FCC RF Test Report

APPLICANT	:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	Portable Tablet Computer
BRAND NAME	:	Lenovo
MODEL NAME	:	Lenovo TB-X505F
FCC ID	:	O57TBX505F
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was received on Jan. 26, 2019 and testing was completed on Apr. 12, 2019. 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.

James Huang

Approved by: James Huang / Manager

TESTING
NVLAP LAB CODE 600155-0

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone,
Jiangsu Province 215335, China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR912606E	Rev. 01	Initial issue of report	Apr. 25, 2019

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b)(4)(i) &15.209(a)	Pass	Under limit 15.30 dB at 5936.000 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 11.29 dB at 0.502 MHz
3.6	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.7	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, Pilot Free Trade Zone, 200131, China

1.2 Manufacturer

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

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Portable Tablet Computer
Brand Name	Lenovo
Model Name	Lenovo TB-X505F
FCC ID	O57TBX505F
EUT supports Radios application	WLAN 2.4GHz 802.11a/b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE FM Receiver / GNSS
HW Version	Lenovo Tablet TB-X505F
SW Version	TB-X505F_RF01_190117
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are seven types of EUT, the differences of them described on operate description submitted separately. According to the difference, we choose the sample 1 to full test

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5825 MHz
Maximum Output Power	**<5745 MHz ~ 5825 MHz>** 802.11a : 14.70 dBm / 0.0295 W 802.11n HT20 : 14.57 dBm / 0.0286 W 802.11n HT40 : 14.77 dBm / 0.0300 W 802.11ac VHT20: 14.77 dBm / 0.0300 W 802.11ac VHT40: 14.55 dBm / 0.0285 W 802.11ac VHT80: 14.47 dBm / 0.0280 W
99% Occupied Bandwidth	802.11a : 18.68 MHz 802.11n HT40 : 36.96 MHz 802.11ac VHT20 : 19.23 MHz 802.11ac VHT80 : 74.45 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Antenna Type / Gain	FPC Antenna with gain 1.83 dBi

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

1.5 Modification of EUT

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

1.6 Testing Location

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

Test Site	Sporton International (Kunshan) Inc.			
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : +86-512-57900158 FAX : +86-512-57900958			
Test Site No.	**Sporton Site No.**			**FCC Test Firm Registration No.**
	TH01-KS	03CH05KS	CO01-KS	630927

1.7 Applicable Standards

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

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

1.8 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	Brand Name	Lenovo (Salom)	Model Name	SC-41
	Power Rating	I/P: 100-240 Vac, 300mA O/P: 5Vdc,2000mA		
AC Adapter 1(EU)	Brand Name	Lenovo (Salom)	Model Name	SC-42
	Power Rating	I/P: 100-240 Vac, 300mA O/P: 5Vdc,2000mA		
AC Adapter 1(UK)	Brand Name	Lenovo (Salom)	Model Name	SC-43
	Power Rating	I/P: 100-240 Vac, 300mA O/P: 5Vdc,2000mA		
AC Adapter 1(IN)	Brand Name	Lenovo (Salom)	Model Name	SC-44
	Power Rating	I/P: 100-240 Vac, 300mA O/P: 5Vdc,2000mA		
AC Adapter 1(AU)	Brand Name	Lenovo (Salom)	Model Name	SC-45
	Power Rating	I/P: 100-240 Vac, 300mA O/P: 5Vdc,2000mA		
AC Adapter 1(AR)	Brand Name	Lenovo (Salom)	Model Name	SC-46
	Power Rating	I/P: 100-240 Vac, 300mA O/P: 5Vdc,2000mA		
AC Adapter 1(KR)	Brand Name	Lenovo (Salom)	Model Name	SC-49
	Power Rating	I/P: 100-240 Vac, 300mAO/P: 5Vdc,2000mA		
AC Adapter 2(US)	Brand Name	Lenovo (Acbel)	Model Name	SC-41
	Power Rating	I/P: 100-240 Vac, 300mAO/P: 5Vdc,2000mA		
AC Adapter 2(EU)	Brand Name	Lenovo (Acbel)	Model Name	SC-42
	Power Rating	I/P: 100-240 Vac, 300mAO/P: 5Vdc,2000mA		
AC Adapter 2(UK)	Brand Name	Lenovo (Acbel)	Model Name	SC-43
	Power Rating	I/P: 100-240 Vac, 300mAO/P: 5Vdc,2000mA		
AC Adapter 2(AU)	Brand Name	Lenovo (Acbel)	Model Name	SC-45
	Power Rating	I/P: 100-240 Vac, 300mAO/P: 5Vdc,2000mA		
AC Adapter 2(AR)	Brand Name	Lenovo (Acbel)	Model Name	SC-46
	Power Rating	I/P: 100-240 Vac, 300mAO/P: 5Vdc,2000mA		
Battery 1	Brand Name	Lenovo (NVT+ATL)	Model Name	L18D1P32
	Power Rating	3.85Vdc,4850mAh	Type	Li-ion, Polymer
Battery 2	Brand Name	Lenovo (Suwnoda + Liwnon)	Model Name	L18D1P32
	Power Rating	3.85Vdc,4850mAh	Type	Li-ion, Polymer
USB Cable 1	Brand Name	Lenovo (LiQI)	Model Name	Lqc0350083
	Signal Line Type	0.7 meter, shielded cable, without ferrite core		
USB Cable 2	Brand Name	Lenovo (JIEYE)	Model Name	JY-C003-292
	Signal Line Type	0.7 meter, shielded cable, without ferrite core		
Lenovo Smart Dock	Brand Name	Lenovo	Model Name	Lenovo HA-200
AC Adapter (AU)	Brand Name	Lenovo (chenyang)	Model Name	CYSE20-120200A

for Dock	**Power Rating**	I/P: 100-240 Vac, 600mA O/P: 12Vdc,2000mA		
AC Adapter (UK) for Dock	**Brand Name**	Lenovo (chenyang)	**Model Name**	CYSE20-120200B
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 12Vdc,2000mA		
AC Adapter (US) for Dock	**Brand Name**	Lenovo (chenyang)	**Model Name**	CYSE20-120200U
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 12Vdc,2000mA		
AC Adapter (EU) for Dock	**Brand Name**	Lenovo (chenyang)	**Model Name**	CYSE20-120200E
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 12Vdc,2000mA		
AC Adapter (JP) for Dock	**Brand Name**	Lenovo (chenyang)	**Model Name**	CYSE20-120200P
	Power Rating	I/P: 100-240 Vac, 600mA O/P: 12Vdc,2000mA		

2 Test Configuration of Equipment Under Test

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

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

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

Note:

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

2.2 Test Mode

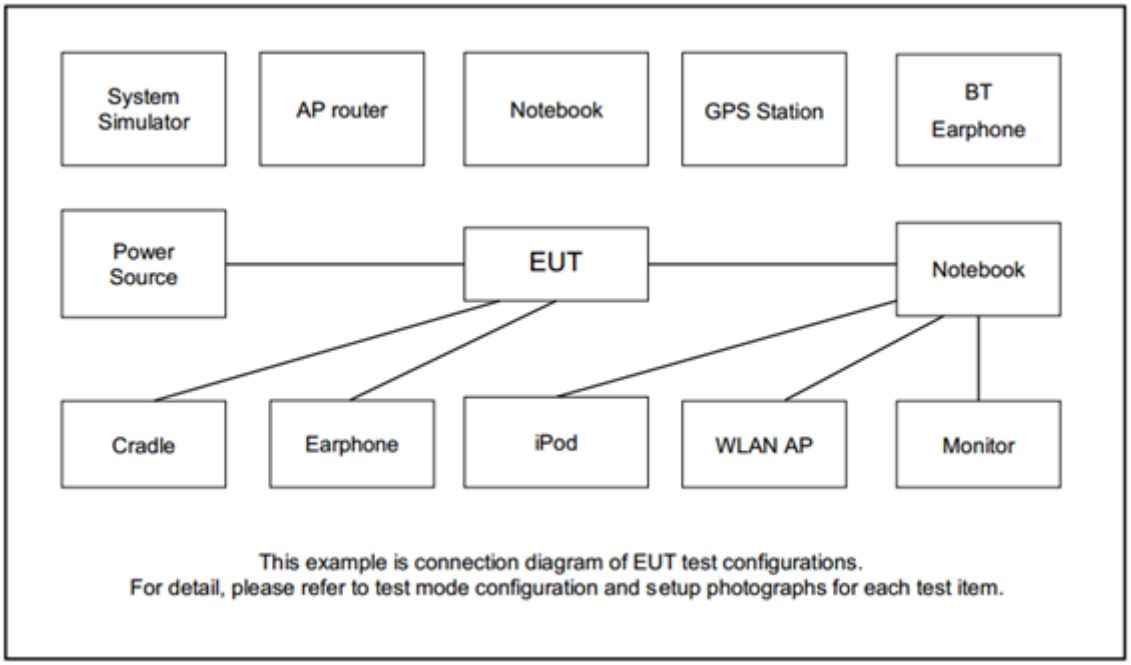
Final test modes are considering the modulation and worse data rates as below table.

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

Test Cases	
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN Link(5G) + Battery 1 + Earphone + USB Cable 1(Charging from Adapter 1) for Sample1
Remark: For Radiated Test Cases, The tests were performed with Adapter 1, Battery 1, Earphone, USB Cable 1 and Sample 1	

Ch. #		Band IV：5745-5825 MHz			
		802.11a	802.11ac VHT20	802.11n HT40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
3.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8m DC O/P: Shielded, 1.8 m
4.	Earphone	Lenovo	P121	N/A	Unshielded,1.2m	N/A

2.5 EUT Operation Test Setup

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

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP 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 7.7

Offset(dB) = RF cable loss(dB)

= 7.7 (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.

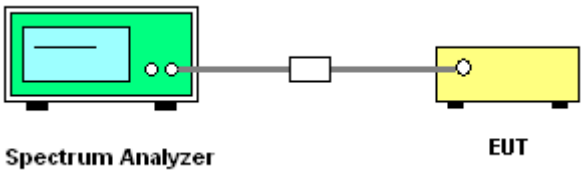
3.1.2 Measuring Instruments

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 v02r01. 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.

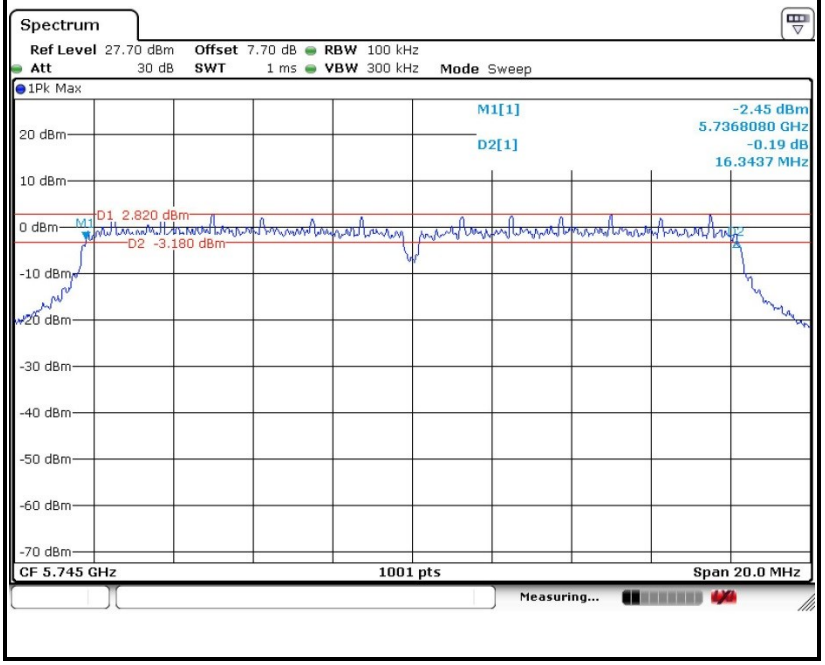
3.1.4 Test Setup



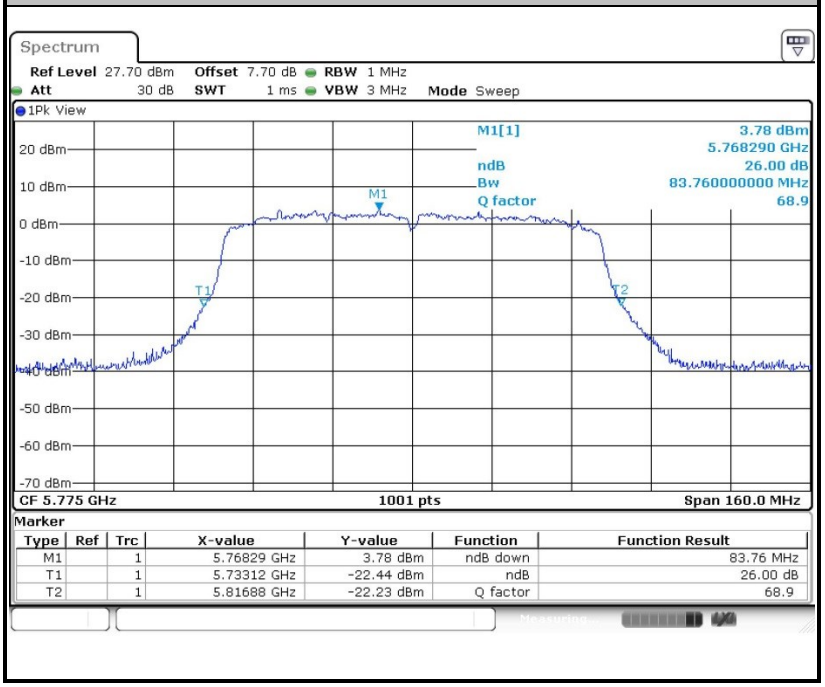
3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth

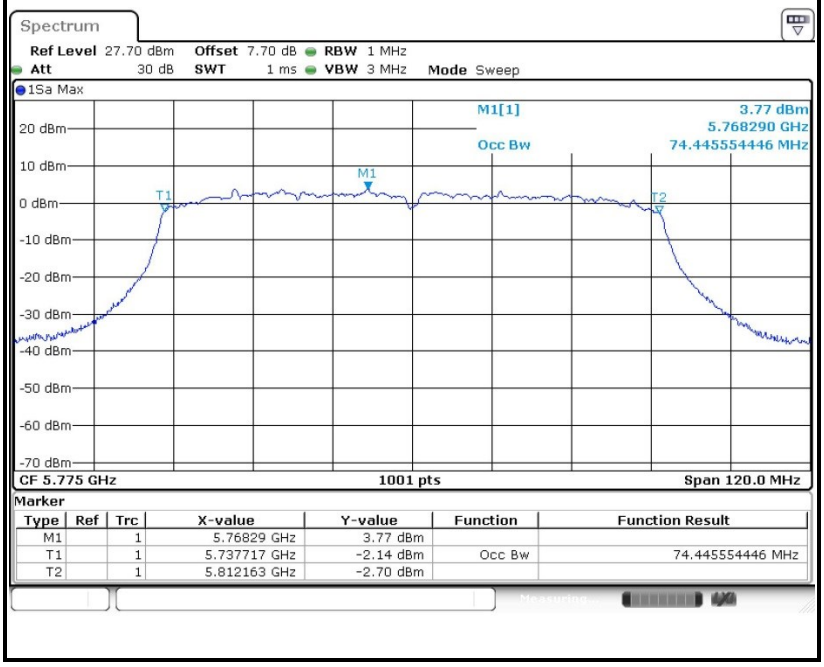


Maximum 26dB Bandwidth



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.76829 GHz	3.78 dBm	ndB down	83.76 MHz
T1		1	5.73312 GHz	-22.44 dBm	ndB	26.00 dB
T2		1	5.81688 GHz	-22.23 dBm	Q factor	68.9

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.

