



FCC RF Test Report

APPLICANT : BlackBerry Ltd.
EQUIPMENT : GSM Quad-band / UMTS Penta-band / LTE Deca-band mobile phone
BRAND NAME : BlackBerry
MODEL NAME : STH100-2 (RJD211LW)
FCC ID : L6ARLD210LW
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Apr. 29, 2016 and testing was completed on Jun. 16, 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.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR642912F	Rev. 01	Initial issue of report	Jun. 24, 2016

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) ≤ -17, -27 dBm/MHz &15.209(a)	Pass	Under limit 1.27 dB at 11649.000 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.31 dB at 0.540 MHz
3.6	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(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 Penta-band / LTE Deca-band mobile phone
Brand Name	BlackBerry
Model Name	STH100-2 (RJD211LW)
FCC ID	L6ARLD210LW
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/ 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: 004402243119892 Conduction: 004402243119900 Radiation: 004402243119918
HW Version	PIO
SW Version	AAF155
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 : 15.44 dBm / 0.0350 W 802.11n HT20 : 15.41 dBm / 0.0348 W 802.11n HT40 : 15.22 dBm / 0.0333 W 802.11ac VHT20: 15.41 dBm / 0.0348 W 802.11ac VHT40: 15.19 dBm / 0.0330 W 802.11ac VHT80: 14.95 dBm / 0.0313 W
99% Occupied Bandwidth	802.11a : 19.08 MHz 802.11n HT20 : 19.78 MHz 802.11n HT40 : 37.26 MHz 802.11ac VHT20 : 19.98 MHz 802.11ac VHT40 : 37.46 MHz 802.11ac VHT80 : 74.93 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 Modification of EUT

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

1.6 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		
	S/N	CBA0059AG4C1		
Battery 1	Brand Name	N/A	Model Name	TLp026EJ
	Power Rating	3.85V 2610mAh		
	Manufacturer	COSLIGHT		
	P/N	C2610010CJ		
Battery 2	Brand Name	N/A	Model Name	TLp026E2
	Power Rating	3.84V 2610mAh		
	Manufacturer	SCUD		
	P/N	C2610011C2		
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	NA	Model Name	NA
	Signal Line Type	1.25 meter, non-shielded cable, without ferrite core		
	P/N	CCB0045A15C3		

1.7 Testing Location

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 Registration No.
	TH01-KS	03CH03-KS	CO01-KS	306251

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)
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: 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	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps								
CH 149	5745	14.74	CH 165	14.54	13.69	12.75	11.93	10.93	9.98	9.94
CH 157	5785	15.21								
CH 165	5825	15.44								

WLAN 5GHz 802.11n-HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0								
CH 149	5745	14.80	CH 165	14.50	13.77	12.89	11.81	11.06	10.15	10.05
CH 157	5785	15.25								
CH 165	5825	15.41								

WLAN 5GHz 802.11n-HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0								
CH 151	5755	14.83	CH 159	14.48	13.49	12.54	11.69	10.83	9.85	9.89
CH 159	5795	15.22								

WLAN 5GHz 802.11ac VHT20 Average Power (dBm)											
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0									
CH 149	5745	14.85	CH 165	14.77	13.71	12.97	11.99	11.53	10.97	10.56	10.04
CH 157	5785	15.29									
CH 165	5825	15.41									

WLAN 5GHz 802.11ac VHT40 Average Power (dBm)												
Power vs. Channel			Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
		MCS0										
CH 151	5755	14.84	CH 159	14.46	13.61	12.54	11.78	11.35	10.69	10.32	9.93	10.02
CH 159	5795	15.19										

WLAN 5GHz 802.11n-HT80 Average Power (dBm)												
Power vs. Channel			Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
		MCS0										
CH 155	5775	14.95	CH 155	14.10	13.18	12.31	11.31	10.81	9.98	9.96	9.48	9.29

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 2; only the test data of it was reported.	

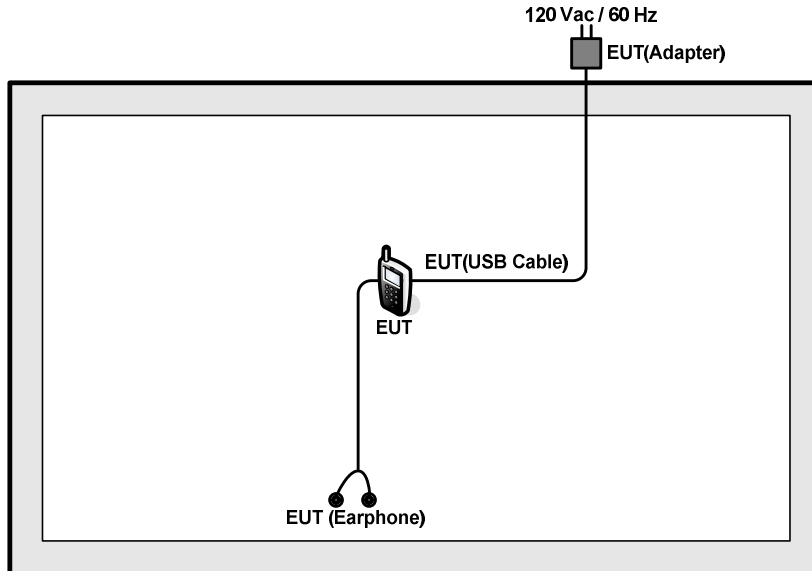
Ch. #		Band IV : 5725-5850 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

Ch. #		Band IV : 5725-5850 MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	165	159	-

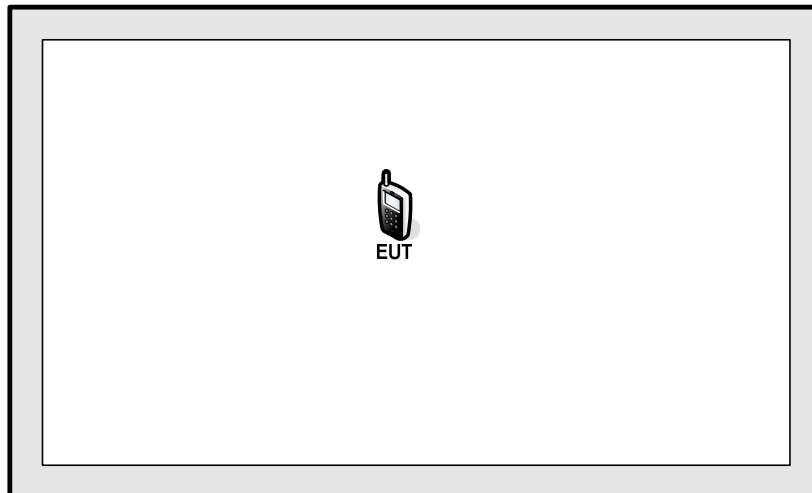
2.4 Connection Diagram of Test System

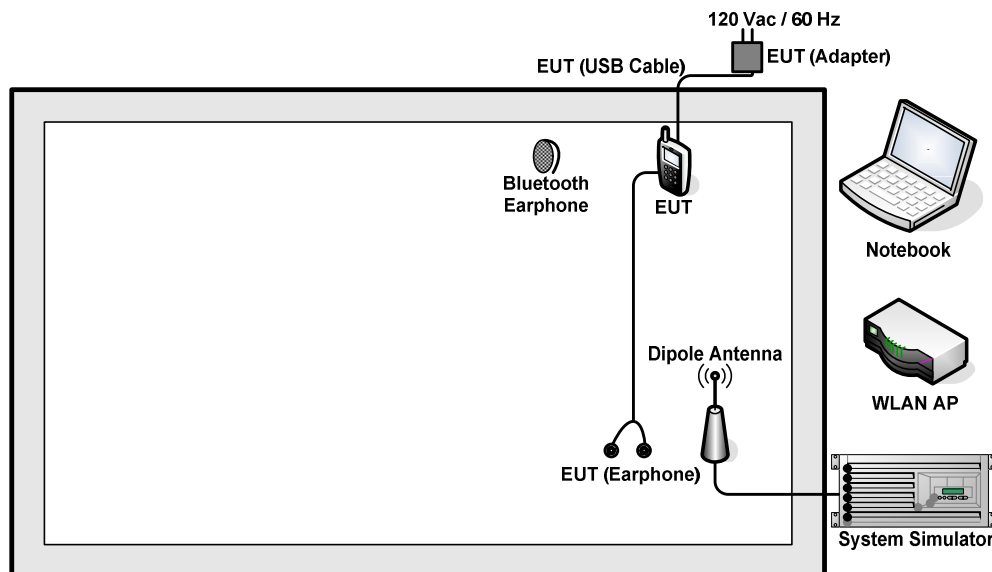
<WLAN Tx Mode>

For 802.11a/n HT20/HT40



For 802.11ac VHT20/VHT40/VHT80



<AC Conducted Emission Mode>


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 between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

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

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

3 Test Result

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

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

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

26dB and 99% Occupied bandwidth are reporting only.

