FCC RF Test Report

APPLICANT	:	BlackBerry Ltd.
EQUIPMENT	:	GSM Quad-band / UMTS FIVE bands / LTE eleven bands mobile phone
BRAND NAME	:	BlackBerry
MODEL NAME	:	RJE181LW
MARKETING NAME	:	DTEK50
FCC ID	:	L6ARJE180LW
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was received on May 09, 2016 and testing was completed on Jun. 29, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Prepared by: James Huang / Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
2627

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TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR611504-06F	Rev. 01	Initial issue of report	Jul. 12, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	RSS-247 Section 6	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	RSS-247 Section 6	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	RSS-247 Section 6	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	RSS-247 Section 6	Unwanted Emissions	≤15.407(b)(4)(i) &15.209(a)	Pass	Under limit 2.55 dB at 11490.000 MHz
3.5	15.207	RSS-Gen 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 9.61 dB at 0.530 MHz
3.6	15.407(g)	-	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	RSS-247 6.4(2)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	N/A	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

BlackBerry Ltd.
2200 University Ave E., Waterloo, ON, CAN. N2K0A7

1.2 Manufacturer

TCL Communication Ltd.
5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	GSM Quad-band / UMTS FIVE bands / LTE eleven bands mobile phone
Brand Name	BlackBerry
Model Name	RJE181LW
Marketing Name	DTEK50
FCC ID	L6ARJE180LW
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 v3.0+EDR/ Bluetooth v4.0 LE/ Bluetooth v4.2 LE
IMEI Code	Conducted: 004402243119934 Conduction: 004402243119983 Radiation: 004402243119926
HW Version	PIO
SW Version	AAF295
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 Channel Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power	802.11a : 14.63 dBm / 0.0290 W 802.11n HT20 : 14.69 dBm / 0.0294 W 802.11n HT40 : 14.56 dBm / 0.0286 W 802.11ac VHT20: 14.75 dBm / 0.0299 W 802.11ac VHT40: 14.55 dBm / 0.0285 W 802.11ac VHT80: 15.35 dBm / 0.0343 W
99% Occupied Bandwidth	802.11a : 18.75 MHz 802.11n HT20 : 19.55 MHz 802.11n HT40 : 37.30 MHz 802.11ac VHT20 : 20.05 MHz 802.11ac VHT40 : 37.50 MHz 802.11ac VHT80 : 75.12 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Antenna Type/Gain	IFA Antenna with gain -2.40 dBi

1.5 Specification of Accessory

Specification of Accessory				
AC Adapter	**Brand Name**	N/A	**Model Name**	UC13US
	Power Rating	I/P: 100 - 240Vac 0.5A, O/P:5V 2.0A		
	Manufacturer	BYD		
	P/N	CBA0059AG4C1		
Battery 1	**Brand Name**	N/A	**Model Name**	TLp026EJ
	Power Rating	3.85V 2610mAh		
	Manufacturer	COSLIGHT		
	P/N	CAC2610010CJ		
Battery 2	**Brand Name**	N/A	**Model Name**	TLp026E2
	Power Rating	3.84V 2610mAh		
	Manufacturer	SCUD		
	P/N	CAC2610011C2		
USB Cable 1	**Brand Name**	NA	**Model Name**	NA
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		
	P/N	CDA0000043C8		
USB Cable 2	**Brand Name**	NA	**Model Name**	NA
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		
	P/N	CDA0000043C2		
Earphone	**Brand Name**	LIANCHUANG	**Model Name**	NA
	Signal Line Type	1.25 meter, non-shielded cable, without ferrite core		
	P/N	CCB0045A15C3		

1.6 Modification of EUT

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

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
Test Site Location	1F & 2F,Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595
Test Site No.	**Sporton Site No.**
	TH01-SZ

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	**Sporton Site No.**			**FCC/IC Registration No.**
	TH01-KS	03CH03-KS	CO01-KS	306251/4086E

Note: The test site complies with ANSI C63.4 2014 requirement.

1.8 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02
- 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

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: conducted emission (150 kHz to 30 MHz) and radiated 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 were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency and Channel

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

Note: The above Frequency and Channel in boldface were 802.11n HT40.

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables.

WLAN 5GHz 802.11a Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate / 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 149	5745	14.28	CH 157	13.69	12.77	11.76	10.77	9.81	8.79	8.81
CH 157	5785	**14.63**								
CH 165	5825	14.51								

WLAN 5GHz 802.11n-HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index / MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 149	5745	14.33	CH 157	13.80	12.39	11.47	10.25	9.39	8.85	8.86
CH 157	5785	**14.69**								
CH 165	5825	14.54								

WLAN 5GHz 802.11n-HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index / MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 151	5755	14.18	CH 159	13.69	12.72	11.74	10.75	9.81	8.75	8.83
CH 159	5795	**14.56**								

WLAN 5GHz 802.11ac VHT20 Average Power (dBm)											
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index / MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 149	5745	14.41	CH 157	13.85	12.86	11.84	10.83	10.38	9.93	9.36	8.83
CH 157	5785	**14.75**									
CH 165	5825	14.59									

WLAN 5GHz 802.11ac VHT40 Average Power (dBm)											
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index / MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 151	5755	14.23	CH 159	13.68	12.76	11.71	10.79	10.30	9.88	9.32	8.91	9.02
CH 159	5795	**14.55**										

WLAN 5GHz 802.11ac VHT 80 Average Power (dBm)											
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index / MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 155	5775	**15.35**	CH 155	14.60	13.82	13.08	12.30	12.01	11.62	11.32	10.82	11.00

2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

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 : **GSM850 Idle + Bluetooth Link + WLAN Link(5G) + Earphone + Battery 1 + USB Cable 1(Charging from Adapter)** Mode 2 : GSM850 Idle + Bluetooth Link + WLAN Link(5G) + Earphone + Battery 2 + USB Cable 2(Charging from Adapter)

Remark:

1. For Radiated TCs, the tests were performed with Adapter, Earphone, Battery 1 and USB Cable 1.

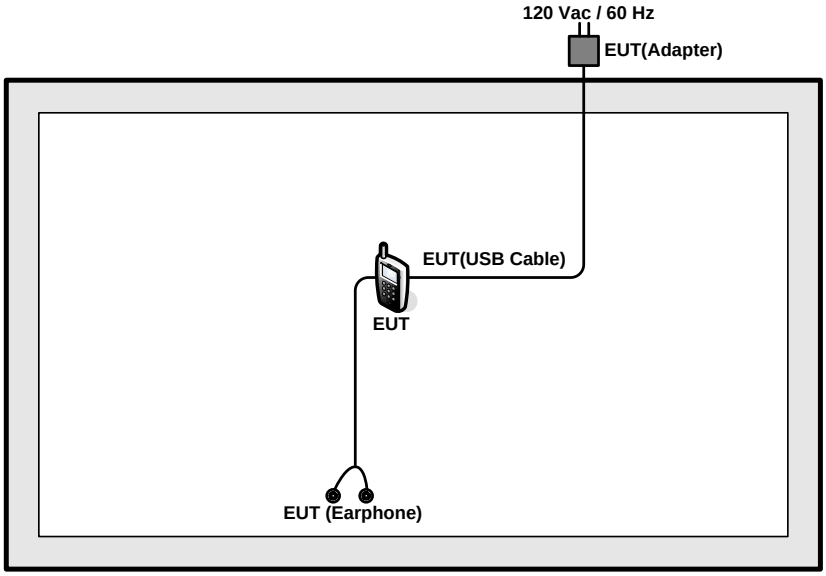
2. The worst case of conducted emission is mode 1; only the test data of it was reported.

