

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
Issue Date	Jun. 07, 2018
Report No.	1830364R-RFUSP26V00
Report Version	V1.0



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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Test Report

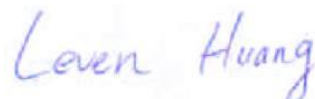
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Applicant	Billion Electric Co., Ltd.
Address	8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)
Manufacturer	Billion Electric Co., Ltd.
Model No.	MX-1200
EUT Rated Voltage	AC 100-240V, 50/60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	BEC, Billion
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Leven Huang)

Tested By :



(Engineer / Anson Lu)

Approved By :



(Director / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Gigabit Multi-Service Broadband Router
Trade Name	BEC, Billion
Model No.	MX-1200
FCC ID.	QI3BIL-MX1200
Frequency Range	802.11b/g/n-20MHz:2412-2462MHz,802.11n-40MHz:2422-2452MHz
Number of Channels	802.11b/g/n-20MHz: 11, n-40MHz: 7
Data Speed	802.11b: 1-11Mbps, 802.11a/g: 6-54Mbps, 802.11n: up to 300Mbps
Type of Modulation	802.11b:DSSS, DBPSK, DQPSK, CCK 802.11g/n: OFDM, BPSK, QPSK, 16QAM, 64QAM
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	AAZAND2S2942510000	Dipole Antenna	1.8dBi for 2.4GHz

Note: The antenna of EUT conforms to FCC 15.203.

802.11b/g/n-20MHz Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2412 MHz	Channel 02:	2417 MHz	Channel 03:	2422 MHz	Channel 04:	2427 MHz
Channel 05:	2432 MHz	Channel 06:	2437 MHz	Channel 07:	2442 MHz	Channel 08:	2447 MHz
Channel 09:	2452 MHz	Channel 10:	2457 MHz	Channel 11:	2462 MHz		

802.11n-40MHz (2.4G Band) Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 03:	2422 MHz	Channel 04:	2427 MHz	Channel 05:	2432 MHz	Channel 06:	2437 MHz
Channel 07:	2442 MHz	Channel 08:	2447 MHz	Channel 09:	2452 MHz		

Note:

1. This device is an Gigabit Multi-Service Broadband Router with a built-in WLAN transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps 、 802.11g is 6Mbps 、 802.11n(20M-BW) is 14.4Mbps and, 802.11n(40M-BW) is 30Mbps).
4. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report. (802.11b is chain B, 802.11g is chain B)
5. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum 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 (802.11b 1Mbps)
	Mode 2: Transmit (802.11g 6Mbps)
	Mode 3: Transmit - (802.11n-20BW_14.4Mbps)
	Mode 4: Transmit - (802.11n-40BW_30Mbps)

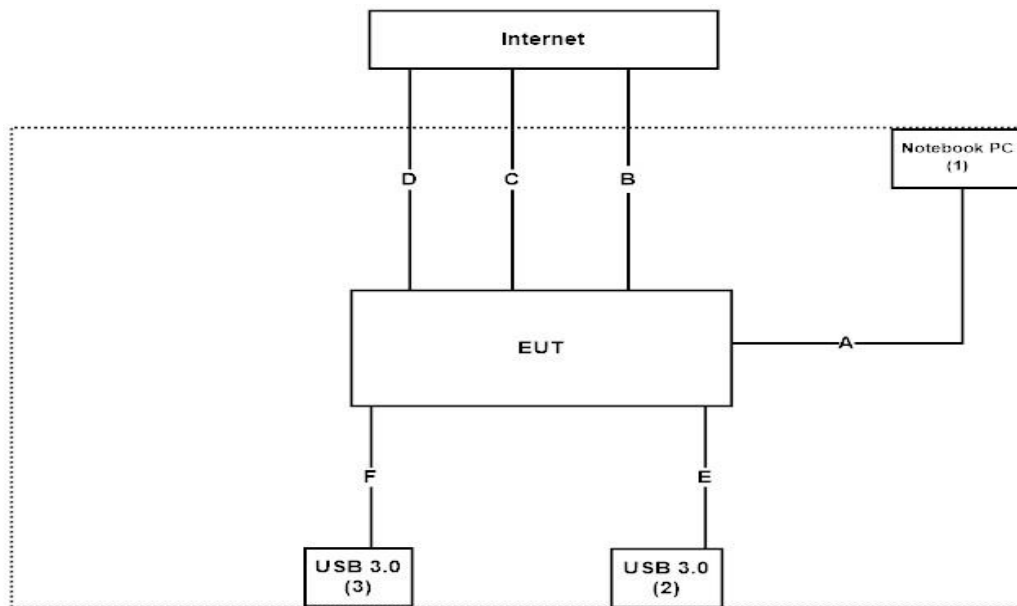
1.3. Tested System Details

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	TS1T5M3	C13890-3746	N/A
(3) USB 3.0(1T)	Transcend	TS1T5M3	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 “7603 QA V0.0.0.00” 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

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Accredited Number: 3023

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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

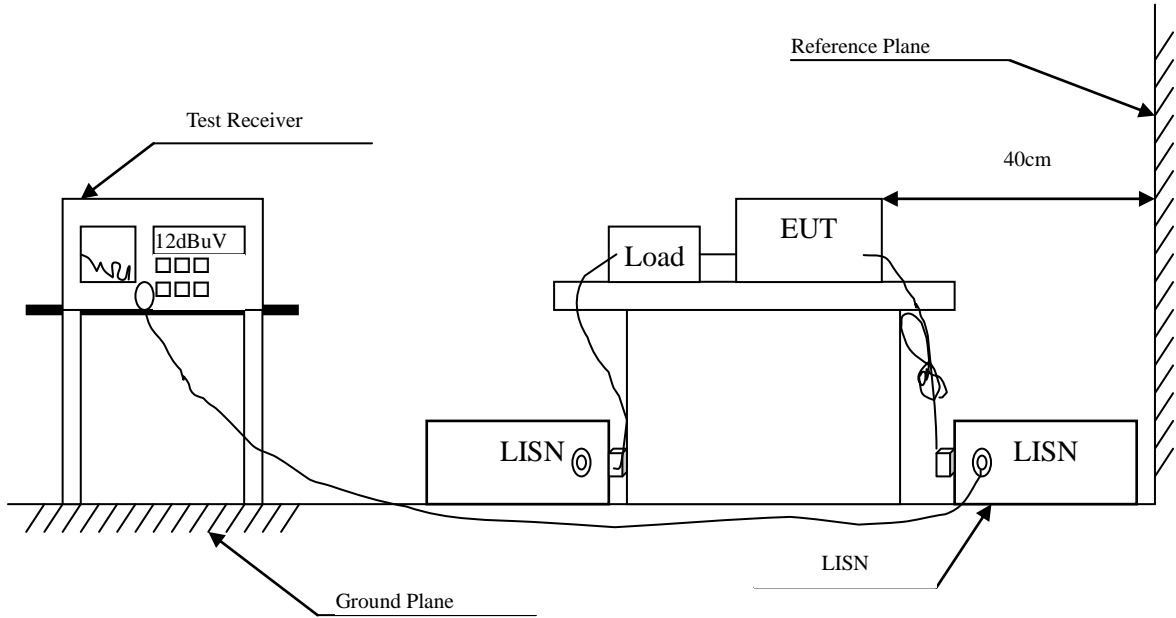
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2018/3/12	2019/3/11
X	Loop Antenna	Teseq	HLA6121	37133	2017/10/13	2018/10/12
X	Bilog Antenna	Schaffner Chase	CBL6112B	2707	2017/06/25	2018/06/24
X	Coaxial Cable	DEKRA	RG 214	LC003-RG	2017/06/15	2018/06/14
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 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

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 investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

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 - (802.11n-40BW_30Mbps) (2437MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.154	9.681	40.320	50.001	-15.885	65.886
0.193	9.672	34.580	44.252	-20.519	64.771
0.298	9.678	34.920	44.598	-17.173	61.771
0.326	9.680	34.780	44.460	-16.511	60.971
1.154	9.743	21.900	31.643	-24.357	56.000
2.212	9.810	22.960	32.770	-23.230	56.000
Average					
0.154	9.681	23.560	33.241	-22.645	55.886
0.193	9.672	17.300	26.972	-27.799	54.771
0.298	9.678	27.200	36.878	-14.893	51.771
0.326	9.680	26.360	36.040	-14.931	50.971
1.154	9.743	13.380	23.123	-22.877	46.000
2.212	9.810	14.250	24.060	-21.940	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 - (802.11n-40BW_30Mbps) (2437MHz)

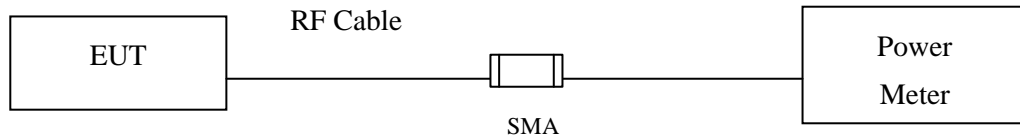
Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.150	9.672	42.140	51.812	-14.188	66.000
0.189	9.671	35.540	45.211	-19.675	64.886
0.236	9.674	32.740	42.414	-21.129	63.543
0.322	9.670	35.220	44.890	-16.196	61.086
1.470	9.753	18.760	28.513	-27.487	56.000
2.259	9.811	19.940	29.751	-26.249	56.000
Average					
0.150	9.672	25.860	35.532	-20.468	56.000
0.189	9.671	19.170	28.841	-26.045	54.886
0.236	9.674	23.510	33.184	-20.359	53.543
0.322	9.670	25.720	35.390	-15.696	51.086
1.470	9.753	9.860	19.613	-26.387	46.000
2.259	9.811	10.780	20.591	-25.409	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. Maximum Conducted Power

3.1. Test Setup



3.2. Limits

The maximum average power shall be less 1 Watt. (Section 15.247 (b)(3))

3.3. Test Procedure

Tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

3.4. Uncertainty

± 1.19 dB

3.5. Test Result of Maximum Conducted Power

Product : Gigabit Multi-Service Broadband Router
 Test Item : Maximum Conducted Power
 Test Site : No.3 OATS
 Test Date : 2018/05/10
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11			
		Measurement Level (dBm)						
01	2412	18.05	--	--	--	19.98	<30dBm	Pass
06	2437	18.18	18.11	18.05	18.08	20.07	<30dBm	Pass
11	2462	17.85	--	--	--	19.67	<30dBm	Pass

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

CHAIN B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11			
		Measurement Level (dBm)						
01	2412	18.23	--	--	--	20.11	<30dBm	Pass
06	2437	18.36	18.28	18.22	18.15	20.21	<30dBm	Pass
11	2462	17.97	--	--	--	19.82	<30dBm	Pass

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

Product : Gigabit Multi-Service Broadband Router
 Test Item : Maximum Conducted Power
 Test Site : No.3 OATS
 Test Date : 2018/05/10
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54			
		Measurement Level (dBm)										
01	2412	17.75	--	--	--	--	--	--	--	27.47	<30dBm	Pass
06	2437	19.61	19.53	19.47	19.41	19.35	19.28	19.22	19.15	29.52	<30dBm	Pass
11	2462	17.25	--	--	--	--	--	--	--	16.23	<30dBm	Pass

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

CHAIN B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54			
		Measurement Level (dBm)										
01	2412	17.87	--	--	--	--	--	--	--	27.61	<30dBm	Pass
06	2437	19.75	19.68	19.62	19.55	19.47	19.41	19.35	19.27	29.65	<30dBm	Pass
11	2462	17.42	--	--	--	--	--	--	--	26.37	<30dBm	Pass

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

Product : Gigabit Multi-Service Broadband Router
 Test Item : Maximum Conducted Power
 Test Site : No.3 OATS
 Test Date : 2018/05/10
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps)

CHAIN A

Channel No	Frequency (MHz)	Average Power								Peak Power
		For different Data Rate (Mbps)								
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
Measurement Level (dBm)										
01	2412	13.25	--	--	--	--	--	--	--	23.47
06	2437	15.05	14.98	14.92	14.85	14.77	14.71	14.65	14.58	23.62
11	2462	14.97	--	--	--	--	--	--	--	23.71

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

CHAIN B

Channel No	Frequency (MHz)	Average Power								Peak Power
		For different Data Rate (Mbps)								
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	
Measurement Level (dBm)										
01	2412	12.49	--	--	--	--	--	--	--	22.37
06	2437	14.43	14.37	14.31	14.23	14.15	14.07	14.01	13.95	23.45
11	2462	15.07	--	--	--	--	--	--	--	23.65

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

CHAIN A+B

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
1	2412	14.4	23.47	22.37	25.97	<30dBm	Pass
6	2437	14.4	23.62	23.45	26.55	<30dBm	Pass
11	2462	14.4	23.71	23.65	26.69	<30dBm	Pass

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : Gigabit Multi-Service Broadband Router
 Test Item : Maximum Conducted Power
 Test Site : No.3 OATS
 Test Date : 2018/05/10
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps)

CHAIN A

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power
		30	60	90	120	180	240	270	300	
		Measurement Level (dBm)								
3	2422	14.06	--	--	--	--	--	--	--	24.21
6	2437	14.74	14.66	14.61	14.53	14.47	14.41	14.35	14.27	23.65
9	2452	14.49	--	--	--	--	--	--	--	23.55

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

CHAIN B

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power
		30	60	90	120	180	240	270	300	
		Measurement Level (dBm)								
3	2422	13.85	--	--	--	--	--	--	--	23.27
6	2437	14.21	14.13	14.05	13.98	13.92	13.85	13.77	13.71	23.99
9	2452	14.27	--	--	--	--	--	--	--	23.65

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

CHAIN A+B

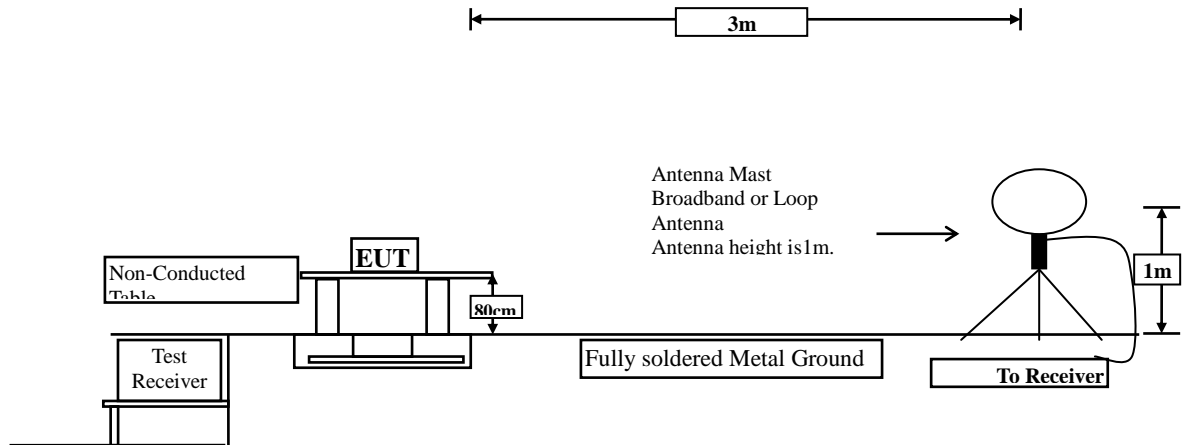
Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
3	2422	30	24.21	23.27	26.78	<30dBm	Pass
6	2437	30	23.65	23.99	26.83	<30dBm	Pass
9	2452	30	23.55	23.65	26.61	<30dBm	Pass

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

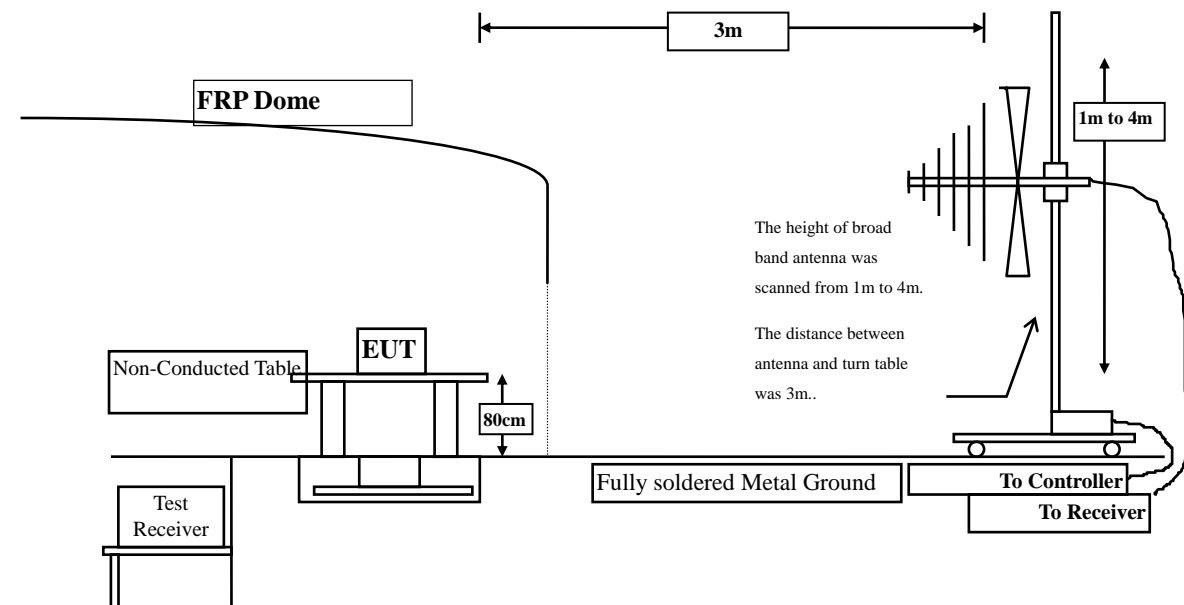
4. Radiated Emission

4.1. Test Setup

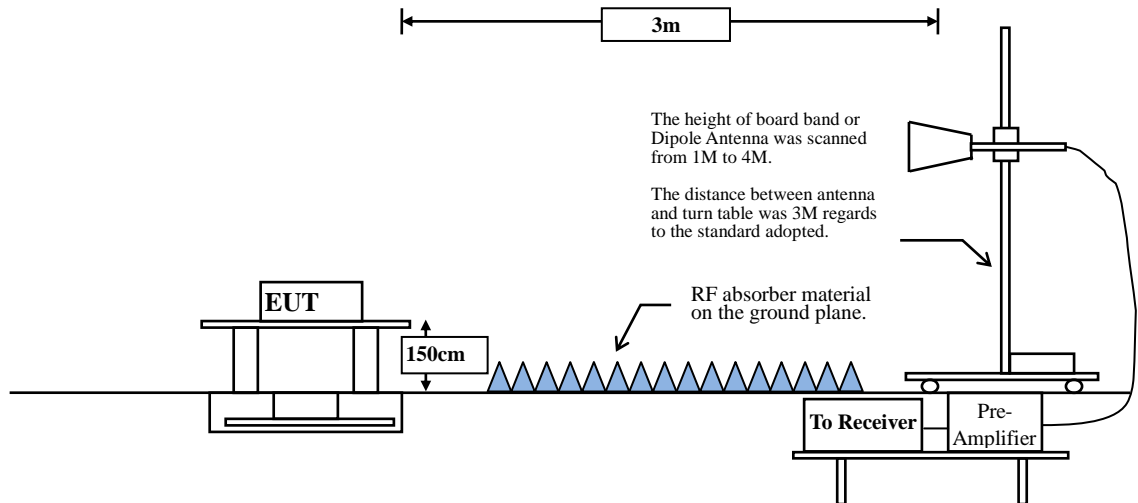
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.2. 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 (dBuV/m) = 20 log E field strength (uV/m)

4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 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 from 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq 98\%$

$VBW \geq 1/T$, 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.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11b	98.83	--	--	10
802.11g	89.94	1.3850	722	1000
802.11n20	89.26	0.6650	1504	2000
802.11n40	66.31	0.3130	3195	3000

Note: Duty Cycle Refer to Section 9

4.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

4.5. 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 (802.11b 1Mbps) (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	-9.979	46.900	36.921	-37.079	74.000
7236.000	-4.641	45.990	41.350	-32.650	74.000
9648.000	-1.835	43.430	41.594	-32.406	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	-6.819	51.280	44.462	-29.538	74.000
7236.000	-3.796	52.280	48.484	-25.516	74.000
9648.000	-1.365	43.940	42.575	-31.425	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 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	-10.271	46.250	35.978	-38.022	74.000
7311.000	-3.853	45.550	41.696	-32.304	74.000
9748.000	-2.526	43.630	41.104	-32.896	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	-7.497	48.600	41.102	-32.898	74.000
7311.000	-3.018	45.370	42.351	-31.649	74.000
9748.000	-2.035	43.270	41.235	-32.765	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 1: Transmit (802.11b 1Mbps) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	-10.519	45.650	35.130	-38.870	74.000
7386.000	-3.876	44.590	40.714	-33.286	74.000
9848.000	-2.581	44.610	42.029	-31.971	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	-7.856	51.610	43.753	-30.247	74.000
7386.000	-2.749	44.290	41.541	-32.459	74.000
9848.000	-2.066	44.530	42.464	-31.536	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 (802.11g 6Mbps) (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	-9.979	46.830	36.851	-37.149	74.000
7236.000	-4.641	47.090	42.450	-31.550	74.000
9648.000	-1.835	42.880	41.044	-32.956	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	-6.819	52.880	46.062	-27.938	74.000
7236.000	-3.796	47.510	43.714	-30.286	74.000
9648.000	-1.365	43.290	41.925	-32.075	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 (802.11g 6Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	-10.271	45.760	35.488	-38.512	74.000
7311.000	-3.853	45.110	41.256	-32.744	74.000
9748.000	-2.526	42.770	40.244	-33.756	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	-7.497	51.470	43.972	-30.028	74.000
7311.000	-3.018	45.870	42.851	-31.149	74.000
9748.000	-2.035	43.150	41.115	-32.885	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 (802.11g 6Mbps) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	-10.519	46.322	35.802	-38.198	74.000
7386.000	-3.876	44.250	40.374	-33.626	74.000
9848.000	-2.581	44.070	41.489	-32.511	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	-7.856	51.230	43.373	-30.627	74.000
7386.000	-2.749	44.750	42.001	-31.999	74.000
9848.000	-2.066	44.370	42.304	-31.696	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-20BW_14.4Mbps) (2412MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4824.000	-9.979	46.260	36.281	-37.719	74.000
7236.000	-4.641	45.730	41.090	-32.910	74.000
9648.000	-1.835	43.430	41.594	-32.406	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	-6.819	52.740	45.922	-28.078	74.000
7236.000	-3.796	45.620	41.824	-32.176	74.000
9648.000	-1.365	43.370	42.005	-31.995	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-20BW_14.4Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	-10.271	46.170	35.898	-38.102	74.000
7311.000	-3.853	45.490	41.636	-32.364	74.000
9748.000	-2.526	42.560	40.034	-33.966	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	-7.497	51.320	43.822	-30.178	74.000
7311.000	-3.018	45.880	42.861	-31.139	74.000
9748.000	-2.035	43.320	41.285	-32.715	74.000
Average Detector:					
--					

Note:

- All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- Measurement Level = Reading Level + Correct Factor.
- Correct Factor = Antenna factor + Cable loss – Amplifier gain.
- The average measurement was not performed when the peak measured data under the limit of average detection.
- 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-20BW_14.4Mbps) (2462 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4924.000	-10.519	45.940	35.420	-38.580	74.000
7386.000	-3.876	44.210	40.334	-33.666	74.000
9848.000	-2.581	44.380	41.799	-32.201	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	-6.819	51.690	44.872	-29.128	74.000
7386.000	-2.749	44.170	41.421	-32.579	74.000
9848.000	-2.066	44.114	42.048	-31.952	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 - (802.11n-40BW_30Mbps) (2422MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4844.000	-10.096	46.110	36.014	-37.986	74.000
7266.000	-4.271	45.700	41.429	-32.571	74.000
9688.000	-2.204	43.630	41.427	-32.573	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4844.000	-7.089	51.650	44.560	-29.440	74.000
7266.000	-3.451	45.190	41.739	-32.261	74.000
9688.000	-1.661	43.710	42.050	-31.950	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 : 2018/05/23
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4874.000	-10.271	57.950	47.678	-26.322	74.000
7311.000	-3.853	45.790	41.936	-32.064	74.000
9748.000	-2.526	42.810	40.284	-33.716	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	-7.497	51.020	43.522	-30.478	74.000
7311.000	-3.018	45.640	42.621	-31.379	74.000
9748.000	-2.035	42.940	40.905	-33.095	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 : 2018/05/23
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2452 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4904.000	-10.435	45.850	35.415	-38.585	74.000
7356.000	-3.867	43.990	40.123	-33.877	74.000
9808.000	-2.726	43.210	40.484	-33.516	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4904.000	-7.819	51.300	43.481	-30.519	74.000
7356.000	-2.857	44.230	41.373	-32.627	74.000
9808.000	-2.300	42.300	40.000	-34.000	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 : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2018/05/16
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
125.060	10.893	22.799	33.692	-9.808	43.500
249.220	14.992	24.990	39.982	-6.018	46.000
480.080	22.183	13.987	36.170	-9.830	46.000
635.280	26.474	3.532	30.006	-15.994	46.000
821.520	27.021	3.846	30.867	-15.133	46.000
961.200	27.425	11.659	39.084	-14.916	54.000
Vertical					
115.360	14.275	17.542	31.817	-11.683	43.500
249.220	20.012	16.970	36.982	-9.018	46.000
386.960	19.965	13.473	33.438	-12.562	46.000
495.600	21.065	16.643	37.708	-8.292	46.000
833.160	26.121	10.255	36.376	-9.624	46.000
961.200	28.175	10.705	38.880	-15.120	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 Data
 Test Site : No.3 OATS
 Test Date : 2018/05/16
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
125.060	10.893	23.013	33.906	-9.594	43.500
262.800	15.067	16.520	31.587	-14.413	46.000
353.980	18.642	14.709	33.351	-12.649	46.000
480.080	22.183	14.348	36.531	-9.469	46.000
833.160	26.991	6.255	33.246	-12.754	46.000
961.200	27.425	15.015	42.440	-11.560	54.000
Vertical					
187.140	18.840	15.334	34.174	-9.326	43.500
249.220	20.012	19.952	39.964	-6.036	46.000
386.960	19.965	14.883	34.848	-11.152	46.000
491.720	21.062	17.065	38.127	-7.873	46.000
833.160	26.121	9.148	35.269	-10.731	46.000
961.200	28.175	11.088	39.263	-14.737	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 Data
 Test Site : No.3 OATS
 Test Date : 2018/05/16
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
125.060	10.893	25.102	35.995	-7.505	43.500
239.520	14.246	22.027	36.273	-9.727	46.000
386.960	20.795	8.617	29.412	-16.588	46.000
480.080	22.183	13.815	35.998	-10.002	46.000
833.160	26.991	5.950	32.941	-13.059	46.000
961.200	27.425	16.205	43.630	-10.370	54.000
Vertical					
125.060	13.823	14.858	28.681	-14.819	43.500
198.780	20.561	13.267	33.828	-9.672	43.500
353.980	17.632	14.256	31.888	-14.112	46.000
480.080	21.023	12.594	33.617	-12.383	46.000
833.160	26.121	10.222	36.343	-9.657	46.000
961.200	28.175	10.014	38.189	-15.811	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 Data
 Test Site : No.3 OATS
 Test Date : 2018/05/16
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2437 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
125.060	10.893	23.060	33.953	-9.547	43.500
352.040	18.518	13.390	31.908	-14.092	46.000
480.080	22.183	13.380	35.563	-10.437	46.000
613.940	26.765	2.431	29.196	-16.804	46.000
833.160	26.991	5.613	32.604	-13.396	46.000
961.200	27.425	16.075	43.500	-10.500	54.000
Vertical					
125.060	13.823	16.082	29.905	-13.595	43.500
249.220	20.012	17.799	37.811	-8.189	46.000
388.900	20.099	14.579	34.678	-11.322	46.000
491.720	21.062	16.195	37.257	-8.743	46.000
833.160	26.121	9.117	35.238	-10.762	46.000
961.200	28.175	9.943	38.118	-15.882	54.000

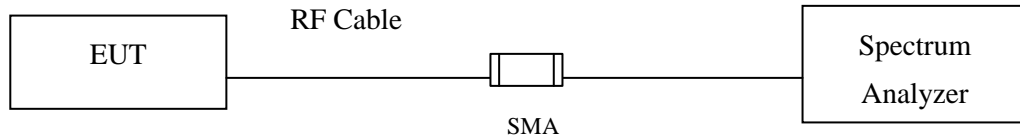
Note:

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.

5. RF Antenna conducted test

5.1. Test Setup

RF antenna Conducted Measurement:



5.2. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.4. Uncertainty

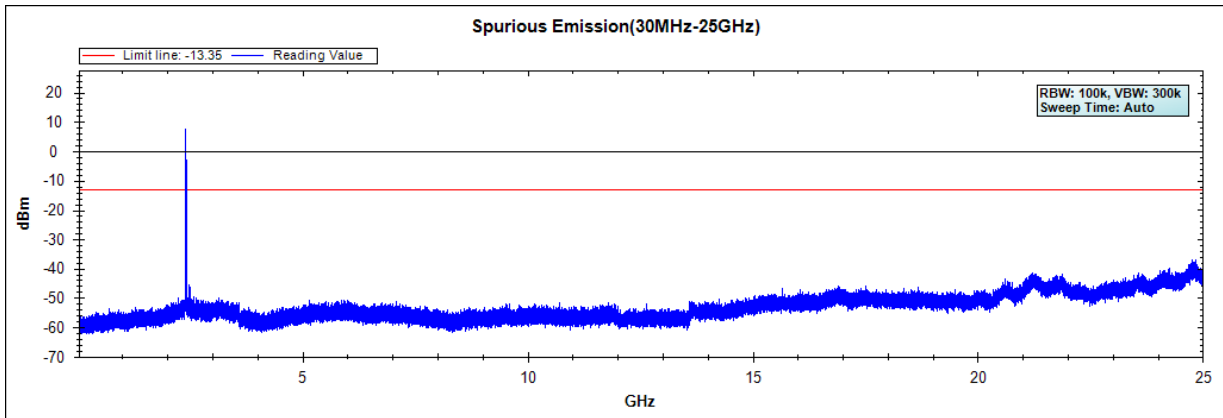
The measurement uncertainty

Conducted is defined as $\pm 1.20\text{dB}$

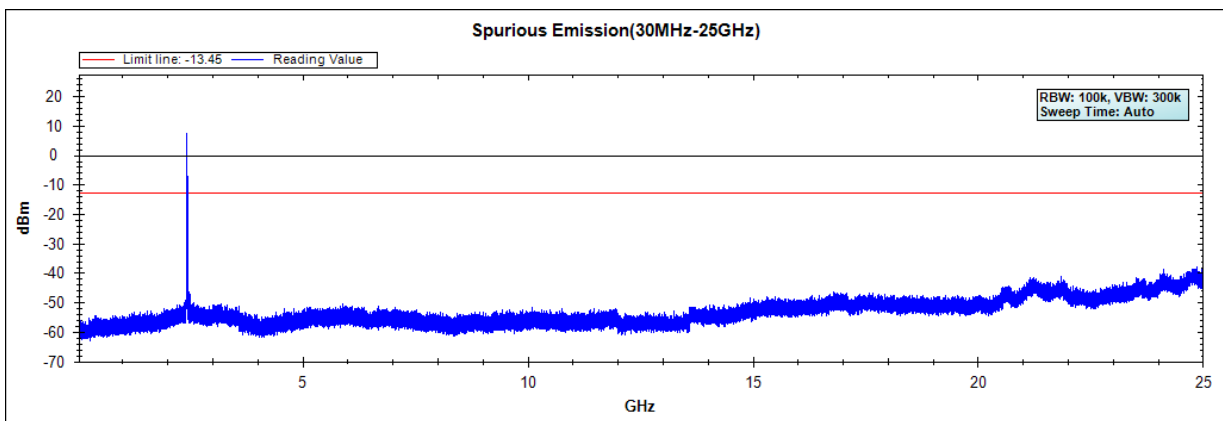
5.5. Test Result of RF antenna conducted test

Product : Gigabit Multi-Service Broadband Router
Test Item : RF antenna conducted test
Test Site : No.3 OATS
Test Date : 2018/05/30
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

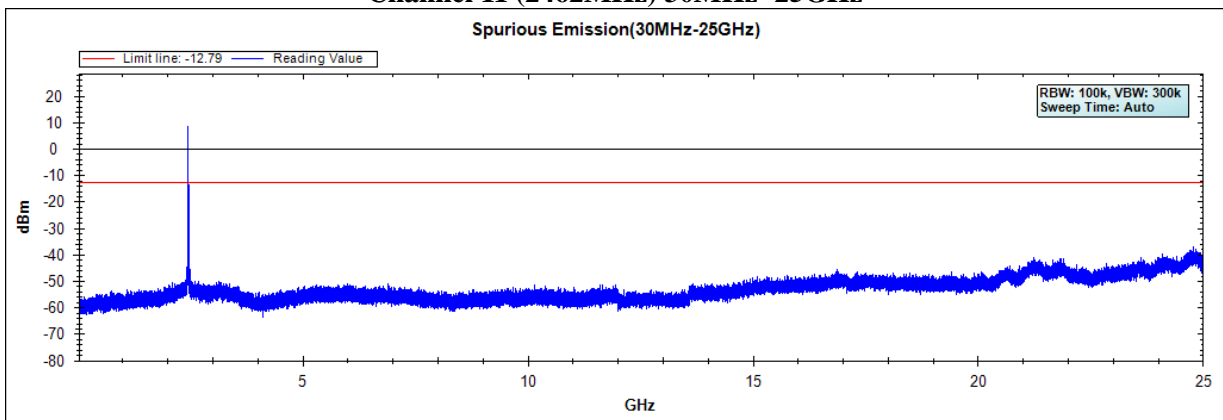
Channel 01 (2412MHz) 30MHz-25GHz



Channel 06 (2437MHz) 30MHz -25GHz



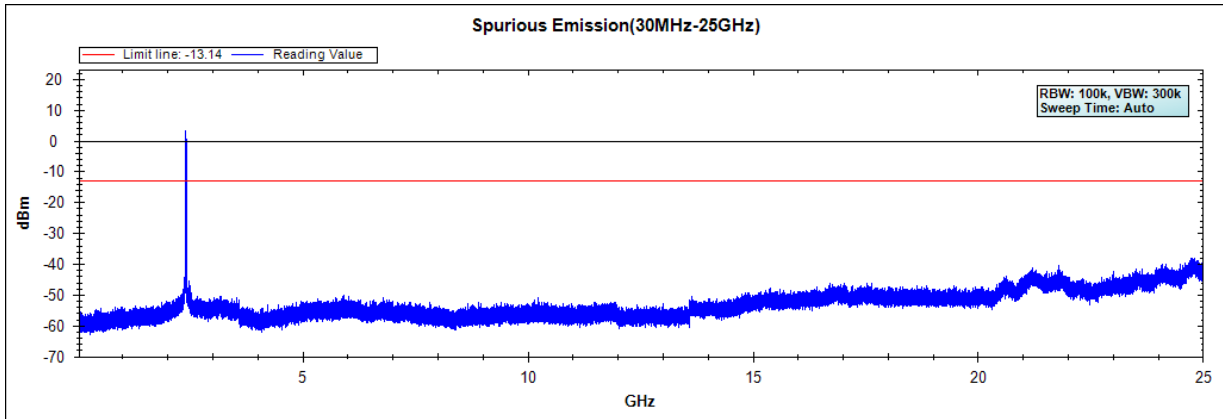
Channel 11 (2462MHz) 30MHz -25GHz



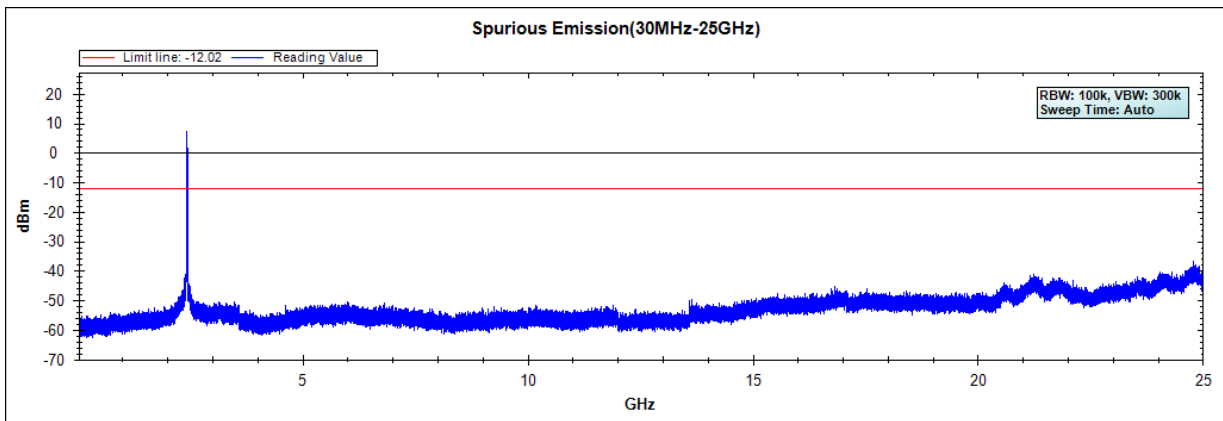
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Gigabit Multi-Service Broadband Router
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Date : 2018/05/30
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

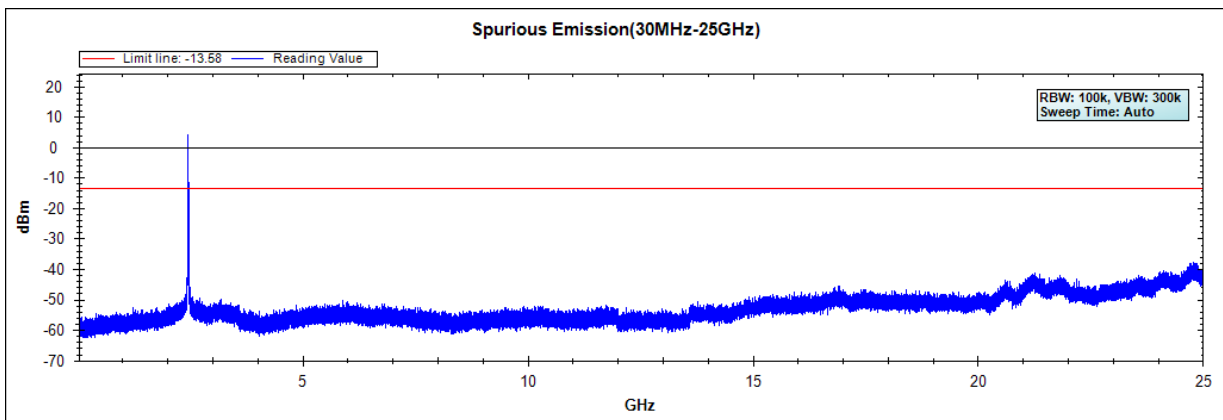
Channel 01 (2412MHz) 30MHz -25GHz



Channel 06 (2437MHz) 30MHz -25GHz



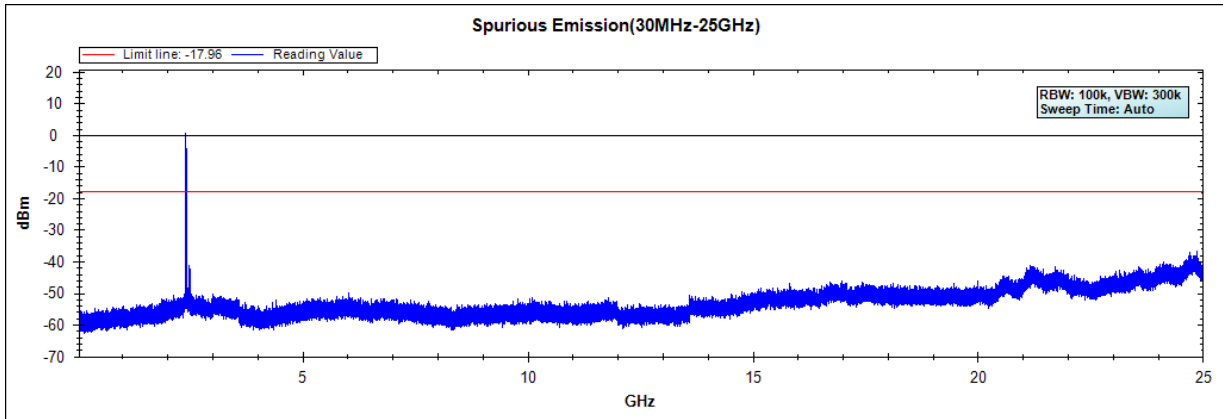
Channel 11 (2462MHz) 30MHz -25GHz



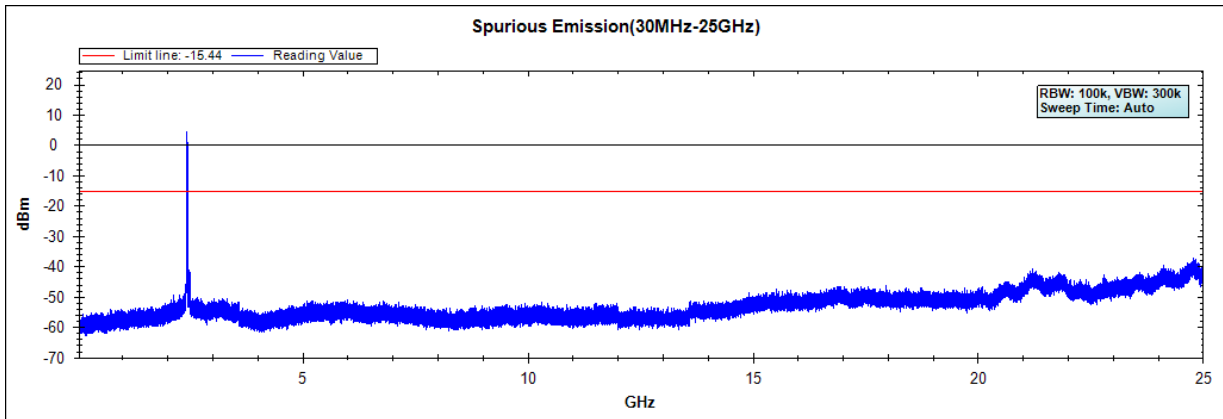
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Gigabit Multi-Service Broadband Router
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Date : 2018/05/30
Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps)

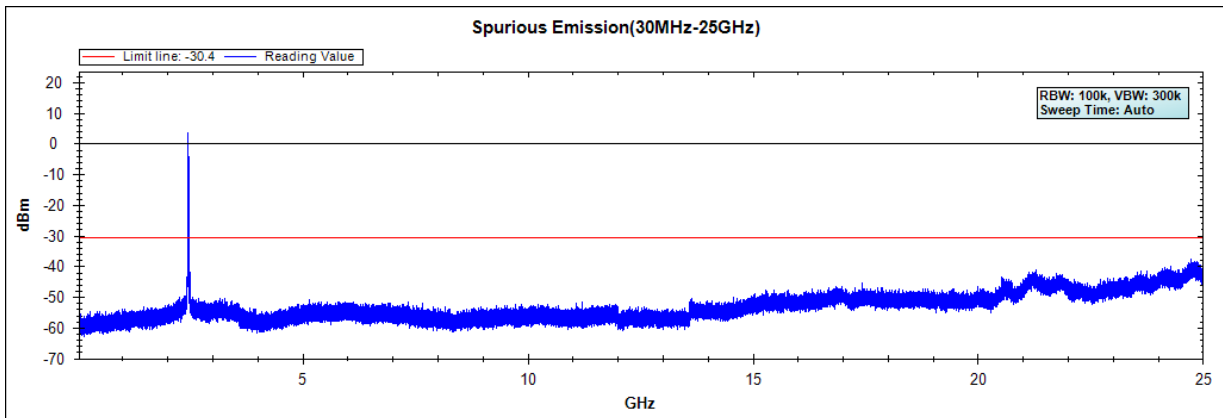
Channel 01 (2412MHz) 30MHz -25GHz-Chain A



Channel 06 (2437MHz) 30MHz -25GHz-Chain A

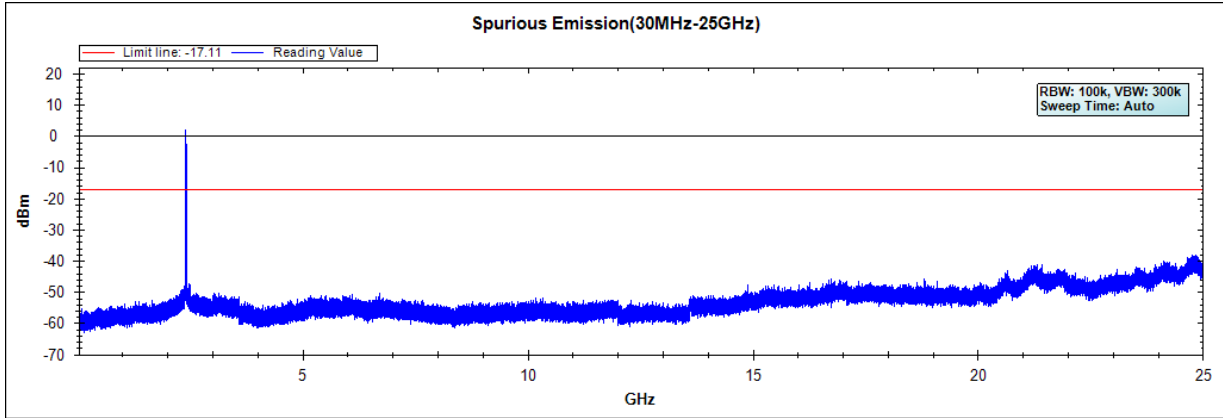


Channel 11 (2462MHz) 30MHz -25GHz-Chain A

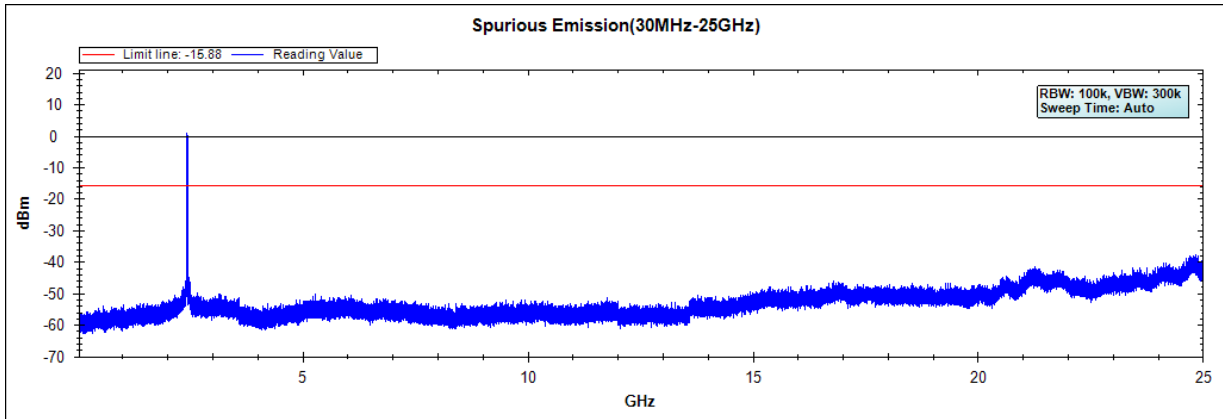


Note: The above test pattern is synthesized by multiple of the frequency range.

