.63	321	140	A	H
		5382.36	55.48	-18.52	74	40.38	34.38	11.41	30.69	321	140	P	H
		5386.32	45.44	-8.56	54	30.34	34.38	11.41	30.69	321	140	A	H
		5141.6	60.63	-13.37	74	45.99	34.07	11.18	30.61	282	58	P	V
		5140.64	50.65	-3.35	54	36.01	34.07	11.18	30.61	282	58	A	V
	*	5224	110.18	-	-	95.4	34.16	11.25	30.63	282	58	P	V
		5224	102.66	-	-	87.88	34.16	11.25	30.63	282	58	A	V
		5380.74	56	-18	74	40.9	34.38	11.41	30.69	282	58	P	V
	5394.06	46.1	-7.9	54	31	34.38	11.41	30.69	282	58	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11ac VHT80 (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. MIMO, 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 for 802.11ac VHT80 CH 42 at 5210MHz.

Remark

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



Band 1 - 5150~5250MHz
WIFI 802.11ax HE20 Full (Band Edge @ 3m)

WIFI Ant. MIMO	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 HE20 Full CH 36 5180MHz		5109.28	56.78	-17.22	74	42.2	34.03	11.15	30.6	268	274	P	H
		5101.44	46.62	-7.38	54	32.08	34.01	11.13	30.6	268	274	A	H
	*	5176	113.42	-	-	98.71	34.12	11.21	30.62	268	274	P	H
		5176	103.37	-	-	88.66	34.12	11.21	30.62	268	274	A	H
		5142.08	57.11	-16.89	74	42.47	34.07	11.18	30.61	282	58	P	V
		5134.24	46.77	-7.23	54	32.17	34.05	11.16	30.61	282	58	A	V
	*	5182	113.17	-	-	98.46	34.12	11.21	30.62	282	58	P	V
		5182	104.86	-	-	90.15	34.12	11.21	30.62	282	58	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11ax HE20 Full (Harmonic @ 3m)

WIFI Ant. MIMO	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 HE20 Full		10358.36	43.15	-25.15	68.3	50.71	37.01	16.11	60.68	300	0	P	H
CH 36 5180MHz		10358.36	42.99	-25.31	68.3	50.55	37.01	16.11	60.68	300	0	P	V
802.11ax HE20 Full		10438.44	42.2	-26.1	68.3	49.61	37.06	16.19	60.66	300	0	P	H
CH 44 5220MHz		10438.44	42.44	-25.86	68.3	49.85	37.06	16.19	60.66	300	0	P	V
802.11ax HE20 Full		10478.47	42.8	-25.5	68.3	50.12	37.09	16.24	60.65	300	0	P	H
CH 48 5240MHz		10478.47	43.07	-25.23	68.3	50.39	37.09	16.24	60.65	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11ax HE40 Full (Band Edge @ 3m)

WIFI Ant. MIMO	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 38 5190MHz		5141.92	57.19	-16.81	74	42.55	34.07	11.18	30.61	269	272	P	H
		5149.98	47.88	-6.12	54	33.24	34.07	11.18	30.61	269	272	A	H
	*	5194	109.76	-	-	95.02	34.14	11.23	30.63	269	272	P	H
		5194	101.88	-	-	87.14	34.14	11.23	30.63	269	272	A	H
		5356.26	55.44	-18.56	74	40.41	34.33	11.38	30.68	269	272	P	H
		5375.7	45.2	-8.8	54	30.14	34.35	11.4	30.69	269	272	A	H
		5148.96	58.71	-15.29	74	44.07	34.07	11.18	30.61	260	57	P	V
		5148.96	48.56	-5.44	54	33.92	34.07	11.18	30.61	260	57	A	V
	*	5182	110.21	-	-	95.5	34.12	11.21	30.62	260	57	P	V
		5182	101.74	-	-	87.03	34.12	11.21	30.62	260	57	A	V
		5371.92	54.79	-19.21	74	39.73	34.35	11.4	30.69	260	57	P	V
	5393.52	45.26	-8.74	54	30.16	34.38	11.41	30.69	260	57	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

