



FCC RF Test Report

APPLICANT : Acer Incorporated
EQUIPMENT : Smart Camera
BRAND NAME : acer
MODEL NAME : C01
MARKETING NAME : Holo360
FCC ID : HLZC01
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on May 12, 2017 and testing was completed on Aug. 24, 2017. 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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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR751212E	Rev. 01	Initial issue of report	Sep. 05, 2017



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) & 15.209(a)	Pass	Under limit 7.00 dB at 30.970 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 11.40 dB at 0.520 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

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	Smart Camera
Brand Name	acer
Model Name	C01
Marketing Name	Holo360
FCC ID	HLZC01
EUT supports Radios application	WCDMA/HSPA/DC-HSDPA/ HSPA+ (16QAM uplink is not supported)/LTE/ WLAN 2.4G 802.11b/g/n HT20/HT40/ WLAN 5G 802.11a/n HT20/HT40/ WLAN 5G 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0 + EDR/ Bluetooth v4.0 LE/Bluetooth v4.1 LE
IMEI Code	Conducted: 358083080000858 Radiation: 358083080000684 Conduction: 358083080000874
HW Version	V1.03
SW Version	Acer_AV0N0_C01_0.000.08_EMEA_GEN1
EUT Stage	Pre-Production

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	<5745 MHz ~ 5825 MHz> 802.11a : 12.66 dBm / 0.0185 W 802.11n HT20 : 11.83 dBm / 0.0152 W 802.11n HT40 : 12.31 dBm / 0.0170 W 802.11ac VHT20: 11.75 dBm / 0.0150 W 802.11ac VHT40: 12.23 dBm / 0.0167 W 802.11ac VHT80: 12.07 dBm / 0.0161 W
99% Occupied Bandwidth	802.11a : 18.78 MHz 802.11n HT20 : 19.33 MHz 802.11n HT40 : 36.76 MHz 802.11ac VHT80 : 74.81 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Antenna Type / Gain	PIFA Antenna with gain -0.86 dBi

Note: For 802.11n HT20 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing has assessed only 802.11an HT20/ HT40 by referring to their maximum conducted power.

1.5 Modification of EUT

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

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No. are CN5018 and CN5019.

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 Test Firm Registration No.
	TH01-SZ	CO01-SZ	251365

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 Test Firm Registration No.
	03CH03-SZ		577730

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

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 v01r04
- ♦ FCC KDB 644545 D03 Guidance for IEEE 802.11ac New Rules v01
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases were recorded in this report.

2.1 Carrier Frequency and Channel

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

Note:

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

2.2 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT80	MCS0

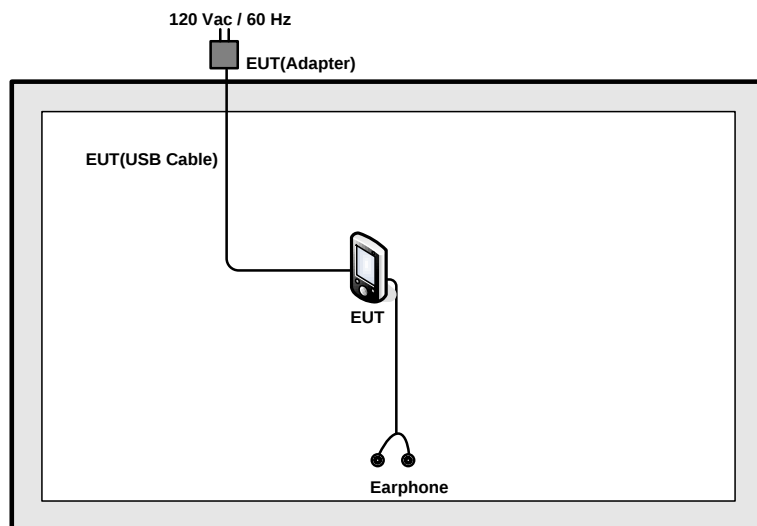
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN Link (5G) + USB Cable (Charging from Adapter) + Earphone
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Ch. #		Band IV : 5745-5825 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

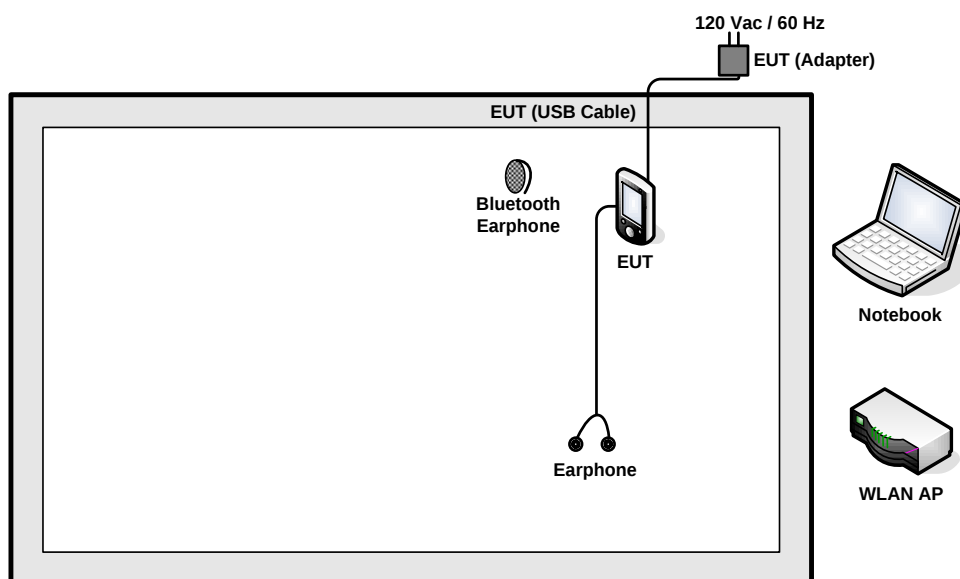
Ch. #		Band IV : 5745-5825 MHz	
		802.11ac VHT80	
L	Low	-	
M	Middle	155	
H	High	-	

2.3 Connection Diagram of Test System

< WLAN Tx Mode >



< AC Conducted Emission Mode >



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-865L	KA2IR865LA1	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	E450	N/A	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Bluetooth Earphone	Nokia	BH-108	PYAHS-107W	N/A	N/A
4.	Earphone	Lenovo	LH102	N/A	Unshielded,1.2m	N/A

2.5 EUT Operation Test Setup

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

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

2.6 Measurement Results Explanation Example

For all conducted test items:

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

Example :

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 6.3 dB and 10dB attenuator.

$$\begin{aligned}
 \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\
 &= 6.3 + 10 = 16.3 \text{ (dB)}
 \end{aligned}$$

3 Test Result

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

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

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

26dB and 99% Occupied bandwidth are reporting only.

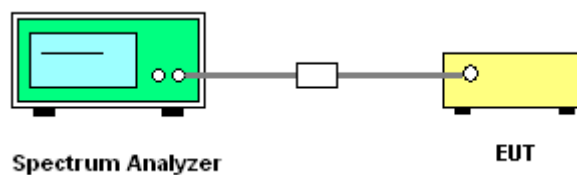
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

