

FCC RF Test Report

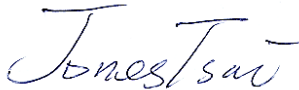
APPLICANT : ZTE CORPORATION
EQUIPMENT : Outdoor Wireless AP
BRAND NAME : ZTE
MODEL NAME : ZXV10 W615 V3
FCC ID : Q78-ZXW3614B
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Jul. 25, 2014 and testing was completed on Mar. 17, 2015. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL (SHENZHEN) INC.

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TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Feature of Equipment Under Test	5
1.4 Product Specification of Equipment Under Test	6
1.5 Modification of EUT	7
1.6 Testing Location	7
1.7 Applicable Standards	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	8
2.1 Carrier Frequency and Channel	8
2.2 Pre-Scanned RF Power	9
2.3 Test Mode	11
2.4 Connection Diagram of Test System	12
2.5 Support Unit used in test configuration and system	13
2.6 EUT Operation Test Setup	13
2.7 Measurement Results Explanation Example	13
3 TEST RESULT	14
3.1 6dB & 26dB Bandwidth Measurement	14
3.2 Maximum Conducted Output Power Measurement	17
3.3 Power Spectral Density Measurement	19
3.4 Unwanted Emissions Measurement	23
3.5 AC Conducted Emission Measurement	42
3.6 Frequency Stability Measurement	46
3.7 Automatically Discontinue Transmission	48
3.8 Antenna Requirements	49
4 LIST OF MEASURING EQUIPMENT	50
5 UNCERTAINTY OF EVALUATION	51
APPENDIX A. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR472505C	Rev. 01	Initial issue of report	Mar. 20, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB Bandwidth	> 500kHz	Pass	-
3.1	15.403(i)	26dB Bandwidth	-	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	≤ -17, -27 dBm/MHz & 15.209(a)	Pass	Under limit 1.85 dB at 5862.56 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 5.62 dB at 0.350 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

NO. 55. Hi-tec Road South, Shenzhen, P. R. China Postcode: 518057

1.2 Manufacturer

ZTE CORPORATION

NO. 55. Hi-tec Road South, Shenzhen, P. R. China Postcode: 518057

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Outdoor Wireless AP
Brand Name	ZTE
Model Name	ZXV10 W615 V3
FCC ID	Q78-ZXW3614B
EUT supports Radios application	WLAN2.4GHz 802.11b/g/n HT20/HT40 WLAN5GHz 802.11a/n HT20/HT40
HW Version	V3.0
SW Version	V2.0
EUT Stage	Production Unit

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

Product Specification subjective to this standard			
Tx/Rx Channel Frequency Range	5725 MHz ~ 5850 MHz		
Maximum Output Power	802.11a : 24.03 dBm / 0.2529 W 802.11n HT20 : 26.48 dBm / 0.4446 W 802.11n HT40 : 18.92 dBm / 0.0780 W		
Minimum 6dB Bandwidth	802.11a : 16.04 MHz 802.11n HT20 : 16.88 MHz 802.11n HT40 : 35.68 MHz		
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)		
Antenna Type / Gain	Chain Port 0 : N-type Dipole Antenna with gain 3.43 dBi Chain Port 1 : N-type Dipole Antenna with gain 3.43 dBi		
Antenna Function Description		Chain Port 0	Chain Port 1
	802.11 a/n SISO	V	V
	802.11 a/n MIMO	V	V

1.5 Modification of EUT

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

1.6 Testing Location

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	1F & 2F,Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	Sporton Site No.	
	TH01-SZ	CO01-SZ

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755- 3320-2398	
Test Site No.	Sporton Site No.	FCC Registration No.
	03CH01-SZ	831040

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 C63.4-2003

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).

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

WLAN 5GHz 802.11a Output 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 149	5745	0	20.79	CH 165	21.03	20.91	20.81	21.02	20.88	20.99	21.02
CH 157	5785	0	20.65								
CH 165	5825	0	21.05								
CH 149	5745	1	20.40	CH 165	20.70	20.68	20.77	20.74	20.77	20.65	20.69
CH 157	5785	1	20.29								
CH 165	5825	1	20.82								
CH 149	5745	0+1(0)	20.95	CH 149	20.74	20.80	20.92	20.90	20.79	20.90	20.83
CH 157	5785	0+1(0)	20.34								
CH 165	5825	0+1(0)	20.57								
CH 149	5745	0+1(1)	21.08	CH 149	21.01	21.03	20.87	20.97	20.93	20.95	21.01
CH 157	5785	0+1(1)	20.60								
CH 165	5825	0+1(1)	20.88								
CH 149	5745	0+1	24.03	CH 149	23.88	23.92	23.91	23.95	23.87	23.94	23.93
CH 157	5785	0+1	23.48								
CH 165	5825	0+1	23.74								

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 149	5745	0	22.45	CH 149	22.42	22.42	22.41	22.43	22.41	22.40	22.42
CH 157	5785	0	22.20								
CH 165	5825	0	22.14								
CH 149	5745	1	23.13	CH 149	23.05	23.07	23.02	23.11	23.04	23.03	22.94
CH 157	5785	1	22.76								
CH 165	5825	1	22.92								
CH 149	5745	0+1(0)	23.36	CH 165	23.11	23.12	23.13	23.03	23.02	23.05	23.10
CH 157	5785	0+1(0)	22.93								
CH 165	5825	0+1(0)	23.18								
CH 149	5745	0+1(1)	23.45	CH 165	23.63	23.66	23.69	23.82	23.71	23.61	23.36
CH 157	5785	0+1(1)	23.02								
CH 165	5825	0+1(1)	23.74								
CH 149	5745	0+1	26.42	CH 165	26.39	26.41	26.43	26.45	26.39	26.35	26.24
CH 157	5785	0+1	25.99								
CH 165	5825	0+1	26.48								



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 151	5755	0	14.90	CH 159	15.09	15.13	15.21	15.21	15.16	15.09	14.74
CH 159	5795	0	15.22								
CH 151	5755	1	16.17	CH 151	16.08	16.04	16.04	16.02	16.15	16.15	16.03
CH 159	5795	1	15.99								
CH 151	5755	0+1(0)	15.59	CH 159	15.47	15.42	15.30	15.53	15.64	15.64	15.60
CH 159	5795	0+1(0)	15.67								
CH 151	5755	0+1(1)	15.69	CH 159	16.07	16.10	16.10	16.01	16.11	15.99	15.93
CH 159	5795	0+1(1)	16.13								
CH 151	5755	0+1	18.65	CH 159	18.80	18.78	18.73	18.79	18.89	18.83	18.78
CH 159	5795	0+1	18.92								

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

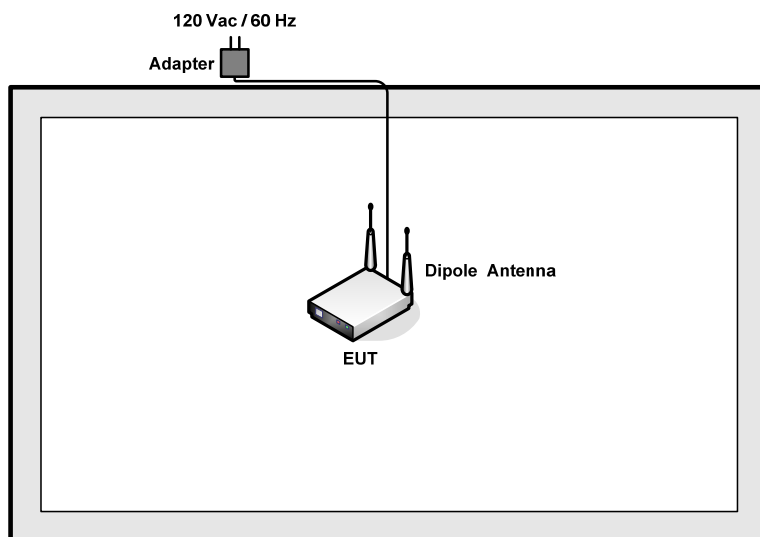
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
Conducted TCs	Test Items	Mode	Data rate	Test Channel
	6dB Bandwidth 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 : WLAN (5G) Link + Adapter + Lan Link			

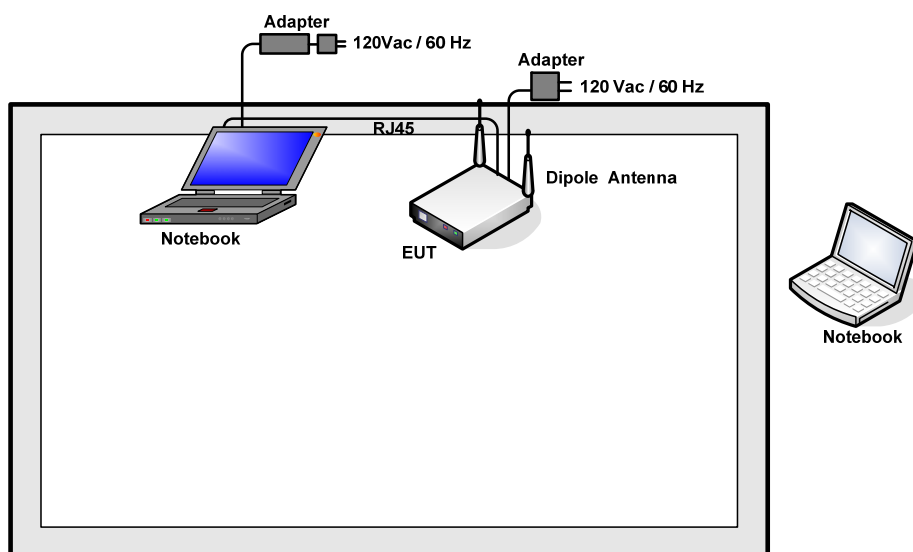
Ch. #		Band IV : 5725-5850 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

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.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	Adaptor	ZTE	RD4800850-C55-CMG	Fcc DoC	N/A	Unshielded, 1.8m
3.	Dipole antenna	N/A	N/A	N/A	N/A	N/A

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 notebook under large package sizes transmission.

2.7 Measurement Results Explanation Example

For all conducted test items:

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

Example :

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5.5 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 5.5 + 10 = 15.5 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 6dB & 26dB Bandwidth Measurement

3.1.1 Description of 26dB & 6dB Bandwidth

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

There is no restriction limits for 26dB bandwidth.

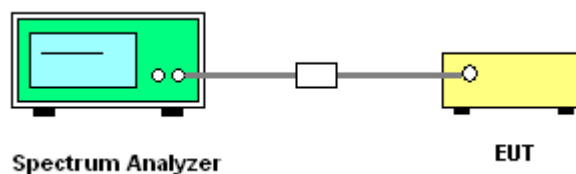
3.1.2 Measuring Instruments

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 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 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%.
8. Measure and record the results in the test report.