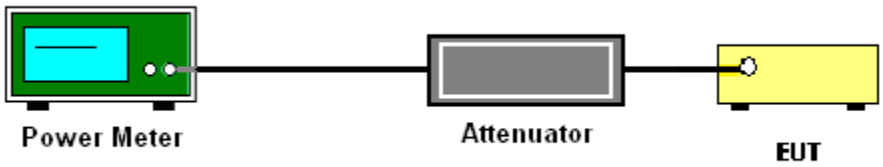
3.2.3 Test Procedures

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

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

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

3.2.4 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 v02r01. Section F) Maximum power spectral density.

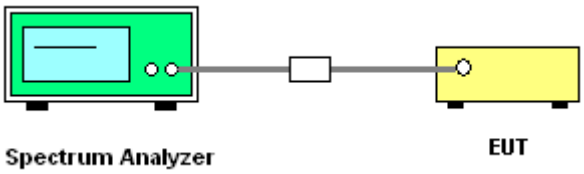
 # Method SA-2 #

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

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

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

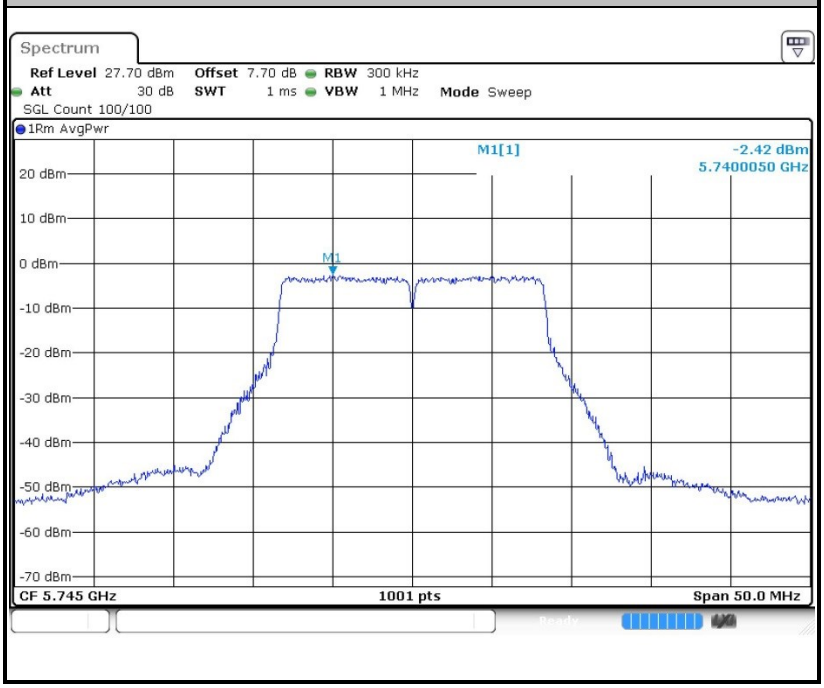
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/300kHz)



3.4 Unwanted Emissions Measurement

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

3.4.1 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 shall comply with the general field strength limits as below table,

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

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

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

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

where

EIRP is the equivalent isotropically radiated power, in dBm

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

d_{Meas} is the measurement distance, in m

3.4.2 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 v02r01. Section G) Unwanted emissions measurement.

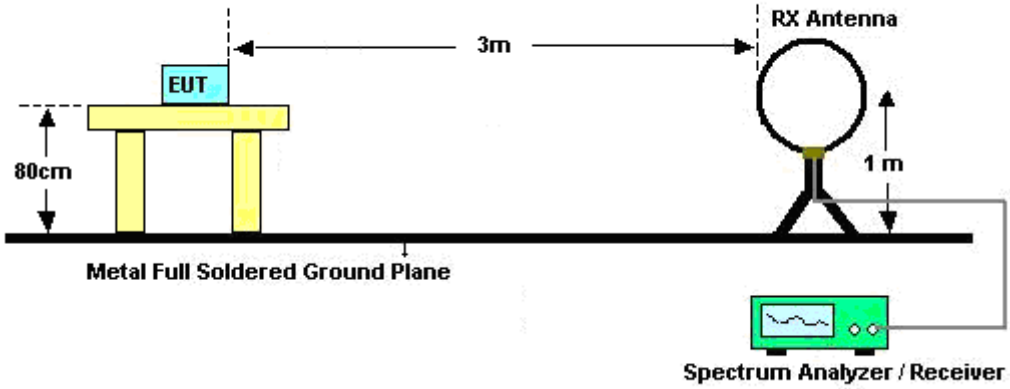
   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

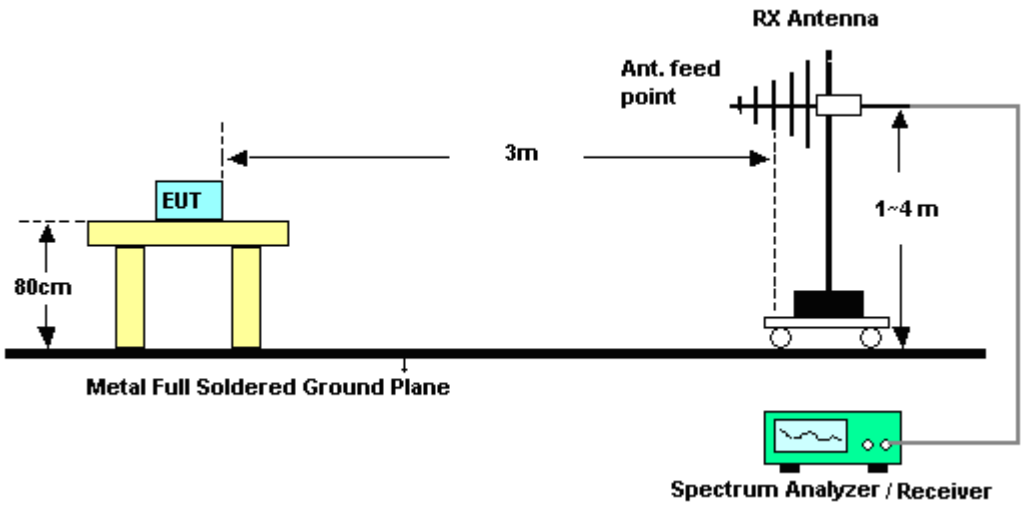
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
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

