

# FCC 47 CFR PART15 SUBPART E

## Test Report

**For**

**Product Name: ClickShare CS-100**

**Brand Name: Barco**

**Model No.: R9861510**

**Series Model.: N/A**

**FCC ID: 2AAED-R9861510**

**IC: 9393B-R9861510**

**Test Report Number:**

**C151211R02-RPW2**

**Issued for**

**Barco NV**

**President Kennedypark 35, 8500 Kortrijk, Belgium**

**Issued by**

**Compliance Certification Services Inc.**

**Kun shan Laboratory**

**No.10 Weiye Rd., Innovation park, Eco&Tec,  
Development Zone, Kunshan City, Jiangsu, China**

**TEL: 86-512-57355888**

**FAX: 86-512-57370818**



TESTING CERT #2541.01

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**1 TEST RESULT CERTIFICATION**

<b>Product Name:</b>	ClickShare CS-100
<b>Trade Name:</b>	Barco
<b>Model Name.:</b>	R9861510
<b>Series Model:</b>	N/A
<b>Applicant Discrepancy:</b>	Initial
<b>Device Category:</b>	Portable device
<b>Date of Test:</b>	December 20, 2015 ~ January 10, 2016
<b>Applicant:</b>	<b>Barco NV</b> President Kennedypark 35, 8500 Kortrijk, Belgium
<b>Manufacturer:</b>	<b>Barco NV</b> President Kennedypark 35, 8500 Kortrijk, Belgium
<b>Application Type:</b>	Certification

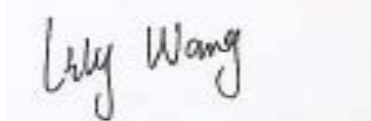
APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart E	No non-compliance noted
Canada RSS-247 Issue 1	No non-compliance noted
Canada RSS-Gen Issue 4	No non-compliance noted

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.407 and KDB 789033.

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

**Approved by:**

**Tested by:**


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Jeff.Fang  
RF Manager  
Compliance Certification Service Inc.

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Lily.Wang  
Test Engineer  
Compliance Certification Service Inc.

## 2 EUT DESCRIPTION

<b>Product Name:</b>	ClickShare CS-100
<b>Brand Name:</b>	Barco
<b>Model Name:</b>	R9861510
<b>Series Model:</b>	N/A
<b>Model Discrepancy:</b>	N/A
<b>Power Adapter:</b>	Brand Name: GLOBTEK Model :GT-46180-1812 Input: 100-240V~0.6A 50-60Hz Output: DC12V 1.5A
<b>Frequency Range :</b>	5725MHz-5850MHz
<b>Transmit Power :</b>	IEEE802.11a mode: 15.29 dBm IEEE802.11an HT20 mode: 14.61 dBm
<b>Modulation Technique :</b>	IEEE802.11a mode: OFDM (6,9,12,18,24,36,48 and 54 Mbps) IEEE802.11an HT20 mode:OFDM (MCS0~MCS7)
<b>Number of Channels :</b>	IEEE 802.11a mode: 5 Channels IEEE 802.11an HT20de: 5 Channels
<b>Antenna Specification:</b>	PCB antenna1 for 5GHz Gain 3.34dBi PCB antenna2 for 5GHz Gain 3.38dBi

### Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for **FCC ID: 2AAED-R9861510** filing to comply with FCC Part 15, Subpart E Rules.
3. This submittal(s) (test report) is intended for **IC: 9393B-R9861510** filing to comply with Canada RSS-247 Issue 1 and Canada RSS-Gen Issue 4 Rules.

### **3 TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.10:2013 and FCC CFR 47 15.207, 15.209 and 15.407,RSS-247.

#### **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 13.3 of ANSI C63.10:2013, 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**

###### **Under 1GHz**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. 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 C63.10:2013.

###### **Above 1GHz**

The EUT is placed on a turn table, which is 1.5 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. 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 C63.10:2013.

### 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	4.50 - 5.15
0.495 - 0.505 <sup>(1)</sup>	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960.0 - 1240	7.25 - 7.75
4.125 - 4.128	25.50 - 25.67	1300 - 1427	8.025 - 8.500
4.17725 - 4.17775	37.50 - 38.25	1435.0 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73.00 - 74.60	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.80 - 75.20	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108.00 - 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	149.90 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500.0	17.7 - 21.4
8.37625 - 8.38675	156.70 - 156.90	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.1700	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.20	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358.0	36.43 - 36.5 <sup>(2)</sup>
12.57675 - 12.57725	322.0 - 335.4	3600 - 4400	
13.36 - 13.41			

<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

Description	Modulation Technology	Modulation Type
6dB Bandwidth and 99% Bandwidth	OFDM	BPSK
Maximum conducted output power	OFDM	BPSK
Band edges measurement	OFDM	BPSK
Peak Power Spectral Density	OFDM	BPSK
Radiated undesirable emission	OFDM	BPSK
Conducted undesirable emission	OFDM	BPSK
Powerline conducted emission	OFDM	BPSK

The EUT transmitting and receiving with two antennas working at a/an mode, Both chain0 and chain1 could be used as transmit/receiving antenna,so 2x2 configuration was used for all testing in this report. Software used to control the EUT for staying in continuous transmitting mode was programmed.

**IEEE 802.11a mode:**

Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 24Mbps data rate were chosen for full testing.

**IEEE 802.11an HT20 mode:**

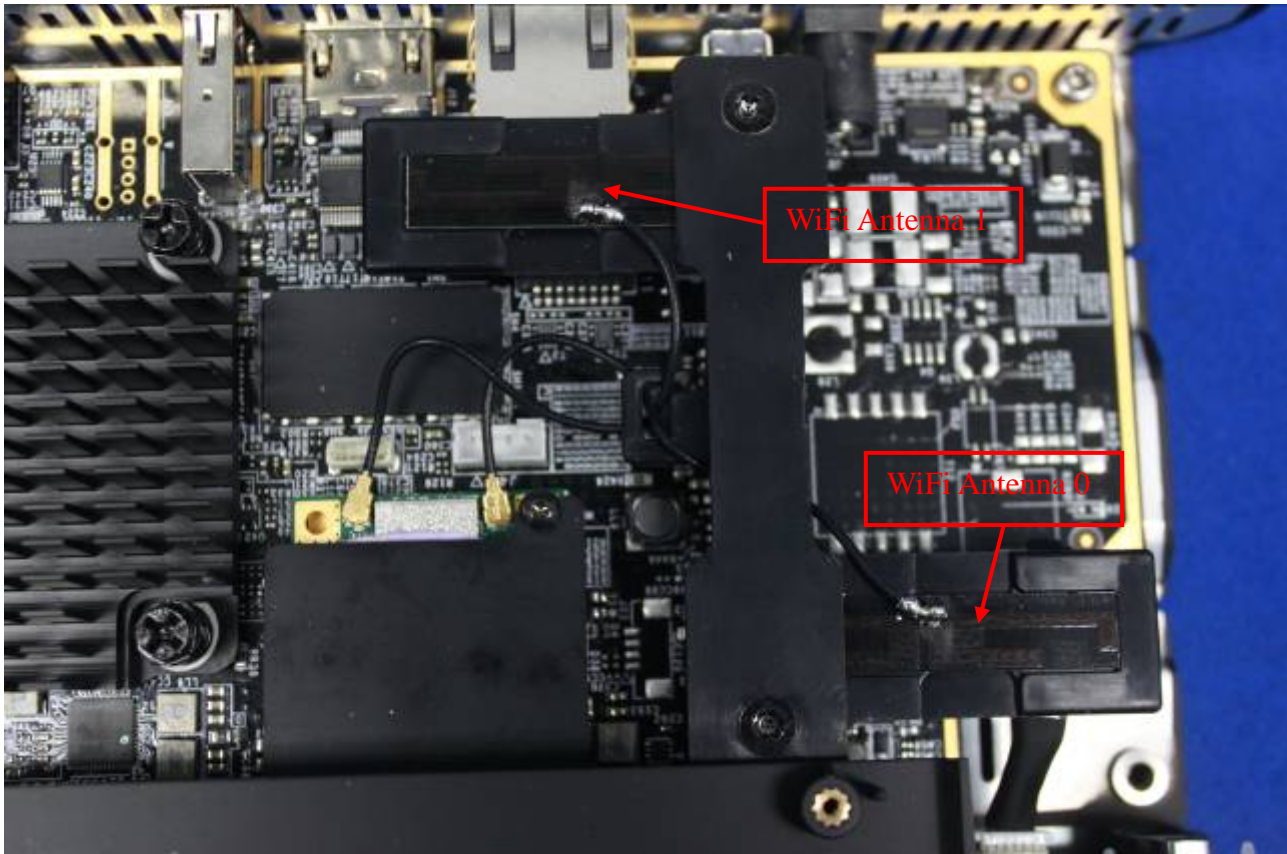
Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with MCS0 data rate were chosen for full testing.

### 3.6 ANTENNA DESCRIPTION

an intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached or an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section”

\* the antenna of this EUT is a unique(PIFA Antenna for 5G WiFi).

\* the EUT complies with the requirement of 15.203.





## 4 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.

### 4.1 MEASUREMENT EQUIPMENT USED

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2015-4-9	2016-4-8
DETECTOR NEGATIVE	Agilent	8473B	MY42240176	2015-5-11	2016-5-10
OSCILLOSCOPE	Agilent	DSO6104A	MY44002585	2015-3-16	2016-3-15
Power meter	Anritsu	ML2495A	1445010	2015-04-24	2016-04-23
Power sensor	Anritsu	MA2411B	1339220	2015-04-24	2016-04-23
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	N.C.R	N.C.R
DC Power Supply	AGILENT	E3632A	MY50340053	N.C.R	N.C.R
Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	2015-1-22	2016-1-21
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	N.C.R	N.C.R
DC POWER SUPPLY	GW instek	GPS-3303C	E903131	N.C.R	N.C.R
Temp. / Humidity Chamber	Kingson	THS-M1	242	2015-1-22	2016-1-21

977 Chamber					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2015-4-9	2016-4-8
EMI Test Receiver	R&S	ESCI	101378	2015-1-22	2016-1-21
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	2015-1-22	2016-1-21
Pre-Amplifier	Miteq	JS41-00101800-32-10P	1675713	2015-1-22	2016-1-21
Bilog Antenna	Sunol	JB1	A062604	2015-3-6	2016-3-5
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2015-3-7	2016-3-6
Turn Table	CT	CT123	4165	N.C.R	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R	N.C.R
Controller	CT	CT100	95637	N.C.R	N.C.R
Test Software			EZ-EMC		

Conducted Emission					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI TEST RECEIVER	R&S	ESCI	100781	2015-3-16	2016-3-15
V (V-LISN)	SCHWARZBECK	NNLK 8129	8129-143	N.C.R	N.C.R
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	05012	2015-3-16	2016-3-15
Pulse LIMITER	R&S	ESH3-Z2	100524	2015-9-24	2016-9-23
Test Software	EZ-EMC				

**Remark:** Each piece of equipment is scheduled for calibration once a year.

## 4.2 MEASUREMENT UNCERTAINTY

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028-1 [2] and shall correspond to an expansion factor (coverage factor)  $k = 1,96$  or  $k = 2$  (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 6 is based on such expansion factors.

**Table 6: Maximum measurement uncertainty**

Parameter	<u>UNCERTAINTY</u>
Radio frequency	$\pm 0.8 \times 10^{-7}$
RF power, conducted	0.2054
Maximum frequency deviation:	
-within 300 Hz and 6 kHz of audio frequency	1.3%
-within 6 kHz and 25 kHz of audio frequency	0.65 dB
Adjacent channel power	0.2054
Conducted spurious emission of transmitter, valid up to 6 GHz	0.2892
Conducted emission of receivers	+1.2/-1.1 dB
Radiated emission of transmitter, valid up to 6 GHz	$\pm 3.94$ dB
Radiated emission of receiver, valid up to 6 GHz	$\pm 3.94$ dB
RF level uncertainty for a given BER	$\pm 0.3$ dB
Temperature	0.1979
Humidity	$\pm 1$ %

## **5 FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

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

**No.10Weiye Rd., Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.**

The sites are constructed in conformance with the requirements of ANSI C63.10:2013 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **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 preselectors 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 TABLE OF ACCREDITATIONS AND LISTINGS**

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: 200581-0 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, 2324E-1 for 10m chamber 10m, 2324E-2 for 10m chamber 3m; the test facilities are listed with USA, Certification and Engineering Bureau, 424105 for 10m chamber 10m, 238958 for 10m chamber 3m.

**5.4 TABLE OF ACCREDITATIONS AND LISTINGS**

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	47 CFR FCC Part 15/18 (using ANSI C63.10 :2013); VCCI V3; CNS 13438; CNS 13439; CNS 13803; CISPR 11; EN 55011; CISPR 13; EN 55013; CISPR 22:2005; CISPR 22:1997 +A1 :2000+A2 :2002; EN 55022:2006; EN55022 :1998 +A1 :2001+A2 :2003; EN 61000-6-3 (excluding discontinuous interference); EN 61000-6-4; AS/NZS CISPR 22; CAN/CSA-CEI/IEC CISPR 22; EN 61000-3-2; EN 61000-3-3; EN550024; EN 61000-4-2; EN 61000-4-3; EN61000-4-4; EN 61000-4-5; EN 61000-4-6; IEC 61000-4-8; EN 61000-4-11; IEC61000-3-2; IEC61000-3-3; IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4; IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-8; IEC 61000-4-11; EN 300 220-3; EN 300 328; EN 300 330-2; EN 300 440-1; EN 300-440-2; EN 300 893; EN 301 489-01; EN 301 489-3; EN 301 489-07; EN 301 489-17; 47 CFR FCC Part 15, 22, 24	
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	 93105, 90471
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	<b>VCCI</b> R-1600 C-1707 G-216

*\* 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 1 for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.
1	Notebook	dell	E5430

**Remark:**

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

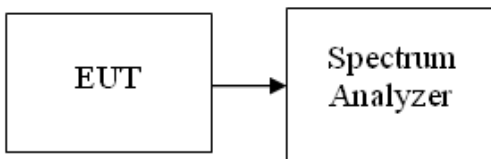
## 7 FCC PART 15 REQUIREMENTS

### 7.1 6 DB BANDWIDTH MEASUREMENT

#### LIMIT

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz.

