



## **FCC 47 CFR PART 15 SUBPART E**

### **TEST REPORT**

**For**

**WLAN USB LGA module**

**Model: LGA22U**

**Trade Name: N/A**

*Issued to*

**Gemicom Technology, Inc.  
14F, No. 108, Sec. 1, Hsin-Tai-Wu Rd., Hsi-Chih Dist., New Taipei City  
22102, Taiwan**

*Issued by*

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Testing Laboratory  
1309

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**Revision History**

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		August 29, 2014		Initial Issue	All	Iren Wang



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## 1. TEST RESULT CERTIFICATION

**Applicant:** **Gemicom Technology, Inc.**  
14F, No. 108, Sec. 1, Hsin-Tai-Wu Rd., Hsi-Chih Dist., New Taipei City  
22102, Taiwan

**Manufacturer:** **Gemicom Technology, Inc.**  
14F, No. 108, Sec. 1, Hsin-Tai-Wu Rd., Hsi-Chih Dist., New Taipei City  
22102, Taiwan

**Equipment Under Test:** WLAN USB LGA module

**Trade Name:** N/A

**Model:** LGA22U

**Date of Test:** July 17 ~ August 15, 2014

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:**

Bill Cheng  
Section Manager

**Reviewed by:**

Angel Hu  
Section Manager



## 2. EUT DESCRIPTION

<b>Product</b>	WLAN USB LGA module				
<b>Trade Name</b>	N/A				
<b>Model Number</b>	LGA22U				
<b>Model Discrepancy</b>	N/A				
<b>EUT Power Rating</b>	5VDC				
<b>Received Date</b>	July 10, 2014				
<b>RF Module Manufacturer</b>	Realtek	<b>Model</b>	RTL8192DU		
<b>Operating Frequency Range &amp; Number of Channels</b>		<b>Mode</b>	<b>Frequency Range (MHz)</b>	<b>Number of Channels</b>	
	UNII Band I	IEEE 802.11a	5180-5240	4 Channels	
		IEEE 802.11n HT20	5180-5240	4 Channels	
		IEEE 802.11n HT40	5190-5230	2 Channels	
	UNII Band III	IEEE 802.11a	5745-5825	5 Channels	
		IEEE 802.11n HT20	5745-5825	5 Channels	
		IEEE 802.11n HT40	5755-5795	2 Channels	
<b>Transmit Power</b>		<b>Mode</b>	<b>Frequency Range (MHz)</b>	<b>Output Power (dBm)</b>	<b>Output Power (W)</b>
	UNII Band I	IEEE 802.11a	5180-5240	11.97	0.0157
		IEEE 802.11n HT20	5180-5240	10.51	0.0112
		IEEE 802.11n HT40	5190-5230	11.82	0.0152
	UNII Band III	IEEE 802.11a	5745-5825	12.63	0.0183
		IEEE 802.11n HT20	5745-5825	13.76	0.0238
		IEEE 802.11n HT40	5755-5795	13.68	0.0233
<b>Modulation Technique</b>	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)				
<b>Transmit Data Rate</b>	IEEE 802.11a mode: 54, 48, 36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT20 mode: OFDM (144.4, 130, 117, 115.6, 104, 86.7, 78, 72.2, 65.0, 58.5, 57.8, 52, 43.3, 39, 28.9, 26, 21.7, 19.5, 14.4, 13, 7.2, 6.5 Mbps) IEEE 802.11n HT40 mode: OFDM (300, 270, 243, 240, 216, 180, 162, 150, 135, 121.5, 120, 108, 90, 81, 60, 54, 45, 40.5, 30, 27, 15, 13.5 Mbps)				
<b>Antenna Specification</b>	Chain 0: PCB Antenna / Gain: 5.9 dBi Chain 1: PCB Antenna / Gain: 4.6 dBi (MIMO: $10\log[(10^{5.9/20} + 10^{4.6/20})^2/2] = 8.28$ )				

**Operation Frequency:**

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	MHz
36	5180
38	5190
42	5210
44	5220
46	5230
48	5240
149	5745
151	5755
153	5765
157	5785
159	5795
161	5805
165	5825

**Remark:**

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **2ACOL-LGA22U** filing to comply with Section 15.207, 15.209 and 15.407 of the FCC Part 15, Subpart E Rules.



### **3. TEST METHODOLOGY**

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2009 Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC CFR 47 Part 15.207, 15.209 and 15.407.

#### **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 Quasi-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: 2003.

**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:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 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	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> 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 is a 2Tx2R MIMO transmitter.

The EUT (model: LGA22U) had been tested under operating condition.

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

The worst case data rate is determined as the data rate with highest output power.

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

The field strength of spurious emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

#### **UNII Band I:**

##### **IEEE 802.11a mode for 5180-5240MHz:**

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

##### **IEEE 802.11n HT20 mode for 5180-5240MHz:**

Channel Low (5180MHz), Channel Mid (5220MHz) and Channel High (5240MHz) with 6.5Mbps data rate were chosen for full testing.

##### **IEEE 802.11n HT40 mode for 5190-5230MHz:**

Channel Low (5190MHz) and Channel High (5230MHz) with 13.5Mbps data rate were chosen for full testing.

#### **UNII Band III:**

##### **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 HT20 mode:**

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

##### **IEEE 802.11n HT40 mode:**

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



## 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.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY48250064	01/01/2015
Spectrum Analyzer	Agilent	N9010A	MY52220817	03/20/2015
Spectrum Analyzer	R&S	FSL	100837	11/11/2014
Power meter	Anritsu	ML2495A	1033009	09/29/2014
Power Sensor	Anritsu	MA2411B	0917221	09/29/2014

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY48250064	01/01/2015
Spectrum Analyzer	R&S	FSL	100837	11/11/2014
Pre-Amplifier	HP	8447D	2944A06530	05/02/2015
Pre-Amplifier	EMEC	EM01M26G	060570	07/28/2015
Pre-Amplifier	MITEQ	AMF-6F-26040 0-40-8P	985646	06/12/2015
Pre-Amplifier	Agilent	8449B	3008A01738	08/11/2015
EMI Test Receiver	SCHAFFNER	SCR 3501	430	03/30/2015
Loop Antenna	EMCO	6502	8905-2356	08/20/2014
Bilog Antenna	TESEQ	CBL 6112D	35378	09/11/2014
Horn Antenna	EMCO	3115	00022250	08/05/2015
Horn Antenna	EMCO	3116	00026370	12/29/2014
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Test S/W	EZ-EMC			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.



Powerline Conducted Emissions Test Site #3				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	101300	09/06/2014
LISN	R&S	ENV216	100069	06/09/2015
LISN	FCC	FCC-LISN-50/2 50-16-2-07	06013	11/20/2014
ISN	TESEQ	ISN-T8	30842	07/30/2015
Current Probe	FCC	F-35	506	07/13/2015
ISN	FCC	FCC-TLISN-T2- 02	20587	07/28/2015
Test S/W	EZ-EMC			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.

### 4.3 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Powerline Conducted Emission # 3	$\pm 2.1876$
3M Semi Anechoic Chamber / 30MHz ~ 200MHz	$\pm 3.5921$
3M Semi Anechoic Chamber / 200MHz ~ 1GHz	$\pm 3.5657$
3M Semi Anechoic Chamber / 1 ~ 8GHz	$\pm 2.5873$
3M Semi Anechoic Chamber / 8 ~ 18GHz	$\pm 2.6646$
3M Semi Anechoic Chamber / 18 ~ 26GHz	$\pm 2.9617$
3M Semi Anechoic Chamber / 26 ~ 40GHz	$\pm 3.4250$

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



## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

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

☐ No. 163-1, Jhongsheng Rd., Sindien District, Taipei City 23151, Taiwan

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☐ No 11, Wugong 6th Rd, Wugu District, 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

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."

### **5.3 LABORATORY ACCREDITATIONS AND LISTING**

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.



## 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	CFR 47, FCC Part15/18, CISPR 22, EN 55022, ICES-003, AS/NZS CISPR 22, VCCI V-3, EN 55011, CISPR 11, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 61000-6-1/2/3/4, EN 55024, CISPR 24, AS/NZS CISPR 24, AS/NZS 61000.6.2, EN 55014-1/-2, ETSI EN 300 386 v1.3.2/v1.3.3, IEC/EN 61000-3-2, AS/NZS 61000.3.2, IEC/EN 61000-3-3, AS/NZS 61000.3.3	 TESTING CERT #0824.01
USA	FCC MRA	3 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 TW1026
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	<b>VCCI</b> R-2882/2541/2798/725/1868 C-402/747/912 T-1930/1646
Taiwan	TAF	EN 55014-1, CISPR 14, CNS 13781-1, EN 55013, CISPR 13, CNS 13439, EN 55011, CISPR 11, CNS 13803, PLMN09, IS2045-0, LP0002 FCC Part 27/90, Part 15B/C/D/E, RSS-192/193/210/310 ETSI EN 300 328/ 300 220-1/ 300 220-2/ 301 893/ 301 489-01/ 301 489-03/ 301 489-07 / 301 489-17/ 300 440-1/ 300 440-2 AS/NZS 4268, AS/NZS 4771 CISPR 22, EN 55022, CNS 13438, AS/NZS CISPR 22, VCCI, IEC/EN 61000-4-2/3/4/5/6/8/11, CNS 14676-2/3/4/5/6/8, CNS 14934-2/3, CNS 13783-1, CNS 13439, CNS 13803	 Testing Laboratory 0363
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	SL2-IS-E-0014 / IN-E-0014 /A1-E-0014 /R1-E-0014 /R2-E-0014 /L1-E-0014
Canada	Industry Canada	RSS-Gen Issue 3	 IC 2324C-5

\* 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 I for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

For Radiated Emissions(Below 1GHz) & Conducted Emission							
No.	Device Type	Model	Series No.	FCC ID	Brand	Data Cable	Power Cord
1	LCD	2408WFB	CN-0NN792-74261-849-15GS	FCC DOC	DELL	HDMI Cable: Shielded, 1.8m	Unshielded, 1.8m
2	Notebook PC	ThinkPad T430u	PB-VZLGG 12/09	FCC DOC	LENOVO	USB Cable: Shielded, 1.8m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
3	USB Mouse	M100	N/A	N/A	Logitech	Shielded, 1.8m	N/A

For Radiated Emissions(Above 1GHz) & Powerline Conducted Emission							
No.	Device Type	Model	Series No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook PC	ThinkPad T430u	PB-VZLGG 12/09	FCC DOC	LENOVO	USB Cable: Shielded, 1.8m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

**Remark:** Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



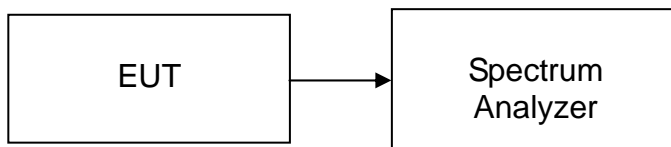
## **7. FCC PART 15 REQUIREMENTS**

### **7.1 26 dB EMISSION BANDWIDTH**

#### **LIMIT**

According to §15.303(c), for purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

#### **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 > 1%EBW, VBW > RBW, Span >26dB bandwidth, and Sweep = auto.
4. Mark the peak frequency and -26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.

#### **TEST RESULTS**

*No non-compliance noted*

**Test Data****Test mode: IEEE 802.11a mode / 5150 ~ 5250MHz**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5180	22.598
Mid	5220	22.783
High	5240	22.847

**Test mode: IEEE 802.11n HT20 mode / 5150 ~ 5250MHz / Chain 0**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5180	22.888
Mid	5220	23.197
High	5240	23.040

**Test mode: IEEE 802.11n HT20 mode / 5150 ~ 5250MHz / Chain 1**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5180	22.394
Mid	5220	23.064
High	5240	23.186

**Test mode: IEEE 802.11n HT40 mode / 5150 ~ 5250MHz / Chain 0**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5190	41.337
High	5230	41.009

**Test mode: IEEE 802.11n HT40 mode / 5150 ~ 5250MHz / Chain 1**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5190	40.580
High	5230	40.779



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

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5745	23.466
Mid	5785	26.070
High	5825	22.728

**Test mode: IEEE 802.11n HT20 mode / 5745 ~ 5825MHz / Chain 0**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5745	25.623
Mid	5785	22.942
High	5825	23.029

**Test mode: IEEE 802.11n HT20 mode / 5745 ~ 5825MHz / Chain 1**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5745	23.896
Mid	5785	25.382
High	5825	26.470

**Test mode: IEEE 802.11n HT40 mode / 5755 ~ 5795MHz / Chain 0**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5755	41.059
High	5795	47.277

**Test mode: IEEE 802.11n HT40 mode / 5755 ~ 5795MHz / Chain 1**

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	5755	45.486
High	5795	49.289



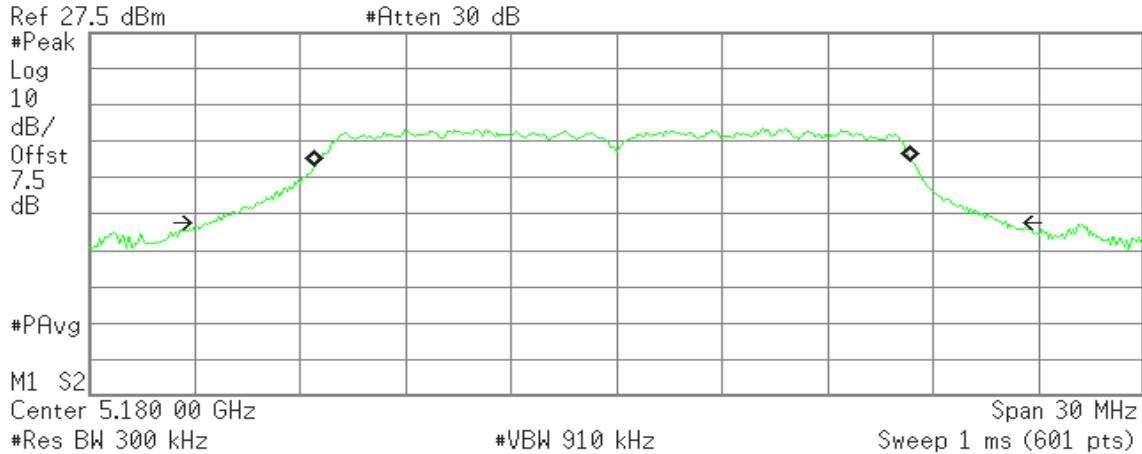
## Test Plot

### IEEE 802.11a mode / 5150 ~ 5250MHz

#### CH Low

Agilent

R L



Occupied Bandwidth  
16.9316 MHz

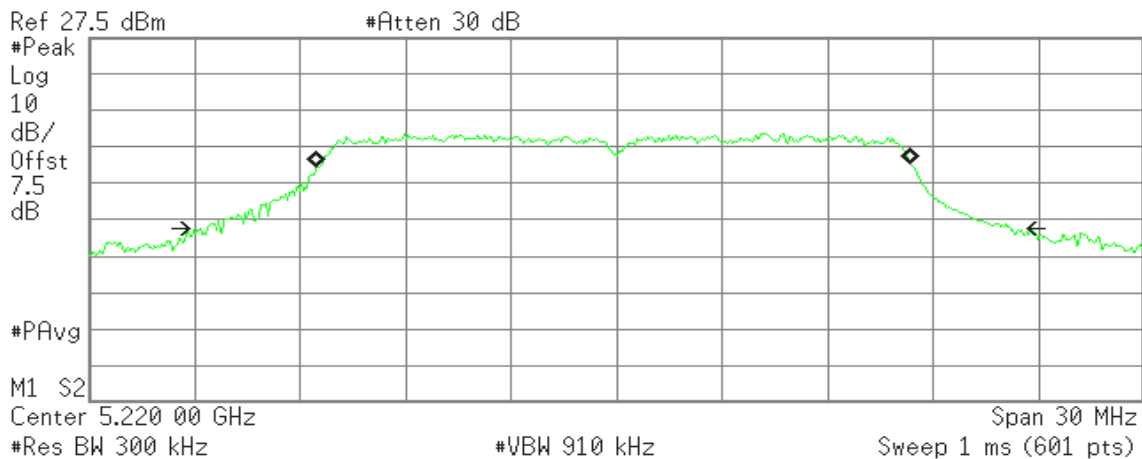
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -114.203 kHz  
x dB Bandwidth 22.598 MHz

#### CH Mid

Agilent

R L



Occupied Bandwidth  
16.8884 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

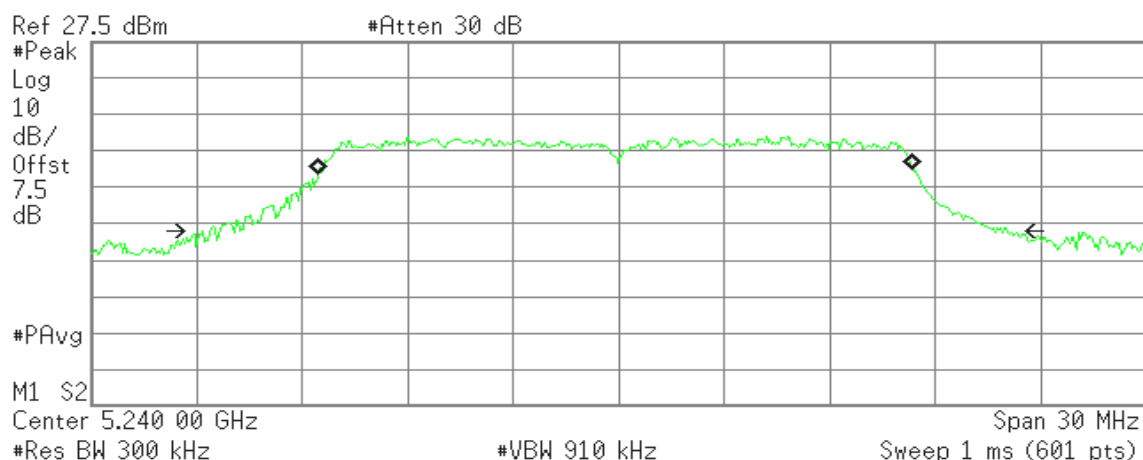
Transmit Freq Error -86.371 kHz  
x dB Bandwidth 22.783 MHz



## CH High

Agilent

R T



Occupied Bandwidth  
16.8848 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

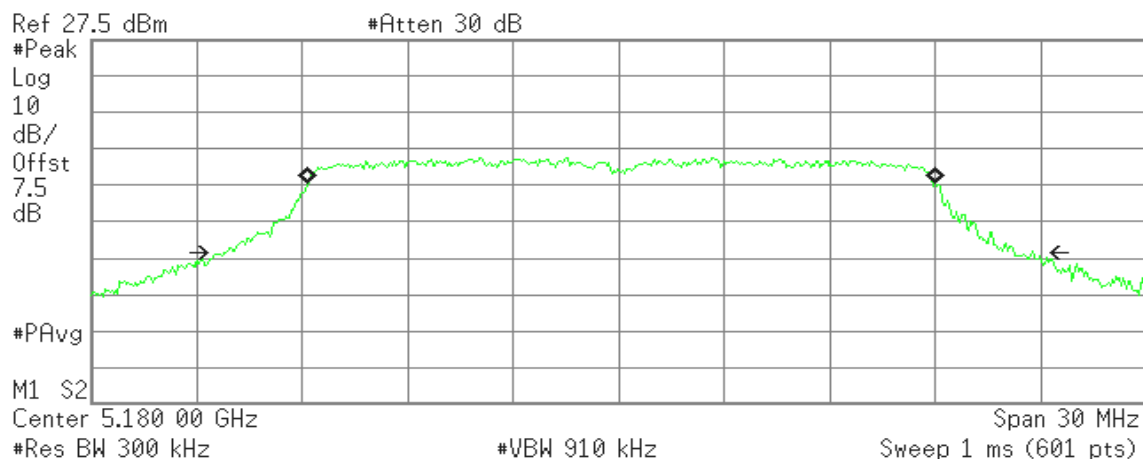
Transmit Freq Error -83.230 kHz  
x dB Bandwidth 22.847 MHz

## IEEE 802.11n HT20 mode / 5150 ~ 5250MHz / Chain 0

## CH Low

Agilent

R L



Occupied Bandwidth  
17.8636 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

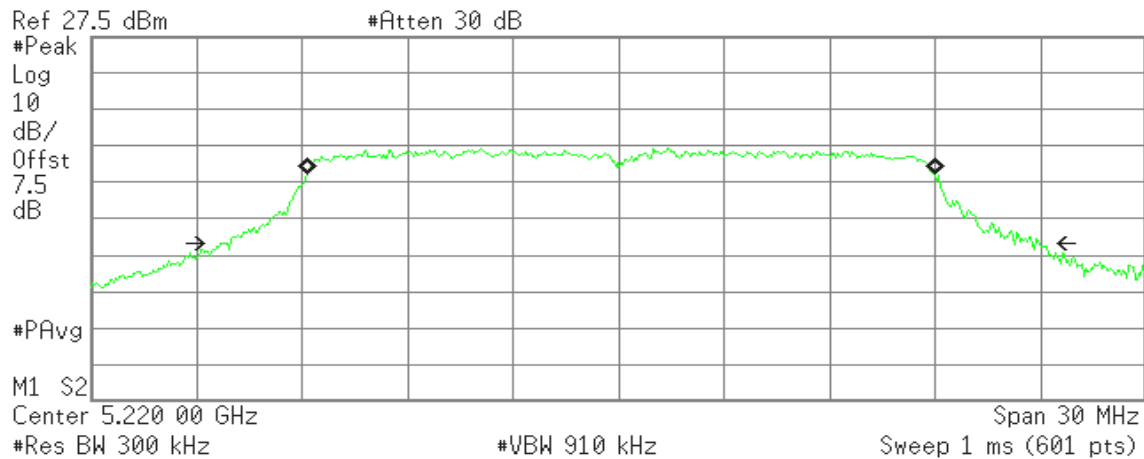
Transmit Freq Error 91.016 kHz  
x dB Bandwidth 22.888 MHz



## CH Mid

Agilent

R L



Occupied Bandwidth  
17.8480 MHz

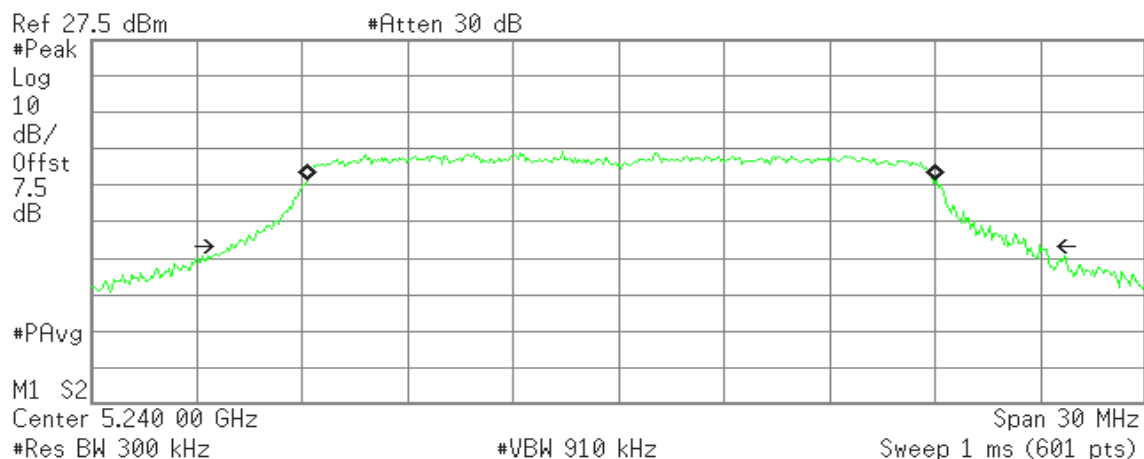
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 70.608 kHz  
x dB Bandwidth 23.197 MHz

## CH High

Agilent

R L



Occupied Bandwidth  
17.8892 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 78.319 kHz  
x dB Bandwidth 23.040 MHz

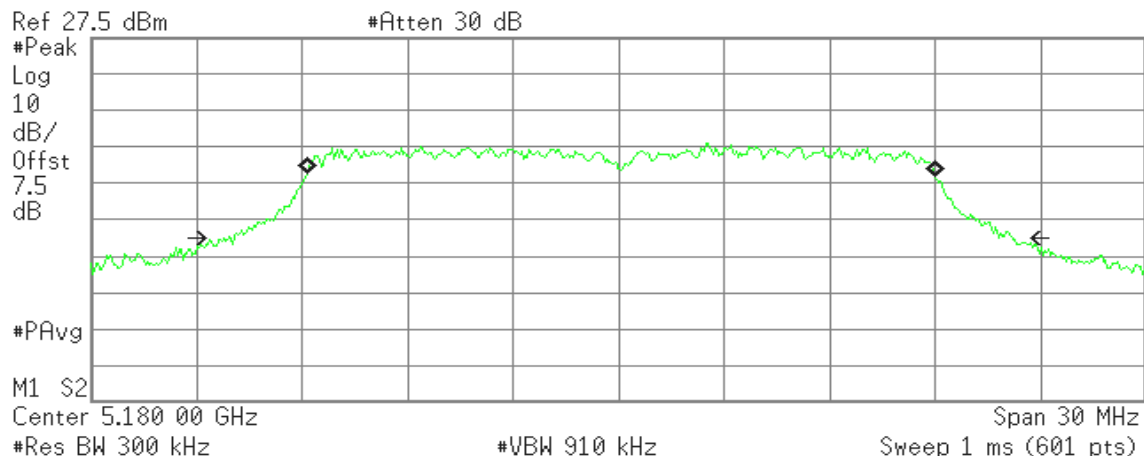


**IEEE 802.11n HT20 mode / 5150 ~ 5250MHz / Chain 1**

**CH Low**

Agilent

R L



**Occupied Bandwidth**  
**17.8414 MHz**

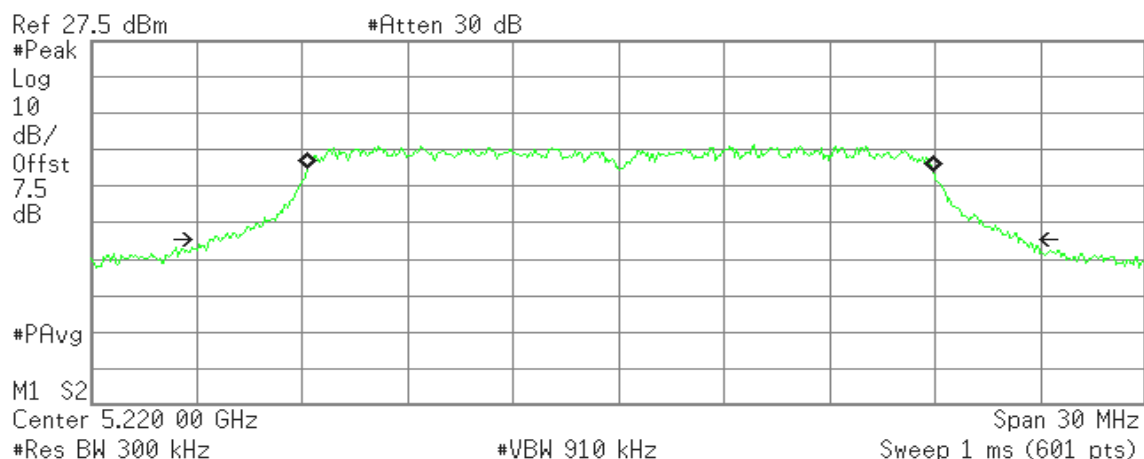
**Occ BW % Pwr** 99.00 %  
**x dB** -26.00 dB