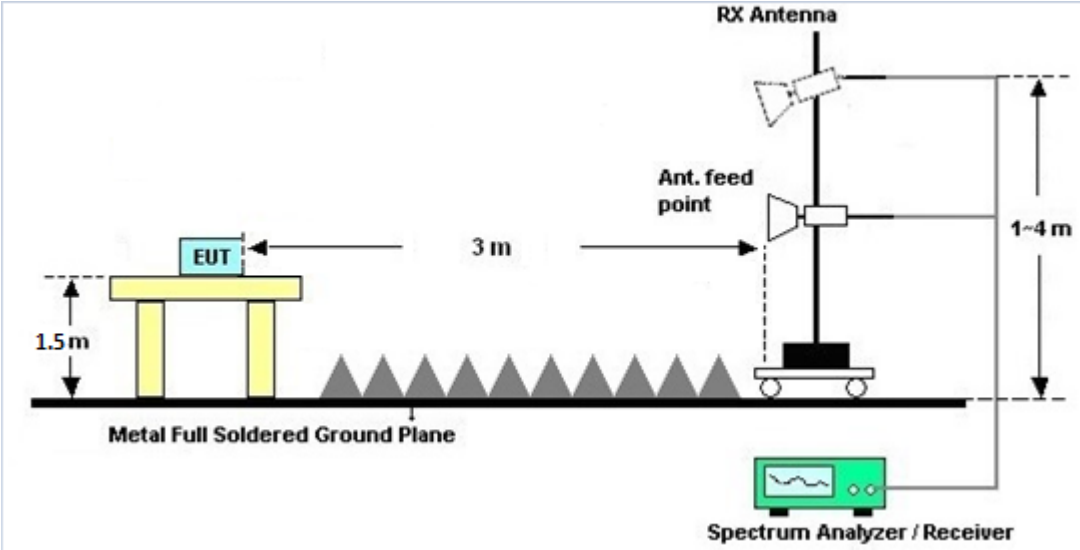
For radiated emissions below 30MHz



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 was not reported.

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

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix C.

3.4.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

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.

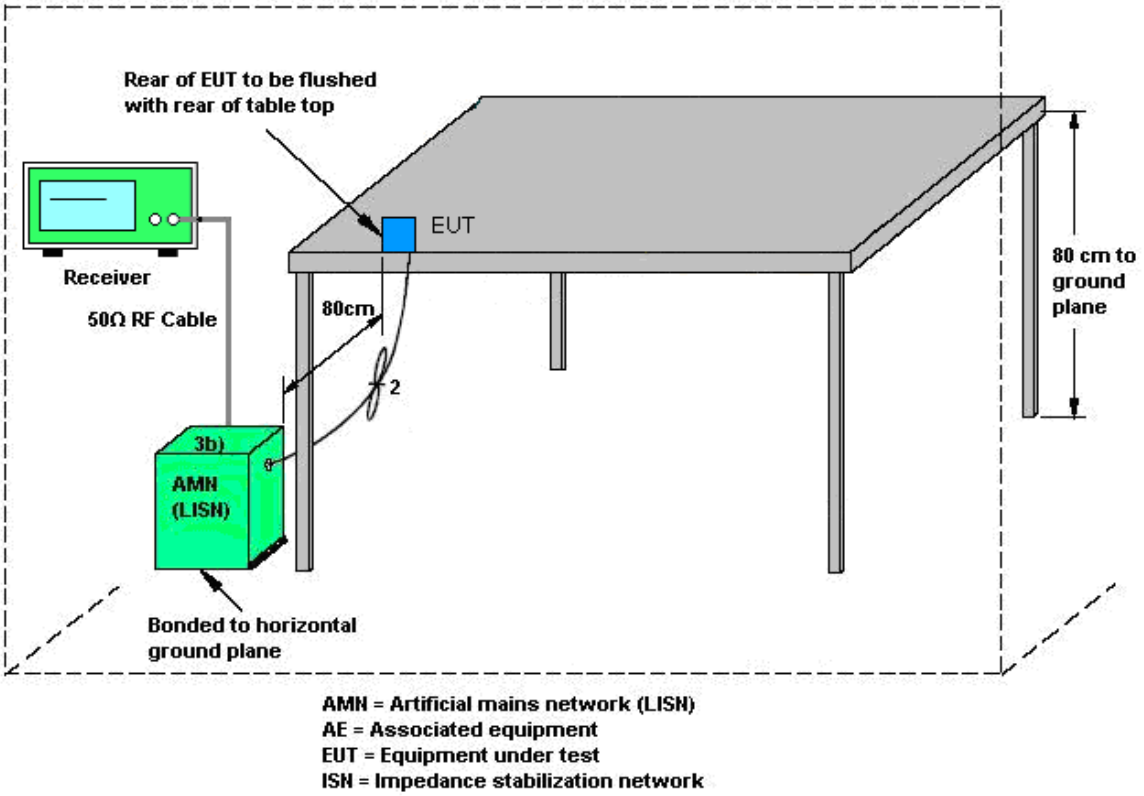
3.5.2 Measuring Instruments

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



3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.6 Automatically Discontinue Transmission

3.6.1 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.

3.6.2 Measuring Instruments

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

3.6.3 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.

3.7 Antenna Requirements

3.7.1 Standard Applicable

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

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 07, 2018	Apr. 12, 2019	Aug. 06, 2019	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 14, 2019	Apr. 12, 2019	Jan. 13, 2020	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Apr. 12, 2019	Jan. 13, 2020	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz;Max 30dBm	Jun. 25. 2018	Mar. 03, 2019	Jun. 24. 2019	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44GHz	Apr. 17, 2018	Mar. 03, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Mar. 03, 2019	Oct. 18, 2019	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Jun. 12, 2018	Mar. 03, 2019	Jun. 11, 2019	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	Mar. 03, 2019	Jan. 26, 2020	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Mar. 03, 2019	Jan. 04, 2020	Radiation (03CH05-KS)
Amplifier	com-power	PA-103A	161069	1MHz ~1000MHz / 32 dB	Apr. 17, 2018	Mar. 03, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Jan. 14, 2019	Mar. 03, 2019	Jan. 13, 2020	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Apr. 17. 2018	Mar. 03, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Apr. 18. 2018	Mar. 03, 2019	Apr. 17. 2019	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Mar. 03, 2019	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Mar. 03, 2019	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Mar. 03, 2019	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	Mar. 21, 2019	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Mar. 21, 2019	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	Mar. 21, 2019	Nov. 18, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Mar. 21, 2019	Oct. 11, 2019	Conduction (CO01-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.9dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0 dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0 dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0 dB**

Appendix A. Conducted Test Results

Report Number : FR912606E

Test Engineer:	Lion Ran	Temperature:	21~25	°C
Test Date:	2019/4/12	Relative Humidity:	51~54	%

Report Number : FR912606E

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	18.43	23.277	16.3437	0.5	Pass
11a	6Mbps	1	157	5785	18.68	23.327	16.3636	0.5	Pass
11a	6Mbps	1	165	5825	18.23	23.227	16.3437	0.5	Pass
HT40	MCS 0	1	151	5755	36.96	44.955	35.1249	0.5	Pass
HT40	MCS 0	1	159	5795	36.56	44.955	35.1249	0.5	Pass
VHT20	MCS 0	1	149	5745	19.13	23.826	17.5824	0.5	Pass
VHT20	MCS 0	1	157	5785	19.23	23.826	17.5624	0.5	Pass
VHT20	MCS 0	1	165	5825	19.03	23.676	17.5624	0.5	Pass
VHT80	MCS 0	1	155	5775	74.45	83.76	75.045	0.5	Pass

