



FCC RF Test Report

APPLICANT : Ring LLC
EQUIPMENT : Spotlight Cam Pro
BRAND NAME : Ring
MODEL NAME : 5E62E9
FCC ID : 2AEUPBHASP001
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure
TEST DATE(S) : Dec. 29, 2021 ~ Jun. 23, 2022

We, Sporton International Inc. (Kunshan), 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. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia



Sporton International Inc. (Kunshan)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR1D0812F	Rev. 01	Initial issue of report	Aug. 16, 2022

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 & 15.403(i)	26dB & 99% Bandwidth	-	Report only	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 24 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 11 dBm	Pass	-
3.4	15.407(b)	Unwanted Emissions	15.407(b) & 15.209(a)	Pass	Under limit 2.67 dB at 5350.00 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 17.60 dB at 0.154 MHz
3.6	15.203 & 15.407(a)	Antenna Requirement	15.203 & 15.407(a)	Pass	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



1 General Description

1.1 Applicant

Ring LLC

12515 Cerise Ave, Hawthorne, CA 90250 USA

1.2 Manufacturer

Goertek Inc.

No.268 Dongfang Road High-Tech Industrial Development District, Weifang Shandong, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Spotlight Cam Pro
Brand Name	Ring
Model Name	5E62E9
FCC ID	2AEUPBHASP001
HW Version	DVT2
SW Version	1.5.17
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz 5260 MHz ~ 5320 MHz 5500 MHz ~ 5720 MHz
Maximum Output Power to Antenna	<5180 MHz ~ 5240 MHz> 802.11a : 15.31 dBm / 0.0340 W 802.11n HT20 : 15.29 dBm / 0.0338 W <5260 MHz ~ 5320 MHz> 802.11a : 14.55 dBm / 0.0285 W 802.11n HT20 : 14.41 dBm / 0.0276 W <5500 MHz ~ 5720 MHz > 802.11a : 15.69 dBm / 0.0371 W 802.11n HT20 : 15.65 dBm / 0.0367 W
99% Occupied Bandwidth	<5180 MHz ~ 5240 MHz> 802.11a : 16.58 MHz 802.11n HT20 : 17.68 MHz <5260 MHz ~ 5320 MHz> 802.11a : 16.58 MHz 802.11n HT20 : 17.68 MHz <5500 MHz ~ 5720 MHz > 802.11a : 16.53 MHz 802.11n HT20 : 17.68 MHz

Antenna Type / Gain	<5180 MHz ~ 5240 MHz>
	Stamping antenna with gain 4.52 dBi
	<5260 MHz ~ 5320 MHz>
	Stamping antenna with gain 4.43 dBi
Type of Modulation	<5500 MHz ~ 5720 MHz>
	Stamping antenna with gain 4.21 dBi
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

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS 03CH06-KS TH01-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH06-KS	AUDIX	E3	6.2009-8-24a1
2.	CO01-KS	AUDIX	E3	6.2009-8-24



1.8 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.

2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y 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)
5180-5240 MHz U-NII-1	36	5180	44	5220
	40	5200	40	5200

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

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5500- 5720 MHz MHz U-NII-2C	100	5500	116	5580
	104	5520	132	5660
	108	5540	136	5680
	112	5560	140	5700

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
TDWR Channel	120	5600	128	5640
	124	5620	-	-

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
Straddle Channel	144	5720	-	-

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 HT20	MCS0

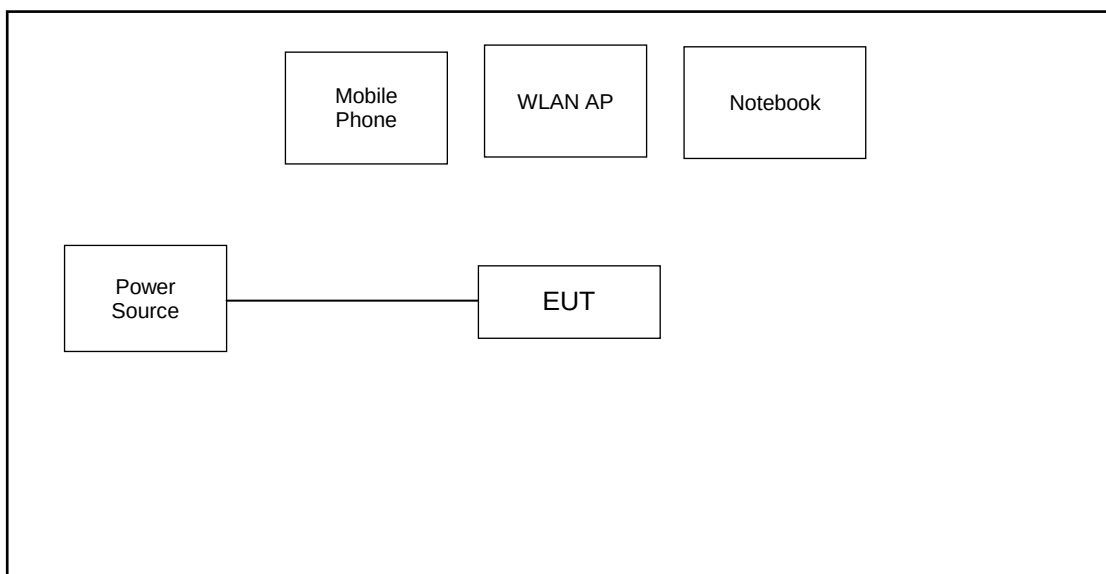
Test Cases	
AC Conducted Emission	Mode 1 : Lora Tx + Bluetooth Link + WLAN(5G)Link + USB Cable 1(Charging from Adapter 1) + Battery3+24G Radar Tx

Ch. #		U-NII-1 : 5180-5240 MHz	U-NII-2A : 5260-5320 MHz	U-NII-2C : 5500- 5720 MHz
		802.11a	802.11a	802.11a
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140
Straddle		-	-	144

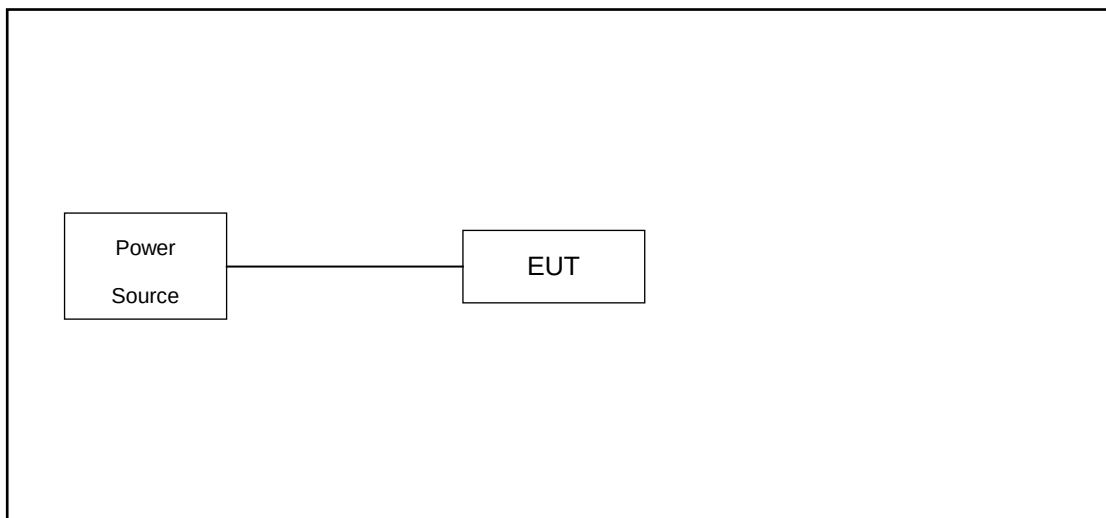
Ch. #		U-NII-1 : 5180-5240 MHz	U-NII-2A : 5260-5320 MHz	U-NII-2C : 5500- 5720 MHz
		802.11n HT20	802.11n HT20	802.11n HT20
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140
Straddle		-	-	144

