



FCC RF Test Report

APPLICANT : Huawei Technologies Co., Ltd.
EQUIPMENT : Smart Phone
BRAND NAME : HUAWEI
MODEL NAME : GLK-LX1U
FCC ID : QISGLK-LX1U
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on May 16, 2019 and testing was completed on May 30, 2019. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Derreck Chen

Reviewed by: Derreck Chen / Supervisor

Eric Shih

Approved by: Eric Shih / Manager



Sporton International (ShenZhen) Inc.

**1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055
People's Republic of China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR932820-01F	Rev. 01	Initial issue of report	Jun. 06, 2019



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) & 15.209(a)	Pass	Under limit 8.18 dB at 11650.000 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.04 dB at 0.490 MHz
3.6	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.7	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart Phone
Brand Name	HUAWEI
Model Name	GLK-LX1U
FCC ID	QISGLK-LX1U
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/HSPA+(16QAM Uplink is not supported)/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE FM Receiver/GNSS
IMEI Code	Conducted: 865951040001537 Conduction: 865951040001362 Radiation: 865951040001479
HW Version	HL7SEEM
SW Version	9.1.0.102(C900E102R1P1)

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This is a variant report for GLK-LX1U, the change note could be referred to the product equality declaration which is exhibit separately. According to the change, all the test items are verified from original test report (Sporton Report Number FR932820F).



1.3 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power	<5745 MHz ~ 5825 MHz> 802.11a : 14.42 dBm / 0.0277 W 802.11n HT20 : 13.29 dBm / 0.0213 W 802.11n HT40 : 12.50 dBm / 0.0178 W 802.11ac VHT20: 13.21 dBm / 0.0209 W 802.11ac VHT40: 12.41 dBm / 0.0174 W 802.11ac VHT80: 9.67 dBm / 0.0093 W
99% Occupied Bandwidth	802.11a : 17.73 MHz 802.11n HT20 : 18.48 MHz 802.11n HT40 : 36.16 MHz 802.11ac VHT80 : 74.81 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Antenna Type / Gain	Internal Antenna with gain 1.00 dBi

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

1.4 Modification of EUT

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



1.5 Testing Location

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.
	CO01-SZ TH01-SZ	CN1256	421272

Test Firm	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan Shenzhen, 518055 People's Republic of China TEL: +86-755-33202398		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH01-SZ	CN1256	421272

1.6 Applicable Standards

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

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

Remark:

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



1.7 Specification of Accessory

AC Adapter 1	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 2	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 3	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 4	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: PHIHONG	SN	
AC Adapter 5	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 6	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 7	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 8	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: PHIHONG	SN	
AC Adapter 9	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 10	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 11	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 12	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: PHIHONG	SN	
AC Adapter 13	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200A02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 14	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200A02
	Power Rating	I/P: <u>100</u> - <u>240</u> Vac, <u>500</u> mA, O/P: <u>5</u> Vdc, <u>2000</u> mA		
	Manufacturer	Manufacturer: BYD	SN	
USB Cable 1	Brand Name	Ningbo Broad Telecommunication Co., Ltd	Model Name	WA0020
	Signal Line	<u>1</u> meter, non-shielded cable, with w/o ferrite core		



USB Cable 2	Brand Name	Dongguan Mingji Electronics Technology Group Co.,Ltd	Model Name	203-1572-0
	Signal Line	_1_ meter, non-shielded cable, with w/o ferrite core		
USB Cable 3	Brand Name	Freeport Resources Enterprises (Jiangxi) Co.,Ltd	Model Name	18-93C2CHO-001HF
	Signal Line	_1_ meter, non-shielded cable, with w/o ferrite core		
USB Cable 4	Brand Name	HONGFUJIN PRECISION INDUSTRIAL(SHENZHEN).LTD	Model Name	CUDU01B-HC295-EH
	Signal Line	_1_ meter, non-shielded cable, with w/o ferrite core		
USB Cable 5	Brand Name	LUXSHARE Precision Industry Co., Ltd.	Model Name	L99UC131-CS-H
	Signal Line	_1_ meter, non-shielded cable, with w/o ferrite core		
USB Cable 6	Brand Name	HUIZHOU DEHONG TECHNOLOGY CO.,LTD.	Model Name	330-50507
	Signal Line	_1_ meter, non-shielded cable, with w/o ferrite core		
Earphone 1	Brand Name	HONGFUJIN PRECISION INDUSTRIAL(SHENZHEN).LTD	Model Name	EPAB542-2WH06-DH
	Signal Line	_1.1_ meter, non-shielded cable, with w/o ferrite core		
Earphone 2	Brand Name	HONGFUJIN PRECISION INDUSTRIAL(SHENZHEN).LTD	Model Name	EPAB542-2WH05-DH
	Signal Line	_1.1_ meter, non-shielded cable, with w/o ferrite core		
Earphone 3	Brand Name	Boluo County Quancheng Electronic Co., Ltd.	Model Name	1293-3283-3.5MM-322
	Signal Line	_1.1_ meter, non-shielded cable, with w/o ferrite core		
Earphone 4	Brand Name	Jiangxi Lianchuang Hongsheng Electronic Co., LTD.	Model Name	MEND1532B528A02
	Signal Line	_1.1_ meter, non-shielded cable, with w/o ferrite core		
Earphone 5	Brand Name	Jiangxi Lianchuang Hongsheng Electronic Co., LTD.	Model Name	MEND1532B528B00
	Signal Line	_1.1_ meter, non-shielded cable, with w/o ferrite core		
Battery	Brand Name	HuaweiTechnologies Co., Ltd.	Model Name	HB446486ECW
	Power Rating	_3.82_ Vdc, _3900_ mAh	Type	Li-ion, <u>Yes</u>



2 Test Configuration of Equipment Under Test

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

2.1 Carrier Frequency and Channel

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

Note:

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



2.2 Test Mode

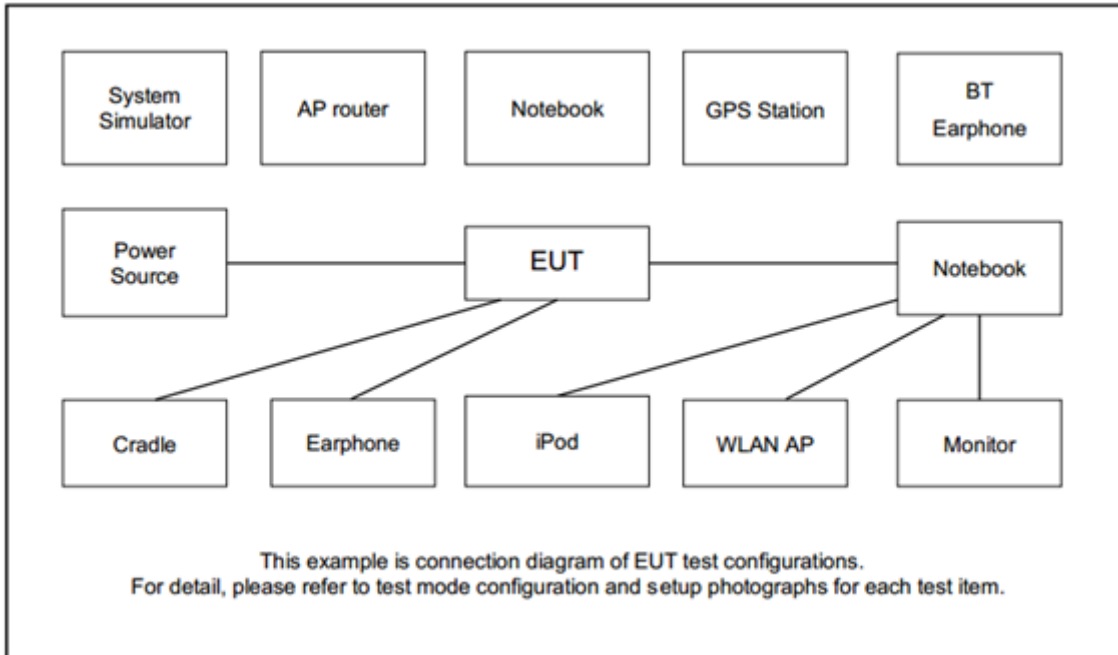
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

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

Ch. #		Band IV : 5725-5850 MHz			
		802.11a	802.11n HT20	802.11n HT40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	Bluetooth Earphone	Samsung	EO-MG900	N/A	N/A	N/A
4.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8 m



2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5.4 dB and 10dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 5.4 + 10 = 15.4 \text{ (dB)} \end{aligned}$$

3 Test Result

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

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

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

26dB and 99% Occupied bandwidth are reporting only.