WIFI 802.11ax HE40 Full (Harmonic @ 3m)

WIFI Ant. MIMO	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		10378.38	41.78	-26.52	68.3	49.27	37.03	16.15	60.67	300	0	P	H
CH 38 5190MHz		10378.38	42.86	-25.44	68.3	50.35	37.03	16.15	60.67	300	0	P	V
802.11ax HE40 Full		10458.46	43.7	-24.6	68.3	51.08	37.07	16.21	60.66	300	0	P	H
CH 46 5230MHz		10458.46	42.9	-25.4	68.3	50.28	37.07	16.21	60.66	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11ax HE80 Full (Band Edge @ 3m)

WIFI Ant. MIMO	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 42 5210MHz		5149.44	63	-11	74	48.36	34.07	11.18	30.61	309	140	P	H
		5140	49.2	-4.8	54	34.56	34.07	11.18	30.61	309	140	A	H
	*	5212	107.03	-	-	92.25	34.16	11.25	30.63	309	140	P	H
		5212	98.48	-	-	83.7	34.16	11.25	30.63	309	140	A	H
		5375.88	54.66	-19.34	74	39.6	34.35	11.4	30.69	309	140	P	H
		5397.48	45.56	-8.44	54	30.42	34.4	11.43	30.69	309	140	A	H
		5143.84	61.04	-12.96	74	46.4	34.07	11.18	30.61	273	54	P	V
		5149.6	49.21	-4.79	54	34.57	34.07	11.18	30.61	273	54	A	V
	*	5206	107.18	-	-	92.44	34.14	11.23	30.63	273	54	P	V
		5206	98.92	-	-	84.18	34.14	11.23	30.63	273	54	A	V
	5352.84	55.56	-18.44	74	40.53	34.33	11.38	30.68	273	54	P	V	
	5351.76	45.5	-8.5	54	30.47	34.33	11.38	30.68	273	54	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz
WIFI 802.11ax HE80 Full (Harmonic @ 3m)

WIFI Ant. MIMO	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 42 5210MHz		10418.42	42.39	-25.91	68.3	49.83	37.05	16.18	60.67	300	0	P	H
		10418.42	43.23	-25.07	68.3	50.67	37.05	16.18	60.67	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11ax HE20 Partial 26 (Band Edge @ 3m)

WIFI Ant. MIMO	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 HE20 Partial 26 CH 36 5180MHz		5145.92	73.9	-0.1	74	60.8	35.33	11.09	33.32	169	280	P	H
		5144.64	52.55	-1.45	54	39.45	35.33	11.09	33.32	169	280	A	H
		5176	117.6	-	-	104.44	35.36	11.12	33.32	169	280	P	H
		5176	109.87	-	-	96.71	35.36	11.12	33.32	169	280	A	H
		5143.68	71.56	-2.44	74	56.92	34.07	11.18	30.61	100	64	P	V
		5142.72	53.77	-0.23	54	39.13	34.07	11.18	30.61	100	64	A	V
		5176	118.59	-	-	103.88	34.12	11.21	30.62	100	64	P	V
		5176	110.73	-	-	96.02	34.12	11.21	30.62	100	64	A	V
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. 												



Band 1 5150~5250MHz
WIFI 802.11ax HE20 Partial 26

WIFI Ant. MIMO	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 HE20 Partial 26 CH 48 5240MHz		5358.78	53.89	-20.11	74	40.41	35.52	11.28	33.32	159	283	P	H
		5393.34	43.9	-10.1	54	30.34	35.56	11.31	33.31	159	283	A	H
		5248	117.73	-	-	104.43	35.43	11.19	33.32	159	283	P	H
		5248	110.32	-	-	97.02	35.43	11.19	33.32	159	283	A	H
		5366.34	53.24	-20.76	74	39.72	35.54	11.3	33.32	164	232	P	V
		5395.14	43.97	-10.03	54	30.38	35.57	11.33	33.31	164	232	A	V
		5248	113.04	-	-	99.74	35.43	11.19	33.32	164	232	P	V
		5248	105.38	-	-	92.08	35.43	11.19	33.32	164	232	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11ax HE20 Partial 52 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. MIMO, 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). Includes a Remark section at the bottom.



