REPORT No.: SZ17080059W01

FCC RF TEST REPORT

APPLICANT	:	ShenZhen Gospell Smarthome Electronic Co., Ltd.
PRODUCT NAME	:	HD WiFi Camera
MODEL NAME	:	T5880HAA
TRADE NAME	:	N/A
BRAND NAME	:	N/A
FCC ID	:	TW5T5880HAA
STANDARD(S)	:	47 CFR Part 15 Subpart C
ISSUE DATE	:	2017-09-26

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

NOTE: This document is issued by MORLAB, the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.

MORLAB GROUP
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China
Tel: 86-755-36698555
Http://www.morlab.com
Fax: 86-755-36698525
E-mail: service@morlab.cn

DIRECTORY

TEST REPORT DECLARATION **4**

1. TECHNICAL INFORMATION **4**

1.1 APPLICANT INFORMATION **5**
1.2 EQUIPMENT UNDER TEST (EUT) DESCRIPTION **5**
1.2.1 IDENTIFICATION OF ALL USED EUTS 6
1.3 TEST STANDARDS AND RESULTS **6**
1.3.1 TEST ENVIRONMENT CONDITIONS 6

2. 47 CFR PART 15C REQUIREMENTS **7**

2.1 ANTENNA REQUIREMENT **7**
2.1.1 APPLICABLE STANDARD 7
2.1.2 RESULT: COMPLIANT 7
2.2 PEAK OUTPUT POWER **7**
2.2.1 REQUIREMENT 7
2.2.2 TEST DESCRIPTION 7
2.2.3 TEST RESULT 8
2.3 BANDWIDTH **10**
2.3.1 REQUIREMENT 10
2.3.2 TEST DESCRIPTION 10
2.3.3 TEST RESULT 10
2.4 CONDUCTED SPURIOUS EMISSIONS AND BAND EDGE **19**
2.4.1 REQUIREMENT 19
2.4.2 TEST DESCRIPTION 19
2.4.3 TEST RESULT 19
2.5 POWER SPECTRAL DENSITY (PSD) **32**
2.5.1 REQUIREMENT 32
2.5.2 TEST DESCRIPTION 32
2.5.3 TEST RESULT 33
2.6 RESTRICTED FREQUENCY BANDS **41**
2.6.1 REQUIREMENT 41
2.6.2 TEST DESCRIPTION 41
2.6.3 TEST RESULT 42

2.7 CONDUCTED EMISSION 53
2.7.1 REQUIREMENT 53
2.7.2 TEST DESCRIPTION 53
2.1.1 TEST RESULT 54
2.8 RADIATED EMISSION 56
2.8.1 REQUIREMENT 56
2.8.2 TEST DESCRIPTION 57
2.8.3 TEST RESULT 59

ANNEX A GENERAL INFORMATION 72

Change History		
Issue	Date	Reason for change
1.0	2017-09-26	First edition

TEST REPORT DECLARATION

Applicant	ShenZhen Gospell Smarthome Electronic Co., Ltd.
Applicant Address	5Floor/Block 2, Vision (SZ) Park, Hi-Tech Industrial Park, Shenzhen, China
Manufacturer Address	ShenZhen Gospell Smarthome Electronic Co., Ltd.
Manufacturer	East of 01st-04st Floor,Block A,No.1 Industrial park, Fenghuanggang, South of No.1 Baotian Road, Xixiang street, Bao'an District, Shenzhen City, Guangdong Province 518126,P.R.China
Product Name	HD WiFi Camera
Model Name	T5880HAA
Brand Name	N/A
HW Version	T5881Y_M03
SW Version	E_900.T5880Y.009.119
Test Standards	47 CFR Part 15 Subpart C
Test Date	2017-08-11 to 2017-09-25
Test Result	PASS

Tested by : Su Hang

Su Hang (Test Engineer)

Approved by : Andy Yeh

Andy Yeh (Supervisor)

1. TECHNICAL INFORMATION

Note: Provide by applicant.

1.1 Applicant Information

Company:	ShenZhen Gospell Smarthome Electronic Co., Ltd.
Address	5Floor/Block 2, Vision (SZ) Park, Hi-Tech Industrial Park, Shenzhen, China

1.2 Equipment under Test (EUT) Description

Brand Name:	N/A
Trade Name:	N/A
Model Name:	T5880HAA
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 Type:	Wire Antenna
Antenna Gain:	1dBi

NOTE:

1. The EUT is a HD WiFi Camera. 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	T5881Y_M03	E_900.T5880Y.009.119

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	Aug 11, 2017	**PASS**
3	15.247(a)	Bandwidth	Aug 11, 2017	**PASS**
4	15.247(d)	Conducted Spurious Emission and Band Edge	Aug 11, 2017& Sep 25, 2017	**PASS**
5	15.247(d)	Restricted Frequency Bands	Sep 01, 2017	**PASS**
6	15.207	Conducted Emission	Aug 14, 2017	**PASS**
7	15.209 ,15.247(d)	Radiated Emission	Sep 20, 2017	**PASS**
8	15.247(e)	Power spectral density (PSD)	Aug 11, 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	17.89	0.06152	30	1	PASS
6	2437	22.22	0.16672			PASS
11	2462	21.63	0.14555			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	16.73	0.04710	30	1	PASS
6	2437	16.78	0.04764			PASS
11	2462	17.22	0.05272			PASS

2.2.3.2 802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	25.30	0.33884	30	1	PASS
6	2437	24.42	0.27669			PASS
11	2462	24.32	0.27040			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	12.47	0.01766	30	1	PASS
6	2437	15.08	0.03221			PASS
11	2462	13.41	0.02193			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	25.24	0.33420	30	1	PASS
6	2437	24.43	0.27733			PASS
11	2462	24.26	0.26669			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	12.52	0.01786	30	1	PASS
6	2437	15.08	0.03221			PASS
11	2462	13.20	0.02089			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	23.67	0.23281	30	1	PASS
6	2437	23.57	0.22751			PASS
9	2452	23.59	0.22856			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	10.15	0.01035	30	1	PASS
6	2437	14.26	0.02667			PASS
9	2452	10.54	0.01132			PASS

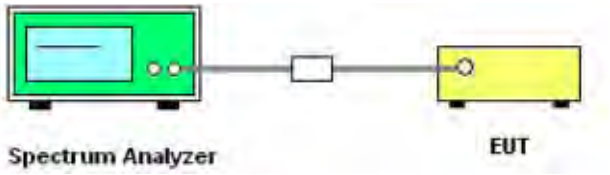
2.3 Bandwidth

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

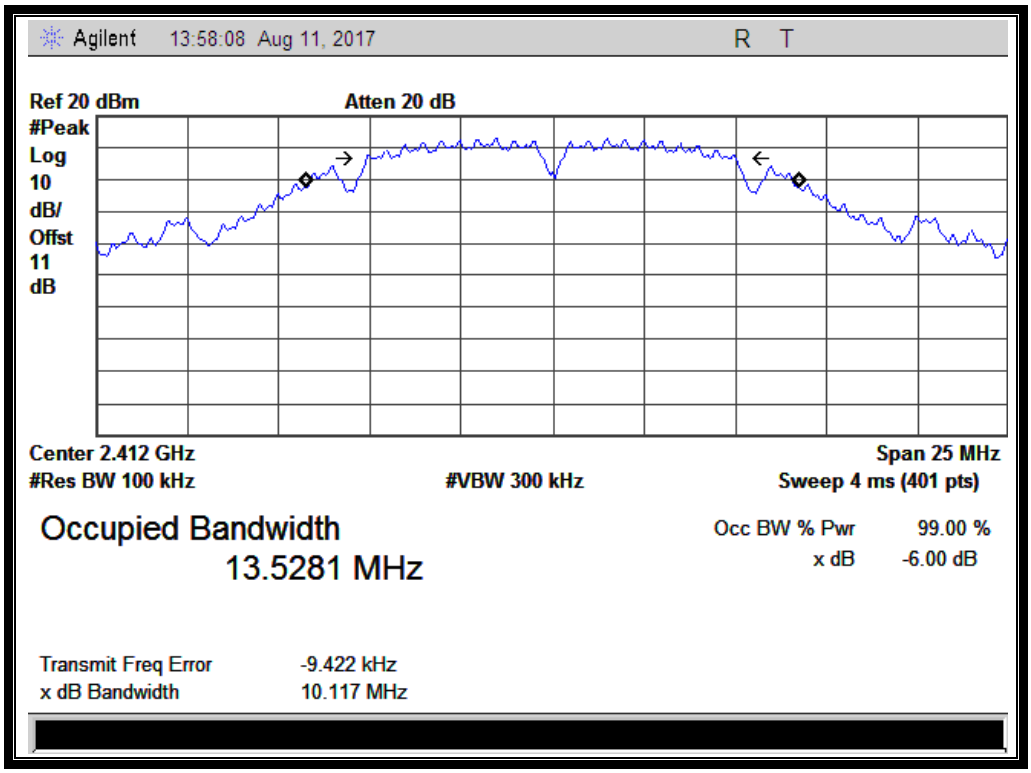
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1 802.11b Test mode

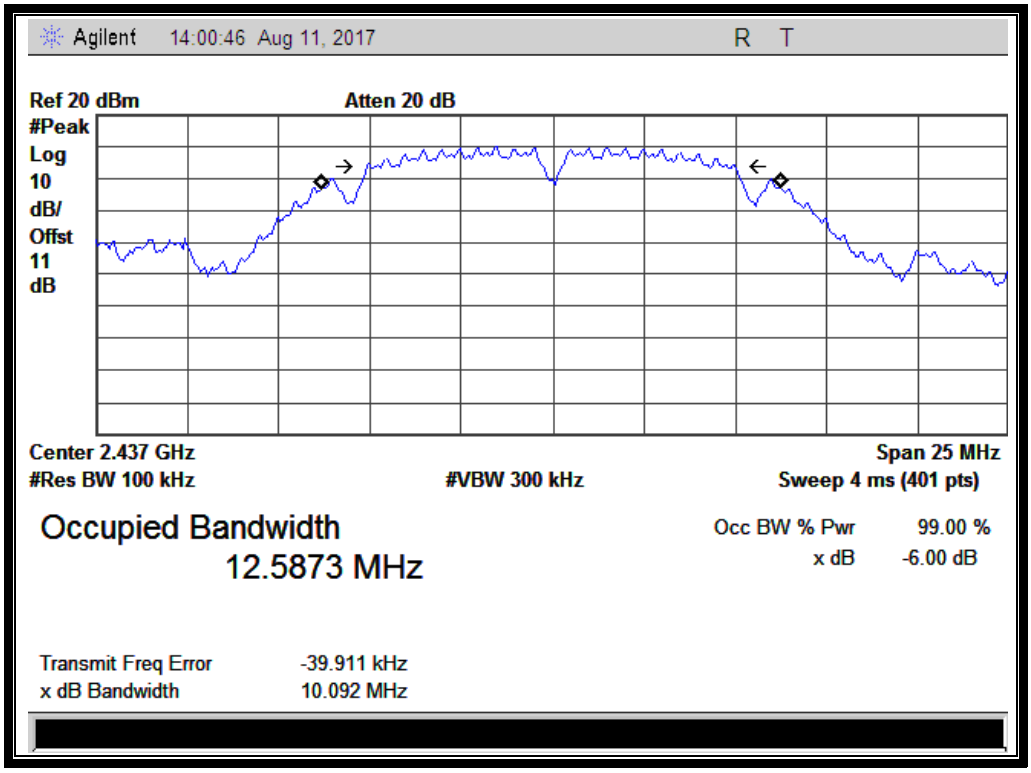
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	10.117	≥500	PASS
6	2437	10.092	≥500	PASS
11	2462	10.080	≥500	PASS

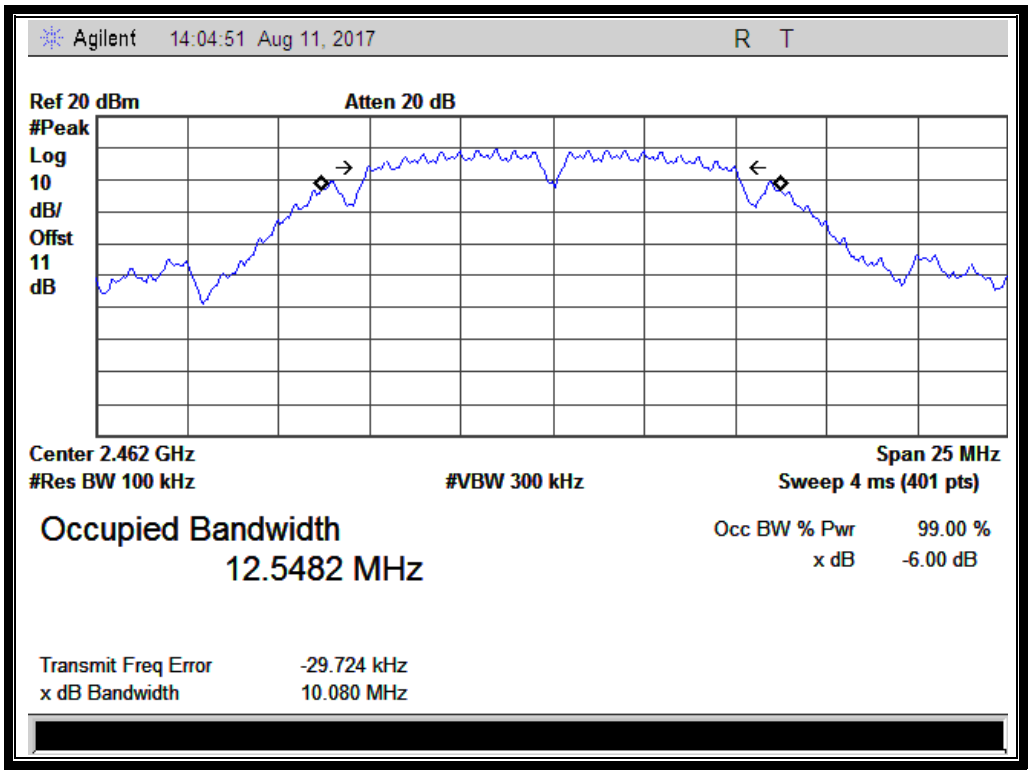
B. Test Plots



(Channel 1: 2412MHz @ 802.11b)



(Channel 6: 2437 MHz @ 802.11b)



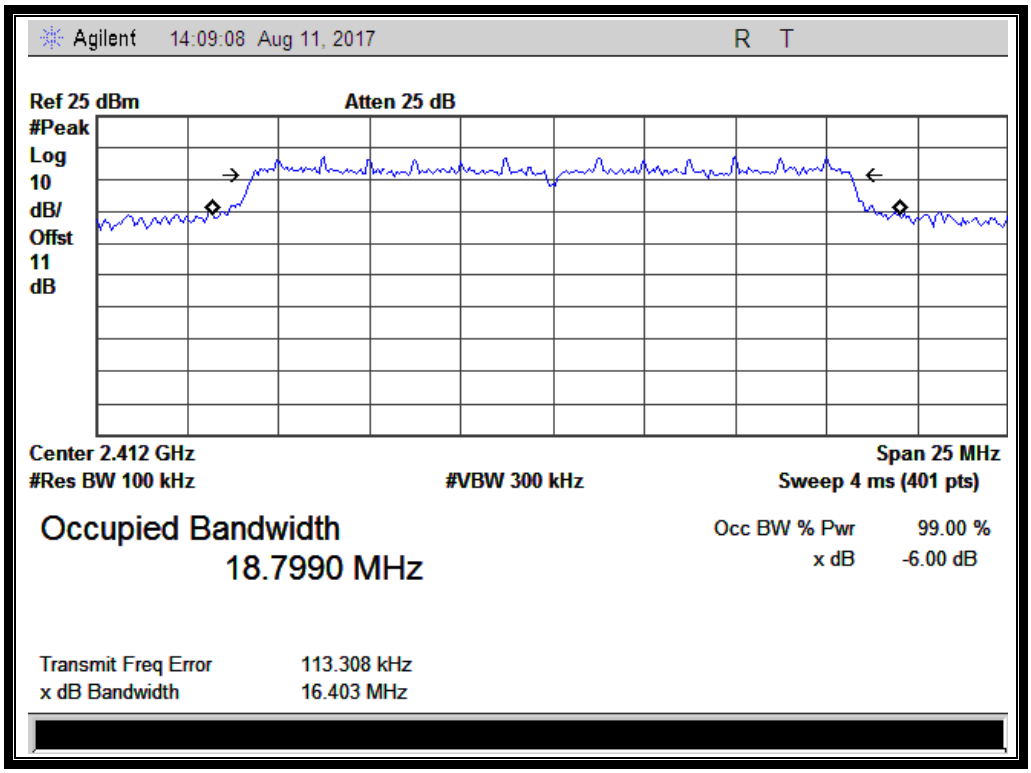
(Channel 11: 2462MHz @ 802.11b)

2.3.3.2 802.11g Test mode

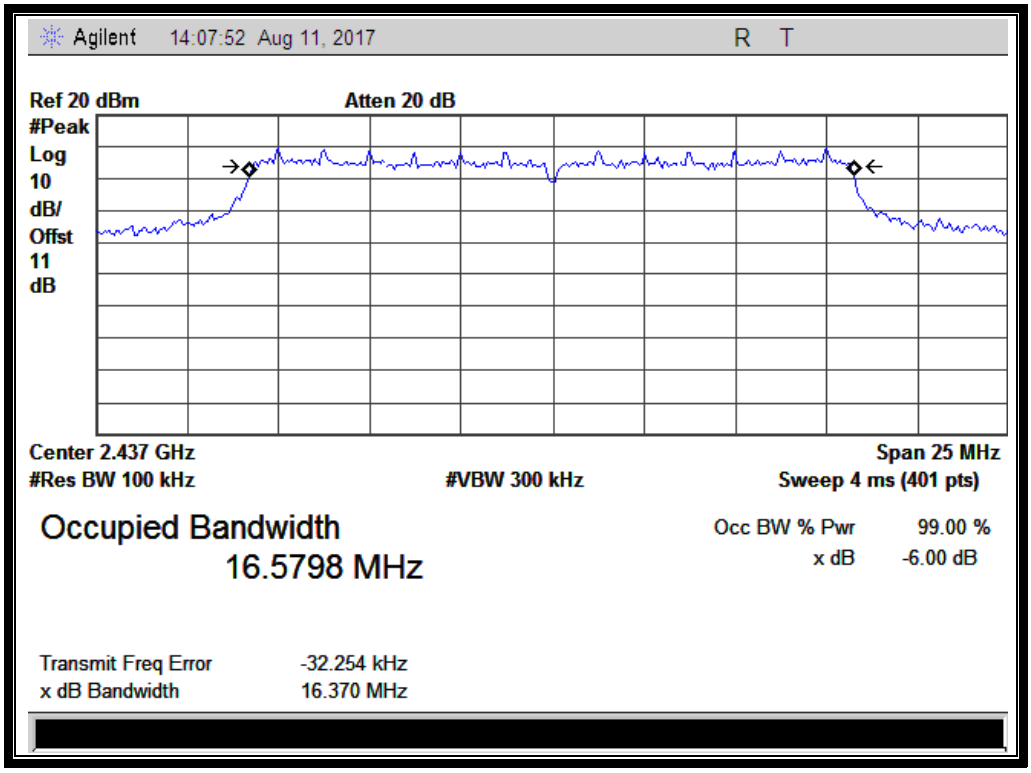
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	16.403	≥500	PASS
6	2437	16.370	≥500	PASS
11	2462	16.376	≥500	PASS

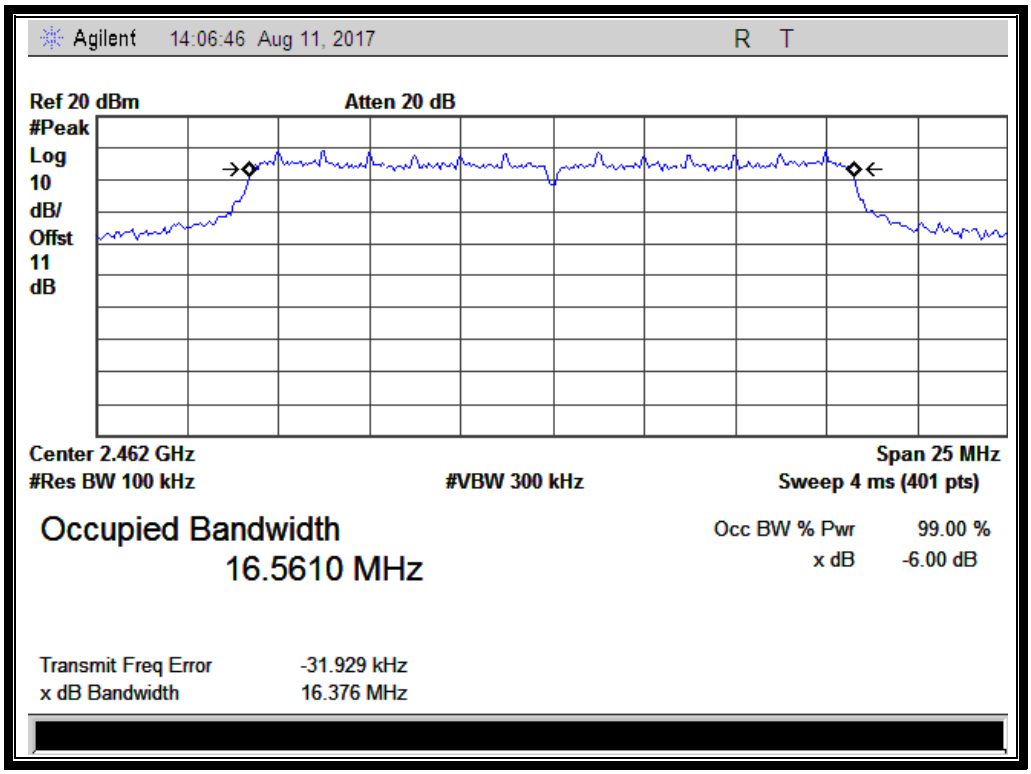
B. Test Plots:



(Channel 1: 2412MHz @ 802.11g)



(Channel 6: 2437MHz @ 802.11g)



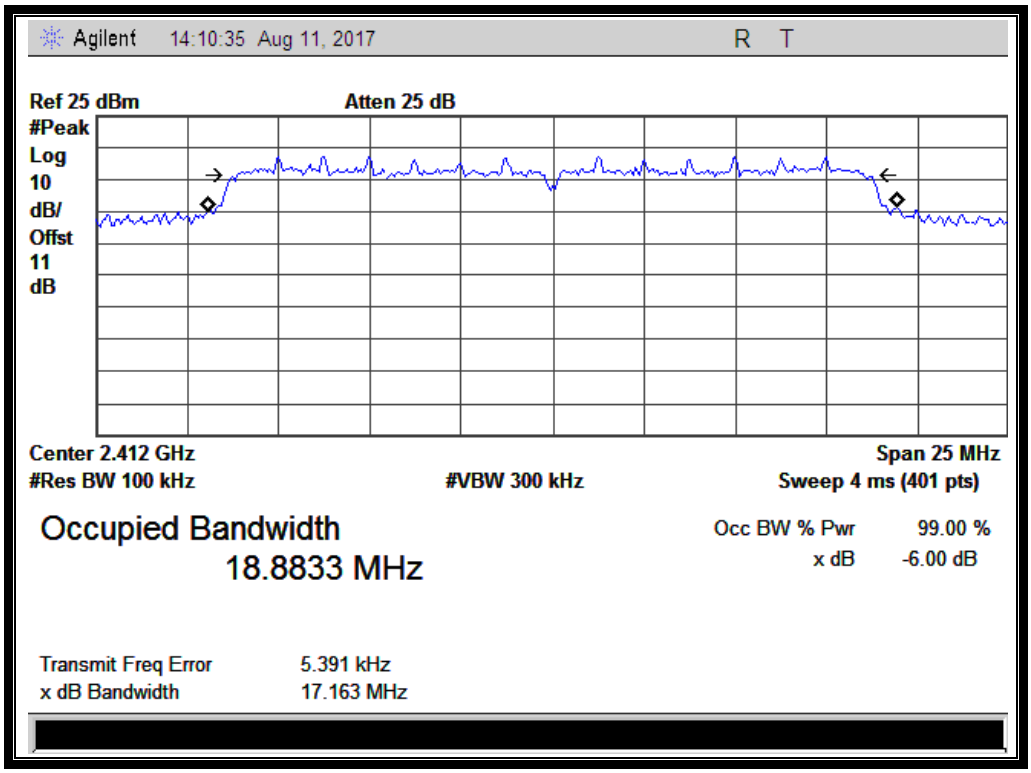
(Channel 11: 2462MHz @ 802.11g)

