TEST REPORT

APPLICANT	:	BLU Products, Inc.
PRODUCT NAME	:	Smart Phone
MODEL NAME	:	G91 MAX
BRAND NAME	:	BLU
FCC ID	:	YHLBLUG91MX
STANDARD(S)	:	47 CFR Part 15 Subpart E
RECEIPT DATE	:	2021-10-20
TEST DATE	:	2021-10-27 to 2021-11-05
ISSUE DATE	:	2021-11-29

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

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Change History		
Version	Date	Reason for change
1.0	2021-11-29	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	BLU Products, Inc.
Applicant Address:	10814 NW 33rd St # 100 Doral, FL 33172,USA
Manufacturer:	BLU Products, Inc.
Manufacturer Address:	10814 NW 33rd St # 100 Doral, FL 33172,USA

1.2. Equipment Under Test (EUT) Description

Product Name:	Smart Phone	
Sample No.:	13#	
Hardware Version:	KF7F2A	
Software Version:	BLU_G0690WW_V11.0.02.01_GENERIC_20211115_1050	
Modulation Type:	OFDM	
Modulation Mode:	802.11a, 802.11n (HT20), 802.11n (HT40) 802.11ac (VHT20), 802.11ac (VHT40), 802.11ac (VHT80),	
Operating Frequency Range:	5180MHz–5240MHz; 5745MHz-5825MHz	
Channel Number:	Refer to 1.3	
Antenna Type:	PIFA Antenna	
Antenna Gain:	0.70dBi	
Accessory Information:	Battery	
	Brand Name:	BLU
	Model No.:	C906249490P
	Serial No.:	N/A
	Capacity:	4900mAh
	Rated Voltage:	3.87V
	Charge Limit:	4.45V
	Manufacturer:	Shenzhenshi jiuliyuan electronic technology Co.,Ltd

Accessory Information:	AC Adapter	
	Brand Name:	BLU
	Model No.:	US-KB-2000
	Serial No.:	N/A
	Rated Output:	3.6-6V⎓3000mA 6-9V⎓2000mA 9-12V⎓1500mA
	Rated Input:	100-240V~50/60Hz, 0.6A
	Manufacturer:	Shenzhen Tianyin Electronics Co.,Ltd

Note 1: WiFi hotspot only support U-NII-1 and U-NII-3 band.

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
OFDM (802.11a)	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
OFDM (802.11ac)	BPSK	**6.5**
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65
	256QAM	78

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

(U-NII-1) 5180MHz-5240MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	**36**	**5180**	40	5200
	44	**5220**	**48**	**5240**
40MHz	**38**	**5190**	**46**	**5230**
80MHz	**42**	**5210**		
(U-NII-3) 5745MHz-5825MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	**149**	**5745**	153	5765
	157	**5785**	161	5805
	165	**5825**		
40MHz	**151**	**5775**	**159**	**5795**
80MHz	**155**	**5775**		

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 E (U-NII band) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15(5-1-14 Edition)	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	ANSI C63.10	Duty Cycle of the Test Signal	Oct 27, 2021	Meng Shurui	PASS	No deviation
3	15.407(a)	Maximum Conducted Output Power	Nov 05, 2021	Meng Shurui	PASS	No deviation
4	15.407(a)(e)	Emission Bandwidth	Nov 05, 2021	Meng Shurui	PASS	No deviation
5	15.407(a)	Peak Power Spectral Density	Nov 05, 2021	Meng Shurui	PASS	No deviation
6	15.407(g)	Frequency Stability	Nov 05, 2021	Meng Shurui	PASS	No deviation
7	15.207	Conducted Emission	Oct 29, 2021	Su Zhan	PASS	No deviation
8	15.407(b)	Restricted Frequency Bands	Nov 03, 2021	Huang Zhiye	PASS	No deviation
9	15.407(b)	Radiated Emission	Nov 04, 2021	Huang Zhiye	PASS	No deviation

Note 1: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.102013.

Note 2: These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 v02r01.

Note 3: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 12.0dB contains two parts that cable loss 1.0dB and

Attenuator 10dB. **Note 4:** 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 5:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

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 15E 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

Inside of the EUT has a PIFA antenna coupled with the metal shrapnel. Please refer to the EUT internal photos.

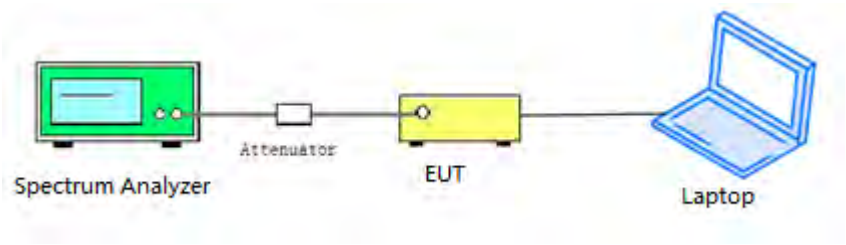
2.2. Duty Cycle of the Test Signal

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 sub clause, 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

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.

2.2.3. Test Procedure

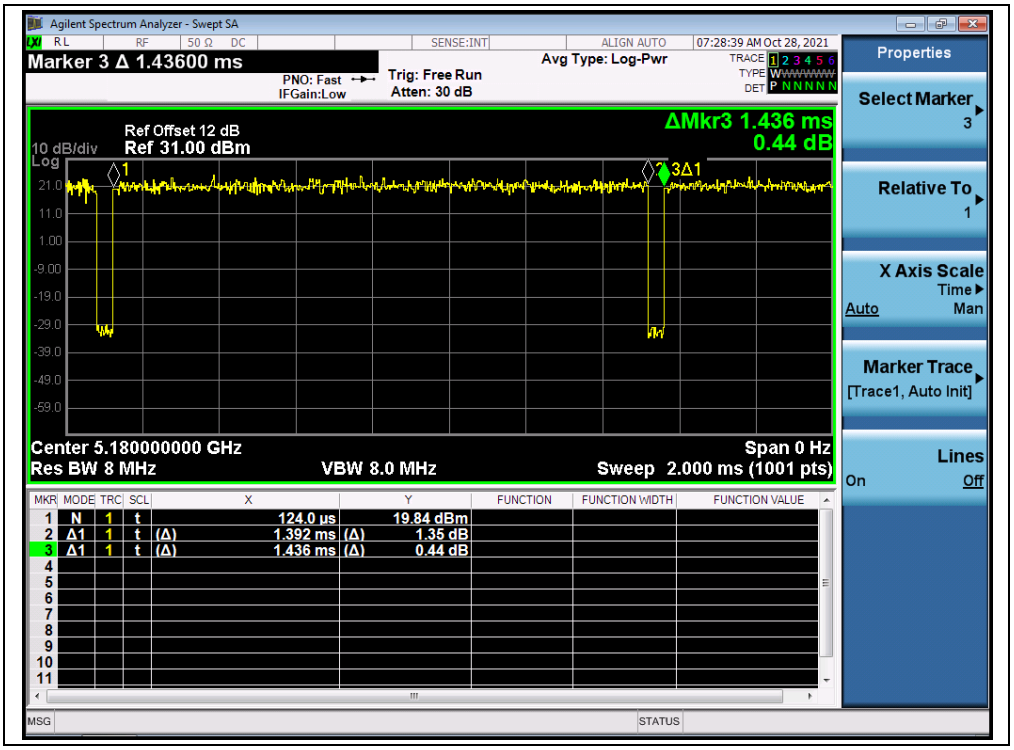
KDB 789033 Section B was used in order to prove compliance.

2.2.4. Test Result

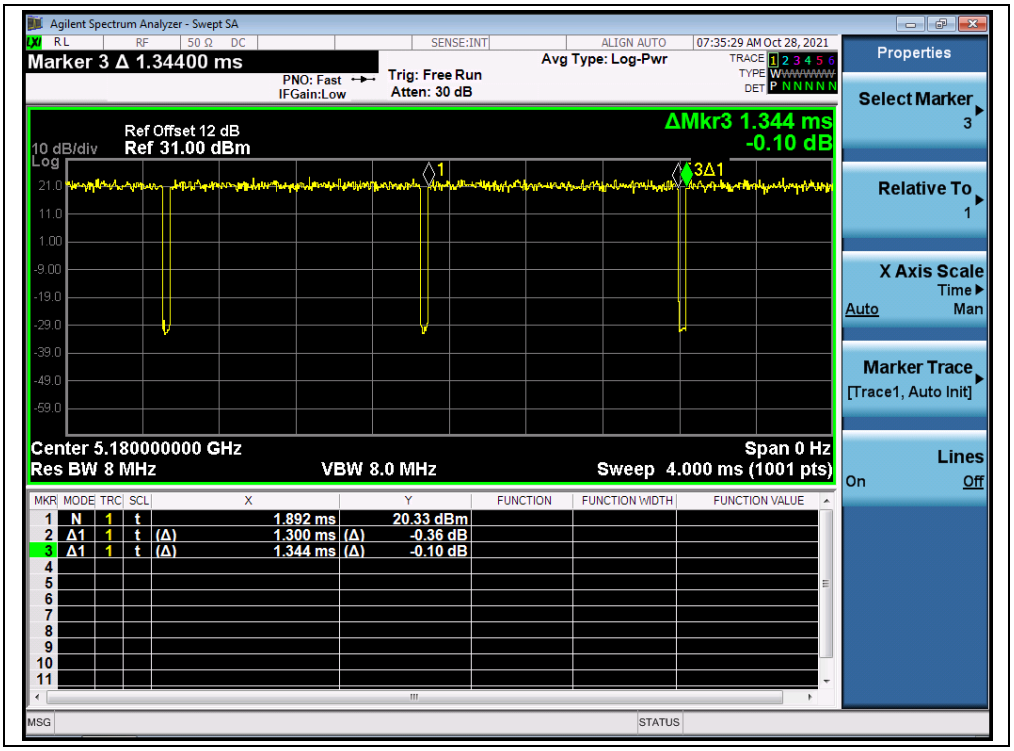
A.Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*log[1/D])
802.11a	96.53	0.15
802.11n (HT20)	97.01	0.13
802.11n (HT40)	94.20	0.26
802.11ac(VHT20)	97.06	0.13
802.11ac(VHT40)	92.86	0.32
802.11ac(VHT80)	86.49	0.63

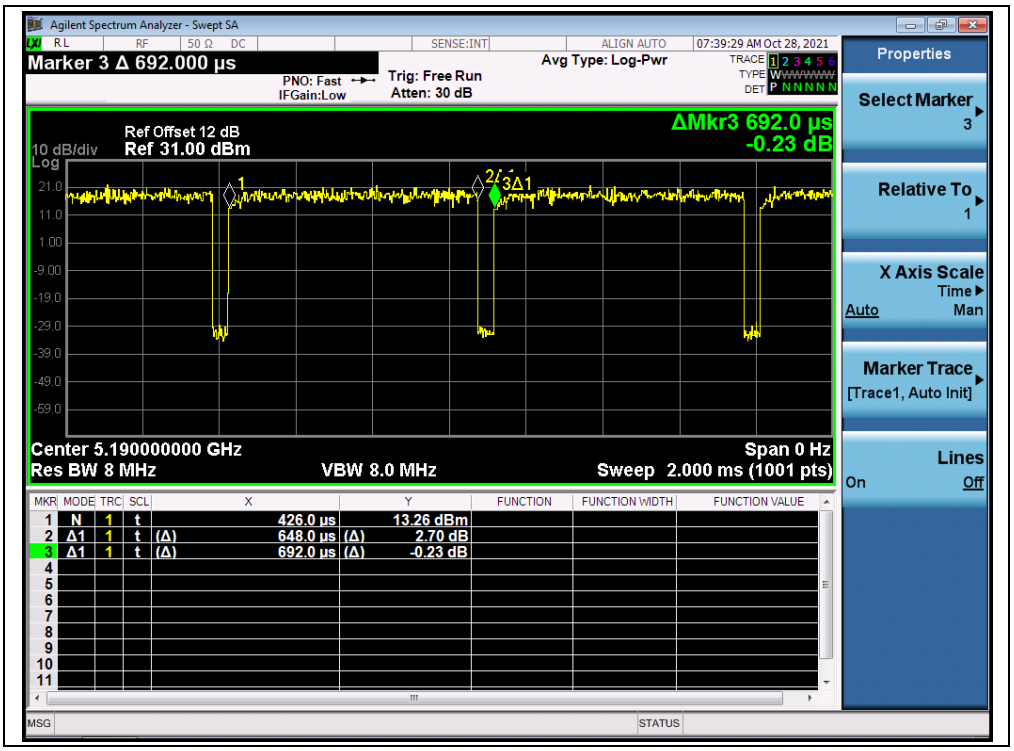
B.Test Plot:



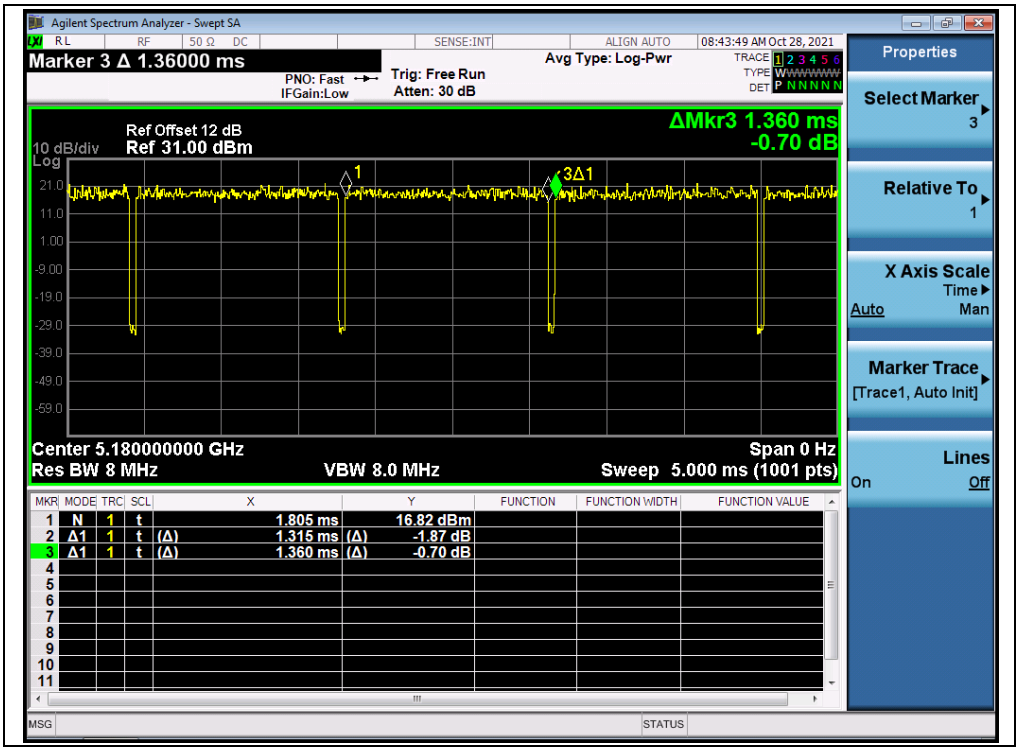
(Channel 36, 5180MHz, 802.11a)



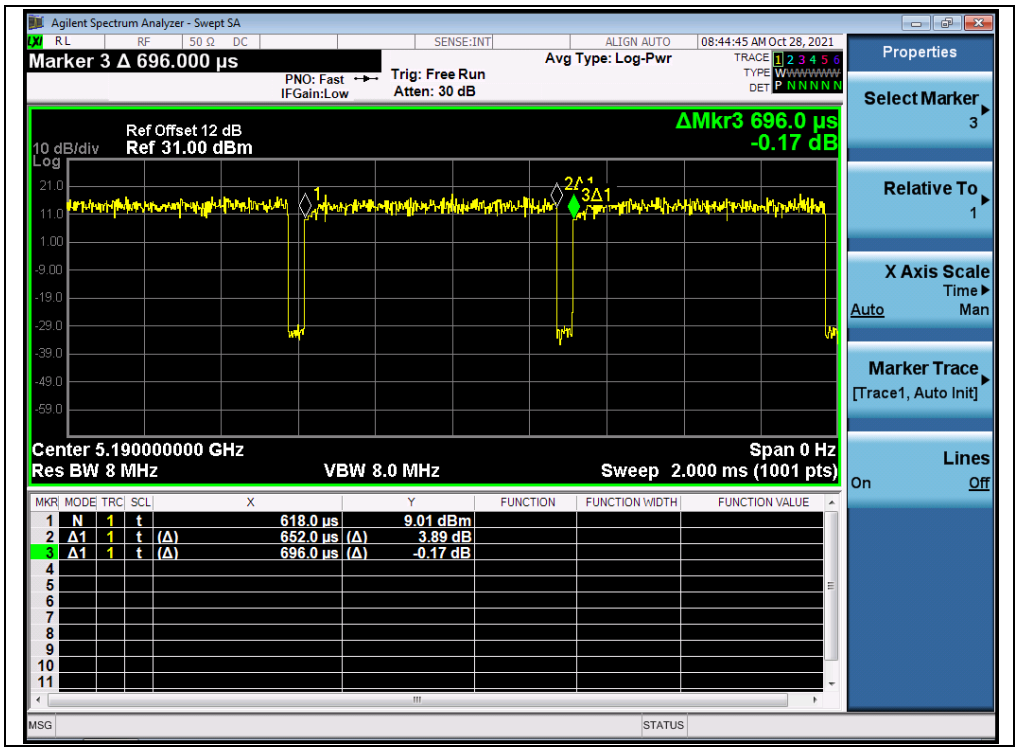
(Channel 36, 5180MHz, 802.11n (HT20))



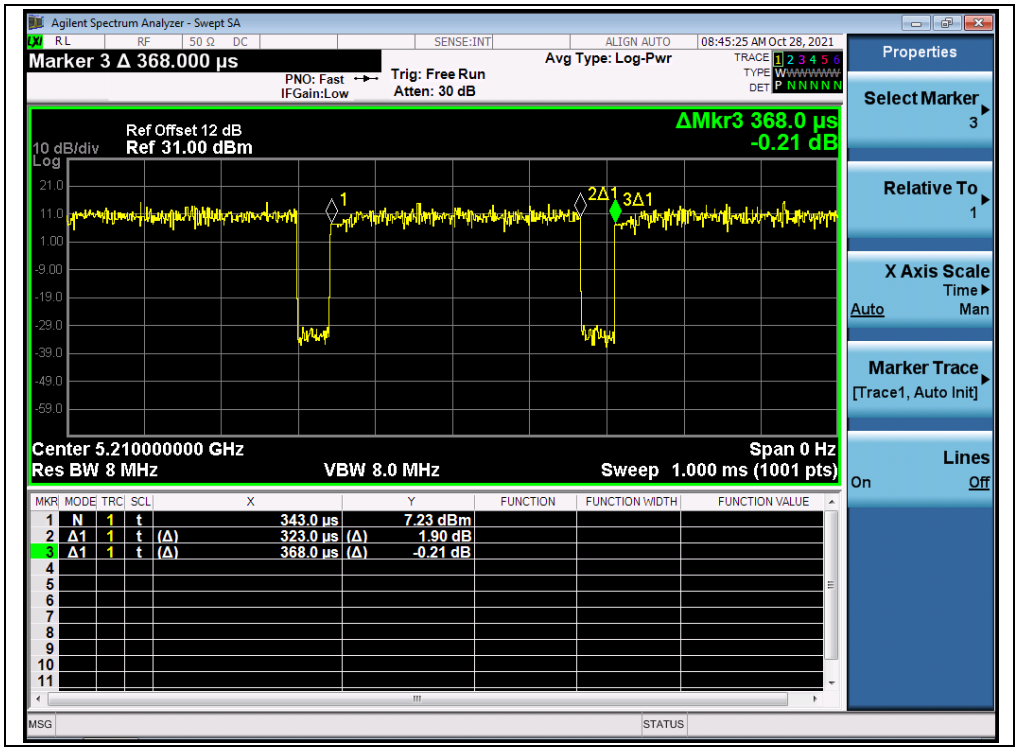
(Channel 38, 5190MHz, 802.11n (HT40))



(CH36_5180MHz _802.11ac (VHT20))



(CH38_5190MHz _802.11ac (VHT40))



(CH42_5210MHz _802.11ac (VHT80))

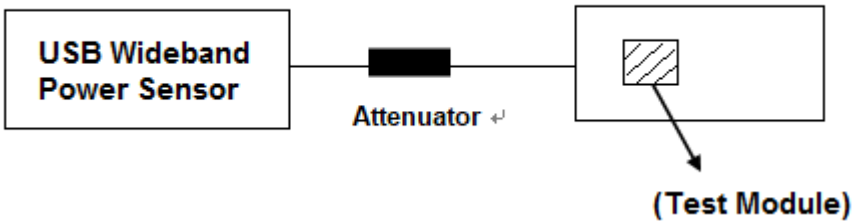
2.3. Maximum Conducted Output Power

2.3.1. Requirement

(1) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi.
(2)For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.
(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = G_{ANT} +10log(N_{ANT})dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

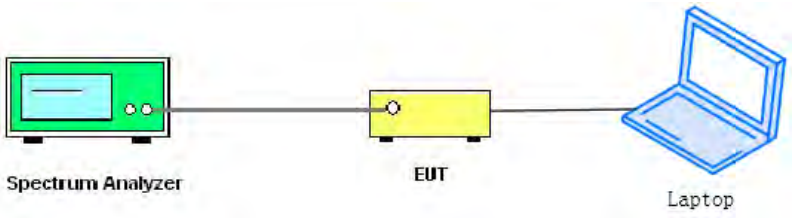
2.3.2. Test Description

Section E) 3) of KDB 789033 defines a methodology using a USB Wideband Power Sensor.
Test Setup:



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

For ac (VHT80) mode power



The EUT (Equipment under the test) 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, all test result in Spectrum analyzer.

2.3.3. Test Result

Maximum Average Conducted Output Power

802.11a Mode

Channel	Frequency (MHz)	Average Power (dBm)				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
36	5180	15.01	0.15	15.16	0.033	24	0.25	PASS
44	5220	15.35		15.50	0.035			
48	5240	15.62		**15.77**	**0.038**			
149	5745	15.51		15.66	0.037	30	1	
157	5785	15.47		15.62	0.036			
165	5825	15.40		15.55	0.036			

802.11n (HT20) Mode

Channel	Frequency (MHz)	Average Power (dBm)				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
36	5180	14.77	0.13	14.90	0.031	24	0.25	PASS
44	5220	15.14		15.27	0.034			
48	5240	15.31		**15.44**	**0.035**			
149	5745	15.15		15.28	0.034	30	1	
157	5785	14.89		15.02	0.032			
165	5825	14.91		15.04	0.032			

802.11n (HT40) Mode

Channel	Frequency (MHz)	Average Power				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
38	5190	14.64	0.26	14.90	0.031	24	0.25	PASS
46	5230	14.87		**15.13**	**0.033**			
151	5755	14.73		14.99	0.032	30	1	
159	5795	14.50		14.76	0.030			

802.11ac (VHT20) Mode

Channel	Frequency (MHz)	Average Power (dBm)				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
36	5180	11.82	0.13	11.95	0.016	24	0.25	PASS
44	5220	12.07		12.20	0.017			
48	5240	12.10		**12.23**	**0.017**			
149	5745	11.92		12.05	0.016	30	1	
157	5785	11.70		11.83	0.015			
165	5825	11.64		11.77	0.015			

802.11ac (VHT40) Mode

Channel	Frequency (MHz)	Average Power				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
38	5190	11.48	0.32	11.80	0.015	24	0.25	PASS
46	5230	11.75		**12.07**	**0.016**			
151	5755	11.62		11.94	0.016	30	1	
159	5795	11.46		11.78	0.015			

802.11ac (VHT80) Mode

Channel	Frequency (MHz)	Average Power				Limit (dBm)		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
42	5210	11.36	0.63	**11.99**	**0.016**	24	0.25	PASS
155	5775	11.18		11.81	0.015	30	1	

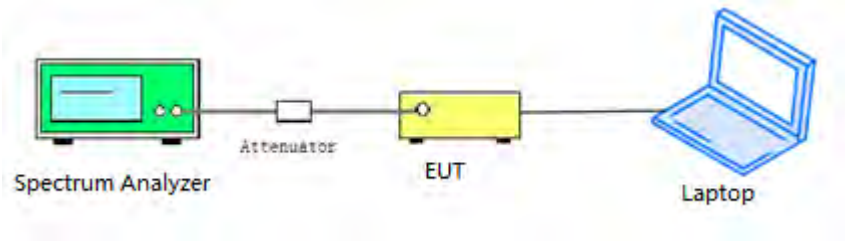
2.4. Emission Bandwidth

2.4.1. Requirement

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement. Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices 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 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.4.3. Test Procedure

1. KDB 789033 Section C) 1) Emission Bandwidth was used in order to prove compliance
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
2. KDB 789033 Section C) 2) minimum emission bandwidth for the band 5.725-5.85GHz was used in order to prove compliance.
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for theband5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.
b) Set video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

2.4.4. Test Result

802.11a Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	20.13
44	5220	20.00
48	5240	20.14
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
149	5745	15.03
157	5785	14.38
165	5825	14.42

B.Test Plot:

(Channel 36, 5180MHz, 802.11a)

(Channel 44, 5220 MHz, 802.11a)

(Channel 48, 5240MHz, 802.11a)

(Channel 149,5745MHz, 802.11a)

(Channel 157,5785MHz, 802.11a)

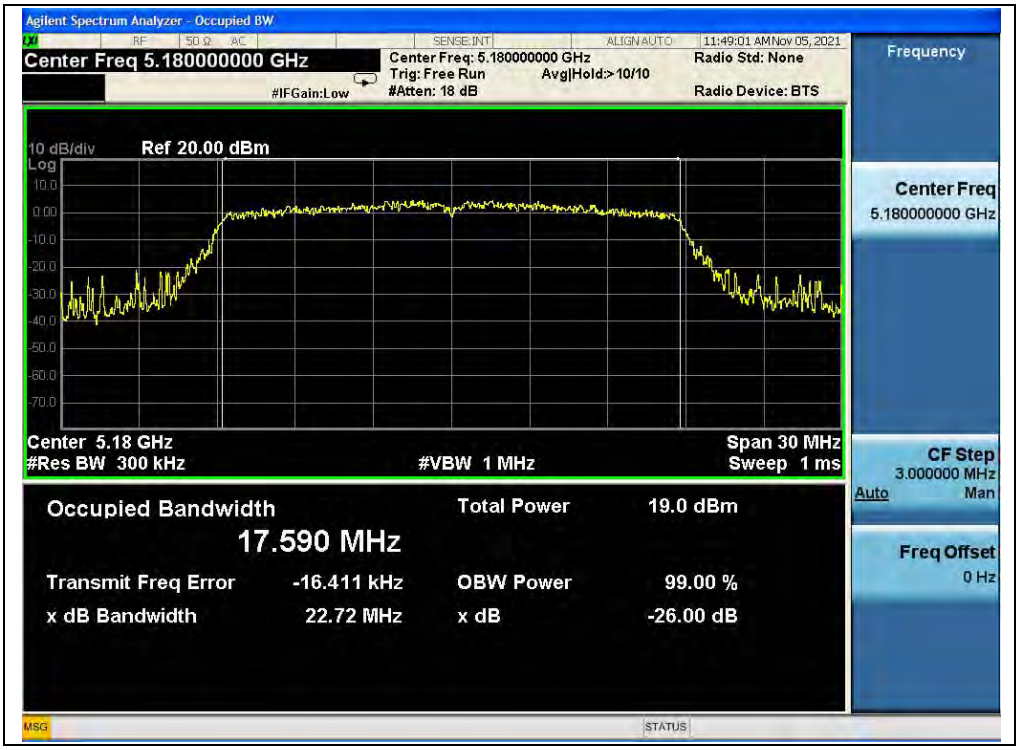
(Channel 165, 5825MHz, 802.11a)

802.11n (HT20) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	22.72
44	5220	20.24
48	5240	20.22
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
149	5745	17.56
157	5785	15.08
165	5825	14.42

B.Test Plot:



(Channel 36, 5180MHz, 802.11n (HT20))

(Channel 44, 5220MHz, 802.11n (HT20))

(Channel 48, 5240MHz, 802.11n (HT20))

(Channel 149, 5745MHz, 802.11 n (HT20))

(Channel 157, 5785MHz, 802.11 n (HT20))

(Channel 165, 5825MHz, 802.11 n (HT20))

802.11n (HT40) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	40.67
46	5230	40.05
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
151	5755	32.56
159	5795	35.07

B.Test Plot:

(Channel 38, 5190MHz, 802.11n (HT40))

(Channel 46, 5230MHz, 802.11n (HT40))

(Channel 151, 5755MHz, 802.11n (HT40))

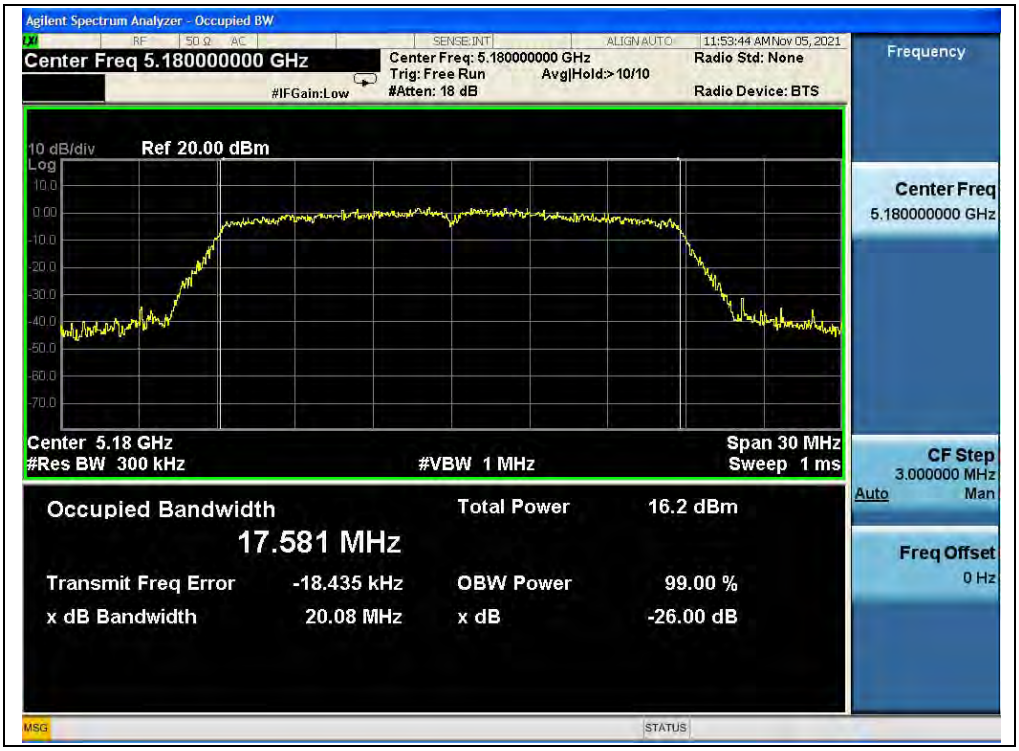
(Channel 159, 5795MHz, 802.11n (HT40))

802.11ac (VHT20) Mode

A.Test Verdict:

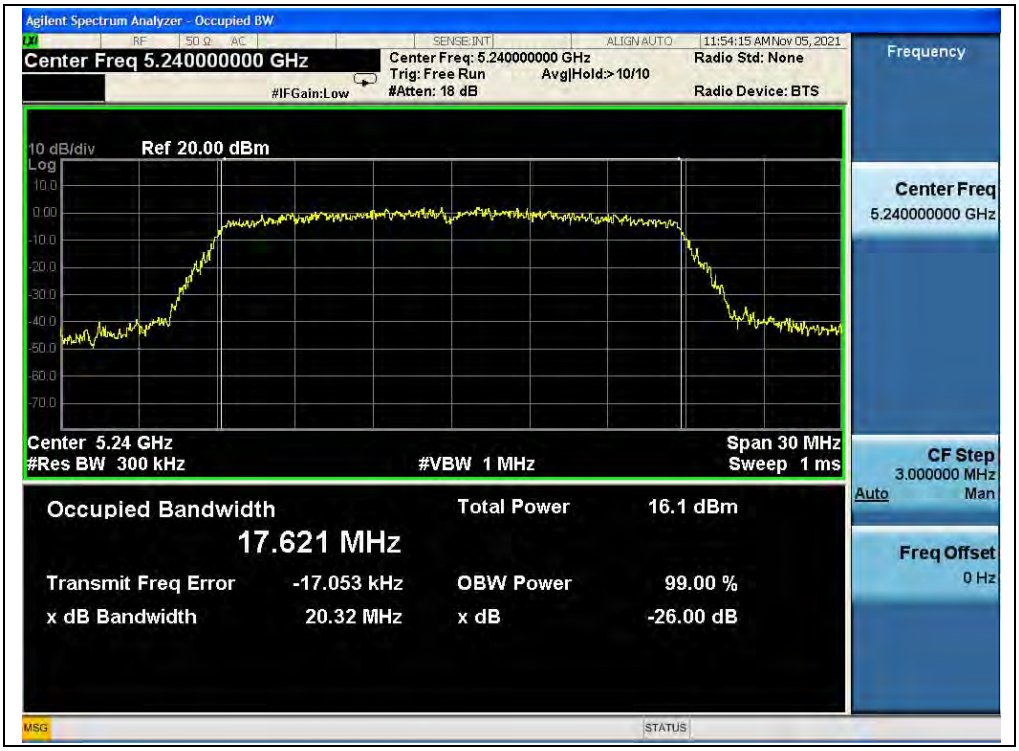
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	20.08
44	5220	20.24
48	5240	20.32
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
149	5745	14.38
157	5785	15.10
165	5825	12.63

B.Test Plot:



(Channel 36, 5180MHz, 802.11ac (VHT20))

(Channel 44, 5220 MHz, 802.11ac (VHT20))



(Channel 48, 5240MHz, 802.11ac (VHT20))

(Channel 149, 5745MHz, 802.11ac (VHT20))

(Channel 157, 5785MHz, 802.11ac (VHT20))

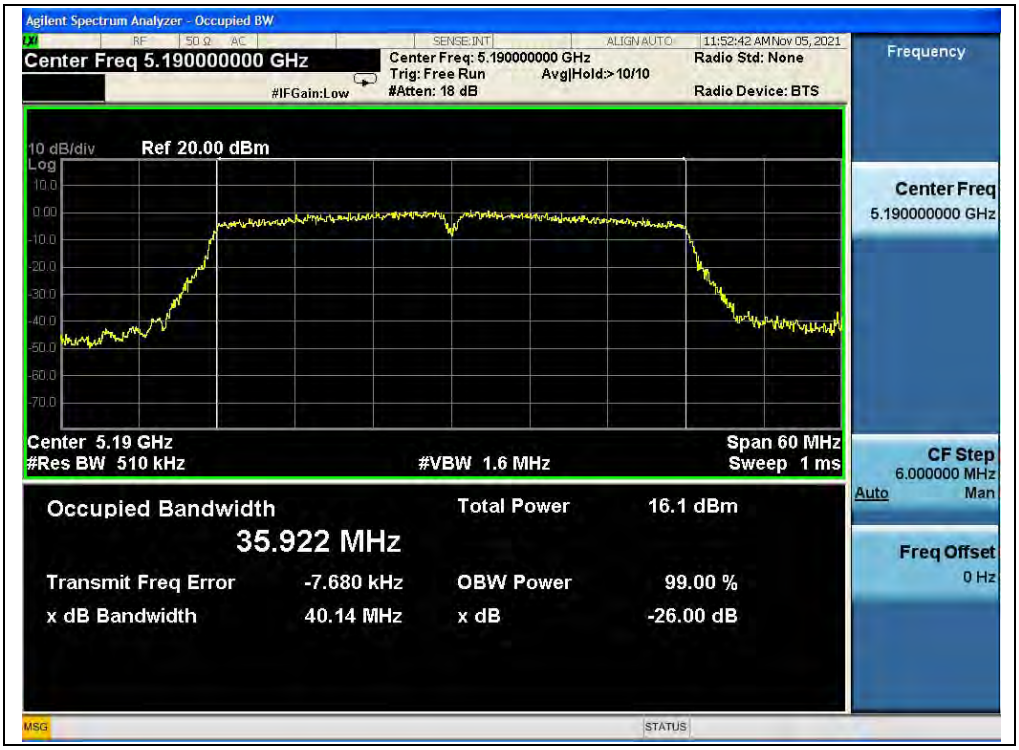
(Channel 165, 5825MHz, 802.11ac (VHT20))

802.11ac (VHT40) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	40.14
46	5230	40.19
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
151	5755	35.03
159	5795	35.03

B.Test Plot:



(Channel 38, 5190MHz, 802.11ac (VHT40))

(Channel 46, 5230 MHz, 802.11ac (VHT40))

(Channel 151, 5755 MHz, 802.11ac (VHT40))

(Channel 159, 5795MHz, 802.11ac (VHT40))

802.11ac (VHT80) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	80.74
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
155	5775	73.95

B.Test Plot:

(Channel 42, 5210MHz, 802.11ac (VHT80))

(Channel 155, 5775 MHz, 802.11ac (VHT80))

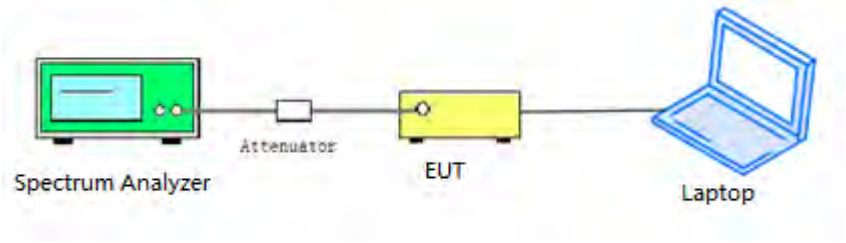
2.5. Peak Power Spectral Density

2.5.1. Requirement

(1)For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.
(2)For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.
(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30dBm in any 500kHz band.
If transmitting antennas of directional gain greater than 6dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = G_{ANT} +10log(N_{ANT}) dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

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.

2.5.3. Test Procedure

KDB 789033 Section F) Maximum Power Spectral Density (PSD) Method SA-1 was used in order to prove compliance

1) Set span to encompass the entire 26-dB emission bandwidth
2) Set RBW = 1MHz. Set VBW ≥ 3MHz
3) Number of points in sweep ≥ 2 Span / RBW. Sweep time = auto
4) Detector = Average
5) Trace mode=Max hold
6) Record the max value

2.5.4. Test Result

802.11a Mode

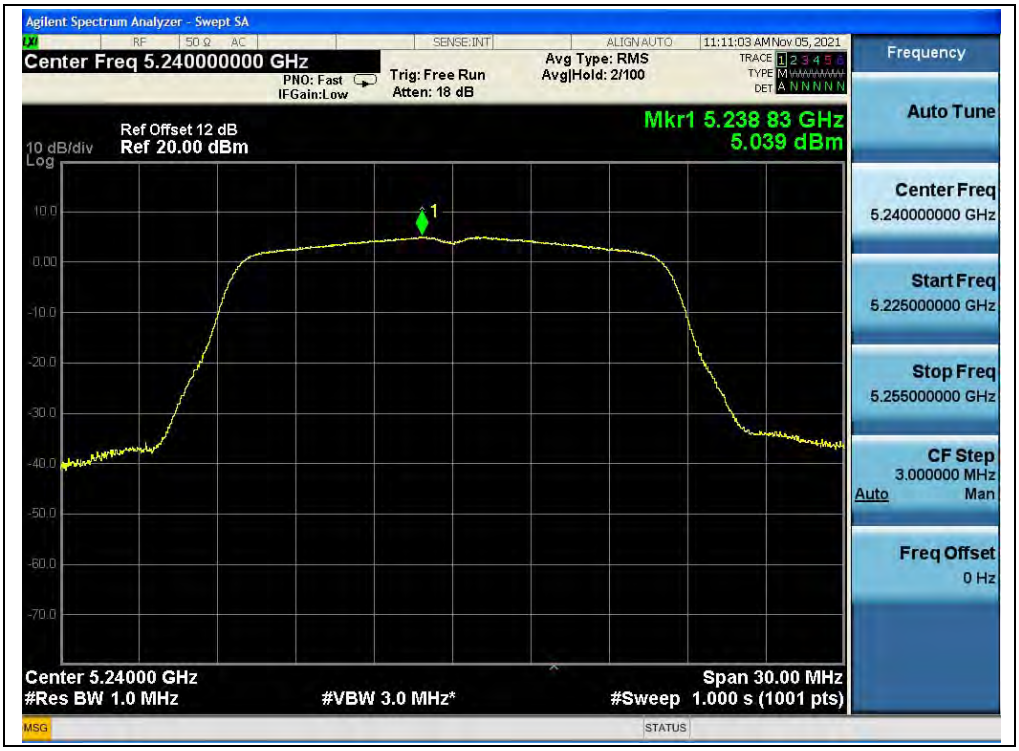
A.Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	5.19	0.15	5.34	11	PASS
44	5220	4.94		5.09		
48	5240	5.04		5.19		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	2.18	0.15	2.33	30	PASS
157	5785	2.33		2.48		
165	5825	1.76		1.91		

B.Test Plot:

(Channel 36, 5180MHz, 802.11)

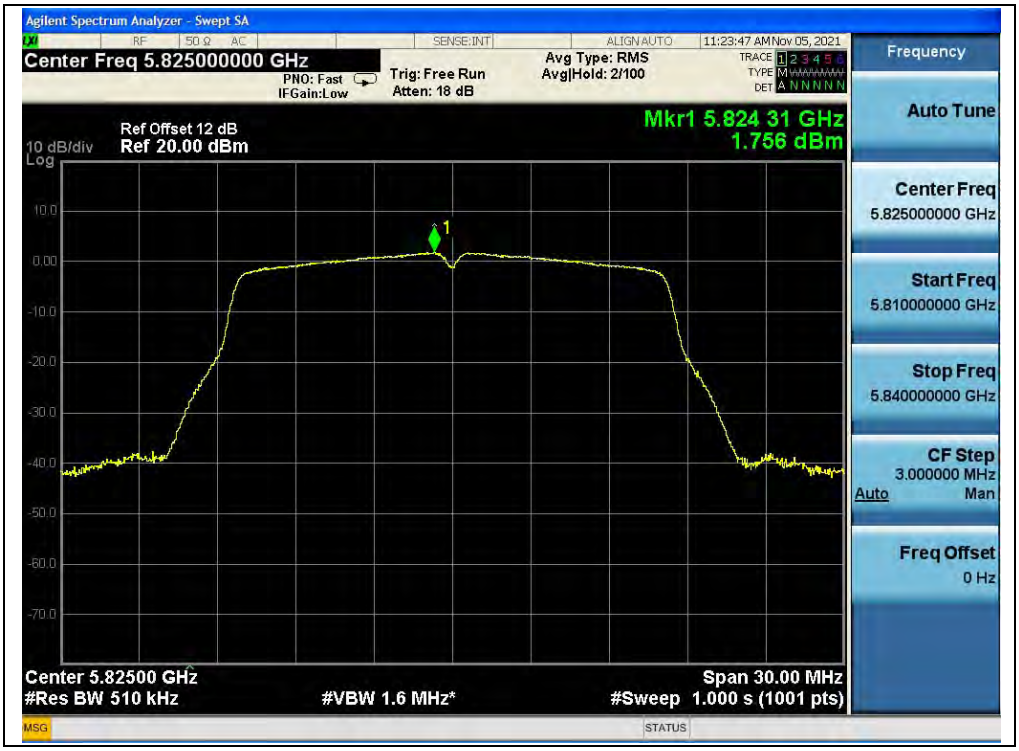
(Channel 44, 5220MHz, 802.11a)



(Channel 48, 5240MHz, 802.11a)

(Channel 149, 5745MHz, 802.11a)

(Channel 157, 5785MHz, 802.11a)



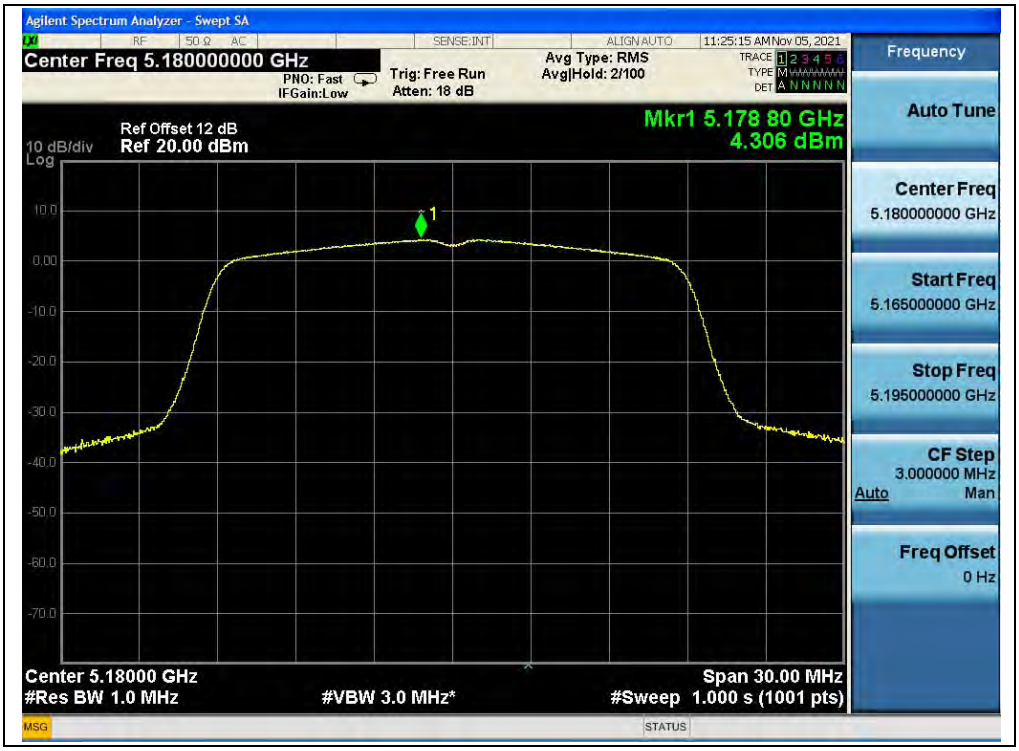
(Channel 165, 5825MHz, 802.11a)

802.11n (HT20) Mode

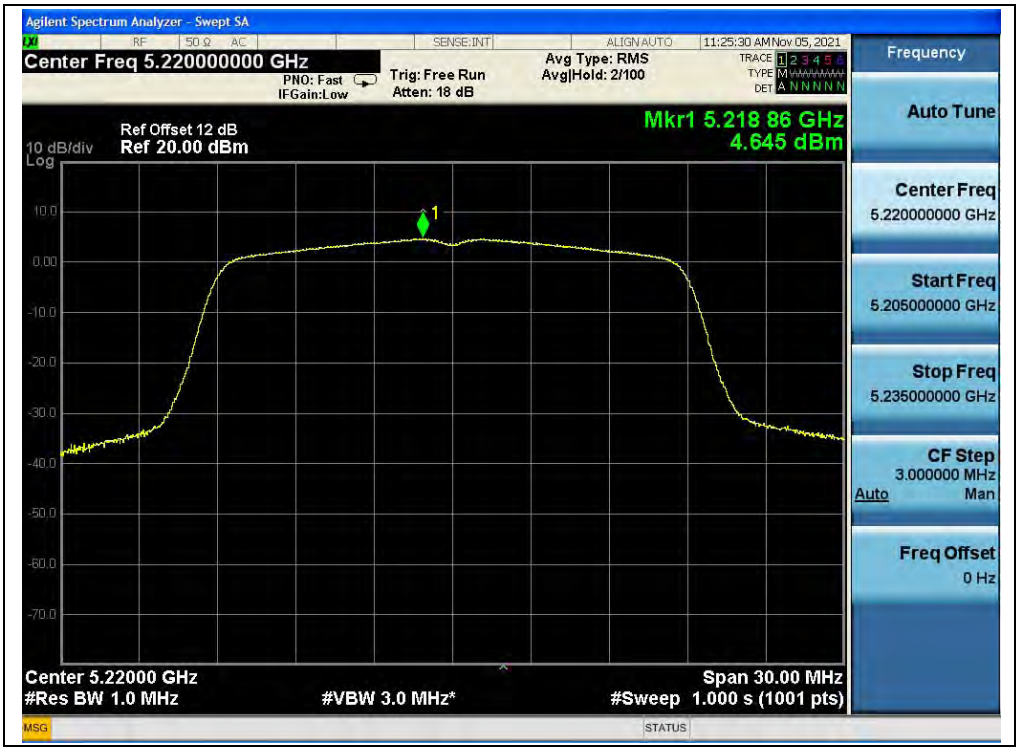
A.Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	4.31	0.13	4.44	11	PASS
44	5220	4.65		4.78		
48	5240	4.62		4.75		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	1.78	0.13	1.91	30	PASS
157	5785	1.52		1.65		
165	5825	1.41		1.54		

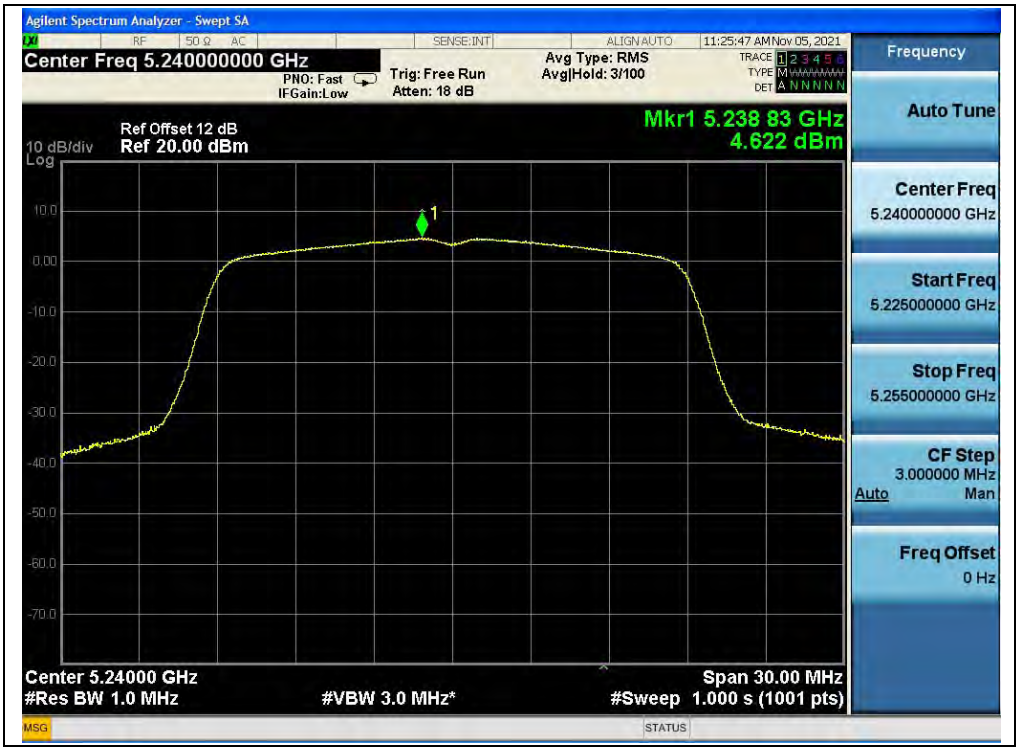
B.Test Plot:



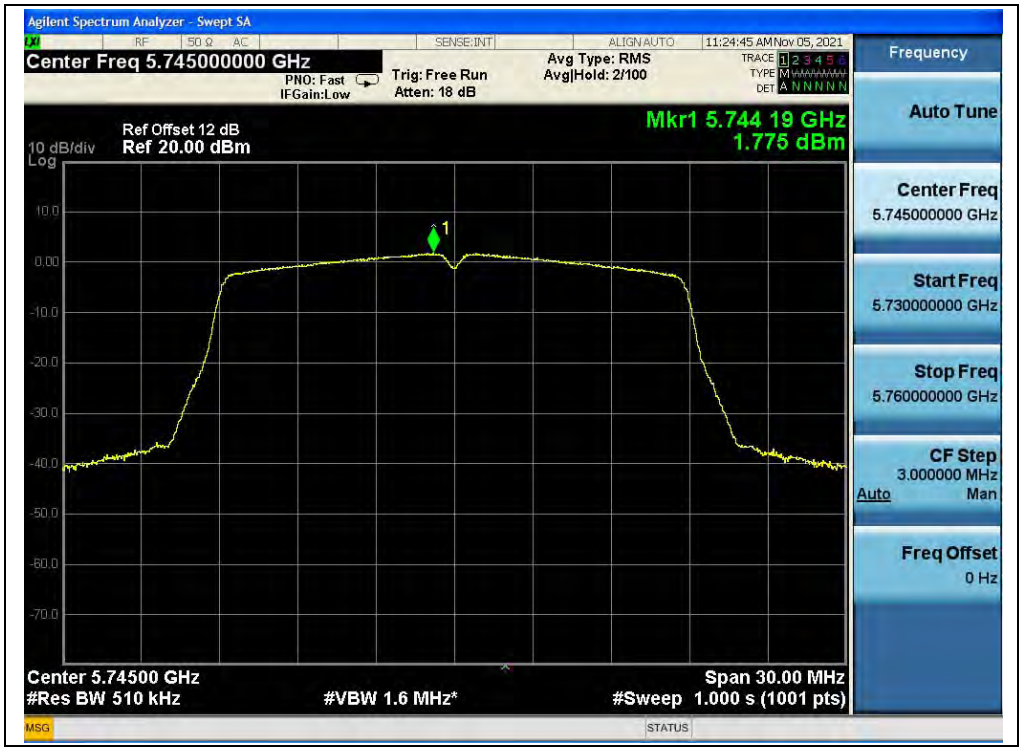
(Channel 36, 5180MHz, 802.11n (HT20))



(Channel 44, 5220MHz, 802.11n (HT20))



(Channel 48, 5240MHz, 802.11n (HT20))



(Channel 149, 5745MHz, 802.11n (HT20))

(Channel 157, 5785MHz, 802.11n (HT20))

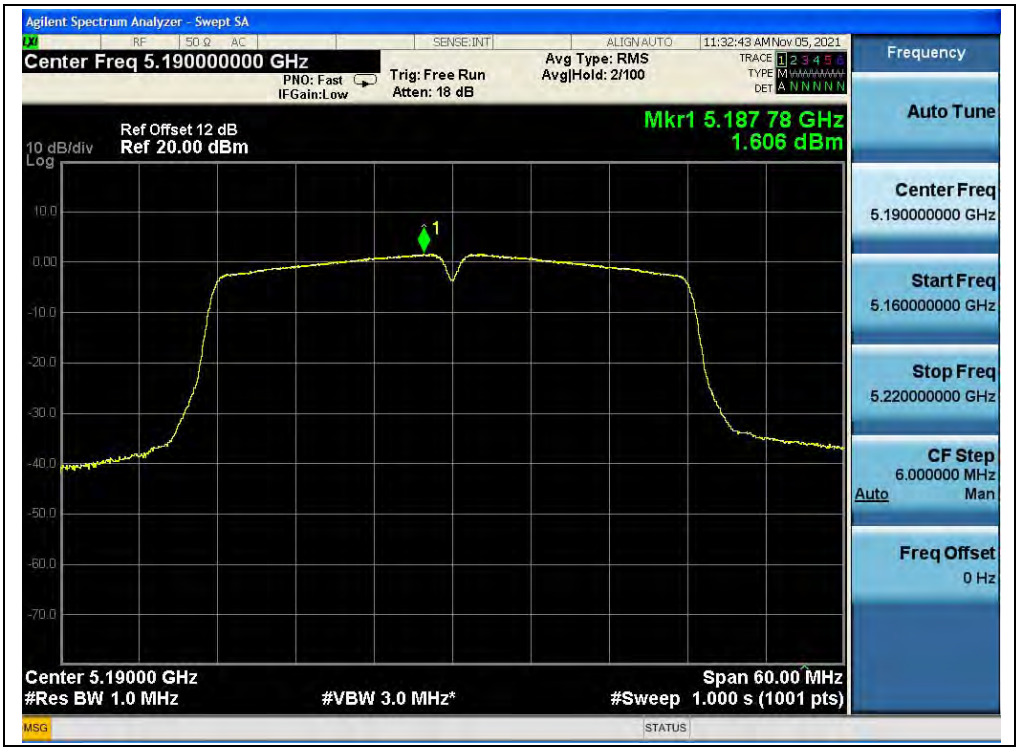
(Channel 165, 5825MHz, 802.11n (HT20))

802.11n (HT40) Mode

A.Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	1.61	0.26	1.87	11	PASS
46	5230	1.62		1.88		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-1.72	0.26	-1.46	30	PASS
159	5795	-1.76		-1.50		

B.Test Plot:



(Channel 38, 5190MHz, 802.11n (HT40))

(Channel 46, 5230MHz, 802.11n (HT40))

(Channel 151, 5755MHz, 802.11n (HT40))

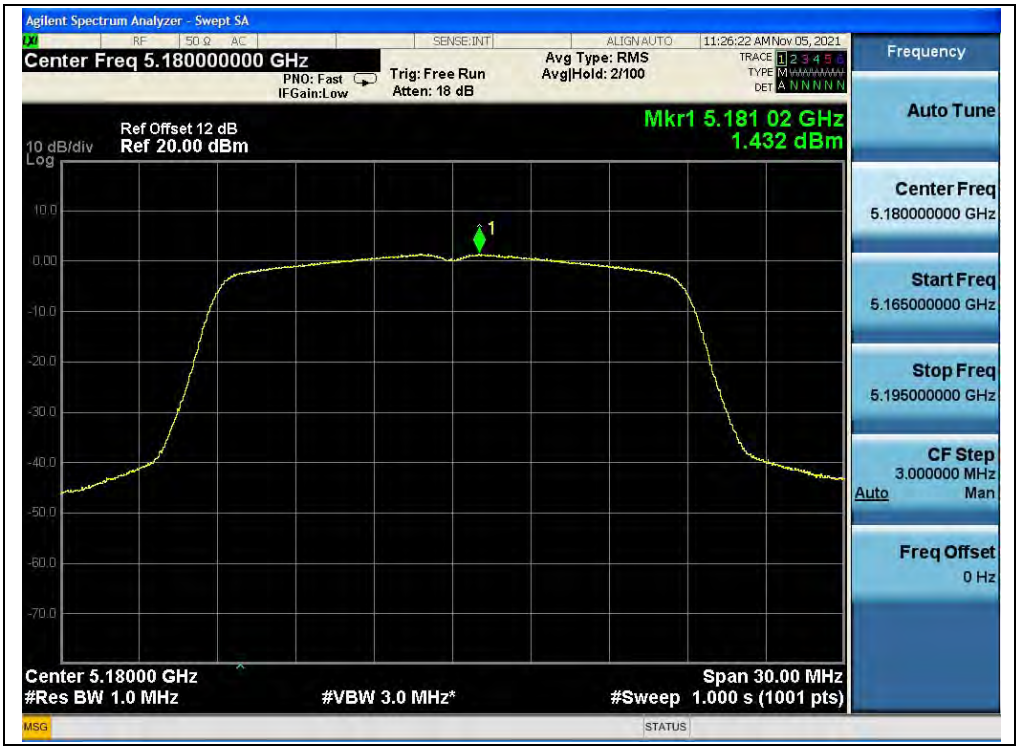
(Channel 159, 5795MHz, 802.11n (HT40))

802.11ac (VHT20) Mode

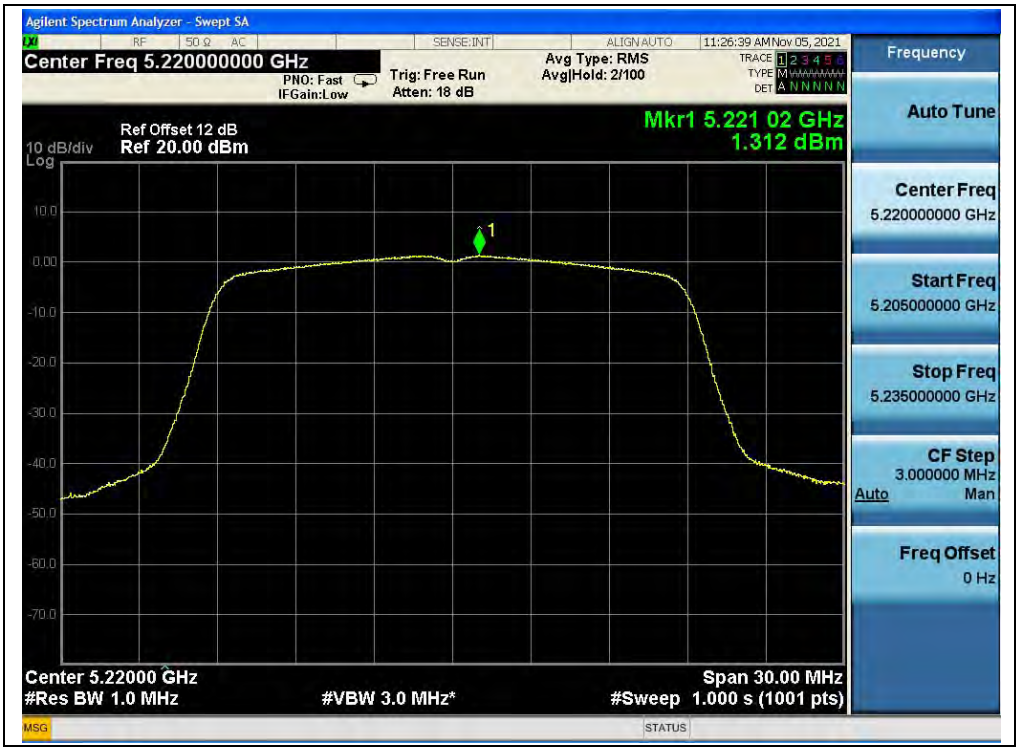
A.Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	1.43	0.13	1.56	11	PASS
44	5220	1.31		1.44		
48	5240	1.58		1.71		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	-0.87	0.13	-0.74	30	PASS
157	5785	-1.85		-1.72		
165	5825	-1.77		-1.64		

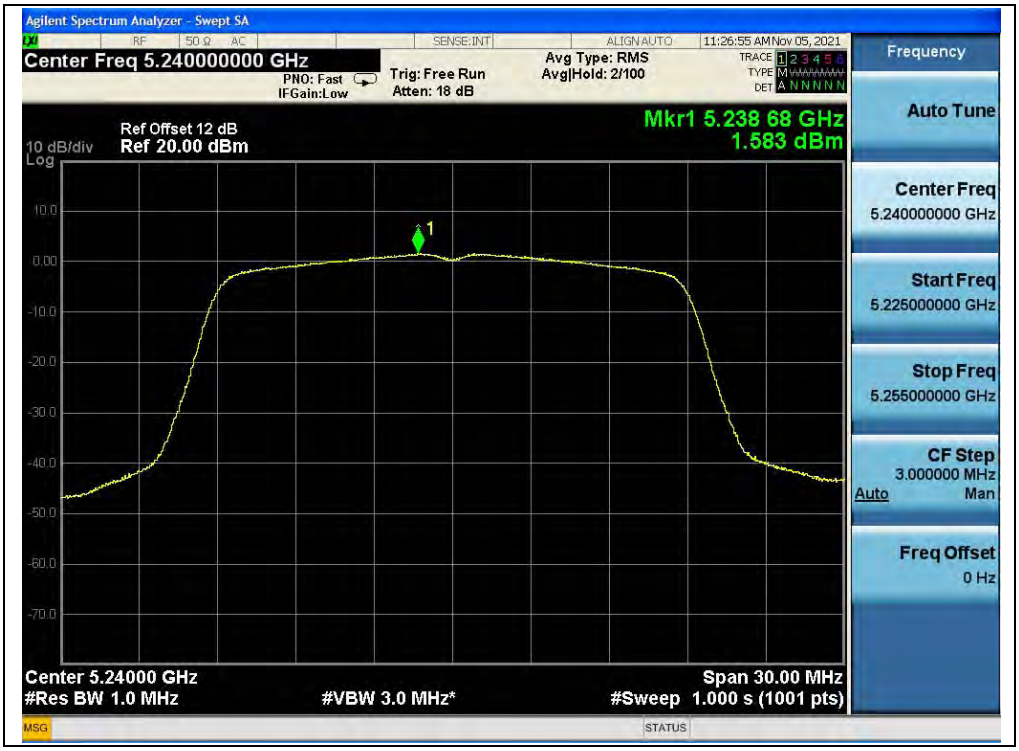
B.Test Plot:



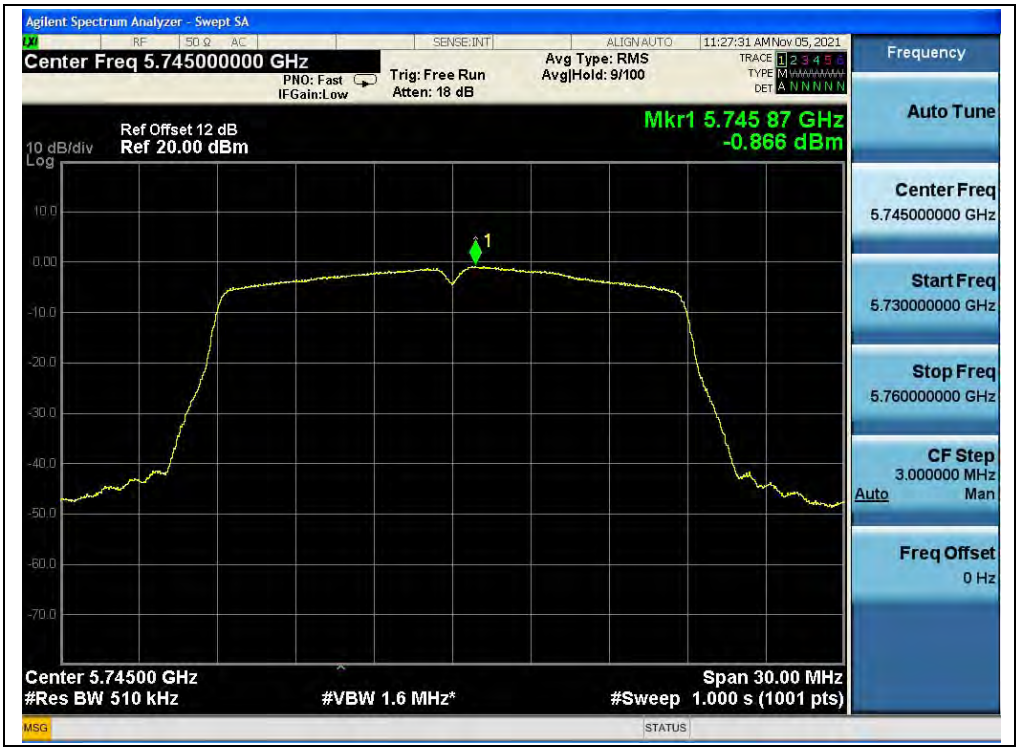
(Channel 36, 5180MHz, 802.11ac (VHT20))



(Channel 44, 5220 MHz, 802.11ac (VHT20))



(Channel 48, 5240MHz, 802.11ac (VHT20))



(Channel 149, 5745MHz, 802.11ac (VHT20))

(Channel 157, 5785MHz, 802.11ac (VHT20))

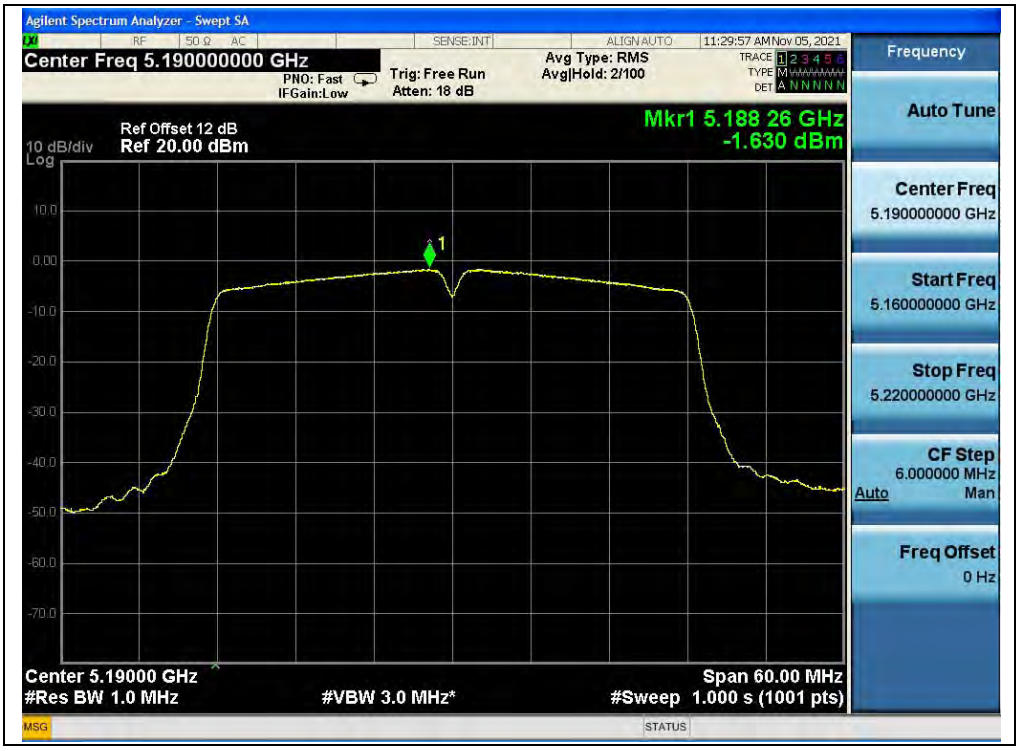
(Channel 165, 5825MHz, 802.11ac (VHT20))

802.11ac (VHT40) Mode

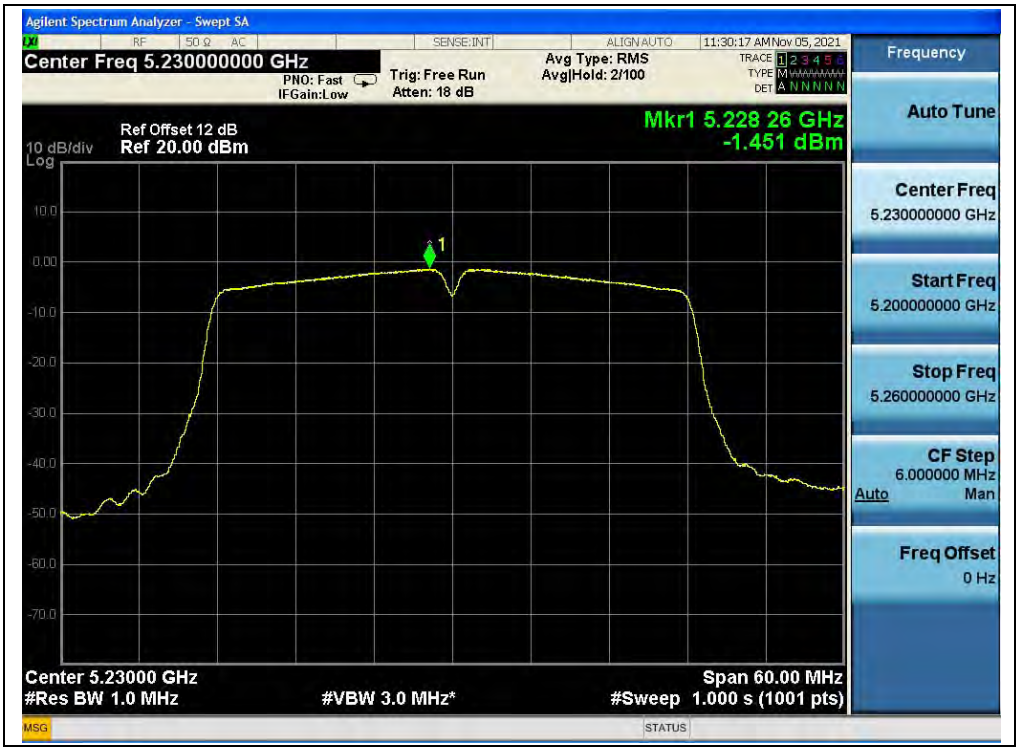
A.Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	-1.63	0.32	-1.31	11	PASS
46	5230	-1.45		-1.13		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-4.53	0.32	-4.21	30	PASS
159	5795	-4.83		-4.51		

B.Test Plot:



(Channel 38, 5190MHz, 802.11ac (VHT40))



(Channel 46, 5230 MHz, 802.11ac (VHT40))

(Channel 151, 5755MHz, 802.11ac (VHT40))

(Channel 159, 5795MHz, 802.11ac (VHT40))

802.11ac (VHT80) Mode

A.Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
42	5210	-4.94	0.63	-4.31	11	PASS
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
155	5775	-8.08	0.63	-7.45	30	PASS

B.Test Plot:

(Channel 42, 5210MHz, 802.11ac (VHT80))

(Channel 155, 5775MHz, 802.11ac (VHT80))

2.6. Frequency Stability

2.6.1. Requirement

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

2.6.2. Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between 5°Cto 40°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

2.6.3. Test Result

U-NII-1 (Ch. 36) 5180MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Fre. Dev. (kHz)	Deviation (ppm)
100%	3.87	+20(Ref)	23	4.440
100%		-30	31	5.985
100%		-20	29	5.598
100%		-10	26	5.019
100%		0	23	4.440
100%		+10	22	4.247
100%		+20	20	3.861
100%		+30	23	4.440
100%		+40	26	5.019
100%		+50	23	4.440
115%	4.45	+20	27	5.212
85%	3.50	+20	30	5.792

U-NII-3 (Ch. 149) 5745MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Fre. Dev. (kHz)	Deviation (ppm)
100%	3.87	+20(Ref)	22	3.829
100%		-30	26	4.526
100%		-20	27	4.700
100%		-10	21	3.655
100%		0	30	5.222
100%		+10	25	4.352
100%		+20	26	4.526
100%		+30	25	4.352
100%		+40	21	3.655
100%		+50	28	4.874
115%	4.45	+20	31	5.396
85%	3.50	+20	29	5.048

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

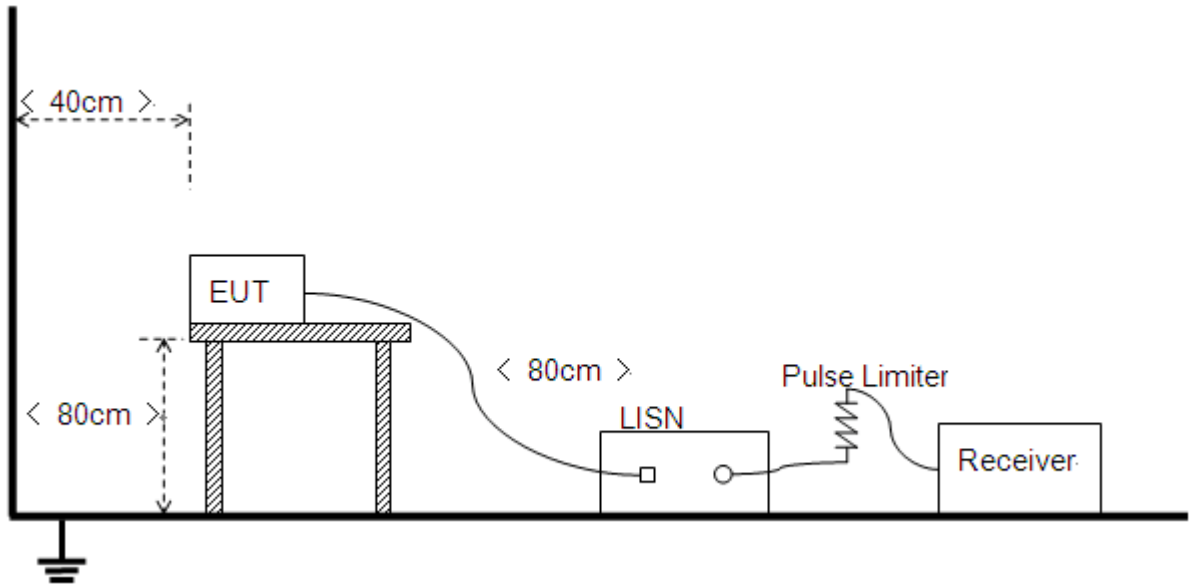
Note:

(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

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. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hzwere 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+Adaptor+WIFI TX

Test Voltage: AC 120V/60Hz

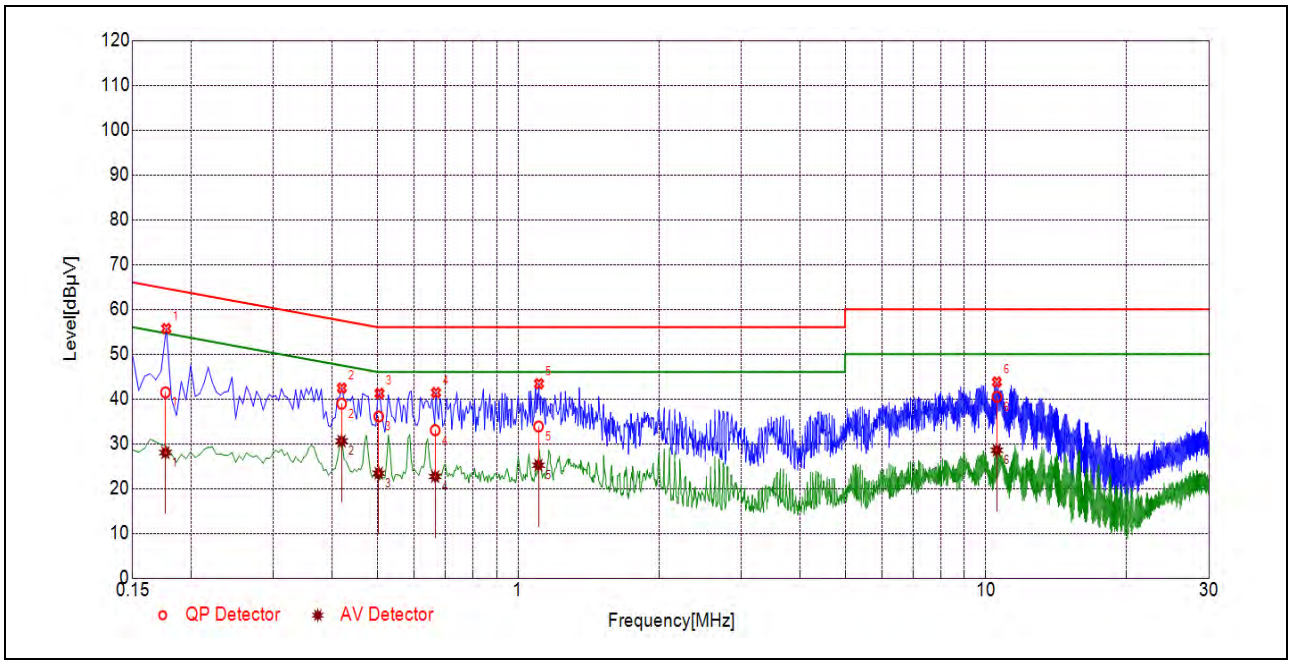
The measurement results are obtained as below:

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

U_R: Receiver Reading

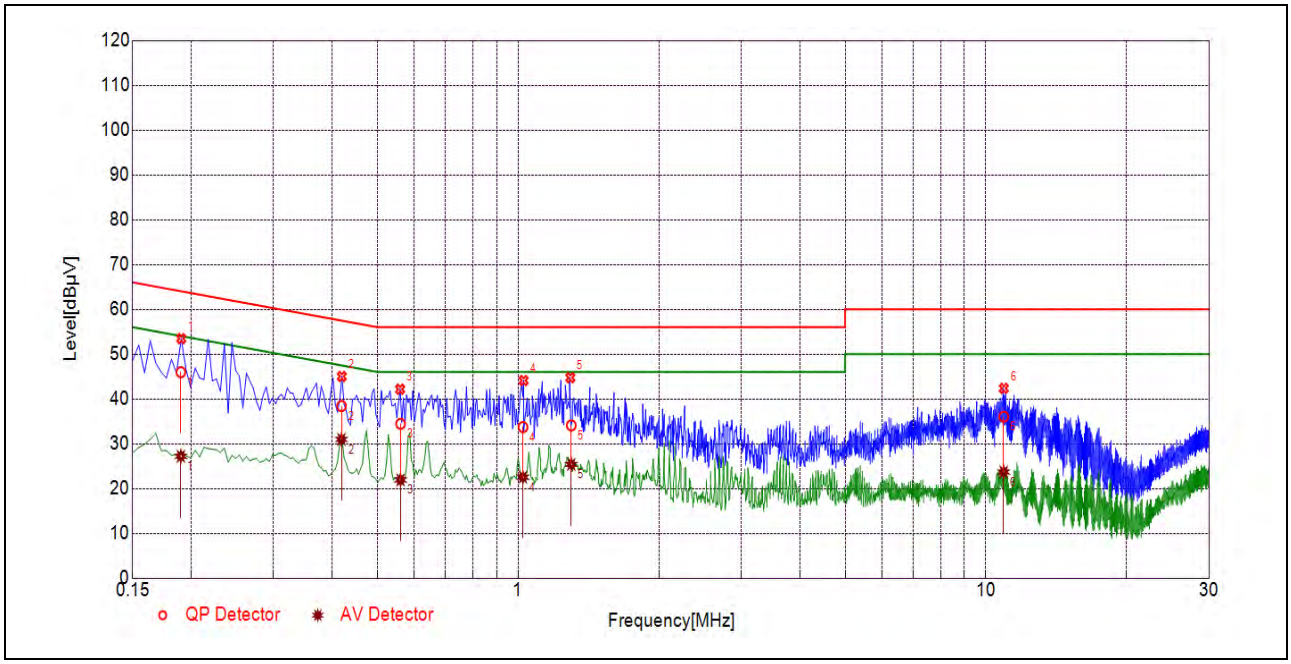
A_{Factor}: Voltage division factor of LISN

B.Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1762	41.45	28.01	64.66	54.66	Line	PASS
2	0.4194	38.92	30.57	57.46	47.46		PASS
3	0.5035	36.06	23.40	56.00	46.00		PASS
4	0.6648	32.99	22.66	56.00	46.00		PASS
5	1.1055	33.83	25.20	56.00	46.00		PASS
6	10.5536	40.47	28.53	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	0.1901	45.95	27.19	45.95	27.19	Neutral	PASS
2	0.4192	38.41	30.95	38.41	30.95		PASS
3	0.5606	34.43	21.89	34.43	21.89		PASS
4	1.0240	33.70	22.52	33.70	22.52		PASS
5	1.2991	34.07	25.38	34.07	25.38		PASS
6	10.9158	36.03	23.67	36.03	23.67		PASS

2.8. Restricted Frequency Bands

2.8.1. Requirement

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.

(2) For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

The following formula is used to convert the equipment isotropic radiated power(e.i.r.p.) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

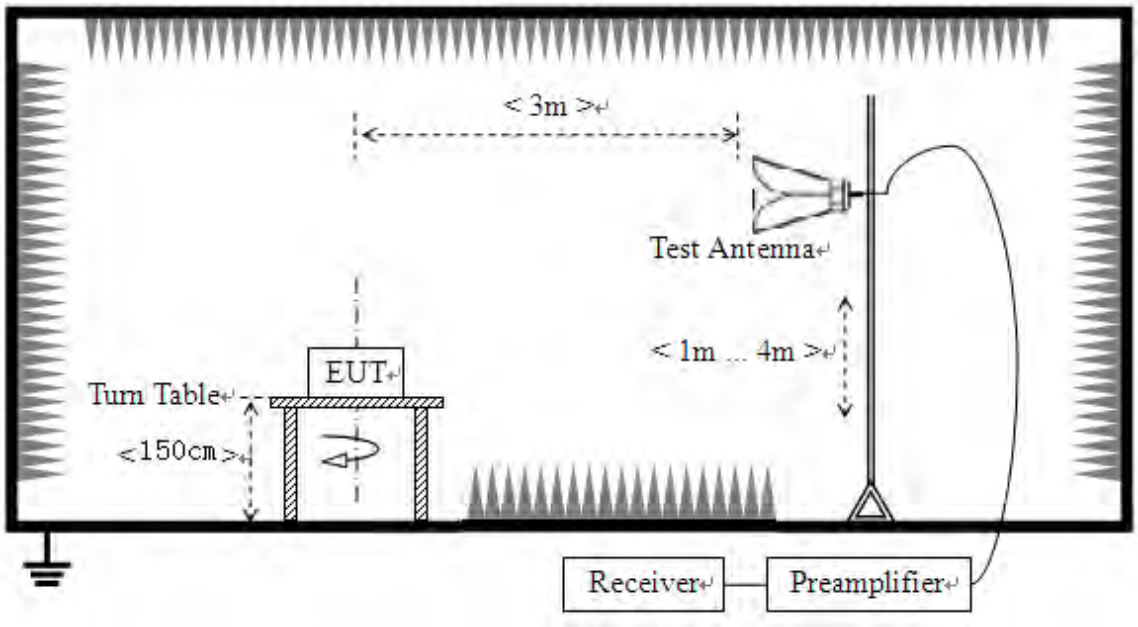
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following 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

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

2.8.2. Test Description

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.
KDB 789033 Section H) 3)5)6(d)) was used in order to prove compliance
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 Result

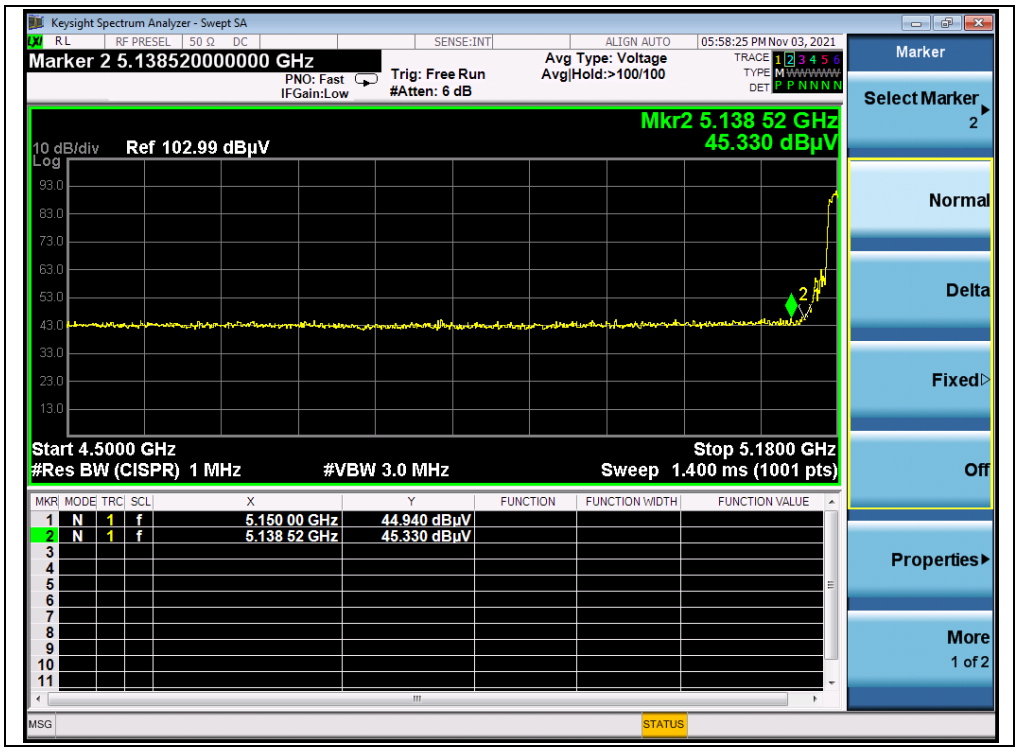
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]$-G_{preamp}$ [dB]
A_T: Total correction Factor except Antenna; U_R: Receiver Reading
G_{preamp}: Preamplifier Gain; A_{Factor}: Antenna Factor at 3m
Note 1: 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.
Note 2 All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

802.11a Mode

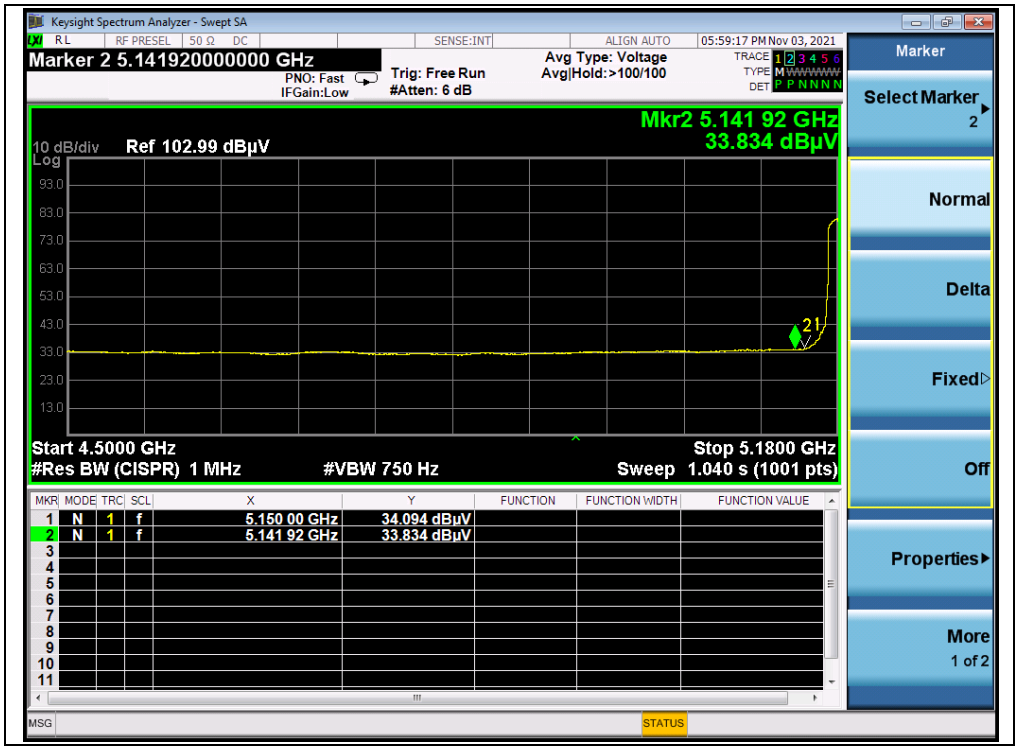
A.Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
36	5138.52	PK	45.33	-19.54	32.20	57.99	74	PASS
36	5150.00	AV	34.09	-19.54	32.20	46.75	54	PASS
48	5405.22	PK	42.79	-19.54	32.20	55.45	74	PASS
48	5356.60	AV	31.63	-19.54	32.20	44.29	54	PASS
149	5725.00	PK	57.08	-19.01	32.20	70.27	122.23	PASS
165	5850.00	PK	50.16	-19.01	32.20	63.35	122.23	PASS

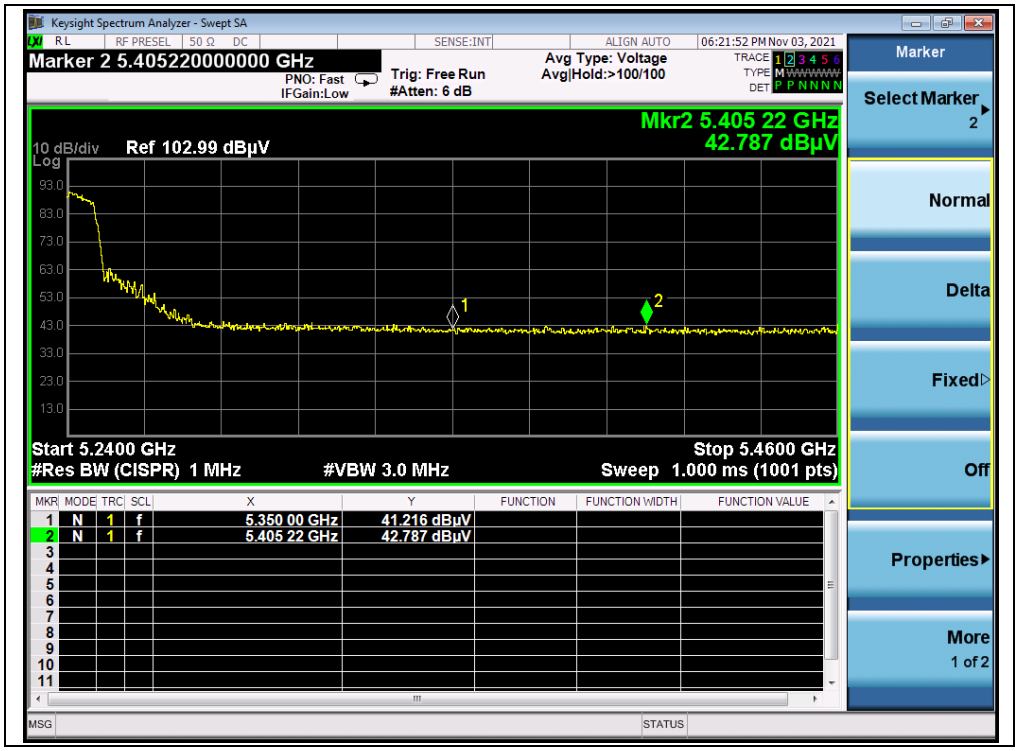
B.Test Plot:



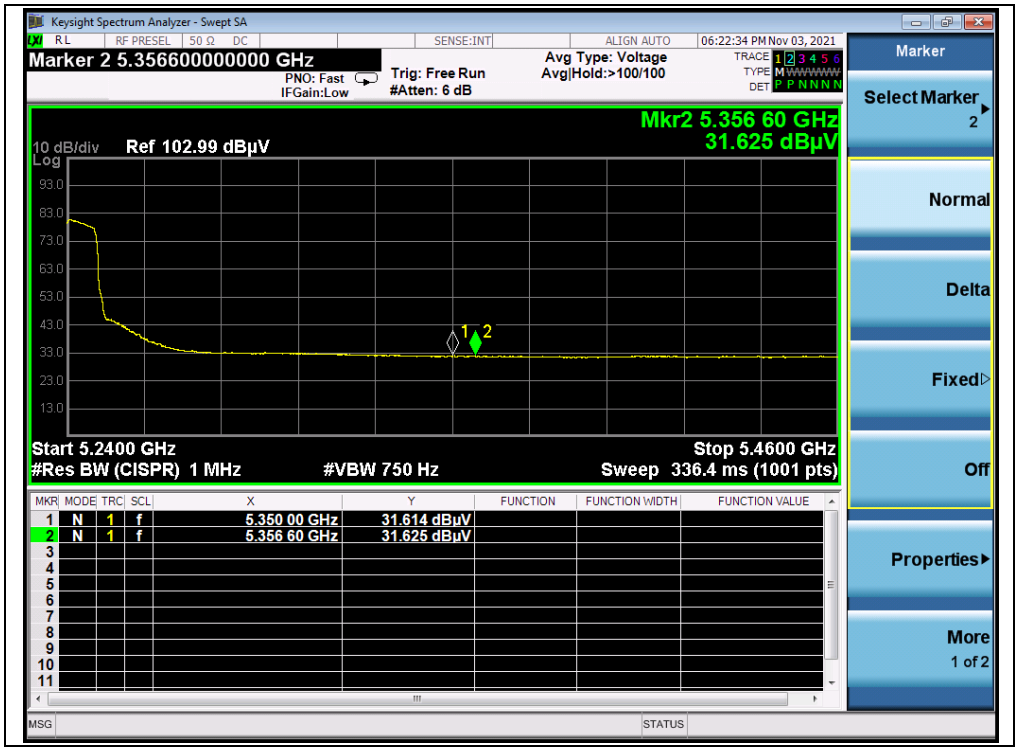
(PEAK, Channel 36, 802.11a)



(AVERAGE, Channel 36, 802.11a)



(PEAK, Channel 48, 802.11a)



(AVERAGE, Channel 48, 802.11a)

(PEAK, Channel 149, 802.11a)

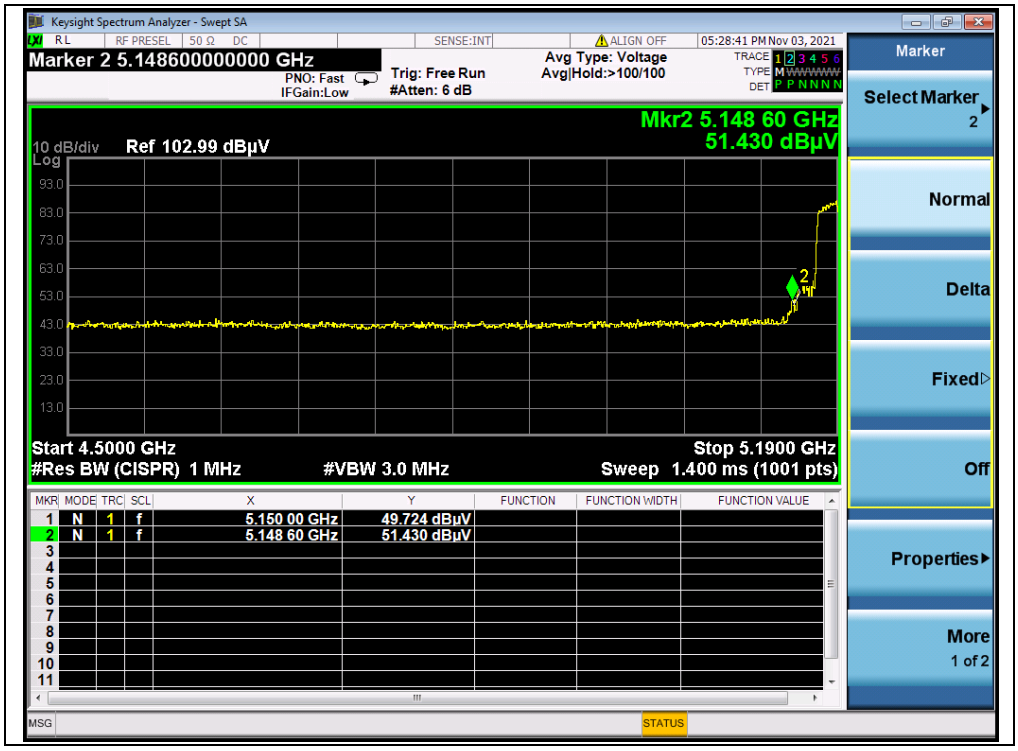
(PEAK, Channel 165, 802.11a)

802.11n (HT40) Mode

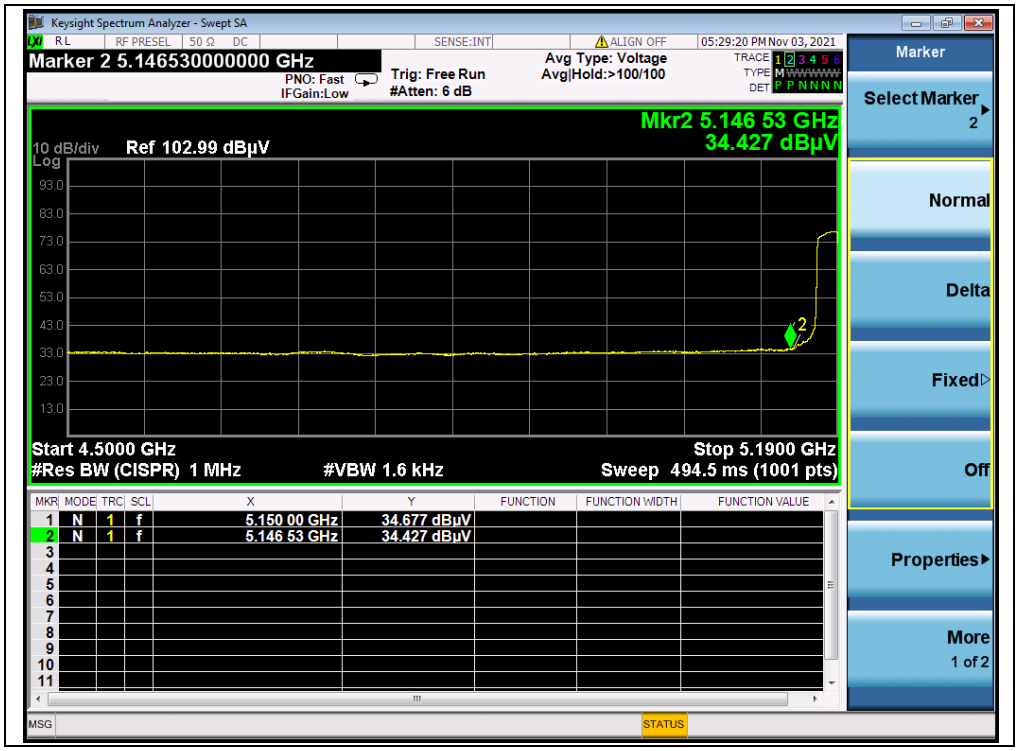
A.Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
38	5148.60	PK	51.43	-19.54	32.20	64.09	74	PASS
38	5150.00	AV	34.68	-19.54	32.20	47.34	54	PASS
48	5373.98	PK	43.08	-19.54	32.20	55.74	74	PASS
48	5350.00	AV	32.03	-19.54	32.20	44.69	54	PASS
151	5725.00	PK	64.25	-19.01	32.20	77.44	122.23	PASS
159	5850.00	PK	46.42	-19.01	32.20	59.61	122.23	PASS

B.Test Plot:

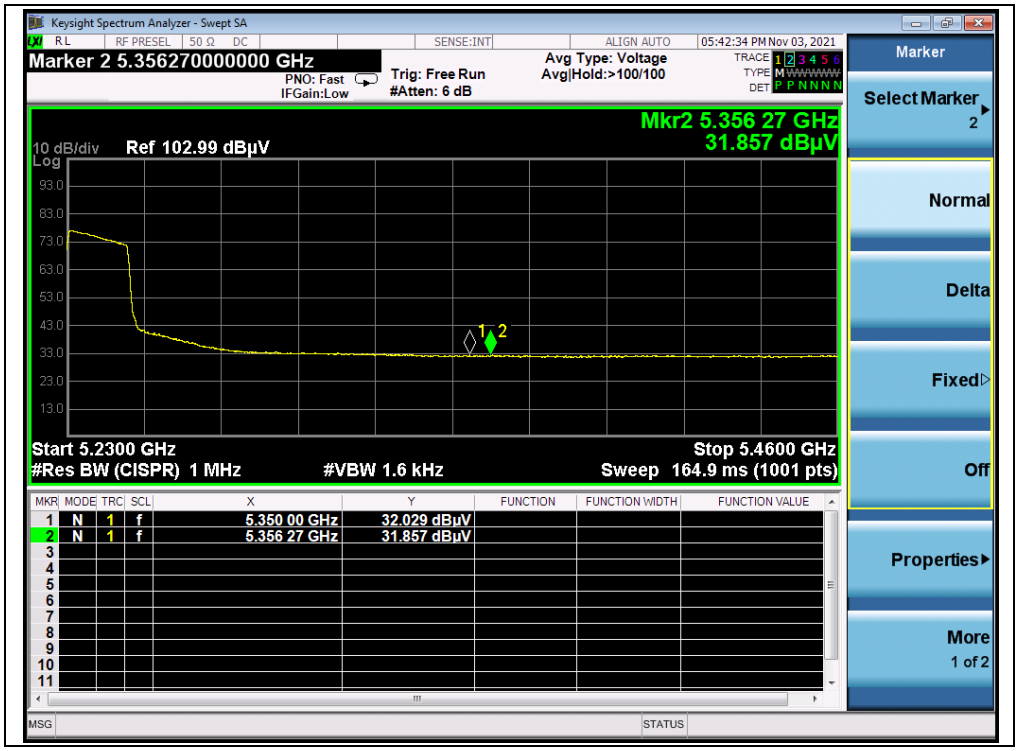


(PEAK, Channel 38, 802.11n (HT40))



(AVERAGE, Channel 38, 802.11n (HT40))

(PEAK, Channel 48, 802.11n (HT40))



(AVERAGE, Channel 48, 802.11n (HT40))

(PEAK, Channel 151, 802.11n (HT40))

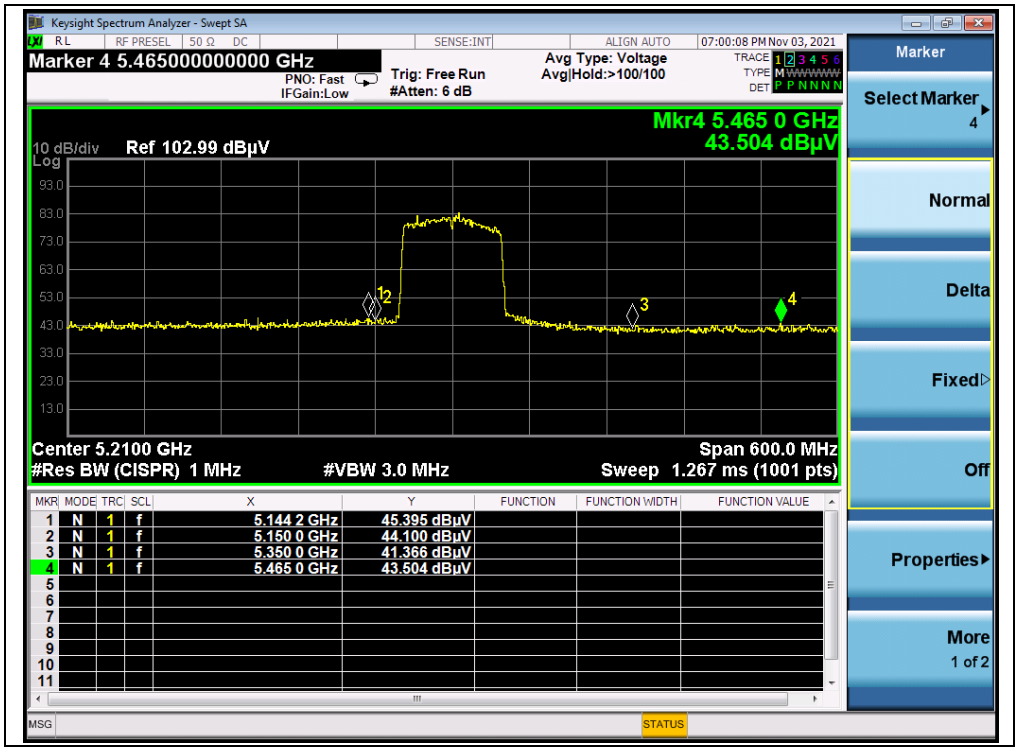
(PEAK, Channel 159, 802.11n (HT40))

802.11 ac (VHT80) Mode

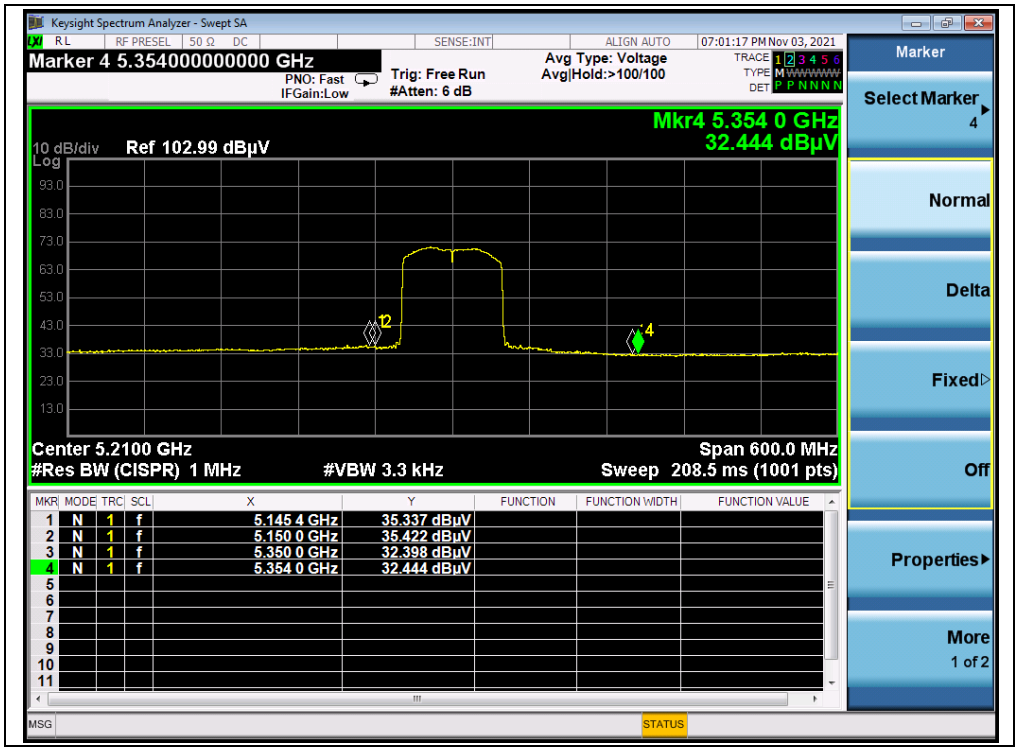
A.Test Verdict:

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
42	5144.20	PK	45.40	-19.54	32.2	58.06	74	PASS
42	5150.00	AV	35.42	-19.54	32.2	48.08	54	PASS
42	5465.00	PK	43.50	-19.54	32.2	56.16	74	PASS
42	5354.00	AV	32.44	-19.54	32.2	45.10	54	PASS
155	5725.00	PK	46.78	-19.01	32.2	59.97	122.23	PASS
155	5861.80	PK	48.35	-19.01	32.2	61.54	91.97	PASS

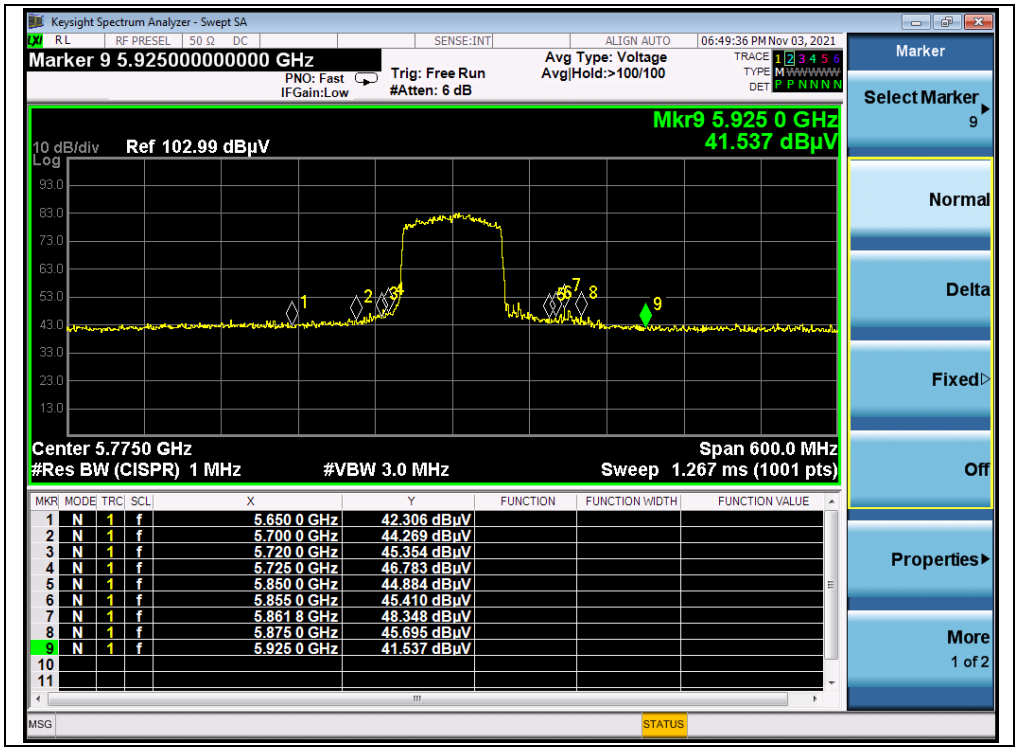
B.Test Plot:



(Channel 42, PEAK, 802.11ac (VHT80))



(Channel 42, AVG, 802.11ac (VHT80))



(Channel 155, PEAK, 802.11ac (VHT80))

2.9. Radiated Emission

2.9.1. Requirement

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.

(2) For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

The following formula is used to convert the equipment isotropic radiated power(e.i.r.p.) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. 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:

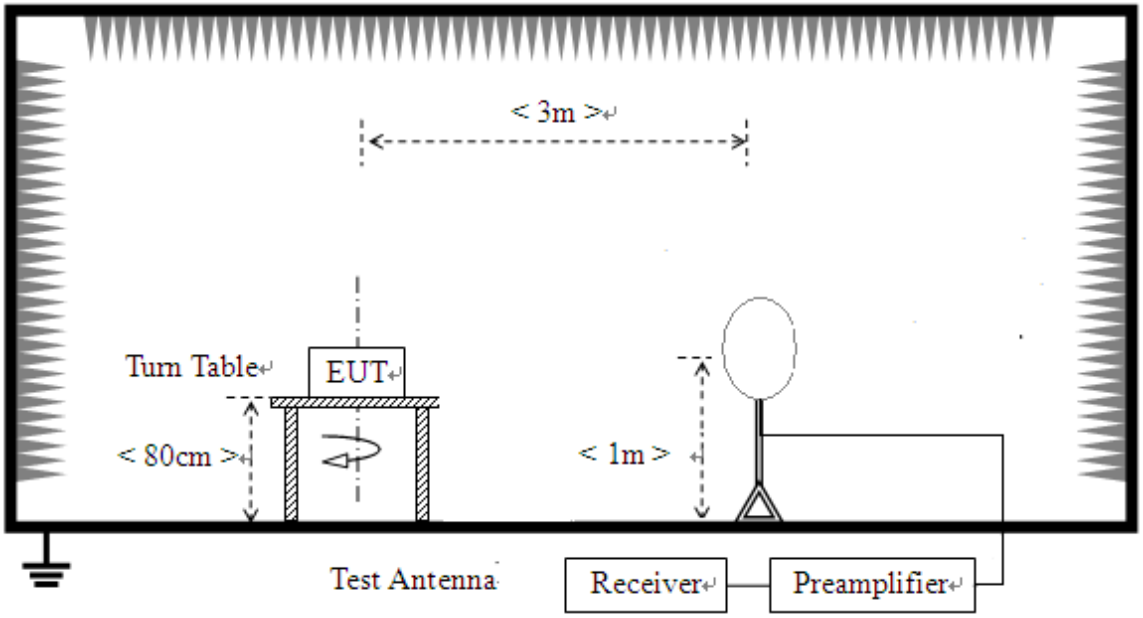
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

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.
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).

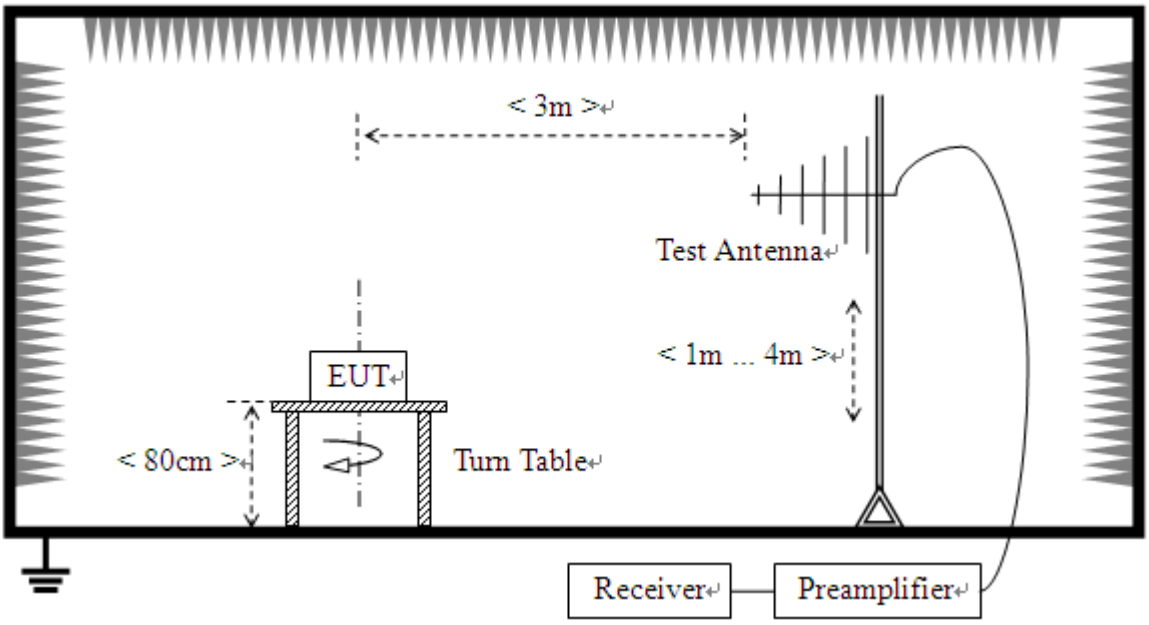
2.9.2. Test Description

Test Setup:

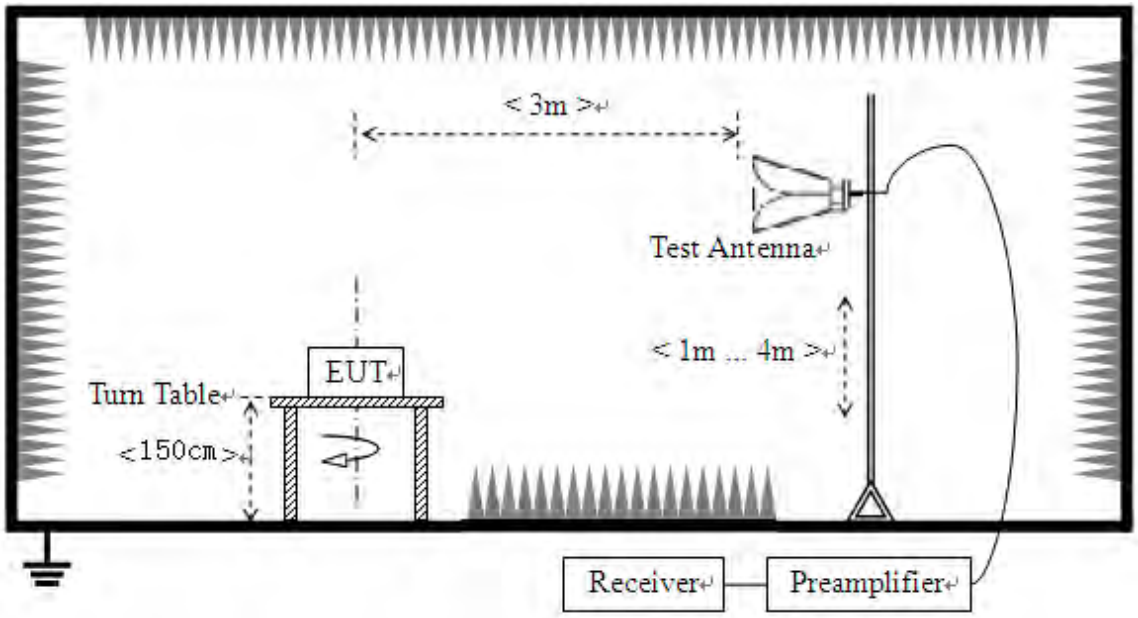
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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 (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

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.

Note 1: 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.

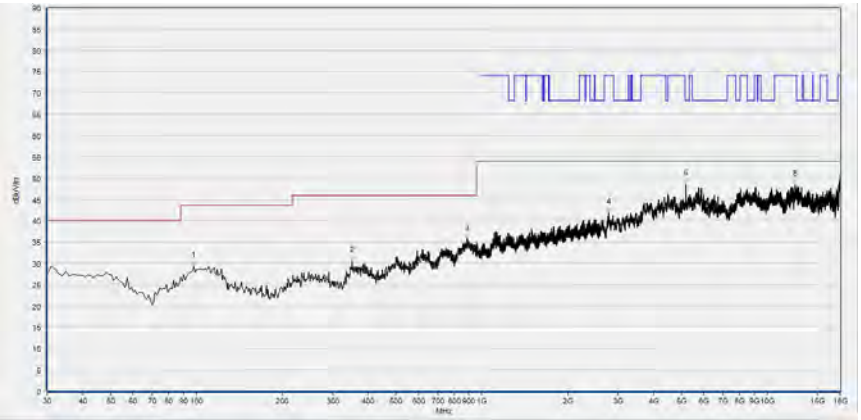
Note 2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note 3: 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.

Note 4: All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

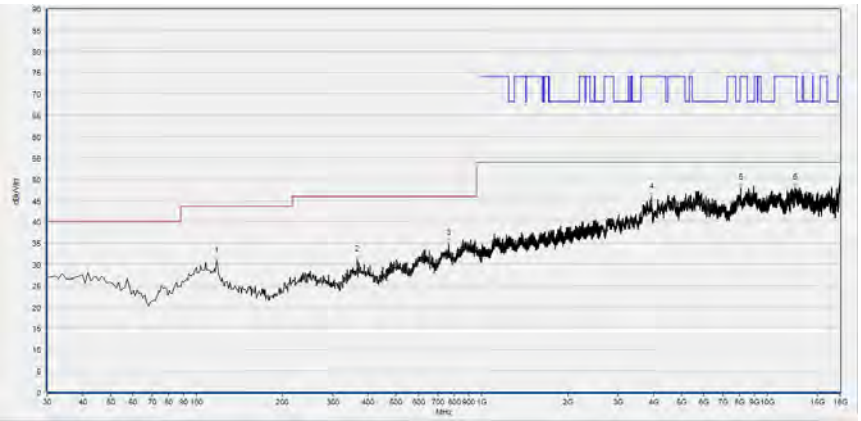
802.11a Mode

Plot for Channel 36



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
97.968	29.37	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
350.420	30.56	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
886.396	35.69	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2781.756	41.91	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5178.476	48.53	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12491.858	48.37	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

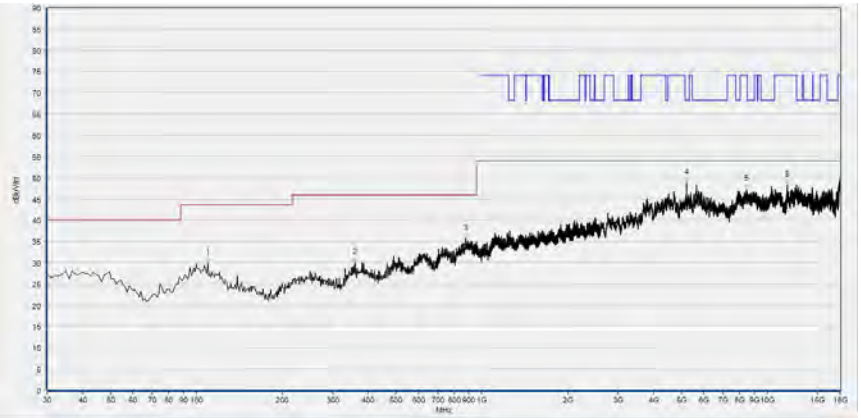
(Antenna Horizontal, 30MHz to 18GHz)



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
117.387	30.61	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
366.927	31.06	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
766.967	34.92	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3933.907	45.73	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8065.013	47.86	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12525.745	47.87	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

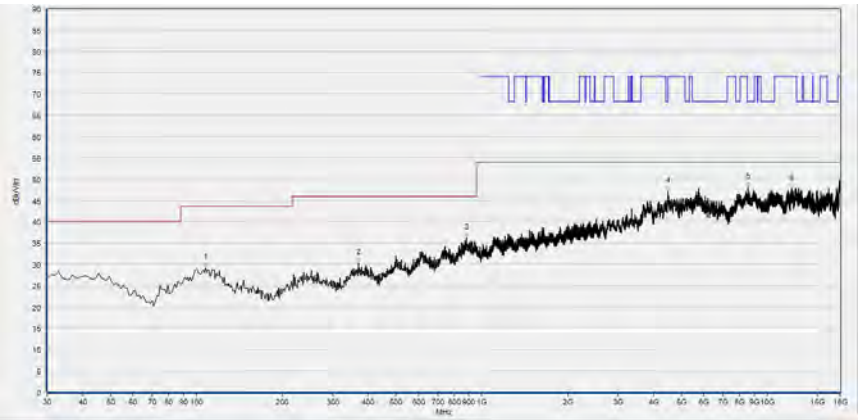
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 44



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
109.620	29.88	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
360.130	30.05	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
878.629	35.71	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5218.524	48.72	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8453.171	47.33	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11755.591	48.22	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

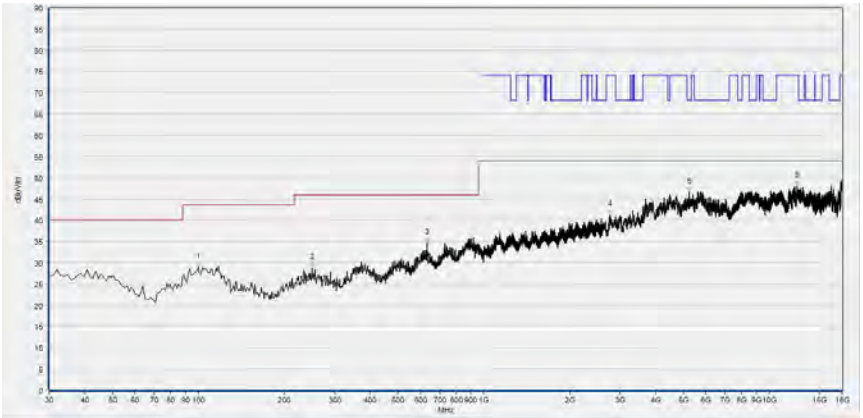
(Antenna Horizontal, 30MHz to 18GHz)



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
107.678	29.13	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
369.840	30.42	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
882.513	36.15	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4497.660	47.09	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8576.395	48.12	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12137.588	47.71	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

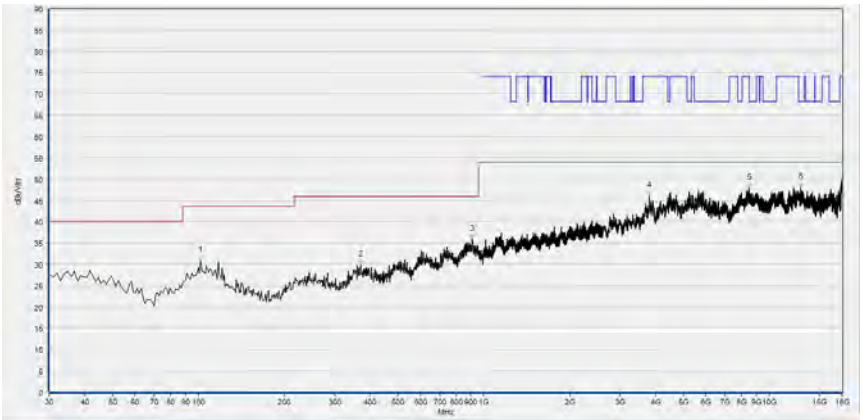
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 48



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
99.910	29.02	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
250.410	28.87	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
632.973	34.69	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2766.353	41.25	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5240.088	46.63	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12510.342	48.06	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

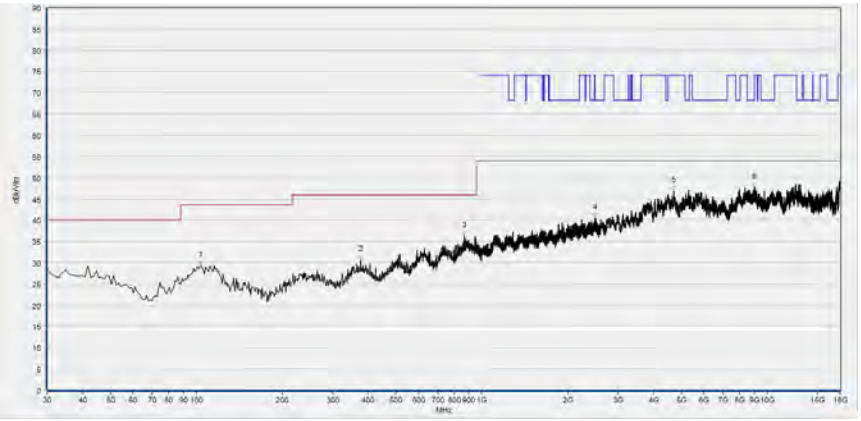
(Antenna Horizontal, 30MHz to 18GHz)



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
101.852	30.83	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
370.811	29.77	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
911.642	35.94	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3807.602	46.01	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8487.057	48.00	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12904.661	48.06	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

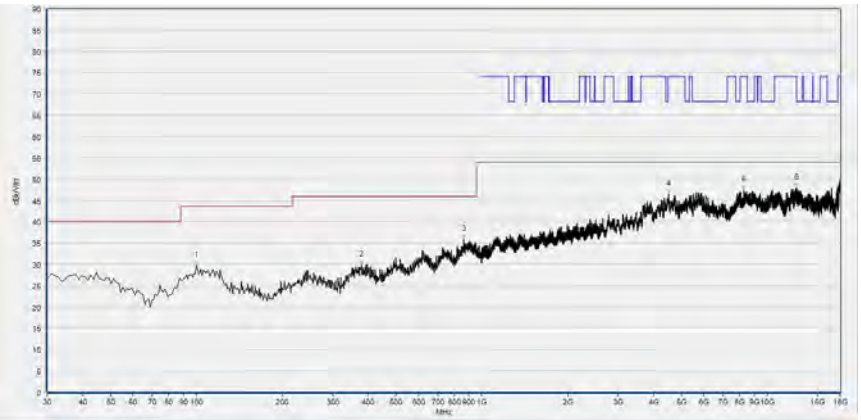
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 149



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
103.794	29.31	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
375.666	30.74	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
868.919	36.40	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2492.231	40.60	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4713.303	47.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8995.359	47.75	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

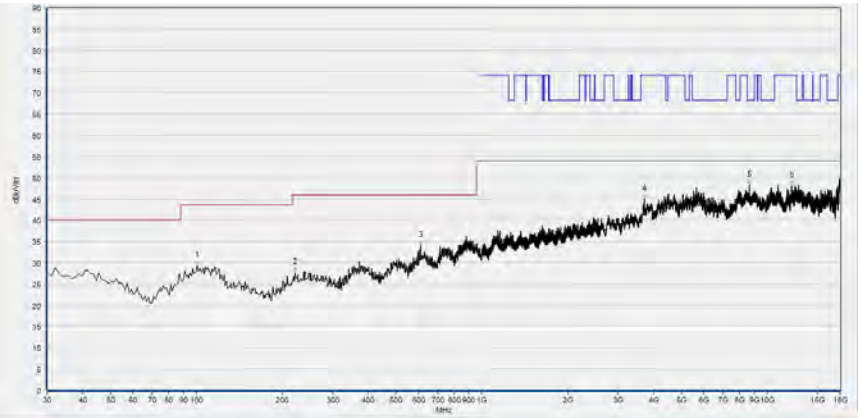
(Antenna Horizontal, 30MHz to 18GHz)



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
99.910	29.63	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
378.579	29.85	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
866.006	35.88	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4509.982	46.39	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8289.898	47.49	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12633.567	47.99	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

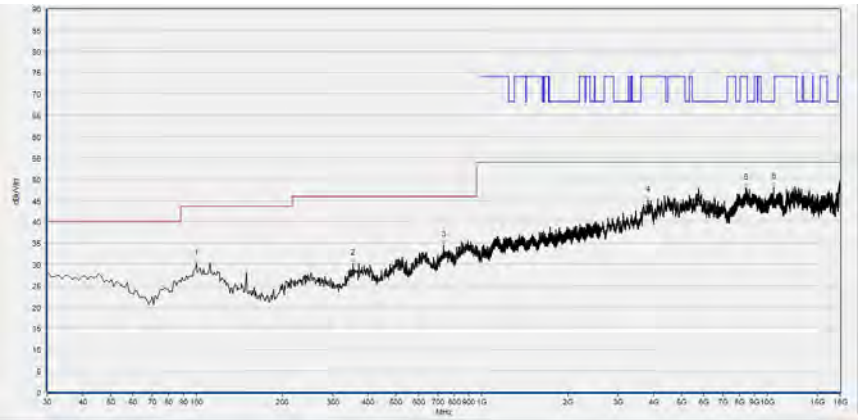
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 157



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
100.881	29.41	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
222.252	27.64	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
610.641	33.95	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3709.022	44.86	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8634.927	48.19	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12146.829	48.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

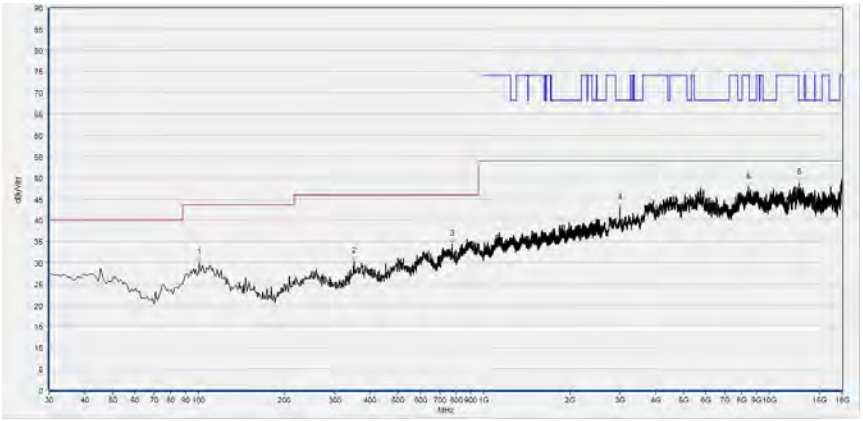
(Antenna Horizontal, 30MHz to 18GHz)



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
99.910	30.15	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
354.304	30.18	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
732.983	34.45	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3816.843	45.08	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8419.284	47.96	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10501.780	48.18	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

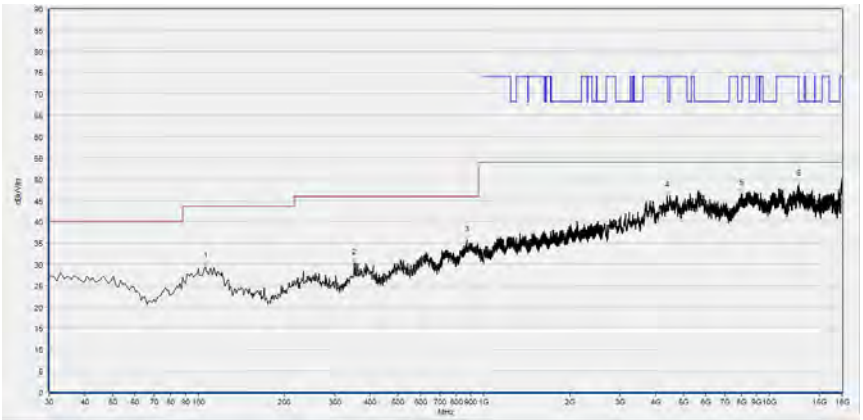
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 165



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
100.881	30.00	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
350.420	30.30	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
773.764	34.38	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2991.238	42.92	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8459.332	47.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12735.227	48.81	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

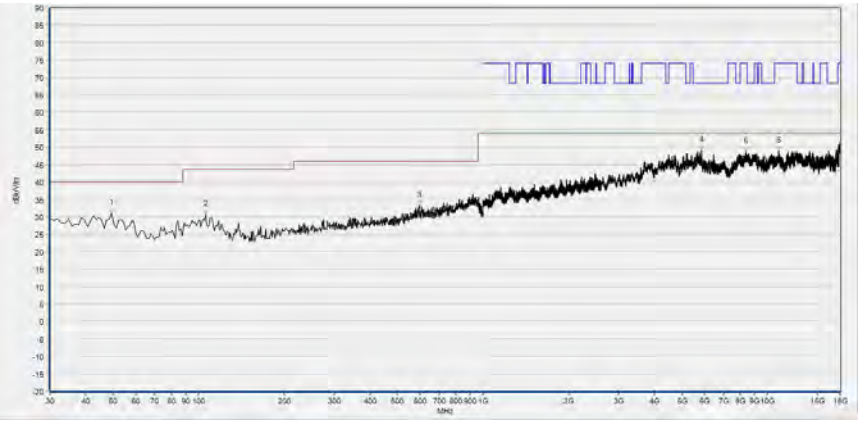


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
105.736	29.48	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
351.391	30.33	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
871.832	35.65	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4389.838	46.07	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7975.675	46.63	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12701.340	48.69	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

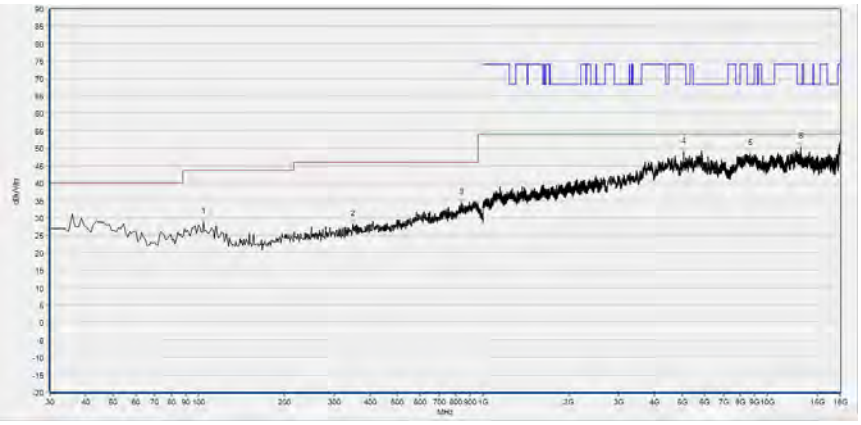
802.11n (HT40) Mode

Plot for Channel 38



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.419	31.05	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
105.736	30.57	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
596.076	33.22	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5871.614	48.98	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8400.800	48.52	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10963.873	48.84	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

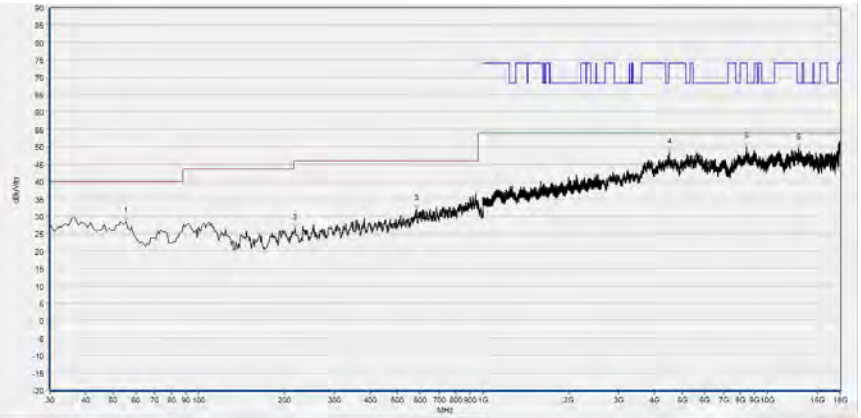
(Antenna Horizontal, 30MHz to 18GHz)



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
103.794	28.79	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
347.508	28.20	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
840.761	34.18	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5073.735	48.75	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8702.701	48.36	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
13080.256	50.16	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

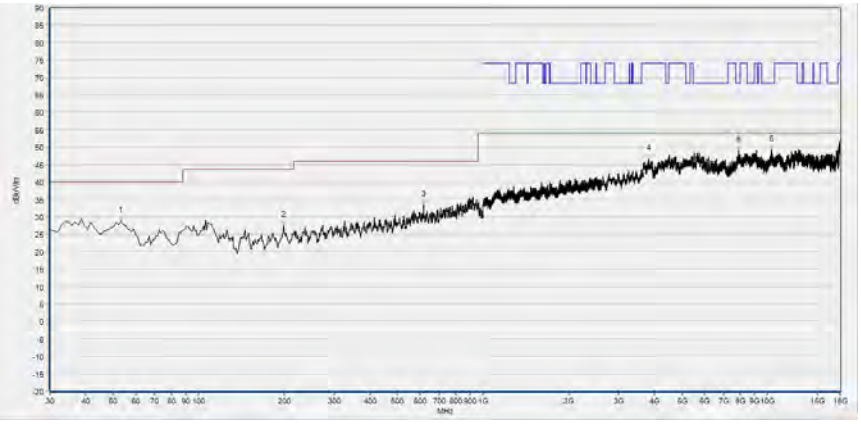
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 46



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
55.245	28.63	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
218.368	26.56	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
584.424	31.95	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4509.982	48.36	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8456.251	50.01	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12870.774	49.64	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

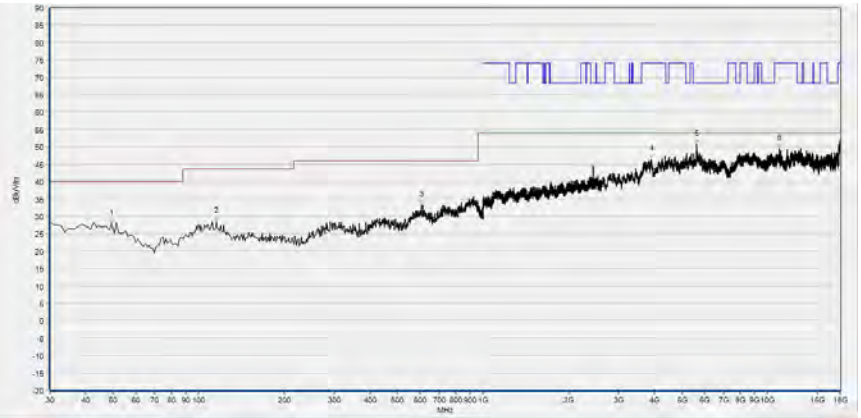
(Antenna Horizontal, 30MHz to 18GHz)



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
53.303	28.73	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
198.949	27.54	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
618.408	33.37	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3823.005	46.57	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7935.627	48.98	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
10316.943	49.31	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

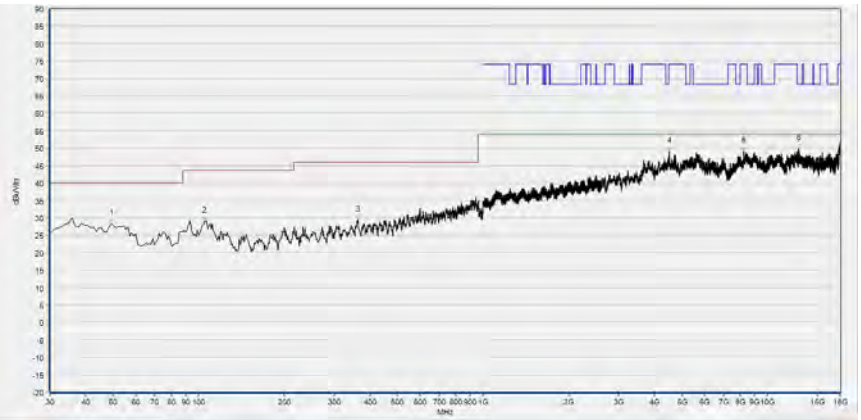
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 151



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.419	27.84	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
115.445	28.65	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
605.786	33.16	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3903.101	46.36	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5643.649	50.65	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11000.840	49.36	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

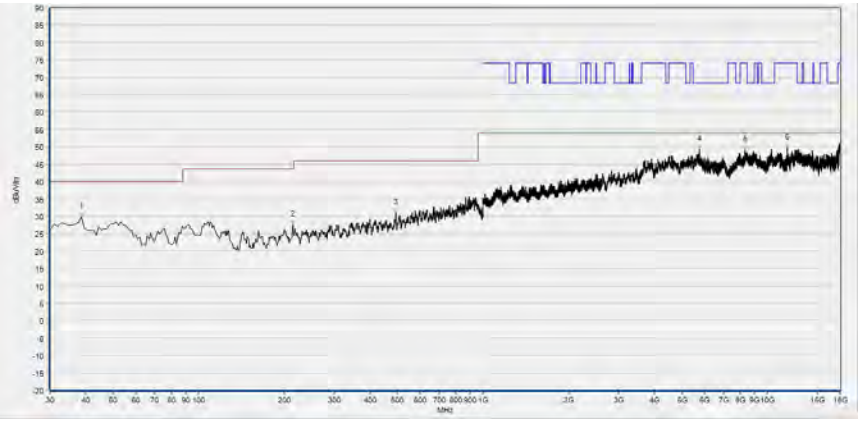
(Antenna Horizontal, 30MHz to 18GHz)



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
49.419	28.42	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
104.765	28.86	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
363.043	29.44	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4522.304	48.96	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8243.689	49.07	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12898.500	49.84	N/A	N/A	68.23	N/A	N/A	54.00	PASS

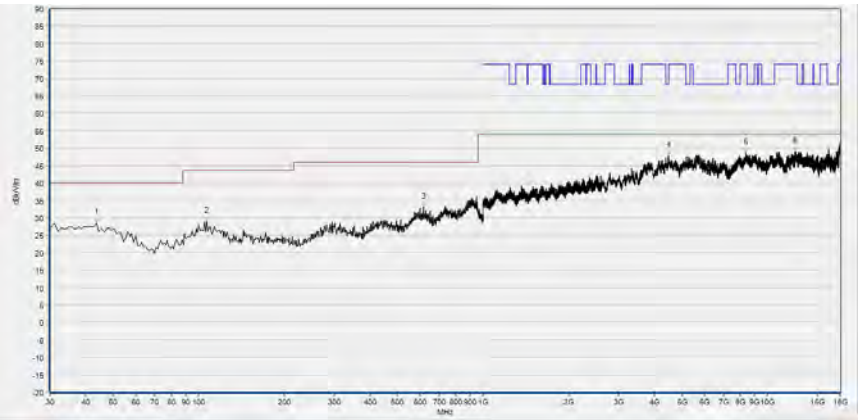
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 159



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
38.739	29.86	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
214.484	27.51	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
494.124	31.11	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5754.551	49.33	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8317.624	49.01	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11727.866	49.55	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

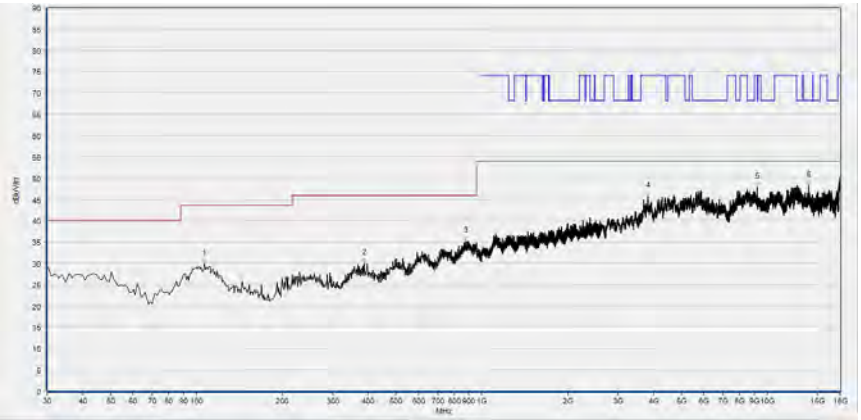


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
43.594	28.49	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
106.707	29.03	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
616.466	33.14	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4479.176	47.71	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8391.558	48.63	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12528.826	49.04	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

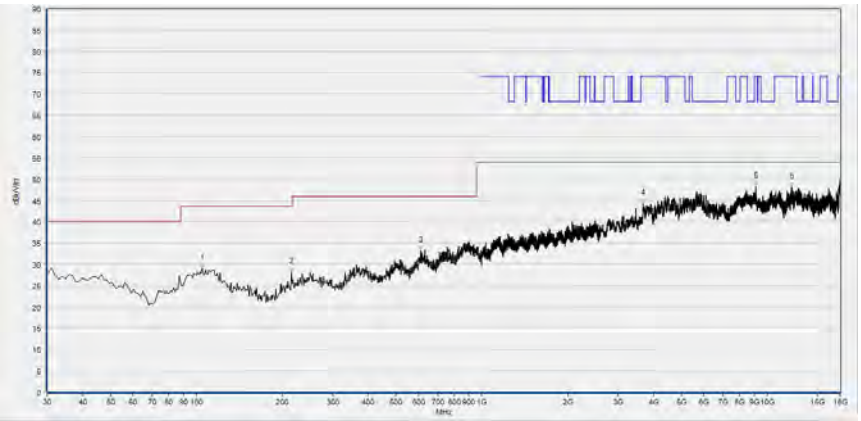
802.11ac (VHT80) Mode

Plot for Channel 42



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
106.707	29.77	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
387.317	30.03	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
879.600	35.22	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3819.924	45.78	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9232.567	47.94	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
14004.441	48.27	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

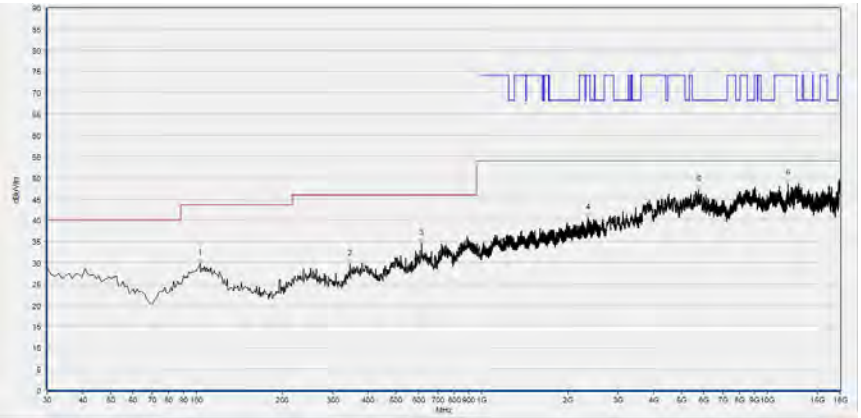
(Antenna Horizontal, 30MHz to 18GHz)



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
104.765	28.98	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
215.455	28.15	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
610.641	33.14	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3678.216	44.17	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9109.342	48.30	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12152.991	48.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

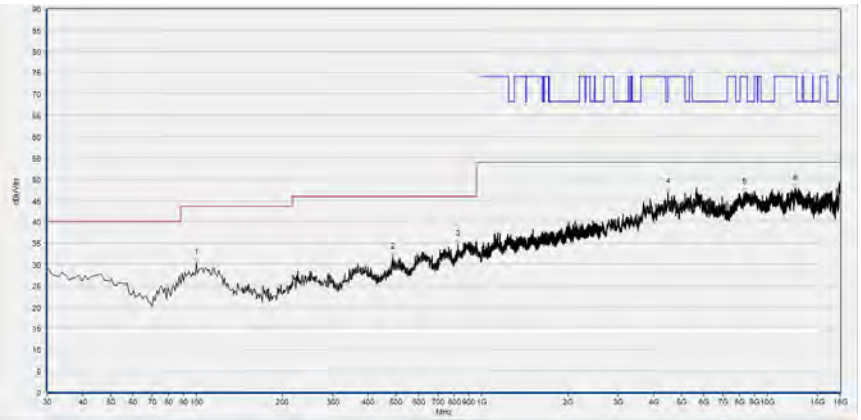
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 155



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
102.823	29.81	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
344.595	29.67	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
615.495	34.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2357.252	40.54	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5757.632	47.08	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11823.365	48.57	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
99.910	30.35	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
487.327	31.65	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
823.283	34.65	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4476.095	46.92	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8320.704	46.85	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12522.665	47.74	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	±2.22dB
Power Spectral Density	±2.22dB
Bandwidth	±5%
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.
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.
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 C63.10-2013and 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	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Attenuator 1	N/A	10dB	Resnet	N/A	N/A
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2021.03.25	2022.03.24
USB Wideband Power Sensor	MY54180008	U2021XA	Agilent	2021.10.21	2022.10.20
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
Temperature Chamber	12108015	DTL-003S101	YOMA	2021.10.20	2022.10.19

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2021.03.09	2022.03.08
LISN	812744	NSLK 8127	Schwarzbeck	2021.03.09	2022.03.08
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2021.07.21	2022.07.20
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	V2.5.77.0418
Morlab EMCR V1.2	Morlab	V1.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0

4.4Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2021.07.16	2022.07.15
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Horn	BBHA9170 #774	BBHA 9170	Schwarzbeck	2019.07.26	2022.07.25
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
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
Coaxial Cable (N male) (30MHz-40GHz)	CB05	EMC05	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L3203	Tonscend	2021.07.16	2022.07.15
26-40GHz pre-Amplifier	56774	S40M400L4002	Tonscend	2021.07.16	2022.07.15
18-26.5GHz pre-Amplifier	46732	S10M100L3802	Tonscend	2021.07.16	2022.07.15
Notch Filter	N/A	WRCG-5150-5350	Wainwright	2021.07.16	2022.07.15
Notch Filter	N/A	WRCG-5470-5725	Wainwright	2021.07.16	2022.07.15
Notch Filter	N/A	WRCG-5725-5850	Wainwright	2021.07.16	2022.07.15

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

END OF REPORT