FCC Test Report

Product Name	Gigabit Multi-Service Broadband Router
Model No	MX-1200
FCC ID	QI3BIL-MX1200

Applicant	Billion Electric Co., Ltd.
Address	8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)

Date of Receipt	Mar. 23, 2018
Issued Date	Jun. 07, 2018
Report No.	1830364R-RFUSP58V00
Report Version	V1.0

Testing Laboratory
3023

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
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Applicant	Billion Electric Co., Ltd.
Address	8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)
Manufacturer	Billion Electric Co., Ltd.
Model No.	MX-1200
EUT Rated Voltage	AC 100-240V, 50/60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	BEC, Billion
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v02
Test Result	Complied

Documented By : Leven Huang

(Senior Adm. Specialist / Leven Huang)

Tested By : Anson Lu

(Engineer / Anson Lu)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Gigabit Multi-Service Broadband Router
Trade Name	BEC, Billion
FCC ID.	QI3BIL-MX1200
Model No.	MX-1200
Frequency Range	802.11a/n-20MHz: 5180-5240MHz, 5745-5825MHz 802.11n-40MHz: 5190-5230 MHz, 5755-5795MHz 802.11ac-80MHz: 5210 MHz, 5775MHz
Number of Channels	802.11a/n-20MHz: 9; 802.11n-40MHz: 4; 802.11ac-80MHz: 2
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 300Mbps 802.11ac-80MHz: up to 866.7MHz
Type of Modulation	802.11a/n/ac:OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna Type	Dipole Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter	MFR:BILLION, M/N: BA024-150160AXU Input: AC 100-240V, 50/60Hz, 0.7A Output: DC 15V, 1.6A Cable IN: Non-Shielded,1.8m

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	BILLION	AAZAND5S5510090A00	Dipole Antenna	5dBi For 5.15~5.25GHz 5dBi For 5.725~5.825GHz

Note: The antenna of EUT is conform to FCC 15.203

802.11a/n-20MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 36:	5180 MHz	Channel 40:	5200 MHz	Channel 44:	5220 MHz	Channel 48:	5240 MHz
Channel 149:	5745 MHz	Channel 153:	5765 MHz	Channel 157:	5785 MHz	Channel 161:	5805 MHz
Channel 165:	5825 MHz						

802.11n-40MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 38:	5190 MHz	Channel 46:	5230 MHz	Channel 151:	5755 MHz	Channel 159:	5795 MHz

802.11ac-80MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 42:	5210 MHz	Channel 155:	5775 MHz				

Note:

1. This device is a Gigabit Multi-Service Broadband Router with a built-in 802.11a/b/g/n/ac WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report. (802.11a is chain A)
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps、802.11n-20BW is 14.4Mbps、802.11n-40BW is 30Mbps and 802.11ac(80M-BW) is 65 Mbps)
5. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.
6. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit (802.11a-6Mbps)
	Mode 2: Transmit (802.11n-20BW 14.4Mbps)
	Mode 3: Transmit (802.11n-40BW 30Mbps)
	Mode 4: Transmit (802.11ac-80BW 65Mbps)

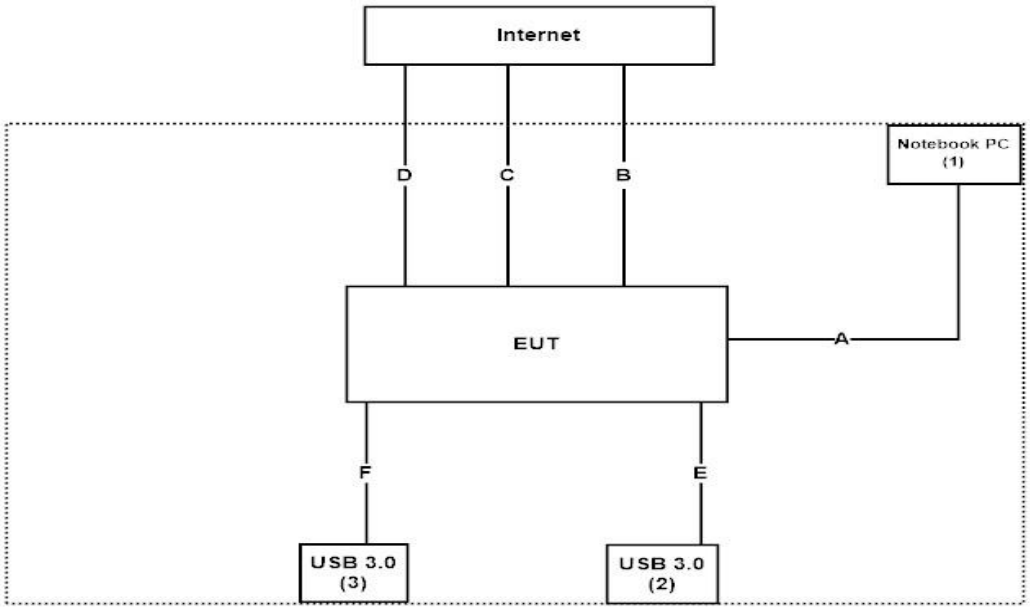
1.3. Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
(1)	Notebook PC	DELL	Latitude E5440	FS9TK32	Non-Shielded, 0.8m
(2)	USB 3.0(1T)	Transcend	TS1TSJ25M3	C13890-3746	N/A
(3)	USB 3.0(1T)	Transcend	TS1TSJ25M3	C13890-3746	N/A

Signal Cable Type		Signal cable Description
A	Nerwork Cable	Non-Shielded, 1.6m
B	Nerwork Cable	Non-Shielded, 1.8m
C	Nerwork Cable	Non-Shielded, 1.8m
D	Nerwork Cable	Non-Shielded, 1.8m
E	USB Cable	Non-Shielded, 0.5m
F	USB Cable	Non-Shielded, 0.5m

1.4. Configuration of tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown on 1.4

(2) Execute “MT7662 V1.03.14 ” program on the Notebook PC.

(3) Configure the test mode, the test channel, and the data rate.

(4) Start the continuous transmission.

(5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd
Site Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2018/2/12	2019/2/11
X	Spectrum Analyzer	Agilent	N9010A	MY48030495	2017/10/13	2018/10/12
X	Power Meter	Anritsu	ML2495A	6K00003357	2017/8/7	2018/8/6
X	Pulse power sensor	Anritsu	MA2411B	0846193	2017/8/7	2018/8/6
X	EMI Test Receiver	R&S	ESCS 30	100369	2017/11/7	2018/11/6
X	LISN	R&S	ESH3-Z5	836679/017	2018/2/9	2019/2/8
X	LISN	R&S	ENV216	100097	2018/2/9	2019/2/8
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2017/6/22	2018/6/21

For Radiated measurements /Site3/CB8

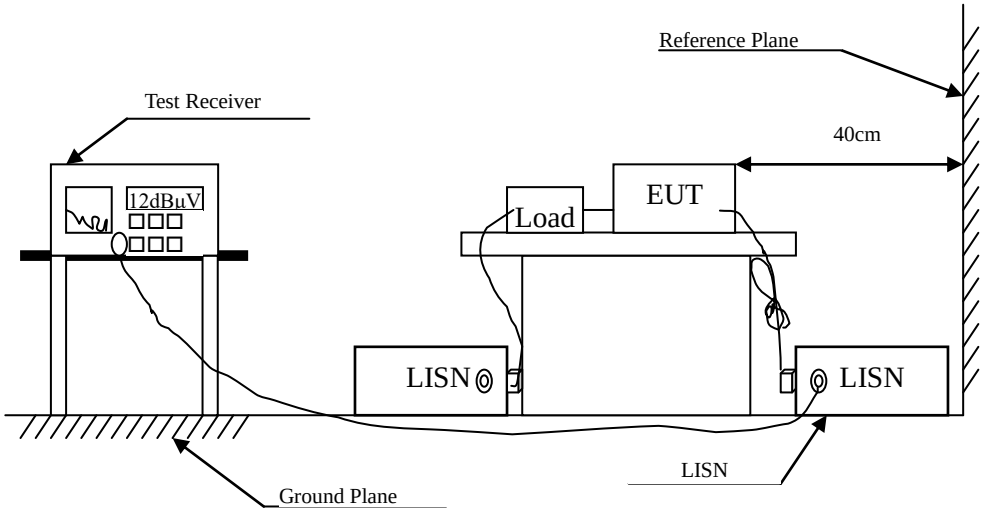
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2018/3/12	2019/3/11
X	Loop Antenna	Teseq	HLA6121	37133	2017/10/13	2018/10/12
X	Bilog Antenna	Schaffner Chase	CBL6112B	2707	2017/06/25	2018/06/24
X	Coaxial Cable	DEKRA	RG 214	LC003-RG	2017/06/15	2018/06/14
X	Pre-Amplifier	Jet-Power	JPA-10M1G33	170101000330 010	2017/07/19	2018/07/18
X	Horn Antenna	ETS-Lindgren	3117	00135205	2018/04/28	2019/04/27
X	Pre-Amplifier	EMCI	EMC012630SE	980210	2018/02/24	2019/02/23
X	Coaxial Cable	QuieTek	SF-106	LC035/37/41-SF	2017/6/21	2018/6/20
X	Horn Antenna	ETS-Lindgren	3117	00135205	2018/04/28	2019/04/27
X	Pre-Amplifier	EMCI	EMC012630SE	980210	2018/02/24	2019/02/23
X	Amplifier + Cable	EMCI	EMC184045SE	980370	2018/03/21	2019/03/20
X	Horn Antenna	Com-Power	AH-840	101043	2018/01/09	2019/01/08
X	Filter	MicroTRON	BRM50701	019	2017/11/21	2018/11/20
X	Filter	Microwave Circuits	N0257881	36681	2018/1/22	2019/1/21

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version :QuieTek EMI 2.0 V2.1.113.

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.3. 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 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

2.4. Uncertainty

± 2.26 dB

2.5. Test Result of Conducted Emission

Product : Gigabit Multi-Service Broadband Router
Test Item : Conducted Emission Test
Power Line : Line 1
Test Date : 2018/05/30
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) (5210MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.150	9.682	41.160	50.842	-15.158	66.000
0.166	9.678	37.260	46.938	-18.605	65.543
0.295	9.678	34.240	43.918	-17.939	61.857
0.326	9.680	34.760	44.440	-16.531	60.971
1.306	9.753	21.760	31.513	-24.487	56.000
1.787	9.783	20.100	29.883	-26.117	56.000
Average					
0.150	9.682	24.450	34.132	-21.868	56.000
0.166	9.678	21.900	31.578	-23.965	55.543
0.295	9.678	25.490	35.168	-16.689	51.857
0.326	9.680	26.360	36.040	-14.931	50.971
1.306	9.753	12.330	22.083	-23.917	46.000
1.787	9.783	8.890	18.673	-27.327	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Gigabit Multi-Service Broadband Router
Test Item : Conducted Emission Test
Power Line : Line 2
Test Date : 2018/05/30
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) (5210MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 2					
Quasi-Peak					
0.158	9.669	38.060	47.730	-18.041	65.771
0.166	9.670	37.700	47.370	-18.173	65.543
0.306	9.670	35.640	45.310	-16.233	61.543
0.322	9.670	35.960	45.630	-15.456	61.086
0.494	9.681	19.800	29.481	-26.690	56.171
0.798	9.710	21.220	30.930	-25.070	56.000
Average					
0.158	9.669	22.770	32.440	-23.331	55.771
0.166	9.670	22.120	31.790	-23.753	55.543
0.306	9.670	24.950	34.620	-16.923	51.543
0.322	9.670	26.560	36.230	-14.856	51.086
0.494	9.681	9.630	19.311	-26.860	46.171
0.798	9.710	10.930	20.640	-25.360	46.000

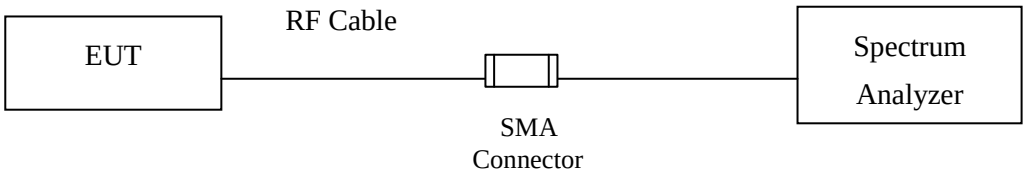
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

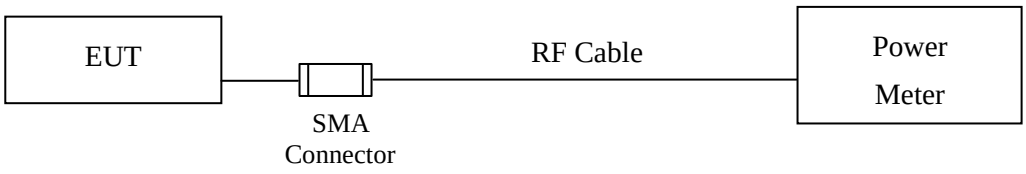
3. Maximun conducted output power

3.1. Test Setup

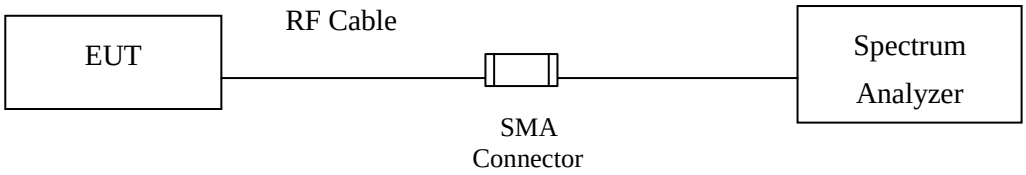
99% Occupied Bandwidth



Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac)



3.2. Limits

3.2.1. For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna

gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.3. For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.3. Test Procedure

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater the 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT

was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW≦40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)
Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D03 section D) procedure is used for measurements.

3.4. Uncertainty

± 1.62 dB

3.5. Test Result of Maximum conducted output power

Product : Gigabit Multi-Service Broadband Router
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 1: Transmit (802.11a-6Mbps)

CHAIN A

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		6	9	12	18	24	36	48	54	
		Measurement Level (dBm)								
36	5180	22.56	--	--	--	--	--	--	--	<30dBm
44	5220	22.52	22.46	22.38	22.32	22.27	22.21	22.15	22.08	<30dBm
48	5240	22.52	--	--	--	--	--	--	--	<30dBm
149	5745	22.58	--	--	--	--	--	--	--	<30dBm
157	5785	22.75	22.68	22.61	22.56	22.49	22.41	22.35	22.28	<30dBm
165	5825	22.62	--	--	--	--	--	--	--	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		6	9	12	18	24	36	48	54	
		Measurement Level (dBm)								
36	5180	22.25	--	--	--	--	--	--	--	<30dBm
44	5220	22.21	22.13	22.05	21.98	21.92	21.85	21.78	21.72	<30dBm
48	5240	22.19	--	--	--	--	--	--	--	<30dBm
149	5745	22.28	--	--	--	--	--	--	--	<30dBm
157	5785	22.41	22.35	22.28	22.22	22.15	22.08	22.02	21.96	<30dBm
165	5825	22.33	--	--	--	--	--	--	--	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:
CHAIN A

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	--	22.56	30	--
44	5220	--	22.52	30	--
48	5240	--	22.52	30	--
149	5745	--	22.58	30	--
157	5785	--	22.75	30	--
165	5825	--	22.62	30	--

Note:
1. Power Output Value =Reading value on average power meter + cable loss
2. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

Product : Gigabit Multi-Service Broadband Router
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps)

CHAIN A

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
		Measurement Level (dBm)								
36	5180	18.26	--	--	--	--	--	--	--	<30dBm
44	5220	18.59	18.52	18.46	18.38	18.31	18.25	18.18	18.12	<30dBm
48	5240	18.56	--	--	--	--	--	--	--	<30dBm
149	5745	17.73	--	--	--	--	--	--	--	<30dBm
157	5785	17.67	17.61	17.55	17.47	17.41	17.33	17.26	17.21	<30dBm
165	5825	17.41	--	--	--	--	--	--	--	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
		Measurement Level (dBm)								
36	5180	18.91	--	--	--	--	--	--	--	<30dBm
44	5220	18.76	18.71	18.63	18.55	18.49	18.42	18.35	18.28	<30dBm
48	5240	18.63	--	--	--	--	--	--	--	<30dBm
149	5745	19.49	--	--	--	--	--	--	--	<30dBm
157	5785	19.26	19.18	19.12	19.05	18.98	18.91	18.85	18.78	<30dBm
165	5825	19.61	--	--	--	--	--	--	--	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

(CHAIN A+ B)

Channel Number	Frequency (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Output Power (dBm)	Output Power Limit	
						(dBm)	dBm+10log(BW)
36	5180	--	18.26	18.91	21.61	30	--
44	5220	--	18.59	18.76	21.69	30	--
48	5240	--	18.56	18.63	21.61	30	--
149	5745	--	17.73	19.49	21.71	30	--
157	5785	--	17.67	19.26	21.55	30	--
165	5825	--	17.41	19.61	21.66	30	--

Note:

1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

Product : Gigabit Multi-Service Broadband Router
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps)

CHAIN A

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		30	60	90	120	180	240	270	300	
		Measurement Level (dBm)								
38	5190	18.36	--	--	--	--	--	--	--	<30dBm
46	5230	18.71	18.65	18.58	18.51	18.45	18.38	18.32	18.25	<30dBm
151	5755	17.89	--	--	--	--	--	--	--	<30dBm
159	5795	17.85	17.78	17.71	17.65	17.58	17.52	17.45	17.39	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable loss=1dB		Maximum conducted output power								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		30	60	90	120	180	240	270	300	
		Measurement Level (dBm)								
38	5190	18.83	--	--	--	--	--	--	--	<30dBm
46	5230	18.37	18.31	18.25	18.17	18.11	18.05	17.98	17.92	<30dBm
151	5755	19.41	--	--	--	--	--	--	--	<30dBm
159	5795	19.46	19.38	19.31	19.25	19.17	19.11	19.05	18.97	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

(CHAIN A+ B)

Channel Number	Frequency (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Output Power (dBm)	Output Power Limit	
						(dBm)	dBm+10log(BW)
38	5190	--	18.36	18.83	21.61	30	--
46	5230	--	18.71	18.37	21.55	30	--
151	5755	--	17.89	19.41	21.73	30	--
159	5795	--	17.85	19.46	21.74	30	--

Note:

1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

Product : Gigabit Multi-Service Broadband Router
Test Item : Maximum conducted output power
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps)

Chain A

Cable loss=1dB		Maximum conducted output power										
Channel No	Frequency (MHz)	Data Rate (Mbps)										Required Limit
		VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	VTH9	
42	5210	19.52	19.45	19.37	19.31	19.23	19.16	19.08	19.02	18.95	18.88	<30dBm
155	5775	19.66	19.58	19.51	19.45	19.37	19.31	19.25	19.17	19.11	19.05	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Chain B

Cable loss=1dB		Maximum conducted output power										
Channel No	Frequency (MHz)	Data Rate (Mbps)										Required Limit
		VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	VTH9	
42	5210	19.87	19.81	19.75	19.67	19.61	19.53	19.45	19.39	19.32	19.25	<30dBm
155	5775	19.63	19.55	19.47	19.41	19.36	19.28	19.22	19.15	19.07	19.01	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

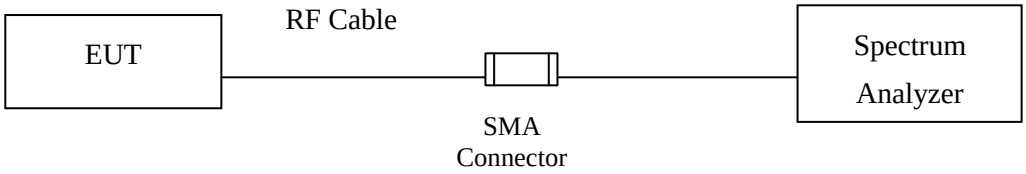
Maximum conducted output power Measurement

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Output Power (dBm)	Output Power Limit		Result
						(dBm)	dBm+10log(BW)	
42	5210	--	19.520	19.870	22.71	30	--	Pass
155	5775	--	19.660	19.630	22.66	30	--	Pass

Note: Power Output Value =Reading value on average power meter + cable loss

4. Peak Power Spectral Density

4.1. Test Setup



4.2. Limits

(1) For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.+

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any

500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

4.3. Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.

SA-1 method is selected to run the test.

For the band 5.725-5.85 GHz, Scale the observed power level to an equivalent value in 500 kHz by adjusting (increase) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log (500 kHz/100 kHz) = 6.98 dB.

4.4. Uncertainty

± 1.62 dB

4.5. Test Result of Peak Power Spectral Density

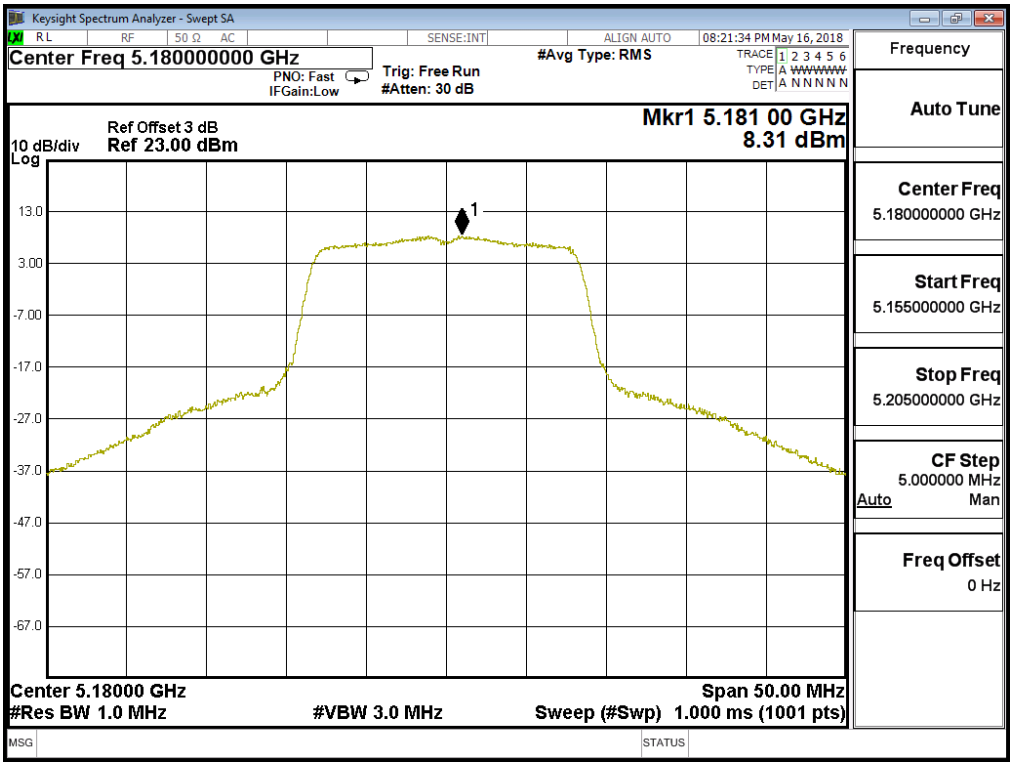
Product : Gigabit Multi-Service Broadband Router
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 1: Transmit (802.11a-6Mbps)

Channel Number	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit (dBm)	Result
36	5180	6	8.310	17	Pass
44	5220	6	8.730	17	Pass
48	5240	6	9.220	17	Pass

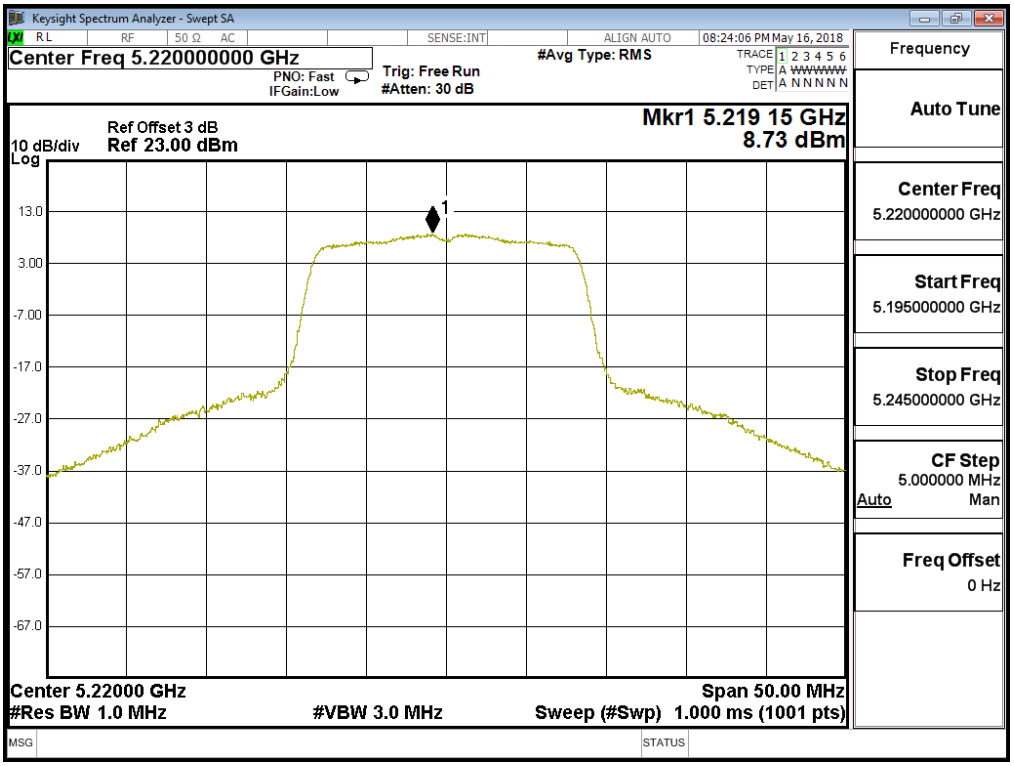
Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	6	2.060	6.980	12.050	<30	Pass
157	5785	6	2.700	6.980	12.690	<30	Pass
165	5825	6	1.990	6.980	11.980	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

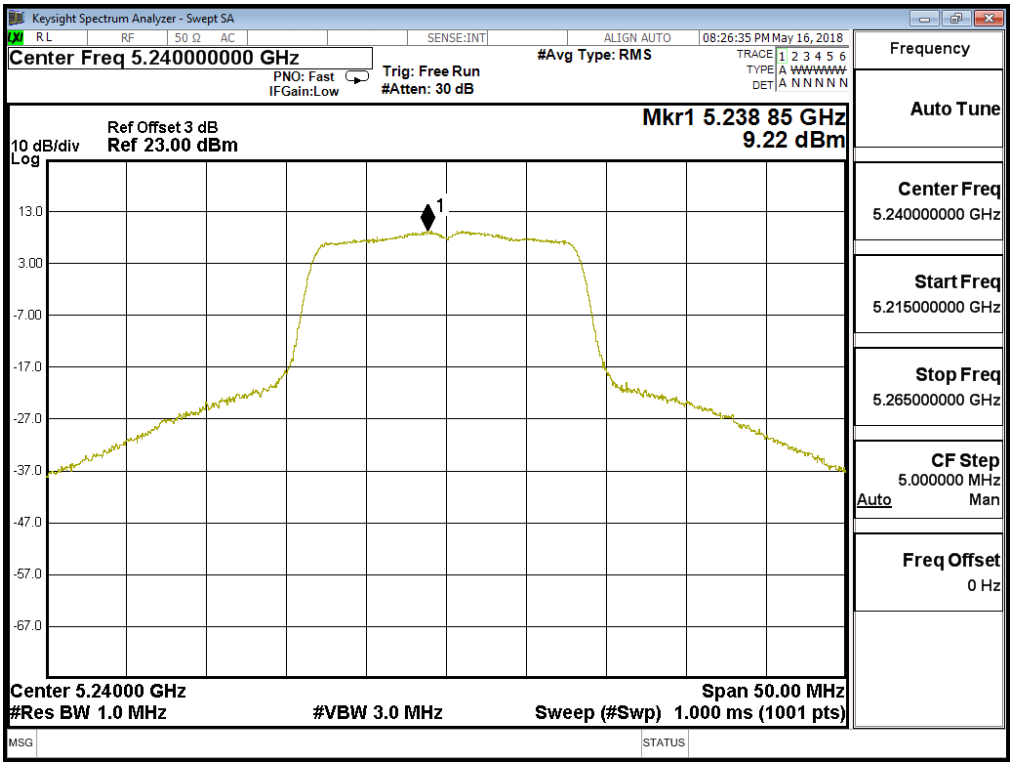
Channel 36:



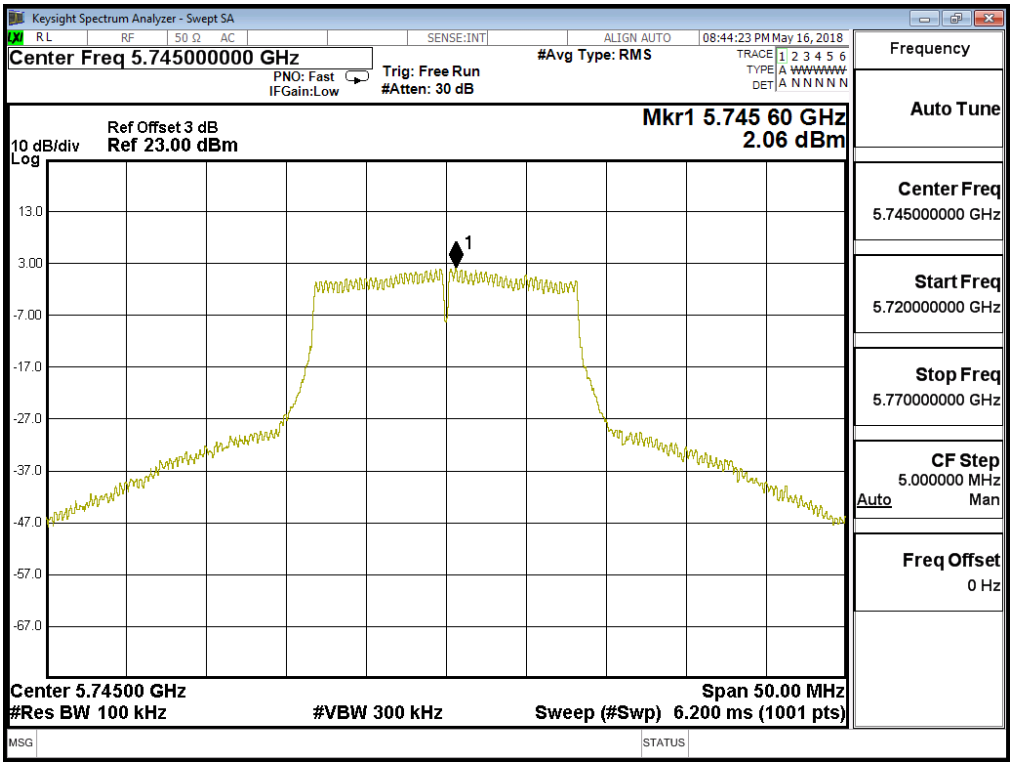
Channel 44:



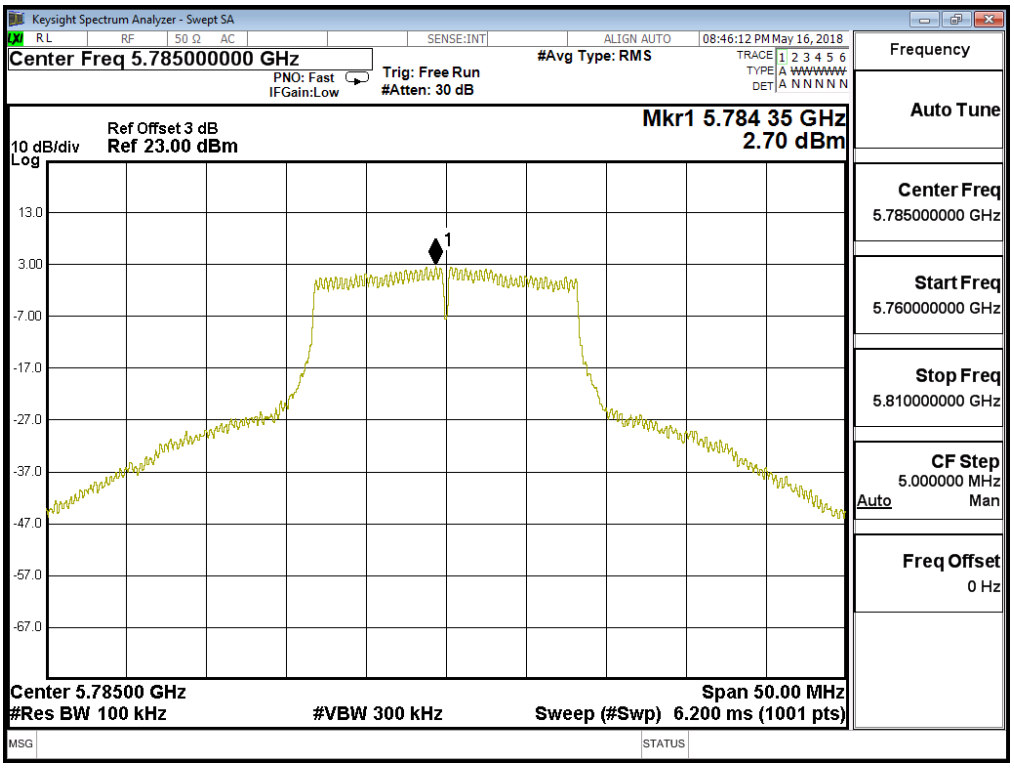
Channel 48:



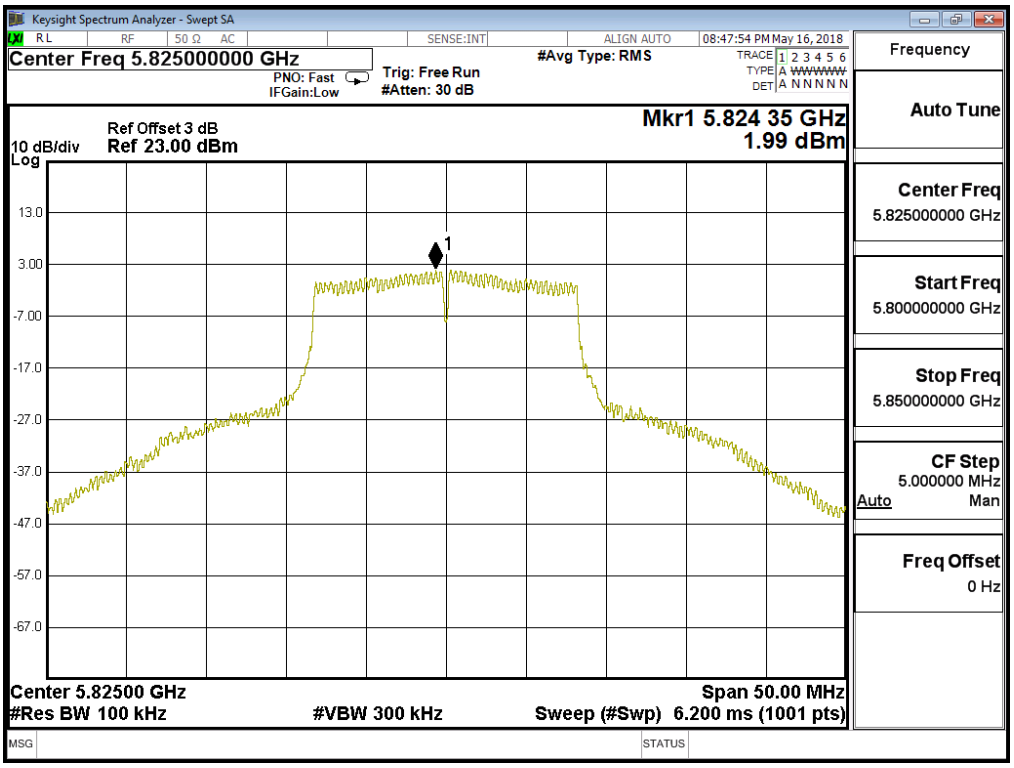
Channel 149



Channel 157



Channel 165



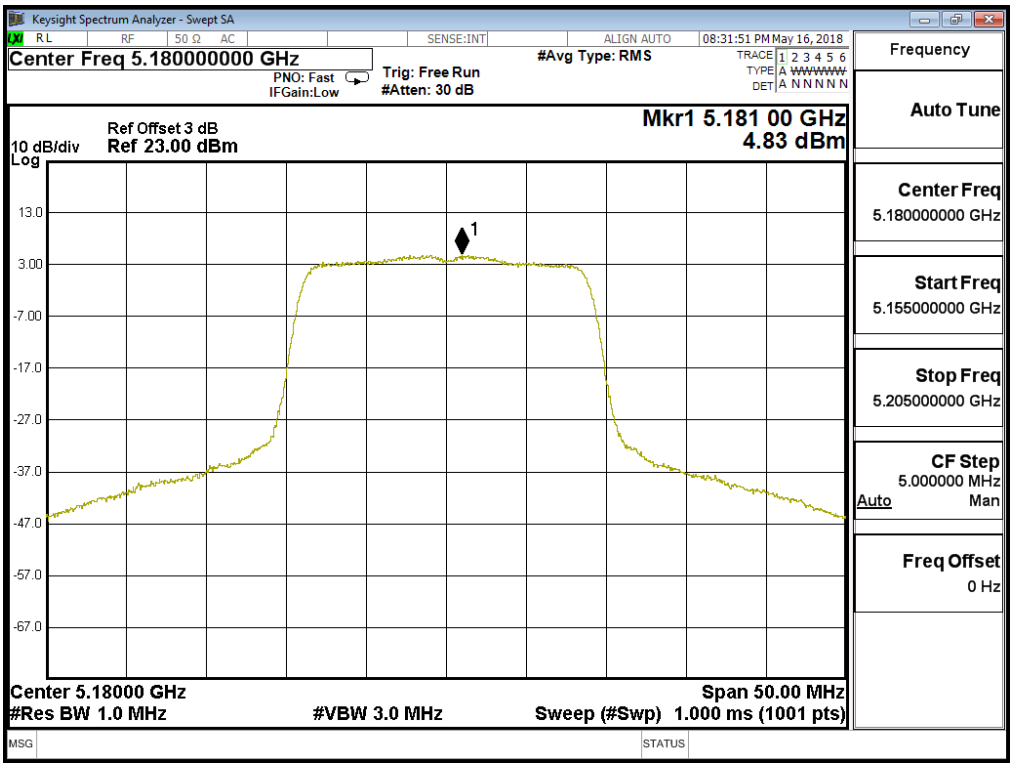
Product : Gigabit Multi-Service Broadband Router
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps)

Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	Total PPSD (dBm)[1]	Required Limit (dBm)	Result
36	5180	A	4.830	7.840	17	Pass
		B	6.360	9.370	17	Pass
44	5220	A	4.820	7.830	17	Pass
		B	6.570	9.580	17	Pass
48	5240	A	4.300	7.310	17	Pass
		B	6.110	9.120	17	Pass

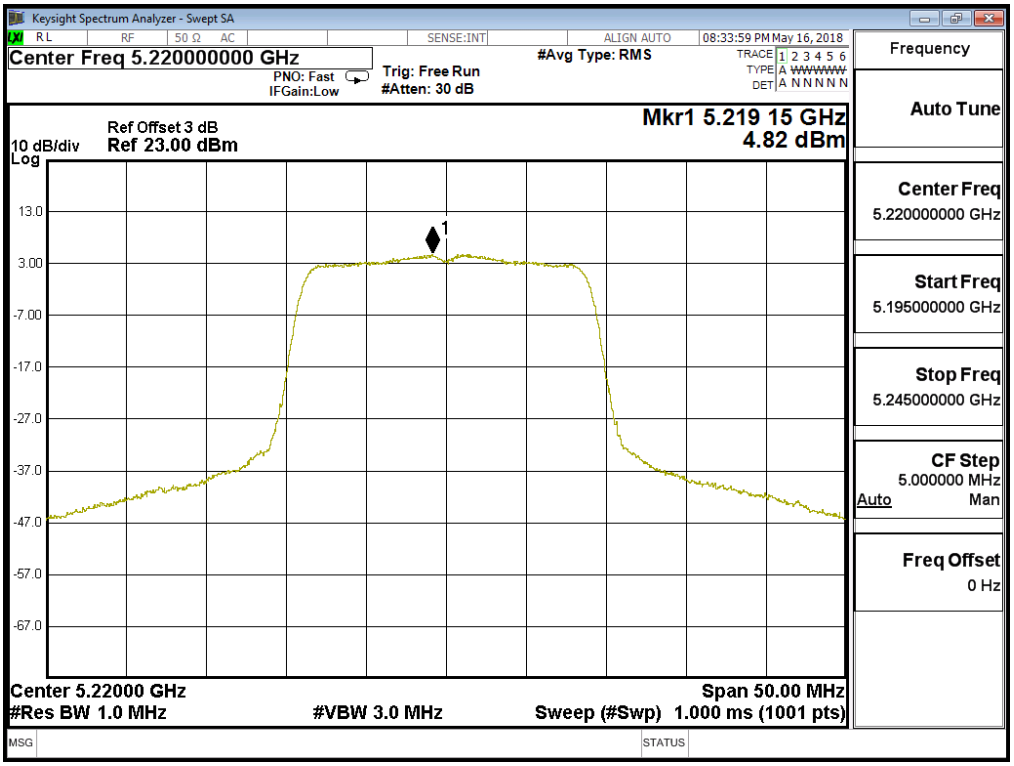
Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)[1]	Required Limit (dBm)	Result
149	5745	A	-3.280	6.980	5.710	<30	Pass
		B	-1.940	6.980	8.050	<30	Pass
157	5785	A	-2.180	6.980	7.810	<30	Pass
		B	-2.120	6.980	7.870	<30	Pass
165	5825	A	-3.090	6.980	6.900	<30	Pass
		B	-2.420	6.980	7.570	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