2.3.3.3 802.11n-20 Test mode

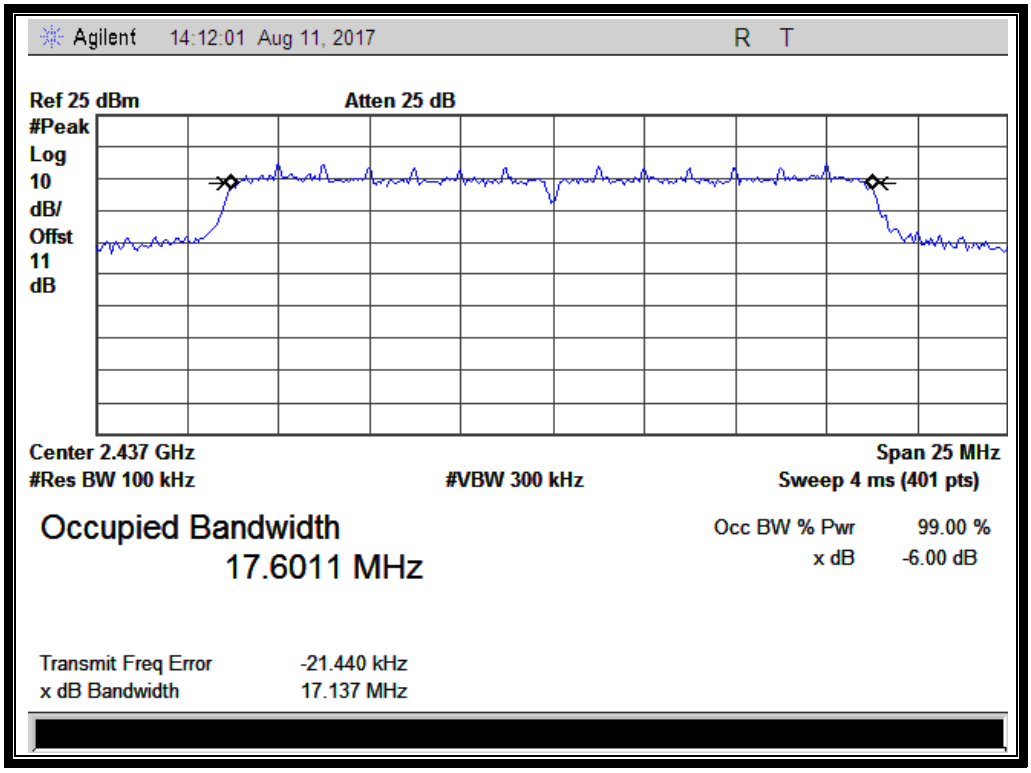
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	17.163	≥500	PASS
6	2437	17.137	≥500	PASS
11	2462	17.140	≥500	PASS

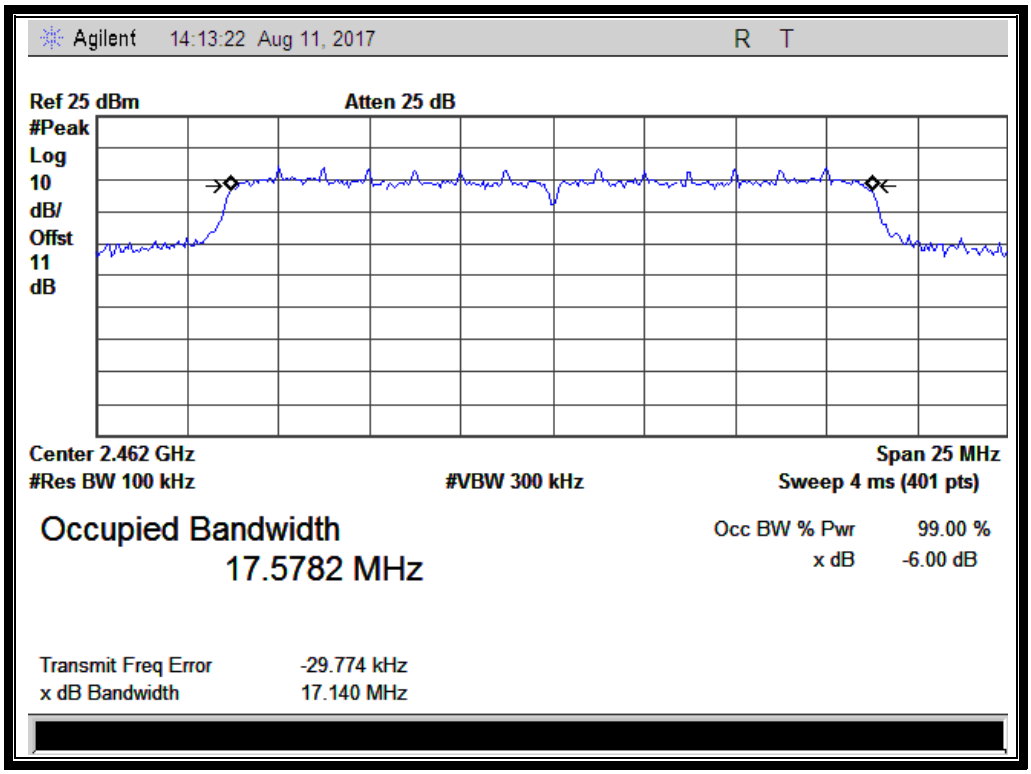
B. Test Plots:



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



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



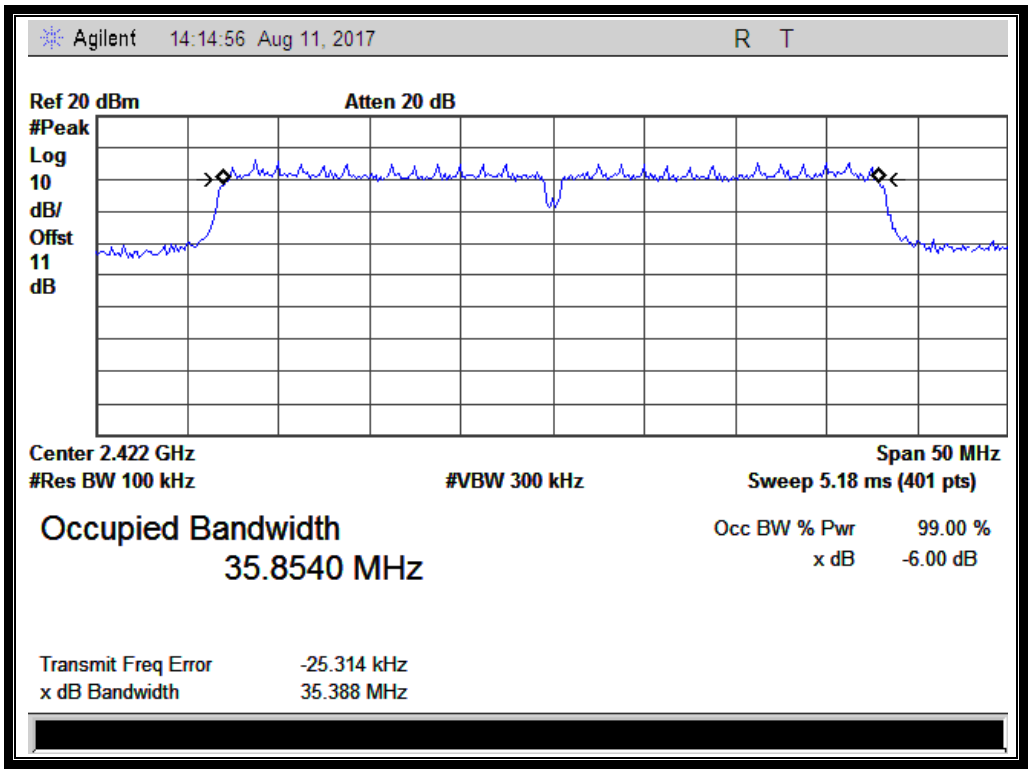
(Channel 11: 2462MHz @ 802.11n-20)

2.3.3.4 802.11n-40 Test mode

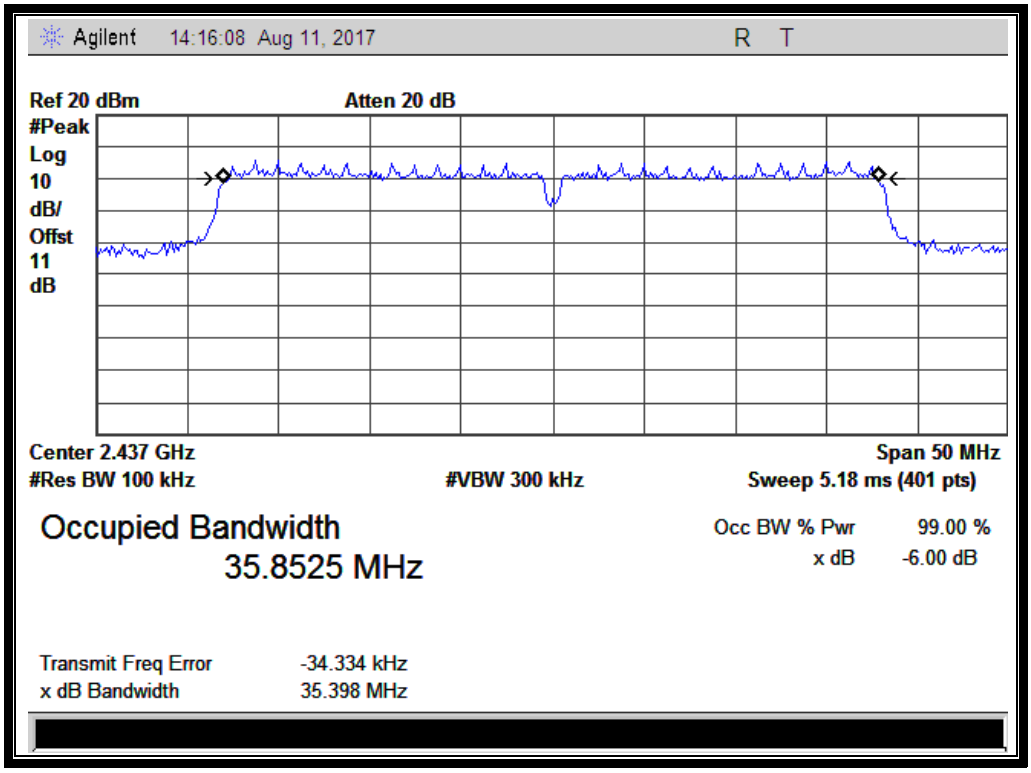
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
3	2422	35.388	≥500	PASS
6	2437	35.398	≥500	PASS
9	2452	35.509	≥500	PASS

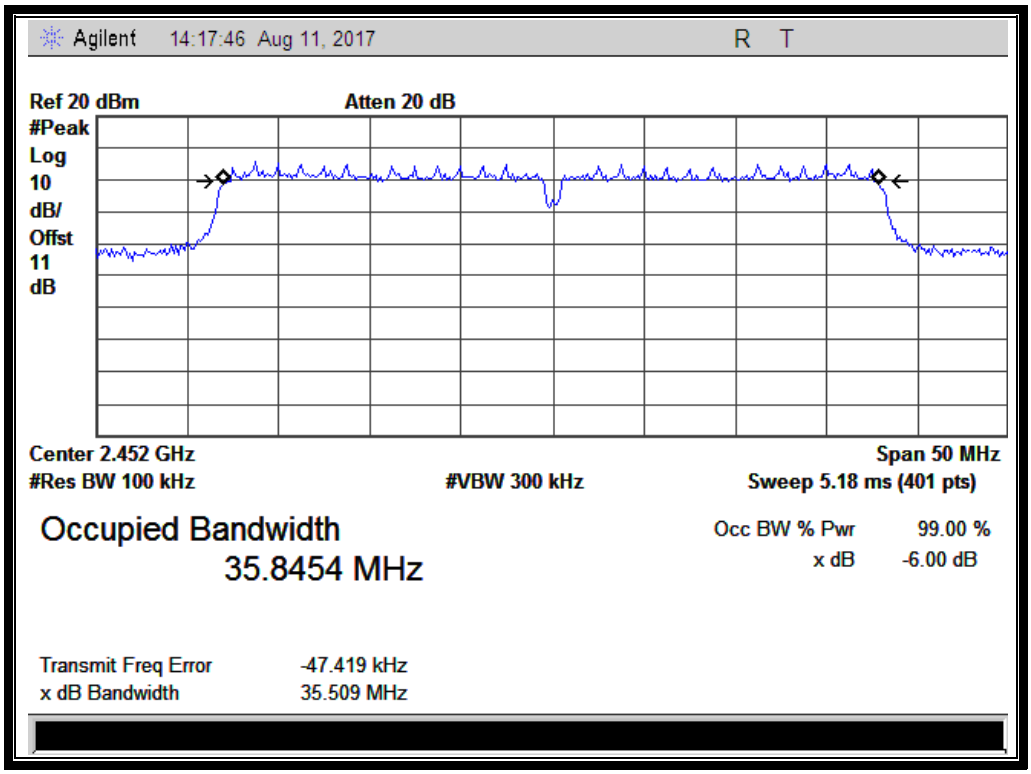
B. Test Plots:



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



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



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

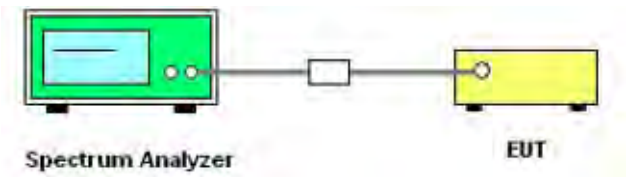
2.4 Conducted Spurious Emissions and Band Edge

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.

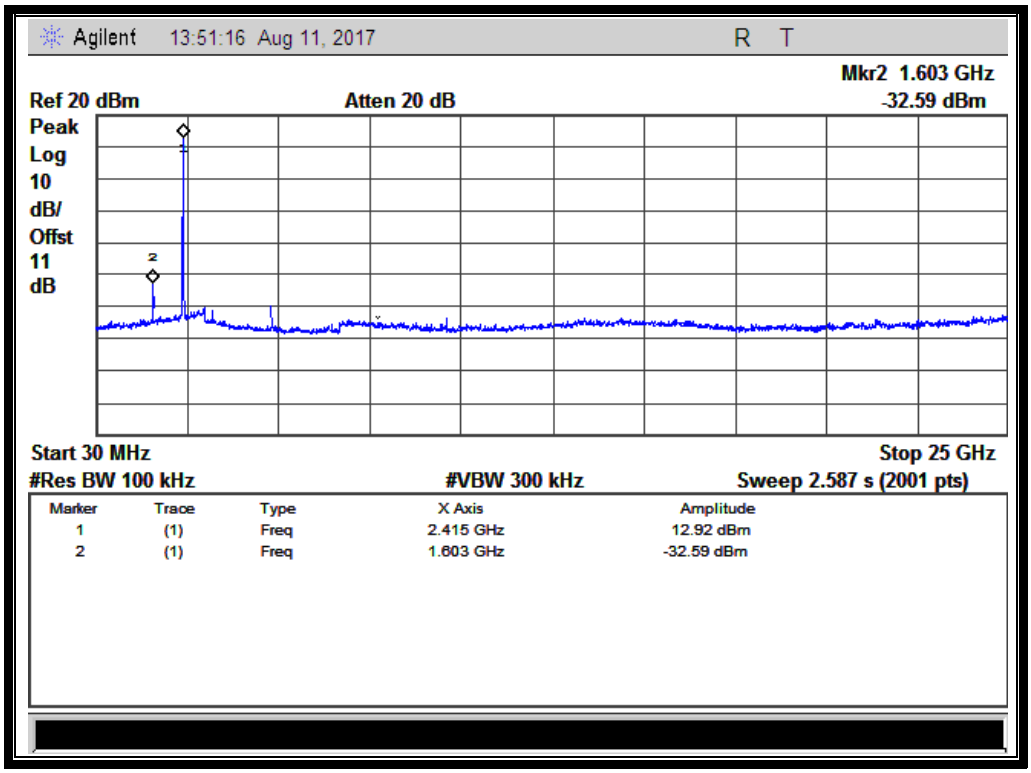
2.4.3.1 802.11b Test mode

A. Test Verdict:

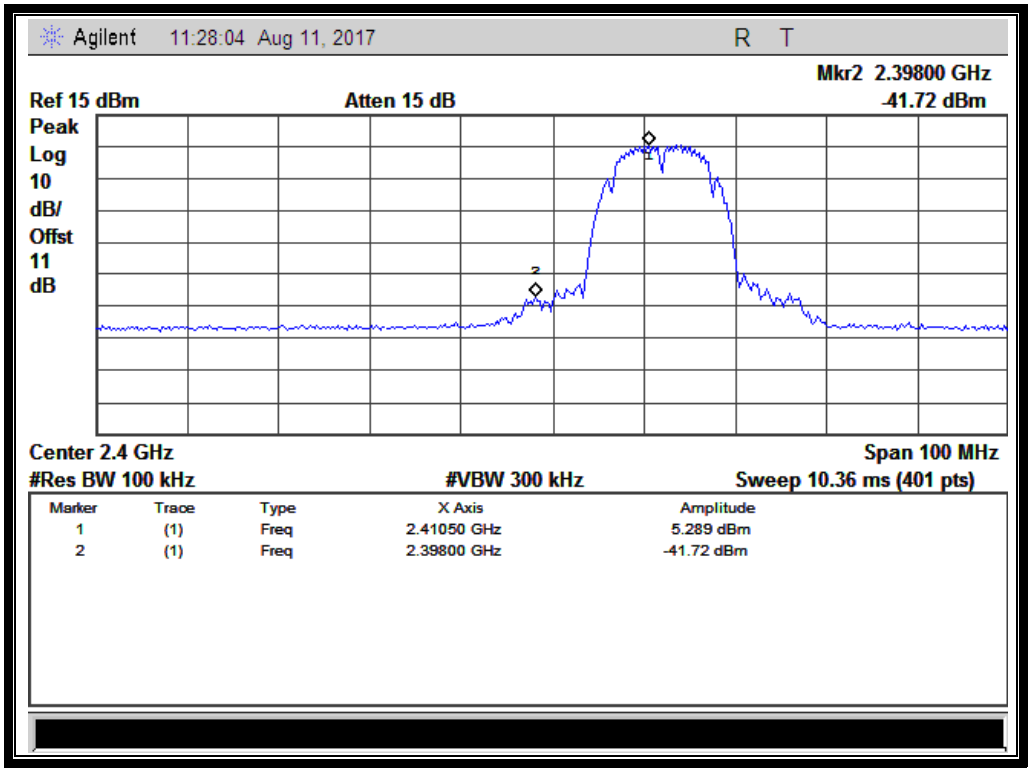
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-32.59	12.92	-7.08	PASS
6	2437	-39.80	9.36	-10.64	PASS
11	2462	-39.93	9.34	-10.66	PASS

B. Test Plots:

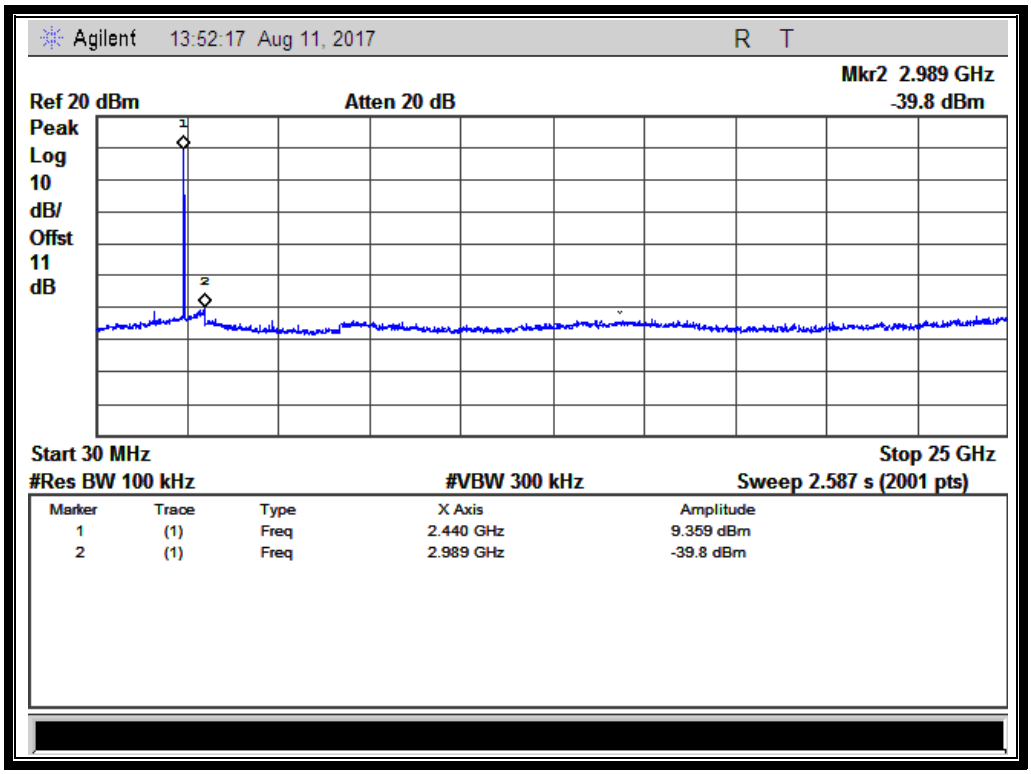
Note: the power of the Module transmitting frequency should be ignored.



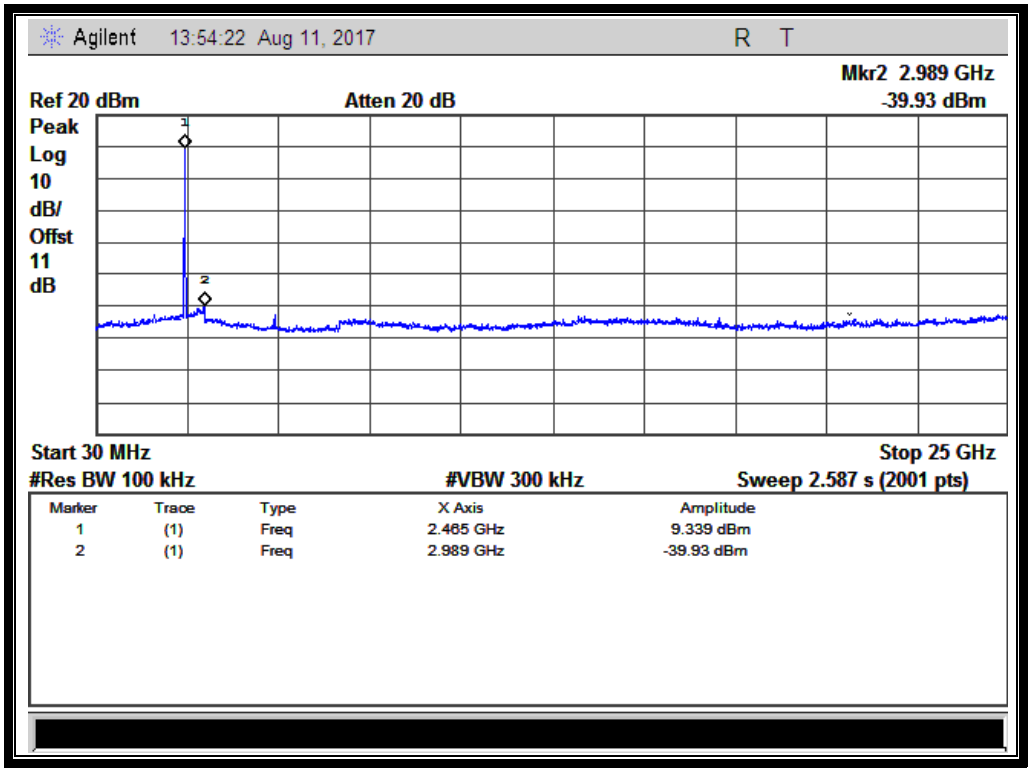
(Channel = 1, 30MHz to 25GHz)



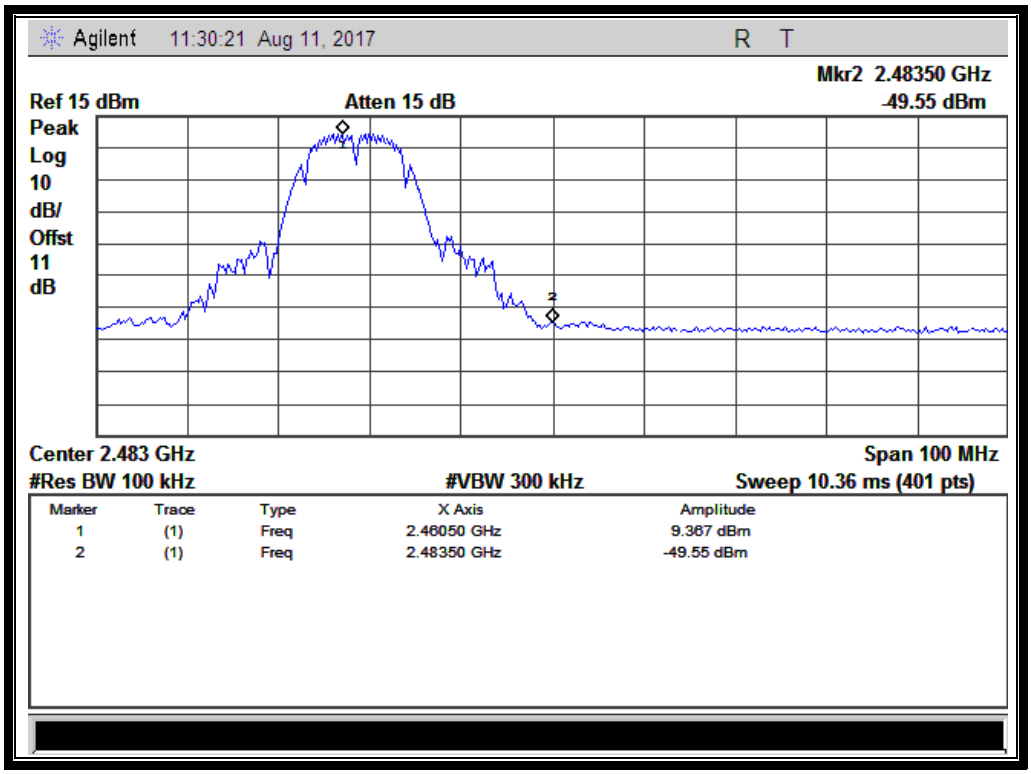
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

