FCC Test Report

Product Name	Key programming device
Model No	KeyReader Plus
FCC ID.	QLXKRP

Applicant	TeraTron GmbH
Address	Bunsenstr. 10, 51647 Gummersbach, Germany

Date of Receipt	Aug. 02, 2016
Issue Date	Jan. 06, 2017
Report No.	1680089R-RFUSP01V00
Report Version	V1.0

Testing Laboratory
3023

Test Report

Issue Date: Jan. 06, 2017
Report No.: 1680089R-RFUSP01V00

Product Name	Key programming device
Applicant	TeraTron GmbH
Address	Bunsenstr. 10, 51647 Gummersbach, Germany
Manufacturer	TeraTron GmbH
Model No.	KeyReader Plus
FCC ID.	QLXKRP
EUT Rated Voltage	DC 3.6V (Power by Battery)
EUT Test Voltage	DC 3.6V (Power by Battery)
Trade Name	TeraTron
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2015 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v03r05
Test Result	Complied

Documented By : Leven Huang

(Senior Adm. Specialist / Leven Huang)

Tested By : Eason chen

(Engineer / Eason Chen)

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	Key programming device
Trade Name	TeraTron
Model No.	KeyReader Plus
FCC ID.	QLXKRP
Frequency Range	2412-2462MHz for 802.11b/g/n-20BW
Number of Channels	802.11b/g/n-20MHz: 11
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 72.2Mbps
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK) 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	Printed on PCB Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
USB Cable	Shielded, 2m
Contain Module	u-blox / ODIN-W16

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	PROANT AB	432	Printed on PCB Antenna	3.0dBi for 2.4 GHz

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		

Note:

1. The EUT is a Key programming device built-in WLAN、Bluetooth V3.0, V2.1+EDR,V4.0 transceiver, this report for WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report.
4. 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 7.2Mbps.
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 MCS0 7.2Mbps 20M-BW)

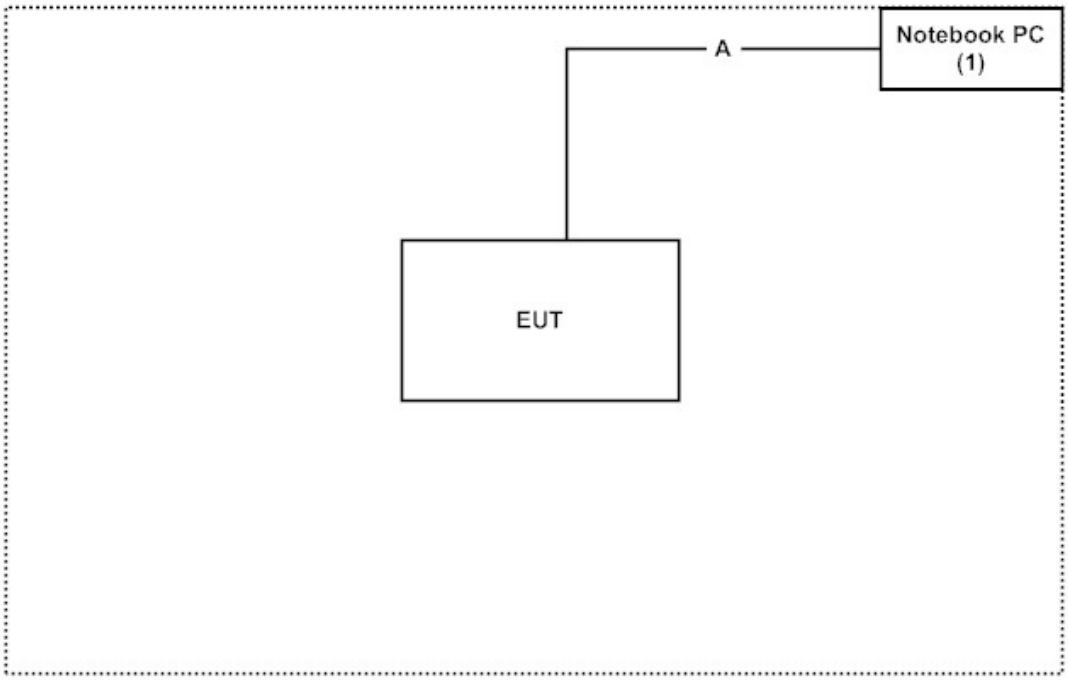
1.3. Tested System Details

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	ASUS	X206H	X206HA	Non-Shielded, 1.8m

Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 2m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software ” Firefox for keyReaderPlus.lnk (Ver2015.08.1-21C /01.25)” on the Notebook PC.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
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/chinese/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

Site Description: Accredited by TAF
Accredited Number: 3023

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

FCC Accreditation Number: TW1014

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	Agilent	N9010A	MY48030495	2016/7/22	2017/7/21
X	Power Meter	Anritsu	ML2495A	6K00003357	2016/6/23	2017/6/22
X	EMI Test Receiver	R&S	ESCS 30	100369	2016/10/13	2017/10/12
X	LISN	R&S	ESH3-Z5	836679/017	2017/1/7	2018/1/6
X	LISN	R&S	ENV216	100097	2017/1/7	2018/1/6
X	Coaxial Cable	QTK(Arnist)	RG 400	LC018-RG	2016/6/25	2017/6/24

For Radiated measurements /Site3/CB8

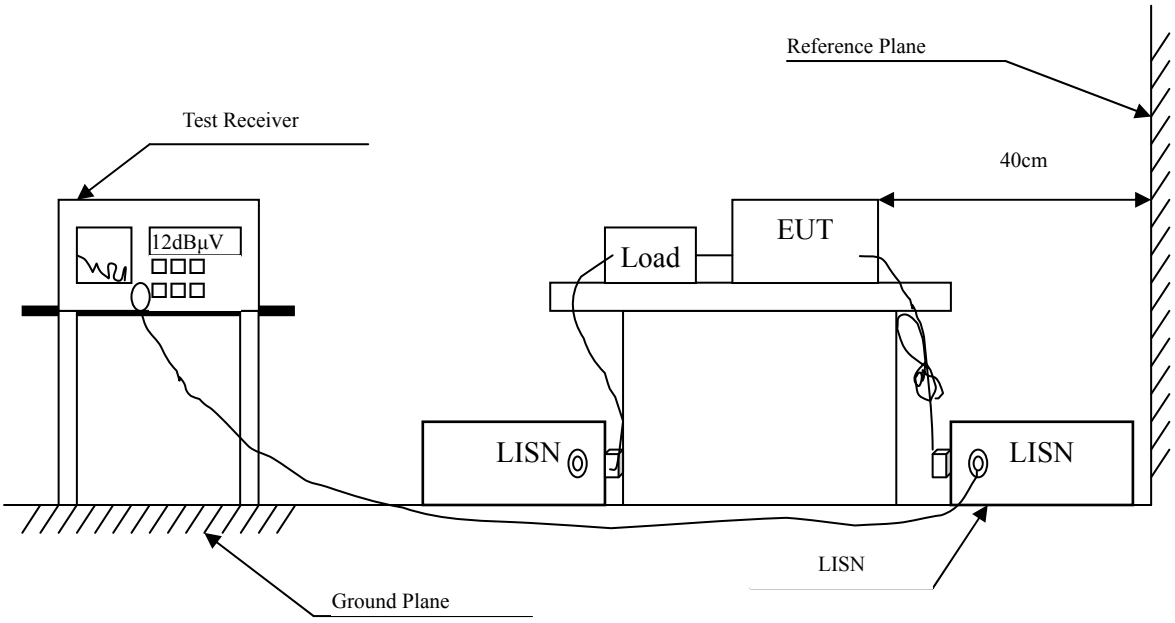
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSP40	100170	2017/1/5	2018/1/4
X	Bi-Log Antenna	Schaffner Chase	CBL6112B	2707	2016/9/10	2017/9/9
X	Horn Antenna	ETS-Lindgren	3117	00135205	2016/4/6	2017/4/5
	Horn Antenna	Schwarzbeck	BBHA9170	9170430	2016/1/11	2017/1/10
X	Pre-Amplifier	QTK	AP/0100A	CHM/0901069	2016/6/28	2017/6/27
X	Pre-Amplifier	EMCI	EMC012630SE	980210	2016/1/27	2017/1/26
	Pre-Amplifier	NARDA WE	DBL-1840N506	013	2016/9/30	2017/9/29
X	Filter	MicroTRON	BRM50701	019	2016/10/20	2017/10/19
	Filter	Microwave Circuits	N0257881	36681	2016/12/7	2017/12/6
X	EMI Test Receiver	R&S	ESR26	101385	2016/9/29	2017/9/28
X	Coaxial Cable	QTK(Arnist)	SUCOFLEX 106	L1606-015C	2016/6/25	2017/6/24
X	EMI Test Receiver	R&S	ESCS 30	838251/001	2016/7/21	2017/7/20
X	Coaxial Cable	QTK(Arnist)	RG 214	LC003-RG	2016/6/21	2017/6/20
X	Coaxial signal switch	Anritsu	MP59B	6201415889	2016/6/16	2017/6/15

Note:

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

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	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 invested 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 : Key programming device
Test Item : Conducted Emission Test
Power Line : Line 1
Test date : 2016.08.31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
Line 1					
Quasi-Peak					
0.154	9.687	35.320	45.006	-20.880	65.886
0.263	9.678	21.530	31.208	-31.563	62.771
0.470	9.675	31.340	41.015	-15.842	56.857
2.076	9.746	15.170	24.916	-31.084	56.000
4.431	9.780	19.990	29.770	-26.230	56.000
7.193	9.838	16.740	26.578	-33.422	60.000
Average					
0.154	9.687	25.940	35.626	-20.260	55.886
0.263	9.678	14.190	23.868	-28.903	52.771
0.470	9.675	24.630	34.305	-12.552	46.857
2.076	9.746	9.990	19.736	-26.264	46.000
4.431	9.780	11.700	21.480	-24.520	46.000
7.193	9.838	11.250	21.088	-28.912	50.000

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 : Key programming device
Test Item : Conducted Emission Test
Power Line : Line 2
Test date : 2016.08.31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
Line 2					
Quasi-Peak					
0.166	9.735	35.990	45.725	-19.818	65.543
0.209	9.736	27.440	37.176	-27.138	64.314
0.459	9.744	30.200	39.944	-17.227	57.171
0.834	9.756	13.440	23.196	-32.804	56.000
1.158	9.767	12.590	22.357	-33.643	56.000
4.091	9.847	14.630	24.477	-31.523	56.000
Average					
0.166	9.735	24.610	34.345	-21.198	55.543
0.209	9.736	13.810	23.546	-30.768	54.314
0.459	9.744	23.440	33.184	-13.987	47.171
0.834	9.756	7.260	17.016	-28.984	46.000
1.158	9.767	5.960	15.727	-30.273	46.000
4.091	9.847	5.140	14.987	-31.013	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. Peak Power Output

3.1. Test Setup

3.2. Limits

The maximum peak power shall be less 1 Watt.

3.3. Test Procedure

The EUT was 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 D01 DTS Meas Guidance v03r04 section 9.1.2 PKPM1 Peak power meter method.

3.4. Uncertainty

± 1.19 dB

3.5. Test Result of Peak Power Output

Product : Key programming device
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11	1		
		Measurement Level (dBm)						
01	2412	12.76	--	--	--	15.06	<30dBm	Pass
06	2437	12.88	12.83	12.79	12.74	15.27	<30dBm	Pass
11	2462	13.11	--	--	--	15.41	<30dBm	Pass

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

Product : Key programming device
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54	6		
		Measurement Level (dBm)										
01	2412	10.5	--	--	--	--	--	--	--	21.72	<30dBm	Pass
06	2437	11.11	11.07	11.02	10.95	10.91	10.87	10.82	10.79	22.56	<30dBm	Pass
11	2462	11.31	--	--	--	--	--	--	--	22.47	<30dBm	Pass

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

Product : Key programming device
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

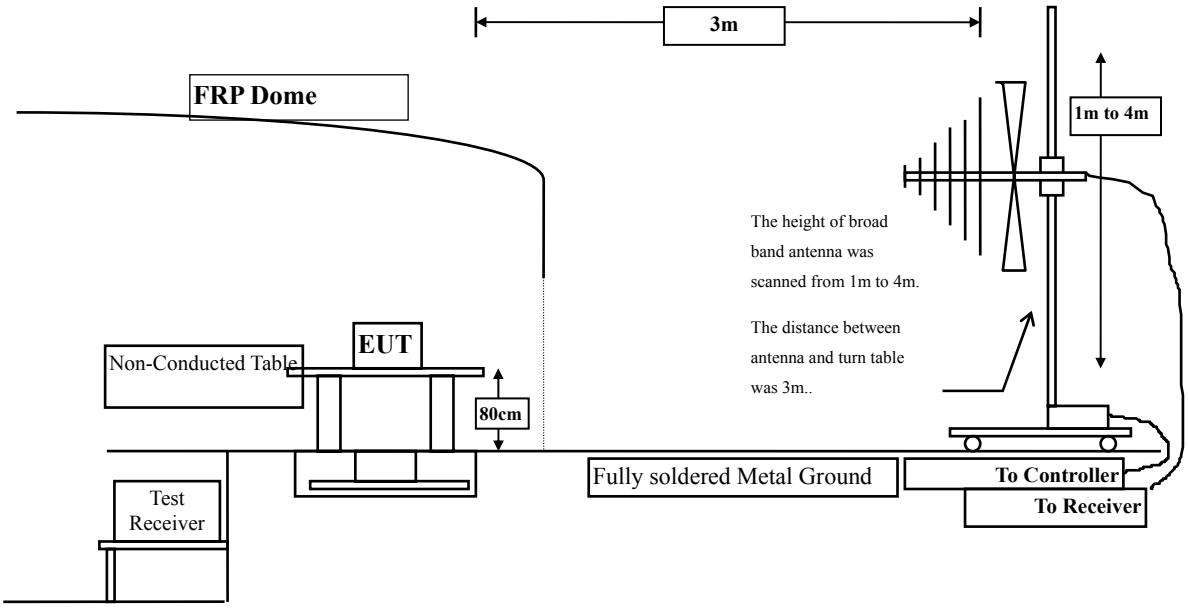
Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2	7.2		
		Measurement Level (dBm)										
01	2412	10.02	--	--	--	--	--	--	--	21.55	<30dBm	Pass
06	2437	10.83	10.78	10.73	10.69	10.62	10.57	10.53	10.47	22.54	<30dBm	Pass
11	2462	10.49	--	--	--	--	--	--	--	22.01	<30dBm	Pass

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

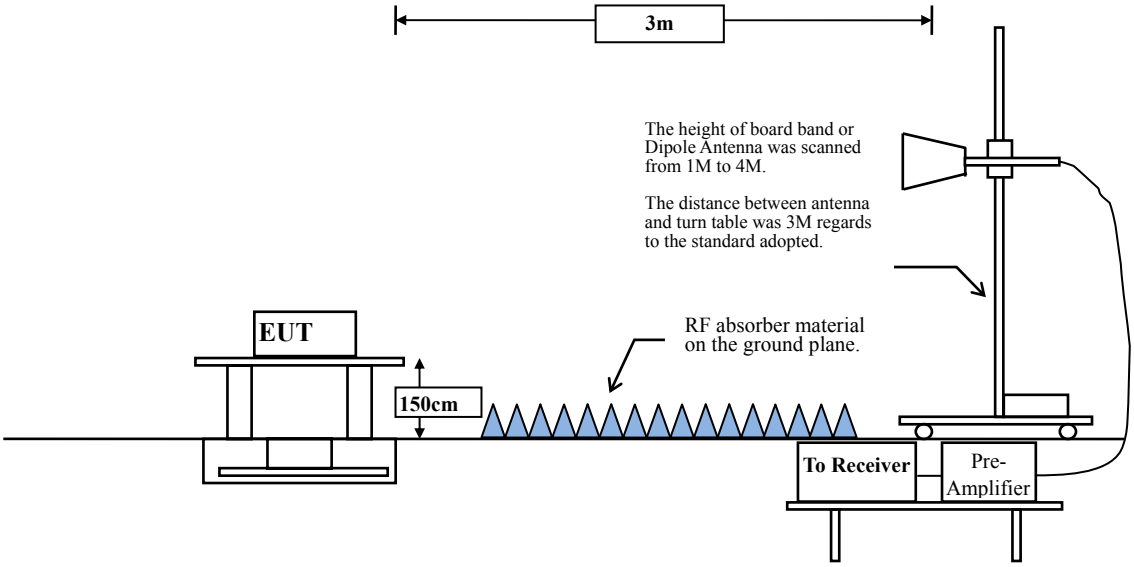
4. Radiated Emission

4.1. Test Setup

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 (dBμV/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 form 9kHz - 10th Harmonic of fundamental was investigated.

