

FCC 47 CFR PART 15 SUBPART E

Applicant : Comtrend Corporation
Product Type : Wireless Gateway
Trade Name : COMTREND
Model Number : VR-3060u, VR-3060
Test Specification : FCC 47 CFR PART 15 SUBPART E
ANSI C63.10:2013
Receive Date : Apr. 19, 2016
Test Period : Apr. 29 ~ Jun. 20, 2016
Issue Date : Sep. 27, 2016

Issue by

A Test Lab Techno Corp.
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Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Jul. 11, 2016	Initial Issue	Snow Wang
01	Sep. 27, 2016	Revised report information.	Snow Wang



Verification of Compliance

Issued Date: Sep. 27, 2016

Applicant : Comtrend Corporation
Product Type : Wireless Gateway
Trade Name : COMTREND
Model Number : VR-3060u, VR-3060
FCC ID : L9VVR3060U
EUT Rated Voltage : DC 12V, 2.5A
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART E
ANSI C63.10:2013
Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.

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Taoyuan City 33465, Taiwan (R.O.C)

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<http://www.atl-lab.com.tw/e-index.htm>



A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By :

Fly Lu

(Manager)

(Fly Lu)

Reviewed By :

Eric Ou Yang

(Testing Engineer)

(Eric Ou Yang)

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1 General Information

1.1. Summary of Test Result

Standard	Item	Result	Remark
FCC			
15.407(b)(6) 15.207	AC Power Conducted Emission	PASS	---
15.407(b) 15.205 / 15.209	Transmitter Radiated Emissions	PASS	---
15.407(a)	Maximum Conducted Output Power	PASS	---
15.407(a)	26dB RF Bandwidth	Reference	---
15.407(e)	6dB RF Bandwidth	PASS	----
15.407(a)	Peak Power Spectral Density	PASS	---
15.407(g)	Frequency Stability	PASS	---
15.407(a) 15.203	Antenna Requirement	PASS	---

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

1.2. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conducted Emission	9kHz ~ 150KHz	2.7 dB
	150kHz ~ 30MHz	2.8 dB
Radiated Emission	9kHz ~ 30MHz	1.457 dB
	30MHz ~ 1000MHz	6.300 dB
	1000MHz ~ 18000MHz	5.474 dB
	18000MHz ~ 26500MHz	5.630 dB
	26500MHz ~ 40000MHz	5.054 dB
Conducted Output Power		+0.27 dB / -0.28 dB
RF Bandwidth		4.96%
Power Spectral Density		+0.71 dB / -0.77 dB
Frequency Stability		+ 2.212 x 10 ⁻⁷ % / - 2.170 x 10 ⁻⁷ %
Duty Cycle		1.06%
Time Occupancy		1.40%

2 EUT Description

Applicant	Comtrend Corporation 3F-1, No. 10, Lane 609, Chung Hsin Road, Section 5, San Chung Dist, New Taipei City 24159, Taiwan				
Manufacturer	Comtrend Corporation 3F-1, No. 10, Lane 609, Chung Hsin Road, Section 5, San Chung Dist, New Taipei City 24159, Taiwan				
Product Type	Wireless Gateway				
Trade Name	COMTREND				
Model No.	VR-3060u, VR-3060				
Model Different Description	Those model numbers differ from each other in selling region.				
FCC ID	L9VVR3060U				
Operate Frequency	Band	Frequency Range (MHz)	Channel Bandwidth	Number of Channels	Data Rate
IEEE 802.11a	U-NII Band I	5180 – 5240	20MHz	4	Up to 54Mbps
	U-NII Band III	5745 – 5825		5	
IEEE 802.11n 5GHz 20 MHz / IEEE 802.11ac 20 MHz	U-NII Band I	5180 – 5240	20MHz	4	Up to 234Mbps
	U-NII Band III	5745 – 5825		5	
IEEE 802.11n 5GHz 40 MHz / IEEE 802.11ac 40 MHz	U-NII Band I	5190 – 5230	40MHz	2	Up to 540Mbps
	U-NII Band III	5755 – 5795		2	
IEEE 802.11ac 80 MHz	U-NII Band I	5210	80MHz	1	Up to 1170Mbps
	U-NII Band III	5775		1	
Modulation Type	OFDM				
Equipment Type	Indoor access point only master mode function				
Antenna information	Antenna	Trade Name	Model	Type	Max. Gain (dBi)
	ANT-0	Cortec	AN2450-64D02BBO	External antenna (Reversed-SMA Connector)	2.5
	ANT-1	Cortec	NBO351-C70BO	Embedded Antenna	4.0
	ANT-2	Cortec	AN2450-64D03BBO	External antenna (Reversed-SMA Connector)	2.5
Antenna Delivery	Reference section 3.1				
Frequency stability specification	± 20 ppm				
Antenna Delivery	0 ~ 40 °C				

Frequency Band		RF Output Power (W)
IEEE 802.11a	U-NII Band I	0.321
	U-NII Band III	0.593
IEEE 802.11ac 20 MHz	U-NII Band I	0.379
	U-NII Band III	0.565
IEEE 802.11ac 40 MHz	U-NII Band I	0.538
	U-NII Band III	0.609
IEEE 802.11ac 80 MHz	U-NII Band I	0.217
	U-NII Band III	0.388

3 Test Methodology

3.1. Mode of Operation

Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Normal Operation Mode
Mode 2: IEEE 802.11a link mode
Mode 3: IEEE 802.11ac 20MHz link mode
Mode 4: IEEE 802.11ac 40MHz link mode
Mode 5: IEEE 802.11ac 80MHz link mode

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

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

Equipment Type	
Outdoor access point	---
Indoor access point	V
Fixed point-to-point access points	---
Client devices	---

Test Mode	ANT-0	ANT-1	ANT-2	ANT-0+1+2
Mode 2	V	V	V	V
Mode 3	V	V	V	V
Mode 4	V	V	V	V
Mode 5	V	V	V	V

Test Mode	Band	Data Rate	Test Channel
Mode 2	U-NII Band I	6M	36, 40, 44, 48
	U-NII Band III		149,153,157,161,165
Mode 3	U-NII Band I	13M	36, 40, 44, 48
	U-NII Band III		149,153,157,161,165
Mode 4	U-NII Band I	27M	38, 46
	U-NII Band III		151,159
Mode 5	U-NII Band I	58.6M	42
	U-NII Band III		155



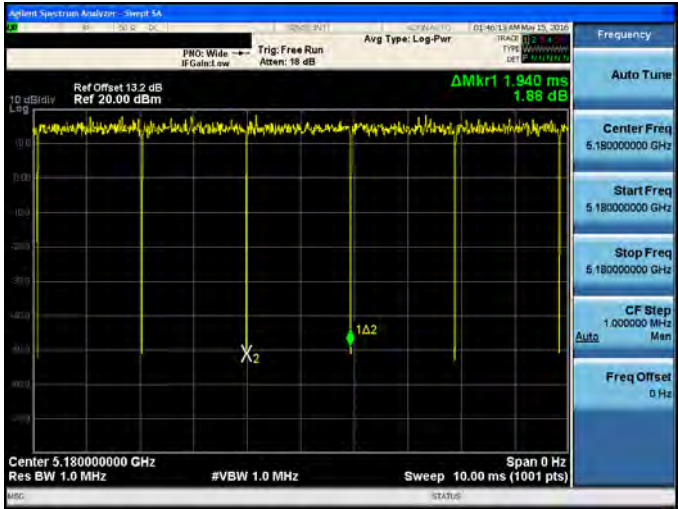
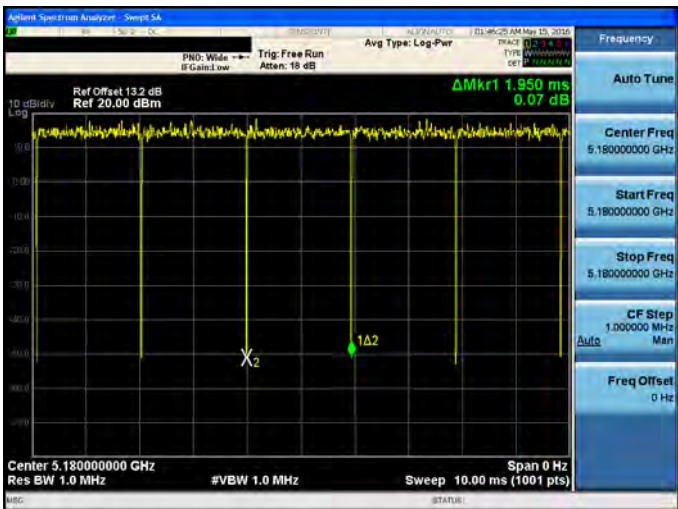
Duty cycle

Test Mode	Frequency (MHz)	on time (ms)	on+off time (ms)	Duty cycle	Duty Factor (dB)	1/T Minimum VBW (kHz)
Mode 2: IEEE 802.11a link mode	5180	2.090	2.100	0.995	0.021	0.010
Mode 3: IEEE 802.11ac 20MHz link mode	5180	1.940	1.950	0.995	0.022	0.010
Mode 4: IEEE 802.11ac 40MHz link mode	5190	0.970	0.980	0.990	0.045	0.010
Mode 5: IEEE 802.11ac 80MHz link mode	5210	0.210	0.230	0.913	0.395	4.762

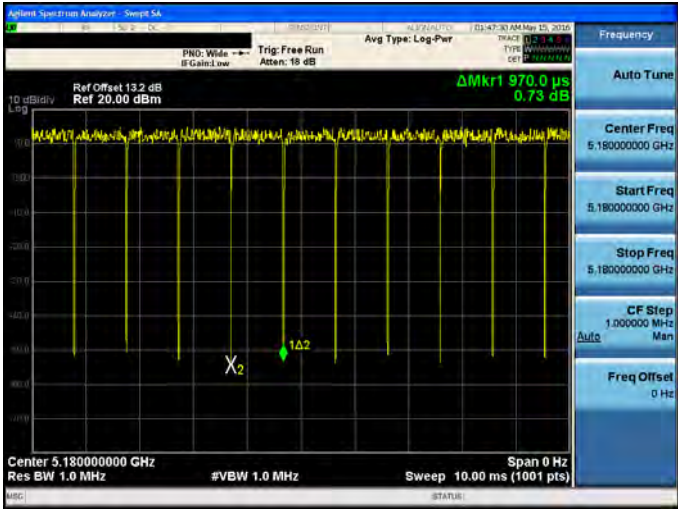
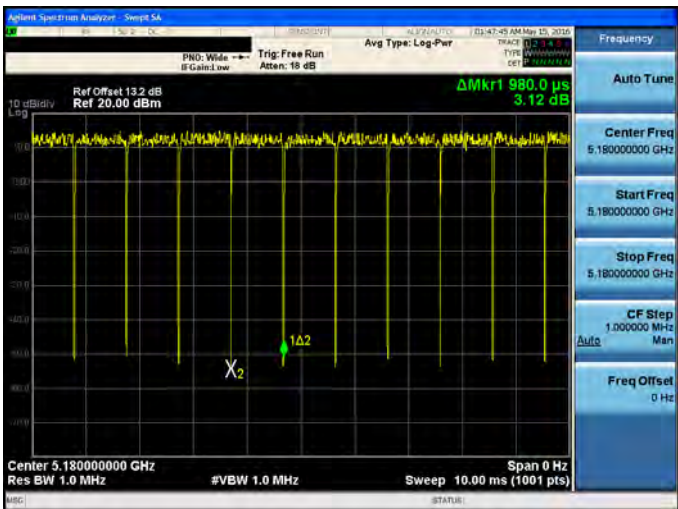
Duty Cycle Graphs

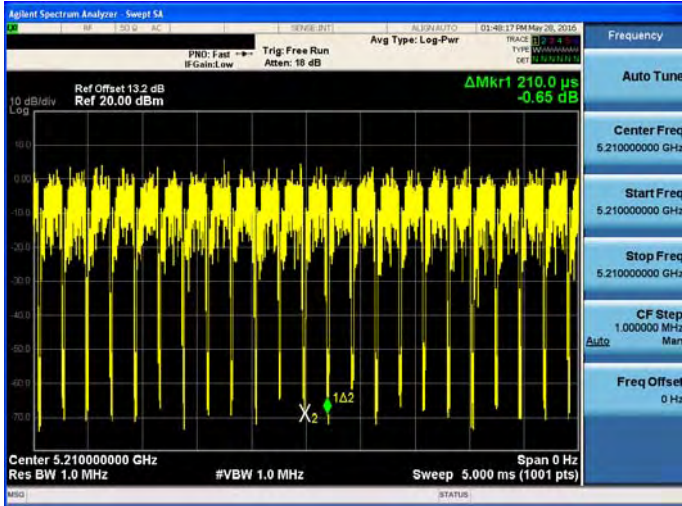
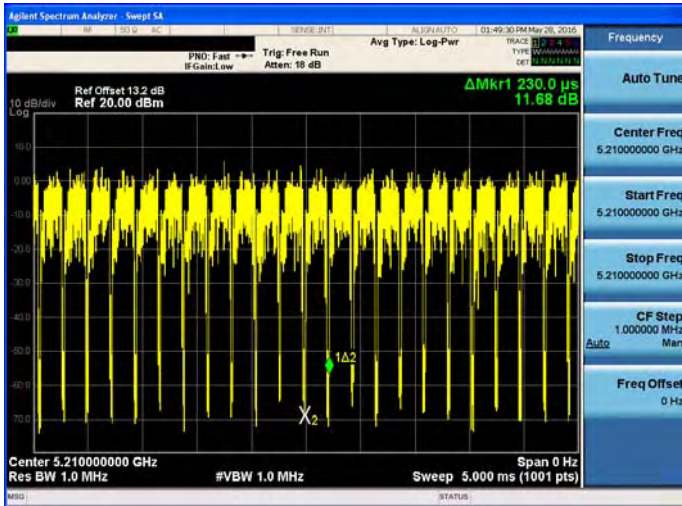
Mode 2: IEEE 802.11a link mode	
On time	
On+off time	



Mode 3: IEEE 802.11ac 20MHz link mode	
On time	 The screenshot shows a spectrum analyzer interface with a yellow trace. A green marker labeled $\Delta Mkr1$ is positioned at 1.940 ms and 1.88 dB. The interface includes various settings like PNO, Trig, and Avg Type, and a right-hand panel with frequency-related controls.
On+off time	 This screenshot is similar to the one above but shows a different measurement for $\Delta Mkr1$ at 1.950 ms and 0.07 dB. The overall layout and settings of the spectrum analyzer are consistent with the previous image.



Mode 4: IEEE 802.11ac 40MHz link mode	
On time	 The screenshot shows a spectrum analyzer interface with a yellow trace. A peak is marked with a green arrow and labeled '1Δ2'. The peak is at approximately 5.180000000 GHz. The y-axis is labeled '10 dB/div' and 'Log'. The x-axis is labeled 'Center 5.180000000 GHz', 'Res BW 1.0 MHz', '#VBW 1.0 MHz', and 'Sweep 10.00 ms (1001 pts)'. The right side of the screen shows a 'Frequency' panel with 'Auto Tune', 'Center Freq 5.180000000 GHz', 'Start Freq 5.180000000 GHz', 'Stop Freq 5.180000000 GHz', 'CF Step 1.000000 MHz', 'Auto', and 'Freq Offset 0 Hz'. The top status bar shows 'Ref Offset 13.2 dB', 'Ref 20.00 dBm', 'Avg Type: Log-Pwr', 'Trig: Free Run', 'Atten: 18 dB', and 'ΔMkr1 970.0 μs 0.73 dB'.
On+off time	 The screenshot shows a spectrum analyzer interface with a yellow trace. A peak is marked with a green arrow and labeled '1Δ2'. The peak is at approximately 5.180000000 GHz. The y-axis is labeled '10 dB/div' and 'Log'. The x-axis is labeled 'Center 5.180000000 GHz', 'Res BW 1.0 MHz', '#VBW 1.0 MHz', and 'Sweep 10.00 ms (1001 pts)'. The right side of the screen shows a 'Frequency' panel with 'Auto Tune', 'Center Freq 5.180000000 GHz', 'Start Freq 5.180000000 GHz', 'Stop Freq 5.180000000 GHz', 'CF Step 1.000000 MHz', 'Auto', and 'Freq Offset 0 Hz'. The top status bar shows 'Ref Offset 13.2 dB', 'Ref 20.00 dBm', 'Avg Type: Log-Pwr', 'Trig: Free Run', 'Atten: 18 dB', and 'ΔMkr1 980.0 μs 3.12 dB'.

Mode 5: IEEE 802.11ac 80MHz link mode	
On time	
On+off time	

3.2. EUT Exercise Software

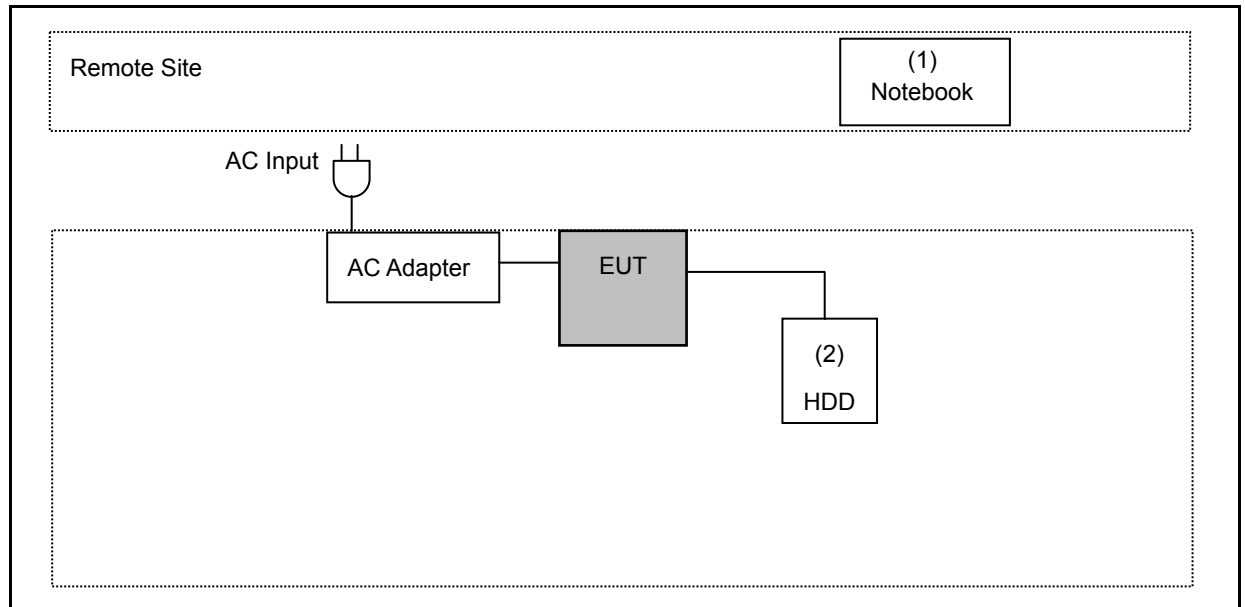
The EUT is operated in the engineering mode to fix the TX frequency for the purposes of measurement. According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

1.	Setup the EUT shown on 3.3.
2.	Turn on the power of all equipment.
3.	EUT run test program.

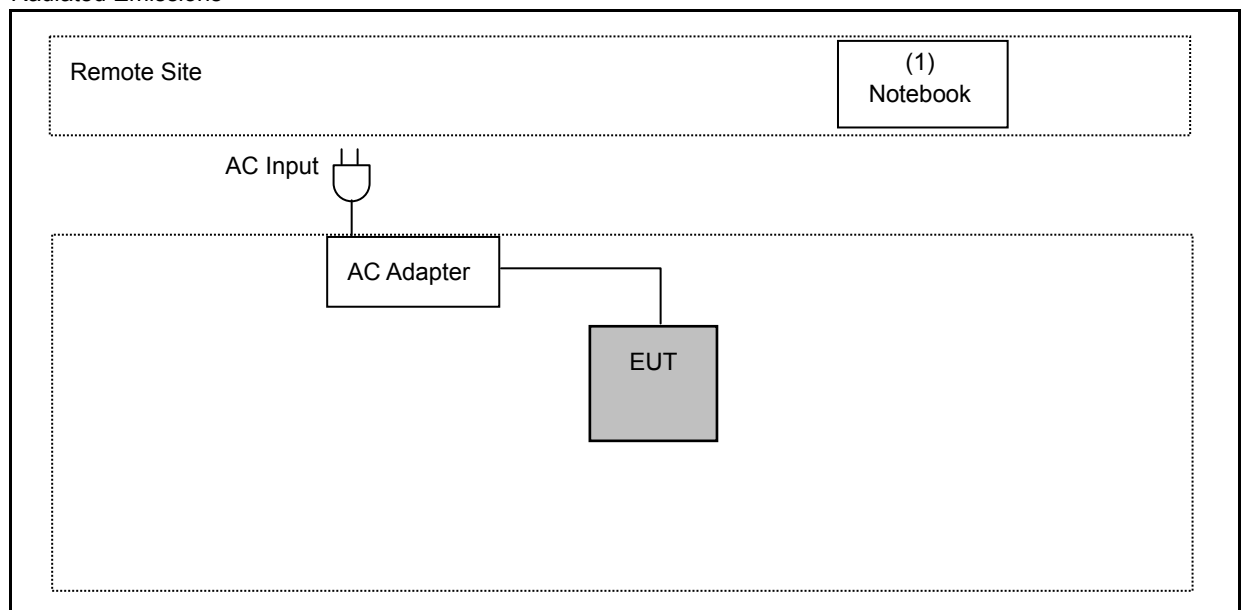
Measurement Software	
1	EZ-EMC Ver. ATL-03A1-1
2	EZ-EMC Ver ATL-ITC-3A1-1

3.3. Configuration of Test System Details

Conducted Emissions



Radiated Emissions



Devices Description					
	Product	Manufacturer	Model Number	Serial Number	Power Cord
(1)	Notebook	DELL	LAPTITU	6699565657	Non-Shielded, 0.8m
(2)	HDD	WD	My Passport	WX21A33S7013	Power by EUT



3.4. Test Site Environment

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950

4 Test Results

4.1. AC Power Line Conducted Emission Measurement

■ Limit

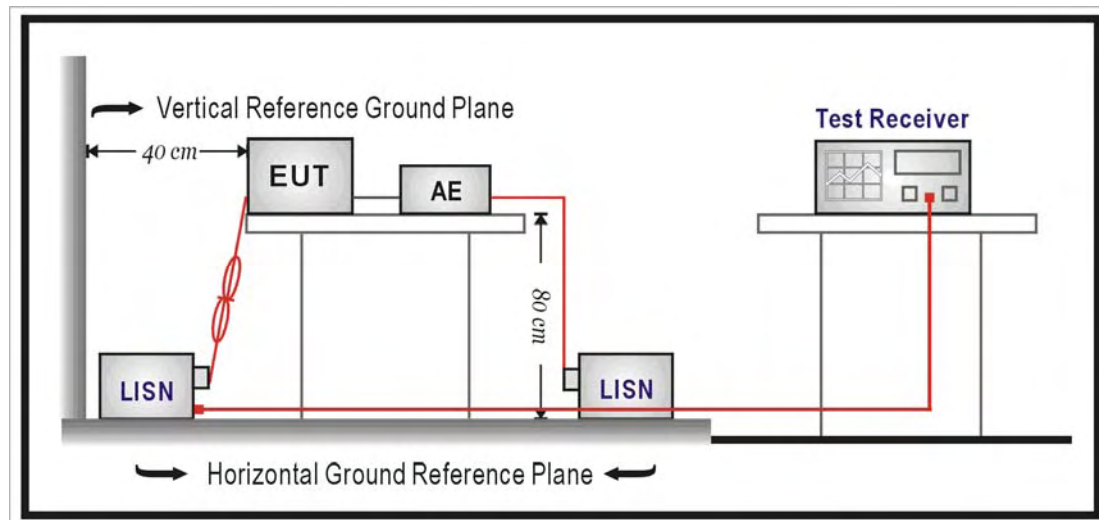
Frequency (MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

■ Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	06/25/2015	1 year
LISN	R&S	ENV216	101040	03/15/2016	1 year
LISN	R&S	ENV216	101041	03/07/2016	1 year
RF Cable	Woken	00100D1380194M	TE-02-02	06/26/2015	1 year
Test Site	ATL	TE02	TE02	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

■ Test Setup



■ Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a $50\Omega // 50\mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a $50\Omega // 50\mu\text{H}$ coupling impedance with 50ohm termination.

