



FCC RF Test Report

APPLICANT : iRobot Corporation
EQUIPMENT : Harpoon
BRAND NAME : iRobot
MODEL NAME : AXE-Y1
FCC ID : UFEAXE-Y1
STANDARD : 47 CFR Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Nov. 13, 2018 and testing was completed on Nov. 28, 2018. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.



Approved by: James Huang / Manager

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



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR8N1306C	Rev. 01	Initial issue of report	Jan. 04, 2019



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	≤ 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 3.79 dB at 5467.28 MHz
3.5	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.6	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

iRobot Corporation

8 Crosby Drive, Bedford, Massachusetts 01730, United States

1.2 Manufacturer

Huizhou BYD Electronic Co.,Ltd.

Xiangshui River,Economic Development Zone,Daya Bay,Huizhou,Guangdong Province,P.R.China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Harpoon
Brand Name	iRobot
Model Name	AXE-Y1
FCC ID	UFEAXE-Y1
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.a/n HT20/HT40 Bluetooth LE
HW Version	Harpoon B2
SW Version	Iewis+2.0.0_rc13+tridentAPQ8009+0000
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 ~ 5700 MHz
Maximum Output Power to Antenna	<5180 MHz ~ 5240 MHz> 802.11a : 15.14 dBm / 0.0327 W 802.11n HT20 : 15.12 dBm / 0.0325 W 802.11n HT40 : 15.11 dBm / 0.0324 W <5260 MHz ~ 5320 MHz> 802.11a : 14.91 dBm / 0.0310 W 802.11n HT20 : 14.88 dBm / 0.0308 W 802.11n HT40 : 14.87 dBm / 0.0307 W <5500 MHz ~ 5700 MHz > 802.11a : 15.02 dBm / 0.0318 W 802.11n HT20 : 14.98 dBm / 0.0315 W 802.11n HT40 : 14.69 dBm / 0.0294 W
99% Occupied Bandwidth	<5180 MHz ~ 5240 MHz> 802.11a : 18.73 MHz 802.11n HT20 : 19.38 MHz 802.11n HT40 : 36.76 MHz <5260 MHz ~ 5320 MHz> 802.11a : 18.63 MHz 802.11n HT20 : 19.43 MHz 802.11n HT40 : 36.76 MHz <5500 MHz ~ 5700 MHz > 802.11a : 18.73 MHz 802.11n HT20 : 19.43 MHz 802.11n HT40 : 36.96 MHz
Antenna Gain / Gain	<5150 MHz ~ 5250 MHz> PCB internal Antenna with gain 1.57 dBi <5250 MHz ~ 5350 MHz> PCB internal Antenna with gain 1.97 dBi <5470 MHz ~ 5700 MHz> PCB internal Antenna with gain 2.96 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

Remark: The antenna provided to the EUT, please refer to the following table.

Antenna No.	Brand	Model	Gain(dBi)	Antenna Type	Frequency range (GHz to GHz)
1	iRobot	AXE-Y1	3.04	PCB internal antenna	2.4-2.4835
1	iRobot	AXE-Y1	1.57	PCB internal antenna	5.15-5.25
1	iRobot	AXE-Y1	1.97	PCB internal antenna	5.25-5.35
1	iRobot	AXE-Y1	2.96	PCB internal antenna	5.47-5.725
1	iRobot	AXE-Y1	1.94	PCB internal antenna	5.725-5.85



1.5 Modification of EUT

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

1.6 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : 86-512-57900158 FAX : 86-512-57900958		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	TH01-KS 03CH06-KS	CN5013	630927

1.7 Applicable Standards

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

- ♦ 47 CFR Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the worst cases 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)
5150-5250 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)
5250-5350 MHz Band 2 (U-NII-2A)	52	5260	60	5300
	54*	5270	62*	5310
	56	5280	64	5320

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5470-5725 MHz Band 3 (U-NII-2C)	100	5500	112	5560
	102*	5510	116	5580
	104	5520	132	5660
	-	-	134*	5670
	108	5540	136	5680
	110*	5550	140	5700

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
TDWR Channel	118*	5590	124	5620
	120	5600	126*	5630
	-	-	128	5640

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

2.2 Test Mode

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

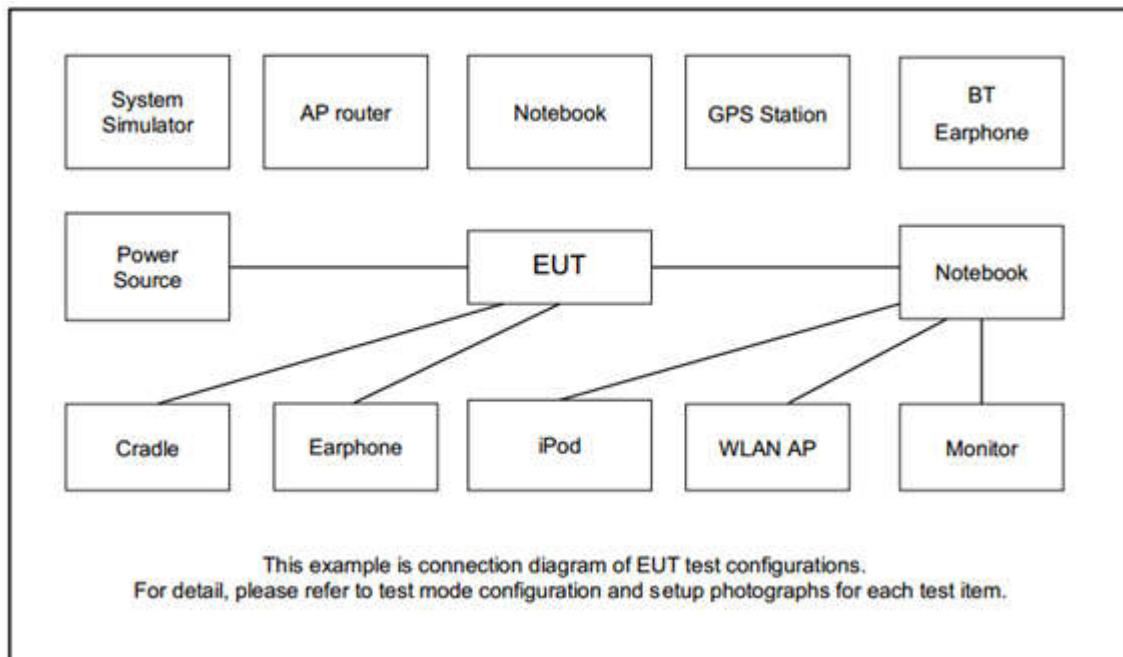
Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

Ch. #		Band I : 5150-5250 MHz	Band II : 5250-5350 MHz	Band III : 5470-5725MHz
		802.11a	802.11a	802.11a
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140

Ch. #		Band I : 5150-5250 MHz	Band II : 5250-5350 MHz	Band III : 5470-5725MHz
		802.11n HT20	802.11n HT20	802.11n HT20
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140

Ch. #		Band I : 5150-5250 MHz	Band II : 5250-5350 MHz	Band III : 5470-5725MHz
		802.11n HT40	802.11n HT40	802.11n HT40
L	Low	38	54	102
M	Middle	-	-	110
H	High	46	62	134

2.3 Connection Diagram of Test System



2.4 EUT Operation Test Setup

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

2.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor 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 7.00dB

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

= 7.00 (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.