4.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

4.5. Test Result of Radiated Emission

Product : Key programming device
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	2.428	41.930	44.359	-29.641	74.000
7236.000	9.177	39.700	48.877	-25.123	74.000
9648.000	10.019	41.570	51.590	-22.410	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	2.836	41.920	44.757	-29.243	74.000
7236.000	9.676	42.120	51.796	-22.204	74.000
9648.000	10.556	41.970	52.527	-21.473	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Key programming device
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test date	:	2016.08.30
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	2.076	42.150	44.227	-29.773	74.000
7311.000	9.512	40.450	49.962	-24.038	74.000
9748.000	9.630	42.140	51.770	-22.230	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	2.532	42.080	44.612	-29.388	74.000
7311.000	10.089	41.690	51.779	-22.221	74.000
9748.000	10.266	42.540	52.807	-21.193	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Key programming device
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4924.000	2.191	41.620	43.811	-30.189	74.000
7386.000	10.373	39.680	50.054	-23.946	74.000
9848.000	9.964	43.720	53.684	-20.316	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	2.805	42.590	45.395	-28.605	74.000
7386.000	11.180	41.620	52.800	-21.200	74.000
9848.000	10.801	42.970	53.771	-20.229	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Key programming device
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	2.428	41.980	44.409	-29.591	74.000
7236.000	9.177	40.120	49.297	-24.703	74.000
9648.000	10.019	41.920	51.940	-22.060	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	2.836	41.370	44.207	-29.793	74.000
7236.000	9.676	41.980	51.656	-22.344	74.000
9648.000	10.556	41.540	52.097	-21.903	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Key programming device
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test date	:	2016.08.30
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	2.076	41.950	44.027	-29.973	74.000
7311.000	9.512	40.940	50.452	-23.548	74.000
9748.000	9.630	42.510	52.140	-21.860	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	2.532	42.560	45.092	-28.908	74.000
7311.000	10.089	42.090	52.179	-21.821	74.000
9748.000	10.266	42.710	52.977	-21.023	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Key programming device
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4924.000	2.191	41.940	44.131	-29.869	74.000
7386.000	10.373	40.120	50.494	-23.506	74.000
9848.000	9.964	43.620	53.584	-20.416	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	2.805	43.110	45.915	-28.085	74.000
7386.000	11.180	41.820	53.000	-21.000	74.000
9848.000	10.801	42.610	53.411	-20.589	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Key programming device
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2412MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4824.000	2.428	42.310	44.739	-29.261	74.000
7236.000	9.177	40.180	49.357	-24.643	74.000
9648.000	10.019	41.890	51.910	-22.090	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4824.000	2.836	41.760	44.597	-29.403	74.000
7236.000	9.676	41.930	51.606	-22.394	74.000
9648.000	10.556	42.050	52.607	-21.393	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	Key programming device
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test date	:	2016.08.30
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4874.000	2.076	42.210	44.287	-29.713	74.000
7311.000	9.512	40.740	50.252	-23.748	74.000
9748.000	9.630	42.360	51.990	-22.010	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4874.000	2.532	41.940	44.472	-29.528	74.000
7311.000	10.089	42.030	52.119	-21.881	74.000
9748.000	10.266	42.490	52.757	-21.243	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Key programming device
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4924.000	2.191	41.370	43.561	-30.439	74.000
7386.000	10.373	40.190	50.564	-23.436	74.000
9848.000	9.964	43.410	53.374	-20.626	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4924.000	2.805	42.390	45.195	-28.805	74.000
7386.000	11.180	41.280	52.460	-21.540	74.000
9848.000	10.801	42.780	53.581	-20.419	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. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Key programming device
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 1: Transmit (802.11b 1Mbps)(2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
214.300	-10.791	42.498	31.707	-11.793	43.500
326.820	-4.548	37.166	32.619	-13.381	46.000
421.880	-3.214	39.707	36.493	-9.507	46.000
557.680	1.971	36.873	38.844	-7.156	46.000
699.300	2.875	37.592	40.467	-5.533	46.000
844.800	5.601	34.863	40.464	-5.536	46.000
Vertical					
175.500	-8.257	42.865	34.607	-8.893	43.500
299.660	-6.855	39.214	32.359	-13.641	46.000
449.040	-7.498	37.931	30.433	-15.567	46.000
664.380	-1.918	36.664	34.746	-11.254	46.000
767.200	2.575	26.730	29.305	-16.695	46.000
965.080	7.932	22.007	29.939	-24.061	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Key programming device
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 2: Transmit (802.11g 6Mbps)(2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
206.540	-11.155	44.439	33.284	-10.216	43.500
353.980	-2.472	40.445	37.973	-8.027	46.000
452.920	-1.266	36.558	35.292	-10.708	46.000
619.760	2.441	34.462	36.903	-9.097	46.000
699.300	2.875	34.869	37.744	-8.256	46.000
883.600	6.146	29.340	35.485	-10.515	46.000
Vertical					
210.420	-7.882	33.242	25.361	-18.139	43.500
313.240	-6.871	34.448	27.577	-18.423	46.000
396.660	-4.356	35.621	31.265	-14.735	46.000
547.980	-2.088	28.538	26.450	-19.550	46.000
677.960	0.527	27.530	28.057	-17.943	46.000
769.140	2.923	30.719	33.642	-12.358	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Key programming device
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)(2437 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
297.720	-3.633	29.714	26.082	-19.918	46.000
352.040	-2.403	33.195	30.792	-15.208	46.000
573.200	2.537	24.753	27.290	-18.710	46.000
699.300	2.875	37.178	40.053	-5.947	46.000
850.620	5.982	23.554	29.536	-16.464	46.000
949.560	6.695	24.649	31.344	-14.656	46.000
Vertical					
371.440	-2.737	25.702	22.965	-23.035	46.000
468.440	-4.725	33.601	28.876	-17.124	46.000
515.000	-1.090	35.221	34.131	-11.869	46.000
693.480	2.168	38.018	40.186	-5.814	46.000
943.740	6.592	27.901	34.494	-11.506	46.000
980.600	2.714	32.076	34.790	-19.210	54.000

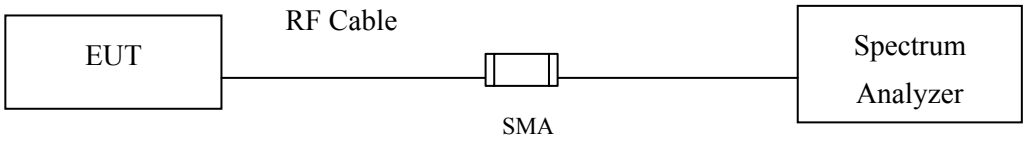
Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

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.

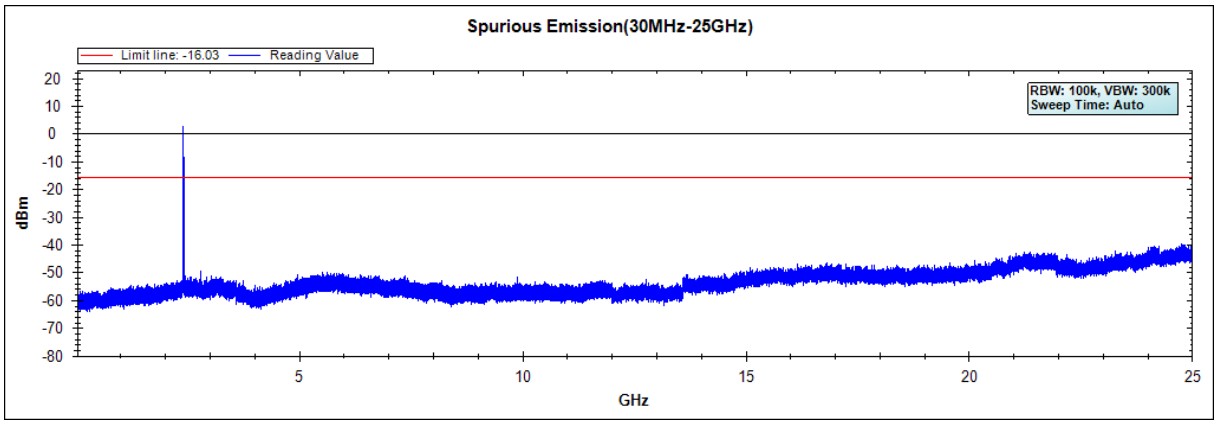
5.4. Uncertainty

The measurement uncertainty
Conducted is defined as ± 1.20dB

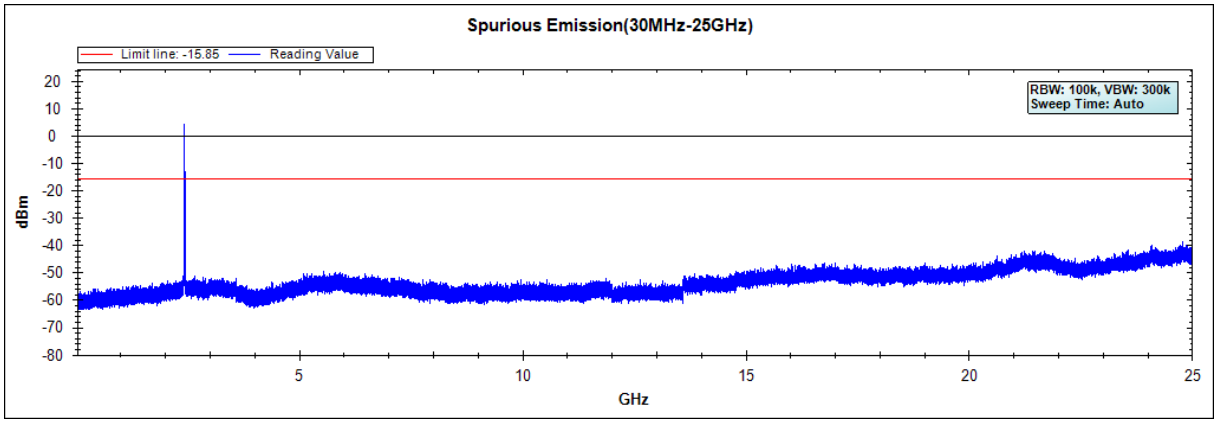
5.5. Test Result of RF antenna conducted test

Product	:	Key programming device
Test Item	:	RF antenna conducted test
Test Site	:	No.3 OATS
Test date	:	2016.08.31
Test Mode	:	Mode 1: Transmit (802.11b 1Mbps)

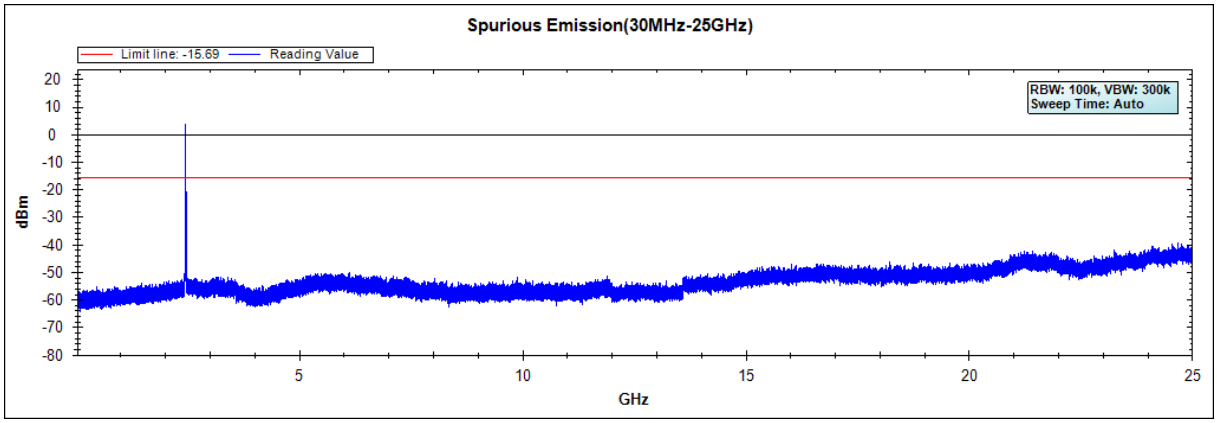
Channel 01 (2412MHz)



Channel 06 (2437MHz)



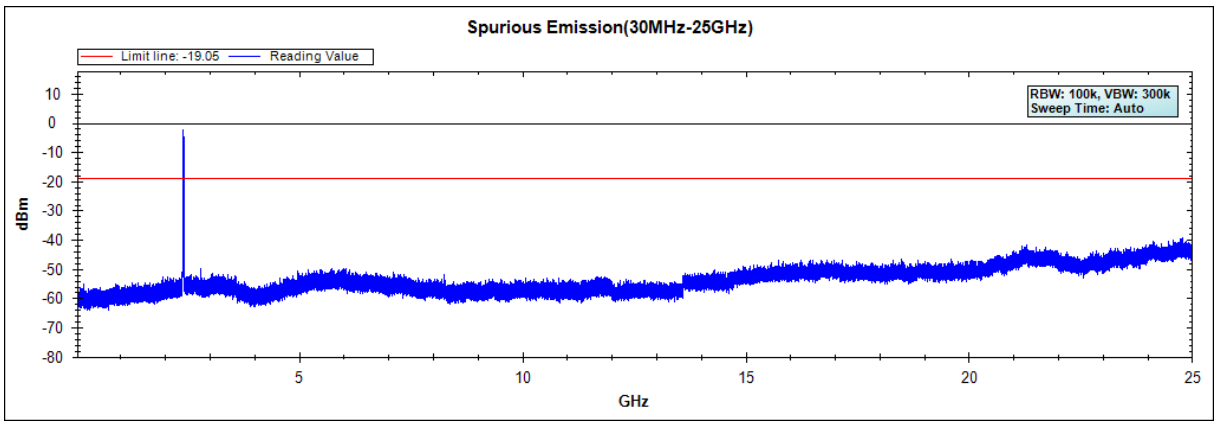
Channel 11 (2462MHz)



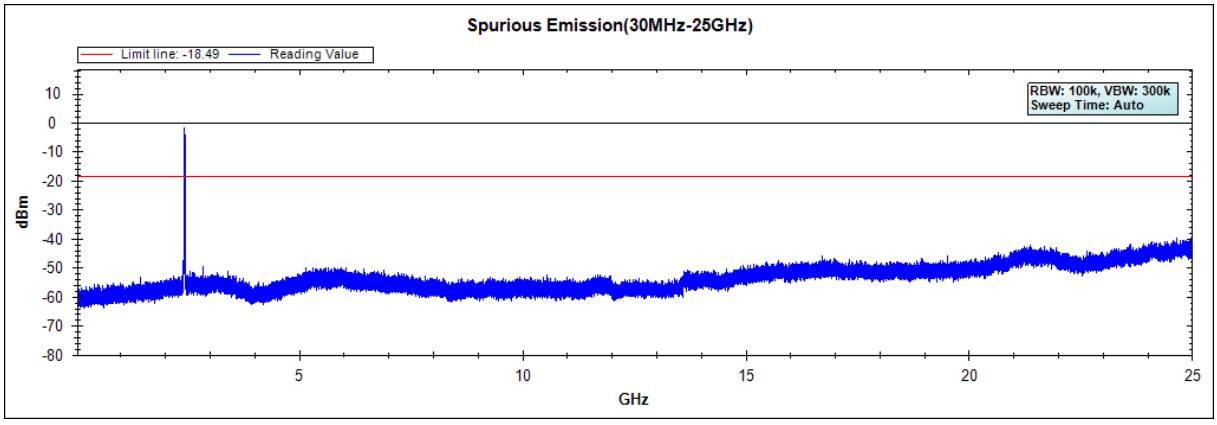
Note: The above test pattern is synthesized by multiple of the frequency range.