Report Number : FR912606E

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	0.58	14.70	30.00	1.83		Pass
11a	6Mbps	1	157	5785	0.58	14.29	30.00	1.83		Pass
11a	6Mbps	1	165	5825	0.58	13.99	30.00	1.83		Pass
HT20	MCS 0	1	149	5745	0.62	14.57	30.00	1.83		Pass
HT20	MCS 0	1	157	5785	0.62	14.33	30.00	1.83		Pass
HT20	MCS 0	1	165	5825	0.62	13.85	30.00	1.83		Pass
HT40	MCS 0	1	151	5755	0.68	14.77	30.00	1.83		Pass
HT40	MCS 0	1	159	5795	0.68	14.47	30.00	1.83		Pass
VHT20	MCS 0	1	149	5745	0.28	14.77	30.00	1.83		Pass
VHT20	MCS 0	1	157	5785	0.28	14.42	30.00	1.83		Pass
VHT20	MCS 0	1	165	5825	0.28	14.08	30.00	1.83		Pass
VHT40	MCS 0	1	151	5755	0.57	14.55	30.00	1.83		Pass
VHT40	MCS 0	1	159	5795	0.57	14.44	30.00	1.83		Pass
VHT80	MCS 0	1	155	5775	0.70	14.47	30.00	1.83		Pass

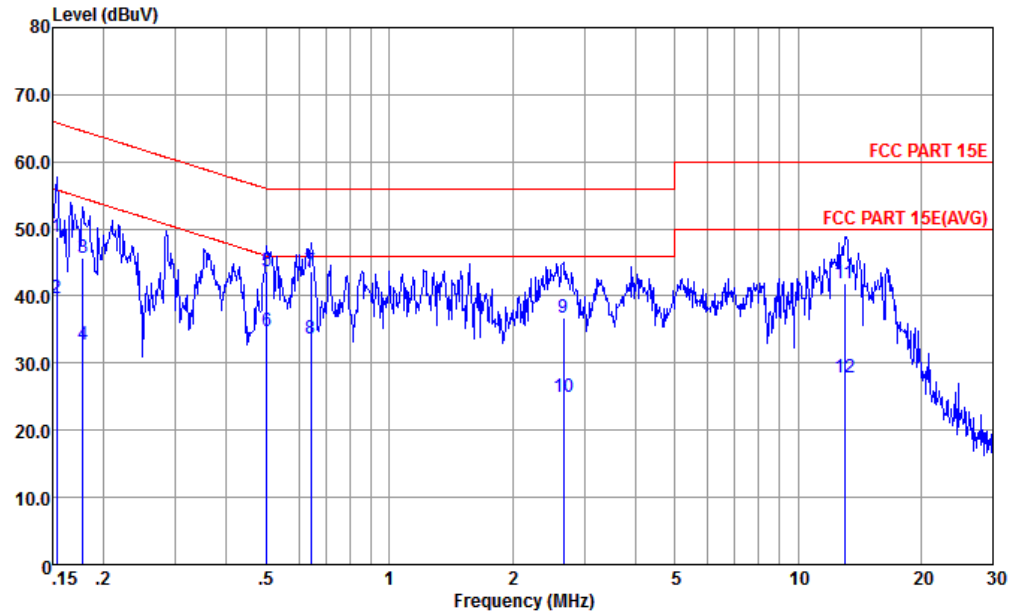
Report Number : FR912606E

TEST RESULTS DATA
Power Spectral Density

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.58	2.22	0.38	30.00	1.83	Pass
11a	6Mbps	1	157	5785	0.58	2.22	-0.40	30.00	1.83	Pass
11a	6Mbps	1	165	5825	0.58	2.22	-0.28	30.00	1.83	Pass
HT40	MCS 0	1	151	5755	0.68	2.22	-2.59	30.00	1.83	Pass
HT40	MCS 0	1	159	5795	0.68	2.22	-2.91	30.00	1.83	Pass
VHT20	MCS 0	1	149	5745	0.28	2.22	0.33	30.00	1.83	Pass
VHT20	MCS 0	1	157	5785	0.28	2.22	-0.03	30.00	1.83	Pass
VHT20	MCS 0	1	165	5825	0.28	2.22	-0.27	30.00	1.83	Pass
VHT80	MCS 0	1	155	5775	0.70	2.22	-7.91	30.00	1.83	Pass

Appendix B. AC Conducted Emission Test Results

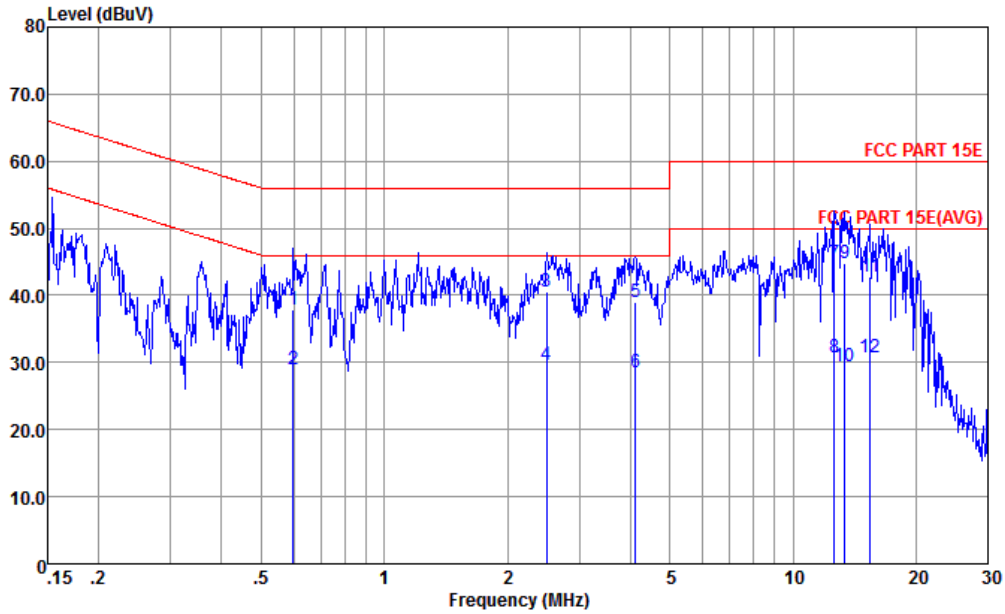
Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line



Site : CO01-KS
Condition : FCC PART 15E LISN-L-181119-060105 LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.153	48.76	-17.06	65.82	38.20	0.09	10.47	QP
2		0.153	39.76	-16.06	55.82	29.20	0.09	10.47	Average
3		0.178	45.72	-18.87	64.59	35.20	0.11	10.41	QP
4		0.178	32.82	-21.77	54.59	22.30	0.11	10.41	Average
5		0.502	43.61	-12.39	56.00	33.20	0.17	10.24	QP
6	*	0.502	34.71	-11.29	46.00	24.30	0.17	10.24	Average
7		0.644	43.62	-12.38	56.00	33.20	0.18	10.24	QP
8		0.644	33.72	-12.28	46.00	23.30	0.18	10.24	Average
9		2.664	36.67	-19.33	56.00	26.20	0.23	10.24	QP
10		2.664	25.07	-20.93	46.00	14.60	0.23	10.24	Average
11		12.988	41.81	-18.19	60.00	31.20	0.23	10.38	QP
12		12.988	27.81	-22.19	50.00	17.20	0.23	10.38	Average

Test Engineer :	Amos Zhang	Temperature :	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-KS
Condition : FCC PART 15E LISN-N-181119-060105 NEUTRAL