#### 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 =100KHz, VBW  $\geq$  3RBW, Detector = Peak. Trace mode = max hold.
4. Measure the maximum width of the emission that is 6 dB down from the peak of the emission..
5. Measure and record the results in the test report

#### TEST RESULTS

*No non-compliance noted*

#### Test Data

**Test mode: IEEE 802.11a mode/chain 0**

**5725~5850MHz**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	FCC 6 dB Bandwidth Min. Limit (MHz)
Low	5745	16.490	0.5
Mid	5785	16.466	0.5
High	5825	16.438	0.5

**Test mode: IEEE 802.11a mode/chain 1**

**5725~5850MHz**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	FCC 6 dB Bandwidth Min. Limit (MHz)
Low	5745	16.506	0.5
Mid	5785	16.463	0.5
High	5825	16.416	0.5

**Test mode: IEEE 802.11n HT20 mode/chain 0**

**5725~5850MHz**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	FCC 6 dB Bandwidth Min. Limit (MHz)
Low	5745	17.645	0.5
Mid	5785	17.611	0.5
High	5825	17.661	0.5

**Test mode: IEEE 802.11n HT20 mode/chain 1**

**5725~5850MHz**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	FCC 6 dB Bandwidth Min. Limit (MHz)
Low	5745	17.296	0.5
Mid	5785	17.303	0.5
High	5825	17.338	0.5



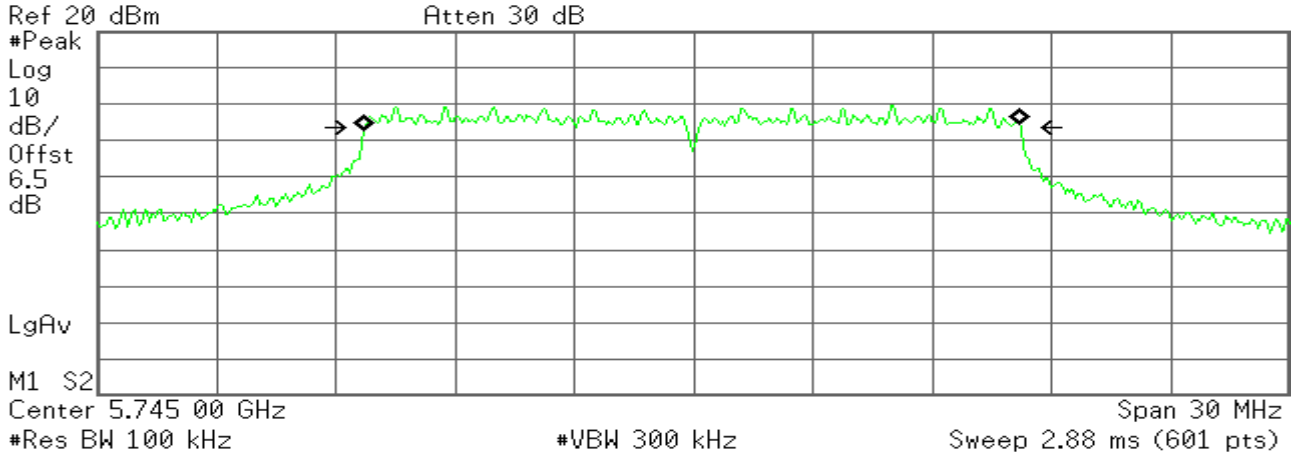
**Test Plot**

**IEEE 802.11a mode/chain 0**

**6dB Bandwidth (CH Low)**

Agilent

R T



**Occupied Bandwidth**  
16.5029 MHz

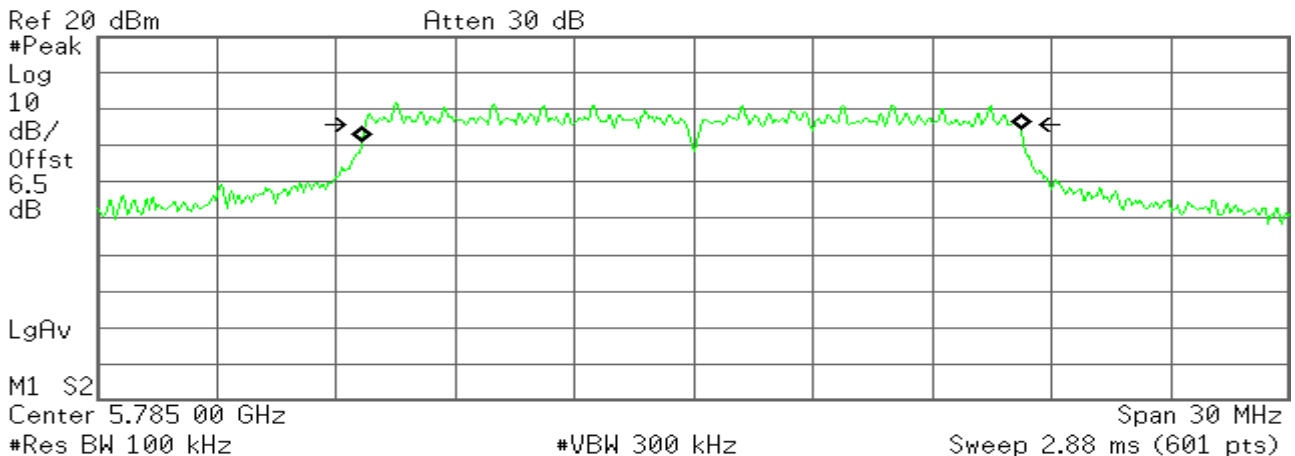
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -34.816 kHz  
**x dB Bandwidth** 16.490 MHz

**6dB Bandwidth (CH Mid)**

Agilent

R T



**Occupied Bandwidth**  
16.5829 MHz

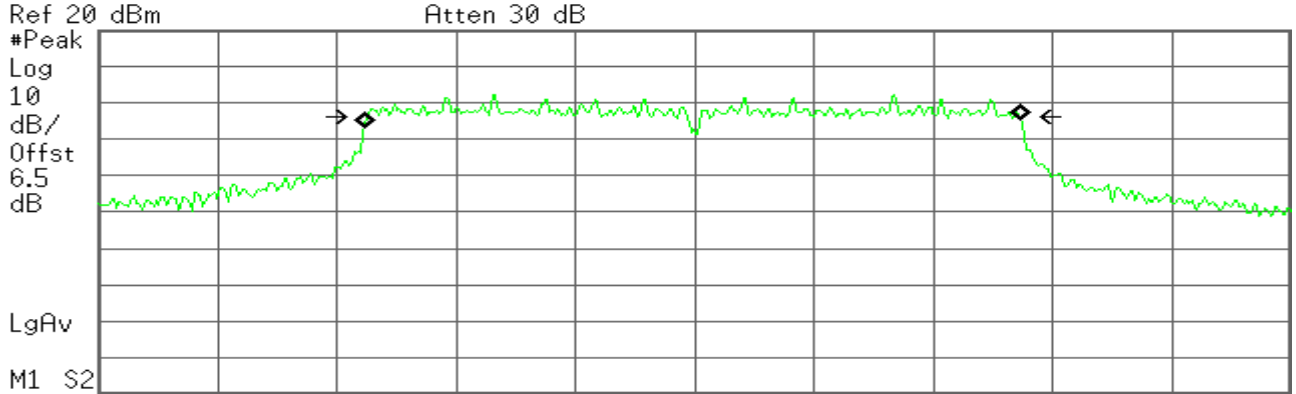
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -53.578 kHz  
**x dB Bandwidth** 16.466 MHz

**6dB Bandwidth (CH High)**

Agilent

R T



M1 S2 Center 5.825 00 GHz Span 30 MHz  
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**16.5301 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

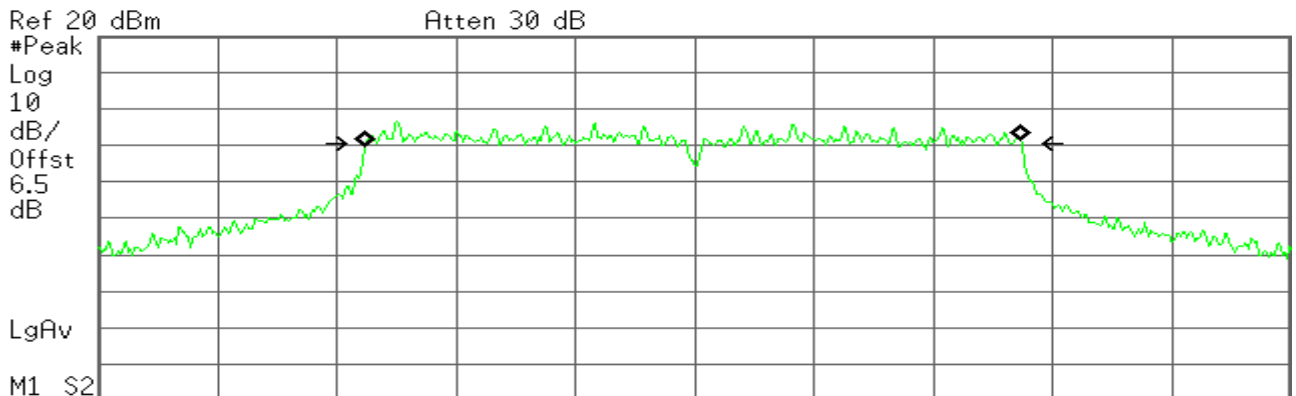
**Transmit Freq Error** -43.058 kHz  
**x dB Bandwidth** 16.438 MHz

**IEEE 802.11a mode/chain 1**

**6dB Bandwidth (CH Low)**

Agilent

R T



M1 S2 Center 5.745 00 GHz Span 30 MHz  
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**16.5073 MHz**

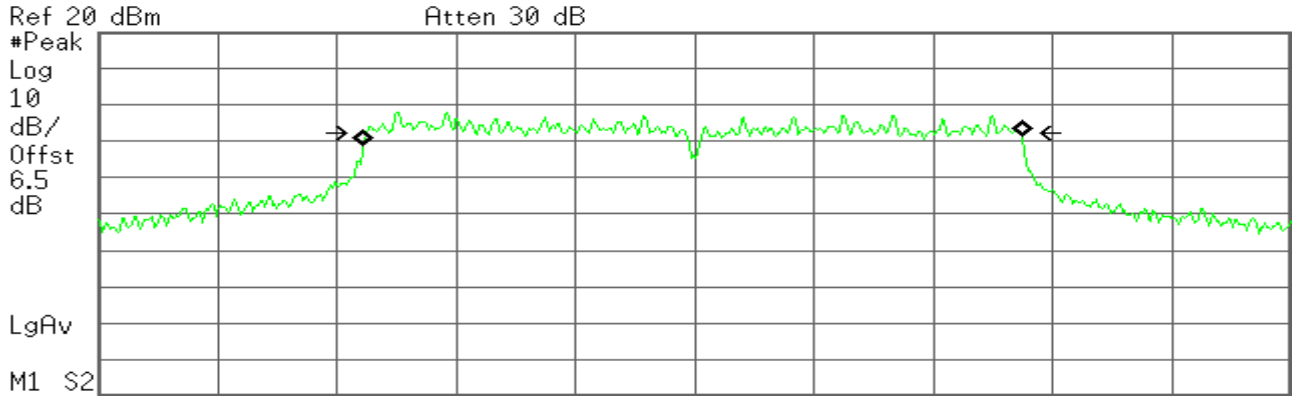
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -31.923 kHz  
**x dB Bandwidth** 16.506 MHz

**6dB Bandwidth (CH Mid)**

Agilent

R T



Center 5.785 00 GHz Span 30 MHz  
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**16.5516 MHz**

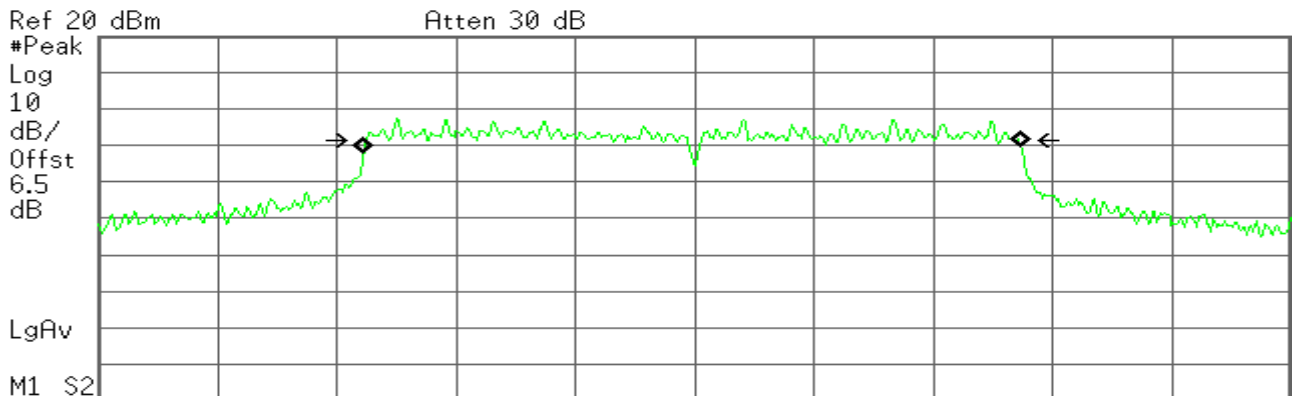
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -49.268 kHz  
**x dB Bandwidth** 16.463 MHz

**6dB Bandwidth (CH High)**

Agilent

R T



Start 5.810 00 GHz Stop 5.840 00 GHz  
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**16.5442 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

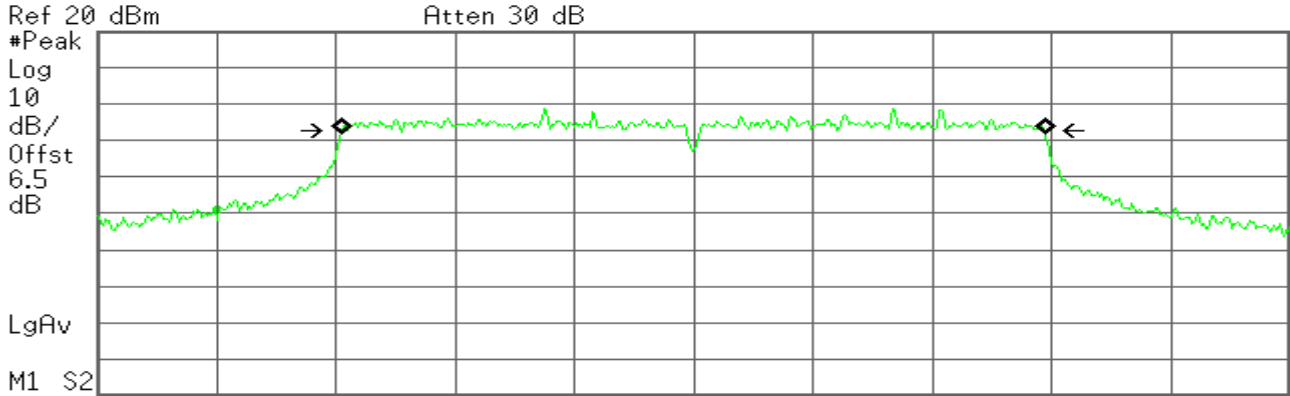
**Transmit Freq Error** -55.000 kHz  
**x dB Bandwidth** 16.416 MHz

**IEEE 802.11n HT20 mode/chain 0**

**6dB Bandwidth (CH Low)**

Agilent

R T



Center 5.745 00 GHz Span 30 MHz  
#Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**17.7033 MHz**

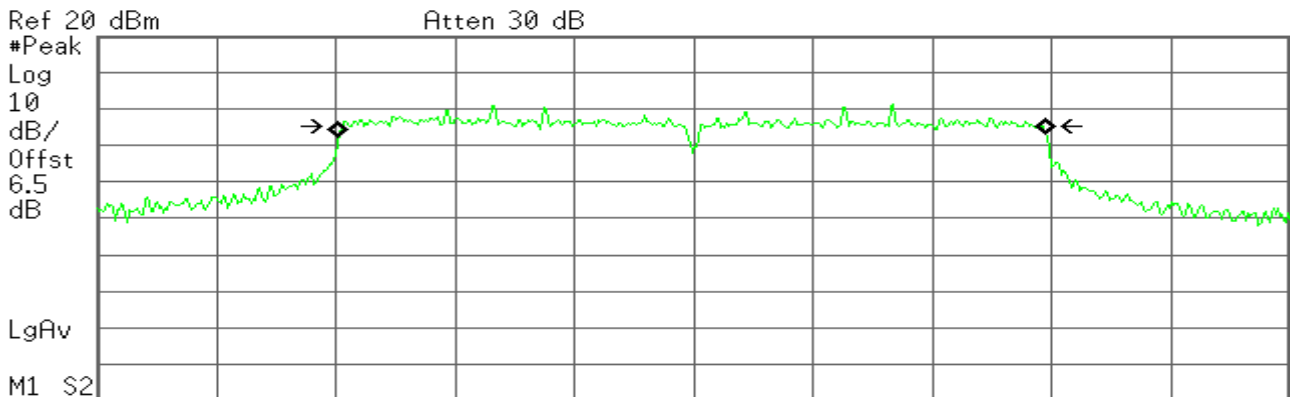
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -19.941 kHz  
**x dB Bandwidth** 17.645 MHz

**6dB Bandwidth (CH Mid)**

Agilent

R T



Center 5.785 00 GHz Span 30 MHz  
#Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**17.7896 MHz**

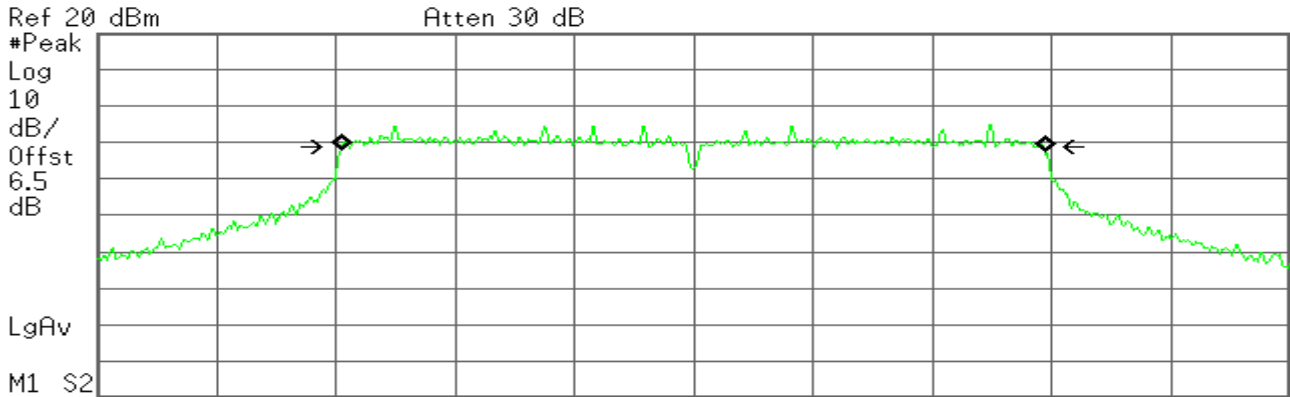
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -34.448 kHz  
**x dB Bandwidth** 17.611 MHz