Band 1 5150~5250MHz
WIFI 802.11ax HE20 Partial 52

Table with 14 columns: WIFI Ant. MIMO, 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). Includes a Remark section at the bottom.



Band 1 5150~5250MHz
WIFI 802.11ax HE20 Partial 106 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. MIMO, 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). Includes a Remark section at the bottom.



Band 1 5150~5250MHz

WIFI 802.11ax HE20 Partial 106

WIFI Ant. MIMO	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 HE20 Partial 106 CH 48 5240MHz		5380.74	53.59	-20.41	74	40.03	35.56	11.31	33.31	266	260	P	H
		5391.18	44.04	-9.96	54	30.48	35.56	11.31	33.31	266	260	A	H
		5236	112.64	-	-	99.38	35.41	11.17	33.32	266	260	P	H
		5236	105.01	-	-	91.75	35.41	11.17	33.32	266	260	A	H
		5373.36	53.79	-20.21	74	40.27	35.54	11.3	33.32	154	236	P	V
		5389.74	44.18	-9.82	54	30.62	35.56	11.31	33.31	154	236	A	V
		5248	113.4	-	-	100.1	35.43	11.19	33.32	154	236	P	V
		5248	105.5	-	-	92.2	35.43	11.19	33.32	154	236	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz
WIFI 802.11ax HE80 Partial 484 (Band Edge @ 3m)

WIFI Ant. MIMO	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 CH 42 5210MHz		5120.16	72.25	-1.75	74	57.67	34.03	11.15	30.6	305	139	P	H
		5149.76	52.06	-1.94	54	37.42	34.07	11.18	30.61	305	139	A	H
		5194	104.16	-	-	89.42	34.14	11.23	30.63	305	139	P	H
		5194	97.62	-	-	82.88	34.14	11.23	30.63	305	139	A	H
		5362.38	56.34	-17.66	74	41.28	34.35	11.4	30.69	305	139	P	H
		5354.28	45.85	-8.15	54	30.82	34.33	11.38	30.68	305	139	A	H
		5120	72.33	-1.67	74	57.75	34.03	11.15	30.6	254	49	P	V
		5149.92	53.03	-0.97	54	38.39	34.07	11.18	30.61	254	49	A	V
		5218	105.99	-	-	91.21	34.16	11.25	30.63	254	49	P	V
		5218	98.02	-	-	83.24	34.16	11.25	30.63	254	49	A	V
		5361.48	46.04	-7.96	54	30.98	34.35	11.4	30.69	254	49	P	V
		5365.44	62.96	-11.04	74	47.9	34.35	11.4	30.69	254	49	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 HE20 Partial 26 (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.	
MIMO		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ax HE20 Partial 26 CH 36 5180MHz LF		38.73	34.42	-5.58	40	53.24	20.33	0.72	39.87	100	360	P	H
		61.04	25.35	-14.65	40	52.46	11.96	0.89	39.96	-	-	P	H
		131.85	23.12	-20.38	43.5	43.35	17.58	1.26	39.07	-	-	P	H
		180.35	21.48	-22.02	43.5	43.7	15.1	1.49	38.81	-	-	P	H
		343.31	21.42	-24.58	46	36.93	20.29	2.05	37.85	-	-	P	H
		530.52	24	-22	46	32.87	24.85	2.53	36.25	-	-	P	H
		51.34	31.91	-8.09	40	56.87	14.15	0.82	39.93	200	0	P	V
		116.33	30.26	-13.24	43.5	50.57	17.38	1.19	38.88	-	-	P	V
		177.44	25.85	-17.65	43.5	47.97	15.26	1.48	38.86	-	-	P	V
		245.34	16.96	-29.04	46	35.4	18.33	1.73	38.5	-	-	P	V
	387.93	21.55	-24.45	46	35.36	21.48	2.18	37.47	-	-	P	V	
	641.1	25.1	-20.9	46	31.13	26.38	2.79	35.2	-	-	P	V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



TX Beamforming

WIFI 802.11ac80 (Band Edge @ 3m)