Ch. #		Band IV：5745-5825 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

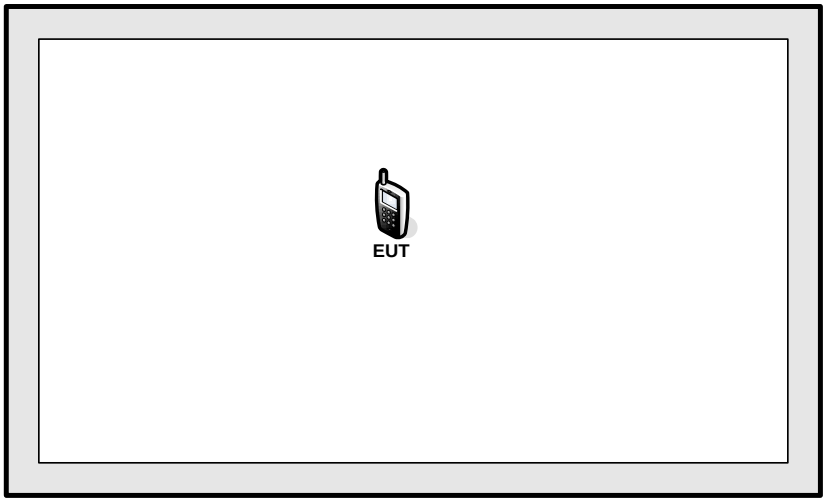
Ch. #		Band IV：5745-5825 MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	165	159	-

2.4 Connection Diagram of Test System

< Radiated Emission Mode>
For 802.11a/n HT20/HT40 and 802.11ac VHT20/VHT80



For 802.11ac VHT40



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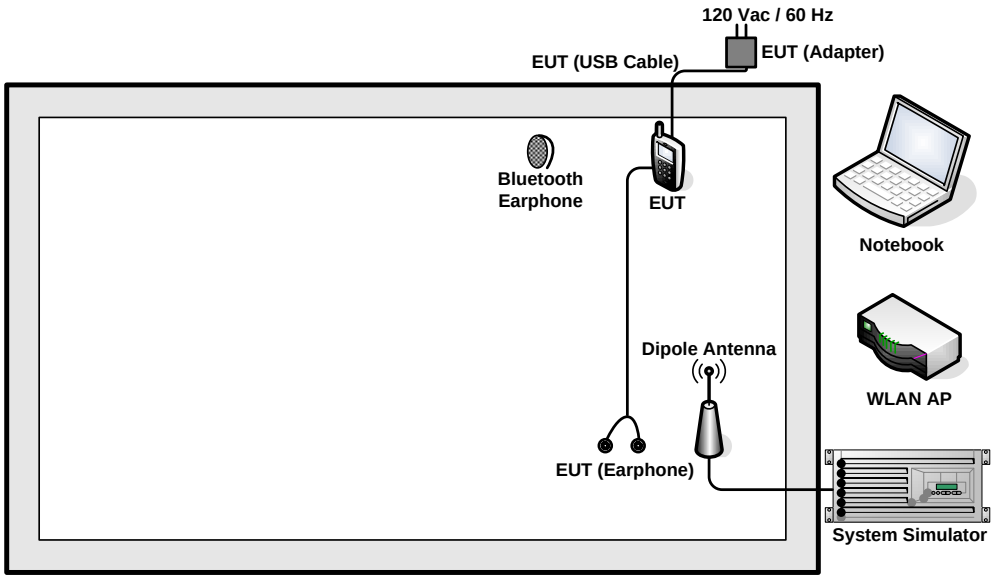


2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
3.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Lenovo	LBH 505	N/A	N/A	N/A
5.	DC Power Supply	GW INSTEK	GPD-2303S	N/A	N/A	Unshielded, 1.8 m

2.6 EUT Operation Test Setup

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

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

2.7 Measurement Results Explanation Example

For all conducted test items:

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

Example :

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 6.5 dB and 10dB attenuator.

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

= 6.5 + 10 = 16.5 (dB)

3 Test Result

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

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

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

26dB and 99% Occupied bandwidth are reporting only.

3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

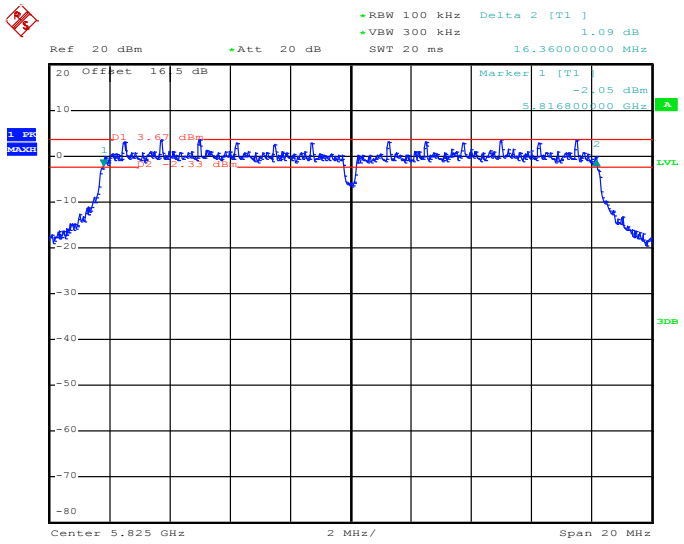
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

3.1.4 Test Setup

3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

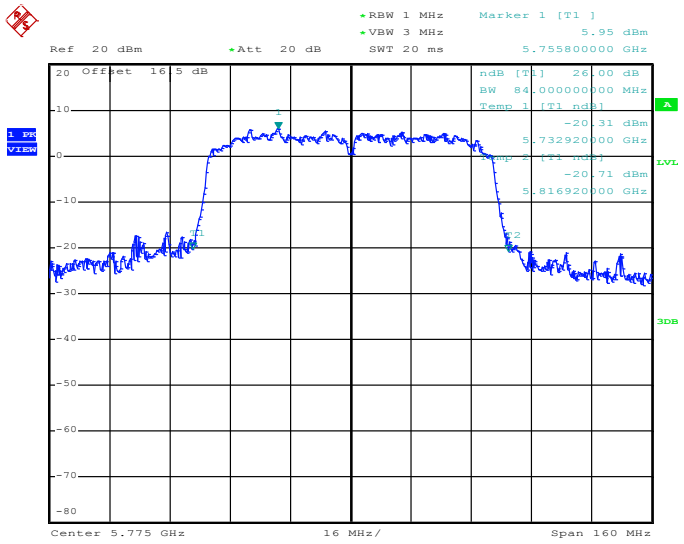
Please refer to Appendix A.

Minimum 6dB Bandwidth



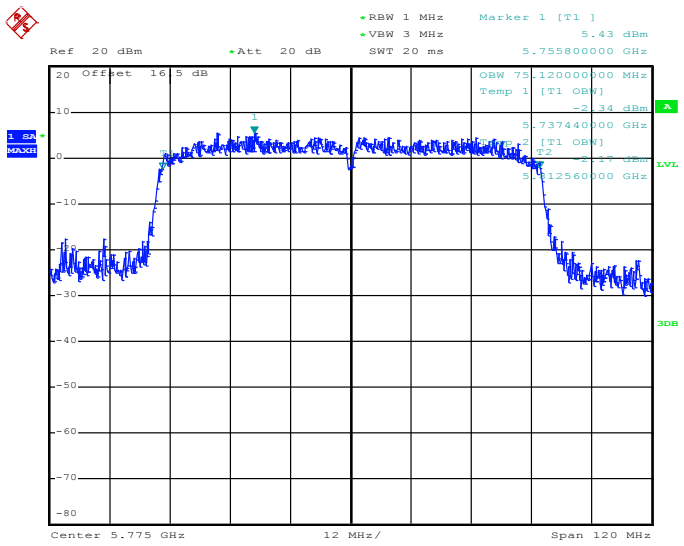
Date: 17.JUN.2016 21:44:14

Maximum 26dB Bandwidth



Date: 17.JUN.2016 02:03:55

Maximum 99% Occupied Bandwidth



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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

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

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

3.2.2 Measuring Instruments

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

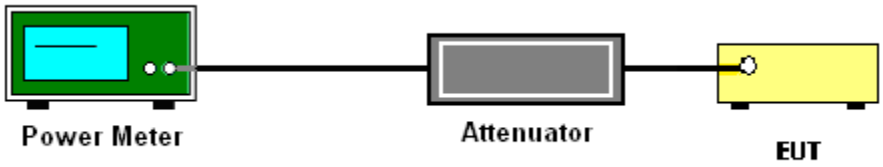
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

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 v01r02. Section F) Maximum power spectral density.