**6dB Bandwidth (CH High)**

Agilent

R T



Ref 20 dBm Atten 30 dB  
 #Peak  
 Log  
 10  
 dB/  
 Offst  
 6.5  
 dB  
 LgAv  
 M1 S2  
 Center 5.825 00 GHz Span 30 MHz  
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**17.7089 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

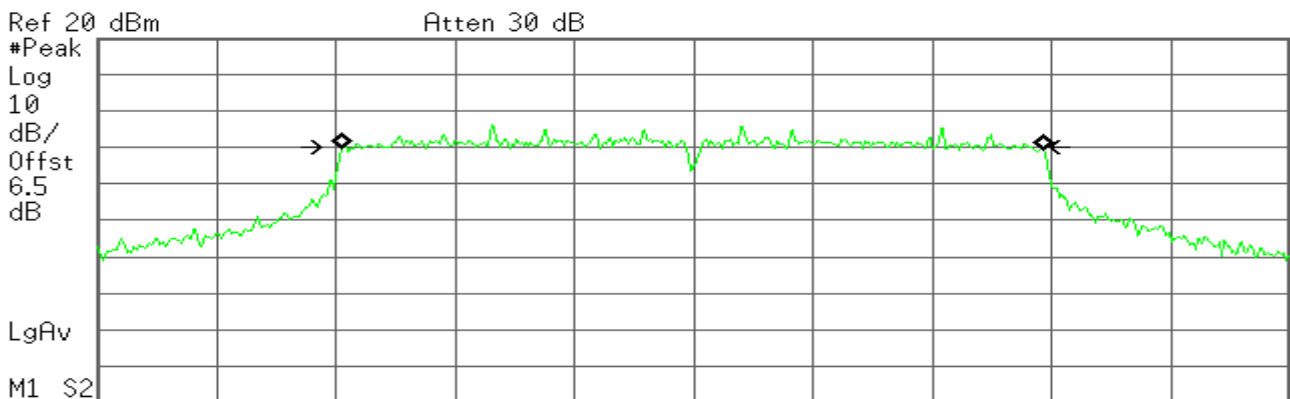
**Transmit Freq Error** -17.012 kHz  
**x dB Bandwidth** 17.661 MHz

**IEEE 802.11n HT20 mode/chain 1**

**6dB Bandwidth (CH Low)**

Agilent

R T



Ref 20 dBm Atten 30 dB  
 #Peak  
 Log  
 10  
 dB/  
 Offst  
 6.5  
 dB  
 LgAv  
 M1 S2  
 Center 5.745 00 GHz Span 30 MHz  
 #Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**17.6674 MHz**

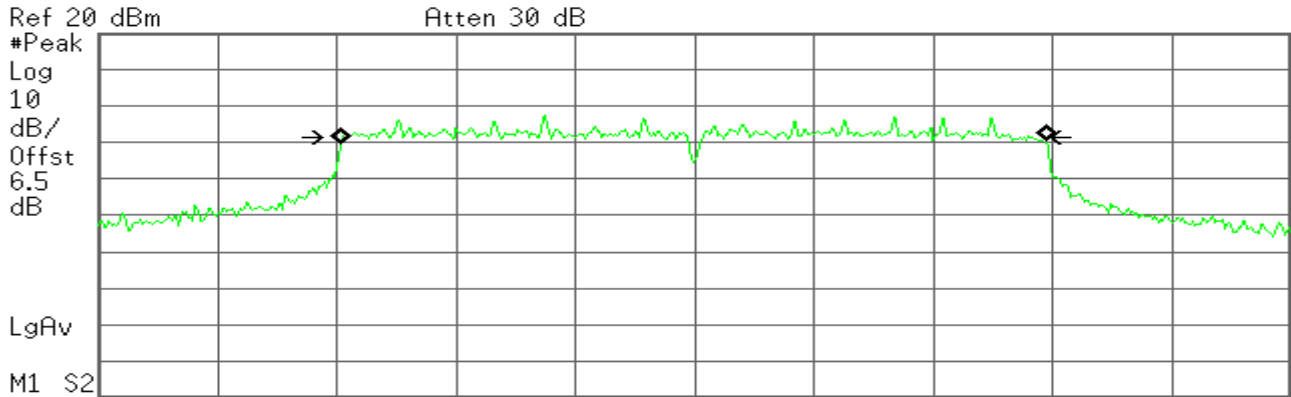
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -21.701 kHz  
**x dB Bandwidth** 17.296 MHz

**6dB Bandwidth (CH Mid)**

Agilent

R T



Center 5.785 00 GHz

Span 30 MHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**17.7285 MHz**

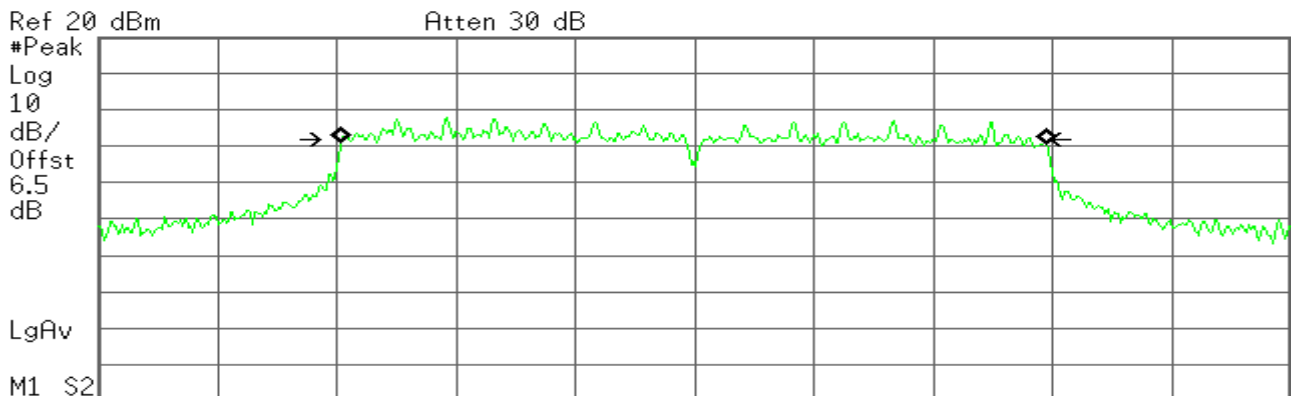
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -27.939 kHz  
**x dB Bandwidth** 17.303 MHz

**6dB Bandwidth (CH High)**

Agilent

R T



Start 5.810 00 GHz

Stop 5.840 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.88 ms (601 pts)

**Occupied Bandwidth**  
**17.7312 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

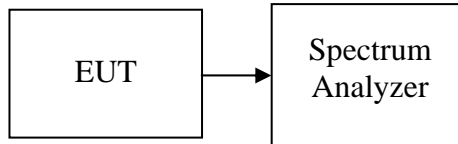
**Transmit Freq Error** -27.062 kHz  
**x dB Bandwidth** 17.338 MHz

**7.2 99% BANDWIDTH MEASUREMENT**

**LIMIT**

None; for reporting purposes only  
RSS-Gen 4.6.1

**Test Configuration**



**TEST PROCEDURE**

The transmitter output is connected to the spectrum analyzer. The RBW is set to close to 1% of the selected span as is possible without being below 1%. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

**TEST RESULTS**

*No non-compliance noted*

**Test Data**

**IEEE 802.11a mode / Chain 0**

Channel	Frequency (MHz)	Bandwidth (MHz)	Result
Low	5745	16.9011	PASS
Mid	5785	17.0631	PASS
High	5825	16.9729	PASS

**IEEE 802.11a mode / Chain 1**

Channel	Frequency (MHz)	Bandwidth (MHz)	Result
Low	5745	16.8572	PASS
Mid	5785	17.0106	PASS
High	5825	17.0223	PASS

**IEEE 802.11n HT20 mode / Chain 0**

Channel	Frequency (MHz)	Bandwidth (MHz)	Result
Low	5745	17.9313	PASS
Mid	5785	18.0104	PASS
High	5825	17.9954	PASS

**IEEE 802.11n HT20 mode / Chain 1**

Channel	Frequency (MHz)	Bandwidth (MHz)	Result
Low	5745	17.8185	PASS
Mid	5785	18.0169	PASS
High	5825	18.0079	PASS

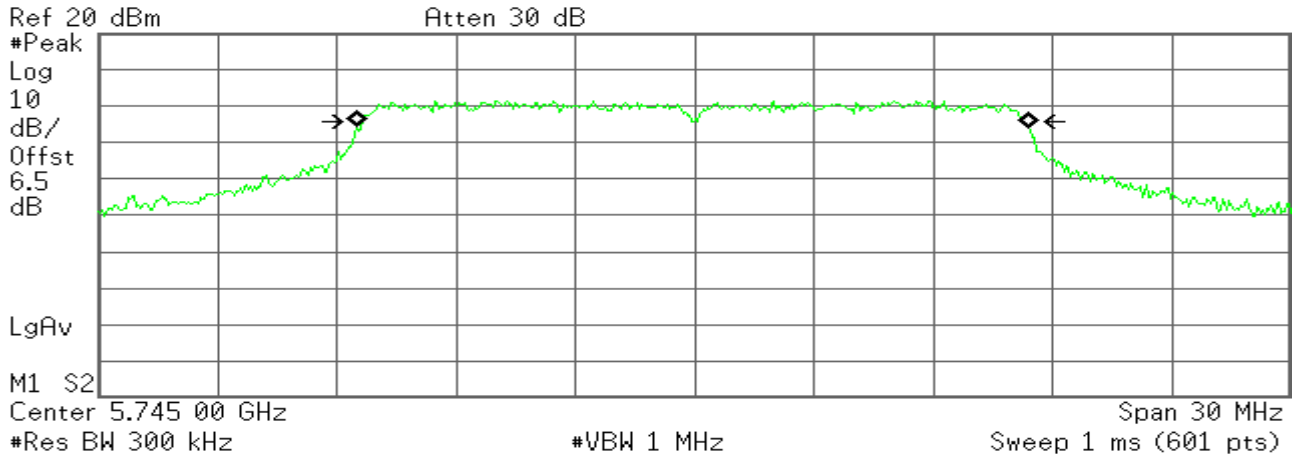
**Test Plot**

**IEEE 802.11n MODE/chain 0**

**99% Bandwidth (CH Low)**

Agilent

R T



**Occupied Bandwidth**  
16.9011 MHz

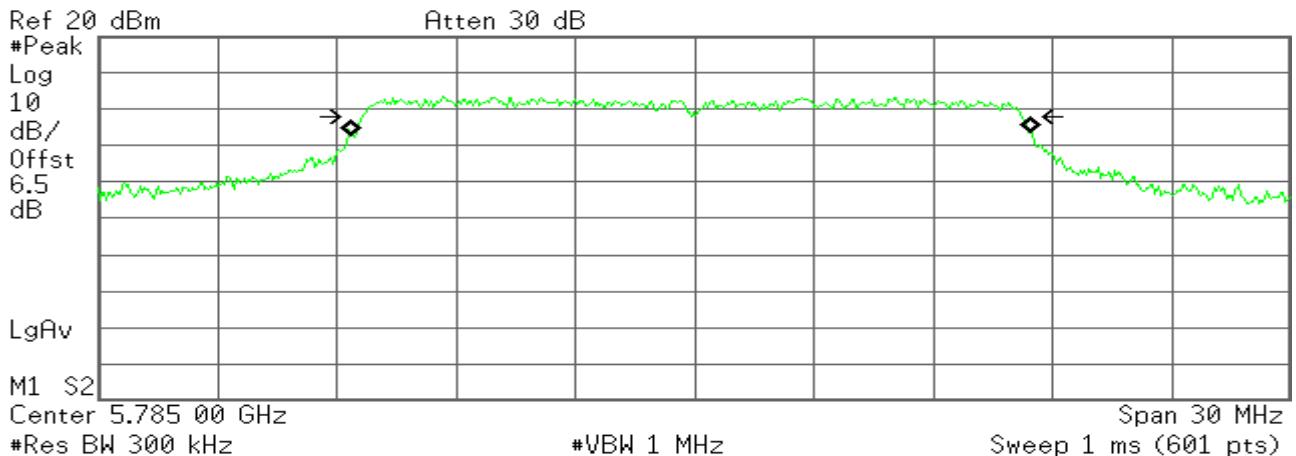
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -43.296 kHz  
**x dB Bandwidth** 16.662 MHz

**99% Bandwidth (CH Mid)**

Agilent

R T



**Occupied Bandwidth**  
17.0631 MHz

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

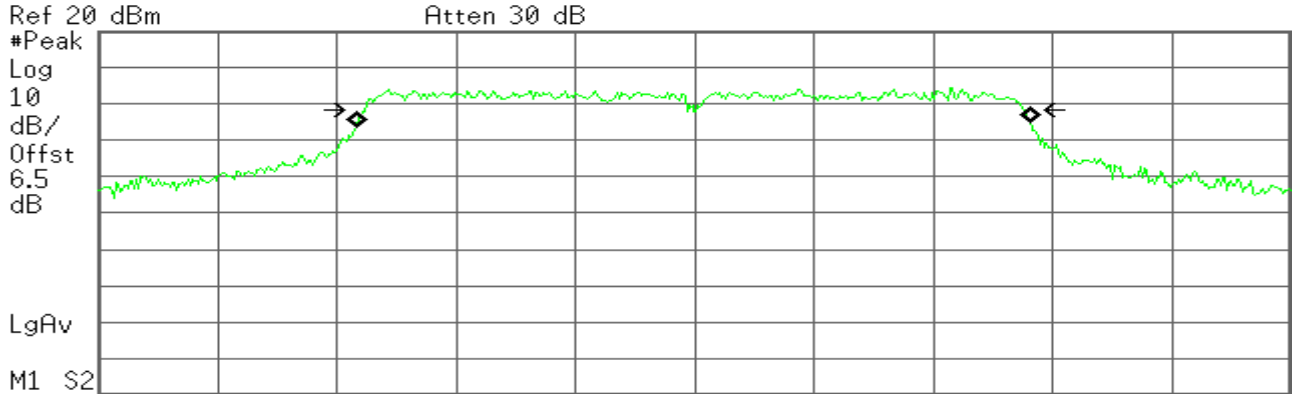
**Transmit Freq Error** -100.440 kHz  
**x dB Bandwidth** 16.628 MHz



**99% Bandwidth (CH High)**

Agilent

R T



Ref 20 dBm Atten 30 dB  
 #Peak  
 Log  
 10  
 dB/  
 Offst  
 6.5  
 dB  
 LgAv  
 M1 S2  
 Center 5.825 00 GHz Span 30 MHz  
 #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**16.9729 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

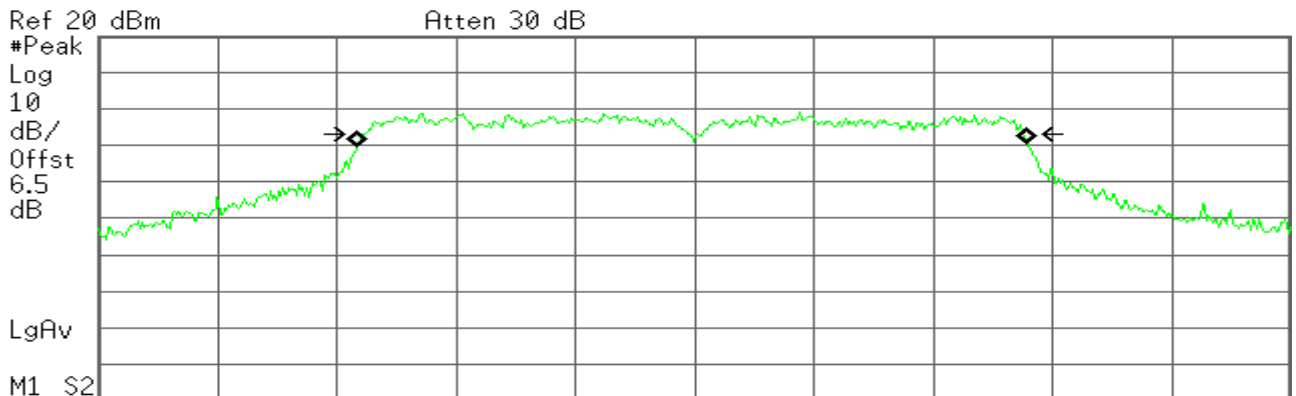
**Transmit Freq Error** -30.279 kHz  
**x dB Bandwidth** 16.569 MHz