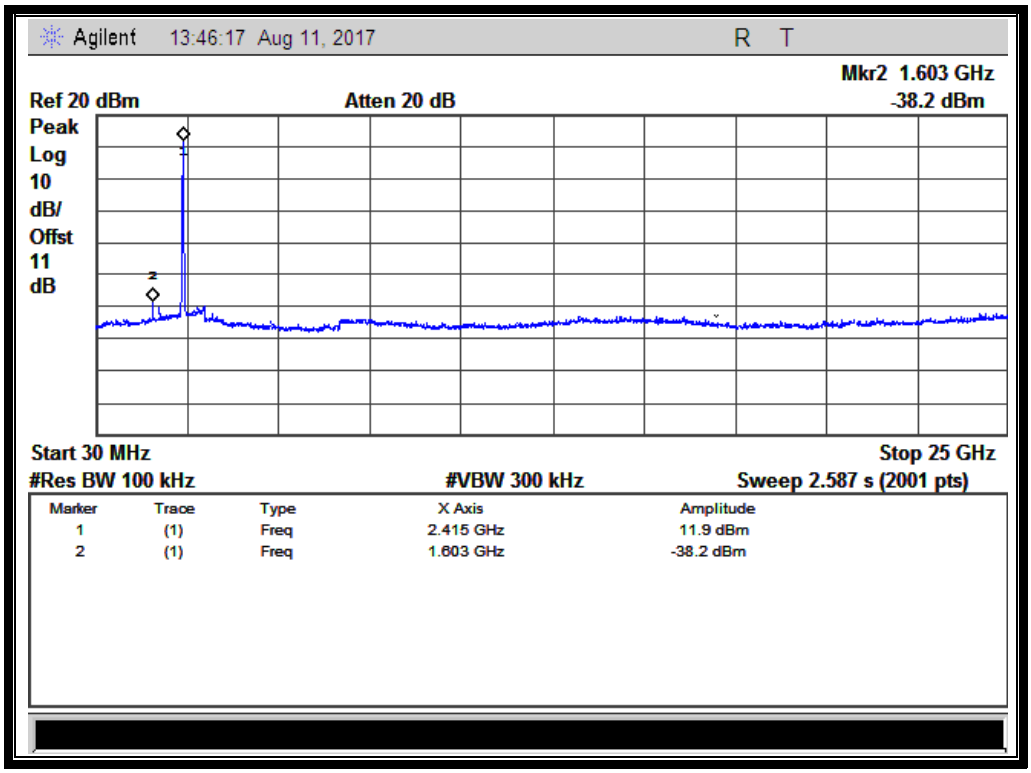
2.4.3.2 802.11g Test mode

A. Test Verdict:

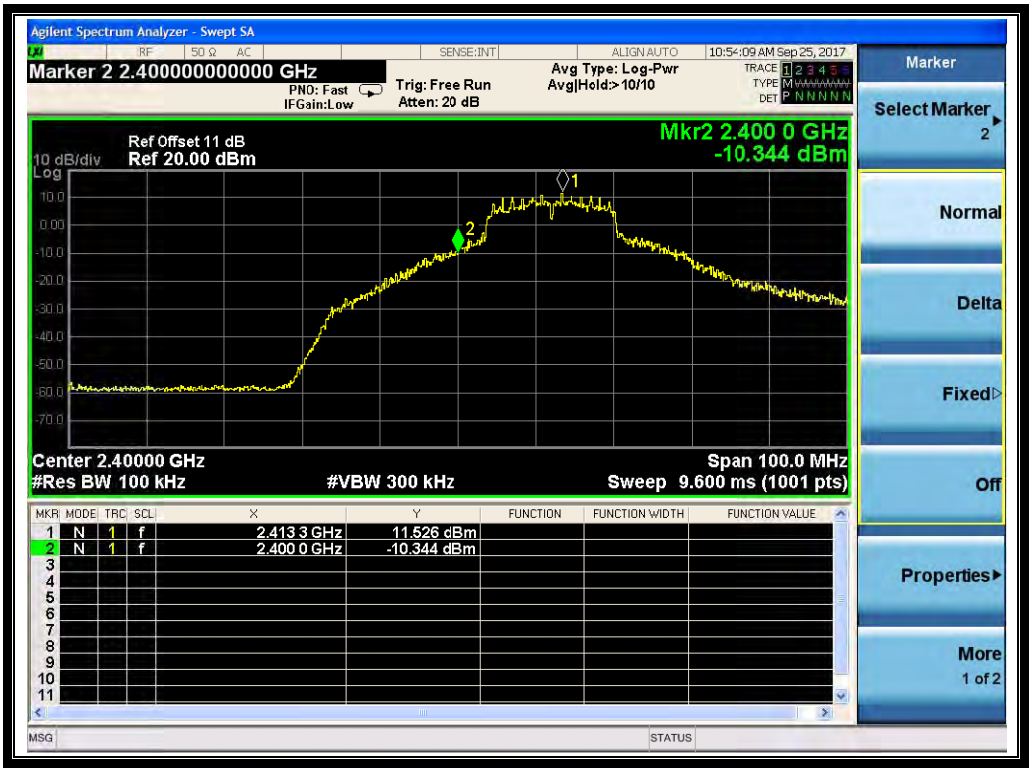
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-38.20	11.90	-8.10	PASS
6	2437	-41.36	9.63	-10.37	PASS
11	2462	-40.44	8.20	-11.80	PASS

B. Test Plots:

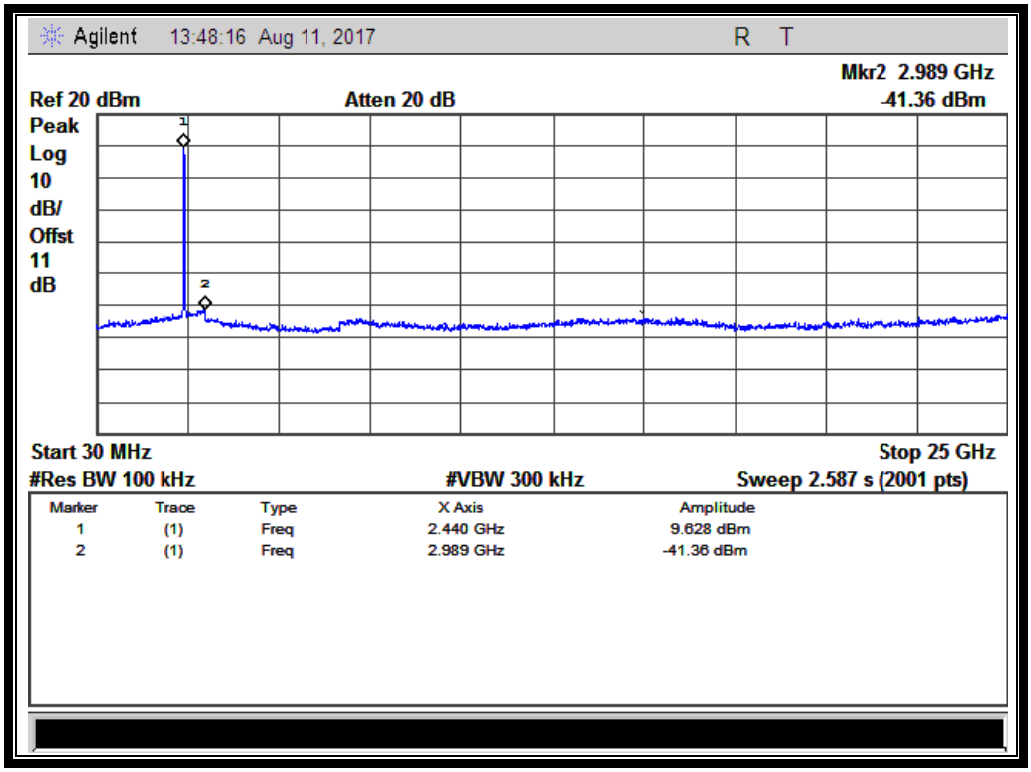
Note: the power of the Module transmitting frequency should be ignored.



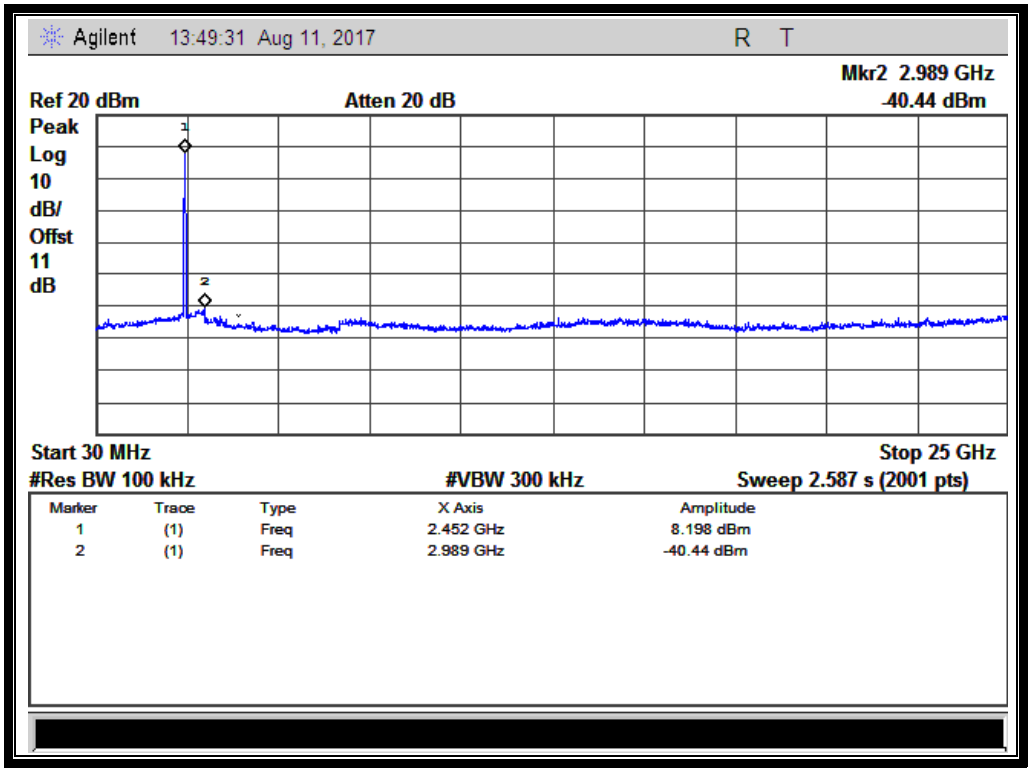
(Channel = 1, 30MHz to 25GHz)



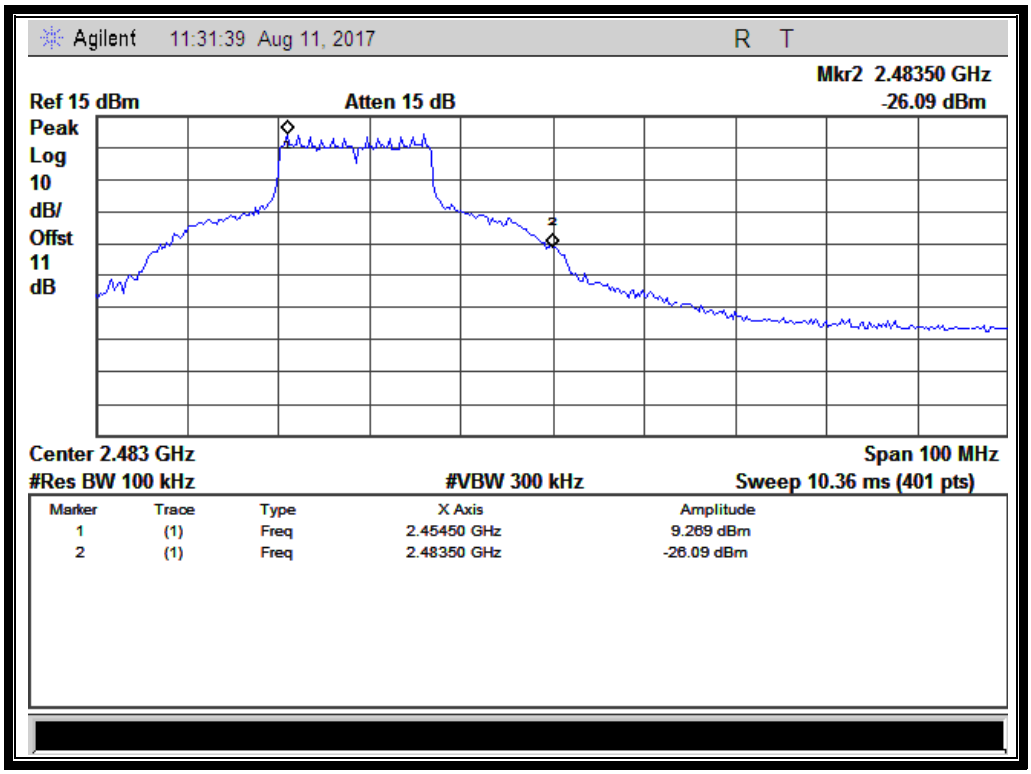
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

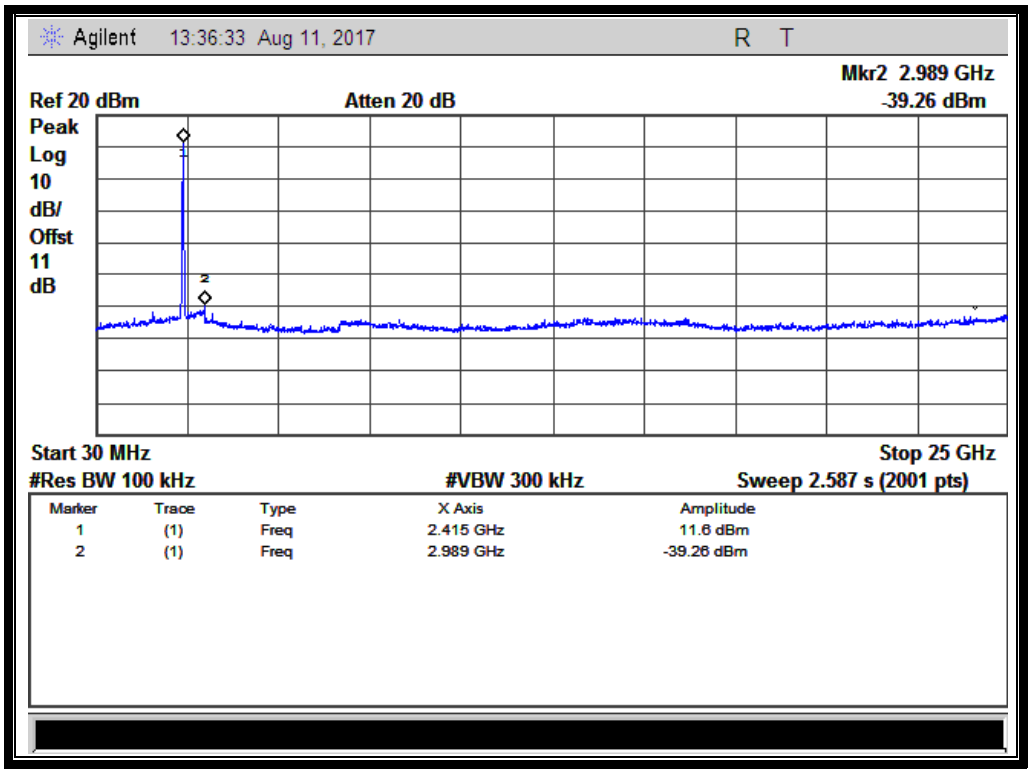
2.4.3.3 802.11n -20MHz Test mode

A. Test Verdict:

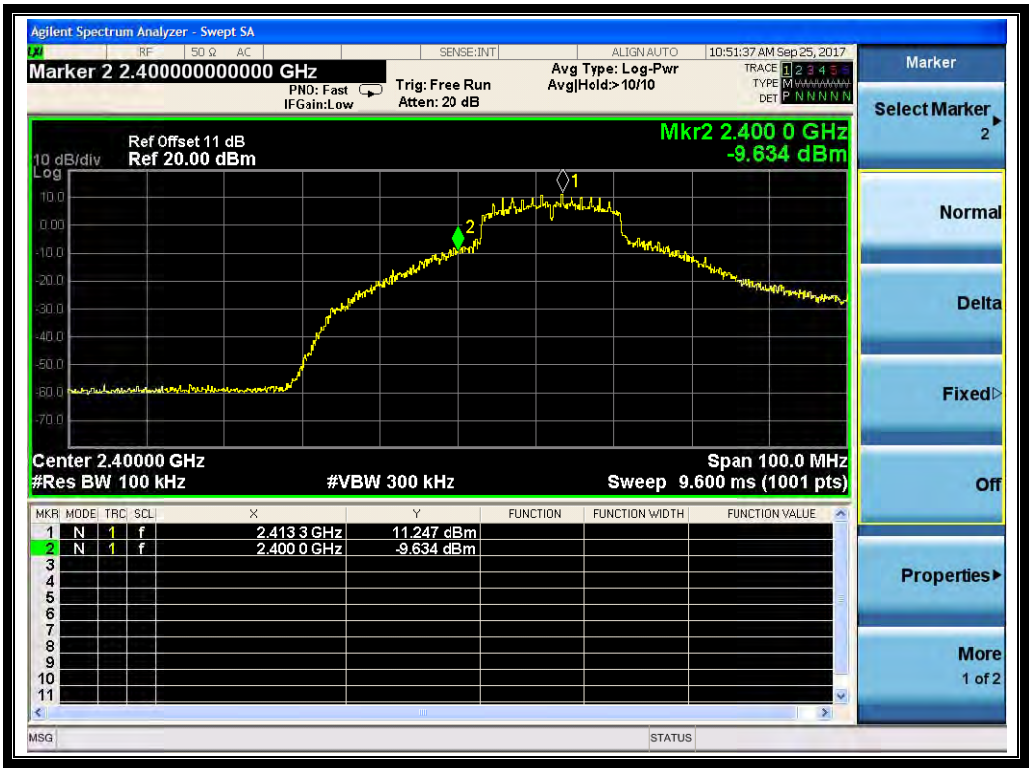
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-39.26	11.60	-8.40	PASS
6	2437	-40.72	8.86	-11.14	PASS
11	2462	-40.66	9.40	-10.6	PASS

B. Test Plots:

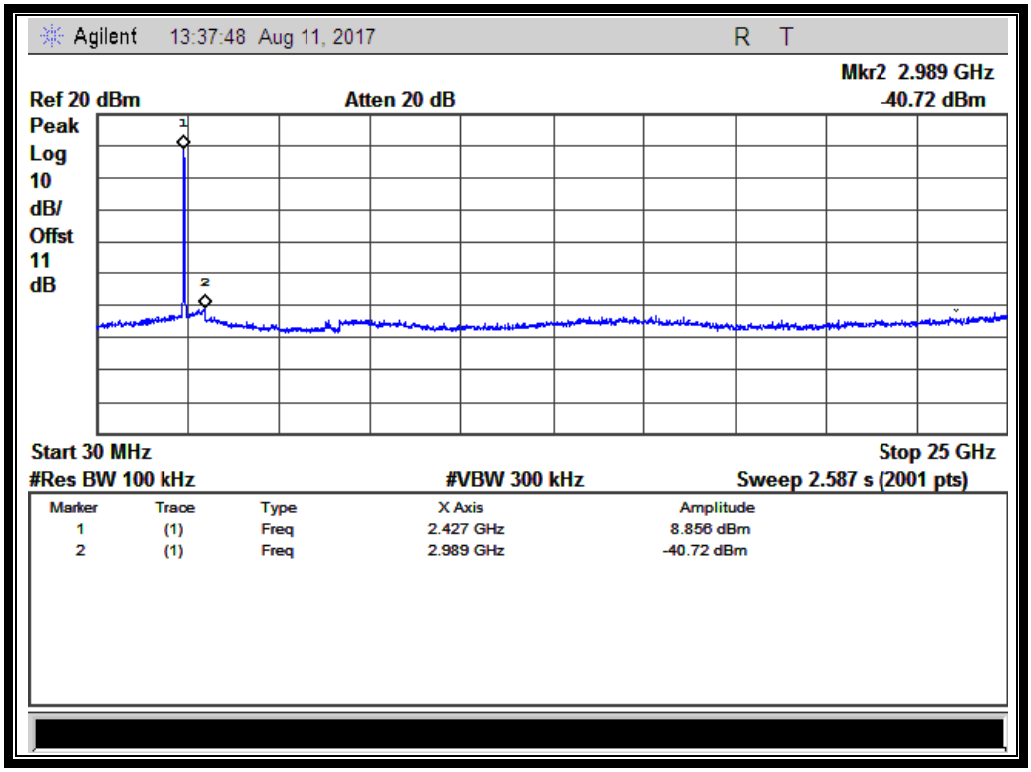
Note: the power of the Module transmitting frequency should be ignored.



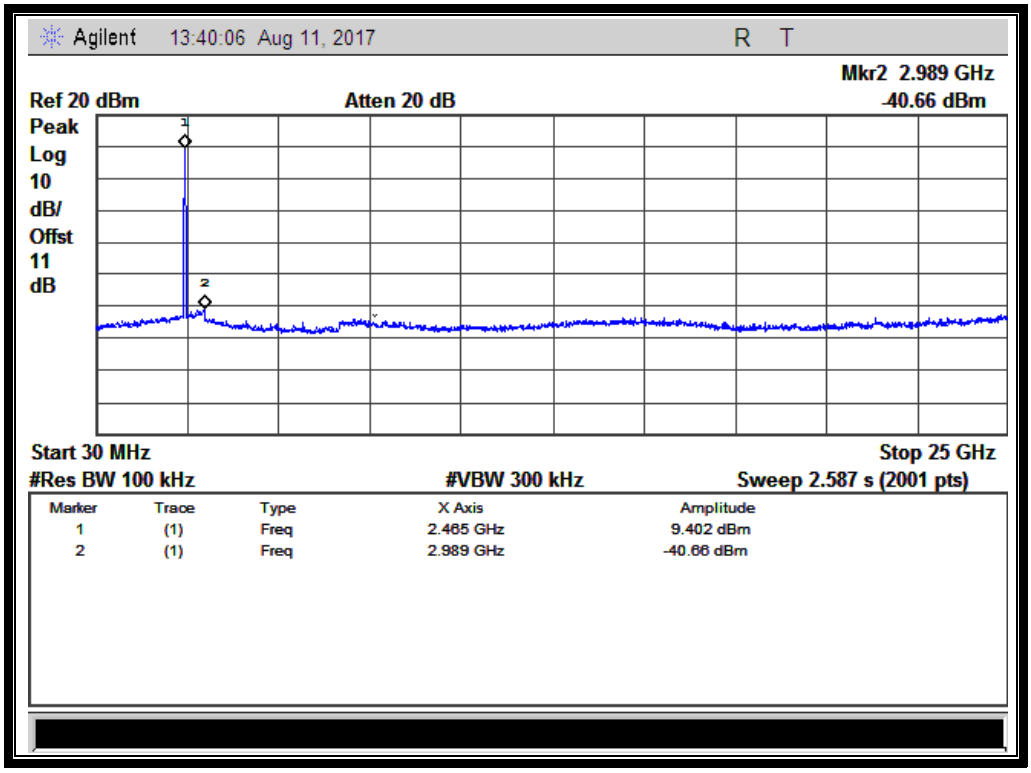
(Channel = 1, 30MHz to 25GHz)



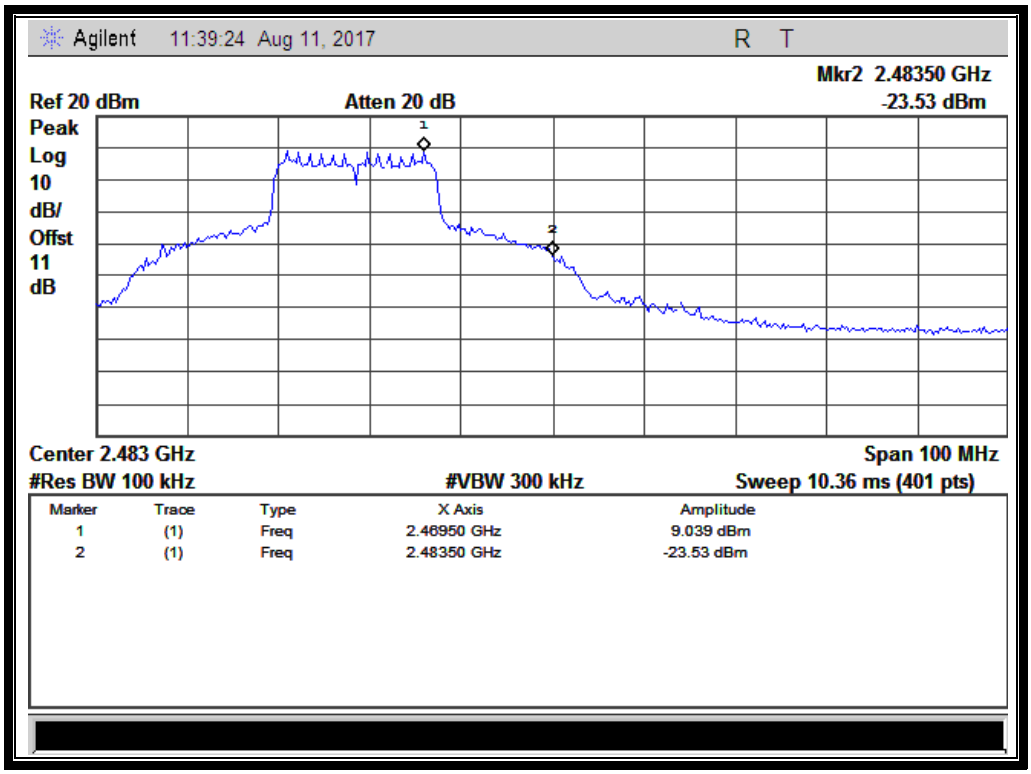
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

