

FCC RF Test Report

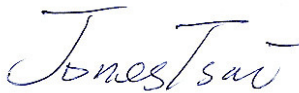
APPLICANT : Lenovo (Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT : Portable Tablet Computer
BRAND NAME : Lenovo
MODEL NAME : Lenovo YT-X703F
FCC ID : O57YTX703F
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Jul. 01, 2016 and testing was completed on Aug. 01, 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



SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR663013-01E	Rev. 01	Initial issue of report	Aug. 08, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	$\leq 15.407(b)(4)(i)$ & 15.209(a)	Pass	Under limit 3.18 dB at 30.810 MHz for Quasi-Peak
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.72 dB at 26.840 MHz
3.6	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

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 YT-X703F
FCC ID	O57YTX703F
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40/ WLAN 5GHz 802.11a/n HT20/HT40/ WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0+EDR/ Bluetooth v4.0 LE/
HW Version	Lenovo Tablet YT-X703F
SW Version	YT-X703F_160817
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

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power	802.11a : 11.32 dBm / 0.0136 W 802.11n HT20 : 9.70 dBm / 0.0093 W 802.11n HT40 : 10.17 dBm / 0.0104 W 802.11ac VHT20: 9.76 dBm / 0.0095 W 802.11ac VHT40: 10.24 dBm / 0.0106 W 802.11ac VHT80: 9.92 dBm / 0.0098 W
99% Occupied Bandwidth	802.11a : 18.53 MHz 802.11n HT20 : 19.28 MHz 802.11n HT40 : 36.76 MHz 802.11ac VHT20: 19.23 MHz 802.11ac VHT40: 36.76 MHz 802.11ac VHT80: 74.81 MHz
Antenna Type / Gain	PIFA Antenna with gain 1.1 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

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
Battery	Sunwoda: L16D3K31 3.75 Vdc, 9300 mAh	SCUD: L16D3K31 3.75 Vdc, 9300 mAh
Rear Camera	Qtech: F5695AK	AVC: CCBFL05006
LCM+TP ASM	Ofilm: AUO 10.1 WQXGA IPS+10.1 inch GFF Direct bounding + S7813	GIS: Innolux 10.1 WQXGA IPS+10.1 inch GFF Direct bounding + S7813
DRAM	Samsung: K3QF4F40BM-FGCF	Hynix: H9CKNNNDATMUPR-NUH
EMMC	Samsung: KLMCG4JENB-B041	Toshiba: THGBMFG8C2LBAIL

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.	
	TH01-KS	CO01-KS

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	FCC Registration No.
	03CH12-HY	TW1098

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 v01r02
- ♦ 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 four orthogonal panels, X, Y, Z and laptop. The worst cases were recorded in this report.

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	165	5825
	155	5775		

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

2.2 Test Mode

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

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

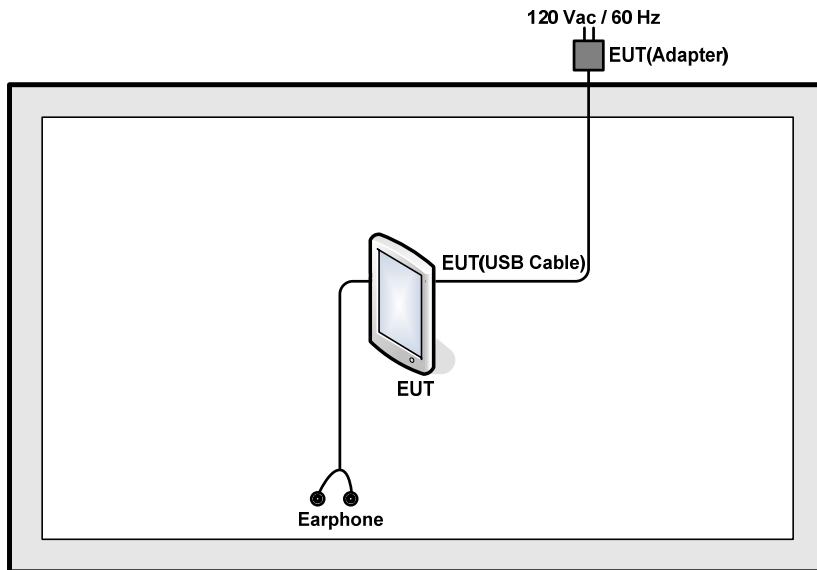
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter 12V) + Battery 1 for Sample 1
	Mode 2 : Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter 5.2V) + Battery 2 for Sample 2
Remark: - For Radiated TCs, the tests were performed with adapter, earphone, USB cable and battery 1 for Sample 1. - 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

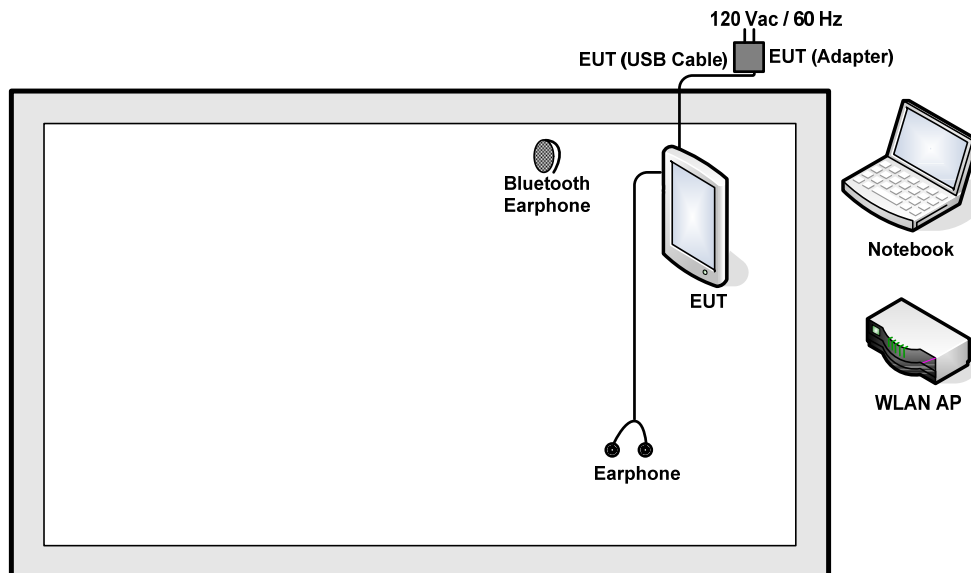
Ch. #		Band IV : 5745 ~ 5825 MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	165	159	-

2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	G480	N/A	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.	Bluetooth Earphone	Lenovo	LBH505	N/A	N/A	N/A
4.	Earphone	Lenovo	LH102	N/A	Unshielded, 1.2 m	N/A
5.	DC Power Supply	GW INSTEK	GPD-2303S	N/A	N/A	Unshielded, 1.8 m

2.5 EUT Operation Test Setup

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

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

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss 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 6.5 dB.

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

= 6.5 (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.

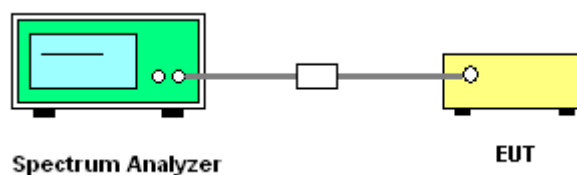
3.1.2 Measuring Instruments

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 v01r02.
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