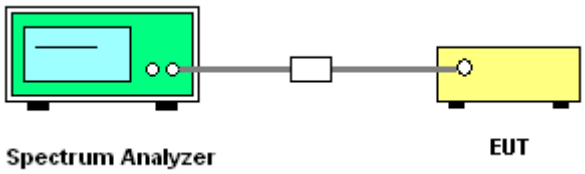
 # Method SA-2 #

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

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 300 kHz.
   - Set VBW ≥ 1 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = RMS
   - Trace average at least 100 traces in power averaging mode.
   - Add 10 log(500kHz/RBW) to the test result.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

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

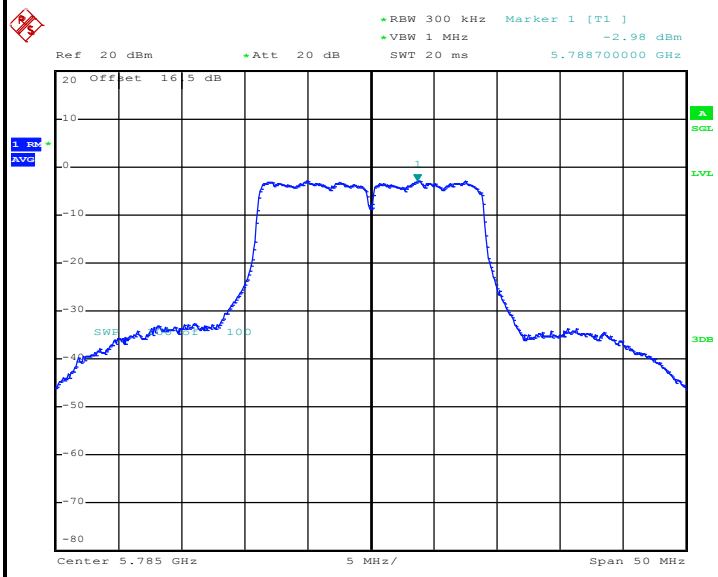
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/300kHz)



3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

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 per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 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

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

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
- 27	68.3

(3) KDB 789033 D02 General UNII Test Procedures New Rules v01r02 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

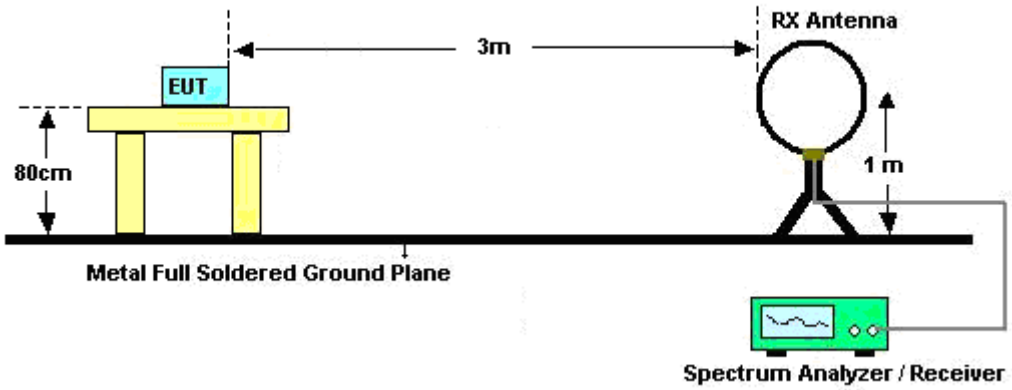
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

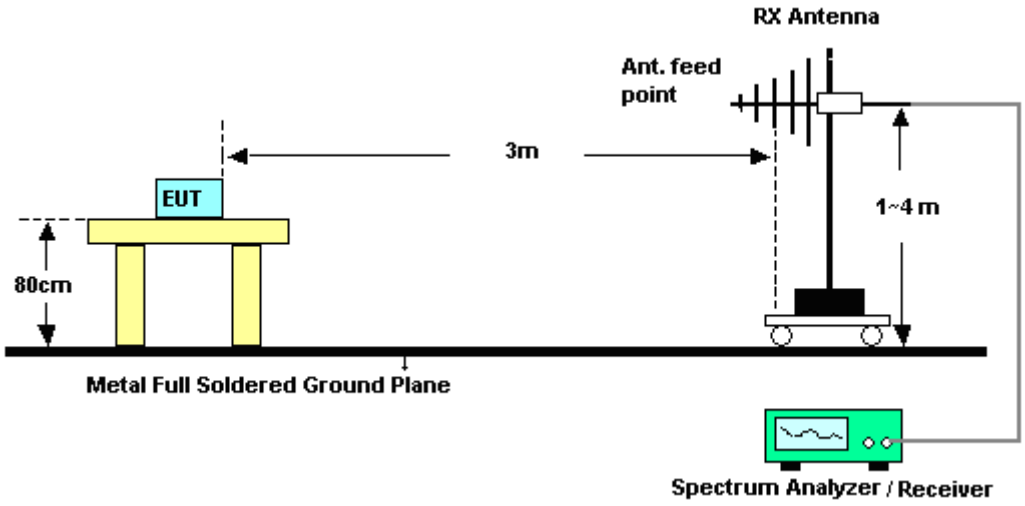
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

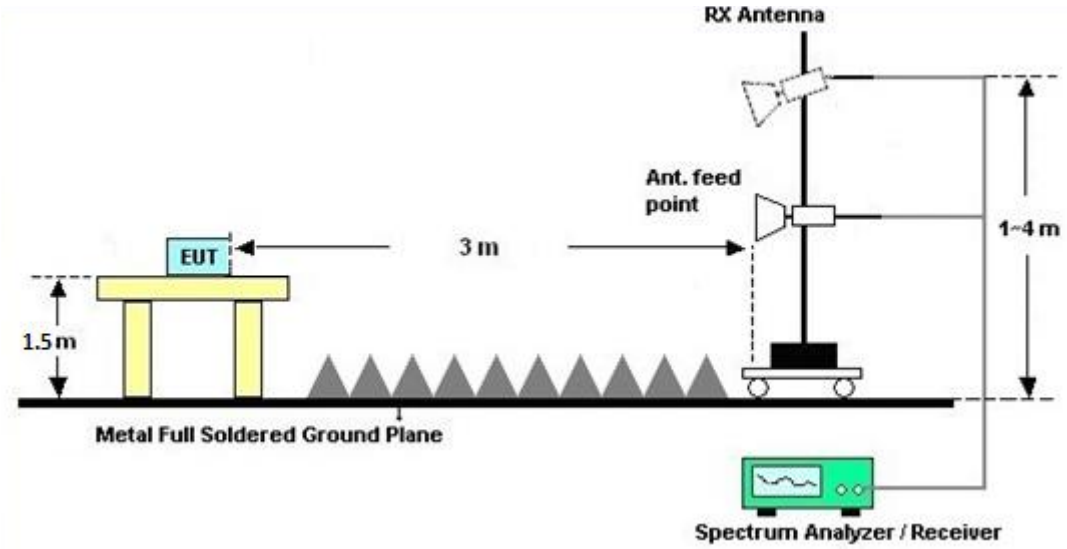
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix B.

3.4.7 Duty Cycle

Please refer to Appendix C.

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

Please refer to Appendix B.

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.

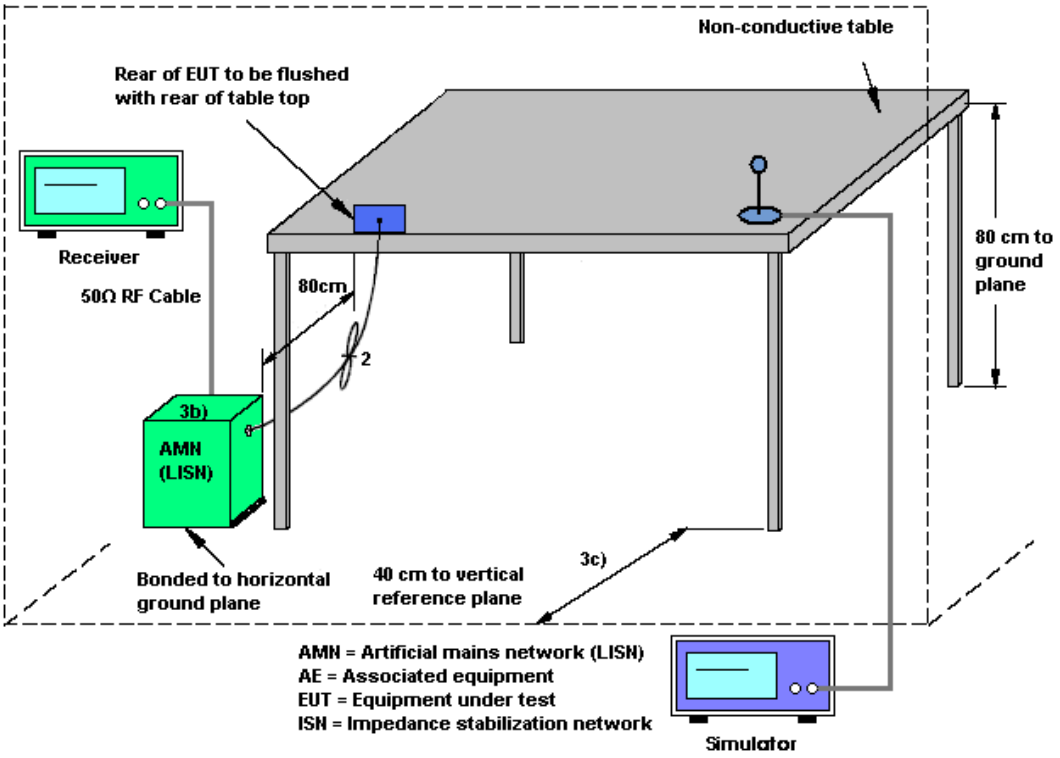
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

