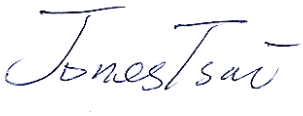
FCC RF Test Report

APPLICANT	**:**	**Jessup L.L.C.**
EQUIPMENT	**:**	**Wireless Remote**
MODEL NAME	**:**	**DR49WK**
FCC ID	**:**	**2ADU9-3876**
STANDARD	**:**	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	**:**	**(NII) Unlicensed National Information Infrastructure**

The testing completed on Jun. 02, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL INC.

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

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D3036-01B	Rev. 01	Initial issue of report	Apr. 22, 2015
FR4D3036-01B	Rev. 02	Adding test data of duty cycle in section 3.4.7 and Automatically Discontinue Transmission in section 3.6.3.	Jun. 02, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	2.1049 15.403(i)	26dB & 99% Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	FCC ≤ 24 dBm (depend on band)	Pass	-
3.3	15.407(a)	Power Spectral Density	FCC ≤ 11 dBm (depend on band)	Pass	-
3.4	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass	Under limit 1.22 dB at 5375.740 MHz
3.5	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.6	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.7	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Jessup L.L.C.
5251 West 116th Place, Suite 200,
Leawood, Kansas 66221

1.2 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Wireless Remote
Model Name	DR49WK
FCC ID	2ADU9-3876
EUT supports Radios application	WLAN 11a/g

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

1.3 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz
Maximum Output Power to Antenna	802.11a : 6.52 dBm / 0.0045 W
99% Occupied Bandwidth	802.11a : 18.85 MHz
Antenna Type	Fixed internal Antenna with gain 4.82 dBi
Type of Modulation	OFDM (BPSK / QPSK / 16QAM)

1.4 Modification of EUT

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

1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH02-HY	03CH07-HY

Note: The test site complies with ANSI C63.4 2009 requirement.

1.6 Applicable Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01
- ANSI C63.10-2009

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. FCC permits the use of the 1.5 meter table as an alternative in C63.10-2013 through inquiry tracking number 961829.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

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

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5150-5250 MHz Band 1 (U-NII-1)	36	5180	44	5220
	40	5200	48	5240

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables. Final Output Power equals to Measured Output Power adds the duty factor.

5GHz 802.11a mode					
Data Rate (MHz)	**6M bps**	**9M bps**	**12M bps**	**18M bps**	**24M bps**
Average Power (dBm)	**6.52**	6.41	6.32	6.19	6.37

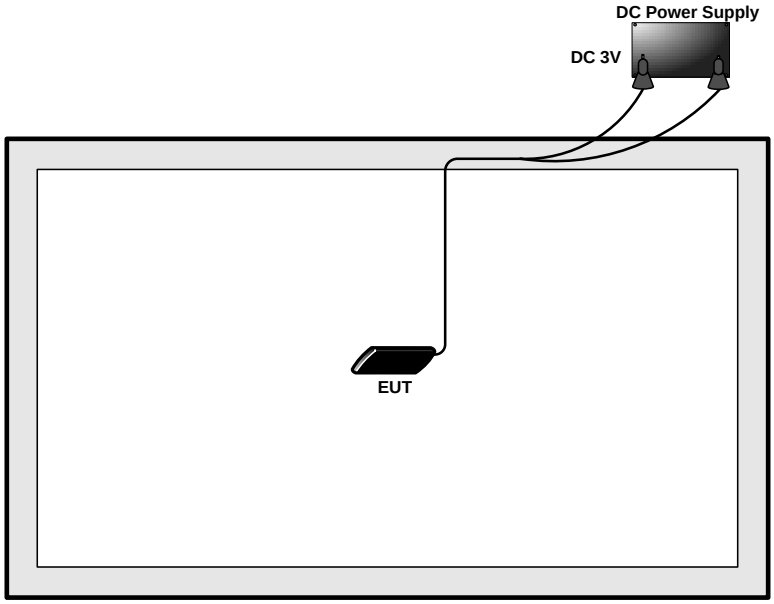
2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

Modulation	Data Rate
802.11a	6 Mbps

Ch. #		Band I：5150-5250 MHz
		802.11a
L	Low	36
M	Middle	44
H	High	48

2.4 Connection Diagram of Test System



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	DC Power Supply	Topward	3303D	N/A	N/A	Unshielded, 1.8 m

2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, “Tera Term” installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

2.7 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 and attenuator factor.
Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (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.

