TEST REPORT

APPLICANT	:	Great Talent Technology Limited
PRODUCT NAME	:	Smart Phone
MODEL NAME	:	ACK2326
BRAND NAME	:	ANS
FCC ID	:	2ALZM-ACK2326
STANDARD(S)	:	47 CFR Part 15 Subpart E
RECEIPT DATE	:	2022-04-01
TEST DATE	:	2022-04-15 to 2022-04-29
ISSUE DATE	:	2022-05-19

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

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Change History		
Version	Date	Reason for change
1.0	2022-05-19	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Great Talent Technology Limited
Applicant Address:	35F, HBC HuiLong Center Building-II Minzhi Street, Longhua, Shenzhen, P. R. China 518110
Manufacturer:	Great Talent Technology Limited
Manufacturer Address:	35F, HBC HuiLong Center Building-II Minzhi Street, Longhua, Shenzhen, P. R. China 518110

1.2. Equipment Under Test (EUT) Description

Product Name:	Smart Phone	
Sample No.:	5#	
Hardware Version:	Q6002_V1.0	
Software Version:	ACK2326V1.0.0B001	
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:	1.39dBi	
Accessory Information:	Battery	
	Brand Name:	N/A
	Model No.:	BTE-3005
	Serial No.:	N/A
	Capacity:	3000mAh
	Rated Voltage:	3.8V
	Charge Limit:	4.35V
	Manufacturer:	Phenix New Energy (Hui Zhou) Co., Ltd.

Accessory Information:	AC Adapter	
	Brand Name:	N/A
	Model No.:	TPA-46050200UU
	Serial No.:	N/A
	Rated Output:	5V⎓2000mA
	Rated Input:	100-240V~50/60Hz, 0.3A
	Manufacturer:	Shenzhen Tianyin Electronics Co., Ltd.

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
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	Apr. 18, 2022	Su Xiaoxian	PASS	No deviation
3	15.407(a)	Maximum Conducted Output Power	Apr. 18, 2022	Su Xiaoxian	PASS	No deviation
4	15.407(a)(e)	Emission Bandwidth	Apr. 25, 2022	Su Xiaoxian	PASS	No deviation
5	15.407(a)	Peak Power Spectral Density	Apr. 25, 2022	Su Xiaoxian	PASS	No deviation
6	15.407(g)	Frequency Stability	Apr. 25, 2022	Su Xiaoxian	PASS	No deviation
7	15.207	Conducted Emission	Apr. 15, 2022	Wu Zhaoling	PASS	No deviation
8	15.407(b)	Restricted Frequency Bands	Apr. 25, 2022	Lin Jiayong	PASS	No deviation
9	15.407(b)	Radiated Emission	Apr. 29, 2022	Lin Jiayong	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 2.0dB 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.

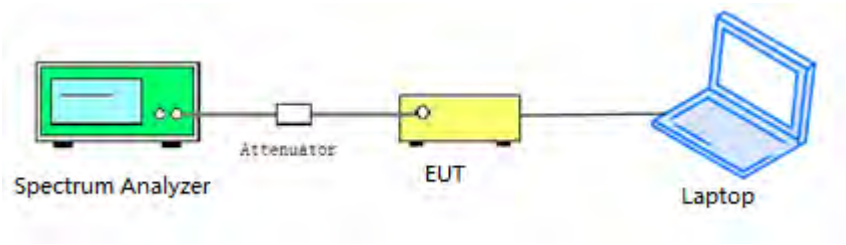
2.2. Duty Cycle of the Test Signal

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

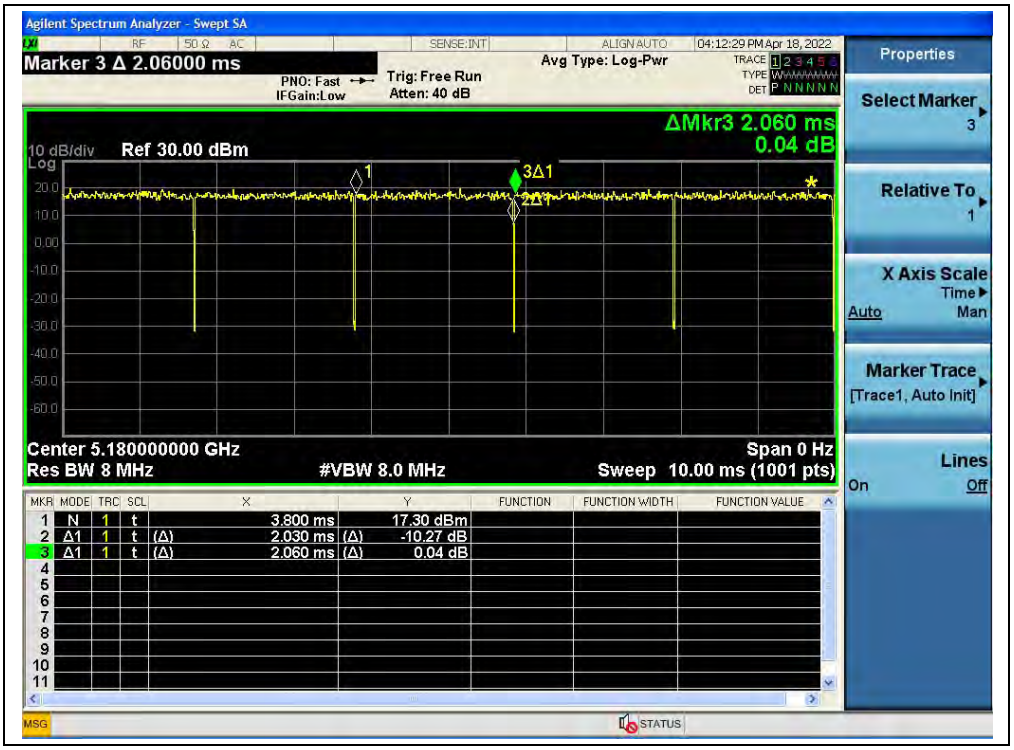
KDB 789033 Section B was used in order to prove compliance.