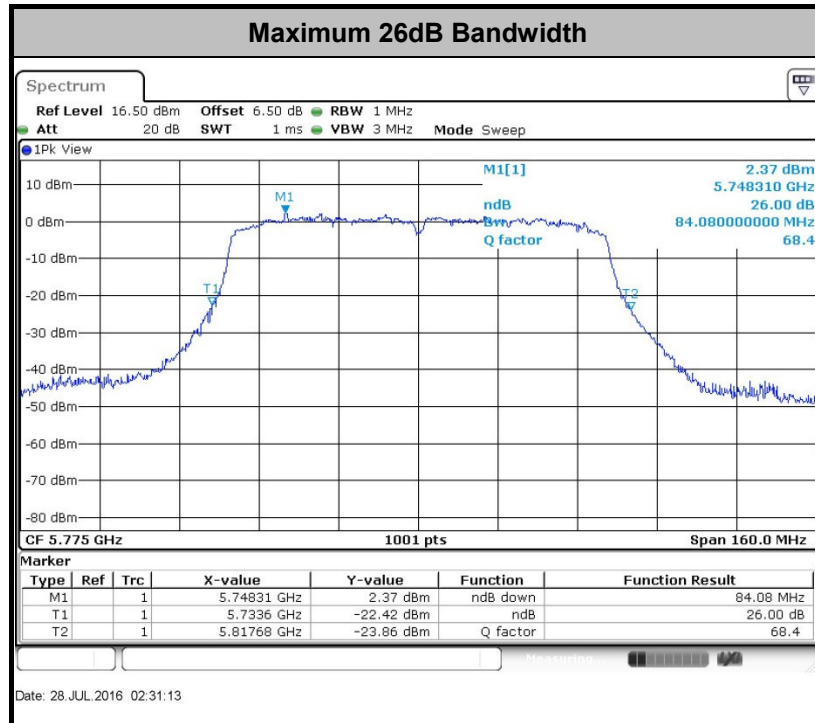
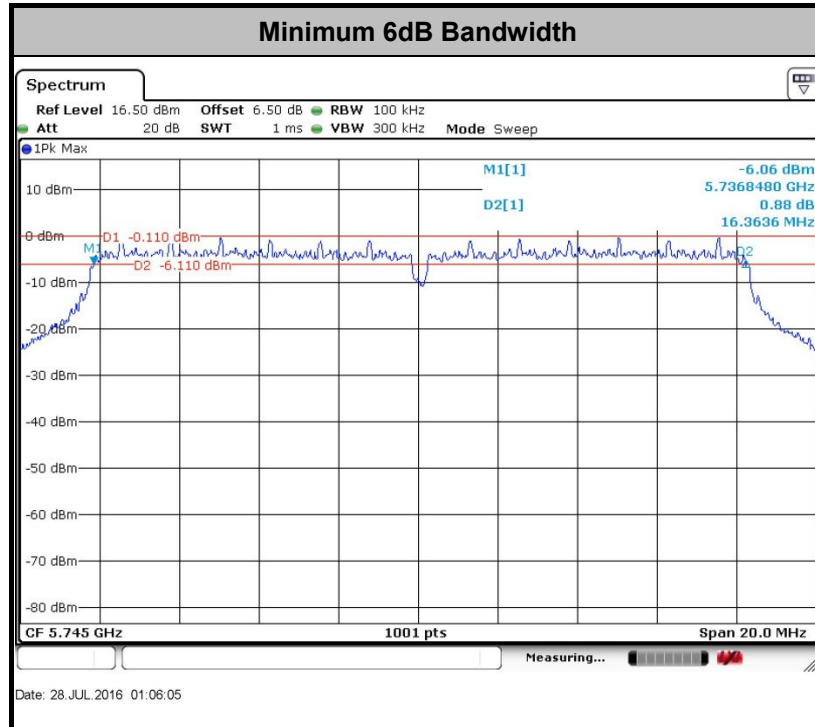
3.1.4 Test Setup

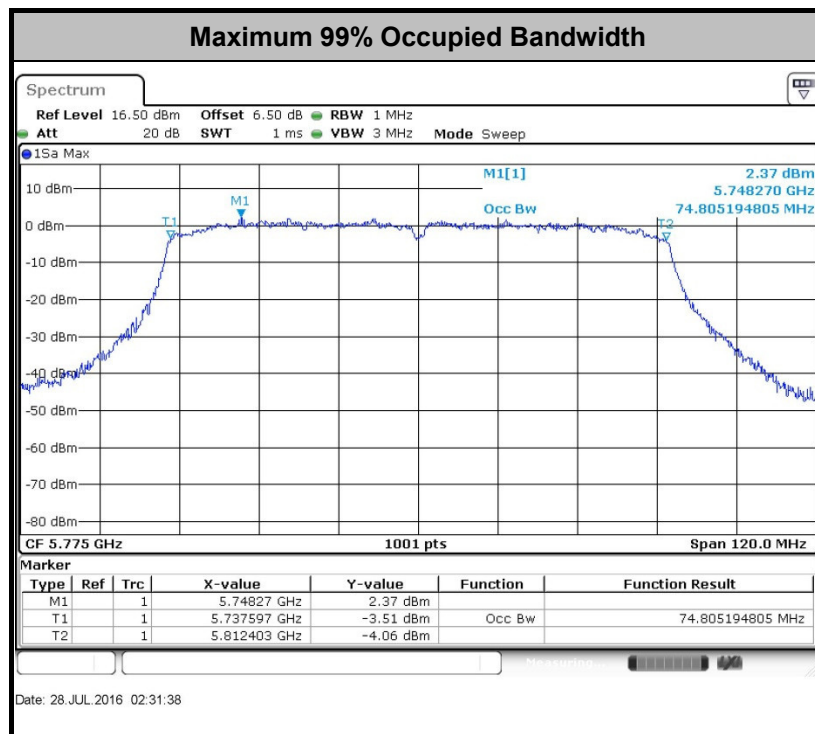




3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.





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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

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

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

3.2.2 Measuring Instruments

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

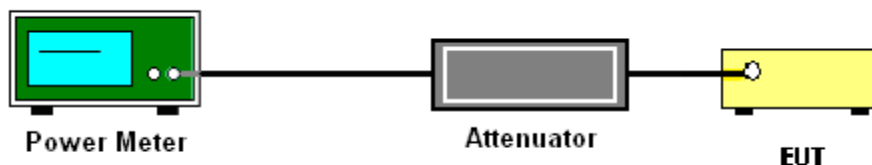
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

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 v01r02.
Section F) Maximum power spectral density.

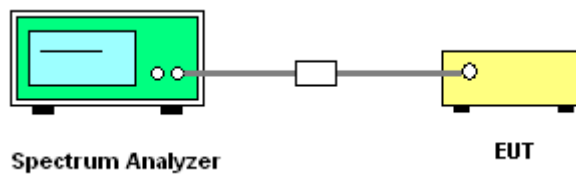
Method SA-2

(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 New Rules v01r02.
 - Measure the duty cycle.
 - Set span to encompass the entire emission bandwidth (EBW) of the signal.
 - Set RBW = 300 kHz.
 - Set VBW $\geq$ 1 MHz.
 - Number of points in sweep $\geq$ 2 Span / RBW.
 - Sweep time = auto.
 - Detector = RMS
 - Trace average at least 100 traces in power averaging mode.
 - Add $10 \log(500\text{kHz}/\text{RBW})$ to the test result.
 - Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.

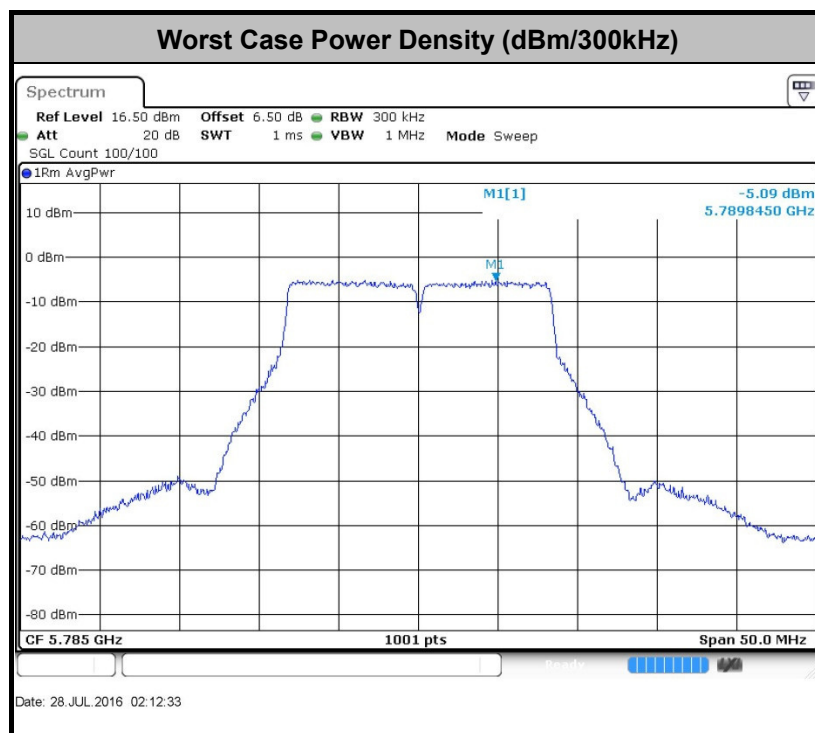
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PSD and record it.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part 15.205.

3.4.1 Limit of Unwanted Emissions

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

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

- (2) Unwanted spurious emissions fallen in restricted bands per FCC Part 15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

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

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

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

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

- (3) KDB 789033 D02 General UNII Test Procedures New Rules v01r02 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 v01r02.

Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

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

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

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

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

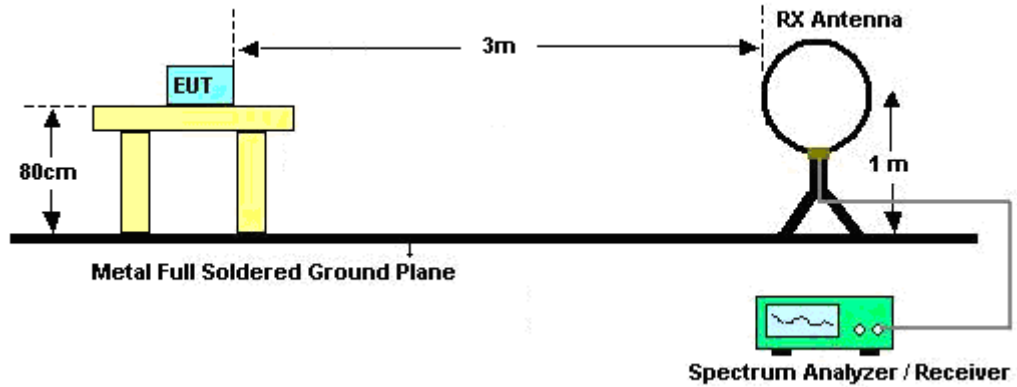
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



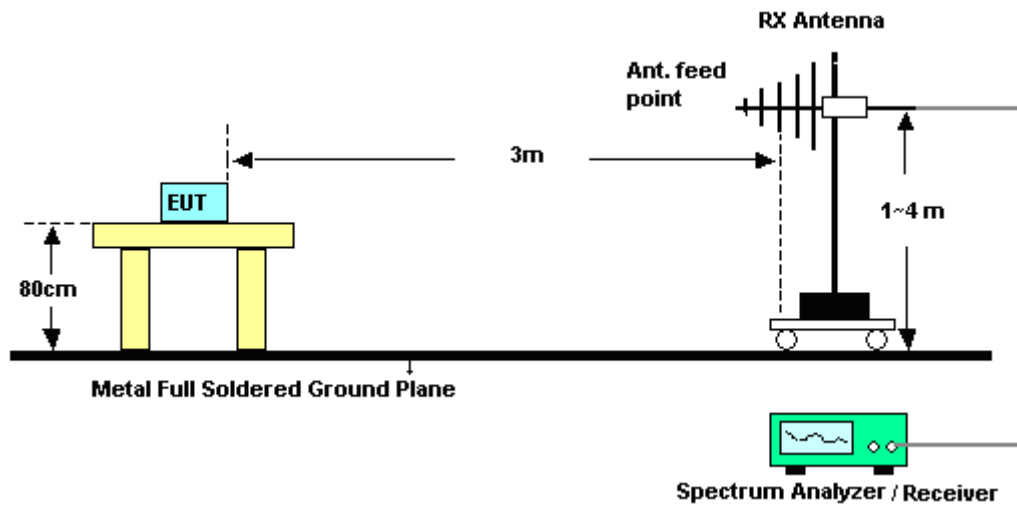
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

3.4.4 Test Setup

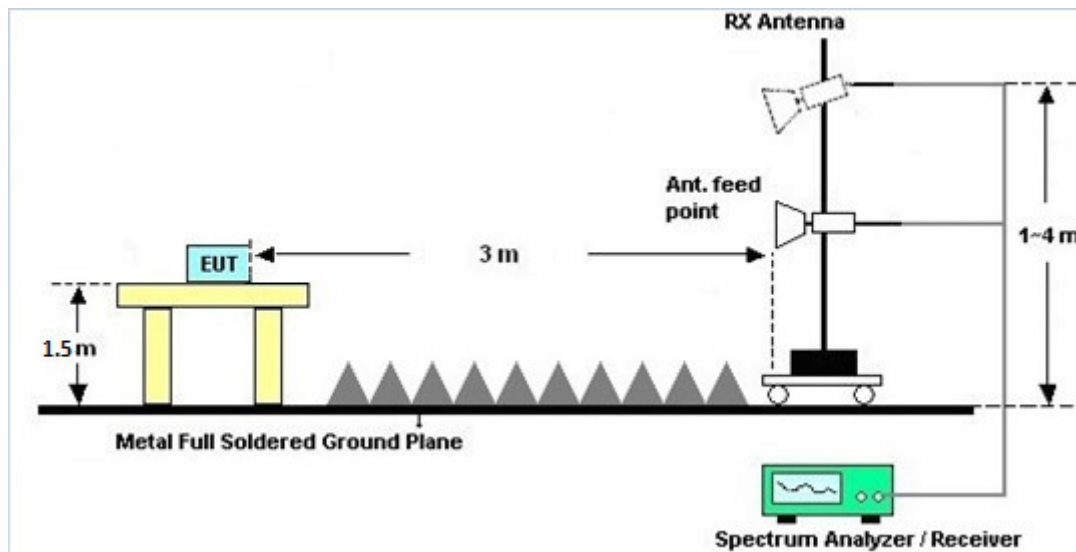
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 Test Results of Radiated 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 Duty Cycle

Please refer to Appendix C.

3.4.8 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 (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

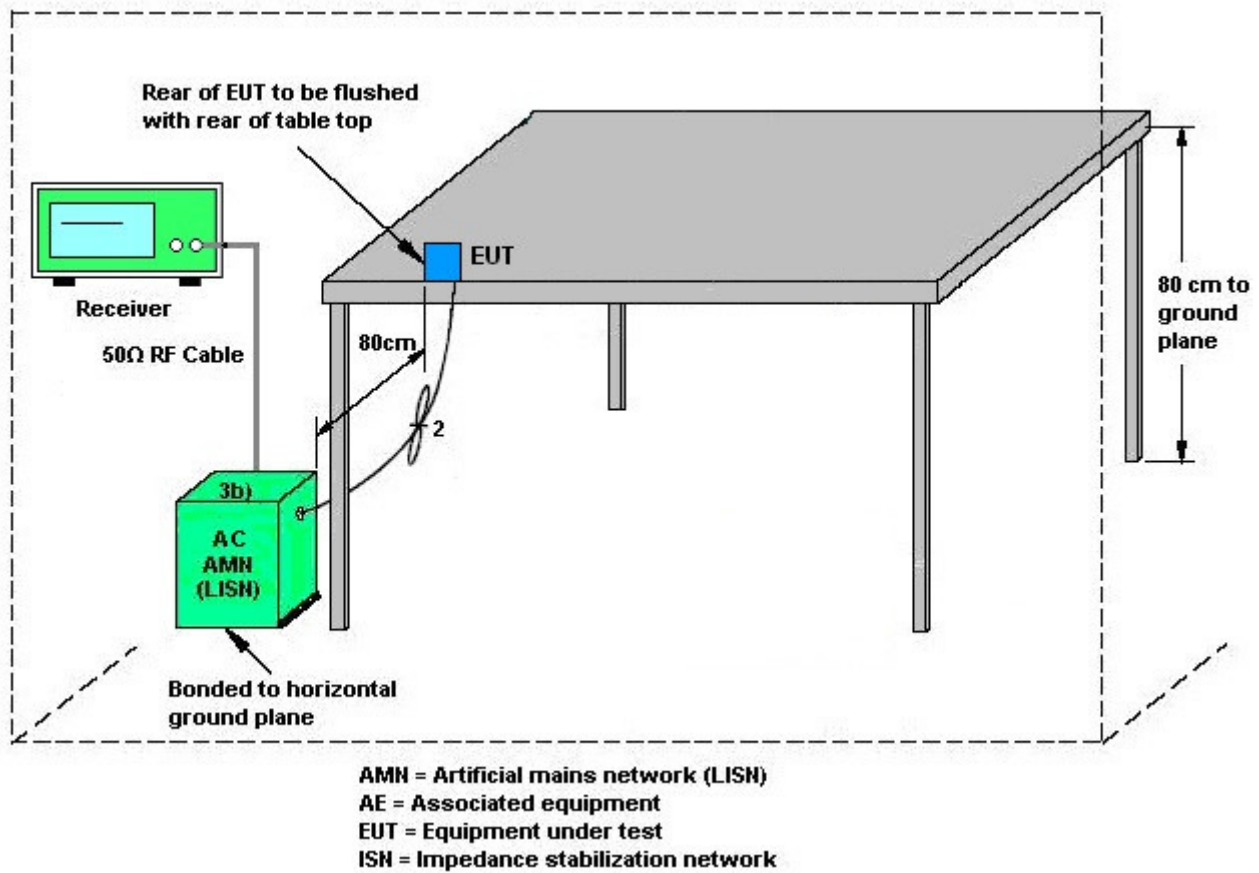
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