WIFI Ant. TXBF	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)
802.11ac80 CH42		5131.2	58.01	-15.99	74	42.85	34.6	11.16	30.6	316	140	P	H
		5150	47.76	-6.24	54	32.57	34.62	11.18	30.61	316	140	A	H
	*	5206	103.27	-	-	87.97	34.7	11.23	30.63	316	140	P	H
		5206	95.58	-	-	80.28	34.7	11.23	30.63	316	140	A	H
		5397.48	56.39	-17.61	74	40.95	34.7	11.43	30.69	316	140	P	H
		5397.12	45.66	-8.34	54	30.22	34.7	11.43	30.69	316	140	A	H
		5124.32	58.6	-15.4	74	43.44	34.6	11.16	30.6	256	52	P	V
		5149.6	47.81	-6.19	54	32.62	34.62	11.18	30.61	256	52	A	V
	*	5218	103.58	-	-	88.26	34.7	11.25	30.63	256	52	P	V
		5218	95.29	-	-	79.97	34.7	11.25	30.63	256	52	A	V
		5394.78	56.26	-17.74	74	40.82	34.7	11.43	30.69	256	52	P	V
		5390.28	45.56	-8.44	54	30.14	34.7	11.41	30.69	256	52	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI 802.11ac80 (Harmonic @ 3m)

WIFI Ant. TXBF	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)
802.11ac80		10420	44.04	-24.26	68.3	50.9	37.63	16.18	60.67	300	0	P	H
CH42		10420	43.3	-25	68.3	50.16	37.63	16.18	60.67	300	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Simultaneous Transmission

Band 1 - 5150~5250MHz

Part 27D LTE Band 30&WIFI 802.11axHE20 (Band Edge @ 3m)

WIFI Ant. MIMO	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)
Part 27D LTE Band 30&WIFI 802.11axHE20 CH36 Partial 26		5144.64	72.22	-1.78	74	59.12	35.33	11.09	33.32	318	134	P	H
		5142.88	53.26	-0.74	54	40.16	35.33	11.09	33.32	318	134	A	H
	*	5176	115.09	-	-	101.93	35.36	11.12	33.32	318	134	P	H
		5176	107.75	-	-	94.59	35.36	11.12	33.32	318	134	A	H
		5141.12	68.43	-5.57	74	55.33	35.33	11.09	33.32	278	55	P	V
		5142.56	53.29	-0.71	54	40.19	35.33	11.09	33.32	278	55	A	V
	*	5170	115.51	-	-	102.38	35.35	11.1	33.32	278	55	P	V
		5170	106.47	-	-	93.34	35.35	11.1	33.32	278	55	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

Part 27D LTE Band 30&WIFI 802.11axHE20 (Harmonic @ 3m)

WIFI Ant. MIMO	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)
Part 27D LTE Band 30&WIFI 802.11axHE20		10358.36	46.6	-21.7	68.3	53.24	39.59	15.86	62.09	300	0	P	H
CH36 Partial 26		10358.36	46.1	-22.2	68.3	52.74	39.59	15.86	62.09	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



EN DC 12A n2A &WIFI 802.11axHE20 (Band Edge @ 3m)

WIFI Ant. MIMO	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)
EN DC 12A n2A&WIFI 802.11AX20 CH36 Partial 26		5141.44	69.63	-4.37	74	56.53	35.33	11.09	33.32	284	247	P	H
		5140.96	53.14	-0.86	54	40.04	35.33	11.09	33.32	284	247	A	H
	*	5176	110.01	-	-	96.85	35.36	11.12	33.32	284	247	P	H
		5176	101.85	-	-	88.69	35.36	11.12	33.32	284	247	A	H
		5142.56	72.93	-1.07	74	59.83	35.33	11.09	33.32	318	64	P	V
		5143.2	53.46	-0.54	54	40.36	35.33	11.09	33.32	318	64	A	V
	*	5170	117.21	-	-	104.08	35.35	11.1	33.32	318	64	P	V
		5170	107.69	-	-	94.56	35.35	11.1	33.32	318	64	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 1 5150~5250MHz

EN DC 12A n2A &WIFI 802.11axHE20 (Harmonic @ 3m)

WIFI Ant. MIMO	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)
EN DC 12A n2A&WIFI 802.11AX20		10358.36	46.48	-21.82	68.3	53.12	39.59	15.86	62.09	300	0	P	H
CH36 Partial 26		10358.36	47.44	-20.86	68.3	54.08	39.59	15.86	62.09	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Note symbol

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



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.	
1		(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”.