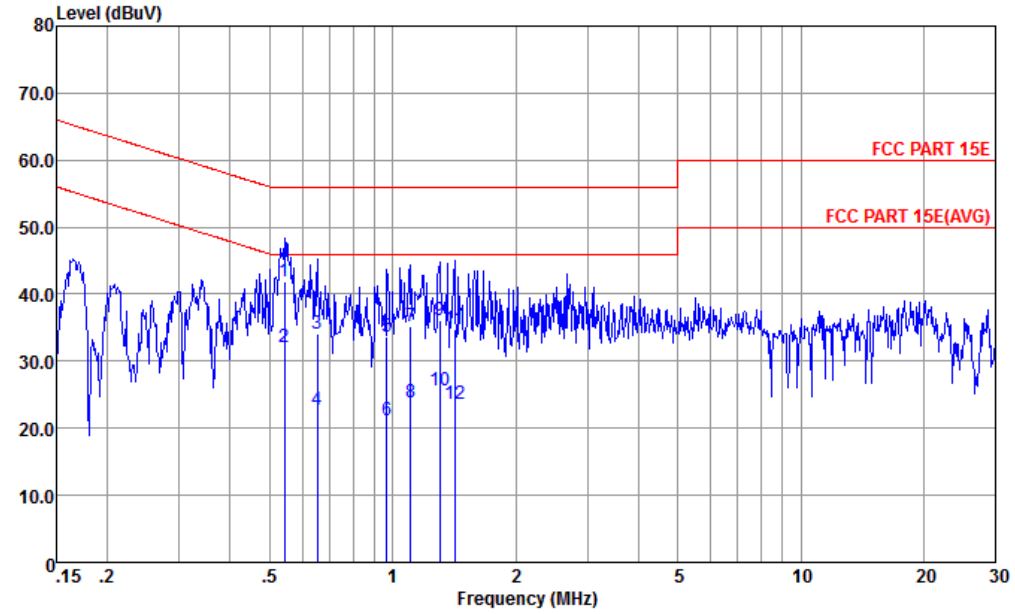
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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

Test Mode :	Mode 1	**Temperature :**	22~24℃
Test Engineer :	Amos Zhang	**Relative Humidity :**	43~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link(5G) + Earphone + Battery 1 + USB Cable 1(Charging from Adapter)		

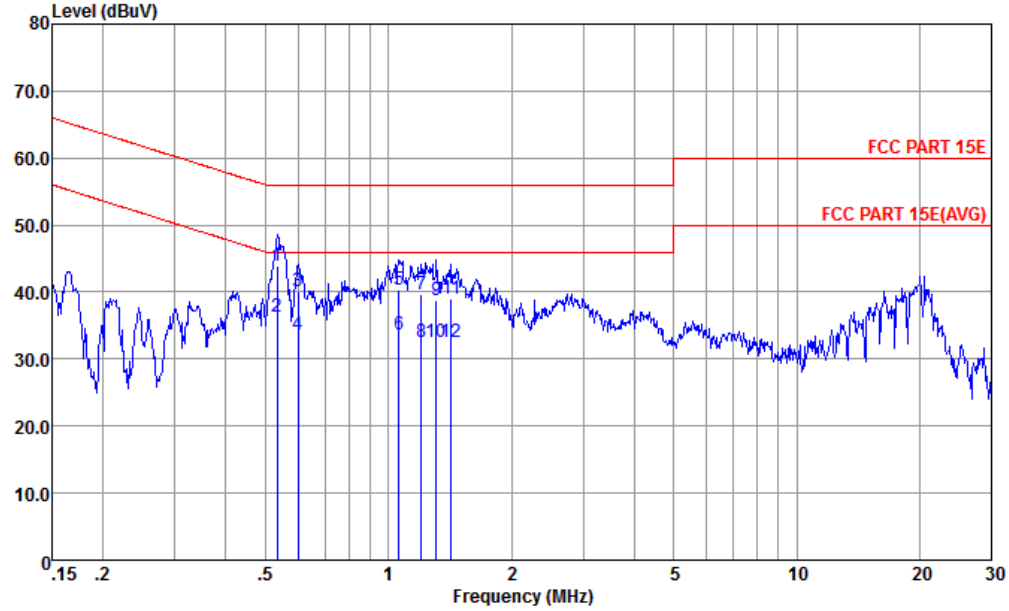


Site : CO01-KS
Condition : FCC PART 15E LISN-L-20151024 LINE

mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.54	41.99	-14.01	56.00	31.60	0.23	10.16	QP
2	*	0.54	31.99	-14.01	46.00	21.60	0.23	10.16	Average
3		0.65	34.19	-21.81	56.00	23.80	0.24	10.15	QP
4		0.65	22.69	-23.31	46.00	12.30	0.24	10.15	Average
5		0.97	33.59	-22.41	56.00	23.20	0.25	10.14	QP
6		0.97	21.19	-24.81	46.00	10.80	0.25	10.14	Average
7		1.11	35.18	-20.82	56.00	24.80	0.24	10.14	QP
8		1.11	23.88	-22.12	46.00	13.50	0.24	10.14	Average
9		1.30	36.16	-19.84	56.00	25.80	0.22	10.14	QP
10		1.30	25.56	-20.44	46.00	15.20	0.22	10.14	Average
11		1.42	34.85	-21.15	56.00	24.50	0.21	10.14	QP
12		1.42	23.55	-22.45	46.00	13.20	0.21	10.14	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	43~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link(5G) + Earphone + Battery 1 + USB Cable 1(Charging from Adapter)		



Site : CO01-KS
Condition : FCC PART 15E LISN-N-20151024 NEUTRAL

mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.53	43.99	-12.01	56.00	33.51	0.32	10.16	QP
2	*	0.53	36.39	-9.61	46.00	25.91	0.32	10.16	Average
3		0.60	40.09	-15.91	56.00	29.60	0.33	10.16	QP
4		0.60	33.69	-12.31	46.00	23.20	0.33	10.16	Average
5		1.06	40.31	-15.69	56.00	29.80	0.37	10.14	QP
6		1.06	33.71	-12.29	46.00	23.20	0.37	10.14	Average
7		1.20	39.71	-16.29	56.00	29.20	0.37	10.14	QP
8		1.20	32.61	-13.39	46.00	22.10	0.37	10.14	Average
9		1.31	38.71	-17.29	56.00	28.20	0.37	10.14	QP
10		1.31	32.61	-13.39	46.00	22.10	0.37	10.14	Average
11		1.43	39.01	-16.99	56.00	28.49	0.38	10.14	QP
12		1.43	32.61	-13.39	46.00	22.09	0.38	10.14	Average

3.6 Frequency Stability Measurement

3.6.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

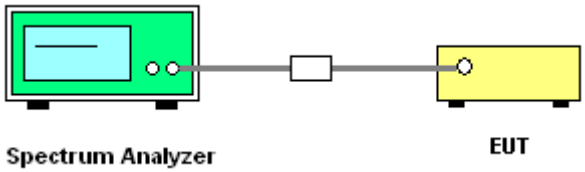
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

3.6.4 Test Setup



3.6.5 Test Result of Frequency Stability

Please refer to Appendix A.

3.7 Automatically Discontinue Transmission

3.7.1 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.

3.7.2 Measuring Instruments

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

3.7.3 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.

3.8 Antenna Requirements

3.8.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,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.

3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.8.3 Antenna Gain

The antenna gain is less than 6 dBi. Therefore, it is not necessary to reduce maximum 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	FSP30	101400	9kHz~30GHz	Jan. 12, 2016	Jun. 13, 2016~ Jun. 17, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	May 07. 2016	Jun. 13, 2016~ Jun. 17, 2016	May 06. 2017	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Jan. 12, 2016	Jun. 13, 2016~ Jun. 17, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Jan. 12, 2016	Jun. 13, 2016~ Jun. 17, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Aug. 07, 2015	Jun. 13, 2016~ Jun. 17, 2016	Aug. 06, 2016	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	Jun. 13, 2016~ Jun. 29, 2016	Sep. 09, 2016	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 22, 2016	Jun. 13, 2016~ Jun. 29, 2016	Apr. 21, 2017	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 07, 2015	Jun. 13, 2016~ Jun. 29, 2016	Nov. 06, 2016	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz-2GHz	Apr. 16, 2016	Jun. 13, 2016~ Jun. 29, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 16, 2016	Jun. 13, 2016~ Jun. 29, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz ~40GHz	Mar. 03, 2016	Jun. 13, 2016~ Jun. 29, 2016	Mar. 02, 2017	Radiation (03CH03-KS)
Amplifier	Burgeon	BPA-530	102212	0.01MHz-3000MHz	Aug. 10, 2015	Jun. 13, 2016~ Jun. 29, 2016	Aug. 09, 2016	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Aug. 27, 2015	Jun. 13, 2016~ Jun. 29, 2016	Aug. 26, 2016	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 24, 2015	Jun. 13, 2016~ Jun. 29, 2016	Oct. 23, 2016	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jun. 13, 2016~ Jun. 29, 2016	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 13, 2016~ Jun. 29, 2016	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 13, 2016~ Jun. 29, 2016	NCR	Radiation (03CH03-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	Jun. 21, 2016	Sep. 09, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	Jun. 21, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	Jun. 21, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	Jun. 21, 2016	Oct. 23, 2016	Conduction (CO01-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.5dB**