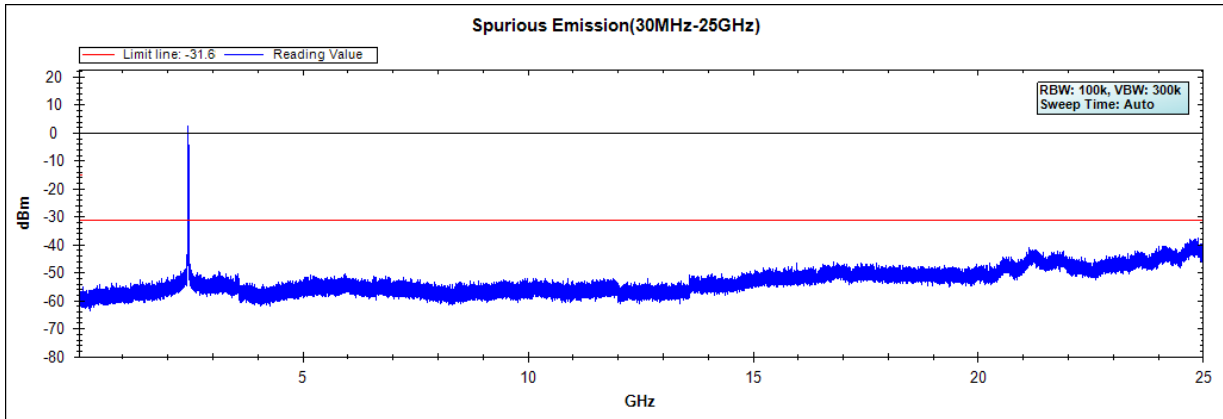
Channel 01 (2412MHz) 30MHz -25GHz-Chain B



Channel 06 (2437MHz) 30MHz -25GHz-Chain B



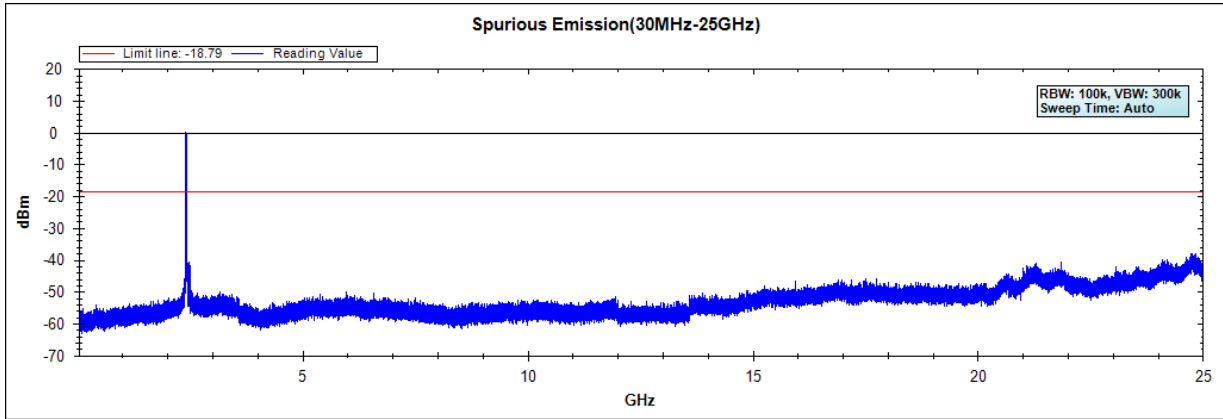
Channel 11 (2462MHz) 30MHz -25GHz-Chain B



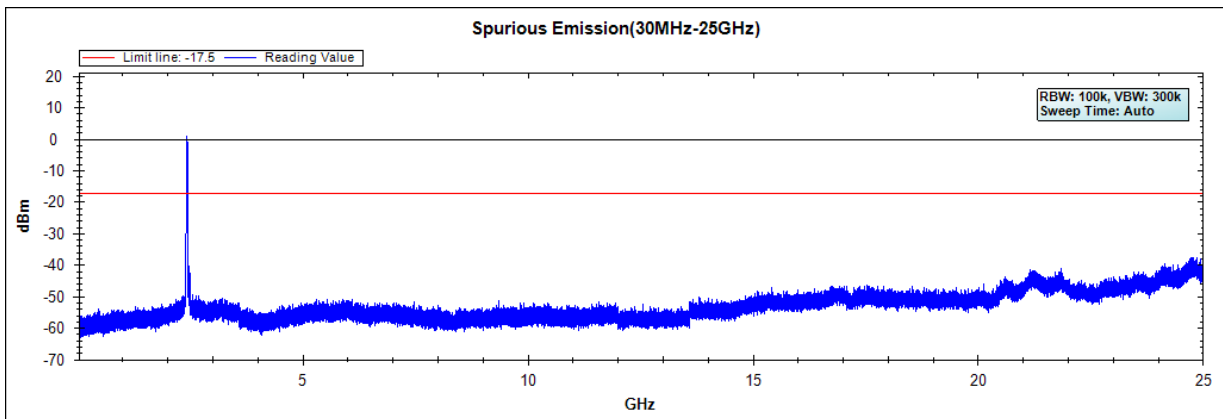
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Gigabit Multi-Service Broadband Router
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Date : 2018/05/30
Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps)

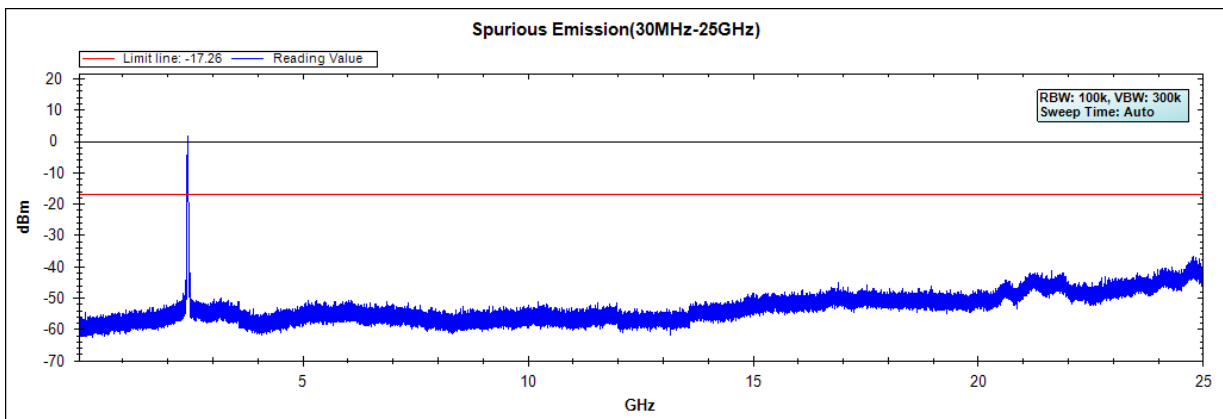
Channel 03 (2422MHz) 30MHz -25GHz-Chain A



Channel 06 (2437MHz) 30MHz -25GHz-Chain A

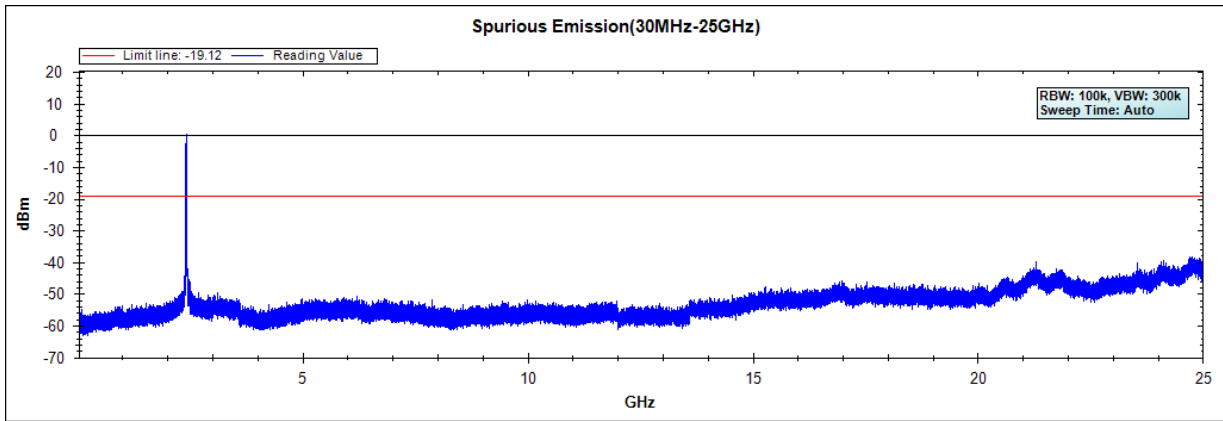


Channel 09 (2452MHz) 30MHz -25GHz-Chain A

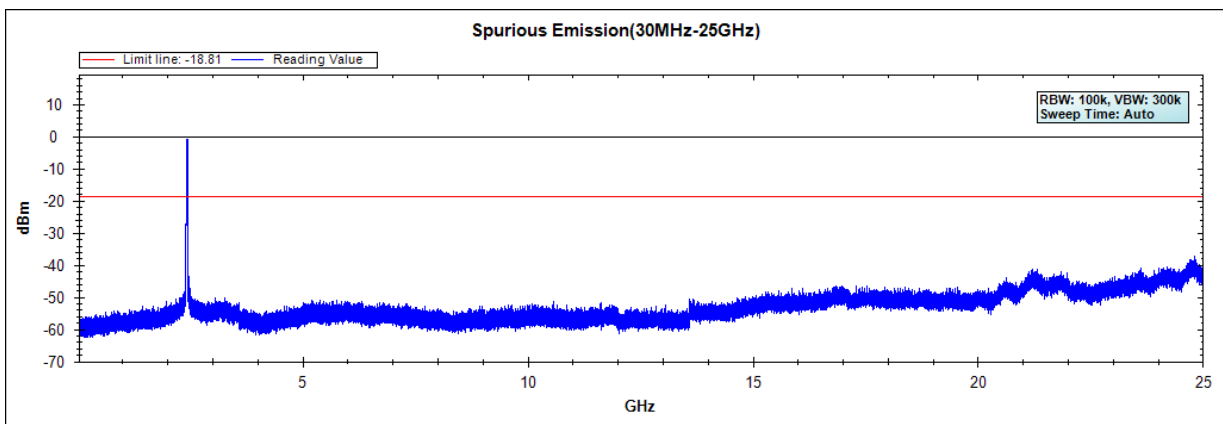


Note: The above test pattern is synthesized by multiple of the frequency range.

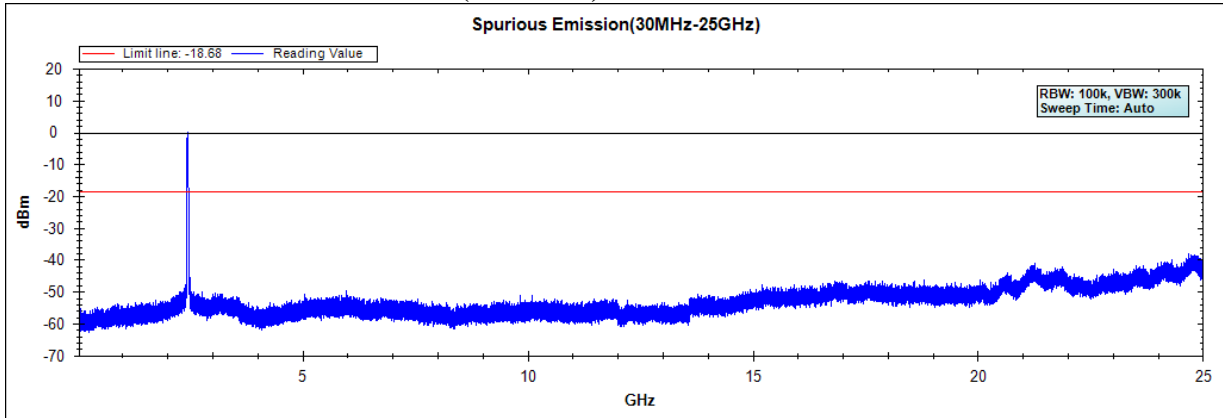
Channel 03 (2422MHz) 30MHz -25GHz-Chain B



Channel 06 (2437MHz) 30MHz -25GHz-Chain B



Channel 09 (2452MHz) 30MHz -25GHz-Chain B

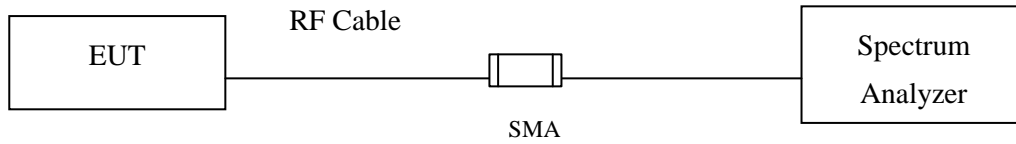


Note: The above test pattern is synthesized by multiple of the frequency range.

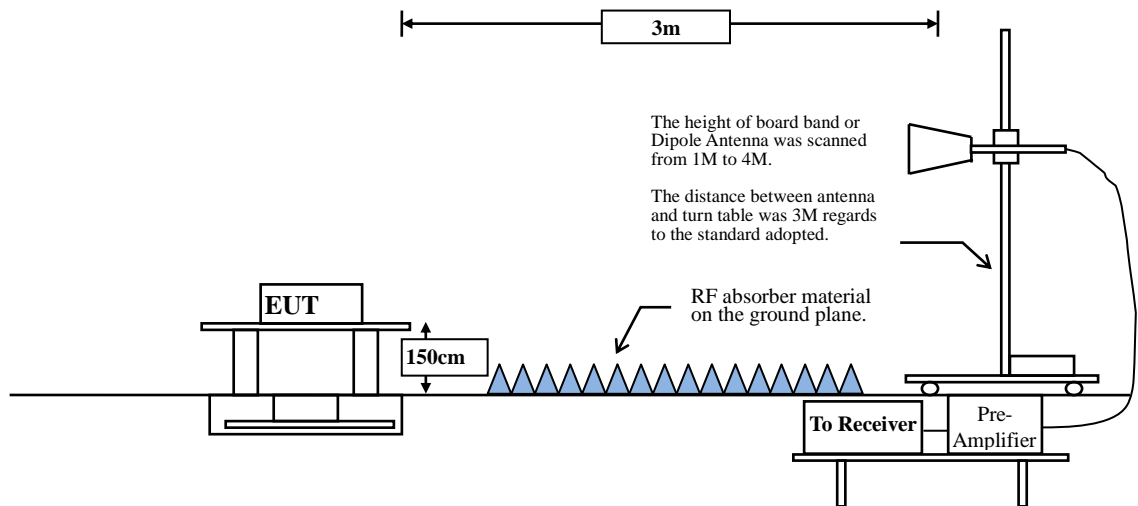
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. 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.

6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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 from 1 meter to 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.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq 98\%$

$VBW \geq 1/T$, 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.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11b	100.00	--	--	10
802.11g	97.23	2.0362	491	500
802.11n20	94.29	0.9565	1045	2k

Note: Duty Cycle Refer to Section 9

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
 Test Site : No.3 OATS
 Test Date : 2018/05/19
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2389.275	6.471	43.618	50.089	74.00	54.00	Pass
01 (Peak)	2390.000	6.474	41.211	47.686	74.00	54.00	Pass
01 (Peak)	2397.246	6.512	46.826	53.338	74.00	54.00	Pass
01 (Peak)	2400.000	6.528	45.939	52.467	--	--	--
01 (Peak)	2413.043	6.610	90.158	96.768	--	--	--
01 (Average)	2390.000	6.474	25.087	31.562	74.00	54.00	Pass
01 (Average)	2396.667	6.509	38.094	44.602	74.00	54.00	Pass
01 (Average)	2400.000	6.528	35.893	42.421	--	--	--
01 (Average)	2412.754	6.608	86.953	93.561	--	--	--

Figure Channel 01: Horizontal (Peak)

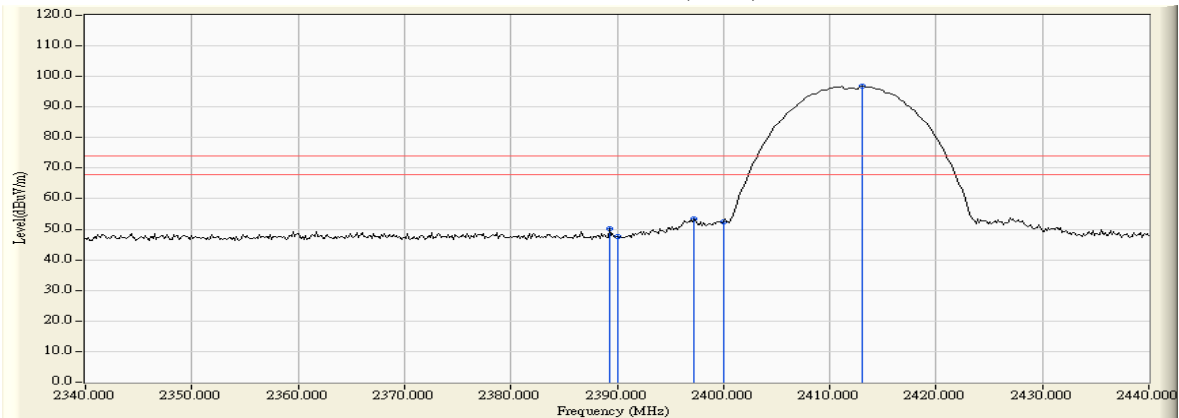
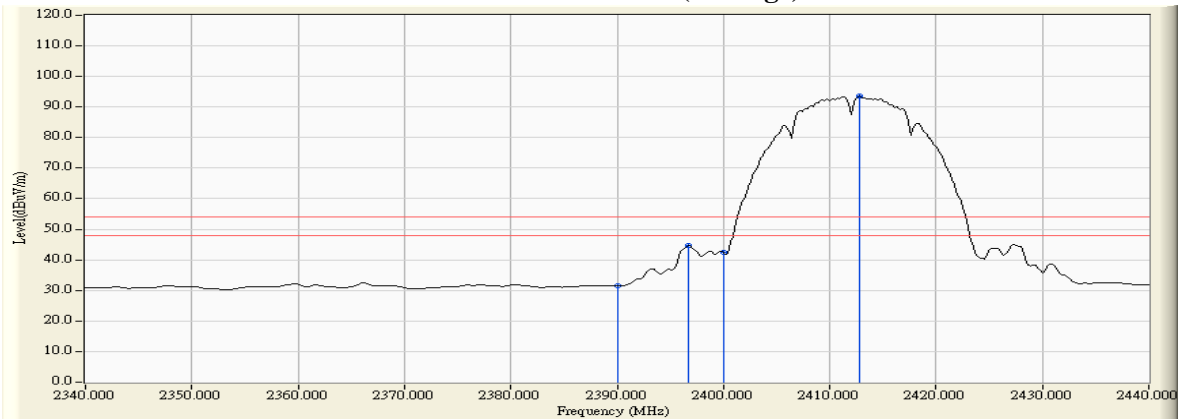


Figure Channel 01: Horizontal (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2390.000	29.821	47.948	53.829	74.00	54.00	Pass
01 (Peak)	2400.000	29.819	56.835	62.714	--	--	--
01 (Peak)	2413.043	29.861	103.180	109.100	--	--	--
01 (Average)	2390.000	5.880	36.385	42.266	74.00	54.00	Pass
01 (Average)	2396.667	5.871	52.627	58.498	74.00	54.00	Pass
01 (Average)	2400.000	5.879	50.320	56.199	--	--	--
01 (Average)	2412.754	5.919	101.438	107.356	--	--	--

Figure Channel 01: Vertical (Peak)

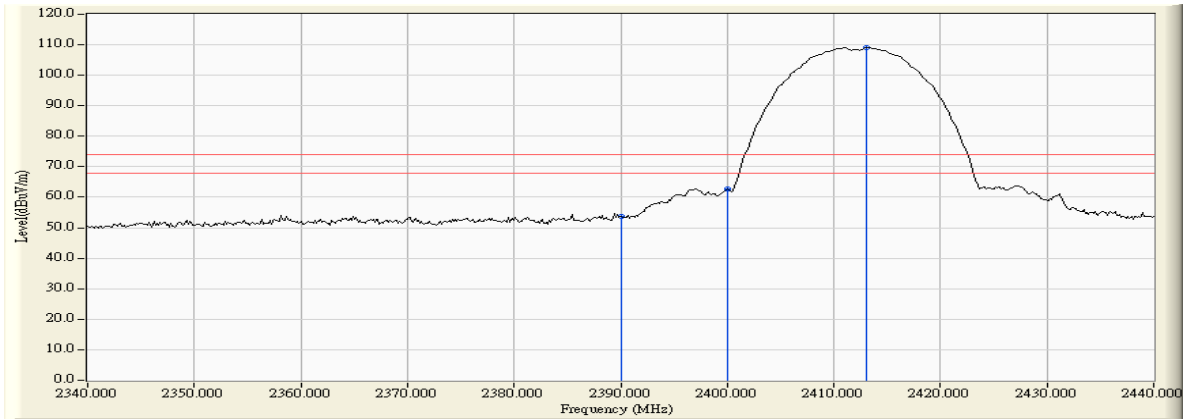
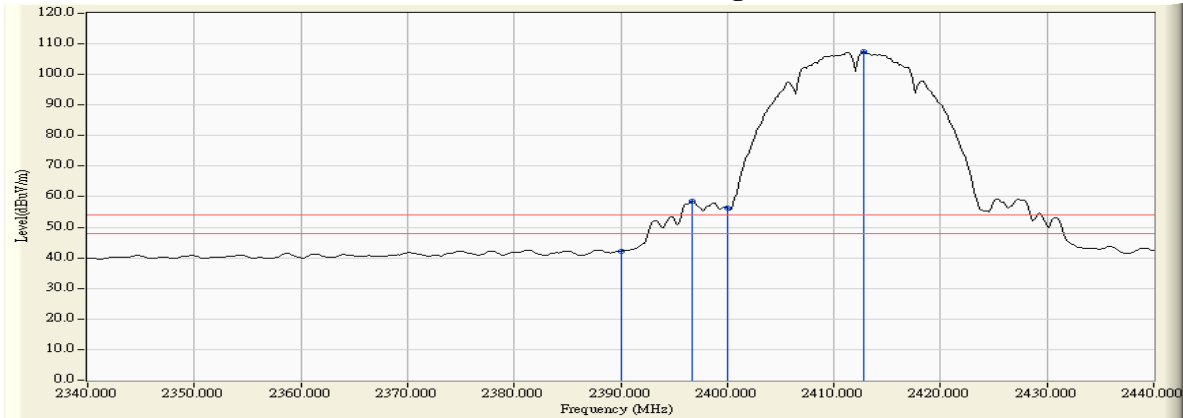


Figure Channel 01: Vertical (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/29
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11 (Peak)	2460.900	6.951	89.000	95.951	--	--	--
11 (Peak)	2483.500	7.110	44.356	51.466	74.00	54.00	Pass
11 (Peak)	2490.900	7.162	48.615	55.777	74.00	54.00	Pass
11 (Average)	2461.200	6.953	86.262	93.215	--	--	--
11 (Average)	2483.500	7.110	33.923	41.033	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

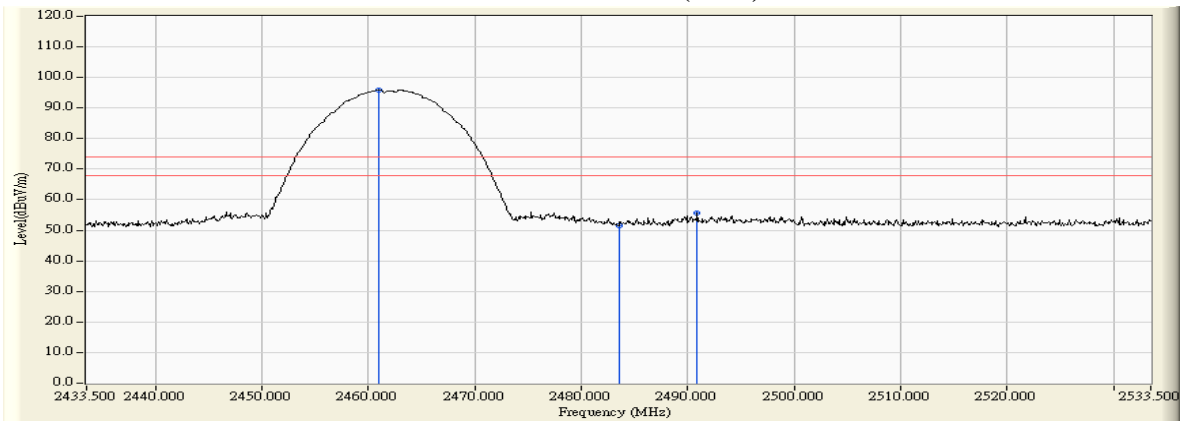
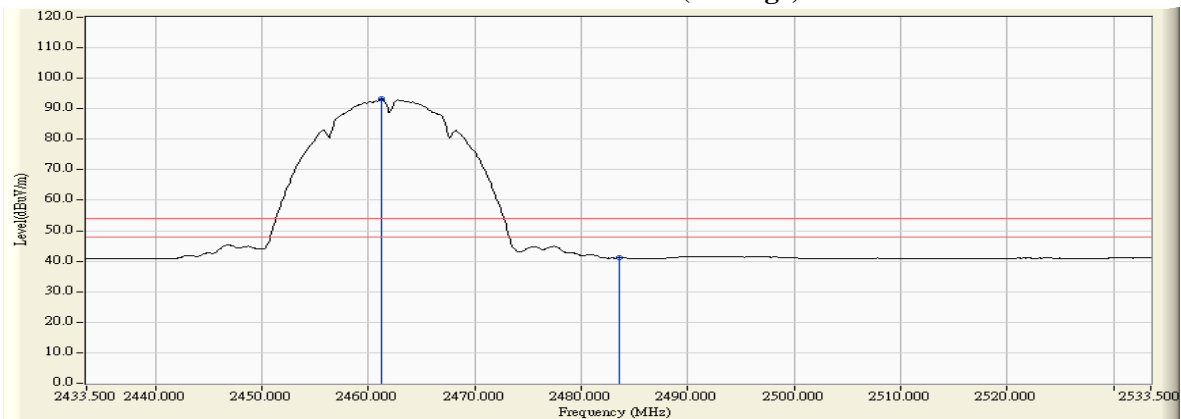


Figure Channel 11: Horizontal (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/29
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11 (Peak)	2463.000	6.236	100.157	106.393	--	--	--
11 (Peak)	2483.500	6.363	49.031	55.394	74.00	54.00	Pass
11 (Peak)	2489.000	6.397	54.525	60.923	74.00	54.00	Pass
11 (Average)	2462.700	6.234	96.976	103.210	--	--	--
11 (Average)	2483.500	6.363	38.040	44.403	74.00	54.00	Pass
11 (Average)	2491.000	6.410	39.388	45.798	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