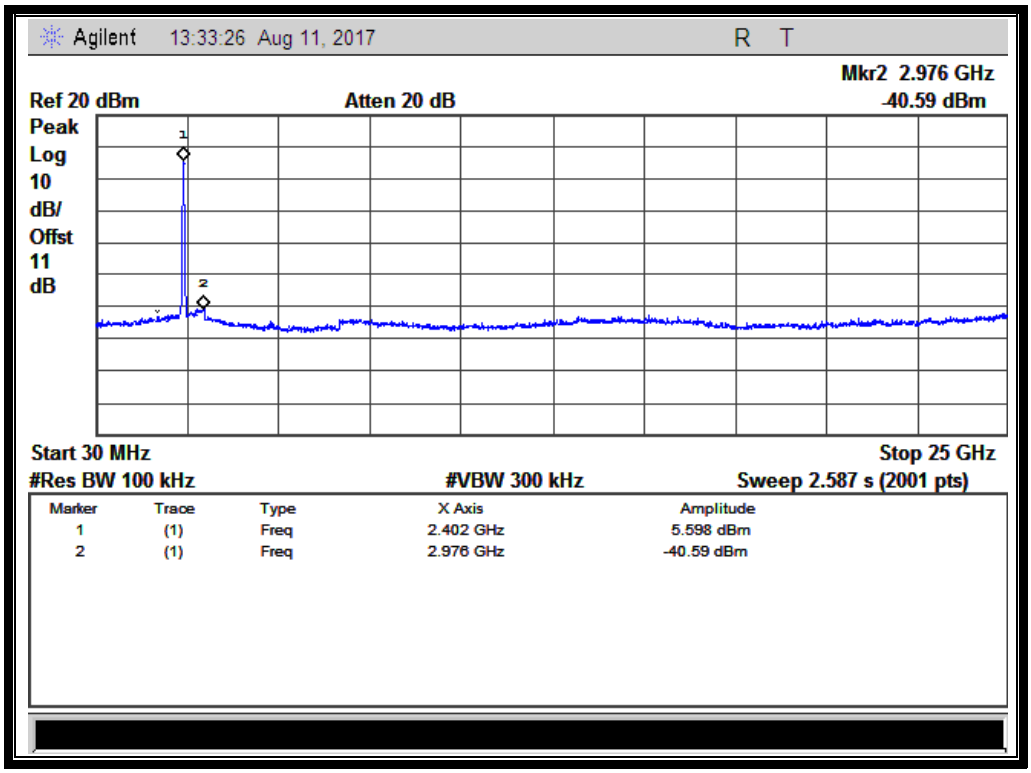
2.4.3.4 802.11n -40MHz Test mode

A. Test Verdict:

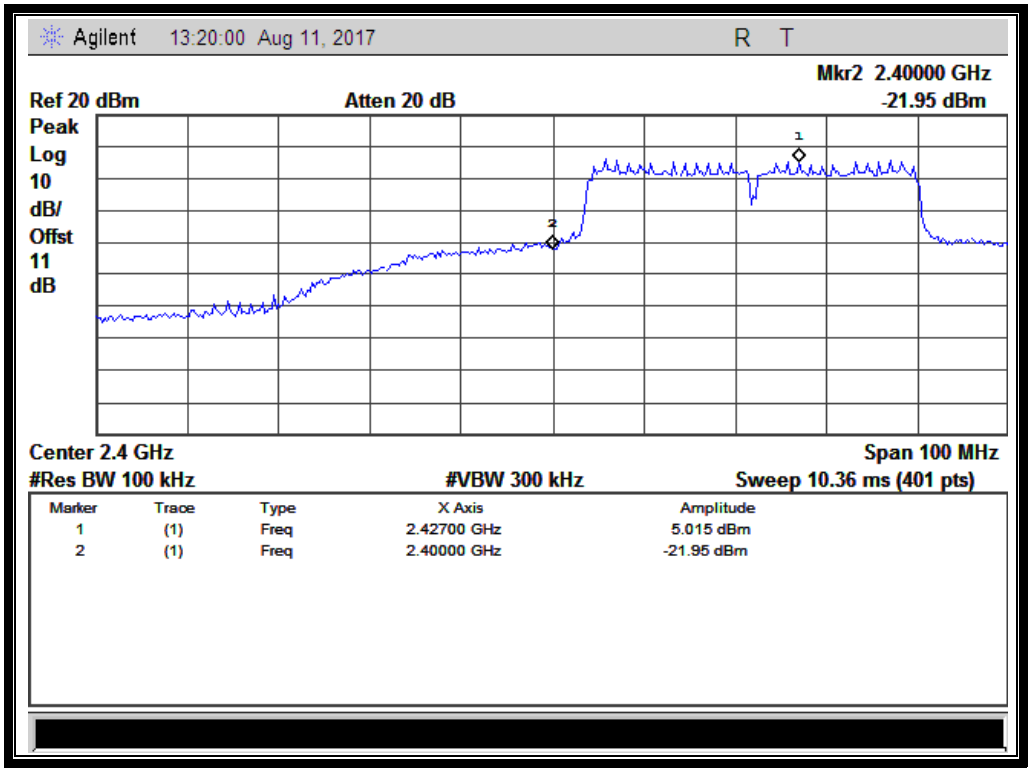
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-40.59	5.60	-14.40	PASS
6	2437	-40.40	4.90	-15.10	PASS
9	2452	-40.67	5.33	-14.67	PASS

B. Test Plots:

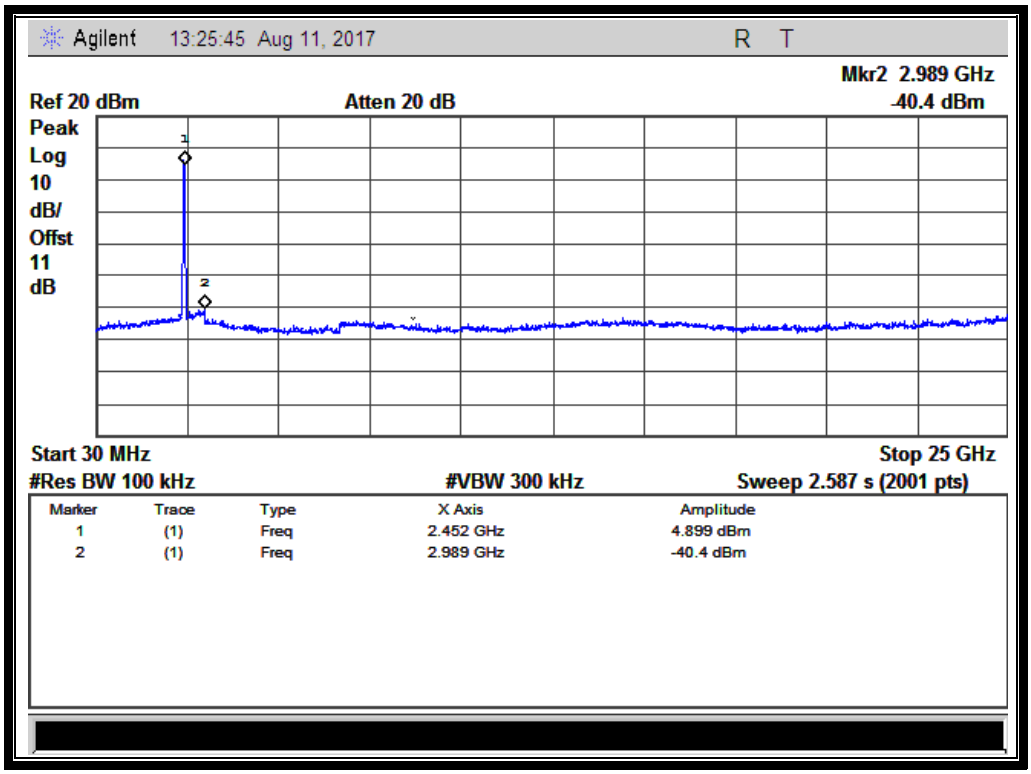
Note: the power of the Module transmitting frequency should be ignored.



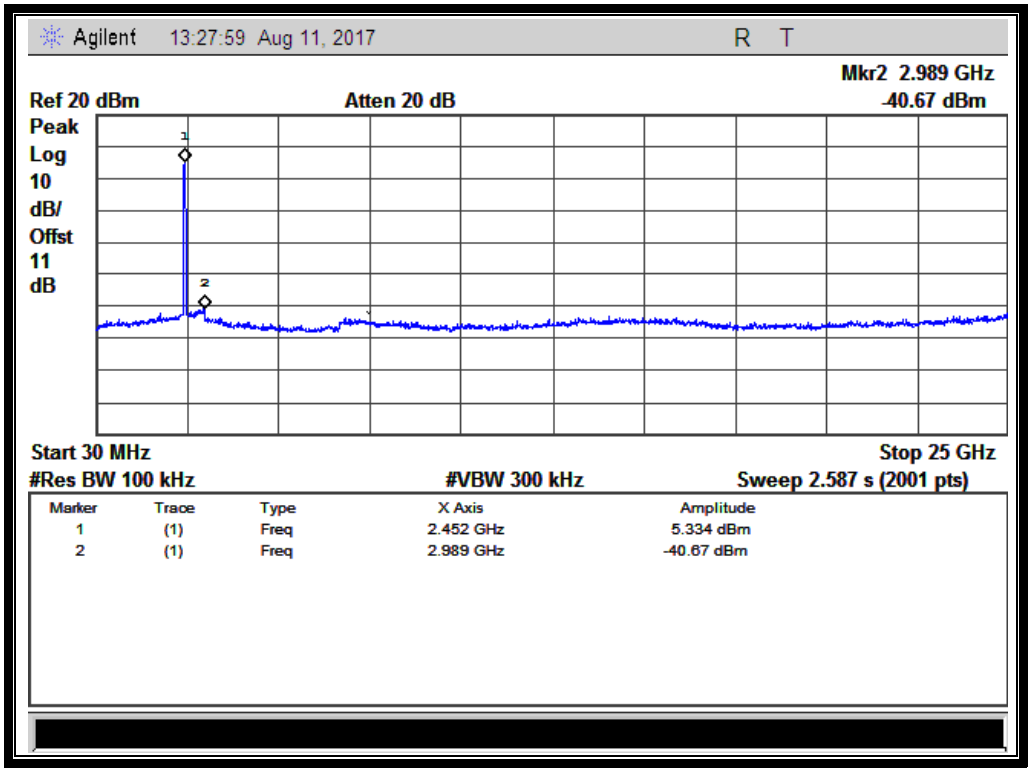
(Channel = 3, 30MHz to 25GHz)



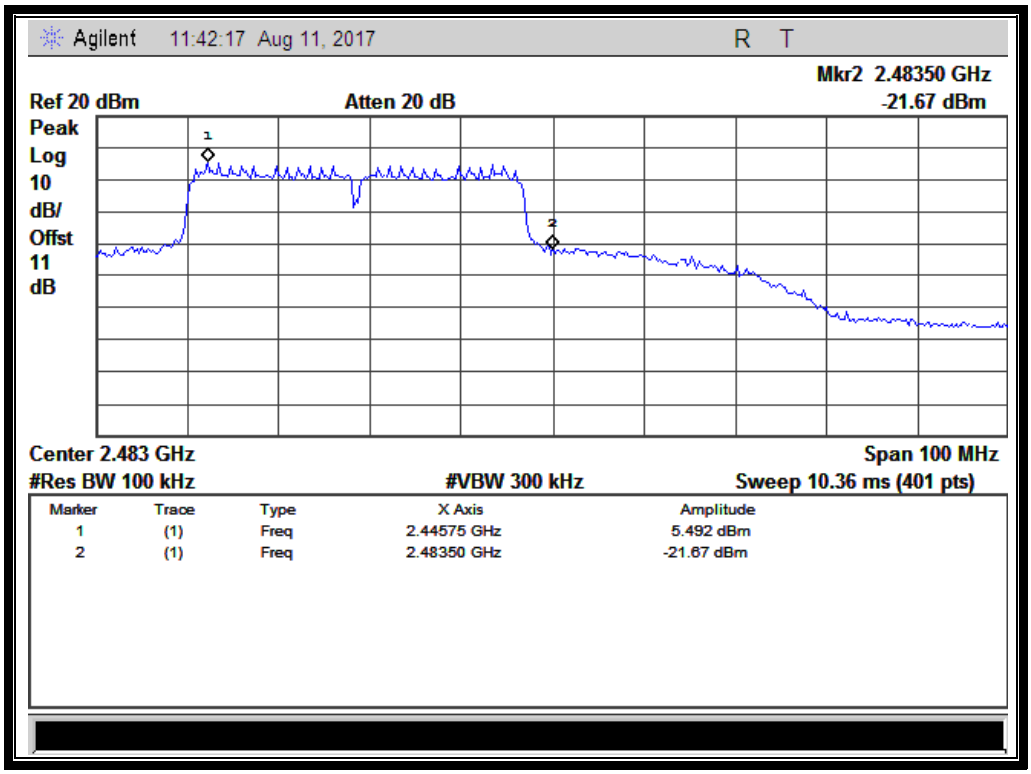
(Band Edge @ Channel = 3)



(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.

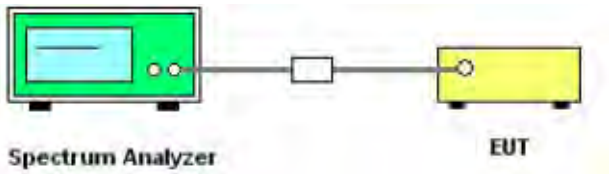
2.5.2 Test Description

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).

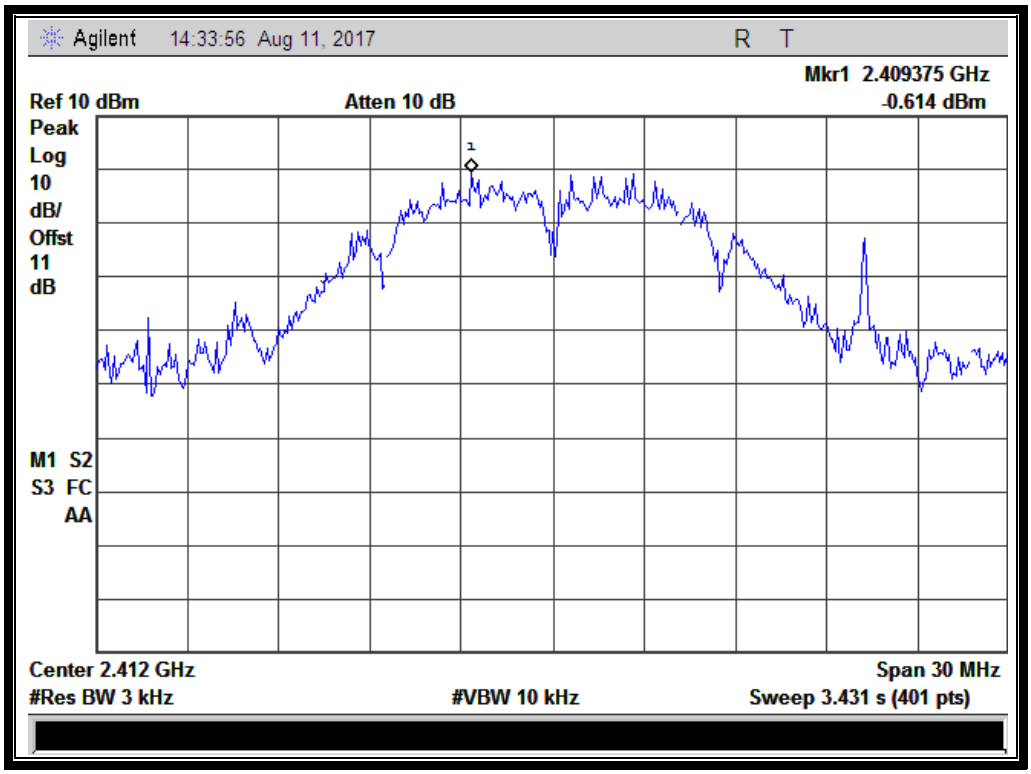
2.5.3 Test Result

2.5.3.1 802.11b Test mode

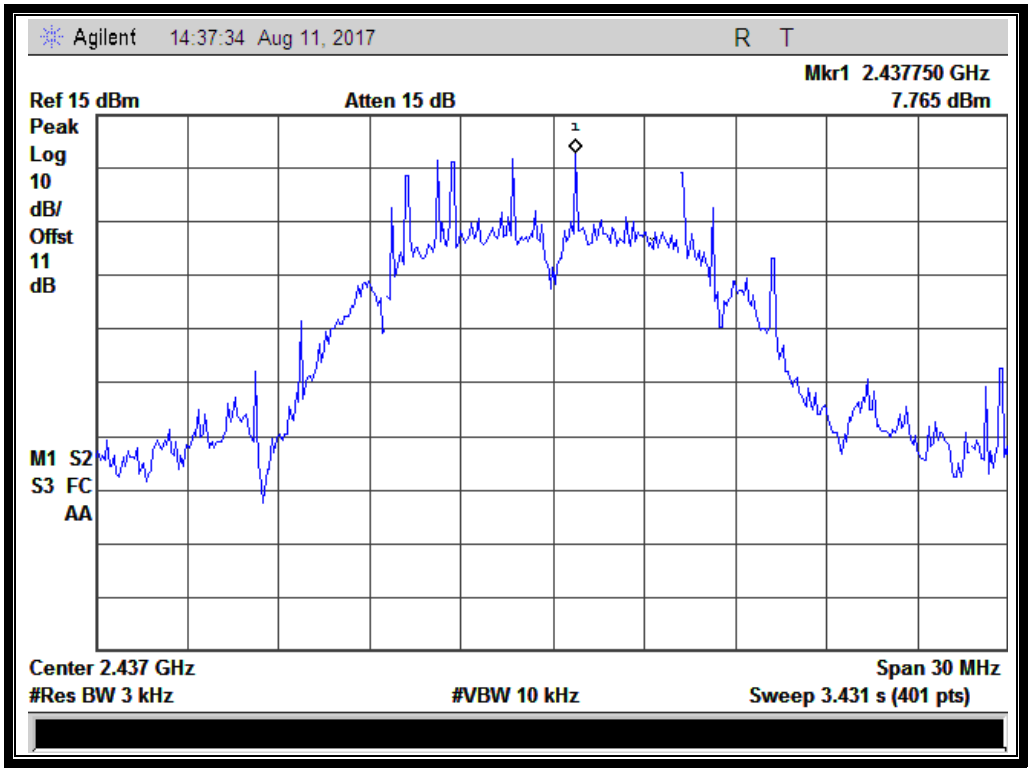
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-0.61	8	PASS
6	2437	7.76	8	PASS
11	2462	6.54	8	PASS
Measurement uncertainty: ±1.3dB				

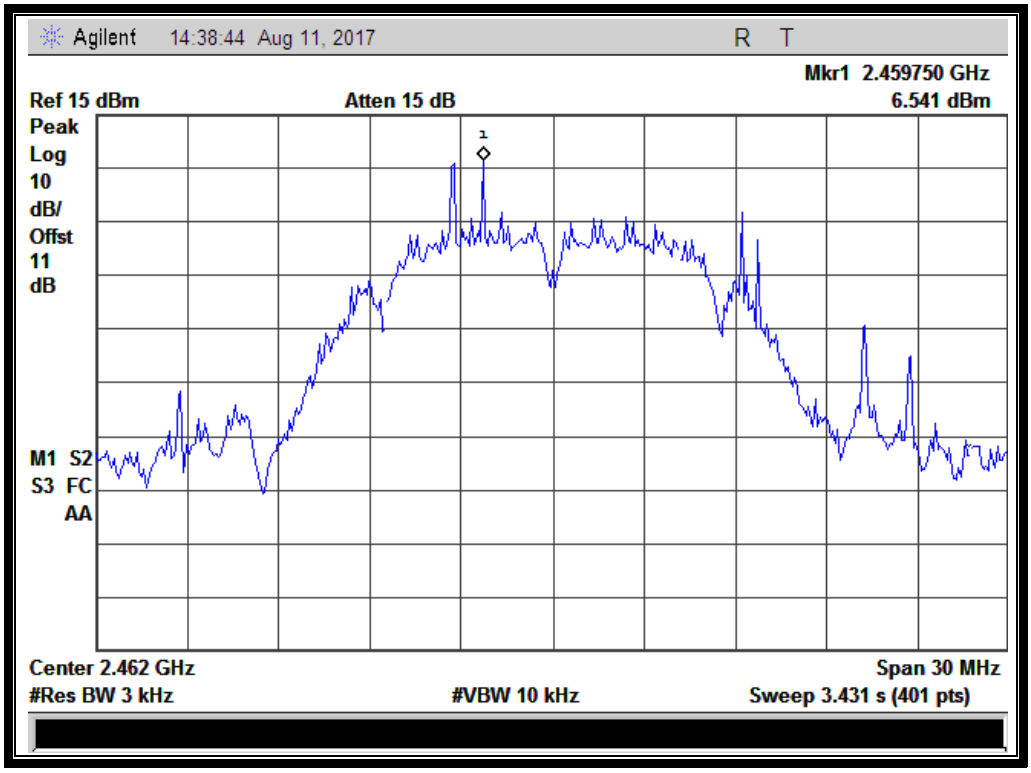
B. Test Plots:



(Channel = 1 @ 802.11b)



(Channel = 6 @ 802.11b)



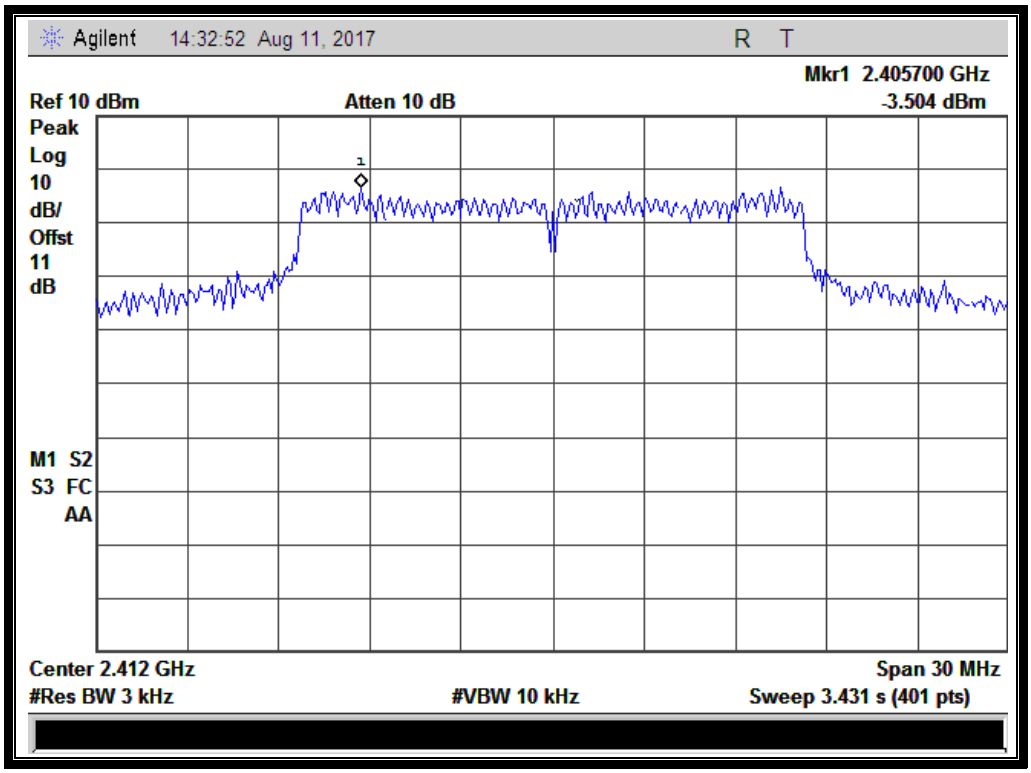
(Channel = 11 @ 802.11b)

2.5.3.2 802.11g Test mode

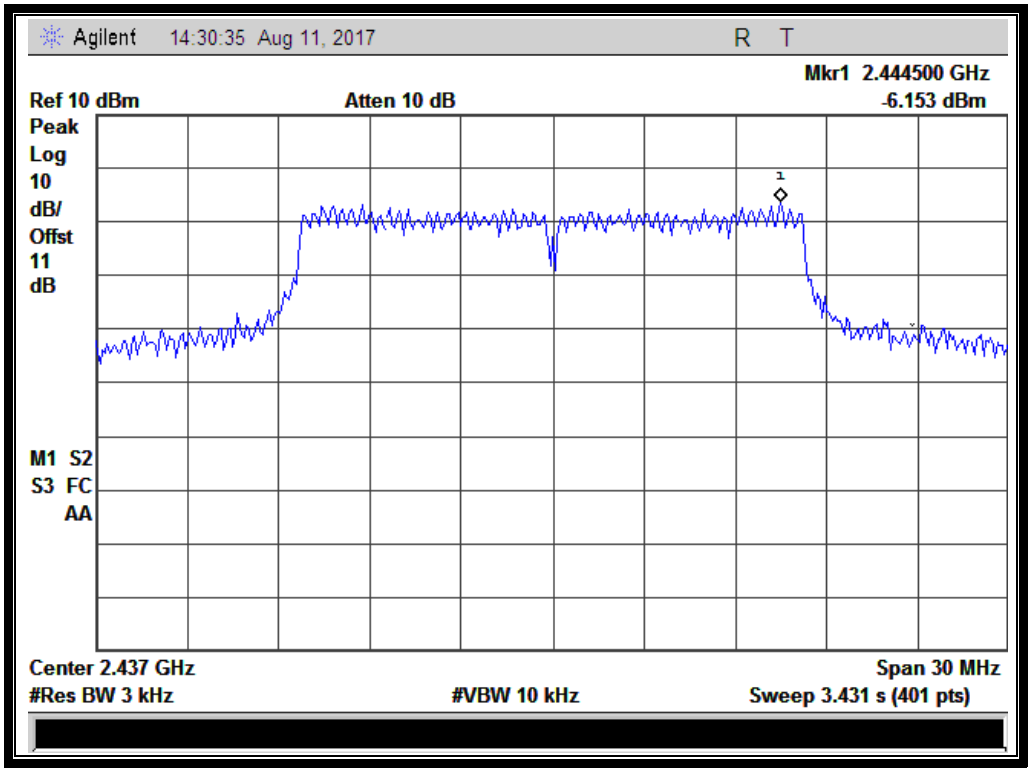
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-3.50	8	PASS
6	2437	-6.15	8	PASS
11	2462	-6.90	8	PASS
Measurement uncertainty: ±1.3dB				