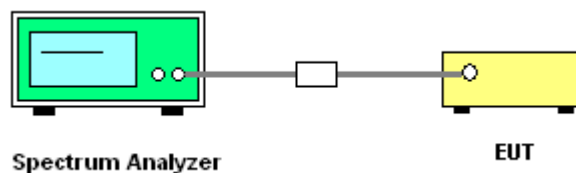
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

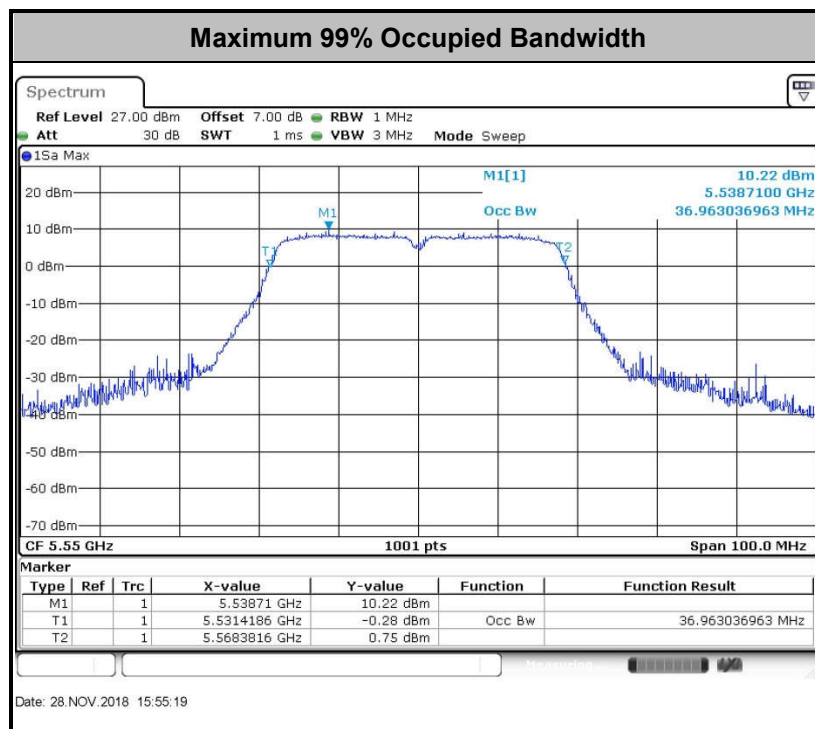
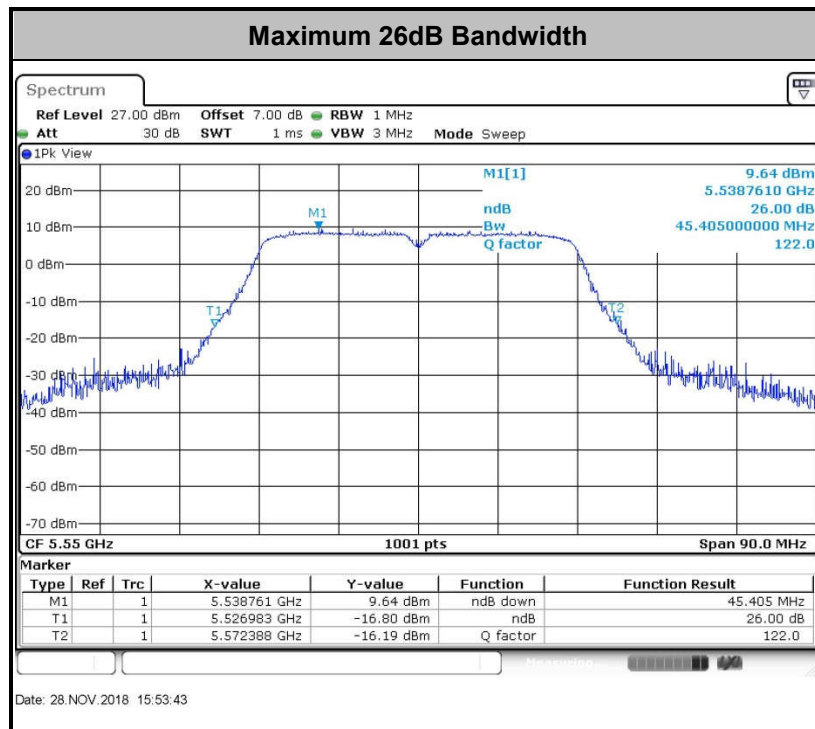
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB 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 1MHz and set the Video bandwidth (VBW) $\geq 3 * \text{RBW}$.
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 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.

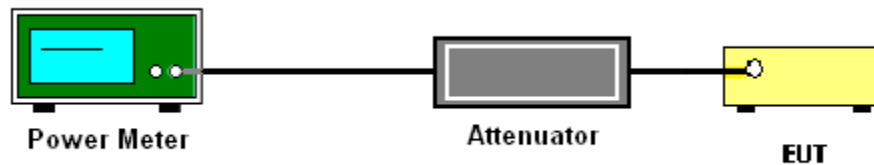
3.2.3 Test Procedures

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

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

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

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<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 v02r01.

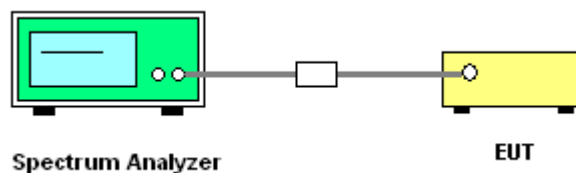
Section F) Maximum power spectral density.