2.3 Connection Diagram of Test System

For AC Conducted Emission:



For Radiated Emission:



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-655	KA21R655B1	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	V130-15IKB005	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m



2.5 EUT Operation Test Setup

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

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 7.0 dB.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} \\ &= 7.0 \text{ (dB)}\end{aligned}$$

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.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

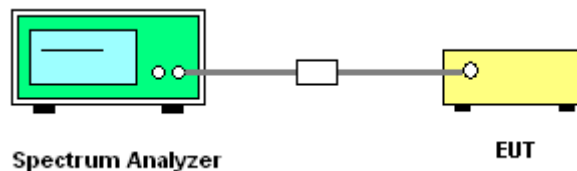
3.1.2 Measuring Instruments

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
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 1% to 5% of the OBW and set the Video bandwidth (VBW) $\geq 3 * RBW$.
8. Measure and record the results in the test report.

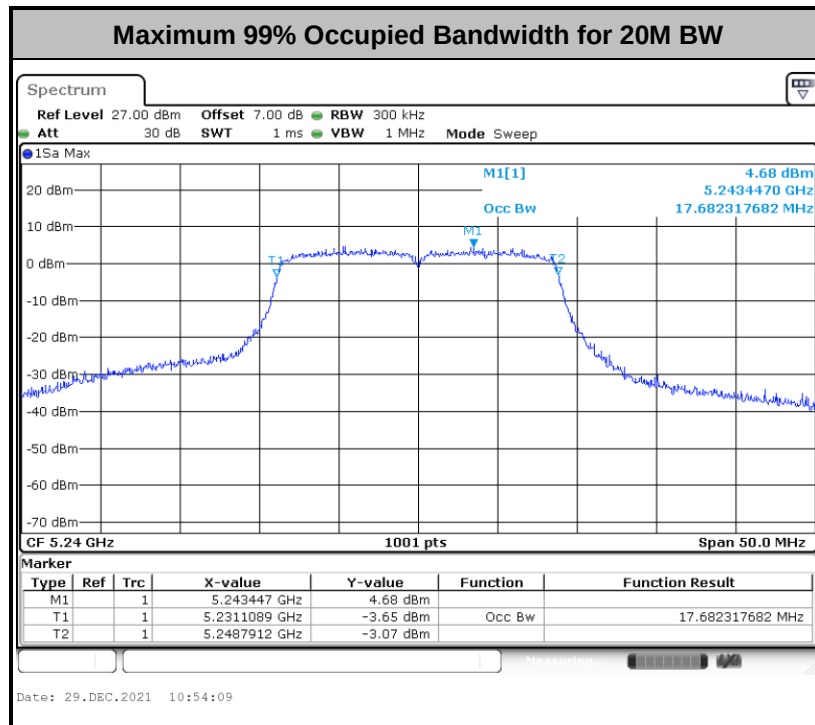
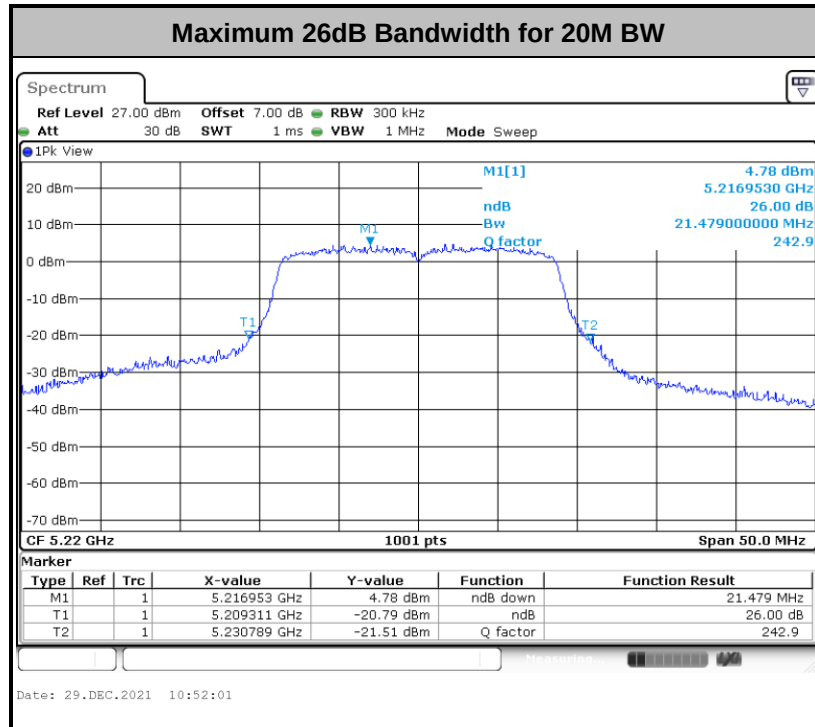
3.1.4 Test Setup





3.1.5 Test Result of 26dB & 99% Occupied Bandwidth

Please refer to Appendix A.



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

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<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 10 B, where B is the 26 dB emission bandwidth in megahertz.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

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

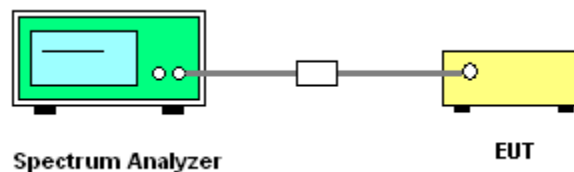
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

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.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

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

<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.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

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

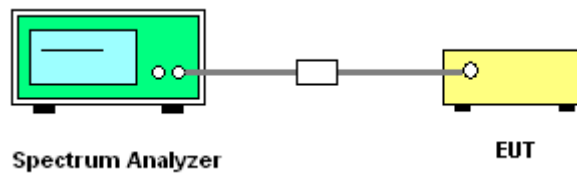
(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW $\geq$ 3 MHz.
- Number of points in sweep $\geq$ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add $10 \log(1/x)$, 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.