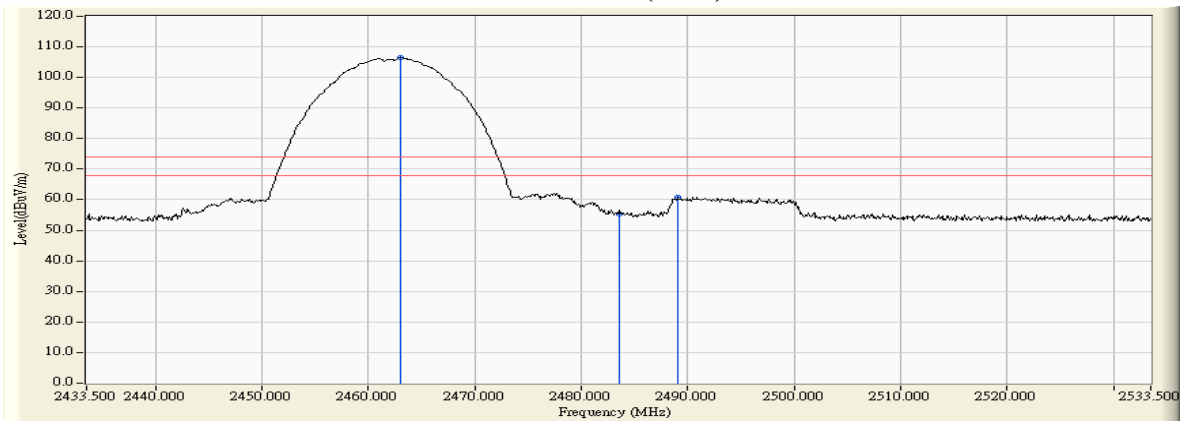
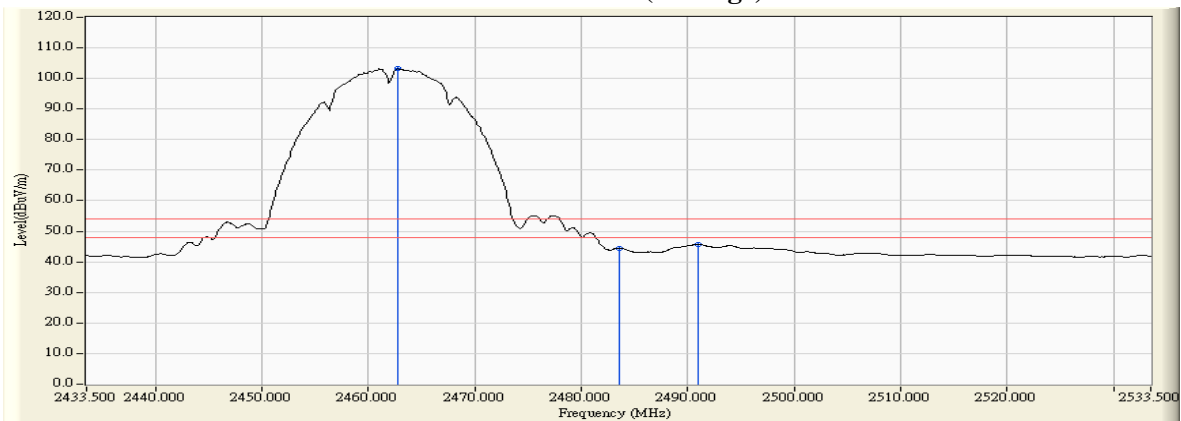


Figure Channel 11: Vertical (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2390.000	6.474	51.649	58.124	74.00	54.00	Pass
01 (Peak)	2400.000	6.528	56.708	63.236	--	--	--
01 (Peak)	2407.391	6.573	93.863	100.436	--	--	--
01(Average)	2390.000	6.474	34.218	40.693	74.00	54.00	Pass
01(Average)	2400.000	6.528	43.603	50.131	--	--	--
01(Average)	2410.435	6.592	84.278	90.870	--	--	--

Figure Channel 01: Horizontal (Peak)

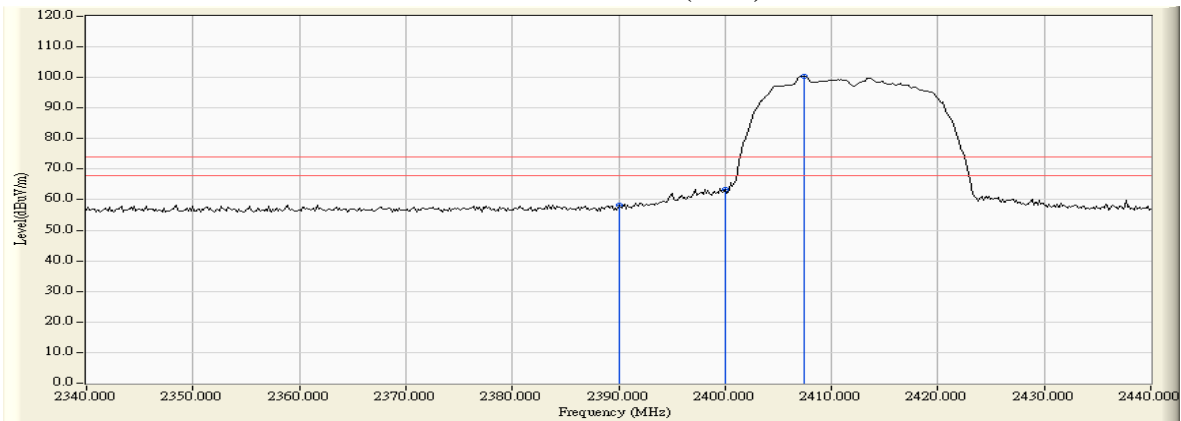
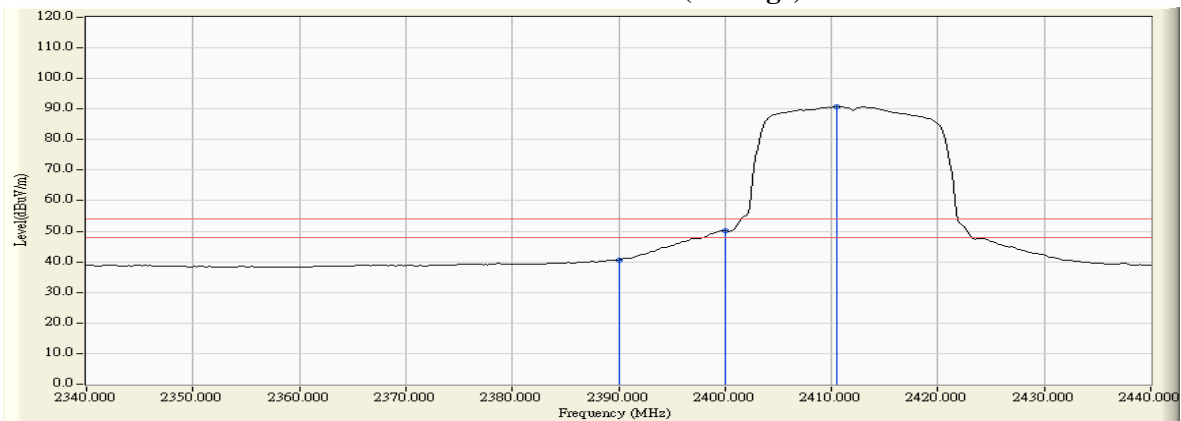


Figure Channel 01: Horizontal (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2389.275	5.884	59.099	64.983	74.00	54.00	Pass
01 (Peak)	2390.000	5.880	58.137	64.018	74.00	54.00	Pass
01 (Peak)	2400.000	5.879	68.104	73.983	--	--	--
01 (Average)	2390.000	5.880	44.018	49.899	74.00	54.00	Pass
01 (Average)	2400.000	5.879	56.781	62.660	--	--	--
01 (Average)	2412.899	5.920	98.769	104.688	--	--	--

Figure Channel 01: Vertical (Peak)

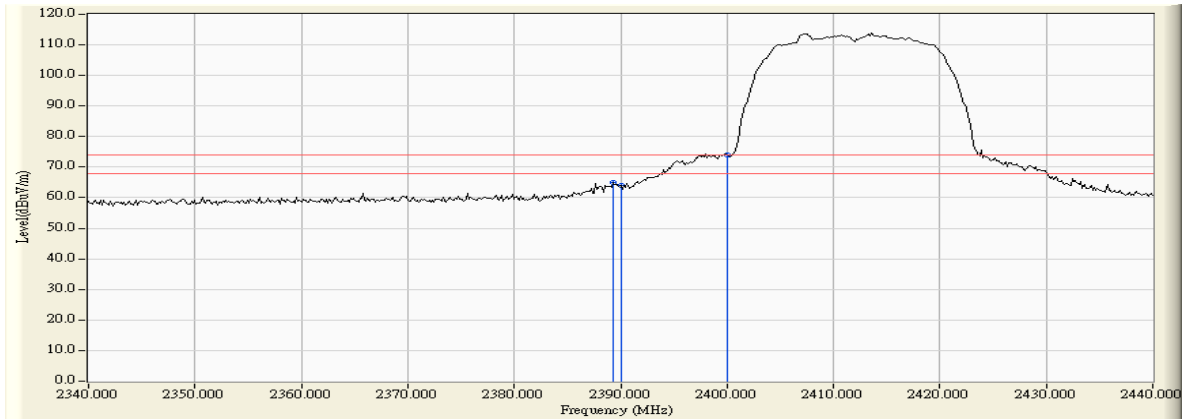
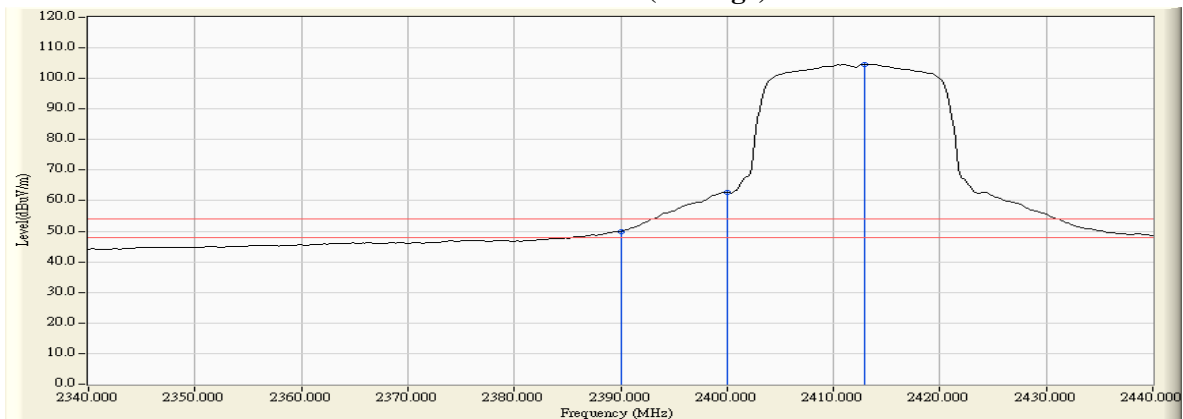


Figure Channel 01: Vertical (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11 (Peak)	2463.355	6.968	95.724	102.692	--	--	--
11 (Peak)	2483.500	7.110	52.276	59.386	74.00	54.00	Pass
11 (Average)	2462.920	6.965	86.497	93.462	--	--	--
11 (Average)	2483.500	7.110	35.268	42.378	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

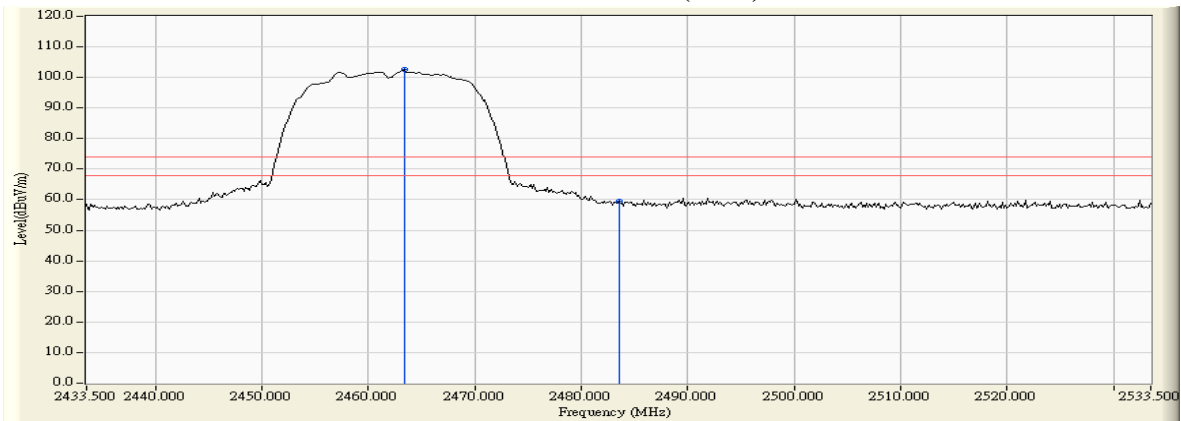
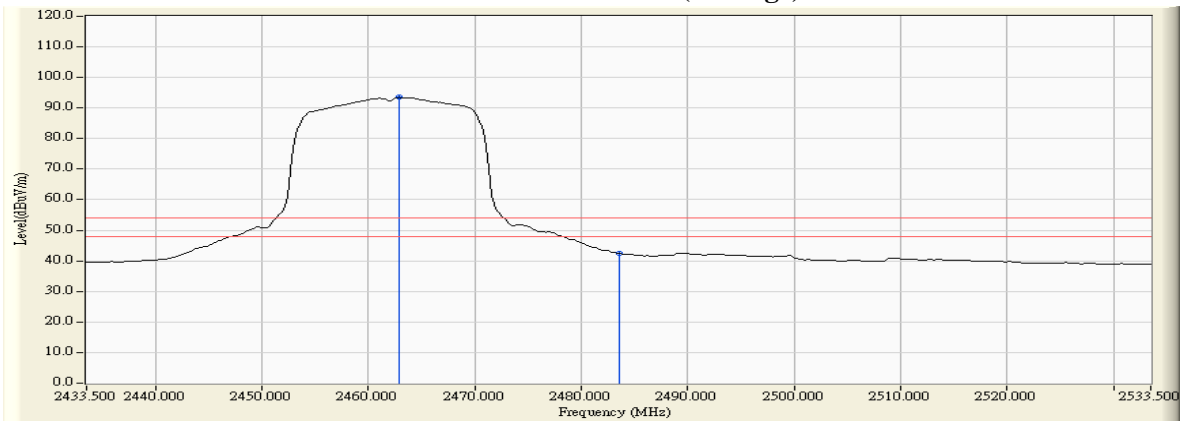


Figure Channel 11: Horizontal (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11 (Peak)	2463.355	6.238	107.272	113.510	--	--	--
11 (Peak)	2483.500	6.363	57.613	63.976	74.00	54.00	Pass
11 (Peak)	2489.152	6.398	58.658	65.057	74.00	54.00	Pass
11 (Average)	2462.920	6.235	98.034	104.269	--	--	--
11 (Average)	2483.500	6.363	43.101	49.464	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

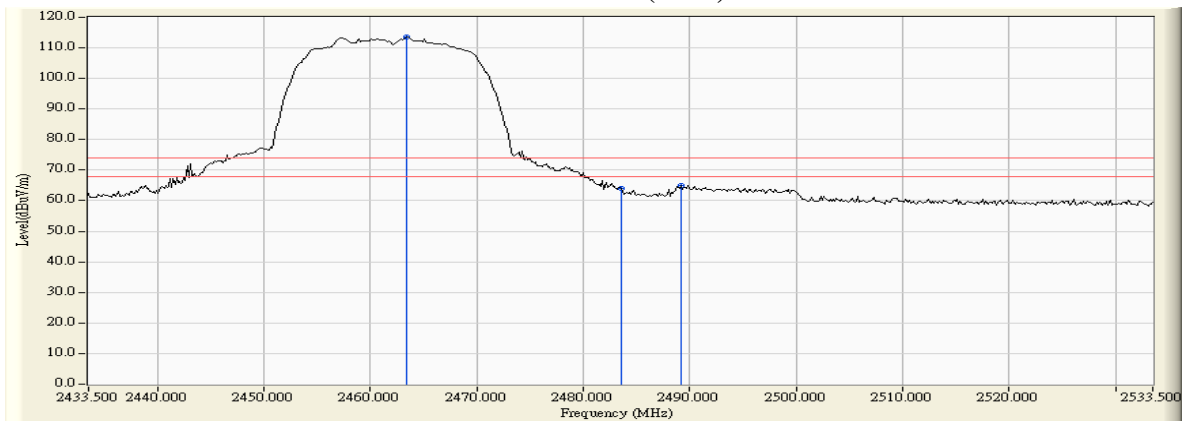
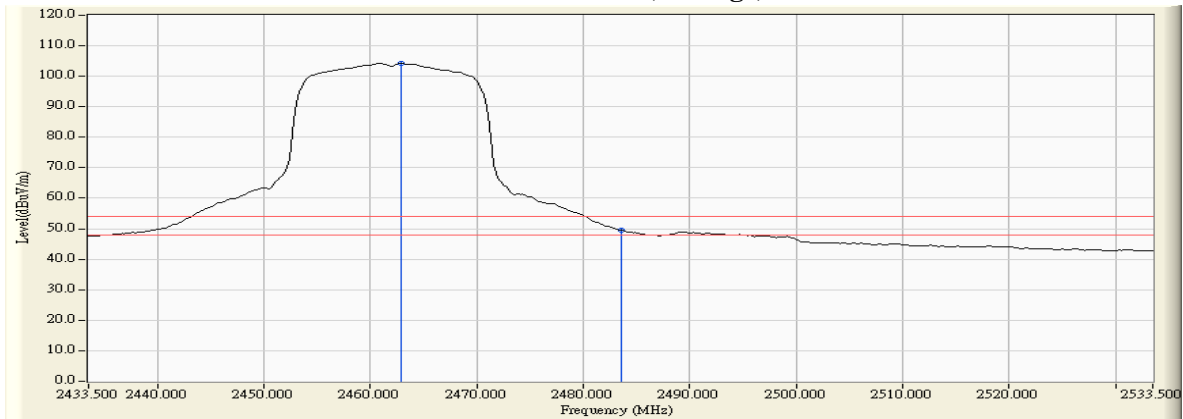


Figure Channel 11: Vertical (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2390.000	6.474	50.188	56.663	74.00	54.00	Pass
01 (Peak)	2399.130	6.523	53.282	59.805	74.00	54.00	Pass
01 (Peak)	2400.000	6.528	52.485	59.013	--	--	--
01 (Peak)	2410.580	6.593	91.567	98.160	--	--	--
01 (Average)	2390.000	6.474	32.585	39.060	74.00	54.00	Pass
01 (Average)	2400.000	6.528	38.959	45.487	--	--	--
01 (Average)	2411.159	6.597	81.744	88.341	--	--	--

Figure Channel 01: Horizontal (Peak)

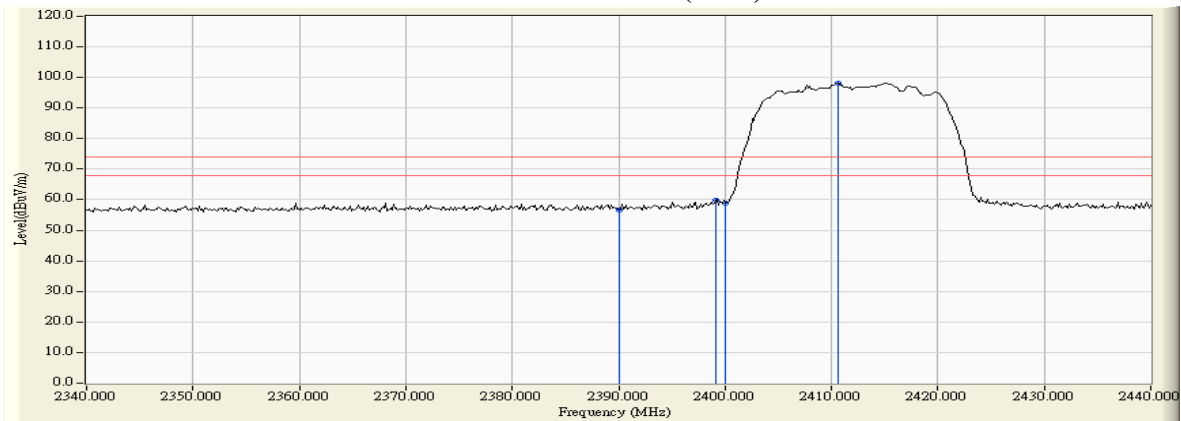
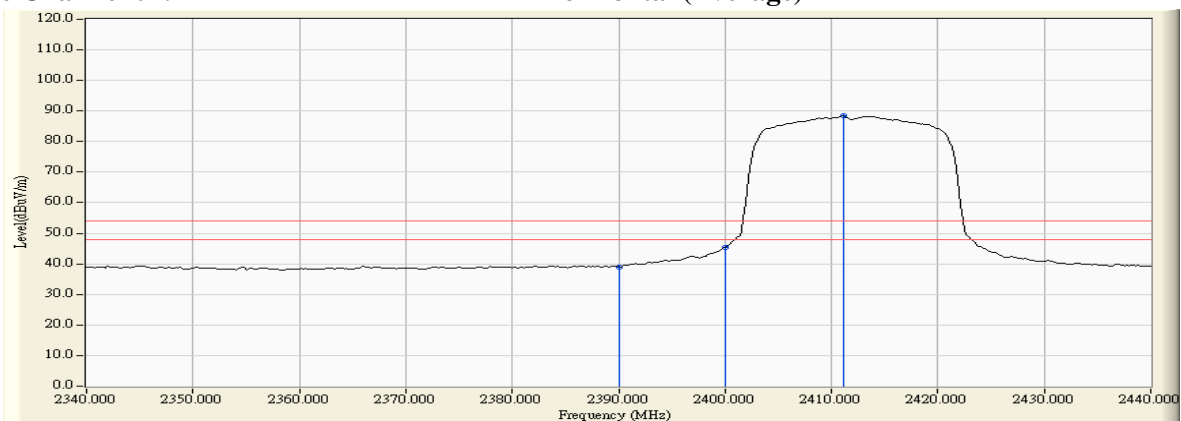


Figure Channel 01: Horizontal (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBUV)	Emission Level (dBUV/m)	Peak Limit (dBUV/m)	Average Limit (dBUV/m)	Result
01 (Peak)	2390.000	5.880	55.788	61.669	74.00	54.00	Pass
01 (Peak)	2400.000	5.879	64.701	70.580	--	--	--
01 (Peak)	2415.072	5.933	106.150	112.083	--	--	--
01 (Average)	2390.000	5.880	42.890	48.771	74.00	54.00	Pass
01 (Average)	2400.000	5.879	52.902	58.781	--	--	--
01 (Average)	2410.725	5.906	96.685	102.592	--	--	--

Figure Channel 01: Vertical (Peak)

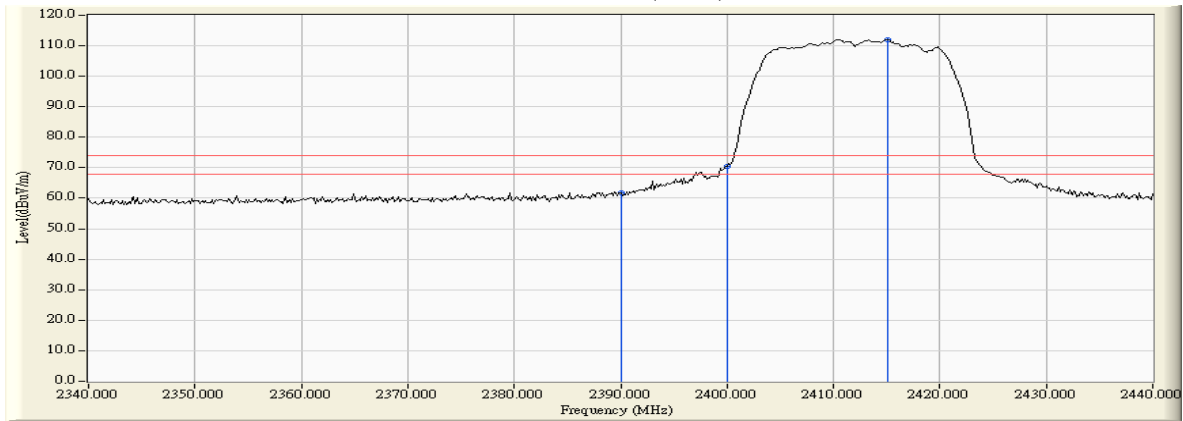
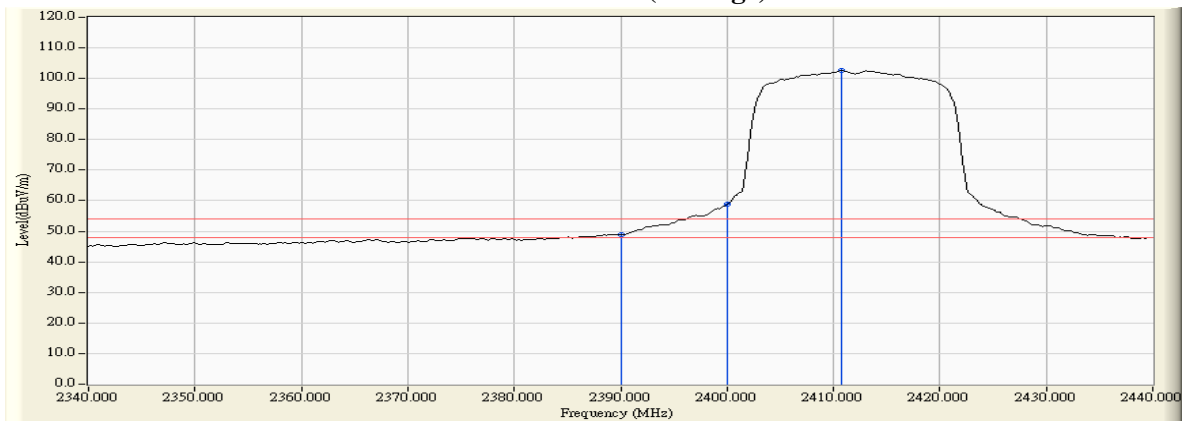