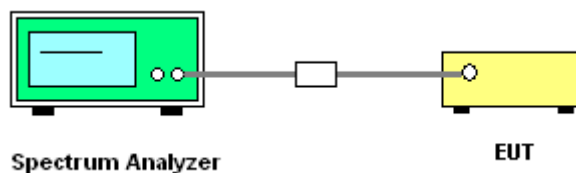
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

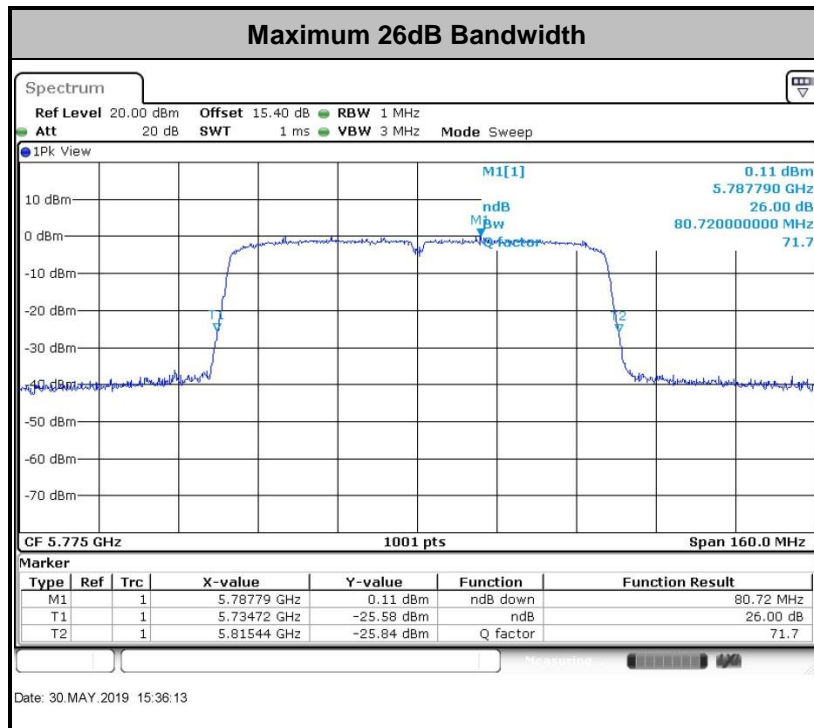
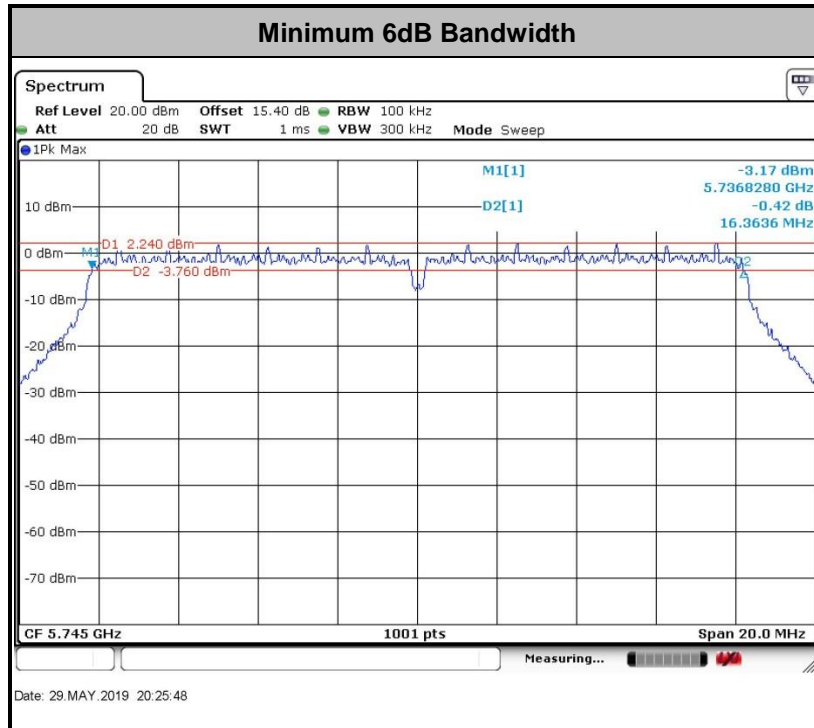
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is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

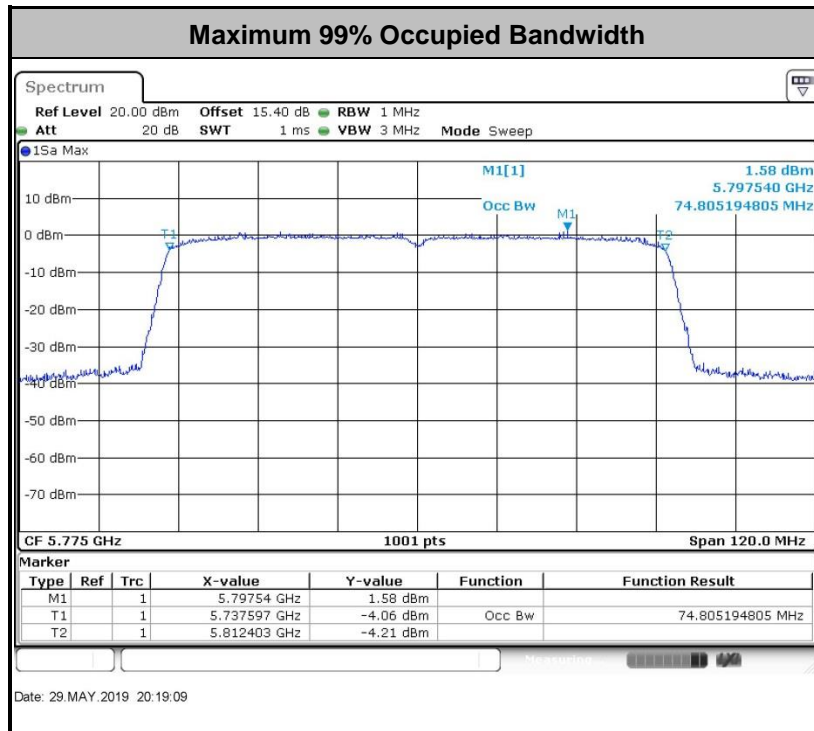
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.





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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

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

3.2.2 Measuring Instruments

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

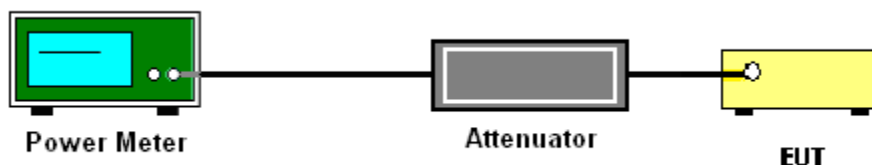
3.2.3 Test Procedures

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

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

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

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

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

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

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

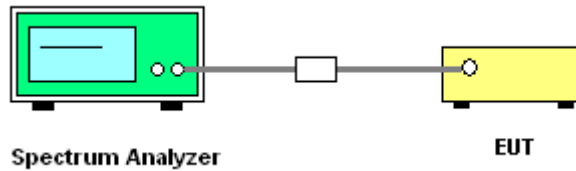
Method SA-2

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

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz.
- Set VBW \geq 1 MHz.
- Number of points in sweep \geq 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add $10 \log(500\text{kHz}/\text{RBW})$ to the test result.
- Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.