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

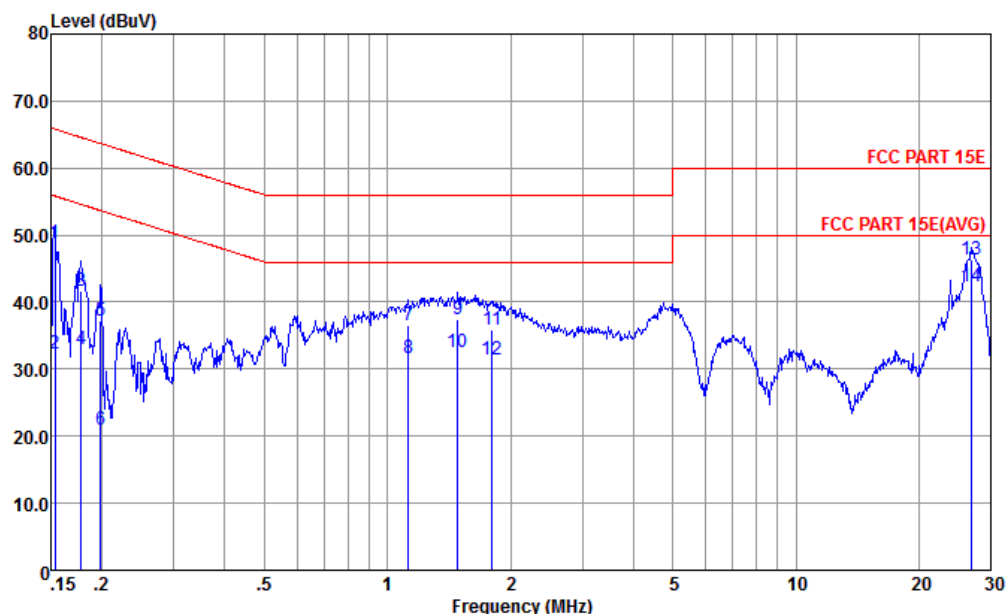
3.5.4 Test Setup





3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter 12V) + Battery 1 for Sample 1		

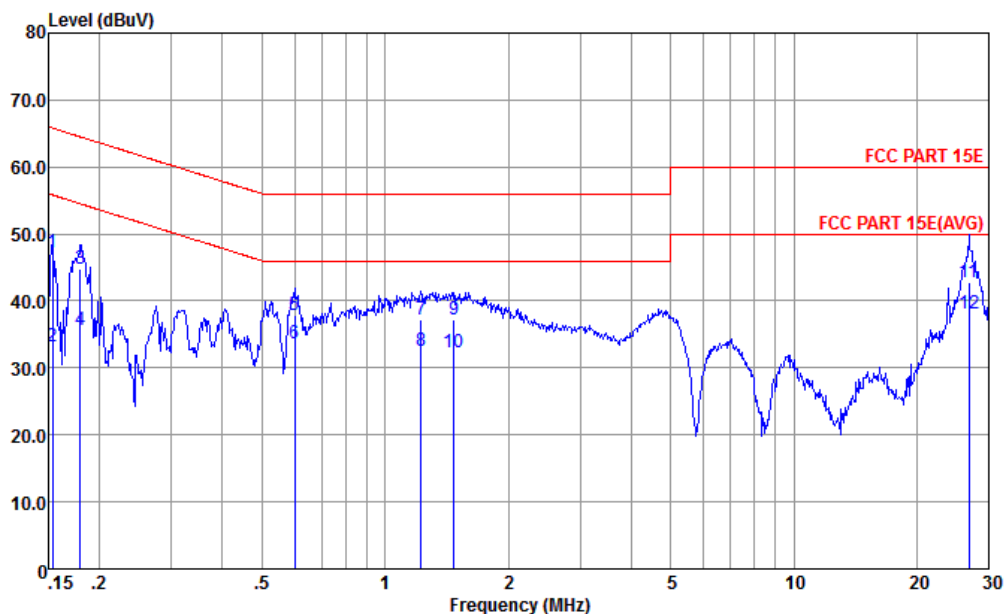


Site : CO01-KS
Condition : FCC PART 15E LISN-L-20151024 LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
1	0.15	48.72	-17.10	65.82	38.10	0.51	10.11	QP
2	0.15	32.22	-23.60	55.82	21.60	0.51	10.11	Average
3	0.18	41.76	-22.83	64.59	31.30	0.34	10.12	QP
4	0.18	33.06	-21.53	54.59	22.60	0.34	10.12	Average
5	0.20	37.26	-26.41	63.67	26.90	0.23	10.13	QP
6	0.20	20.96	-32.71	53.67	10.60	0.23	10.13	Average
7	1.12	36.58	-19.42	56.00	26.20	0.24	10.14	QP
8	1.12	31.58	-14.42	46.00	21.20	0.24	10.14	Average
9	1.49	37.55	-18.45	56.00	27.20	0.21	10.14	QP
10	1.49	32.45	-13.55	46.00	22.10	0.21	10.14	Average
11	1.80	35.93	-20.07	56.00	25.60	0.19	10.14	QP
12	1.80	31.43	-14.57	46.00	21.10	0.19	10.14	Average
13	26.84	46.28	-13.72	60.00	35.31	0.22	10.75	QP
14 *	26.84	42.28	-7.72	50.00	31.31	0.22	10.75	Average



Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable (Charging from Adapter 12V) + Battery 1 for Sample 1		



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

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.15	47.31	-18.51	65.82	36.90	0.30	10.11	QP
2	0.15	33.21	-22.61	55.82	22.80	0.30	10.11	Average
3	0.18	44.73	-19.77	64.50	34.30	0.31	10.12	QP
4	0.18	35.73	-18.77	54.50	25.30	0.31	10.12	Average
5	0.60	37.79	-18.21	56.00	27.30	0.33	10.16	QP
6	0.60	33.59	-12.41	46.00	23.10	0.33	10.16	Average
7	1.22	37.31	-18.69	56.00	26.80	0.37	10.14	QP
8	1.22	32.61	-13.39	46.00	22.10	0.37	10.14	Average
9	1.47	37.31	-18.69	56.00	26.79	0.38	10.14	QP
10	1.47	32.41	-13.59	46.00	21.89	0.38	10.14	Average
11	26.84	42.89	-17.11	60.00	31.90	0.24	10.75	QP
12 *	26.84	38.19	-11.81	50.00	27.20	0.24	10.75	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.

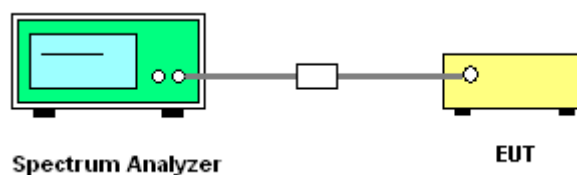
3.6.2 Measuring Instruments

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

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Sep. 10, 2015	Jul. 23, 2016~ Jul. 28, 2016	Sep. 09, 2016	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 20, 2016	Jul. 23, 2016~ Jul. 28, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Jul. 23, 2016~ Jul. 28, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 24, 2015	Jul. 23, 2016~ Jul. 28, 2016	Oct. 23, 2016	Conducted (TH01-KS)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Jul. 23, 2016~ Aug. 01, 2016	Sep. 01, 2016	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D	37059	30MHz~1GHz	Dec. 29, 2015	Jul. 23, 2016~ Aug. 01, 2016	Dec. 28, 2016	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Nov. 02, 2015	Jul. 23, 2016~ Aug. 01, 2016	Nov. 01, 2016	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 02, 2015	Jul. 23, 2016~ Aug. 01, 2016	Nov. 01, 2016	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 21, 2015	Jul. 23, 2016~ Aug. 01, 2016	Dec. 20, 2016	Radiation (03CH12-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz ~ 44GHz	Sep. 24, 2015	Jul. 23, 2016~ Aug. 01, 2016	Sep. 23, 2016	Radiation (03CH12-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 20, 2015	Jul. 23, 2016~ Aug. 01, 2016	Nov. 19, 2016	Radiation (03CH12-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1815698	1GHz~18GHz	Dec. 14, 2015	Jul. 23, 2016~ Aug. 01, 2016	Dec. 13, 2016	Radiation (03CH12-HY)
Preamplifier	MITEQ	TTA0204	1872107	2GHz~40GHz	Feb. 15, 2016	Jul. 23, 2016~ Aug. 01, 2016	Feb. 14, 2017	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	NCR	Jul. 23, 2016~ Aug. 01, 2016	NCR	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	NCR	Jul. 23, 2016~ Aug. 01, 2016	NCR	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	NCR	Jul. 23, 2016~ Aug. 01, 2016	NCR	Radiation (03CH12-HY)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	Jul. 20, 2016	Sep. 09, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	Jul. 20, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	Jul. 20, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	Jul. 20, 2016	Oct. 23, 2016	Conduction (CO01-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1dB
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Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2dB
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Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7dB
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Appendix A. Conducted Test Results

Test Engineer:	Ivan Zhang	Temperature:	24~25	°C
Test Date:	2016/7/23~2016/7/28	Relative Humidity:	54~55	%

