FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT

For

1200Mbps Wireless Dual Band 11AC Gigabit Router

MODEL No.: BL-W1200

FCC ID: S8J-W1200

Trade Mark: LB-LINK

Report No.: ED151116018E2

Issue Date: April 26, 2016

Prepared for

Shenzhen Bilian Electronic Co., Ltd.

Building B1, Zhongxing Industrial Zone, Juling Jutang Community, Guanlan street, Bao'an, Shenzhen China

Prepared by

EMTEK(DONGGUAN) CO., LTD.

No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China
TEL: 86-769-22807078
FAX: 86-769-22807079

1 TEST RESULT CERTIFICATION

Applicant:	Shenzhen Bilian Electronic Co., Ltd. Building B1, Zhongxing Industrial Zone, Juling Jutang Community, Guanlan street, Bao'an, Shenzhen China
Manufacturer:	Shenzhen Bilian Electronic Co., Ltd. Building B1, Zhongxing Industrial Zone, Juling Jutang Community, Guanlan street, Bao'an, Shenzhen China
Product Description:	1200Mbps Wireless Dual Band 11AC Gigabit Router
Model Number:	BL-W1200
Trade Mark:	LB-LINK

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	**PASS**

The above equipment was tested by EMTEK(DONGGUAN) CO., LTD. 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 2 and Part 15.407

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

Date of Test : November 16, 2016 to April 20, 2016

Prepared by : Ivy Huang/Editor

Reviewer : Alan He/Supervisor

Approve & Authorized Signer : Sam Lv/Manager

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2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Modulation	802.11b: DSSS(DBPSK/DQPSK/CCK) 802.11a/g: OFDM(BPSK/QPSK/QAM16/QAM64) 802.11n/ac:OFDM(BPSK/QPSK/QAM16/QAM64/QAM256)
Operating Frequency Range	2412-2462MHz / 5725 ~ 5850MHz
Number of Channels	For 2.4GHz Band: 11 for 20MHz bandwidth; 7 for 40MHz bandwidth For 5GHz Band: 5 for 20MHz bandwidth; 2 for 40MHz bandwidth; 1 for 80MHz bandwidth
Transmit Power Max	For 2.4GHz Band: 802.11b: 18.44dBm(0.069823W) 802.11g: 16.75dBm (0.047315W) 802.11n(HT20): 14.57dBm(0.028642W) 802.11n(HT40): 14.72dBm (0.029648W) For 5GHz Band: 802.11a: 19.11dBm(0.08147W) 802.11ac(VHT20): 17.59dBm(0.057412W) 802.11ac(VHT40): 14.02dBm(0.025235W) 802.11ac(VHT80): 12.31dBm(0.017022W)
Antenna Port	☒ Ant2(TX2.4G); ☒ Ant3(TX2.4G); ☒ Ant2(TX5G); ☒ Ant3(TX5G);
Antenna Gain	5.0dBi (For Per Antenna Port Max) 8.0dBi for MIMO(Ant2+Ant3 Directional Gain)
Power Supply for Adapter	Model: BL-POWER-12W Input: AC 100-240V~50/60Hz 0.3A MAX Output:DC 12V 1A

Note: *for more details, please refer to the User's manual of the EUT.*

3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.407 (a)(1) 15.407 (a)(3)	6dB Bandwidth	PASS	
15.407 (a)(1) 15.407 (a)(3)	Maximum Conducted Output Power	PASS	
15.407 (a)(1) 15.407 (a)(3)	Peak Power Spectral Density	PASS	
15.407 (b)(1) 15.407 (b)(4) 15.407 (b)(6)	Radiated Spurious Emission	PASS	
15.407 (a)(6)	Peak Excursion	PASS	
15.209	Radiated Spurious Emission	PASS	
15.407(g)	Frequency Stability	PASS	
15.407 (b)(6) 15.207	Power Line Conducted Emission	PASS	
§15.407(a)&§15. 203	Antenna Application	PASS	

NOTE1: N/A (Not Applicable)
NOTE2: According to FCC OET KDB 789003 D2 General UNII Test Procedures New Rules v01, In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: S8J-W1200 filing to comply with Section 15.247 of the FCC Part 15, Subpart E Rules.
The system is compliance with Subpart B is authorized under a DOC procedure

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
FCC 47 CFR Part 2, Subpart J
FCC 47 CFR Part 15, Subpart E
FCC KDB 789033 D2 General UNII Test Procedures New Rules v01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
FCC KDB 662911 D02 MIMO With Cross Polarized Antenna V01

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Test Receiver	Rohde&Schwarz	ESCS30	100018	5/16/2015
L.I.S.N.	Rohde&Schwarz	ENV216	100017	5/16/2015
RF Switching Unit	CDS	RSU-M2	38401	5/16/2015

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Test Receiver	Rohde & Schwarz	ESCI	1166.5950.03	5/16/2015
Loop Antenna	Schwarzbeck	FMZB 1519	012	5/16/2015
Bilog Antenna	Schwarzbeck	VULB9163	000141	5/16/2015
Power Amplifier	CDS	RSU-M352	818	5/16/2015
Power Amplifier	HP	8447F	OPT H64	5/16/2015
Color Monitor	SUNSPO	SP-140A	N/A	5/16/2015
Single Line Filter	JIANLI	XL-3	N/A	5/16/2015
Single Phase Power Line Filter	JIANLI	DL-2X100B	N/A	5/16/2015
3 Phase Power Line Filter	JIANLI	DL-4X100B	N/A	5/16/2015
DC Power Filter	JIANLI	DL-2X50B	N/A	5/16/2015
Cable	Schwarzbeck	PLF-100	549489	5/16/2015
Cable	Rosenberger	CIL02	A0783566	5/16/2015
Cable	Rosenberger	RG 233/U	525178	5/16/2015
Signal Analyzer	Rohde & Schwarz	FSV30	103040	5/16/2015
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1272	5/16/2015
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	5/16/2015
Power Amplifier	LUNAR EM	LNA1G18-40	J10100000081	5/16/2015
Cable	H+S	CBL-26	N/A	5/16/2015
Cable	H+S	CBL-26	N/A	5/16/2015
Cable	H+S	CBL-26	N/A	5/16/2015

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.
Spectrum Analyzer	Rohde & Schwarz	FSV30	1321.3008K	5/16/2015
Signal Analyzer	Agilent	N9010A	My53470879	5/16/2015
Power meter	Anritsu	ML2495A	0824006	5/16/2015
Power sensor	Anritsu	MA2411B	0738172	5/16/2015

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

4.3 DESCRIPTION OF TEST MODES

The EUT only incorporates the MIMO function. Physically, the EUT provides 2 complested transmitters and 2 receivers. Please find details for following table.

Antenna and Band Width:

Antenna	Single(TX)			Two(TX)		
Band Width Mode	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz
IEEE 802.11a	X	X	X	V	X	X
IEEE 802.11n(5G)	X	X	X	V	V	X
IEEE 802.11ac	X	X	X	V	V	V

The EUT has been tested under its typical operating condition.
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (☒802.11a: 6 Mbps; ☒802.11ac(VHT20): MCS0; ☒802.11ac(VHT40): MCS8 ; ☒ 802.11ac(VHT80):MCS8)were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Mode	Test Frequency (MHz)		
802.11a	5745 MHz	5785 MHz	5825 MHz
802.11ac(VHT20)	5745 MHz	5785 MHz	5825 MHz
802.11ac(VHT40)	5755 MHz		5795 MHz
802.11ac(VHT80)	5775 MHz		

5 TEST FACILITY

Site Description
EMC Lab. : Registered on FCC, June 18, 2014
The Certificate Number is 247565

Registered on Industry Canada, February 19, 2014
The Certificate Number is 9444A.

Name of Firm : EMTEK(DONGGUAN) CO., LTD.
Site Location : No.281, Guantai Road, Nancheng District, Dongguan, Guangdong, China

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

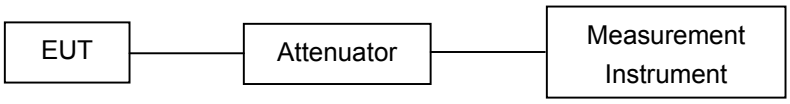
Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Power Density	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5℃
Humidity	±3%

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP

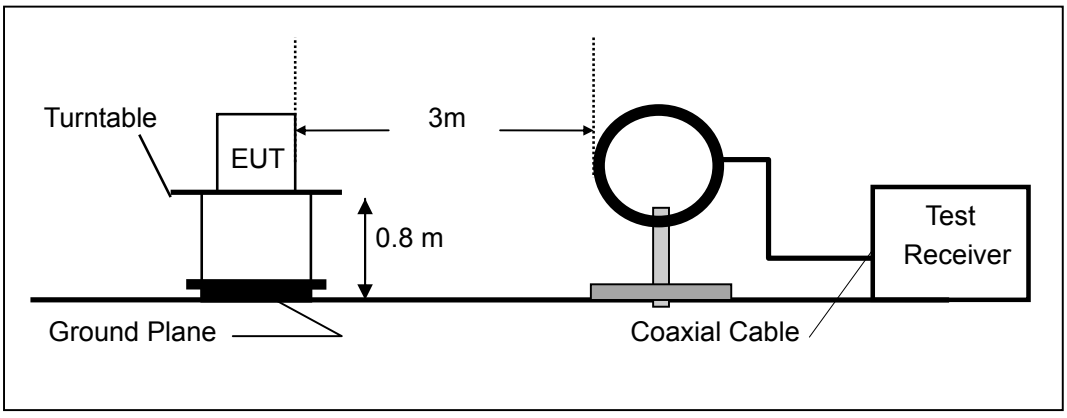
The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

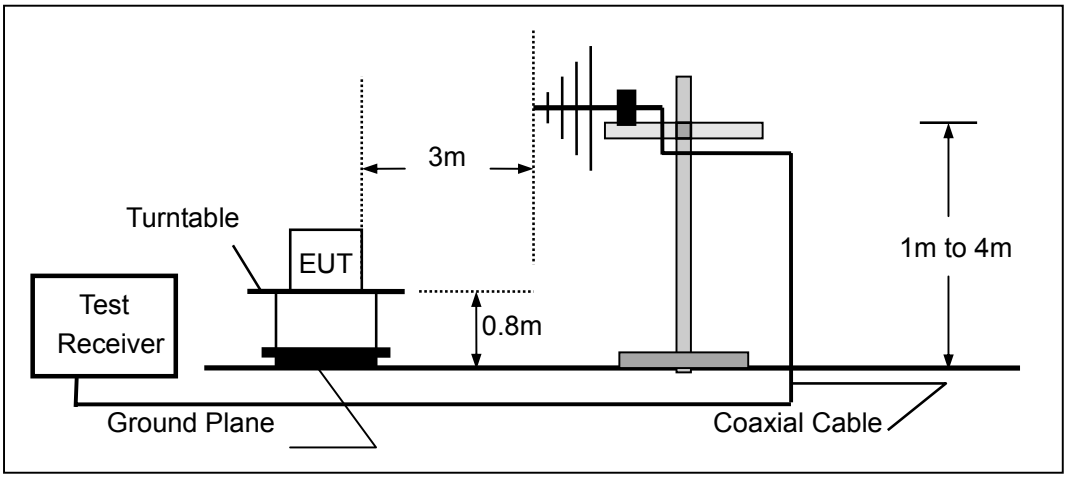
Above 30MHz：
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz：
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)
The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

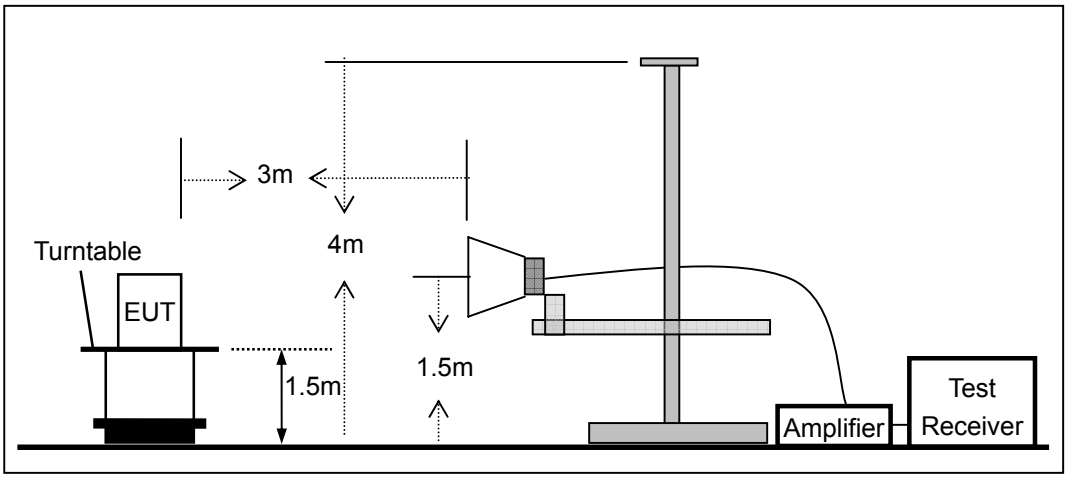
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

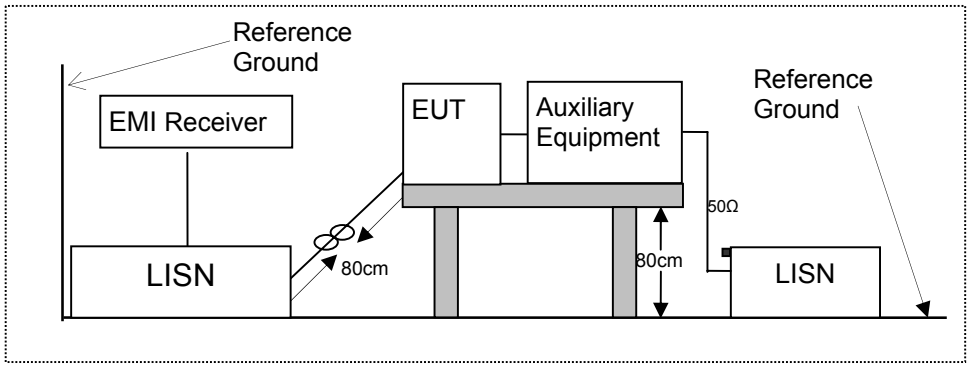


7.3 CONDUCTED EMISSION TEST SETUP

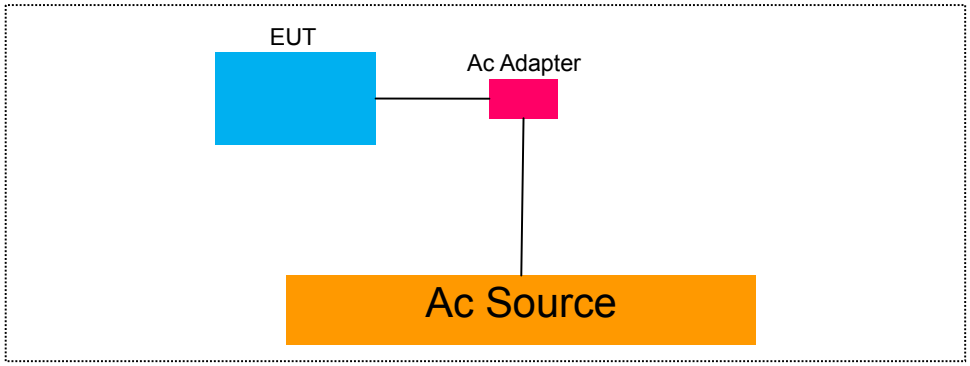
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	N/A	N/A	N/A	N/A	N/A	

Notes:

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.*

8 TEST REQUIREMENTS

8.1 BANDWIDTH MEASUREMENT

8.1.1 Applicable Standard

According to FCC Part 15.407(a)(3) for band 5725-5850MHz and KDB 789003 D2

8.1.2 Conformance Limit

The minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz.

8.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.1.4 Test Procedure

Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below

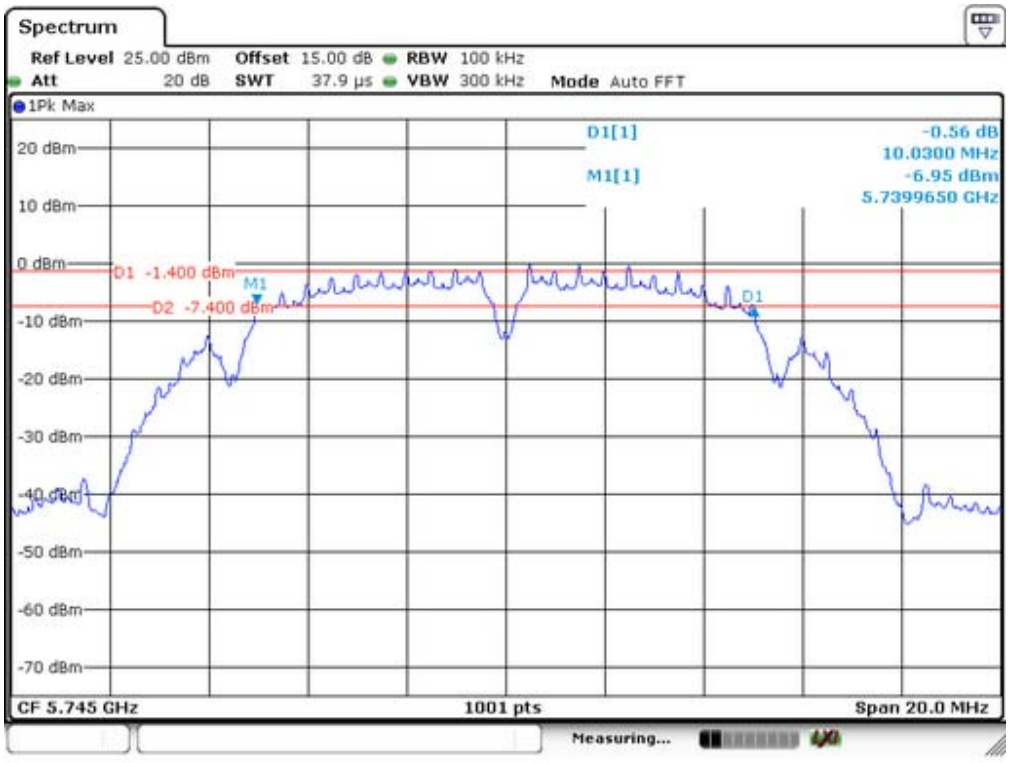
- Minimum Emission Bandwidth for the band 5.725-5.85 GHz

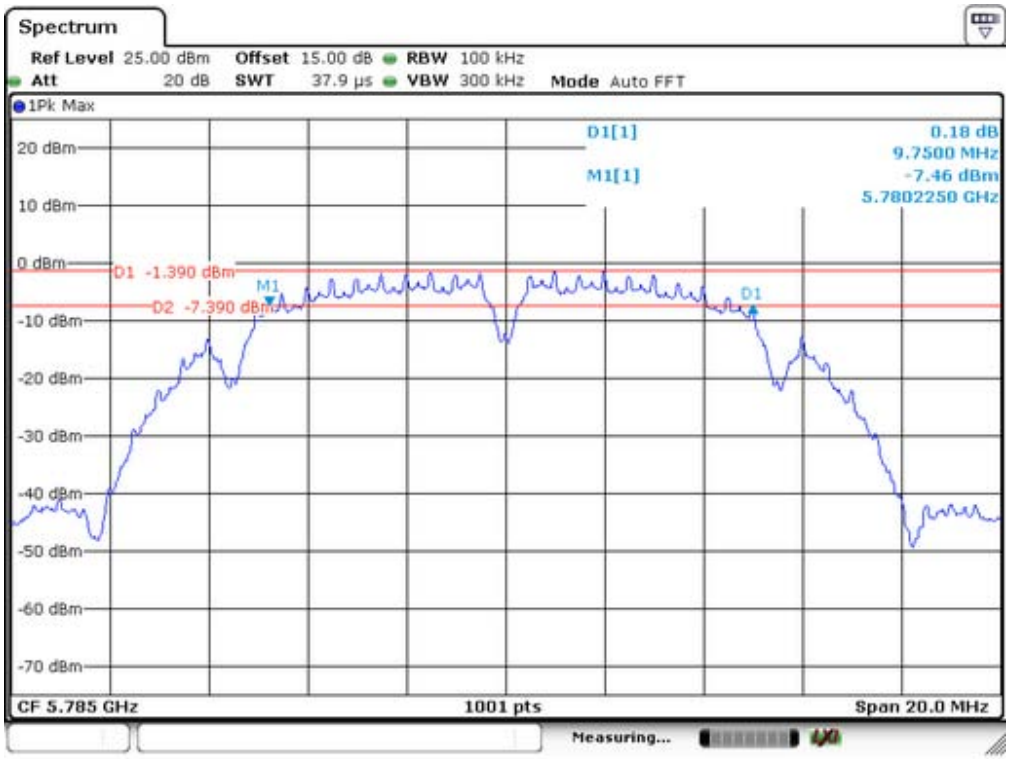
1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequency) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