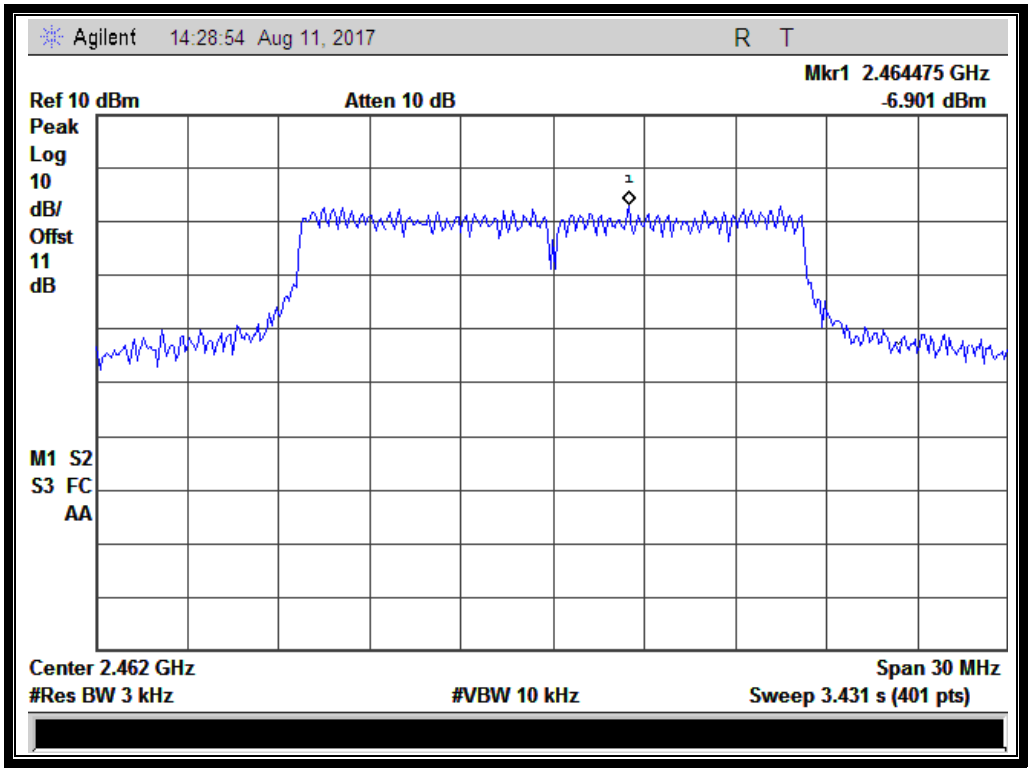
B. Test Plots:



(Channel = 1 @ 802.11g)



(Channel = 6 @ 802.11g)



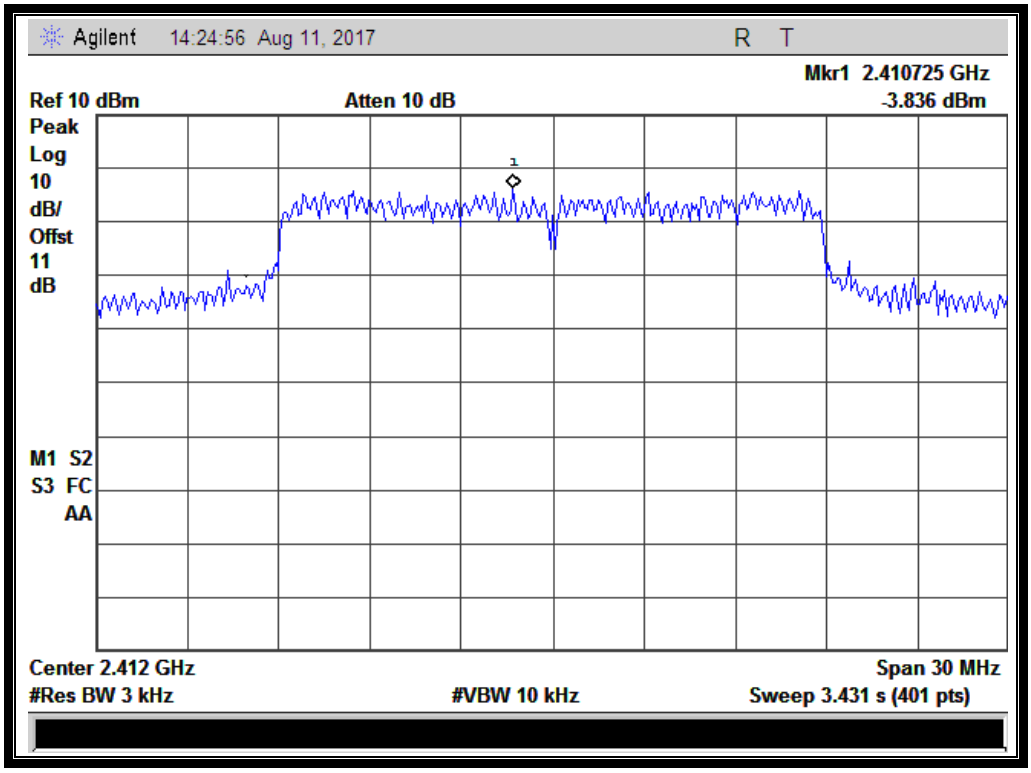
(Channel = 11 @ 802.11g)

2.5.3.3 802.11n-20MHz Test mode

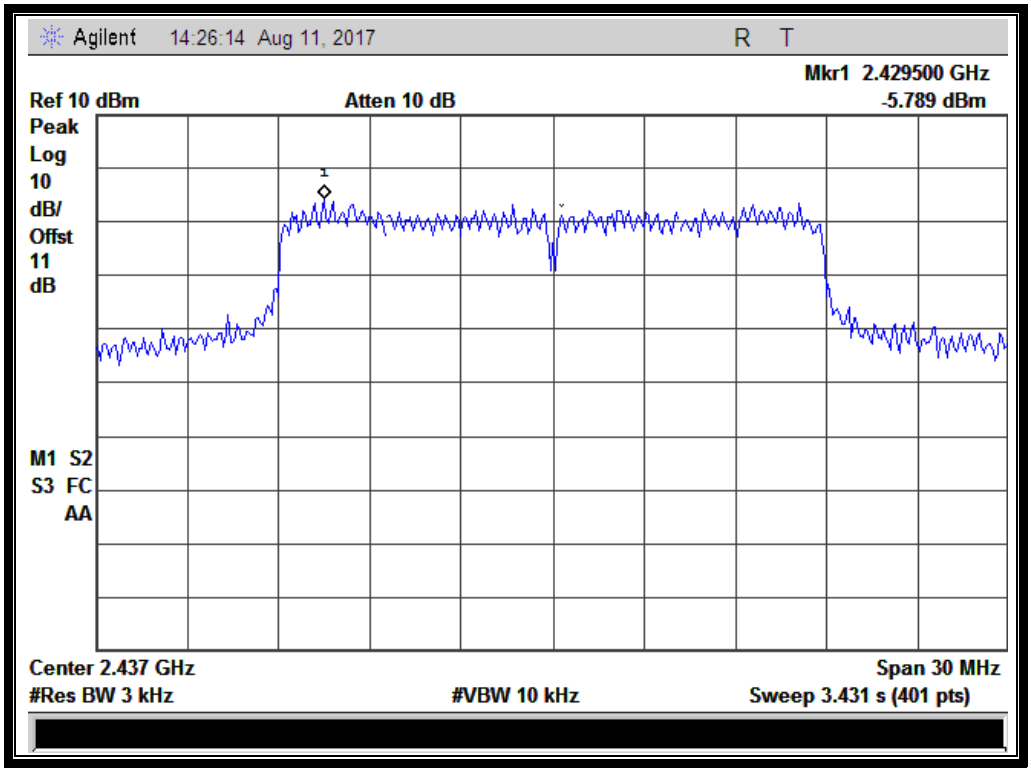
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-3.84	8	PASS
6	2437	-5.79	8	PASS
11	2462	-6.66	8	PASS
Measurement uncertainty: ±1.3dB				

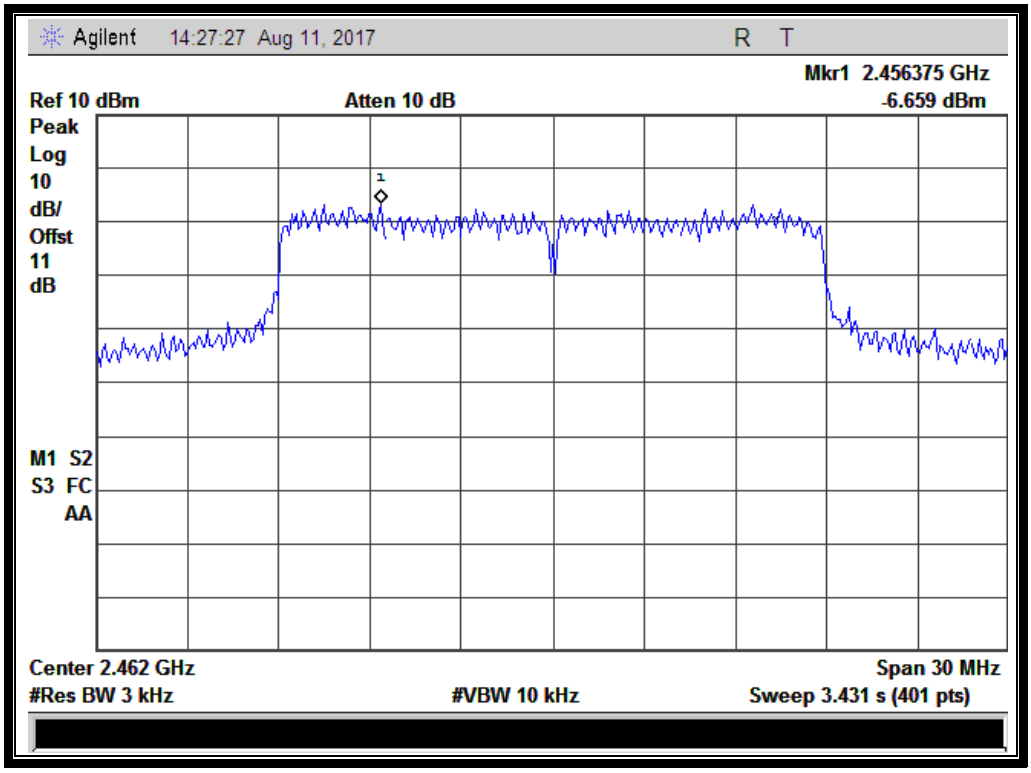
B. Test Plots:



(Channel = 1 @ 802.11n-20MHz)



(Channel = 6 @ 802.11n-20MHz)



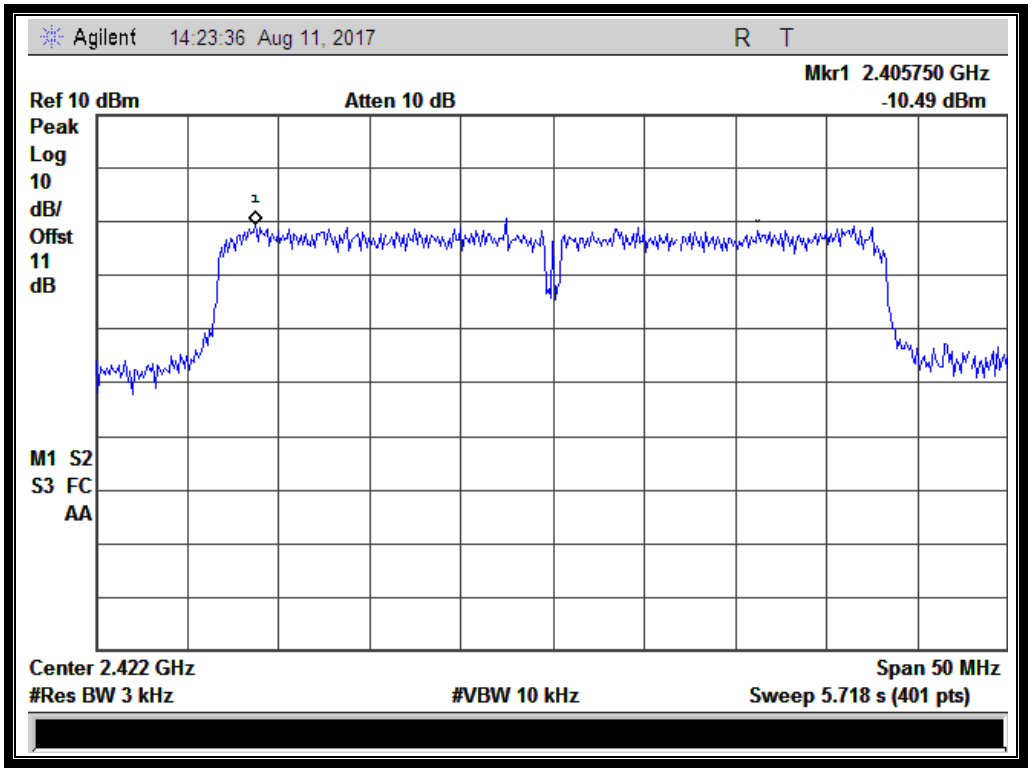
(Channel = 11 @ 802.11n-20MHz)

2.5.3.4 802.11n-40MHz Test mode

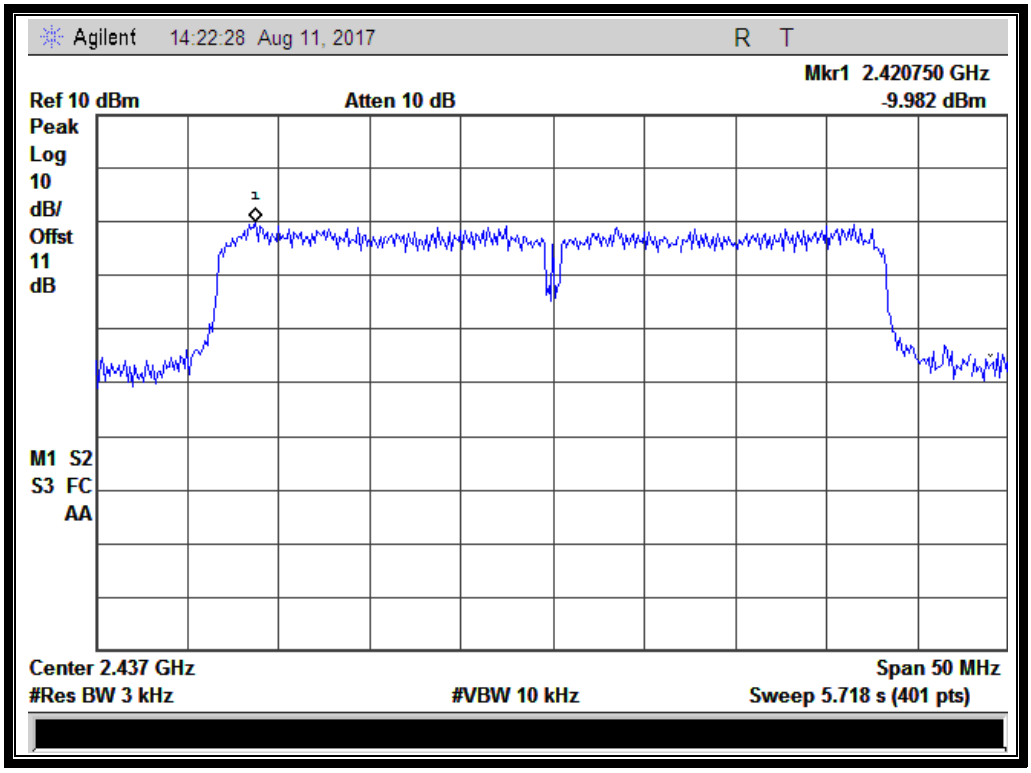
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
3	2422	-10.49	8	PASS
6	2437	-9.98	8	PASS
9	2452	-10.09	8	PASS
Measurement uncertainty: ±1.3dB				

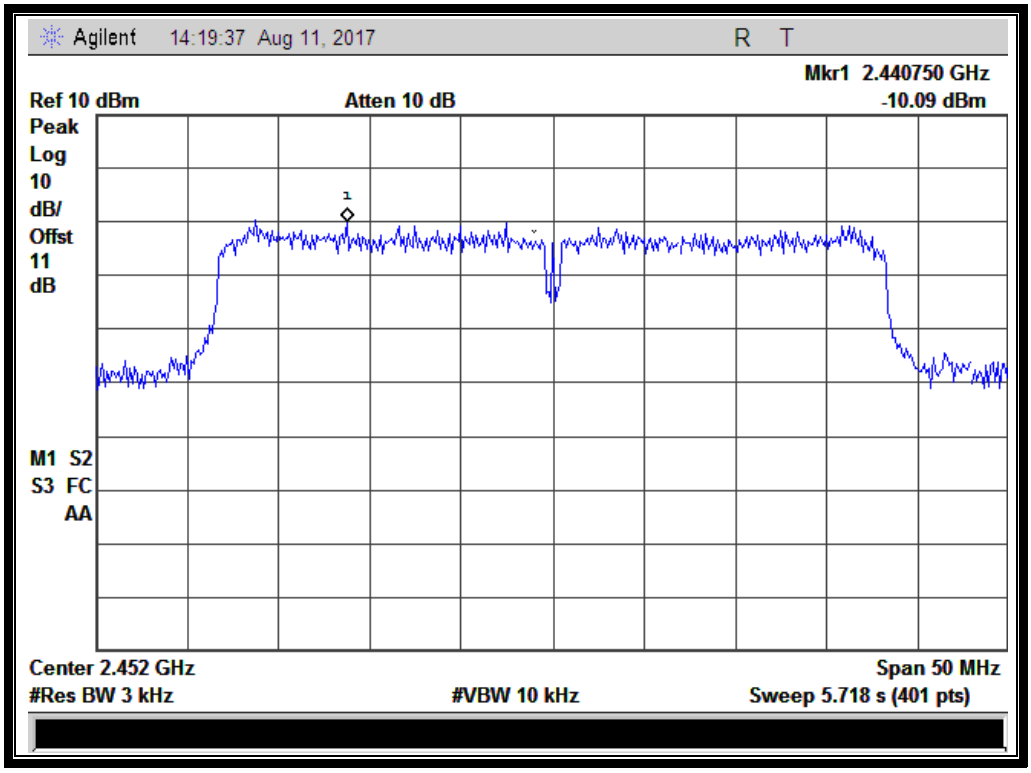
B. Test Plots:



(Channel = 3 @ 802.11n-40MHz)



(Channel = 6 @ 802.11n-40MHz)



(Channel = 9 @ 802.11n-40MHz)

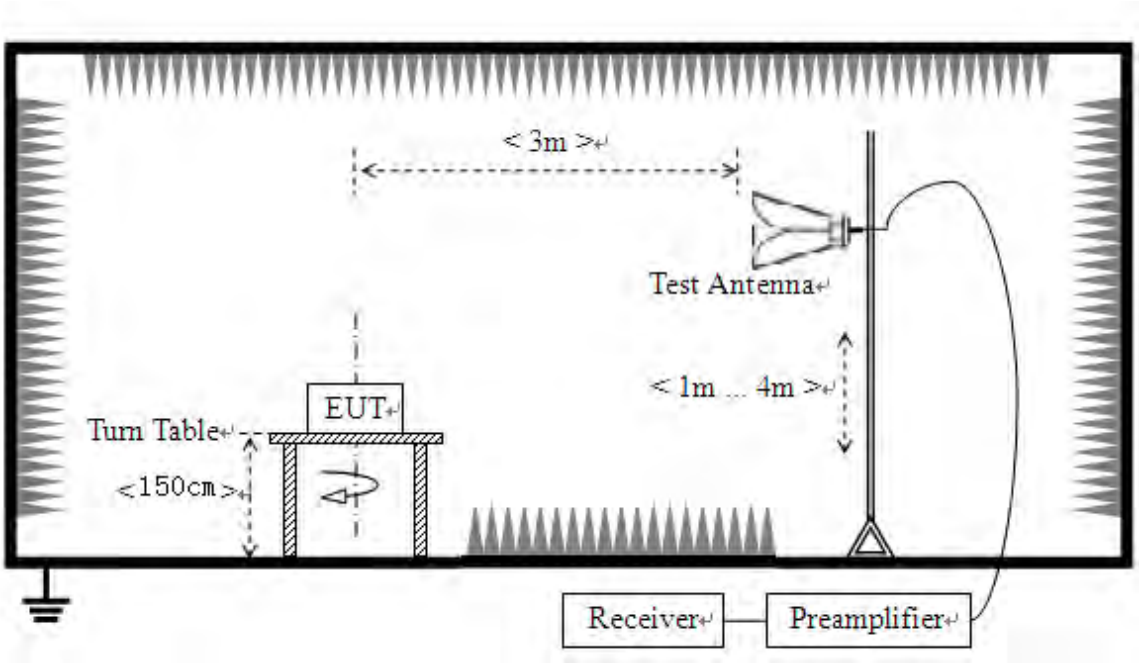
2.6 Restricted Frequency Bands

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.

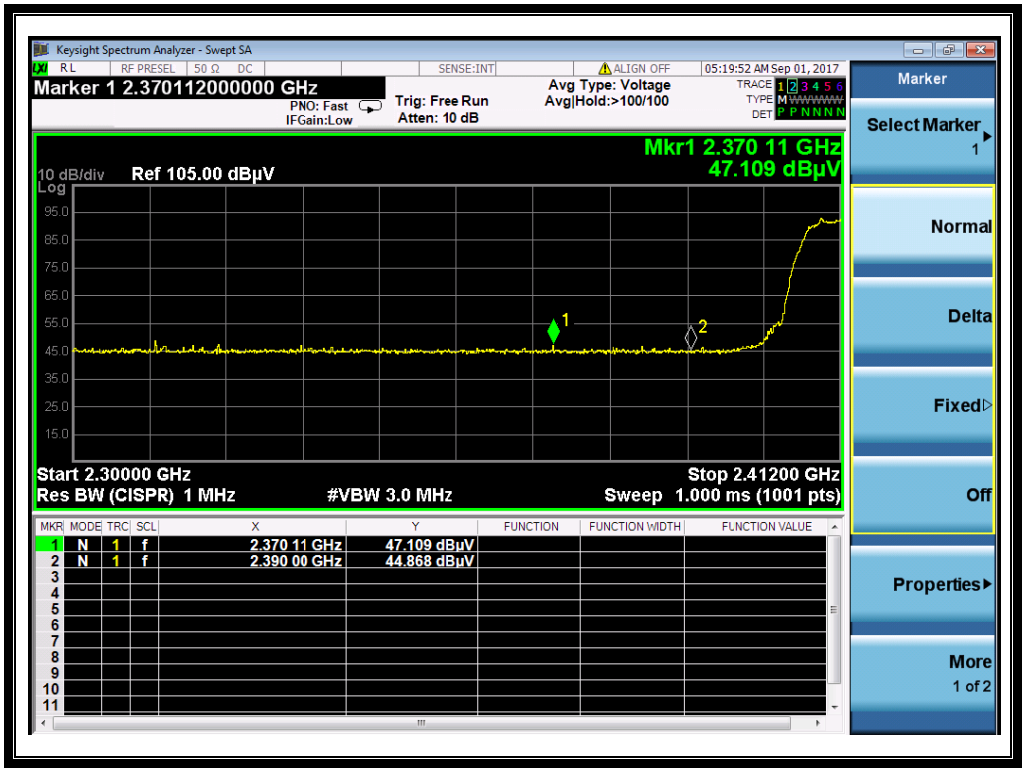
2.6.3.1 802.11b Test mode

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

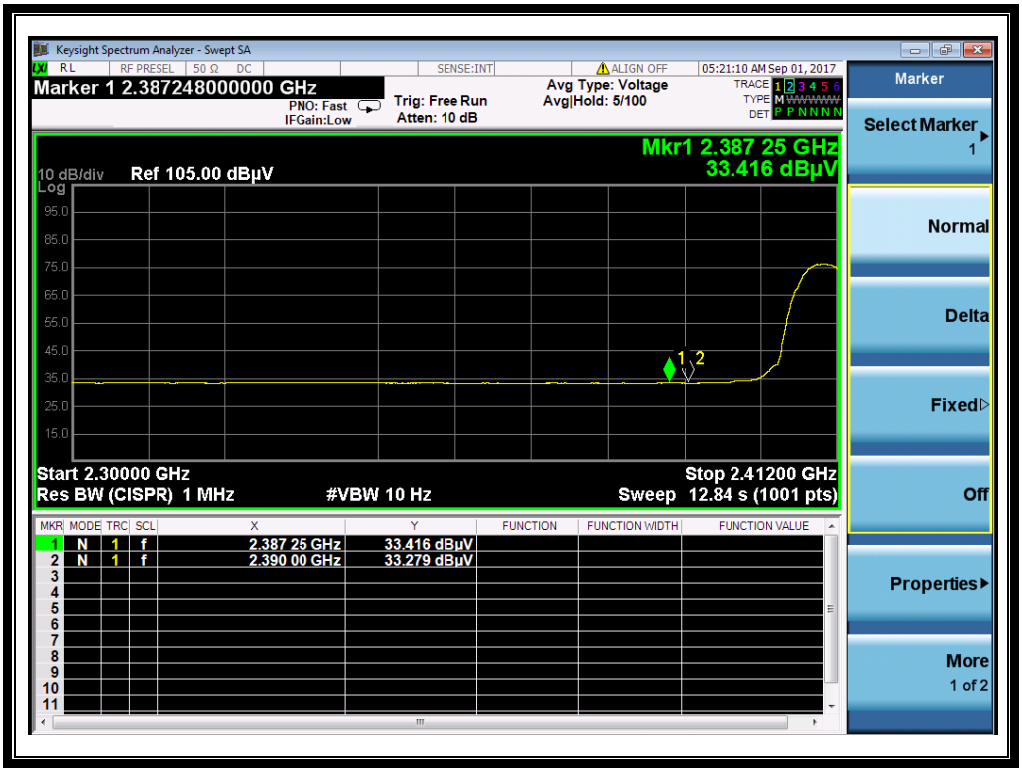
A. Test Verdict:

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	2370.11	PK	47.11	-33.63	32.56	46.04	74	Pass
1	2387.25	AV	33.42	-33.63	32.56	32.35	54	Pass
11	2488.90	PK	48.01	-33.18	32.5	47.33	74	Pass
11	2485.67	AV	33.21	-33.18	32.5	32.53	54	Pass

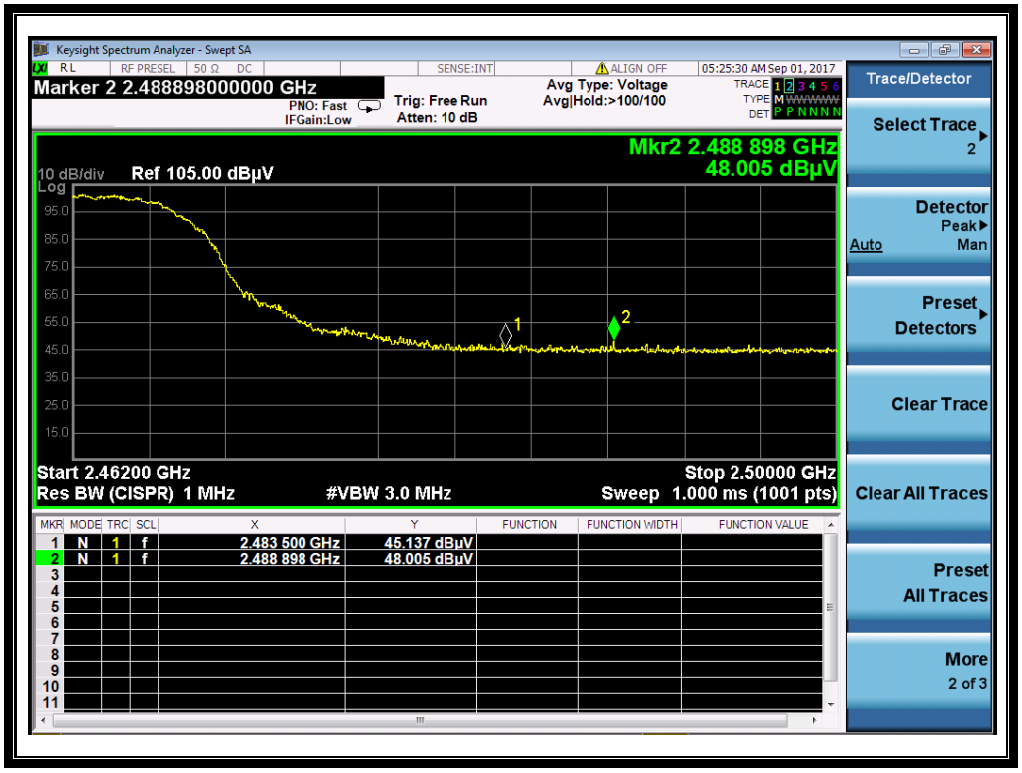
B. Test Plots:



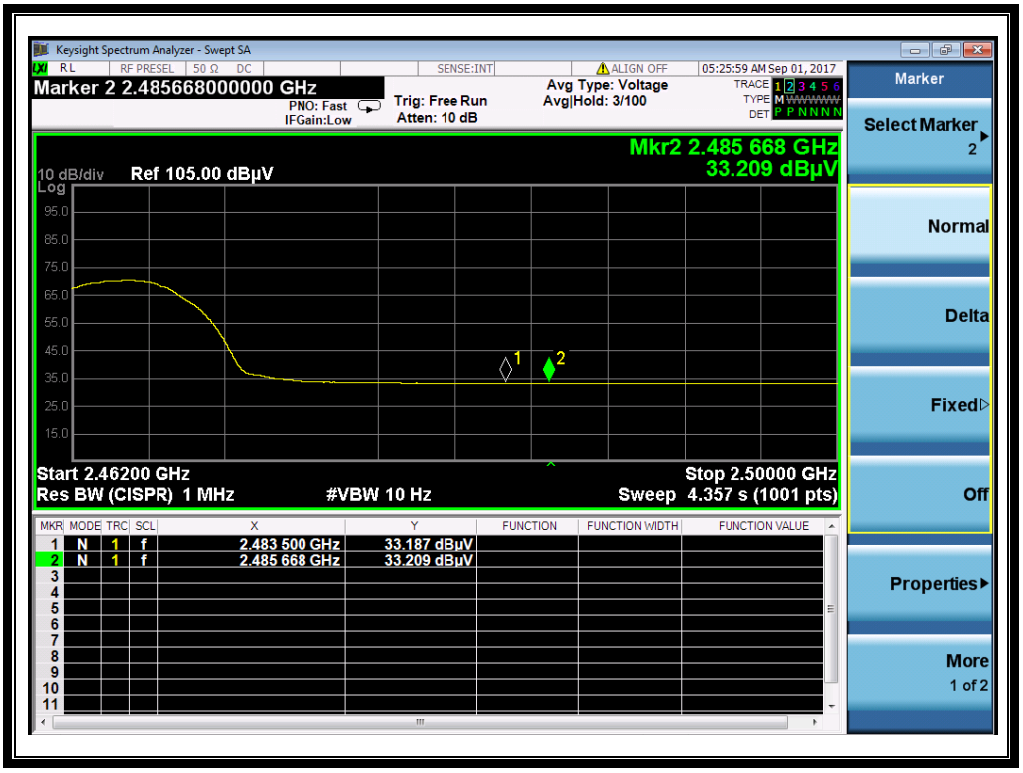
(Plot A1: Channel = 1 PEAK @ 802.11b)



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



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



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

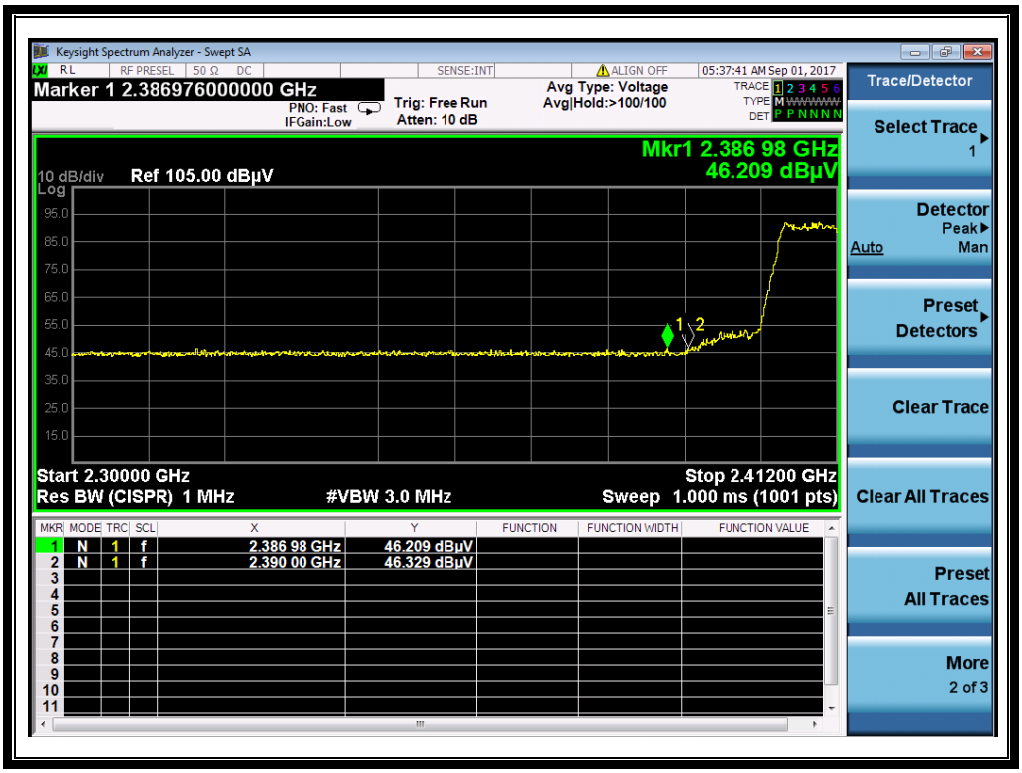
2.6.3.2 802.11g Test mode

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

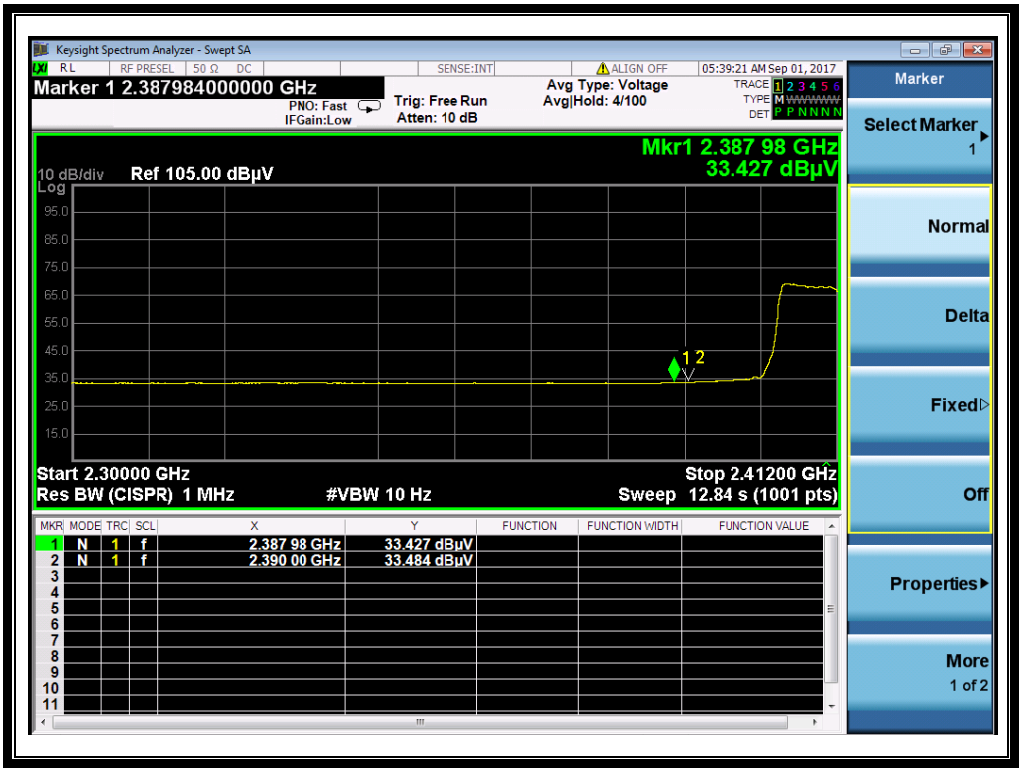
C. Test Verdict:

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	2386.98	PK	46.21	-33.63	32.56	45.14	74	Pass
1	2387.98	AV	33.43	-33.63	32.56	32.36	54	Pass
11	2487.28	PK	46.13	-33.18	32.5	45.45	74	Pass
11	2484.00	AV	33.22	-33.18	32.5	32.54	54	Pass

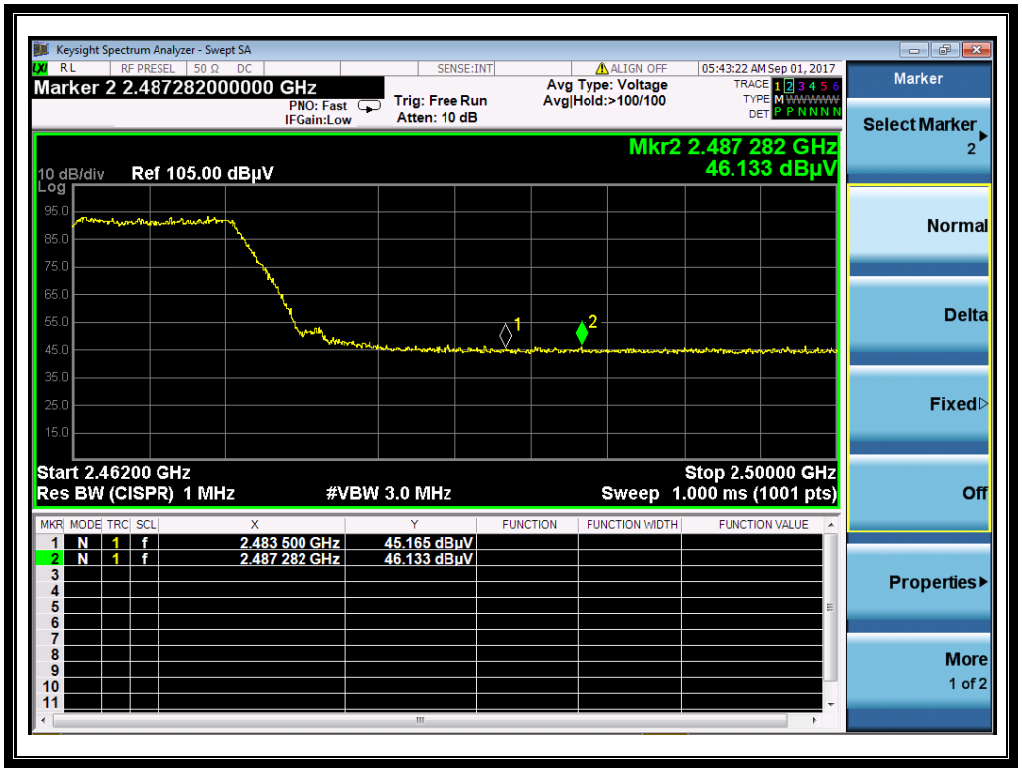
D. Test Plots:



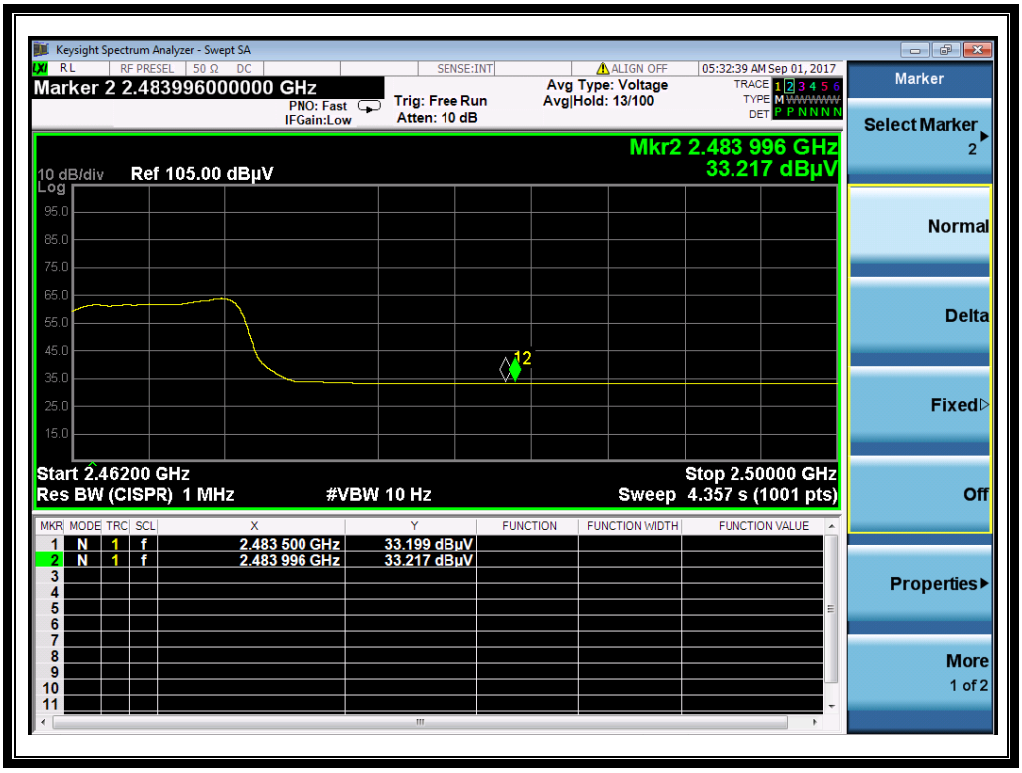
(Plot C1: Channel = 1 PEAK @ 802.11g)



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



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



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

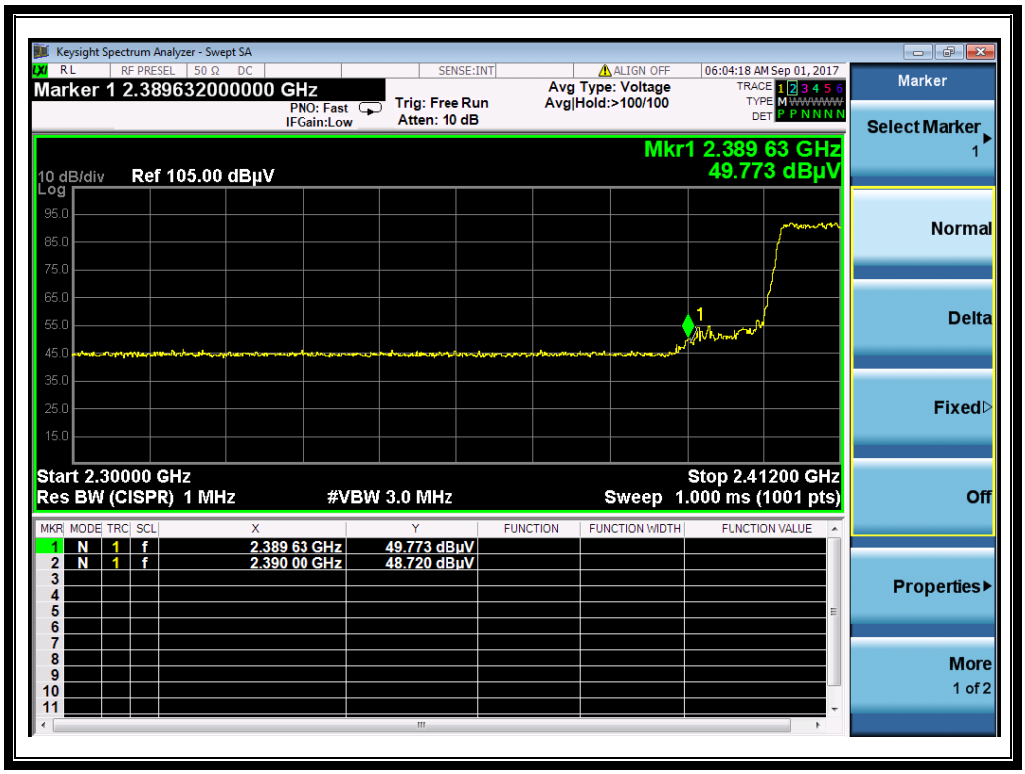
2.6.3.3 802.11n-20MHz Test mode

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

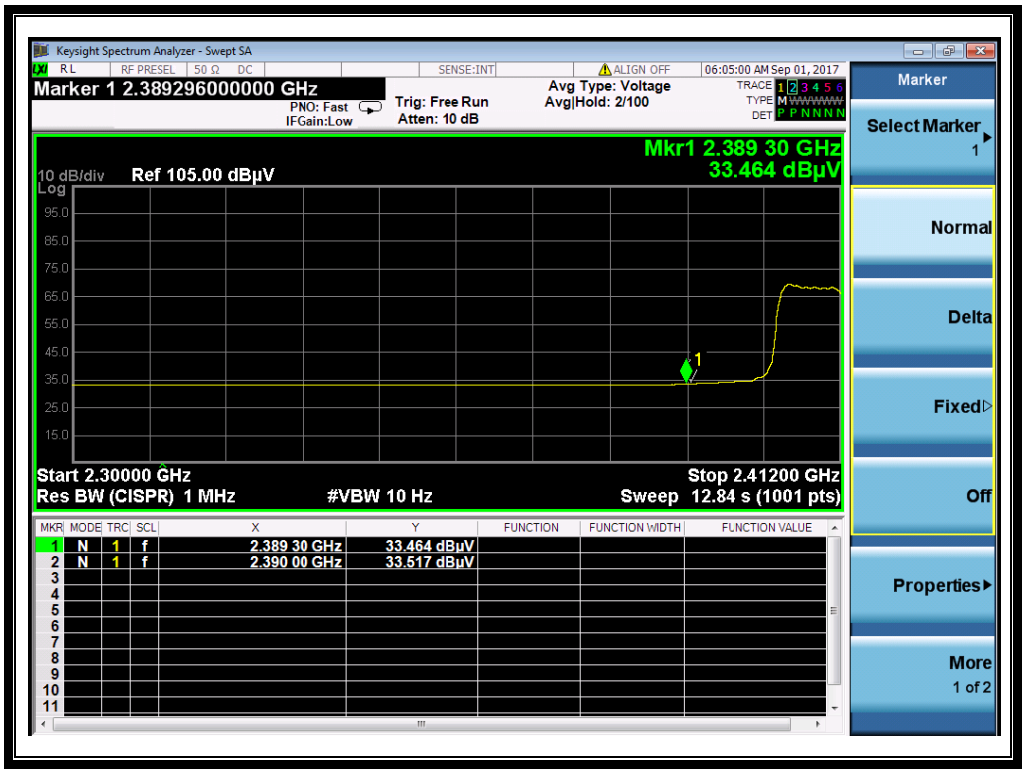
E. Test Verdict:

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	2389.63	PK	49.77	-33.63	32.56	48.70	74	Pass
1	2389.30	AV	33.46	-33.63	32.56	32.39	54	Pass
11	2487.24	PK	46.05	-33.18	32.5	45.37	74	Pass
11	2484.55	AV	33.12	-33.18	32.5	32.44	54	Pass

F. Test Plots:

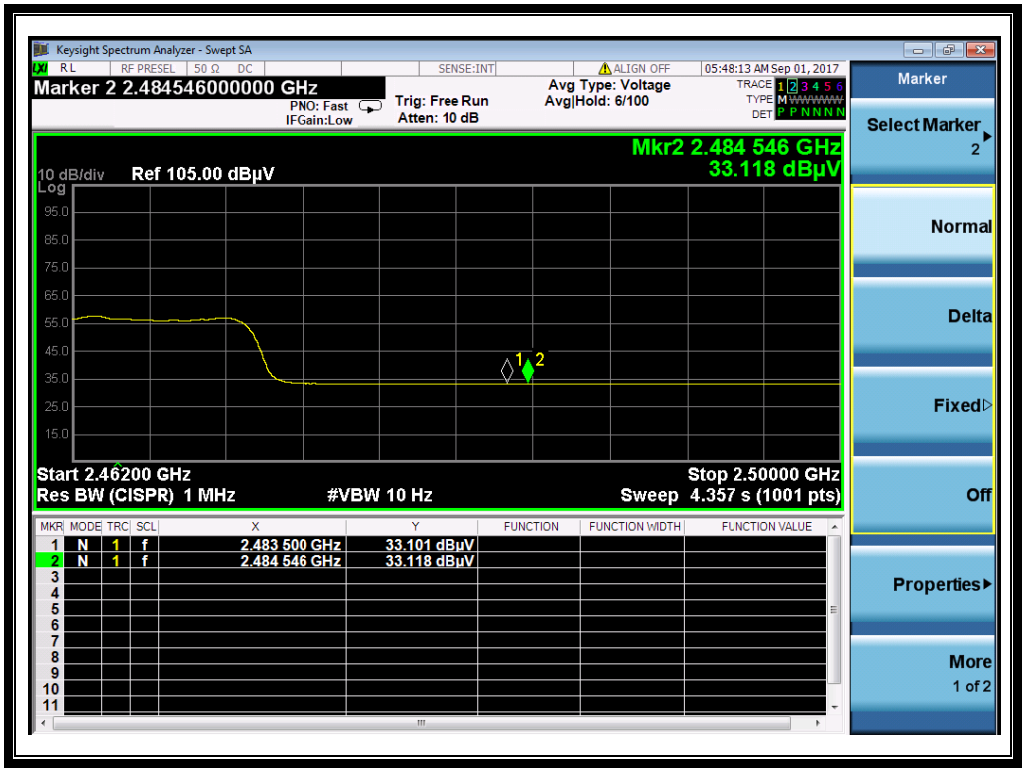


(Plot E1: Channel = 1 PEAK @ 802.11n-20)