Figure Channel 01: Vertical (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11 (Peak)	2463.645	6.970	95.999	102.969	--	--	--
11 (Peak)	2483.500	7.110	52.349	59.459	74.00	54.00	Pass
11 (Peak)	2490.601	7.160	56.036	63.196	74.00	54.00	Pass
11 (Average)	2463.065	6.966	85.845	92.811	--	--	--
11 (Average)	2483.500	7.110	36.528	43.638	74.00	54.00	Pass
11 (Average)	2492.920	7.177	38.068	45.245	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

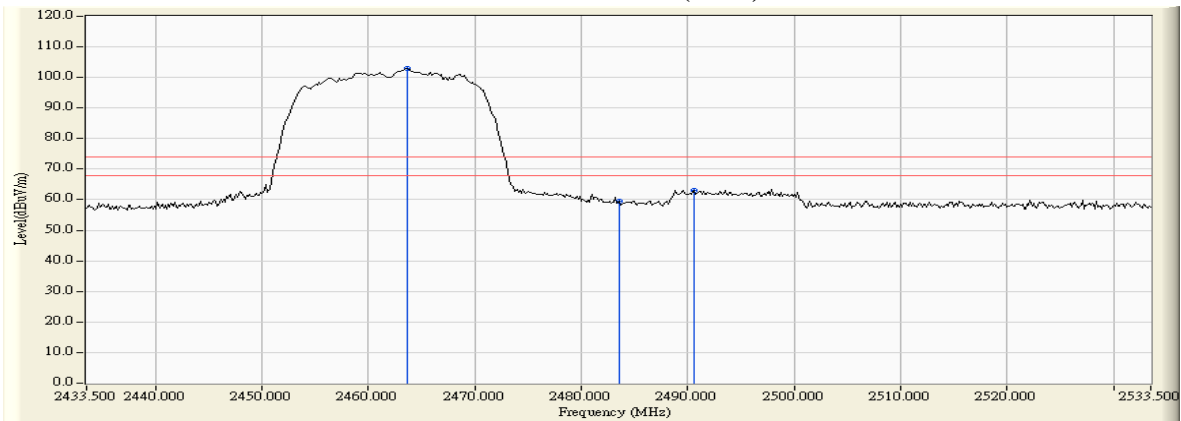
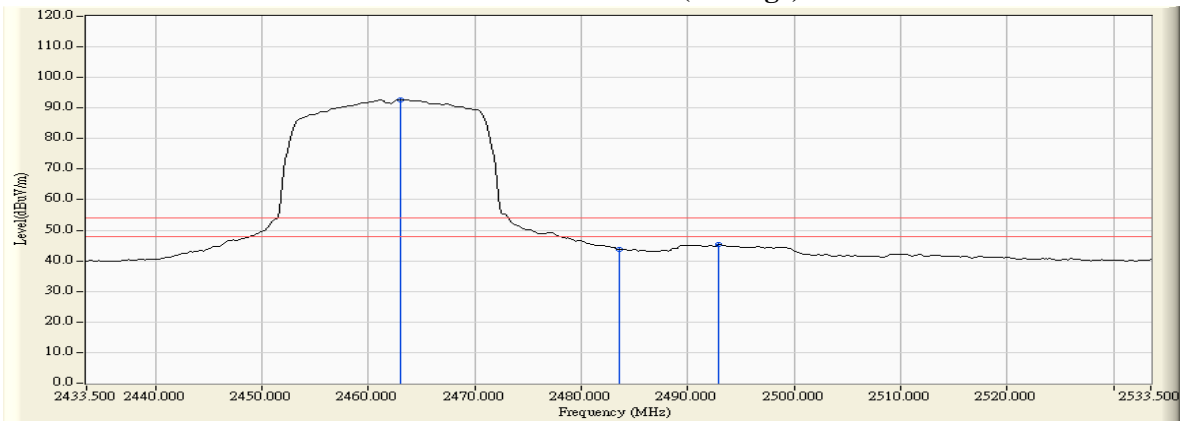


Figure Channel 11: Horizontal (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/22
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
11 (Peak)	2462.630	6.234	107.106	113.339	--	--	--
11 (Peak)	2483.500	6.363	56.043	62.406	74.00	54.00	Pass
11 (Peak)	2489.442	6.401	61.199	67.599	74.00	54.00	Pass
11 (Average)	2460.891	6.223	97.452	103.674	--	--	--
11 (Average)	2483.500	6.363	43.477	49.840	74.00	54.00	Pass
11 (Average)	2489.877	6.403	43.997	50.400	74.00	54.00	Pass

Figure Channel 11: Vertical (Peak)

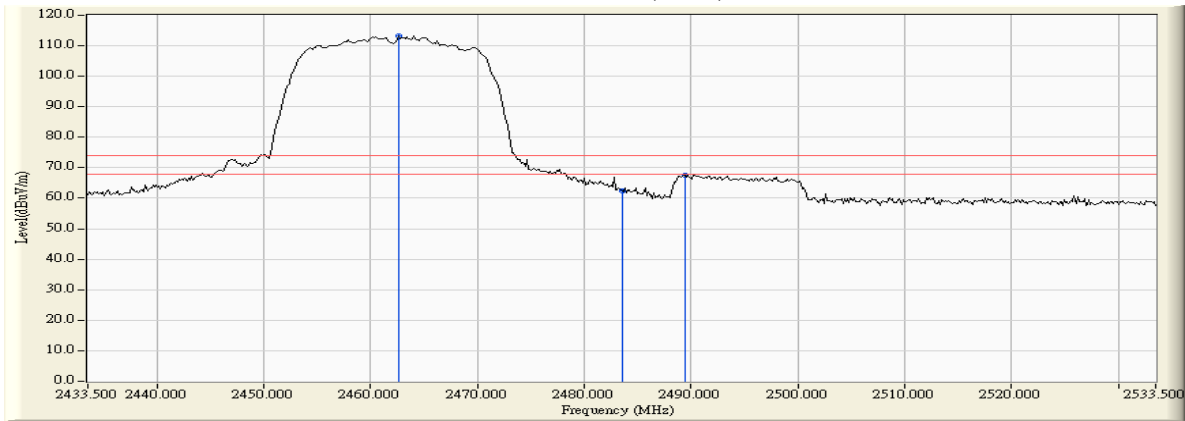
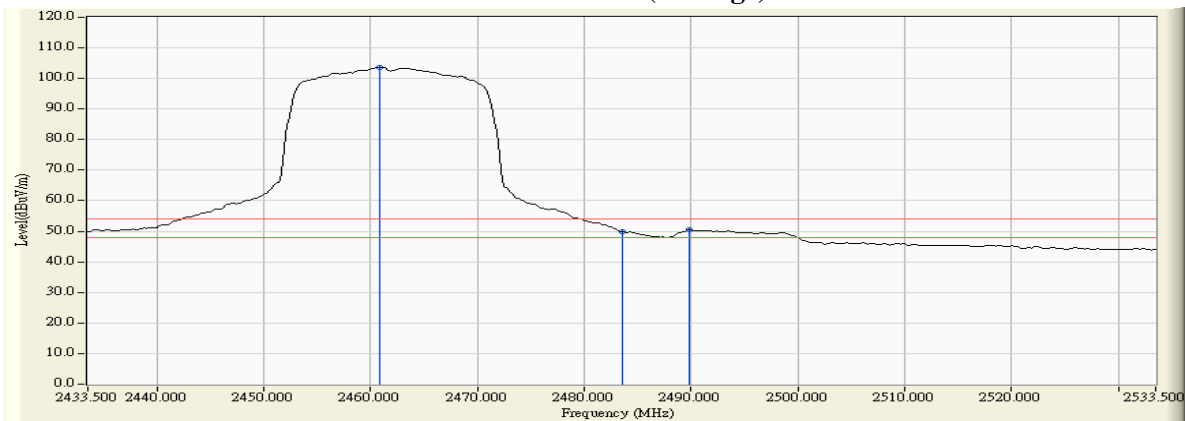


Figure Channel 11: Vertical (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/19
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
03 (Peak)	2379.565	6.428	52.744	59.173	74.00	54.00	Pass
03 (Peak)	2390.000	6.474	51.607	58.082	74.00	54.00	Pass
03 (Peak)	2397.391	6.513	53.833	60.346	74.00	54.00	Pass
03 (Peak)	2400.000	6.528	53.182	59.710	--	--	--
03 (Peak)	2424.493	6.692	89.819	96.511	--	--	--
03 (Average)	2390.000	6.474	30.725	37.200	74.00	54.00	Pass
03 (Average)	2400.000	6.528	37.477	44.005	--	--	--
03 (Average)	2424.203	6.690	79.390	86.080	--	--	--

Figure Channel 01: Horizontal (Peak)

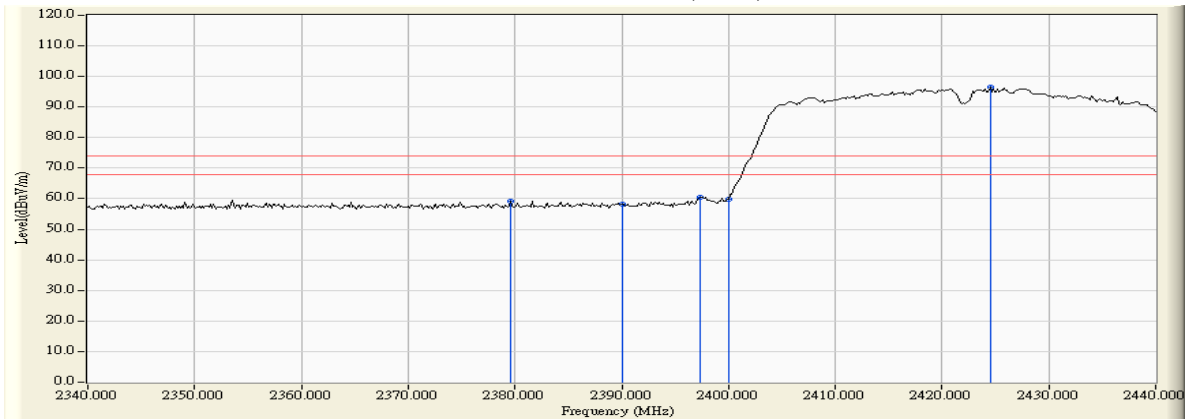
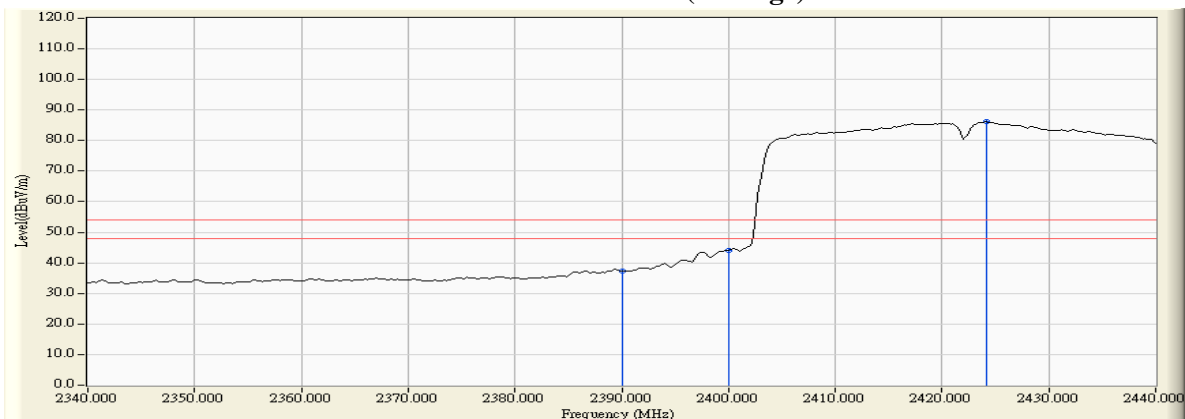


Figure Channel 01: Horizontal (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/19
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
03 (Peak)	2386.522	5.895	60.459	66.354	74.00	54.00	Pass
03 (Peak)	2390.000	5.880	59.691	65.572	74.00	54.00	Pass
03 (Peak)	2400.000	5.879	65.112	70.991	--	--	--
03 (Peak)	2424.638	5.993	104.954	110.947	--	--	--
03 (Average)	2386.812	5.894	46.434	52.328	74.00	54.00	Pass
03 (Average)	2390.000	5.880	46.254	52.135	74.00	54.00	Pass
03 (Average)	2400.000	5.879	53.313	59.192	--	--	--
03 (Average)	2418.986	5.957	93.625	99.582	--	--	--

Figure Channel 01: Vertical (Peak)

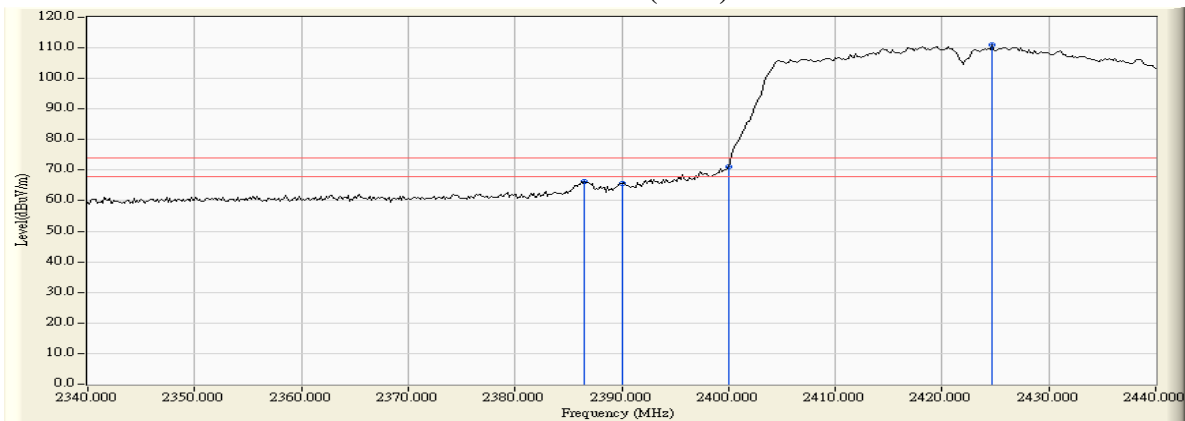
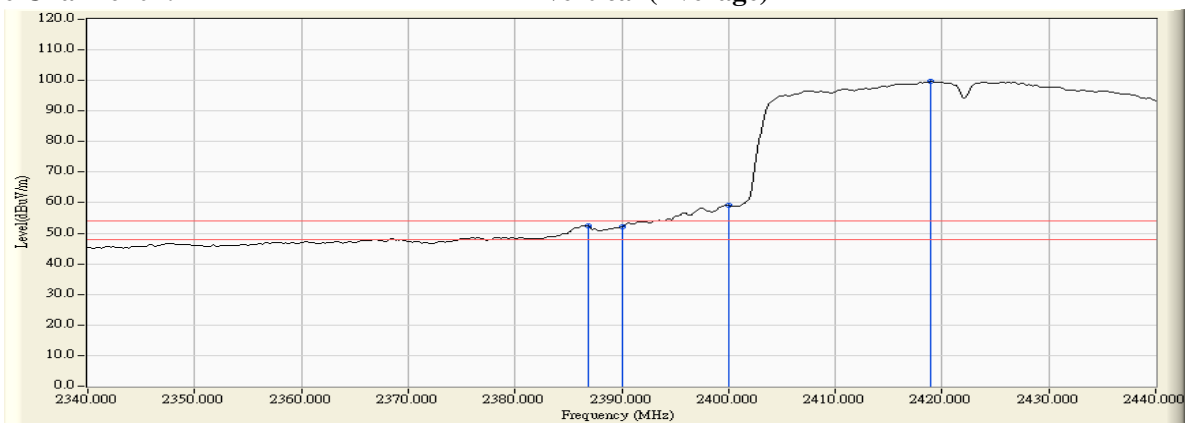


Figure Channel 01: Vertical (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/19
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
09 (Peak)	2457.703	6.928	89.055	95.983	--	--	--
09 (Peak)	2483.500	7.110	50.825	57.935	74.00	54.00	Pass
09 (Peak)	2490.746	7.161	53.593	60.754	74.00	54.00	Pass
09 (Average)	2454.225	6.903	79.254	86.157	--	--	--
09 (Average)	2483.500	7.110	31.615	38.725	74.00	54.00	Pass
09 (Average)	2484.514	7.117	32.388	39.505	74.00	54.00	Pass

Figure Channel 07: Horizontal (Peak)

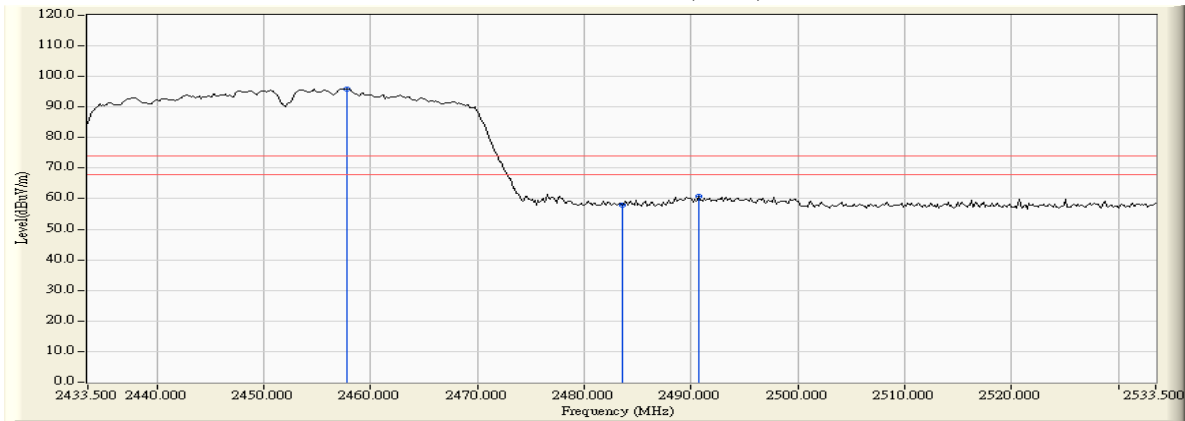
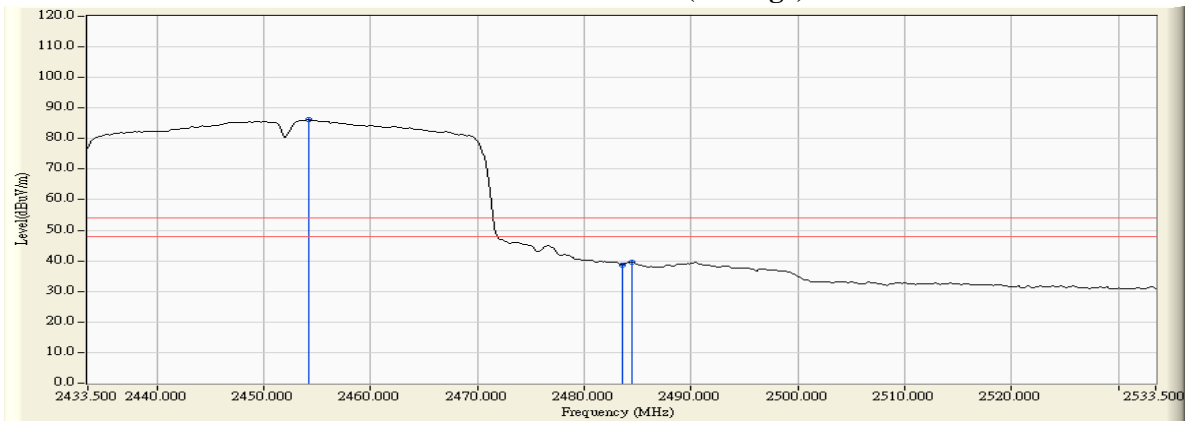


Figure Channel 07: Horizontal (Average)



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
 Test Site : No.3 OATS
 Test Date : 2018/05/19
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
09 (Peak)	2456.833	6.196	103.699	109.895	--	--	--
09 (Peak)	2483.500	6.363	58.750	65.113	74.00	54.00	Pass
09 (Peak)	2490.746	6.408	61.863	68.272	74.00	54.00	Pass
09 (Average)	2456.688	6.195	93.706	99.901	--	--	--
09 (Average)	2483.500	6.363	44.504	50.867	74.00	54.00	Pass

Figure Channel 07: Vertical (Peak)

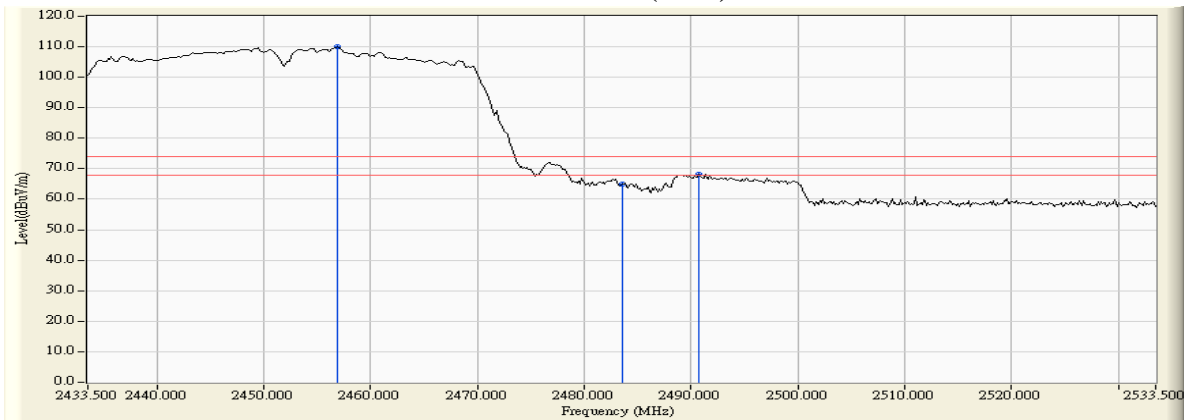
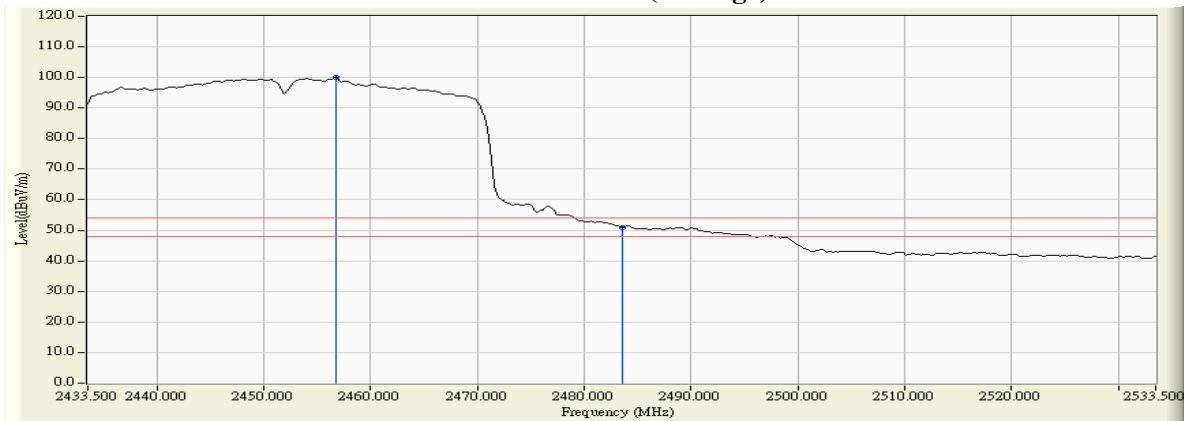


Figure Channel 07: Vertical (Average)

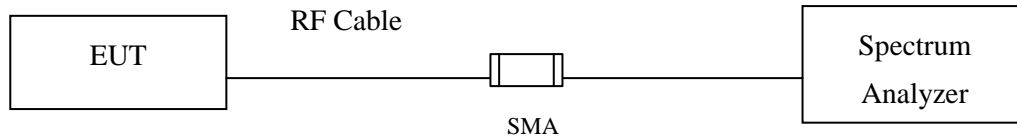


Note:

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..