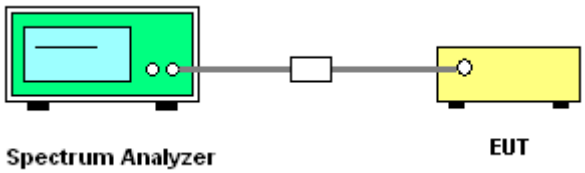
3.1.2 Measuring Instruments

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 v01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

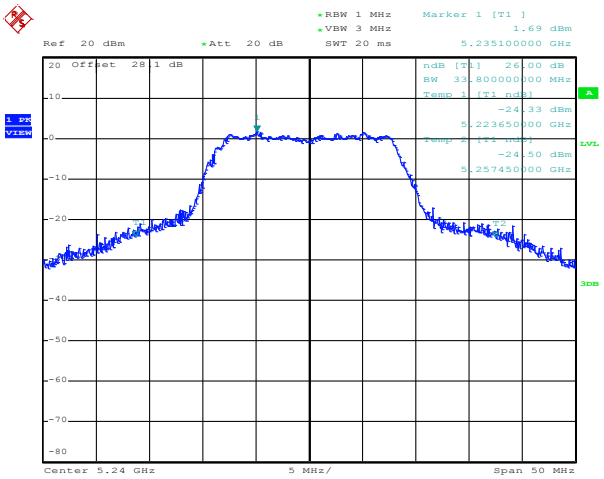
3.1.4 Test Setup



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

Please refer to Appendix A.

Maximum 26dB Bandwidth



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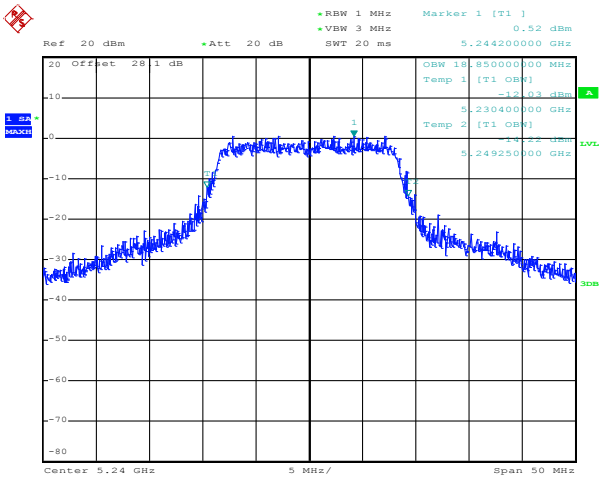
Maximum 99% Occupied Bandwidth



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3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

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.

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

3.2.2 Measuring Instruments

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

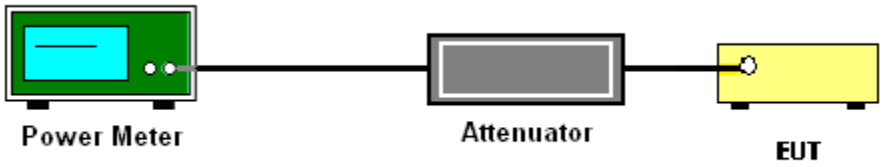
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.

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

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

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For 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.

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 v01.

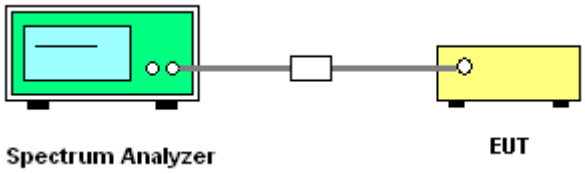
Section F) Maximum power spectral density.

