

FCC RF Test Report

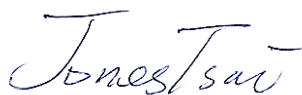
APPLICANT : Dell Inc.
EQUIPMENT : Portable Computer
BRAND NAME : DELL
MODEL NAME : T14G
FCC ID : E2K-T14G001
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Nov. 07, 2014 and testing was completed on Dec. 24, 2014. 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.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4N0733E	Rev. 01	Initial issue of report	Dec. 11, 2014
FR4N0733E	Rev. 02	Revising the Power Spectral Density Measurement information in section 3.3.5	Dec. 24, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	$\leq -17, -27$ dBm/MHz & 15.209(a)	Pass	Under limit 1.17 dB at 5724.600 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 6.20 dB at 0.470 MHz
3.6	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Dell Inc.

One Dell Way Round Rock, TX 78682, USA

1.2 Manufacturer

Dell Inc.

One Dell Way Round Rock, TX 78682, USA

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Portable Computer
Brand Name	DELL
Model Name	T14G
FCC ID	E2K-T14G001
EUT supports Radios application	WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 Bluetooth v4.0 EDR/LE
HW Version	DVT1 Stage
SW Version	X12
EUT Stage	Production Unit

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

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard															
Tx/Rx Channel Frequency Range		5725 MHz ~ 5850 MHz													
Maximum Output Power		<Ant. 1> 802.11a : 13.98 dBm / 0.0250 W SISO <Ant. Port 1> 802.11n HT20 : 11.98 dBm / 0.0158 W 802.11n HT40 : 11.99 dBm / 0.0158 W <Ant. 2> 802.11a : 13.96 dBm / 0.0249 W SISO <Ant. Port 2> 802.11n HT20 : 11.96 dBm / 0.0157 W 802.11n HT40 : 11.68 dBm / 0.0147 W MIMO <Ant. Port 1 + 2> 802.11n HT20 : 11.86 dBm / 0.0153 W 802.11n HT40 : 11.82 dBm / 0.0152 W													
Type of Modulation		802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)													
Antenna Type / Gain		Main Antenna : PIFA Antenna with gain -1.23 dBi Aux. Antenna : PIFA Antenna with gain -0.92 dBi													
Antenna Function Description		<table><tr><td></td><td>Ant. 1</td><td>Ant. 2</td></tr><tr><td>802.11 a</td><td>V</td><td>V</td></tr><tr><td>802.11 n SISO</td><td>V</td><td>V</td></tr><tr><td>802.11 n MIMO</td><td>V</td><td>V</td></tr></table>			Ant. 1	Ant. 2	802.11 a	V	V	802.11 n SISO	V	V	802.11 n MIMO	V	V
	Ant. 1	Ant. 2													
802.11 a	V	V													
802.11 n SISO	V	V													
802.11 n MIMO	V	V													

1.5 Modification of EUT

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

1.6 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 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.		
	TH02-HY	CO05-HY	03CH07-HY

1.7 Applicable Standards

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

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v01
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.4-2003

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

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 (X plane for antenna 1 and Z plane for MIMO antenna 1+2) 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 and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151	5755	159	5795
	153	5765	161	5805
	155	5775	165	5825

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

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.

<Ant. 1>

5GHz 802.11a mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Average Power (dBm)	13.98	13.87	13.92	13.91	13.95	13.82	13.87	13.92

SISO <Ant. 1>

5GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	11.98	11.95	11.95	11.94	11.96	11.91	11.93	11.96

5GHz 802.11n HT40 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	11.99	11.91	11.90	11.93	11.87	11.91	11.97	11.90

<Ant. 2>

5GHz 802.11a mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Average Power (dBm)	13.96	13.86	13.92	13.93	13.91	13.92	13.94	13.93

SISO <Ant. 2>

5GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	11.96	11.81	11.90	11.92	11.94	11.96	11.93	11.93

5GHz 802.11n HT40 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Average Power (dBm)	11.68	11.64	11.59	11.61	11.65	11.64	11.62	11.57

MIMO <Ant. 1+2>

5GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
Average Power (dBm)	11.86	11.56	11.58	11.64	11.63	11.57	11.60	11.58

5GHz 802.11n HT40 mode								
Data Rate (MHz)	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
Average Power (dBm)	11.68	11.63	11.65	11.62	11.64	11.61	11.82	11.65

Note: MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.

2.3 Test Mode

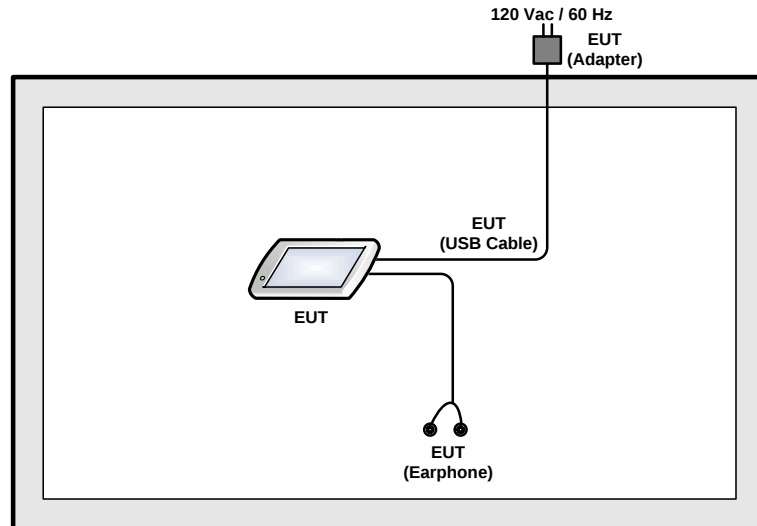
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
Conducted TCs	Test Items	Mode	Data rate	Test Channel
	6dB Bandwidth Power Spectral Density	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0/ MCS8	L/M/H
		802.11n HT40	MCS0/ MCS8	L/M/H
	Output Power	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0/ MCS8	L/M/H
		802.11n HT40	MCS0/ MCS8	L/M/H
	Frequency Stability	802.11a	6 Mbps	L
Radiated TCs	Test Items	Mode	Data rate	Test Channel
	Radiated Band Edge	802.11a	6 Mbps	L/H
		802.11n HT20	MCS0/ MCS8	L/H
		802.11n HT40	MCS0/ MCS8	L/H
	Radiated Spurious Emission	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0/ MCS8	L/M/H
		802.11n HT40	MCS0/ MCS8	L/M/H
	AC Conducted Emission	Mode 1 : TC + TF		
Remark:				
1. TC stands for Test Configuration, and consists of Data Link with USB HD, earphone, adapter, HDMI cable, LCD Monitor and SD card.				
2. TF stands for Test Function, and consists of Bluetooth Link, WLAN (5GHz) Link, H Pattern, Camera, and MPEG4.				

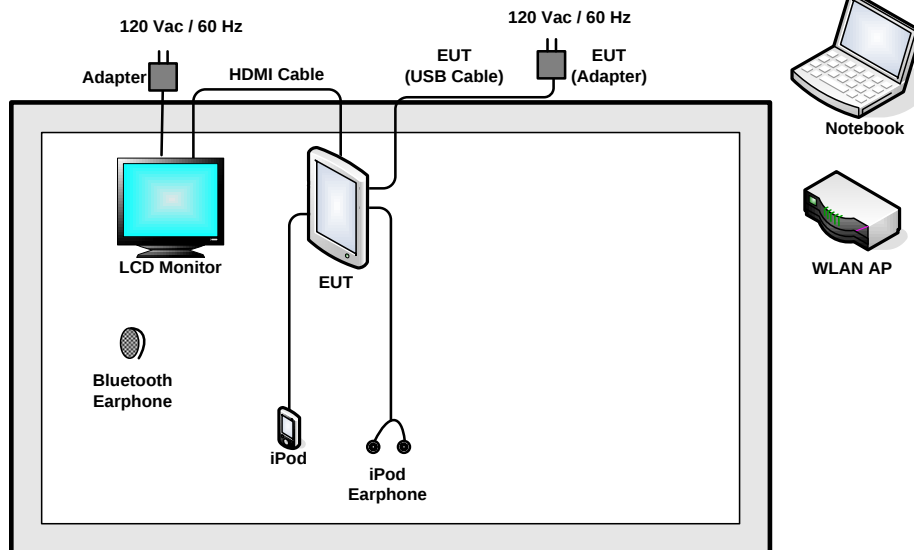
Ch. #		Band IV : 5725-5850 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	165	165	159

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<EUT with Adapter Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	WLAN AP	D-Link	DIR-865L	KA2IR865LA1	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
5.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
6.	LCD Monitor	DELL	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
7.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.6 EUT Operation Test Setup

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

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.

$$\begin{aligned}
 \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\
 &= 4.2 + 10 = 14.2 \text{ (dB)}
 \end{aligned}$$

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Description of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

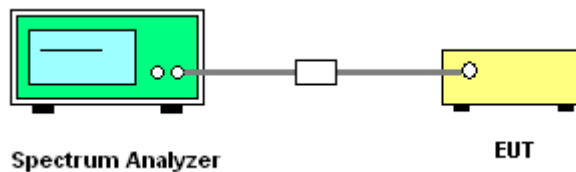
3.1.2 Measuring Instruments

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 for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

