



REPORT No.: SZ20060057W02

TEST REPORT

APPLICANT : Hohem Technology Co.,Ltd

PRODUCT NAME : 3-AXIS HANDHELD STABILIZING
GIMBAL FOR ACTION CAMERA

MODEL NAME : iSteady Pro3

BRAND NAME : Hohem

FCC ID : 2AIB7HGS3

STANDARD(S) : 47 CFR Part 15 Subpart C

RECEIPT DATE : 2020-06-05

TEST DATE : 2020-06-12 to 2020-07-29

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Change History		
Version	Date	Reason for change
1.0	2020-08-18	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Hohem Technology Co.,Ltd
Applicant Address:	B106,University Creative Park,Xili,Nanshan,Shenzhen,China
Manufacturer:	Hohem Technology Co.,Ltd
Manufacturer Address:	B106,University Creative Park,Xili,Nanshan,Shenzhen,China

1.2. Equipment Under Test (EUT) Description

Product Name:	3-AXIS HANDHELD STABILIZING GIMBAL FOR ACTION CAMERA	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	V1.00	
Software Version:	V1.001	
Equipment Type:	WLAN2.4G	
Modulation Technology:	DSSS, OFDM	
Modulation Type:	Refer to section1.3	
Operating Frequency Range:	802.11b/g/ n (HT20): 2412MHz–2462MHz 802.11n (HT40): 2422MHz–2452MHz	
Antenna Type:	Ceramic Antenna	
Antenna Gain:	2.0dBi	
Accessory Information:	Battery	
	Brand Name:	GREAT POWER
	Model No.:	ICR18650
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	3600mAh
	Rated Voltage:	3.70V
	Charge Limit:	4.25V

Note 1: We use the dedicated software to control the EUT continuous transmission.

Note 2: 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 (HT20))	BPSK	6.5
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65
OFDM (802.11n (HT40))	BPSK	13.5
	QPSK	27/40.5
	16QAM	54/81/108
	64QAM	121.5/135

Note1: The worst-case mode (bold face) 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		
	6	2437		
	7	2442		
Test Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11n (HT40)	3	2422	8	2447
	4	2427	9	2452
	5	2432		
	6	2437		
	7	2442		

Note 1: The black bold channels were selected for test.



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	Jul 29, 2020	Lu Qiang	PASS	No deviation
3	15.247(b)	Maximum Peak and Average Conducted Output Power	Jul 29, 2020	Lu Qiang	PASS	No deviation
4	15.247(a)	Bandwidth	Jun 26, 2020	Lu Qiang	PASS	No deviation
5	15.247(d)	Conducted Spurious Emission and Band Edge	Jun 26, 2020	Lu Qiang	PASS	No deviation
6	15.247(e)	Power Spectral Density (PSD)	Jun 26, 2020	Lu Qiang	PASS	No deviation
7	15.207	Conducted Emission	Jun 12, 2019	Huang Zhiye	PASS	No deviation
8	15.247(d)	Restricted Frequency Bands	Jul 25, 2020	Peng Xuwei	PASS	No deviation
9	15.209, 15.247(d)	Radiated Emission	Jul 25, 2020	Peng Xuwei	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013, KDB558074 D01 v05r02.

Note 2: 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 shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 4: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% risk level.

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. Test 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

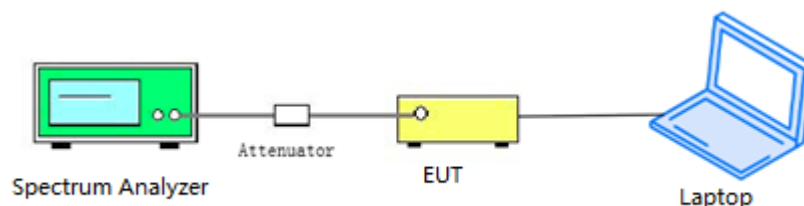
2.2.1. Requirement

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 $\pm 2\%$; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

Test Setup:



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

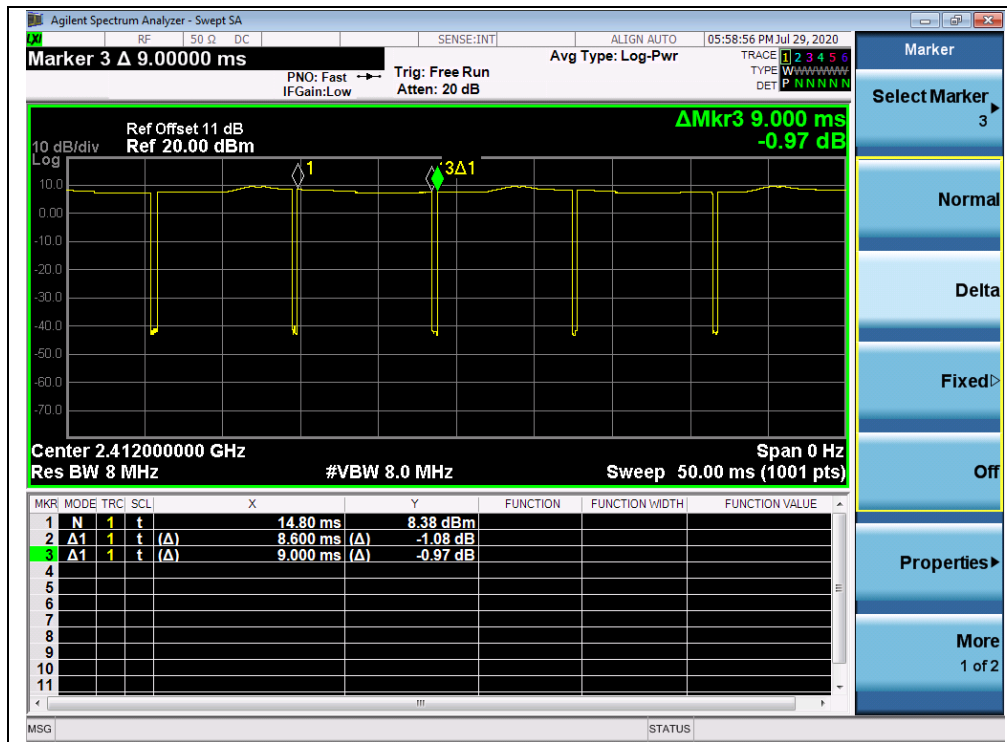


2.2.3. Test Result

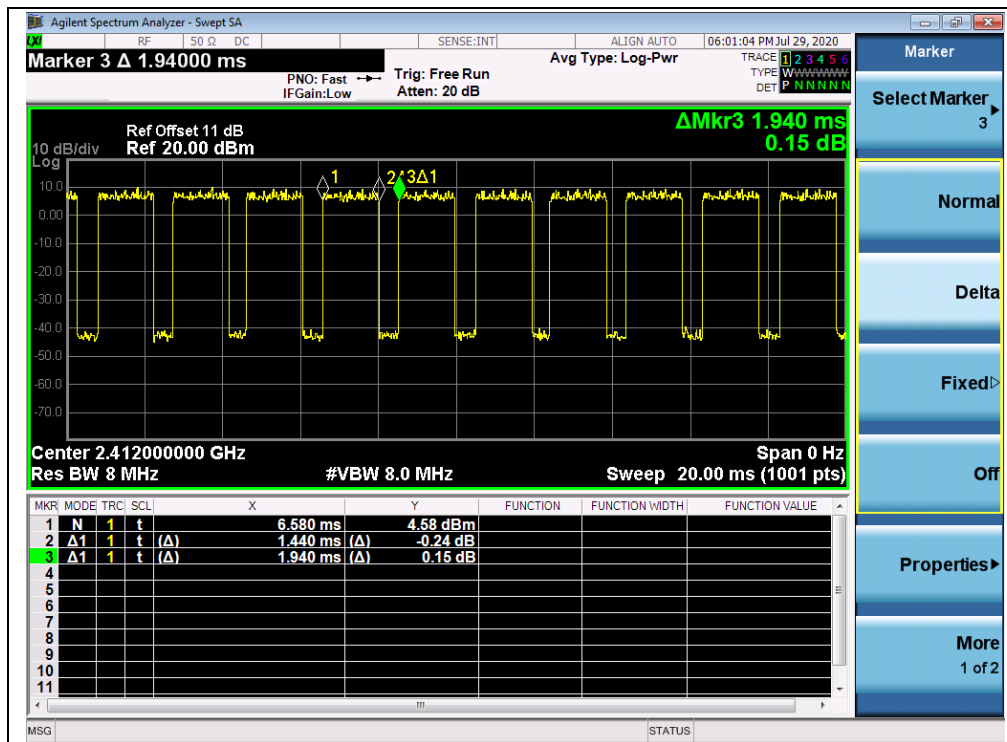
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor ($10 \cdot \lg[1/D]$)
802.11b	95.56	0.20
802.11g	74.23	1.29
802.11n (HT20)	68.37	1.65
802.11n (HT40)	48.18	3.17

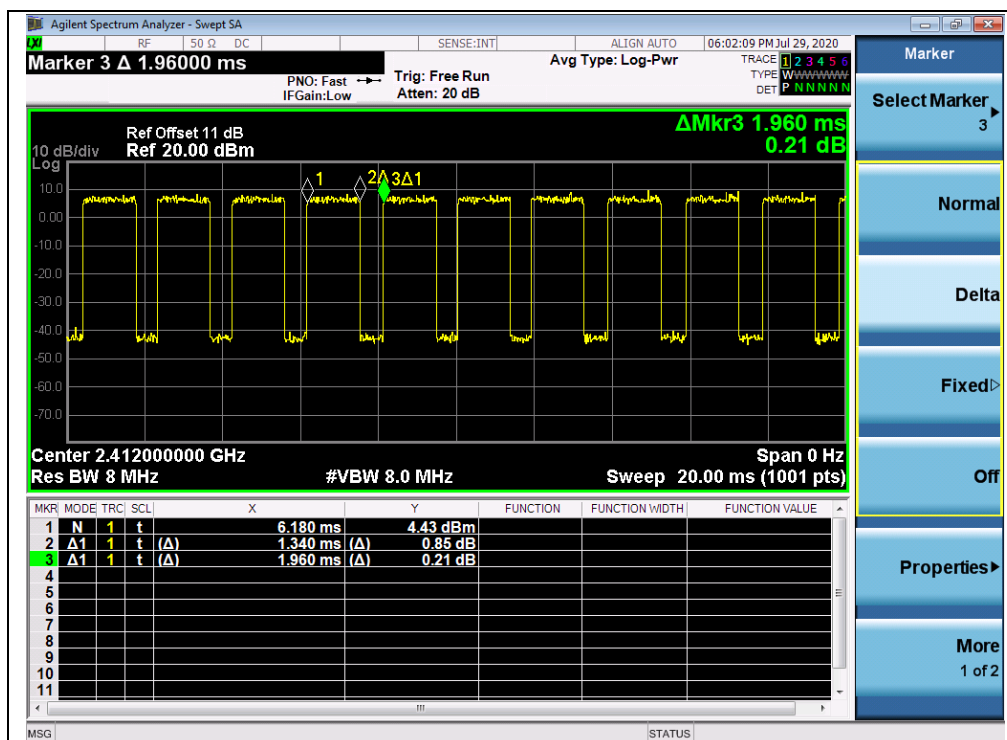
B. Test Plot:



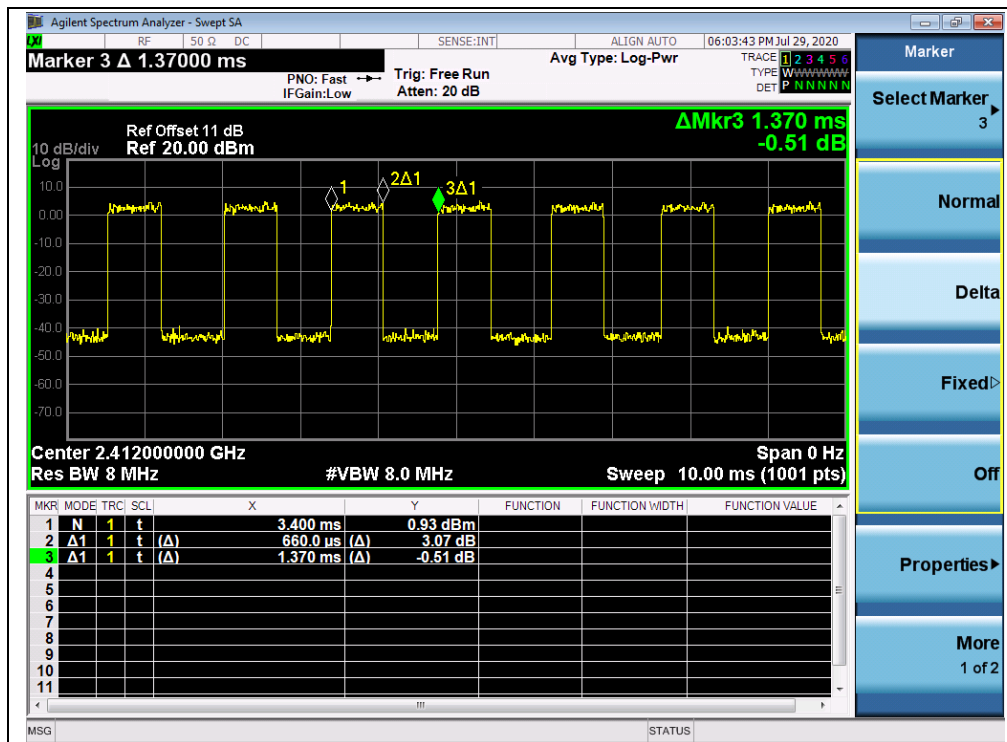
(Channel 1, 802.11b)



(Channel 1, 802.11g)



(Channel 1, 802.11n (HT20))



(Channel 3, 802.11n (HT40))

2.3. Maximum Peak and Average Conducted Output Power

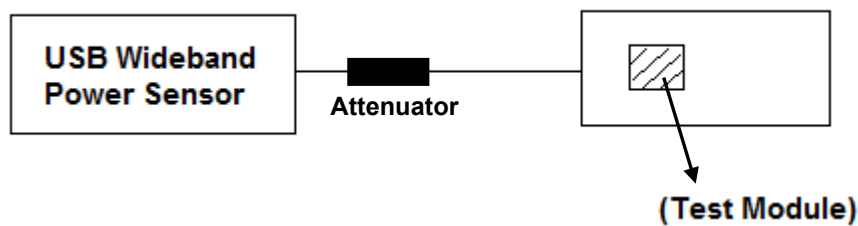
2.3.1. Requirement

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 exceed 1 Watt.

2.3.2. Test Description

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

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 Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	14.87	0.031	30	1	PASS
6	2437	14.68	0.029			PASS
11	2462	14.72	0.030			PASS

802.11g Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	18.43	0.070	30	1	PASS
6	2437	18.32	0.068			PASS
11	2462	18.89	0.077			PASS

802.11n (HT20) Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	18.11	0.065	30	1	PASS
6	2437	18.01	0.063			PASS
11	2462	18.53	0.071			PASS

802.11n (HT40) Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	17.92	0.062	30	1	PASS
6	2437	18.01	0.063			PASS
9	2452	18.25	0.067			PASS

**Maximum Average Conducted Output Power****802.11b Mode**

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	12.24	0.20	12.44	0.018	30	1	PASS
6	2437	12.17		12.37	0.017			PASS
11	2462	12.31		12.51	0.018			PASS

802.11g Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	8.75	1.29	10.04	0.010	30	1	PASS
6	2437	8.67		9.96	0.010			PASS
11	2462	8.92		10.21	0.010			PASS

802.11n (HT20) Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	8.59	1.65	10.24	0.011	30	1	PASS
6	2437	8.56		10.21	0.010			PASS
11	2462	9.16		10.81	0.012			PASS

802.11n (HT40) Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty factor Calculated				
		dBm		dBm	W	dBm	W	
3	2422	6.87	3.17	10.04	0.010	30	1	PASS
6	2437	6.85		10.02	0.010			PASS
9	2452	6.90		10.07	0.010			PASS

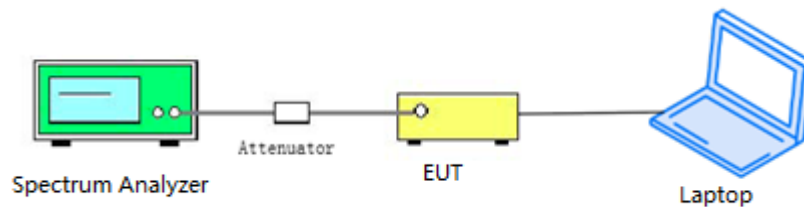
2.4. Bandwidth

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

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50 Ohm; 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.



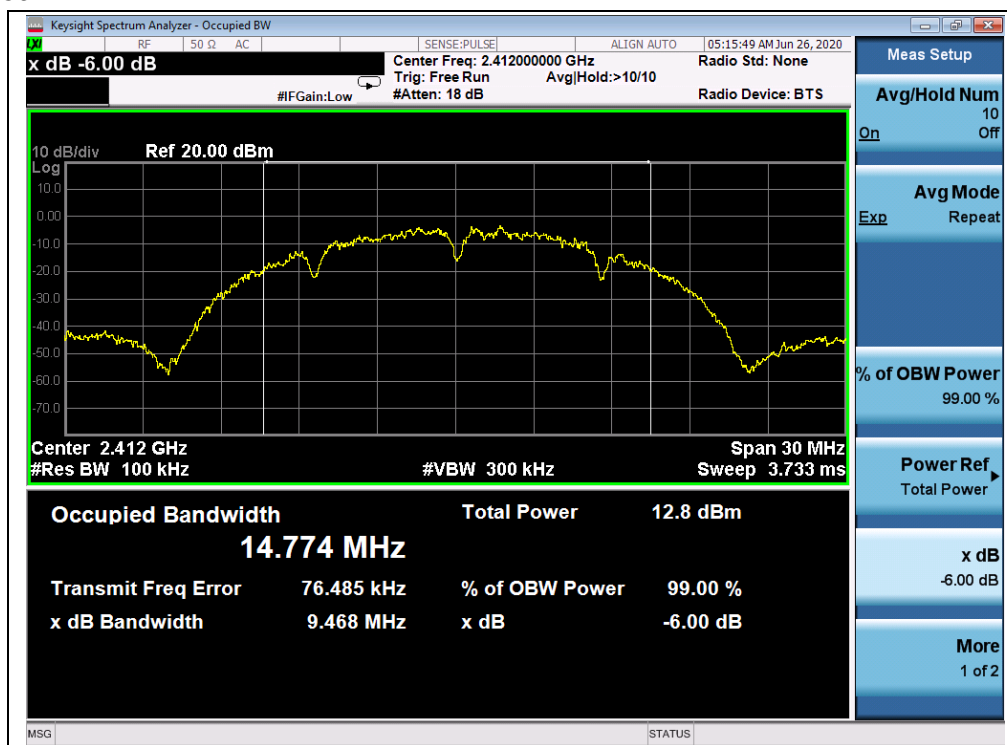
2.4.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	9.468	≥500	PASS
6	2437	9.599	≥500	PASS
11	2462	9.765	≥500	PASS

B. Test Plot:



(Channel 1, 802.11b)



(Channel 6, 802.11b)



(Channel 11, 802.11b)

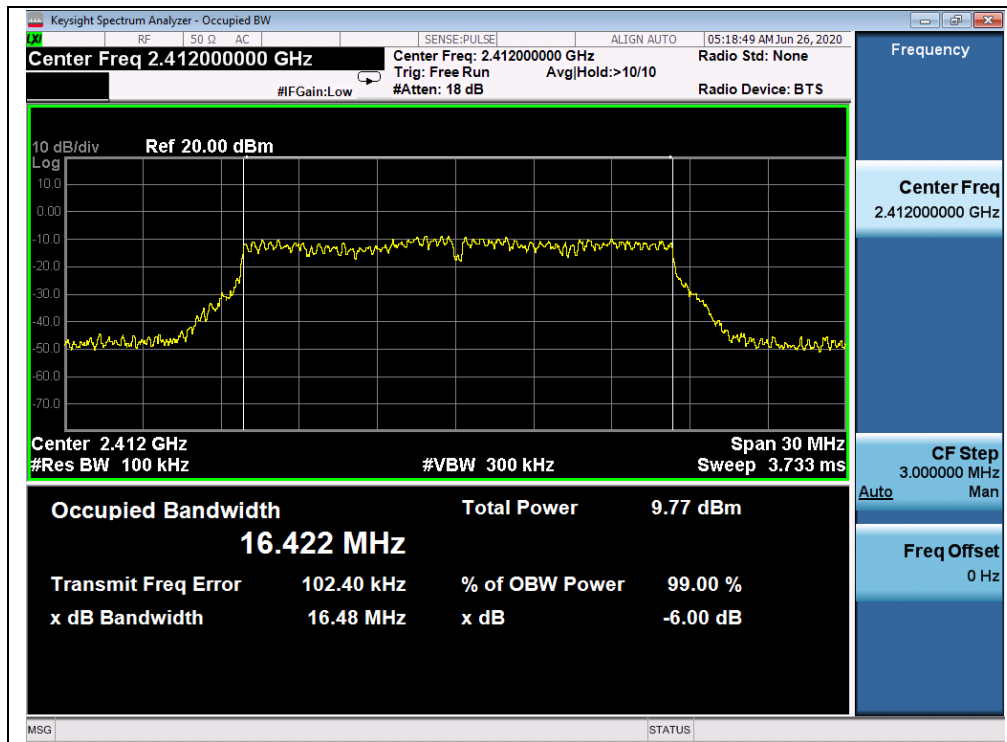


802.11g Mode

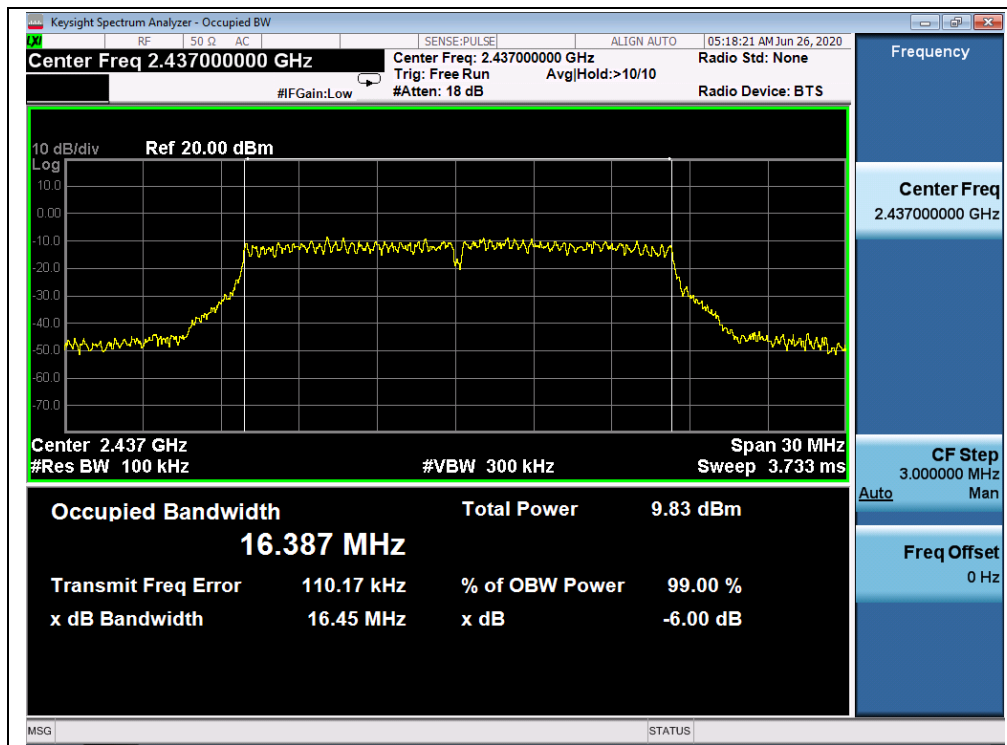
A.Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	16.48	≥500	PASS
6	2437	16.45	≥500	PASS
11	2462	16.45	≥500	PASS

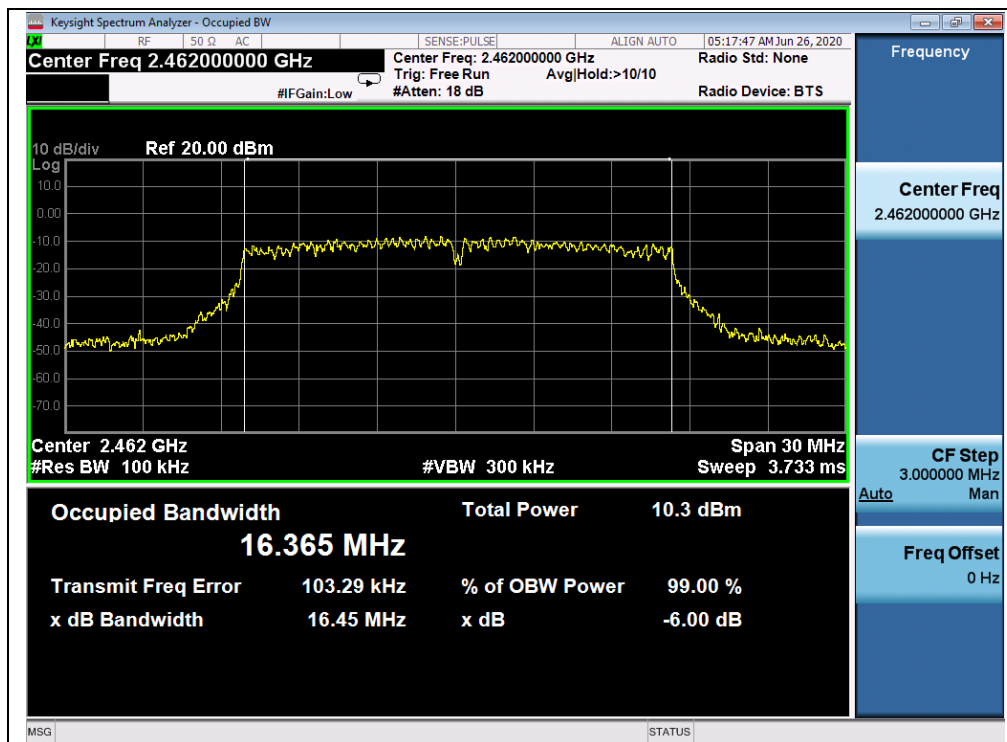
B.Test Plot:



(Channel 1, 802.11g)



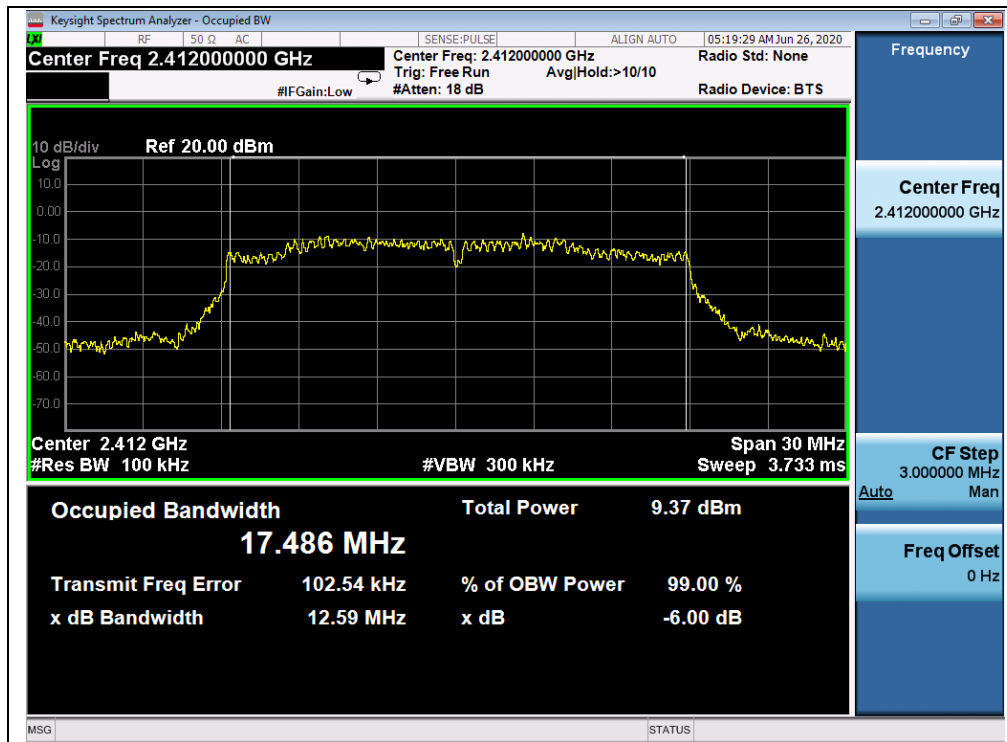
(Channel 6, 802.11g)



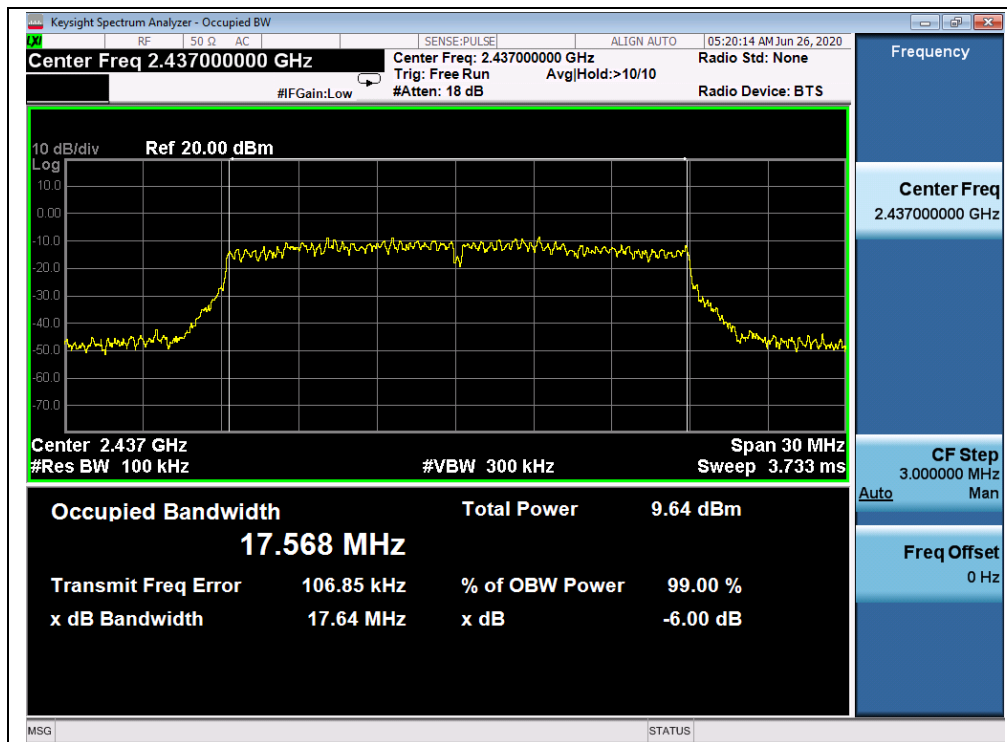
(Channel 11, 802.11g)

**802.11n (HT20) Mode****A.Test Verdict:**

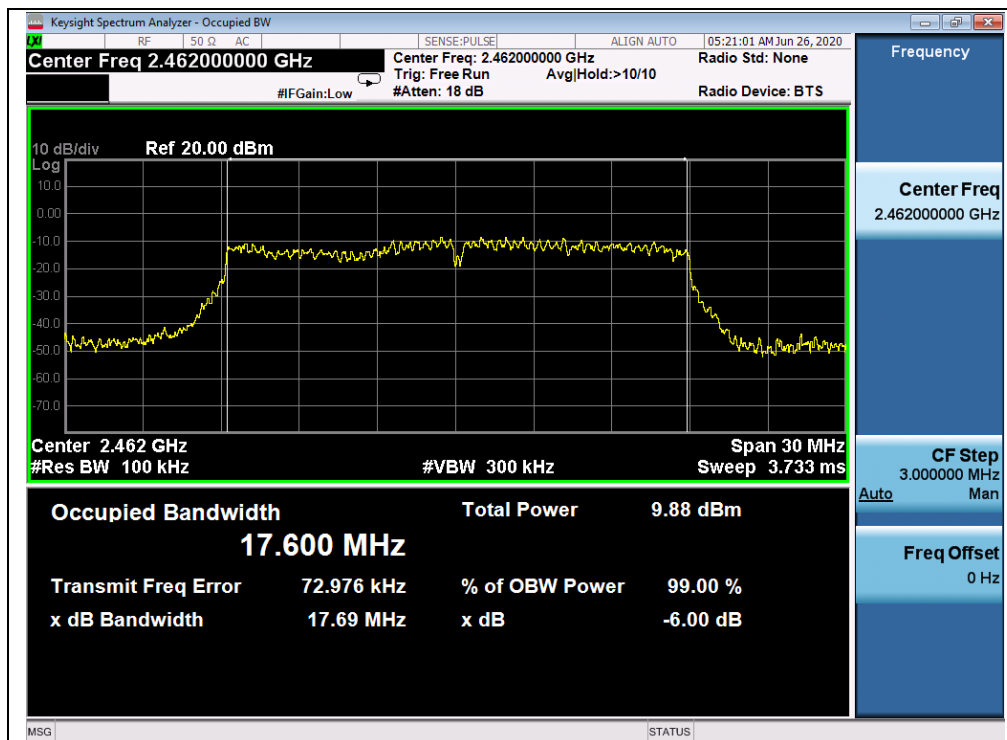
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	12.59	≥500	PASS
6	2437	17.64	≥500	PASS
11	2462	17.69	≥500	PASS

B.Test Plot:

(Channel 1, 802.11n (HT20))



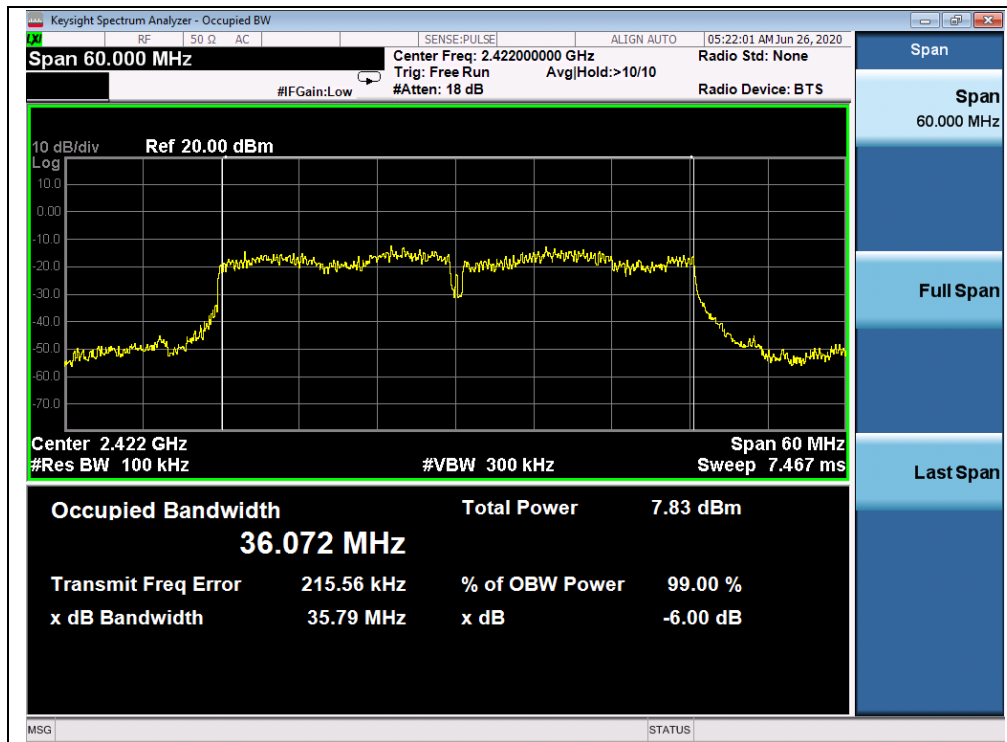
(Channel 6, 802.11n (HT20))



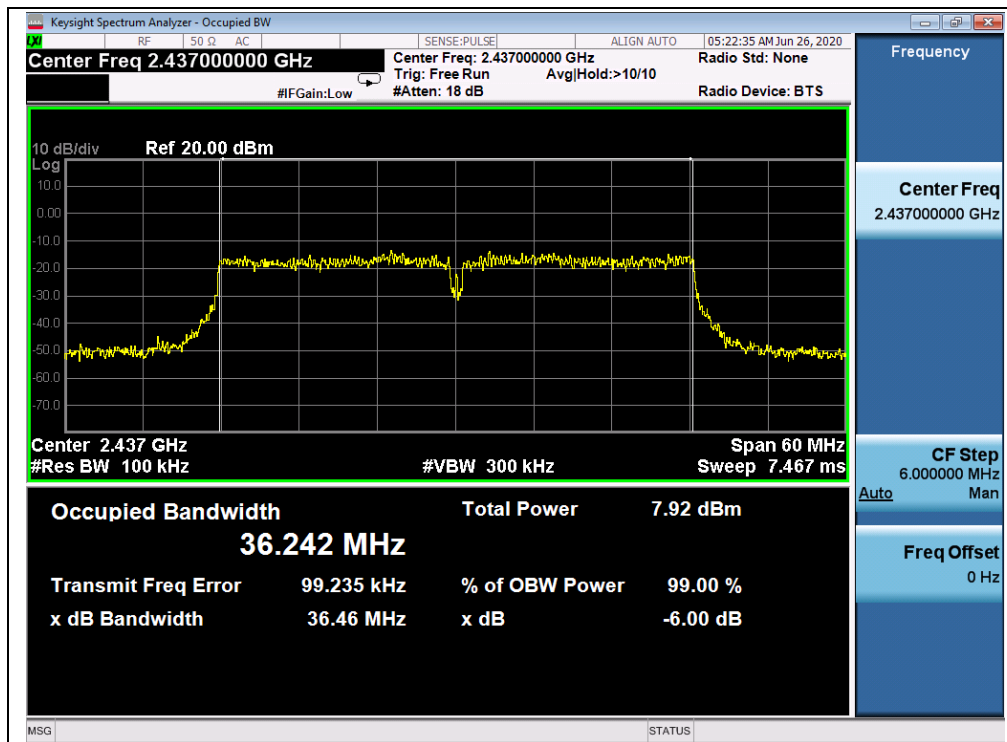
(Channel 11, 802.11n (HT20))

**802.11n (HT40) Mode****A.Test Verdict:**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
3	2422	35.79	≥500	PASS
6	2437	36.46	≥500	PASS
9	2452	34.35	≥500	PASS

B.Test Plot:

(Channel 3, 802.11n (HT40))



(Channel 6, 802.11n (HT40))



(Channel 9, 802.11n (HT40))

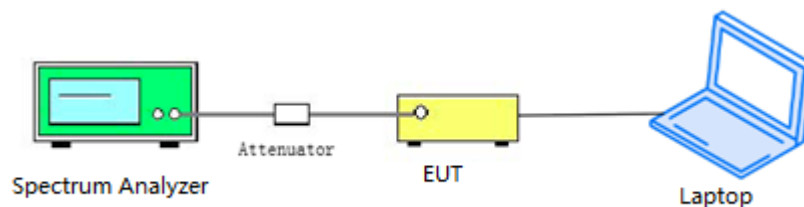
2.5. Conducted Spurious Emissions and Band Edge

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

Test Setup:



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.



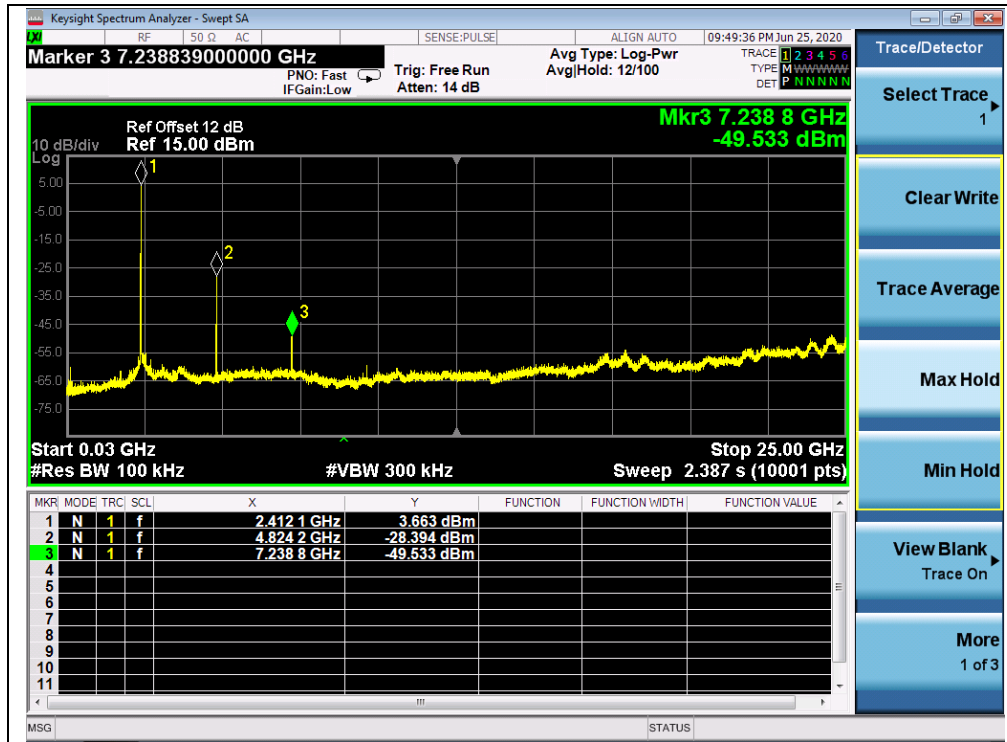
2.5.4. Test Result

802.11b Mode

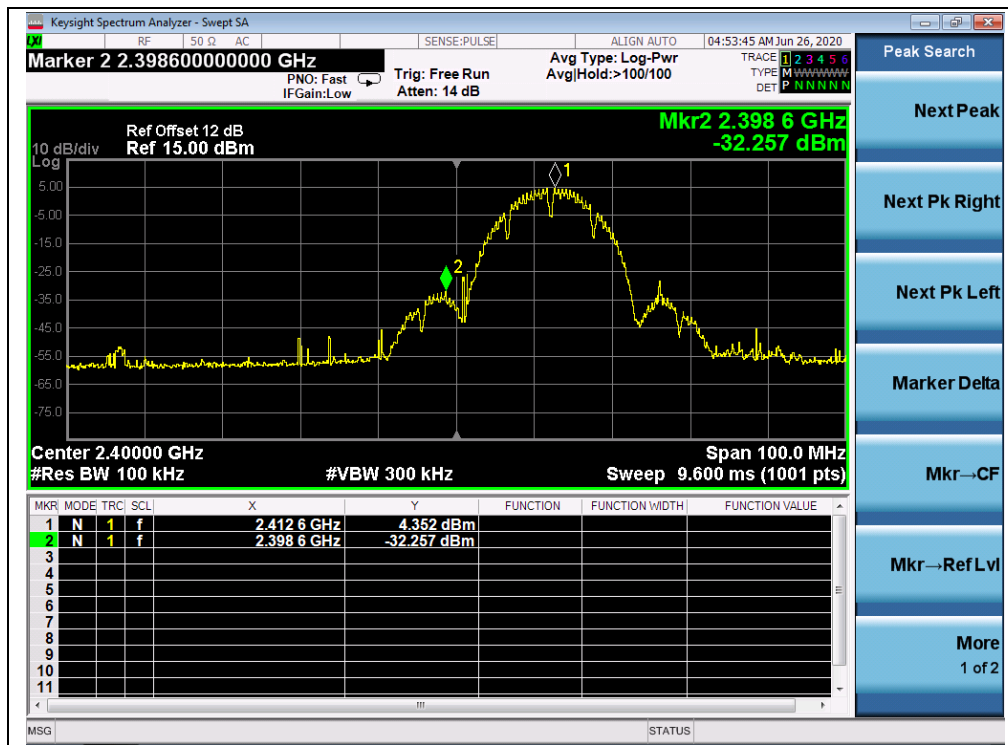
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-28.39	3.66	-16.34	PASS
6	2437	-29.44	-1.03	-21.03	PASS
11	2462	-29.62	2.89	-17.11	PASS

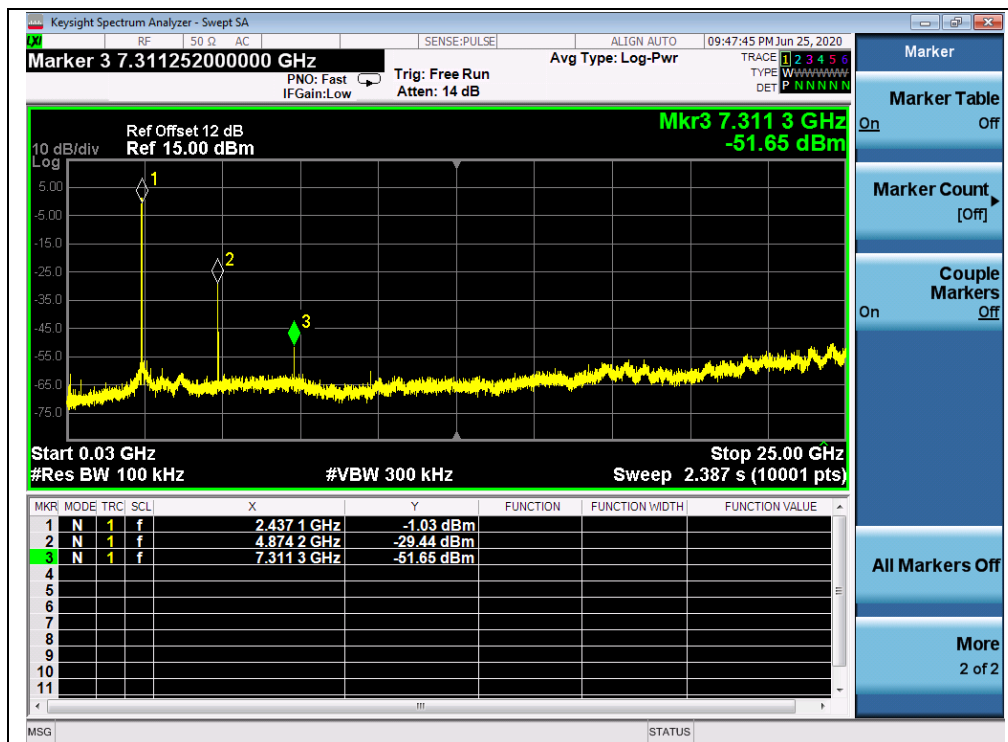
B. Test Plot:



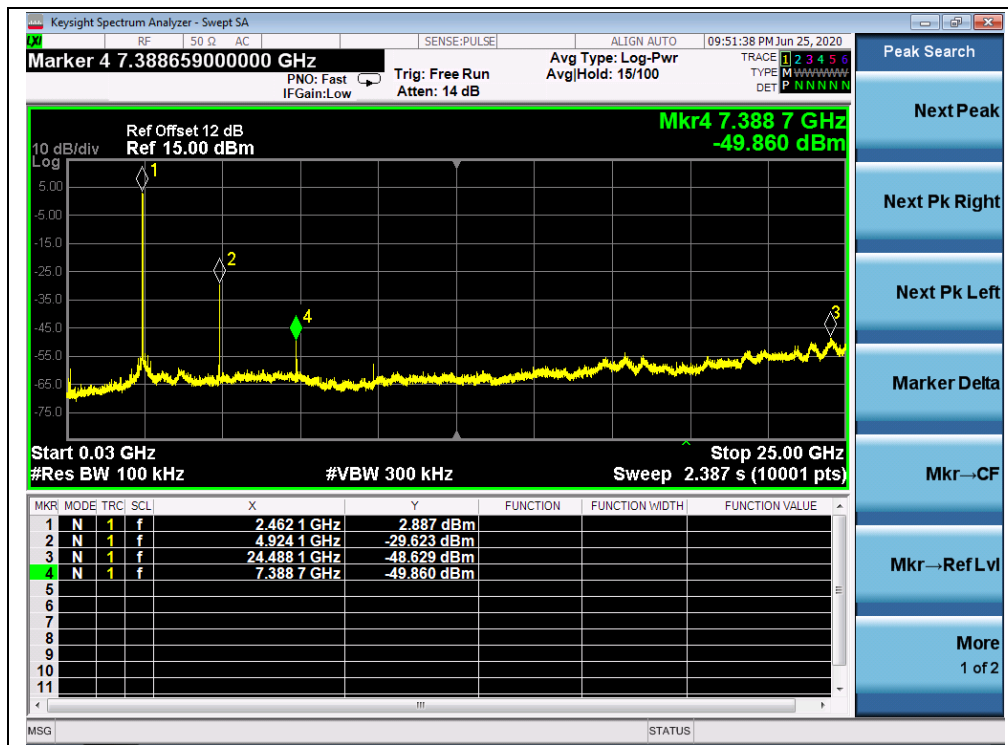
(30MHz to 25GHz, Channel 1, 802.11b)