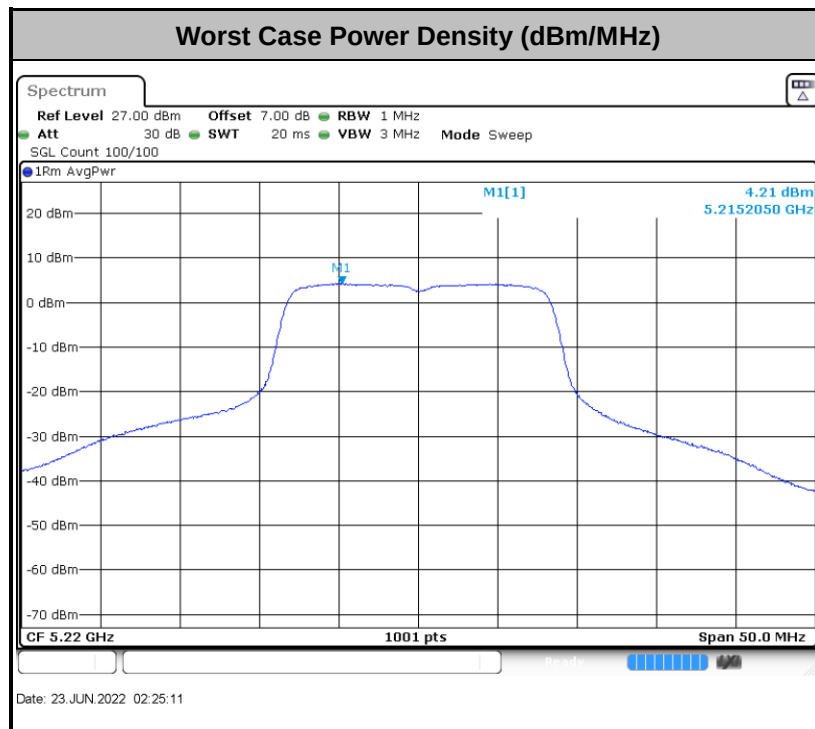
1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



Note: Max Average Power Density (4.29dBm/MHz) = Measured value (4.21dBm/MHz) + Duty Factor (0.08dB)

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 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.

For transmitters operating in the 5470-5725 MHz band: all emissions outside of the 5470-5725 MHz band shall not exceed an EIRP of -27 dBm/MHz.

- (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	68.2

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

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

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) ANSI C63.10-2013 clause 12.7.3 note 97

As specified by regulatory requirements, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit. However, an out-of-band emission that complies with both the average and peak general regulatory limits is not required to satisfy the peak emission limit.

3.4.2 Measuring Instruments

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

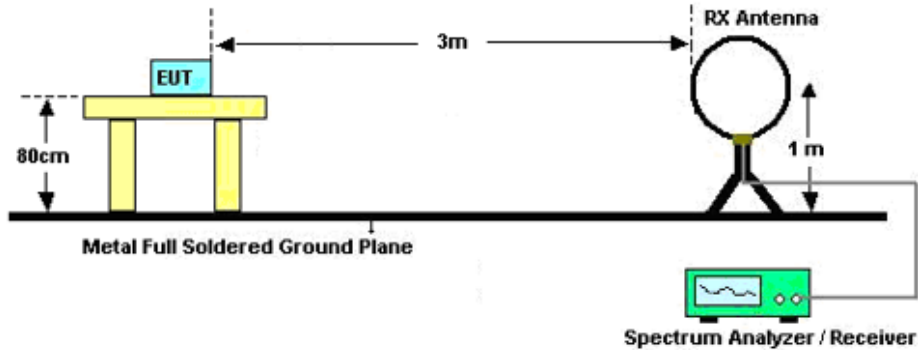


3.4.3 Test Procedures

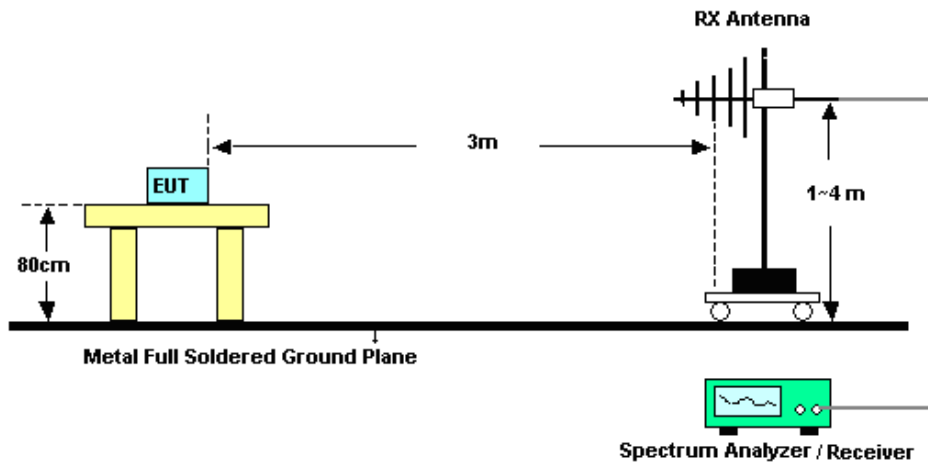
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
 - RBW = 1 MHz
 - VBW $\geq$ 3 MHz
 - Detector = Peak
 - Sweep time = auto
 - Trace mode = max hold
 - (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
 - RBW = 1 MHz
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak 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

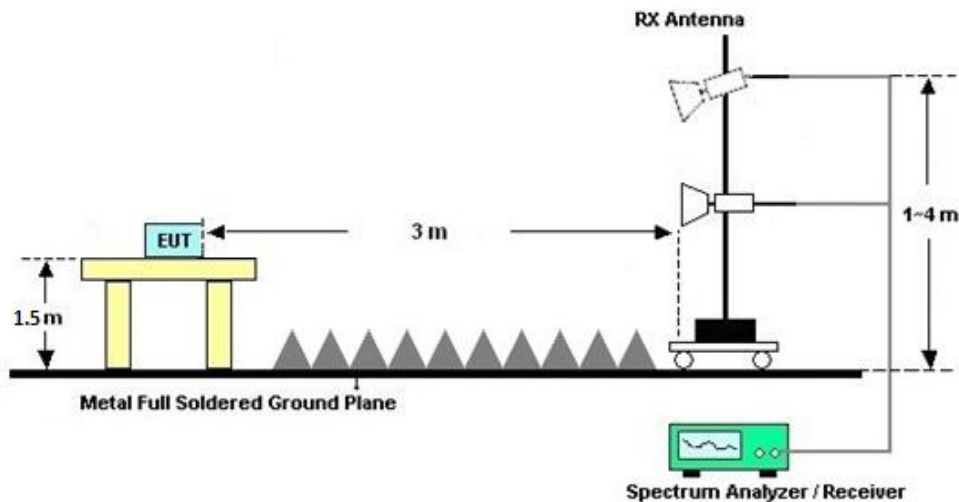
For radiated emissions below 30MHz



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.

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 Spurious at Band Edges

Please refer to Appendix C.

3.4.7 Duty Cycle

Please refer to Appendix D.

3.4.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

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.