Method SA-2

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

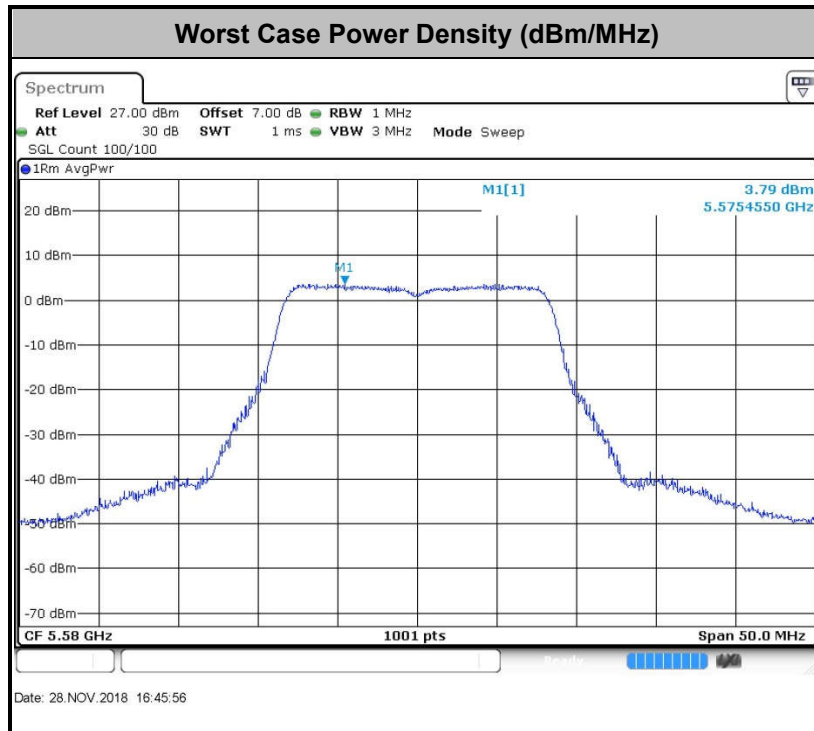
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW \geq 3 MHz.
- Number of points in sweep \geq 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add $10 \log(1/x)$,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

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



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

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 5470-5600 MHz and 5650-5725MHz band: all emissions outside of the 5470-5600 MHz and 5650-5725MHz 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	68.3

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

3.4.2 Measuring Instruments

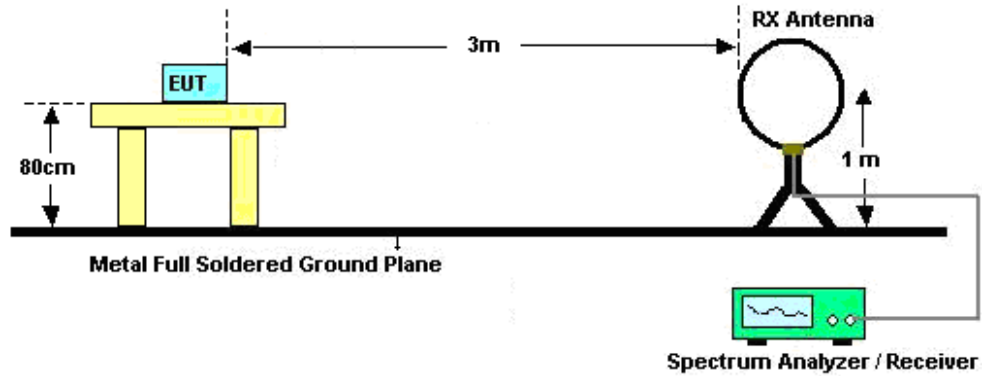
The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

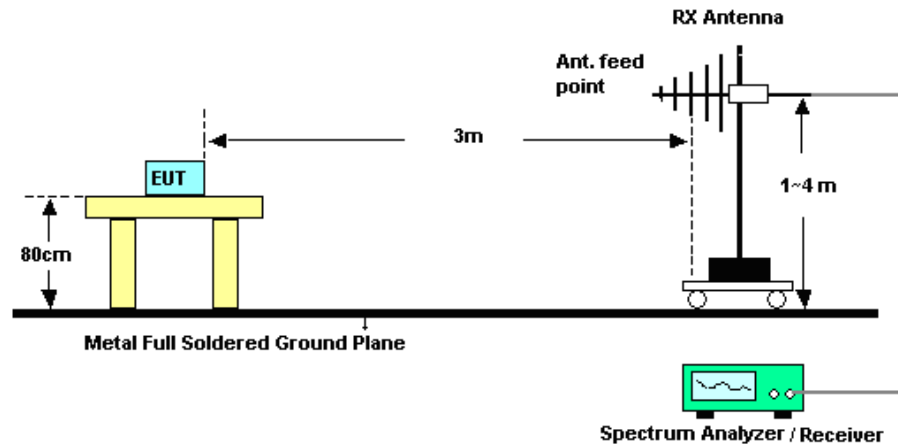
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak 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 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

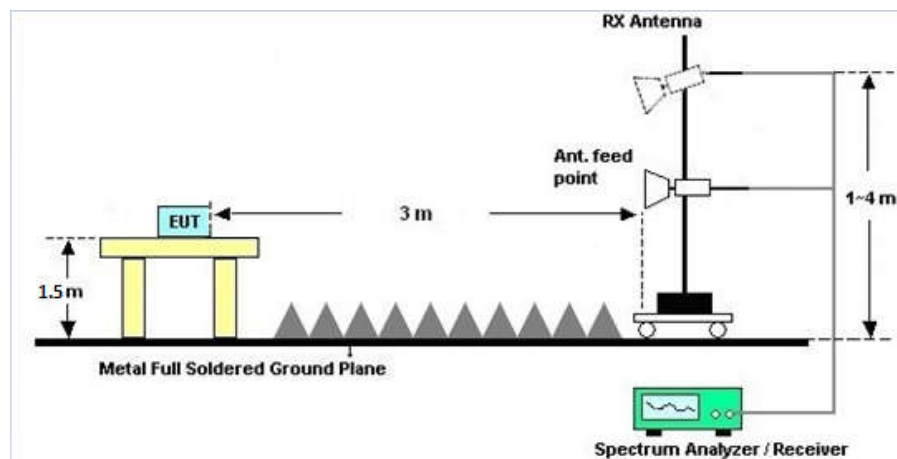
For radiated emissions below 30MHz



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.