Product	:	Key programming device
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	No.3 OATS
Test date	:	2016.08.31
Test Mode	:	Mode 2: Transmit (802.11g 6Mbps)

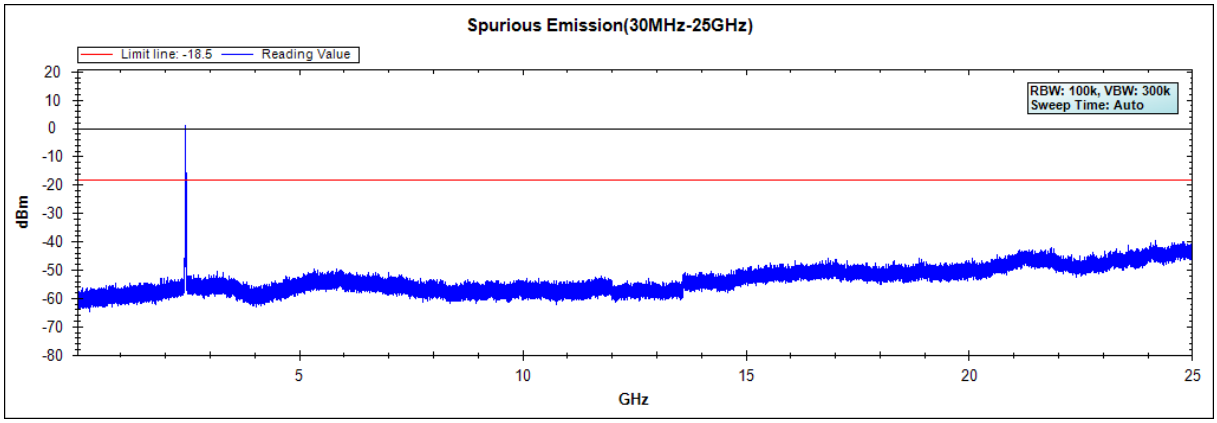
Channel 01 (2412MHz)



Channel 06 (2437MHz)



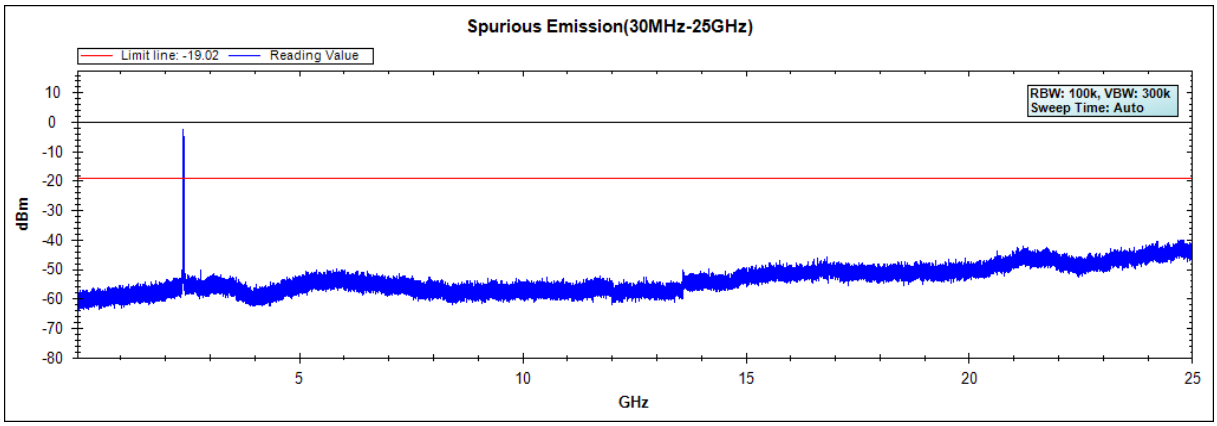
Channel 11 (2462MHz)



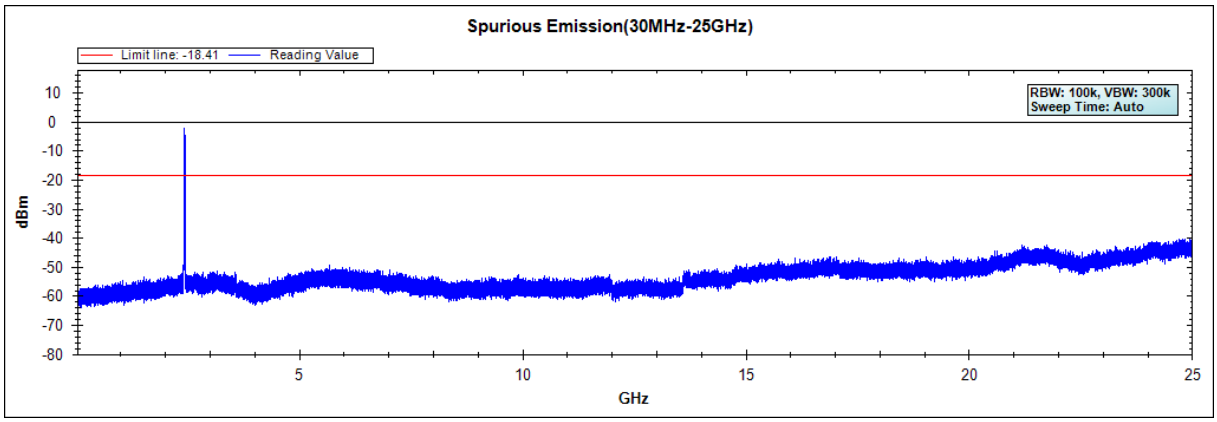
Note: The above test pattern is synthesized by multiple of the frequency range.

Product	:	Key programming device
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	No.3 OATS
Test date	:	2016.08.31
Test Mode	:	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

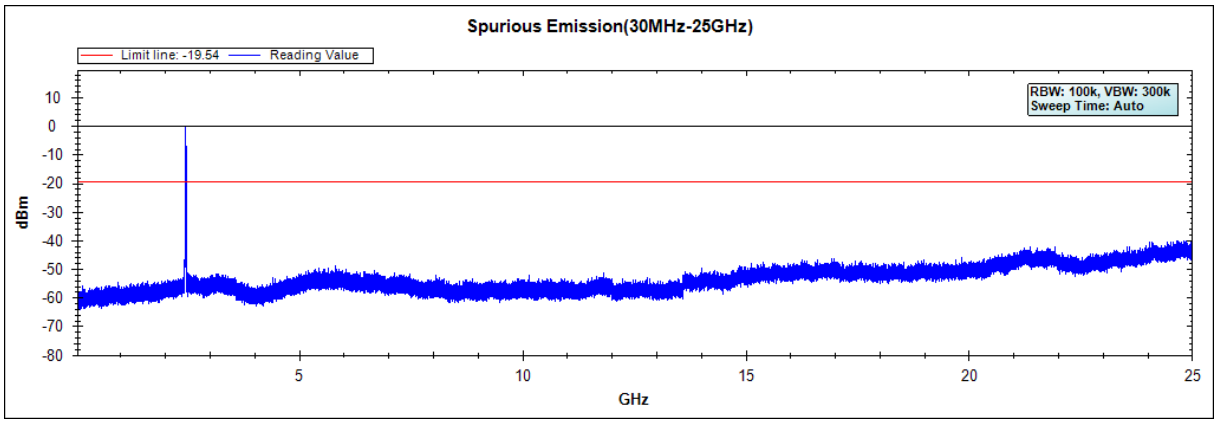
Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)

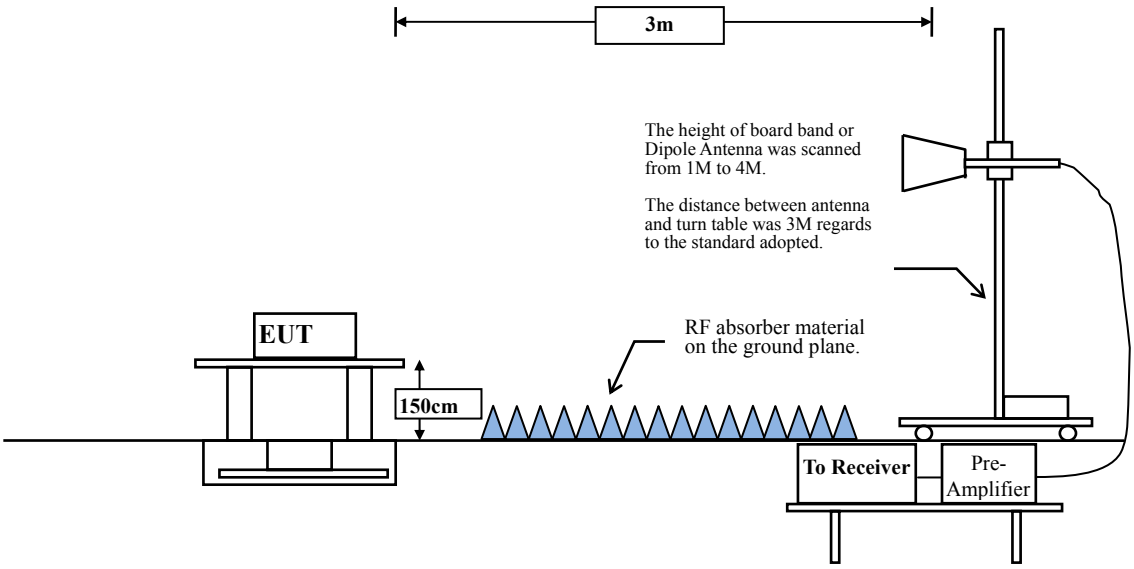


Note: The above test pattern is synthesized by multiple of the frequency range.

6. Band Edge

6.1. Test Setup

Above 1GHz



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.

6.4. Uncertainty

± 4.08 dB above 1GHz
± 4.22 dB below 1GHz

6.5. Test Result of Band Edge

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
01 (Peak)	2385.942	-2.704	53.045	50.340	74.00	54.00	Pass
01 (Peak)	2390.000	-2.687	51.047	48.360	74.00	54.00	Pass
01 (Peak)	2400.000	-2.660	59.207	56.547	--	--	--
01 (Peak)	2413.043	-2.642	107.237	104.594	--	--	--
01 (Average)	2386.087	-2.704	40.853	38.149	74.00	54.00	Pass
01 (Average)	2390.000	-2.687	38.370	35.683	74.00	54.00	Pass
01 (Average)	2400.000	-2.660	51.740	49.080	--	--	--
01 (Average)	2412.754	-2.642	102.042	99.399	--	--	--

Figure Channel 01: Horizontal (Peak)

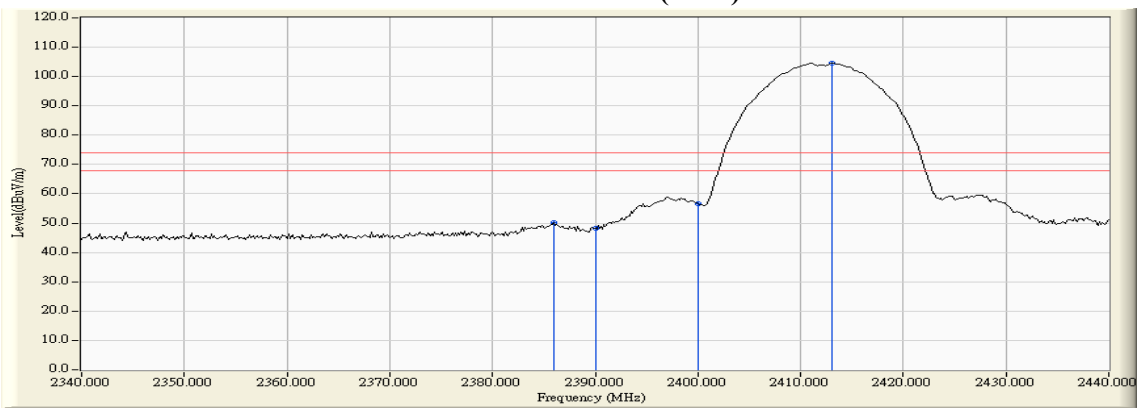
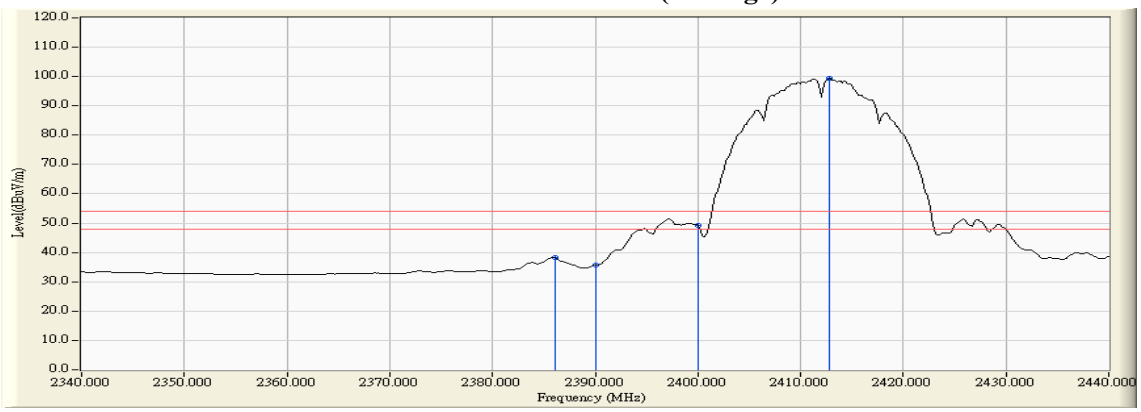


Figure Channel 01: Horizontal (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2412MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
01 (Peak)	2386.667	-4.148	50.968	46.820	74.00	54.00	Pass
01 (Peak)	2390.000	-4.159	49.358	45.199	74.00	54.00	Pass
01 (Peak)	2400.000	-4.171	55.491	51.320	--	--	--
01 (Peak)	2413.043	-4.163	101.826	97.662	--	--	--
01 (Average)	2386.232	-4.146	39.460	35.314	74.00	54.00	Pass
01 (Average)	2390.000	-4.159	37.143	32.984	74.00	54.00	Pass
01 (Average)	2400.000	-4.171	47.049	42.878	--	--	--
01 (Average)	2412.754	-4.164	96.948	92.784	--	--	--

Figure Channel 01: VERTICAL (Peak)

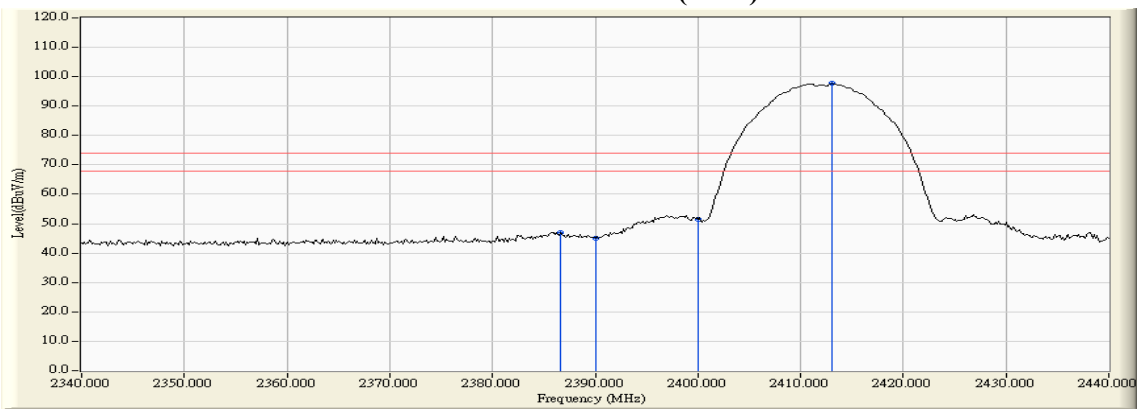
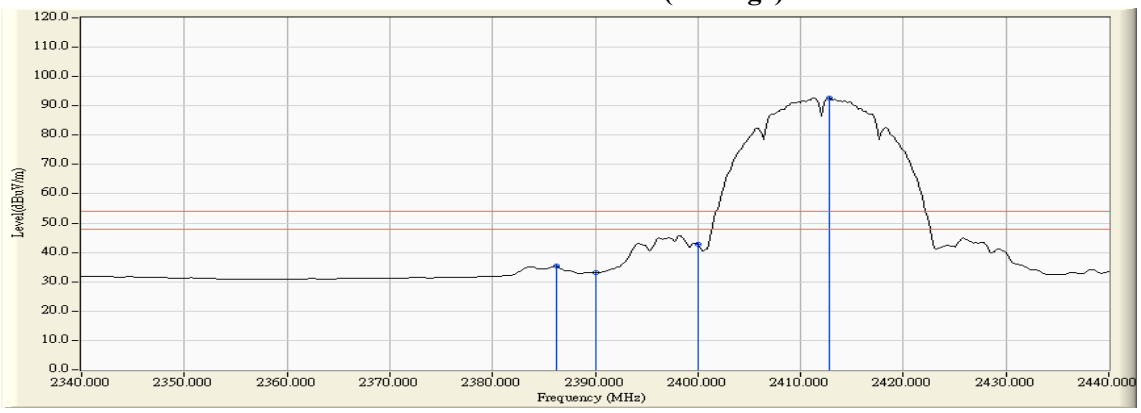


Figure Channel 01: VERTICAL (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
11 (Peak)	2462.920	-2.622	108.726	106.104	--	--	--
11 (Peak)	2483.500	-2.601	54.664	52.062	74.00	54.00	Pass
11 (Peak)	2486.833	-2.599	56.004	53.405	74.00	54.00	Pass
11 (Average)	2462.775	-2.622	101.322	98.700	--	--	--
11 (Average)	2483.500	-2.601	42.239	39.637	74.00	54.00	Pass
11 (Average)	2486.833	-2.599	43.854	41.255	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

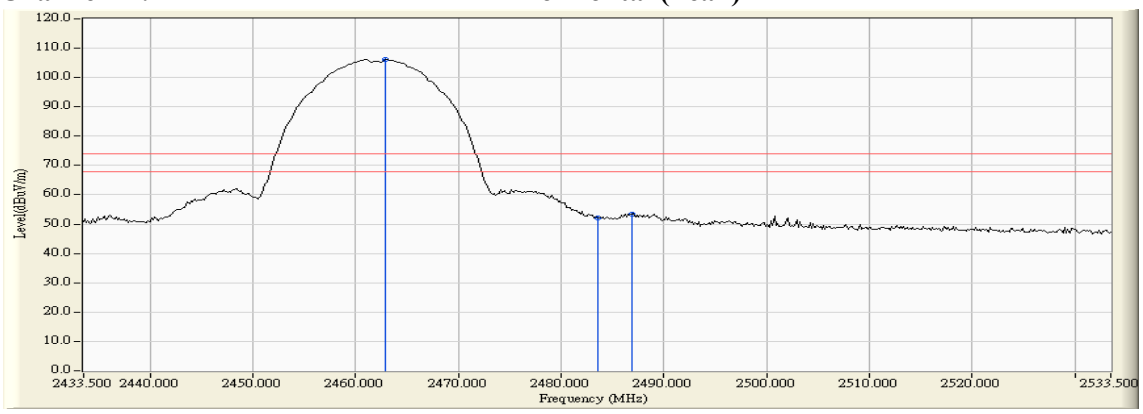
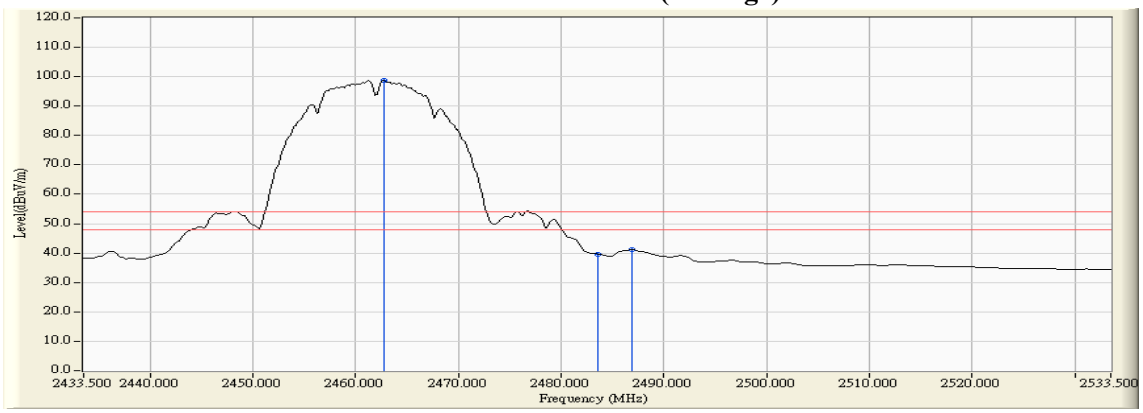


Figure Channel 11: Horizontal (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 1: Transmit (802.11b 1Mbps) (2462MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
11 (Peak)	2463.065	-4.031	102.011	97.980	--	--	--
11 (Peak)	2483.500	-3.966	51.267	47.300	74.00	54.00	Pass
11 (Peak)	2503.210	-3.894	52.504	48.610	74.00	54.00	Pass
11 (Average)	2462.775	-4.032	94.883	90.851	--	--	--
11 (Average)	2483.500	-3.966	37.538	33.571	74.00	54.00	Pass
11 (Average)	2486.833	-3.957	39.123	35.167	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

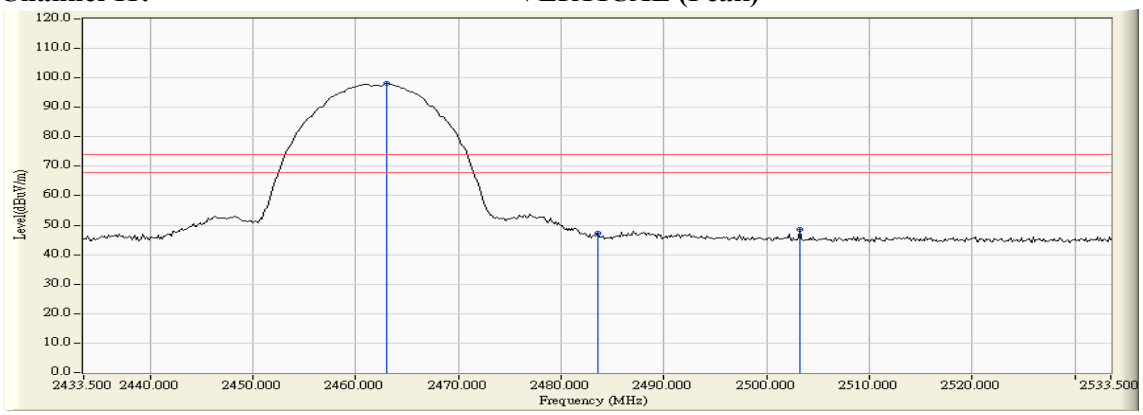
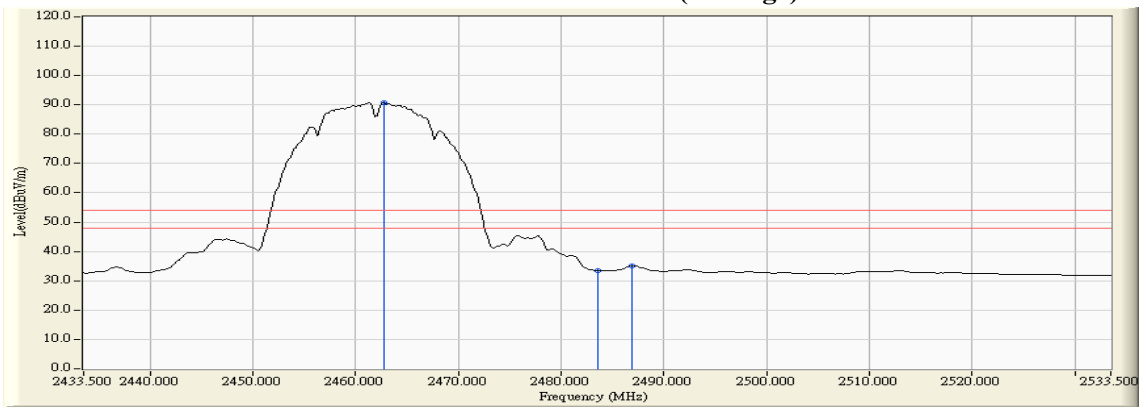


Figure Channel 11: VERTICAL (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
01 (Peak)	2389.130	-2.690	59.220	56.529	74.00	54.00	Pass
01 (Peak)	2390.000	-2.687	59.165	56.478	74.00	54.00	Pass
01 (Peak)	2400.000	-2.660	84.794	82.134	--	--	--
01 (Peak)	2414.783	-2.643	109.290	106.647	--	--	--
01 (Average)	2390.000	-2.687	41.770	39.083	74.00	54.00	Pass
01 (Average)	2400.000	-2.660	54.922	52.262	--	--	--
01 (Average)	2413.913	-2.643	84.220	81.577	--	--	--

Figure Channel 01: Horizontal (Peak)

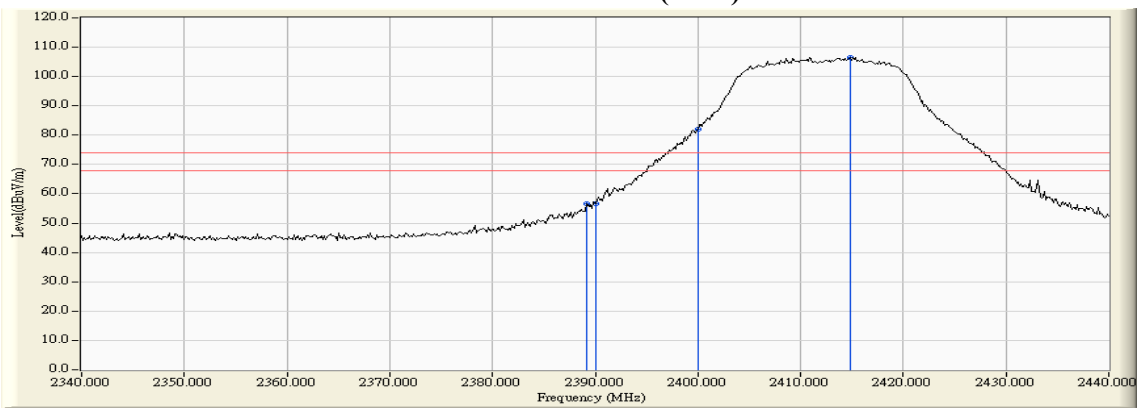
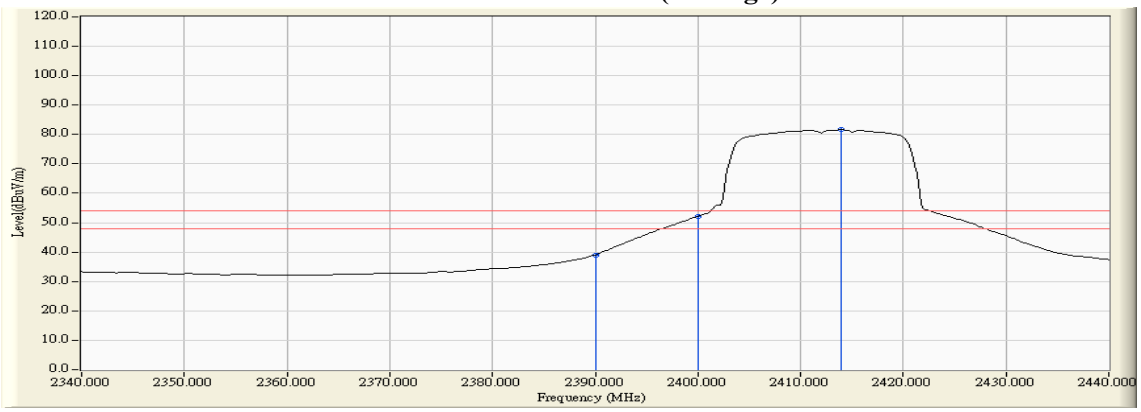


Figure Channel 01: Horizontal (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
01 (Peak)	2389.565	-4.157	59.361	55.204	74.00	54.00	Pass
01 (Peak)	2390.000	-4.159	57.617	53.458	74.00	54.00	Pass
01 (Peak)	2400.000	-4.171	81.619	77.448	--	--	--
01 (Peak)	2414.493	-4.159	104.155	99.995	--	--	--
01 (Average)	2390.000	-4.159	39.412	35.253	74.00	54.00	Pass
01 (Average)	2400.000	-4.171	51.719	47.548	--	--	--
01 (Average)	2413.188	-4.164	80.279	76.116	--	--	--

Figure Channel 01: VERTICAL (Peak)

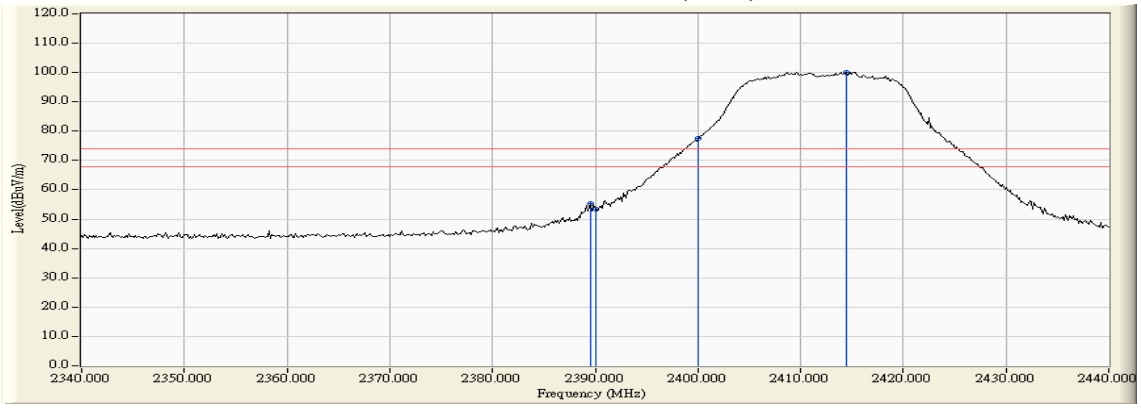
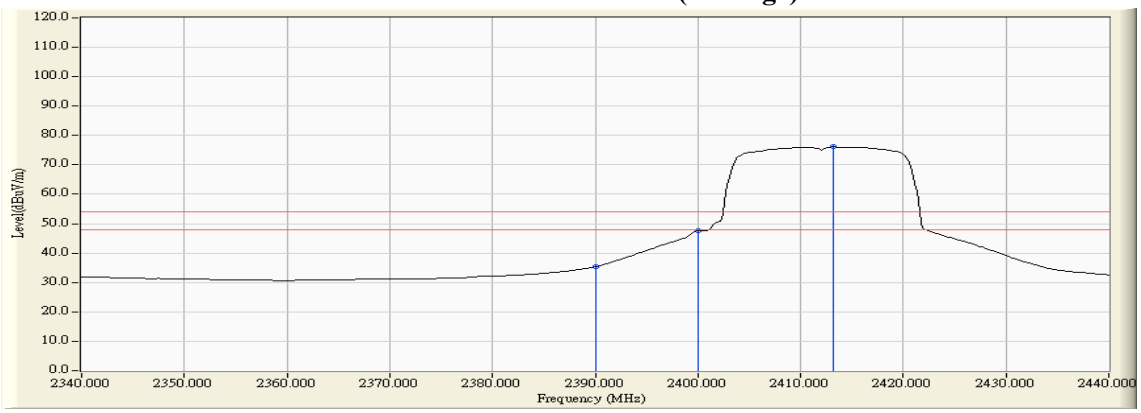


Figure Channel 01: VERTICAL (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
11 (Peak)	2465.094	-2.620	111.467	108.847	--	--	--
11 (Peak)	2483.500	-2.601	68.088	65.486	74.00	54.00	Pass
11 (Average)	2463.065	-2.622	87.189	84.567	--	--	--
11 (Average)	2483.500	-2.601	44.965	42.363	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

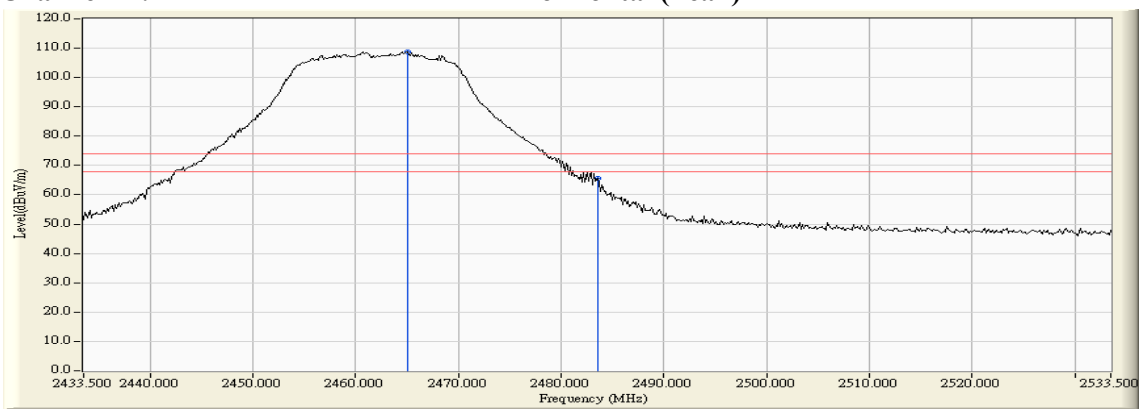
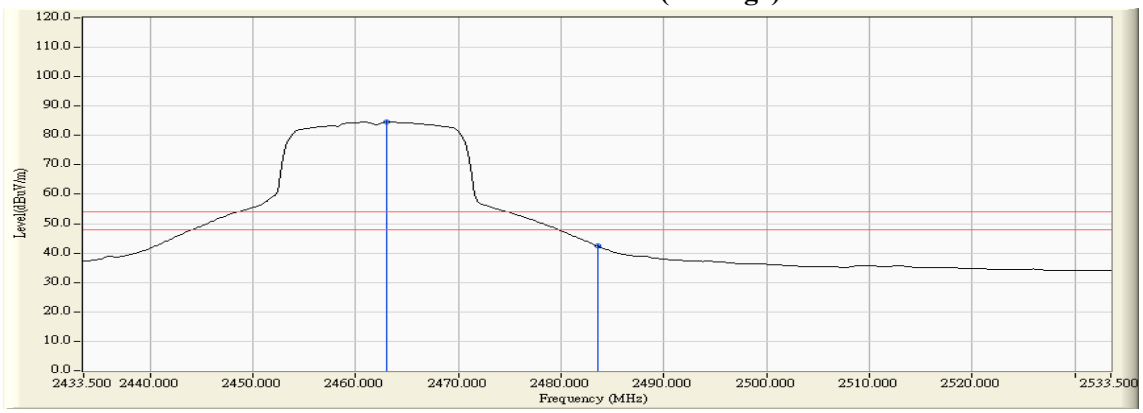


Figure Channel 11: Horizontal (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2462MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
11 (Peak)	2459.442	-4.042	104.516	100.474	--	--	--
11 (Peak)	2483.500	-3.966	56.967	53.000	74.00	54.00	Pass
11 (Average)	2463.500	-4.030	81.124	77.094	--	--	--
11 (Average)	2483.500	-3.966	40.006	36.039	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

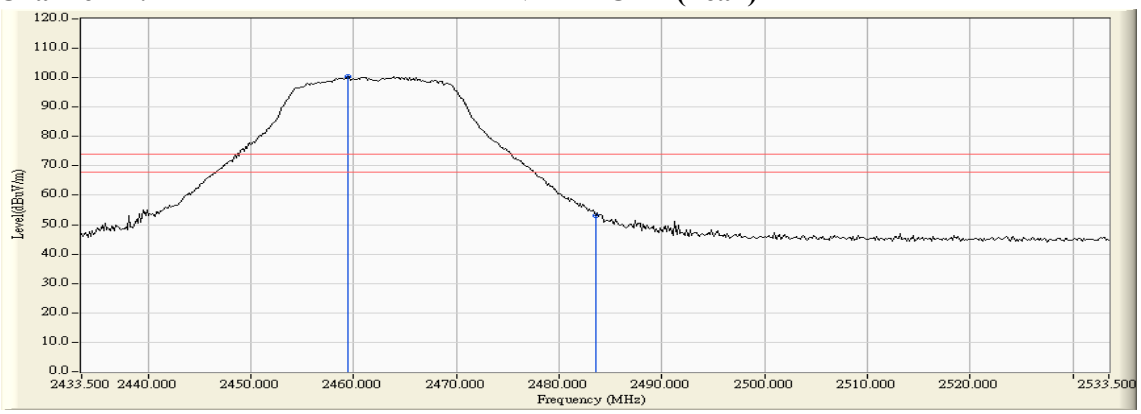
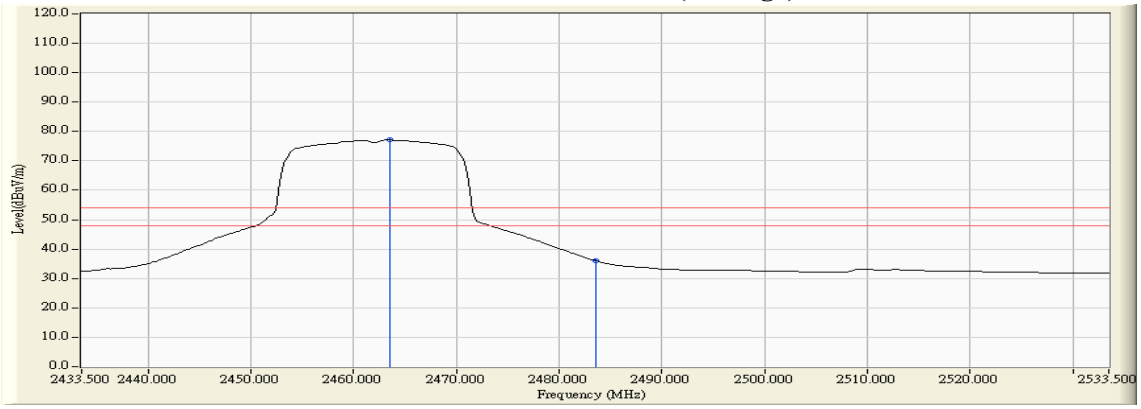


Figure Channel 11: VERTICAL (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
01 (Peak)	2389.855	-2.687	64.437	61.750	74.00	54.00	Pass
01 (Peak)	2390.000	-2.687	61.678	58.991	74.00	54.00	Pass
01 (Peak)	2400.000	-2.660	86.546	83.886	--	--	--
01 (Peak)	2415.072	-2.643	108.667	106.025	--	--	--
01 (Average)	2390.000	-2.687	42.639	39.952	74.00	54.00	Pass
01 (Average)	2400.000	-2.660	54.803	52.143	--	--	--
01 (Average)	2413.188	-2.643	83.839	81.196	--	--	--

Figure Channel 01: Horizontal (Peak)

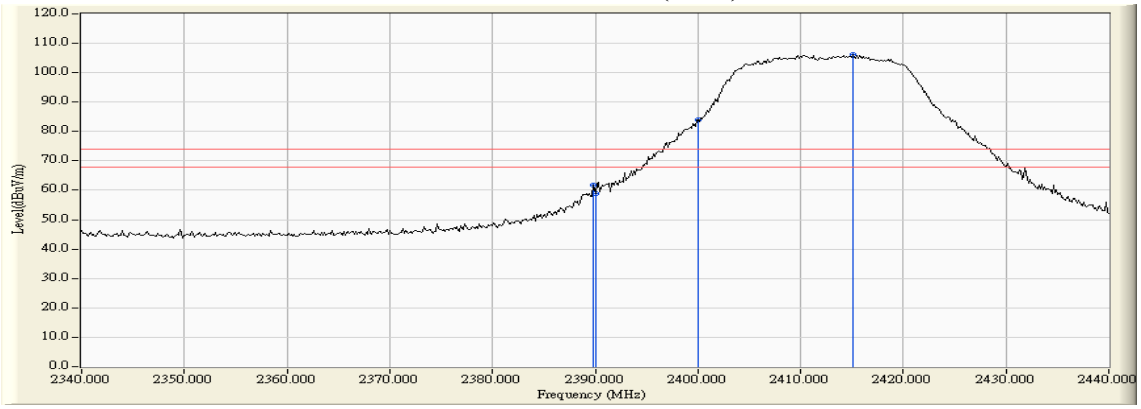
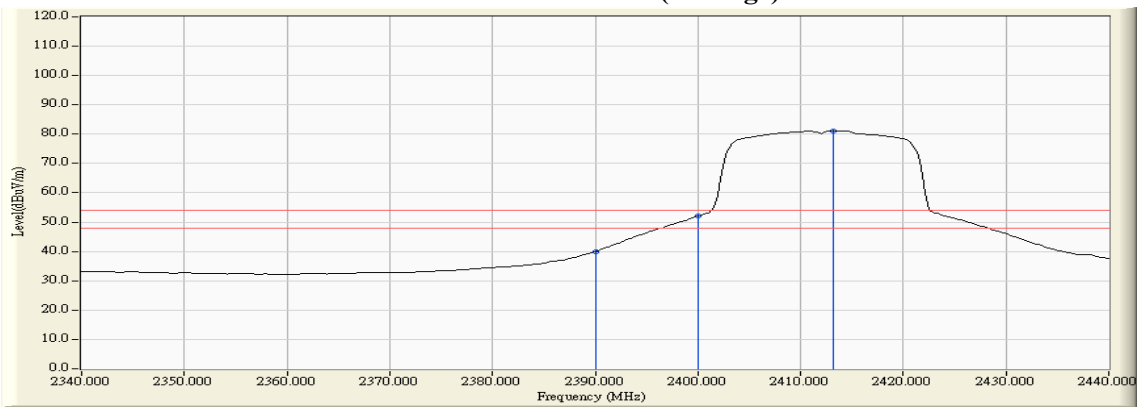


Figure Channel 01: Horizontal (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2412MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
01 (Peak)	2389.420	-4.156	58.115	53.958	74.00	54.00	Pass
01 (Peak)	2390.000	-4.159	57.886	53.727	74.00	54.00	Pass
01 (Peak)	2400.000	-4.171	82.297	78.126	--	--	--
01 (Peak)	2412.174	-4.166	103.420	99.254	--	--	--
01 (Average)	2390.000	-4.159	40.120	35.961	74.00	54.00	Pass
01 (Average)	2400.000	-4.171	51.867	47.696	--	--	--
01 (Average)	2413.478	-4.163	80.964	76.801	--	--	--

Figure Channel 01: VERTICAL (Peak)

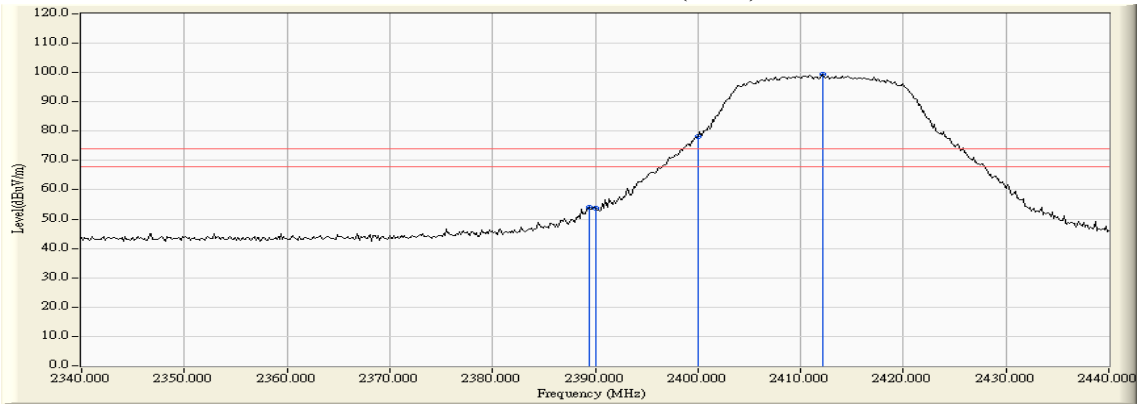
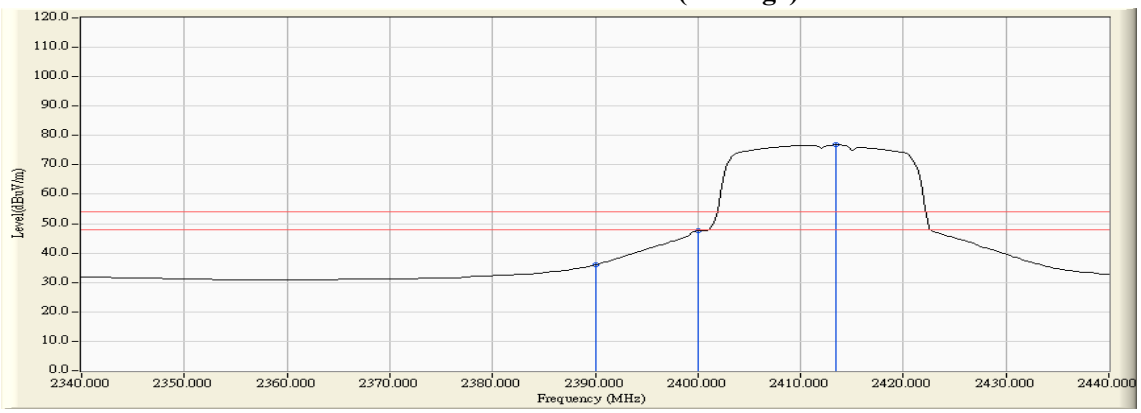


Figure Channel 01: VERTICAL (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
11 (Peak)	2462.196	-2.623	110.291	107.669	--	--	--
11 (Peak)	2483.500	-2.601	68.595	65.993	74.00	54.00	Pass
11 (Average)	2457.848	-2.625	86.128	83.502	--	--	--
11 (Average)	2483.500	-2.601	45.459	42.857	74.00	54.00	Pass

Figure Channel 11: Horizontal (Peak)

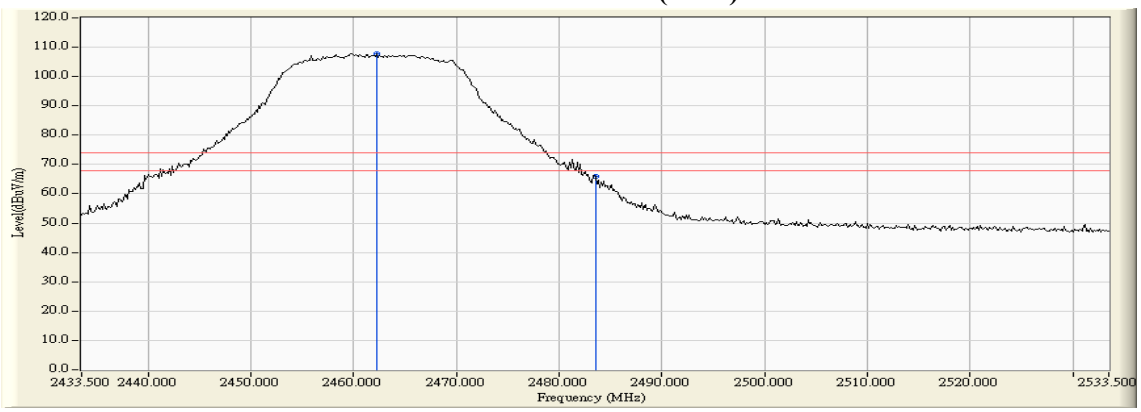
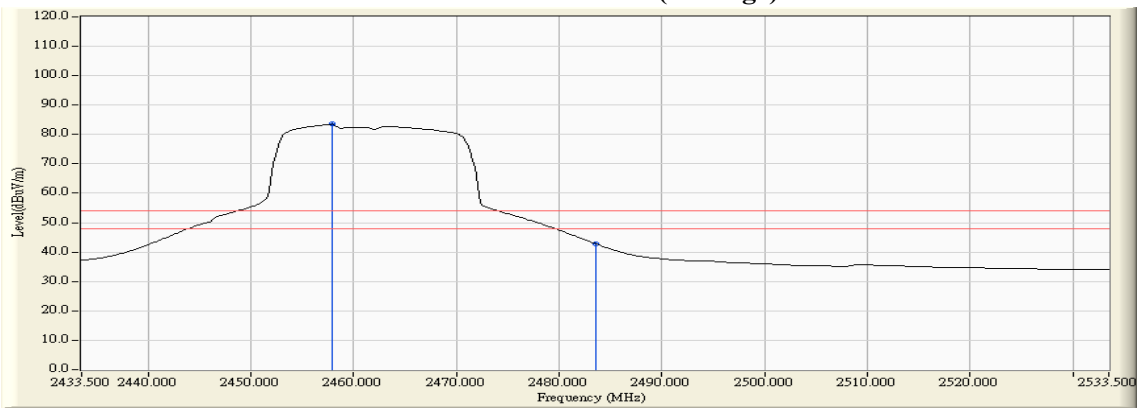


Figure Channel 11: Horizontal (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Key programming device
Test Item : Band Edge Data
Test Site : No.3 OATS
Test date : 2016.08.30
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
11 (Peak)	2458.717	-4.044	103.594	99.549	--	--	--
11 (Peak)	2483.500	-3.966	57.119	53.152	74.00	54.00	Pass
11 (Peak)	2483.645	-3.966	59.735	55.769	74.00	54.00	Pass
11 (Average)	2457.848	-4.047	81.100	77.053	--	--	--
11 (Average)	2483.500	-3.966	40.201	36.234	74.00	54.00	Pass

Figure Channel 11: VERTICAL (Peak)

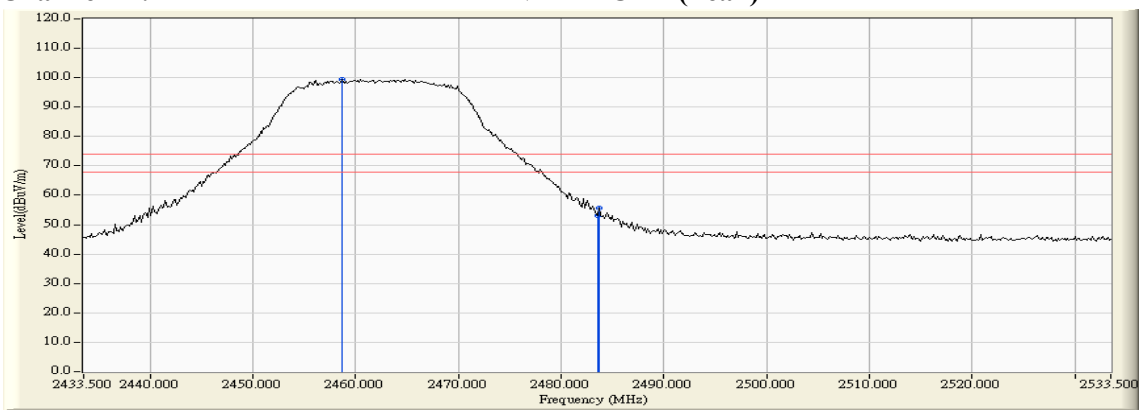
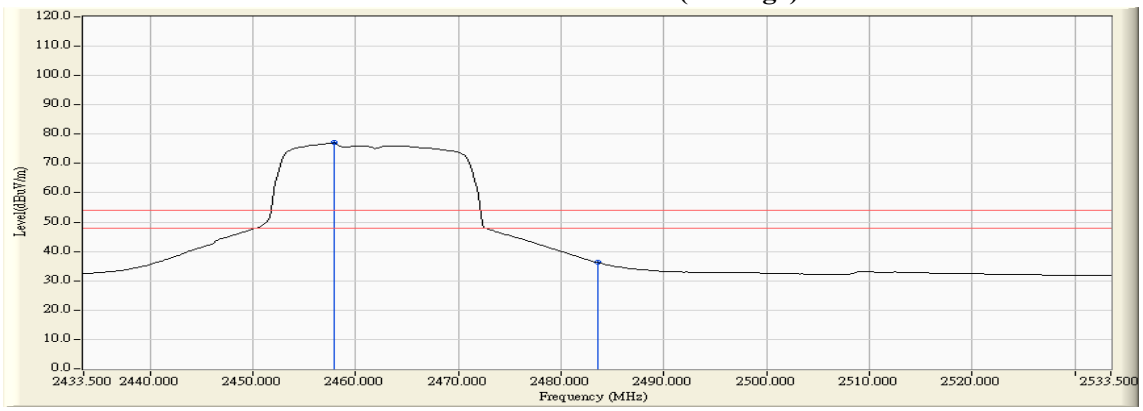


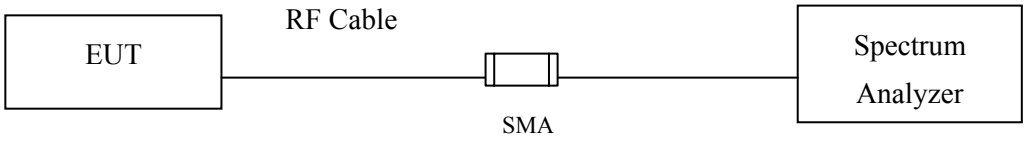
Figure Channel 11: VERTICAL (Average)



Note:1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. 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 C63.4: 2014; tested according to DTS test procedure of Jan KDB558074 for compliance to FCC 47CFR 15.247 requirements.