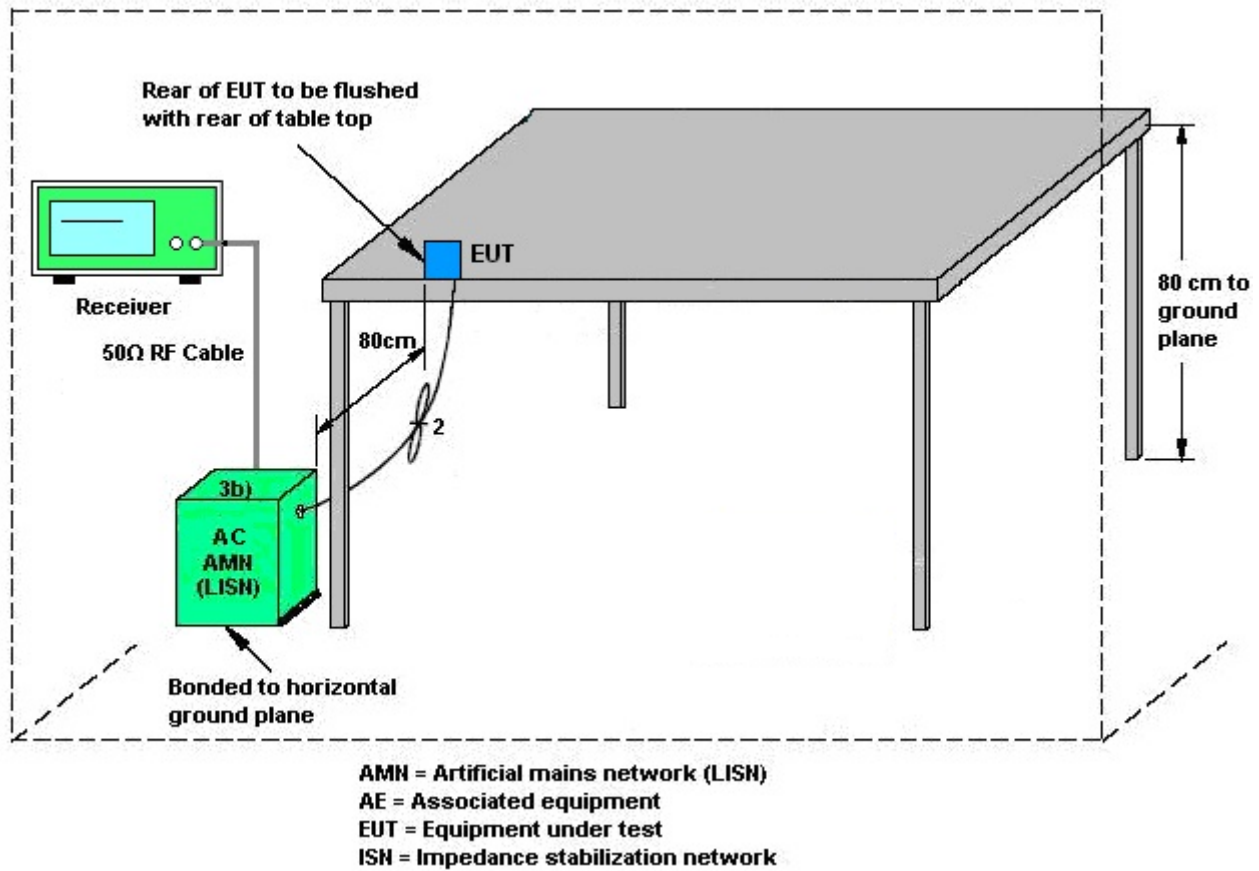
3.5.2 Measuring Instruments

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 Antenna Requirements

3.6.1 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.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.6.3 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	Oct. 14, 2021	Dec. 29, 2021~ Jun. 23, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2021	Dec. 29, 2021~ Jun. 23, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2021	Dec. 29, 2021~ Jun. 23, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 12, 2021	Dec. 29, 2021~ Jun. 23, 2022	Jul. 11, 2022	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz; Max 30dBm	Oct. 16, 2021	May 12, 2022	Oct. 15, 2022	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY60242126	10Hz~44GHz	Oct. 26, 2021	May 12, 2022	Oct. 25, 2022	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	May 12, 2022	Oct. 29, 2022	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz~1GHz	May 24, 2021	May 12, 2022	May 23, 2022	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00240138	1GHz~18GHz	Jul. 19, 2021	May 12, 2022	Jul. 18, 2022	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101093	18GHz~40GHz	Jan. 05, 2022	May 12, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	380827	9KHz ~1GHZ	Jul. 30, 2021	May 12, 2022	Jul. 29, 2022	Radiation (03CH06-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	May 12, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Jul. 30, 2021	May 12, 2022	Jul. 29, 2022	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY53270319	500MHz~26.5GHz	Oct. 14, 2021	May 12, 2022	Oct. 13, 2022	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	May 12, 2022	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 12, 2022	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 12, 2022	NCR	Radiation (03CH06-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 24, 2022	Jun. 11, 2022	May 23, 2023	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 14, 2021	Jun. 11, 2022	Oct. 13, 2022	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 24, 2022	Jun. 11, 2022	May 23, 2023	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	AC 0V~300V, 45Hz~1000Hz	Oct. 14, 2021	Jun. 11, 2022	Oct. 13, 2022	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 Measurement

Test Item	Uncertainty
Conducted Power	± 0.56 dB
Conducted Emissions	± 0.92 dB
Occupied Channel Bandwidth	± 0.03 %
Conducted Power Spectral Density	± 0.54 dB

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.94dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
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----- THE END -----



Appendix A. Conducted Test Results

Report Number : FR1D0812F

Test Engineer:	Han Lei	Temperature:	21~25	°C
Test Date:	2021/12/29~2022/6/23	Relative Humidity:	51~54	%

TEST RESULTS DATA
26dB and 99% OBW

U-NII-1										
Mod.	Data Rate	N _{TX}	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	16.53	20.48	-	22.18		
11a	6Mbps	1	44	5220	16.53	20.23	-	22.18		
11a	6Mbps	1	48	5240	16.58	20.68	-	22.20		
HT20	MCS0	1	36	5180	17.68	21.08	-	22.47		
HT20	MCS0	1	44	5220	17.63	21.48	-	22.46		
HT20	MCS0	1	48	5240	17.68	20.83	-	22.47		

TEST RESULTS DATA
Average Power Table

U-NII-1											
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	0.08	13.97	24.00	4.52			Pass
11a	6Mbps	1	44	5220	0.08	15.31	24.00	4.52			Pass
11a	6Mbps	1	48	5240	0.08	15.05	24.00	4.52			Pass
HT20	MCS0	1	36	5180	0.08	13.31	24.00	4.52			Pass
HT20	MCS0	1	44	5220	0.08	15.29	24.00	4.52			Pass
HT20	MCS0	1	48	5240	0.08	15.05	24.00	4.52			Pass

TEST RESULTS DATA
Power Spectral Density

FCC U-NII-1											
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	0.08	0.98	11.00	4.52			Pass
11a	6Mbps	1	44	5220	0.08	4.29	11.00	4.52			Pass
11a	6Mbps	1	48	5240	0.08	3.78	11.00	4.52			Pass
HT20	MCS0	1	36	5180	0.08	0.53	11.00	4.52			Pass
HT20	MCS0	1	44	5220	0.08	3.91	11.00	4.52			Pass
HT20	MCS0	1	48	5240	0.08	3.49	11.00	4.52			Pass

TEST RESULTS DATA
26dB and 99% OBW

U-NII-2A										
Mod.	Data Rate	N _{TX}	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	16.58	20.63	23.20	29.20	23.98	
11a	6M bps	1	60	5300	16.58	20.43	23.20	29.20	23.98	
11a	6M bps	1	64	5320	16.58	20.63	23.20	29.20	23.98	
HT20	MCS 0	1	52	5260	17.68	21.23	23.47	29.47	23.98	
HT20	MCS 0	1	60	5300	17.63	21.48	23.46	29.46	23.98	
HT20	MCS 0	1	64	5320	17.68	21.18	23.47	29.47	23.98	