2.2.4. Test Result

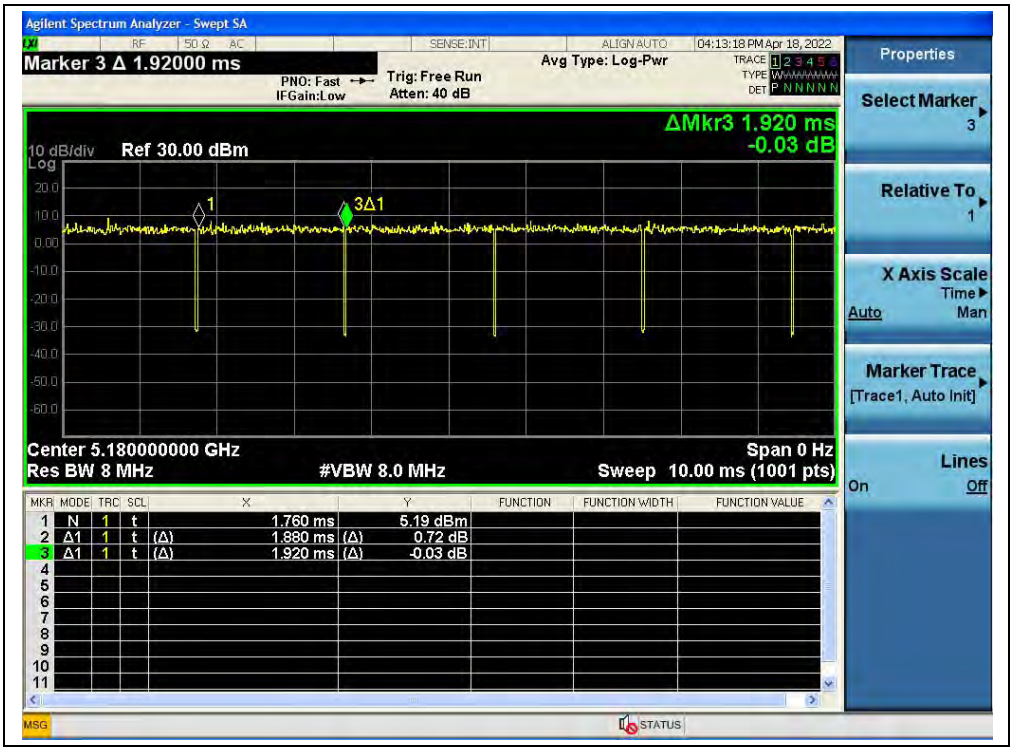
A.Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*log[1/D])
802.11a	98.54	0.06
802.11n (HT20)	97.92	0.09
802.11n (HT40)	96.37	0.16
802.11ac(VHT20)	98.19	0.08
802.11ac(VHT40)	95.90	0.18
802.11ac(VHT80)	92.07	0.36

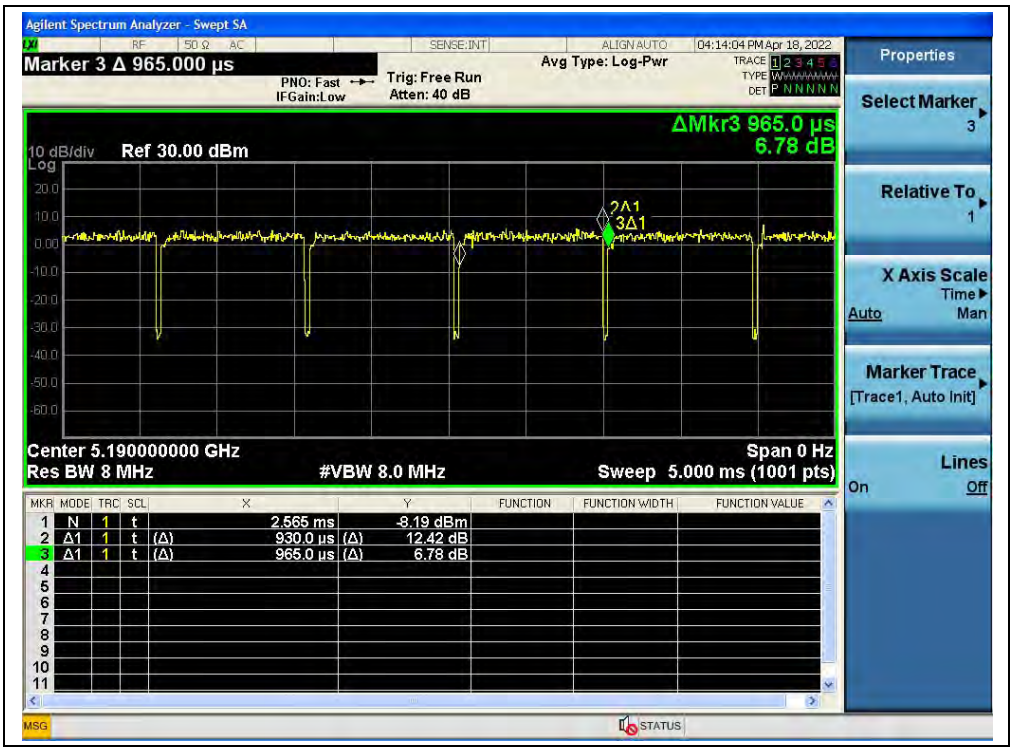
B.Test Plot:



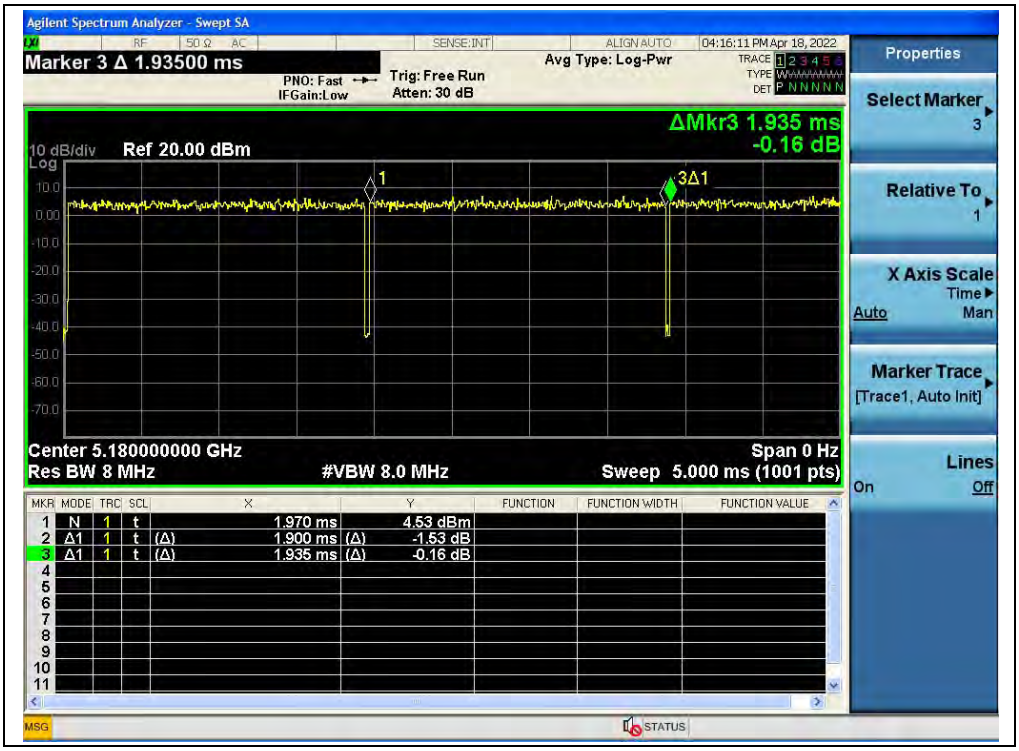
(Channel 36, 5180MHz, 802.11a)



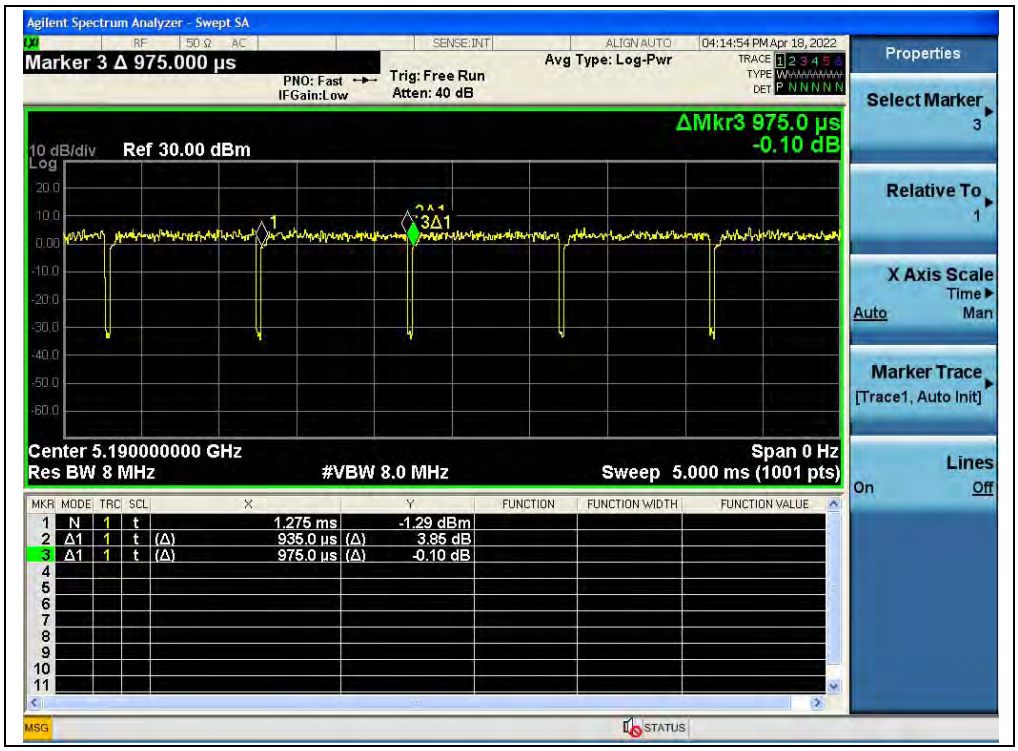
(Channel 36, 5180MHz, 802.11n (HT20))