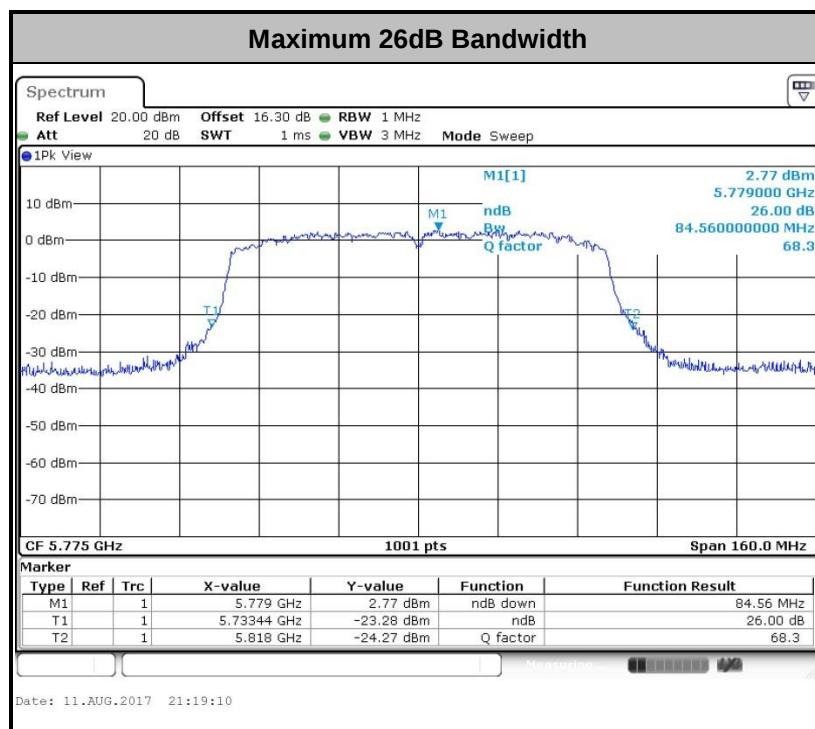
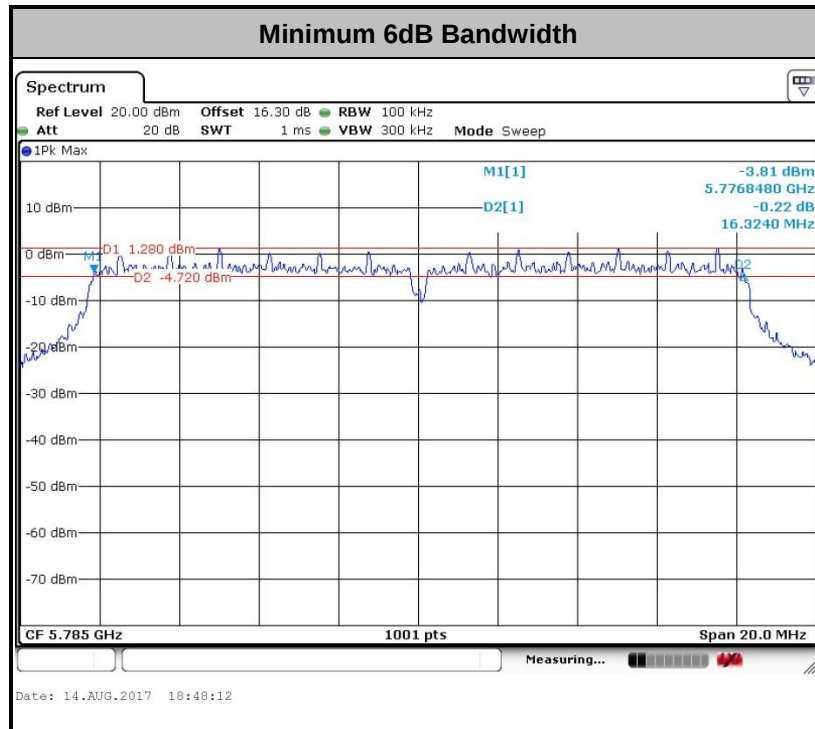
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

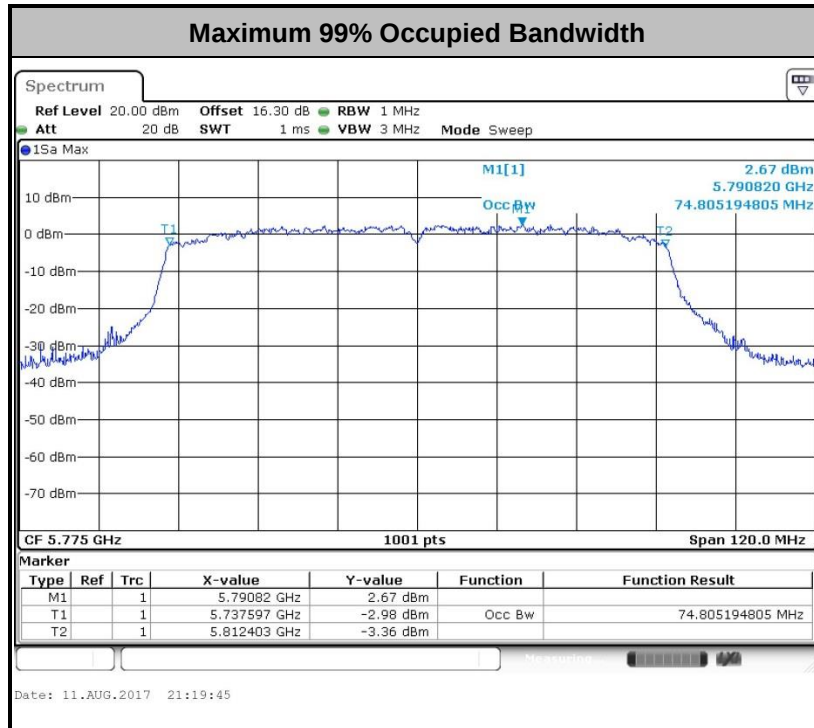
3.1.4 Test Setup



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

Please refer to Appendix A.





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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

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

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

3.2.2 Measuring Instruments

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

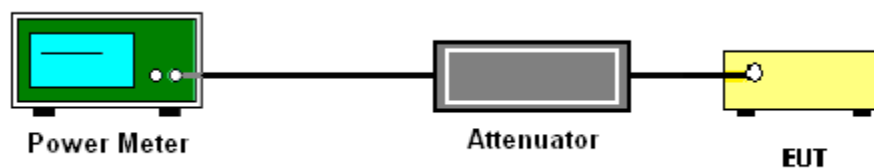
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.

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

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

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.
Section F) Maximum power spectral density.

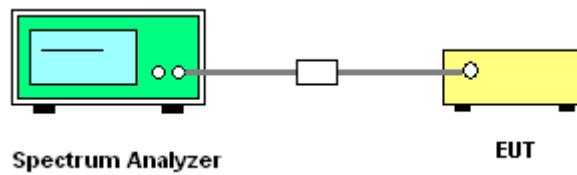
Method SA-2

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

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz.
- Set VBW ≥ 1 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add $10 \log(500\text{kHz}/\text{RBW})$ 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.

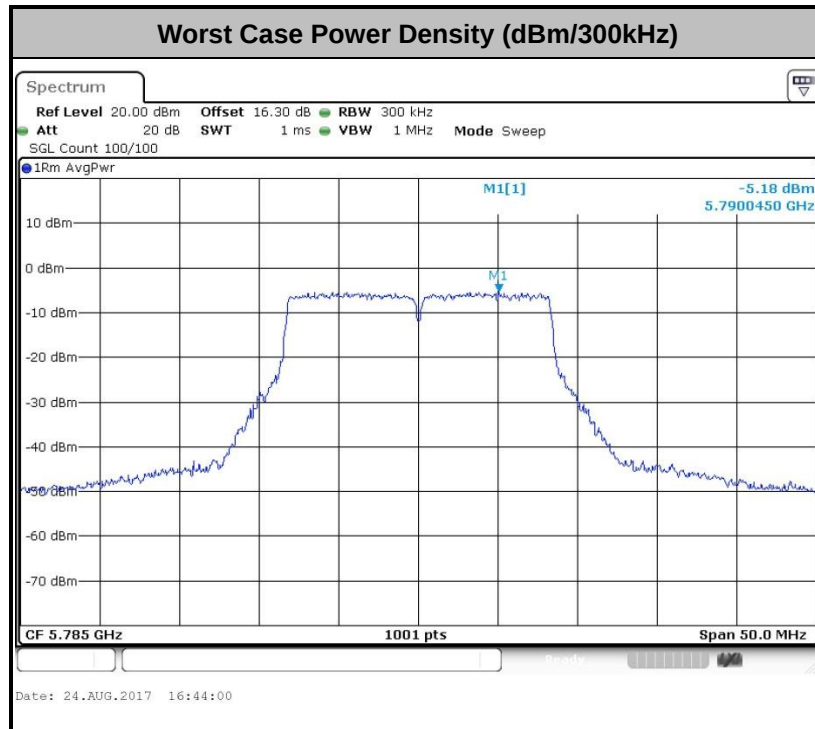
1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



3.4 Unwanted Emissions Measurement

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

3.4.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

- (2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

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

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

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

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

(3) KDB789033 D02 v01r04 G)2)c)

- (i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.³
- (ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.⁴

Note 3: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

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 v01r04.
Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

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

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

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

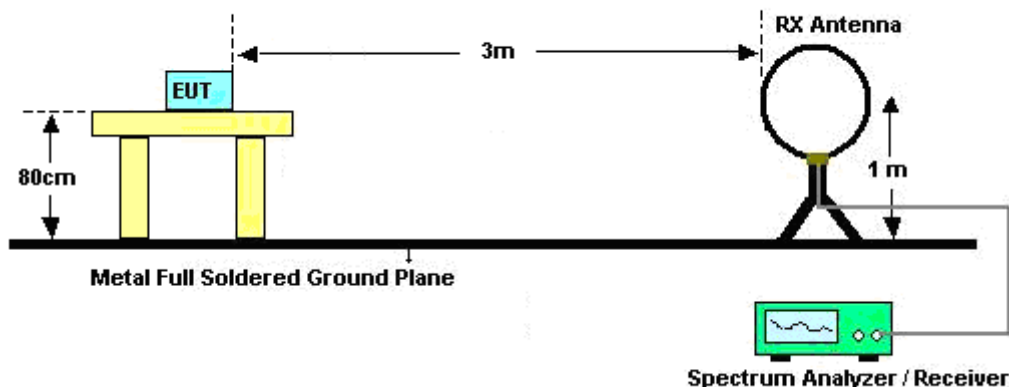
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

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

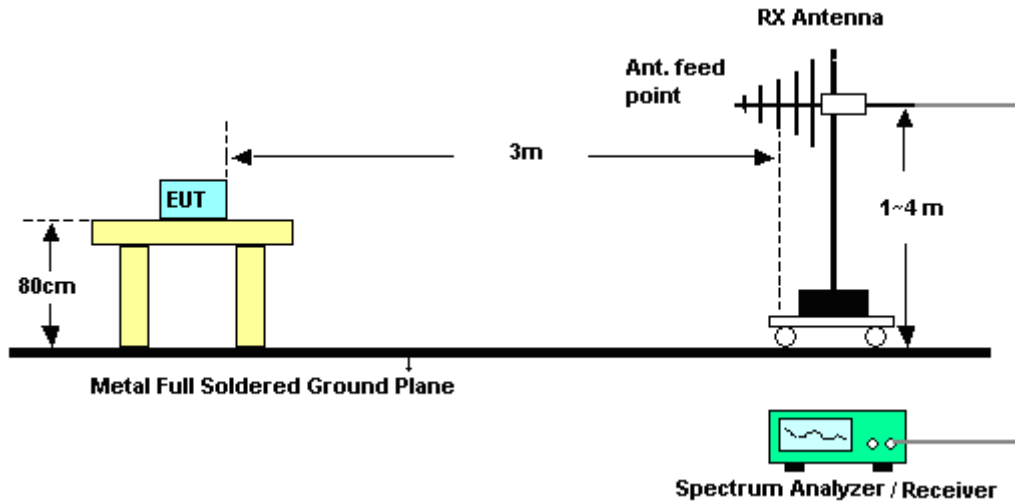
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

3.4.4 Test Setup

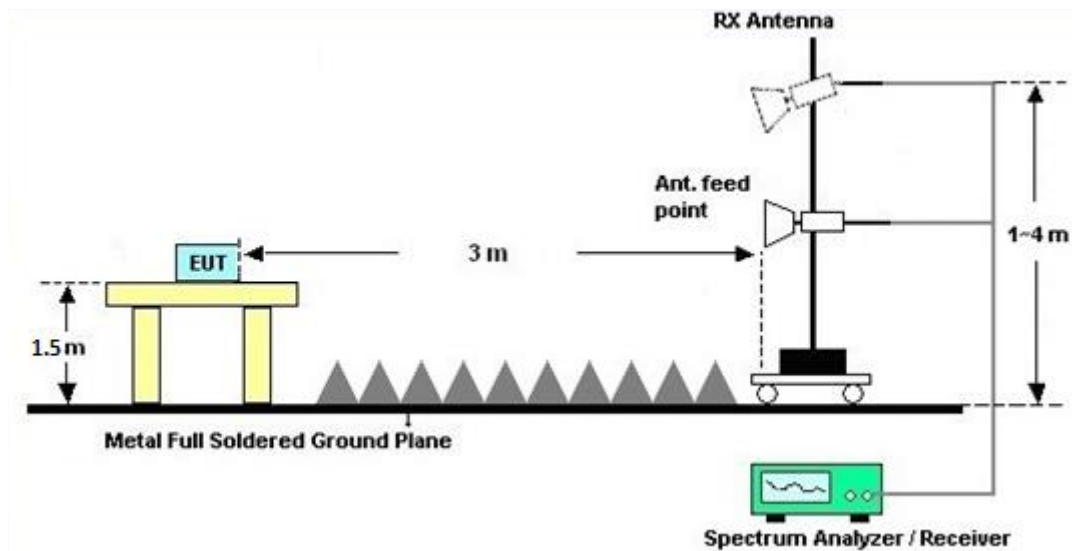
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



**3.4.5 Test Results of Radiated Spurious 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 Spurious at Band Edges

Please refer to Appendix B.

3.4.7 Duty Cycle

Please refer to Appendix C.

3.4.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix B.

3.5 AC Conducted Emission Measurement

3.5.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

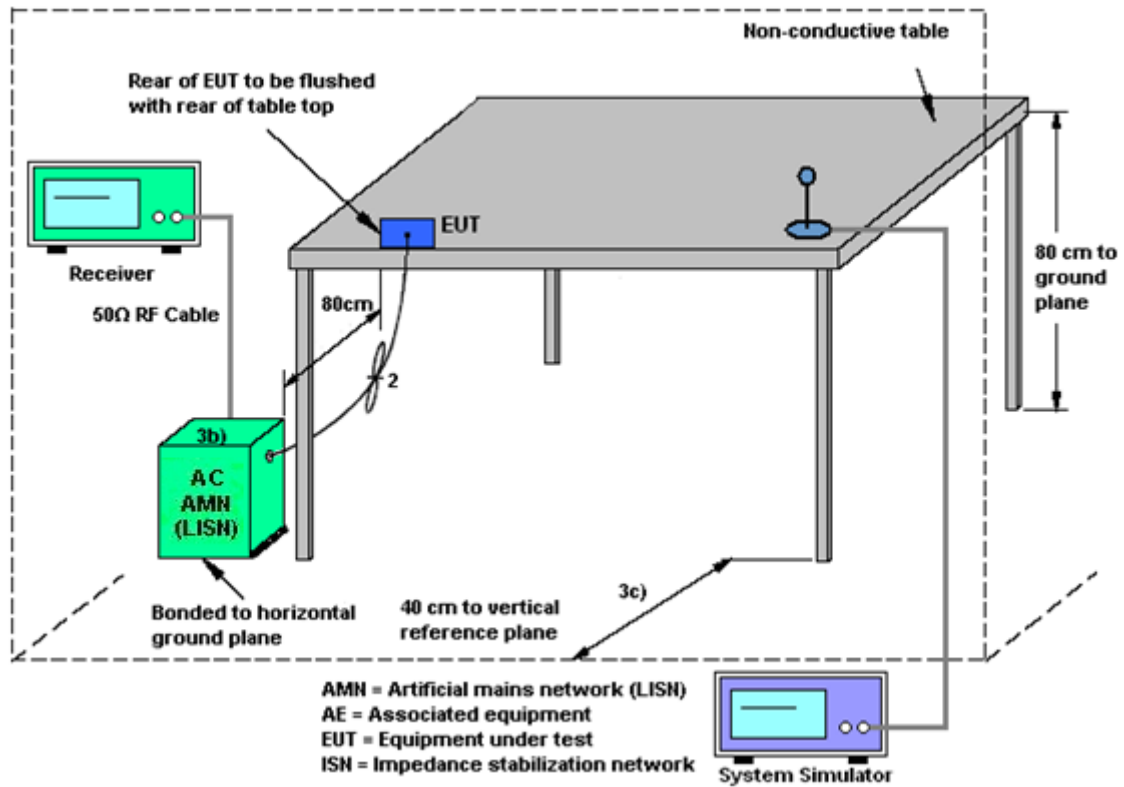
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