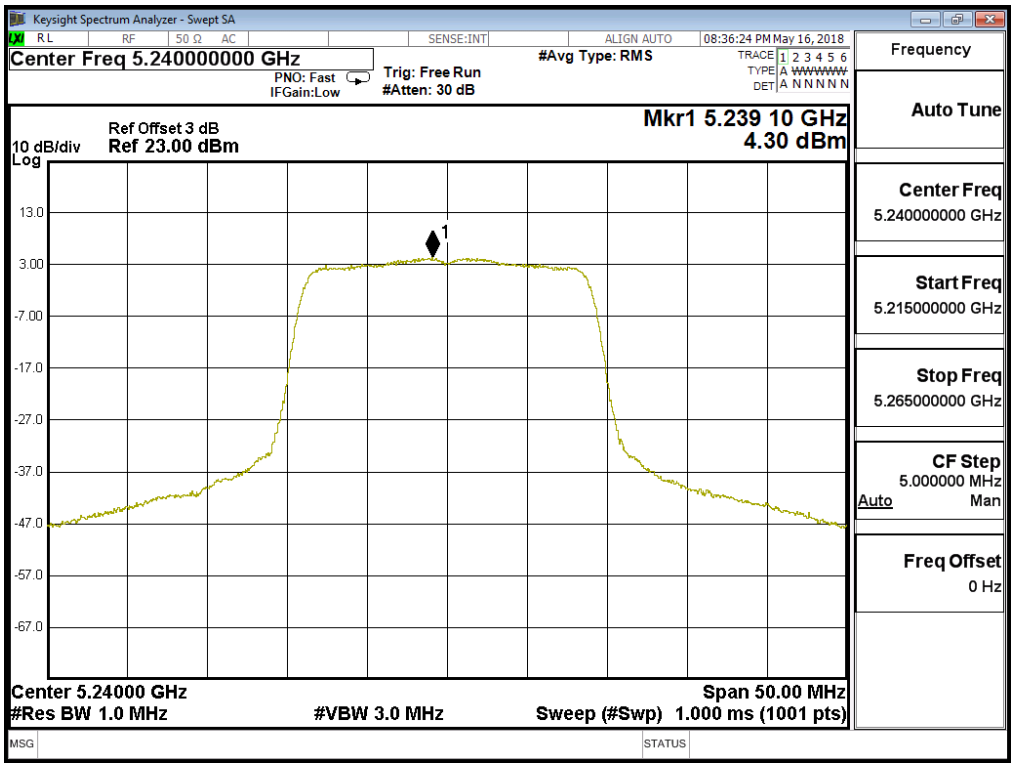
Channel 36 – Chain A



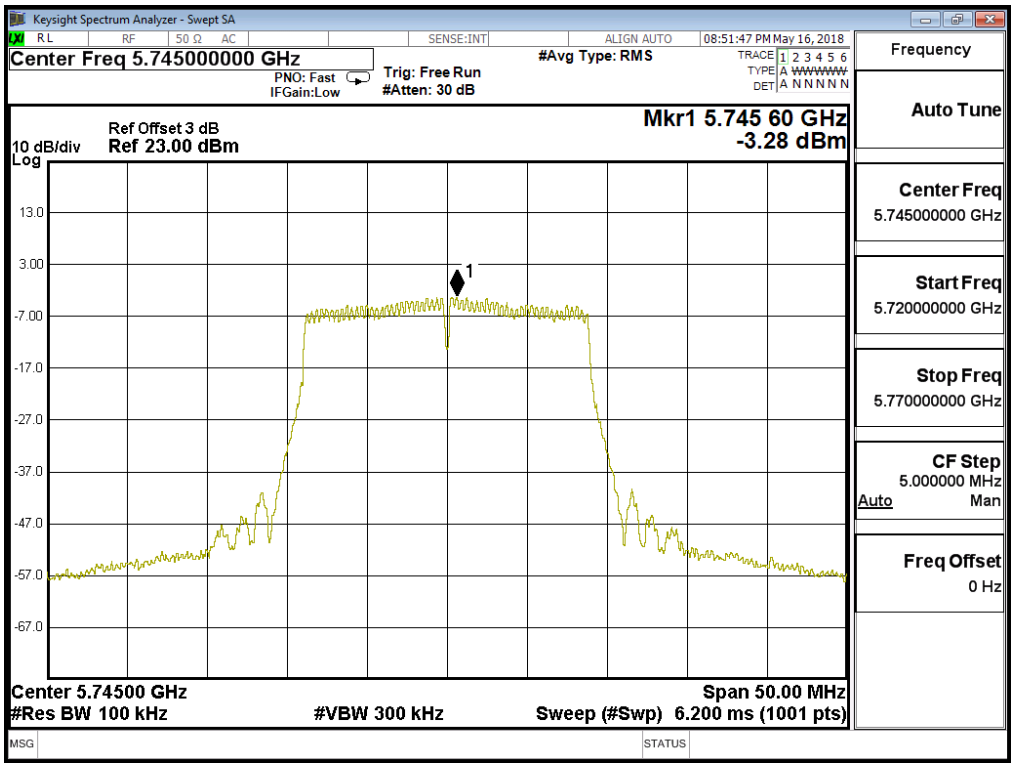
Channel 44 – Chain A



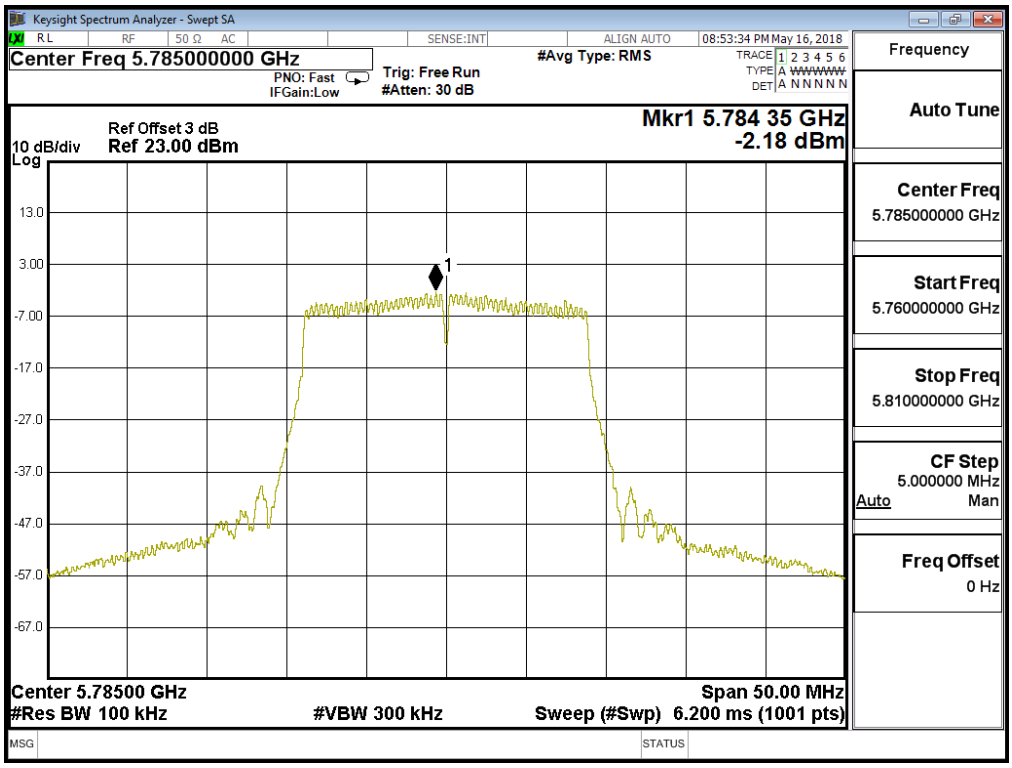
Channel 48 – Chain A



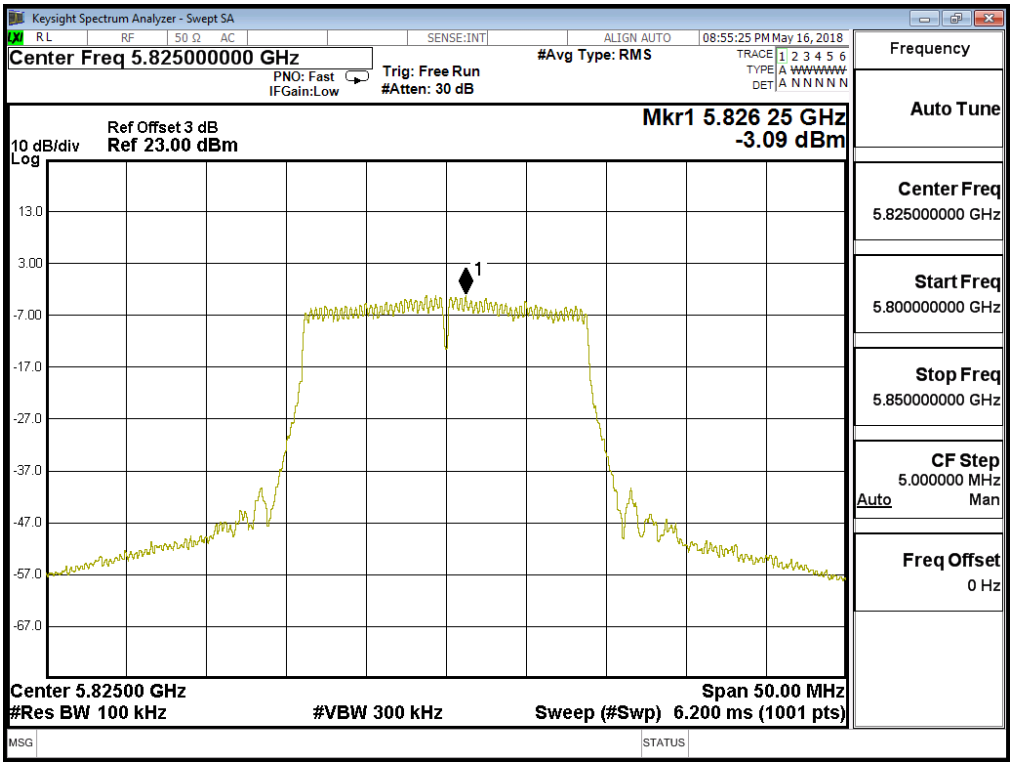
Channel 149 – Chain A



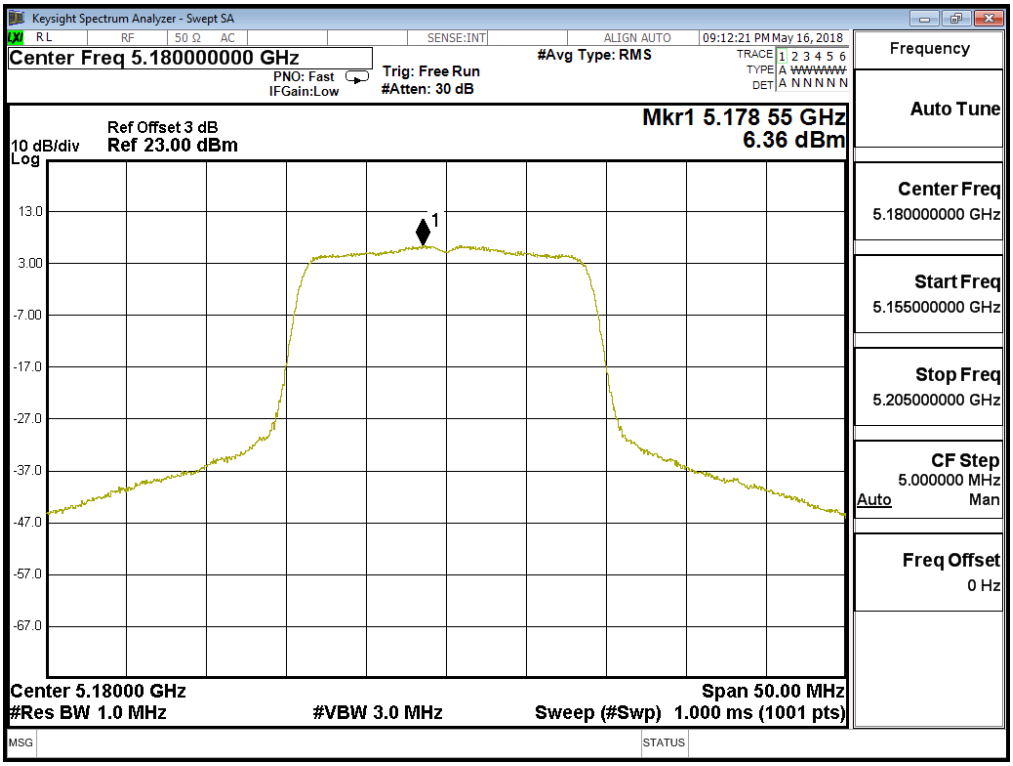
Channel 157 – Chain A



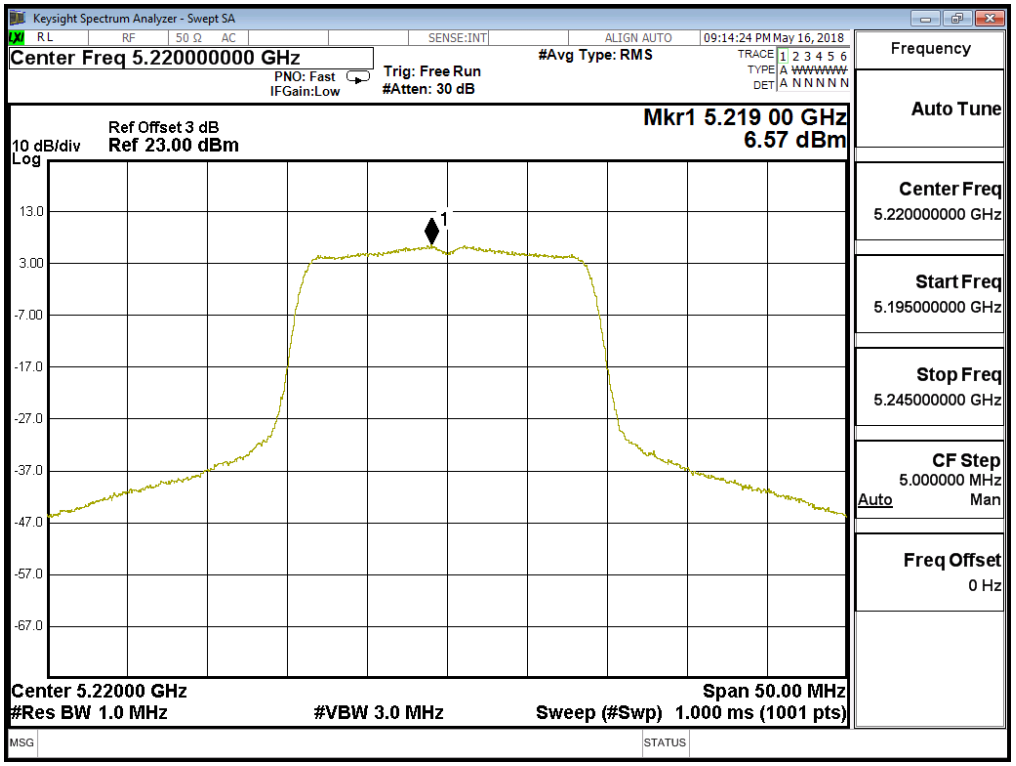
Channel 165 – Chain A



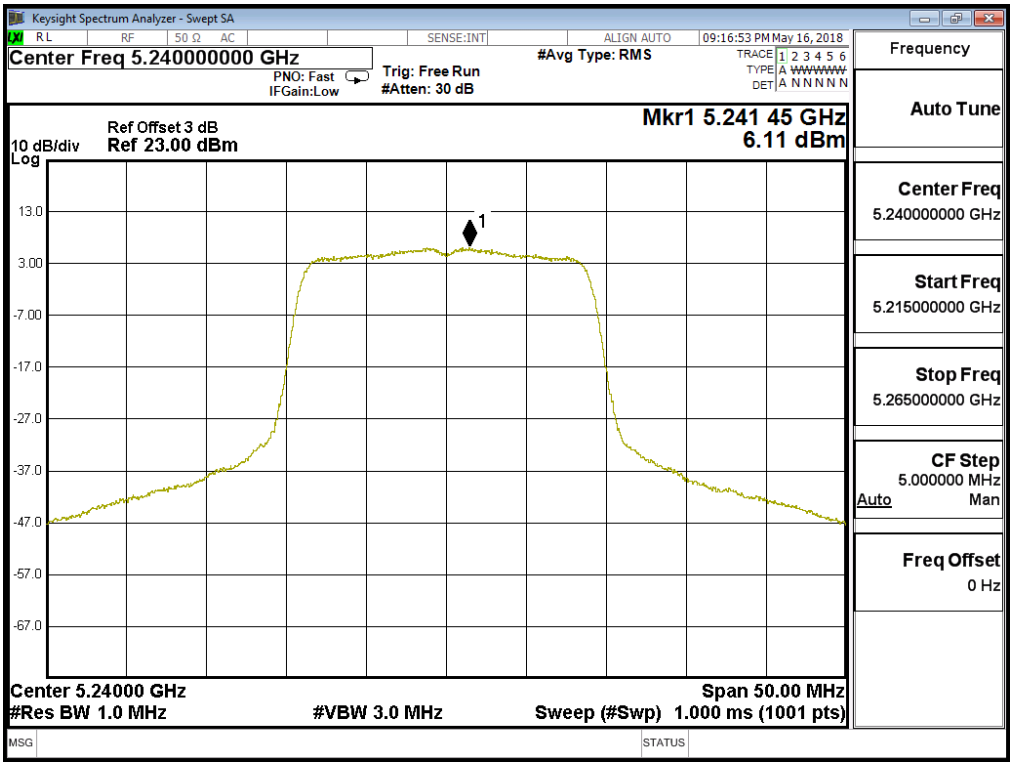
Channel 36 – Chain B



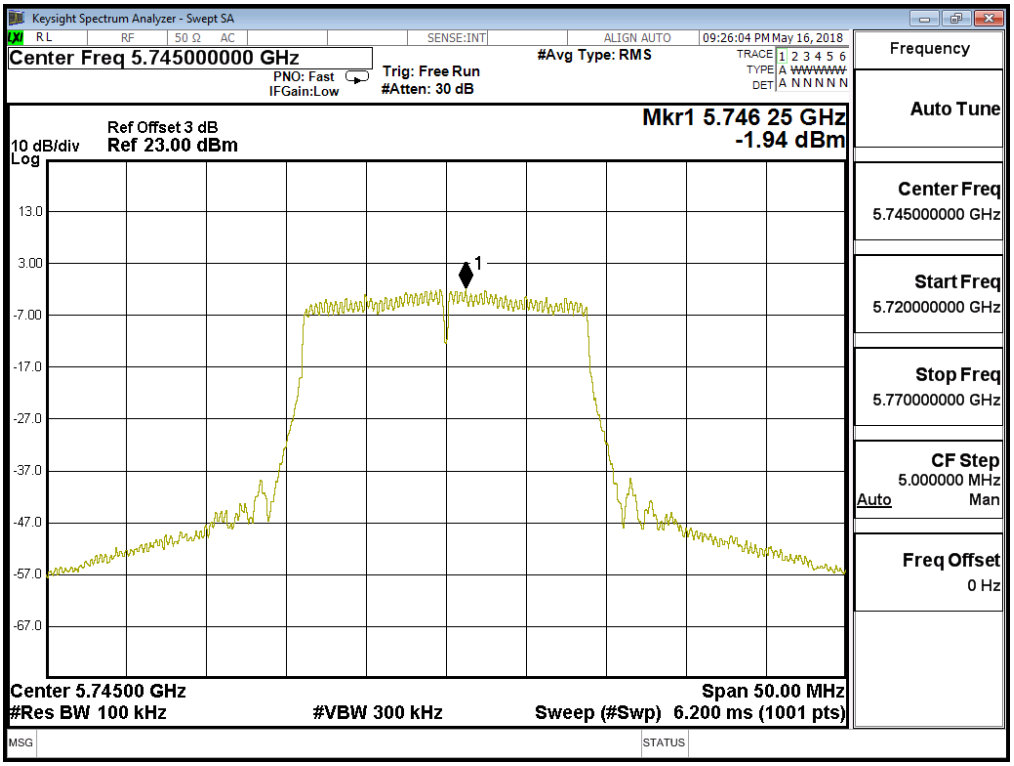
Channel 44 – Chain B



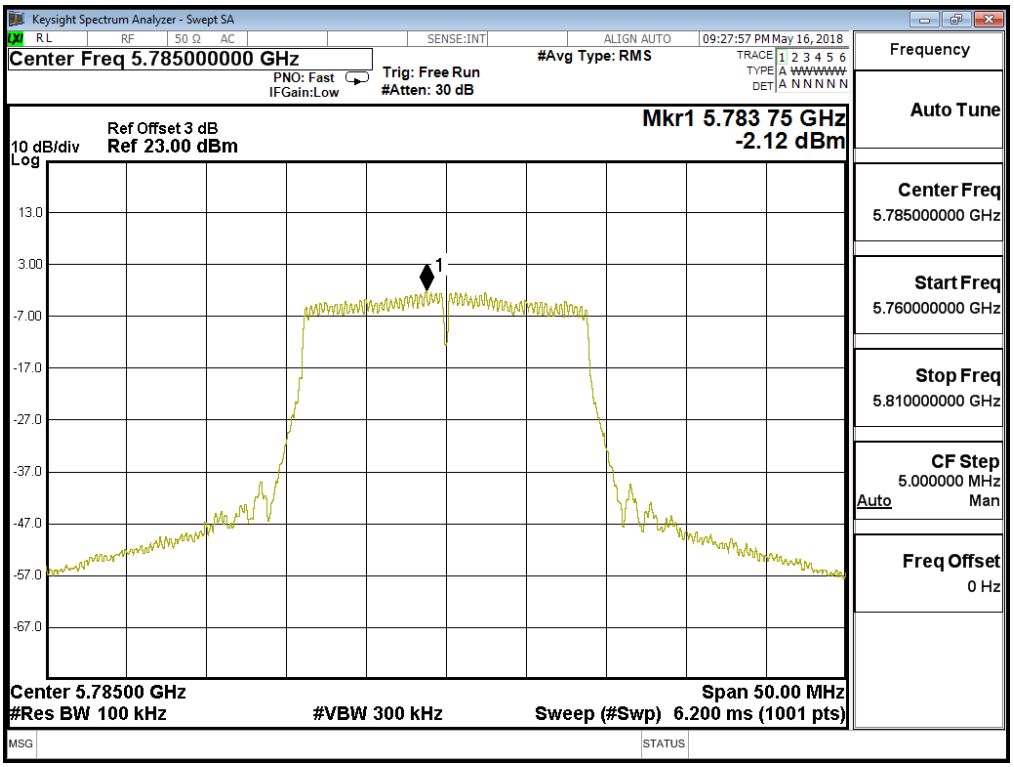
Channel 48 – Chain B



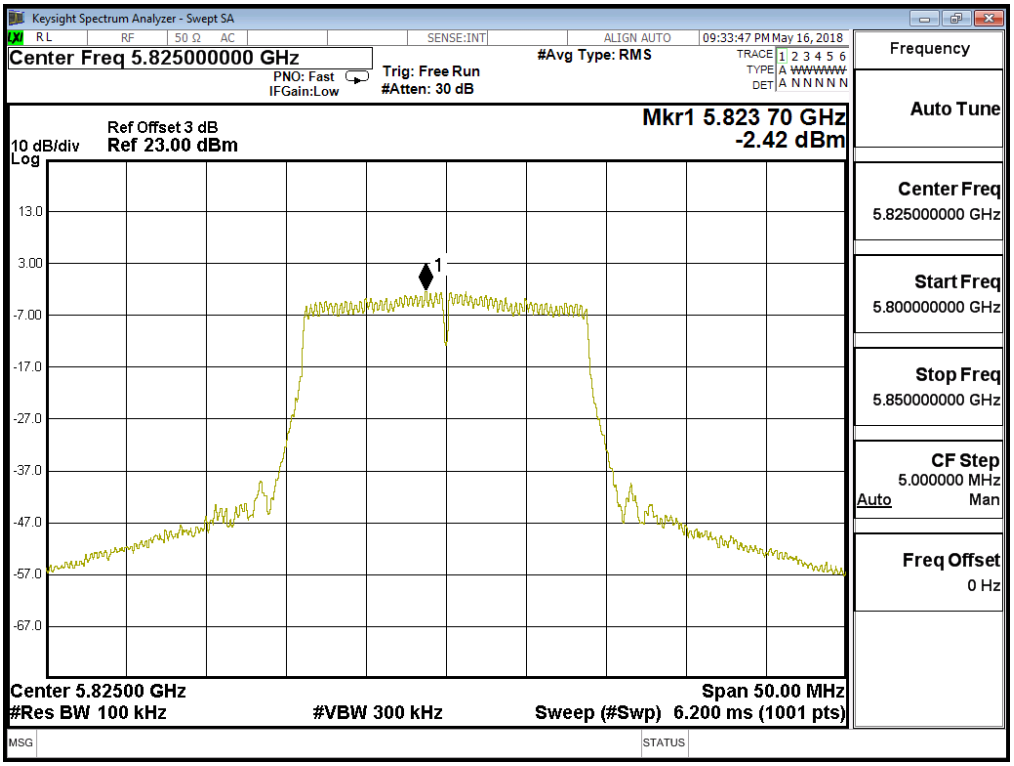
Channel 149 – Chain B



Channel 157 – Chain B



Channel 165 – Chain B



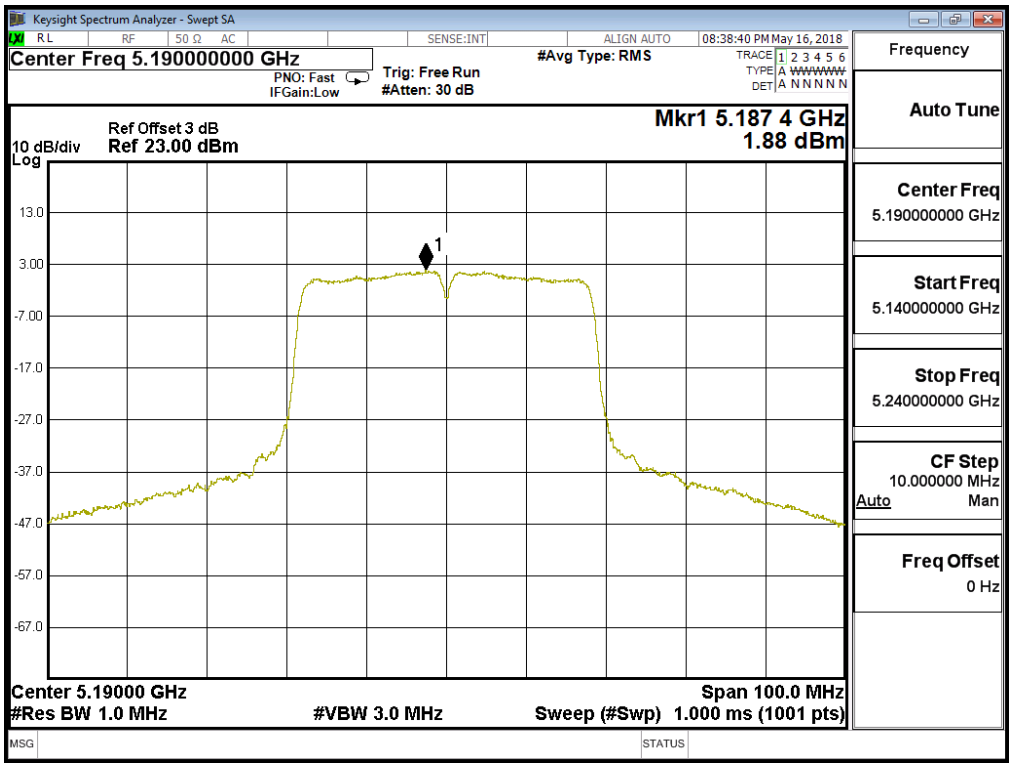
Product : Gigabit Multi-Service Broadband Router
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps)

Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	Total PPSD (dBm)1	Required Limit (dBm)	Result
38	5190	A	1.880	4.890	17	Pass
		B	3.100	6.110	17	Pass
46	5230	A	3.250	6.260	17	Pass
		B	3.340	6.350	17	Pass

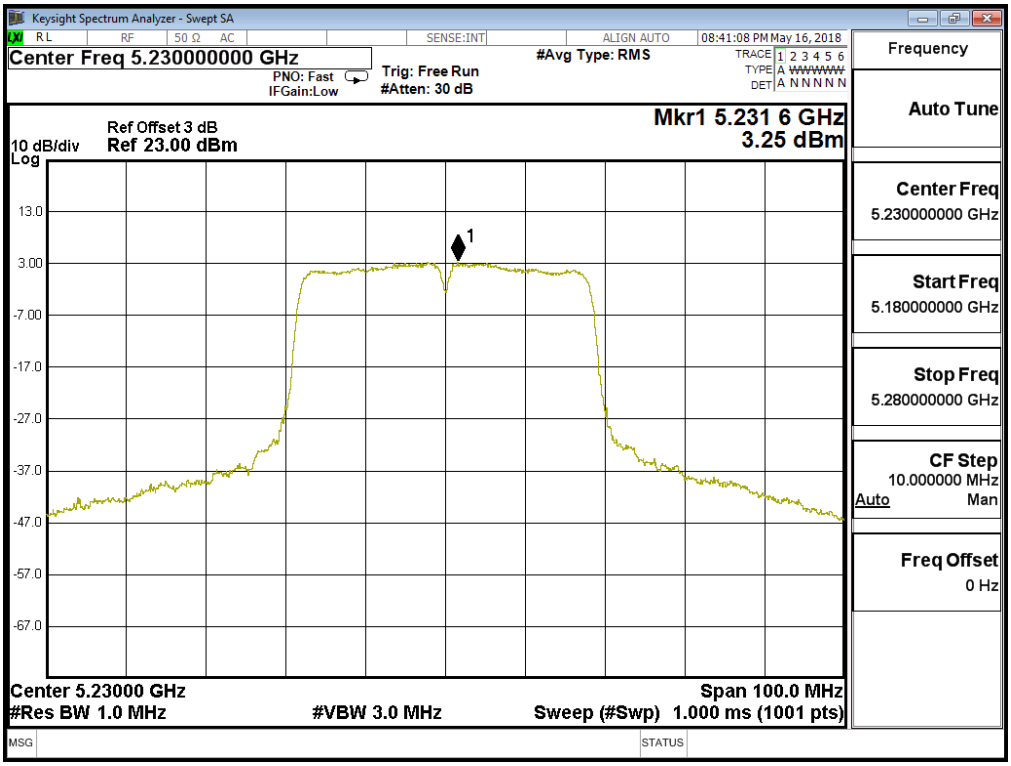
Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)[1]	Required Limit (dBm)	Result
151	5755	A	-6.060	6.980	3.930	<30	Pass
		B	-4.940	6.980	5.050	<30	Pass
159	5795	A	-5.780	6.980	4.210	<30	Pass
		B	-4.760	6.980	5.230	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

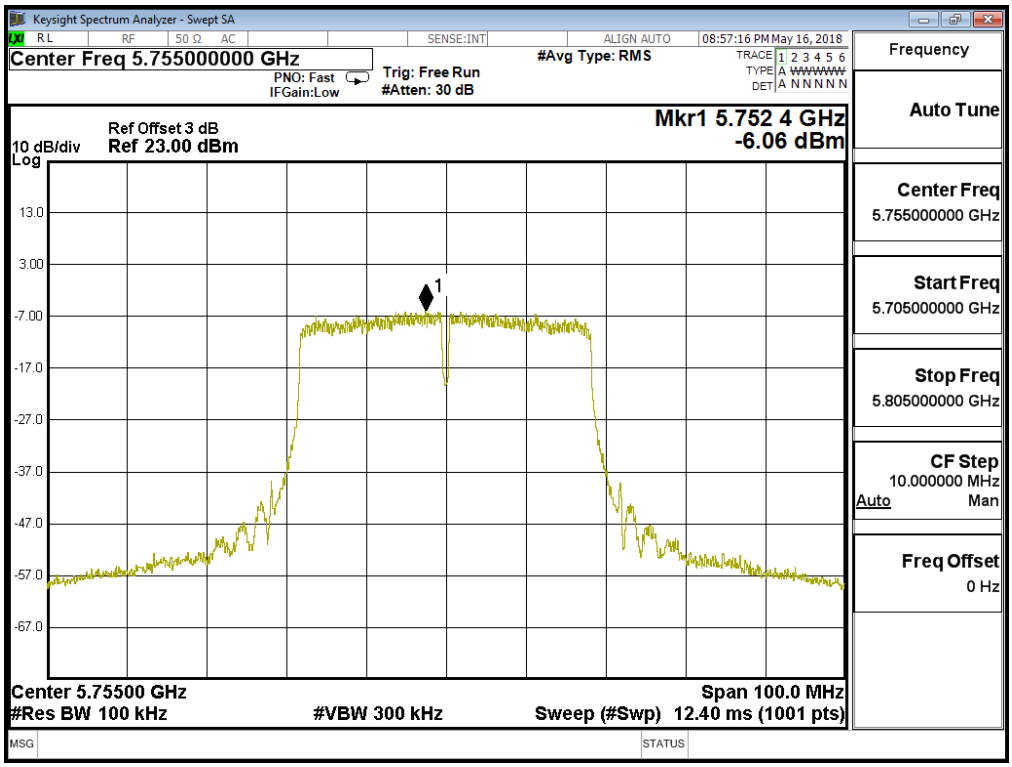
Channel 38 – Chain A



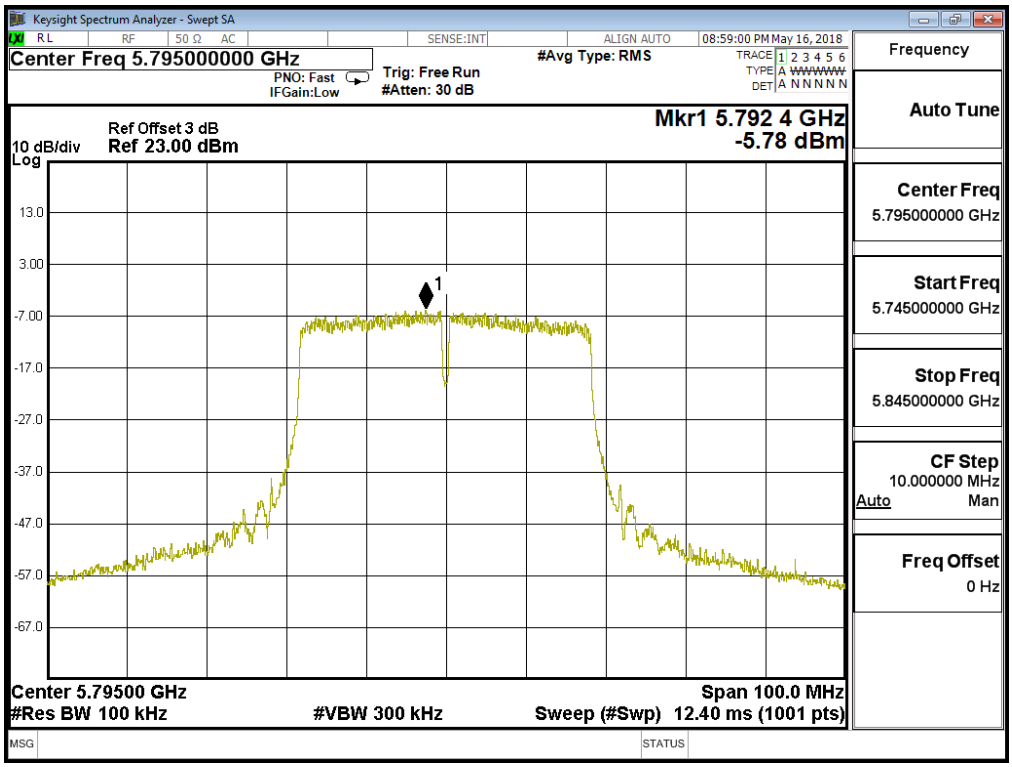
Channel 46 – Chain A



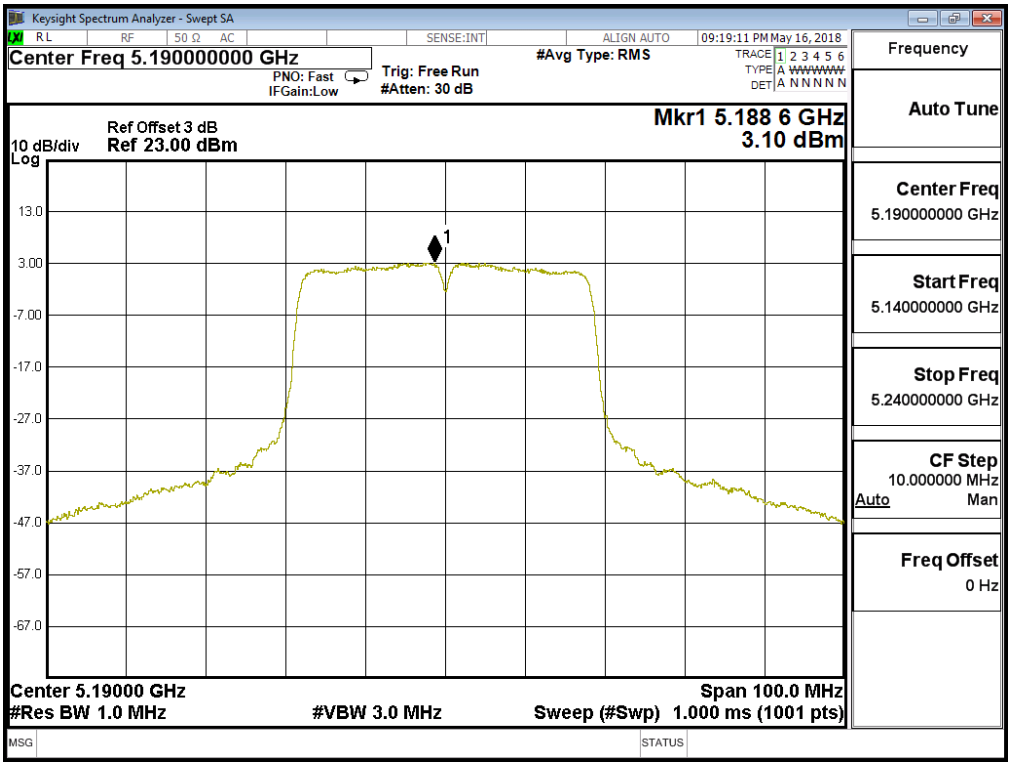
Channel 151 – Chain A



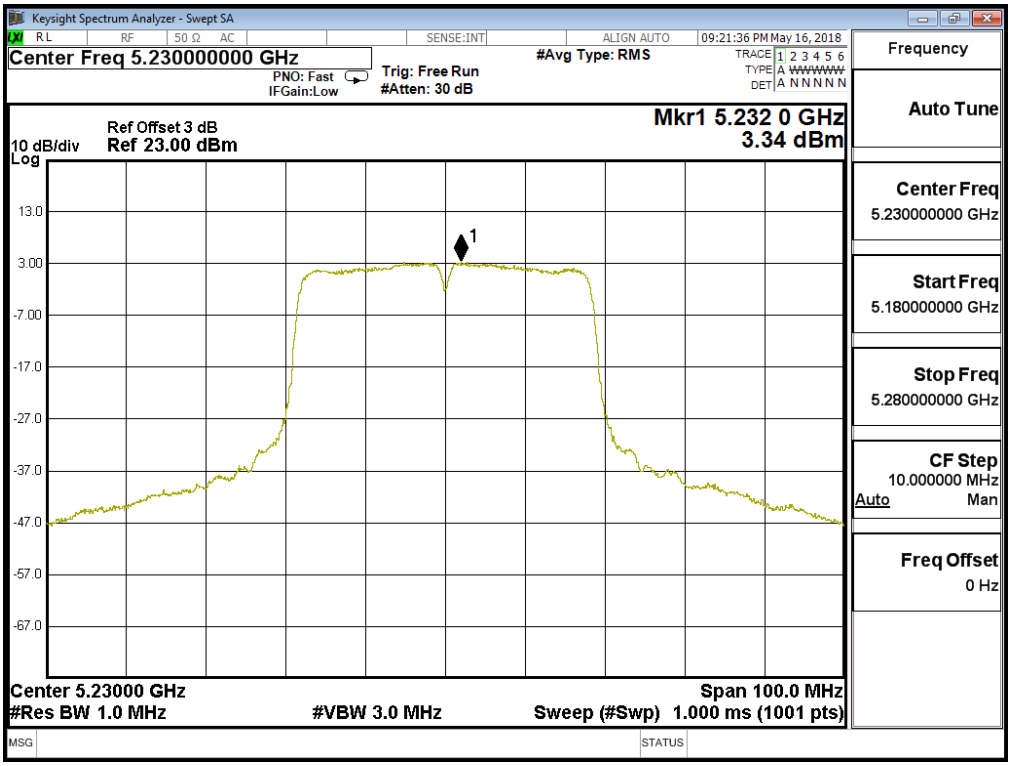
Channel 159 – Chain A



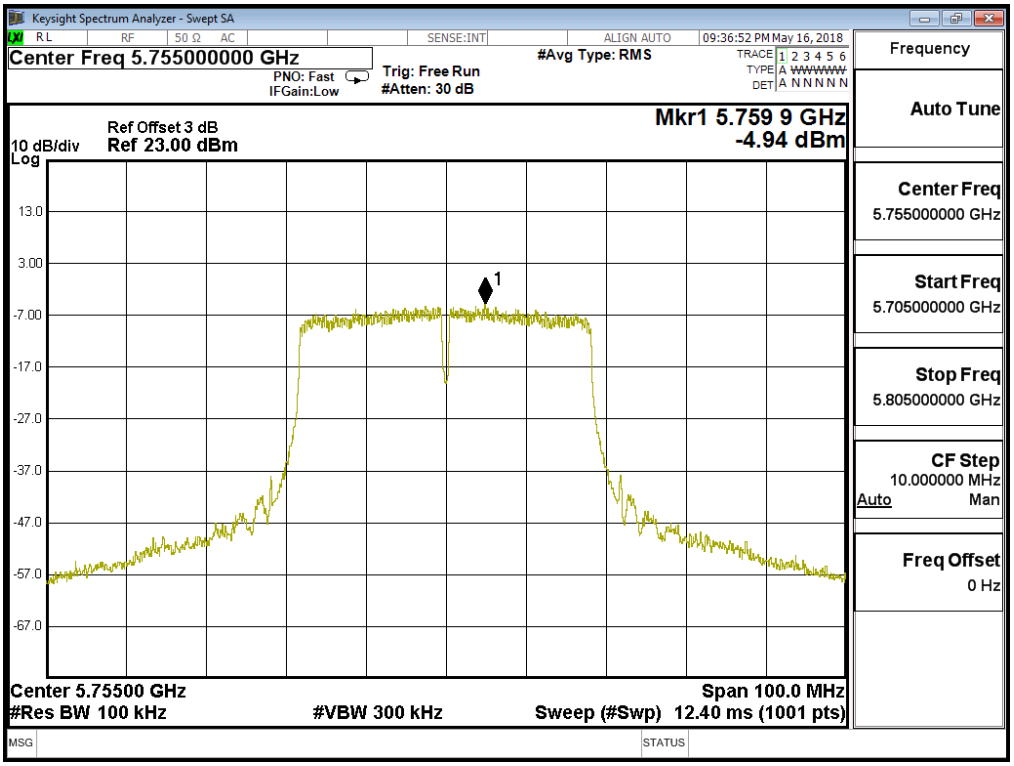
Channel 38 – Chain B



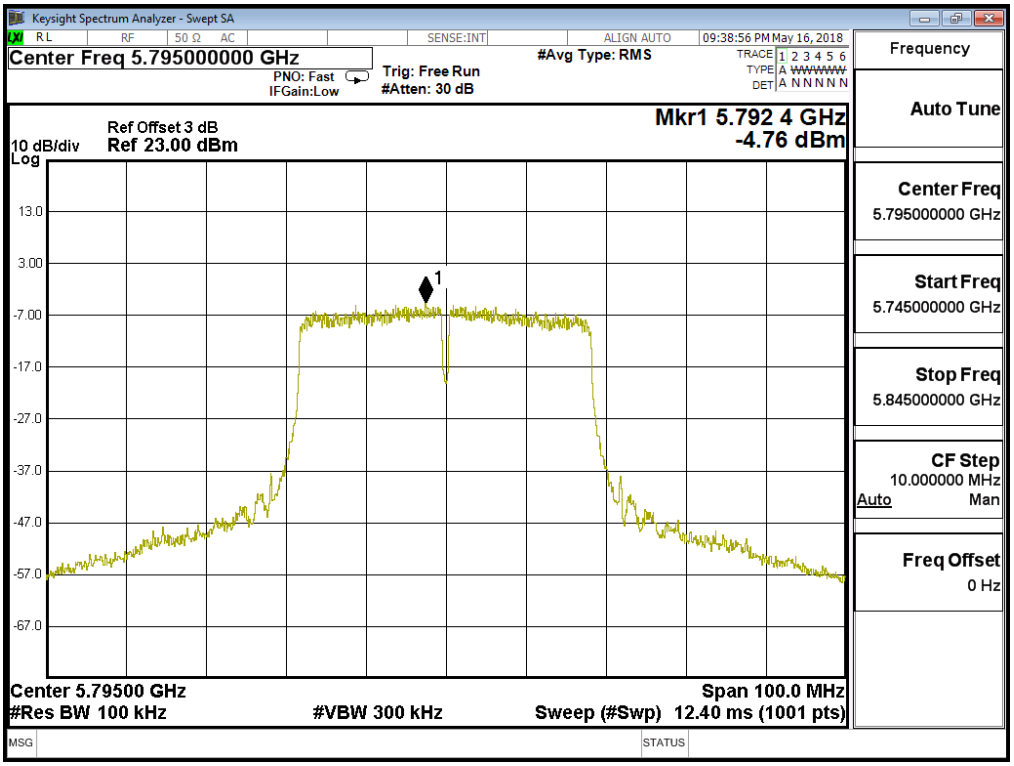
Channel 46 – Chain B



Channel 151 – Chain B



Channel 159 – Chain B



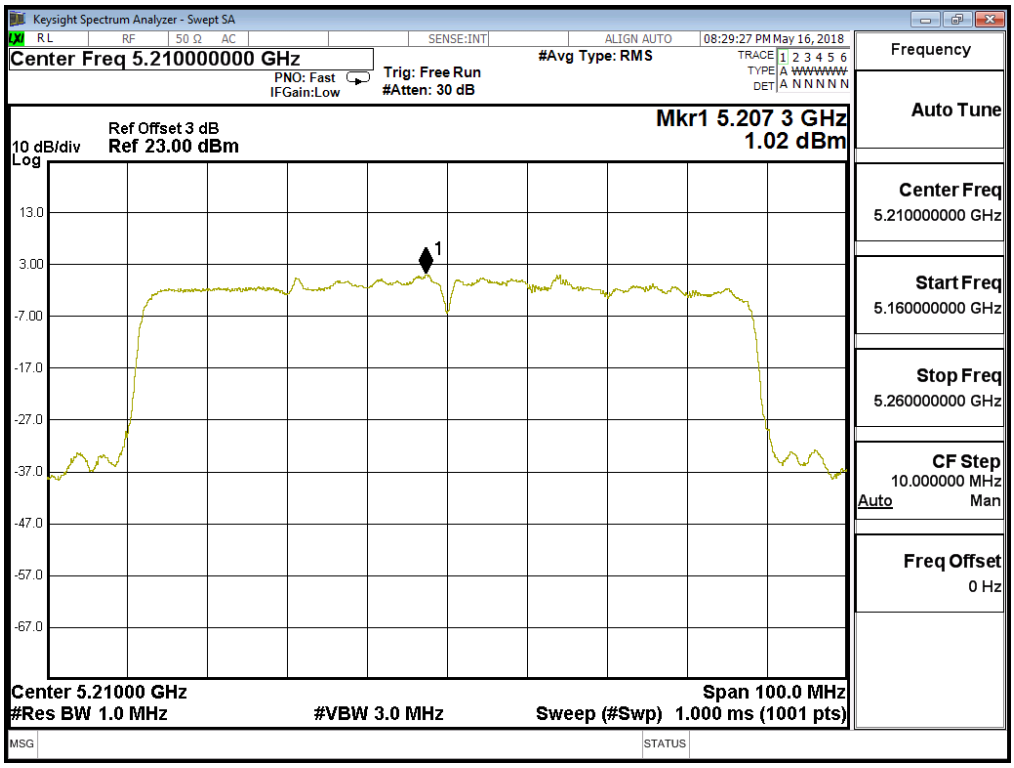
Product : Gigabit Multi-Service Broadband Router
Test Item : Peak Power Spectral Density
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps)

Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	Total PPSD (dBm)1	Required Limit (dBm)	Result
42	5210	A	1.020	4.030	17	Pass
		B	3.820	6.830	17	Pass

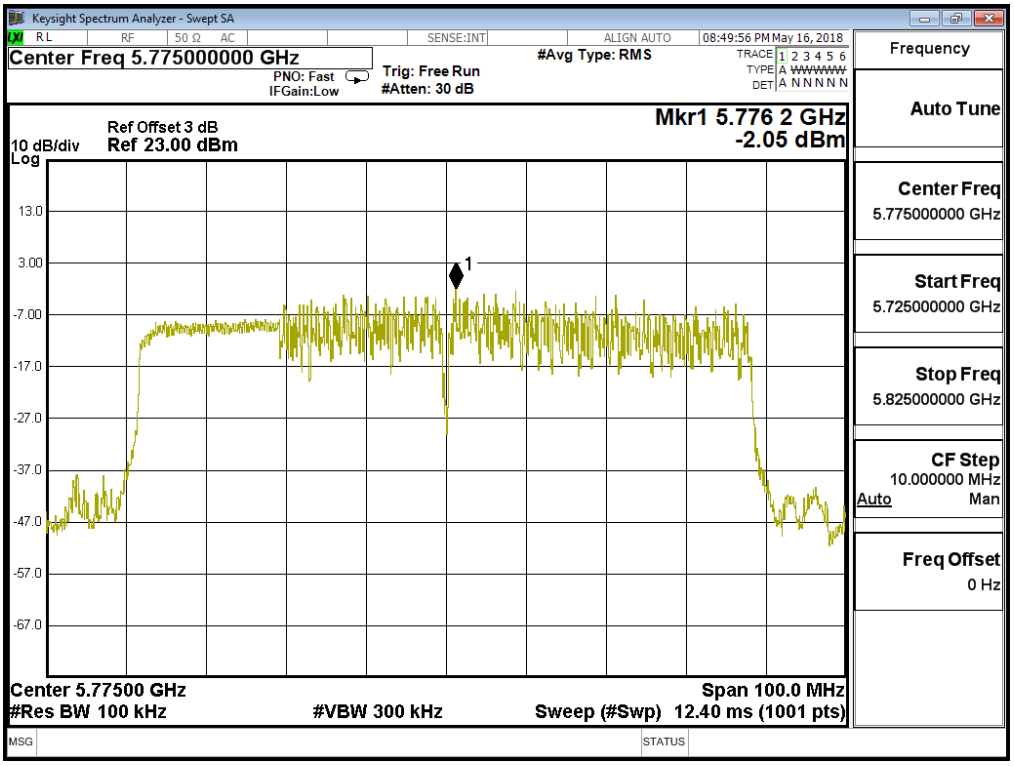
Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)[1]	Required Limit (dBm)	Result
155	5775	A	-2.050	6.98	0.960	<30	Pass
		B	-1.180	6.98	1.830	<30	Pass