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.5dB**

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.6dB**

Appendix A. Conducted Test Results

Report Number : FR611504-06F

Test Engineer:	Mygai Mo	Temperature:	24~26	°C
Test Date:	2016/6/13 ~ 2016/6/17	Relative Humidity:	50~53	%

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

Band IV									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	18.75	24.85	16.44	0.5	Pass
11a	6Mbps	1	157	5785	18.65	26.1	16.36	0.5	Pass
11a	6Mbps	1	165	5825	18.65	25.25	16.36	0.5	Pass
HT20	MCS 0	1	149	5745	19.55	24.75	17.6	0.5	Pass
HT20	MCS 0	1	157	5785	19.55	27.45	17.6	0.5	Pass
HT20	MCS 0	1	165	5825	19.55	25.75	17.56	0.5	Pass
HT40	MCS 0	1	151	5755	37.3	47.61	35.52	0.5	Pass
HT40	MCS 0	1	159	5795	37.2	50.49	35.76	0.5	Pass
VHT20	MCS 0	1	149	5745	19.45	25.5	17.56	0.5	Pass
VHT20	MCS 0	1	157	5785	20.05	28.75	17.56	0.5	Pass
VHT20	MCS 0	1	165	5825	19.85	30.25	17.56	0.5	Pass
VHT40	MCS 0	1	151	5755	37.5	47.07	35.2	0.5	Pass
VHT40	MCS 0	1	159	5795	37.4	49.95	35.12	0.5	Pass
VHT80	MCS 0	1	155	5775	75.12	84	75.2	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	-	Pass/Fail
11a	6M bps	1	149	5745	0.58	14.28	30.00	-2.40		Pass
11a	6Mbps	1	157	5785	0.58	14.63	30.00	-2.40		Pass
11a	6Mbps	1	165	5825	0.58	14.51	30.00	-2.40		Pass
HT20	MCS 0	1	149	5745	0.60	14.33	30.00	-2.40		Pass
HT20	MCS 0	1	157	5785	0.60	14.69	30.00	-2.40		Pass
HT20	MCS 0	1	165	5825	0.60	14.54	30.00	-2.40		Pass
HT40	MCS 0	1	151	5755	1.17	14.18	30.00	-2.40		Pass
HT40	MCS 0	1	159	5795	1.17	14.56	30.00	-2.40	-	Pass
VHT20	MCS 0	1	149	5745	0.80	14.41	30.00	-2.40		Pass
VHT20	MCS 0	1	157	5785	0.80	14.75	30.00	-2.40		Pass
VHT20	MCS 0	1	165	5825	0.80	14.59	30.00	-2.40		Pass
VHT40	MCS 0	1	151	5755	1.48	14.23	30.00	-2.40		Pass
VHT40	MCS 0	1	159	5795	1.48	14.55	30.00	-2.40		Pass
VHT80	MCS 0	1	155	5775	2.61	15.35	30.00	-2.40		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	0.58	2.22	-0.47	30.00	-2.40	Pass
11a	6Mbps	1	157	5785	0.58	2.22	-0.16	30.00	-2.40	Pass
11a	6Mbps	1	165	5825	0.58	2.22	-0.31	30.00	-2.40	Pass
HT20	MCS 0	1	149	5745	0.60	2.22	-0.72	30.00	-2.40	Pass
HT20	MCS 0	1	157	5785	0.60	2.22	-0.21	30.00	-2.40	Pass
HT20	MCS 0	1	165	5825	0.60	2.22	-0.48	30.00	-2.40	Pass
HT40	MCS 0	1	151	5755	1.17	2.22	-3.52	30.00	-2.40	Pass
HT40	MCS 0	1	159	5795	1.17	2.22	-3.31	30.00	-2.40	Pass
VHT20	MCS 0	1	149	5745	0.80	2.22	-0.25	30.00	-2.40	Pass
VHT20	MCS 0	1	157	5785	0.80	2.22	0.04	30.00	-2.40	Pass
VHT20	MCS 0	1	165	5825	0.80	2.22	-0.15	30.00	-2.40	Pass
VHT40	MCS 0	1	151	5755	1.48	2.22	-2.79	30.00	-2.40	Pass
VHT40	MCS 0	1	159	5795	1.48	2.22	-2.41	30.00	-2.40	Pass
VHT80	MCS 0	1	155	5775	2.61	2.22	-5.01	30.00	-2.40	Pass

TEST RESULTS DATA
Frequency Stability

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6M bps	1	149	5745	5745.025	0.025	4.35	20	3.55	-
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	4.4	-
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	3.9	-
11a	6M bps	1	149	5745	5744.975	-0.025	-4.35	-30	3.9	-
11a	6M bps	1	149	5745	5745.000	0.000	0.00	50	3.9	-

Appendix B. Radiated Spurious Emission

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 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)
802.11a CH 149 5745MHz		5689.8	47.35	-50.43	97.78	43.04	32.02	8.54	36.25	300	336	P	H
		5719.48	55.65	-55.1	110.75	51.32	32.04	8.57	36.28	300	336	P	H
		5724.92	65.35	-56.77	122.12	61.02	32.04	8.57	36.28	300	336	P	H
	*	5740	96.82	-	-	92.48	32.05	8.58	36.29	300	336	P	H
	*	5740	89.34	-	-	85	32.05	8.58	36.29	300	336	A	H
		5692.12	46.8	-52.69	99.49	42.49	32.02	8.54	36.25	113	322	P	V
		5717.8	55.05	-55.23	110.28	50.72	32.04	8.57	36.28	113	322	P	V
		5724.36	62.92	-57.92	120.84	58.59	32.04	8.57	36.28	113	322	P	V
	*	5742	95.23	-	-	90.89	32.05	8.58	36.29	113	322	P	V
	*	5740	87.58	-	-	83.24	32.05	8.58	36.29	113	322	A	V
802.11a CH 157 5785MHz	*	5788	95.85	-	-	91.48	32.07	8.62	36.32	301	337	P	H
	*	5780	88.48	-	-	84.13	32.06	8.6	36.31	301	337	A	H
	*	5782	93.89	-	-	89.54	32.06	8.6	36.31	134	318	P	V
	*	5778	86.4	-	-	82.05	32.06	8.6	36.31	134	318	A	V
802.11a CH 165 5825MHz	*	5820	96.11	-	-	91.74	32.08	8.64	36.35	336	338	P	H
	*	5820	88.42	-	-	84.05	32.08	8.64	36.35	336	338	A	H
		5853.44	56.62	-57.84	114.46	52.24	32.09	8.65	36.36	336	338	P	H
		5856.24	53.25	-57.3	110.55	48.86	32.1	8.66	36.37	336	338	P	H
		5878.96	47.37	-54.99	102.36	42.98	32.1	8.67	36.38	336	338	P	H
	*	5820	93.49	-	-	89.12	32.08	8.64	36.35	145	323	P	V
	*	5830	86.23	-	-	81.86	32.08	8.64	36.35	145	323	A	V
		5850.16	55.42	-66.51	121.93	51.04	32.09	8.65	36.36	145	323	P	V
		5856.16	51.38	-59.19	110.57	46.99	32.1	8.66	36.37	145	323	P	V
		5877.44	47.92	-55.57	103.49	43.53	32.1	8.67	36.38	145	323	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		11490	46.85	-27.15	74	54.6	38.59	14.2	60.54	100	0	P	H
CH 149		11490	53.55	-20.45	74	61.3	38.59	14.2	60.54	100	9	P	V
5745MHz	!	11490	49.38	-4.62	54	57.13	38.59	14.2	60.54	100	9	A	V
802.11a		11570	45.31	-28.69	74	52.81	38.75	14.25	60.5	100	360	P	H
CH 157		11570	53.62	-20.38	74	61.12	38.75	14.25	60.5	105	13	P	V
5785MHz	!	11570	49.85	-4.15	54	57.35	38.75	14.25	60.5	105	13	A	V
802.11a		11650	45.41	-28.59	74	52.69	38.9	14.29	60.47	100	0	P	H
CH 165		11650	53.09	-20.91	74	60.37	38.9	14.29	60.47	100	12	P	V
5825MHz	!	11650	49.07	-4.93	54	56.35	38.9	14.29	60.47	100	12	A	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)