 # Method SA-2 #

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

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = RMS
   - Trace average at least 100 traces in power averaging mode.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

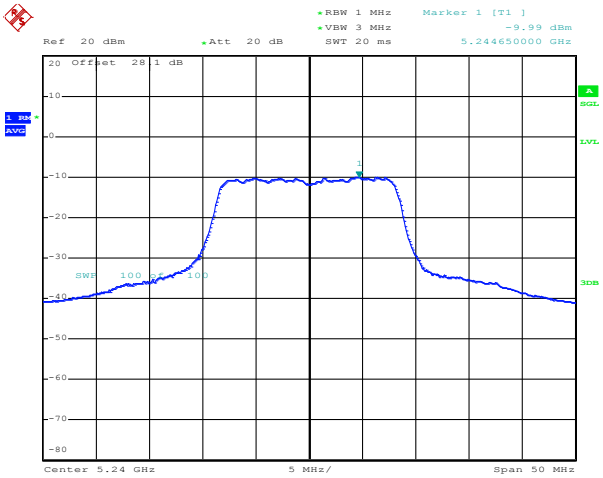
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Spectral Density(dBm/MHz)



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

3.4 Unwanted Radiated Emission Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

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.

(2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

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

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

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

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

(3) KDB789033 v01 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

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

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

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

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

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

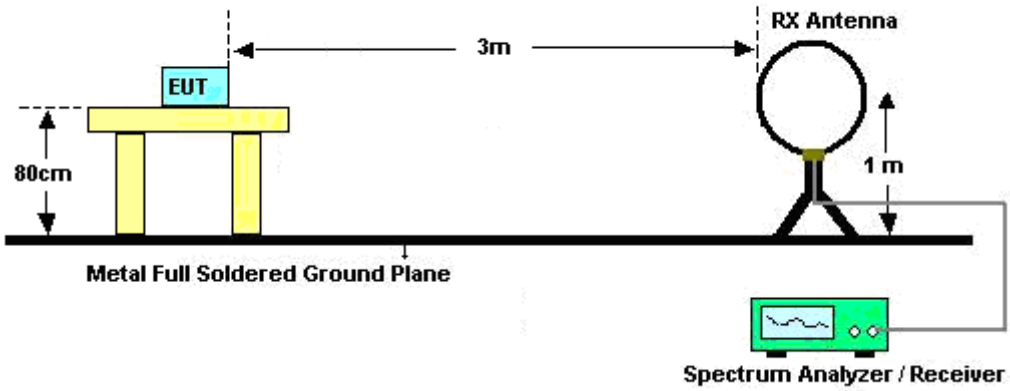
Band	Duty Cycle(%)	T(μs)	1/T(kHz)	VBW Setting
802.11a	47.3	1400	0.71	1kHz

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

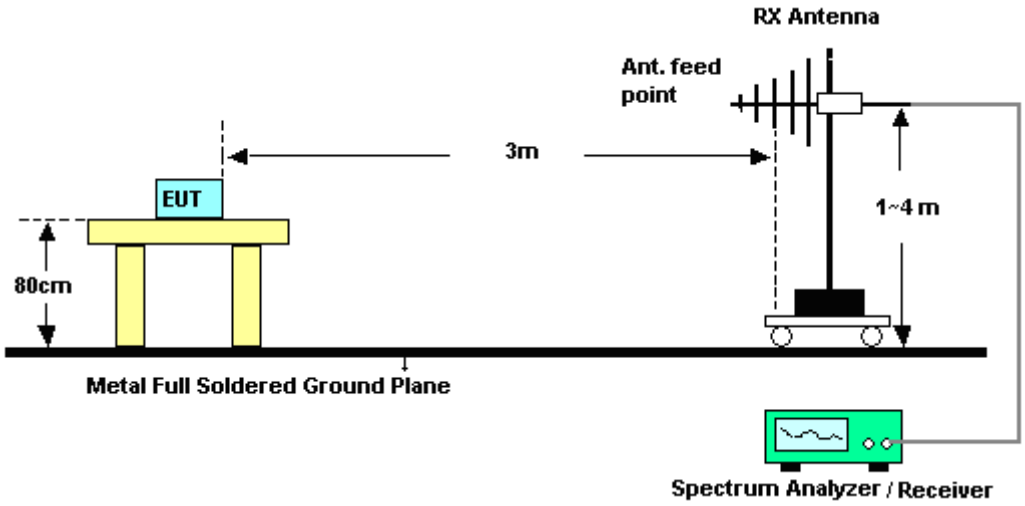
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