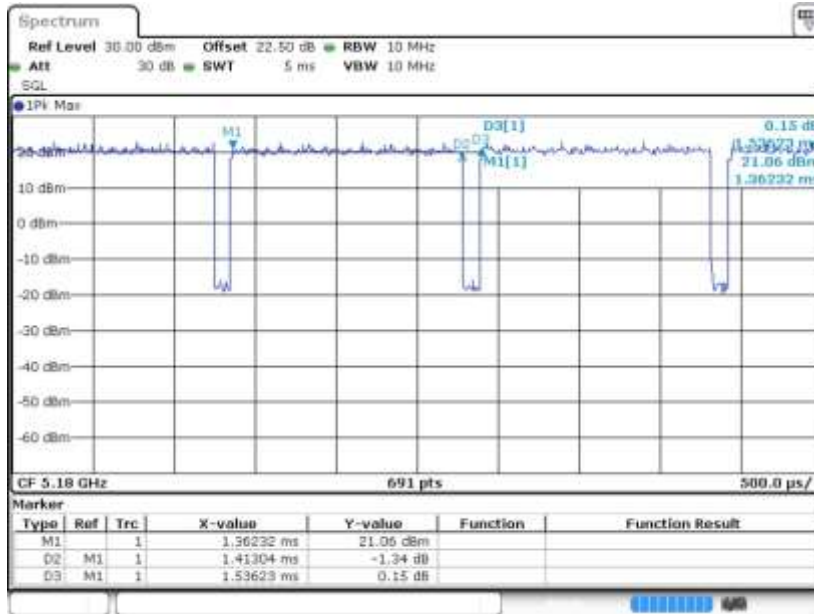


Appendix D. Duty Cycle Plots

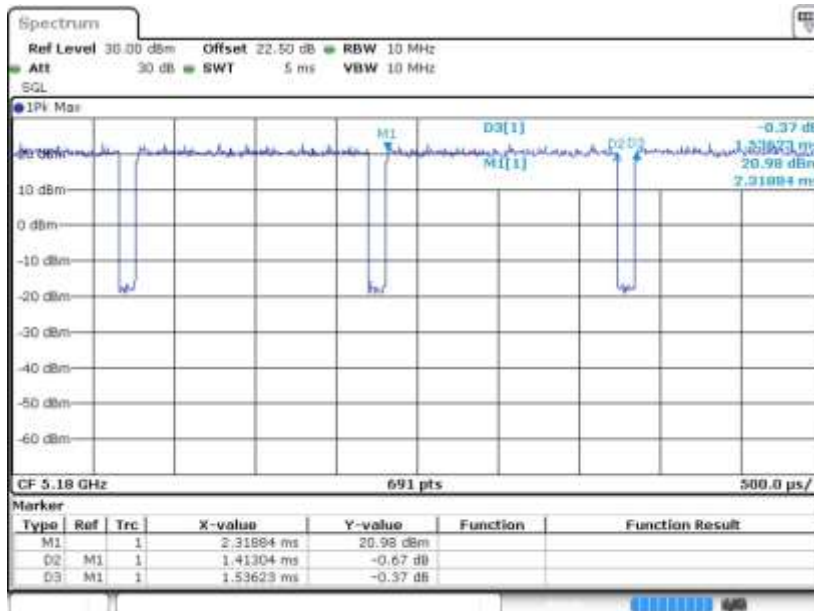
Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11a	91.98	1.413	0.708	0.75KHz
2	802.11a	91.98	1.413	0.708	0.75KHz
3	802.11a	91.55	1.413	0.708	0.75KHz
4	802.11a	92.42	1.413	0.708	0.75KHz
1+2+3+4	802.11n HT20	95.65	5.413	0.185	0.2KHz
1+2+3+4	802.11n HT40	94.90	5.391	0.185	0.2KHz
1+2+3+4	802.11ac VHT80	94.88	5.370	0.186	0.2KHz
1+2+3+4	802.11ax HE20	95.38	5.391	0.185	0.2KHz
1+2+3+4	802.11ax HE40	95.42	5.435	0.184	0.2KHz
1+2+3+4	802.11ax HE80	94.32	5.413	0.185	0.2KHz