3.1.4 Test Setup

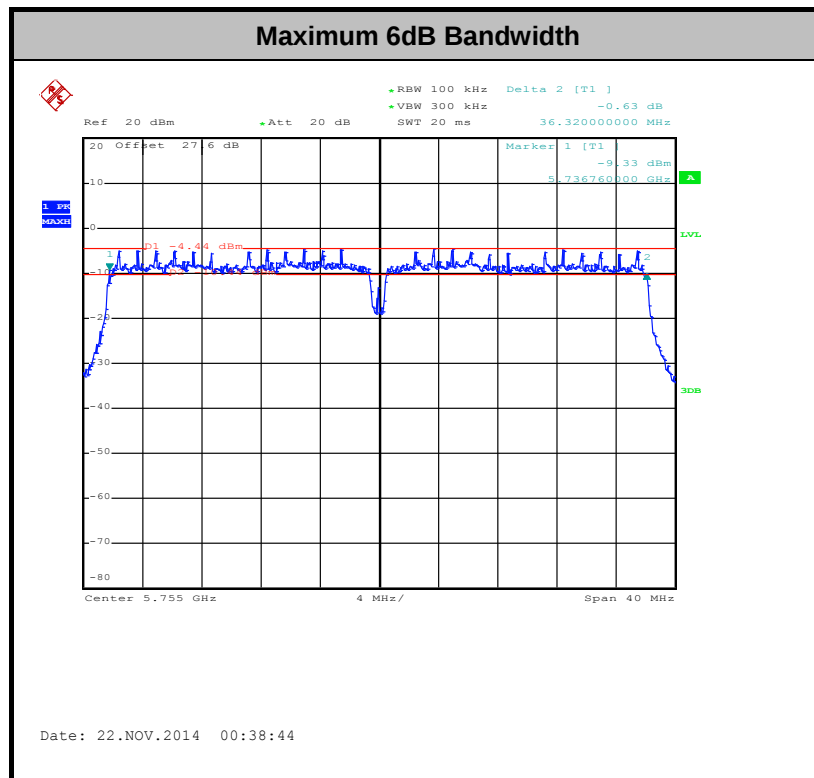




3.1.5 Test Result of 6dB Bandwidth

Test Band :	5GHz band 4	Temperature :	21~26℃
Test Engineer :	Bill Kuo, Osolemio Chang, and Luffy Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	6 dB Bandwidth (MHz)		FCC 6 dB Bandwidth Min. Limit (MHz)		Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	15.80	-	0.5	0.5	Pass
11a	6Mbps	1	157	5785	15.70	-	0.5	0.5	Pass
11a	6Mbps	1	165	5825	16.40	-	0.5	0.5	Pass
HT20	MCS0	1	149	5745	15.80	-	0.5	0.5	Pass
HT20	MCS0	1	157	5785	15.90	-	0.5	0.5	Pass
HT20	MCS0	1	165	5825	15.76	-	0.5	0.5	Pass
HT40	MCS0	1	151	5755	36.32	-	0.5	0.5	Pass
HT40	MCS0	1	159	5795	36.40	-	0.5	0.5	Pass
HT20	MCS0	2	149	5745	15.80	16.32	0.5		Pass
HT20	MCS0	2	157	5785	15.84	16.32	0.5		Pass
HT20	MCS0	2	165	5825	16.32	16.36	0.5		Pass
HT40	MCS0	2	151	5755	36.32	36.40	0.5		Pass
HT40	MCS0	2	159	5795	36.40	36.40	0.5		Pass



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 the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

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

3.2.2 Measuring Instruments

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

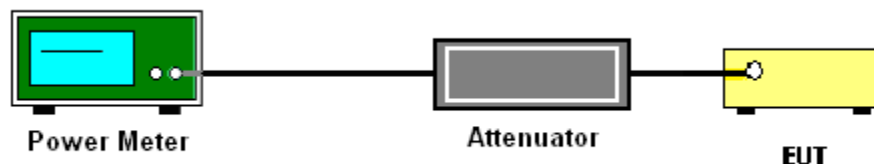
3.2.3 Test Procedures

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

Test Band :	5GHz band 4	Temperature :	21~26℃
Test Engineer :	Bill Kuo, Osolemio Chang, and Luffy Lin	Relative Humidity :	45~54%

Mod.	Data Rate	NT x	Channel	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	0.20	0.20	13.98	13.90	-	30.00	30.00	-1.23	-0.92	Pass
11a	6Mbps	1	157	5785	0.20	0.20	13.91	13.95		30.00	30.00	-1.23	-0.92	Pass
11a	6Mbps	1	165	5825	0.20	0.20	13.95	13.96		30.00	30.00	-1.23	-0.92	Pass
HT20	MCS0	1	149	5745	0.19	0.23	11.98	11.94		30.00	30.00	-1.23	-0.92	Pass
HT20	MCS0	1	157	5785	0.19	0.23	11.94	11.95		30.00	30.00	-1.23	-0.92	Pass
HT20	MCS0	1	165	5825	0.19	0.23	11.90	11.96		30.00	30.00	-1.23	-0.92	Pass
HT40	MCS0	1	151	5755	0.42	0.39	10.20	10.19		30.00	30.00	-1.23	-0.92	Pass
HT40	MCS0	1	159	5795	0.42	0.39	11.99	11.68		30.00	30.00	-1.23	-0.92	Pass
HT20	MCS0	2	149	5745	0.44	0.44	9.23	8.45	11.86	30.00		1.94		Pass
HT20	MCS0	2	157	5785	0.44	0.44	9.48	8.03	11.82	30.00		1.94		Pass
HT20	MCS0	2	165	5825	0.44	0.44	9.17	8.05	11.65	30.00		1.94		Pass
HT40	MCS0	2	151	5755	0.76	0.77	9.25	7.98	11.67	30.00		1.94		Pass
HT40	MCS0	2	159	5795	0.76	0.77	9.28	7.96	11.68	30.00		1.94		Pass

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

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

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules 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).

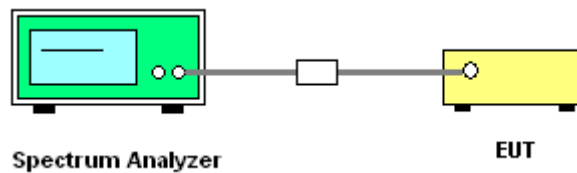
1. The testing follows Method SA-2 of FCC KDB 789033 D01 General UNII Test Procedures v01r03.
 - Measure the duty cycle.
 - Set span to encompass the entire emission bandwidth (EBW) of the signal.
 - Set RBW = 300 kHz.
 - Set VBW $\geq$ 1 MHz.
 - Number of points in sweep $\geq$ 2 Span / RBW.
 - Sweep time = auto.
 - Detector = RMS
 - Trace average at least 100 traces in power averaging mode.
 - Add $10 \log(500\text{kHz}/\text{RBW})$ to the test result.
 - Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.

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 PSD and record it.
4. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (1): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

3.3.4 Test Setup

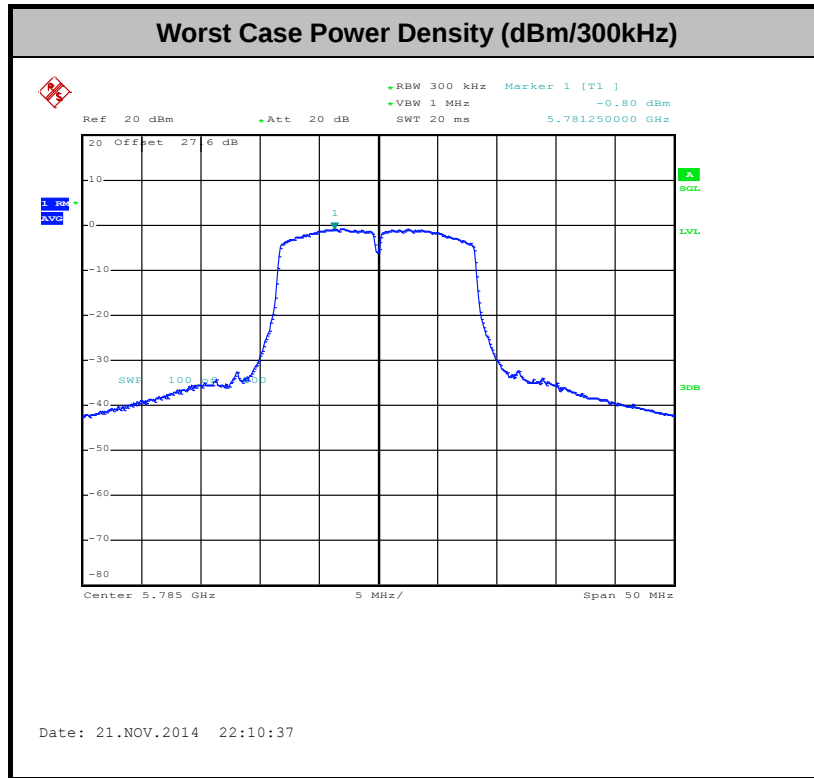




3.3.5 Test Result of Power Spectral Density

Test Band :	5GHz band 4	Temperature :	21~26°C
Test Engineer :	Bill Kuo, Osolemio Chang, and Luffy Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Duty Factor (dB)		10log (500kHz /RBW) Factor (dB)		Average Power Density (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	0.20	0.20	2.22	2.22	1.61	0.22	-	30.00	30.00	-1.23	-0.92	Pass
11a	6Mbps	1	157	5785	0.20	0.20	2.22	2.22	1.62	0.21		30.00	30.00	-1.23	-0.92	Pass
11a	6Mbps	1	165	5825	0.20	0.20	2.22	2.22	0.73	0.62		30.00	30.00	-1.23	-0.92	Pass
HT20	MCS0	1	149	5745	0.19	0.23	2.22	2.22	-0.42	-2.53		30.00	30.00	-1.23	-0.92	Pass
HT20	MCS0	1	157	5785	0.19	0.23	2.22	2.22	-0.62	-2.58		30.00	30.00	-1.23	-0.92	Pass
HT20	MCS0	1	165	5825	0.19	0.23	2.22	2.22	-1.21	-2.18		30.00	30.00	-1.23	-0.92	Pass
HT40	MCS0	1	151	5755	0.42	0.39	2.22	2.22	-5.74	-7.28		30.00	30.00	-1.23	-0.92	Pass
HT40	MCS0	1	159	5795	0.42	0.39	2.22	2.22	-4.21	-5.08		30.00	30.00	-1.23	-0.92	Pass
HT20	MCS0	2	149	5745	0.44	0.44	2.22		-		-2.23	30.00		1.94		Pass
HT20	MCS0	2	157	5785	0.44	0.44	2.22				-2.31	30.00		1.94		Pass
HT20	MCS0	2	165	5825	0.44	0.44	2.22				-2.20	30.00		1.94		Pass
HT40	MCS0	2	151	5755	0.76	0.77	2.22				-6.06	30.00		1.94		Pass
HT40	MCS0	2	159	5795	0.76	0.77	2.22				-6.41	30.00		1.94		Pass



3.4 Unwanted Emissions 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 5725-5850 MHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBμV/m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBμV/m).
- (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.

