TEST REPORT

APPLICANT	:	Hangzhou Vision Insight Technology Co., Ltd.
PRODUCT NAME	:	Smart Pan-Tilt Camera
MODEL NAME	:	A31, A31C, A31D, A31S, A31F
BRAND NAME	:	blurams
FCC ID	:	2ASAQ-A31
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2019-07-29
TEST DATE	:	2019-08-06 to 2019-09-26
ISSUE DATE	:	2019-10-09

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Peng Huarui (Supervisor)

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

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Change History		
Version	**Date**	**Reason for change**
1.0	2019-10-09	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Hangzhou Vision Insight Technology Co., Ltd.
Applicant Address:	Room 203, South Floor 2, Building 5, 90 Wensan Road, Xihu District, Hangzhou, Zhejiang
Manufacturer:	Hangzhou Vision Insight Technology Co., Ltd.
Manufacturer Address:	Room 203, South Floor 2, Building 5, 90 Wensan Road, Xihu District, Hangzhou, Zhejiang

1.2. Equipment Under Test (EUT) Description

Product Name:	Smart Pan-Tilt Camera	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	C31_MB_V1.10	
Software Version:	19.0723.728.1719	
Equipment type:	WLAN2.4G	
Modulation Type:	DSSS, OFDM	
Operating Frequency Range:	802.11b/g/ n(HT20): 2.412GHz - 2.472GHz	
Antenna Type:	Metal Antenna	
Antenna Gain:	2.1 dBi	
Accessory Information:	AC Adapter	
	Brand Name:	Aohai
	Model No.:	A8A-050150U-US2
	Serial No.:	(N/A, marked #1 by test site)
	Rated Output:	5.0V⎓1.5A
	Rated Input:	100-240V ～ 50/60Hz 0.35A

Note 1: According to the certificate holder, they declared that the models A31, A31C, A31D, A31S, A31F only the model name and package are different, the others are all the same. The main measuring model is A31, only the results for A31 were recorded in this report.

Note 2: We use the dedicated software to control the EUT continuous transmission.

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Modulation Type and Data Rate of EUT

Modulation technology	Modulation Type	Data Rate (Mbps) Note1
DSSS (802.11b)	DBPSK	**1**
	DQPSK	2
	CCK	5.5/ 11
OFDM (802.11g)	BPSK	**6** / 9
	QPSK	12 / 18
	16QAM	24 / 36
	64QAM	48 / 54
OFDM(802.11n)	BPSK	**6.5**
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65

Note1: The worst-case mode (black bold) in all data rates has been determined during the pre-scan, only the test data of the worst-case were recorded in this report.

1.4. The channel number and frequency

Test Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11b/g/ n(HT20)	**1**	**2412**	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	**11**	**2462**
	5	2432	**12**	**2467**
	6	**2437**	**13**	**2472**
	7	2442		

Note1: The Lowest Channel (1), Middle Channel (6), Highest Channel (11), Channel (12) and Channel (13) were selected test for 802.11b/g/n(HT20) mode.

1.5. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15	Radio Frequency Devices

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

No.	Section	Description	Test Date	Test Engineer	Result	Method determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	N/A	Duty Cycle Of Test Signal	Aug 06, 2019	Wang Meng	PASS	No deviation
3	15.247(b)	Maximum Peak and Average Conducted Output Power	Aug 06, 2019 Sep 25, 2019	Wang Meng	PASS	No deviation
4	15.247(a)	Bandwidth	Aug 06, 2019 Sep 25, 2019	Wang Meng	PASS	No deviation
5	15.247(d)	Conducted Spurious Emission and Band Edge	Aug 06, 2019 Sep 25, 2019	Wang Meng	PASS	No deviation
6	15.247(e)	Power spectral density (PSD)	Aug 06, 2019 Sep 25, 2019	Wang Meng	PASS	No deviation
7	15.207	Conducted Emission	Sep 12, 2019	Lin Jiayong	PASS	No deviation
8	15.247(d)	Restricted Frequency Bands	Aug 15&21, 2019 Sep 26, 2019	Gao Jianrou	PASS	No deviation
9	15.209, 15.247(d)	Radiated Emission	Aug 14, 2019 Sep 26, 2019	Gao Jianrou	PASS	No deviation

Note1: The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013, KDB558074 D01 v05r02.

Note2: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 12dB contains two parts that cable loss 2dB and Attenuator

10dB. **Note 3:** Additions to, deviation, or exclusions from the method should be judged in the "method determination" column of add, deviate or exclude from the specific method should be explained in the "Remark" of the above table.

1.6. Environmental 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.

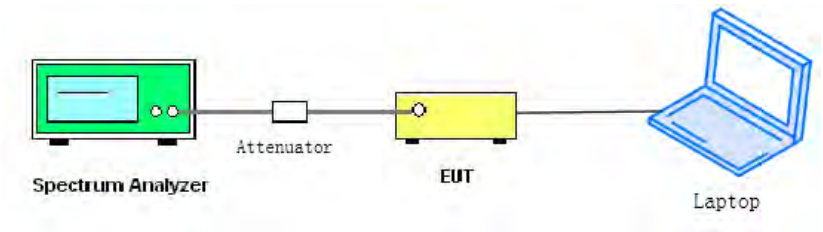
2.2. Duty Cycle Of Test Signal

2.2.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).
When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

A. Test Set:



ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.

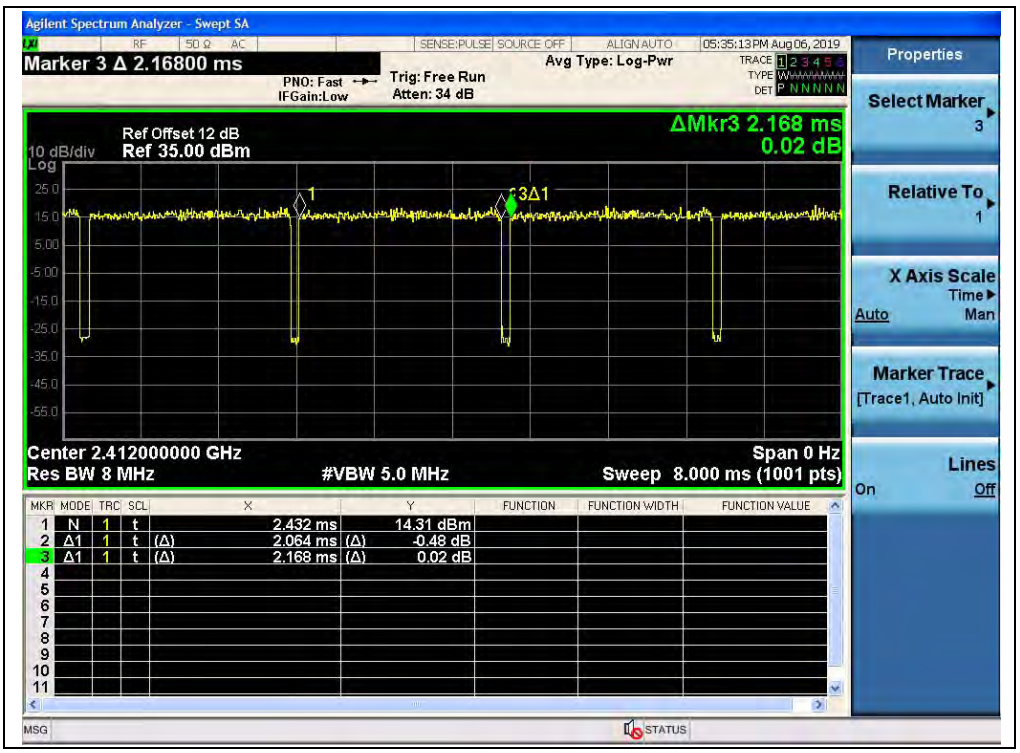
2.2.3. Test Result

A. Test Verdict:

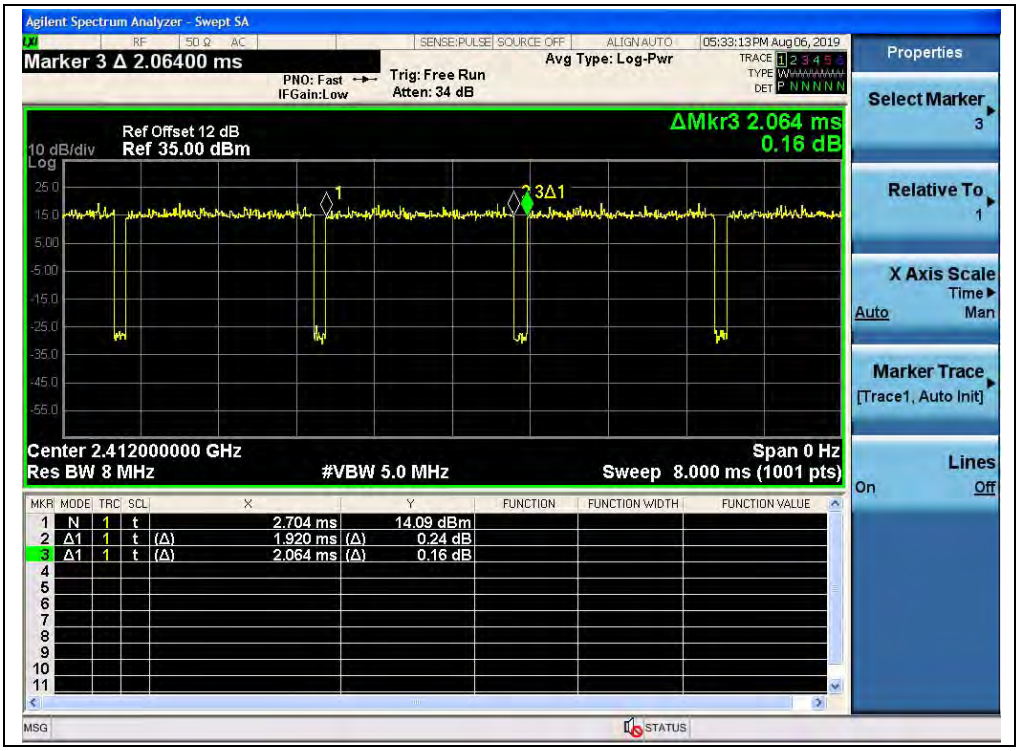
Test Mode	Duty Cycle (%) (D)	Duty Factor (10*lg[1/D])
802.11b	100.00	0.00
802.11g	95.20	0.21
802.11n(HT20)	93.02	0.31

B. Test Plots

(Channel 1, 2412MHz, 802.11b)



(Channel 1, 2412MHz, 802.11g)



(Channel 1, 2412MHz, 802.11 n (HT20))

2.3. Maximum Peak and Average Conducted Output Power

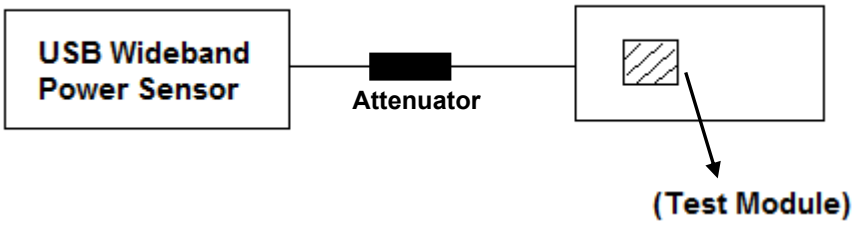
2.3.1. Requirement

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.

2.3.2. 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.

2.3.3. Test Result

Maximum Peak Conducted Output Power

802.11b Test Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	**19.30**	**0.085**	30	1	PASS
6	2437	17.81	0.060			PASS
11	2462	16.47	0.044			PASS
12	2467	16.55	0.045			PASS
13	2472	16.39	0.044			PASS

802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	**19.97**	**0.099**	30	1	PASS
6	2437	18.55	0.072			PASS
11	2462	17.13	0.052			PASS
12	2467	17.08	0.051			PASS
13	2472	16.84	0.048			PASS

802.11n (HT20) Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	**20.12**	**0.103**	30	1	PASS
6	2437	18.68	0.074			PASS
11	2462	17.35	0.054			PASS
12	2467	17.20	0.052			PASS
13	2472	16.94	0.049			PASS

Maximum Average Conducted Output Power

802.11b Test Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	17.02	0.00	**17.02**	**0.050**	30	1	PASS
6	2437	15.45		15.45	0.035			PASS
11	2462	13.92		13.92	0.025			PASS
12	2467	13.78		13.78	0.024			PASS
13	2472	13.43		13.43	0.022			PASS

802.11g Test mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	12.74	0.21	**12.95**	**0.020**	30	1	PASS
6	2437	10.19		10.40	0.011			PASS
11	2462	8.36		8.57	0.007			PASS
12	2467	8.29		8.50	0.007			PASS
13	2472	8.18		8.39	0.007			PASS

802.11n (HT20) Test mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	12.50	0.31	**12.81**	**0.019**	30	1	PASS
6	2437	10.27		10.58	0.011			PASS
11	2462	8.46		8.77	0.008			PASS
12	2467	8.32		8.63	0.007			PASS
13	2472	8.12		8.43	0.007			PASS

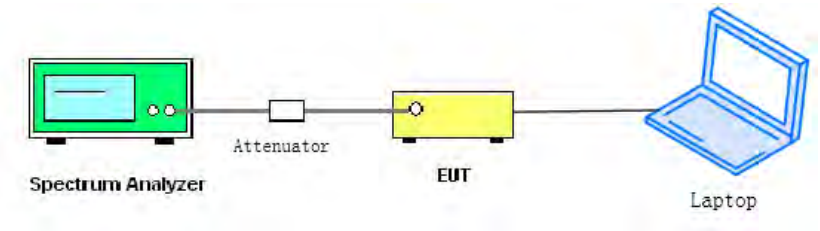
2.4. Bandwidth

2.4.1. 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.

2.4.2. 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.

2.4.3. Test procedure

KDB 558074 Section 8.2 was used in order to prove compliance.

2.4.4. Test Result

802.11b Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	9.066	≥500	PASS
6	2437	8.571	≥500	PASS
11	2462	9.544	≥500	PASS
12	2467	8.587	≥500	PASS
13	2472	8.535	≥500	PASS

B. Test Plots

(Channel 1, 802.11b)

(Channel 6, 802.11b)

(Channel 11, 802.11b)

(Channel 12, 802.11b)

(Channel 13, 802.11b)

802.11g Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	16.33	≥500	PASS
6	2437	16.34	≥500	PASS
11	2462	16.36	≥500	PASS
12	2467	16.39	≥500	PASS
13	2472	16.36	≥500	PASS

B. Test Plots:

(Channel 1, 802.11g)

(Channel 6, 802.11g)

(Channel 11, 802.11g)

(Channel 12, 802.11g)

(Channel 13, 802.11g)

802.11n (HT20) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	17.30	≥500	PASS
6	2437	17.21	≥500	PASS
11	2462	17.32	≥500	PASS
12	2467	17.57	≥500	PASS
13	2472	17.56	≥500	PASS

B. Test Plots:

(Channel 1, 802.11n(HT20))

(Channel 6, 802.11n(HT20))

(Channel 11, 802.11n(HT20))

(Channel 12, 802.11n(HT20))

(Channel 13, 802.11n(HT20))

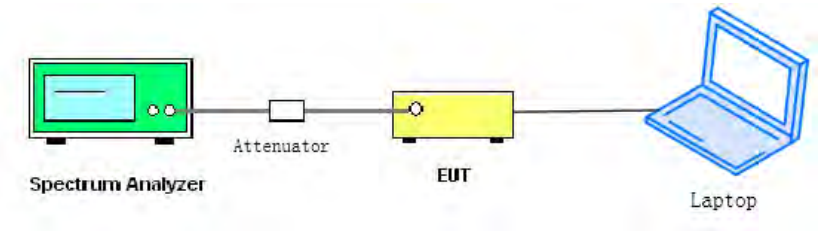
2.5. Conducted Spurious Emissions and Band Edge

2.5.1. 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.

2.5.2. 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.

2.5.3. Test procedure

KDB 558074 Section 8.5 and 8.7 was used in order to prove compliance.

2.5.4. Test Result

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	-38.96	6.72	-13.28	PASS
6	2437	-38.69	4.54	-15.46	PASS
11	2462	-39.39	5.40	-14.60	PASS
12	2467	-45.13	3.34	-16.66	PASS
13	2472	-45.31	2.39	-17.61	PASS

B. Test Plots:

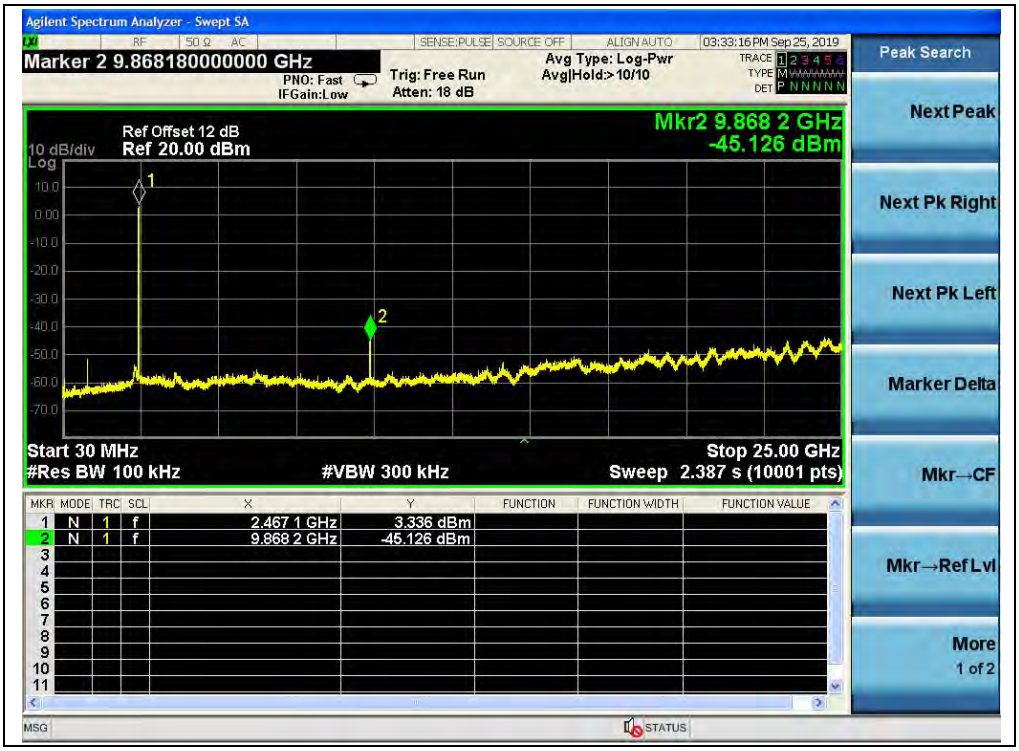
(Channel = 1, 30MHz to 25GHz)

(Band Edge, Channel = 1)

(Channel = 6, 30MHz to 25GHz)

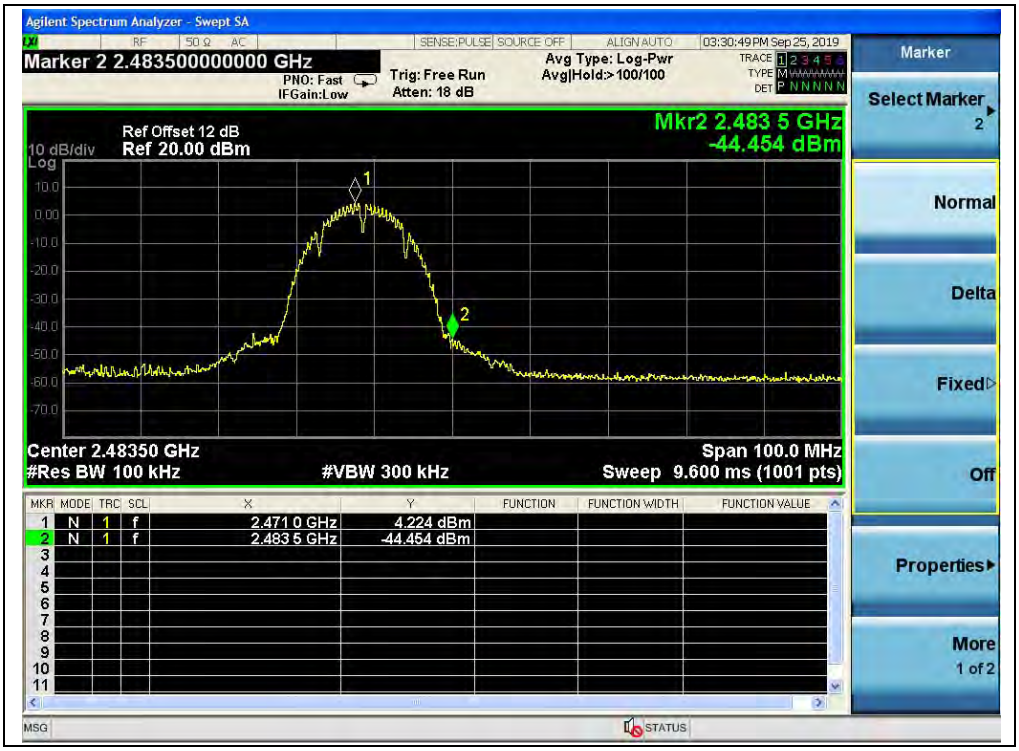
(Channel = 11, 30MHz to 25GHz)