802.11a Ant 1

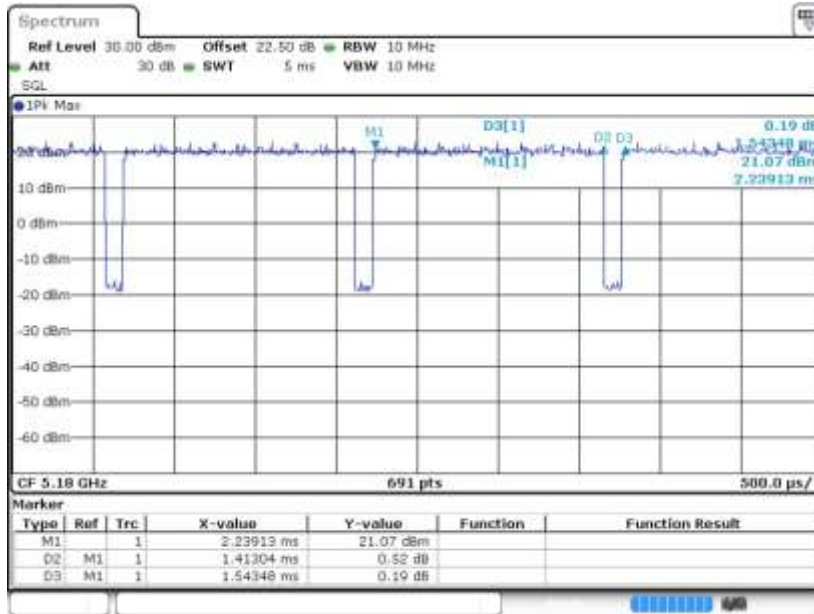


802.11a Ant 2

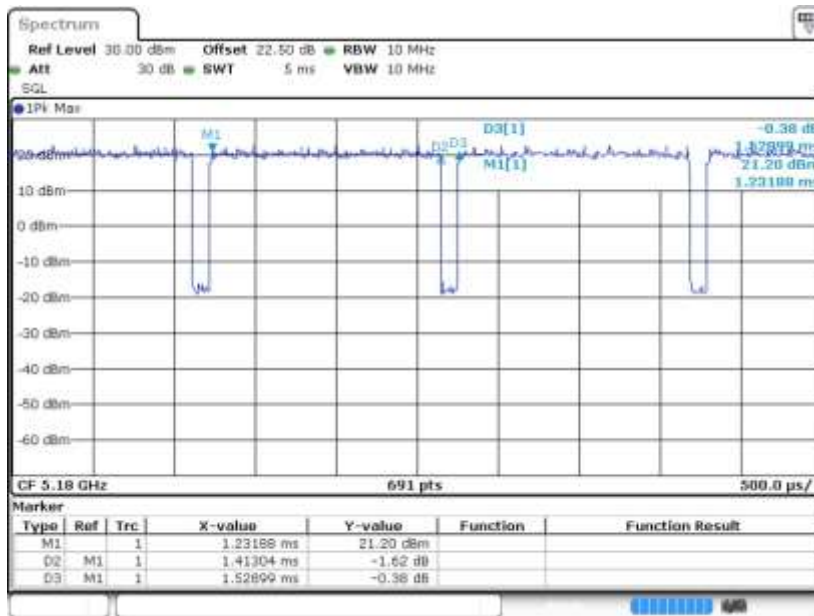




802.11a Ant 3