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

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

- (3) KDB789033 v01r03 H)2)c)(i) 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 $\geq$ 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.

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	802.11a	95.57	2075	0.48	1kHz
1	5GHz 802.11n HT20	95.63	1931	0.52	1kHz
1	5GHz 802.11n HT40	90.84	953	1.05	3kHz
1+2	5GHz 802.11n HT20 for Ant 1	90.44	986	1.01	3kHz
1+2	5GHz 802.11n HT20 for Ant 2	90.44	986	1.01	3kHz
1+2	5GHz 802.11n HT40 for Ant 1	83.87	500	2	3kHz
1+2	5GHz 802.11n HT40 for Ant 2	83.87	500	2	3kHz

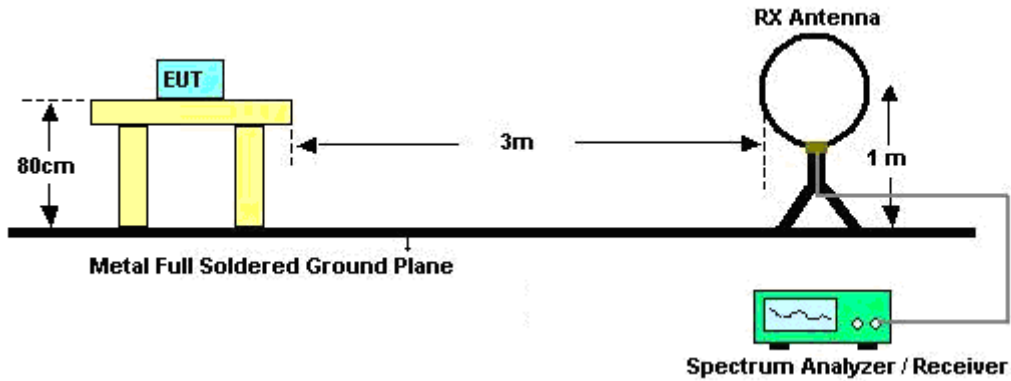
2. The EUT was placed on a rotatable table top 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.



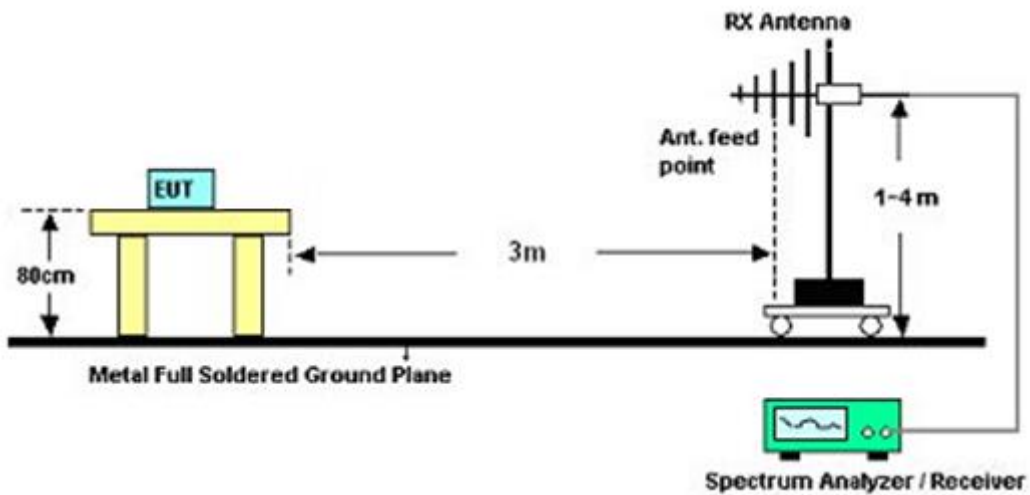
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst 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

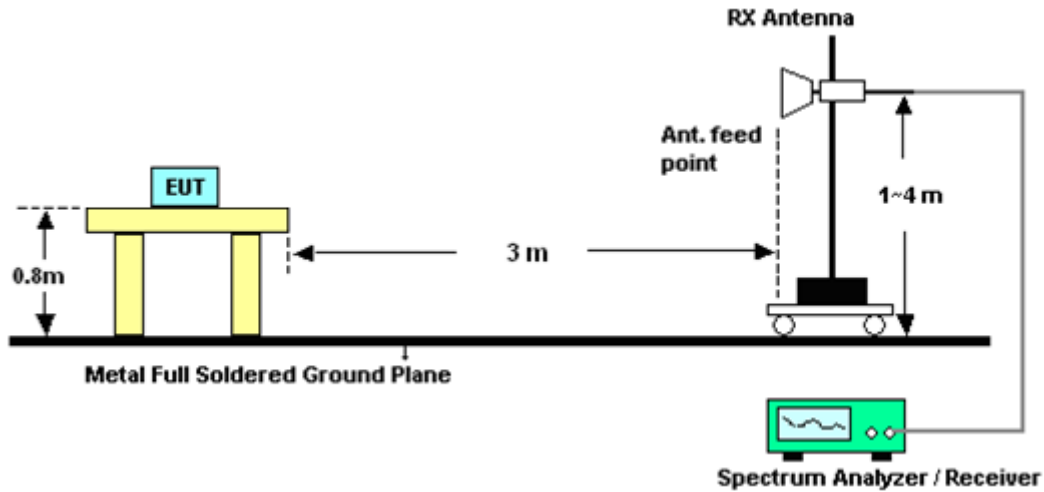
For radiated emissions below 30MHz



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 and Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

The test results please refer to Appendix A.

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 (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

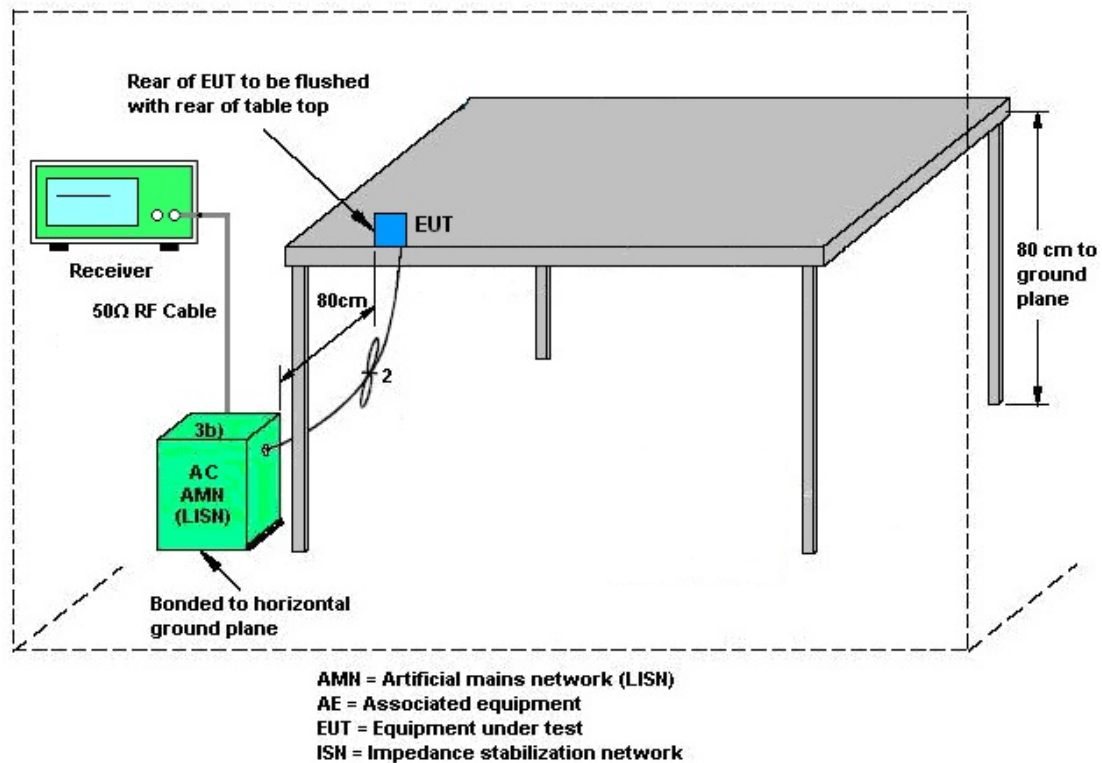
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

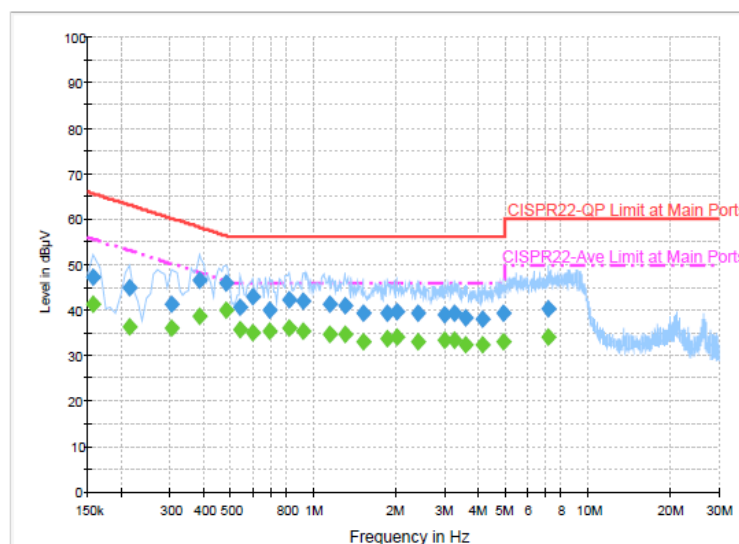
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	TC + TF		