Tabletop device shall be placed on a non-conducting platform, of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The wall of screened room shall be located 40cm to the rear of the EUT. Other surfaces of tabletop or floor standing EUT shall be at least 80cm from any other ground conducting surface including one or more LISNs. For floor-standing device shall be placed under the EUT with a 12mm insulating material.

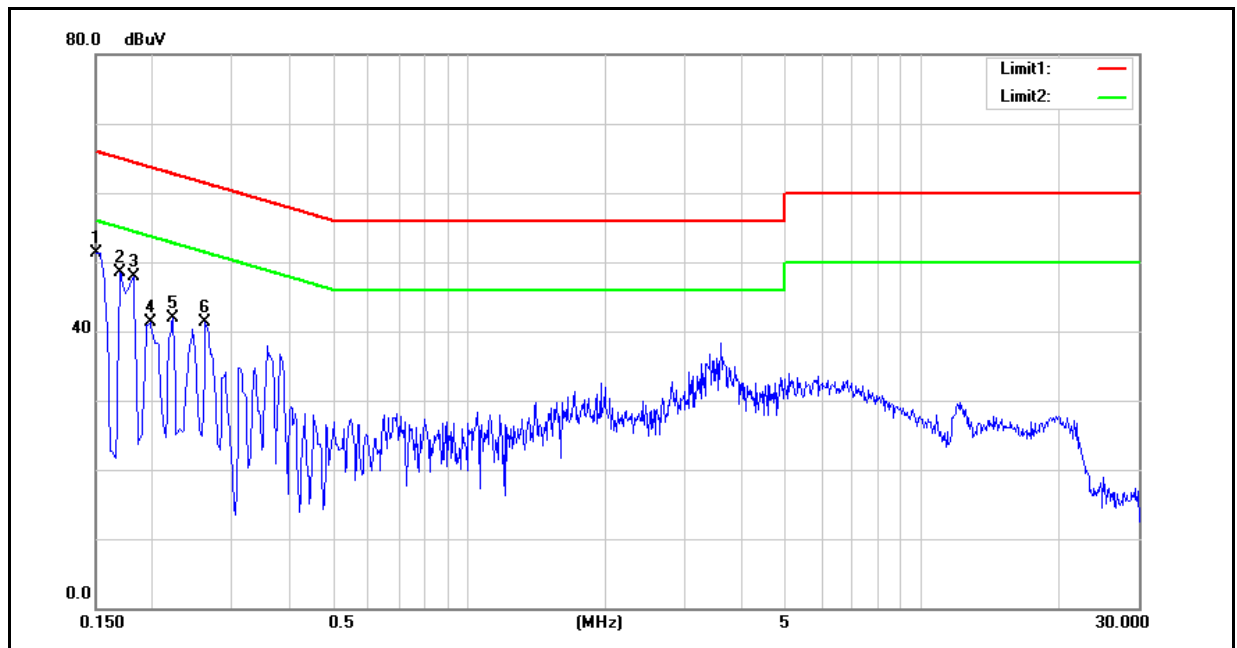
Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a resolution bandwidth of 9 kHz. The equipment under test (EUT) shall be meet the limits in section 4.1, as applicable, including the average limit and the quasi-peak limit when using respectively, an average detector and quasi-peak detector measured in accordance with the methods described of related standard. When all of peak value were complied with quasi-peak and average limit from 150kHz to 30MHz then quasi-peak and average measurement was unnecessary.

The AMN shall be placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for AMNs mounted on top of the ground reference plane. This distance is between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment shall be at least 0,8 m from the AMN. If the mains power cable is longer than 1m then the cable shall be folded back and forth at the centre of the lead to form a bundle no longer than 0.4m. All of interconnecting cables that hang closer than 40cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long. All of EUT and AE shall be separate place more than 0.1m. All 50 Ω ports of the LISN shall be resistively terminated into 50 Ω loads when not connected to the measuring instrument.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

Test Result

Standard:	FCC Part 15E	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 1	Date:	04/29/2016
		Test By:	Eric Ou Yang
Description:			

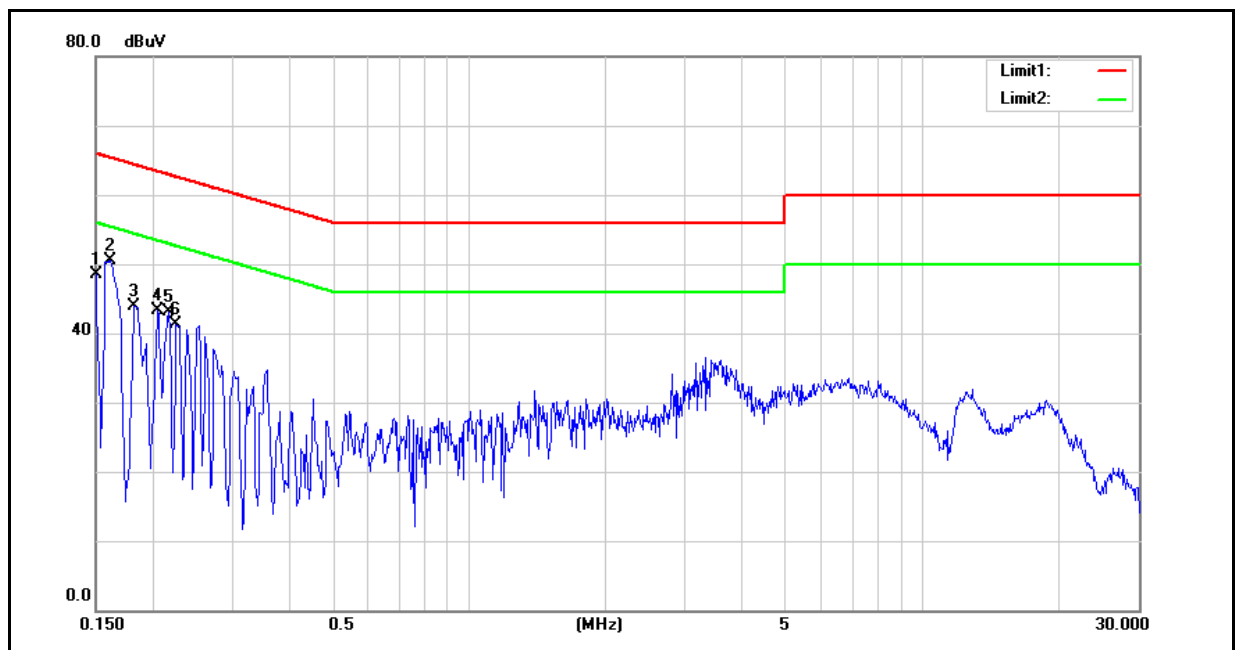


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	42.08	25.75	9.60	51.68	35.35	66.00	56.00	-14.32	-20.65	Pass
2	0.1700	36.10	20.06	9.60	45.70	29.66	64.96	54.96	-19.26	-25.30	Pass
3	0.1820	36.67	20.62	9.59	46.26	30.21	64.39	54.39	-18.13	-24.18	Pass
4	0.1980	31.35	21.12	9.59	40.94	30.71	63.69	53.69	-22.75	-22.98	Pass
5	0.2220	31.63	18.47	9.59	41.22	28.06	62.74	52.74	-21.52	-24.68	Pass
6	0.2620	29.36	17.50	9.60	38.96	27.10	61.37	51.37	-22.41	-24.27	Pass

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.

Standard:	FCC Part 15E	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 1	Date:	04/29/2016
		Test By:	Eric Ou Yang
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	40.36	25.44	9.59	49.95	35.03	66.00	56.00	-16.05	-20.97	Pass
2	0.1620	38.52	20.77	9.59	48.11	30.36	65.36	55.36	-17.25	-25.00	Pass
3	0.1820	36.22	19.58	9.58	45.80	29.16	64.39	54.39	-18.59	-25.23	Pass
4	0.2060	33.60	17.18	9.58	43.18	26.76	63.37	53.37	-20.19	-26.61	Pass
5	0.2180	29.88	14.37	9.58	39.46	23.95	62.89	52.89	-23.43	-28.94	Pass
6	0.2260	30.75	17.78	9.58	40.33	27.36	62.60	52.60	-22.27	-25.24	Pass

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.

4.2. Transmitter Radiated Emissions Measurement

■ Limit

(1)Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(a)For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(d)For transmitters operating in the 5.725-5.85 GHz band:

(i)All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2)Limits of Radiated Emission Measurement

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequency Range (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	10	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

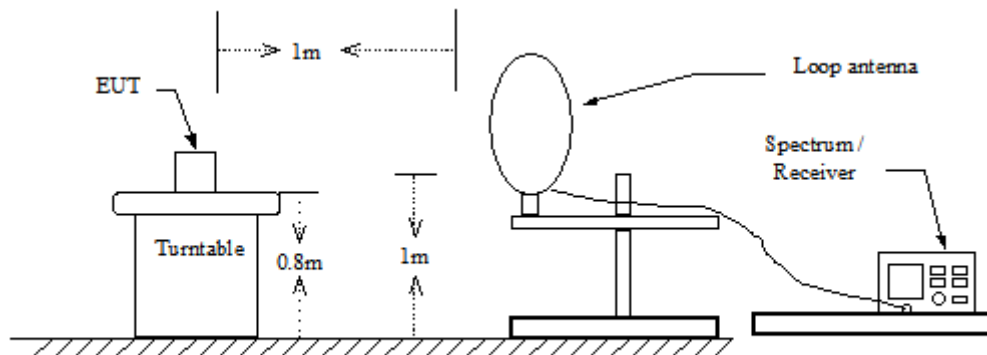
■ Test Instruments

3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/08/2016	1 year
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/08/2016	1 year
Pre Amplifier	Agilent	8449B	3008A02237	10/07/2015	1 year
Pre Amplifier	Agilent	8447D	2944A11119	01/11/2016	1 year
Broadband Antenna	Schwarzbeck	VULB9168	416	09/25/2015	1 year
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/12/2015	1 year
Horn Antenna (18~40GHz)	ETS	3116	86467	09/01/2015	1 year
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	02/01/2016	1 year
Microwave Cable	EMCI	EMC102-KM-KM-1 4000	151001	10/15/2015	1 year
Microwave Cable	EMCI	EMC-104-SM-SM- 14000	140202	10/15/2015	1 year
Microwave Cable	EMCI	EMC104-SM-SM-6 00	140301	10/15/2015	1 year
Test Site	ATL	TE01	888001	08/27/2015	1 year

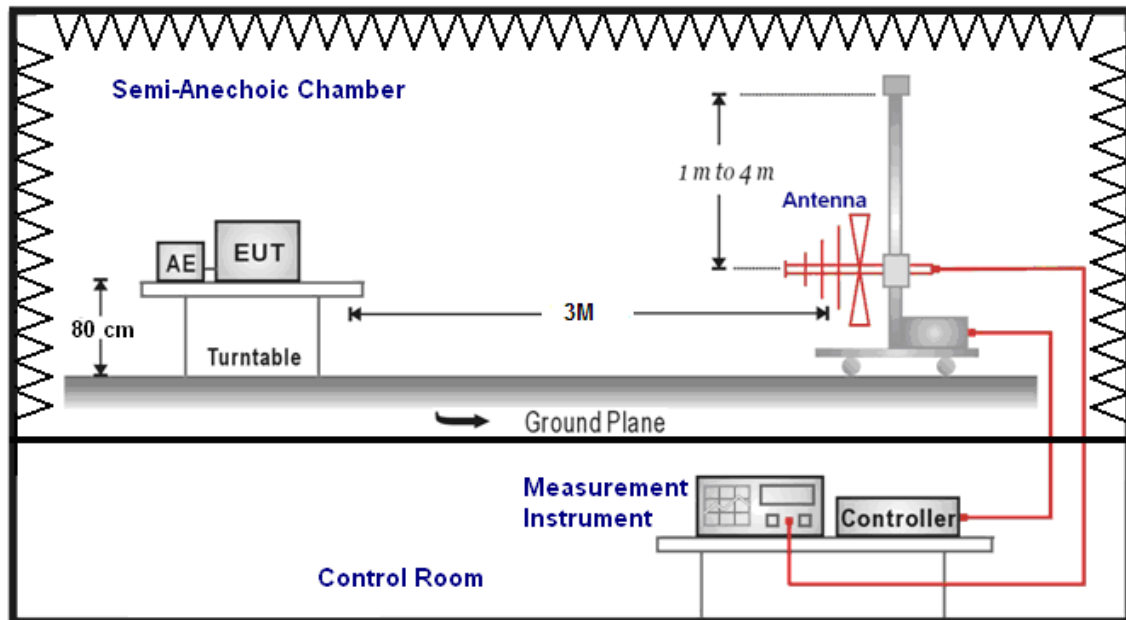
Note: N.C.R. = No Calibration Request.

■ Setup

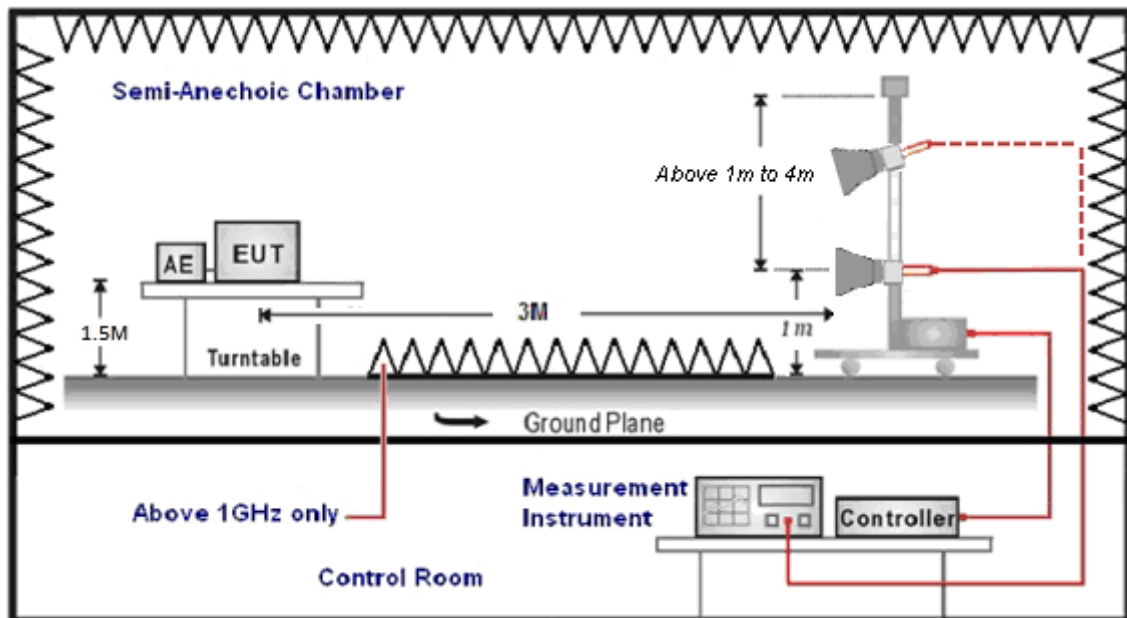
9kHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz



■ Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 or 1.5 meters height (below 1GHz use 0.8m turntable / above 1GHz use 1.5m turntable), top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 40 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For restricted measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 3 MHz for peak measurements and 10 Hz for average measurements when Duty cycle > 0.98 / 1/T for average measurements when Duty cycle < 0.98.

For out of band measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 3 MHz for peak measurements.

A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Trilog-Broadband Antenna at 3 Meter and the ETS-Lindgren Double-Ridged Waveguide Horn antenna Schwarzbeck Mess-Elektronik Broadband Horn Antenna was used in frequencies 1 – 40 GHz at a distance of 3 meter. The antenna at an angle toward the source of the emission. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts per meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro volts per meter (dBuV/m).

The actual field intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

$$(1) \text{ Amplitude (dBuV/m) = FI (dBuV) + AF (dBuV) + CL (dBuV) - Gain (dB)}$$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

$$(2) \text{ Actual Amplitude (dBuV/m) = Amplitude (dBuV) - Dis(dB)}$$

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

Measuring Instruments and setting

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000MHz
Stop Frequency	40GHz
RBW/VBW(Emission in restricted band)	1MHz / 3MHz for Peak 1MHz / (1/T) for Average
RBW/VBW(Emission in non-restricted band)	1MHz / 3MHz for Peak



■ Test Result

Below 1GHz

Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Test Mode:		Mode 1		Date:		05/24/2016	
Description:				Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
244.5000	38.46	-5.60	32.86	46.00	-13.14	QP	H
295.0000	27.66	-3.54	24.12	46.00	-21.88	QP	H
439.5000	34.97	-0.50	34.47	46.00	-11.53	QP	H
521.0000	24.93	1.04	25.97	46.00	-20.03	QP	H
710.5000	23.97	4.94	28.91	46.00	-17.09	QP	H
855.0000	23.89	7.66	31.55	46.00	-14.45	QP	H
185.5000	39.49	-6.83	32.66	43.50	-10.84	QP	V
243.0000	39.02	-5.70	33.32	46.00	-12.68	QP	V
413.0000	37.60	-1.30	36.30	46.00	-9.70	QP	V
464.5000	38.41	0.09	38.50	46.00	-7.50	QP	V
833.5000	27.35	7.27	34.62	46.00	-11.38	QP	V
905.0000	26.46	8.70	35.16	46.00	-10.84	QP	V

Note: 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

2. Result = Correction factor + Reading

3. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Above 1GHz

Standard:	FCC Part 15E		Test Distance:	3m			
Test item:	Radiated Emission		Power:	AC 120V/60Hz			
Model Number:	VR-3060u		Temp.(℃)/Hum.(%RH):	26(℃)/60%RH			
Test Mode:	Mode 2		Date:	05/25/2016			
Frequency:	5180MHz		Test By:	Eric Ou Yang			
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10360.000	44.82	5.21	50.03	68.20	-18.17	peak	H
10360.000	45.34	5.21	50.55	68.20	-17.65	peak	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 2	Date:	05/25/2016				
Frequency:	5200MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10400.000	43.76	5.33	49.09	68.20	-19.11	peak	H
10400.000	44.69	5.33	50.02	68.20	-18.18	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 2	Date:	05/25/2016				
Frequency:	5240MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10480.000	43.33	5.55	48.88	68.20	-19.32	peak	H
10480.000	43.37	5.55	48.92	68.20	-19.28	peak	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 2	Date:	05/25/2016				
Frequency:	5745MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11490.000	45.42	6.44	51.86	74.00	-22.14	peak	H
11490.000	50.91	6.44	57.35	74.00	-16.65	peak	V
11490.000	43.92	6.44	50.36	54.00	-3.64	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 2	Date:	05/25/2016				
Frequency:	5785MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11570.000	44.51	6.63	51.14	74.00	-22.86	peak	H
11570.000	48.81	6.63	55.44	74.00	-18.56	peak	V
11570.000	41.92	6.63	48.55	54.00	-5.45	AVG	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH				
Test Mode:	Mode 2	Date:	05/25/2016				
Frequency:	5825MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11650.000	44.45	6.85	51.30	74.00	-22.70	peak	H
11650.000	47.25	6.85	54.10	74.00	-19.90	peak	V
11650.000	39.88	6.85	46.73	54.00	-7.27	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E		Test Distance:	3m			
Test item:	Radiated Emission		Power:	AC 120V/60Hz			
Model Number:	VR-3060u		Temp.(℃)/Hum.(%RH):	26(℃)/60%RH			
Test Mode:	Mode 3		Date:	05/25/2016			
Frequency:	5180MHz		Test By:	Eric Ou Yang			
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10360.000	44.76	5.21	49.97	68.20	-18.23	peak	H
10360.000	43.98	5.21	49.19	68.20	-19.01	peak	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 3	Date:	05/25/2016				
Frequency:	5200MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10400.000	44.14	5.33	49.47	68.20	-18.73	peak	H
10400.000	44.76	5.33	50.09	68.20	-18.11	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E		Test Distance:	3m			
Test item:	Radiated Emission		Power:	AC 120V/60Hz			
Model Number:	VR-3060u		Temp.(℃)/Hum.(%RH):	26(℃)/60%RH			
Test Mode:	Mode 3		Date:	05/25/2016			
Frequency:	5240MHz		Test By:	Eric Ou Yang			
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10480.000	43.54	5.55	49.09	68.20	-19.11	peak	H
10480.000	43.70	5.55	49.25	68.20	-18.95	peak	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 3	Date:	05/25/2016				
Frequency:	5745MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11490.000	45.35	6.44	51.79	74.00	-22.21	peak	H
11490.000	51.06	6.44	57.50	74.00	-16.50	peak	V
11490.000	43.76	6.44	50.20	54.00	-3.80	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E		Test Distance:	3m			
Test item:	Radiated Emission		Power:	AC 120V/60Hz			
Model Number:	VR-3060u		Temp.(℃)/Hum.(%RH):	26(℃)/60%RH			
Test Mode:	Mode 3		Date:	05/25/2016			
Frequency:	5785MHz		Test By:	Eric Ou Yang			
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11570.000	43.35	6.63	49.98	74.00	-24.02	peak	H
11570.000	50.64	6.63	57.27	74.00	-16.73	peak	V
11570.000	44.45	6.63	51.08	54.00	-2.92	AVG	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 3	Date:	05/25/2016				
Frequency:	5825MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11570.000	44.18	6.63	50.81	74.00	-23.19	peak	H
11650.000	50.42	6.85	57.27	74.00	-16.73	peak	V
11650.000	42.49	6.85	49.34	54.00	-4.66	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E		Test Distance:	3m			
Test item:	Radiated Emission		Power:	AC 120V/60Hz			
Model Number:	VR-3060u		Temp.(℃)/Hum.(%RH):	26(℃)/60%RH			
Test Mode:	Mode 4		Date:	05/25/2016			
Frequency:	5190MHz		Test By:	Eric Ou Yang			
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10380.000	43.63	5.27	48.90	68.20	-19.30	peak	H
10380.000	44.49	5.27	49.76	68.20	-18.44	peak	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 4	Date:	05/25/2016				
Frequency:	5230MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10460.000	43.02	5.50	48.52	68.20	-19.68	peak	H
10460.000	43.70	5.50	49.20	68.20	-19.00	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 4	Date:	05/25/2016				
Frequency:	5755MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11510.000	45.33	6.47	51.80	74.00	-22.20	peak	H
11510.000	50.11	6.47	56.58	74.00	-17.42	peak	V
11510.000	40.73	6.47	47.20	54.00	-6.80	AVG	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(℃)/Hum.(%RH):	26(℃)/60%RH				
Test Mode:	Mode 4	Date:	05/25/2016				
Frequency:	5795MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11590.000	43.76	6.69	50.45	74.00	-23.55	peak	H
11590.000	50.70	6.69	57.39	74.00	-16.61	peak	V
11590.000	39.40	6.69	46.09	54.00	-7.91	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH				
Test Mode:	Mode 5	Date:	05/25/2016				
Frequency:	5210MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
10420.000	43.29	5.37	48.66	68.20	-19.54	peak	H
10420.000	43.65	5.37	49.02	68.20	-19.18	peak	V

Standard:	FCC Part 15E	Test Distance:	3m				
Test item:	Radiated Emission	Power:	AC 120V/60Hz				
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH				
Test Mode:	Mode 5	Date:	05/25/2016				
Frequency:	5775MHz	Test By:	Eric Ou Yang				
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
11550.000	44.76	6.58	51.34	74.00	-22.66	peak	H
11550.000	49.37	6.58	55.95	74.00	-18.05	peak	V
11550.000	40.13	6.58	46.71	54.00	-7.29	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E		Test Distance:	3m			
Test item:	Radiated Emission		Power:	AC 120V/60Hz			
Model Number:	VR-3060u		Temp.(℃)/Hum.(%RH):	26(℃)/60%RH			
Test Mode:	Simultaneous Transmitting (DTS+NII)		Date:	06/20/2016			
			Test By:	Eric Ou Yang			
Description:							
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2751.000	49.31	-13.59	35.72	74.00	-38.28	peak	H
4230.000	47.49	-9.43	38.06	74.00	-35.94	peak	H
7511.000	44.21	0.13	44.34	74.00	-29.66	peak	H
2785.000	50.79	-13.50	37.29	74.00	-36.71	peak	H
4247.000	47.23	-9.38	37.85	74.00	-36.15	peak	H
7613.000	45.86	0.39	46.25	74.00	-27.75	peak	H

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.