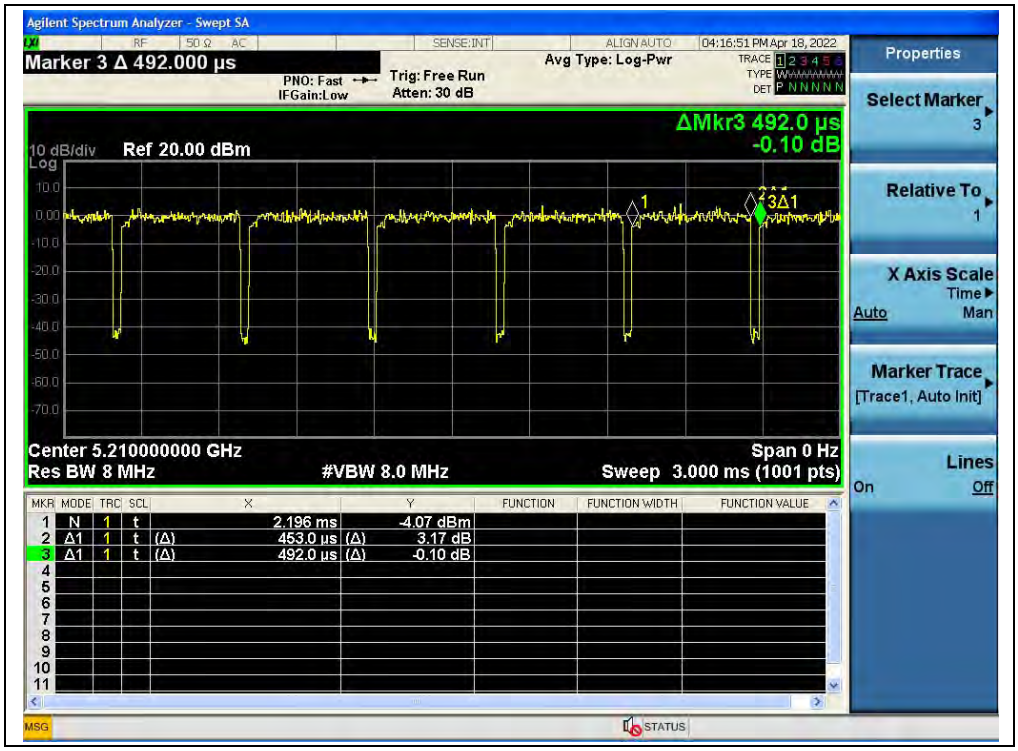
(Channel 38, 5190MHz, 802.11n (HT40))



(CH36_5180MHz _802.11ac (VHT20))



(CH38_5190MHz _802.11ac (VHT40))



(CH42_5210MHz _802.11ac (VHT80))

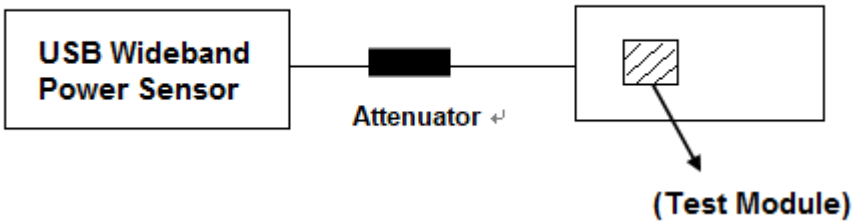
2.3. Maximum Conducted Output Power

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.

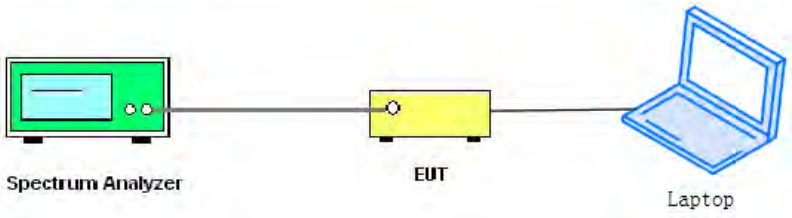
2.3.2. Test Description

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	10.25	0.06	10.31	0.011	24	0.25	PASS
44	5220	10.65		10.71	0.012			
48	5240	10.39		10.45	0.011			
149	5745	12.64		**12.70**	**0.019**	30	1	
157	5785	11.11		11.17	0.013			
165	5825	11.06		11.12	0.013			

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	10.10	0.09	10.19	0.010	24	0.25	PASS
44	5220	10.47		10.56	0.011			
48	5240	10.61		10.70	0.012			
149	5745	12.49		**12.58**	**0.018**	30	1	
157	5785	11.92		12.01	0.016			
165	5825	11.02		11.11	0.013			

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	10.22	0.16	10.38	0.011	24	0.25	PASS
46	5230	10.45		10.61	0.012			
151	5755	12.47		**12.63**	**0.018**	30	1	
159	5795	11.69		11.85	0.015			