**Transmit Freq Error** 62.662 kHz  
**x dB Bandwidth** 22.394 MHz

**CH Mid**

Agilent

R L



**Occupied Bandwidth**  
**17.8203 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -26.00 dB

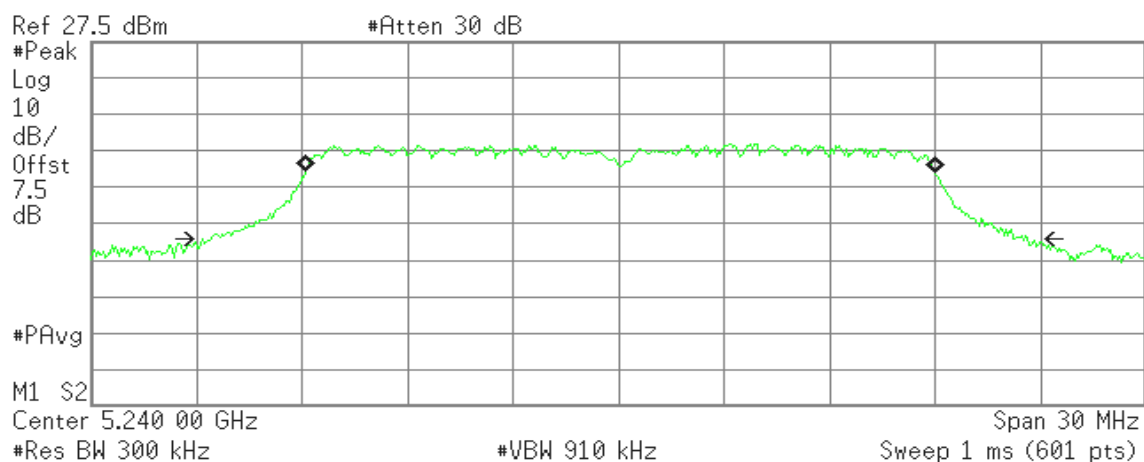
**Transmit Freq Error** 48.509 kHz  
**x dB Bandwidth** 23.064 MHz



## CH High

Agilent

R L



Occupied Bandwidth

17.8668 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error 43.754 kHz

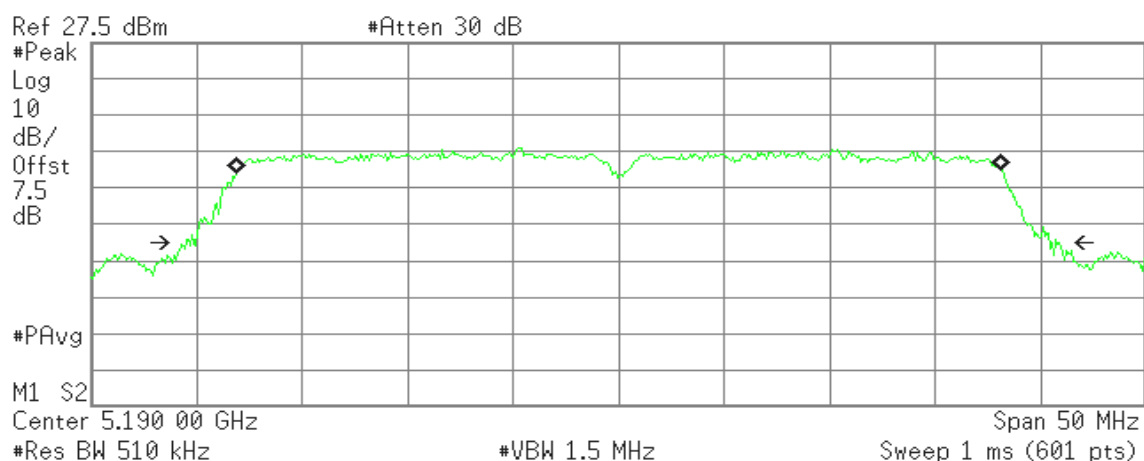
x dB Bandwidth 23.186 MHz

## IEEE 802.11n HT40 mode / 5150 ~ 5250MHz / Chain 0

### CH Low

Agilent

R L



Occupied Bandwidth

36.1220 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error -108.109 Hz

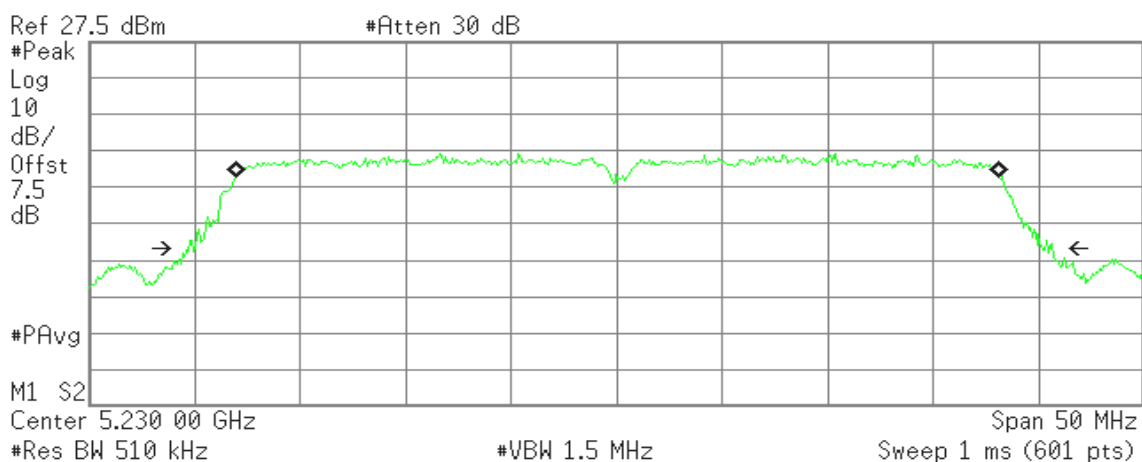
x dB Bandwidth 41.337 MHz



## CH High

Agilent

R L



Occupied Bandwidth

36.0780 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error 45.623 kHz

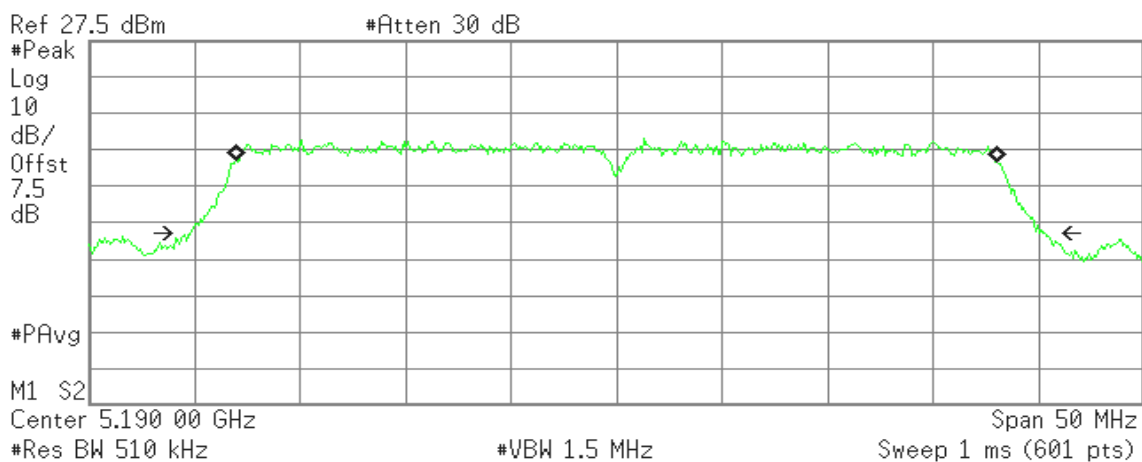
x dB Bandwidth 41.009 MHz

## IEEE 802.11n HT40 mode / 5150 ~ 5250MHz / Chain 1

### CH Low

Agilent

R L



Occupied Bandwidth

36.0690 MHz

Occ BW % Pwr 99.00 %

x dB -26.00 dB

Transmit Freq Error -118.573 Hz

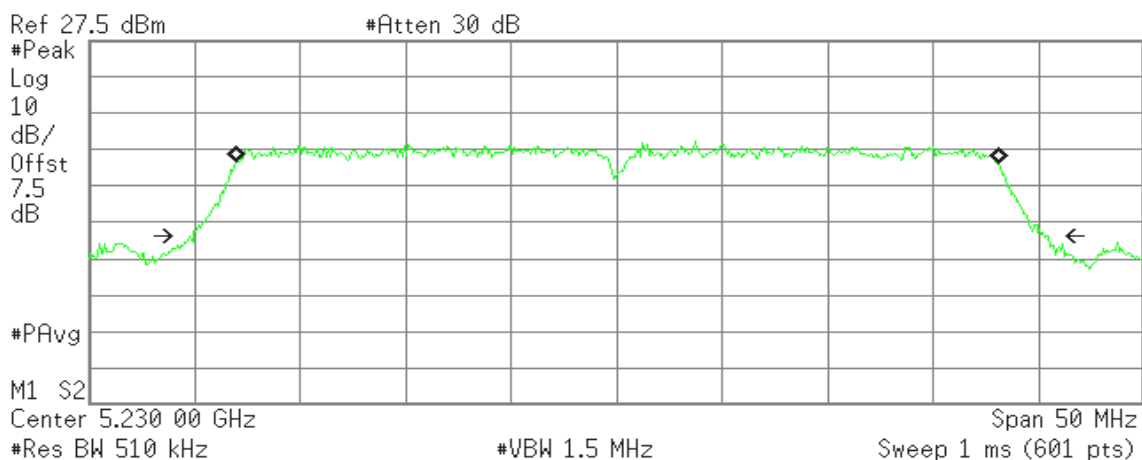
x dB Bandwidth 40.580 MHz



## CH High

Agilent

R L



Occupied Bandwidth  
36.0700 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

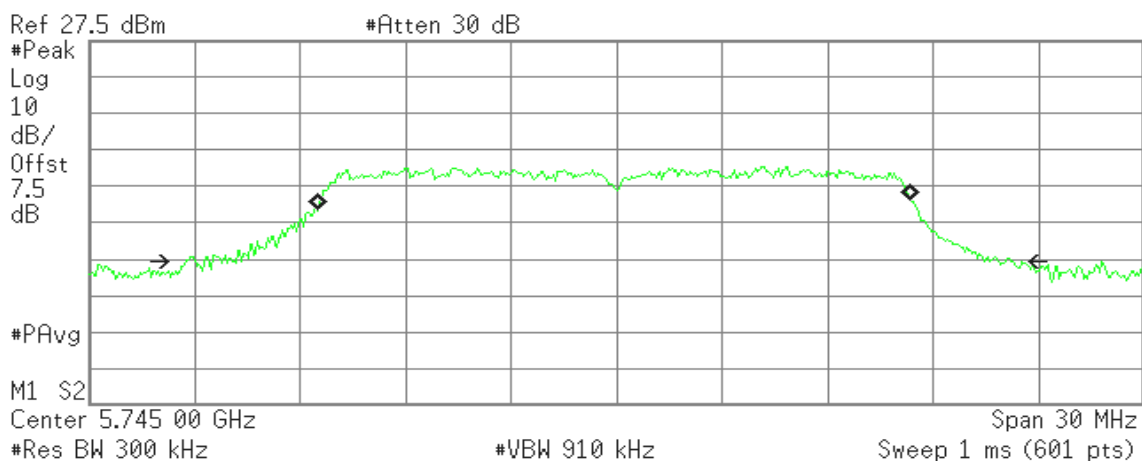
Transmit Freq Error 16.174 kHz  
x dB Bandwidth 40.779 MHz

## IEEE 802.11a mode / 5745 ~ 5825MHz

## CH Low

Agilent

R L



Occupied Bandwidth  
16.8388 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -72.630 kHz  
x dB Bandwidth 23.466 MHz

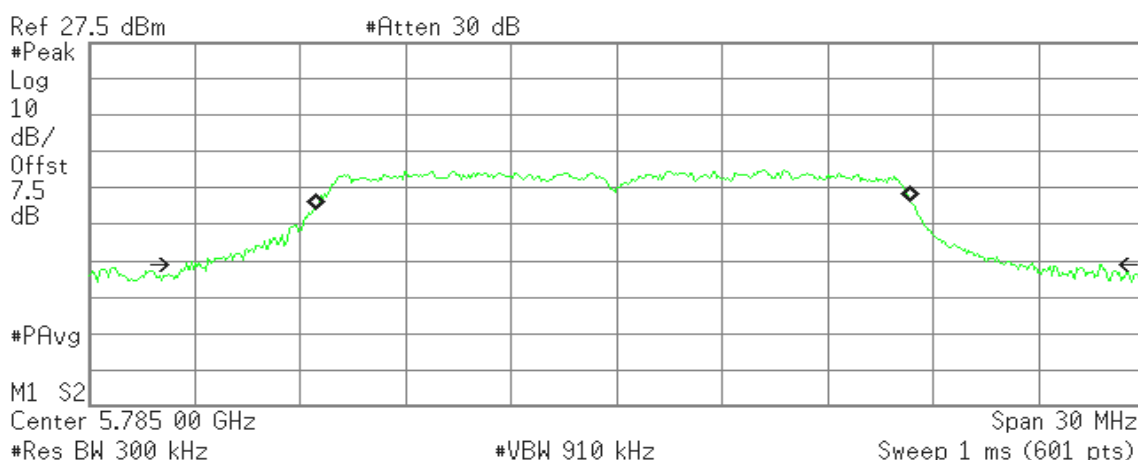




## CH Mid

Agilent

R L



Occupied Bandwidth  
16.8866 MHz

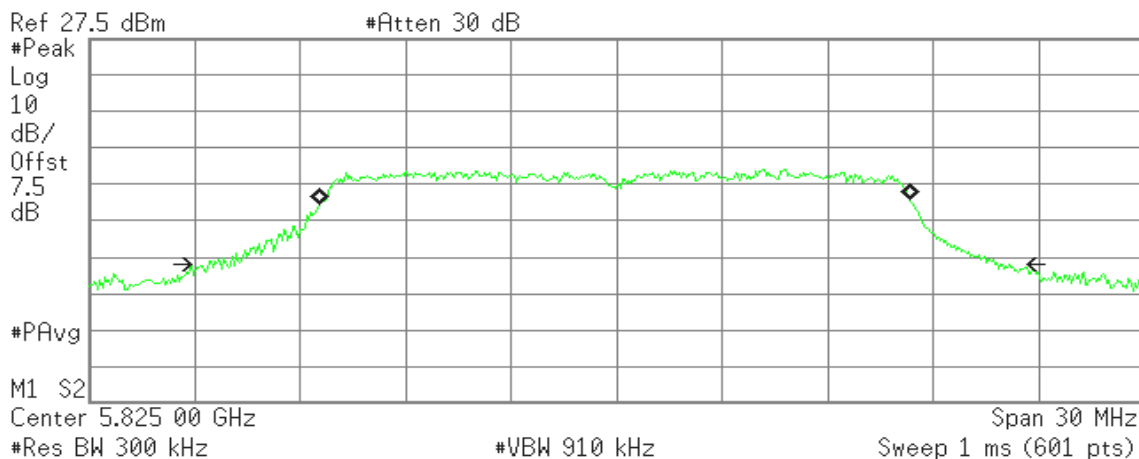
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -94.439 kHz  
x dB Bandwidth 26.070 MHz

## CH High

Agilent

R L



Occupied Bandwidth  
16.7749 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -53.734 kHz  
x dB Bandwidth 22.728 MHz

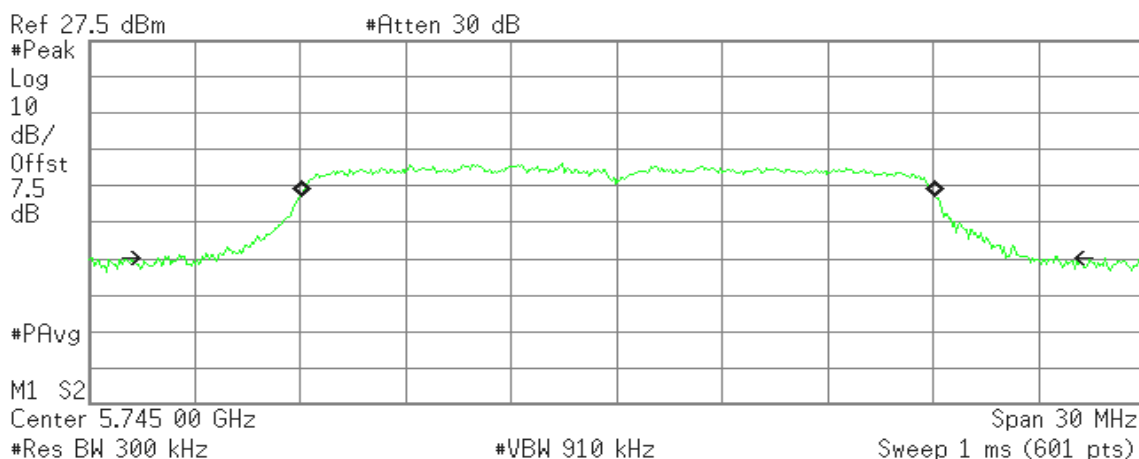


**IEEE 802.11n HT20 mode / 5745 ~ 5825MHz / Chain 0**

**CH Low**

Agilent

R L



Occupied Bandwidth  
17.9846 MHz

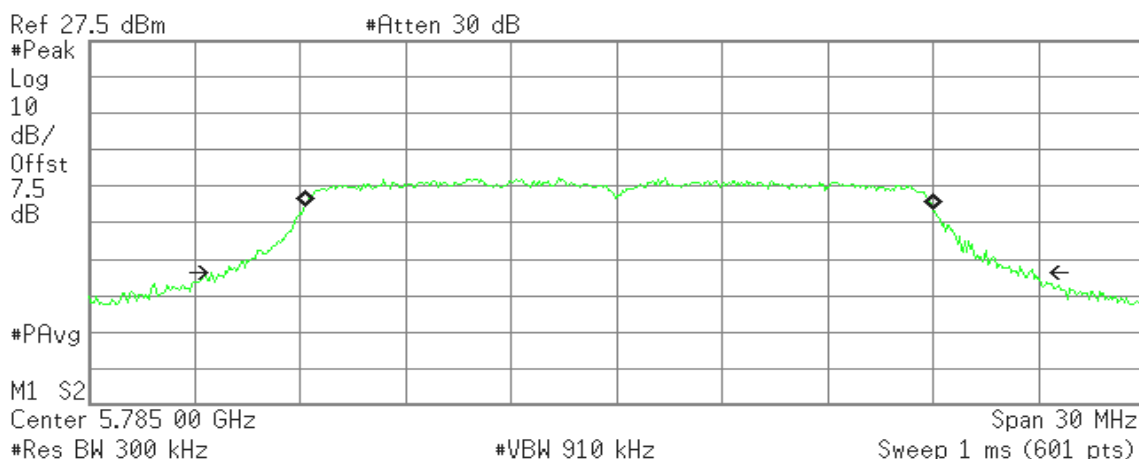
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 42.815 kHz  
x dB Bandwidth 25.623 MHz

**CH Mid**

Agilent

R L



Occupied Bandwidth  
17.8474 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

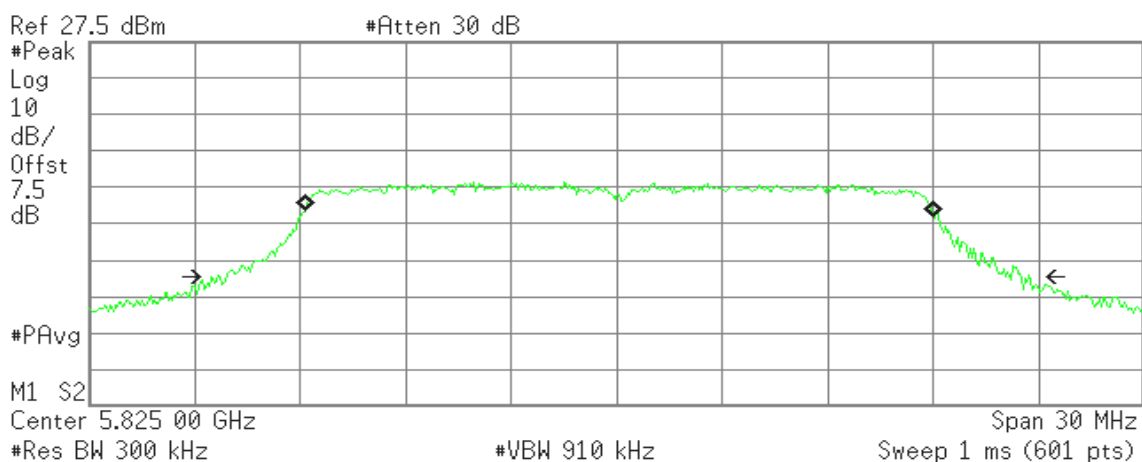
Transmit Freq Error 62.299 kHz  
x dB Bandwidth 22.942 MHz



## CH High

Agilent

R L



Occupied Bandwidth  
17.8547 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

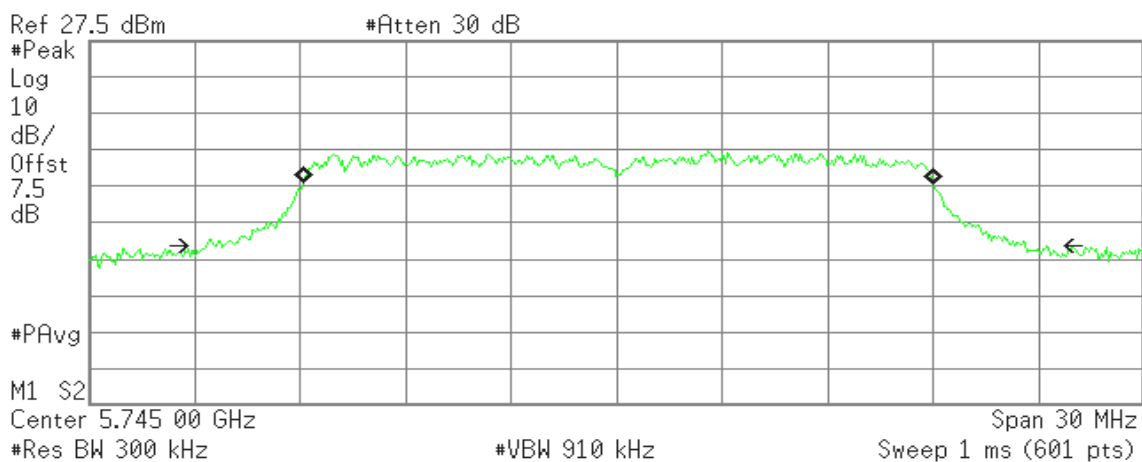
Transmit Freq Error 83.383 kHz  
x dB Bandwidth 23.029 MHz

## IEEE 802.11n HT20 mode / 5745 ~ 5825MHz / Chain 1

### CH Low

Agilent

R L



Occupied Bandwidth  
17.8762 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

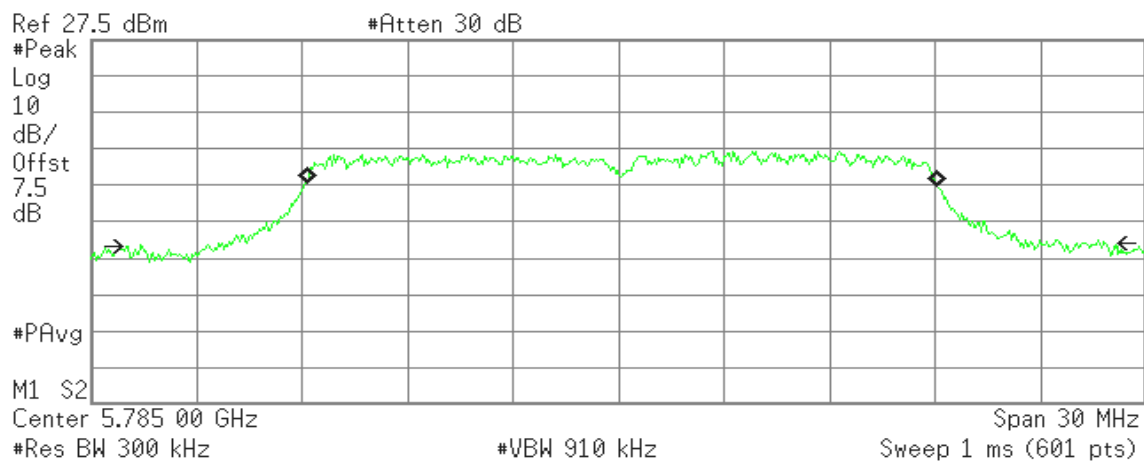
Transmit Freq Error 44.868 kHz  
x dB Bandwidth 23.896 MHz