7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth, $VBW \geq 3 * RBW$

7.4. Uncertainty

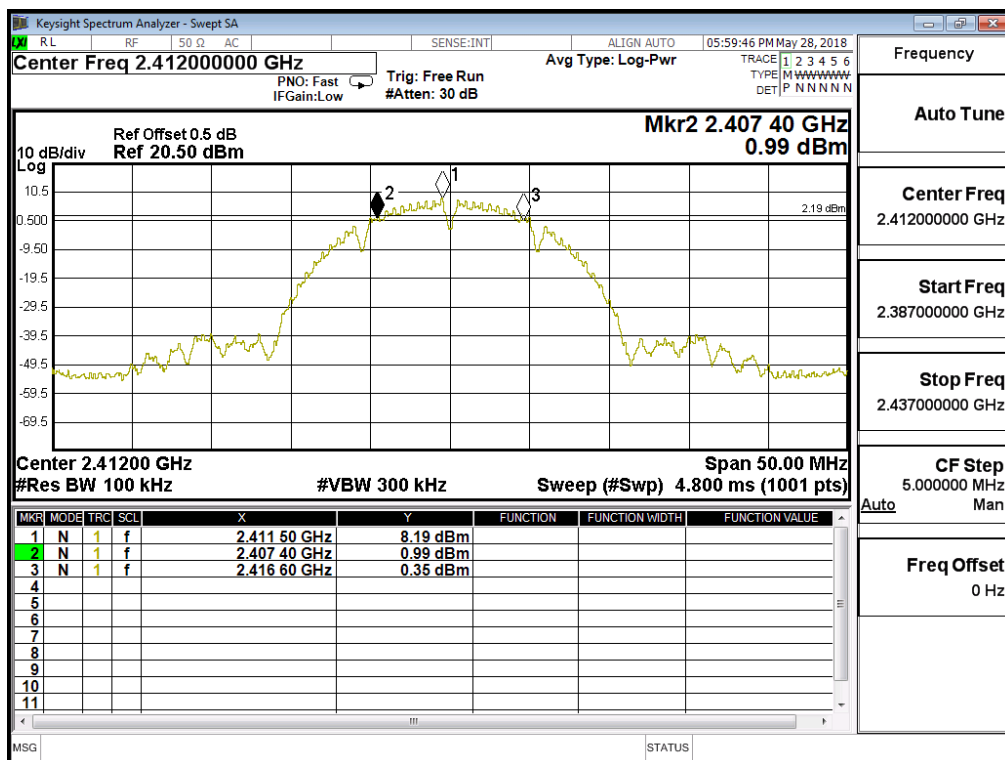
$\pm 283\text{Hz}$

7.5. Test Result of 6dB Bandwidth

Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1	2412.00	9200	>500	Pass

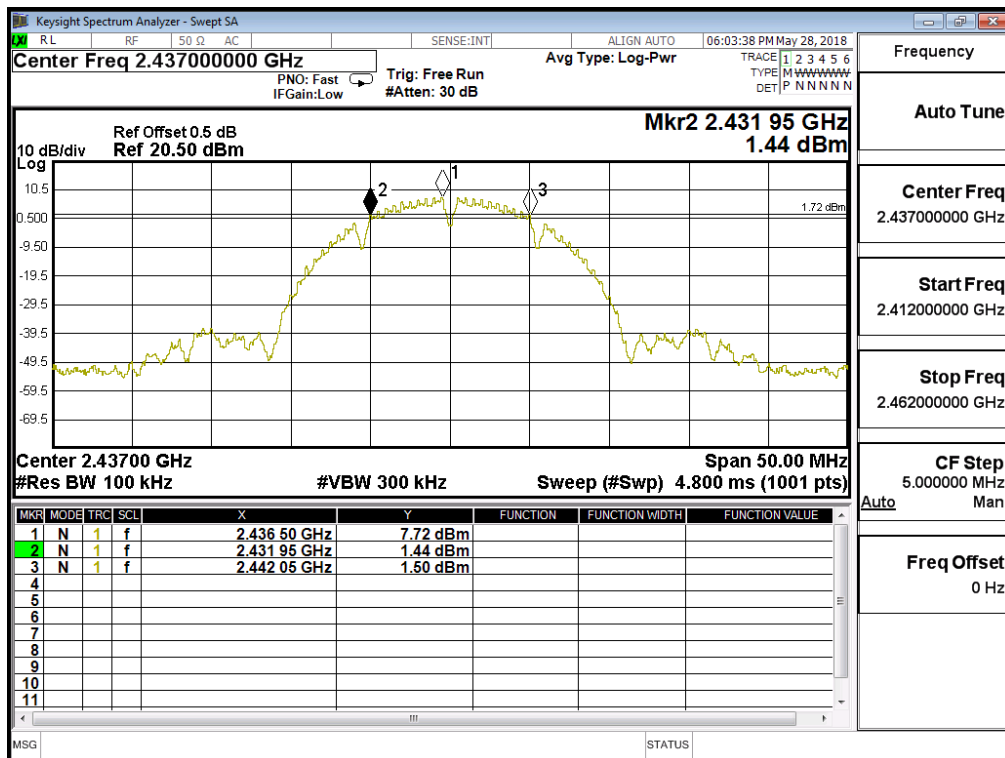
Figure Channel 1:



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6	2437.00	10100	>500	Pass

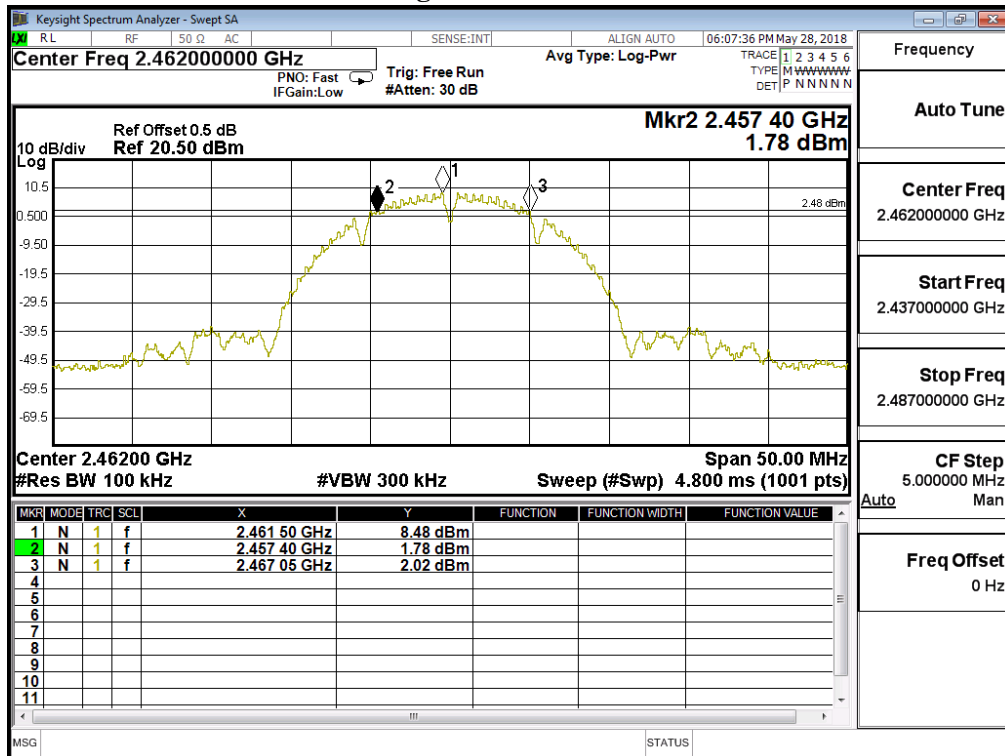
Figure Channel 6:



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11	2462.00	9650	>500	Pass

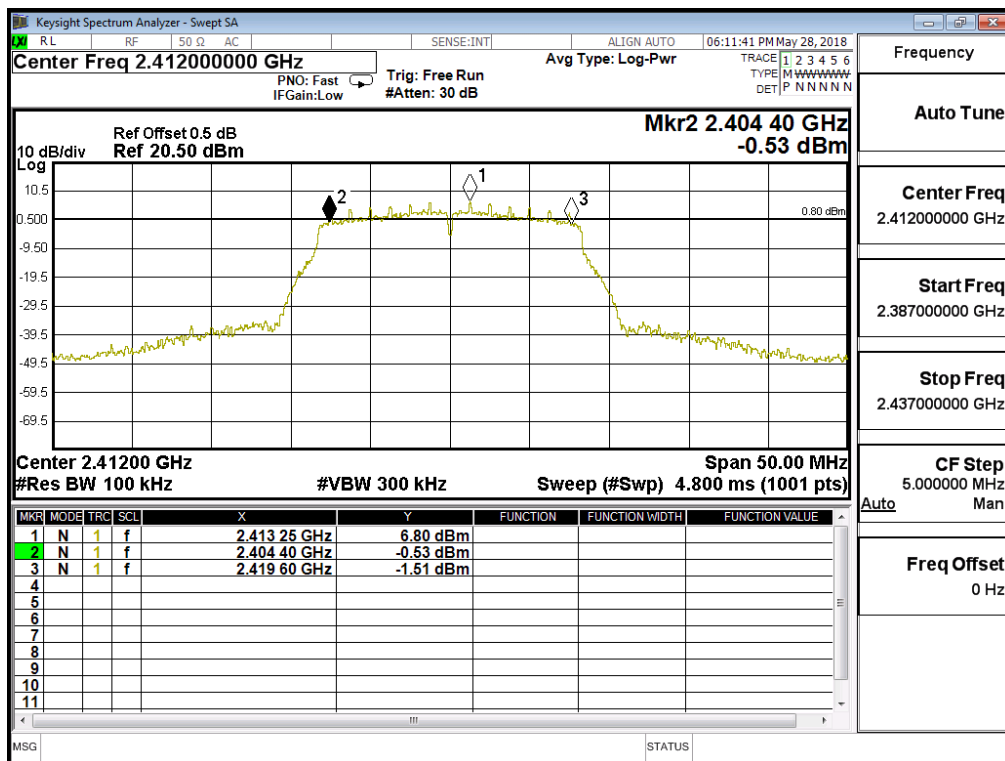
Figure Channel 11:



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1	2412.00	15200	>500	Pass

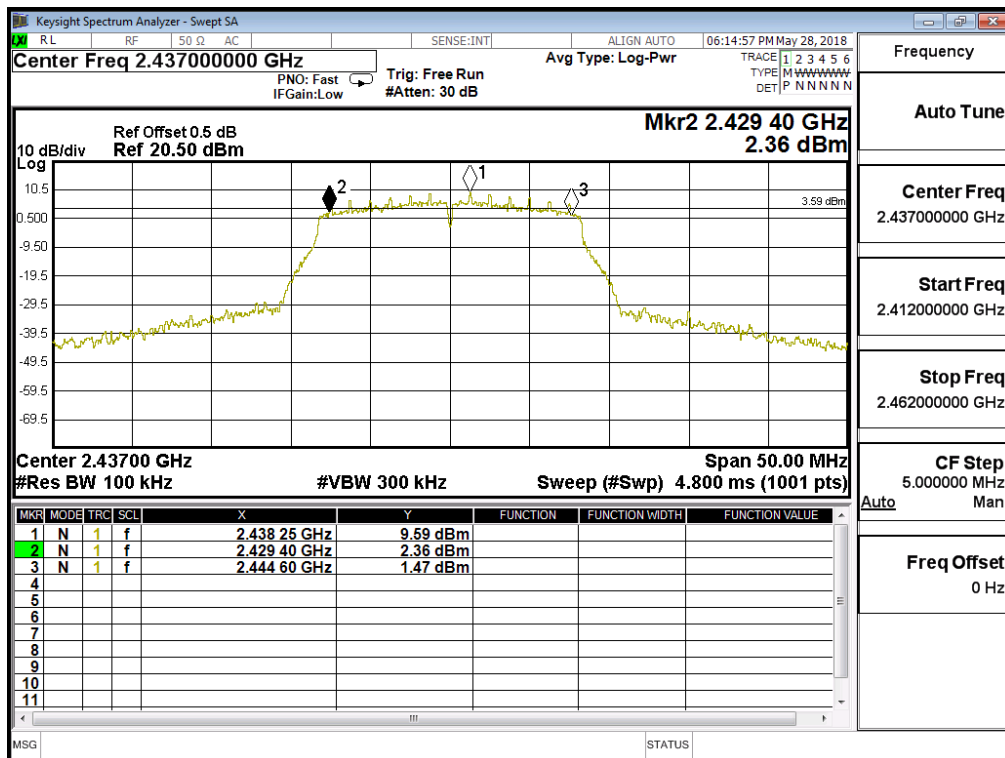
Figure Channel 1:



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6	2437.00	15200	>500	Pass

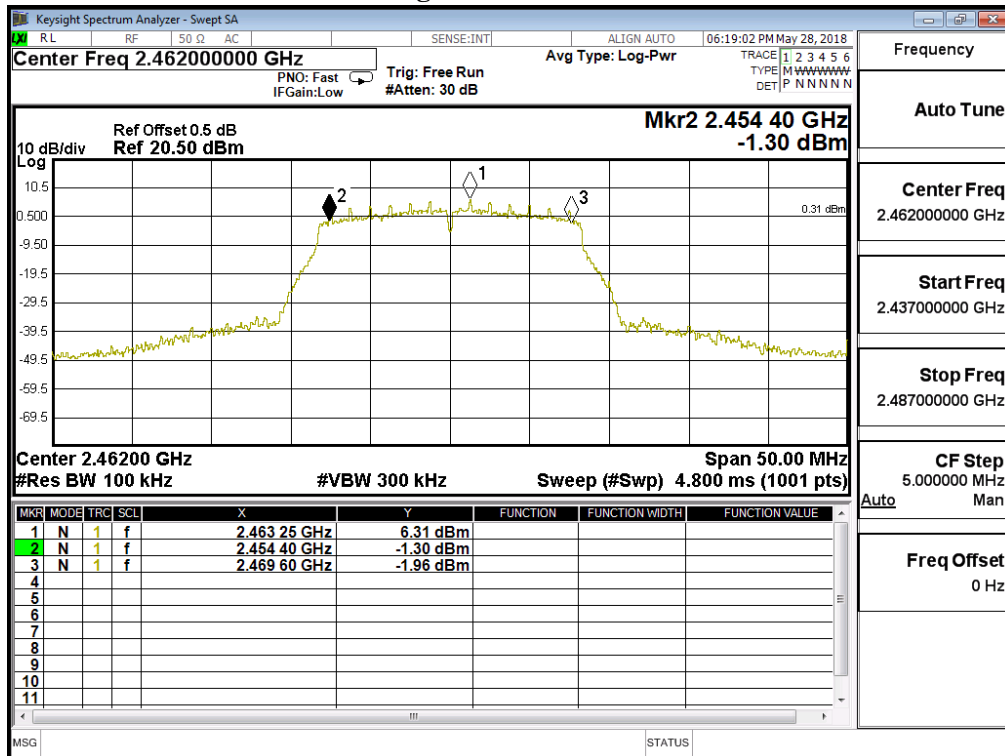
Figure Channel 6:



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11	2462.00	15200	>500	Pass

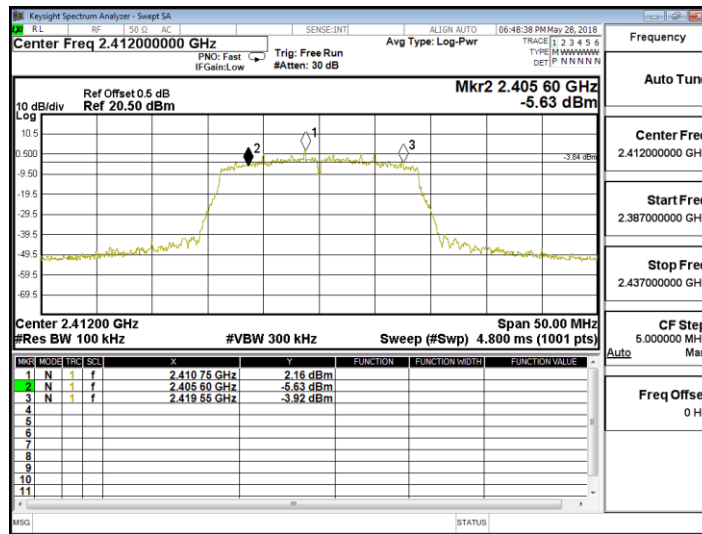
Figure Channel 11:



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps) (2412MHz)

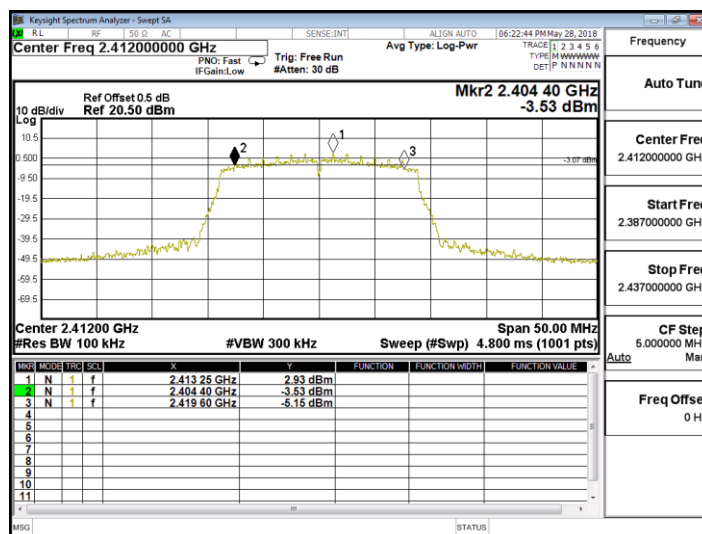
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1	2412.00	15200	>500	Pass

Figure Channel 1: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
1	2412.00	13950	>500	Pass

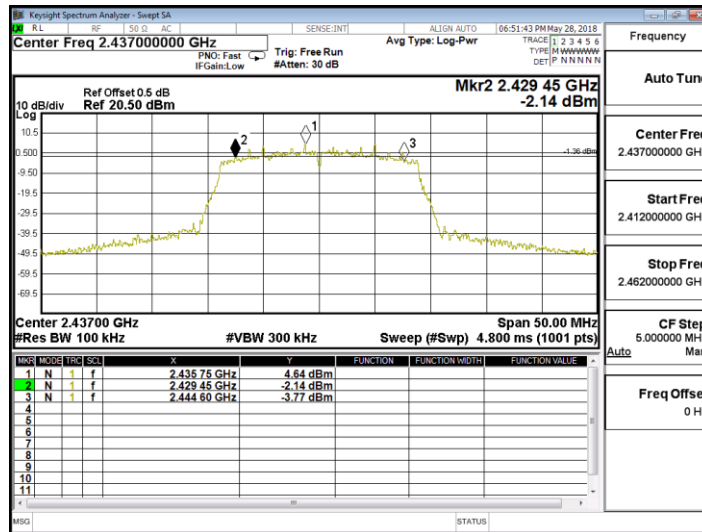
Figure Channel 1: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps) (2437MHz)

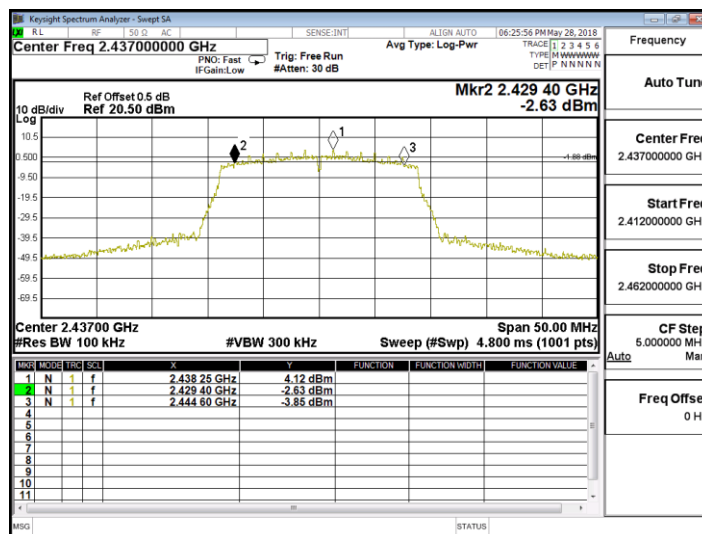
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6	2437.00	15200	>500	Pass

Figure Channel 6: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6	2437.00	15150	>500	Pass

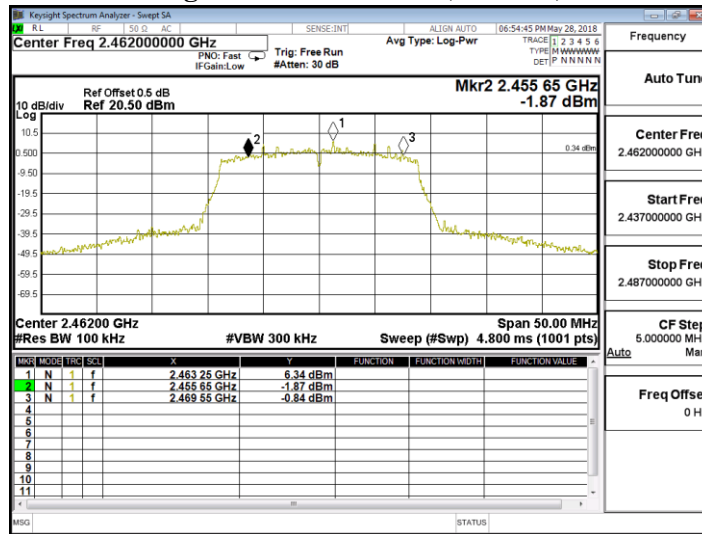
Figure Channel 6: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps) (2462MHz)

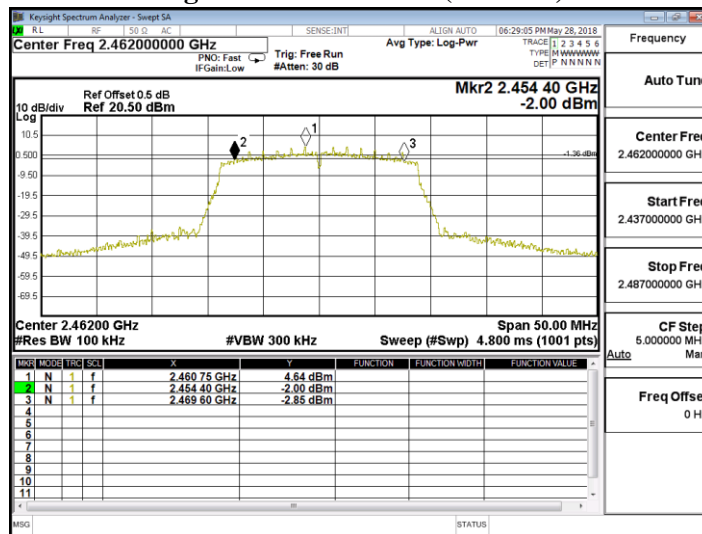
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11	2462.00	15200	>500	Pass

Figure Channel 11: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
11	2462.00	13900	>500	Pass

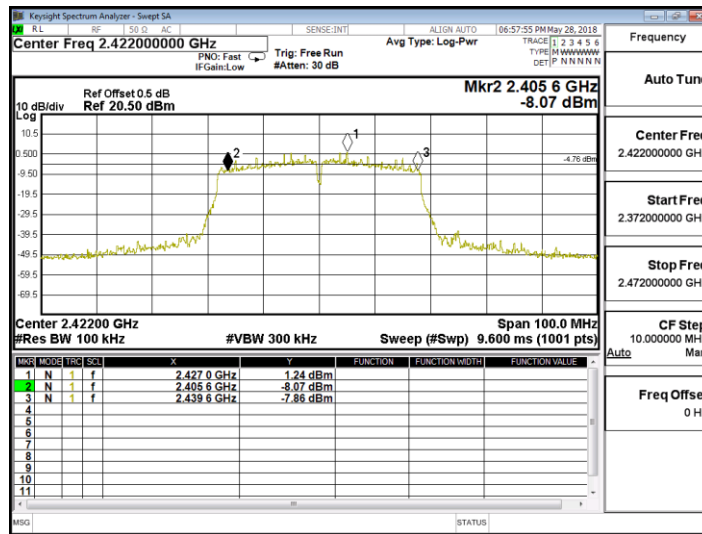
Figure Channel 11: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2422MHz)