7.4. Uncertainty

± 283Hz

7.5. Test Result of 6dB Bandwidth

Product : Key programming device
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	9150	>500	Pass
06	2437	9200	>500	Pass
11	2462	9200	>500	Pass

Figure Channel 01:

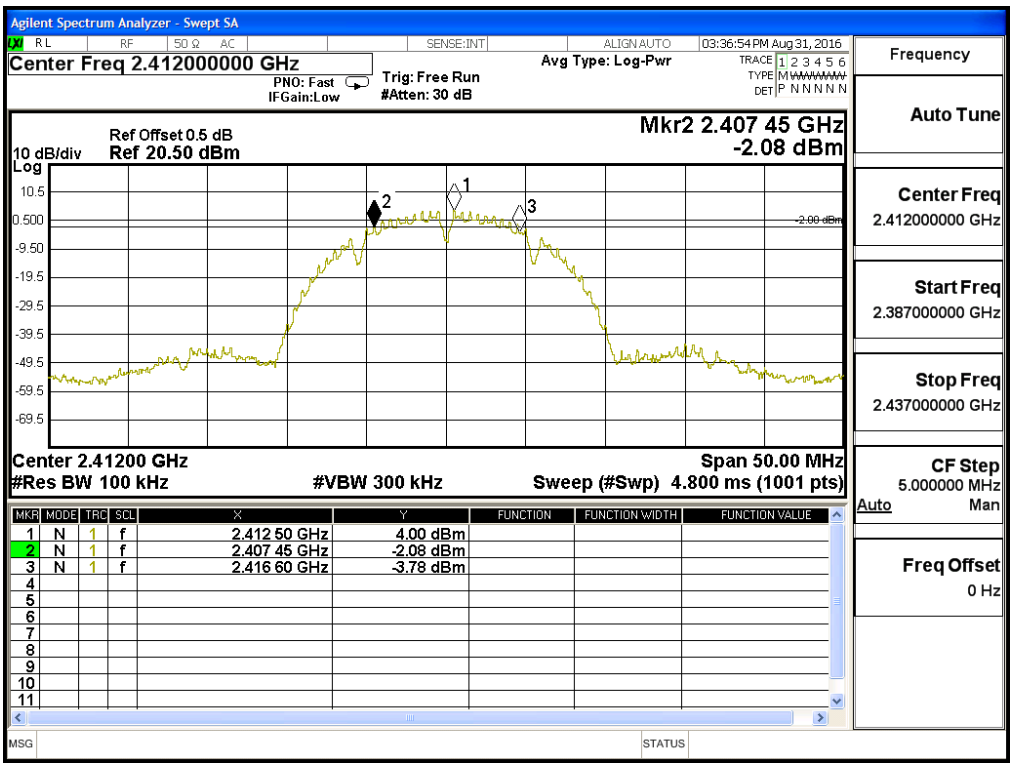


Figure Channel 06:

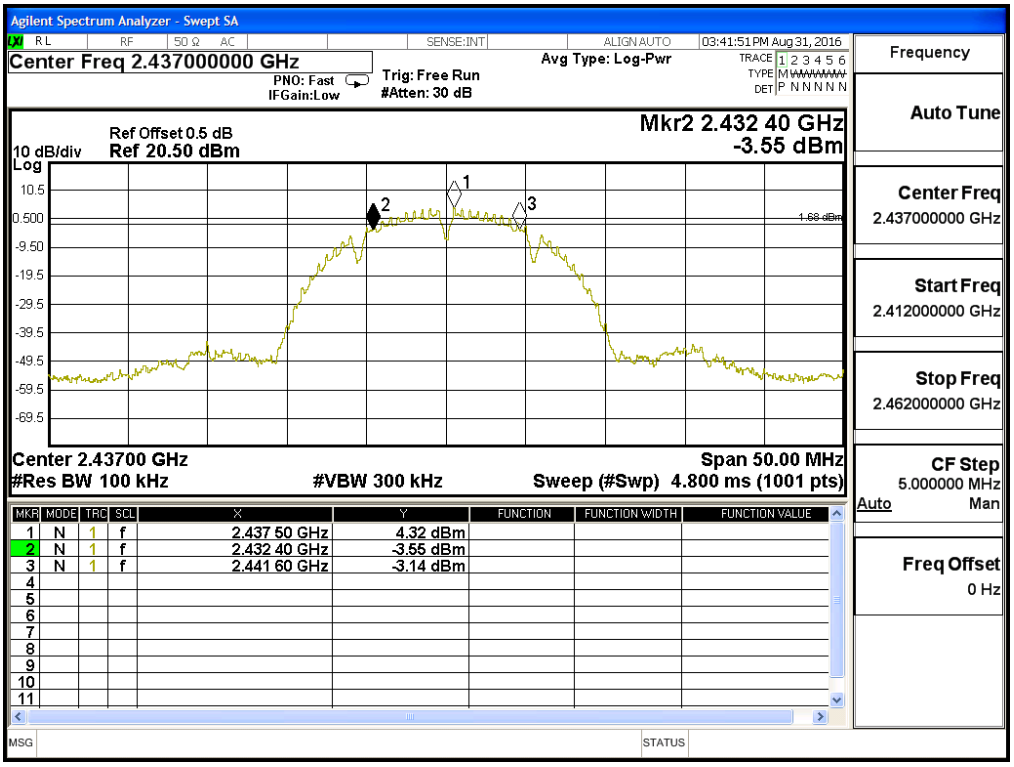
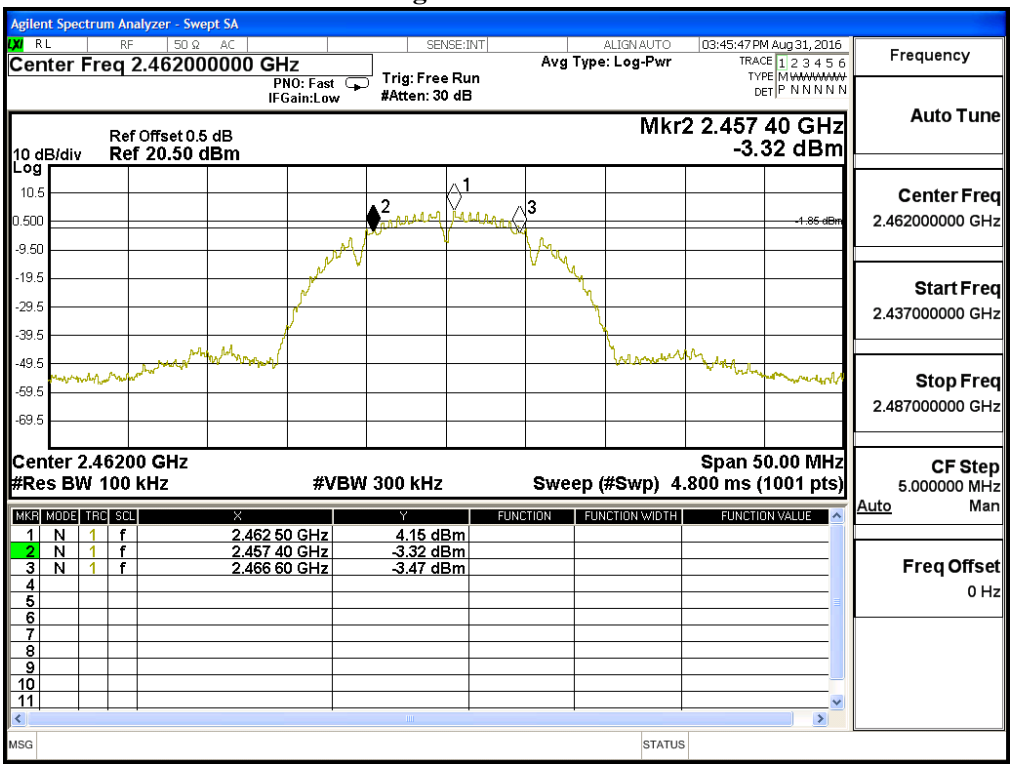


Figure Channel 11:



Product : Key programming device
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 2: Transmit (802.11g 6Mbps) (2412MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	16150	>500	Pass
06	2437	15650	>500	Pass
11	2462	15150	>500	Pass

Figure Channel 01:

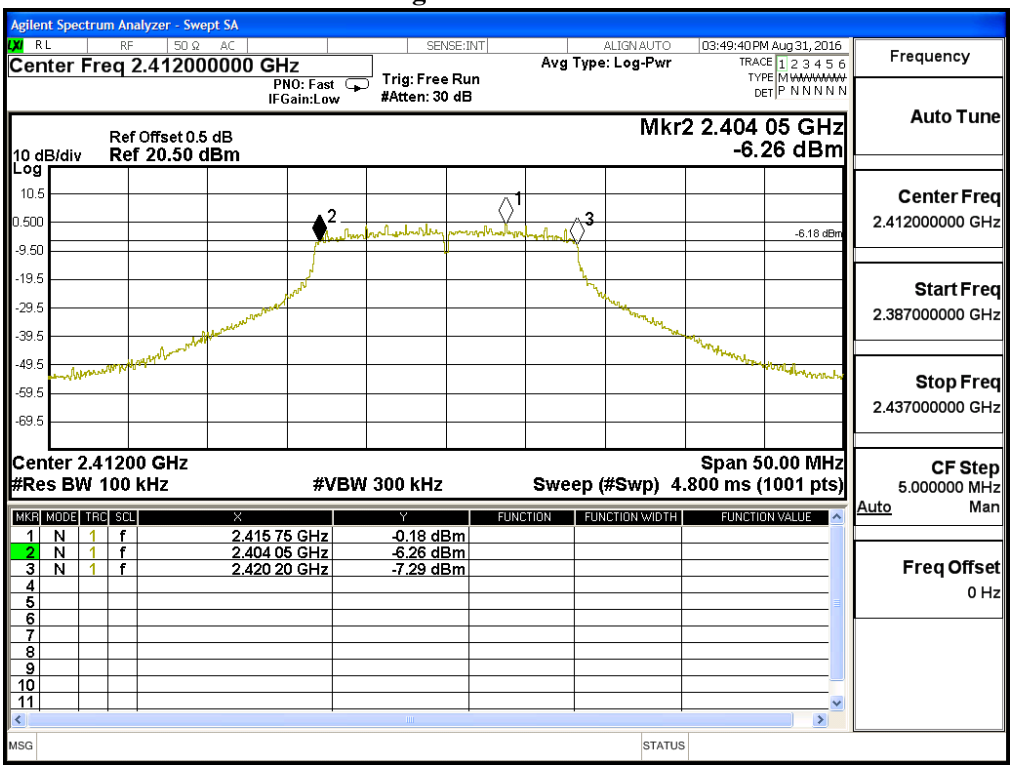


Figure Channel 06:

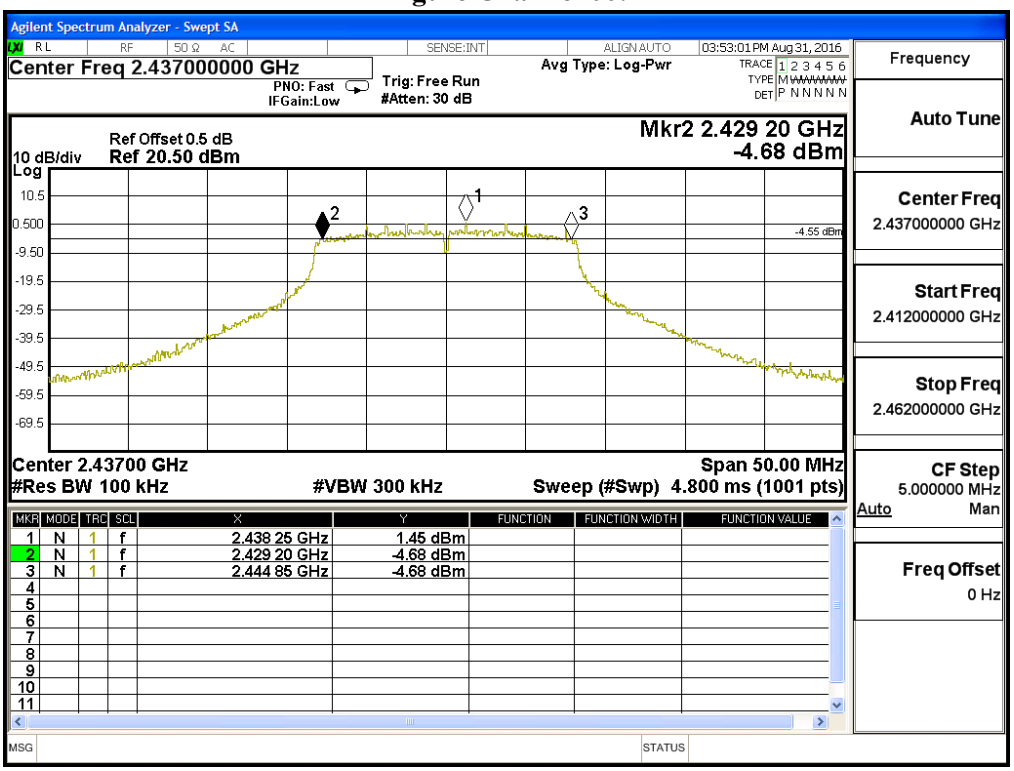
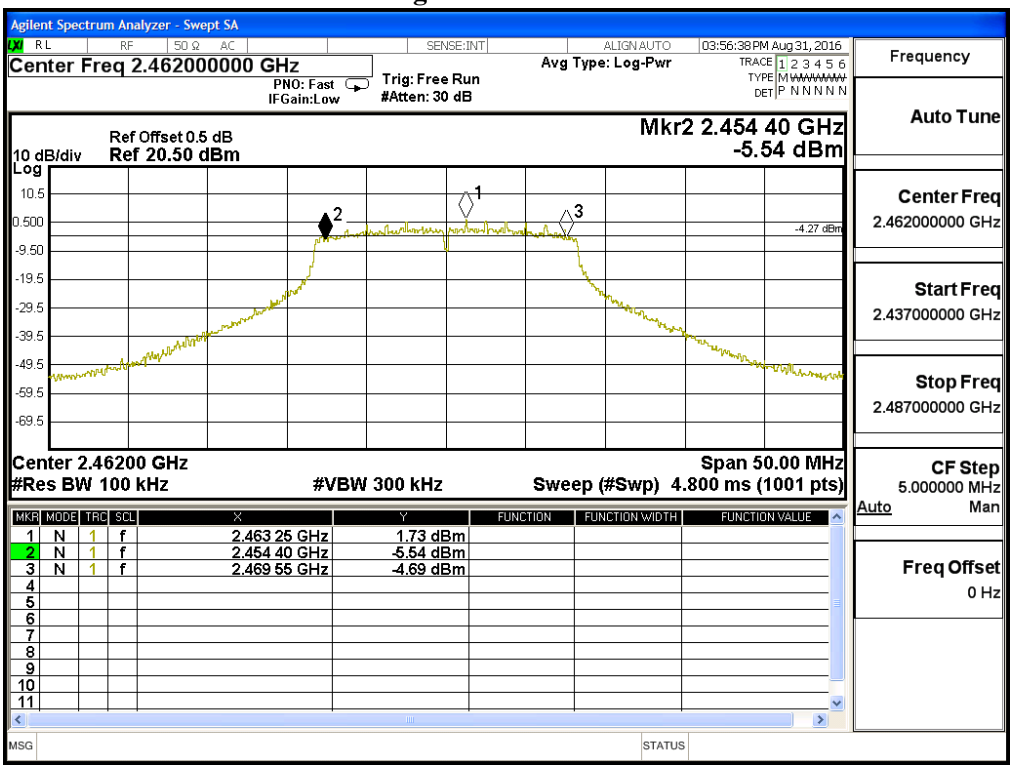