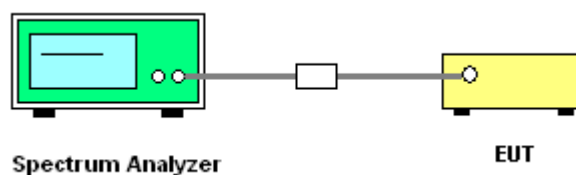
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

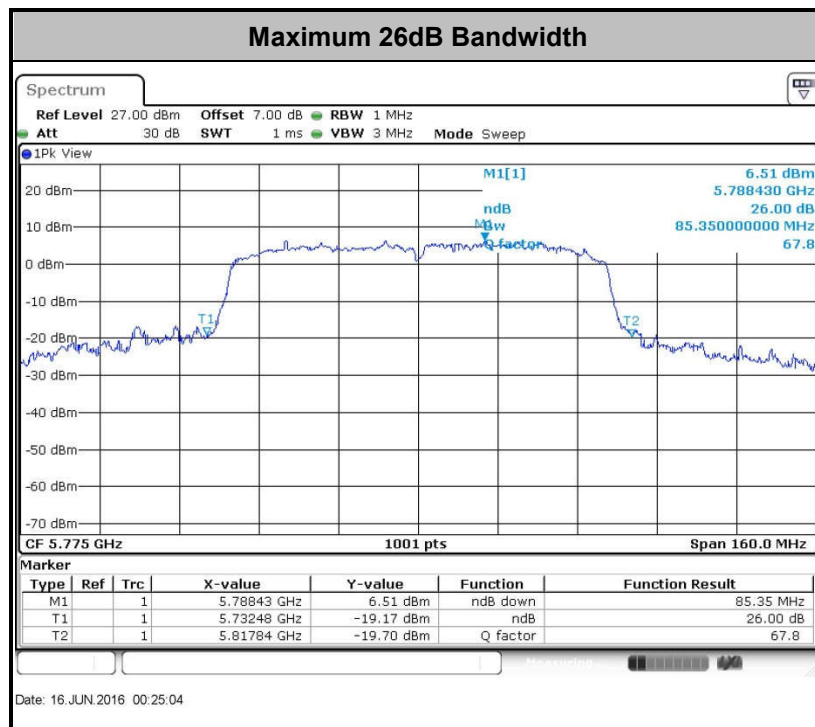
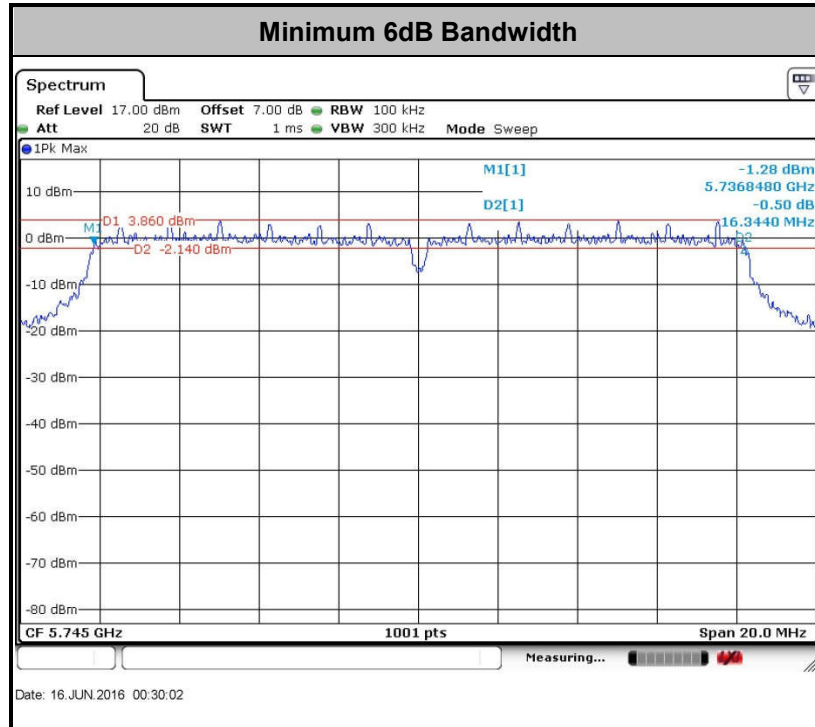
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is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

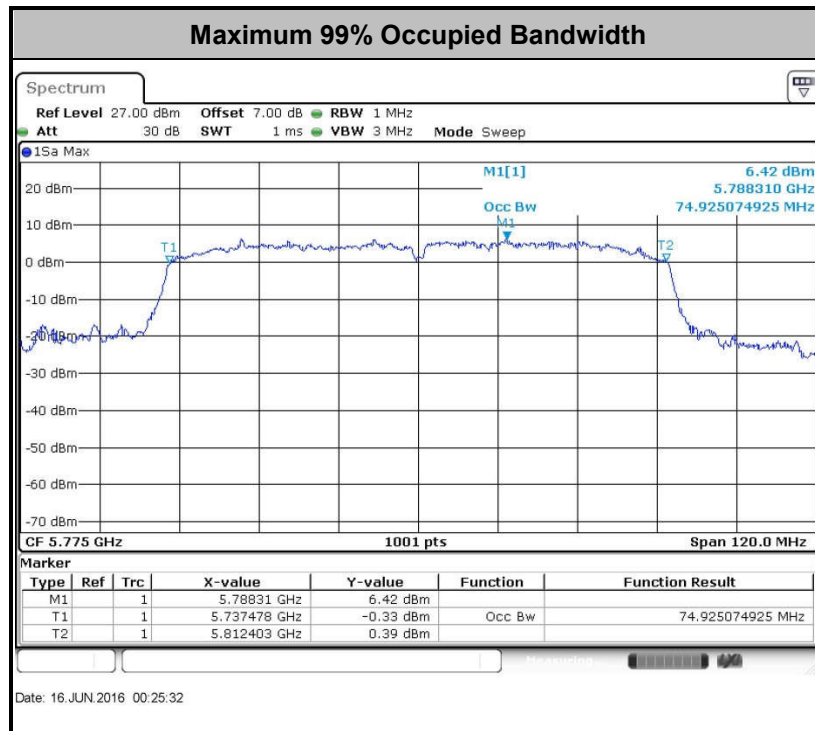
3.1.4 Test Setup



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.

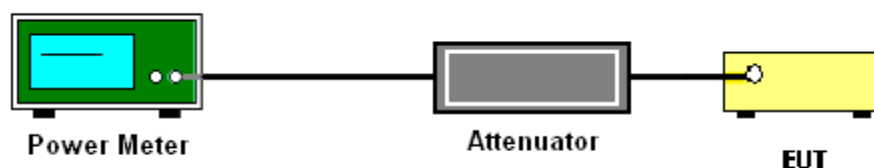
3.2.3 Test Procedures

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

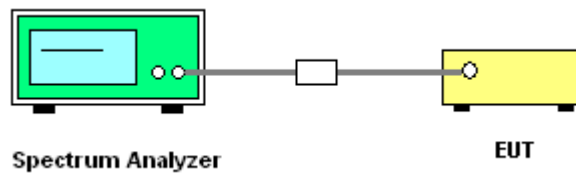
Method SA-2

(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 $\geq$ 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.

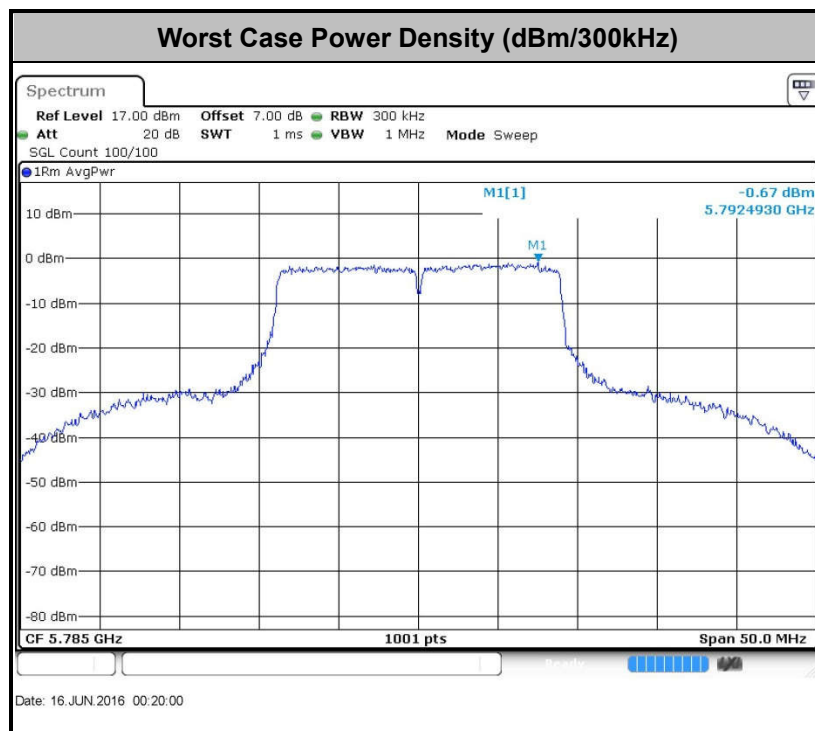
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



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 Part 15.205.