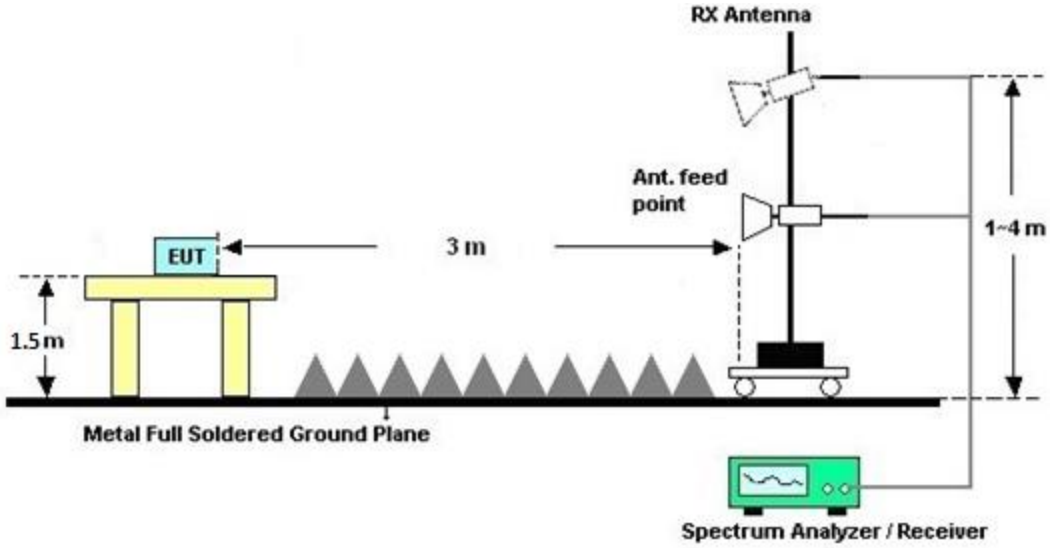
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



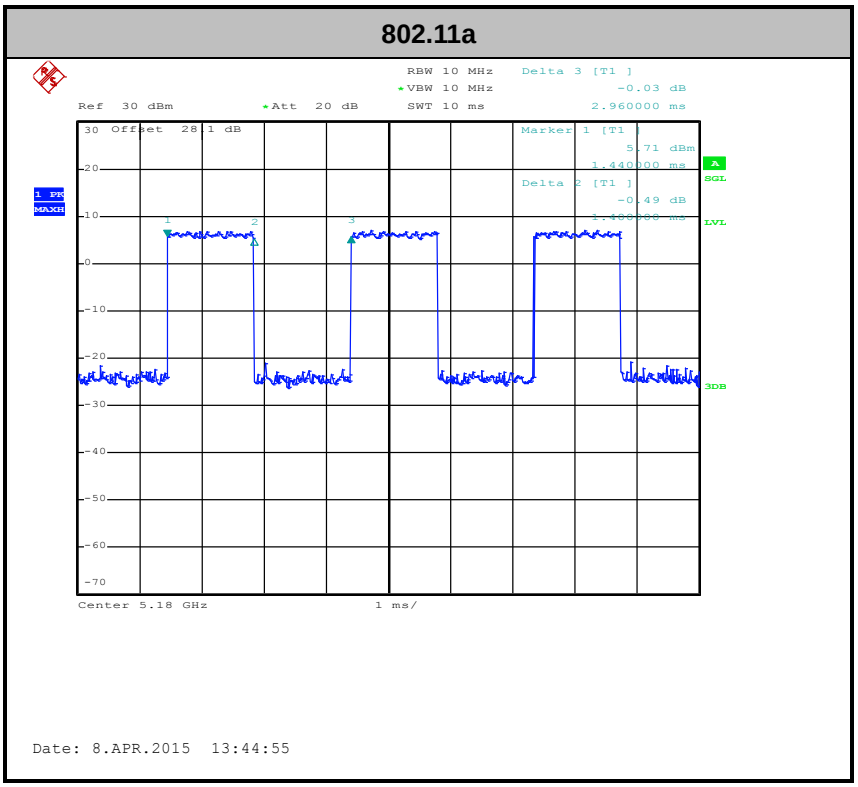
3.4.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix A.