(Band Edge, Channel = 11)



(Channel = 12, 30MHz to 25GHz)

(Channel = 13, 30MHz to 25GHz)



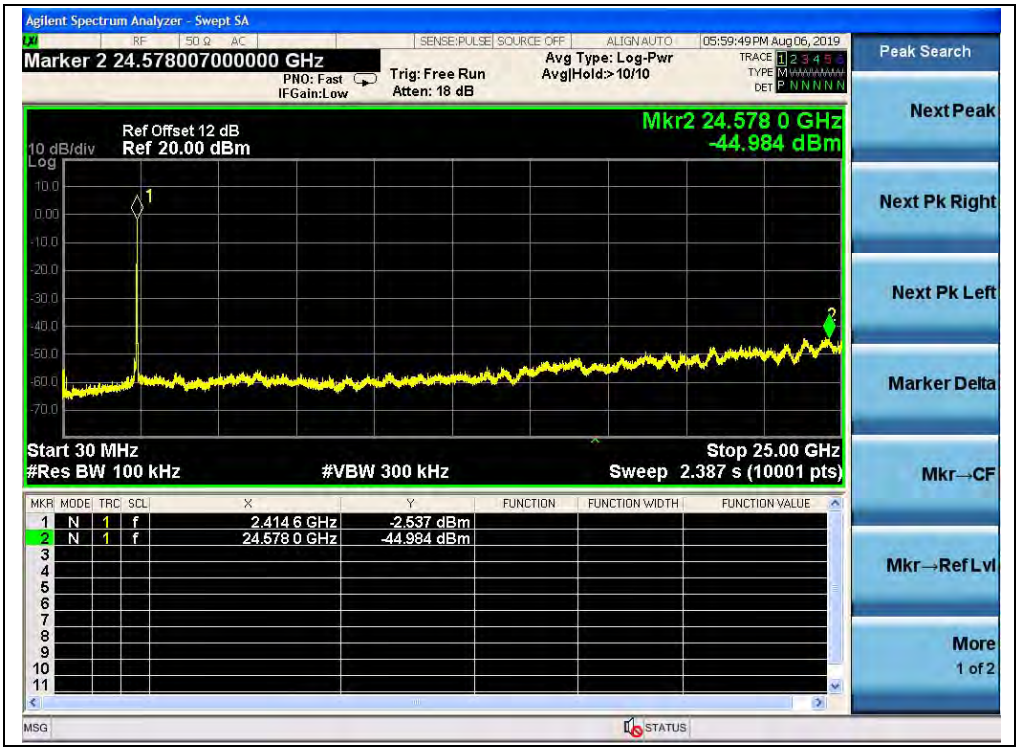
(Band Edge, Channel = 13)

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	-44.98	-2.54	-22.54	PASS
6	2437	-43.79	-4.36	-24.36	PASS
11	2462	-43.74	-5.84	-25.84	PASS
12	2467	-45.67	-7.72	-27.72	PASS
13	2472	-46.11	-5.05	-25.05	PASS

B. Test Plots:

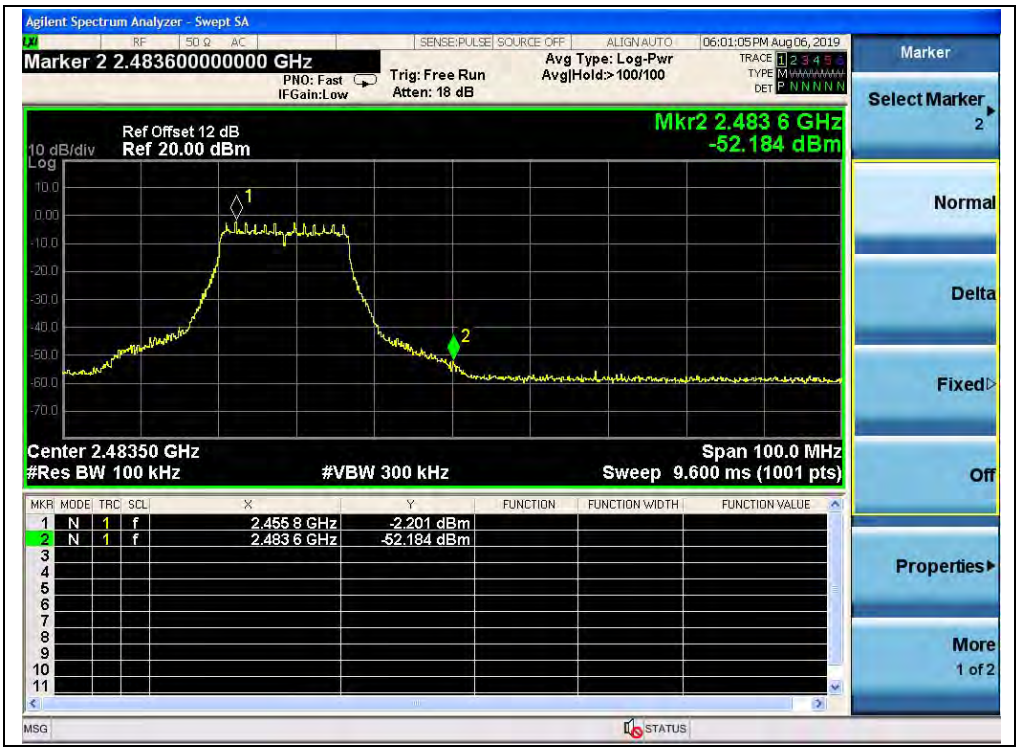


(Channel = 1, 30MHz to 25GHz)

(Band Edge, Channel = 1)

(Channel = 6, 30MHz to 25GHz)

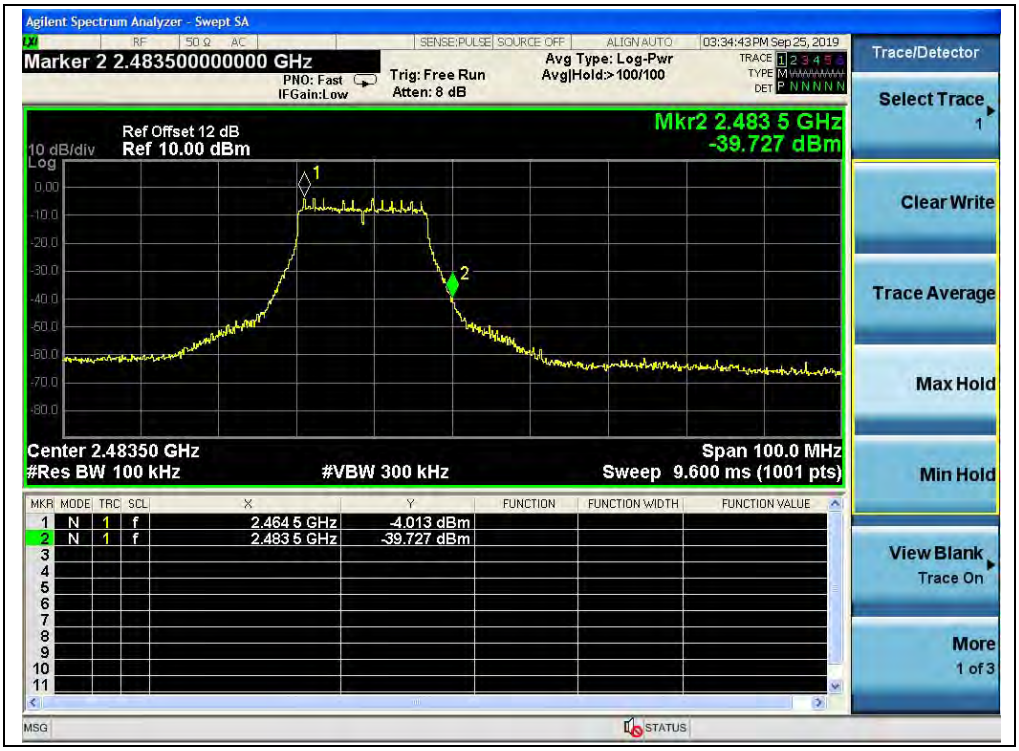
(Channel = 11, 30MHz to 25GHz)



(Band Edge, Channel = 11)

(Channel = 12, 30MHz to 25GHz)

(Channel = 13, 30MHz to 25GHz)



(Band Edge, Channel = 13)

802.11n (HT20) 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	-44.80	-1.49	-21.49	PASS
6	2437	-43.88	-3.79	-23.79	PASS
11	2462	-44.48	-3.68	-23.68	PASS
12	2467	-45.35	-6.97	-26.97	PASS
13	2472	-45.70	-5.91	-25.91	PASS

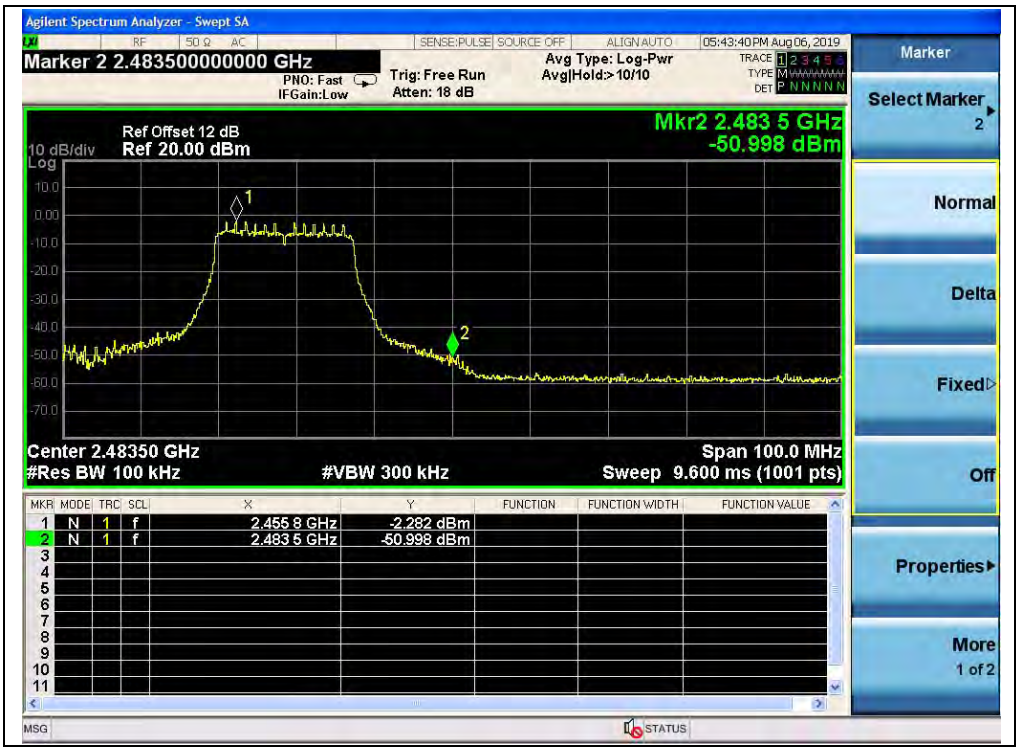
B. Test Plots:

(Channel = 1, 30MHz to 25GHz)

(Band Edge, Channel = 1)

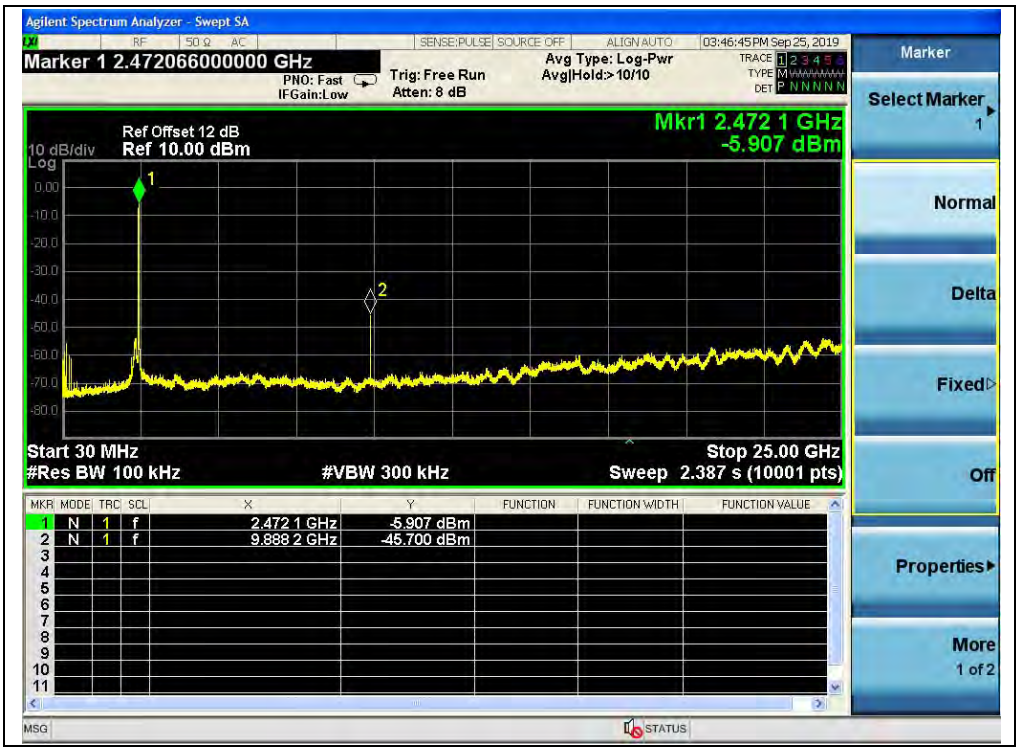
(Channel = 6, 30MHz to 25GHz)

(Channel = 11, 30MHz to 25GHz)



(Band Edge, Channel = 11)

(Channel = 12, 30MHz to 25GHz)



(Channel = 13, 30MHz to 25GHz)

(Band Edge, Channel = 13)

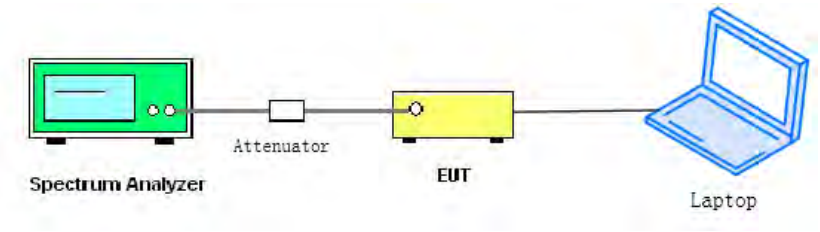
2.6. Power spectral density (PSD)

2.6.1. 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.

2.6.2. 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.

2.6.3. Test procedure

KDB 558074 Section 8.4 was used in order to prove compliance.

2.6.4. Test Result

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	-5.72	8	PASS
6	2437	-8.11	8	PASS
11	2462	-8.39	8	PASS
12	2467	-9.54	8	PASS
13	2472	-10.12	8	PASS

B. Test Plots:

(Channel = 1, 802.11b)

(Channel = 6, 802.11b)

(Channel = 11, 802.11b)

(Channel = 12, 802.11b)

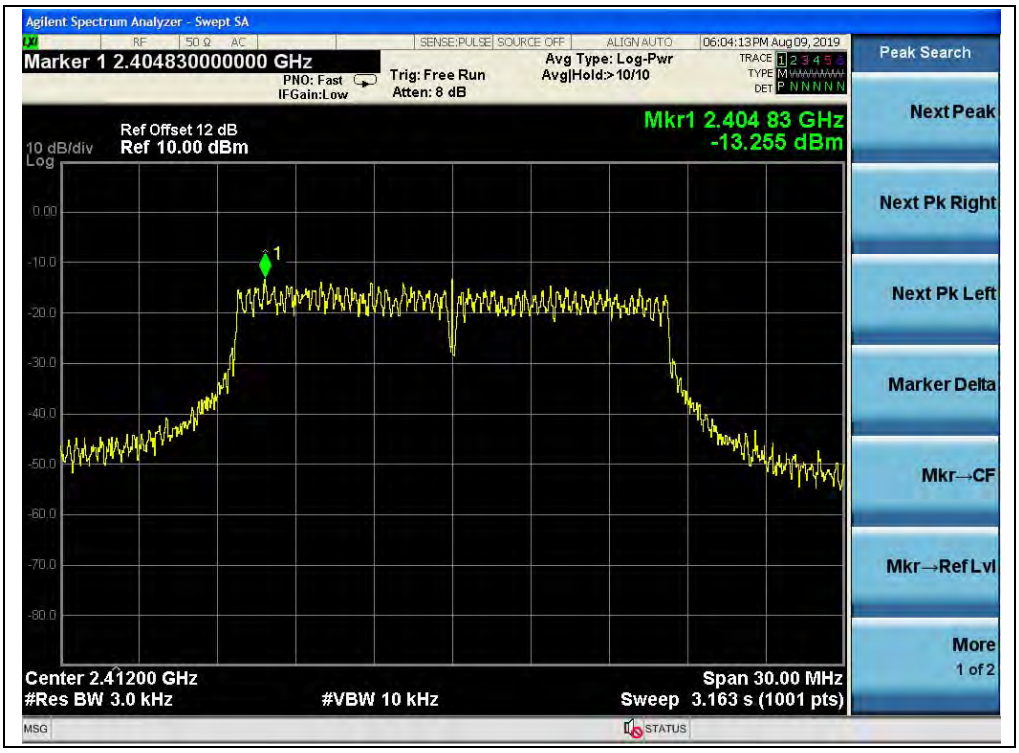
(Channel = 13, 802.11b)

802.11g Test mode

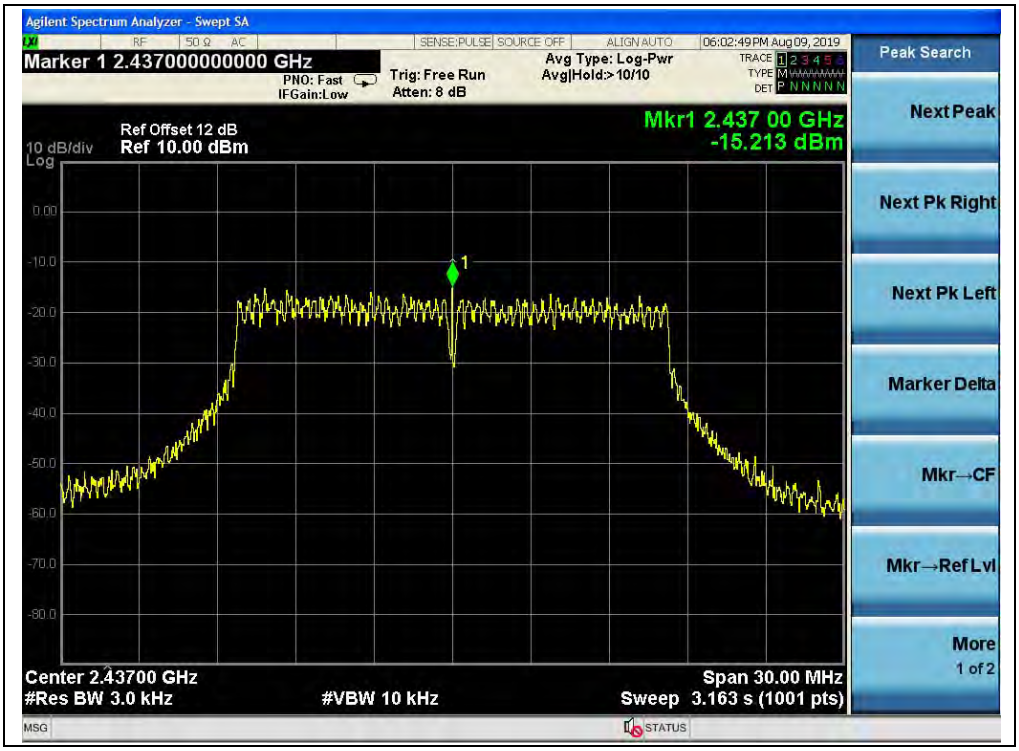
A. Test Verd0.90t:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-13.26	8	PASS
6	2437	-15.21	8	PASS
11	2462	-16.78	8	PASS
12	2467	-15.24	8	PASS
13	2472	-17.21	8	PASS