**IEEE 802.11n MODE/chain 1**

**99% Bandwidth (CH Low)**

Agilent

R T



Ref 20 dBm Atten 30 dB  
 #Peak  
 Log  
 10  
 dB/  
 Offst  
 6.5  
 dB  
 LgAv  
 M1 S2  
 Center 5.745 00 GHz Span 30 MHz  
 #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**16.8572 MHz**

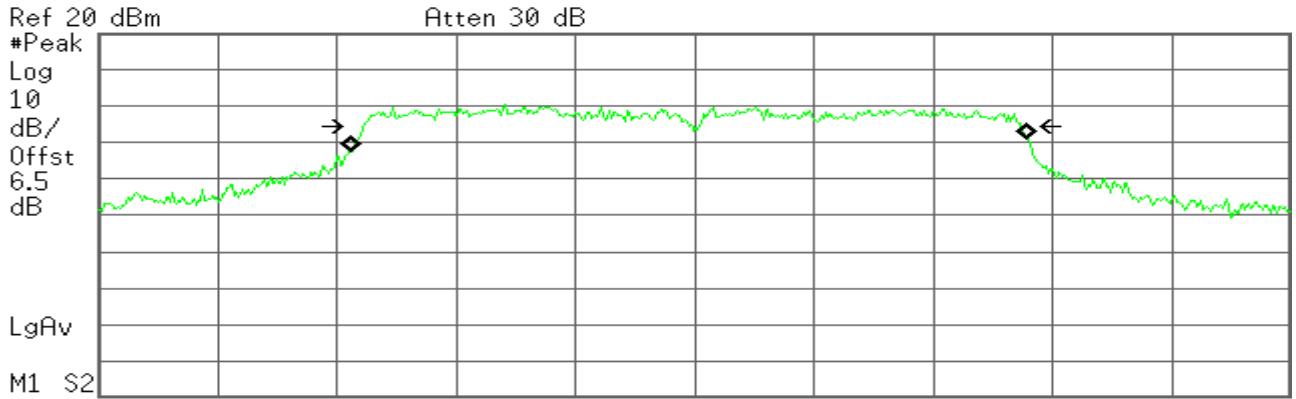
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -54.026 kHz  
**x dB Bandwidth** 16.564 MHz

**99% Bandwidth (CH Mid)**

Agilent

R T



Center 5.785 00 GHz Span 30 MHz  
#Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**17.0106 MHz**

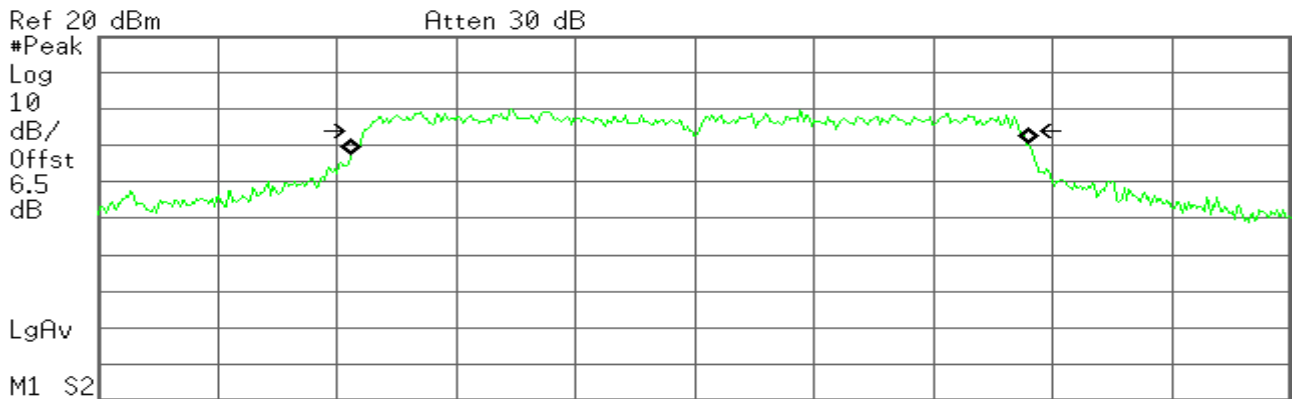
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -154.177 kHz  
**x dB Bandwidth** 16.551 MHz

**99% Bandwidth (CH High)**

Agilent

R T



Center 5.825 00 GHz Span 30 MHz  
#Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**17.0223 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

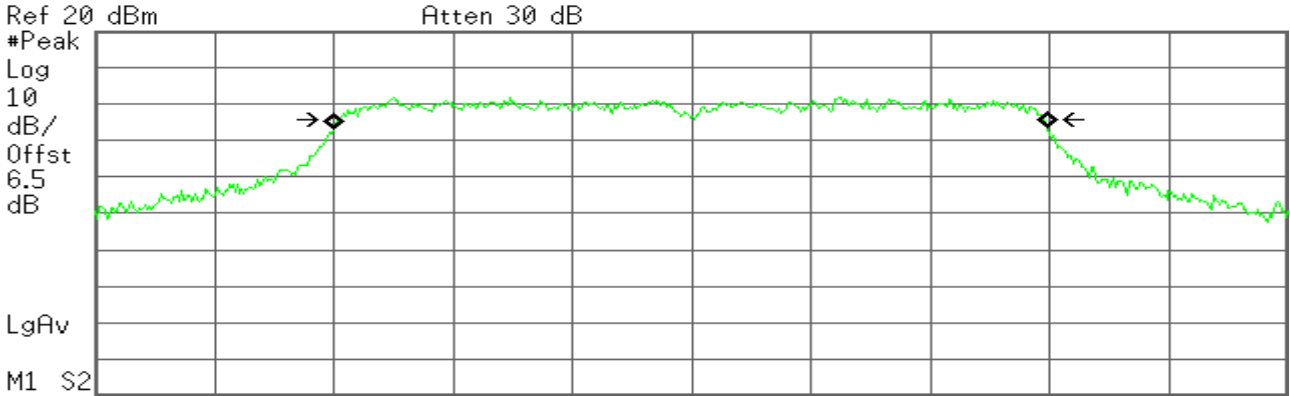
**Transmit Freq Error** -115.534 kHz  
**x dB Bandwidth** 16.501 MHz

**IEEE 802.11n HT20 MODE/chain 0**

**99% Bandwidth (CH Low)**

Agilent

R T



Center 5.745 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**17.9313 MHz**

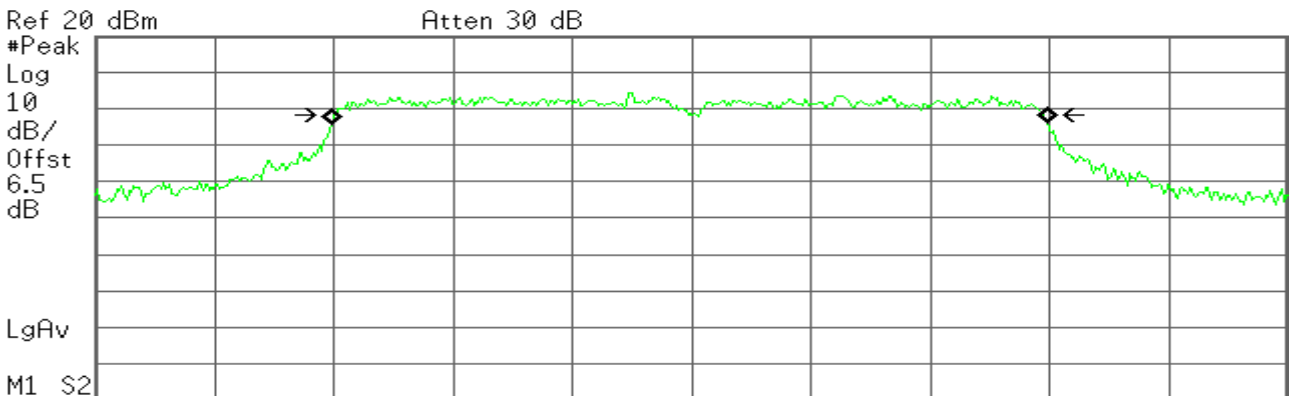
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -37.158 kHz  
**x dB Bandwidth** 17.771 MHz

**99% Bandwidth (CH Mid)**

Agilent

R T



Center 5.785 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**18.0104 MHz**

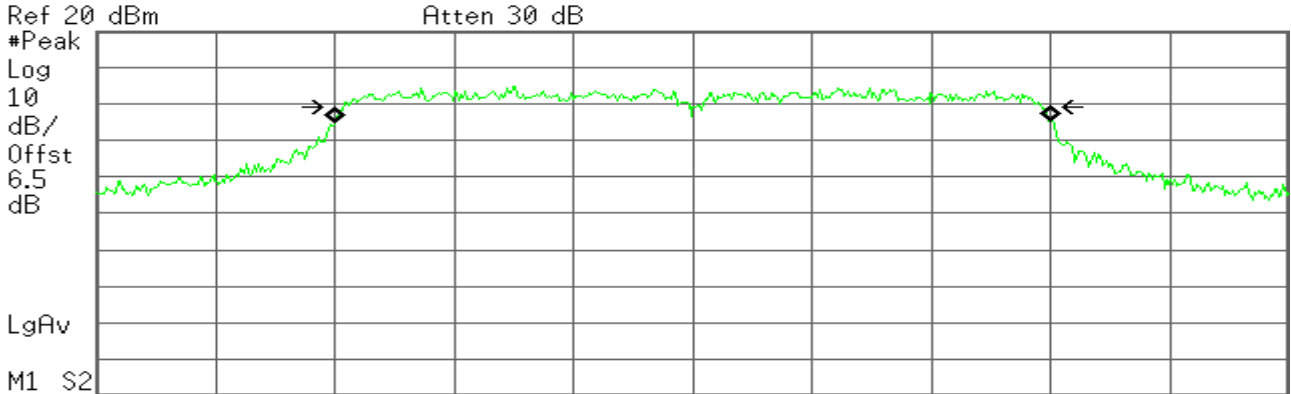
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -44.746 kHz  
**x dB Bandwidth** 17.778 MHz

**99% Bandwidth (CH High)**

Agilent

R T



Ref 20 dBm Atten 30 dB  
 #Peak Log 10 dB/Offst 6.5 dB  
 LgAv  
 M1 S2  
 Center 5.825 00 GHz Span 30 MHz  
 #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**17.9954 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

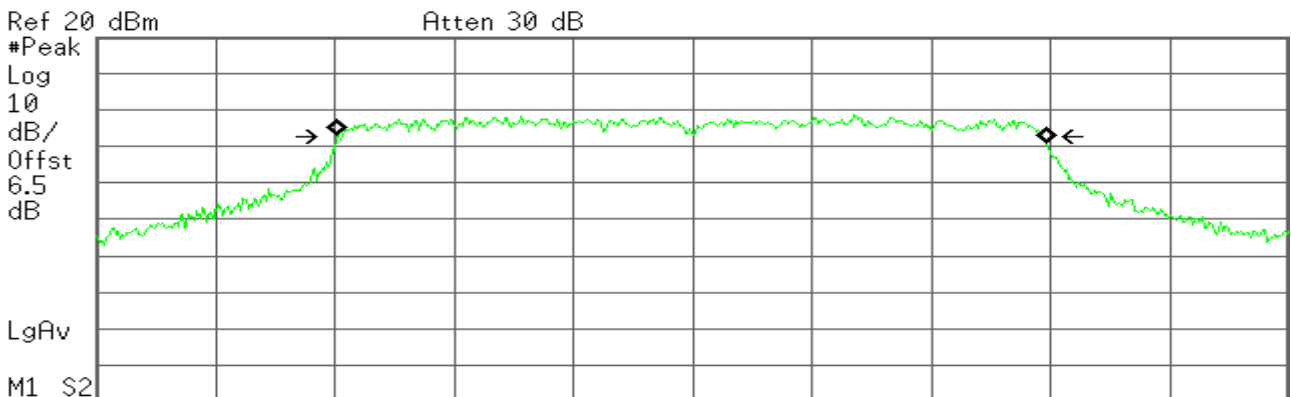
**Transmit Freq Error** -19.499 kHz  
**x dB Bandwidth** 17.591 MHz

**IEEE 802.11n HT20 MODE/chain 1**

**99% Bandwidth (CH Low)**

Agilent

R T



Ref 20 dBm Atten 30 dB  
 #Peak Log 10 dB/Offst 6.5 dB  
 LgAv  
 M1 S2  
 Center 5.745 00 GHz Span 30 MHz  
 #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**17.8185 MHz**

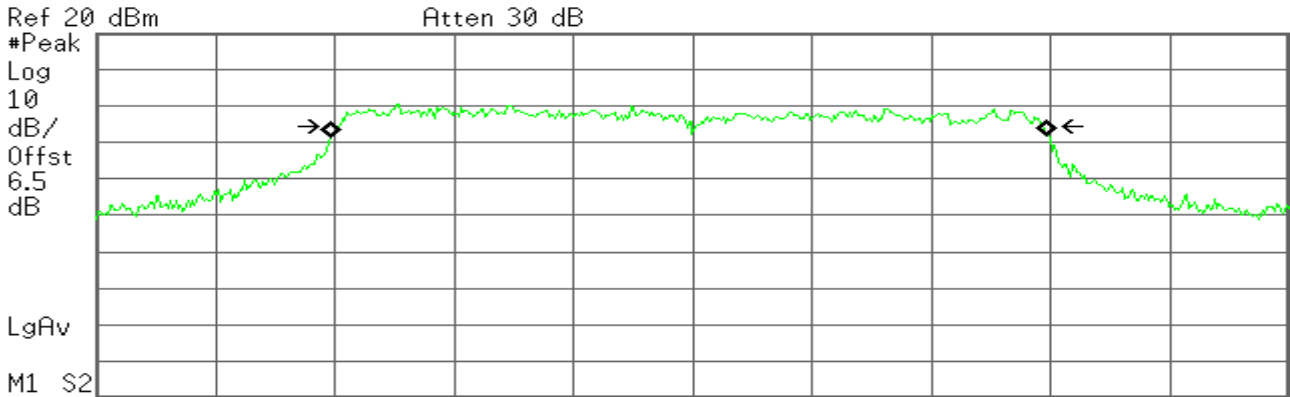
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -28.666 kHz  
**x dB Bandwidth** 17.762 MHz

**99% Bandwidth (CH Mid)**

Agilent

R T



Center 5.785 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**18.0169 MHz**

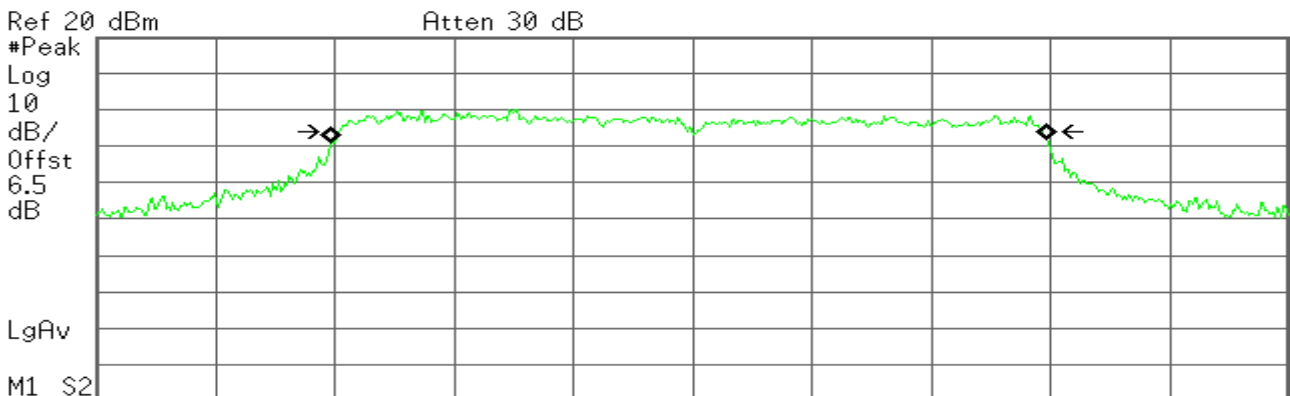
**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -97.865 kHz  
**x dB Bandwidth** 17.703 MHz