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 Part 15.205 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.

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

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 $\geq$ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

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

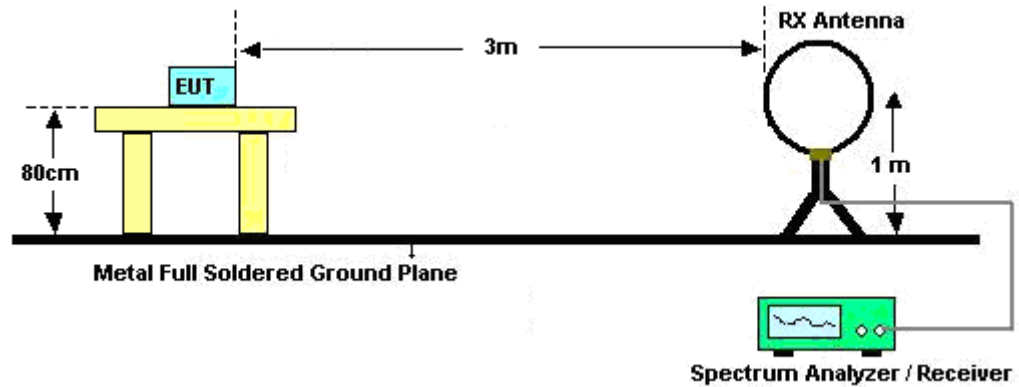
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



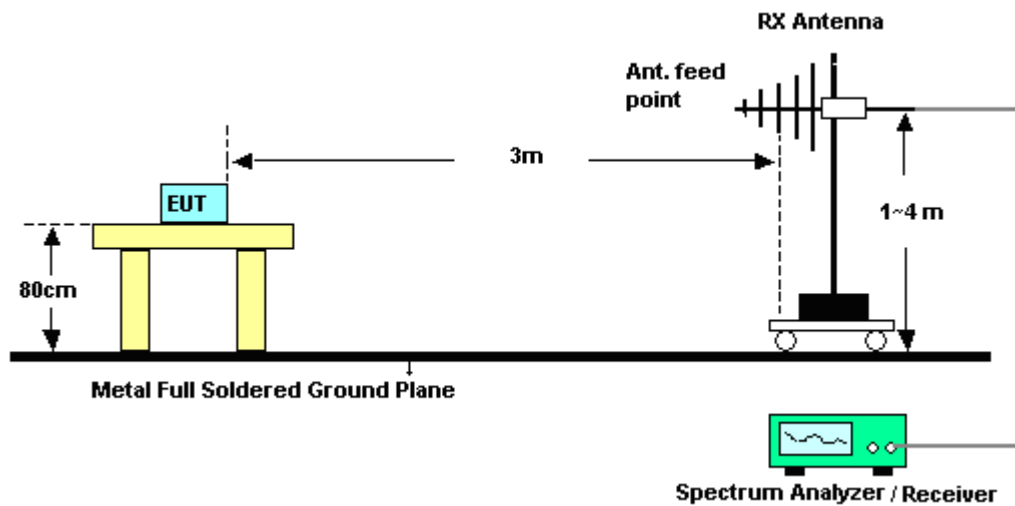
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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

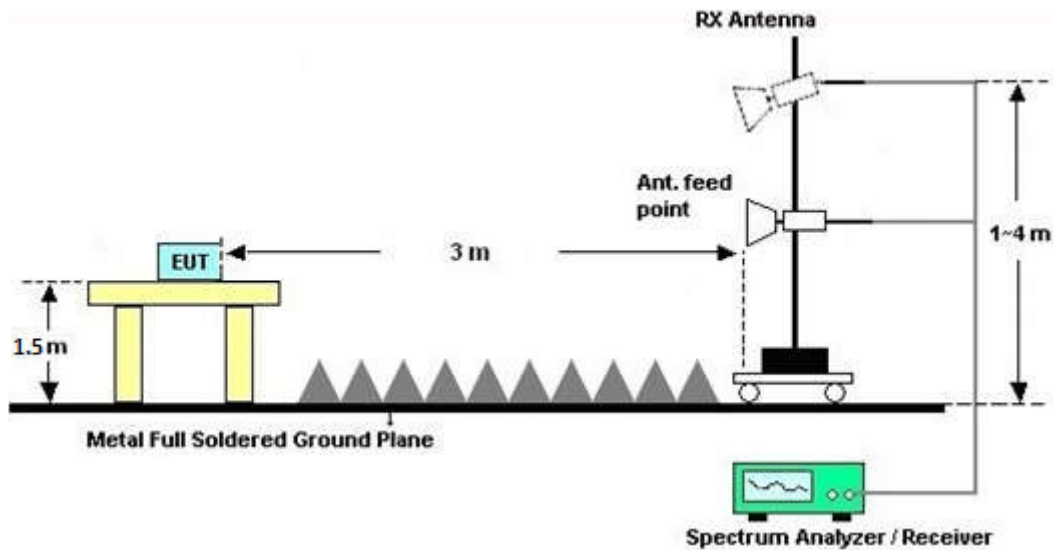
For radiated emissions below 30MHz



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 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 (dB μ V)	
	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.

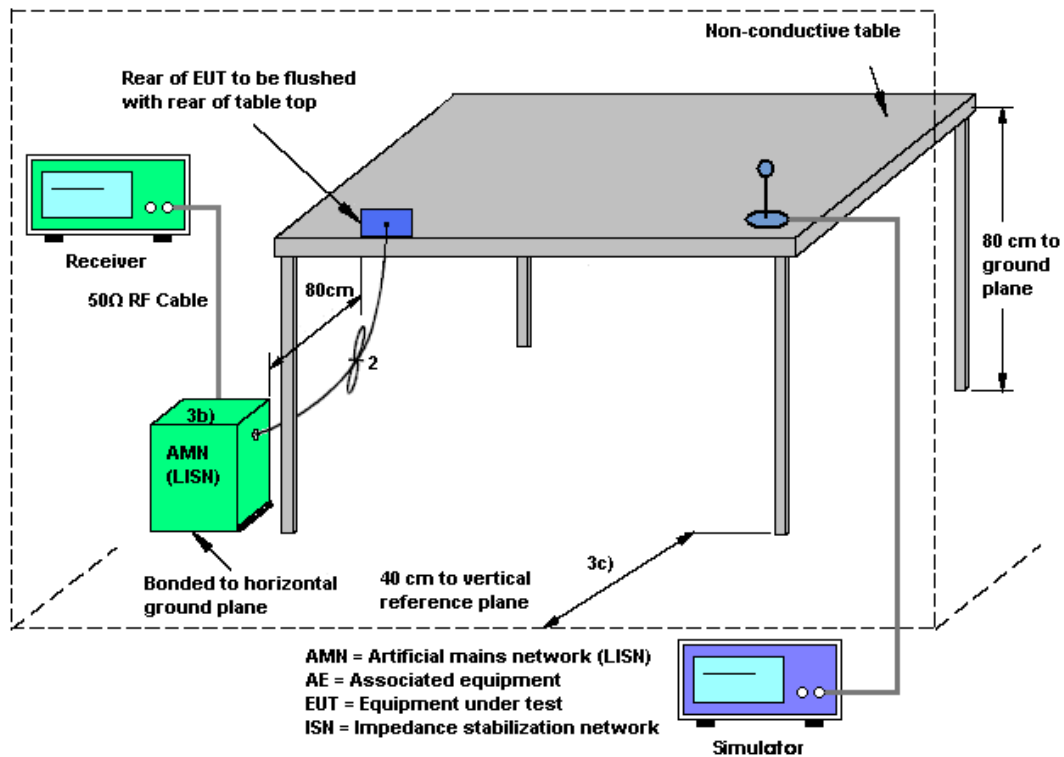
3.5.2 Measuring Instruments

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.