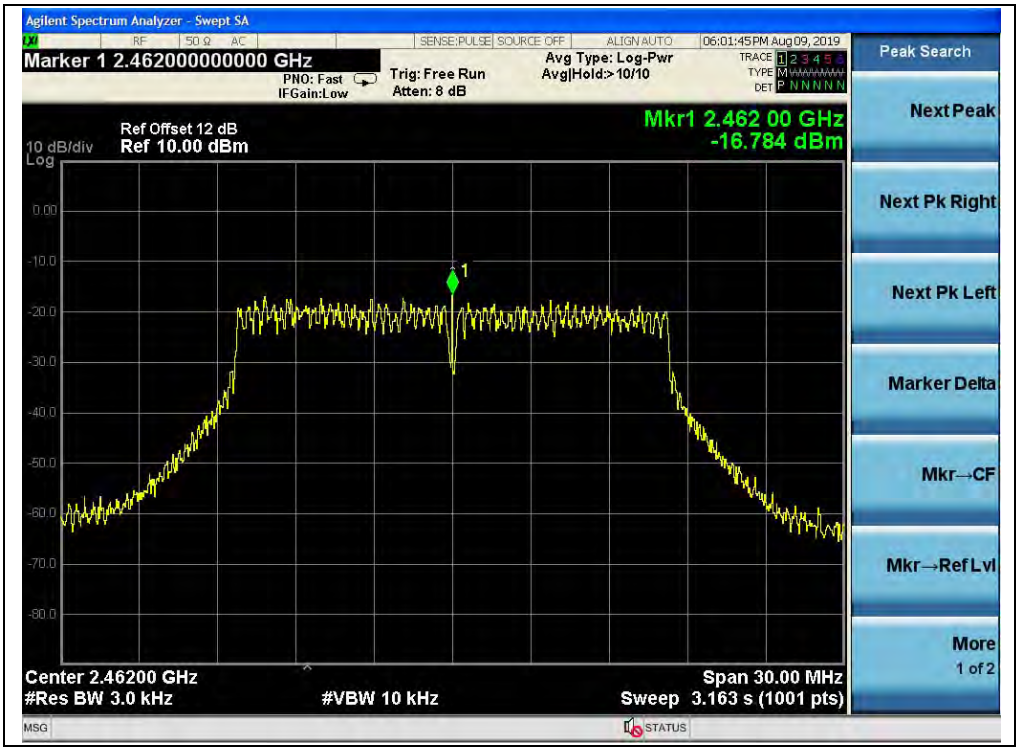
B. Test Plots:



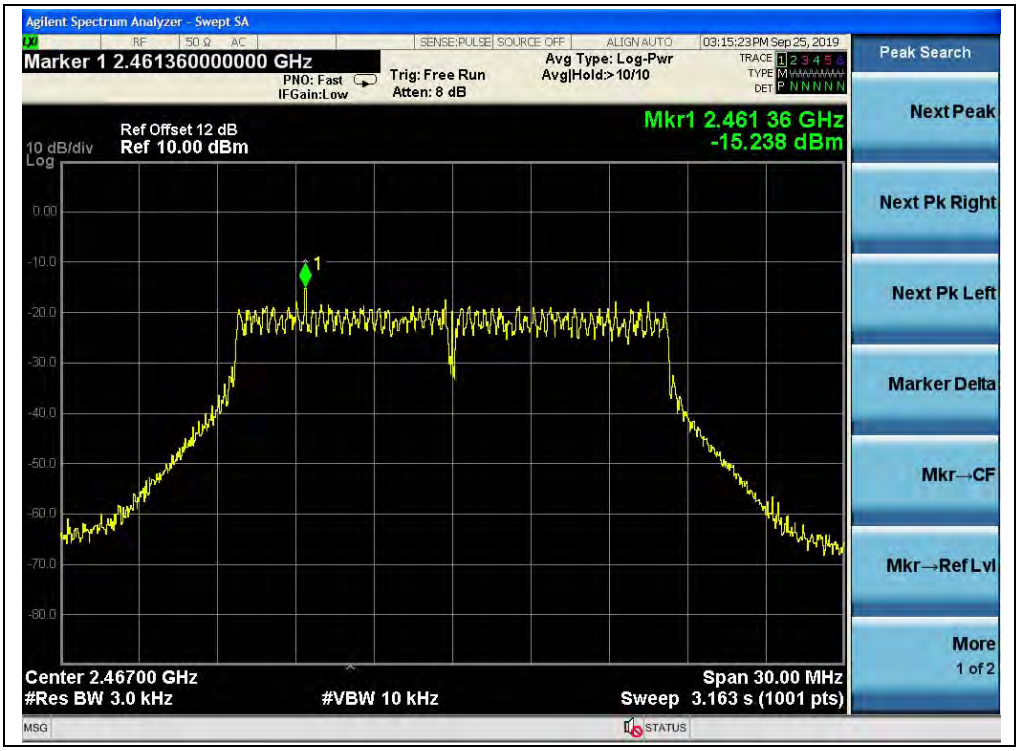
(Channel = 1, 802.11g)



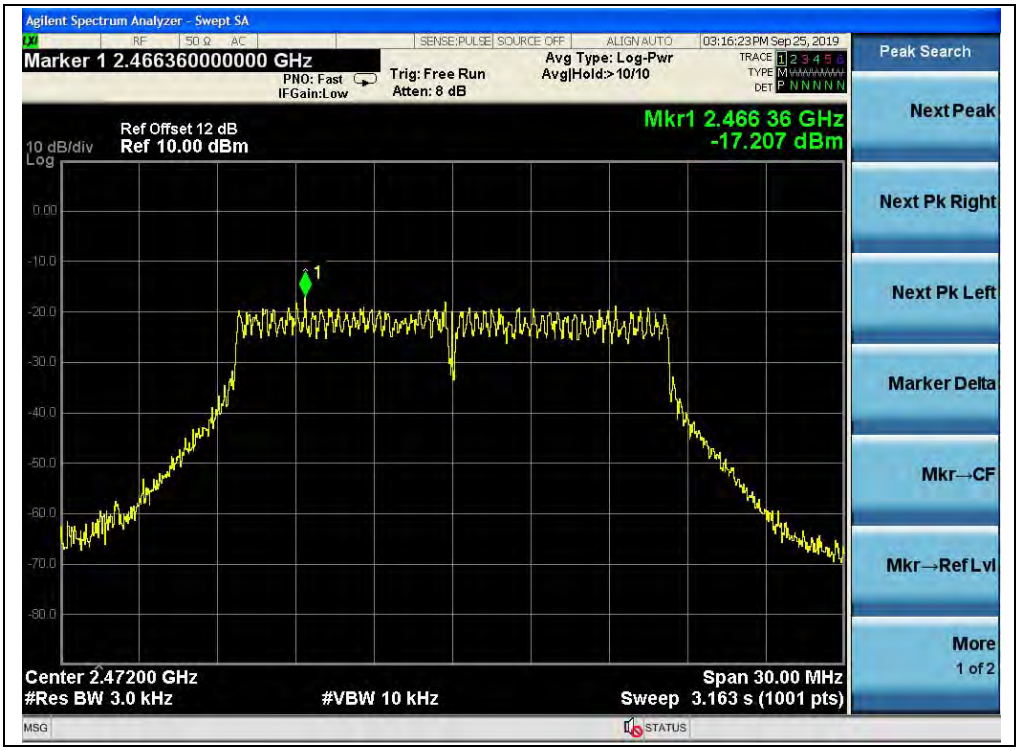
(Channel = 6, 802.11g)



(Channel = 11, 802.11g)



(Channel = 12, 802.11g)



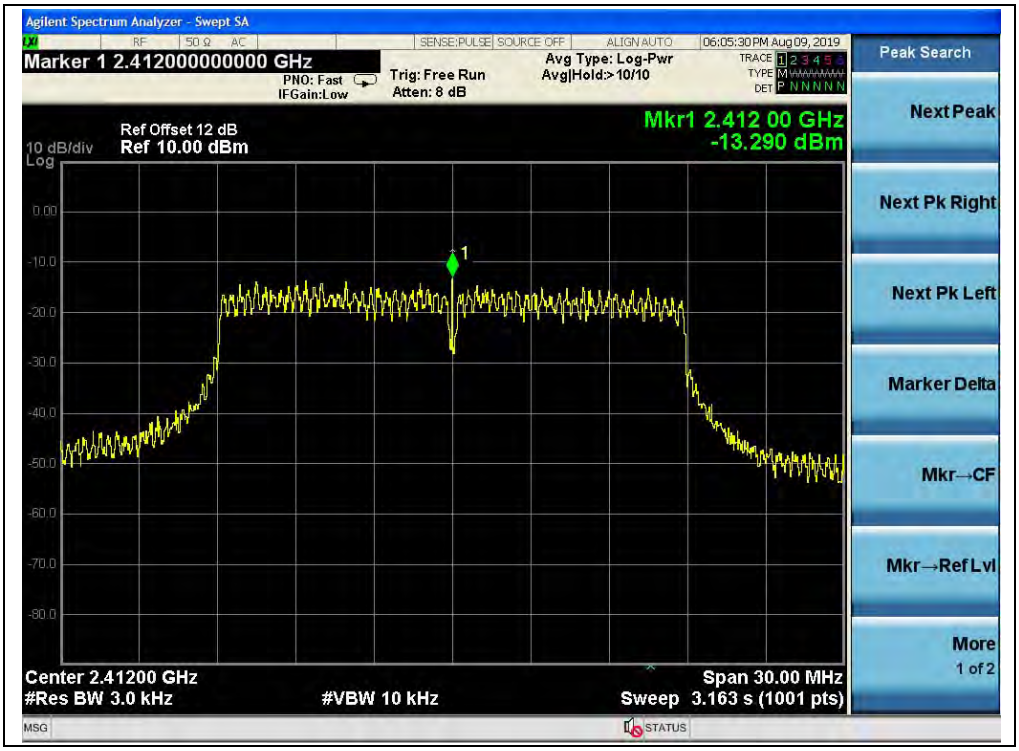
(Channel = 13, 802.11g)

802.11n (HT20) Test mode

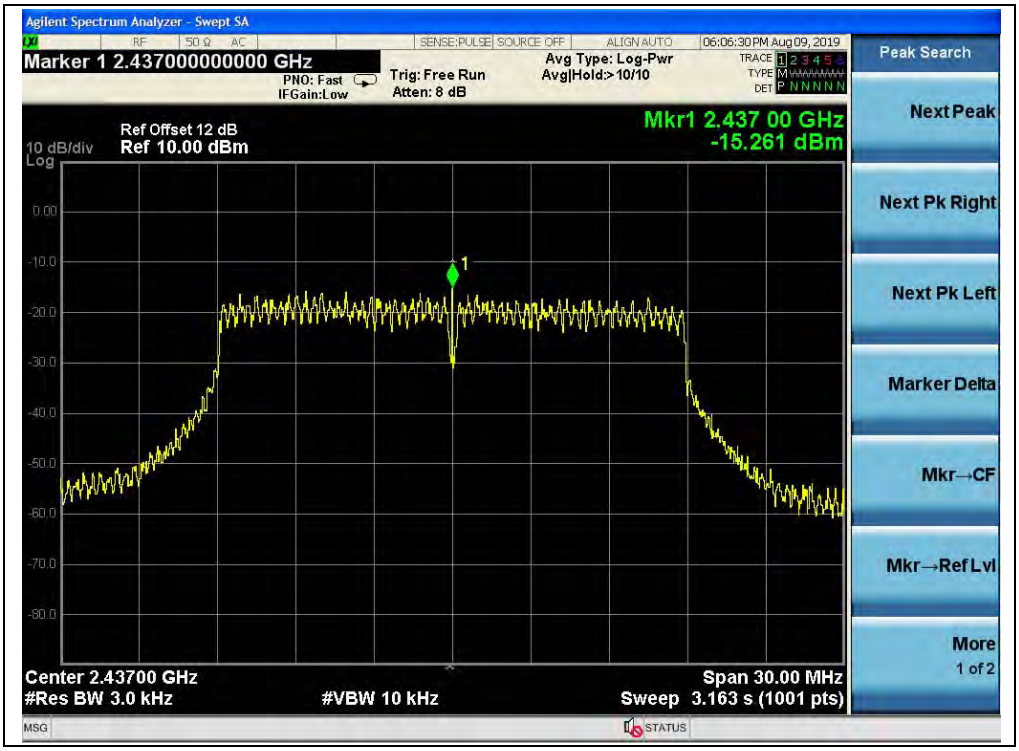
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-13.29	8	PASS
6	2437	-15.26	8	PASS
11	2462	-16.88	8	PASS
12	2467	-15.25	8	PASS
13	2472	-15.69	8	PASS

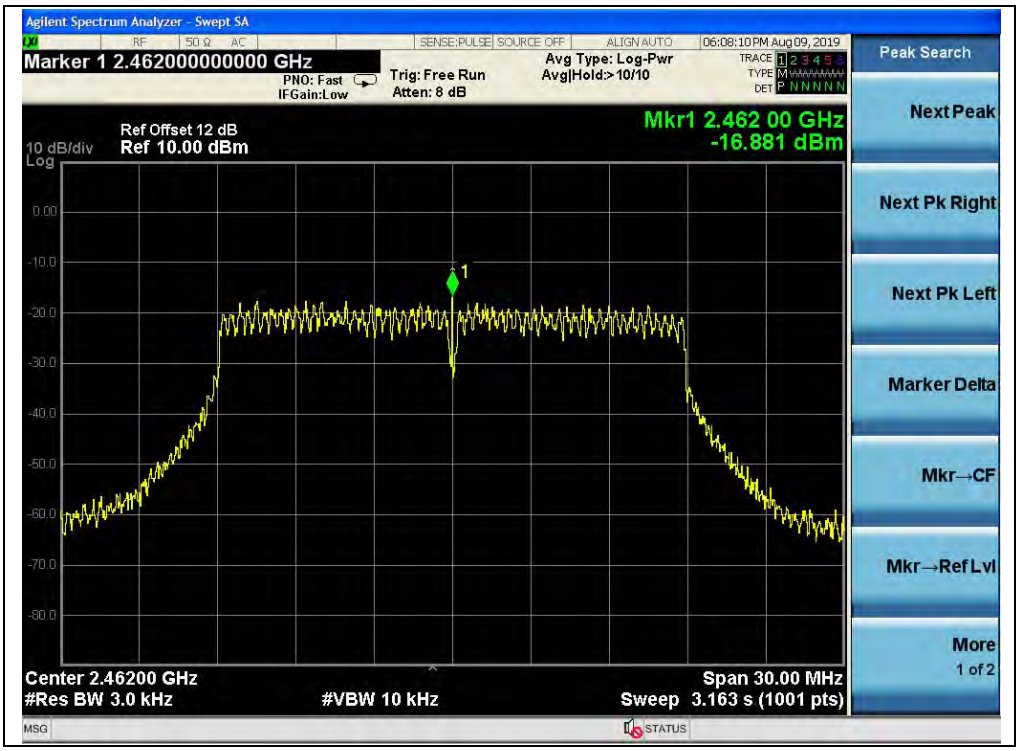
B. Test Plots:



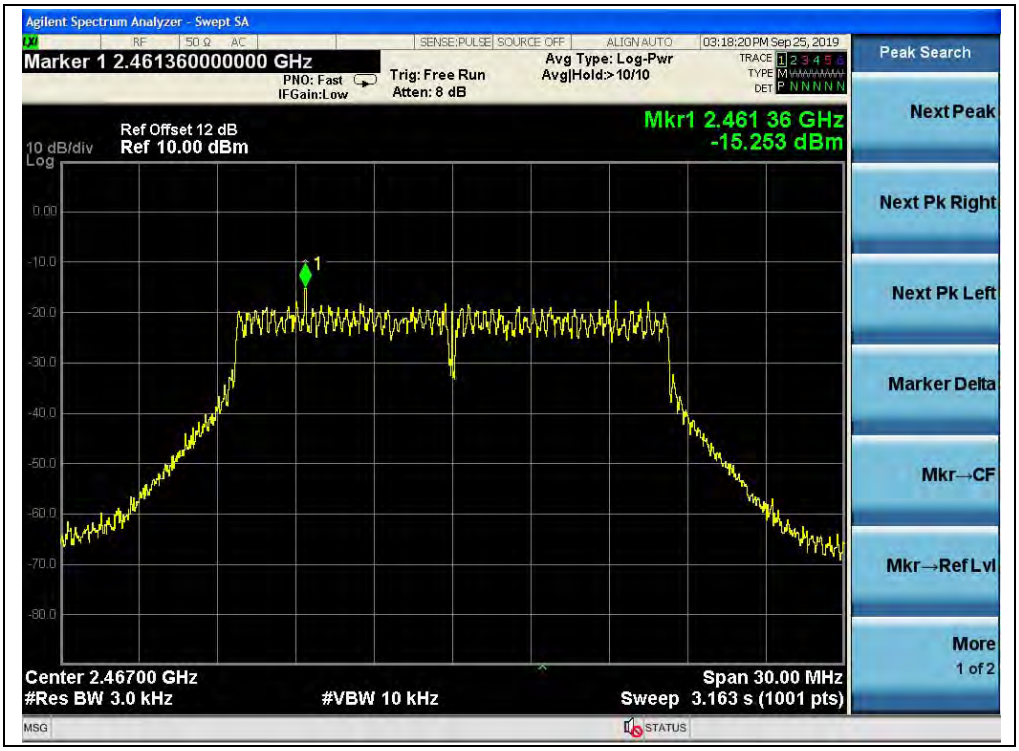
(Channel = 1, 802.11n(HT20))



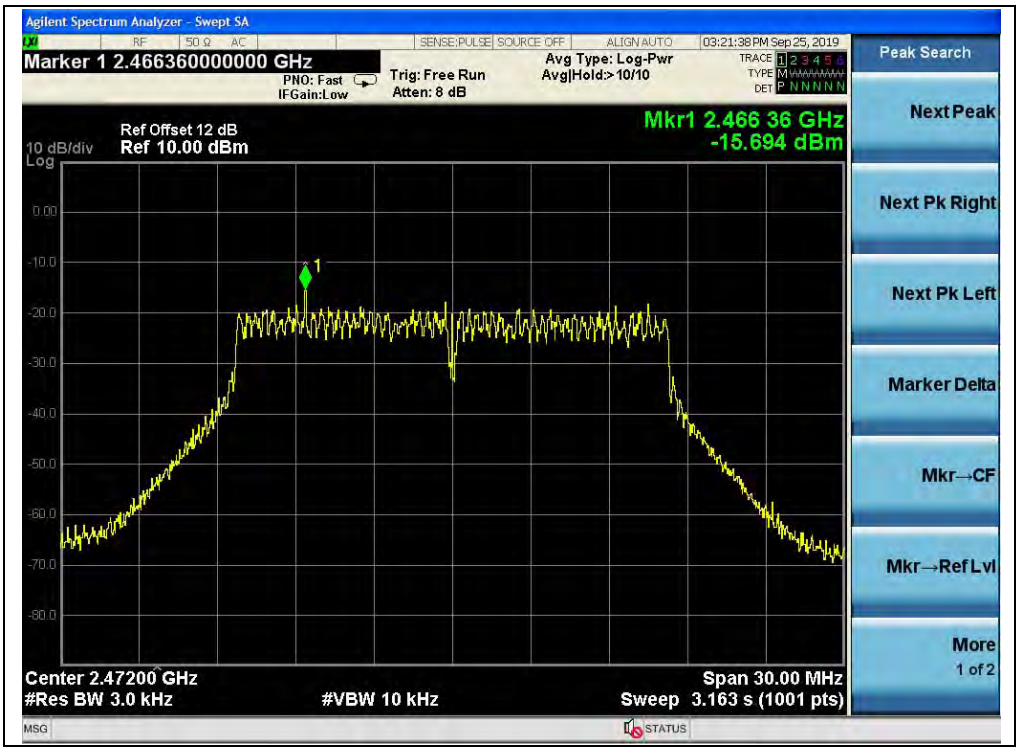
(Channel = 6, 802.11n(HT20))



(Channel = 11, 802.11n(HT20))



(Channel = 12, 802.11n(HT20))



(Channel = 13, 802.11n(HT20))

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

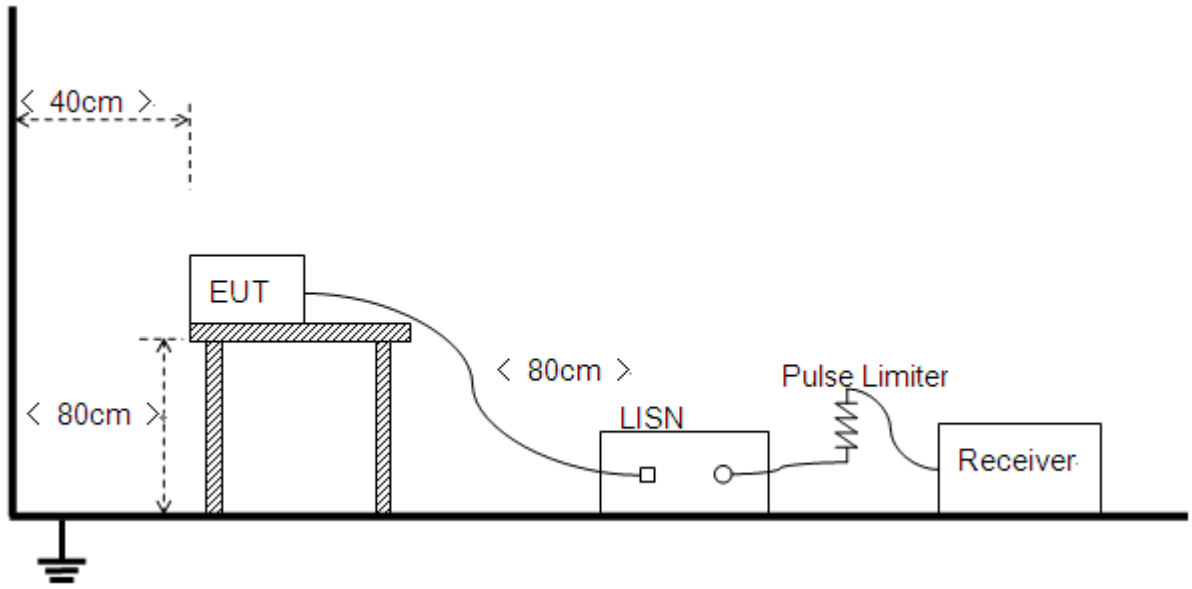
NOTE:

(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.