Note 1: The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

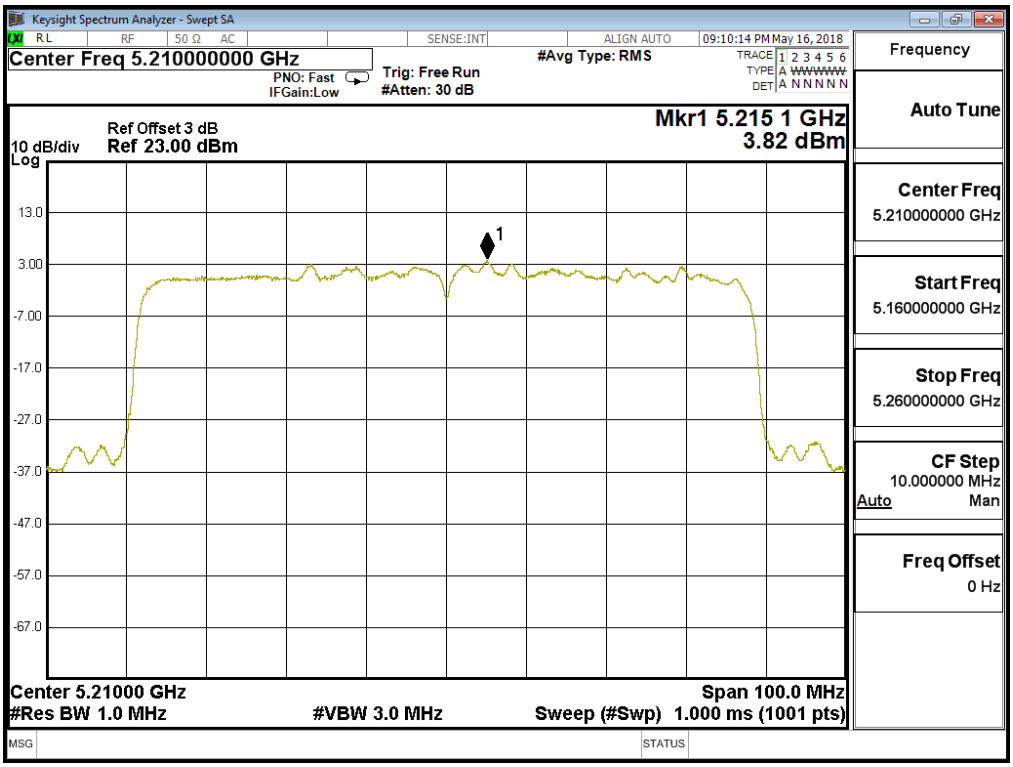
Channel 42 – Chain A



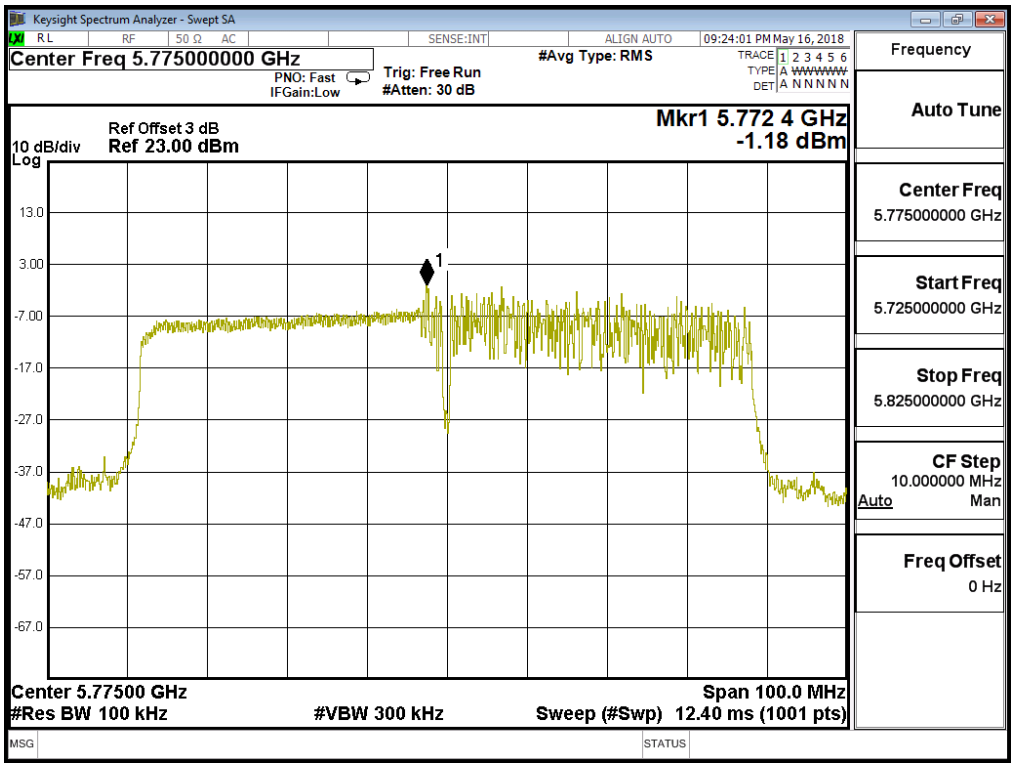
Channel 155: CHAIN A



Channel 42 – Chain B



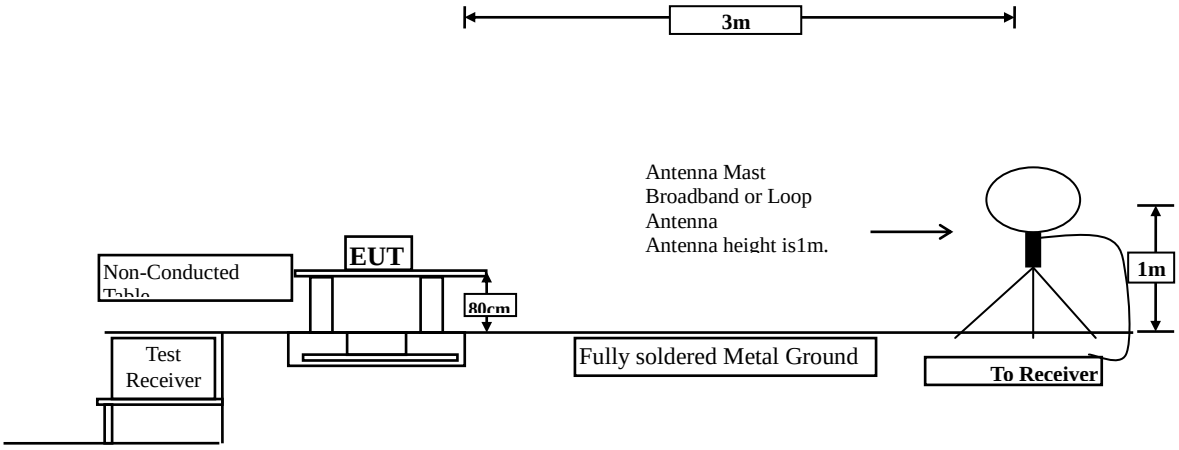
Channel 155: CHAIN B



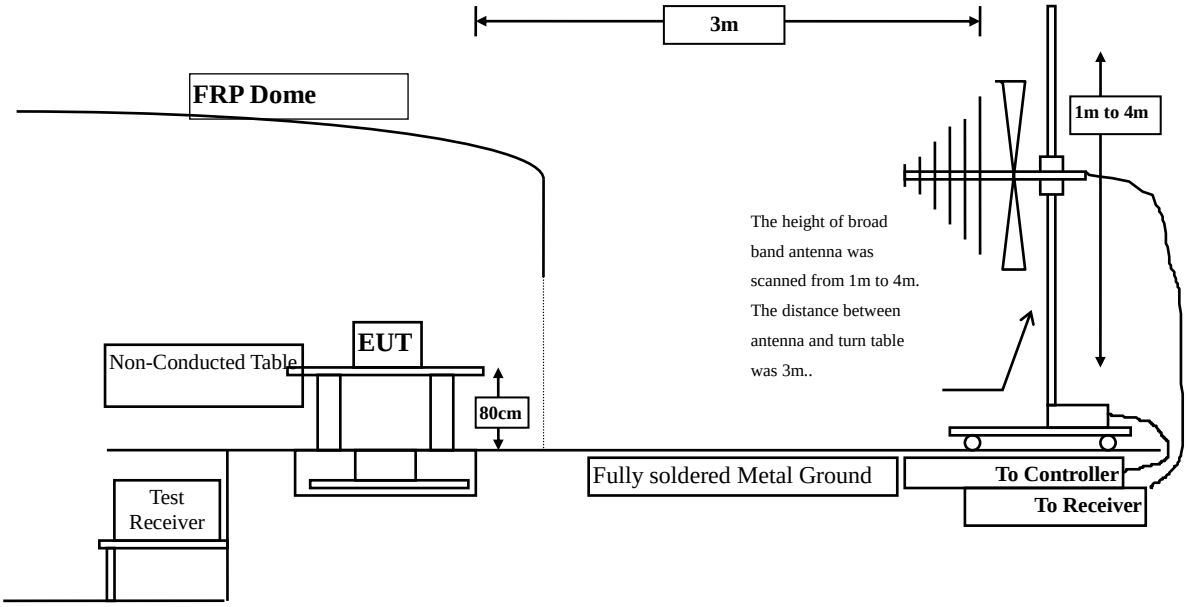
5. Radiated Emission

5.1. Test Setup

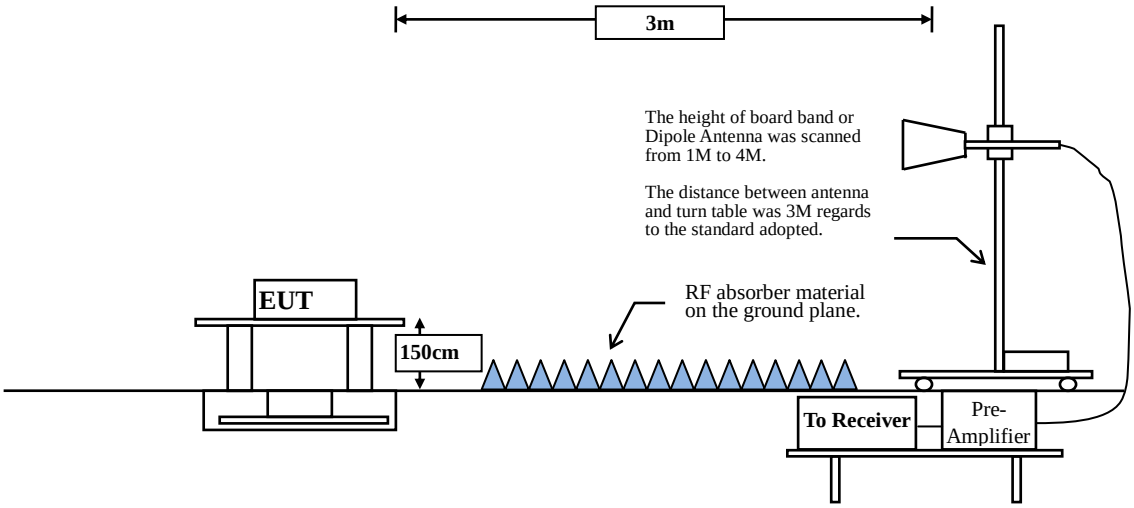
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



5.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBμV/m) = 20 log E field strength (uV/m)

5.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW ≥ 3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 a	93.52	1.4280	700	1000
802.11 n20	86.42	0.6870	1456	1500
802.11 n40	95.49	0.3390	2950	3000
802.11 ac80	96.19	0.3030	3300	3500

Note: Duty Cycle Refer to Section 5

5.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

5.5. Test Result of Radiated Emission

Product : Gigabit Multi-Service Broadband Router
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/05/22
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
10360.000	-2.181	51.970	49.789	-24.211	74.000
15540.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
10360.000	-1.387	60.580	59.193	-14.807	74.000
15540.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average Detector:					
10360.000	-1.387	38.480	37.093	-16.907	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report..

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5220MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
10440.000	-1.613	52.700	51.087	-22.913	74.000
15660.000	*	*	*	*	74.000
20880.000	*	*	*	*	74.000
26100.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
10440.000	-1.613	61.104	59.491	-14.509	74.000
15660.000	*	*	*	*	74.000
20880.000	*	*	*	*	74.000
26100.000	*	*	*	*	74.000
Average Detector:					
10440.000	-0.690	37.240	36.550	-17.450	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5240MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
10480.000	-1.075	49.070	47.996	-26.004	74.000
15720.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
Average					
Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
10480.000	-0.148	59.830	59.683	-14.317	74.000
15720.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
Average					
Detector:					
10480.000	-0.148	38.900	38.753	-15.247	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report..

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5745MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal Peak Detector:					
11490.000	2.672	41.140	43.812	-30.188	74.000
17235.000	*	*	*	*	74.000
22980.000	*	*	*	*	74.000
28752.000	*	*	*	*	74.000
34470.000	*	*	*	*	74.000
40215.000	*	*	*	*	74.000
Average Detector:					
11490.000	3.600	52.310	55.910	-18.090	74.000
Vertical Peak Detector:					
11490.000	15.842	53.970	69.811	-4.189	74.000
17235.000	*	*	*	*	74.000
22980.000	*	*	*	*	74.000
28752.000	*	*	*	*	74.000
34470.000	*	*	*	*	74.000
40215.000	*	*	*	*	74.000
Average Detector:					
11490.000	3.600	29.010	32.610	-21.390	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11570.000	2.336	41.800	44.136	-29.864	74.000
17355.000	*	*	*	*	74.000
20800.000	*	*	*	*	74.000
26000.000	*	*	*	*	74.000
31200.000	*	*	*	*	74.000
36400.000	*	*	*	*	74.000
Average					
Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
11570.000	3.225	52.600	55.824	-18.176	74.000
17355.000	*	*	*	*	74.000
20800.000	*	*	*	*	74.000
26000.000	*	*	*	*	74.000
31200.000	*	*	*	*	74.000
36400.000	*	*	*	*	74.000
Average					
Detector:					
11570.000	3.225	29.080	32.304	-21.696	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5825MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11650.000	1.608	41.630	43.239	-30.761	74.000
17475.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
Average					
Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
11650.000	2.724	55.970	58.695	-15.305	74.000
17475.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
Average					
Detector:					
11650.000	2.724	31.510	34.235	-19.765	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Gigabit Multi-Service Broadband Router
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/05/22
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5180MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
10360.000	-2.181	44.040	41.859	-32.141	74.000
15540.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
10360.000	-1.387	56.780	55.393	-18.607	74.000
15540.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
Average Detector:					
10360.000	-1.387	35.450	34.063	-19.937	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5220MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
10440.000	-1.613	48.070	46.457	-27.543	74.000
15660.000	*	*	*	*	74.000
20880.000	*	*	*	*	74.000
26100.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
10440.000	-0.690	56.980	56.290	-17.710	74.000
15660.000	*	*	*	*	74.000
20880.000	*	*	*	*	74.000
26100.000	*	*	*	*	74.000
Average Detector:					
10440.000	-0.690	33.250	32.560	-21.440	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5240MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
10480.000	-1.075	46.330	45.256	-28.744	74.000
15720.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
10480.000	-0.148	55.050	54.903	-19.097	74.000
15720.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
Average Detector:					
10480.000	-0.148	32.520	32.373	-21.627	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5745MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11490.000	2.672	40.580	43.252	-30.748	74.000
17235.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
11490.000	3.600	46.920	50.520	-23.480	74.000
17235.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report..

Product : Gigabit Multi-Service Broadband Router
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/05/22
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11570.000	2.336	40.950	43.286	-30.714	74.000
17355.000	*	*	*	*	74.000
20880.000	*	*	*	*	74.000
26100.000	*	*	*	*	74.000
31320.000	*	*	*	*	74.000
36540.000	*	*	*	*	74.000
Average					
Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
11570.000	3.225	46.720	49.944	-24.056	74.000
17355.000	*	*	*	*	74.000
20880.000	*	*	*	*	74.000
26100.000	*	*	*	*	74.000
31320.000	*	*	*	*	74.000
36540.000	*	*	*	*	74.000
Average					
Detector:					
*	*	*	*	*	*

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5825MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal Peak Detector:					
11650.000	1.608	42.130	43.739	-30.261	74.000
17475.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440.000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical Peak Detector:					
11650.000	2.724	53.270	55.995	-18.005	74.000
17475.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440.000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
Average Detector:					
11650.000	2.724	30.470	33.195	-20.805	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Gigabit Multi-Service Broadband Router
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/05/22
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5190MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
10380.000	-2.167	44.360	42.193	-31.807	74.000
15570.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
10380.000	-1.310	51.540	50.230	-23.770	74.000
15570.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Gigabit Multi-Service Broadband Router
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/05/22
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5230MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
10460.000	-1.343	46.660	45.316	-28.684	74.000
15690.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
10460.000	-0.418	53.870	53.451	-20.549	74.000
15690.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Gigabit Multi-Service Broadband Router
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/05/22
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5755MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal Peak Detector:					
11510.000	2.683	41.800	44.483	-29.517	74.000
17265.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical Peak Detector:					
11510.000	3.640	48.150	51.790	-22.210	74.000
17265.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/22
Test Mode	:	Mode 3: Transmit (802.11n-40BW 30Mbps) (5795MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11590.000	2.216	41.510	43.726	-30.274	74.000
17385.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
31380.000	*	*	*	*	74.000
36610.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical					
Peak Detector:					
11590.000	3.082	48.990	52.072	-21.928	74.000
17385.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
31380.000	*	*	*	*	74.000
36610.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Gigabit Multi-Service Broadband Router
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/05/22
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) (5210MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal Peak Detector:					
10420.000	-1.883	47.900	46.016	-27.984	74.000
11550.000	*	*	*	*	74.000
17325.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical Peak Detector:					
10420.000	-0.961	54.850	53.888	-20.112	74.000
11550.000	*	*	*	*	74.000
17325.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Gigabit Multi-Service Broadband Router
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2018/05/22
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) (5775MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal Peak Detector:					
11550.000	2.451	41.560	44.011	-29.989	74.000
17325.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average Detector:					
*	*	*	*	*	*
Vertical Peak Detector:					
11550.000	3.363	51.470	54.833	-19.167	74.000
17325.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average Detector:					
11550.000	3.363	40.160	43.523	-10.477	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Gigabit Multi-Service Broadband Router
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5220MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector					
115.360	12.855	18.765	31.620	-11.880	43.500
239.520	14.246	23.069	37.315	-8.685	46.000
357.860	18.895	20.329	39.224	-6.776	46.000
495.600	22.295	13.809	36.104	-9.896	46.000
833.160	26.991	6.272	33.263	-12.737	46.000
961.200	27.425	16.259	43.684	-10.316	54.000
Vertical					
Peak Detector					
115.360	14.275	17.032	31.307	-12.193	43.500
198.780	20.561	13.687	34.248	-9.252	43.500
353.980	17.632	14.302	31.934	-14.066	46.000
491.720	21.062	16.802	37.864	-8.136	46.000
833.160	26.121	9.844	35.965	-10.035	46.000
961.200	28.175	9.732	37.907	-16.093	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

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Product : Gigabit Multi-Service Broadband Router
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector					
115.360	12.855	18.804	31.659	-11.841	43.500
249.220	14.992	22.838	37.830	-8.170	46.000
386.960	20.795	10.491	31.286	-14.714	46.000
491.720	22.272	13.734	36.006	-9.994	46.000
833.160	26.991	5.346	32.337	-13.663	46.000
961.200	27.425	16.067	43.492	-10.508	54.000
Vertical					
Peak Detector					
119.240	13.377	14.988	28.365	-15.135	43.500
198.780	20.561	12.418	32.979	-10.521	43.500
386.960	19.965	10.717	30.682	-15.318	46.000
495.600	21.065	17.186	38.251	-7.749	46.000
833.160	26.121	8.378	34.499	-11.501	46.000
961.200	28.175	10.149	38.324	-15.676	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Gigabit Multi-Service Broadband Router
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5220MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector					
113.420	13.514	18.776	32.290	-11.210	43.500
235.640	13.951	22.890	36.841	-9.159	46.000
361.740	19.148	12.571	31.719	-14.281	46.000
495.600	22.295	13.786	36.081	-9.919	46.000
833.160	26.991	6.341	33.332	-12.668	46.000
961.200	27.425	15.605	43.030	-10.970	54.000
Vertical					
Peak Detector					
198.780	20.561	12.815	33.376	-10.124	43.500
249.220	20.012	16.065	36.077	-9.923	46.000
386.960	19.965	13.960	33.925	-12.075	46.000
495.600	21.065	16.313	37.378	-8.622	46.000
833.160	26.121	8.204	34.325	-11.675	46.000
961.200	28.175	10.678	38.853	-15.147	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

.

Product : Gigabit Multi-Service Broadband Router
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5785MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector					
113.420	13.514	18.269	31.783	-11.717	43.500
187.140	9.700	21.990	31.690	-11.810	43.500
375.320	20.049	9.682	29.731	-16.269	46.000
491.720	22.272	14.158	36.430	-9.570	46.000
833.160	26.991	4.753	31.744	-14.256	46.000
961.200	27.425	16.225	43.650	-10.350	54.000
Vertical					
Peak Detector					
173.560	16.749	12.699	29.448	-14.052	43.500
249.220	20.012	18.014	38.026	-7.974	46.000
386.960	19.965	13.945	33.910	-12.090	46.000
491.720	21.062	15.950	37.012	-8.988	46.000
833.160	26.121	8.046	34.167	-11.833	46.000
961.200	28.175	8.333	36.508	-17.492	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

.

Product : Gigabit Multi-Service Broadband Router
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5230MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector					
125.060	10.893	18.126	29.019	-14.481	43.500
237.580	14.099	20.523	34.622	-11.378	46.000
371.440	19.790	11.583	31.373	-14.627	46.000
480.080	22.183	15.055	37.238	-8.762	46.000
840.920	26.974	3.827	30.801	-15.199	46.000
961.200	27.425	16.315	43.740	-10.260	54.000
Vertical					
Peak Detector					
125.060	13.823	18.116	31.939	-11.561	43.500
280.260	16.285	14.427	30.712	-15.288	46.000
423.820	20.927	7.375	28.302	-17.698	46.000
563.500	22.688	3.876	26.564	-19.436	46.000
833.160	26.121	2.610	28.731	-17.269	46.000
961.200	28.175	11.826	40.001	-13.999	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

.

Product : Gigabit Multi-Service Broadband Router
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5755MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector					
115.360	12.855	18.547	31.402	-12.098	43.500
227.880	13.351	20.510	33.861	-12.139	46.000
361.740	19.148	11.132	30.280	-15.720	46.000
491.720	22.272	11.094	33.366	-12.634	46.000
833.160	26.991	5.956	32.947	-13.053	46.000
961.200	27.425	12.759	40.184	-13.816	54.000
Vertical					
Peak Detector					
198.780	20.561	12.376	32.937	-10.563	43.500
352.040	17.498	12.698	30.196	-15.804	46.000
491.720	21.062	17.711	38.773	-7.227	46.000
635.280	23.704	2.782	26.486	-19.514	46.000
833.160	26.121	9.822	35.943	-10.057	46.000
961.200	28.175	11.358	39.533	-14.467	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

.

Product : Gigabit Multi-Service Broadband Router
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) (5210MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector					
173.560	8.609	21.332	29.941	-13.559	43.500
266.680	15.072	20.643	35.715	-10.285	46.000
480.080	22.183	15.052	37.235	-8.765	46.000
633.340	26.499	4.187	30.686	-15.314	46.000
875.840	26.881	4.929	31.810	-14.190	46.000
961.200	27.425	16.604	44.029	-9.971	54.000
Vertical					
Peak Detector					
161.920	14.880	16.377	31.257	-12.243	43.500
249.220	20.012	16.939	36.951	-9.049	46.000
353.980	17.632	16.719	34.351	-11.649	46.000
491.720	21.062	16.240	37.302	-8.698	46.000
833.160	26.121	9.334	35.455	-10.545	46.000
994.180	28.287	10.260	38.547	-15.453	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

.

Product : Gigabit Multi-Service Broadband Router
Test Item : General Radiated Emission
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) (5775MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector					
187.140	9.700	21.266	30.966	-12.534	43.500
375.320	20.049	10.275	30.324	-15.676	46.000
480.080	22.183	14.323	36.506	-9.494	46.000
635.280	26.474	2.143	28.617	-17.383	46.000
833.160	26.991	4.938	31.929	-14.071	46.000
961.200	27.425	16.182	43.607	-10.393	54.000
Vertical					
Peak Detector					
202.660	20.709	13.578	34.287	-9.213	43.500
249.220	20.012	15.155	35.167	-10.833	46.000
388.900	20.099	12.452	32.551	-13.449	46.000
491.720	21.062	16.557	37.619	-8.381	46.000
833.160	26.121	8.862	34.983	-11.017	46.000
961.200	28.175	11.560	39.735	-14.265	54.000

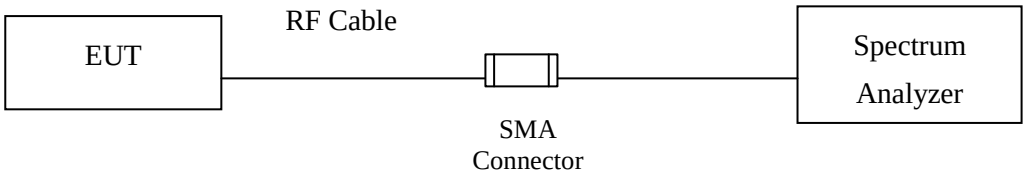
Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

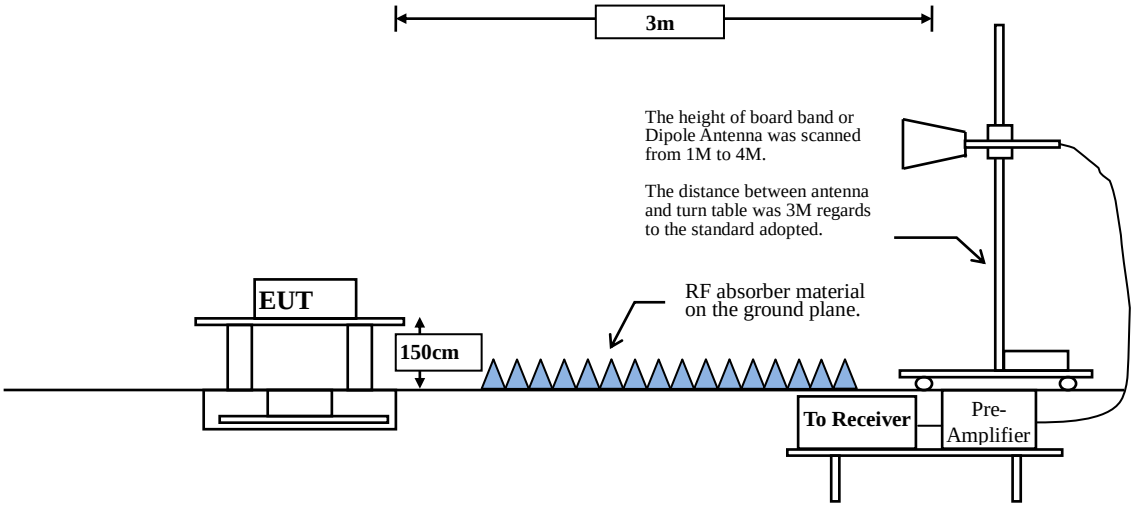
6. Band Edge

6.1. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



6.2. Limits

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBμV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks : 1. RF Voltage (dBμV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

6.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

RBW and VBW Parameter setting:

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW ≥ 3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11n20	85.46	0.994	1006.03	2k
802.11n40	93.59	0.497	2012.07	3k
802.11ac20	90.33	1.898	526.87	1k
802.11ac40	87.35	0.905	1104.97	2k
802.11ac80	73.54	0.228	4385.96	5k

Note: Duty Cycle Refer to Section 5

6.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

6.5. Test Result of Band Edge

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)-Channel 36

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
36 (Peak)	5150.000	10.470	50.073	60.544	74.00	54.00	Pass
36 (Peak)	5175.217	10.406	92.444	102.850	--	--	--
36 (Average)	5150.000	10.470	26.067	36.538	74.00	54.00	Pass
36 (Average)	5178.406	10.397	77.107	87.505	--	--	--

Figure Channel 36: Horizontal (Peak)