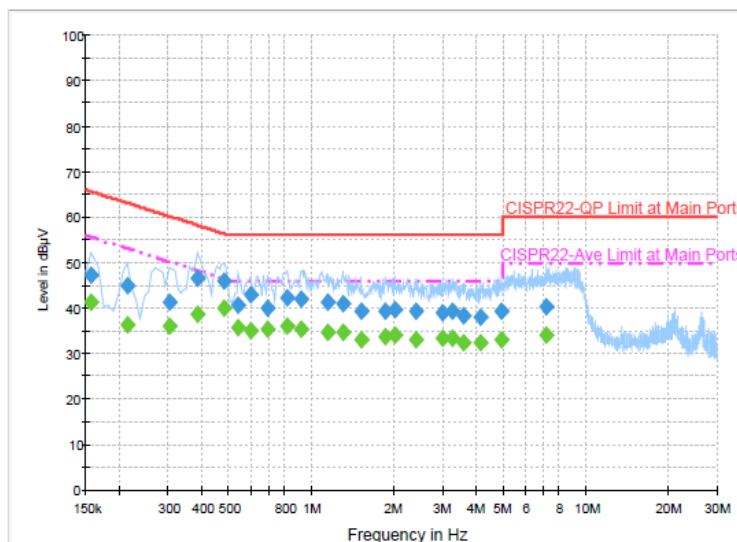


Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	47.1	Off	L1	19.4	18.5	65.6
0.214000	44.7	Off	L1	19.4	18.3	63.0
0.302000	41.2	Off	L1	19.4	19.0	60.2
0.382000	46.4	Off	L1	19.4	11.8	58.2
0.478000	45.8	Off	L1	19.4	10.6	56.4
0.542000	40.7	Off	L1	19.4	15.3	56.0
0.598000	42.8	Off	L1	19.5	13.2	56.0
0.694000	40.0	Off	L1	19.5	16.0	56.0
0.814000	42.1	Off	L1	19.5	13.9	56.0
0.918000	42.0	Off	L1	19.5	14.0	56.0
1.150000	41.1	Off	L1	19.5	14.9	56.0
1.302000	40.8	Off	L1	19.5	15.2	56.0
1.518000	39.2	Off	L1	19.5	16.8	56.0
1.846000	39.3	Off	L1	19.5	16.7	56.0
2.014000	39.6	Off	L1	19.5	16.4	56.0
2.398000	39.2	Off	L1	19.5	16.8	56.0
3.006000	38.8	Off	L1	19.6	17.2	56.0
3.246000	39.3	Off	L1	19.6	16.7	56.0
3.566000	38.2	Off	L1	19.6	17.8	56.0
4.118000	38.0	Off	L1	19.6	18.0	56.0
4.918000	39.2	Off	L1	19.6	16.8	56.0
7.126000	40.1	Off	L1	19.6	19.9	60.0



Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	TC + TF		

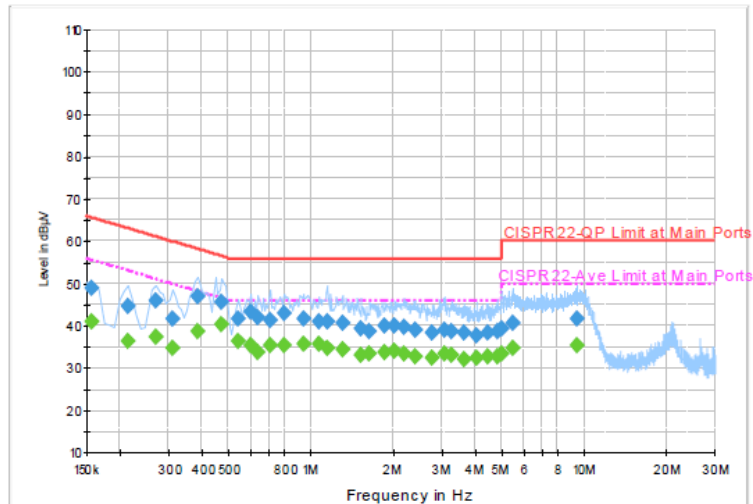


Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	41.3	Off	L1	19.4	14.3	55.6
0.214000	36.4	Off	L1	19.4	16.6	53.0
0.302000	36.0	Off	L1	19.4	14.2	50.2
0.382000	38.7	Off	L1	19.4	9.5	48.2
0.478000	39.8	Off	L1	19.4	6.6	46.4
0.542000	35.8	Off	L1	19.4	10.2	46.0
0.598000	35.0	Off	L1	19.5	11.0	46.0
0.694000	35.5	Off	L1	19.5	10.5	46.0
0.814000	36.1	Off	L1	19.5	9.9	46.0
0.918000	35.4	Off	L1	19.5	10.6	46.0
1.150000	34.7	Off	L1	19.5	11.3	46.0
1.302000	34.7	Off	L1	19.5	11.3	46.0
1.518000	33.0	Off	L1	19.5	13.0	46.0
1.846000	33.5	Off	L1	19.5	12.5	46.0
2.014000	34.0	Off	L1	19.5	12.0	46.0
2.398000	33.0	Off	L1	19.5	13.0	46.0
3.006000	33.3	Off	L1	19.6	12.7	46.0
3.246000	33.3	Off	L1	19.6	12.7	46.0
3.566000	32.3	Off	L1	19.6	13.7	46.0
4.118000	32.4	Off	L1	19.6	13.6	46.0
4.918000	33.1	Off	L1	19.6	12.9	46.0
7.126000	34.1	Off	L1	19.6	15.9	50.0

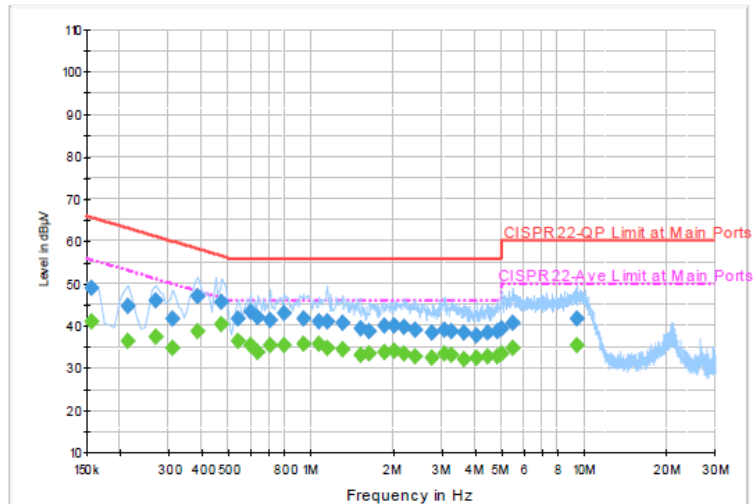


Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	TC + TF		

**Final Result : QuasiPeak**

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	49.0	Off	N	19.4	16.6	65.6
0.214000	44.8	Off	N	19.4	18.2	63.0
0.270000	46.1	Off	N	19.4	15.0	61.1
0.310000	41.7	Off	N	19.4	18.3	60.0
0.382000	46.8	Off	N	19.4	11.4	58.2
0.470000	45.7	Off	N	19.5	10.8	56.5
0.542000	41.8	Off	N	19.4	14.2	56.0
0.598000	43.2	Off	N	19.5	12.8	56.0
0.638000	42.0	Off	N	19.5	14.0	56.0
0.710000	41.5	Off	N	19.5	14.5	56.0
0.798000	43.1	Off	N	19.5	12.9	56.0
0.934000	41.8	Off	N	19.5	14.2	56.0
1.062000	40.9	Off	N	19.5	15.1	56.0
1.142000	41.1	Off	N	19.5	14.9	56.0
1.302000	40.6	Off	N	19.5	15.4	56.0
1.518000	39.5	Off	N	19.5	16.5	56.0
1.630000	38.8	Off	N	19.5	17.2	56.0
1.862000	39.9	Off	N	19.5	16.1	56.0

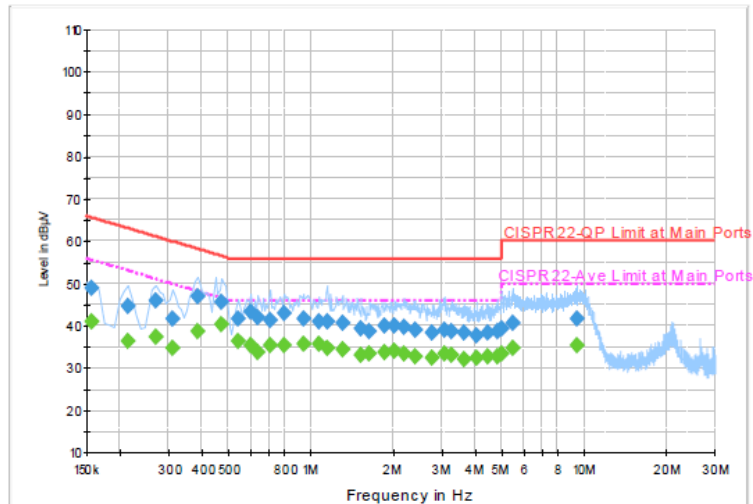
Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	TC + TF		


Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.022000	40.0	Off	N	19.5	16.0	56.0
2.174000	39.7	Off	N	19.3	16.3	56.0
2.398000	39.2	Off	N	19.5	16.8	56.0
2.766000	38.2	Off	N	19.6	17.8	56.0
3.086000	39.1	Off	N	19.6	16.9	56.0
3.270000	38.7	Off	N	19.6	17.3	56.0
3.638000	38.3	Off	N	19.6	17.7	56.0
4.022000	37.8	Off	N	19.6	18.2	56.0
4.414000	38.5	Off	N	19.6	17.5	56.0
4.774000	38.8	Off	N	19.6	17.2	56.0
4.950000	39.5	Off	N	19.7	16.5	56.0
5.430000	40.7	Off	N	19.6	19.3	60.0
9.414000	41.6	Off	N	19.7	18.4	60.0