3.4.7 Duty Cycle



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

Please refer to Appendix A.

3.5 Frequency Stability Measurement

3.5.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

3.5.4 Test Setup

3.5.5 Test Result of Frequency Stability

Please refer to Appendix A.

The frequency band 5180-5240MHz which was verified by testing against other standard is less than 20 ppm which is sufficient to maintain the signal within the 5150-5250MHz band.

3.6 Automatically Discontinue Transmission

3.6.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.6.2 Measuring Instruments

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

3.6.3 Test Result of Automatically Discontinue Transmission

EUT is verified this characteristic during the function check of normal sample associated with an access point:

A. Information start: make EUT supply information to the access point.

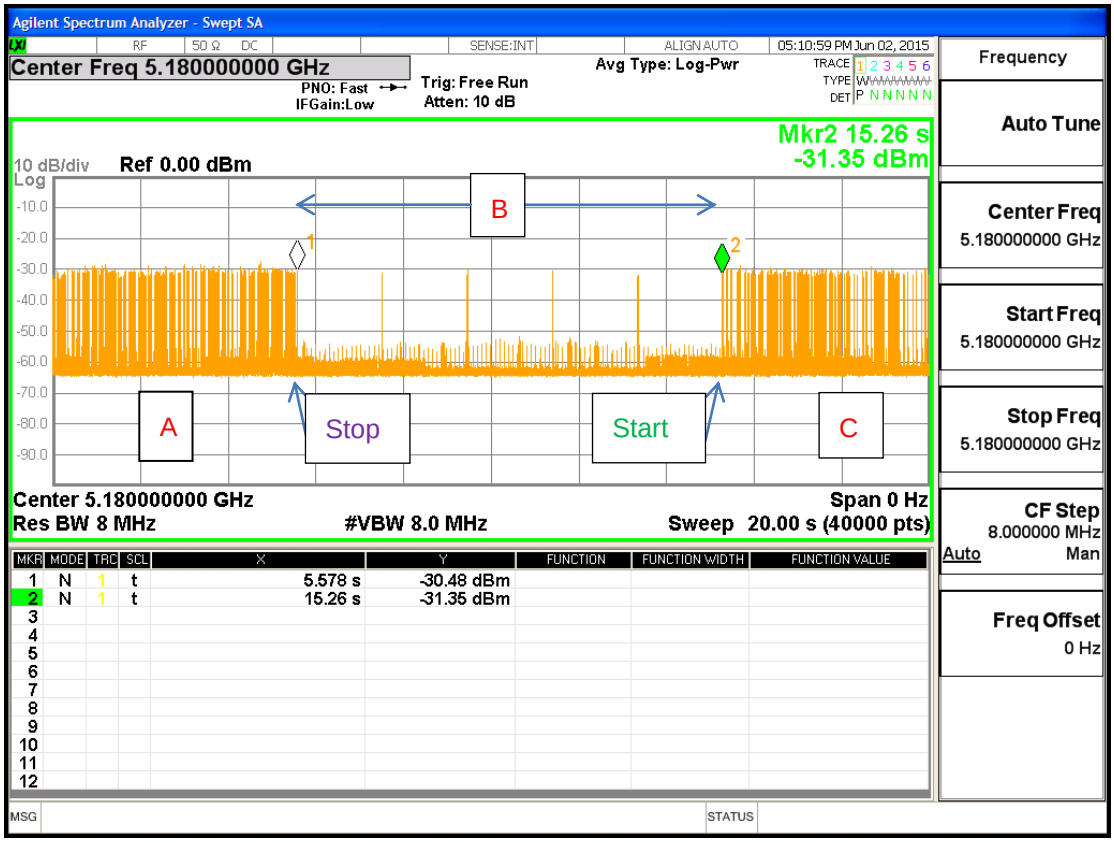
B. Information stop: stop supplying information to the access point.

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving.

C. Information start: make EUT supply information to the access point again.

The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

5180MHz



Note: The control / signalling information during the period B is precluded.

3.7 Antenna Requirements

3.7.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Apr. 08, 2015~ Jun 02, 2015	Jun. 08, 2015	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 09, 2014	Apr. 08, 2015~ Jun 02, 2015	Aug. 08, 2015	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 09, 2014	Apr. 08, 2015~ Jun 02, 2015	Aug. 08, 2015	Conducted (TH02-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Mar. 18, 2015	Apr. 08, 2015~ Jun 02, 2015	Mar. 17, 2016	Conducted (TH02-HY)
Signal Analyzer	Rohde & Schwarz	FSV 30	101749	9kH z~ 30GHz	Mar. 10, 2015	Apr. 16, 2015~ Apr. 17, 2015	Mar. 09, 2016	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9 kHz~7 GHz	Aug. 30, 2014	Apr. 16, 2015~ Apr. 17, 2015	Aug. 29, 2015	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	100315	9 kHz~30 MHz	Jul. 28, 2014	Apr. 16, 2015~ Apr. 17, 2015	Jul. 27, 2015	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Apr. 16, 2015~ Apr. 17, 2015	Sep. 26, 2015	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 19, 2014	Apr. 16, 2015~ Apr. 17, 2015	Aug. 18, 2015	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Oct. 02, 2014	Apr. 16, 2015~ Apr. 17, 2015	Oct. 01, 2015	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz	Mar. 12, 2015	Apr. 16, 2015~ Apr. 17, 2015	Mar. 11, 2016	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz~26.5 GHz	Oct. 21, 2014	Apr. 16, 2015~ Apr. 17, 2015	Oct. 20, 2015	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	DC~18 GHz	Apr. 21, 2014	Apr. 16, 2015~ Apr. 17, 2015	Apr. 20, 2015	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Apr. 16, 2015~ Apr. 17, 2015	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Apr. 16, 2015~ Apr. 17, 2015	N/A	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.50**

Appendix A. Conducted Test Results

Test Engineer:	Tommy Lee	Temperature:	21~25	°C
Test Date:	2015/4/8 ~ 2015/6/2	Relative Humidity:	51~54	%

Report Number : FR4D3036-01B

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	18.45	27.10	-	22.66		
11a	6Mbps	1	44	5220	18.80	30.40	-	22.74		
11a	6Mbps	1	48	5240	18.85	33.80	-	22.75		

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	3.25	6.02	24.00	4.82		Pass
11a	6Mbps	1	44	5220	3.25	6.52	24.00	4.82		Pass
11a	6Mbps	1	48	5240	3.25	6.40	24.00	4.82		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	3.25	-7.69	11.00	4.82		Pass
11a	6Mbps	1	44	5220	3.25	-7.13	11.00	4.82		Pass
11a	6Mbps	1	48	5240	3.25	-6.74	11.00	4.82		Pass