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.598	37.98	-18.02	56.00	27.60	0.14	10.24	QP
2		0.598	28.98	-17.02	46.00	18.60	0.14	10.24	Average
3		2.500	40.59	-15.41	56.00	30.19	0.16	10.24	QP
4		2.500	29.69	-16.31	46.00	19.29	0.16	10.24	Average
5		4.114	39.03	-16.97	56.00	28.61	0.17	10.25	QP
6		4.114	28.63	-17.37	46.00	18.21	0.17	10.25	Average
7		12.649	44.71	-15.29	60.00	34.20	0.14	10.37	QP
8		12.649	30.71	-19.29	50.00	20.20	0.14	10.37	Average
9	*	13.408	44.71	-15.29	60.00	34.20	0.13	10.38	QP
10		13.408	29.41	-20.59	50.00	18.90	0.13	10.38	Average
11		15.470	42.82	-17.18	60.00	32.30	0.12	10.40	QP
12		15.470	30.72	-19.28	50.00	20.20	0.12	10.40	Average

Appendix C. Radiated Spurious Emission

Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5648	52.1	-16.2	68.3	41.51	34.67	8.55	32.63	100	262	P	H
		5692	54.78	-44.62	99.4	44.24	34.7	8.58	32.74	100	262	P	H
		5717.6	54.87	-55.36	110.23	44.29	34.77	8.61	32.8	100	262	P	H
		5724.8	60.35	-61.49	121.84	49.77	34.77	8.61	32.8	100	262	P	H
		5750	105.64	-	-	95.06	34.8	8.64	32.86	100	262	P	H
		5750	98.67	-	-	88.09	34.8	8.64	32.86	100	262	A	H
		5631.2	52.95	-15.35	68.3	42.4	34.63	8.55	32.63	352	287	P	V
		5690.8	52.98	-45.54	98.52	42.44	34.7	8.58	32.74	352	287	P	V
		5718.8	53.45	-57.11	110.56	42.87	34.77	8.61	32.8	352	287	P	V
		5724.8	58.5	-63.34	121.84	47.92	34.77	8.61	32.8	352	287	P	V
		5748	104.66	-	-	94.08	34.8	8.64	32.86	352	287	P	V
		5748	97.97	-	-	87.39	34.8	8.64	32.86	352	287	A	V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 165 5825MHz		5820	104.96	-	-	94.31	34.97	8.72	33.04	100	254	P	H
		5820	97.48	-	-	86.83	34.97	8.72	33.04	100	254	A	H
		5854.8	52.94	-58.42	111.36	42.29	35.03	8.72	33.1	100	254	P	H
		5856.4	54.46	-56.05	110.51	43.76	35.03	8.77	33.1	100	254	P	H
		5878	53.05	-50.02	103.07	42.31	35.07	8.77	33.1	100	254	P	H
		5934.4	52.4	-15.9	68.3	41.48	35.17	8.88	33.13	100	254	P	H
		5820	104.1	-	-	93.45	34.97	8.72	33.04	343	288	P	V
		5820	96.39	-	-	85.74	34.97	8.72	33.04	343	288	A	V
		5853.6	51.51	-62.58	114.09	40.86	35.03	8.72	33.1	343	288	P	V
		5857.2	51.71	-58.57	110.28	41.01	35.03	8.77	33.1	343	288	P	V
		5877.6	52.27	-51.1	103.37	41.53	35.07	8.77	33.1	343	288	P	V
		5989.6	52.49	-15.81	68.3	41.41	35.3	8.93	33.15	343	288	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	44.66	-29.34	74	56.67	38.08	12.74	62.83	100	360	P	H
		11490	48.18	-25.82	74	60.19	38.08	12.74	62.83	100	360	P	V
802.11a CH 157 5785MHz		11570	44.78	-29.22	74	56.64	38.17	12.79	62.82	100	360	P	H
		11570	48.07	-25.93	74	59.93	38.17	12.79	62.82	100	360	P	V
802.11a CH 165 5825MHz		11650	45.27	-28.73	74	56.99	38.24	12.85	62.81	100	360	P	H
		11650	47.47	-26.53	74	59.19	38.24	12.85	62.81	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151 5755MHz		5618.8	52.2	-16.1	68.3	41.69	34.63	8.52	32.64	100	272	P	H
		5693.6	52.87	-47.71	100.58	42.33	34.7	8.58	32.74	100	272	P	H
		5713.6	60.42	-48.69	109.11	49.88	34.73	8.61	32.8	100	272	P	H
		5721.6	61.23	-53.32	114.55	50.65	34.77	8.61	32.8	100	272	P	H
		5744	103.34	-	-	92.76	34.8	8.64	32.86	100	272	P	H
		5744	94.89	-	-	84.31	34.8	8.64	32.86	100	272	A	H
		5853.2	51.99	-63.01	115	41.37	35	8.72	33.1	100	272	P	H
		5867.6	52.67	-54.7	107.37	41.97	35.03	8.77	33.1	100	272	P	H
		5884.4	52.41	-45.91	98.32	41.68	35.07	8.77	33.11	100	272	P	H
		5934.8	52.1	-16.2	68.3	41.18	35.17	8.88	33.13	100	272	P	H
		5648.8	52.78	-15.52	68.3	42.19	34.67	8.55	32.63	337	285	P	V
		5693.2	52.37	-47.92	100.29	41.83	34.7	8.58	32.74	337	285	P	V
		5719.6	58.54	-52.25	110.79	47.96	34.77	8.61	32.8	337	285	P	V
		5724.8	61.37	-60.47	121.84	50.79	34.77	8.61	32.8	337	285	P	V
		5744	102.05	-	-	91.47	34.8	8.64	32.86	337	285	P	V
		5744	94.44	-	-	83.86	34.8	8.64	32.86	337	285	A	V
		5852	51.31	-66.43	117.74	40.69	35	8.72	33.1	337	285	P	V
		5857.6	54.14	-56.03	110.17	43.44	35.03	8.77	33.1	337	285	P	V
		5885.6	51.79	-45.64	97.43	41.06	35.07	8.77	33.11	337	285	P	V
		5965.2	51.89	-16.41	68.3	40.92	35.23	8.88	33.14	337	285	P	V

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 159 5795MHz		5634.4	52.86	-15.44	68.3	42.27	34.67	8.55	32.63	108	262	P	H
		5686.4	52.57	-42.7	95.27	42.03	34.7	8.58	32.74	108	262	P	H
		5705.2	52.24	-54.52	106.76	41.7	34.73	8.61	32.8	108	262	P	H
		5723.2	50.85	-67.35	118.2	40.27	34.77	8.61	32.8	108	262	P	H
		5806	101.56	-	-	90.94	34.93	8.67	32.98	108	262	P	H
		5806	94.32	-	-	83.7	34.93	8.67	32.98	108	262	A	H
		5852.4	53.31	-63.52	116.83	42.69	35	8.72	33.1	108	262	P	H
		5863.2	53.62	-54.98	108.6	42.92	35.03	8.77	33.1	108	262	P	H
		5884.4	52.13	-46.19	98.32	41.4	35.07	8.77	33.11	108	262	P	H
		5940	52.54	-15.76	68.3	41.59	35.2	8.88	33.13	108	262	P	H
		5636.8	52.28	-16.02	68.3	41.69	34.67	8.55	32.63	362	286	P	V
		5663.2	53.68	-24.42	78.1	43.08	34.7	8.58	32.68	362	286	P	V
		5717.2	52.43	-57.69	110.12	41.89	34.73	8.61	32.8	362	286	P	V
		5722	53.21	-62.25	115.46	42.63	34.77	8.61	32.8	362	286	P	V
		5794	102.83	-	-	92.24	34.9	8.67	32.98	362	286	P	V
		5794	95.48	-	-	84.89	34.9	8.67	32.98	362	286	A	V
		5854.8	52.41	-58.95	111.36	41.76	35.03	8.72	33.1	362	286	P	V
		5872.4	53.28	-52.75	106.03	42.54	35.07	8.77	33.1	362	286	P	V
		5898.8	53.06	-34.59	87.65	42.25	35.1	8.82	33.11	362	286	P	V
		5936	53	-15.3	68.3	42.08	35.17	8.88	33.13	362	286	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 151 5755MHz		11510	44.59	-29.41	74	56.58	38.1	12.74	62.83	100	360	P	H
		11510	47.63	-26.37	74	59.62	38.1	12.74	62.83	100	360	P	V
802.11n HT40 CH 159 5795MHz		11590	44.95	-29.05	74	56.76	38.18	12.82	62.81	100	360	P	H
		11590	47.98	-26.02	74	59.79	38.18	12.82	62.81	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac 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		5630.4	49.33	-18.97	68.3	42.54	34.63	8.55	36.39	113	258	P	H
		5693.2	57.18	-43.11	100.29	50.32	34.7	8.58	36.42	113	258	P	H
		5717.2	56.84	-53.28	110.12	49.92	34.73	8.61	36.42	113	258	P	H
		5722.4	63.63	-52.74	116.37	56.68	34.77	8.61	36.43	113	258	P	H
		5740	108.31	-	-	101.31	34.8	8.64	36.44	113	258	P	H
		5740	101.05	-	-	94.05	34.8	8.64	36.44	113	258	A	H
		5644.4	50.16	-18.14	68.3	43.33	34.67	8.55	36.39	330	285	P	V
		5693.6	53.15	-47.43	100.58	46.29	34.7	8.58	36.42	330	285	P	V
		5718.8	52.3	-58.26	110.56	45.35	34.77	8.61	36.43	330	285	P	V
		5724.8	64.28	-57.56	121.84	57.33	34.77	8.61	36.43	330	285	P	V
		5742	107.11	-	-	100.11	34.8	8.64	36.44	330	285	P	V
		5742	100.15	-	-	93.15	34.8	8.64	36.44	330	285	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 165 5825MHz		5850	56.14	-66.16	122.3	48.91	35	8.72	36.49	105	187	P	H
		5855.2	50.76	-60.08	110.84	43.51	35.03	8.72	36.5	105	187	A	H
		5876.8	54.43	-49.53	103.96	47.1	35.07	8.77	36.51	105	187	P	H
		5948.8	50.08	-18.22	68.3	42.53	35.2	8.88	36.53	105	187	P	H
		5818	107.29	-	-	100.11	34.93	8.72	36.47	105	187	P	H
		5818	99.57	-	-	92.39	34.93	8.72	36.47	105	187	P	H
		5850.8	53.83	-66.65	120.48	46.6	35	8.72	36.49	331	342	P	V
		5868.8	50.62	-56.41	107.03	43.32	35.03	8.77	36.5	331	342	A	V
		5879.2	52.05	-50.13	102.18	44.72	35.07	8.77	36.51	331	342	P	V
		5960.8	51.12	-17.18	68.3	43.54	35.23	8.88	36.53	331	342	P	V
		5828	105.87	-	-	98.66	34.97	8.72	36.48	331	342	P	V
		5828	98.45	-	-	91.24	34.97	8.72	36.48	331	342	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	43.96	-30.04	74	55.97	38.08	12.74	62.83	100	360	P	H
		11490	46.22	-27.78	74	58.23	38.08	12.74	62.83	100	360	P	V
802.11ac VHT20 CH 157 5785MHz		11570	42.35	-31.65	74	54.21	38.17	12.79	62.82	100	360	P	H
		11570	46.8	-27.2	74	58.66	38.17	12.79	62.82	100	360	P	V
802.11ac VHT20 CH 165 5825MHz		11650	44.19	-29.81	74	55.91	38.24	12.85	62.81	100	360	P	H
		11650	46.67	-27.33	74	58.39	38.24	12.85	62.81	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac 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		5646.8	50.69	-17.61	68.3	43.86	34.67	8.55	36.39	100	257	P	H
		5694	58.77	-42.11	100.88	51.91	34.7	8.58	36.42	100	257	P	H
		5719.6	66.64	-44.15	110.79	59.69	34.77	8.61	36.43	100	257	P	H
		5720.8	66.65	-46.07	112.72	59.7	34.77	8.61	36.43	100	257	P	H
		5850	60.23	-62.07	122.3	53	35	8.72	36.49	100	257	P	H
		5859.6	64.17	-45.44	109.61	56.87	35.03	8.77	36.5	100	257	P	H
		5878.8	55.24	-47.24	102.48	47.91	35.07	8.77	36.51	100	257	P	H
		5932	50.75	-17.55	68.3	43.28	35.17	8.82	36.52	100	257	P	H
		5768	104.02	-	-	97	34.83	8.64	36.45	100	257	P	H
		5768	95.55	-	-	88.53	34.83	8.64	36.45	100	257	A	H
		5642.8	49.2	-19.1	68.3	42.37	34.67	8.55	36.39	313	285	P	V
		5696.8	58.41	-44.53	102.94	51.55	34.7	8.58	36.42	313	285	P	V
		5720	65.05	-45.85	110.9	58.1	34.77	8.61	36.43	313	285	P	V
		5724.8	65.64	-56.2	121.84	58.69	34.77	8.61	36.43	313	285	P	V
		5854.4	56.1	-56.17	112.27	48.85	35.03	8.72	36.5	313	285	P	V
		5858.4	61.53	-48.42	109.95	54.23	35.03	8.77	36.5	313	285	P	V
		5875.2	53.2	-51.95	105.15	45.87	35.07	8.77	36.51	313	285	P	V
		5952.8	51.21	-17.09	68.3	43.66	35.2	8.88	36.53	313	285	P	V
		5756	103.35	-	-	96.33	34.83	8.64	36.45	313	285	P	V
		5756	94.63	-	-	87.61	34.83	8.64	36.45	313	285	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 4 5725~5850MHz

WIFI 802.11ac 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 VHT80 CH 155 5775MHz		11550	45.24	-28.76	74	57.12	38.15	12.79	62.82	100	360	P	H
		11550	48.22	-25.78	74	60.1	38.15	12.79	62.82	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

WIFI 802.11n HT40 (LF @ 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)
5GHz 802.11n HT40 LF		32.91	17.79	-22.21	40	27.41	21.66	0.69	31.97	-	-	P	H
		109.54	18.11	-25.39	43.5	32.11	16.72	1.21	31.93	-	-	P	H
		172.59	20.62	-22.88	43.5	35.12	15.9	1.52	31.92	-	-	P	H
		235.64	21.75	-24.25	46	34.53	17.36	1.8	31.94	-	-	P	H
		266.68	27.58	-18.42	46	39.15	18.53	1.9	32	-	-	P	H
		280.26	28.34	-17.66	46	39.63	18.81	1.93	32.03	100	0	P	H
		32.91	19.98	-20.02	40	29.6	21.66	0.69	31.97	-	-	P	V
		49.4	19.85	-20.15	40	37.12	13.83	0.84	31.94	-	-	P	V
		108.57	18.53	-24.97	43.5	32.53	16.73	1.2	31.93	-	-	P	V
		180.35	25.1	-18.4	43.5	39.75	15.73	1.54	31.92	100	0	P	V
		223.03	20.01	-25.99	46	33.56	16.64	1.74	31.93	-	-	P	V
		294.81	20.67	-25.33	46	31.67	19.1	1.97	32.07	-	-	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.	
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)

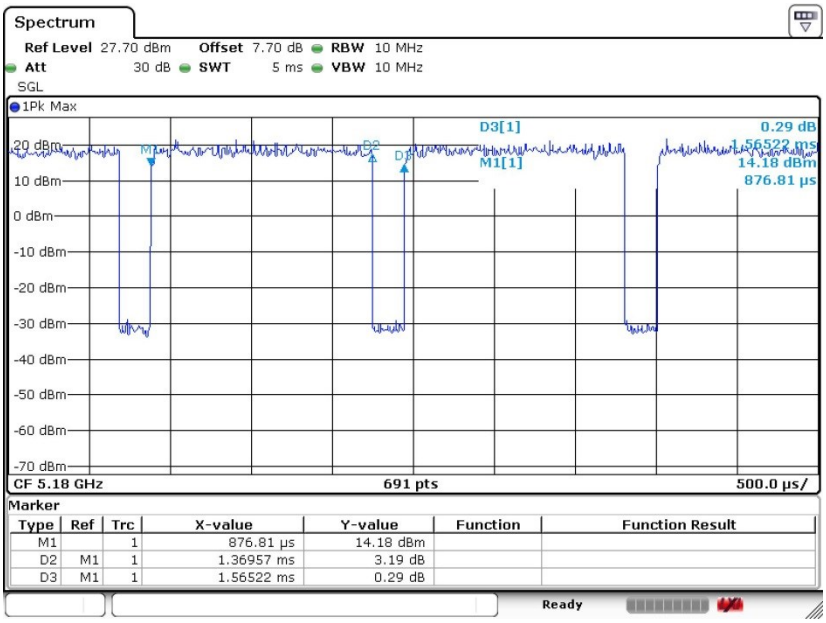
= -10.46(dB)

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

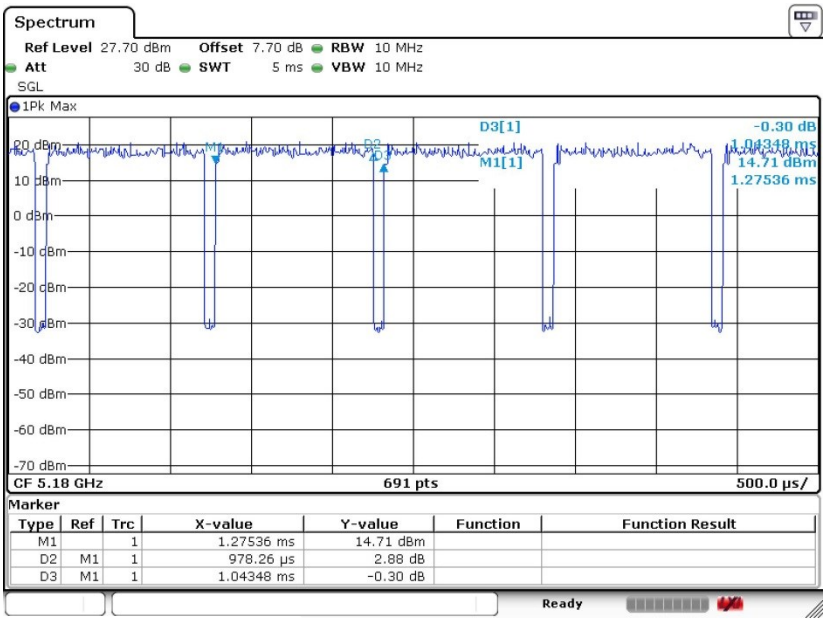
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	87.50	1.370	0.730	0.75kHz
5GHz 802.11ac VHT 20	93.75	0.978	1.022	1.10kHz
5GHz 802.11n HT40	85.48	1.220	0.820	0.82kHz
5GHz 802.11ac VHT80	85.15	0.249	4.016	4.30kHz

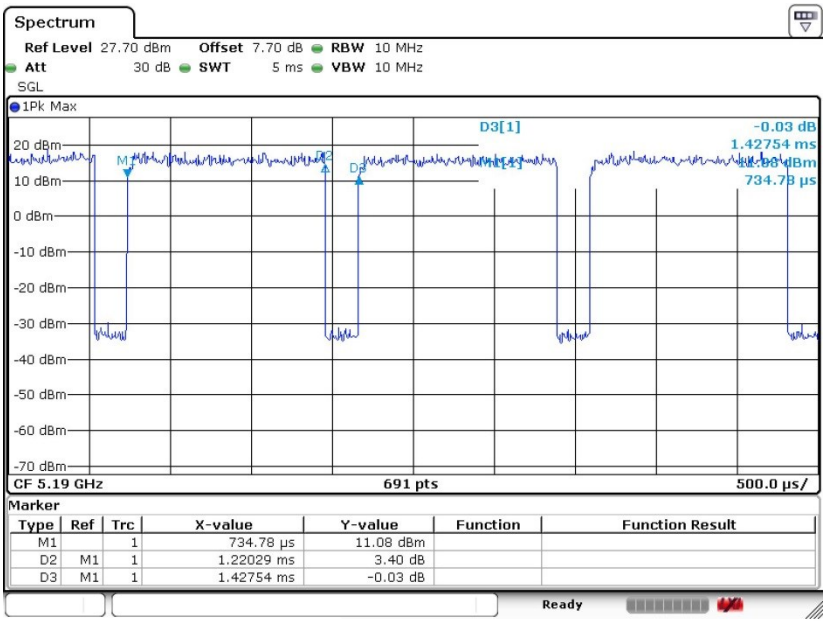
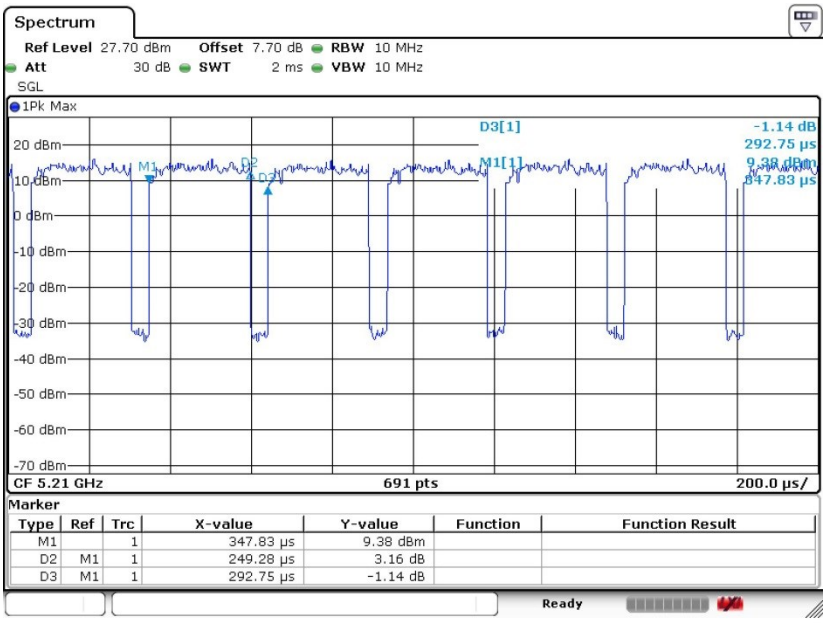
802.11a



802.11ac VHT20



802.11n HT40



802.11ac VHT80