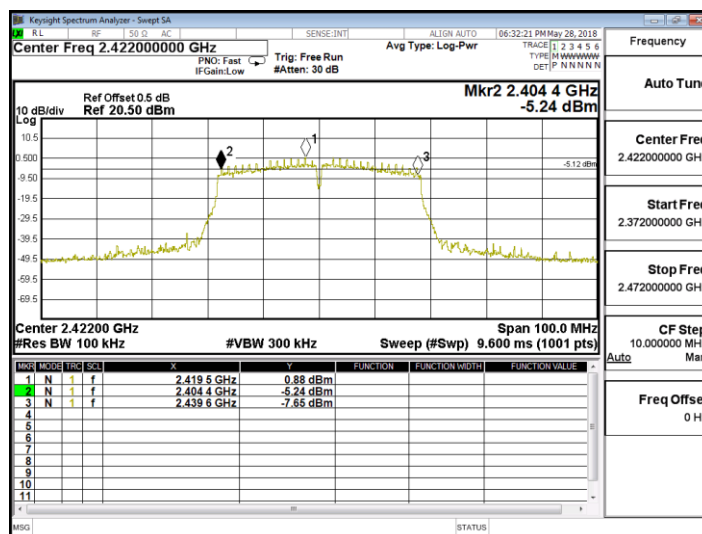
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
3	2422.00	35200	>500	Pass

Figure Channel 1: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
3	2422.00	34000	>500	Pass

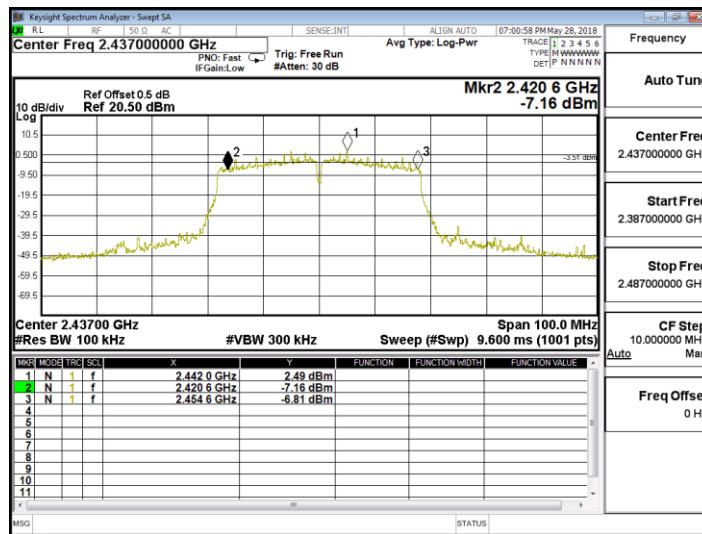
Figure Channel 1: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2437MHz)

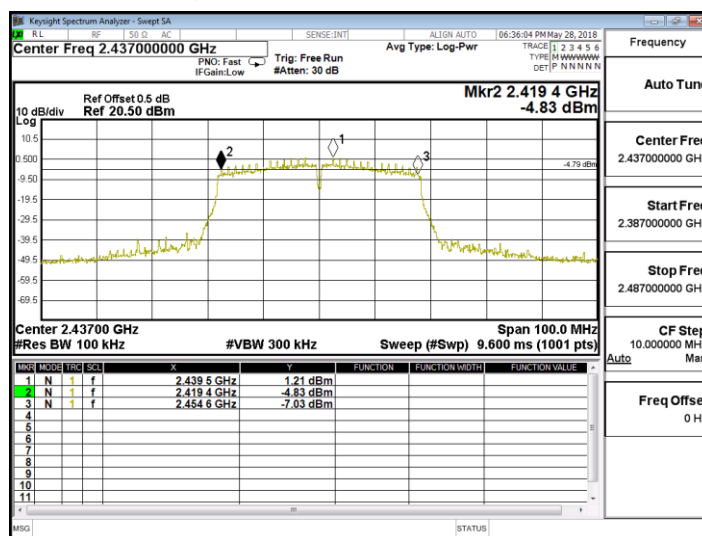
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6	2437.00	35200	>500	Pass

Figure Channel 4: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
6	2437.00	34000	>500	Pass

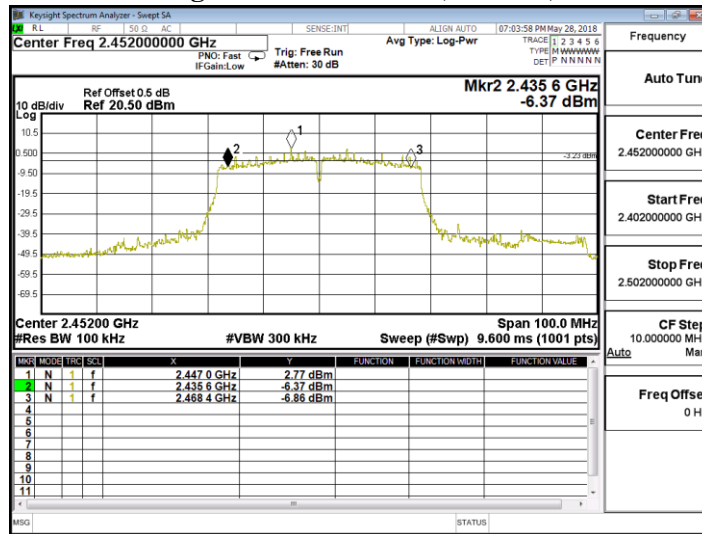
Figure Channel 4: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2452MHz)

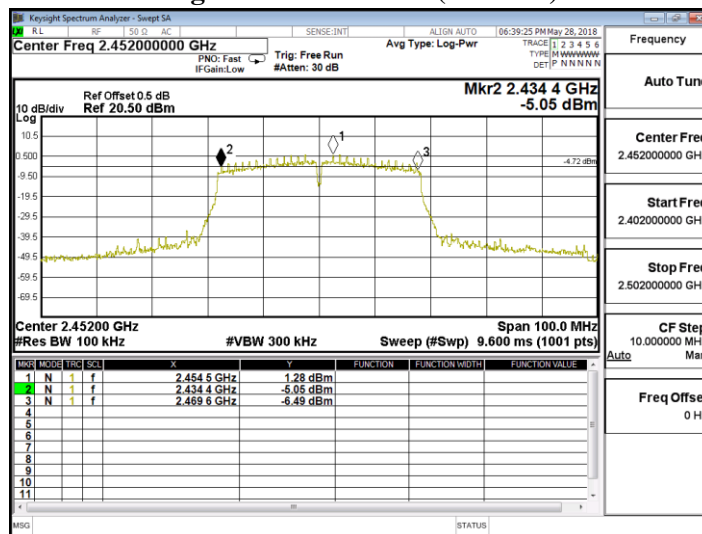
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
9	2452.00	35200	>500	Pass

Figure Channel 7: (Chain A)



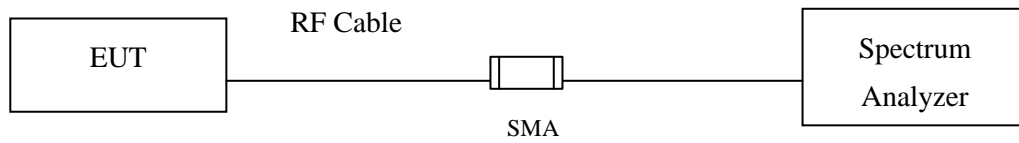
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
9	2452.00	32800	>500	Pass

Figure Channel 7: (Chain B)



8. Power Density

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.4. Uncertainty

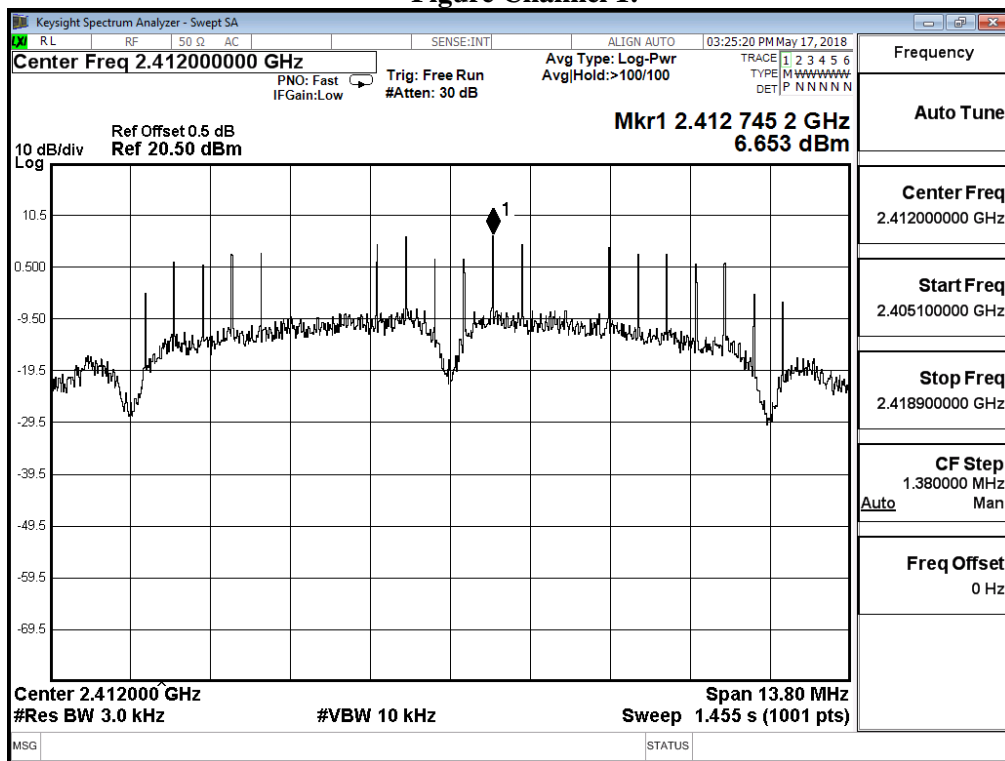
± 1.20 dB

8.5. Test Result of Power Density

Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2018/05/17
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2412	6.653	≤ 8dBm	Pass

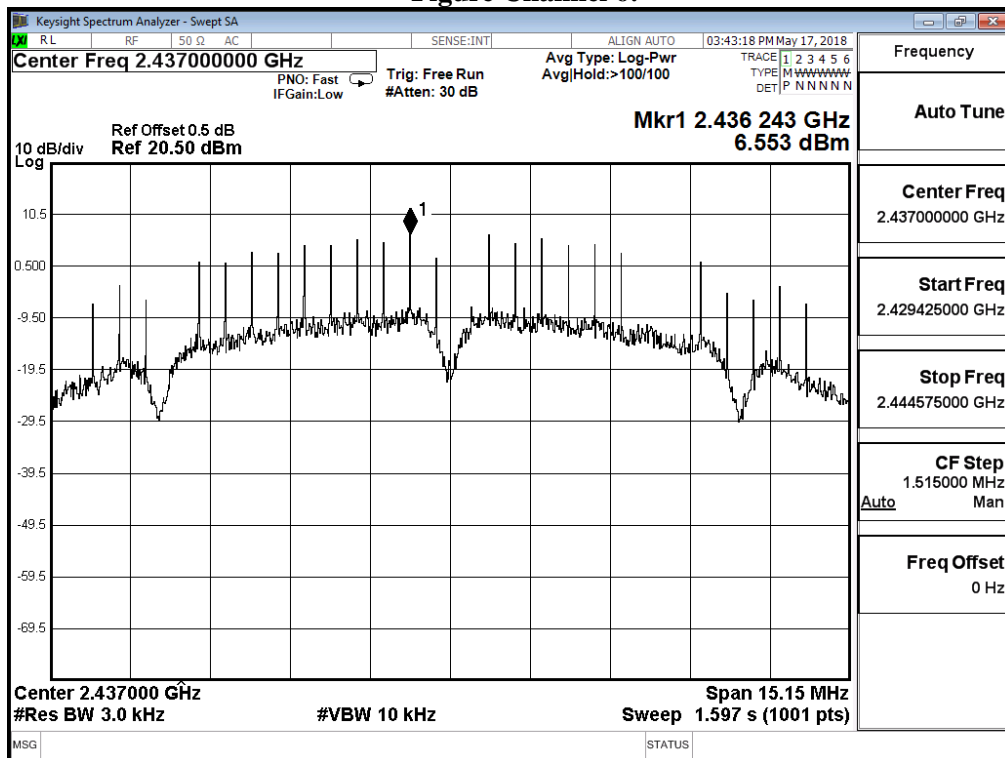
Figure Channel 1:



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Date : 2018/05/17
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2437MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
6	2437	6.553	≤ 8dBm	Pass

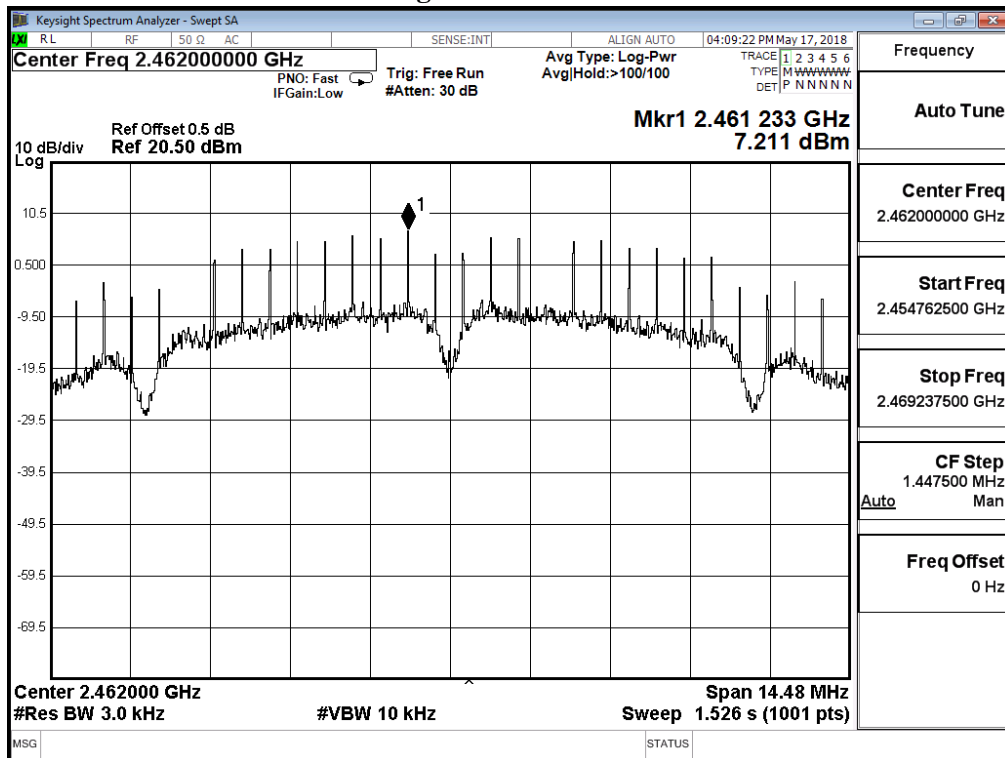
Figure Channel 6:



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2018/05/17
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
11	2462	7.211	≤ 8dBm	Pass

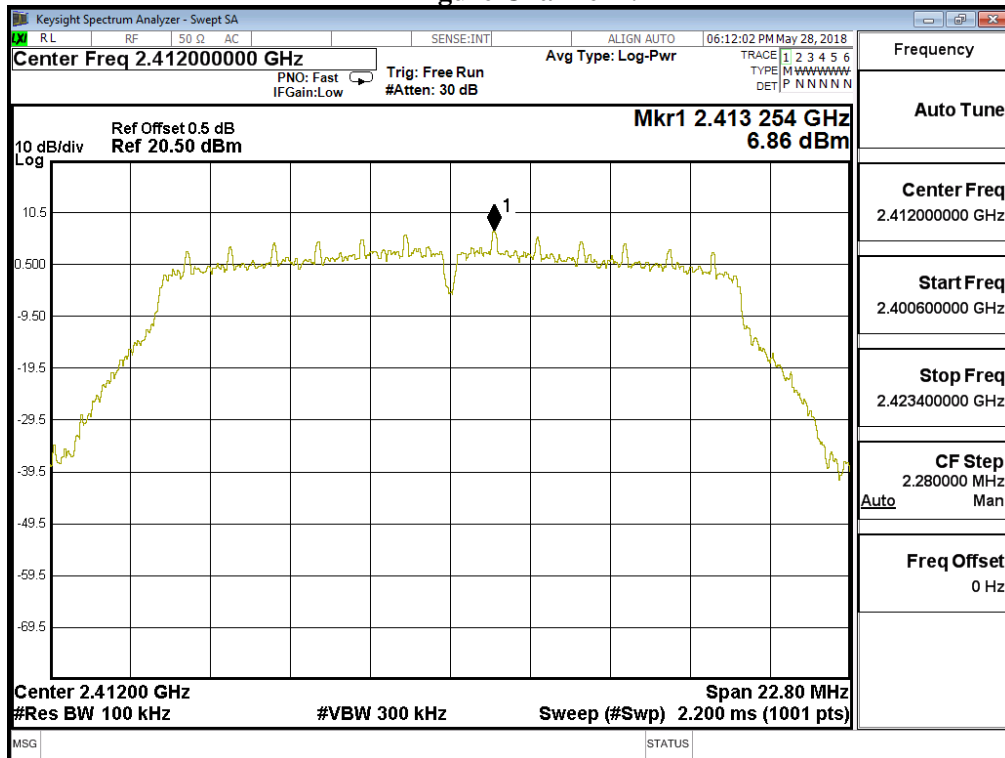
Figure Channel 11:



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2412	6.860	≤ 8dBm	Pass

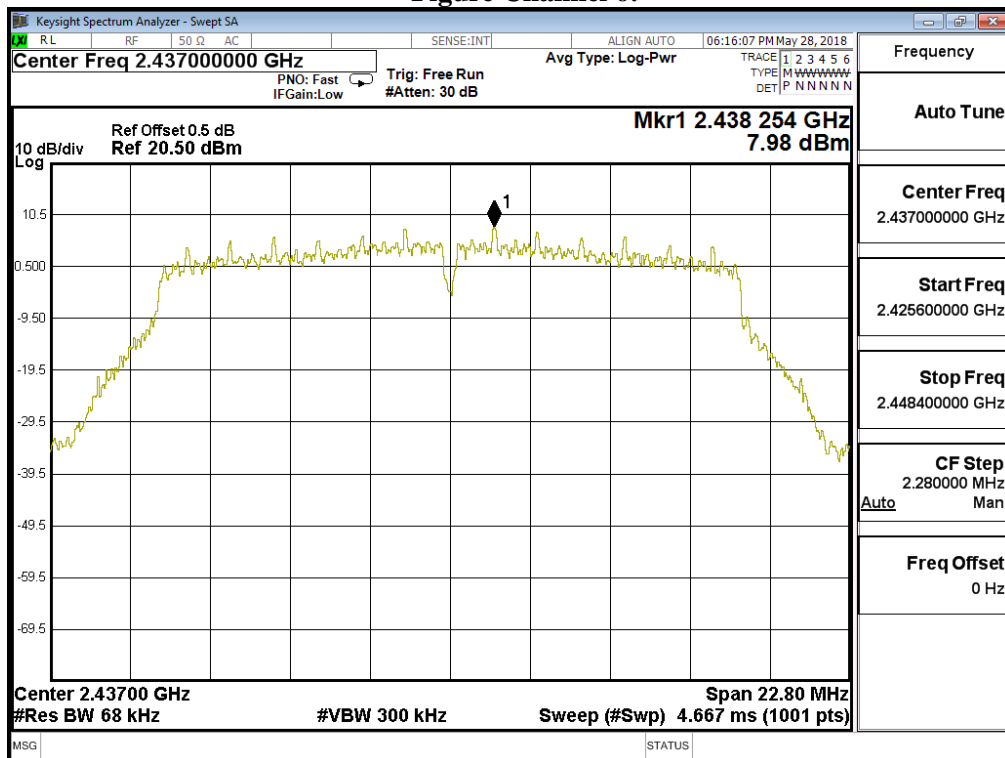
Figure Channel 1:



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Date : 2018/05/28
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2437MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
6	2437	7.980	≤ 8dBm	Pass

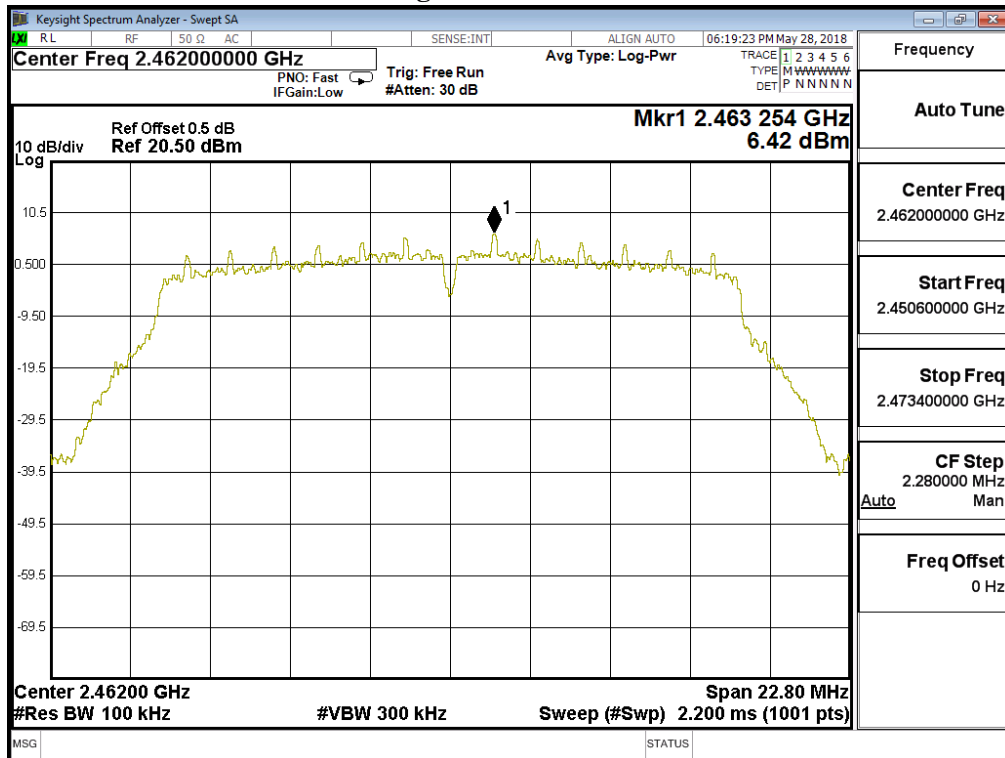
Figure Channel 6:



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
11	2462	6.420	≤ 8dBm	Pass

Figure Channel 11:



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps) (2412MHz)

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)1	Limit	Result
A	2.040	5.050	≤ 8dBm	Pass
B	2.890	5.900	≤ 8dBm	Pass

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

Figure Channel 1: (Chain A)

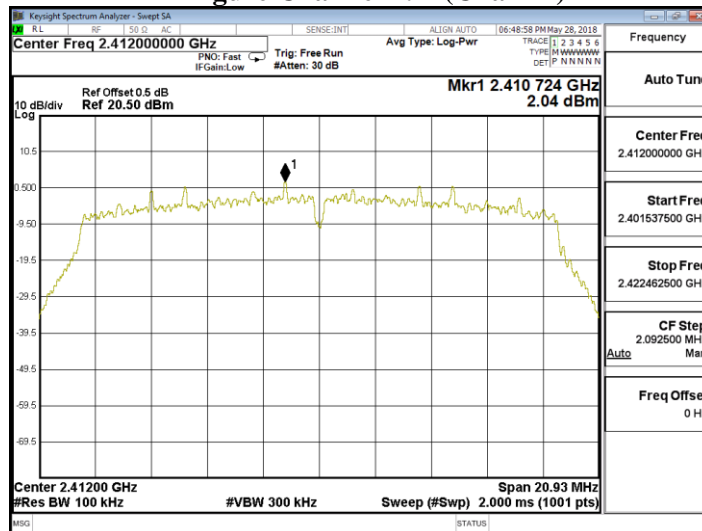
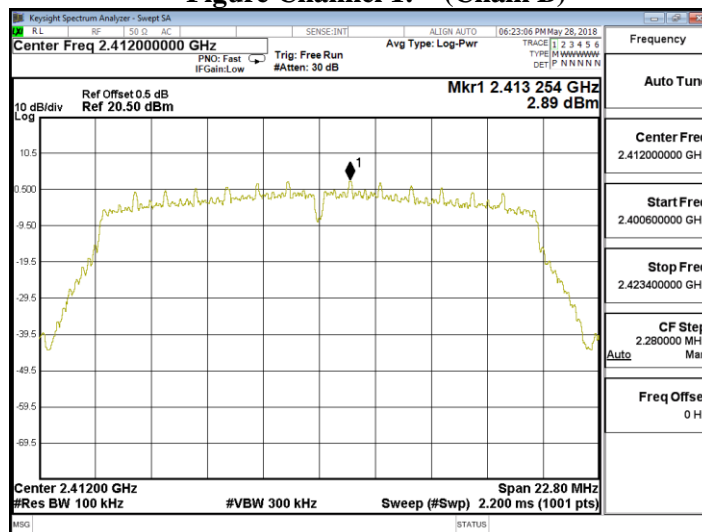