Figure Channel 11:



Product : Key programming device
Test Item : 6dB Bandwidth Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	15250	>500	Pass
06	2437	15750	>500	Pass
11	2462	15450	>500	Pass

Figure Channel 01:

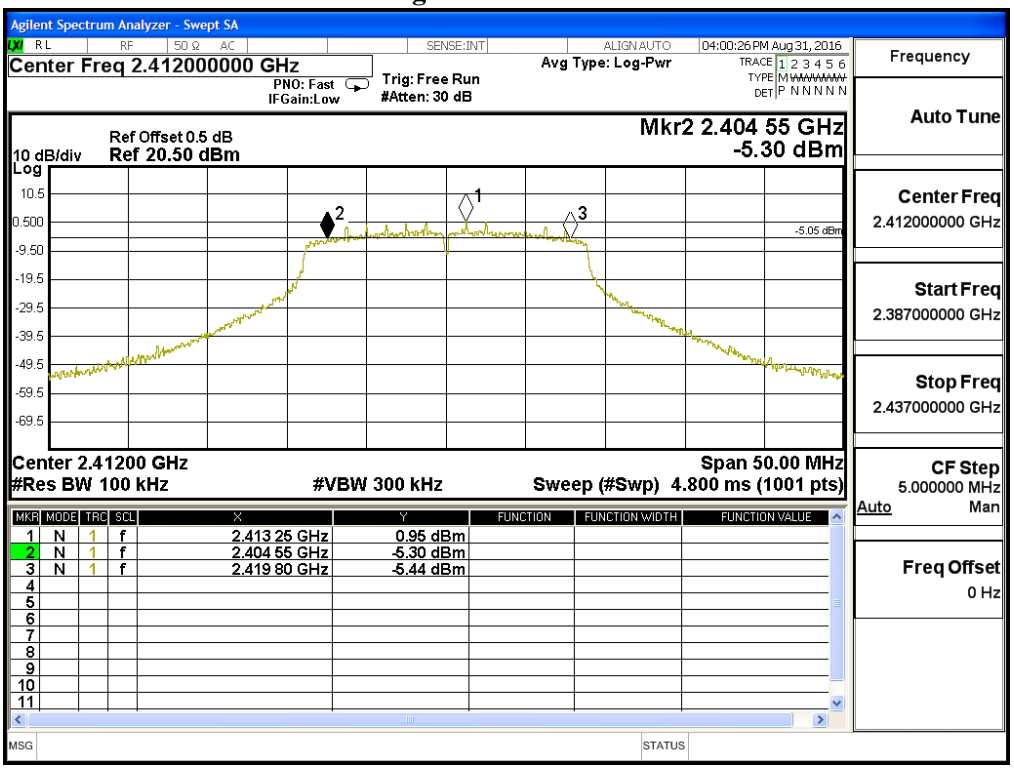


Figure Channel 06:

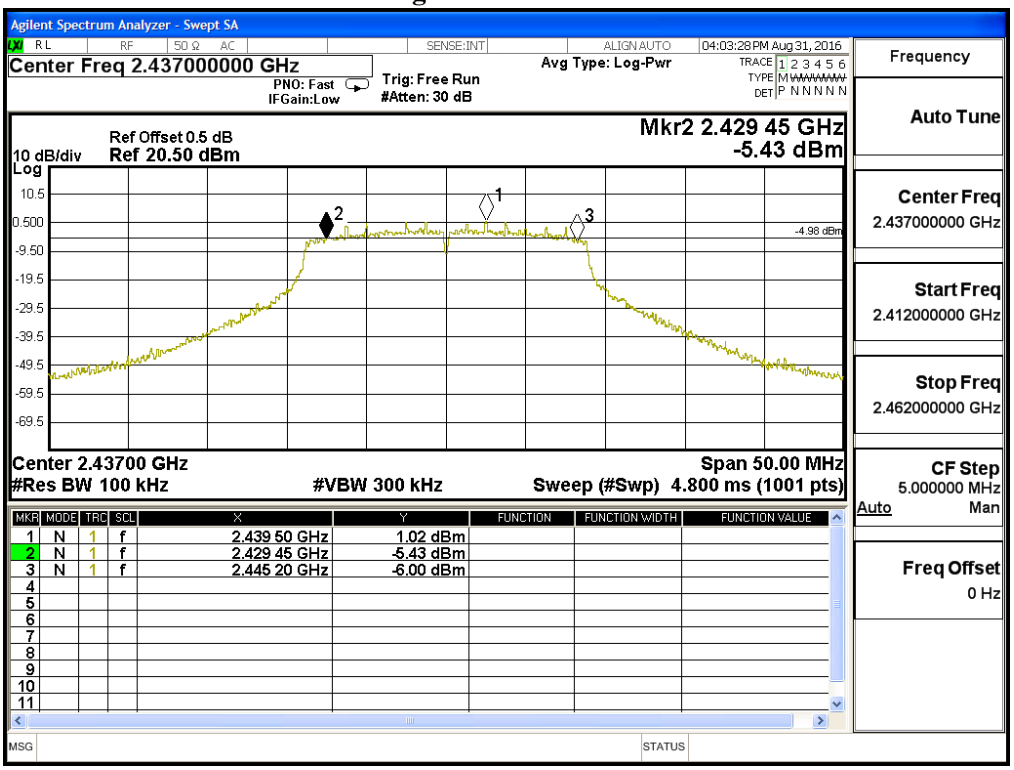
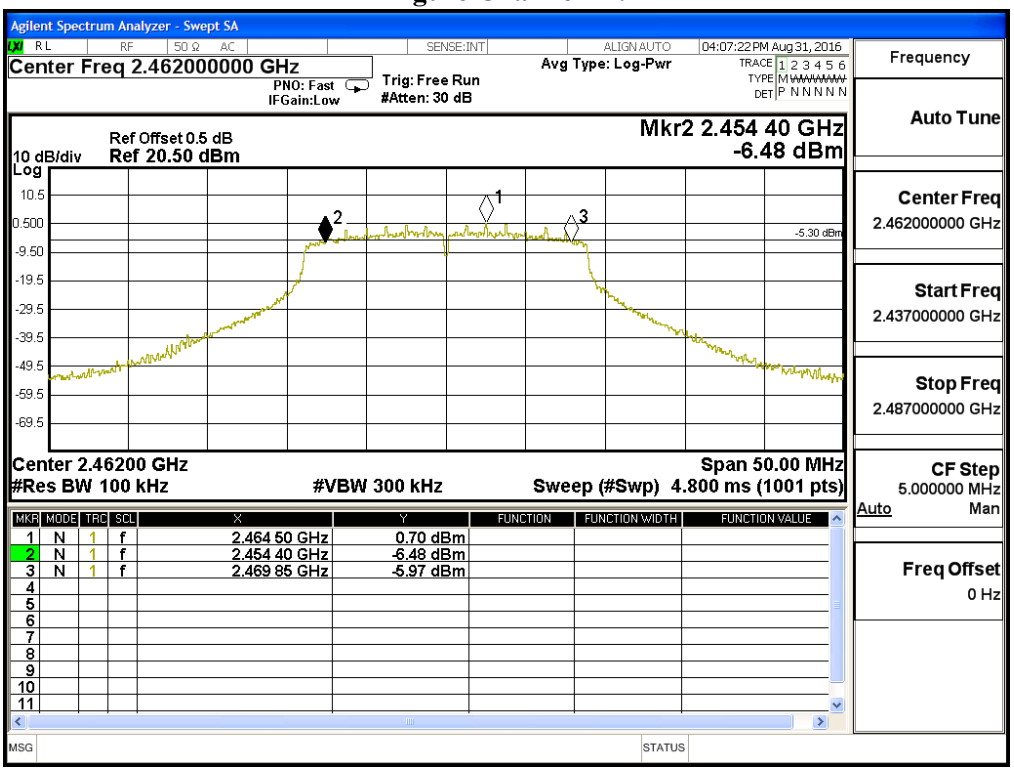
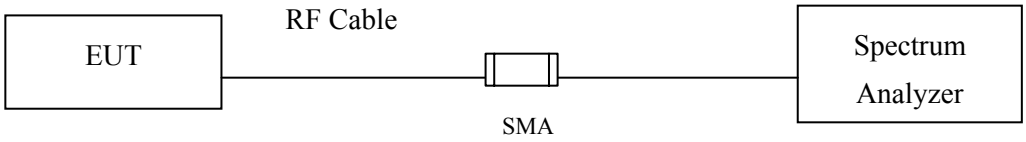


Figure Channel 11:



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 : Key programming device
Test Item : Power Density Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 1: Transmit (802.11b 1Mbps)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	3.970	≦8dBm	Pass
06	2437	4.150	≦8dBm	Pass
11	2462	4.310	≦8dBm	Pass

Figure Channel 01:

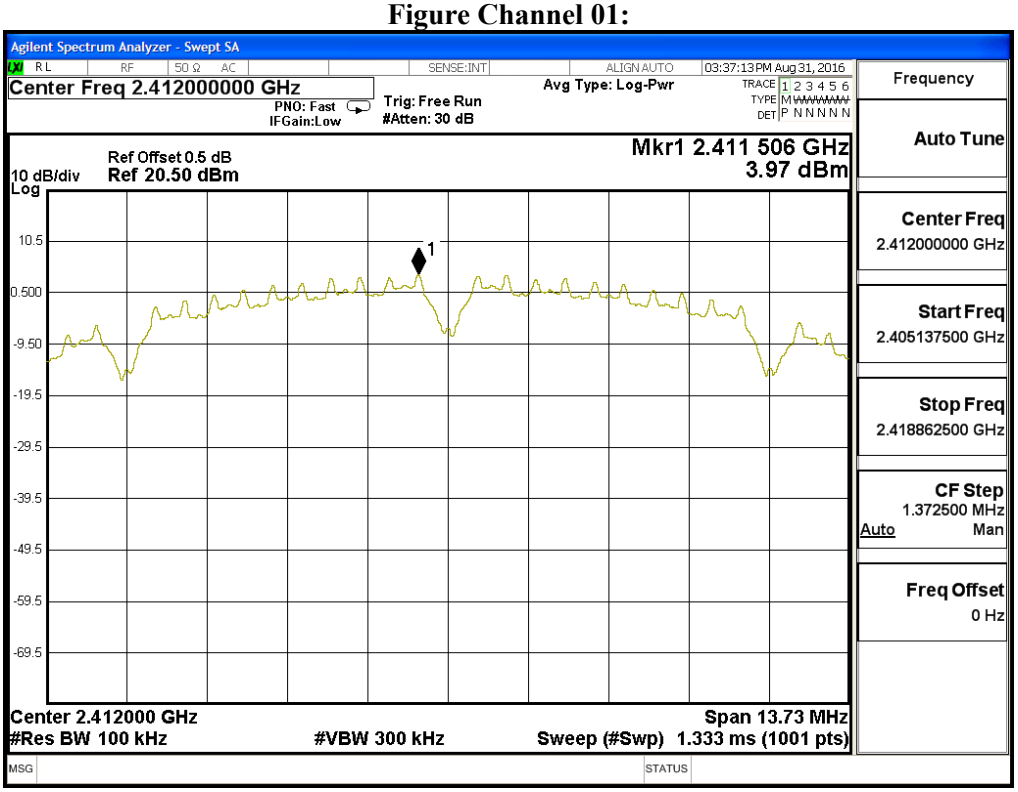


Figure Channel 06:

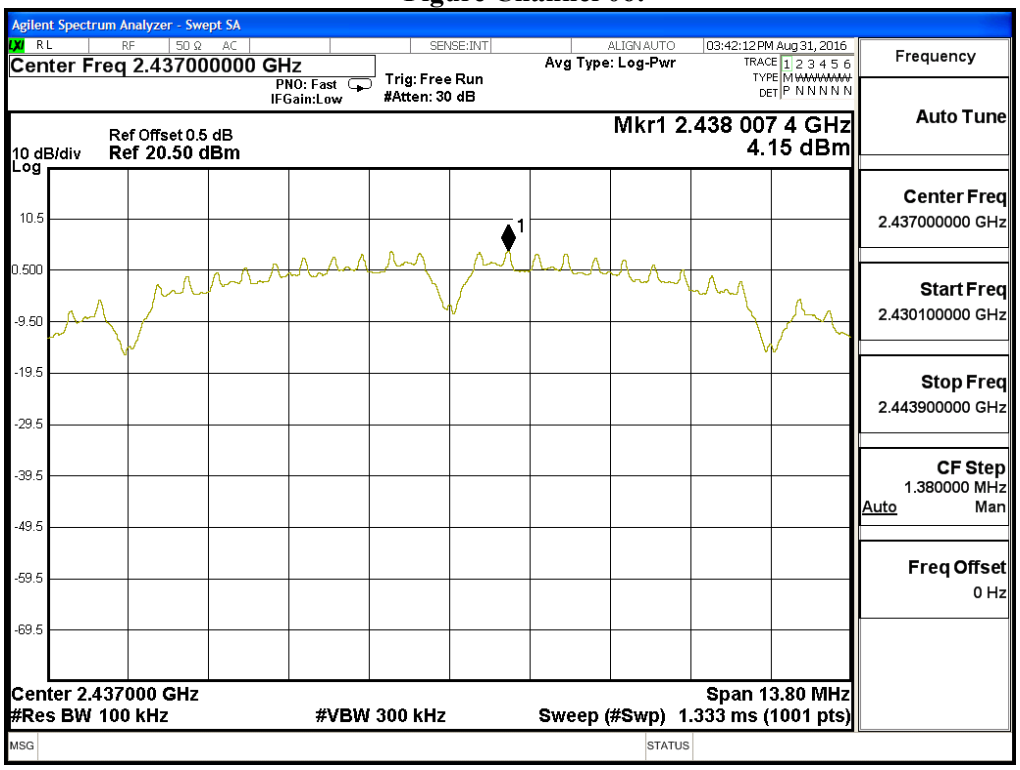
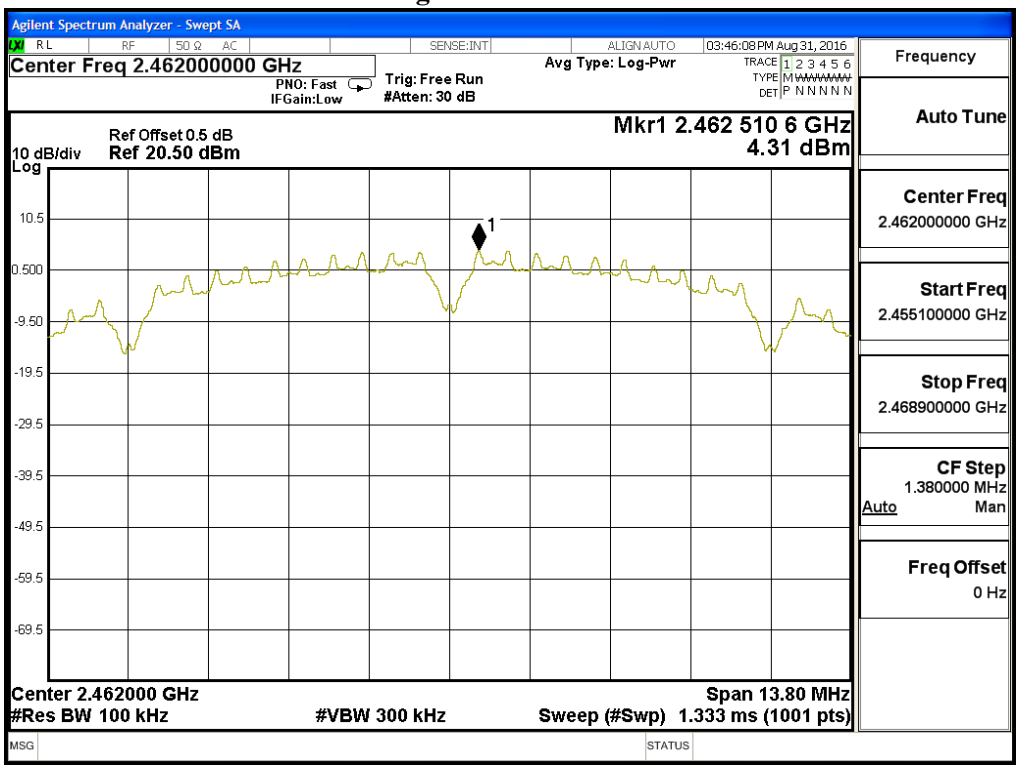