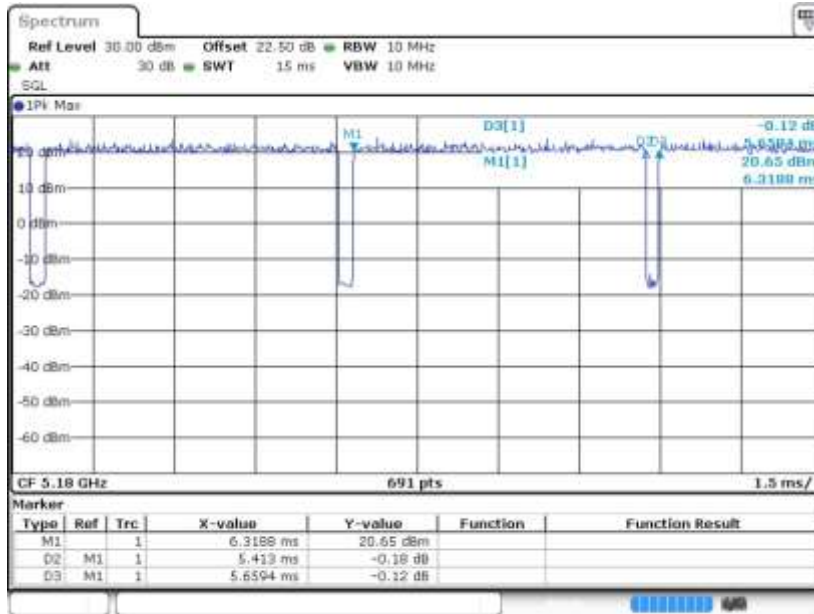


802.11a Ant 4

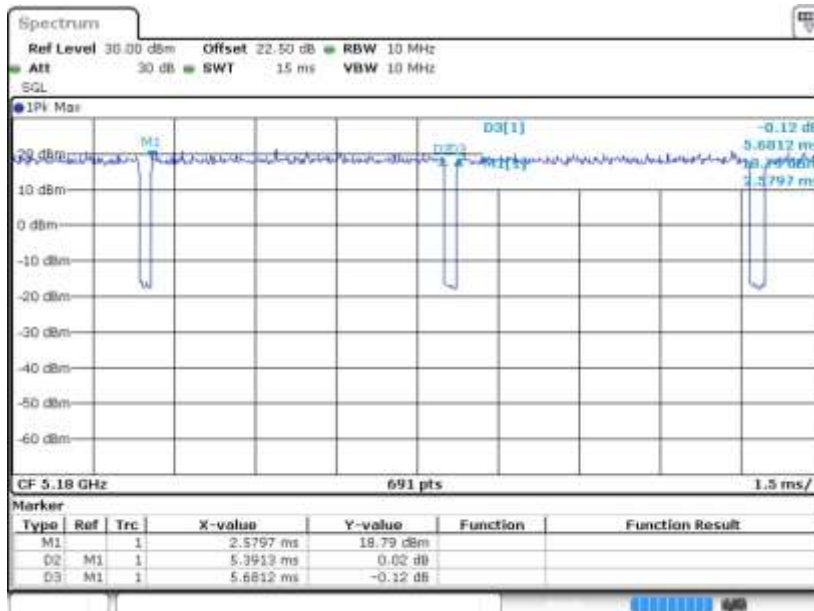




802.11n HT20

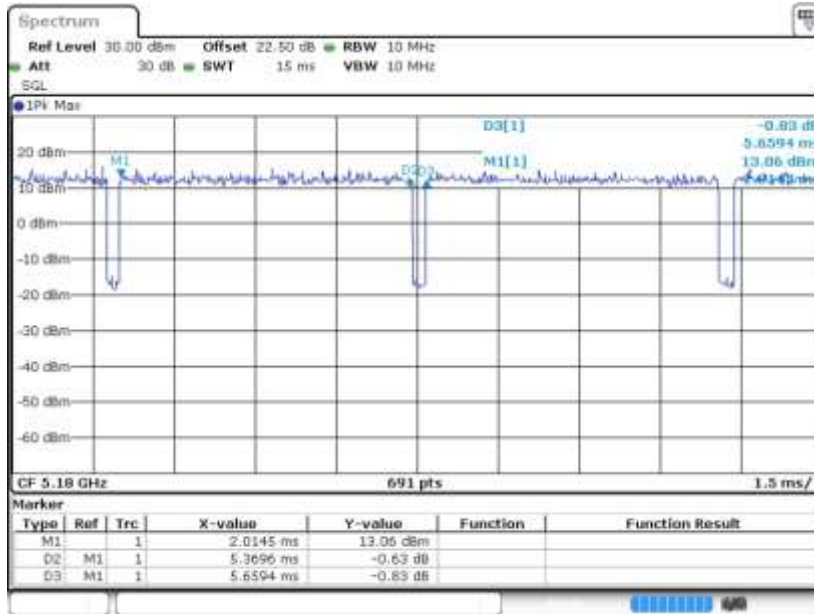


802.11n HT40