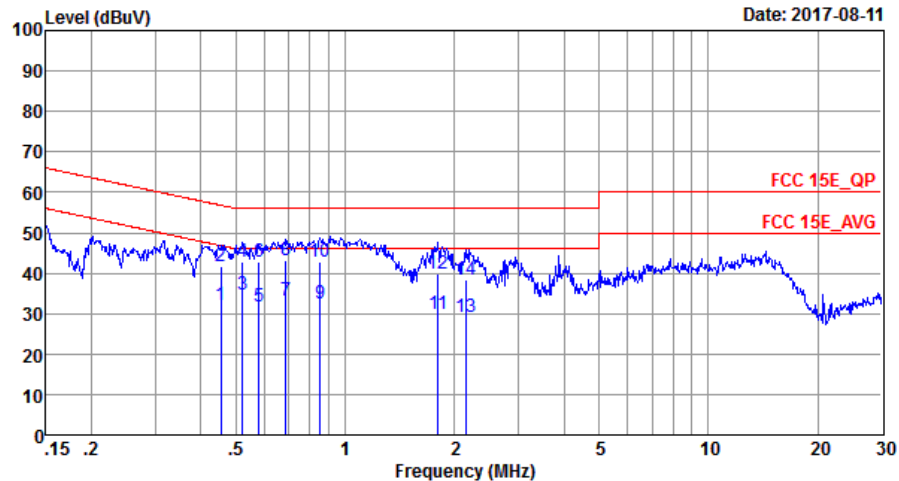
3.5.4 Test Setup





3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	24~25℃
Test Engineer :	Peng Wang	Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN Link (5G) + USB Cable (Charging from Adapter) + Earphone		



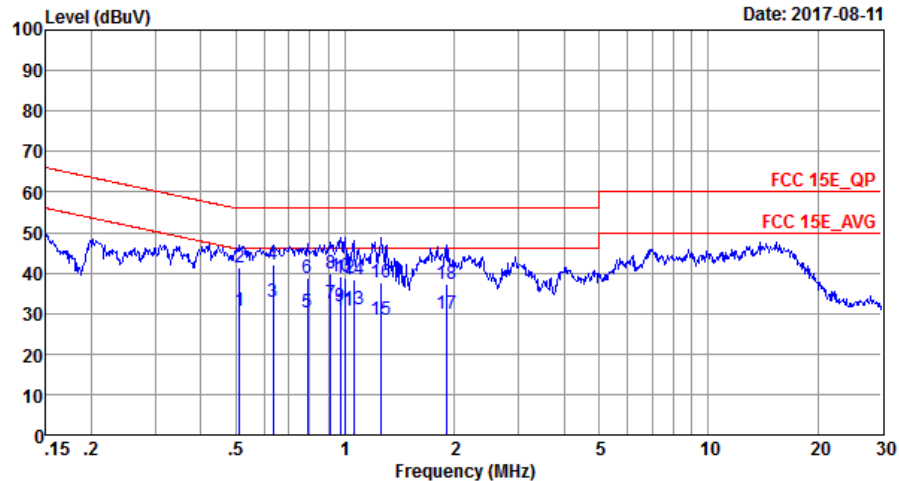
Site : CO01-SZ
Condition: FCC 15E_QP LISN_20170301_L LINE

Mode : Mode 1
IMEI : 358083080000874

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.45	32.21	-14.59	46.80	22.01	0.02	10.18	Average
2	0.45	41.61	-15.19	56.80	31.41	0.02	10.18	QP
3 *	0.52	34.60	-11.40	46.00	24.40	0.02	10.18	Average
4	0.52	42.90	-13.10	56.00	32.70	0.02	10.18	QP
5	0.58	31.69	-14.31	46.00	21.50	0.02	10.17	Average
6	0.58	42.89	-13.11	56.00	32.70	0.02	10.17	QP
7	0.69	33.09	-12.91	46.00	22.90	0.02	10.17	Average
8	0.69	43.29	-12.71	56.00	33.10	0.02	10.17	QP
9	0.85	32.40	-13.60	46.00	22.19	0.05	10.16	Average
10	0.85	42.78	-13.22	56.00	32.57	0.05	10.16	QP
11	1.80	29.76	-16.24	46.00	19.50	0.10	10.16	Average
12	1.80	39.76	-16.24	56.00	29.50	0.10	10.16	QP
13	2.14	29.09	-16.91	46.00	18.80	0.12	10.17	Average
14	2.14	38.49	-17.51	56.00	28.20	0.12	10.17	QP



Test Mode :	Mode 1	Temperature :	24~25℃
Test Engineer :	Peng Wang	Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN Link (5G) + USB Cable (Charging from Adapter) + Earphone		



Site : C001-SZ
Condition: FCC 15E_QP LISN_20170301_N NEUTRAL

Mode : Mode 1
IMEI : 358083080000874

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.51	30.50	-15.50	46.00	20.30	0.02	10.18	Average
2	0.51	41.20	-14.80	56.00	31.00	0.02	10.18	QP
3 *	0.63	32.79	-13.21	46.00	22.60	0.02	10.17	Average
4	0.63	42.09	-13.91	56.00	31.90	0.02	10.17	QP
5	0.79	30.39	-15.61	46.00	20.20	0.03	10.16	Average
6	0.79	38.59	-17.41	56.00	28.40	0.03	10.16	QP
7	0.91	32.50	-13.50	46.00	22.31	0.04	10.15	Average
8	0.91	39.83	-16.17	56.00	29.64	0.04	10.15	QP
9	0.97	31.80	-14.20	46.00	21.60	0.05	10.15	Average
10	0.97	39.30	-16.70	56.00	29.10	0.05	10.15	QP
11	1.00	30.61	-15.39	46.00	20.41	0.05	10.15	Average
12	1.00	38.60	-17.40	56.00	28.40	0.05	10.15	QP
13	1.05	30.90	-15.10	46.00	20.70	0.05	10.15	Average
14	1.05	38.50	-17.50	56.00	28.30	0.05	10.15	QP
15	1.25	28.50	-17.50	46.00	18.30	0.05	10.15	Average
16	1.25	37.50	-18.50	56.00	27.30	0.05	10.15	QP
17	1.90	30.01	-15.99	46.00	19.80	0.05	10.16	Average
18	1.90	37.21	-18.79	56.00	27.00	0.05	10.16	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.

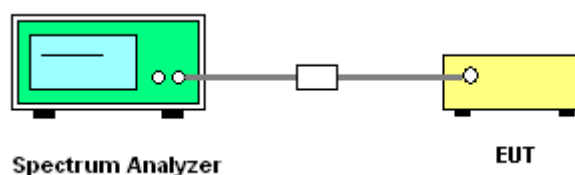
3.6.2 Measuring Instruments

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

Please refer to Appendix A.