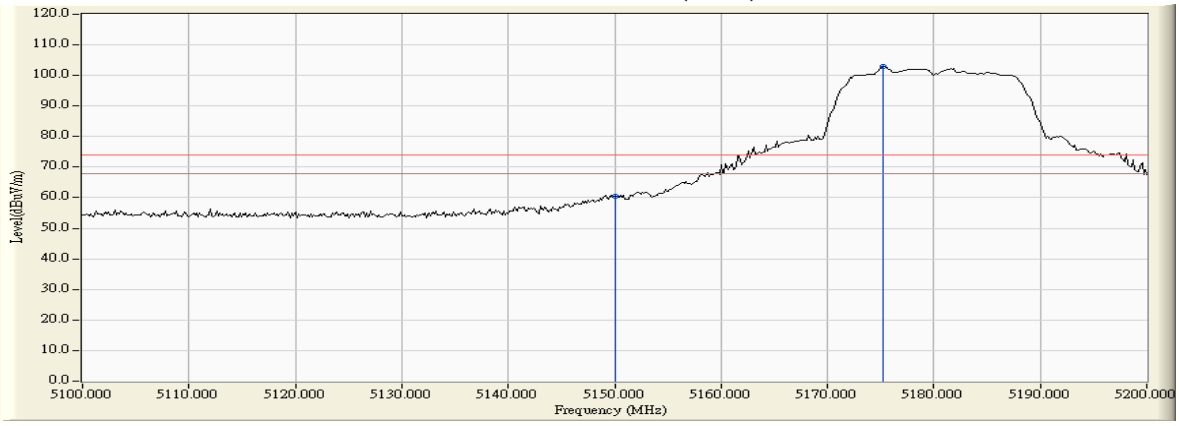
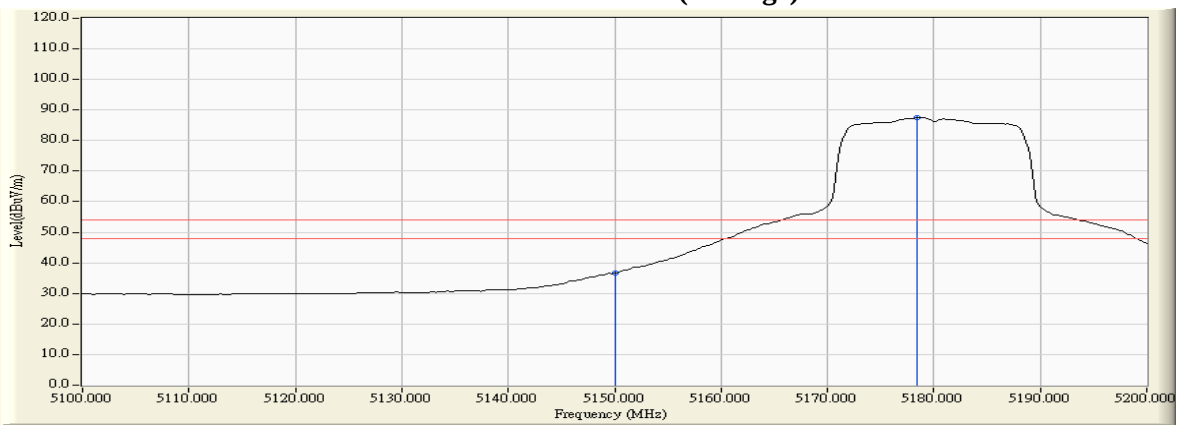


Figure Channel 36: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)-Channel 36

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
36 (Peak)	5150.000	12.390	56.169	68.559	74.00	54.00	Pass
36 (Peak)	5175.217	12.484	100.343	112.827	--	--	--
36 (Average)	5150.000	12.390	32.857	45.247	74.00	54.00	Pass
36 (Average)	5179.130	12.498	85.085	97.583	--	--	--

Figure Channel 36: Vertical (Peak)

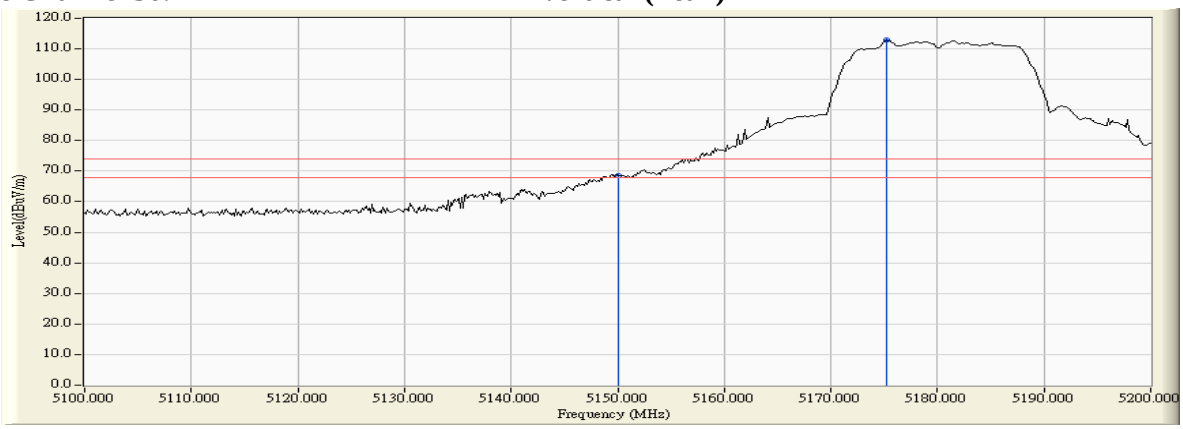
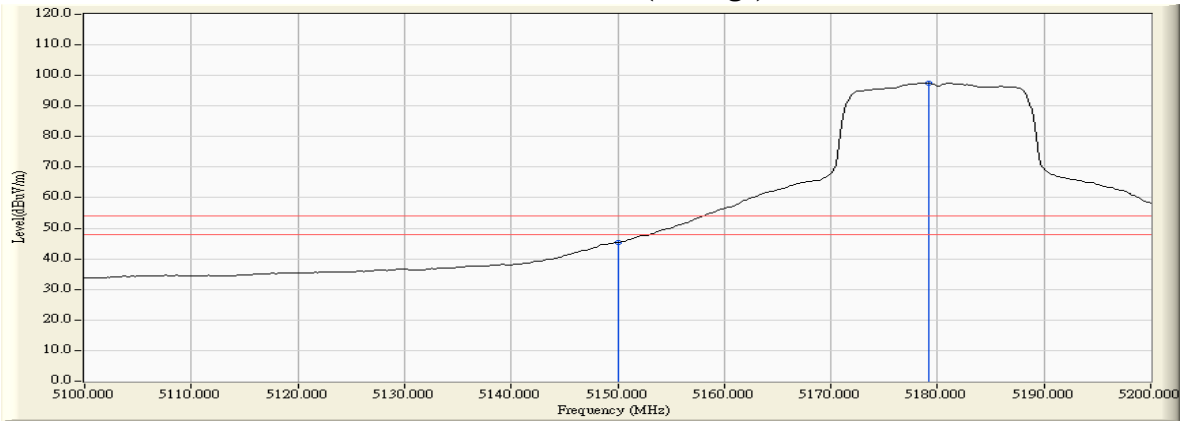


Figure Channel 36: Vertical (Average)



Note:

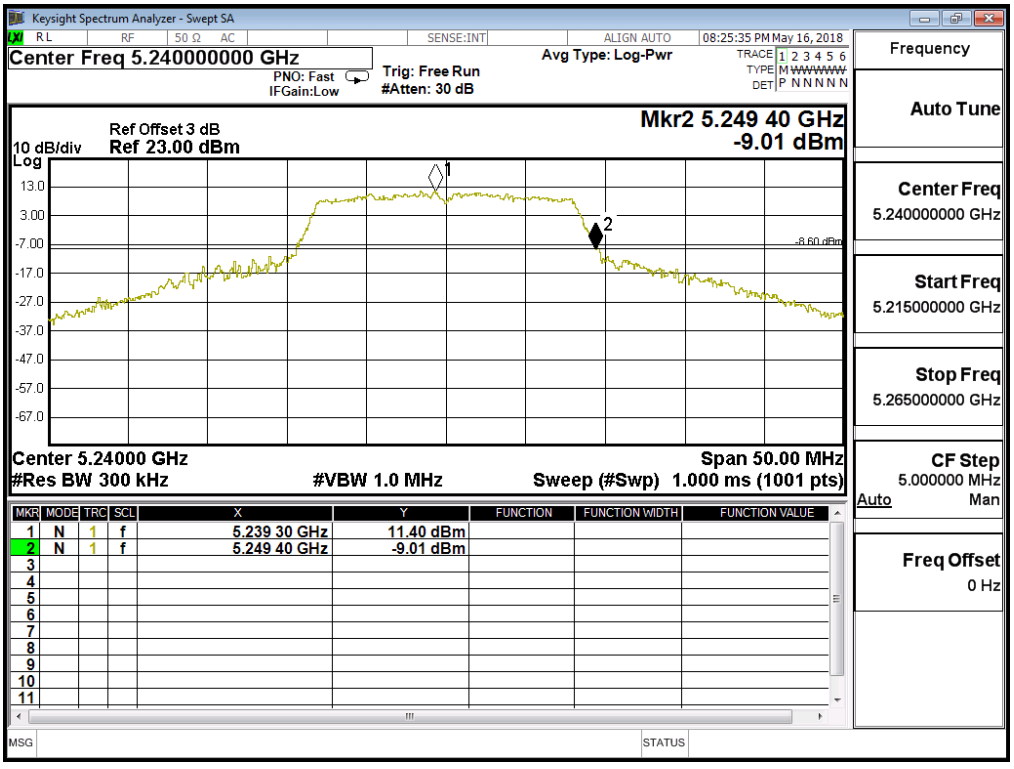
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection

Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 1: Transmit (802.11a-6Mbps)-Channel 48

Chain A

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5240	5249.40	<5250	PASS

NOTE: Accordance with 15.215 requirement.

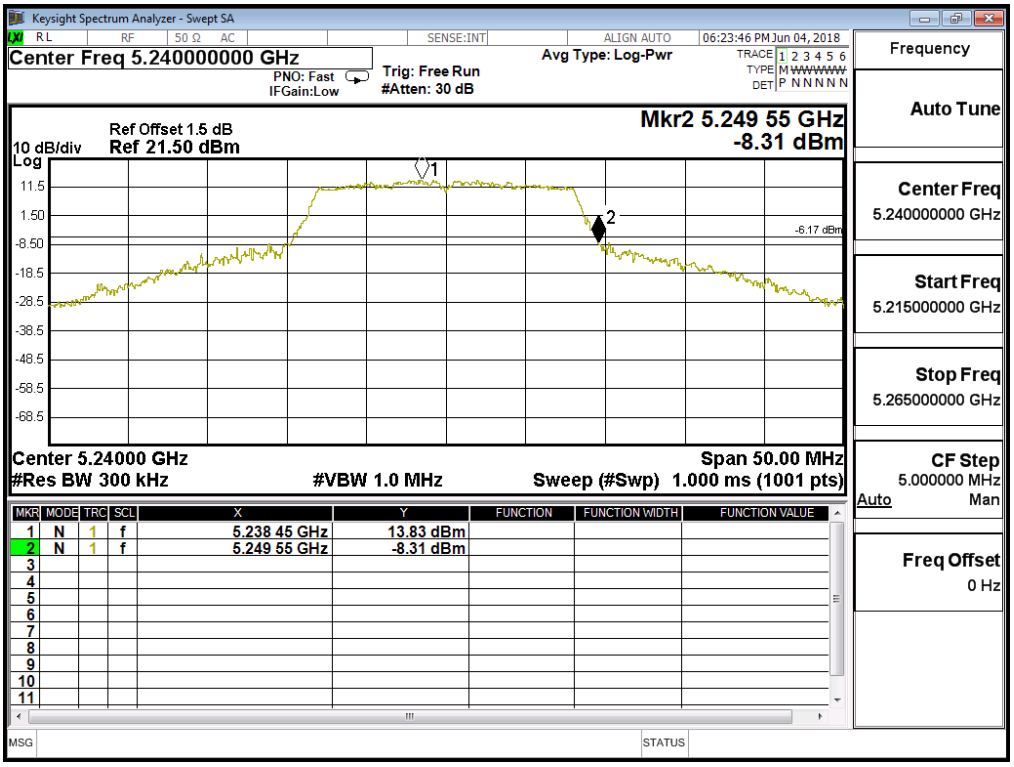


Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/06/04
Test Mode : Mode 1: Transmit (802.11a-6Mbps)-Channel 48

Chain B

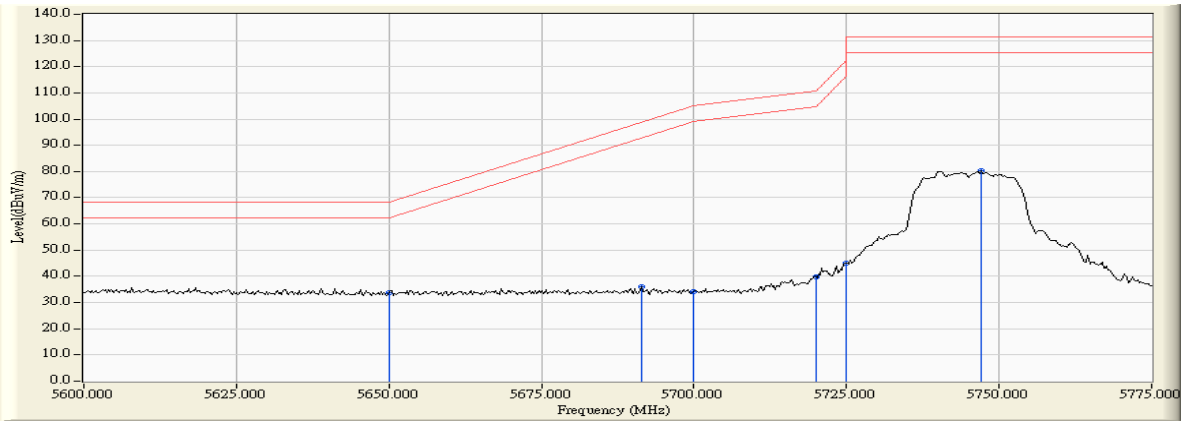
Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5240	5249.55	<5250	PASS

NOTE: Accordance with 15.215 requirement.

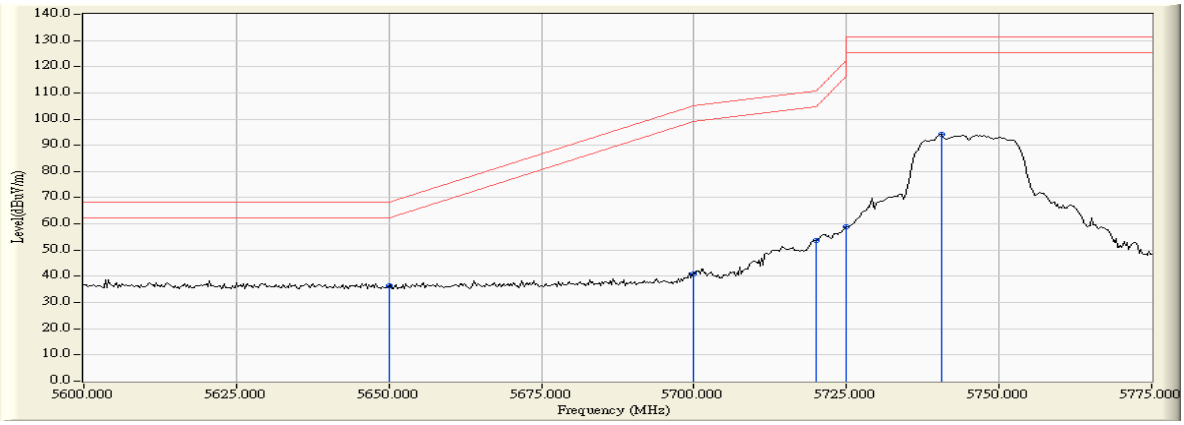


Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)-Channel 149

RF Radiated Measurement:



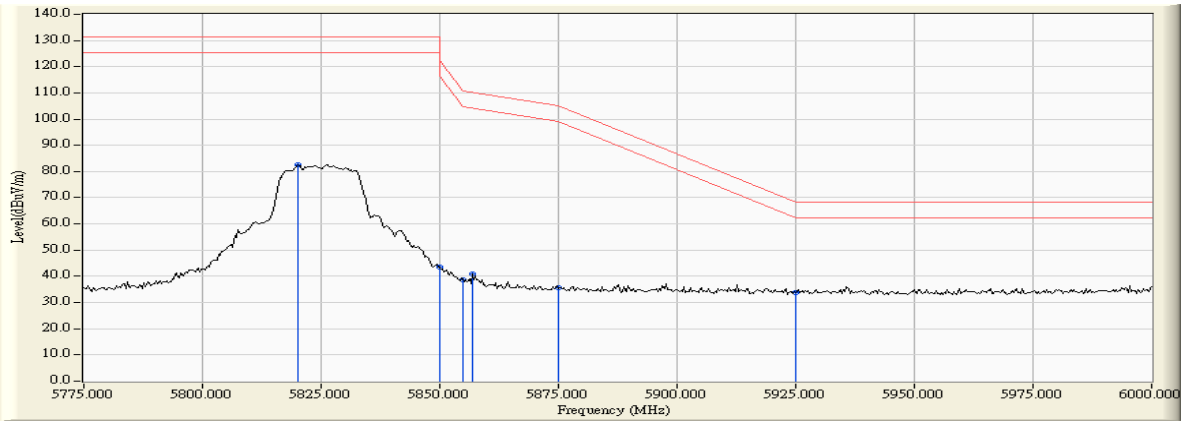
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Horizontal	5650.000	-9.369	43.213	33.844	-34.376	68.220	Pass
Horizontal	5691.304	-9.281	45.186	35.905	-62.863	98.768	Pass
Horizontal	5700.000	-9.287	43.454	34.168	-71.032	105.200	Pass
Horizontal	5720.000	-9.331	49.140	39.809	-70.991	110.800	Pass
Horizontal	5725.000	-9.347	54.315	44.968	-77.232	122.200	Pass
Horizontal	5747.102	-9.422	89.716	80.294	-50.906	131.200	Pass



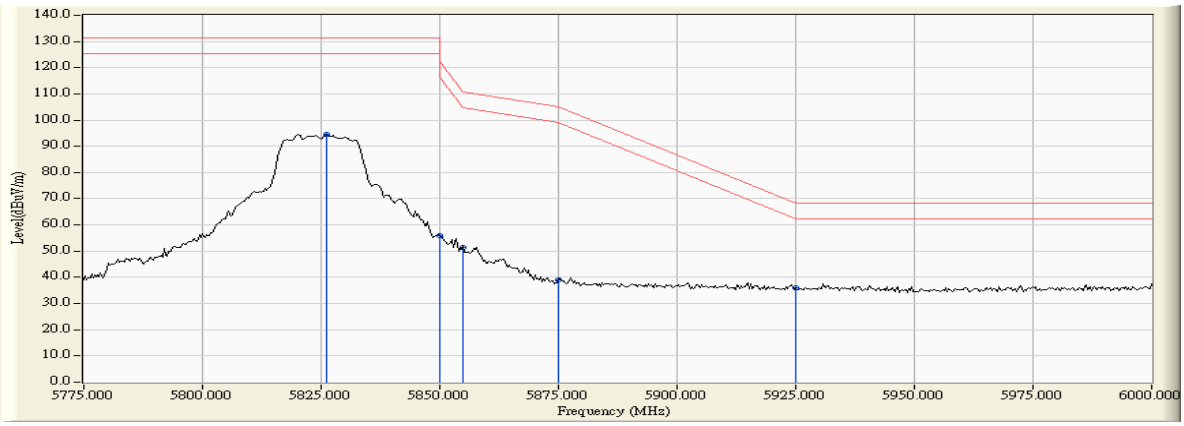
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Vertical	5650.000	-7.894	44.119	36.225	-31.995	68.220	Pass
Vertical	5700.000	-7.931	49.026	41.095	-64.105	105.200	Pass
Vertical	5720.000	-7.991	61.596	53.605	-57.195	110.800	Pass
Vertical	5725.000	-8.009	66.812	58.803	-63.397	122.200	Pass
Vertical	5740.507	-8.066	102.396	94.330	-36.870	131.200	Pass

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)-Channel 165

RF Radiated Measurement:



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Horizontal	5820.000	-9.468	92.001	82.532	-48.668	131.200	Pass
Horizontal	5850.000	-9.271	52.978	43.707	-78.493	122.200	Pass
Horizontal	5855.000	-9.238	47.989	38.751	-72.049	110.800	Pass
Horizontal	5856.848	-9.227	50.068	40.842	-69.441	110.283	Pass
Horizontal	5875.000	-9.107	44.596	35.489	-69.711	105.200	Pass
Horizontal	5925.000	-8.928	42.794	33.867	-34.333	68.200	Pass



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Vertical	5826.196	-8.240	102.681	94.440	-36.760	131.200	Pass
Vertical	5850.000	-8.198	63.989	55.791	-66.409	122.200	Pass
Vertical	5855.000	-8.189	59.499	51.309	-59.491	110.800	Pass
Vertical	5875.000	-8.155	47.191	39.036	-66.164	105.200	Pass
Vertical	5925.000	-8.085	43.938	35.853	-32.347	68.200	Pass

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 2: Transmit (802.11n-20BW 14.4Mbps) -Channel 36

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
36 (Peak)	5150.000	10.470	45.725	56.196	74.00	54.00	Pass
36 (Peak)	5175.217	10.406	94.012	104.418	--	--	--
36 (Average)	5150.000	10.470	22.733	33.204	74.00	54.00	Pass
36 (Average)	5178.986	10.396	78.615	89.011	--	--	--

Figure Channel 36: Horizontal (Peak)

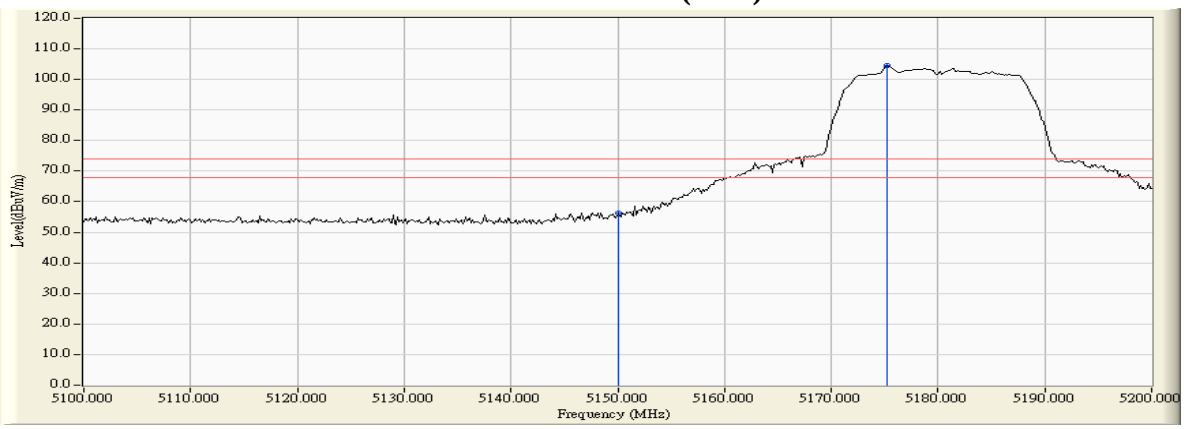
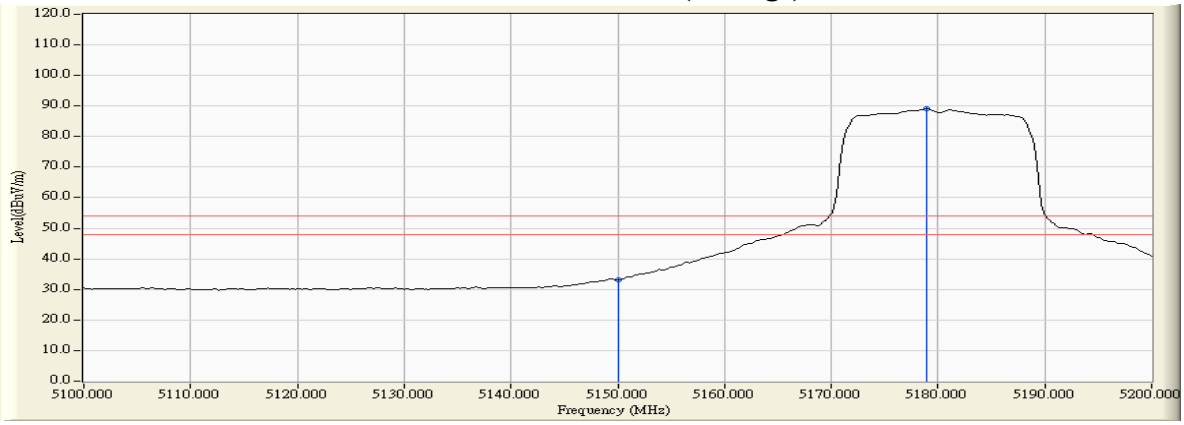


Figure Channel 36: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection

Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/21
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) -Channel 36

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
36 (Peak)	5145.942	12.376	52.385	64.760	74.00	54.00	Pass
36 (Peak)	5150.000	12.390	51.425	63.815	74.00	54.00	Pass
36 (Peak)	5175.362	12.485	102.721	115.206	--	--	--
36 (Average)	5150.000	12.390	29.276	41.666	74.00	54.00	Pass
36 (Average)	5178.551	12.496	87.522	100.018	--	--	--

Figure Channel 36: Vertical (Peak)

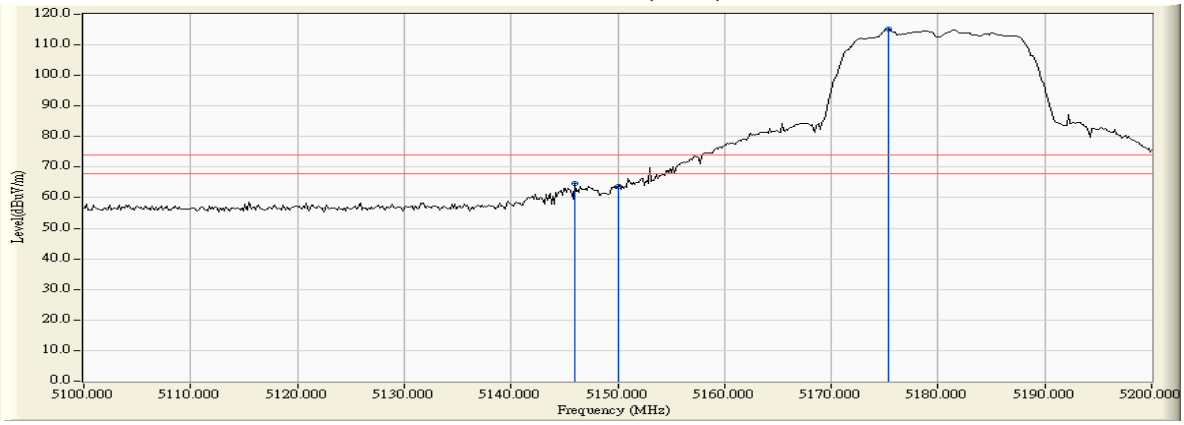
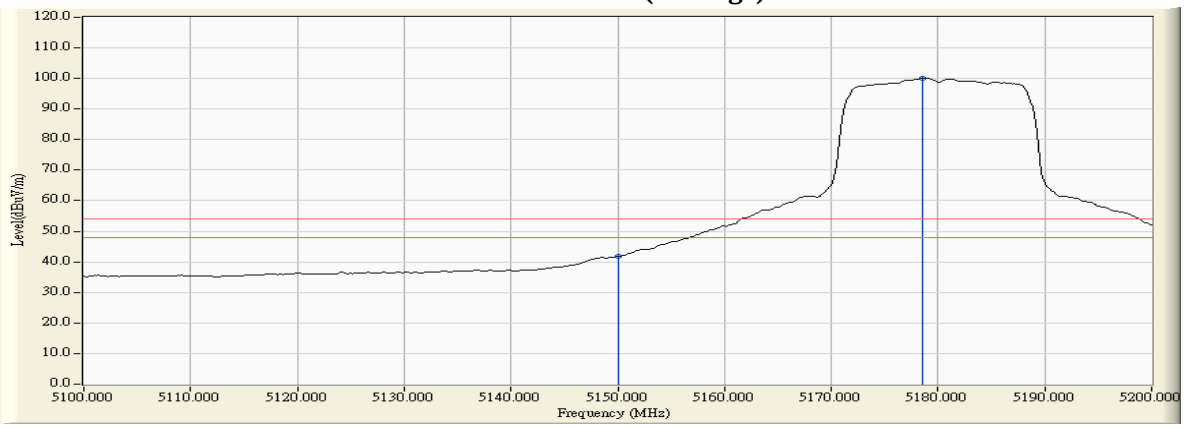


Figure Channel 36: Vertical (Average)



Note:

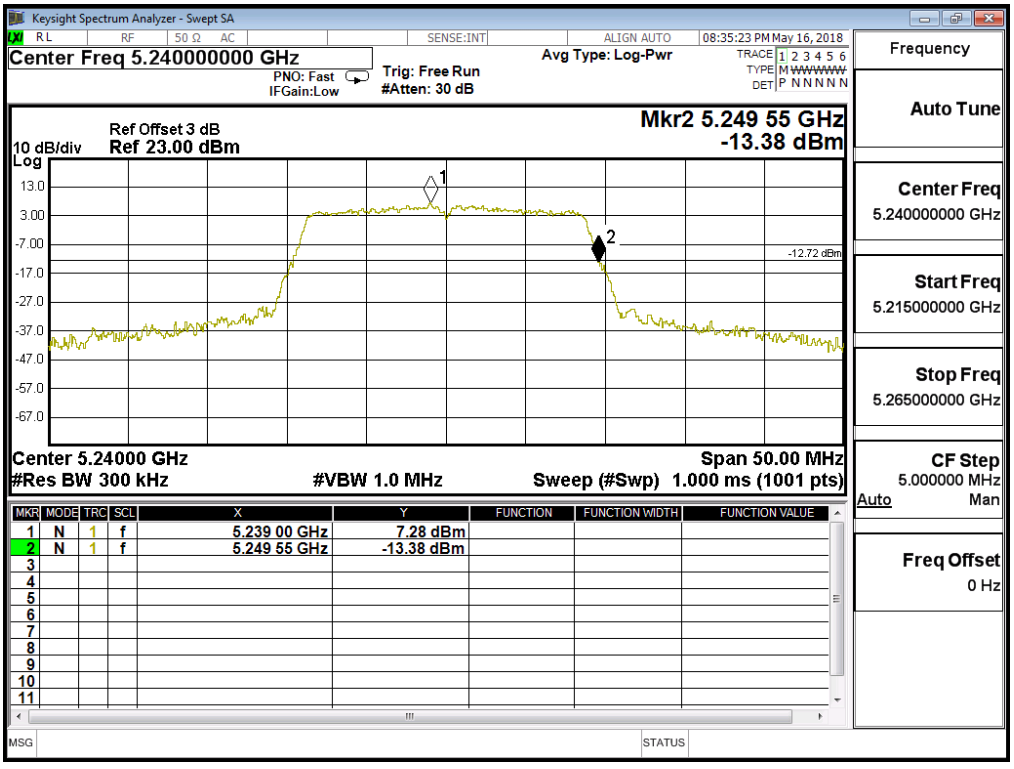
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) -Channel 48

Chain A

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5240	5249.55	<5250	PASS

NOTE: Accordance with 15.215 requirement.