**Band Edge**

Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Test Mode:		Mode 2		Date:		05/24/2016	
Frequency:		5180 MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
4964.800	48.77	7.99	56.76	74.00	-17.24	peak	H
4964.800	36.40	7.99	44.39	54.00	-9.61	AVG	H
5150.000	47.38	8.29	55.67	74.00	-18.33	peak	H
5150.000	36.47	8.29	44.76	54.00	-9.24	AVG	H
5144.000	63.67	8.28	71.95	74.00	-2.05	peak	V
5144.000	43.11	8.28	51.39	54.00	-2.61	AVG	V
5150.000	61.54	8.29	69.83	74.00	-4.17	peak	V
5150.000	45.08	8.29	53.37	54.00	-0.63	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:		FCC Part 15E			Test Distance:		3m	
Test item:		Radiated Emission			Power:		AC 120V/60Hz	
Model Number:		VR-3060u			Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Test Mode:		Mode 2			Date:		05/24/2016	
Frequency:		5200 MHz			Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V	
5119.200	49.77	8.25	58.02	74.00	-15.98	peak	H	
5119.200	36.44	8.25	44.69	54.00	-9.31	AVG	H	
5150.000	46.18	8.29	54.47	74.00	-19.53	peak	H	
5150.000	36.81	8.29	45.10	54.00	-8.90	AVG	H	
5350.000	46.94	8.50	55.44	74.00	-18.56	peak	H	
5350.000	36.52	8.50	45.02	54.00	-8.98	AVG	H	
5438.880	49.79	8.59	58.38	74.00	-15.62	peak	H	
5438.880	36.18	8.59	44.77	54.00	-9.23	AVG	H	
5118.240	54.04	8.25	62.29	74.00	-11.71	peak	V	
5118.240	45.29	8.25	53.54	54.00	-0.46	AVG	V	
5150.000	47.30	8.29	55.59	74.00	-18.41	peak	V	
5150.000	38.21	8.29	46.50	54.00	-7.50	AVG	V	
5350.000	48.60	8.50	57.10	74.00	-16.90	peak	V	
5350.000	38.31	8.50	46.81	54.00	-7.19	AVG	V	
5355.360	55.17	8.51	63.68	74.00	-10.32	peak	V	
5355.360	45.22	8.51	53.73	54.00	-0.27	AVG	V	

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Test Mode:		Mode 2		Date:		05/24/2016	
Frequency:		5240 MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5350.000	48.28	8.50	56.78	74.00	-17.22	peak	H
5350.000	36.42	8.50	44.92	54.00	-9.08	AVG	H
5403.020	50.24	8.56	58.80	74.00	-15.20	peak	H
5403.020	36.25	8.56	44.81	54.00	-9.19	AVG	H
5350.000	51.47	8.50	59.97	74.00	-14.03	peak	V
5350.000	39.25	8.50	47.75	54.00	-6.25	AVG	V
5405.880	58.48	8.56	67.04	74.00	-6.96	peak	V
5405.880	44.95	8.56	53.51	54.00	-0.49	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:		FCC Part 15E			Test Distance:		3m	
Test item:		Radiated Emission			Power:		AC 120V/60Hz	
Model Number:		VR-3060u			Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Test Mode:		Mode 2			Date:		05/24/2016	
Frequency:		5745 MHz			Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V	
5632.100	53.90	8.96	62.86	68.20	-5.34	peak	H	
5656.850	59.31	9.02	68.33	73.27	-4.94	peak	H	
5662.850	62.55	9.04	71.59	77.71	-6.12	peak	H	
5723.450	66.81	9.18	75.99	118.67	-42.68	peak	H	
5639.450	58.50	8.99	67.49	68.20	-0.71	peak	V	
5648.600	58.05	9.00	67.05	68.20	-1.15	peak	V	
5650.400	58.88	9.01	67.89	68.50	-0.61	peak	V	
5658.350	63.62	9.02	72.64	74.38	-1.74	peak	V	
5661.050	65.23	9.04	74.27	76.38	-2.11	peak	V	

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 2	Date:	05/24/2016
Frequency:	5785 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5650.000	47.26	9.01	56.27	68.20	-11.93	peak	H
5700.000	53.96	9.13	63.09	105.20	-42.11	peak	H
5720.000	49.41	9.17	58.58	110.80	-52.22	peak	H
5725.000	48.97	9.19	58.16	122.20	-64.04	peak	H
5850.000	48.10	9.46	57.56	122.20	-64.64	peak	H
5855.000	48.84	9.48	58.32	110.80	-52.48	peak	H
5875.000	46.28	9.53	55.81	105.20	-49.39	peak	H
5925.000	46.48	9.65	56.13	68.20	-12.07	peak	H
5631.600	57.50	8.96	66.46	68.20	-1.74	peak	V
5945.200	56.82	9.68	66.50	68.20	-1.70	peak	V
5951.200	57.49	9.70	67.19	68.20	-1.01	peak	V
5723.200	62.69	9.18	71.87	118.10	-46.23	peak	V
5854.000	57.61	9.48	67.09	113.08	-45.99	peak	V
5872.400	57.54	9.51	67.05	105.93	-38.88	peak	V
5892.800	53.63	9.56	63.19	92.03	-28.84	peak	V
5933.200	48.33	9.66	57.99	68.20	-10.21	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Test Mode:	Mode 2			Date:	05/24/2016		
Frequency:	5825 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5850.000	57.59	9.46	67.05	122.20	-55.15	peak	H
5855.000	55.65	9.48	65.13	110.80	-45.67	peak	H
5875.000	46.20	9.53	55.73	105.20	-49.47	peak	H
5925.000	47.14	9.65	56.79	68.20	-11.41	peak	H
5981.460	57.92	9.76	67.68	68.20	-0.52	peak	V
5985.780	57.63	9.78	67.41	68.20	-0.79	peak	V
5991.360	57.49	9.79	67.28	68.20	-0.92	peak	V
5959.860	46.03	9.72	55.75	68.20	-12.45	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 3	Date:	05/24/2016
Frequency:	5180 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5143.300	48.21	8.28	56.49	74.00	-17.51	peak	H
5143.300	35.93	8.28	44.21	54.00	-9.79	AVG	H
5150.000	48.07	8.29	56.36	74.00	-17.64	peak	H
5150.000	35.97	8.29	44.26	54.00	-9.74	AVG	H
5144.700	51.77	8.28	60.05	74.00	-13.95	peak	V
5144.700	42.51	8.28	50.79	54.00	-3.21	AVG	V
5150.000	52.23	8.29	60.52	74.00	-13.48	peak	V
5150.000	45.19	8.29	53.48	54.00	-0.52	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:		FCC Part 15E			Test Distance:		3m	
Test item:		Radiated Emission			Power:		AC 120V/60Hz	
Model Number:		VR-3060u			Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Test Mode:		Mode 3			Date:		05/24/2016	
Frequency:		5200 MHz			Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V	
5121.120	48.25	8.25	56.50	74.00	-17.50	peak	H	
5121.120	39.13	8.25	47.38	54.00	-6.62	AVG	H	
5150.000	45.34	8.29	53.63	74.00	-20.37	peak	H	
5150.000	38.23	8.29	46.52	54.00	-7.48	AVG	H	
5350.000	47.78	8.50	56.28	74.00	-17.72	peak	H	
5350.000	37.67	8.50	46.17	54.00	-7.83	AVG	H	
5408.160	49.56	8.56	58.12	74.00	-15.88	peak	H	
5408.160	39.46	8.56	48.02	54.00	-5.98	AVG	H	
5123.040	51.23	8.25	59.48	74.00	-14.52	peak	V	
5123.040	44.01	8.25	52.26	54.00	-1.74	AVG	V	
5150.000	48.67	8.29	56.96	74.00	-17.04	peak	V	
5150.000	39.14	8.29	47.43	54.00	-6.57	AVG	V	
5350.000	49.67	8.50	58.17	74.00	-15.83	peak	V	
5350.000	39.33	8.50	47.83	54.00	-6.17	AVG	V	
5361.120	52.73	8.52	61.25	74.00	-12.75	peak	V	
5361.120	45.05	8.52	53.57	54.00	-0.43	AVG	V	

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(℃)/Hum.(%RH):	26(℃)/60%RH		
Test Mode:	Mode 3			Date:	05/24/2016		
Frequency:	5240 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5350.000	47.08	8.50	55.58	74.00	-18.42	peak	H
5350.000	39.30	8.50	47.80	54.00	-6.20	AVG	H
5400.600	49.89	8.56	58.45	74.00	-15.55	peak	H
5400.600	40.72	8.56	49.28	54.00	-4.72	AVG	H
5350.000	49.50	8.50	58.00	74.00	-16.00	peak	V
5350.000	40.24	8.50	48.74	54.00	-5.26	AVG	V
5400.600	53.93	8.56	62.49	74.00	-11.51	peak	V
5400.600	44.74	8.56	53.30	54.00	-0.70	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Test Mode:	Mode 3	Date:	05/24/2016
Frequency:	5745 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5657.300	61.57	9.02	70.59	73.60	-3.01	peak	H
5620.700	57.15	8.94	66.09	68.20	-2.11	peak	V
5633.750	56.83	8.97	65.80	68.20	-2.40	peak	V
5656.550	62.80	9.02	71.82	73.05	-1.23	peak	V
5664.050	64.99	9.04	74.03	78.60	-4.57	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 3	Date:	05/24/2016
Frequency:	5785 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5650.000	49.50	9.01	58.51	68.20	-9.69	peak	H
5700.000	55.15	9.13	64.28	105.20	-40.92	peak	H
5720.000	61.67	9.17	70.84	110.80	-39.96	peak	H
5725.000	60.58	9.19	69.77	122.20	-52.43	peak	H
5850.000	56.07	9.46	65.53	122.20	-56.67	peak	H
5855.000	54.13	9.48	63.61	110.80	-47.19	peak	H
5875.000	48.77	9.53	58.30	105.20	-46.90	peak	H
5925.000	46.43	9.65	56.08	68.20	-12.12	peak	H
5618.000	57.24	8.94	66.18	68.20	-2.02	peak	V
5937.200	57.36	9.67	67.03	68.20	-1.17	peak	V
5951.200	57.73	9.70	67.43	68.20	-0.77	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		VR-3060u		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Test Mode:		Mode 3		Date:		05/24/2016	
Frequency:		5825 MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5850.000	69.76	9.46	79.22	122.20	-42.98	peak	H
5855.000	62.94	9.48	72.42	110.80	-38.38	peak	H
5875.000	55.90	9.53	65.43	105.20	-39.77	peak	H
5925.000	46.29	9.65	55.94	68.20	-12.26	peak	H
5911.260	61.64	9.62	71.26	78.37	-7.11	peak	V
5923.680	55.72	9.64	65.36	69.18	-3.82	peak	V
5981.460	57.90	9.76	67.66	68.20	-0.54	peak	V
5991.540	57.65	9.79	67.44	68.20	-0.76	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Test Mode:	Mode 4			Date:	05/24/2016		
Frequency:	5190 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5144.700	51.04	8.28	59.32	74.00	-14.68	peak	H
5144.700	42.02	8.28	50.30	54.00	-3.70	AVG	H
5150.000	51.99	8.29	60.28	74.00	-13.72	peak	H
5150.000	43.42	8.29	51.71	54.00	-2.29	AVG	H
5146.100	61.13	8.28	69.41	74.00	-4.59	peak	V
5146.100	43.94	8.28	52.22	54.00	-1.78	AVG	V
5150.000	63.54	8.29	71.83	74.00	-2.17	peak	V
5150.000	45.14	8.29	53.43	54.00	-0.57	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:		FCC Part 15E			Test Distance:		3m	
Test item:		Radiated Emission			Power:		AC 120V/60Hz	
Model Number:		VR-3060u			Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Test Mode:		Mode 4			Date:		05/24/2016	
Frequency:		5230 MHz			Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V	
5144.160	50.25	8.28	58.53	74.00	-15.47	peak	H	
5144.160	39.53	8.28	47.81	54.00	-6.19	AVG	H	
5150.000	50.34	8.29	58.63	74.00	-15.37	peak	H	
5150.000	40.97	8.29	49.26	54.00	-4.74	AVG	H	
5350.000	47.59	8.50	56.09	74.00	-17.91	peak	H	
5350.000	40.92	8.50	49.42	54.00	-4.58	AVG	H	
5429.280	50.21	8.59	58.80	74.00	-15.20	peak	H	
5429.280	38.41	8.59	47.00	54.00	-7.00	AVG	H	
5144.160	58.25	8.28	66.53	74.00	-7.47	peak	V	
5144.160	45.22	8.28	53.50	54.00	-0.50	AVG	V	
5150.000	58.25	8.29	66.54	74.00	-7.46	peak	V	
5150.000	45.17	8.29	53.46	54.00	-0.54	AVG	V	
5350.000	52.41	8.50	60.91	74.00	-13.09	peak	V	
5350.000	43.42	8.50	51.92	54.00	-2.08	AVG	V	
5387.040	54.09	8.54	62.63	74.00	-11.37	peak	V	
5387.040	44.85	8.54	53.39	54.00	-0.61	AVG	V	

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 4	Date:	05/24/2016
Frequency:	5755 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5610.240	57.17	8.91	66.08	68.20	-2.12	peak	H
5638.720	56.72	8.98	65.70	68.20	-2.50	peak	H
5645.760	58.06	8.99	67.05	68.20	-1.15	peak	H
5659.520	61.18	9.02	70.20	75.24	-5.04	peak	H
5609.600	58.57	8.91	67.48	68.20	-0.72	peak	V
5639.840	58.02	8.99	67.01	68.20	-1.19	peak	V
5647.840	58.43	9.00	67.43	68.20	-0.77	peak	V
5654.080	61.14	9.02	70.16	71.22	-1.06	peak	V
5656.160	63.03	9.02	72.05	72.76	-0.71	peak	V
5658.080	63.15	9.02	72.17	74.18	-2.01	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 4	Date:	05/24/2016
Frequency:	5795 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5850.000	60.05	9.46	69.51	122.20	-52.69	peak	H
5855.000	61.72	9.48	71.20	110.80	-39.60	peak	H
5875.000	53.63	9.53	63.16	105.20	-42.04	peak	H
5925.000	48.56	9.65	58.21	68.20	-9.99	peak	H
5912.850	59.64	9.62	69.26	77.19	-7.93	peak	V
5927.340	56.68	9.65	66.33	68.20	-1.87	peak	V
5933.850	57.07	9.66	66.73	68.20	-1.47	peak	V
5937.000	57.96	9.67	67.63	68.20	-0.57	peak	V
5942.250	56.70	9.68	66.38	68.20	-1.82	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	VR-3060u	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 5	Date:	05/24/2016
Frequency:	5210 MHz	Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5142.240	50.87	8.28	59.15	74.00	-14.85	peak	H
5142.240	41.94	8.28	50.22	54.00	-3.78	AVG	H
5150.000	49.03	8.29	57.32	74.00	-16.68	peak	H
5150.000	42.84	8.29	51.13	54.00	-2.87	AVG	H
5350.000	46.86	8.50	55.36	74.00	-18.64	peak	H
5350.000	37.41	8.50	45.91	54.00	-8.09	AVG	H
5434.080	48.75	8.59	57.34	74.00	-16.66	peak	H
5434.080	36.75	8.59	45.34	54.00	-8.66	AVG	H
5143.200	63.46	8.28	71.74	74.00	-2.26	peak	V
5143.200	44.50	8.28	52.78	54.00	-1.22	AVG	V
5150.000	60.85	8.29	69.14	74.00	-4.86	peak	V
5150.000	45.34	8.29	53.63	54.00	-0.37	AVG	V
5350.000	50.08	8.50	58.58	74.00	-15.42	peak	V
5350.000	40.85	8.50	49.35	54.00	-4.65	AVG	V
5373.600	51.70	8.52	60.22	74.00	-13.78	peak	V
5373.600	38.81	8.52	47.33	54.00	-6.67	AVG	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.



Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	VR-3060u			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Test Mode:	Mode 5			Date:	05/24/2016		
Frequency:	5775 MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5650.000	52.18	9.01	61.19	68.20	-7.01	peak	H
5700.000	65.80	9.13	74.93	105.20	-30.27	peak	H
5720.000	63.77	9.17	72.94	110.80	-37.86	peak	H
5725.000	65.95	9.19	75.14	122.20	-47.06	peak	H
5850.000	65.28	9.46	74.74	122.20	-47.46	peak	H
5855.000	58.76	9.48	68.24	110.80	-42.56	peak	H
5875.000	55.90	9.53	65.43	105.20	-39.77	peak	H
5925.000	47.28	9.65	56.93	68.20	-11.27	peak	H
5642.400	58.26	8.99	67.25	68.20	-0.95	peak	V
5920.400	58.71	9.63	68.34	71.60	-3.26	peak	V
5926.400	57.69	9.65	67.34	68.20	-0.86	peak	V
5931.200	57.74	9.65	67.39	68.20	-0.81	peak	V
5964.800	57.36	9.73	67.09	68.20	-1.11	peak	V
5970.400	57.06	9.75	66.81	68.20	-1.39	peak	V

Note: 1. Result = Correction factor + Reading

2. Correction factor = Antenna Factor + Cable loss – Pre-Amplifier gain.

4.3. Maximum Conducted Output Power Measurement

■ Limit

Frequency Range (MHz)	FCC Maximum Conducted Output Power Limit	
	Master	Client
5.150 ~ 5.250 GHz	The lesser of 1W (30dBm)	The lesser of 250mW (24dBm)
5.725 ~ 5.850 GHz	The lesser of 1W (30dBm)	---

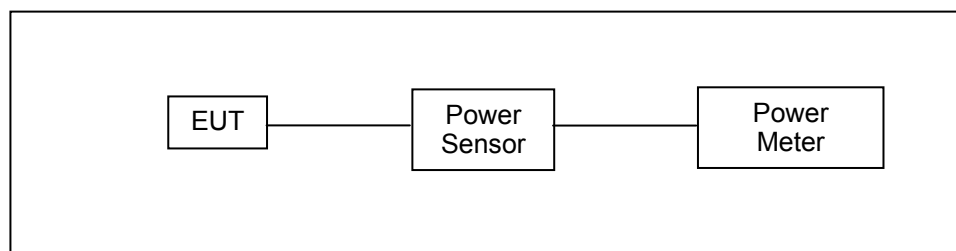
According FCC KDB 662911 D01 v02r01 – for power measurements on IEEE802.11 devices,

Directional gain = $10 \cdot \log\{[10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20}]^2 / NANT\}$

* MIMO mode : Directional Gain = 7.8 dBi > 6dBi -- For Master

MIMO mode power limit shall be reduced = 30 -1.8 = 28.2 dBm -- For Master mode (Band 1 / Band 3)

■ Test Setup



■ Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Power Sensor	Anritsu	MA2411B	1126022	08/24/2015	1 year
Power Meter	Anritsu	ML2495A	1135009	08/24/2015	1 year
Microwave Cable	EMCI	EMCI 104-SM-SM-1500	140303	02/23/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

■ Test Procedure

The test is performed in accordance with KDB789033: D02 General UNII Test Procedures New Rules v01r02, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices

Section (E) Maximum Conducted Output Power

3. Measurement using a Power Meter (PM)

b) Method PM-G (Measurement using a gated RF average power meter)