3.7 Automatically Discontinue Transmission

3.7.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.7.2 Measuring Instruments

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

3.7.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



3.8 Antenna Requirements

3.8.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2), if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.8.3 Antenna Gain

The antenna gain is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Jan. 06, 2017	Aug. 07, 2017~ Aug. 24, 2017	Jan. 05, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Jan. 06, 2017	Aug. 07, 2017~ Aug. 24, 2017	Jan. 05, 2018	Conducted (TH01-SZ)
DC Power Supply	GWINSTEK	AnritsuGPS-3030D	EM882636	Max 30V	May 12, 2017	Aug. 07, 2017~ Aug. 24, 2017	May 11, 2018	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Jul. 20, 2017	Aug. 07, 2017~ Aug. 24, 2017	Jul. 19, 2018	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	Apr. 20, 2017	Aug. 07, 2017~ Aug. 24, 2017	Apr. 19, 2018	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 20, 2017	Aug. 07, 2017~ Aug. 24, 2017	Apr. 19, 2018	Radiation (03CH03-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 20, 2017	Aug. 07, 2017~ Aug. 24, 2017	Apr. 19, 2018	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2017	Aug. 07, 2017~ Aug. 24, 2017	May 13, 2018	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz-2GHz	May 14, 2017	Aug. 07, 2017~ Aug. 24, 2017	May 13, 2018	Radiation (03CH03-SZ)
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1285	1GHz~18GHz	Jan. 12, 2017	Aug. 07, 2017~ Aug. 24, 2017	Jan. 11, 2018	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Jun. 16, 2017	Aug. 07, 2017~ Aug. 24, 2017	Jun. 15, 2018	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102210	0.01Hz~3000MHz	Oct. 11, 2016	Aug. 07, 2017~ Aug. 24, 2017	Oct. 10, 2017	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 11, 2016	Aug. 07, 2017~ Aug. 24, 2017	Oct. 10, 2017	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 06, 2017	Aug. 07, 2017~ Aug. 24, 2017	Jan. 05, 2018	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1988315	18GHz~40GHz	Jul. 27, 2017	Aug. 07, 2017~ Aug. 24, 2017	Jul. 26, 2018	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Aug. 07, 2017~ Aug. 24, 2017	NCR	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Aug. 07, 2017~ Aug. 24, 2017	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Aug. 07, 2017~ Aug. 24, 2017	NCR	Radiation (03CH03-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Jan. 06, 2017	Aug. 11, 2017	Jan. 05, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Jan. 05, 2017	Aug. 11, 2017	Jan. 04, 2018	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Jan. 05, 2017	Aug. 11, 2017	Jan. 04, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 19, 2017	Aug. 11, 2017	Jul. 18, 2018	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% ($U = 2Uc(y)$)	2.5dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
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Appendix A. Conducted Test Results

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Rain Wang	Temperature:	24~26	°C
Test Date:	2017/8/7~2017/8/24	Relative Humidity:	50~53	%

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

Band IV									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	18.68	23.53	16.34	0.5	Pass
11a	6Mbps	1	157	5785	18.78	23.63	16.32	0.5	Pass
11a	6Mbps	1	165	5825	18.58	23.33	16.32	0.5	Pass
HT20	MCS 0	1	149	5745	19.33	23.93	17.54	0.5	Pass
HT20	MCS 0	1	157	5785	19.23	23.93	17.56	0.5	Pass
HT20	MCS 0	1	165	5825	19.28	23.53	17.56	0.5	Pass
HT40	MCS 0	1	151	5755	36.76	44.78	35.13	0.5	Pass
HT40	MCS 0	1	159	5795	36.76	44.87	35.13	0.5	Pass
VHT80	MCS 0	1	155	5775	74.81	84.56	75.05	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6M bps	1	149	5745	0.61	12.66	30.00	-0.86		Pass
11a	6Mbps	1	157	5785	0.61	12.60	30.00	-0.86		Pass
11a	6Mbps	1	165	5825	0.61	12.51	30.00	-0.86		Pass
HT20	MCS 0	1	149	5745	0.63	11.78	30.00	-0.86		Pass
HT20	MCS 0	1	157	5785	0.63	11.83	30.00	-0.86		Pass
HT20	MCS 0	1	165	5825	0.63	11.54	30.00	-0.86		Pass
HT40	MCS 0	1	151	5755	1.18	12.31	30.00	-0.86		Pass
HT40	MCS 0	1	159	5795	1.18	12.22	30.00	-0.86		Pass
VHT20	MCS 0	1	149	5745	0.80	11.75	30.00	-0.86		Pass
VHT20	MCS 0	1	157	5785	0.80	11.74	30.00	-0.86		Pass
VHT20	MCS 0	1	165	5825	0.80	11.47	30.00	-0.86		Pass
VHT40	MCS 0	1	151	5755	1.48	12.23	30.00	-0.86		Pass
VHT40	MCS 0	1	159	5795	1.48	12.18	30.00	-0.86		Pass
VHT80	MCS 0	1	155	5775	2.56	12.07	30.00	-0.86		Pass

TEST RESULTS DATA
Power Spectral Density

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.61	2.22	-2.94	30.00	-0.86	Pass
11a	6Mbps	1	157	5785	0.61	2.22	-2.35	30.00	-0.86	Pass
11a	6Mbps	1	165	5825	0.61	2.22	-2.52	30.00	-0.86	Pass
HT20	MCS 0	1	149	5745	0.63	2.22	-3.89	30.00	-0.86	Pass
HT20	MCS 0	1	157	5785	0.63	2.22	-4.05	30.00	-0.86	Pass
HT20	MCS 0	1	165	5825	0.63	2.22	-3.60	30.00	-0.86	Pass
HT40	MCS 0	1	151	5755	1.18	2.22	-5.94	30.00	-0.86	Pass
HT40	MCS 0	1	159	5795	1.18	2.22	-6.19	30.00	-0.86	Pass
VHT80	MCS 0	1	155	5775	2.56	2.22	-8.62	30.00	-0.86	Pass

TEST RESULTS DATA
Frequency Stability

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6M bps	1	149	5745	5745.025	0.025	4.35	50	4	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	-30	4	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	4.2	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	3.6	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	20	4	