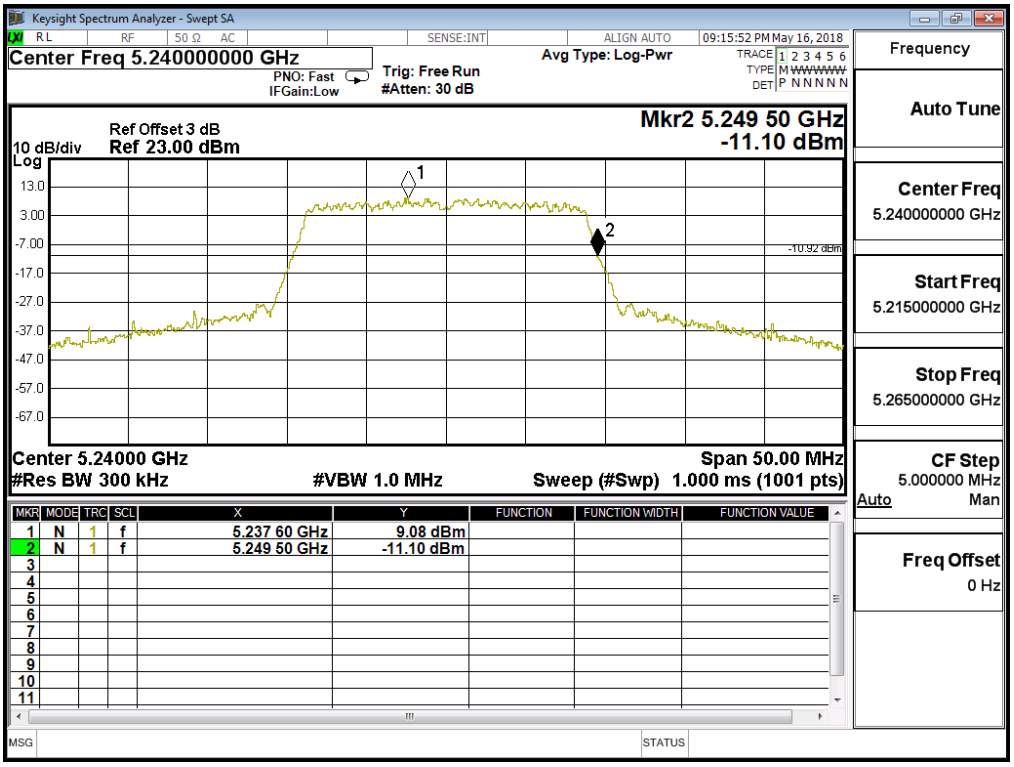


Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) -Channel 48

Chain B

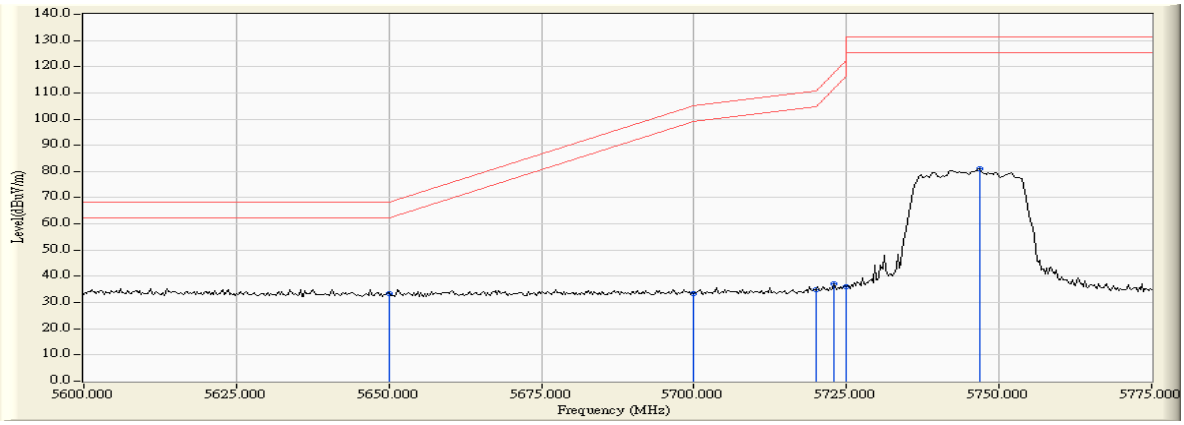
Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5240	5249.50	<5250	PASS

NOTE: Accordance with 15.215 requirement.

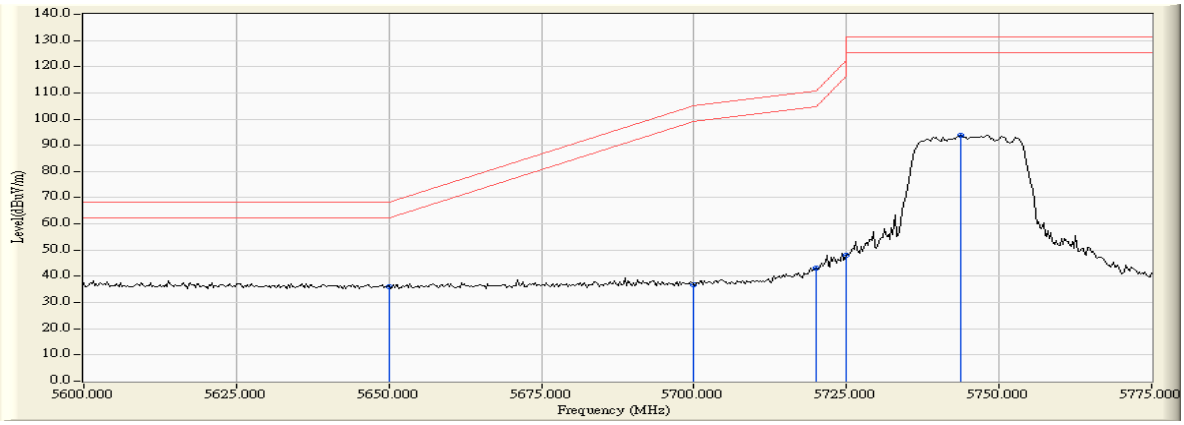


Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 2: Transmit (802.11n-20BW 14.4Mbps) -Channel 149

RF Radiated Measurement:



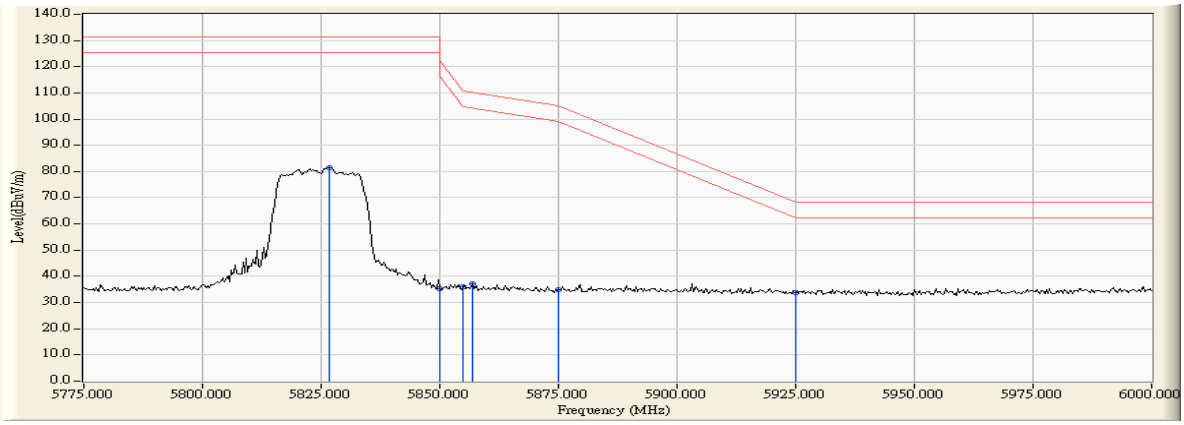
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Horizontal	5650.000	-9.369	42.931	33.562	-34.658	68.220	Pass
Horizontal	5700.000	-9.287	42.819	33.533	-71.667	105.200	Pass
Horizontal	5720.000	-9.331	44.072	34.741	-76.059	110.800	Pass
Horizontal	5723.007	-9.341	46.473	37.132	-80.524	117.656	Pass
Horizontal	5725.000	-9.347	45.320	35.973	-86.227	122.200	Pass
Horizontal	5746.848	-9.421	90.497	81.075	-50.125	131.200	Pass



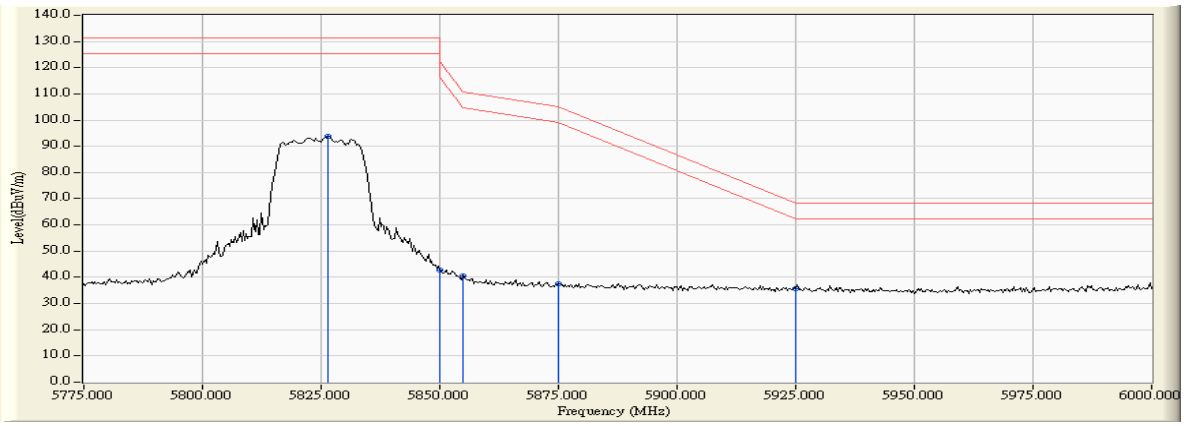
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Vertical	5650.000	-7.894	44.000	36.106	-32.114	68.220	Pass
Vertical	5700.000	-7.931	44.898	36.967	-68.233	105.200	Pass
Vertical	5720.000	-7.991	50.971	42.980	-67.820	110.800	Pass
Vertical	5725.000	-8.009	55.912	47.903	-74.297	122.200	Pass
Vertical	5743.804	-8.078	102.058	93.979	-37.221	131.200	Pass

Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/21
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) -Channel 165

RF Radiated Measurement:



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Horizontal	5826.848	-9.424	90.973	81.549	-49.651	131.200	Pass
Horizontal	5850.000	-9.271	44.736	35.465	-86.735	122.200	Pass
Horizontal	5855.000	-9.238	45.134	35.896	-74.904	110.800	Pass
Horizontal	5856.848	-9.227	46.322	37.096	-73.187	110.283	Pass
Horizontal	5875.000	-9.107	43.988	34.881	-70.319	105.200	Pass
Horizontal	5925.000	-8.928	42.736	33.809	-34.391	68.200	Pass



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Vertical	5826.522	-8.240	102.066	93.826	-37.374	131.200	Pass
Vertical	5850.000	-8.198	50.969	42.771	-79.429	122.200	Pass
Vertical	5855.000	-8.189	48.700	40.510	-70.290	110.800	Pass
Vertical	5875.000	-8.155	45.599	37.444	-67.756	105.200	Pass
Vertical	5925.000	-8.085	43.909	35.824	-32.376	68.200	Pass

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 3: Transmit (802.11n-40BW 30Mbps) -Channel 38

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
38 (Peak)	5146.232	10.480	51.963	62.443	74.00	54.00	Pass
38 (Peak)	5150.000	10.470	49.033	59.504	74.00	54.00	Pass
38 (Peak)	5185.942	10.379	89.646	100.025	--	--	--
38 (Average)	5150.000	10.470	28.370	38.841	74.00	54.00	Pass
38 (Average)	5188.261	10.372	75.041	85.413	--	--	--

Figure Channel 38: Horizontal (Peak)

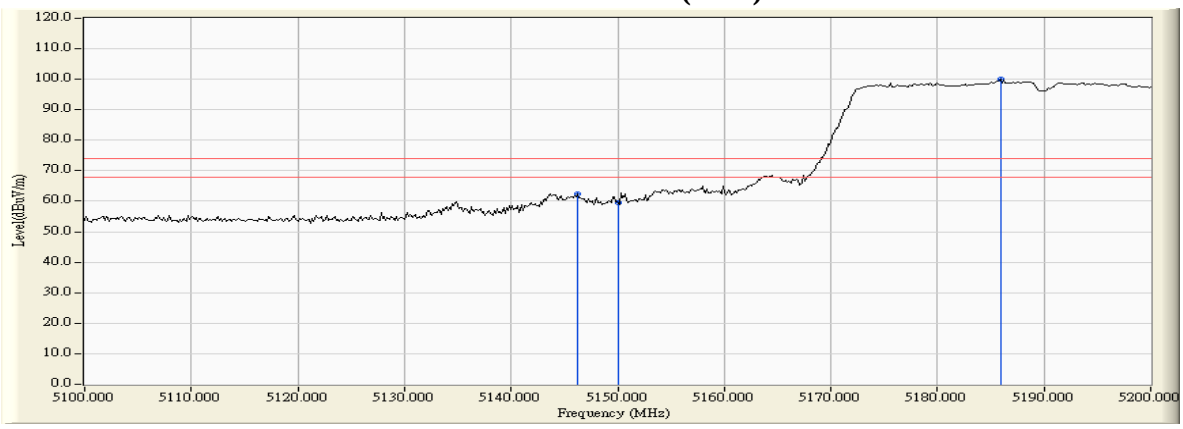
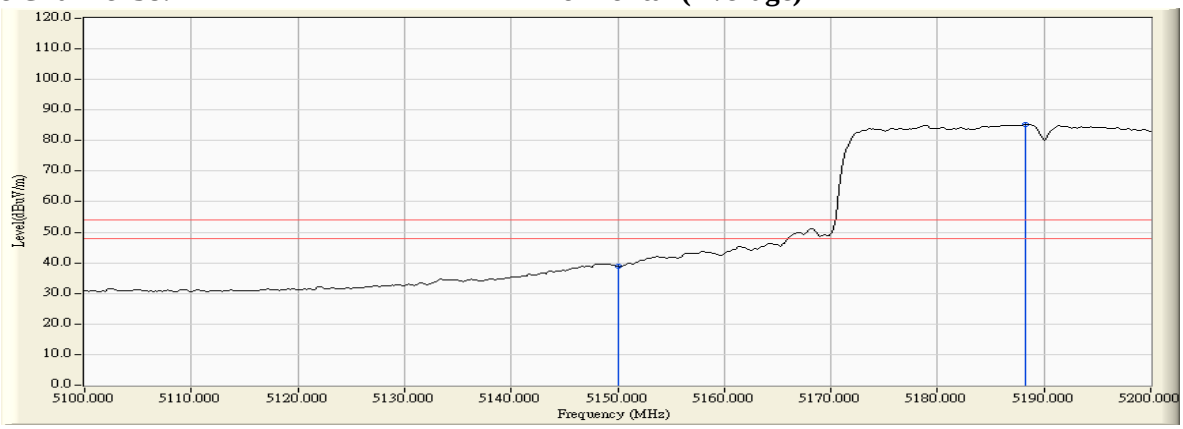


Figure Channel 38: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/21
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) -Channel 38

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
38 (Peak)	5149.710	12.390	57.864	70.253	74.00	54.00	Pass
38 (Peak)	5150.000	12.390	56.800	69.190	74.00	54.00	Pass
38 (Peak)	5186.087	12.524	98.419	110.943	--	--	--
38 (Average)	5148.406	12.385	36.259	48.643	74.00	54.00	Pass
38 (Average)	5150.000	12.390	35.220	47.610	74.00	54.00	Pass
38 (Average)	5188.261	12.531	84.066	96.598	--	--	--

Figure Channel 38: Vertical (Peak)

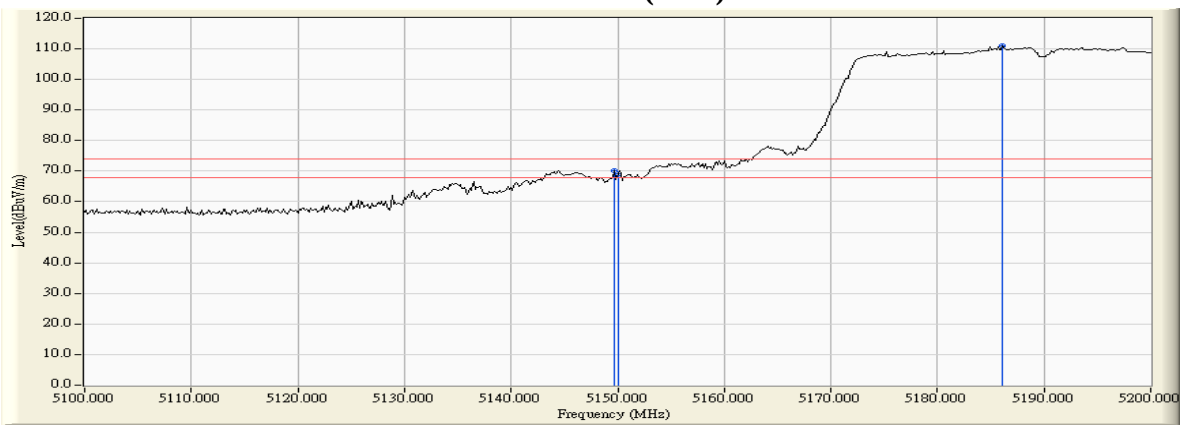
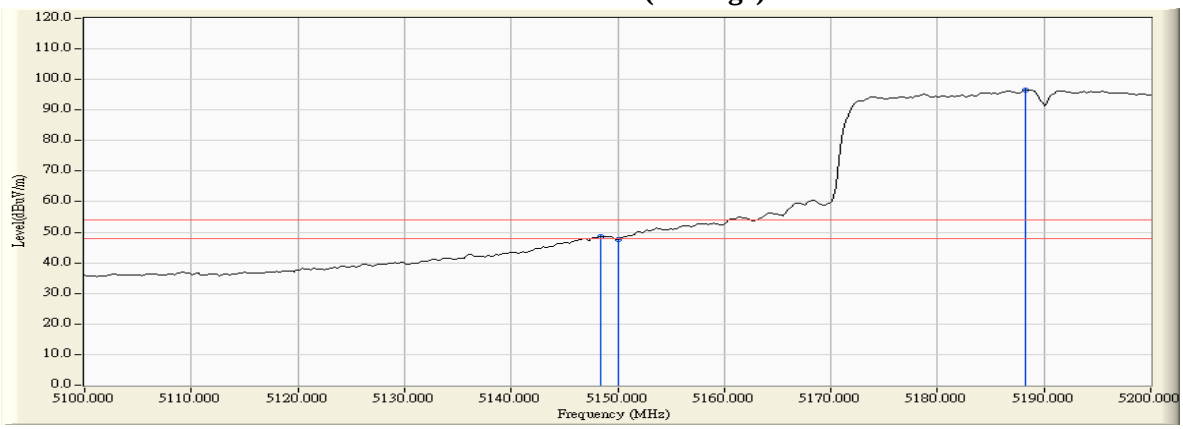


Figure Channel 38: Vertical (Average)



Note:

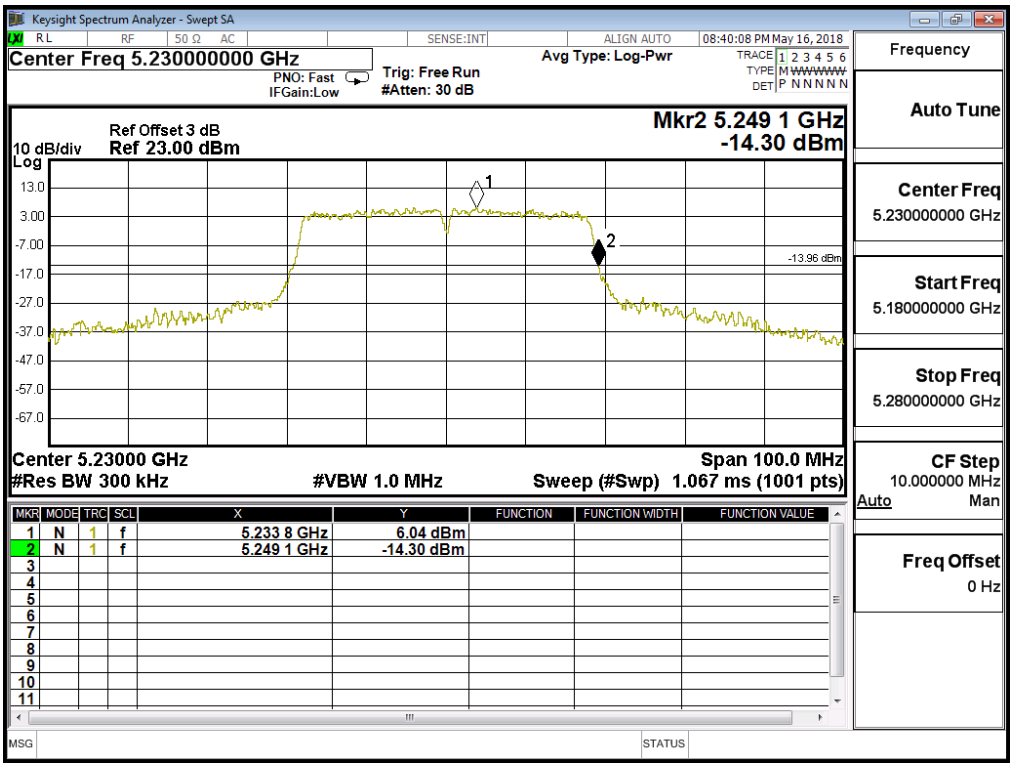
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection

Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) -Channel 46

Chain A

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5230	5249.10	<5250	PASS

NOTE: Accordance with 15.215 requirement.

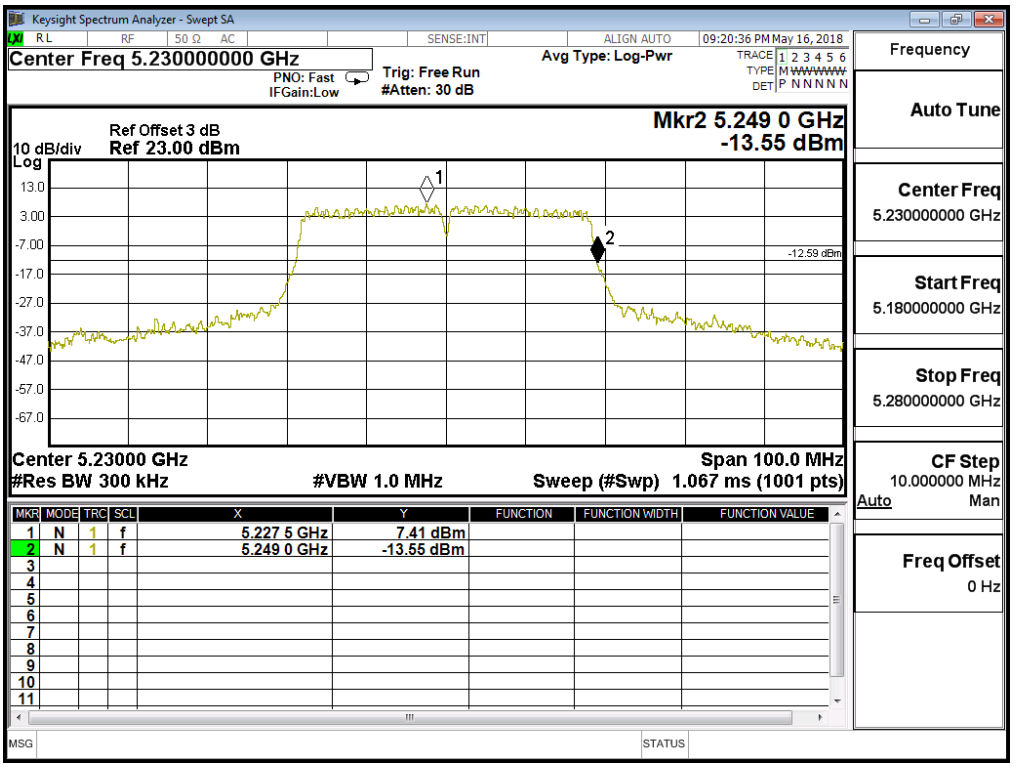


Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) -Channel 46

Chain B

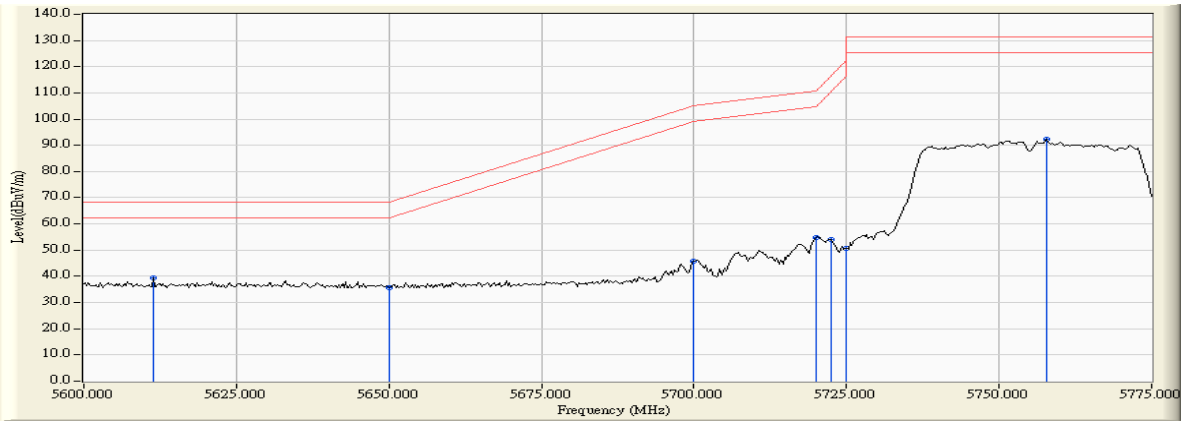
Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5230	5249.00	<5250	PASS

NOTE: Accordance with 15.215 requirement.

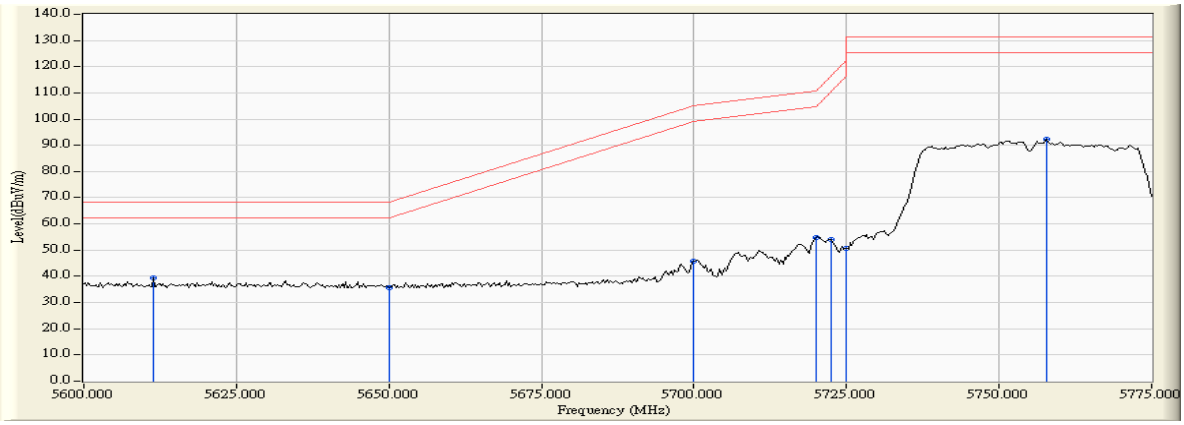


Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 3: Transmit (802.11n-40BW 30Mbps) -Channel 151

RF Radiated Measurement :



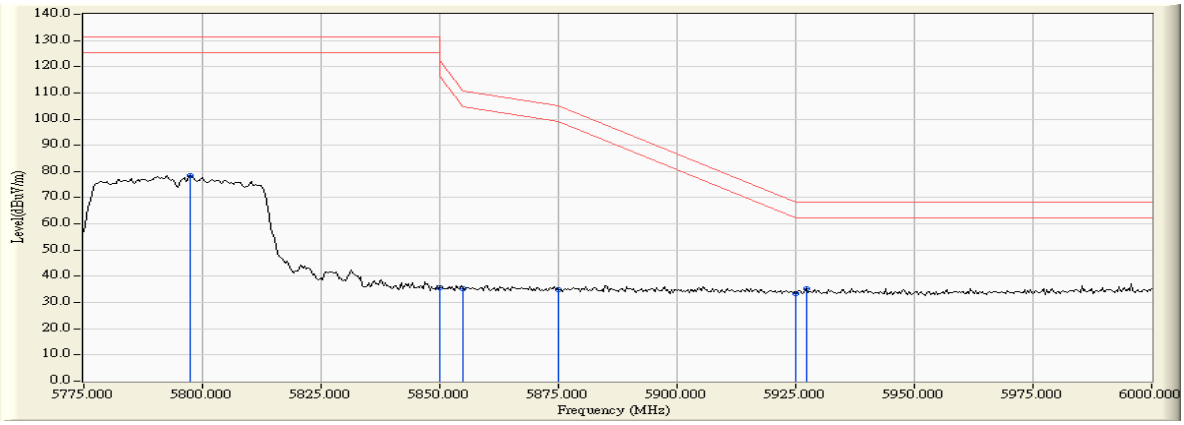
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Horizontal	5650.000	-9.369	42.996	33.627	-34.593	68.220	Pass
Horizontal	5700.000	-9.287	44.216	34.930	-70.270	105.200	Pass
Horizontal	5720.000	-9.331	53.077	43.746	-67.054	110.800	Pass
Horizontal	5725.000	-9.347	50.268	40.921	-81.279	122.200	Pass
Horizontal	5756.232	-9.453	87.311	77.858	-53.342	131.200	Pass



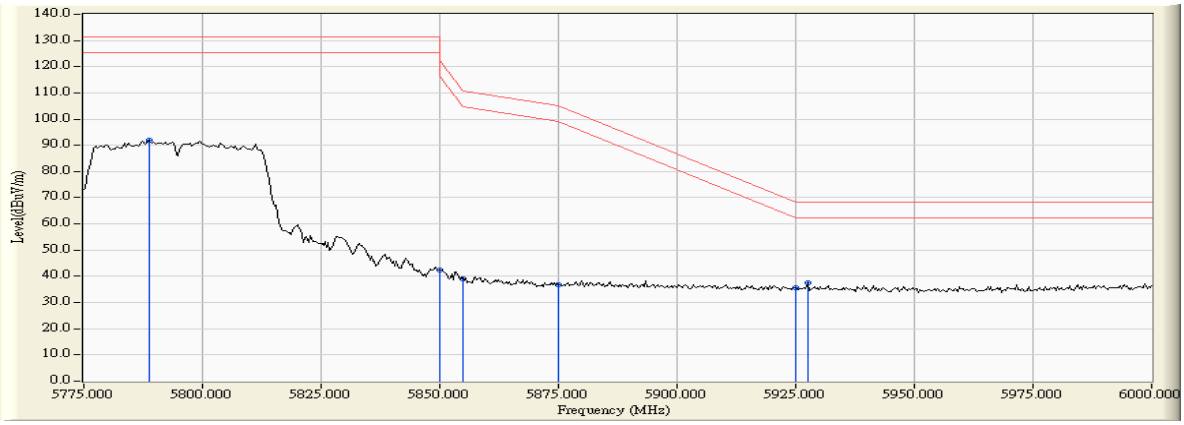
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Vertical	5611.413	-7.876	47.178	39.301	-28.919	68.220	Pass
Vertical	5650.000	-7.894	43.708	35.814	-32.406	68.220	Pass
Vertical	5700.000	-7.931	53.668	45.737	-59.463	105.200	Pass
Vertical	5720.000	-7.991	62.847	54.856	-55.944	110.800	Pass
Vertical	5722.500	-8.000	61.968	53.968	-62.532	116.500	Pass
Vertical	5725.000	-8.009	58.724	50.715	-71.485	122.200	Pass
Vertical	5757.754	-8.131	100.450	92.319	-38.881	131.200	Pass