TEST RESULTS DATA
Average Power Table

FCC U-NII-2A										
Mod.	Data Rate	N _{TX}	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	0.08	14.55	23.98	4.43	26.99	Pass
11a	6M bps	1	60	5300	0.08	14.47	23.98	4.43	26.99	Pass
11a	6M bps	1	64	5320	0.08	14.00	23.98	4.43	26.99	Pass
HT20	MCS 0	1	52	5260	0.08	14.41	23.98	4.43	26.99	Pass
HT20	MCS 0	1	60	5300	0.08	14.32	23.98	4.43	26.99	Pass
HT20	MCS 0	1	64	5320	0.08	13.40	23.98	4.43	26.99	Pass

TEST RESULTS DATA
Power Spectral Density

U-NII-2A										
Mod.	Data Rate	N _{TX}	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	0.08	2.00	11.00	4.43		Pass
11a	6M bps	1	60	5300	0.08	2.01	11.00	4.43		Pass
11a	6M bps	1	64	5320	0.08	1.27	11.00	4.43		Pass
HT20	MCS 0	1	52	5260	0.08	1.45	11.00	4.43		Pass
HT20	MCS 0	1	60	5300	0.08	1.48	11.00	4.43		Pass
HT20	MCS 0	1	64	5320	0.08	0.79	11.00	4.43		Pass

TEST RESULTS DATA
26dB and 99% OBW

U-NII-2C										
Mod.	Data Rate	N _{TX}	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	100	5500	16.53	20.38	23.18	29.18	23.98	
11a	6M bps	1	116	5580	16.53	20.28	23.18	29.18	23.98	
11a	6M bps	1	140	5700	16.53	20.58	23.18	29.18	23.98	
11a	6Mbps	1	144	5720	16.53	20.23	23.18	29.18	23.98	
HT20	MCS 0	1	100	5500	17.68	21.23	23.47	29.47	23.98	
HT20	MCS 0	1	116	5580	17.63	21.13	23.46	29.46	23.98	
HT20	MCS 0	1	140	5700	17.63	21.18	23.46	29.46	23.98	
HT20	MCS0	1	144	5720	17.63	21.13	23.46	29.46	23.98	

TEST RESULTS DATA
Average Power Table

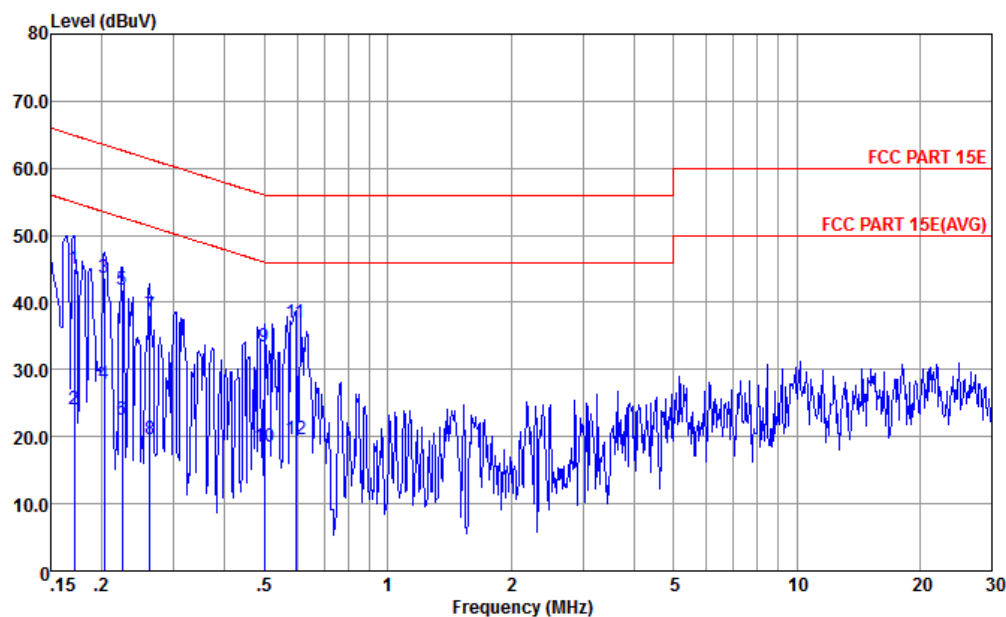
FCC U-NII-2C										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	EIRP Power Limit (dBm)	Pass/Fail
11a	6M bps	1	100	5500	0.08	14.71	23.98	4.21	26.99	Pass
11a	6M bps	1	116	5580	0.08	15.09	23.98	4.21	26.99	Pass
11a	6M bps	1	140	5700	0.08	15.60	23.98	4.21	26.99	Pass
11a	6Mbps	1	144	5720	0.08	15.69	23.98	4.21	26.99	Pass
HT20	MCS 0	1	100	5500	0.08	14.65	23.98	4.21	26.99	Pass
HT20	MCS 0	1	116	5580	0.08	14.87	23.98	4.21	26.99	Pass
HT20	MCS 0	1	140	5700	0.08	15.65	23.98	4.21	26.99	Pass
HT20	MCS0	1	144	5720	0.08	15.35	23.98	4.21	26.99	Pass

TEST RESULTS DATA
Power Spectral Density

U-NII-2C										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm/MHz)	DG (dBi)		Pass/Fail
11a	6M bps	1	100	5500	0.08	2.01	11.00	4.21		Pass
11a	6M bps	1	116	5580	0.08	3.85	11.00	4.21		Pass
11a	6M bps	1	140	5700	0.08	4.28	11.00	4.21		Pass
11a	6Mbps	1	144	5720	0.08	4.22	11.00	4.21		Pass
HT20	MCS 0	1	100	5500	0.08	1.59	11.00	4.21		Pass
HT20	MCS 0	1	116	5580	0.08	3.38	11.00	4.21		Pass
HT20	MCS 0	1	140	5700	0.08	4.19	11.00	4.21		Pass
HT20	MCS0	1	144	5720	0.08	3.78	11.00	4.21		Pass

Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	Temperature :	24.2~25.6°C
		Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