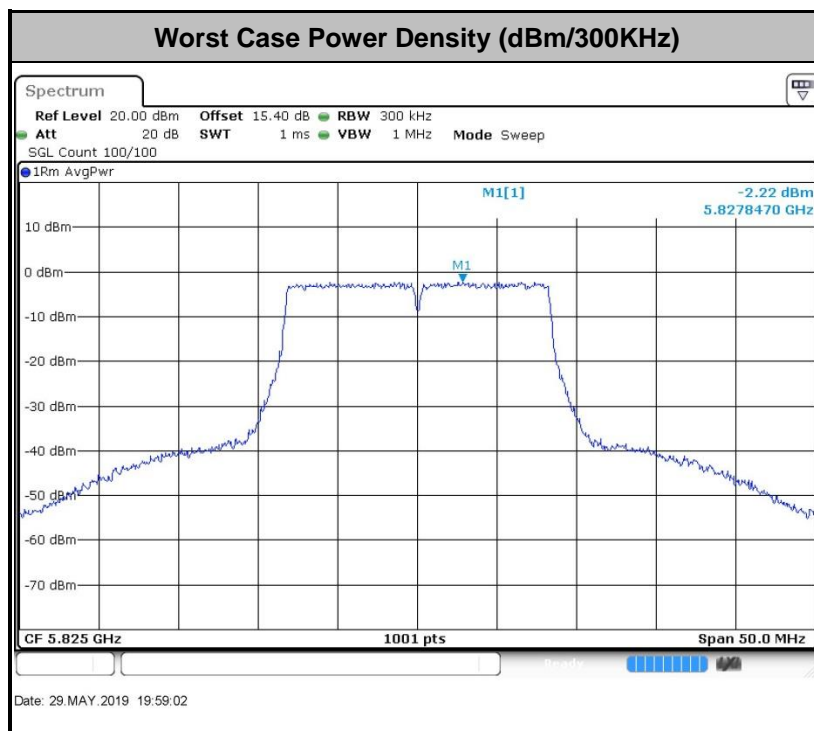
1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, and attenuator loss. Measure the PSD and record it.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.





3.4 Unwanted Emissions Measurement

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

3.4.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5.725-5.85 GHz band:
 15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- (2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3



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

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

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

where

EIRP is the equivalent isotropically radiated power, in dBm

E_{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.

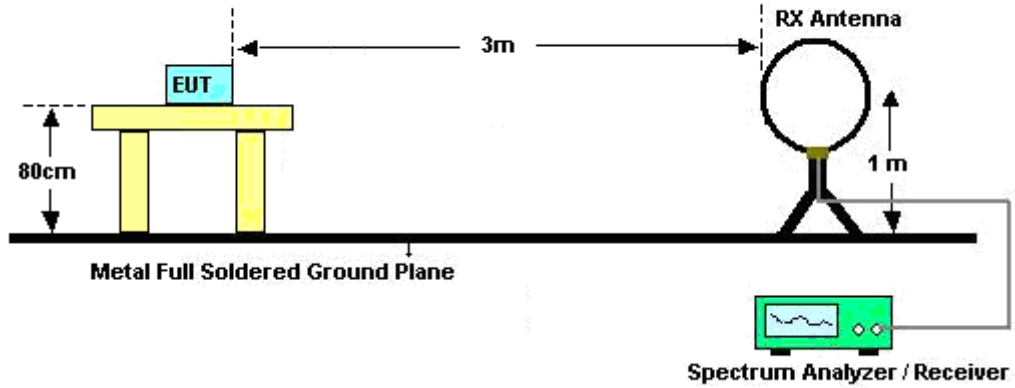


3.4.3 Test Procedures

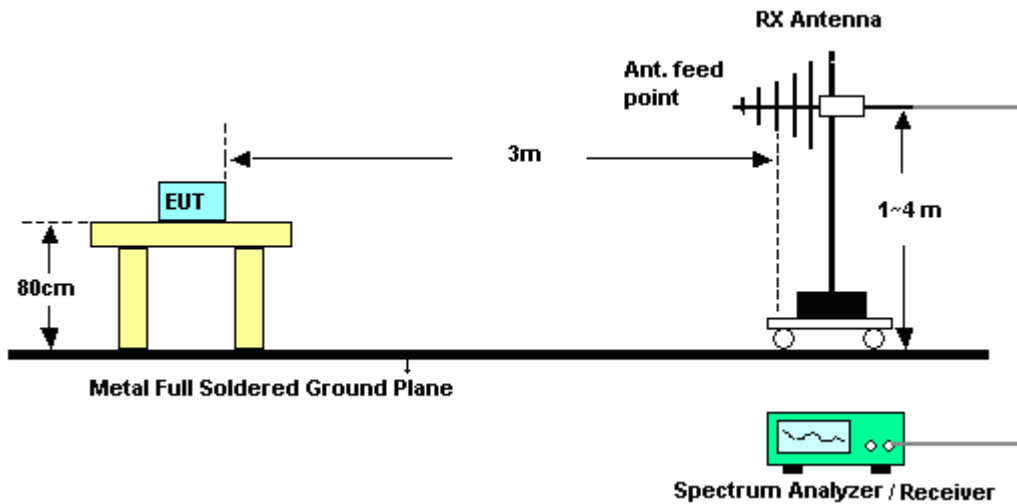
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak 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 average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

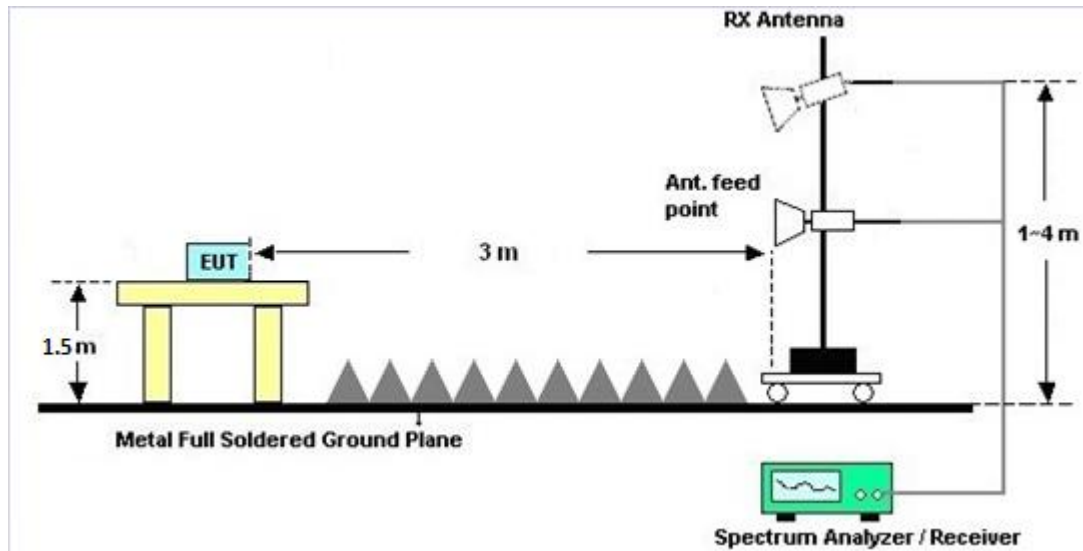
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix C.

3.4.7 Duty Cycle

Please refer to Appendix D.

3.4.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C.



3.5 AC Conducted Emission Measurement

3.5.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

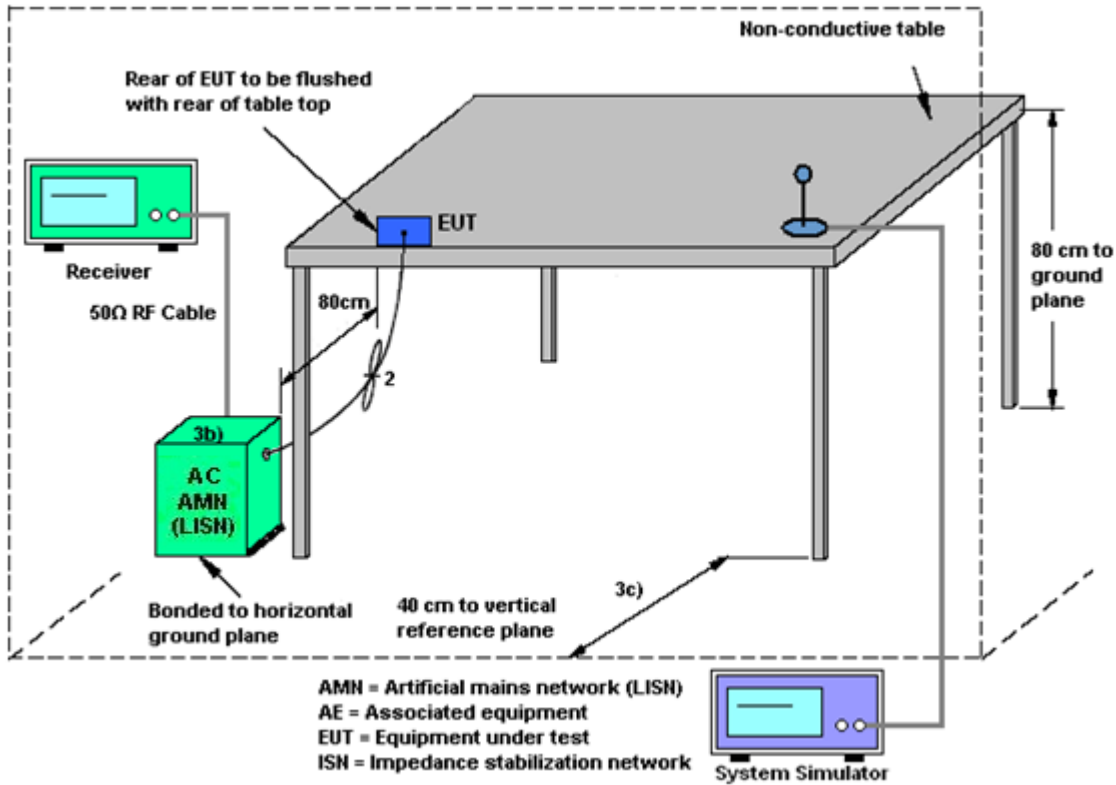
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.6 Automatically Discontinue Transmission

