FCC RF Test Report

APPLICANT	**:**	**ZTE CORPORATION**
EQUIPMENT	**:**	**LTE Ufi**
BRAND NAME	**:**	**ZTE**
MODEL NAME	**:**	**MF97G**
FCC ID	**:**	**SRQ-MF97G**
STANDARD	**:**	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	**:**	**(NII) Unlicensed National Information Infrastructure**

The product testing was completed on May 26, 2015. 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.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR542003D	Rev. 01	Initial issue of report	May 28, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 15.403(i)	99% Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 24 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤11 dBm	Pass	-
3.4	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass	Under limit 1.08 dB at 5150.000 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 16.09 dB at 0.160 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

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P. R. China

1.2 Manufacturer

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P. R. China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	LTE Ufi
Brand Name	ZTE
Model Name	MF97G
FCC ID	SRQ-MF97G
EUT supports Radios application	WLAN 2.4GHz 802. 11b/g/n HT20/ WLAN 5GHz 802. 11a/n HT20/HT40/ Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
HW Version	d96C
SW Version	SPRO2GV1.0.0B01
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

<table>
<tr><th colspan="2">Product Specification subjective to this standard</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>5180 MHz ~ 5240 MHz</td></tr>
<tr><td>Maximum Output Power</td><td>802.11a : 15.25 dBm / 0.0335 W
802.11n HT20 : 17.32 dBm / 0.0540 W
802.11n HT40 : 14.97 dBm / 0.0314 W</td></tr>
<tr><td>Maximum 99% Occupied Bandwidth</td><td>802.11a : 18.50 MHz
802.11n HT20 : 19.25 MHz
802.11n HT40 : 37.00 MHz</td></tr>
<tr><td>Antenna Type / Gain</td><td>Chain Port 0 : IFA Antenna with gain 2.90 dBi
Chain Port 1 : IFA Antenna with gain 3.17 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)</td></tr>
<tr><td>Antenna Function Description</td><td>
<table>
<tr><th></th><th>Chain Port 0</th><th>Chain Port 1</th></tr>
<tr><td>802.11a</td><td>V</td><td>V</td></tr>
<tr><td>802.11n SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11n MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
</table>

1.5 Modification of EUT

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

1.6 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	03CH02-KS	CO01-KS	418269

1.7 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 v01
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. FCC permits the use of the 1.5 meter table above 1 GHz as an alternative in C63.10-2013 through inquiry tracking number 961829.
3. 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)
5150-5250 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38	**5190**	**46**	**5230**
	40	5200	48	5240

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. Final Output Power equals to Measured Output Power adds the duty factor.

WLAN 5GHz 802.11a Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	0	14.98	CH 48	15.16	15.18	15.23	15.13	15.21	15.20	15.09
CH 44	5220	0	14.37								
CH 48	5240	0	**15.25**								
CH 36	5180	1	**12.57**	CH 36	12.41	12.24	12.32	12.23	12.41	12.36	12.26
CH 44	5220	1	11.67								
CH 48	5240	1	12.13								

WLAN 5GHz 802.11n-HT20 Output Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	0	**14.26**	CH 36	13.98	13.96	14.21	14.22	14.18	14.10	14.17
CH 44	5220	0	13.49								
CH 48	5240	0	13.63								
CH 36	5180	1	**12.56**	CH 36	12.37	12.44	12.55	12.54	12.43	12.53	12.51
CH 44	5220	1	11.36								
CH 48	5240	1	11.62								
CH 36	5180	0+1(0)	**14.81**	CH 36	14.61	14.59	14.62	14.57	14.49	14.55	14.42
CH 44	5220	0+1(0)	14.60								
CH 48	5240	0+1(0)	14.64								
CH 36	5180	0+1(1)	**13.73**	CH 36	13.70	13.51	13.76	13.73	13.66	13.62	13.68
CH 44	5220	0+1(1)	13.82								
CH 48	5240	0+1(1)	13.73								
CH 36	5180	0+1	**17.32**	CH 36	17.19	17.09	17.22	17.18	17.11	17.12	17.07
CH 44	5220	0+1	17.24								
CH 48	5240	0+1	17.22								

WLAN 5GHz 802.11n-HT40 Output Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	0	13.67	CH 46	13.62	13.60	13.65	13.71	13.73	13.64	13.69
CH 46	5230	0	**13.75**								
CH 38	5190	1	**10.57**	CH 38	10.29	10.47	10.49	10.52	10.50	10.52	10.55
CH 46	5230	1	9.62								
CH 38	5190	0+1(0)	**12.39**	CH 38	12.26	12.36	12.24	12.35	12.25	12.37	12.38
CH 46	5230	0+1(0)	12.32								
CH 38	5190	0+1(1)	**11.48**	CH 38	11.43	11.38	11.38	11.39	11.37	11.33	11.29
CH 46	5230	0+1(1)	11.36								
CH 38	5190	0+1	**14.97**	CH 38	14.87	14.91	14.84	14.90	14.84	14.89	14.88
CH 46	5230	0+1	14.88								

Note: Chain Port 0+1 is a calculated result from sum of the power Chain Port 0+1(0) and Chain Port 0+1(1).

2.3 Test Mode

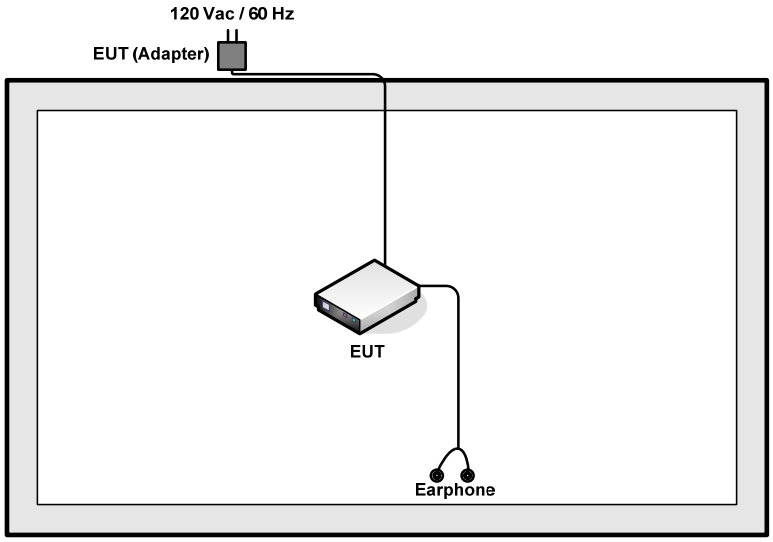
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	**Mode**	**Data rate**	**Test Channel**
Conducted TCs	**99% BW Power Spectral Density**	**802.11a**	**6 Mbps**	**L/M/H**
		802.11n HT20	**MCS0**	**L/M/H**
		802.11n HT40	**MCS0**	**L/H**
	Output Power	**802.11a**	**6 Mbps**	**L/M/H**
		802.11n HT20	**MCS0**	**L/M/H**
		802.11n HT40	**MCS0**	**L/H**
	Frequency Stability	**802.11a**	**6 Mbps**	**L**
Radiated TCs	**Radiated Band Edge**	**802.11a**	**6 Mbps**	**L/H**
		802.11n HT20	**MCS0**	**L/H**
		802.11n HT40	**MCS0**	**L/H**
	Radiated Spurious Emission	**802.11a**	**6 Mbps**	**L/M/H**
		802.11n HT20	**MCS0**	**L/M/H**
		802.11n HT40	**MCS0**	**L/H**
AC Conducted Emission	Mode 1 ： Bluetooth Link + WLAN (5G) Link + Earphone + Adapter			
Remark: For radiated TCs, the tests were performed with adapter and earphone.				

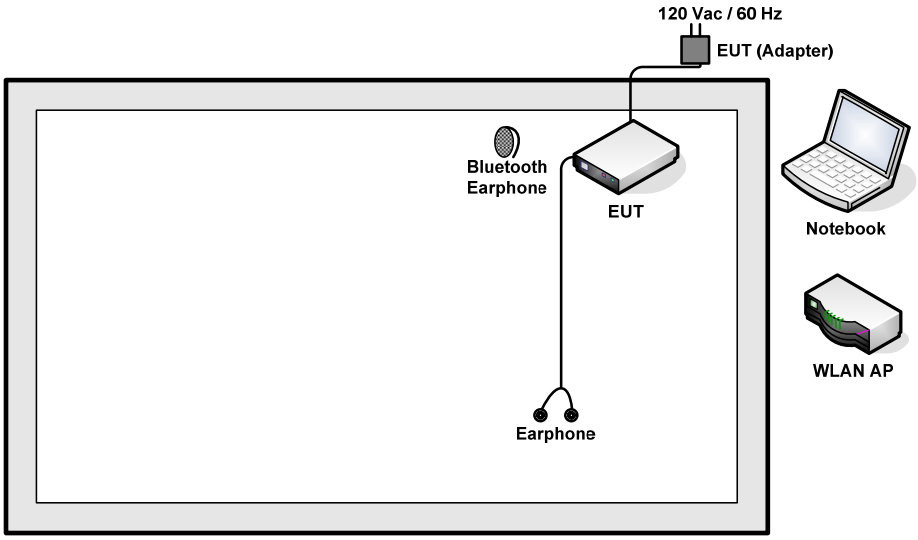
Ch. #		Band I： 5150-5250 MHz		
		802.11a	**802.11n HT20**	**802.11n HT40**
L	**Low**	36	36	38
M	**Middle**	44	44	-
H	**High**	48	48	46

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<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.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
2.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 0.9 m DC O/P: Shielded, 1.8 m
3.	Bluetooth Earphone	Nokia	BH-106	QTLBH-106	N/A	N/A
4.	Earphone	Lenovo	SH100	N/A	Unshielded, 1.2 m	N/A
5.	DC Power Supply	GWINSTEK	GPS-3030D	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 continuous transmit/receive.

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

2.7 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 7.5 dB.

Offset (dB) = RF cable loss(dB).

= 7.5 (dB)

3 Test Result

3.1 99% Bandwidth Measurement

3.1.1 Description of 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

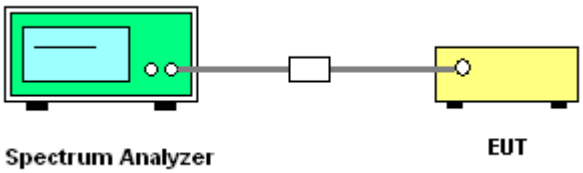
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

3.1.4 Test Setup

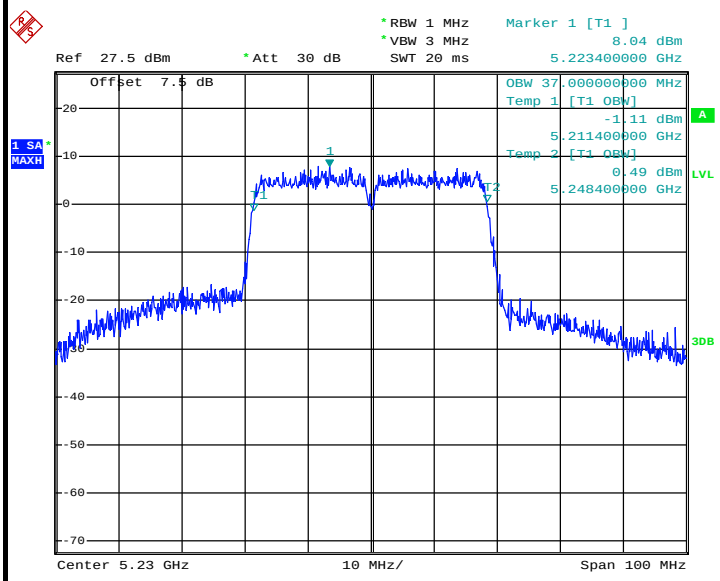


3.1.5 Test Result of 99% Occupied Bandwidth

Test Band :	5GHz band 1	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	99% Bandwidth (MHz)		99% Bandwidth EIRP Limit (dBm)	
					Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1
11a	6Mbps	1	36	5180	18.50	-	22.67	-
11a	6Mbps	1	44	5220	18.40	-	22.65	-
11a	6Mbps	1	48	5240	18.30	-	22.62	-
HT20	MCS0	1	36	5180	19.05	-	22.80	-
HT20	MCS0	1	44	5220	19.05	-	22.80	-
HT20	MCS0	1	48	5240	19.05	-	22.80	-
HT40	MCS0	1	38	5190	36.60	-	23.01	-
HT40	MCS0	1	46	5230	36.80	-	23.01	-
HT20	MCS0	2	36	5180	19.20	18.95	22.78	
HT20	MCS0	2	44	5220	19.00	18.90	22.76	
HT20	MCS0	2	48	5240	19.25	18.90	22.76	
HT40	MCS0	2	38	5190	36.70	36.70	23.01	
HT40	MCS0	2	46	5230	37.00	36.70	23.01	

Maximum 99% Occupied Bandwidth



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3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

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.

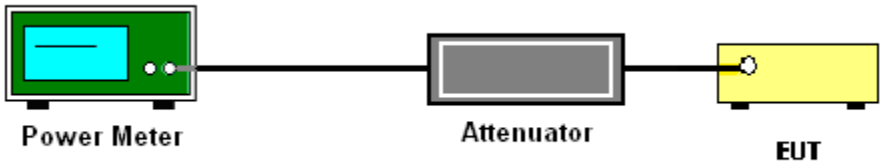
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.

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

Test Band :	5GHz band 1	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Power Limit (dBm)		DG (dBi)		Pass /Fail
					Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	Sum Power	Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	
11a	6Mbps	1	36	5180	0.29	0.29	14.98	12.57	-	24.00	24.00	2.90	3.17	Pass
11a	6Mbps	1	44	5220	0.29	0.29	14.37	11.67		24.00	24.00	2.90	3.17	Pass
11a	6Mbps	1	48	5240	0.29	0.29	15.25	12.13		24.00	24.00	2.90	3.17	Pass
HT20	MCS0	1	36	5180	0.32	0.31	14.26	12.56		24.00	24.00	2.90	3.17	Pass
HT20	MCS0	1	44	5220	0.32	0.31	13.49	11.36		24.00	24.00	2.90	3.17	Pass
HT20	MCS0	1	48	5240	0.32	0.31	13.63	11.62		24.00	24.00	2.90	3.17	Pass
HT40	MCS0	1	38	5190	0.60	0.61	13.67	10.57		24.00	24.00	2.90	3.17	Pass
HT40	MCS0	1	46	5230	0.60	0.61	13.75	9.62		24.00	24.00	2.90	3.17	Pass
HT20	MCS0	2	36	5180	0.31	0.31	14.81	13.73	17.32	23.95		6.05		Pass
HT20	MCS0	2	44	5220	0.31	0.31	14.60	13.82	17.24	23.95		6.05		Pass
HT20	MCS0	2	48	5240	0.31	0.31	14.64	13.73	17.22	23.95		6.05		Pass
HT40	MCS0	2	38	5190	0.60	0.65	12.39	11.48	14.97	23.95		6.05		Pass
HT40	MCS0	2	46	5230	0.60	0.65	12.32	11.36	14.88	23.95		6.05		Pass

Note:

1. Final Output Power equals to Measured Output Power adds the duty factor.
2. Sum Power is a calculated result from sum of the Chain Port 0+1(0) and Chain Port 0+1(1)

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
Section F) Maximum power spectral density.

 # Method SA-2 #

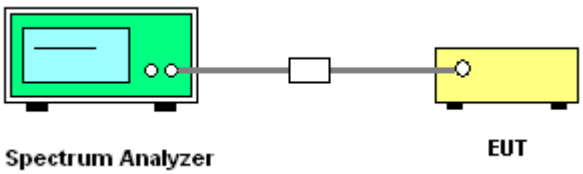
(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 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(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.
4. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

   Method (1): Measure and sum the spectra across the outputs.

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

3.3.4 Test Setup



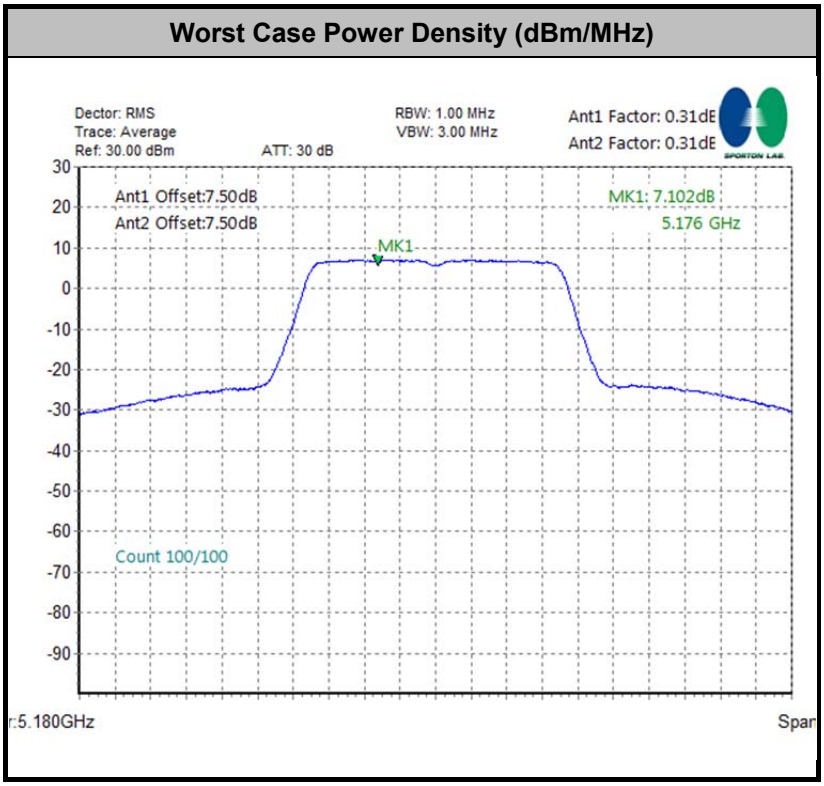
3.3.5 Test Result of Power Spectral Density

Test Band :	5GHz band 1	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	49~51%

Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)		Average Power Density (dBm/MHz)			Average PSD Limit (dBm)		DG (dBi)		Pass /Fail
					Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	Sum Power	Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	
11a	6Mbps	1	36	5180	0.29	0.29	6.15	-		11.00	11.00	2.90	3.17	Pass
11a	6Mbps	1	44	5220	0.29	0.29	6.03	-		11.00	11.00	2.90	3.17	Pass
11a	6Mbps	1	48	5240	0.29	0.29	6.83	-		11.00	11.00	2.90	3.17	Pass
HT20	MCS0	1	36	5180	0.32	0.31	5.74	-		11.00	11.00	2.90	3.17	Pass
HT20	MCS0	1	44	5220	0.32	0.31	5.99	-	-	11.00	11.00	2.90	3.17	Pass
HT20	MCS0	1	48	5240	0.32	0.31	6.45	-		11.00	11.00	2.90	3.17	Pass
HT40	MCS0	1	38	5190	0.60	0.61	0.75	-		11.00	11.00	2.90	3.17	Pass
HT40	MCS0	1	46	5230	0.60	0.61	1.15	-		11.00	11.00	2.90	3.17	Pass
HT20	MCS0	2	36	5180	0.31	0.31			7.10	10.95		6.05		Pass
HT20	MCS0	2	44	5220	0.31	0.31			6.93	10.95		6.05		Pass
HT20	MCS0	2	48	5240	0.31	0.31	-		7.08	10.95		6.05		Pass
HT40	MCS0	2	38	5190	0.60	0.65			1.78	10.95		6.05		Pass
HT40	MCS0	2	46	5230	0.60	0.65			1.95	10.95		6.05		Pass

Note: Sum PSD is a bin-by-bin combined result of Chain Port 0+1(0) and Chain Port 0+1(1).

Worst Case Power Density (dBm/MHz)



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 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

(2) Unwanted spurious emissions fallen in restricted bands 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) KDB789033 v01 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 v01. 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.

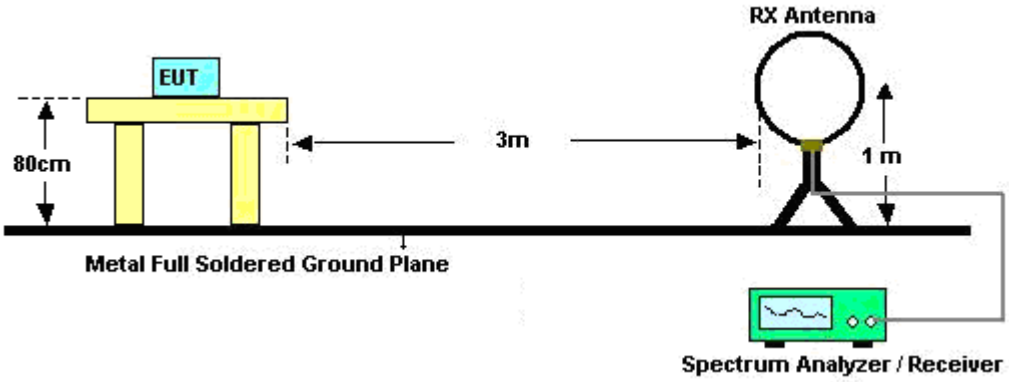
Chain Port	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
0	802.11a	93.464	1.430	0.699	1kHz
1	802.11a	93.464	1.430	0.699	1kHz
0+1	802.11n HT20	93.056	1.340	0.746	1kHz
0+1	802.11n HT40	87.080	0.674	1.484	3kHz

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.

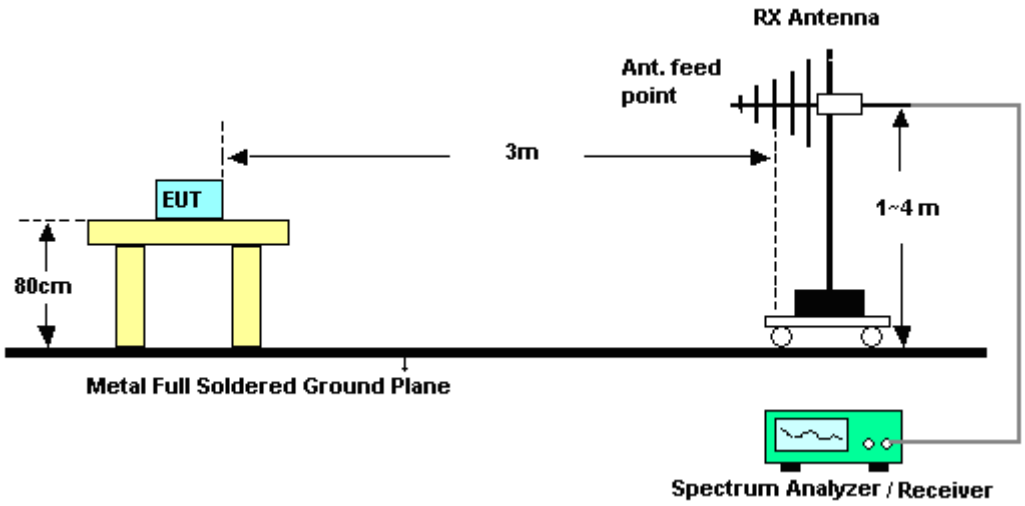
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level 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

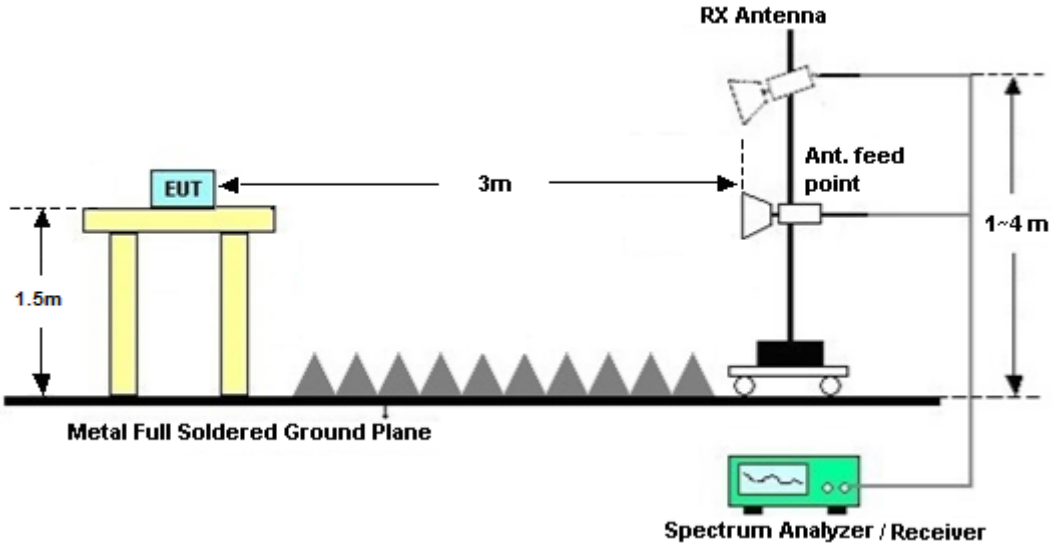
For radiated emissions below 30MHz



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 A.

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

Please refer to Appendix A.

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.

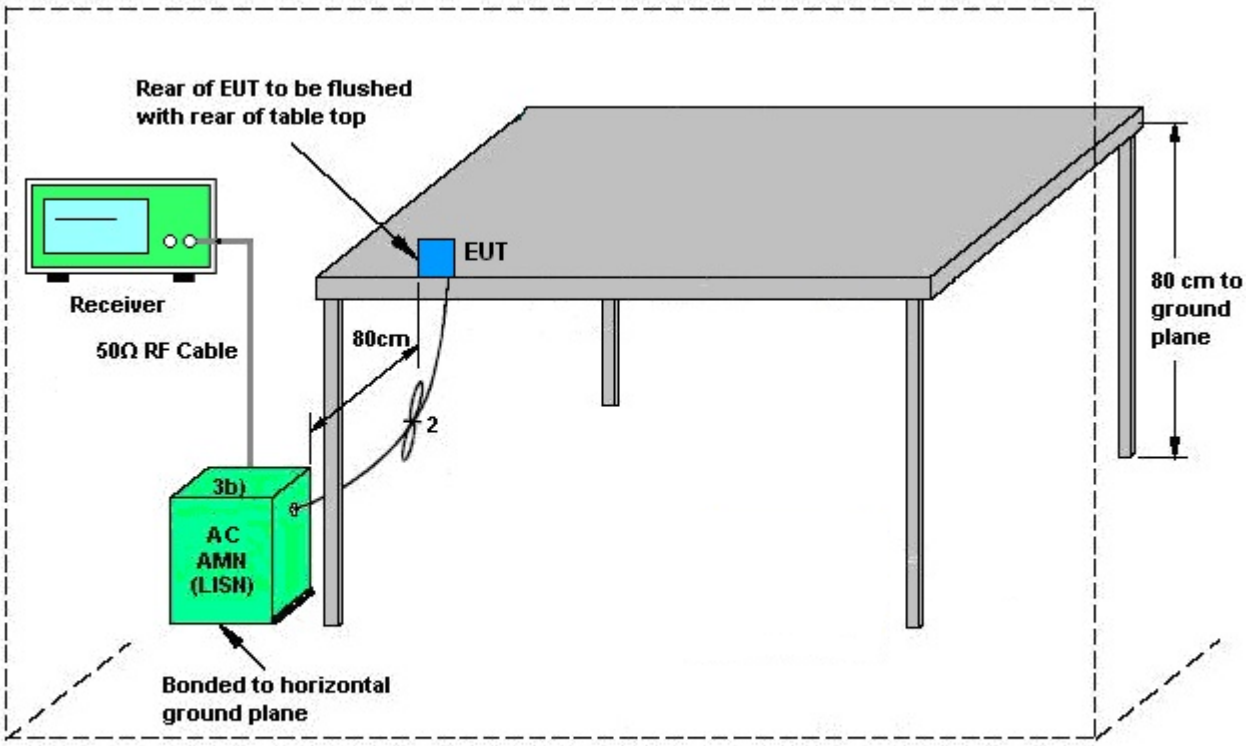
3.5.2 Measuring Instruments

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.

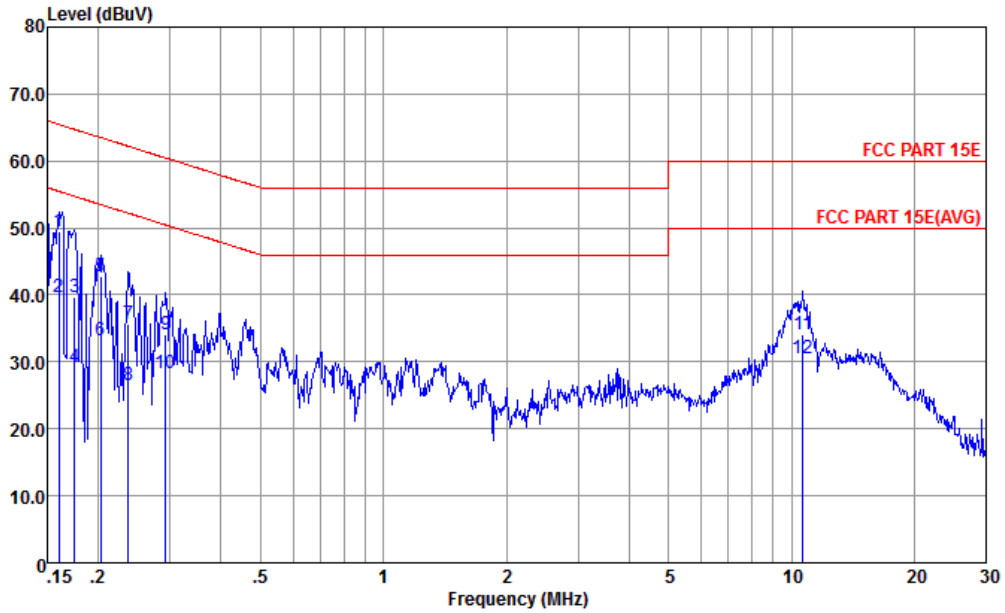
3.5.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN (5G) Link + Earphone + Adapter		

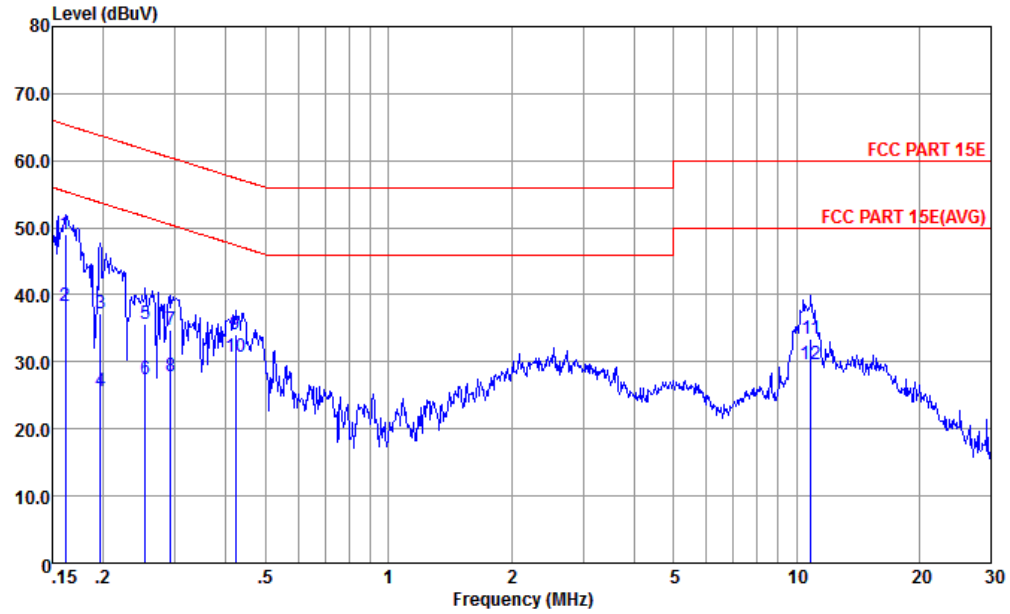


Site : CO01-KS
Condition : FCC PART 15E LISN-L20140306 LINE

mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.16	49.38	-16.09	65.47	37.20	1.79	10.39	QP
2	*	0.16	39.68	-15.79	55.47	27.50	1.79	10.39	Average
3		0.17	39.66	-25.06	64.72	27.80	1.42	10.44	QP
4		0.17	29.26	-25.46	54.72	17.40	1.42	10.44	Average
5		0.20	42.69	-20.80	63.49	31.20	0.99	10.50	QP
6		0.20	33.09	-20.40	53.49	21.60	0.99	10.50	Average
7		0.24	35.63	-26.59	62.22	24.20	0.91	10.52	QP
8		0.24	26.53	-25.69	52.22	15.10	0.91	10.52	Average
9		0.29	34.20	-26.26	60.46	22.90	0.73	10.57	QP
10		0.29	28.20	-22.26	50.46	16.90	0.73	10.57	Average
11		10.68	34.06	-25.94	60.00	22.90	0.20	10.96	QP
12		10.68	30.46	-19.54	50.00	19.30	0.20	10.96	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN (5G) Link + Earphone + Adapter		



Site : CO01-KS
Condition : FCC PART 15E LISN-N20140306 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	*	0.16	49.01	-16.37	65.38	36.90	1.71	10.40	QP
2		0.16	38.31	-17.07	55.38	26.20	1.71	10.40	Average
3		0.20	37.13	-26.63	63.76	25.61	1.03	10.49	QP
4		0.20	25.73	-28.03	53.76	14.21	1.03	10.49	Average
5		0.25	35.61	-26.03	61.64	24.20	0.88	10.53	QP
6		0.25	27.31	-24.33	51.64	15.90	0.88	10.53	Average
7		0.29	34.83	-25.63	60.46	23.50	0.76	10.57	QP
8		0.29	27.93	-22.53	50.46	16.60	0.76	10.57	Average
9		0.42	34.10	-23.32	57.42	23.11	0.37	10.62	QP
10		0.42	30.70	-16.72	47.42	19.71	0.37	10.62	Average
11		10.85	33.48	-26.52	60.00	22.31	0.21	10.96	QP
12		10.85	29.68	-20.32	50.00	18.51	0.21	10.96	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.

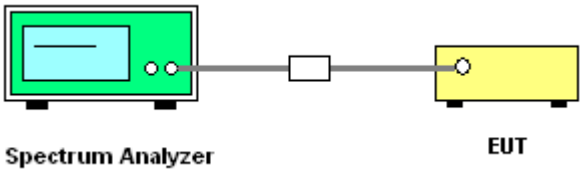
3.6.2 Measuring Instruments

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

Test Band :	5GHz band 1	Test Engineer :	Issac Song

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (℃)	Voltage (V)
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	3.5
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	4.2
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	3.8
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	-30	3.8
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	50	3.8

Note: Center Frequency = (Low Frequency + High Frequency) / 2.

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

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

where

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

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

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k / 20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

The EUT supports CDD mode.

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

The directional gain “DG” is calculated as following table.

	Chain Port 0 (dBi)	Chain Port 1 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
Band I	2.90	3.17	6.05	6.05	0.05	0.05

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

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 28, 2014	Oct. 29, 2014~ May 26, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV30	100845	9kHz~30GHz	Oct. 28, 2014	Oct. 29, 2014~ May 26, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Feb. 27, 2014 Jan. 23, 2015	Oct. 29, 2014~ May 26, 2015	Feb. 26, 2015 Jan. 22, 2016	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Feb. 27, 2014 Jan. 23, 2015	Oct. 29, 2014~ May 26, 2015	Feb. 26, 2015 Jan. 22, 2016	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 25, 2014	Oct. 29, 2014~ May 26, 2015	Oct. 24, 2015	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 29, 2014	May 04, 2015	Sep. 28, 2015	Radiation (03CH02-KS)
Spectrum Analyzer	R&S	FSV40	101040	10kHz~40GHz; Max 30dBm	Sep. 25, 2014	May 04, 2015	Sep. 24, 2015	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 13, 2014	May 04, 2015	Nov. 12, 2015	Radiation (03CH01-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz~2GHz	Sep. 13, 2014	May 04, 2015	Sep. 12, 2015	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2014	May 04, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 08, 2014	May 04, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
SHF-EHF Horn	com-power	AH-840	101070	18GHz~40GHz	Sep. 04, 2014	May 04, 2015	Sep. 03, 2015	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz~1000MHz / 32 dB	May 04, 2015	May 04, 2015	May 03, 2016	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1GHz~26.5GHz Gain 30dB	Oct. 28, 2014	May 04, 2015	Oct. 27, 2015	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	May 04, 2015	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 04, 2015	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 04, 2015	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	May 04, 2014	Apr. 24, 2015	May 03, 2015	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 25, 2014	Apr. 24, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 25, 2014	Apr. 24, 2015	Oct. 24, 2015	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 25, 2014	Apr. 24, 2015	Oct. 24, 2015	Conduction (CO01-KS)

5 Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1 dB**

Appendix A. Radiated Test Results

Band 1 - 5150~5250MHz

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.	
0		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		5139.6	57.6	-16.4	74	48.4	35.04	9.01	34.85	171	278	P	H
		5132.25	43.14	-10.86	54	33.89	35.04	9.01	34.8	171	278	A	H
	*	5178	96.71	-	-	87.56	35.05	9.06	34.96	171	278	P	H
	*	5172	86.21	-	-	77	35.05	9.06	34.9	171	278	A	H
		5144.7	59.81	-14.19	74	50.61	35.04	9.01	34.85	134	272	P	V
		5149	44.43	-9.57	54	35.23	35.04	9.01	34.85	134	272	A	V
	*	5174	107.38	-	-	98.23	35.05	9.06	34.96	192	353	P	V
	*	5182	97.17	-	-	88.02	35.05	9.06	34.96	192	353	A	V
802.11a CH 44 5220MHz	*	5214	95.83	-	-	86.84	35.06	9.1	35.17	162	24	P	H
	*	5214	85.62	-	-	76.63	35.06	9.1	35.17	162	24	A	H
	*	5220	108.77	-	-	99.78	35.06	9.1	35.17	185	13	P	V
	*	5220	98.52	-	-	89.53	35.06	9.1	35.17	185	13	A	V
802.11a CH 48 5240MHz		5365.15	56.88	-17.12	74	49.13	35.11	9.27	36.63	152	214	P	H
		5351.55	42.47	-11.53	54	34.6	35.11	9.23	36.47	152	214	A	H
	*	5240	97.91	-	-	89.07	35.07	9.1	35.33	152	214	P	H
	*	5236	87.28	-	-	78.44	35.07	9.1	35.33	152	214	A	H
		5351.65	58.18	-15.82	74	50.31	35.11	9.23	36.47	194	0	P	V
		5350.4	43.18	-10.82	54	35.31	35.11	9.23	36.47	194	0	A	V
	*	5234	109.33	-	-	100.49	35.07	9.1	35.33	194	0	P	V
	*	5246	97.9	-	-	89.18	35.08	9.14	35.5	194	0	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 0	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 36 5180MHz		10359	60.39	-13.61	74	70.04	38.3	13.15	61.1	225	221	P	H
		10359	46.24	-7.76	54	55.89	38.3	13.15	61.1	225	221	A	H
		10360	60.91	-13.09	74	70.56	38.3	13.15	61.1	187	269	P	V
		10360	47.23	-6.77	54	56.88	38.3	13.15	61.1	187	269	A	V
802.11a CH 44 5220MHz		10440	61.87	-12.13	74	71.41	38.35	13.18	61.07	150	328	P	H
		10440	47.67	-6.33	54	57.21	38.35	13.18	61.07	150	328	A	H
		10440	60.95	-13.05	74	70.49	38.35	13.18	61.07	158	324	P	V
		10440	46.74	-7.26	54	56.28	38.35	13.18	61.07	158	324	A	V
802.11a CH 48 5240MHz		10480	62.39	-11.61	74	71.84	38.39	13.2	61.04	206	275	P	H
		10480	47.18	-6.82	54	56.63	38.39	13.2	61.04	206	275	A	H
		10480	64.09	-9.91	74	73.54	38.39	13.2	61.04	163	304	P	V
	!	10480	49.87	-4.13	54	59.32	38.39	13.2	61.04	163	304	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

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.	
0		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a LF		32.91	22.48	-17.52	40	36.6	17.73	0.79	32.64	-	-	P	H
		53.28	24.94	-15.06	40	48.84	7.92	0.79	32.61	-	-	P	H
	!	67.83	34.42	-5.58	40	58.48	7.78	0.79	32.63	163	57	P	H
		110.51	20.8	-22.7	43.5	40.83	11.38	1.23	32.64	-	-	P	H
		151.25	24.48	-19.02	43.5	43.94	11.66	1.44	32.56	-	-	P	H
		195.87	32.21	-11.29	43.5	53.12	9.95	1.61	32.47	-	-	P	H
		32.91	32.21	-7.79	40	46.33	17.73	0.79	32.64	-	-	P	V
	!	53.28	35.43	-4.57	40	59.33	7.92	0.79	32.61	-	-	P	V
	!	67.83	36.95	-3.05	40	61.01	7.78	0.79	32.63	106	261	QP	V
		71.71	33.63	-6.37	40	56.88	8.36	1.04	32.65	-	-	P	V
		111.48	25.16	-18.34	43.5	45.18	11.39	1.23	32.64	-	-	P	V
		195.87	25.39	-18.11	43.5	46.3	9.95	1.61	32.47	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Band 1 - 5150~5250MHz

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 36 5180MHz		5148.8	62.66	-11.34	74	53.46	35.04	9.01	34.85	191	222	P	H
		5148.55	46.14	-7.86	54	36.94	35.04	9.01	34.85	191	222	A	H
	*	5176	103.85	-	-	94.7	35.05	9.06	34.96	191	222	P	H
	*	5176	93.78	-	-	84.63	35.05	9.06	34.96	191	222	A	H
		5149.45	64.22	-9.78	74	55.02	35.04	9.01	34.85	131	251	P	V
		5149.75	47.17	-6.83	54	37.97	35.04	9.01	34.85	131	251	A	V
	*	5174	105.83	-	-	96.68	35.05	9.06	34.96	131	251	P	V
	*	5174	95.98	-	-	86.83	35.05	9.06	34.96	131	251	A	V
802.11a CH 44 5220MHz	*	5216	103.98	-	-	94.99	35.06	9.1	35.17	164	216	P	H
	*	5212	94.07	-	-	85.08	35.06	9.1	35.17	164	216	A	H
	*	5216	106.97	-	-	97.98	35.06	9.1	35.17	119	249	P	V
	*	5212	97.13	-	-	88.14	35.06	9.1	35.17	119	249	A	V
802.11a CH 48 5240MHz		5364.45	56.66	-17.34	74	48.91	35.11	9.27	36.63	108	221	P	H
		5379.8	42.65	-11.35	54	35.06	35.12	9.27	36.8	108	221	A	H
	*	5240	104.52	-	-	95.68	35.07	9.1	35.33	108	221	P	H
	*	5242	94.11	-	-	85.43	35.08	9.1	35.5	108	221	A	H
		5372.45	57.1	-16.9	74	49.35	35.11	9.27	36.63	110	248	P	V
		5353.35	42.85	-11.15	54	34.98	35.11	9.23	36.47	110	248	A	V
	*	5240	107.06	-	-	98.22	35.07	9.1	35.33	110	248	P	V
	*	5234	96.4	-	-	87.56	35.07	9.1	35.33	110	248	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 36 5180MHz		10360	59.2	-14.8	74	68.85	38.3	13.15	61.1	182	347	P	H
		10360	45.29	-8.71	54	54.94	38.3	13.15	61.1	182	347	A	H
		10360	57.12	-16.88	74	66.77	38.3	13.15	61.1	182	246	P	V
		10360	42.98	-11.02	54	52.63	38.3	13.15	61.1	182	246	A	V
802.11a CH 44 5220MHz		10440	59.68	-14.32	74	69.22	38.35	13.18	61.07	173	49	P	H
		10440	46.36	-7.64	54	55.9	38.35	13.18	61.07	173	49	A	H
		10440	58.73	-15.27	74	68.27	38.35	13.18	61.07	214	342	P	V
		10440	45.08	-8.92	54	54.62	38.35	13.18	61.07	214	342	A	V
802.11a CH 48 5240MHz		10480	64.64	-9.36	74	74.09	38.39	13.2	61.04	225	244	P	H
	!	10480	50.23	-3.77	54	59.68	38.39	13.2	61.04	225	244	A	H
		10480	61.19	-12.81	74	70.64	38.39	13.2	61.04	163	227	P	V
		10480	46.78	-7.22	54	56.23	38.39	13.2	61.04	163	227	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

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)
802.11a LF		32.91	24.48	-15.52	40	38.6	17.73	0.79	32.64			P	H
		53.28	26.94	-13.06	40	50.84	7.92	0.79	32.61			P	H
	!	67.83	36.42	-3.58	40	60.48	7.78	0.79	32.63	174	26	P	H
		110.51	23.8	-19.7	43.5	43.83	11.38	1.23	32.64			P	H
		151.25	22.48	-21.02	43.5	41.94	11.66	1.44	32.56			P	H
		195.87	30.21	-13.29	43.5	51.12	9.95	1.61	32.47			P	H
		32.91	31.21	-8.79	40	45.33	17.73	0.79	32.64			P	V
	!	53.28	34.43	-5.57	40	58.33	7.92	0.79	32.61			P	V
	!	67.83	36.45	-3.55	40	60.51	7.78	0.79	32.63	161	43	QP	V
		111.48	28.16	-15.34	43.5	48.18	11.39	1.23	32.64			P	V
		152.22	26.91	-16.59	43.5	46.4	11.63	1.44	32.56			P	V
		195.87	28.39	-15.11	43.5	49.3	9.95	1.61	32.47			P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 0+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)
		5149.95	67.68	-6.32	74	58.48	35.04	9.01	34.85	265	356	P	H
	!	5149.85	50.14	-3.86	54	40.94	35.04	9.01	34.85	265	356	A	H
802.11n	*	5174	109.1	-	-	99.95	35.05	9.06	34.96	265	356	P	H
HT20	*	5176	99.15	-	-	90	35.05	9.06	34.96	265	356	A	H
CH 36		5149.55	64.77	-9.23	74	55.57	35.04	9.01	34.85	154	111	P	V
5180MHz		5149.7	47.27	-6.73	54	38.07	35.04	9.01	34.85	154	111	A	V
	*	5174	103.07	-	-	93.92	35.05	9.06	34.96	154	111	P	V
	*	5172	92.55	-	-	83.34	35.05	9.06	34.9	154	111	A	V
802.11n	*	5214	108.36	-	-	99.37	35.06	9.1	35.17	173	28	P	H
HT20	*	5216	98.7	-	-	89.71	35.06	9.1	35.17	173	28	A	H
CH 44	*	5226	103.96	-	-	95.12	35.07	9.1	35.33	158	108	P	V
5220MHz	*	5222	93.01	-	-	84.02	35.06	9.1	35.17	158	108	A	V
		5350.45	57.03	-16.97	74	49.16	35.11	9.23	36.47	152	358	P	H
		5353.45	43	-11	54	35.13	35.11	9.23	36.47	152	358	A	H
802.11n	*	5236	109.73	-	-	100.89	35.07	9.1	35.33	152	358	P	H
HT20	*	5242	99.53	-	-	90.85	35.08	9.1	35.5	152	358	A	H
CH 48		5395.25	56.27	-17.73	74	48.84	35.12	9.27	36.96	176	114	P	V
5240MHz		5350.35	42.25	-11.75	54	34.38	35.11	9.23	36.47	176	114	A	V
	*	5242	103.5	-	-	94.82	35.08	9.1	35.5	176	114	P	V
	*	5244	92.84	-	-	84.12	35.08	9.14	35.5	176	114	A	V

Remark

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

Band 1 5150~5250MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 0+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		10360	62.7	-11.3	74	72.35	38.3	13.15	61.1	151	122	P	H
HT20	!	10360	48.62	-5.38	54	58.27	38.3	13.15	61.1	151	122	A	H
CH 36		10360	62.33	-11.67	74	71.98	38.3	13.15	61.1	206	226	P	V
5180MHz		10360	47.75	-6.25	54	57.4	38.3	13.15	61.1	206	226	A	V
802.11n		10440	61.83	-12.17	74	71.37	38.35	13.18	61.07	150	127	P	H
HT20	!	10440	48.74	-5.26	54	58.28	38.35	13.18	61.07	150	127	A	H
CH 44		10440	63.3	-10.7	74	72.84	38.35	13.18	61.07	175	103	P	V
5220MHz	!	10440	48.69	-5.31	54	58.23	38.35	13.18	61.07	175	103	A	V
802.11n		10480	63.81	-10.19	74	73.26	38.39	13.2	61.04	150	208	P	H
HT20	!	10480	50.07	-3.93	54	59.52	38.39	13.2	61.04	150	208	A	H
CH 48		10480	63.36	-10.64	74	72.81	38.39	13.2	61.04	201	354	P	V
5240MHz		10480	47.12	-6.88	54	56.57	38.39	13.2	61.04	201	354	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 0+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)
	!	5150	68.53	-5.47	74	59.33	35.04	9.01	34.85	243	59	P	H
	!	5150	52.92	-1.08	54	43.72	35.04	9.01	34.85	243	59	A	H
802.11n	*	5206	104.09	-	-	94.94	35.06	9.1	35.01	243	59	P	H
HT40	*	5200	93.43	-	-	84.32	35.06	9.06	35.01	243	59	A	H
CH 38		5149.75	65.92	-8.08	74	56.72	35.04	9.01	34.85	150	360	P	V
5190MHz	!	5149.4	50.86	-3.14	54	41.66	35.04	9.01	34.85	150	360	A	V
	*	5204	102.12	-	-	92.97	35.06	9.1	35.01	150	360	P	V
	*	5204	92.54	-	-	83.39	35.06	9.1	35.01	150	360	A	V
		5362.35	56.53	-17.47	74	48.78	35.11	9.27	36.63	250	66	P	H
		5382.3	43.19	-10.81	54	35.6	35.12	9.27	36.8	250	66	A	H
802.11n	*	5240	104.16	-	-	95.32	35.07	9.1	35.33	250	66	P	H
HT40	*	5234	93.3	-	-	84.46	35.07	9.1	35.33	250	66	A	H
CH 46		5354.95	56.91	-17.09	74	49.04	35.11	9.23	36.47	150	350	P	V
5230MHz		5364.15	43.48	-10.52	54	35.73	35.11	9.27	36.63	150	350	A	V
	*	5236	103.7	-	-	94.86	35.07	9.1	35.33	150	350	P	V
	*	5236	93.77	-	-	84.93	35.07	9.1	35.33	150	350	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 0+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		10389	56.43	-17.57	74	66.05	38.31	13.17	61.1	188	330	P	H
HT40		10389	43.44	-10.56	54	53.06	38.31	13.17	61.1	188	330	A	H
CH 38		10377	54.83	-19.17	74	64.45	38.31	13.17	61.1	150	273	P	V
5190MHz		10377	40.42	-13.58	54	50.04	38.31	13.17	61.1	150	273	A	V
802.11n		10458	55.67	-18.33	74	65.17	38.36	13.2	61.06	161	0	P	H
HT40		10458	39.98	-14.02	54	49.48	38.36	13.2	61.06	161	0	A	H
CH 46		10470	54.09	-19.91	74	63.56	38.38	13.2	61.05	150	276	P	V
5230MHz		10470	40.92	-13.08	54	50.39	38.38	13.2	61.05	150	276	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

WIFI 802.11n HT20 (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.	
0+1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 LF		32.91	30.48	-9.52	40	44.6	17.73	0.79	32.64	-	-	P	H
		53.28	31.94	-8.06	40	55.84	7.92	0.79	32.61	-	-	P	H
	!	65.89	35.31	-4.69	40	59.76	7.36	0.79	32.6	182	31	P	H
		110.51	29.8	-13.7	43.5	49.83	11.38	1.23	32.64	-	-	P	H
		151.25	26.48	-17.02	43.5	45.94	11.66	1.44	32.56	-	-	P	H
		195.87	32.21	-11.29	43.5	53.12	9.95	1.61	32.47	-	-	P	H
		32.91	33.21	-6.79	40	47.33	17.73	0.79	32.64	-	-	P	V
	!	53.28	36.43	-3.57	40	60.33	7.92	0.79	32.61	-	-	P	V
	!	67.83	35.95	-4.05	40	60.01	7.78	0.79	32.63	186	223	QP	V
		111.48	31.16	-12.34	43.5	51.18	11.39	1.23	32.64	-	-	P	V
		144.46	31.09	-12.41	43.5	50.77	11.65	1.23	32.56	-	-	P	V
		192.96	31.75	-11.75	43.5	52.55	10.06	1.61	32.47	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Emission below 1GHz

WIFI 802.11n HT40 (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.	
0+1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 LF		32.91	29.48	-10.52	40	43.6	17.73	0.79	32.64	-	-	P	H
		53.28	30.94	-9.06	40	54.84	7.92	0.79	32.61	-	-	P	H
	!	65.89	34.31	-5.69	40	58.76	7.36	0.79	32.6	163	25	P	H
		110.51	28.8	-14.7	43.5	48.83	11.38	1.23	32.64	-	-	P	H
		148.34	26.28	-17.22	43.5	45.72	11.68	1.44	32.56	-	-	P	H
		195.87	32.21	-11.29	43.5	53.12	9.95	1.61	32.47	-	-	P	H
	!	32.91	34.21	-5.79	40	48.33	17.73	0.79	32.64	-	-	P	V
	!	53.28	36.43	-3.57	40	60.33	7.92	0.79	32.61	-	-	P	V
	!	67.83	35.95	-4.05	40	60.01	7.78	0.79	32.63	152	147	QP	V
		127.97	31.63	-11.87	43.5	51.49	11.52	1.23	32.61	-	-	P	V
		144.46	33.09	-10.41	43.5	52.77	11.65	1.23	32.56	-	-	P	V
		192.96	34.75	-8.75	43.5	55.55	10.06	1.61	32.47	-	-	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.	
0+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".