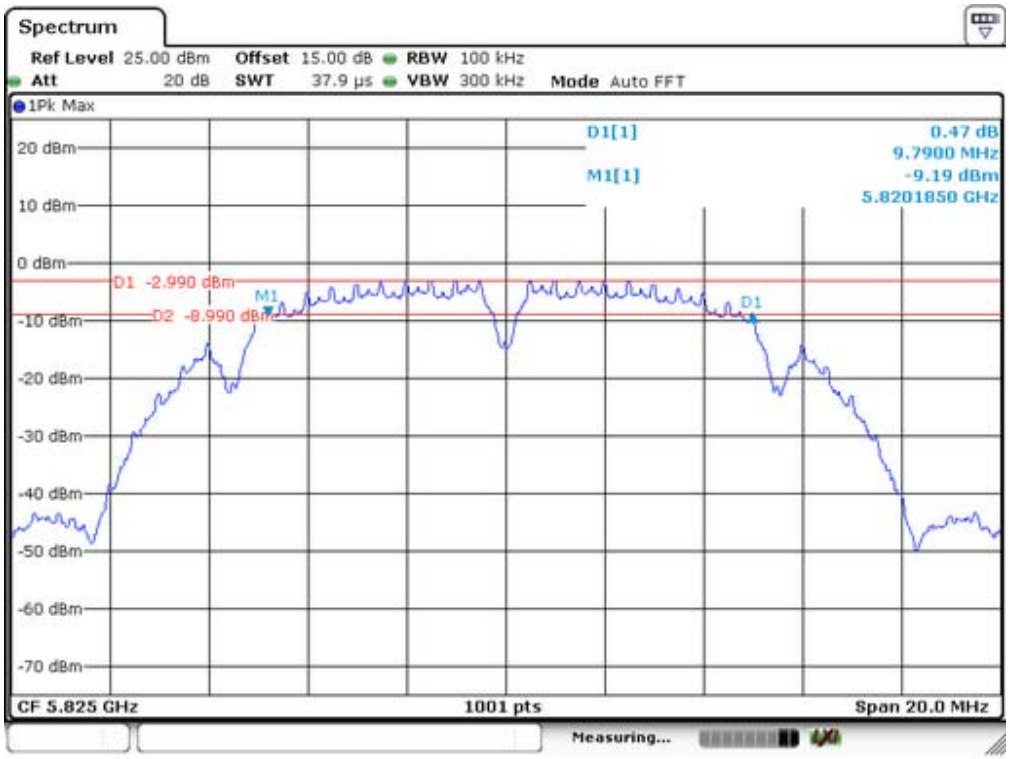
8.1.5 Test Results

IEEE 802.11a				
Channel frequency (MHz)	Measurement level (KHz)		Required Limit (KHz)	Result
	Ant2	Ant3		
5745	10030	10010	>500	Pass
5785	9750	9990	>500	
5825	9790	10010	>500	

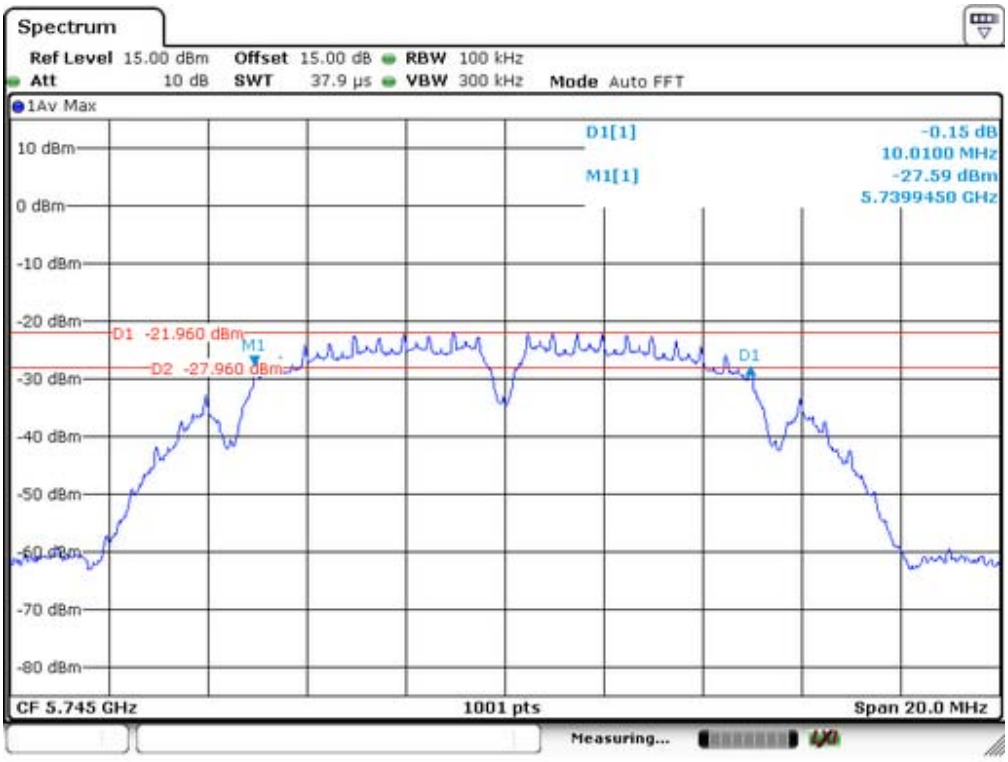
Ant 2

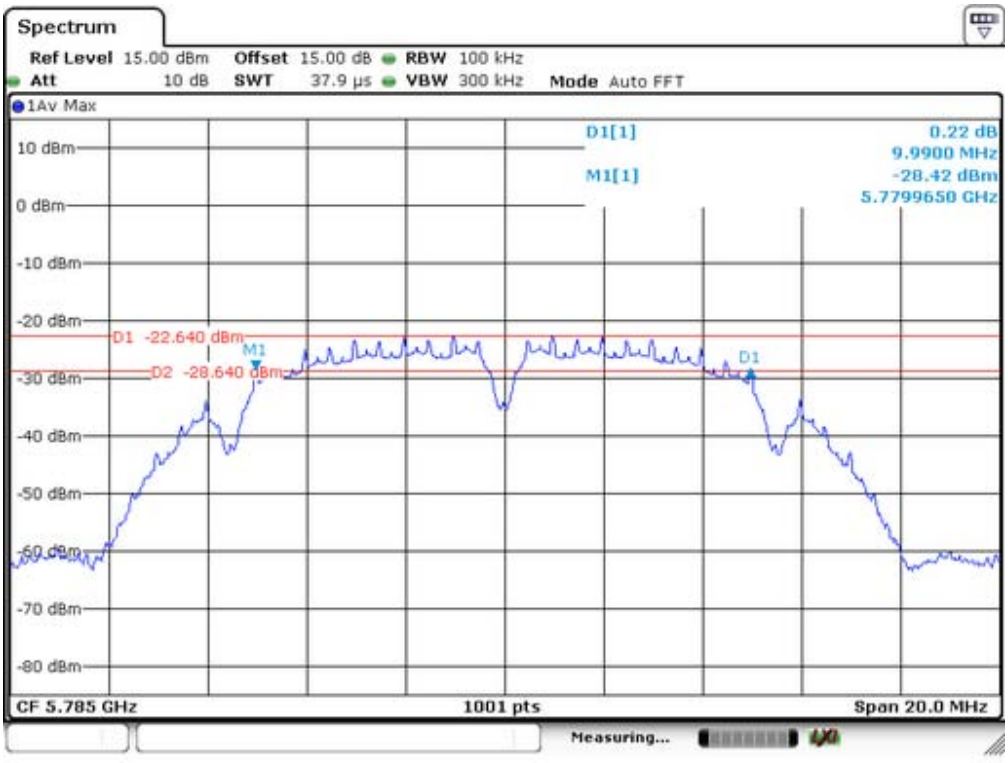


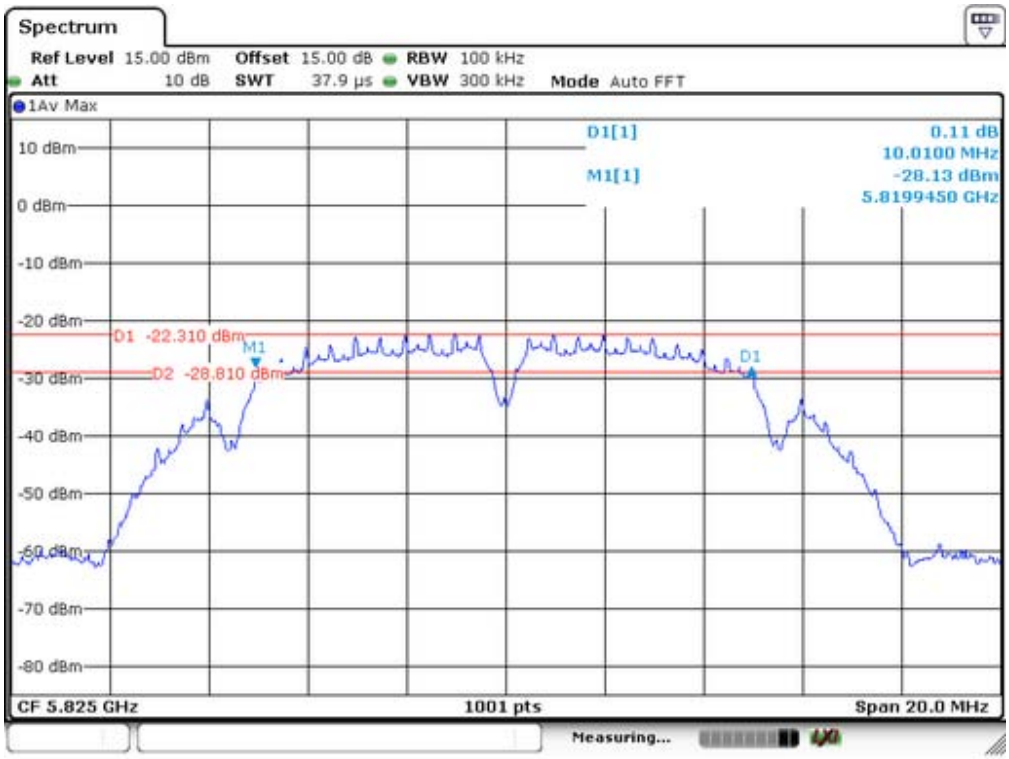

Spectrum
Ref Level 25.00 dBm Offset 15.00 dB RBW 100 kHz
Att 20 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.18 dB
9.7500 MHz
M1[1] -7.46 dBm
5.7802250 GHz
D1 -1.390 dBm
D2 -7.390 dBm
CF 5.785 GHz
1001 pts
Span 20.0 MHz
Measuring...


Spectrum
Ref Level 25.00 dBm Offset 15.00 dB RBW 100 kHz
Att 20 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.47 dB
9.7900 MHz
M1[1] -9.19 dBm
5.8201850 GHz
D1 -2.990 dBm
D2 -8.990 dBm
CF 5.825 GHz
1001 pts
Span 20.0 MHz
Measuring...

Ant 3

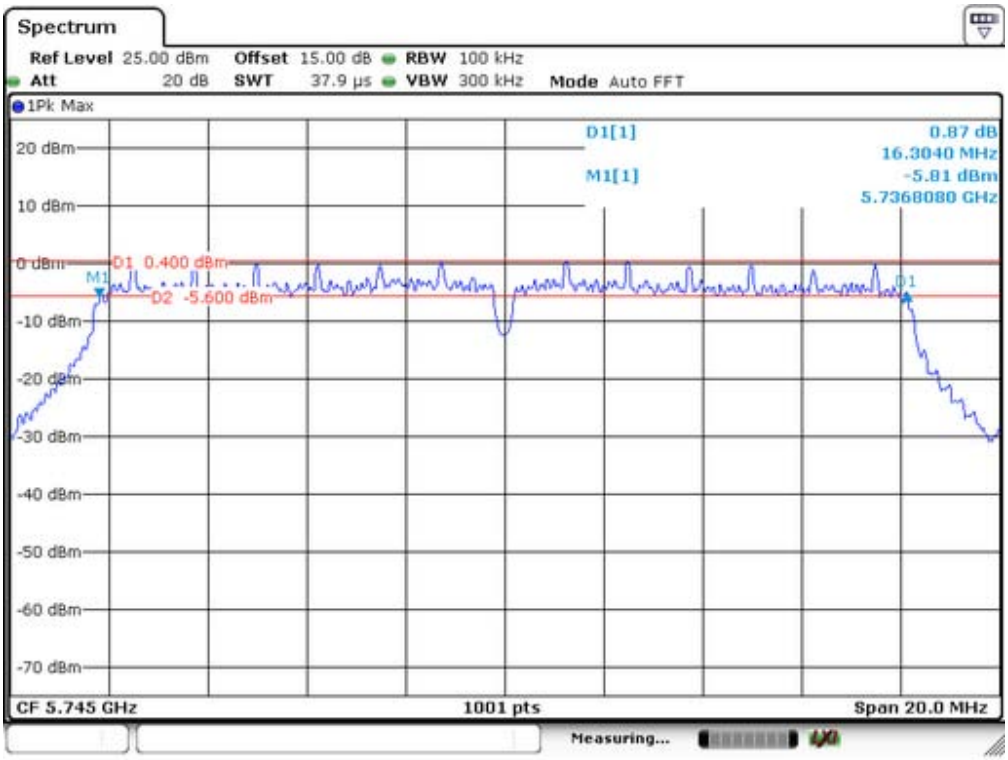

Spectrum
Ref Level 15.00 dBm Offset 15.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Av Max
D1[1] -0.15 dB
10.0100 MHz
M1[1] -27.59 dBm
5.7399450 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
D1 -21.960 dBm
D2 -27.960 dBm
M1
D1
CF 5.745 GHz
1001 pts
Span 20.0 MHz
Measuring...

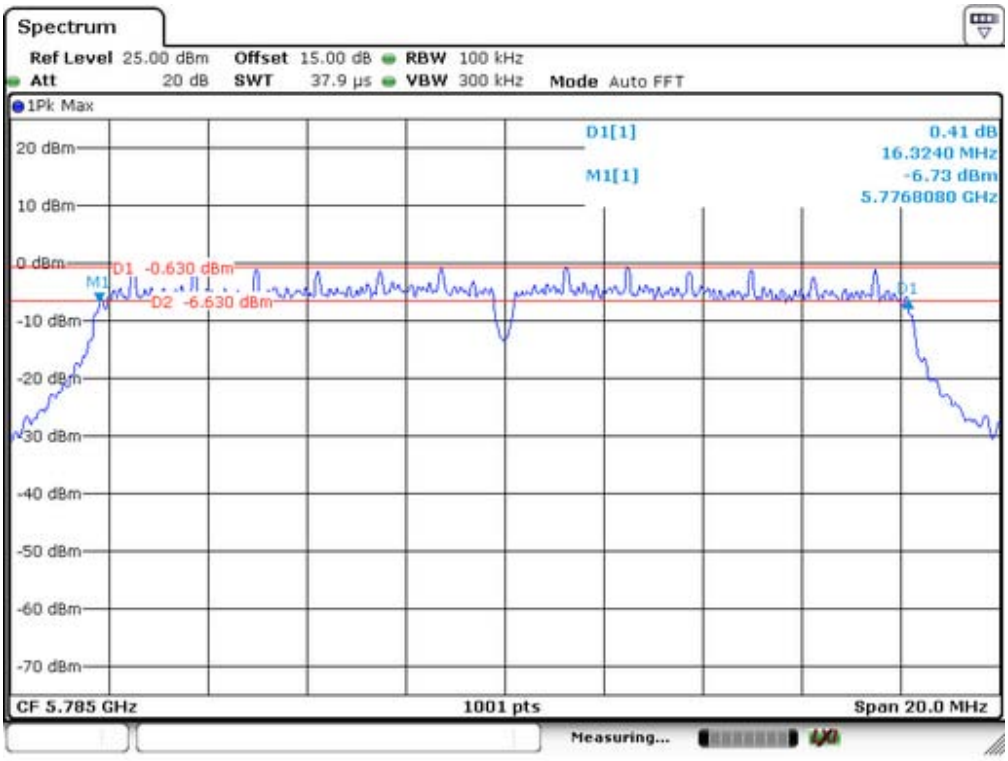

Spectrum
Ref Level 15.00 dBm Offset 15.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Av Max
D1[1] 0.22 dB
9.9900 MHz
M1[1] -28.42 dBm
5.7799650 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
D1 -22.640 dBm
D2 -28.640 dBm
M1
D1
CF 5.785 GHz
1001 pts
Span 20.0 MHz
Measuring...

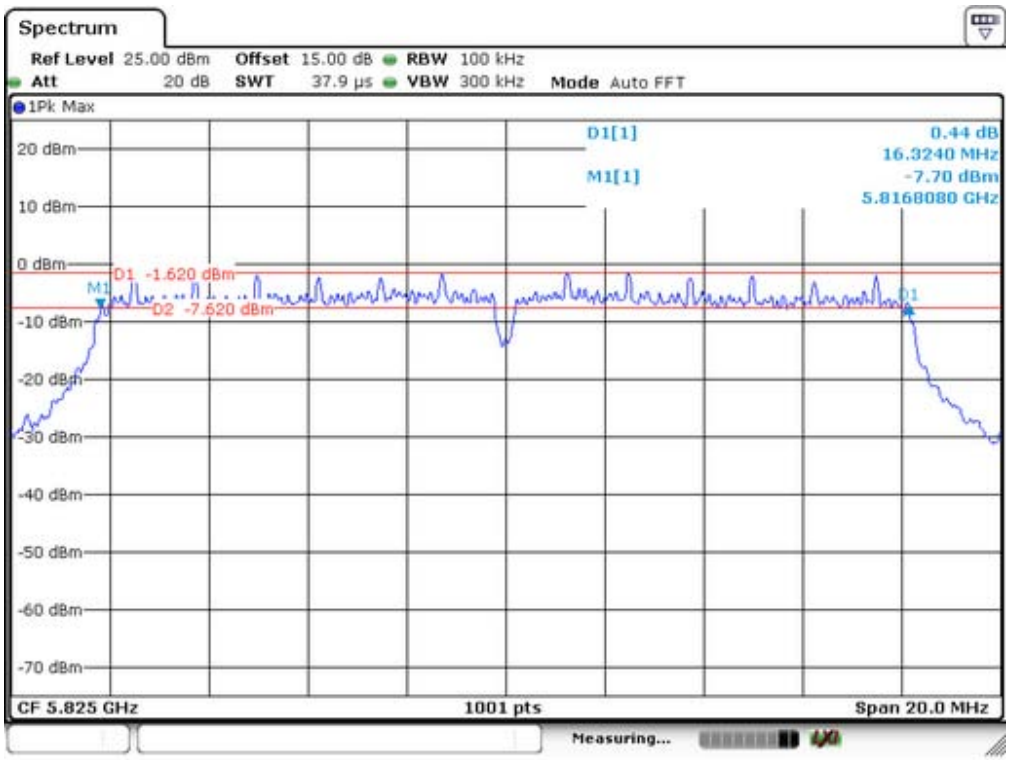


IEEE 802.11ac(VHT20)				
Channel frequency (MHz)	Measurement level (KHz)		Required Limit (KHz)	Result
	Ant2	Ant3		
5745	16304	17023	>500	Pass
5785	16324	17003	>500	
5825	16324	17023	>500	