3.6.1 Limit of Automatically Discontinue Transmission

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

3.6.2 Measuring Instruments

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

3.6.3 Test Result of Automatically Discontinue Transmission

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



3.7 Antenna Requirements

3.7.1 Standard Applicable

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

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 18, 2019	May 29, 2019~ May 30, 2019	Apr. 17, 2020	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 22, 2018	May 29, 2019~ May 30, 2019	Dec. 21, 2019	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 22, 2018	May 29, 2019~ May 30, 2019	Dec. 21, 2019	Conducted (TH01-SZ)
EMI Test Receiver&SA	Agilent	N9038A	MY522601 85	20Hz~26.5GHz	Aug. 30, 2018	May 30, 2019	Aug. 29, 2019	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 28, 2019	May 30, 2019	May 27, 2020	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Jun. 05, 2018	May 30, 2019	Jun. 04, 2019	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	119436	1GHz~18GHz	Jun. 28, 2018	May 30, 2019	Jun. 27, 2019	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz-40GHz	Mar. 30, 2019	May 30, 2019	Mar. 29, 2020	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 19, 2019	May 30, 2019	Apr. 18, 2020	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1707137	1GHz~18GHz	Oct. 19, 2018	May 30, 2019	Oct. 18, 2019	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY532701 04	0.5GHz~26.5GHz	Dec. 22, 2018	May 30, 2019	Dec. 21, 2019	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 17, 2018	May 30, 2019	Jul. 16, 2019	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001 985	N/A	NCR	May 30, 2019	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	May 30, 2019	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	May 30, 2019	NCR	Radiation (03CH01-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 23, 2018	May 28, 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Oct. 18, 2018	May 28, 2019	Oct. 17, 2019	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Dec. 23, 2018	May 28, 2019	Dec. 22, 2019	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000 891	100Vac~250Vac	Jul. 18, 2018	May 28, 2019	Jul. 17, 2019	Conduction (CO01-SZ)

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))	2.6dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.8 dB
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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))	5.0 dB
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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))	4.3 dB
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Appendix A. Conducted Test Results

Test Engineer:	Jensen Wu	Temperature:	24~26	°C
Test Date:	2019/5/29~2019/5/30	Relative Humidity:	50~53	%

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

Band IV									
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	17.73	20.73	16.36	0.5	Pass
11a	6Mbps	1	157	5785	17.68	20.88	16.36	0.5	Pass
11a	6Mbps	1	165	5825	17.68	20.68	16.36	0.5	Pass
HT20	MCS 0	1	149	5745	18.48	21.33	17.56	0.5	Pass
HT20	MCS 0	1	157	5785	18.38	21.38	17.58	0.5	Pass
HT20	MCS 0	1	165	5825	18.43	21.38	17.58	0.5	Pass
HT40	MCS 0	1	151	5755	36.06	40.10	35.64	0.5	Pass
HT40	MCS 0	1	159	5795	36.16	40.01	35.52	0.5	Pass
VHT80	MCS 0	1	155	5775	74.81	80.72	75.12	0.5	Pass

TEST RESULTS DATA
Average Power Table

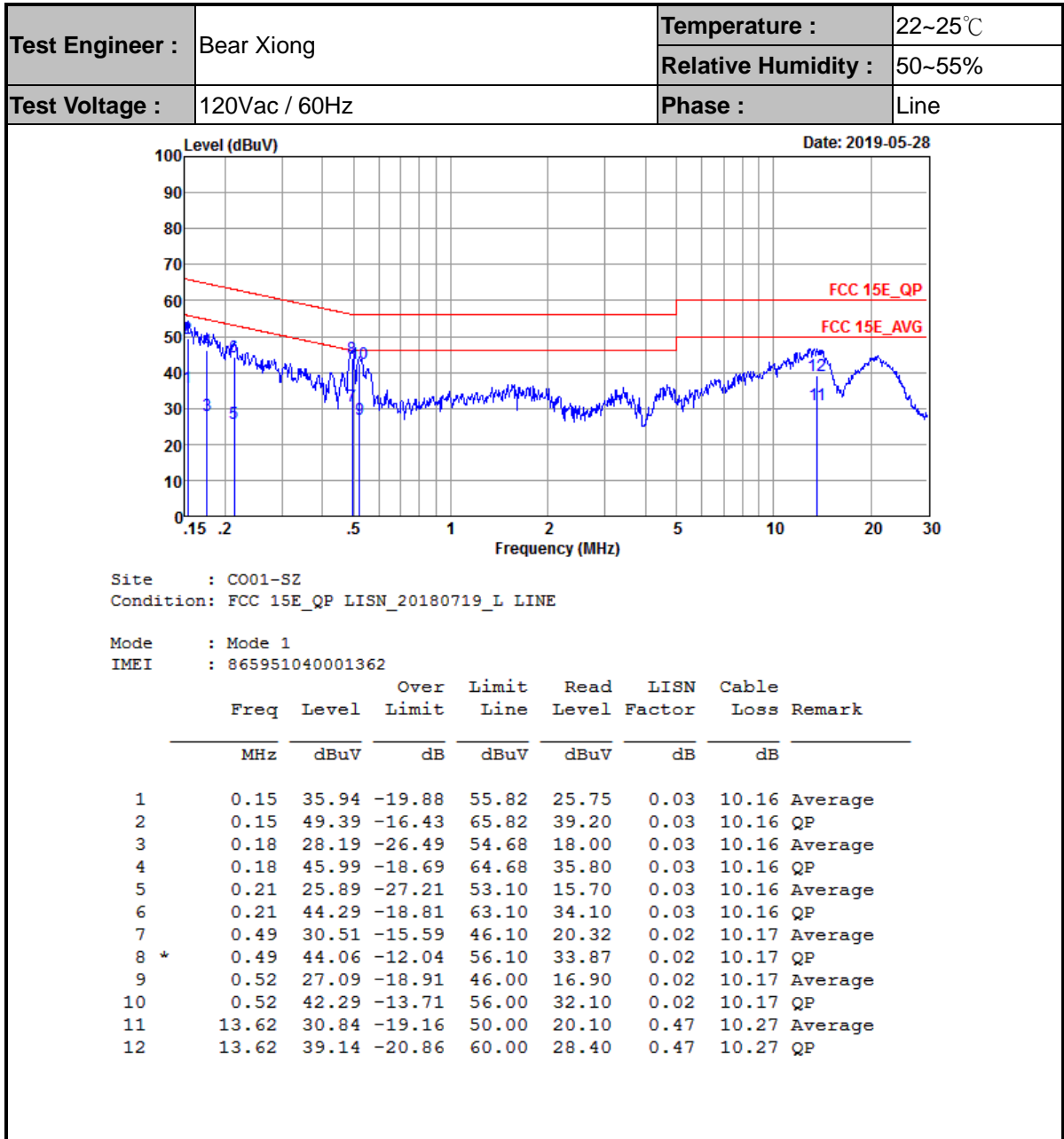
Band IV										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6M bps	1	149	5745	0.11	14.17	30.00	1.00		Pass
11a	6Mbps	1	157	5785	0.11	14.36	30.00	1.00		Pass
11a	6Mbps	1	165	5825	0.11	14.42	30.00	1.00		Pass
HT20	MCS 0	1	149	5745	0.07	12.98	30.00	1.00		Pass
HT20	MCS 0	1	157	5785	0.07	13.18	30.00	1.00		Pass
HT20	MCS 0	1	165	5825	0.07	13.29	30.00	1.00		Pass
HT40	MCS 0	1	151	5755	0.17	12.29	30.00	1.00		Pass
HT40	MCS 0	1	159	5795	0.17	12.50	30.00	1.00		Pass
VHT20	MCS 0	1	149	5745	0.06	12.94	30.00	1.00		Pass
VHT20	MCS 0	1	157	5785	0.06	13.05	30.00	1.00		Pass
VHT20	MCS 0	1	165	5825	0.06	13.21	30.00	1.00		Pass
VHT40	MCS 0	1	151	5755	0.09	12.24	30.00	1.00		Pass
VHT40	MCS 0	1	159	5795	0.09	12.41	30.00	1.00		Pass
VHT80	MCS 0	1	155	5775	0.16	9.67	30.00	1.00		Pass

