FCC RF Test Report

APPLICANT	:	Lenovo (Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	Portable Tablet Computer
BRAND NAME	:	Lenovo
MODEL NAME	:	Lenovo YB1-X90F
FCC ID	:	O57YB1X90F
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was received on Dec. 07, 2015 and testing was completed on Jan. 31, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Prepared by: James Huang / Manager

Approved by: Jones Tsai / Manager

Testing Laboratory 2627

SPORTON INTERNATIONAL (KUNSHAN) INC.
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TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR5N3007-01E	Rev. 01	Initial issue of report	Feb. 15, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	RSS-247 Section 6	6dB Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	RSS-247 Section 6	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	RSS-247 Section 6	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	RSS-247 Section 6	Unwanted Emissions	≤ -17, -27 dBm/MHz &15.209(a)	Pass	Under limit 3.38 dB at 5687.160 MHz
3.5	15.207	RSS-Gen 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 5.29 dB at 1.460 MHz
3.6	15.407(g)	-	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	RSS-247 6.4(2)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	N/A	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Lenovo (Shanghai) Electronics Technology Co., Ltd.
NO.68 BUILDING, 199 FENJU RD, China (Shanghai) 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 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Portable Tablet Computer
Brand Name	Lenovo
Model Name	Lenovo YB1-X90F
FCC ID	O57YB1X90F
EUT supports Radios application	WLAN2.4GHz 802.11b/g/n HT20/ WLAN5GHz 802.11a/n HT20/HT40/ WLAN5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0+EDR/Bluetooth v4.0 LE
HW Version	Lenovo YB1-X90F
SW Version	YB1-X90F_151203
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Product Specification subjective to this standard</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>5745 MHz ~ 5825 MHz</td></tr>
<tr><td>Maximum Output Power</td><td>802.11a : 15.90 dBm / 0.0389 W
802.11n HT20 : 16.48 dBm / 0.0445 W
802.11n HT40 : 14.80 dBm / 0.0302 W
802.11ac VHT20: 14.59 dBm / 0.0288 W
802.11ac VHT40: 14.84 dBm / 0.0305 W
802.11ac VHT80: 14.56 dBm / 0.0286 W</td></tr>
<tr><td>Antenna Type / Gain</td><td>Chain Port 1 : PIFA Antenna with gain -0.70 dBi
Chain Port 2 : PIFA Antenna with gain -4.41 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)</td></tr>
<tr><td>Antenna Function Description</td><td>
<table>
<tr><th></th><th>Chain Port 1</th><th>Chain Port 2</th></tr>
<tr><td>802.11a</td><td>V</td><td>V</td></tr>
<tr><td>802.11n/ac SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11n/ac MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
</table>

1.5 Component List

Note: There are two types of EUT, the details refer the following table. According to the difference, we evaluate is not affect RF performance, so only choose sample 1 to perform RF test.

Component	Sample 1	Sample 2
CPU	Intel Cherry Trail-T4	Intel Cherry Trail-T4
Flash	Samsung KLMBG4WEBD-B031	Toshiba THGBMFG9C4LBAIR
LCD	INX P101KDA-AK0;10.1;IPS;1200×1920;MIPI;2.5	AUO B101UAN07.1;10.1;IPS1200×1920MIPI;2.5
TP	O-Film TP_GFF_OF/MCF-101-2292	GIS TP_GFF_GIS/TC101GFL11 V.A
Front Camera	Primax CCM L202V 2M OV2740 COB 24PIN BtoB	Ofilm CCM L2740F00 2M OV2740 COB 24PIN BtoB
Back Camera	Ofilm CCM L8858A20 8M OV8858 COB 31PIN ZIF	Ofilm CCM L8858A20 8M OV8858 COB 31PIN ZIF
Battery	CELXPERT L15C2P31 3.8V;32.3Wh;8500mAh; 2cell bty	CELXPERT L15C2P31 3.8V;32.3Wh;8500mAh; 2cell bty

1.6 Modification of EUT

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

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	**Sporton Site No.**			**FCC/IC Registration No.**
	TH01-KS	CO01-KS	03CH03-KS	306251/4086E

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

1.8 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01
- 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

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 (X plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency and Channel

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

Note: The above Frequency and Channel in boldface were 802.11n HT40.

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables. Final Output Power equals to Measured Output Power adds the duty factor.

WLAN 5GHz 802.11a Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 149	5745	1	14.90	CH 165	15.10	15.13	14.96	15.38	15.40	15.29	15.24
CH 157	5785	1	14.69							15.07	
CH 165	5825	1	15.16							**15.49**	
CH 149	5745	2	15.50	CH 165	15.36	15.39	15.58	15.71	15.87	15.84	15.84
CH 157	5785	2	15.03							15.60	
CH 165	5825	2	15.55							**15.90**	

WLAN 5GHz 802.11n-HT20 Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 149	5745	1	13.15	CH 165	13.23	13.28	13.51	13.47	13.46	13.52	13.42
CH 157	5785	1	12.89								13.16
CH 165	5825	1	13.26								**13.53**
CH 149	5745	2	13.77	CH 165	13.77	13.83	13.94	13.96	14.06	14.04	13.89
CH 157	5785	2	13.65								13.98
CH 165	5825	2	13.80								**14.06**
Channel	Frequency (MHz)	Chain Port	MCS Index MCS8	Channel	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 149	5745	1+2(1)	13.19	CH 165	13.24	13.28	13.58	13.63	13.56	13.59	13.51
CH 157	5785	1+2(1)	12.96								13.39
CH 165	5825	1+2(1)	13.26								**13.68**
CH 149	5745	1+2(2)	12.65	CH 165	12.82	12.91	13.18	13.22	13.16	13.13	12.94
CH 157	5785	1+2(2)	12.76								13.03
CH 165	5825	1+2(2)	12.97								**13.25**
CH 149	5745	1+2	15.94	CH 165	16.04	16.11	16.40	16.44	16.37	16.38	16.25
CH 157	5785	1+2	15.87								16.23
CH 165	5825	1+2	16.13								**16.48**

WLAN 5GHz 802.11n-HT40 Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 151	5755	1	11.79	CH 159	11.82	11.80	12.03	12.09	12.06	12.05	11.85
CH 159	5795	1	11.99								**12.12**
CH 151	5755	2	12.11	CH 159	12.15	12.19	12.37	12.33	12.41	12.43	12.17
CH 159	5795	2	12.18								**12.45**
Channel	Frequency (MHz)	Chain Port	MCS Index MCS8	Channel	MCS9	MCS10	MCS11	MCS12	MCS13	MCS14	MCS15
CH 151	5755	1+2(1)	11.82	CH 159	11.92	11.85	12.04	12.00	11.98	11.95	11.93
CH 159	5795	1+2(1)	11.96								**12.05**
CH 151	5755	1+2(2)	10.83	CH 159	11.47	11.27	11.49	11.32	11.39	11.50	10.93
CH 159	5795	1+2(2)	11.35								**11.51**
CH 151	5755	1+2	14.36	CH 159	14.71	14.58	14.78	14.68	14.70	14.74	14.47
CH 159	5795	1+2	14.67								**14.80**

WLAN 5GHz 802.11ac VHT20 Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 149	5745	1	11.50	CH 165	11.61	11.64	11.92	11.94	12.00	11.98	11.97	11.76
CH 157	5785	1	11.31									11.68
CH 165	5825	1	11.63									**12.02**
CH 149	5745	2	11.71	CH 165	11.89	11.99	12.13	12.11	12.10	12.08	12.12	11.84
CH 157	5785	2	11.62									11.97
CH 165	5825	2	11.83									**12.15**
CH 149	5745	1+2(1)	11.55	CH 165	11.66	11.84	11.93	11.92	11.91	11.95	11.97	11.81
CH 157	5785	1+2(1)	11.47									11.63
CH 165	5825	1+2(1)	11.64									**11.99**
CH 149	5745	1+2(2)	10.68	CH 165	10.83	11.06	11.08	11.12	10.97	11.02	11.09	11.14
CH 157	5785	1+2(2)	10.66									**11.20**
CH 165	5825	1+2(2)	10.88									11.13
CH 149	5745	1+2	14.14	CH 165	14.28	14.47	14.54	14.55	14.47	14.52	14.56	14.50
CH 157	5785	1+2	14.09									14.43
CH 165	5825	1+2	14.28									**14.59**