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

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



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

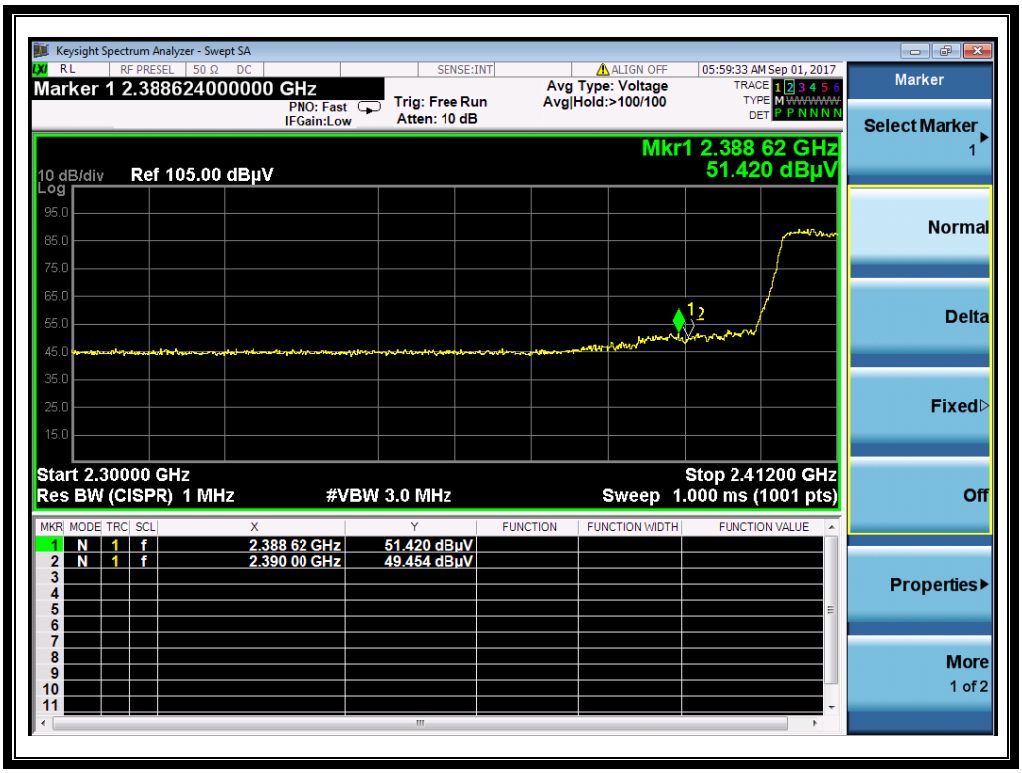
2.6.3.4 802.11n-40MHz Test mode

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

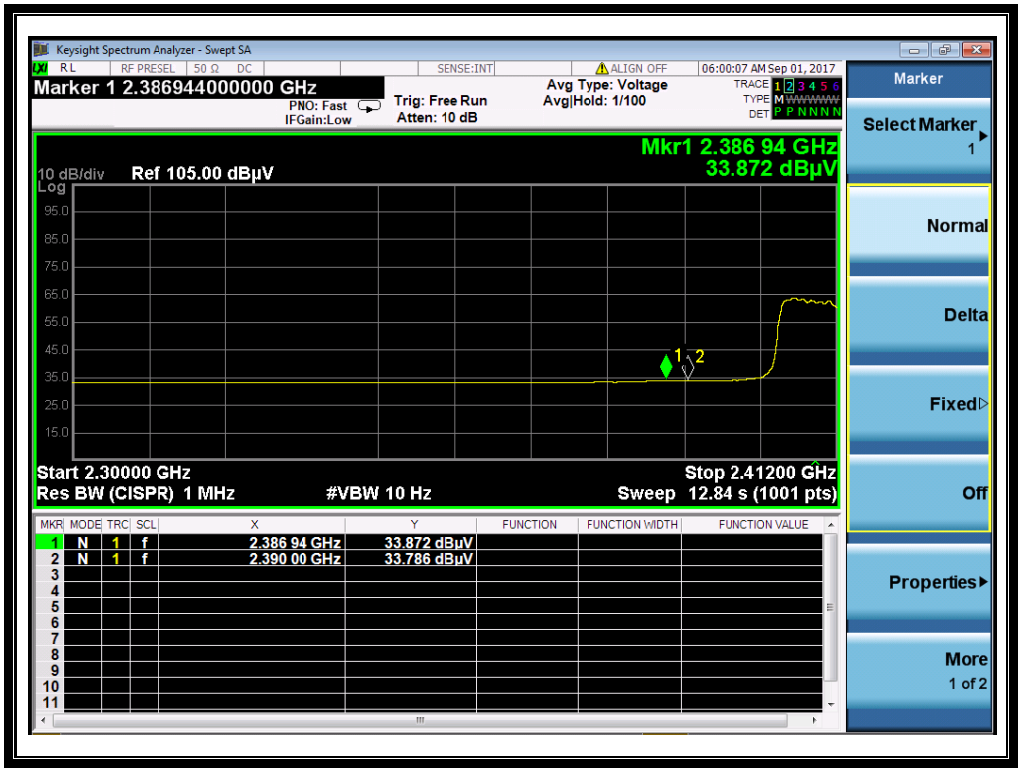
G. Test Verdict:

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	2388.62	PK	51.42	-33.63	32.56	50.35	74	Pass
3	2386.94	AV	33.87	-33.63	32.56	32.80	54	Pass
9	2485.42	PK	52.52	-33.18	32.5	51.84	74	Pass
9	2487.28	AV	33.23	-33.18	32.5	32.55	54	Pass

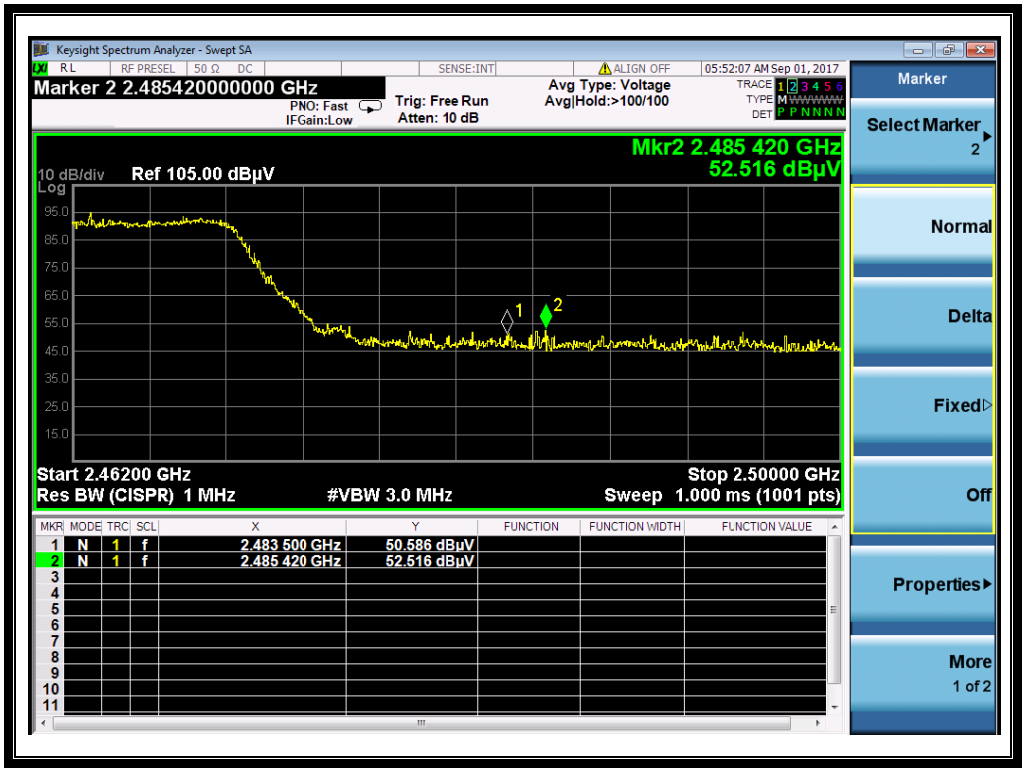
H. Test Plots:



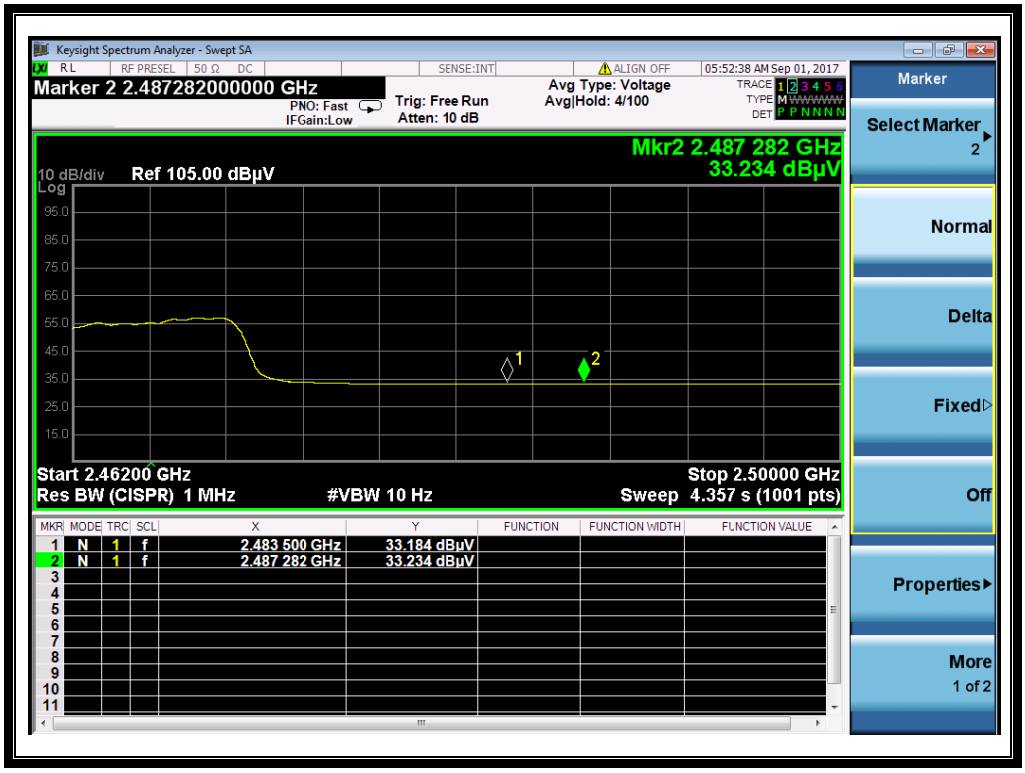
(Plot E1: Channel = 3 PEAK @ 802.11n-40)



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



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



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

2.7 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

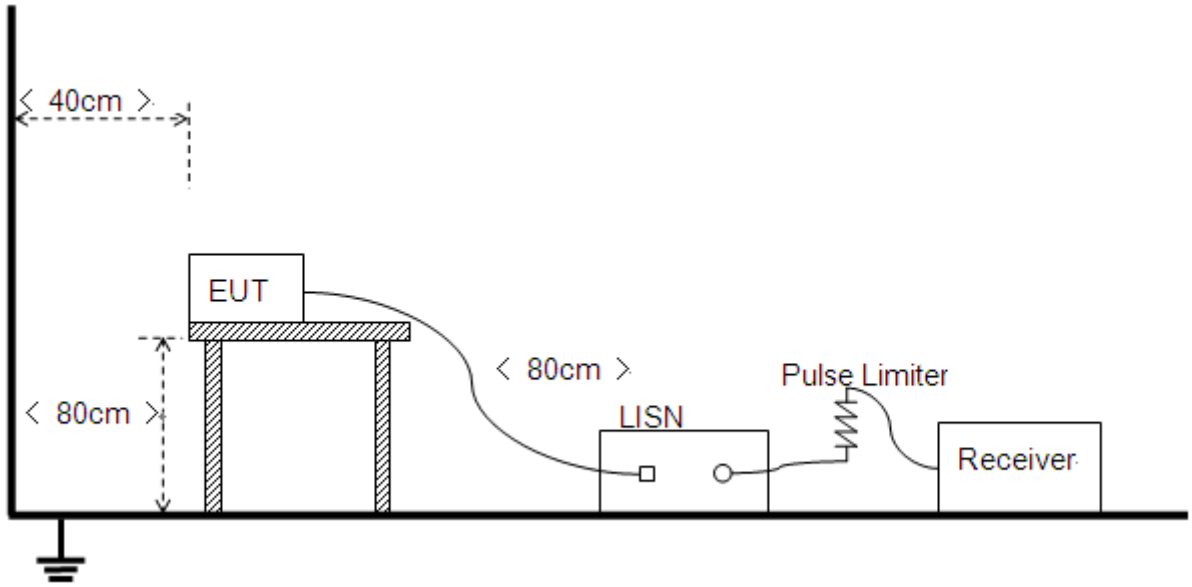
NOTE:

(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.

A. Equipments List:

Please reference ANNEX A(1.5).

2.1.1 Test Result

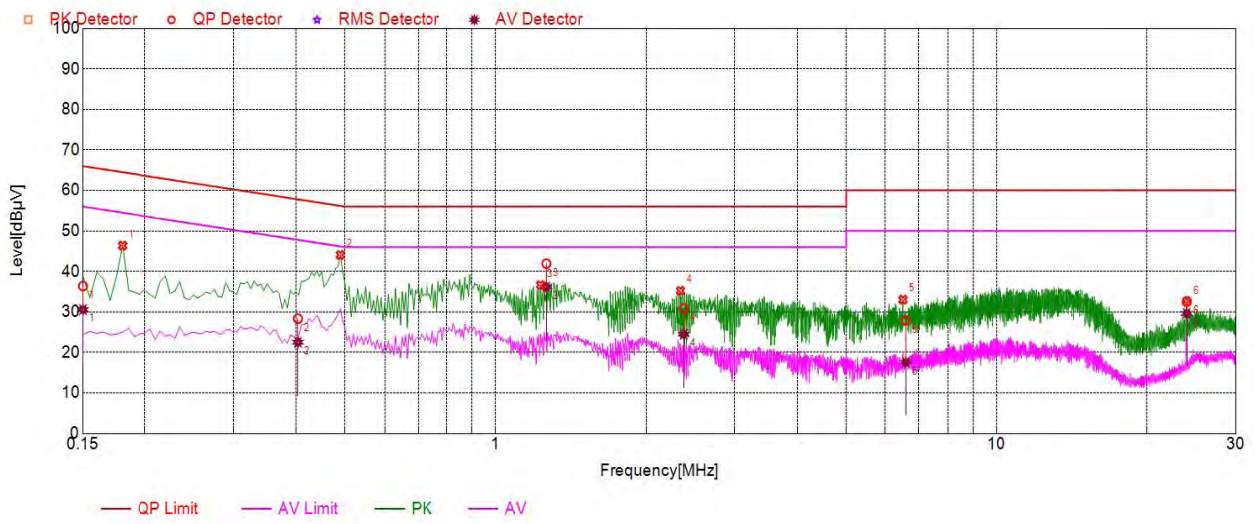
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT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

A. Test setup:

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

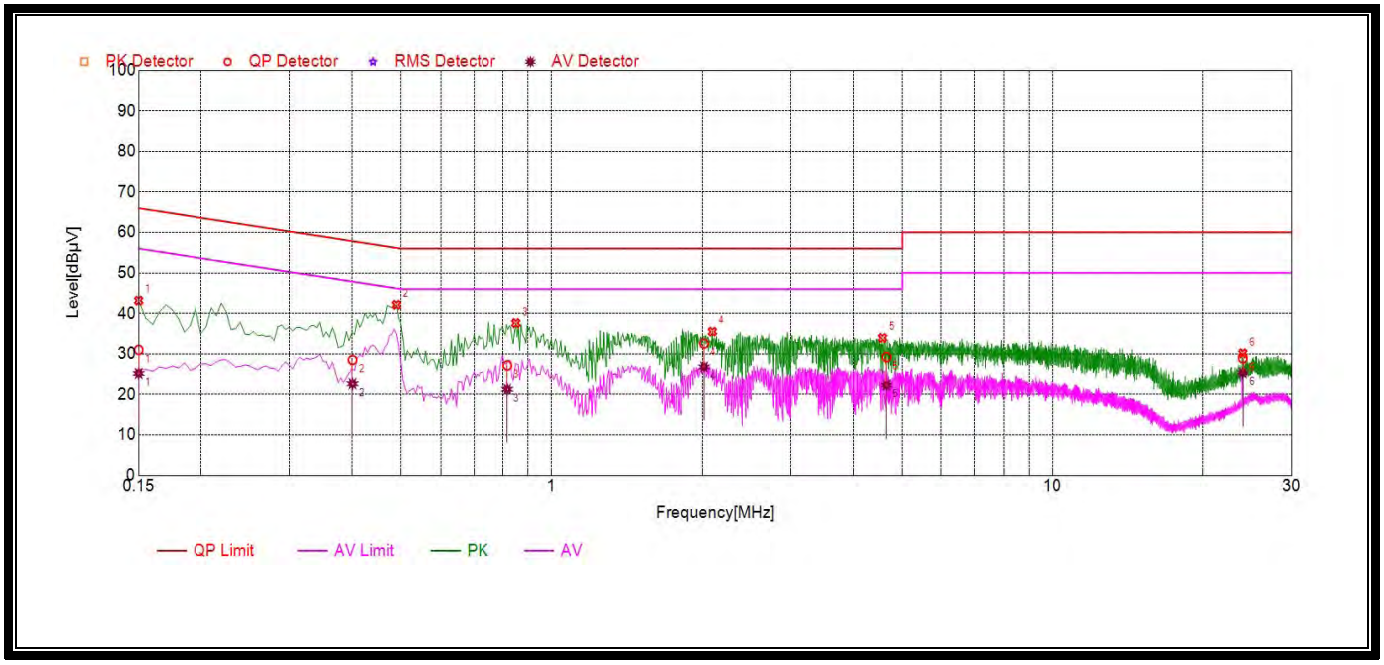
Note: The test voltage is AC 120V/60Hz.

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	0.1502	36.38	30.58	65.99	55.99	Line	PASS
2	0.4038	28.34	22.54	58.75	48.75		PASS
3	1.2624	41.93	36.17	56.00	46.00		PASS
4	2.3758	30.87	24.50	56.00	46.00		PASS
5	6.603	27.90	17.59	60.00	50.00		PASS
6	24.0006	32.62	29.63	60.00	50.00		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	30.98	25.16	66.00	56.00	Line	PASS
2	0.4012	28.49	22.65	58.82	48.82		PASS
3	0.8174	27.13	21.29	56.00	46.00		PASS
4	2.0156	32.53	26.77	56.00	46.00		PASS
5	4.654	29.21	22.30	56.00	46.00		PASS
6	24.0012	28.90	25.33	60.00	50.00		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.

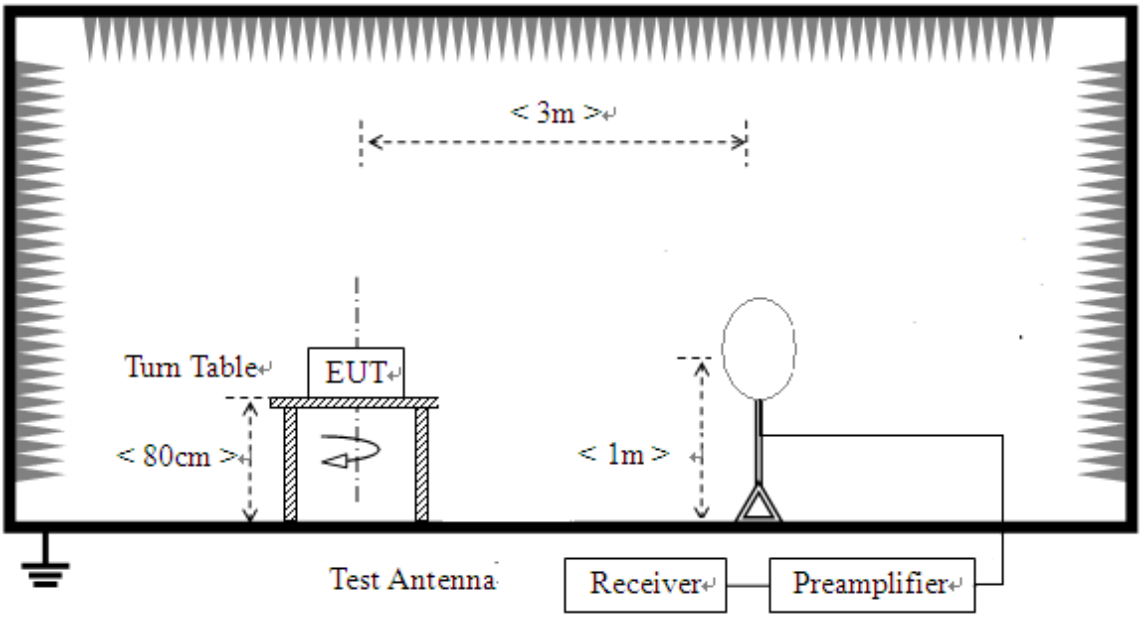
For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

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)

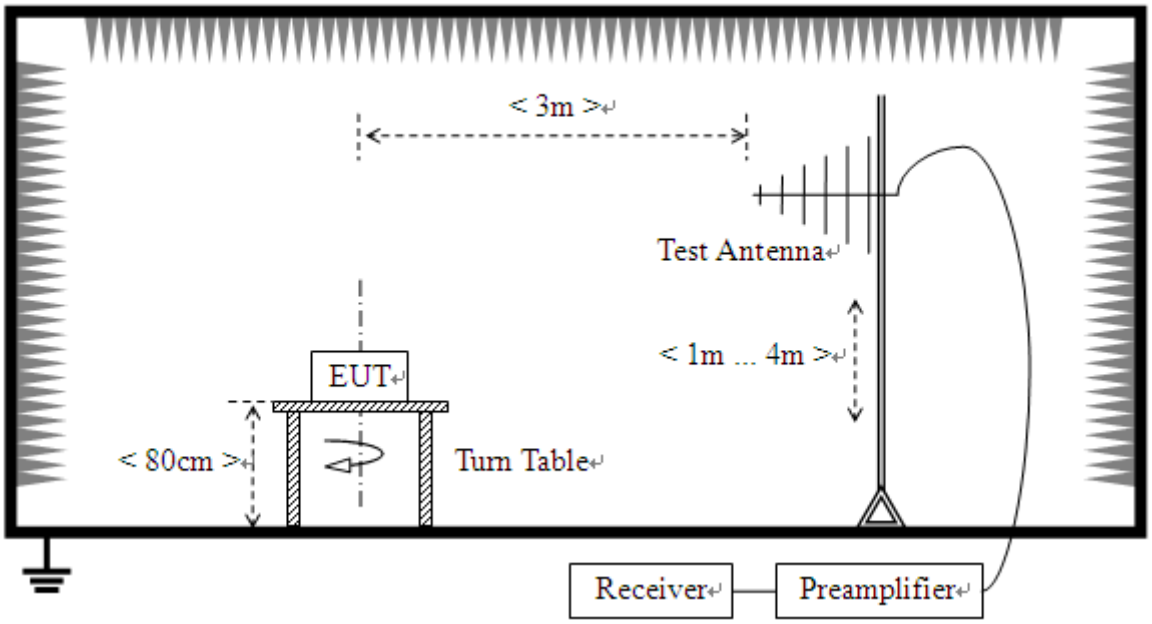
2.8.2 Test Description

A. Test Setup:

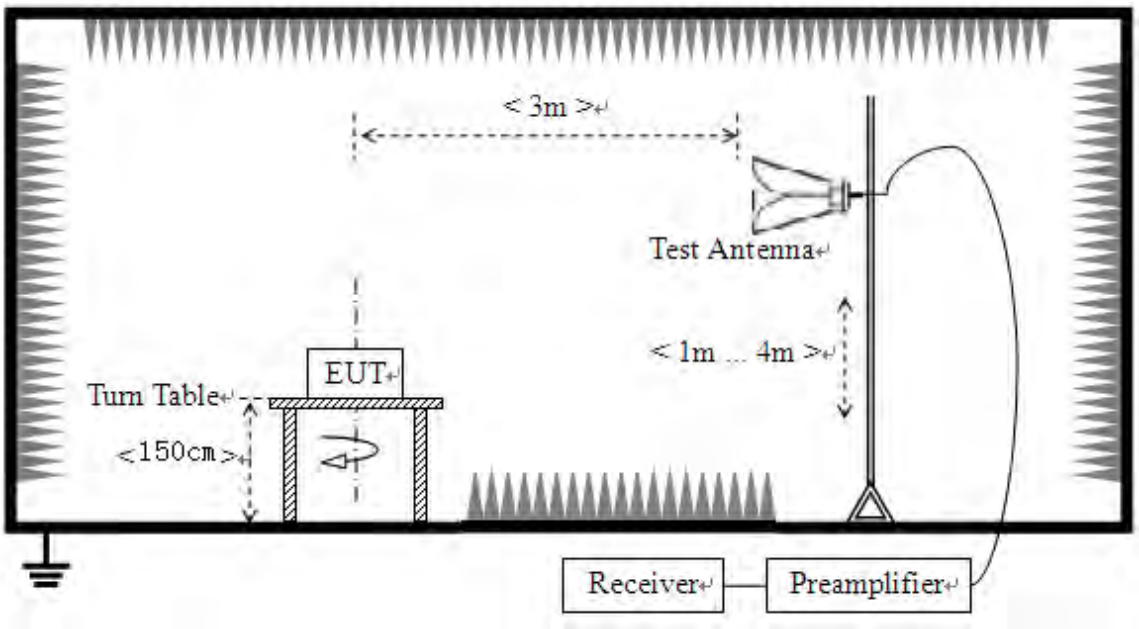
1) For radiated emissions from 9kHz to 30MHz



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

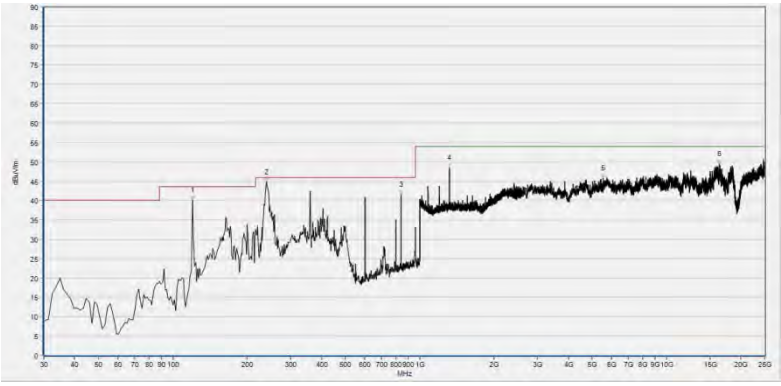
During the test, the total correction Factor A_T and A_{Factor} were built in test software.