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	7.81	0.08	7.89	0.006	24	0.25	PASS
44	5220	7.76		7.84	0.006			
48	5240	7.77		7.85	0.006			
149	5745	10.45		**10.53**	**0.011**	30	1	
157	5785	9.49		9.57	0.009			
165	5825	7.69		7.77	0.006			

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	7.50	0.18	7.68	0.006	24	0.25	PASS
46	5230	7.67		7.85	0.006			
151	5755	10.03		**10.21**	**0.010**	30	1	
159	5795	8.83		9.01	0.008			

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	7.31	0.36	7.67	0.006	24	0.25	PASS
155	5775	9.35		**9.71**	**0.009**	30	1	

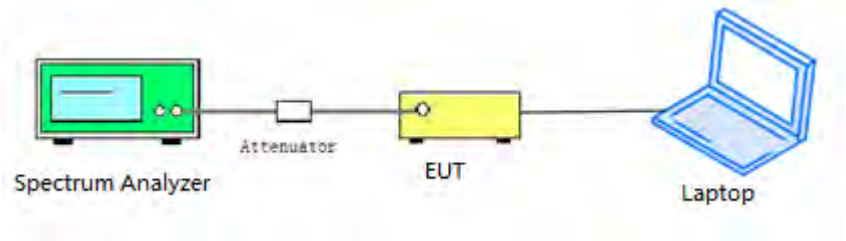
2.4. Emission Bandwidth

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	23.05
44	5220	22.93
48	5240	23.61
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
149	5745	16.07
157	5785	16.32
165	5825	16.33

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	24.22
44	5220	23.69
48	5240	23.91
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
149	5745	15.43
157	5785	17.55
165	5825	17.54

B.Test Plot:

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

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

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

(Channel 149, 5745MHz, 802.11 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	41.24
46	5230	41.11
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
151	5755	36.27
159	5795	36.31

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	23.39
44	5220	23.59
48	5240	24.28
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
149	5745	17.02
157	5785	16.31
165	5825	17.52

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:

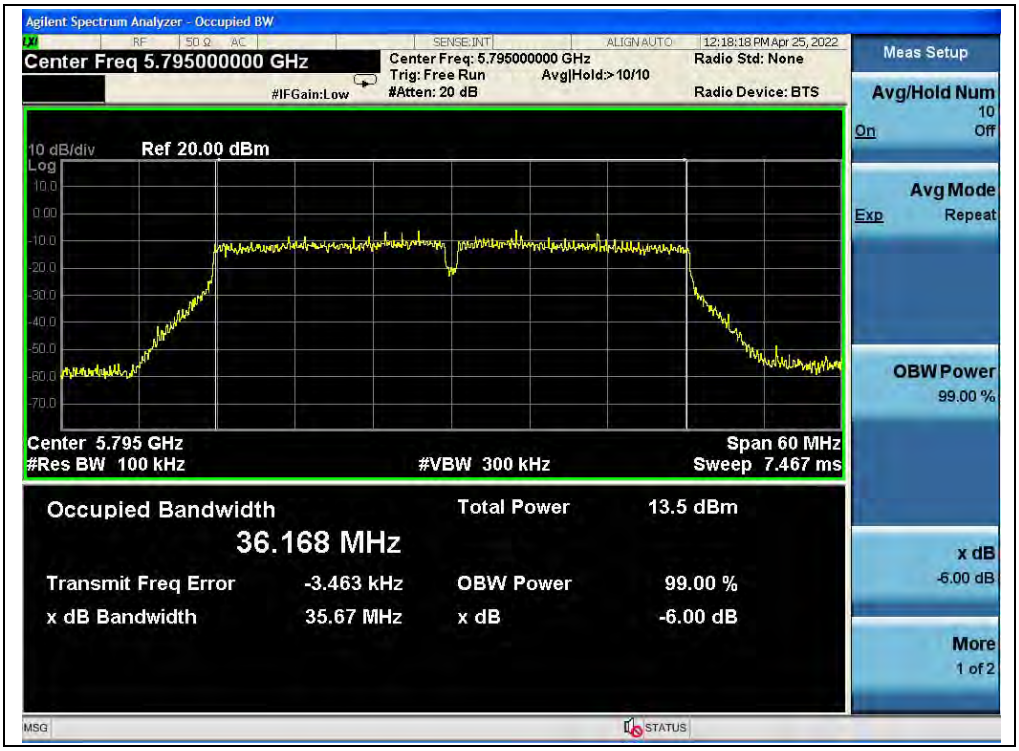
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	41.19
46	5230	40.64
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
151	5755	36.31
159	5795	35.67

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))