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

Band IV									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	18.53	23.28	16.36	0.5	Pass
11a	6Mbps	1	157	5785	18.48	23.63	16.36	0.5	Pass
11a	6Mbps	1	165	5825	18.43	23.13	16.36	0.5	Pass
HT20	MCS 0	1	149	5745	19.13	23.83	17.58	0.5	Pass
HT20	MCS 0	1	157	5785	19.28	23.68	17.58	0.5	Pass
HT20	MCS 0	1	165	5825	19.03	23.33	17.58	0.5	Pass
HT40	MCS 0	1	151	5755	36.66	44.60	35.32	0.5	Pass
HT40	MCS 0	1	159	5795	36.76	44.69	35.48	0.5	Pass
VHT20	MCS 0	1	149	5745	19.08	23.78	17.56	0.5	Pass
VHT20	MCS 0	1	157	5785	19.23	23.78	17.56	0.5	Pass
VHT20	MCS 0	1	165	5825	19.13	23.88	17.58	0.5	Pass
VHT40	MCS 0	1	151	5755	36.76	44.42	35.16	0.5	Pass
VHT40	MCS 0	1	159	5795	36.76	44.69	35.32	0.5	Pass
VHT80	MCS 0	1	155	5775	74.81	84.08	75.05	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6M bps	1	149	5745	0.20	10.57	30.00	1.10		Pass
11a	6Mbps	1	157	5785	0.20	11.11	30.00	1.10		Pass
11a	6Mbps	1	165	5825	0.20	11.32	30.00	1.10		Pass
HT20	MCS 0	1	149	5745	0.64	8.62	30.00	1.10		Pass
HT20	MCS 0	1	157	5785	0.64	9.58	30.00	1.10		Pass
HT20	MCS 0	1	165	5825	0.64	9.70	30.00	1.10		Pass
HT40	MCS 0	1	151	5755	1.16	9.34	30.00	1.10		Pass
HT40	MCS 0	1	159	5795	1.16	10.17	30.00	1.10		Pass
VHT20	MCS 0	1	149	5745	0.79	8.65	30.00	1.10		Pass
VHT20	MCS 0	1	157	5785	0.79	9.32	30.00	1.10		Pass
VHT20	MCS 0	1	165	5825	0.79	9.76	30.00	1.10		Pass
VHT40	MCS 0	1	151	5755	1.47	9.62	30.00	1.10		Pass
VHT40	MCS 0	1	159	5795	1.47	10.24	30.00	1.10		Pass
VHT80	MCS 0	1	155	5775	2.57	9.92	30.00	1.10		Pass

TEST RESULTS DATA
Power Spectral Density

Band IV										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.20	2.22	-3.40	30.00	1.10	Pass
11a	6Mbps	1	157	5785	0.20	2.22	-2.67	30.00	1.10	Pass
11a	6Mbps	1	165	5825	0.20	2.22	-2.89	30.00	1.10	Pass
HT20	MCS 0	1	149	5745	0.64	2.22	-5.01	30.00	1.10	Pass
HT20	MCS 0	1	157	5785	0.64	2.22	-3.89	30.00	1.10	Pass
HT20	MCS 0	1	165	5825	0.64	2.22	-4.16	30.00	1.10	Pass
HT40	MCS 0	1	151	5755	1.16	2.22	-6.89	30.00	1.10	Pass
HT40	MCS 0	1	159	5795	1.16	2.22	-6.16	30.00	1.10	Pass
VHT20	MCS 0	1	149	5745	0.79	2.22	-4.95	30.00	1.10	Pass
VHT20	MCS 0	1	157	5785	0.79	2.22	-3.77	30.00	1.10	Pass
VHT20	MCS 0	1	165	5825	0.79	2.22	-3.73	30.00	1.10	Pass
VHT40	MCS 0	1	151	5755	1.47	2.22	-6.57	30.00	1.10	Pass
VHT40	MCS 0	1	159	5795	1.47	2.22	-5.95	30.00	1.10	Pass
VHT80	MCS 0	1	155	5775	2.57	2.22	-8.46	30.00	1.10	Pass

TEST RESULTS DATA
Frequency Stability

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6M bps	1	149	5745	5745.050	0.050	8.70	20	3.6	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	20	4.2	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	20	3.75	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	-30	3.75	
11a	6M bps	1	149	5745	5745.025	0.025	4.35	50	3.75	



Appendix B. Radiated Spurious Emission

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		5644.2	59.74	-8.56	68.3	46.76	32.19	11.79	31	100	263	P	H
		5673.6	59.43	-26.27	85.7	46.38	32.24	11.82	31.01	100	263	P	H
		5718.6	59.13	-51.28	110.41	46	32.31	11.84	31.02	100	263	P	H
		5725	58.53	-63.67	122.2	45.4	32.31	11.84	31.02	100	263	P	H
	*	5746	103.12	-	-	89.95	32.34	11.86	31.03	100	263	P	H
	*	5746	93.67	-	-	80.5	32.34	11.86	31.03	100	263	A	H
		5637.6	59.54	-8.76	68.3	46.56	32.19	11.79	31	400	274	P	V
		5690.8	60.11	-38.31	98.42	47.03	32.27	11.82	31.01	400	274	P	V
		5717.6	59.71	-50.42	110.13	46.58	32.31	11.84	31.02	400	274	P	V
		5725	58.71	-63.49	122.2	45.58	32.31	11.84	31.02	400	274	P	V
	*	5746	99.69	-	-	86.52	32.34	11.86	31.03	400	274	P	V
	*	5746	90.58	-	-	77.41	32.34	11.86	31.03	400	274	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 157 5785MHz		5609	59.5	-8.8	68.3	46.58	32.14	11.77	30.99	100	264	P	H
		5674.2	60.12	-26.03	86.15	47.07	32.24	11.82	31.01	100	264	P	H
		5702.8	59.42	-46.57	105.99	46.3	32.29	11.84	31.01	100	264	P	H
		5724.4	58.8	-62.03	120.83	45.67	32.31	11.84	31.02	100	264	P	H
	*	5783	101.69	-	-	88.47	32.39	11.88	31.05	100	264	P	H
	*	5783	92.43	-	-	79.21	32.39	11.88	31.05	100	264	A	H
		5850.6	59.84	-60.99	120.83	46.39	32.48	12.03	31.06	100	264	P	H
		5873.2	60.55	-45.15	105.7	46.92	32.53	12.17	31.07	100	264	P	H
		5893.6	60.45	-30.95	91.4	46.8	32.56	12.17	31.08	100	264	P	H
		5936.6	61.37	-6.93	68.3	47.55	32.6	12.31	31.09	100	264	P	H
		5624.6	59.62	-8.68	68.3	46.65	32.17	11.79	30.99	297	18	P	V
		5686.8	60.42	-35.04	95.46	47.34	32.27	11.82	31.01	297	18	P	V
		5718.4	59.45	-50.9	110.35	46.32	32.31	11.84	31.02	297	18	P	V
		5720	58.86	-51.94	110.8	45.73	32.31	11.84	31.02	297	18	P	V
	*	5783	98.79	-	-	85.57	32.39	11.88	31.05	297	18	P	V
	*	5783	89.53	-	-	76.31	32.39	11.88	31.05	297	18	A	V
		5853.4	59.64	-54.81	114.45	46.19	32.48	12.03	31.06	297	18	P	V
		5872.4	59.84	-46.09	105.93	46.21	32.53	12.17	31.07	297	18	P	V
		5917.8	61.16	-12.35	73.51	47.36	32.58	12.31	31.09	297	18	P	V
		5928.6	61.5	-6.8	68.3	47.68	32.6	12.31	31.09	297	18	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz	*	5823	102.51	-	-	89.07	32.46	12.03	31.05	100	265	P	H
	*	5823	93.04	-	-	79.6	32.46	12.03	31.05	100	265	A	H
		5853.8	59.29	-54.25	113.54	45.81	32.51	12.03	31.06	100	265	P	H
		5868.2	59.68	-47.42	107.1	46.07	32.51	12.17	31.07	100	265	P	H
		5885.8	60.42	-36.76	97.18	46.8	32.53	12.17	31.08	100	265	P	H
		5932.8	59.9	-8.4	68.3	46.08	32.6	12.31	31.09	100	265	P	H
	*	5827	99.29	-	-	85.85	32.46	12.03	31.05	291	62	P	V
	*	5827	90.17	-	-	76.73	32.46	12.03	31.05	291	62	A	V
		5854.6	58.8	-52.91	111.71	45.32	32.51	12.03	31.06	291	62	P	V
		5864.6	59.8	-48.31	108.11	46.19	32.51	12.17	31.07	291	62	P	V
		5900.4	61.64	-24.72	86.36	47.85	32.56	12.31	31.08	291	62	P	V
		5941.4	59.9	-8.4	68.3	45.91	32.63	12.45	31.09	291	62	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 149 5745MHz		11490	48.3	-25.7	74	47.57	40.11	18.4	57.78	100	0	P	H
		17235	48.84	-19.46	68.3	41.19	41.65	23.14	57.14	100	0	P	H
		11490	50.53	-23.47	74	49.8	40.11	18.4	57.78	100	0	P	V
		17235	47.83	-20.47	68.3	40.18	41.65	23.14	57.14	100	0	P	V
802.11a CH 157 5785MHz		11570	47.33	-26.67	74	46.69	39.95	18.49	57.8	100	0	P	H
		17355	48.93	-19.37	68.3	41.22	42.02	23.25	57.56	100	0	P	H
		11570	50.01	-23.99	74	49.37	39.95	18.49	57.8	100	0	P	V
		17355	49.16	-19.14	68.3	41.45	42.02	23.25	57.56	100	0	P	V
802.11a CH 165 5825MHz		11650	47.77	-26.23	74	47.19	39.8	18.58	57.8	100	0	P	H
		17475	48.44	-19.86	68.3	40.67	42.39	23.36	57.98	100	0	P	H
		11650	50.38	-23.62	74	49.8	39.8	18.58	57.8	100	0	P	V
		17475	49.01	-19.29	68.3	41.24	42.39	23.36	57.98	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 VHT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 149 5745MHz		5637.8	59.55	-8.75	68.3	46.57	32.19	11.79	31	100	266	P	H
		5675.4	60.01	-27.03	87.04	46.96	32.24	11.82	31.01	100	266	P	H
		5712.2	59.99	-48.63	108.62	46.88	32.29	11.84	31.02	100	266	P	H
		5721.6	59.38	-55.07	114.45	46.25	32.31	11.84	31.02	100	266	P	H
	*	5743	99.45	-	-	86.28	32.34	11.86	31.03	100	266	P	H
	*	5743	90.11	-	-	76.94	32.34	11.86	31.03	100	266	A	H
		5636.8	59.67	-8.63	68.3	46.69	32.19	11.79	31	286	58	P	V
		5657.2	60.33	-13.22	73.55	47.33	32.22	11.79	31.01	286	58	P	V
		5718.8	59.9	-50.56	110.46	46.77	32.31	11.84	31.02	286	58	P	V
		5720.2	59.84	-51.42	111.26	46.71	32.31	11.84	31.02	286	58	P	V
	*	5743	98.1	-	-	84.93	32.34	11.86	31.03	286	58	P	V
	*	5743	88.48	-	-	75.31	32.34	11.86	31.03	286	58	A	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 157 5785MHz		5614.2	59.26	-9.04	68.3	46.34	32.14	11.77	30.99	100	291	P	H
		5665	59.46	-19.87	79.33	46.43	32.22	11.82	31.01	100	291	P	H
		5700.4	60.18	-45.13	105.31	47.08	32.27	11.84	31.01	100	291	P	H
		5722.8	59.31	-57.87	117.18	46.18	32.31	11.84	31.02	100	291	P	H
	*	5785	97.51	-	-	84.29	32.39	11.88	31.05	100	291	P	H
	*	5785	88.5	-	-	75.28	32.39	11.88	31.05	100	291	A	H
		5854.8	59.72	-51.54	111.26	46.24	32.51	12.03	31.06	100	291	P	H
		5867.2	60.69	-46.69	107.38	47.08	32.51	12.17	31.07	100	291	P	H
		5918	60.31	-13.05	73.36	46.51	32.58	12.31	31.09	100	291	P	H
		5949	60.29	-8.01	68.3	46.3	32.63	12.45	31.09	100	291	P	H
		5649.2	59.77	-8.53	68.3	46.79	32.19	11.79	31	297	21	P	V
		5652	59.78	-9.91	69.69	46.77	32.22	11.79	31	297	21	P	V
		5712.2	59.94	-48.68	108.62	46.83	32.29	11.84	31.02	297	21	P	V
		5721.4	59.72	-54.27	113.99	46.59	32.31	11.84	31.02	297	21	P	V
	*	5785	95.49	-	-	82.27	32.39	11.88	31.05	297	21	P	V
	*	5785	87.34	-	-	74.12	32.39	11.88	31.05	297	21	A	V
		5850.2	60.18	-61.56	121.74	46.73	32.48	12.03	31.06	297	21	P	V
		5874.2	59.99	-45.43	105.42	46.36	32.53	12.17	31.07	297	21	P	V
		5893	60.68	-31.16	91.84	47.03	32.56	12.17	31.08	297	21	P	V
		5948.2	60.23	-8.07	68.3	46.24	32.63	12.45	31.09	297	21	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 165 5825MHz	*	5825	99.01	-	-	85.57	32.46	12.03	31.05	100	292	P	H
	*	5825	89.68	-	-	76.24	32.46	12.03	31.05	100	292	A	H
		5851	59.01	-60.91	119.92	45.56	32.48	12.03	31.06	100	292	P	H
		5865.4	59.81	-48.08	107.89	46.2	32.51	12.17	31.07	100	292	P	H
		5910.4	60.05	-18.92	78.97	46.25	32.58	12.31	31.09	100	292	P	H
		5932.4	60.63	-7.67	68.3	46.81	32.6	12.31	31.09	100	292	P	H
	*	5825	97.43	-	-	83.99	32.46	12.03	31.05	289	358	P	V
	*	5825	89.68	-	-	76.24	32.46	12.03	31.05	289	358	A	V
		5854.4	59.93	-52.24	112.17	46.45	32.51	12.03	31.06	289	358	P	V
		5865.4	59.96	-47.93	107.89	46.35	32.51	12.17	31.07	289	358	P	V
		5894	60.18	-30.92	91.1	46.53	32.56	12.17	31.08	289	358	P	V
		5939.4	60.9	-7.4	68.3	47.05	32.63	12.31	31.09	289	358	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 VHT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT20 CH 149 5745MHz		11490	48.45	-25.55	74	47.72	40.11	18.4	57.78	100	0	P	H
		17235	48.13	-20.17	68.3	40.48	41.65	23.14	57.14	100	0	P	H
		11490	54.83	-19.17	74	54.1	40.11	18.4	57.78	100	151	P	V
		11490	50.57	-3.43	54	49.84	40.11	18.4	57.78	100	151	A	V
		17235	48.29	-20.01	68.3	40.64	41.65	23.14	57.14	100	0	P	V
802.11ac VHT20 CH 157 5785MHz		11570	47.99	-26.01	74	47.35	39.95	18.49	57.8	100	0	P	H
		17355	49.07	-19.23	68.3	41.36	42.02	23.25	57.56	100	0	P	H
		11570	50.97	-23.03	74	50.33	39.95	18.49	57.8	100	0	P	V
		17355	48.75	-19.55	68.3	41.04	42.02	23.25	57.56	100	0	P	V
802.11ac VHT20 CH 165 5825MHz		11650	47.03	-26.97	74	46.45	39.8	18.58	57.8	100	0	P	H
		17475	48.69	-19.61	68.3	40.92	42.39	23.36	57.98	100	0	P	H
		11650	50.77	-23.23	74	50.19	39.8	18.58	57.8	100	0	P	V
		17475	48.45	-19.85	68.3	40.68	42.39	23.36	57.98	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 VHT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT40 CH 151 5755MHz		5641.8	59.18	-9.12	68.3	46.2	32.19	11.79	31	100	357	P	H
		5682.2	59.31	-32.76	92.07	46.26	32.24	11.82	31.01	100	357	P	H
		5700.6	59.98	-45.39	105.37	46.86	32.29	11.84	31.01	100	357	P	H
		5721	58.72	-54.36	113.08	45.59	32.31	11.84	31.02	100	357	P	H
	*	5755	95.17	-	-	81.98	32.36	11.86	31.03	100	357	P	H
	*	5755	85.35	-	-	72.16	32.36	11.86	31.03	100	357	A	H
		5852.4	58.51	-58.22	116.73	45.06	32.48	12.03	31.06	100	357	P	H
		5863	59.36	-49.2	108.56	45.75	32.51	12.17	31.07	100	357	P	H
		5917.6	61.36	-12.3	73.66	47.56	32.58	12.31	31.09	100	357	P	H
		5948.8	60.92	-7.38	68.3	46.93	32.63	12.45	31.09	100	357	P	H
		5622.6	59.85	-8.45	68.3	46.88	32.17	11.79	30.99	288	20	P	V
		5692	60.29	-39.01	99.3	47.21	32.27	11.82	31.01	288	20	P	V
		5710.4	58.89	-49.22	108.11	45.78	32.29	11.84	31.02	288	20	P	V
		5721.8	59.8	-55.1	114.9	46.67	32.31	11.84	31.02	288	20	P	V
	*	5755	93.25	-	-	80.06	32.36	11.86	31.03	288	20	P	V
	*	5755	84.5	-	-	71.31	32.36	11.86	31.03	288	20	A	V
		5855	59.47	-51.33	110.8	45.99	32.51	12.03	31.06	288	20	P	V
		5871.8	59.68	-46.41	106.09	46.05	32.53	12.17	31.07	288	20	P	V
		5924.2	60.8	-7.99	68.79	46.98	32.6	12.31	31.09	288	20	P	V
		5933.2	60.84	-7.46	68.3	47.02	32.6	12.31	31.09	288	20	P	V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT40 CH 159 5795MHz		5642.4	60.09	-8.21	68.3	47.11	32.19	11.79	31	100	291	P	H
		5683	59.92	-32.74	92.66	46.87	32.24	11.82	31.01	100	291	P	H
		5701.6	59.59	-46.06	105.65	46.47	32.29	11.84	31.01	100	291	P	H
		5725	58.97	-63.23	122.2	45.84	32.31	11.84	31.02	100	291	P	H
	*	5795	94.98	-	-	81.74	32.41	11.88	31.05	100	291	P	H
	*	5795	86.11	-	-	72.87	32.41	11.88	31.05	100	291	A	H
		5854.2	58.62	-54	112.62	45.14	32.51	12.03	31.06	100	291	P	H
		5864	60.59	-47.69	108.28	46.98	32.51	12.17	31.07	100	291	P	H
		5915	61.57	-14	75.57	47.77	32.58	12.31	31.09	100	291	P	H
		5941.8	60.49	-7.81	68.3	46.5	32.63	12.45	31.09	100	291	P	H
		5637.2	59.96	-8.34	68.3	46.98	32.19	11.79	31	295	359	P	V
		5674.8	60.58	-26.01	86.59	47.53	32.24	11.82	31.01	295	359	P	V
		5713.2	59.3	-49.6	108.9	46.19	32.29	11.84	31.02	295	359	P	V
		5722	58.6	-56.76	115.36	45.47	32.31	11.84	31.02	295	359	P	V
	*	5795	93.94	-	-	80.7	32.41	11.88	31.05	295	359	P	V
	*	5795	84.77	-	-	71.53	32.41	11.88	31.05	295	359	A	V
		5853.8	59.6	-53.94	113.54	46.12	32.51	12.03	31.06	295	359	P	V
		5863.8	59.58	-48.75	108.33	45.97	32.51	12.17	31.07	295	359	P	V
		5916	59.74	-15.1	74.84	45.94	32.58	12.31	31.09	295	359	P	V
		5931.4	60.11	-8.19	68.3	46.29	32.6	12.31	31.09	295	359	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 VHT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT40 CH 151 5755MHz		11510	48.57	-25.43	74	47.82	40.1	18.45	57.8	100	0	P	H
		17265	47.33	-20.97	68.3	39.67	41.75	23.17	57.26	100	0	P	H
		11510	54.14	-19.86	74	53.39	40.1	18.45	57.8	100	66	P	V
		11510	50.35	-3.65	54	49.6	40.1	18.45	57.8	100	66	A	V
		17265	47.87	-20.43	68.3	40.21	41.75	23.17	57.26	100	0	P	V
802.11ac VHT40 CH 159 5795MHz		11590	49.05	-24.95	74	48.4	39.91	18.54	57.8	100	0	P	H
		17385	47.8	-20.5	68.3	40.06	42.13	23.29	57.68	100	0	P	H
		11590	49.39	-24.61	74	48.74	39.91	18.54	57.8	100	0	P	V
		17385	47.87	-20.43	68.3	40.13	42.13	23.29	57.68	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	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac VHT80 CH 155 5775MHz		5647	59.5	-8.8	68.3	46.52	32.19	11.79	31	338	292	P	H
		5662.6	59.8	-17.75	77.55	46.77	32.22	11.82	31.01	338	292	P	H
		5703.6	59.14	-47.07	106.21	46.02	32.29	11.84	31.01	338	292	P	H
		5722.4	59.17	-57.1	116.27	46.04	32.31	11.84	31.02	338	292	P	H
	*	5775	93.62	-	-	80.41	32.39	11.86	31.04	338	292	P	H
	*	5775	83.94	-	-	70.73	32.39	11.86	31.04	338	292	A	H
		5854.4	59.99	-52.18	112.17	46.51	32.51	12.03	31.06	338	292	P	H
		5867.6	59.56	-47.71	107.27	45.95	32.51	12.17	31.07	338	292	P	H
		5922	60.33	-10.08	70.41	46.51	32.6	12.31	31.09	338	292	P	H
		5937	60.07	-8.23	68.3	46.25	32.6	12.31	31.09	338	292	P	H
		5619.4	59.57	-8.73	68.3	46.62	32.17	11.77	30.99	311	355	P	V
		5651.6	59.55	-9.84	69.39	46.54	32.22	11.79	31	311	355	P	V
		5702.4	58.87	-47	105.87	45.75	32.29	11.84	31.01	311	355	P	V
		5723.4	59.53	-59.02	118.55	46.4	32.31	11.84	31.02	311	355	P	V
	*	5775	91.52	-	-	78.31	32.39	11.86	31.04	311	355	P	V
	*	5775	82.48	-	-	69.27	32.39	11.86	31.04	311	355	A	V
		5851	59.45	-60.47	119.92	46	32.48	12.03	31.06	311	355	P	V
		5865.2	59.86	-48.08	107.94	46.25	32.51	12.17	31.07	311	355	P	V
		5888.6	60.63	-34.47	95.1	46.98	32.56	12.17	31.08	311	355	P	V
		5946.8	60.01	-8.29	68.3	46.02	32.63	12.45	31.09	311	355	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