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

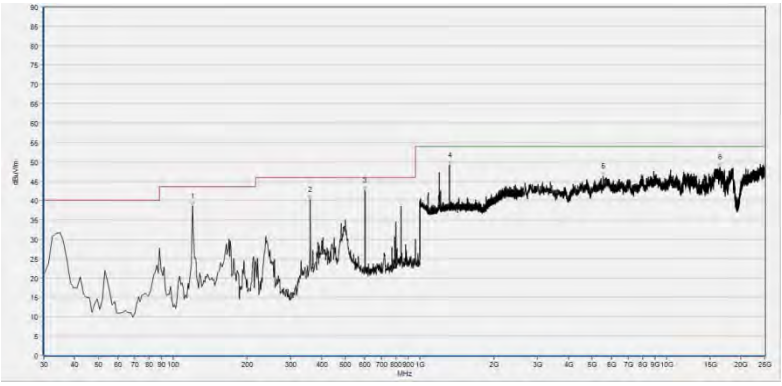
A. Test Plots for the Whole Measurement Frequency Range:

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
119.837	40.04	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
240.025	44.68	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
839.750	41.57	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1319.488	48.44	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5532.897	45.83	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16368.322	49.46	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

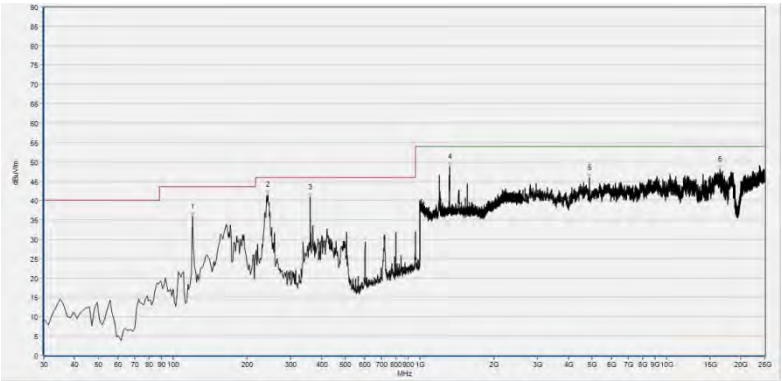
(Antenna Horizontal, 30MHz to 25GHz)



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
119.837	38.47	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	40.29	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
599.374	42.51	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1320.128	49.08	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
5541.044	46.19	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16445.717	48.68	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

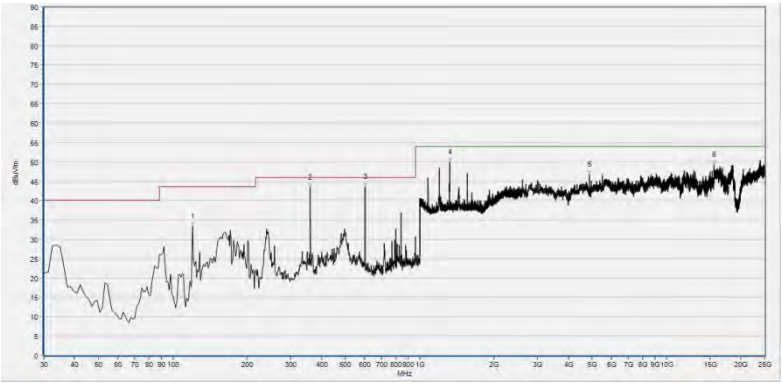
(Antenna Vertical, 30MHz to 25GHz)

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
119.837	35.86	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
242.453	41.57	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
360.213	40.84	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1320.768	48.80	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4872.995	45.93	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16425.350	48.07	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

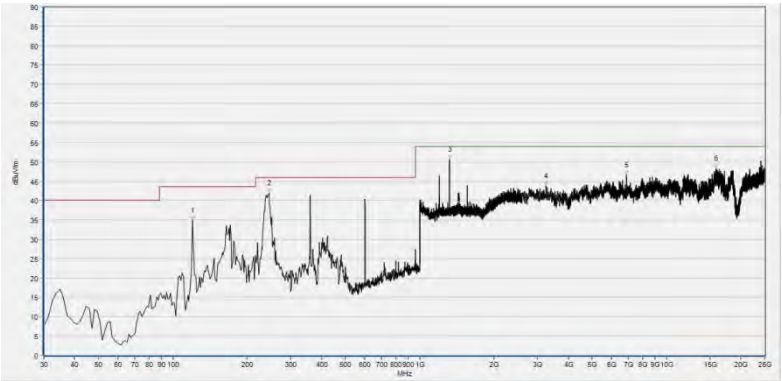
(Antenna Horizontal, 30MHz to 25GHz)



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
119.837	33.29	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	43.43	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
600.588	43.64	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1320.768	49.93	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
4872.995	46.77	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
15606.583	49.22	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

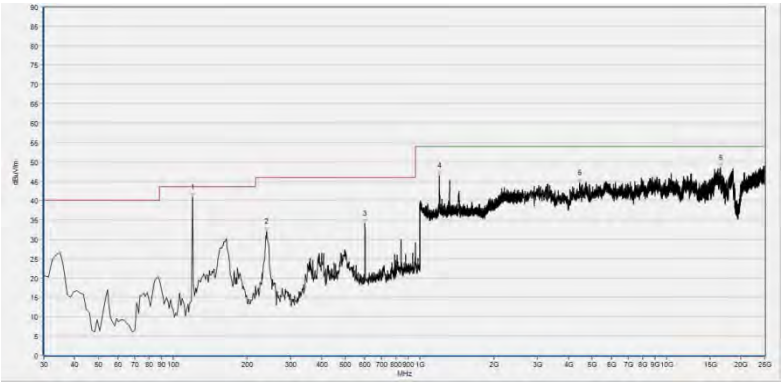
(Antenna Vertical, 30MHz to 25GHz)

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
119.837	34.89	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
244.881	41.88	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1320.128	50.59	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
3251.755	43.76	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
6897.509	46.63	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
15879.505	48.33	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



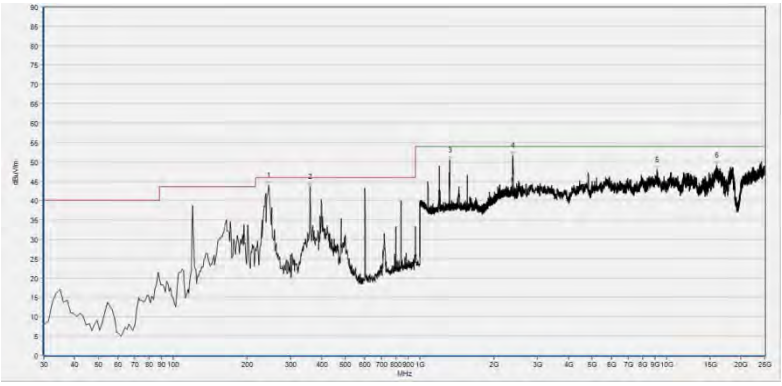
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
119.837	40.88	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
240.025	32.04	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
599.374	34.04	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1199.120	46.44	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
4449.354	44.60	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16559.775	48.37	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

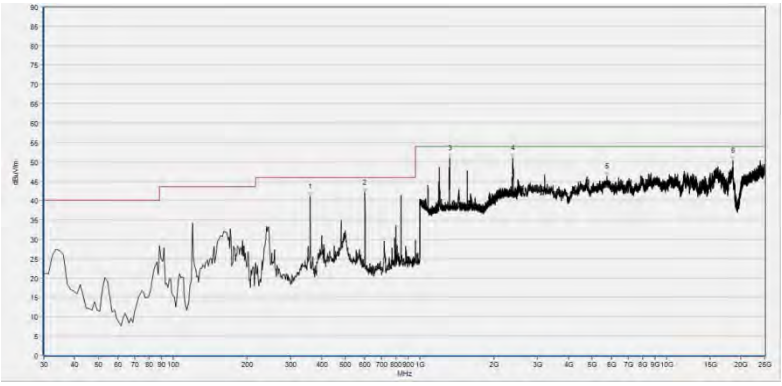
B. Test Plots for the Whole Measurement Frequency Range:

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
243.667	43.83	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
358.999	43.63	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1320.768	50.38	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
2383.593	51.59	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
9133.843	47.94	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
15981.342	49.17	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

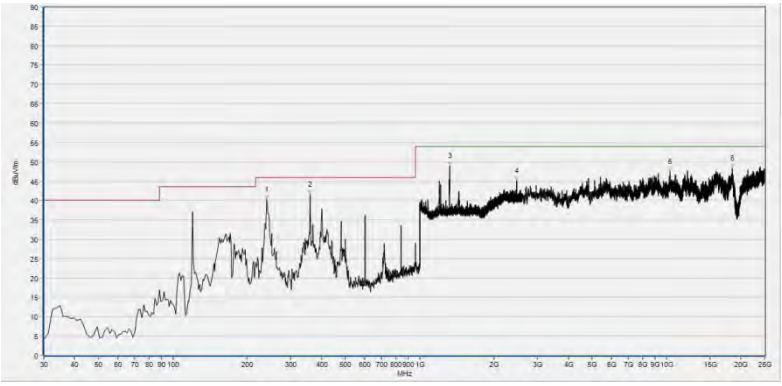
(Antenna Horizontal, 30MHz to 25GHz)



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
360.213	41.00	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
599.374	42.03	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1320.768	50.97	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
2386.154	50.89	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
5740.644	46.19	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
18551.700	50.30	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

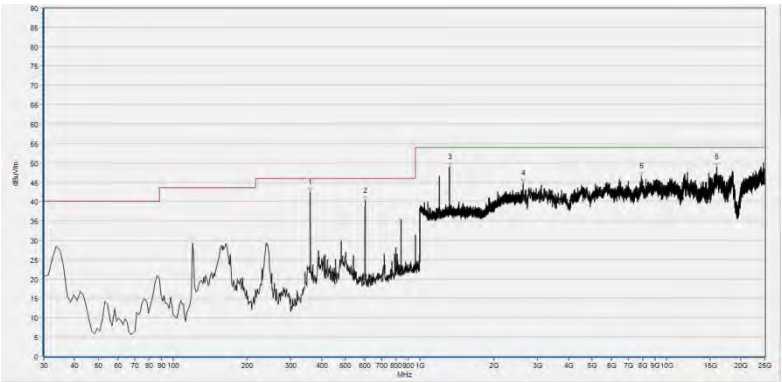
(Antenna Vertical, 30MHz to 25GHz)

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
240.025	40.23	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
358.999	41.50	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1320.768	48.97	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
2466.827	45.11	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
10351.809	47.35	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
18515.039	48.27	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

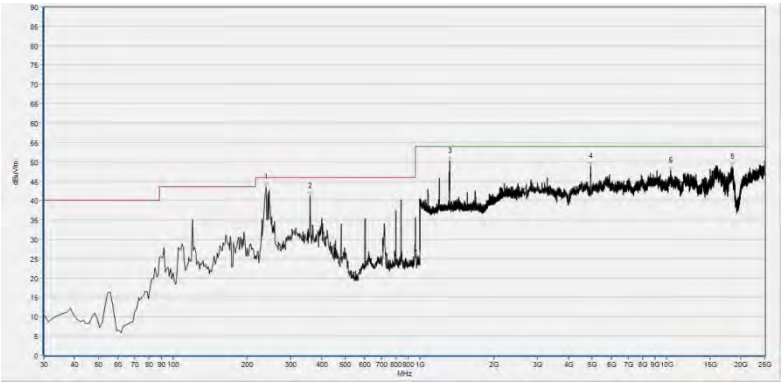
(Antenna Horizontal, 30MHz to 25GHz)



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
360.213	42.46	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
600.588	40.16	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1320.128	48.92	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
2624.441	44.71	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
7915.876	46.52	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
15997.636	48.97	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

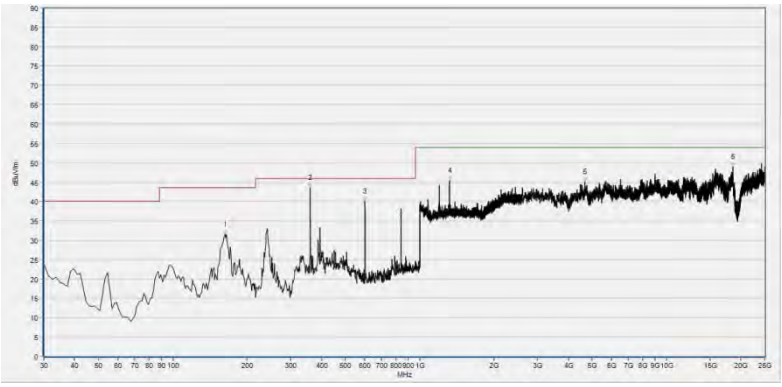
(Antenna Vertical, 30MHz to 25GHz)

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
238.811	43.58	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
358.999	41.15	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1320.768	50.25	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4930.024	48.99	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
10368.103	47.76	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
18498.745	48.82	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



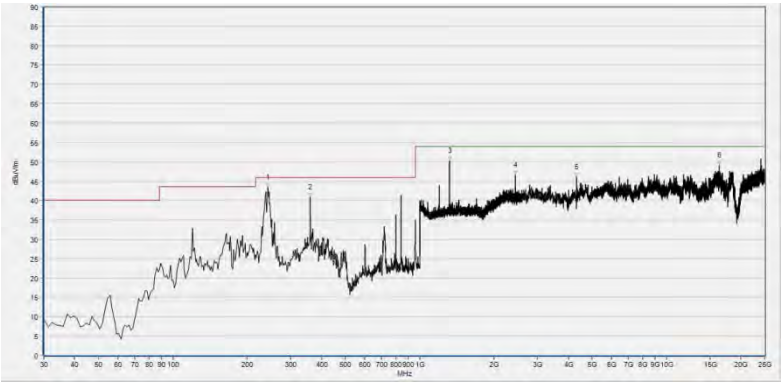
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
162.328	31.54	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	43.57	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
599.374	39.99	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1320.128	45.34	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
4665.248	45.08	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
162.328	31.54	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

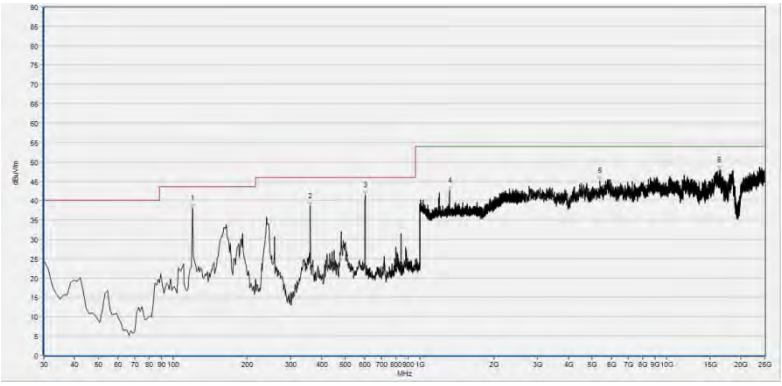
C. Test Plots for the Whole Measurement Frequency Range:

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
242.453	43.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
360.213	40.97	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1320.128	50.22	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
2442.497	46.54	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4323.077	46.05	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16388.689	49.15	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

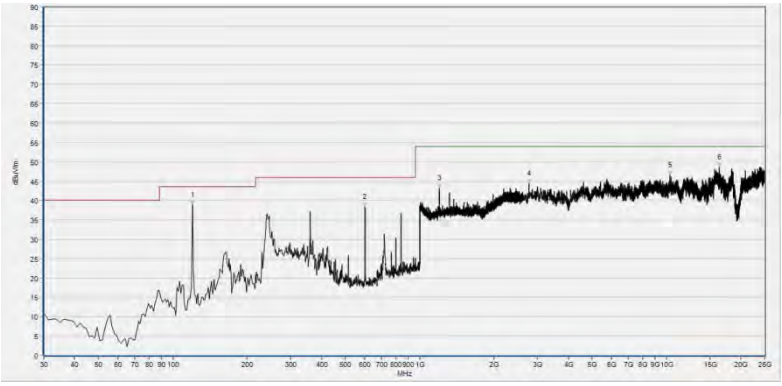
(Antenna Horizontal, 30MHz to 25GHz)



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
119.837	38.05	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	38.59	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
600.588	41.33	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1320.128	42.50	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
5378.105	45.09	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16352.028	47.96	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

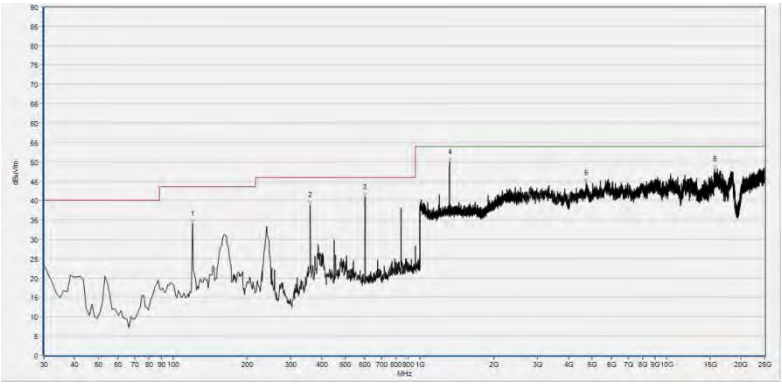
(Antenna Vertical, 30MHz to 25GHz)

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
119.837	38.90	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
599.374	38.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1199.760	43.28	N/A	N/A	74.0	N/A	74.0	Horizontal	PASS
2767.012	44.38	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
10335.516	46.64	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16396.836	48.56	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

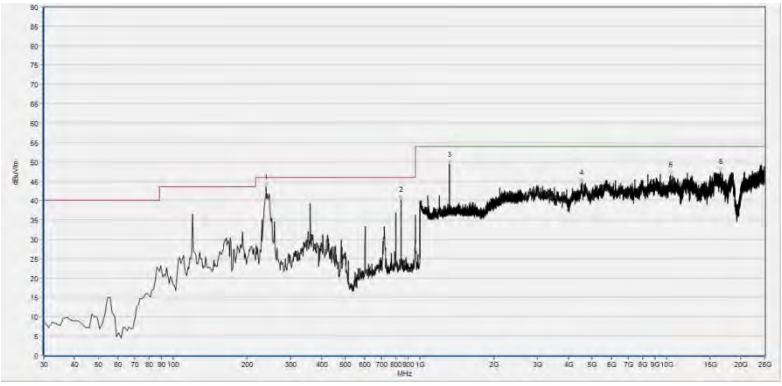
(Antenna Horizontal, 30MHz to 25GHz)



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
119.837	34.01	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	38.92	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
599.374	40.84	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1320.128	49.97	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
4718.203	44.52	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
119.837	34.01	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

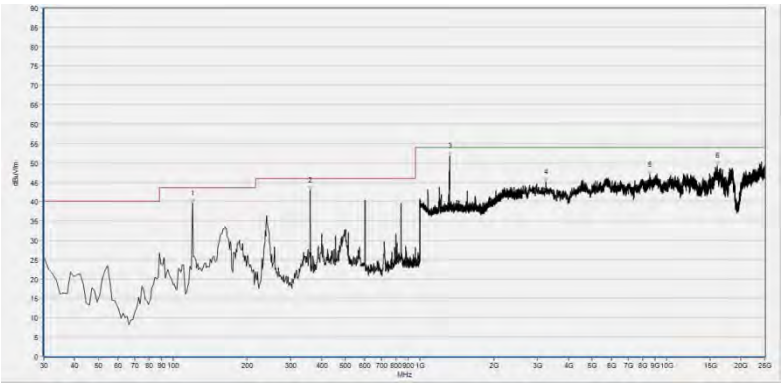
(Antenna Vertical, 30MHz to 25GHz)

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
238.811	43.36	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
839.750	40.28	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1319.488	49.22	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4538.971	44.66	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
10355.883	46.53	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16535.334	47.45	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



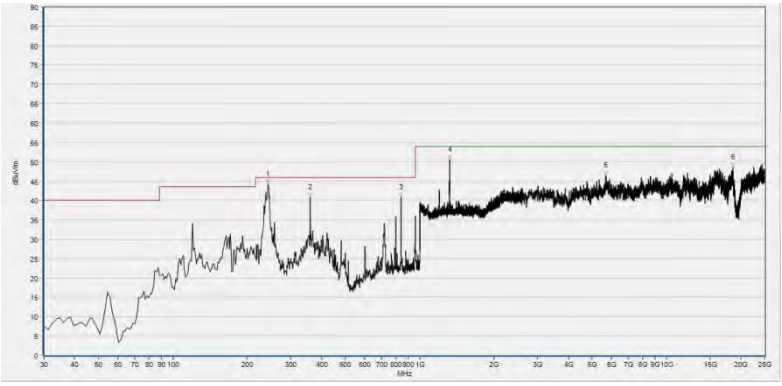
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
119.837	39.47	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	42.90	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1320.768	51.73	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3247.681	45.12	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
8575.777	46.99	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16022.077	49.20	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

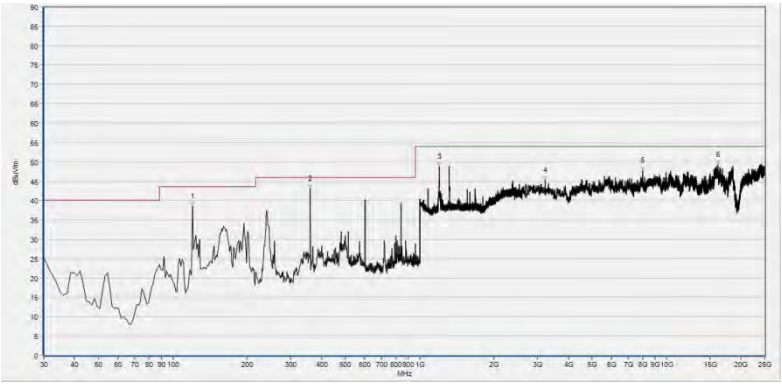
D. Test Plots for the Whole Measurement Frequency Range:

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
242.453	43.16	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
360.213	40.82	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
839.750	45.93	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1320.768	50.57	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5663.248	46.52	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
18535.406	48.66	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

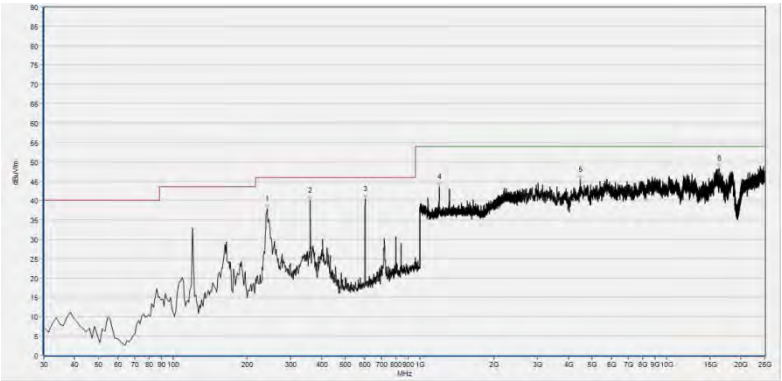
(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)



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
119.837	38.58	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	43.09	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1200.400	48.79	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3227.314	45.20	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
8001.418	47.76	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
16152.428	49.30	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

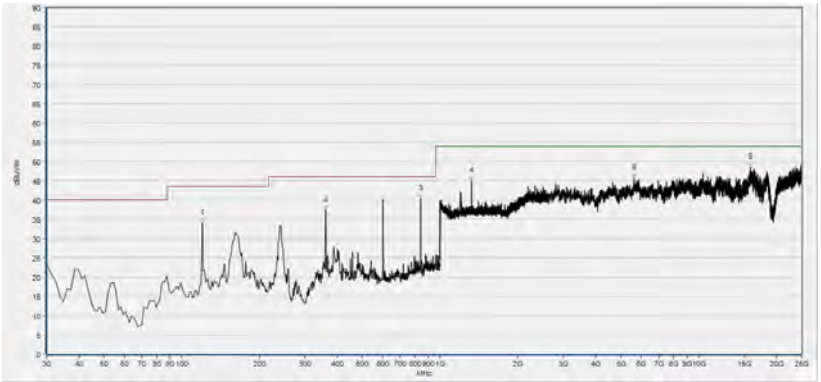
(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

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
241.239	37.89	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
360.213	40.13	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
600.588	40.38	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1199.760	43.63	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
4465.648	45.39	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16396.836	48.24	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS

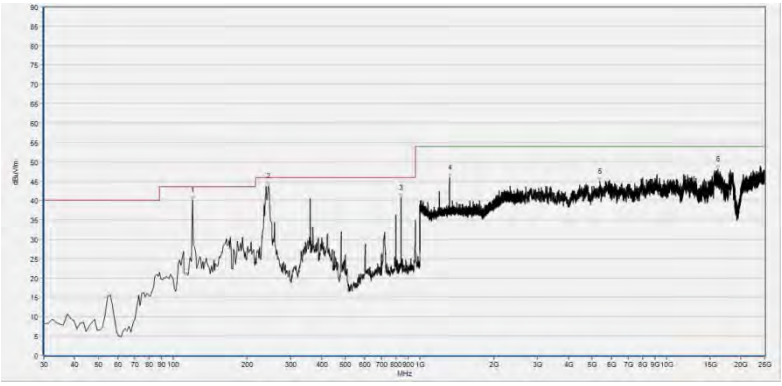
(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)



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
119.837	34.15	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	37.47	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
839.750	40.27	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1319.488	45.05	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
5622.513	45.67	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
119.837	34.15	N/A	N/A	74.0	N/A	54.0	Vertical	PASS

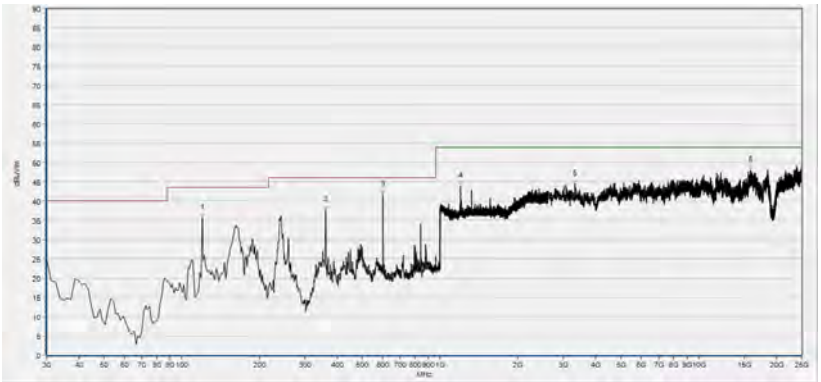
(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

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
119.837	42.05	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
243.667	43.79	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
839.750	40.68	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1320.128	45.88	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
5378.105	44.89	N/A	N/A	74.0	N/A	54.0	Horizontal	PASS
16180.942	48.15	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
119.837	35.75	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	37.74	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
600.588	41.75	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1199.760	43.93	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
3325.077	44.43	N/A	N/A	74.0	N/A	54.0	Vertical	PASS
15834.697	48.11	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 *****