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 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 Automatically Discontinue Transmission

3.5.1 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.

3.5.2 Measuring Instruments

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

3.5.3 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.



3.6 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

Antenna permanently attached.

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	Aug. 07, 2018	Nov. 28, 2018	Aug. 06, 2019	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 18, 2018	Nov. 28, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 18, 2018	Nov. 28, 2018	Jan. 17, 2019	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400023	3Hz~8.5GHz; Max 30dBm	Oct. 12, 2018	Nov. 24, 2018	Oct. 11, 2019	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471084	10Hz~44GHz	Jun. 25, 2018	Nov. 24, 2018	Jun. 24, 2019	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Nov. 24, 2018	Oct. 18, 2019	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz~1GHz	Jan. 29, 2018	Nov. 24, 2018	Jan 28, 2019	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 20, 2018	Nov. 24, 2018	Oct. 19, 2019	Radiation (03CH06-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	Nov. 24, 2018	Feb. 06, 2019	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	187289	9KHz ~1GHZ	Aug. 06, 2018	Nov. 24, 2018	Aug. 05, 2019	Radiation (03CH06-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Feb. 08, 2018	Nov. 24, 2018	Feb. 07, 2019	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Apr. 17, 2018	Nov. 24, 2018	Apr. 16, 2019	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY53270203	500MHz~26.5GHz	Dec. 16, 2017	Nov. 24, 2018	Dec. 15, 2018	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Nov. 24, 2018	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Nov. 24, 2018	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Nov. 24, 2018	NCR	Radiation (03CH06-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% ($U = 2U_c(y)$)	2.9 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.0 dB
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Appendix A. Conducted Test Results

Report Number : FR8N1306C

Test Engineer:	Silent Hai	Temperature:	21~25	°C
Test Date:	2018/11/28	Relative Humidity:	49~51	%

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	18.58	23.48	-	22.69		
11a	6Mbps	1	44	5220	18.73	23.58	-	22.73		
11a	6Mbps	1	48	5240	18.43	23.43	-	22.66		
HT20	MCS0	1	36	5180	19.28	23.28	-	22.85		
HT20	MCS0	1	44	5220	19.38	23.63	-	22.87		
HT20	MCS0	1	48	5240	19.38	23.73	-	22.87		
HT40	MCS0	1	38	5190	36.76	44.33	-	23.01		
HT40	MCS0	1	46	5230	36.76	43.70	-	23.01		

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	0.59	14.80	24.00	1.57		Pass
11a	6Mbps	1	44	5220	0.59	14.96	24.00	1.57		Pass
11a	6Mbps	1	48	5240	0.59	15.14	24.00	1.57		Pass
HT20	MCS0	1	36	5180	0.63	14.87	24.00	1.57		Pass
HT20	MCS0	1	44	5220	0.63	14.94	24.00	1.57		Pass
HT20	MCS0	1	48	5240	0.63	15.12	24.00	1.57		Pass
HT40	MCS0	1	38	5190	0.65	14.89	24.00	1.57		Pass
HT40	MCS0	1	46	5230	0.65	15.11	24.00	1.57		Pass

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	0.59	3.91	11.00	1.57		Pass
11a	6Mbps	1	44	5220	0.59	4.12	11.00	1.57		Pass
11a	6Mbps	1	48	5240	0.59	4.17	11.00	1.57		Pass
HT20	MCS0	1	36	5180	0.63	3.85	11.00	1.57		Pass
HT20	MCS0	1	44	5220	0.63	3.73	11.00	1.57		Pass
HT20	MCS0	1	48	5240	0.63	4.08	11.00	1.57		Pass
HT40	MCS0	1	38	5190	0.65	1.09	11.00	1.57		Pass
HT40	MCS0	1	46	5230	0.65	1.29	11.00	1.57		Pass

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	18.53	23.68	23.68	29.68	23.98	
11a	6M bps	1	60	5300	18.58	23.53	23.69	29.69	23.98	
11a	6M bps	1	64	5320	18.63	23.48	23.70	29.70	23.98	
HT20	MCS 0	1	52	5260	19.33	23.83	23.86	29.86	23.98	
HT20	MCS 0	1	60	5300	19.28	23.78	23.85	29.85	23.98	
HT20	MCS 0	1	64	5320	19.43	23.98	23.88	29.88	23.98	
HT40	MCS 0	1	54	5270	36.66	44.51	23.98	30.00	23.98	
HT40	MCS 0	1	62	5310	36.76	44.69	23.98	30.00	23.98	

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	0.59	14.91	23.98	1.97	26.99	Pass
11a	6M bps	1	60	5300	0.59	14.76	23.98	1.97	26.99	Pass
11a	6M bps	1	64	5320	0.59	14.67	23.98	1.97	26.99	Pass
HT20	MCS 0	1	52	5260	0.63	14.88	23.98	1.97	26.99	Pass
HT20	MCS 0	1	60	5300	0.63	14.79	23.98	1.97	26.99	Pass
HT20	MCS 0	1	64	5320	0.63	14.66	23.98	1.97	26.99	Pass
HT40	MCS 0	1	54	5270	0.65	14.87	23.98	1.97	26.99	Pass
HT40	MCS 0	1	62	5310	0.65	14.76	23.98	1.97	26.99	Pass

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	0.59	4.28	11.00	1.97		Pass
11a	6M bps	1	60	5300	0.59	3.75	11.00	1.97		Pass
11a	6M bps	1	64	5320	0.59	3.87	11.00	1.97		Pass
HT20	MCS 0	1	52	5260	0.63	3.83	11.00	1.97		Pass
HT20	MCS 0	1	60	5300	0.63	3.51	11.00	1.97		Pass
HT20	MCS 0	1	64	5320	0.63	3.70	11.00	1.97		Pass
HT40	MCS 0	1	54	5270	0.65	1.10	11.00	1.97		Pass
HT40	MCS 0	1	62	5310	0.65	0.67	11.00	1.97		Pass

TEST RESULTS DATA
26dB and 99% OBW

Band III										
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	100	5500	18.73	23.43	23.73	29.73	23.98	
11a	6M bps	1	116	5580	18.73	23.43	23.73	29.73	23.98	
11a	6M bps	1	140	5700	18.68	23.43	23.71	29.71	23.98	
HT20	MCS 0	1	100	5500	19.43	23.53	23.88	29.88	23.98	
HT20	MCS 0	1	116	5580	19.38	23.83	23.87	29.87	23.98	
HT20	MCS 0	1	140	5700	19.28	23.83	23.85	29.85	23.98	
HT40	MCS 0	1	102	5510	36.86	44.51	23.98	30.00	23.98	
HT40	MCS 0	1	110	5550	36.96	45.41	23.98	30.00	23.98	
HT40	MCS 0	1	134	5670	36.76	44.69	23.98	30.00	23.98	

