FCC RF Test Report

APPLICANT	:	**Shanghai Longcheer Technology Co. Ltd.**
EQUIPMENT	:	**Connected Media Applicance**
BRAND NAME	:	**Longcheer**
MODEL NAME	:	**CMA1000**
FCC ID	:	**WH7CMA1000**
STANDARD	:	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	:	**(NII) Unlicensed National Information Infrastructure**

The product was received on May 04, 2017 and testing was completed on Jun. 02, 2017. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR750402D	Rev. 01	Initial issue of report	Jun. 28, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 15.403(i)	26dB & 99% Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	FCC ≤ 24 dBm (depend on band)	Pass	-
3.3	15.407(a)	Power Spectral Density	FCC ≤ 11 dBm (depend on band)	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b) 15.209(a)	Pass	Under limit 3.19 dB at 33.880 MHz for Quasi-Peak
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 3.57 dB at 0.431 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

Shanghai Longcheer Technology Co. Ltd.
No.401, Building 1, Caobao, Xuhui District, Shanghai, China

1.2 Manufacturer

Shanghai Longcheer Technology Co. Ltd.
No.401, Building 1, Caobao, Xuhui District, Shanghai, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Connected Media Applicance
Brand Name	Longcheer
Model Name	CMA1000
FCC ID	WH7CMA1000
EUT supports Radios application	LTE/WLAN2.4GHz 802.11b/g/n HT20/HT40 WLAN5GHz 802.11a/n HT20/HT40 Bluetooth v3.0+EDR/ Bluetooth v4.0 LE/ Bluetooth v4.1 LE
IMEI Code	Conducted: 865464030001335 Radiation: N/A Conduction: 865464030000055
HW Version	LLAM013C2-1
SW Version	0.1.6
EUT Stage	Production Unit

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz 5260 MHz ~ 5320 MHz
Maximum Output Power to Antenna	**<5180 MHz ~ 5240 MHz>** 802.11a : 11.75 dBm / 0.0150 W 802.11n HT20 : 11.54 dBm / 0.0143 W 802.11n HT40 : 11.67 dBm / 0.0147 W **<5260 MHz ~ 5320 MHz>** 802.11a : 11.51 dBm / 0.0142 W 802.11n HT20 : 11.19 dBm / 0.0132 W 802.11n HT40 : 11.46 dBm / 0.0140 W
99% Occupied Bandwidth	**<5180 MHz ~ 5240 MHz>** 802.11a : 16.83 MHz 802.11n HT20 : 17.78 MHz 802.11n HT40 : 36.06 MHz **<5260 MHz ~ 5320 MHz>** 802.11a : 16.78 MHz 802.11n HT20 : 17.73 MHz 802.11n HT40 : 36.06 MHz
Antenna Type / Gain	**<5180 MHz ~ 5240 MHz >** IFA Antenna with gain -2.6 dBi **<5260 MHz ~ 5320 MHz >** IFA Antenna with gain -2.6 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

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

1.6 Testing Location

Test Site	Sporton International (KunShan) INC.			
Test Site Location	No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	**Sporton Site No.**			**FCC Registration No.**
	TH01-KS	03CH02-KS	CO01-KS	418269

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

1.7 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04
- 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).

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5180-5240 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	-	-	-	-

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5260-5320 MHz Band 2 (U-NII-2A)	52	5260	60	5300
	54*	5270	62*	5310
	56	5280	64	5320
	-	-		

Note: The above Frequency and Channel in "*" 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

AC Conducted Emission	Mode 1 : LTE Band 2 Idle + Bluetooth Link + WLAN Link (5G) + USB Cable (Charging from Adapter)

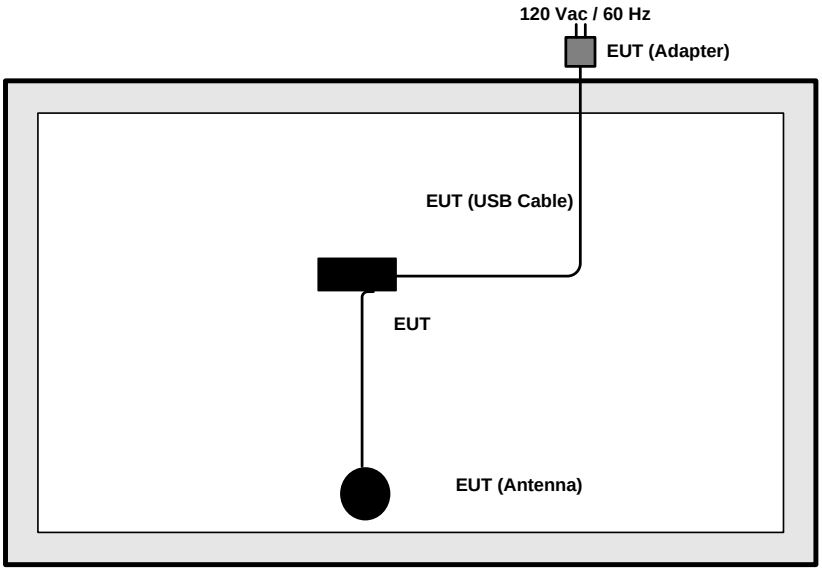
Ch. #		Band I：5180-5240 MHz	Band II：5260-5320 MHz
		802.11a	802.11a
L	Low	36	52
M	Middle	44	60
H	High	48	64

Ch. #		Band I：5180-5240 MHz	Band II：5260-5320 MHz
		802.11n HT20	802.11n HT20
L	Low	36	52
M	Middle	44	60
H	High	48	64

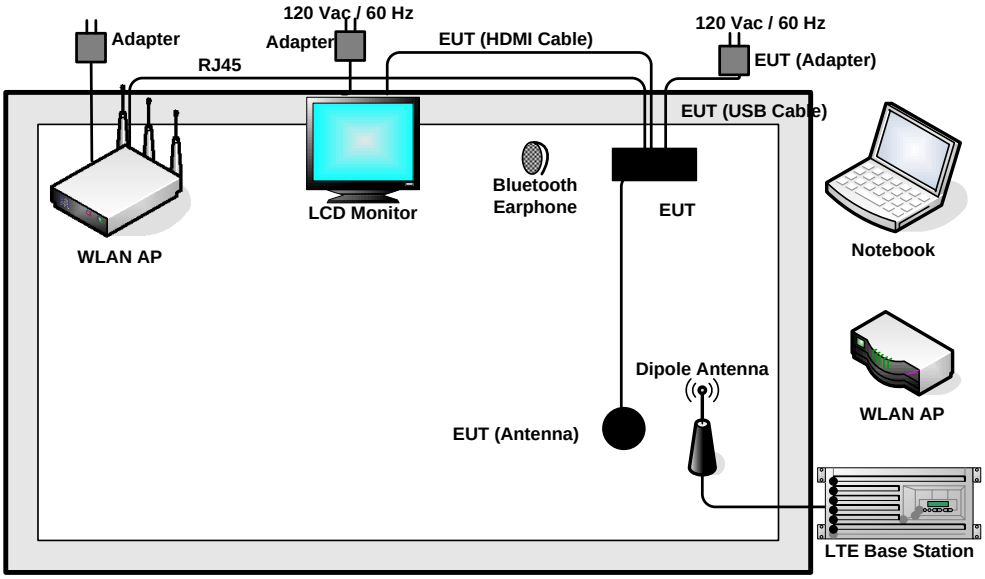
Ch. #		Band I：5180-5240 MHz	Band II：5260-5320 MHz
		802.11n HT40	802.11n HT40
L	Low	38	54
M	Middle	-	-
H	High	46	62

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.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	Cisco	Air-AP1262N-A-K9	LDK102073	N/A	Unshielded, 1.8 m
3.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
4.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
6.	Monitor	Dell	IN1940MWb	Fcc DoC	N/A	Unshielded,1.8m
7.	SD Card	Kingston	8GB	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT 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 5.4 dB.