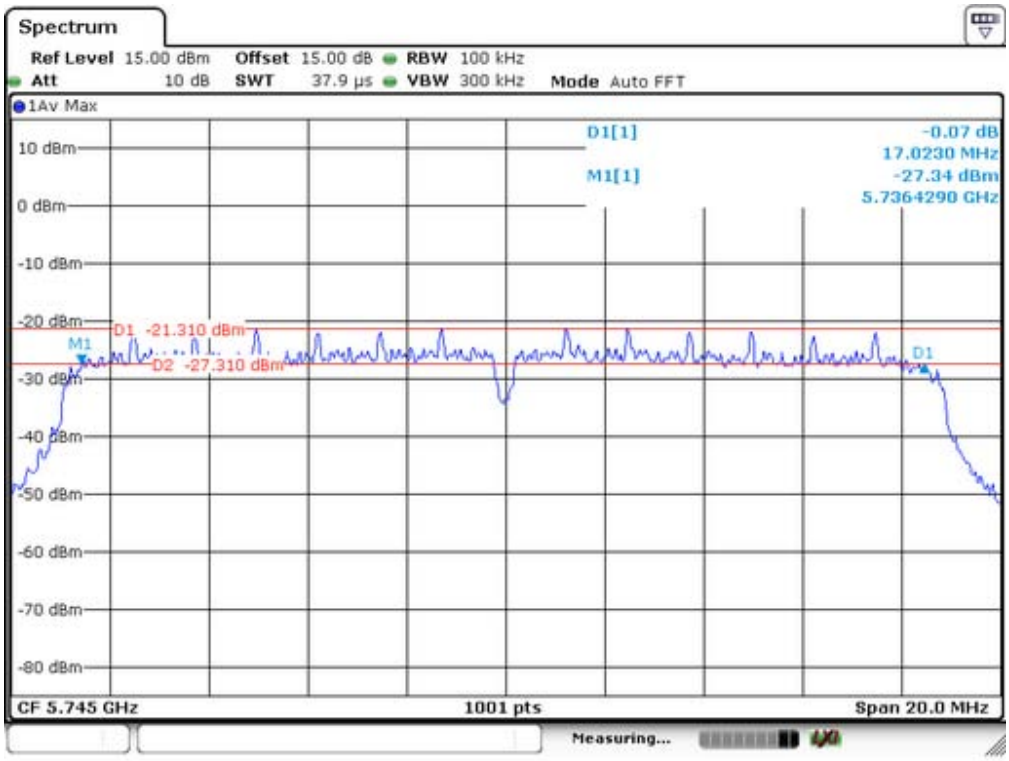
Ant 2

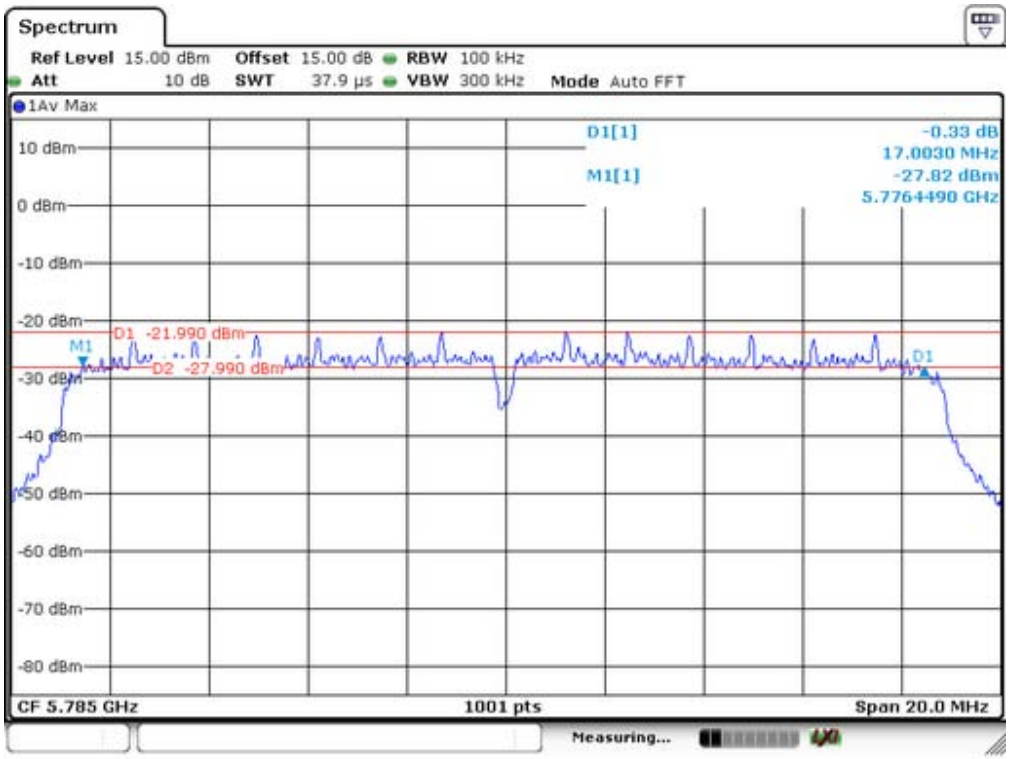

Spectrum
Ref Level 25.00 dBm Offset 15.00 dB RBW 100 kHz
Att 20 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.87 dB
16.3040 MHz
M1[1] -5.81 dBm
5.7368080 GHz
D1 0.400 dBm
D2 -5.600 dBm
CF 5.745 GHz
1001 pts
Span 20.0 MHz
Measuring...

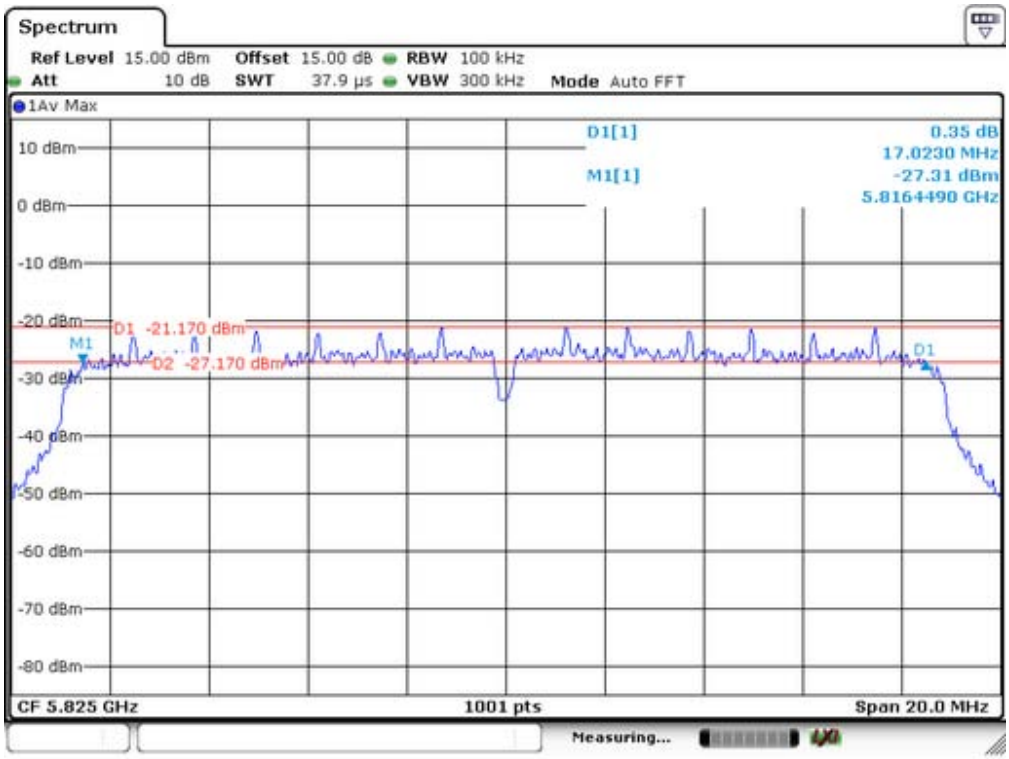

Spectrum
Ref Level 25.00 dBm Offset 15.00 dB RBW 100 kHz
Att 20 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.41 dB
16.3240 MHz
M1[1] -6.73 dBm
5.7768080 GHz
D1 -0.630 dBm
D2 -6.630 dBm
CF 5.785 GHz
1001 pts
Span 20.0 MHz
Measuring...


Spectrum
Ref Level 25.00 dBm Offset 15.00 dB RBW 100 kHz
Att 20 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.44 dB
16.3240 MHz
M1[1] -7.70 dBm
5.8168080 GHz
D1 -1.620 dBm
D2 -7.620 dBm
CF 5.825 GHz
1001 pts
Span 20.0 MHz
Measuring...

Ant 3

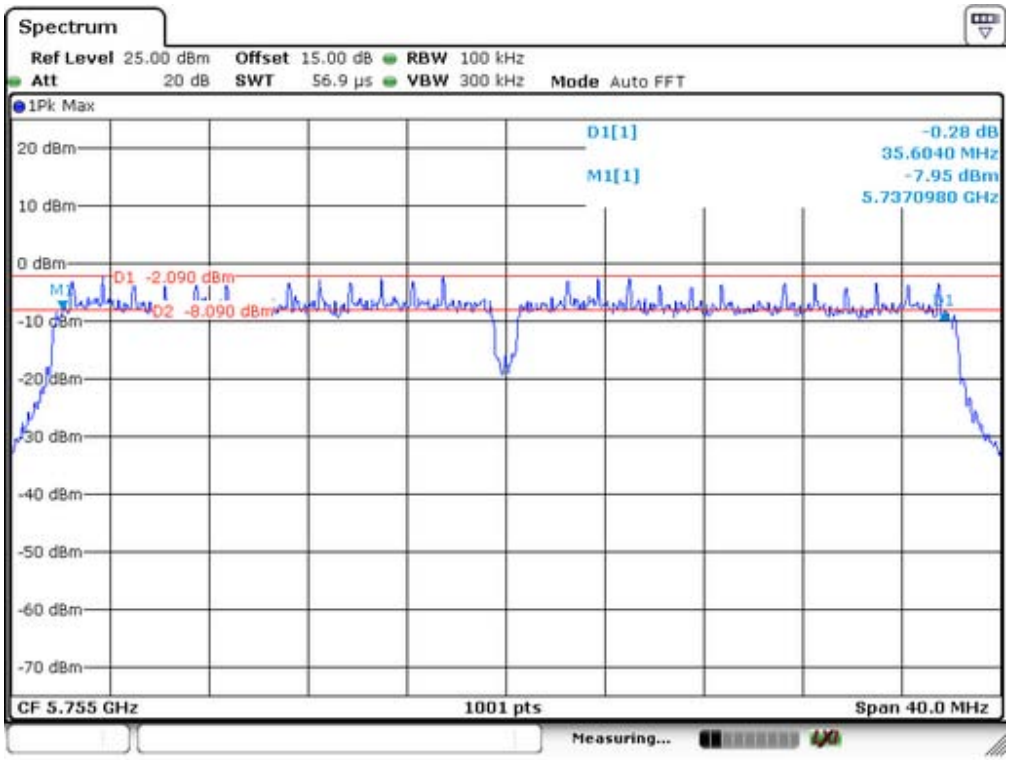

Spectrum
Ref Level 15.00 dBm Offset 15.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Av Max
D1[1] -0.07 dB
17.0230 MHz
M1[1] -27.34 dBm
5.7364290 GHz
D1 -21.310 dBm
D2 -27.310 dBm
CF 5.745 GHz
1001 pts
Span 20.0 MHz
Measuring...

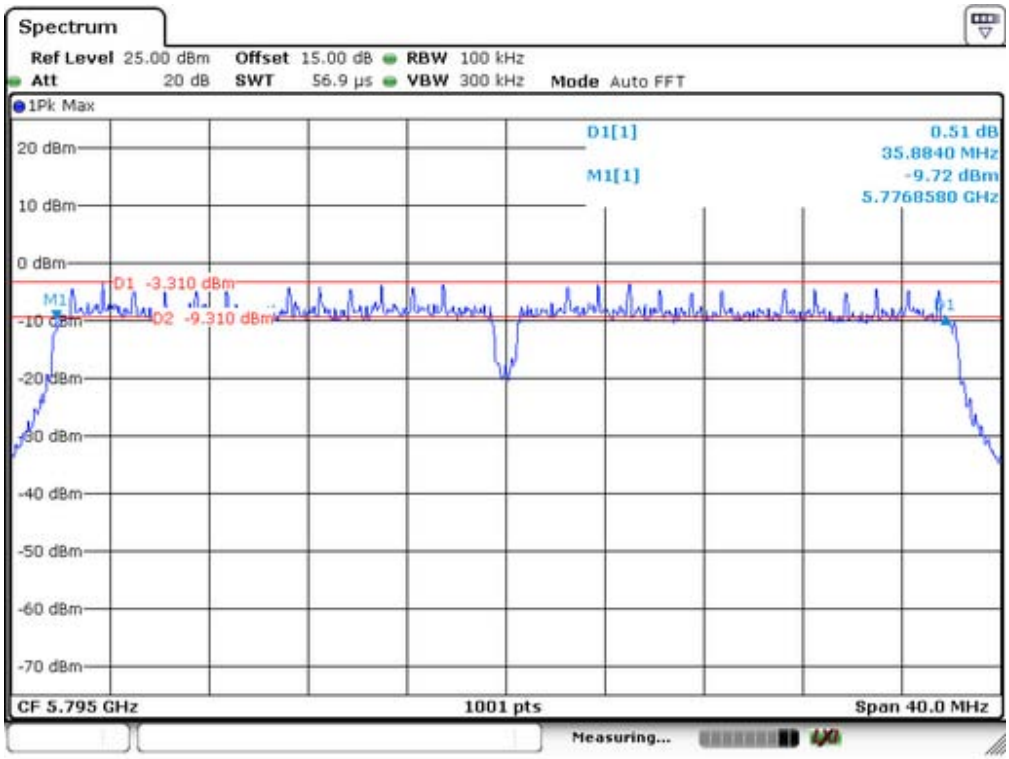

Spectrum
Ref Level 15.00 dBm Offset 15.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Av Max
D1[1] -0.33 dB
17.0030 MHz
M1[1] -27.82 dBm
5.7764490 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
D1 -21.990 dBm
D2 -27.990 dBm
M1
D1
CF 5.785 GHz
1001 pts
Span 20.0 MHz
Measuring...


Spectrum
Ref Level 15.00 dBm Offset 15.00 dB RBW 100 kHz
Att 10 dB SWT 37.9 µs VBW 300 kHz Mode Auto FFT
1Av Max
D1[1] 0.35 dB
17.0230 MHz
M1[1] -27.31 dBm
5.8164490 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
D1 -21.170 dBm
D2 -27.170 dBm
M1
D1
CF 5.825 GHz
1001 pts
Span 20.0 MHz
Measuring...

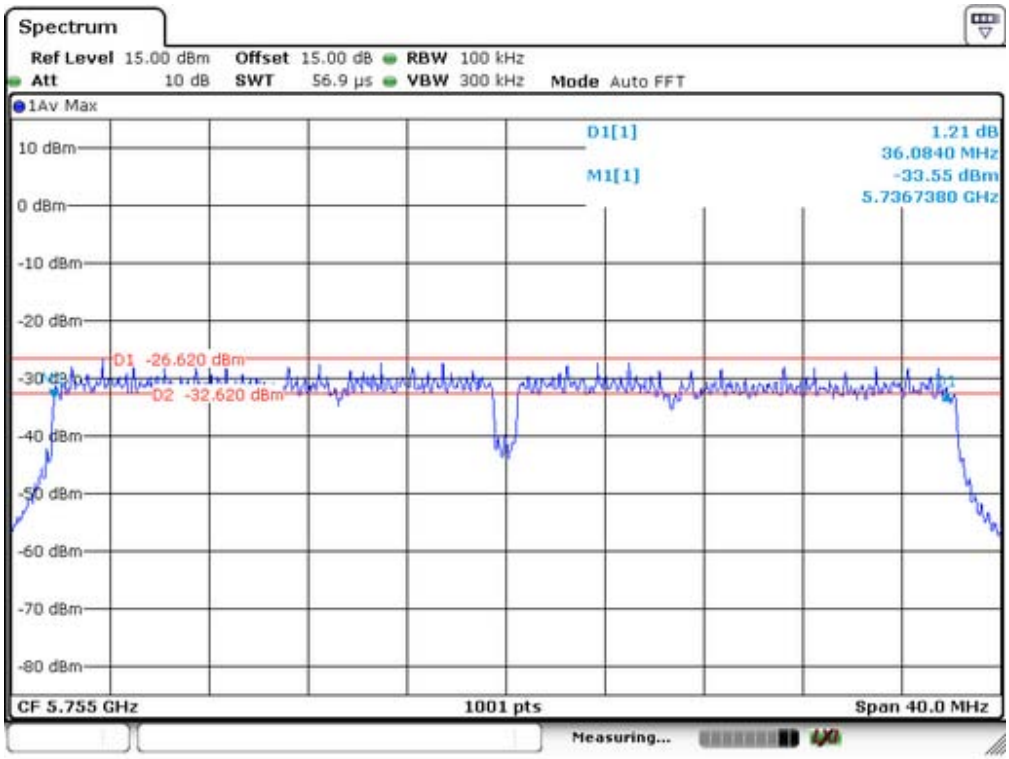
IEEE 802.11ac(VHT40)				
Channel frequency (MHz)	Measurement level (KHz)		Required Limit (KHz)	Result
	Ant2	Ant3		
5755	35604	36084	>500	Pass
5795	35884	36404	>500	

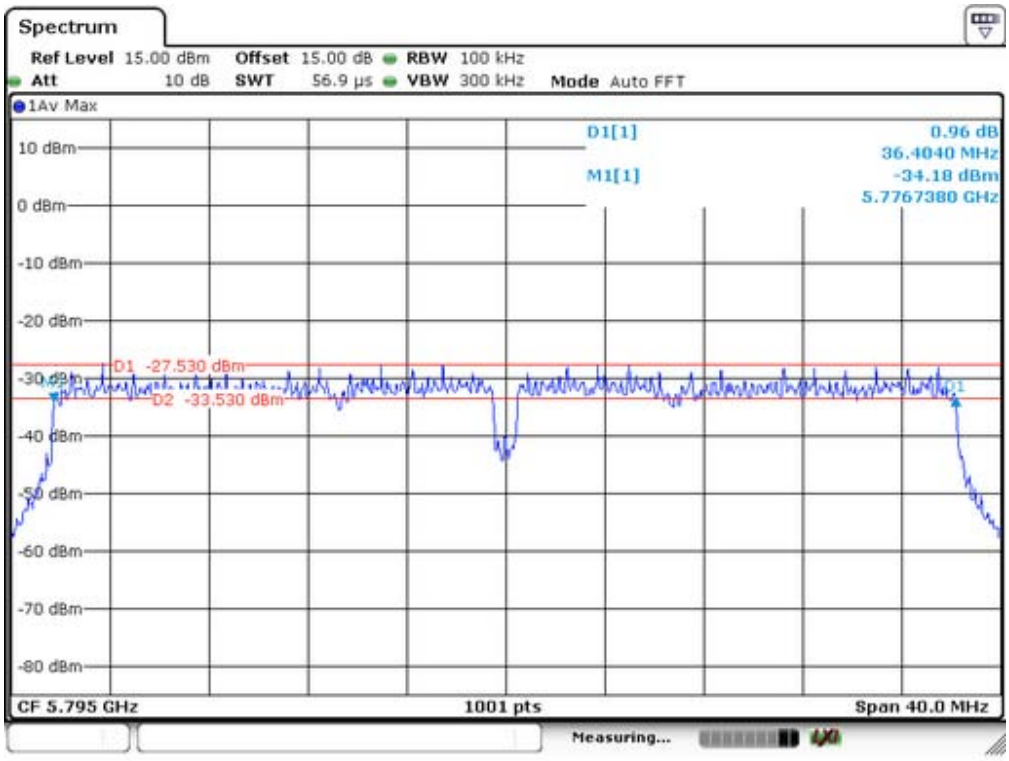
Ant 2




Spectrum
Ref Level 25.00 dBm Offset 15.00 dB RBW 100 kHz
Att 20 dB SWT 56.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] 0.51 dB
35.8840 MHz
M1[1] -9.72 dBm
5.7768580 GHz
D1 -3.310 dBm
D2 -9.310 dBm
CF 5.795 GHz
1001 pts
Span 40.0 MHz
Measuring...

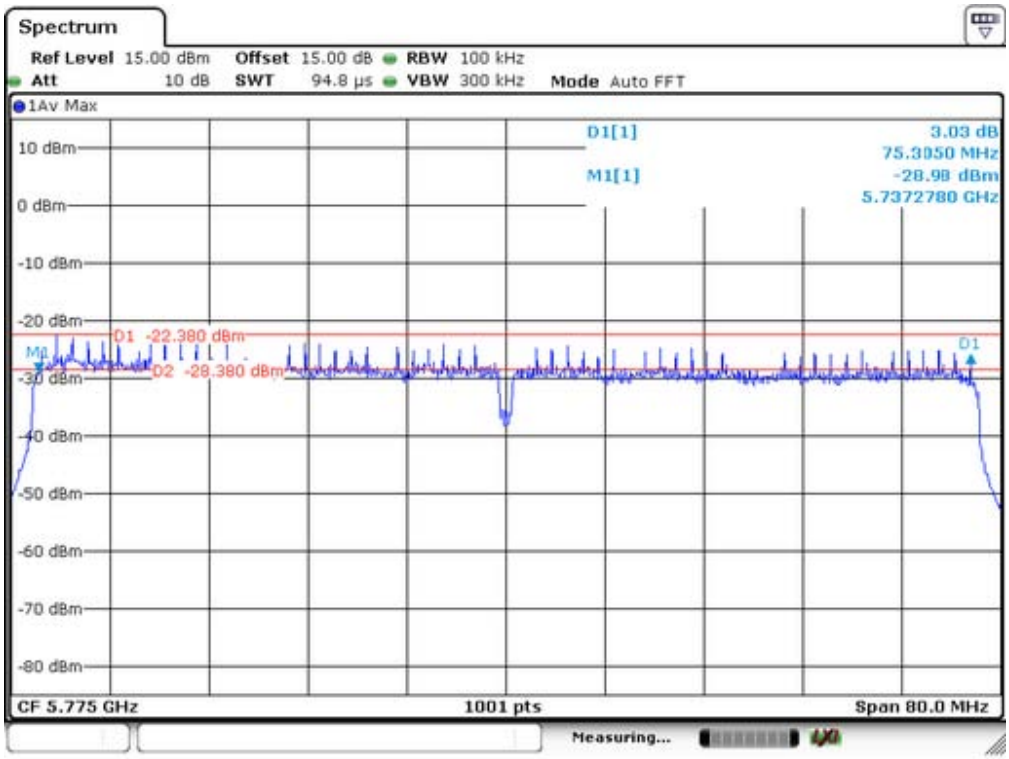
Ant 3


Spectrum
Ref Level 15.00 dBm Offset 15.00 dB RBW 100 kHz
Att 10 dB SWT 56.9 µs VBW 300 kHz Mode Auto FFT
1Av Max
D1[1] 1.21 dB
36.0840 MHz
M1[1] -33.55 dBm
5.7367380 GHz
D1 -26.620 dBm
D2 -32.620 dBm
CF 5.755 GHz
1001 pts
Span 40.0 MHz
Measuring...

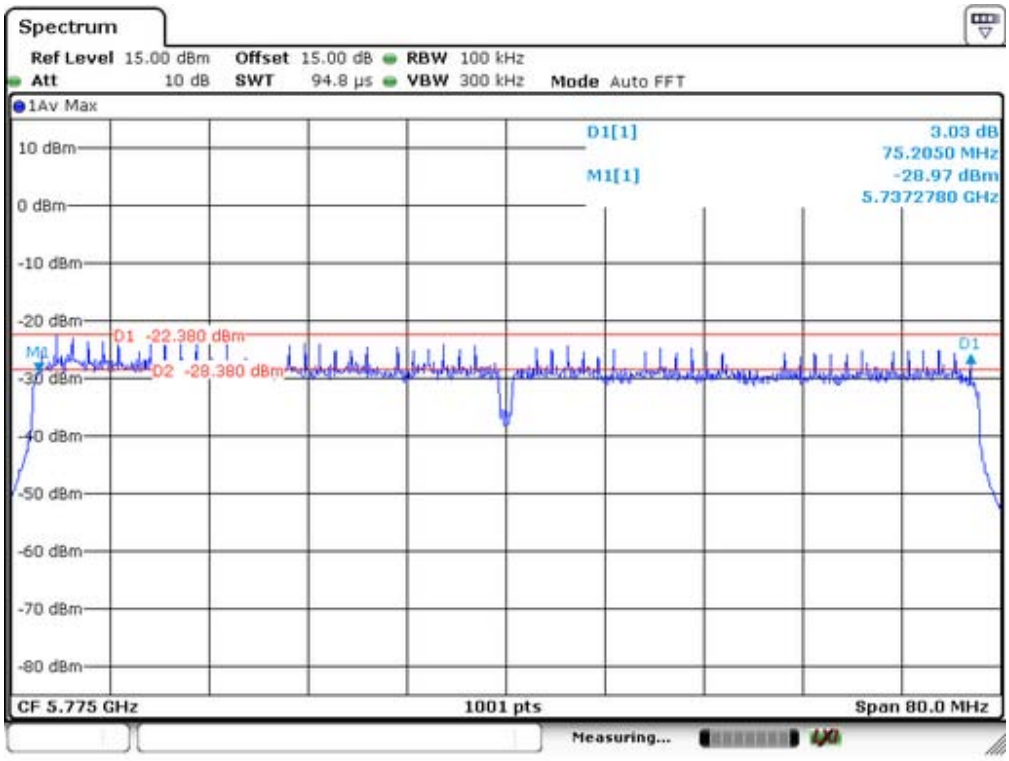


IEEE 802.11ac(VHT80)				
Channel frequency (MHz)	Measurement level (KHz)		Required Limit (KHz)	Result
	Ant2	Ant3		
5775	75305	75205	>500	Pass

Ant 2


Spectrum
Ref Level 15.00 dBm Offset 15.00 dB RBW 100 kHz
Att 10 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT
1Av Max
D1[1] 3.03 dB
75.3050 MHz
M1[1] -28.98 dBm
5.7372780 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
D1 -22.380 dBm
D2 -28.380 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.775 GHz
1001 pts
Span 80.0 MHz
Measuring...

Ant 3


Spectrum
Ref Level 15.00 dBm Offset 15.00 dB RBW 100 kHz
Att 10 dB SWT 94.8 µs VBW 300 kHz Mode Auto FFT
1Av Max
D1[1] 3.03 dB
75.2050 MHz
M1[1] -28.97 dBm
5.7372780 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
D1 -22.380 dBm
D2 -28.380 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.775 GHz
1001 pts
Span 80.0 MHz
Measuring...

8.2 MAXIMUM CONDUCTED OUTPUT POWER

8.2.1 Applicable Standard

According to FCC Part 15.407 (a)(3) for band 5725-5850MHz and KDB 789003 D2

8.2.2 Conformance Limit

■ For the band 5.725-5.85 GHz

(a) (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.

8.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.2.4 Test Procedure

The maximum average conducted output power can be measured using Method PM-G (Measurement using a gated RF average power meter):

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

1. The Transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the power value.
3. Repeat above procedures on all channels needed to be tested.

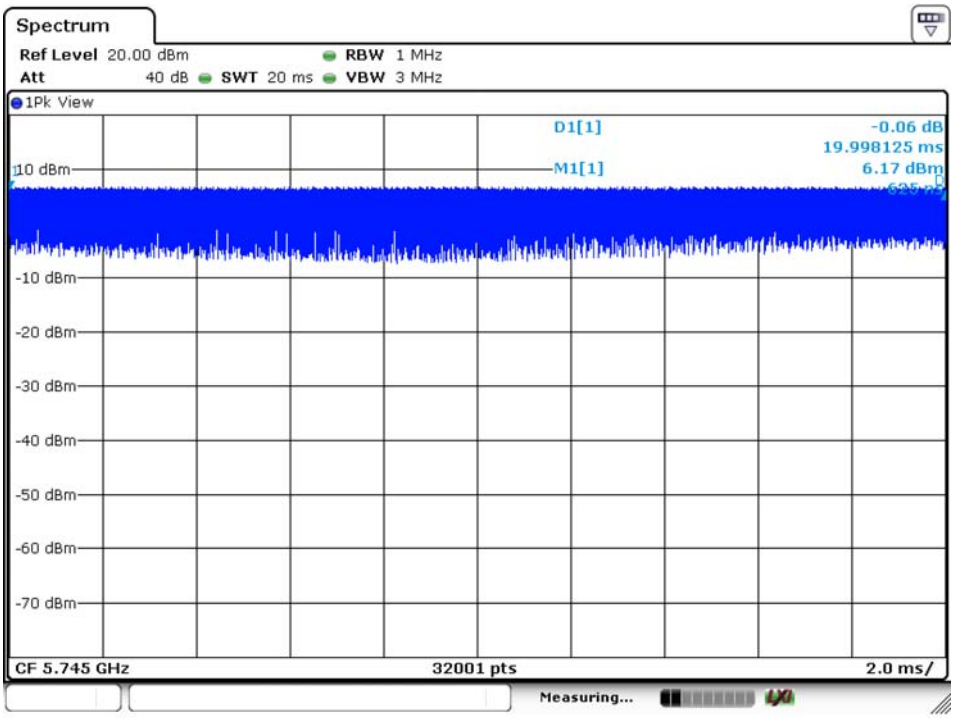
8.2.5 Test Results

☒Frequency Band III (5725-5850MHz)			
Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy

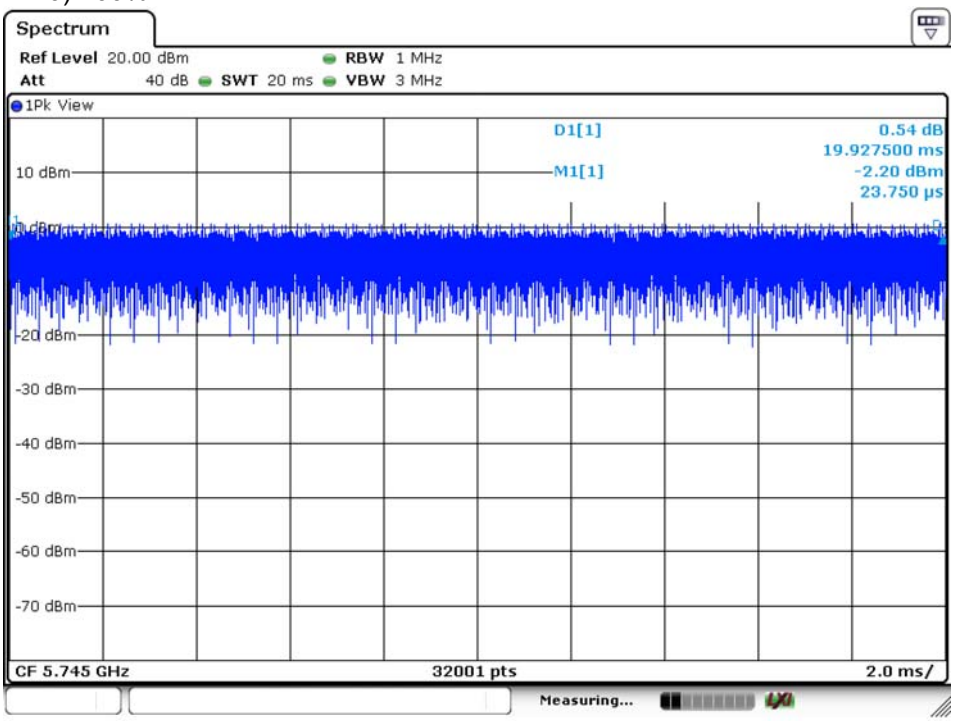
Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)			Limit (dBm)	Verdict
			Ant2	Ant3	Sum		
802.11a	149	5745	16.24	15.96	19.11	27.99	PASS
	157	5785	16.12	15.43	18.80	27.99	PASS
	165	5825	16.08	14.36	18.31	27.99	PASS
802.11ac (VHT20)	149	5745	15.32	13.69	17.59	27.99	PASS
	157	5785	15.46	12.34	17.18	27.99	PASS
	165	5825	15.22	11.04	16.62	27.99	PASS
802.11ac (VHT40)	151	5755	11.36	10.62	14.02	27.99	PASS
	159	5795	10.72	9.42	13.13	27.99	PASS
802.11ac (VHT80)	155	5775	9.27	9.33	12.31	27.99	PASS

Note:
1. For MIMO System, total power is calculated by combining the output power of each antenna according to KDB662911.
2. Antenna 2 Gain: 5dBi, Antenna 3 Gain: 5dBi. For antennas with gains of 6dBi or less, maximum allowed Transmitter output watt(+30dBm)
3. In MIMO, Ant2+Ant3 Directional Gain=G_{ANT}+10Log(N)dBi=5+10log(2)=8.01dBi> 6dBi, so the Power limit shall be reduced to 30-(8.01-6)=27.99dBm.

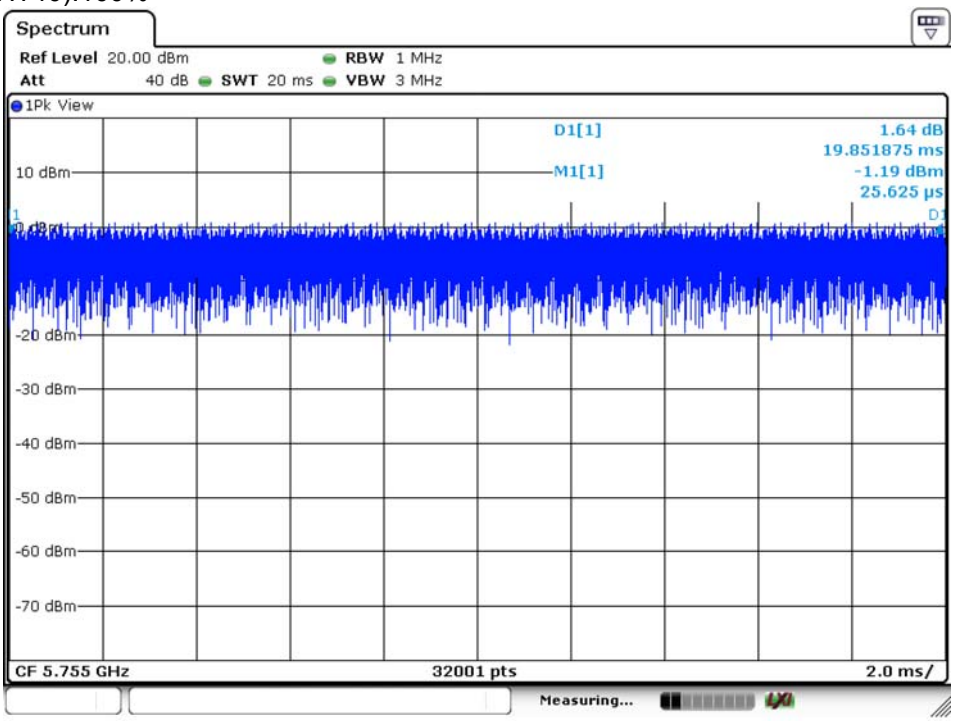
Duty Cycle Plot
802.11a:100%



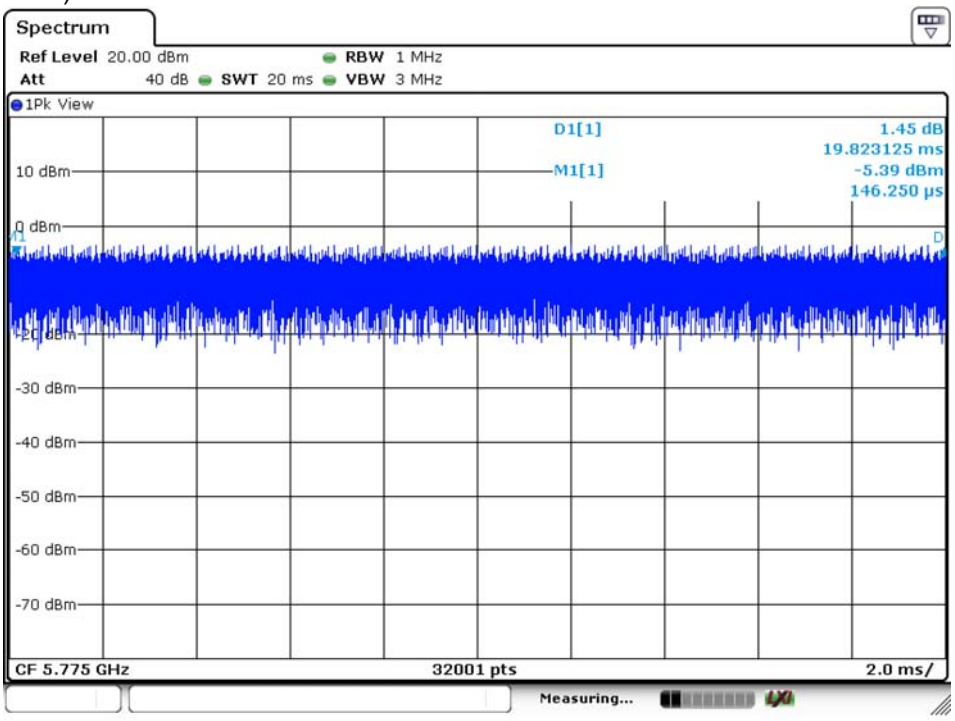
802.11ac(VHT20):100%



802.11ac(VHT40):100%



802.11ac(VHT80):100%



8.3 MAXIMUM PEAK POWER DENSITY

8.3.1 Applicable Standard

According to FCC Part 15.407 (a)(3) for band 5725-5850MHz and KDB 789003 D2

8.3.2 Conformance Limit

(a) (3)For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, 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.

8.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.3.4 Test Procedure

Methods refer to FCC KDB 789033

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”.

2) Use the peak search function on the instrument to find the peak of the spectrum.

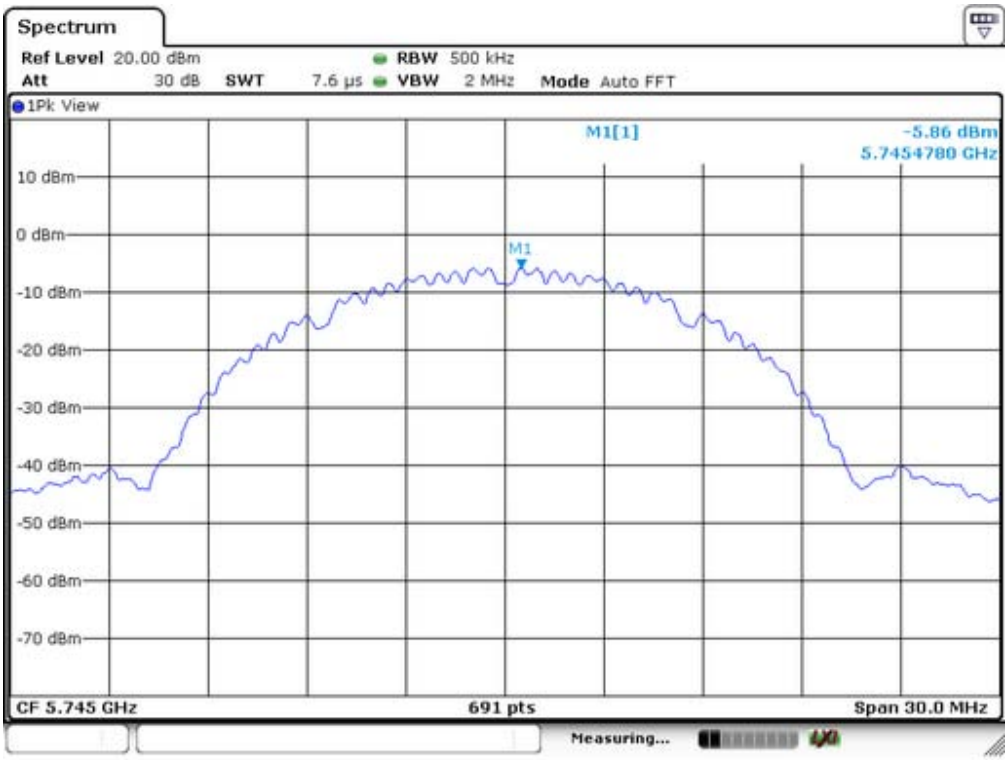
3) The result is the PPSD.
4) The above procedures make use of 500kHz resolution bandwidth to satisfy the 500kHz measurement bandwidth specified in the 15.407(a)(5). That rule section also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 500kHz bandwidth .