Test Result

Test Item		Maximum Conducted Output Power								
Test Mode		Mode 2: IEEE 802.11a link mode								
Date of Test		04/29/2016								
Frequency (MHz)	Data Rate	Max. Output Power								FCC Limit (dBm)
		ANT-0		ANT-1		ANT-2		ANT-0+1+2		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
5180	6M	20.49	0.112	20.16	0.104	20.24	0.106	25.07	0.321	≤ 28.2
5200		19.45	0.088	18.77	0.075	19.18	0.083	23.91	0.246	
5220		19.26	0.084	18.68	0.074	18.86	0.077	23.71	0.235	
5240		19.13	0.082	18.74	0.075	18.82	0.076	23.67	0.233	
5745		23.05	0.202	22.34	0.171	23.41	0.219	27.73	0.593	≤ 28.2
5765		22.87	0.194	22.09	0.162	23.22	0.210	27.52	0.565	
5785		22.65	0.184	22.17	0.165	23.37	0.217	27.53	0.566	
5805		22.66	0.185	22.34	0.171	23.31	0.214	27.56	0.570	
5825		21.19	0.132	20.80	0.120	20.85	0.122	25.72	0.373	
5180	54M	20.38	0.109	20.06	0.101	20.14	0.103	24.97	0.314	≤ 28.2
5200		19.28	0.085	18.67	0.074	19.01	0.080	23.77	0.238	
5220		19.14	0.082	18.52	0.071	18.74	0.075	23.58	0.228	
5240		19.05	0.080	18.58	0.072	18.64	0.073	23.53	0.226	
5745		22.95	0.197	22.24	0.167	23.21	0.209	27.59	0.574	≤ 28.2
5765		22.71	0.187	21.98	0.158	23.12	0.205	27.40	0.550	
5785		22.48	0.177	22.07	0.161	23.18	0.208	27.37	0.546	
5805		22.58	0.181	22.25	0.168	23.17	0.207	27.45	0.557	
5825		21.01	0.126	20.69	0.117	20.71	0.118	25.58	0.361	



Test Item		Maximum Conducted Output Power								
Test Mode		Mode 3: IEEE 802.11ac 20MHz link mode								
Date of Test		04/29/2016								
Frequency (MHz)	Data Rate	Max. Output Power								FCC Limit (dBm)
		ANT-0		ANT-1		ANT-2		ANT-0+1+2		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
5180	19.5M	21.46	0.140	20.65	0.116	20.78	0.120	25.75	0.376	≤ 28.2
5200		21.37	0.137	20.88	0.122	20.76	0.119	25.78	0.379	
5220		21.41	0.138	20.71	0.118	20.65	0.116	25.71	0.372	
5240		21.31	0.135	20.76	0.119	20.64	0.116	25.68	0.370	
5745		22.68	0.185	22.08	0.161	23.18	0.208	27.44	0.555	≤ 28.2
5765		22.53	0.179	21.92	0.156	22.76	0.189	27.19	0.523	
5785		22.64	0.184	22.01	0.159	23.42	0.220	27.50	0.562	
5805		22.55	0.180	22.06	0.161	23.47	0.222	27.50	0.563	
5825		22.79	0.190	22.11	0.163	23.27	0.212	27.52	0.565	
5180	234M	20.51	0.112	19.62	0.092	19.85	0.097	24.78	0.301	≤ 28.2
5200		20.36	0.109	19.92	0.098	19.72	0.094	24.78	0.301	
5220		20.44	0.111	19.71	0.094	19.65	0.092	24.72	0.296	
5240		20.31	0.107	19.75	0.094	19.61	0.091	24.67	0.293	
5745		21.74	0.149	21.14	0.130	22.25	0.168	26.50	0.447	≤ 28.2
5765		21.51	0.142	20.91	0.123	21.82	0.152	26.20	0.417	
5785		21.61	0.145	21.05	0.127	22.41	0.174	26.50	0.446	
5805		21.55	0.143	21.13	0.130	22.55	0.180	26.56	0.452	
5825		21.88	0.154	21.16	0.131	22.31	0.170	26.58	0.455	



Test Item		Maximum Conducted Output Power								
Test Mode		Mode 4: IEEE 802.11ac 40MHz link mode								
Date of Test		04/29/2016								
Frequency (MHz)	Data Rate	Max. Output Power								FCC Limit (dBm)
		ANT-0		ANT-1		ANT-2		ANT-0+1+2		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
5190	40.5M	19.79	0.095	19.04	0.080	19.46	0.088	24.21	0.264	≤ 28.2
5230		23.01	0.200	21.91	0.155	22.61	0.182	27.30	0.538	
5755		22.97	0.198	22.53	0.179	23.51	0.224	27.79	0.602	≤ 28.2
5795		23.01	0.200	22.48	0.177	23.65	0.232	27.84	0.609	
5190	540M	18.82	0.076	17.72	0.059	18.52	0.071	23.15	0.206	≤ 28.2
5230		21.82	0.152	21.05	0.127	21.51	0.142	26.24	0.421	
5755		21.81	0.152	21.66	0.147	22.48	0.177	26.77	0.475	≤ 28.2
5755		22.09	0.162	21.51	0.142	22.68	0.185	26.89	0.489	

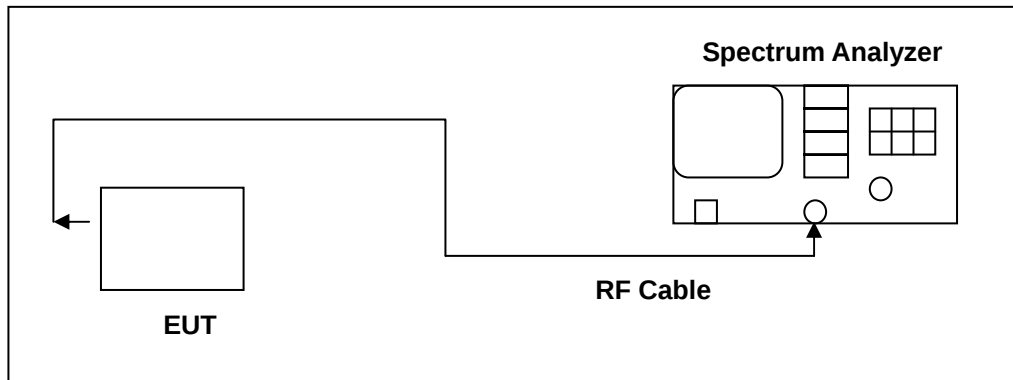
Test Item		Maximum Conducted Output Power								
Test Mode		Mode 5: IEEE 802.11ac 80MHz link mode								
Date of Test		04/29/2016								
Frequency (MHz)	Data Rate	Max. Output Power								FCC Limit (dBm)
		ANT-0		ANT-1		ANT-2		ANT-0+1+2		
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	(dBm)	(W)	
5210	87.9M	18.92	0.078	18.55	0.072	18.31	0.068	23.37	0.217	≤ 28.2
5775		21.22	0.132	21.00	0.126	21.13	0.130	25.89	0.388	≤ 28.2
5210	1170M	17.38	0.055	17.09	0.051	16.94	0.049	21.91	0.155	≤ 28.2
5775		19.68	0.093	19.41	0.087	19.62	0.092	24.34	0.272	≤ 28.2

4.4. 26dB RF Bandwidth & 99 % Occupied Bandwidth Measurement

■ Limit

N/A

■ Test Setup



■ Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/15/2015	1 year
Microwave Cable	EMCI	EMCI 104-SM-SM-1500	140303	02/23/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

■ Test Procedure

The test is performed in accordance with KDB789033: D02 General UNII Test Procedures New Rules v01r02, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	>26dB Bandwidth
RBW	Approximately 1% of the emission bandwidth
VBW	VBW > RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto



■ Test Result

Test Item	26dB RF Bandwidth & 99 % Occupied Bandwidth Measurement					
Test Mode	Mode 2: IEEE 802.11a link mode					
Date of Test	05/14/2016					
Frequency (MHz)	26dB Bandwidth (MHz)			99 % Occupied Bandwidth		
	ANT-0	ANT-1	ANT-2	ANT-0	ANT-1	ANT-2
5180	21.020	18.560	18.700	16.750	16.185	16.167
5200	20.920	19.050	18.830	16.862	16.208	16.177
5240	20.990	18.660	18.830	16.861	16.187	16.193

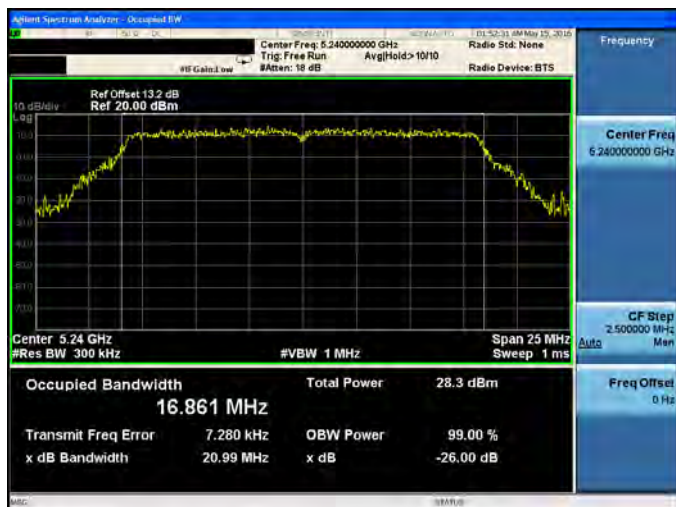
Test Item	26dB RF Bandwidth & 99 % Occupied Bandwidth Measurement					
Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode					
Date of Test	05/14/2016					
Frequency (MHz)	26dB Bandwidth (MHz)			99 % Occupied Bandwidth		
	ANT-0	ANT-1	ANT-2	ANT-0	ANT-1	ANT-2
5180	21.540	19.620	19.420	17.944	17.162	17.150
5200	21.090	19.000	19.510	17.867	17.153	17.206
5240	21.070	19.070	19.350	17.859	17.200	17.165

Test Item	26dB RF Bandwidth & 99 % Occupied Bandwidth Measurement					
Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode					
Date of Test	05/14/2016					
Frequency (MHz)	26dB Bandwidth (MHz)			99 % Occupied Bandwidth		
	ANT-0	ANT-1	ANT-2	ANT-0	ANT-1	ANT-2
5190	46.170	45.070	46.470	36.783	36.556	36.517
5230	43.440	48.860	44.660	36.628	36.625	36.495

Test Item	26dB RF Bandwidth & 99 % Occupied Bandwidth Measurement					
Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode					
Date of Test	05/14/2016					
Frequency (MHz)	26dB Bandwidth (MHz)			99 % Occupied Bandwidth		
	ANT-0	ANT-1	ANT-2	ANT-0	ANT-1	ANT-2
5210	82.700	81.100	82.470	75.798	75.716	75.677

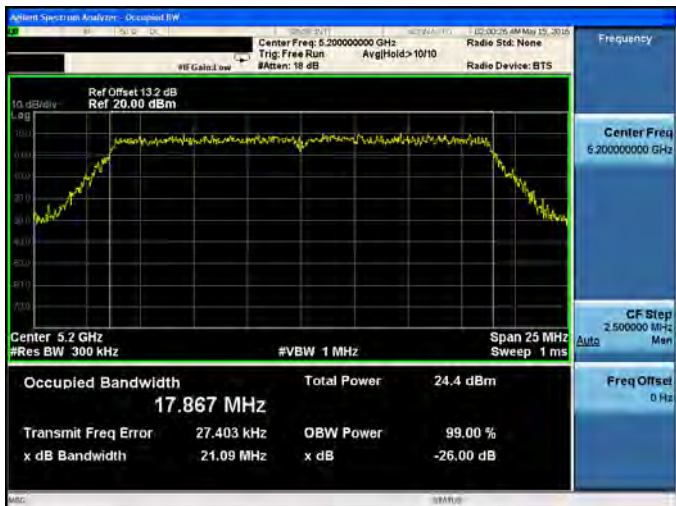
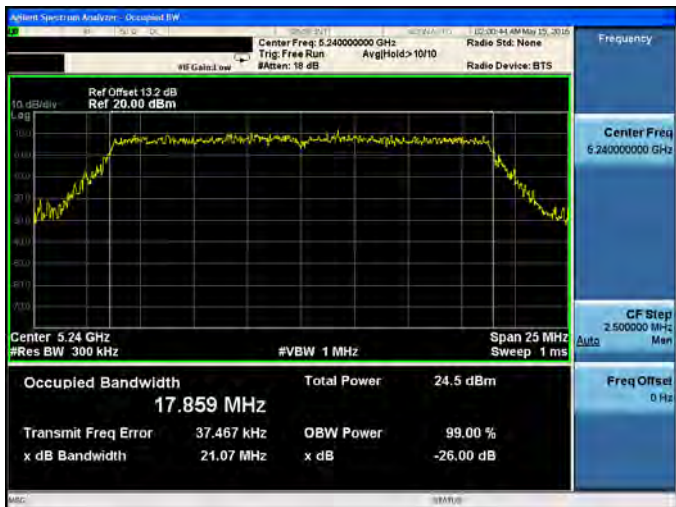
Note: The 99% occupied bandwidth not crossed 5250MHz.

Test Graphs

Mode 2: IEEE 802.11a link mode_ ANT-0													
5180 MHz	 Center 5.18 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms <table><tr><td>Occupied Bandwidth</td><td>16.750 MHz</td><td>Total Power</td><td>27.7 dBm</td></tr><tr><td>Transmit Freq Error</td><td>36.042 kHz</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>21.02 MHz</td><td>x dB</td><td>-26.00 dB</td></tr></table>	Occupied Bandwidth	16.750 MHz	Total Power	27.7 dBm	Transmit Freq Error	36.042 kHz	OBW Power	99.00 %	x dB Bandwidth	21.02 MHz	x dB	-26.00 dB
Occupied Bandwidth	16.750 MHz	Total Power	27.7 dBm										
Transmit Freq Error	36.042 kHz	OBW Power	99.00 %										
x dB Bandwidth	21.02 MHz	x dB	-26.00 dB										
5200 MHz	 Center 5.2 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms <table><tr><td>Occupied Bandwidth</td><td>16.862 MHz</td><td>Total Power</td><td>28.2 dBm</td></tr><tr><td>Transmit Freq Error</td><td>39.366 kHz</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>20.92 MHz</td><td>x dB</td><td>-26.00 dB</td></tr></table>	Occupied Bandwidth	16.862 MHz	Total Power	28.2 dBm	Transmit Freq Error	39.366 kHz	OBW Power	99.00 %	x dB Bandwidth	20.92 MHz	x dB	-26.00 dB
Occupied Bandwidth	16.862 MHz	Total Power	28.2 dBm										
Transmit Freq Error	39.366 kHz	OBW Power	99.00 %										
x dB Bandwidth	20.92 MHz	x dB	-26.00 dB										
5240 MHz	 Center 5.24 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms <table><tr><td>Occupied Bandwidth</td><td>16.861 MHz</td><td>Total Power</td><td>28.3 dBm</td></tr><tr><td>Transmit Freq Error</td><td>7.280 kHz</td><td>OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>20.99 MHz</td><td>x dB</td><td>-26.00 dB</td></tr></table>	Occupied Bandwidth	16.861 MHz	Total Power	28.3 dBm	Transmit Freq Error	7.280 kHz	OBW Power	99.00 %	x dB Bandwidth	20.99 MHz	x dB	-26.00 dB
Occupied Bandwidth	16.861 MHz	Total Power	28.3 dBm										
Transmit Freq Error	7.280 kHz	OBW Power	99.00 %										
x dB Bandwidth	20.99 MHz	x dB	-26.00 dB										



Mode 3: IEEE 802.11ac 20MHz link mode_ANT-0

5180 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.18 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 17.944 MHz Total Power 24.6 dBm Transmit Freq Error 15.805 kHz OBW Power 99.00 % x dB Bandwidth 21.54 MHz x dB -26.00 dB Center Freq 5.18000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz
5200 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.2 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 17.867 MHz Total Power 24.4 dBm Transmit Freq Error 27.403 kHz OBW Power 99.00 % x dB Bandwidth 21.09 MHz x dB -26.00 dB Center Freq 5.20000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz
5240 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.24 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 17.859 MHz Total Power 24.5 dBm Transmit Freq Error 37.467 kHz OBW Power 99.00 % x dB Bandwidth 21.07 MHz x dB -26.00 dB Center Freq 5.24000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz

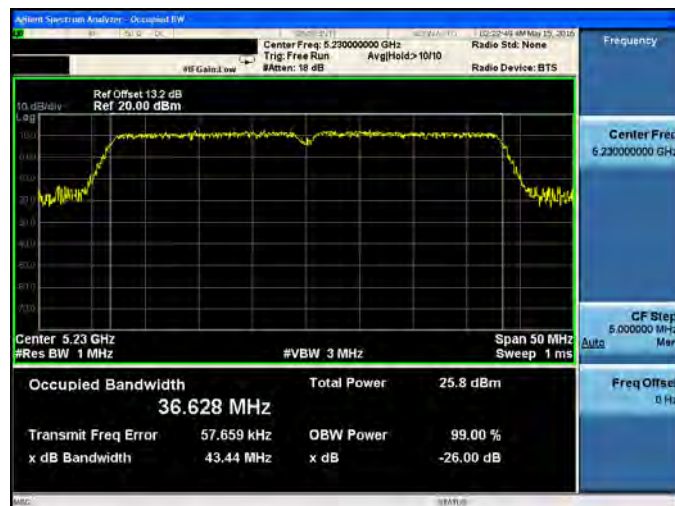


Mode 4: IEEE 802.11ac 40MHz link mode_ ANT-0

5190 MHz



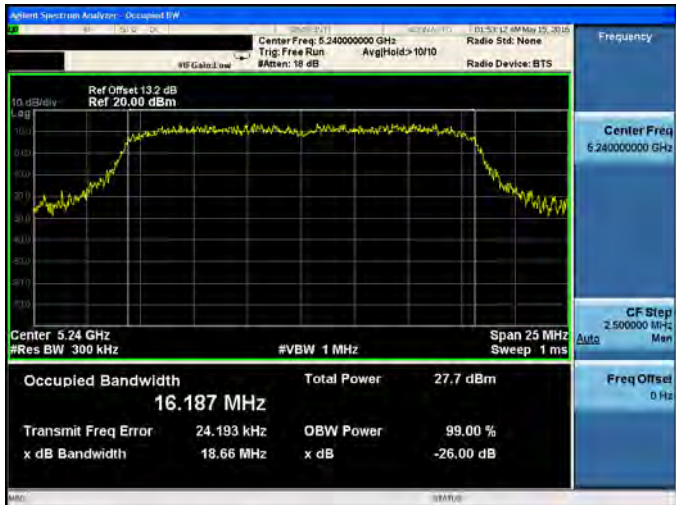
5230 MHz



Mode 5: IEEE 802.11ac 80MHz link mode_ ANT-0

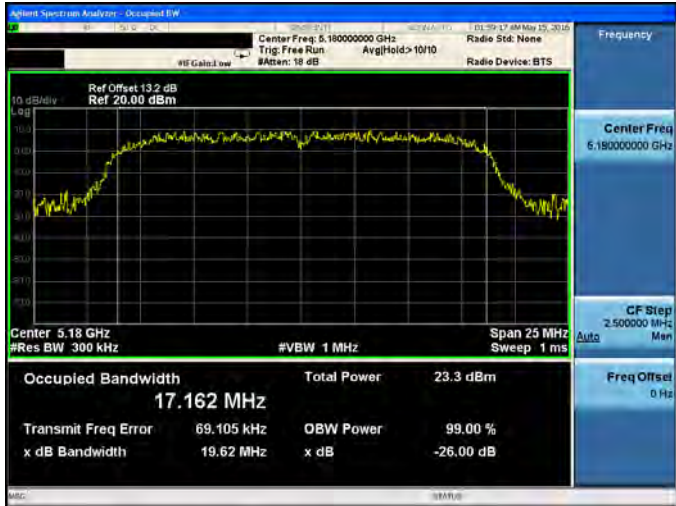
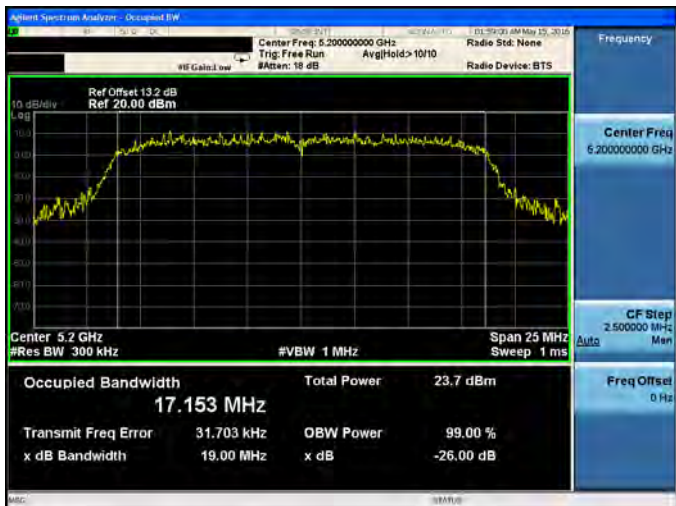
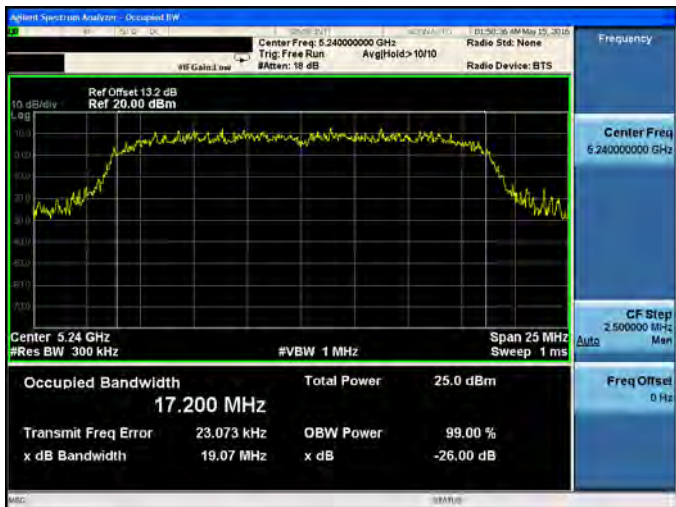
5210 MHz



Mode 2: IEEE 802.11a link mode_ANT-1	
5180 MHz	 Center 5.18 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 16.185 MHz Total Power 27.3 dBm Transmit Freq Error -8.556 kHz OBW Power 99.00 % x dB Bandwidth 18.56 MHz x dB -26.00 dB
5200 MHz	 Center 5.2 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 16.208 MHz Total Power 28.7 dBm Transmit Freq Error 21.754 kHz OBW Power 99.00 % x dB Bandwidth 19.05 MHz x dB -26.00 dB
5240 MHz	 Center 5.24 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 16.187 MHz Total Power 27.7 dBm Transmit Freq Error 24.193 kHz OBW Power 99.00 % x dB Bandwidth 18.66 MHz x dB -26.00 dB