Offset (dB) = RF cable loss(dB).
= 5.4 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Description of 26dB & 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

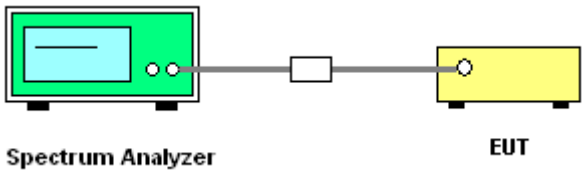
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

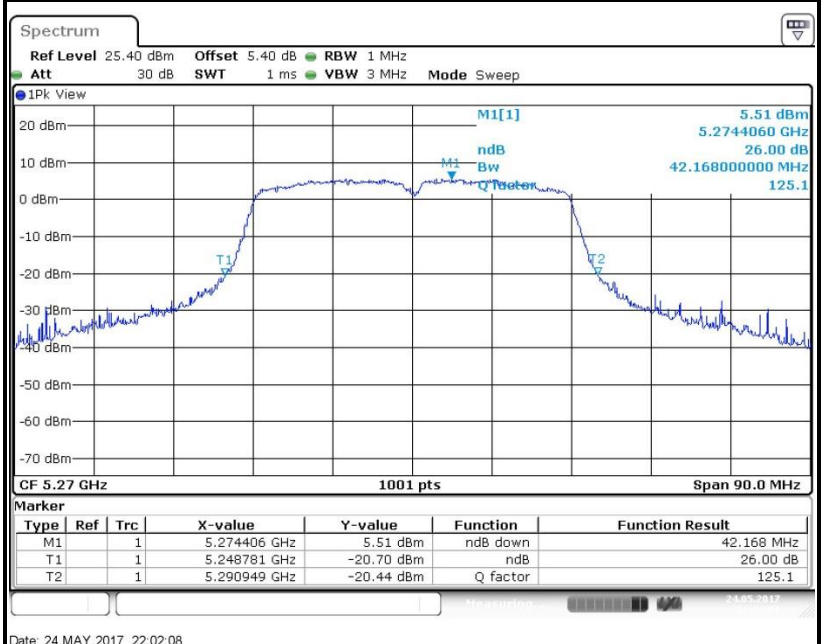
3.1.4 Test Setup



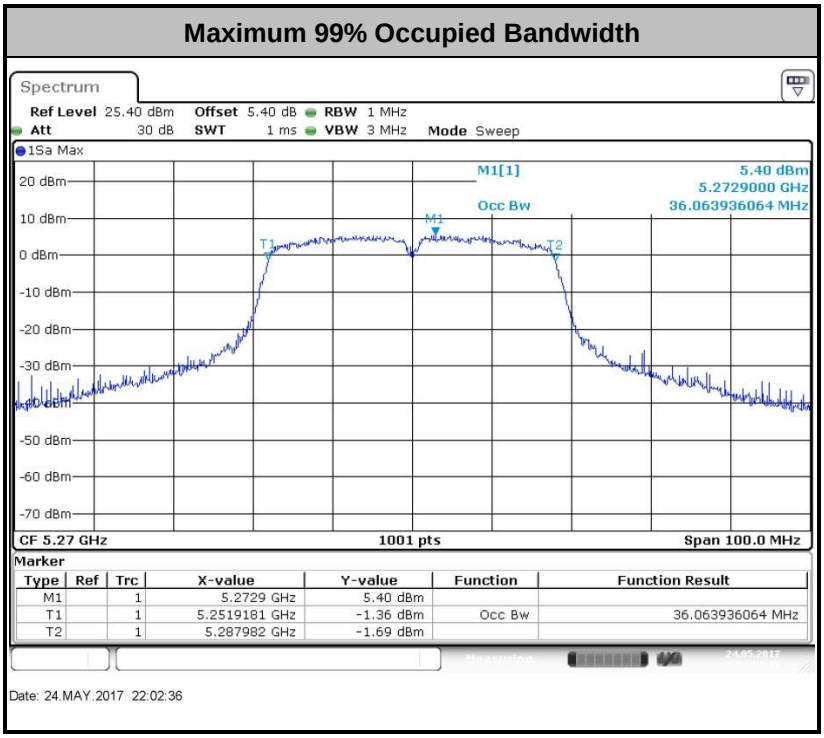
3.1.5 Test Result of 26dB & 99% Occupied Bandwidth Plots

Please refer to Appendix A.

Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth



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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

For the 5.25–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz.

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.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

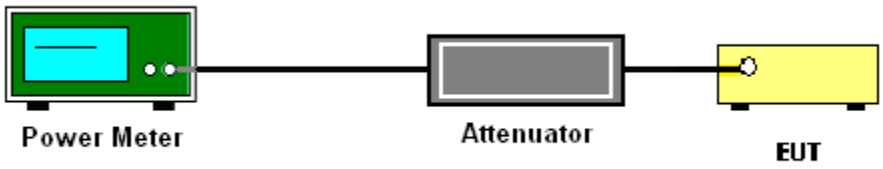
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.

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

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

3.2.4 Test Setup

For normal channel:



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

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

For the 5.25–5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

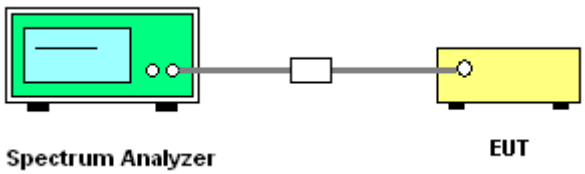
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section F) Maximum power spectral density.

 # Method SA-2 #

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

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 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(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

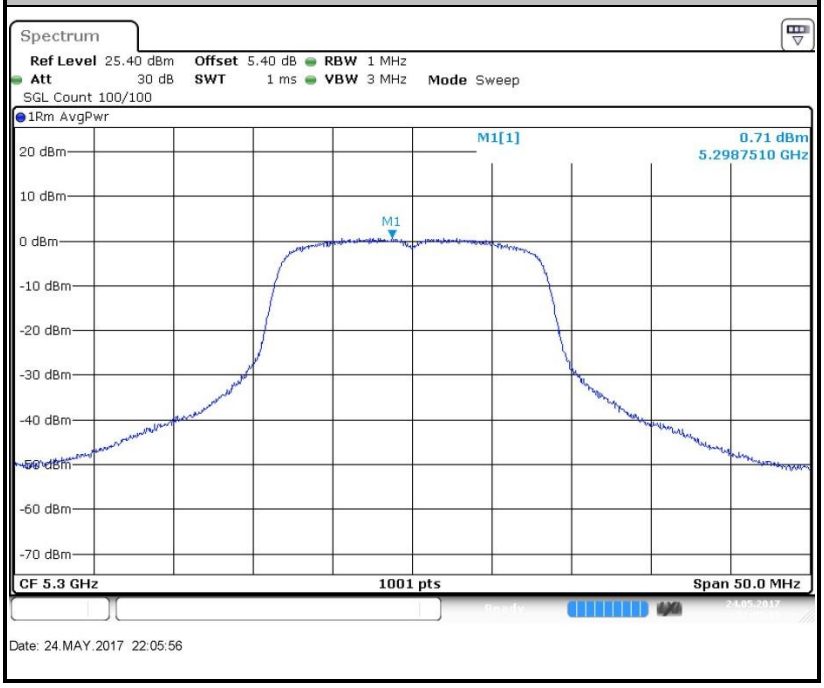
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Spectral Density(dBm/MHz)



Note: Average Power Density (dB) = Measured value+ Duty Factor

3.4 Unwanted Radiated Emission 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 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

(2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table

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

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

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

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

(3) KDB789033 D01 v01r04 G)2)c)

(i) Section 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.[3]

(ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.[4]

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

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

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

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

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

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

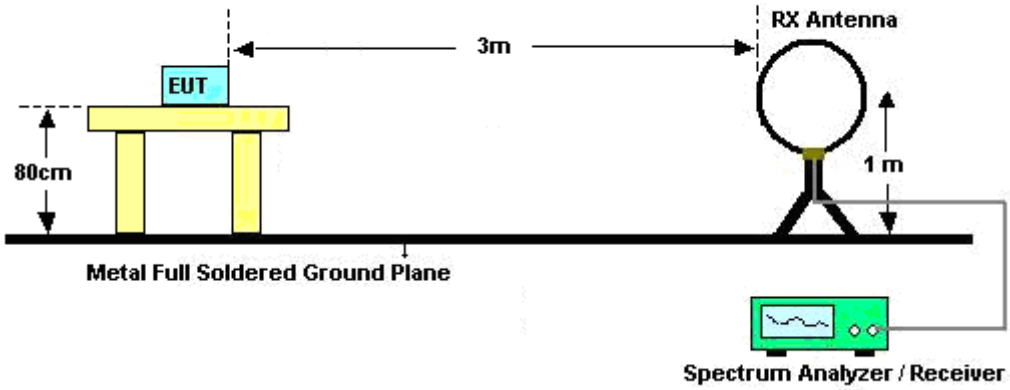
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - 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.