TEST RESULTS DATA
Average Power Table

FCC Band III										
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	100	5500	0.59	14.72	23.98	2.96	26.99	Pass
11a	6M bps	1	116	5580	0.59	14.74	23.98	2.96	26.99	Pass
11a	6M bps	1	140	5700	0.59	15.02	23.98	2.96	26.99	Pass
HT20	MCS 0	1	100	5500	0.63	14.76	23.98	2.96	26.99	Pass
HT20	MCS 0	1	116	5580	0.63	14.79	23.98	2.96	26.99	Pass
HT20	MCS 0	1	140	5700	0.63	14.98	23.98	2.96	26.99	Pass
HT40	MCS 0	1	102	5510	0.65	14.60	23.98	2.96	26.99	Pass
HT40	MCS 0	1	110	5550	0.65	14.69	23.98	2.96	26.99	Pass
HT40	MCS 0	1	134	5670	0.65	14.68	23.98	2.96	26.99	Pass

TEST RESULTS DATA
Power Spectral Density

Band III										
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	100	5500	0.59	3.71	11.00	2.96		Pass
11a	6M bps	1	116	5580	0.59	4.38	11.00	2.96		Pass
11a	6M bps	1	140	5700	0.59	4.28	11.00	2.96		Pass
HT20	MCS 0	1	100	5500	0.63	3.67	11.00	2.96		Pass
HT20	MCS 0	1	116	5580	0.63	3.85	11.00	2.96		Pass
HT20	MCS 0	1	140	5700	0.63	4.09	11.00	2.96		Pass
HT40	MCS 0	1	102	5510	0.65	0.53	11.00	2.96		Pass
HT40	MCS 0	1	110	5550	0.65	0.61	11.00	2.96		Pass
HT40	MCS 0	1	134	5670	0.65	0.57	11.00	2.96		Pass



Appendix B. Radiated Spurious Emission

15E Band 1 - 5150~5250MHz

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 36 5180MHz		5147.36	63.21	-10.79	74	55.25	31.16	8.47	31.67	100	151	P	H
		5127.68	43.65	-10.35	54	35.68	31.19	8.47	31.69	100	151	A	H
	*	5184	106.1	-	-	98.18	31.1	8.48	31.66	100	151	P	H
		5184	96.66	-	-	88.74	31.1	8.48	31.66	100	151	A	H
		5149.76	59.15	-14.85	74	51.19	31.16	8.47	31.67	100	111	P	V
		5127.36	46.83	-7.17	54	38.86	31.19	8.47	31.69	100	111	A	V
	*	5186	107.49	-	-	99.57	31.1	8.48	31.66	100	111	P	V
		5186	100.34	-	-	92.42	31.1	8.48	31.66	100	111	A	V



15E band 1 5150~5250MHz
WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 36 5180MHz		10360	41.61	-26.69	68.3	56.35	38.04	12.29	65.07	100	0	P	H
		10360	41.98	-26.32	68.3	56.72	38.04	12.29	65.07	100	360	P	V
802.11a CH 44 5220MHz		10440	42.82	-25.48	68.3	57.42	38.14	12.35	65.09	100	360	P	H
		10440	41.49	-26.81	68.3	56.09	38.14	12.35	65.09	100	0	P	V
802.11a CH 48 5240MHz		10480	42.88	-25.42	68.3	57.37	38.22	12.4	65.11	100	360	P	H
		10480	42.68	-25.62	68.3	57.17	38.22	12.4	65.11	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E band 1 5150~5250MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 36 5180MHz		5148.64	58.66	-15.34	74	50.7	31.16	8.47	31.67	100	32	P	H
		5128.32	46.9	-7.1	54	38.93	31.19	8.47	31.69	100	32	A	H
	*	5176	106.01	-	-	98.09	31.1	8.48	31.66	100	32	P	H
		5176	98.59	-	-	90.67	31.1	8.48	31.66	100	32	A	H
		5149.44	57.98	-16.02	74	50.02	31.16	8.47	31.67	118	114	P	V
		5128	46.92	-7.08	54	38.95	31.19	8.47	31.69	118	114	A	V
	*	5186	106.1	-	-	98.18	31.1	8.48	31.66	118	114	P	V
		5186	98.91	-	-	90.99	31.1	8.48	31.66	118	114	A	V



15E band 1 5150~5250MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 36 5180MHz		10360	43.69	-24.61	68.3	58.43	38.04	12.29	65.07	100	360	P	H
		10360	42.04	-26.26	68.3	56.78	38.04	12.29	65.07	100	0	P	V
802.11n HT20 CH 44 5220MHz		10440	42.38	-25.92	68.3	56.98	38.14	12.35	65.09	100	360	P	H
		10440	42.34	-25.96	68.3	56.94	38.14	12.35	65.09	100	0	P	V
802.11n HT20 CH 48 5240MHz		10480	42.59	-25.71	68.3	57.08	38.22	12.4	65.11	100	360	P	H
		10480	43.04	-25.26	68.3	57.53	38.22	12.4	65.11	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E band 1 5150~5250MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 38 5190MHz		5149.92	63	-11	74	55.04	31.16	8.47	31.67	100	29	P	H
		5149.92	48.31	-5.69	54	40.35	31.16	8.47	31.67	100	29	A	H
	*	5202	103.59	-	-	95.69	31.07	8.48	31.65	100	29	P	H
		5202	96.31	-	-	88.41	31.07	8.48	31.65	100	29	A	H
		5351.04	47.93	-26.07	74	40.03	30.81	8.66	31.57	100	29	P	H
		5380.92	38.35	-15.65	54	30.45	30.75	8.7	31.55	100	29	A	H
		5149.12	61.95	-12.05	74	53.99	31.16	8.47	31.67	100	113	P	V
		5149.92	48.24	-5.76	54	40.28	31.16	8.47	31.67	100	113	A	V
	*	5192	104.4	-	-	96.51	31.07	8.48	31.66	100	113	P	V
		5192	97.15	-	-	89.26	31.07	8.48	31.66	100	113	A	V
		5395.14	47.85	-26.15	74	39.96	30.72	8.72	31.55	100	113	P	V
		5389.02	38.44	-15.56	54	30.54	30.75	8.7	31.55	100	113	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E band 1 5150~5250MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 38 5190MHz		10380	42.63	-25.67	68.3	57.34	38.07	12.3	65.08	100	360	P	H
		10380	43.19	-25.11	68.3	57.9	38.07	12.3	65.08	100	0	P	V
802.11n HT40 CH 46 5230MHz		10460	44.49	-23.81	68.3	59.05	38.17	12.37	65.1	100	360	P	H
		10460	43.09	-25.21	68.3	57.65	38.17	12.37	65.1	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E 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 64 5320MHz	*	5314	107.9	-	-	100.01	30.86	8.62	31.59	100	38	P	H
		5314	100.66	-	-	92.77	30.86	8.62	31.59	100	38	A	H
		5350.5	55.76	-18.24	74	47.86	30.81	8.66	31.57	100	38	P	H
		5372.3	47.41	-6.59	54	39.52	30.78	8.68	31.57	100	38	A	H
	*	5314	107.05	-	-	99.16	30.86	8.62	31.59	100	66	P	V
		5314	99.57	-	-	91.68	30.86	8.62	31.59	100	66	A	V
		5351.8	63.37	-10.63	74	55.47	30.81	8.66	31.57	100	66	P	V
		5372.1	45.17	-8.83	54	37.28	30.78	8.68	31.57	100	66	A	V



15E band 2 5250~5350MHz
WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 52 5260MHz		10520	41.83	-26.47	68.3	56.25	38.27	12.43	65.12	100	360	P	H
		10520	41.84	-26.46	68.3	56.26	38.27	12.43	65.12	100	0	P	V
802.11a CH 60 5300MHz		10600	43.18	-25.12	68.3	57.42	38.39	12.52	65.15	100	360	P	H
		10600	42.26	-26.04	68.3	56.5	38.39	12.52	65.15	100	0	P	V
802.11a CH 64 5320MHz		10640	41.58	-32.42	74	55.75	38.44	12.55	65.16	100	360	P	H
		10640	44.51	-29.49	74	58.68	38.44	12.55	65.16	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E band 2 5250~5350MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 64 5320MHz	*	5312	106.51	-	-	98.62	30.86	8.62	31.59	100	38	P	H
		5312	99.23	-	-	91.34	30.86	8.62	31.59	100	38	A	H
		5353.1	57.29	-16.71	74	49.39	30.81	8.66	31.57	100	38	P	H
		5371.8	46.55	-7.45	54	38.66	30.78	8.68	31.57	100	38	A	H
	*	5314	105.74	-	-	97.85	30.86	8.62	31.59	100	116	P	V
		5314	98.81	-	-	90.92	30.86	8.62	31.59	100	116	A	V
		5350.1	58.3	-15.7	74	50.4	30.81	8.66	31.57	100	116	P	V
		5371.9	46.43	-7.57	54	38.54	30.78	8.68	31.57	100	116	A	V



15E band 2 5250~5350MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 52 5260MHz		10520	42.45	-25.85	68.3	56.87	38.27	12.43	65.12	100	360	P	H
		10520	41.41	-26.89	68.3	55.83	38.27	12.43	65.12	100	0	P	V
802.11n HT20 CH 60 5300MHz		10600.1	44.65	-29.35	74	58.89	38.39	12.52	65.15	100	360	P	H
		10600.1	42.48	-31.52	74	56.72	38.39	12.52	65.15	100	0	P	V
802.11n HT20 CH 64 5320MHz		10640	44.11	-29.89	74	58.28	38.44	12.55	65.16	100	360	P	H
		10640	43.62	-30.38	74	57.79	38.44	12.55	65.16	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E band 2 5250~5350MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 62 5310MHz		5120.32	49.85	-24.15	74	41.86	31.22	8.46	31.69	101	31	P	H
		5104.48	40.23	-13.77	54	32.22	31.25	8.46	31.7	101	31	A	H
	*	5318	103.43	-	-	95.54	30.86	8.62	31.59	101	31	P	H
		5318	96.01	-	-	88.12	30.86	8.62	31.59	101	31	A	H
		5351.5	61.88	-12.12	74	53.98	30.81	8.66	31.57	101	31	P	H
		5350.2	46.8	-7.2	54	38.9	30.81	8.66	31.57	101	31	A	H
		5119.68	50.1	-23.9	74	42.11	31.22	8.46	31.69	100	116	P	V
		5111.52	40.41	-13.59	54	32.43	31.22	8.46	31.7	100	116	A	V
	*	5296	103.78	-	-	95.9	30.89	8.6	31.61	100	116	P	V
		5296	96.56	-	-	88.68	30.89	8.6	31.61	100	116	A	V
		5350.5	65.31	-8.69	74	57.41	30.81	8.66	31.57	100	116	P	V
		5352.4	48.99	-5.01	54	41.09	30.81	8.66	31.57	100	116	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E band 2 5250~5350MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 54 5270MHz		10540	43.88	-24.42	68.3	58.27	38.29	12.45	65.13	100	360	P	H
		10540	43.75	-24.55	68.3	58.14	38.29	12.45	65.13	100	0	P	V
802.11n HT40 CH 62 5310MHz		10620	44.35	-29.65	74	58.56	38.41	12.53	65.15	100	360	P	H
		10620	44.11	-29.89	74	58.32	38.41	12.53	65.15	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 3 - 5470~5725MHz

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 100 5500MHz		5447.12	53.85	-20.15	74	45.98	30.63	8.77	31.53	105	32	P	H
		5470	54.67	-13.63	68.3	46.8	30.6	8.78	31.51	105	32	P	H
		5447.76	47.1	-6.9	54	39.23	30.63	8.77	31.53	105	32	A	H
	*	5498	107.22	-	-	99.37	30.54	8.81	31.5	105	32	P	H
		5498	100	-	-	92.15	30.54	8.81	31.5	105	32	A	H
		5446.48	53.61	-20.39	74	45.74	30.63	8.77	31.53	317	152	P	V
		5467.76	52.56	-15.74	68.3	44.69	30.6	8.78	31.51	317	152	P	V
		5447.6	46.3	-7.7	54	38.43	30.63	8.77	31.53	317	152	A	V
	*	5496	107.01	-	-	99.14	30.57	8.8	31.5	317	152	P	V
		5496	99.59	-	-	91.72	30.57	8.8	31.5	317	152	A	V
802.11a CH 140 5700MHz	*	5694	106.85	-	-	98.64	30.72	8.98	31.49	113	43	P	H
		5694	99.7	-	-	91.49	30.72	8.98	31.49	113	43	A	H
		5730.04	63.18	-5.12	68.3	54.7	30.99	9.01	31.52	113	43	P	H
	*	5694	107.17	-	-	98.96	30.72	8.98	31.49	308	171	P	V
		5694	100.14	-	-	91.93	30.72	8.98	31.49	308	171	A	V
		5726.6	62.95	-5.35	68.3	54.47	30.99	9.01	31.52	308	171	P	V