**99% Bandwidth (CH High)**

Agilent

R T



Center 5.825 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**18.0079 MHz**

**Occ BW % Pwr** 99.00 %  
**x dB** -6.00 dB

**Transmit Freq Error** -84.463 kHz  
**x dB Bandwidth** 17.687 MHz

## 7.3 MAXIMUM CONDUCTED OUTPUT POWER

### LIMIT

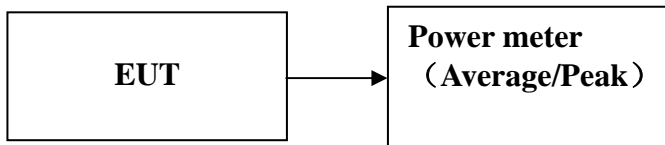
According to §15.407(a),

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

*If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.*

The peak power shall not exceed the limit as follow:

### Test Configuration



*The EUT was connected to a spectrum analyzer through a 50Ω RF cable.*

### TEST PROCEDURE

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

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

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

### TEST RESULTS

*No non-compliance noted*

**Test Data**

**Test mode: IEEE 802.11a mode**

**5725~5850MHz**

Channel	Frequency (MHz)	Average Conducted Power (dBm)			Limit (dBm)
		Chain 0	Chain 1	Total Maximum Conducted Output Power	
Low	5745	11.10	8.94	13.16	30
Mid	5785	12.64	9.49	14.35	30
High	5825	13.81	9.89	15.29	30

**Test mode: IEEE 802.11n HT20 mode**

**5725~5850MHz**

Channel	Frequency (MHz)	Average Conducted Power (dBm)			Limit (dBm)
		Chain 0	Chain 1	Total Maximum Conducted Output Power	
Low	5745	11.09	8.78	13.10	30
Mid	5785	12.62	9.40	14.31	30
High	5825	12.89	9.75	14.61	30

**Note:**Duty factor has been offsetted with cableloss

**Remark:** Total Output Power (dBm) = 10\*LOG(10^(Chain 0 Output Power / 10)+10^(Chain 1 Output Power /10))

## 7.4 BAND EDGES MEASUREMENT

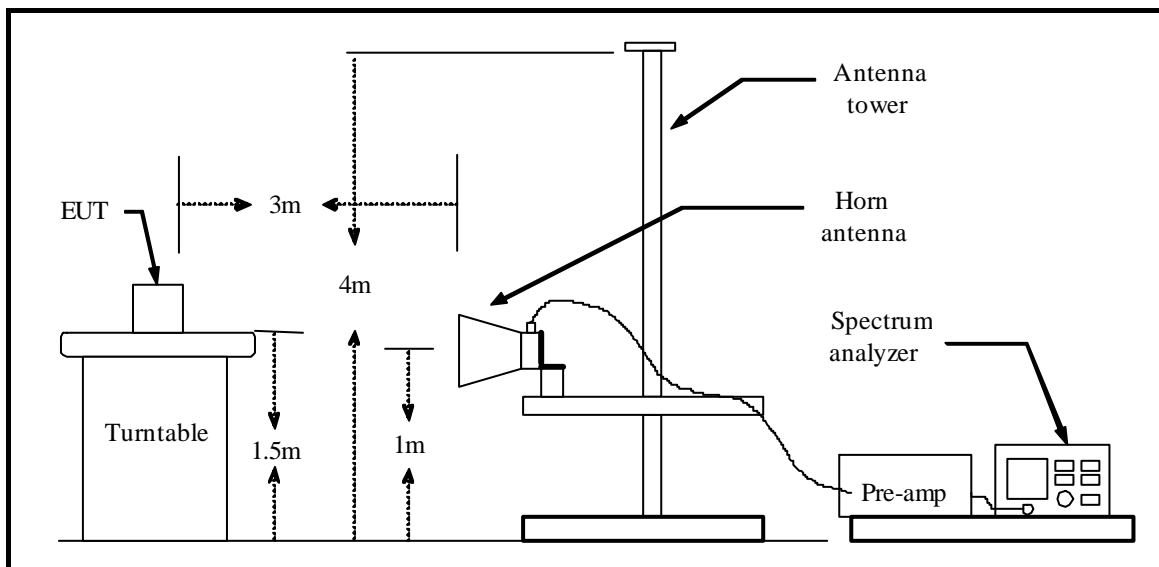
### LIMIT

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 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / 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.



<b>Operation Mode:</b>	Tx / IEEE 802.11a mode CH/ Low	<b>Test Date:</b>	2015-12-26
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5714.303	61.22	-0.77	60.45	68.20	-7.75	100	326	peak
2	5724.519	74.52	-0.75	73.77	78.20	-4.43	100	318	peak
3	N/A								

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5714.784	61.37	-0.77	60.60	68.20	-7.60	200	335	peak
2	5724.760	77.08	-0.75	76.33	78.20	-1.87	100	332	peak
3	N/A								

<b>Operation Mode:</b>	Tx / IEEE 802.11a mode/ CH High	<b>Test Date:</b>	2015-12-25
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5850.160	67.80	-0.53	67.27	78.20	-10.93	201	187	peak
2	5860.897	57.88	-0.51	57.37	68.20	-10.83	201	187	peak
3	N/A								

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5851.763	67.94	-0.53	67.41	78.20	-10.79	185	360	peak
2	5861.538	57.76	-0.51	57.25	68.20	-10.95	195	360	peak
3	N/A								

<b>Operation Mode:</b>	Tx / IEEE 802.11n HT20 mode/ CH Low	<b>Test Date:</b>	2015-12-25
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5713.101	57.97	-0.77	57.20	68.20	-11.00	173	0	peak
2	5723.438	75.96	-0.76	75.20	78.20	-3.00	201	195	peak
3	N/A								

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5712.861	60.01	-0.77	59.24	68.20	-8.96	201	186	peak
2	5724.159	77.16	-0.75	76.41	78.20	-1.79	201	186	peak
3	N/A								

<b>Operation Mode:</b>	Tx / IEEE 802.11n HT20 mode/ CH High	<b>Test Date:</b>	2015-12-25
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5850.160	71.80	-0.53	71.27	78.20	-6.93	201	145	peak
2	5860.256	62.04	-0.51	61.53	68.20	-6.67	131	360	peak
3	N/A								

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5850.160	71.75	-0.53	71.22	78.20	-6.98	200	200	peak
2	5860.096	62.12	-0.51	61.61	68.20	-6.59	176	360	peak
3	N/A								

## 7.5 POWER SPECTRAL DENSITY

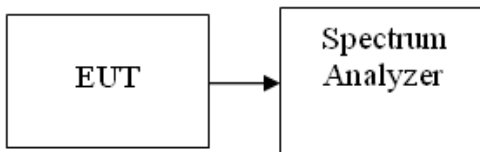
### LIMIT

According to §15.407(a),

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

*If transmitting antennas of directional gain greater than 6dBi are used, both the maximum transmit power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.*

### Test Configuration



### TEST PROCEDURE

1. The testing follows Method SA-2 of FCC KDB 789033 D01 General UNII Test Procedures v01r03.
2. Measure the duty cycle, Set span to encompass the entire emission bandwidth (EBW) of the signal. Set RBW = 300 kHz. Set VBW  $\geq$  1 MHz. Number of points in sweep  $\geq$  2 Span / RBW. Sweep time = auto. Detector = RMS, Trace average at least 100 traces in power averaging mode. Add  $10 \log(500\text{kHz}/\text{RBW})$  to the test result. Add  $10 \log(1/x)$ , where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add  $10 \log(1/0.25) = 6$  dB if the duty cycle is 25 percent.
3. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
4. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

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

### TEST RESULTS

*No non-compliance noted*

### Test Data

Test mode: IEEE 802.11a mode

#### 5725~5850MHz

Channel	Frequency (MHz)	Average PSD (dBm/300kHz)		10log (500kHz/RBW) Factor (dB)	Average PSD (dBm/500kHz)		Total Average PSD (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	Result
		Chain 0	Chain 1		Chain 0	Chain 1			
Low	5745	2.41	-0.49	2.22	4.63	1.73	6.43	30.00	PASS
Mid	5785	3.84	0.60	2.22	6.06	2.82	7.75	30.00	PASS
High	5825	4.45	0.23	2.22	6.67	2.45	8.06	30.00	PASS

Test mode: IEEE 802.11n HT20 mode

#### 5725~5850MHz

Channel	Frequency (MHz)	Average PSD (dBm/300kHz)		10log (500kHz/RBW) Factor (dB)	Average PSD (dBm/500kHz)		Total Average PSD (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	Result
		Chain 0	Chain 1		Chain 0	Chain 1			
Low	5745	1.67	-1.55	2.22	3.89	0.67	5.58	30.00	PASS
Mid	5785	3.99	-0.42	2.22	6.21	1.80	7.55	30.00	PASS
High	5825	4.21	-0.34	2.22	6.43	1.88	7.74	30.00	PASS

**Note:**Duty factor has been offsetted with cableloss

**Remark:** Total PPSD (dBm) =  $10 * \text{LOG}(10^{(Chain 0 PPSD / 10)} + 10^{(Chain 1 PPSD / 10)})$

**Test Plot**

**IEEE 802.11a mode/chain 0**

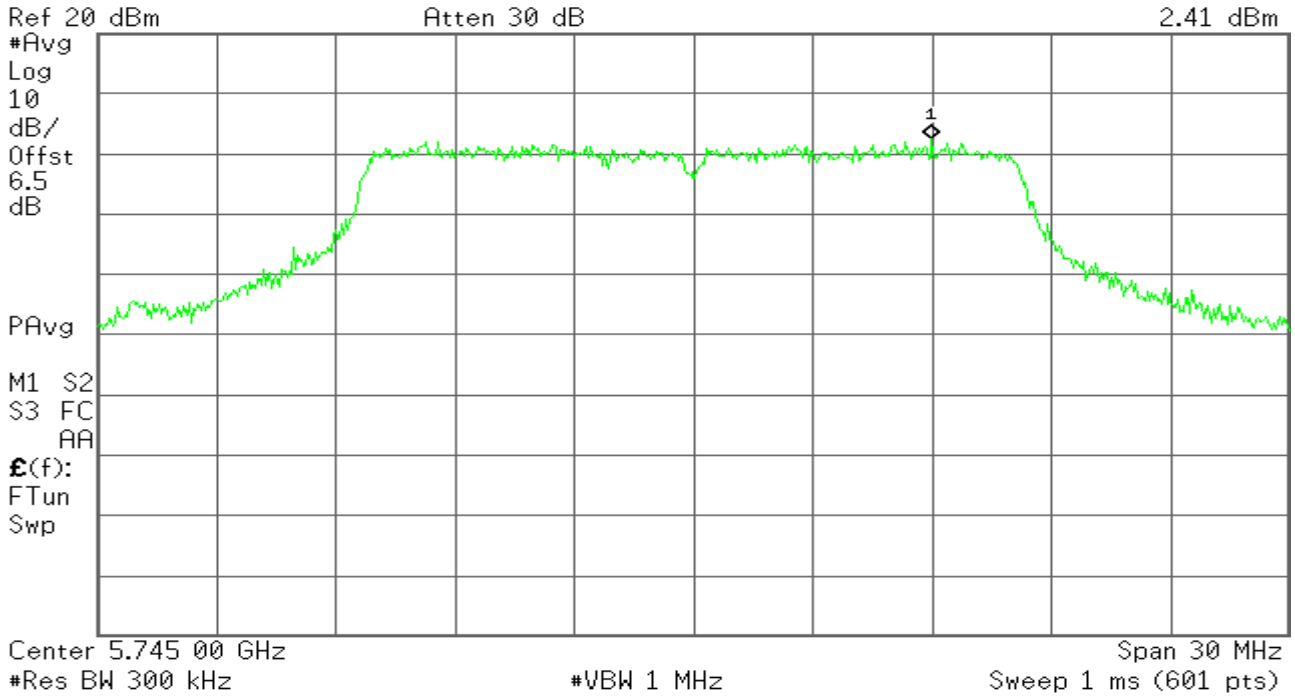
**5725~5850MHz**

**CH Low**

**Agilent**

**R T**

Mkr1 5.751 00 GHz  
2.41 dBm

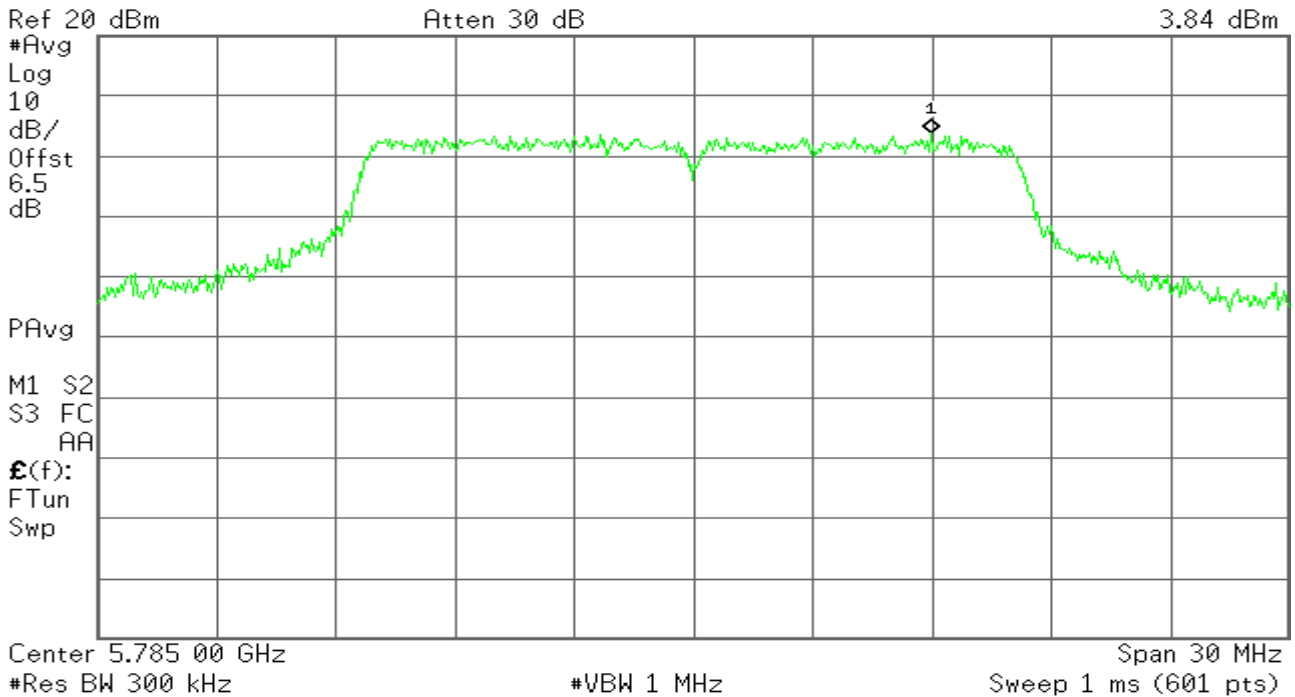


**CH Mid**

**Agilent**

**R T**

Mkr1 5.791 00 GHz  
3.84 dBm



CH High

Agilent

R T

Mkr1 5.818 30 GHz  
4.45 dBm

Ref 20 dBm

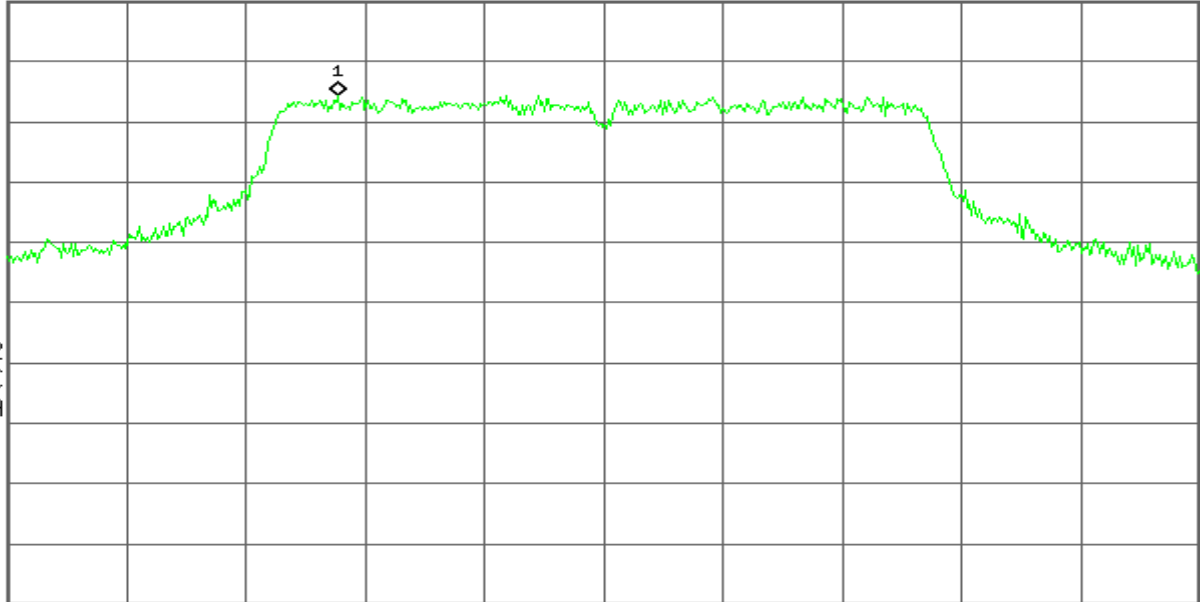
Atten 30 dB

#Avg  
Log  
10  
dB/  
Offst  
6.5  
dB

PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.825 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

IEEE 802.11n mode/chain 1  
5725~5850MHz

CH Low

Agilent

R T

Mkr1 5.738 25 GHz  
-0.49 dBm

Ref 20 dBm

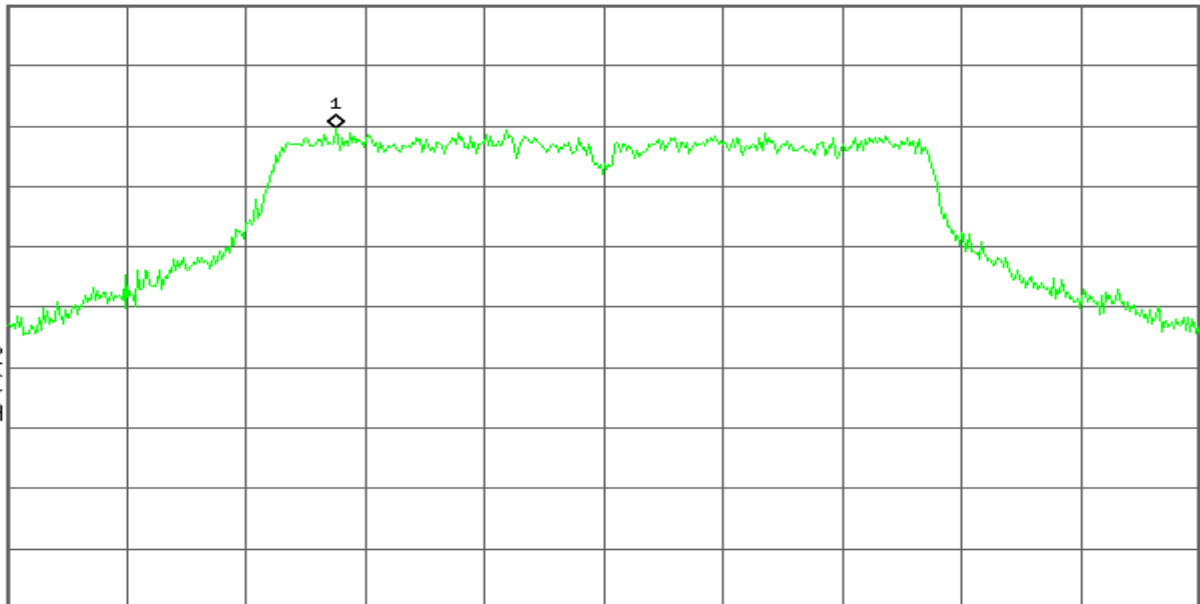
Atten 30 dB

#Avg  
Log  
10  
dB/  
Offst  
6.5  
dB

PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.745 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**CH Mid**

Agilent

R T

Mkr1 5.787 70 GHz  
0.60 dBm

Ref 20 dBm

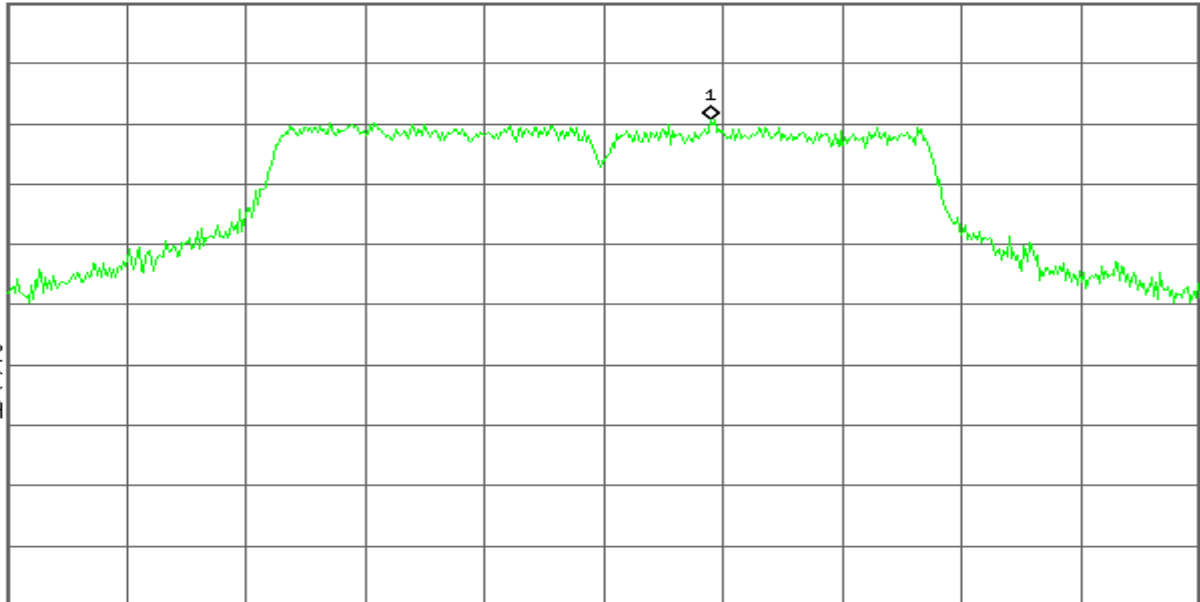
Atten 30 dB

#Avg  
Log  
10  
dB/  
Offst  
6.5  
dB

PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.785 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**CH High**

Agilent

R T

Mkr1 5.820 40 GHz  
0.23 dBm

Ref 20 dBm

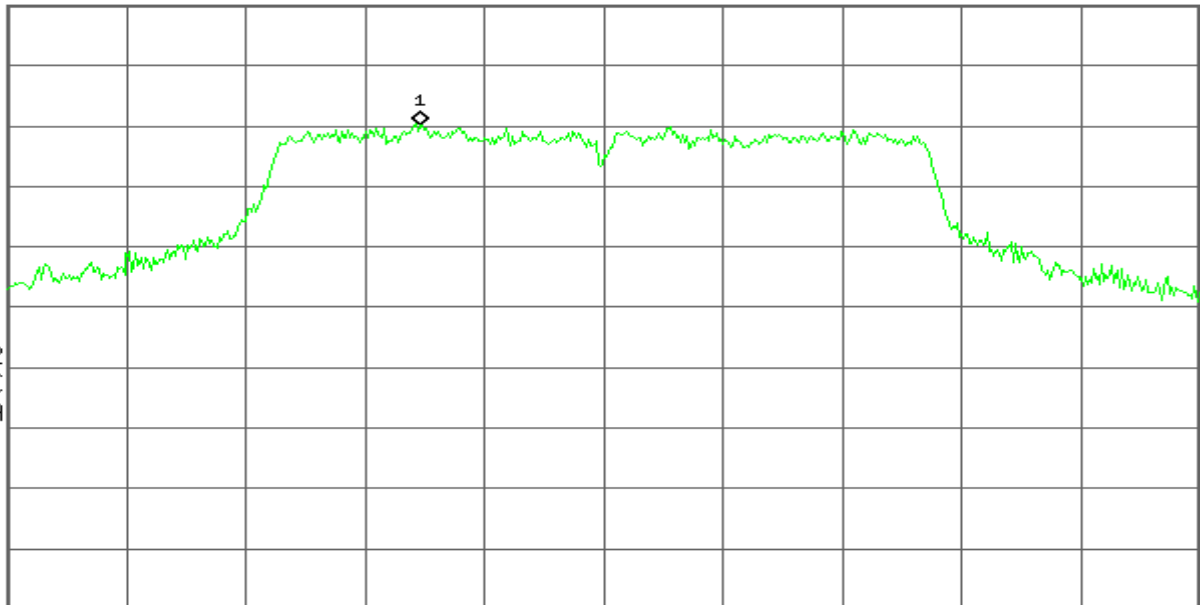
Atten 30 dB

#Avg  
Log  
10  
dB/  
Offst  
6.5  
dB

PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.825 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)



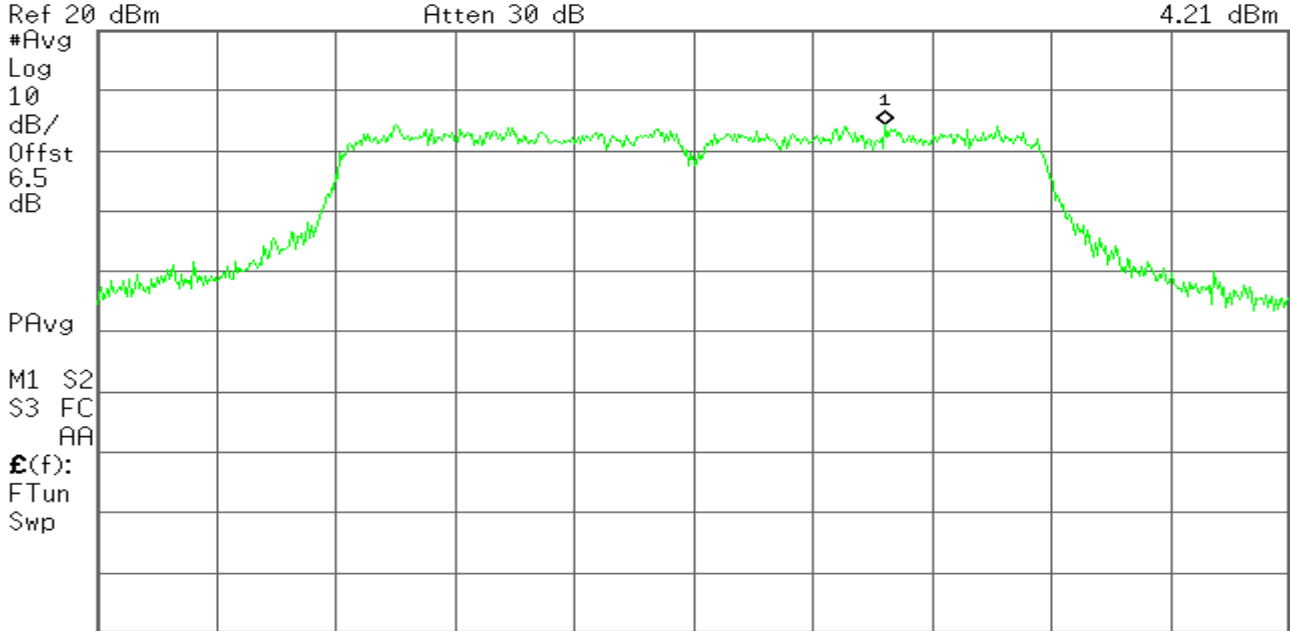


**CH High**

Agilent

R T

Mkr1 5.829 80 GHz  
4.21 dBm



Center 5.825 00 GHz Span 30 MHz  
#Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

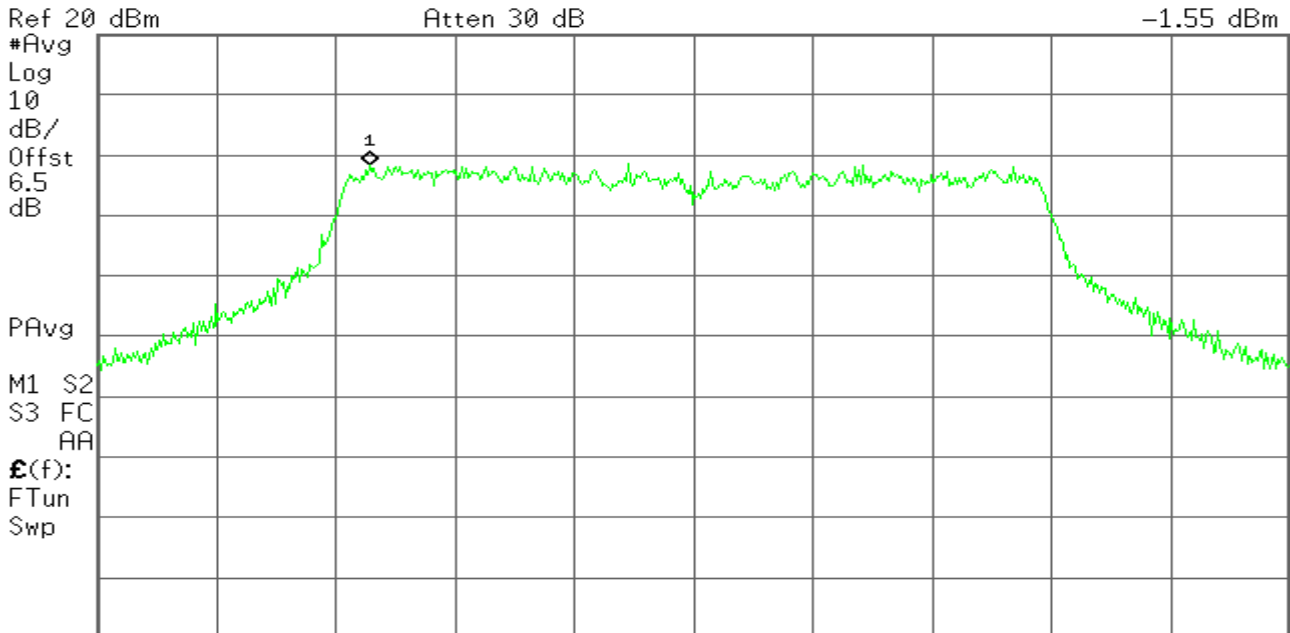
**IEEE 802.11a HT20 mode/chain 1  
5725~5850MHz**

**CH Low**

Agilent

R T

Mkr1 5.736 85 GHz  
-1.55 dBm



Center 5.745 00 GHz Span 30 MHz  
#Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**CH Mid**

Agilent

R T

Mkr1 5.779 95 GHz  
-0.42 dBm

Ref 20 dBm

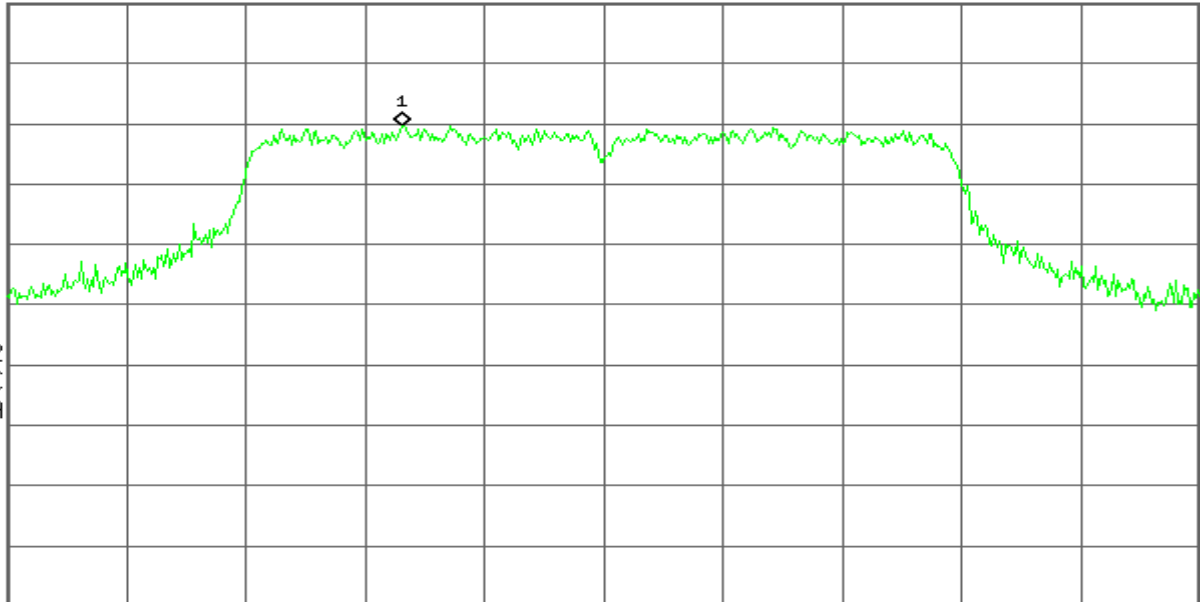
Atten 30 dB

#Avg  
Log  
10  
dB/  
Offst  
6.5  
dB

PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.785 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

**CH High**

Agilent

R T

Mkr1 5.818 65 GHz  
-0.34 dBm

Ref 20 dBm

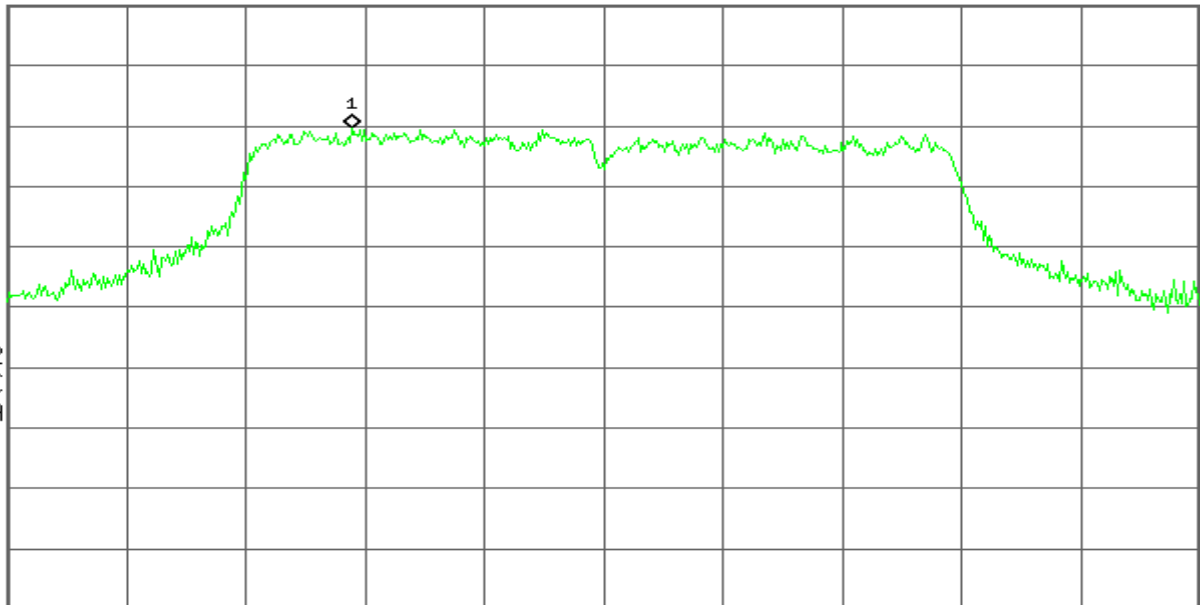
Atten 30 dB

#Avg  
Log  
10  
dB/  
Offst  
6.5  
dB

PAvg

M1 S2  
S3 FC  
AA

£(f):  
FTun  
Swp



Center 5.825 00 GHz

Span 30 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

## 7.6 RADIATED UNDESIRABLE EMISSION

### LIMIT

Radiated emissions from 9 kHz to 25 GHz were measured according to the methods defines in ANSI C63.10-2013. The EUT was placed above the ground plane, 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

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:

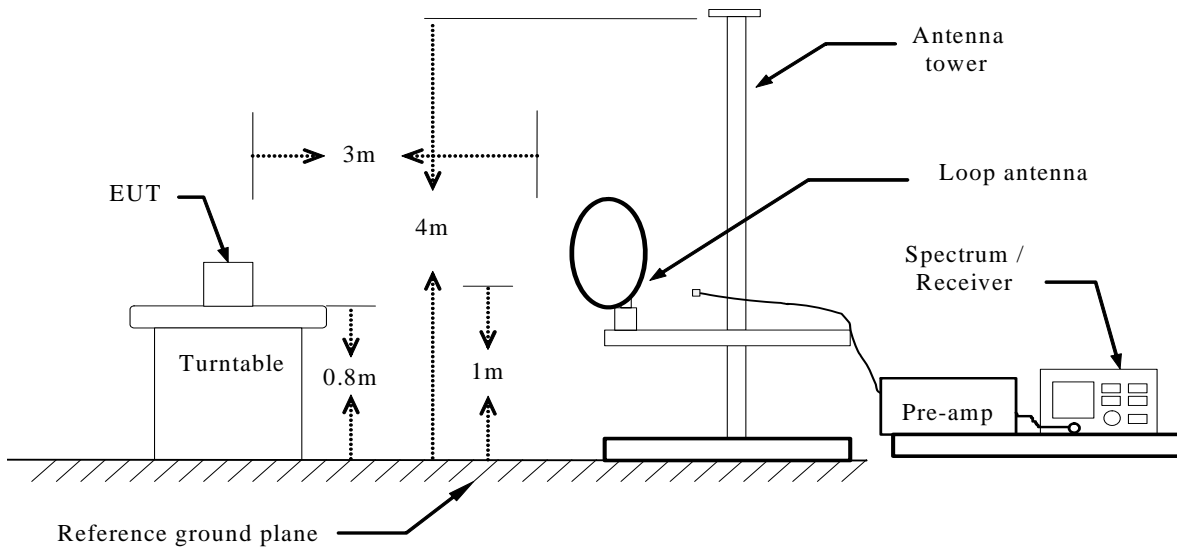
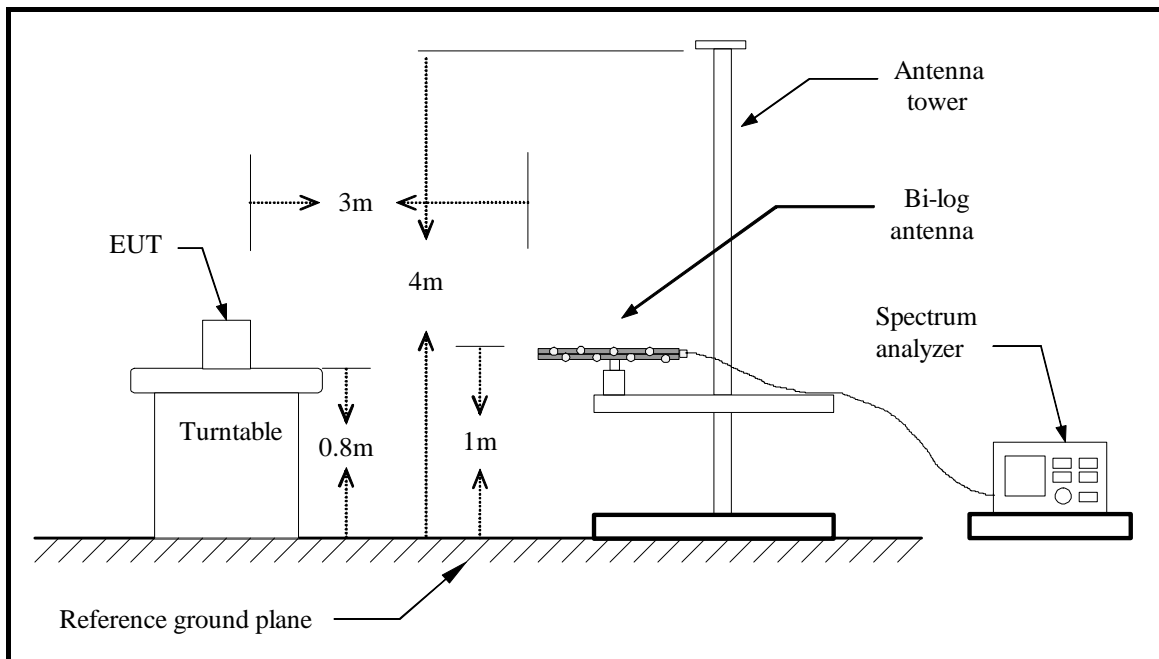
FREQUENCIES(MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE(meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

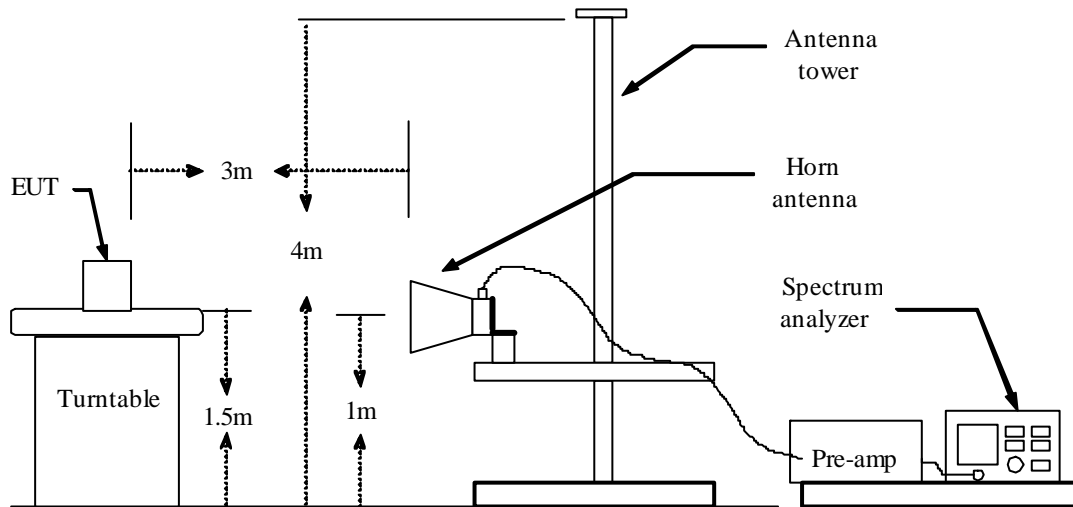
**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections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

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

Frequency (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ at 3-meter)	Field Strength ( $\text{dB}\mu\text{V}/\text{m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

### Test Configuration

**Below 30MHz****Below 1 GHz**

**Above 1 GHz****TEST PROCEDURE**

1. The EUT is placed on a turntable above ground plane, which is 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz.
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 1GHz:

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

Above 1GHz:

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

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

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

## TEST RESULTS

### Below 1 GHz

<b>Operation Mode:</b>	Normal Link	<b>Test Date:</b>	2015-12-27
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	48% RH	<b>Polarity:</b>	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
32.9100	V	16.05	18.38	34.43	40.00	-5.57	peak
118.2700	V	25.49	11.97	37.46	43.50	-6.04	peak
154.1600	V	24.59	11.59	36.18	43.50	-7.32	peak
461.6500	V	17.48	18.64	36.12	46.00	-9.88	peak
723.5500	V	17.74	22.78	40.52	46.00	-5.48	peak
960.2300	V	16.07	24.78	40.85	54.00	-13.15	peak
32.9100	H	14.70	18.38	33.08	40.00	-6.92	peak
117.3000	H	21.20	11.98	33.18	43.50	-10.32	peak
154.1600	H	24.32	11.59	35.91	43.50	-7.59	peak
308.3900	H	18.52	14.59	33.11	46.00	-12.89	peak
720.6400	H	18.87	22.79	41.66	46.00	-4.34	peak
939.8600	H	15.05	24.68	39.73	46.00	-6.27	peak

**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.(no emission found from the lowest internal used/generated frequency to 30MHz)
2. Radiated emissions measured 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

<b>Operation Mode:</b>	Tx / IEEE 802.11a mode CH Low	<b>Test Date:</b>	2016-1-5
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

#### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11951.923	40.17	3.18	43.35	74.00	-30.65	100	109	peak
2	15493.590	39.01	2.88	41.89	74.00	-32.11	100	173	peak
3	N/A								
4									
5									
6									

#### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11597.756	40.44	3.65	44.09	74.00	-29.91	100	183	peak
2	15302.885	38.16	3.79	41.95	74.00	-32.05	100	2	peak
3	N/A								
4									
5									
6									

<b>Operation Mode:</b>	Tx / IEEE 802.11a mode CH Mid	<b>Test Date:</b>	2016-1-5
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

#### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11570.513	47.43	3.68	51.11	74.00	-22.89	100	309	peak
2	15330.128	38.11	3.66	41.77	74.00	-32.23	100	8	peak
3	N/A								
4									
5									
6									

#### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11570.513	48.70	3.68	52.38	74.00	-21.62	100	357	peak
2	15330.128	37.62	3.66	41.28	74.00	-32.72	100	241	peak
3	N/A								
4									
5									
6									

<b>Operation Mode:</b>	Tx / IEEE 802.11a mode CH High	<b>Test Date:</b>	2016-1-5
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11652.244	52.33	3.58	55.91	74.00	-18.09	100	309	peak
2	11652.244	34.89	3.58	38.47	54.00	-15.53	100	349	AVG
3	17482.372	41.10	9.33	50.43	74.00	-23.57	100	353	peak
4	N/A								
5									
6									

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11652.244	51.99	3.58	55.57	74.00	-18.43	100	331	peak
2	11652.244	37.01	3.58	40.59	54.00	-13.41	100	331	AVG
3	17482.372	44.84	9.33	54.17	74.00	-19.83	100	318	peak
4	17482.372	30.48	9.33	39.81	54.00	-14.19	100	318	AVG
5	N/A								
6									

<b>Operation Mode:</b>	TX / IEEE 802.11n HT20 mode /CH Low	<b>Test Date:</b>	2016-1-5
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11488.782	48.87	3.79	52.66	80.00	-27.34	100	286	peak
2	17237.179	42.61	8.42	51.03	80.00	-28.97	100	340	peak
3	N/A								
4									
5									
6									

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11488.782	47.72	3.79	51.51	80.00	-28.49	100	114	peak
2	17264.423	43.83	8.52	52.35	80.00	-27.65	100	354	peak
3	N/A								
4									
5									
6									



<b>Operation Mode:</b>	TX / IEEE 802.11n HT20 mode /CH Mid	<b>Test Date:</b>	2016-1-5
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	13858.974	41.22	6.76	47.98	80.00	-32.02	100	87	peak
2	17318.910	40.34	8.72	49.06	80.00	-30.94	100	78	peak
3	N/A								
4									
5									
6									

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	13858.974	41.04	6.76	47.80	80.00	-32.20	100	126	peak
2	16991.987	38.89	7.49	46.38	80.00	-33.62	100	356	peak
3	N/A								
4									
5									
6									

<b>Operation Mode:</b>	TX / IEEE 802.11n HT20 mode /CH High	<b>Test Date:</b>	2016-1-5
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	55% RH	<b>Polarity:</b>	Ver. / Hor.

### Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11652.244	52.45	3.58	56.03	74.00	-17.97	100	344	peak
2	11652.244	37.03	3.58	40.61	54.00	-13.39	100	361	AVG
3	17482.372	40.52	9.33	49.85	74.00	-24.15	100	351	peak
4	N/A								
5									
6									

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	11652.244	53.68	3.58	57.26	74.00	-16.74	100	47	peak
2	11652.244	37.74	3.58	41.32	54.00	-12.68	100	315	AVG
3	17482.372	44.06	9.33	53.39	74.00	-20.61	100	316	peak
4	N/A								
5									
6									

**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 3 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).*

**7.7 POWERLINE CONDUCTED EMISSIONS**

**LIMIT**

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

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

\* Decreases with the logarithm of the frequency.

**TEST CONFIGURATION**

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

**TEST PROCEDURE**

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

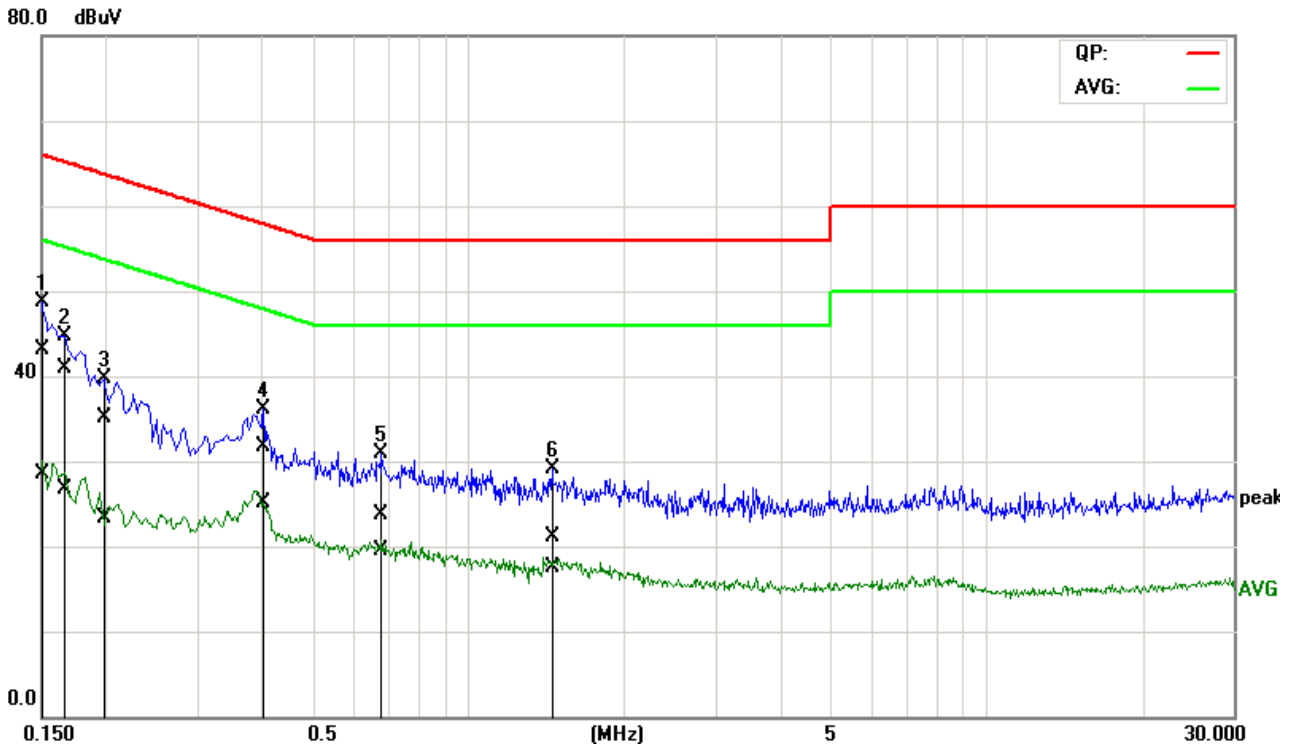
**TEST RESULTS**

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**

Job No.:	C151211R02	Date:	2016-1-9
Model No.:	R9861510	Time:	PM 04:39:12
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Lily.Wang
Line:	L1	Test Voltage:	AC 120V/60Hz
Model:		Description:	

**L1**

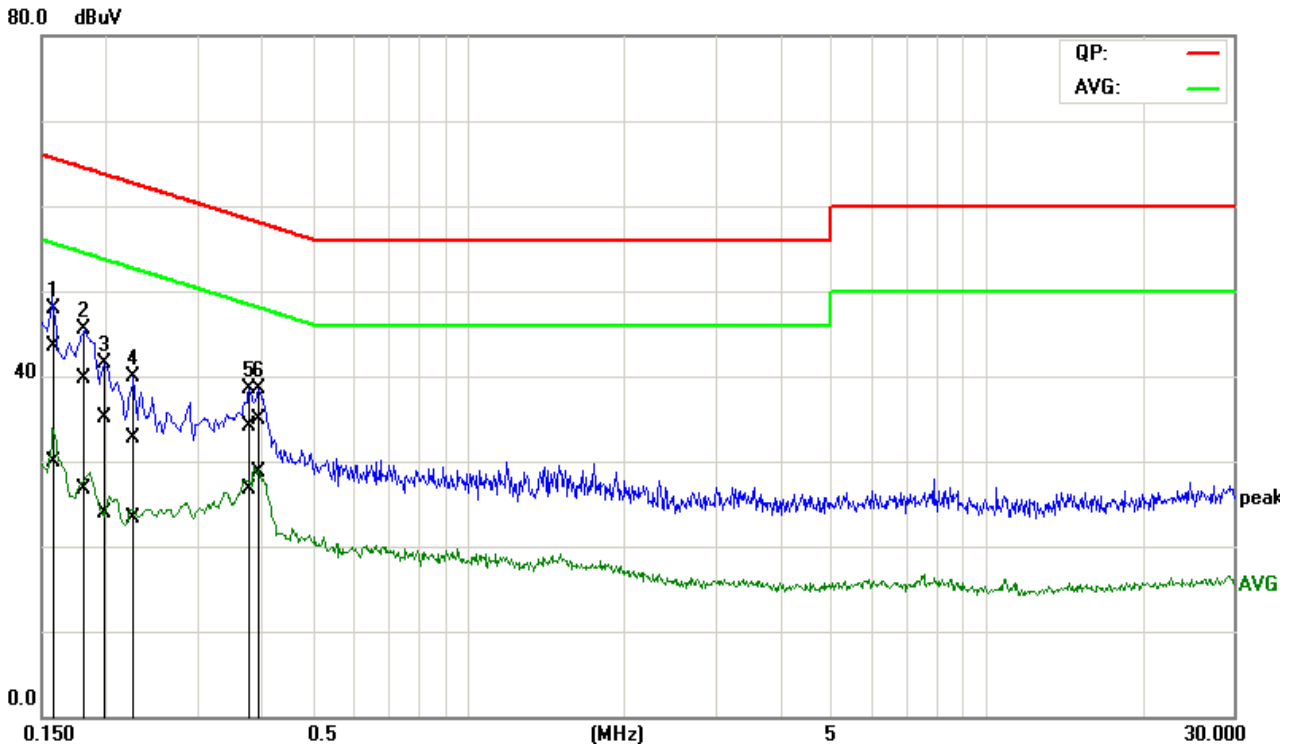


No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1510	23.40	8.67	19.78	43.18	28.45	65.94	55.94	-22.76	-27.49	Pass
2	0.1648	21.13	6.90	19.78	40.91	26.68	65.22	55.22	-24.31	-28.54	Pass
3	0.1955	15.25	3.49	19.79	35.04	23.28	63.80	53.80	-28.76	-30.52	Pass
4	0.3988	11.82	5.24	19.80	31.62	25.04	57.88	47.88	-26.26	-22.84	Pass
5	0.6757	3.83	-0.30	19.81	23.64	19.51	56.00	46.00	-32.36	-26.49	Pass
6	1.4449	1.30	-2.28	19.83	21.13	17.55	56.00	46.00	-34.87	-28.45	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Job No.:	C151211R02	Date:	2016-1-9
Model No.:	R9861510	Time:	PM 04:34:02
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Lily.Wang
Line:	L2	Test Voltage:	AC 120V/60Hz
Model:		Description:	

**L2**

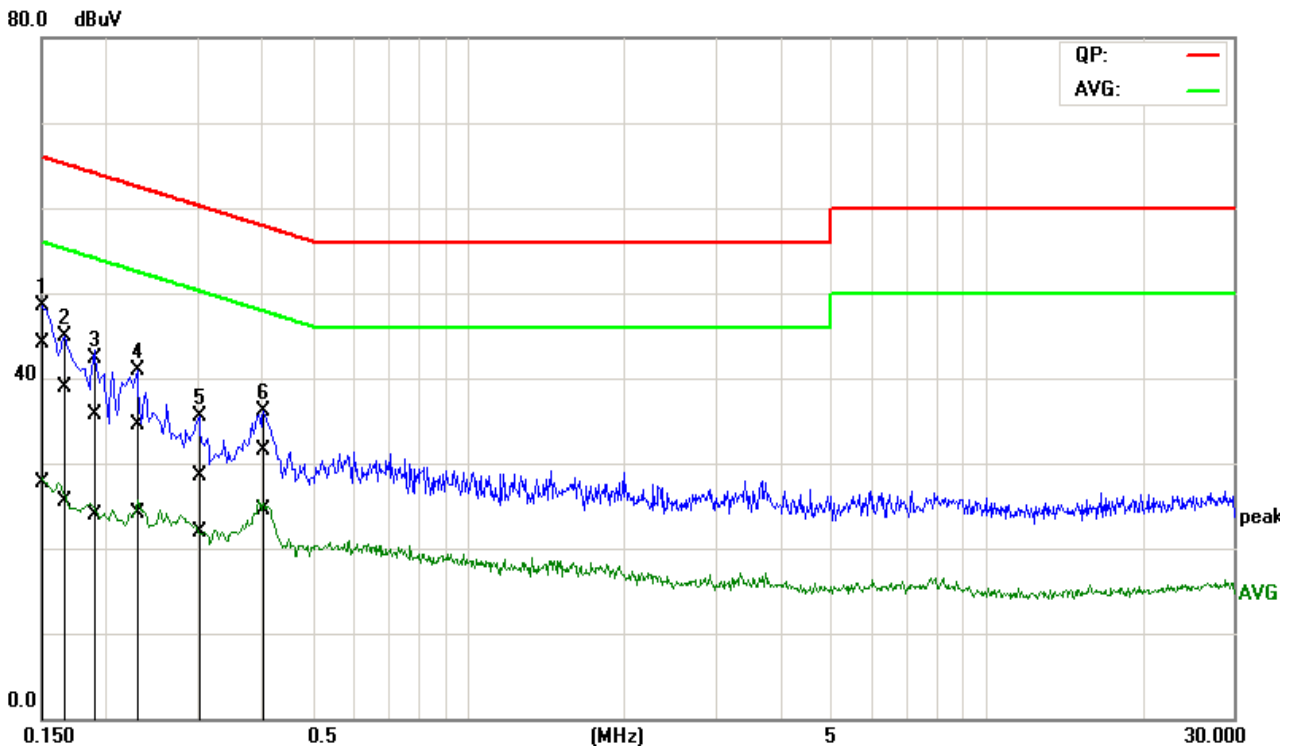


No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1599	23.79	10.09	19.73	43.52	29.82	65.47	55.47	-21.95	-25.65	Pass
2	0.1801	19.91	6.95	19.74	39.65	26.69	64.48	54.48	-24.83	-27.79	Pass
3	0.1975	15.46	4.20	19.74	35.20	23.94	63.72	53.72	-28.52	-29.78	Pass
4	0.2254	13.05	3.54	19.74	32.79	23.28	62.62	52.62	-29.83	-29.34	Pass
5	0.3762	14.37	7.01	19.75	34.12	26.76	58.36	48.36	-24.24	-21.60	Pass
6*	0.3936	15.21	8.94	19.75	34.96	28.69	57.99	47.99	-23.03	-19.30	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Job No.:	C151211R02	Date:	2016-1-9
Model No.:	R9861510	Time:	PM 04:44:19
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Lily.Wang
Line:	L1	Test Voltage:	AC 240V/60Hz
Model:		Description:	

**L1**

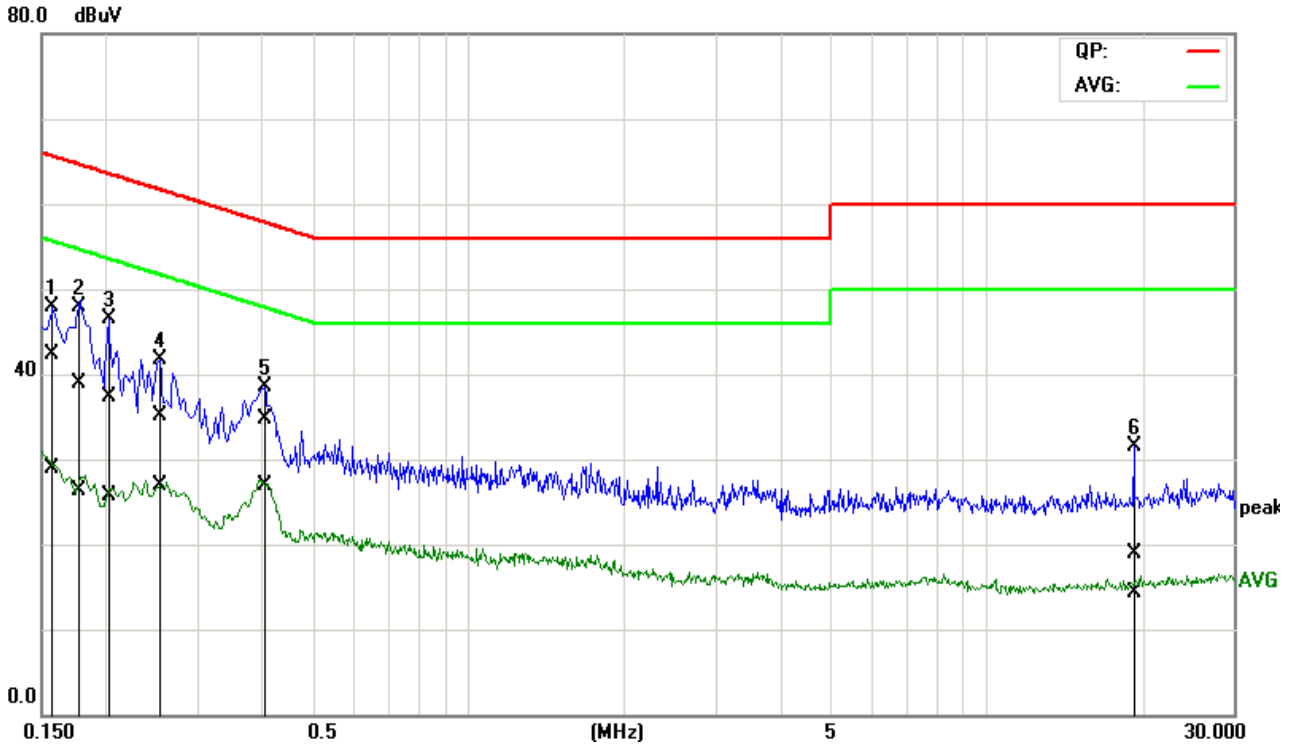


No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1514	24.34	7.83	19.78	44.12	27.61	65.92	55.92	-21.80	-28.31	Pass
2	0.1669	19.06	5.70	19.78	38.84	25.48	65.11	55.11	-26.27	-29.63	Pass
3	0.1913	16.00	4.09	19.79	35.79	23.88	63.98	53.98	-28.19	-30.10	Pass
4	0.2307	14.63	4.26	19.79	34.42	24.05	62.42	52.42	-28.00	-28.37	Pass
5	0.3040	8.65	2.19	19.80	28.45	21.99	60.13	50.13	-31.68	-28.14	Pass
6	0.4059	11.79	4.73	19.81	31.60	24.54	57.73	47.73	-26.13	-23.19	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Job No.:	C151211R02	Date:	2016-1-9
Model No.:	R9861510	Time:	PM 04:49:29
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Lily.Wang
Line:	L2	Test Voltage:	AC 240V/60Hz
Model:		Description:	

**L2**



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1584	22.48	9.11	19.73	42.21	28.84	65.55	55.55	-23.34	-26.71	Pass
2	0.1750	19.25	6.50	19.73	38.98	26.23	64.72	54.72	-25.74	-28.49	Pass
3	0.2007	17.62	5.90	19.74	37.36	25.64	63.58	53.58	-26.22	-27.94	Pass
4	0.2526	15.31	7.14	19.74	35.05	26.88	61.67	51.67	-26.62	-24.79	Pass
5*	0.4048	15.02	7.10	19.75	34.77	26.85	57.75	47.75	-22.98	-20.90	Pass
6	19.2696	-1.40	-6.00	20.27	18.87	14.27	60.00	50.00	-41.13	-35.73	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

**END OF REPORT**