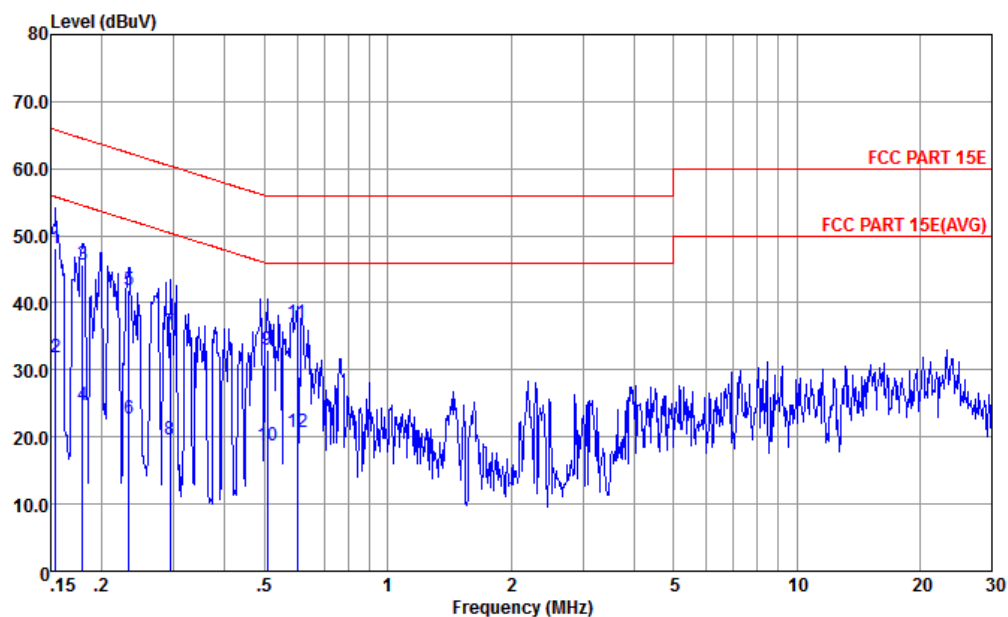


Site : CO01-KS
Condition : FCC PART 15E LISN-060105-L LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.171	45.06	-19.84	64.90	34.60	0.03	10.43	QP
2	0.171	23.96	-30.94	54.90	13.50	0.03	10.43	Average
3	0.203	43.60	-19.89	63.49	33.20	0.04	10.36	QP
4	0.203	27.90	-25.59	53.49	17.50	0.04	10.36	Average
5	0.224	42.00	-20.66	62.66	31.60	0.05	10.35	QP
6	0.224	22.60	-30.06	52.66	12.20	0.05	10.35	Average
7	0.262	38.19	-23.19	61.38	27.80	0.06	10.33	QP
8	0.262	19.59	-31.79	51.38	9.20	0.06	10.33	Average
9	0.499	33.53	-22.48	56.01	23.20	0.10	10.23	QP
10	0.499	18.53	-27.48	46.01	8.20	0.10	10.23	Average
11 *	0.595	36.94	-19.06	56.00	26.59	0.11	10.24	QP
12	0.595	19.64	-26.36	46.00	9.29	0.11	10.24	Average



Test Engineer :	Amos Zhang	Temperature :	24.2~25.6°C
		Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



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

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1 *	0.154	48.18	-17.60	65.78	37.60	0.11	10.47	QP
2	0.154	31.78	-24.00	55.78	21.20	0.11	10.47	Average
3	0.180	45.71	-18.79	64.50	35.20	0.10	10.41	QP
4	0.180	24.71	-29.79	54.50	14.20	0.10	10.41	Average
5	0.233	41.94	-20.41	62.35	31.50	0.10	10.34	QP
6	0.233	22.64	-29.71	52.35	12.20	0.10	10.34	Average
7	0.294	35.61	-24.80	60.41	25.20	0.10	10.31	QP
8	0.294	19.71	-30.70	50.41	9.30	0.10	10.31	Average
9	0.507	32.95	-23.05	56.00	22.60	0.11	10.24	QP
10	0.507	18.65	-27.35	46.00	8.30	0.11	10.24	Average
11	0.601	36.95	-19.05	56.00	26.60	0.11	10.24	QP
12	0.601	20.65	-25.35	46.00	10.30	0.11	10.24	Average

Note:

1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)



Appendix C. Radiated Spurious Emission

UNII-1 - 5150~5250MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		5149.98	61.74	-12.26	74	45.39	34.62	13.54	31.81	279	198	P	H
		5150	50.86	-3.14	54	38.89	34	9.78	31.81	279	198	A	H
	*	5176	107.68	-	-	95.62	34.07	9.81	31.82	279	198	P	H
		5176	100.4	-	-	88.34	34.07	9.81	31.82	279	198	A	H
		5149.12	60.63	-13.37	74	48.66	34	9.78	31.81	298	77	P	V
		5150	48.93	-5.07	54	36.96	34	9.78	31.81	298	77	A	V
	*	5176	106.28	-	-	94.22	34.07	9.81	31.82	298	77	P	V
		5176	98.54	-	-	86.48	34.07	9.81	31.82	298	77	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

UNII-1 5150~5250MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		10355	47.68	-20.62	68.3	58.21	37.25	14.12	61.9	300	0	P	H
		10355	51.57	-16.73	68.3	62.1	37.25	14.12	61.9	100	0	P	V
802.11a CH 44 5220MHz		10443	50.18	-18.12	68.3	60.41	37.33	14.18	61.74	300	0	P	H
		10443	51.01	-17.29	68.3	61.24	37.33	14.18	61.74	100	0	P	V
802.11a CH 48 5240MHz		10476	49.51	-18.79	68.3	59.62	37.37	14.2	61.68	300	0	P	H
		10476	51.29	-17.01	68.3	61.4	37.37	14.2	61.68	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 36 5180MHz		5149.76	61.58	-12.42	74	49.61	34	9.78	31.81	194	209	P	H
		5150	51.01	-2.99	54	39.04	34	9.78	31.81	194	209	A	H
	*	5176	106.98	-	-	94.92	34.07	9.81	31.82	194	209	P	H
		5176	99.74	-	-	87.68	34.07	9.81	31.82	194	209	A	H
		5149.69	62.16	-11.84	74	45.81	34.62	13.54	31.81	379	230	P	V
		5150	49.7	-4.3	54	37.73	34	9.78	31.81	379	230	A	V
	*	5176	106.63	-	-	94.57	34.07	9.81	31.82	379	230	P	V
		5176	98.75	-	-	86.69	34.07	9.81	31.82	379	230	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

UNII-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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 36 5180MHz		10366	47.04	-21.26	68.3	57.51	37.27	14.13	61.87	300	0	P	H
		10366	48.54	-19.76	68.3	59.01	37.27	14.13	61.87	100	0	P	V
802.11n HT20 CH 44 5220MHz		10432	48.52	-19.78	68.3	58.75	37.33	14.18	61.74	300	0	P	H
		10443	53.36	-14.94	68.3	63.59	37.33	14.18	61.74	100	0	P	V
802.11n HT20 CH 48 5240MHz		10487	49.05	-19.25	68.3	59.11	37.38	14.21	61.65	300	0	P	H
		10476	50.72	-17.58	68.3	60.83	37.37	14.2	61.68	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-2A - 5250~5350MHz

WIFI 802.11a (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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 64 5320MHz	*	5320	107.72	-	-	95.4	34.33	9.89	31.9	300	200	P	H
		5320	100.86	-	-	88.54	34.33	9.89	31.9	300	200	A	H
		5350.3	62.11	-11.89	74	49.73	34.4	9.91	31.93	300	200	P	H
		5350	50.83	-3.17	54	38.45	34.4	9.91	31.93	300	200	A	H
	*	5314	107.05	-	-	94.73	34.33	9.89	31.9	295	151	P	V
		5314	101.18	-	-	88.86	34.33	9.89	31.9	295	151	A	V
		5350.6	60.29	-13.71	74	47.91	34.4	9.91	31.93	295	151	P	V
		5350	50.25	-3.75	54	37.87	34.4	9.91	31.93	295	151	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