2.7.3. 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.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test setup:

Test Mode: EUT + Adapter+ WiFi TX

Test Voltage: AC 120V/60Hz

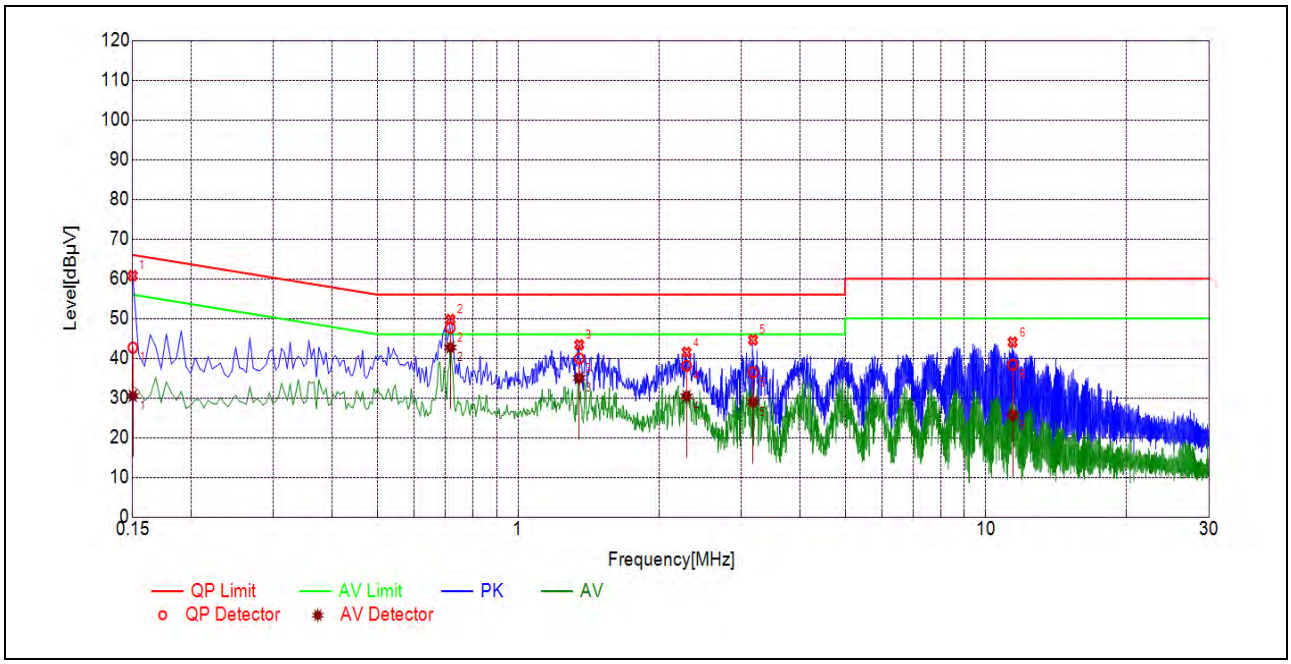
The measurement results are obtained as below:

E [dBμV] $=U_R + L_{Cable\ loss}$ [dB] + A_{Factor}

U_R: Receiver Reading

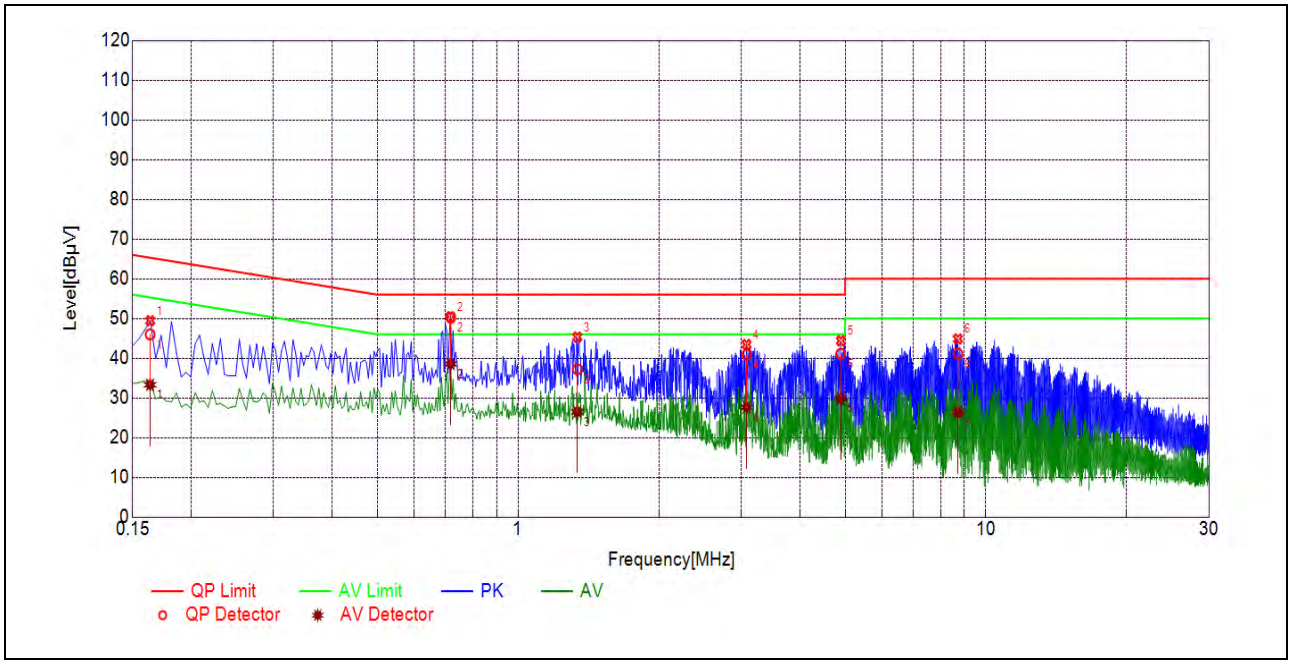
A_{Factor}: Voltage division factor of LISN

B. Test Plots:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1501	42.67	30.52	65.99	55.99	Line	PASS
2	0.7163	47.68	42.72	56.00	46.00		PASS
3	1.3509	39.93	35.01	56.00	46.00		PASS
4	2.2919	38.06	30.43	56.00	46.00		PASS
5	3.1780	36.45	28.97	56.00	46.00		PASS
6	11.4092	38.34	25.64	60.00	50.00		PASS



(N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1634	45.99	33.30	65.29	55.29	Neutral	PASS
2	0.7175	50.18	38.54	56.00	46.00		PASS
3	1.3377	37.22	26.49	56.00	46.00		PASS
4	3.0803	40.86	27.65	56.00	46.00		PASS
5	4.8930	41.12	29.85	56.00	46.00		PASS
6	8.7145	41.11	26.35	60.00	50.00		PASS

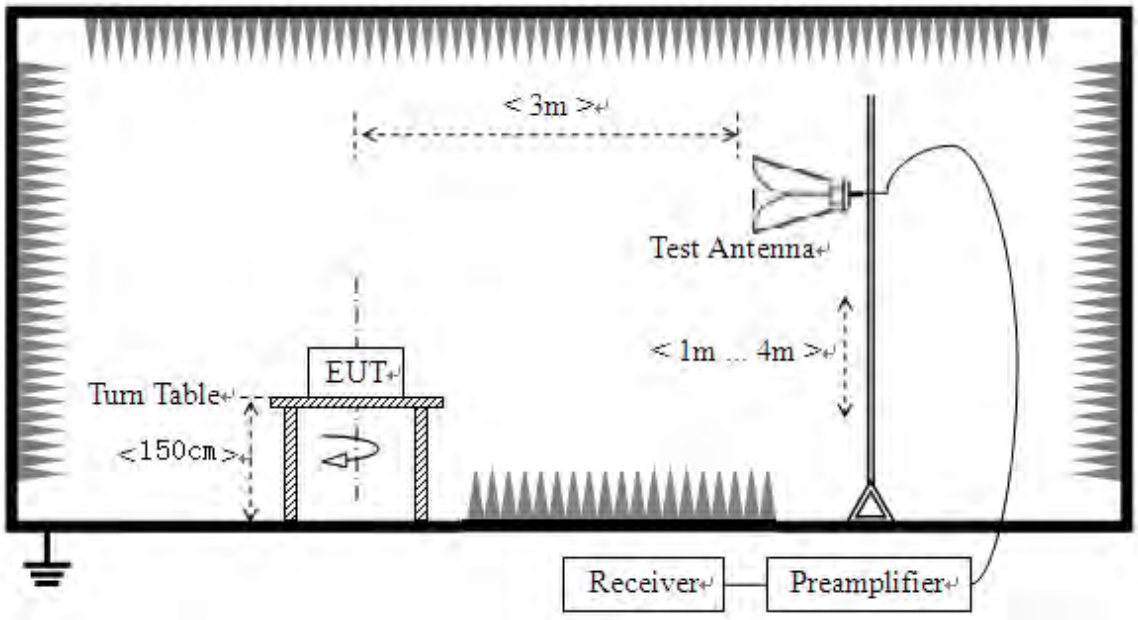
2.8. Restricted Frequency Bands

2.8.1. 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).

2.8.2. 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.

2.8.3. Test procedure

KDB 558074 Section 8.6 and 8.7 was used in order to prove compliance.

2.8.4. 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

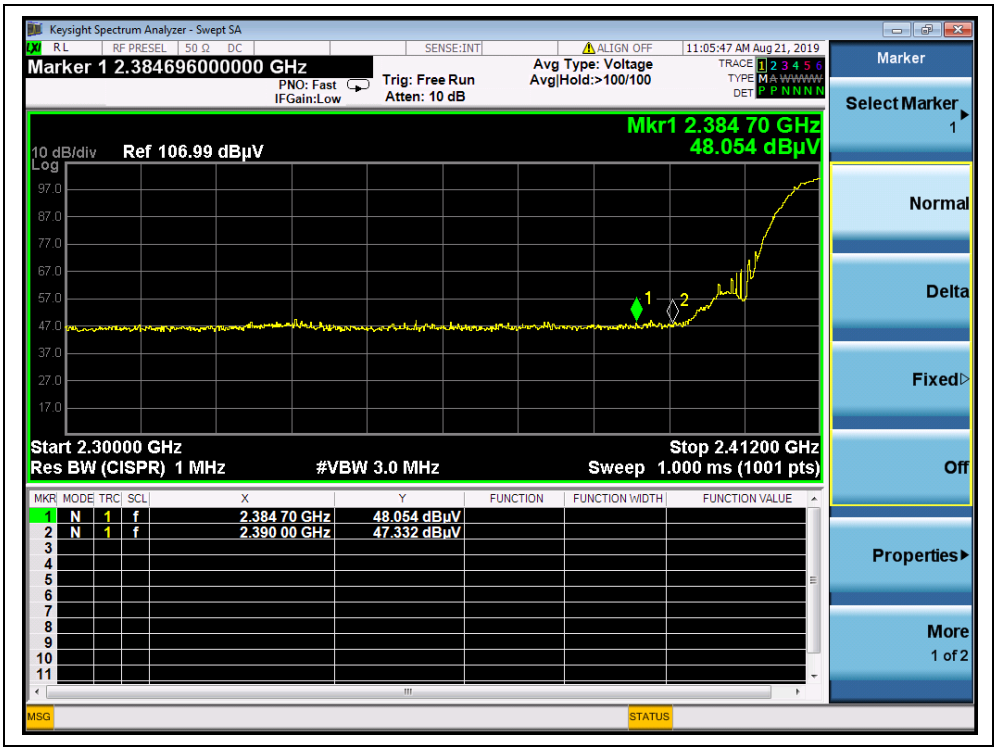
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

802.11b Test mode

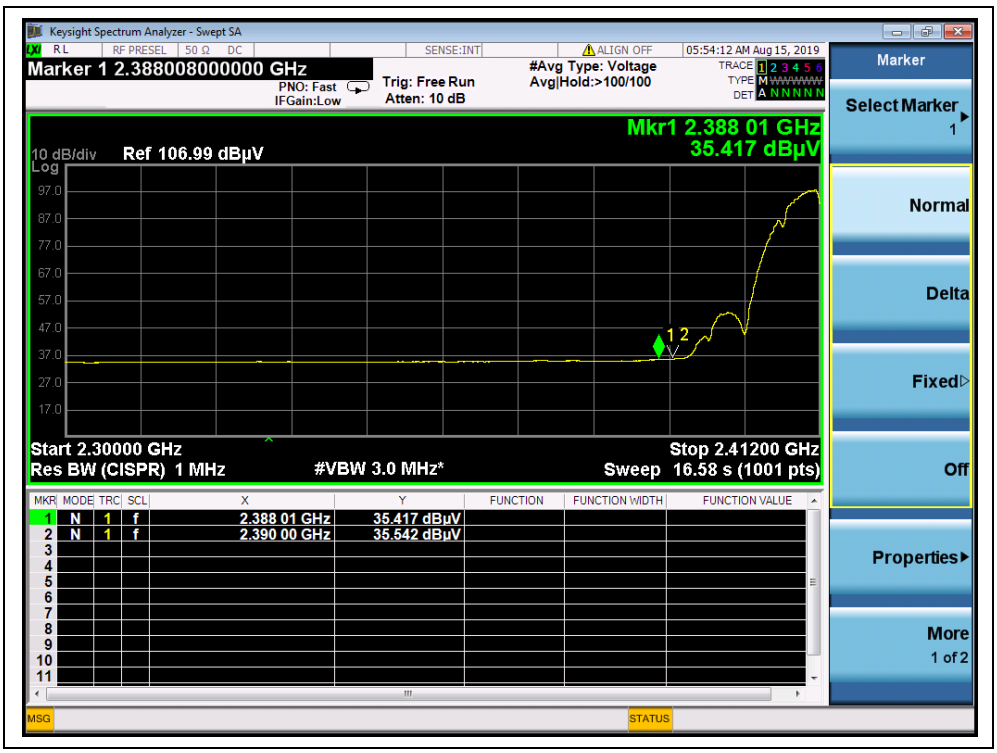
A. Test Verdict:

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	2384.70	PK	48.05	-29.67	32.56	50.94	74	PASS
1	2390.00	AV	35.54	-29.67	32.56	38.43	54	PASS
11	2483.50	PK	54.74	-29.67	32.56	57.63	74	PASS
11	2484.49	AV	34.61	-29.67	32.56	37.50	54	PASS
12	2483.50	PK	51.59	-29.67	32.56	54.48	74	PASS
12	2484.57	AV	48.97	-29.67	32.56	51.86	54	PASS
13	2483.50	PK	60.68	-29.67	32.56	63.57	74	PASS
13	2484.27	AV	46.46	-29.67	32.56	49.35	54	PASS

B. Test Plots:



(Channel = 1 PEAK, 802.11b)

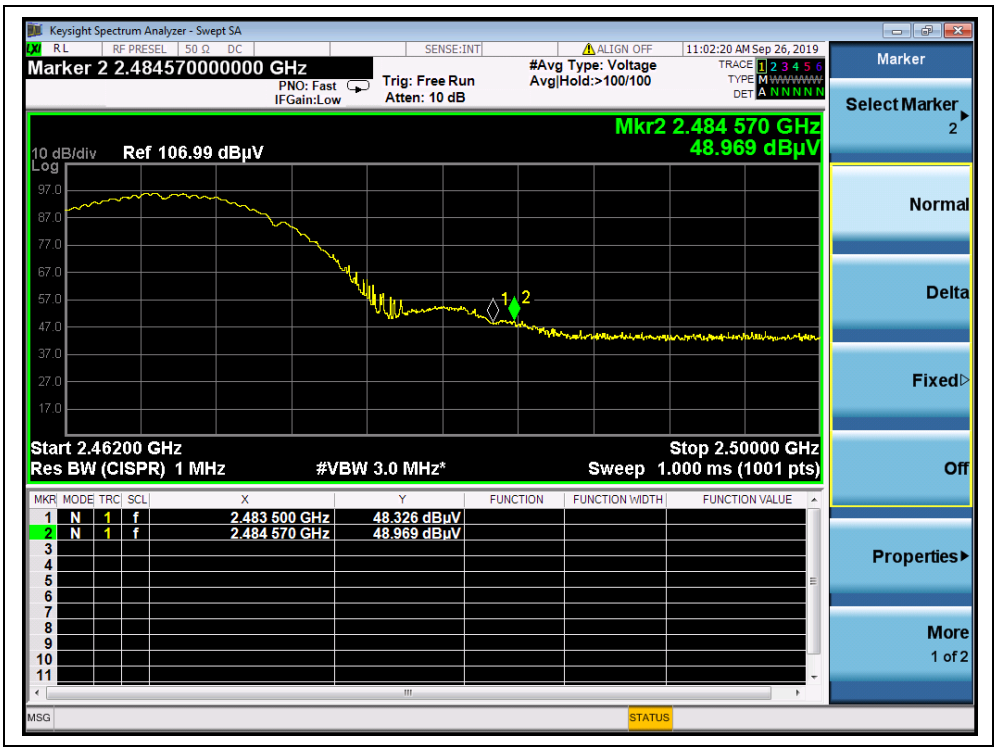


(Channel = 1 AVG, 802.11b)

(Channel = 11 PEAK, 802.11b)