Appendix B. Radiated Spurious Emission

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5631.6	47.5	-20.7	68.2	39.94	32.34	8.22	33	100	163	P	H
		5674.4	48.03	-38.27	86.3	40.37	32.44	8.22	33	100	163	P	H
		5707.2	47.02	-60.2	107.22	39.28	32.51	8.23	33	100	163	P	H
		5724.8	46.42	-75.32	121.74	38.64	32.55	8.23	33	100	163	P	H
	*	5745	91.24	-	-	83.43	32.58	8.23	33	100	163	P	H
	*	5745	85.05	-	-	77.24	32.58	8.23	33	100	163	A	H
		5618.4	47.97	-20.23	68.2	40.42	32.34	8.21	33	189	11	P	V
		5671.2	48.65	-35.28	83.93	40.99	32.44	8.22	33	189	11	P	V
		5712.8	47.25	-61.54	108.79	39.51	32.51	8.23	33	189	11	P	V
		5724.8	49.61	-72.13	121.74	41.83	32.55	8.23	33	189	11	P	V
	*	5745	95.92	-	-	88.11	32.58	8.23	33	189	11	P	V
	*	5745	89.08	-	-	81.27	32.58	8.23	33	189	11	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 157 5785MHz		5619.2	48.04	-20.16	68.2	40.49	32.34	8.21	33	100	163	P	H
		5677	47.57	-40.65	88.22	39.91	32.44	8.22	33	100	163	P	H
		5716.2	46.36	-63.38	109.74	38.62	32.51	8.23	33	100	163	P	H
		5721.4	46.66	-67.33	113.99	38.88	32.55	8.23	33	100	163	P	H
	*	5785	89.81	-	-	81.92	32.65	8.24	33	100	163	P	H
	*	5785	84.33	-	-	76.44	32.65	8.24	33	100	163	A	H
		5852	47.04	-70.6	117.64	38.96	32.79	8.29	33	100	163	P	H
		5868.2	46.56	-60.54	107.1	38.41	32.82	8.33	33	100	163	P	H
		5921.2	47.81	-23.19	71	39.5	32.93	8.38	33	100	163	P	H
		5945.6	47.55	-20.65	68.2	39.13	33	8.42	33	100	163	P	H
		5613.4	46.75	-21.45	68.2	39.23	32.31	8.21	33	190	10	P	V
		5657.6	47.5	-26.35	73.85	39.87	32.41	8.22	33	190	10	P	V
		5718.6	47.16	-63.25	110.41	39.38	32.55	8.23	33	190	10	P	V
		5721.2	45.34	-68.2	113.54	37.56	32.55	8.23	33	190	10	P	V
	*	5785	95.53	-	-	87.64	32.65	8.24	33	190	10	P	V
	*	5785	89.13	-	-	81.24	32.65	8.24	33	190	10	A	V
		5853.8	47.55	-65.99	113.54	39.44	32.82	8.29	33	190	10	P	V
		5861.4	48	-61.01	109.01	39.85	32.82	8.33	33	190	10	P	V
		5896.4	48.08	-41.25	89.33	39.81	32.89	8.38	33	190	10	P	V
		5934.2	47.62	-20.58	68.2	39.24	32.96	8.42	33	190	10	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz	*	5825	91.16	-	-	83.11	32.76	8.29	33	156	166	P	H
	*	5825	85.02	-	-	76.97	32.76	8.29	33	156	166	A	H
		5854.8	46.28	-64.98	111.26	38.17	32.82	8.29	33	156	166	P	H
		5865.4	47.63	-60.26	107.89	39.48	32.82	8.33	33	156	166	P	H
		5891.4	47.76	-45.27	93.03	39.54	32.89	8.33	33	156	166	P	H
		5938.2	47.39	-20.81	68.2	39.01	32.96	8.42	33	156	166	P	H
	*	5825	95.22	-	-	87.17	32.76	8.29	33	182	12	P	V
	*	5825	88.46	-	-	80.41	32.76	8.29	33	182	12	A	V
		5854.2	46.97	-65.65	112.62	38.86	32.82	8.29	33	182	12	P	V
		5873.2	48.6	-57.1	105.7	40.41	32.86	8.33	33	182	12	P	V
		5912	47.69	-30.1	77.79	39.38	32.93	8.38	33	182	12	P	V
		5941.6	47.49	-20.71	68.2	39.07	33	8.42	33	182	12	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 149 5745MHz		11490	49.71	-24.29	74	55.19	39.22	11.32	56.02	160	360	P	H
		17235	50.26	-17.94	68.2	47.33	41.49	16.89	55.45	170	360	P	H
		11490	49.65	-24.35	74	55.13	39.22	11.32	56.02	160	360	P	V
		17235	50.76	-17.44	68.2	47.83	41.49	16.89	55.45	170	360	P	V
802.11a CH 157 5785MHz		11570	49.99	-24.01	74	55.59	39.14	11.37	56.11	175	198	P	H
		17355	50.21	-17.99	68.2	46.76	42.24	17.22	56.01	189	185	P	H
		11570	49.56	-24.44	74	55.16	39.14	11.37	56.11	175	198	P	V
		17355	50.01	-18.19	68.2	46.56	42.24	17.22	56.01	189	185	P	V
802.11a CH 165 5825MHz		11650	49.83	-24.17	74	55.5	39.09	11.43	56.19	156	347	P	H
		17475	50.46	-17.74	68.2	46.49	42.99	17.55	56.57	150	360	P	H
		11650	49.19	-24.81	74	54.86	39.09	11.43	56.19	156	347	P	V
		17475	50.78	-17.42	68.2	46.81	42.99	17.55	56.57	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 149 5745MHz		5637	47.25	-20.95	68.2	39.65	32.38	8.22	33	160	163	P	H
		5675.8	47.37	-39.96	87.33	39.71	32.44	8.22	33	160	163	P	H
		5711.4	46.15	-62.24	108.39	38.41	32.51	8.23	33	160	163	P	H
		5721.8	46.2	-68.7	114.9	38.42	32.55	8.23	33	160	163	P	H
	*	5745	91.31	-	-	83.5	32.58	8.23	33	160	163	P	H
	*	5745	83.94	-	-	76.13	32.58	8.23	33	160	163	A	H
		5643	47.39	-20.81	68.2	39.79	32.38	8.22	33	180	10	P	V
		5691.2	46.82	-51.89	98.71	39.12	32.48	8.22	33	180	10	P	V
		5711.8	47.15	-61.36	108.51	39.41	32.51	8.23	33	180	10	P	V
		5721.4	47.84	-66.15	113.99	40.06	32.55	8.23	33	180	10	P	V
	*	5745	93.75	-	-	85.94	32.58	8.23	33	180	10	P	V
	*	5745	87.71	-	-	79.9	32.58	8.23	33	180	10	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 157 5785MHz		5602.2	47.9	-20.3	68.2	40.38	32.31	8.21	33	160	154	P	H
		5682	46.69	-45.23	91.92	39.03	32.44	8.22	33	160	154	P	H
		5709.2	46.84	-60.94	107.78	39.1	32.51	8.23	33	160	154	P	H
		5721.8	45.66	-69.24	114.9	37.88	32.55	8.23	33	160	154	P	H
	*	5785	92.39	-	-	84.5	32.65	8.24	33	160	154	P	H
	*	5785	86.41	-	-	78.52	32.65	8.24	33	160	154	A	H
		5853.4	45.86	-68.59	114.45	37.78	32.79	8.29	33	160	154	P	H
		5860.8	47.47	-61.7	109.17	39.32	32.82	8.33	33	160	154	P	H
		5890.2	47.27	-46.65	93.92	39.05	32.89	8.33	33	160	154	P	H
		5939.6	47.72	-20.48	68.2	39.3	33	8.42	33	160	154	P	H
		5637.8	47.76	-20.44	68.2	40.16	32.38	8.22	33	179	10	P	V
		5694.4	46.7	-54.37	101.07	39	32.48	8.22	33	179	10	P	V
		5704.8	48.04	-58.51	106.55	40.3	32.51	8.23	33	179	10	P	V
		5722.4	45.44	-70.83	116.27	37.66	32.55	8.23	33	179	10	P	V
	*	5785	94.35	-	-	86.46	32.65	8.24	33	179	10	P	V
	*	5785	88.15	-	-	80.26	32.65	8.24	33	179	10	A	V
		5852.4	46.76	-69.97	116.73	38.68	32.79	8.29	33	179	10	P	V
		5862.4	47.24	-61.49	108.73	39.09	32.82	8.33	33	179	10	P	V
		5899.8	48.55	-38.26	86.81	40.28	32.89	8.38	33	179	10	P	V
		5926.6	47.73	-20.47	68.2	39.39	32.96	8.38	33	179	10	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 165 5825MHz	*	5825	92.59	-	-	84.54	32.76	8.29	33	162	154	P	H
	*	5825	85.45	-	-	77.4	32.76	8.29	33	162	154	A	H
		5852.6	47.85	-68.42	116.27	39.77	32.79	8.29	33	162	154	P	H
		5867.8	47.69	-59.52	107.21	39.54	32.82	8.33	33	162	154	P	H
		5891.4	48.42	-44.61	93.03	40.2	32.89	8.33	33	162	154	P	H
		5930.8	48.75	-19.45	68.2	40.41	32.96	8.38	33	162	154	P	H
	*	5825	94.4	-	-	86.35	32.76	8.29	33	184	13	P	V
	*	5825	87.36	-	-	79.31	32.76	8.29	33	184	13	A	V
		5853.4	47.2	-67.25	114.45	39.12	32.79	8.29	33	184	13	P	V
		5860.4	47.92	-61.37	109.29	39.77	32.82	8.33	33	184	13	P	V
		5895.4	48.44	-41.63	90.07	40.17	32.89	8.38	33	184	13	P	V
		5933.4	48.35	-19.85	68.2	40.01	32.96	8.38	33	184	13	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		11490	49	-25	74	54.48	39.22	11.32	56.02	160	360	P	H
HT20		17235	49.74	-18.46	68.2	46.81	41.49	16.89	55.45	170	360	P	H
CH 149		11490	49.98	-24.02	74	55.46	39.22	11.32	56.02	160	360	P	V
5745MHz		17235	50.04	-18.16	68.2	47.11	41.49	16.89	55.45	170	360	P	V
802.11n		11570	49.87	-24.13	74	55.47	39.14	11.37	56.11	175	198	P	H
HT20		17355	50.31	-17.89	68.2	46.86	42.24	17.22	56.01	189	185	P	H
CH 157		11570	50.39	-23.61	74	55.99	39.14	11.37	56.11	175	198	P	V
5785MHz		17355	50.36	-17.84	68.2	46.91	42.24	17.22	56.01	189	185	P	V
802.11n		11650	49.22	-24.78	74	54.89	39.09	11.43	56.19	156	347	P	H
HT20		17475	50.02	-18.18	68.2	46.05	42.99	17.55	56.57	150	360	P	H
CH 165		11650	49.59	-24.41	74	55.26	39.09	11.43	56.19	156	347	P	V
5825MHz		17475	50.48	-17.72	68.2	46.51	42.99	17.55	56.57	150	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151 5755MHz		5606	47.42	-20.78	68.2	39.9	32.31	8.21	33	160	163	P	H
		5672.8	47.42	-37.69	85.11	39.76	32.44	8.22	33	160	163	P	H
		5716.8	47.11	-62.8	109.91	39.37	32.51	8.23	33	160	163	P	H
		5724.6	47.63	-73.66	121.29	39.85	32.55	8.23	33	160	163	P	H
	*	5755	87.86	-	-	80.01	32.62	8.23	33	160	163	P	H
	*	5755	82.37	-	-	74.52	32.62	8.23	33	160	163	A	H
		5853.2	46.14	-68.76	114.9	38.06	32.79	8.29	33	160	163	P	H
		5859.4	46.97	-62.6	109.57	38.82	32.82	8.33	33	160	163	P	H
		5892.6	47.76	-44.38	92.14	39.54	32.89	8.33	33	160	163	P	H
		5934.6	47.72	-20.48	68.2	39.34	32.96	8.42	33	160	163	P	H
		5639.8	47	-21.2	68.2	39.4	32.38	8.22	33	177	10	P	V
		5691	47.25	-51.31	98.56	39.55	32.48	8.22	33	177	10	P	V
		5718.2	52.79	-57.51	110.3	45.01	32.55	8.23	33	177	10	P	V
		5724.4	56.39	-64.44	120.83	48.61	32.55	8.23	33	177	10	P	V
	*	5755	91.94	-	-	84.09	32.62	8.23	33	177	10	P	V
	*	5755	85.74	-	-	77.89	32.62	8.23	33	177	10	A	V
		5853	46.22	-69.14	115.36	38.14	32.79	8.29	33	177	10	P	V
		5872.2	47.54	-58.44	105.98	39.35	32.86	8.33	33	177	10	P	V
		5889.6	47.51	-46.85	94.36	39.29	32.89	8.33	33	177	10	P	V
		5928.2	48.51	-19.69	68.2	40.17	32.96	8.38	33	177	10	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 159 5795MHz		5621.8	48.29	-19.91	68.2	40.73	32.34	8.22	33	161	151	P	H
		5661.4	48.56	-28.1	76.66	40.93	32.41	8.22	33	161	151	P	H
		5712	47.29	-61.27	108.56	39.55	32.51	8.23	33	161	151	P	H
		5723.6	46.06	-72.95	119.01	38.28	32.55	8.23	33	161	151	P	H
	*	5795	89.41	-	-	81.48	32.69	8.24	33	161	151	P	H
	*	5795	83.82	-	-	75.89	32.69	8.24	33	161	151	A	H
		5851.6	46.59	-71.96	118.55	38.51	32.79	8.29	33	161	151	P	H
		5862.2	47.58	-61.2	108.78	39.43	32.82	8.33	33	161	151	P	H
		5878.8	47.59	-54.79	102.38	39.4	32.86	8.33	33	161	151	P	H
		5947	47.73	-20.47	68.2	39.31	33	8.42	33	161	151	P	H
		5616.6	47.58	-20.62	68.2	40.03	32.34	8.21	33	187	11	P	V
		5661.6	47.42	-29.39	76.81	39.79	32.41	8.22	33	187	11	P	V
		5709.4	47.27	-60.56	107.83	39.53	32.51	8.23	33	187	11	P	V
		5720.2	46.45	-64.81	111.26	38.67	32.55	8.23	33	187	11	P	V
	*	5795	91.44	-	-	83.51	32.69	8.24	33	187	11	P	V
	*	5795	86.16	-	-	78.23	32.69	8.24	33	187	11	A	V
		5850	46.68	-75.52	122.2	38.6	32.79	8.29	33	187	11	P	V
		5864	47.3	-60.98	108.28	39.15	32.82	8.33	33	187	11	P	V
		5924.8	48.57	-19.78	68.35	40.23	32.96	8.38	33	187	11	P	V
		5942.8	47.37	-20.83	68.2	38.95	33	8.42	33	187	11	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		11510	49.97	-24.03	74	55.48	39.2	11.32	56.03	160	360	P	H
HT40		17265	50.18	-18.02	68.2	47.08	41.71	17	55.61	170	360	P	H
CH 151		11510	50.2	-23.8	74	55.71	39.2	11.32	56.03	160	360	P	V
5755MHz		17265	50.58	-17.62	68.2	47.48	41.71	17	55.61	170	360	P	V
802.11n		11590	50.23	-23.77	74	55.83	39.13	11.4	56.13	170	300	P	H
HT40		17385	50.64	-17.56	68.2	47.03	42.45	17.33	56.17	150	200	P	H
CH 159		11590	50.18	-23.82	74	55.78	39.13	11.4	56.13	170	300	P	V
5795MHz		17385	50.46	-17.74	68.2	46.85	42.45	17.33	56.17	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	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		5605.8	47.53	-20.67	68.2	40.01	32.31	8.21	33	145	166	P	H
		5669.8	46.93	-35.96	82.89	39.27	32.44	8.22	33	145	166	P	H
		5706.6	46.64	-60.41	107.05	38.9	32.51	8.23	33	145	166	P	H
		5721.6	47.86	-66.59	114.45	40.08	32.55	8.23	33	145	166	P	H
	*	5775	84.67	-	-	76.79	32.65	8.23	33	145	166	P	H
	*	5775	80.31	-	-	72.43	32.65	8.23	33	145	166	A	H
		5853.6	46.69	-67.3	113.99	38.58	32.82	8.29	33	145	166	P	H
		5867.6	47.53	-59.74	107.27	39.38	32.82	8.33	33	145	166	P	H
		5896.2	48	-41.47	89.47	39.73	32.89	8.38	33	145	166	P	H
		5943.6	47.12	-21.08	68.2	38.7	33	8.42	33	145	166	P	H
		5609.8	47.51	-20.69	68.2	39.99	32.31	8.21	33	195	9	P	V
		5672.2	48.01	-36.66	84.67	40.35	32.44	8.22	33	195	9	P	V
		5707.4	47.79	-59.48	107.27	40.05	32.51	8.23	33	195	9	P	V
		5724.4	50.18	-70.65	120.83	42.4	32.55	8.23	33	195	9	P	V
	*	5775	88.95	-	-	81.07	32.65	8.23	33	195	9	P	V
	*	5775	84.41	-	-	76.53	32.65	8.23	33	195	9	A	V
		5850.8	48.58	-71.8	120.38	40.5	32.79	8.29	33	195	9	P	V
		5855.2	48.35	-62.39	110.74	40.24	32.82	8.29	33	195	9	P	V
		5896.8	47.92	-41.11	89.03	39.65	32.89	8.38	33	195	9	P	V
		5948.2	48.11	-20.09	68.2	39.69	33	8.42	33	195	9	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