## CH Mid

Agilent

R L



Occupied Bandwidth  
17.9170 MHz

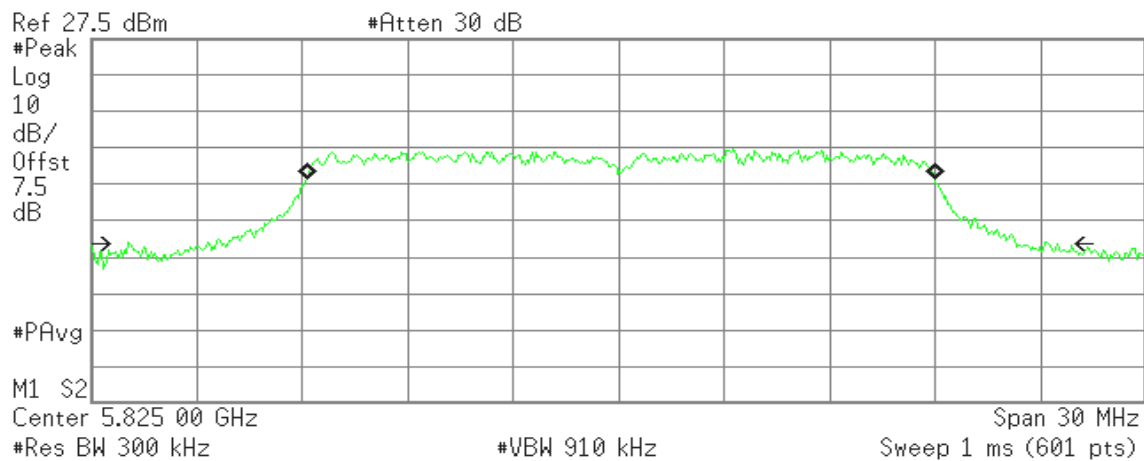
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 91.559 kHz  
x dB Bandwidth 25.382 MHz

## CH High

Agilent

R L



Occupied Bandwidth  
17.8572 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 54.611 kHz  
x dB Bandwidth 26.470 MHz

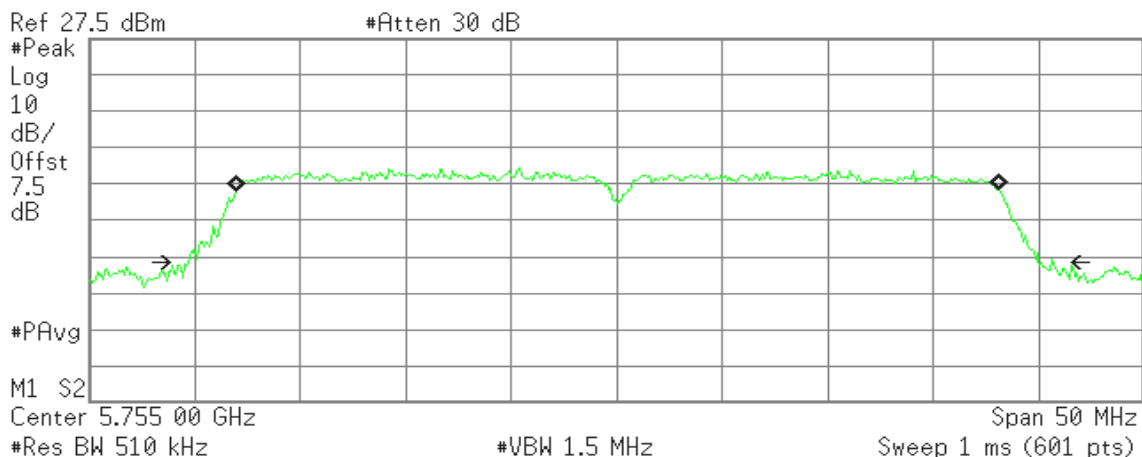


**IEEE 802.11n HT40 mode / 5755 ~ 5795MHz / Chain 0**

**CH Low**

Agilent

R L



Occupied Bandwidth  
36.0671 MHz

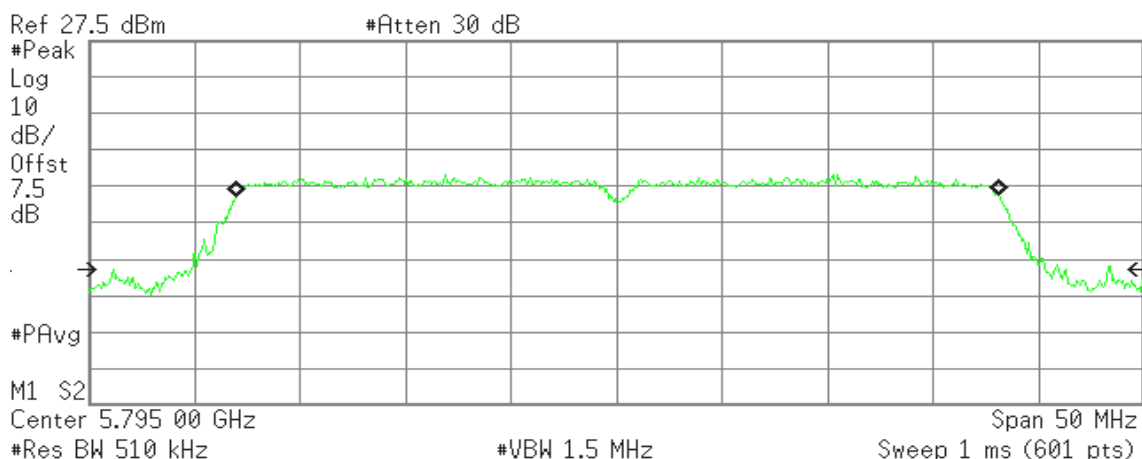
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 48.750 kHz  
x dB Bandwidth 41.059 MHz

**CH High**

Agilent

R L



Occupied Bandwidth  
36.0499 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 49.650 kHz  
x dB Bandwidth 47.277 MHz

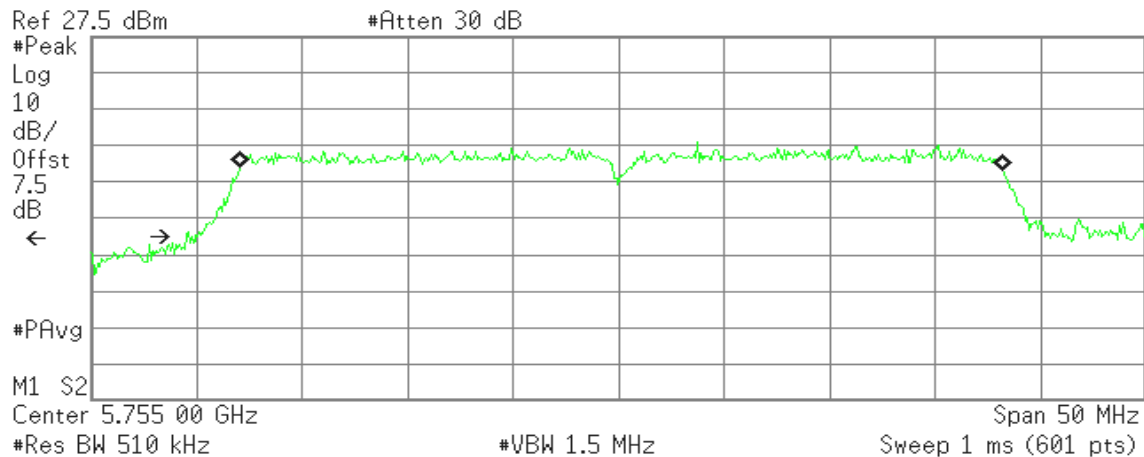


**IEEE 802.11n HT40 mode / 5755 ~ 5795MHz / Chain 1**

**CH Low**

Agilent

R L



Occupied Bandwidth  
36.1131 MHz

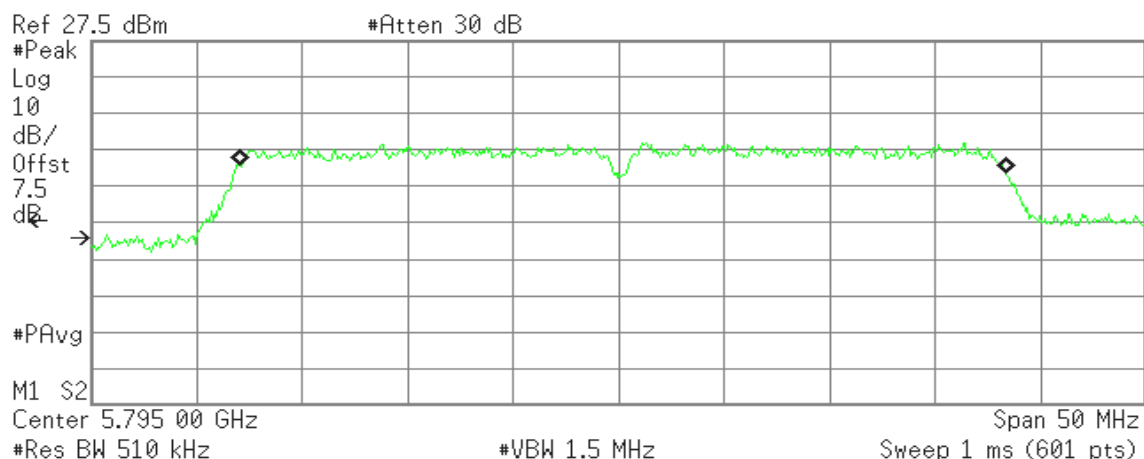
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 148.119 kHz  
x dB Bandwidth 45.486 MHz

**CH High**

Agilent

R L



Occupied Bandwidth  
36.2662 MHz

Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error 179.223 kHz  
x dB Bandwidth 49.289 MHz



## **7.2 MAXIMUM CONDUCTED OUTPUT POWER**

### **LIMIT**

#### **According to § 15.407(a)**

(1) For the band 5.15-5.25 GHz.

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



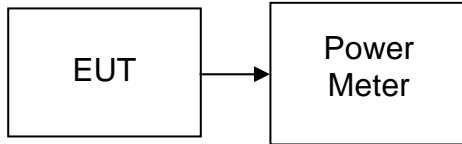
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm  $10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.





### **Test Configuration**

*The EUT was connected to a spectrum analyzer through a 50 $\Omega$  RF cable.*



### **TEST PROCEDURE**

Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz.

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to "free run". Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

### **TEST RESULTS**

*No non-compliance noted*

**Test Data****Test mode: IEEE 802.11a mode / 5150 ~ 5250MHz**

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	10.94	30.00
Mid	5220	11.97	30.00
High	5240	11.76	30.00

**Test mode: IEEE 802.11n HT20 mode / 5150 ~ 5250MHz**

Channel	Frequency (MHz)	Chain 0 Maximum Conducted Output Power (dBm)	Chain 1 Maximum Conducted Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5180	7.26	6.51	9.91	27.72
Mid	5220	8.13	6.76	10.51	27.72
High	5240	7.96	6.01	10.10	27.72

**Test mode: IEEE 802.11n HT40 mode / 5150 ~ 5250MHz**

Channel	Frequency (MHz)	Chain 0 Maximum Conducted Output Power (dBm)	Chain 1 Maximum Conducted Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5190	9.62	6.41	11.32	27.72
High	5230	10.23	6.67	11.82	27.72

**Remark:**

1. Total Output Power (w) = Chain 0 ( $10^{(\text{Output Power}/10)/1000}$ ) + Chain 1 ( $10^{(\text{Output Power}/10)/1000}$ )
2. The maximum antenna gain is 8.28dBi; therefore the reduction due to antenna gain is 2.28dBi, so the limit is 27.72dBm(0.5916W).

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

Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5745	12.63	30.00
Mid	5785	11.87	30.00
High	5825	11.72	30.00

**Test mode: IEEE 802.11n HT20 mode / 5745 ~ 5825MHz**

Channel	Frequency (MHz)	Chain 0 Maximum Conducted Output Power (dBm)	Chain 1 Maximum Conducted Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5745	10.34	11.12	13.76	27.72
Mid	5785	9.72	10.83	13.32	27.72
High	5825	9.73	10.56	13.18	27.72

**Test mode: IEEE 802.11n HT40 mode / 5755 ~ 5795MHz**

Channel	Frequency (MHz)	Chain 0 Maximum Conducted Output Power (dBm)	Chain 1 Maximum Conducted Output Power (dBm)	Total Maximum Conducted Output Power (dBm)	Limit (dBm)
Low	5755	9.72	10.93	13.38	27.72
High	5795	9.83	11.37	13.68	27.72

**Remark:**

1. Total Output Power (w) = Chain 0 ( $10^{(\text{Output Power} / 10) / 1000}$ ) + Chain 1 ( $10^{(\text{Output Power} / 10) / 1000}$ )
2. The maximum antenna gain is 8.28dBi; therefore the reduction due to antenna gain is 2.28dBi, so the limit is 27.72dBm(0.5916W).



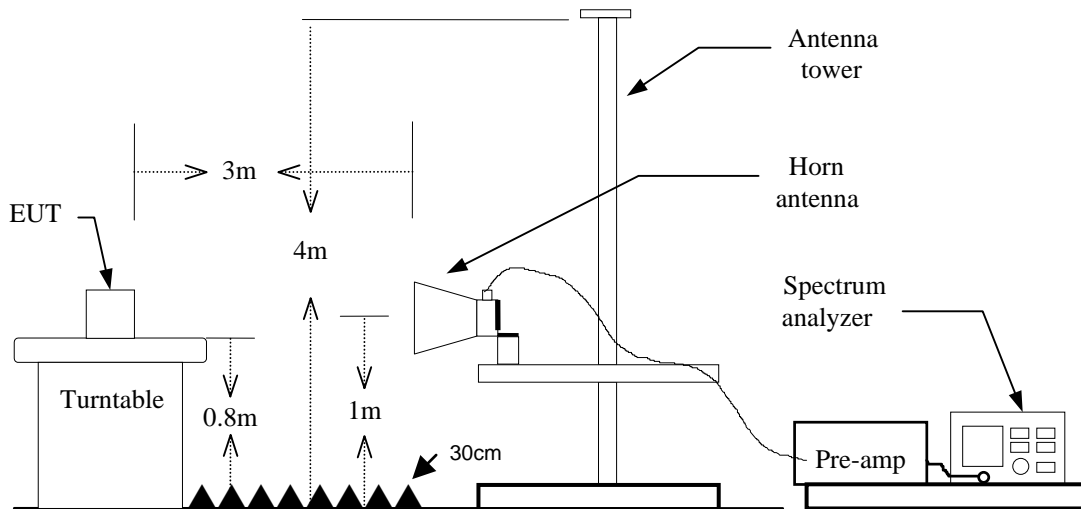
## 7.3 BAND EDGES MEASUREMENT

### 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.

### 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=1MHz / VBW=3MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=300Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

### TEST RESULTS

Refer to attach spectrum analyzer data chart.



IEEE 802.11a mode / 5150 ~ 5250MHz / CH Low

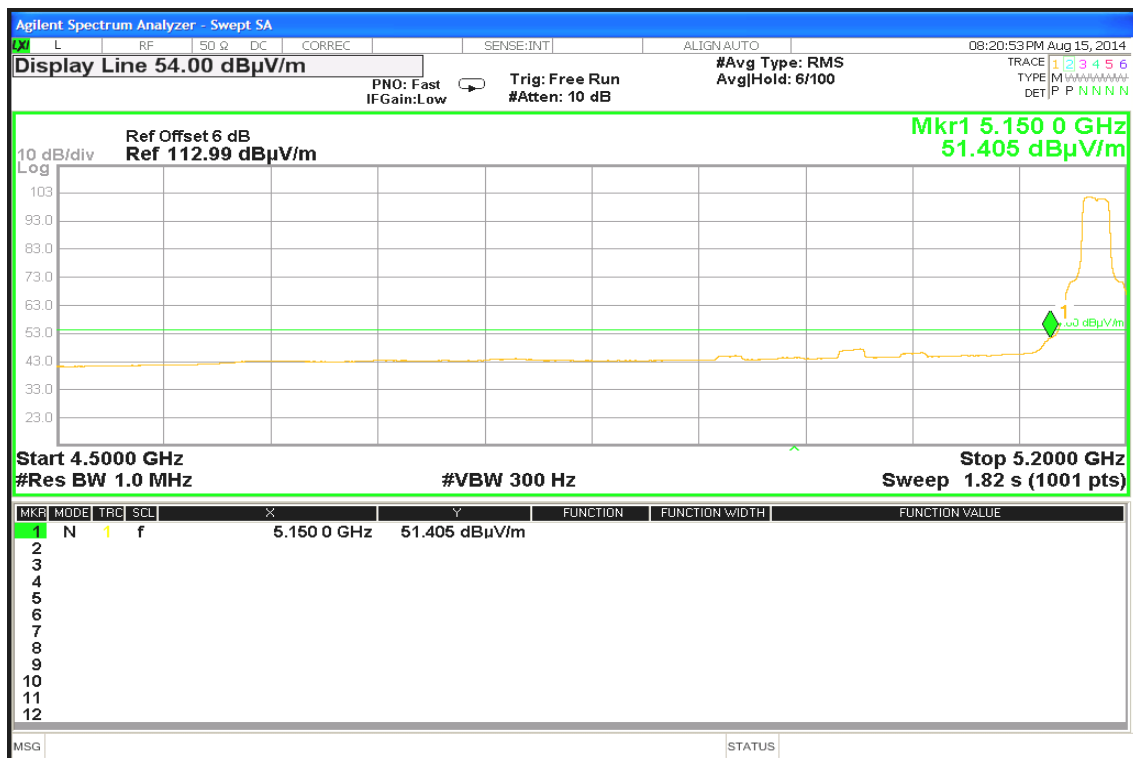
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical





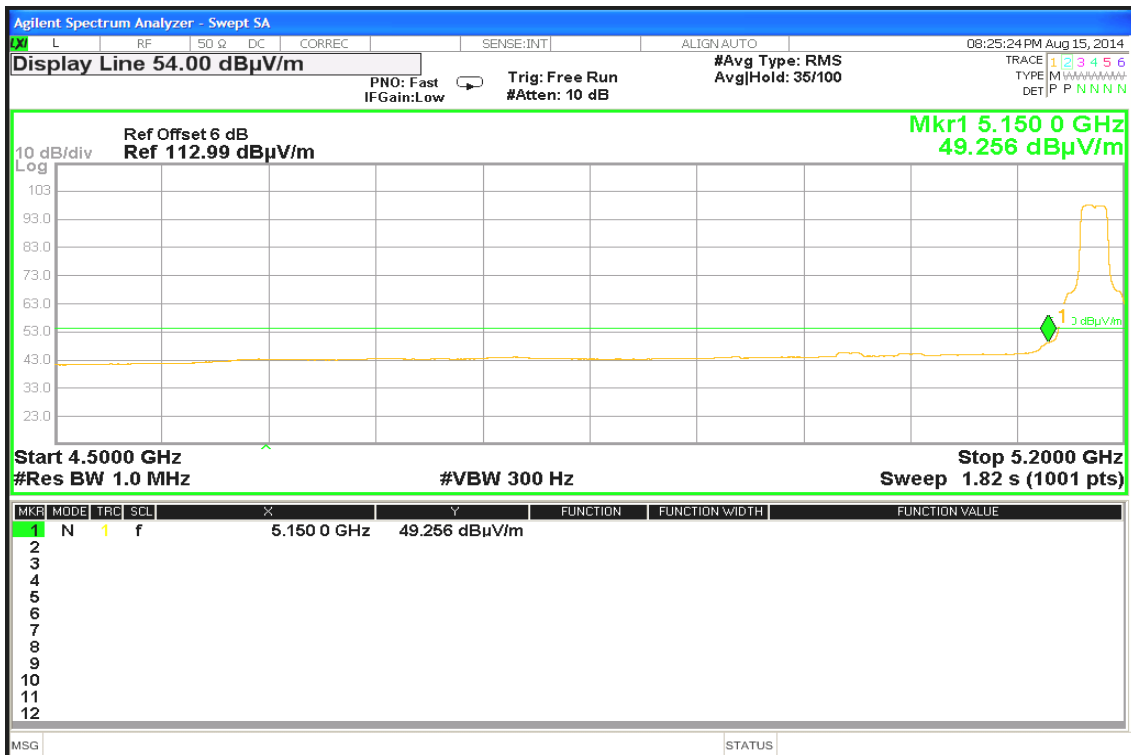
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

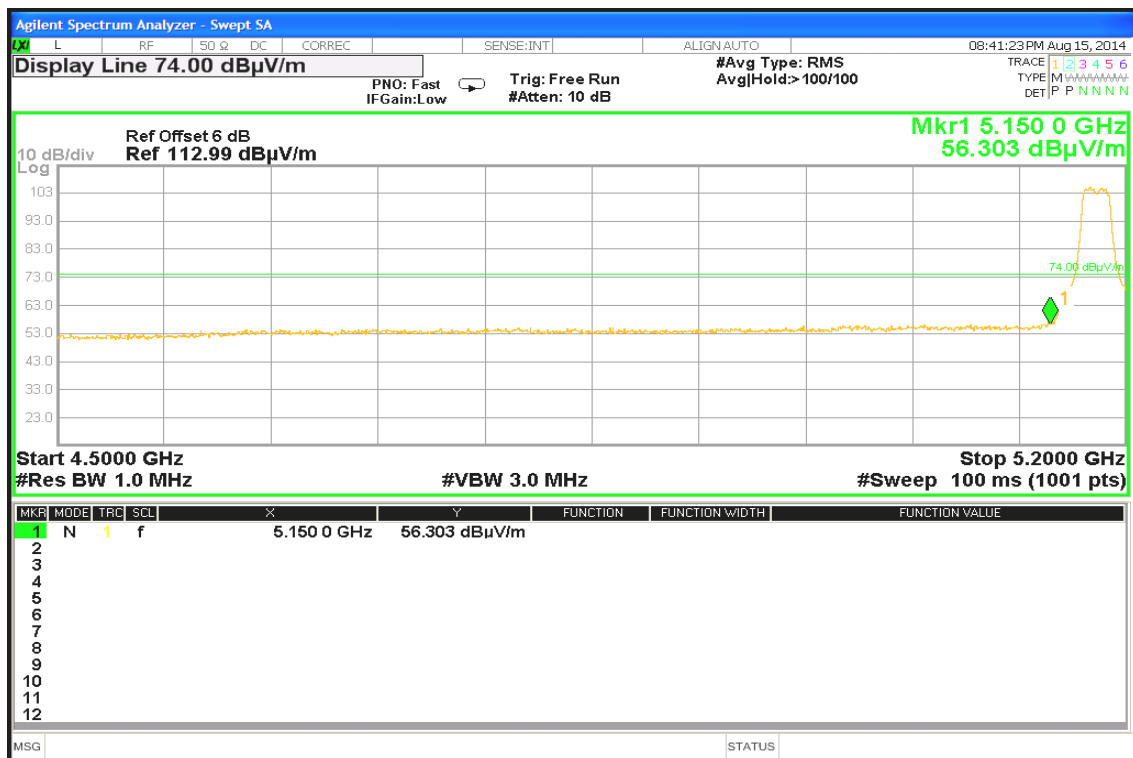




IEEE 802.11n HT20 mode / 5150 ~ 5250MHz / CH Low

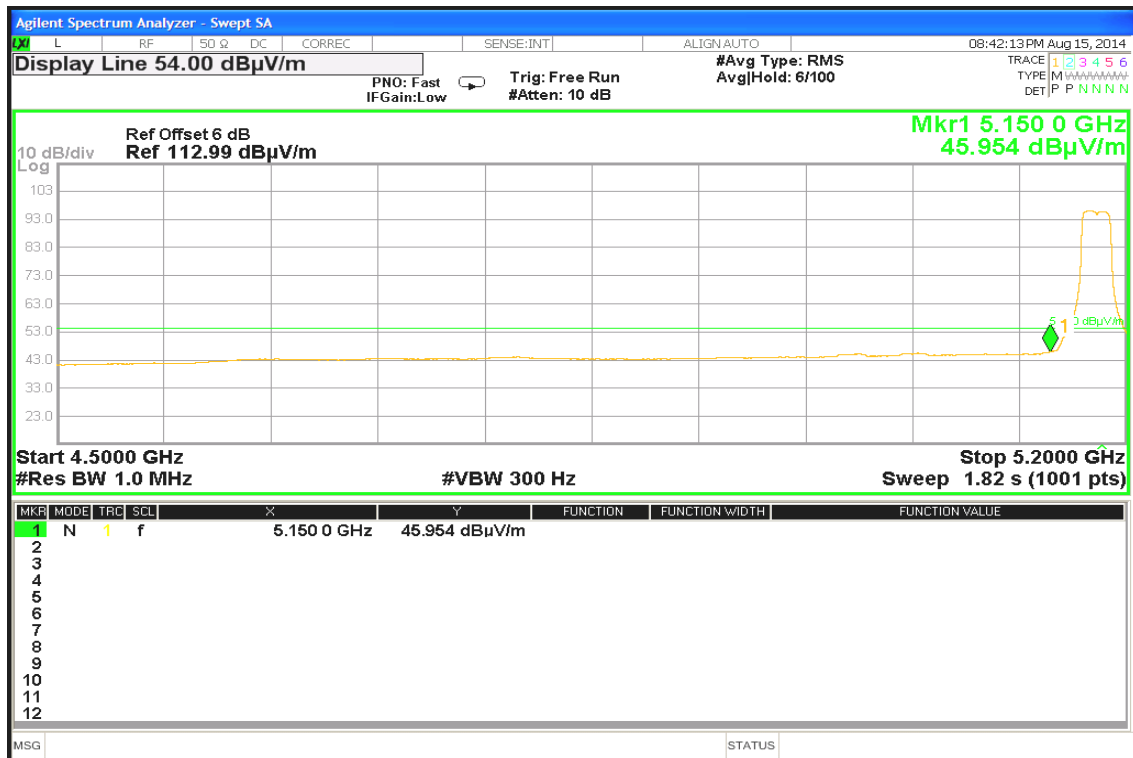
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical





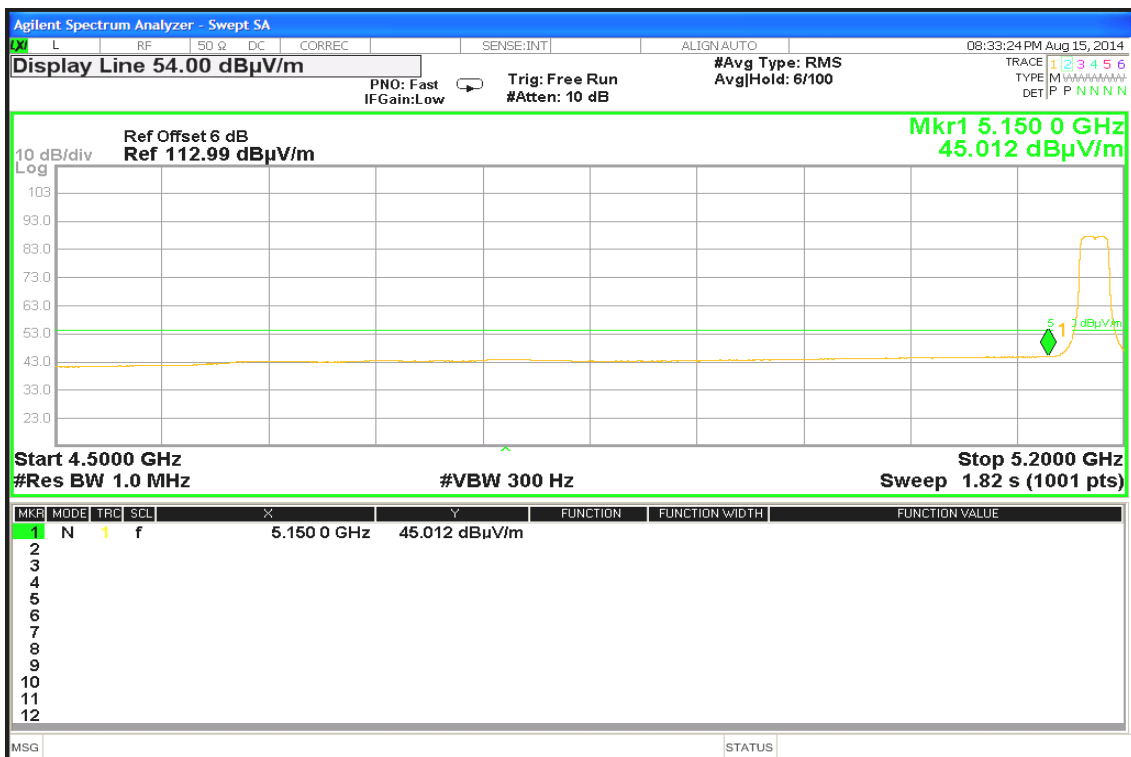
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal



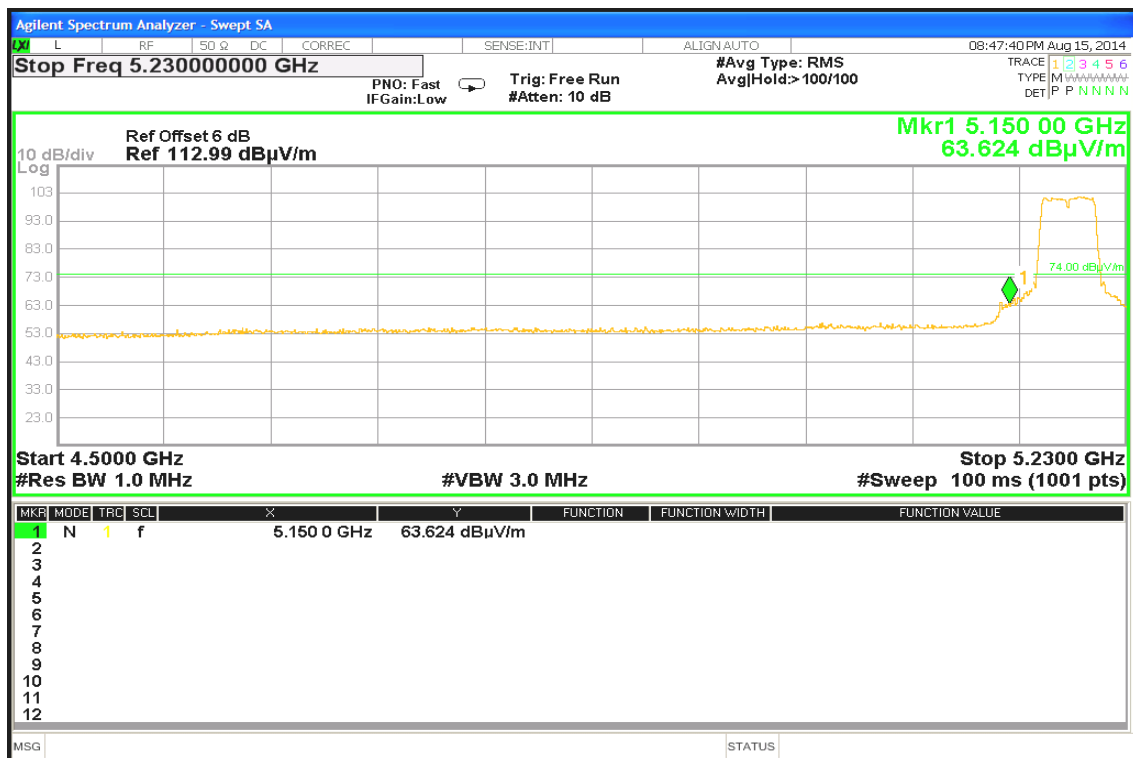




IEEE 802.11n HT40 mode / 5150 ~ 5250MHz / CH Low

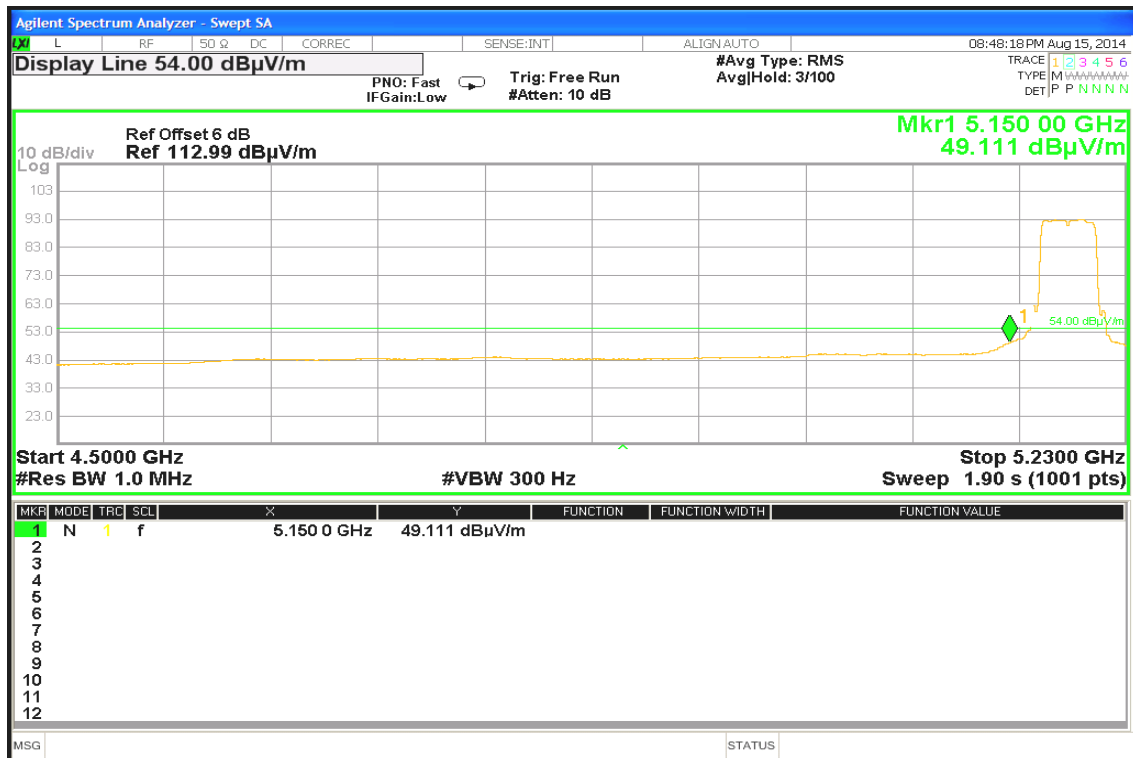
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

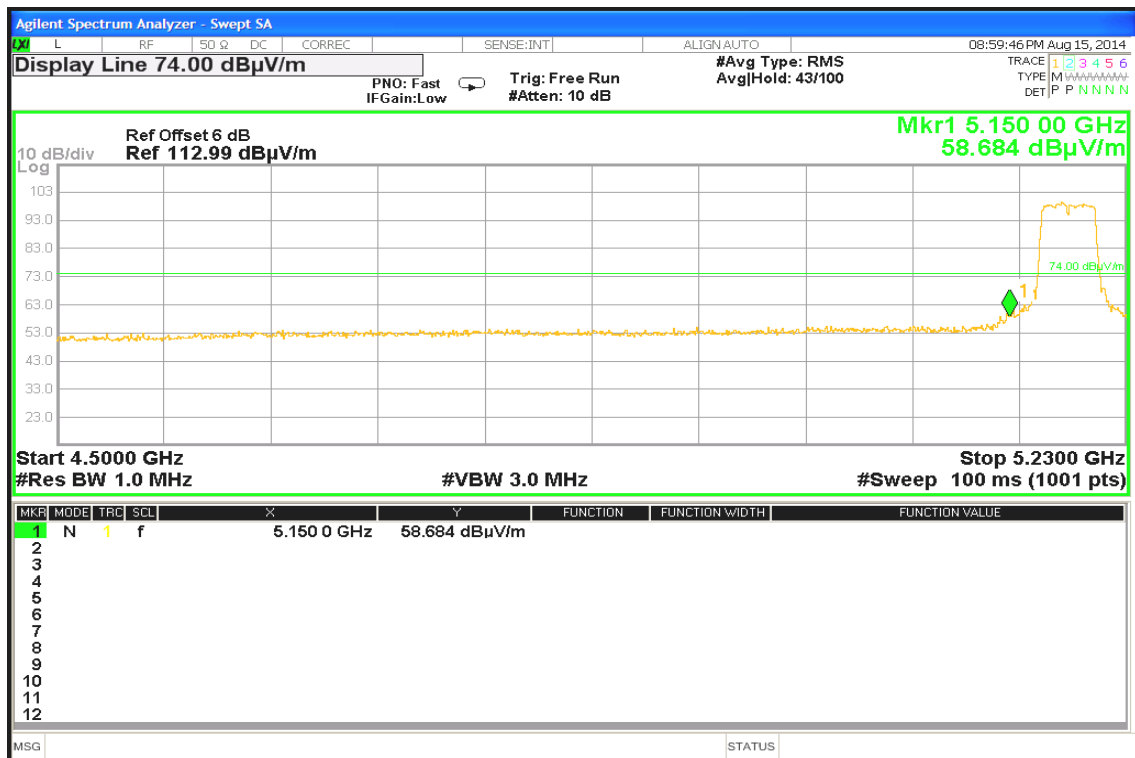
Polarity: Vertical





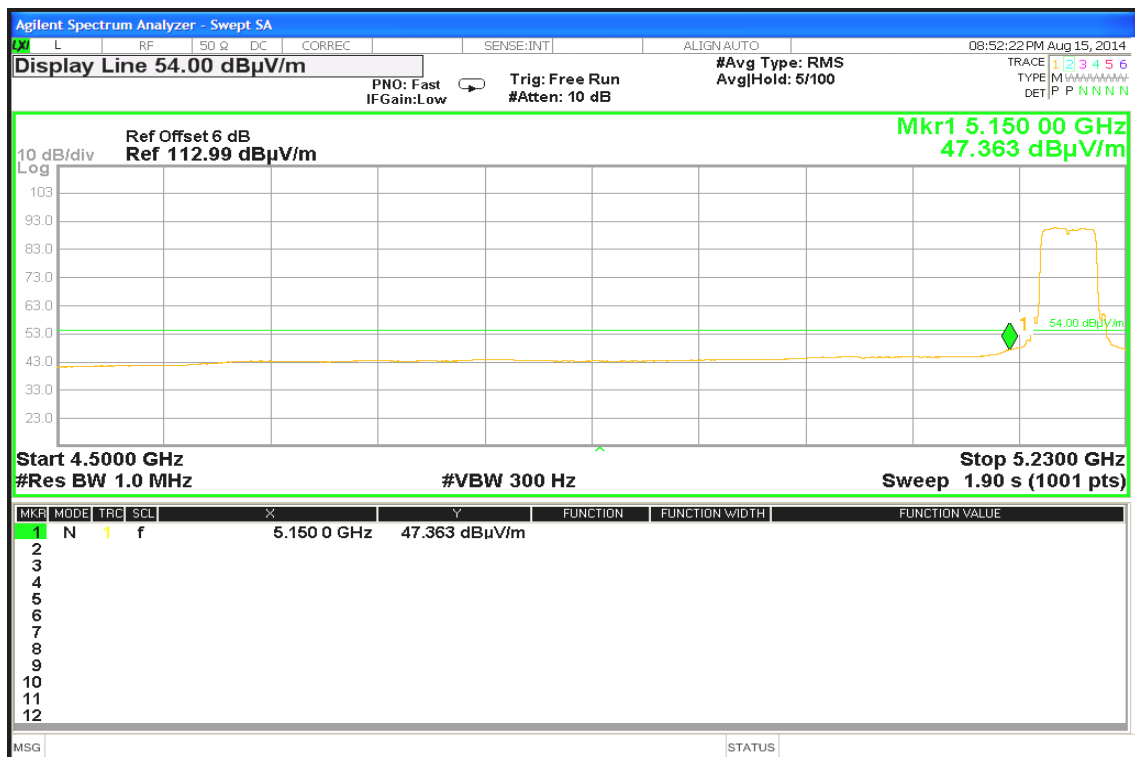
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal





## **7.4 PEAK POWER SPECTRAL DENSITY**

### **LIMIT**

#### **According to § 15.407(a)**

(1) For the band 5.15-5.25 GHz.

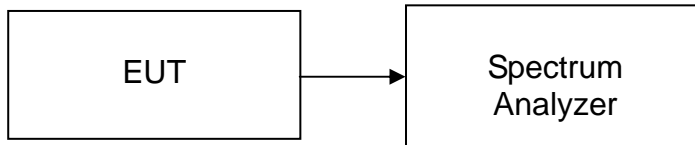
- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm  $10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, 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, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.



### **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 = 1MHz, VBW = 3MHz, 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*

**Test Data****Test mode: IEEE 802.11a mode / 5150 ~ 5250MHz**

Channel	Frequency (MHz)	PEAK POWER SPECTRAL DENSITY (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	8.92	11.00	-2.08	PASS
Mid	5220	9.02	11.00	-1.98	PASS
High	5240	8.9	11.00	-2.10	PASS

**Test mode: IEEE 802.11n HT20 mode / 5150 ~ 5250MHz**

Channel	Frequency (MHz)	PEAK POWER SPECTRAL DENSITY (Chain 0) (dB)	PEAK POWER SPECTRAL DENSITY (Chain 1) (dB)	PEAK POWER SPECTRAL DENSITY (Total) (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	5.21	5.62	8.43	8.72	-0.29	PASS
Mid	5220	5.55	3.38	7.61	8.72	-1.11	PASS
High	5240	5.62	2.96	7.50	8.72	-1.22	PASS

**Test mode: IEEE 802.11n HT40 mode / 5150 ~ 5250MHz**

Channel	Frequency (MHz)	PEAK POWER SPECTRAL DENSITY (Chain 0) (dB)	PEAK POWER SPECTRAL DENSITY (Chain 1) (dB)	PEAK POWER SPECTRAL DENSITY (Total) (dB)	Limit (dB)	Margin (dB)	Result
Low	5190	4.04	2.39	6.30	8.72	-2.42	PASS
High	5230	3.84	0.03	5.35	8.72	-3.37	PASS

**Remark:**

1. Total PPSD (dBm) =  $10 \cdot \log(10^{\text{Chain 0 PPSD} / 10} + 10^{\text{Chain 1 PPSD} / 10})$

2. The maximum antenna gain is 8.28dBi; therefore the reduction due to antenna gain is 2.28dBi, so the limit is 8.72dBm.

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

Channel	Frequency (MHz)	PEAK POWER SPECTRAL DENSITY	Limit (dB)	Margin (dB)	Result
Low	5745	6.19	11.00	-4.81	PASS
Mid	5785	3.49	11.00	-7.51	PASS
High	5825	5.4	11.00	-5.60	PASS

**Test mode: IEEE 802.11n HT20 mode / 5745 ~ 5825MHz /**

Channel	Frequency (MHz)	PEAK POWER SPECTRAL DENSITY (Chain 0) (dB)	PEAK POWER SPECTRAL DENSITY (Chain 1) (dB)	PEAK POWER SPECTRAL DENSITY (Total) (dB)	Limit (dB)	Margin (dB)	Result
Low	5745	3.26	5.48	7.52	8.72	-1.20	PASS
Mid	5785	2.87	5.69	7.52	8.72	-1.20	PASS
High	5825	1.58	5.66	7.09	8.72	-1.63	PASS

**Test mode: IEEE 802.11n HT40 mode / 5755 ~ 5795MHz**

Channel	Frequency (MHz)	PEAK POWER SPECTRAL DENSITY (Chain 0) (dB)	PEAK POWER SPECTRAL DENSITY (Chain 1) (dB)	PEAK POWER SPECTRAL DENSITY (Total) (dB)	Limit (dB)	Margin (dB)	Result
Low	5755	2.16	2.65	5.42	8.72	-3.30	PASS
High	5795	-0.02	2.24	4.27	8.72	-4.45	PASS

**Remark:**

1.  $Total\ PPSP\ (dBm) = 10 * LOG(10^{(Chain\ 0\ PPSP / 10)} + 10^{(Chain\ 1\ PPSP / 10)})$

2. The maximum antenna gain is 8.28dBi; therefore the reduction due to antenna gain is 2.28dBi, so the limit is 8.72dBm.



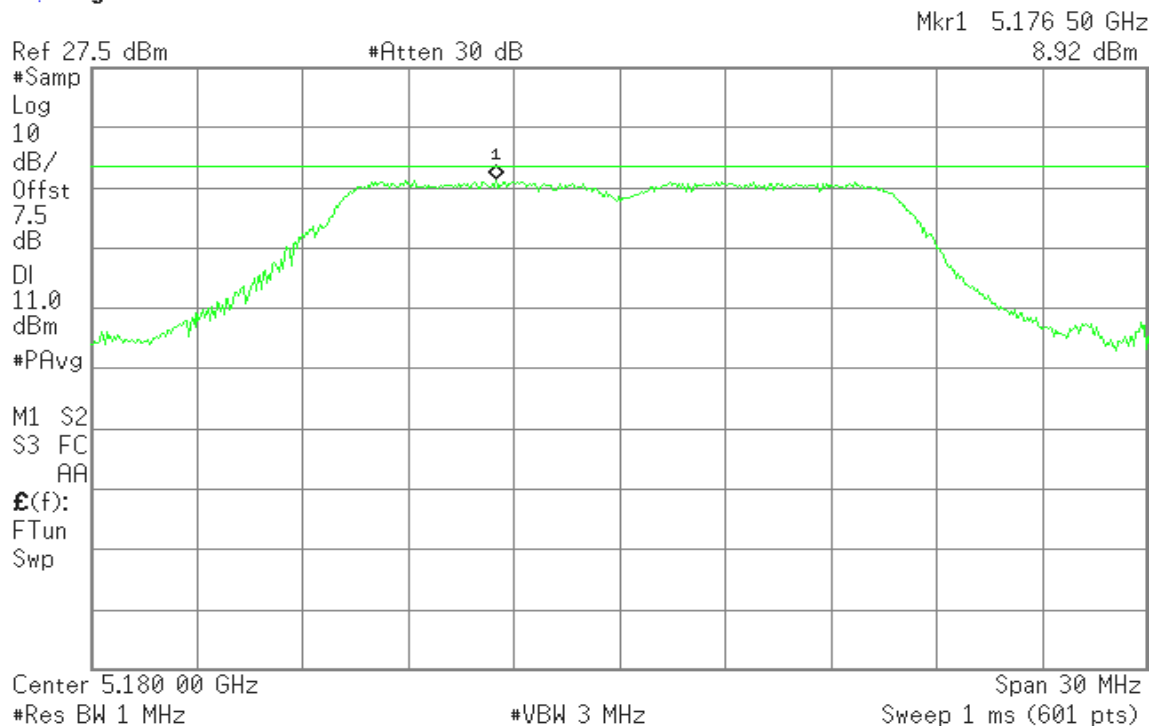
## Test Plot

### IEEE 802.11a mode / 5180-5240MHz

#### CH Low

Agilent

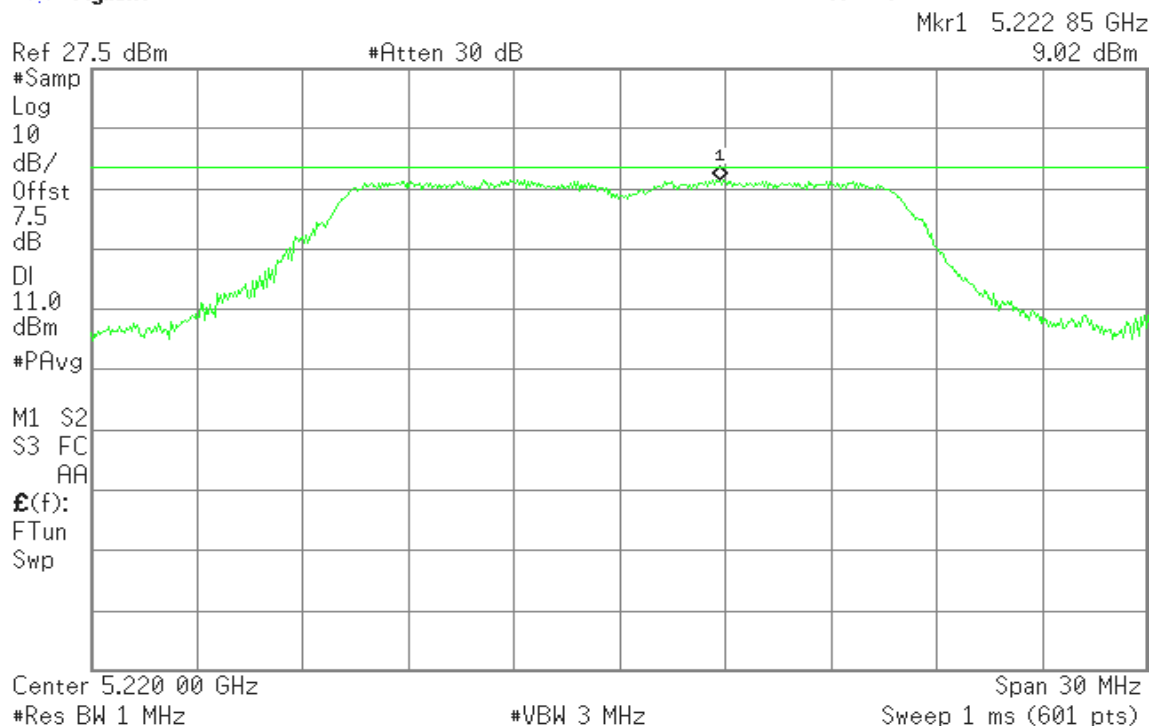
R L



#### CH Mid

Agilent

R T



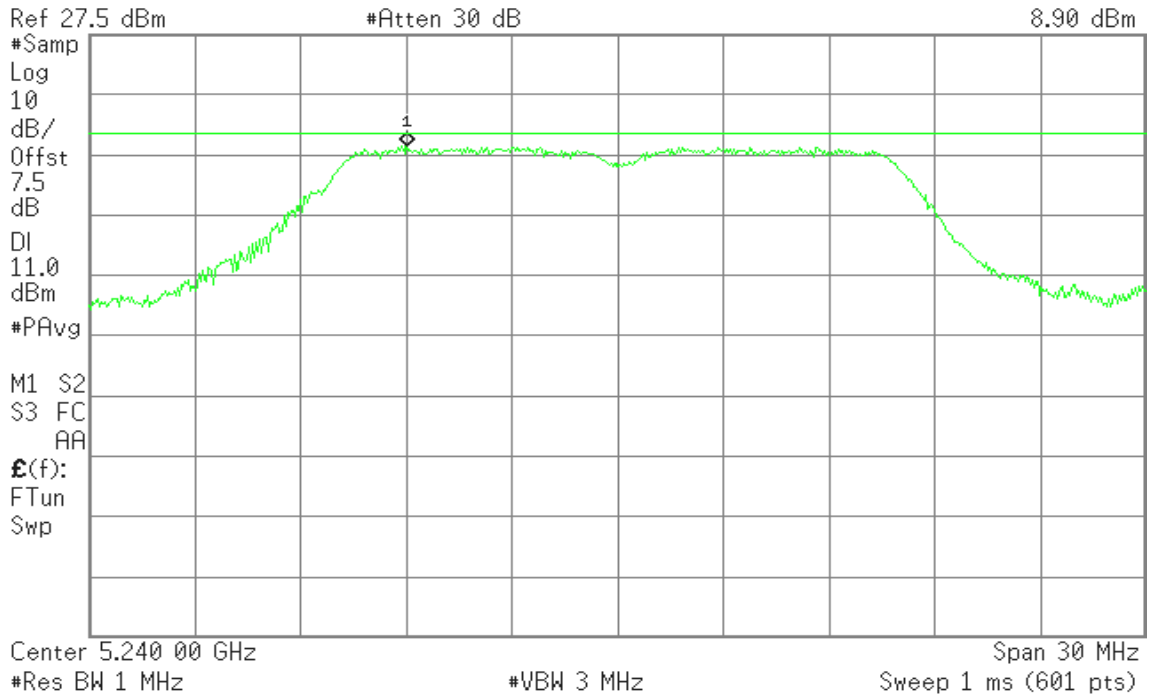




## CH High

Agilent

R L

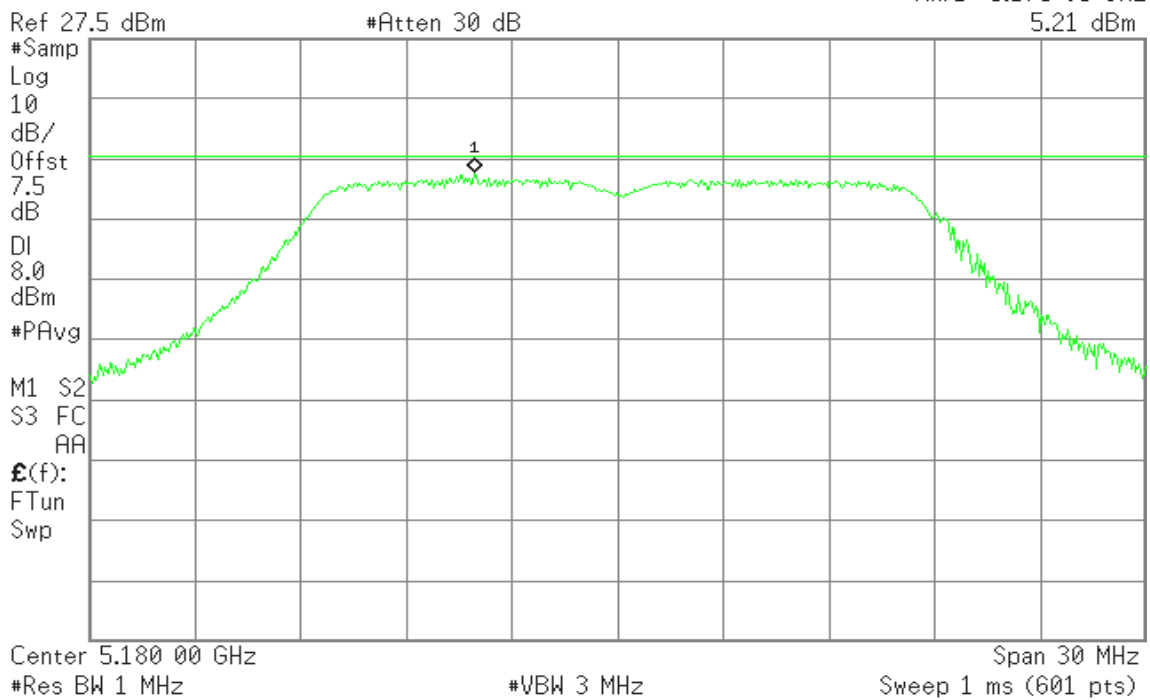


## IEEE 802.11n HT20 mode / 5180-5240MHz / Chain 0

### CH Low

Agilent

R L





## CH Mid

Agilent

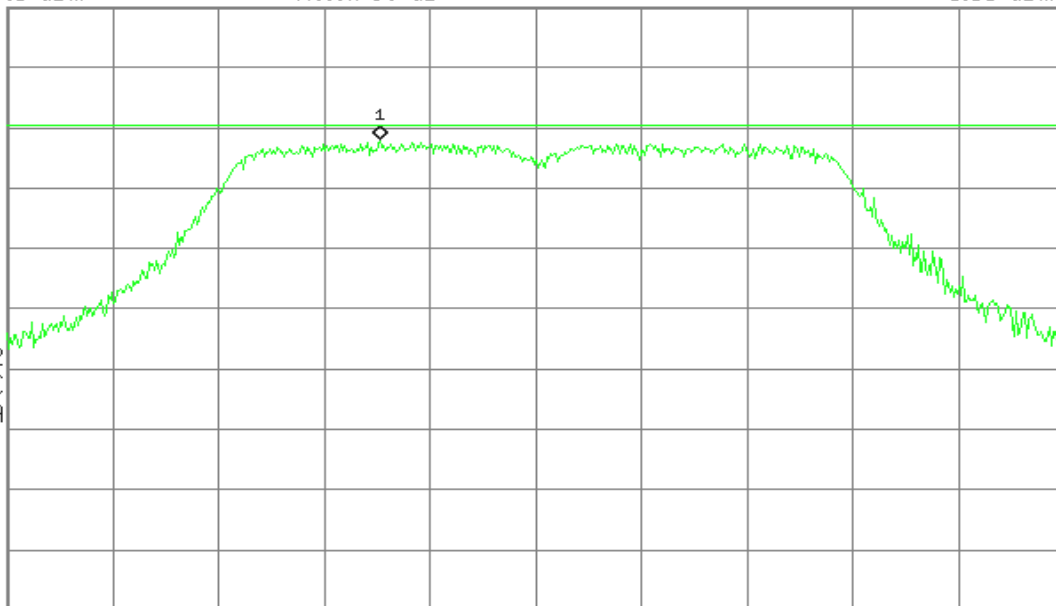
R L

Mkr1 5.215 60 GHz  
5.55 dBm

Ref 27.5 dBm

#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB  
DI  
8.0  
dBm  
#PAvg  
M1 S2  
S3 FC  
AA  
£(f):  
FTun  
Swp