15E band 3 - 5470~5725MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 100 5500MHz		11000	45.63	-28.37	74	59.04	38.96	12.89	65.26	100	360	P	H
		11000	44.27	-29.73	74	57.68	38.96	12.89	65.26	100	0	P	V
802.11a CH 116 5580MHz		11160	44.35	-29.65	74	57.41	39.21	13.05	65.32	100	360	P	H
		11160	44.74	-29.26	74	57.8	39.21	13.05	65.32	100	0	P	V
802.11a CH 140 5700MHz		11400	46.6	-27.4	74	59.16	39.55	13.28	65.39	100	360	P	H
		11400	44.5	-29.5	74	57.06	39.55	13.28	65.39	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E band 3 - 5470~5725MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 100 5500MHz		5447.76	55.18	-18.82	74	47.31	30.63	8.77	31.53	109	37	P	H
		5469.84	56.63	-11.67	68.3	48.76	30.6	8.78	31.51	109	37	P	H
		5448.08	47.13	-6.87	54	39.26	30.63	8.77	31.53	109	37	A	H
	*	5504	105.97	-	-	98.11	30.54	8.81	31.49	109	37	P	H
		5504	99.01	-	-	91.15	30.54	8.81	31.49	109	37	A	H
		5448.4	55.41	-18.59	74	47.54	30.63	8.77	31.53	100	115	P	V
		5469.04	60.45	-7.85	68.3	52.58	30.6	8.78	31.51	100	115	P	V
		5448.08	48.11	-5.89	54	40.24	30.63	8.77	31.53	100	115	A	V
	*	5504	106.71	-	-	98.85	30.54	8.81	31.49	100	115	P	V
		5504	99.57	-	-	91.71	30.54	8.81	31.49	100	115	A	V
802.11n HT20 CH 140 5700MHz	*	5706	107.25	-	-	98.92	30.85	9	31.52	112	41	P	H
		5706	99.51	-	-	91.18	30.85	9	31.52	112	41	A	H
		5725.56	64.07	-4.23	68.3	55.59	30.99	9.01	31.52	112	41	P	H
	*	5694	106.75	-	-	98.54	30.72	8.98	31.49	308	168	P	V
		5694	99.49	-	-	91.28	30.72	8.98	31.49	308	168	A	V
		5726.92	62.85	-5.45	68.3	54.37	30.99	9.01	31.52	308	168	P	V



15E band 3 - 5470~5725MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 100 5500MHz		11000	47.31	-26.69	74	60.72	38.96	12.89	65.26	100	360	P	H
		11000	44.18	-29.82	74	57.59	38.96	12.89	65.26	100	0	P	V
802.11n HT20 CH 116 5580MHz		11160	44.68	-29.32	74	57.74	39.21	13.05	65.32	100	360	P	H
		11160	45.23	-28.77	74	58.29	39.21	13.05	65.32	100	0	P	V
802.11n HT20 CH 140 5700MHz		11400	46.18	-27.82	74	58.74	39.55	13.28	65.39	100	360	P	H
		11400	44.16	-29.84	74	56.72	39.55	13.28	65.39	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E band 3 - 5470~5725MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 102 5510MHz		5458.16	57.23	-16.77	74	49.34	30.63	8.77	31.51	100	26	P	H
		5467.28	64.51	-3.79	68.3	56.64	30.6	8.78	31.51	100	26	P	H
		5459.92	43.51	-10.49	54	35.62	30.63	8.77	31.51	100	26	A	H
	*	5502	102.4	-	-	94.54	30.54	8.81	31.49	100	26	P	H
		5502	95.11	-	-	87.25	30.54	8.81	31.49	100	26	A	H
		5731.72	49.6	-18.7	68.3	41.15	30.99	9.01	31.55	100	26	P	H
		5459.28	57.63	-16.37	74	49.74	30.63	8.77	31.51	100	114	P	V
		5467.6	61.93	-6.37	68.3	54.06	30.6	8.78	31.51	100	114	P	V
		5459.92	44.08	-9.92	54	36.19	30.63	8.77	31.51	100	114	A	V
	*	5496	103.36	-	-	95.49	30.57	8.8	31.5	100	114	P	V
		5496	96.15	-	-	88.28	30.57	8.8	31.5	100	114	A	V
		5732.68	49.96	-18.34	68.3	41.51	30.99	9.01	31.55	100	114	P	V
802.11n HT40 CH 134 5670MHz		5409.84	47.94	-26.06	74	40.04	30.72	8.72	31.54	100	38	P	H
		5467.92	48.31	-19.99	68.3	40.44	30.6	8.78	31.51	100	38	P	H
		5459.92	38.74	-15.26	54	30.85	30.63	8.77	31.51	100	38	A	H
	*	5658	103.52	-	-	95.58	30.44	8.95	31.45	100	38	P	H
		5658	96	-	-	88.06	30.44	8.95	31.45	100	38	A	H
		5725.08	56.58	-11.72	68.3	48.1	30.99	9.01	31.52	100	38	P	H
		5365.68	49.08	-24.92	74	41.19	30.78	8.68	31.57	324	176	P	V
		5464.08	51.46	-16.84	68.3	43.59	30.6	8.78	31.51	324	176	P	V
		5459.76	38.58	-15.42	54	30.69	30.63	8.77	31.51	324	176	A	V
	*	5680	103.72	-	-	95.66	30.58	8.97	31.49	324	167	P	V
		5680	96.35	-	-	88.29	30.58	8.97	31.49	324	167	A	V
		5730.52	54.39	-13.91	68.3	45.94	30.99	9.01	31.55	324	167	P	V