TEST RESULTS DATA
Frequency Stability

Band I										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stablility (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6Mbps	1	36	5180	5179.925	-0.075	-14.48	20	2.1	
11a	6Mbps	1	36	5180	5179.900	-0.100	-19.31	20	3.6	
11a	6Mbps	1	36	5180	5179.950	-0.050	-9.65	20	2.5	
11a	6Mbps	1	36	5180	5179.950	-0.050	-9.65	0	2.5	
11a	6Mbps	1	36	5180	5179.900	-0.100	-19.31	40	2.5	

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		5148.35	59.3	-14.7	74	45.63	34.61	11.55	32.49	195	292	P	H
		5148.8	46.79	-7.21	54	33.12	34.61	11.55	32.49	195	292	A	H
	*	5183	100.99	-	-	87.26	34.66	11.59	32.52	195	292	P	H
	*	5183	90.32	-	-	76.59	34.66	11.59	32.52	195	292	A	H
		5369.14	57.35	-16.65	74	43.91	34.91	11.71	33.18	195	292	P	H
		5424.69	44.78	-9.22	54	31.48	34.98	11.8	33.48	195	292	A	H
		5017.4	59.29	-14.71	74	45.82	34.42	11.37	32.32	208	301	P	V
		5015.75	46.96	-7.04	54	33.46	34.42	11.37	32.29	208	301	A	V
	*	5180	100.47	-	-	86.78	34.66	11.55	32.52	208	301	P	V
	*	5180	90.81	-	-	77.12	34.66	11.55	32.52	208	301	A	V
		5350.77	57.93	-16.07	74	44.51	34.89	11.71	33.18	208	301	P	V
		5426.12	45.26	-8.74	54	31.96	34.98	11.8	33.48	208	301	A	V
802.11a CH 44 5220MHz		5064.2	58.41	-15.59	74	44.81	34.49	11.46	32.35	204	310	P	H
		5067.05	46.42	-7.58	54	32.82	34.49	11.46	32.35	204	310	A	H
	*	5220	101.51	-	-	87.77	34.7	11.59	32.55	204	310	P	H
	*	5220	91.46	-	-	77.72	34.7	11.59	32.55	204	310	A	H
		5381.13	64.87	-9.13	74	51.47	34.94	11.74	33.28	204	310	P	H
		5385.86	52.51	-1.49	54	39.11	34.94	11.74	33.28	204	310	P	H
		5058.8	58.06	-15.94	74	44.51	34.49	11.41	32.35	100	299	P	V
		5052.8	46.56	-7.44	54	33.03	34.47	11.41	32.35	100	299	A	V
	*	5220	102	-	-	88.26	34.7	11.59	32.55	100	299	P	V
	*	5220	91.73	-	-	77.99	34.7	11.59	32.55	100	299	A	V
		5374.09	63.56	-10.44	74	50.22	34.91	11.71	33.28	100	299	P	V
		5375.74	52.78	-1.22	54	39.44	34.91	11.71	33.28	100	299	A	V