Center 5.220 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

Span 30 MHz  
Sweep 1 ms (601 pts)

## CH High

Agilent

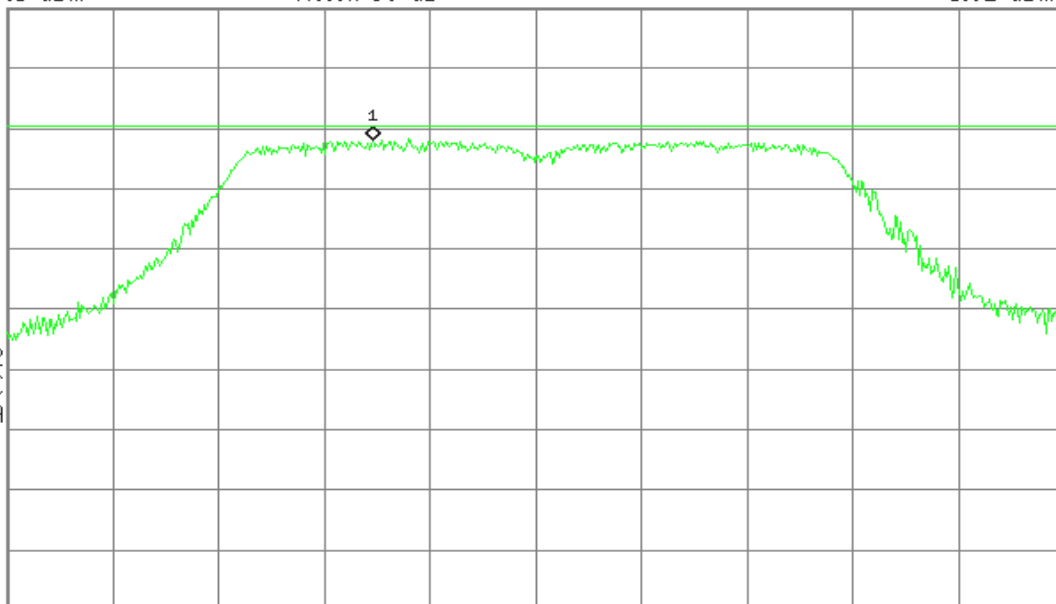
R L

Mkr1 5.235 40 GHz  
5.62 dBm

Ref 27.5 dBm

#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB  
DI  
8.0  
dBm  
#PAvg  
M1 S2  
S3 FC  
AA  
£(f):  
FTun  
Swp



Center 5.240 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

Span 30 MHz  
Sweep 1 ms (601 pts)

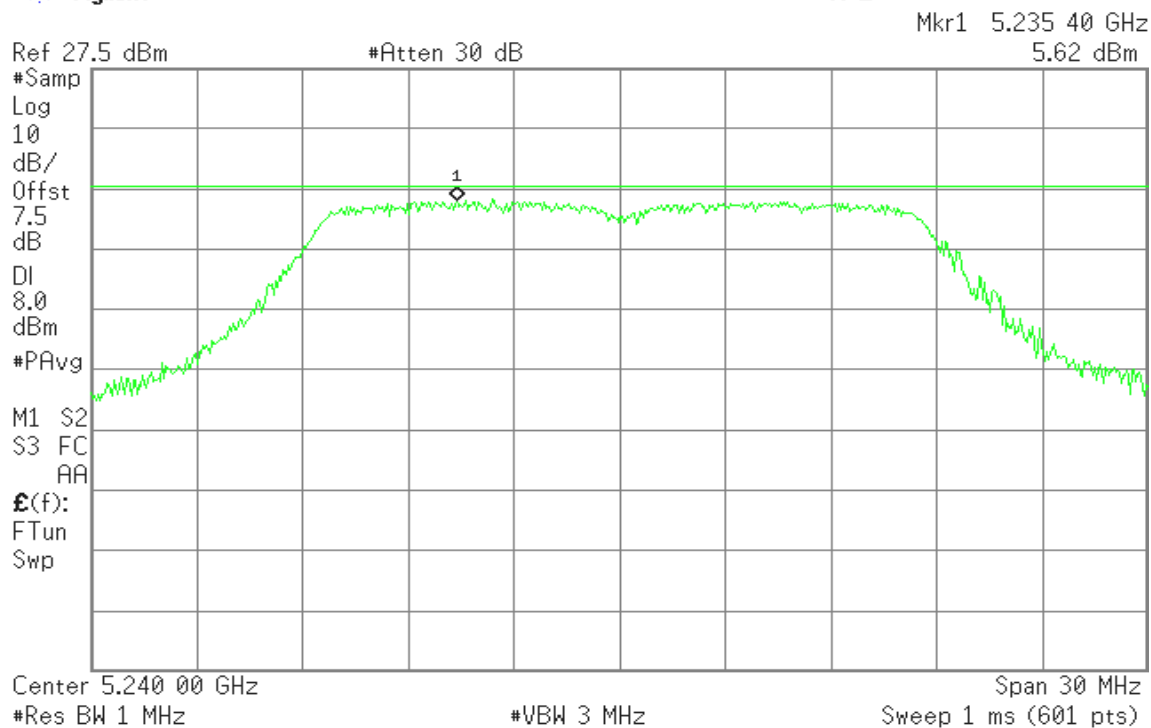


**IEEE 802.11n HT20 mode / 5180-5240MHz / Chain 1**

**CH Low**

Agilent

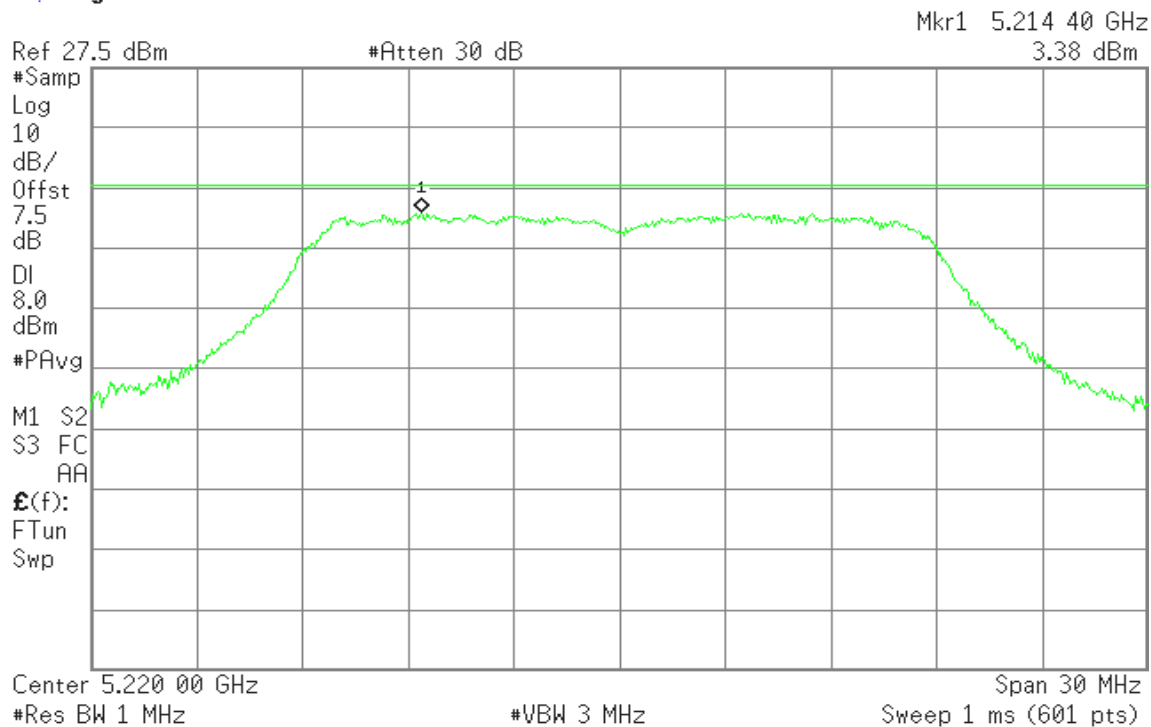
R L



**CH Mid**

Agilent

R L



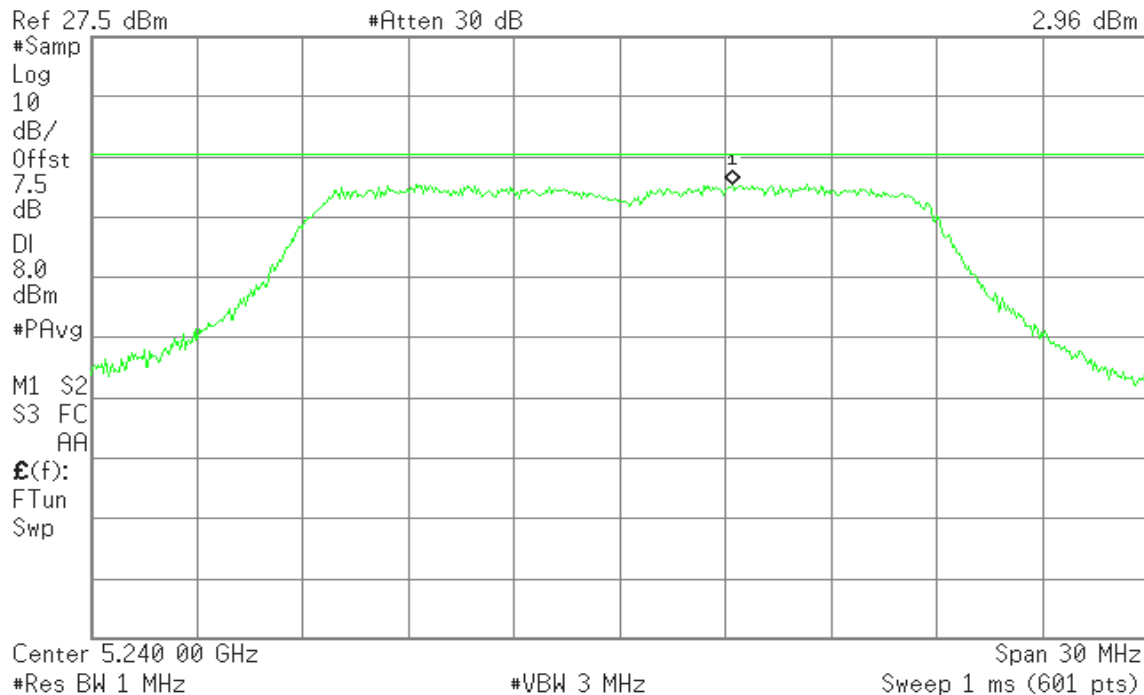


## CH High

Agilent

R L

Mkr1 5.243 20 GHz  
2.96 dBm



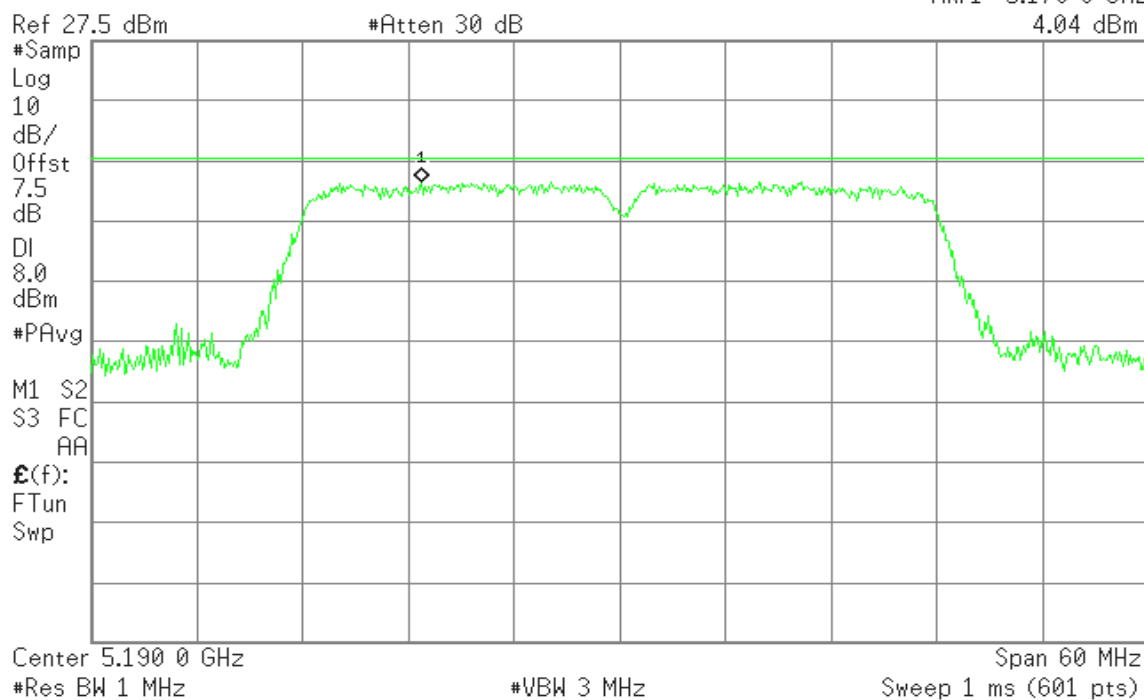
## IEEE 802.11n HT40 mode / 5190-5230MHz / Chain 0

### CH Low

Agilent

R T

Mkr1 5.178 8 GHz  
4.04 dBm





## CH High



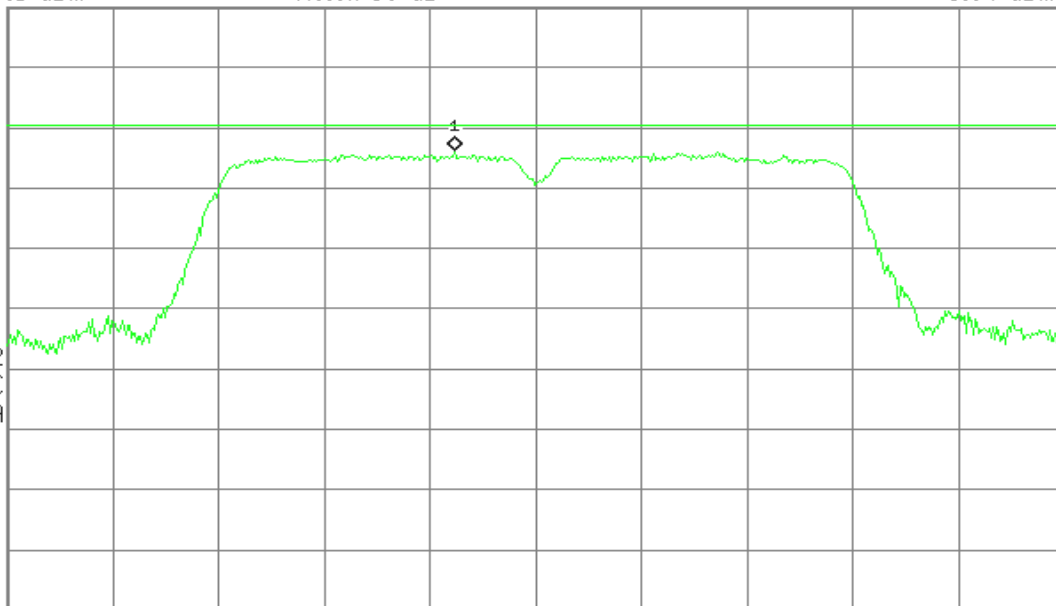
R T

Mkr1 5.225 4 GHz  
3.84 dBm

Ref 27.5 dBm

#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB  
DI  
8.0  
dBm  
#PAvg  
M1 S2  
S3 FC  
AA  
£(f):  
FTun  
Swp



Center 5.230 0 GHz

#Res BW 1 MHz

#VBW 3 MHz

Span 60 MHz  
Sweep 1 ms (601 pts)

## IEEE 802.11n HT40 mode / 5190-5230MHz / Chain 1

### CH Low



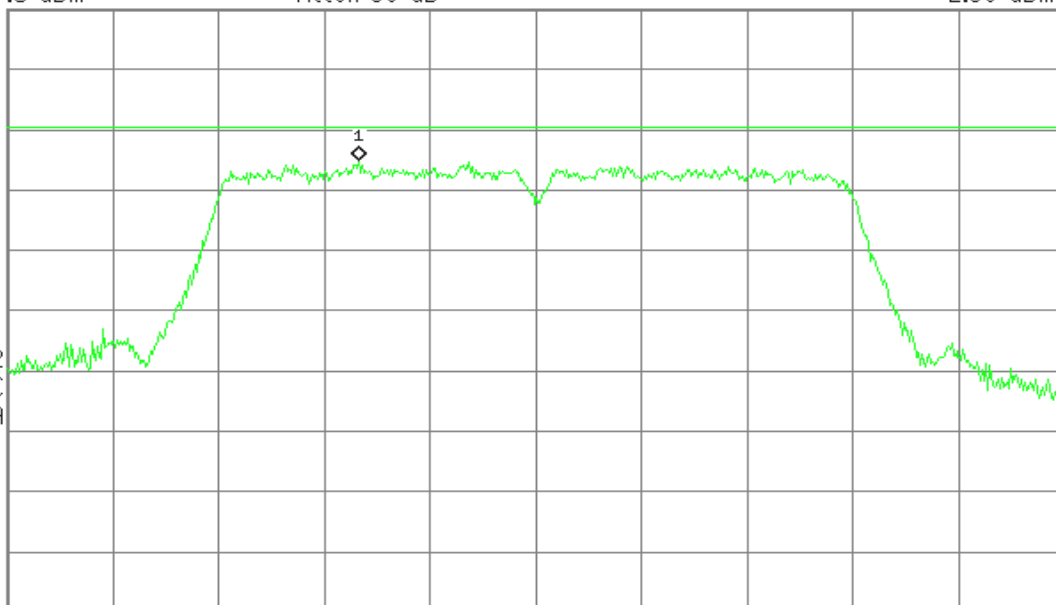
R T

Mkr1 5.180 0 GHz  
2.39 dBm

Ref 27.5 dBm

#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB  
DI  
8.0  
dBm  
#PAvg  
M1 S2  
S3 FC  
AA  
£(f):  
FTun  
Swp



Center 5.190 0 GHz

#Res BW 1 MHz

#VBW 3 MHz

Span 60 MHz  
Sweep 1 ms (601 pts)



## CH High

Agilent

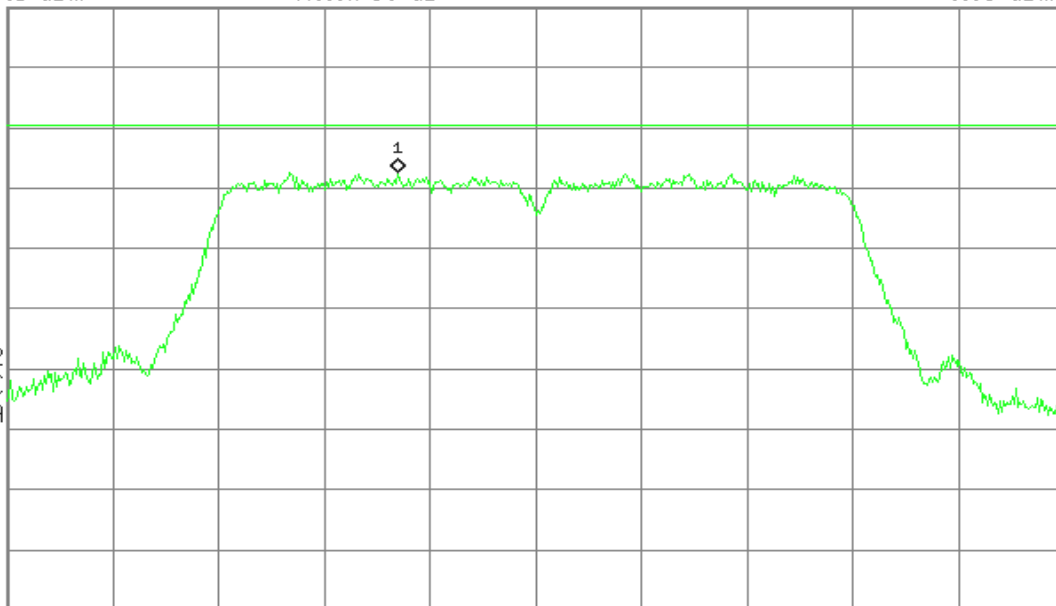
R T

Mkr1 5.222 2 GHz  
0.03 dBm

Ref 27.5 dBm

#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB  
DI  
8.0  
dBm  
#PAvg  
M1 S2  
S3 FC  
AA  
£(f):  
FTun  
Swp



Center 5.230 0 GHz

#Res BW 1 MHz

#VBW 3 MHz

Span 60 MHz  
Sweep 1 ms (601 pts)

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

## CH Low

Agilent

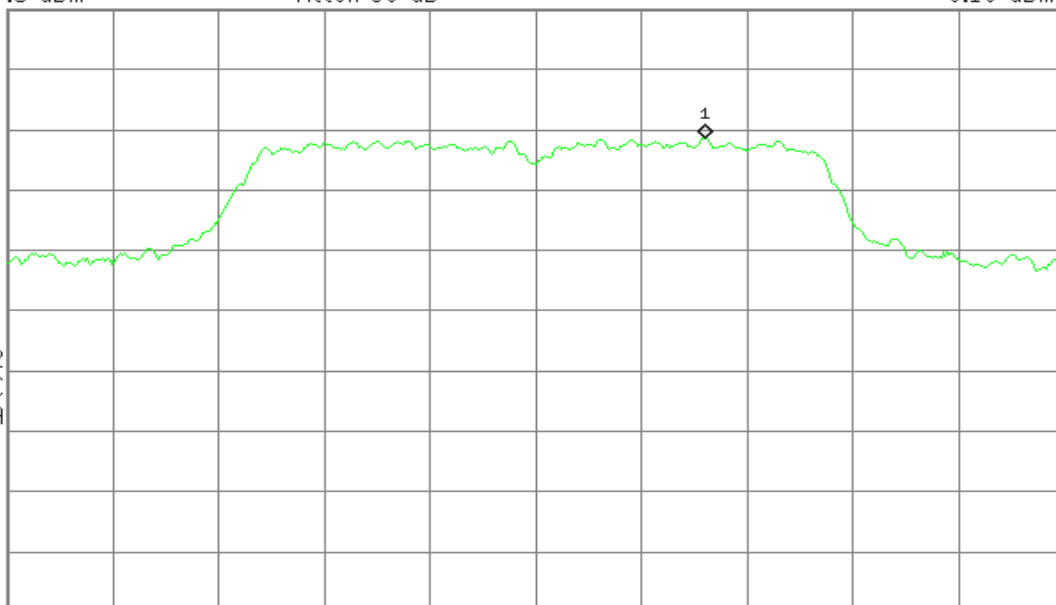
R T

Mkr1 5.749 80 GHz  
6.19 dBm

Ref 27.5 dBm

#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB  
#PAvg  
M1 S2  
S3 FC  
AA  
£(f):  
FTun  
Swp