UNII-2A 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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 52 5260MHz		10520	50.9	-17.4	68.3	60.85	37.43	14.24	61.62	300	0	P	H
		10520	50.89	-17.41	68.3	60.84	37.43	14.24	61.62	100	0	P	V
802.11a CH 60 5300MHz		10600.01	49.47	-24.53	74	59.22	37.6	14.29	61.64	300	0	P	H
		10600.01	54.75	-19.25	74	64.5	37.6	14.29	61.64	100	0	P	V
		10600.01	42.92	-11.08	54	52.67	37.6	14.29	61.64	100	0	A	V
802.11a CH 64 5320MHz		10641	48.04	-25.96	74	57.77	37.6	14.32	61.65	300	0	P	H
		10641	49.83	-24.17	74	59.56	37.6	14.32	61.65	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-2A 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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 64 5320MHz	*	5326	108.55	-	-	96.24	34.33	9.89	31.91	281	201	P	H
		5326	100.72	-	-	88.41	34.33	9.89	31.91	281	201	A	H
		5351.7	60.91	-13.09	74	48.53	34.4	9.91	31.93	281	201	P	H
		5350	51.33	-2.67	54	38.95	34.4	9.91	31.93	281	201	A	H
	*	5320	108.04	-	-	95.72	34.33	9.89	31.9	300	232	P	V
		5320	100.36	-	-	88.04	34.33	9.89	31.9	300	232	A	V
		5353.1	59.89	-14.11	74	47.51	34.4	9.91	31.93	300	232	P	V
		5350	50.7	-3.3	54	38.32	34.4	9.91	31.93	300	232	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

UNII-2A 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)	Path 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	49.5	-18.8	68.3	59.45	37.43	14.24	61.62	300	0	P	H
		10520	51.75	-16.55	68.3	61.7	37.43	14.24	61.62	100	0	P	V
802.11n HT20 CH 60 5300MHz		10608	52.2	-21.8	74	61.95	37.6	14.29	61.64	302	220	P	H
		10608	42.35	-11.65	54	52.1	37.6	14.29	61.64	302	220	A	H
		10600	52.78	-21.22	74	58	38.18	18.24	61.64	245	36	P	V
		10600	43.94	-10.06	54	53.69	37.6	14.29	61.64	245	36	A	V
802.11n HT20 CH 64 5320MHz		10641	44.14	-29.86	74	53.87	37.6	14.32	61.65	300	0	P	H
		10641	44.06	-29.94	74	53.79	37.6	14.32	61.65	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-2C - 5470~5725MHz

WIFI 802.11a (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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 100 5500MHz		5418.8	54.41	-19.59	74	41.97	34.43	9.97	31.96	111	167	P	H
		5469.84	62.76	-5.54	68.3	50.21	34.5	10.04	31.99	111	167	P	H
		5458.48	44.78	-9.22	54	32.25	34.5	10.02	31.99	111	167	P	H
	*	5494	107.14	-	-	94.58	34.5	10.07	32.01	111	167	P	H
		5494	99.33	-	-	86.77	34.5	10.07	32.01	111	167	A	H
		5455.12	54.07	-19.93	74	41.54	34.5	10.02	31.99	368	233	P	V
		5469.52	63.11	-5.19	68.3	50.56	34.5	10.04	31.99	368	233	P	V
		5458.64	44.89	-9.11	54	32.36	34.5	10.02	31.99	368	233	P	V
	*	5494	107.45	-	-	94.89	34.5	10.07	32.01	368	233	P	V
		5494	100.32	-	-	87.76	34.5	10.07	32.01	368	233	A	V
802.11a CH 140 5700MHz	*	5692	108.78	-	-	95.82	34.7	10.32	32.06	342	202	P	H
		5692	99.48	-	-	86.52	34.7	10.32	32.06	342	202	A	H
		5725	64.38	-3.92	68.3	51.54	34.53	10.35	32.04	286	223	P	H
	*	5704	106.6	-	-	93.56	34.77	10.33	32.06	385	154	P	V
		5704	98.48	-	-	85.44	34.77	10.33	32.06	385	154	A	V
		5726.76	61.71	-6.59	68.3	48.57	34.83	10.35	32.04	385	154	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-2C - 5470~5725MHz
WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a		11004	49.69	-24.31	74	58.75	38.1	14.56	61.72	300	0	P	H
CH 100		11004	56.03	-17.97	74	65.09	38.1	14.56	61.72	308	226	P	V
5500MHz		11004	46.2	-7.8	54	55.26	38.1	14.56	61.72	308	226	A	V
802.11a		11169	56.41	-17.59	74	65.05	38.33	14.68	61.65	307	165	P	H
CH 116		11169	46.52	-7.48	54	55.16	38.33	14.68	61.65	307	165	A	H
5580MHz		11158	58.55	-15.45	74	67.19	38.33	14.68	61.65	234	353	P	V
		11158	48.8	-5.2	54	57.44	38.33	14.68	61.65	234	353	A	V
802.11a		11400	49.98	-24.02	74	58.08	38.6	14.85	61.55	300	0	P	H
CH 140		11400	56.27	-17.73	74	64.37	38.6	14.85	61.55	352	343	P	V
5700MHz		11400	46.36	-7.64	54	54.46	38.6	14.85	61.55	352	343	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-2C - 5470~5725MHz

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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 100 5500MHz		5452.24	55.79	-18.21	74	43.26	34.5	10.02	31.99	293	245	P	H
		5467.6	62	-6.3	68.3	49.45	34.5	10.04	31.99	293	245	P	H
		5460	45.87	-8.13	54	33.34	34.5	10.02	31.99	293	245	A	H
	*	5494	109.02	-	-	96.46	34.5	10.07	32.01	293	245	P	H
		5494	100.49	-	-	87.93	34.5	10.07	32.01	293	245	A	H
		5453.68	54.62	-19.38	74	42.09	34.5	10.02	31.99	260	147	P	V
		5468.72	63.98	-4.32	68.3	51.43	34.5	10.04	31.99	260	147	P	V
		5460	45.95	-8.05	54	33.42	34.5	10.02	31.99	260	147	A	V
	*	5500	107.88	-	-	95.3	34.5	10.09	32.01	260	147	P	V
802.11n HT20 CH 140 5700MHz		5500	100.1	-	-	87.52	34.5	10.09	32.01	260	147	A	V
	*	5698	106.09	-	-	93.33	34.5	10.32	32.06	338	198	P	H
		5698	97.12	-	-	84.36	34.5	10.32	32.06	338	198	A	H
		5728.12	62.74	-5.56	68.3	49.9	34.53	10.35	32.04	338	198	P	H
	*	5698	105.51	-	-	92.75	34.5	10.32	32.06	183	236	P	V
		5698	98.49	-	-	85.73	34.5	10.32	32.06	183	236	A	V
Remark		5726.6	64.07	-4.23	68.3	51.23	34.53	10.35	32.04	183	236	P	V
	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-2C - 5470~5725MHz
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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 100 5500MHz		10993	50.83	-23.17	74	59.89	38.1	14.56	61.72	291	299	P	H
		10993	42.16	-11.84	54	51.22	38.1	14.56	61.72	291	299	A	H
		10993	47.09	-26.91	74	56.15	38.1	14.56	61.72	100	0	P	V
802.11n HT20 CH 116 5580MHz		11158	62.21	-11.79	74	70.85	38.33	14.68	61.65	100	338	P	H
		11158	49.29	-4.71	54	57.93	38.33	14.68	61.65	100	338	A	H
		11158	59.72	-14.28	74	68.36	38.33	14.68	61.65	302	149	P	V
		11158	46.68	-7.32	54	55.32	38.33	14.68	61.65	302	149	A	V
802.11n HT20 CH 140 5700MHz		11389	49.63	-24.37	74	58.12	38.23	14.84	61.56	300	0	P	H
		11400	56.9	-17.1	74	65.36	38.24	14.85	61.55	273	347	P	V
		11400	47.91	-6.09	54	56.37	38.24	14.85	61.55	273	347	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-2C - Straddle Channel