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)
		5693.56	47.45	-53.1	100.55	43.14	32.02	8.54	36.25	299	337	P	H
		5719.64	55.9	-54.9	110.8	51.57	32.04	8.57	36.28	299	337	P	H
		5723.64	65.04	-54.16	119.2	60.71	32.04	8.57	36.28	299	337	P	H
802.11n	*	5742	95.89	-	-	91.55	32.05	8.58	36.29	299	337	P	H
HT20	*	5740	88.53	-	-	84.19	32.05	8.58	36.29	299	337	A	H
CH 149		5690.92	48.28	-50.32	98.6	43.97	32.02	8.54	36.25	104	322	P	V
5745MHz		5719.88	55.69	-55.11	110.8	51.36	32.04	8.57	36.28	104	322	P	V
		5724.76	63.84	-57.91	121.75	59.51	32.04	8.57	36.28	104	322	P	V
	*	5740	94.17	-	-	89.83	32.05	8.58	36.29	104	322	P	V
	*	5740	86.99	-	-	82.65	32.05	8.58	36.29	104	322	A	V
802.11n	*	5790	95.01	-	-	90.64	32.07	8.62	36.32	300	330	P	H
HT20	*	5790	87.32	-	-	82.95	32.07	8.62	36.32	300	330	A	H
CH 157	*	5792	93.72	-	-	89.35	32.07	8.62	36.32	134	338	P	V
5785MHz	*	5780	86.18	-	-	81.83	32.06	8.6	36.31	134	338	A	V
	*	5832	94.96	-	-	90.59	32.08	8.64	36.35	300	332	P	H
	*	5820	87.41	-	-	83.04	32.08	8.64	36.35	300	332	A	H
		5850.08	60.03	-62.09	122.12	55.65	32.09	8.65	36.36	300	332	P	H
802.11n		5857.52	53.72	-56.47	110.19	49.33	32.1	8.66	36.37	300	332	P	H
HT20		5878.8	47.34	-55.14	102.48	42.95	32.1	8.67	36.38	300	332	P	H
CH 165	*	5818	91.73	-	-	87.35	32.08	8.63	36.33	104	326	P	V
5825MHz	*	5830	84.32	-	-	79.95	32.08	8.64	36.35	104	326	A	V
		5851.44	54.25	-64.77	119.02	49.87	32.09	8.65	36.36	104	326	P	V
		5855.28	51.4	-59.42	110.82	47.01	32.1	8.66	36.37	104	326	P	V
		5879.6	46.54	-55.34	101.88	42.15	32.1	8.67	36.38	104	326	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)

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		11490	46.28	-27.72	74	54.03	38.59	14.2	60.54	100	360	P	H
HT20		11490	53.93	-20.07	74	61.68	38.59	14.2	60.54	100	14	P	V
CH 149 5745MHz	!	11490	50.47	-3.53	54	58.22	38.59	14.2	60.54	100	14	A	V
802.11n		11570	46.67	-27.33	74	54.17	38.75	14.25	60.5	100	0	P	H
HT20		11570	53.57	-20.43	74	61.07	38.75	14.25	60.5	100	11	P	V
CH 157 5785MHz	!	11570	49.91	-4.09	54	57.41	38.75	14.25	60.5	100	11	A	V
802.11n		11650	45.29	-28.71	74	52.57	38.9	14.29	60.47	100	0	P	H
HT20		11650	53.96	-20.04	74	61.24	38.9	14.29	60.47	100	8	P	V
CH 165 5825MHz	!	11650	50.35	-3.65	54	57.63	38.9	14.29	60.47	100	8	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI 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)
		5698.52	49.56	-54.65	104.21	45.25	32.02	8.54	36.25	293	25	P	H
		5717.16	61.35	-48.76	110.11	57.04	32.03	8.55	36.27	293	25	P	H
		5723.88	66.76	-52.99	119.75	62.43	32.04	8.57	36.28	293	25	P	H
802.11n	*	5750	91.08	-	-	86.74	32.05	8.58	36.29	293	25	P	H
HT40	*	5744	83.9	-	-	79.56	32.05	8.58	36.29	293	25	A	H
CH 151		5693.88	51.37	-49.42	100.79	47.06	32.02	8.54	36.25	300	20	P	V
5755MHz		5714.52	65.56	-43.81	109.37	61.25	32.03	8.55	36.27	300	20	P	V
		5720.28	67.64	-43.9	111.54	63.31	32.04	8.57	36.28	300	20	P	V
	*	5752	94.26	-	-	89.92	32.05	8.59	36.3	300	20	P	V
	*	5742	87.29	-	-	82.95	32.05	8.58	36.29	300	20	A	V
	*	5788	92.71	-	-	88.34	32.07	8.62	36.32	342	7	P	H
	*	5782	85.55	-	-	81.2	32.06	8.6	36.31	342	7	A	H
		5852.24	51.06	-66.13	117.19	46.68	32.09	8.65	36.36	342	7	P	H
802.11n		5857.76	48.57	-61.56	110.13	44.18	32.1	8.66	36.37	342	7	P	H
HT40		5876.96	46.34	-57.5	103.84	41.95	32.1	8.67	36.38	342	7	P	H
CH 159	*	5790	92.34	-	-	87.97	32.07	8.62	36.32	300	6	P	V
5795MHz	*	5782	85.33	-	-	80.98	32.06	8.6	36.31	300	6	A	V
		5851.76	50.3	-67.99	118.29	45.92	32.09	8.65	36.36	300	6	P	V
		5856.24	48.71	-61.84	110.55	44.32	32.1	8.66	36.37	300	6	P	V
		5889.2	45.97	-48.79	94.76	41.58	32.11	8.68	36.4	300	6	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI 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 151 5755MHz		11510	50.29	-23.71	74	58.02	38.6	14.21	60.54	100	360	P	H
		11510	46.84	-27.16	74	54.57	38.6	14.21	60.54	100	360	P	V
802.11n HT40 CH 159 5795MHz		11590	53.32	-20.68	74	60.76	38.79	14.26	60.49	111	348	P	H
	!	11590	49.75	-4.25	54	57.19	38.79	14.26	60.49	111	348	A	H
		11590	47.41	-26.59	74	54.85	38.79	14.26	60.49	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Band Edge @ 3m)

WIFI 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)
		5694.28	48.45	-52.63	101.08	44.14	32.02	8.54	36.25	387	360	P	H
		5719.96	57.3	-53.50	110.8	52.97	32.04	8.57	36.28	387	360	P	H
		5723.56	66.29	-52.73	119.02	61.96	32.04	8.57	36.28	387	360	P	H
802.11ac	*	5744	96.18	-	-	91.84	32.05	8.58	36.29	387	360	P	H
VHT20	*	5740	89.2	-	-	84.86	32.05	8.58	36.29	387	360	A	H
CH 149		5693.88	50.6	-50.19	100.79	46.29	32.02	8.54	36.25	317	17	P	V
5745MHz		5718.92	58.12	-52.48	110.6	53.79	32.04	8.57	36.28	317	17	P	V
		5722.92	67.44	-50.12	117.56	63.11	32.04	8.57	36.28	317	17	P	V
	*	5748	97.02	-	-	92.68	32.05	8.58	36.29	317	17	P	V
	*	5752	90.03	-	-	85.69	32.05	8.59	36.3	317	17	A	V
802.11ac	*	5782	95.57	-	-	91.22	32.06	8.6	36.31	378	7	P	H
VHT20	*	5780	88.47	-	-	84.12	32.06	8.6	36.31	378	7	A	H
CH 157	*	5792	95.76	-	-	91.39	32.07	8.62	36.32	324	360	P	V
5785MHz	*	5792	87.69	-	-	83.32	32.07	8.62	36.32	324	360	A	V
	*	5832	96.21	-	-	91.84	32.08	8.64	36.35	356	9	P	H
	*	5830	88.12	-	-	83.75	32.08	8.64	36.35	356	9	A	H
		5851.6	59.61	-59.04	118.65	55.23	32.09	8.65	36.36	356	9	P	H
802.11ac		5855.28	57.21	-53.59	110.8	52.82	32.1	8.66	36.37	356	9	P	H
VHT20		5878.96	48.18	-54.18	102.36	43.79	32.1	8.67	36.38	356	9	P	H
CH 165	*	5820	97	-	-	92.63	32.08	8.64	36.35	280	20	P	V
5825MHz	*	5830	89.65	-	-	85.28	32.08	8.64	36.35	280	20	A	V
		5852	60.92	-56.82	117.74	56.54	32.09	8.65	36.36	280	20	P	V
		5855.84	56.94	-53.72	110.66	52.55	32.1	8.66	36.37	280	20	P	V
		5876.48	48.04	-56.16	104.2	43.65	32.1	8.67	36.38	280	20	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	54.74	-19.26	74	62.49	38.59	14.2	60.54	106	352	P	H
VHT20	!	11490	51.45	-2.55	54	59.2	38.59	14.2	60.54	106	352	A	H
CH 149 5745MHz		11490	46.78	-27.22	74	54.53	38.59	14.2	60.54	100	360	P	V
802.11ac		11570	53.84	-20.16	74	61.34	38.75	14.25	60.5	112	349	P	H
VHT20	!	11570	50.33	-3.67	54	57.83	38.75	14.25	60.5	112	349	A	H
CH 157 5785MHz		11570	46.95	-27.05	74	54.45	38.75	14.25	60.5	100	360	P	V
802.11ac		11650	54.42	-19.58	74	61.7	38.9	14.29	60.47	115	349	P	H
VHT20	!	11650	50.54	-3.46	54	57.82	38.9	14.29	60.47	115	349	A	H
CH 165 5825MHz		11650	47.63	-26.37	74	54.91	38.9	14.29	60.47	100	0	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)