Center 5.745 00 GHz

#Res BW 510 kHz

#VBW 1.5 MHz

Span 30 MHz  
Sweep 1 ms (601 pts)



## CH Mid

Agilent

R T

Mkr1 5.781 35 GHz  
3.49 dBm

Ref 27.5 dBm

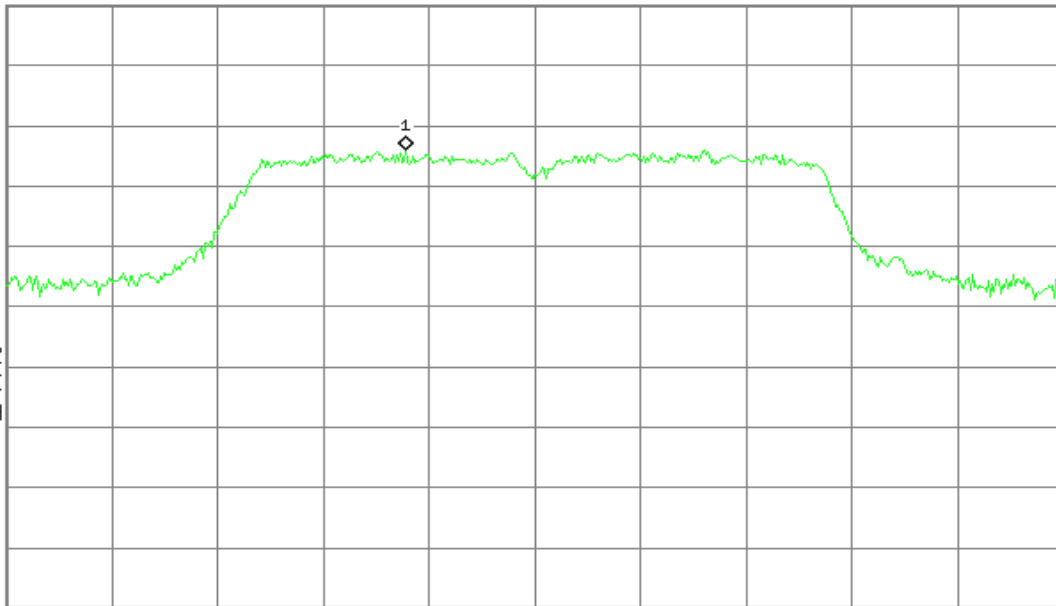
#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB

#PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.785 00 GHz

Span 30 MHz

#Res BW 510 kHz

#VBW 1.5 MHz

Sweep 1 ms (601 pts)

## CH High

Agilent

R T

Mkr1 5.829 75 GHz  
5.40 dBm

Ref 27.5 dBm

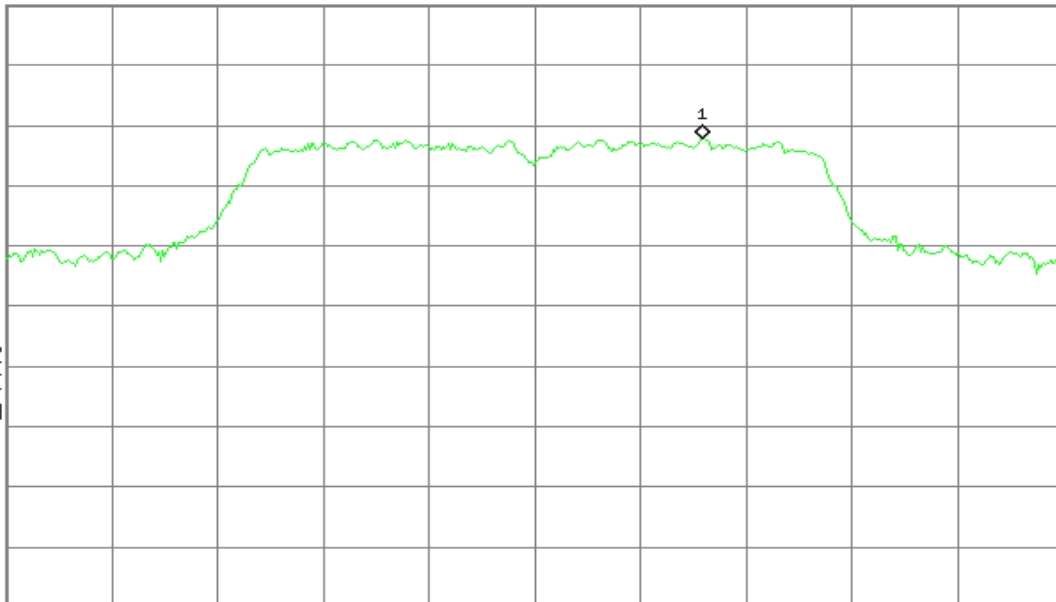
#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB

#PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.825 00 GHz

Span 30 MHz

#Res BW 510 kHz

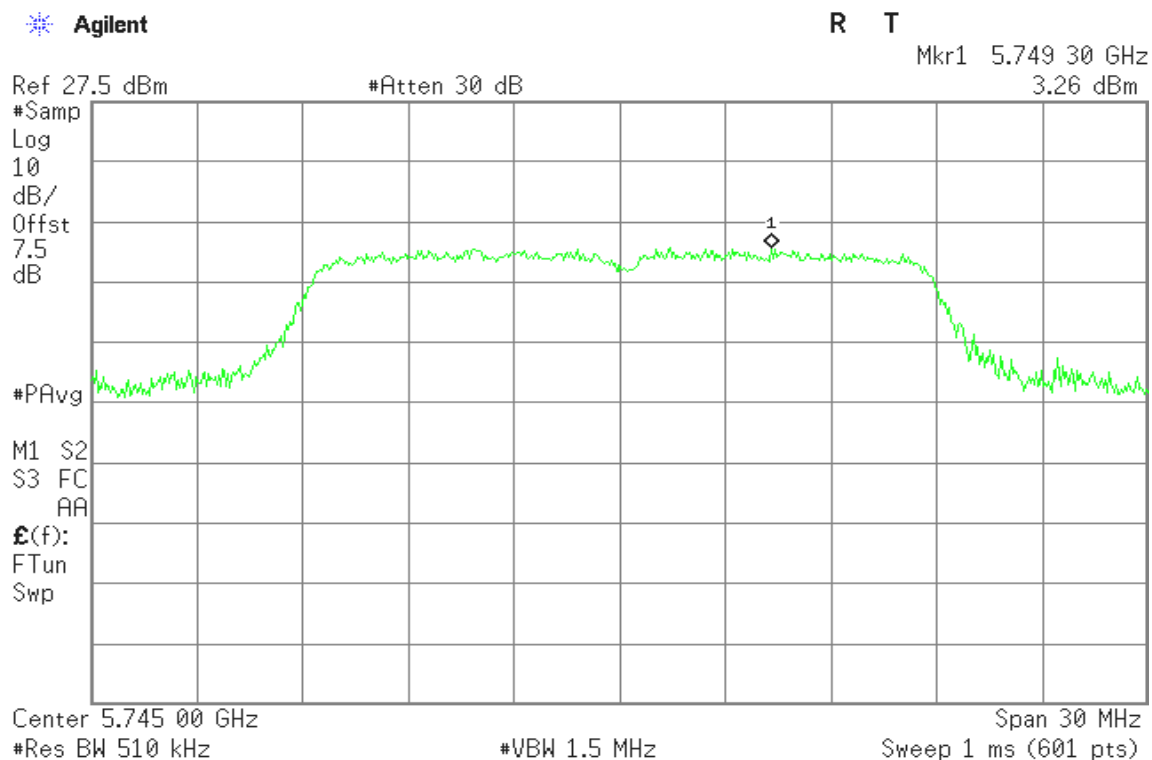
#VBW 1.5 MHz

Sweep 1 ms (601 pts)

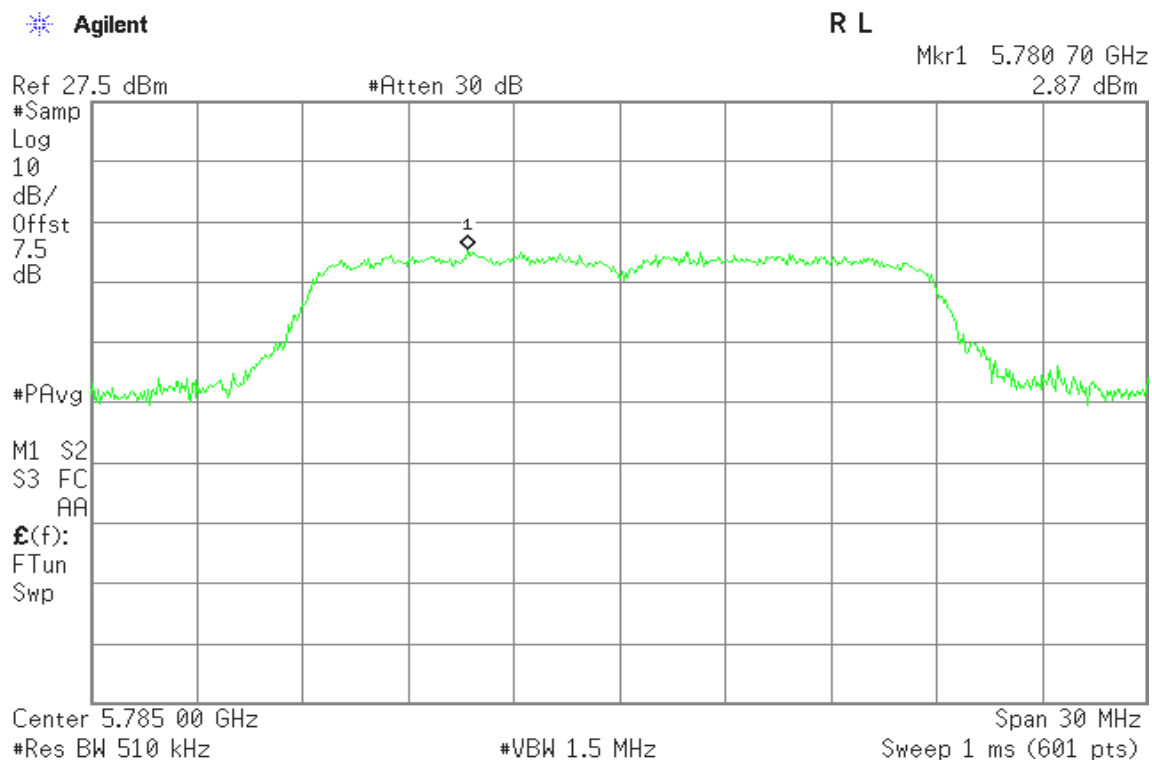


**Test mode: IEEE 802.11n HT20 mode / 5745 ~ 5825MHz / Chain 0**

**CH Low**



**CH Mid**







## CH High

Agilent

R T

Mkr1 5.821 05 GHz  
1.58 dBm

Ref 27.5 dBm

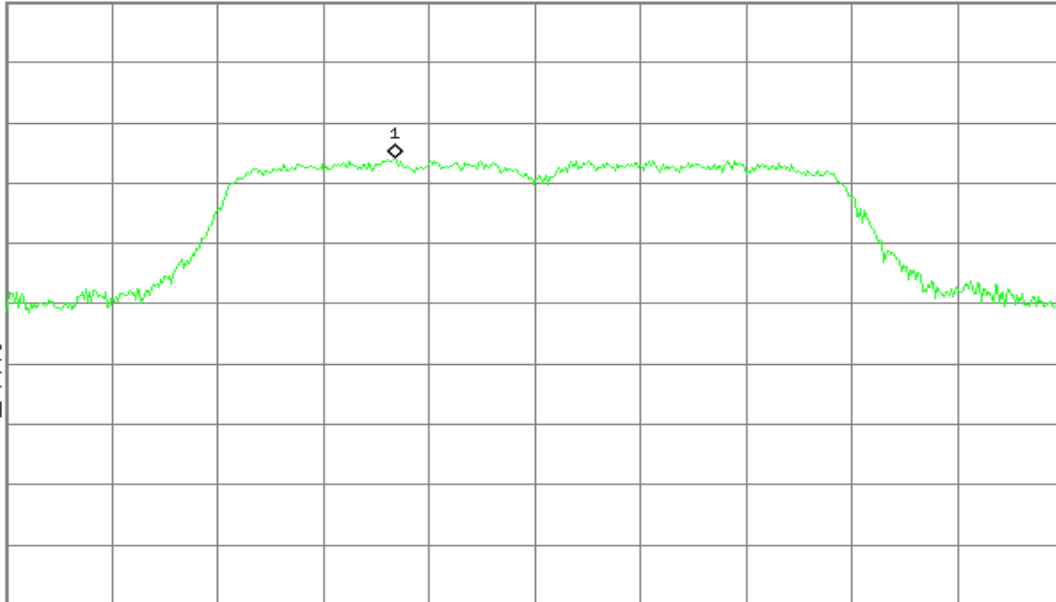
#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB

#PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.825 00 GHz

#Res BW 510 kHz

#VBW 1.5 MHz

Span 30 MHz  
Sweep 1 ms (601 pts)

## Test mode: IEEE 802.11n HT20 mode / 5745 ~ 5825MHz / Chain 1

## CH Low

Agilent

R L

Mkr1 5.748 15 GHz  
5.48 dBm

Ref 27.5 dBm

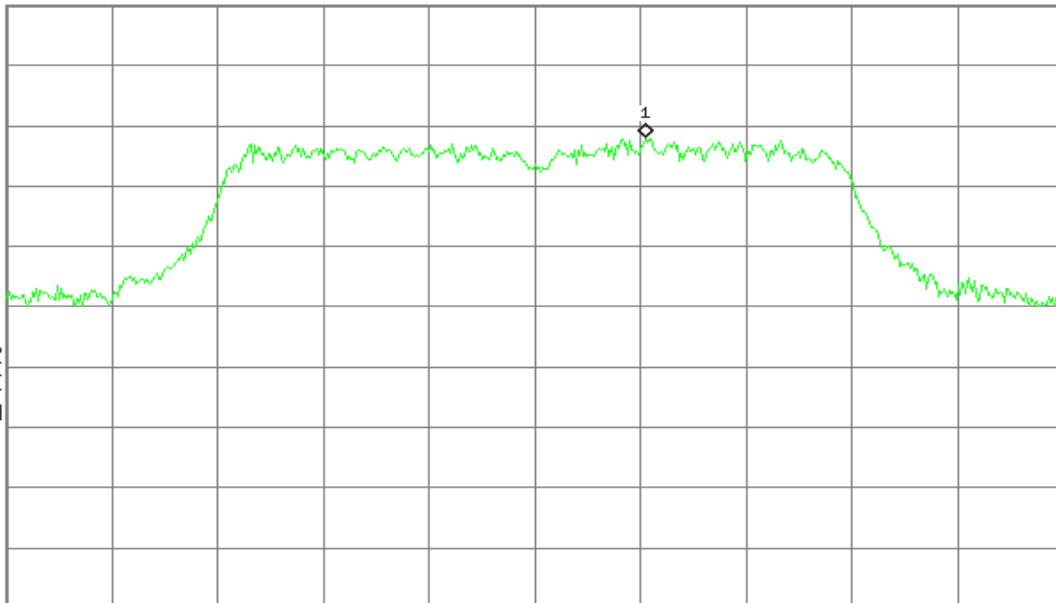
#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB

#PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.745 00 GHz

#Res BW 510 kHz

#VBW 1.5 MHz

Span 30 MHz  
Sweep 1 ms (601 pts)



## CH Mid

Agilent

R T

Mkr1 5.787 45 GHz  
5.69 dBm

Ref 27.5 dBm

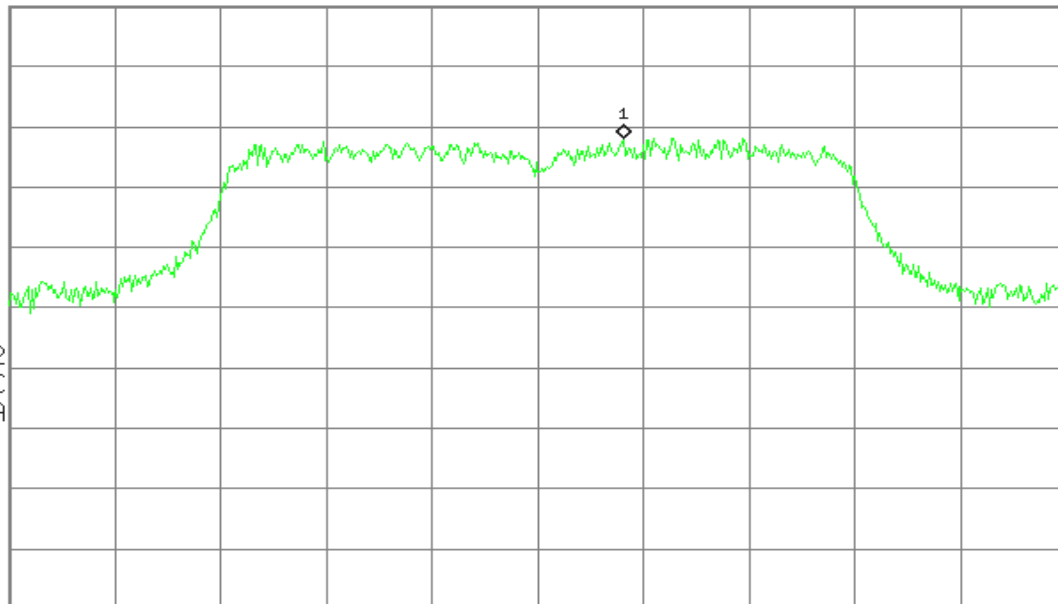
#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB

#PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.785 00 GHz

#Res BW 510 kHz

#VBW 1.5 MHz

Span 30 MHz  
Sweep 1 ms (601 pts)

## CH High

Agilent

R T

Mkr1 5.827 55 GHz  
5.66 dBm

Ref 27.5 dBm

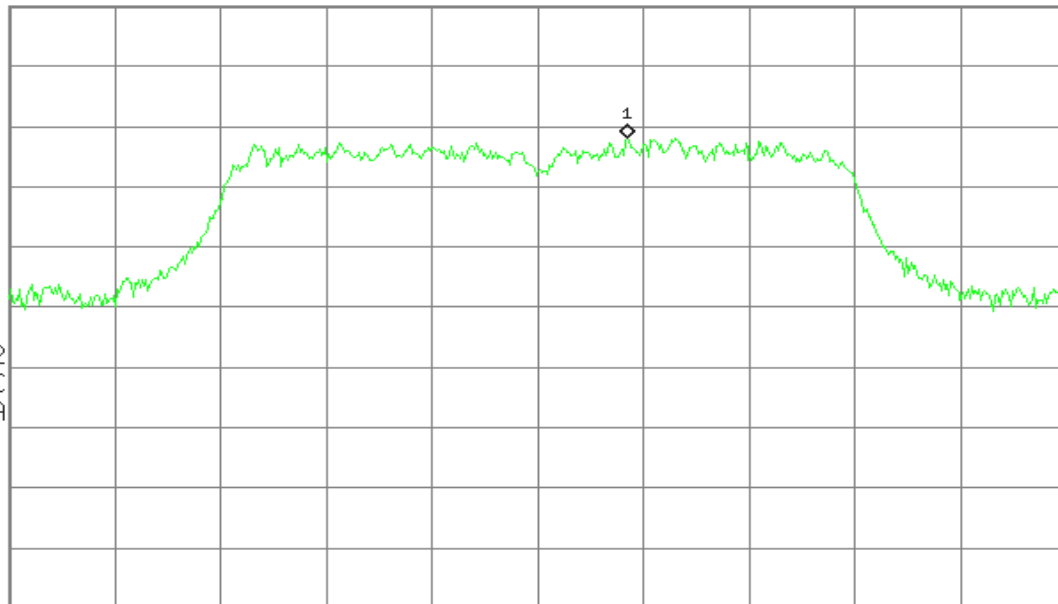
#Atten 30 dB

#Samp  
Log  
10  
dB/  
Offst  
7.5  
dB

#PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.825 00 GHz

#Res BW 510 kHz

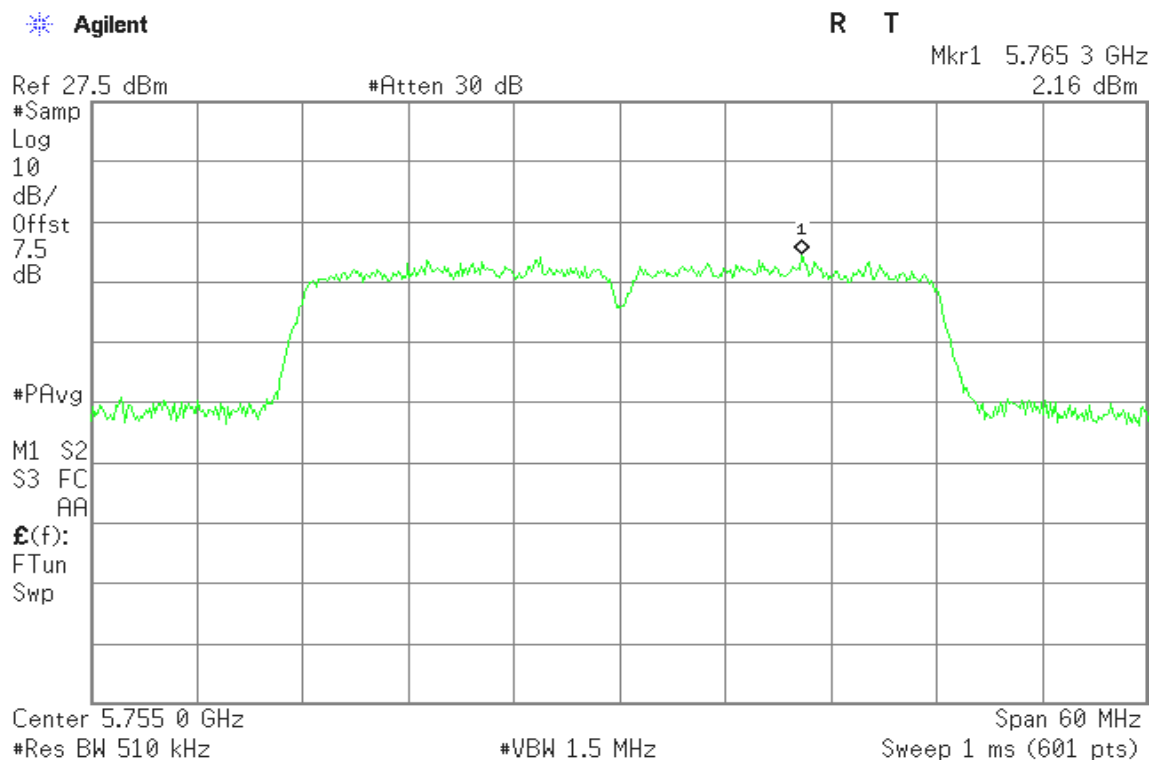
#VBW 1.5 MHz

Span 30 MHz  
Sweep 1 ms (601 pts)