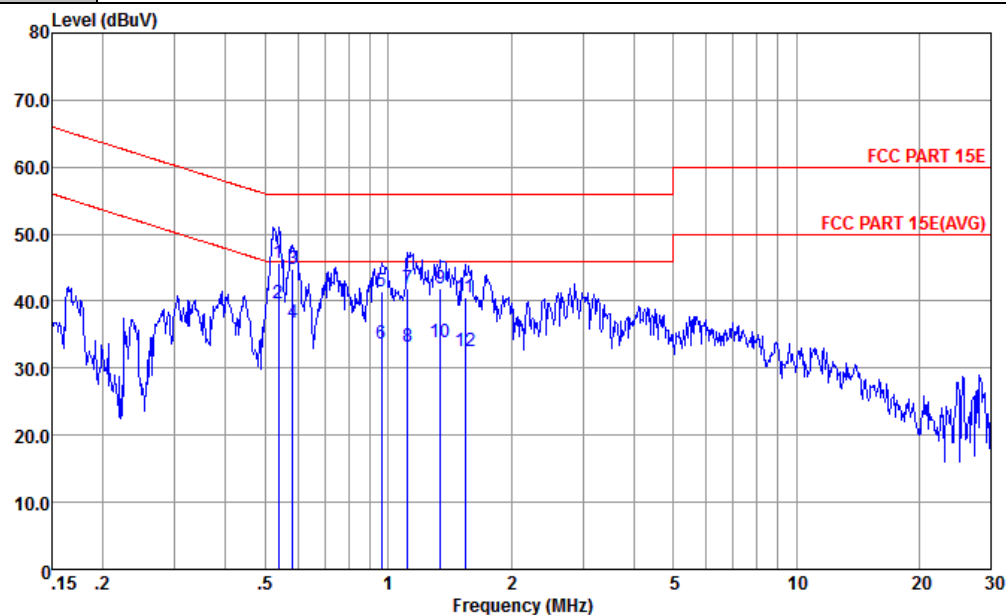
3.5.4 Test Setup





3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 2	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link(5G) + Earphone + Battery 2 + USB Cable 2(Charging from Adapter)		

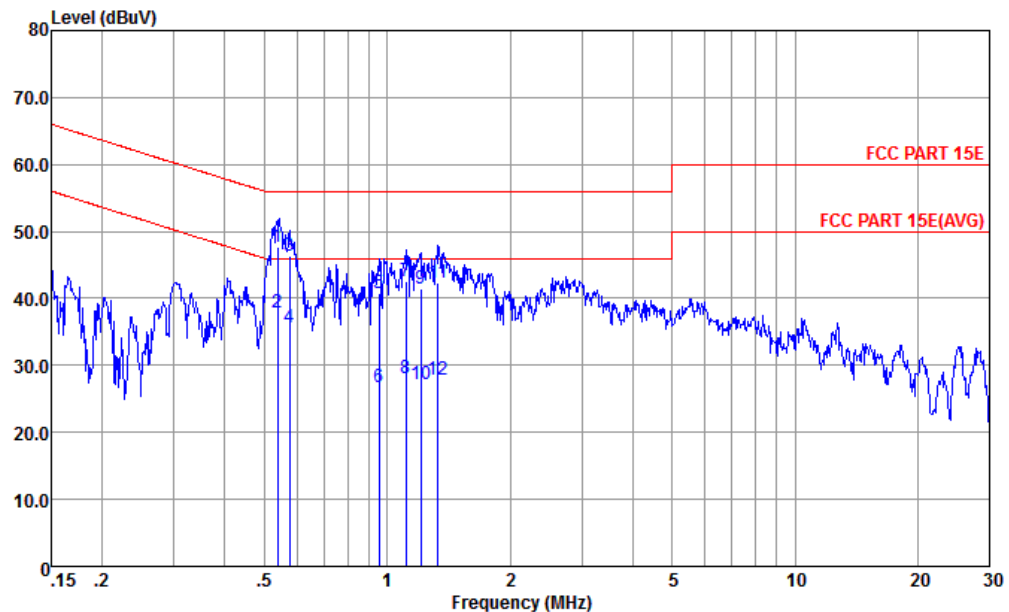


Site : CO01-KS
Condition : FCC PART 15E LISN-L-20151024 LINE
mode : Mode 2

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.54	45.59	-10.41	56.00	35.20	0.23	10.16	QP
2 *	0.54	39.69	-6.31	46.00	29.30	0.23	10.16	Average
3	0.58	44.69	-11.31	56.00	34.30	0.23	10.16	QP
4	0.58	36.69	-9.31	46.00	26.30	0.23	10.16	Average
5	0.96	41.49	-14.51	56.00	31.10	0.25	10.14	QP
6	0.96	33.59	-12.41	46.00	23.20	0.25	10.14	Average
7	1.12	41.98	-14.02	56.00	31.60	0.24	10.14	QP
8	1.12	33.28	-12.72	46.00	22.90	0.24	10.14	Average
9	1.34	41.86	-14.14	56.00	31.50	0.22	10.14	QP
10	1.34	33.96	-12.04	46.00	23.60	0.22	10.14	Average
11	1.54	40.55	-15.45	56.00	30.20	0.21	10.14	QP
12	1.54	32.45	-13.55	46.00	22.10	0.21	10.14	Average



Test Mode :	Mode 2	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link(5G) + Earphone + Battery 2 + USB Cable 2(Charging from Adapter)		



Site : C001-KS
Condition : FCC PART 15E LISN-N-20151024 NEUTRAL
mode : Mode 2

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.54	47.79	-8.21	56.00	37.31	0.32	10.16	QP
2 *	0.54	37.99	-8.01	46.00	27.51	0.32	10.16	Average
3	0.58	46.39	-9.61	56.00	35.90	0.33	10.16	QP
4	0.58	35.69	-10.31	46.00	25.20	0.33	10.16	Average
5	0.95	40.70	-15.30	56.00	30.19	0.37	10.14	QP
6	0.95	26.80	-19.20	46.00	16.29	0.37	10.14	Average
7	1.11	42.61	-13.39	56.00	32.10	0.37	10.14	QP
8	1.11	28.11	-17.89	46.00	17.60	0.37	10.14	Average
9	1.21	41.41	-14.59	56.00	30.90	0.37	10.14	QP
10	1.21	27.11	-18.89	46.00	16.60	0.37	10.14	Average
11	1.33	42.41	-13.59	56.00	31.90	0.37	10.14	QP
12	1.33	27.81	-18.19	46.00	17.30	0.37	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.

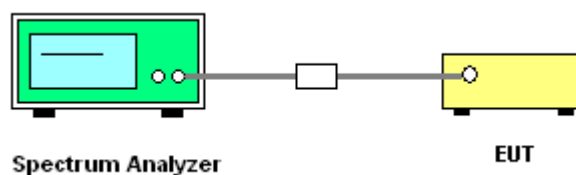
3.6.2 Measuring Instruments

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	FSV40	101040	10Hz~40GHz	Sep. 10, 2015	Jun. 16, 2016	Sep. 09, 2016	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 20, 2016	Jun. 16, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Jun. 16, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 24, 2015	Jun. 16, 2016	Oct. 23, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	May 10, 2016 Jun. 14, 2016	Sep. 09, 2016	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 22, 2016	May 10, 2016 Jun. 14, 2016	Apr. 21, 2017	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 07, 2015	May 10, 2016 Jun. 14, 2016	Nov. 06, 2016	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz~2GHz	Apr. 16, 2016	May 10, 2016 Jun. 14, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 16, 2016	May 10, 2016 Jun. 14, 2016	Apr. 15, 2017	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz ~40GHz	Mar. 03, 2016	May 10, 2016 Jun. 14, 2016	Mar. 02, 2017	Radiation (03CH03-KS)
Amplifier	Burgeon	BPA-530	102212	0.01MHz-3000MHz	Aug. 10, 2015	May 10, 2016 Jun. 14, 2016	Aug. 09, 2016	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Aug. 27, 2015	May 10, 2016 Jun. 14, 2016	Aug. 26, 2016	Radiation (03CH03-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	1889560	1GHz~18GHz	Aug. 10, 2015	May 10, 2016 Jun. 14, 2016	Aug. 09, 2016	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 24, 2015	May 10, 2016 Jun. 14, 2016	Oct. 23, 2016	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	May 10, 2016 Jun. 14, 2016	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 10, 2016 Jun. 14, 2016	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 10, 2016 Jun. 14, 2016	NCR	Radiation (03CH03-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	May 29, 2016	Sep. 09, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	May 29, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	May 29, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	May 29, 2016	Oct. 23, 2016	Conduction (CO01-KS)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.3dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.5dB
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Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.5dB
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Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.6dB
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Appendix A. Conducted Test Results