3.1.4 Test Setup

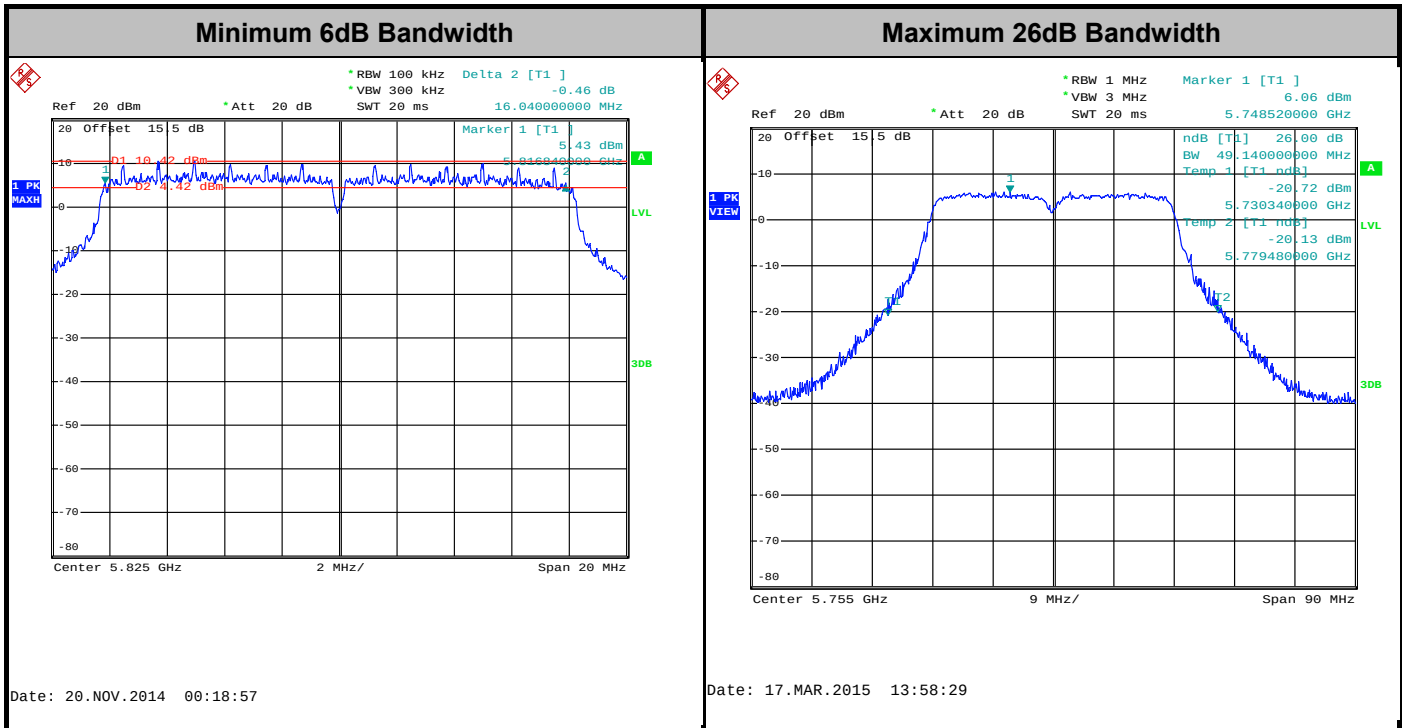




3.1.5 Test Result of 6dB Bandwidth

Test Band :	5GHz band 4	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		FCC 6 dB Bandwidth Min. Limit (MHz)		Pass/Fail
					Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	
11a	6Mbps	1	149	5745	25.15	25.15	16.32	16.28	0.5	0.5	Pass
11a	6Mbps	1	157	5785	25.25	25.25	16.32	16.28	0.5	0.5	Pass
11a	6Mbps	1	165	5825	25.25	25.50	16.32	16.04	0.5	0.5	Pass
HT20	MCS0	1	149	5745	26.15	25.70	17.28	17.28	0.5	0.5	Pass
HT20	MCS0	1	157	5785	25.70	25.40	17.24	17.24	0.5	0.5	Pass
HT20	MCS0	1	165	5825	25.90	25.75	17.04	17.28	0.5	0.5	Pass
HT40	MCS0	1	151	5755	49.14	48.60	36.32	35.92	0.5	0.5	Pass
HT40	MCS0	1	159	5795	48.69	48.15	36.08	35.76	0.5	0.5	Pass
11a	6Mbps	2	149	5745	25.45	24.35	16.32	16.30	0.5	0.5	Pass
11a	6Mbps	2	157	5785	25.15	24.30	16.28	16.30	0.5	0.5	Pass
11a	6Mbps	2	165	5825	25.45	24.00	16.28	16.28	0.5	0.5	Pass
HT20	MCS0	2	149	5745	25.75	25.50	17.52	17.20	0.5	0.5	Pass
HT20	MCS0	2	157	5785	25.90	25.50	17.28	17.28	0.5	0.5	Pass
HT20	MCS0	2	165	5825	25.90	25.65	17.32	16.88	0.5	0.5	Pass
HT40	MCS0	2	151	5755	48.96	48.06	36.00	35.68	0.5	0.5	Pass
HT40	MCS0	2	159	5795	48.60	48.06	35.92	35.68	0.5	0.5	Pass



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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For 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.

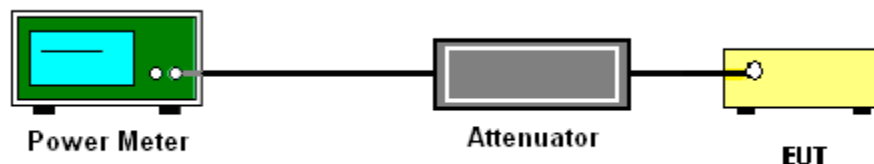
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules 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 4	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Mod.	Data Rate	N _T x	Channel	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass /Fail
					Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	SUM	Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	
11a	6Mbps	1	149	5745	0.14	0.14	20.79	20.40	-	30.00	30.00	3.43	3.43	Pass
11a	6Mbps	1	157	5785	0.14	0.14	20.65	20.29		30.00	30.00	3.43	3.43	Pass
11a	6Mbps	1	165	5825	0.14	0.14	21.05	20.82		30.00	30.00	3.43	3.43	Pass
HT20	MCS0	1	149	5745	0.16	0.16	22.45	23.13		30.00	30.00	3.43	3.43	Pass
HT20	MCS0	1	157	5785	0.16	0.16	22.20	22.76		30.00	30.00	3.43	3.43	Pass
HT20	MCS0	1	165	5825	0.16	0.16	22.14	22.92		30.00	30.00	3.43	3.43	Pass
HT40	MCS0	1	151	5755	0.24	0.24	14.90	16.17		30.00	30.00	3.43	3.43	Pass
HT40	MCS0	1	159	5795	0.24	0.24	15.22	15.99		30.00	30.00	3.43	3.43	Pass
11a	6Mbps	2	149	5745	0.14	0.14	20.95	21.08	24.03	30.00		3.43		Pass
11a	6Mbps	2	157	5785	0.14	0.14	20.34	20.60	23.48	30.00		3.43		Pass
11a	6Mbps	2	165	5825	0.14	0.14	20.57	20.88	23.74	30.00		3.43		Pass
HT20	MCS0	2	149	5745	0.16	0.16	23.36	23.45	26.42	30.00		3.43		Pass
HT20	MCS0	2	157	5785	0.16	0.16	22.93	23.02	25.99	30.00		3.43		Pass
HT20	MCS0	2	165	5825	0.16	0.16	23.18	23.74	26.48	30.00		3.43		Pass
HT40	MCS0	2	151	5755	0.24	0.24	15.59	15.69	18.65	30.00		3.43		Pass
HT40	MCS0	2	159	5795	0.24	0.24	15.67	16.13	18.92	30.00		3.43		Pass

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

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 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).

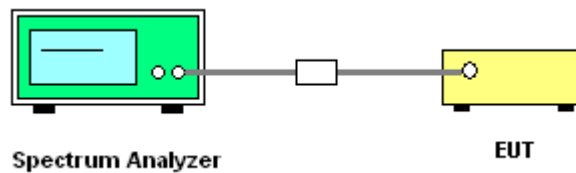
1. The testing follows Method SA-2 of FCC KDB 789033 D01 General UNII Test Procedures v01r03.
 - Measure the duty cycle.
 - Set span to encompass the entire emission bandwidth (EBW) of the signal.
 - Set RBW = 300 kHz.
 - Set VBW $\geq$ 1 MHz.
 - Number of points in sweep $\geq$ 2 Span / RBW.
 - Sweep 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.
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

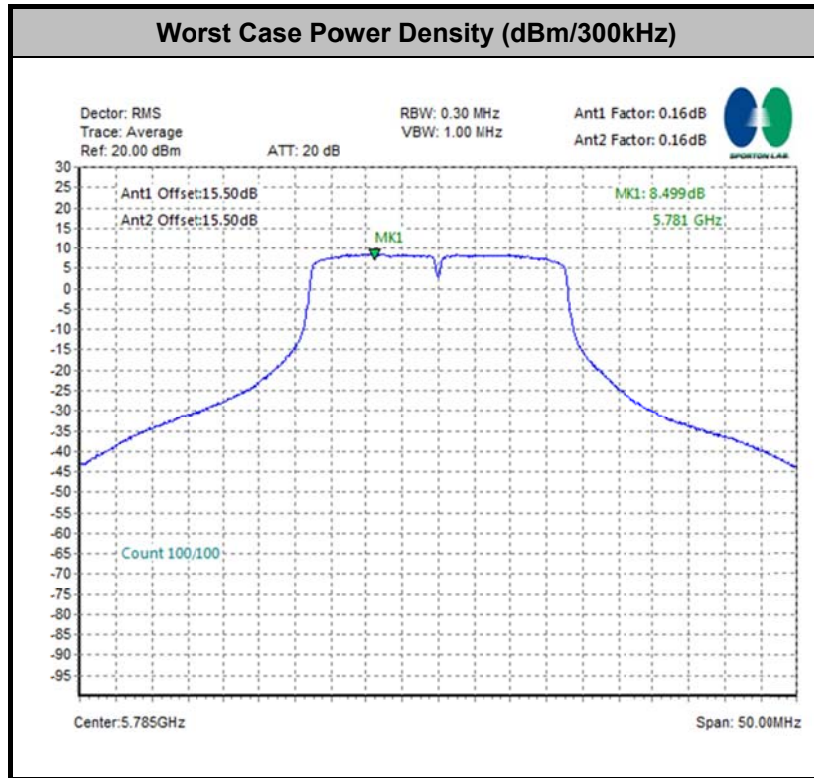




3.3.5 Test Result of Power Spectral Density

Test Band :	5GHz band 4	Temperature :	24~26℃
Test Engineer :	Fly Liang	Relative Humidity :	50~53%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Duty Factor (dB)		10log (500kHz /RBW) Factor (dB)		Average Power Density (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	Chain Port 0	Chain Port 1	SUM	Chain Port 0	Chain Port 1	Chain Port0	Chain Port 1	
11a	6Mbps	1	149	5745	0.14	0.14	2.22	2.22	6.58	7.30	-	30.00	30.00	3.43	3.43	Pass
11a	6Mbps	1	157	5785	0.14	0.14	2.22	2.22	6.52	6.97		30.00	30.00	3.43	3.43	Pass
11a	6Mbps	1	165	5825	0.14	0.14	2.22	2.22	6.30	6.67		30.00	30.00	3.43	3.43	Pass
HT20	MCS0	1	149	5745	0.16	0.16	2.22	2.22	7.63	8.09		30.00	30.00	3.43	3.43	Pass
HT20	MCS0	1	157	5785	0.16	0.16	2.22	2.22	7.45	8.10		30.00	30.00	3.43	3.43	Pass
HT20	MCS0	1	165	5825	0.16	0.16	2.22	2.22	7.33	7.96		30.00	30.00	3.43	3.43	Pass
HT40	MCS0	1	151	5755	0.24	0.24	2.22	2.22	-2.82	-1.20		30.00	30.00	3.43	3.43	Pass
HT40	MCS0	1	159	5795	0.24	0.24	2.22	2.22	-2.31	-1.55		30.00	30.00	3.43	3.43	Pass
11a	6Mbps	2	149	5745	0.14	0.14	2.22		-			9.85	29.56		6.44	Pass
11a	6Mbps	2	157	5785	0.14	0.14	2.22					10.01	29.56		6.44	Pass
11a	6Mbps	2	165	5825	0.14	0.14	2.22					9.67	29.56		6.44	Pass
HT20	MCS0	2	149	5745	0.16	0.16	2.22					10.59	29.56		6.44	Pass
HT20	MCS0	2	157	5785	0.16	0.16	2.22					10.72	29.56		6.44	Pass
HT20	MCS0	2	165	5825	0.16	0.16	2.22					10.72	29.56		6.44	Pass
HT40	MCS0	2	151	5755	0.24	0.24	2.22					0.29	29.56		6.44	Pass
HT40	MCS0	2	159	5795	0.24	0.24	2.22					0.45	29.56		6.44	Pass



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 5725-5850 MHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBμV/m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBμV/m).
- (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.

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

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

- (3) KDB789033 v01r03 H)2)c)(i) 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 $\geq$ 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.

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
0+1	802.11a	96.83	1.36	0.74	1kHz
0+1	802.11n HT20	96.39	1.28	0.78	1kHz
0+1	802.11n HT40	94.64	0.64	1.57	3kHz

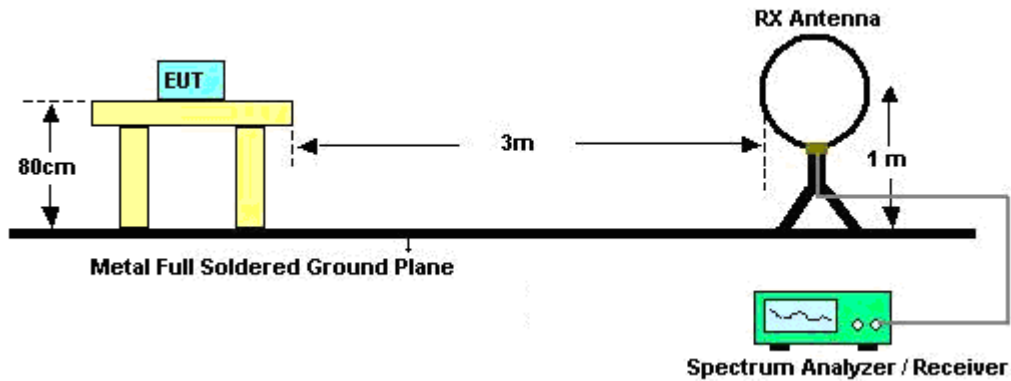
2. The EUT was placed on a rotatable table top 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.



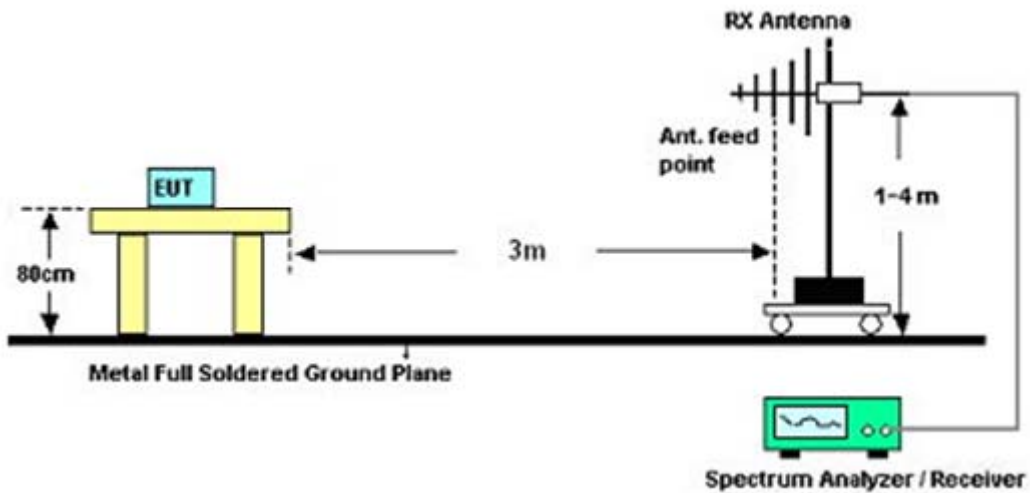
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst 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

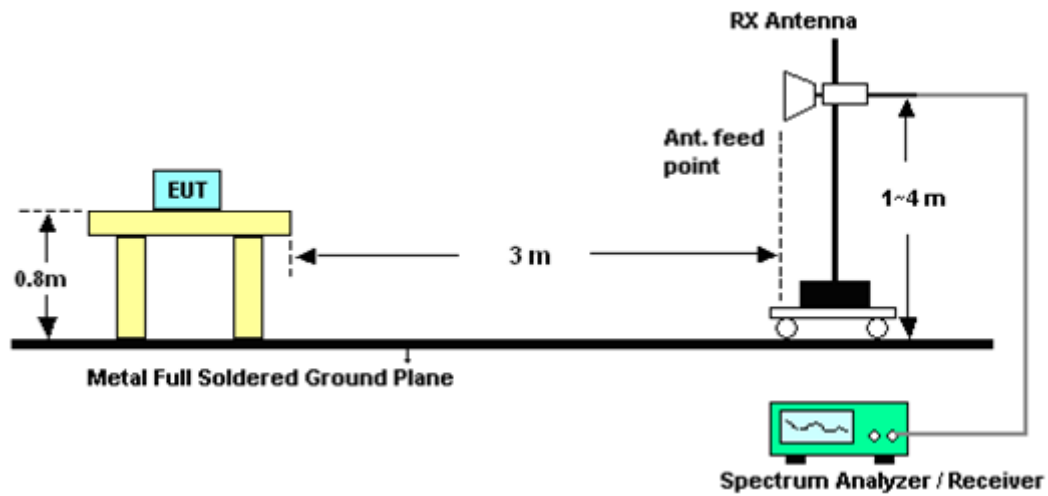
For radiated emissions below 30MHz



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

Chain Port 0+1

Test Mode :	802.11a	Temperature :	23~25°C
Test Channel :	149	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5697.08	57.62	-10.68	68.3	36.8	35.37	13.74	28.29	100	283	Peak
5721.08	58.35	-19.95	78.3	37.41	35.41	13.8	28.27	100	283	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5708.12	59.61	-8.69	68.3	38.7	35.39	13.8	28.28	145	50	Peak
5724.68	65.37	-12.93	78.3	44.43	35.41	13.8	28.27	145	50	Peak

Test Mode :	802.11a	Temperature :	23~25°C
Test Channel :	165	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5853.04	57.59	-20.71	78.3	36.35	35.58	13.83	28.17	167	279	Peak
5876.16	58.16	-10.14	68.3	36.85	35.63	13.81	28.13	167	279	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5850.08	59.68	-18.62	78.3	38.44	35.58	13.83	28.17	100	1	Peak
5860.16	57.91	-10.39	68.3	36.64	35.61	13.81	28.15	100	1	Peak



Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Channel :	149	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5708.68	58.39	-9.91	68.3	37.48	35.39	13.8	28.28	157	275	Peak
5724.68	59.42	-18.88	78.3	38.48	35.41	13.8	28.27	157	275	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5703.8	61.44	-6.86	68.3	40.53	35.39	13.8	28.28	100	343	Peak
5725	66.72	-11.58	78.3	45.78	35.41	13.8	28.27	100	343	Peak

Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Channel :	165	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5850.88	58.06	-20.24	78.3	36.82	35.58	13.83	28.17	100	282	Peak
5863.92	58.12	-10.18	68.3	36.85	35.61	13.81	28.15	100	282	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5852.56	68.27	-10.03	78.3	47.03	35.58	13.83	28.17	134	0	Peak
5862.56	66.45	-1.85	68.3	45.18	35.61	13.81	28.15	134	0	Peak



Test Mode :	802.11n HT40	Temperature :	23~25°C
Test Channel :	151	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5713.16	58.51	-9.79	68.3	37.6	35.39	13.8	28.28	146	274	Peak
5722.12	59.52	-18.78	78.3	38.58	35.41	13.8	28.27	146	274	Peak
5851.12	57.33	-20.97	78.3	36.09	35.58	13.83	28.17	146	274	Peak
5878.88	58.49	-9.81	68.3	37.18	35.63	13.81	28.13	146	274	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5702.92	59.35	-8.95	68.3	38.44	35.39	13.8	28.28	100	340	Peak
5724.84	65.72	-12.58	78.3	44.78	35.41	13.8	28.27	100	340	Peak
5852.96	57.55	-20.75	78.3	36.31	35.58	13.83	28.17	100	340	Peak
5864.16	57.9	-10.40	68.3	36.63	35.61	13.81	28.15	100	340	Peak



Test Mode :	802.11n HT40	Temperature :	23~25°C
Test Channel :	159	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5706.68	58	-10.30	68.3	37.09	35.39	13.8	28.28	100	282	Peak
5716.12	57.84	-20.46	78.3	36.93	35.39	13.8	28.28	100	282	Peak
5851.68	57.29	-21.01	78.3	36.05	35.58	13.83	28.17	100	282	Peak
5875.44	57.6	-10.70	68.3	36.29	35.63	13.81	28.13	100	282	Peak

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5692.52	58.13	-10.17	68.3	37.31	35.37	13.74	28.29	144	360	Peak
5717.48	58.55	-19.75	78.3	37.64	35.39	13.8	28.28	144	360	Peak
5851.36	58.79	-19.51	78.3	37.55	35.58	13.83	28.17	144	360	Peak
5875.12	58.91	-9.39	68.3	37.6	35.63	13.81	28.13	144	360	Peak

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

Chain Port 0+1

Test Mode :	802.11a	Temperature :	23~25°C
Test Channel :	149	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 5745 MHz is fundamental signal which can be ignored.. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5745	95.53	-	-	74.48	35.44	13.87	28.26	100	283	Peak
5745	88.6	-	-	67.55	35.44	13.87	28.26	100	283	Average
11490	38.82	-35.18	74	40.76	39.19	17.68	58.81	145	265	Peak

Test Mode :	802.11a	Temperature :	23~25°C
Test Channel :	149	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Vertical
Remark :	1. 5745 MHz is fundamental signal which can be ignored.. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5745	111.61	-	-	90.56	35.44	13.87	28.26	145	50	Peak
5745	102.77	-	-	81.72	35.44	13.87	28.26	145	50	Average
11490	39.27	-34.73	74	41.21	39.19	17.68	58.81	145	265	Peak



Test Mode :	802.11a	Temperature :	23~25°C
Test Channel :	157	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 5785 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5785	93.98	-	-	72.88	35.49	13.85	28.24	100	282	Peak
5785	86.87	-	-	65.77	35.49	13.85	28.24	100	282	Average
11570	38.38	-35.62	74	39.84	39.24	18.01	58.71	105	198	Peak

Test Mode :	802.11a	Temperature :	23~25°C
Test Channel :	157	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Vertical
Remark :	1. 5785 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5785	109.01	-	-	87.91	35.49	13.85	28.24	139	309	Peak
5785	100.69	-	-	79.59	35.49	13.85	28.24	139	309	Average
11570	38.31	-35.69	74	39.77	39.24	18.01	58.71	105	198	Peak



Test Mode :	802.11a	Temperature :	23~25°C
Test Channel :	165	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 5825 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5825	97.93	-	-	76.73	35.56	13.83	28.19	167	279	Peak
5825	89.4	-	-	68.2	35.56	13.83	28.19	167	279	Average
11650	39.69	-34.31	74	40.7	39.28	18.34	58.63	146	347	Peak

Test Mode :	802.11a	Temperature :	23~25°C
Test Channel :	165	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Vertical
Remark :	1. 5825 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5825	105.72	-	-	84.52	35.56	13.83	28.19	100	1	Peak
5825	97.55	-	-	76.35	35.56	13.83	28.19	100	1	Average
11650	40.34	-33.66	74	41.35	39.28	18.34	58.63	146	347	Peak



Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Channel :	149	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 5745 MHz is fundamental signal which can be ignored.. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5745	106.43	-	-	85.38	35.44	13.87	28.26	157	275	Peak
5745	96.85	-	-	75.8	35.44	13.87	28.26	157	275	Average
11490	39.84	-34.16	74	41.78	39.19	17.68	58.81	145	265	Peak



Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Channel :	149	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Vertical
Remark :	1. 5745 MHz is fundamental signal which can be ignored.. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5745	114.6	-	-	93.55	35.44	13.87	28.26	100	343	Peak
5745	106.65	-	-	85.6	35.44	13.87	28.26	100	343	Average
11490	40.54	-33.46	74	42.48	39.19	17.68	58.81	145	265	Peak



Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Channel :	157	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 5785 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5785	98.57	-	-	77.47	35.49	13.85	28.24	100	282	Peak
5785	90.06	-	-	68.96	35.49	13.85	28.24	100	282	Average
11570	39.91	-34.09	74	41.37	39.24	18.01	58.71	105	198	Peak

Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Channel :	157	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Vertical
Remark :	1. 5785 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5785	113.49	-	-	92.39	35.49	13.85	28.24	127	315	Peak
5785	105.29	-	-	84.19	35.49	13.85	28.24	127	315	Average
11570	39.55	-34.45	74	41.01	39.24	18.01	58.71	105	198	Peak



Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Channel :	165	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 5825 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
62.01	18.87	-21.13	40	43.74	4.7	1.2	30.77	-	-	Peak
159.98	24.31	-19.19	43.5	44.16	8.9	1.96	30.71	-	-	Peak
324.88	22.43	-23.57	46	36.13	13.85	2.85	30.4	-	-	Peak
632.37	24.03	-21.97	46	30.91	18.6	4.05	29.53	-	-	Peak
925.31	30.13	-15.87	46	32.98	21.1	4.94	28.89	-	-	Peak
960.23	38.69	-15.31	54	41.03	21.3	5.06	28.7	200	136	Peak
5825	95.84	-	-	74.64	35.56	13.83	28.19	100	282	Peak
5825	88.76	-	-	67.56	35.56	13.83	28.19	100	282	Average
11650	41.2	-32.80	74	42.21	39.28	18.34	58.63	146	347	Peak



Test Mode :	802.11n HT20	Temperature :	23~25°C
Test Channel :	165	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Vertical
Remark :	1. 5825 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
41.64	35.58	-4.42	40	53.46	11.9	0.98	30.76	100	200	Peak
139.61	25.27	-18.23	43.5	43.16	11	1.83	30.72	-	-	Peak
549.92	24.17	-21.83	46	32.21	18.1	3.76	29.9	-	-	Peak
804.06	26.42	-19.58	46	31.01	20.16	4.62	29.37	-	-	Peak
960.23	34.01	-19.99	54	36.35	21.3	5.06	28.7	-	-	Peak
5825	113.19	-	-	91.99	35.56	13.83	28.19	134	0	Peak
5825	104.54	-	-	83.34	35.56	13.83	28.19	134	0	Average
11650	43.27	-30.73	74	44.28	39.28	18.34	58.63	146	347	Peak



Test Mode :	802.11n HT40	Temperature :	23~25°C
Test Channel :	151	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 5755 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5755	96.14	-	-	75.06	35.46	13.87	28.25	146	274	Peak
5755	88.68	-	-	67.6	35.46	13.87	28.25	146	274	Average
11510	39.01	-34.99	74	40.92	39.2	17.68	58.79	165	25	Peak

Test Mode :	802.11n HT40	Temperature :	23~25°C
Test Channel :	151	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Vertical
Remark :	1. 5755 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5755	102.94	-	-	81.86	35.46	13.87	28.25	100	340	Peak
5755	94.98	-	-	73.9	35.46	13.87	28.25	100	340	Average
11510	39.31	-34.69	74	41.22	39.2	17.68	58.79	150	125	Peak



Test Mode :	802.11n HT40	Temperature :	23~25°C
Test Channel :	159	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Horizontal
Remark :	1. 5795 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5795	90.08	-	-	68.95	35.51	13.85	28.23	100	282	Peak
5795	82.08	-	-	60.95	35.51	13.85	28.23	100	282	Average
11390	39.3	-34.70	74	41.01	39.11	18.11	58.93	135	251	Peak

Test Mode :	802.11n HT40	Temperature :	23~25°C
Test Channel :	159	Relative Humidity :	48~52%
Test Engineer :	Gavin Zhang	Polarization :	Vertical
Remark :	1. 5795 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5795	102.68	-	-	81.55	35.51	13.85	28.23	144	360	Peak
5795	94.68	-	-	73.55	35.51	13.85	28.23	144	360	Average
11390	39.14	-34.86	74	40.85	39.11	18.11	58.93	120	50	Peak

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.

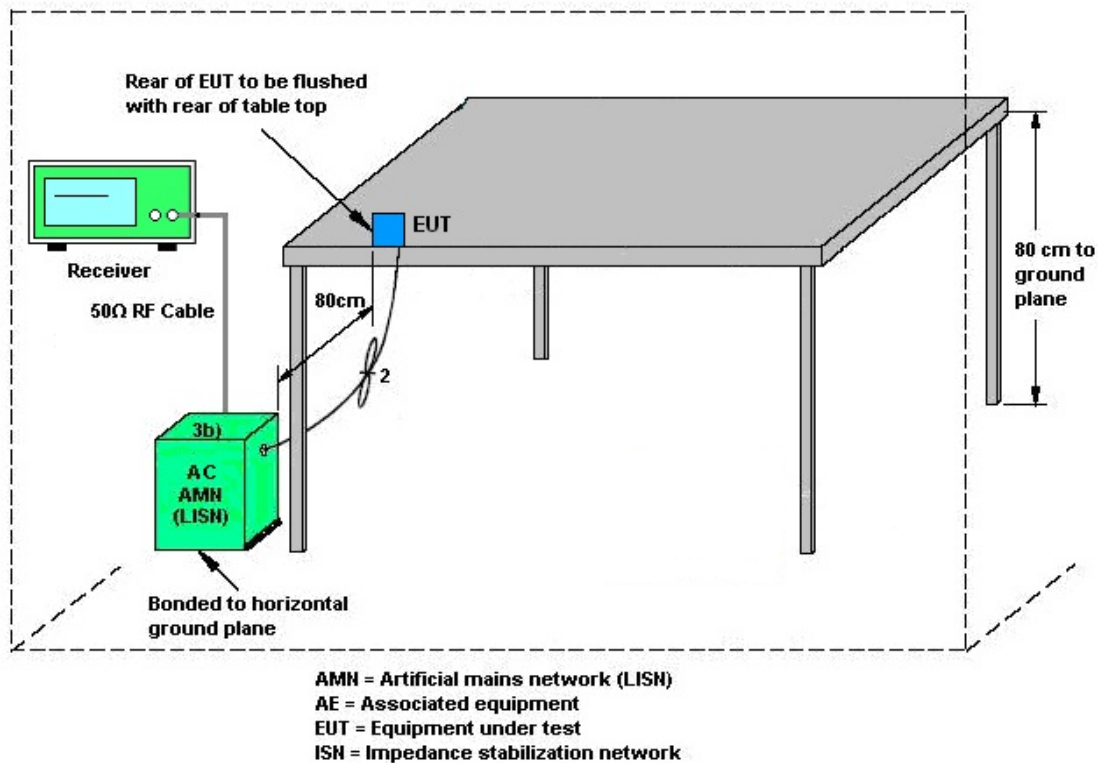
3.5.2 Measuring Instruments

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.

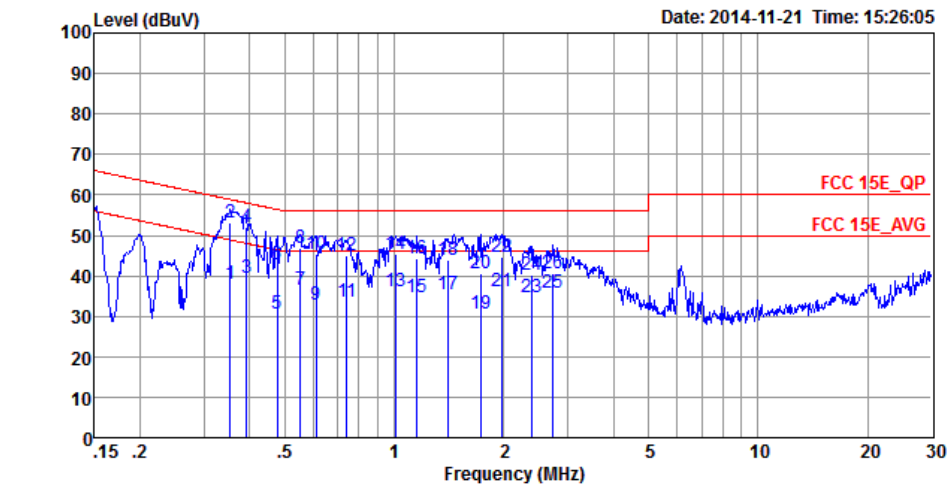
3.5.4 Test Setup





3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Jack Tian	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5G) Link + Adapter + Lan Link		

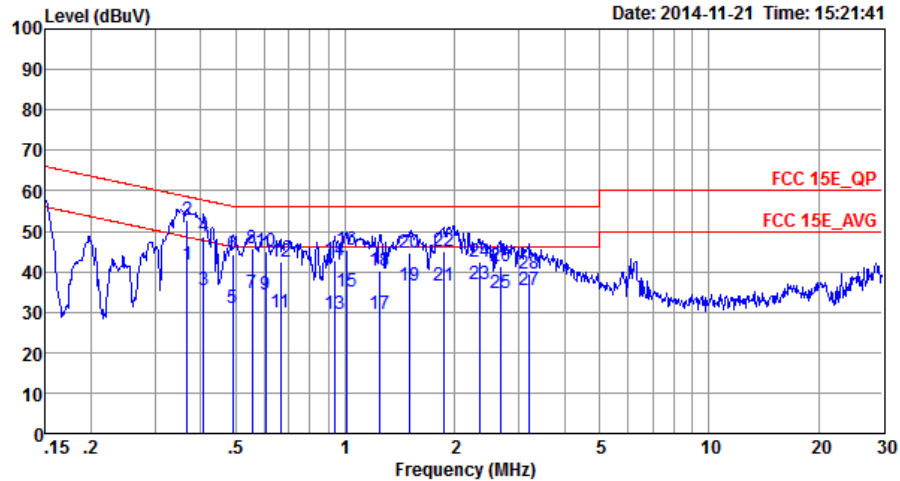


Site : C001-SZ
Condition: FCC 15E_QP LISN_L_20140304 LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.35	38.05	-10.82	48.87	27.60	0.27	10.18	Average
2 *	0.35	53.25	-5.62	58.87	42.80	0.27	10.18	QP
3	0.39	39.35	-8.64	47.99	28.90	0.28	10.17	Average
4	0.39	51.95	-6.04	57.99	41.50	0.28	10.17	QP
5	0.48	30.45	-15.96	46.41	19.99	0.30	10.16	Average
6	0.48	42.85	-13.56	56.41	32.39	0.30	10.16	QP
7	0.55	36.42	-9.58	46.00	26.01	0.26	10.15	Average
8	0.55	47.02	-8.98	56.00	36.61	0.26	10.15	QP
9	0.61	32.78	-13.22	46.00	22.40	0.23	10.15	Average
10	0.61	45.38	-10.62	56.00	35.00	0.23	10.15	QP
11	0.74	33.64	-12.36	46.00	23.30	0.19	10.15	Average
12	0.74	44.84	-11.16	56.00	34.50	0.19	10.15	QP
13	1.01	36.01	-9.99	46.00	25.60	0.26	10.15	Average
14	1.01	45.31	-10.69	56.00	34.90	0.26	10.15	QP
15	1.15	34.61	-11.39	46.00	24.20	0.25	10.16	Average
16	1.15	44.11	-11.89	56.00	33.70	0.25	10.16	QP
17	1.41	35.31	-10.69	46.00	24.90	0.24	10.17	Average
18	1.41	43.91	-12.09	56.00	33.50	0.24	10.17	QP
19	1.73	30.71	-15.29	46.00	20.30	0.23	10.18	Average
20	1.73	40.61	-15.39	56.00	30.20	0.23	10.18	QP
21	1.97	36.21	-9.79	46.00	25.80	0.22	10.19	Average
22	1.97	44.51	-11.49	56.00	34.10	0.22	10.19	QP
23	2.38	34.56	-11.44	46.00	24.10	0.26	10.20	Average
24	2.38	40.16	-15.84	56.00	29.70	0.26	10.20	QP
25	2.74	35.70	-10.30	46.00	25.20	0.29	10.21	Average
26	2.74	40.70	-15.30	56.00	30.20	0.29	10.21	QP



Test Mode :	Mode 1	Temperature :	21~22℃
Test Engineer :	Jack Tian	Relative Humidity :	41~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5G) Link + Adapter + Lan Link		



Site : C001-SZ

Condition: FCC 15E_QP LISN_N_20140304 NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.37	41.56	-7.00	48.56	31.00	0.38	10.18	Average
2 *	0.37	52.86	-5.70	58.56	42.30	0.38	10.18	QP
3	0.41	35.26	-12.42	47.68	24.70	0.39	10.17	Average
4	0.41	48.76	-8.92	57.68	38.20	0.39	10.17	QP
5	0.49	31.07	-15.07	46.14	20.50	0.41	10.16	Average
6	0.49	44.27	-11.87	56.14	33.70	0.41	10.16	QP
7	0.56	34.71	-11.29	46.00	24.20	0.36	10.15	Average
8	0.56	45.61	-10.39	56.00	35.10	0.36	10.15	QP
9	0.60	34.17	-11.83	46.00	23.70	0.32	10.15	Average
10	0.60	45.17	-10.83	56.00	34.70	0.32	10.15	QP
11	0.66	29.93	-16.07	46.00	19.50	0.28	10.15	Average
12	0.66	42.43	-13.57	56.00	32.00	0.28	10.15	QP
13	0.94	29.57	-16.43	46.00	19.10	0.32	10.15	Average
14	0.94	42.67	-13.33	56.00	32.20	0.32	10.15	QP
15	1.00	34.98	-11.02	46.00	24.50	0.33	10.15	Average
16	1.00	45.38	-10.62	56.00	34.90	0.33	10.15	QP
17	1.24	29.50	-16.50	46.00	19.00	0.34	10.16	Average
18	1.24	40.40	-15.60	56.00	29.90	0.34	10.16	QP
19	1.50	36.53	-9.47	46.00	26.01	0.35	10.17	Average
20	1.50	44.83	-11.17	56.00	34.31	0.35	10.17	QP
21	1.86	36.45	-9.55	46.00	25.90	0.37	10.18	Average
22	1.86	44.85	-11.15	56.00	34.30	0.37	10.18	QP
23	2.35	36.79	-9.21	46.00	26.20	0.39	10.20	Average
24	2.35	42.49	-13.51	56.00	31.90	0.39	10.20	QP
25	2.66	34.61	-11.39	46.00	24.00	0.41	10.20	Average
26	2.66	41.41	-14.59	56.00	30.80	0.41	10.20	QP
27	3.19	35.25	-10.75	46.00	24.61	0.43	10.21	Average
28	3.19	39.65	-16.35	56.00	29.01	0.43	10.21	QP

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.

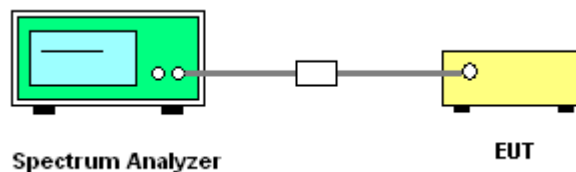
3.6.2 Measuring Instruments

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 4	Test Engineer :	Fly Liang
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Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)
11a	6Mbps	1	149	5745	5745.000	0.000	0.00	20	102
11a	6Mbps	1	149	5745	5744.950	-0.050	-8.70	20	138
11a	6Mbps	1	149	5745	5744.950	-0.050	-8.70	20	120
11a	6Mbps	1	149	5745	5745.050	0.050	8.70	-30	120
11a	6Mbps	1	149	5745	5744.950	-0.050	-8.70	50	120

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

Device use external antennas with N type connector, and device shall be professionally installed.

3.8.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

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

Array Gain = $10 \log(N_{ANT}/N_{SS}=1)$ dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

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.

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Chain Port 0	Chain Port 1	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
Band IV	3.43	3.43	3.43	6.44	0.00	0.44

Power limit reduction = Composite gain – 6dBi, (min = 0)

PSD limit reduction = Composite gain + PSD Array gain – 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	FSP30	101400	9kHz~30GHz	Mar. 03, 2014	Nov. 20, 2014	Mar. 02, 2015	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSP30	101400	9kHz~30GHz	Jan. 28, 2015	Mar. 17, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	13dBm ~-20dBm	Mar. 03, 2014	Nov. 20, 2014	Mar. 02, 2015	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	13dBm ~-20dBm	Jan. 28, 2015	Mar. 17, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
Power Sensor	Dare	RPR3006W	TH01SZ00019	0.3GHz~6GHz	Mar. 14, 2014	Nov. 20, 2014	Mar. 13, 2015	Conducted (TH01-SZ)
Power Sensor	Dare	RPR3006W	TH01SZ00019	0.3GHz~6GHz	Jan. 28, 2015	Mar. 17, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
Thermal Chamber	Hongzhangroup	LP-150U	HD20120425	-40°C~150°C	Feb. 21, 2014	Nov. 20, 2014	Feb. 20, 2015	Conducted (TH01-SZ)
Thermal Chamber	Hongzhangroup	LP-150U	HD20120425	-40°C~150°C	Jan. 28, 2015	Mar. 17, 2015	Jan. 27, 2016	Conducted (TH01-SZ)
AC Source	Chroma	61601	616010001985	100Vac~250Vac	Mar. 25, 2014	Nov. 20, 2014~ Mar. 17, 2015	Mar. 24, 2015	Conducted (TH01-SZ)
ESCIO TEST Receiver	R&S	ESCI	100724	9kHz~3GHz	Feb. 21, 2014	Nov. 15, 2014	Feb. 20, 2015	Radiation (03CH01-SZ)
Spectrum Analyzer	Agilent Technologies	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2014	Nov. 15, 2014	May 25, 2015	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 09, 2014	Nov. 15, 2014	May 08, 2015	Radiation (03CH01-SZ)
Bilog Antenna	TESEQ	CBL 6112D	37877	30MHz~2GHz	Oct. 15, 2014	Nov. 15, 2014	Oct. 14, 2015	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 15, 2014	Nov. 15, 2014	Oct. 14, 2015	Radiation (03CH01-SZ)
Double Ridged Horn Antenna	COM-POWER	AH-840	101073	18GHz~40GHz	Jun. 09, 2014	Nov. 15, 2014	Jun. 08, 2015	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3000MHz	Feb. 21, 2014	Nov. 15, 2014	Feb. 20, 2015	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 08, 2014	Nov. 15, 2014	May 07, 2015	Radiation (03CH01-SZ)
AC Source(AVR)	Chroma	61601	616010001985	100Vac~250Vac	Mar. 25, 2014	Nov. 15, 2014	Mar. 24, 2015	Radiation (03CH01-SZ)
Turn Table	EM Electronics	EM 1000	N/A	0~360 degree	NCR	Nov. 15, 2014	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM Electronics	EM 1000	N/A	1 m~4 m	NCR	Nov. 15, 2014	NCR	Radiation (03CH01-SZ)
ESCIO TEST Receiver	R&S	ESCI	100724	9kHz~3GHz	Feb. 21, 2014	Nov. 21, 2014	Feb. 20, 2015	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Mar. 04, 2014	Nov. 21, 2014	Mar. 03, 2015	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Mar. 04, 2014	Nov. 21, 2014	Mar. 03, 2015	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Dec. 17, 2013	Nov. 21, 2014	Dec. 16, 2014	Conduction (CO01-SZ)



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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.9 dB
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