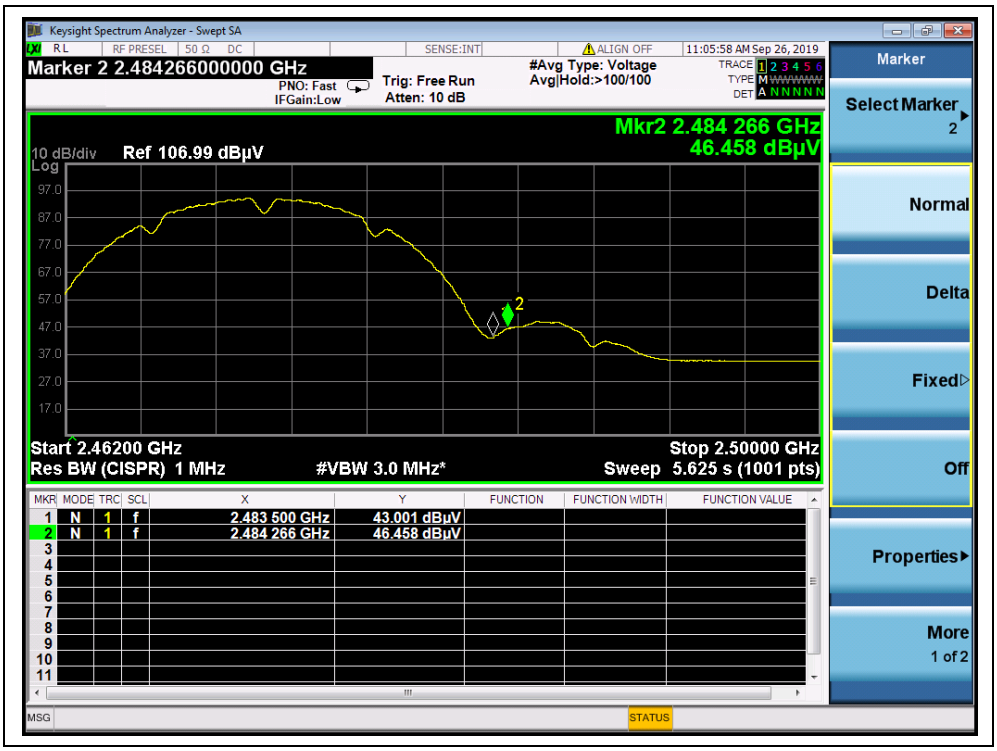
(Channel = 11 AVG, 802.11b)

(Channel = 12 PEAK, 802.11b)



(Channel = 12 AVG, 802.11b)

(Channel = 13 PEAK, 802.11b)



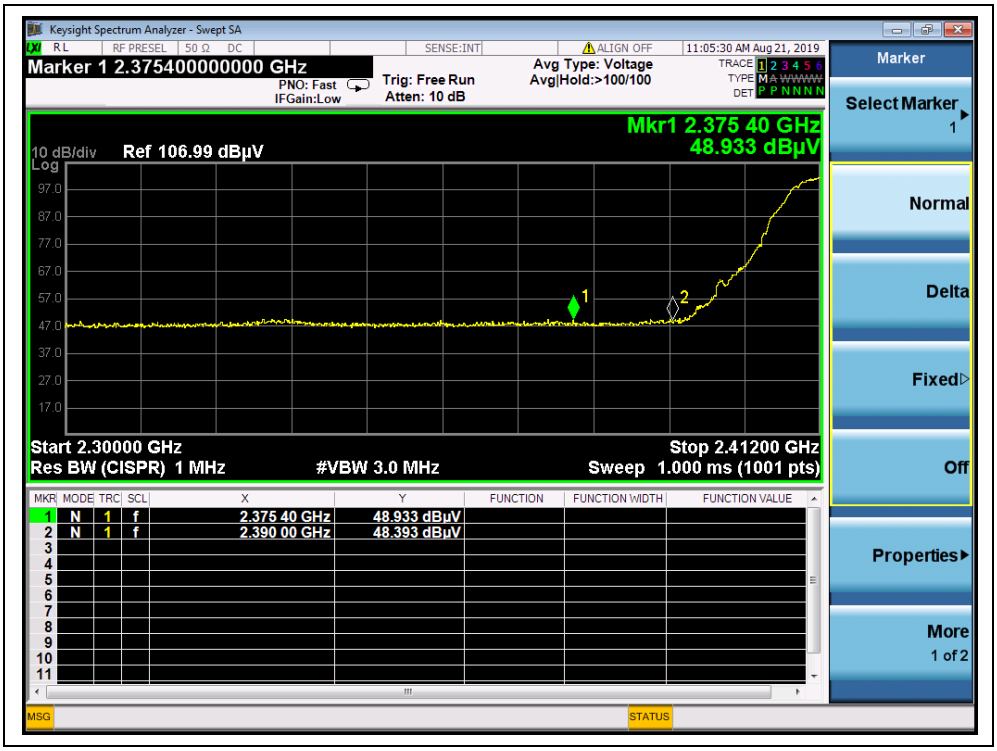
(Channel = 13 AVG, 802.11b)

802.11g Test mode

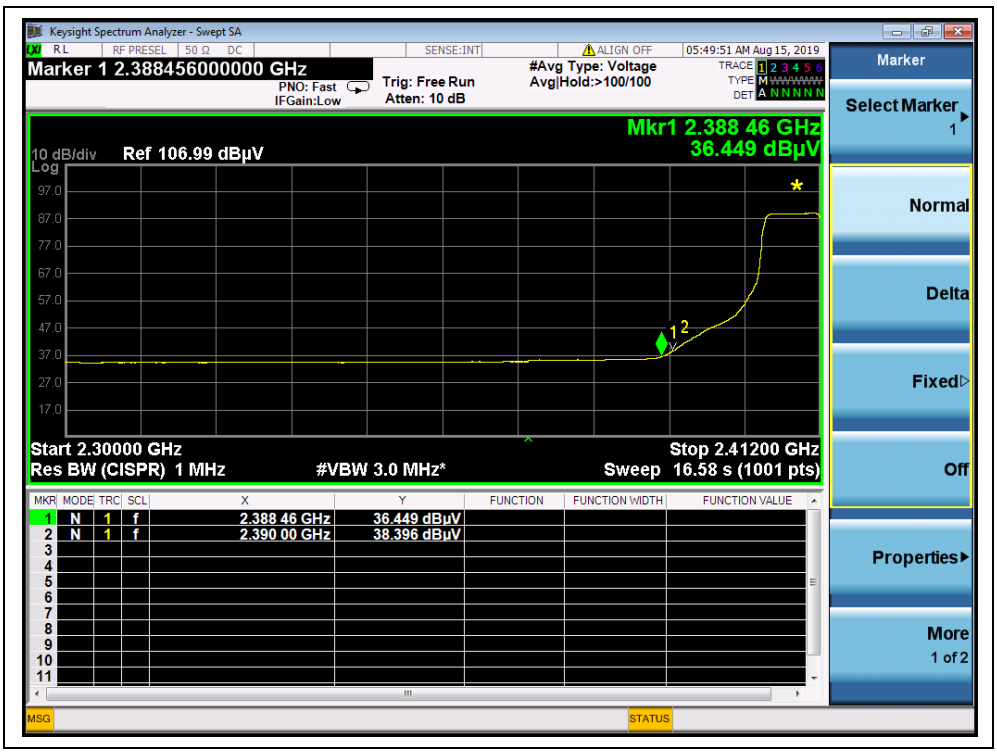
A. Test Verdict:

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	2375.40	PK	48.93	-29.67	32.56	51.82	74	PASS
1	2390.00	AV	38.40	-29.67	32.56	41.29	54	PASS
11	2485.63	PK	53.68	-29.67	32.56	56.57	74	PASS
11	2483.50	AV	36.51	-29.67	32.56	39.40	54	PASS
12	2484.00	PK	62.66	-29.67	32.56	65.55	74	PASS
12	2483.50	AV	43.76	-29.67	32.56	46.65	54	PASS
13	2483.50	PK	56.56	-29.67	32.56	59.45	74	PASS
13	2483.50	AV	39.29	-29.67	32.56	42.18	54	PASS

B. Test Plots:

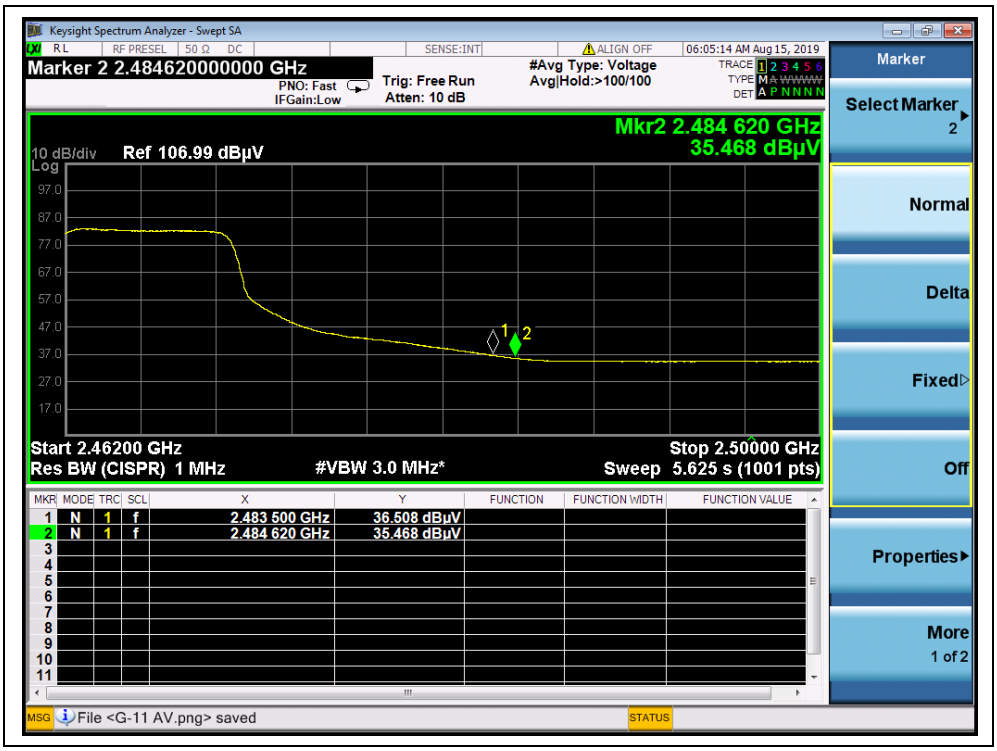


(Channel = 1 PEAK, 802.11g)



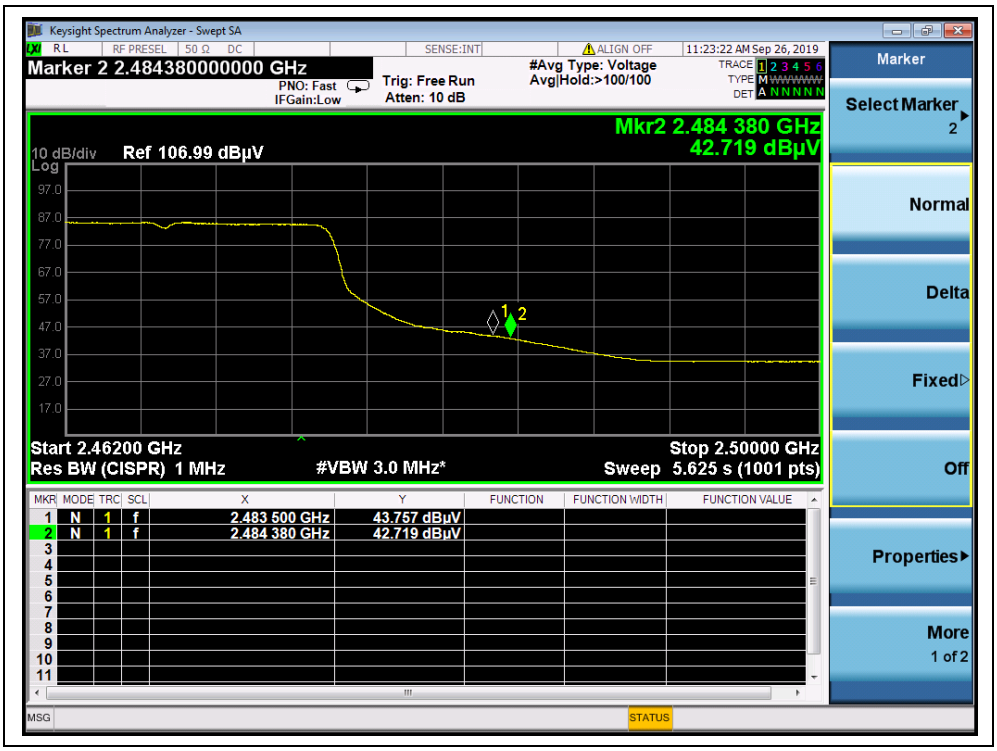
(Channel = 1 AVG, 802.11g)

(Channel = 11 PEAK, 802.11g)

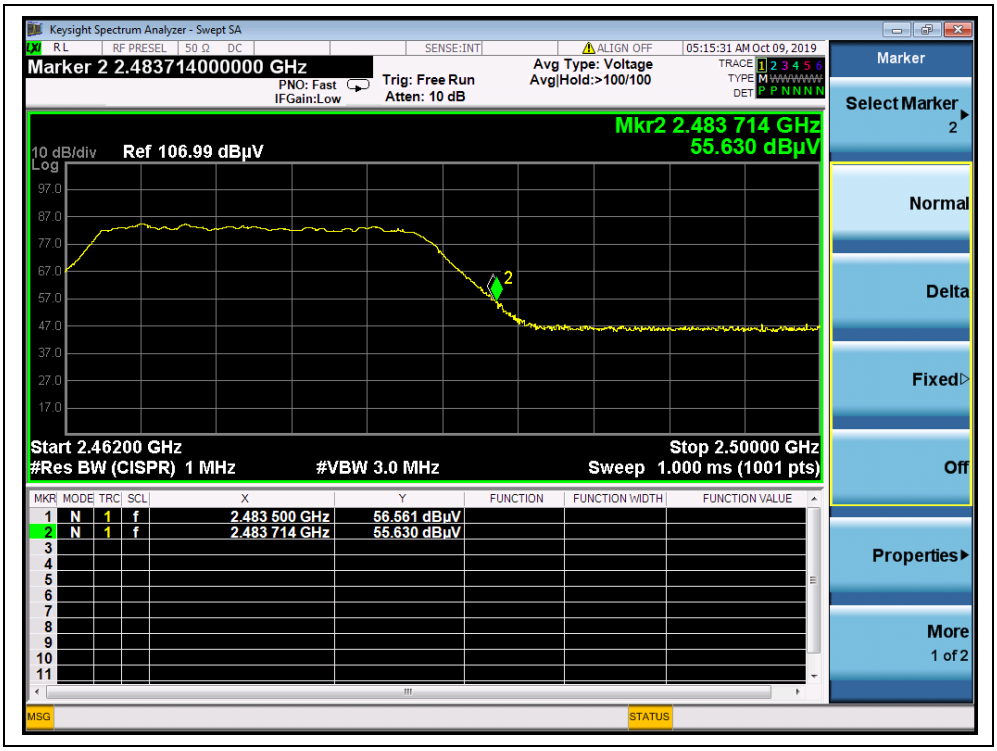


(Channel = 11 AVG, 802.11g)

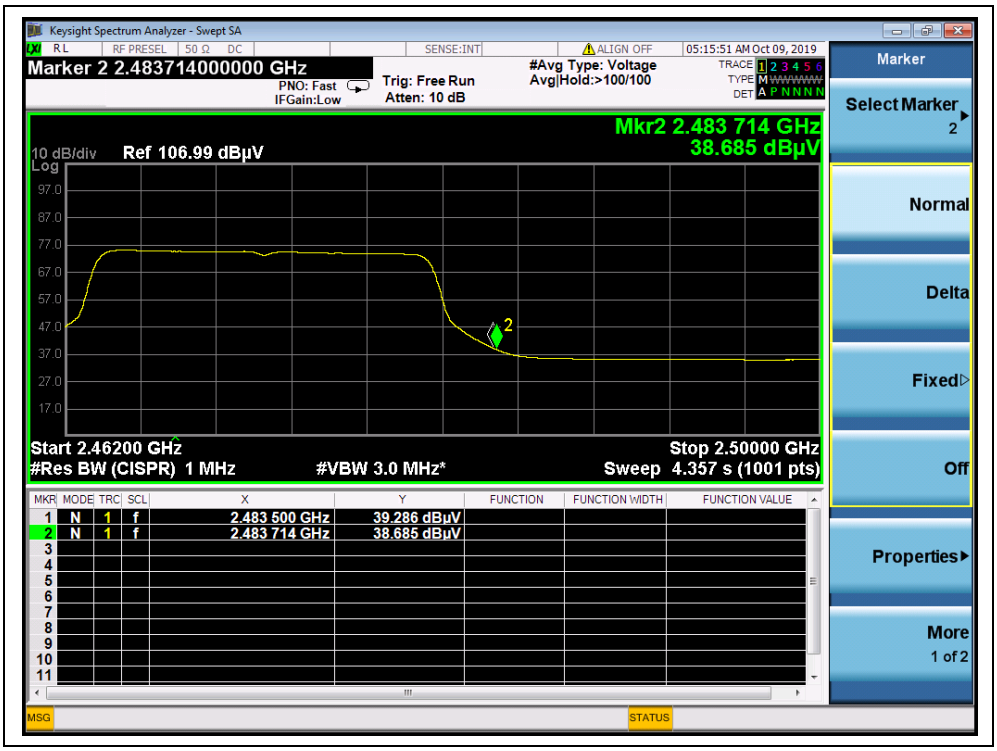
(Channel = 12 PEAK, 802.11g)



(Channel = 12 AVG, 802.11g)



(Channel = 13 PEAK, 802.11g)



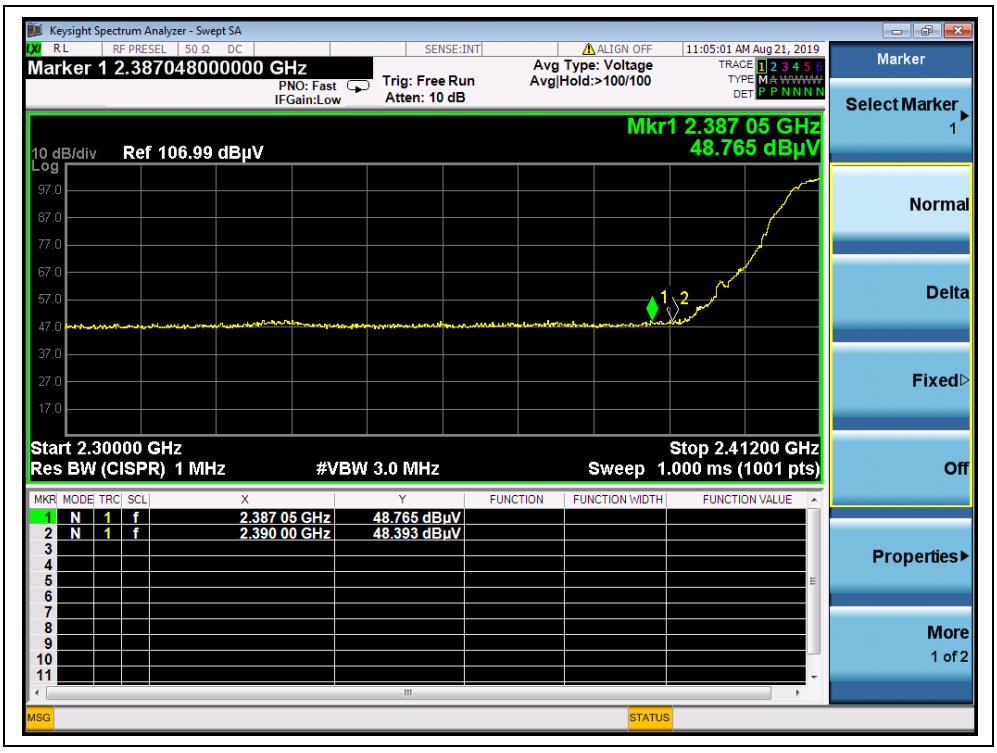
(Channel = 13 AVG, 802.11g)

802.11 n (HT20) Test mode

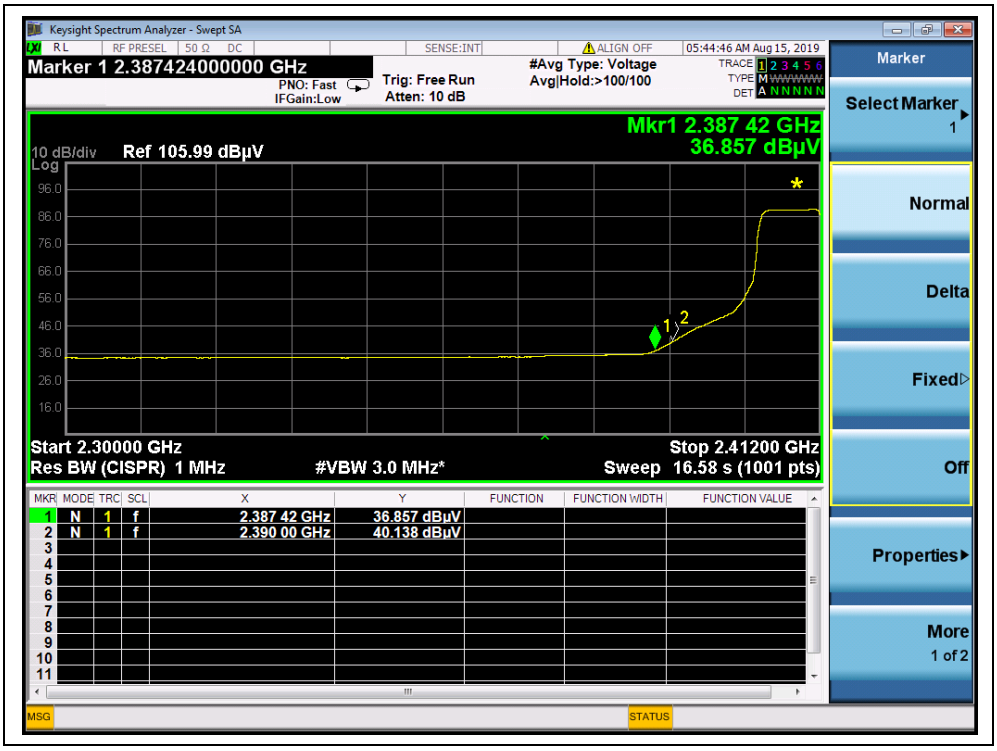
A. Test Verdict:

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	2487.05	PK	48.77	-29.67	32.56	51.66	74	PASS
1	2390.00	AV	40.14	-29.67	32.56	43.03	54	PASS
11	2485.18	PK	55.56	-29.67	32.56	58.45	74	PASS
11	2483.50	AV	38.62	-29.67	32.56	41.51	54	PASS
12	2483.50	PK	62.50	-29.67	32.56	65.39	74	PASS
12	2483.50	AV	47.88	-29.67	32.56	50.77	54	PASS
13	2483.50	PK	56.35	-29.67	32.56	59.24	74	PASS
13	2483.50	AV	40.02	-29.67	32.56	42.91	54	PASS

B. Test Plots:



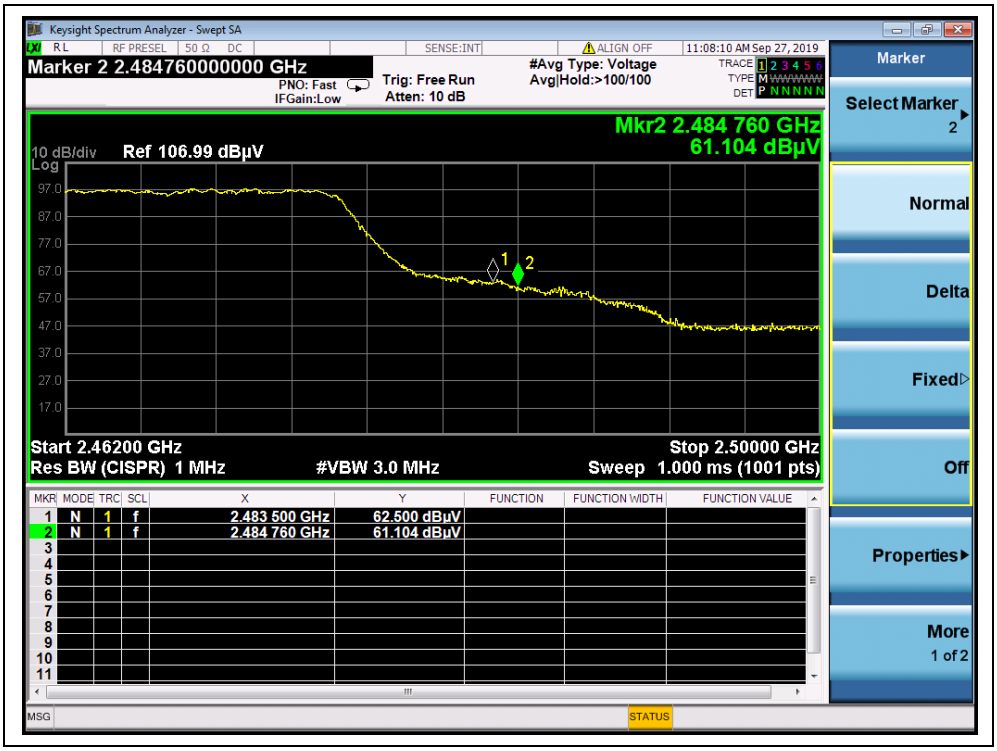
(Channel = 1 PEAK, 802.11n(HT20))



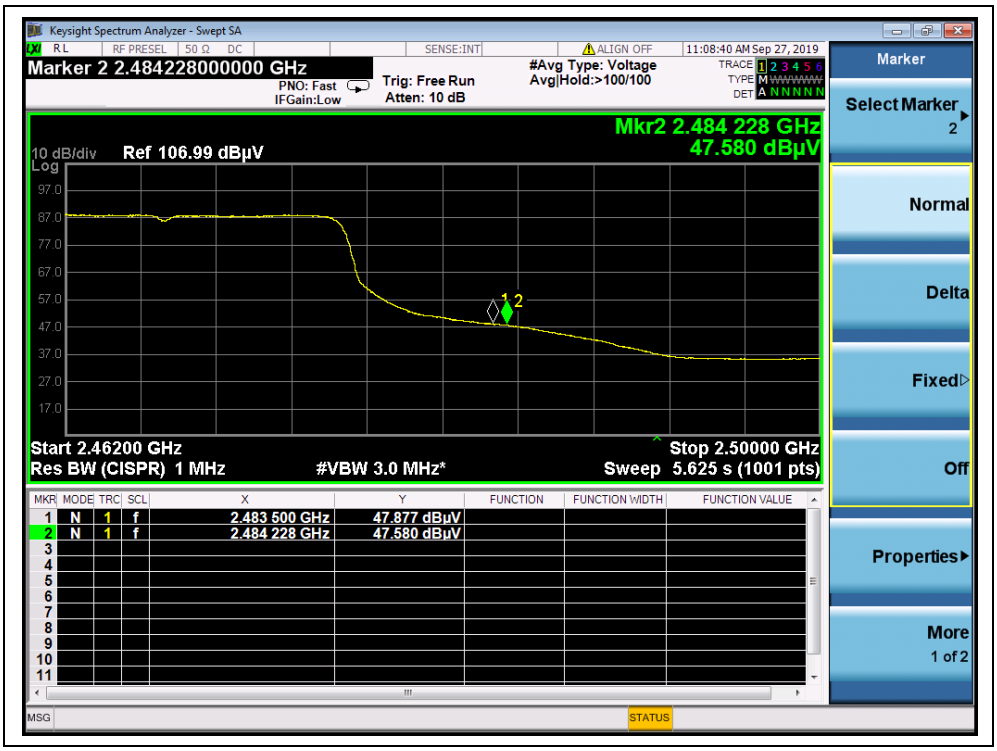
(Channel = 1 AVG, 802.11n(HT20))

(Channel = 11 PEAK, 802.11n(HT20))

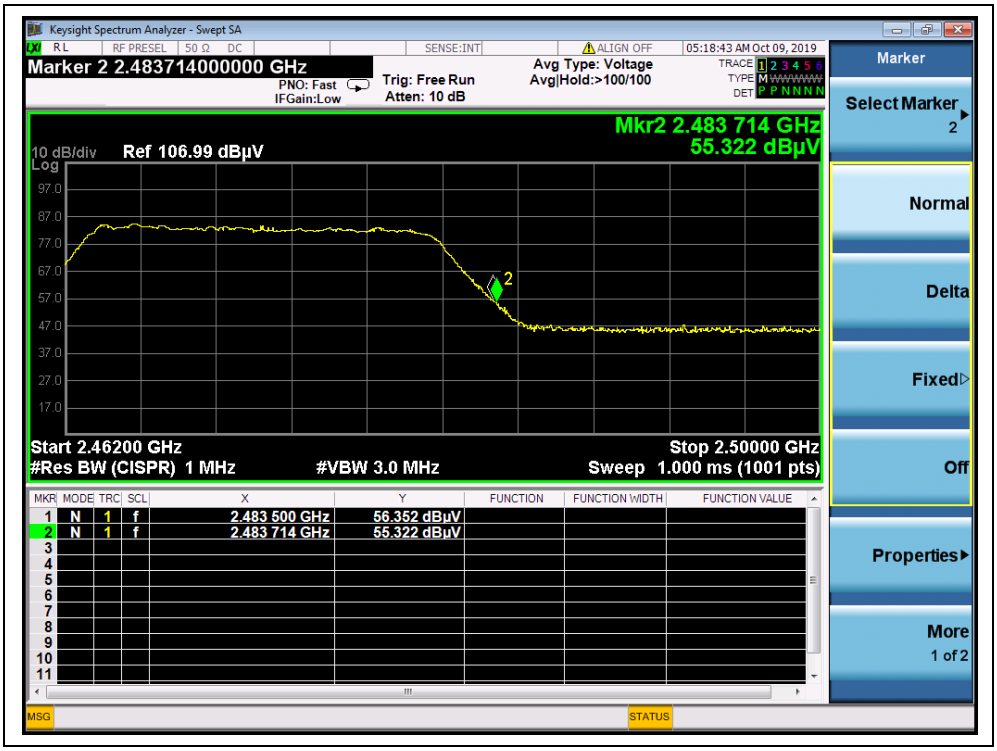
(Channel = 11 AVG, 802.11n(HT20))



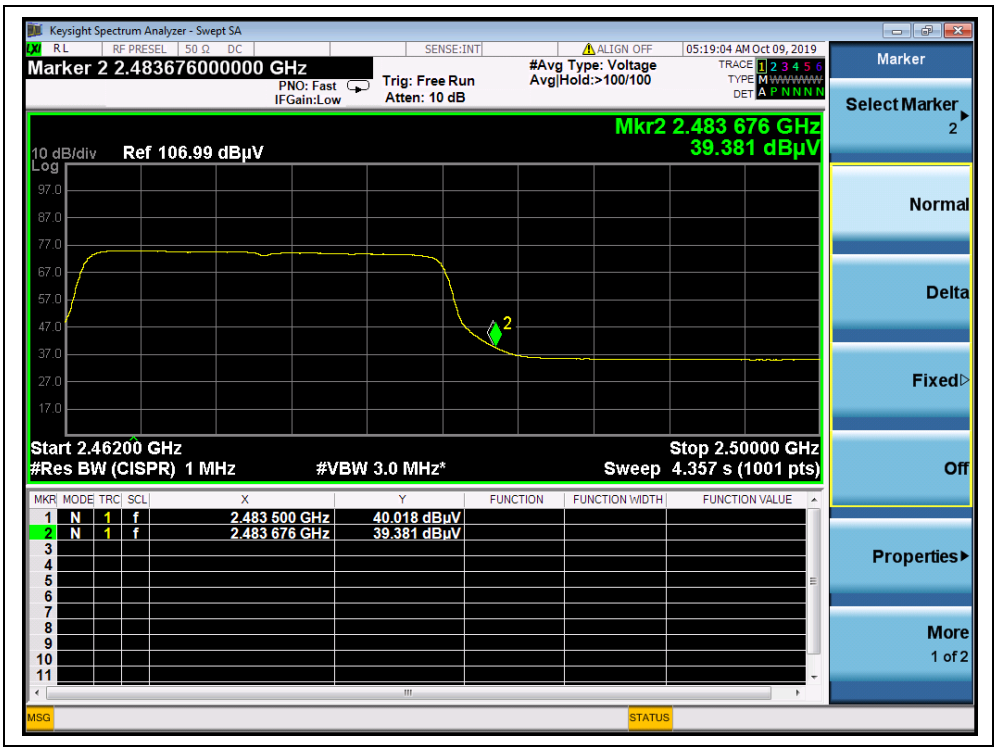
(Channel = 12 PEAK, 802.11n(HT20))



(Channel = 12 AVG, 802.11n(HT20))



(Channel = 13 PEAK, 802.11n(HT20))



(Channel = 13 AVG, 802.11n(HT20))

2.9. Radiated Emission

2.9.1. 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.

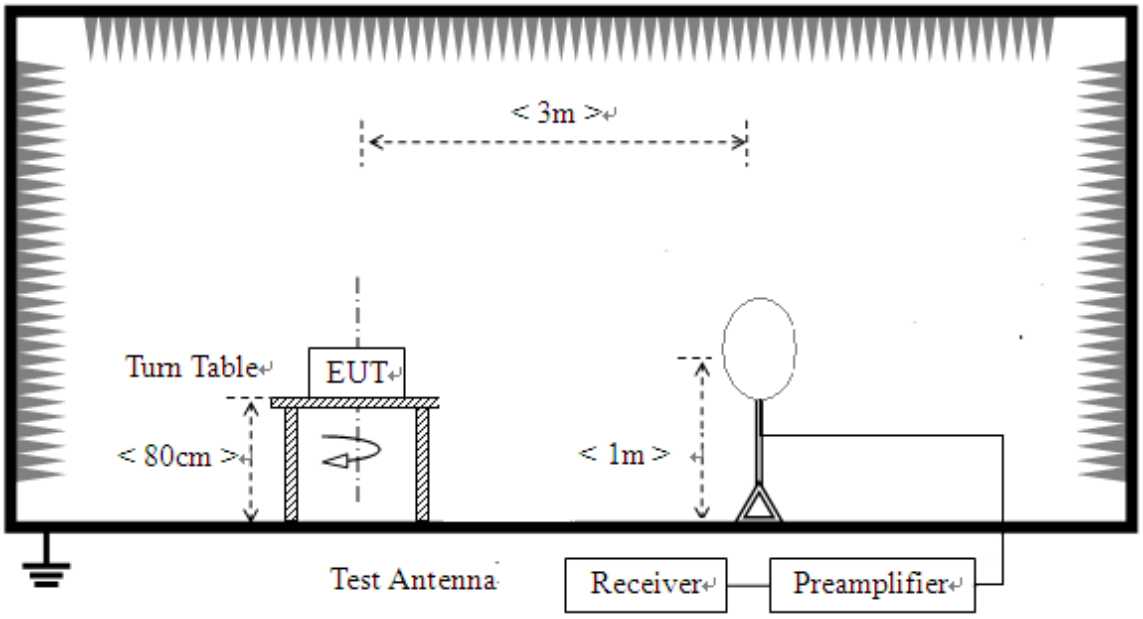
For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

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)

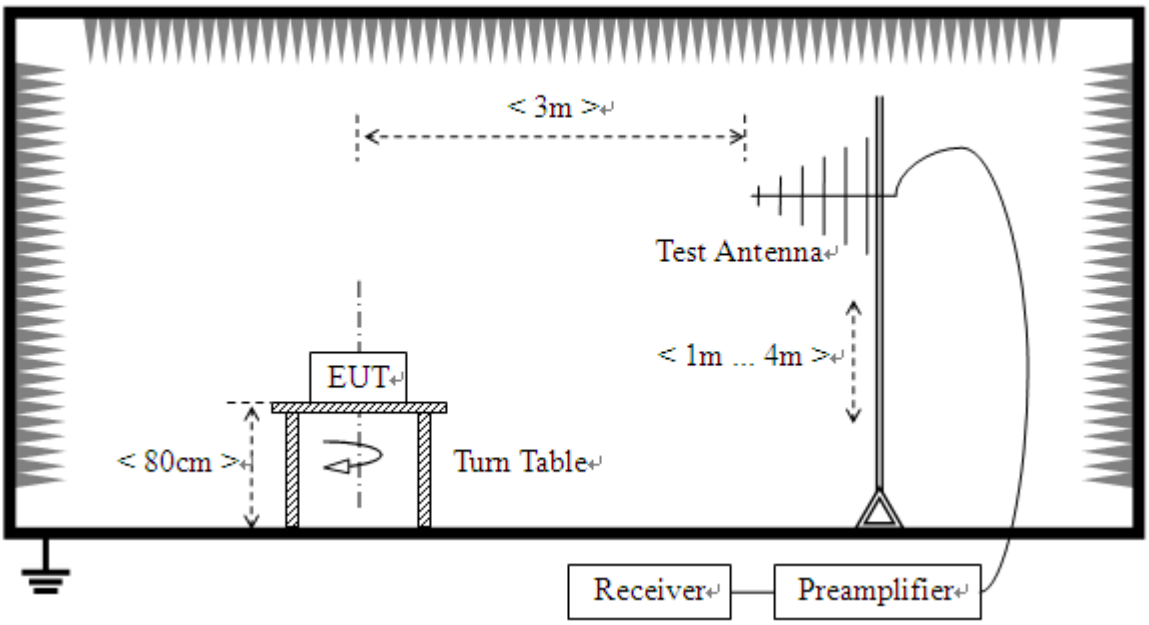
2.9.2. Test Description

A. Test Setup:

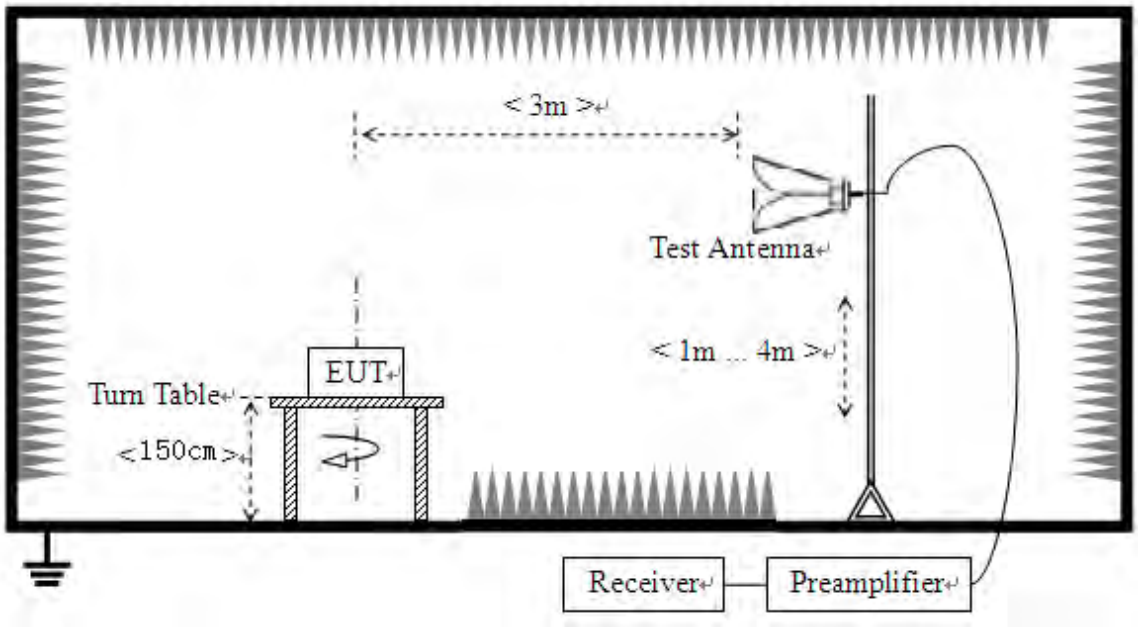
1) For radiated emissions from 9kHz to 30MHz



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.

2.9.3. 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.