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 3: Transmit (802.11n-40BW 30Mbps) -Channel 159

RF Radiated Measurement:



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Horizontal	5797.500	-9.574	88.014	78.439	-52.761	131.200	Pass
Horizontal	5850.000	-9.271	44.862	35.591	-86.609	122.200	Pass
Horizontal	5855.000	-9.238	44.386	35.148	-75.652	110.800	Pass
Horizontal	5875.000	-9.107	44.131	35.024	-70.176	105.200	Pass
Horizontal	5925.000	-8.928	42.420	33.493	-34.707	68.200	Pass
Horizontal	5927.283	-8.926	44.322	35.396	-32.804	68.200	Pass



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Vertical	5788.696	-8.246	100.141	91.895	-39.305	131.200	Pass
Vertical	5850.000	-8.198	50.517	42.319	-79.881	122.200	Pass
Vertical	5855.000	-8.189	47.260	39.070	-71.730	110.800	Pass
Vertical	5875.000	-8.155	44.949	36.794	-68.406	105.200	Pass
Vertical	5925.000	-8.085	43.869	35.784	-32.416	68.200	Pass
Vertical	5927.609	-8.082	45.631	37.549	-30.651	68.200	Pass

Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/21
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) -Channel 42

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
42 (Peak)	5147.536	10.477	51.674	62.151	74.00	54.00	Pass
42 (Peak)	5150.000	10.470	49.544	60.015	74.00	54.00	Pass
42 (Peak)	5194.783	10.351	86.344	96.694	--	--	--
42 (Average)	5147.101	10.478	30.796	41.274	74.00	54.00	Pass
42 (Average)	5150.000	10.470	30.050	40.521	74.00	54.00	Pass
42 (Average)	5186.812	10.377	70.243	80.620	--	--	--

Figure Channel 42: Horizontal (Peak)

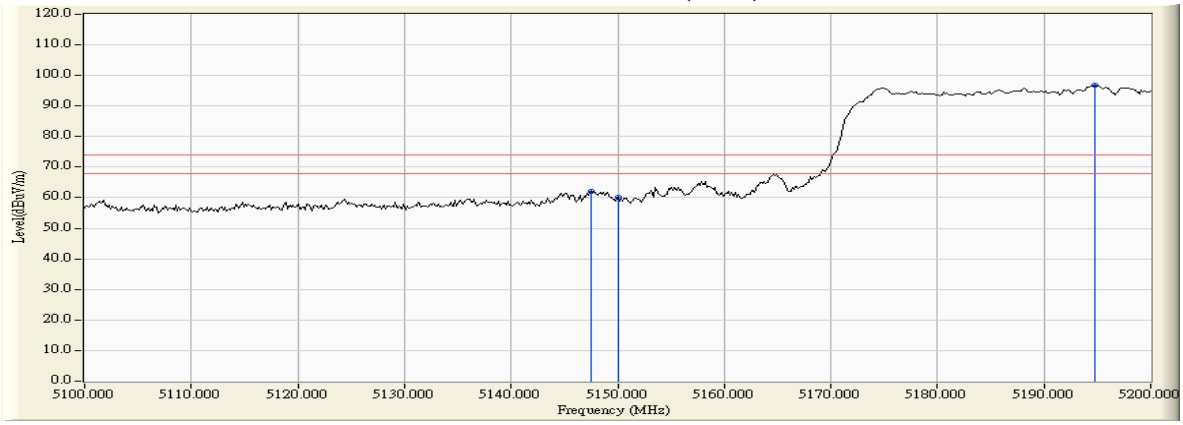
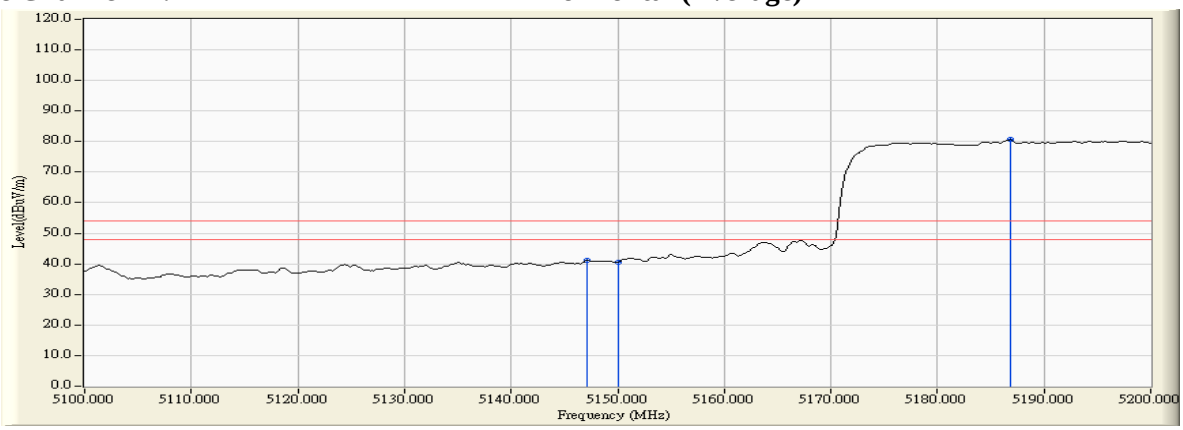


Figure Channel 42: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection

Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 4: Transmit (802.11ac-80BW 65Mbps) -Channel 42

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
42 (Peak)	5148.551	12.385	59.144	71.529	74.00	54.00	Pass
42 (Peak)	5150.000	12.390	55.208	67.598	74.00	54.00	Pass
42 (Peak)	5194.783	12.551	94.699	107.249	--	--	--
42 (Average)	5147.826	12.382	39.233	51.615	74.00	54.00	Pass
42 (Average)	5150.000	12.390	38.753	51.143	74.00	54.00	Pass
42 (Average)	5198.986	12.562	79.046	91.608	--	--	--

Figure Channel 42: Vertical (Peak)

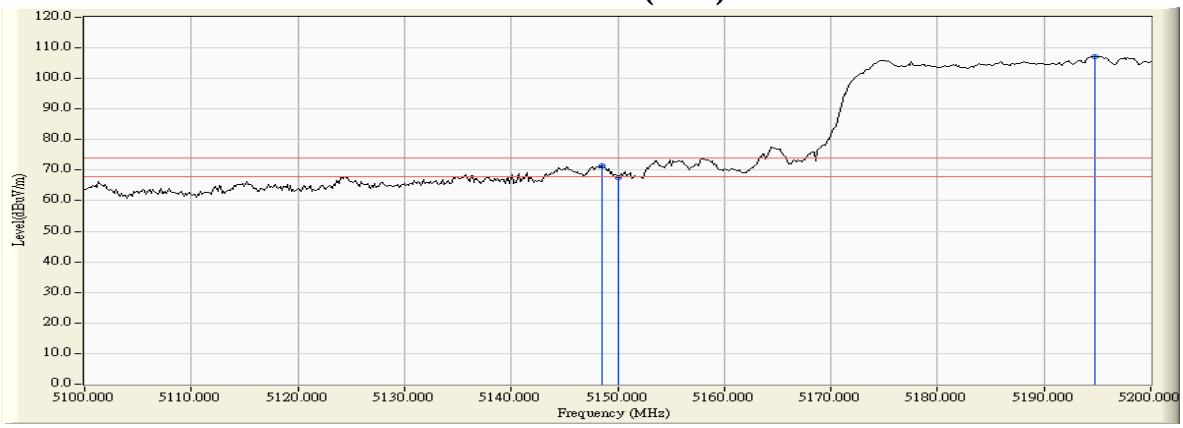
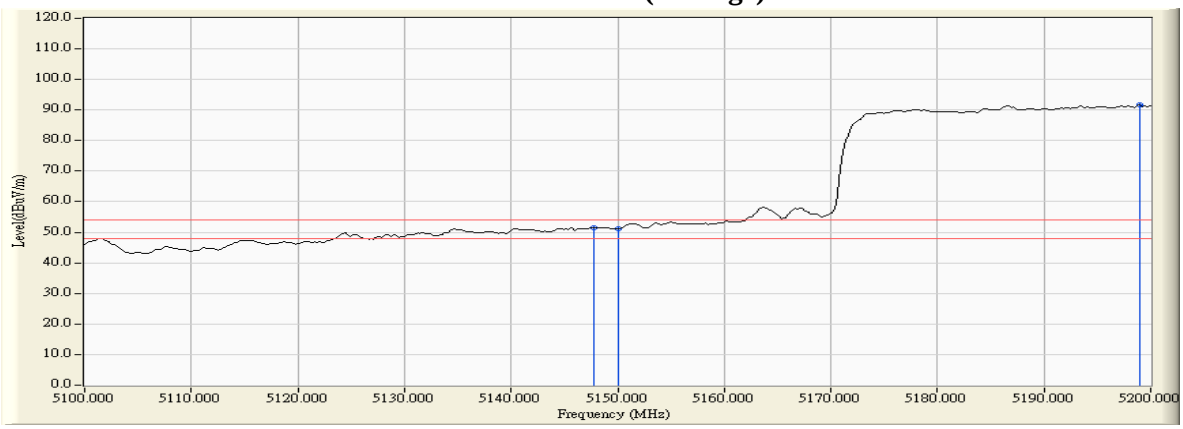


Figure Channel 42: Vertical (Average)



Note:

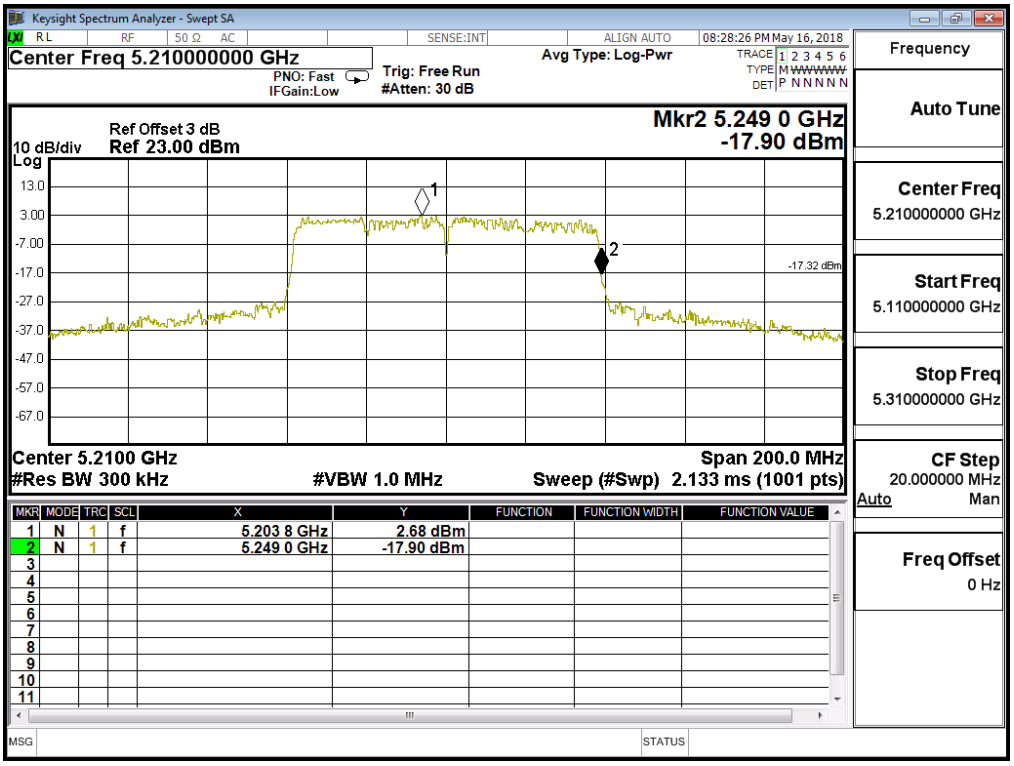
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection

Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) -Channel 42

Chain A

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5210	5249.00	<5250	PASS

NOTE: Accordance with 15.215 requirement.

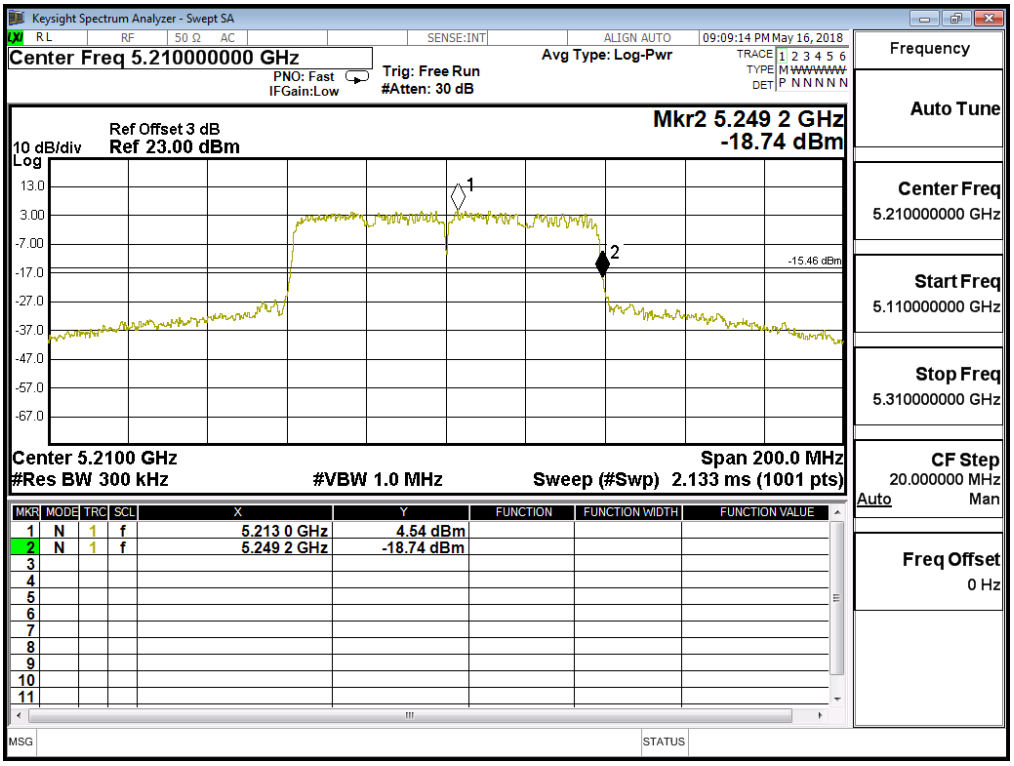


Product : Gigabit Multi-Service Broadband Router
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) -Channel 42

Chain B

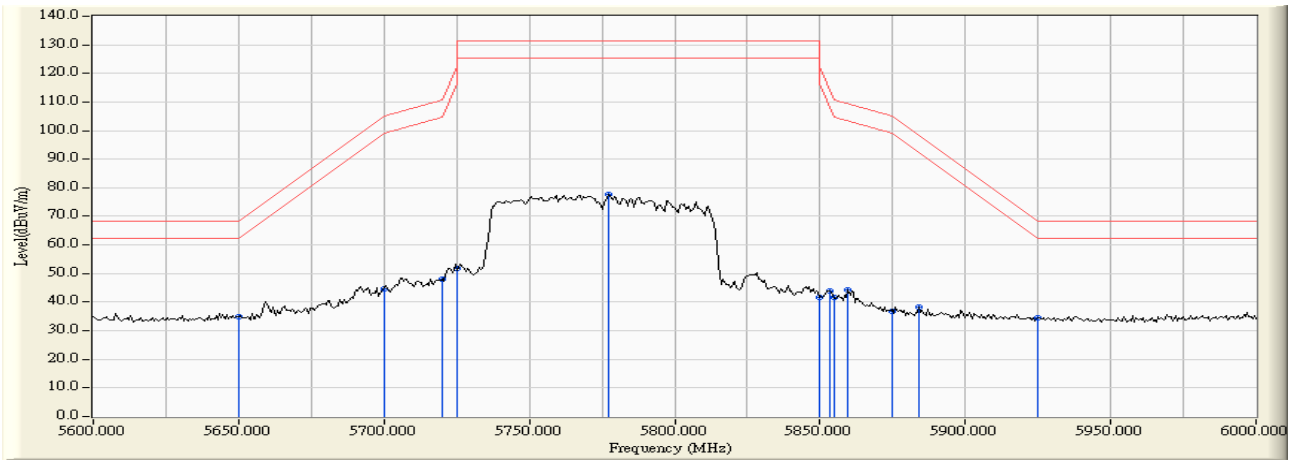
Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5210	5249.20	<5250	PASS

NOTE: Accordance with 15.215 requirement.

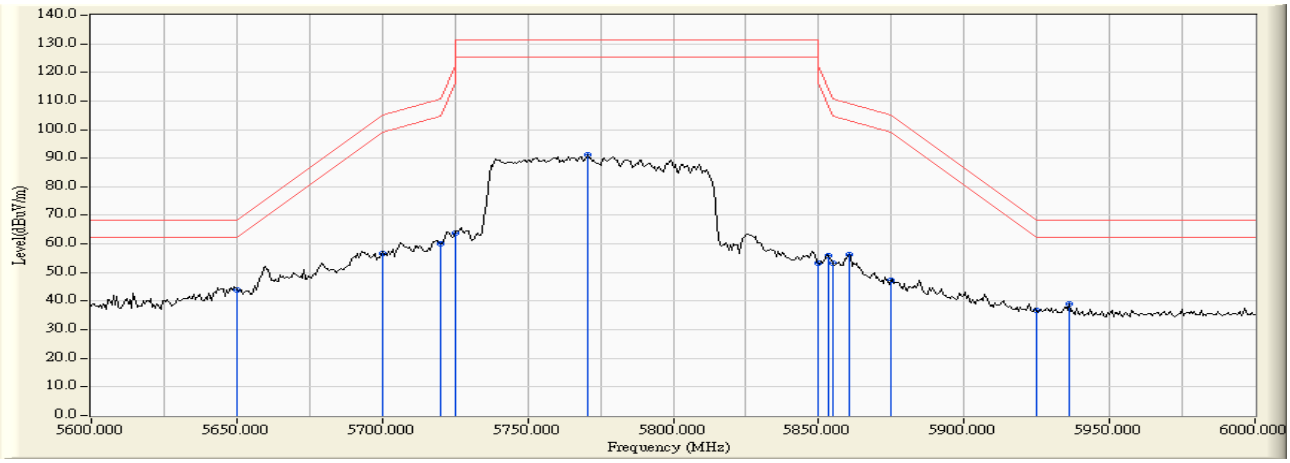


Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/21
Test Mode	:	Mode 4: Transmit (802.11ac-80BW 65Mbps)-Channel 155

RF Radiated Measurement:



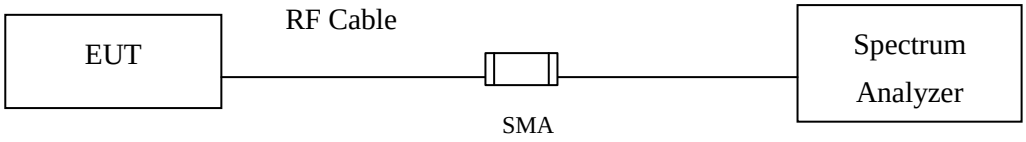
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Horizontal	5650.000	-9.369	44.291	34.922	-33.298	68.220	Pass
Horizontal	5700.000	-9.287	54.099	44.813	-60.387	105.200	Pass
Horizontal	5720.000	-9.331	57.358	48.027	-62.773	110.800	Pass
Horizontal	5725.000	-9.347	61.231	51.884	-70.316	122.200	Pass
Horizontal	5777.391	-9.525	87.042	77.517	-53.683	131.200	Pass
Horizontal	5850.000	-9.271	51.060	41.789	-80.411	122.200	Pass
Horizontal	5853.333	-9.250	53.089	43.840	-70.761	114.601	Pass
Horizontal	5855.000	-9.238	50.806	41.568	-69.232	110.800	Pass
Horizontal	5859.710	-9.207	53.500	44.292	-65.189	109.481	Pass
Horizontal	5875.000	-9.107	45.992	36.885	-68.315	105.200	Pass
Horizontal	5884.058	-9.046	47.464	38.418	-60.079	98.497	Pass
Horizontal	5925.000	-8.928	43.277	34.350	-33.850	68.200	Pass



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Measure Level (dBµV /m)	Margin (dB)	Limit (dBµV /m)	Result
Vertical	5650.000	-7.894	51.986	44.092	-24.128	68.220	Pass
Vertical	5700.000	-7.931	64.624	56.693	-48.507	105.200	Pass
Vertical	5720.000	-7.991	67.900	59.909	-50.891	110.800	Pass
Vertical	5725.000	-8.009	71.991	63.982	-58.218	122.200	Pass
Vertical	5770.435	-8.179	99.327	91.149	-40.051	131.200	Pass
Vertical	5850.000	-8.198	61.380	53.182	-69.018	122.200	Pass
Vertical	5853.333	-8.193	64.267	56.075	-58.526	114.601	Pass
Vertical	5855.000	-8.189	61.485	53.295	-57.505	110.800	Pass
Vertical	5860.290	-8.181	64.663	56.482	-52.837	109.319	Pass
Vertical	5875.000	-8.155	55.447	47.292	-57.908	105.200	Pass
Vertical	5925.000	-8.085	44.839	36.754	-31.446	68.200	Pass
Vertical	5936.232	-8.073	47.106	39.033	-29.167	68.200	Pass

7. Occupied Bandwidth

7.1. Test Setup



7.2. Limits

For the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

7.3. .Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

7.4. Uncertainty

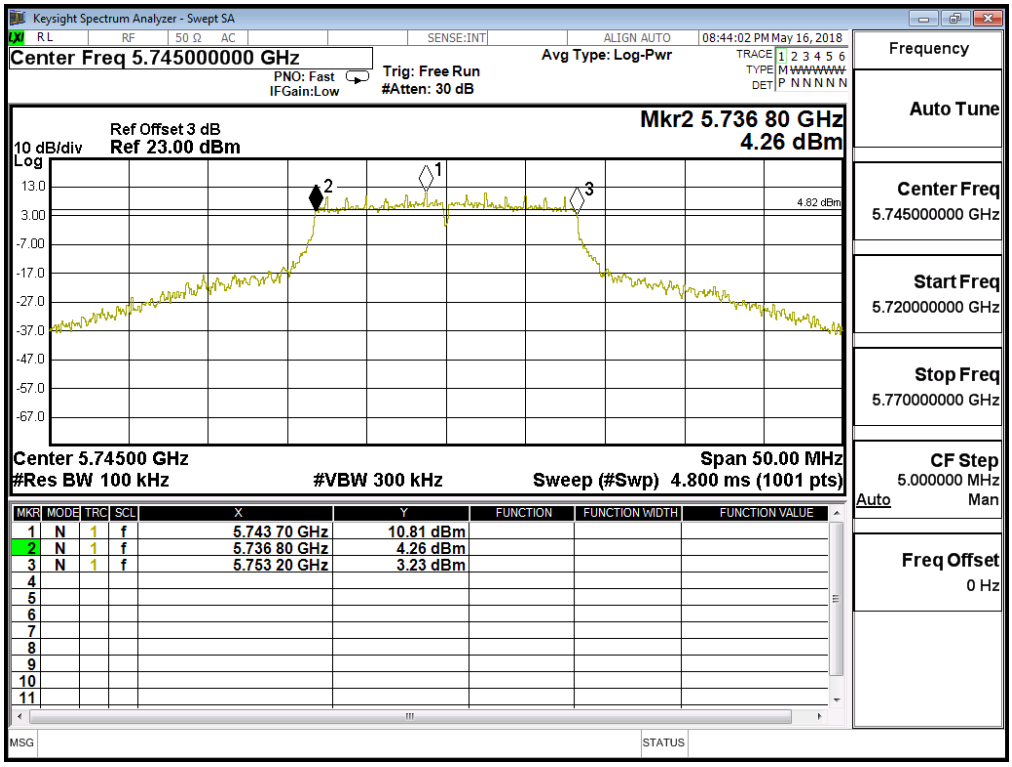
± 681.6Hz

7.5. Test Result of Occupied Bandwidth

Product : Gigabit Multi-Service Broadband Router
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5745MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745.00	16400	>500	Pass

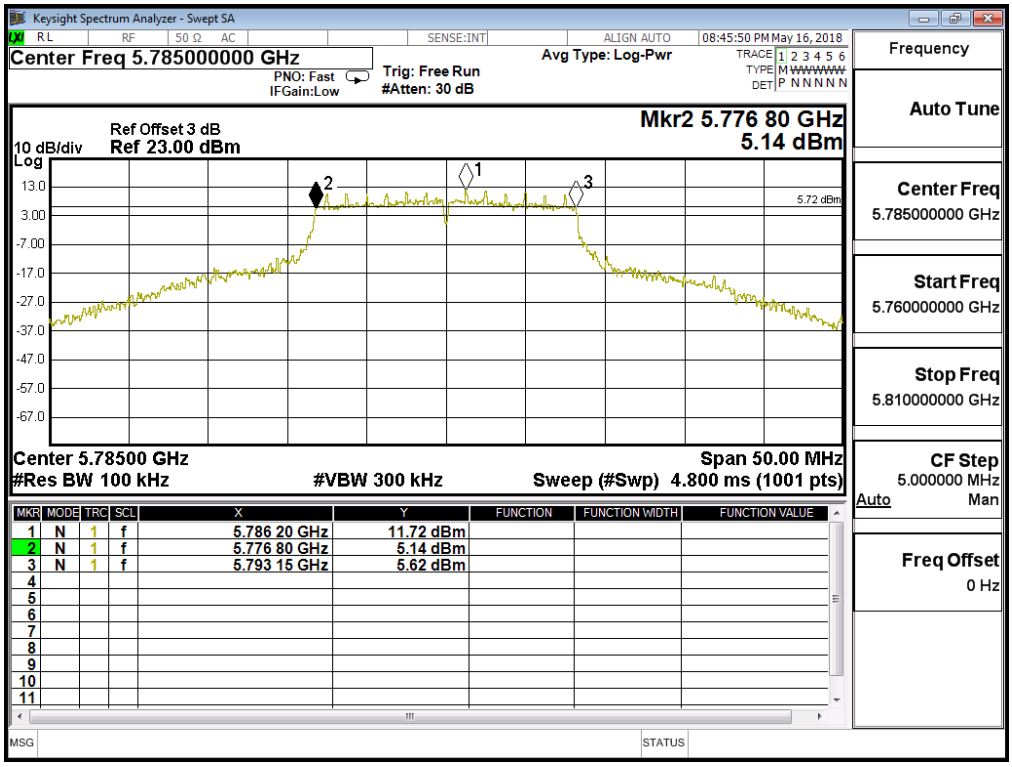
Figure Channel 149:



Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/16
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5785MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
157	5785.00	16350	>500	Pass

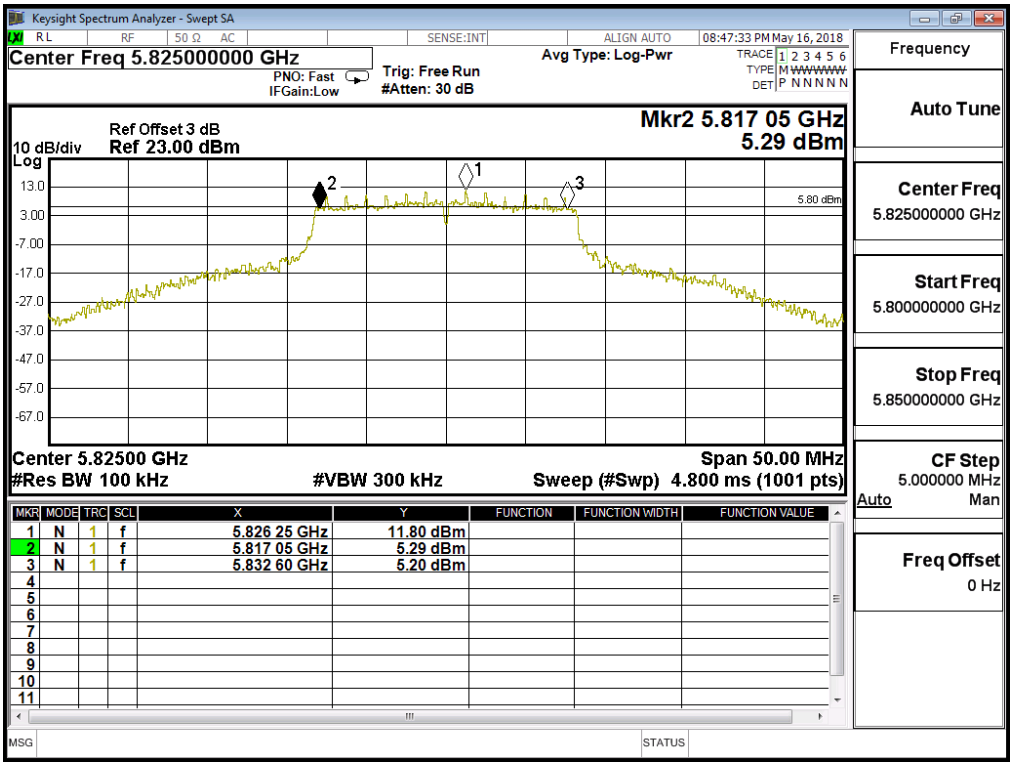
Figure Channel 157:



Product	:	Gigabit Multi-Service Broadband Router
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Date	:	2018/05/16
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5825MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165	5825.00	15550	>500	Pass