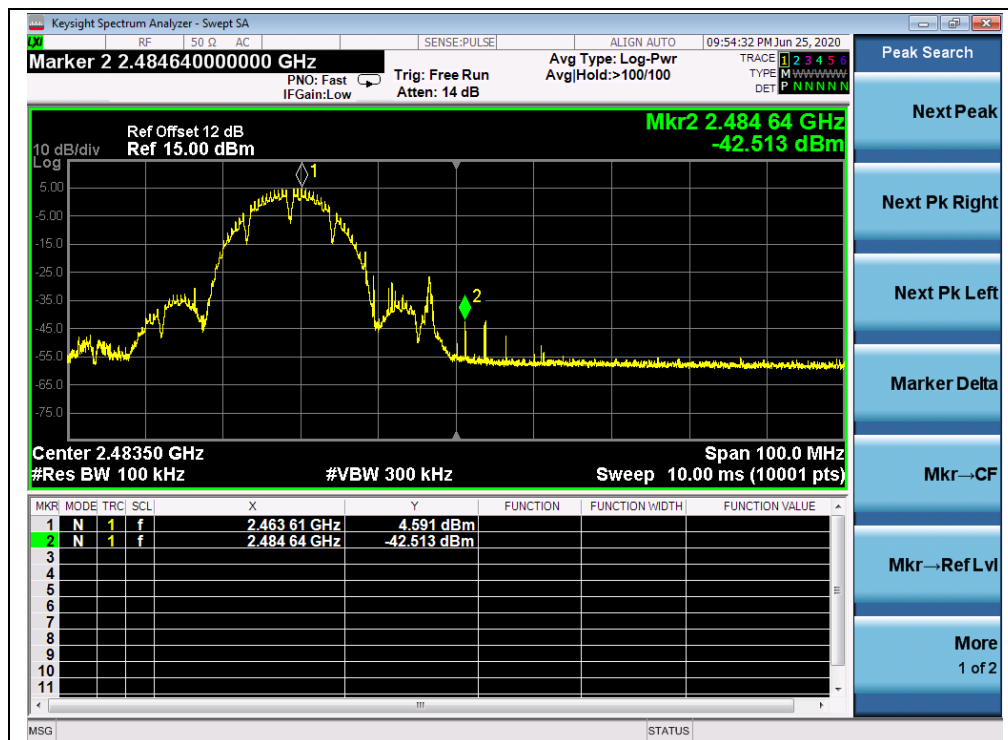
(Band Edge, Channel 1, 802.11b)



(30MHz to 25GHz, Channel 6, 802.11b)



(30MHz to 25GHz, Channel 11, 802.11b)



(Band Edge, Channel 11, 802.11b)

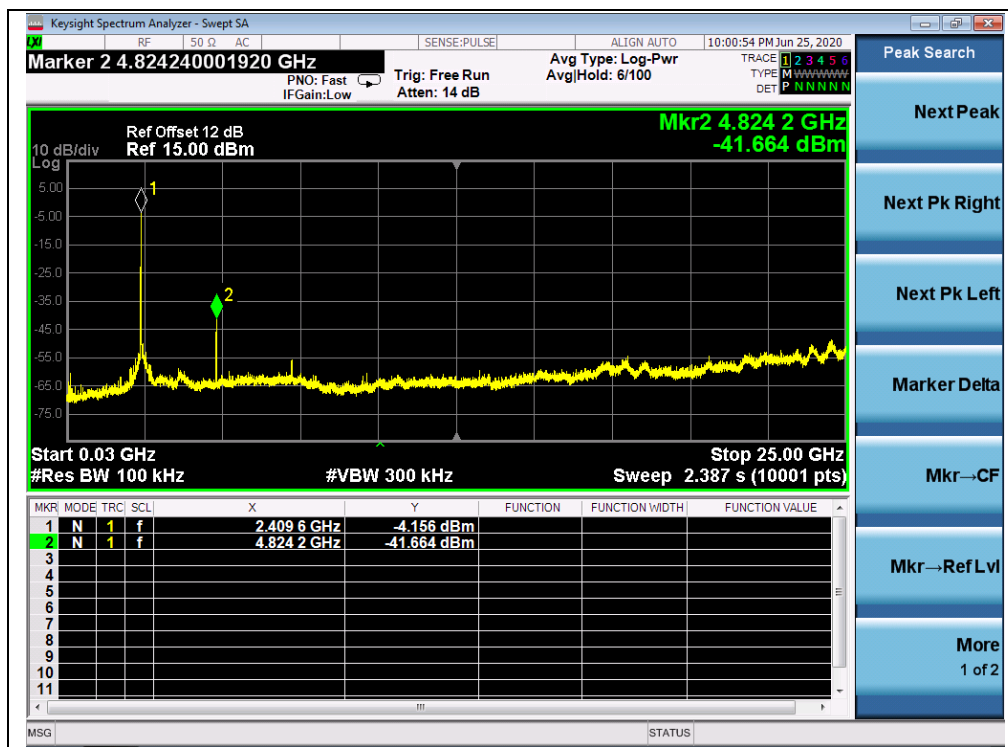


802.11g Mode

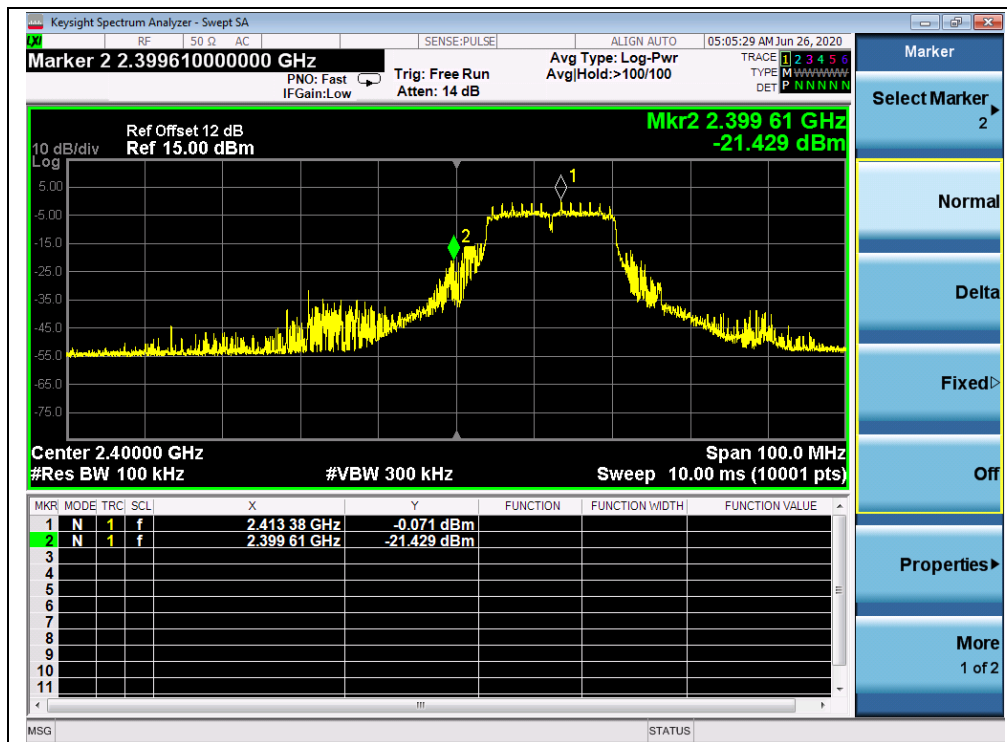
A.Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.66	-4.16	-24.16	PASS
6	2437	-45.00	-3.50	-23.50	PASS
11	2462	-43.34	-0.41	-20.41	PASS

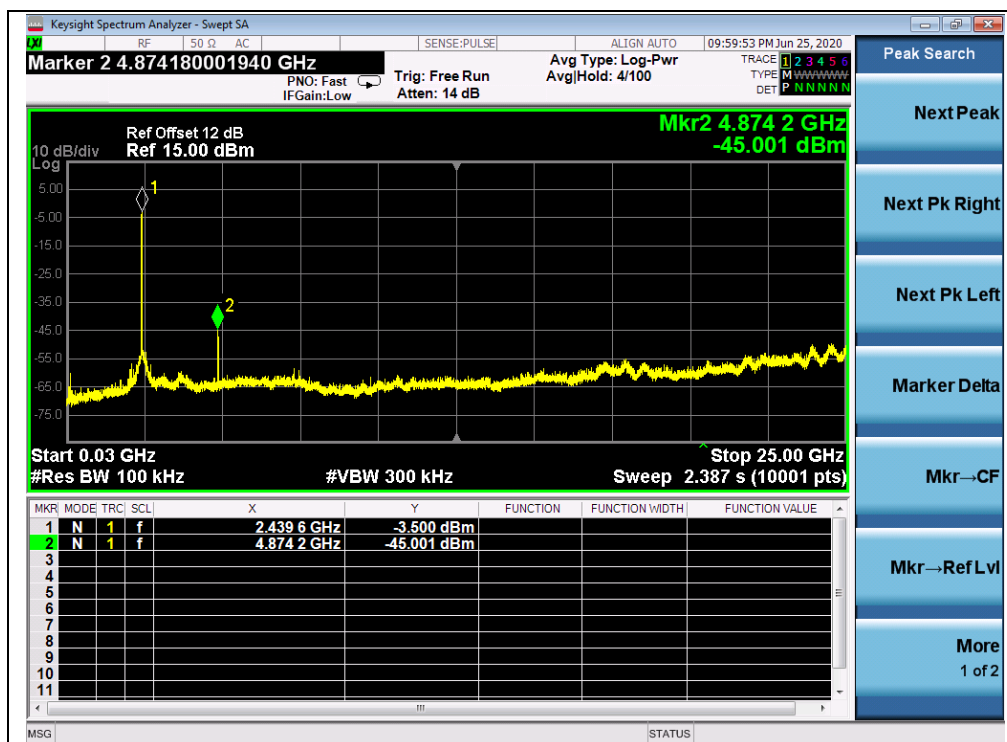
B.Test Plot:



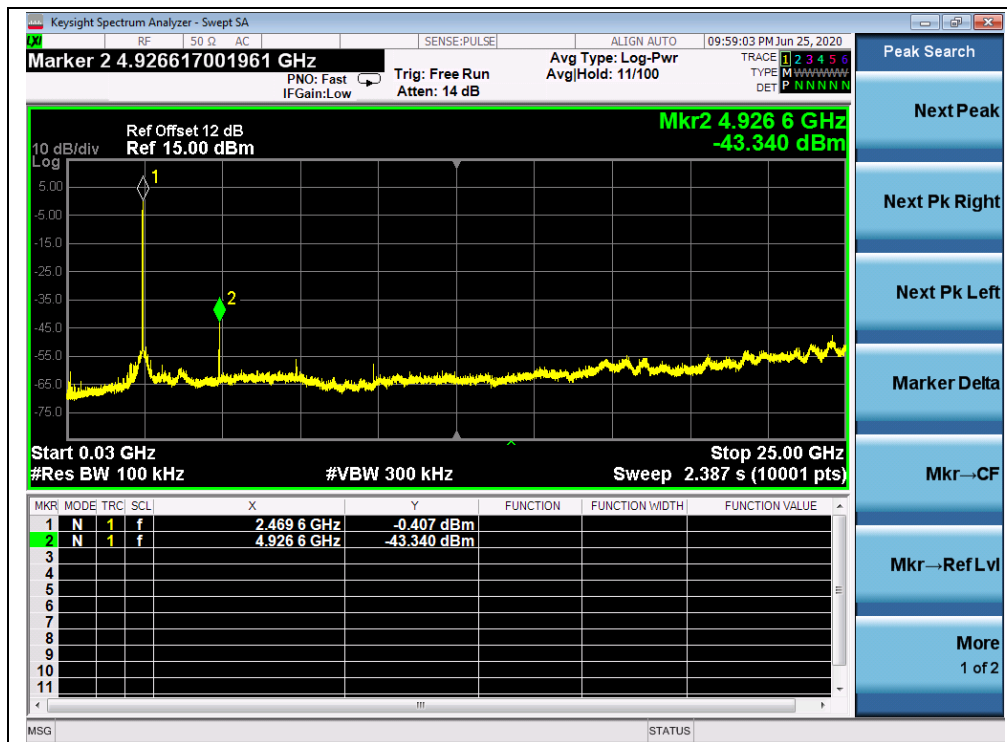
(30MHz to 25GHz, Channel 1, 802.11g)



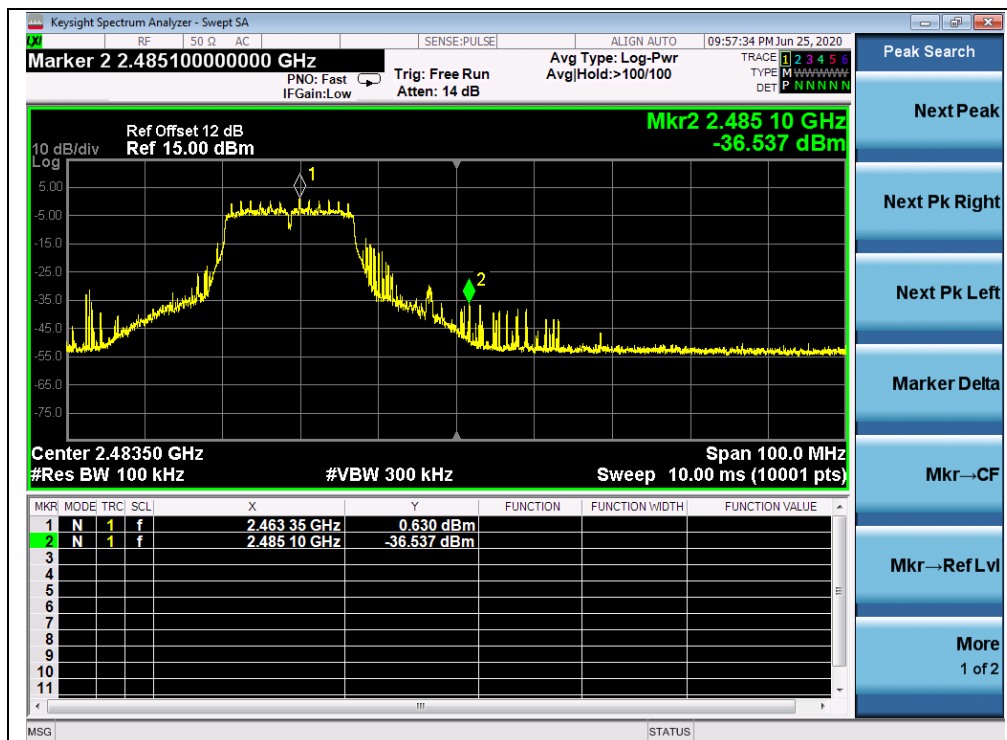
(Band Edge, Channel 1, 802.11g)



(30MHz to 25GHz, Channel 6, 802.11g)



(30MHz to 25GHz, Channel 11, 802.11g)



(Band Edge, Channel 11, 802.11g)

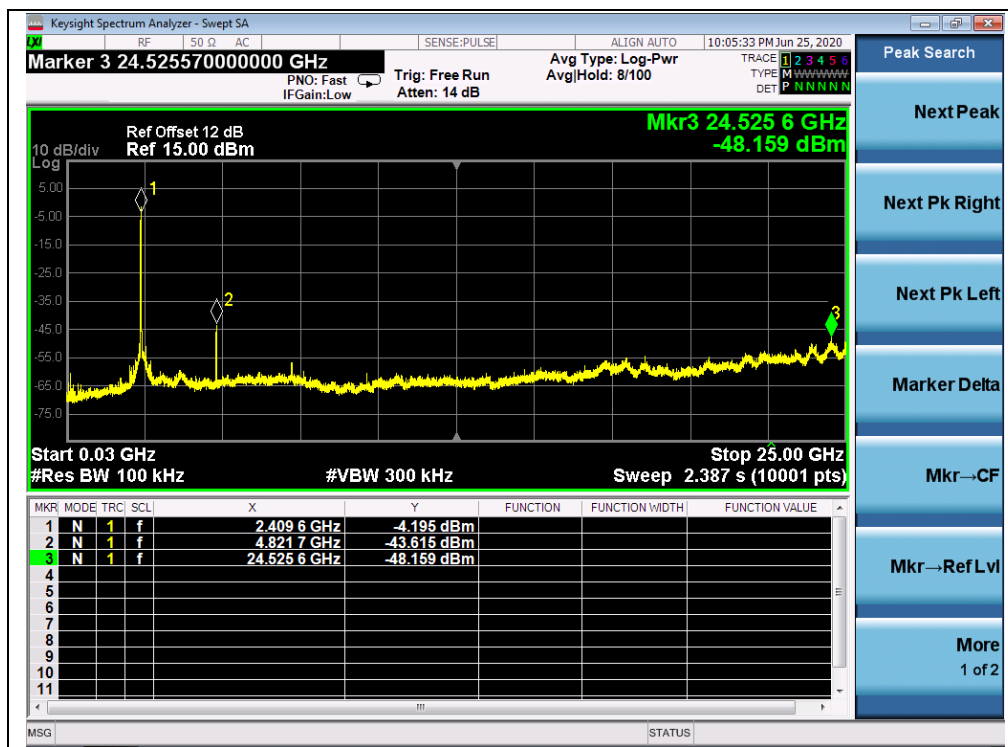


802.11n (HT20) Mode

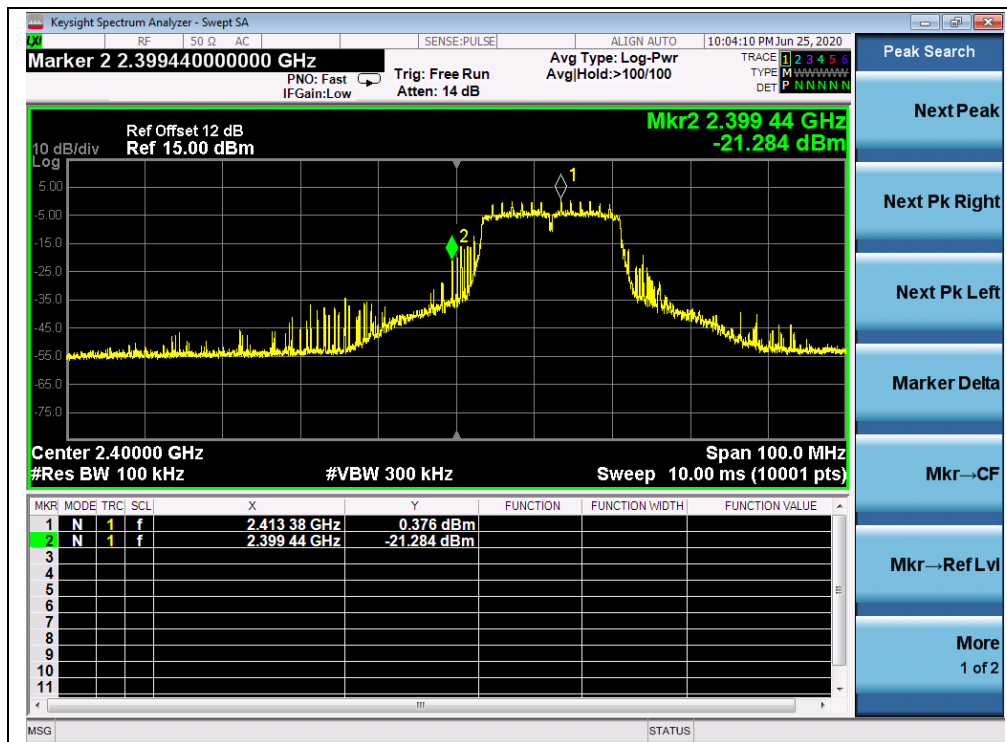
A.Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-43.62	-4.20	-24.20	PASS
6	2437	-44.56	-4.38	-24.38	PASS
11	2462	-46.61	-3.11	-23.11	PASS

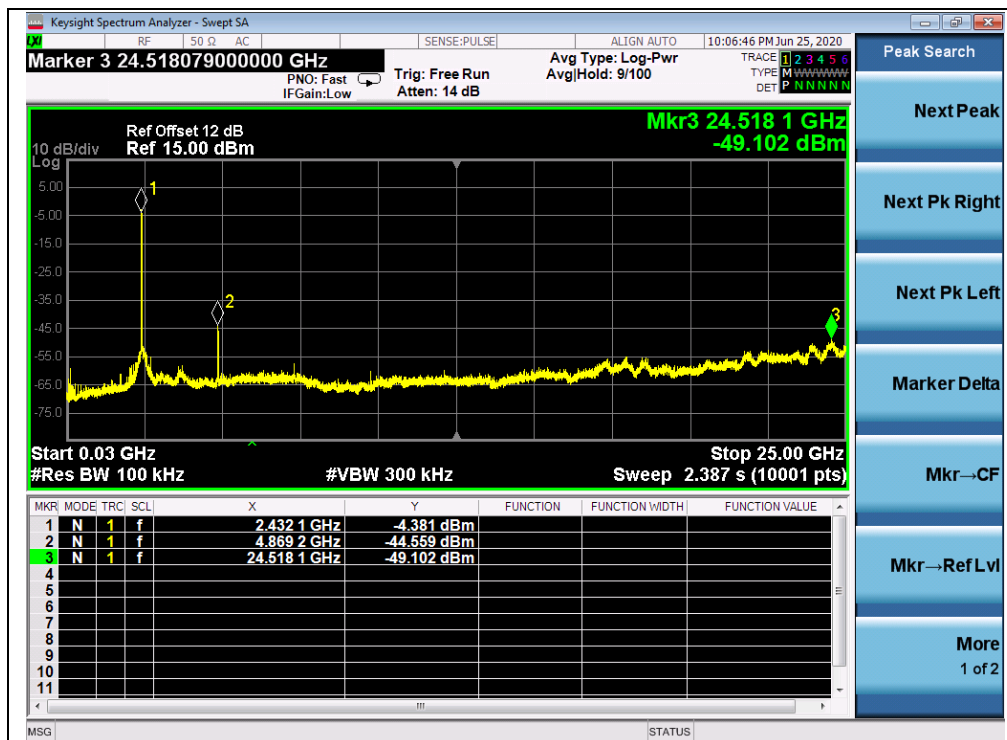
B.Test Plot:



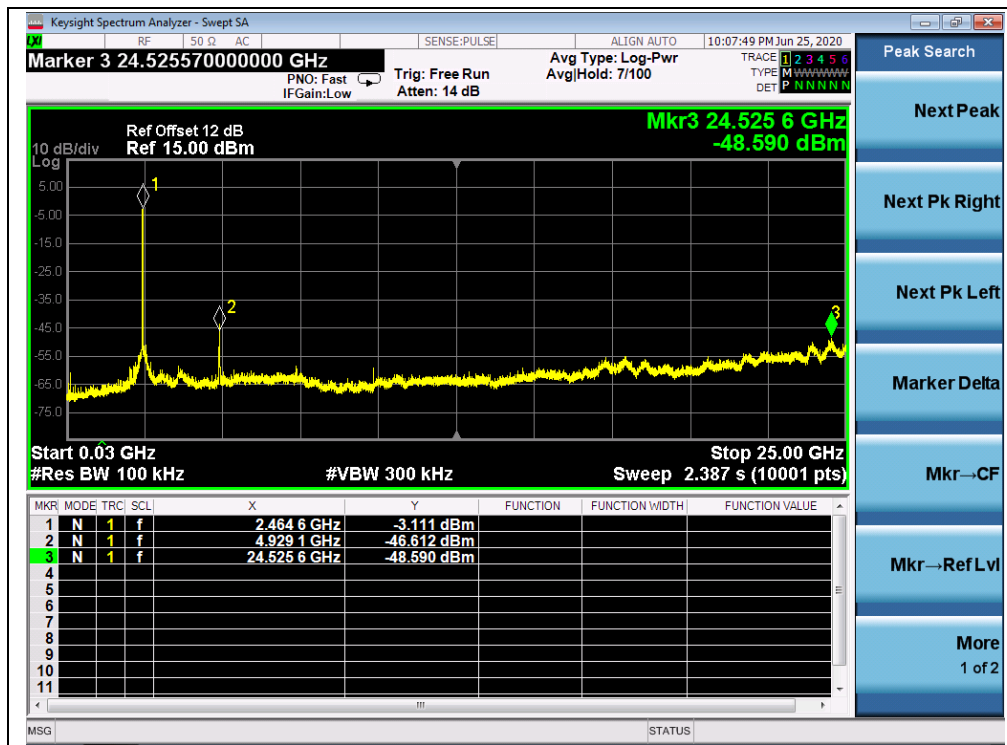
(30MHz to 25GHz, Channel 1, 802.11n (HT20))



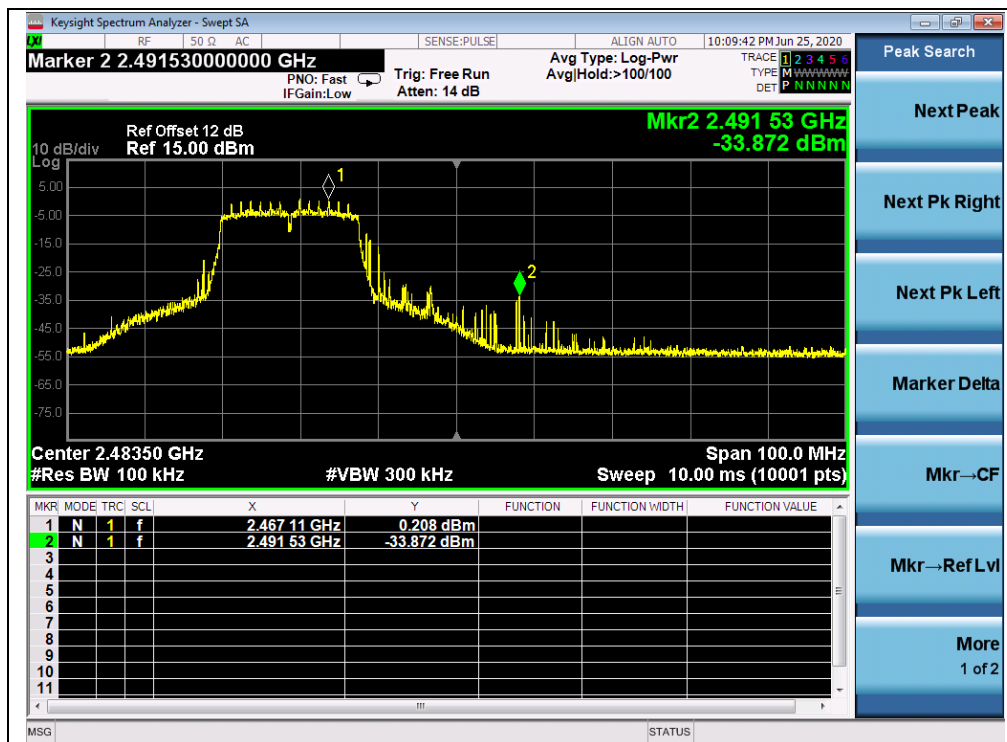
(Band Edge, Channel 1, 802.11n (HT20))



(30MHz to 25GHz, Channel 6, 802.11n (HT20))



(30MHz to 25GHz, Channel 11, 802.11n (HT20))



(Band Edge, Channel 13, 802.11n (HT20))

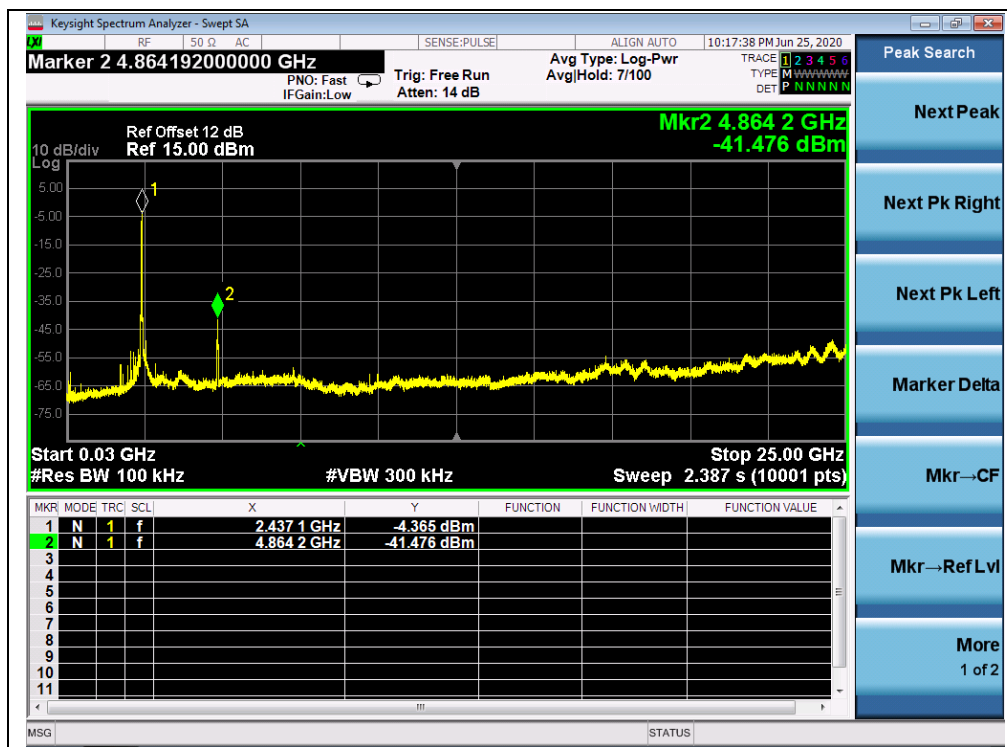


802.11n (HT40) Mode

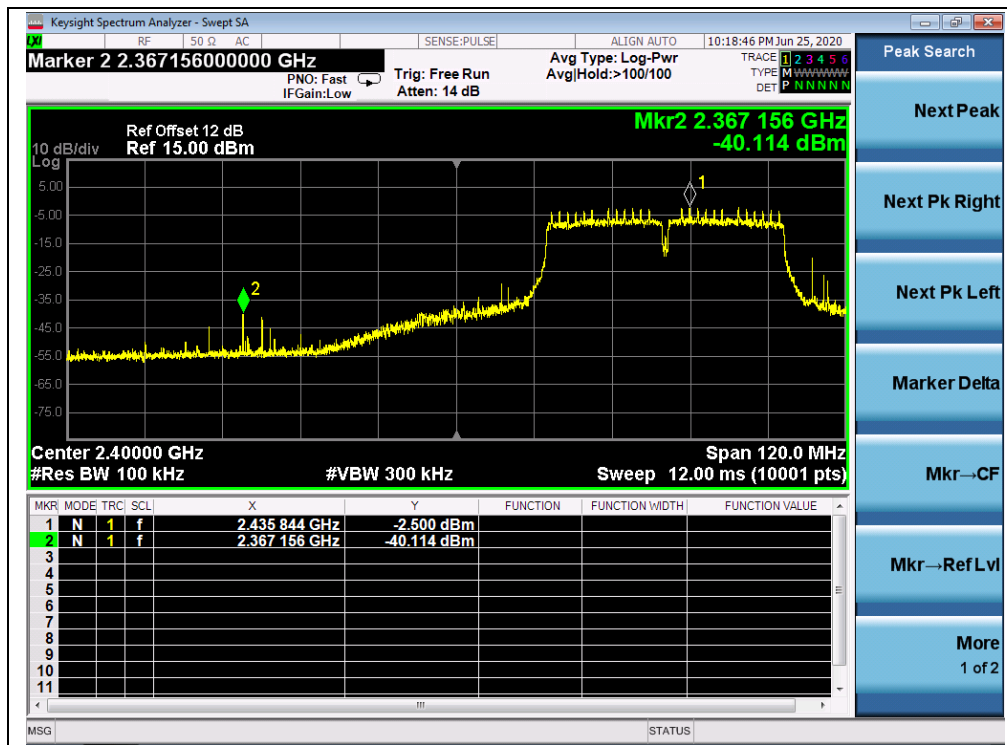
A.Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-41.48	-4.37	-24.37	PASS
6	2437	-45.91	-3.25	-23.25	PASS
9	2452	-44.89	-5.18	-25.18	PASS

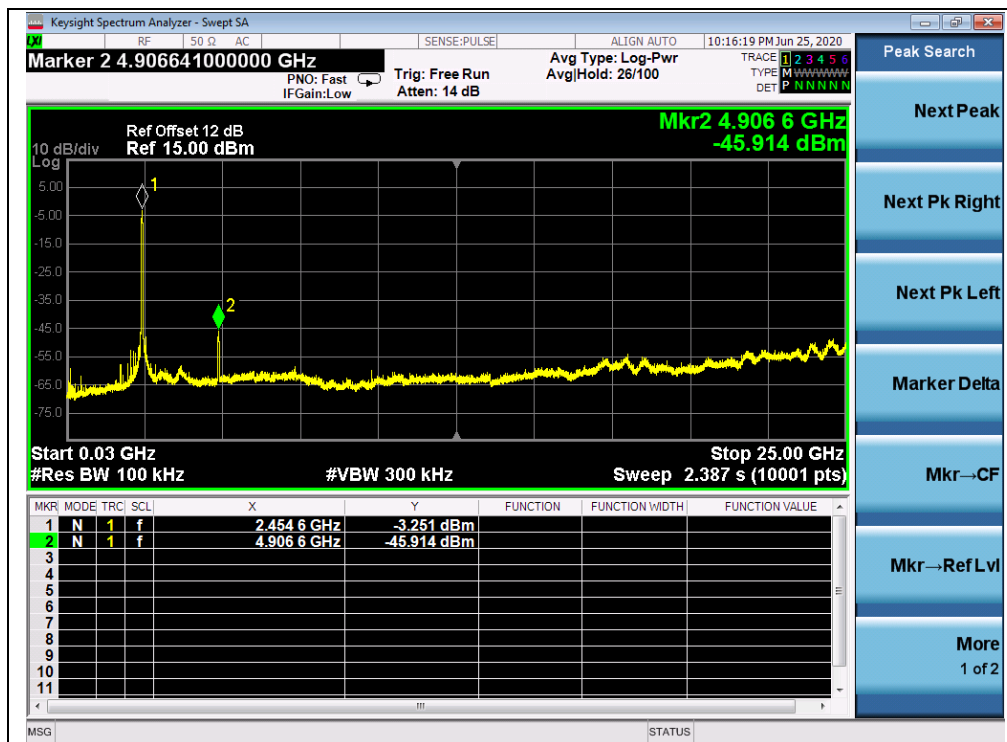
B.Test Plot:



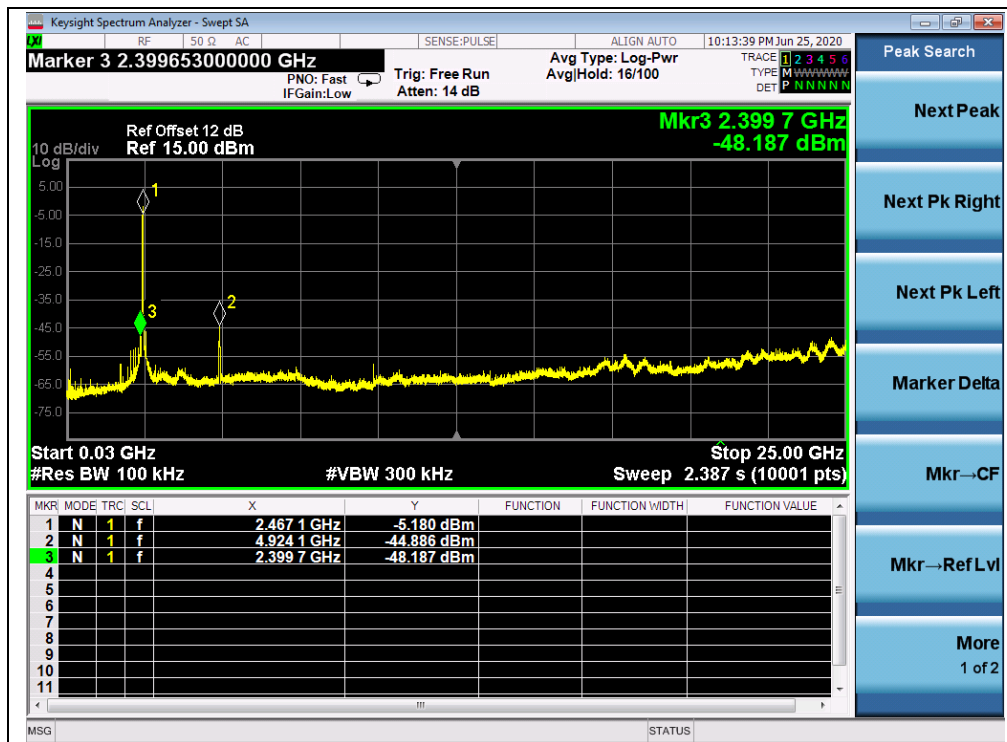
(30MHz to 25GHz, Channel 3, 802.11n (HT40))



(Band Edge, Channel 3, 802.11n (HT40))



(30MHz to 25GHz, Channel 6, 802.11n (HT40))



(30MHz to 25GHz, Channel 9, 802.11n (HT40))



(Band Edge, Channel 11, 802.11n (HT40))

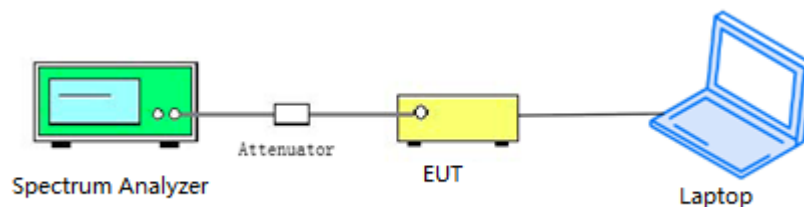
2.6. Power Spectral Density (PSD)

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

Test Setup:



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 Mode

A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-10.29	8	PASS
6	2437	-10.79	8	PASS
11	2462	-10.63	8	PASS

B. Test Plot:



(Channel 1, 802.11b)



(Channel 6, 802.11b)



(Channel 11, 802.11b)

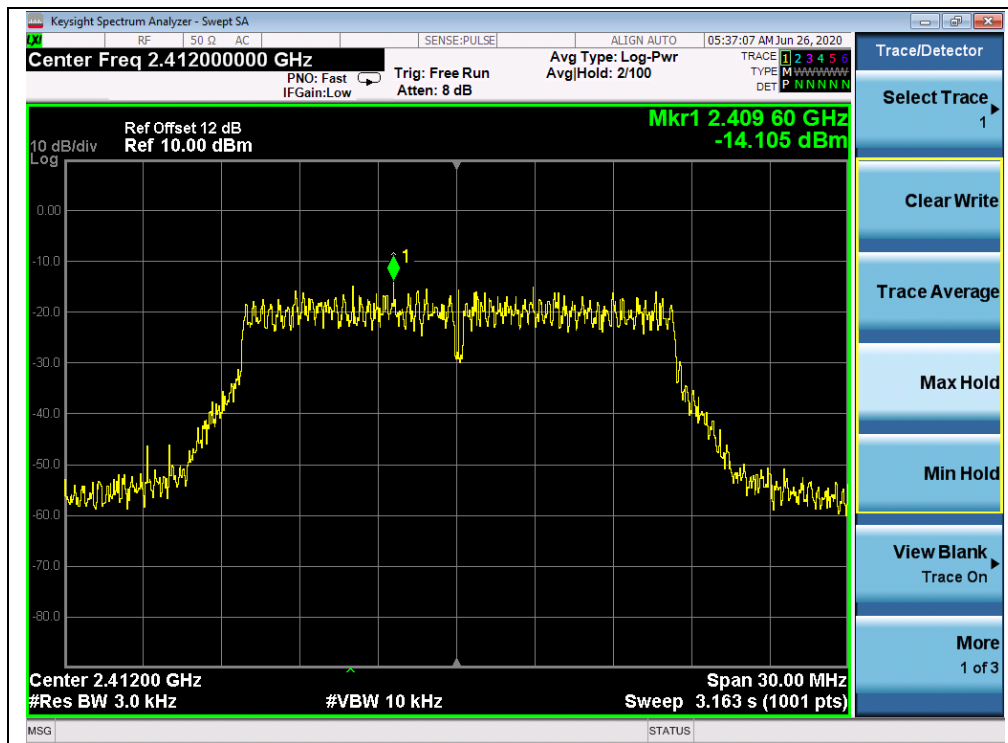


802.11g Mode

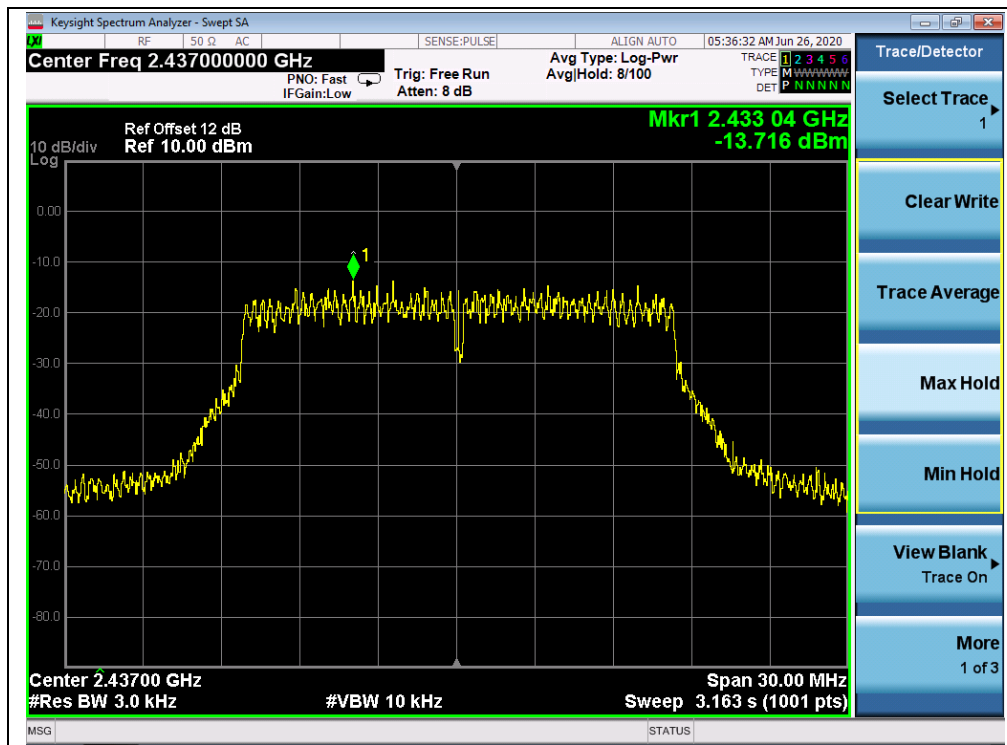
A.Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-14.11	8	PASS
6	2437	-13.72	8	PASS
11	2462	-13.49	8	PASS

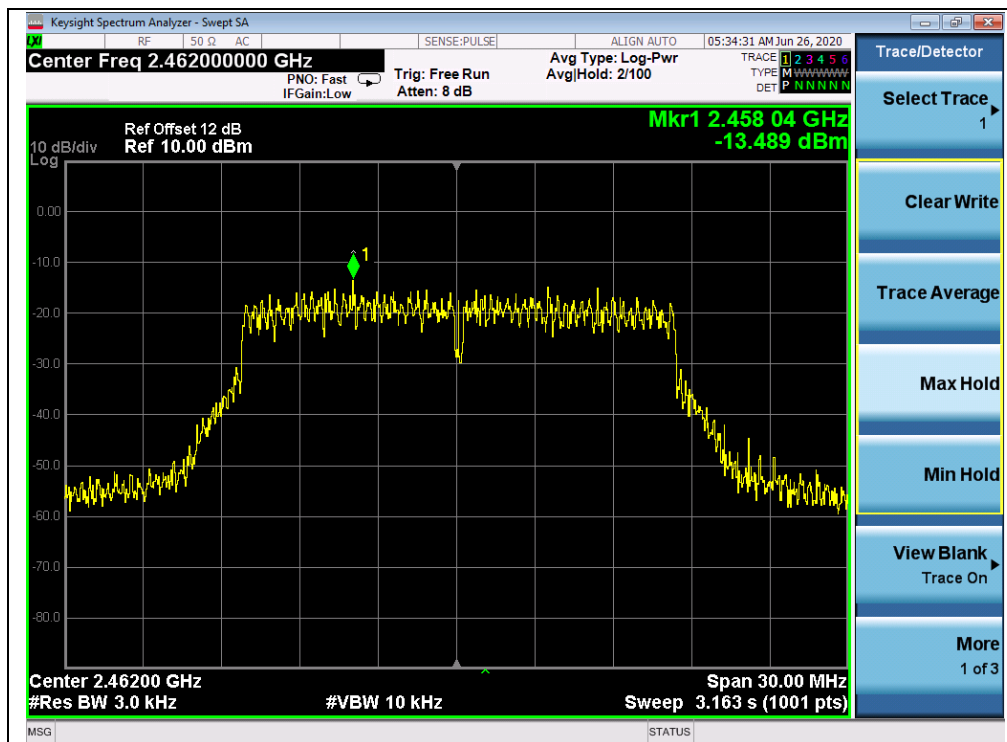
B.Test Plot:



(Channel 1, 802.11g)



(Channel 6, 802.11g)



(Channel 11, 802.11g)

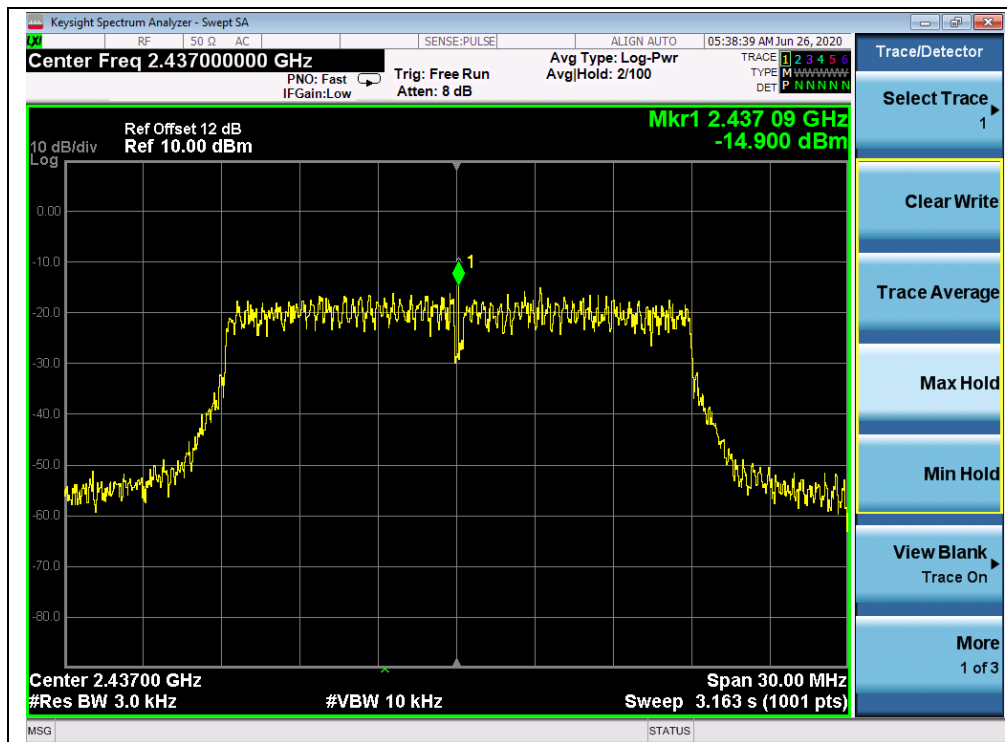


A.Test Verdict:

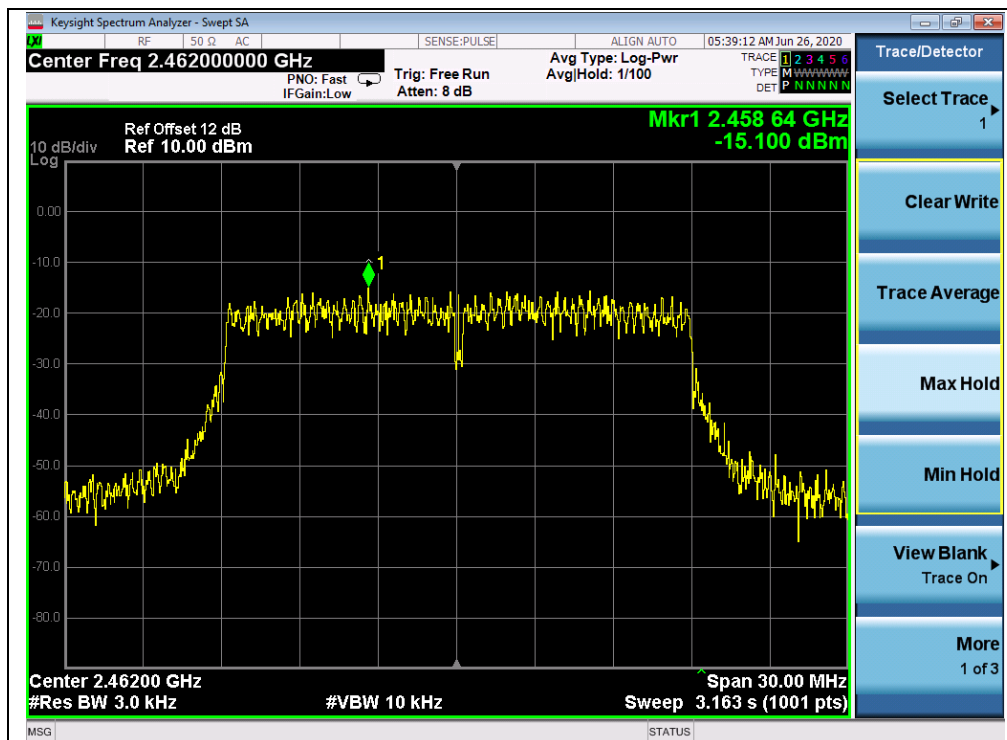
Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-13.66	8	PASS
6	2437	-14.90	8	PASS
11	2462	-15.10	8	PASS

[illegible]

(Channel 1, 802.11n (HT20))



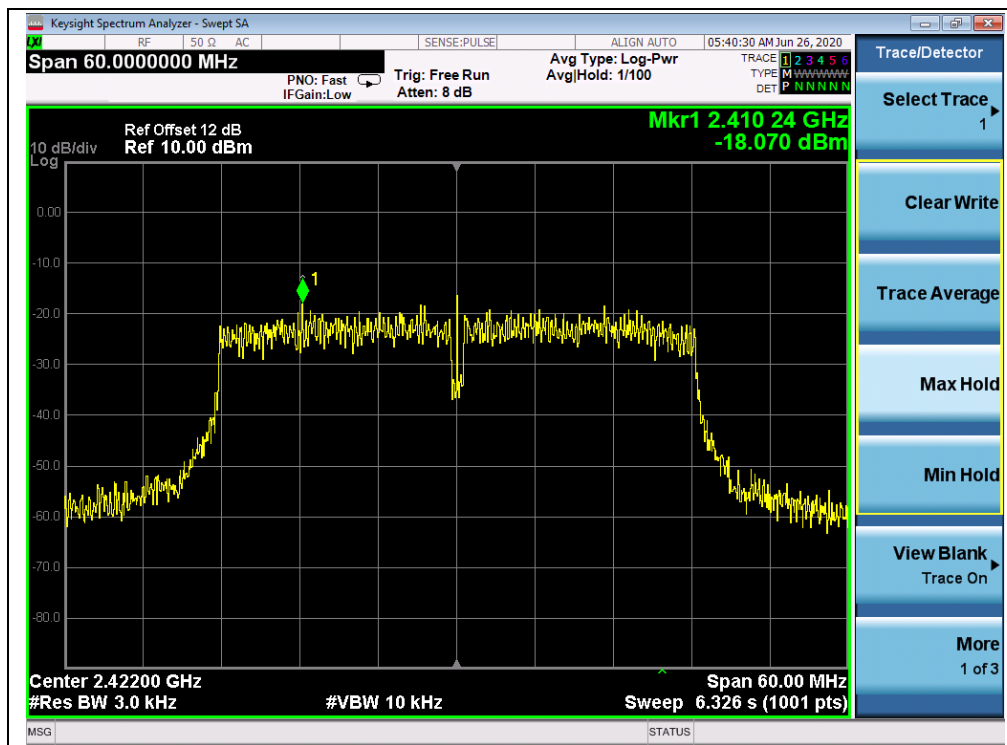
(Channel 6, 802.11n (HT20))



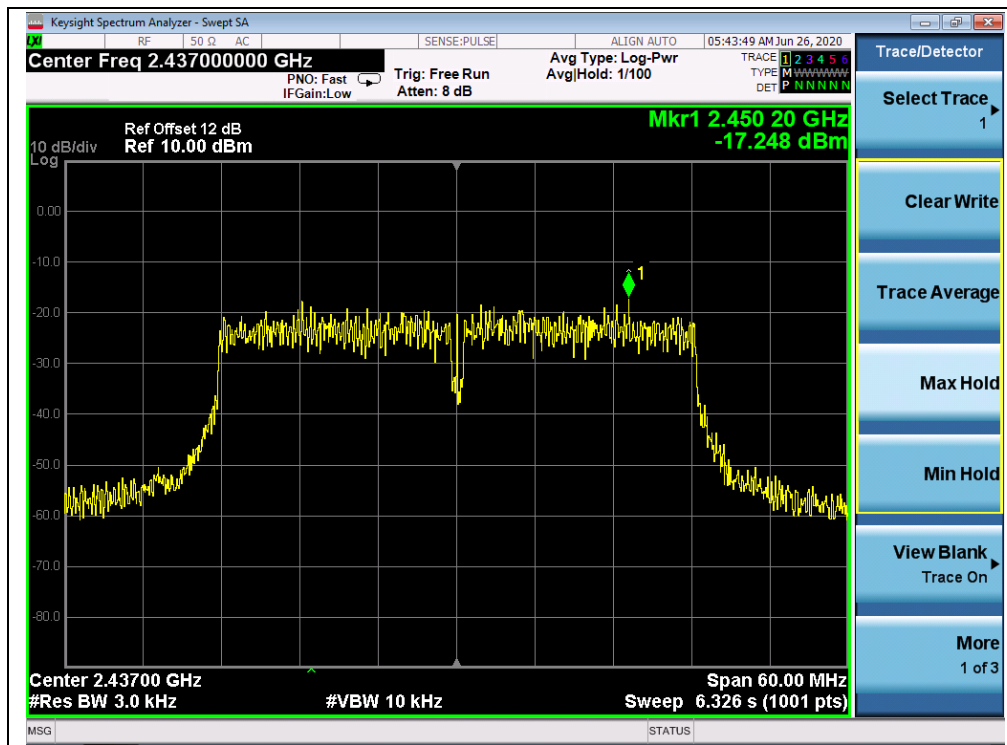
(Channel 11, 802.11n (HT20))

**802.11n (HT40) Mode****A.Test Verdict:**

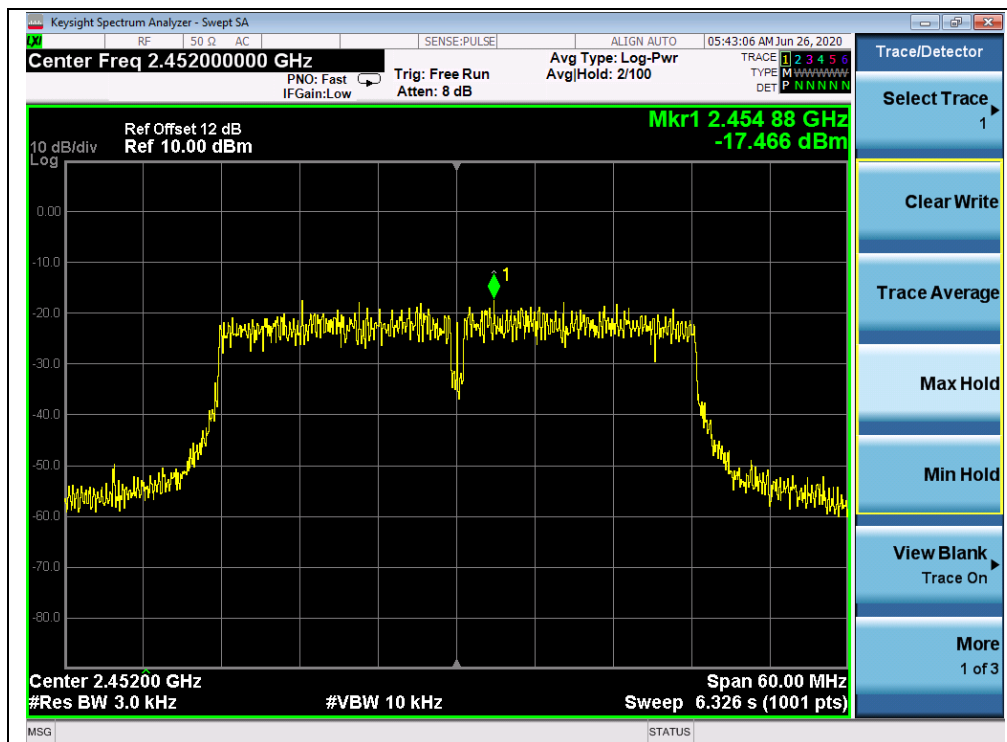
Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
3	2422	-18.07	8	PASS
6	2437	-17.25	8	PASS
9	2452	-17.47	8	PASS

B.Test Plot:

(Channel 3, 802.11n (HT40))



(Channel 6, 802.11n (HT40))



(Channel 9, 802.11n (HT40))

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 50 μ H/50 Ω line impedance stabilization network (LISN).

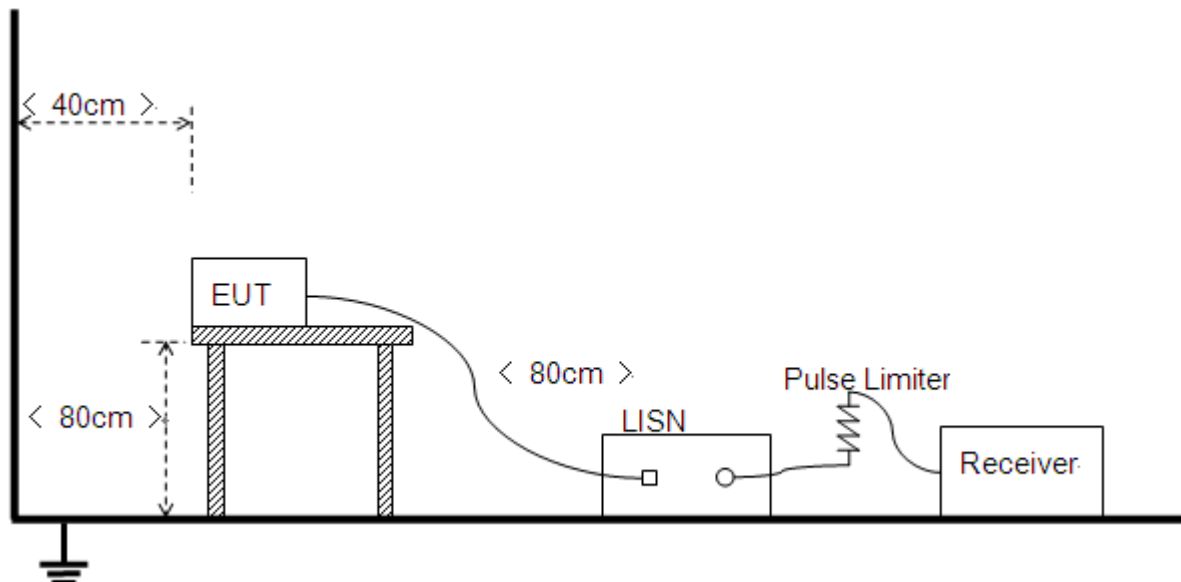
Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

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

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+ Camera+ WIFI TX

Test Voltage: AC 120V/60Hz

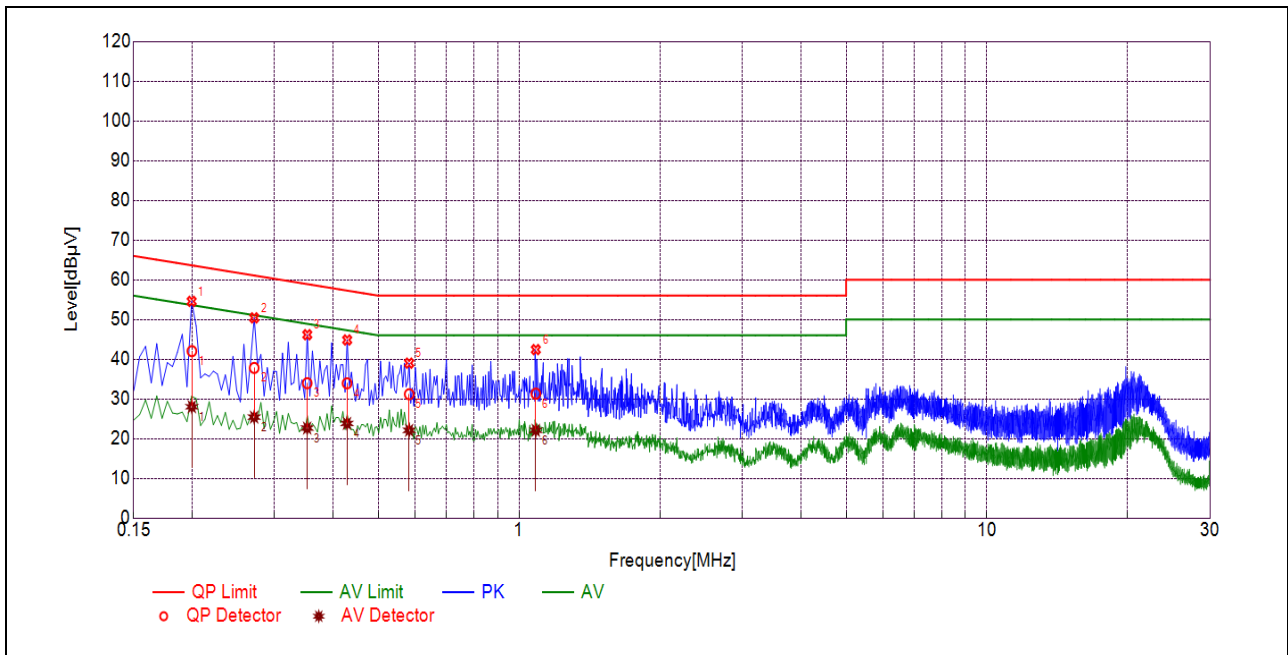
The measurement results are obtained as below:

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

U_R : Receiver Reading

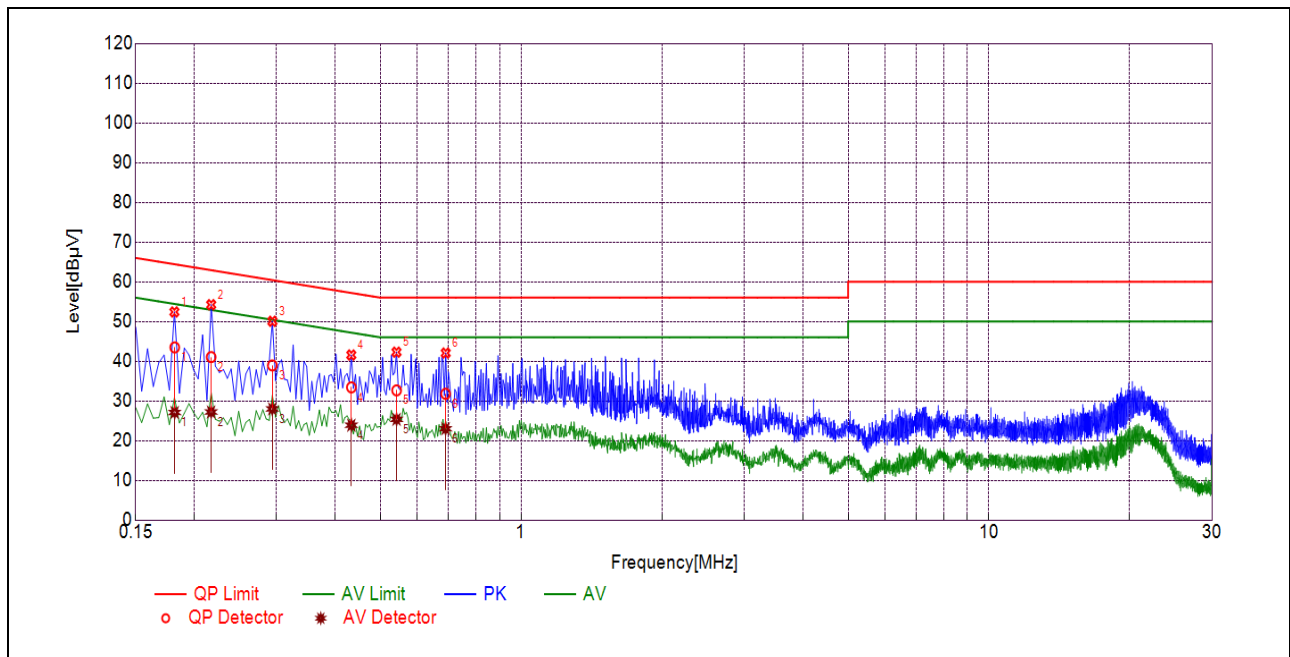
A_{Factor} : Voltage division factor of LISN

B.Test Plot:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1997	42.03	28.03	63.62	53.62	Line	PASS
2	0.2714	37.80	25.41	61.08	51.08		PASS
3	0.3523	33.96	22.66	58.91	48.91		PASS
4	0.4286	33.92	23.83	57.28	47.28		PASS
5	0.5821	31.19	22.09	56.00	46.00		PASS
6	1.0856	31.33	22.10	56.00	46.00		PASS



(N Phase)

NO.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1817	43.48	27.10	64.41	54.41	Neutral	PASS
2	0.2174	41.04	27.21	62.92	52.92		PASS
3	0.2938	38.94	27.99	60.42	50.42		PASS
4	0.4336	33.41	23.88	57.18	47.18		PASS
5	0.5417	32.66	25.36	56.00	46.00		PASS
6	0.6895	31.80	23.00	56.00	46.00		PASS

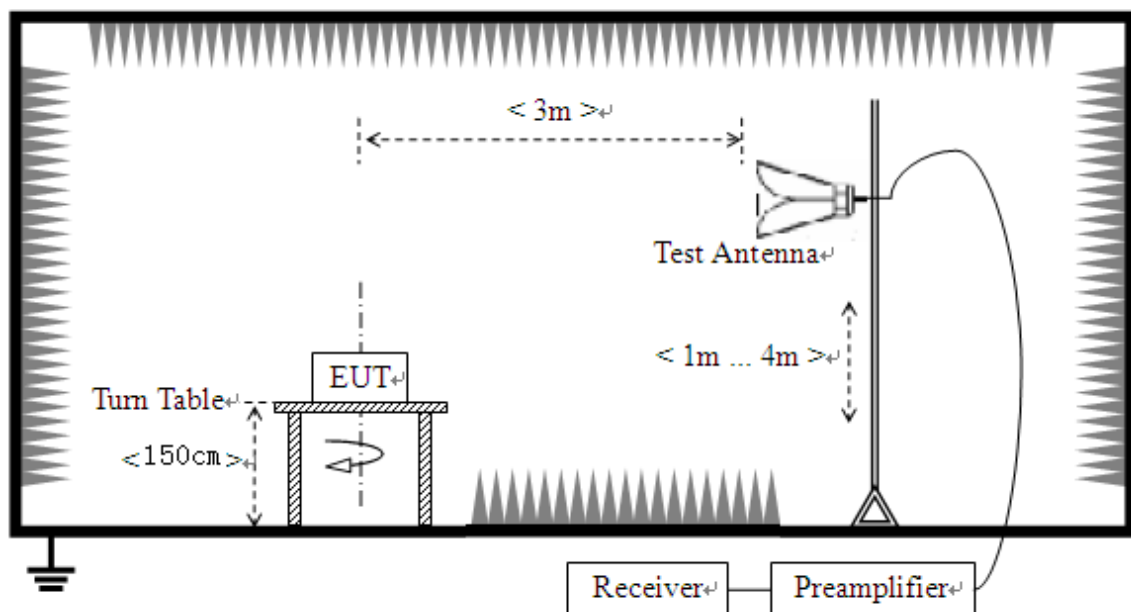
2.8. Restricted Frequency Bands

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

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:

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

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.

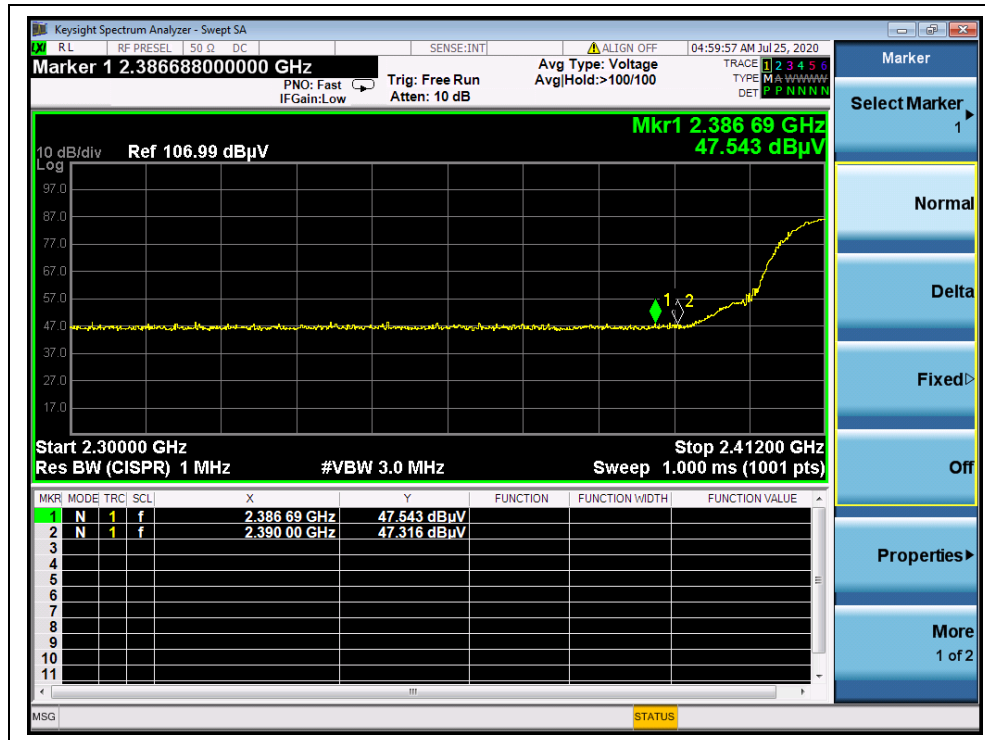
802.11b Mode

A.Test Verdict:

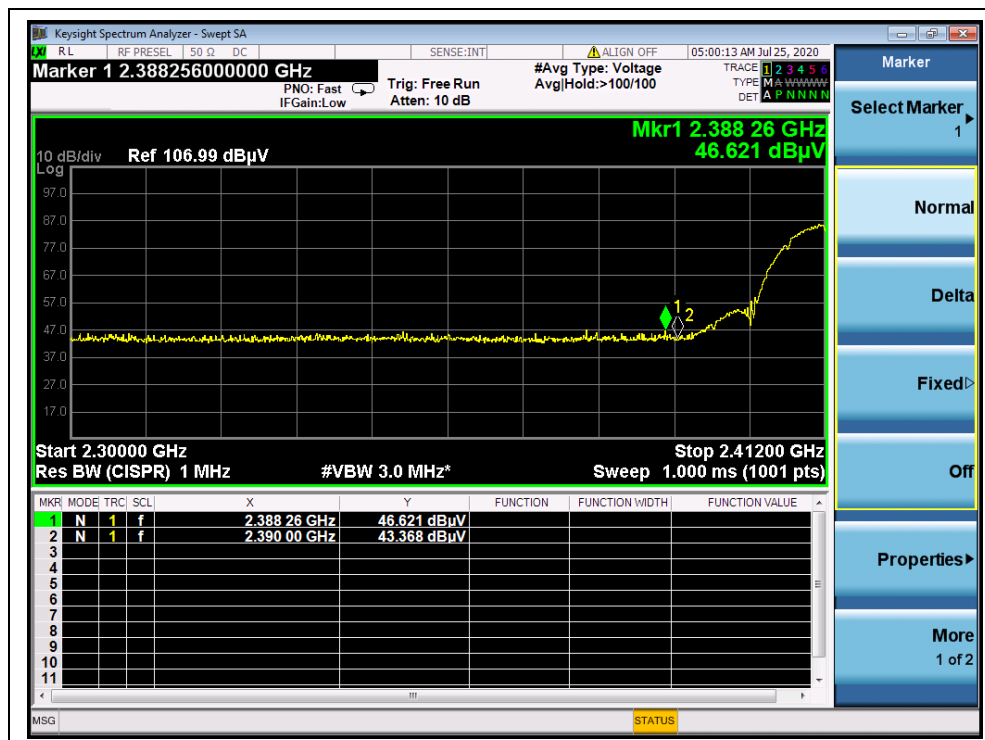
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dB μ V)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV						
1	2386.69	PK	47.54	-29.67	32.56	50.43	74	PASS
1	2388.26	AV	46.62	-29.67	32.56	49.51	54	PASS
11	2485.63	PK	47.71	-29.67	32.56	50.60	74	PASS
11	2487.04	AV	45.57	-29.67	32.56	48.46	54	PASS



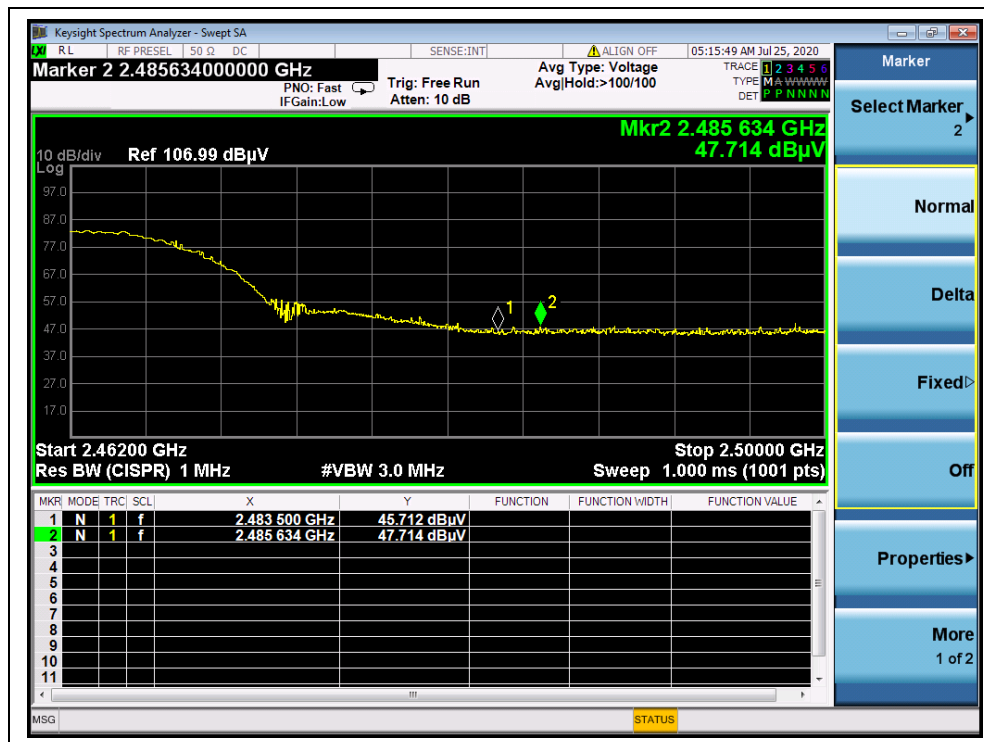
B.Test Plot:



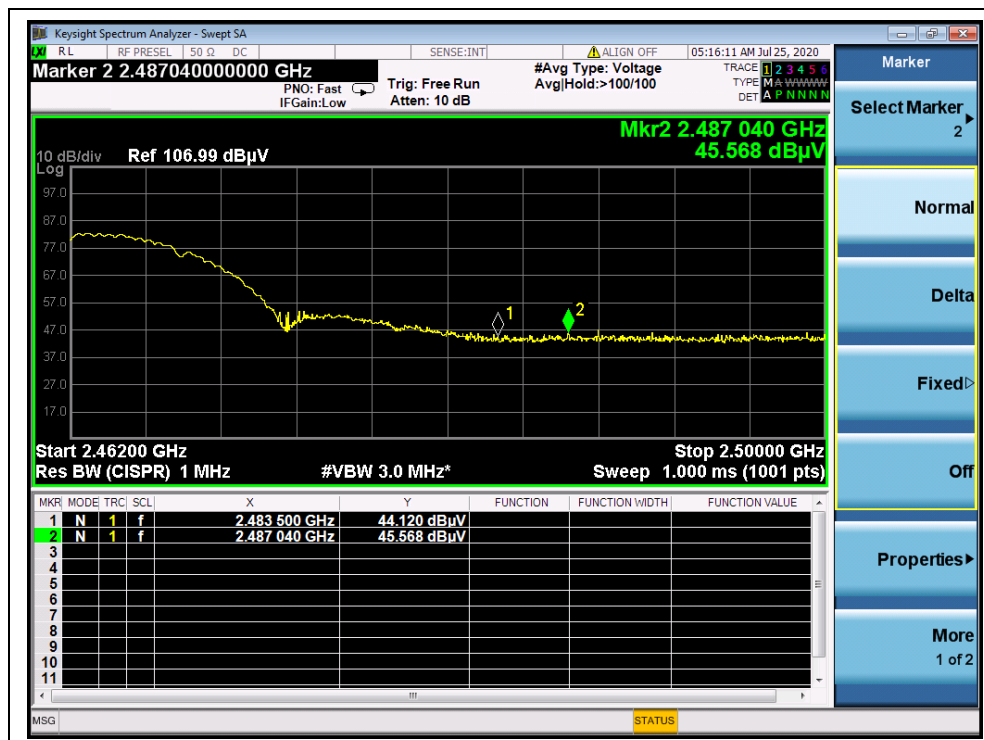
(PEAK, Channel 1, 802.11b)



(AVERAGE, Channel 1, 802.11b)



(PEAK, Channel 11, 802.11b)



(AVERAGE, Channel 11, 802.11b)

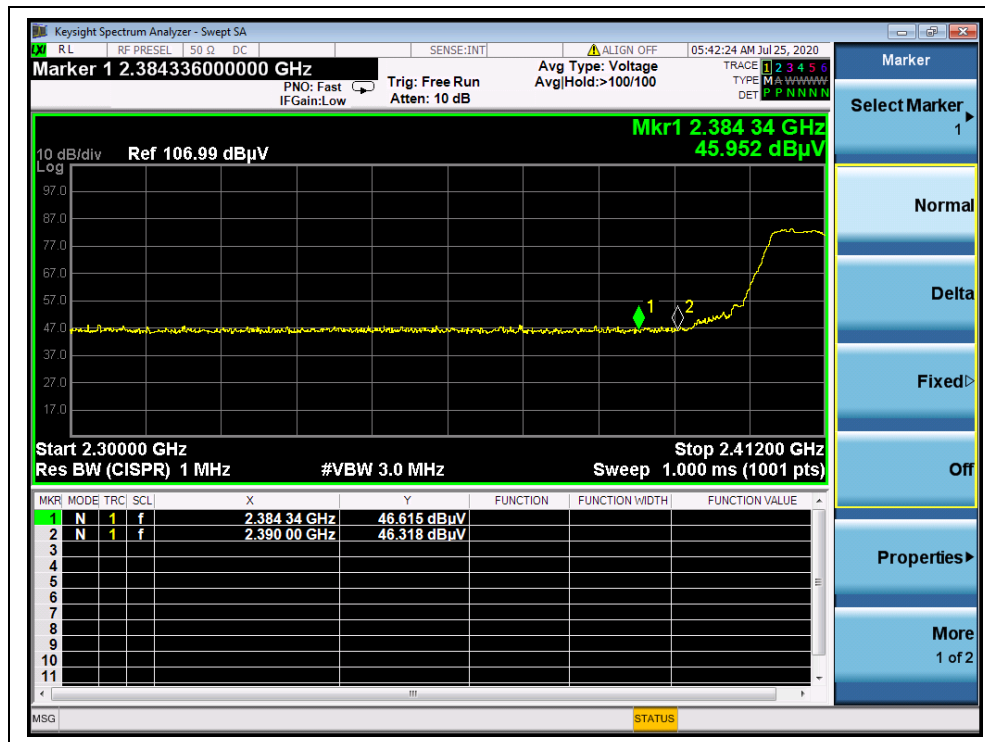


802.11g Mode

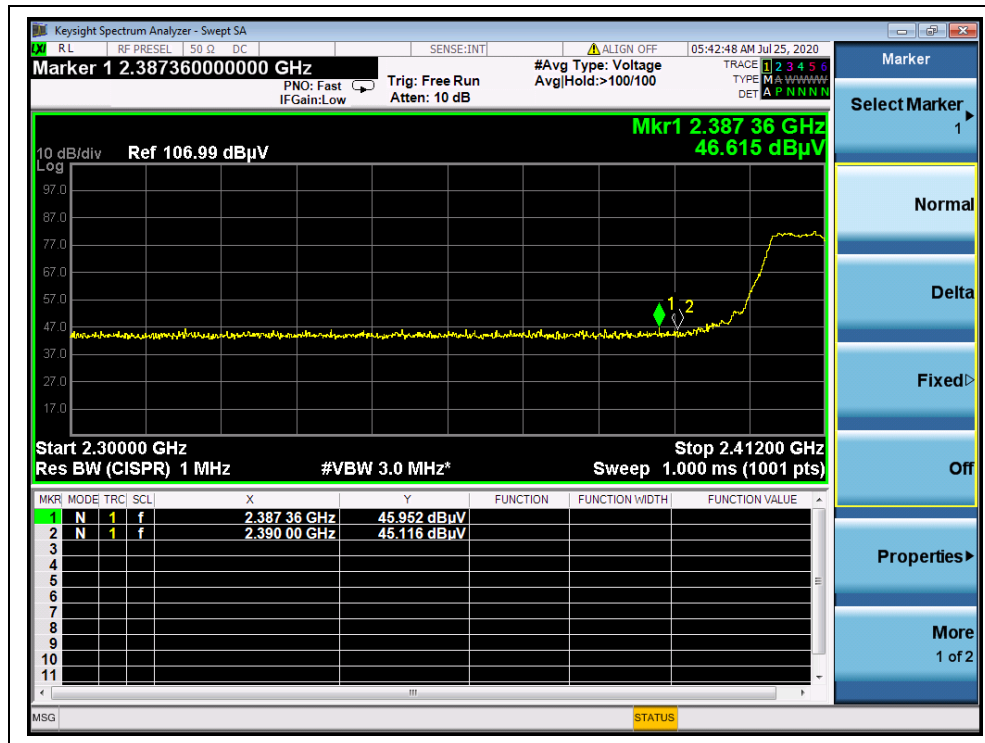
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
1	2384.34	PK	46.62	-29.67	32.56	49.51	74	PASS
1	2387.36	AV	45.95	-29.67	32.56	48.84	54	PASS
11	2488.03	PK	46.59	-29.67	32.56	49.48	74	PASS
11	2484.57	AV	46.40	-29.67	32.56	49.29	54	PASS

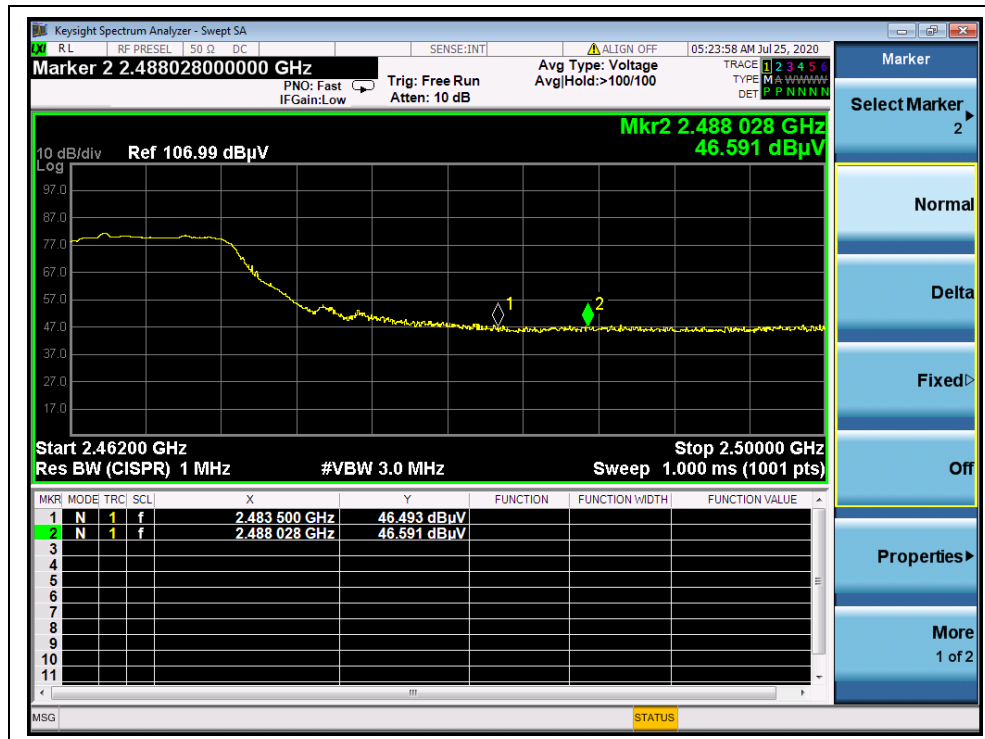
B. Test Plot:



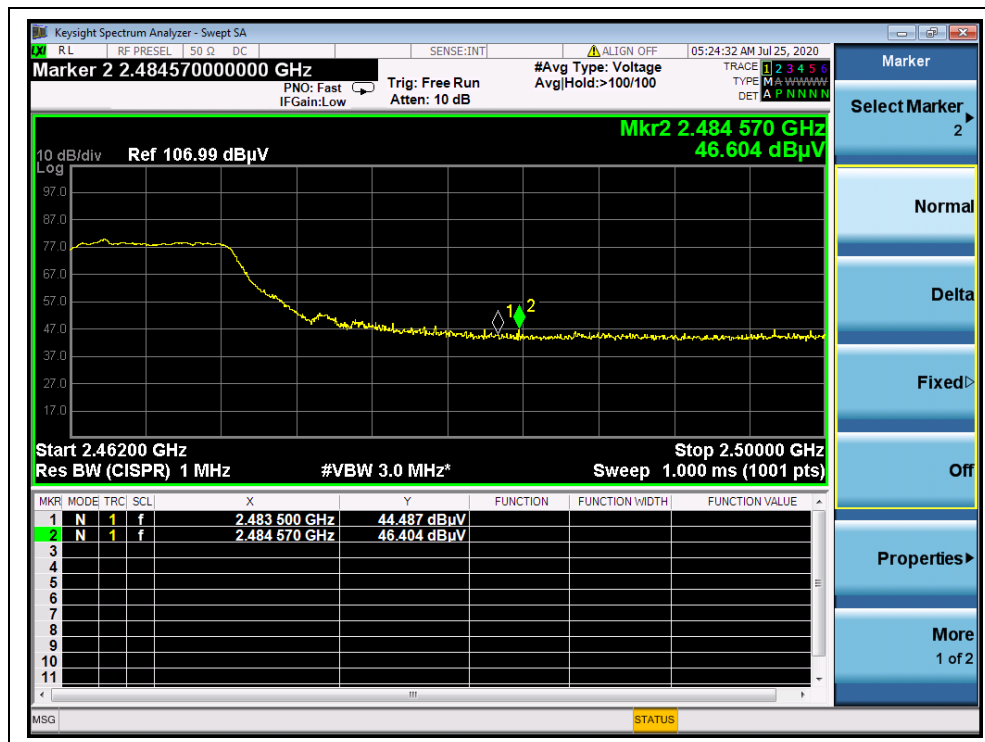
(PEAK, Channel 1, 802.11g)



(AVERAGE, Channel 1, 802.11g)



(PEAK, Channel 11, 802.11g)



(AVERAGE, Channel 11, 802.11g)

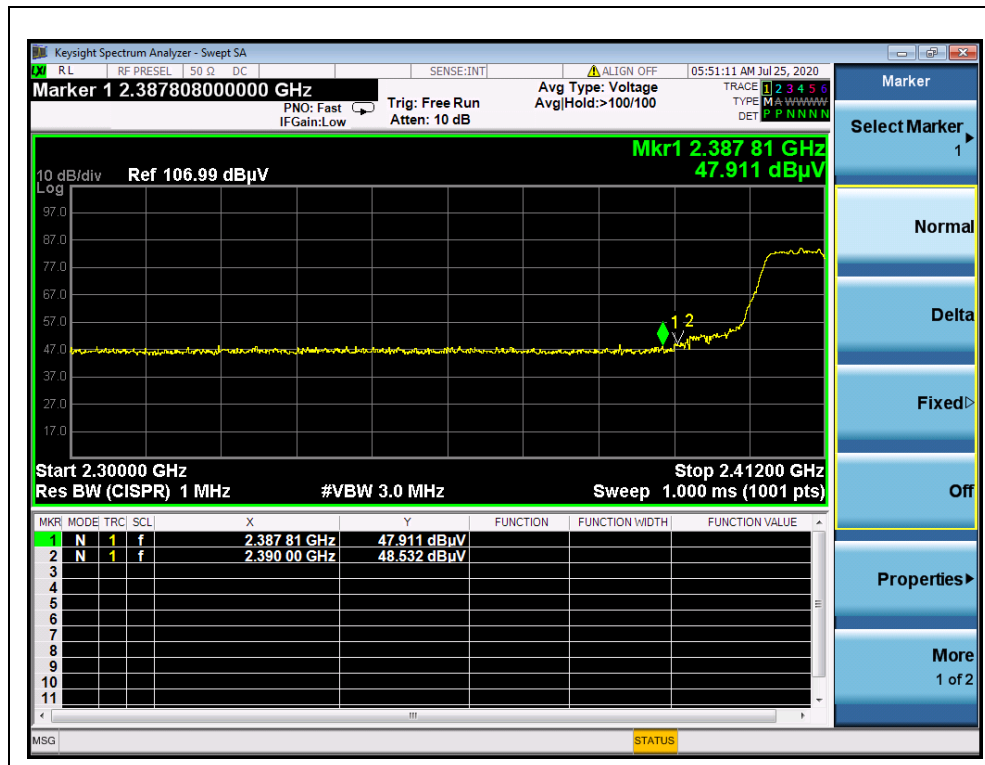


802.11 n (HT20) Mode

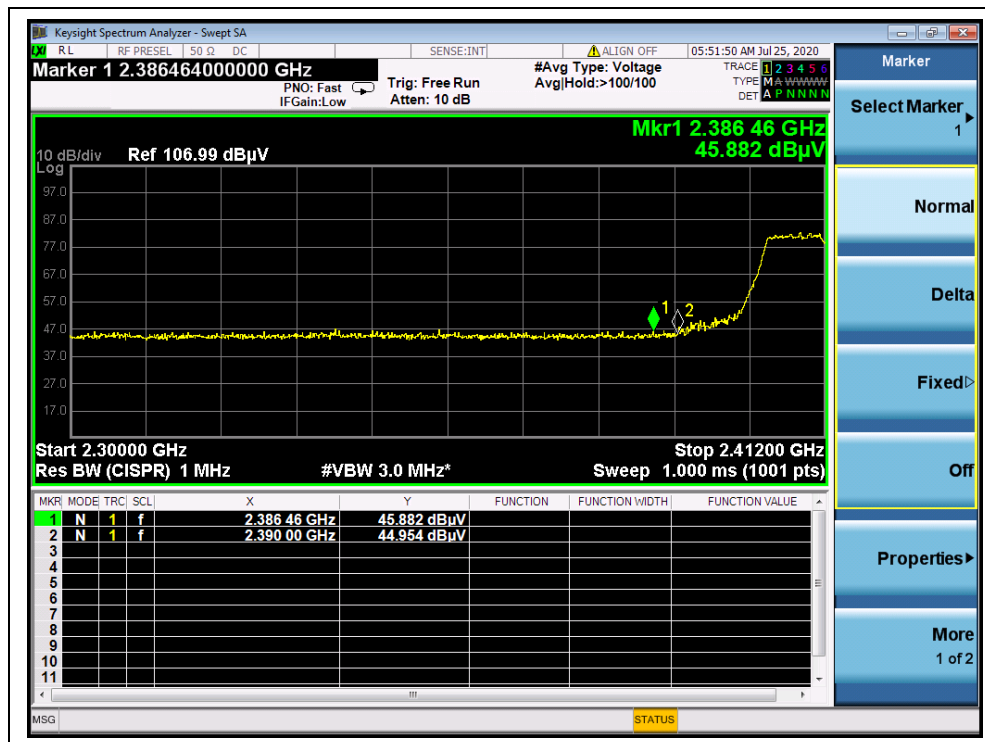
A.Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dB μ V)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV						
1	2390.00	PK	48.53	-29.67	32.56	51.42	74	PASS
1	2386.46	AV	45.88	-29.67	32.56	48.77	54	PASS
11	2483.50	PK	49.44	-29.67	32.56	52.33	74	PASS
11	2485.56	AV	45.03	-29.67	32.56	47.92	54	PASS

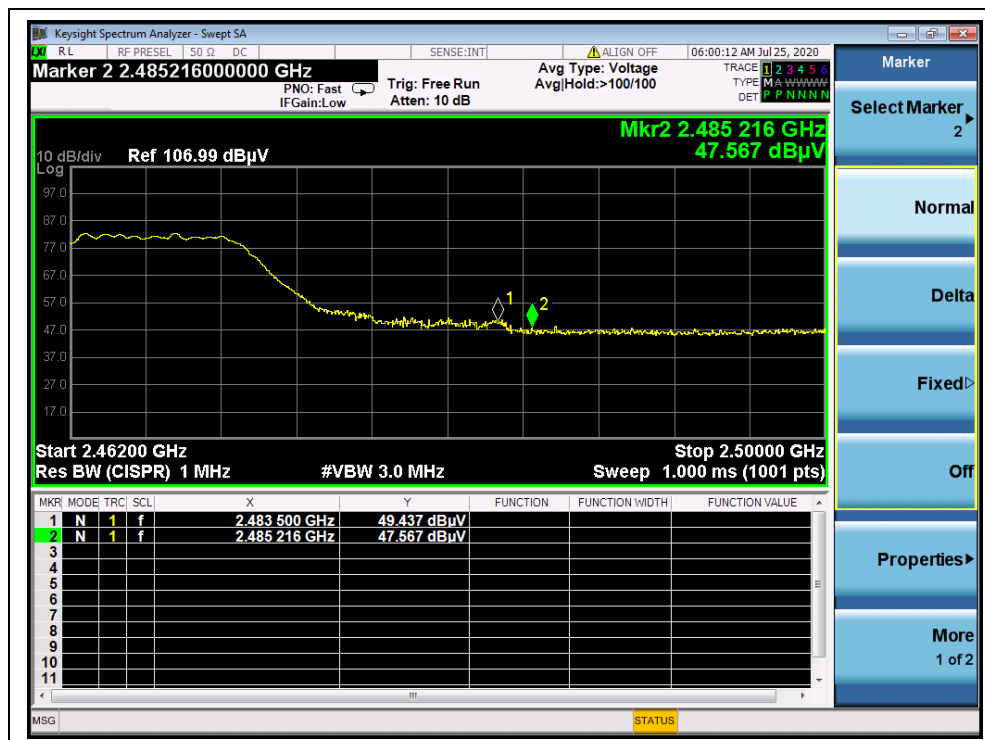
B.Test Plot:



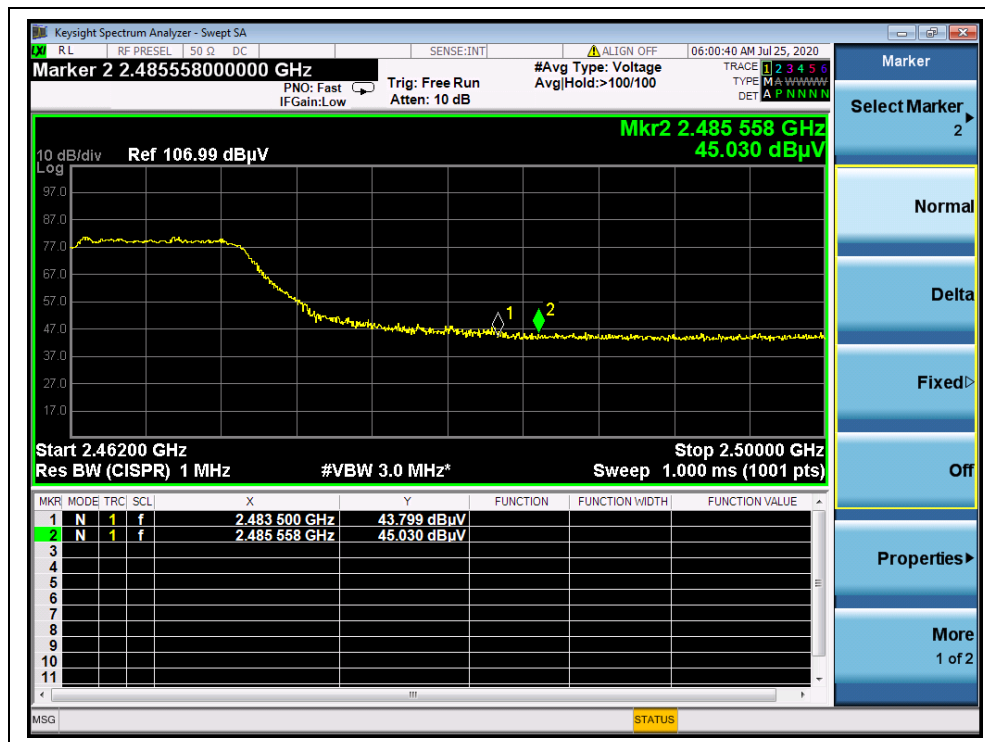
(PEAK, Channel 1, 802.11n (HT20))



(AVERAGE, Channel 1, 802.11n (HT20))



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



(AVERAGE, Channel 11, 802.11n (HT20))

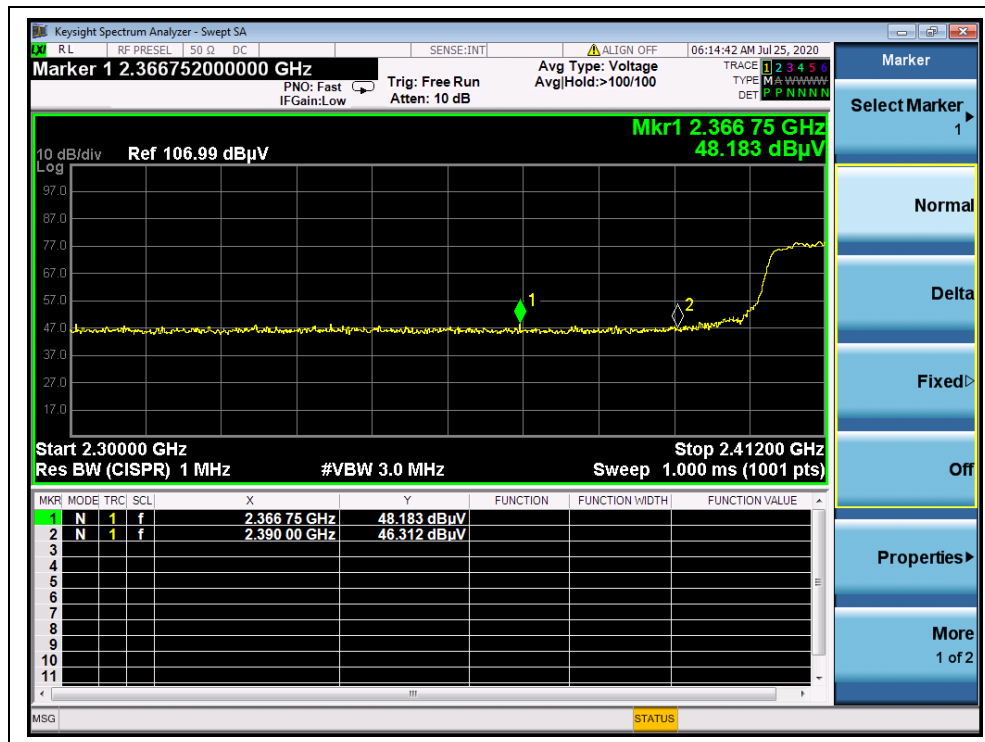


802.11n (HT40) Mode

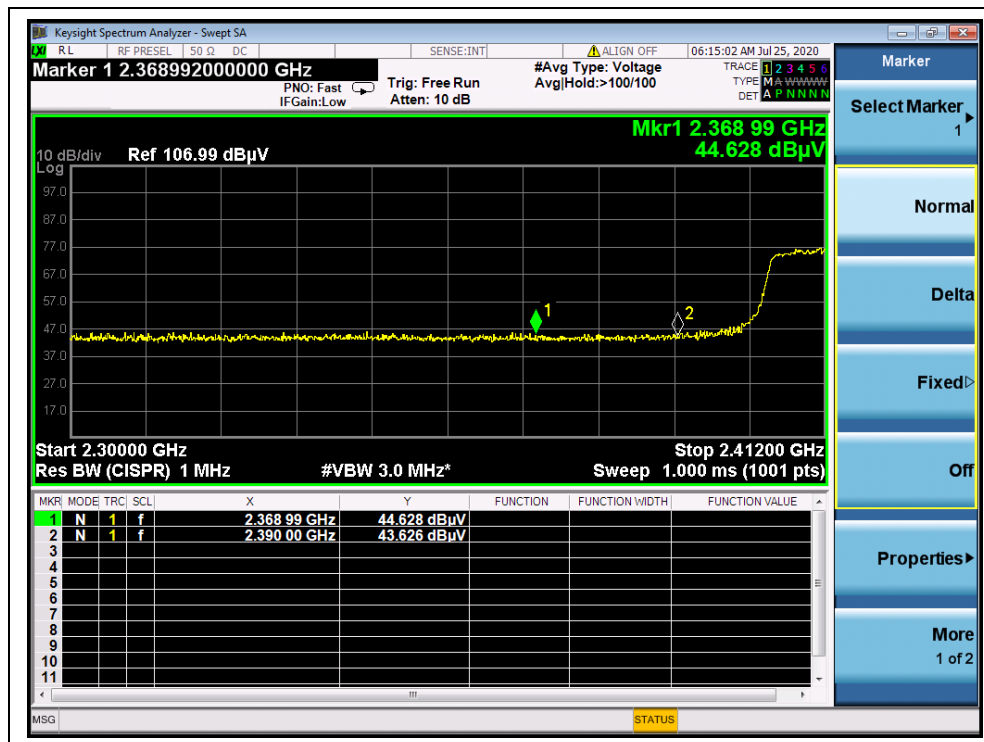
A.Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
3	2366.75	PK	48.18	-29.67	32.56	51.07	74	PASS
3	2368.99	AV	44.63	-29.67	32.56	47.52	54	PASS
9	2484.53	PK	48.55	-29.67	32.56	51.44	74	PASS
9	2485.90	AV	46.73	-29.67	32.56	49.62	54	PASS

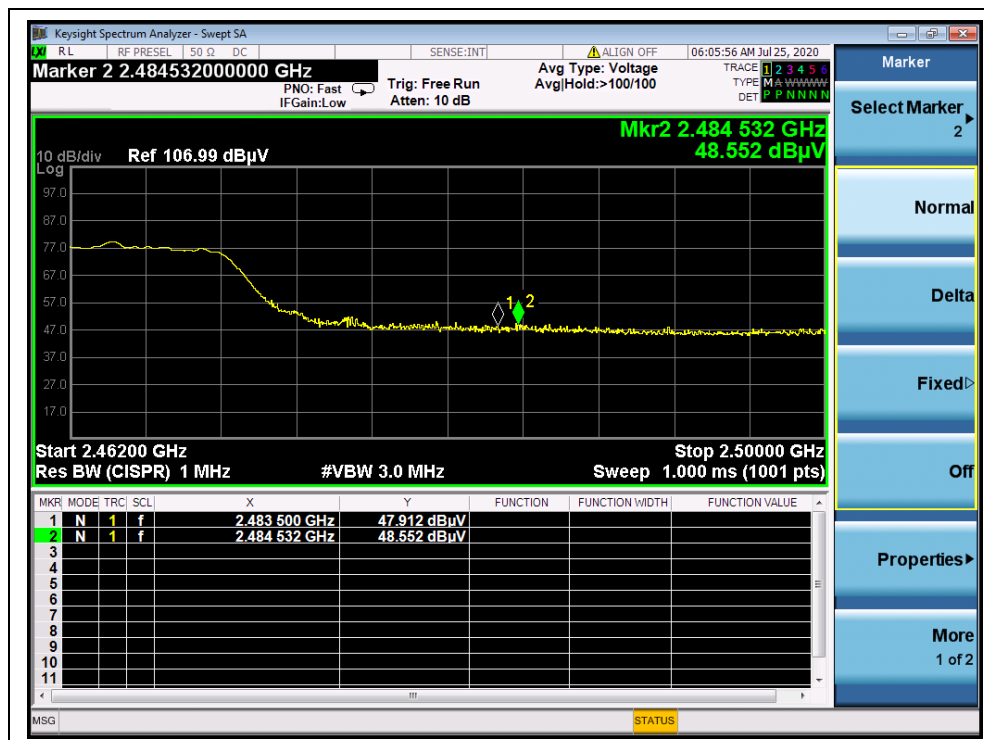
B.Test Plot:



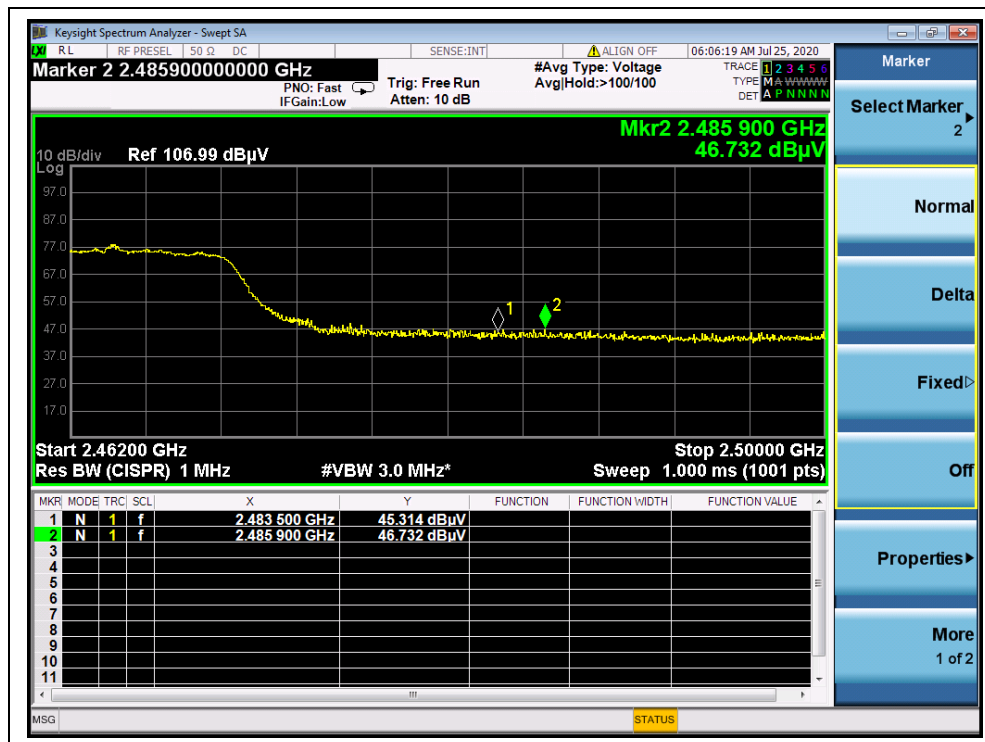
(PEAK, Channel 3, 802.11n (HT40))



(AVERAGE, Channel 3, 802.11n (HT40))



(PEAK, Channel 9, 802.11n (HT40))



(AVERAGE, Channel 9, 802.11n (HT40))

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 ($\mu\text{V/m}$)	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

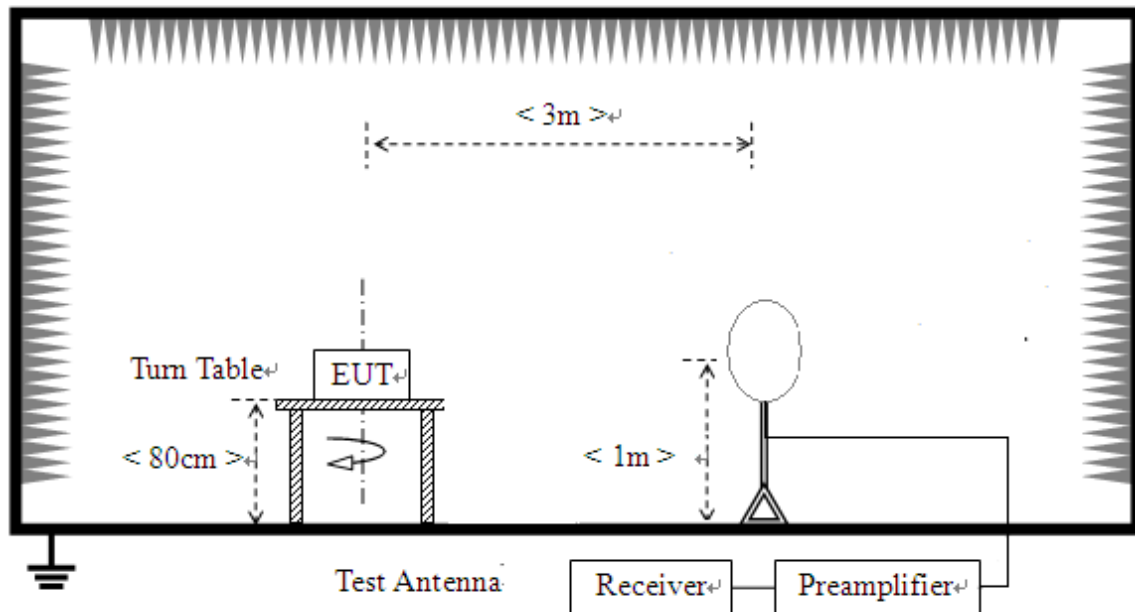
Note1: For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

Note2: 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).

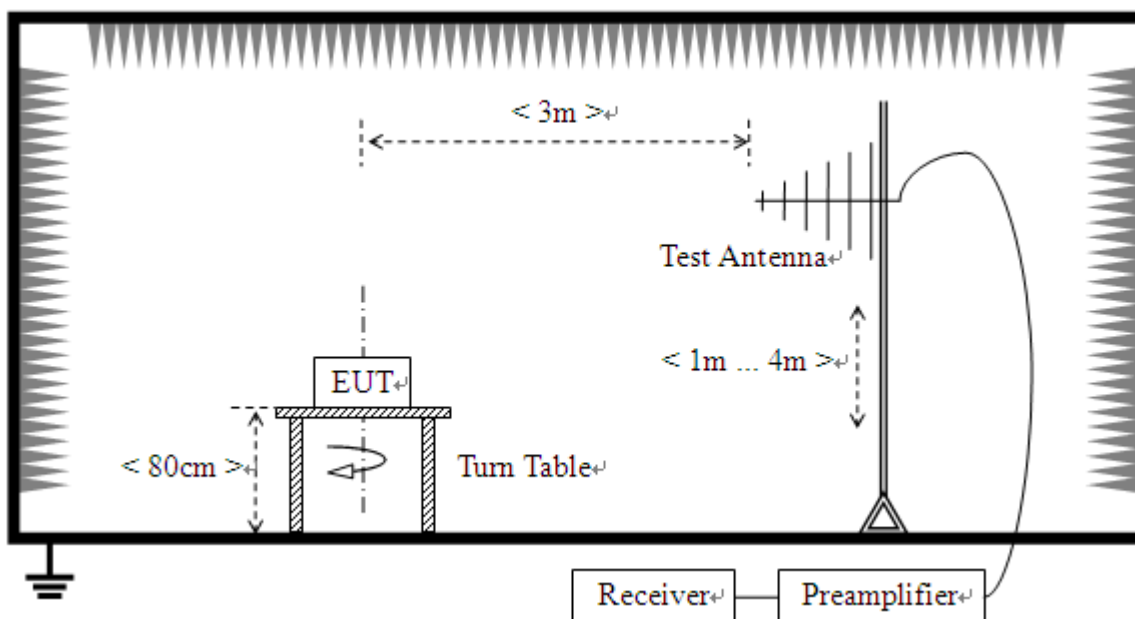
2.9.2. Test Description

Test Setup:

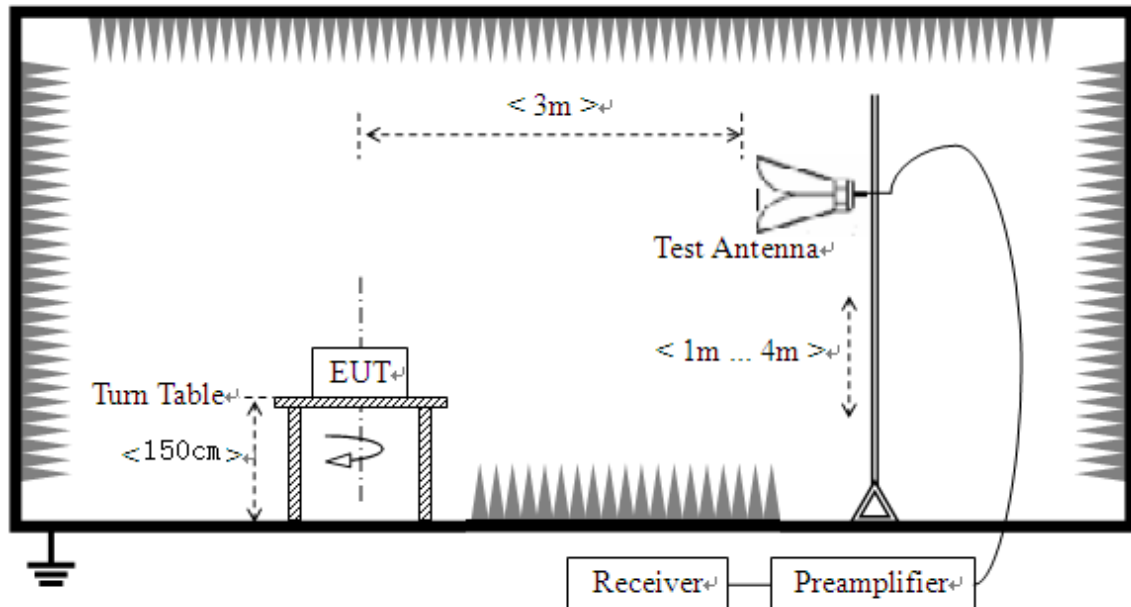
- 1) For radiated emissions from 9kHz to 30MHz



- 2) For radiated emissions from 30MHz to 1GHz



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:

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

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.

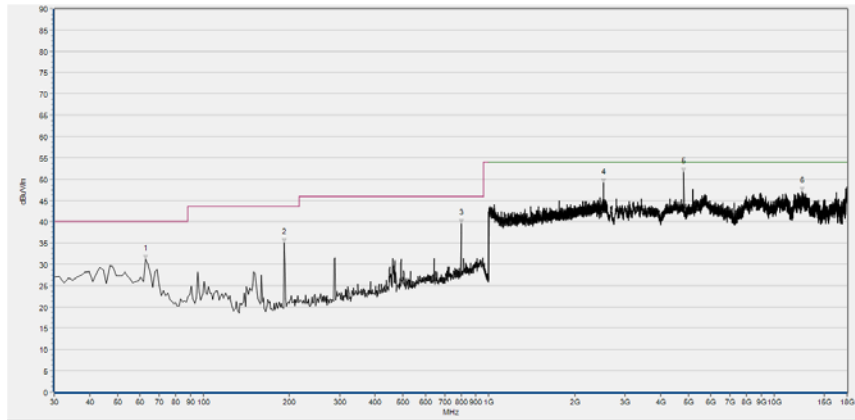
Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note2: For the frequency, which started from 9kHz 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 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

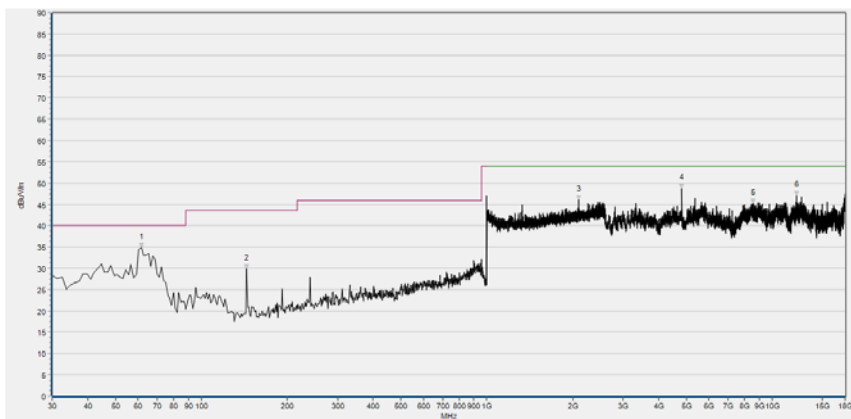
**802.11b Mode**

Plot 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
62.778	31.19	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
191.464	35.10	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
800.901	39.57	N/A	N/A	N/A	46.00	54.00	Horizontal	PASS
2516.126	49.09	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4824.100	51.62	N/A	45.66	74.00	N/A	54.00	Horizontal	PASS
12516.603	47.12	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

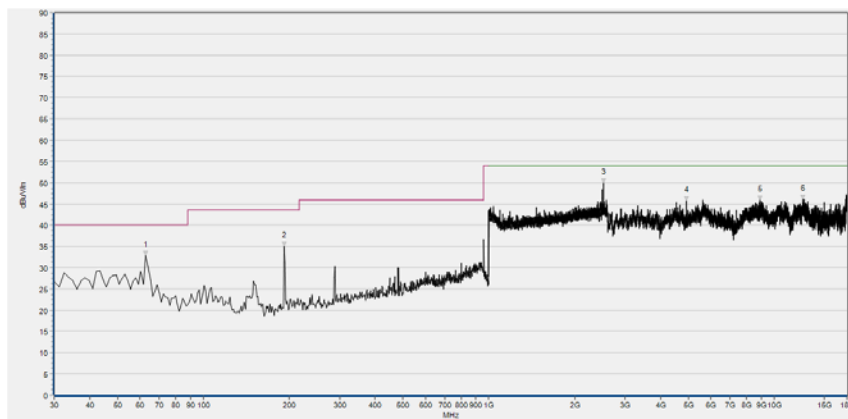


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
61.564	34.87	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	29.89	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2096.118	46.01	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4823.604	48.72	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8567.885	45.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12191.744	47.15	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

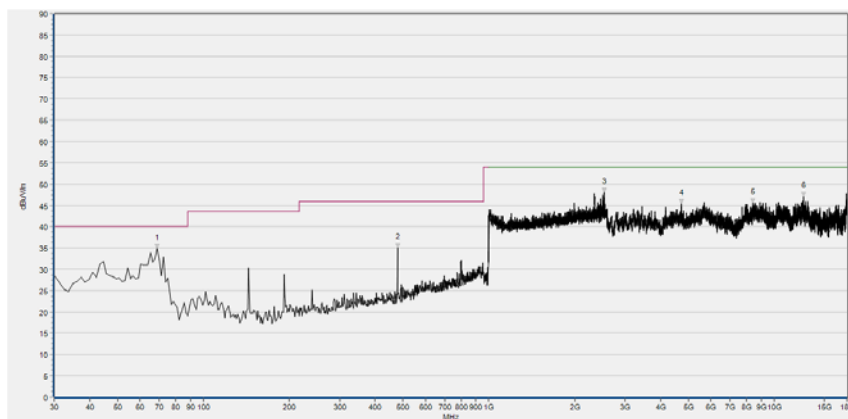


Plot for Channel 6



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
62.778	32.89	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
191.464	35.01	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2521.889	49.89	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4716.423	45.80	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8903.946	46.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12620.222	46.09	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

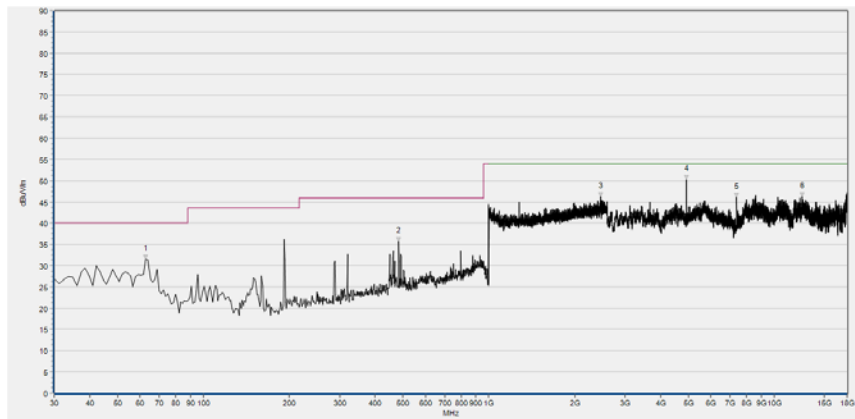


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
68.849	34.83	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
479.186	35.03	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2534.054	48.07	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4719.985	45.45	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8402.655	45.63	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12651.027	47.02	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

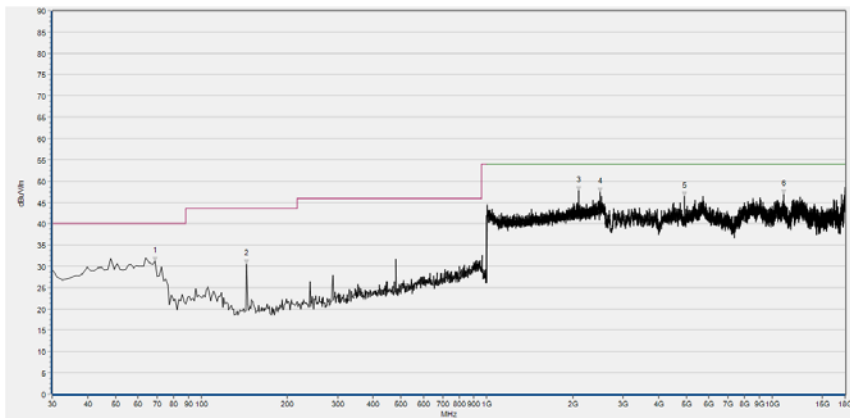


Plot for Channel 11



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
62.778	31.52	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
482.829	35.75	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2461.064	46.34	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4924.423	50.34	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7386.070	46.14	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12547.409	46.26	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

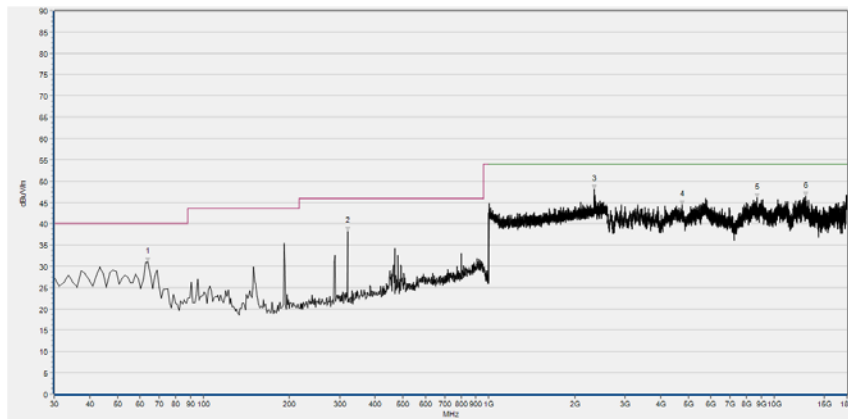


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
68.849	31.09	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	30.55	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2095.478	47.72	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2498.199	47.35	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4924.423	46.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10967.921	46.93	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

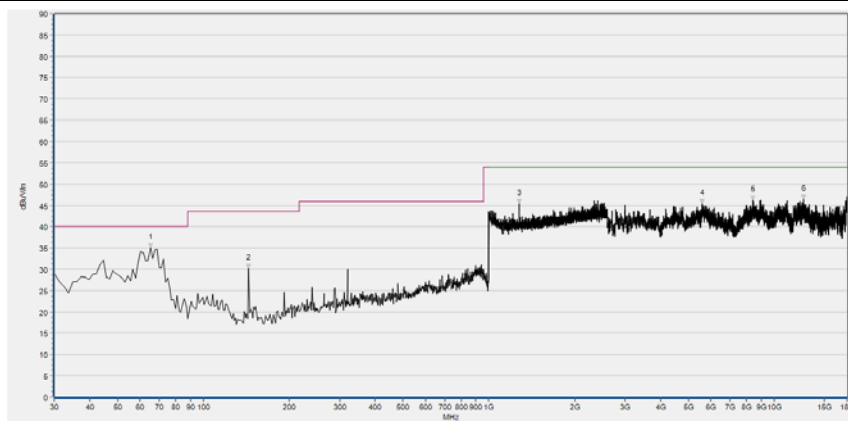
**802.11g Mode**

Plot 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
63.992	31.08	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
320.150	38.25	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2342.617	48.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4745.190	44.37	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8691.107	46.14	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12889.071	46.35	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

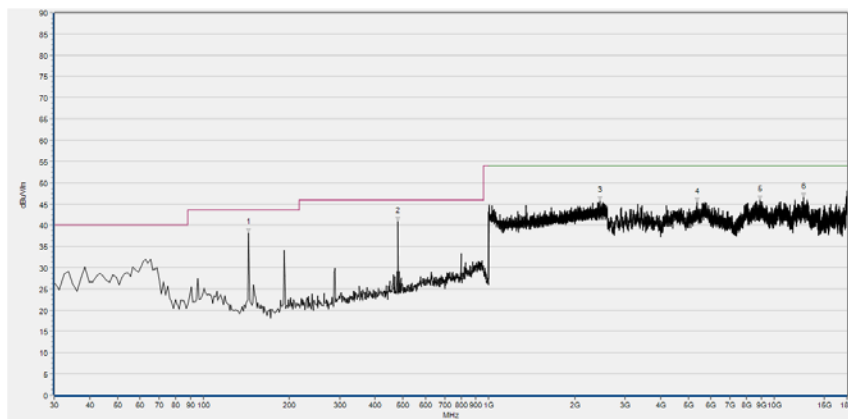


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
65.207	34.97	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	30.11	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1279.792	45.38	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5574.141	45.37	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8422.259	46.18	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12634.224	46.42	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

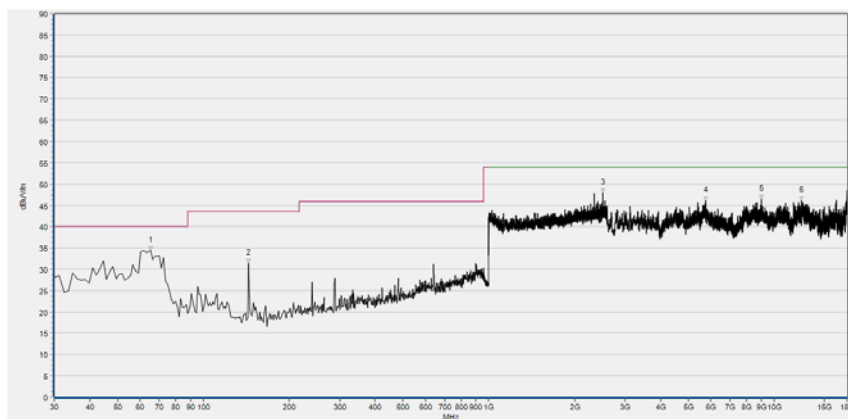


Plot for Channel 6



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
144.118	38.22	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
480.401	40.89	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2451.461	45.70	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5375.305	45.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8923.550	45.98	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12656.628	46.51	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

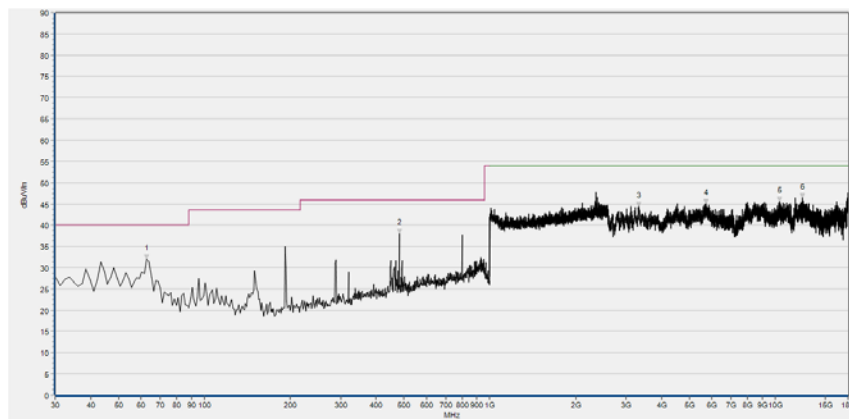


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
65.207	34.31	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	31.42	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2511.645	47.88	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5758.974	46.17	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9029.969	46.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12471.795	46.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

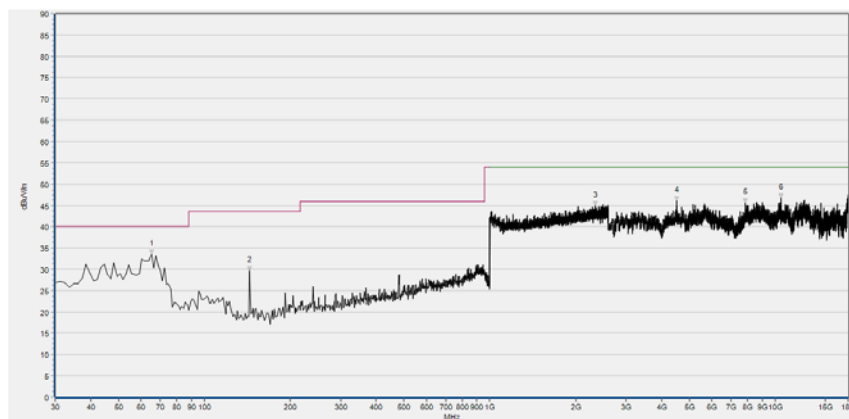


Plot for Channel 11



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
62.778	32.00	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
481.615	38.04	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3328.132	44.40	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5708.565	45.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10360.211	45.64	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12471.795	46.36	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

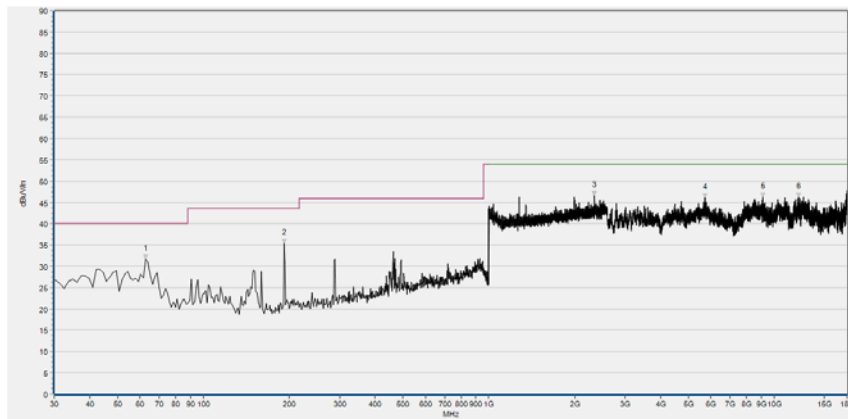


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
65.207	33.52	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	29.59	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2343.257	44.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4501.546	46.08	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7839.753	45.61	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10500.236	46.82	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

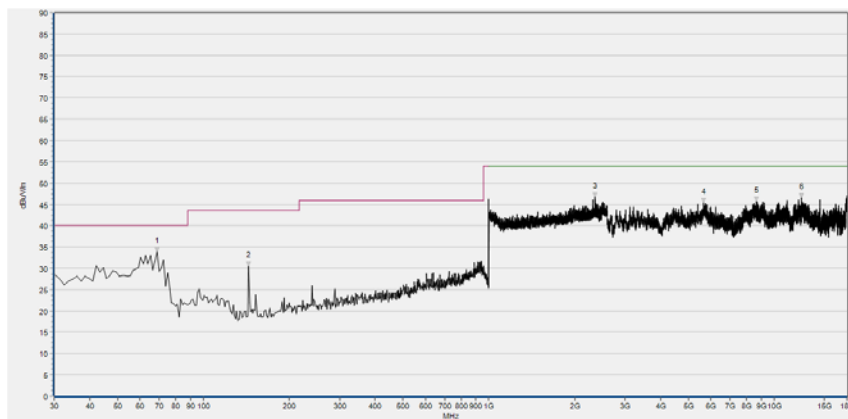
**802.11n (HT20) Mode**

Plot 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
62.778	31.68	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
191.464	35.40	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2345.818	46.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5708.565	46.01	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9105.583	46.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12197.345	46.23	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

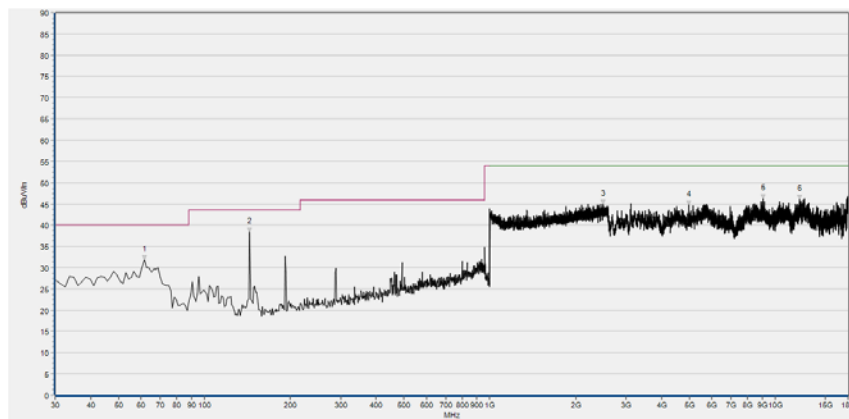


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
68.849	33.90	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	30.50	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2349.660	46.82	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5646.954	45.49	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8677.105	45.74	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12480.196	46.61	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

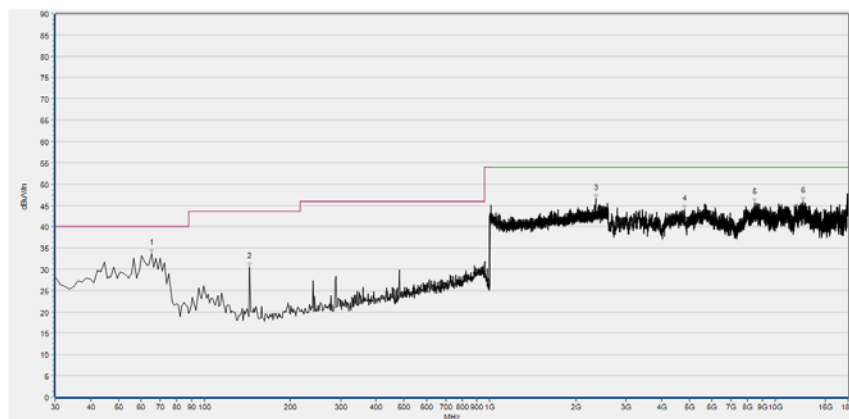


Plot for Channel 6



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
61.564	31.86	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
144.118	38.43	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2490.516	44.85	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4983.233	44.70	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9055.174	46.23	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12152.537	46.09	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

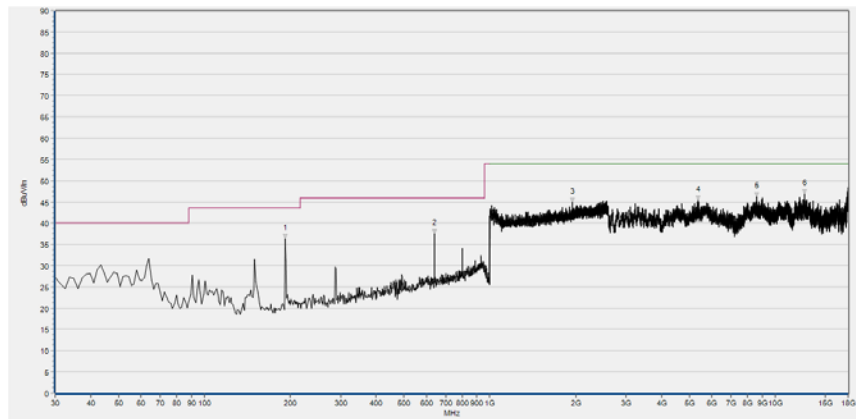


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
65.207	33.68	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	30.52	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2347.099	46.55	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4818.003	44.07	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8450.264	45.53	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12491.398	45.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

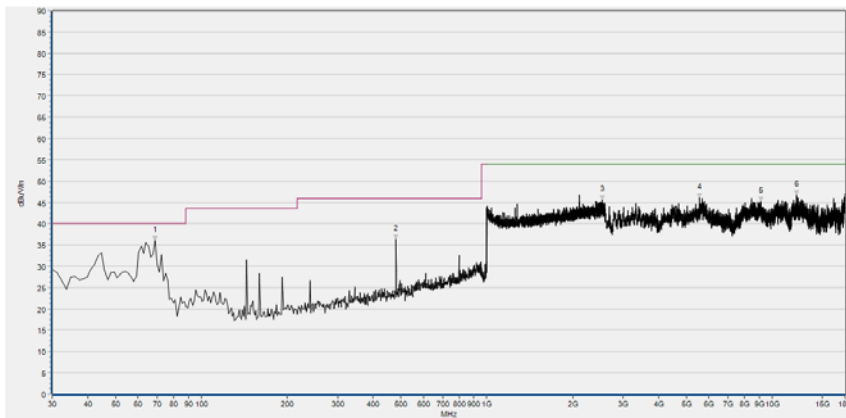


Plot for Channel 11



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
191.464	36.32	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
639.437	37.56	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1948.860	44.94	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5366.903	45.38	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8609.893	46.29	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12665.030	46.89	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

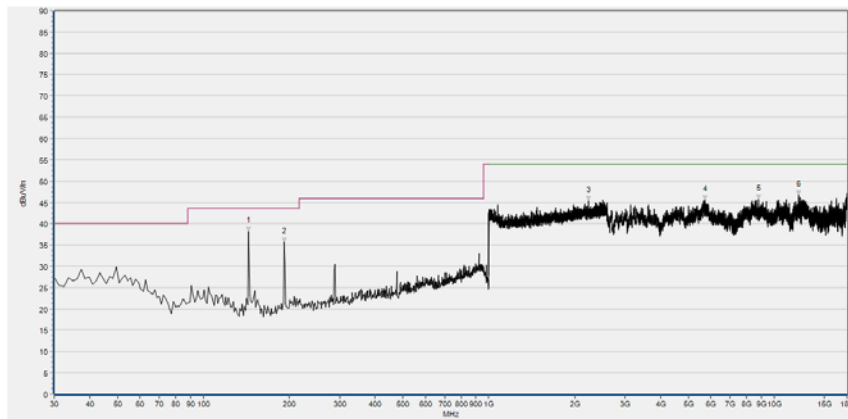


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
68.849	36.04	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
480.401	36.34	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2536.615	45.60	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5568.540	46.01	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9094.381	45.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12186.143	46.72	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

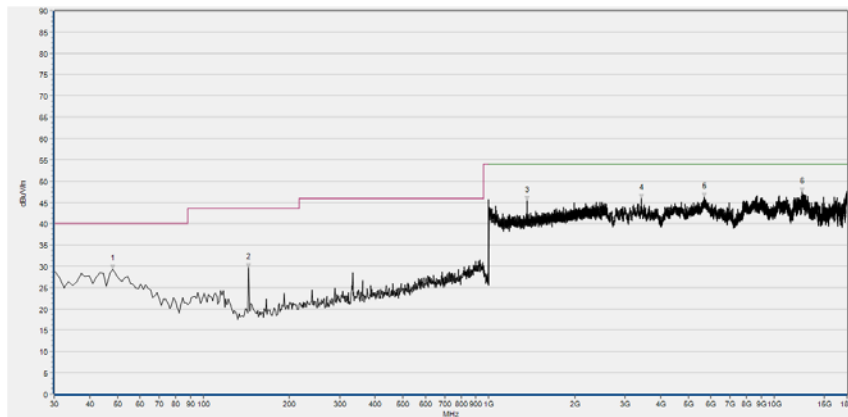
**802.11n (HT40) Mode**

Plot 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
144.118	38.15	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
191.464	35.68	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2236.335	45.41	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5705.765	45.65	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8791.926	45.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12130.133	46.76	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

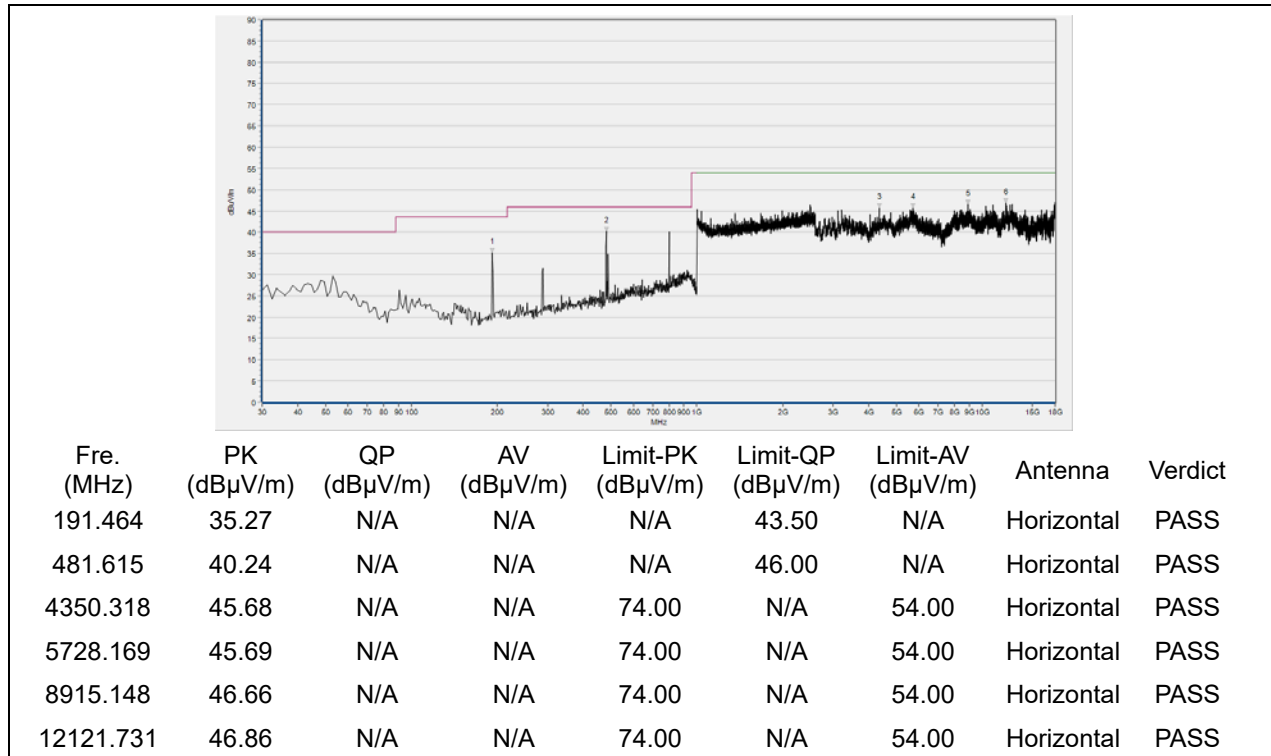
(Antenna Horizontal, 30MHz to 18GHz)



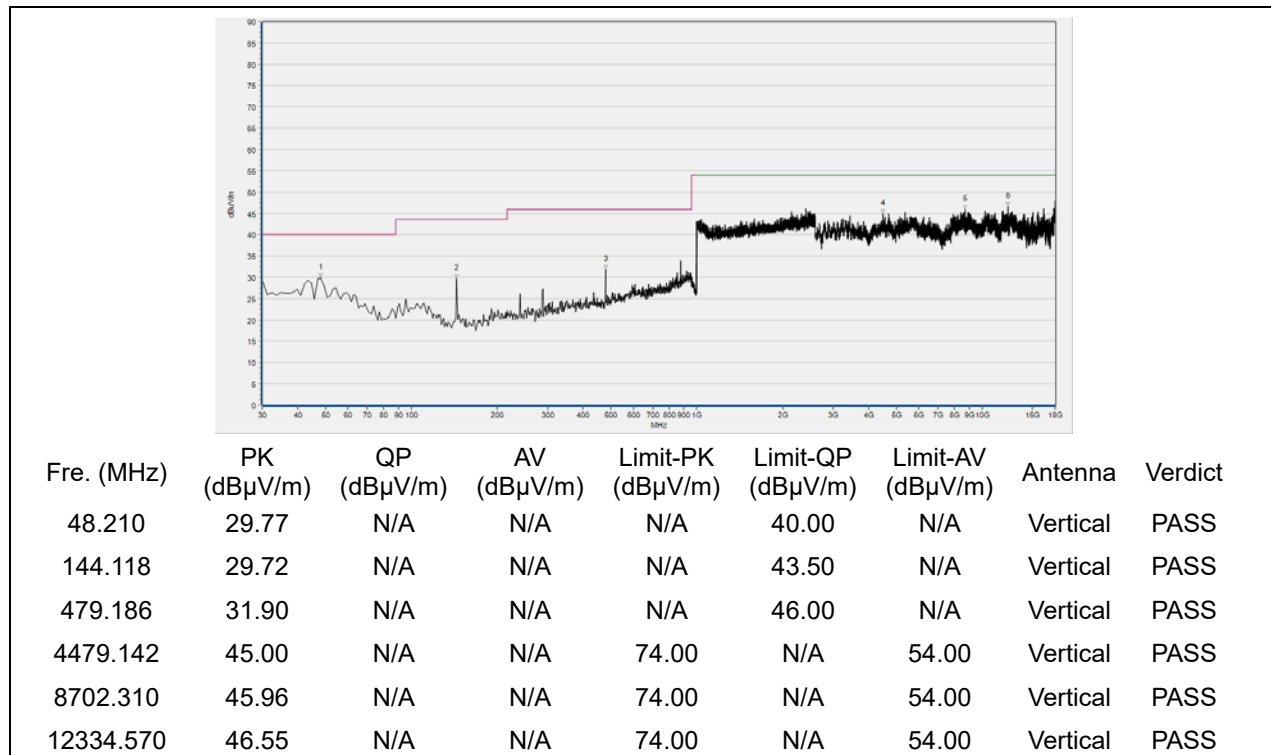
Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.210	29.30	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	29.68	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1359.824	45.44	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3414.948	45.94	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5686.161	46.32	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12555.810	47.39	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 6



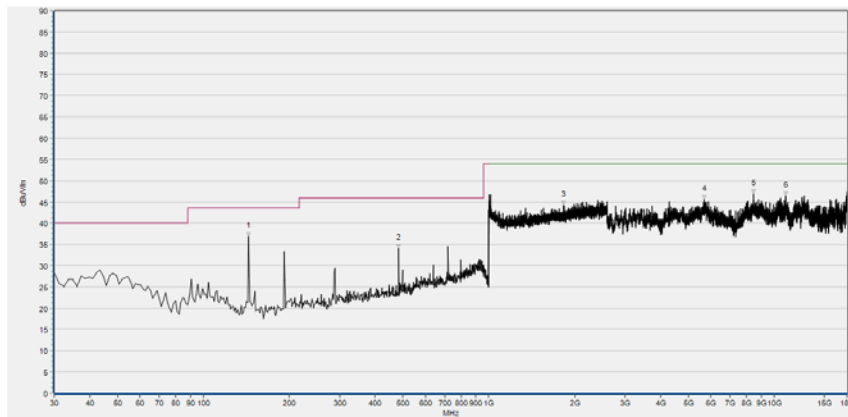
(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)

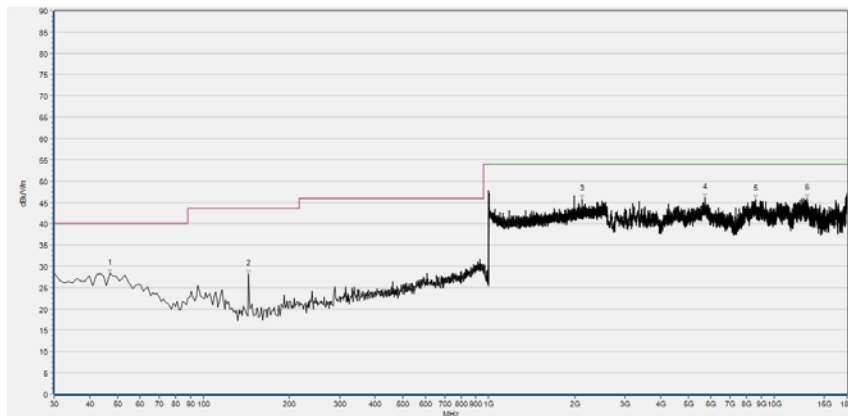


Plot for Channel 9



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
144.118	36.87	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
482.829	34.09	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1829.772	44.18	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5686.161	45.59	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8481.069	46.86	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10976.323	46.35	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)



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
46.996	28.33	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
144.118	28.11	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2118.527	45.78	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5733.770	46.12	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8618.294	45.80	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
13071.104	45.93	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

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	$\pm 2.22\text{dB}$
Power spectral density (PSD)	$\pm 2.22\text{dB}$
Bandwidth	$\pm 5\%$
Conducted Spurious Emission	$\pm 2.77\text{dB}$
Restricted Frequency Bands	$\pm 5\%$
Radiated Emission	$\pm 2.95\text{dB}$
Conducted Emission	$\pm 2.44\text{dB}$

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	Resent	N/A	N/A
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2020.04.01	2021.03.31
USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2020.04.01	2021.03.31
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	2020.03.26	2021.03.25
LISN	812744	NSLK 8127	Schwarzbeck	2020.03.26	2021.03.25
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2020.07.24	2021.07.23
Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A
Adapter	J5164200005	AK933JH	OPPO	N/A	N/A

4.3 List of Software Used

Description	Manufacturer	Software Version
Test system	Townsend	V2.6
Power Panel	Agilent	V3.8
MORLAB EMCR V1.2	MORLAB	V1.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0

**4.4 Radiated Test Equipments**

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY54130016	N9038A	Agilent	2020.07.21	2021.07.20
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2019.02.14	2022.02.13
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2019.07.26	2022.07.25
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	61171/61172	S020180L32 03	Tonscend	2020.07.21	2021.07.20
18-26.5GHz pre-Amplifier	46732	S10M100L38 02	Tonscend	2020.07.21	2021.07.20
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2020.07.21	2021.07.20
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

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