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Note2: For the frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.
Note3: For the frequency, which started from 25GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

2.9.4. Test Result

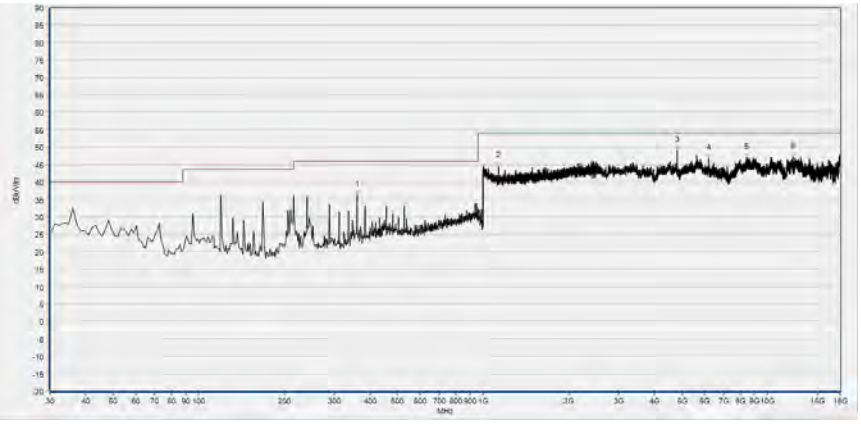
According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with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

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Note2: For the frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.
Note3: For the frequency, which started from 25GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

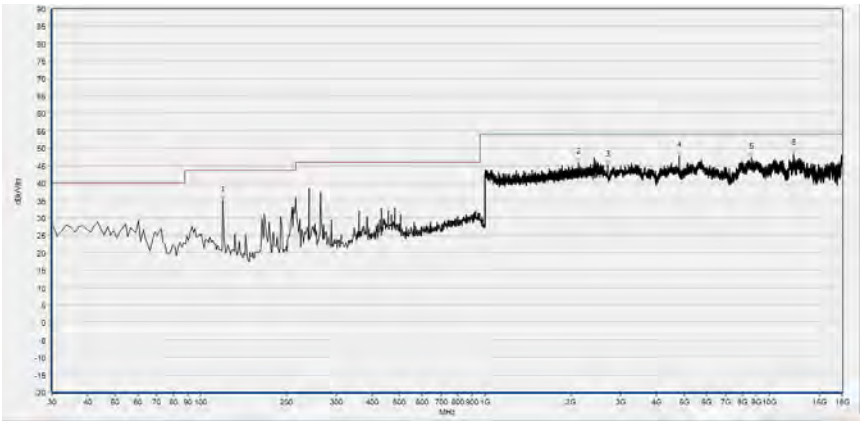
802.11b Test mode

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
360.213	36.34	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1135.734	44.51	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4823.604	49.06	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
6212.657	46.85	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8427.860	47.08	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12270.158	47.14	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

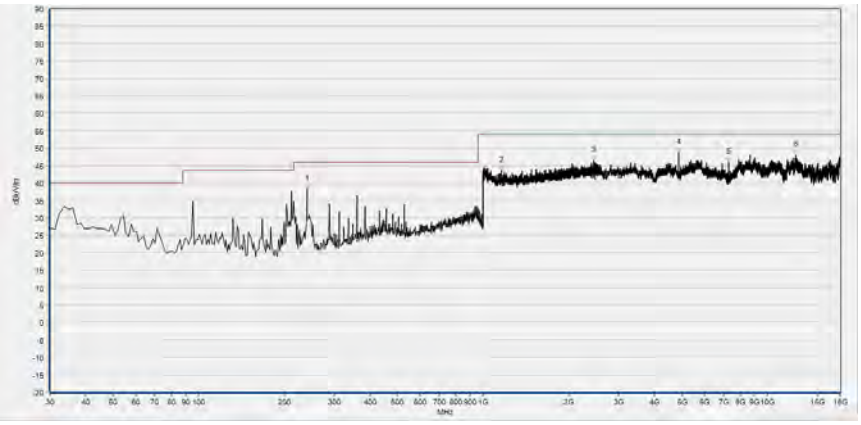
(Antenna Horizontal, 30MHz to 25GHz)



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	35.15	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2124.930	46.05	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2698.018	45.09	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4823.604	47.70	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8640.698	47.42	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12141.335	48.35	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

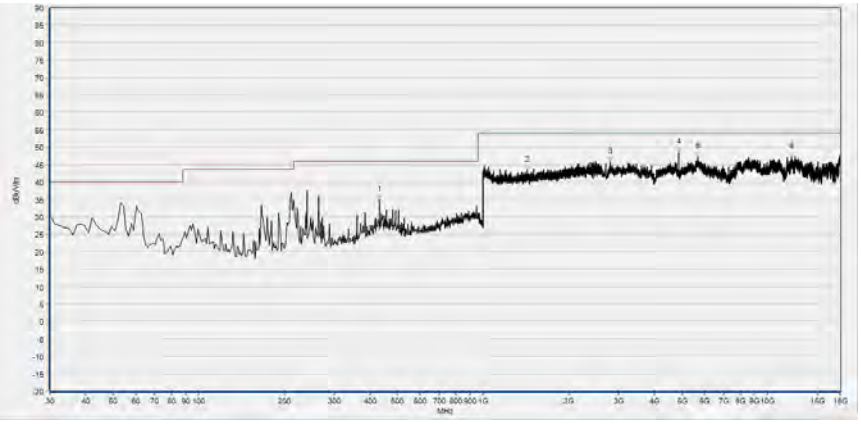
(Antenna Vertical, 30MHz to 25GHz)

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	38.09	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1157.503	43.51	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2448.900	46.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4874.013	48.61	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7310.456	45.98	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12597.818	47.96	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

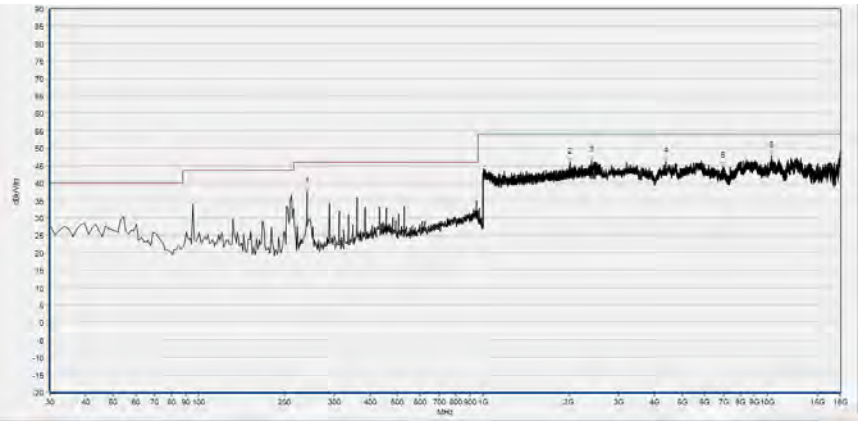
(Antenna Horizontal, 30MHz to 25GHz)



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
431.840	34.91	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1430.252	43.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2798.836	45.84	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4874.013	48.33	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5677.760	47.11	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12174.941	47.18	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

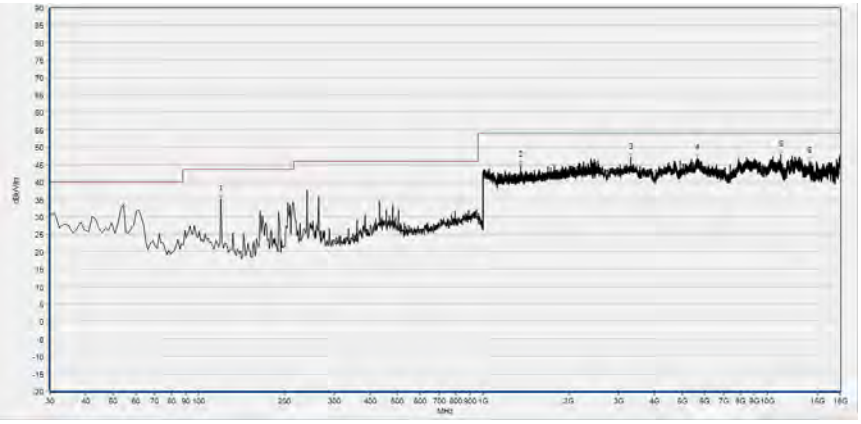
(Antenna Vertical, 30MHz to 25GHz)

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
240.025	37.59	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2026.331	46.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2409.204	46.45	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4397.927	46.07	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
6965.994	44.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10321.004	47.82	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

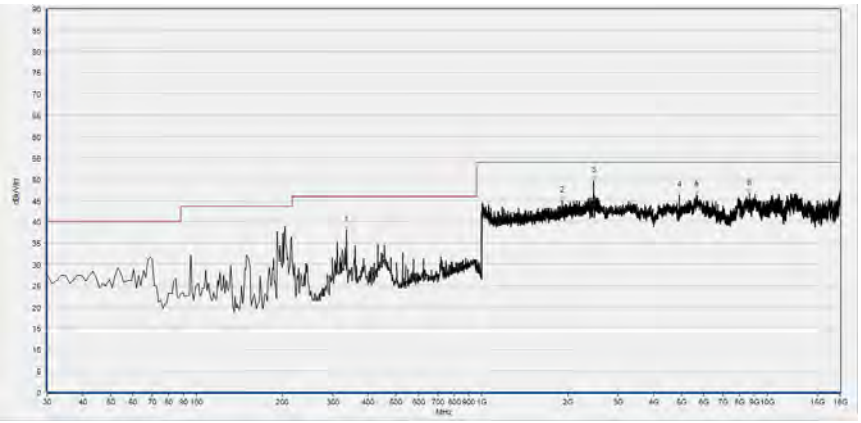
(Antenna Horizontal, 30MHz to 25GHz)



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	35.05	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1355.342	44.80	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3302.928	46.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5666.558	46.68	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11127.550	47.86	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
14012.075	46.00	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

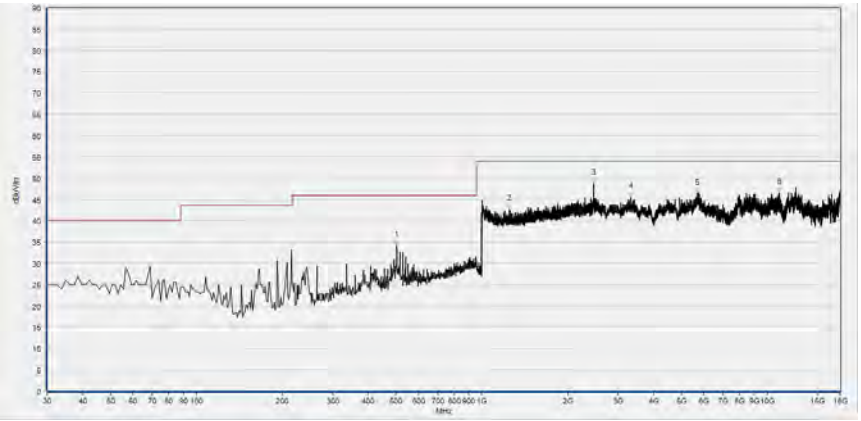
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 12



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
335.932	37.98	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1916.206	44.95	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2464.906	49.59	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4932.824	46.29	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5644.153	46.22	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8654.701	46.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

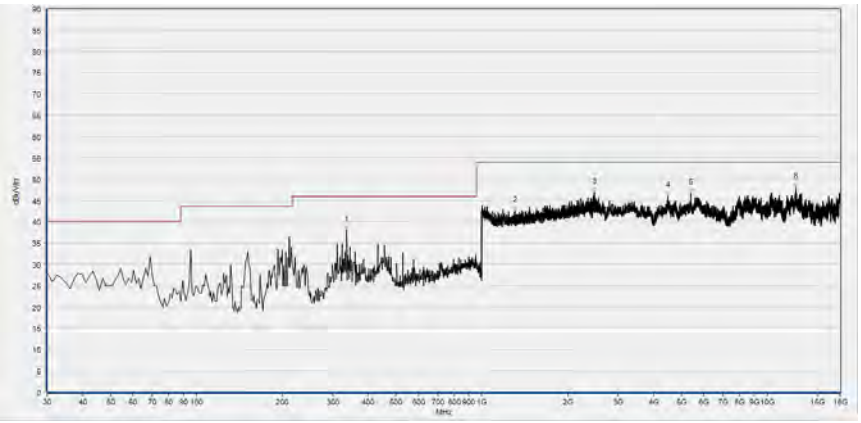
(Antenna Horizontal, 30MHz to 25GHz)



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
503.467	34.25	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1246.499	42.82	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2466.827	48.70	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3316.930	45.66	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5672.159	46.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11057.538	46.54	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

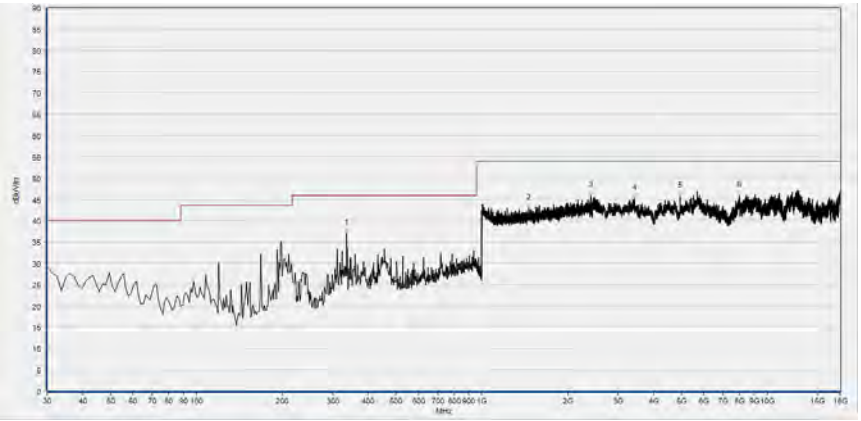
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 13



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
335.932	38.00	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1304.122	42.50	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2475.150	46.92	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4479.142	46.03	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5400.509	46.72	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12603.419	48.11	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

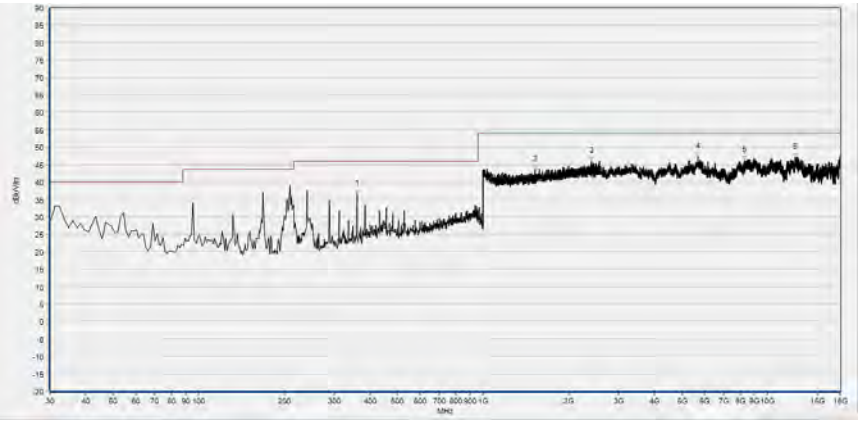


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
335.932	37.01	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1455.222	42.92	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2412.405	45.88	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3417.749	45.24	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4944.026	45.77	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7996.581	45.88	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

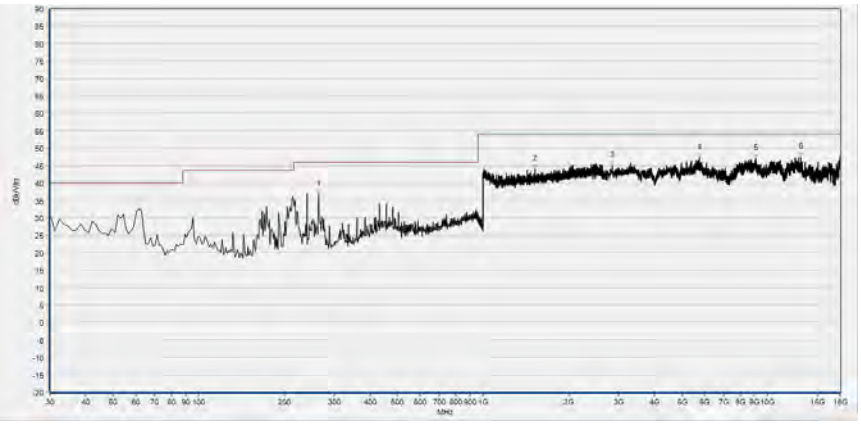
802.11g Test mode

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
360.213	36.58	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1523.089	43.47	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2404.082	45.98	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5694.563	47.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8299.036	46.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12494.199	46.95	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

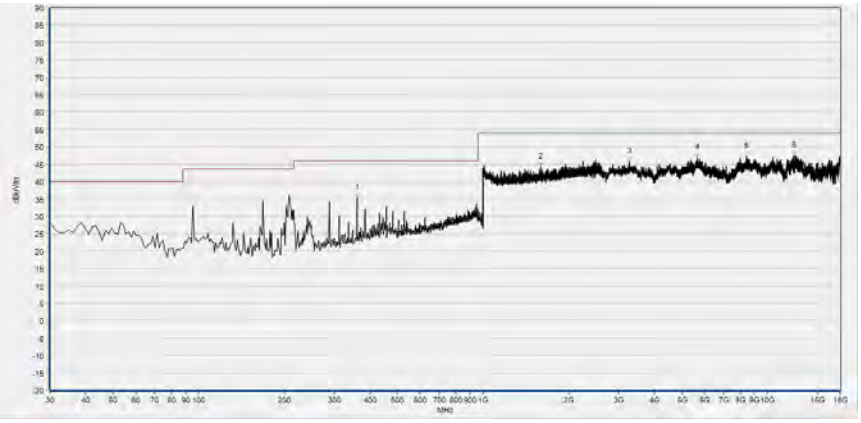
(Antenna Horizontal, 30MHz to 25GHz)



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
264.305	36.65	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1523.729	43.87	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2840.844	44.87	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5753.373	47.25	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9116.785	46.89	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
13087.907	47.36	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

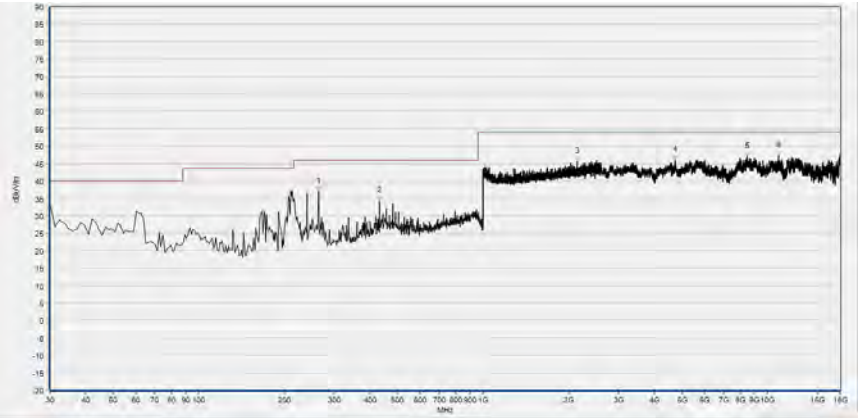
(Antenna Vertical, 30MHz to 25GHz)

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
360.213	35.32	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1594.158	44.08	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3263.721	45.68	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5652.555	46.78	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8453.064	47.22	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12326.168	47.38	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

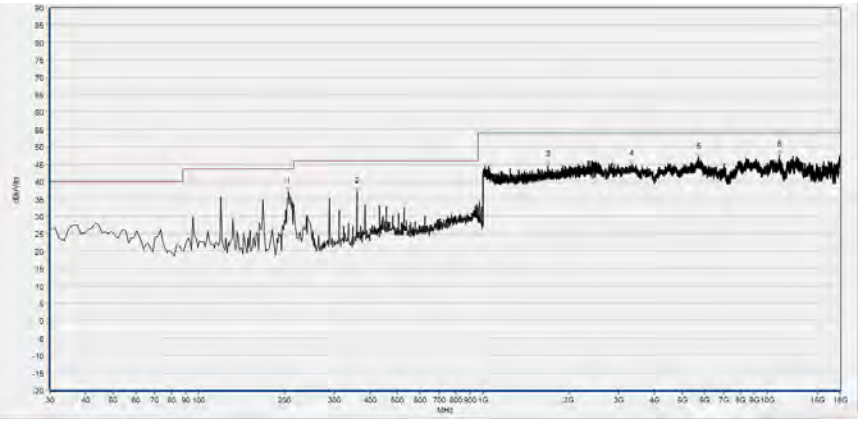
(Antenna Horizontal, 30MHz to 25GHz)



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
264.305	36.91	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
431.840	34.32	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2139.016	45.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4742.390	45.87	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8475.468	46.92	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10965.121	47.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

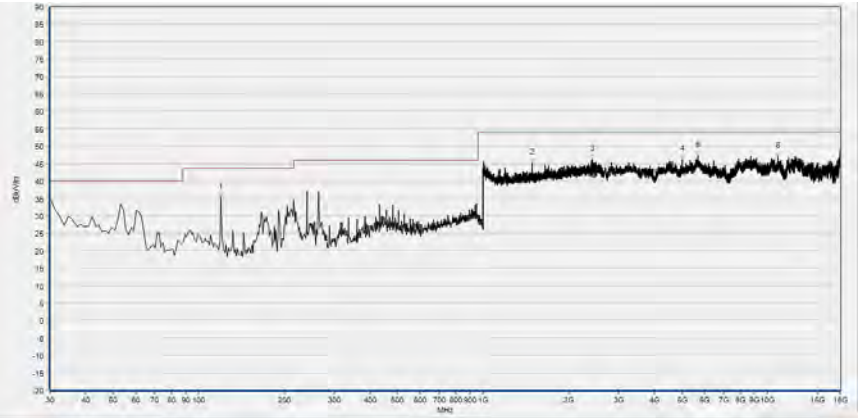
(Antenna Vertical, 30MHz to 25GHz)

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
207.247	37.15	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
360.213	37.09	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1685.714	44.63	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3319.731	45.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5725.368	47.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10984.724	47.54	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