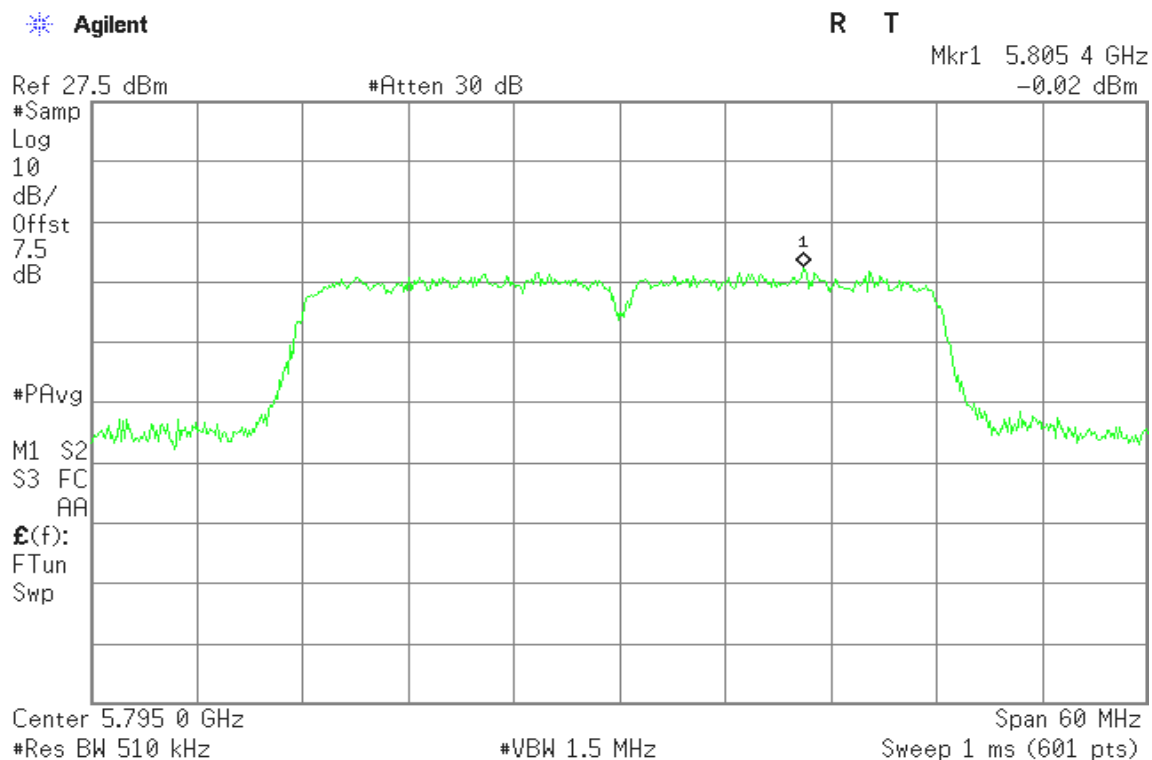


Test mode: IEEE 802.11n HT40 mode / 5755 ~ 5795MHz / Chain 0

CH Low



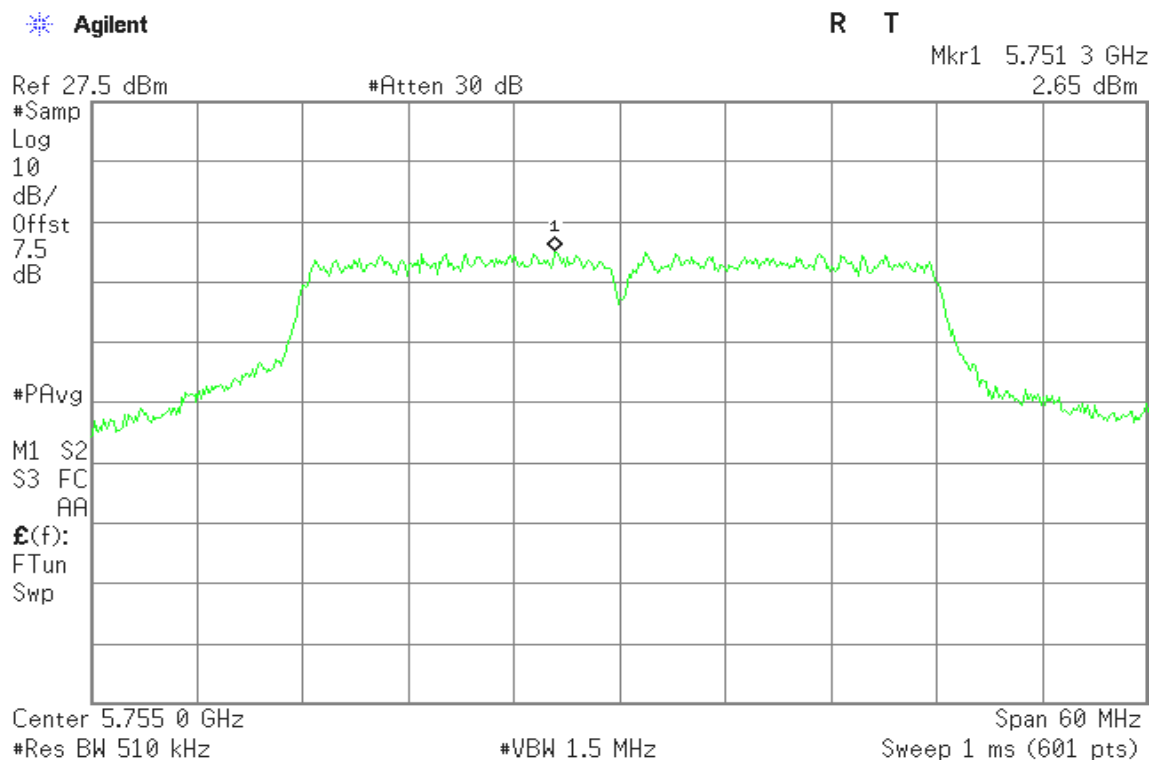
CH High



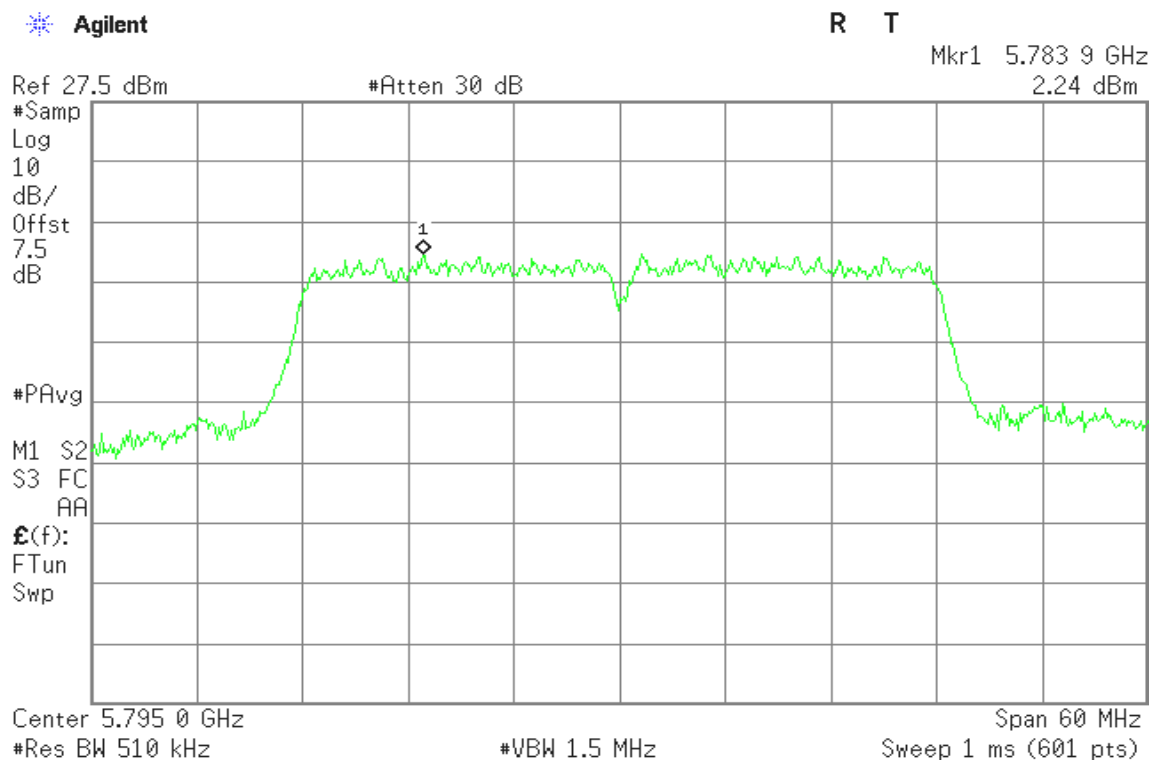


Test mode: IEEE 802.11n HT40 mode / 5755 ~ 5795MHz / Chain 1

CH Low



CH High





## 7.5 RADIATED UNDESIRABLE EMISSION

### LIMIT

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:

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.

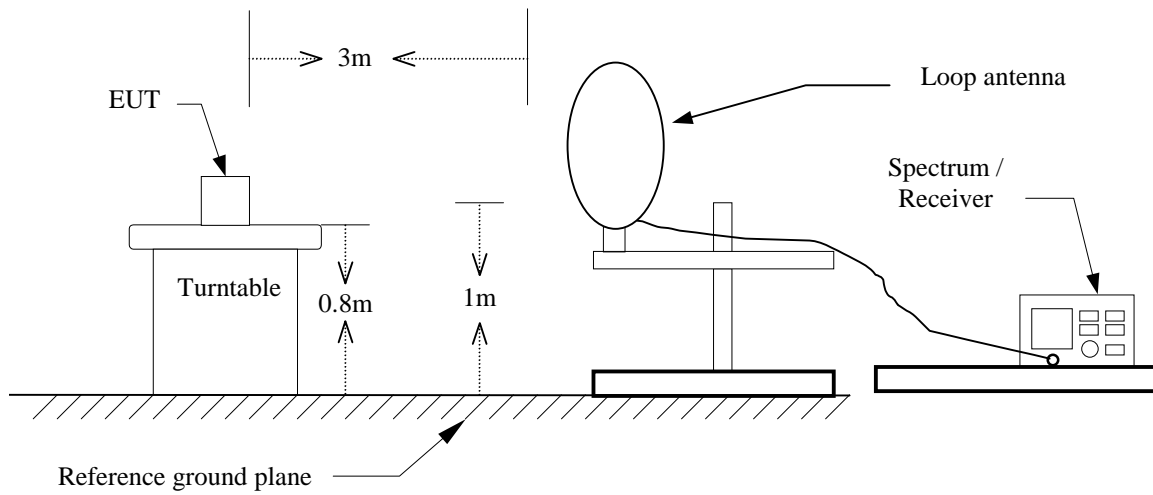
2. In the above emission table, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
0.009 - 0.490	2400/F(kHz) x10000	20LOG((2400/F(kHz))+80)
0.490 - 1.705	24000/F(kHz) x100	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

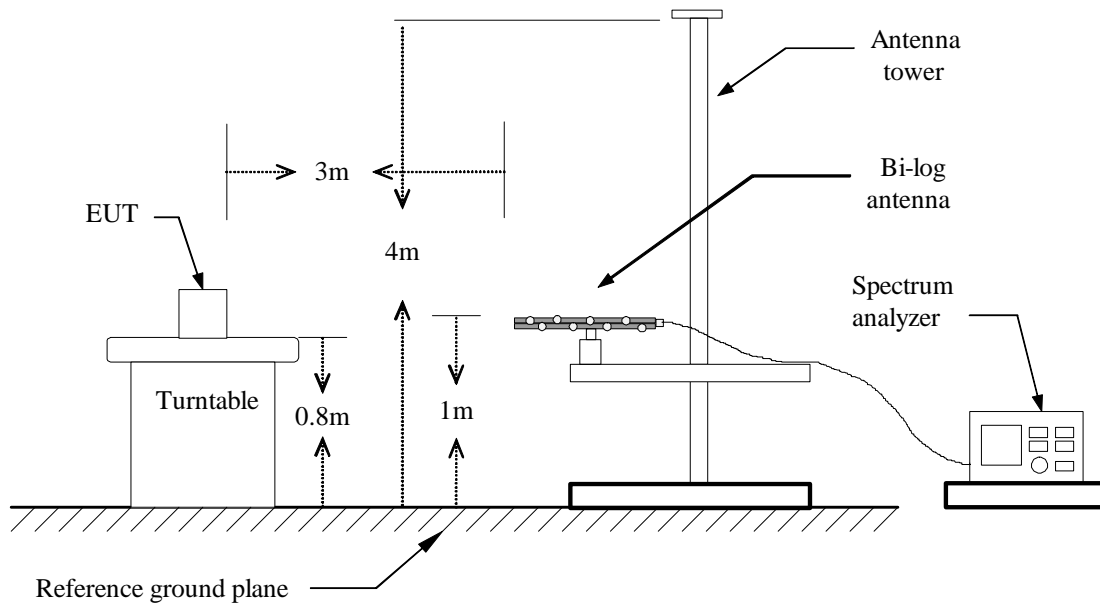


## Test Configuration

### 9kHz ~ 30MHz

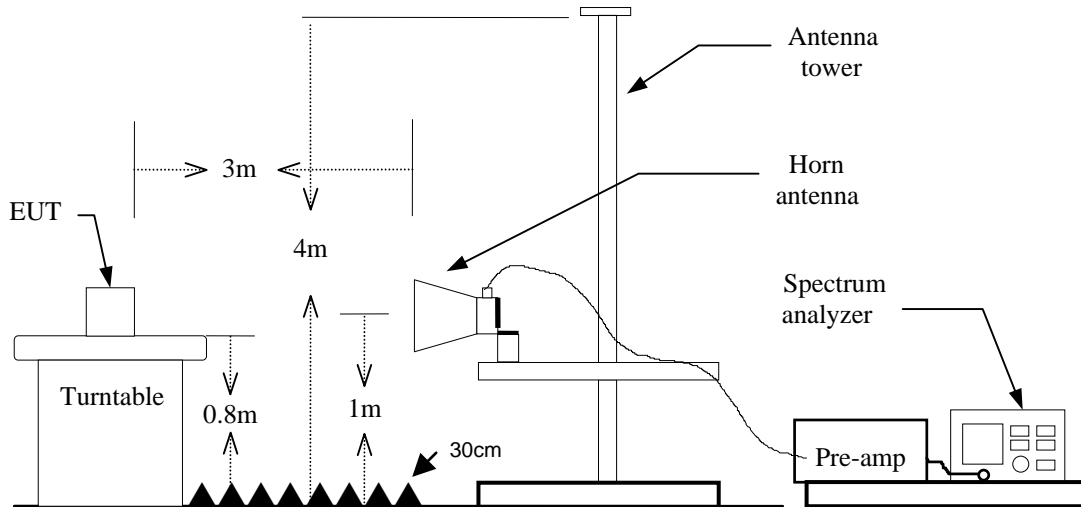


### 30MHz ~ 1GHz





## Above 1 GHz



## 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.
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 30MHz

RBW=10kHz / VBW=30kHz / Sweep=AUTO

### 30 ~ 1000MHz:

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

### Above 1GHz:

- a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
  - b) AVERAGE: RBW=1MHz / VBW=300Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.



## **DATA SAMPLE**

### **Below 1 GHz**

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol. (H/V)	Remark
x.xx	43.20	-20.71	22.49	40.00	-17.51	V	QP

Frequency (MHz)

= Emission frequency in MHz

Reading (dBuV)

= Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m)

= Antenna factor – Amplifier gain + Cable loss

Result (dBuV/m)

= Reading (dBuV) + Corr. Factor (dB/m)

Limit (dBuV/m)

= Limit stated in standard

Margin (dB)

= Result (dBuV/m) – Limit (dBuV/m)

Q.P.

= Quasi-Peak

### **Above 1 GHz**

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
x.xx	45.25	6.91	52.16	74.00	-21.84	H	peak
x.xx	32.33	6.91	39.24	54.00	-14.76	H	AVG

Frequency (MHz)

= Emission frequency in MHz

Reading (dBuV)

= Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m)

= Antenna factor + Cable loss – Amplifier gain

Result (dBuV/m)

= Reading (dBuV) + Corr. Factor (dB/m)

Limit (dBuV/m)

= Limit stated in standard

Margin (dB)

= Result (dBuV/m) – Limit (dBuV/m)



**Below 1 GHz****Operation Mode:** Data Link**Test Date:** 2014/7/22**Temperature:** 26°C**Tested by:** Francis Lee**Humidity:** 56% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol. (H/V)	Remark
35.8200	50.00	-12.13	37.87	40.00	-2.13	V	QP
112.4500	43.94	-15.68	28.26	43.50	-15.24	V	QP
154.1599	42.85	-16.39	26.46	43.50	-17.04	V	QP
179.3799	42.54	-17.26	25.28	43.50	-18.22	V	QP
617.8200	37.11	-7.76	29.35	46.00	-16.65	V	QP
927.2500	34.65	-3.58	31.07	46.00	-14.93	V	QP
35.8200	40.55	-12.13	28.42	40.00	-11.58	H	QP
309.3599	38.00	-12.11	25.89	46.00	-20.11	H	QP
341.3700	39.72	-11.36	28.36	46.00	-17.64	H	QP
617.8200	40.35	-7.76	32.59	46.00	-13.41	H	QP
772.0500	38.13	-5.91	32.22	46.00	-13.78	H	QP
927.2500	38.37	-3.58	34.79	46.00	-11.21	H	QP

**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 or as required by the applicant.
4. 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.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).

**Above 1 GHz**

**Operation Mode:** TX / IEEE 802.11a mode / **Test Date:** 2014/7/18  
5180-5240MHz / Low

**Temperature:** 26°C

**Tested by:** Francis Lee

**Humidity:** 56%RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1995.000	51.37	-1.38	49.99	74.00	-24.01	V	peak
3780.000	46.43	3.45	49.88	74.00	-24.12	V	peak
5025.000	48.82	5.08	53.90	74.00	-20.10	V	peak
5025.000	41.14	5.08	46.22	54.00	-7.78	V	AVG
5345.000	48.52	5.76	54.28	74.00	-19.72	V	peak
5345.000	38.66	5.76	44.42	54.00	-9.58	V	AVG
11220.000	38.04	10.38	48.42	74.00	-25.58	V	peak
3635.000	47.51	4.02	51.53	74.00	-22.47	H	peak
4320.000	45.72	7.51	53.23	74.00	-20.77	H	peak
4320.000	35.39	7.51	42.90	54.00	-11.10	H	AVG
5015.000	48.05	7.40	55.45	74.00	-18.55	H	peak
5015.000	37.83	7.40	45.23	54.00	-8.77	H	AVG
5340.000	47.27	7.63	54.90	74.00	-19.10	H	peak
5340.000	40.54	7.63	48.17	54.00	-5.83	H	AVG
5895.000	46.06	9.10	55.16	74.00	-18.84	H	peak
5895.000	35.23	9.10	44.33	54.00	-9.67	H	AVG
11400.000	38.17	10.52	48.69	74.00	-25.31	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11a mode / **Test Date:** 2014/7/18  
5180-5240MHz / Mid

**Temperature:** 26°C

**Tested by:** Francis Lee

**Humidity:** 56%RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
3655.000	46.98	2.68	49.66	74.00	-24.34	V	peak
5055.000	47.97	4.80	52.77	74.00	-21.23	V	peak
5055.000	40.54	4.80	45.34	54.00	-8.66	V	AVG
5385.000	47.44	6.22	53.66	74.00	-20.34	V	peak
5385.000	40.02	6.22	46.24	54.00	-7.76	V	AVG
5875.000	45.83	5.98	51.81	74.00	-22.19	V	peak
11388.000	37.84	10.51	48.35	74.00	-25.65	V	peak
3115.000	47.27	1.29	48.56	74.00	-25.44	H	peak
4320.000	45.69	7.51	53.20	74.00	-20.80	H	peak
4320.000	35.53	7.51	43.04	54.00	-10.96	H	AVG
5065.000	46.71	6.76	53.47	74.00	-20.53	H	peak
5065.000	38.88	6.76	45.64	54.00	-8.36	H	AVG
5385.000	47.20	8.20	55.40	74.00	-18.60	H	peak
5385.000	41.07	8.20	49.27	54.00	-4.73	H	AVG
5610.000	46.01	9.09	55.10	74.00	-18.90	H	peak
5610.000	34.51	9.09	43.60	54.00	-10.40	H	AVG
11280.000	38.10	10.42	48.52	74.00	-25.48	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11a mode / **Test Date:** 2014/7/18  
 5180-5240MHz / High  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1990.000	48.75	-1.46	47.29	74.00	-26.71	V	peak
3665.000	47.31	2.63	49.94	74.00	-24.06	V	peak
5000.000	47.92	5.32	53.24	74.00	-20.76	V	peak
5000.000	38.72	5.32	44.04	54.00	-9.96	V	AVG
5080.000	49.02	4.56	53.58	74.00	-20.42	V	peak
5080.000	40.62	4.56	45.18	54.00	-8.82	V	AVG
5395.000	48.59	6.33	54.92	74.00	-19.08	V	peak
5395.000	40.22	6.33	46.55	54.00	-7.45	V	AVG
11988.000	39.14	10.76	49.90	74.00	-24.10	V	peak
3825.000	46.71	5.13	51.84	74.00	-22.16	H	peak
4320.000	45.32	7.51	52.83	74.00	-21.17	H	peak
4320.000	35.37	7.51	42.88	54.00	-11.12	H	AVG
5080.000	46.83	6.57	53.40	74.00	-20.60	H	peak
5080.000	35.21	6.57	41.78	54.00	-12.22	H	AVG
5400.000	47.20	8.39	55.59	74.00	-18.41	H	peak
5400.000	38.20	8.39	46.59	54.00	-7.41	H	AVG
5900.000	45.60	9.22	54.82	74.00	-19.18	H	peak
5900.000	35.09	9.22	44.31	54.00	-9.69	H	AVG
12276.000	39.09	10.91	50.00	74.00	-24.00	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT20 mode / 5180-5240MHz / Low **Test Date:** 2014/7/18

**Temperature:** 26°C **Tested by:** Francis Lee

**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1990.000	48.73	-1.46	47.27	74.00	-26.73	V	peak
3800.000	46.87	3.69	50.56	74.00	-23.44	V	peak
5560.000	45.93	6.04	51.97	74.00	-22.03	V	peak
12156.000	39.48	10.84	50.32	74.00	-23.68	V	peak
N/A							
1720.000	57.00	-7.45	49.55	74.00	-24.45	H	peak
4340.000	46.52	7.36	53.88	74.00	-20.12	H	peak
4340.000	35.66	7.36	43.02	54.00	-10.98	H	AVG
5645.000	45.69	8.70	54.39	74.00	-19.61	H	peak
5645.000	34.68	8.70	43.38	54.00	-10.62	H	AVG
5900.000	44.73	9.22	53.95	74.00	-20.05	H	peak
5900.000	34.81	9.22	44.03	54.00	-9.97	H	AVG
11976.000	38.27	10.75	49.02	74.00	-24.98	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT20 mode / 5180-5240MHz / Mid **Test Date:** 2014/7/18  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
2000.000	49.11	-1.30	47.81	74.00	-26.19	V	peak
4045.000	46.64	3.32	49.96	74.00	-24.04	V	peak
5835.000	45.63	5.53	51.16	74.00	-22.84	V	peak
11604.000	37.84	10.63	48.47	74.00	-25.53	V	peak
N/A							
3195.000	47.62	1.09	48.71	74.00	-25.29	H	peak
4320.000	45.54	7.51	53.05	74.00	-20.95	H	peak
4320.000	35.55	7.51	43.06	54.00	-10.94	H	AVG
4985.000	45.39	7.52	52.91	74.00	-21.09	H	peak
4985.000	34.74	7.52	42.26	54.00	-11.74	H	AVG
5535.000	45.52	8.98	54.50	74.00	-19.50	H	peak
5535.000	34.52	8.98	43.50	54.00	-10.50	H	AVG
5955.000	45.52	9.01	54.53	74.00	-19.47	H	peak
5955.000	35.14	9.01	44.15	54.00	-9.85	H	AVG
11388.000	37.75	10.51	48.26	74.00	-25.74	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT20 mode / 5180-5240MHz / High **Test Date:** 2014/7/18

**Temperature:** 26°C **Tested by:** Francis Lee

**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1990.000	51.35	-1.46	49.89	74.00	-24.11	V	peak
3630.000	47.86	2.79	50.65	74.00	-23.35	V	peak
5645.000	45.51	5.92	51.43	74.00	-22.57	V	peak
11460.000	37.48	10.57	48.05	74.00	-25.95	V	peak
N/A							
3655.000	47.08	3.95	51.03	74.00	-22.97	H	peak
4285.000	45.60	7.41	53.01	74.00	-20.99	H	peak
4285.000	35.65	7.41	43.06	54.00	-10.94	H	AVG
5600.000	45.19	9.20	54.39	74.00	-19.61	H	peak
5600.000	34.64	9.20	43.84	54.00	-10.16	H	AVG
5925.000	45.47	9.12	54.59	74.00	-19.41	H	peak
5925.000	35.34	9.12	44.46	54.00	-9.54	H	AVG
11364.000	38.49	10.49	48.98	74.00	-25.02	H	peak

**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) or Peak limit (dBuV/m).





**Operation Mode:** TX / IEEE 802.11n HT40 mode / 5190-5230MHz / Low **Test Date:** 2014/7/18

**Temperature:** 26°C **Tested by:** Francis Lee

**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
2000.000	50.81	-1.30	49.51	74.00	-24.49	V	peak
4345.000	47.53	2.02	49.55	74.00	-24.45	V	peak
5515.000	46.42	6.18	52.60	74.00	-21.40	V	peak
5515.000	35.12	6.18	41.30	54.00	-12.70	V	AVG
11532.000	40.03	10.61	50.64	74.00	-23.36	V	peak
N/A							
3630.000	47.63	4.04	51.67	74.00	-22.33	H	peak
4340.000	47.12	7.36	54.48	74.00	-19.52	H	peak
4340.000	35.85	7.36	43.21	54.00	-10.79	H	AVG
5035.000	46.98	7.14	54.12	74.00	-19.88	H	peak
5035.000	36.90	7.14	44.04	54.00	-9.96	H	AVG
5595.000	45.12	9.18	54.30	74.00	-19.70	H	peak
5595.000	35.25	9.18	44.43	54.00	-9.57	H	AVG
5945.000	45.45	9.04	54.49	74.00	-19.51	H	peak
5945.000	35.10	9.04	44.14	54.00	-9.86	H	AVG
11952.000	39.34	10.74	50.08	74.00	-23.92	H	peak

**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) or Peak limit (dBuV/m).





**Operation Mode:** TX / IEEE 802.11n HT40 mode / 5190-5230MHz / High **Test Date:** 2014/7/18  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
3800.000	46.43	3.69	50.12	74.00	-23.88	V	peak
4975.000	46.36	5.08	51.44	74.00	-22.56	V	peak
5865.000	45.70	5.86	51.56	74.00	-22.44	V	peak
11448.000	38.54	10.56	49.10	74.00	-24.90	V	peak
N/A							
3750.000	47.88	4.43	52.31	74.00	-21.69	H	peak
3750.000	36.51	4.43	40.94	54.00	-13.06	H	AVG
4240.000	46.89	6.65	53.54	74.00	-20.46	H	peak
4240.000	36.14	6.65	42.79	54.00	-11.21	H	AVG
5530.000	46.07	8.96	55.03	74.00	-18.97	H	peak
5530.000	35.16	8.96	44.12	54.00	-9.88	H	AVG
5910.000	45.80	9.18	54.98	74.00	-19.02	H	peak
5910.000	35.35	9.18	44.53	54.00	-9.47	H	AVG
11700.000	38.76	10.66	49.42	74.00	-24.58	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11a mode / **Test Date:** 2014/7/18  
5745-5825MHz / Low  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1330.000	54.64	-8.02	46.62	74.00	-27.38	V	peak
3765.000	46.35	3.26	49.61	74.00	-24.39	V	peak
5580.000	49.29	5.97	55.26	74.00	-18.74	V	peak
5580.000	41.05	5.97	47.02	54.00	-6.98	V	AVG
5860.000	47.60	5.81	53.41	74.00	-20.59	V	peak
5860.000	37.76	5.81	43.57	54.00	-10.43	V	AVG
11496.000	44.48	10.60	55.08	74.00	-18.92	V	peak
11496.000	35.74	10.60	46.34	54.00	-7.66	V	AVG
3665.000	47.61	3.91	51.52	74.00	-22.48	H	peak
4295.000	45.06	7.58	52.64	74.00	-21.36	H	peak
4295.000	35.31	7.58	42.89	54.00	-11.11	H	AVG
5630.000	47.76	8.87	56.63	74.00	-17.37	H	peak
5630.000	39.48	8.87	48.35	54.00	-5.65	H	AVG
5905.000	46.56	9.20	55.76	74.00	-18.24	H	peak
5905.000	38.02	9.20	47.22	54.00	-6.78	H	AVG
11484.000	40.94	10.59	51.53	74.00	-22.47	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11a mode / **Test Date:** 2014/7/18  
5745-5825MHz / Mid  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
2000.000	49.49	-1.30	48.19	74.00	-25.81	V	peak
3800.000	46.28	3.69	49.97	74.00	-24.03	V	peak
5620.000	48.28	5.92	54.20	74.00	-19.80	V	peak
5620.000	39.28	5.92	45.20	54.00	-8.80	V	AVG
5940.000	46.33	5.84	52.17	74.00	-21.83	V	peak
5940.000	38.23	5.84	44.07	54.00	-9.93	V	AVG
11568.000	42.61	10.62	53.23	74.00	-20.77	V	peak
11568.000	33.64	10.62	44.26	54.00	-9.74	V	AVG
3775.000	47.18	4.77	51.95	74.00	-22.05	H	peak
4255.000	46.06	6.90	52.96	74.00	-21.04	H	peak
4255.000	36.44	6.90	43.34	54.00	-10.66	H	AVG
5630.000	49.36	8.87	58.23	74.00	-15.77	H	peak
5630.000	41.13	8.87	50.00	54.00	-4.00	H	AVG
5940.000	47.51	9.06	56.57	74.00	-17.43	H	peak
5940.000	36.22	9.06	45.28	54.00	-8.72	H	AVG
11568.000	40.14	10.62	50.76	74.00	-23.24	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11a mode / **Test Date:** 2014/7/18  
5745-5825MHz / High

