REPORT No.: SZ17050133W15A

FCC RF TEST REPORT

APPLICANT	:	Pycom Ltd
PRODUCT NAME	:	Triple Network (LoRa, WiFi and Bluetooth) IoT development Module powered by MicroPython.
MODEL NAME	:	L01 1.0
TRADE NAME	:	LoPy OEM
BRAND NAME	:	Pycom
FCC ID	:	2AJMTLOPY01R
STANDARD(S)	:	47 CFR Part 15 Subpart C
ISSUE DATE	:	2017-09-21

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

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DIRECTORY

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Change History		
Issue	Date	Reason for change
1.0	2017-09-21	First edition

TEST REPORT DECLARATION

Applicant	Pycom Ltd
Applicant Address	Highpoint, 9 Sydenham Road, GU1 3RX Guildford, Surrey UK
Manufacturer Address	In-Tech Electronics Ltd
Manufacturer	2/F Rhythm Home,119 ShazuiRoad, Futian, Shenzhen, Guangdong, P.R.China
Product Name	Triple Network (LoRa, WiFi and Bluetooth) IoT development Module powered by MicroPython.
Model Name	L01 1.0
Brand Name	Pycom
HW Version	1.0r
SW Version	1.0
Test Standards	47 CFR Part 15 Subpart C
Test Date	2017-07-08 to 2017-09-19
Test Result	PASS

Tested by : Tu Ya'nan

Tu Ya'nan (Test Engineer)

Approved by : Andy Yeh

Andy Yeh (Supervisor)

1. TECHNICAL INFORMATION

Note: Provide by applicant.

1.1 Applicant Information

Company:	Pycom Ltd
Address	Highpoint, 9 Sydenham Road, GU1 3RX Guildford, Surrey UK

1.2 Equipment under Test (EUT) Description

Brand Name:	Pycom
Trade Name:	LoPy OEM
Model Name:	L01 1.0
Frequency Range:	802.11b/g/n-20MHz: 2.412GHz - 2.462GHz 802.11n-40MHz: 2.422GHz - 2.452GHz
Channel Number:	802.11b/g/n-20MHz: 11 802.11n-40MHz: 7
Modulation Type:	DSSS, OFDM
Antenna 1 Type:	Ceramic Antenna
Antenna 1Gain:	-0.5dBi
Antenna 2 Type:	External Antenna
Antenna 2Gain:	2.0dBi

NOTE:

1. The EUT is a Triple Network (LoRa, WiFi and Bluetooth) IoT development Module powered by MicroPython. It's operating at 2.4GHz ISM; it supports 802.11b, 802.11g, 802.11n and they are all tested in this report.

For 802.11b/g/n-20MHz (2.4GHz band), the frequencies allocated is F (MHz) =2412+5*(n-1) (1<=n<=11). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz).

For 802.11n-40MHz, the frequencies allocated is F (MHz) =2412+5*(n-1) (3<=n<=9). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 3 (2422MHz), 6 (2437MHz) and 9 (2452MHz).

2. The EUT connected to the serial port of the computer with a serial communication cable, we use the dedicated software to control the EUT continuous transmission. And the duty cycle is 100%.
3. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.2.1 Identification of all used EUTs

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
A01	1.0r	1.0

1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-15 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Result
1	15.203	Antenna Requirement	N/A	**PASS**
2	15.247(b)	Peak Output Power	Jul 08, 2017	**PASS**
3	15.247(a)	Bandwidth	Jul 08, 2017	**PASS**
4	15.247(d)	Conducted Spurious Emission and Band Edge	Jul 08, 2017	**PASS**
5	15.247(d)	Restricted Frequency Bands	Aug 10, 2017& Sep 19, 2017	**PASS**
6	15.207	Conducted Emission	Aug 15, 2017	**PASS**
7	15.209 ,15.247(d)	Radiated Emission	Aug 02, 2017& Sep 19, 2017	**PASS**
8	15.247(e)	Power spectral density (PSD)	Jul 08, 2017	**PASS**

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013 and KDB558074 D01 v04 (04/05/2017).

1.3.1 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR PART 15C REQUIREMENTS

2.1 Antenna requirement

2.1.1 Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2 Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2 Peak Output Power

2.2.1 Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed1 Watt.

2.2.2 Test Description

The measured output power was calculated by the reading of the USB Wideband Power Sensor and calibration.

A. Test Setup:

The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in power meter.

B. Equipments List:

Please reference ANNEX A(1.5).

2.2.3 Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

2.2.3.1 802.11b Test Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	15.43	0.03491	30	1	PASS
6	2437	15.11	0.03243			PASS
11	2462	14.52	0.02831			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	12.68	0.01854	30	1	PASS
6	2437	11.82	0.01521			PASS
11	2462	10.93	0.01239			PASS

2.2.3.2 802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	17.68	0.05861	30	1	PASS
6	2437	17.04	0.05058			PASS
11	2462	16.24	0.04207			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	8.88	0.00773	30	1	PASS
6	2437	8.51	0.00710			PASS
11	2462	7.93	0.00621			PASS

2.2.3.3 802.11n-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	17.85	0.06095	30	1	PASS
6	2437	17.16	0.05200			PASS
11	2462	16.34	0.04305			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	8.98	0.00791	30	1	PASS
6	2437	8.62	0.00728			PASS
11	2462	8.01	0.00632			PASS

2.2.3.4 802.11n-40MHz Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	17.12	0.05152	30	1	PASS
6	2437	16.78	0.04764			PASS
9	2452	16.36	0.04325			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	8.93	0.00782	30	1	PASS
6	2437	8.41	0.00693			PASS
9	2452	7.91	0.00618			PASS

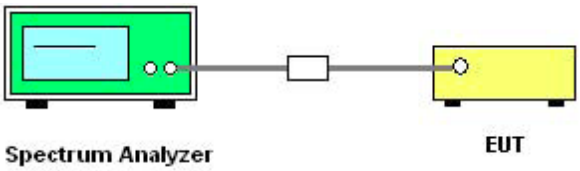
2.3 Bandwidth

2.3.1 Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.3.2 Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

KDB 558074 Section 8.1 Option 1 was used in order to prove compliance.

B. Equipments List:

Please reference ANNEX A(1.5).

2.3.3 Test Result

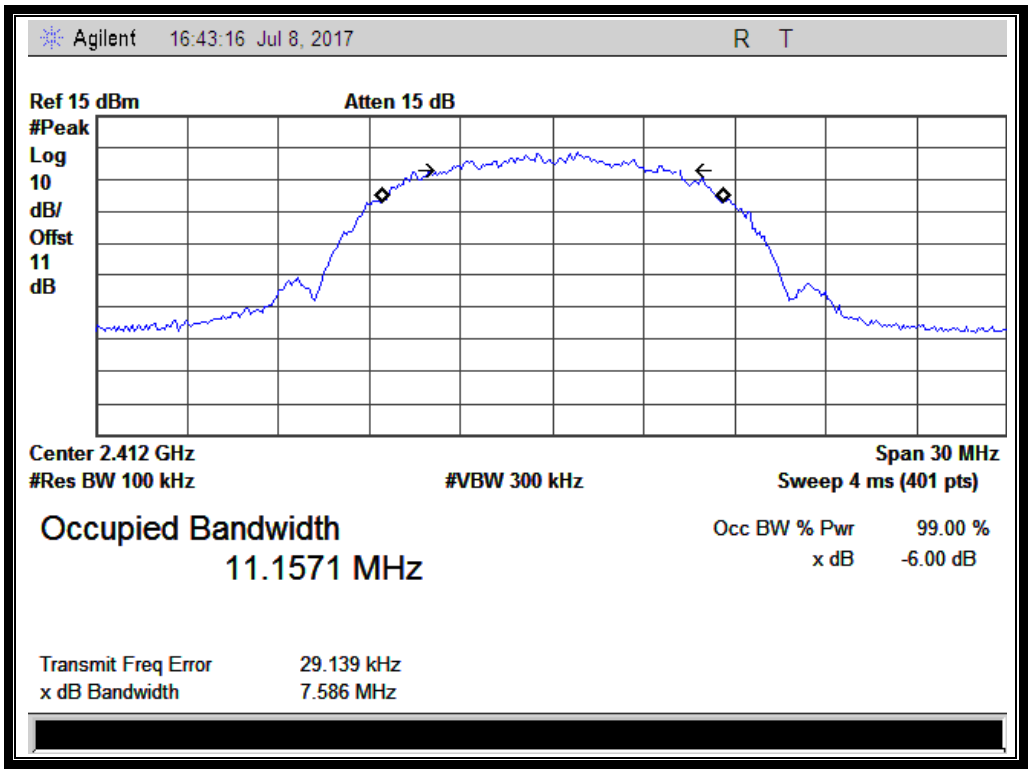
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1 802.11b Test mode

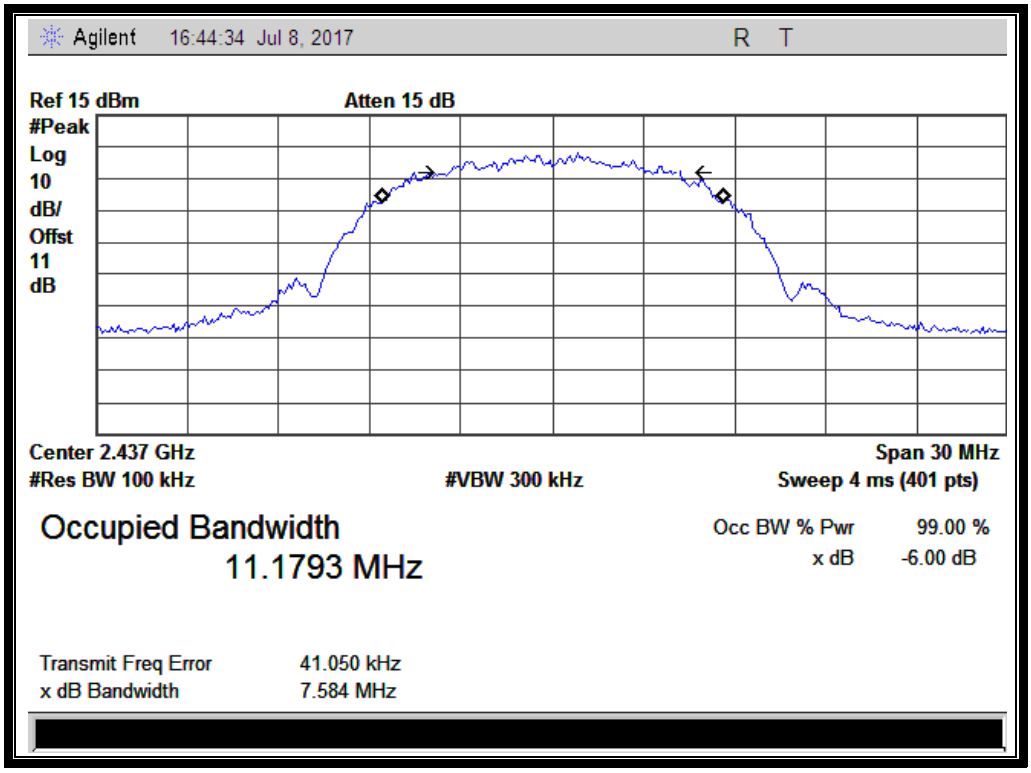
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	7.586	≥500	PASS
6	2437	7.584	≥500	PASS
11	2462	8.263	≥500	PASS

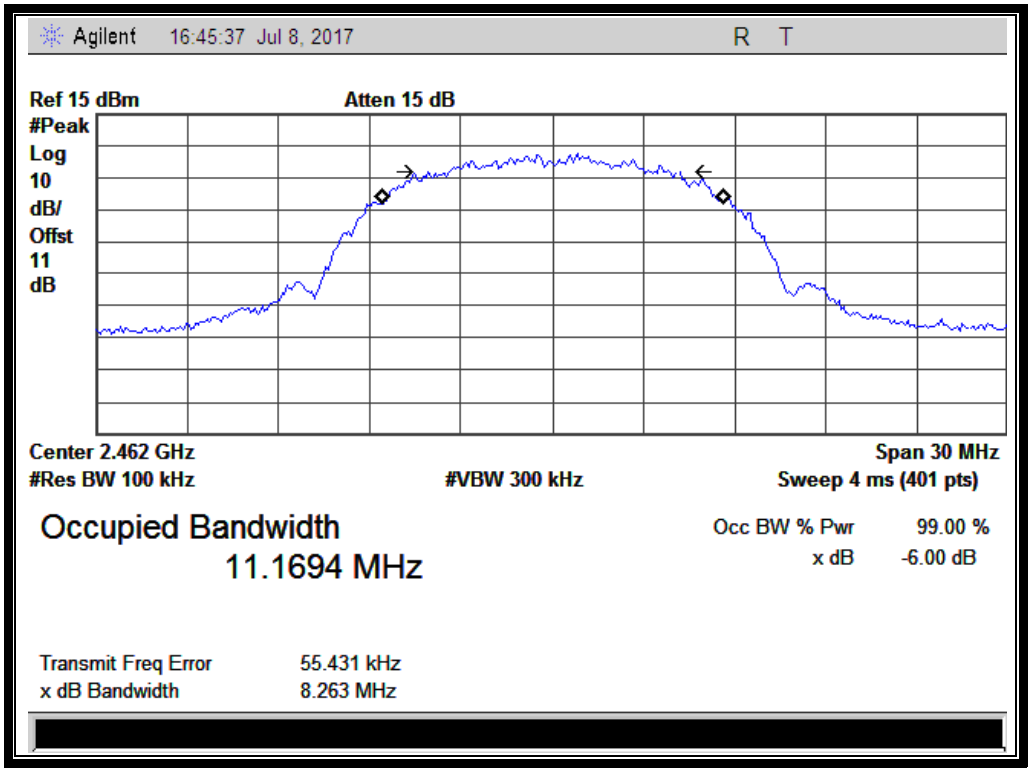
B. Test Plots



(Channel 1: 2412MHz @ 802.11b)



(Channel 6: 2437 MHz @ 802.11b)



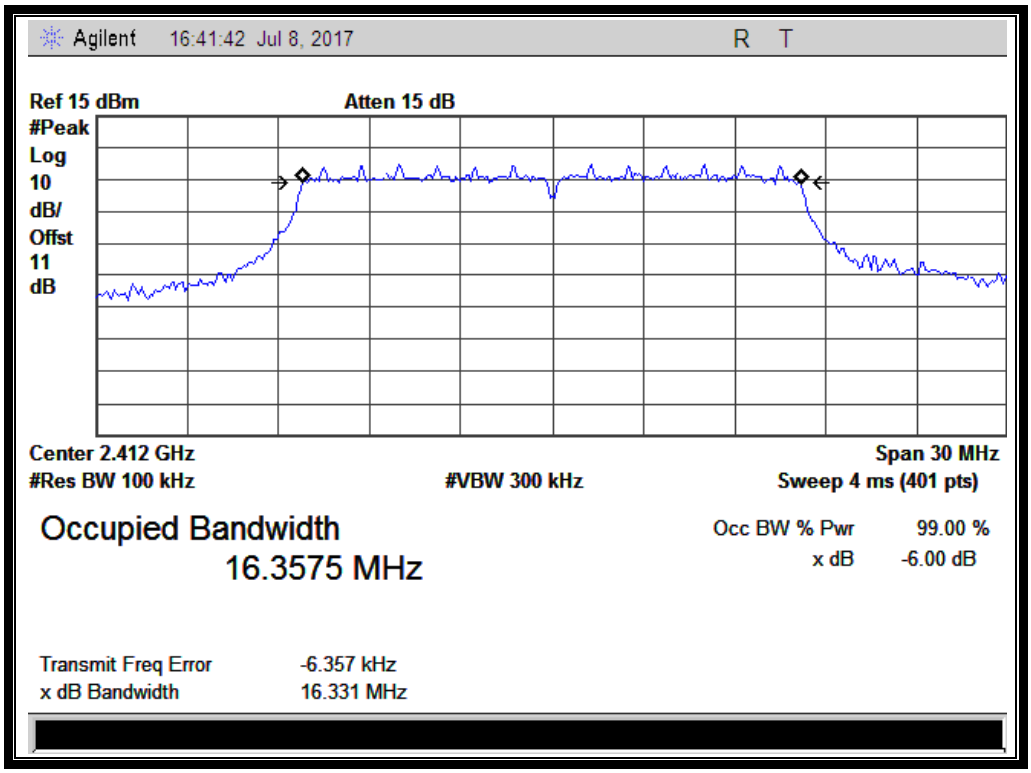
(Channel 11: 2462MHz @ 802.11b)

2.3.3.2 802.11g Test mode

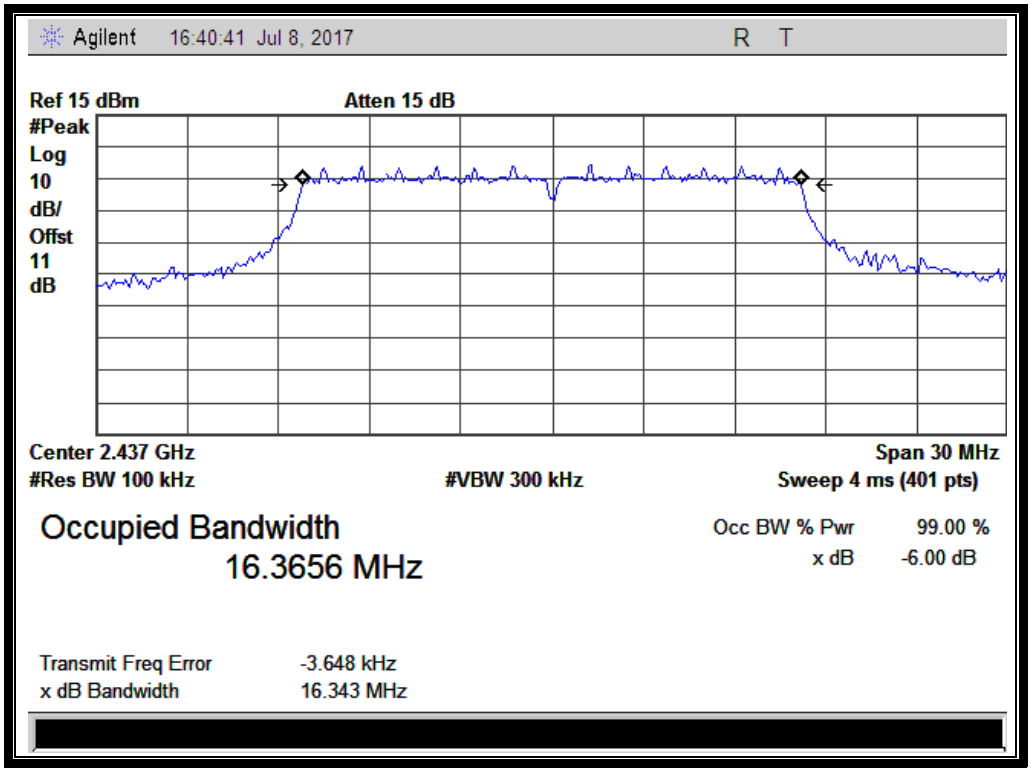
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	16.331	≥500	PASS
6	2437	16.343	≥500	PASS
11	2462	16.353	≥500	PASS

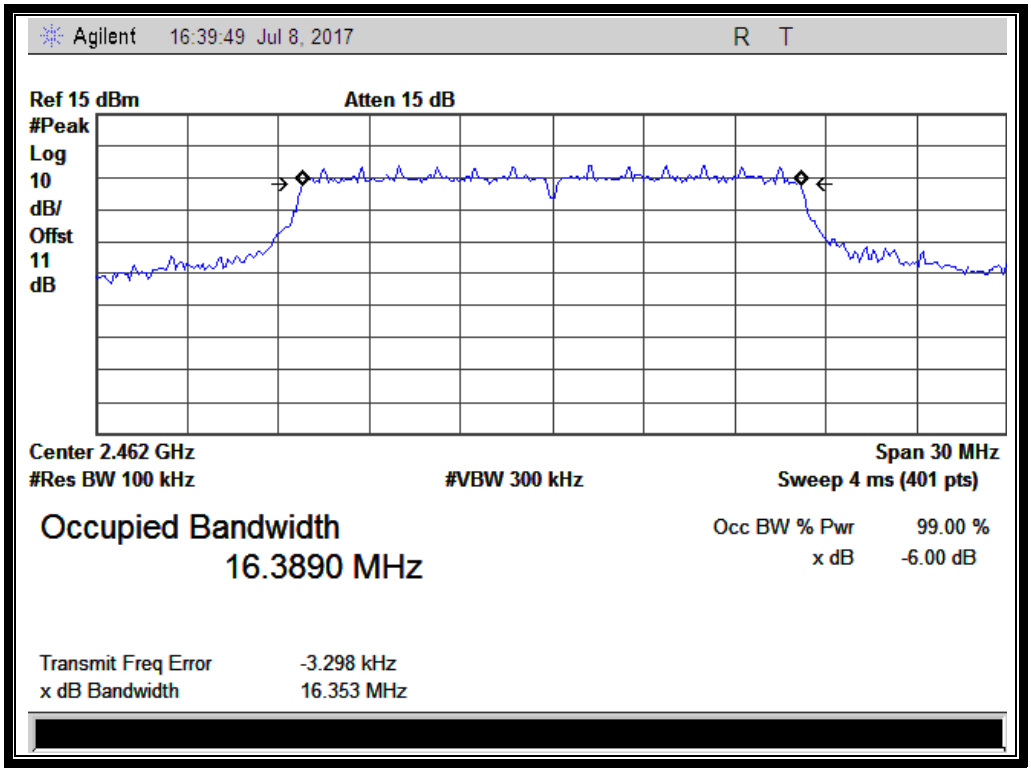
B. Test Plots:



(Channel 1: 2412MHz @ 802.11g)



(Channel 6: 2437MHz @ 802.11g)



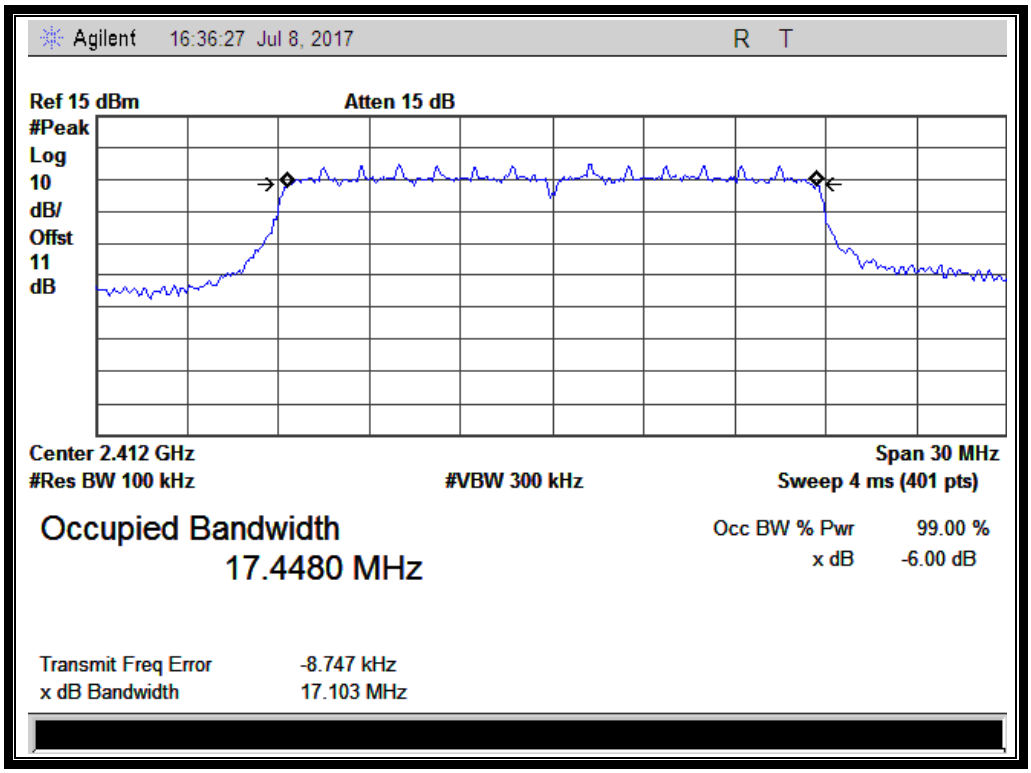
(Channel 11: 2462MHz @ 802.11g)

2.3.3.3 802.11n-20 Test mode

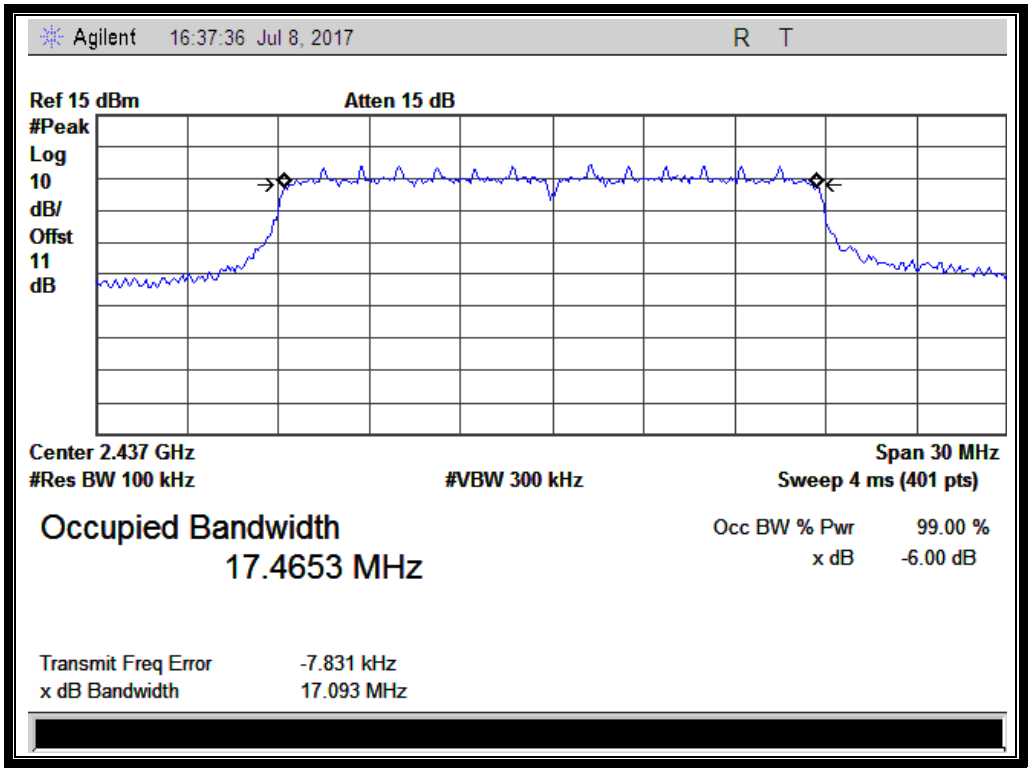
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	17.103	≥500	PASS
6	2437	17.093	≥500	PASS
11	2462	17.067	≥500	PASS

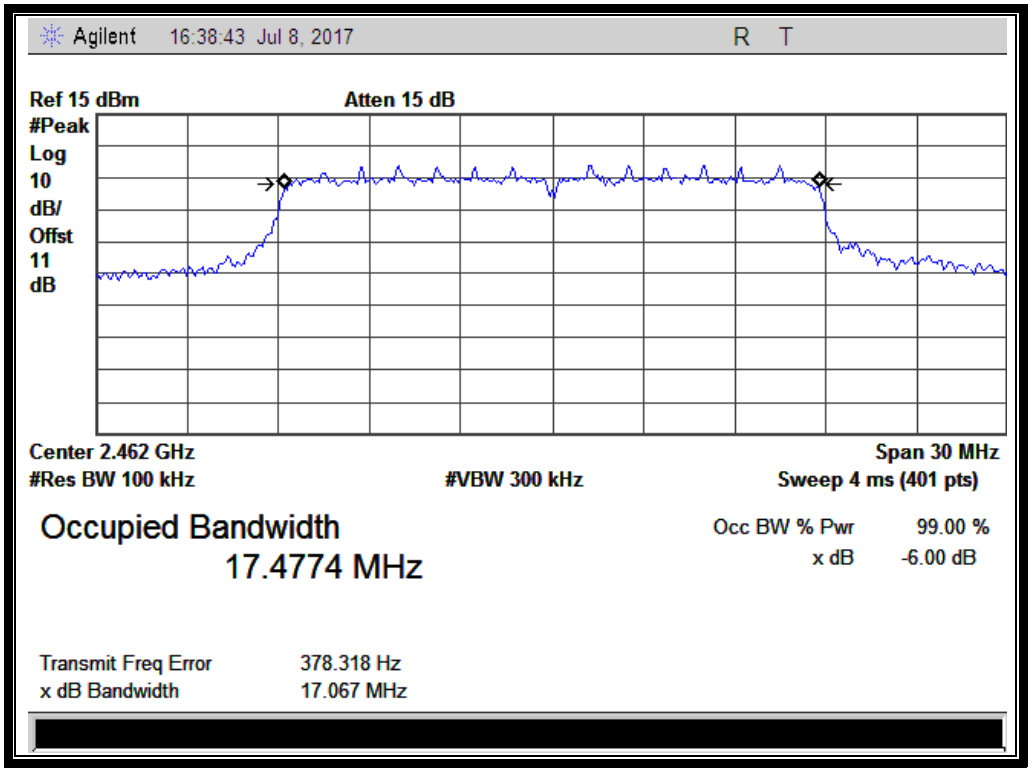
B. Test Plots:



(Channel 1: 2412MHz @ 802.11n-20)



(Channel 6: 2437MHz @ 802.11n-20)



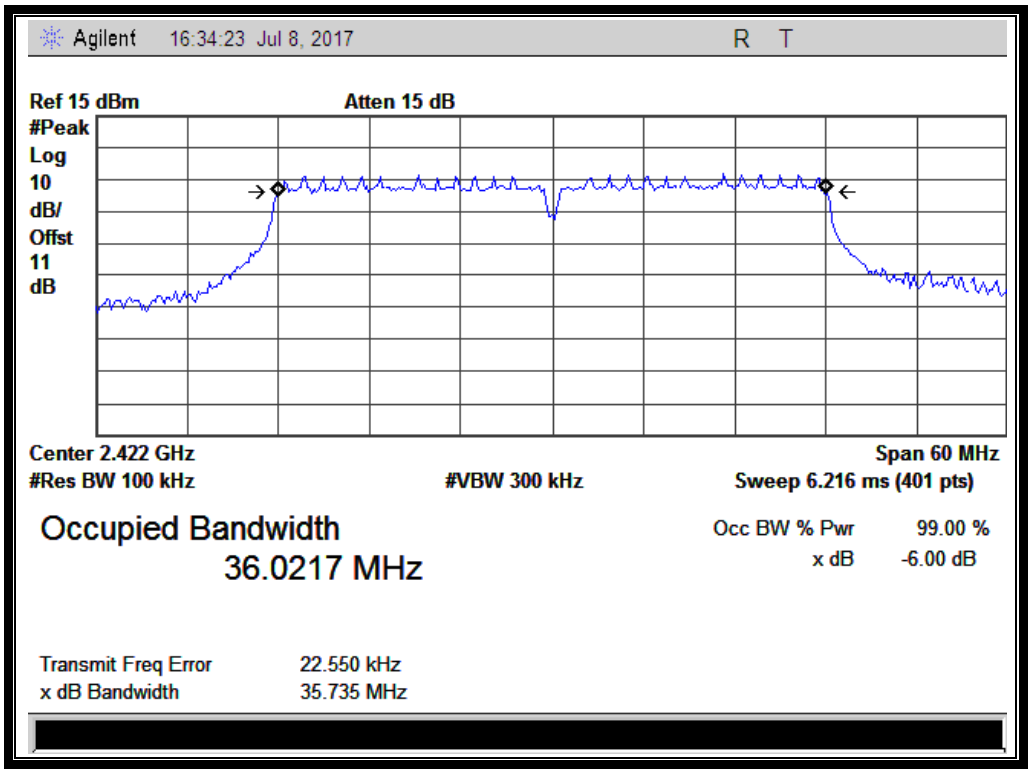
(Channel 11: 2462MHz @ 802.11n-20)