802.11a CH 48 5240MHz		5075.75	58.48	-15.52	74	44.89	34.52	11.46	32.39	104	312	P	H
		5087.3	47.03	-6.97	54	33.44	34.52	11.46	32.39	104	312	A	H
	*	5240	102.22	-	-	88.52	34.73	11.62	32.65	104	312	P	H
	*	5240	91.26	-	-	77.56	34.73	11.62	32.65	104	312	A	H
		5392.46	62.41	-11.59	74	49.01	34.94	11.74	33.28	104	312	P	H
		5398.07	51.45	-2.55	54	38.03	34.96	11.74	33.28	104	312	A	H
		5073.65	58.73	-15.27	74	45.14	34.52	11.46	32.39	104	301	P	V
		5082.2	47.11	-6.89	54	33.52	34.52	11.46	32.39	104	301	A	V
	*	5240	102.96	-	-	89.26	34.73	11.62	32.65	104	301	P	V
	*	5240	91.42	-	-	77.72	34.73	11.62	32.65	104	301	A	V
		5393.12	63.38	-10.62	74	49.98	34.94	11.74	33.28	104	301	P	V
		5401.7	52.06	-1.94	54	38.75	34.96	11.74	33.39	104	301	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 802.11a (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		5506	62.47	-11.53	74	49.19	35.1	11.92	33.74	100	309	P	H
		5506	50.07	-3.93	54	36.79	35.1	11.92	33.74	100	309	A	H
		10359	43.01	-30.99	74	48.32	37.22	16.34	58.87	100	0	P	H
		15540	48.53	-25.47	74	45.32	40.34	20.36	57.49	100	0	P	H
		5500	62.89	-11.11	74	49.59	35.1	11.86	33.66	199	294	P	V
		5500	50.42	-3.58	54	37.12	35.1	11.86	33.66	199	294	A	V
		10359	42.85	-31.15	74	48.16	37.22	16.34	58.87	100	0	P	V
		15540	48.05	-25.95	74	44.84	40.34	20.36	57.49	100	0	P	V
802.11a CH 44 5220MHz		5542	58.23	-15.77	74	44.96	35.12	11.98	33.83	204	310	P	H
		5542	48.48	-5.52	54	35.21	35.12	11.98	33.83	204	310	A	H
		10440	45.08	-28.92	74	50.29	37.26	16.41	58.88	100	0	P	H
		15660	46.87	-27.13	74	43.32	40.49	20.41	57.35	100	0	P	H
		5536	58.19	-15.81	74	44.98	35.12	11.92	33.83	102	291	P	V
		5536	47.36	-6.64	54	34.15	35.12	11.92	33.83	102	291	A	V
		10440	44.39	-29.61	74	49.6	37.26	16.41	58.88	100	0	P	V
		15660	46.69	-27.31	74	43.14	40.49	20.41	57.35	100	0	P	V
802.11a CH 48 5240MHz		5554	55.64	-18.36	74	42.45	35.13	11.98	33.92	104	312	P	H
		5554	46.44	-7.56	54	33.25	35.13	11.98	33.92	104	312	A	H
		10480	43.7	-30.3	74	48.85	37.29	16.45	58.89	100	0	P	H
		15720	48.09	-25.91	74	44.34	40.57	20.45	57.27	100	0	P	H
		5560	57.53	-16.47	74	44.34	35.13	11.98	33.92	104	301	P	V
		5560	46.45	-7.55	54	33.26	35.13	11.98	33.92	104	301	A	V
		10480	44.01	-29.99	74	49.16	37.29	16.45	58.89	100	0	P	V
		15720	48.57	-25.43	74	44.82	40.57	20.45	57.27	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 802.11a (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)
		48.36	28.7	-11.3	40	49.03	9.1	1.77	31.2			P	H
		63.21	30.17	-9.83	40	53.35	6	2.06	31.24	163	5	P	H
		69.69	18.45	-21.55	40	41.29	6.4	2.06	31.3			P	H
		644.4	24.91	-21.09	46	30.8	20.4	4.22	30.51			P	H
		750.8	25.95	-20.05	46	29.77	22.1	4.48	30.4			P	H
		801.9	26.32	-19.68	46	29.96	22.04	4.62	30.3			P	H
													H
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802.11a													H
LF		64.29	27.77	-12.23	40	50.93	6	2.06	31.22	120	151	P	V
		106.95	30.2	-13.3	43.5	48.37	10.62	2.38	31.17			P	V
		126.66	29.91	-13.59	43.5	46.87	11.76	2.38	31.1			P	V
		440	31	-15	46	41.07	17	3.63	30.7			P	V
		459.6	27.75	-18.25	46	37.52	17.4	3.63	30.8			P	V
		469.4	26.29	-19.71	46	35.83	17.49	3.77	30.8			P	V
													V
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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	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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

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

1. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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