**Temperature:** 26°C

**Tested by:** Francis Lee

**Humidity:** 56%RH

**Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
3765.000	46.81	3.26	50.07	74.00	-23.93	V	peak
5245.000	45.74	5.41	51.15	74.00	-22.85	V	peak
5665.000	47.20	5.93	53.13	74.00	-20.87	V	peak
5665.000	38.28	5.93	44.21	54.00	-9.79	V	AVG
5990.000	46.92	5.31	52.23	74.00	-21.77	V	peak
5990.000	37.50	5.31	42.81	54.00	-11.19	V	AVG
11652.000	40.85	10.65	51.50	74.00	-22.50	V	peak
3775.000	46.75	4.77	51.52	74.00	-22.48	H	peak
4335.000	45.26	7.40	52.66	74.00	-21.34	H	peak
4335.000	35.58	7.40	42.98	54.00	-11.02	H	AVG
5660.000	47.74	8.53	56.27	74.00	-17.73	H	peak
5660.000	39.28	8.53	47.81	54.00	-6.19	H	AVG
5980.000	46.48	8.91	55.39	74.00	-18.61	H	peak
5980.000	37.90	8.91	46.81	54.00	-7.19	H	AVG
11652.000	40.15	10.65	50.80	74.00	-23.20	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT20 mode / 5745-5825MHz / Low **Test Date:** 2014/7/18  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
2000.000	49.61	-1.30	48.31	74.00	-25.69	V	peak
4020.000	47.05	3.42	50.47	74.00	-23.53	V	peak
5630.000	47.03	5.92	52.95	74.00	-21.05	V	peak
5630.000	37.64	5.92	43.56	54.00	-10.44	V	AVG
5870.000	46.44	5.92	52.36	74.00	-21.64	V	peak
5870.000	36.56	5.92	42.48	54.00	-11.52	V	AVG
11136.000	38.33	10.31	48.64	74.00	-25.36	V	peak
3590.000	47.93	3.93	51.86	74.00	-22.14	H	peak
4340.000	45.69	7.36	53.05	74.00	-20.95	H	peak
4340.000	35.63	7.36	42.99	54.00	-11.01	H	AVG
5625.000	45.76	8.92	54.68	74.00	-19.32	H	peak
5625.000	36.13	8.92	45.05	54.00	-8.95	H	AVG
5925.000	45.42	9.12	54.54	74.00	-19.46	H	peak
5925.000	36.40	9.12	45.52	54.00	-8.48	H	AVG
11388.000	38.60	10.51	49.11	74.00	-24.89	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT20 mode / 5745-5825MHz / Mid **Test Date:** 2014/7/18  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1330.000	55.52	-8.02	47.50	74.00	-26.50	V	peak
3820.000	46.96	3.24	50.20	74.00	-23.80	V	peak
5215.000	46.65	5.50	52.15	74.00	-21.85	V	peak
5215.000	35.38	5.50	40.88	54.00	-13.12	V	AVG
5630.000	48.52	5.92	54.44	74.00	-19.56	V	peak
5630.000	38.80	5.92	44.72	54.00	-9.28	V	AVG
5950.000	46.67	5.73	52.40	74.00	-21.60	V	peak
5950.000	36.50	5.73	42.23	54.00	-11.77	V	AVG
11484.000	38.46	10.59	49.05	74.00	-24.95	V	peak
3770.000	46.97	4.70	51.67	74.00	-22.33	H	peak
4310.000	45.13	7.59	52.72	74.00	-21.28	H	peak
4310.000	35.41	7.59	43.00	54.00	-11.00	H	AVG
5605.000	45.16	9.14	54.30	74.00	-19.70	H	peak
5605.000	34.69	9.14	43.83	54.00	-10.17	H	AVG
5940.000	46.16	9.06	55.22	74.00	-18.78	H	peak
5940.000	35.33	9.06	44.39	54.00	-9.61	H	AVG
11880.000	38.14	10.72	48.86	74.00	-25.14	H	peak

**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) or Peak limit (dBuV/m).



**Operation Mode:** TX / IEEE 802.11n HT20 mode / 5745-5825MHz / High **Test Date:** 2014/7/18  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
2000.000	50.22	-1.30	48.92	74.00	-25.08	V	peak
3690.000	47.84	2.52	50.36	74.00	-23.64	V	peak
5270.000	46.00	5.33	51.33	74.00	-22.67	V	peak
5670.000	48.22	5.93	54.15	74.00	-19.85	V	peak
5670.000	38.59	5.93	44.52	54.00	-9.48	V	AVG
5945.000	45.56	5.78	51.34	74.00	-22.66	V	peak
12156.000	39.67	10.84	50.51	74.00	-23.49	V	peak
3630.000	46.83	4.04	50.87	74.00	-23.13	H	peak
4325.000	47.14	7.47	54.61	74.00	-19.39	H	peak
4325.000	35.75	7.47	43.22	54.00	-10.78	H	AVG
4915.000	45.99	7.22	53.21	74.00	-20.79	H	peak
4915.000	35.50	7.22	42.72	54.00	-11.28	H	AVG
5655.000	47.37	8.59	55.96	74.00	-18.04	H	peak
5655.000	36.39	8.59	44.98	54.00	-9.02	H	AVG
5930.000	45.89	9.10	54.99	74.00	-19.01	H	peak
5930.000	35.34	9.10	44.44	54.00	-9.56	H	AVG
11688.000	38.59	10.66	49.25	74.00	-24.75	H	peak

**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) or Peak limit (dBuV/m).





**Operation Mode:** TX / IEEE 802.11n HT40 mode / 5755-5795MHz / Low **Test Date:** 2014/7/18  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
3770.000	47.79	3.32	51.11	74.00	-22.89	V	peak
4845.000	47.43	3.13	50.56	74.00	-23.44	V	peak
5525.000	46.30	6.15	52.45	74.00	-21.55	V	peak
5525.000	35.42	6.15	41.57	54.00	-12.43	V	AVG
5915.000	46.25	6.10	52.35	74.00	-21.65	V	peak
5915.000	35.63	6.10	41.73	54.00	-12.27	V	AVG
12144.000	39.54	10.84	50.38	74.00	-23.62	V	peak
3640.000	47.20	4.00	51.20	74.00	-22.80	H	peak
4315.000	45.90	7.55	53.45	74.00	-20.55	H	peak
4315.000	35.94	7.55	43.49	54.00	-10.51	H	AVG
5570.000	45.77	9.10	54.87	74.00	-19.13	H	peak
5570.000	35.23	9.10	44.33	54.00	-9.67	H	AVG
5905.000	46.71	9.20	55.91	74.00	-18.09	H	peak
5905.000	35.36	9.20	44.56	54.00	-9.44	H	AVG
11868.000	39.22	10.72	49.94	74.00	-24.06	H	peak

**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) or Peak limit (dBuV/m).





**Operation Mode:** TX / IEEE 802.11n HT40 mode / 5755-5795MHz / High **Test Date:** 2014/7/18  
**Temperature:** 26°C **Tested by:** Francis Lee  
**Humidity:** 56%RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
2695.000	49.30	-1.50	47.80	74.00	-26.20	V	peak
3800.000	46.52	3.69	50.21	74.00	-23.79	V	peak
5465.000	45.56	6.29	51.85	74.00	-22.15	V	peak
5900.000	46.61	6.26	52.87	74.00	-21.13	V	peak
5900.000	35.89	6.26	42.15	54.00	-11.85	V	AVG
12132.000	39.18	10.83	50.01	74.00	-23.99	V	peak
3600.000	46.81	4.16	50.97	74.00	-23.03	H	peak
4295.000	46.40	7.58	53.98	74.00	-20.02	H	peak
4295.000	35.94	7.58	43.52	54.00	-10.48	H	AVG
5020.000	47.50	7.33	54.83	74.00	-19.17	H	peak
5020.000	35.57	7.33	42.90	54.00	-11.10	H	AVG
5580.000	46.86	9.13	55.99	74.00	-18.01	H	peak
5580.000	35.45	9.13	44.58	54.00	-9.42	H	AVG
5945.000	45.27	9.04	54.31	74.00	-19.69	H	peak
5945.000	35.60	9.04	44.64	54.00	-9.36	H	AVG
11724.000	39.18	10.67	49.85	74.00	-24.15	H	peak

**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) or Peak limit (dBuV/m).



## 7.6 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(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  $\mu$ 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.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	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 II 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.



## **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.

### **Test Data**

**Operation Mode:** normal link**Test Date:** 2014/8/27**Temperature:** 25°C**Tested by:** Francis Lee**Humidity:** 57% RH

Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.1640	45.34	26.88	9.78	55.12	36.66	65.25	55.26	-10.13	-18.60	L1
0.2245	35.99	21.69	9.73	45.72	31.42	62.65	52.65	-16.93	-21.23	L1
3.1966	24.39	18.48	9.83	34.22	28.31	56.00	46.00	-21.78	-17.69	L1
5.9343	20.95	15.55	9.91	30.86	25.46	60.00	50.00	-29.14	-24.54	L1
12.9590	23.06	17.68	10.01	33.07	27.69	60.00	50.00	-26.93	-22.31	L1
17.5611	29.06	23.73	10.06	39.12	33.79	60.00	50.00	-20.88	-16.21	L1
0.1570	43.05	26.12	9.76	52.81	35.88	65.62	55.62	-12.81	-19.74	L2
0.2065	29.05	8.34	9.72	38.77	18.06	63.34	53.34	-24.57	-35.28	L2
3.4520	21.08	15.59	9.82	30.90	25.41	56.00	46.00	-25.10	-20.59	L2
7.0884	19.93	14.42	9.94	29.87	24.36	60.00	50.00	-30.13	-25.64	L2
13.9558	19.97	14.70	10.05	30.02	24.75	60.00	50.00	-29.98	-25.25	L2
21.5275	21.18	15.89	10.17	31.35	26.06	60.00	50.00	-28.65	-23.94	L2

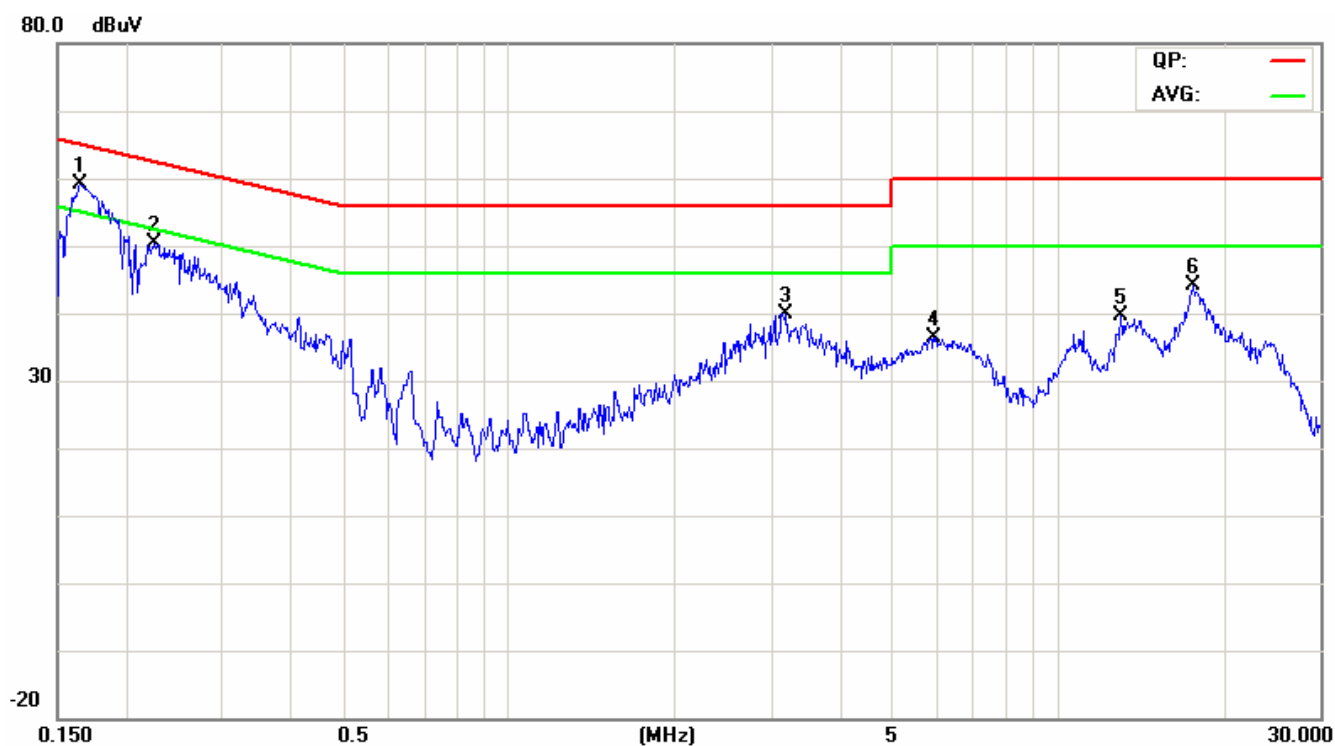
### **Remark:**

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)

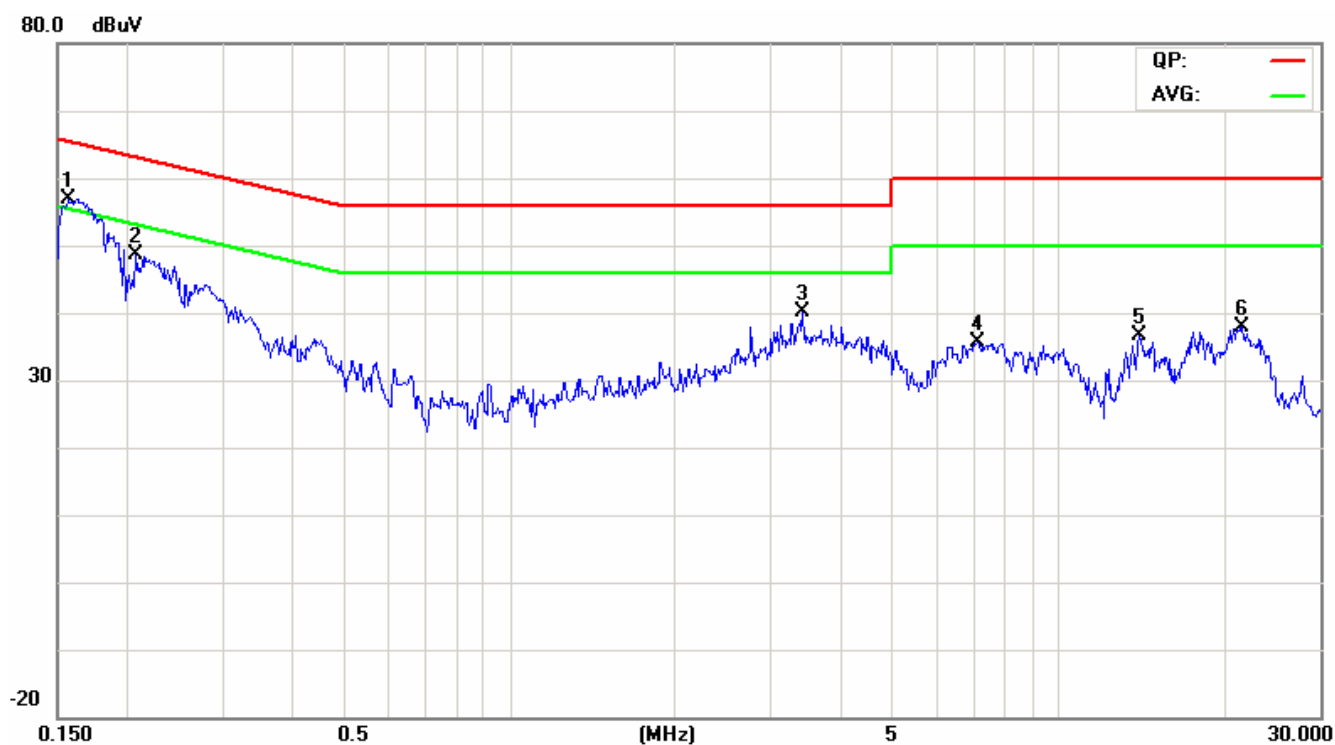


## Test Plots

### Conducted emissions (Line 1)



### Conducted emissions (Line 2)



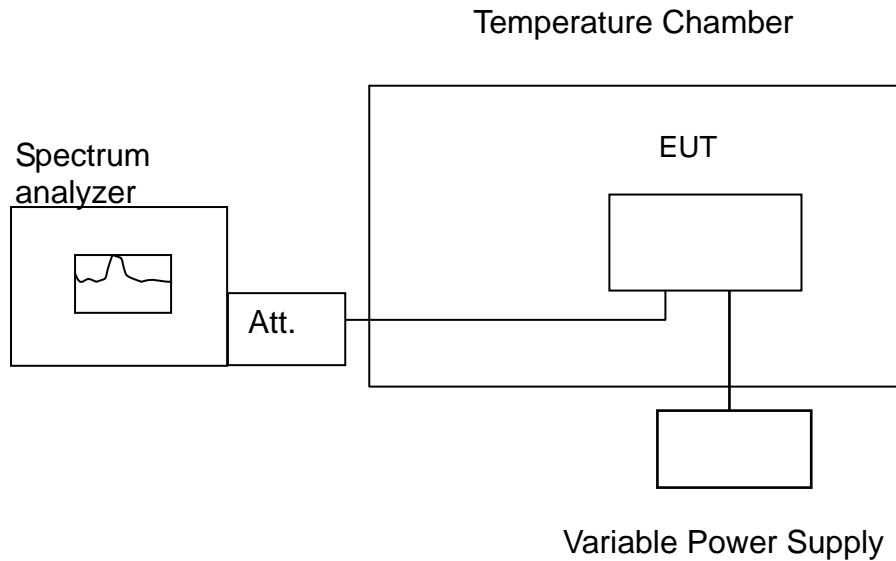


## 7.7 FREQUENCY STABILITY

### LIMIT

According to §15.407(g), 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 operational description.

### Test Configuration



**Remark:** Measurement setup for testing on Antenna connector



## **TEST PROCEDURE**

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

## **TEST RESULTS**

*No non-compliance noted.*

**IEEE 802.11a mode / 5180 ~ 5240 MHz:****CH Low**

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5179.967555	5150~5250	Pass
-10	120	5179.971219	5150~5250	Pass
0	120	5179.986913	5150~5250	Pass
10	120	5179.990862	5150~5250	Pass
20	120	5179.983828	5150~5250	Pass
30	120	5180.009203	5150~5250	Pass
40	120	5180.019801	5150~5250	Pass
50	120	5180.019725	5150~5250	Pass

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5179.964453	5150~5250	Pass
	120	5179.993918	5150~5250	Pass
	132	5180.027615	5150~5250	Pass

**CH High**

Operating Frequency: 5240 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5239.967457	5150~5250	Pass
-10	120	5239.920585	5150~5250	Pass
0	120	5239.996338	5150~5250	Pass
10	120	5239.974728	5150~5250	Pass
20	120	5239.982054	5150~5250	Pass
30	120	5240.002444	5150~5250	Pass
40	120	5240.028546	5150~5250	Pass
50	120	5240.033142	5150~5250	Pass

Operating Frequency: 5240 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5239.963267	5150~5250	Pass
	120	5239.987904	5150~5250	Pass
	132	5240.028691	5150~5250	Pass



**IEEE 802.11n HT20 mode / 5180 ~ 5240 MHz:****CH Low**

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5179.944695	5150~5250	Pass
-10	120	5179.986246	5150~5250	Pass
0	120	5179.95809	5150~5250	Pass
10	120	5179.962512	5150~5250	Pass
20	120	5179.999057	5150~5250	Pass
30	120	5180.003942	5150~5250	Pass
40	120	5180.017491	5150~5250	Pass
50	120	5180.017361	5150~5250	Pass

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5179.99534	5150~5250	Pass
	120	5179.993355	5150~5250	Pass
	132	5180.009461	5150~5250	Pass

**CH High**

Operating Frequency: 5240 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5239.957946	5150~5250	Pass
-10	120	5239.975715	5150~5250	Pass
0	120	5239.990434	5150~5250	Pass
10	120	5239.985694	5150~5250	Pass
20	120	5239.988645	5150~5250	Pass
30	120	5240.016463	5150~5250	Pass
40	120	5240.016500	5150~5250	Pass
50	120	5240.005662	5150~5250	Pass

Operating Frequency: 5240 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5239.967557	5150~5250	Pass
	120	5239.996521	5150~5250	Pass
	132	5240.012784	5150~5250	Pass

**IEEE 802.11n HT40 mode / 5190 ~ 5230 MHz:****CH Low**

Operating Frequency: 5190 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5189.972483	5150~5250	Pass
-10	120	5189.950986	5150~5250	Pass
0	120	5189.974345	5150~5250	Pass
10	120	5189.997286	5150~5250	Pass
20	120	5189.970964	5150~5250	Pass
30	120	5190.010986	5150~5250	Pass
40	120	5190.017315	5150~5250	Pass
50	120	5190.035572	5150~5250	Pass

Operating Frequency: 5190 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5189.968736	5150~5250	Pass
	120	5189.994549	5150~5250	Pass
	132	5190.023912	5150~5250	Pass

**CH High**

Operating Frequency: 5230 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5229.972938	5150~5250	Pass
-10	120	5229.953641	5150~5250	Pass
0	120	5229.996911	5150~5250	Pass
10	120	5229.976185	5150~5250	Pass
20	120	5229.977007	5150~5250	Pass
30	120	5230.007263	5150~5250	Pass
40	120	5230.012011	5150~5250	Pass
50	120	5230.027493	5150~5250	Pass

Operating Frequency: 5230 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5229.999726	5150~5250	Pass
	120	5229.980408	5150~5250	Pass
	132	5230.024107	5150~5250	Pass

**IEEE 802.11a mode / 5745 ~ 5825MHz:****CH Low**

Operating Frequency: 5745 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5744.971552	5725~5850	Pass
-10	120	5744.975912	5725~5850	Pass
0	120	5744.990705	5725~5850	Pass
10	120	5744.954924	5725~5850	Pass
20	120	5744.994303	5725~5850	Pass
30	120	5745.018161	5725~5850	Pass
40	120	5745.003808	5725~5850	Pass
50	120	5745.027947	5725~5850	Pass

Operating Frequency: 5745 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5744.962141	5725~5850	Pass
	120	5744.994380	5725~5850	Pass
	132	5745.016935	5725~5850	Pass

**CH High**

Operating Frequency: 5825 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5824.996458	5725~5850	Pass
-10	120	5824.961048	5725~5850	Pass
0	120	5824.947168	5725~5850	Pass
10	120	5824.982178	5725~5850	Pass
20	120	5824.993302	5725~5850	Pass
30	120	5825.010606	5725~5850	Pass
40	120	5825.025184	5725~5850	Pass
50	120	5825.022972	5725~5850	Pass

Operating Frequency: 5825 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5824.997739	5725~5850	Pass
	120	5824.986859	5725~5850	Pass
	132	5825.015107	5725~5850	Pass

**IEEE 802.11n HT20 mode / 5745 ~ 5825MHz:****CH Low**

Operating Frequency: 5745 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5744.973364	5725~5850	Pass
-10	120	5744.938685	5725~5850	Pass
0	120	5744.957259	5725~5850	Pass
10	120	5744.989907	5725~5850	Pass
20	120	5744.996842	5725~5850	Pass
30	120	5745.017130	5725~5850	Pass
40	120	5745.025915	5725~5850	Pass
50	120	5745.020275	5725~5850	Pass

Operating Frequency: 5745 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5744.969703	5725~5850	Pass
	120	5744.985679	5725~5850	Pass
	132	5745.011121	5725~5850	Pass

**CH High**

Operating Frequency: 5825 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5824.98197	5725~5850	Pass
-10	120	5824.981102	5725~5850	Pass
0	120	5824.969793	5725~5850	Pass
10	120	5824.995931	5725~5850	Pass
20	120	5824.98056	5725~5850	Pass
30	120	5825.017661	5725~5850	Pass
40	120	5825.017731	5725~5850	Pass
50	120	5825.039747	5725~5850	Pass

Operating Frequency: 5825 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5824.995001	5725~5850	Pass
	120	5824.993219	5725~5850	Pass
	132	5825.024569	5725~5850	Pass



**IEEE 802.11n HT40 mode / 5755 ~ 5815MHz:****CH Low**

Operating Frequency: 5755 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5754.983260	5725~5850	Pass
-10	120	5754.926728	5725~5850	Pass
0	120	5754.937137	5725~5850	Pass
10	120	5754.972433	5725~5850	Pass
20	120	5754.965888	5725~5850	Pass
30	120	5755.017918	5725~5850	Pass
40	120	5755.023905	5725~5850	Pass
50	120	5755.023119	5725~5850	Pass

Operating Frequency: 5755 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5754.996454	5725~5850	Pass
	120	5754.987148	5725~5850	Pass
	132	5755.024026	5725~5850	Pass

**CH High**

Operating Frequency: 5795 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
-20	120	5794.962498	5725~5850	Pass
-10	120	5794.944672	5725~5850	Pass
0	120	5794.967730	5725~5850	Pass
10	120	5794.982078	5725~5850	Pass
20	120	5794.976635	5725~5850	Pass
30	120	5795.006171	5725~5850	Pass
40	120	5795.007332	5725~5850	Pass
50	120	5795.024108	5725~5850	Pass

Operating Frequency: 5795 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Limit Range	Test Result
20	108	5794.984818	5725~5850	Pass
	120	5794.981653	5725~5850	Pass
	132	5795.000350	5725~5850	Pass



## **8. APPENDIX I PHOTOGRAPHS OF TEST SETUP**

### **Radiated Emissions Setup Photos Below 1GHz**





## Above 1GHz





## Conducted Emissions Setup Photo







## Powerline Conducted Emissions Setup Photos





## **9. APPENDIX II: PHOTOGRAPHS OF EUT**

**Refer to T140710L08 External Photographs.**