TEST RESULTS DATA
Power Spectral Density

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.11	2.22	-0.36	30.00	1.00	Pass
11a	6Mbps	1	157	5785	0.11	2.22	-0.01	30.00	1.00	Pass
11a	6Mbps	1	165	5825	0.11	2.22	0.11	30.00	1.00	Pass
HT20	MCS 0	1	149	5745	0.07	2.22	-2.06	30.00	1.00	Pass
HT20	MCS 0	1	157	5785	0.07	2.22	-1.49	30.00	1.00	Pass
HT20	MCS 0	1	165	5825	0.07	2.22	-1.22	30.00	1.00	Pass
HT40	MCS 0	1	151	5755	0.17	2.22	-5.46	30.00	1.00	Pass
HT40	MCS 0	1	159	5795	0.17	2.22	-5.15	30.00	1.00	Pass
VHT80	MCS 0	1	155	5775	0.16	2.22	-11.01	30.00	1.00	Pass

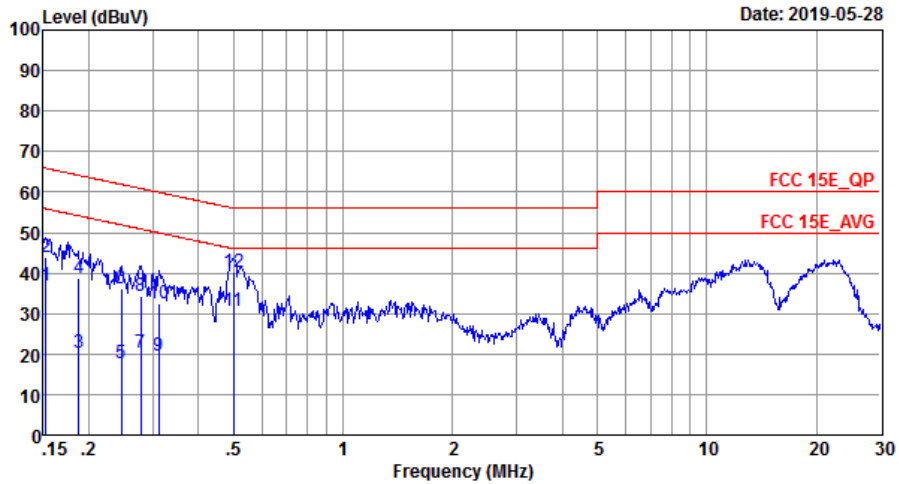


Appendix B. AC Conducted Emission Test Results





Test Engineer :	Bear Xiong	Temperature :	22~25°C
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-SZ
 Condition: FCC 15E_QP LISN_20180719_N NEUTRAL

Mode : Mode 1
 IMEI : 865951040001362

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.15	36.74	-19.13	55.87	26.55	0.03	10.16	Average
2	0.15	44.09	-21.78	65.87	33.90	0.03	10.16	QP
3	0.19	20.29	-33.86	54.15	10.10	0.03	10.16	Average
4	0.19	38.89	-25.26	64.15	28.70	0.03	10.16	QP
5	0.25	17.64	-34.27	51.91	7.44	0.03	10.17	Average
6	0.25	36.30	-25.61	61.91	26.10	0.03	10.17	QP
7	0.28	20.30	-30.60	50.90	10.10	0.03	10.17	Average
8	0.28	34.30	-26.60	60.90	24.10	0.03	10.17	QP
9	0.31	19.60	-30.33	49.93	9.40	0.03	10.17	Average
10	0.31	32.60	-27.33	59.93	22.40	0.03	10.17	QP
11 *	0.50	30.77	-15.24	46.01	20.58	0.02	10.17	Average
12	0.50	40.19	-15.82	56.01	30.00	0.02	10.17	QP



Appendix C. Radiated Spurious Emission

Test Engineer :	Fuquan Wu	Temperature :	24~25°C
		Relative Humidity :	48~49%



Band 4 - 5725~5850MHz
WIFI 802.11a (Band Edge @ 3m)

Table with 14 columns: WIFI, Note, Frequency, Level, Over, Limit, Read, Antenna, Cable, Preamp, Ant, Table, Peak, Pol. It contains 12 rows of test data for 802.11a CH 149 at 5745MHz.



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5607.8	53.68	-14.52	68.2	37.63	34.46	14.69	33.1	104	142	P	H
		5687.2	54.15	-41.61	95.76	37.9	34.48	14.87	33.1	104	142	P	H
		5707.6	53.61	-53.72	107.33	37.27	34.47	14.97	33.1	104	142	P	H
		5720.8	54.18	-58.44	112.62	37.85	34.46	14.97	33.1	104	142	P	H
	*	5785	106.23	-	-	89.74	34.44	15.15	33.1	104	142	P	H
		5785	99.12	-	-	82.63	34.44	15.15	33.1	104	142	A	H
		5852.4	52.66	-64.07	116.73	36.12	34.41	15.23	33.1	104	142	P	H
		5861.6	54.06	-54.89	108.95	37.44	34.4	15.32	33.1	104	142	P	H
		5888.4	53.7	-41.55	95.25	37.06	34.42	15.32	33.1	104	142	P	H
		5948.6	54.13	-14.07	68.2	37.28	34.46	15.49	33.1	104	142	P	H
		5647.2	54.06	-14.14	68.2	37.88	34.5	14.78	33.1	333	229	P	V
		5686.4	53.77	-41.4	95.17	37.52	34.48	14.87	33.1	333	229	P	V
		5720	54.4	-56.4	110.8	38.07	34.46	14.97	33.1	333	229	P	V
		5720	54.4	-56.4	110.8	38.07	34.46	14.97	33.1	333	229	P	V
	*	5785	100.94	-	-	84.45	34.44	15.15	33.1	333	229	P	V
		5785	94.95	-	-	78.46	34.44	15.15	33.1	333	229	A	V
		5854.6	52.09	-59.62	111.71	35.56	34.4	15.23	33.1	333	229	P	V
		5856.2	55.39	-55.07	110.46	38.77	34.4	15.32	33.1	333	229	P	V
		5918.2	53.91	-19.3	73.21	37.17	34.44	15.4	33.1	333	229	P	V
		5941.4	54.07	-14.13	68.2	37.22	34.46	15.49	33.1	333	229	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz	*	5825	104.59	-	-	88.04	34.42	15.23	33.1	100	143	P	H
	*	5825	98.34	-	-	81.79	34.42	15.23	33.1	100	143	A	H
		5852.4	54.84	-61.89	116.73	38.3	34.41	15.23	33.1	100	143	P	H
		5868.6	54.91	-52.08	106.99	38.29	34.4	15.32	33.1	100	143	P	H
		5922.4	54.28	-15.84	70.12	37.53	34.45	15.4	33.1	100	143	P	H
		5935	53.82	-14.38	68.2	36.98	34.45	15.49	33.1	100	143	P	H
	*	5825	101.52	-	-	84.97	34.42	15.23	33.1	331	230	P	V
		5825	93.75	-	-	77.2	34.42	15.23	33.1	331	230	A	V
		5854	53.71	-59.37	113.08	37.18	34.4	15.23	33.1	331	230	P	V
		5860.6	53.57	-55.66	109.23	36.95	34.4	15.32	33.1	331	230	P	V
		5916.6	54.21	-20.18	74.39	37.47	34.44	15.4	33.1	331	230	P	V
		5933.2	53.51	-14.69	68.2	36.76	34.45	15.4	33.1	331	230	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 149 5745MHz		11490	46.32	-27.68	74	46.17	37.69	20.22	57.76	189	321	P	H
		17235	46.69	-21.51	68.2	37.35	43.89	23.42	57.97	195	29	P	H
		11490	45.39	-28.61	74	45.24	37.69	20.22	57.76	160	360	P	V
		17235	47.57	-20.63	68.2	38.23	43.89	23.42	57.97	170	360	P	V
802.11a CH 157 5785MHz		11570	46.46	-27.54	74	46.07	37.81	20.25	57.67	175	185	P	H
		17355	47.37	-20.83	68.2	38.15	43.53	23.49	57.8	125	198	P	H
		11570	45.66	-28.34	74	45.27	37.81	20.25	57.67	175	198	P	V
		17355	47.21	-20.99	68.2	37.99	43.53	23.49	57.8	175	198	P	V
802.11a CH 165 5825MHz		11650	47.76	-26.24	74	47.14	37.92	20.29	57.59	148	79	P	H
		17475	48.7	-19.5	68.2	39.6	43.18	23.56	57.64	150	314	P	H
		11650	45.22	-28.78	74	44.6	37.92	20.29	57.59	148	36	P	V
		17475	49.28	-18.92	68.2	40.18	43.18	23.56	57.64	150	314	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include frequencies from 5641.6 to 5745 MHz with various measurement values.



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 157 5785MHz		5639	54.5	-13.7	68.2	38.32	34.5	14.78	33.1	100	140	P	H
		5677	54.13	-34.09	88.22	37.88	34.48	14.87	33.1	100	140	P	H
		5705.6	54.31	-52.46	106.77	37.97	34.47	14.97	33.1	100	140	P	H
		5720	53.22	-57.58	110.8	36.89	34.46	14.97	33.1	100	140	P	H
	*	5785	103.18	-	-	86.69	34.44	15.15	33.1	100	140	P	H
		5785	96.12	-	-	79.63	34.44	15.15	33.1	100	140	A	H
		5854.2	53.07	-59.55	112.62	36.54	34.4	15.23	33.1	100	140	P	H
		5870.6	53.75	-52.68	106.43	37.12	34.41	15.32	33.1	100	140	P	H
		5923.2	54.51	-15.02	69.53	37.76	34.45	15.4	33.1	100	140	P	H
		5936.2	54.34	-13.86	68.2	37.5	34.45	15.49	33.1	100	140	P	H
		5650	53.83	-14.37	68.2	37.66	34.49	14.78	33.1	387	225	P	V
		5677	53.83	-34.39	88.22	37.66	34.49	14.78	33.1	387	225	P	V
		5706.2	53.82	-53.12	106.94	37.48	34.47	14.97	33.1	387	225	P	V
		5723.4	53	-65.55	118.55	36.67	34.46	14.97	33.1	387	225	P	V
	*	5785	100.03	-	-	83.54	34.44	15.15	33.1	387	225	P	V
		5785	92.68	-	-	76.19	34.44	15.15	33.1	387	225	A	V
		5852	52.01	-65.63	117.64	35.47	34.41	15.23	33.1	387	225	P	V
		5873.8	52.67	-52.87	105.54	36.04	34.41	15.32	33.1	387	225	P	V
	5924.4	53.9	-14.74	68.64	37.15	34.45	15.4	33.1	387	225	P	V	
	5941	53.07	-15.13	68.2	36.22	34.46	15.49	33.1	387	225	P	V	



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 165 5825MHz	*	5825	102.59	-	-	86.04	34.42	15.23	33.1	100	139	P	H
		5825	95.04	-	-	78.49	34.42	15.23	33.1	100	139	A	H
		5850	54.77	-67.43	122.2	38.23	34.41	15.23	33.1	100	139	P	H
		5859	54.01	-55.67	109.68	37.39	34.4	15.32	33.1	100	139	P	H
		5922.6	53.8	-16.17	69.97	37.05	34.45	15.4	33.1	100	139	P	H
		5947.6	54.83	-13.37	68.2	37.98	34.46	15.49	33.1	100	139	P	H
	*	5825	98.97	-	-	82.42	34.42	15.23	33.1	387	229	P	V
		5825	93.44	-	-	76.89	34.42	15.23	33.1	387	229	A	V
		5850	53.46	-68.74	122.2	36.92	34.41	15.23	33.1	387	229	P	V
		5858	53.6	-56.36	109.96	36.98	34.4	15.32	33.1	387	229	P	V
	5907.8	53.7	-27.19	80.89	36.96	34.44	15.4	33.1	387	229	P	V	
	5936.8	53.75	-14.45	68.2	36.91	34.45	15.49	33.1	387	229	P	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include test results for 802.11n HT20 and 5745MHz, 5785MHz, and 5825MHz channels.

Remark

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



Band 4 5725~5850MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include frequency measurements from 5630.2 to 5929.6 MHz.



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 159 5795MHz		5627.8	54.73	-13.47	68.2	38.57	34.48	14.78	33.1	100	142	P	H
		5689.4	53.81	-43.57	97.38	37.56	34.48	14.87	33.1	100	142	P	H
		5705.6	54.19	-52.58	106.77	37.85	34.47	14.97	33.1	100	142	P	H
		5724.4	53.57	-67.26	120.83	37.24	34.46	14.97	33.1	100	142	P	H
	*	5795	100.63	-	-	84.15	34.43	15.15	33.1	100	142	P	H
		5795	94.37	-	-	77.89	34.43	15.15	33.1	100	142	A	H
		5854	54.49	-58.59	113.08	37.96	34.4	15.23	33.1	100	142	P	H
		5861.4	54.66	-54.35	109.01	38.04	34.4	15.32	33.1	100	142	P	H
		5924	54.24	-14.7	68.94	37.49	34.45	15.4	33.1	100	142	P	H
		5948.8	54.13	-14.07	68.2	37.28	34.46	15.49	33.1	100	142	P	H
		5630.2	53.39	-14.81	68.2	37.23	34.48	14.78	33.1	355	232	P	V
		5692	53.63	-45.67	99.3	37.38	34.48	14.87	33.1	355	232	P	V
		5702	54.56	-51.2	105.76	38.22	34.47	14.97	33.1	355	232	P	V
		5720	53.96	-56.84	110.8	37.63	34.46	14.97	33.1	355	232	P	V
	*	5785	97.17	-	-	80.68	34.44	15.15	33.1	355	232	P	V
		5785	90.26	-	-	73.77	34.44	15.15	33.1	355	232	A	V
		5851.6	53.03	-65.52	118.55	36.49	34.41	15.23	33.1	355	232	P	V
		5870	53	-53.6	106.6	36.38	34.4	15.32	33.1	355	232	P	V
	5915.6	53.64	-21.49	75.13	36.9	34.44	15.4	33.1	355	232	P	V	
	5927	53.8	-14.4	68.2	37.05	34.45	15.4	33.1	355	232	P	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include test results for 802.11n HT40 CH 151 and 5755MHz, and 802.11n HT40 CH 159 and 5795MHz.



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

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include test results for frequencies 5623.8, 5671.2, 5720, 5723.8, 5745, 5745, 5642.6, 5650.6, 5719.8, 5725, 5745, 5745.