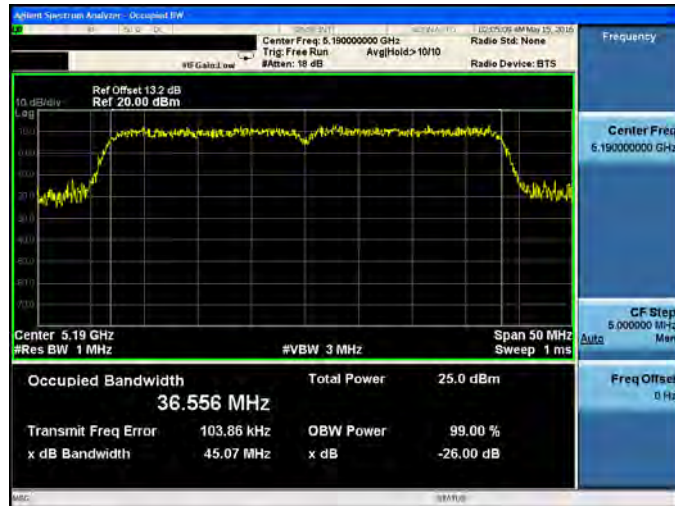
Mode 3: IEEE 802.11ac 20MHz link mode_ANT-1

5180 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.18 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 17.162 MHz Total Power 23.3 dBm Transmit Freq Error 69.105 kHz x dB Bandwidth 19.62 MHz OBW Power 99.00 % x dB -26.00 dB Center Freq 5.18000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz
5200 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.2 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 17.153 MHz Total Power 23.7 dBm Transmit Freq Error 31.703 kHz x dB Bandwidth 19.00 MHz OBW Power 99.00 % x dB -26.00 dB Center Freq 5.20000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz
5240 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.24 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 17.200 MHz Total Power 25.0 dBm Transmit Freq Error 23.073 kHz x dB Bandwidth 19.07 MHz OBW Power 99.00 % x dB -26.00 dB Center Freq 5.24000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz

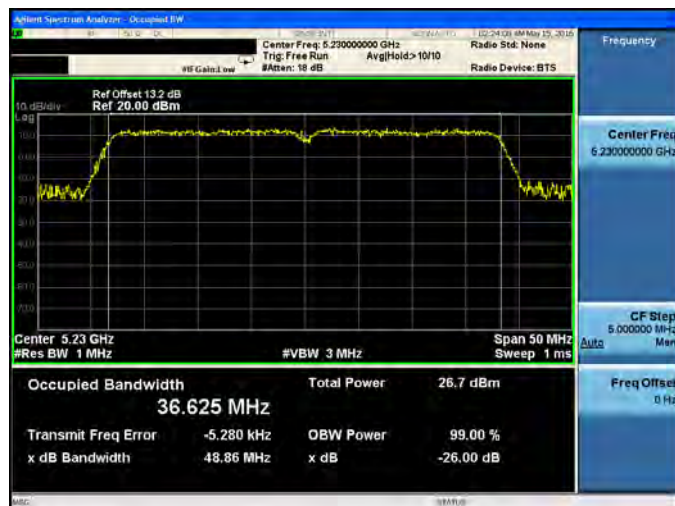


Mode 4: IEEE 802.11ac 40MHz link mode_ ANT-1

5190 MHz



5230 MHz

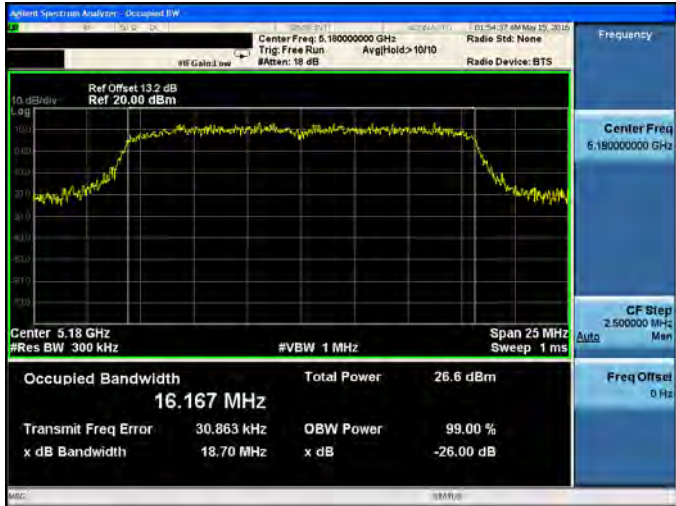
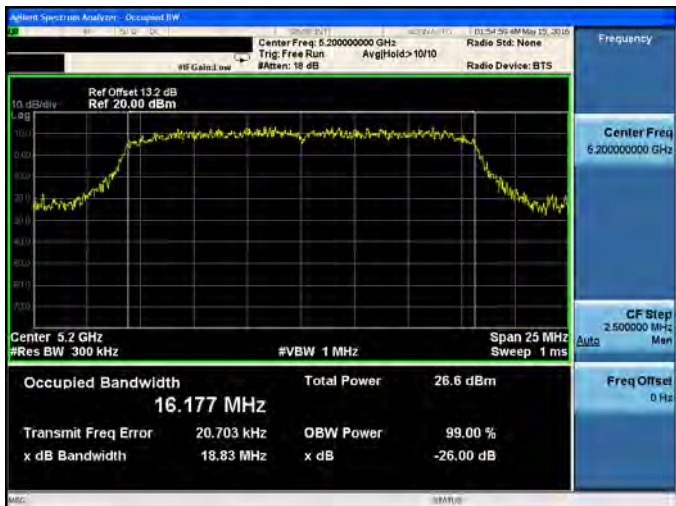
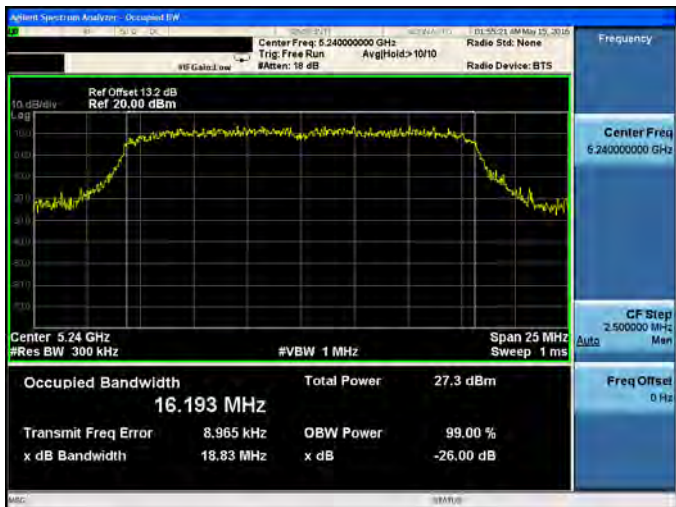


Mode 5: IEEE 802.11ac 80MHz link mode_ ANT-1

5210 MHz



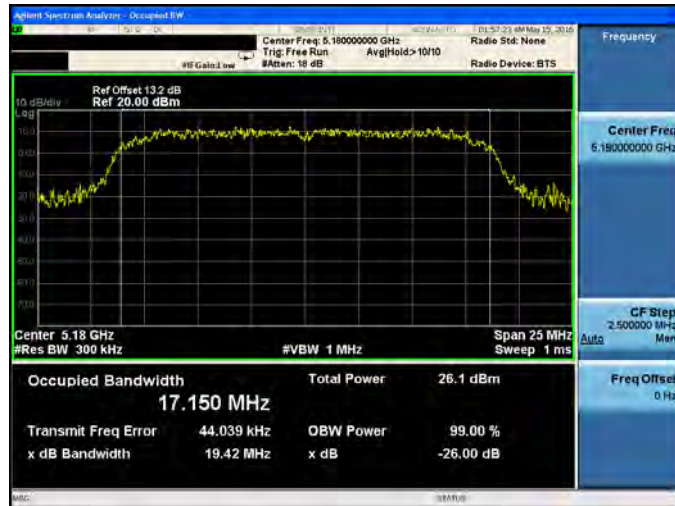


Mode 2: IEEE 802.11a link mode_ ANT-2	
5180 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.18 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 16.167 MHz Total Power 26.6 dBm Transmit Freq Error 30.863 kHz x dB Bandwidth 18.70 MHz OBW Power 99.00 % x dB -26.00 dB Center Freq 5.18000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz
5200 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.2 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 16.177 MHz Total Power 26.6 dBm Transmit Freq Error 20.703 kHz x dB Bandwidth 18.83 MHz OBW Power 99.00 % x dB -26.00 dB Center Freq 5.20000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz
5240 MHz	 Ref Offset 13.2 dB Ref 20.00 dBm Center 5.24 GHz #Res BW 300 kHz #VBW 1 MHz Span 25 MHz Sweep 1 ms Occupied Bandwidth 16.193 MHz Total Power 27.3 dBm Transmit Freq Error 8.965 kHz x dB Bandwidth 18.83 MHz OBW Power 99.00 % x dB -26.00 dB Center Freq 5.24000000 GHz CF Step 2.500000 MHz Freq Offset 0 Hz



Mode 3: IEEE 802.11ac 20MHz link mode_ANT-2

5180 MHz



5200 MHz



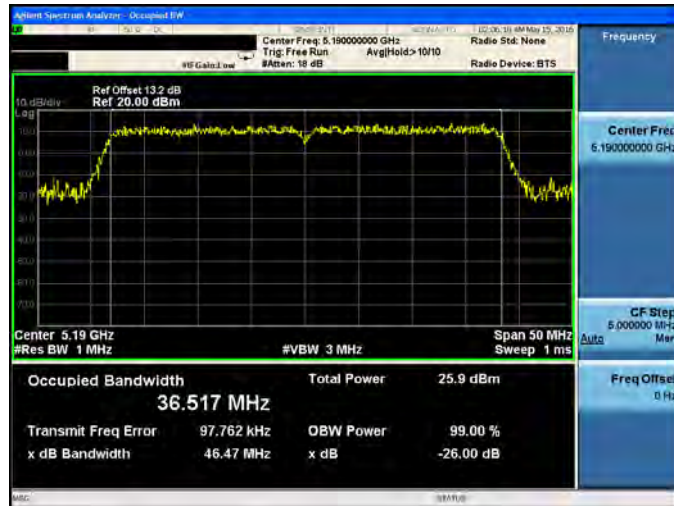
5240 MHz



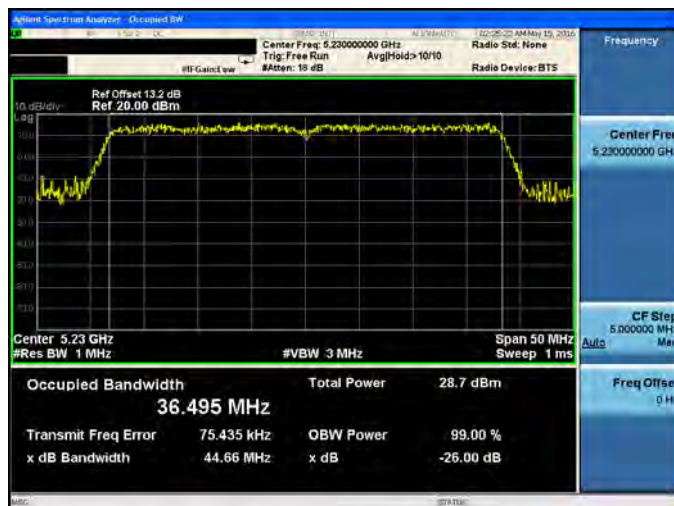


Mode 4: IEEE 802.11ac 40MHz link mode_ANT-2

5190 MHz

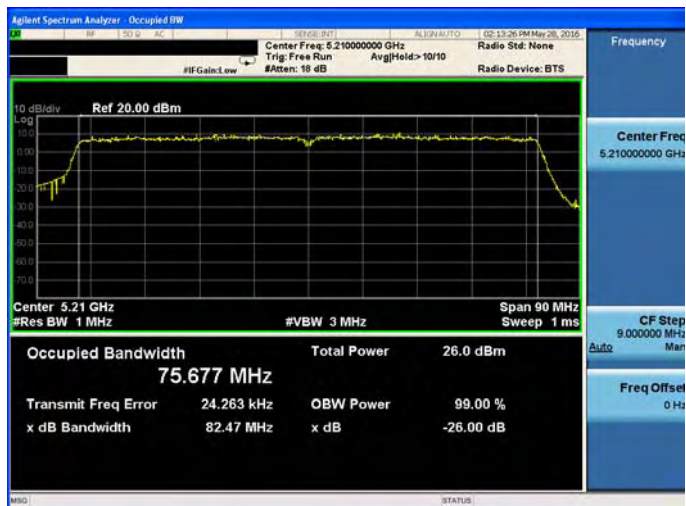


5230 MHz



Mode 5: IEEE 802.11ac 80MHz link mode_ANT-2

5210 MHz



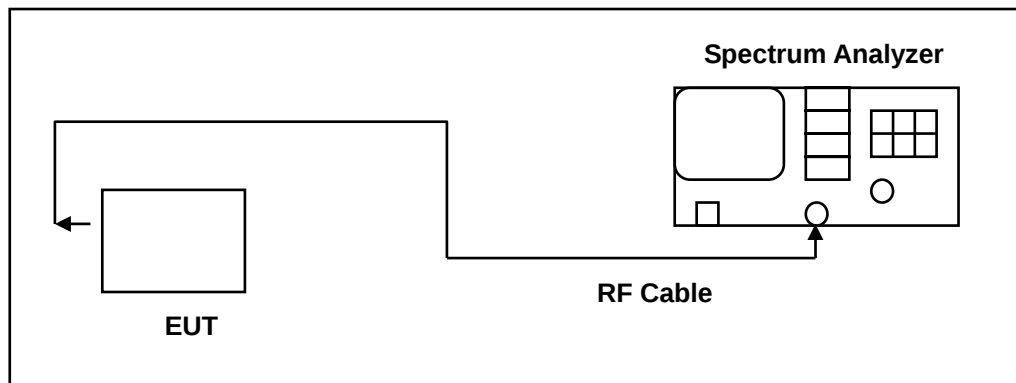
4.5. 6dB RF Bandwidth Measurement

■ Limit

6dB RF Bandwidth

Systems using digital modulation techniques may operate in the 5725~5850MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

■ Test Setup



■ Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/15/2015	1 year
Microwave Cable	EMCI	EMCI 104-SM-SM-1500	140303	02/23/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

■ Test Procedure

6dB RF Bandwidth

The EUT tested to UNII test procedure of KDB789033 D02 for compliance to FCC 47CFR 15.407 requirements. The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A peak output reading was taken, a DISPLAY line was drawn 6 dB lower than peak level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line. The test was performed at 3 channels.



■ Test Result

Test Item	6dB RF Bandwidth			
Test Mode	Mode 2: IEEE 802.11a link mode			
Date of Test	05/14/2016			
Frequency (MHz)	6dB Bandwidth (kHz)			Limit (kHz)
	ANT-0	ANT-1	ANT-2	
5745	16440	15140	14080	> 500
5785	16330	16320	14390	> 500
5825	16330	14420	14450	> 500

Test Item	6dB RF Bandwidth			
Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode			
Date of Test	03/19/2016			
Frequency (MHz)	6dB Bandwidth (kHz)			Limit (kHz)
	ANT-0	ANT-1	ANT-2	
5745	17610	14890	14250	> 500
5785	17450	14800	14310	> 500
5825	17720	14240	14770	> 500

Test Item	6dB RF Bandwidth			
Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode			
Date of Test	03/19/2016			
Frequency (MHz)	6dB Bandwidth (kHz)			Limit (kHz)
	ANT-0	ANT-1	ANT-2	
5755	36330	36340	36110	> 500
5795	36070	35870	36400	> 500

Test Item	6dB RF Bandwidth			
Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode			
Date of Test	03/19/2016			
Frequency (MHz)	6dB Bandwidth (kHz)			Limit (kHz)
	ANT-0	ANT-1	ANT-2	
5775	75670	75840	76040	> 500



■ Test Graphs

Mode 2: IEEE 802.11a link mode_ANT-0

5745 MHz	Center Freq: 5.74500000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 13.2 dB Ref 20.00 dBm Center 5.745 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms Occupied Bandwidth 16.673 MHz Total Power 29.5 dBm Transmit Freq Error 8.867 kHz OBW Power 99.00 % x dB Bandwidth 16.44 MHz x dB -6.00 dB Frequency: 5.74500000 GHz CF Step 3.000000 MHz Man Freq Offset 0 Hz
5785 MHz	Center Freq: 5.78500000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 13.2 dB Ref 20.00 dBm Center 5.785 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms Occupied Bandwidth 16.778 MHz Total Power 28.7 dBm Transmit Freq Error -30.895 kHz OBW Power 99.00 % x dB Bandwidth 16.33 MHz x dB -6.00 dB Frequency: 5.78500000 GHz CF Step 3.000000 MHz Man Freq Offset 0 Hz
5825 MHz	Center Freq: 5.82500000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 13.2 dB Ref 20.00 dBm Center 5.825 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms Occupied Bandwidth 17.062 MHz Total Power 28.3 dBm Transmit Freq Error 12.179 kHz OBW Power 99.00 % x dB Bandwidth 16.33 MHz x dB -6.00 dB Frequency: 5.82500000 GHz CF Step 3.000000 MHz Man Freq Offset 0 Hz

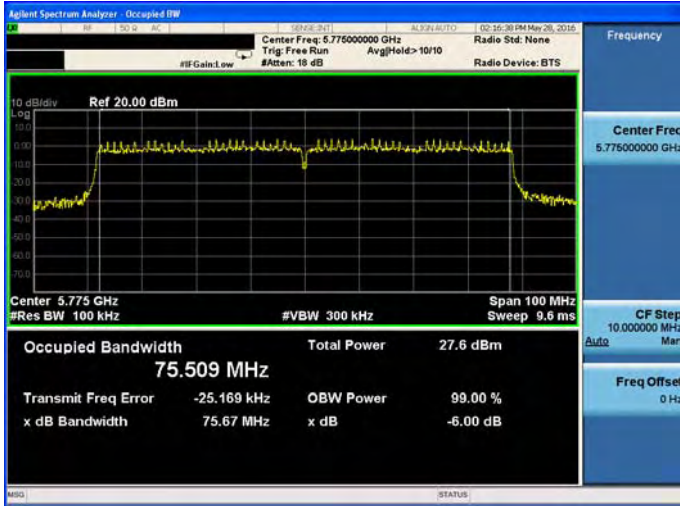
Mode 3: IEEE 802.11ac 20MHz link mode_ANT-0	
5745 MHz	 Center Freq: 5.74500000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 13.2 dB Ref 20.00 dBm Center 5.745 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms Occupied Bandwidth 17.817 MHz Total Power 29.5 dBm Transmit Freq Error 3.080 kHz OBW Power 99.00 % x dB Bandwidth 17.61 MHz x dB -6.00 dB Frequency: 5.74500000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz
5785 MHz	 Center Freq: 5.78500000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 13.2 dB Ref 20.00 dBm Center 5.785 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms Occupied Bandwidth 17.828 MHz Total Power 28.9 dBm Transmit Freq Error -21.452 kHz OBW Power 99.00 % x dB Bandwidth 17.45 MHz x dB -6.00 dB Frequency: 5.78500000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz
5825 MHz	 Center Freq: 5.82500000 GHz Trig: Free Run Avg/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 13.2 dB Ref 20.00 dBm Center 5.825 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms Occupied Bandwidth 17.992 MHz Total Power 28.3 dBm Transmit Freq Error -16.683 kHz OBW Power 99.00 % x dB Bandwidth 17.72 MHz x dB -6.00 dB Frequency: 5.82500000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz



Mode 4: IEEE 802.11ac 40MHz link mode_ANT-0

5755 MHz	 Center Freq: 5.755 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 50 MHz Sweep: 4.8 ms Occupied Bandwidth: 36.286 MHz Total Power: 30.2 dBm Transmit Freq Error: 9.832 kHz OBW Power: 99.00 % x dB Bandwidth: 36.33 MHz x dB: -6.00 dB
5795 MHz	 Center Freq: 5.795 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 50 MHz Sweep: 4.8 ms Occupied Bandwidth: 36.332 MHz Total Power: 29.2 dBm Transmit Freq Error: -250 Hz OBW Power: 99.00 % x dB Bandwidth: 36.07 MHz x dB: -6.00 dB

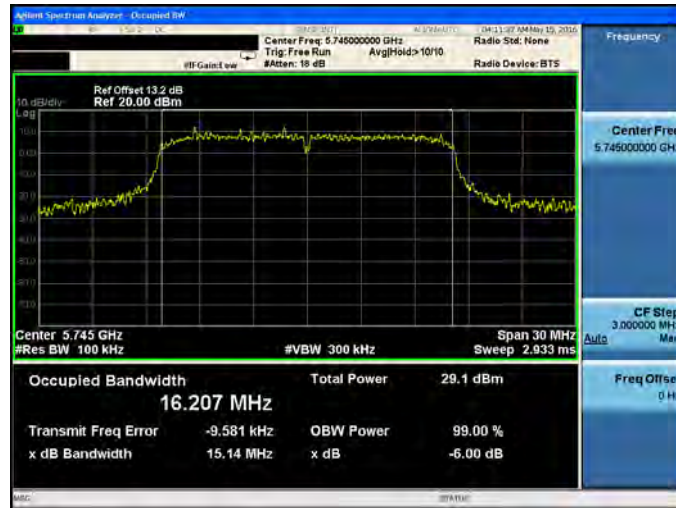
Mode 5: IEEE 802.11ac 80MHz link mode_ANT-0

5775 MHz	 Center Freq: 5.775 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 100 MHz Sweep: 9.6 ms Occupied Bandwidth: 75.509 MHz Total Power: 27.6 dBm Transmit Freq Error: -25.169 kHz OBW Power: 99.00 % x dB Bandwidth: 75.67 MHz x dB: -6.00 dB
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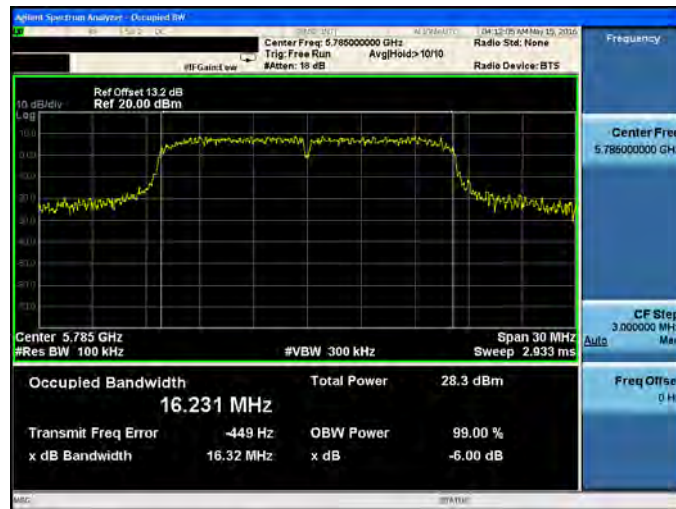


