



FCC RF Test Report

APPLICANT : Acer Incorporated
EQUIPMENT : Notebook computer
BRAND NAME : acer
MODEL NAME : N17H2
FCC ID : Contains FCC ID :HLZ9560D2W
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was installed a module during the test: WLAN and BT, 2*2 PCIe M.2 1216 SD adapter card (Brand Name: acer, Model Name: 9560D2W, FCC ID: HLZ9560D2W) during test.

The product was received on Aug. 03, 2018 and testing was completed on Sep. 13, 2018. 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.



Approved by: Eric Shih / Manager

Sporton International (Shenzhen) Inc.

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Guangdong Province 518055 China**



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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	1
3.1	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
-	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	1
3.2	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) & 15.209(a)	Pass	Under limit 9.28 dB at 205.57 MHz
3.3	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.30 dB at 0.51 MHz
3.4	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.5	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-
Remark: Test items were leveraged from module RF report "170919-03.TR03".					



1 General Description

1.1 Applicant

Acer Incorporated

8F ,88, Sec.1 Xintai 5th Rd. Xizhi, New Taipei City 221, Taiwan, R.O.C

1.2 Manufacturer

Acer Incorporated

8F ,88, Sec.1 Xintai 5th Rd. Xizhi, New Taipei City 221, Taiwan, R.O.C

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Notebook computer
Brand Name	acer
Model Name	N17H2
FCC ID	Contains FCC ID :HLZ9560D2W
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160 Bluetooth BR/EDR/LE
EUT Stage	Identical Prototype

Module Feature & Specification	
Equipment	WLAN and BT, 2*2 PCIe M.2 1216 SD adapter card
Brand Name	acer
Model Name	9560D2W
FCC ID	HLZ9560D2W

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



1.4 Product Specification of Equipment Under Test

Standards-related Product Specification										
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz									
Maximum Output Power	<p><5745 MHz ~ 5825 MHz></p> <p><Ant. 1></p> <p>802.11a : 12.83 dBm / 0.0192 W 802.11n HT20 : 12.74 dBm / 0.0188 W 802.11n HT40 : 12.74 dBm / 0.0188 W 802.11ac VHT20: 12.72 dBm / 0.0187 W 802.11ac VHT40: 12.74 dBm / 0.0188 W 802.11ac VHT80: 12.76 dBm / 0.0189 W</p> <p><Ant. 2></p> <p>802.11a : 12.68 dBm / 0.0185 W 802.11n HT20 : 12.63 dBm / 0.0183 W 802.11n HT40 : 12.57 dBm / 0.0181 W 802.11ac VHT20: 12.60 dBm / 0.0182 W 802.11ac VHT40: 12.52 dBm / 0.0179 W 802.11ac VHT80: 12.58 dBm / 0.0181 W</p> <p>MIMO <Ant. 1 + 2></p> <p>802.11n HT20 : 15.74 dBm / 0.0375 W 802.11n HT40 : 15.73 dBm / 0.0374 W 802.11ac VHT20: 15.72 dBm / 0.0373 W 802.11ac VHT40: 15.71 dBm / 0.0372 W 802.11ac VHT80: 15.75 dBm / 0.0376 W</p>									
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)									
Antenna Type / Gain	<Ant. 1> : PIFA Antenna with gain -0.80 dBi <Ant. 2> : PIFA Antenna with gain -0.70 dBi									
Antenna Function Description	<table border="1"> <thead> <tr> <th></th> <th>Ant. 1</th> <th>Ant. 2</th> </tr> </thead> <tbody> <tr> <td>802.11 a/n/ac SISO</td> <td>V</td> <td>V</td> </tr> <tr> <td>802.11 n/ac MIMO</td> <td>V</td> <td>V</td> </tr> </tbody> </table>		Ant. 1	Ant. 2	802.11 a/n/ac SISO	V	V	802.11 n/ac MIMO	V	V
	Ant. 1	Ant. 2								
802.11 a/n/ac SISO	V	V								
802.11 n/ac MIMO	V	V								



1.5 Component List

Note: There are three types of EUT. The detail difference as follow table, according the difference, we choose sample 1 to full test, and sample 2/3 to verified the worst case of Sample 1.

Component	Sample 1 SKUC	Sample 2 SKUA	Sample 3 SKUB
CPU	N5000	N5000	N4000
BT/WIFI Module	9560D2W	9560D2W	9560D2W
RAM	HYNIX LPD4_2GB(200b_D4x32) H9HCNNNBPUMLHR-NME	HYNIX LPD4_2GB(200b_D4x32) H9HCNNNBPUMLHR-NME	MICRON LPD4_2GB(200b_D2x3 2) MT53E512M32D2NP-04 6 WT:E
EMMC	SANDISK NAND 128GB SDINADF4-128G-1220	SANDISK NAND 64GB SDINBDA4-64-1220V	SANDISK NAND 64GB SDINBDA4-64-1220V
Camera front	6SF009N2	6SF009N2	6SF009N2
LCD	ZC-116A-1227BT	ZC-116A-1227BT	ZC-116A-1227BT
Battery	AP16L5J	AP16L5J	AP16L5J

1.6 Modification of EUT

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



1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0).

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	TH01-SZ CO01-SZ	CN5018	337463

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	03CH03-SZ	CN5019	577730

1.8 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- 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. 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

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

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

Note:

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



2.2 Test Mode

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

RSE test items:

1. For 802.11n HT20 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing has assessed only 802.11ac VHT20/ VHT40 by referring to their higher conducted power.
2. For 802.11a SISO mode, the Radiated Spurious Emission only assessed Antenna 1 by referring to the higher conducted power.
3. For 802.11n/ac SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to the higher conducted power.

Single Mode

Modulation	Data Rate
802.11a	6 Mbps

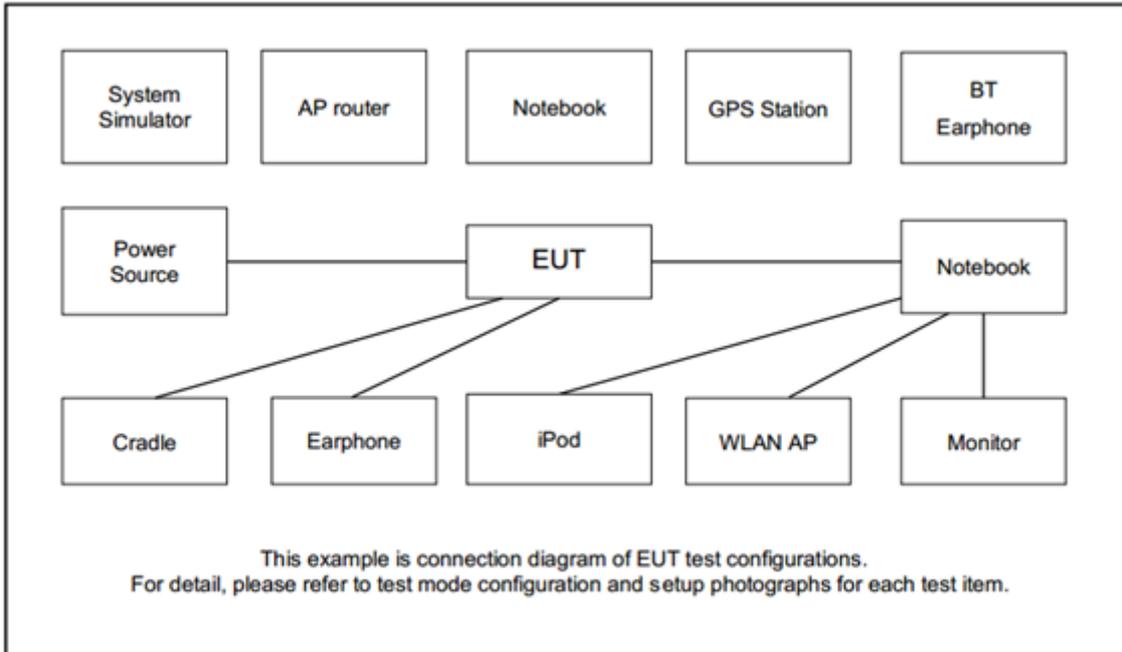
MIMO Mode

Modulation	Data Rate
802.11n HT20	MCS8
802.11n HT40	MCS8
802.11ac VHT80	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : WLAN(5G) Link + Bluetooth Link + Earphone + Adapter 1 for Sample 1 Mode 2 : WLAN(5G) Link + Bluetooth Link + Earphone + Adapter 2 for Sample 1 Mode 3 : WLAN(5G) Link + Bluetooth Link + Earphone + Adapter 3 for Sample 1 Mode 4 : WLAN(5G) Link + Bluetooth Link + Earphone + Adapter 4 for Sample 1 Mode 5 : WLAN(5G) Link + Bluetooth Link + Earphone + Adapter 5 for Sample 1
Remark:	
<ol style="list-style-type: none"> 1. The worst case of conducted emission is mode 2; only the test data of it was reported. 2. For Radiated Test Cases, The tests were performance with Adapter, Earphone. 	