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 144 5720MHz		5716	95.33	-	-	82.27	34.77	10.33	32.04	400	0	P	H
		5716	87.58	-	-	74.52	34.77	10.33	32.04	400	0	A	H
		5722	96.83	-	-	83.69	34.83	10.35	32.04	100	0	P	V
		5722	88.74	-	-	75.6	34.83	10.35	32.04	100	0	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

UNII-2C - Straddle Channel

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 144 5720MHz		11444	53.04	-20.96	74	61.08	38.63	14.87	61.54	303	208	P	H
		11444	44.03	-9.97	54	52.07	38.63	14.87	61.54	303	208	A	H
		11444	57.31	-16.69	74	65.35	38.63	14.87	61.54	394	0	P	V
		11444	47.15	-6.85	54	55.19	38.63	14.87	61.54	394	0	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



UNII-2C - Straddle Channel
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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		5716	104.05	-	-	90.99	34.77	10.33	32.04	300	0	P	H
HT20		5716	96.49	-	-	83.43	34.77	10.33	32.04	300	0	A	H
CH 144		5728	106.98	-	-	93.84	34.83	10.35	32.04	100	0	P	V
5720MHz		5728	99.66	-	-	86.52	34.83	10.35	32.04	100	0	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

UNII-2C - Straddle Channel
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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		11444	56.53	-17.47	74	64.57	38.63	14.87	61.54	307	209	P	H
HT20		11444	43.74	-10.26	54	51.78	38.63	14.87	61.54	307	209	A	H
CH 144		11433	58.87	-15.13	74	66.91	38.63	14.87	61.54	396	0	P	V
5720MHz		11433	46.26	-7.74	54	54.3	38.63	14.87	61.54	396	0	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

WIFI 802.11n HT20 (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 LF		30	24.38	-15.62	40	30.01	25.15	0.45	31.23	-	-	P	H
		73.65	21.68	-18.32	40	39.68	12.86	1.01	31.87	-	-	P	H
		139.61	26.21	-17.29	43.5	39.3	16.77	1.57	31.43	-	-	P	H
		167.74	25.8	-17.7	43.5	39.21	16.19	1.73	31.33	-	-	P	H
		245.34	32.22	-13.78	46	43.19	18.28	2.11	31.36	-	-	P	H
		353.98	25.64	-20.36	46	34.22	20.51	2.53	31.62	-	-	P	H
		36.79	34.53	-5.47	40	43.75	21.7	0.54	31.46	100	0	P	V
		56.19	31.17	-8.83	40	47.68	14.04	0.79	31.34	-	-	P	V
		95.96	24.44	-19.06	43.5	37.81	17.26	1.29	31.92	-	-	P	V
		175.5	29.3	-14.2	43.5	41.96	16.89	1.78	31.33	-	-	P	V
		246.31	29.57	-16.43	46	39.65	19.16	2.12	31.36	-	-	P	V
		378.23	24.89	-21.11	46	31.54	22.14	2.62	31.41	-	-	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	Peak or Average
H/V	Horizontal or Vertical



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

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

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
 = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
 = 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
 = 55.45 (dBμV/m)
2. Over Limit(dB)
 = Level(dBμV/m) – Limit Line(dBμV/m)
 = 55.45(dBμV/m) – 74(dBμV/m)
 = -18.55(dB)

For Average Limit @ 2390MHz:

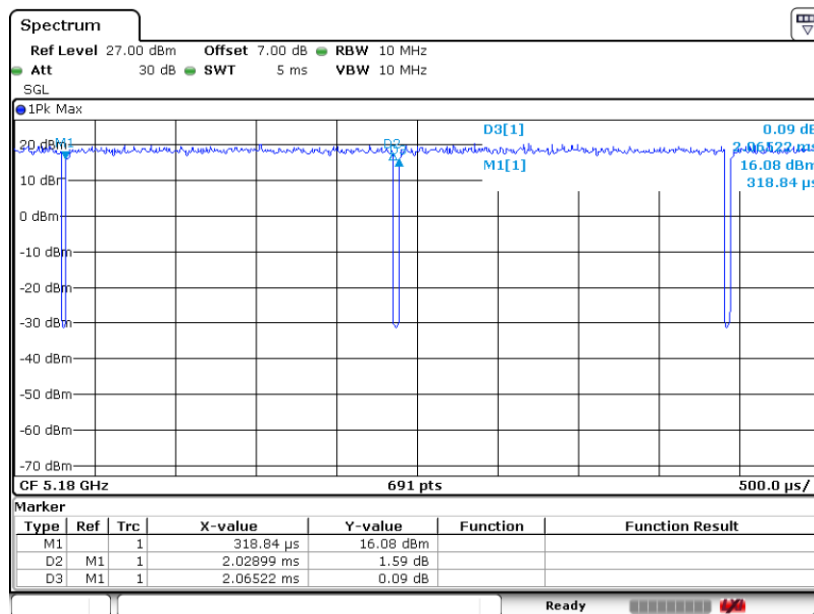
1. Level(dBμV/m)
 = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
 = 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
 = 43.54 (dBμV/m)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)
 = 43.54(dBμV/m) – 54(dBμV/m)
 = -10.46(dB)

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

Appendix D. Duty Cycle Plots

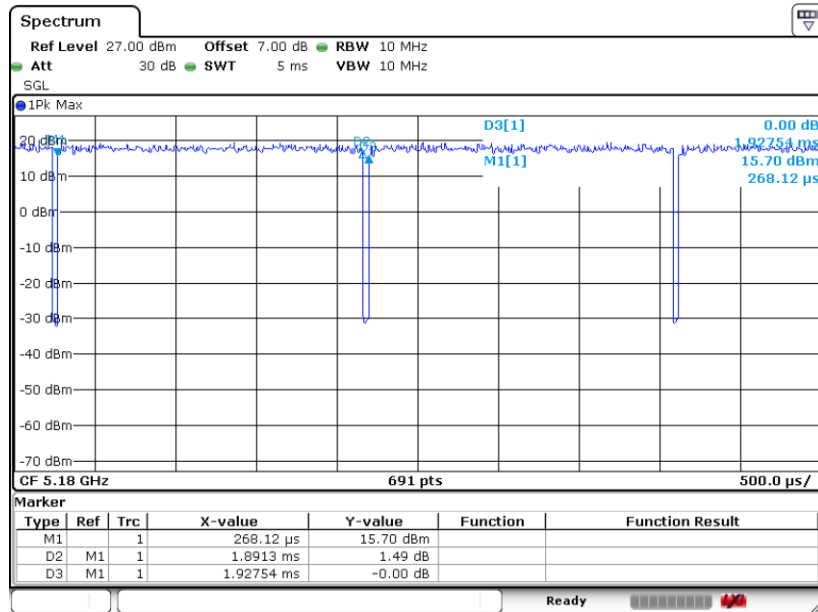
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	98.25	-	-	10Hz
802.11n HT20	98.12	-	-	10Hz

802.11a



Date: 20.DEC.2021 21:21:40

802.11n HT20



Date: 20.DEC.2021 21:56:04