Mode 2: IEEE 802.11a link mode_ANT-1

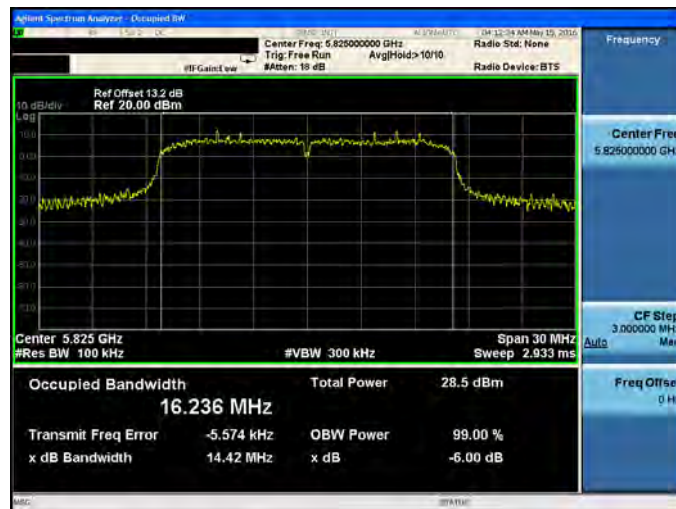
5745 MHz



5785 MHz



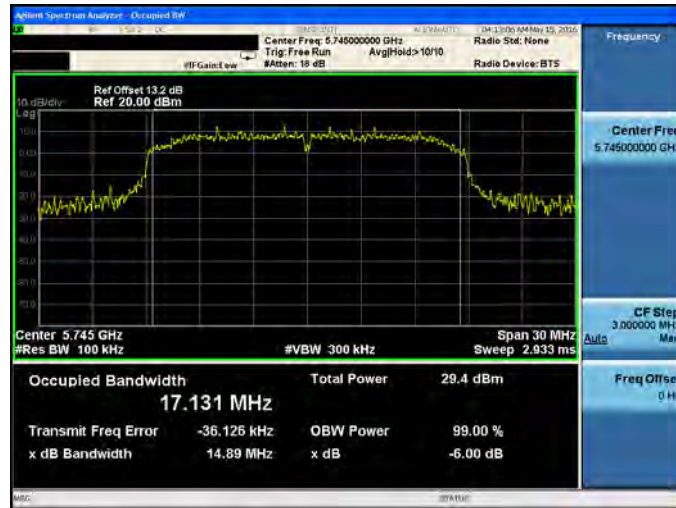
5825 MHz



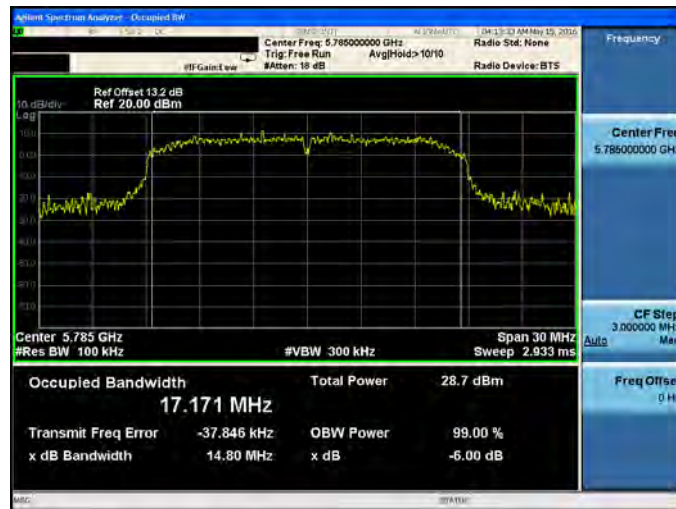


Mode 3: IEEE 802.11ac 20MHz link mode_ANT-1

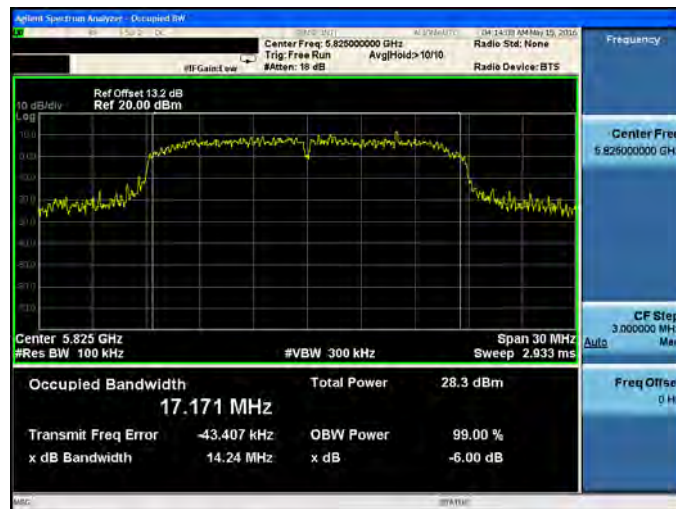
5745 MHz



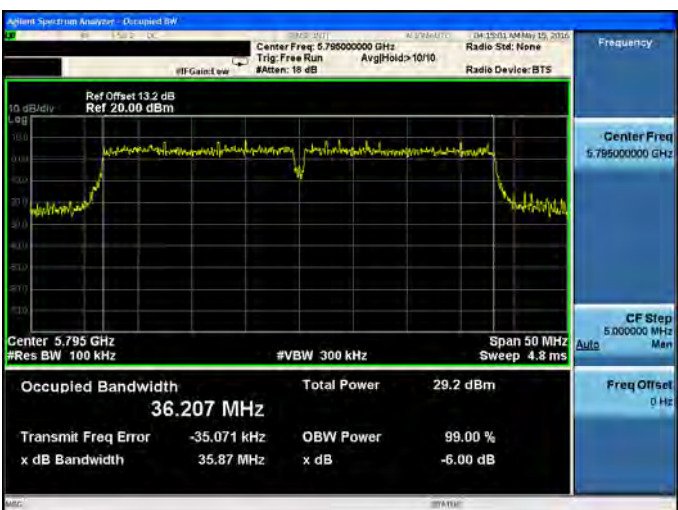
5785 MHz



5825 MHz



Mode 4: IEEE 802.11ac 40MHz link mode_ANT-1

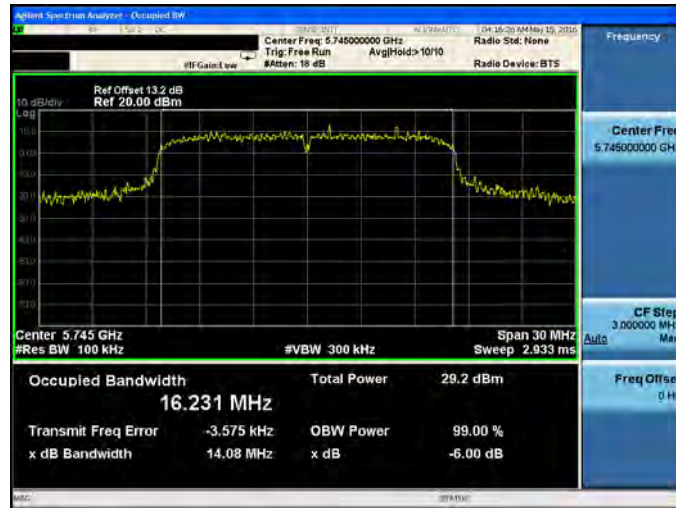
5755 MHz	 Center Freq: 5.755 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 50 MHz Sweep: 4.8 ms Occupied Bandwidth: 36.195 MHz Total Power: 29.7 dBm Transmit Freq Error: -19.685 kHz OBW Power: 99.00 % x dB Bandwidth: 36.34 MHz x dB: -6.00 dB
5795 MHz	 Center Freq: 5.795 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 50 MHz Sweep: 4.8 ms Occupied Bandwidth: 36.207 MHz Total Power: 29.2 dBm Transmit Freq Error: -35.071 kHz OBW Power: 99.00 % x dB Bandwidth: 35.87 MHz x dB: -6.00 dB

Mode 5: IEEE 802.11ac 80MHz link mode_ANT-1

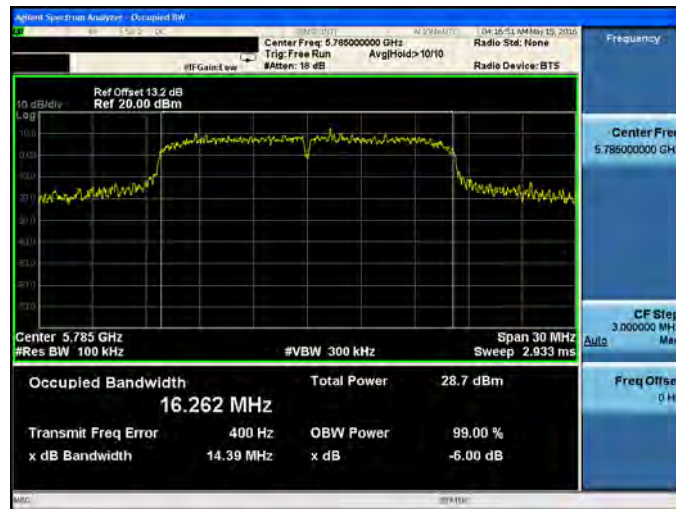
5775 MHz	 Center Freq: 5.775 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 100 MHz Sweep: 9.6 ms Occupied Bandwidth: 75.505 MHz Total Power: 26.6 dBm Transmit Freq Error: 22.585 kHz OBW Power: 99.00 % x dB Bandwidth: 75.84 MHz x dB: -6.00 dB
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Mode 2: IEEE 802.11a link mode_ANT-2

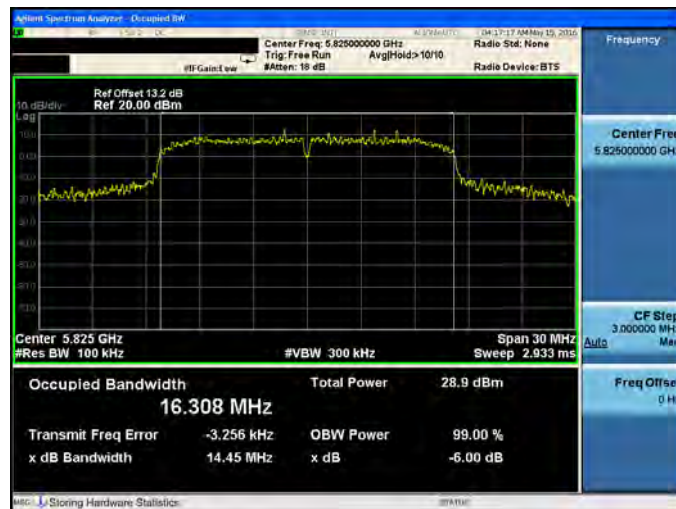
5745 MHz



5785 MHz



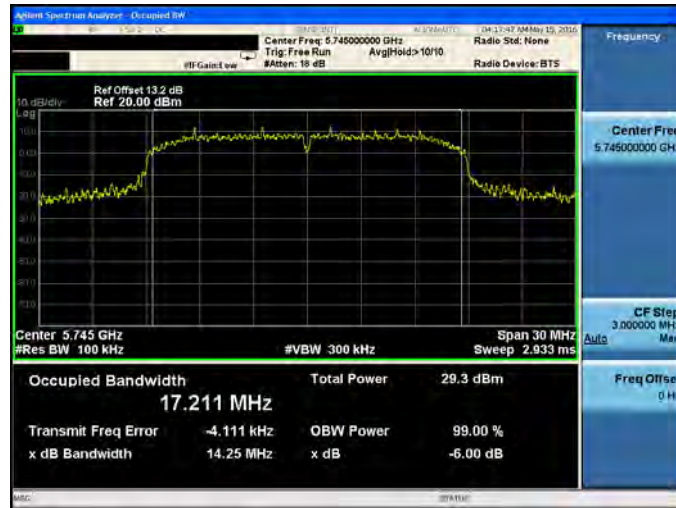
5825 MHz



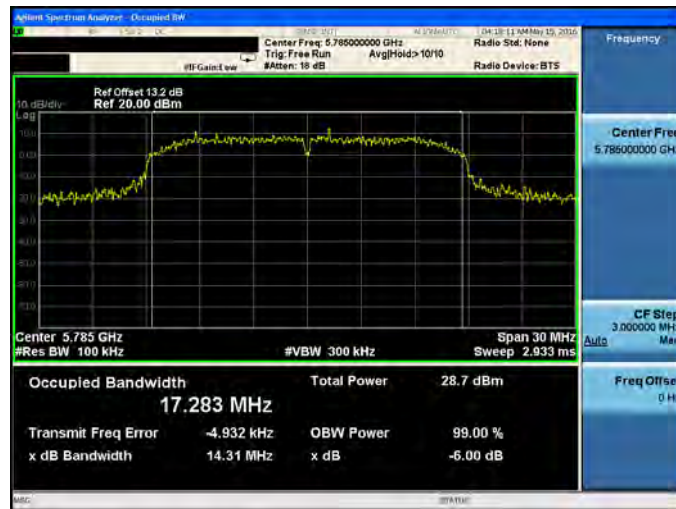


Mode 3: IEEE 802.11ac 20MHz link mode_ANT-2

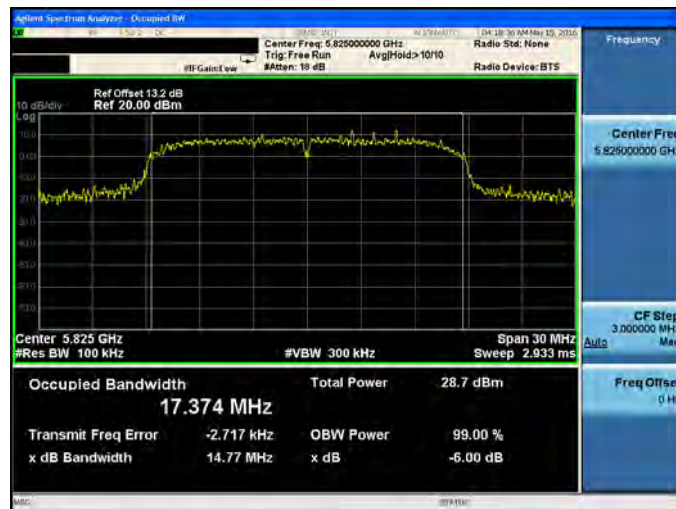
5745 MHz



5785 MHz



5825 MHz

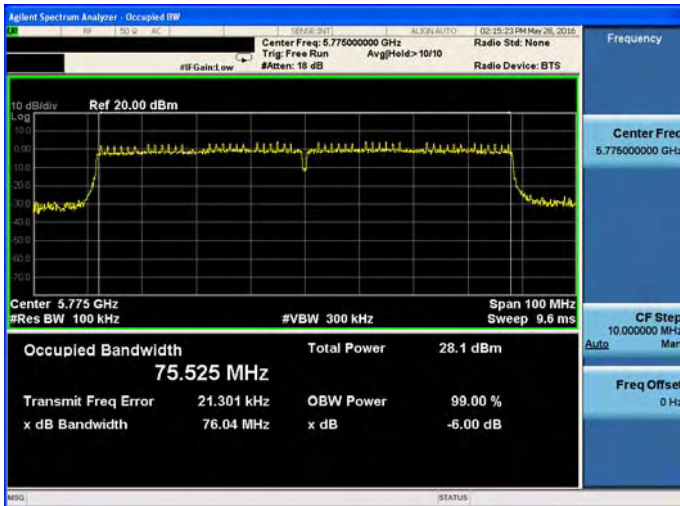




Mode 4: IEEE 802.11ac 40MHz link mode_ANT-2

5755 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 5.75500000 GHz Trig: Free Run Ave/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 13.2 dB Ref 20.00 dBm Center 5.755 GHz #Res BW 100 kHz #VBW 300 kHz Span 50 MHz Sweep 4.8 ms Occupied Bandwidth 36.232 MHz Total Power 29.6 dBm Transmit Freq Error -14.567 kHz OBW Power 99.00 % x dB Bandwidth 36.11 MHz x dB -6.00 dB Frequency: 5.75500000 GHz CF Step 5.000000 MHz Man Freq Offset 0 Hz
5795 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 5.79500000 GHz Trig: Free Run Ave/Hold: 10/10 Radio Std: None Radio Device: BTS Ref Offset 13.2 dB Ref 20.00 dBm Center 5.795 GHz #Res BW 100 kHz #VBW 300 kHz Span 50 MHz Sweep 4.8 ms Occupied Bandwidth 36.298 MHz Total Power 29.6 dBm Transmit Freq Error -9.447 kHz OBW Power 99.00 % x dB Bandwidth 36.40 MHz x dB -6.00 dB Frequency: 5.79500000 GHz CF Step 5.000000 MHz Man Freq Offset 0 Hz

Mode 5: IEEE 802.11ac 80MHz link mode_ANT-2

5775 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 5.77500000 GHz Trig: Free Run Ave/Hold: 10/10 Radio Std: None Radio Device: BTS Ref 20.00 dBm Center 5.775 GHz #Res BW 100 kHz #VBW 300 kHz Span 100 MHz Sweep 9.6 ms Occupied Bandwidth 75.525 MHz Total Power 28.1 dBm Transmit Freq Error 21.301 kHz OBW Power 99.00 % x dB Bandwidth 76.04 MHz x dB -6.00 dB Frequency: 5.77500000 GHz CF Step 10.000000 MHz Man Freq Offset 0 Hz
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4.6. Peak Power Spectral Density Measurement

■ Limit

Conducted power spectral density

Frequency Range (MHz)	FCC Limit	
	Master	Client
5.150 ~ 5.250 GHz	17 dBm/MHz	11 dBm/MHz
5.725 ~ 5.850 GHz	30 dBm/500KHz	---

According FCC KDB 662911 D01 v02r01 – for power measurements on IEEE802.11 devices,

Directional gain = GANT + 10 log(NANT/NSS) dBi

5.150 ~ 5.250 GHz

* MIMO mode : Directional Gain = 7.8 dBi > 6dBi -- For Master & Client mode

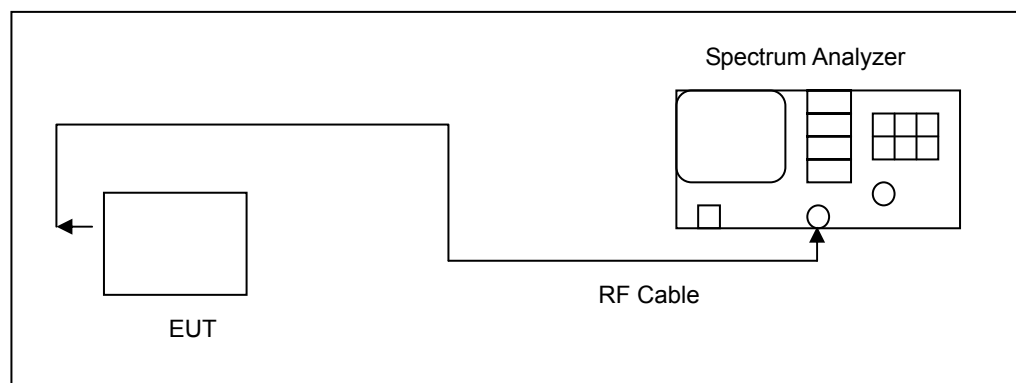
MIMO mode power limit shall be reduced = 17 - 1.8 = 15.2 dBm/MHz

5.725 ~ 5.850 GHz

* MIMO mode : Directional Gain = 7.8 dBi > 6dBi

MIMO mode power limit shall be reduced = 30 - 1.8 = 28.2 dBm/ 500KHz

■ Test Setup



■ Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/15/2015	1 year
Microwave Cable	EMCI	EMCI 104-SM-SM-1500	140303	02/23/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

**■ Test Procedure**

The test is performed in accordance with KDB789033: D02 General UNII Test Procedures New Rules v01r02, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	1 MHz (5725 ~ 5850MHz use 100 kHz)
VBW	3 MHz (5725 ~ 5850MHz use 300 kHz)
Detector	RMS
Trace	AVERAGE
Sweep Time	Auto
Trace Average	100 times
Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/100\text{kHz})$ to the measured result.	



Test Result

Test Item	Conducted power spectral density			
Test Mode	Mode 2: IEEE 802.11a link mode			
Date of Test	05/28/2016			
Frequency (MHz)	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	9.215	0.021	9.236	< 15.2
5200	7.847	0.021	7.868	
5240	7.351	0.021	7.372	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	8.721	0.021	8.742	< 15.2
5200	7.367	0.021	7.388	
5240	6.945	0.021	6.966	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	8.818	0.021	8.839	< 15.2
5200	7.599	0.021	7.620	
5240	7.044	0.021	7.065	
Frequency (MHz)	ANT-0+1+2			Limit (dBm/MHz)
	Calculated (dBm/MHz)			
5180	13.715			< 15.2
5200	12.401			
5240	11.909			

Note: Method SA-2, Power density = measured result + 10log (1/duty cycle) measured result + duty factor.



Test Item	Conducted power spectral density			
Test Mode	Mode 2: IEEE 802.11a link mode			
Date of Test	05/28/2016			
Frequency (MHz)	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	3.189	0.021	10.199	< 28.2
5785	2.975	0.021	9.985	
5825	0.981	0.021	7.991	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	2.001	0.021	9.011	< 28.2
5785	1.748	0.021	8.758	
5825	0.180	0.021	7.190	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	2.658	0.021	9.668	< 28.2
5785	2.854	0.021	9.864	
5825	0.827	0.021	7.837	
Frequency (MHz)	ANT-0+1+2			
	Limit (dBm/500KHz)			Limit (dBm/500KHz)
5745	14.425			< 28.2
5785	14.341			
5825	12.458			

Note: Method SA-2, Power density = measured result + 10log (1/duty cycle) = measured result + duty factor.

Conversion ratio = 10*Log (500k/100k)



Test Item	Conducted power spectral density			
Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode			
Date of Test	05/28/2016			
Frequency (MHz)	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	9.458	0.022	9.480	< 15.2
5200	9.331	0.022	9.353	
5240	9.070	0.022	9.092	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	8.930	0.022	8.952	< 15.2
5200	8.798	0.022	8.820	
5240	8.888	0.022	8.910	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5180	8.897	0.022	8.919	< 15.2
5200	8.955	0.022	8.977	
5240	9.148	0.022	9.170	
Frequency (MHz)	ANT-0+1+2			
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5180	13.896			< 15.2
5200	13.827			
5240	13.830			

Note: Method SA-2, Power density = measured result + 10log (1/duty cycle) = measured result + duty factor.



Test Item	Conducted power spectral density			
Test Mode	Mode 3: IEEE 802.11ac 20MHz link mode			
Date of Test	05/28/2016			
Frequency (MHz)	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	2.540	0.022	9.552	< 28.2
5785	2.849	0.022	9.861	
5825	2.743	0.022	9.755	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	1.989	0.022	9.001	< 28.2
5785	1.602	0.022	8.614	
5825	1.522	0.022	8.534	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5745	2.965	0.022	9.977	< 28.2
5785	3.202	0.022	10.214	
5825	2.812	0.022	9.824	
Frequency (MHz)	ANT-0+1+2			Limit (dBm/500KHz)
	Calculated (dBm/500KHz)			
5745	14.300			< 28.2
5785	14.387			
5825	14.181			

Note: Method SA-2, Power density = measured result + 10log (1/duty cycle) = measured result + duty factor.

Conversion ratio = 10*Log (500k/100k)



Test Item	Conducted power spectral density			
Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode			
Date of Test	05/28/2016			
Frequency (MHz)	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	4.254	0.045	4.299	< 15.2
5230	8.144	0.045	8.189	
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	4.226	0.045	4.271	< 15.2
5230	8.035	0.045	8.080	
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5190	4.274	0.045	4.319	< 15.2
5230	8.144	0.045	8.189	
Frequency (MHz)	ANT-0+1+2			Limit (dBm/MHz)
	Calculated (dBm/MHz)			
5190	9.067			< 15.2
5230	12.924			

Note: Method SA-2, Power density = measured result + 10log (1/duty cycle) = measured result + duty factor.



Test Item	Conducted power spectral density			
Test Mode	Mode 4: IEEE 802.11ac 40MHz link mode			
Date of Test	05/28/2016			
Frequency (MHz)	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	0.364	0.045	7.398	< 28.2
5795	0.768	0.045	7.802	
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-0.793	0.045	6.241	< 28.2
5795	-0.597	0.045	6.437	
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/500KHz)
5755	-0.053	0.045	6.981	< 28.2
5795	-0.201	0.045	6.833	
Frequency (MHz)	ANT-0+1+2			
	Calculated (dBm/500KHz)			Limit (dBm/500KHz)
5755	11.671			< 28.2
5795	11.834			

Note: Method SA-2, Power density = measured result + 10log (1/duty cycle) = measured result + duty factor.

Conversion ratio = 10*Log (500k/100k)



Test Item	Conducted power spectral density			
Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode			
Date of Test	05/28/2016			
Frequency (MHz)	ANT-0			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-0.439	0.395	-0.044	< 15.2
Frequency (MHz)	ANT-1			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	0.618	0.395	1.013	< 15.2
Frequency (MHz)	ANT-2			
	Measurement (dBm/MHz)	Duty Factor (dB)	Calculated (dBm/MHz)	Limit (dBm/MHz)
5210	-0.951	0.395	-0.556	< 15.2
Frequency (MHz)	ANT-0+1+2			Limit (dBm/MHz)
	Calculated (dBm/MHz)			Limit (dBm/MHz)
5210	4.959			< 15.2

Note: Method SA-2, Power density = measured result + 10log (1/duty cycle) = measured result + duty factor.

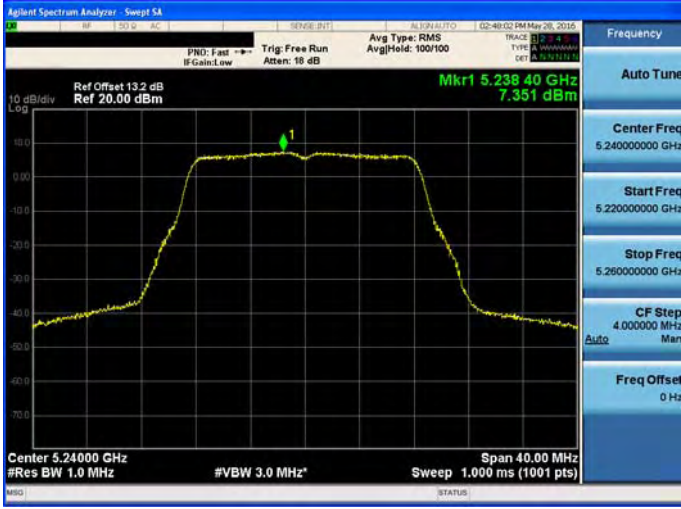


Test Item	Conducted power spectral density			
Test Mode	Mode 5: IEEE 802.11ac 80MHz link mode			
Date of Test	05/28/2016			
Frequency (MHz)	ANT-0			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/MHz)
5775	-5.618	0.395	1.767	< 28.2
Frequency (MHz)	ANT-1			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/MHz)
5775	-5.579	0.395	1.806	< 28.2
Frequency (MHz)	ANT-2			
	Measurement (dBm/100KHz)	Duty Factor (dB)	Calculated (dBm/500KHz)	Limit (dBm/MHz)
5775	-5.919	0.395	1.466	< 28.2
Frequency (MHz)	ANT-0+1+2			
	Calculated (dBm/500KHz)			Limit (dBm/MHz)
5775	6.453			< 28.2

Note: Method SA-2, Power density = measured result + 10log (1/duty cycle) = measured result + duty factor.

Conversion ratio = 10*Log (500k/100k)

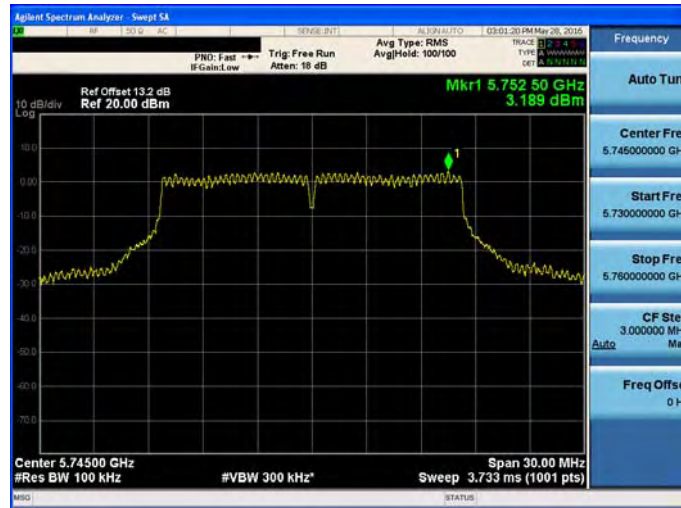
Test Graphs

Mode 2: IEEE 802.11a link mode_ ANT-0	
5180 MHz	 Agilent Spectrum Analyzer - Sweep SA Ref Offset 13.2 dB Ref 20.00 dBm Mkr1 5.178 72 GHz 9.215 dBm Center 5.18000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz* Span 40.00 MHz Sweep 1.000 ms (1001 pts)
5200 MHz	 Agilent Spectrum Analyzer - Sweep SA Ref Offset 13.2 dB Ref 20.00 dBm Mkr1 5.197 60 GHz 7.847 dBm Center 5.20000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz* Span 40.00 MHz Sweep 1.000 ms (1001 pts)
5240 MHz	 Agilent Spectrum Analyzer - Sweep SA Ref Offset 13.2 dB Ref 20.00 dBm Mkr1 5.238 40 GHz 7.351 dBm Center 5.24000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz* Span 40.00 MHz Sweep 1.000 ms (1001 pts)

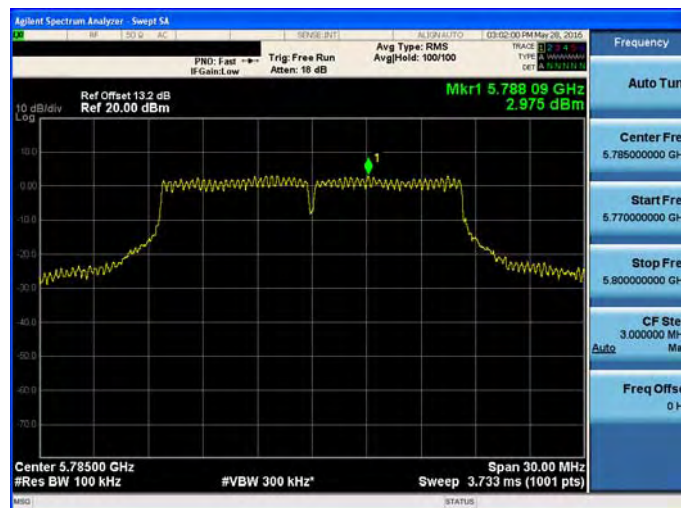


Mode 2: IEEE 802.11a link mode_ ANT-0

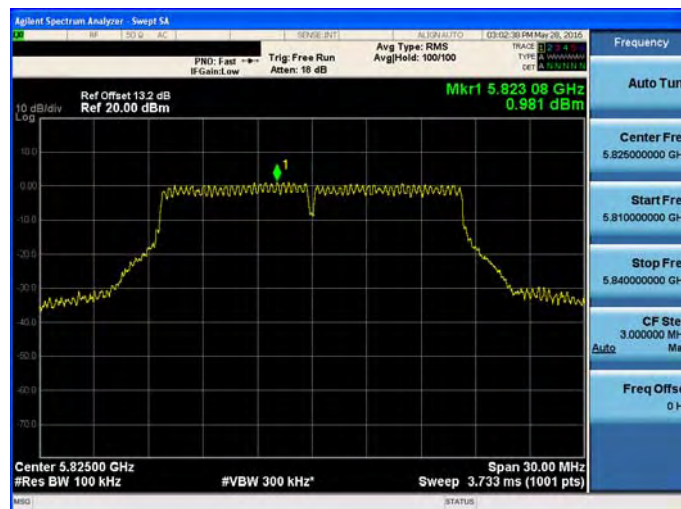
5745 MHz



5785 MHz

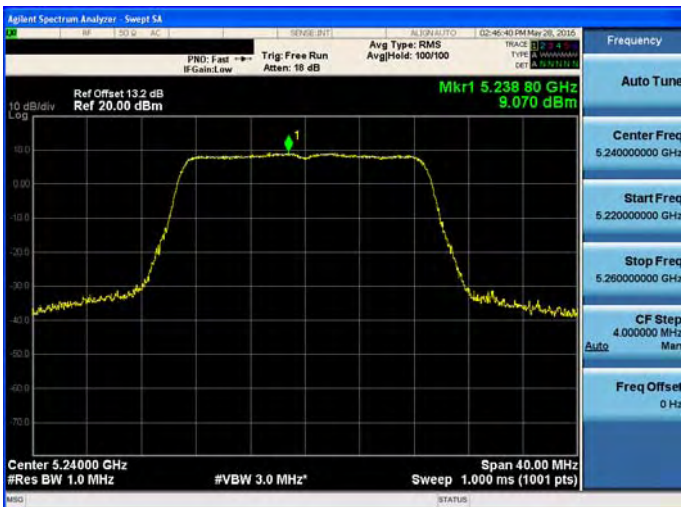


5825 MHz





Mode 3: IEEE 802.11ac 20MHz link mode _ ANT-0

5180 MHz	
5200 MHz	
5240 MHz	

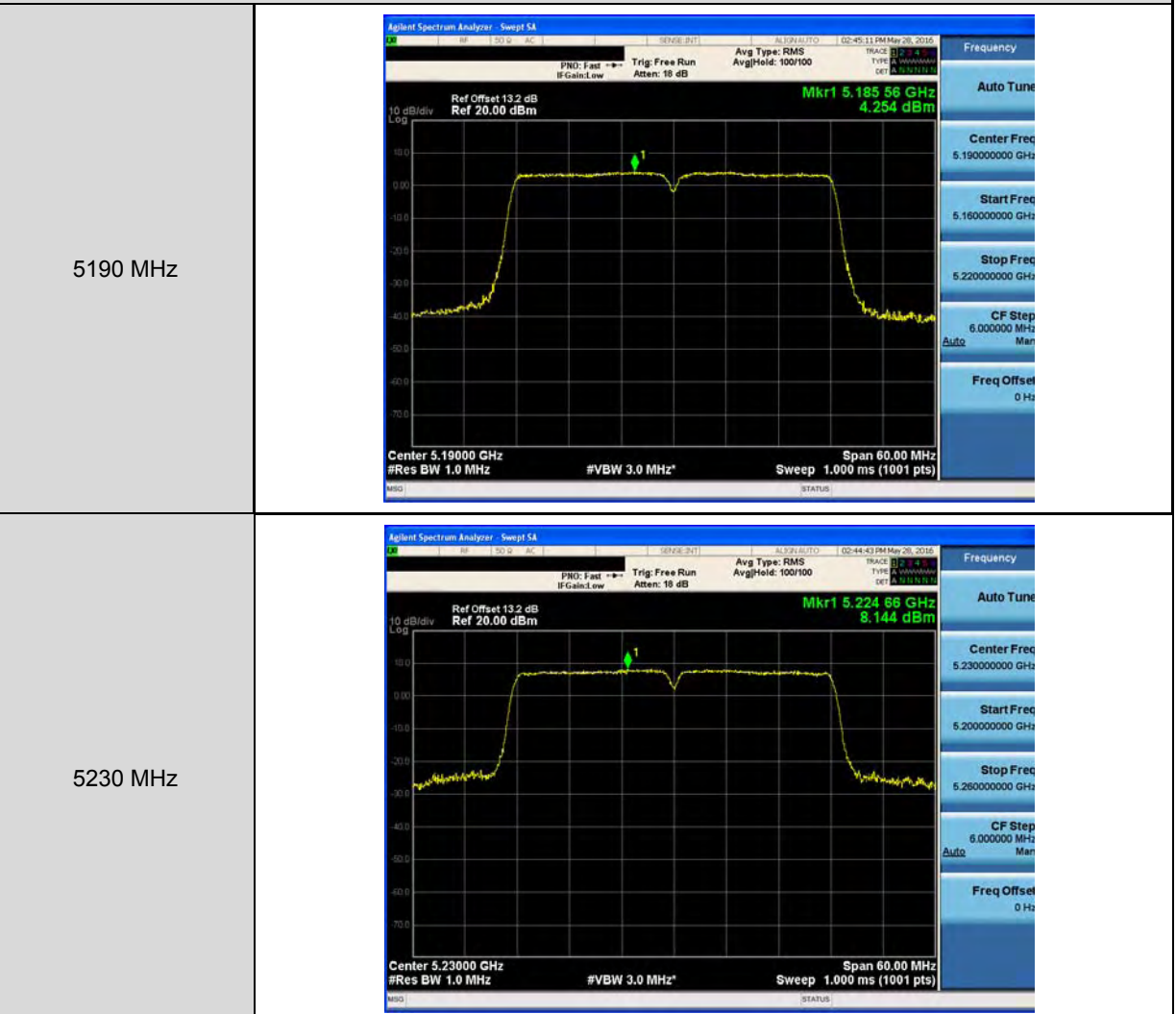


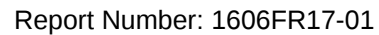
Mode 3: IEEE 802.11ac 20MHz link mode _ ANT-0

5745 MHz	
5785 MHz	
5825 MHz	



Mode 4: IEEE 802.11ac 40MHz link mode_ANT-0



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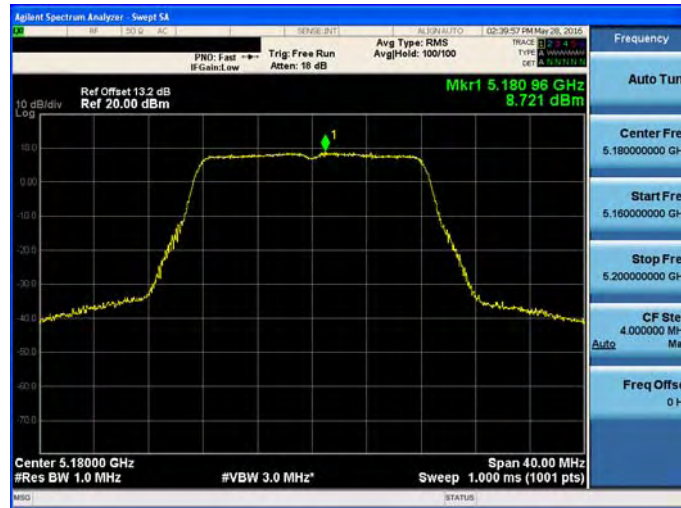


Mode 5: IEEE 802.11ac 80MHz link mode _ ANT-0	
5210 MHz	
5775 MHz	

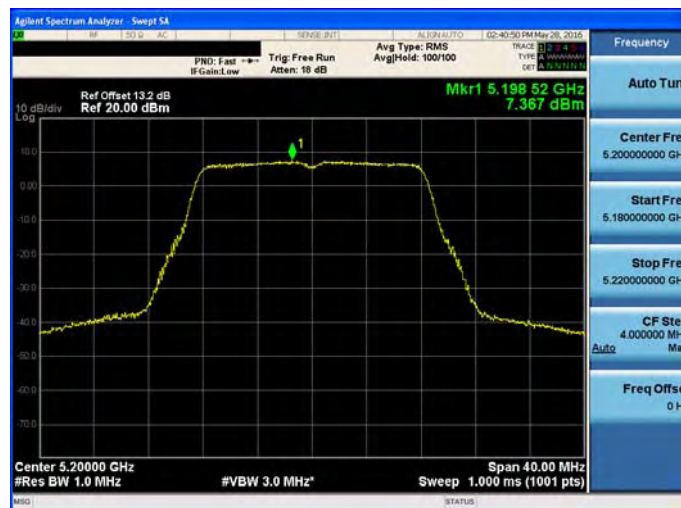


Mode 2: IEEE 802.11a link mode_ANT-1

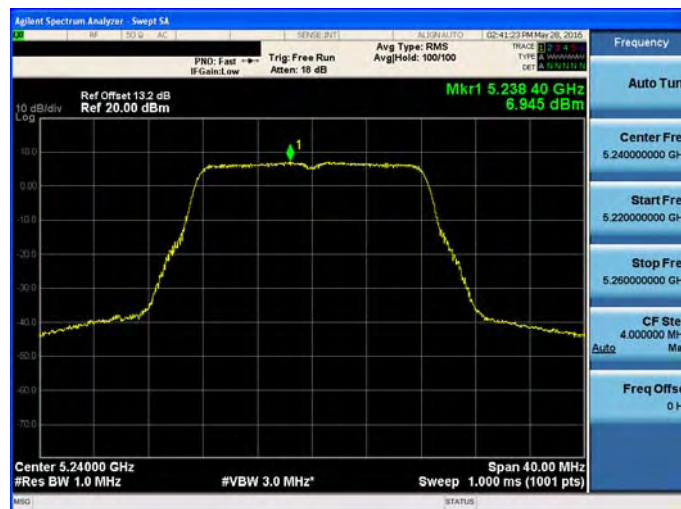
5180 MHz



5200 MHz



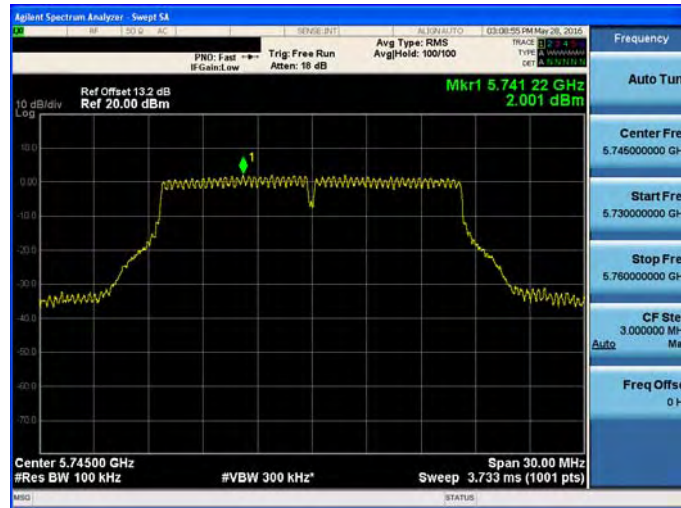
5240 MHz



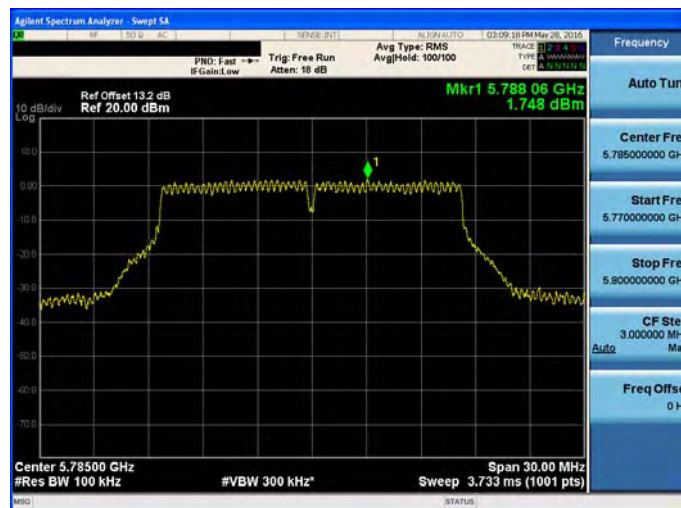


Mode 2: IEEE 802.11a link mode_ANT-1

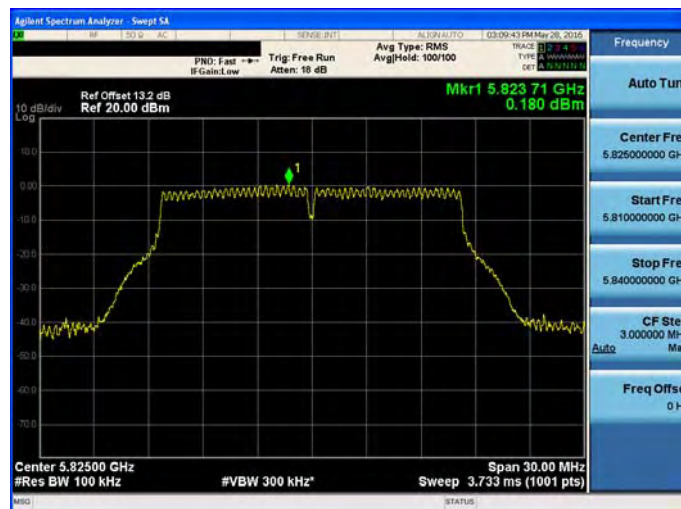
5745 MHz



5785 MHz



5825 MHz



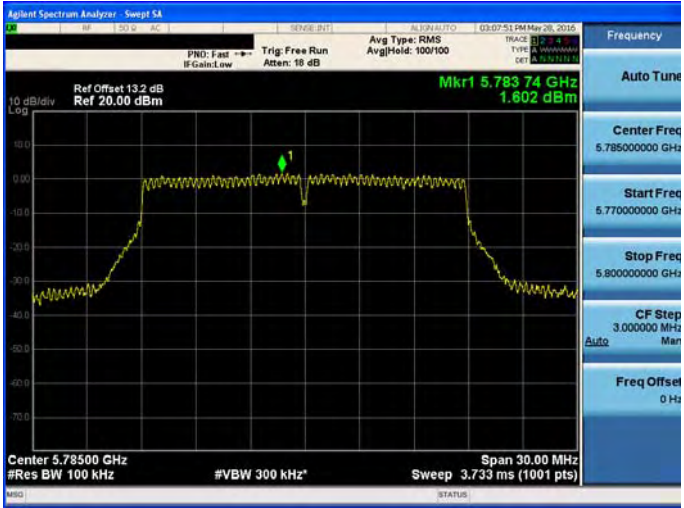
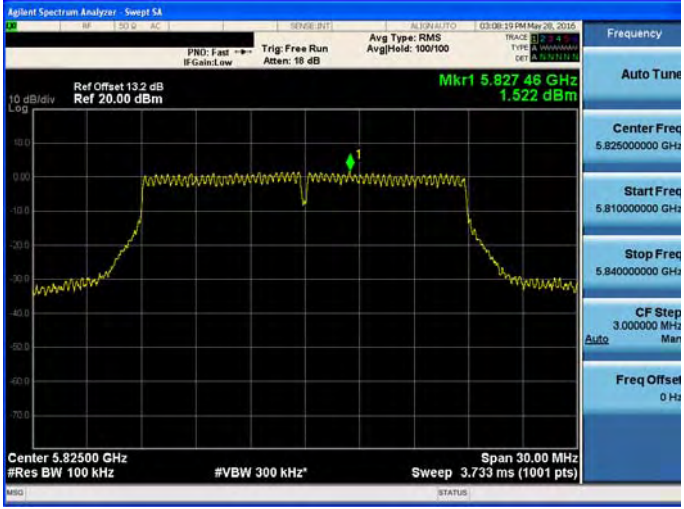