WLAN 5GHz 802.11ac VHT40 Average Power (dBm)													
Power vs. Channel				Power vs. Data Rate									
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 151	5755	1	11.84	CH 159	11.96	12.08	12.16	12.19	12.13	12.08	12.09	12.12	12.16
CH 159	5795	1	12.00										**12.21**
CH 151	5755	2	12.02	CH 159	12.20	12.22	12.30	12.25	12.28	12.23	12.26	12.24	12.08
CH 159	5795	2	12.29										**12.31**
CH 151	5755	1+2(1)	11.80	CH 159	11.81	11.80	11.93	12.04	11.96	12.01	11.93	12.08	12.00
CH 159	5795	1+2(1)	11.87										**12.11**
CH 151	5755	1+2(2)	11.00	CH 159	11.44	11.56	11.41	11.44	11.54	11.49	11.50	11.41	11.50
CH 159	5795	1+2(2)	11.23										**11.53**
CH 151	5755	1+2	14.43	CH 159	14.64	14.69	14.69	14.76	14.76	14.82	14.73	14.77	14.76
CH 159	5795	1+2	14.58										**14.84**

WLAN 5GHz 802.11n-HT80 Average Power (dBm)													
Power vs. Channel				Power vs. Data Rate									
Channel	Frequency (MHz)	Chain Port	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 155	5775	1	11.37	CH 155	11.29	11.36	11.67	11.72	11.65	11.71	11.70	11.74	**11.76**
CH 155	5775	2	11.63	CH 155	11.70	11.65	11.93	11.90	11.87	11.92	11.95	11.99	**12.01**
CH 155	5775	1+2(1)	11.18	CH 155	11.34	11.37	11.58	11.63	11.60	11.77	11.70	11.76	**11.89**
CH 155	5775	1+2(2)	10.63	CH 155	10.82	10.86	11.13	11.16	11.10	11.05	11.14	11.09	**11.18**
CH 155	5775	1+2	13.93	CH 155	14.10	14.13	14.37	14.41	14.36	14.43	14.44	14.45	**14.56**

Note: Chain Port 1+2 is a calculated result from sum of the power Chain Port 1+2(1) and Chain Port 1+2(2).

2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

Modulation	Data Rate
802.11a	48 Mbps
802.11n HT20	MCS7/MCS15
802.11n HT40	MCS7/MCS15
802.11ac VHT20	MCS8
802.11ac VHT40	MCS9
802.11ac VHT80	MCS9

AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable 1 (Charging from Adapter 12V) for Sample 1 Mode 2 : Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable 2 (Charging from Adapter 5.2V) for Sample 2

Remark:

1. For Radiated TCs, the tests were performed with Adapter 12V, Earphone, USB cable 1 and sample 1.

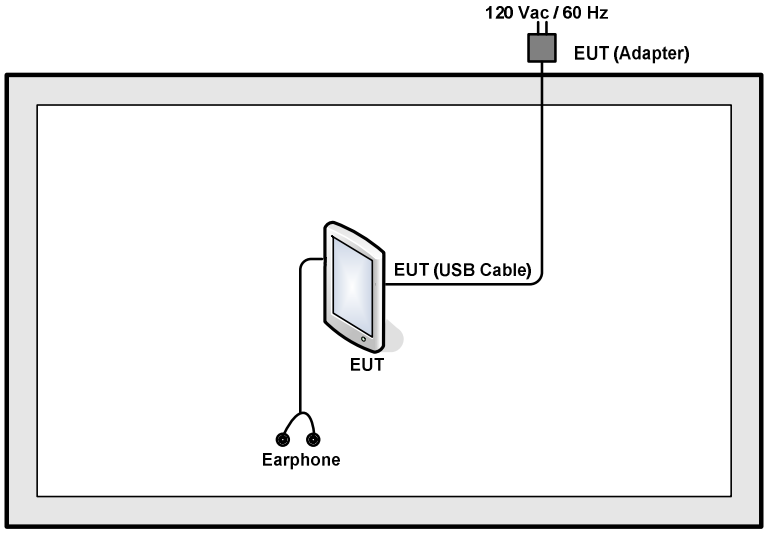
2. The worst case of conducted emission is mode 1; only the test data of it was reported.

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

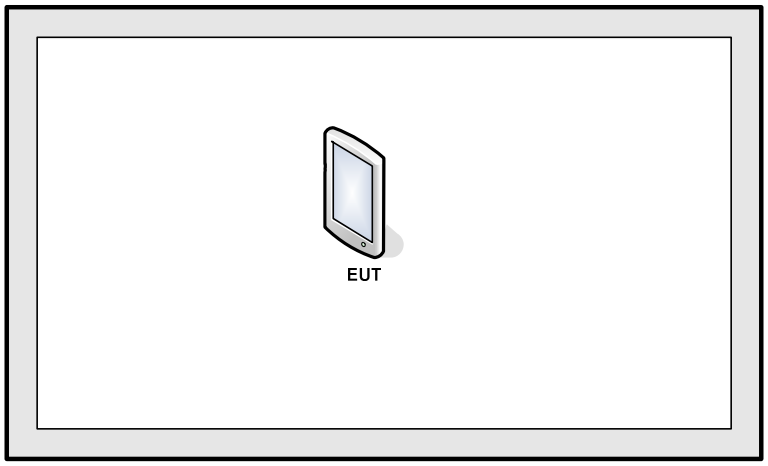
Ch. #		Band IV：5745 ~ 5825MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	165	159	-

2.4 Connection Diagram of Test System

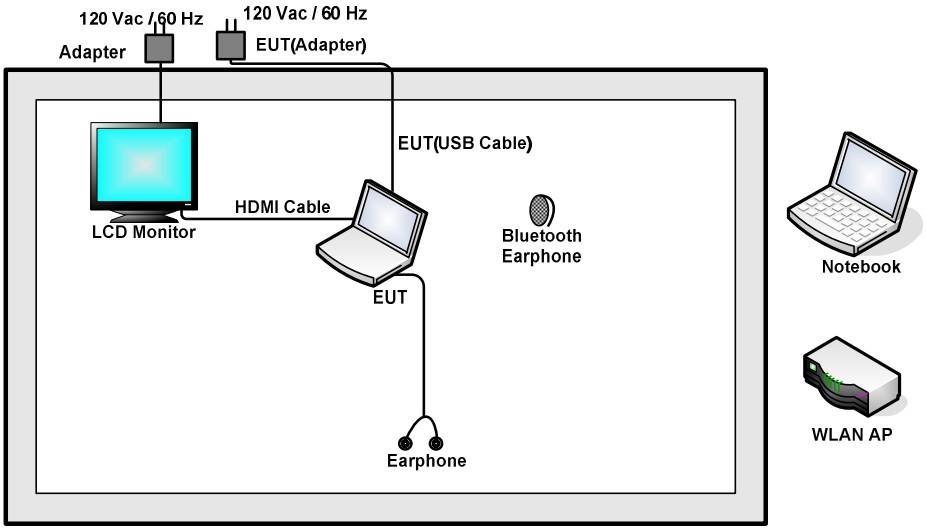
<WLAN5GHz 802.11a/n HT40/WLAN5GHz 802.11ac VHT20/VHT40/VHT80 Tx Mode>



<WLAN5GHz 802.11n HT20 Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-855	KA2IR855A2	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Lenovo	LBH 308	FCC DoC	N/A	N/A
5.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
6.	DC Power Supply	GW INSTEK	GPD-2303S	N/A	N/A	Unshielded, 1.8 m
7.	Earphone	Lenovo	LH102	N/A	N/A	Unshielded, 1.2 m
8.	LCD Monitor	Dell	P2715Qt	N/A	N/A	Unshielded, 1.8 m
9.	HDMI Cable	N/A	N/A	N/A	Shielded,1.5m	N/A

2.6 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.

2.7 Measurement Results Explanation Example

For all conducted test items:

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

Example:
The spectrum analyzer offset is derived from RF cable loss.
Offset = RF cable loss.
Following shows an offset computation example with cable loss 7.0 dB.

Offset (dB) = RF cable loss(dB).
= 7.0 (dB)

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.

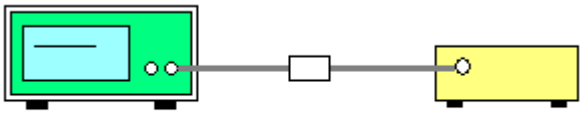
3.1.2 Measuring Instruments

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 v01. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW ≥ 3 x 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.