2.3.3.4 802.11n-40 Test mode

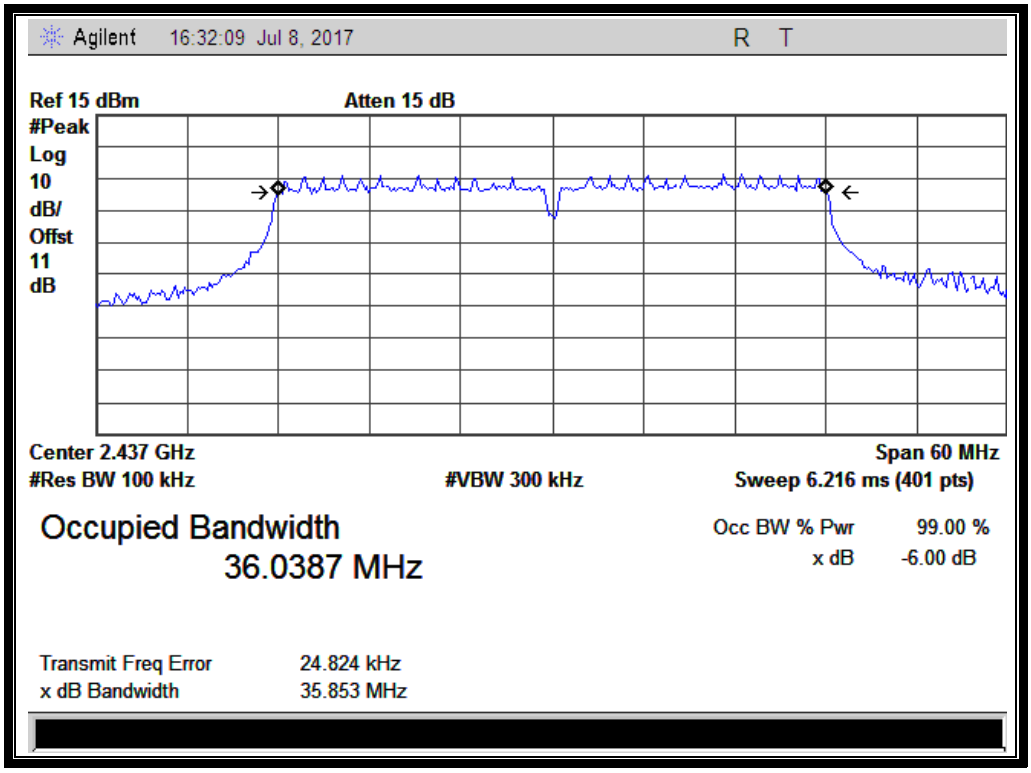
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
3	2422	35.735	≥500	PASS
6	2437	35.853	≥500	PASS
9	2452	35.559	≥500	PASS

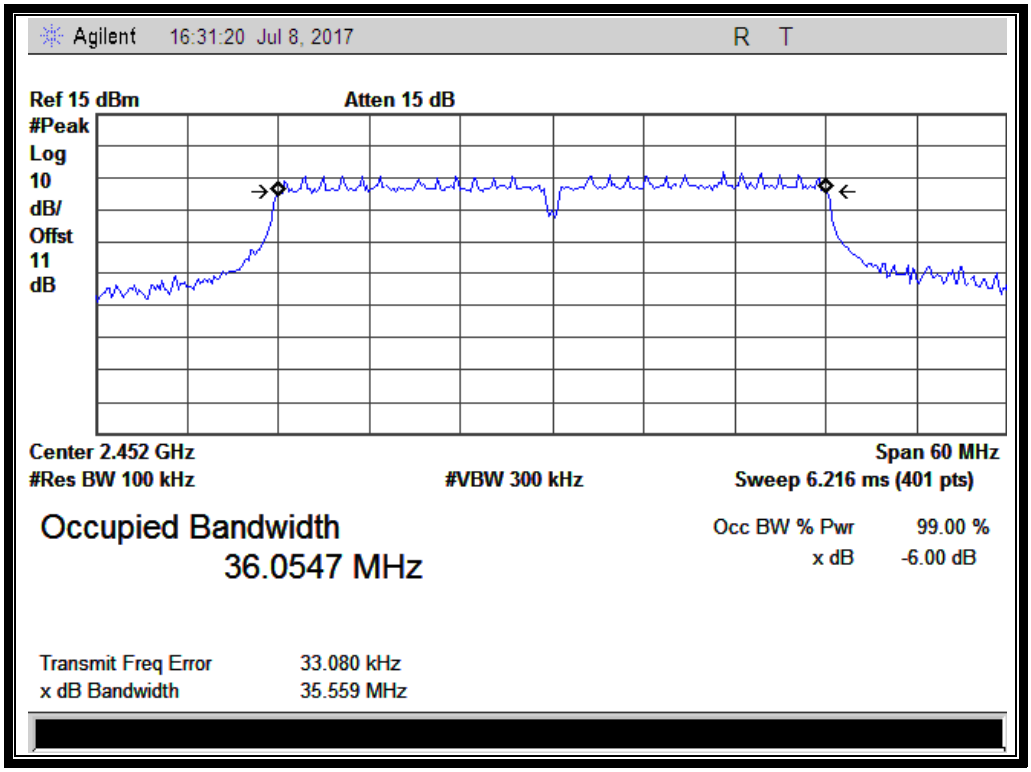
B. Test Plots:



(Channel 3: 2422Mz @ 802.11n-40)



(Channel 6: 2437MHz @ 802.11n-40)



(Channel 9: 2452MHz @ 802.11n-40)

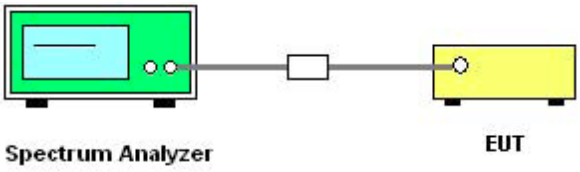
2.4 Conducted Spurious Emissions and Band Edge

2.4.1 Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.4.2 Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

KDB 558074 Section 11.0 was used in order to prove compliance.

B. Equipments List:

Please reference ANNEX A(1.5).

2.4.3 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

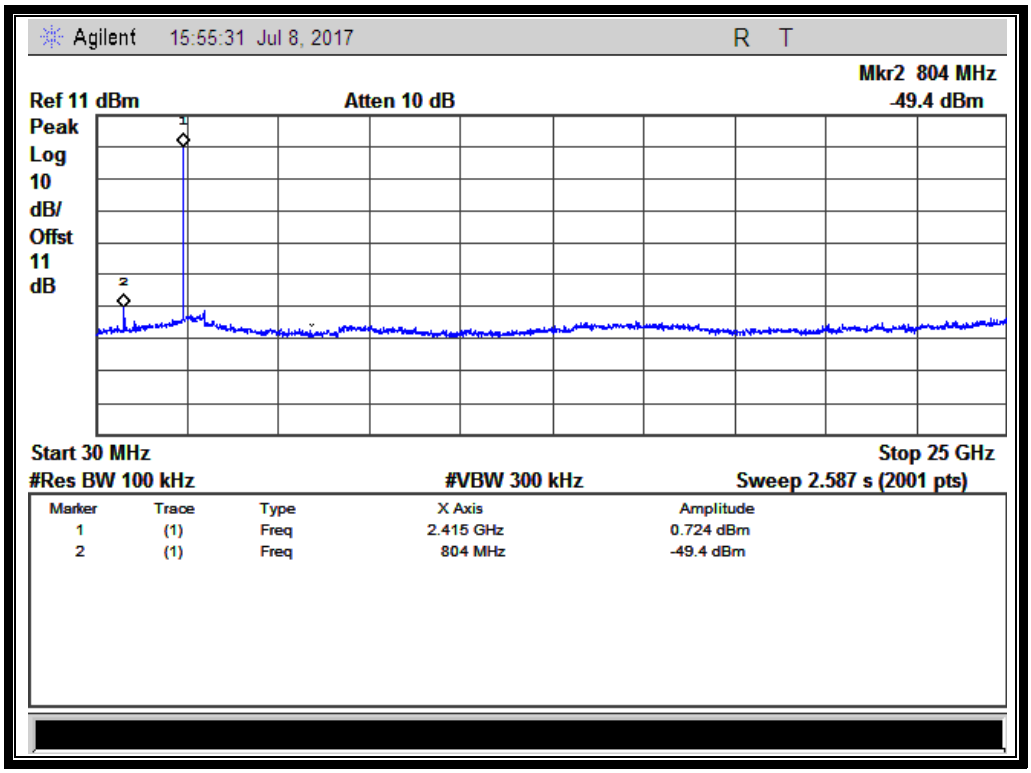
2.4.3.1 802.11b Test mode

A. Test Verdict:

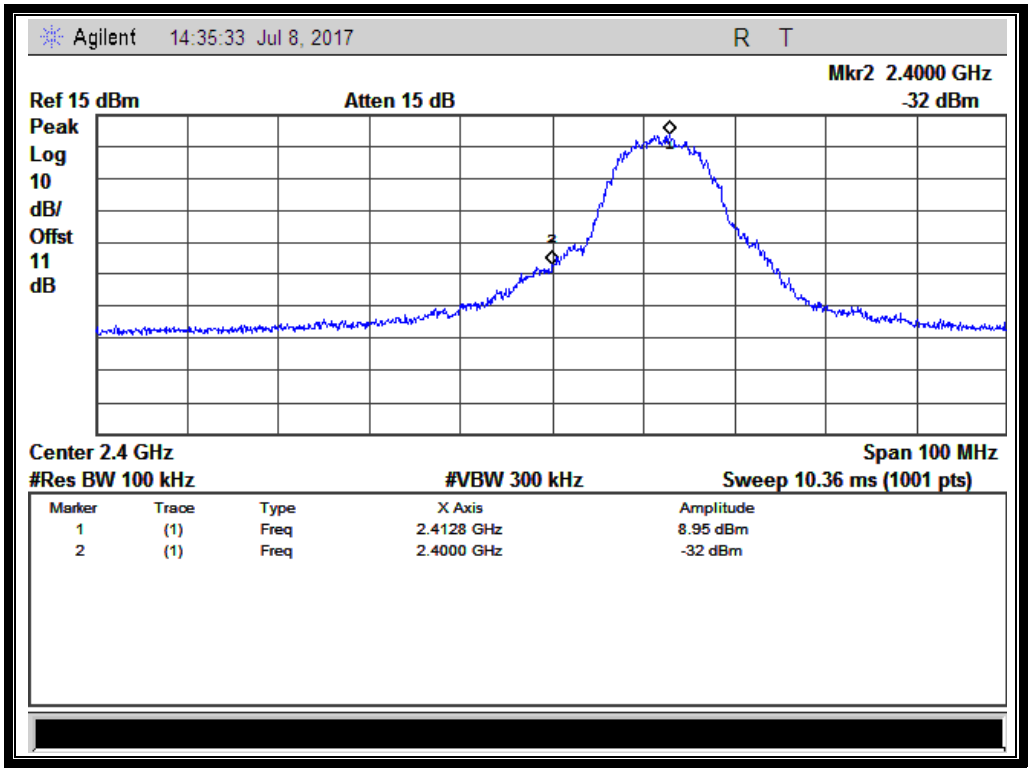
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-49.40	0.72	-19.28	PASS
6	2437	-47.86	0.21	-19.79	PASS
11	2462	-49.75	0.19	-19.81	PASS

B. Test Plots:

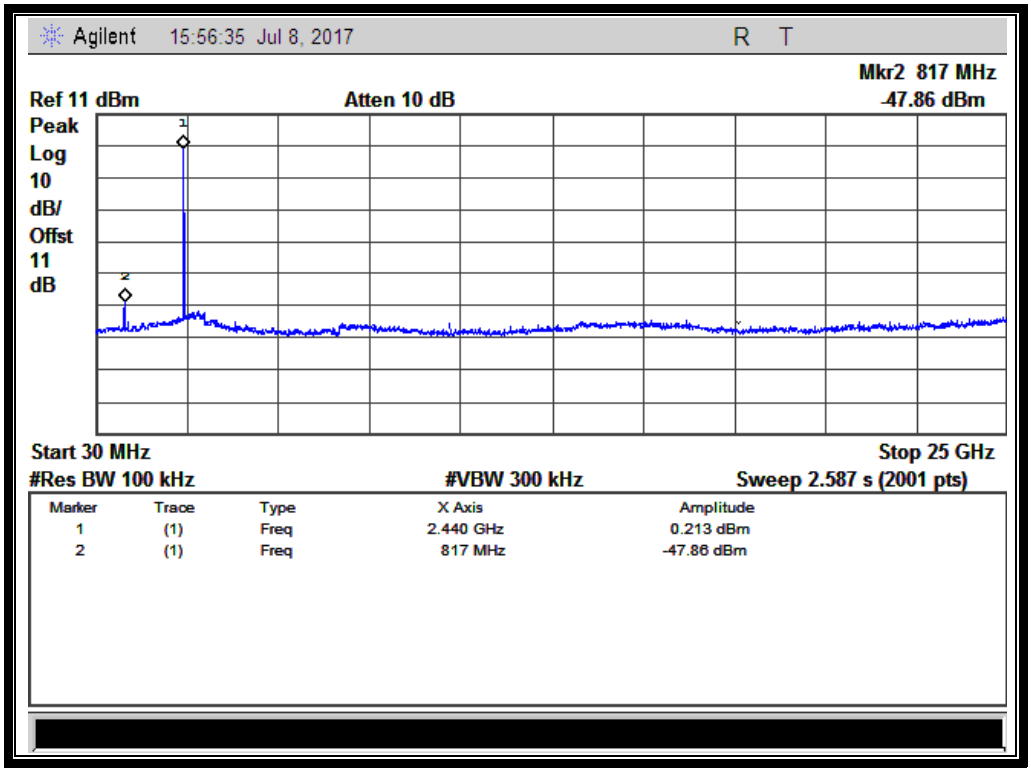
Note: the power of the Module transmitting frequency should be ignored.



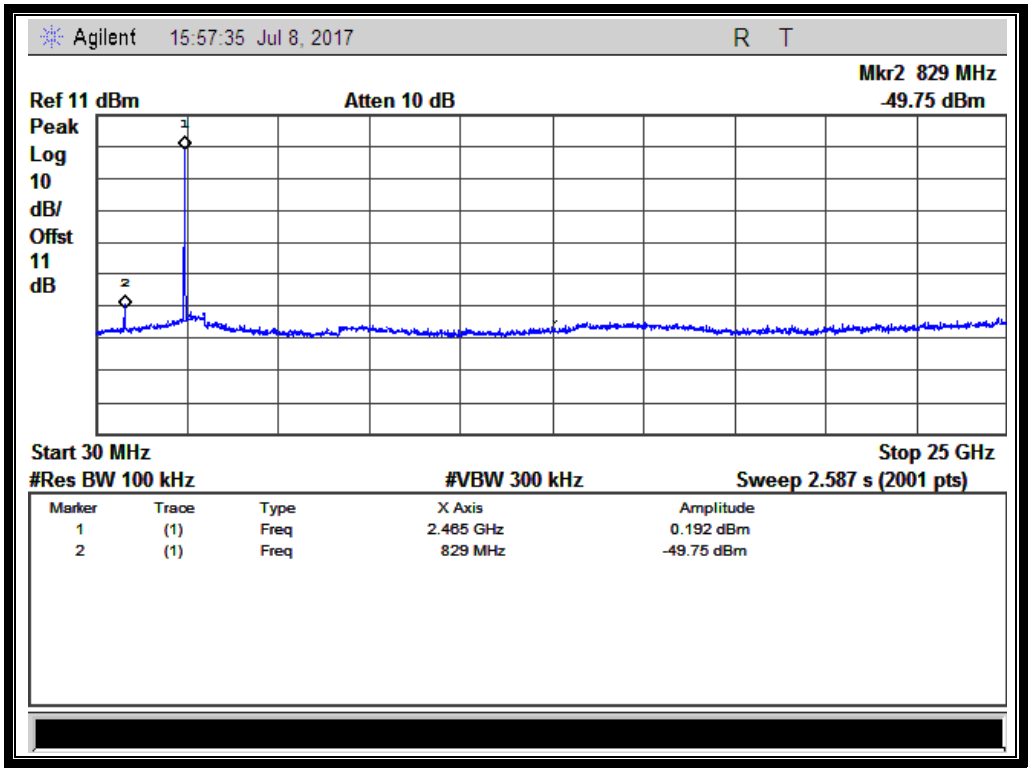
(Channel = 1, 30MHz to 25GHz)



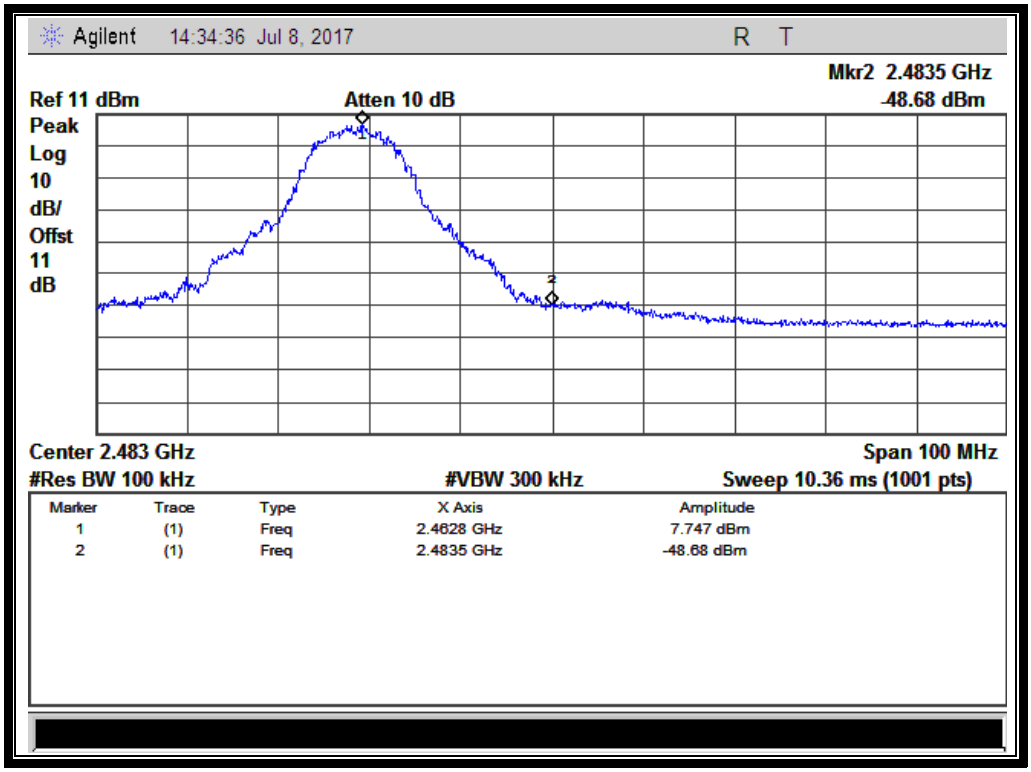
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

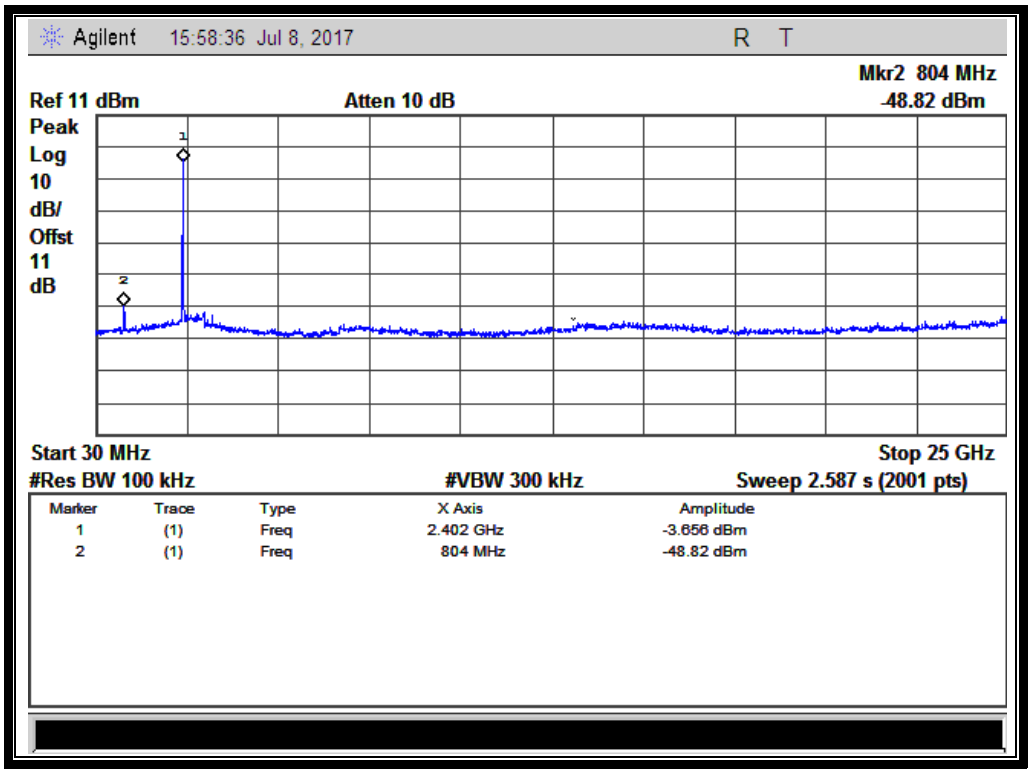
2.4.3.2 802.11g Test mode

A. Test Verdict:

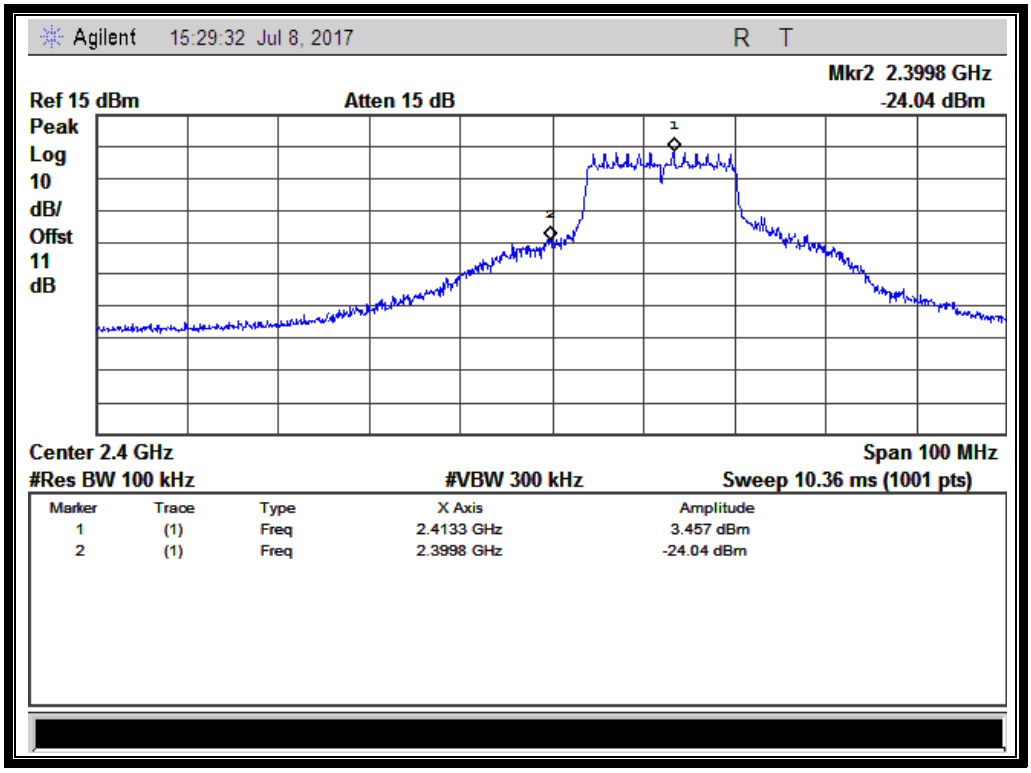
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-48.82	-3.66	-23.66	PASS
6	2437	-48.86	-2.33	-22.33	PASS
11	2462	-51.26	-1.78	-21.78	PASS

B. Test Plots:

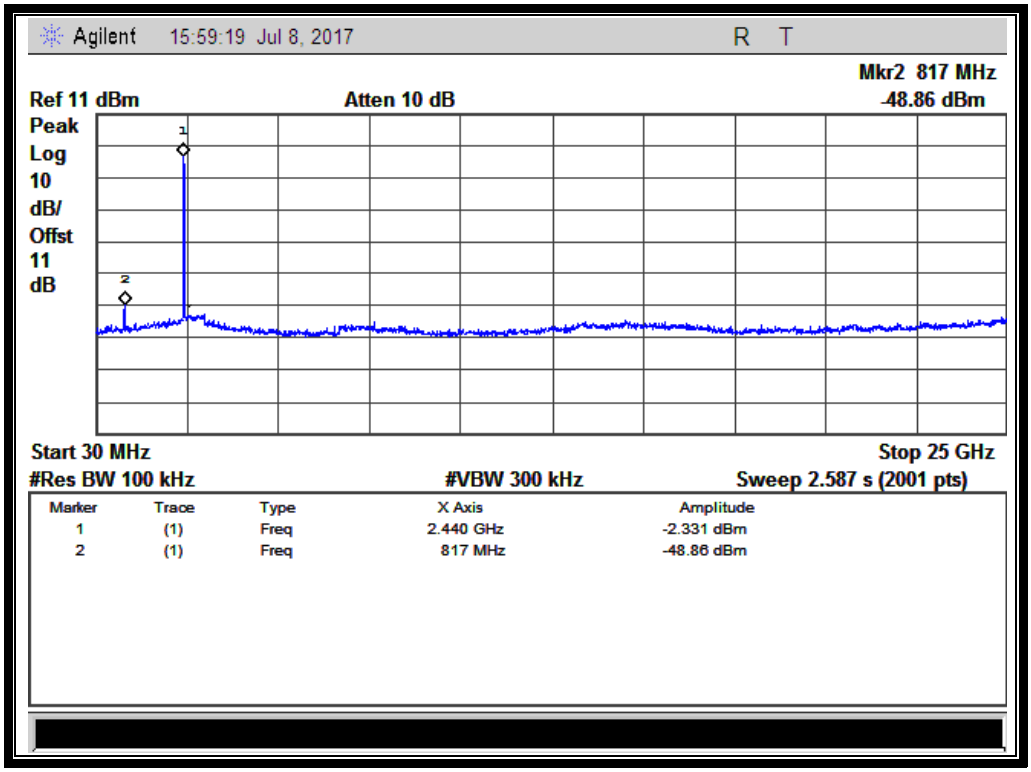
Note: the power of the Module transmitting frequency should be ignored.



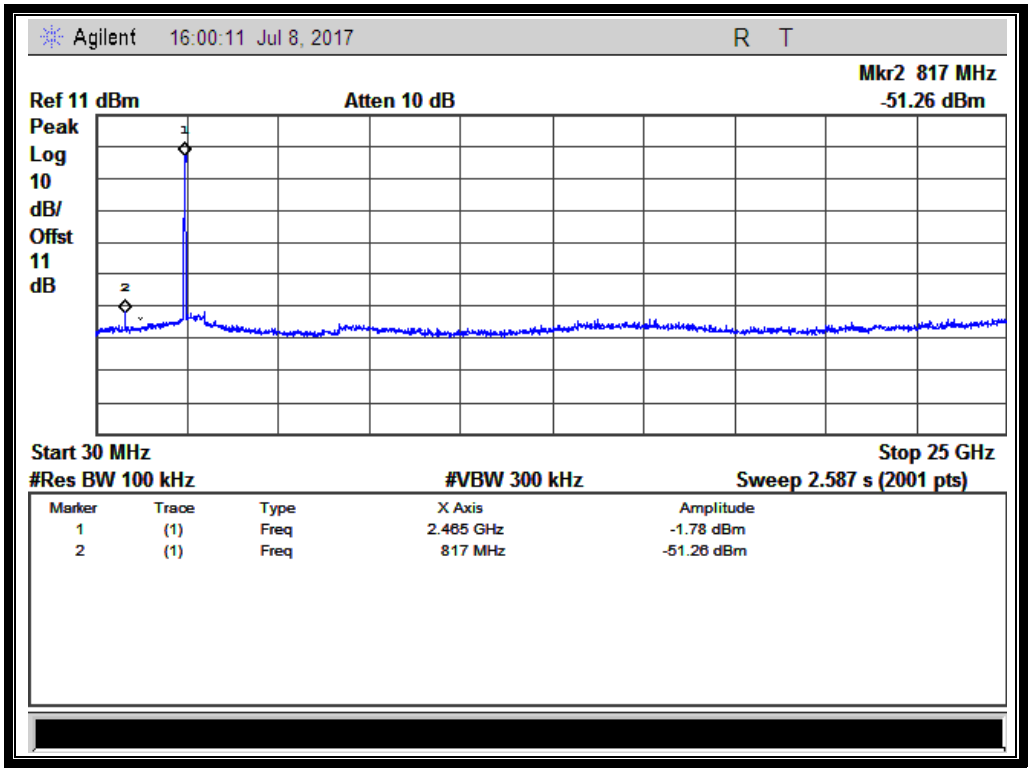
(Channel = 1, 30MHz to 25GHz)



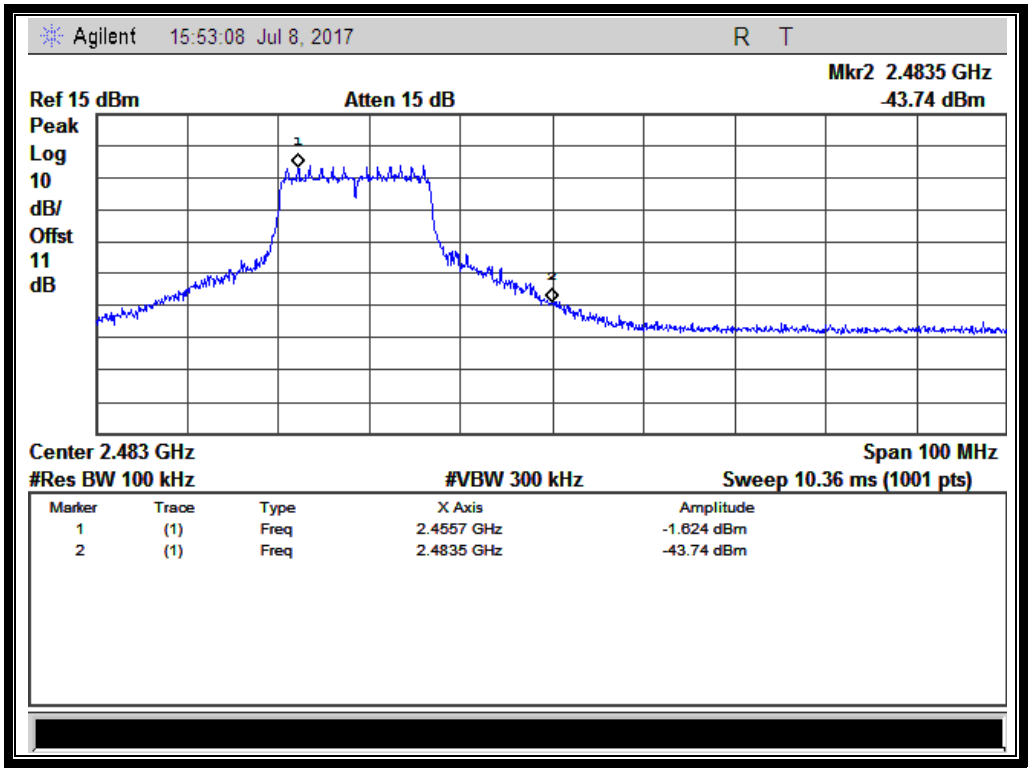
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

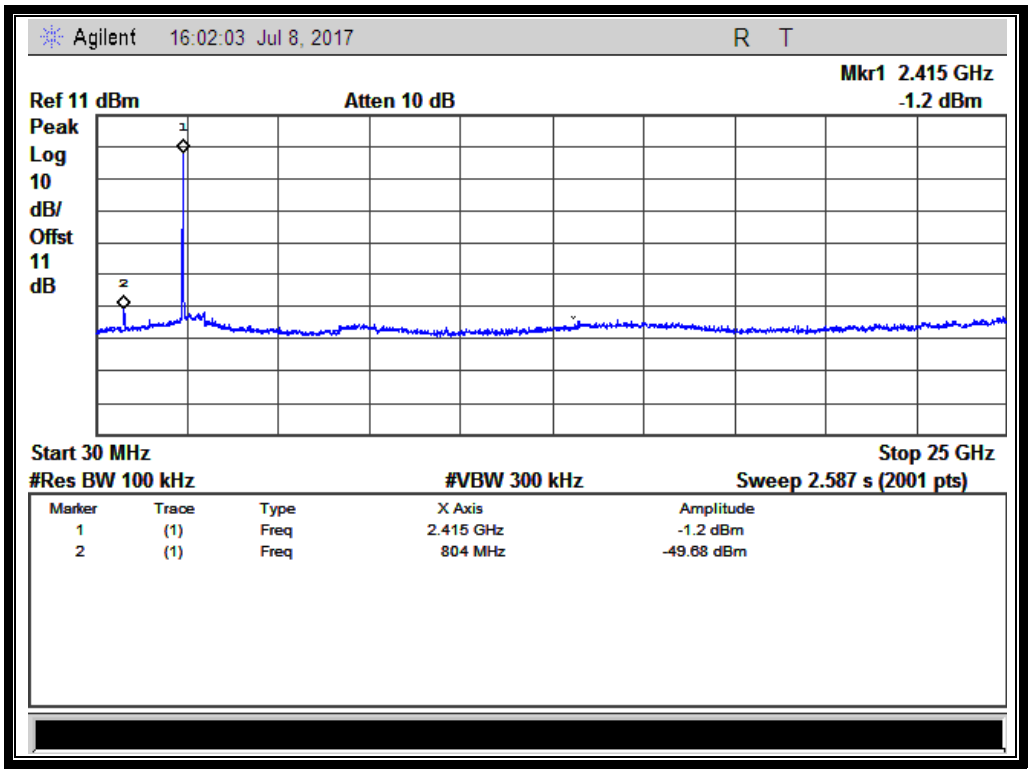
2.4.3.3 802.11n -20MHz Test mode

A. Test Verdict:

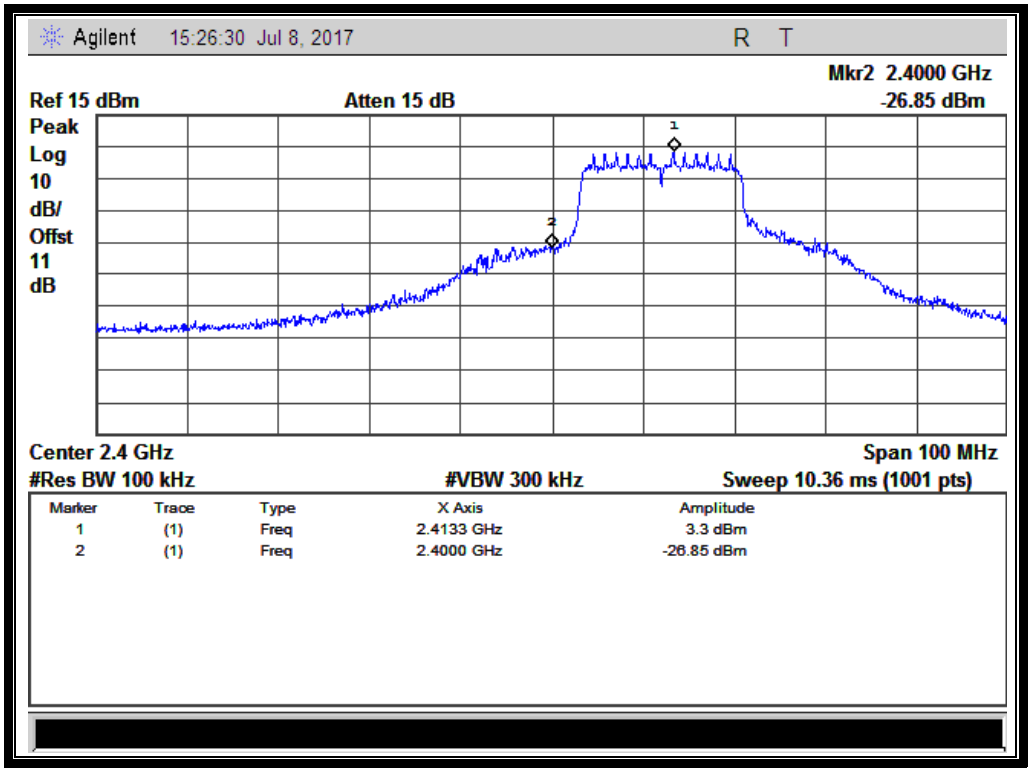
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-49.68	-1.20	-21.20	PASS
6	2437	-50.49	-1.37	-21.37	PASS
11	2462	-50.48	-2.93	-22.93	PASS

B. Test Plots:

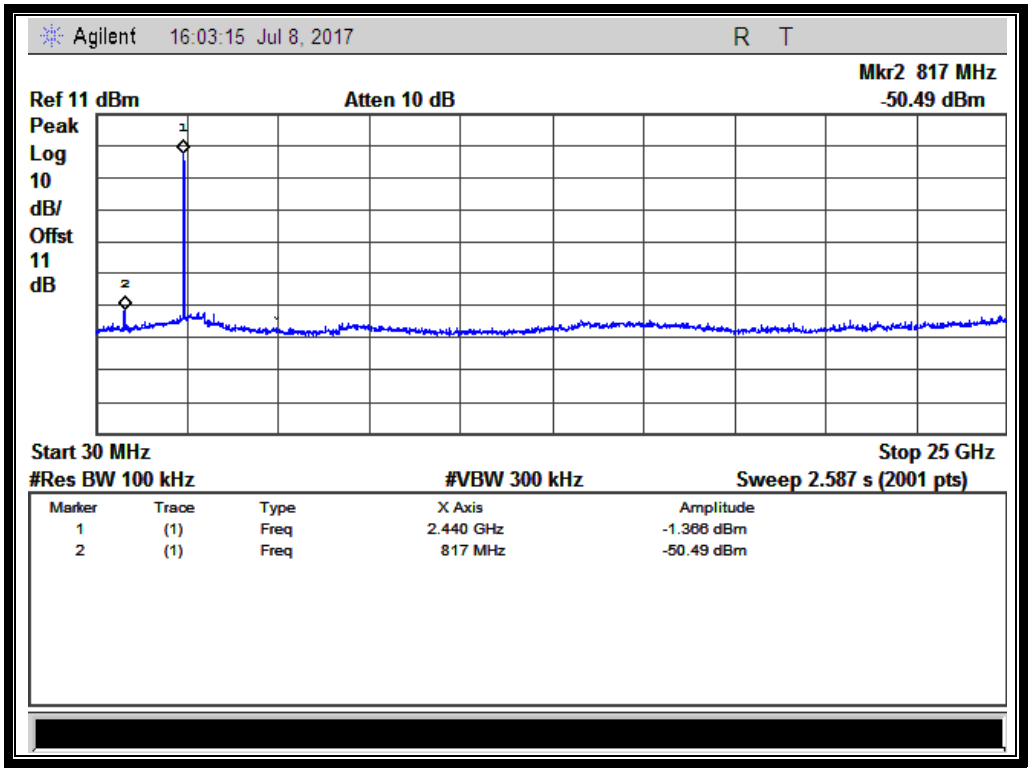
Note: the power of the Module transmitting frequency should be ignored.



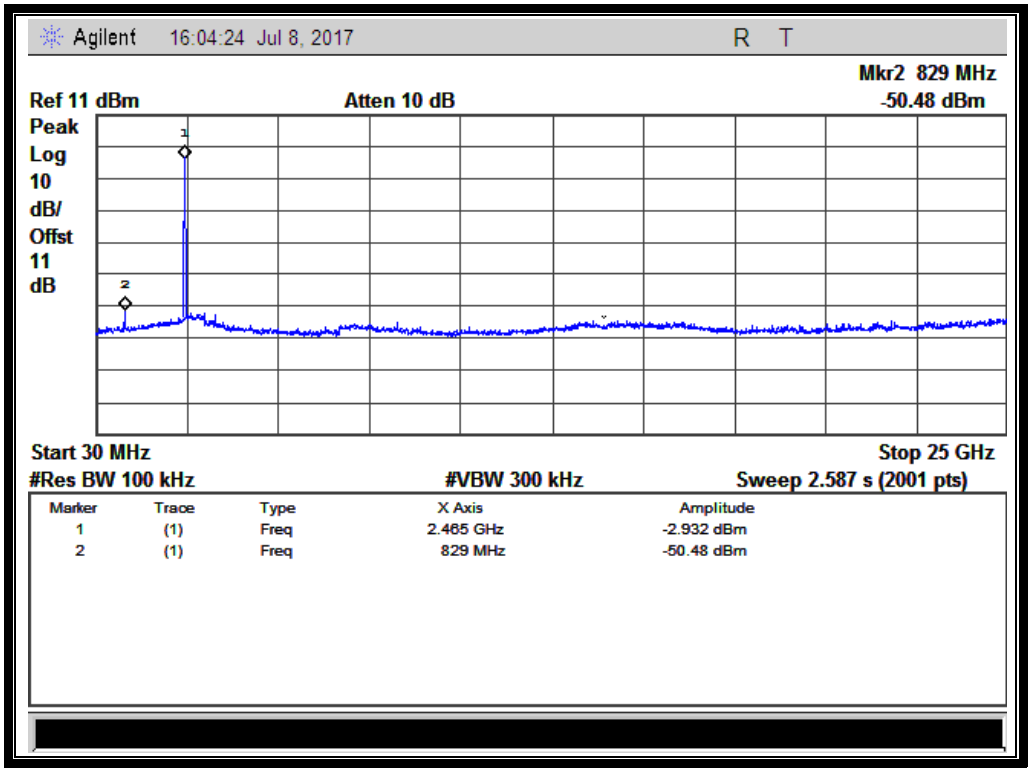
(Channel = 1, 30MHz to 25GHz)



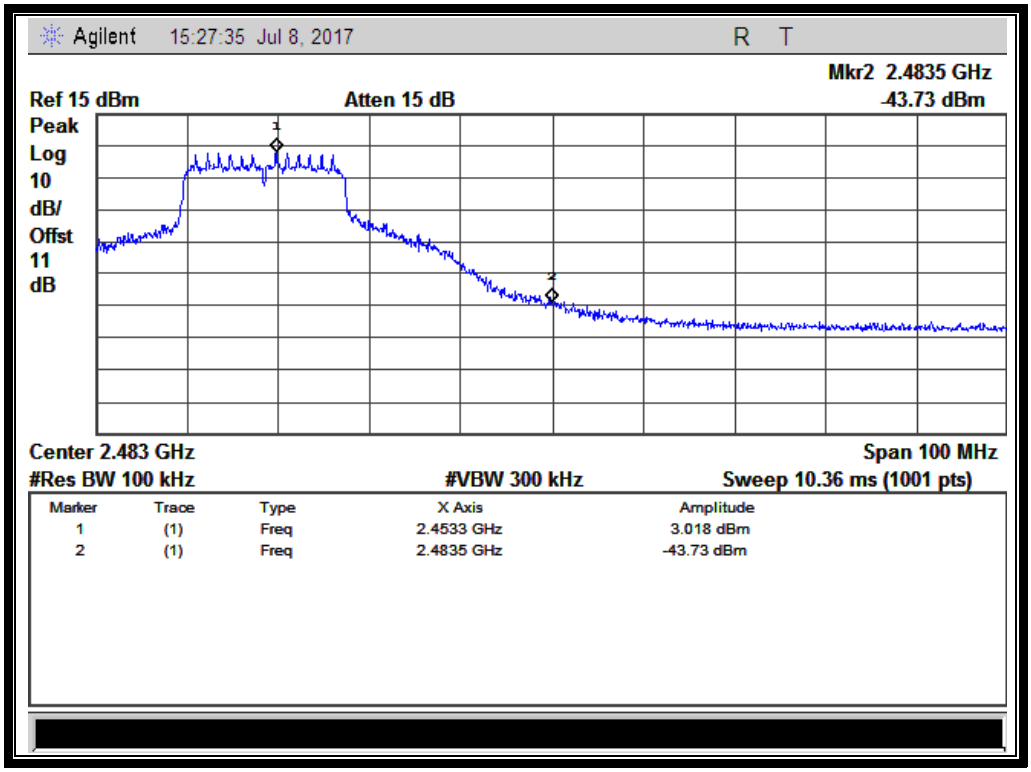
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

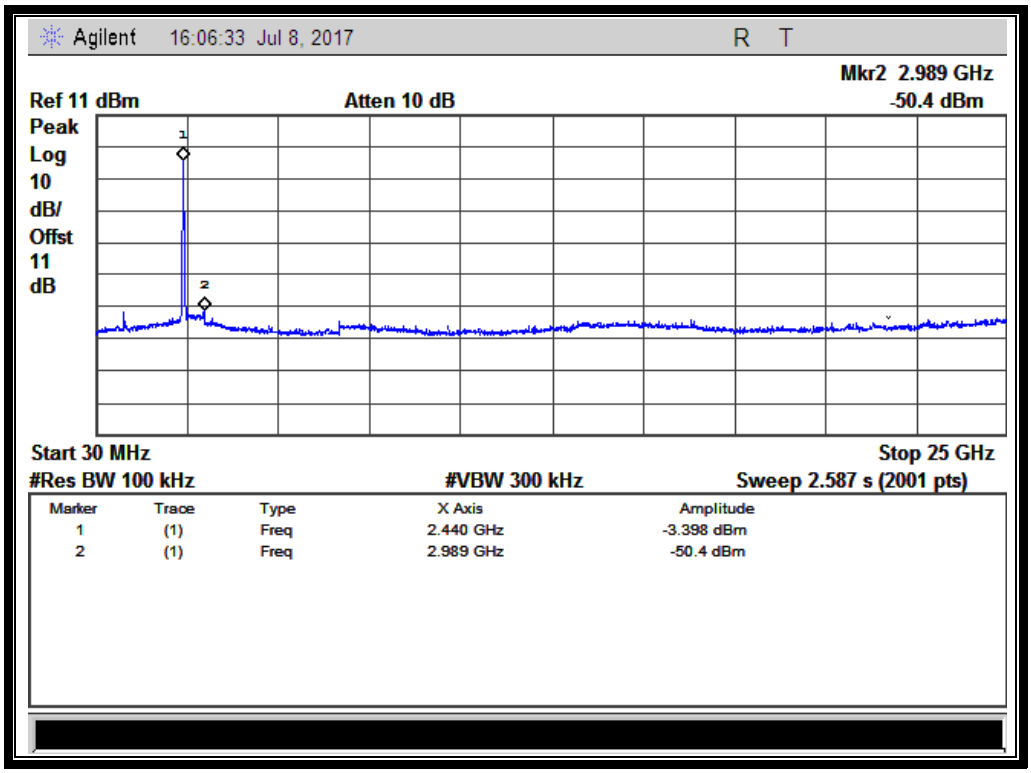
2.4.3.4 802.11n -40MHz Test mode

A. Test Verdict:

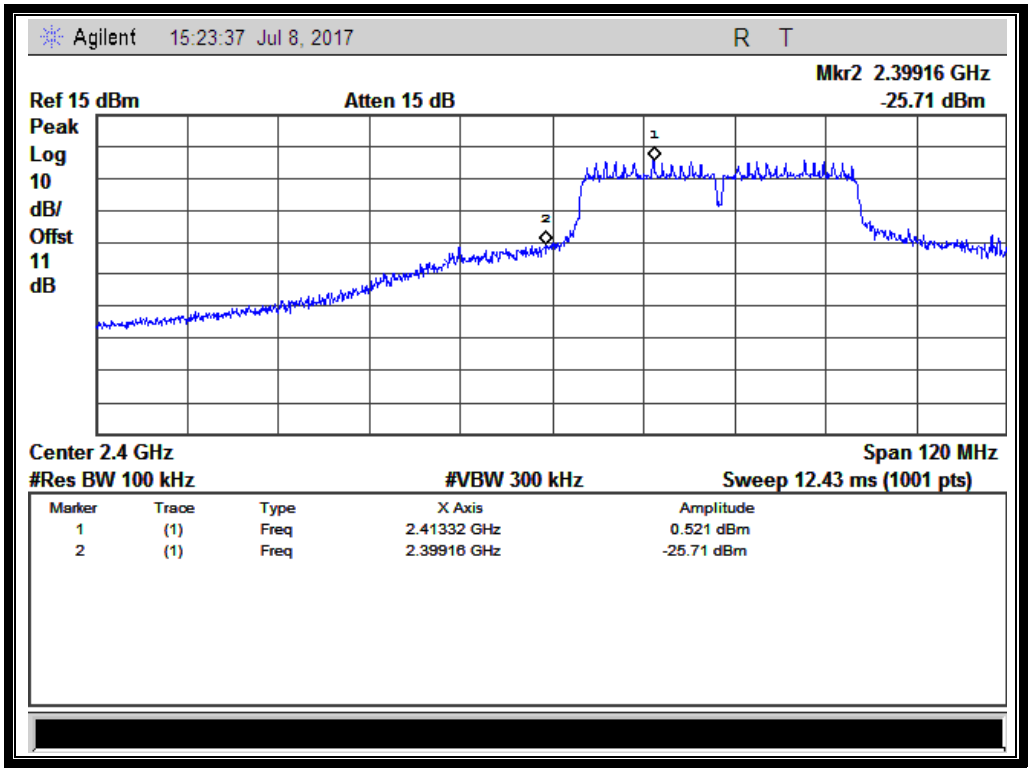
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-50.40	-3.40	-23.4	PASS
6	2437	-52.42	-4.46	-24.46	PASS
9	2452	-50.69	-4.78	-24.78	PASS

B. Test Plots:

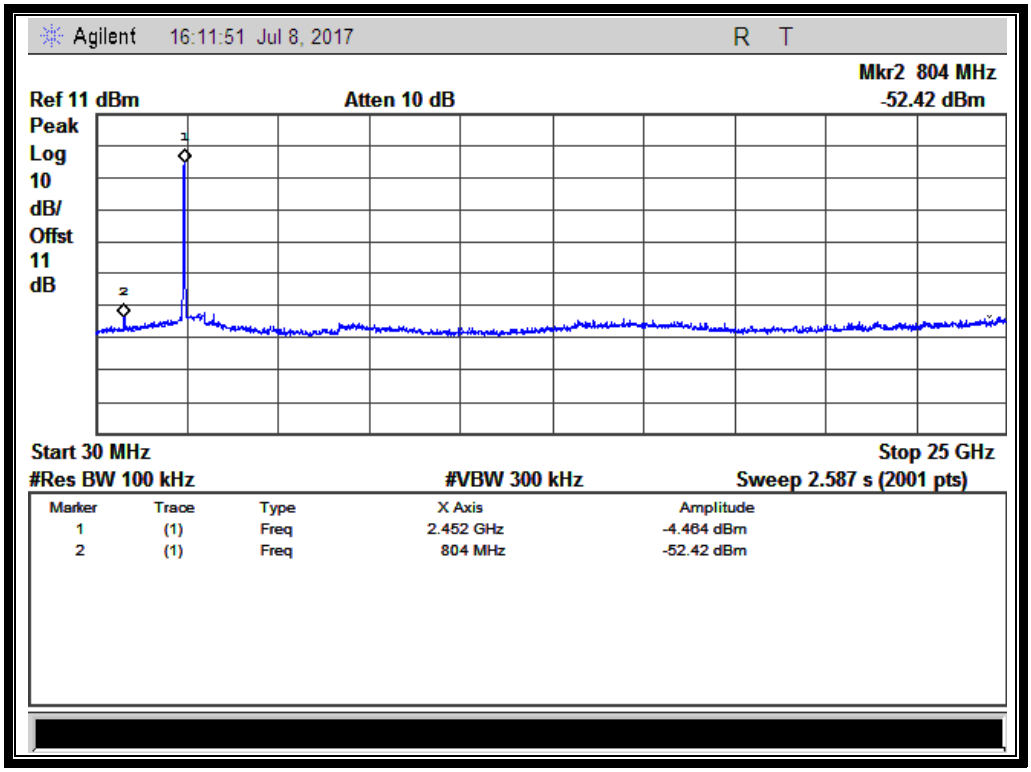
Note: the power of the Module transmitting frequency should be ignored.



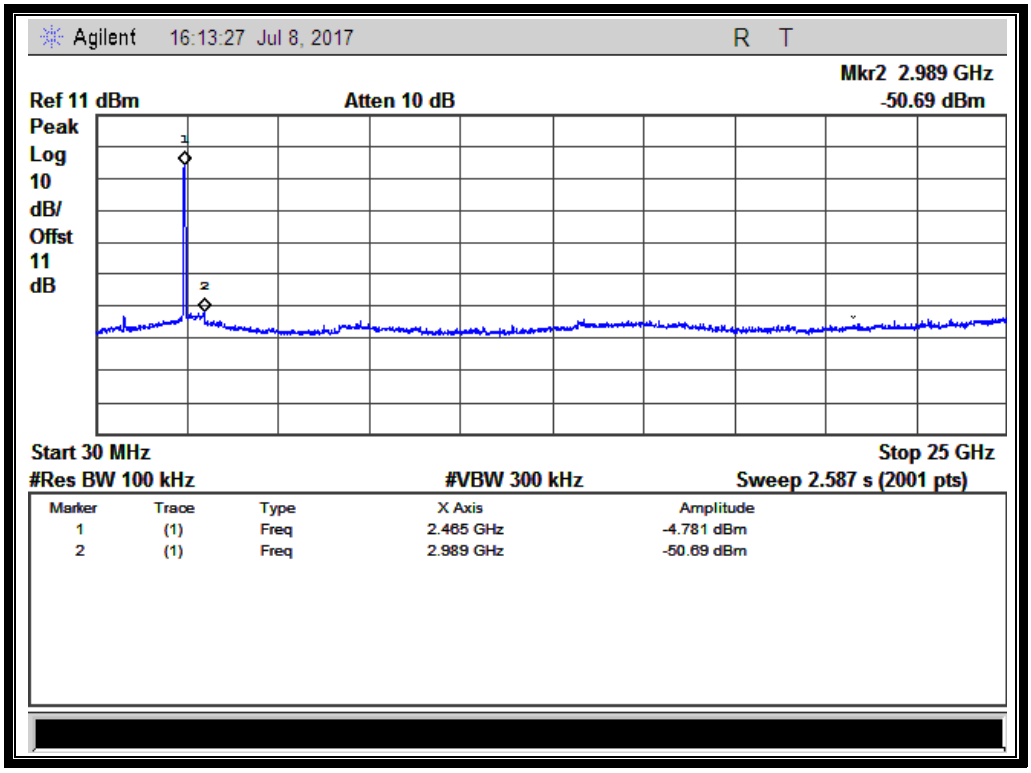
(Channel = 3, 30MHz to 25GHz)



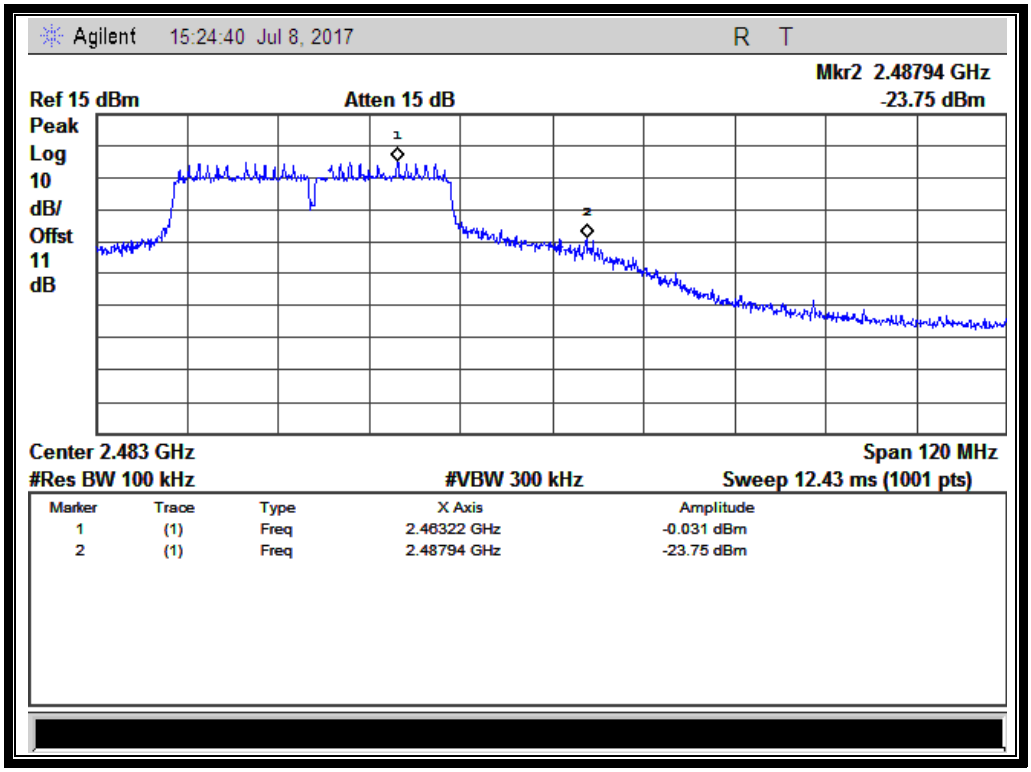
(Band Edge @ Channel = 3)



(Channel = 6, 30MHz to 25GHz)



(Channel = 9, 30MHz to 25GHz)



(Band Edge @ Channel = 9)

2.5 Power spectral density (PSD)

2.5.1 Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

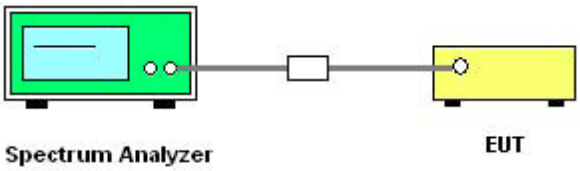
2.5.2 Test Description

A. Test procedure

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:

a) Set analyzer center frequency to channel center frequency.
b) Set the span to 30MHz
c) Set the RBW to 3 kHz
d) Set the VBW to 10KHz
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

B. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

KDB 558074 Section 10.2 was used in order to prove compliance.

C. Equipments List:

Please reference ANNEX A(1.5).

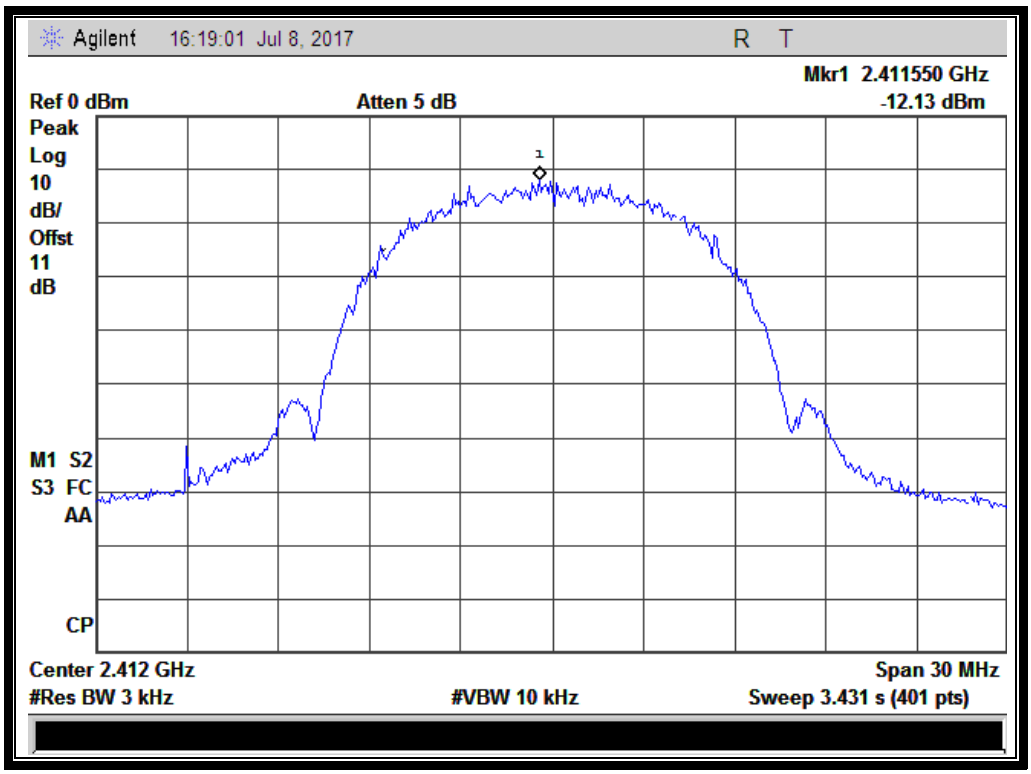
2.5.3 Test Result

2.5.3.1 802.11b Test mode

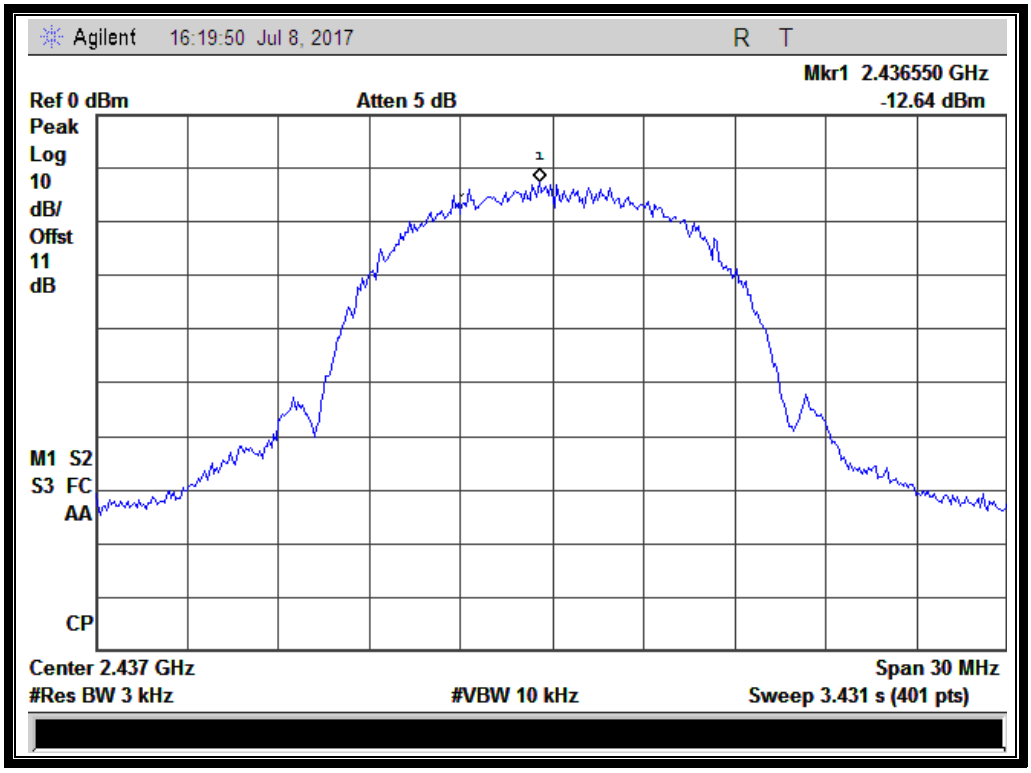
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-12.13	8	PASS
6	2437	-12.64	8	PASS
11	2462	-13.34	8	PASS
Measurement uncertainty: ±1.3dB				

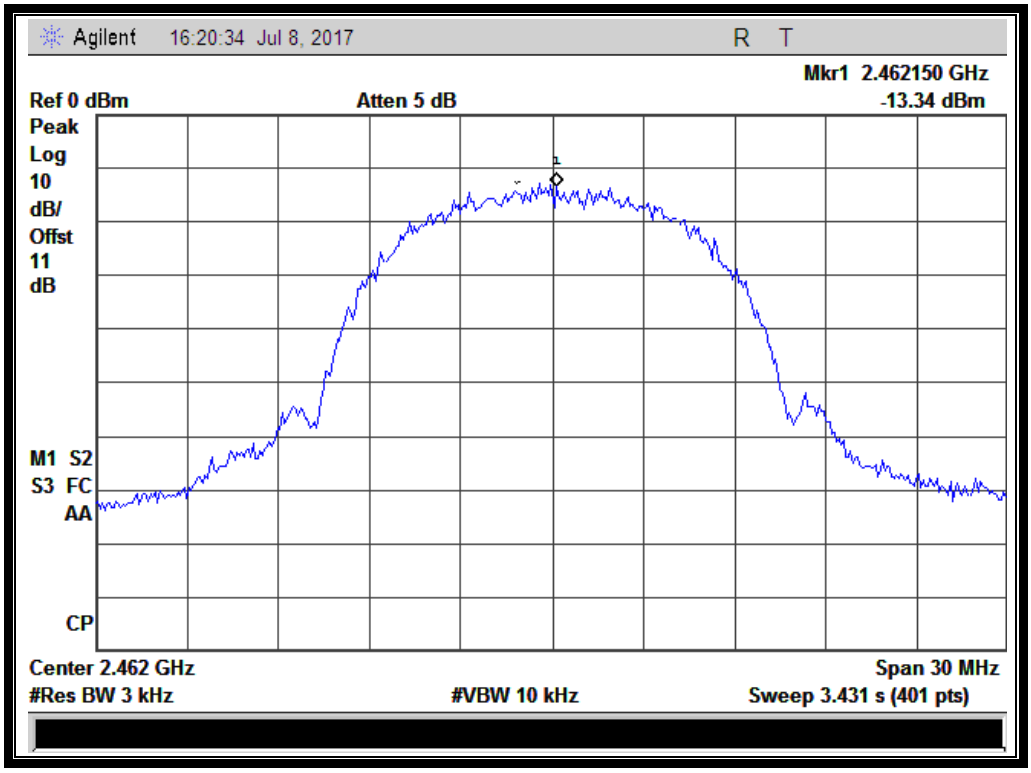
B. Test Plots:



(Channel = 1 @ 802.11b)



(Channel = 6 @ 802.11b)



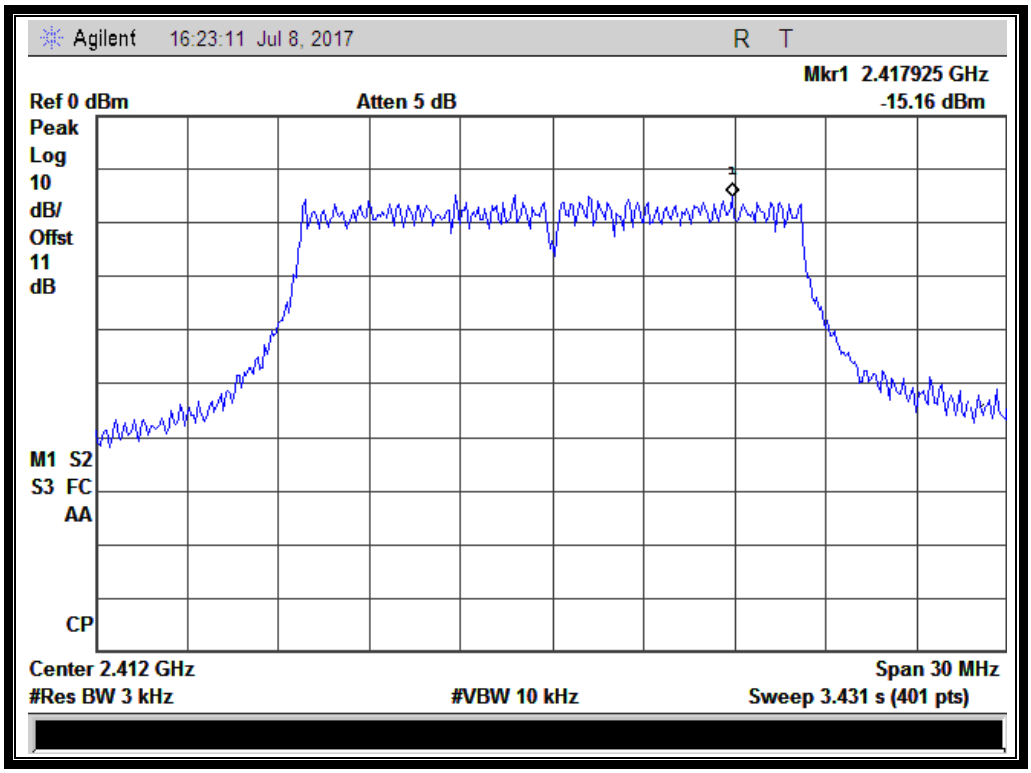
(Channel = 11 @ 802.11b)

2.5.3.2 802.11g Test mode

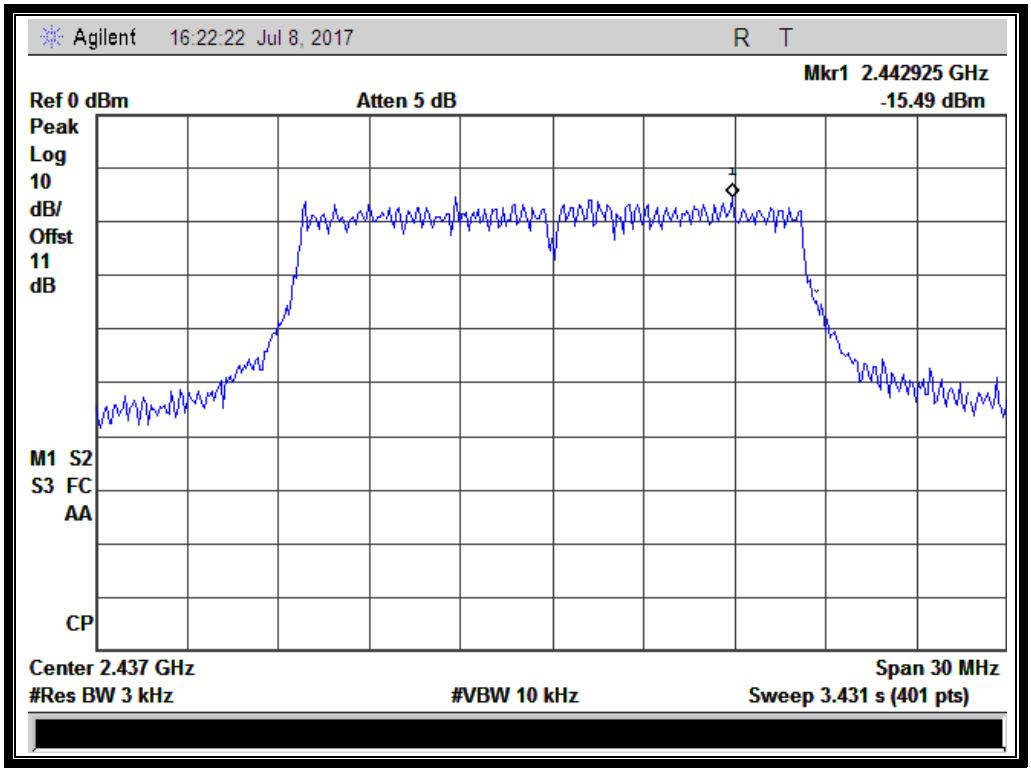
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-15.16	8	PASS
6	2437	-15.49	8	PASS
11	2462	-15.45	8	PASS
Measurement uncertainty: ±1.3dB				

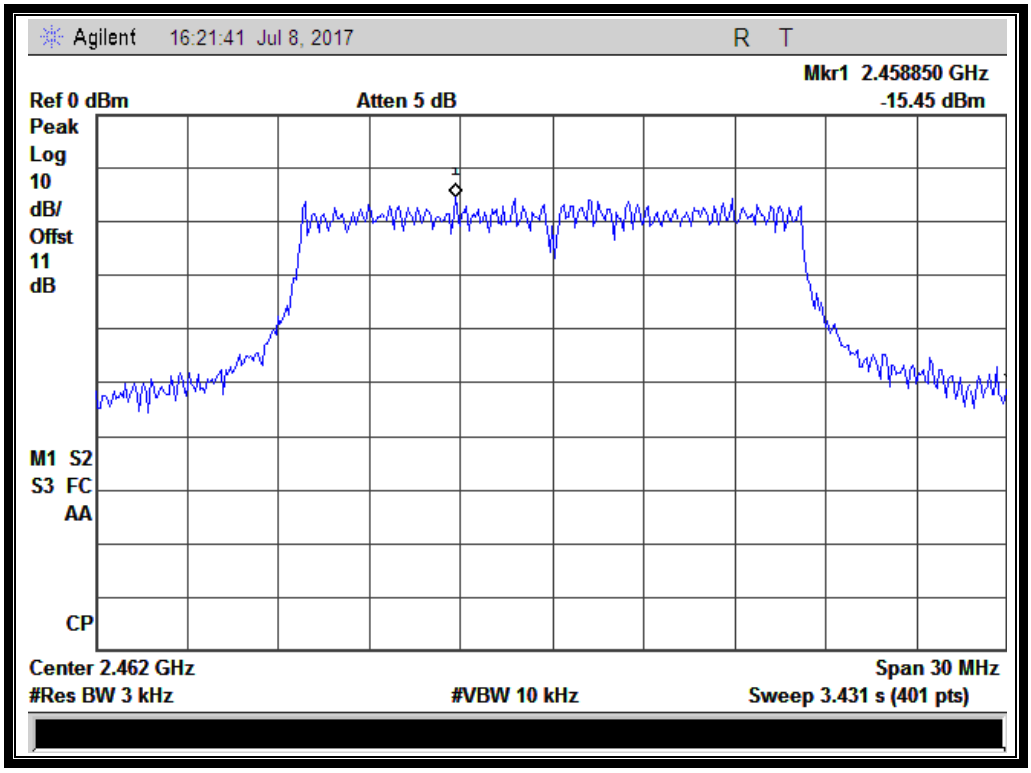
B. Test Plots:



(Channel = 1 @ 802.11g)



(Channel = 6 @ 802.11g)



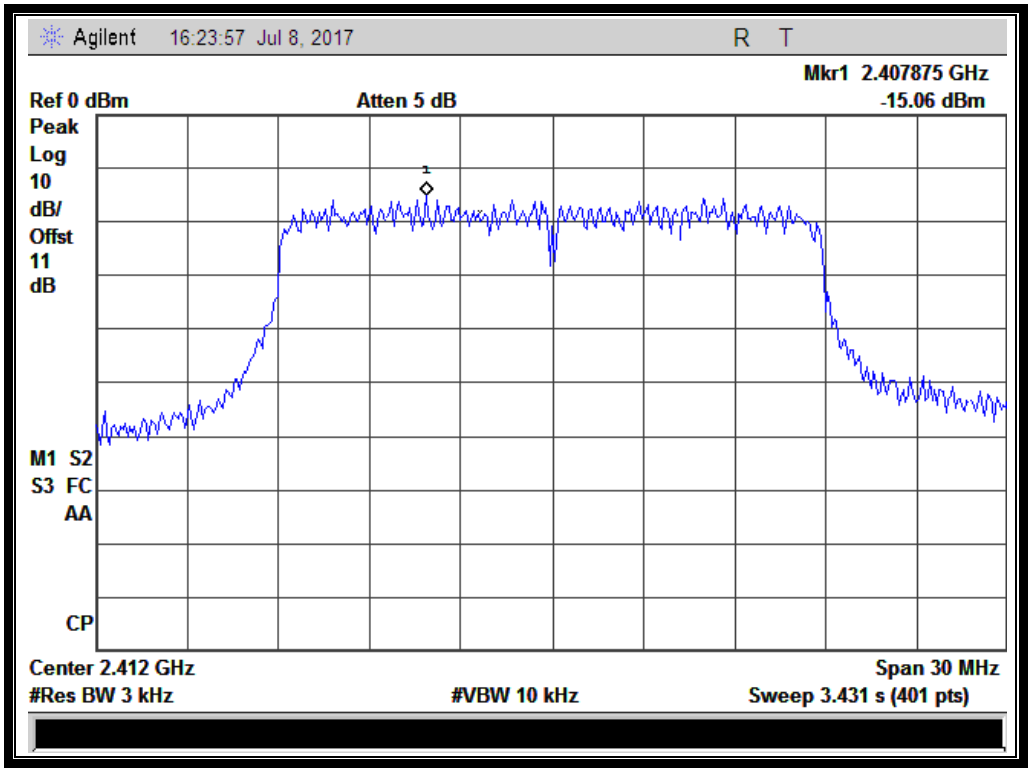
(Channel = 11 @ 802.11g)

2.5.3.3 802.11n-20MHz Test mode

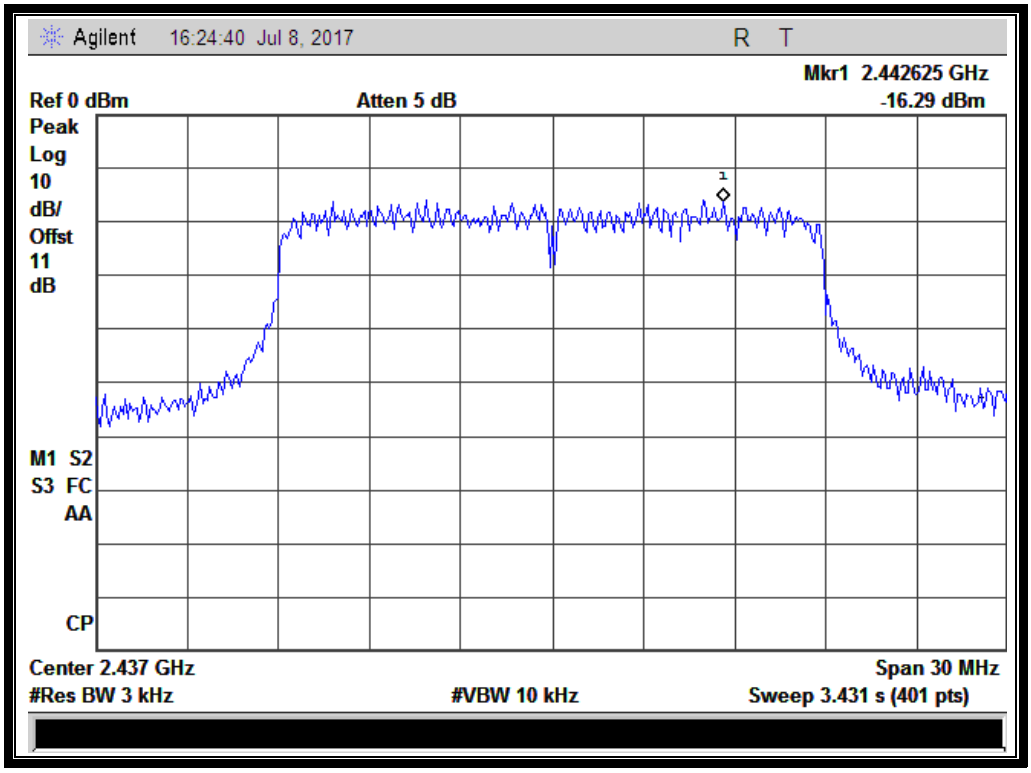
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-15.06	8	PASS
6	2437	-16.29	8	PASS
11	2462	-16.18	8	PASS
Measurement uncertainty: ±1.3dB				

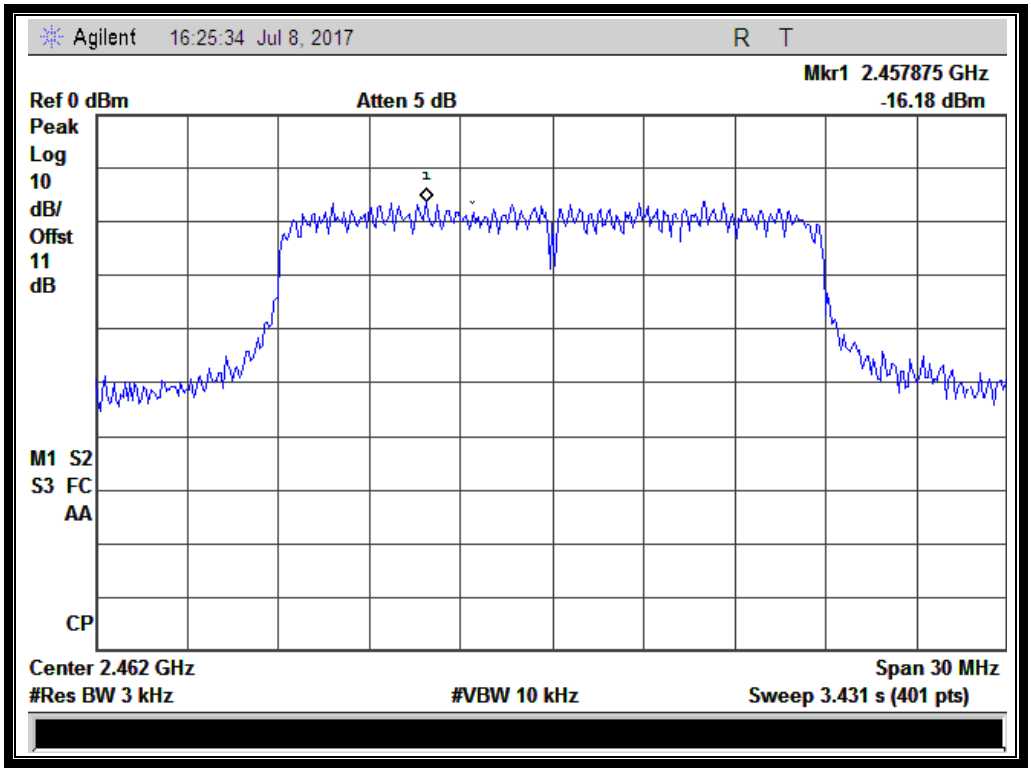
B. Test Plots:



(Channel = 1 @ 802.11n-20MHz)



(Channel = 6 @ 802.11n-20MHz)



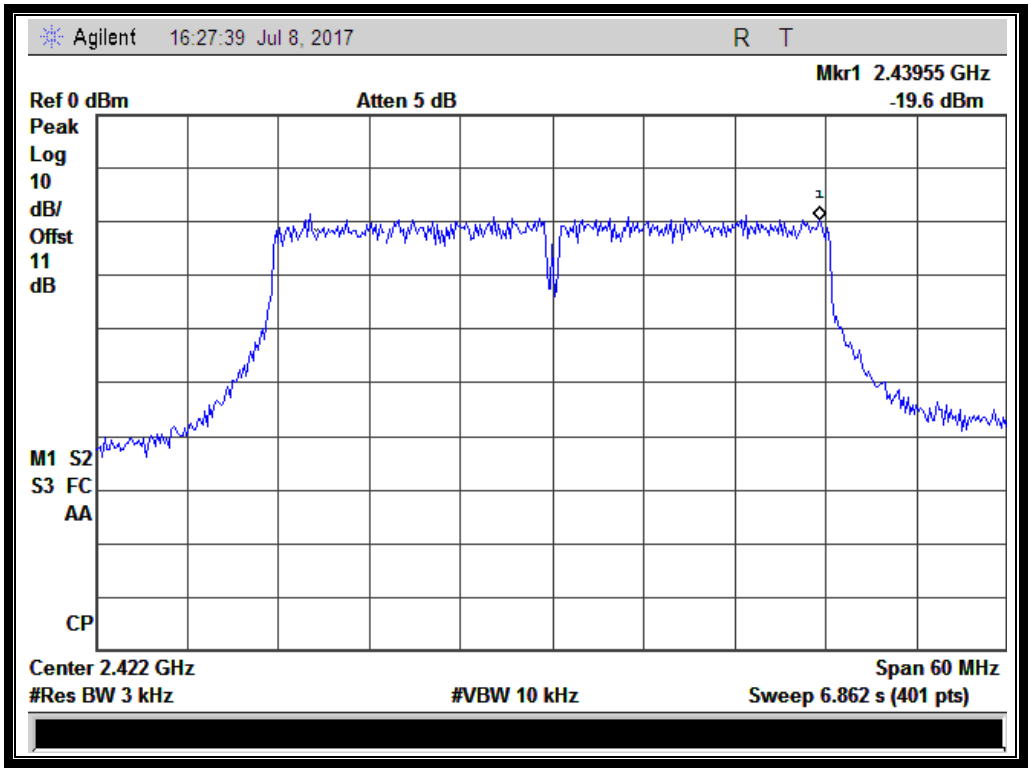
(Channel = 11 @ 802.11n-20MHz)

2.5.3.4 802.11n-40MHz Test mode

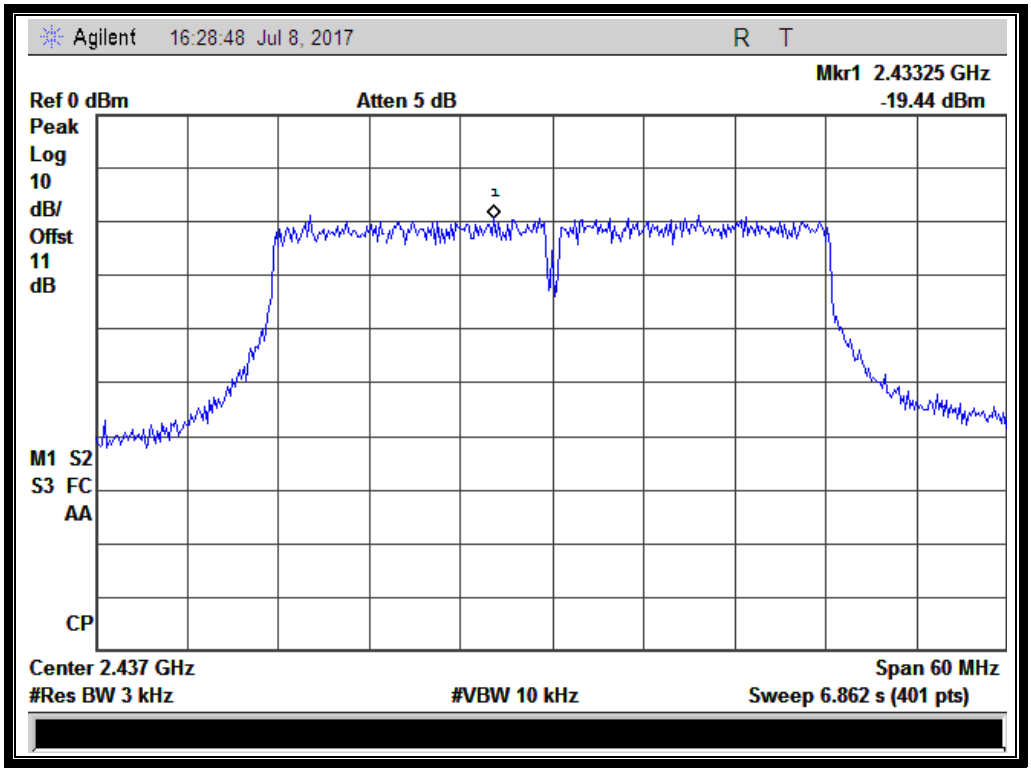
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
3	2422	-19.60	8	PASS
6	2437	-19.44	8	PASS
9	2452	-19.28	8	PASS
Measurement uncertainty: ±1.3dB				

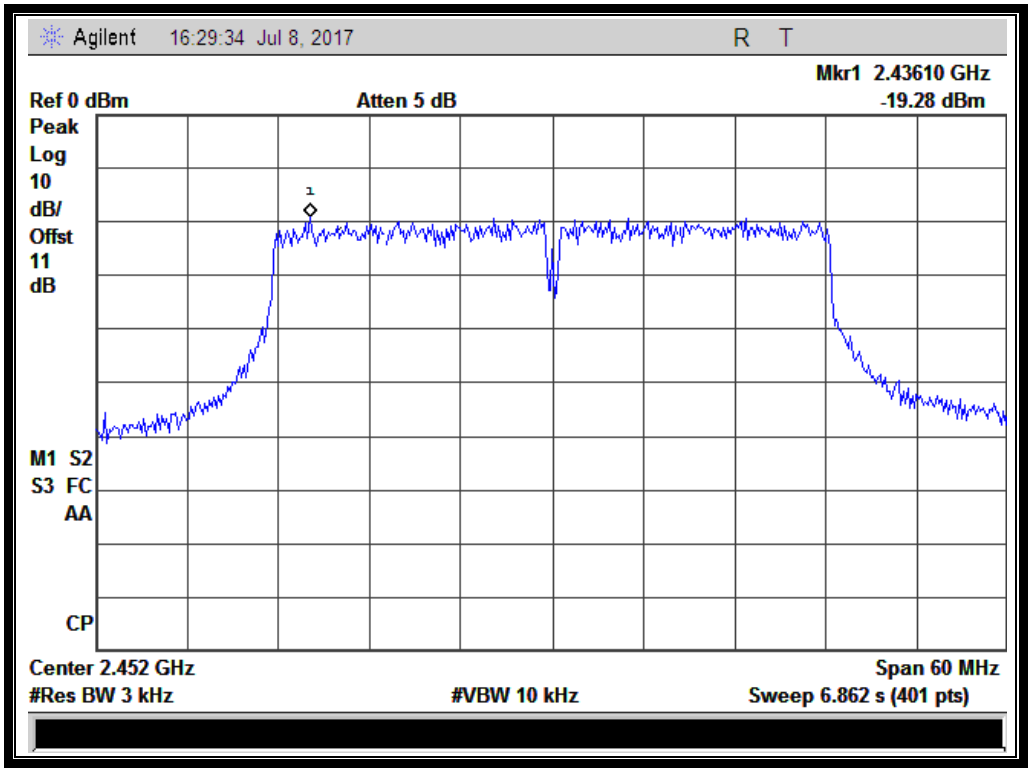
B. Test Plots:



(Channel = 3 @ 802.11n-40MHz)



(Channel = 6 @ 802.11n-40MHz)



(Channel = 9 @ 802.11n-40MHz)

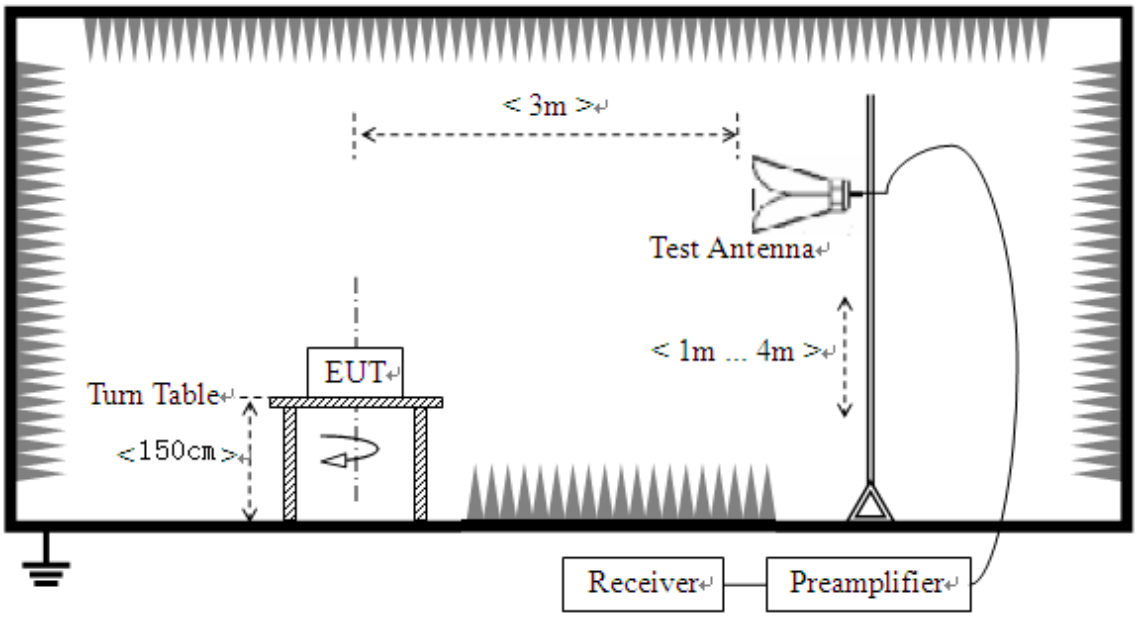
2.6 Restricted Frequency Bands

2.6.1 Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.6.2 Test Description

A. Test Setup



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

KDB 558074 Section 12.1 was used in order to prove compliance.

B. Equipments List:

Please reference ANNEX A(1.5).

2.6.3 Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

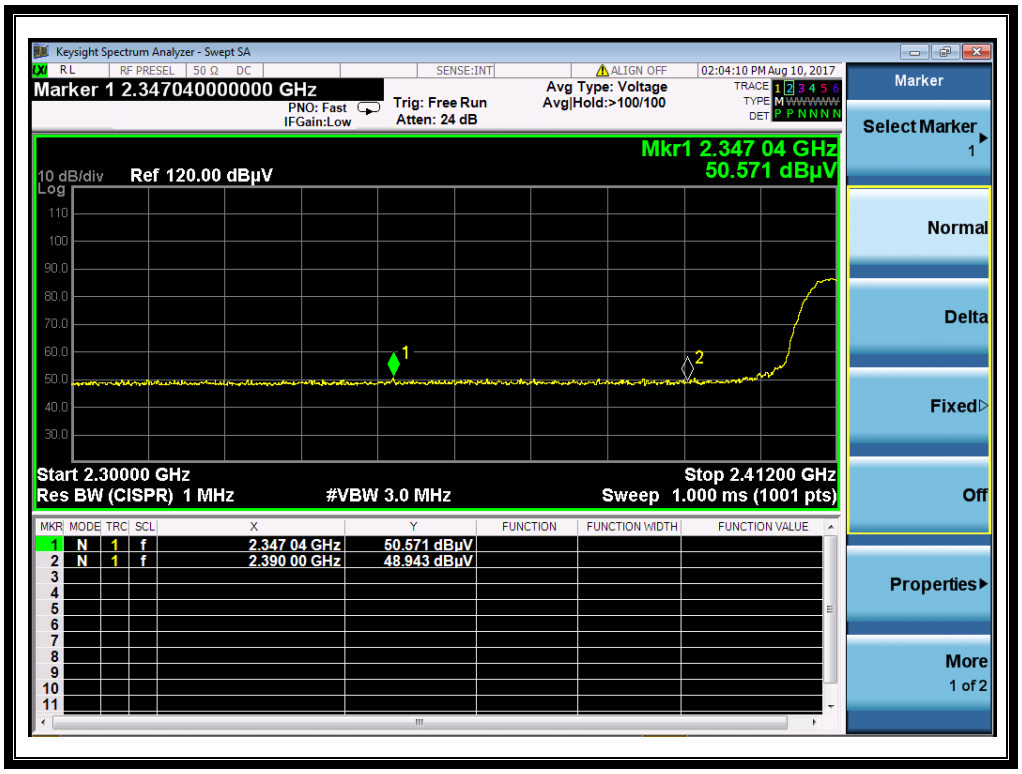
2.6.3.1 802.11b Test mode (Antenna 1)

The lowest and highest channels are tested to verify the band edge emissions.

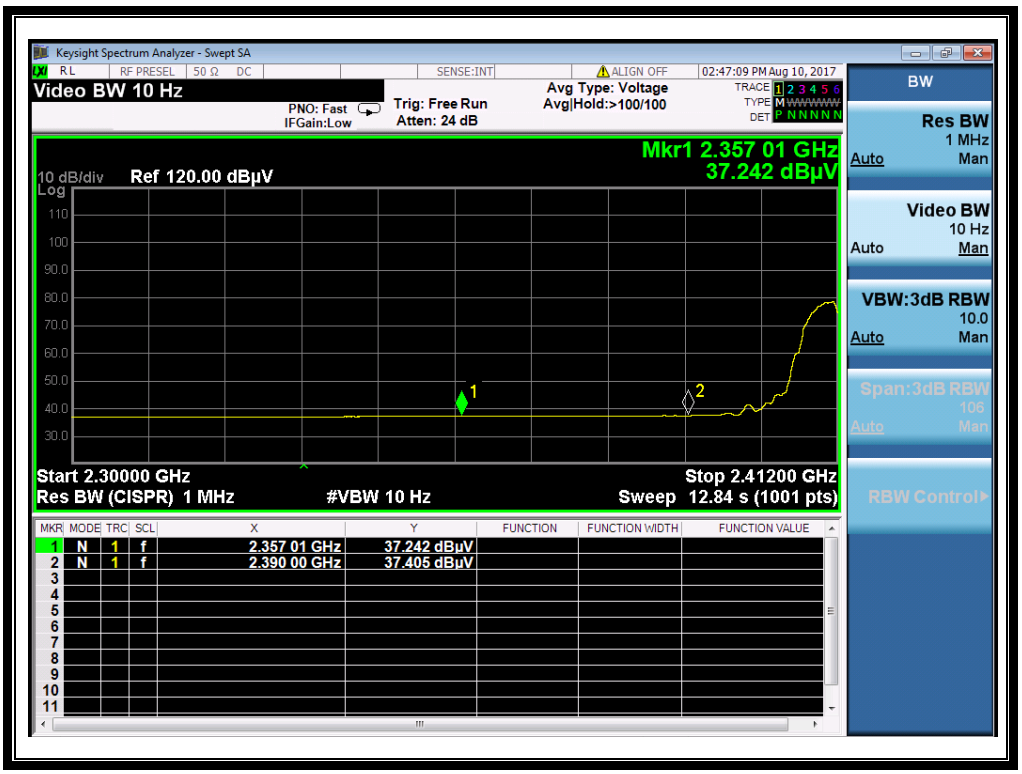
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2347.04	PK	50.57	-33.63	32.56	49.50	74	Pass
1	2357.01	AV	37.24	-33.63	32.56	36.17	54	Pass
11	2484.04	PK	46.89	-33.18	32.5	46.21	74	Pass
11	2483.70	AV	38.47	-33.18	32.5	37.79	54	Pass

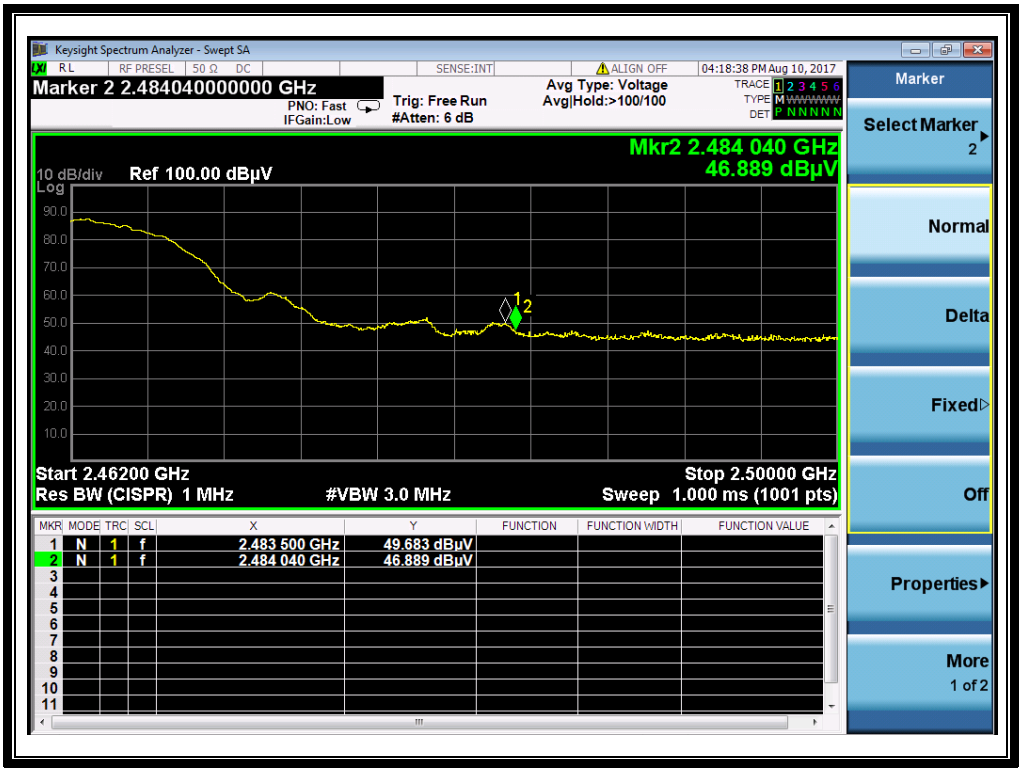
B. Test Plots:



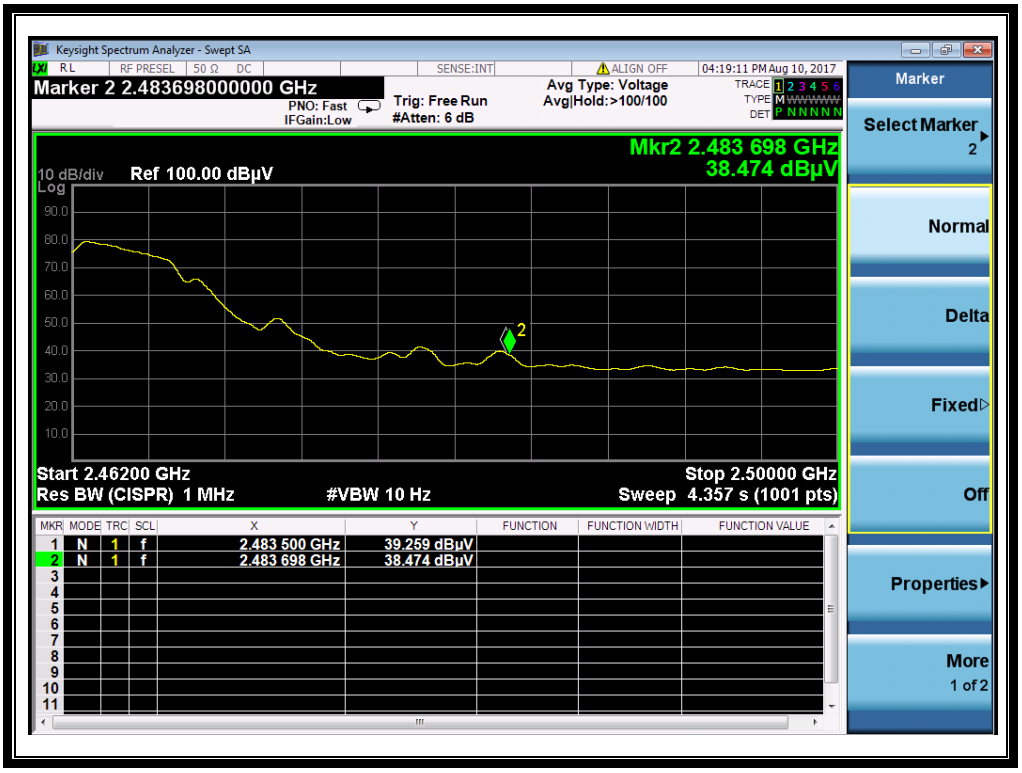
(Plot A1: Channel = 1 PEAK @ 802.11b)



(Plot A2: Channel = 1 AVG @ 802.11b)



(Plot B1: Channel = 11 PEAK @ 802.11b)



(Plot B2: Channel = 11 AVG @ 802.11b)

2.6.3.2 802.11g Test mode (Antenna 1)

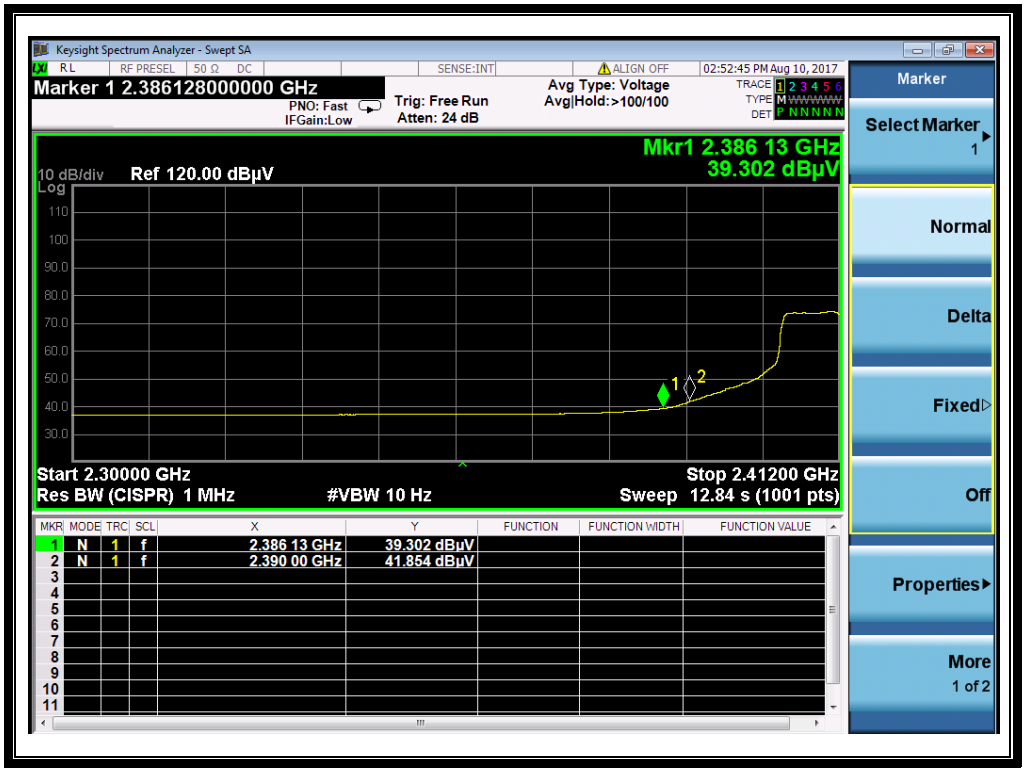
The lowest and highest channels are tested to verify the band edge emissions.

C. Test Verdict:

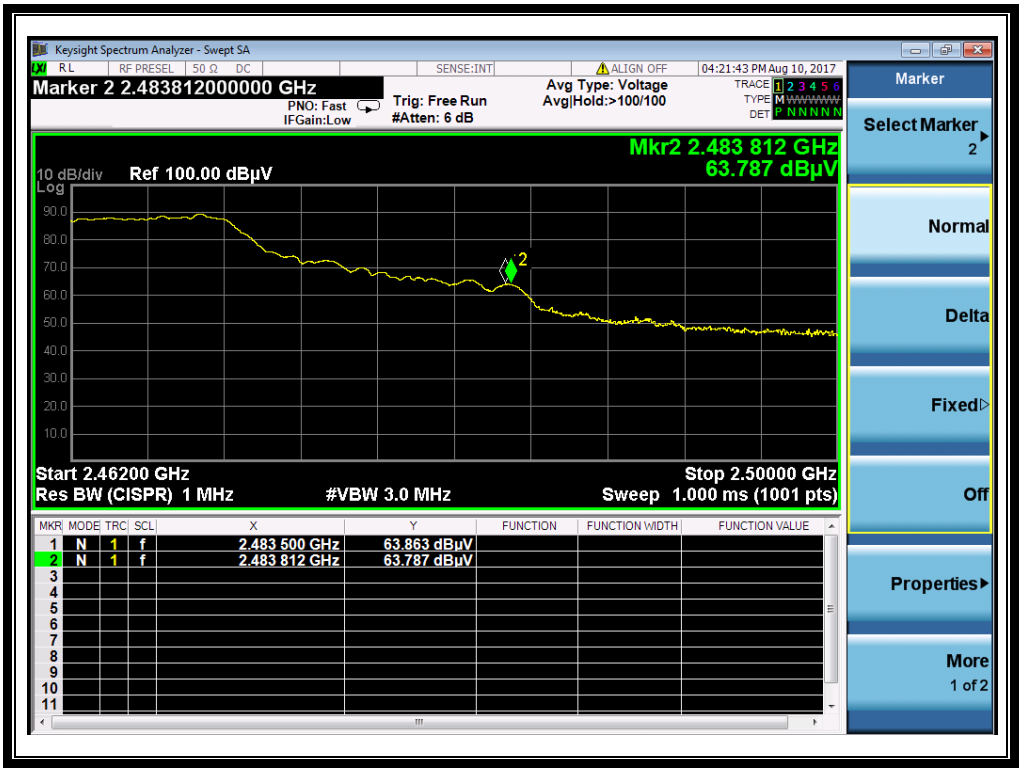
Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2388.48	PK	56.87	-33.63	32.56	55.80	74	Pass
1	2386.13	AV	39.30	-33.63	32.56	38.23	54	Pass
11	2483.81	PK	63.79	-33.18	32.5	63.11	74	Pass
11	2484.15	AV	41.07	-33.18	32.5	40.39	54	Pass

D. Test Plots:

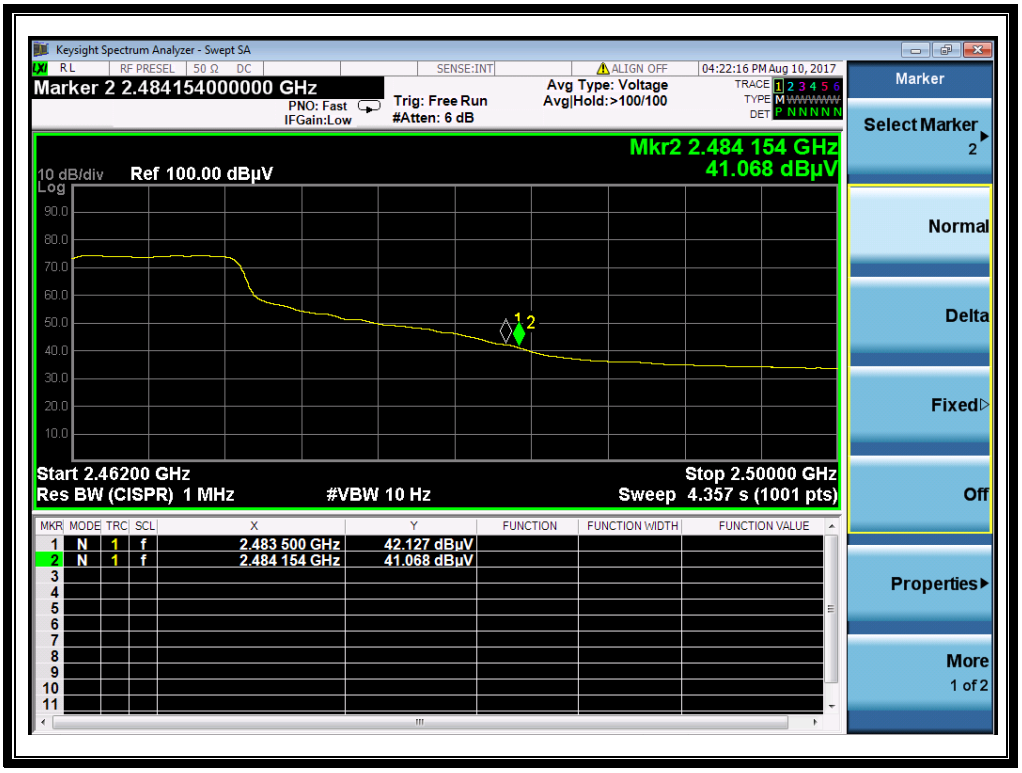
(Plot C1: Channel = 1 PEAK @ 802.11g)



(Plot C2: Channel = 1 AVG @ 802.11g)



(Plot D1: Channel = 11 PEAK @ 802.11g)



(Plot D2: Channel = 11 AVG @ 802.11g)

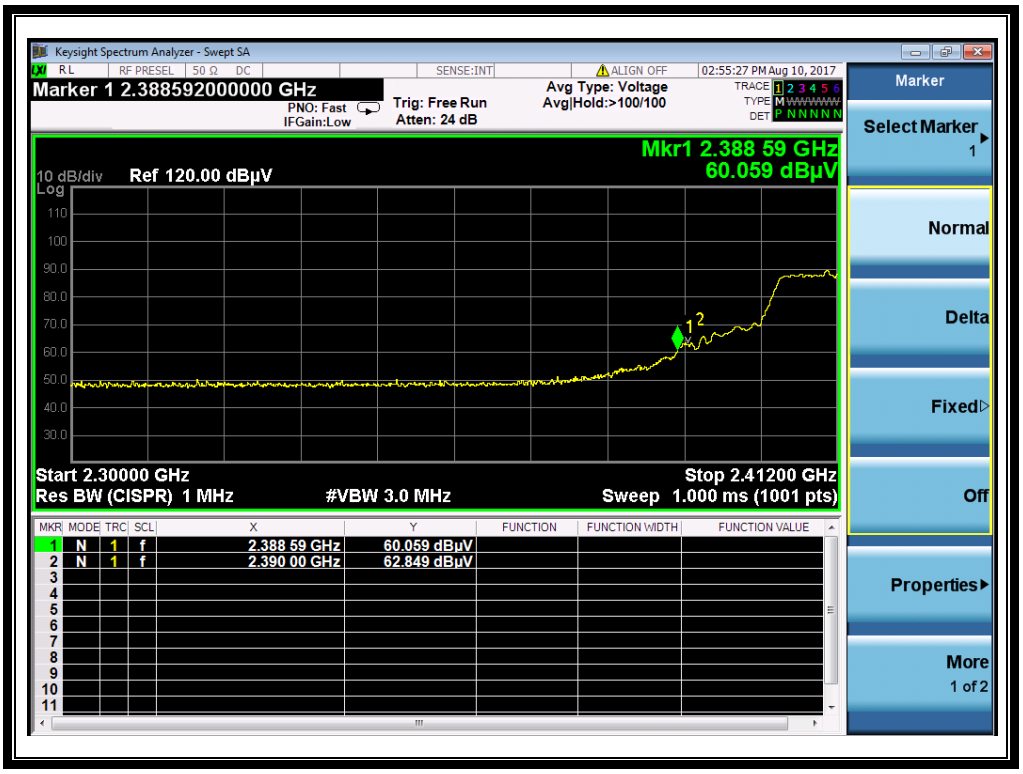
2.6.3.3 802.11n-20MHz Test mode (Antenna 1)

The lowest and highest channels are tested to verify the band edge emissions.

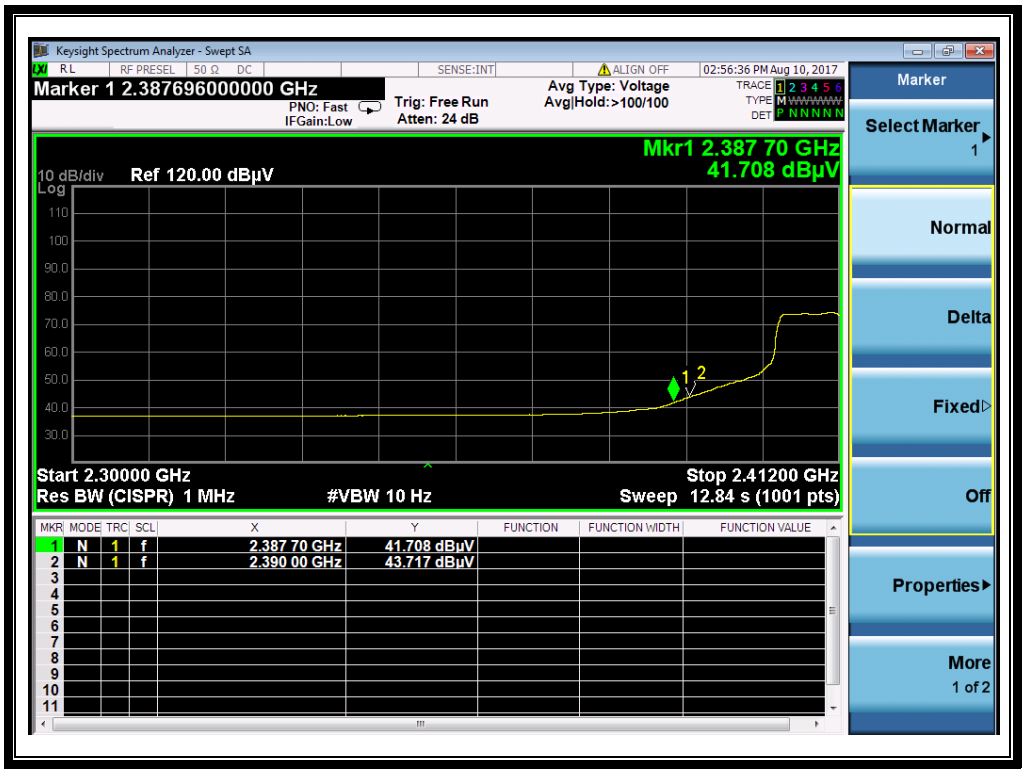
E. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
1	2388.59	PK	60.06	-33.63	32.56	58.99	74	Pass
1	2387.70	AV	41.71	-33.63	32.56	40.64	54	Pass
11	2484.57	PK	61.35	-33.18	32.5	60.67	74	Pass
11	2484.31	AV	42.68	-33.18	32.5	42.00	54	Pass

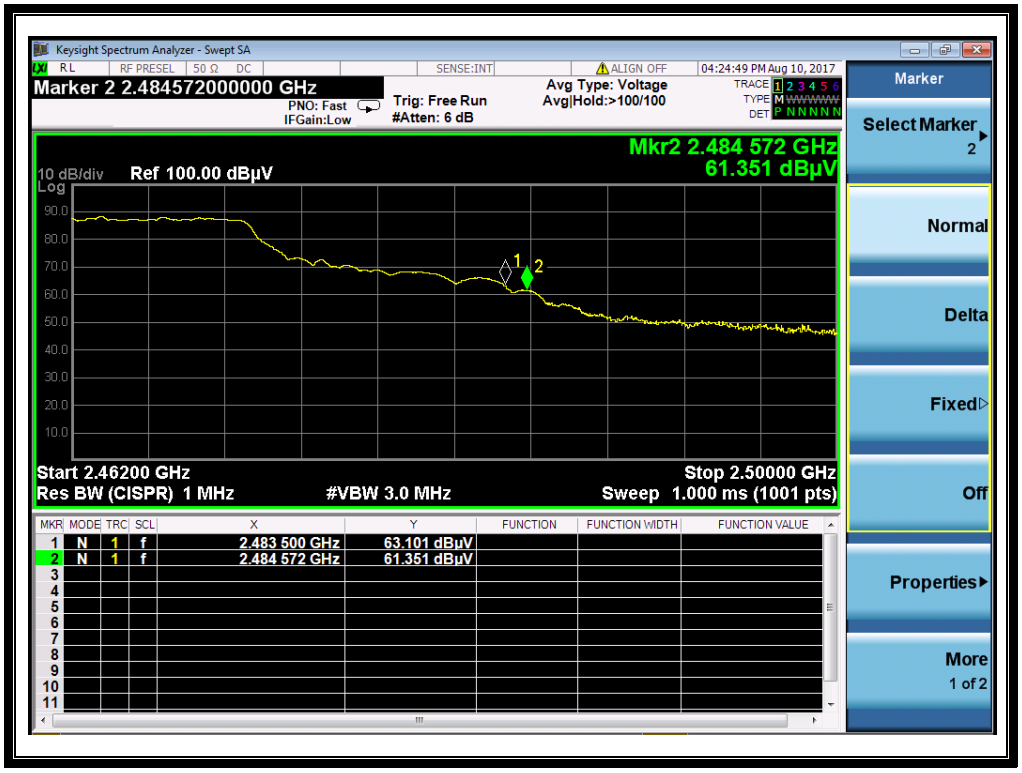
F. Test Plots:



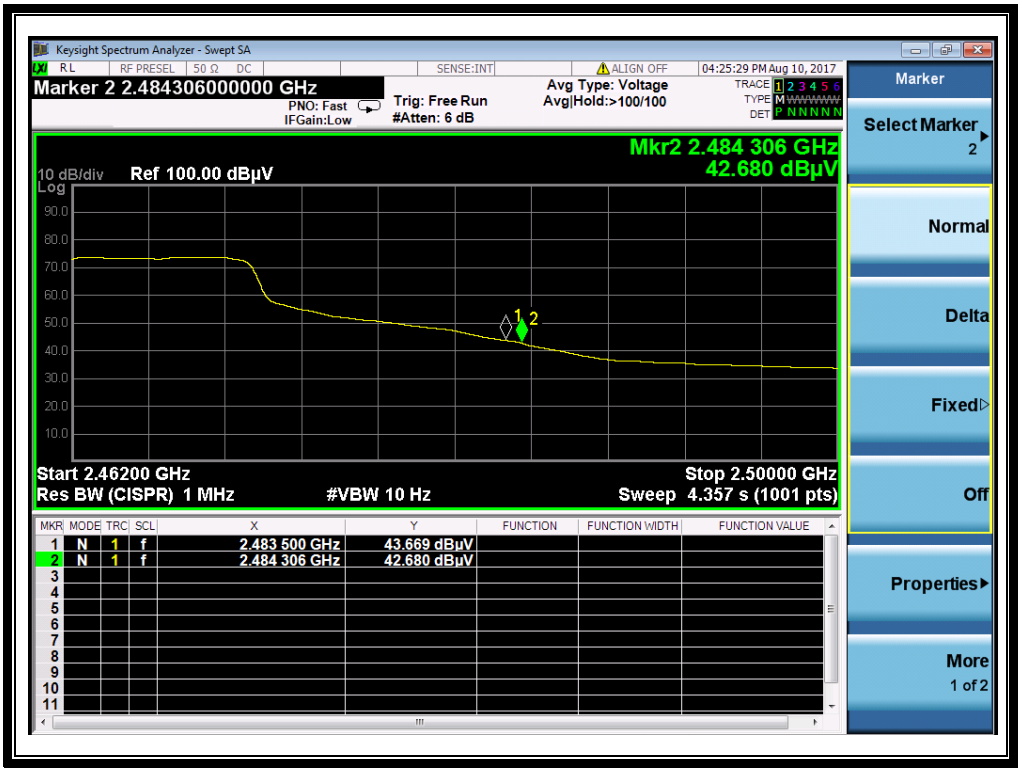
(Plot E1: Channel = 1 PEAK @ 802.11n-20)



(Plot E2: Channel = 1 AVG @ 802.11n-20)



(Plot F1: Channel = 11 PEAK @ 802.11n-20)



(Plot F2: Channel = 11 AVG @ 802.11n-20)

2.6.3.4 802.11n-40MHz Test mode (Antenna 1)

The lowest and highest channels are tested to verify the band edge emissions.

G. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
3	2386.94	PK	51.11	-33.63	32.56	50.04	74	Pass
3	2386.94	AV	38.13	-33.63	32.56	37.06	54	Pass
9	2484.76	PK	50.58	-33.18	32.5	49.90	74	Pass
9	2484.76	AV	34.86	-33.18	32.5	34.18	54	Pass

H. Test Plots:

(Plot E1: Channel = 3 PEAK @ 802.11n-40)

(Plot E2: Channel = 3 AVG @ 802.11n-40)

(Plot F1: Channel = 9 PEAK @ 802.11n-40)

(Plot F2: Channel = 9 AVG @ 802.11n-40)

2.6.3.5 802.11b Test mode (Antenna 2)

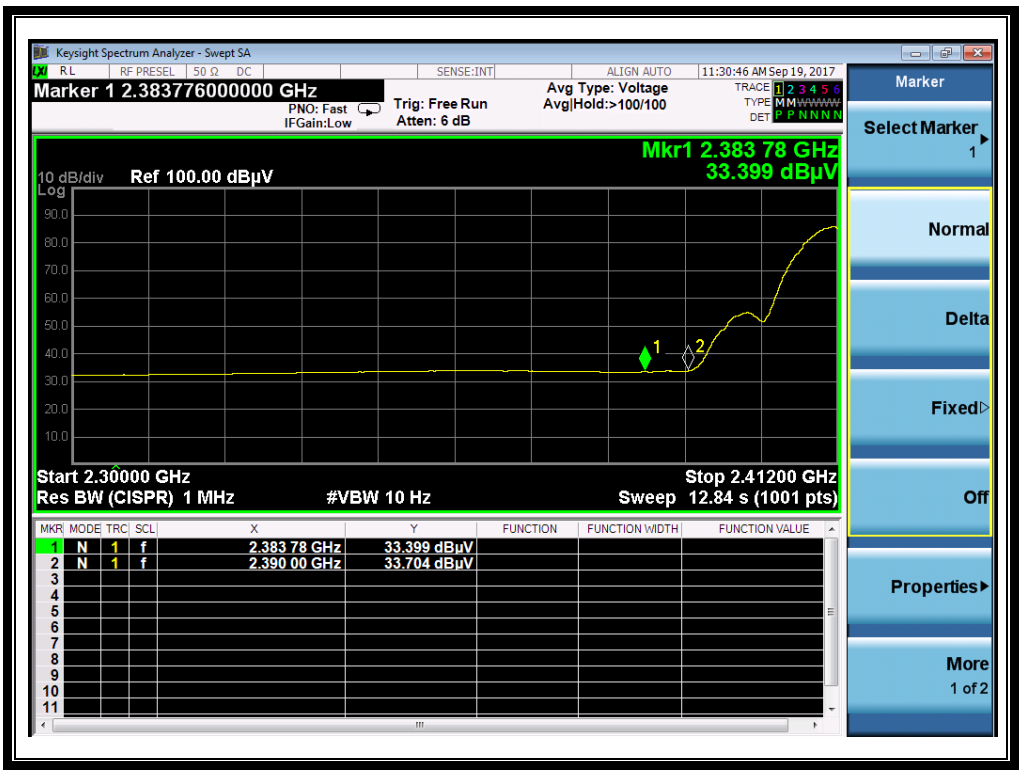
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
1	2383.78	PK	43.94	-33.63	32.56	42.87	74	Pass
1	2383.78	AV	33.40	-33.63	32.56	32.33	54	Pass
11	2484.32	PK	45.02	-33.18	32.5	44.34	74	Pass
11	2485.35	AV	33.71	-33.18	32.5	33.03	54	Pass

B. Test Plots:

(Plot A1: Channel = 1 PEAK @ 802.11b)



(Plot A2: Channel = 1 AVG @ 802.11b)

(Plot B1: Channel = 11 PEAK @ 802.11b)

(Plot B2: Channel = 11 AVG @ 802.11b)

2.6.3.6 802.11g Test mode (Antenna 2)

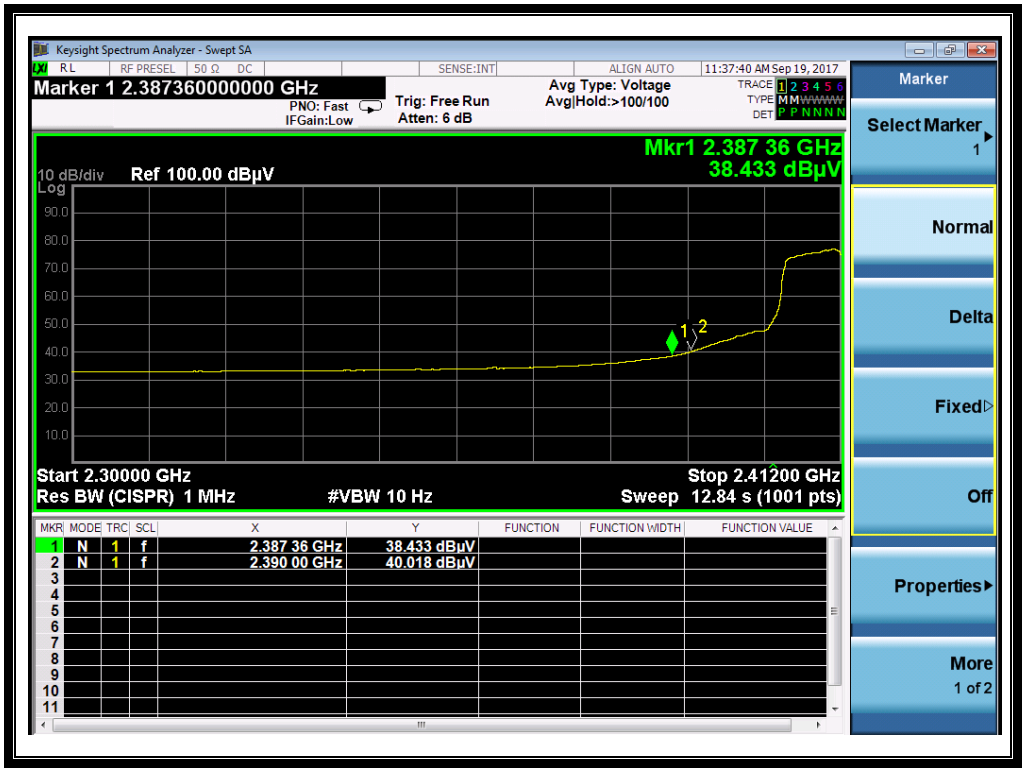
The lowest and highest channels are tested to verify the band edge emissions.

I. Test Verdict:

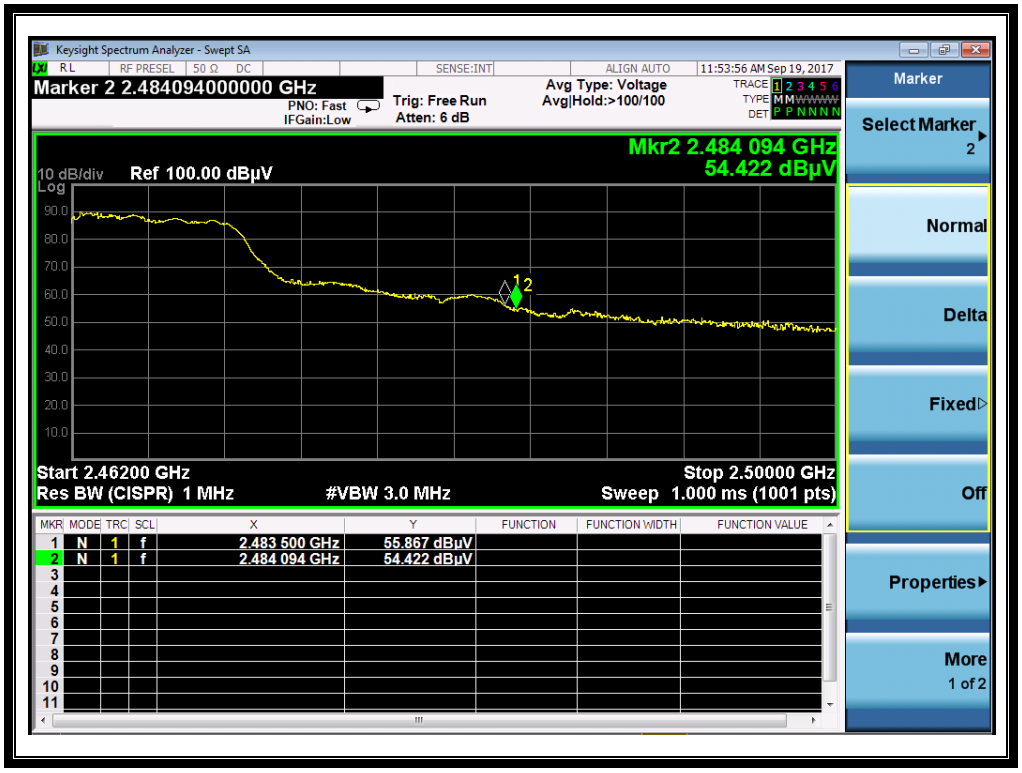
Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2388.93	PK	54.15	-33.63	32.56	53.08	74	Pass
1	2387.36	AV	38.43	-33.63	32.56	37.36	54	Pass
11	2484.09	PK	54.42	-33.18	32.5	53.74	74	Pass
11	2484.21	AV	38.39	-33.18	32.5	37.71	54	Pass

J. Test Plots:

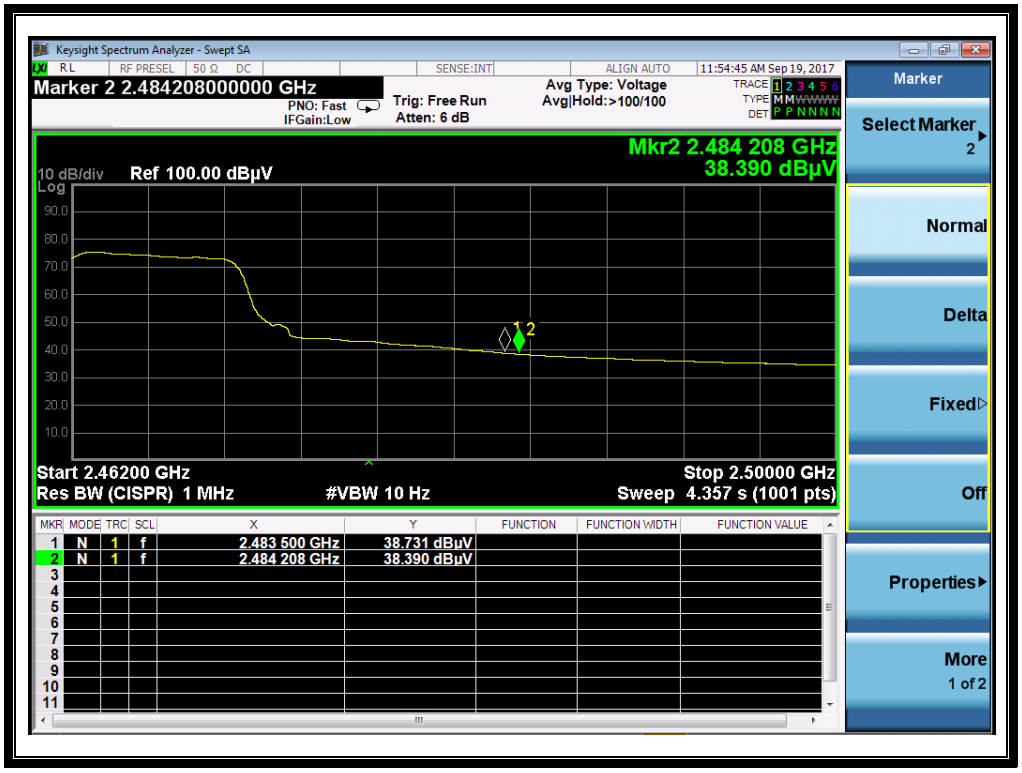
(Plot C1: Channel = 1 PEAK @ 802.11g)



(Plot C2: Channel = 1 AVG @ 802.11g)



(Plot D1: Channel = 11 PEAK @ 802.11g)



(Plot D2: Channel = 11 AVG @ 802.11g)

2.6.3.7 802.11n-20MHz Test mode (Antenna 2)

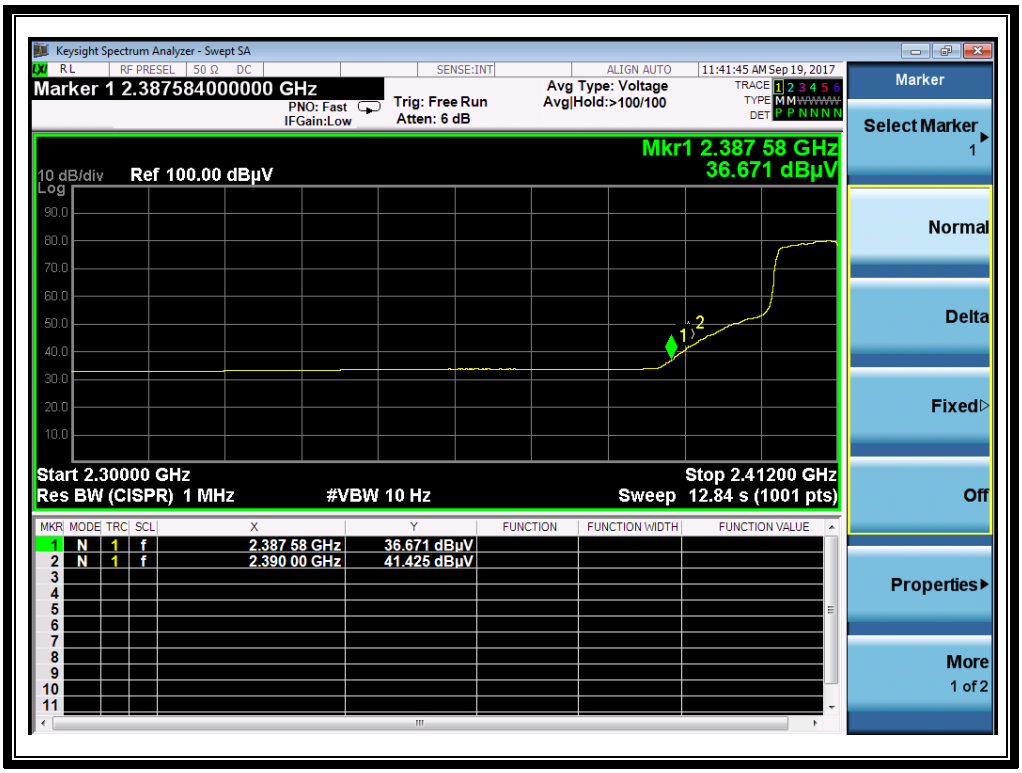
The lowest and highest channels are tested to verify the band edge emissions.

K. Test Verdict:

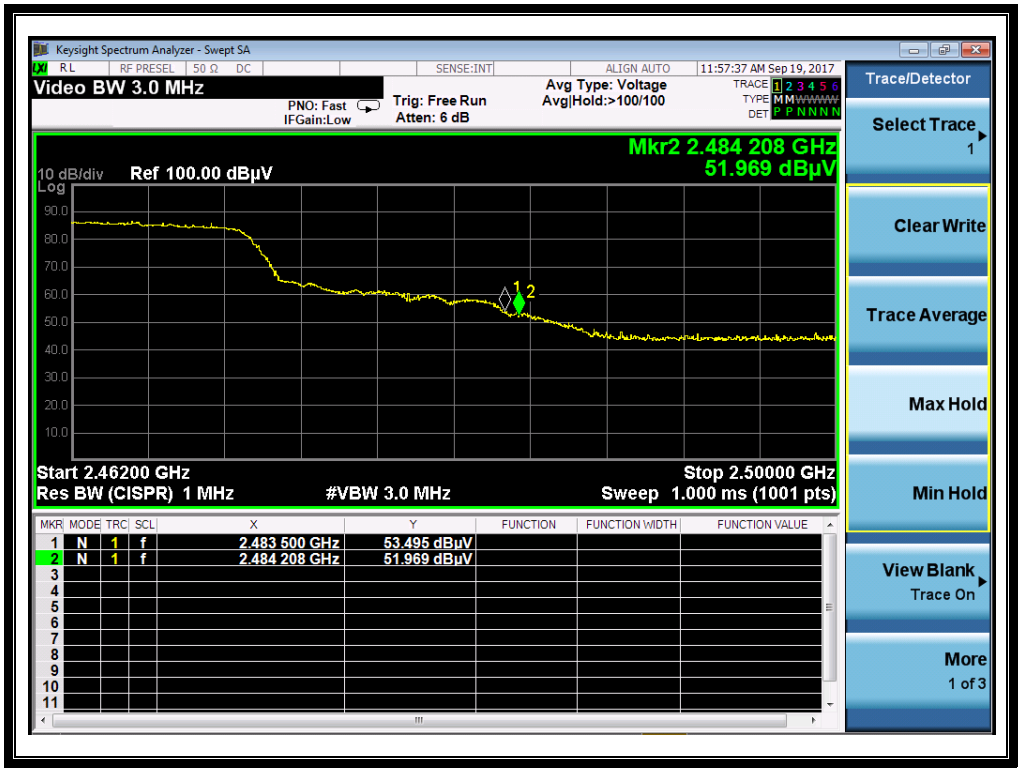
Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
1	2386.91	PK	53.69	-33.63	32.56	52.62	74	Pass
1	2387.58	AV	36.67	-33.63	32.56	35.60	54	Pass
11	2484.21	PK	51.97	-33.18	32.5	51.29	74	Pass
11	2484.21	AV	37.92	-33.18	32.5	37.24	54	Pass

L. Test Plots:

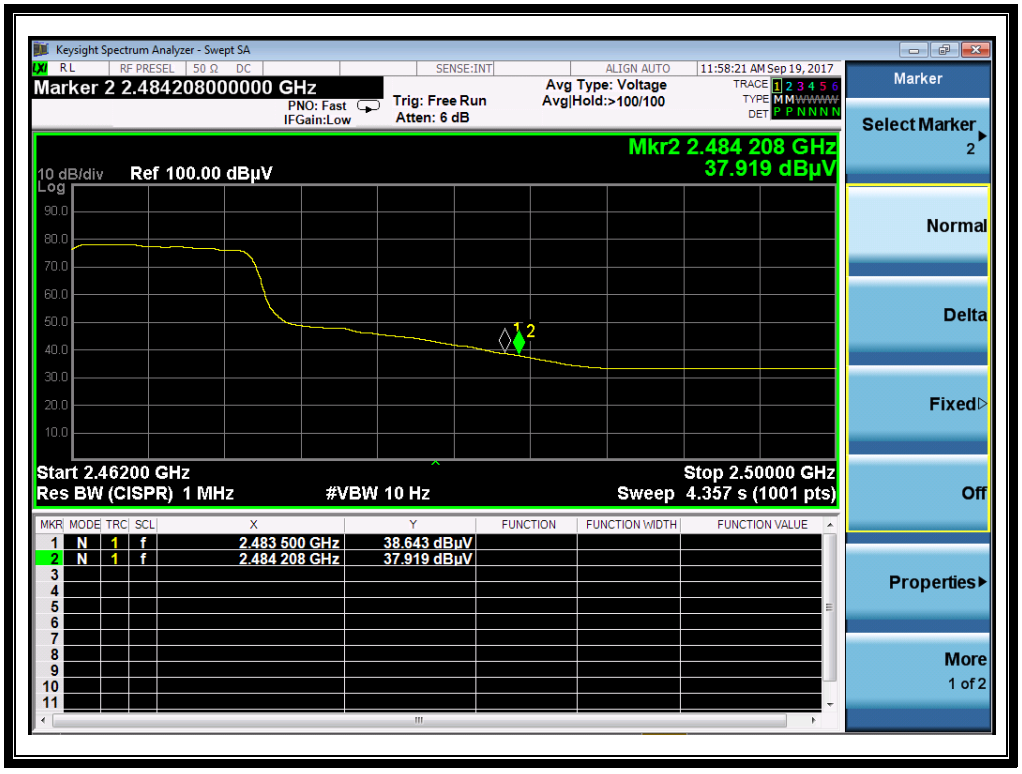
(Plot E1: Channel = 1 PEAK @ 802.11n-20)



(Plot E2: Channel = 1 AVG @ 802.11n-20)



(Plot F1: Channel = 11 PEAK @ 802.11n-20)



(Plot F2: Channel = 11 AVG @ 802.11n-20)

2.6.3.8 802.11n-40MHz Test mode (Antenna 2)

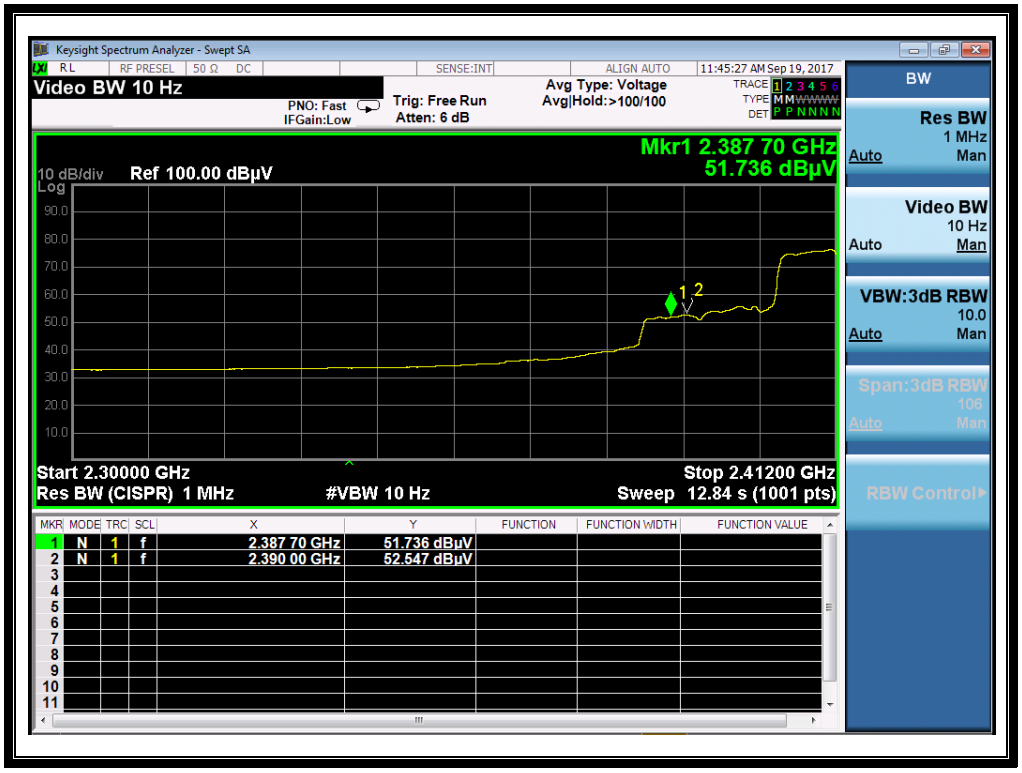
The lowest and highest channels are tested to verify the band edge emissions.

M. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
3	2387.70	PK	63.21	-33.63	32.56	62.14	74	Pass
3	2387.70	AV	51.74	-33.63	32.56	50.67	54	Pass
9	2485.75	PK	61.79	-33.18	32.5	61.11	74	Pass
9	2484.46	AV	49.70	-33.18	32.5	49.02	54	Pass

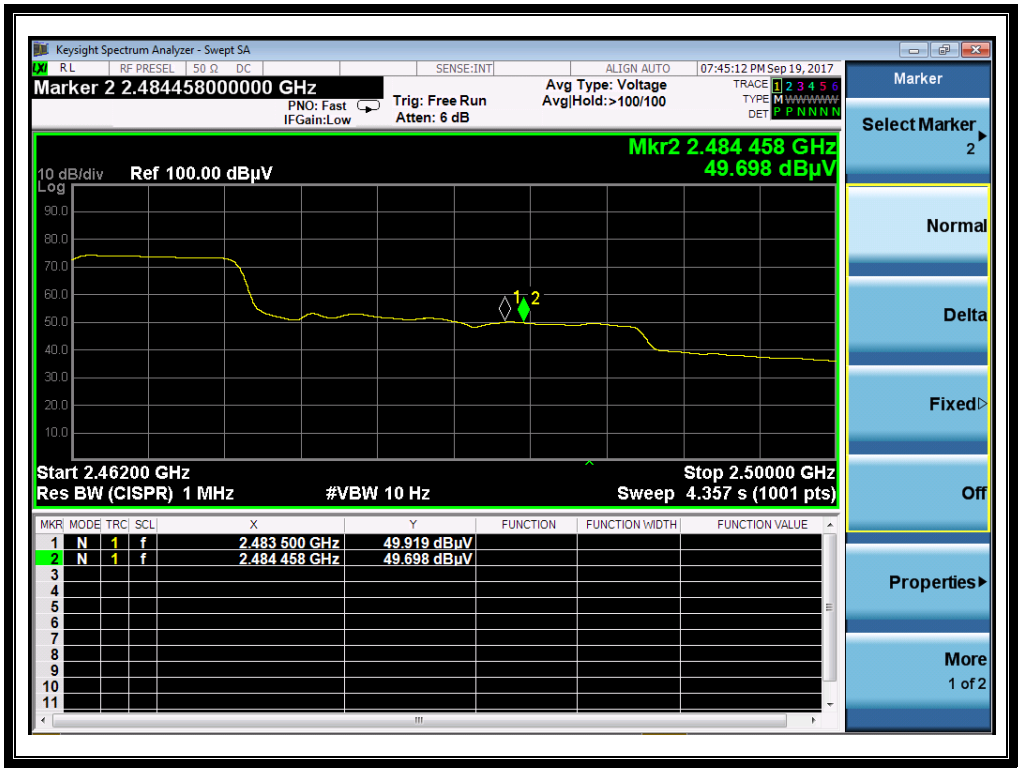
N. Test Plots:

(Plot E1: Channel = 3 PEAK @ 802.11n-40)



(Plot E2: Channel = 3 AVG @ 802.11n-40)

(Plot F1: Channel = 9 PEAK @ 802.11n-40)



(Plot F2: Channel = 9 AVG @ 802.11n-40)

2.7 Conducted Emission

2.7.1 Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

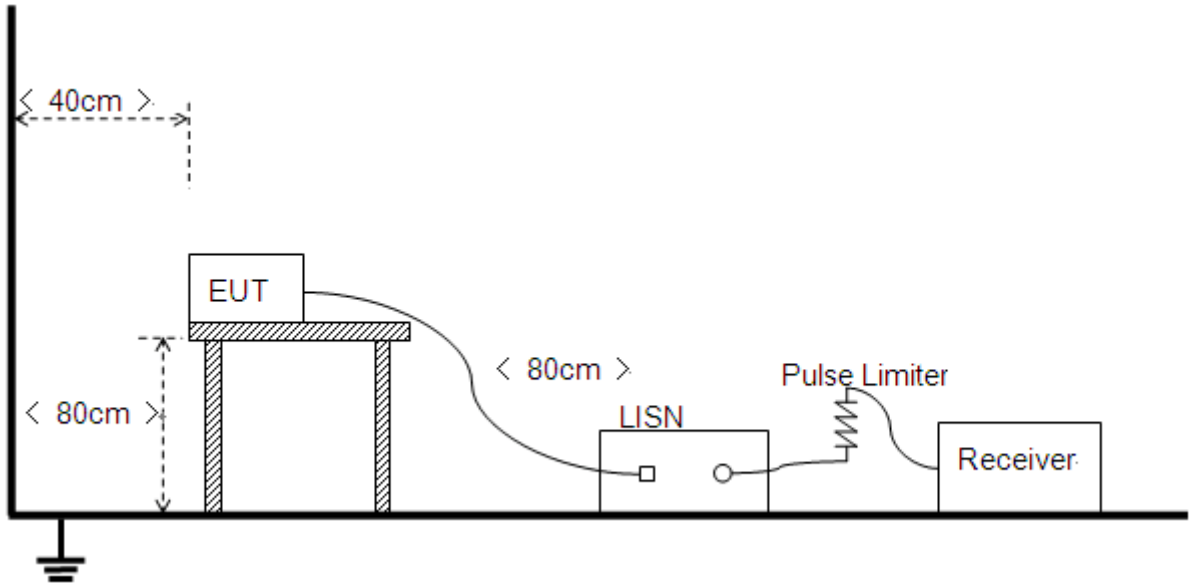
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2 Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10 2013.

B. Equipments List:

Please reference ANNEX A(1.5).

2.1.1 Test Result

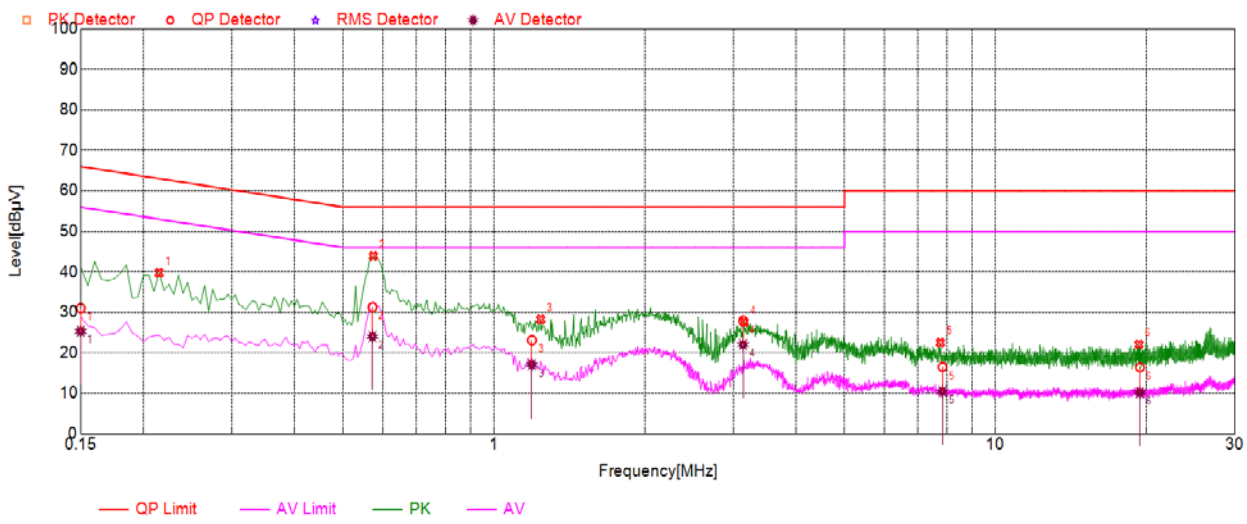
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

A. Test setup:

The EUT configuration of the emission tests is EUT + Link.

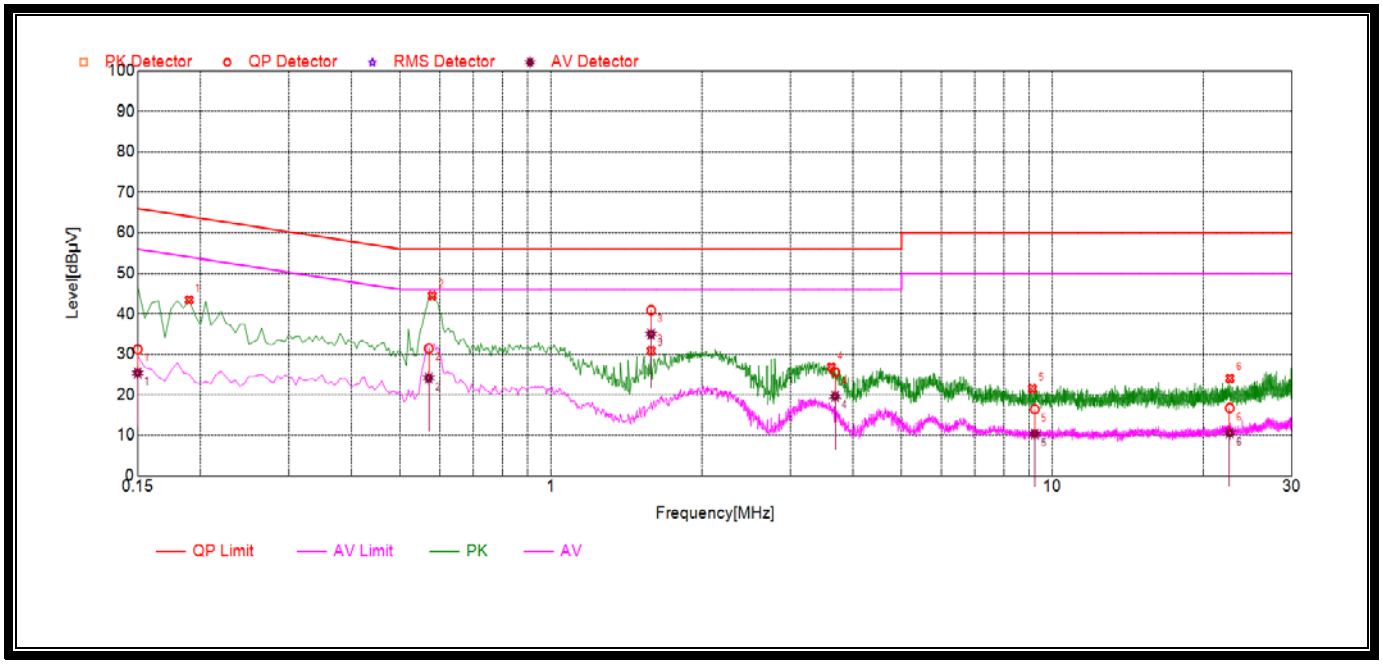
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.15	31.03	25.30	66.00	56.00	Line	PASS
2	0.5726	31.29	24.06	56	46		PASS
3	1.1908	23.11	17.07	56	46		PASS
4	3.1396	27.90	22.04	56	46		PASS
5	7.8422	16.51	10.48	60	50		PASS
6	19.4186	16.40	10.19	60	50		PASS



(Plot B: N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.15	31.23	25.38	66.00	56.00	Line	PASS
2	0.5708	31.45	24.19	56	46		PASS
3	1.5844	40.92	35.01	56	46		PASS
4	3.6884	25.60	19.61	56	46		PASS
5	9.223	16.44	10.37	60	50		PASS
6	22.5706	16.74	10.59	60	50		PASS

2.8 Radiated Emission

2.8.1 Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

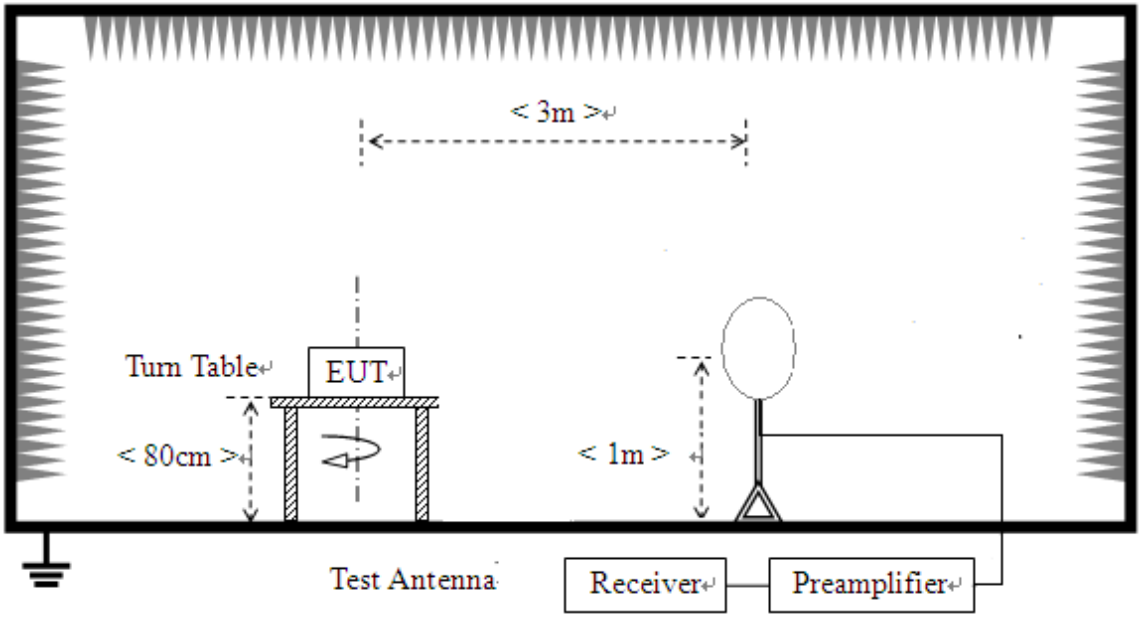
For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

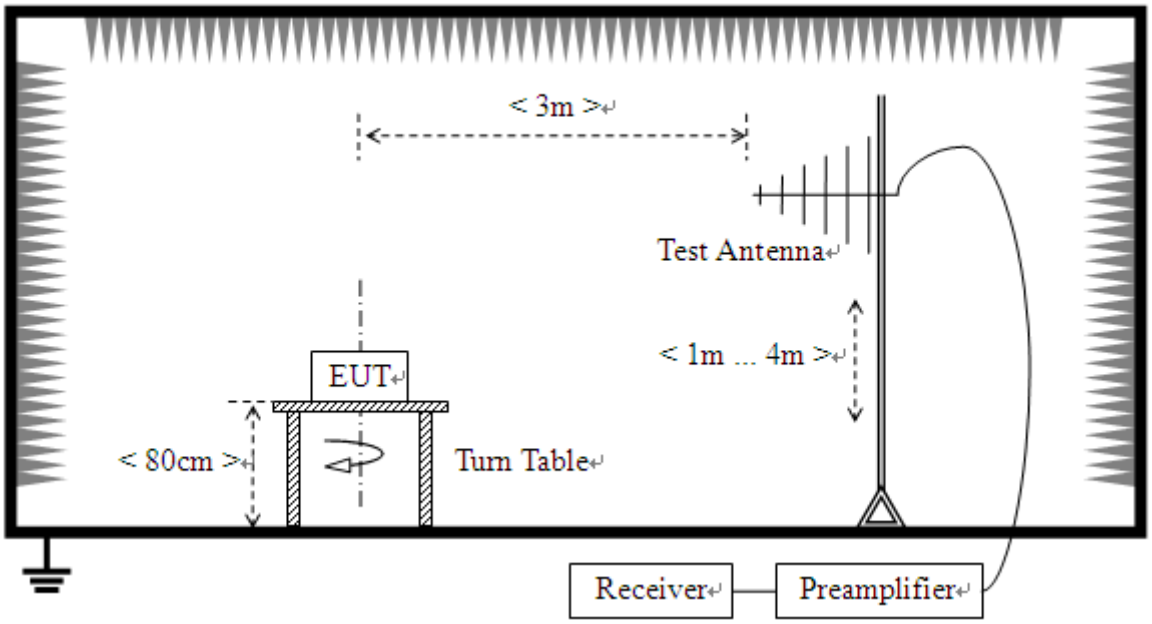
2.8.2 Test Description

A. Test Setup:

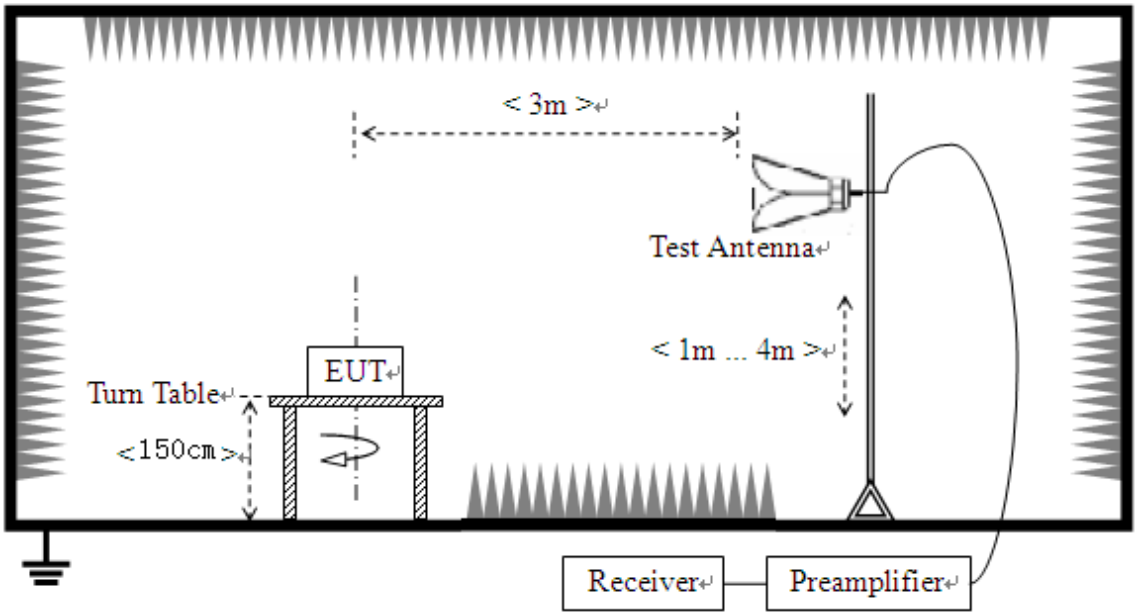
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The RF absorbing material used on the reference ground plane and on the turntable have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz. Test site have a minimum area of the ground plane covered with RF absorbing material as specified in Figure 6 of ANSI C63.4: 2014.

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2013). For radiated emissions below or equal to 1GHz, The EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of

the site as factors are calculated to correct the reading

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Place the test antenna at 3m away from area of the EUT, while keeping the test antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The test antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final test antenna elevation shall be that which maximizes the emissions. The test antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

Please reference ANNEX A(1.5).

2.8.3 Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]$-G_{preamp}$ [dB]

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

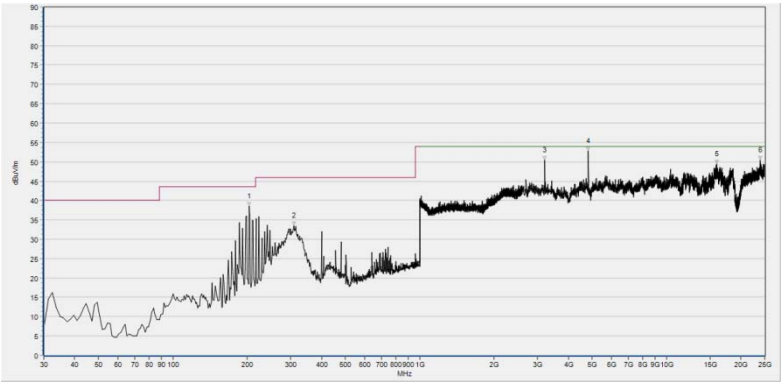
During the test, the total correction Factor A_T and A_{Factor} were built in test software.

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

2.8.3.1 802.11b Test mode (Antenna 1)

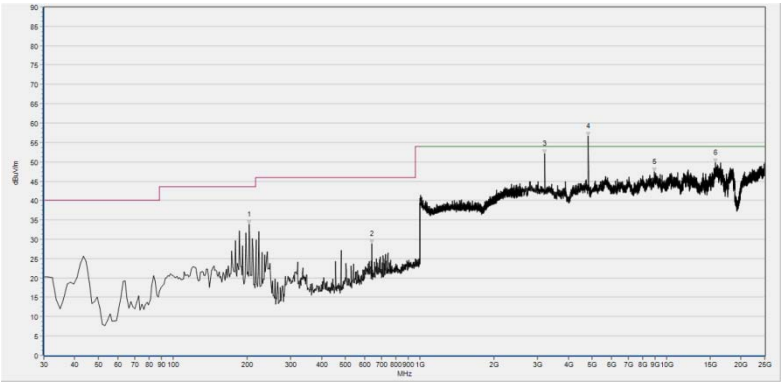
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	38.47	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
309.224	33.53	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
3215.094	50.48	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4823.900	54.09	52.23	45.54	74.0	N.A	54.0	Horizontal	PASS
15969.122	49.47	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
23924.604	50.38	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

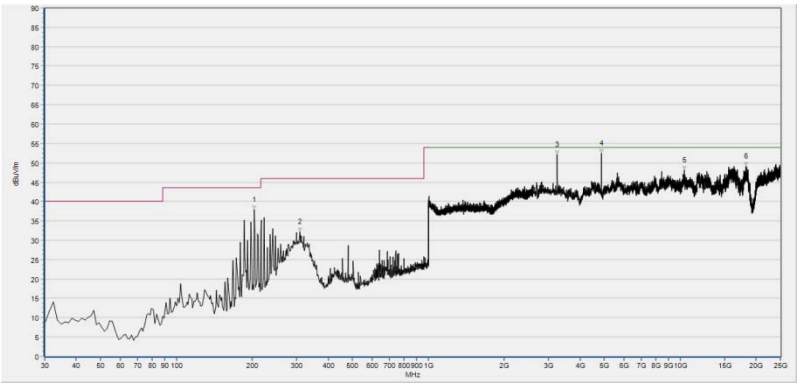
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	33.82	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
639.437	28.77	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
3215.900	51.24	49.46	47.04	74.0	N.A	54.0	Vertical	PASS
4824.000	56.68	55.31	48.70	74.0	N.A	54.0	Vertical	PASS
8930.169	47.42	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
15765.448	49.78	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

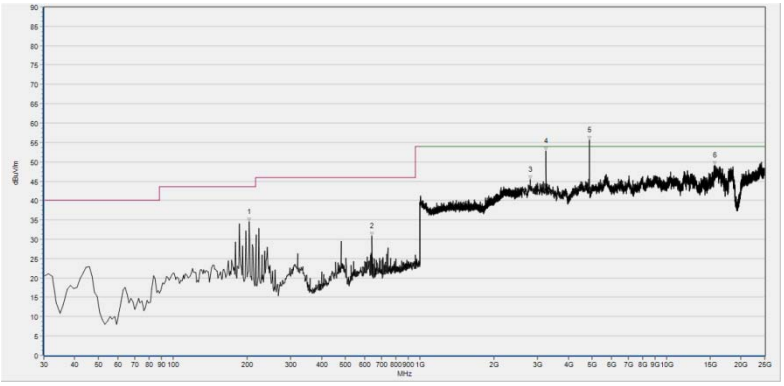
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	37.92	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
309.224	32.20	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
3249.300	50.91	49.03	46.46	74.0	N.A	54.0	Horizontal	PASS
4874.000	52.00	49.91	43.09	74.0	N.A	54.0	Horizontal	PASS
10380.324	48.07	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
18250.264	49.18	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

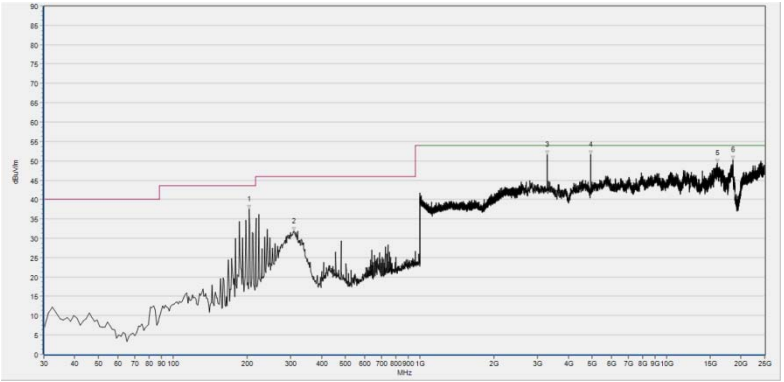
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	34.54	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
639.437	30.81	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2807.747	45.36	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
3249.300	54.30	53.10	51.62	74.0	N.A	54.0	Vertical	PASS
4873.900	55.26	53.79	47.19	74.0	N.A	54.0	Vertical	PASS
15639.171	49.06	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

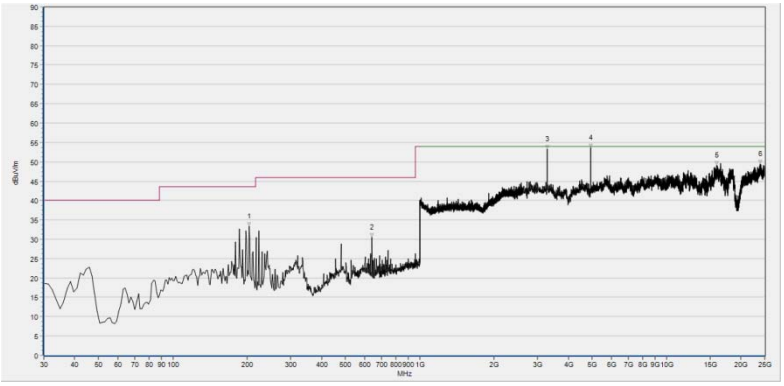
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	37.56	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
309.224	31.81	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
3282.600	53.38	51.86	50.02	74.0	N/A	54.0	Horizontal	PASS
4925.950	51.57	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16099.473	49.51	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
18547.627	50.31	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



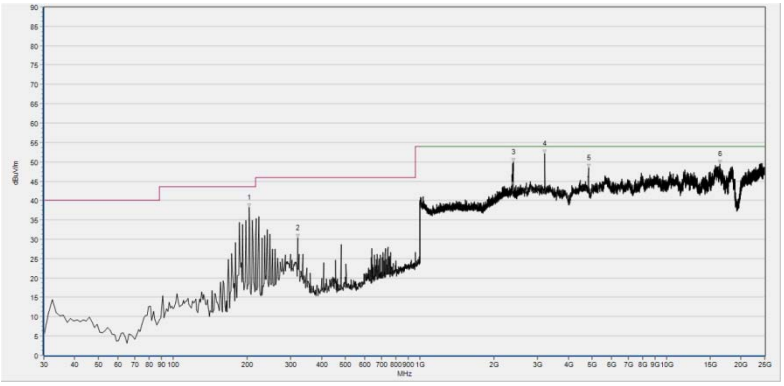
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	33.42	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
639.437	30.50	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3282.700	54.39	53.13	51.60	74.0	N/A	54.0	Vertical	PASS
4923.900	55.64	54.32	47.69	74.0	N/A	54.0	Vertical	PASS
16009.856	49.10	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
23924.604	49.39	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.8.3.2 802.11g Test mode (Antenna 1)

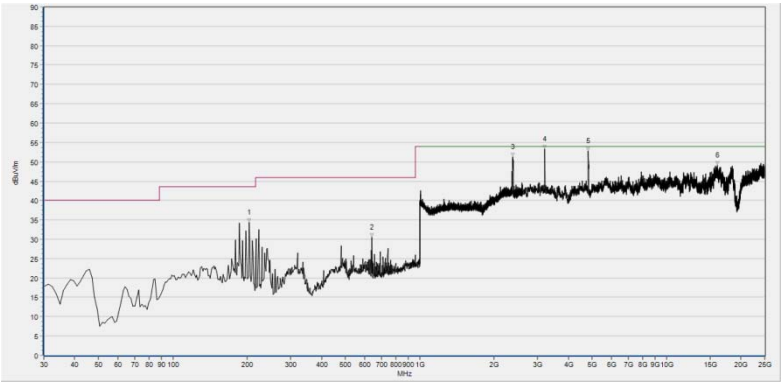
B. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	38.23	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
320.150	30.29	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2390.636	49.99	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
3215.900	50.82	48.42	45.61	74.0	N/A	54.0	Horizontal	PASS
4828.187	48.43	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16453.864	49.52	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

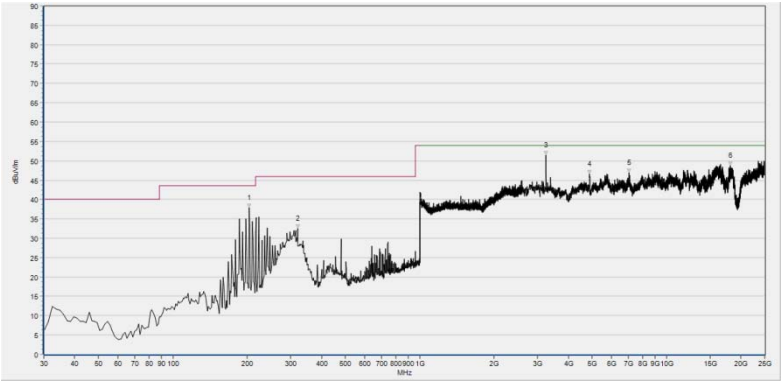
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	34.37	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
639.437	30.49	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2383.593	51.27	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3216.100	53.53	51.92	50.15	74.0	N/A	54.0	Vertical	PASS
4824.200	53.02	48.90	37.51	74.0	N/A	54.0	Vertical	PASS
16022.077	49.18	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

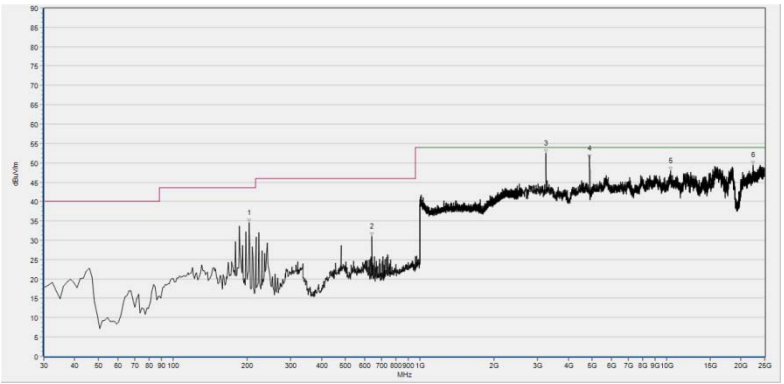
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	37.91	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
320.150	32.53	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3247.681	51.41	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4872.995	46.60	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
7056.374	46.85	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
18172.868	48.77	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

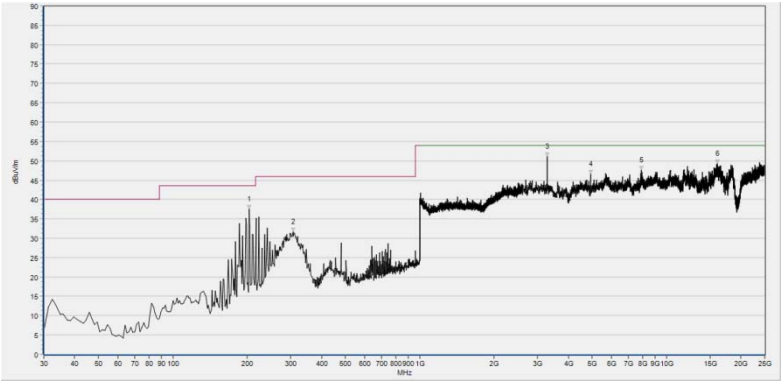
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	34.60	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
639.437	30.96	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3249.300	54.08	52.70	51.11	74.0	N/A	54.0	Vertical	PASS
4873.300	52.99	49.16	37.56	74.0	N/A	54.0	Vertical	PASS
10359.956	47.92	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
22372.613	49.42	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

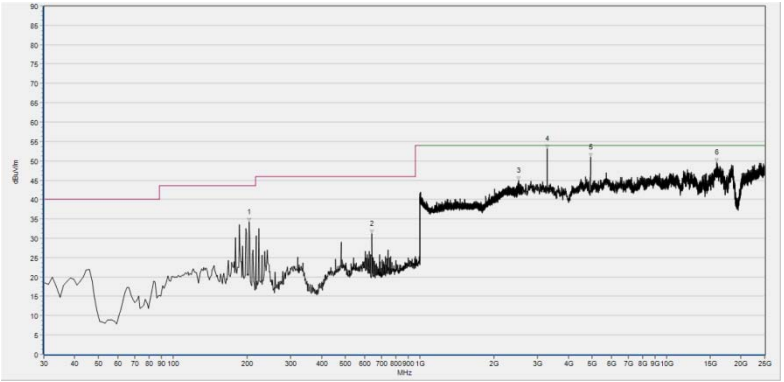
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	37.56	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
306.796	31.69	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3282.800	51.12	48.92	46.20	74.0	N/A	54.0	Horizontal	PASS
4921.877	46.59	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
7915.876	47.63	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16026.150	49.19	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



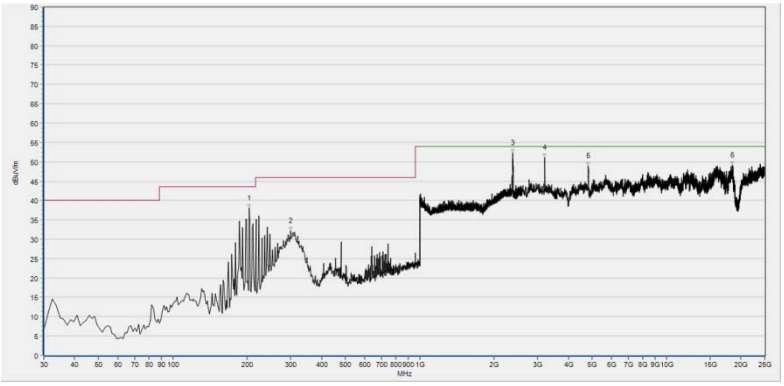
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	34.23	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
639.437	31.21	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2509.724	45.00	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3282.600	54.25	52.88	51.31	74.0	N/A	54.0	Vertical	PASS
4925.950	51.02	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16009.856	49.57	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.8.3.3 802.11n-20MHz Test mode (Antenna 1)

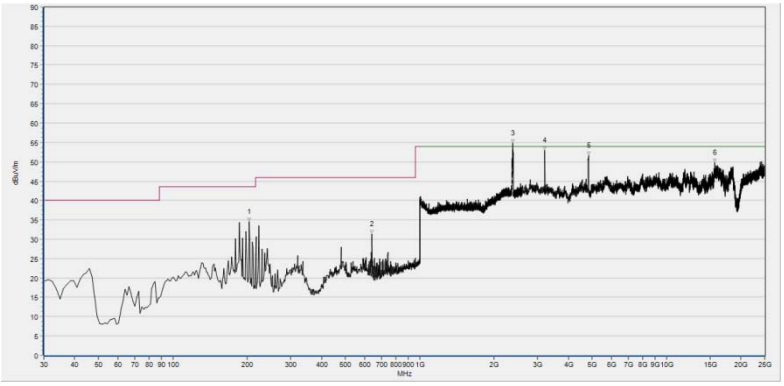
C. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	38.12	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
299.512	32.20	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2389.600	56.17	51.98	44.14	74.0	N/A	54.0	Horizontal	PASS
3215.094	51.11	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4824.113	48.97	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
18490.598	49.03	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

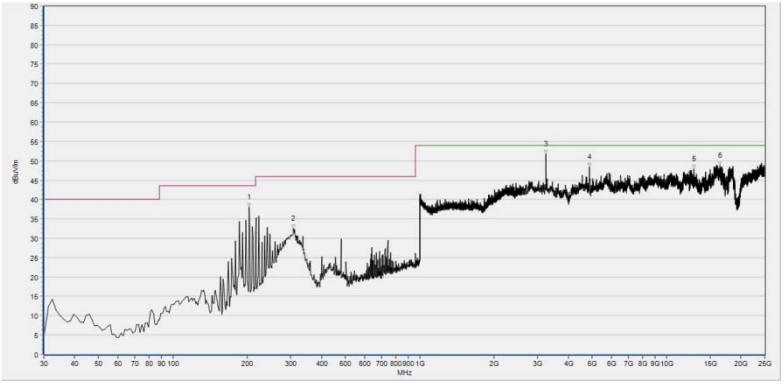
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	34.55	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
639.437	31.35	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2389.700	56.64	52.01	44.16	74.0	N/A	54.0	Vertical	PASS
3216.000	53.81	52.38	50.74	74.0	N/A	54.0	Vertical	PASS
4828.187	51.64	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
15675.832	49.71	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

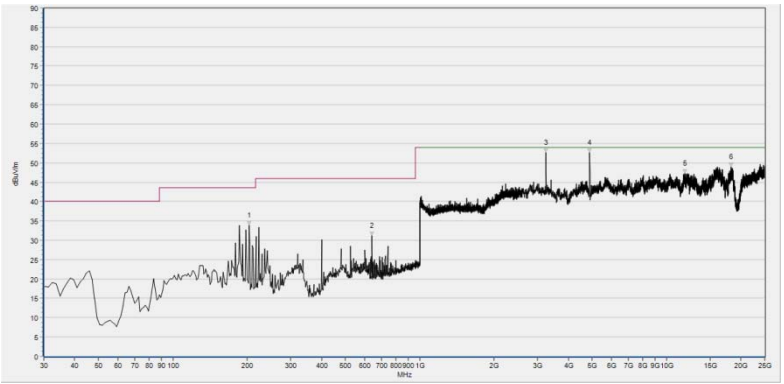
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	38.03	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
308.010	32.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3249.400	51.72	49.69	47.28	74.0	N/A	74.0	Horizontal	PASS
4872.995	48.48	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
12918.094	47.88	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16445.717	48.81	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

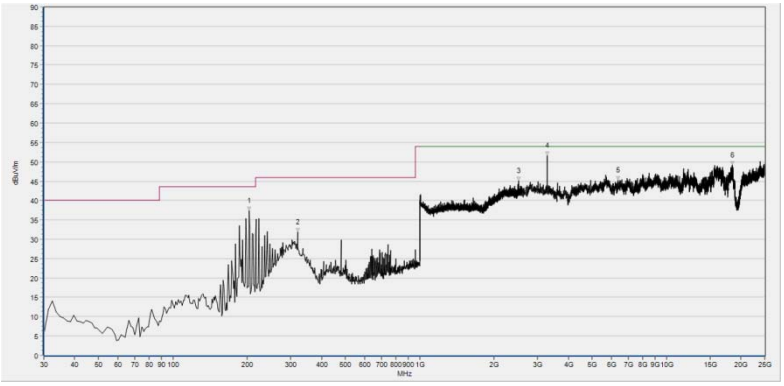
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	33.80	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
639.437	31.12	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3249.400	53.77	52.50	50.88	74.0	N/A	54.0	Vertical	PASS
4879.800	54.85	49.43	37.11	74.0	N/A	54.0	Vertical	PASS
11871.213	47.22	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
18229.896	48.91	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

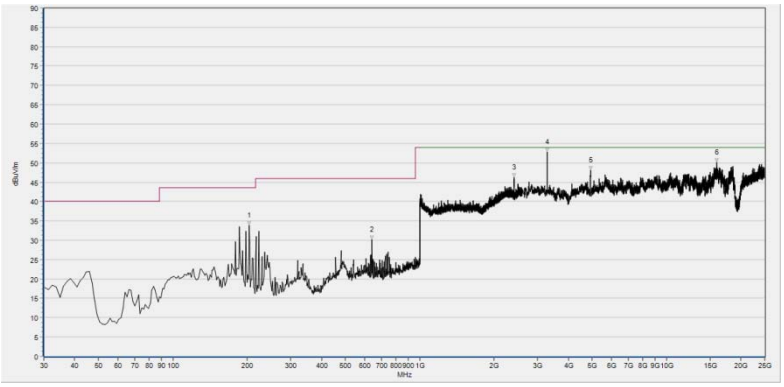
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	37.34	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
320.150	31.76	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2514.206	45.11	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
3282.700	50.99	48.97	46.29	74.0	N/A	54.0	Horizontal	PASS
6347.590	45.18	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
18506.892	49.07	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



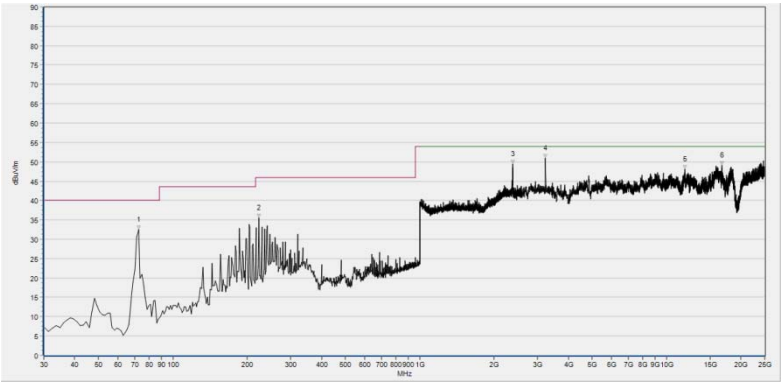
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
203.605	33.85	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
639.437	30.15	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2413.045	46.24	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3282.800	53.71	52.39	50.69	74.0	N/A	54.0	Vertical	PASS
4921.877	48.03	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16013.930	50.06	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.8.3.4 802.11n-40MHz Test mode (Antenna 1)

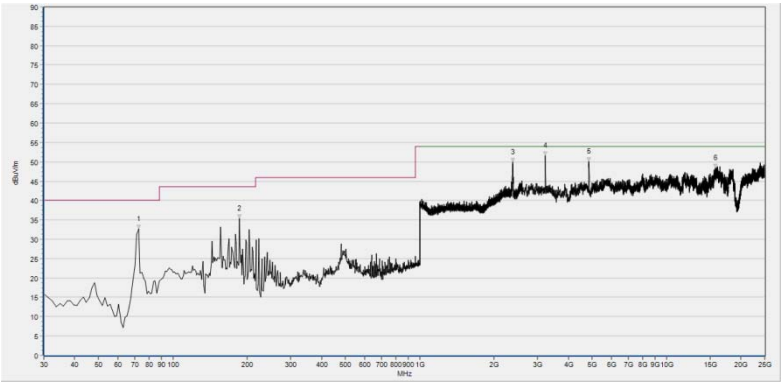
D. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 3



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
72.491	32.43	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
223.029	35.47	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2377.191	49.36	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
3227.314	50.91	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
11854.919	48.09	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16804.183	49.09	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

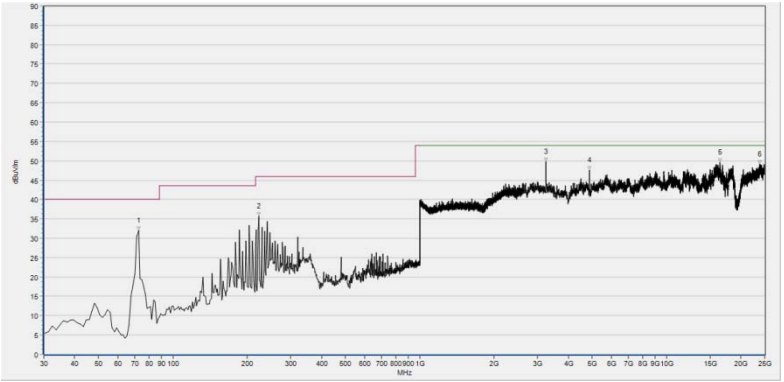
(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
72.491	32.64	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
185.394	35.41	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2382.313	49.90	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3227.314	51.55	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
4852.628	50.14	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
15753.228	48.50	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

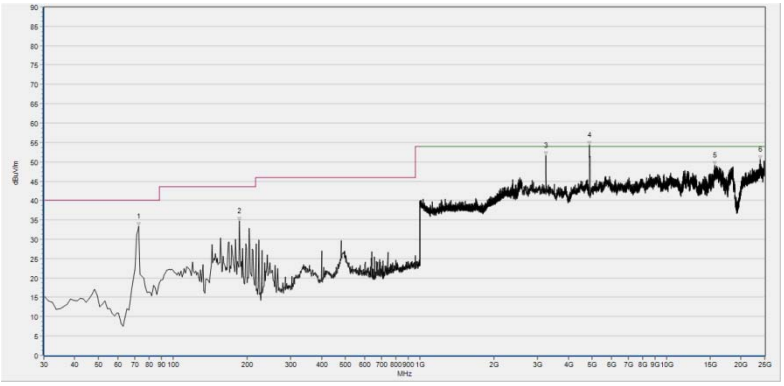
(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 6



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
72.491	31.99	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
223.029	35.72	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3247.681	49.80	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4872.995	47.65	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16441.644	49.58	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
23887.943	49.17	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

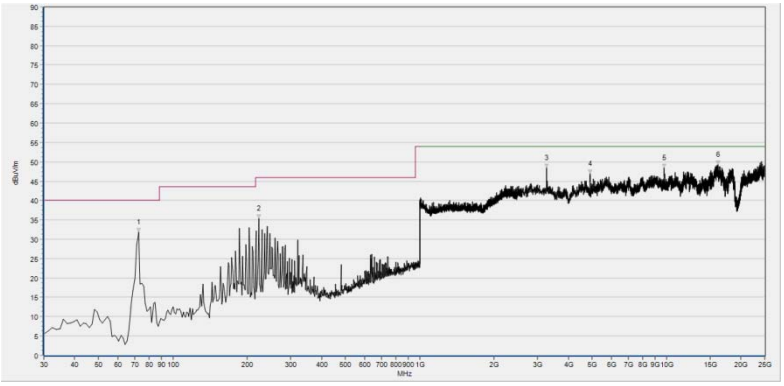
(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
72.491	33.34	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
185.394	34.68	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
3247.681	51.63	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
4875.000	55.85	51.60	41.87	74.0	N/A	54.0	Vertical	PASS
15675.832	49.16	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
23985.706	50.61	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

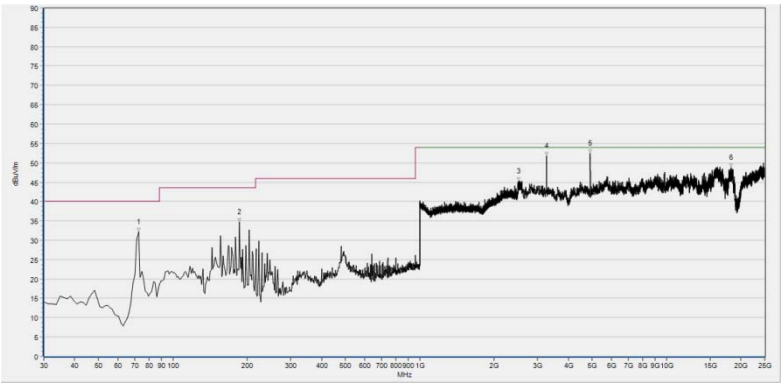
(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 9



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
72.491	31.79	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
223.029	35.30	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3268.049	48.48	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4905.583	46.96	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
9793.744	48.45	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16144.281	49.22	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



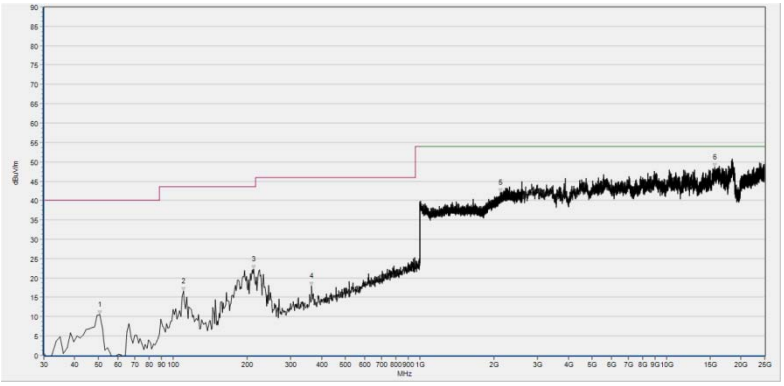
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
72.491	32.11	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
185.394	34.67	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2508.443	45.19	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3268.049	51.84	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
4900.000	55.25	50.41	41.03	74.0	N/A	54.0	Vertical	PASS
18229.896	48.69	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(Plot C.3: Antenna Vertical, 30MHz to 25GHz)

2.8.3.5 802.11b Test mode (Antenna 2)

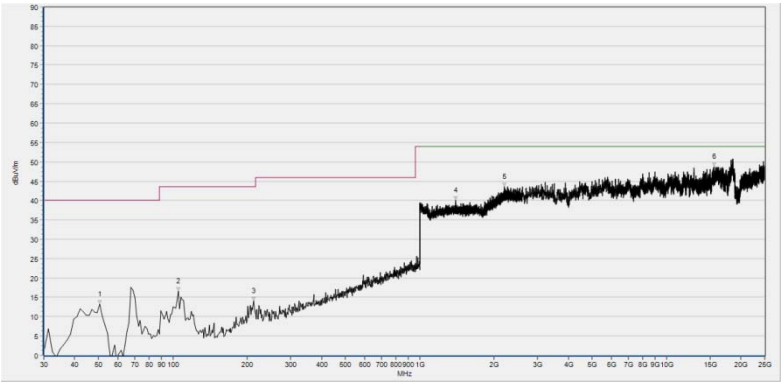
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.638	10.50	N.A	N.A	N.A	40.00	N.A	Horizontal	PASS
110.125	16.58	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
212.103	22.31	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
365.069	17.98	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2124.290	42.13	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15675.832	48.57	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



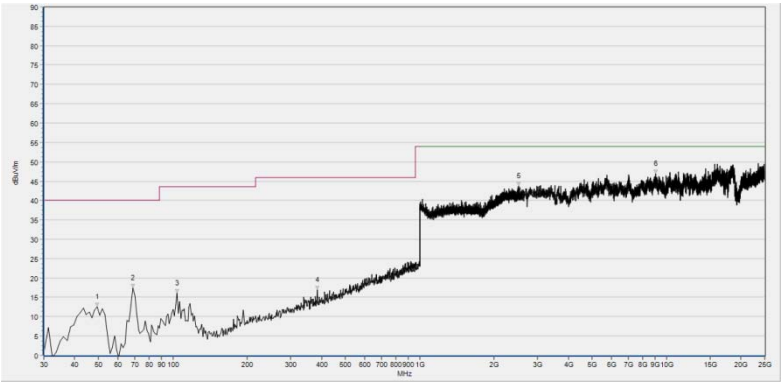
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.638	13.23	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
105.269	16.52	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
212.103	14.14	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
1394.398	40.01	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2199.200	43.56	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
15631.024	48.85	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6

Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	11.07	N.A	N.A	N.A	40.00	N.A	Horizontal	PASS
119.837	15.34	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
366.283	19.12	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2220.968	43.65	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4514.530	45.50	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
12188.943	48.80	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

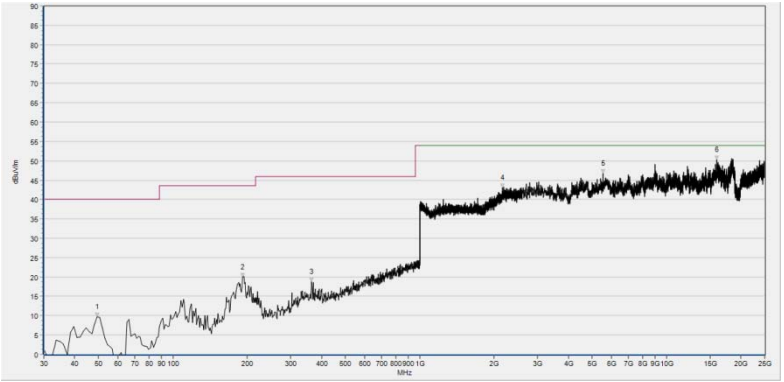
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	12.49	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
68.849	17.38	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
104.055	16.13	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
384.493	16.93	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2518.047	43.79	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
9007.565	46.98	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

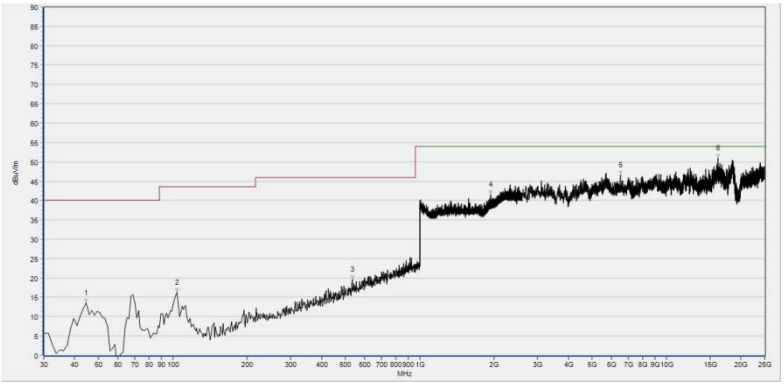
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	9.68	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
191.464	19.93	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
365.069	18.79	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2168.467	43.05	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5516.603	46.82	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
15993.562	50.21	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



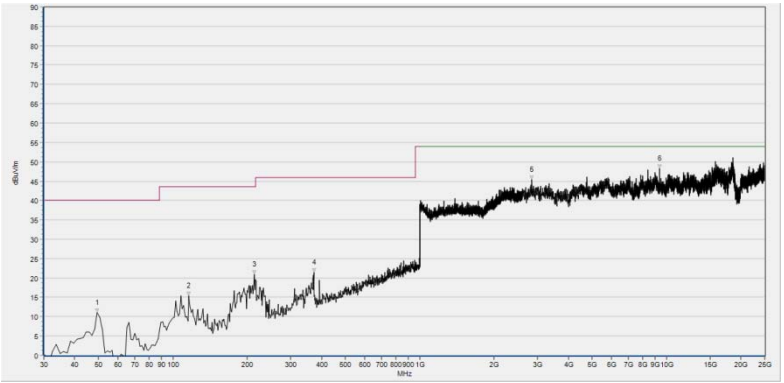
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
44.568	13.62	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
104.055	16.27	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
532.603	19.64	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1940.536	41.58	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
6494.235	46.59	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16193.162	51.01	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.8.3.6 802.11g Test mode (Antenna 2)

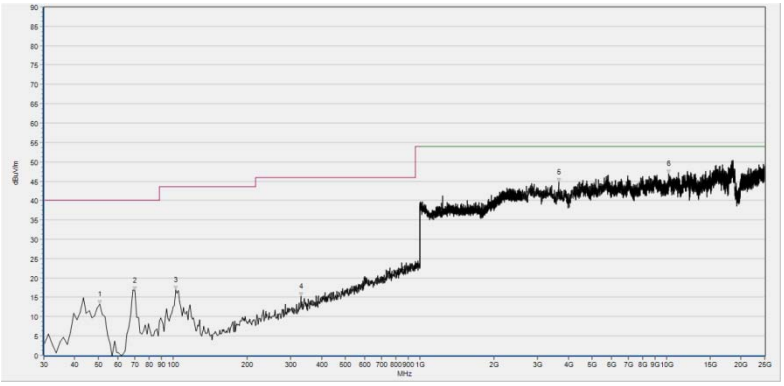
B. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	11.05	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
116.195	15.43	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
213.317	20.87	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
372.353	21.37	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2844.408	45.34	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
9357.883	48.22	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

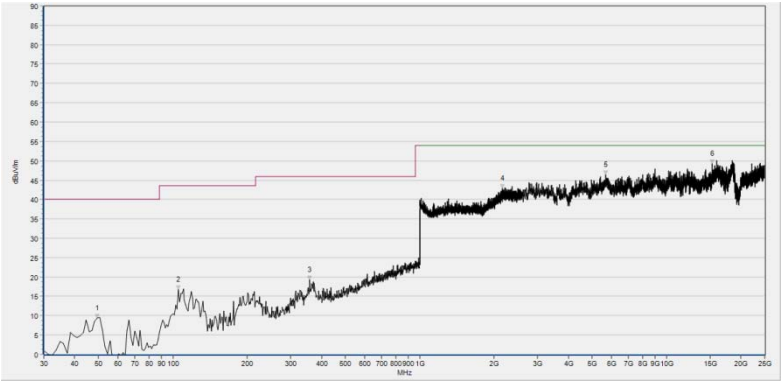
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.638	13.18	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
70.063	16.78	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
102.841	17.01	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
329.862	15.21	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3655.028	44.68	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
10197.018	47.00	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

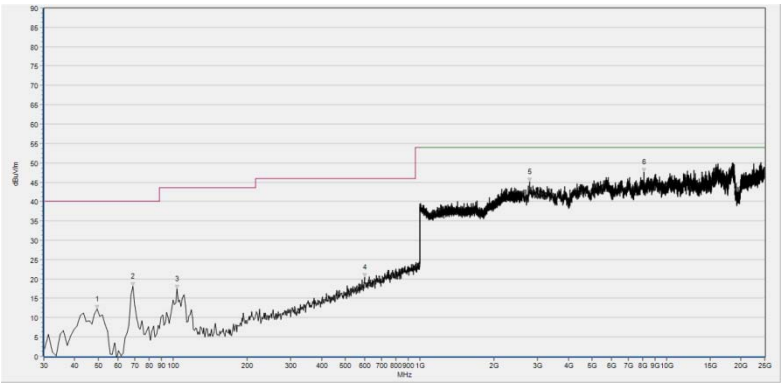
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	9.44	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
105.269	16.79	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
357.785	19.22	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2159.504	42.92	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5675.468	46.38	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
15321.440	49.21	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

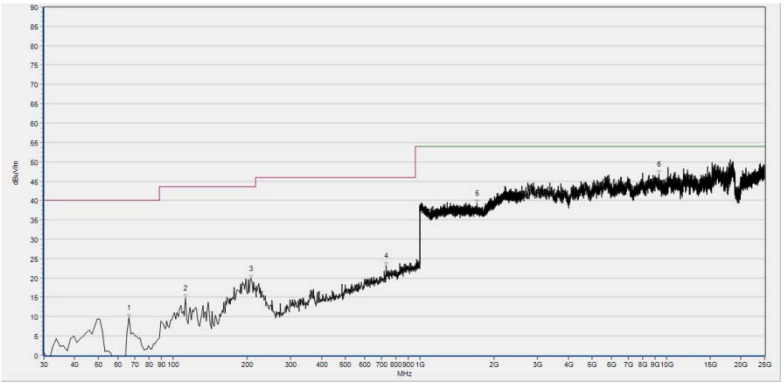
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	12.25	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
68.849	18.11	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
104.055	17.51	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
596.946	20.47	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2783.306	45.01	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
8107.329	47.67	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

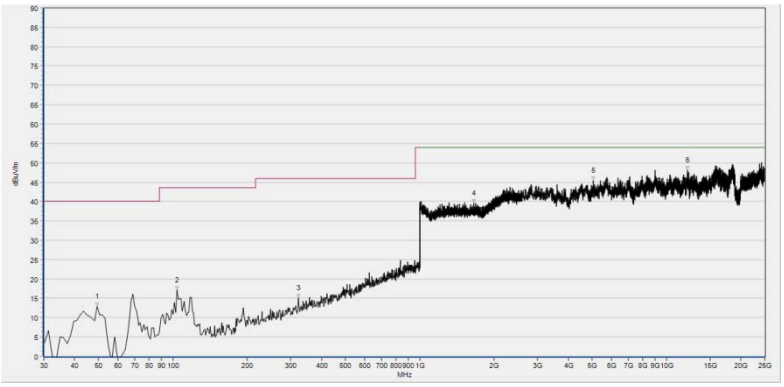
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
66.421	9.70	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
112.553	14.70	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
207.247	19.73	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
731.702	23.05	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1706.843	39.14	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
9317.149	46.70	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



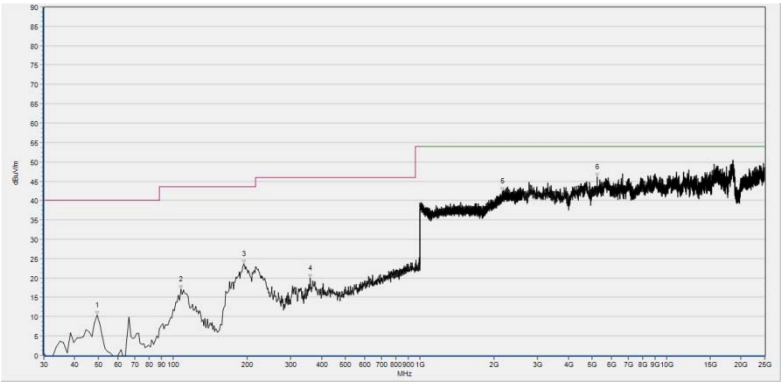
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	12.93	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
104.055	17.16	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
322.578	15.12	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1660.104	39.48	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
5060.375	45.49	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
12140.062	48.12	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.8.3.7 802.11n-20MHz Test mode (Antenna 2)

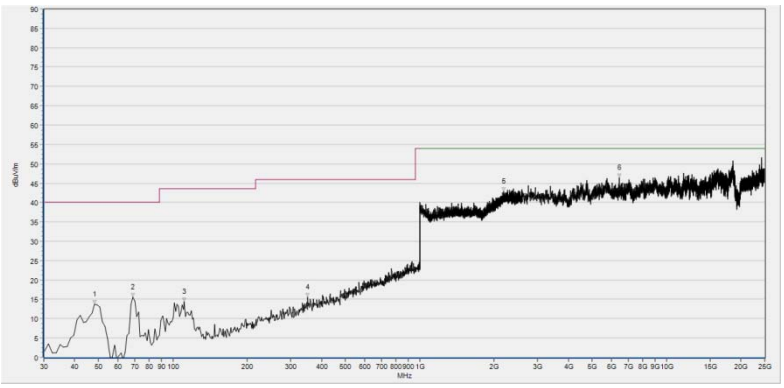
C. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	10.34	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
107.697	17.07	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
193.892	23.57	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
360.213	19.99	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2165.266	42.44	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5247.754	46.01	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

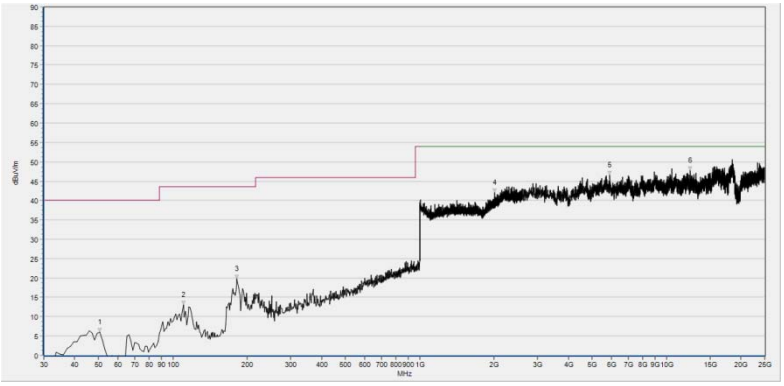
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.210	13.76	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
68.849	15.59	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
111.339	14.38	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
351.715	15.51	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2191.517	42.93	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
6441.280	46.37	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

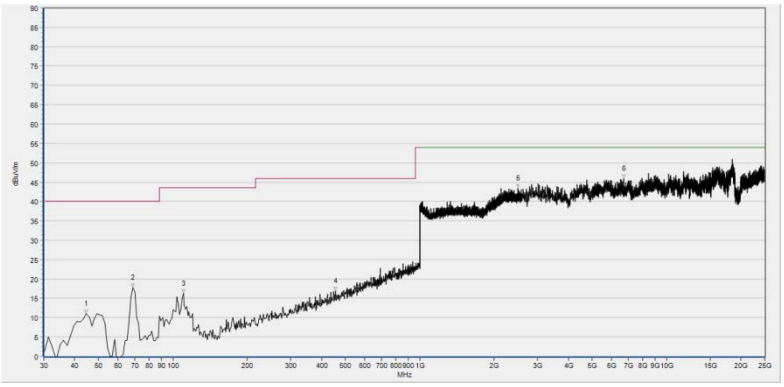
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.638	5.98	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
110.125	13.06	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
181.752	19.79	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2016.086	42.09	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5891.362	46.67	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
12490.380	47.79	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

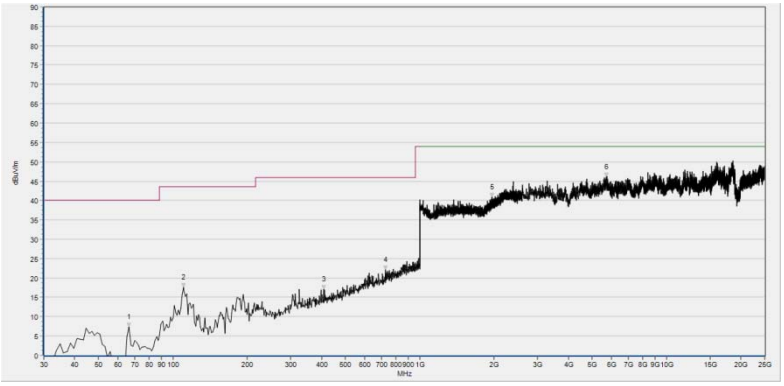
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
44.568	11.13	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
68.849	17.85	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
110.125	16.25	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
456.120	16.94	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2505.242	43.35	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
6722.350	45.94	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

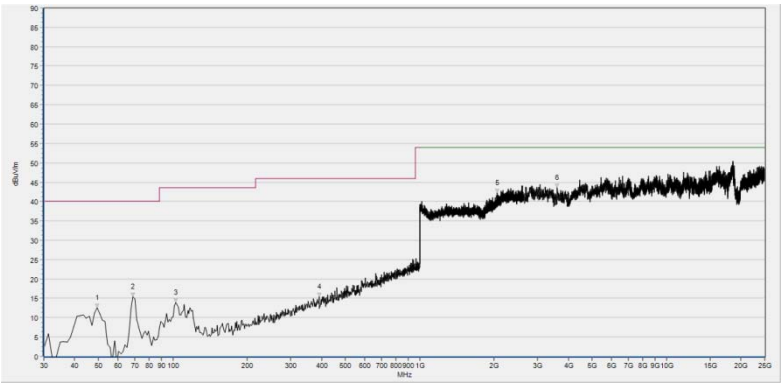
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
66.421	7.44	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
110.125	17.59	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
407.559	17.04	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
724.418	22.06	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1957.183	40.97	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5683.615	46.17	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



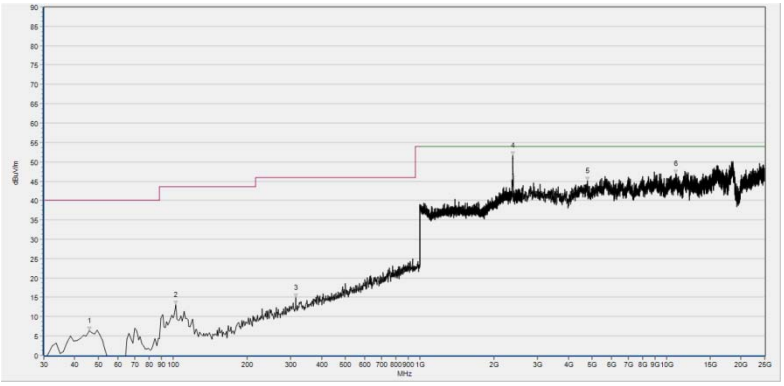
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	12.56	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
68.849	15.40	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
102.841	13.92	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
390.563	15.49	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2058.984	42.21	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3606.147	43.61	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.8.3.8 802.11n-40MHz Test mode (Antenna 2)

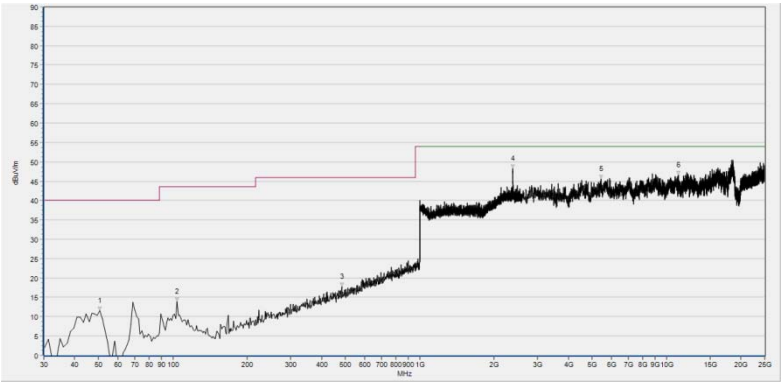
D. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 3



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
45.782	6.44	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
102.841	13.02	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
314.080	14.88	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2384.874	51.55	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4771.158	45.13	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
10881.360	46.96	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

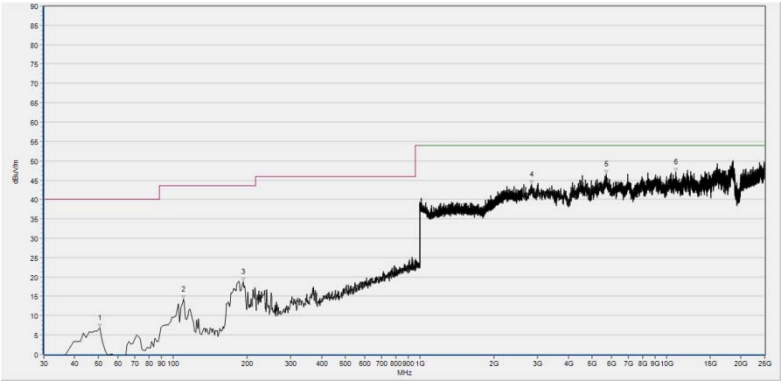
(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.638	11.54	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
104.055	13.85	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
482.829	17.83	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2385.514	48.26	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
5418.840	45.66	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
11137.989	46.54	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

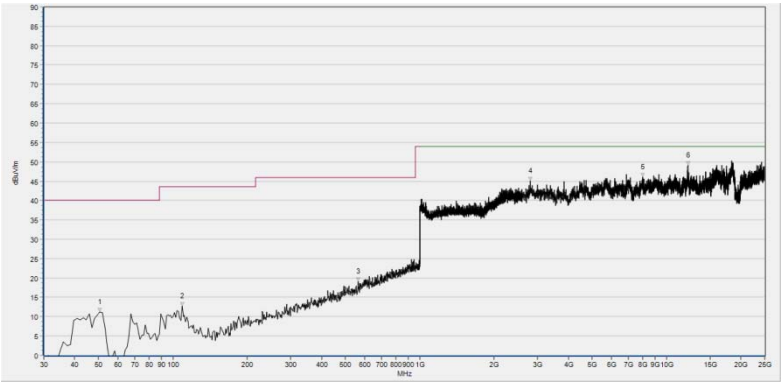
(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 6



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.638	6.79	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
110.125	14.26	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
192.678	18.82	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2836.261	43.83	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5703.983	46.57	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
10873.213	47.10	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

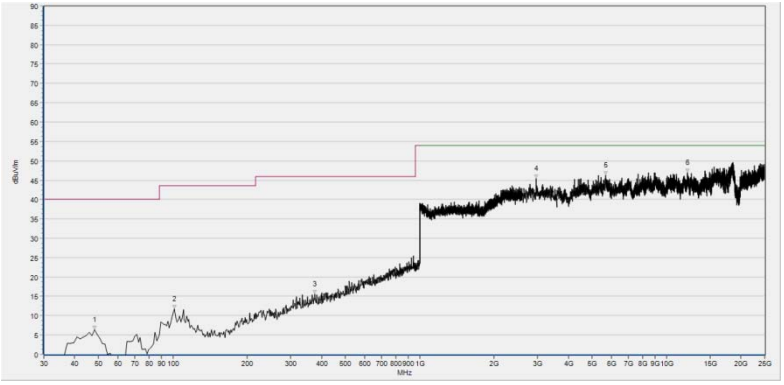
(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.638	11.17	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
108.911	12.66	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
561.740	19.11	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2803.673	45.16	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
7985.125	46.16	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
12197.090	49.08	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

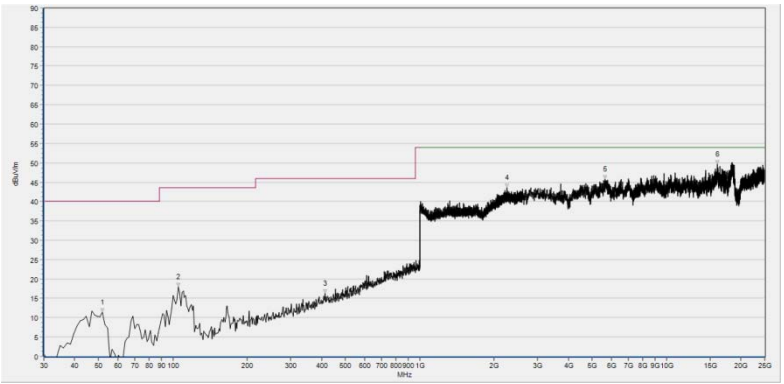
(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 9



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.210	6.35	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
101.627	11.72	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
375.995	15.52	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2958.465	45.49	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5655.101	46.29	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
12180.797	46.93	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
51.852	11.46	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
105.269	17.97	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
412.416	16.28	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2256.182	43.53	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
5646.954	45.77	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16103.546	49.62	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

(Plot C.3: Antenna Vertical, 30MHz to 25GHz)

ANNEX A GENERAL INFORMATION

1.1 Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

1.2 Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

1.3 Facilities and Accreditations

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192.

1.4 Maximum measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Peak Output Power	±2.22dB
Power spectral density (PSD)	±2.22dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77 dB
Restricted Frequency Bands	±5%
Radiated Emission	±2.95dB
Conducted Emission	±2.44dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

1.5 Test Equipments Utilized

1.5.1 Conducted Test Equipments

Conducted Test Equipment						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Spectrum Analyzer	MY45101810	E4407B	Agilent	2017.05.24	2018.05.23
2	Power Splitter	NW521	1506A	Weinschel	2017.05.24	2018.05.23
3	Attenuator 1	(N/A.)	10dB	Resnet	2017.05.24	2018.05.23
4	Attenuator 2	(N/A.)	3dB	Resnet	2017.05.24	2018.05.23
5	EXA Signal Analzyer	MY53470836	N9010A	Agilent	2016.12.07	2017.12.06
6	RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
7	Coaxial cable	CB02	RF02	Morlab	N/A	N/A
8	SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.5.2 Conducted Emission Test Equipments

Conducted Emission Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Receiver	US44210471	E7405A	Agilent	2017.05.24	2018.05.23
2	LISN	812744	NSLK 8127	Schwarzbeck	2017.05.24	2018.05.23
3	Service Supplier	100448	CMU200	R&S	2017.05.24	2018.05.23
4	Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2017.05.24	2018.05.23
5	Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

1.5.3 Auxiliary Test Equipment

Auxiliary Test Equipment						
No.	**Equipment Name**	**Model No.**	**Brand Name**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Computer	T430i	Think Pad	Lenovo	N/A	N/A

1.5.4 Radiated Test Equipments

Radiated Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal.Due Date**
1	System Simulator	GB45360846	8960-E5515C	Agilent	2017.05.17	2018.05.16
2	Receiver	MY54130016	N9038A	Agilent	2017.05.17	2018.05.16
3	Test Antenna - Bi-Log	N/A	VULB9163	Schwarzbeck	2016.12.09	2017.12.08
4	Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2017.03.30	2018.03.29
5	Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2017.03.30	2018.03.29
6	Test Antenna - Horn	71688	BBHA 9120D	Schwarzbeck	2017.03.30	2018.03.29
7	Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
8	Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
9	Coaxial cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
10	1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16
11	18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16

1.5.5 Climate Chamber

Climate Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Climate Chamber	2004012	HL4003T	Yinhe	2017.01.11	2018.01.10

1.5.6 Vibration Table

Vibration Table						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Vibration Table	N/A	ACT2000-S015L	CMI-COM	2017.01.11	2018.01.10

1.5.7 Anechoic Chamber

Anechoic Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Anechoic Chamber	N/A	9m*6m*6m	Changning	2017.01.11	2018.01.10

***** END OF REPORT *****