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

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ac		11550	48.33	-25.67	74	47.65	39.99	18.49	57.8	100	0	P	H
VHT80		17325	49.5	-18.8	68.3	41.82	41.91	23.21	57.44	100	0	P	H
CH 155		11550	50.48	-23.52	74	49.8	39.99	18.49	57.8	100	0	P	V
5775MHz		17325	49.05	-19.25	68.3	41.37	41.91	23.21	57.44	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 802.11ac VHT20 (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11ac VHT20 LF		67.26	27.76	-12.24	40	47	12.15	1.06	32.45	-	-	P	H
		160.41	36.78	-6.72	43.5	50.45	17	1.75	32.42	100	0	P	H
		279.75	38.28	-7.72	46	49.2	19.1	2.25	32.27	-	-	P	H
		335	37.19	-8.81	46	46.59	20.54	2.34	32.28	-	-	P	H
		521.9	35.27	-10.73	46	40.26	24.22	3.19	32.4	-	-	P	H
		951	33.51	-12.49	46	29.59	30.29	4.75	31.12	-	-	P	H
		30.81	36.82	-3.18	40	43.24	25.26	0.78	32.46	100	357	QP	V
		37.29	31.08	-8.92	40	41.34	21.42	0.78	32.46	-	-	P	V
		199.56	28.09	-15.41	43.5	43	15.8	1.7	32.41	-	-	P	V
		327.3	29.8	-16.2	46	39.42	20.31	2.34	32.27	-	-	P	V
		714.4	39.95	-6.05	46	41.69	26.75	3.89	32.38	-	-	P	V
		939.8	33.38	-12.62	46	29.97	30.03	4.6	31.22	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

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



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

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

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

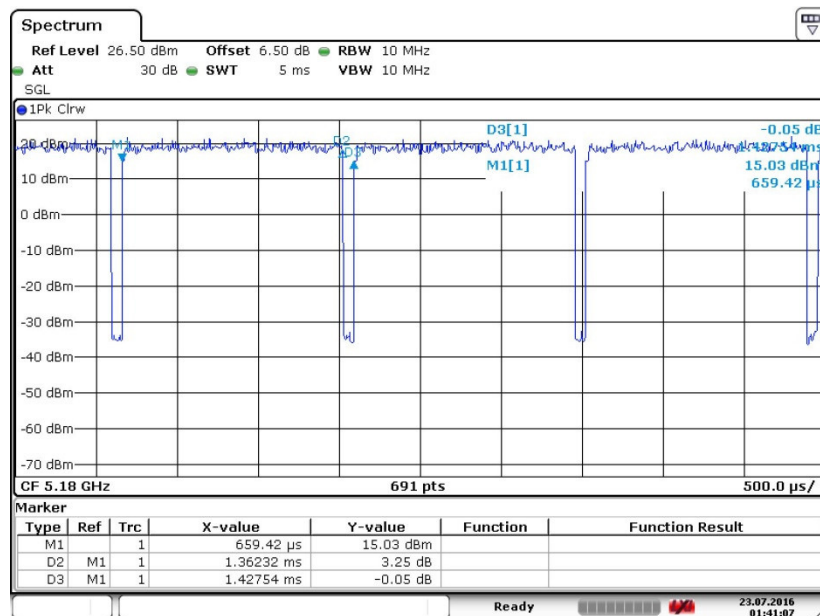
= -10.46(dB)

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

Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	95.43	1.36	0.73	1KHz
802.11n HT20	86.27	1.28	0.78	1KHz
802.11n HT40	76.52	0.64	1.57	3KHz
802.11ac VHT20	83.33	0.98	1.02	3KHz
802.11ac VHT40	71.22	0.49	2.04	3KHz
802.11ac VHT80	55.34	0.25	4.04	10KHz