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)
		5699.8	51.29	-53.86	105.15	46.98	32.02	8.54	36.25	400	0	P	H
		5719.56	64.52	-46.26	110.78	60.19	32.04	8.57	36.28	400	0	P	H
		5721.64	66.39	-48.25	114.64	62.06	32.04	8.57	36.28	400	0	P	H
802.11ac	*	5746	93.08	-	-	88.74	32.05	8.58	36.29	400	0	P	H
VHT40	*	5744	86.06	-	-	81.72	32.05	8.58	36.29	400	0	A	H
CH 151		5697.96	50.18	-53.62	103.8	45.87	32.02	8.54	36.25	313	28	P	V
5755MHz		5719.64	63.74	-47.06	110.8	59.41	32.04	8.57	36.28	313	28	P	V
		5724.92	65.27	-56.85	122.12	60.94	32.04	8.57	36.28	313	28	P	V
	*	5752	93.5	-	-	89.16	32.05	8.59	36.3	313	28	P	V
	*	5744	85.28	-	-	80.94	32.05	8.58	36.29	313	28	A	V
	*	5782	91.59	-	-	87.24	32.06	8.6	36.31	359	13	P	H
	*	5784	84.21	-	-	79.86	32.06	8.6	36.31	359	13	A	H
		5851.2	49.73	-69.83	119.56	45.35	32.09	8.65	36.36	359	13	P	H
802.11ac		5857.6	48.92	-61.25	110.17	44.53	32.1	8.66	36.37	359	13	P	H
VHT40		5884.32	46.17	-52.21	98.38	41.78	32.1	8.67	36.38	359	13	P	H
CH 159	*	5784	92.48	-	-	88.13	32.06	8.6	36.31	279	14	P	V
5795MHz	*	5784	85.14	-	-	80.79	32.06	8.6	36.31	279	14	A	V
		5850.32	49.48	-72.09	121.57	45.1	32.09	8.65	36.36	279	14	P	V
		5856.32	48.23	-62.3	110.53	43.84	32.1	8.66	36.37	279	14	P	V
		5879.84	46.72	-54.98	101.7	42.33	32.1	8.67	36.38	279	14	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)

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 151 5755MHz		11510	50.94	-23.06	74	58.67	38.6	14.21	60.54	100	360	P	H
		11510	46.88	-27.12	74	54.61	38.6	14.21	60.54	100	360	P	V
802.11ac VHT40 CH 159 5795MHz		11590	53.22	-20.78	74	60.66	38.79	14.26	60.49	100	351	P	H
	!	11590	49.86	-4.14	54	57.3	38.79	14.26	60.49	100	351	A	H
		11590	46.48	-27.52	74	53.92	38.79	14.26	60.49	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80 CH 155 5775MHz		5698.52	53.8	-50.41	104.21	49.49	32.02	8.54	36.25	300	336	P	H
		5718.36	63.43	-47.01	110.44	59.1	32.04	8.57	36.28	300	336	P	H
		5722.6	60.78	-56.05	116.83	56.45	32.04	8.57	36.28	300	336	P	H
	*	5768	90.15	-	-	85.81	32.05	8.59	36.3	300	336	P	H
	*	5778	82.92	-	-	78.57	32.06	8.6	36.31	300	336	A	H
		5850.8	53.53	-66.95	120.48	49.15	32.09	8.65	36.36	300	336	P	H
		5855.2	52.25	-58.59	110.8	47.86	32.1	8.66	36.37	300	336	P	H
		5888.88	47.64	-47.36	95	43.25	32.11	8.68	36.4	300	336	P	H
		5698.84	54.35	-50.1	104.45	50.04	32.02	8.54	36.25	103	320	P	V
		5718.36	62.48	-47.96	110.44	58.15	32.04	8.57	36.28	103	320	P	V
		5724.76	59.57	-62.18	121.75	55.24	32.04	8.57	36.28	103	320	P	V
	*	5754	89.49	-	-	85.15	32.05	8.59	36.3	103	320	P	V
	*	5756	82.38	-	-	78.04	32.05	8.59	36.3	103	320	A	V
		5854.48	52.25	-59.84	112.09	47.86	32.1	8.66	36.37	103	320	P	V
		5855.2	51.57	-59.23	110.8	47.18	32.1	8.66	36.37	103	320	P	V
		5884.64	47.23	-50.91	98.14	42.84	32.1	8.67	36.38	103	320	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80 CH 155 5775MHz		11550	46.06	-27.94	74	53.62	38.71	14.24	60.51	100	0	P	H
		11550	50.21	-23.79	74	57.77	38.71	14.24	60.51	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

5GHz WIFI 802.11ac (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11ac LF		55.22	33.84	-6.16	40	57.95	7.6	0.89	32.6	100	32	P	H
		74.62	27.22	-12.78	40	49.56	9.1	1.05	32.49	-	-	P	H
		105.66	24.88	-18.62	43.5	42.76	13.18	1.24	32.3	-	-	P	H
		199.75	28.12	-15.38	43.5	48.15	10.7	1.73	32.46	-	-	P	H
		232.73	29.01	-16.99	46	47.32	12.33	1.73	32.37	-	-	P	H
		288.02	32.29	-13.71	46	47.95	14.5	2.04	32.2	-	-	P	H
		74.62	33.86	-6.14	40	56.2	9.1	1.05	32.49	100	54	P	V
		105.66	32.81	-10.69	43.5	50.69	13.18	1.24	32.3	-	-	P	V
		164.83	23.52	-19.98	43.5	41.51	12.89	1.55	32.43	-	-	P	V
		229.82	26.99	-19.01	46	45.4	12.19	1.73	32.33	-	-	P	V
		288.02	26.18	-19.82	46	41.84	14.5	2.04	32.2	-	-	P	V
		438.37	24.2	-21.8	46	36.51	17.31	2.6	32.22	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Emission below 1GHz

Note symbol

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

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

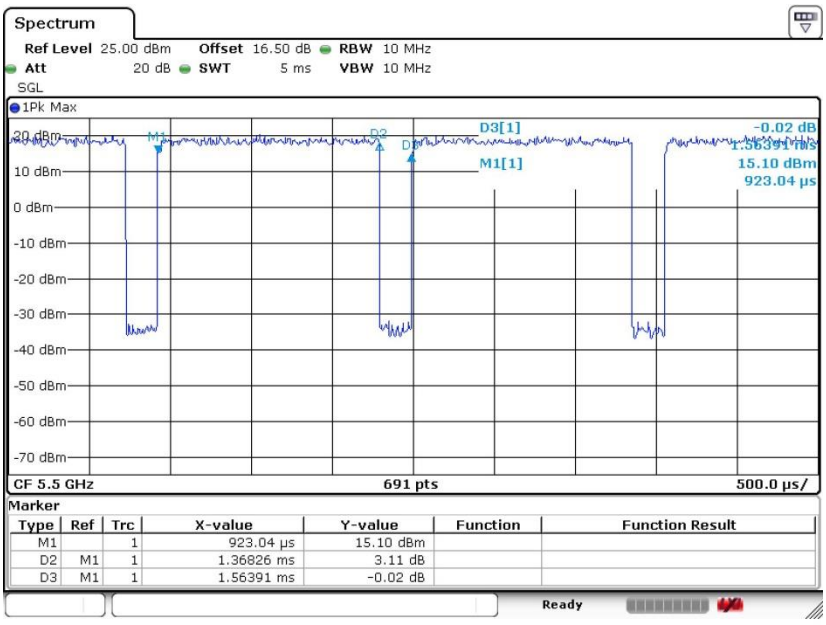
= -10.46(dB)

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

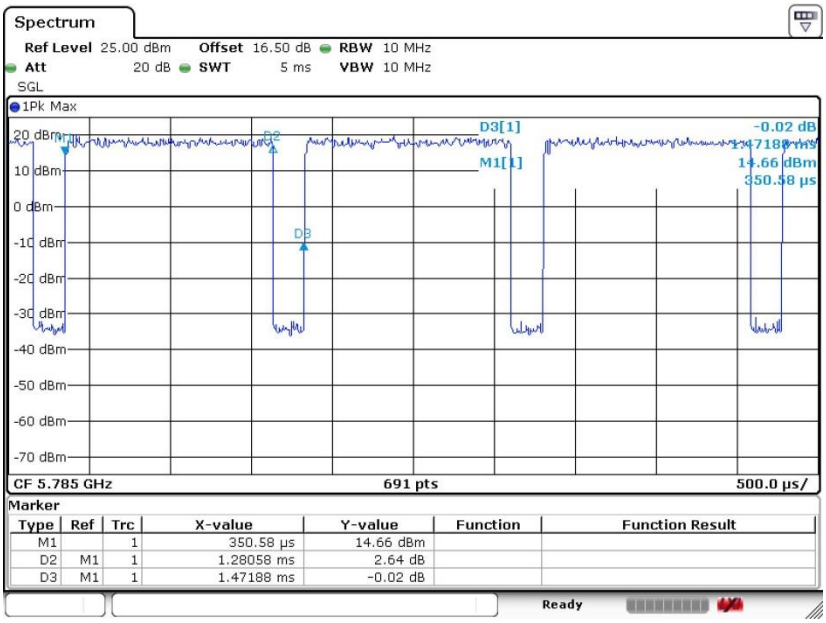
Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	87.49	1.37	0.73	1kHz
802.11n HT20	87.00	1.28	0.78	1kHz
802.11n HT40	76.52	0.64	1.57	3kHz
802.11ac VHT20	83.11	0.97	1.03	3kHz
802.11ac VHT40	71.07	0.49	2.04	3kHz
802.11ac VHT80	54.96	0.25	4.07	10kHz

802.11a



802.11n HT20



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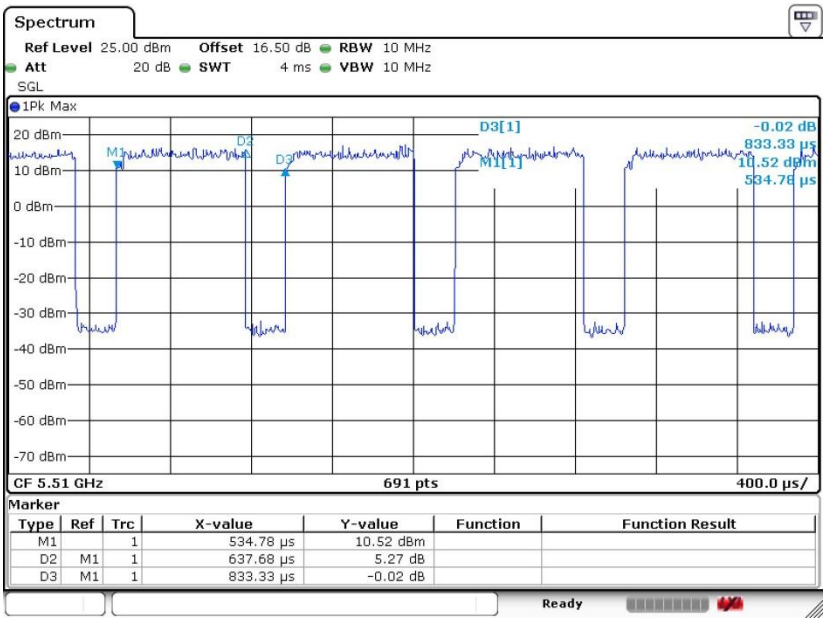
802.11n HT40



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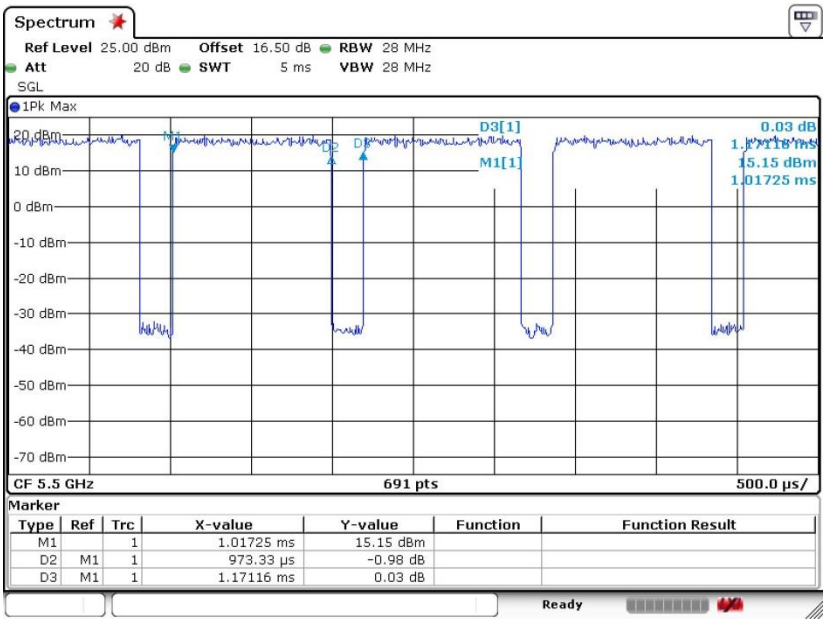
802.11ac VHT20



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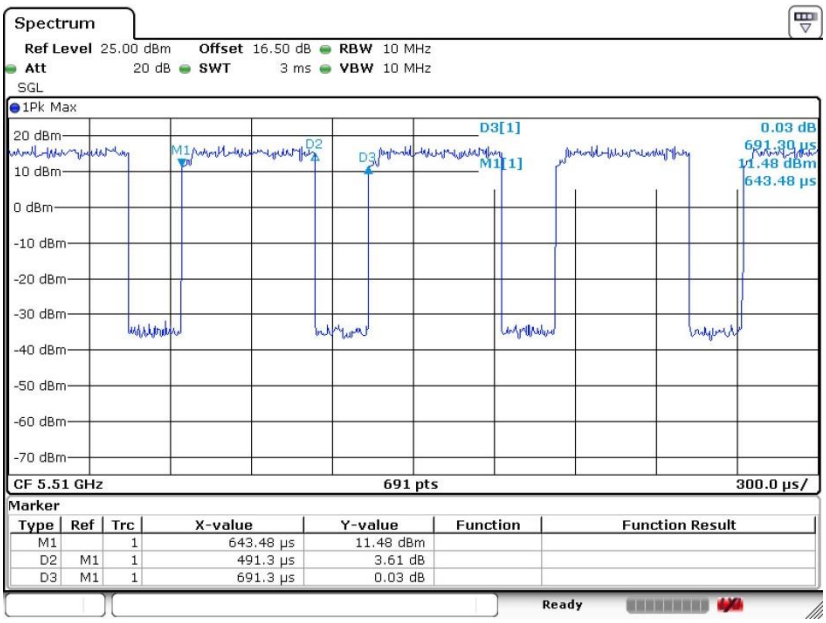

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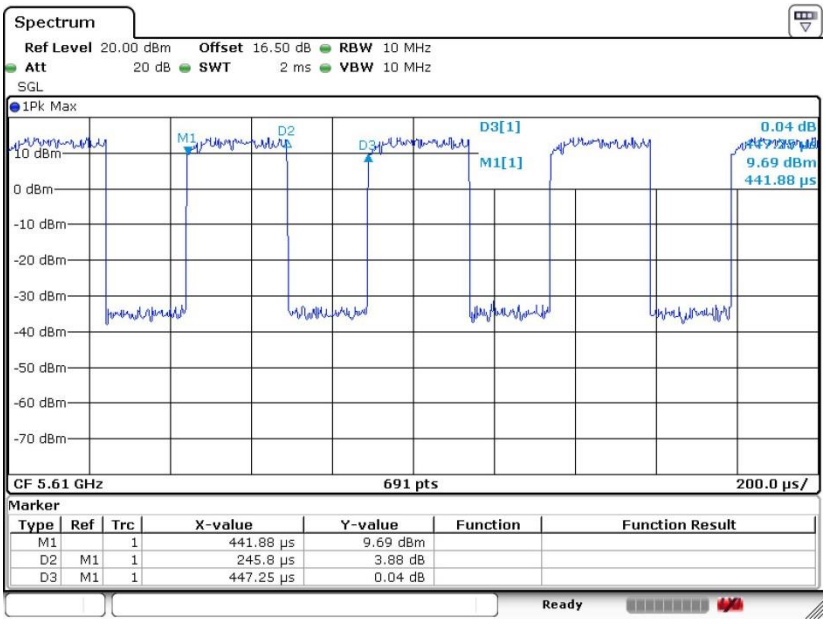
802.11ac VHT80



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