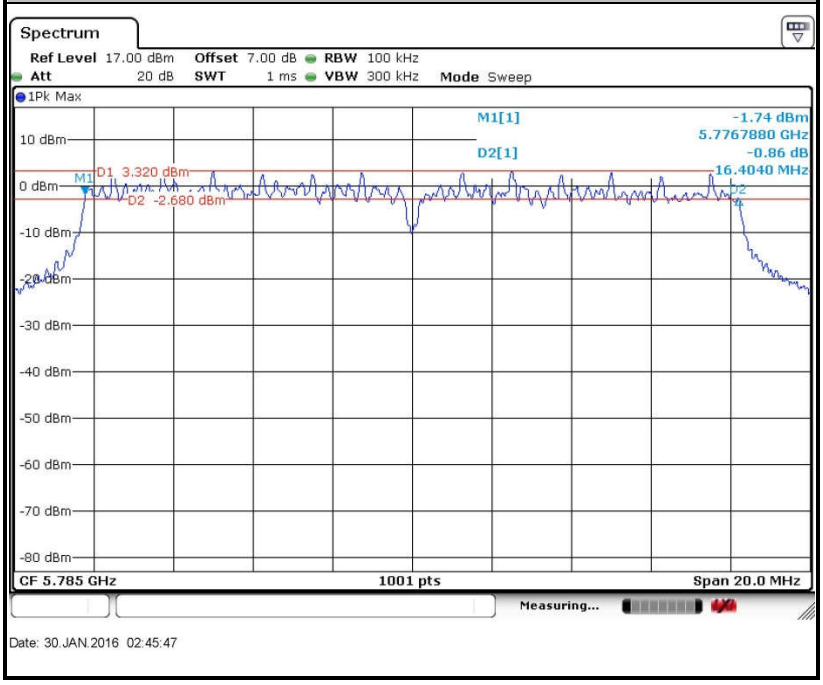
3.1.4 Test Setup



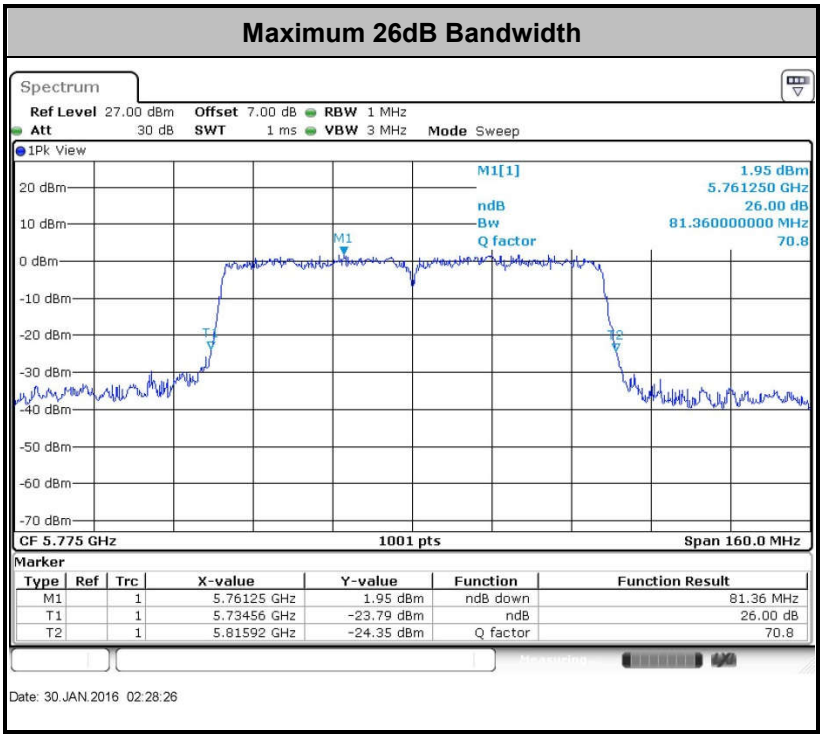
3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

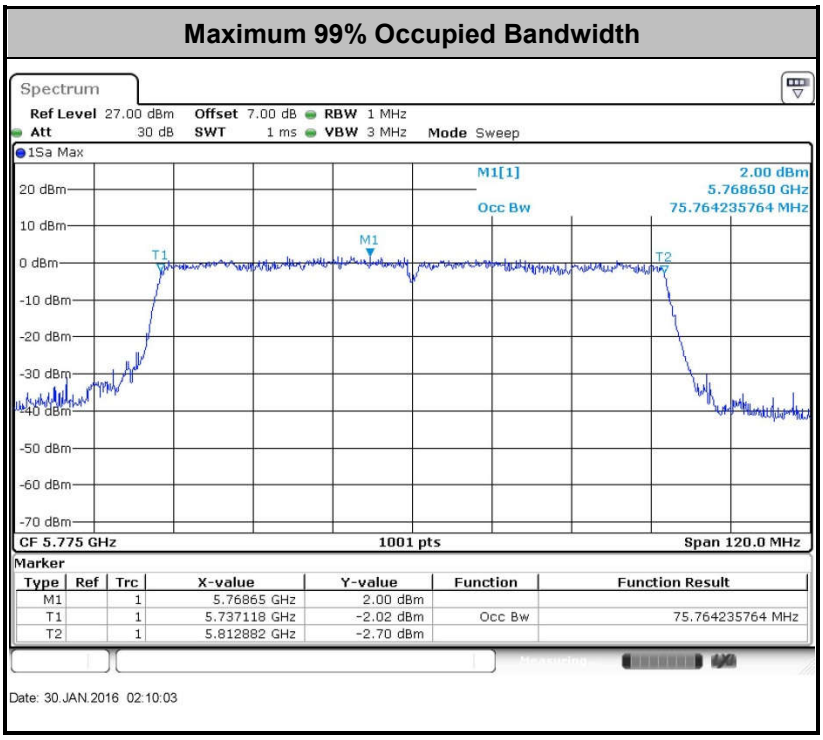
Minimum 6dB Bandwidth



Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth



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.

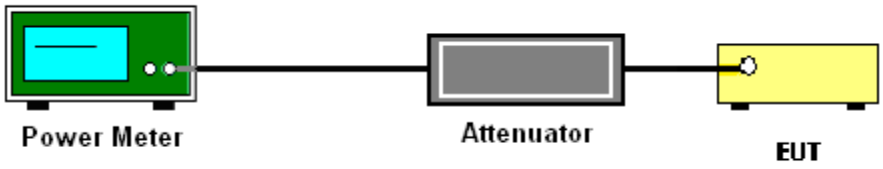
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01.

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 v01r01. Section F) Maximum power spectral density.

 # Method SA-2 #

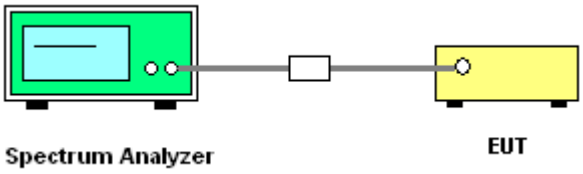
(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures v01r01.
   - 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(500kHz/RBW) to the test result.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
4. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (c): Measure and add 10 log(NANT) dB, where NANT is the number of outputs.

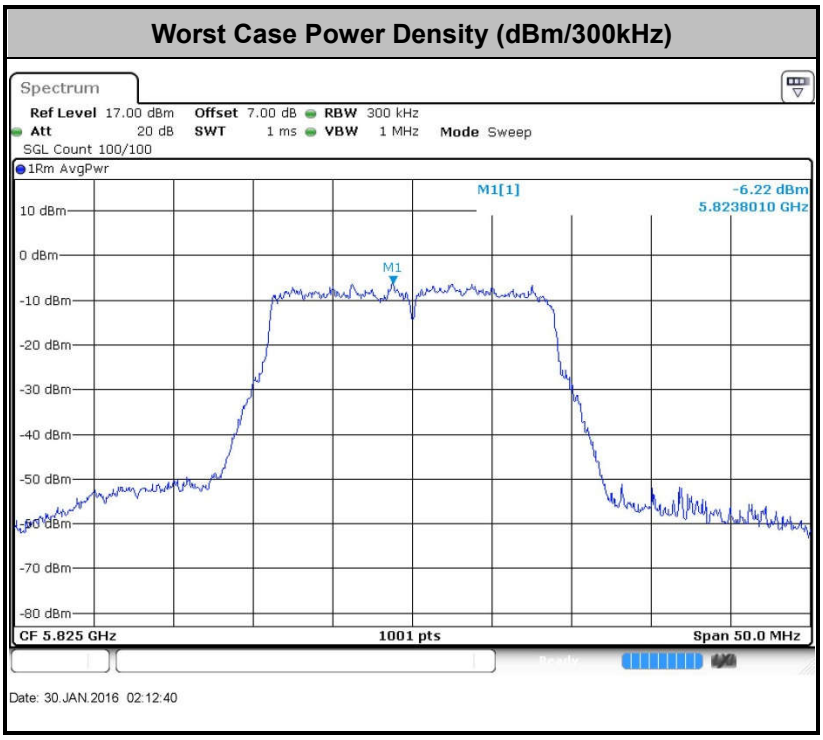
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/300kHz)



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

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

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

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

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

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

(3) KDB 789033 D02 General UNII Test Procedures New Rules v01r01 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

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

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

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

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

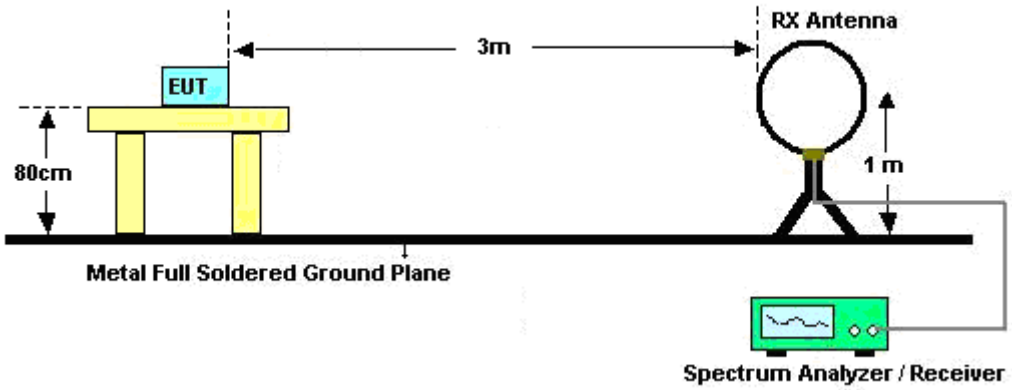
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11a	65.333	0.196	5.102	10kHz
2	802.11a	65.772	0.196	5.102	10kHz
1+2	802.11n HT20	57.627	0.136	7.353	10kHz
1+2	802.11n HT40	46.809	0.088	11.364	12kHz
1+2	802.11ac VHT20	50.000	0.100	10.000	10kHz
1+2	802.11ac VHT40	39.286	0.066	15.152	16kHz
1+2	802.11ac VHT80	35.443	0.056	17.857	19kHz

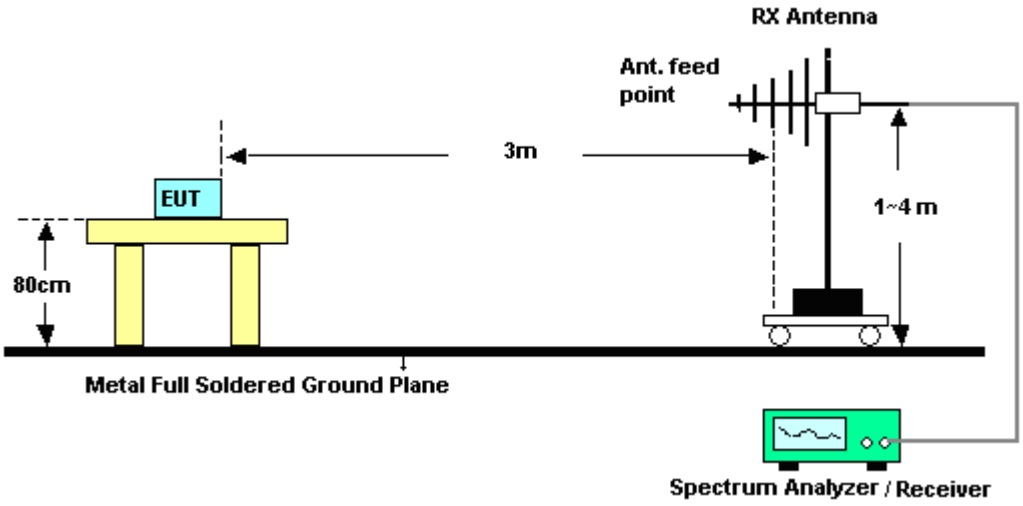
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

3.4.4 Test Setup

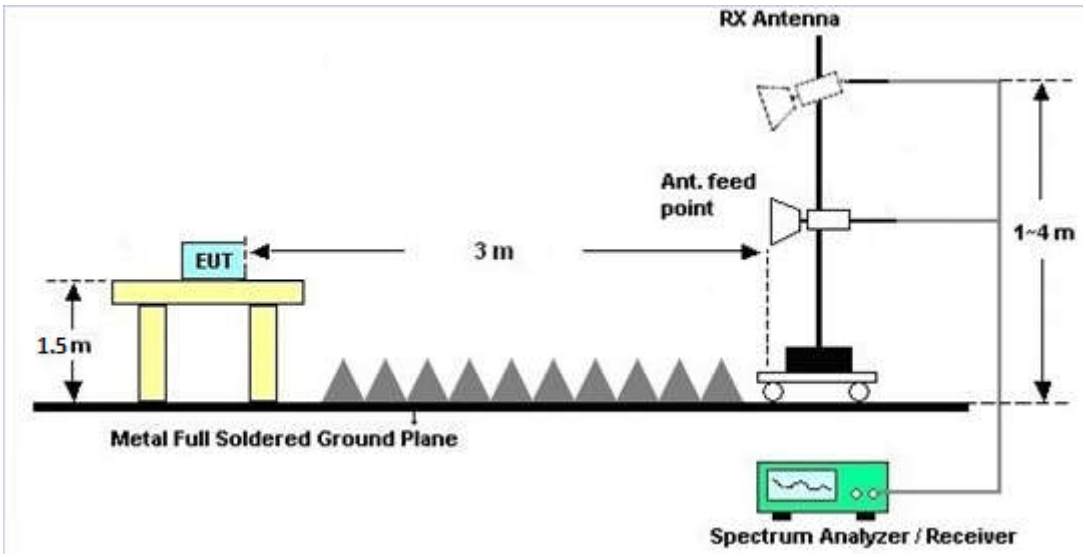
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix B.

3.4.7 Test Result of Unwanted Radiated Emission (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 (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

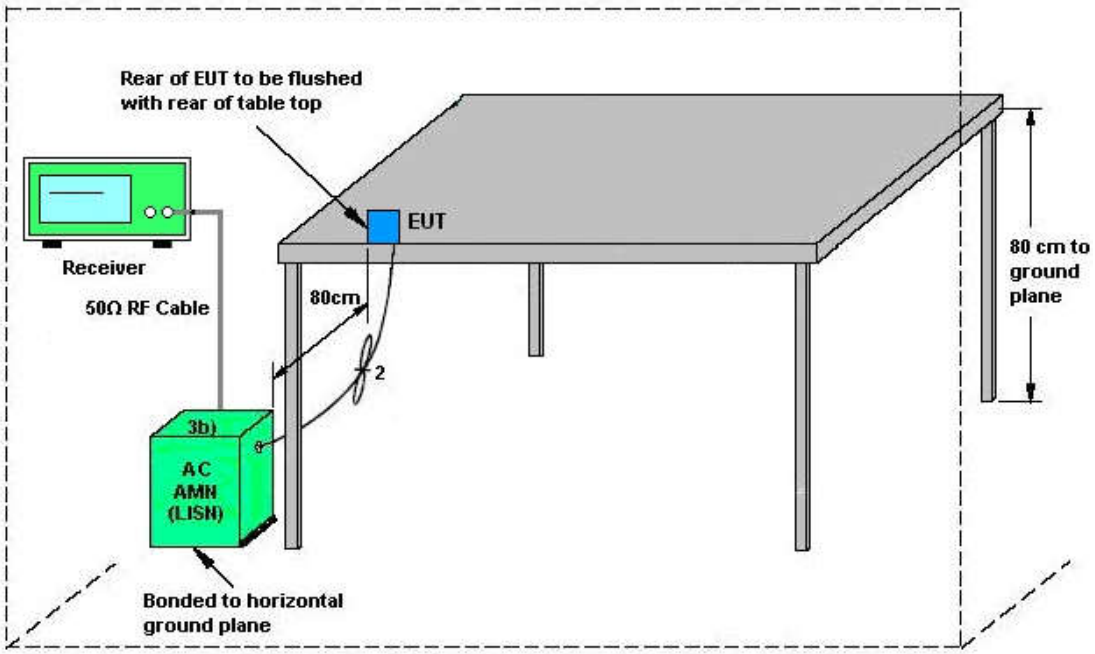
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

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

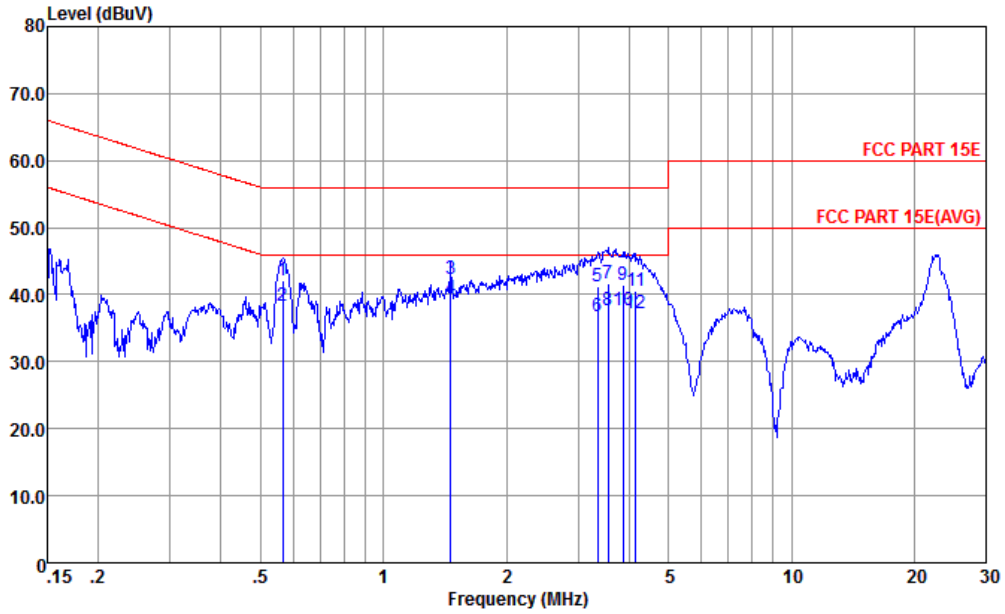
3.5.4 Test Setup



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

3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~46%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable 1 (Charging from Adapter 12V) for Sample 1		

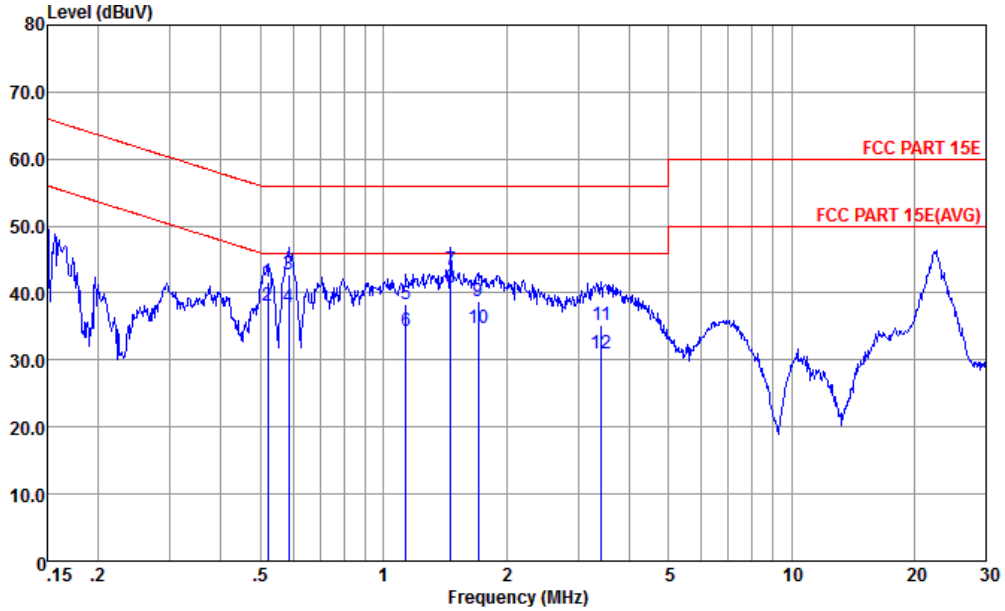


Site : CO01-KS
Condition : FCC PART 15E LISN-L-20151024 LINE

mode : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.57	42.19	-13.81	56.00	31.80	0.23	10.16	QP
2		0.57	38.29	-7.71	46.00	27.90	0.23	10.16	Average
3		1.46	42.25	-13.75	56.00	31.90	0.21	10.14	QP
4	*	1.46	39.45	-6.55	46.00	29.10	0.21	10.14	Average
5		3.35	41.14	-14.86	56.00	30.79	0.19	10.16	QP
6		3.35	36.84	-9.16	46.00	26.49	0.19	10.16	Average
7		3.55	41.75	-14.25	56.00	31.40	0.19	10.16	QP
8		3.55	37.65	-8.35	46.00	27.30	0.19	10.16	Average
9		3.86	41.45	-14.55	56.00	31.10	0.19	10.16	QP
10		3.86	37.55	-8.45	46.00	27.20	0.19	10.16	Average
11		4.16	40.66	-15.34	56.00	30.30	0.19	10.17	QP
12		4.16	37.26	-8.74	46.00	26.90	0.19	10.17	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable 1 (Charging from Adapter 12V) for Sample 1		



Site : CO01-KS
Condition : FCC PART 15E LISN-N-20151024 NEUTRAL

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.52	41.69	-14.31	56.00	31.21	0.32	10.16	QP
2	0.52	38.09	-7.91	46.00	27.61	0.32	10.16	Average
3	0.59	42.79	-13.21	56.00	32.30	0.33	10.16	QP
4	0.59	37.99	-8.01	46.00	27.50	0.33	10.16	Average
5	1.14	38.31	-17.69	56.00	27.80	0.37	10.14	QP
6	1.14	34.41	-11.59	46.00	23.90	0.37	10.14	Average
7	1.46	43.41	-12.59	56.00	32.89	0.38	10.14	QP
8 *	1.46	40.71	-5.29	46.00	30.19	0.38	10.14	Average
9	1.71	38.72	-17.28	56.00	28.20	0.38	10.14	QP
10	1.71	34.82	-11.18	46.00	24.30	0.38	10.14	Average
11	3.42	35.23	-20.77	56.00	24.70	0.37	10.16	QP
12	3.42	31.03	-14.97	46.00	20.50	0.37	10.16	Average

3.6 Frequency Stability Measurement

3.6.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

3.6.4 Test Setup

3.6.5 Test Result of Frequency Stability

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

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

where

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

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

N_{ANT} = the total number of antennas

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

G_k is the gain in dBi of the kth antenna.

The EUT supports CDD mode.

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

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

	Chain Port 1 (dBi)	Chain Port 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
Band IV	-0.70	-4.41	0.65	0.65	0.00	0.00

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

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV30	101338	9kHz~30GHz	May 04, 2015	Jan. 30, 2016	May 03, 2016	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Jan. 20, 2016	Jan. 30, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Jan. 30, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 24, 2015	Jan. 30, 2016	Oct. 23, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Sep. 10, 2015	Jan. 31, 2016	Sep. 09, 2016	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Jun. 05, 2015	Jan. 31, 2016	Jun. 04, 2016	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 07, 2015	Jan. 31, 2016	Nov. 06, 2016	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	25MHz-2GHz	Jan. 16, 2016	Jan. 31, 2016	Jan. 15, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Jun. 25, 2015	Jan. 31, 2016	Jun. 24, 2016	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz ~40GHz	Mar. 03, 2015	Jan. 31, 2016	Mar. 02, 2016	Radiation (03CH03-KS)
Amplifier	Burgeon	BPA-530	102212	0.01MHz-3000MHz	Aug. 10, 2015	Jan. 31, 2016	Aug. 09, 2016	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18~40GHz	Aug. 27, 2015	Jan. 31, 2016	Aug. 26, 2016	Radiation (03CH03-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	1889560	1GHz-18GHz	Aug. 10, 2015	Jan. 31, 2016	Aug. 09, 2016	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 24, 2015	Jan. 31, 2016	Oct. 23, 2016	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jan. 31, 2016	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jan. 31, 2016	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jan. 31, 2016	NCR	Radiation (03CH03-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2015	Jan. 19, 2016	May 03, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	Jan. 19, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	Jan. 19, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	Jan. 19, 2016	Oct. 23, 2016	Conduction (CO01-KS)

5 Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.5 dB**

Appendix A. Conducted Test Results

Report Number : FR5N3007-01E

Test Engineer:	Issac Song	Temperature:	24~25	°C
Test Date:	2016/1/30	Relative Humidity:	49~51	%

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

Band IV													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)		Pass/Fail
					Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 1	
11a	48Mbps	1	149	5745		18.18		22.38		16.42	0.5	0.5	Pass
11a	48Mbps	1	157	5785		18.13		22.48		16.40	0.5	0.5	Pass
11a	48Mbps	1	165	5825		17.93		22.33		16.44	0.5	0.5	Pass
HT20	MCS7	1	149	5745		18.88		22.58		17.74	0.5	0.5	Pass
HT20	MCS7	1	157	5785		18.93		22.58		17.72	0.5	0.5	Pass
HT20	MCS7	1	165	5825		18.83		22.78		17.76	0.5	0.5	Pass
HT40	MCS7	1	151	5755		36.56		40.64		36.48	0.5	0.5	Pass
HT40	MCS7	1	159	5795		36.76		40.73		36.52	0.5	0.5	Pass
VHT20	MCS8	1	149	5745		18.93		22.48		17.74	0.5	0.5	Pass
VHT20	MCS8	1	157	5785		18.93		22.68		17.72	0.5	0.5	Pass
VHT20	MCS8	1	165	5825		18.78		22.43		17.74	0.5	0.5	Pass
VHT40	MCS9	1	151	5755		36.96		41.00		36.44	0.5	0.5	Pass
VHT40	MCS9	1	159	5795		37.16		41.18		36.44	0.5	0.5	Pass
VHT80	MCS9	1	155	5775		75.76		81.52		76.40	0.5	0.5	Pass
HT20	MCS15	2	149	5745	18.98	19.03	22.63	22.78	17.72	17.72	0.5		Pass
HT20	MCS15	2	157	5785	19.08	19.13	22.68	22.68	17.74	17.74	0.5		Pass
HT20	MCS15	2	165	5825	18.83	18.83	22.53	22.28	17.76	17.74	0.5		Pass
HT40	MCS15	2	151	5755	36.76	36.66	40.55	40.64	36.40	36.40	0.5		Pass
HT40	MCS15	2	159	5795	36.66	36.86	40.73	40.91	36.44	36.44	0.5		Pass
VHT20	MCS8	2	149	5745	18.78	18.88	22.58	22.58	17.74	17.72	0.5		Pass
VHT20	MCS8	2	157	5785	18.73	18.93	22.73	22.63	17.76	17.74	0.5		Pass
VHT20	MCS8	2	165	5825	18.68	18.78	22.48	22.73	17.78	17.74	0.5		Pass
VHT40	MCS9	2	151	5755	36.56	36.56	40.73	40.55	36.40	36.36	0.5		Pass
VHT40	MCS9	2	159	5795	36.66	36.76	40.64	40.64	36.36	36.44	0.5		Pass
VHT80	MCS9	2	155	5775	75.64	75.64	81.36	81.36	76.32	76.40	0.5		Pass

Report Number : FR5N3007-01E

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 0	Ant 1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1		
11a	48Mbps	1	149	5745	1.85	1.82	15.29	15.84		30.00	30.00	-0.70	-4.41		Pass
11a	48Mbps	1	157	5785	1.85	1.82	15.07	15.60		30.00	30.00	-0.70	-4.41		Pass
11a	48Mbps	1	165	5825	1.85	1.82	15.49	15.90		30.00	30.00	-0.70	-4.41		Pass
HT20	MCS7	1	149	5745	1.58	1.57	13.42	13.89		30.00	30.00	-0.70	-4.41		Pass
HT20	MCS7	1	157	5785	1.58	1.57	13.16	13.98		30.00	30.00	-0.70	-4.41		Pass
HT20	MCS7	1	165	5825	1.58	1.57	13.53	14.06		30.00	30.00	-0.70	-4.41		Pass
HT40	MCS7	1	151	5755	2.44	2.51	11.85	12.17		30.00	30.00	-0.70	-4.41		Pass
HT40	MCS7	1	159	5795	2.44	2.51	12.12	12.45		30.00	30.00	-0.70	-4.41		Pass
VHT20	MCS8	1	149	5745	1.76	1.79	11.76	11.84		30.00	30.00	-0.70	-4.41		Pass
VHT20	MCS8	1	157	5785	1.76	1.79	11.68	11.97		30.00	30.00	-0.70	-4.41		Pass
VHT20	MCS8	1	165	5825	1.76	1.79	12.02	12.15		30.00	30.00	-0.70	-4.41		Pass
VHT40	MCS9	1	151	5755	3.40	3.20	12.16	12.08		30.00	30.00	-0.70	-4.41		Pass
VHT40	MCS9	1	159	5795	3.40	3.20	12.21	12.31		30.00	30.00	-0.70	-4.41		Pass
VHT80	MCS9	1	155	5775	4.14	4.09	11.76	12.01		30.00	30.00	-0.70	-4.41		Pass
HT20	MCS15	2	149	5745	2.43	2.39	13.51	12.94	16.25	30.00		0.65			Pass
HT20	MCS15	2	157	5785	2.43	2.39	13.39	13.03	16.23	30.00		0.65			Pass
HT20	MCS15	2	165	5825	2.43	2.39	13.68	13.25	16.48	30.00		0.65			Pass
HT40	MCS15	2	151	5755	3.30	3.30	11.93	10.93	14.47	30.00		0.65			Pass
HT40	MCS15	2	159	5795	3.30	3.30	12.05	11.51	14.80	30.00		0.65			Pass
VHT20	MCS8	2	149	5745	3.01	3.01	11.81	11.14	14.50	30.00		0.65			Pass
VHT20	MCS8	2	157	5785	3.01	3.01	11.63	11.20	14.43	30.00		0.65			Pass
VHT20	MCS8	2	165	5825	3.01	3.01	11.99	11.13	14.59	30.00		0.65			Pass
VHT40	MCS9	2	151	5755	4.06	3.93	12.00	11.50	14.76	30.00		0.65			Pass
VHT40	MCS9	2	159	5795	4.06	3.93	12.11	11.53	14.84	30.00		0.65			Pass
VHT80	MCS9	2	155	5775	4.61	4.51	11.89	11.18	14.56	30.00		0.65			Pass

Report Number : FR5N3007-01E

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
					Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1	
11a	48Mbps	1	149	5745	1.85	1.82	2.22	2.22		1.41		30.00	30.00	-0.70	-4.41	Pass
11a	48Mbps	1	157	5785	1.85	1.82	2.22	2.22		1.77		30.00	30.00	-0.70	-4.41	Pass
11a	48Mbps	1	165	5825	1.85	1.82	2.22	2.22		1.22		30.00	30.00	-0.70	-4.41	Pass
HT20	MCS7	1	149	5745	1.58	1.57	2.22	2.22		-0.95		30.00	30.00	-0.70	-4.41	Pass
HT20	MCS7	1	157	5785	1.58	1.57	2.22	2.22		-0.72		30.00	30.00	-0.70	-4.41	Pass
HT20	MCS7	1	165	5825	1.58	1.57	2.22	2.22		-1.36		30.00	30.00	-0.70	-4.41	Pass
HT40	MCS7	1	151	5755	2.44	2.51	2.22	2.22		-4.94		30.00	30.00	-0.70	-4.41	Pass
HT40	MCS7	1	159	5795	2.44	2.51	2.22	2.22		-5.48		30.00	30.00	-0.70	-4.41	Pass
VHT20	MCS8	1	149	5745	1.76	1.79	2.22	2.22		-2.74		30.00	30.00	-0.70	-4.41	Pass
VHT20	MCS8	1	157	5785	1.76	1.79	2.22	2.22		-2.59		30.00	30.00	-0.70	-4.41	Pass
VHT20	MCS8	1	165	5825	1.76	1.79	2.22	2.22		-3.18		30.00	30.00	-0.70	-4.41	Pass
VHT40	MCS9	1	151	5755	3.40	3.20	2.22	2.22		-4.62		30.00	30.00	-0.70	-4.41	Pass
VHT40	MCS9	1	159	5795	3.40	3.20	2.22	2.22		-4.52		30.00	30.00	-0.70	-4.41	Pass
VHT80	MCS9	1	155	5775	4.14	4.09	2.22	2.22		-6.38		30.00	30.00	-0.70	-4.41	Pass
HT20	MCS15	2	149	5745	2.43	2.39	2.22				2.08	30.00		0.65		Pass
HT20	MCS15	2	157	5785	2.43	2.39	2.22				2.14	30.00		0.65		Pass
HT20	MCS15	2	165	5825	2.43	2.39	2.22				2.10	30.00		0.65		Pass
HT40	MCS15	2	151	5755	3.30	3.30	2.22				-1.97	30.00		0.65		Pass
HT40	MCS15	2	159	5795	3.30	3.30	2.22				-1.75	30.00		0.65		Pass
VHT20	MCS8	2	149	5745	3.01	3.01	2.22				1.17	30.00		0.65		Pass
VHT20	MCS8	2	157	5785	3.01	3.01	2.22				0.94	30.00		0.65		Pass
VHT20	MCS8	2	165	5825	3.01	3.01	2.22				0.92	30.00		0.65		Pass
VHT40	MCS9	2	151	5755	4.06	3.93	2.22				-1.21	30.00		0.65		Pass
VHT40	MCS9	2	159	5795	4.06	3.93	2.22				-0.61	30.00		0.65		Pass
VHT80	MCS9	2	155	5775	4.61	4.51	2.22				-3.51	30.00		0.65		Pass

TEST RESULTS DATA
Frequency Stability

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (°C)	Voltage (V)	Note
11a	48Mbps	1	149	5745	5745.000	0.000	0.00	25	3.6	
11a	48Mbps	1	149	5745	5745.000	0.000	0.00	25	4.35	
11a	48Mbps	1	149	5745	5745.000	0.000	0.00	25	3.8	
11a	48Mbps	1	149	5745	5744.975	-0.025	-4.35	-30	3.8	
11a	48Mbps	1	149	5745	5745.000	0.000	0.00	50	3.8	

Appendix B. Radiated Test Results

15E Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5713.72	55.22	-13.08	68.3	50.91	32.03	8.55	36.27	100	8	P	H
		5724.28	64.27	-14.03	78.3	59.94	32.04	8.57	36.28	100	8	P	H
	*	5744	103.53	-	-	99.19	32.05	8.58	36.29	100	8	P	H
	*	5740	96.82	-	-	92.48	32.05	8.58	36.29	100	8	A	H
		5712.36	49.03	-19.27	68.3	44.72	32.03	8.55	36.27	106	158	P	V
		5724.44	57.72	-20.58	78.3	53.39	32.04	8.57	36.28	106	158	P	V
	*	5744	97.7	-	-	93.36	32.05	8.58	36.29	106	158	P	V
	*	5742	90.67	-	-	86.33	32.05	8.58	36.29	106	158	A	V
802.11a CH 157 5785MHz	*	5780	102.51	-	-	98.16	32.06	8.6	36.31	100	360	P	H
	*	5780	95.84	-	-	91.49	32.06	8.6	36.31	100	360	A	H
	*	5784	96.69	-	-	92.34	32.06	8.6	36.31	100	157	P	V
	*	5782	89.64	-	-	85.29	32.06	8.6	36.31	100	157	A	V
802.11a CH 165 5825MHz	*	5832	101.86	-	-	97.49	32.08	8.64	36.35	100	2	P	H
	*	5822	95.39	-	-	91.02	32.08	8.64	36.35	100	2	A	H
		5852.56	53.33	-24.97	78.3	48.95	32.09	8.65	36.36	100	2	P	H
		5885.6	50.02	-18.28	68.3	45.63	32.1	8.67	36.38	100	2	P	H
	*	5822	95.47	-	-	91.1	32.08	8.64	36.35	400	159	P	V
	*	5820	89.39	-	-	85.02	32.08	8.64	36.35	400	159	A	V
		5850.08	46.8	-31.5	78.3	42.42	32.09	8.65	36.36	400	159	P	V
		5881.04	47.07	-21.23	68.3	42.68	32.1	8.67	36.38	400	159	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		11490	49.42	-24.58	74	59.02	38.59	12.35	60.54	100	0	P	H
		11490	48.82	-25.18	74	58.42	38.59	12.35	60.54	100	0	P	V
802.11a CH 157 5785MHz		11571	47.96	-26.04	74	57.31	38.75	12.4	60.5	100	0	P	H
		11571	48.83	-25.17	74	58.18	38.75	12.4	60.5	100	0	P	V
802.11a CH 165 5825MHz		11649	48.67	-25.33	74	57.79	38.9	12.45	60.47	100	0	P	H
		11649	49.26	-24.74	74	58.38	38.9	12.45	60.47	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average 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 per 15.209(c).
!	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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

15E Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5714.92	59.77	-8.53	68.3	55.46	32.03	8.55	36.27	300	16	P	H
		5724.6	67.4	-10.9	78.3	63.07	32.04	8.57	36.28	300	16	P	H
	*	5744	102	-	-	97.66	32.05	8.58	36.29	300	16	P	H
	*	5742	95.59	-	-	91.25	32.05	8.58	36.29	300	16	A	H
		5713.56	55.91	-12.39	68.3	51.6	32.03	8.55	36.27	300	212	P	V
		5724.12	62.97	-15.33	78.3	58.64	32.04	8.57	36.28	300	212	P	V
	*	5746	96.82	-	-	92.48	32.05	8.58	36.29	300	212	P	V
	*	5742	90.59	-	-	86.25	32.05	8.58	36.29	300	212	A	V
802.11a CH 157 5785MHz	*	5784	102.46	-	-	98.11	32.06	8.6	36.31	102	358	P	H
	*	5782	96.16	-	-	91.81	32.06	8.6	36.31	102	358	A	H
	*	5780	98.25	-	-	93.9	32.06	8.6	36.31	322	199	P	V
	*	5782	92.2	-	-	87.85	32.06	8.6	36.31	322	199	A	V
802.11a CH 165 5825MHz	*	5824	103.5	-	-	99.13	32.08	8.64	36.35	100	4	P	H
	*	5822	96.89	-	-	92.52	32.08	8.64	36.35	100	4	A	H
		5851.2	60.18	-18.12	78.3	55.8	32.09	8.65	36.36	100	4	P	H
		5862.88	54.01	-14.29	68.3	49.62	32.1	8.66	36.37	100	4	P	H
	*	5820	99.47	-	-	95.1	32.08	8.64	36.35	317	198	P	V
	*	5822	93.19	-	-	88.82	32.08	8.64	36.35	317	198	A	V
		5850.4	57	-21.3	78.3	52.62	32.09	8.65	36.36	317	198	P	V
		5868.64	48.89	-19.41	68.3	44.5	32.1	8.66	36.37	317	198	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		11490	49.24	-24.76	74	58.84	38.59	12.35	60.54	102	357	P	H
		11490	49.01	-24.99	74	58.61	38.59	12.35	60.54	309	191	P	V
802.11a CH 157 5785MHz		11571	49.96	-24.04	74	59.31	38.75	12.4	60.5	300	356	P	H
		11571	50.53	-23.47	74	59.88	38.75	12.4	60.5	331	188	P	V
802.11a CH 165 5825MHz		11649	50.64	-23.36	74	59.76	38.9	12.45	60.47	112	5	P	H
		11649	50.41	-23.59	74	59.53	38.9	12.45	60.47	325	170	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average 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 per 15.209(c).
!	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.	
2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

15E Band 4 5725~5850MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
	!	5714.68	64.23	-4.07	68.3	54.38	32.03	8.55	30.73	100	12	P	H
		5722.52	68.95	-9.35	78.3	59.08	32.04	8.57	30.74	100	12	P	H
802.11n	*	5748	111.02	-	-	101.14	32.05	8.58	30.75	100	12	P	H
HT20	*	5742	103.97	-	-	94.09	32.05	8.58	30.75	100	12	A	H
CH 149		5714.28	59.12	-9.18	68.3	49.27	32.03	8.55	30.73	304	203	P	V
5745MHz		5723.08	65.87	-12.43	78.3	56	32.04	8.57	30.74	304	203	P	V
	*	5740	104.15	-	-	94.27	32.05	8.58	30.75	304	203	P	V
	*	5740	98.56	-	-	88.68	32.05	8.58	30.75	304	203	A	V
802.11n	*	5782	108.97	-	-	99.08	32.06	8.6	30.77	100	10	P	H
HT20	*	5778	103.12	-	-	93.23	32.06	8.6	30.77	100	10	A	H
CH 157	*	5780	103.96	-	-	94.07	32.06	8.6	30.77	300	203	P	V
5785MHz	*	5788	97.38	-	-	87.47	32.07	8.62	30.78	300	203	A	V
	*	5818	110.47	-	-	100.55	32.08	8.63	30.79	105	10	P	H
	*	5824	103.55	-	-	93.63	32.08	8.64	30.8	105	10	A	H
802.11n		5852.8	68.28	-10.02	78.3	58.35	32.09	8.65	30.81	105	10	P	H
HT20		5860.48	60.73	-7.57	68.3	50.79	32.1	8.66	30.82	105	10	P	H
CH 165	*	5822	103.96	-	-	94.04	32.08	8.64	30.8	300	215	P	V
5825MHz	*	5830	97.4	-	-	87.48	32.08	8.64	30.8	300	215	A	V
		5851.2	64.62	-13.68	78.3	54.69	32.09	8.65	30.81	300	215	P	V
		5860.8	57.86	-10.44	68.3	47.92	32.1	8.66	30.82	300	215	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 149 5745MHz		11490	50.71	-23.29	74	60.31	38.59	12.35	60.54	100	344	P	H
		11490	50.55	-23.45	74	60.15	38.59	12.35	60.54	300	0	P	V
802.11n HT20 CH 157 5785MHz		11571	50.03	-23.97	74	59.38	38.75	12.4	60.5	152	167	P	H
		11571	49.32	-24.68	74	58.67	38.75	12.4	60.5	329	116	P	V
802.11n HT20 CH 165 5825MHz		11649	50.8	-23.2	74	59.92	38.9	12.45	60.47	135	228	P	H
		11649	48.93	-25.07	74	58.05	38.9	12.45	60.47	312	169	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz	!	5714.6	64.14	-4.16	68.3	59.83	32.03	8.55	36.27	124	14	P	H
		5722.52	69.21	-9.09	78.3	64.88	32.04	8.57	36.28	124	14	P	H
	*	5764	99.86	-	-	95.52	32.05	8.59	36.3	124	14	P	H
	*	5742	94.72	-	-	90.38	32.05	8.58	36.29	124	14	A	H
		5713.96	57.35	-10.95	68.3	53.04	32.03	8.55	36.27	351	206	P	V
		5723.24	61.26	-17.04	78.3	56.93	32.04	8.57	36.28	351	206	P	V
	*	5762	93.98	-	-	89.64	32.05	8.59	36.3	351	206	P	V
	*	5748	87.18	-	-	82.84	32.05	8.58	36.29	351	206	A	V
802.11n HT40 CH 159 5795MHz	*	5788	99.91	-	-	95.54	32.07	8.62	36.32	113	4	P	H
	*	5780	94.3	-	-	89.95	32.06	8.6	36.31	113	4	A	H
		5859.28	51.99	-26.31	78.3	47.6	32.1	8.66	36.37	113	4	P	H
		5868.56	49.8	-18.5	68.3	45.41	32.1	8.66	36.37	113	4	P	H
	*	5780	93.08	-	-	88.73	32.06	8.6	36.31	303	217	P	V
	*	5800	87.5	-	-	83.13	32.07	8.62	36.32	303	217	A	V
		5853.44	47.91	-30.39	78.3	43.53	32.09	8.65	36.36	303	217	P	V
		5884.96	47.33	-20.97	68.3	42.94	32.1	8.67	36.38	303	217	P	V