Figure Channel 11:



Product : Key programming device
Test Item : Power Density Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 2: Transmit (802.11g 6Mbps)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	0.950	≦8dBm	Pass
06	2437	1.510	≦8dBm	Pass
11	2462	1.500	≦8dBm	Pass

Figure Channel 01:

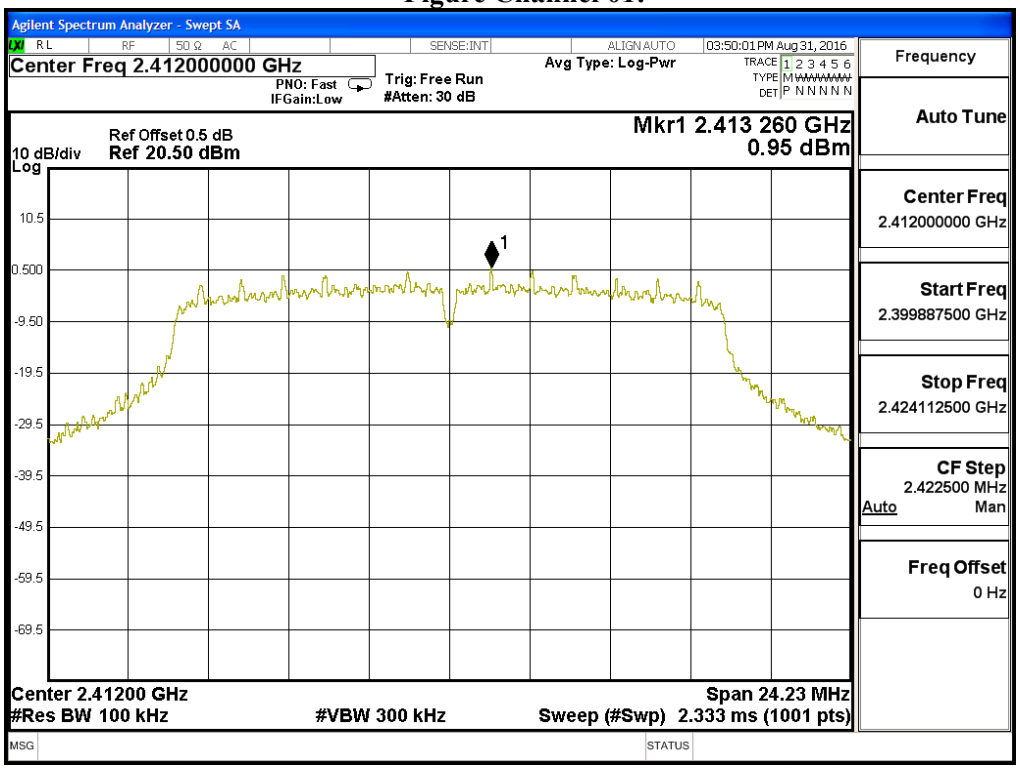


Figure Channel 06:

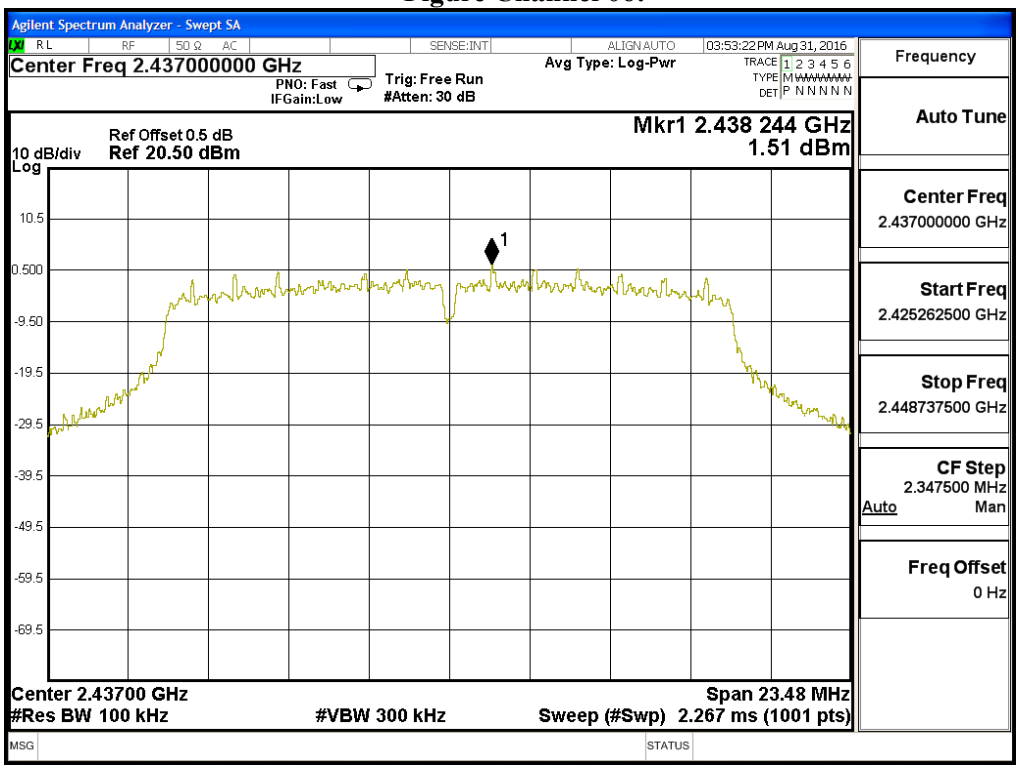
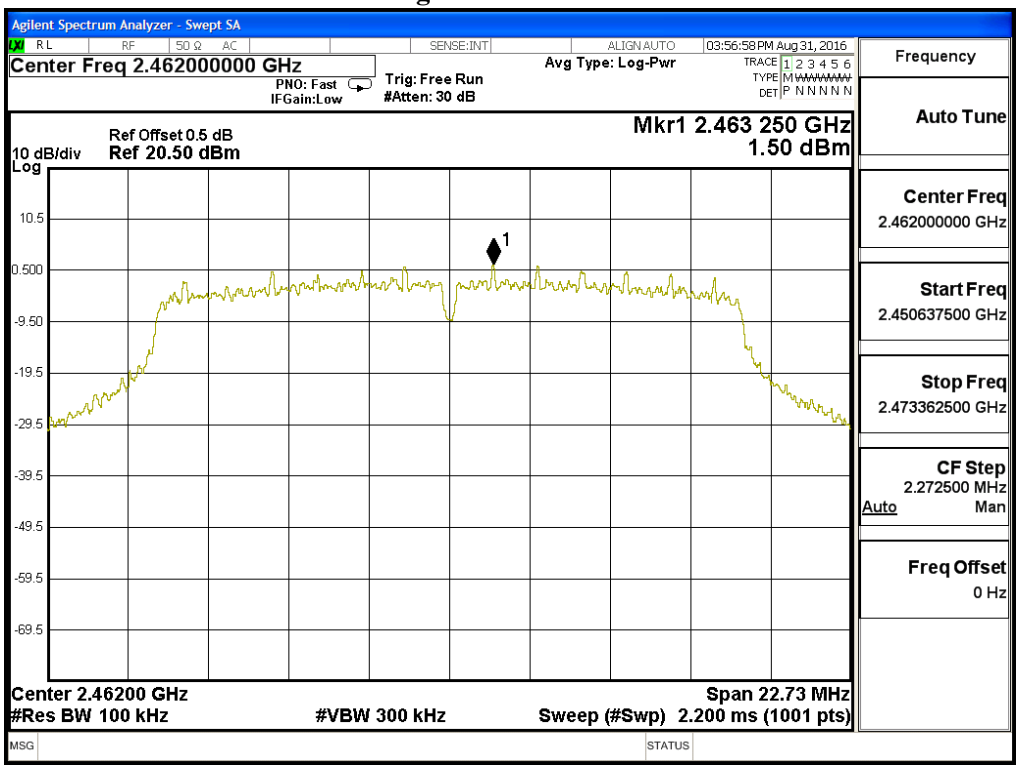


Figure Channel 11:



Product : Key programming device
Test Item : Power Density Data
Test Site : No.3 OATS
Test date : 2016.08.31
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	0.980	≦8dBm	Pass
06	2437	1.590	≦8dBm	Pass
11	2462	0.460	≦8dBm	Pass

Figure Channel 01:

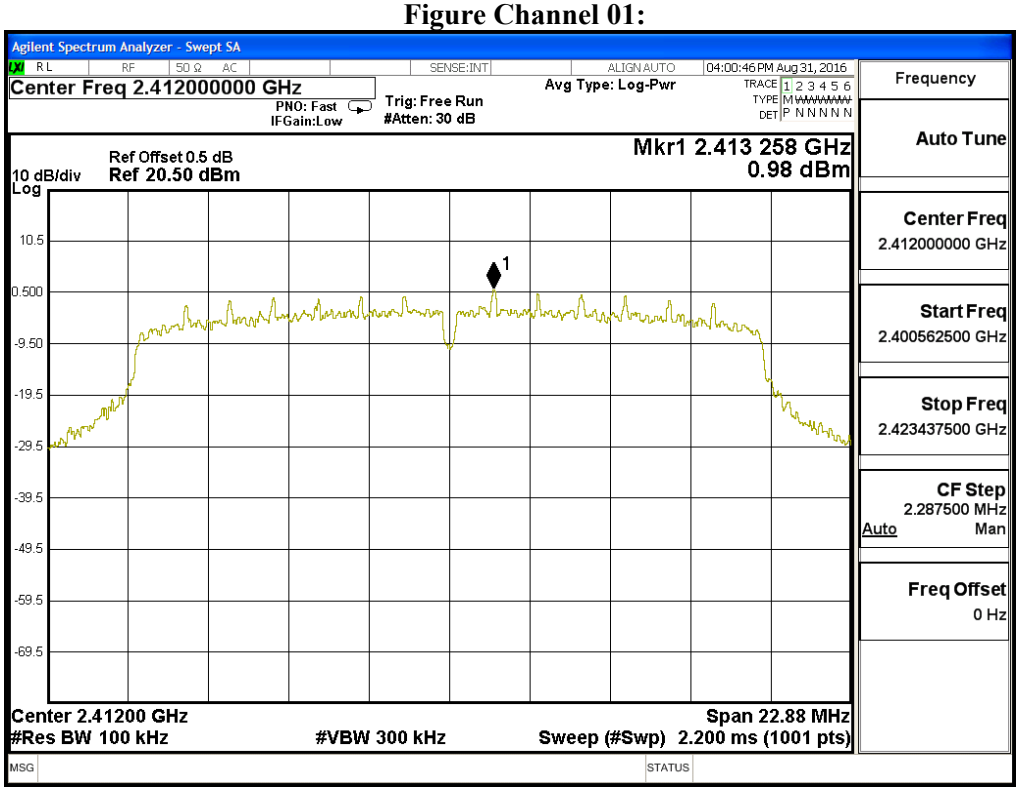


Figure Channel 06:

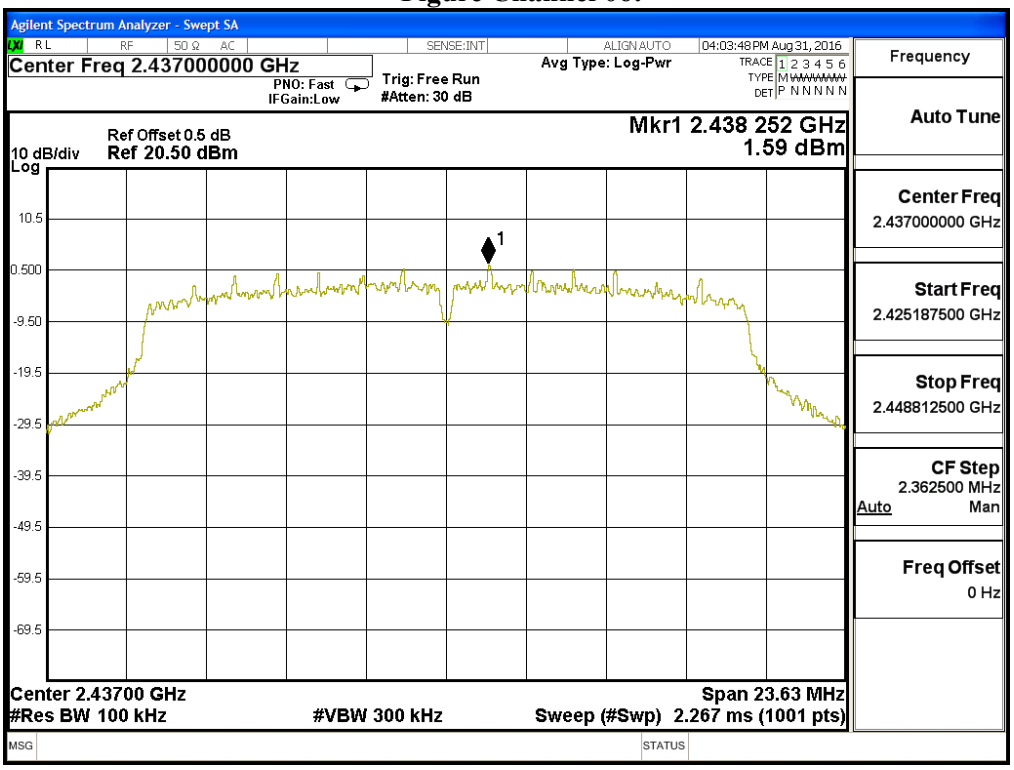
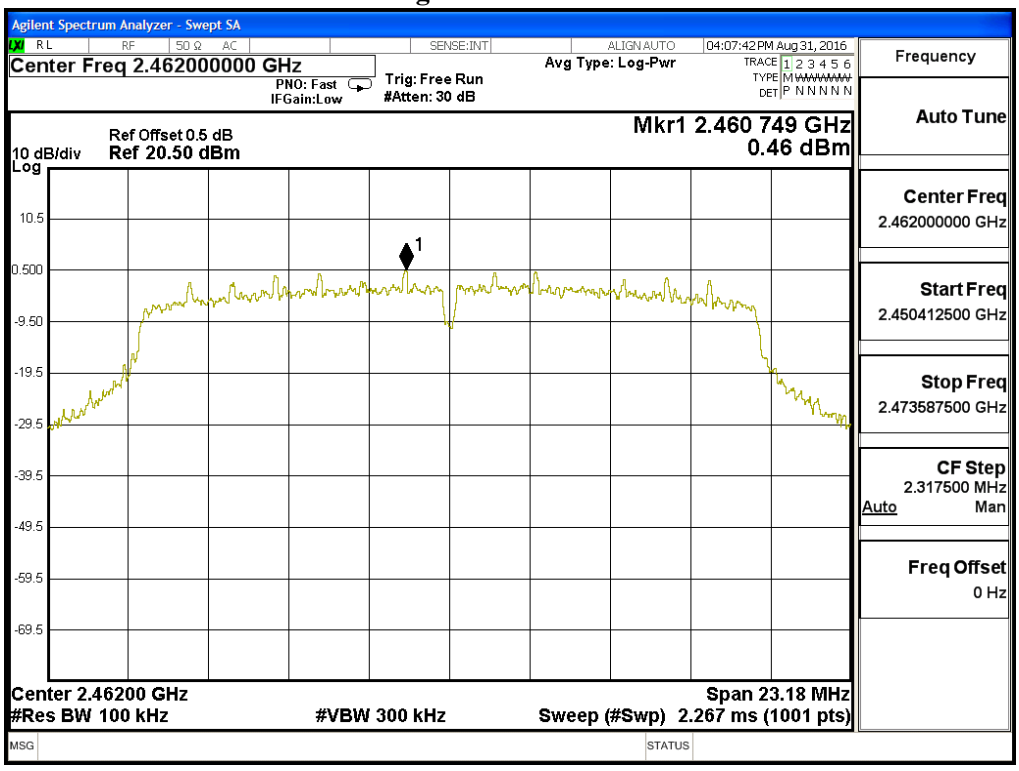


Figure Channel 11:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.