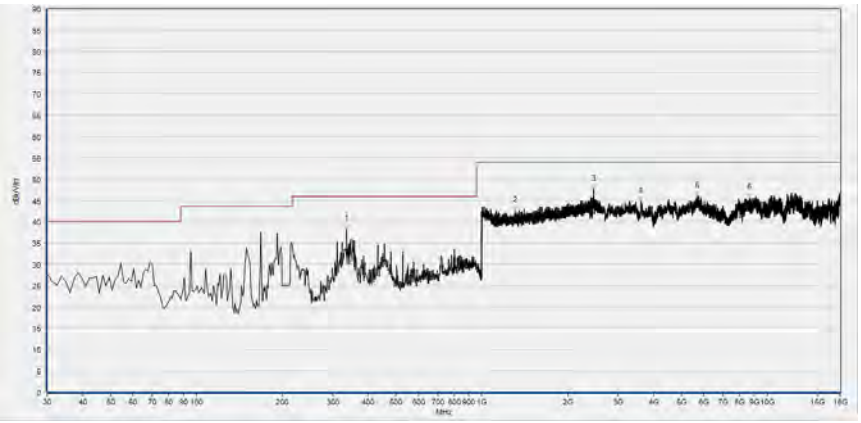
(Antenna Horizontal, 30MHz to 25GHz)



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	35.21	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1484.034	45.04	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2421.369	46.09	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5011.238	46.07	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5691.762	47.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10864.303	47.06	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

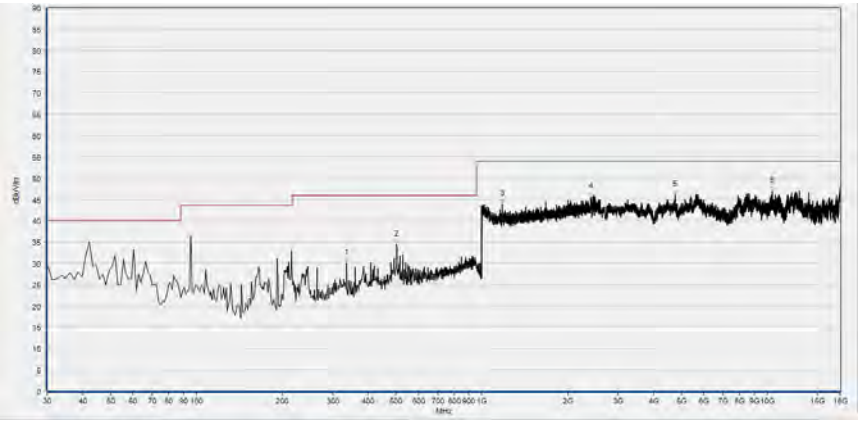
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 12



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
335.932	38.29	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1307.323	42.51	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2463.625	47.67	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3613.784	44.81	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5677.760	46.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8657.501	45.58	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

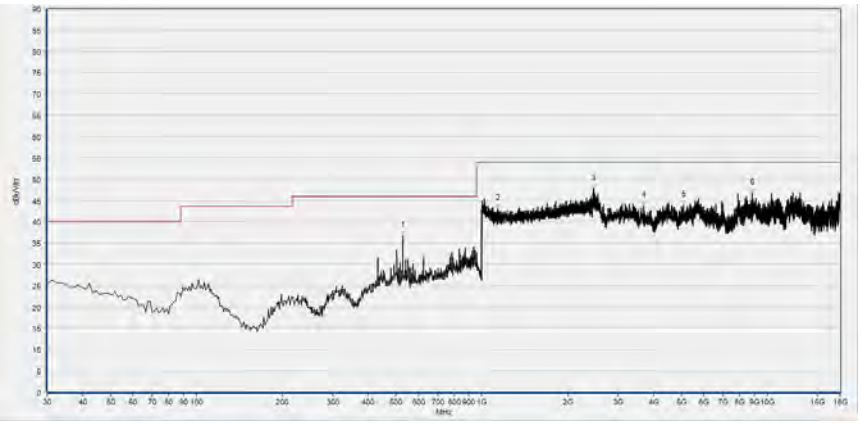
(Antenna Horizontal, 30MHz to 25GHz)



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
335.932	30.01	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
503.467	34.34	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1176.711	43.93	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2408.563	45.57	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4745.190	46.01	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10416.221	46.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

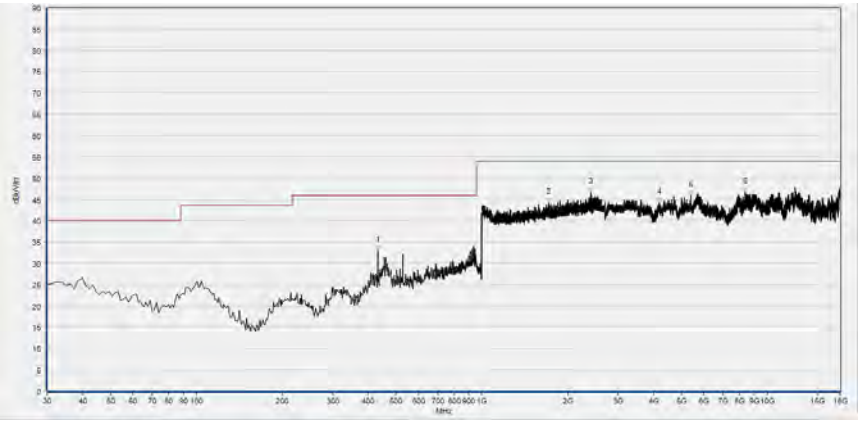
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 13



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
527.747	36.67	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1137.015	42.99	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2461.705	47.84	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3692.199	43.66	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5100.855	43.90	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8845.135	46.80	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

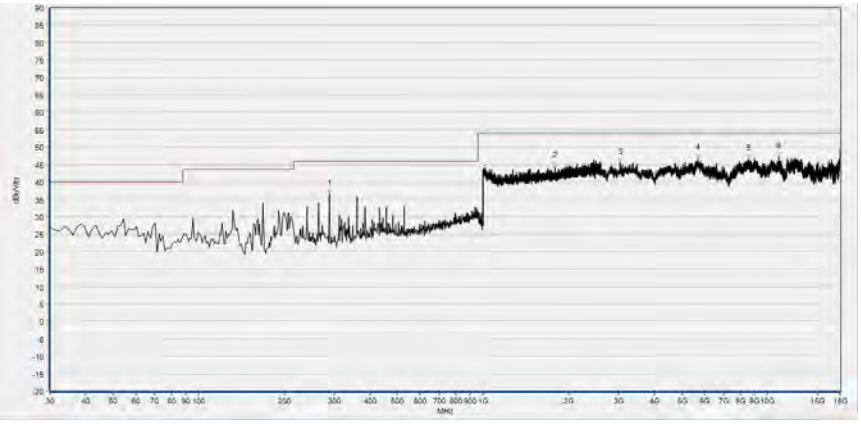


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
431.840	33.01	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1717.727	44.28	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2408.563	46.72	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4190.689	44.23	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5383.706	45.92	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8363.448	46.76	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

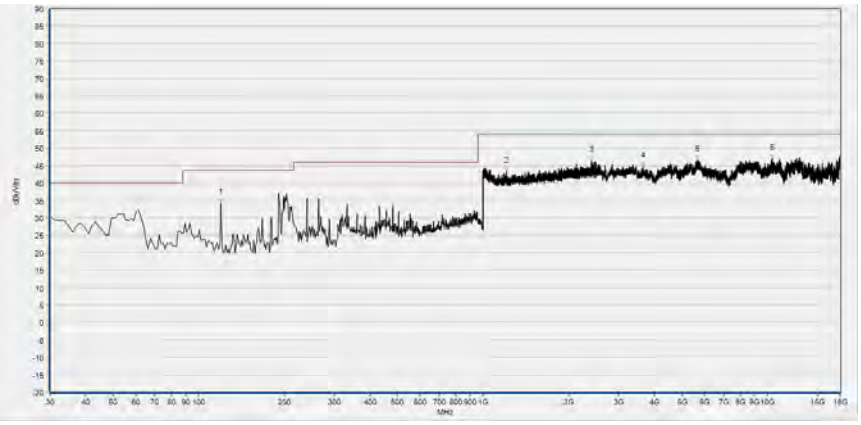
802.11n (HT20) Test mode

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
288.586	36.50	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1788.155	44.45	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3031.278	45.45	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5683.361	46.69	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8587.489	46.51	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10959.520	47.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

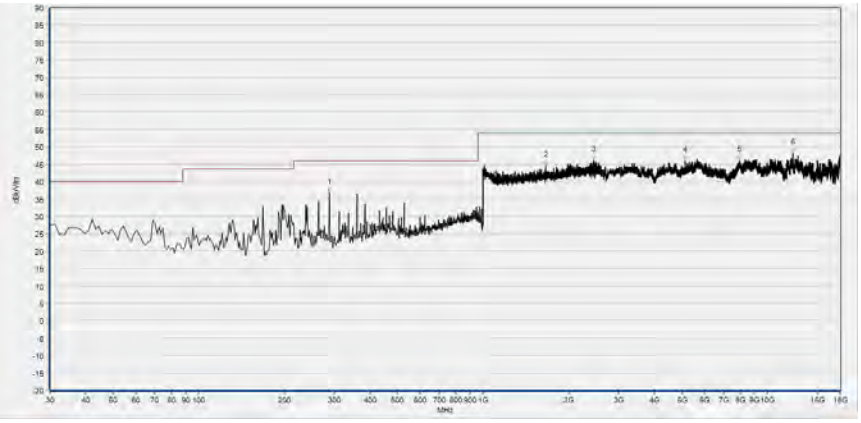
(Antenna Horizontal, 30MHz to 25GHz)



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	34.36	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1207.443	43.36	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2411.765	46.43	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3650.191	44.78	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5663.757	46.57	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10413.421	46.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

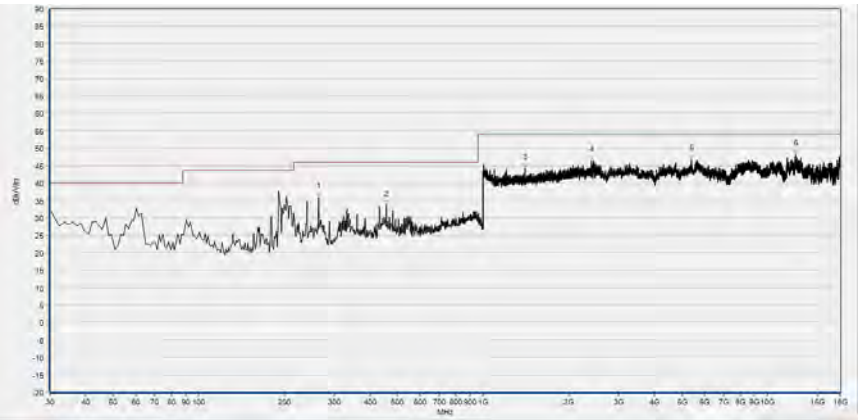
(Antenna Vertical, 30MHz to 25GHz)

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
288.586	36.81	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1658.824	44.53	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2453.381	46.12	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5145.663	45.89	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7954.574	46.08	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12292.562	48.12	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

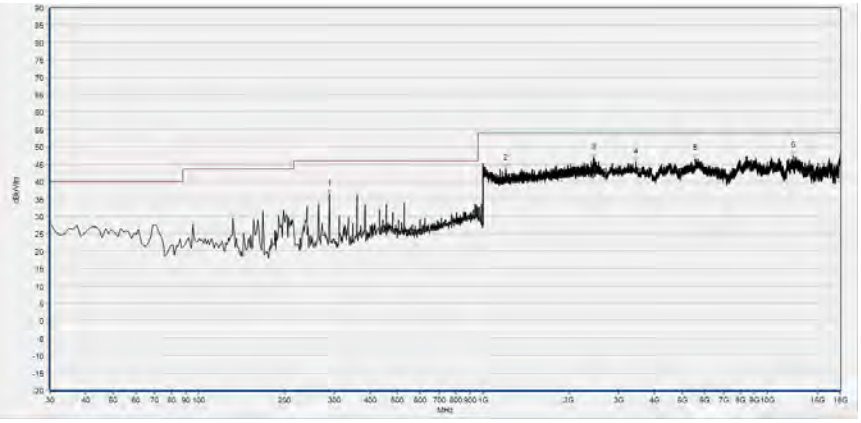
(Antenna Horizontal, 30MHz to 25GHz)



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
264.305	35.84	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
456.120	33.76	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1405.282	44.35	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2409.204	46.38	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5392.108	46.84	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12606.219	48.30	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

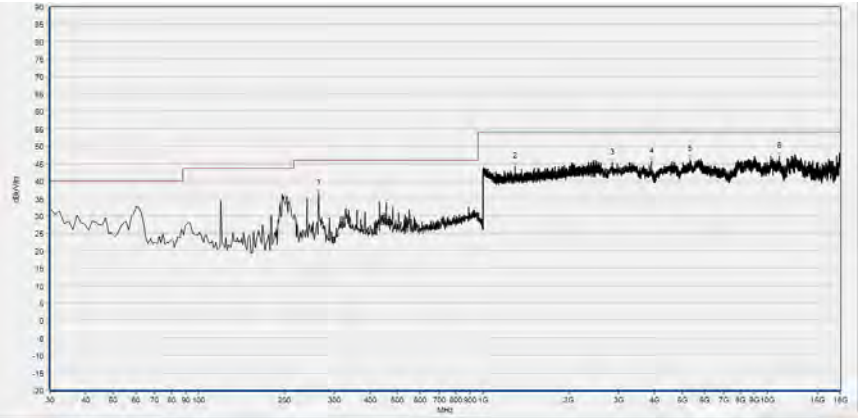
(Antenna Vertical, 30MHz to 25GHz)

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
288.586	36.41	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1201.681	43.67	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2452.101	46.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3445.754	45.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5579.742	46.50	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12314.966	47.30	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

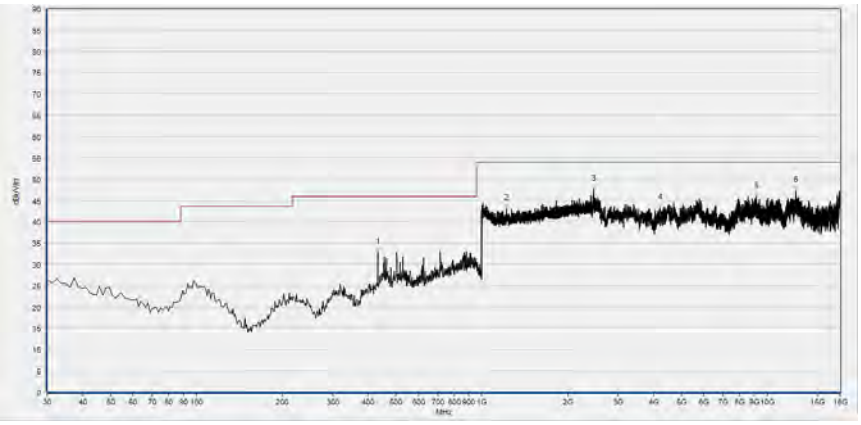
(Antenna Horizontal, 30MHz to 25GHz)



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
264.305	36.59	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1296.439	44.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2852.046	45.21	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3899.436	45.55	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5336.097	46.20	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11026.732	47.02	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

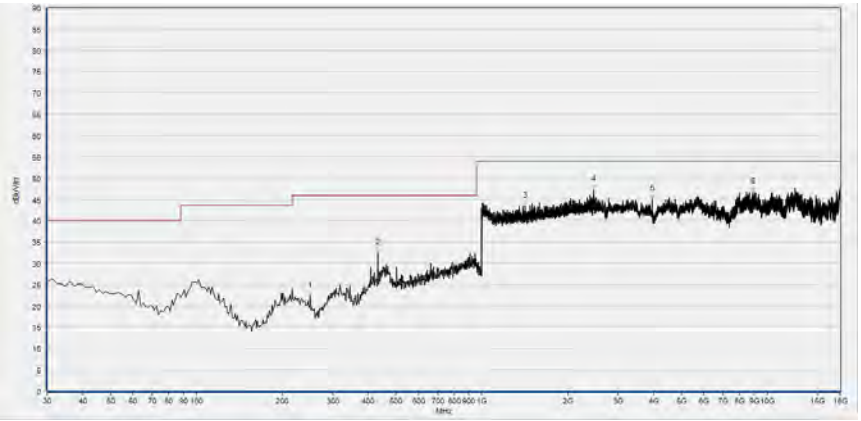
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 12



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
431.840	32.83	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1217.047	43.14	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2464.906	47.54	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4213.093	43.26	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9147.590	45.96	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12620.222	47.27	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

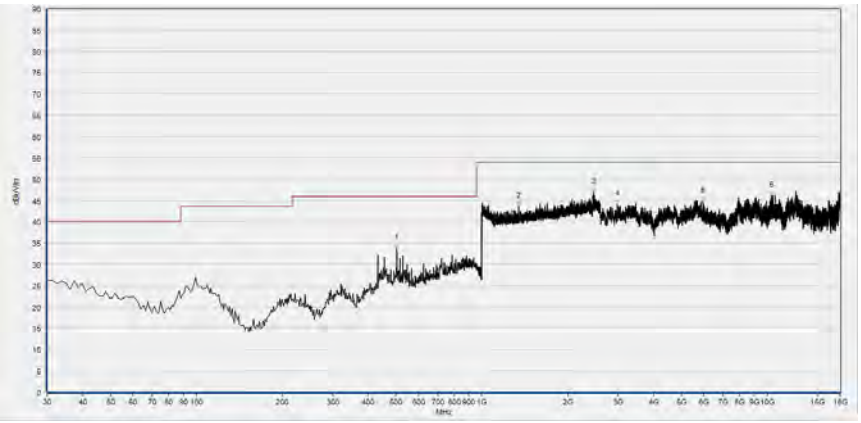
(Antenna Horizontal, 30MHz to 25GHz)



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
249.737	22.31	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
431.840	32.34	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1418.727	43.42	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2465.546	47.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3952.646	45.12	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8931.951	46.80	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

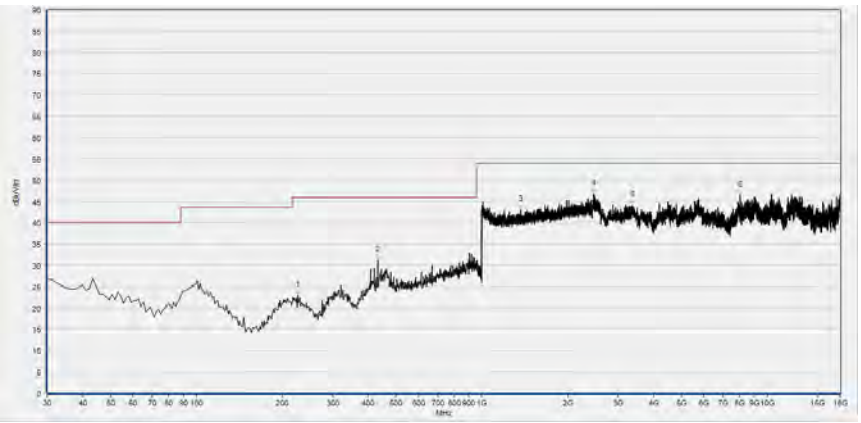
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 13



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
503.467	33.71	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1346.379	43.53	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2465.546	46.88	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
2978.069	44.16	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5955.010	44.68	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10354.610	46.16	N/A	N/A	74.00	N/A	54.00	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
226.671	22.90	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
431.840	31.15	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1370.708	43.08	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2463.625	46.74	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3367.340	44.11	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8013.384	46.40	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

Annex A Test 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

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

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

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

3. Facilities and Accreditations

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, the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Attenuator 1	(N/A.)	10dB	Resnet	N/A	N/A
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2019.04.09	2020.04.08
USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2019.04.16	2020.04.15
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY56400093	N9038A	KEYSIGHT	2019.05.08	2020.05.09
LISN	812744	NSLK 8127	Schwarzbeck	2019.05.08	2020.05.09
Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2019.05.08	2020.05.09
Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3 List of Software Used

Description	Manufacturer	Software Version
Test system	Tonscend	V2.6
Power Panel	Agilent	V3.8
MORLAB EMCR V1.2	MORLAB	V 1.0

4.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY54130016	N9038A	Agilent	2019.07.26	2020.07.25
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.08	2020.05.09
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2019.02.15	2020.02.14
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2019.07.26	2020.07.25
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2019.07.26	2020.07.25
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2019.05.08	2020.05.09
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2019.05.08	2020.05.09
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2018.12.01	2019.11.30
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT