FCC 47 CFR PART 15 SUBPART E

Report No.: T150123W04-RP5

TEST REPORT

For

Notebook Computer

Model:

Trade Name: TOSHIBA

Issued to

Pegatron Corporation 5F, NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112, TAIWAN (R.O.C.)

Issued by

Compliance Certification Services Inc.
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)
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Revision History

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	Issue		Effect	
Rev.	Date	Revisions	Page	Revised By
00	February 25, 2015	Initial Issue	ALL	Kelly Cheng

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1. TEST RESULT CERTIFICATION

Applicant: Pegatron Corporation

5F, NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112,

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TAIWAN (R.O.C.)

Equipment Under Test: Notebook Computer

Trade Name: TOSHIBA

Model: Satellite S5*********, Satellite E5*******,

Satellite L5*******C*****, Satellite P5*******-C*****,

Satellite Radius L5********-C*****, Satellite Radius P5*******-C*****, Satellite Fusion L5******-C*****,

(* means 0-9; a-z; A-Z; /; -; no symbol, or blank for marketing

purpose)

Date of Test: February 11 ~ 14, 2015

APPLICABLE STANDARDS					
STANDARD TEST RESULT					
FCC 47 CFR Part 15 Subpart E	No non-compliance noted				

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407.

The test results of this report relate only to the tested sample identified in this report.

Approved by: Reviewed by:

Miller Lee Section Manager

Compliance Certification Services Inc.

Willer Loe

Angel Cheng Section Manager

Compliance Certification Services Inc.

Angel Chent

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2. EUT DESCRIPTION

Product	Notebook Computer					
Trade Name	TOSHIBA					
Model Number	Satellite S5************************************					
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of "*" (*means 0-9; a-z; A-Z; /; -; no symbol, or blank for marketing purpose) on model number is just for marketing purpose only.					
Received Date	January 23,	2015				
Power Supply	1. VDC from Power Adapter Liteon / Model: PA5178U-1ACA I/P: 100-240V, 50-60Hz, 1.7A O/P: 19V, 3.42A 2. Power from Battery TOSHIBA / PA5208U-1BRS Rating 10.8Vdc, 45Wh, 3860mAh					
	8	Mode	Frequency Range (MHz)	Number of Channels		
Operating Frequency Range & Number of Channels	UNII Band IV	IEEE 802.11a IEEE 802.11n HT 20 mode IEEE 802.11n HT 40 mode IEEE 802.11ac80 mode	5745 ~ 5825 5745 ~ 5825 5755 ~ 5795 5775	5 Channels 5 Channels 2 Channels 1 Channels		
Transmit Power	IEEE 802.11 IEEE 802.11	a mode / 5745 ~ 5825 n HT 20 mode / 5745 n HT 40 mode / 5670 ac80 mode / 5775MH	MHz: 13.46dBm ~ 5825MHz: 13.4 ~ 5795MHz: 13.4	-5dBm		
Modulation Technique	OFDM (QPS	SK, BPSK, 16-QAM, 6	54-QAM)			
Transmit Data Rate	IEEE 802.11a mode: 54, 48, 36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT 20 mode: OFDM (6.50, 13.00, 19.50, 26.00, 39.00, 52.00, 58.50, 65.00, 78.00, 104.0, 117.0, 130.0 156.0, 175.5, 195.0Mbps) IEEE 802.11n HT 40 mode: OFDM (13.50, 27.00, 40.50, 54.00)					

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Remark:

- 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
- 2. This submittal(s) (test report) is intended for FCC ID: <u>VUI-THOR7265</u> filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

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3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 Radiated testing was performed at an antenna to EUT distance 3 meters.

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3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Ouasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

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3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	$\binom{2}{}$
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

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² Above 38.6

⁽b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5 DESCRIPTION OF TEST MODES

The EUT (model: Satellite S50-C) comes with eight types of antenna (model: ANTA0TP09551WLAN4 (TX1) / ANTA0TP09551WLAN3 (TX2) / ANTA0TP09551WLAN2 (TX1) / ANTA0TP09551WLAN1 (TX2) / APP6Y-700301 (TX1) / APP6Y-700302 (TX2) / APP6Y-700249 (TX1) / APP6Y-700250 (TX2)) for sale. After the preliminary test, the antenna ANTA0TP09551WLAN4 (TX1) / ANTA0TP09551WLAN3 (TX2) were found to emit the worst emissions and therefore had been tested under operating condition.

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The EUT is a IEEE802.11b/g is 1x1 SISO only, IEEE802.11n HT20/HT40 is 2x2 MIMO, 2x2 configuration spatial MIMO (2Tx & 2Rx) without beam forming function that operate in double TX chains and double RX chains. The 2x2 configuration is implemented with two outside TX & RX chains (Chain 0 and 1).

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

UNII Band VI:

IEEE 802.11a mode:

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6Mbps data rate were chosen for full testing.

IEEE 802.11n HT 20 mode:

Channel Low(5745MHz), Channel Mid(5785MHz) and Channel High(5825MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT 40 mode:

Channel Low(5755MHz) and Channel High(5795MHz) with 13.5Mbps data rate were chosen for full testing.

IEEE 802.11ac80 mode:

Channel Low(5775MHz) with 29.3Mbps data rate were chosen for full testing.

The field strength of spurious emission was measured in the following position: The EUT has Notebook mode, Flat mode, and Tent mode, Stand mode, Tablet X, Y and Z axis modes. The worst emission was found in Notebook mode and the worst case was recorded.

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4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.

Conducted Emissions Test Site							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due			
Spectrum Analyzer	Agilent	E4446A	US42510252	11/23/2015			
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/07/2015			
AC Power Source	EXTECH	6205	1140845	N.C.R			
DC Power Supply	ABM	8301HD	D011531	N.C.R			
Power Meter	Anritsu	ML2495A	1012009	06/03/2015			
Power Sensor	Anritsu	MA2411A	0917072	06/03/2015			
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40	101073	07/09/2015			

Wugu 966 Chamber A							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due			
Spectrum Analyzer	Agilent	E4446A	US42510268	09/18/2015			
EMI Test Receiver	R&S	ESCI	100064	05/30/2015			
Bilog Antenna	Sunol Sciences	JB3	A030105	08/19/2015			
Horn Antenna	EMCO	3117	00055165	01/26/2016			
Horn Antenna	EMCO	3116	26370	12/25/2015			
Turn Table	CCS	CC-T-1F	N/A	N.C.R			
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R			
Controller	CCS	CC-C-1F	N/A	N.C.R			
Pre-Amplifier	MITEQ	1652-3000	1490939	08/09/2016			
Pre-Amplifier	EMC	EMC 01265	4035	08/09/2016			
Pre-Amplifier	MITEQ	AMF-6F-260400-4 0-8P	985646	12/25/2015			
Coaxial Cable	Huber+Suhner	102	29212/2	12/25/2015			
Coaxial Cable	Huber+Suhner	102	29406/2	12/25/2015			
Test S/W		EZ-EMC ((CCS-3A1RE)				

Conducted Emission room # B							
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due			
EMI Test Receiver	R&S	ESCI	101073	09/18/2015			
LISN	R&S	ENV216	101054	05/18/2015			
LISN	SCHWARZBECK	NSLK 8127	8127-541	11/25/2015			
Capacitive Voltage Probe	FCC	F-CVP-1	100185	03/09/2015			
Test S/W	-CE	_					

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4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 1.2575
3M Semi Anechoic Chamber / <200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

 ∑ No.139, Wugong Rd., Wugu Dist., New Taipei City 24891, Taiwan (R.O.C.)
 Tel: 886-2-2298-4086 / Fax: 886-2-2298-1470

 ∑ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)
 Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

 ∑ No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.
 Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12,2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method -47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	Canada IC 2324G-1 IC 2324G-2

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^{*} No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
	N/A						

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Remark:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

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7. FCC PART 15 REQUIREMENTS

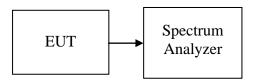
7.1 6DB BANDWIDTH

LIMIT

According to §15.407, systems using digital modulation techniques may operate in the 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

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Test Configuration



TEST PROCEDURE

- 1. Place the EUT on the table and set it in the transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW = VBW = 100kHz, Span = 50MHz, Sweep = auto.
- 4. Mark the peak frequency and -6dB (upper and lower) frequency.
- 5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted

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TEST RESULTS

No non-compliance noted

Test Data

Test mode: IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)	
Low	5745	16.179	16.9156	
Mid	Mid 5785		16.8504	
High 5825		16.200	16.8191	

Test mode: IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 0

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)		
Low	5745	17.247	17.8656		
Mid	5785	17.359	17.9032		
High	5825	17.126	17.7817		

Test mode: IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 1

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)	
Low	5745	17.358	17.8467	
Mid	5785	17.499	18.0590	
High	5825	17.143	17.9798	

Test mode: IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 0

Channel Frequency (MHz) Low 5755 High 5795		6db Bandwidth (MHz)	99% Bandwidth (MHz)		
		35.962	36.1713		
		36.046	36.1651		

Test mode: IEEE 802.11n HT 40 mode/ 5755 ~ 5795MHz / Chain 1

Channel	Frequency (MHz)	6db Bandwidth (MHz)	99% Bandwidth (MHz)	
Low 5755		36.055	36.1821	
High 5795		35.955	36.2653	

Test mode: IEEE 802.11ac80 mode / 5775MHz / Chain 0

Channel	Frequency	6db Bandwidth	99% Bandwidth	
	(MHz)	(MHz)	(MHz)	
Mid	5290	75.549	76.5384	

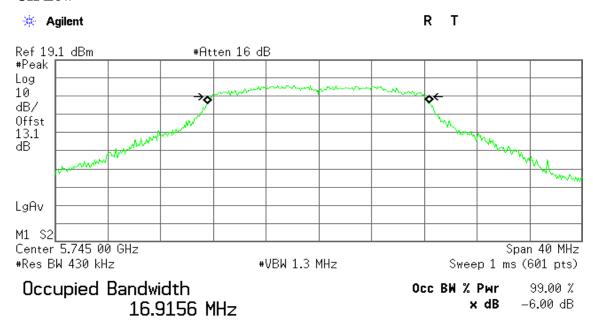
Test mode: IEEE 802.11ac80 mode/ 5775MHz / Chain 1

Channel	Frequency	6db Bandwidth	99% Bandwidth	
	(MHz)	(MHz)	(MHz)	
Mid	5290	75.566	75.9495	

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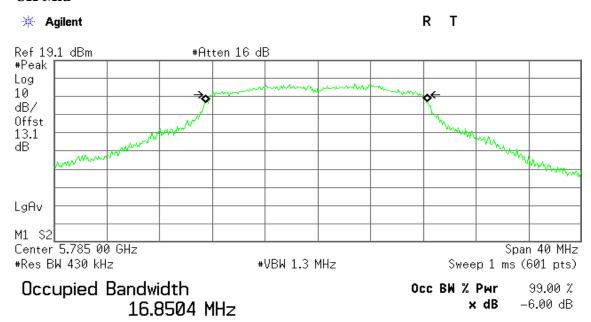
IEEE 802.11a mode / 5745 ~ 5825MHz

CH Low



Transmit Freq Error -27.078 kHz x dB Bandwidth 16.179 MHz

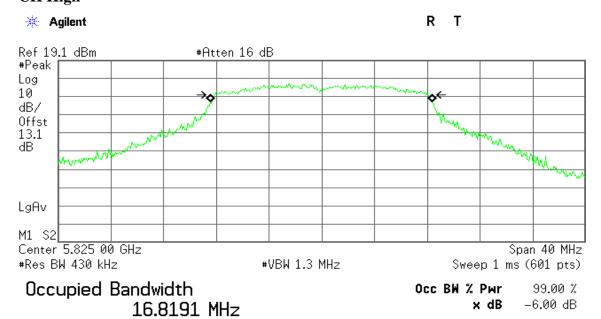
CH Mid



Transmit Freq Error -84.526 kHz x dB Bandwidth 15.979 MHz

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CH High

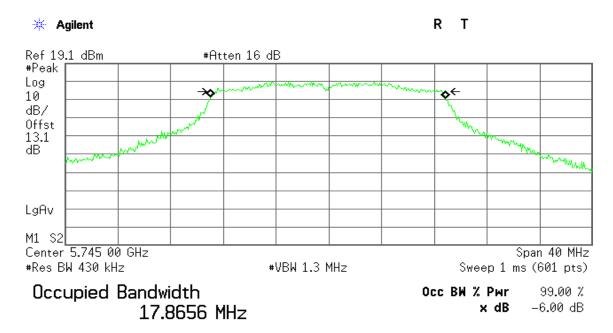


Transmit Freq Error -40.158 kHz x dB Bandwidth 16.200 MHz

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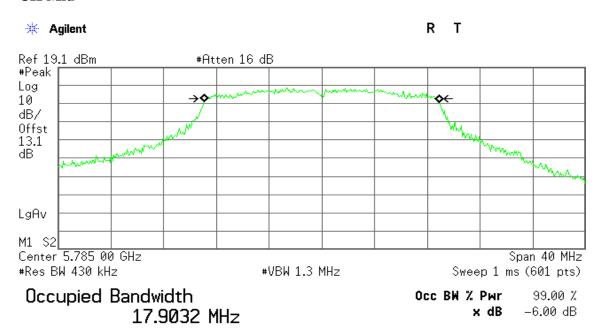
IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 0

CH Low



Transmit Freq Error -40.103 kHz x dB Bandwidth 17.247 MHz

CH Mid

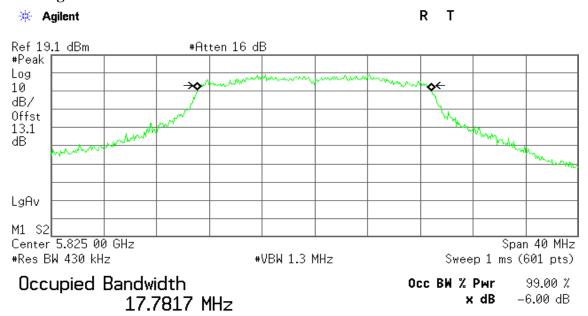


Transmit Freq Error -7.896 kHz x dB Bandwidth 17.359 MHz

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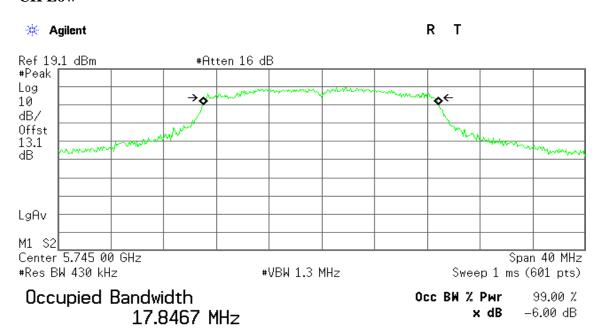
CH High



Transmit Freq Error -23.687 kHz x dB Bandwidth 17.126 MHz

<u>IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 1</u>

CH Low

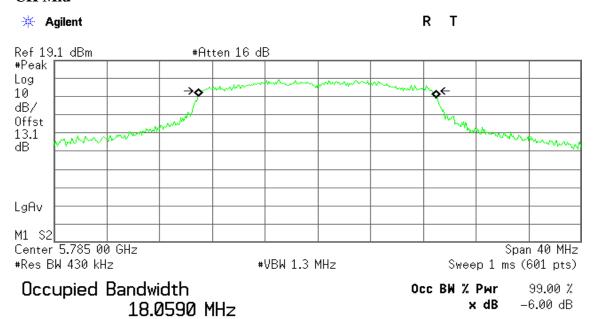


Transmit Freq Error -53.566 kHz x dB Bandwidth 17.358 MHz

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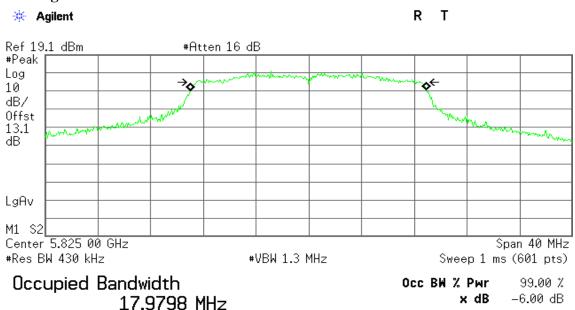
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CH Mid



Transmit Freq Error -58.266 kHz x dB Bandwidth 17.499 MHz

CH High

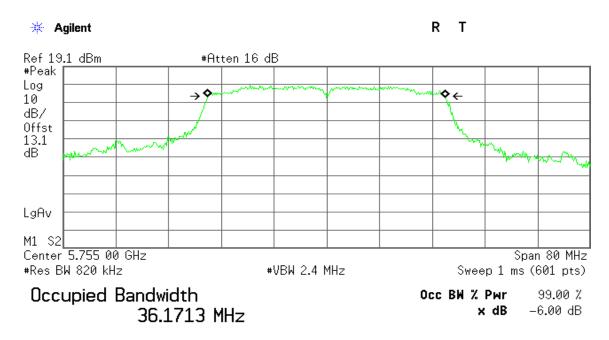


Transmit Freq Error -28.177 kHz x dB Bandwidth 17.143 MHz

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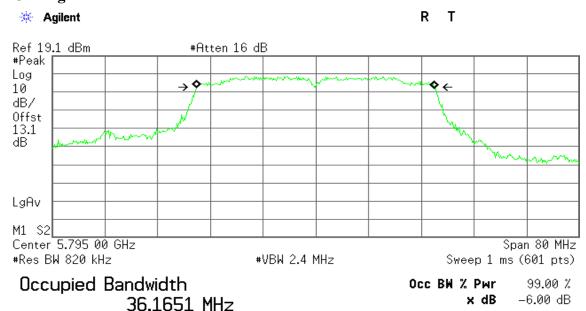
IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 0

CH Low



Transmit Freq Error -41.577 kHz x dB Bandwidth 35.962 MHz

CH High

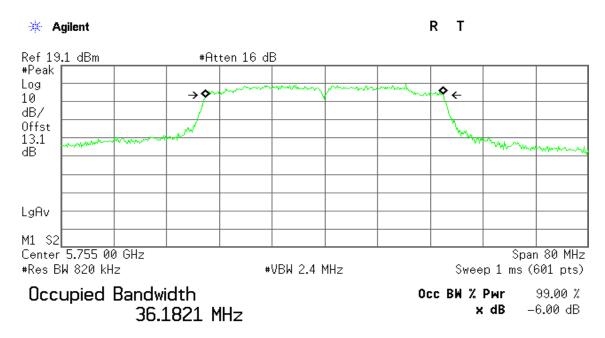


Transmit Freq Error -35.501 kHz x dB Bandwidth 36.046 MHz

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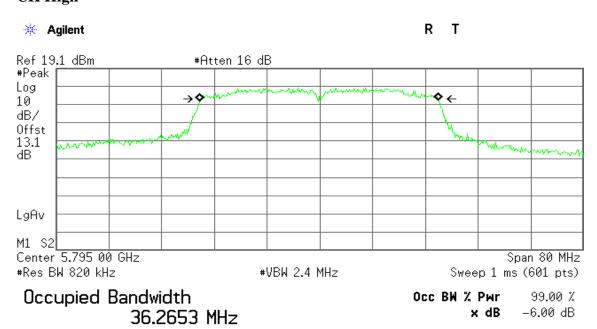
IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 1

CH Low



Transmit Freq Error -71.296 kHz x dB Bandwidth 36.055 MHz

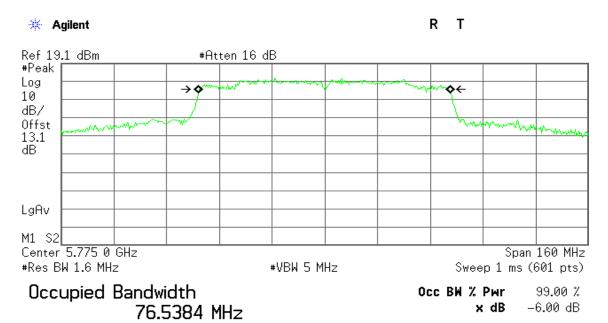
CH High



Transmit Freq Error -89.493 kHz x dB Bandwidth 35.955 MHz

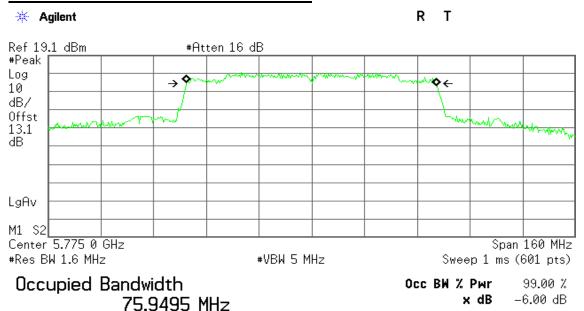
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IEEE 802.11ac80 mode / 5775MHz / Chain 0



Transmit Freq Error -105.287 kHz x dB Bandwidth 75.549 MHz

IEEE 802.11ac80 mode / 5775MHz / Chain 1



Transmit Freq Error -77.721 kHz x dB Bandwidth 75.566 MHz

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7.2 MAXIMUM OUTPUT POWER

LIMIT

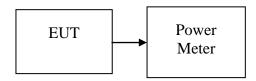
According to §15.407(a)

(1) For the band 5.725-5.850 GHz bands, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 30 dBm, where B is the 6 dB emission bandwidth in MHz.

If transmitting antennas of directional gain greater than 6dBi are used, 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 6dBi.

Test Configuration

The EUT was connected to a Power Meter through a 50Ω RF cable



TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the avg power detection. The EUT is configured to transmit continuously.

TEST RESULTS

No non-compliance noted

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Test Data

Test mode: IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5745	13.42	
Mid	5785	13.45	30.00
High	5825	13.46	

Test mode: IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5745	10.46	10.42	13.45	
Mid	5785	10.41	10.38	13.41	30.00
High	5825	10.32	10.26	13.30	

Test mode: IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5755	10.42	10.36	13.40	20.00
High	5795	10.32	10.38	13.36	30.00

Test mode: IEEE 802.11n HT 80 MHz mode / 5775MHz

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Mid	5775	10.42	10.46	13.45	30.00

Remark: 1. Total PPSD (dBm) = 10*LOG(10^(Chain 0 PPSD / 10)+10^(Chain 1 PPSD /10))

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7.3 BAND EDGES MEASUREMENT

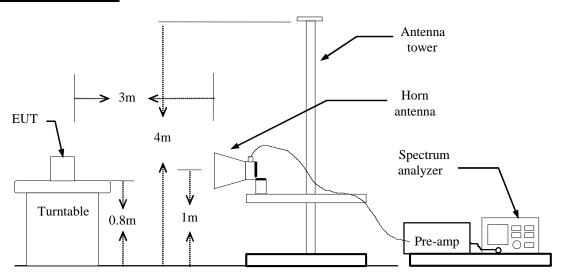
LIMIT

According to §15.407(b),

- (1) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

Report No.: T150123W04-RP5

Test Configuration



TEST PROCEDURE

- 1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz,

if duty cycle ≥ 98%, VBW=10Hz.

if duty cycle<98% VBW=1/T.

IEEE 802.11b mode: \ge 98%, VBW=10Hz **IEEE 802.11g mode:** \ge 98%, VBW=10Hz

IEEE 802.11n HT 20 MHz mode: \geq 98%, VBW=10Hz

IEEE 802.11n HT 40 MHz mode: 96%=VBW 2kHz

5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

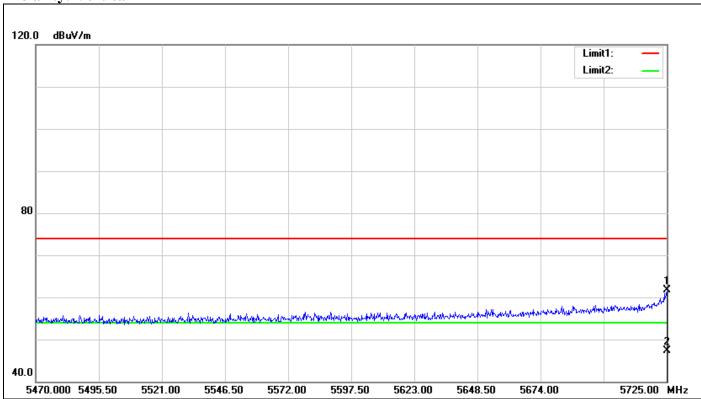
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TEST RESULTS

Refer to attach spectrum analyzer data chart.

Band Edges (IEEE 802.11a mode / CH 5745 MHz)

Polarity: Vertical

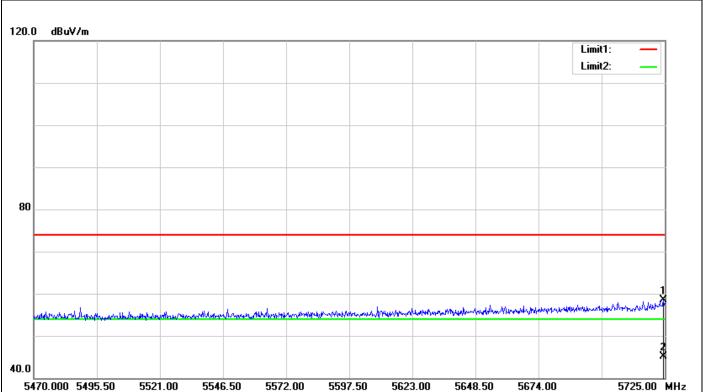


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5725.000	55.47	6.21	61.68	74.00	-12.32	100	248	peak
2	5725.000	41.12	6.21	47.33	54.00	-6.67	100	248	AVG

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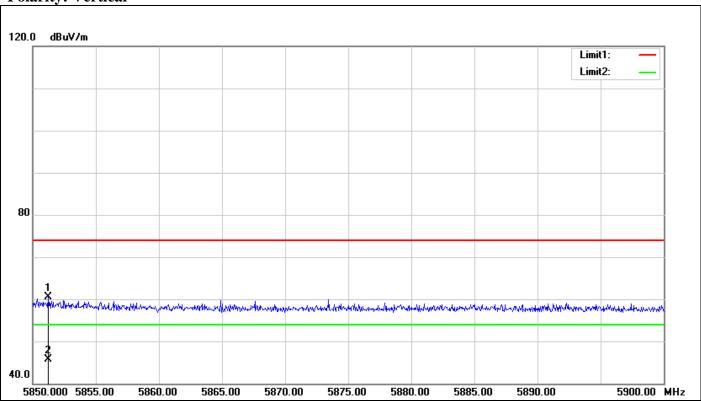


No	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5724.490	52.38	6.21	58.59	74.00	-15.41	100	86	peak
2	5724.490	38.81	6.21	45.02	54.00	-8.98	100	86	AVG

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Band Edges (IEEE 802.11a mode / CH 5825 MHz)

Polarity: Vertical



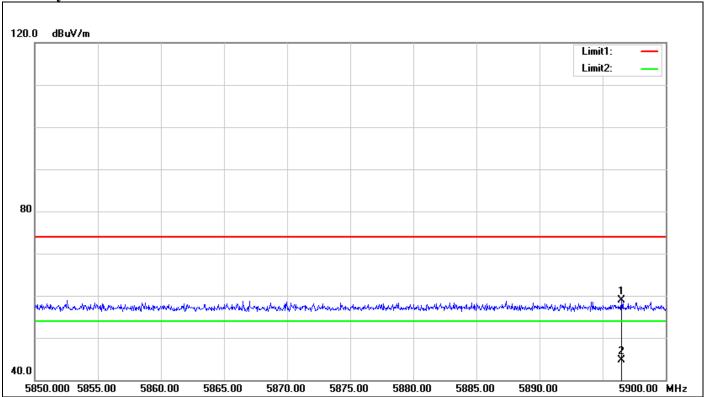
Report No.: T150123W04-RP5

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5851.250	53.66	6.75	60.41	74.00	-13.59	100	184	peak
2	5851.250	38.95	6.75	45.70	54.00	-8.30	100	184	AVG

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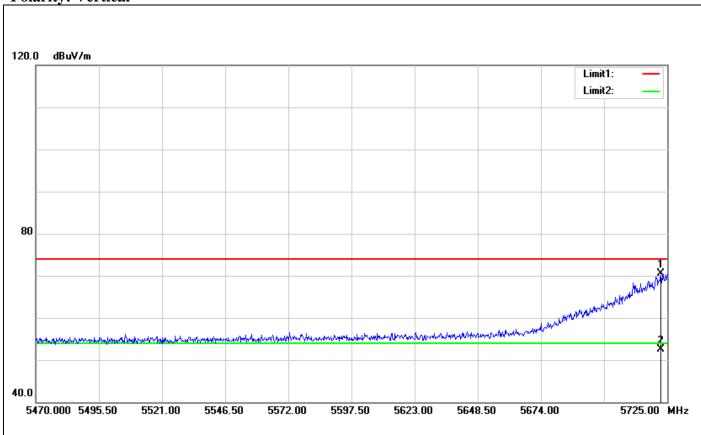


Report No.: T150123W04-RP5

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5896.500	51.93	6.94	58.87	74.00	-15.13	100	310	peak
2	5896.500	37.80	6.94	44.74	54.00	-9.26	100	310	AVG

Page 31 Rev.00 Band Edges (IEEE 802.11n HT 20 MHz mode / CH 5745 MHz)

Polarity: Vertical



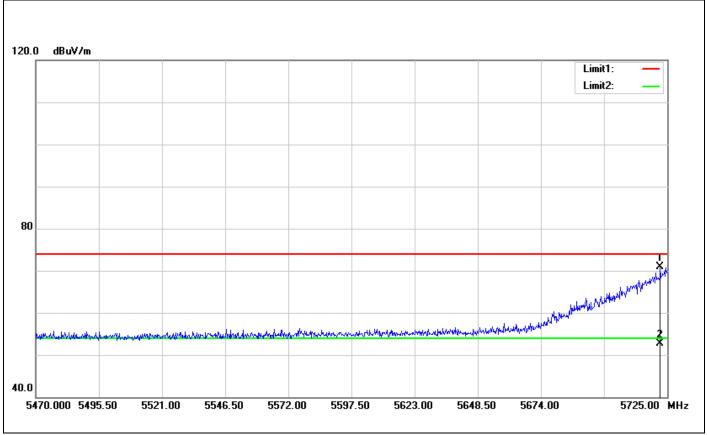
Report No.: T150123W04-RP5

N	lo.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
		(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(*)	
	1	5722.450	64.36	6.20	70.56	74.00	-3.44	100	163	peak
,	2	5722.450	46.27	6.20	52.47	54.00	-1.53	100	163	AVG

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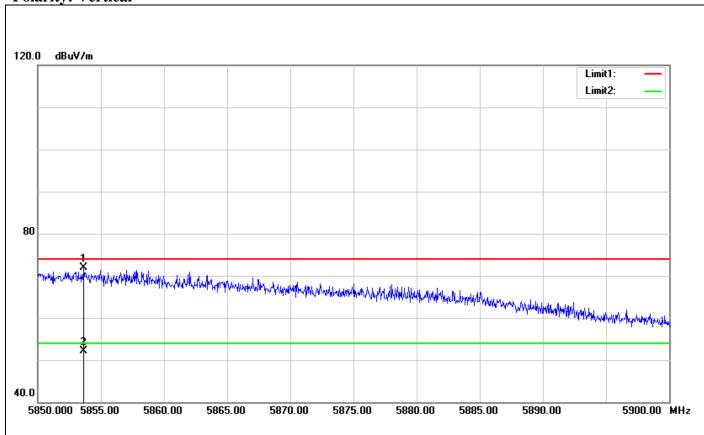




No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5722.195	64.77	6.20	70.97	74.00	-3.03	100	156	peak
2	5722.195	46.47	6.20	52.67	54.00	-1.33	100	156	AVG

Page 33 Rev.00 Band Edges (IEEE 802.11n HT 20 MHz mode / CH 5825 MHz)

Polarity: Vertical



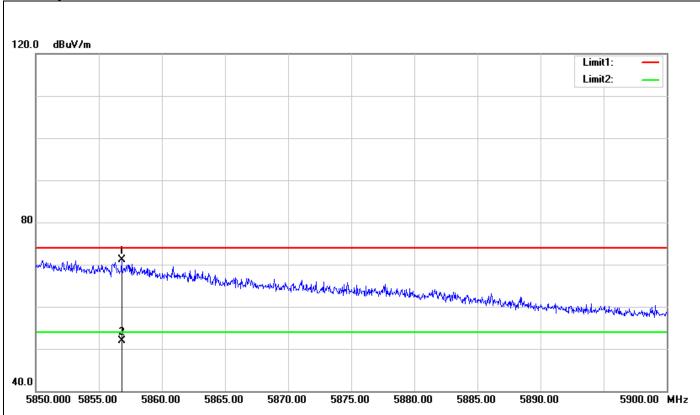
Report No.: T150123W04-RP5

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(*)	
1	5853.650	65.22	6.76	71.98	74.00	-2.02	100	10	peak
2	5853.650	45.40	6.76	52.16	54.00	-1.84	100	10	AVG

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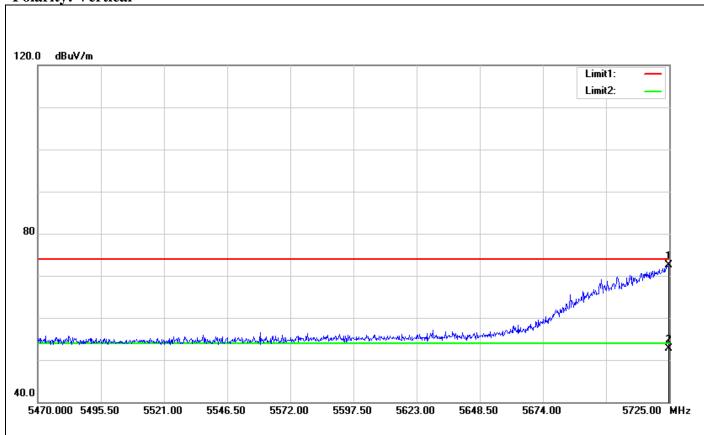




No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5856.800	64.35	6.77	71.12	74.00	-2.88	100	241	peak
2	5856.800	45.08	6.77	51.85	54.00	-2.15	100	241	AVG

Page 35 Rev.00 Band Edges (IEEE 802.11n HT 40 MHz mode / CH 5755 MHz)

Polarity: Vertical



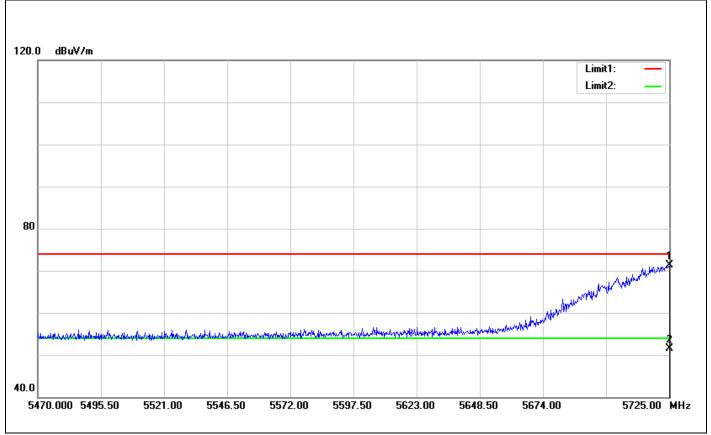
Report No.: T150123W04-RP5

N	o.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
		(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(*)	
	1	5724.745	66.37	6.21	72.58	74.00	-1.42	100	159	peak
2	2	5724.745	46.40	6.21	52.61	54.00	-1.39	100	159	AVG

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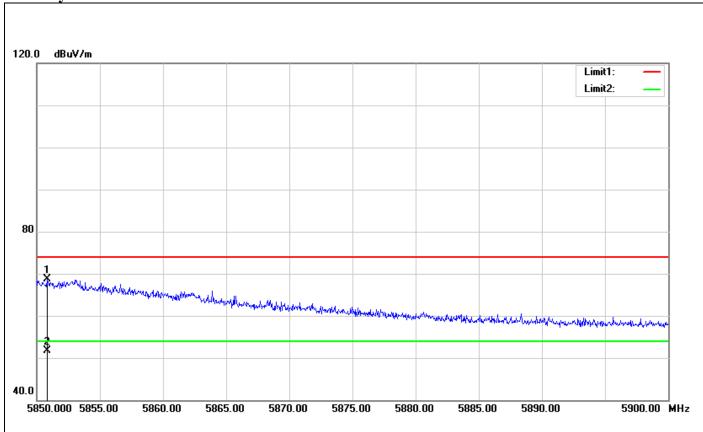




No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5725.000	65.17	6.21	71.38	74.00	-2.62	100	266	peak
2	5725.000	45.28	6.21	51.49	54.00	-2.51	100	266	AVG

Page 37 Rev.00 Band Edges (IEEE 802.11n HT 40 MHz mode / CH 5795 MHz)

Polarity: Vertical



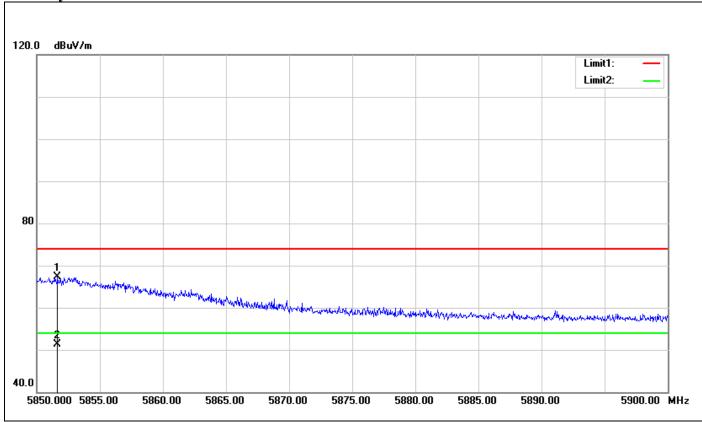
Report No.: T150123W04-RP5

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(*)	
1	5850.800	61.94	6.74	68.68	74.00	-5.32	100	129	peak
2	5850.800	45.03	6.74	51.77	54.00	-2.23	100	129	AVG

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FCC ID: VUI-THOR7265 Report No.: T150123W04-RP5



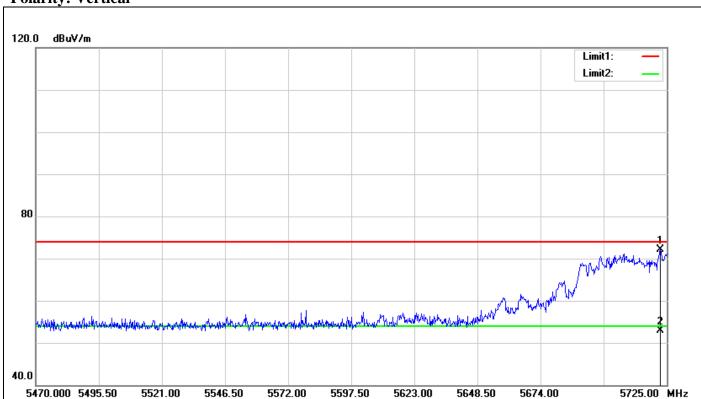


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5851.650	60.46	6.75	67.21	74.00	-6.79	100	248	peak
2	5851.650	44.64	6.75	51.39	54.00	-2.61	100	248	AVG

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Band Edges (IEEE 802.11n HT 80 MHz mode / CH 5775 MHz)

Polarity: Vertical



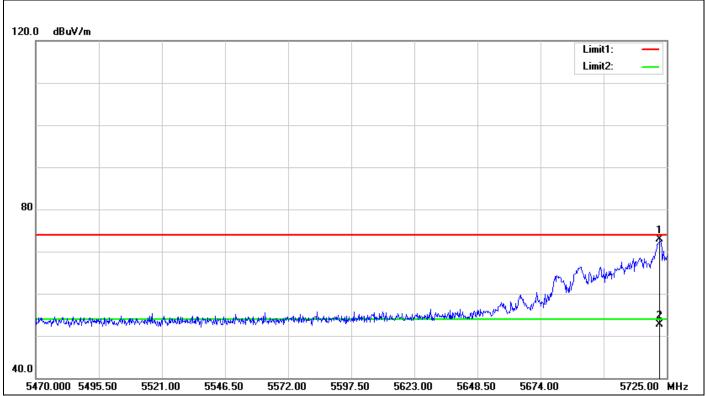
Report No.: T150123W04-RP5

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5722.450	65.98	6.20	72.18	74.00	-1.82	100	111	peak
2	5722.450	46.64	6.20	52.84	54.00	-1.16	100	111	AVG

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FCC ID: VUI-THOR7265 Report No.: T150123W04-RP5



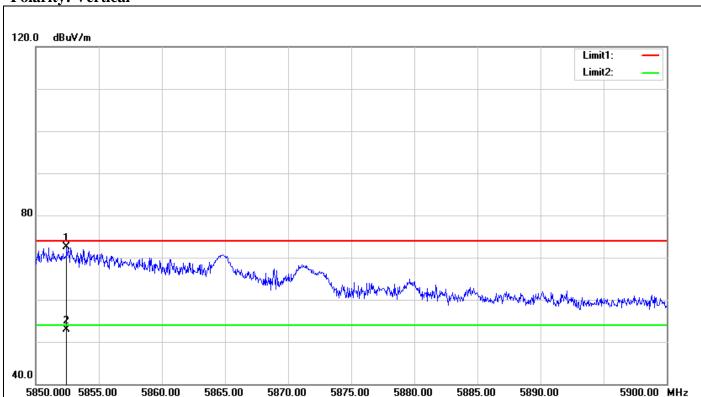


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5722.195	66.64	6.20	72.84	74.00	-1.16	100	328	peak
2	5722.195	46.51	6.20	52.71	54.00	-1.29	100	328	AVG

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Band Edges (IEEE 802.11n HT 80 MHz mode / CH 5775 MHz)

Polarity: Vertical



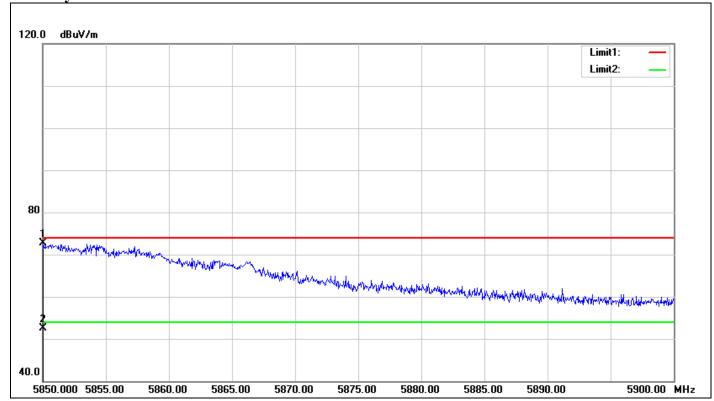
Report No.: T150123W04-RP5

N	0.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
		(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	1	5852.450	65.71	6.75	72.46	74.00	-1.54	100	71	peak
2	2	5852.450	46.15	6.75	52.90	54.00	-1.10	100	71	AVG

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Report No.: T150123W04-RP5

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	5850.050	66.03	6.74	72.77	74.00	-1.23	100	200	peak
2	5850.050	45.78	6.74	52.52	54.00	-1.48	100	200	AVG

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7.4 PEAK POWER SPECTRAL DENSITY

LIMIT

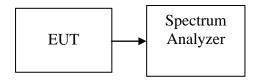
According to §15.407(a),

(1) For the band 5.725-5.850 GHz, the peak power spectral density shall not exceed 30dBm in any 1MHz band.

Report No.: T150123W04-RP5

If transmitting antennas of directional gain greater than 6dBi are used, 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 6dBi.

Test Configuration



TEST PROCEDURE

- 1. Place the EUT on the table and set it in transmitting mode.

 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2. Set the spectrum analyzer as RBW = 500kHHz, VBW = 3*RBW, Span = Sweep= AUTO
- 3. Record the max. reading.
- 4. Repeat the above procedure until the measurements for all frequencies are completed

TEST RESULTS

No non-compliance noted

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Test Data

Test mode: IEEE 802.11a mode/ 5745 ~ 5825MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	5745	-0.07		PASS
Mid	5785	-0.12	30.00	PASS
High	5825	1.11		PASS

Test mode: IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	5745	0.57	1.09	3.85		PASS
Mid	5785	0.30	0.87	3.60	30.00	PASS
High	5825	1.25	1.81	4.55		PASS

Test mode: IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	5755	-2.31	-2.24	0.74	20.00	PASS
High	5795	-2.96	-2.48	0.30	30.00	PASS

Test mode: IEEE 802.11n HT 80 MHz mode / 5775MHz

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Mid	5775	-5.07	-4.40	-1.71	30.00	PASS

Remark: 1. Total PPSD (dBm) = 10*LOG(10^(Chain 0 PPSD / 10)+10^(Chain 1 PPSD /10))

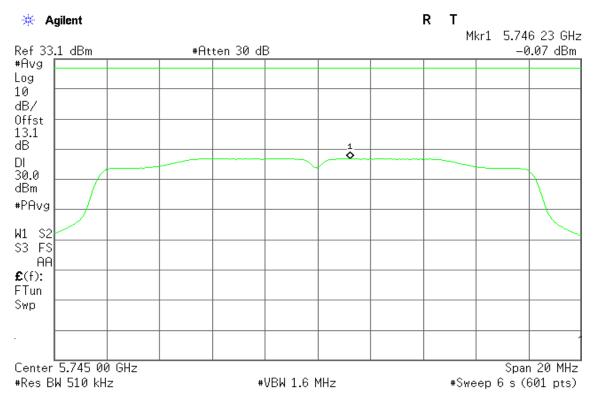
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Report No.: T150123W04-RP5

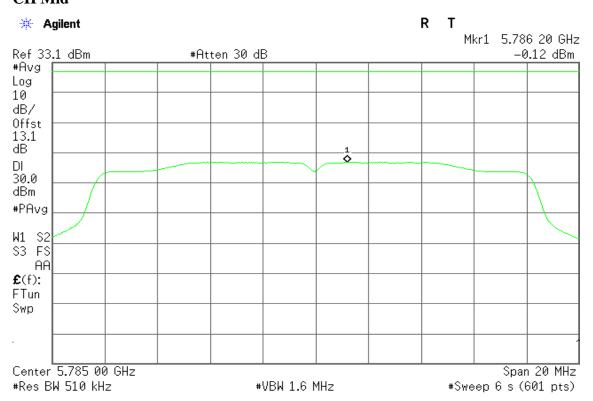


IEEE 802.11a mode / 5745 ~ 5825MHz

CH Low



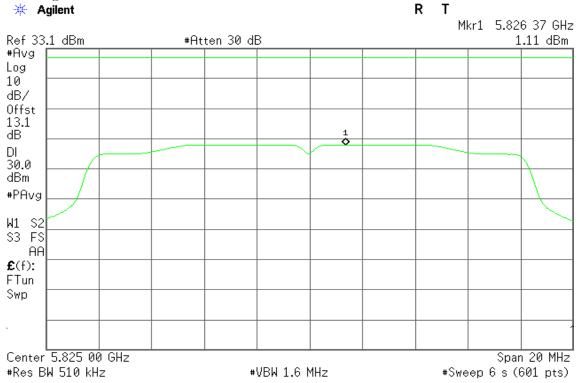
CH Mid



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CH High

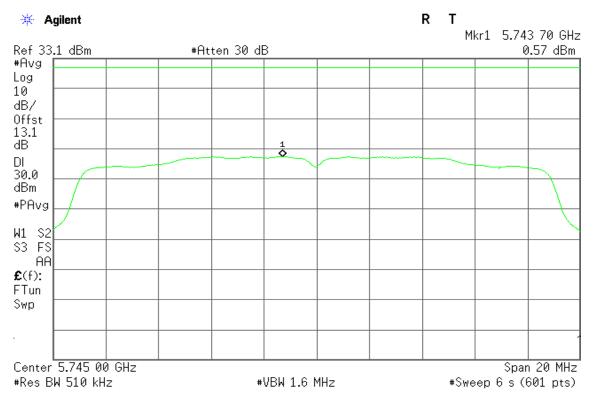


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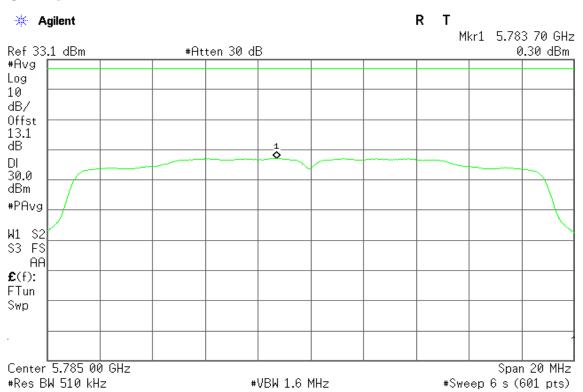


IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 0

CH Low



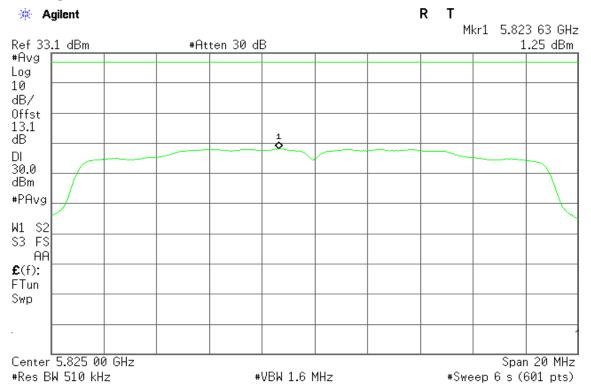
CH Mid



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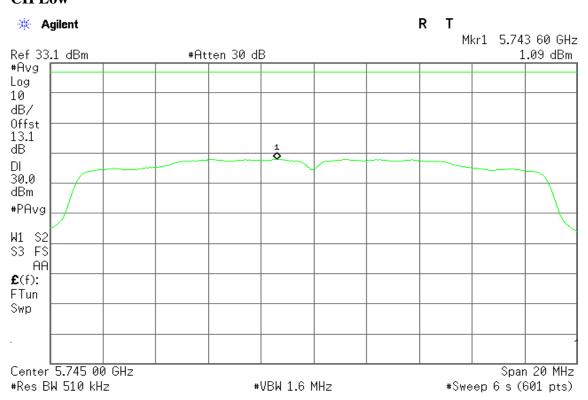
Report No.: T150123W04-RP5

CH High



<u>IEEE 802.11n HT 20 mode / 5745 ~ 5825MHz / Chain 1</u>

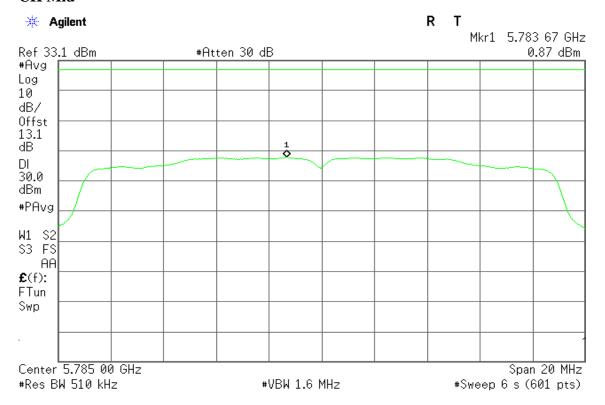
CH Low



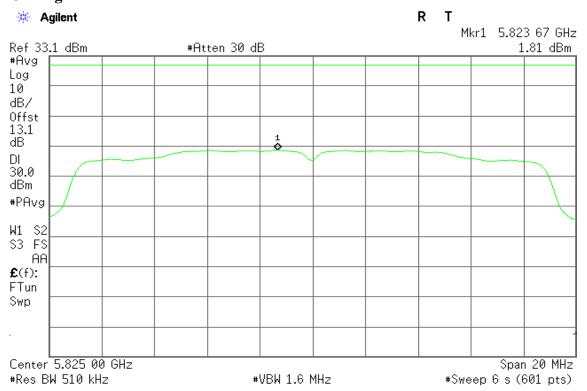
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Report No.: T150123W04-RP5

CH Mid



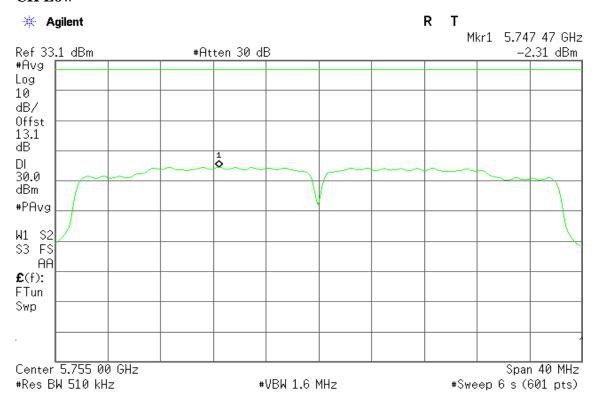
CH High



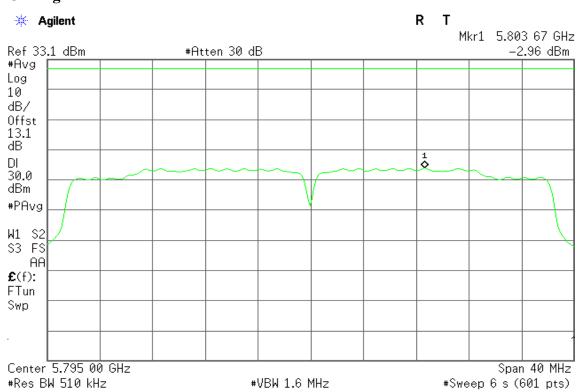
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IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 0

CH Low



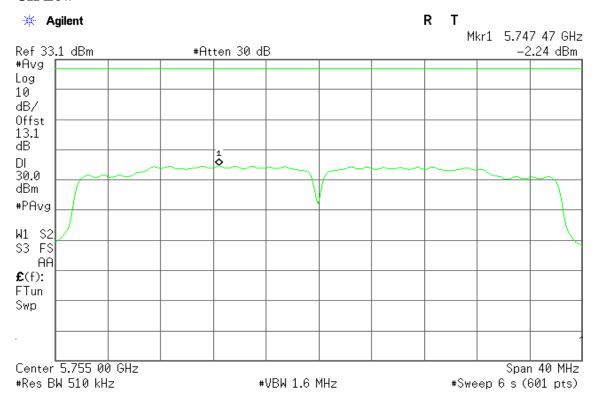
CH High



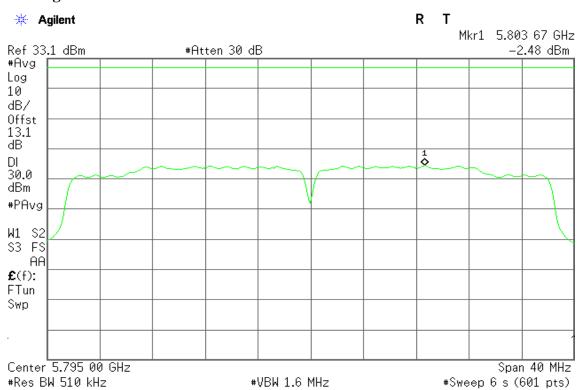
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IEEE 802.11n HT 40 mode / 5755 ~ 5795MHz / Chain 1

CH Low



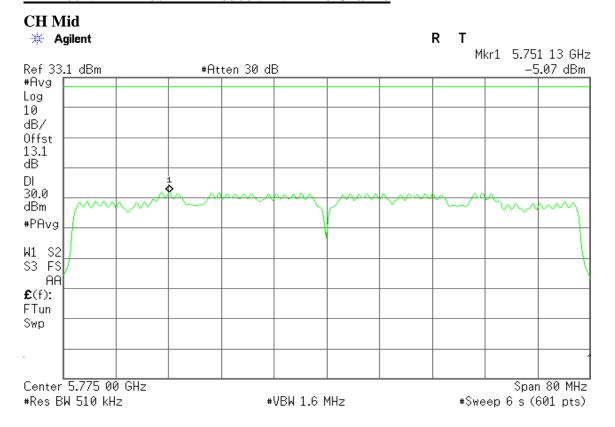
CH High



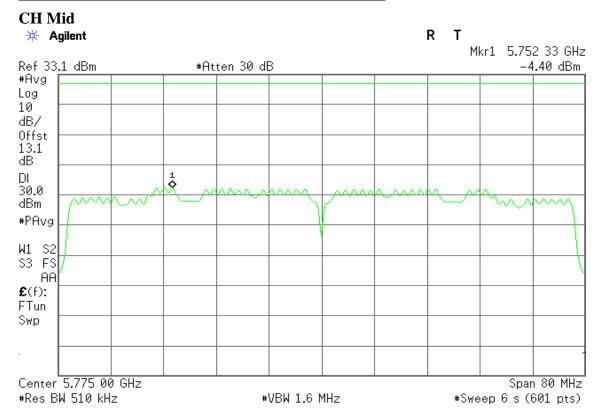
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IEEE 802.11n HT 80 MHz mode / 5775MHz / Chain 0



<u>IEEE 802.11n HT 80 MHz mode / 5775MHz / Chain 1</u>



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7.5 RADIATED UNDESIRABLE EMISSION

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Report No.: T150123W04-RP5

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

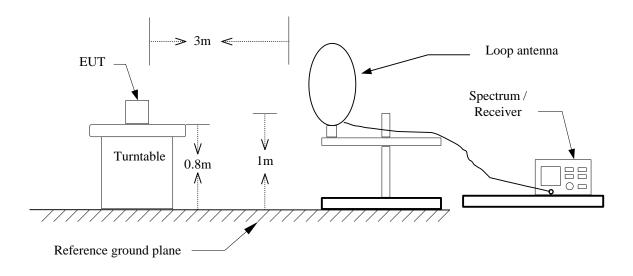
2. In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
0.009 - 0.490	2400/F(kHz) +80	20LOG((2400/F(kHz))+80)
0.490 - 1.705	24000/F(kHz) +40	20LOG((24000/F(kHz))+40)
1.705 - 30.0	30	69.54
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

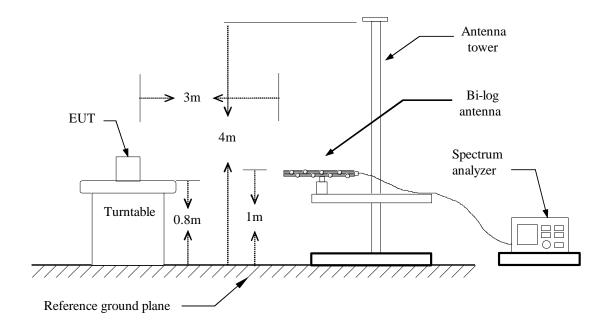
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Test Configuration

$9kHz \sim 30MHz$

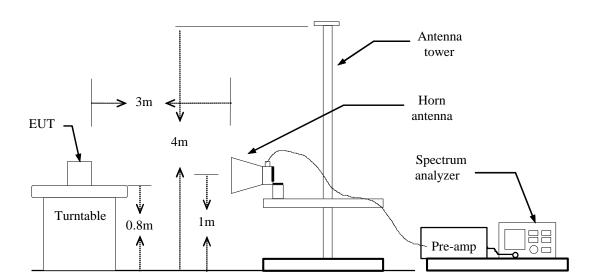


30MHz ~ 1GHz



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Above 1 GHz



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TEST PROCEDURE

- 1. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

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- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz,

if duty cycle ≥ 98%, VBW=10Hz.

if duty cycle<98% VBW=1/T.

IEEE 802.11b mode: \ge 98%, VBW=10Hz

IEEE 802.11g mode: \ge 98%, VBW=10Hz

IEEE 802.11n HT 20 MHz mode: \geq 98%, VBW=10Hz

IEEE 802.11n HT 40 MHz mode: 96%=VBW 2kHz

7. Repeat above procedures until the measurements for all frequencies are complete.

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Below 1 GHz

Operation Mode: Normal Link **Test Date:** February 13, 2015

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Temperature:24°CTested by:Dennis LiHumidity:50% RHPolarity:Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
36.7900	47.36	-14.85	32.51	40.00	-7.49	Peak	V
76.5600	52.10	-22.90	29.20	40.00	-10.80	Peak	V
259.8900	33.28	-17.68	15.60	46.00	-30.40	Peak	V
449.0400	35.30	-12.69	22.61	46.00	-23.39	Peak	V
668.2600	30.21	-9.12	21.09	46.00	-24.91	Peak	V
852.5600	28.68	-6.75	21.93	46.00	-24.07	Peak	V
36.7900	45.81	-14.85	30.96	40.00	-9.04	Peak	Н
76.5600	48.48	-22.90	25.58	40.00	-14.42	Peak	Н
320.0300	42.28	-15.92	26.36	46.00	-19.64	Peak	Н
533.4300	33.23	-11.28	21.95	46.00	-24.05	Peak	Н
749.7400	29.90	-7.88	22.02	46.00	-23.98	Peak	Н
893.3000	29.30	-6.24	23.06	46.00	-22.94	Peak	Н

Remark:

- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)
- 2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
- 3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Quasi-peak limit(dBuV/m).

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Above 1 GHz

Tx / IEEE 802.11a mode / 5745 ~ 5825MHz / **Test Date:** February 11, 2015 **Operation Mode:**

CH Low

27°C **Tested by:** Dennis Li **Temperature:**

Humidity: 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1595.000	57.36	-7.03	50.33	74.00	-23.67	peak	V
N/A							
1602.000	57.81	-6.99	50.82	74.00	-23.18	peak	Н
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Radiated emissions measured in frequency above 1000MHz were made with an 2. instrument using peak/average detector mode.
- Average test would be performed if the peak result were greater than the average limit. 3.
- 4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser, 5. with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- $Margin(dB) = Remark\ result\ (dBuV/m) Average\ limit\ (dBuV/m).$ 6.

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Operation Mode: Tx / IEEE 802.11a mode / 5745 ~ 5825MHz Test Date: February 11, 2015

/CH Mid

Temperature: 27 °C **Tested by:** Dennis Li **Humidity:** 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.09	-7.97	49.12	74.00	-24.88	peak	V
N/A							
1399.000	57.93	-7.97	49.96	74.00	-24.04	peak	Н
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3. Average test would be performed if the peak result were greater than the average limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Average limit(dBuV/m).

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Operation Mode: Tx / IEEE 802.11a mode / 5745 ~ 5825MHz

/CH High Test Date: February 11, 2015

Report No.: T150123W04-RP5

Temperature: 27 °C **Tested by:** Dennis Li **Humidity:** 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.18	-7.97	49.21	74.00	-24.79	peak	V
N/A							
1399.000	58.67	-7.97	50.70	74.00	-23.30	peak	Н
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3. Average test would be performed if the peak result were greater than the average limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Average limit(dBuV/m).

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Operation Mode: Tx / IEEE 802.11n HT 20 mode / 5745 ~

E: 5825MHz / CH Low Test Date: February 11, 2015

Report No.: T150123W04-RP5

Temperature: 27 °C **Tested by:** Dennis Li **Humidity:** 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1392.000	58.59	-8.01	50.58	74.00	-23.42	peak	V
N/A							
1994.000	51.19	-4.91	46.28	74.00	-27.72	peak	Н
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3. Average test would be performed if the peak result were greater than the average limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Average limit(dBuV/m).

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Operation Mode: Tx / IEEE 802.11n HT 20 mode / 5745 ~

: 5825MHz / CH Mid Test Date: February 11, 2015

Report No.: T150123W04-RP5

Temperature: 27 °C **Tested by:** Dennis Li **Humidity:** 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1196.000	57.91	-8.87	49.04	74.00	-24.96	peak	V
N/A							
1399.000	56.62	-7.97	48.65	74.00	-25.35	peak	Н
N/A		,,,,,	.0.00	7 1100	20.00	Pemi	

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3. Average test would be performed if the peak result were greater than the average limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Average limit(dBuV/m).

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Operation Mode: Tx / IEEE 802.11n HT 20 mode / 5745 ~

5825MHz / CH High

Temperature: 27°C **Tested by:** Dennis Li

Humidity: 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.54	-7.97	49.57	74.00	-24.43	peak	V
N/A							
1399.000	58.03	-7.97	50.06	74.00	-23.94	peak	Н
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3. Average test would be performed if the peak result were greater than the average limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Average limit(dBuV/m).

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Report No.: T150123W04-RP5

Test Date: February 11, 2015

Operation Mode: Tx / IEEE 802.11n HT 40 mode / 5755 ~

le: 17 / IEEE 802.111 111 40 mode / 3733 ~ Test Date: February 11, 2015

Report No.: T150123W04-RP5

Temperature: 27 °C **Tested by:** Dennis Li **Humidity:** 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.36	-7.97	49.39	74.00	-24.61	peak	V
N/A							
1399.000	56.96	-7.97	48.99	74.00	-25.01	peak	Н
	30.90	-1.51	40.77	74.00	-23.01	реак	11
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3. Average test would be performed if the peak result were greater than the average limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Average limit(dBuV/m).

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Operation Mode: Tx / IEEE 802.11n HT 40 mode / 5755 ~

e: 1X / IEEE 802.111 111 40 Hode / 3733 ~ Test Date: February 11, 2015

Report No.: T150123W04-RP5

Temperature: 27 °C **Tested by:** Dennis Li **Humidity:** 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1595.000	54.23	-7.03	47.20	74.00	-26.80	peak	V
N/A							
1399.000	57.88	-7.97	49.91	74.00	-24.09	peak	Н
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3. Average test would be performed if the peak result were greater than the average limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Average limit(dBuV/m).

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Operation Mode: Tx / IEEE 802.11ac80 mode / 5775MHz **Test Date:** February 11, 2015

Report No.: T150123W04-RP5

Temperature: 27°C **Tested by:** Dennis Li

Humidity: 53% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Pol. (H/V)
1399.000	57.15	-7.97	49.18	74.00	-24.82	peak	V
N/A							
1392.000	57.17	-8.01	49.16	74.00	-24.84	peak	Н
N/A							

Remark:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3. Average test would be performed if the peak result were greater than the average limit.
- 4. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- 6. Margin(dB) = Remark result(dBuV/m) Average limit(dBuV/m).

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7.6 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to $\S15.207(a)$, except as shown in paragraphs (b) and (c) of this section, for an intentional radiator 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, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Report No.: T150123W04-RP5

Frequency Range	Limits (dBμV)				
(MHz)	Quasi-peak	Average			
0.15 to 0.50	66 to 56*	56 to 46*			
0.50 to 5	56	46			
5 to 30	60	50			

^{*} Decreases with the logarithm of the frequency.

TEST CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

- 1. The EUT was placed on a table, which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

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TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Report No.: T150123W04-RP5

Test Data

Operation Mode: Normal Link **Test Date:** February 14, 2015

Temperature: 24°C **Tested by:** Ken Tsai

Humidity: 50% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.2678	33.00	31.98	9.58	42.58	41.56	61.18	51.19	-18.60	-9.63	L1
0.4876	22.71	16.02	9.58	32.29	25.60	56.21	46.21	-23.92	-20.61	L1
0.5197	36.26	27.46	9.58	45.84	37.04	56.00	46.00	-10.16	-8.96	L1
0.7229	28.38	17.64	9.59	37.97	27.23	56.00	46.00	-18.03	-18.77	L1
0.8562	28.61	17.66	9.59	38.20	27.25	56.00	46.00	-17.80	-18.75	L1
2.5752	26.91	16.17	9.60	36.51	25.77	56.00	46.00	-19.49	-20.23	L1
0.2679	32.58	31.73	9.63	42.21	41.36	61.18	51.18	-18.97	-9.82	L2
0.5039	28.72	19.06	9.63	38.35	28.69	56.00	46.00	-17.65	-17.31	L2
0.5917	26.90	17.19	9.63	36.53	26.82	56.00	46.00	-19.47	-19.18	L2
0.7316	22.93	13.73	9.64	32.57	23.37	56.00	46.00	-23.43	-22.63	L2
1.4299	18.52	11.75	9.64	28.16	21.39	56.00	46.00	-27.84	-24.61	L2
2.5111	20.16	12.60	9.65	29.81	22.25	56.00	46.00	-26.19	-23.75	L2

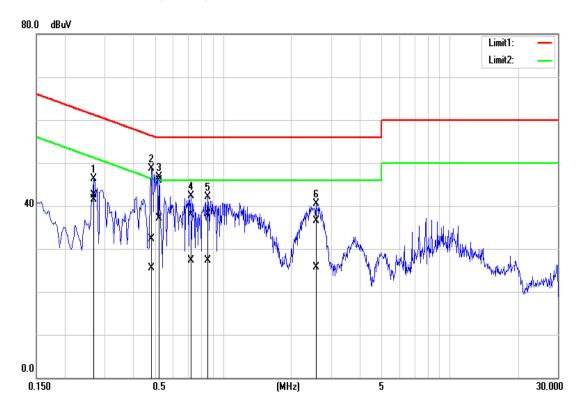
Remark:

- 1. Measuring frequencies from 0.15 MHz to 30MHz.
- 2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
- 3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
- 4. $L1 = Line \ One \ (Live \ Line) / L2 = Line \ Two \ (Neutral \ Line)$

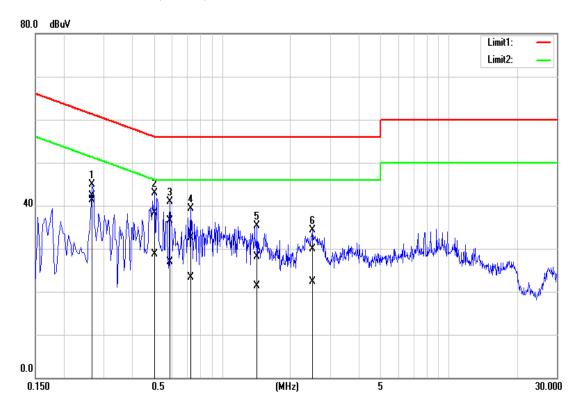
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Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)



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