Mode 3: IEEE 802.11ac 20MHz link mode _ ANT-1

5180 MHz	
5200 MHz	
5240 MHz	

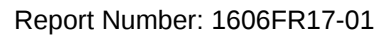


Mode 3: IEEE 802.11ac 20MHz link mode _ ANT-1

5745 MHz	
5785 MHz	
5825 MHz	



Mode 4: IEEE 802.11ac 40MHz link mode_ANT-1	
5190 MHz	
5230 MHz	

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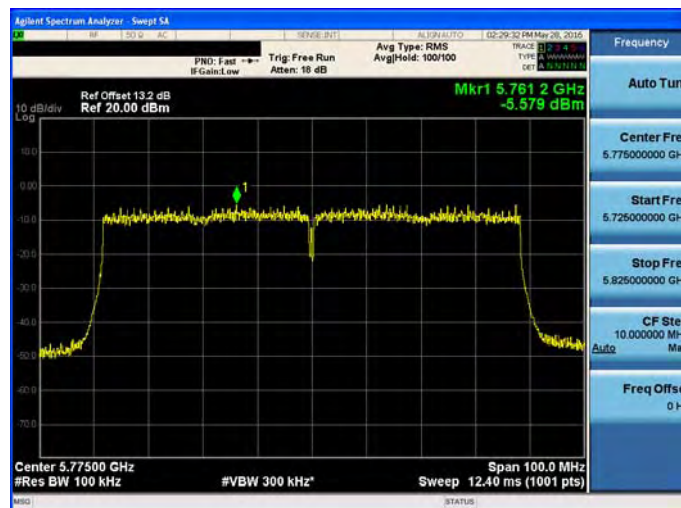


Mode 5: IEEE 802.11ac 80MHz link mode _ ANT-1

5210 MHz



5775 MHz



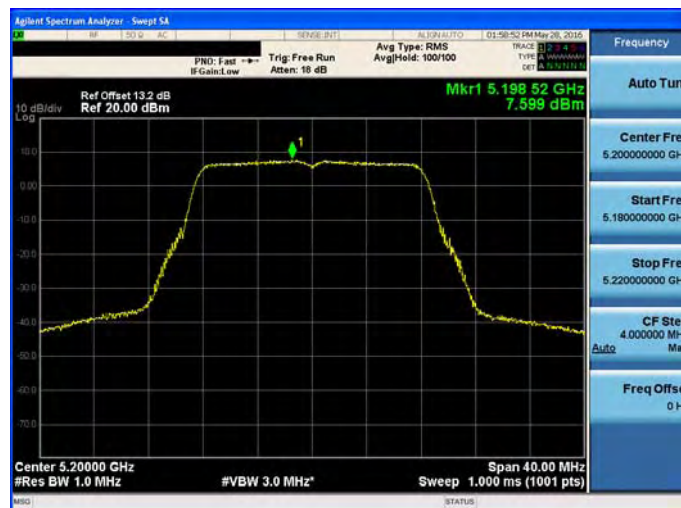


Mode 2: IEEE 802.11a link mode_ANT-2

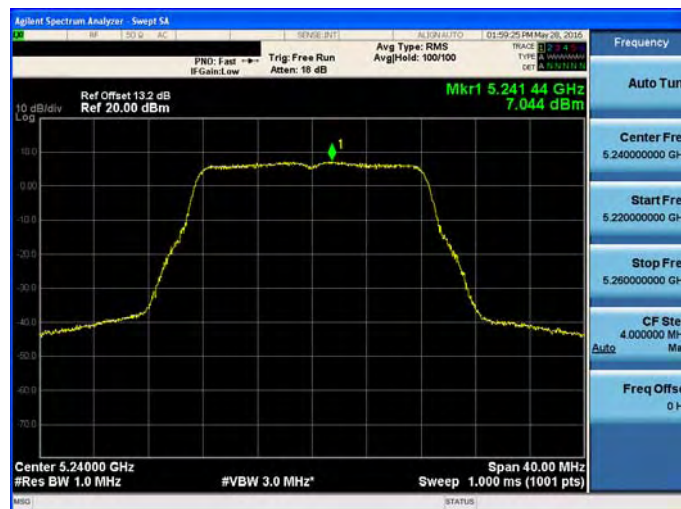
5180 MHz



5200 MHz



5240 MHz



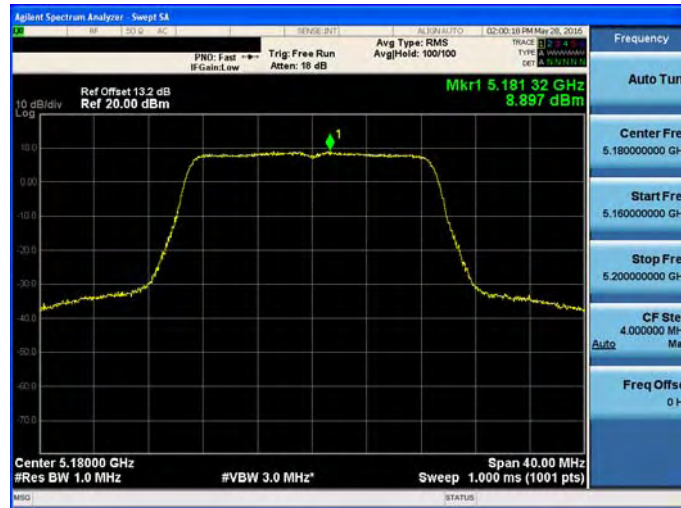


Mode 2: IEEE 802.11a link mode_ANT-2	
5745 MHz	
5785 MHz	
5825 MHz	

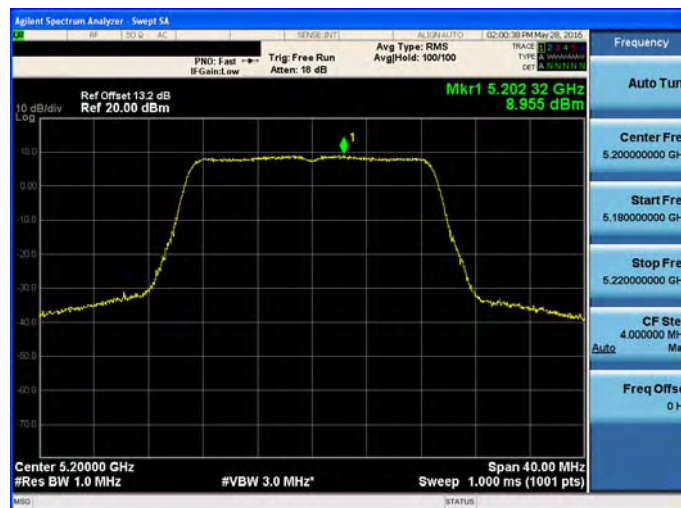


Mode 3: IEEE 802.11ac 20MHz link mode _ ANT-2

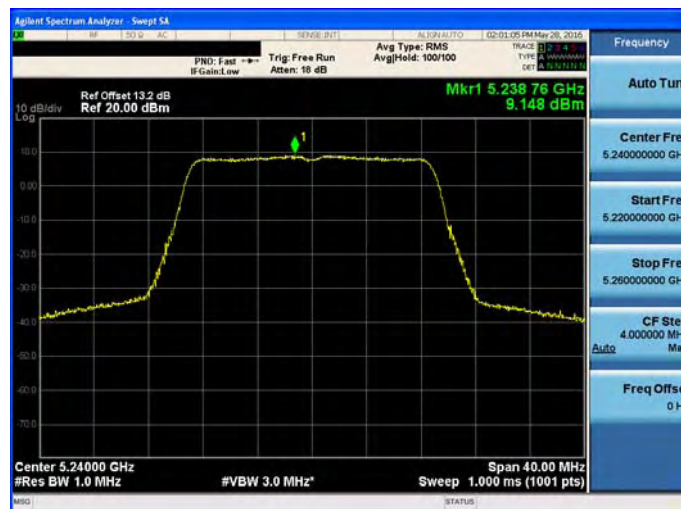
5180 MHz



5200 MHz



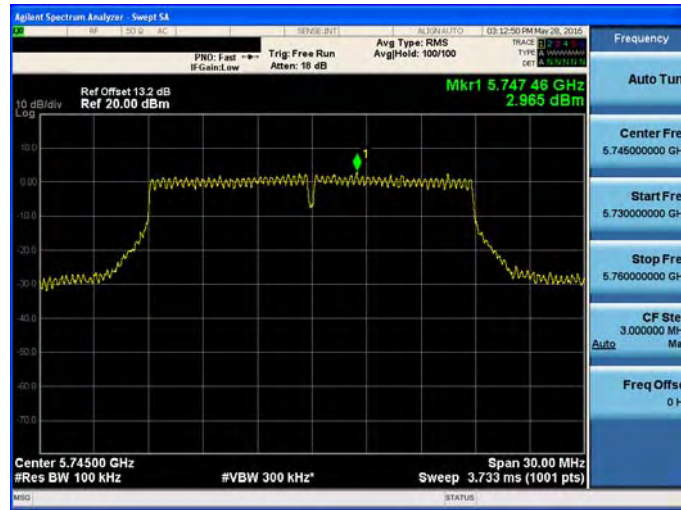
5240 MHz



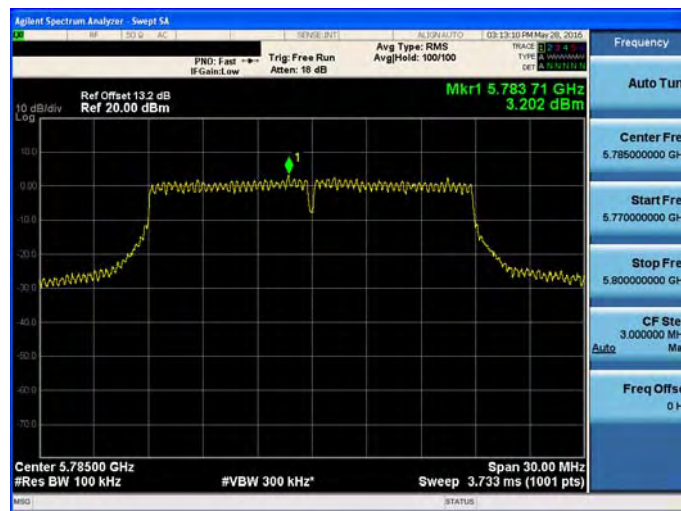


Mode 3: IEEE 802.11ac 20MHz link mode _ ANT-2

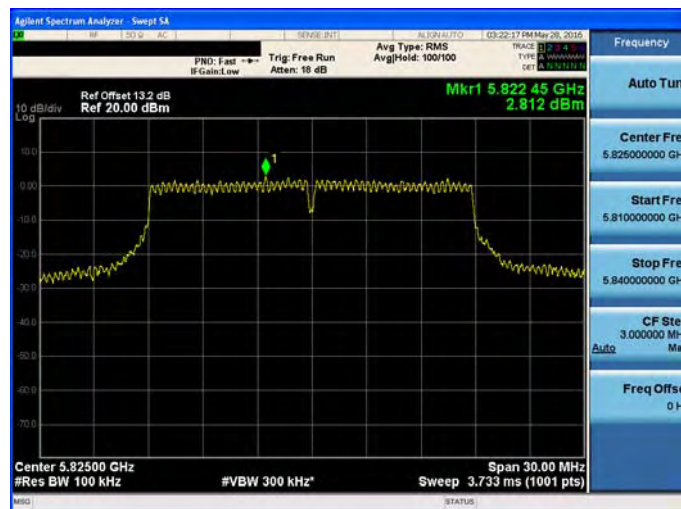
5745 MHz



5785 MHz

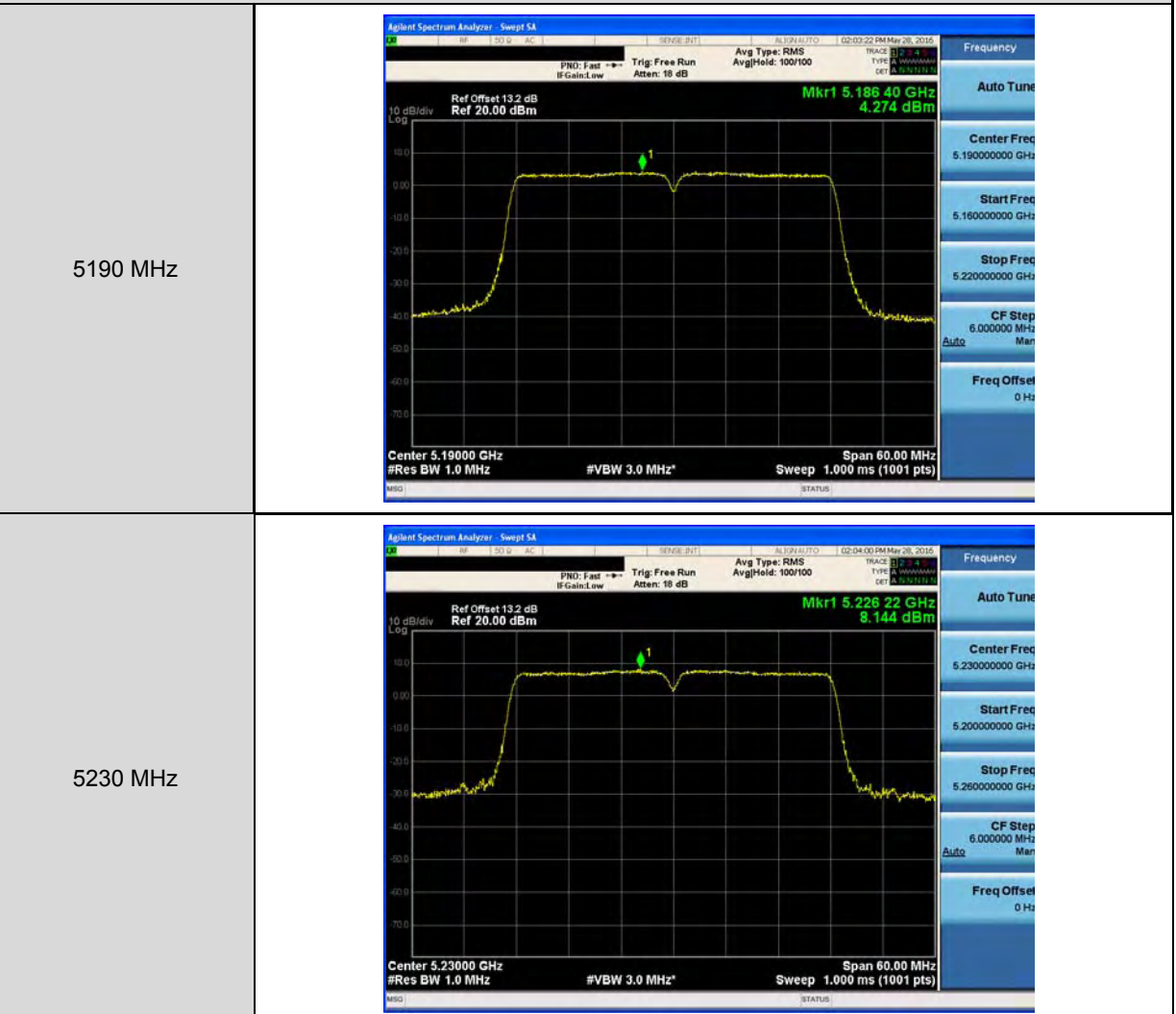


5825 MHz

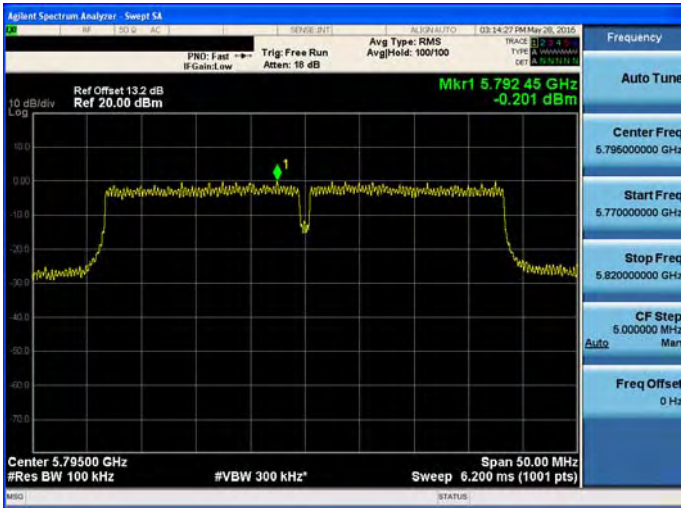




Mode 4: IEEE 802.11ac 40MHz link mode_ANT-2





Mode 4: IEEE 802.11ac 40MHz link mode_ANT-2	
5755 MHz	
5795 MHz	

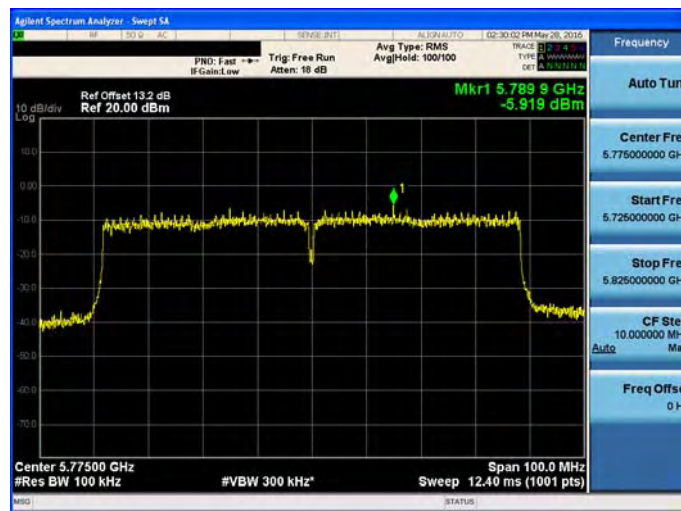


Mode 5: IEEE 802.11ac 80MHz link mode _ ANT-2

5210 MHz



5775 MHz

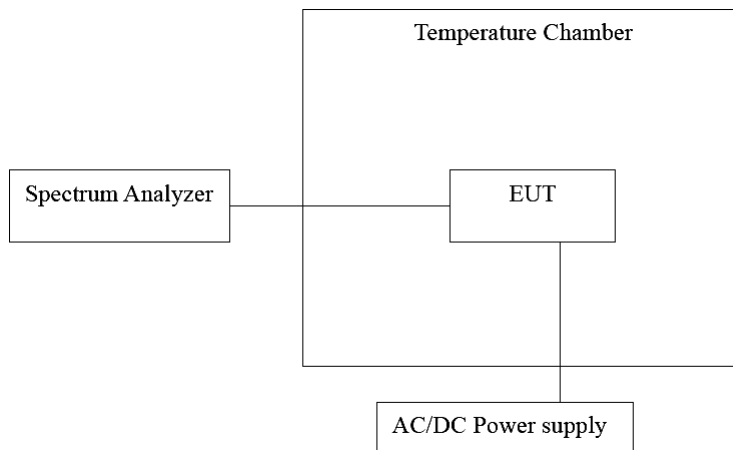


4.7. Frequency Stability Measurement

■ 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.

■ Test Setup



■ Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/27/2015	1 year
Microwave Cable	EMCI	EMCI 104-SM-SM-1500	140303	02/23/2016	1 year
Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	04/18/2016	1 year
Test Site	ATL	TE05	TE05	N.C.R.	-----

Note: N.C.R. = No Calibration Request.

■ Test Procedure

1. The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.



■ Test Result

Temperature Variations

Test Item	Frequency Stability					
Date of Test	06/01/2016					
Frequency	Temp. (°C)	Voltage (Vac)	Measured Freq. (MHz)	Delta Freq. (Hz)	Tolerance (ppm)	Result (Pass/Fail)
5200 MHz	0	120	5199.9629	-37100	-7.135	Pass
	10		5199.9685	-31500	-6.058	Pass
	20		5199.9732	-26800	-5.154	Pass
	30		5199.9877	-12300	-2.365	Pass
	40		5200.0078	7800	1.500	Pass
5785 MHz	0	120	5784.9529	-47100	-8.142	Pass
	10		5784.9627	-37300	-6.448	Pass
	20		5784.9720	-28000	-4.840	Pass
	30		5784.9809	-19100	-3.302	Pass
	40		5785.0007	700	0.121	Pass

Voltage Variations

Test Item	Frequency Stability					
Date of Test	06/01/2016					
Frequency	Temp. (°C)	Voltage (Vac)	Measured Freq. (MHz)	Delta Freq. (Hz)	Tolerance (ppm)	Result (Pass/Fail)
5200 MHz	20	138.00	5199.9672	-32800	-6.308	Pass
		120.00	5199.9730	-27000	-5.192	Pass
		102.00	5199.9924	-7600	-1.462	Pass
5785 MHz	20	138.00	5784.9665	-33500	-5.791	Pass
		120.00	5784.9664	-33600	-5.808	Pass
		102.00	5784.9883	-11700	-2.022	Pass

Note: The manufacturer's frequency stability specification is better than 20ppm.



4.8. Antenna Requirement

■ Limit

For intentional device, according to 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 15.407 (a), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

■ Antenna Connector Construction

See section 2 – antenna information.

■ Directional Gain Calculated

Directional Gain = $10 \cdot \log\{[10^{(G1/20)} + 10^{(G2/20)} + \dots + 10^{(Gn/20)}]^2 / NANT\}$ = 7.8 dBi > 6dBi

Operate Freq. Band	Directional Gain (dBi)
IEEE 802.11a link mode	7.8
IEEE 802.11ac 20MHz link mode	7.8
IEEE 802.11ac 40MHz link mode	7.8
IEEE 802.11ac 80MHz link mode	7.8