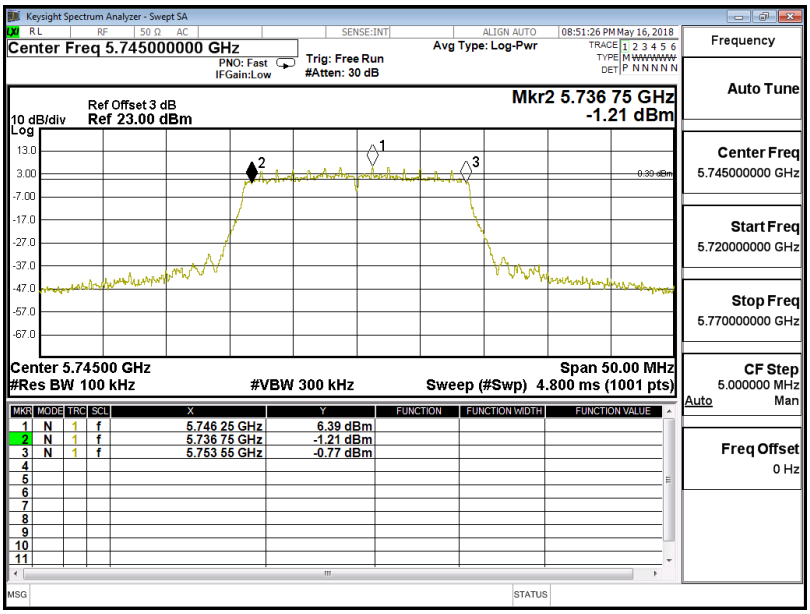
Figure Channel 165:



Product : Gigabit Multi-Service Broadband Router
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5745MHz)

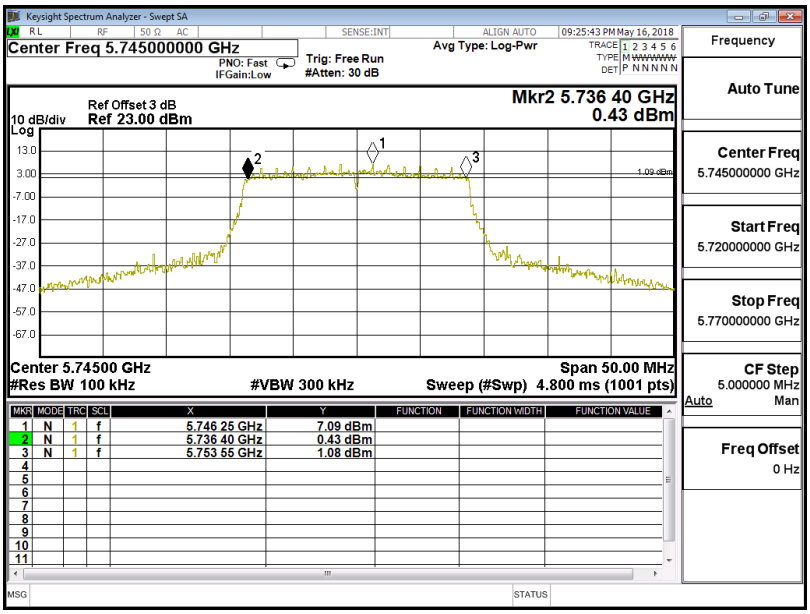
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745.00	17650	>500	Pass

Figure Channel 149: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745.00	17150	>500	Pass

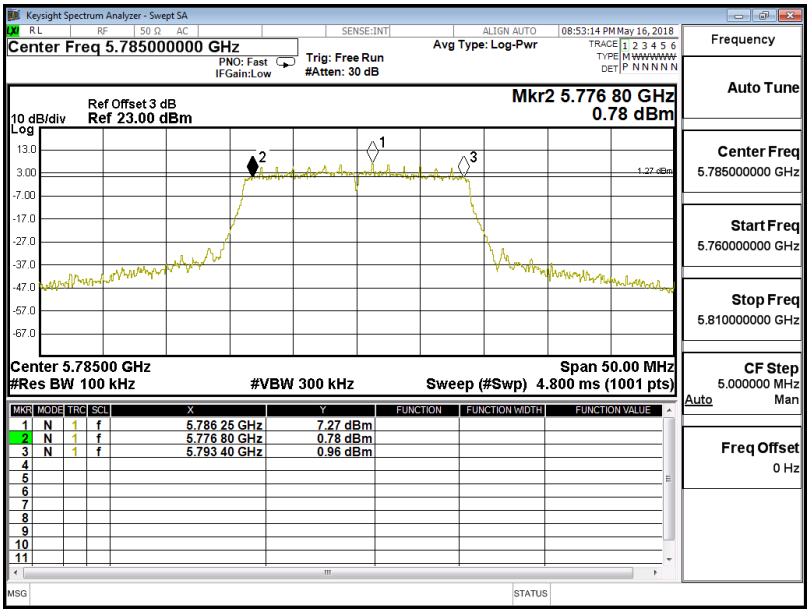
Figure Channel 149: (Chain B)



Product : Gigabit Multi-Service Broadband Router
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5785MHz)

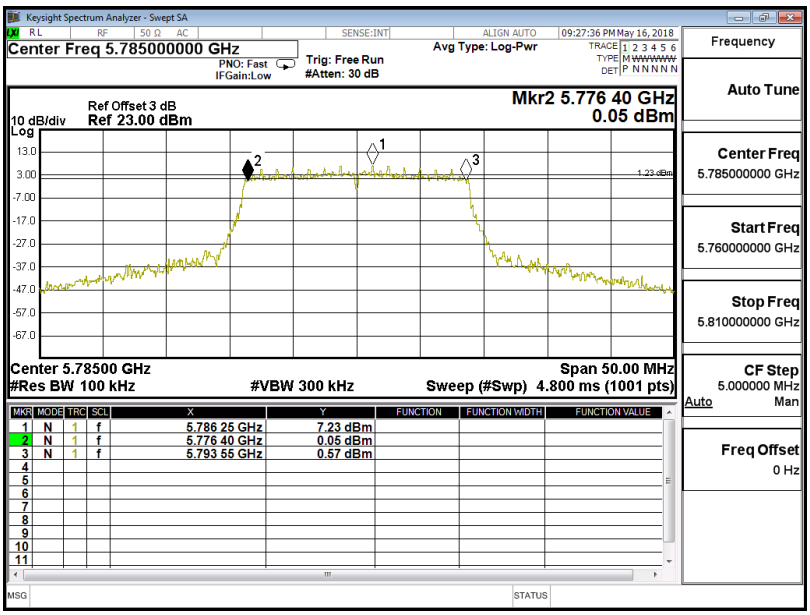
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
157	5785.00	17650	>500	Pass

Figure Channel 157: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
157	5785.00	17150	>500	Pass

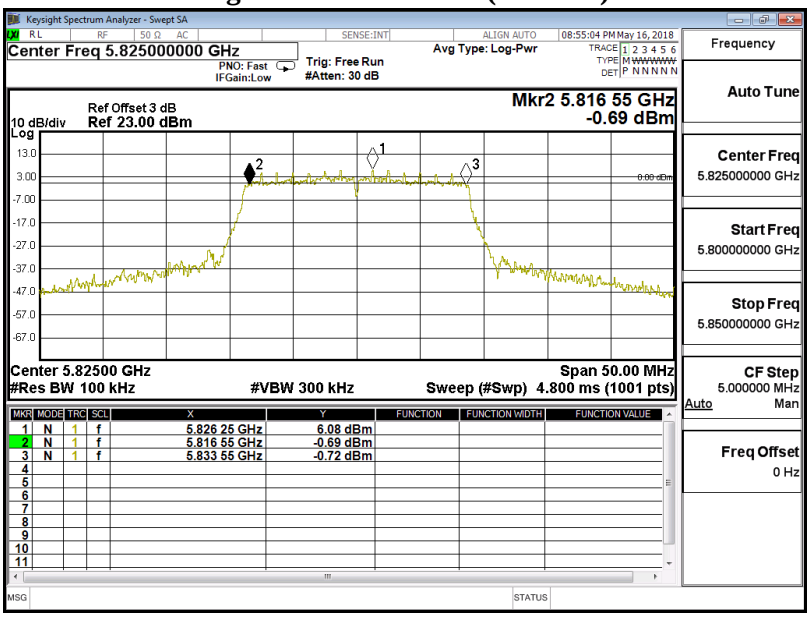
Figure Channel 157: (Chain B)



Product : Gigabit Multi-Service Broadband Router
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 2: Transmit (802.11n-20BW 14.4Mbps) (5825MHz)

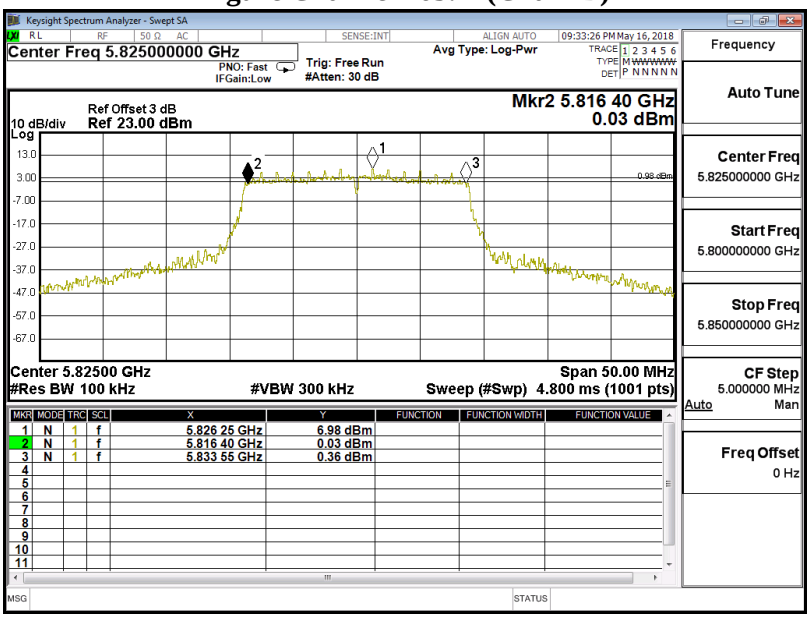
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165	5825.00	17650	>500	Pass

Figure Channel 165: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165	5825.00	17150	>500	Pass

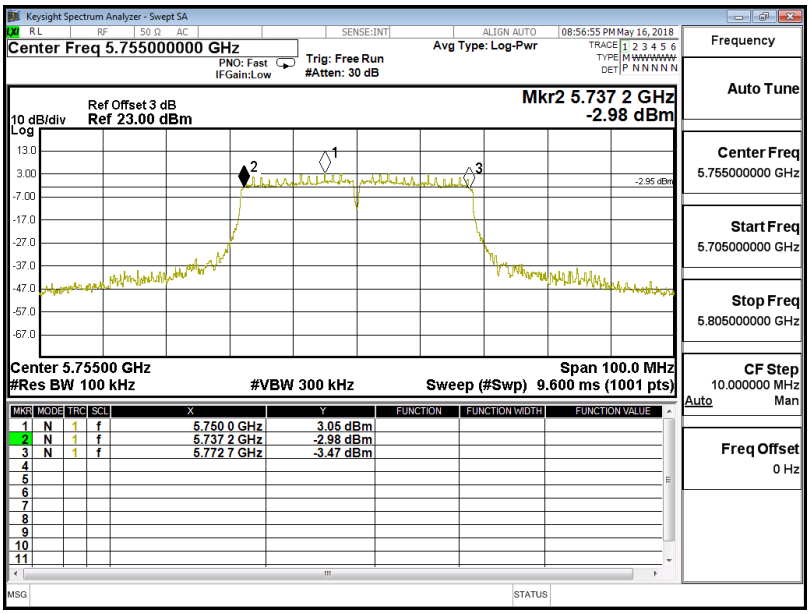
Figure Channel 165: (Chain B)



Product : Gigabit Multi-Service Broadband Router
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5755MHz)

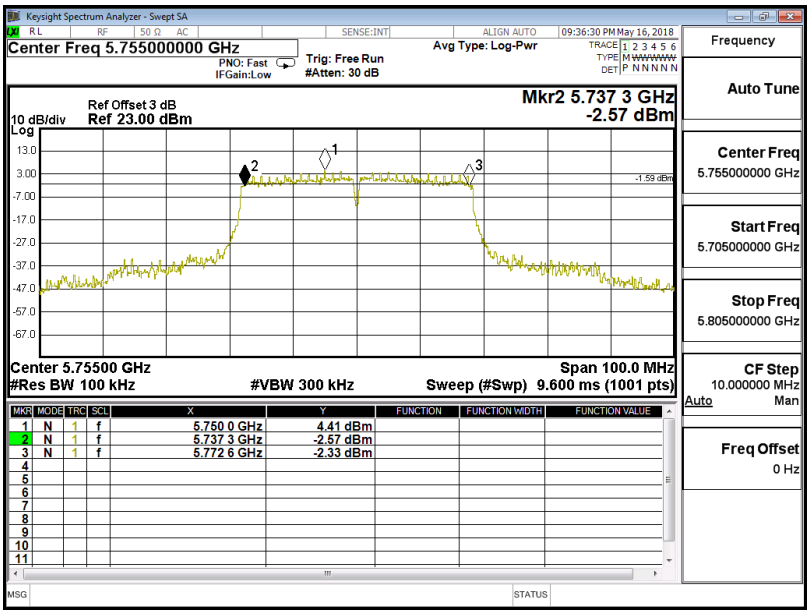
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	35500	>500	Pass

Figure Channel 151: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	35300	>500	Pass

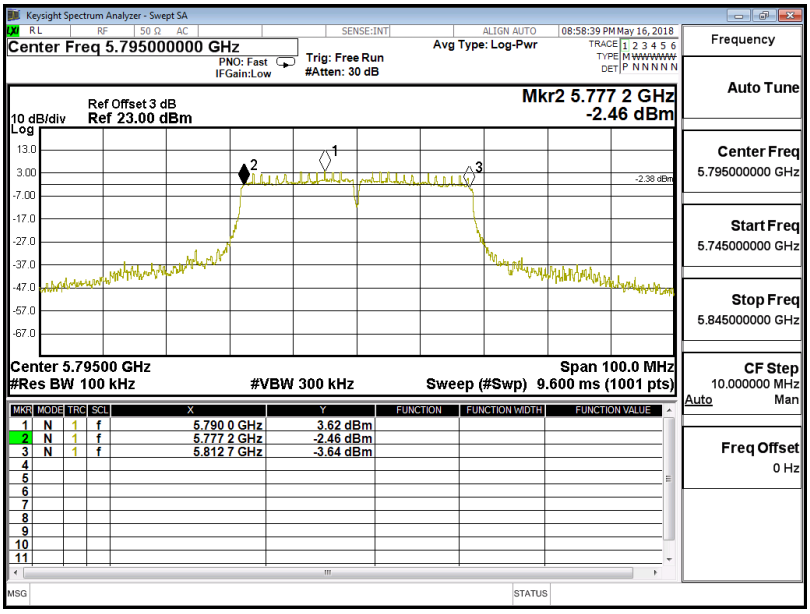
Figure Channel 151: (Chain B)



Product : Gigabit Multi-Service Broadband Router
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 3: Transmit (802.11n-40BW 30Mbps) (5795MHz)

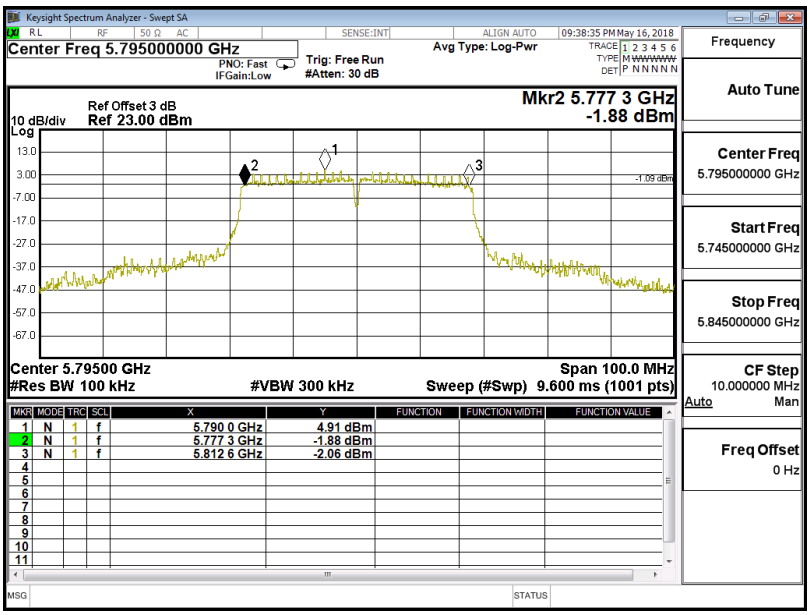
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	35500	>500	Pass

Figure Channel 159: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	35300	>500	Pass

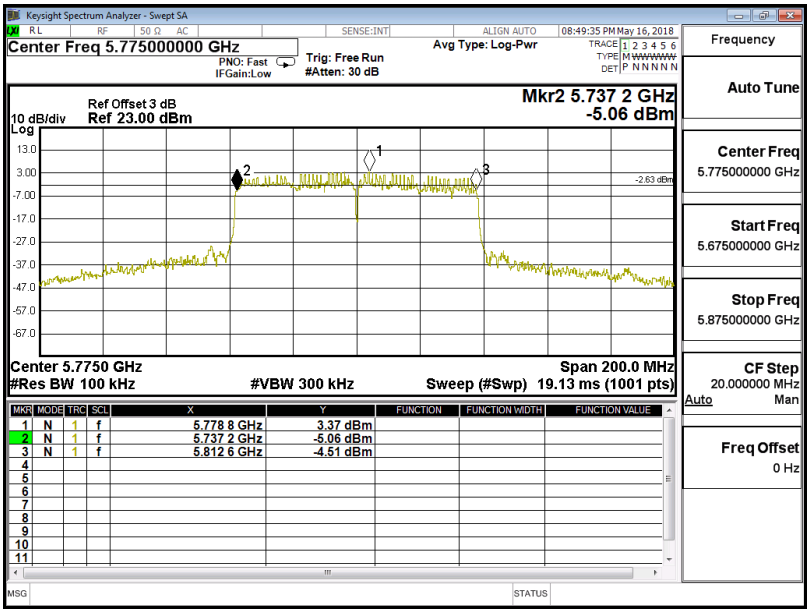
Figure Channel 159: (Chain B)



Product : Gigabit Multi-Service Broadband Router
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Date : 2018/05/16
Test Mode : Mode 4: Transmit (802.11ac-80BW 65Mbps) (5775MHz)

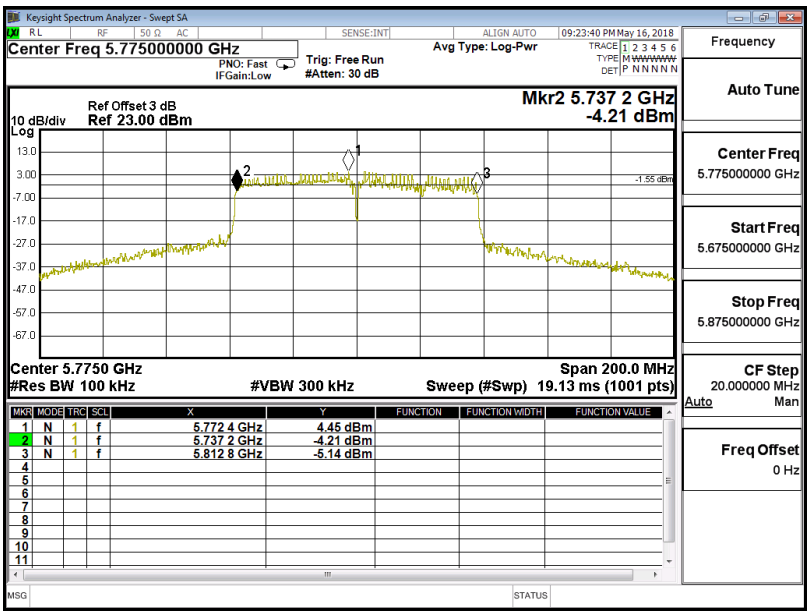
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	5775.00	75400	>500	Pass

Figure Channel 155: (Chain A)



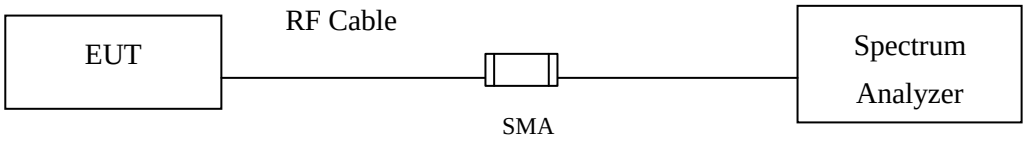
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	5775.00	75600	>500	Pass

Figure Channel 155: (Chain B)



8. Duty Cycle

8.1. Test Setup



8.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to test procedure of KDB789033 for compliance to FCC 47CFR 15.407 requirements.

8.3. Uncertainty

± 2.31msec

8.4. Test Result of Duty Cycle

Product : Gigabit Multi-Service Broadband Router
Test Item : Duty Cycle
Test Date : 2018/05/16
Test Mode : Transmit

Duty Cycle Formula:

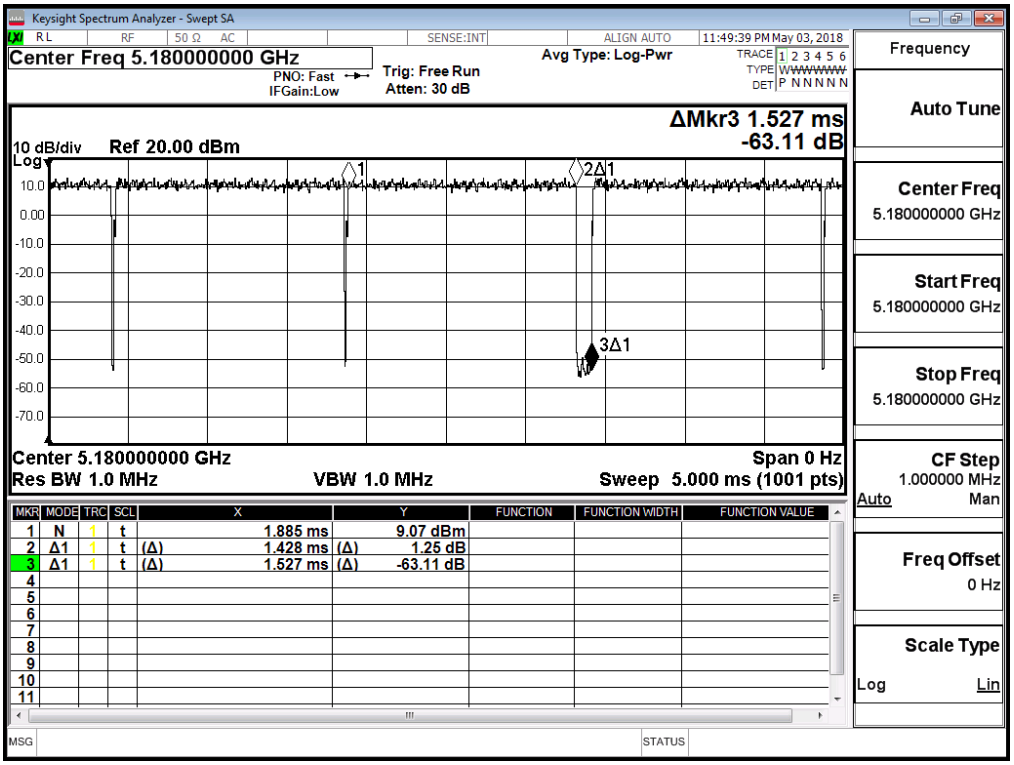
Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

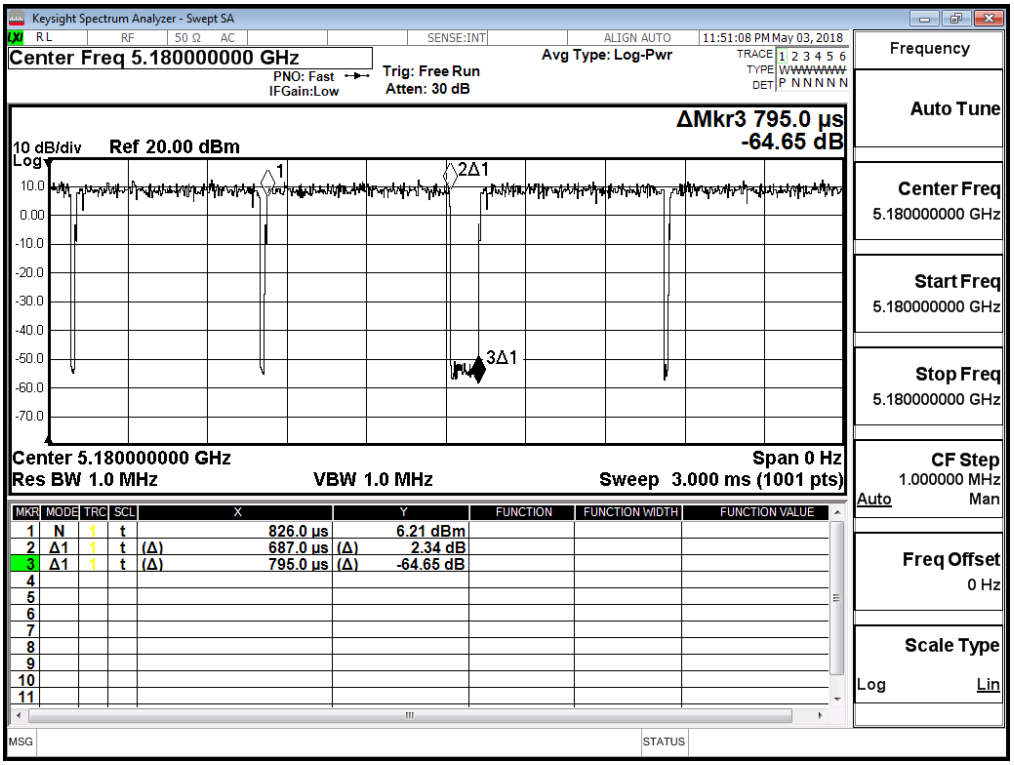
Results:

5GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	1.4280	1.5270	93.52	0.29
802.11n20	0.6870	0.7950	86.42	0.63
802.11n40	0.3390	0.3550	95.49	0.20
802.11ac80	0.3030	0.3150	96.19	0.17

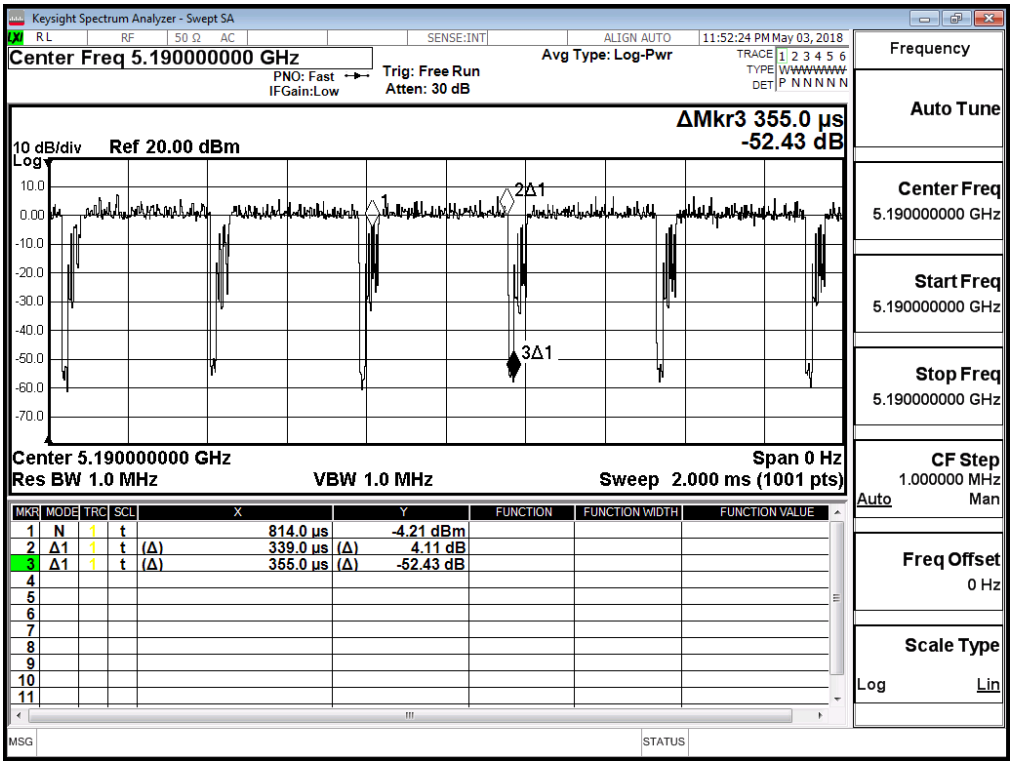
802.11a



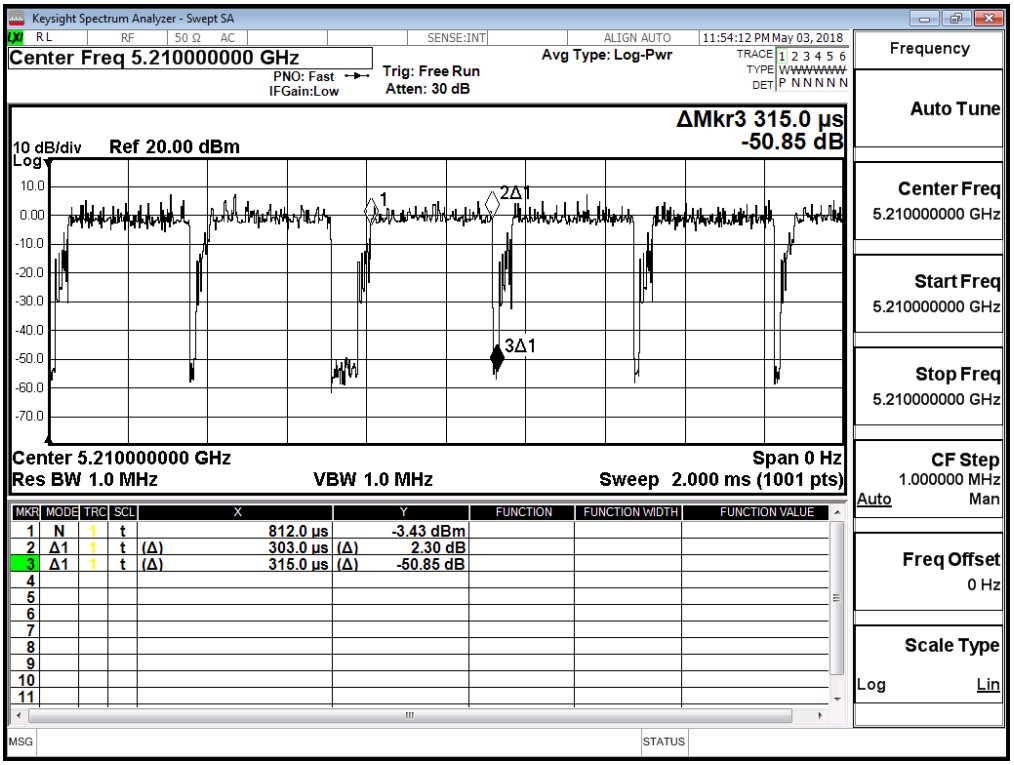
802.11n20



802.11n40



802.11ac80



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.