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

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A
2.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	SD Card	N/A	MicroSD HC	FCC DoC	N/A	N/A
4.	Earphone	apple	DCAY1V-A9007ZJW3-000	N/A	N/A	Unshielded,1.8m
5.	Monitor	DELL	P2715QT	FCC DoC	N/A	N/A
6.	ipod	apple	MC69029/A	N/A	N/A	Unshielded,1.8m

2.5 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.

3 Test Result

3.1 Maximum Conducted Output Power Measurement

3.1.1 Limit of Maximum Conducted Output Power

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

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

3.1.2 Measuring Instruments

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

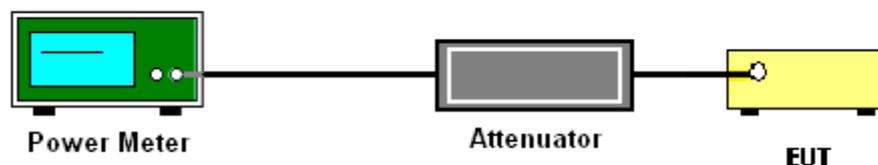
3.1.3 Test Procedures

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

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

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

3.1.4 Test Setup



3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



3.2 Unwanted Emissions Measurement

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

3.2.1 Limit of Unwanted Emissions

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

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



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

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

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

where

EIRP is the equivalent isotropically radiated power, in dBm

E_{Meas} is the field strength of the emission at the measurement distance, in dBµV/m

d_{Meas} is the measurement distance, in m

3.2.2 Measuring Instruments

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

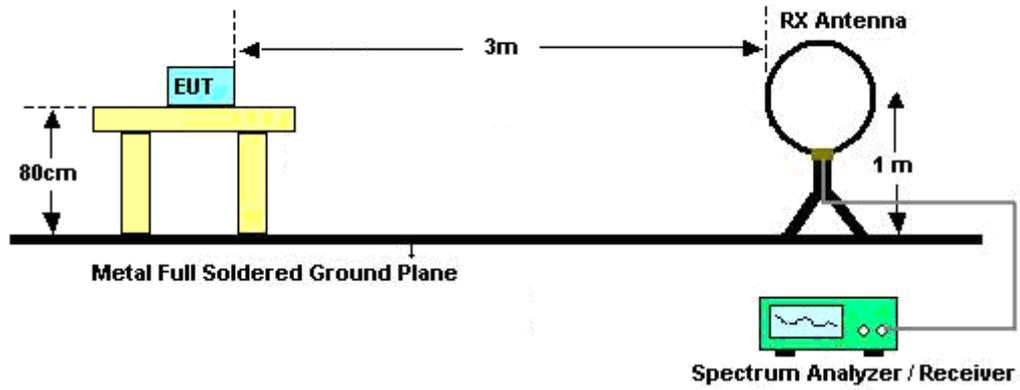


3.2.3 Test Procedures

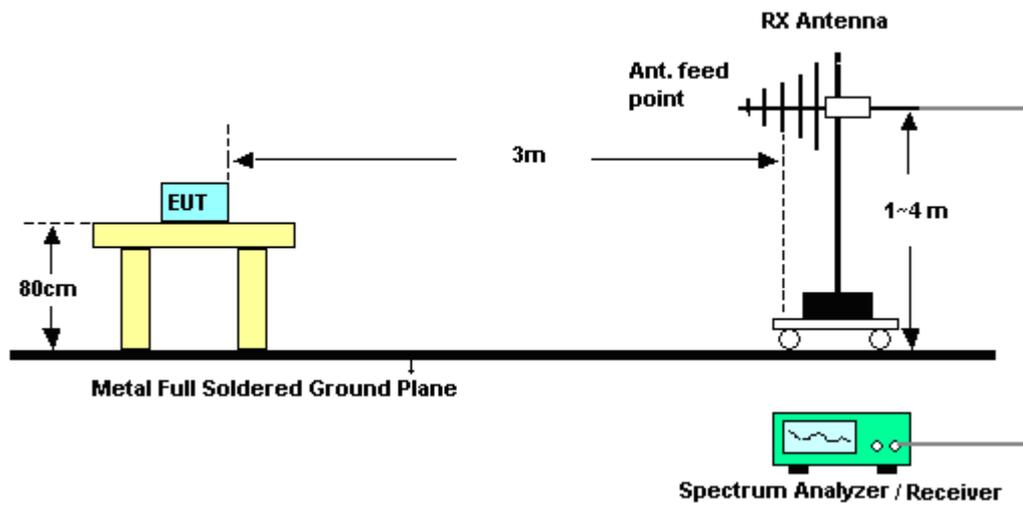
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
 - RBW = 1 MHz
 - VBW \geq 3 MHz
 - Detector = Peak
 - Sweep time = auto
 - Trace mode = max hold
 - (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
 - RBW = 1 MHz
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW \geq 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.2.4 Test Setup

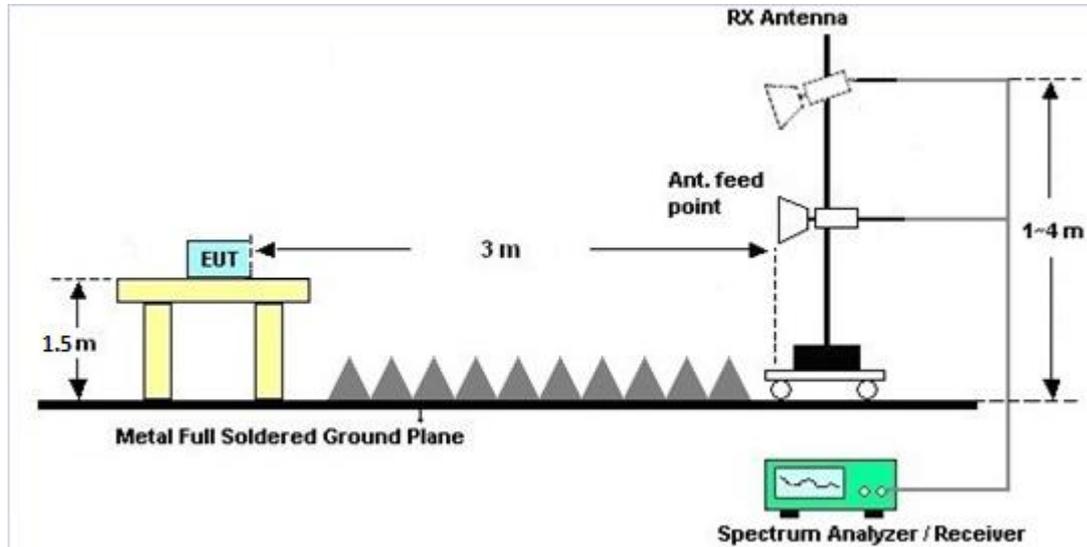
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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

3.2.6 Test Result of Radiated Band Edges

Please refer to Appendix C.