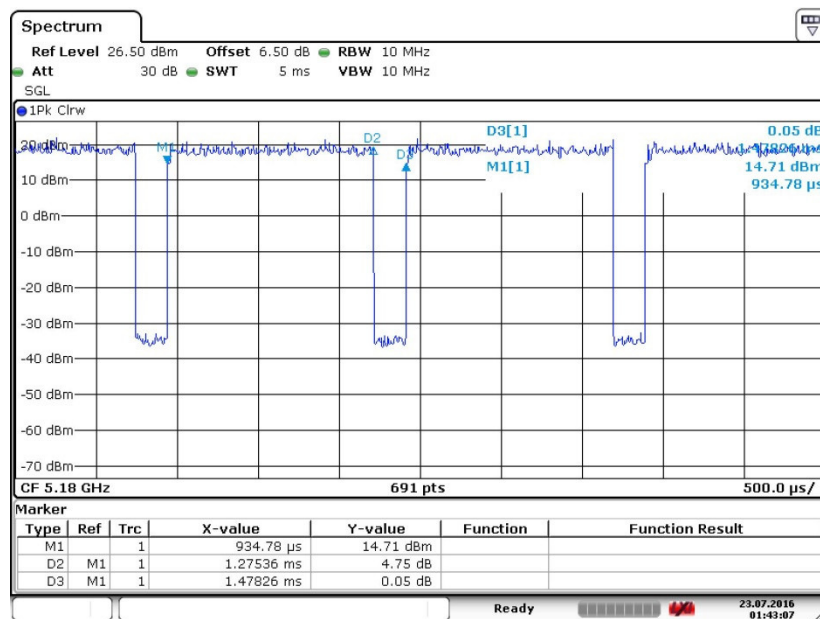
802.11a



Date: 23.JUL.2016 01:41:07

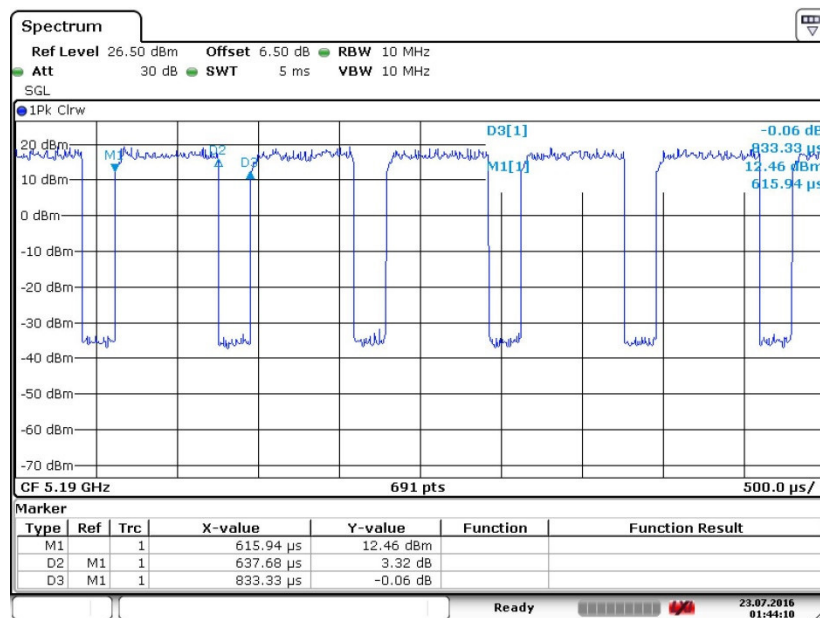


802.11n HT20



Date: 23 JUL 2016 01:43:08

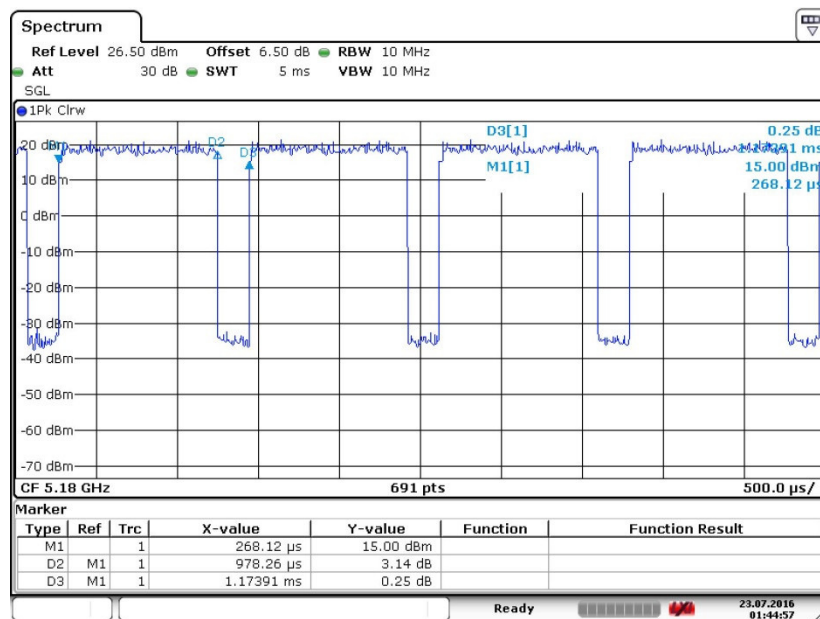
802.11n HT40



Date: 23 JUL 2016 01:44:10

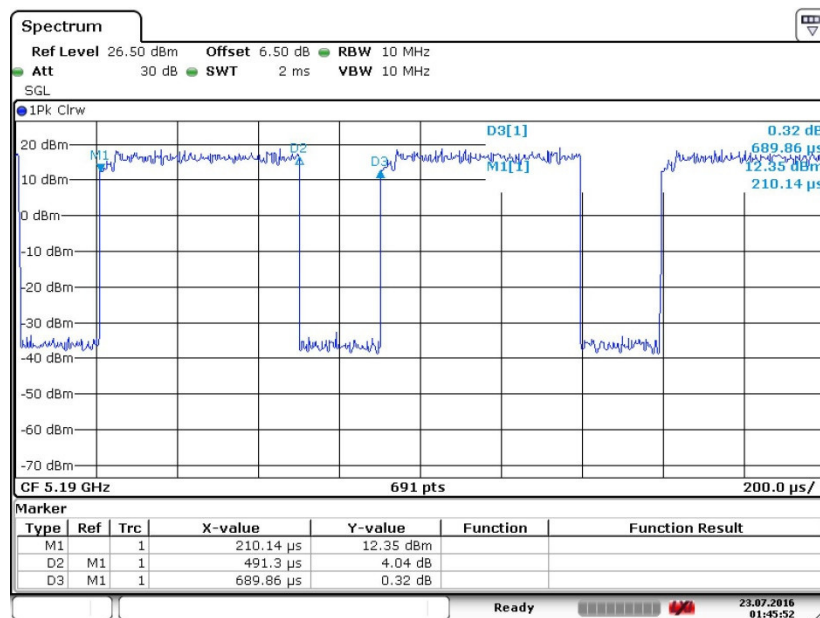


802.11ac VHT20



Date: 23 JUL 2016 01:44:57

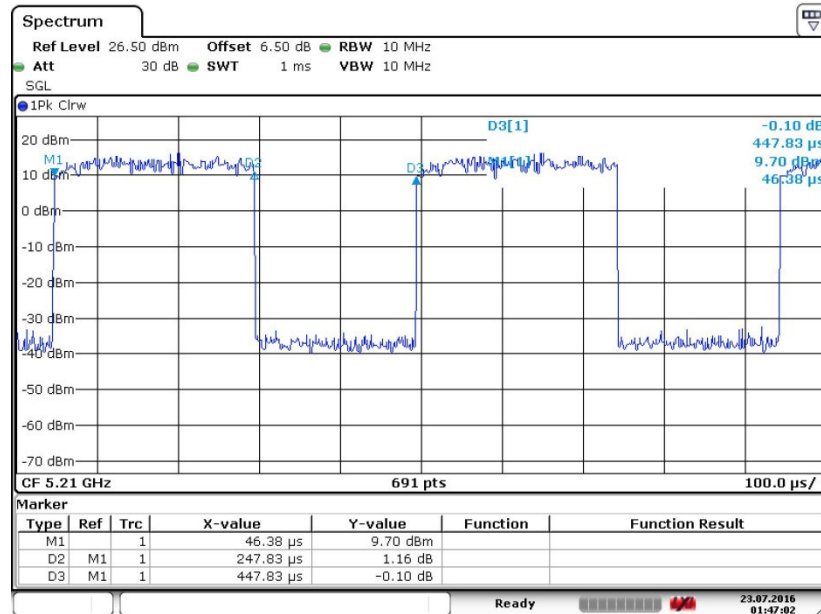
802.11ac VH40



Date: 23 JUL 2016 01:45:52



802.11ac VHT80



Date: 23 JUL 2016 01:47:02