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

15E Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz		11511	47.2	-26.8	74	56.78	38.6	12.36	60.54	100	0	P	H
		11511	47.15	-26.85	74	56.73	38.6	12.36	60.54	100	0	P	V
802.11n HT40 CH 159 5795MHz		11589	49.67	-24.33	74	58.95	38.79	12.42	60.49	100	0	P	H
		11589	48.59	-25.41	74	57.87	38.79	12.42	60.49	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5715	53.72	-24.58	78.3	49.41	32.03	8.55	36.27	100	12	P	H
		5723.96	60.47	-17.83	78.3	56.14	32.04	8.57	36.28	100	12	P	H
802.11ac	*	5740	103.36	-	-	99.02	32.05	8.58	36.29	100	12	P	H
VHT20	*	5738	96.56	-	-	92.22	32.05	8.58	36.29	100	12	A	H
CH 149		5713.48	48.6	-19.7	68.3	44.29	32.03	8.55	36.27	300	199	P	V
5745MHz		5723	51.08	-27.22	78.3	46.75	32.04	8.57	36.28	300	199	P	V
	*	5744	95.28	-	-	90.94	32.05	8.58	36.29	300	199	P	V
	*	5744	89.5	-	-	85.16	32.05	8.58	36.29	300	199	A	V
802.11ac	*	5784	104.36	-	-	100.01	32.06	8.6	36.31	100	12	P	H
VHT20	*	5782	96.96	-	-	92.61	32.06	8.6	36.31	100	12	A	H
CH 157	*	5790	97.99	-	-	93.62	32.07	8.62	36.32	297	201	P	V
5785MHz	*	5778	91.6	-	-	87.25	32.06	8.6	36.31	297	201	A	V
	*	5824	103.1	-	-	98.73	32.08	8.64	36.35	100	10	P	H
	*	5818	96.1	-	-	91.72	32.08	8.63	36.33	100	10	A	H
802.11ac		5853.12	57.02	-21.28	78.3	52.64	32.09	8.65	36.36	100	10	P	H
VHT20		5866.16	50.4	-17.9	68.3	46.01	32.1	8.66	36.37	100	10	P	H
CH 165	*	5820	96.47	-	-	92.1	32.08	8.64	36.35	300	211	P	V
5825MHz	*	5820	90.37	-	-	86	32.08	8.64	36.35	300	211	A	V
		5851.28	53.14	-25.16	78.3	48.76	32.09	8.65	36.36	300	211	P	V
		5863.04	47.21	-21.09	68.3	42.82	32.1	8.66	36.37	300	211	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT20 CH 149 5745MHz		11490	42.86	-31.14	74	52.46	38.59	12.35	60.54	100	0	P	H
		11490	43.07	-30.93	74	52.67	38.59	12.35	60.54	100	0	P	V
802.11ac VHT20 CH 157 5785MHz		11571	45.56	-28.44	74	53.06	38.75	14.25	60.5	100	0	P	H
		11571	45.81	-28.19	74	53.31	38.75	14.25	60.5	100	0	P	V
802.11ac VHT20 CH 165 5825MHz		11649	44.23	-29.77	74	53.35	38.9	12.45	60.47	100	0	P	H
		11649	44.86	-29.14	74	53.98	38.9	12.45	60.47	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11ac VHT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT40 CH 151 5755MHz	!	5714.04	63.68	-4.62	68.3	59.37	32.03	8.55	36.27	100	10	P	H
		5718.12	69.87	-8.43	78.3	65.54	32.04	8.57	36.28	100	10	P	H
	*	5738	100.98	-	-	96.64	32.05	8.58	36.29	100	10	P	H
	*	5738	94.7	-	-	90.36	32.05	8.58	36.29	100	10	A	H
		5714.9	59.4	-8.9	68.3	55.09	32.03	8.55	36.27	300	199	P	V
		5719	64.28	-14.02	78.3	59.95	32.04	8.57	36.28	300	199	P	V
	*	5744	94.96	-	-	90.62	32.05	8.58	36.29	300	199	P	V
	*	5740	89.34	-	-	85	32.05	8.58	36.29	300	199	A	V
802.11ac VHT40 CH 159 5795MHz	*	5780	100.25	-	-	95.9	32.06	8.6	36.31	100	7	P	H
	*	5778	94.53	-	-	90.18	32.06	8.6	36.31	100	7	A	H
		5857.2	52.21	-26.09	78.3	47.82	32.1	8.66	36.37	100	7	P	H
		5861.68	51.07	-17.23	68.3	46.68	32.1	8.66	36.37	100	7	P	H
	*	5800	94.83	-	-	90.46	32.07	8.62	36.32	331	201	P	V
	*	5798	88.92	-	-	84.55	32.07	8.62	36.32	331	201	A	V
		5858.8	47.84	-30.46	78.3	43.45	32.1	8.66	36.37	331	201	P	V
		5860.24	47.01	-21.29	68.3	42.62	32.1	8.66	36.37	331	201	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11ac VHT40 (Harmonic @ 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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT40 CH 151 5755MHz		11511	45.23	-28.77	74	52.96	38.6	14.21	60.54	100	0	P	H
		11511	46.13	-27.87	74	53.86	38.6	14.21	60.54	100	0	P	V
802.11ac VHT40 CH 159 5795MHz		11589	47.62	-26.38	74	55.06	38.79	14.26	60.49	100	0	P	H
		11589	45.51	-28.49	74	52.95	38.79	14.26	60.49	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT80 CH 155 5775MHz	!	5687.16	64.92	-3.38	68.3	60.61	32.02	8.54	36.25	100	0	P	H
		5723.64	66.18	-12.12	78.3	61.85	32.04	8.57	36.28	100	0	P	H
	*	5750	98.28	-	-	93.94	32.05	8.58	36.29	100	0	P	H
	*	5744	92.32	-	-	87.98	32.05	8.58	36.29	100	0	A	H
		5859.04	57.56	-20.74	78.3	53.17	32.1	8.66	36.37	100	0	P	H
		5870.88	58.19	-10.11	68.3	53.8	32.1	8.67	36.38	100	0	P	H
		5687.16	58.81	-9.49	68.3	54.5	32.02	8.54	36.25	300	210	P	V
		5718.28	59.88	-18.42	78.3	55.55	32.04	8.57	36.28	300	210	P	V
	*	5750	92.38	-	-	88.04	32.05	8.58	36.29	300	210	P	V
	*	5760	86.17	-	-	81.83	32.05	8.59	36.3	300	210	A	V
		5850.08	51.23	-27.07	78.3	46.85	32.09	8.65	36.36	300	210	P	V
		5870.88	54.02	-14.28	68.3	49.63	32.1	8.67	36.38	300	210	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac		11550	46.21	-27.79	74	53.77	38.71	14.24	60.51	100	0	P	H
VHT80 CH 155 5775MHz		11550	46.13	-27.87	74	53.69	38.71	14.24	60.51	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

15E 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+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11n VHT80 LF		30	23.21	-16.79	40	35.06	18.6	0.65	31.1	-	-	P	H
		76.56	22.14	-17.86	40	42.4	9.17	1.07	30.5	-	-	P	H
		166.77	29.03	-14.47	43.5	45.1	12.77	1.56	30.4	-	-	P	H
		240.49	33.37	-12.63	46	49.4	12.72	1.73	30.48	100	199	P	H
		420.91	31.98	-14.02	46	42.89	17.17	2.54	30.62	-	-	P	H
		481.05	24.88	-21.12	46	34.63	17.95	2.74	30.44	-	-	P	H
		30.97	35.59	-4.41	40	47.53	18.46	0.66	31.06	100	154	P	V
		76.56	27.06	-12.94	40	47.32	9.17	1.07	30.5	-	-	P	V
		158.04	28.67	-14.83	43.5	44.24	13.31	1.52	30.4	-	-	P	V
		321	21.94	-24.06	46	35	15.28	2.2	30.54	-	-	P	V
		410.24	23.88	-22.12	46	34.96	17.08	2.5	30.66	-	-	P	V
		600.36	24.49	-21.51	46	34.42	17.2	3.07	30.2	-	-	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 per 15.209(c).
!	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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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