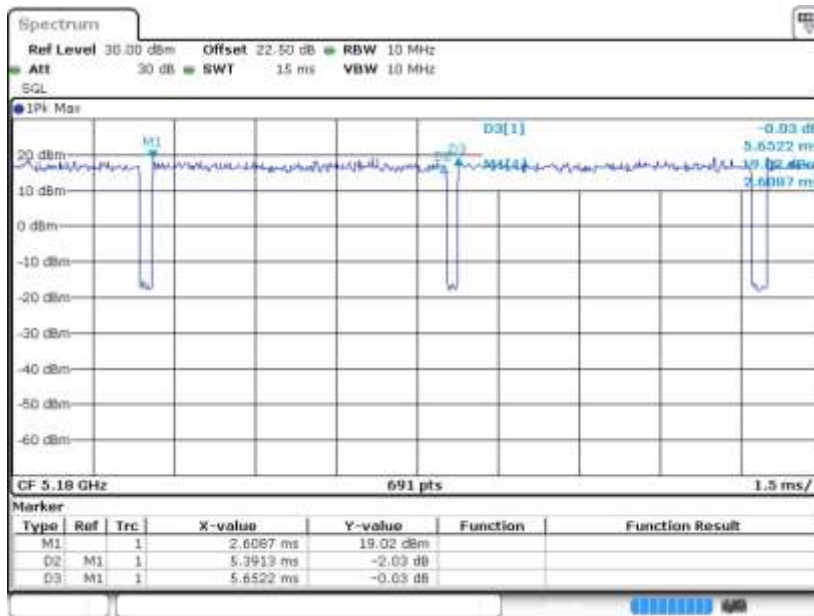




802.11ac VHT80

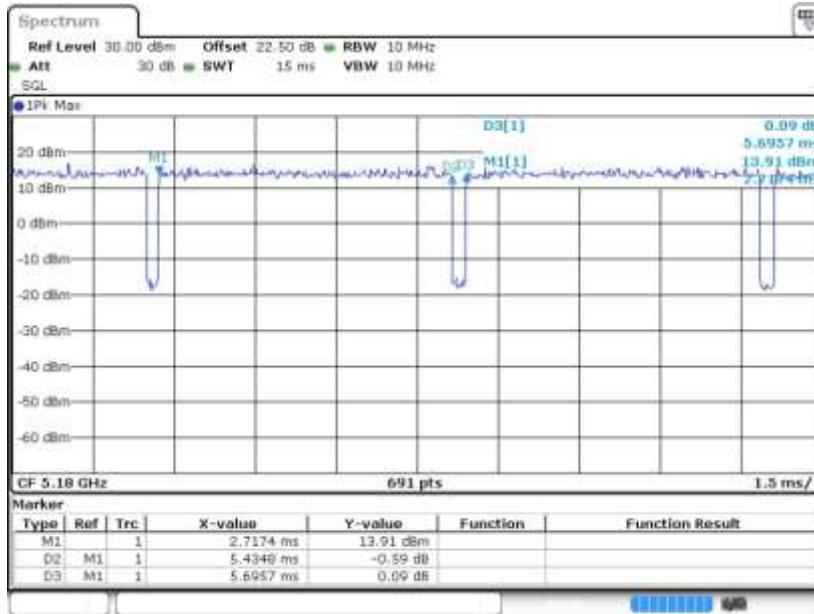


802.11ax HE20





802.11ax HE40



802.11ax HE80