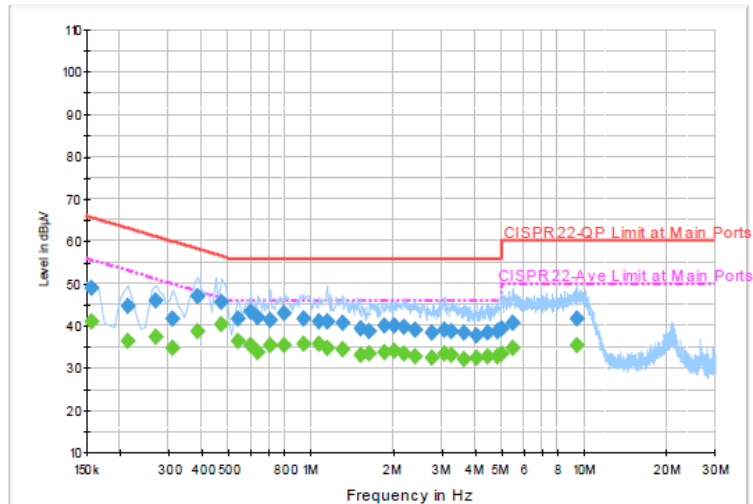


Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	TC + TF		

**Final Result : Average**

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	41.1	Off	N	19.4	14.5	55.6
0.214000	36.5	Off	N	19.4	16.5	53.0
0.270000	37.5	Off	N	19.4	13.6	51.1
0.310000	34.9	Off	N	19.4	15.1	50.0
0.382000	38.8	Off	N	19.4	9.4	48.2
0.470000	40.3	Off	N	19.5	6.2	46.5
0.542000	36.4	Off	N	19.4	9.6	46.0
0.598000	35.3	Off	N	19.5	10.7	46.0
0.638000	33.9	Off	N	19.5	12.1	46.0
0.710000	35.6	Off	N	19.5	10.4	46.0
0.798000	35.3	Off	N	19.5	10.7	46.0
0.934000	35.6	Off	N	19.5	10.4	46.0
1.062000	35.7	Off	N	19.5	10.3	46.0
1.142000	34.7	Off	N	19.5	11.3	46.0
1.302000	34.3	Off	N	19.5	11.7	46.0
1.518000	33.0	Off	N	19.5	13.0	46.0
1.630000	33.3	Off	N	19.5	12.7	46.0
1.862000	33.7	Off	N	19.5	12.3	46.0

Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Eric Jeng	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	TC + TF		


Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.022000	33.9	Off	N	19.5	12.1	46.0
2.174000	33.5	Off	N	19.3	12.5	46.0
2.398000	32.9	Off	N	19.5	13.1	46.0
2.766000	32.3	Off	N	19.6	13.7	46.0
3.086000	33.3	Off	N	19.6	12.7	46.0
3.270000	33.1	Off	N	19.6	12.9	46.0
3.638000	32.3	Off	N	19.6	13.7	46.0
4.022000	32.3	Off	N	19.6	13.7	46.0
4.414000	32.6	Off	N	19.6	13.4	46.0
4.774000	32.9	Off	N	19.6	13.1	46.0
4.950000	33.3	Off	N	19.7	12.7	46.0
5.430000	34.6	Off	N	19.6	15.4	50.0
9.414000	35.4	Off	N	19.7	14.6	50.0

3.6 Frequency Stability Measurement

3.6.1 Limit of Frequency Stability

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

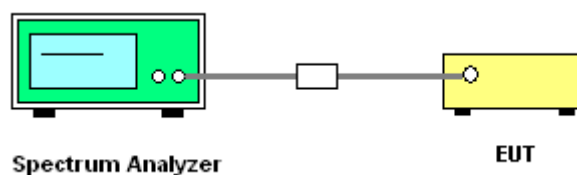
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

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

3.6.4 Test Setup



**3.6.5 Test Result of Frequency Stability**

Test Band :	5GHz band 4	Test Engineer :	Bill Kuo, Osolemio Chang, and Luffy Lin
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Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)
11a	6Mbps	1	149	5745	5744.950	-0.050	-8.70	20	3.33
11a	6Mbps	1	149	5745	5744.950	-0.050	-8.70	20	4.07
11a	6Mbps	1	149	5745	5744.950	-0.050	-8.70	20	3.7
11a	6Mbps	1	149	5745	5744.925	-0.075	-13.05	-30	3.7
11a	6Mbps	1	149	5745	5744.900	-0.100	-17.41	50	3.7

Note: Center Frequency = (Low Frequency + High Frequency) / 2.



3.7 Automatically Discontinue Transmission

3.7.1 Limit of Automatically Discontinue Transmission

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

3.7.2 Measuring Instruments

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

3.7.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.8 Antenna Requirements

3.8.1 Standard Applicable

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.

3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.8.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k / 20}$ if the k th antenna is being fed by spatial stream j , or zero if it is not;
 G_k is the gain in dBi of the k th antenna.

The EUT supports CDD mode.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.



			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant 1	Ant 2	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
Band IV	-1.23	-0.92	1.94	1.94	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)



4 List of Measuring Equipment

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	Nov. 21, 2014~ Dec. 24, 2014	Jun. 08, 2015	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 09, 2014	Nov. 21, 2014~ Dec. 24, 2014	Aug. 08, 2015	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 09, 2014	Nov. 21, 2014~ Dec. 24, 2014	Aug. 08, 2015	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	101749	10Hz ~ 30GHz	Feb. 10, 2014	Nov. 14, 2014~ Nov. 19, 2014	Feb. 09, 2015	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9 kHz~7 GHz	Aug. 30, 2014	Nov. 14, 2014~ Nov. 19, 2014	Aug. 29, 2015	Radiation (03CH07-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	Dec. 02, 2012	Nov. 14, 2014~ Nov. 19, 2014	Dec. 03, 2014	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Nov. 14, 2014~ Nov. 19, 2014	Sep. 26, 2015	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 19, 2014	Nov. 14, 2014~ Nov. 19, 2014	Aug. 18, 2015	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Oct. 02, 2014	Nov. 14, 2014~ Nov. 19, 2014	Oct. 01, 2015	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz	Mar. 17, 2014	Nov. 14, 2014~ Nov. 19, 2014	Mar. 16, 2015	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz~26.5 GHz	Nov. 29, 2013	Nov. 14, 2014~ Nov. 19, 2014	Nov. 28, 2014	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	DC~18 GHz	Apr. 21, 2014	Nov. 14, 2014~ Nov. 19, 2014	Apr. 20, 2015	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Nov. 14, 2014~ Nov. 19, 2014	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Nov. 14, 2014~ Nov. 19, 2014	N/A	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 12, 2014	Nov. 13, 2014	Nov. 11, 2015	Conduction (CO05-HY)
LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2013	Nov. 13, 2014	Dec. 11, 2014	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 04, 2013	Nov. 13, 2014	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Nov. 13, 2014	N/A	Conduction (CO05-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.26
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.50
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Appendix A. Radiated Spurious Emission

Test Mode :	802.11a	Temperature :	21~23°C
Test Channel :	149	Relative Humidity :	47~49%
Test Engineer :	Nick Yu, Ken Wu, and Derreck Chen	Polarization :	Horizontal

15E Band 4 - 5725~5850MHz

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 149 5745MHz		5713.64	72.2	-1.8	74	61.05	35.22	10.08	34.15	100	355	P	H
		5724.6	77.13	-1.17	78.3	66.02	35.23	10.03	34.15	100	355	P	H
		5715	52.08	-1.92	54	40.93	35.22	10.08	34.15	100	355	A	H
	*	5748	106.99	-	-	95.94	35.24	9.98	34.17	100	355	P	H
	*	5748	97.39	-	-	86.34	35.24	9.98	34.17	100	355	A	H
													H
													H
													H
		5713.56	69.5	-4.5	74	58.35	35.22	10.08	34.15	173	233	P	V
		5722.04	71.98	-6.32	78.3	60.87	35.23	10.03	34.15	173	233	P	V
		5714.84	47.7	-6.3	54	36.55	35.22	10.08	34.15	173	233	A	V
	*	5748	102	-	-	90.95	35.24	9.98	34.17	173	233	P	V
	*	5748	92.55	-	-	81.5	35.24	9.98	34.17	173	233	A	V
													V
													V
													V



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 157 5785MHz		5714.76	57.48	-16.52	74	46.33	35.22	10.08	34.15	100	19	P	H
		5725	56.13	-22.17	78.3	45.02	35.23	10.03	34.15	100	19	P	H
		5707	44.34	-9.66	54	33.19	35.22	10.08	34.15	100	19	A	H
	*	5784	104.78	-	-	93.81	35.27	9.93	34.23	100	19	P	H
	*	5784	95.38	-	-	84.41	35.27	9.93	34.23	100	19	A	H
		5855.68	56.54	-21.76	78.3	45.55	35.32	9.98	34.31	100	19	P	H
		5883.44	54.99	-19.01	74	44.02	35.33	10.03	34.39	100	19	P	H
		5855.84	42.84	-11.16	54	31.85	35.32	9.98	34.31	100	19	A	H
		5704.6	55.4	-18.6	74	44.22	35.22	10.08	34.12	187	240	P	V
		5725	53.1	-25.2	78.3	41.99	35.23	10.03	34.15	187	240	P	V
		5717.4	42.16	-11.84	54	31.06	35.22	10.03	34.15	187	240	A	V
	*	5783	99	-	-	88.03	35.27	9.93	34.23	187	240	P	V
	*	5783	89.6	-	-	78.63	35.27	9.93	34.23	187	240	A	V
		5857.76	54.74	-23.56	78.3	43.79	35.32	9.98	34.35	187	240	P	V
		5888.64	54.99	-19.01	74	43.95	35.34	10.09	34.39	187	240	P	V
		5858.4	41.84	-12.16	54	30.89	35.32	9.98	34.35	187	240	A	V