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 157 5785MHz		5636.8	54.3	-13.9	68.2	38.12	34.5	14.78	33.1	112	141	P	H
		5695.8	54.02	-48.08	102.1	37.77	34.48	14.87	33.1	112	141	P	H
		5714	53.69	-55.43	109.12	37.35	34.47	14.97	33.1	112	141	P	H
		5722	54.08	-61.28	115.36	37.75	34.46	14.97	33.1	112	141	P	H
		5785	104.39	-	-	87.9	34.44	15.15	33.1	112	141	P	H
		5785	97	-	-	80.51	34.44	15.15	33.1	112	141	A	H
		5851.6	52.63	-65.92	118.55	36.09	34.41	15.23	33.1	112	141	P	H
		5869.6	54.19	-52.52	106.71	37.57	34.4	15.32	33.1	112	141	P	H
		5908	53.3	-27.44	80.74	36.56	34.44	15.4	33.1	112	141	P	H
		5932.4	54.16	-14.04	68.2	37.41	34.45	15.4	33.1	112	141	P	H
		5627.8	54.05	-14.15	68.2	37.89	34.48	14.78	33.1	353	229	P	V
		5659	53.66	-21.22	74.88	37.49	34.49	14.78	33.1	353	229	P	V
		5701.4	53.28	-52.31	105.59	36.94	34.47	14.97	33.1	353	229	P	V
		5724.2	52.63	-67.75	120.38	36.3	34.46	14.97	33.1	353	229	P	V
		5785	99.5	-	-	83.01	34.44	15.15	33.1	353	229	P	V
		5785	91.98	-	-	75.49	34.44	15.15	33.1	353	229	A	V
		5852.2	53.81	-63.37	117.18	37.27	34.41	15.23	33.1	353	229	P	V
		5858.8	53.81	-55.92	109.73	37.19	34.4	15.32	33.1	353	229	P	V
	5906.2	54.44	-27.64	82.08	37.7	34.44	15.4	33.1	353	229	P	V	
	5931.4	54.82	-13.38	68.2	38.07	34.45	15.4	33.1	353	229	P	V	



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 165 5825MHz		5825	101.9	-	-	85.35	34.42	15.23	33.1	100	140	P	H
		5825	95.18	-	-	78.63	34.42	15.23	33.1	100	140	A	H
		5850	56.27	-65.93	122.2	39.73	34.41	15.23	33.1	100	140	P	H
		5870.8	54.27	-52.1	106.37	37.64	34.41	15.32	33.1	100	140	P	H
		5921.2	55.04	-15.96	71	38.3	34.44	15.4	33.1	100	140	P	H
		5925	54.14	-14.06	68.2	37.39	34.45	15.4	33.1	100	140	P	H
		5825	99.95	-	-	83.4	34.42	15.23	33.1	349	231	P	V
		5825	92.73	-	-	76.18	34.42	15.23	33.1	349	231	A	V
		5850.2	53.51	-68.23	121.74	36.97	34.41	15.23	33.1	349	231	P	V
		5856.8	53.26	-57.04	110.3	36.64	34.4	15.32	33.1	349	231	P	V
		5875.2	54.1	-50.95	105.05	37.47	34.41	15.32	33.1	349	231	P	V
	5933	53.5	-14.7	68.2	36.75	34.45	15.4	33.1	349	231	P	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac		11490	46.02	-27.98	74	45.87	37.69	20.22	57.76	160	360	P	H
VHT20		17235	46.44	-21.76	68.2	37.1	43.89	23.42	57.97	170	42	P	H
CH 149		11490	45.03	-28.97	74	44.88	37.69	20.22	57.76	189	321	P	V
5745MHz		17235	47.16	-21.04	68.2	37.82	43.89	23.42	57.97	195	29	P	V
802.11ac		11570	45.96	-28.04	74	45.57	37.81	20.25	57.67	175	185	P	H
VHT20		17355	47.12	-21.08	68.2	37.9	43.53	23.49	57.8	185	198	P	H
CH 157		11570	45.26	-28.74	74	44.87	37.81	20.25	57.67	175	185	P	V
5785MHz		17355	47.2	-21	68.2	37.98	43.53	23.49	57.8	125	198	P	V
802.11ac		11650	47.62	-26.38	74	47	37.92	20.29	57.59	148	36	P	H
VHT20		17475	48.84	-19.36	68.2	39.74	43.18	23.56	57.64	150	75	P	H
CH 165		11650	44.82	-29.18	74	44.2	37.92	20.29	57.59	156	347	P	V
5825MHz		17475	48.8	-19.4	68.2	39.7	43.18	23.56	57.64	150	75	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include frequency measurements from 5648.8 to 5940.2 MHz.



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT40 CH 159 5795MHz		5644.4	54.53	-13.67	68.2	38.35	34.5	14.78	33.1	100	141	P	H
		5658.8	53.88	-20.86	74.74	37.71	34.49	14.78	33.1	100	141	P	H
		5702	54.65	-51.11	105.76	38.31	34.47	14.97	33.1	100	141	P	H
		5720.8	53.81	-58.81	112.62	37.48	34.46	14.97	33.1	100	141	P	H
	*	5795	99.92	-	-	83.44	34.43	15.15	33.1	100	141	P	H
		5795	92.66	-	-	76.18	34.43	15.15	33.1	100	141	A	H
		5851.2	53.01	-66.45	119.46	36.47	34.41	15.23	33.1	100	141	P	H
		5875	54.21	-50.99	105.2	37.58	34.41	15.32	33.1	100	141	P	H
		5924.4	54.64	-14	68.64	37.89	34.45	15.4	33.1	100	141	P	H
		5925	53.5	-14.7	68.2	36.75	34.45	15.4	33.1	100	141	P	H
		5606	53.62	-14.58	68.2	37.57	34.46	14.69	33.1	374	230	P	V
		5662.2	53.2	-24.06	77.26	36.94	34.49	14.87	33.1	374	230	P	V
		5711.8	54	-54.51	108.51	37.66	34.47	14.97	33.1	374	230	P	V
		5724	52.22	-67.7	119.92	35.89	34.46	14.97	33.1	374	230	P	V
	*	5795	95.95	-	-	79.47	34.43	15.15	33.1	374	230	P	V
		5795	88.67	-	-	72.19	34.43	15.15	33.1	374	230	A	V
		5851.2	52.25	-67.21	119.46	35.71	34.41	15.23	33.1	374	230	P	V
		5866.2	53.38	-54.28	107.66	36.76	34.4	15.32	33.1	374	230	P	V
	5910.6	53.45	-25.37	78.82	36.71	34.44	15.4	33.1	374	230	P	V	
	5932.6	53.26	-14.94	68.2	36.51	34.45	15.4	33.1	374	230	P	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include test results for 802.11ac VHT40 CH 151 and 5755MHz, and 802.11ac VHT40 CH 159 and 5795MHz.



Band 4 5725~5850MHz
WIFI 802.11ac VHT80 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include frequencies from 5646 to 5926.8 MHz.

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



Band 4 5725~5850MHz
WIFI 802.11 VHT80 (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include 802.11ac, VHT80, CH 155, 5775MHz and a Remark section.



Band 4 5725~5850MHz

Emission below 1GHz

5GHz WIFI 802.11n HT20 (LF @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11n HT20 LF		30	24.5	-15.5	40	30.44	24.4	0.96	31.3	128	199	P	H
		229.82	28.97	-17.03	46	41.51	16.3	2.7	31.54	-	-	P	H
		276.38	28.2	-17.8	46	37.71	19.07	2.96	31.54	-	-	P	H
		419.94	27.51	-18.49	46	33.34	21.96	3.65	31.44	-	-	P	H
		630.43	29.02	-16.98	46	31.41	24.62	4.47	31.48	-	-	P	H
		991.27	32.96	-21.04	54	31.24	27.32	5.62	31.22	-	-	P	H
		30	24.24	-15.76	40	30.18	24.4	0.96	31.3	-	-	P	V
		119.24	20.75	-22.75	43.5	32.39	17.94	1.94	31.52	-	-	P	V
		426.73	27.99	-18.01	46	33.69	22.08	3.68	31.46	-	-	P	V
		510.15	30.08	-15.92	46	33.76	23.51	4.03	31.22	-	-	P	V
		728.4	33.1	-12.9	46	34.37	25.27	4.82	31.36	129	278	P	V
	960.23	32.46	-21.54	54	31.18	27.04	5.52	31.28	-	-	P	V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	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	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

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

For Peak Limit @ 2390MHz:

- Level(dBμV/m)
= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

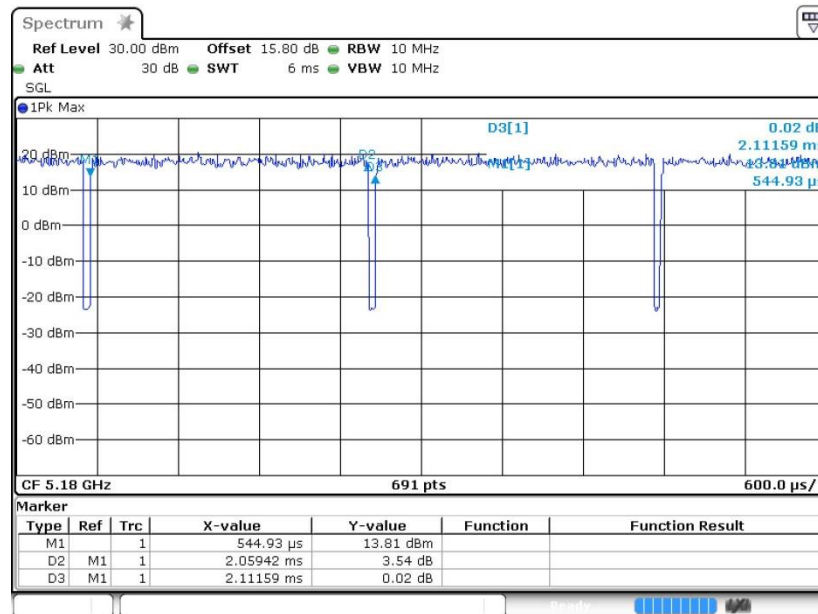
- Level(dBμV/m)
= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
- Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

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

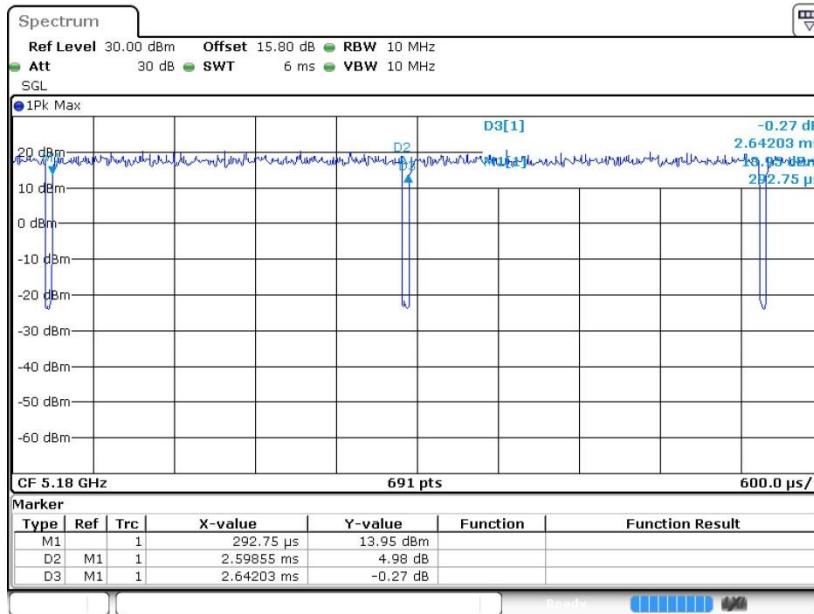
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	97.53	2.059	0.486	1KHz
802.11an HT 20	98.35	-	-	10Hz
802.11an HT 40	96.26	1.268	0.789	1KHz
802.11ac VHT 20	98.60	-	-	10Hz
802.11ac VHT 40	98.01	-	-	10Hz
802.11ac VHT80	96.34	1.144	0.875	1KHz

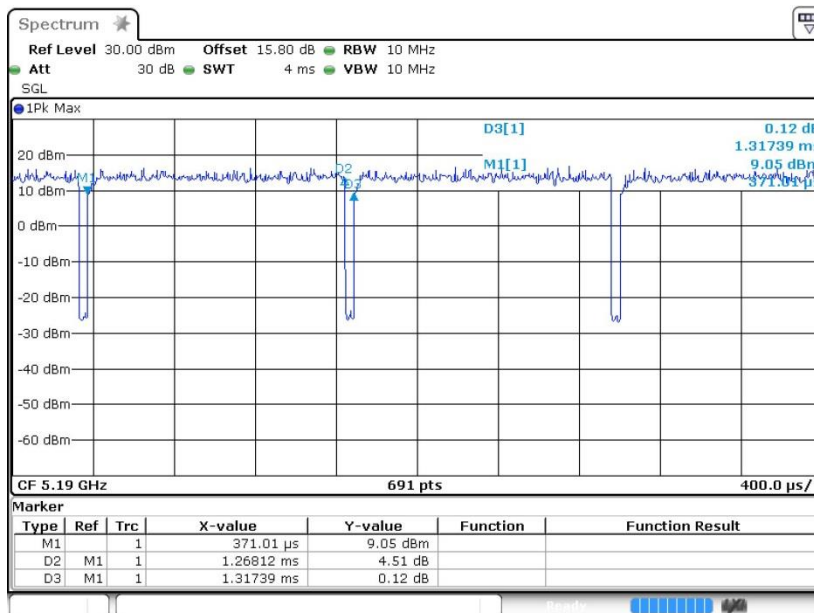
802.11a



802.11an HT20

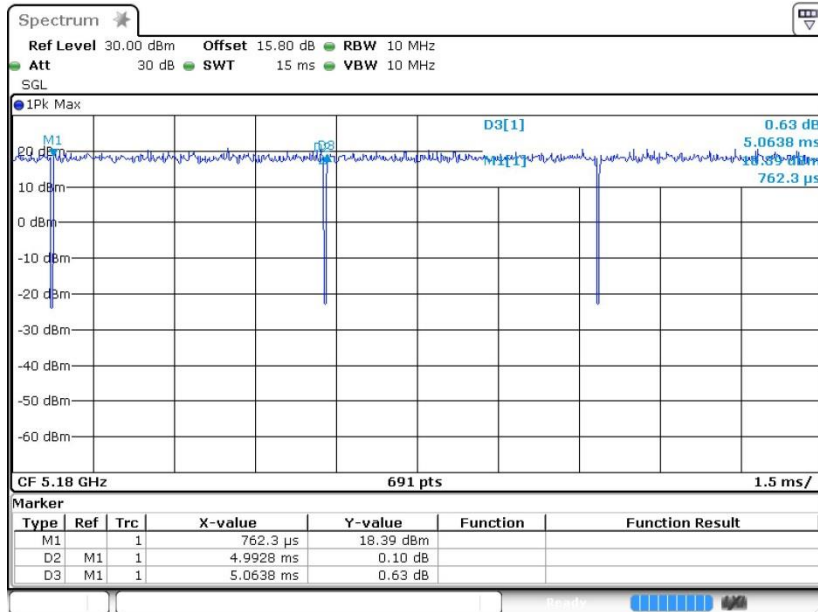


802.11an HT40

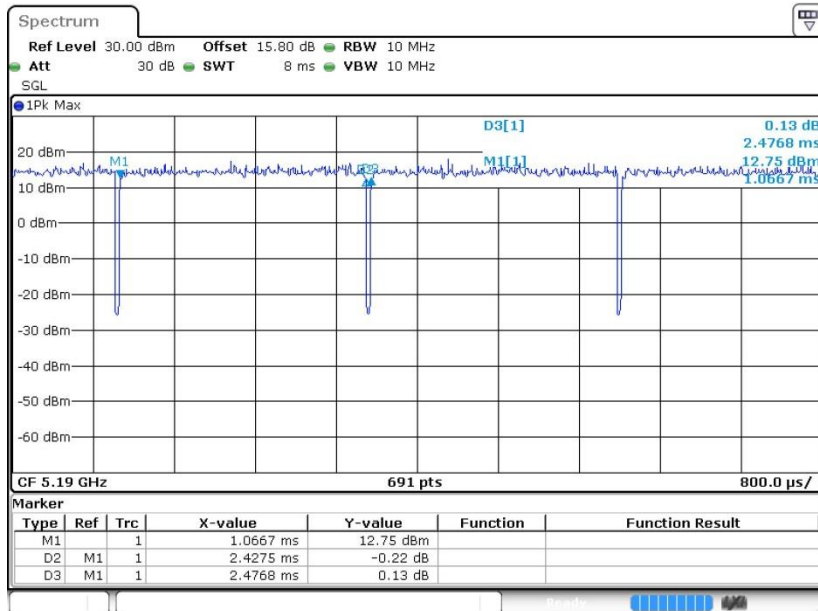




802.11ac VHT20



802.11ac VHT40





802.11ac VHT80