Figure Channel 1: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Date : 2018/05/28
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps) (2437MHz)

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)1	Limit	Result
A	4.560	7.570	≤ 8dBm	Pass
B	4.120	7.130	≤ 8dBm	Pass

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

Figure Channel 6: (Chain A)

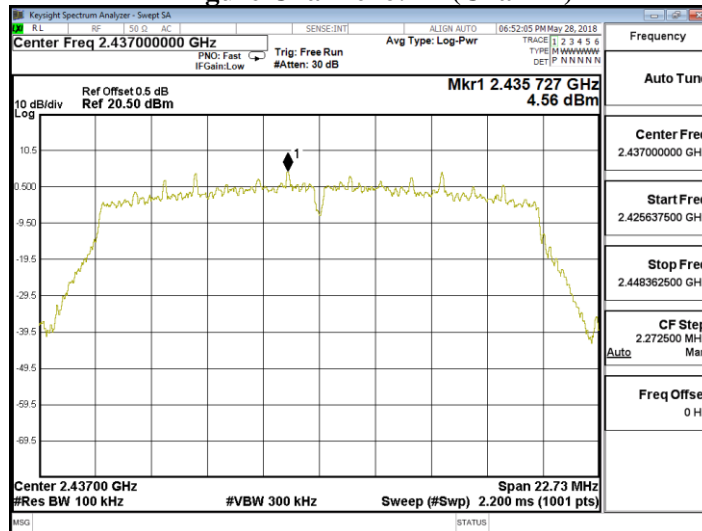
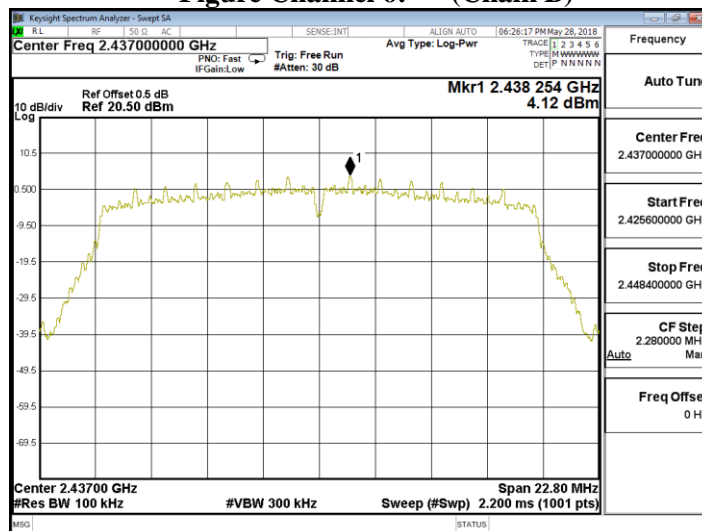


Figure Channel 6: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2018/05/31
 Test Mode : Mode 3: Transmit - (802.11n-20BW_14.4Mbps) (2462MHz)

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)1	Limit	Result
A	-10.403	-7.393	≤ 8dBm	Pass
B	-11.599	-8.589	≤ 8dBm	Pass

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

Figure Channel 11: (Chain A)

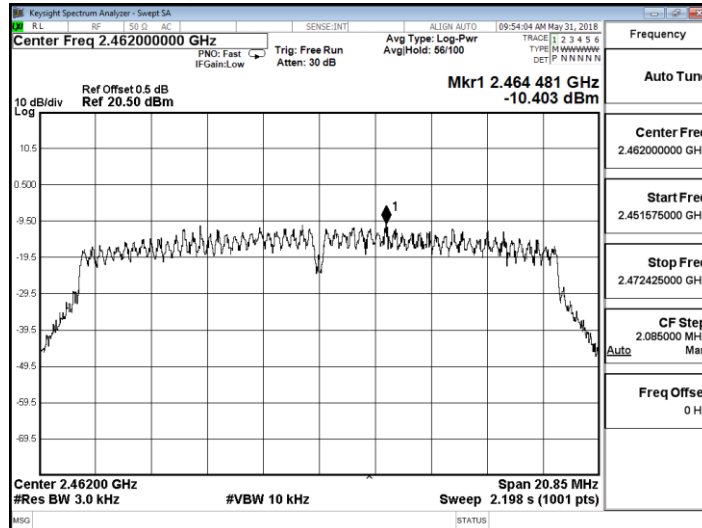
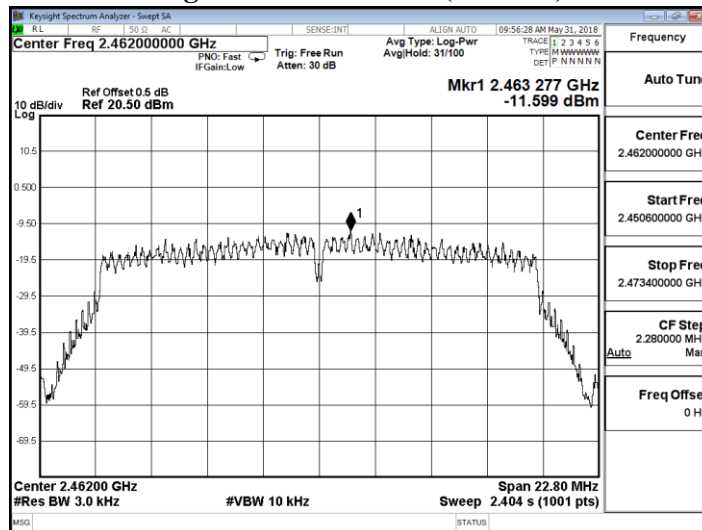


Figure Channel 11: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2422MHz)

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)1	Limit	Result
A	1.210	4.220	≤ 8dBm	Pass
B	0.880	3.890	≤ 8dBm	Pass

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

Figure Channel 3: (Chain A)

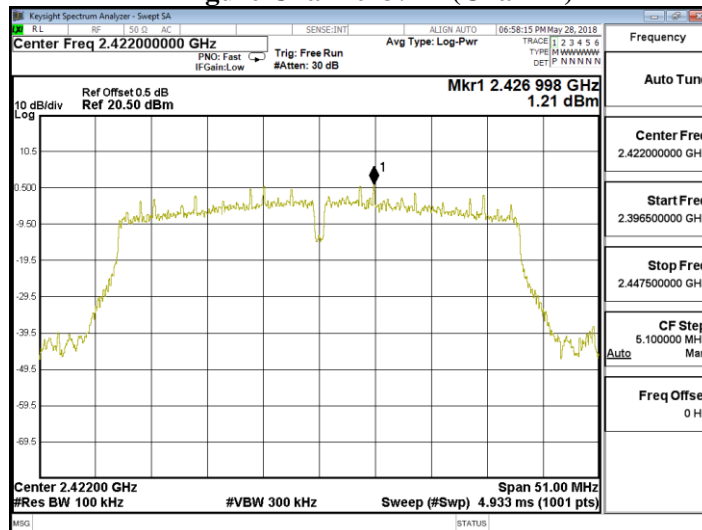
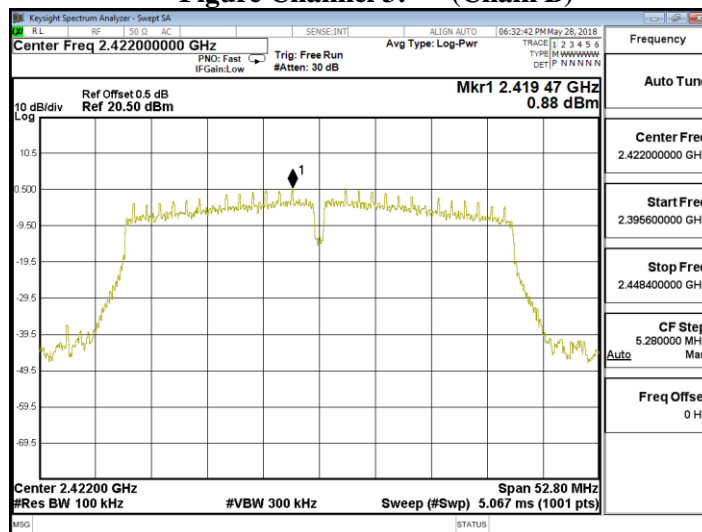


Figure Channel 3: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Date : 2018/05/28
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2437MHz)

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)1	Limit	Result
A	2.500	5.510	≤ 8dBm	Pass
B	1.190	4.200	≤ 8dBm	Pass

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

Figure Channel 6: (Chain A)

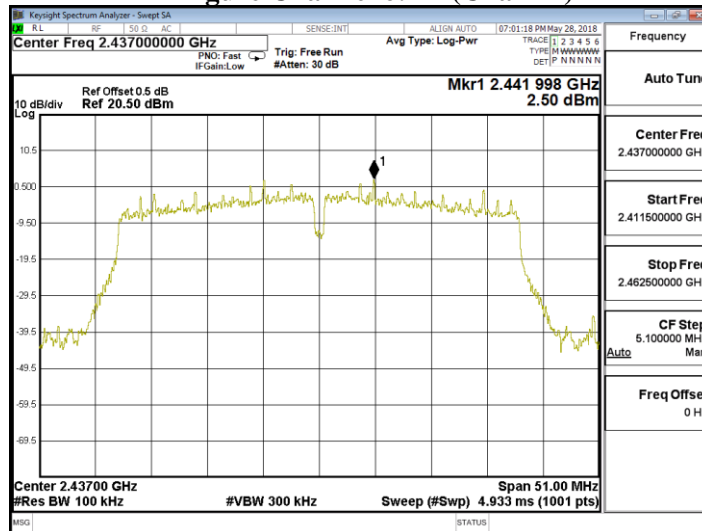
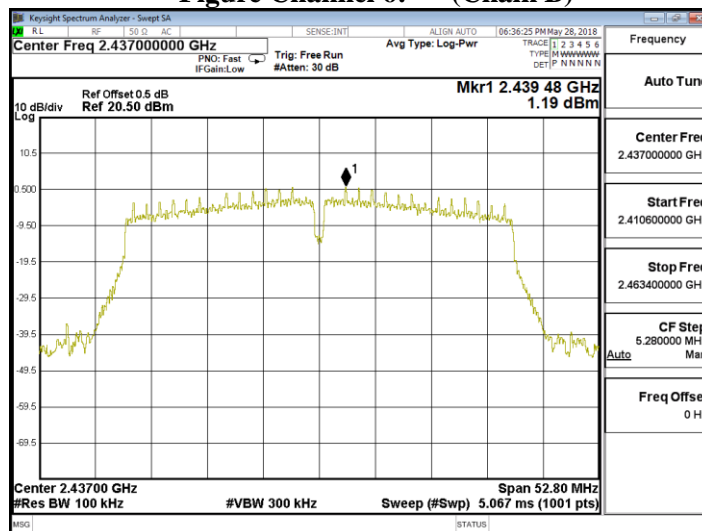


Figure Channel 6: (Chain B)



Product : Gigabit Multi-Service Broadband Router
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Date : 2018/05/28
 Test Mode : Mode 4: Transmit - (802.11n-40BW_30Mbps) (2452MHz)

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)1	Limit	Result
A	2.740	5.750	≤ 8dBm	Pass
B	1.320	4.330	≤ 8dBm	Pass

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

Figure Channel 9: (Chain A)

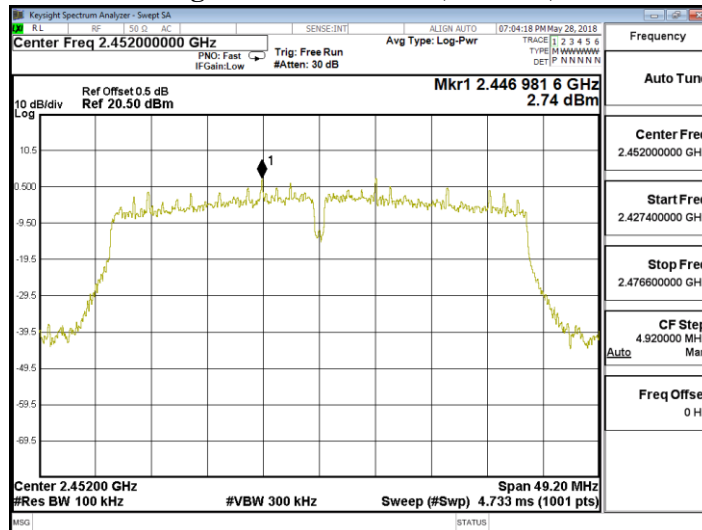
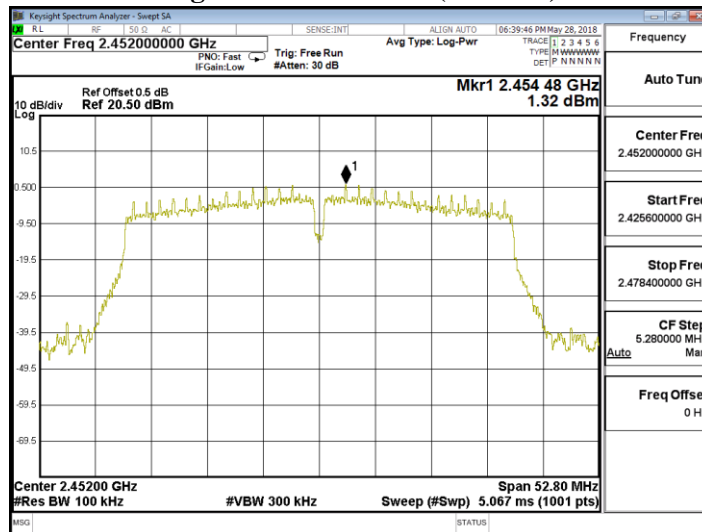
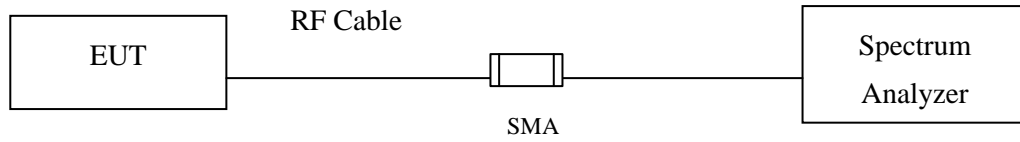


Figure Channel 9: (Chain B)



9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

9.3. Uncertainty

$\pm 2.31\text{msec}$

9.4. Test Result of Duty Cycle

Product : Gigabit Multi-Service Broadband Router
 Test Item : Duty Cycle
 Test Date : 2018/05/03
 Test Mode : Transmit

Duty Cycle Formula:

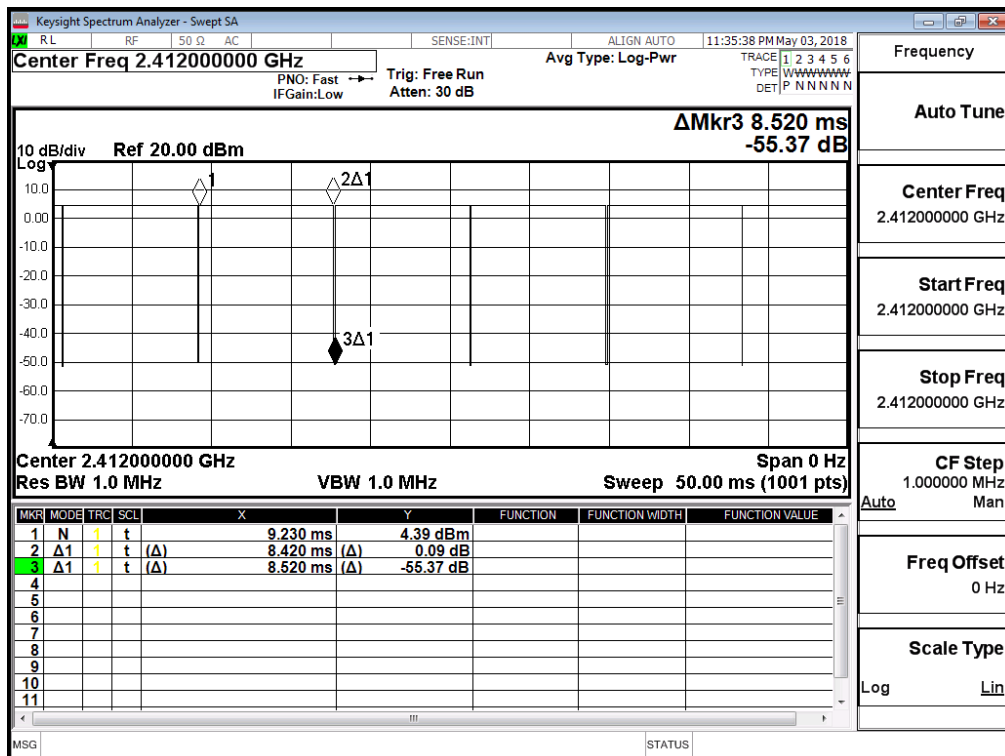
$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

$$\text{Duty Factor} = 10 \text{ Log} (1/\text{Duty Cycle})$$

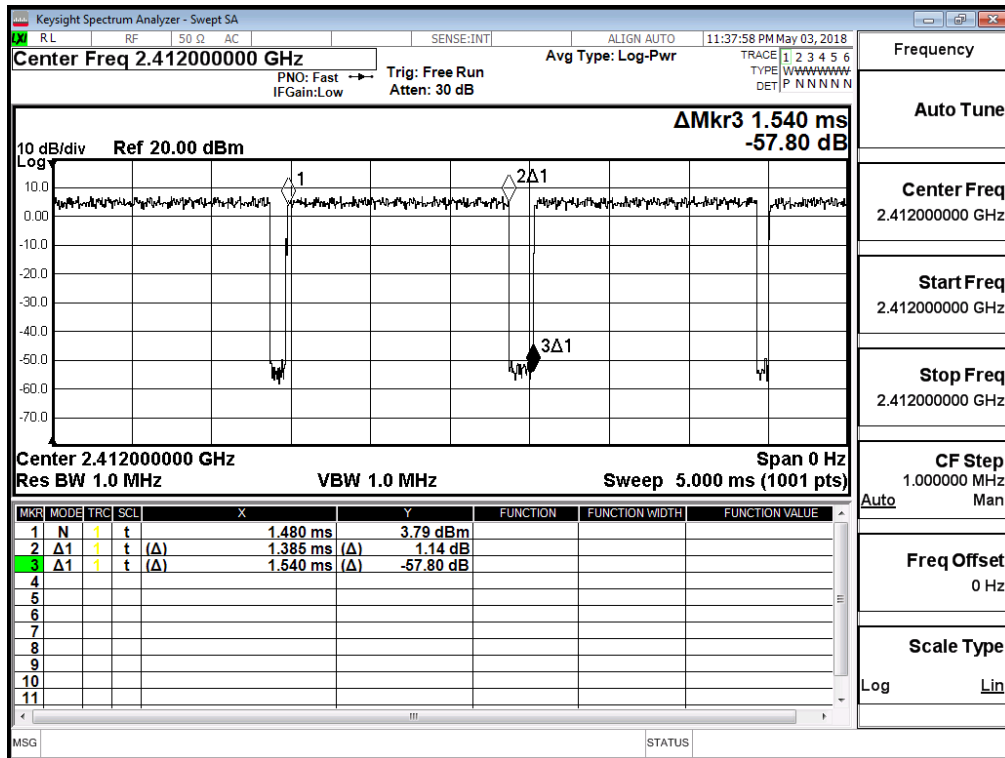
Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11b	8.4200	8.5200	98.83	0.05
802.11g	1.3850	1.5400	89.94	0.46
802.11n20	0.6650	0.7450	89.26	0.49
802.11n40	0.3130	0.4720	66.31	1.78

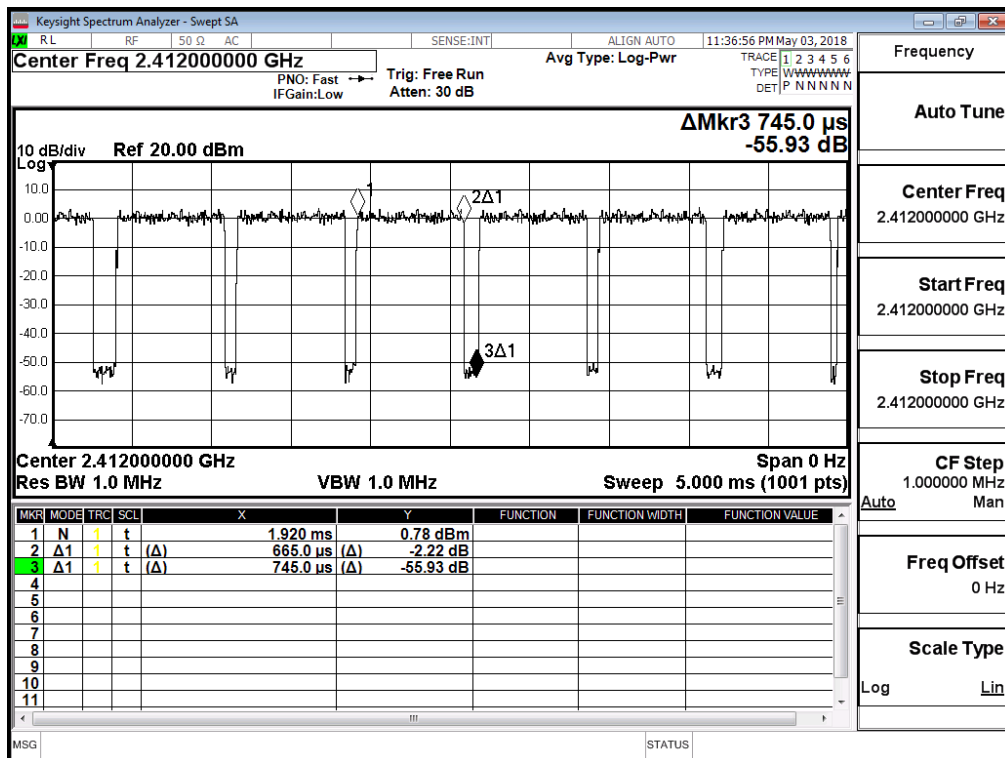
802.11b



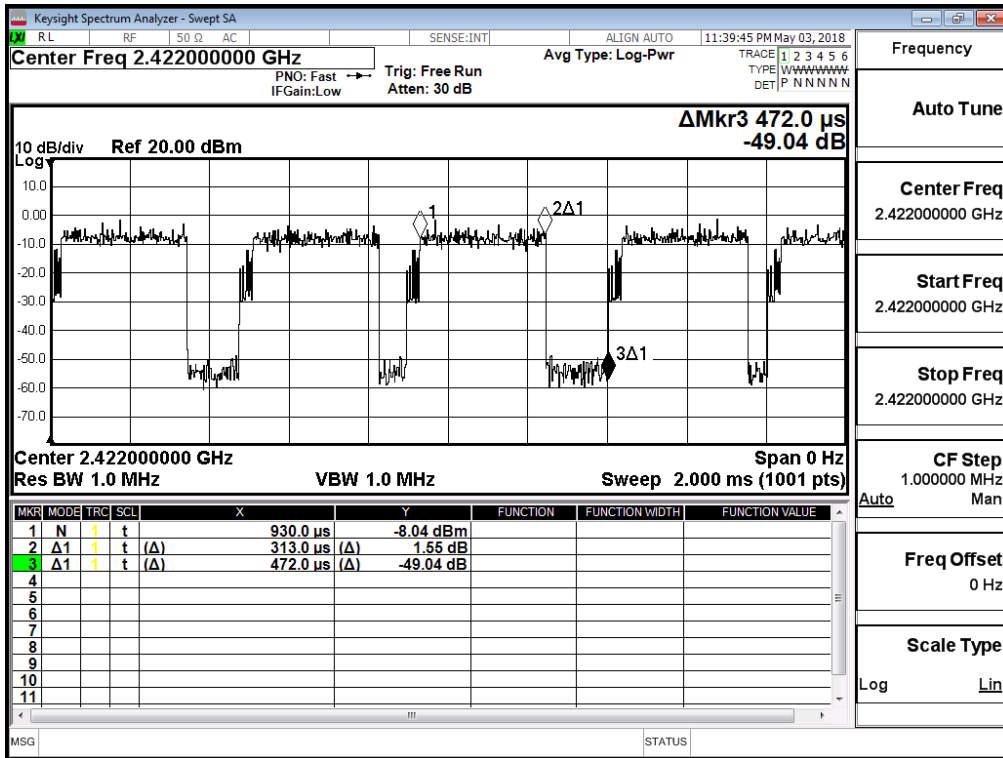
802.11g



802.11n20



802.11n40



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.