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 165 5825MHz	*	5824	103.29	-	-	92.33	35.3	9.93	34.27	100	27	P	H
	*	5824	93.26	-	-	82.3	35.3	9.93	34.27	100	27	A	H
		5850.56	66.89	-11.41	78.3	55.91	35.31	9.98	34.31	100	27	P	H
		5860.64	61.37	-12.63	74	50.37	35.32	10.03	34.35	100	27	P	H
		5860.24	44.82	-9.18	54	33.82	35.32	10.03	34.35	100	27	A	H
													H
													H
													H
	*	5823	97.02	-	-	86.06	35.3	9.93	34.27	172	215	P	V
	*	5823	87.48	-	-	76.52	35.3	9.93	34.27	172	215	A	V
		5850.16	61.22	-17.08	78.3	50.24	35.31	9.98	34.31	172	215	P	V
		5860	57.82	-16.18	74	46.87	35.32	9.98	34.35	172	215	P	V
		5860.08	42.9	-11.1	54	31.9	35.32	10.03	34.35	172	215	A	V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

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 149 5745MHz		11490	44.23	-29.77	74	48.52	38.19	14.49	56.97	100	0	P	H
		17232	49.04	-24.96	74	46.06	42.21	16.96	56.19	100	0	P	H
													H
													H
		11490	43.49	-30.51	74	47.78	38.19	14.49	56.97	100	0	P	V
		17232	48.82	-25.18	74	45.84	42.21	16.96	56.19	100	0	P	V
													V
													V
802.11a CH 157 5785MHz		11570	43.43	-30.57	74	47.38	38.3	14.53	56.78	100	0	P	H
		17352	47.65	-26.35	74	44.67	42.12	17.08	56.22	100	0	P	H
													H
													H
		11570	44.85	-29.15	74	48.8	38.3	14.53	56.78	100	0	P	V
		17355	47.81	-26.19	74	44.83	42.12	17.08	56.22	100	0	P	V
													V
													V
802.11a CH 165 5825MHz		11650	43.78	-30.22	74	47.41	38.39	14.59	56.61	100	0	P	H
		17475	48.55	-25.45	74	45.57	42.03	17.2	56.25	100	0	P	H
													H
													H
		11650	43.88	-30.12	74	47.51	38.39	14.59	56.61	100	0	P	V
		17475	48.52	-25.48	74	45.54	42.03	17.2	56.25	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												


15E Band 4 5725~5850MHz
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 149 5745MHz		5715	62.2	-11.8	74	51.05	35.22	10.08	34.15	100	22	P	H
		5725	73.18	-5.12	78.3	62.07	35.23	10.03	34.15	100	22	P	H
		5715	47.63	-6.37	54	36.48	35.22	10.08	34.15	100	22	P	H
	*	5747	104.13	-	-	93.08	35.24	9.98	34.17	100	22	P	H
	*	5747	93.96	-	-	82.91	35.24	9.98	34.17	100	22	A	H
													H
													H
													H
		5715	57.39	-16.61	74	46.24	35.22	10.08	34.15	189	238	P	V
		5720.84	65.98	-12.32	78.3	54.87	35.23	10.03	34.15	189	238	P	V
		5715	43.9	-10.1	54	32.75	35.22	10.08	34.15	189	238	P	V
	*	5743	98.73	-	-	87.68	35.24	9.98	34.17	189	238	P	V
	*	5743	88.94	-	-	77.89	35.24	9.98	34.17	189	238	A	V
													V
													V
													V



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 157 5785MHz		5703.88	56.65	-17.35	74	45.47	35.22	10.08	34.12	100	20	P	H
		5717.8	56.78	-21.52	78.3	45.67	35.23	10.03	34.15	100	20	P	H
		5713.32	43.58	-10.42	54	32.43	35.22	10.08	34.15	100	20	A	H
	*	5783	102.21	-	-	91.24	35.27	9.93	34.23	100	20	P	H
	*	5783	92.9	-	-	81.93	35.27	9.93	34.23	100	20	A	H
		5856.48	54.86	-23.44	78.3	43.87	35.32	9.98	34.31	100	20	P	H
		5883.68	55.21	-18.79	74	44.24	35.33	10.03	34.39	100	20	P	H
		5854.72	42.52	-11.48	54	31.53	35.32	9.98	34.31	100	20	A	H
		5692.28	55.78	-18.22	74	44.61	35.21	10.08	34.12	187	240	P	V
		5715.16	54.91	-23.39	78.3	43.76	35.22	10.08	34.15	187	240	P	V
		5714.6	41.96	-12.04	54	30.81	35.22	10.08	34.15	187	240	A	V
	*	5783	96.47	-	-	85.5	35.27	9.93	34.23	187	240	P	V
	*	5783	87.52	-	-	76.55	35.27	9.93	34.23	187	240	A	V
		5851.2	54.72	-23.58	78.3	43.74	35.31	9.98	34.31	187	240	P	V
		5867.68	54.74	-19.26	74	43.74	35.32	10.03	34.35	187	240	P	V
		5887.76	41.64	-12.36	54	30.6	35.34	10.09	34.39	187	240	A	V



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 165 5825MHz	*	5823	100.72	-	-	89.76	35.3	9.93	34.27	100	27	P	H
	*	5823	91.32	-	-	80.36	35.3	9.93	34.27	100	27	A	H
		5850.88	61.88	-16.42	78.3	50.9	35.31	9.98	34.31	100	27	P	H
		5861.92	57.13	-16.87	74	46.13	35.32	10.03	34.35	100	27	P	H
		5860	43.4	-10.6	54	32.45	35.32	9.98	34.35	100	27	A	H
													H
													H
													H
	*	5823	95.77	-	-	84.81	35.3	9.93	34.27	186	242	P	V
	*	5823	86.54	-	-	75.58	35.3	9.93	34.27	186	242	A	V
		5850.48	56.56	-21.74	78.3	45.58	35.31	9.98	34.31	186	242	P	V
		5889.12	55.3	-18.7	74	44.26	35.34	10.09	34.39	186	242	P	V
		5863.44	41.93	-12.07	54	30.93	35.32	10.03	34.35	186	242	A	V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

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 149 5745MHz		11490	44.32	-29.68	74	48.61	38.19	14.49	56.97	100	0	P	H
		17235	47.69	-26.31	74	44.71	42.21	16.96	56.19	100	0	P	H
													H
													H
		11490	43.95	-30.05	74	48.24	38.19	14.49	56.97	100	0	P	V
		17235	48.34	-25.66	74	45.36	42.21	16.96	56.19	100	0	P	V
													V
													V
802.11n HT20 CH 157 5785MHz		11571	43.55	-30.45	74	47.5	38.3	14.53	56.78	100	0	P	H
		17355	48.23	-25.77	74	45.25	42.12	17.08	56.22	100	0	P	H
													H
													H
		11571	43.76	-30.24	74	47.71	38.3	14.53	56.78	100	0	P	V
		17355	47.69	-26.31	74	44.71	42.12	17.08	56.22	100	0	P	V
													V
													V
802.11n HT20 CH 165 5825MHz		11649	44.53	-29.47	74	48.16	38.39	14.59	56.61	100	0	P	H
		17475	49.9	-24.1	74	46.92	42.03	17.2	56.25	100	0	P	H
													H
													H
		11649	44.81	-29.19	74	48.44	38.39	14.59	56.61	100	0	P	V
		17475	48.95	-25.05	74	45.97	42.03	17.2	56.25	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

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 151 5755MHz		5714.6	69.91	-4.09	74	58.76	35.22	10.08	34.15	100	16	P	H
		5725	72.82	-5.48	78.3	61.71	35.23	10.03	34.15	100	16	P	H
		5715	52.48	-1.52	54	41.33	35.22	10.08	34.15	100	16	A	H
	*	5757	100.02	-	-	88.98	35.26	9.98	34.2	100	16	P	H
	*	5757	91.02	-	-	79.98	35.26	9.98	34.2	100	16	A	H
		5854.72	54.39	-23.91	78.3	43.4	35.32	9.98	34.31	100	16	P	H
		5876.4	55.12	-18.88	74	44.11	35.33	10.03	34.35	100	16	P	H
		5867.76	42.02	-11.98	54	31.02	35.32	10.03	34.35	100	16	A	H
		5709.24	61.84	-12.16	74	50.69	35.22	10.08	34.15	171	237	P	V
		5724.36	63.93	-14.37	78.3	52.82	35.23	10.03	34.15	171	237	P	V
		5714.36	45.49	-8.51	54	34.34	35.22	10.08	34.15	171	237	A	V
	*	5758	94.2	-	-	83.16	35.26	9.98	34.2	171	237	P	V
	*	5758	84.99	-	-	73.95	35.26	9.98	34.2	171	237	A	V
		5857.6	54.42	-23.88	78.3	43.43	35.32	9.98	34.31	171	237	P	V
		5864.4	54.2	-19.8	74	43.2	35.32	10.03	34.35	171	237	P	V
		5875.6	41.92	-12.08	54	30.91	35.33	10.03	34.35	171	237	A	V



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 159 5795MHz		5704.12	59.57	-14.43	74	48.39	35.22	10.08	34.12	100	17	P	H
		5724.52	63.82	-14.48	78.3	52.71	35.23	10.03	34.15	100	17	P	H
		5714.52	45.96	-8.04	54	34.81	35.22	10.08	34.15	100	17	A	H
	*	5795	100.12	-	-	89.19	35.28	9.88	34.23	100	17	P	H
	*	5795	91.14	-	-	80.21	35.28	9.88	34.23	100	17	A	H
		5850.56	61.9	-16.4	78.3	50.92	35.31	9.98	34.31	100	17	P	H
		5860.08	56.05	-17.95	74	45.05	35.32	10.03	34.35	100	17	P	H
		5860.24	43.66	-10.34	54	32.66	35.32	10.03	34.35	100	17	A	H
		5705.16	55.51	-18.49	74	44.36	35.22	10.08	34.15	186	242	P	V
		5724.84	56.58	-21.72	78.3	45.47	35.23	10.03	34.15	186	242	P	V
		5713	42.45	-11.55	54	31.3	35.22	10.08	34.15	186	242	A	V
	*	5793	95.35	-	-	84.42	35.28	9.88	34.23	186	242	P	V
	*	5793	85.62	-	-	74.69	35.28	9.88	34.23	186	242	A	V
		5856	56.33	-21.97	78.3	45.34	35.32	9.98	34.31	186	242	P	V
		5862.64	54.72	-19.28	74	43.72	35.32	10.03	34.35	186	242	P	V
		5861.04	42.28	-11.72	54	31.28	35.32	10.03	34.35	186	242	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