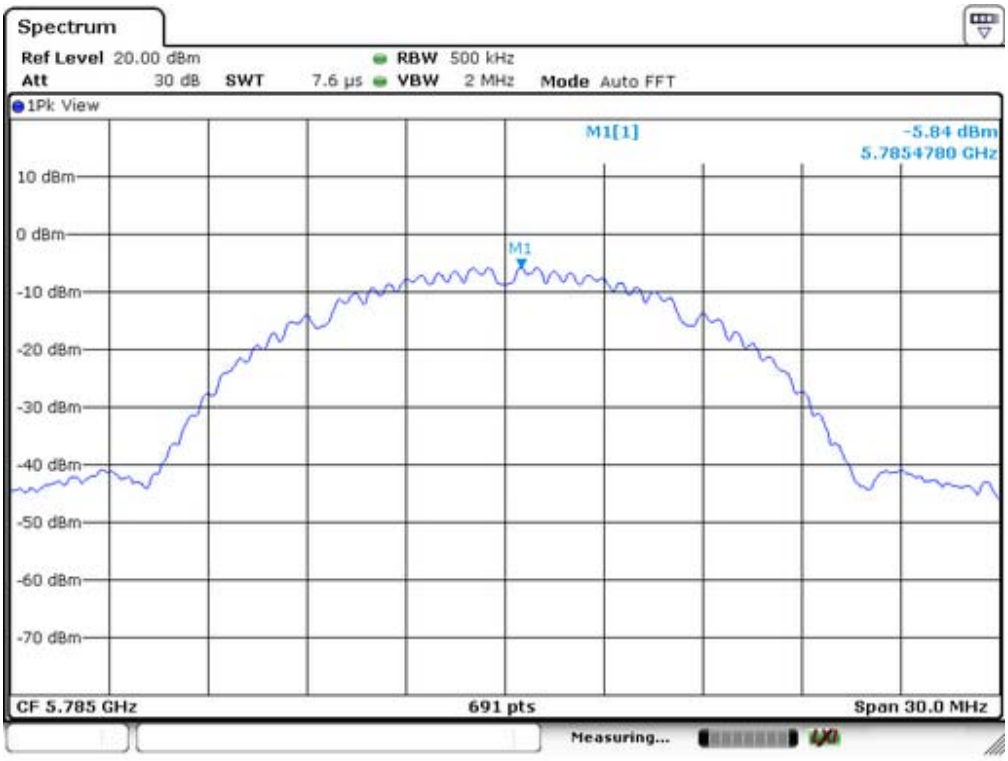
8.3.5 Test Results

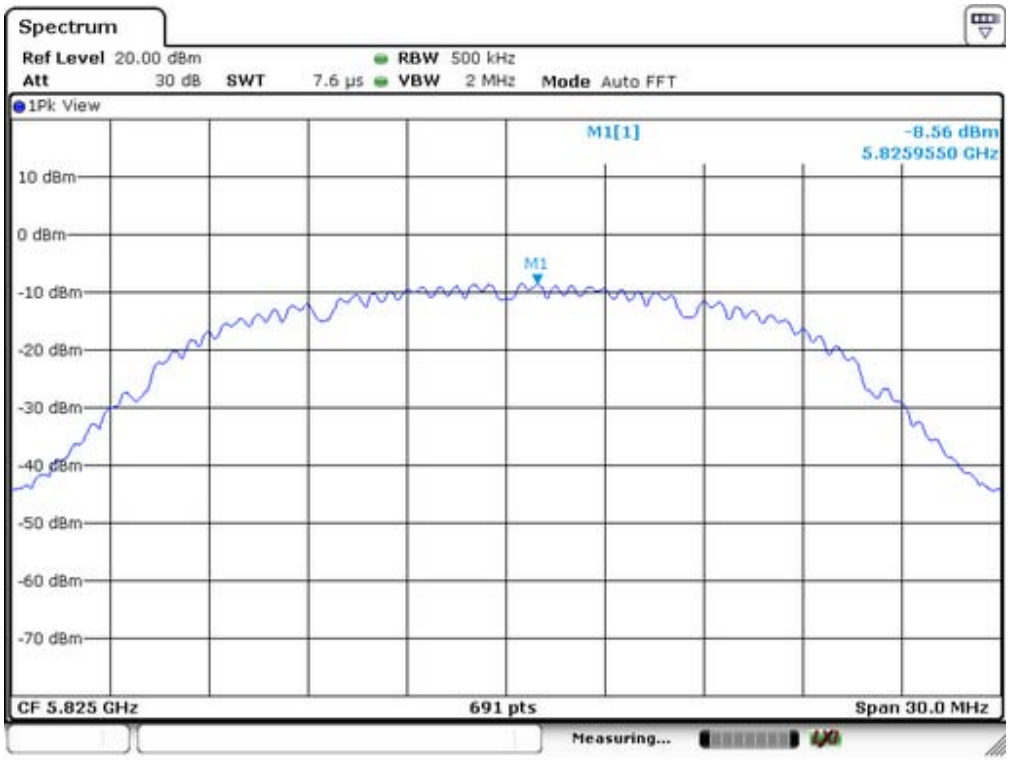
☒Frequency Band III (5725-5850MHz)			
Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	King Kong

IEEE 802.11a				
Channel frequency (MHz)	Power Density (dBm/500kHz)		Power Density Limit (dBm/500kHz)	Result
	Ant2	Ant3		
5745	-5.86	-5.74	30	Pass
5785	-5.84	-10.03		
5825	-8.56	-8.58		

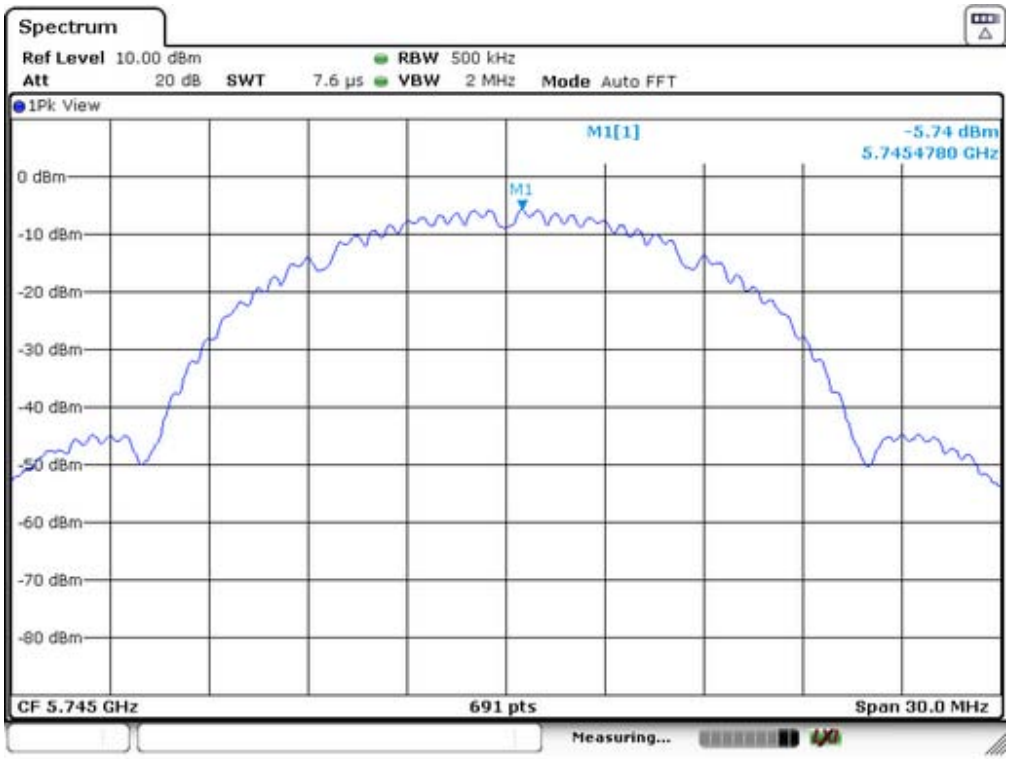
Ant 2

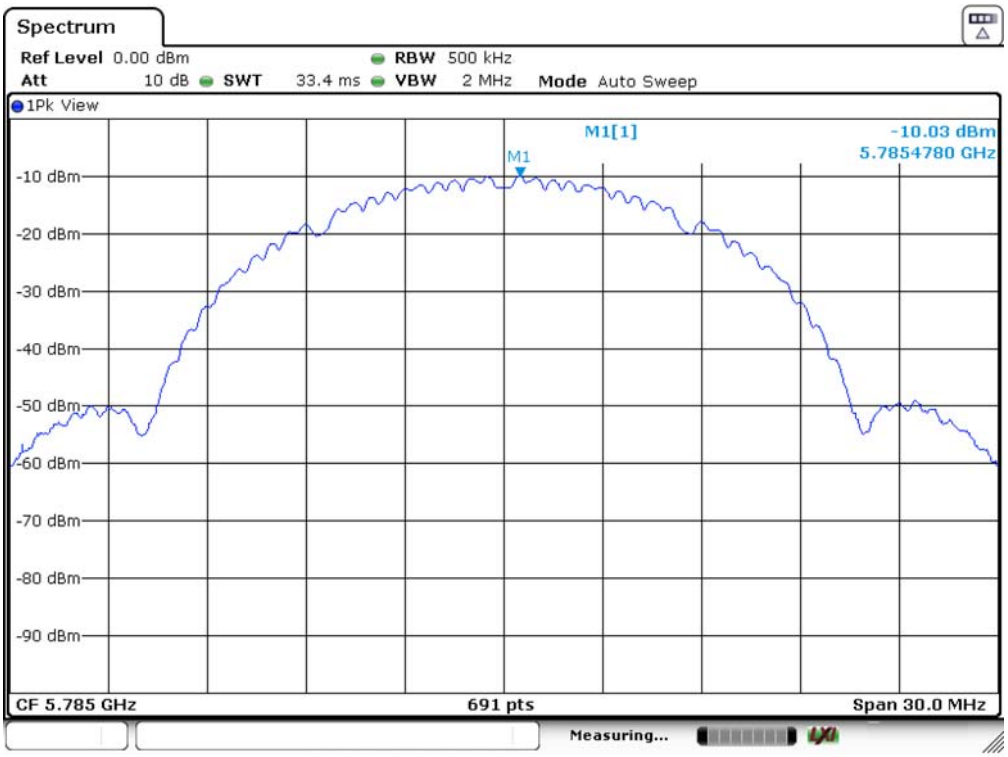

Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 7.6 µs VBW 2 MHz Mode Auto FFT
1Pk View
M1[1]
-5.86 dBm
5.7454780 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.745 GHz
691 pts
Span 30.0 MHz
Measuring...

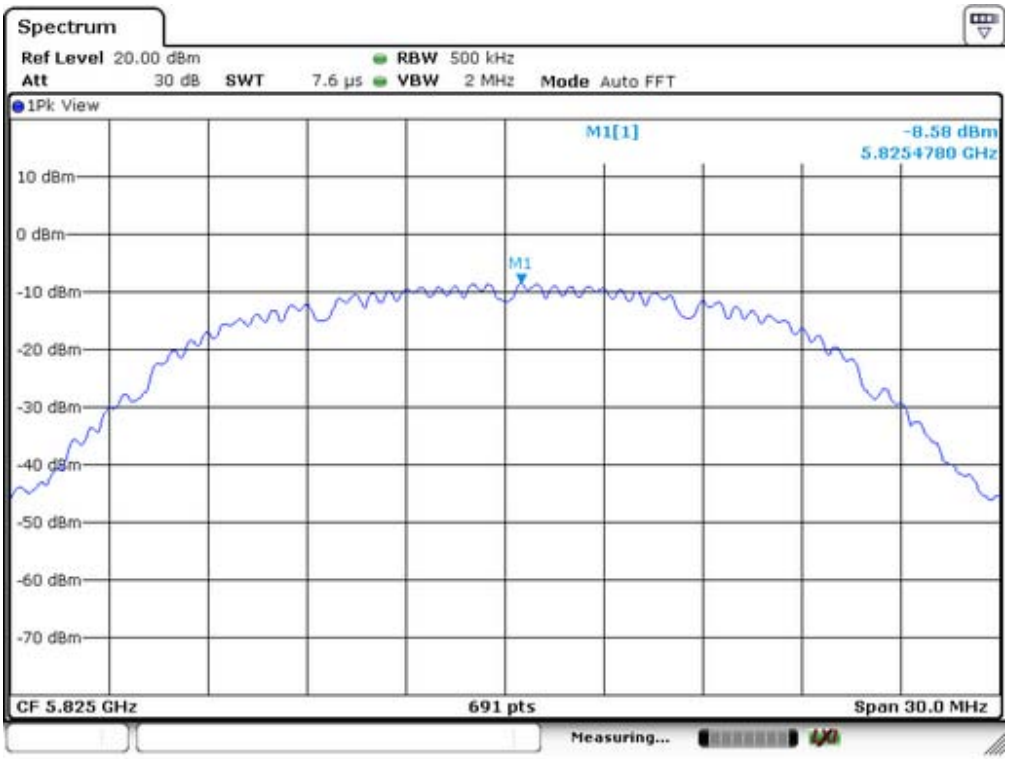

Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 7.6 µs VBW 2 MHz Mode Auto FFT
1Pk View
M1[1]
-5.84 dBm
5.7854780 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.785 GHz
691 pts
Span 30.0 MHz
Measuring...


Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 7.6 µs VBW 2 MHz Mode Auto FFT
1Pk View
M1[1]
-8.56 dBm
5.8259550 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.825 GHz
691 pts
Span 30.0 MHz
Measuring...

Ant 3

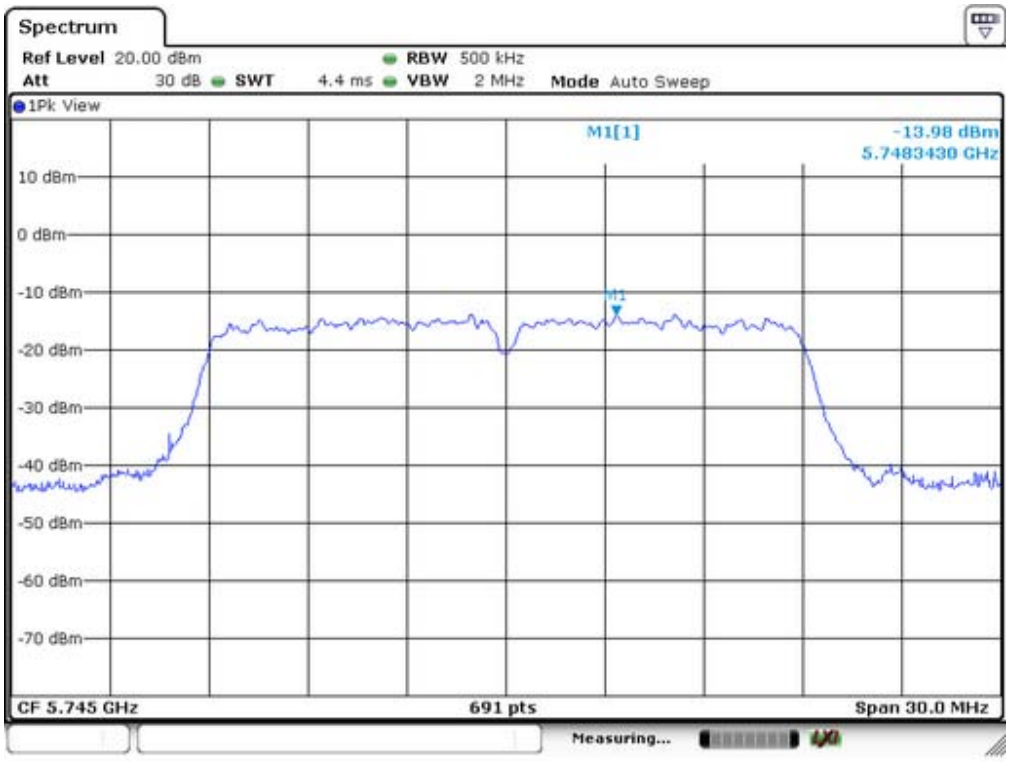

Spectrum
Ref Level 10.00 dBm
RBW 500 kHz
Att 20 dB SWT 7.6 µs VBW 2 MHz Mode Auto FFT
1Pk View
M1[1]
-5.74 dBm
5.7454780 GHz
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 5.745 GHz
691 pts
Span 30.0 MHz
Measuring...

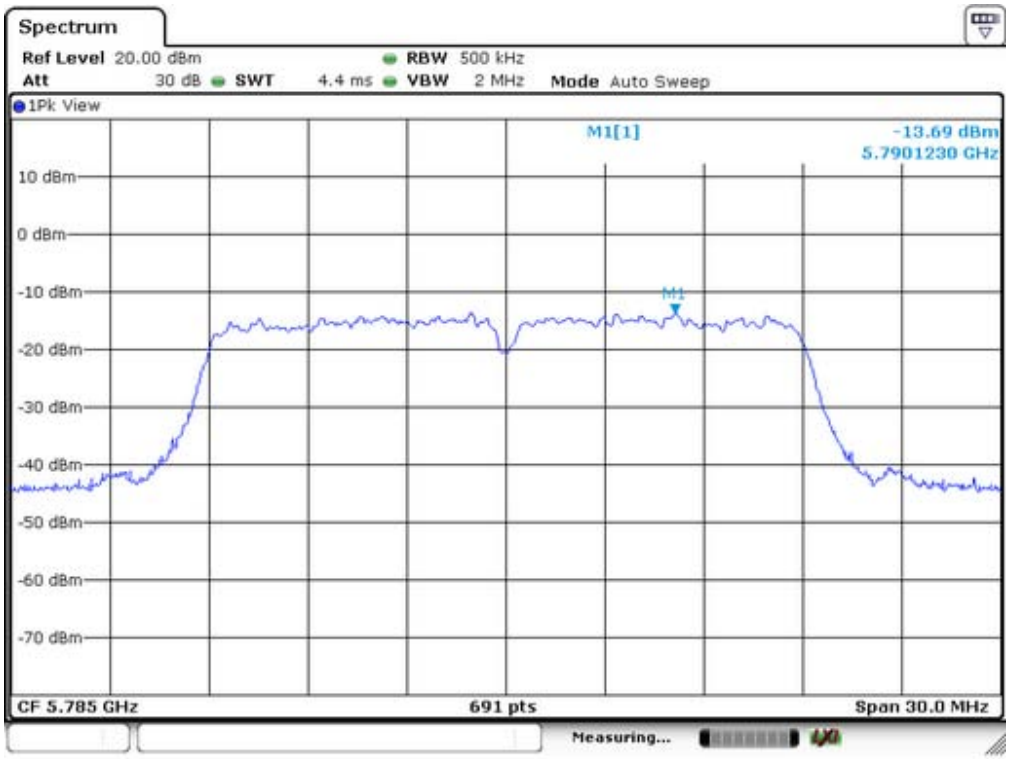

Spectrum
Ref Level 0.00 dBm
RBW 500 kHz
Att 10 dB SWT 33.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1]
-10.03 dBm
5.7854780 GHz
M1
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
CF 5.785 GHz
691 pts
Span 30.0 MHz
Measuring...

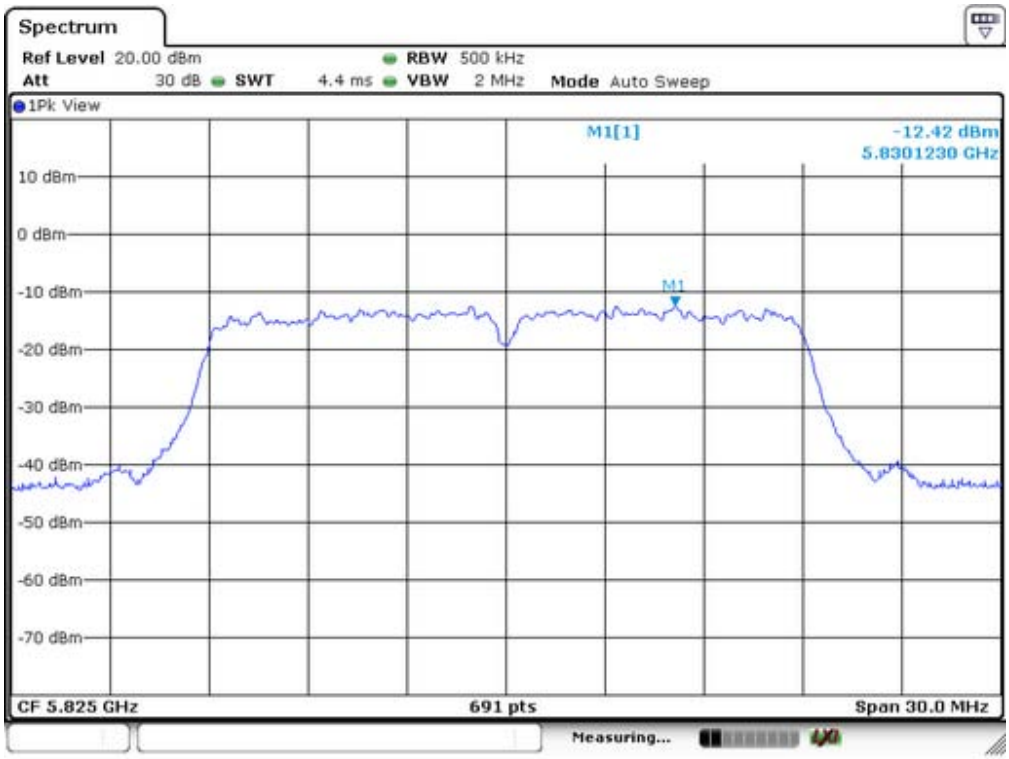

Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 7.6 µs VBW 2 MHz Mode Auto FFT
1Pk View
M1[1]
-8.58 dBm
5.8254780 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.825 GHz
691 pts
Span 30.0 MHz
Measuring...

IEEE 802.11ac(VHT20)				
Channel frequency (MHz)	Power Density (dBm/3kHz)		Power Density Limit (dBm/3kHz)	Result
	Ant2	Ant3		
5745	-13.98	-13.96	5.99	Pass
5785	-13.69	-13.18		
5825	-12.42	-13.44		

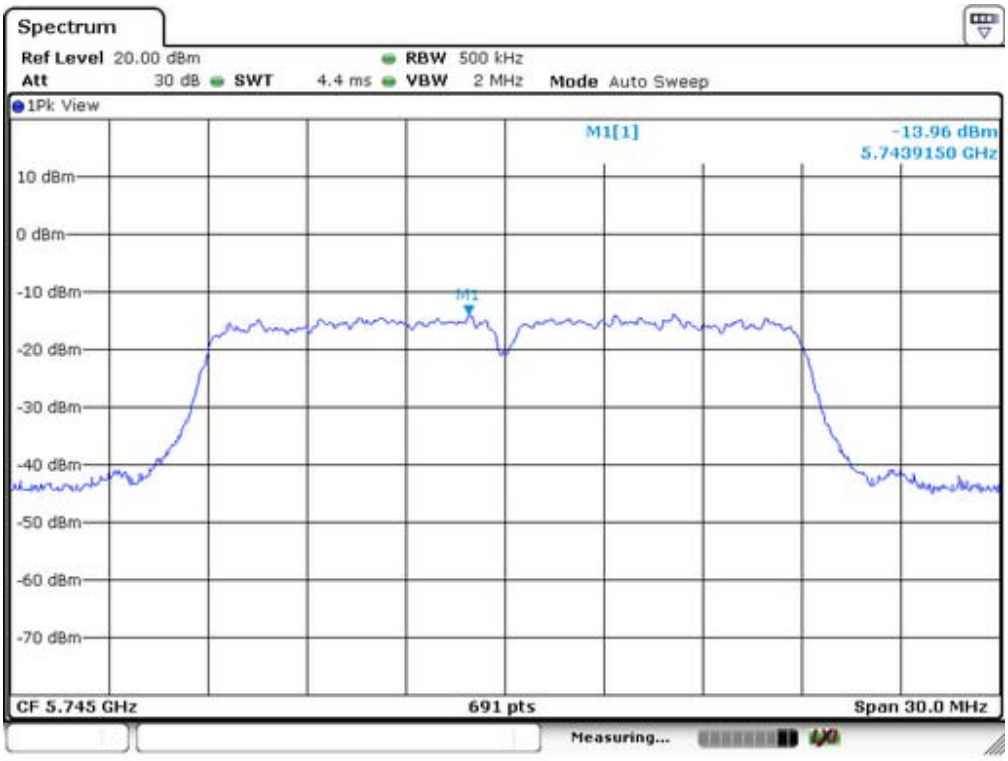
Ant 2

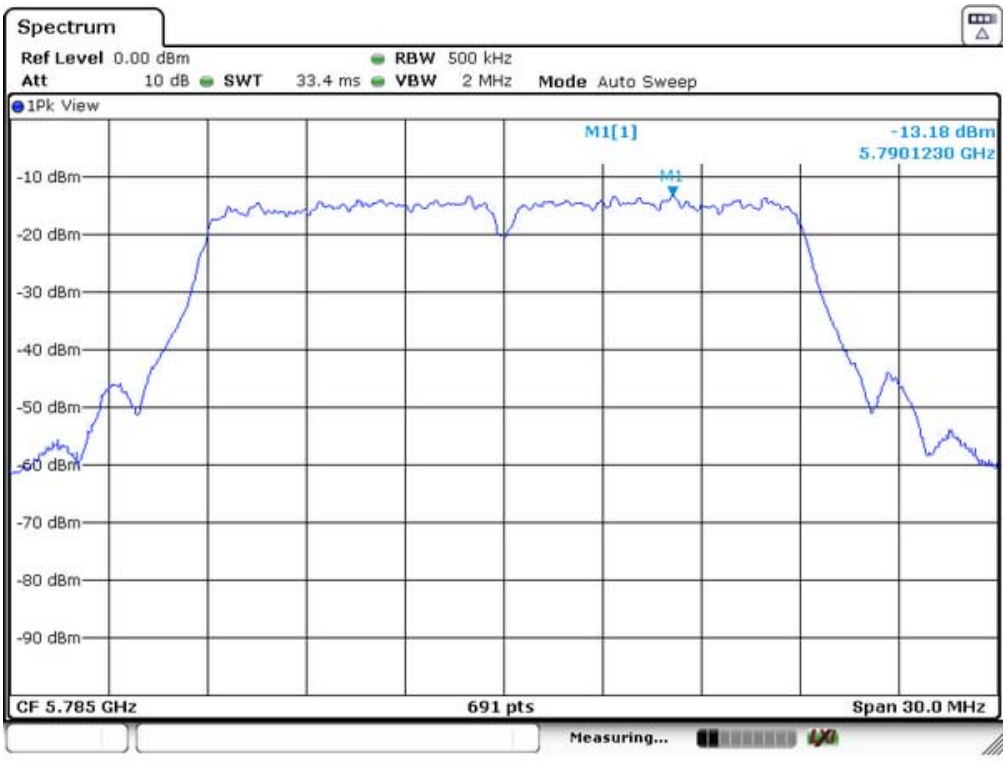


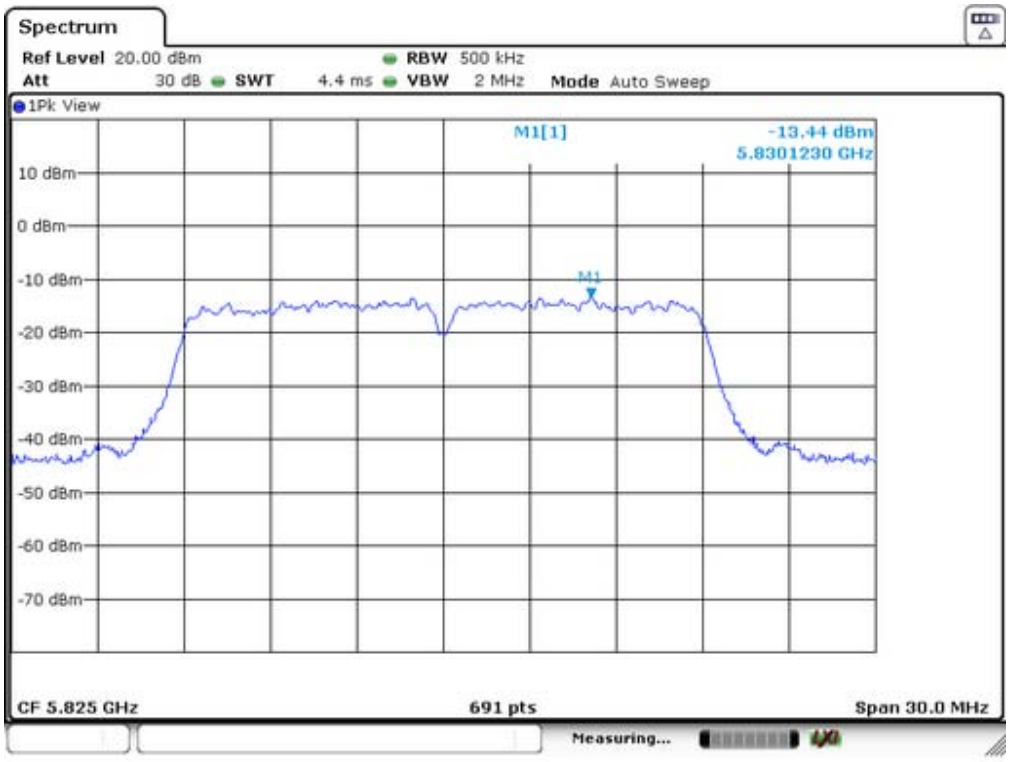

Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 4.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1]
-13.69 dBm
5.7901230 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.785 GHz
691 pts
Span 30.0 MHz
Measuring...


Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 4.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1]
-12.42 dBm
5.8301230 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.825 GHz
691 pts
Span 30.0 MHz
Measuring...

Ant 3

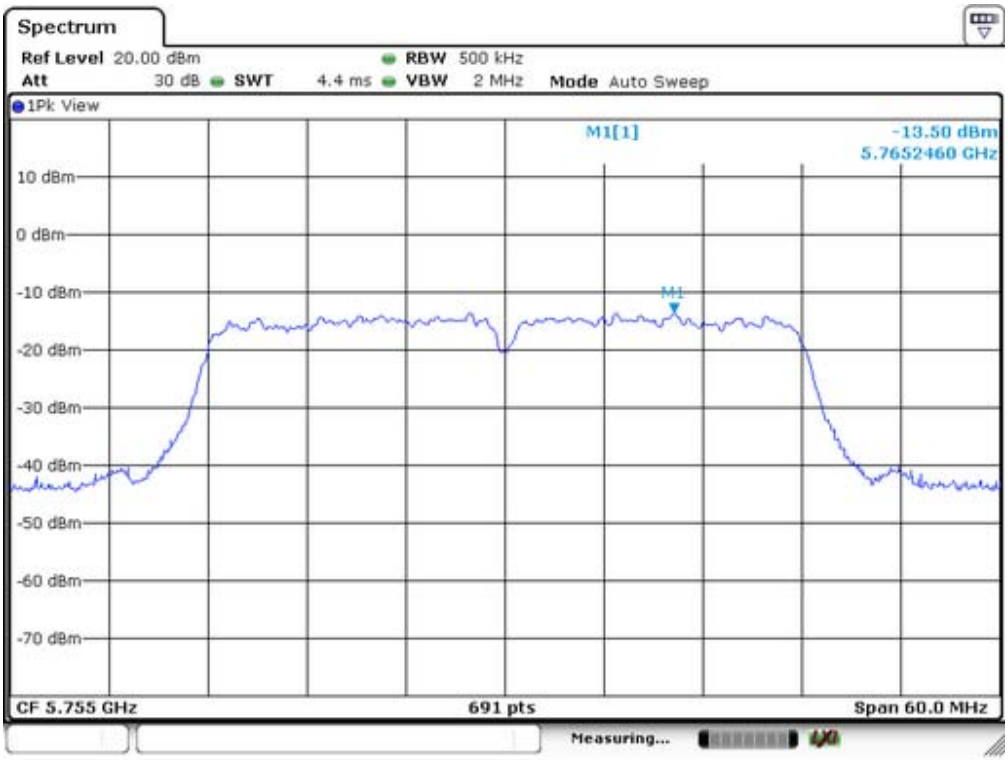

Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 4.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1] -13.96 dBm
5.7439150 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.745 GHz
691 pts
Span 30.0 MHz
Measuring...


Spectrum
Ref Level 0.00 dBm
RBW 500 kHz
Att 10 dB SWT 33.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1] -13.18 dBm
5.7901230 GHz
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
M1
CF 5.785 GHz
691 pts
Span 30.0 MHz
Measuring...



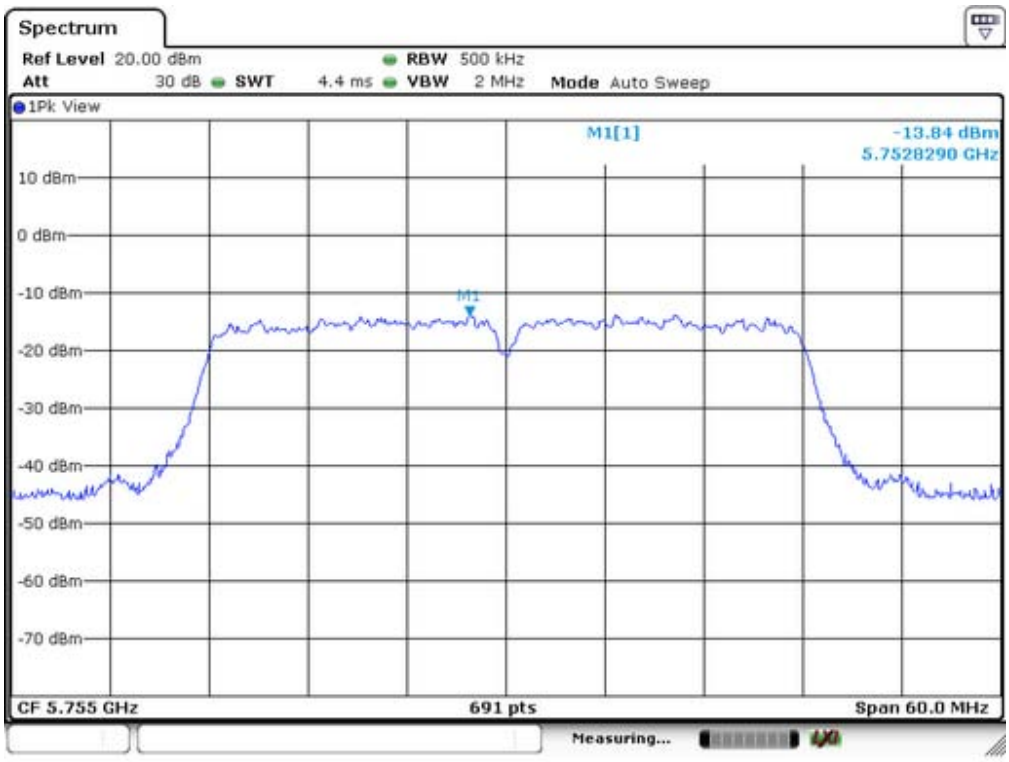
IEEE 802.11ac(VHT40)				
Channel frequency (MHz)	Power Density (dBm/500kHz)		Power Density Limit (dBm/500kHz)	Result
	Ant2	Ant3		
5755	-13.50	-13.84	30	Pass
5795	-13.30	-13.31		

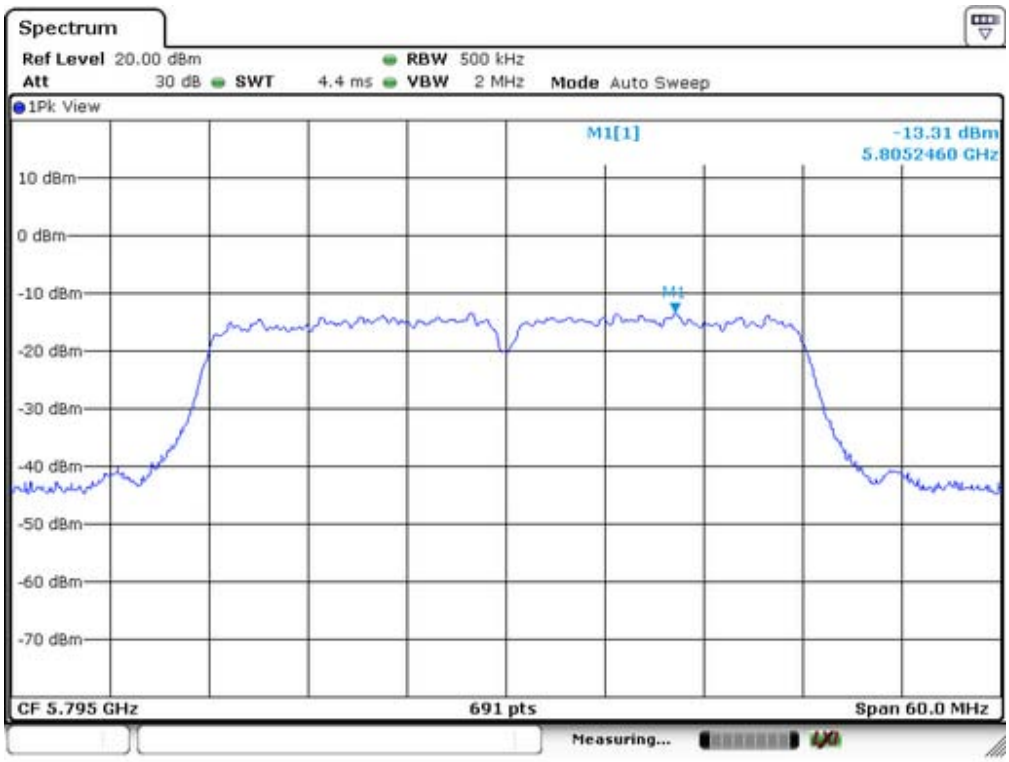
Ant 2


Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 4.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1]
-13.50 dBm
5.7652460 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.755 GHz
691 pts
Span 60.0 MHz
Measuring...


Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 4.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1]
-13.30 dBm
5.8052460 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.795 GHz
691 pts
Span 60.0 MHz
Measuring...

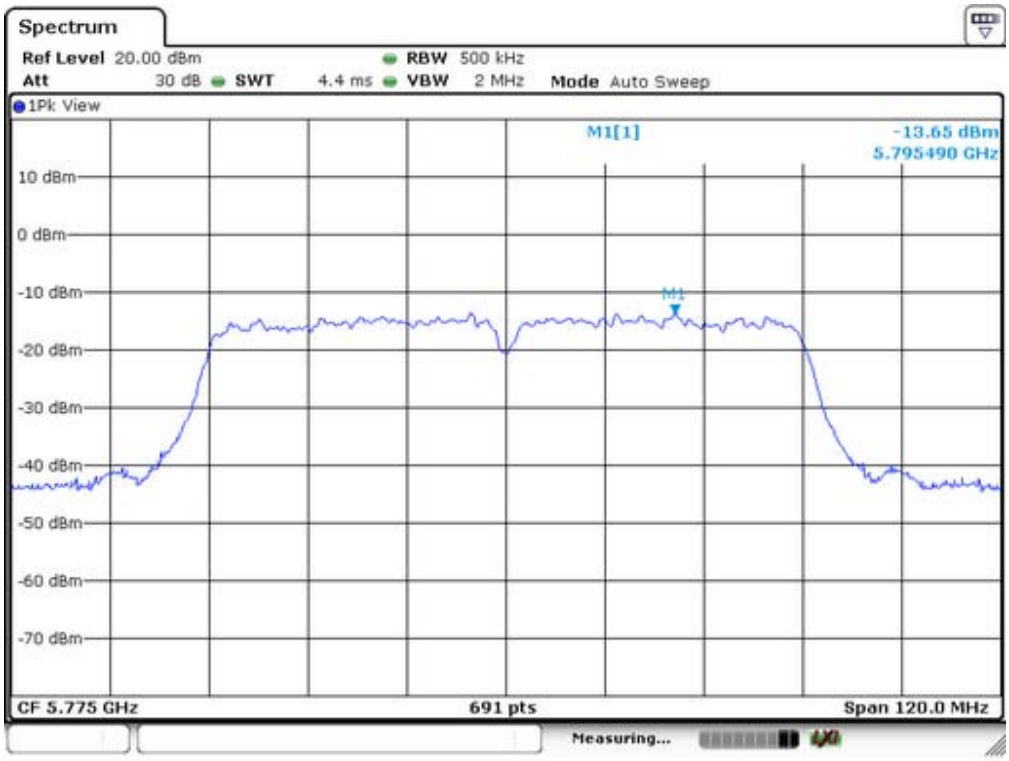
Ant 3


Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 4.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1]
-13.84 dBm
5.7528290 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.755 GHz
691 pts
Span 60.0 MHz
Measuring...

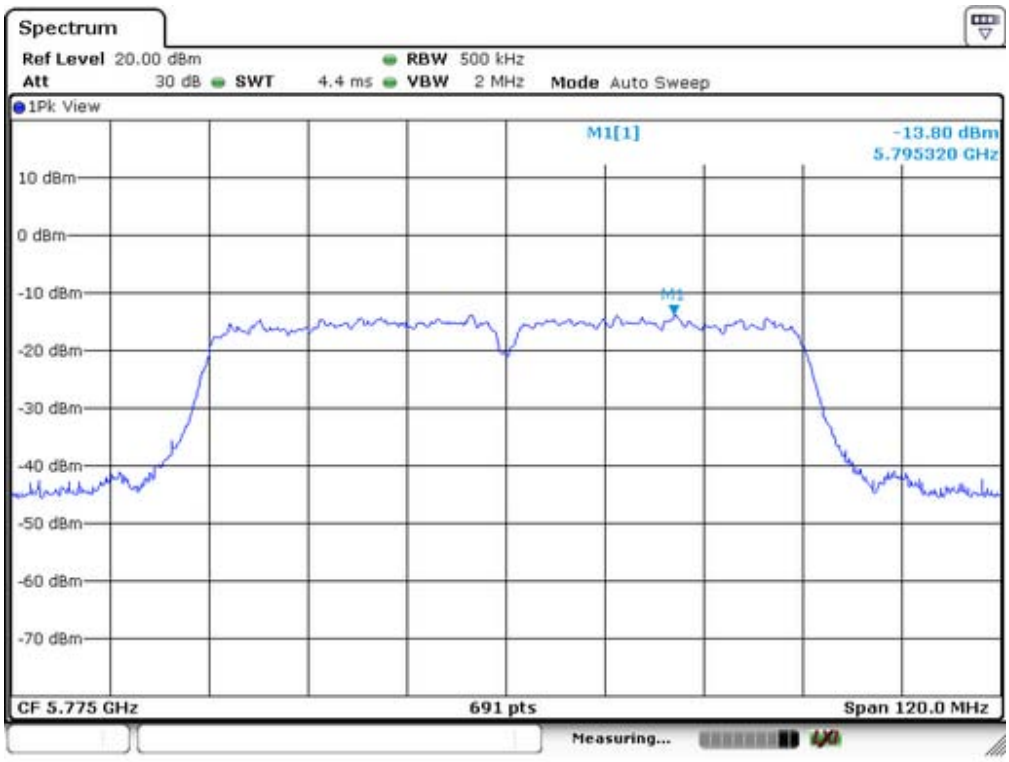

Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 4.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1]
-13.31 dBm
5.8052460 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.795 GHz
691 pts
Span 60.0 MHz
Measuring...

IEEE 802.11ac(VHT80)				
Channel frequency (MHz)	Power Density (dBm/500kHz)		Power Density Limit (dBm/500kHz)	Result
	Ant2	Ant3		
5775	-13.65	-13.80	30	Pass

Ant 2



Ant 3


Spectrum
Ref Level 20.00 dBm
RBW 500 kHz
Att 30 dB SWT 4.4 ms VBW 2 MHz Mode Auto Sweep
1Pk View
M1[1]
-13.80 dBm
5.795320 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.775 GHz
691 pts
Span 120.0 MHz
Measuring...

8.4 FREQUENCY STABILITY

8.4.1 Applicable Standard

According to FCC Part 15.407(g) and KDB 789003 D2

8.4.2 Conformance Limit

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 users manual.

8.4.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.4.4 Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously
Set RBW = 10 kHz.
Set the video bandwidth (VBW) =30 kHz.
Set Span= Entire absence of modulation emissions bandwidth
Set Detector = Peak.
Set Trace mode = max hold.
Set Sweep = auto couple.
Allow the trace to stabilize.
The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
Beginning at each temperature level specified in user manual , the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10° centigrade above the respective beginning ambient temperature level
Measure and record the results in the test report.

8.4.5 Test Results

☒Frequency Band III (5725-5850MHz)			
Temperature :	--	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy

Channel Number	Test Conditions		Test Frequency (MHz)	Max. Deviation (MHz)	Max. Deviation (ppm)	Verdict
	Voltage(V)	Temp(℃)				
CH 149	Vnom	-20	5744.9550	-0.0450	-7.83	PASS
		-10	5744.9550	-0.0450	-7.83	PASS
		0	5744.9500	-0.0500	-8.70	PASS
		10	5744.9550	-0.0450	-7.83	PASS
		20	5744.9550	-0.0450	-7.83	PASS
		30	5744.9550	-0.0450	-7.83	PASS
		40	5744.9500	-0.0500	-8.70	PASS
		50	5744.9550	-0.0450	-7.83	PASS
	85% Vnom	20	5744.9550	-0.0450	-7.83	PASS
	115% Vnom	20	5744.9550	-0.0450	-7.83	PASS
CH 157	Vnom	-20	5784.9550	-0.0450	-7.78	PASS
		-10	5784.9550	-0.0450	-7.78	PASS
		0	5784.9500	-0.0500	-8.64	PASS
		10	5784.9550	-0.0450	-7.78	PASS
		20	5784.9500	-0.0500	-8.64	PASS
		30	5784.9550	-0.0450	-7.78	PASS
		40	5784.9550	-0.0450	-7.78	PASS
		50	5784.9500	-0.0500	-8.64	PASS
	85% Vnom	20	5784.9550	-0.0450	-7.78	PASS
	115% Vnom	20	5784.9500	-0.0500	-8.64	PASS
CH 165	Vnom	-20	5824.9500	-0.0500	-8.58	PASS
		-10	5824.9550	-0.0450	-7.73	PASS
		0	5824.9550	-0.0450	-7.73	PASS
		10	5824.9550	-0.0450	-7.73	PASS
		20	5824.9500	-0.0500	-8.58	PASS
		30	5824.9550	-0.0450	-7.73	PASS
		40	5824.9550	-0.0450	-7.73	PASS
		50	5824.9550	-0.0450	-7.73	PASS
	85% Vnom	20	5824.9550	-0.0450	-7.73	PASS
	115% Vnom	20	5824.9500	-0.0500	-8.58	PASS
Note: N/A (Not Applicable)						

8.5 UNDESIRABLE RADIATED SPURIOUS EMISSION

8.5.1 Applicable Standard

According to FCC Part 15.407 (b)(4)(5)(6)for band 5725-5850MHz and KDB 789003 D2

8.5.2 Conformance Limit

For transmitters operating in the 5.725-5.850 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz
The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209
The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 15.209(a):

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	2400/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

The provisions of §15.205 apply to intentional radiators operating under this section,15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	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	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205, and the emissions located in restricted bands also comply with 15.209 limit.

8.5.3 Test Configuration

Test according to clause 6.2 radio frequency test setup

8.5.4 Test Procedure

■ Unwanted Emissions Measurements below 1000 MHz

Compliance shall be demonstrated using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.
The EUT was placed on a turn table which is 0.8m above ground plane.
And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
Repeat above procedures until all frequency measured was complete.
We use software control the EUT, Let EUT hopping on and transmit with highest power, All the modes have been tested and the worst result was reported.
Use the following spectrum analyzer settings:
Set RBW=120kHz for f < 1 GHz(30MHz to 1GHz), 200Hz for f<150KHz(9KHz to 150KHz), 9KHz for <30MHz (150KHz to 30KHz).
Set the VBW > RBW.
Detector = Peak.
Trace mode = max hold.
Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.
Repeat above procedures until all frequency measured was complete.

■ Unwanted Maximum peak Emissions Measurements above 1000 MHz

Maximum emission levels are measured by setting the analyzer as follows:
RBW = 1 MHz.
VBW ≥ 3 MHz.
Detector = Peak.
Sweep time = auto.
Trace mode = max hold.
Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

■ Unwanted Average Emissions Measurements above 1000 MHz

Method VB (Averaging using reduced video bandwidth): Alternative method.
RBW = 1 MHz.
Video bandwidth. • If the EUT is configured to transmit with duty cycle ≥ 98 percent, set VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10 Hz.
• If the EUT duty cycle is < 98 percent, set VBW ≥ 1/T, where T is defined in section II.B.1.a).
Video bandwidth mode or display mode • The instrument shall be set to ensure that video filtering is applied in the power domain. Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).
• As an alternative, the analyzer may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some analyzers require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode.
Detector = Peak.
Sweep time = auto.
Trace mode = max hold.
Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where x is the

duty cycle. For example, use at least 200 traces if the duty cycle is 25 percent. (If a specific emission is demonstrated to be continuous—i.e., 100 percent duty cycle—rather than turning on and off with the transmit cycle, at least 50 traces shall be averaged.)

- Band edge measurements.

Unwanted band-edge emissions may be measured using either of the special band-edge measurement techniques (the marker-delta or integration methods) described below. Note that the marker-delta method is primarily a radiated measurement technique that requires the 99% occupied bandwidth edge to be within 2 MHz of the authorized band edge, whereas the integration method can be used in either a radiated or conducted measurement without any special requirement with regards to the displacement of the unwanted emission(s) relative to the authorized bandwidth.
Marker-Delta Method.
The marker-delta method, as described in ANSI C63.10, can be used to perform measurements of the radiated unwanted emissions level of emissions provided that the 99% occupied bandwidth of the fundamental is within 2 MHz of the authorized band-edge.

8.5.5 Test Results

Radiated emissions measured in frequency range from 9k~40GHz were made with an instrument using Peak detector mode.

■ ☒For Undesirable radiated Spurious Emission in Band III (5725-5850MHz)

All the modes has been tested and the worst result 802.11a recorded as below:

● ☒Undesirable radiated Spurious Emission Above 1GHz

Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy
Test mode:	802.11a	Frequency:	Channel 149: 5745MHz

Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)
8055.00	V	52.53	-38.68	-27.00	-11.68
10741.00	V	57.80	-39.85	-27.00	-12.35
14124.00	V	64.42	-38.93	-27.00	-11.93
--					
7919.00	H	53.13	-42.07	-27.00	-15.07
11285.00	H	57.83	-42.37	-27.00	-15.37
14311.00	H	64.68	-40.52	-27.00	-13.52
--					

Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy
Test mode:	802.11a	Frequency:	Channel 157: 5785MHz

Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)
8056.04	V	52.28	-37.92	-27.00	-10.92
10742.05	V	57.59	-39.73	-27.00	-12.73
--					
14122.66	V	64.16	-38.07	-27.00	-11.07
7920.06	H	52.89	-40.31	-27.00	-13.31
11283.65	H	57.58	-40.62	-27.00	-13.62
14309.62	H	64.45	-38.75	-27.00	-11.75
--					

Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy
Test mode:	802.11a	Frequency:	Channel 165: 5825MHz

Freq. (MHz)	Ant.Pol. H/V	Field Strength (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Over(dB)
8057.05	V	52.28	-37.92	-27.00	-10.92
10740.54	V	57.59	-38.61	-27.00	-11.61
14121.20	V	64.16	-37.04	-27.00	-10.04
--					
7921.04	H	52.89	-40.31	-27.00	-13.31
11282.21	H	57.58	-40.62	-27.00	-13.62
14308.13	H	64.45	-37.75	-27.00	-10.75
--					

Note: (1) All Readings are Peak Value (VBW=3MHz) and AV Value (VBW=10Hz).
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3)EIRP[dBm] = E[dBμV/m] + 20 log(d[meters]) - 104.77
d is the measurement distance in 3 meters
(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

- ☒Undesirable radiated Spurious Emission in Restricted Band (4500-5100MHz and 5350-5460MHz)

Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy
Test mode:	802.11a	Frequency:	Channel 149: 5745MHz

Freq. (MHz)	Ant.Pol. H/V	PK (dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Margin (dB)	AV (dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Margin (dB)
4980.96	H	44.13	74.00	-29.87	34.60	54.00	-19.40
5043.36	V	44.71	74.00	-29.29	35.20	54.00	-18.80
5396.64	H	44.27	74.00	-29.73	35.60	54.00	-18.40
5389.92	V	45.58	74.00	-28.42	45.58	54.00	-17.70

Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy
Test mode:	802.11a	Frequency:	Channel 165: 5825MHz

Freq. (MHz)	Ant.Pol. H/V	PK (dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Margin (dB)	AV (dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Margin (dB)
5055.84	H	44.23	74.00	-29.77	36.60	54.00	-17.40
5039.52	V	44.55	74.00	-29.45	36.00	54.00	-18.00
5388.96	H	44.19	74.00	-29.81	35.30	54.00	-18.70
5373.60	V	44.52	74.00	-29.48	35.90	54.00	-18.10

- ☒Undesirable radiated Spurious Emission in band edge

Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy
Test mode:	802.11a	Frequency:	Channel 149: 5745MHz

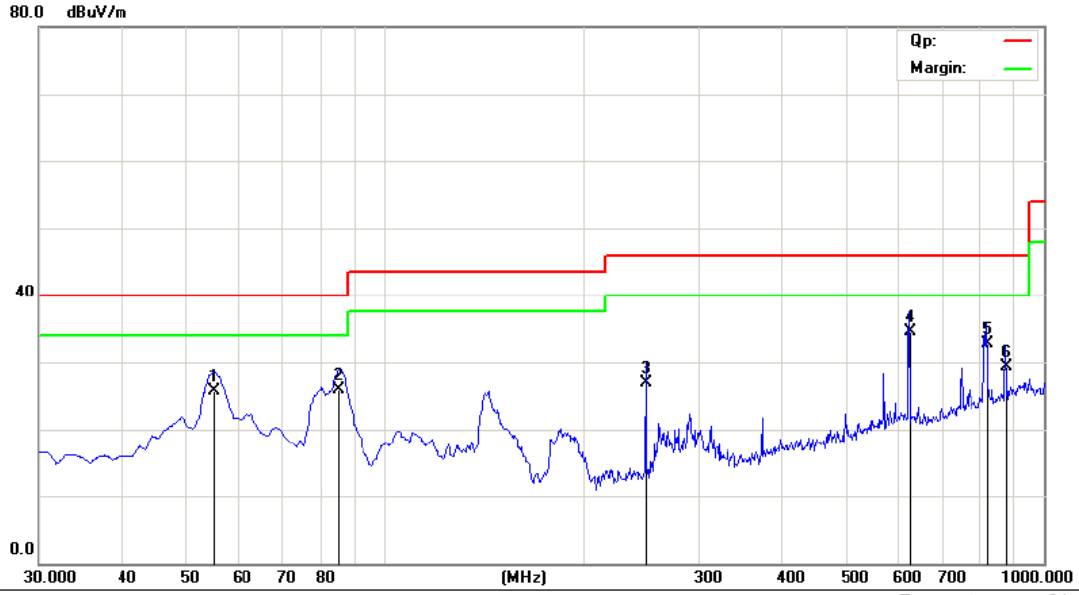
Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5706.600	H	55.86	-39.34	-27	PASS
5720.850	H	59.73	-35.47	-17	PASS
5713.650	V	58.07	-37.13	-27	PASS
5724.250	V	65.21	-29.99	-17	PASS

Temperature :	28℃	Test Date :	December 18, 2015
Humidity :	65 %	Test By:	Andy
Test mode:	802.11a	Frequency:	Channel 165: 5825MHz

Freq. (MHz)	Ant.Pol. H/V	Field Strength (RBW=100KHz) (dBuV/m)	E.I.R.P (dBm)	Limit (dBm)	Verdict
5856.560	H	61.40	-33.80	-17	PASS
5882.320	H	56.01	-39.19	-27	PASS
5851.440	V	63.24	-31.96	-17	PASS
5874.400	V	57.35	-37.85	-27	PASS

Note: (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).
(2) Emission Level= Reading Level+Probe Factor +Cable Loss.
(3)EIRP[dBm] = E[dBμV/m] + 20 log(d[meters]) - 104.77
d is the measurement distance in 3 meters

- Undesirable radiated Spurious Emission below 1GHz (30MHz to 1GHz)



Site site #1 Polarization: ***Horizontal*** Temperature: 24

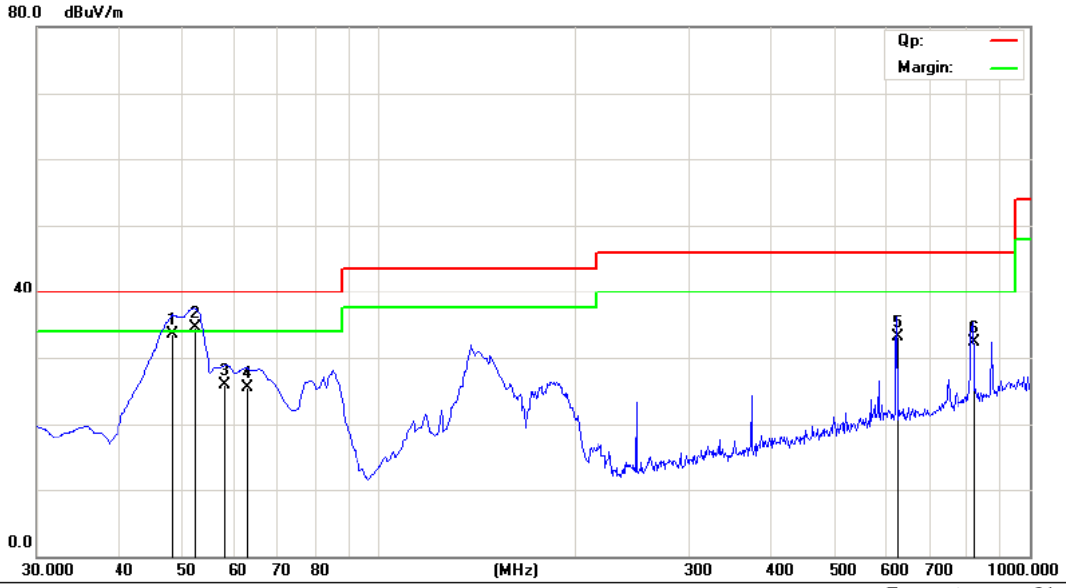
Limit: (RE)FCC PART 15 class B 3m Power: AC 120V/60Hz Humidity: 55 %

Mode:TX 5745(5G)

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		55.2200	43.23	-17.46	25.77	40.00	-14.23	QP		0	
2		85.2980	47.58	-21.77	25.81	40.00	-14.19	QP		0	
3		250.1900	42.32	-15.48	26.84	46.00	-19.16	QP		0	
4	*	625.5800	42.72	-8.22	34.50	46.00	-11.50	QP		0	
5		819.5800	37.10	-4.43	32.67	46.00	-13.33	QP		0	
6		875.8400	33.43	-4.21	29.22	46.00	-16.78	QP		0	

*:Maximum data x:Over limit !:over margin Operator: KYO



Site site #1 Polarization: *Vertical* Temperature: 24

Limit: (RE)FCC PART 15 class B 3m Power: AC 120V/60Hz Humidity: 55 %

Mode:TX 5745(5G)

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		48.4300	48.19	-14.74	33.45	40.00	-6.55	QP		0	
2	*	52.3100	50.81	-16.32	34.49	40.00	-5.51	QP		0	
3		58.1300	44.60	-18.68	25.92	40.00	-14.08	QP		0	
4		62.9800	45.79	-20.27	25.52	40.00	-14.48	QP		0	
5		625.5800	41.38	-8.23	33.15	46.00	-12.85	QP		0	
6		820.5500	36.81	-4.42	32.39	46.00	-13.61	QP		0	

*:Maximum data x:Over limit !:over margin Operator: KYO

8.6 POWER LINE CONDUCTED EMISSIONS

8.6.1 Applicable Standard

According to FCC Part 15.207(a)

8.6.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.6.3 Test Configuration

Test according to clause 6.3 conducted emission test setup

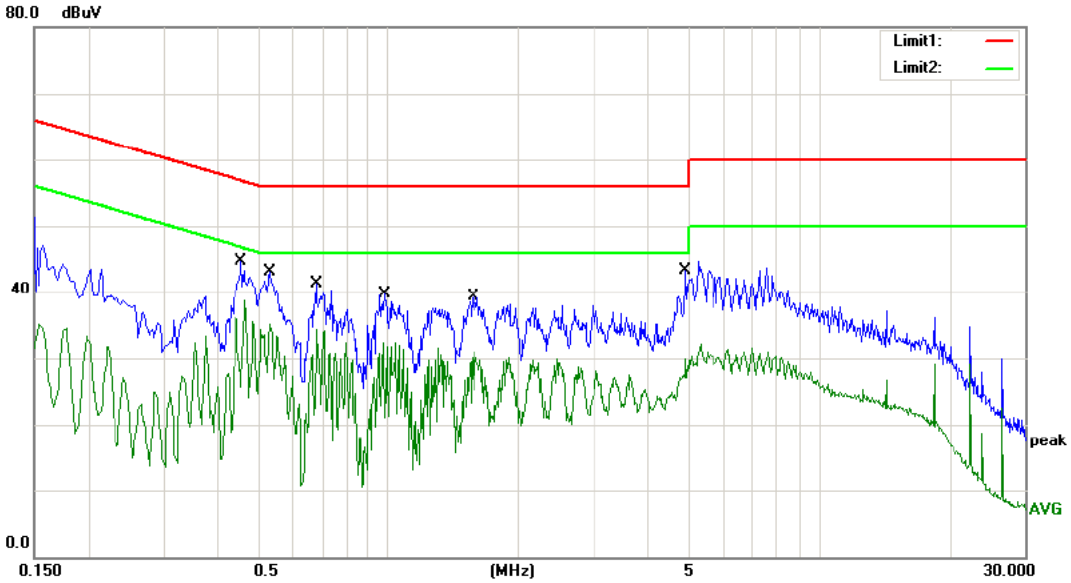
8.6.4 Test Procedure

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

8.6.5 Test Results

Pass

Please refer to following pages.