15E band 3 - 5470~5725MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 102 5510MHz		11020	45.69	-28.31	74	59.07	38.98	12.91	65.27	100	360	P	H
		11020	43.94	-30.06	74	57.32	38.98	12.91	65.27	100	0	P	V
802.11n HT40 CH 110 5550MHz		11100	45.22	-28.78	74	58.42	39.11	12.99	65.3	100	360	P	H
		11100	44.65	-29.35	74	57.85	39.11	12.99	65.3	100	0	P	V
802.11n HT40 CH 134 5670MHz		11340	45.85	-28.15	74	58.56	39.45	13.21	65.37	100	360	P	H
		11340	44.74	-29.26	74	57.45	39.45	13.21	65.37	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Emission below 1GHz

WIFI 802.11n HT40 (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 LF		40.67	20.98	-19.02	40	35.22	18.19	0.55	32.98			P	H
		162.89	26.92	-16.58	43.5	42.77	15.8	1.3	32.95			P	H
		233.7	30.9	-15.1	46	45.47	16.81	1.58	32.96			P	H
		460.68	28.79	-17.21	46	37.07	22.69	2.26	33.23			P	H
		633.34	31.51	-14.49	46	37.46	24.7	2.67	33.32			P	H
		786.6	35.39	-10.61	46	39.37	25.94	3.11	33.03	100	0	P	H
		30.97	21.79	-18.21	40	30.65	23.64	0.47	32.97			P	V
		68.8	21.23	-18.77	40	40.62	12.76	0.78	32.93			P	V
		470.38	27.88	-18.12	46	35.97	22.86	2.28	33.23			P	V
		594.54	30.71	-15.29	46	36.94	24.53	2.59	33.35	100	0	P	V
		709.97	29.15	-16.85	46	34.48	25.02	2.9	33.25			P	V
		921.43	28.56	-17.44	46	30.54	26.69	3.39	32.06			P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency per 15.209(c).
!	Test result is over limit line.
P/A	Peak or Average
H/V	H orizontal or V ertical



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

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

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

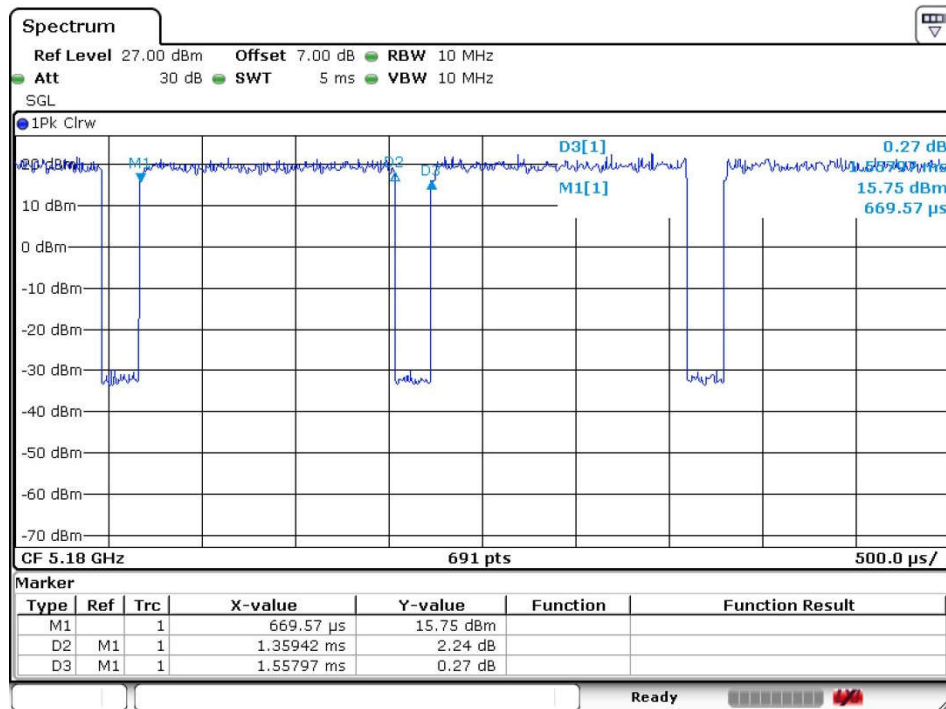
= -10.46(dB)

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

Appendix C. Duty Cycle Plots

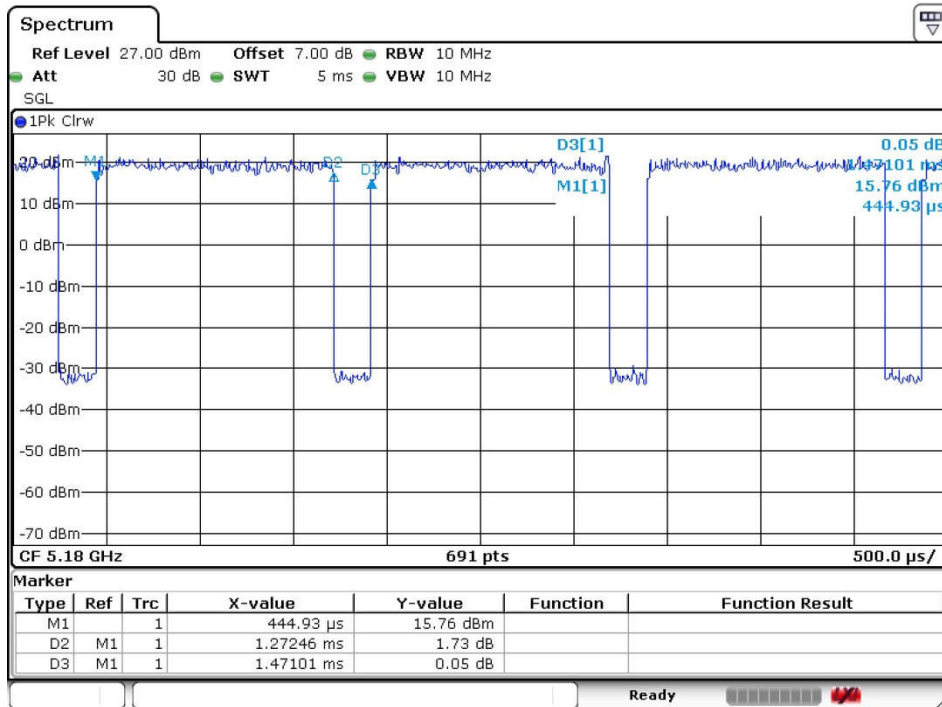
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	87.26	1.359	0.736	0.75KHz
802.11n HT20	86.50	1.272	0.786	0.82KHz
802.11n HT40	86.09	1.229	0.814	0.82KHz

802.11a





802.11n HT20



802.11n HT40