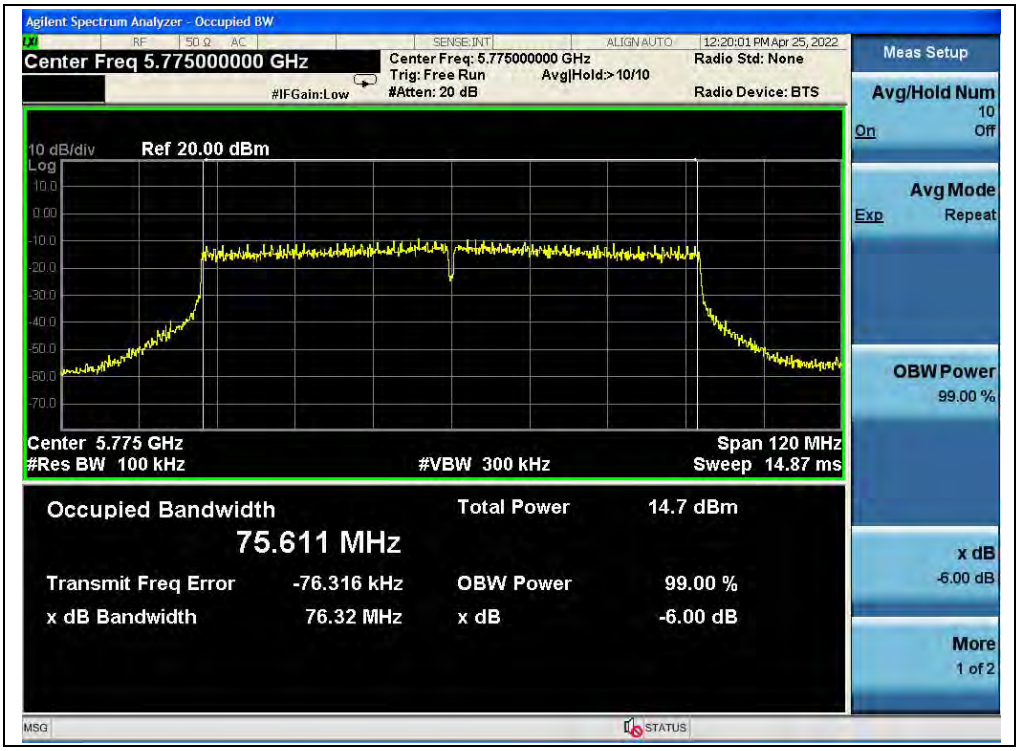
802.11ac (VHT80) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	81.49
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
155	5775	76.32

B.Test Plot:

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



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

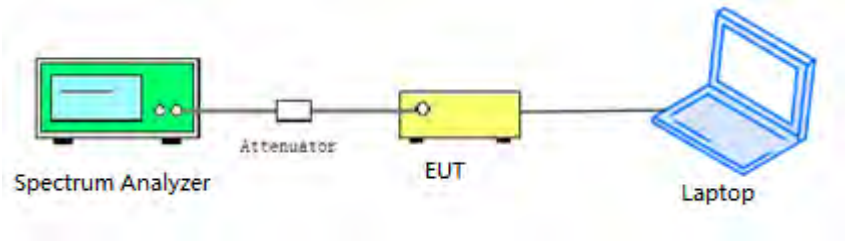
2.5. Peak Power Spectral Density

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	2.58	0.06	2.64	11	PASS
44	5220	2.92		2.98		
48	5240	3.05		3.11		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	0.23	0.06	0.29	30	PASS
157	5785	-0.31		-0.25		
165	5825	-1.43		-1.37		

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	2.08	0.09	2.17	11	PASS
44	5220	2.56		2.65		
48	5240	2.78		2.87		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	0.66	0.09	0.75	30	PASS
157	5785	-0.75		-0.66		
165	5825	-1.82		-1.73		

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	-0.92	0.16	-0.76	11	PASS
46	5230	-0.59		-0.43		
Channel	**Frequency (MHz)**	**Measured PPSD (dBm/500KHz)**	**Duty Factor**	**Corrected (dBm/500KHz)**	**Limit (dBm/500KHz)**	**Verdict**
151	5755	-3.42	0.16	-3.26	30	PASS
159	5795	-4.27		-4.11		

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

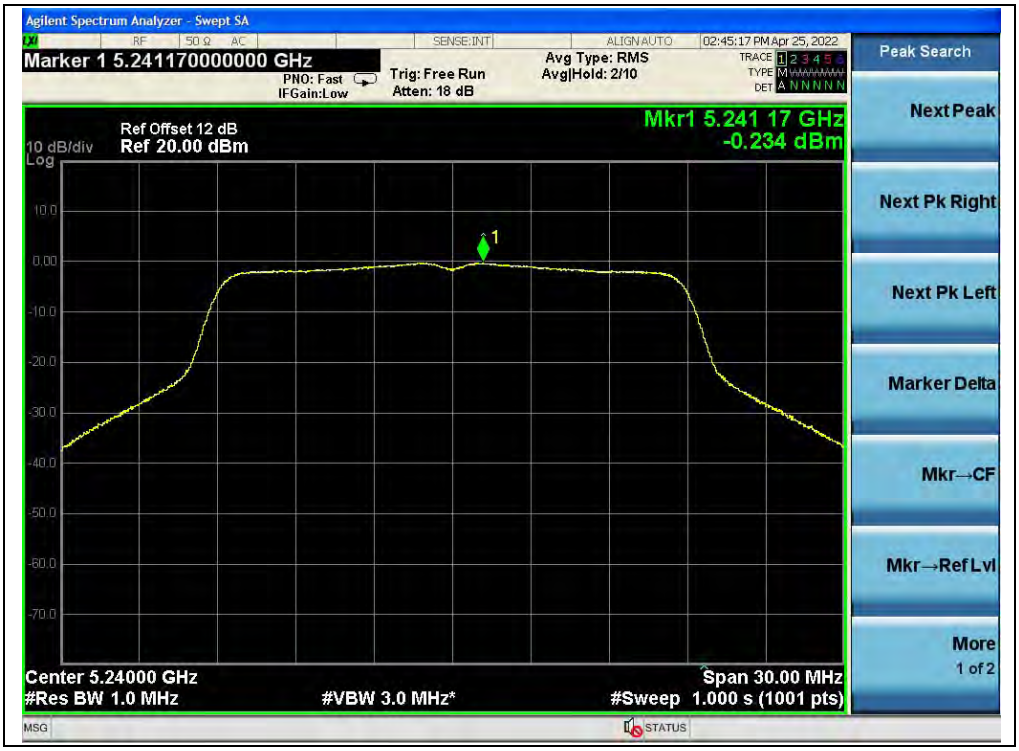
A.Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	-0.61	0.08	-0.53	11	PASS
44	5220	-0.31		-0.23		
48	5240	-0.23		-0.15		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	-3.53	0.08	-3.45	30	PASS
157	5785	-4.65		-4.57		
165	5825	-5.33		-5.25		