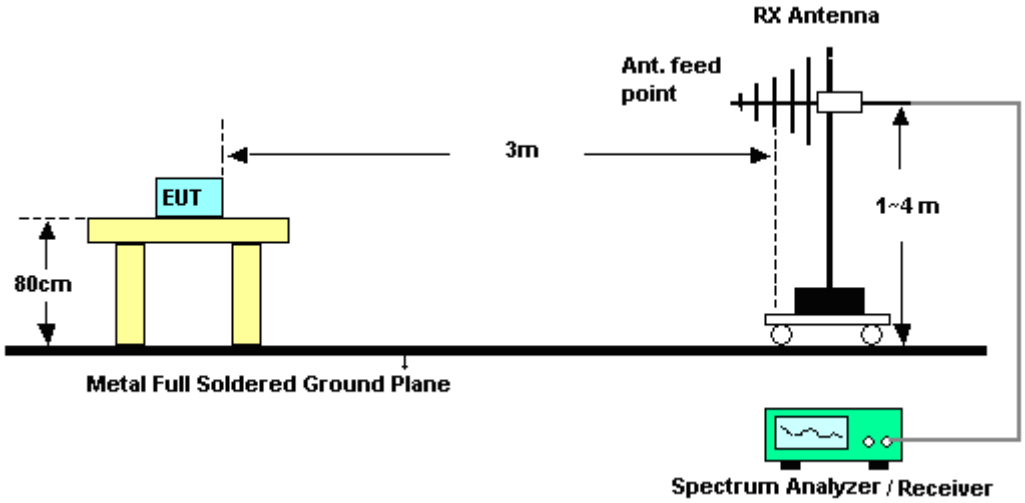
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

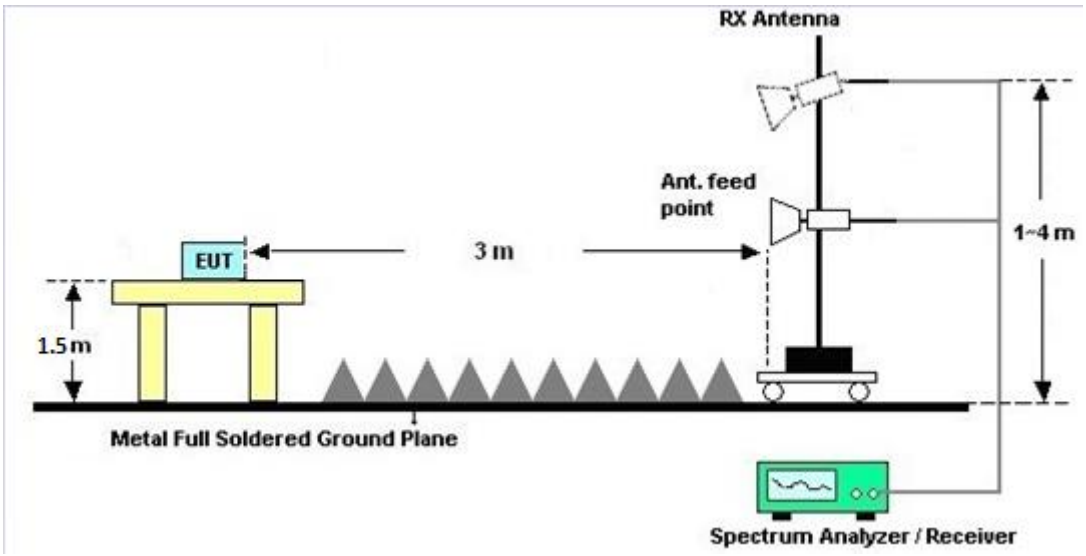
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

3.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

3.4.7 Duty Cycle

Please refer to Appendix C.

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

Please refer to Appendix B.

3.5 AC Conducted Emission Measurement

3.5.1 Limit of AC Conducted Emission

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

Frequency of emission (MHz)	Conducted limit (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.

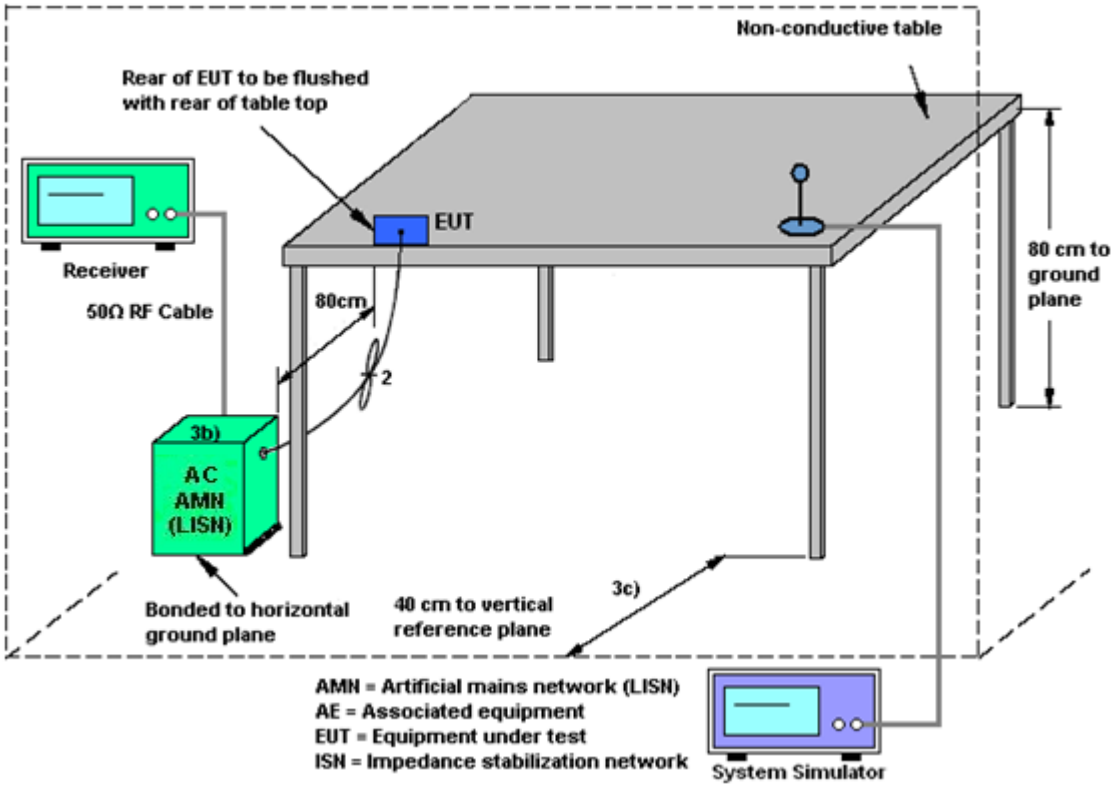
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

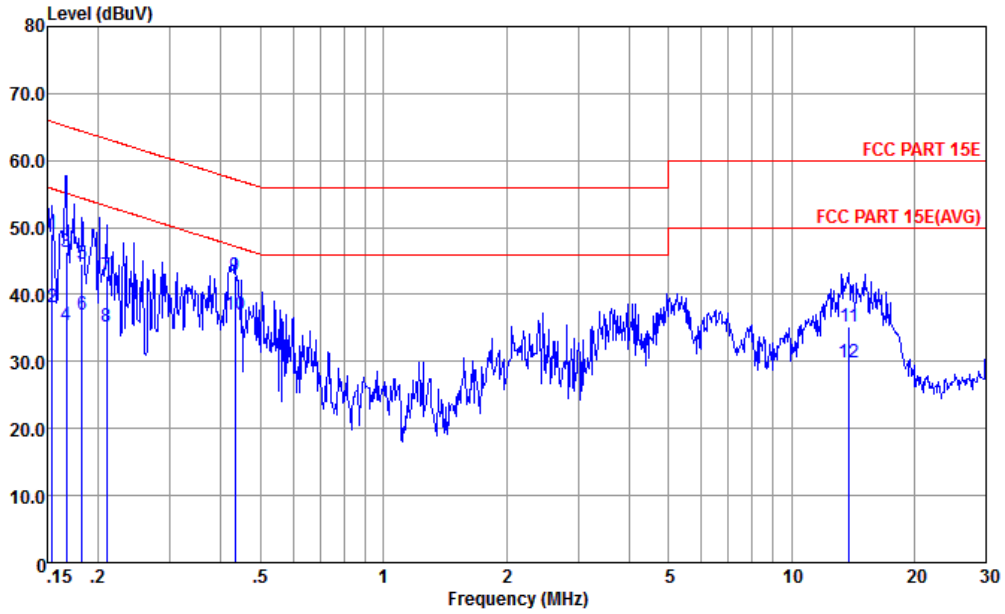
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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

Test Mode :	Mode 1	**Temperature :**	22~24℃
Test Engineer :	Amos Zhang	**Relative Humidity :**	42~46%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	LTE Band 2 Idle + Bluetooth Link + WLAN Link (5G) + USB Cable (Charging from Adapter)		

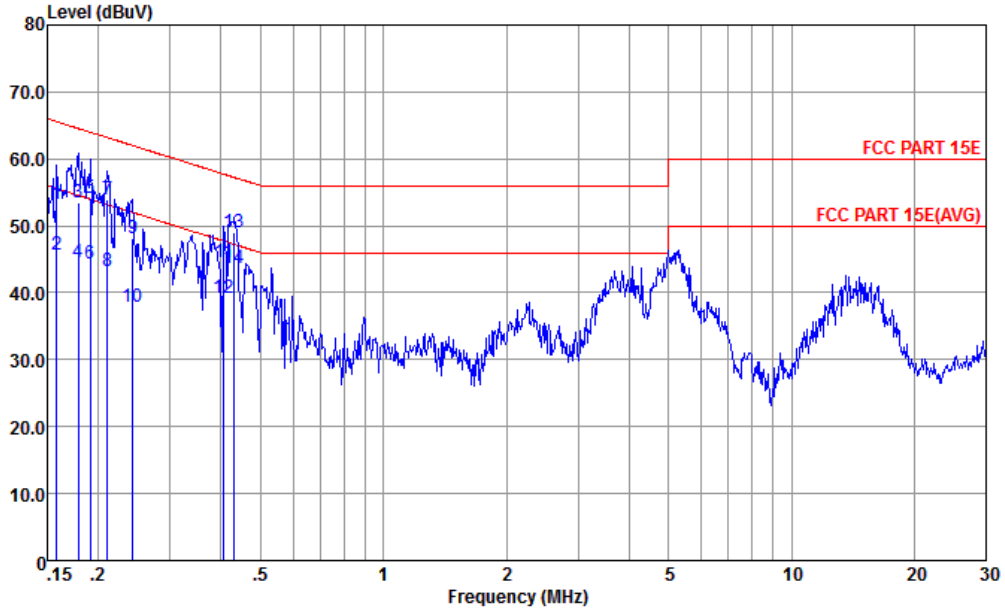


Site : CO01-KS
Condition : FCC PART 15E LISN-L-161017-060103 LINE

mode : Mode 1
: 865464030000055 #14

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.154	49.01	-16.77	65.78	38.09	0.53	10.39	QP
2		0.154	38.21	-17.57	55.78	27.29	0.53	10.39	Average
3		0.167	46.42	-18.70	65.12	35.60	0.45	10.37	QP
4		0.167	35.42	-19.70	55.12	24.60	0.45	10.37	Average
5		0.182	44.61	-19.76	64.37	33.90	0.36	10.35	QP
6		0.182	36.91	-17.46	54.37	26.20	0.36	10.35	Average
7		0.209	42.89	-20.34	63.23	32.30	0.27	10.32	QP
8		0.209	35.19	-18.04	53.23	24.60	0.27	10.32	Average
9		0.433	42.77	-14.43	57.20	32.30	0.27	10.20	QP
10	*	0.433	37.07	-10.13	47.20	26.60	0.27	10.20	Average
11		13.841	35.31	-24.69	60.00	24.60	0.28	10.43	QP
12		13.841	29.91	-20.09	50.00	19.20	0.28	10.43	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	42~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	LTE Band 2 Idle + Bluetooth Link + WLAN Link (5G) + USB Cable (Charging from Adapter)		



Site : CO01-KS
Condition : FCC PART 15E LISN-N-161017-060103 NEUTRAL

mode : Mode 1
: 865464030000055 #14

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.158	53.32	-12.24	65.56	42.60	0.34	10.38	QP
2	0.158	45.62	-9.94	55.56	34.90	0.34	10.38	Average
3	0.179	53.59	-10.96	64.55	42.90	0.33	10.36	QP
4	0.179	44.59	-9.96	54.55	33.90	0.33	10.36	Average
5	0.191	54.17	-9.81	63.98	43.50	0.33	10.34	QP
6	0.191	44.27	-9.71	53.98	33.60	0.33	10.34	Average
7	0.211	53.86	-9.32	63.18	43.21	0.33	10.32	QP
8	0.211	43.26	-9.92	53.18	32.61	0.33	10.32	Average
9	0.243	48.24	-13.76	62.00	37.60	0.34	10.30	QP
10	0.243	37.94	-14.06	52.00	27.30	0.34	10.30	Average
11	0.406	44.47	-13.26	57.73	33.90	0.37	10.20	QP
12	0.406	39.27	-8.46	47.73	28.70	0.37	10.20	Average
13	0.431	48.97	-8.27	57.24	38.40	0.37	10.20	QP
14 *	0.431	43.67	-3.57	47.24	33.10	0.37	10.20	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

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

3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.8.3 Antenna Gain

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

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 09, 2016	May 23, 2017~ May 24, 2017	Aug. 08, 2017	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 19, 2017	May 23, 2017~ May 24, 2017	Jan. 18, 2018	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 19, 2017	May 23, 2017~ May 24, 2017	Jan. 18, 2018	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 13, 2016	May 23, 2017~ May 24, 2017	Oct. 12, 2017	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Aug. 09, 2016	May 23, 2017~ Jun. 02, 2017	Aug. 08, 2017	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz~44GHz, MAX 30dB	Apr. 18, 2017	May 23, 2017~ Jun. 02, 2017	Apr. 17, 2018	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 23, 2016	May 23, 2017~ Jun. 02, 2017	Nov. 22, 2017	Radiation (03CH01-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz~2GHz	Aug. 20, 2016	May 23, 2017~ Jun. 02, 2017	Aug. 19, 2017	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 22, 2016	May 23, 2017~ Jun. 02, 2017	Oct. 21, 2017	Radiation (03CH02-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 15, 2017	May 23, 2017~ Jun. 02, 2017	Feb. 14, 2018	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 09, 2016	May 23, 2017~ Jun. 02, 2017	Aug. 08, 2017	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1GHz~26.5GHz	Oct. 13, 2016	May 23, 2017~ Jun. 02, 2017	Oct. 12, 2017	Radiation (03CH02-KS)
Amplifier	MITEQ	TTA1840-35-HG	1887435	18GHz~40GHz	Oct. 13, 2016	May 23, 2017~ Jun. 02, 2017	Oct. 12, 2017	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	6160100024 73	N/A	NCR	May 23, 2017~ Jun. 02, 2017	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	May 23, 2017~ Jun. 02, 2017	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	May 23, 2017~ Jun. 02, 2017	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	Apr. 29, 2016	May 27, 2017	Apr. 28, 2017	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2016	May 27, 2017	Oct. 12, 2017	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2016	May 27, 2017	Oct. 12, 2017	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 13, 2016	May 27, 2017	Oct. 12, 2017	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**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2dB**

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.7dB**

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.3dB**

Appendix A. Conducted Test Results

Report Number : FR750402D

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2017/5/23~2017/5/24	Relative Humidity:	51~55	%

Report Number : FR750402D

TEST RESULTS DATA
26dB and 99% OBW

Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	IC 99% Bandwidth Power Limit (dBm)	IC 99% Bandwidth EIRP Limit (dBm)		
11a	6Mbps	1	36	5180	16.83	20.68	-	22.26		
11a	6Mbps	1	44	5220	16.78	20.88	-	22.25		
11a	6Mbps	1	48	5240	16.78	20.88	-	22.25		
HT20	MCS0	1	36	5180	17.78	21.63	-	22.50		
HT20	MCS0	1	44	5220	17.78	21.83	-	22.50		
HT20	MCS0	1	48	5240	17.68	21.68	-	22.48		
HT40	MCS0	1	38	5190	35.96	41.27	-	23.01		
HT40	MCS0	1	46	5230	36.06	41.54	-	23.01		

Report Number : FR750402D

TEST RESULTS DATA
Average Power Table

FCC Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6Mbps	1	36	5180	0.22	11.70	24.00	-2.60		Pass
11a	6Mbps	1	44	5220	0.22	11.75	24.00	-2.60		Pass
11a	6Mbps	1	48	5240	0.22	11.24	24.00	-2.60		Pass
HT20	MCS0	1	36	5180	0.27	11.45	24.00	-2.60		Pass
HT20	MCS0	1	44	5220	0.27	11.54	24.00	-2.60		Pass
HT20	MCS0	1	48	5240	0.27	10.98	24.00	-2.60		Pass
HT40	MCS0	1	38	5190	0.41	11.62	24.00	-2.60		Pass
HT40	MCS0	1	46	5230	0.41	11.67	24.00	-2.60		Pass

Report Number : FR750402D

TEST RESULTS DATA
Power Spectral Density

FCC Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm/MHz)	DG (dBi)	-	Pass/Fail
11a	6Mbps	1	36	5180	0.22	0.82	11.00	-2.60		Pass
11a	6Mbps	1	44	5220	0.22	0.65	11.00	-2.60		Pass
11a	6Mbps	1	48	5240	0.22	0.88	11.00	-2.60		Pass
HT20	MCS0	1	36	5180	0.27	0.30	11.00	-2.60		Pass
HT20	MCS0	1	44	5220	0.27	0.48	11.00	-2.60		Pass
HT20	MCS0	1	48	5240	0.27	0.82	11.00	-2.60		Pass
HT40	MCS0	1	38	5190	0.41	-1.58	11.00	-2.60		Pass
HT40	MCS0	1	46	5230	0.41	-1.81	11.00	-2.60		Pass

Report Number : FR750402D

TEST RESULTS DATA
26dB and 99% OBW

Band II										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	IC 99% Bandwidth Power Limit (dBm)	IC 99% Bandwidth EIRP Limit (dBm)	FCC 26dB Bandwidth Power Limit (dBm)	Note
11a	6M bps	1	52	5260	16.73	20.88	23.24	29.24	23.98	
11a	6M bps	1	60	5300	16.73	20.88	23.24	29.24	23.98	
11a	6M bps	1	64	5320	16.78	20.73	23.25	29.25	23.98	
HT20	MCS 0	1	52	5260	17.73	21.78	23.49	29.49	23.98	
HT20	MCS 0	1	60	5300	17.68	21.58	23.48	29.48	23.98	
HT20	MCS 0	1	64	5320	17.73	21.68	23.49	29.49	23.98	
HT40	MCS 0	1	54	5270	36.06	42.17	23.98	30.00	23.98	
HT40	MCS 0	1	62	5310	35.96	41.54	23.98	30.00	23.98	

Report Number : FR750402D

TEST RESULTS DATA
Average Power Table

FCC Band II										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
11a	6M bps	1	52	5260	0.22	11.51	23.98	-2.60	26.99	Pass
11a	6M bps	1	60	5300	0.22	11.19	23.98	-2.60	26.99	Pass
11a	6M bps	1	64	5320	0.22	11.24	23.98	-2.60	26.99	Pass
HT20	MCS 0	1	52	5260	0.27	11.19	23.98	-2.60	26.99	Pass
HT20	MCS 0	1	60	5300	0.27	10.98	23.98	-2.60	26.99	Pass
HT20	MCS 0	1	64	5320	0.27	10.96	23.98	-2.60	26.99	Pass
HT40	MCS 0	1	54	5270	0.41	11.43	23.98	-2.60	26.99	Pass
HT40	MCS 0	1	62	5310	0.41	11.46	23.98	-2.60	26.99	Pass

Report Number : FR750402D

TEST RESULTS DATA
Power Spectral Density

Band II										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm/MHz)	DG (dBi)		Pass/Fail
11a	6M bps	1	52	5260	0.22	0.78	11.00	-2.60		Pass
11a	6M bps	1	60	5300	0.22	0.93	11.00	-2.60		Pass
11a	6M bps	1	64	5320	0.22	0.38	11.00	-2.60		Pass
HT20	MCS 0	1	52	5260	0.27	0.47	11.00	-2.60		Pass
HT20	MCS 0	1	60	5300	0.27	0.65	11.00	-2.60		Pass
HT20	MCS 0	1	64	5320	0.27	0.17	11.00	-2.60		Pass
HT40	MCS 0	1	54	5270	0.41	-2.35	11.00	-2.60		Pass
HT40	MCS 0	1	62	5310	0.41	-1.94	11.00	-2.60		Pass

Report Number : FR750402D

TEST RESULTS DATA
Frequency Stability

Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (˚C)	Voltage (V)	Note
11a	6Mbps	1	36	5180	5179.950	-0.050	-9.65	50	120	
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	-30	120	
11a	6Mbps	1	36	5180	5179.950	-0.050	-9.65	20	138	
11a	6Mbps	1	36	5180	5179.950	-0.050	-9.65	20	102	
11a	6Mbps	1	36	5180	5179.950	-0.050	-9.65	20	120	

Band II										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (˚C)	Voltage (V)	Note
11a	6Mbps	1	64	5320	5319.925	-0.075	-14.10	50	120	
11a	6Mbps	1	64	5320	5319.975	-0.025	-4.70	-30	120	
11a	6Mbps	1	64	5320	5319.925	-0.075	-14.10	20	138	
11a	6Mbps	1	64	5320	5319.925	-0.075	-14.10	20	102	
11a	6Mbps	1	64	5320	5319.925	-0.075	-14.10	20	120	

Appendix B. Radiated Spurious Emission

Band 1 - 5150~5250MHz

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 36 5180MHz		5148	50.52	-23.48	74	44.56	31.06	7.02	32.12	315	110	P	H
		5149.6	40.88	-13.12	54	34.92	31.06	7.02	32.12	315	110	A	H
	*	5178	102.58	-	-	96.65	31	7.06	32.13	315	110	P	H
	*	5178	94.9	-	-	88.97	31	7.06	32.13	315	110	A	H
		5148.48	49.73	-24.27	74	43.77	31.06	7.02	32.12	282	147	P	V
		5149.97	40.05	-13.95	54	34.09	31.06	7.02	32.12	282	147	A	V
	*	5182	100.94	-	-	95.01	31	7.06	32.13	282	147	P	V
	*	5182	93.26	-	-	87.33	31	7.06	32.13	282	147	A	V
802.11a CH 44 5220MHz		5138.88	48.23	-25.77	74	42.26	31.09	7	32.12	316	111	P	H
		5148.32	38.85	-15.15	54	32.89	31.06	7.02	32.12	316	111	A	H
	*	5222	100.56	-	-	94.64	30.94	7.11	32.13	316	111	P	H
	*	5222	93.2	-	-	87.28	30.94	7.11	32.13	316	111	A	H
		5358.06	45.25	-28.75	74	39.39	30.71	7.3	32.15	316	111	P	H
		5353.56	36.55	-17.45	54	30.69	30.71	7.3	32.15	316	111	A	H
		5103.2	48.07	-25.93	74	42.08	31.15	6.95	32.11	299	148	P	V
		5149.76	38.77	-15.23	54	32.81	31.06	7.02	32.12	299	148	A	V
	*	5218	99.55	-	-	93.63	30.94	7.11	32.13	299	148	P	V
	*	5218	91.74	-	-	85.82	30.94	7.11	32.13	299	148	A	V
		5373.54	47	-27	74	41.16	30.68	7.32	32.16	299	148	P	V
		5352.3	36.57	-17.43	54	30.71	30.71	7.3	32.15	299	148	A	V

802.11a CH 48 5240MHz		5355.36	46.15	-27.85	74	40.29	30.71	7.3	32.15	315	112	P	H
		5353.74	36.91	-17.09	54	31.05	30.71	7.3	32.15	315	112	A	H
	*	5244	100.68	-	-	94.78	30.88	7.16	32.14	315	112	P	H
	*	5244	93.62	-	-	87.72	30.88	7.16	32.14	315	112	A	H
		5375.34	46.84	-27.16	74	41	30.68	7.32	32.16	296	148	P	V
		5352.3	36.71	-17.29	54	30.85	30.71	7.3	32.15	296	148	A	V
	*	5244	99.22	-	-	93.32	30.88	7.16	32.14	296	148	P	V
	*	5244	92.42	-	-	86.52	30.88	7.16	32.14	296	148	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

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 36 5180MHz		10360	41.06	-32.94	74	57.49	37.49	9.9	63.82	100	360	P	H
		10360	40.12	-33.88	74	56.55	37.49	9.9	63.82	100	360	P	V
802.11a CH 44 5220MHz		10440	41.9	-32.1	74	58.08	37.62	9.94	63.74	100	360	P	H
		10440	41.3	-32.7	74	57.48	37.62	9.94	63.74	100	360	P	V
802.11a CH 48 5240MHz		10480	42.96	-31.04	74	58.97	37.71	9.97	63.69	100	360	P	H
		10480	41.32	-32.68	74	57.33	37.71	9.97	63.69	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5140.32	50.6	-23.4	74	44.64	31.06	7.02	32.12	321	112	P	H
		5149.96	40.36	-13.64	54	34.4	31.06	7.02	32.12	321	112	A	H
802.11n	*	5182	101.58	-	-	95.65	31	7.06	32.13	321	112	P	H
HT20	*	5182	94.02	-	-	88.09	31	7.06	32.13	321	112	A	H
CH 36		5142.72	49.08	-24.92	74	43.12	31.06	7.02	32.12	400	141	P	V
5180MHz		5149.96	39.69	-14.31	54	33.73	31.06	7.02	32.12	400	141	A	V
	*	5176	100.28	-	-	94.35	31	7.06	32.13	400	141	P	V
	*	5176	92.96	-	-	87.03	31	7.06	32.13	400	141	A	V
		5135.04	48.8	-25.2	74	42.83	31.09	7	32.12	375	114	P	H
		5149.92	38.73	-15.27	54	32.77	31.06	7.02	32.12	375	114	A	H
	*	5208	98.81	-	-	92.89	30.94	7.11	32.13	375	114	P	H
	*	5208	91.26	-	-	85.34	30.94	7.11	32.13	375	114	A	H
802.11n		5350.68	45.68	-28.32	74	39.82	30.71	7.3	32.15	375	114	P	H
HT20		5371.2	36.5	-17.5	54	30.66	30.68	7.32	32.16	375	114	A	H
CH 44		5138.56	47.89	-26.11	74	41.92	31.09	7	32.12	365	140	P	V
5220MHz		5149.12	38.65	-15.35	54	32.69	31.06	7.02	32.12	365	140	A	V
	*	5208	100.07	-	-	94.15	30.94	7.11	32.13	365	140	P	V
	*	5208	92.13	-	-	86.21	30.94	7.11	32.13	365	140	A	V
		5353.74	45.98	-28.02	74	40.12	30.71	7.3	32.15	365	140	P	V
		5350.86	36.7	-17.3	54	30.84	30.71	7.3	32.15	365	140	A	V

		5378.4	45.79	-28.21	74	39.96	30.65	7.34	32.16	321	112	P	H
		5351.94	36.7	-17.3	54	30.84	30.71	7.3	32.15	321	112	A	H
802.11n	*	5244	100.38	-	-	94.48	30.88	7.16	32.14	321	112	P	H
HT20	*	5244	92.83	-	-	86.93	30.88	7.16	32.14	321	112	A	H
CH 48		5354.1	45.28	-28.72	74	39.42	30.71	7.3	32.15	380	140	P	V
5240MHz		5353.56	36.7	-17.3	54	30.84	30.71	7.3	32.15	380	140	A	V
	*	5244	99.91	-	-	94.01	30.88	7.16	32.14	380	140	P	V
	*	5244	92.42	-	-	86.52	30.88	7.16	32.14	380	140	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 36 5180MHz		10360	40.46	-33.54	74	56.89	37.49	9.9	63.82	100	360	P	H
		10360	40.41	-33.59	74	56.84	37.49	9.9	63.82	100	360	P	V
802.11n HT20 CH 44 5220MHz		10440	41.85	-32.15	74	58.03	37.62	9.94	63.74	100	360	P	H
		10440	41.55	-32.45	74	57.73	37.62	9.94	63.74	100	360	P	V
802.11n HT20 CH 48 5240MHz		10480	41.48	-32.52	74	57.49	37.71	9.97	63.69	100	360	P	H
		10480	40.7	-33.3	74	56.71	37.71	9.97	63.69	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

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 38 5190MHz		5127.36	55.6	-18.4	74	49.63	31.09	7	32.12	268	110	P	H
		5149.92	46.18	-7.82	54	40.22	31.06	7.02	32.12	268	110	A	H
	*	5182	97.68	-	-	91.75	31	7.06	32.13	268	110	P	H
	*	5182	91.12	-	-	85.19	31	7.06	32.13	268	110	A	H
		5399.1	46.29	-27.71	74	40.46	30.62	7.37	32.16	268	110	P	H
		5376.6	36.96	-17.04	54	31.12	30.68	7.32	32.16	268	110	A	H
		5149.96	54.15	-19.85	74	48.19	31.06	7.02	32.12	293	147	P	V
		5149.6	46.24	-7.76	54	40.28	31.06	7.02	32.12	293	147	A	V
	*	5182	96.53	-	-	90.6	31	7.06	32.13	293	147	P	V
	*	5182	89.5	-	-	83.57	31	7.06	32.13	293	147	A	V
		5359.14	48.01	-25.99	74	42.15	30.71	7.3	32.15	293	147	P	V
		5361.84	36.92	-17.08	54	31.08	30.68	7.32	32.16	293	147	A	V
802.11n HT40 CH 46 5230MHz		5148.64	48	-26	74	42.04	31.06	7.02	32.12	301	111	P	H
		5146.4	39.76	-14.24	54	33.8	31.06	7.02	32.12	301	111	A	H
	*	5234	97.58	-	-	91.68	30.91	7.13	32.14	301	111	P	H
	*	5234	89.82	-	-	83.92	30.91	7.13	32.14	301	111	A	H
		5357.7	45.45	-28.55	74	39.59	30.71	7.3	32.15	301	111	P	H
		5358.96	37.45	-16.55	54	31.59	30.71	7.3	32.15	301	111	A	H
		5148.48	48.58	-25.42	74	42.62	31.06	7.02	32.12	290	150	P	V
		5147.2	39.39	-14.61	54	33.43	31.06	7.02	32.12	290	150	A	V
	*	5236	96.21	-	-	90.31	30.91	7.13	32.14	290	150	P	V
	*	5236	88.72	-	-	82.82	30.91	7.13	32.14	290	150	A	V
		5353.56	48.34	-25.66	74	42.48	30.71	7.3	32.15	290	150	P	V
		5350.32	37.31	-16.69	54	31.45	30.71	7.3	32.15	290	150	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 1 5150~5250MHz

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 38 5190MHz		10380	41.86	-32.14	74	58.23	37.52	9.91	63.8	100	360	P	H
		10380	41.26	-32.74	74	57.63	37.52	9.91	63.8	100	360	P	V
802.11n HT40 CH 46 5230MHz		10460	40.99	-33.01	74	57.11	37.65	9.95	63.72	100	360	P	H
		10460	42.16	-31.84	74	58.28	37.65	9.95	63.72	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 2 - 5250~5350MHz

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 52 5260MHz		5137.76	48.99	-25.01	74	43.02	31.09	7	32.12	309	111	P	H
		5102.4	38.71	-15.29	54	32.72	31.15	6.95	32.11	309	111	A	H
	*	5262	101.31	-	-	95.42	30.85	7.18	32.14	309	111	P	H
	*	5262	93.92	-	-	88.03	30.85	7.18	32.14	309	111	A	H
		5145.76	48.19	-25.81	74	42.23	31.06	7.02	32.12	296	149	P	V
		5135.36	38.6	-15.4	54	32.63	31.09	7	32.12	296	149	A	V
	*	5262	100.29	-	-	94.4	30.85	7.18	32.14	296	149	P	V
	*	5262	93.11	-	-	87.22	30.85	7.18	32.14	296	149	A	V
802.11a CH 60 5300MHz		5132.64	47.4	-26.6	74	41.43	31.09	7	32.12	364	68	P	H
		5116.64	38.18	-15.82	54	32.2	31.12	6.98	32.12	364	68	A	H
	*	5302	99.59	-	-	93.72	30.79	7.23	32.15	364	68	P	H
	*	5302	92.45	-	-	86.58	30.79	7.23	32.15	364	68	A	H
		5364.6	46.92	-27.08	74	41.08	30.68	7.32	32.16	364	68	P	H
		5350.2	37.89	-16.11	54	32.03	30.71	7.3	32.15	364	68	A	H
		5124.8	47.3	-26.7	74	41.33	31.09	7	32.12	400	140	P	V
		5129.44	38.42	-15.58	54	32.45	31.09	7	32.12	400	140	A	V
	*	5302	99.94	-	-	94.07	30.79	7.23	32.15	400	140	P	V
	*	5302	92.68	-	-	86.81	30.79	7.23	32.15	400	140	A	V
		5359.9	46.32	-27.68	74	40.46	30.71	7.3	32.15	400	140	P	V
		5350.4	38.32	-15.68	54	32.46	30.71	7.3	32.15	400	140	A	V

802.11a CH 64 5320MHz	*	5322	99.42	-	-	93.56	30.76	7.25	32.15	400	64	P	H
	*	5322	92.15	-	-	86.29	30.76	7.25	32.15	400	64	A	H
		5352.1	48.42	-25.58	74	42.56	30.71	7.3	32.15	400	64	P	H
		5350.8	38.91	-15.09	54	33.05	30.71	7.3	32.15	400	64	A	H
	*	5318	98.52	-	-	92.66	30.76	7.25	32.15	400	147	P	V
	*	5318	91.62	-	-	85.76	30.76	7.25	32.15	400	147	A	V
		5350.4	47.86	-26.14	74	42	30.71	7.3	32.15	400	147	P	V
		5350.8	38.69	-15.31	54	32.83	30.71	7.3	32.15	400	147	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 2 5250~5350MHz

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 52 5260MHz		10520	40.47	-33.53	74	56.34	37.78	10	63.65	100	360	P	H
		10520	41.9	-32.1	74	57.77	37.78	10	63.65	100	360	P	V
802.11a CH 60 5300MHz		10600	41.79	-32.21	74	57.36	37.93	10.05	63.55	100	360	P	H
		10600	41.77	-32.23	74	57.34	37.93	10.05	63.55	100	360	P	V
802.11a CH 64 5320MHz		10640	41.43	-32.57	74	56.88	38	10.07	63.52	100	360	P	H
		10640	40.48	-33.52	74	55.93	38	10.07	63.52	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 2 5250~5350MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5132.48	47.87	-26.13	74	41.9	31.09	7	32.12	323	113	P	H
		5124.32	38.62	-15.38	54	32.65	31.09	7	32.12	323	113	A	H
802.11n	*	5258	100.63	-	-	94.73	30.88	7.16	32.14	323	113	P	H
HT20	*	5258	93.02	-	-	87.12	30.88	7.16	32.14	323	113	A	H
CH 52		5142.56	48.41	-25.59	74	42.45	31.06	7.02	32.12	400	142	P	V
5260MHz		5137.92	38.42	-15.58	54	32.45	31.09	7	32.12	400	142	A	V
	*	5258	100.57	-	-	94.67	30.88	7.16	32.14	400	142	P	V
	*	5258	93.05	-	-	87.15	30.88	7.16	32.14	400	142	A	V
		5124.48	47.39	-26.61	74	41.42	31.09	7	32.12	321	112	P	H
		5101.92	38.31	-15.69	54	32.32	31.15	6.95	32.11	321	112	A	H
	*	5298	98.9	-	-	93.03	30.79	7.23	32.15	321	112	P	H
	*	5298	91.37	-	-	85.5	30.79	7.23	32.15	321	112	A	H
802.11n		5382	46.86	-27.14	74	41.03	30.65	7.34	32.16	321	112	P	H
HT20		5350	37.92	-16.08	54	32.06	30.71	7.3	32.15	321	112	A	H
CH 60		5112.64	47.57	-26.43	74	41.59	31.12	6.98	32.12	400	143	P	V
5300MHz		5113.6	38.24	-15.76	54	32.26	31.12	6.98	32.12	400	143	A	V
	*	5298	98.98	-	-	93.11	30.79	7.23	32.15	400	143	P	V
	*	5298	92.04	-	-	86.17	30.79	7.23	32.15	400	143	A	V
		5357	46.66	-27.34	74	40.8	30.71	7.3	32.15	400	143	P	V
		5352.2	37.84	-16.16	54	31.98	30.71	7.3	32.15	400	143	A	V

	*	5318	98.97	-	-	93.11	30.76	7.25	32.15	317	112	P	H
	*	5318	91.35	-	-	85.49	30.76	7.25	32.15	317	112	A	H
802.11n		5373.3	47.44	-26.56	74	41.6	30.68	7.32	32.16	317	112	P	H
HT20		5355.5	38.55	-15.45	54	32.69	30.71	7.3	32.15	317	112	A	H
CH 64	*	5322	99.11	-	-	93.25	30.76	7.25	32.15	400	141	P	V
5320MHz	*	5322	91.77	-	-	85.91	30.76	7.25	32.15	400	141	A	V
		5360.5	48.3	-25.7	74	42.44	30.71	7.3	32.15	400	141	P	V
		5350.9	38.79	-15.21	54	32.93	30.71	7.3	32.15	400	141	A	V

Remark

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

Band 2 5250~5350MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 52 5260MHz		10520	40.99	-33.01	74	56.86	37.78	10	63.65	100	360	P	H
		10520	41.48	-32.52	74	57.35	37.78	10	63.65	100	360	P	V
802.11n HT20 CH 60 5300MHz		10600	43.05	-30.95	74	58.62	37.93	10.05	63.55	100	360	P	H
		10600	40.54	-33.46	74	56.11	37.93	10.05	63.55	100	360	P	V
802.11n HT20 CH 64 5320MHz		10640	42.76	-31.24	74	58.21	38	10.07	63.52	100	360	P	H
		10640	41.52	-32.48	74	56.97	38	10.07	63.52	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 2 5250~5350MHz

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 54 5270MHz		5102.08	47.14	-26.86	74	41.15	31.15	6.95	32.11	290	109	P	H
		5149.12	39.14	-14.86	54	33.18	31.06	7.02	32.12	290	109	A	H
	*	5274	96.71	-	-	90.82	30.85	7.18	32.14	290	109	P	H
	*	5274	89.97	-	-	84.08	30.85	7.18	32.14	290	109	A	H
		5355.8	50	-24	74	44.14	30.71	7.3	32.15	290	109	P	H
		5350.5	37.85	-16.15	54	31.99	30.71	7.3	32.15	290	109	A	H
		5120.32	47.92	-26.08	74	41.94	31.12	6.98	32.12	312	148	P	V
		5108.16	39.23	-14.77	54	33.25	31.12	6.98	32.12	312	148	A	V
	*	5274	96.7	-	-	90.81	30.85	7.18	32.14	312	148	P	V
	*	5274	89.63	-	-	83.74	30.85	7.18	32.14	312	148	A	V
		5357.5	51.4	-22.6	74	45.54	30.71	7.3	32.15	312	148	P	V
		5352.9	38.03	-15.97	54	32.17	30.71	7.3	32.15	312	148	A	V
802.11n HT40 CH 62 5310MHz		5105.76	47.98	-26.02	74	42	31.12	6.98	32.12	327	80	P	H
		5126.08	38.86	-15.14	54	32.89	31.09	7	32.12	327	80	A	H
	*	5314	96.7	-	-	90.84	30.76	7.25	32.15	327	80	P	H
	*	5314	89.89	-	-	84.03	30.76	7.25	32.15	327	80	A	H
		5351.1	53.5	-20.5	74	47.64	30.71	7.3	32.15	327	80	P	H
		5350	44.59	-9.41	54	38.73	30.71	7.3	32.15	327	80	A	H
		5118.4	47.99	-26.01	74	42.01	31.12	6.98	32.12	306	150	P	V
		5133.44	38.92	-15.08	54	32.95	31.09	7	32.12	306	150	A	V
	*	5304	95.19	-	-	89.32	30.79	7.23	32.15	306	150	P	V
	*	5304	88.32	-	-	82.45	30.79	7.23	32.15	306	150	A	V
		5351.4	58.02	-15.98	74	52.16	30.71	7.3	32.15	306	150	P	V
		5350	43.6	-10.4	54	37.74	30.71	7.3	32.15	306	150	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 2 5250~5350MHz