Report Number : FR642912F

Test Engineer:	Ivan Wang	Temperature:	22~24	°C
Test Date:	2016/6/16	Relative Humidity:	44~47	%

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	19.08	28.57	16.34	0.5	Pass
11a	6Mbps	1	157	5785	18.93	30.42	16.34	0.5	Pass
11a	6Mbps	1	165	5825	18.78	25.43	16.34	0.5	Pass
HT20	MCS 0	1	149	5745	19.78	30.07	17.56	0.5	Pass
HT20	MCS 0	1	157	5785	19.73	33.32	17.58	0.5	Pass
HT20	MCS 0	1	165	5825	19.63	26.62	17.56	0.5	Pass
HT40	MCS 0	1	151	5755	37.26	49.09	35.45	0.5	Pass
HT40	MCS 0	1	159	5795	37.16	52.51	35.13	0.5	Pass
VHT20	MCS 0	1	149	5745	19.98	32.97	17.56	0.5	Pass
VHT20	MCS 0	1	157	5785	19.93	32.77	17.56	0.5	Pass
VHT20	MCS 0	1	165	5825	19.68	28.97	17.56	0.5	Pass
VHT40	MCS 0	1	151	5755	37.46	49.54	35.17	0.5	Pass
VHT40	MCS 0	1	159	5795	37.26	54.04	35.13	0.5	Pass
VHT80	MCS 0	1	155	5775	74.93	85.35	75.05	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	0.59	14.74	30.00	-2.40	-	Pass
11a	6Mbps	1	157	5785	0.59	15.21	30.00	-2.40		Pass
11a	6Mbps	1	165	5825	0.59	15.44	30.00	-2.40		Pass
HT20	MCS 0	1	149	5745	0.61	14.80	30.00	-2.40		Pass
HT20	MCS 0	1	157	5785	0.61	15.25	30.00	-2.40		Pass
HT20	MCS 0	1	165	5825	0.61	15.41	30.00	-2.40		Pass
HT40	MCS 0	1	151	5755	1.20	14.83	30.00	-2.40		Pass
HT40	MCS 0	1	159	5795	1.20	15.22	30.00	-2.40		Pass
VHT20	MCS 0	1	149	5745	0.81	14.85	30.00	-2.40		Pass
VHT20	MCS 0	1	157	5785	0.81	15.29	30.00	-2.40		Pass
VHT20	MCS 0	1	165	5825	0.81	15.41	30.00	-2.40		Pass
VHT40	MCS 0	1	151	5755	1.47	14.84	30.00	-2.40		Pass
VHT40	MCS 0	1	159	5795	1.47	15.19	30.00	-2.40		Pass
VHT80	MCS 0	1	155	5775	2.57	14.95	30.00	-2.40		Pass

TEST RESULTS DATA
Power Spectral Density

Band IV										
Mod.	Data Rate	N _{TX}	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	0.59	2.22	1.20	30.00	-2.40	Pass
11a	6Mbps	1	157	5785	0.59	2.22	2.00	30.00	-2.40	Pass
11a	6Mbps	1	165	5825	0.59	2.22	1.29	30.00	-2.40	Pass
HT20	MCS 0	1	149	5745	0.61	2.22	0.65	30.00	-2.40	Pass
HT20	MCS 0	1	157	5785	0.61	2.22	1.61	30.00	-2.40	Pass
HT20	MCS 0	1	165	5825	0.61	2.22	1.13	30.00	-2.40	Pass
HT40	MCS 0	1	151	5755	1.20	2.22	-1.94	30.00	-2.40	Pass
HT40	MCS 0	1	159	5795	1.20	2.22	-1.29	30.00	-2.40	Pass
VHT20	MCS 0	1	149	5745	0.81	2.22	1.15	30.00	-2.40	Pass
VHT20	MCS 0	1	157	5785	0.81	2.22	2.36	30.00	-2.40	Pass
VHT20	MCS 0	1	165	5825	0.81	2.22	1.39	30.00	-2.40	Pass
VHT40	MCS 0	1	151	5755	1.47	2.22	-1.98	30.00	-2.40	Pass
VHT40	MCS 0	1	159	5795	1.47	2.22	-0.99	30.00	-2.40	Pass
VHT80	MCS 0	1	155	5775	2.57	2.22	-4.33	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 Stability (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	5745.025	0.025	4.35	20	4.4	-
11a	6M bps	1	149	5745	5745.025	0.025	4.35	20	3.9	-
11a	6M bps	1	149	5745	5745.050	0.050	8.70	-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	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz	*	5748	93.97	-	-	89.63	32.05	8.58	36.29	400	0	P	H
	*	5750	86.56	-	-	82.22	32.05	8.58	36.29	400	0	A	H
		5692.28	47.43	-52.18	99.61	43.12	32.02	8.54	36.25	400	0	P	H
		5713.16	47.73	-61.26	108.99	43.42	32.03	8.55	36.27	400	0	P	H
		5724.6	59.3	-62.09	121.39	54.97	32.04	8.57	36.28	400	0	P	H
	*	5742	96.3	-	-	91.96	32.05	8.58	36.29	317	32	P	V
	*	5750	88.53	-	-	84.19	32.05	8.58	36.29	317	32	A	V
		5692.44	47	-52.73	99.73	42.69	32.02	8.54	36.25	317	32	P	V
		5713.72	49.11	-60.03	109.14	44.8	32.03	8.55	36.27	317	32	P	V
		5724.84	62.27	-59.66	121.93	57.94	32.04	8.57	36.28	317	32	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 157 5785MHz	*	5790	90.39	-	-	86.02	32.07	8.62	36.32	100	125	P	H
	*	5790	83.01	-	-	78.64	32.07	8.62	36.32	100	125	A	H
	*	5780	95.64	-	-	91.29	32.06	8.6	36.31	325	31	P	V
	*	5780	87.93	-	-	83.58	32.06	8.6	36.31	325	31	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz	*	5826	92.95	-	-	88.58	32.08	8.64	36.35	100	126	P	H
	*	5830	84.21	-	-	79.84	32.08	8.64	36.35	100	126	A	H
		5851.12	52.76	-66.99	119.75	48.38	32.09	8.65	36.36	100	126	P	H
		5858.16	48.47	-61.54	110.01	44.08	32.1	8.66	36.37	100	126	P	H
		5877.52	46.5	-56.93	103.43	42.11	32.1	8.67	36.38	100	126	P	H
	*	5830	96.2	-	-	91.83	32.08	8.64	36.35	289	33	P	V
	*	5830	88.58	-	-	84.21	32.08	8.64	36.35	289	33	A	V
		5850	55.57	-66.73	122.3	51.19	32.09	8.65	36.36	289	33	P	V
		5856.64	51.76	-58.68	110.44	47.37	32.1	8.66	36.37	289	33	P	V
		5876.4	47.66	-56.6	104.26	43.27	32.1	8.67	36.38	289	33	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	54.98	-19.02	74	62.73	38.59	14.2	60.54	108	355	P	H
CH 149	!	11490	52.22	-1.78	54	59.97	38.59	14.2	60.54	108	355	A	H
5745MHz		11490	42.71	-31.29	74	50.46	38.59	14.2	60.54	100	0	P	V
802.11a		11571	54.07	-19.93	74	61.57	38.75	14.25	60.5	100	353	P	H
CH 157	!	11571	50.67	-3.33	54	58.17	38.75	14.25	60.5	100	353	A	H
5785MHz		11570	44.86	-29.14	74	52.36	38.75	14.25	60.5	100	0	P	V
802.11a		11649	55.58	-18.42	74	62.86	38.9	14.29	60.47	100	360	P	H
CH 165		11649	52.73	-1.27	54	60.01	38.9	14.29	60.47	100	360	A	H
5825MHz		11649	43.96	-30.04	74	51.24	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 802.11n 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)
802.11n HT20 CH 149 5745MHz	*	5752	96.82	-	-	92.48	32.05	8.59	36.3	325	331	P	H
	*	5750	89	-	-	84.66	32.05	8.58	36.29	325	331	A	H
		5693.64	48.05	-52.56	100.61	43.74	32.02	8.54	36.25	325	331	P	H
		5719.96	53.97	-56.92	110.89	49.64	32.04	8.57	36.28	325	331	P	H
		5724.68	65.34	-56.23	121.57	61.01	32.04	8.57	36.28	325	331	P	H
	*	5750	95.87	-	-	91.53	32.05	8.58	36.29	135	336	P	V
	*	5750	88.58	-	-	84.24	32.05	8.58	36.29	135	336	A	V
		5691.48	47.85	-51.17	99.02	43.54	32.02	8.54	36.25	135	336	P	V
		5719.48	53.59	-57.16	110.75	49.26	32.04	8.57	36.28	135	336	P	V
		5723.08	62.26	-55.66	117.92	57.93	32.04	8.57	36.28	135	336	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	*	5790	96.98	-	-	92.61	32.07	8.62	36.32	312	336	P	H
HT20	*	5792	89.21	-	-	84.84	32.07	8.62	36.32	312	336	A	H
CH 157	*	5780	96.12	-	-	91.77	32.06	8.6	36.31	118	336	P	V
5785MHz	*	5780	88.4	-	-	84.05	32.06	8.6	36.31	118	336	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 165 5825MHz	*	5818	96.02	-	-	91.64	32.08	8.63	36.33	306	316	P	H
	*	5820	88.5	-	-	84.13	32.08	8.64	36.35	306	316	A	H
		5850.64	58.01	-62.83	120.84	53.63	32.09	8.65	36.36	306	316	P	H
		5857.28	55.14	-55.12	110.26	50.75	32.1	8.66	36.37	306	316	P	H
		5878.88	48.68	-53.74	102.42	44.29	32.1	8.67	36.38	306	316	P	H
	*	5818	96.49	-	-	92.11	32.08	8.63	36.33	140	338	P	V
	*	5820	89.03	-	-	84.66	32.08	8.64	36.35	140	338	A	V
		5851.6	58.39	-60.26	118.65	54.01	32.09	8.65	36.36	140	338	P	V
		5856	55.04	-55.58	110.62	50.65	32.1	8.66	36.37	140	338	P	V
		5877.2	49.31	-54.36	103.67	44.92	32.1	8.67	36.38	140	338	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 HT20 CH 149 5745MHz		11490	43.96	-30.04	74	51.71	38.59	14.2	60.54	100	222	P	H
		11490	50.53	-23.47	74	58.28	38.59	14.2	60.54	103	12	P	V
	!	11490	49.45	-4.55	54	57.2	38.59	14.2	60.54	103	12	A	V
802.11n HT20 CH 157 5785MHz		11571	45.07	-28.93	74	52.57	38.75	14.25	60.5	103	249	P	H
		11571	52.82	-21.18	74	60.32	38.75	14.25	60.5	103	13	P	V
	!	11571	49.11	-4.89	54	56.61	38.75	14.25	60.5	103	13	A	V
802.11n HT20 CH 165 5825MHz		11649	43.81	-30.19	74	51.09	38.9	14.29	60.47	103	34	P	H
		11649	53.2	-20.8	74	60.48	38.9	14.29	60.47	103	1	P	V
		11649	49.02	-4.98	54	56.3	38.9	14.29	60.47	103	1	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)
802.11n HT40 CH 151 5755MHz		5698.6	49.26	-55.01	104.27	44.95	32.02	8.54	36.25	331	329	P	H
		5711.56	59.6	-48.94	108.54	55.29	32.03	8.55	36.27	331	329	P	H
		5722.2	64.13	-51.79	115.92	59.8	32.04	8.57	36.28	331	329	P	H
	*	5768	93.09	-	-	88.75	32.05	8.59	36.3	331	329	P	H
	*	5766	85.86	-	-	81.52	32.05	8.59	36.3	331	329	A	H
		5693.72	48.53	-52.14	100.67	44.22	32.02	8.54	36.25	148	339	P	V
		5716.28	62.82	-47.04	109.86	58.51	32.03	8.55	36.27	148	339	P	V
		5722.92	61.75	-55.81	117.56	57.42	32.04	8.57	36.28	148	339	P	V
	*	5752	91.44	-	-	87.1	32.05	8.59	36.3	148	339	P	V
	*	5764	84.19	-	-	79.85	32.05	8.59	36.3	148	339	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 159 5795MHz	*	5788	95.12	-	-	90.75	32.07	8.62	36.32	280	307	P	H
	*	5784	86.23	-	-	81.88	32.06	8.6	36.31	280	307	A	H
		5852.88	52.9	-62.83	115.73	48.52	32.09	8.65	36.36	280	307	P	H
		5862.88	49.38	-59.31	108.69	44.99	32.1	8.66	36.37	280	307	P	H
		5884.64	47.26	-50.88	98.14	42.87	32.1	8.67	36.38	280	307	P	H
	*	5782	91.99	-	-	87.64	32.06	8.6	36.31	145	331	P	V
	*	5784	84.02	-	-	79.67	32.06	8.6	36.31	145	331	A	V
		5853.04	51.65	-63.72	115.37	47.27	32.09	8.65	36.36	145	331	P	V
		5860.08	48.57	-60.91	109.48	44.18	32.1	8.66	36.37	145	331	P	V
		5876.16	47.01	-57.43	104.44	42.62	32.1	8.67	36.38	145	331	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		11511	42.35	-31.65	74	50.08	38.6	14.21	60.54	100	360	P	H
		11511	51.61	-22.39	74	59.34	38.6	14.21	60.54	113	9	P	V
	!	11511	48.62	-5.38	54	56.35	38.6	14.21	60.54	113	9	A	V
802.11n HT40 CH 159 5795MHz		11589	44.53	-29.47	74	51.97	38.79	14.26	60.49	100	0	P	H
		11589	52.62	-21.38	74	60.06	38.79	14.26	60.49	104	9	P	V
	!	11589	49.35	-4.65	54	56.79	38.79	14.26	60.49	104	9	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 149 5745MHz	*	5744	94.86	-	-	90.52	32.05	8.58	36.29	301	334	P	H
	*	5740	87.82	-	-	83.48	32.05	8.58	36.29	301	334	A	H
		5688.92	46.33	-50.8	97.13	42.02	32.02	8.54	36.25	301	334	P	H
		5716.2	53.14	-56.7	109.84	48.83	32.03	8.55	36.27	301	334	P	H
		5724.04	62.05	-58.06	120.11	57.72	32.04	8.57	36.28	301	334	P	H
	*	5752	93.76	-	-	89.42	32.05	8.59	36.3	100	332	P	V
	*	5752	86.39	-	-	82.05	32.05	8.59	36.3	100	332	A	V
		5693.16	46.14	-54.12	100.26	41.83	32.02	8.54	36.25	100	332	P	V
		5719.24	52.21	-58.48	110.69	47.88	32.04	8.57	36.28	100	332	P	V
		5723.32	61.9	-56.57	118.47	57.57	32.04	8.57	36.28	100	332	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	*	5790	95.17	-	-	90.8	32.07	8.62	36.32	309	331	P	H
VHT20	*	5780	87.99	-	-	83.64	32.06	8.6	36.31	309	331	A	H
CH 157	*	5788	92.87	-	-	88.5	32.07	8.62	36.32	100	328	P	V
5785MHz	*	5782	85.86	-	-	81.51	32.06	8.6	36.31	100	328	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 165 5825MHz	*	5824	95.49	-	-	91.12	32.08	8.64	36.35	303	332	P	H
	*	5830	88.26	-	-	83.89	32.08	8.64	36.35	303	332	A	H
		5850	56.35	-65.95	122.3	51.97	32.09	8.65	36.36	303	332	P	H
		5856.08	54.04	-56.56	110.6	49.65	32.1	8.66	36.37	303	332	P	H
		5876.64	47.27	-56.81	104.08	42.88	32.1	8.67	36.38	303	332	P	H
	*	5834	93.29	-	-	88.92	32.08	8.64	36.35	100	323	P	V
	*	5832	86.61	-	-	82.24	32.08	8.64	36.35	100	323	A	V
		5851.36	55.22	-63.98	119.2	50.84	32.09	8.65	36.36	100	323	P	V
		5857.44	52.76	-57.46	110.22	48.37	32.1	8.66	36.37	100	323	P	V
		5879.6	46.87	-55.01	101.88	42.48	32.1	8.67	36.38	100	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 802.11ac VHT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 149 5745MHz		11490	43.99	-30.01	74	51.74	38.59	14.2	60.54	100	360	P	H
		11490	53.23	-20.77	74	60.98	38.59	14.2	60.54	100	19	P	V
	!	11490	49.65	-4.35	54	57.4	38.59	14.2	60.54	100	19	A	V
802.11ac VHT20 CH 157 5785MHz		11571	43.97	-30.03	74	51.47	38.75	14.25	60.5	100	360	P	H
		11571	53.2	-20.8	74	60.7	38.75	14.25	60.5	100	13	P	V
	!	11571	49.97	-4.03	54	57.47	38.75	14.25	60.5	100	13	A	V
802.11ac VHT20 CH 165 5825MHz		11649	44.59	-29.41	74	51.87	38.9	14.29	60.47	100	360	P	H
		11649	54.7	-19.3	74	61.98	38.9	14.29	60.47	107	9	P	V
		11649	49.94	-4.06	54	57.22	38.9	14.29	60.47	106	9	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz
WIFI 802.11ac 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)
802.11ac VHT40 CH 151 5755MHz	*	5742	92.71	-	-	88.37	32.05	8.58	36.29	300	333	P	H
	*	5744	85.22	-	-	80.88	32.05	8.58	36.29	300	333	A	H
		5699.72	48.52	-56.57	105.09	44.21	32.02	8.54	36.25	300	333	P	H
		5713.08	59.31	-49.65	108.96	55	32.03	8.55	36.27	300	333	P	H
		5724.6	61.77	-59.62	121.39	57.44	32.04	8.57	36.28	300	333	P	H
	*	5764	90.34	-	-	86	32.05	8.59	36.3	100	330	P	V
	*	5752	82.88	-	-	78.54	32.05	8.59	36.3	100	330	A	V
		5698.92	47.37	-57.13	104.5	43.06	32.02	8.54	36.25	100	330	P	V
		5719.96	57.7	-53.19	110.89	53.37	32.04	8.57	36.28	100	330	P	V
		5721.08	60.74	-52.62	113.36	56.41	32.04	8.57	36.28	100	330	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 VHT40 CH 159 5795MHz	*	5806	92.45	-	-	88.07	32.08	8.63	36.33	300	338	P	H
	*	5784	84.9	-	-	80.55	32.06	8.6	36.31	300	338	A	H
		5850.32	51.04	-70.53	121.57	46.66	32.09	8.65	36.36	300	338	P	H
		5861.52	48.62	-60.45	109.07	44.23	32.1	8.66	36.37	300	338	P	H
		5875.76	46.91	-57.83	104.74	42.52	32.1	8.67	36.38	300	338	P	H
	*	5794	91.53	-	-	87.16	32.07	8.62	36.32	105	331	P	V
	*	5792	83.38	-	-	79.01	32.07	8.62	36.32	105	331	A	V
		5852.08	49.91	-67.65	117.56	45.53	32.09	8.65	36.36	105	331	P	V
		5855.36	47.79	-63.01	110.8	43.4	32.1	8.66	36.37	105	331	P	V
		5885.04	46.27	-51.58	97.85	41.88	32.1	8.67	36.38	105	331	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		11511	44.11	-29.89	74	51.84	38.6	14.21	60.54	100	360	P	H
VHT40		11511	53.23	-20.77	74	60.96	38.6	14.21	60.54	102	10	P	V
CH 151	!	11511	50.13	-3.87	54	57.86	38.6	14.21	60.54	102	10	A	V
5755MHz													
802.11ac		11589	45	-29	74	52.44	38.79	14.26	60.49	100	360	P	H
VHT40		11589	53.99	-20.01	74	61.43	38.79	14.26	60.49	106	10	P	V
CH 159	!	11589	50.56	-3.44	54	58	38.79	14.26	60.49	106	10	A	V
5795MHz													
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	*	5758	88.75	-	-	84.41	32.05	8.59	36.3	368	329	P	H
	*	5748	81.78	-	-	77.44	32.05	8.58	36.29	368	329	A	H
		5686.36	53.98	-41.26	95.24	49.67	32.02	8.54	36.25	368	329	P	H
		5717.88	61.65	-48.66	110.31	57.32	32.04	8.57	36.28	368	329	P	H
		5725	58.51	-63.79	122.3	54.18	32.04	8.57	36.28	368	329	P	H
		5852.8	53.42	-62.5	115.92	49.04	32.09	8.65	36.36	368	329	P	H
		5856.24	52.55	-58	110.55	48.16	32.1	8.66	36.37	368	329	P	H
		5875.04	47.84	-57.43	105.27	43.45	32.1	8.67	36.38	368	329	P	H
	*	5778	87.67	-	-	83.32	32.06	8.6	36.31	100	331	P	V
	*	5778	80.67	-	-	76.32	32.06	8.6	36.31	100	331	A	V
		5686.76	53.16	-42.37	95.53	48.85	32.02	8.54	36.25	100	331	P	V
		5718.68	60.01	-50.52	110.53	55.68	32.04	8.57	36.28	100	331	P	V
		5724.28	57.32	-63.34	120.66	52.99	32.04	8.57	36.28	100	331	P	V
		5851.44	51.58	-67.44	119.02	47.2	32.09	8.65	36.36	100	331	P	V
		5857.04	51.13	-59.2	110.33	46.74	32.1	8.66	36.37	100	331	P	V
		5879.04	47.17	-55.13	102.3	42.78	32.1	8.67	36.38	100	331	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		11439	42.28	-31.72	74	50.11	38.57	14.17	60.57	100	0	P	H
VHT80		11550	52.97	-21.03	74	60.53	38.71	14.24	60.51	100	8	P	V
CH 155 5775MHz	!	11550	50.11	-3.89	54	57.67	38.71	14.24	60.51	100	8	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

5GHz WIFI 802.11a (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 802.11a LF		33.88	20.88	-19.12	40	34.63	18.04	0.7	32.49	-	-	P	H
		103.72	23.55	-19.95	43.5	41.47	13.15	1.23	32.3	-	-	P	H
		150.28	25.04	-18.46	43.5	42.2	13.8	1.48	32.44	-	-	P	H
		192.96	28.59	-14.91	43.5	48.31	11.13	1.69	32.54	-	-	P	H
		217.21	36.9	-9.1	46	55.94	11.57	1.73	32.34	100	23	P	H
		278.32	27.98	-18.02	46	43.96	14.17	1.96	32.11	-	-	P	H
		30	31.28	-8.72	40	44.64	18.6	0.65	32.61	100	69	P	V
		37.76	29.34	-10.66	40	45.44	15.68	0.74	32.52	-	-	P	V
		69.77	23.57	-16.43	40	47.19	7.9	1	32.52	-	-	P	V
		102.75	24.52	-18.98	43.5	42.45	13.14	1.23	32.3	-	-	P	V
		184.23	27.22	-16.28	43.5	46.44	11.67	1.65	32.54	-	-	P	V
		222.06	34.13	-11.87	46	52.93	11.81	1.73	32.34	-	-	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	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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. 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)

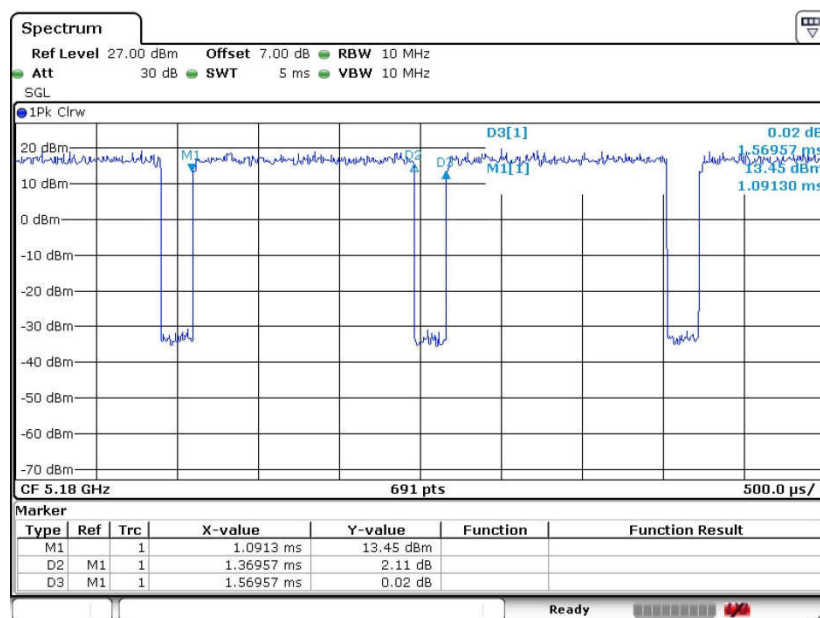
= -10.46(dB)

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	87.26	1.37	0.73	1KHz
802.11n HT20	86.94	1.27	0.78	1KHz
802.11n HT40	75.86	0.64	1.57	3KHz
802.11ac VHT20	82.92	0.97	1.03	3KHz
802.11ac VHT40	71.34	0.49	2.02	3KHz
802.11ac VHT80	55.34	0.25	4.04	10kHz

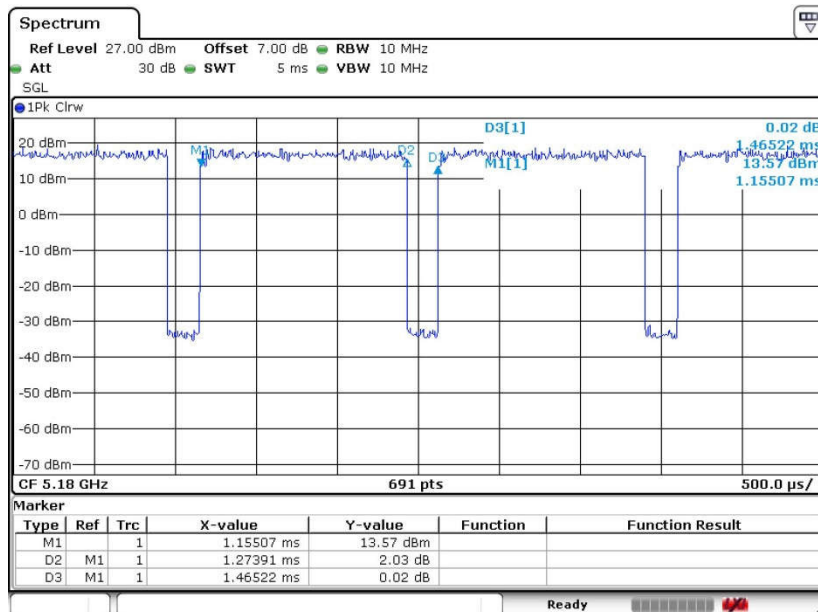
802.11a



Date: 10.MAY.2016 00:16:59

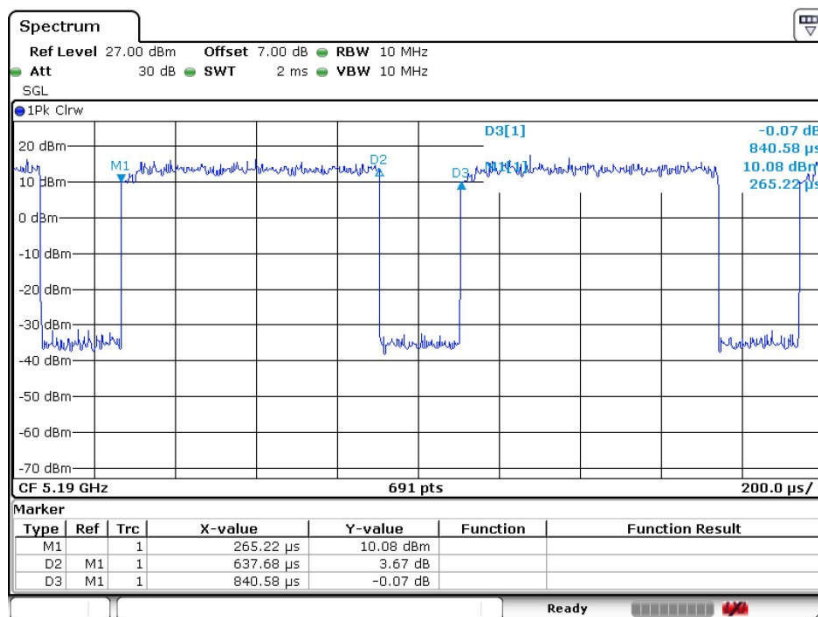


802.11n HT20



Date: 10.MAY.2016 01:13:40

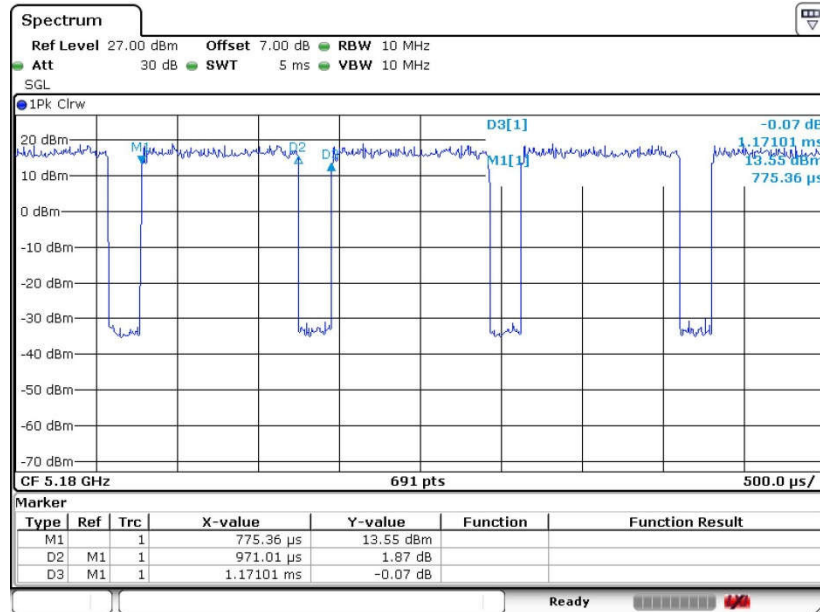
802.11n HT40



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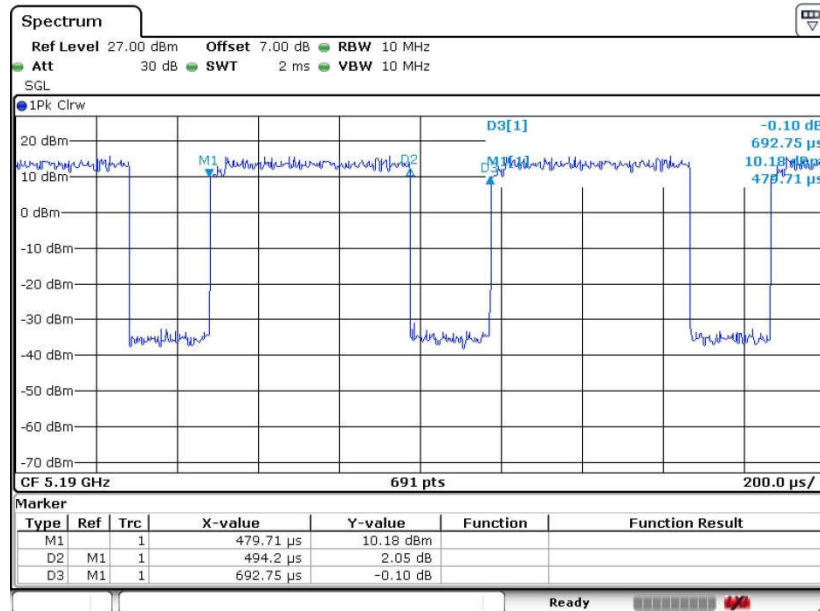


802.11ac VHT20



Date: 10.MAY.2016 01:31:45

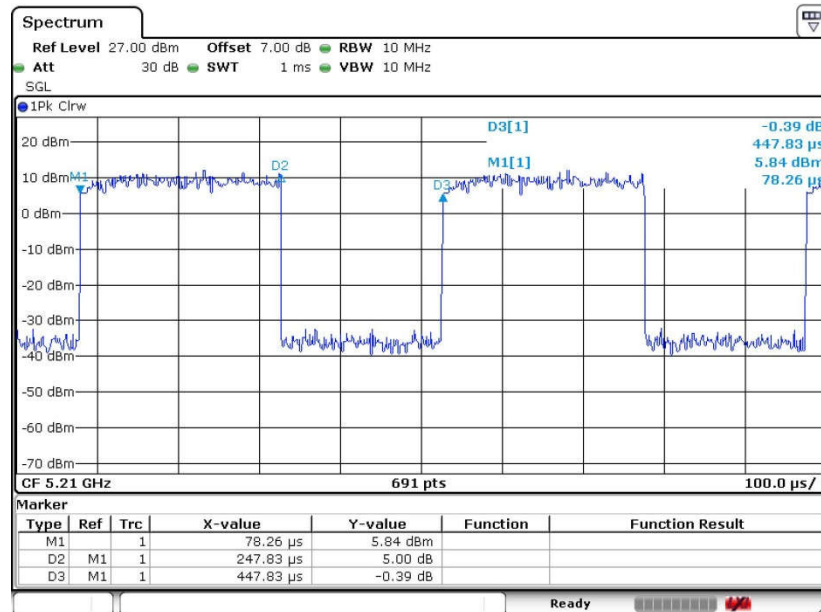
802.11ac VHT40



Date: 10.MAY.2016 01:39:05



802.11ac VHT80



Date: 10.MAY.2016 01:46:44