3.2.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.



3.3 AC Conducted Emission Measurement

3.3.1 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.

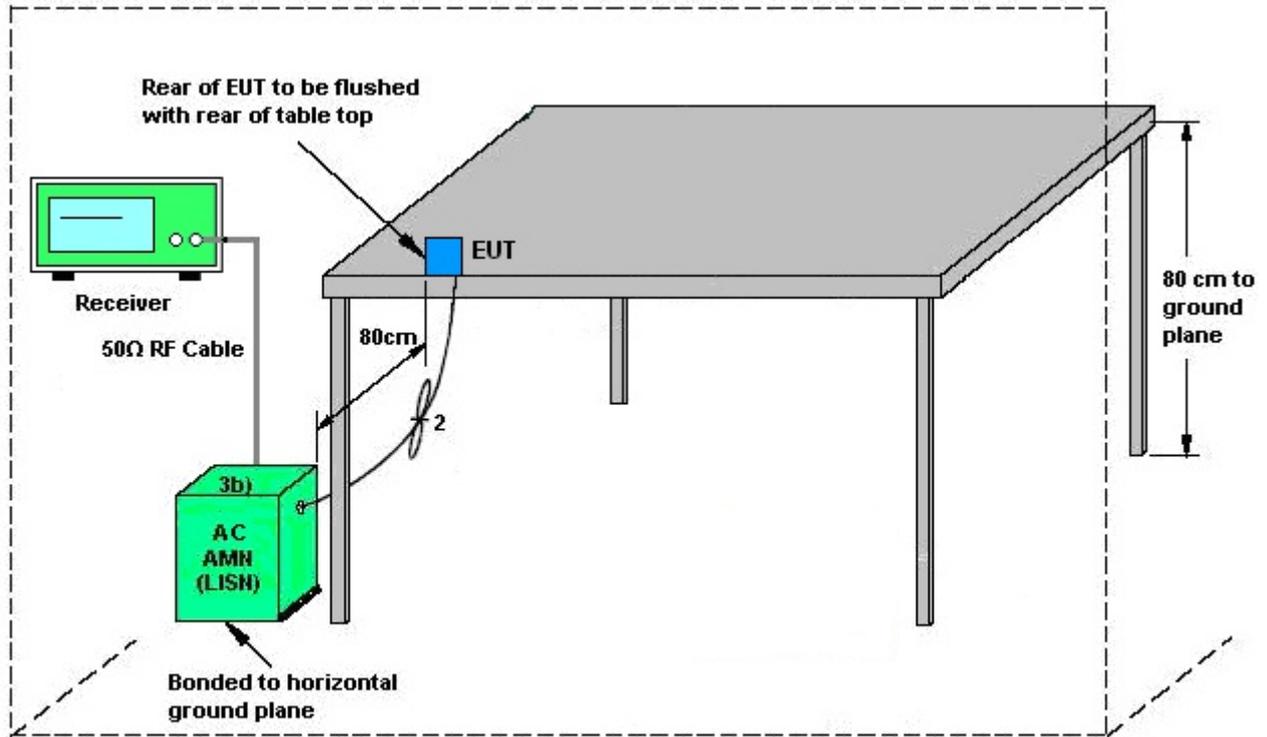
3.3.2 Measuring Instruments

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

3.3.3 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.

3.3.4 Test Setup



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

3.3.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.4 Automatically Discontinue Transmission

3.4.1 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.

3.4.2 Measuring Instruments

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

3.4.3 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.



3.5 Antenna Requirements

3.5.1 Standard Applicable

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

3.5.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.5.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = GANT + Array Gain, where Array Gain is as follows.

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

Array Gain = 10 log(NANT/NSS=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

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.

<CDD Modes>						
			DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
	Ant. 1 (dBi)	Ant. 2 (dBi)				
Band IV	-0.80	-0.70	-0.70	2.26	0.00	0.00

$Power\ Limit\ Reduction = DG(Power) - 6dBi, (min = 0)$

$PSD\ Limit\ Reduction = DG(PSD) - 6dBi, (min = 0)$



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr.19, 2018	Sep. 11, 2018	Apr.18, 2019	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2017	Sep. 11, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	Sep. 11, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr.19, 2018	Sep. 13, 2018	Apr.18, 2019	Radiation (03CH03-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr.19, 2018	Sep. 13, 2018	Apr.18, 2019	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May. 14, 2018	Sep. 13, 2018	May.13, 2019	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz~2GHz	Apr. 19, 2018	Sep. 13, 2018	Apr. 18, 2019	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Mar. 29, 2018	Sep. 13, 2018	Mar. 28, 2019	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Mar.30 2018	Sep. 13, 2018	Mar.29, 2019	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102210	0.01Hz~3000MHz	Oct.19,2017	Sep. 13, 2018	Oct.18,2018	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct.19,2017	Sep. 13, 2018	Oct.18,2018	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 27, 2017	Sep. 13, 2018	Dec. 26, 2018	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 30. 2018	Sep. 13, 2018	Jul. 30. 2019	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Sep. 13, 2018	NCR	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Sep. 13, 2018	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Sep. 13, 2018	NCR	Radiation (03CH03-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2017	Aug. 23, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Dec. 26, 2017	Aug. 23, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Nov. 01, 2017	Aug. 23, 2018	Oct. 31, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 18, 2018	Aug. 23, 2018	Jul. 17, 2019	Conduction (CO01-SZ)

NCR: No Calibration Required



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.6 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.8dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

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

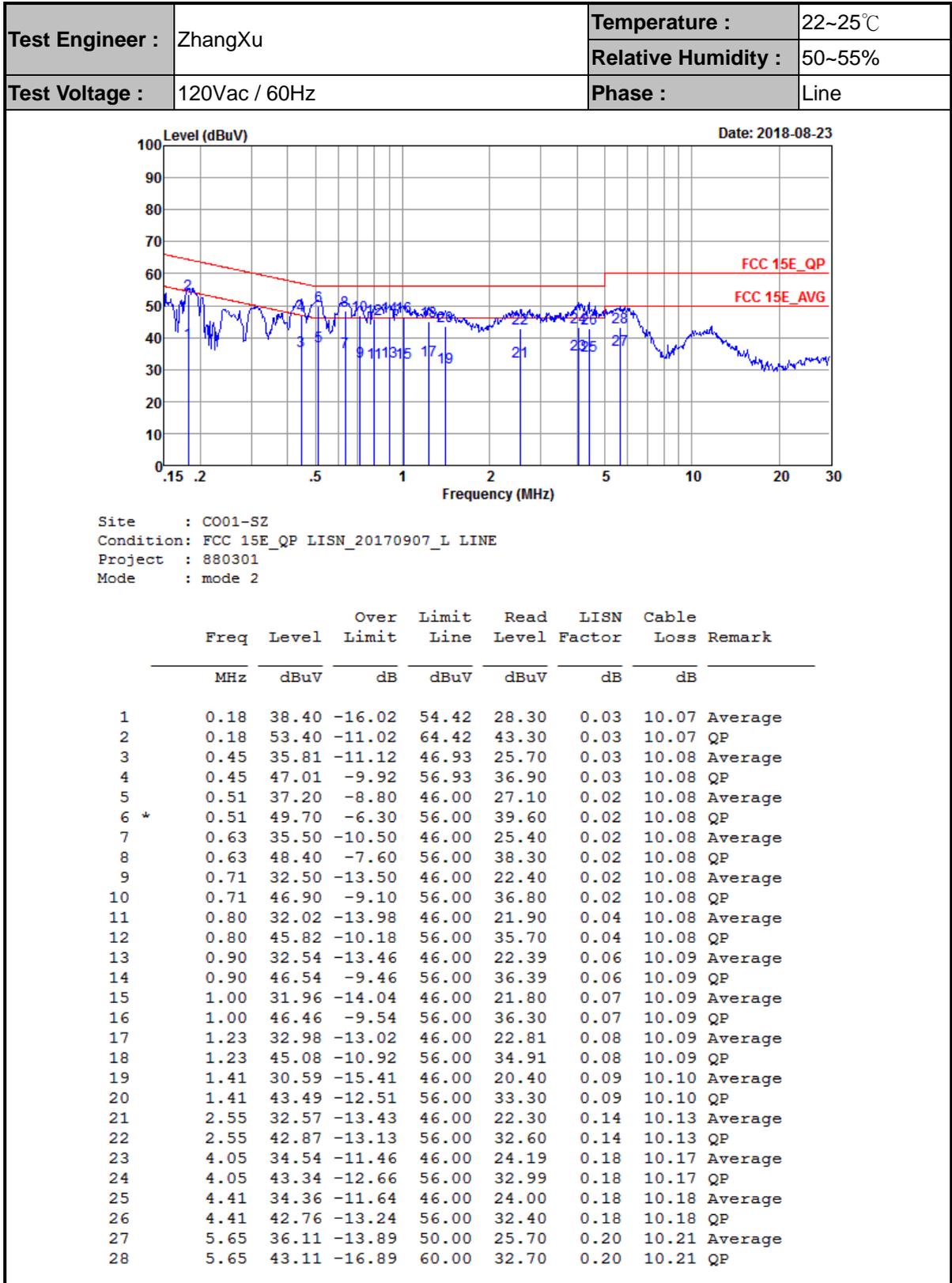
Test Engineer:	Hayden Chen	Temperature:	21~25	°C
Test Date:	2018/9/11	Relative Humidity:	51~54	%