Site site #1 Phase: L1 Temperature: 24

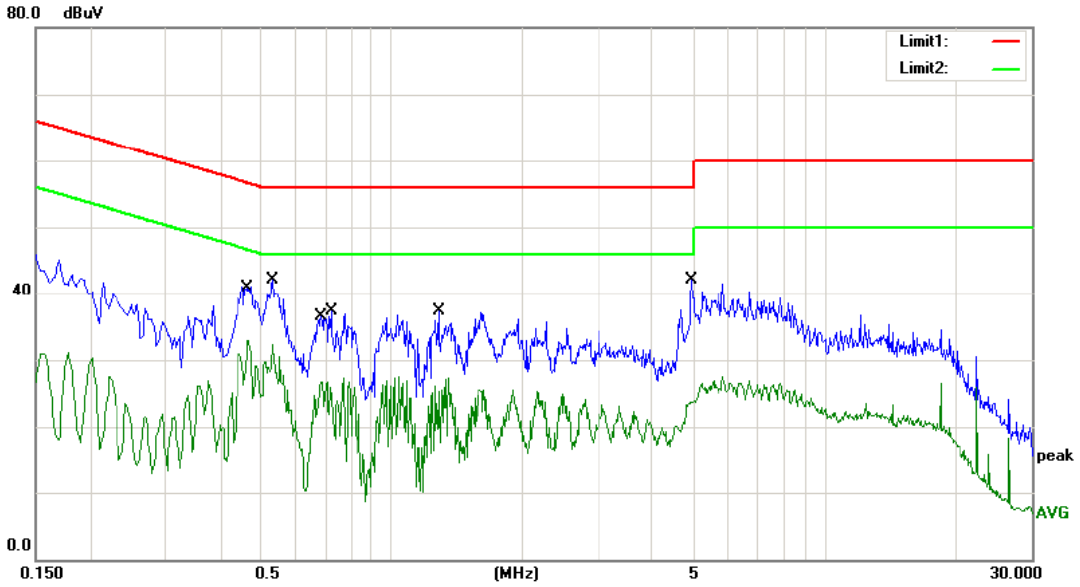
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 55 %

Mode: TX

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4540	34.43	10.18	44.61	56.80	-12.19	QP	
2		0.4540	15.52	10.18	25.70	46.80	-21.10	AVG	
3		0.5300	32.92	10.19	43.11	56.00	-12.89	QP	
4		0.5300	22.79	10.19	32.98	46.00	-13.02	AVG	
5		0.6780	31.19	10.19	41.38	56.00	-14.62	QP	
6	*	0.6780	24.10	10.19	34.29	46.00	-11.71	AVG	
7		0.9820	29.48	10.18	39.66	56.00	-16.34	QP	
8		0.9820	10.94	10.18	21.12	46.00	-24.88	AVG	
9		1.5700	29.04	10.17	39.21	56.00	-16.79	QP	
10		1.5700	19.88	10.17	30.05	46.00	-15.95	AVG	
11		4.8980	33.14	10.10	43.24	56.00	-12.76	QP	
12		4.8980	17.33	10.10	27.43	46.00	-18.57	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:



Site site #1 Phase: N Temperature: 24

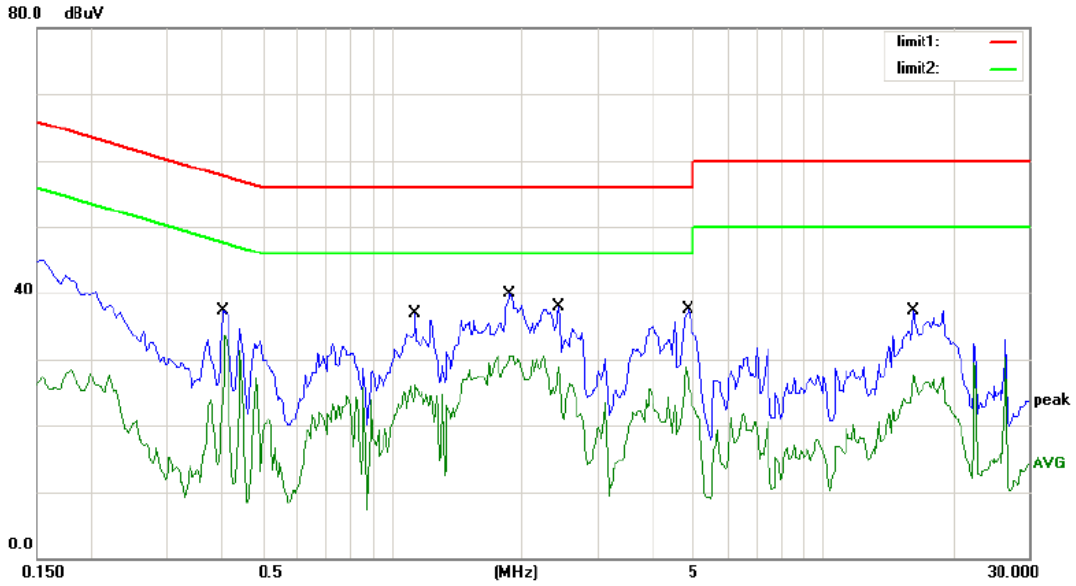
Limit: (CE)FCC PART 15 class B_QP Power: AC 120V/60Hz Humidity: 55 %

Mode: TX

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4660	30.81	10.18	40.99	56.58	-15.59	QP	
2	*	0.4660	22.71	10.18	32.89	46.58	-13.69	AVG	
3		0.5300	32.00	10.19	42.19	56.00	-13.81	QP	
4		0.5300	22.05	10.19	32.24	46.00	-13.76	AVG	
5		0.6860	26.25	10.19	36.44	56.00	-19.56	QP	
6		0.6860	16.57	10.19	26.76	46.00	-19.24	AVG	
7		0.7220	27.07	10.19	37.26	56.00	-18.74	QP	
8		0.7220	15.66	10.19	25.85	46.00	-20.15	AVG	
9		1.2780	27.16	10.17	37.33	56.00	-18.67	QP	
10		1.2780	9.60	10.17	19.77	46.00	-26.23	AVG	
11		4.9180	32.06	10.10	42.16	56.00	-13.84	QP	
12		4.9180	13.54	10.10	23.64	46.00	-22.36	AVG	

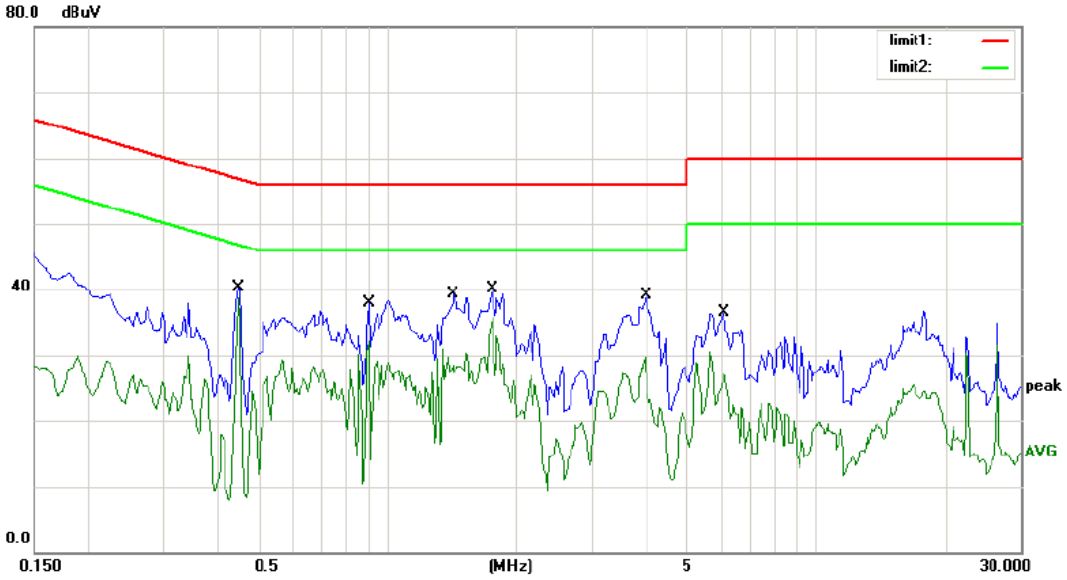
*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator:



Site site #1 Phase: *L1* Temperature: 24
Limit: (CE)FCC PART 15 class B_QP Power: AC 240V/60Hz Humidity: 55 %
Mode: TX
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4050	37.27	0.00	37.27	57.75	-20.48	QP	
2	*	0.4050	33.61	0.00	33.61	47.75	-14.14	AVG	
3		1.1300	36.82	0.00	36.82	56.00	-19.18	QP	
4		1.1300	26.03	0.00	26.03	46.00	-19.97	AVG	
5		1.8850	39.94	0.00	39.94	56.00	-16.06	QP	
6		1.8850	30.45	0.00	30.45	46.00	-15.55	AVG	
7		2.4400	37.96	0.00	37.96	56.00	-18.04	QP	
8		2.4400	28.95	0.00	28.95	46.00	-17.05	AVG	
9		4.8800	37.53	0.00	37.53	56.00	-18.47	QP	
10		4.8800	28.80	0.00	28.80	46.00	-17.20	AVG	
11		16.1750	37.38	0.00	37.38	60.00	-22.62	QP	
12		16.1750	27.76	0.00	27.76	50.00	-22.24	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.



Site site #1 Phase: N Temperature: 24
Limit: (CE)FCC PART 15 class B_QP Power: AC 240V/60Hz Humidity: 55 %
Mode: TX
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4500	40.40	0.00	40.40	56.88	-16.48	QP	
2	*	0.4500	38.63	0.00	38.63	46.88	-8.25	AVG	
3		0.9050	37.86	0.00	37.86	56.00	-18.14	QP	
4		0.9050	32.07	0.00	32.07	46.00	-13.93	AVG	
5		1.4300	39.24	0.00	39.24	56.00	-16.76	QP	
6		1.4300	27.80	0.00	27.80	46.00	-18.20	AVG	
7		1.7550	40.09	0.00	40.09	56.00	-15.91	QP	
8		1.7550	35.66	0.00	35.66	46.00	-10.34	AVG	
9		4.0100	39.12	0.00	39.12	56.00	-16.88	QP	
10		4.0100	29.61	0.00	29.61	46.00	-16.39	AVG	
11		6.1200	36.51	0.00	36.51	60.00	-23.49	QP	
12		6.1200	27.10	0.00	27.10	50.00	-22.90	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.

8.7 ANTENNA APPLICATION

8.7.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

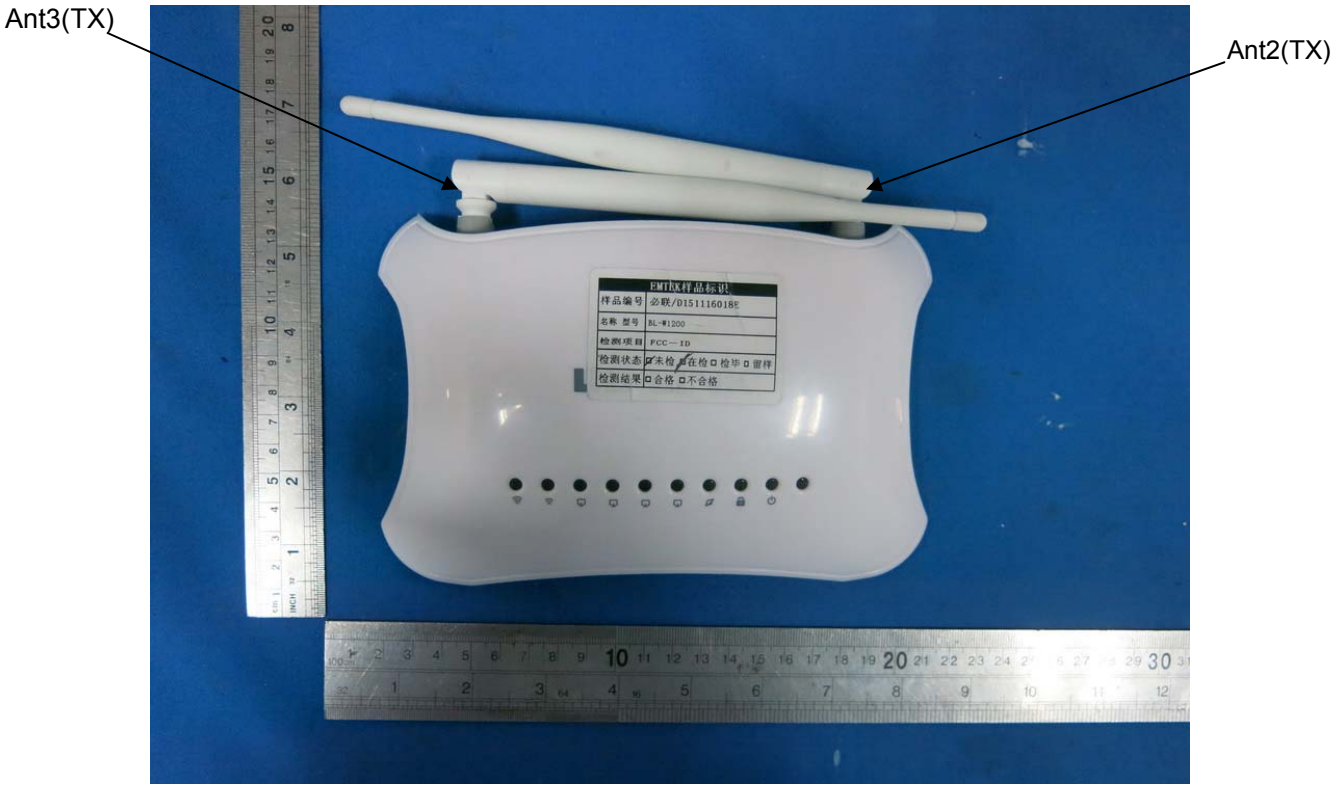
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

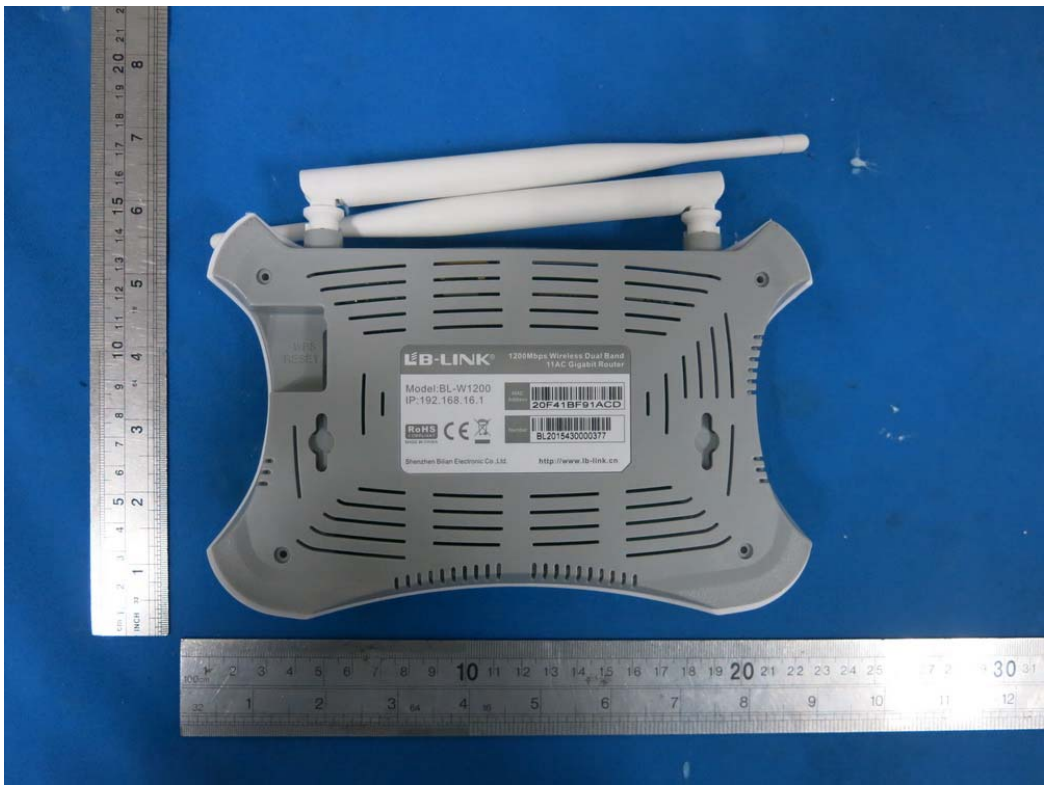
8.7.2 Result

PASS.

The EUT'S antenna, permanent attach antenna, is external antenna. The antenna's gain is 5dBi and meets the requirement.

APPENDIX I
(PHOTOS OF EUT)


Ant3(TX)
Ant2(TX)


LB-LINK
1200Mbps Wireless Dual Band 11AC Gigabit Router
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IP:192.168.16.1
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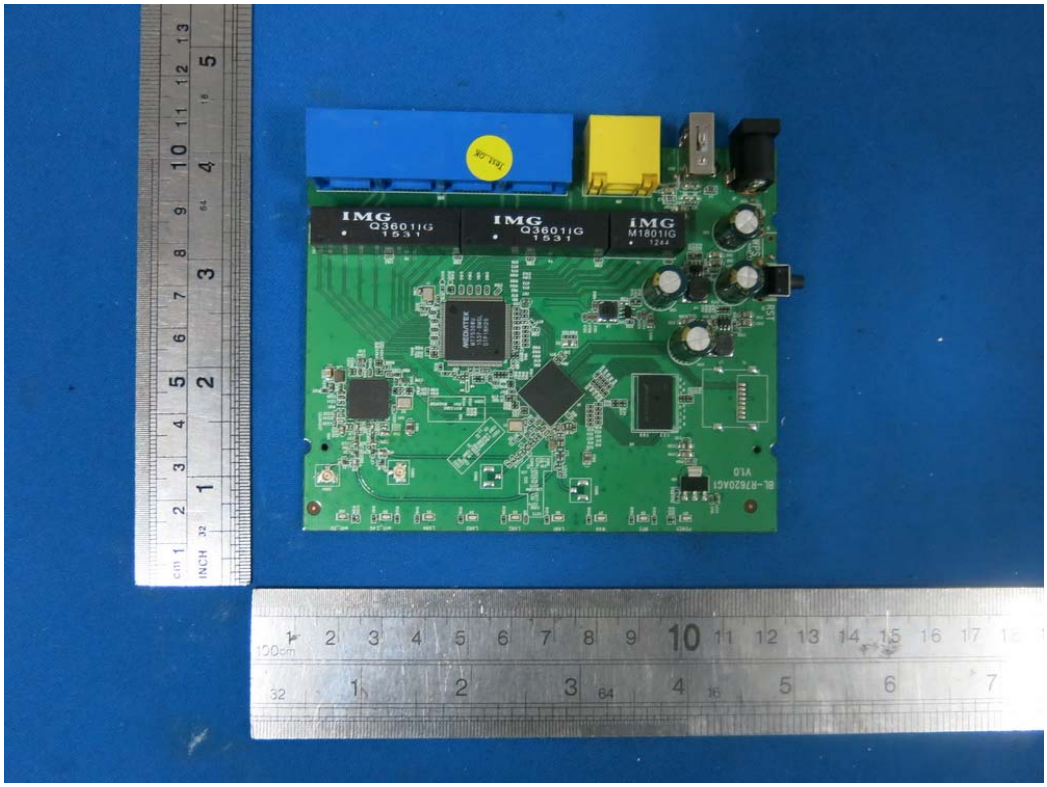
BL2015430000377
http://www.lb-link.cn


IMG
Q3601IG
1531
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