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 54 5270MHz		10540	42.35	-31.65	74	58.16	37.81	10.01	63.63	100	360	P	H
		10540	41.34	-32.66	74	57.15	37.81	10.01	63.63	100	360	P	V
802.11n HT40 CH 62 5310MHz		10620	42.09	-31.91	74	57.61	37.96	10.06	63.54	100	360	P	H
		10620	41.16	-32.84	74	56.68	37.96	10.06	63.54	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 2 5250~5350MHz

Emission below 1GHz

WIFI 802.11n HT40 (LF @ 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)
802.11n HT40 LF		33.88	24.71	-15.29	40	31.12	24.06	0.55	31.02	-	-	P	H
		99.84	25.1	-18.4	43.5	37.61	17.8	0.39	30.7	-	-	P	H
		162.89	26.42	-17.08	43.5	38.87	16.89	1.61	30.95	-	-	P	H
		196.84	25.85	-17.65	43.5	39.41	15.79	1.74	31.09	-	-	P	H
		241.46	26.08	-19.92	46	38.19	17.52	1.55	31.18	-	-	P	H
		314.21	32.49	-13.51	46	42.16	20.06	1.77	31.5	100	126	P	H
		33.88	36.81	-3.19	40	43.22	24.06	0.55	31.02	100	265	QP	V
		44.55	26.11	-13.89	40	39.09	17.8	0.62	31.4	-	-	P	V
		86.26	24.64	-15.36	40	38.65	16.34	0.89	31.24	-	-	P	V
		114.39	21.82	-21.68	43.5	34.45	17.66	0.47	30.76	-	-	P	V
		165.8	22.44	-21.06	43.5	35.06	16.8	1.54	30.96	-	-	P	V
		193.93	23.45	-20.05	43.5	36.98	15.89	1.66	31.08	-	-	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 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)

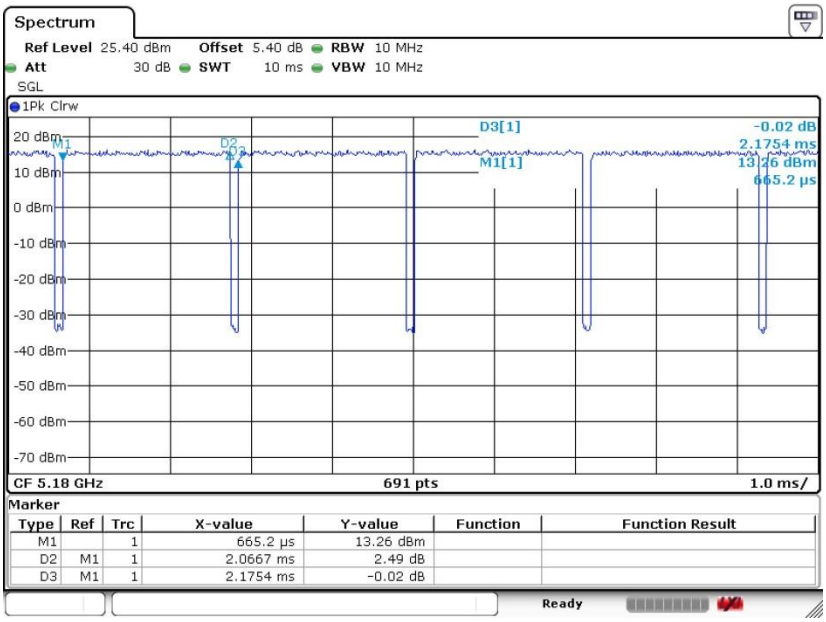
= -10.46(dB)

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

Appendix C. Duty Cycle Plots

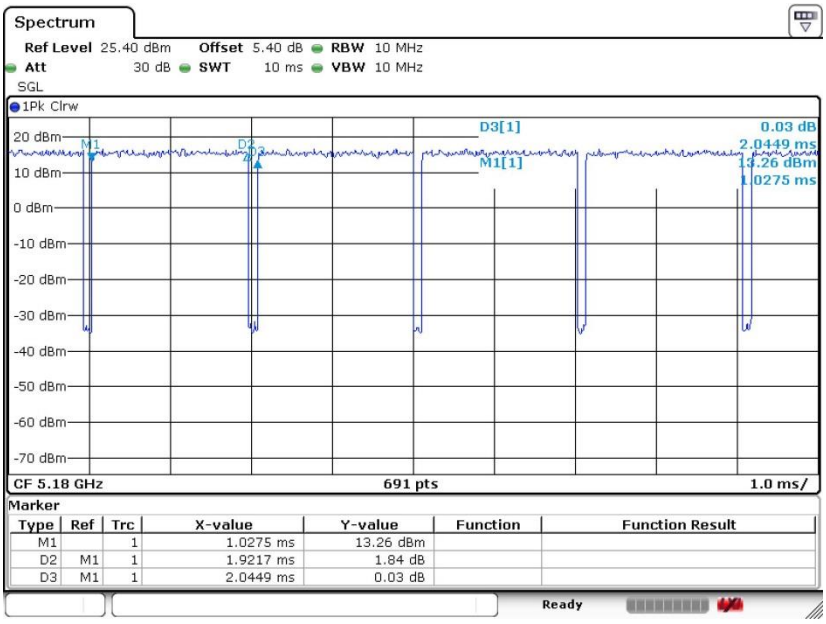
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	95.00	2.067	0.484	1kHz
802.11n HT20	93.98	1.922	0.520	1kHz
802.11n HT40	90.98	0.951	1.052	3kHz

802.11a



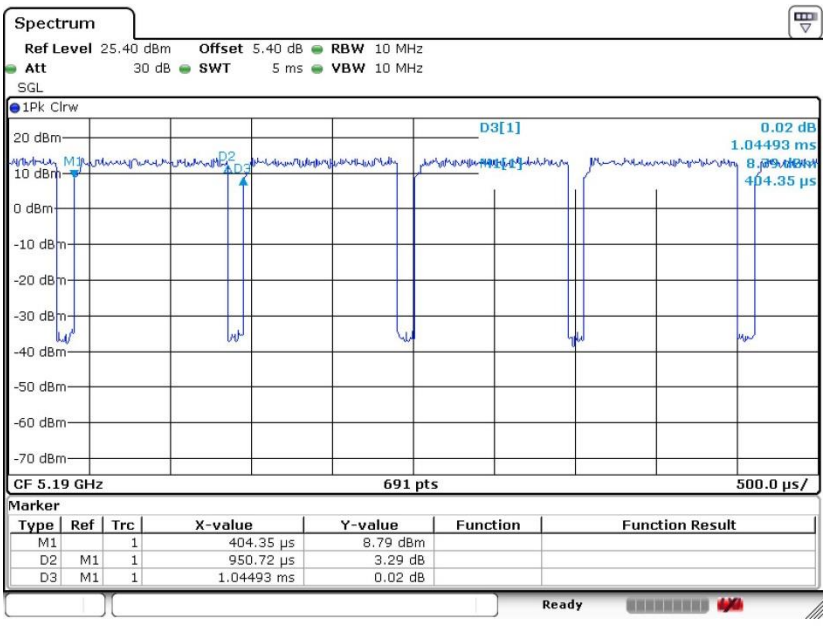
Date: 23.MAY.2017 14:32:57

802.11n HT20



Date: 23.MAY.2017 14:33:31

802.11n HT40



Date: 23.MAY.2017 14:34:44