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 151 5755MHz		11511	43.91	-30.09	74	48.15	38.2	14.51	56.95	100	0	P	H
		17265	47.88	-26.12	74	44.88	42.19	17.01	56.2	100	0	P	H
													H
													H
		11511	44.05	-29.95	74	48.29	38.2	14.51	56.95	100	0	P	V
		17265	48.46	-25.54	74	45.46	42.19	17.01	56.2	100	0	P	V
													V
													V
802.11n HT40 CH 159 5795MHz		11589	43.29	-30.71	74	47.16	38.32	14.55	56.74	100	0	P	H
		17385	48.35	-25.65	74	45.36	42.09	17.13	56.23	100	0	P	H
													H
													H
		11589	43.53	-30.47	74	47.4	38.32	14.55	56.74	100	0	P	V
		17385	49.01	-24.99	74	46.02	42.09	17.13	56.23	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Emission below 1GHz

5GHz 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)
5GHz 802.11a LF		46.47	27.02	-12.98	40	47.75	9.8	0.67	31.2	100	207	P	H
		76.71	25.68	-14.32	40	49.15	6.87	0.86	31.2			P	H
		163.11	24.93	-18.57	43.5	44.79	10.08	1.22	31.16			P	H
		475	20.5	-25.5	46	31.38	17.55	2.37	30.8			P	H
		668.9	23.21	-22.79	46	30.4	20.39	2.88	30.46			P	H
		967.1	28.78	-25.22	54	30.86	24.77	3.48	30.33			P	H
													H
													H
													H
													H
													H
													H
		46.74	29.11	-10.89	40	49.84	9.8	0.67	31.2			P	V
		76.17	30.48	-9.52	40	53.95	6.87	0.86	31.2	170	215	P	V
		161.49	27.56	-15.94	43.5	47.3	10.22	1.22	31.18			P	V
		407.8	21.09	-24.91	46	33.66	16.12	2.17	30.86			P	V
		475	23.71	-22.29	46	34.59	17.55	2.37	30.8			P	V
		846.7	26.96	-19.04	46	30.82	23.27	3.26	30.39			P	V
													V
													V
													V
													V
													V
													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”.



15E Band 4 5725~5850MHz

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 149 5745MHz		5705.4	55.43	-18.57	74	44.28	35.22	10.08	34.15	102	359	P	H
		5723.96	59.32	-18.98	78.3	48.21	35.23	10.03	34.15	102	359	P	H
		5708.76	41.86	-12.14	54	30.71	35.22	10.08	34.15	102	359	A	H
	*	5744	96.71	-	-	85.66	35.24	9.98	34.17	102	359	P	H
	*	5744	86.02	-	-	74.97	35.24	9.98	34.17	102	359	A	H
													H
													H
													H
		5713.64	60.33	-13.67	74	49.18	35.22	10.08	34.15	163	232	P	V
		5722.52	62.45	-15.85	78.3	51.34	35.23	10.03	34.15	163	232	P	V
		5714.68	43.93	-10.07	54	32.78	35.22	10.08	34.15	163	232	A	V
	*	5743	101.66	-	-	90.61	35.24	9.98	34.17	163	232	P	V
	*	5743	91.1	-	-	80.05	35.24	9.98	34.17	163	232	A	V
													V
													V
													V



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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 157 5785MHz		5709.24	55.46	-18.54	74	44.31	35.22	10.08	34.15	100	359	P	H
		5715.16	54.09	-24.21	78.3	42.94	35.22	10.08	34.15	100	359	P	H
		5704.84	41.55	-12.45	54	30.4	35.22	10.08	34.15	100	359	A	H
	*	5785	94.86	-	-	83.89	35.27	9.93	34.23	100	359	P	H
	*	5785	83.68	-	-	72.71	35.27	9.93	34.23	100	359	A	H
		5858.4	54.28	-24.02	78.3	43.33	35.32	9.98	34.35	100	359	P	H
		5874.64	54.5	-19.5	74	43.49	35.33	10.03	34.35	100	359	P	H
		5871.2	41.08	-12.92	54	30.07	35.33	10.03	34.35	100	359	A	H
		5706.52	55.27	-18.73	74	44.12	35.22	10.08	34.15	161	234	P	V
		5715.8	54.69	-23.61	78.3	43.54	35.22	10.08	34.15	161	234	P	V
		5712.2	42.22	-11.78	54	31.07	35.22	10.08	34.15	161	234	A	V
	*	5784	100.5	-	-	89.53	35.27	9.93	34.23	161	234	P	V
	*	5784	90.57	-	-	79.6	35.27	9.93	34.23	161	234	A	V
		5851	54.15	-24.15	78.3	43.17	35.31	9.98	34.31	161	234	P	V
		5862.8	54.08	-19.92	74	43.08	35.32	10.03	34.35	161	234	P	V
		5866.56	41.32	-12.68	54	30.32	35.32	10.03	34.35	161	234	A	V



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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 165 5825MHz	*	5823	92.41	-	-	81.45	35.3	9.93	34.27	100	359	P	H
	*	5823	82.64	-	-	71.68	35.3	9.93	34.27	100	359	A	H
		5856	54.58	-23.72	78.3	43.59	35.32	9.98	34.31	100	359	P	H
		5868.64	54.28	-19.72	74	43.28	35.32	10.03	34.35	100	359	P	H
		5876.64	41.14	-12.86	54	30.13	35.33	10.03	34.35	100	359	A	H
													H
													H
													H
	*	5824	100.26	-	-	89.3	35.3	9.93	34.27	159	236	P	V
	*	5824	90.14	-	-	79.18	35.3	9.93	34.27	159	236	A	V
		5850.96	57.29	-21.01	78.3	46.31	35.31	9.98	34.31	159	236	P	V
		5878.32	54.84	-19.16	74	43.83	35.33	10.03	34.35	159	236	P	V
		5861.12	41.77	-12.23	54	30.77	35.32	10.03	34.35	159	236	A	V
													V
													V
													V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 149 5745MHz		11490	45.94	-28.06	74	50.23	38.19	14.49	56.97	100	0	P	H
		17235	49.96	-24.04	74	46.98	42.21	16.96	56.19	100	0	P	H
													H
													H
		11490	45.73	-28.27	74	50.02	38.19	14.49	56.97	100	0	P	V
		17235	49.83	-24.17	74	46.85	42.21	16.96	56.19	100	0	P	V
													V
													V
802.11n HT20 CH 157 5785MHz		11571	44.49	-29.51	74	48.44	38.3	14.53	56.78	100	0	P	H
		17355	49.82	-24.18	74	46.84	42.12	17.08	56.22	100	0	P	H
													H
													H
		11571	44.98	-29.02	74	48.93	38.3	14.53	56.78	100	0	P	V
		17355	49.48	-24.52	74	46.5	42.12	17.08	56.22	100	0	P	V
													V
													V
802.11n HT20 CH 165 5825MHz		11649	45.81	-28.19	74	49.44	38.39	14.59	56.61	100	0	P	H
		17475	50.46	-23.54	74	47.48	42.03	17.2	56.25	100	0	P	H
													H
													H
		11649	46.66	-27.34	74	50.29	38.39	14.59	56.61	100	0	P	V
		17475	50.24	-23.76	74	47.26	42.03	17.2	56.25	100	0	P	V
													V
													V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz		5714.68	57.73	-16.27	74	46.58	35.22	10.08	34.15	102	357	P	H
		5722.2	60.03	-18.27	78.3	48.92	35.23	10.03	34.15	102	357	P	H
		5714.84	43.67	-10.33	54	32.52	35.22	10.08	34.15	102	357	A	H
	*	5753	93.04	-	-	81.97	35.26	9.98	34.17	102	357	P	H
	*	5753	82.71	-	-	71.64	35.26	9.98	34.17	102	357	A	H
		5855.76	53.59	-24.71	78.3	42.6	35.32	9.98	34.31	102	357	P	H
		5865.6	54.6	-19.4	74	43.6	35.32	10.03	34.35	102	357	P	H
		5871.92	41.96	-12.04	54	30.95	35.33	10.03	34.35	102	357	A	H
		5714.28	64.82	-9.18	74	53.67	35.22	10.08	34.15	163	228	P	V
		5717	66.06	-12.24	78.3	54.96	35.22	10.03	34.15	163	228	P	V
		5714.84	48.8	-5.2	54	37.65	35.22	10.08	34.15	163	228	A	V
	*	5753	96.87	-	-	85.8	35.26	9.98	34.17	163	228	P	V
	*	5753	87.84	-	-	76.77	35.26	9.98	34.17	163	228	A	V
		5853.2	54.26	-24.04	78.3	43.28	35.31	9.98	34.31	163	228	P	V
		5870	54.41	-19.59	74	43.41	35.32	10.03	34.35	163	228	P	V
		5877.6	42.1	-11.9	54	31.09	35.33	10.03	34.35	163	228	A	V



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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 159 5795MHz		5691.88	54.61	-19.39	74	43.39	35.21	10.13	34.12	100	322	P	H
		5716.12	53.99	-24.31	78.3	42.89	35.22	10.03	34.15	100	322	P	H
		5688.6	42.11	-11.89	54	30.89	35.21	10.13	34.12	100	322	A	H
	*	5797	90.69	-	-	79.76	35.28	9.88	34.23	100	322	P	H
	*	5797	80.18	-	-	69.25	35.28	9.88	34.23	100	322	A	H
		5850.24	54.51	-23.79	78.3	43.53	35.31	9.98	34.31	100	322	P	H
		5865.84	54.73	-19.27	74	43.73	35.32	10.03	34.35	100	322	P	H
		5865.84	41.91	-12.09	54	30.91	35.32	10.03	34.35	100	322	A	H
		5700.04	55.57	-18.43	74	44.4	35.21	10.08	34.12	161	233	P	V
		5723	55.34	-22.96	78.3	44.23	35.23	10.03	34.15	161	233	P	V
		5702.68	43.12	-10.88	54	31.94	35.22	10.08	34.12	161	233	A	V
	*	5793	95.73	-	-	84.8	35.28	9.88	34.23	161	233	P	V
	*	5793	86.72	-	-	75.79	35.28	9.88	34.23	161	233	A	V
		5851.68	55.19	-23.11	78.3	44.21	35.31	9.98	34.31	161	233	P	V
		5871.12	54.94	-19.06	74	43.93	35.33	10.03	34.35	161	233	P	V
		5871.6	42.13	-11.87	54	31.12	35.33	10.03	34.35	161	233	A	V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz		11511	46.05	-27.95	74	50.29	38.2	14.51	56.95	100	0	P	H
		17265	50.62	-23.38	74	47.62	42.19	17.01	56.2	100	0	P	H
													H
													H
		11511	45.4	-28.6	74	49.64	38.2	14.51	56.95	100	0	P	V
		17265	50.08	-23.92	74	47.08	42.19	17.01	56.2	100	0	P	V
													V
													V
802.11n HT40 CH 159 5795MHz		11589	44.87	-29.13	74	48.74	38.32	14.55	56.74	100	0	P	H
		17385	50.02	-23.98	74	47.03	42.09	17.13	56.23	100	0	P	H
													H
													H
		11589	45.17	-28.83	74	49.04	38.32	14.55	56.74	100	0	P	V
		17385	50.33	-23.67	74	47.34	42.09	17.13	56.23	100	0	P	V
													V
													V
Remark	3. No other spurious found. 4. All results are PASS against Peak and Average limit line.												



15E Emission below 1GHz

5GHz WIFI 802.11n HT20 (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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11n HT20 LF		47.28	26.76	-13.24	40	47.84	9.45	0.67	31.2	108	296	P	H
		76.44	25.58	-14.42	40	49.05	6.87	0.86	31.2			P	H
		162.84	24.9	-18.6	43.5	44.77	10.08	1.22	31.17			P	H
		573	22.37	-23.63	46	30.8	19.67	2.61	30.71			P	H
		712.3	24.21	-21.79	46	30.56	21.08	2.97	30.4			P	H
		799.1	25.41	-20.59	46	30.58	21.99	3.14	30.3			P	H
													H
													H
													H
													H
													H
													H
		39.72	27.74	-12.26	40	44.32	14	0.62	31.2			P	V
		46.2	29.25	-10.75	40	49.98	9.8	0.67	31.2			P	V
		76.71	30.31	-9.69	40	53.78	6.87	0.86	31.2	158	222	P	V
		475	22.46	-23.54	46	33.34	17.55	2.37	30.8			P	V
		594	22.88	-23.12	46	31.29	19.54	2.67	30.62			P	V
		729.1	25.11	-20.89	46	30.55	21.95	3.01	30.4			P	V
													V
													V
													V
													V
													V
													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+2		(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

3. Level(dBμV/m) =

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

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

For Peak Limit @ 2390MHz:

3. 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)

4. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

3. 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)

4. 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 B. Setup Photographs

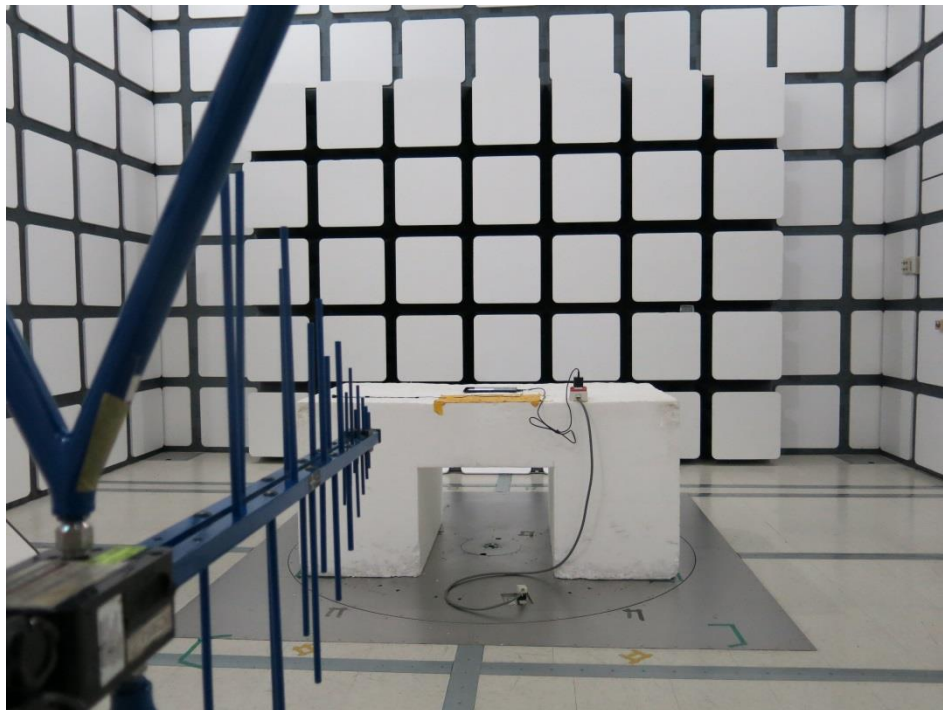
<Conducted Emission>



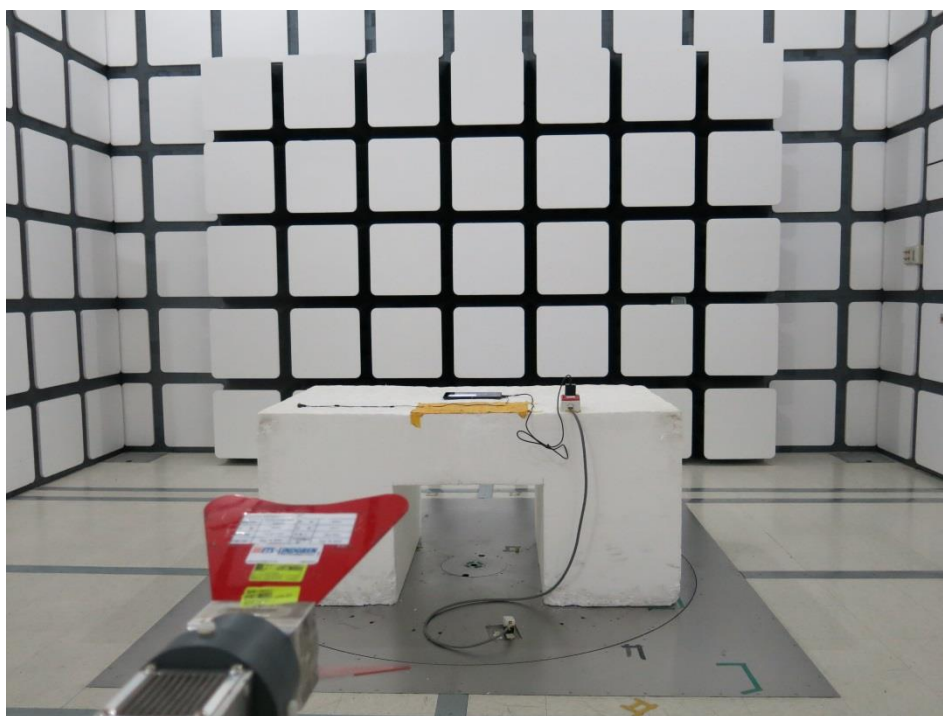
<Radiated Emission>

X Plane

LF

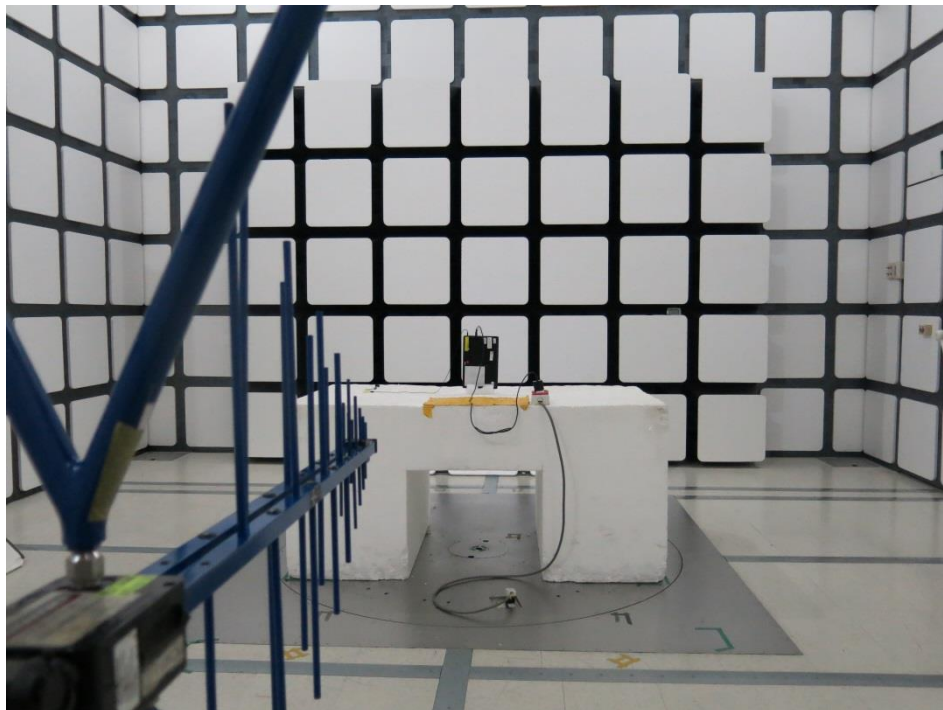


HF



Z Plane

LF



HF