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

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac		11550	49.87	-24.13	74	55.43	39.16	11.37	56.09	160	360	P	H
VHT80		17325	50.5	-17.7	68.2	47.1	42.03	17.22	55.85	170	360	P	H
CH 155		11550	49.71	-24.29	74	55.27	39.16	11.37	56.09	160	360	P	V
5775MHz		17325	50.83	-17.37	68.2	47.43	42.03	17.22	55.85	170	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

5GHz WIFI 802.11n VHT80 (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 802.11n VHT80 LF		30.97	23.98	-16.02	40	30.95	24.52	0.29	31.78	100	142	P	H
		112.45	20.26	-23.24	43.5	33.81	16.88	1.11	31.54	-	-	P	H
		232.73	22.3	-23.7	46	35.02	16.87	1.69	31.28	-	-	P	H
		393.75	23.03	-22.97	46	31.17	20.98	2.13	31.25	-	-	P	H
		625.58	27.26	-18.74	46	30.67	25.05	2.77	31.23	-	-	P	H
		836.07	29.84	-16.16	46	30.23	27.61	3.25	31.25	-	-	P	H
		30.97	33	-7	40	39.99	24.52	0.27	31.78	100	254	P	V
		119.24	24.54	-18.96	43.5	37.84	17.08	1.14	31.52	-	-	P	V
		172.59	22.8	-20.7	43.5	36.08	16.69	1.37	31.34	-	-	P	V
		523.73	26.96	-19.04	46	31.98	23.66	2.49	31.17	-	-	P	V
		769.14	29.35	-16.65	46	31.08	26.42	3.08	31.23	-	-	P	V
		881.66	32.31	-13.69	46	32.06	28.18	3.34	31.27	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

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



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

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

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

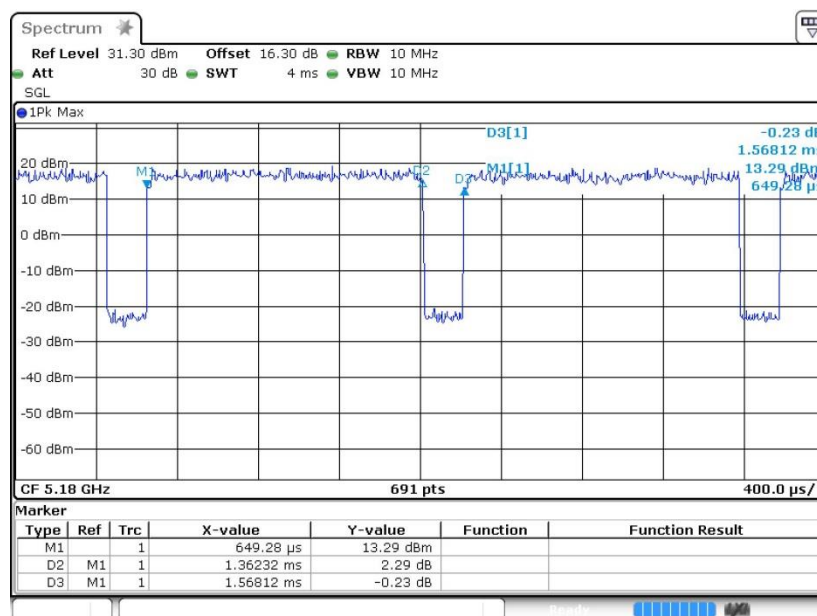
= -10.46(dB)

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

Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	86.88	1.362	0.734	1kHz
802.11n HT20	86.44	1.275	0.784	1kHz
802.11n HT40	76.12	0.638	1.568	3kHz
802.11ac VHT80	55.48	0.249	4.012	10kHz

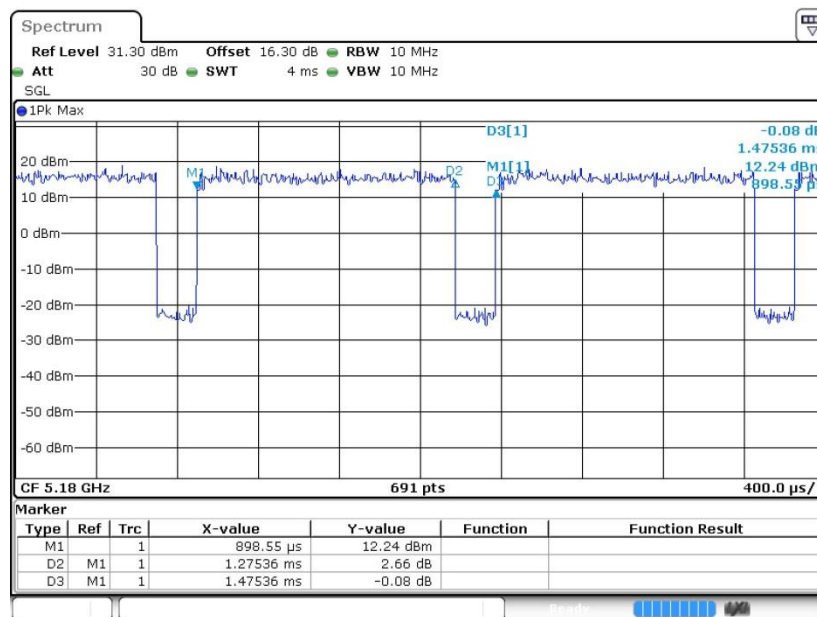
802.11a



Date: 7.AUG.2017 17:49:57

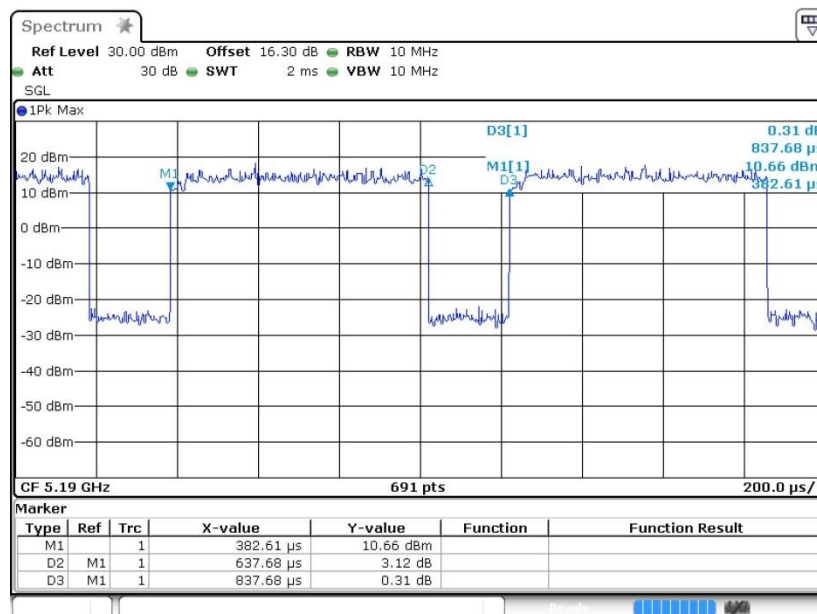


802.11n HT20



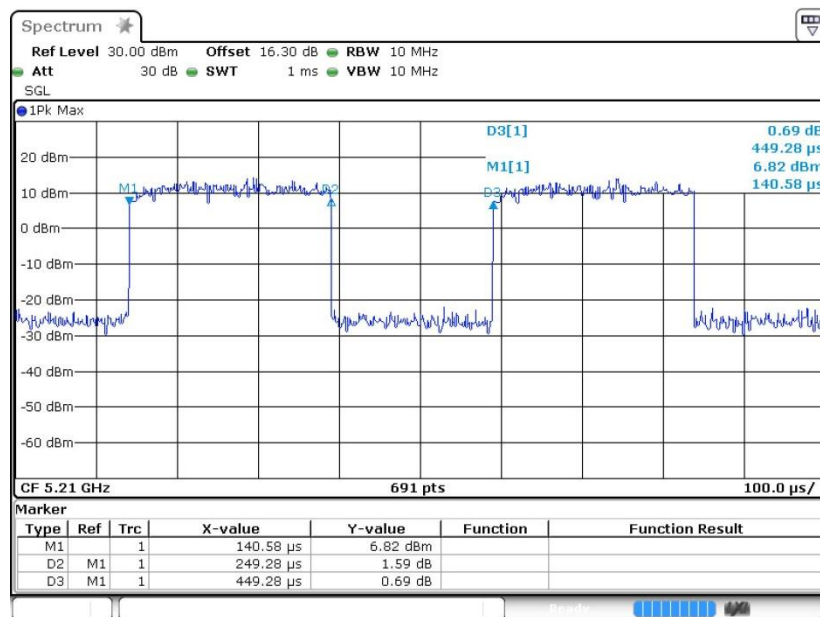
Date: 7.AUG.2017 18:01:39

802.11n HT40



Date: 7.AUG.2017 18:23:19

802.11ac VHT80



Date: 7.AUG.2017 19:15:05