



FCC RF Test Report

APPLICANT : Lenovo(Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT : Notebook Computer
BRAND NAME : Lenovo
MODEL NAME : Lenovo YB-J912L
FCC ID : O57YBJ912L
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product were integrated the WWAN module (Brand Name: Fibocom, Model Name: L850-GL, FCC ID: ZMOL850GL) and the BT/WLAN module (Brand Name: Intel®, Model Name: 8265D2W, FCC ID: PD98265D2) during the test.

The product was received on Jan. 03, 2018 and testing was completed on Mar. 28, 2018. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

This report contains data that were produced under subcontract by Laboratory SPORTON INTERNATIONAL INC.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Approved by: James Huang / Manager



Sporton International (Kunshan) Inc.

**No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335
China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR810315E	Rev. 01	Initial issue of report	Mar. 30, 2018

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 3.31 dB at 32.91 MHz
3.3	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.26 dB at 0.203 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 1: All conducted test items were leveraged from module RF report "160321-02.TR03".					

1 General Description

1.1 Applicant

Lenovo(Shanghai) Electronics Technology Co., Ltd.

NO.68 BUILDING, 199 FENJU RD, Pilot Free Trade Zone, 200131, China

1.2 Manufacturer

Lenovo PC HK Limited

23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Notebook Computer
Brand Name	Lenovo
Model Name	Lenovo YB-J912L
FCC ID	O57YBJ912L
EUT supports Radios application	WCDMA/HSPA/HSPA+ (16QAM uplink is not supported)/DC-HSDPA/LTE WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth v3.0+EDR/ Bluetooth v4.0 LE/ Bluetooth v4.1 LE/ Bluetooth v4.2 LE
HW Version	Lenovo YB-J912L
SW Version	Windows 10
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification			
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz		
Maximum Output Power	<5745 MHz ~ 5825 MHz> <Ant. 1> 802.11a : 18.85 dBm / 0.0767 W MIMO <Ant. 1 + 2> 802.11n HT20 : 20.78 dBm / 0.1197 W 802.11n HT40 : 20.78 dBm / 0.1197 W 802.11ac VHT20: 20.72 dBm / 0.1180 W 802.11ac VHT40: 20.70 dBm / 0.1175 W 802.11ac VHT80: 18.77 dBm / 0.0753 W		
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)		
Antenna Type / Gain	For PC Mode: <Ant. 1> : PIFA Antenna with gain 3.60 dBi <Ant. 2> : PIFA Antenna with gain 3.40 dBi For Pad Mode: <Ant. 1> : PIFA Antenna with gain 3.70 dBi <Ant. 2> : PIFA Antenna with gain 4.10 dBi		
Antenna Function Description		Chain Port 1	Chain Port 2
	802.11a/n/ac SISO	V	V
	802.11n/ac MIMO	V	V

1.5 Modification of EUT

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



1.6 Testing Location

SPORTON INTERNATIONAL INC. is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and under the FCC-recognized accredited testing laboratories by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No.58, Aly. 75, Ln. 564 Wenha 3rd Rd. Guishan Dist. Taoyuan City Taiwan TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	03CH11-HY	TW0007	214511

Note:

1. The test site complies with ANSI C63.4 2014 requirement.
2. Test data subcontracted: radiated spurious emissions for section 3.2 of this report.

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No is CN5013.

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Test Firm Registration No.	
	TH01-KS	CO01-KS	630927

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 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). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases were recorded in this report.
- 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 "[#]" were 802.11ac VHT80.

2.2 Test Mode

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

Single Mode

Modulation	Data Rate
802.11a	6 Mbps

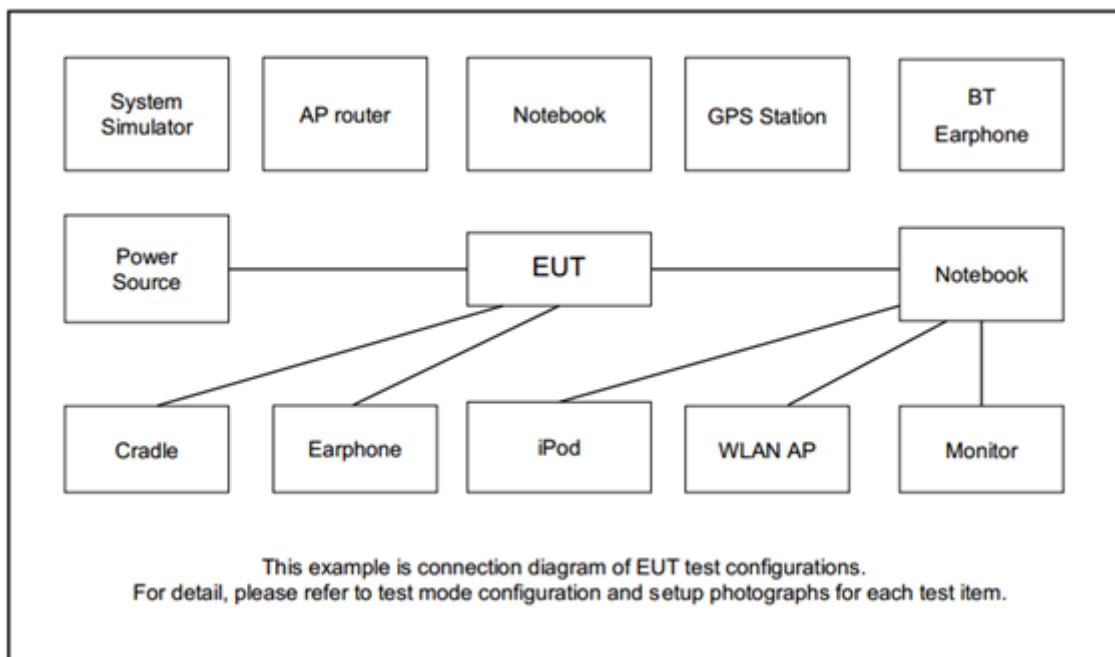
MIMO Mode

Modulation	Data Rate
802.11n HT20	MCS8
802.11n HT40	MCS8
802.11ac VHT20 (Covered by HT20)	MCS8
802.11ac VHT40 (Covered by HT40)	MCS8
802.11ac VHT80	MCS0

AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN Link(5G) + Adaptor 1 with Type C cable1 from Type C port1 + USB Link with U-Disk from Type C port2 + Play H Plane
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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.	WLAN AP	D-link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
3.	SD Card	Kingston	SDC4/4GB	N/A	N/A	N/A
4.	U Disk	SanDisk	SDCZ51-004G	N/A	N/A	N/A

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.

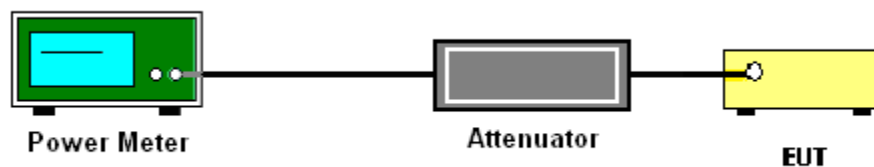
3.1.3 Test Procedures

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

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)
- 27	68.3

(3) KDB789033 D02 v02r01 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).

3.2.2 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

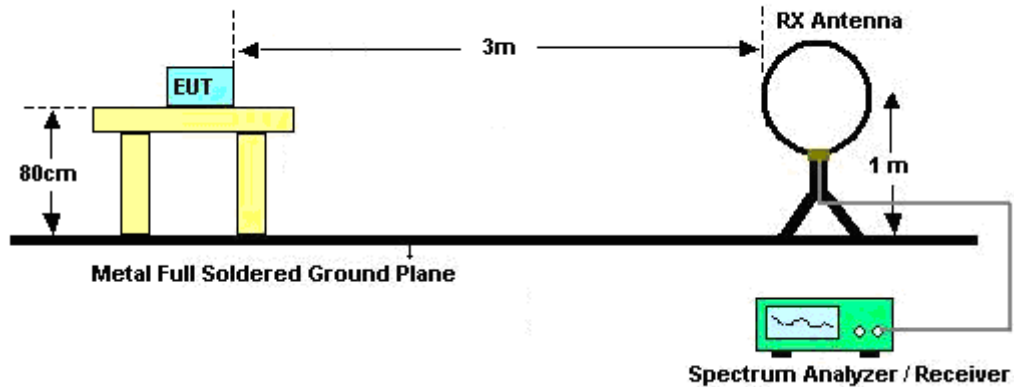
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



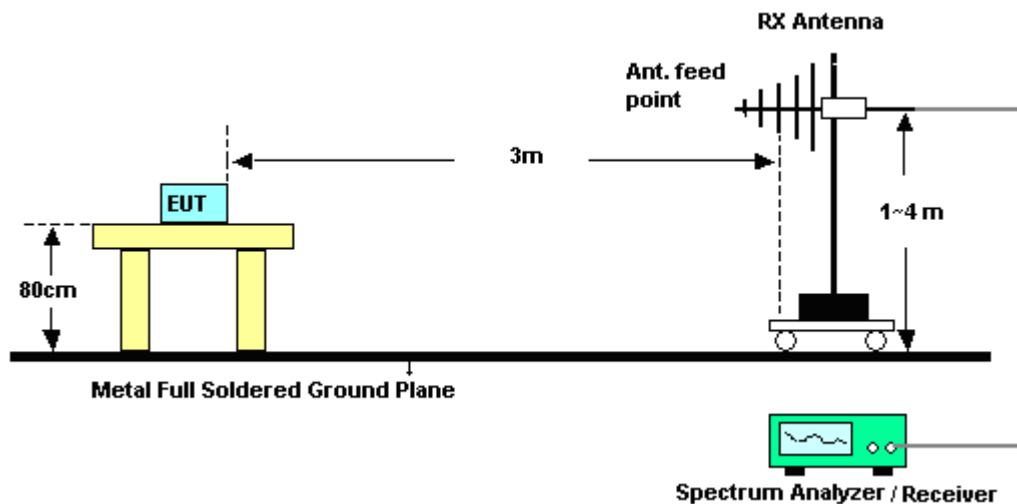
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

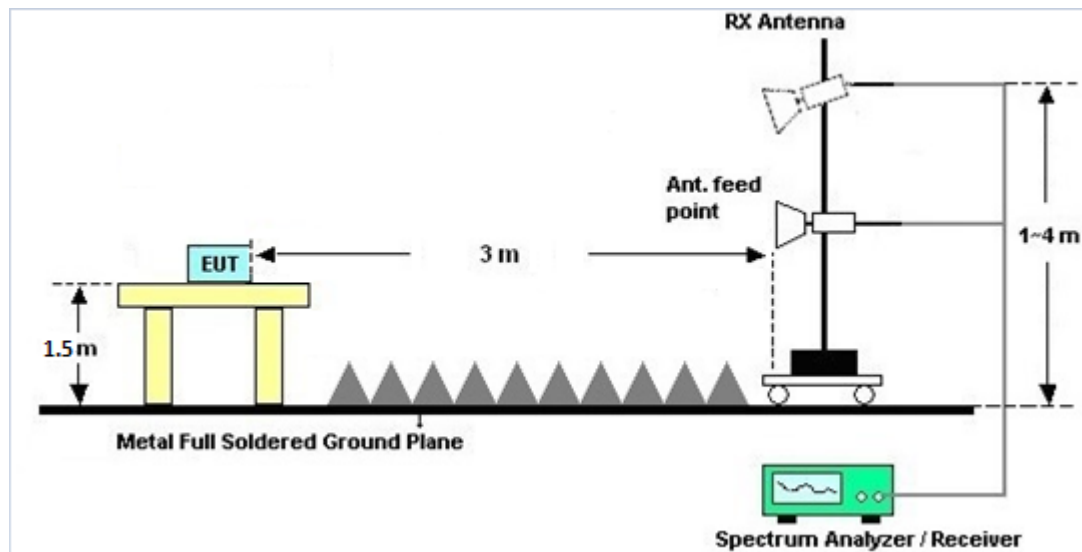
For radiated emissions below 30MHz



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 B.

3.2.7 Duty Cycle

Please refer to Appendix C.

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

Please refer to Appendix B.

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 (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.

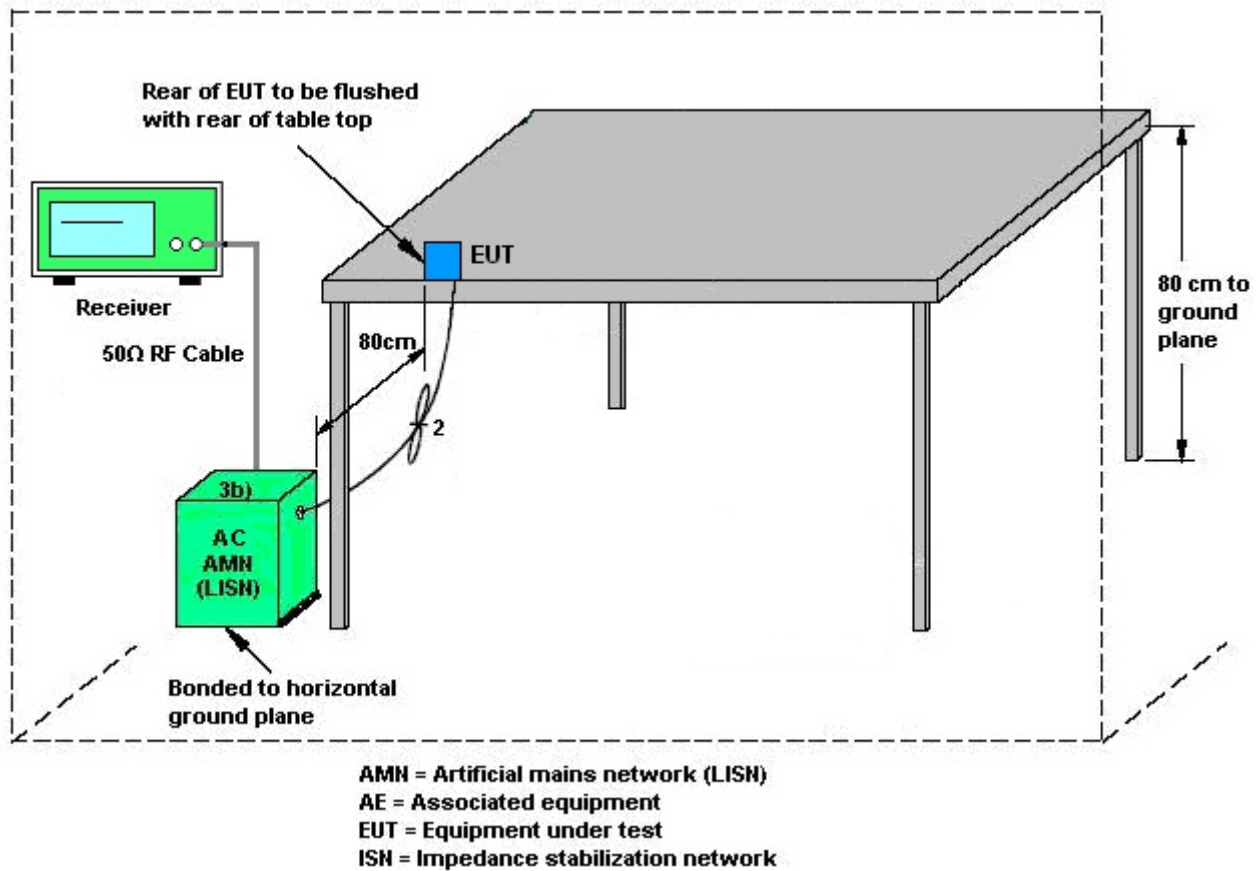
3.3.2 Measuring Instruments

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.

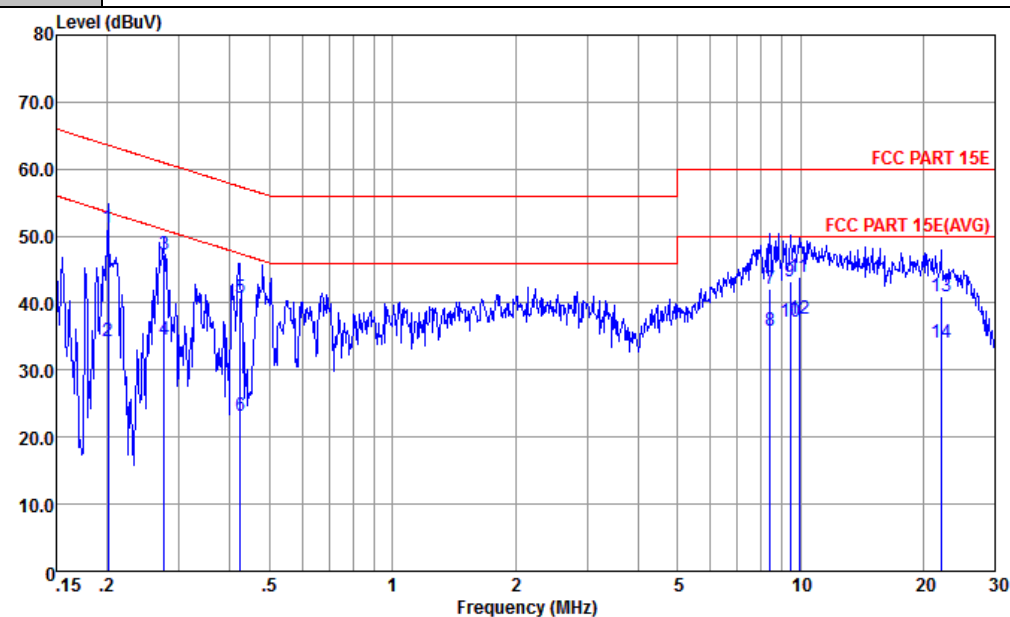
3.3.4 Test Setup





3.3.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	24~25℃
Test Engineer :	Amos Zhang	Relative Humidity :	37~41%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN Link(5G) + Adaptor 1 with Type C cable1 from Type C port1 + USB Link with U-Disk from Type C port2 + Play H Plane		

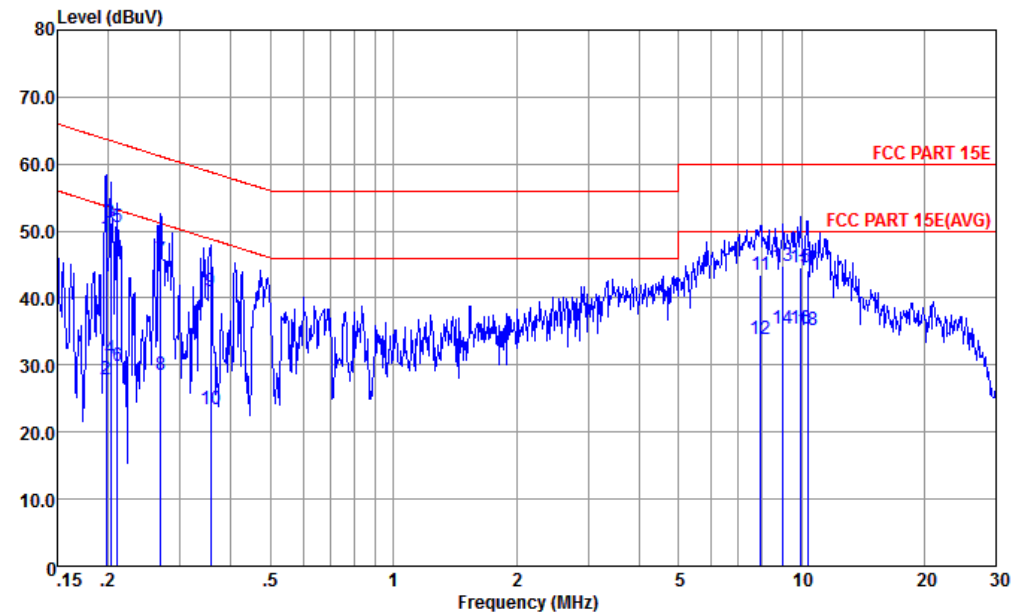


Site : CO01-KS
Condition : FCC PART 15E LISN-L-171013-060103 LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.201	51.26	-12.32	63.58	40.61	0.20	10.45	QP
2	0.201	34.26	-19.32	53.58	23.61	0.20	10.45	Average
3	0.276	47.25	-13.69	60.94	36.60	0.22	10.43	QP
4	0.276	34.45	-16.49	50.94	23.80	0.22	10.43	Average
5	0.424	40.83	-16.54	57.37	30.20	0.25	10.38	QP
6	0.424	23.23	-24.14	47.37	12.60	0.25	10.38	Average
7	8.412	42.18	-17.82	60.00	31.50	0.35	10.33	QP
8	8.412	35.88	-14.12	50.00	25.20	0.35	10.33	Average
9	9.451	43.28	-16.72	60.00	32.60	0.35	10.33	QP
10	9.451	37.28	-12.72	50.00	26.60	0.35	10.33	Average
11	9.913	43.88	-16.12	60.00	33.20	0.35	10.33	QP
12	9.913	37.58	-12.42	50.00	26.90	0.35	10.33	Average
13	22.063	41.00	-19.00	60.00	30.20	0.27	10.53	QP
14	22.063	34.10	-15.90	50.00	23.30	0.27	10.53	Average



Test Mode :	Mode 1	Temperature :	24~25°C
Test Engineer :	Amos Zhang	Relative Humidity :	37~41%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN Link(5G) + Adaptor 1 with Type C cable1 from Type C port1 + USB Link with U-Disk from Type C port2 + Play H Plane		



Site : CO01-KS
Condition : FCC PART 15E LISN-N-171013-060103 NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.198	48.94	-14.77	63.71	38.20	0.28	10.46	QP
2	0.198	27.94	-25.77	53.71	17.20	0.28	10.46	Average
3 *	0.203	51.23	-12.26	63.49	40.50	0.28	10.45	QP
4	0.203	31.03	-22.46	53.49	20.30	0.28	10.45	Average
5	0.211	50.63	-12.55	63.18	39.90	0.28	10.45	QP
6	0.211	29.93	-23.25	53.18	19.20	0.28	10.45	Average
7	0.269	45.62	-15.54	61.16	34.91	0.28	10.43	QP
8	0.269	28.52	-22.64	51.16	17.81	0.28	10.43	Average
9	0.356	40.90	-17.93	58.83	30.19	0.29	10.42	QP
10	0.356	23.30	-25.53	48.83	12.59	0.29	10.42	Average
11	7.935	43.45	-16.55	60.00	32.81	0.31	10.33	QP
12	7.935	33.85	-16.15	50.00	23.21	0.31	10.33	Average
13	9.011	44.84	-15.16	60.00	34.20	0.31	10.33	QP
14	9.011	35.54	-14.46	50.00	24.90	0.31	10.33	Average
15	9.913	44.53	-15.47	60.00	33.90	0.30	10.33	QP
16	9.913	35.53	-14.47	50.00	24.90	0.30	10.33	Average
17	10.342	44.23	-15.77	60.00	33.60	0.29	10.34	QP
18	10.342	35.23	-14.77	50.00	24.60	0.29	10.34	Average

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

The EUT does not support CDD mode.

The antenna peak gain of EUT 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	0917070	300MHz~40GHz	Jan. 18, 2018	Mar. 28, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 18, 2018	Mar. 28, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 08, 2017	Mar. 28, 2018	Aug. 07, 2018	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 20, 2017	Mar. 23, 2018	Apr. 19, 2018	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2017	Mar. 23, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2017	Mar. 23, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2017	Mar. 23, 2018	Oct. 11, 2018	Conduction (CO01-KS)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 10, 2016	Jan. 31, 2018~Feb. 03, 2018	Nov. 09, 2018	Radiation (03CH11-HY)
Preamplifier	MITEQ	AMF-7D-00101800	2025787	1GHZ~18GHZ	Feb. 13, 2017	Jan. 31, 2018~Feb. 03, 2018	Feb. 12, 2018	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHZ~26.5GHZ	Nov. 10, 2016	Jan. 31, 2018~Feb. 03, 2018	Nov. 09, 2018	Radiation (03CH11-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHZ~40GHZ, VSWR : 2.5:1 max	Jul. 18, 2017	Jan. 31, 2018~Feb. 03, 2018	Jul. 17, 2018	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	Jan. 31, 2018~Feb. 03, 2018	Nov. 22, 2019	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6-06	35414&AT-N0602	30MHz~1GHz	Oct. 14, 2017	Jan. 31, 2018~Feb. 03, 2018	Oct. 13, 2018	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 16, 2017	Jan. 31, 2018~Feb. 03, 2018	Oct. 15, 2018	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 27, 2017	Jan. 31, 2018~Feb. 03, 2018	Nov. 26, 2018	Radiation (03CH11-HY)
Hygrometer	TECEPIL	DTN-303B	TP140325	N/A	Oct. 12, 2017	Jan. 31, 2018~Feb. 03, 2018	Oct. 11, 2018	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHz	Oct. 19, 2017	Jan. 31, 2018~Feb. 03, 2018	Oct. 18, 2018	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Jan. 31, 2018~Feb. 03, 2018	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jan. 31, 2018~Feb. 03, 2018	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jan. 31, 2018~Feb. 03, 2018	N/A	Radiation (03CH11-HY)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.5 dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2 dB
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Appendix A. Conducted Test Results

Report Number : FR810315E

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2018/3/28	Relative Humidity:	51~55	%

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
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	0.24	0.24	18.77	18.82		30.00	30.00	3.70	4.10	Pass
11a	6Mbps	1	157	5785	0.24	0.24	18.72	18.76		30.00	30.00	3.70	4.10	Pass
11a	6Mbps	1	165	5825	0.24	0.24	18.85	18.83		30.00	30.00	3.70	4.10	Pass
HT20	MCS0	1	149	5745	0.19	0.18	18.80	18.77		30.00	30.00	3.70	4.10	Pass
HT20	MCS0	1	157	5785	0.19	0.18	18.76	18.81		30.00	30.00	3.70	4.10	Pass
HT20	MCS0	1	165	5825	0.19	0.18	18.85	18.83		30.00	30.00	3.70	4.10	Pass
HT40	MCS0	1	151	5755	0.74	0.72	18.73	18.80		30.00	30.00	3.70	4.10	Pass
HT40	MCS0	1	159	5795	0.74	0.72	18.83	18.76		30.00	30.00	3.70	4.10	Pass
VHT20	MCS0	1	149	5745	0.21	0.20	18.72	18.72		30.00	30.00	3.70	4.10	Pass
VHT20	MCS0	1	157	5785	0.21	0.20	18.69	18.76		30.00	30.00	3.70	4.10	Pass
VHT20	MCS0	1	165	5825	0.21	0.20	18.74	18.80		30.00	30.00	3.70	4.10	Pass
VHT40	MCS0	1	151	5755	0.74	0.72	18.70	18.74		30.00	30.00	3.70	4.10	Pass
VHT40	MCS0	1	159	5795	0.74	0.72	18.76	18.67		30.00	30.00	3.70	4.10	Pass
VHT80	MCS0	1	155	5775	0.77	0.77	16.29	16.22		30.00	30.00	3.70	4.10	Pass
HT20	MCS0	2	149	5745	0.74	0.72	17.74	17.76	20.76	30.00		4.10		Pass
HT20	MCS0	2	157	5785	0.74	0.72	17.70	17.74	20.73	30.00		4.10		Pass
HT20	MCS0	2	165	5825	0.74	0.72	17.72	17.81	20.78	30.00		4.10		Pass
HT40	MCS0	2	151	5755	0.79	0.79	17.75	17.75	20.76	30.00		4.10		Pass
HT40	MCS0	2	159	5795	0.79	0.79	17.81	17.73	20.78	30.00		4.10		Pass
VHT20	MCS0	2	149	5745	0.40	0.40	17.65	17.71	20.69	30.00		4.10		Pass
VHT20	MCS0	2	157	5785	0.40	0.40	17.64	17.65	20.66	30.00		4.10		Pass
VHT20	MCS0	2	165	5825	0.40	0.40	17.67	17.75	20.72	30.00		4.10		Pass
VHT40	MCS0	2	151	5755	0.41	0.45	17.70	17.69	20.70	30.00		4.10		Pass
VHT40	MCS0	2	159	5795	0.41	0.45	17.72	17.63	20.68	30.00		4.10		Pass
VHT80	MCS0	2	155	5775	0.48	0.46	15.82	15.70	18.77	30.00		4.10		Pass



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	Path 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		5647.6	55.13	-13.07	68.2	46.27	32.35	9.61	33.1	100	133	P	H
		5698.2	56.48	-47.39	103.87	47.41	32.44	9.75	33.12	100	133	P	H
		5718.6	64.39	-46.02	110.41	55.21	32.5	9.81	33.13	100	133	P	H
		5724.8	76.92	-44.82	121.74	67.74	32.5	9.81	33.13	100	133	P	H
	*	5745	113.22	-	-	103.96	32.53	9.88	33.15	100	133	P	H
	*	5745	105.73	-	-	96.47	32.53	9.88	33.15	100	133	A	H
		5649.2	49.81	-18.39	68.2	40.95	32.35	9.61	33.1	332	275	P	V
		5697.6	52.31	-51.12	103.43	43.24	32.44	9.75	33.12	332	275	P	V
		5716.4	60.28	-49.51	109.79	51.13	32.47	9.81	33.13	332	275	P	V
		5725	65.97	-56.23	122.2	56.79	32.5	9.81	33.13	332	275	P	V
	*	5745	105.7	-	-	96.44	32.53	9.88	33.15	332	275	P	V
	*	5745	98.04	-	-	88.78	32.53	9.88	33.15	332	275	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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 157 5785MHz		5628.8	53.88	-14.32	68.2	45.05	32.32	9.61	33.1	100	131	P	H
		5686.8	52.92	-42.54	95.46	43.85	32.44	9.75	33.12	100	131	P	H
		5711.6	53.91	-54.54	108.45	44.76	32.47	9.81	33.13	100	131	P	H
		5724.4	53.99	-66.84	120.83	44.81	32.5	9.81	33.13	100	131	P	H
	*	5785	113.08	-	-	103.64	32.6	10.01	33.17	100	131	P	H
	*	5785	105.27	-	-	95.83	32.6	10.01	33.17	100	131	A	H
		5850.4	53.01	-68.28	121.29	43.46	32.72	10.02	33.19	100	131	P	H
		5866.4	53.98	-53.63	107.61	44.42	32.75	10.02	33.21	100	131	P	H
		5880.8	53.1	-47.79	100.89	43.51	32.78	10.02	33.21	100	131	P	H
		5927.8	51.15	-17.05	68.2	41.48	32.88	10.02	33.23	100	131	P	H
		5628.6	50.81	-17.39	68.2	41.98	32.32	9.61	33.1	342	278	P	V
		5656.2	50.49	-22.32	72.81	41.54	32.38	9.68	33.11	342	278	P	V
		5718.4	50.34	-60.01	110.35	41.16	32.5	9.81	33.13	342	278	P	V
		5723.8	50.82	-68.64	119.46	41.64	32.5	9.81	33.13	342	278	P	V
	*	5785	105.35	-	-	95.91	32.6	10.01	33.17	342	278	P	V
	*	5785	97.77	-	-	88.33	32.6	10.01	33.17	342	278	A	V
		5850.6	48.54	-72.29	120.83	38.99	32.72	10.02	33.19	342	278	P	V
		5855	49.33	-61.47	110.8	39.75	32.75	10.02	33.19	342	278	P	V
		5882.8	49.31	-50.1	99.41	39.72	32.78	10.02	33.21	342	278	P	V
		5942.6	49.16	-19.04	68.2	39.47	32.91	10.02	33.24	342	278	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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz	*	5825	112.6	-	-	103.07	32.69	10.02	33.18	100	132	P	H
	*	5825	104.96	-	-	95.43	32.69	10.02	33.18	100	132	A	H
		5850.2	65.65	-56.09	121.74	56.1	32.72	10.02	33.19	100	132	P	H
		5857.2	62.84	-47.34	110.18	53.26	32.75	10.02	33.19	100	132	P	H
		5876	55.33	-49.13	104.46	45.74	32.78	10.02	33.21	100	132	P	H
		5934.2	52.02	-16.18	68.2	42.35	32.88	10.02	33.23	100	132	P	H
	*	5825	104.25	-	-	94.72	32.69	10.02	33.18	306	269	P	V
	*	5825	96.79	-	-	87.26	32.69	10.02	33.18	306	269	A	V
		5850.4	58.54	-62.75	121.29	48.99	32.72	10.02	33.19	306	269	P	V
		5855	56.37	-54.43	110.8	46.79	32.75	10.02	33.19	306	269	P	V
		5893.2	50.3	-41.4	91.7	40.69	32.81	10.02	33.22	306	269	P	V
		5932.8	50.35	-17.85	68.2	40.68	32.88	10.02	33.23	306	269	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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 149 5745MHz		5428	53.44	-20.56	74	45.18	32.02	9.26	33.02	100	133	P	H
		5428	46.48	-7.52	54	38.22	32.02	9.26	33.02	100	133	A	H
		5506	54.16	-14.04	68.2	45.72	32.1	9.37	33.03	100	133	P	H
		5584	57.13	-11.07	68.2	48.46	32.26	9.48	33.07	100	133	P	H
		6070	55.64	-12.56	68.2	45.61	33.2	10.12	33.29	100	133	P	H
		6148	54.83	-13.37	68.2	44.47	33.45	10.22	33.31	100	133	P	H
		11490	46.5	-27.5	74	56.17	40	15.44	65.39	100	0	P	H
		17235	47.9	-20.3	68.2	52.03	40.54	19.24	64.27	100	0	P	H
		11490	57.58	-16.42	74	67.25	40	15.44	65.39	102	114	P	V
		11490	44.49	-9.51	54	54.16	40	15.44	65.39	102	114	A	V
		17235	57.93	-10.27	68.2	62.06	40.54	19.24	64.27	100	0	P	V



802.11a CH 157 5785MHz		5548	54.97	-13.23	68.2	46.42	32.19	9.41	33.05	100	131	P	H
		6022	54.05	-14.15	68.2	44.22	33.05	10.06	33.28	100	131	P	H
		6100	55.57	-12.63	68.2	45.42	33.3	10.15	33.3	100	131	P	H
		11570	56.11	-17.89	74	65.85	39.86	15.49	65.37	100	247	P	H
		11570	43.63	-10.37	54	53.37	39.86	15.49	65.37	100	247	A	H
		17355	47.57	-20.63	68.2	51.04	40.96	19.31	64.11	100	0	P	H
		5542	53.8	-14.4	68.2	45.28	32.16	9.41	33.05	342	278	P	V
		11570	56.36	-17.64	74	66.1	39.86	15.49	65.37	102	114	P	V
		11570	45.97	-8.03	54	55.71	39.86	15.49	65.37	102	114	A	V
		17355	50.44	-17.76	68.2	53.91	40.96	19.31	64.11	100	0	P	V



802.11a CH 165 5825MHz		5500	53.03	-15.17	68.2	44.58	32.1	9.37	33.02	100	132	P	H
		5584	54.78	-13.42	68.2	46.11	32.26	9.48	33.07	100	132	P	H
		5668	53.46	-14.74	68.2	44.48	32.41	9.68	33.11	100	132	P	H
		6142	54.58	-13.62	68.2	44.31	33.4	10.18	33.31	100	132	P	H
		11650	49.98	-24.02	74	59.76	39.72	15.56	65.34	100	0	P	V
		17475	49.82	-18.38	68.2	52.64	41.38	19.37	63.95	100	0	P	V
		11650	55.14	-18.86	74	64.92	39.72	15.56	65.34	100	119	P	V
		11650	44.71	-9.29	54	54.49	39.72	15.56	65.34	100	119	P	V
		17475	49.79	-18.41	68.2	52.61	41.38	19.37	63.95	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 - 5725~5850MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 149 5745MHz		5645.6	53.93	-14.27	68.2	45.07	32.35	9.61	33.1	100	114	P	H
		5698.8	60.07	-44.25	104.32	51	32.44	9.75	33.12	100	114	P	H
		5719.8	66.45	-44.29	110.74	57.27	32.5	9.81	33.13	100	114	P	H
		5725	75.81	-46.39	122.2	66.63	32.5	9.81	33.13	100	114	P	H
	*	5745	113.68	-	-	104.42	32.53	9.88	33.15	100	114	P	H
	*	5745	106.61	-	-	97.35	32.53	9.88	33.15	100	114	A	H
		5611.6	50.49	-17.71	68.2	41.73	32.29	9.55	33.08	304	84	P	V
		5696.6	53.21	-49.48	102.69	44.14	32.44	9.75	33.12	304	84	P	V
		5720	64.12	-46.68	110.8	54.94	32.5	9.81	33.13	304	84	P	V
		5724.6	69.5	-51.79	121.29	60.32	32.5	9.81	33.13	304	84	P	V
	*	5745	108.94	-	-	99.68	32.53	9.88	33.15	304	84	P	V
	*	5745	100.91	-	-	91.65	32.53	9.88	33.15	304	84	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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 157 5785MHz		5623.2	54.11	-14.09	68.2	45.32	32.32	9.55	33.08	100	128	P	H
		5687.8	54.29	-41.91	96.2	45.22	32.44	9.75	33.12	100	128	P	H
		5708.2	54.71	-52.79	107.5	45.56	32.47	9.81	33.13	100	128	P	H
		5720.4	54.38	-57.33	111.71	45.2	32.5	9.81	33.13	100	128	P	H
	*	5785	114.44	-	-	105	32.6	10.01	33.17	100	128	P	H
	*	5785	106.68	-	-	97.24	32.6	10.01	33.17	100	128	A	H
		5852.8	54.41	-61.41	115.82	44.86	32.72	10.02	33.19	100	128	P	H
		5872.2	54.01	-51.97	105.98	44.42	32.78	10.02	33.21	100	128	P	H
		5879.4	53.25	-48.68	101.93	43.66	32.78	10.02	33.21	100	128	P	H
		5948.4	50.67	-17.53	68.2	40.98	32.91	10.02	33.24	100	128	P	H
		5624	48.94	-19.26	68.2	40.15	32.32	9.55	33.08	296	49	P	V
		5683	50.83	-41.83	92.66	41.79	32.41	9.75	33.12	296	49	P	V
		5706.4	50.21	-56.78	106.99	41.06	32.47	9.81	33.13	296	49	P	V
		5723.8	50.56	-68.9	119.46	41.38	32.5	9.81	33.13	296	49	P	V
	*	5785	107.92	-	-	98.48	32.6	10.01	33.17	296	49	P	V
	*	5785	100.44	-	-	91	32.6	10.01	33.17	296	49	A	V
		5850	48.57	-73.63	122.2	39.02	32.72	10.02	33.19	296	49	P	V
		5861.2	51.47	-57.59	109.06	41.91	32.75	10.02	33.21	296	49	P	V
		5886	49.91	-47.12	97.03	40.33	32.78	10.02	33.22	296	49	P	V
		5929	49.44	-18.76	68.2	39.77	32.88	10.02	33.23	296	49	P	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)	Path 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	113.58	-	-	104.05	32.69	10.02	33.18	100	129	P	H
	*	5825	106.26	-	-	96.73	32.69	10.02	33.18	100	129	A	H
		5850	70.87	-51.33	122.2	61.32	32.72	10.02	33.19	100	129	P	H
		5855	67.67	-43.13	110.8	58.09	32.75	10.02	33.19	100	129	P	H
		5877.4	59.03	-44.39	103.42	49.44	32.78	10.02	33.21	100	129	P	H
		5927.8	51.47	-16.73	68.2	41.8	32.88	10.02	33.23	100	129	P	H
	*	5825	108.44	-	-	98.91	32.69	10.02	33.18	307	298	P	V
	*	5825	101.03	-	-	91.5	32.69	10.02	33.18	307	298	A	V
		5850.2	65.08	-56.66	121.74	55.53	32.72	10.02	33.19	307	298	P	V
		5856	64.91	-45.61	110.52	55.33	32.75	10.02	33.19	307	298	P	V
		5878.8	54.31	-48.07	102.38	44.72	32.78	10.02	33.21	307	298	P	V
		5927.4	50.17	-18.03	68.2	40.5	32.88	10.02	33.23	307	298	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+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 149 5745MHz		5350	52.6	-15.6	68.2	44.49	31.95	9.19	33.03	100	114	P	H
		5428	54.38	-19.62	74	46.12	32.02	9.26	33.02	100	114	P	H
		5428	46.66	-7.34	54	38.4	32.02	9.26	33.02	100	114	A	H
		5506	54.37	-13.83	68.2	45.93	32.1	9.37	33.03	100	114	P	H
		6064	54.93	-13.27	68.2	44.93	33.2	10.09	33.29	100	114	P	H
		6148	54.04	-14.16	68.2	43.68	33.45	10.22	33.31	100	114	P	H
		11490	47.07	-26.93	74	56.74	40	15.44	65.39	100	0	P	H
		17235	51.42	-16.78	68.2	55.55	40.54	19.24	64.27	100	0	P	H
		11490	53.24	-20.76	74	62.91	40	15.44	65.39	100	113	P	V
		11490	43.7	-10.3	54	53.37	40	15.44	65.39	100	113	A	V
		17235	52.33	-15.87	68.2	56.46	40.54	19.24	64.27	100	0	P	V



802.11n HT20 CH 157 5785MHz		5386	52.48	-21.52	74	44.32	31.98	9.2	33.02	100	128	P	H
		5386	43.57	-10.43	54	35.41	31.98	9.2	33.02	100	128	A	H
		5470	53.25	-14.95	68.2	44.91	32.07	9.29	33.02	100	128	P	H
		5548	55.45	-12.75	68.2	46.9	32.19	9.41	33.05	100	128	P	H
		6028	53.62	-14.58	68.2	43.74	33.1	10.06	33.28	100	128	P	H
		6106	54.9	-13.3	68.2	44.75	33.3	10.15	33.3	100	128	P	H
		11570	48.46	-25.54	74	58.2	39.86	15.49	65.37	100	0	P	H
		17355	51.8	-16.4	68.2	55.27	40.96	19.31	64.11	100	0	P	H
		11570	53.29	-20.71	74	63.03	39.86	15.49	65.37	100	115	P	V
		11570	44.17	-9.83	54	53.91	39.86	15.49	65.37	100	115	A	V
		17355	55.86	-12.34	68.2	59.33	40.96	19.31	64.11	100	0	P	V



802.11n HT20 CH 165 5825MHz		5350	51.07	-17.13	68.2	42.96	31.95	9.19	33.03	100	129	P	H
		5506	52.88	-15.32	68.2	44.44	32.1	9.37	33.03	100	129	P	H
		5590	54.24	-13.96	68.2	45.57	32.26	9.48	33.07	100	129	P	H
		6070	53.19	-15.01	68.2	43.16	33.2	10.12	33.29	100	129	P	H
		6148	53.98	-14.22	68.2	43.62	33.45	10.22	33.31	100	129	P	H
		11650	46.79	-27.21	74	56.57	39.72	15.56	65.34	100	0	P	H
		17475	57	-11.2	68.2	59.82	41.38	19.37	63.95	100	0	P	H
		11650	53.09	-20.91	74	62.87	39.72	15.56	65.34	100	116	P	V
		11650	43.01	-10.99	54	52.79	39.72	15.56	65.34	100	116	A	V
		17475	60.68	-7.52	68.2	63.5	41.38	19.37	63.95	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11n HT40 (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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151 5755MHz		5646.4	54.94	-13.26	68.2	46.08	32.35	9.61	33.1	100	114	P	H
		5688.6	62.03	-34.76	96.79	52.96	32.44	9.75	33.12	100	114	P	H
		5718	69.81	-40.43	110.24	60.63	32.5	9.81	33.13	100	114	P	H
		5722.2	70.79	-45.03	115.82	61.61	32.5	9.81	33.13	100	114	P	H
	*	5755	111.5	-	-	102.2	32.57	9.88	33.15	100	114	P	H
	*	5755	103.54	-	-	94.24	32.57	9.88	33.15	100	114	A	H
		5852	53.75	-63.89	117.64	44.2	32.72	10.02	33.19	100	114	P	H
		5859	53.4	-56.28	109.68	43.84	32.75	10.02	33.21	100	114	P	H
		5881.6	52.54	-47.76	100.3	42.95	32.78	10.02	33.21	100	114	P	H
		5927.6	52.33	-15.87	68.2	42.66	32.88	10.02	33.23	100	114	P	H
		5642.6	50.03	-18.17	68.2	41.17	32.35	9.61	33.1	287	83	P	V
		5691.2	57.39	-41.32	98.71	48.32	32.44	9.75	33.12	287	83	P	V
		5717.8	57.31	-52.87	110.18	48.13	32.5	9.81	33.13	287	83	P	V
		5721.2	59.39	-54.15	113.54	50.21	32.5	9.81	33.13	287	83	P	V
	*	5755	105.71	-	-	96.41	32.57	9.88	33.15	287	83	P	V
	*	5755	97.87	-	-	88.57	32.57	9.88	33.15	287	83	A	V
		5852.4	50.98	-65.75	116.73	41.43	32.72	10.02	33.19	287	83	P	V
		5855.4	52.16	-58.53	110.69	42.58	32.75	10.02	33.19	287	83	P	V
		5904	50.19	-33.51	83.7	40.58	32.81	10.02	33.22	287	83	P	V
		5925	50.13	-18.07	68.2	40.46	32.88	10.02	33.23	287	83	P	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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 159 5795MHz		5634	52.49	-15.71	68.2	43.63	32.35	9.61	33.1	100	130	P	H
		5697.8	56.43	-47.15	103.58	47.36	32.44	9.75	33.12	100	130	P	H
		5708.6	59.24	-48.37	107.61	50.09	32.47	9.81	33.13	100	130	P	H
		5725	57.28	-64.92	122.2	48.1	32.5	9.81	33.13	100	130	P	H
	*	5795	111.94	-	-	102.47	32.63	10.01	33.17	100	130	P	H
	*	5795	103.97	-	-	94.5	32.63	10.01	33.17	100	130	A	H
		5850	66.76	-55.44	122.2	57.21	32.72	10.02	33.19	100	130	P	H
		5856	65.36	-45.16	110.52	55.78	32.75	10.02	33.19	100	130	P	H
		5877.4	56.1	-47.32	103.42	46.51	32.78	10.02	33.21	100	130	P	H
		5940.4	52.03	-16.17	68.2	42.34	32.91	10.02	33.24	100	130	P	H
		5646.6	50.59	-17.61	68.2	41.73	32.35	9.61	33.1	295	298	P	V
		5690	51.57	-46.26	97.83	42.5	32.44	9.75	33.12	295	298	P	V
		5718.2	53.14	-57.16	110.3	43.96	32.5	9.81	33.13	295	298	P	V
		5723.8	53.47	-65.99	119.46	44.29	32.5	9.81	33.13	295	298	P	V
	*	5795	105.76	-	-	96.29	32.63	10.01	33.17	295	298	P	V
	*	5795	98.03	-	-	88.56	32.63	10.01	33.17	295	298	A	V
		5851.8	57.08	-61.02	118.1	47.53	32.72	10.02	33.19	295	298	P	V
		5856.2	58.73	-51.73	110.46	49.15	32.75	10.02	33.19	295	298	P	V
		5875.4	53.61	-51.29	104.9	44.02	32.78	10.02	33.21	295	298	P	V
		5929.4	49.19	-19.01	68.2	39.52	32.88	10.02	33.23	295	298	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+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151 5755MHz		11510	46.62	-27.38	74	56.29	40	15.45	65.4	100	0	P	H
		17265	46.76	-21.44	68.2	50.71	40.66	19.26	64.23	100	0	P	H
		11510	47.92	-26.08	74	57.59	40	15.45	65.4	100	0	P	V
		17265	48.63	-19.57	68.2	52.58	40.66	19.26	64.23	100	0	P	V
802.11n HT40 CH 159 5795MHz		5464	50.86	-17.34	68.2	42.52	32.07	9.29	33.02	100	130	P	H
		5560	53.24	-14.96	68.2	44.67	32.19	9.44	33.06	100	130	P	H
		6034	53.58	-14.62	68.2	43.7	33.1	10.06	33.28	100	130	P	H
		6112	55.63	-12.57	68.2	45.43	33.35	10.15	33.3	100	130	P	H
		11590	46.08	-27.92	74	55.83	39.83	15.51	65.37	100	0	P	H
		17385	48.19	-20.01	68.2	51.48	41.08	19.32	64.06	100	0	P	H
		11590	49.5	-24.5	74	59.25	39.83	15.51	65.37	100	0	P	V
		17385	50.17	-18.03	68.2	53.46	41.08	19.32	64.06	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac 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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80 CH 155 5775MHz		5649	55.64	-12.56	68.2	46.78	32.35	9.61	33.1	100	132	P	H
		5691.6	61.73	-37.28	99.01	52.66	32.44	9.75	33.12	100	132	P	H
		5703.8	63.42	-42.85	106.27	54.32	32.47	9.75	33.12	100	132	P	H
		5720.2	62.46	-48.8	111.26	53.28	32.5	9.81	33.13	100	132	P	H
	*	5775	104.9	-	-	95.51	32.6	9.95	33.16	100	132	P	H
	*	5775	97.02	-	-	87.63	32.6	9.95	33.16	100	132	A	H
		5851.4	67.73	-51.28	119.01	58.18	32.72	10.02	33.19	100	132	P	H
		5861	66.88	-42.24	109.12	57.32	32.75	10.02	33.21	100	132	P	H
		5878.8	57.32	-45.06	102.38	47.73	32.78	10.02	33.21	100	132	P	H
		5933.4	51.63	-16.57	68.2	41.96	32.88	10.02	33.23	100	132	P	H
		5648.4	51.65	-16.55	68.2	42.79	32.35	9.61	33.1	333	93	P	V
		5696.4	54.41	-48.14	102.55	45.34	32.44	9.75	33.12	333	93	P	V
		5715	58.64	-50.76	109.4	49.49	32.47	9.81	33.13	333	93	P	V
		5725	56.97	-65.23	122.2	47.79	32.5	9.81	33.13	333	93	P	V
	*	5775	98.88	-	-	89.49	32.6	9.95	33.16	333	93	P	V
	*	5775	91.5	-	-	82.11	32.6	9.95	33.16	333	93	A	V
		5852.4	58.52	-58.21	116.73	48.97	32.72	10.02	33.19	333	93	P	V
		5856.8	58.73	-51.57	110.3	49.15	32.75	10.02	33.19	333	93	P	V
		5880.2	52.31	-49.03	101.34	42.72	32.78	10.02	33.21	333	93	P	V
		5929	49.62	-18.58	68.2	39.95	32.88	10.02	33.23	333	93	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+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac		11550	46.91	-27.09	74	56.63	39.9	15.48	65.38	100	0	P	H
VHT80		17325	48.86	-19.34	68.2	52.52	40.84	19.29	64.16	100	0	P	H
CH 155		11550	47.17	-26.83	74	56.89	39.9	15.48	65.38	100	0	P	V
5775MHz		17325	48.86	-19.34	68.2	52.52	40.84	19.29	64.16	100	0	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 HT20 (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11n HT20 LF		32.91	36.61	-3.39	40	44.72	23.32	0.61	32.04	100	0	P	H
		90.14	39.82	-3.68	43.5	55.97	14.9	0.97	32.02	-	-	P	H
		149.31	34.27	-9.23	43.5	48.28	16.58	1.25	31.84	-	-	P	H
		419.94	30.92	-15.08	46	37.3	22.14	2.12	30.64	-	-	P	H
		500.45	35.37	-10.63	46	39.8	23.5	2.38	30.31	-	-	P	H
		839.95	32.43	-13.57	46	31.24	26.22	2.97	28	-	-	P	H
		32.91	36.69	-3.31	40	44.8	23.32	0.61	32.04	100	0	P	V
		43.58	35.42	-4.58	40	49.98	16.88	0.66	32.1	-	-	P	V
		90.14	40.06	-3.44	43.5	56.21	14.9	0.97	32.02	-	-	P	V
		149.31	31.24	-12.26	43.5	45.25	16.58	1.25	31.84	-	-	P	V
		209.45	29.02	-14.48	43.5	43.86	15.31	1.5	31.65	-	-	P	V
		500.45	33.85	-12.15	46	38.28	23.5	2.38	30.31	-	-	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	Path	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. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
 = Antenna Factor(dB/m) + Path 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) + Path 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”.

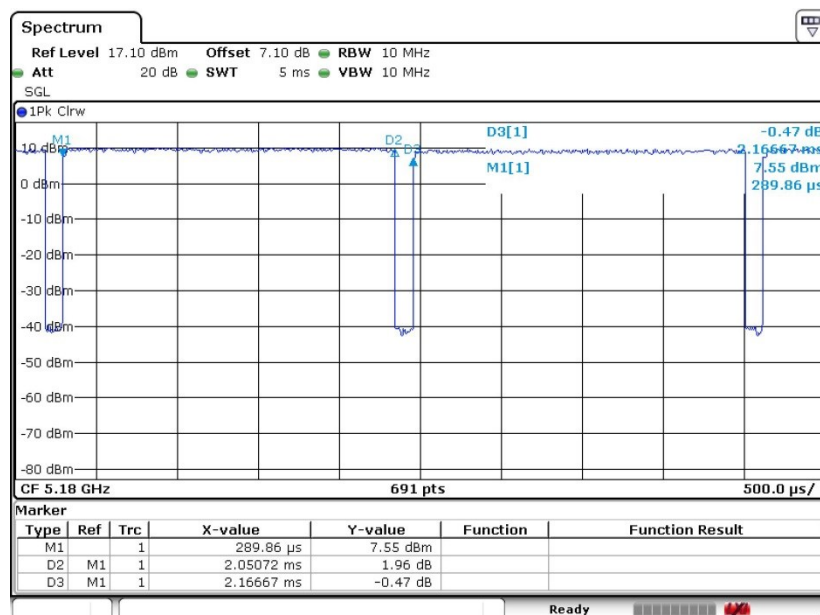


Appendix C. Duty Cycle Plots

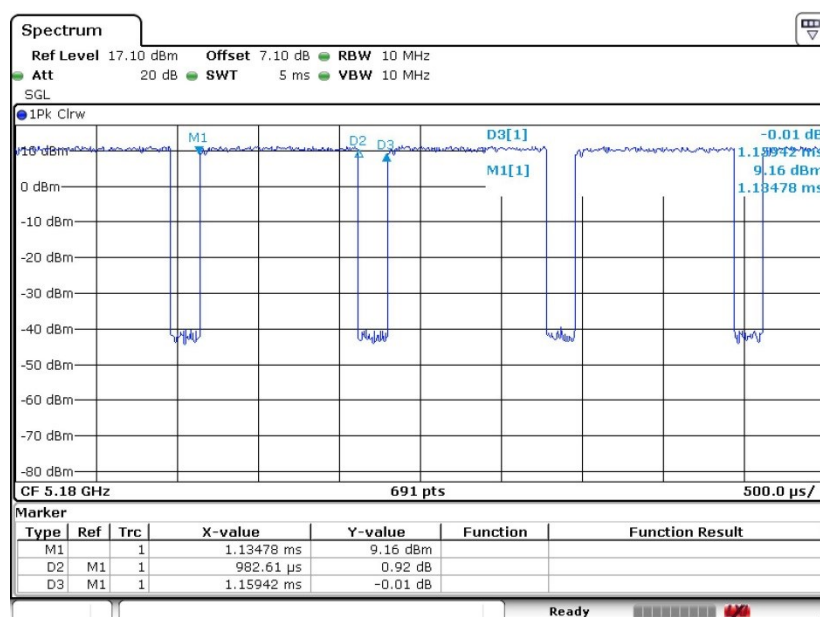
Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11a	94.65	2.051	0.488	1kHz
1+2	802.11n HT20	84.75	0.983	1.018	3kHz
1+2	802.11n HT40	83.37	0.494	2.023	3kHz
1+2	802.11ac VHT80	89.89	0.464	2.156	3kHz



802.11a Ant.1

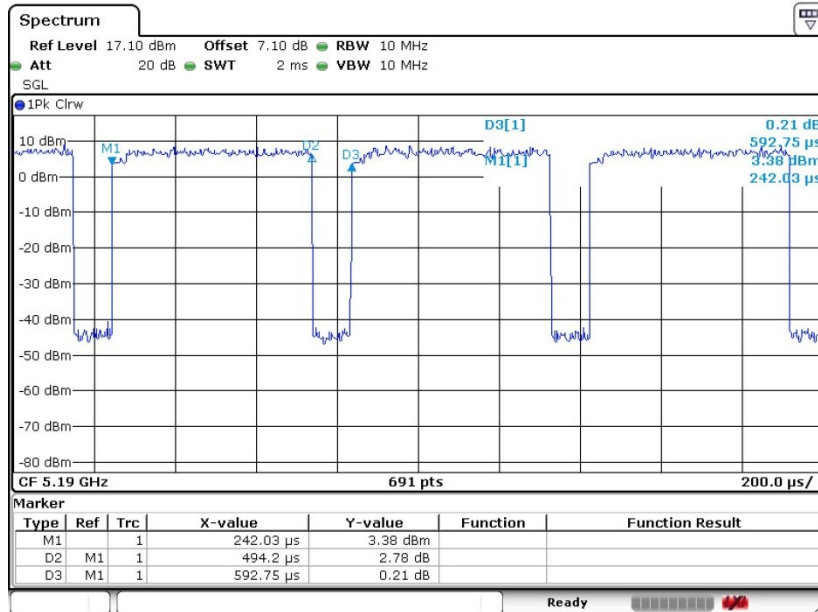


802.11n HT20 Ant. 1+2





802.11n HT40 Ant. 1+2



802.11ac VHT80 Ant. 1+2