TEST RESULTS DATA
Average Power Table

Band IV														
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	0.61	0.62	12.73	12.58		30.00	30.00	-0.80	-0.70	Pass
11a	6Mbps	1	157	5785	0.61	0.62	12.70	12.55		30.00	30.00	-0.80	-0.70	Pass
11a	6Mbps	1	165	5825	0.61	0.62	12.83	12.68		30.00	30.00	-0.80	-0.70	Pass
HT20	MCS0	1	149	5745	0.71	0.72	12.69	12.53		30.00	30.00	-0.80	-0.70	Pass
HT20	MCS0	1	157	5785	0.71	0.72	12.65	12.52		30.00	30.00	-0.80	-0.70	Pass
HT20	MCS0	1	165	5825	0.71	0.72	12.74	12.63		30.00	30.00	-0.80	-0.70	Pass
HT40	MCS0	1	151	5755	0.72	0.72	12.71	12.57		30.00	30.00	-0.80	-0.70	Pass
HT40	MCS0	1	159	5795	0.72	0.72	12.74	12.53		30.00	30.00	-0.80	-0.70	Pass
VHT20	MCS0	1	149	5745	0.71	0.72	12.67	12.52		30.00	30.00	-0.80	-0.70	Pass
VHT20	MCS0	1	157	5785	0.71	0.72	12.62	12.48		30.00	30.00	-0.80	-0.70	Pass
VHT20	MCS0	1	165	5825	0.71	0.72	12.72	12.60		30.00	30.00	-0.80	-0.70	Pass
VHT40	MCS0	1	151	5755	0.73	0.71	12.68	12.52		30.00	30.00	-0.80	-0.70	Pass
VHT40	MCS0	1	159	5795	0.73	0.71	12.74	12.50		30.00	30.00	-0.80	-0.70	Pass
VHT80	MCS0	1	155	5775	0.75	0.75	12.76	12.58		30.00	30.00	-0.80	-0.70	Pass
HT20	MCS8	2	149	5745	0.62	0.63	12.72	12.56	15.65	30.00		-0.70		Pass
HT20	MCS8	2	157	5785	0.62	0.63	12.68	12.54	15.62	30.00		-0.70		Pass
HT20	MCS8	2	165	5825	0.62	0.63	12.79	12.66	15.74	30.00		-0.70		Pass
HT40	MCS8	2	151	5755	0.67	0.66	12.77	12.64	15.71	30.00		-0.70		Pass
HT40	MCS8	2	159	5795	0.67	0.66	12.81	12.63	15.73	30.00		-0.70		Pass
VHT20	MCS0	2	149	5745	0.62	0.64	12.70	12.54	15.63	30.00		-0.70		Pass
VHT20	MCS0	2	157	5785	0.62	0.64	12.69	12.53	15.62	30.00		-0.70		Pass
VHT20	MCS0	2	165	5825	0.62	0.64	12.76	12.65	15.72	30.00		-0.70		Pass
VHT40	MCS0	2	151	5755	0.66	0.66	12.76	12.62	15.70	30.00		-0.70		Pass
VHT40	MCS0	2	159	5795	0.66	0.66	12.80	12.59	15.71	30.00		-0.70		Pass
VHT80	MCS0	2	155	5775	0.73	0.77	12.81	12.67	15.75	30.00		-0.70		Pass

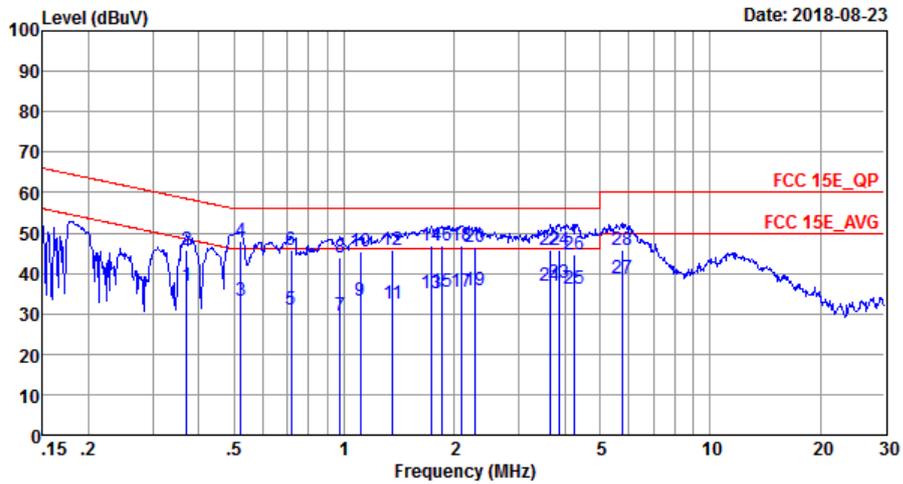


Appendix B. AC Conducted Emission Test Results





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



Site : CO01-SZ
 Condition: FCC 15E_QP LISN_20170907_N NEUTRAL
 Project : 880301
 Mode : mode 2

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.37	36.90	-11.57	48.47	26.80	0.02	10.08	Average
2	0.37	45.70	-12.77	58.47	35.60	0.02	10.08	QP
3	0.52	33.30	-12.70	46.00	23.20	0.02	10.08	Average
4 *	0.52	47.80	-8.20	56.00	37.70	0.02	10.08	QP
5	0.72	30.90	-15.10	46.00	20.80	0.02	10.08	Average
6	0.72	45.70	-10.30	56.00	35.60	0.02	10.08	QP
7	0.97	29.54	-16.46	46.00	19.40	0.05	10.09	Average
8	0.97	43.94	-12.06	56.00	33.80	0.05	10.09	QP
9	1.11	33.14	-12.86	46.00	23.00	0.05	10.09	Average
10	1.11	45.44	-10.56	56.00	35.30	0.05	10.09	QP
11	1.36	32.35	-13.65	46.00	22.20	0.05	10.10	Average
12	1.36	45.65	-10.35	56.00	35.50	0.05	10.10	QP
13	1.73	35.15	-10.85	46.00	25.00	0.05	10.10	Average
14	1.73	46.75	-9.25	56.00	36.60	0.05	10.10	QP
15	1.85	35.56	-10.44	46.00	25.40	0.05	10.11	Average
16	1.85	46.86	-9.14	56.00	36.70	0.05	10.11	QP
17	2.09	35.36	-10.64	46.00	25.20	0.05	10.11	Average
18	2.09	46.76	-9.24	56.00	36.60	0.05	10.11	QP
19	2.27	35.96	-10.04	46.00	25.80	0.04	10.12	Average
20	2.27	46.36	-9.64	56.00	36.20	0.04	10.12	QP
21	3.66	37.00	-9.00	46.00	26.79	0.05	10.16	Average
22	3.66	45.70	-10.30	56.00	35.49	0.05	10.16	QP
23	3.86	37.51	-8.49	46.00	27.30	0.05	10.16	Average
24	3.86	45.91	-10.09	56.00	35.70	0.05	10.16	QP
25	4.25	36.33	-9.67	46.00	26.10	0.06	10.17	Average
26	4.25	44.63	-11.37	56.00	34.40	0.06	10.17	QP
27	5.74	38.58	-11.42	50.00	28.30	0.07	10.21	Average
28	5.74	45.58	-14.42	60.00	35.30	0.07	10.21	QP



Appendix C. Radiated Spurious Emission

Test Engineer :	Liangliang Lu	Temperature :	23~25°C
		Relative Humidity :	48~52%

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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5621.8	47.64	-20.56	68.2	38.42	31.59	9.23	31.6	100	88	P	H
		5680.8	48.05	-42.98	91.03	38.68	31.72	9.25	31.6	100	88	A	H
		5706.4	47.99	-59	106.99	38.46	31.85	9.28	31.6	100	88	P	H
		5722.4	52.26	-64.01	116.27	42.67	31.91	9.28	31.6	100	88	A	H
	*	5745	98.38	-	-	88.71	31.97	9.3	31.6	100	88	P	H
	*	5745	94.2	-	-	84.53	31.97	9.3	31.6	100	88	A	H
		5629.8	47.85	-20.35	68.2	38.63	31.59	9.23	31.6	100	10	P	V
		5695.8	48.92	-53.18	102.1	39.49	31.78	9.25	31.6	100	10	A	V
		5703.4	49.89	-56.26	106.15	40.36	31.85	9.28	31.6	100	10	P	V
		5721.4	52.43	-61.56	113.99	42.84	31.91	9.28	31.6	100	10	A	V
	*	5745	100.74	-	-	91.07	31.97	9.3	31.6	100	10	P	V
	*	5745	96.45	-	-	86.78	31.97	9.3	31.6	100	10	A	V



WiFi Ant.	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 157 5785MHz		5617.4	47.74	-20.46	68.2	38.55	31.59	9.2	31.6	122	90	P	H
		5679.6	47.35	-42.79	90.14	37.98	31.72	9.25	31.6	122	90	A	H
		5704.6	47.43	-59.06	106.49	37.9	31.85	9.28	31.6	122	90	P	H
		5722.2	46.5	-69.32	115.82	36.91	31.91	9.28	31.6	122	90	A	H
	*	5785	99.34	-	-	89.52	32.09	9.33	31.6	122	90	P	H
	*	5785	96.8	-	-	86.98	32.09	9.33	31.6	122	90	A	H
		5852.8	46.43	-69.39	115.82	36.33	32.34	9.36	31.6	122	90	P	H
		5859	47.74	-61.94	109.68	37.55	32.4	9.39	31.6	122	90	A	H
		5907	48.02	-33.46	81.48	37.7	32.5	9.42	31.6	122	90	P	H
		5932.2	48.13	-20.07	68.2	37.78	32.53	9.42	31.6	122	90	A	H
		5630.6	47.6	-20.6	68.2	38.38	31.59	9.23	31.6	103	29	P	V
		5696.8	47.87	-54.97	102.84	38.44	31.78	9.25	31.6	103	29	A	V
		5707.4	48.29	-58.98	107.27	38.76	31.85	9.28	31.6	103	29	P	V
		5721.8	47.71	-67.19	114.9	38.12	31.91	9.28	31.6	103	29	A	V
	*	5785	101.81	-	-	91.99	32.09	9.33	31.6	103	29	P	V
	*	5785	97.91	-	-	88.09	32.09	9.33	31.6	103	29	A	V
		5851.4	46.97	-72.04	119.01	36.87	32.34	9.36	31.6	103	29	P	V
		5858.8	47.23	-62.5	109.73	37.04	32.4	9.39	31.6	103	29	A	V
		5923.2	48.27	-21.26	69.53	37.92	32.53	9.42	31.6	103	29	P	V
	5942.6	48.72	-19.48	68.2	38.31	32.56	9.45	31.6	103	29	A	V	



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz	*	5825	99.61	-	-	89.57	32.28	9.36	31.6	100	87	P	H
	*	5825	95.18	-	-	85.14	32.28	9.36	31.6	100	87	A	H
		5853.4	48.37	-66.08	114.45	38.27	32.34	9.36	31.6	100	87	P	H
		5868.2	49.61	-57.49	107.1	39.42	32.4	9.39	31.6	100	87	A	H
		5921.6	48.73	-21.98	70.71	38.38	32.53	9.42	31.6	100	87	P	H
		5939.6	48.57	-19.63	68.2	38.16	32.56	9.45	31.6	100	87	A	H
	*	5825	101.2	-	-	91.16	32.28	9.36	31.6	108	28	P	V
	*	5825	97.05	-	-	87.01	32.28	9.36	31.6	108	28	A	V
		5850.2	48.34	-73.4	121.74	38.24	32.34	9.36	31.6	108	28	P	V
		5862.2	49.18	-59.6	108.78	38.99	32.4	9.39	31.6	108	28	A	V
		5878.8	48.42	-53.96	102.38	38.2	32.43	9.39	31.6	108	28	P	V
		5936.6	47.94	-20.26	68.2	37.56	32.53	9.45	31.6	108	28	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for CH 149 (5745MHz), CH 157 (5785MHz), and CH 165 (5825MHz).

Remark

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



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

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include frequencies from 5623.6 to 5745 MHz with various test parameters.



WiFi Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 157 5785MHz		5641.6	47.78	-20.42	68.2	38.55	31.6	9.23	31.6	179	70	P	H
		5679.4	48.71	-41.29	90	39.34	31.72	9.25	31.6	179	70	A	H
		5713.8	48.54	-60.53	109.07	39.01	31.85	9.28	31.6	179	70	P	H
		5724	47.66	-72.26	119.92	38.07	31.91	9.28	31.6	179	70	A	H
	*	5785	103.68	-	-	93.86	32.09	9.33	31.6	179	70	P	H
	*	5785	98.45	-	-	88.63	32.09	9.33	31.6	179	70	A	H
		5853.2	47.49	-67.41	114.9	37.39	32.34	9.36	31.6	179	70	P	H
		5869.8	48.98	-57.67	106.65	38.79	32.4	9.39	31.6	179	70	A	H
		5907.4	48.97	-32.22	81.19	38.65	32.5	9.42	31.6	179	70	P	H
		5932.6	48.32	-19.88	68.2	37.97	32.53	9.42	31.6	179	70	A	H
		5634.6	47.56	-20.64	68.2	38.33	31.6	9.23	31.6	115	315	P	V
		5675.8	47.23	-40.1	87.33	37.86	31.72	9.25	31.6	115	315	A	V
		5700	47.86	-57.34	105.2	38.4	31.78	9.28	31.6	115	315	P	V
		5724.8	48.16	-73.58	121.74	38.57	31.91	9.28	31.6	115	315	A	V
	*	5785	102.58	-	-	92.76	32.09	9.33	31.6	115	315	P	V
	*	5785	97.45	-	-	87.63	32.09	9.33	31.6	115	315	A	V
		5851	48.91	-71.01	119.92	38.81	32.34	9.36	31.6	115	315	P	V
		5859.2	48.35	-61.27	109.62	38.16	32.4	9.39	31.6	115	315	A	V
	5898.6	49.35	-38.35	87.7	39.06	32.47	9.42	31.6	115	315	P	V	
	5932.2	49.3	-18.9	68.2	38.95	32.53	9.42	31.6	115	315	A	V	



WiFi Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 165 5825MHz	*	5825	103.76	-	-	93.72	32.28	9.36	31.6	173	69	P	H
	*	5825	98.18	-	-	88.14	32.28	9.36	31.6	173	69	A	H
		5852.8	52.08	-63.74	115.82	41.98	32.34	9.36	31.6	173	69	P	H
		5855.4	51.25	-59.44	110.69	41.09	32.4	9.36	31.6	173	69	A	H
		5875.2	49.06	-55.99	105.05	38.84	32.43	9.39	31.6	173	69	P	H
		5936.8	48.48	-19.72	68.2	38.1	32.53	9.45	31.6	173	69	A	H
	*	5825	102.33	-	-	92.29	32.28	9.36	31.6	100	72	P	V
	*	5825	97.68	-	-	87.64	32.28	9.36	31.6	100	72	A	V
		5850	48.29	-73.91	122.2	38.19	32.34	9.36	31.6	100	72	P	V
		5855.8	48.55	-62.03	110.58	38.36	32.4	9.39	31.6	100	72	A	V
		5904.4	47.88	-35.53	83.41	37.59	32.47	9.42	31.6	100	72	P	V
		5935.8	49.22	-18.98	68.2	38.84	32.53	9.45	31.6	100	72	A	V
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. 												



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

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20		11490	50.54	-23.46	74	56.95	41.18	12.04	59.63	160	360	P	H
		17235	51.63	-16.57	68.2	54.49	42.4	14.83	60.09	170	360	P	H
CH 149 5745MHz		11490	50.07	-23.93	74	56.48	41.18	12.04	59.63	187	249	P	V
		17235	51.02	-17.18	68.2	53.88	42.4	14.83	60.09	176	254	P	V
802.11n HT20 CH 157 5785MHz		11570	49.5	-24.5	74	56.1	40.98	12.07	59.65	175	198	P	H
		17355	52.47	-15.73	68.2	54.57	43.1	14.9	60.1	189	185	P	H
		11570	50.72	-23.28	74	57.32	40.98	12.07	59.65	161	100	P	V
		17355	52.53	-15.67	68.2	54.63	43.1	14.9	60.1	167	211	P	V
802.11n HT20 CH 165 5825MHz		11650	49.62	-24.38	74	56.43	40.76	12.1	59.67	156	347	P	H
		17475	54.72	-13.48	68.2	56.08	43.8	14.96	60.12	150	360	P	H
		11650	49.36	-24.64	74	56.17	40.76	12.1	59.67	151	211	P	V
		17475	54.24	-13.96	68.2	55.6	43.8	14.96	60.12	166	245	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include frequencies from 5626.4 to 5929.2 MHz.



WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 159 5795MHz		5607.2	47.83	-20.37	68.2	38.65	31.58	9.2	31.6	129	83	P	H
		5673.6	47.98	-37.72	85.7	38.61	31.72	9.25	31.6	129	83	A	H
		5717	47.94	-62.02	109.96	38.41	31.85	9.28	31.6	129	83	P	H
		5722.6	47.86	-68.87	116.73	38.27	31.91	9.28	31.6	129	83	A	H
	*	5795	101.18	-	-	91.3	32.15	9.33	31.6	129	83	P	H
	*	5795	94.99	-	-	85.11	32.15	9.33	31.6	129	83	A	H
		5854.2	47.68	-64.94	112.62	37.52	32.4	9.36	31.6	129	83	P	H
		5870	48.17	-58.43	106.6	37.98	32.4	9.39	31.6	129	83	A	H
		5901.4	48.12	-37.5	85.62	37.83	32.47	9.42	31.6	129	83	P	H
		5944.2	48.83	-19.37	68.2	38.42	32.56	9.45	31.6	129	83	A	H
		5601.2	47.65	-20.55	68.2	38.47	31.58	9.2	31.6	100	43	P	V
		5668	49.03	-32.53	81.56	39.66	31.72	9.25	31.6	100	43	A	V
		5718.8	49.19	-61.27	110.46	39.6	31.91	9.28	31.6	100	43	P	V
		5721.6	47.98	-66.47	114.45	38.39	31.91	9.28	31.6	100	43	A	V
	*	5795	101.74	-	-	91.86	32.15	9.33	31.6	100	43	P	V
	*	5795	94.49	-	-	84.61	32.15	9.33	31.6	100	43	A	V
		5850.2	48.22	-73.52	121.74	38.12	32.34	9.36	31.6	100	43	P	V
		5871.2	49.14	-57.12	106.26	38.92	32.43	9.39	31.6	100	43	A	V
		5898	48.7	-39.44	88.14	38.41	32.47	9.42	31.6	100	43	P	V
	5927.4	49.43	-18.77	68.2	39.08	32.53	9.42	31.6	100	43	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151		11510	50.62	-23.38	74	57.01	41.2	12.04	59.63	135	40	P	H
		17265	52.06	-16.14	68.2	54.71	42.6	14.85	60.1	185	70	P	H
5755MHz		11510	50.34	-23.66	74	56.73	41.2	12.04	59.63	160	360	P	V
		17265	51.46	-16.74	68.2	54.11	42.6	14.85	60.1	170	360	P	V
802.11n HT40 CH 159		11590	50.92	-23.08	74	57.57	40.92	12.09	59.66	155	241	P	H
		17385	52.45	-15.75	68.2	54.34	43.3	14.92	60.11	169	82	P	H
5795MHz		11590	49.94	-24.06	74	56.59	40.92	12.09	59.66	170	300	P	V
		17385	53.5	-14.7	68.2	55.39	43.3	14.92	60.11	150	200	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80 CH 155 5775MHz		5621.2	48.51	-19.69	68.2	39.32	31.59	9.2	31.6	156	74	P	H
		5697.8	56.07	-47.51	103.58	46.64	31.78	9.25	31.6	156	74	A	H
		5712	58.73	-49.83	108.56	49.2	31.85	9.28	31.6	156	74	P	H
		5725	62.62	-59.58	122.2	53.03	31.91	9.28	31.6	156	74	A	H
	*	5775	100.84	-	-	91.05	32.09	9.3	31.6	156	74	P	H
	*	5775	91.29	-	-	81.5	32.09	9.3	31.6	156	74	A	H
		5852.8	54.41	-61.4	115.81	44.31	32.34	9.36	31.6	156	74	P	H
		5860.4	54.91	-54.38	109.29	44.72	32.4	9.39	31.6	156	74	A	H
		5876.4	50.37	-53.79	104.16	40.15	32.43	9.39	31.6	156	74	P	H
		5931.6	48.1	-20.1	68.2	37.75	32.53	9.42	31.6	156	74	A	H
		5620	47.73	-20.47	68.2	38.54	31.59	9.2	31.6	100	312	P	V
		5700	54.52	-50.68	105.2	45.06	31.78	9.28	31.6	100	312	A	V
		5717.6	58.35	-51.78	110.13	48.76	31.91	9.28	31.6	100	312	P	V
		5724.6	60.39	-60.9	121.29	50.8	31.91	9.28	31.6	100	312	A	V
	*	5775	97.45	-	-	87.66	32.09	9.3	31.6	100	312	P	V
	*	5775	90.06	-	-	80.27	32.09	9.3	31.6	100	312	A	V
		5854	53.92	-59.16	113.08	43.76	32.4	9.36	31.6	100	312	P	V
		5856.8	52.88	-57.42	110.3	42.69	32.4	9.39	31.6	100	312	A	V
		5880.2	48.36	-52.98	101.34	38.14	32.43	9.39	31.6	100	312	P	V
		5934.6	47.77	-20.43	68.2	37.39	32.53	9.45	31.6	100	312	A	V

Remark

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



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

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Cable Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include 802.11ac, VHT80, CH 155, 5775MHz and a Remark section.



Verify Data

The above test data are performed with Adapter 1 and Sample 1, the following test data are verified with Sample 1/2/3 and Adapter 2/3/4/5 for the worst case.

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

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 165 5825MHz (Adapter 2 + Sample 1)	*	5825	100.61	-	-	90.57	32.28	9.36	31.6	100	78	P	H
	*	5825	94.4	-	-	84.36	32.28	9.36	31.6	100	78	A	H
		5853.4	48.21	-66.24	114.45	38.11	32.34	9.36	31.6	100	78	P	H
		5857	48.46	-61.78	110.24	38.27	32.4	9.39	31.6	100	78	A	H
		5888.8	48.54	-46.42	94.96	38.28	32.47	9.39	31.6	100	78	P	H
		5933.6	49.09	-19.11	68.2	38.71	32.53	9.45	31.6	100	78	A	H
	*	5825	100.83	-	-	90.79	32.28	9.36	31.6	102	80	P	V
	*	5825	94.36	-	-	84.32	32.28	9.36	31.6	102	80	A	V
		5854.2	48.71	-63.91	112.62	38.55	32.4	9.36	31.6	102	80	P	V
		5858.4	49.82	-60.03	109.85	39.63	32.4	9.39	31.6	102	80	A	V
	5890.2	48.15	-45.77	93.92	37.89	32.47	9.39	31.6	102	80	P	V	
	5941	48.96	-19.24	68.2	38.55	32.56	9.45	31.6	102	80	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WiFi Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz (Adapter 3+Sample 2)	*	5825	100.75	-	-	90.71	32.28	9.36	31.6	255	298	P	H
	*	5825	93.71	-	-	83.67	32.28	9.36	31.6	255	298	A	H
		5853.8	47.8	-65.74	113.54	37.64	32.4	9.36	31.6	255	298	P	H
		5856.6	47.4	-62.95	110.35	37.21	32.4	9.39	31.6	255	298	A	H
		5906.2	47.82	-34.26	82.08	37.5	32.5	9.42	31.6	255	298	P	H
		5939	47.68	-20.52	68.2	37.27	32.56	9.45	31.6	255	298	A	H
	*	5825	99.11	-	-	89.07	32.28	9.36	31.6	100	29	P	V
	*	5825	93	-	-	82.96	32.28	9.36	31.6	100	29	A	V
		5851.2	48.09	-71.37	119.46	37.99	32.34	9.36	31.6	100	29	P	V
		5874.2	47.67	-57.75	105.42	37.45	32.43	9.39	31.6	100	29	A	V
		5916.4	48.21	-26.33	74.54	37.89	32.5	9.42	31.6	100	29	P	V
	5931.4	47.77	-20.43	68.2	37.42	32.53	9.42	31.6	100	29	A	V	
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WiFi Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz (Adapter 4+Sample 3)	*	5825	100.63	-	-	90.59	32.28	9.36	31.6	138	80	P	H
	*	5825	93.99	-	-	83.95	32.28	9.36	31.6	138	80	A	H
		5854.6	48.01	-63.7	111.71	37.85	32.4	9.36	31.6	138	80	P	H
		5873.4	48.76	-56.89	105.65	38.54	32.43	9.39	31.6	138	80	A	H
		5889	47.57	-47.24	94.81	37.31	32.47	9.39	31.6	138	80	P	H
		5944.8	48.35	-19.85	68.2	37.94	32.56	9.45	31.6	138	80	A	H
	*	5825	99.1	-	-	89.06	32.28	9.36	31.6	100	31	P	V
	*	5825	93.3	-	-	83.26	32.28	9.36	31.6	100	31	A	V
		5850.2	47.86	-73.88	121.74	37.76	32.34	9.36	31.6	100	31	P	V
		5865.8	48.33	-59.44	107.77	38.14	32.4	9.39	31.6	100	31	A	V
		5906	48.16	-34.06	82.22	37.84	32.5	9.42	31.6	100	31	P	V
	5939.6	46.93	-21.27	68.2	36.52	32.56	9.45	31.6	100	31	A	V	
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. 												



WiFi Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz (Adapter 5 + Sample 1)	*	5825	100.45	-	-	90.41	32.28	9.36	31.6	118	80	P	H
	*	5825	95.61	-	-	85.57	32.28	9.36	31.6	118	80	A	H
		5853.4	48.92	-65.53	114.45	38.82	32.34	9.36	31.6	118	80	P	H
		5859.6	49.77	-59.74	109.51	39.58	32.4	9.39	31.6	118	80	A	H
		5924	49.69	-19.25	68.94	39.34	32.53	9.42	31.6	118	80	P	H
		5944.2	47.58	-20.62	68.2	37.17	32.56	9.45	31.6	118	80	A	H
	*	5825	101.11	-	-	91.07	32.28	9.36	31.6	100	27	P	V
	*	5825	95.41	-	-	85.37	32.28	9.36	31.6	100	27	A	V
		5851.2	51.13	-68.33	119.46	41.03	32.34	9.36	31.6	100	27	P	V
		5861.4	49.76	-59.25	109.01	39.57	32.4	9.39	31.6	100	27	A	V
		5919.6	48.22	-23.96	72.18	37.9	32.5	9.42	31.6	100	27	P	V
		5943.6	47.68	-20.52	68.2	37.27	32.56	9.45	31.6	100	27	A	V
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. 												



Band 4 5725~5850MHz
WIFI 802.11a (Harmonic @ 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 165 5825MHz		11650	50.4	-23.6	74	57.21	40.76	12.1	59.67	156	347	P	H
		17475	54.96	-13.24	68.2	56.32	43.8	14.96	60.12	150	360	P	H
(Adapter 2 + Sample 1)		11650	49.22	-24.78	74	56.03	40.76	12.1	59.67	142	213	P	V
		17475	54.18	-14.02	68.2	55.54	43.8	14.96	60.12	174	195	P	V
802.11a CH 165 5825MHz		11650	49.73	-24.27	74	56.54	40.76	12.1	59.67	123	214	P	H
		17475	54.89	-13.31	68.2	56.25	43.8	14.96	60.12	172	165	P	H
(Adapter 3 + Sample 2)		11650	50.05	-23.95	74	56.86	40.76	12.1	59.67	198	65	P	V
		17475	54.21	-13.99	68.2	55.57	43.8	14.96	60.12	100	47	P	V
802.11a CH 165 5825MHz		11650	49.24	-24.76	74	56.05	40.76	12.1	59.67	132	252	P	H
		17475	54.43	-13.77	68.2	55.79	43.8	14.96	60.12	198	54	P	H
(Adapter 4 + Sample 3)		11650	49.34	-24.66	74	56.15	40.76	12.1	59.67	137	49	P	V
		17475	54.06	-14.14	68.2	55.42	43.8	14.96	60.12	162	198	P	V
802.11a CH 165 5825MHz		11650	49.88	-24.12	74	56.69	40.76	12.1	59.67	149	271	P	H
		17475	53.54	-14.66	68.2	54.9	43.8	14.96	60.12	103	268	P	H
(Adapter 5 + Sample 1)		11650	49.64	-24.36	74	56.45	40.76	12.1	59.67	145	265	P	V
		17475	55.01	-13.19	68.2	56.37	43.8	14.96	60.12	117	78	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

Emission below 1GHz

5GHz WIFI 802.11a (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11a LF		30.97	23.36	-16.64	40	30.77	24.62	0.57	32.6	-	-	P	H
		83.35	28.44	-11.56	40	45.95	13.84	0.95	32.3	-	-	P	H
		205.57	34.22	-9.28	43.5	48.62	15.5	1.49	31.39	162	30	P	H
		255.04	31.01	-14.99	46	41.97	19.45	1.68	32.09	-	-	P	H
		376.29	26.28	-19.72	46	34.89	21.24	2.05	31.9	-	-	P	H
		893.3	30	-16	46	31.33	26.76	3.3	31.39	-	-	P	H
		34.85	27.16	-12.84	40	36.83	22.3	0.63	32.6	-	-	P	V
		82.38	29.16	-10.84	40	46.86	13.66	0.94	32.3	152	40	P	V
		203.63	26.96	-16.54	43.5	41.33	15.5	1.48	31.35	-	-	P	V
		256.01	26.24	-19.76	46	37.05	19.6	1.68	32.09	-	-	P	V
		526.64	30.24	-15.76	46	34.83	24.39	2.47	31.45	-	-	P	V
	602.3	31.07	-14.93	46	35.08	24.91	2.68	31.6	-	-	P	V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

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



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

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

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

For Peak Limit @ 2390MHz:

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

For Average Limit @ 2390MHz:

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

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



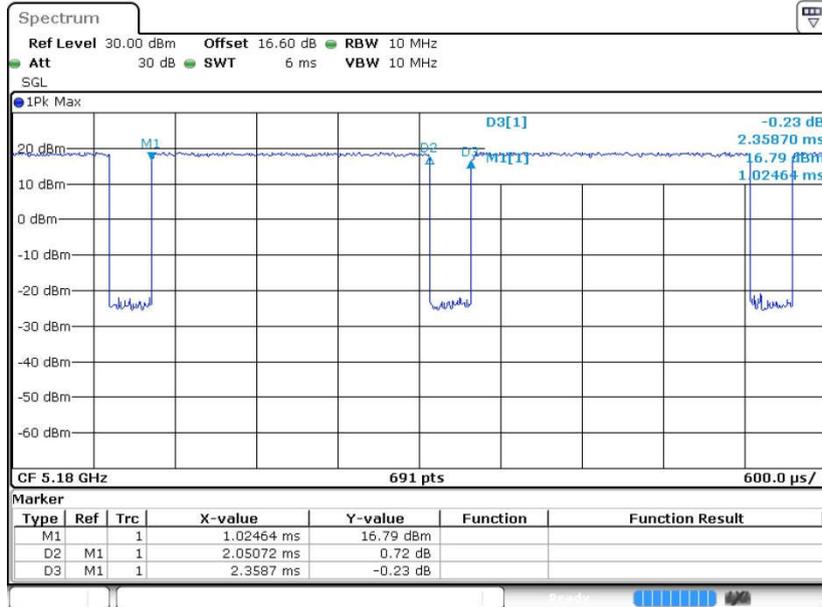
Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11a	86.94	2.051	0.488	1kHz
1+2	802.11n HT20	86.63	0.981	1.019	3kHz
1+2	802.11n HT40	85.89	0.494	2.023	3kHz
1+2	802.11ac VHT80	84.49	0.257	3.898	10kHz
1+2	802.11ac VHT160	75.81	0.152	6.571	10kHz



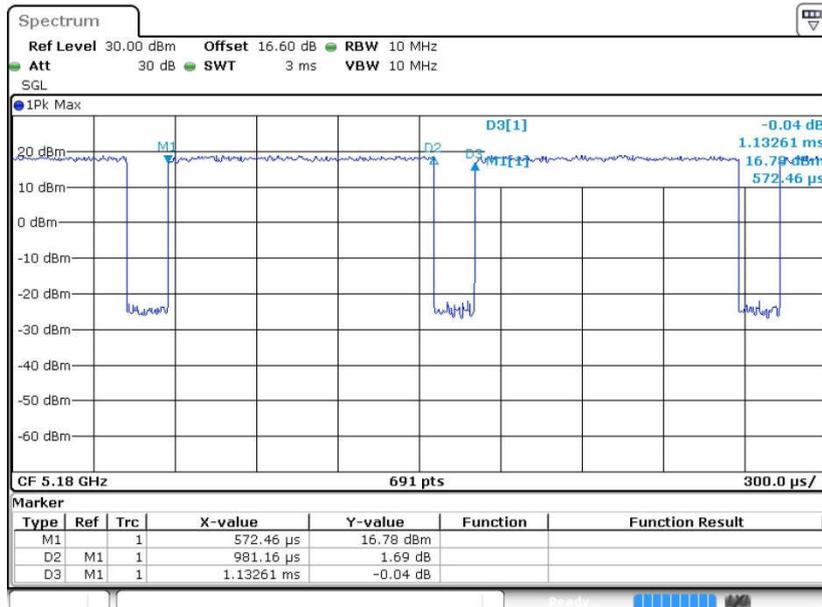
Ant.1

802.11a



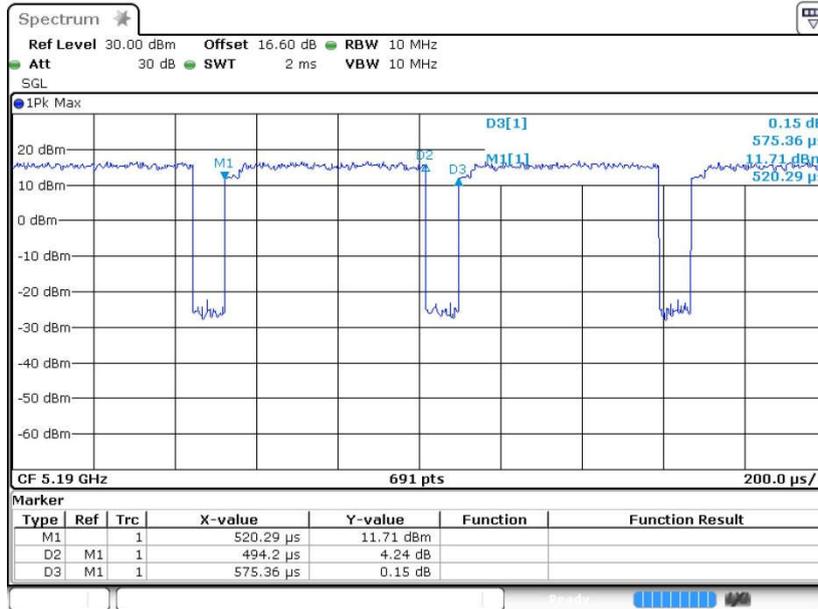
Ant.1+2

802.11n HT20

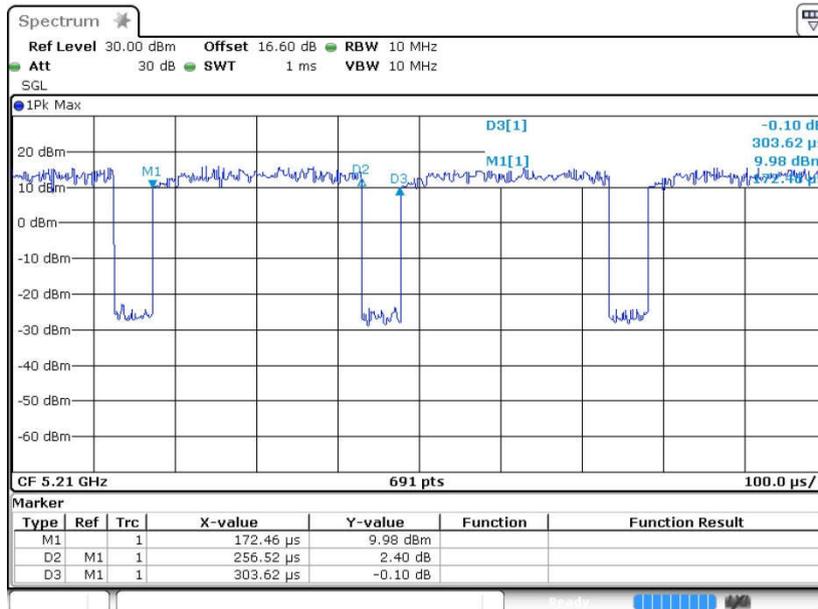




802.11n HT40



802.11ac VHT80





802.11ac VHT160