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	-2.91	0.18	-2.73	11	PASS
46	5230	-2.73		-2.55		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-5.79	0.18	-5.61	30	PASS
159	5795	-6.98		-6.80		

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	-6.51	0.36	-6.15	11	PASS
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
155	5775	-9.53	0.36	-9.17	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%	3.80	+20(Ref)	22	4.247
100%		-30	30	5.792
100%		-20	28	5.405
100%		-10	25	4.826
100%		0	24	4.633
100%		+10	21	4.054
100%		+20	19	3.668
100%		+30	22	4.247
100%		+40	25	4.826
100%		+50	22	4.247
115%	4.35	+20	27	5.212
85%	3.65	+20	29	5.598

U-NII-3 (Ch. 149) 5745MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Fre. Dev. (kHz)	Deviation (ppm)
100%	3.80	+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	26	4.526
100%		+40	28	4.874
100%		+50	28	4.874
115%	4.35	+20	31	5.396
85%	3.65	+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

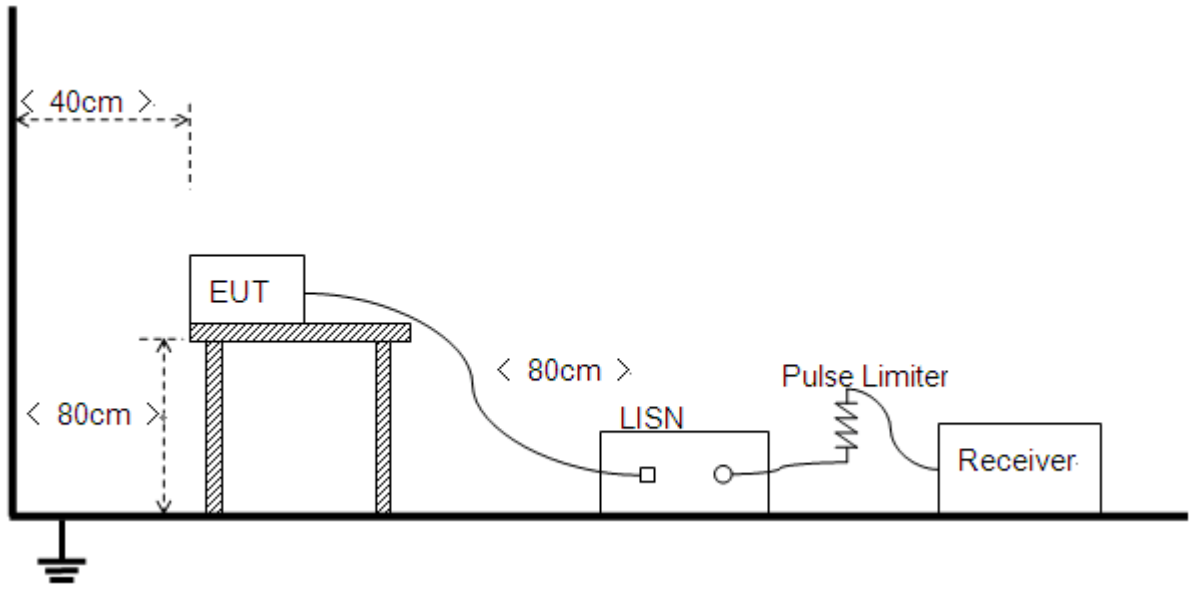
Note:

(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+ Adapter+Earphone WIFI TX

Test Voltage: AC 120V/60Hz

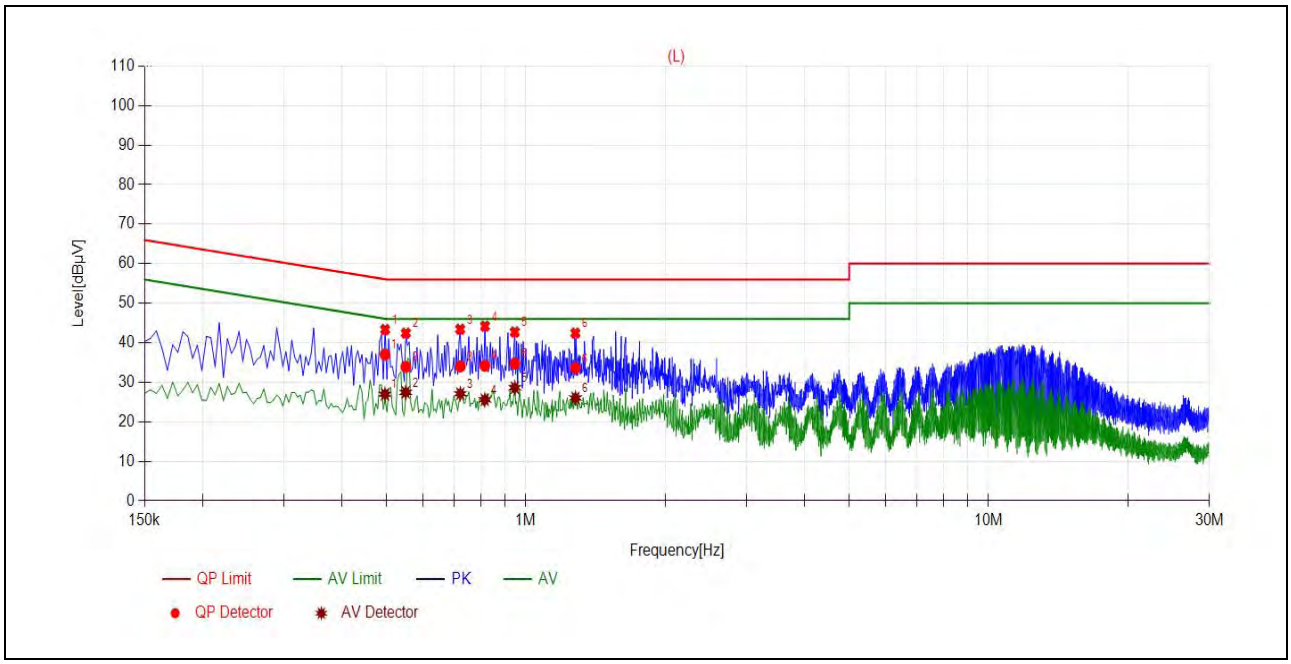
The measurement results are obtained as below:

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

U_R: Receiver Reading

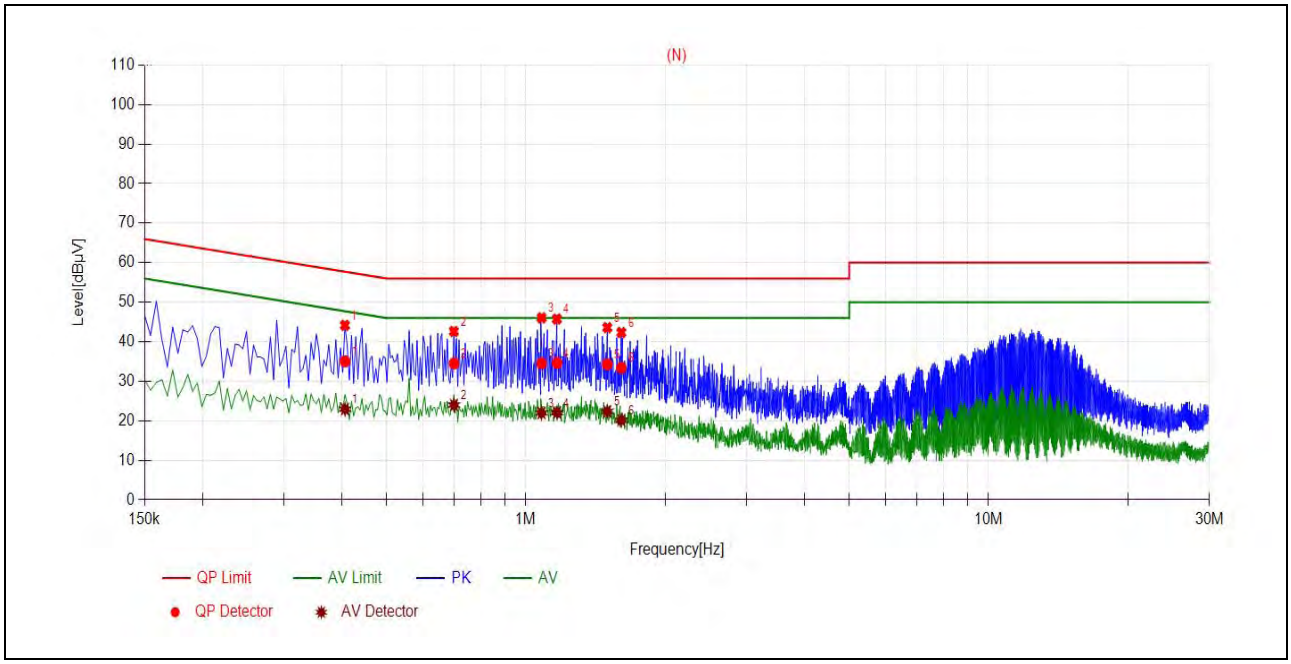
A_{Factor}: Voltage division factor of LISN

B.Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.4960	37.02	26.97	56.07	46.07	Line	PASS
2	0.5501	33.91	27.45	56.00	46.00		PASS
3	0.7218	34.02	27.10	56.00	46.00		PASS
4	0.8153	34.19	25.55	56.00	46.00		PASS
5	0.9467	34.76	28.62	56.00	46.00		PASS
6	1.2803	33.59	26.02	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	0.4066	35.04	22.92	57.72	47.72	Neutral	PASS
2	0.6994	34.52	23.99	56.00	46.00		PASS
3	1.0810	34.54	21.96	56.00	46.00		PASS
4	1.1680	34.65	22.04	56.00	46.00		PASS
5	1.4995	34.31	22.36	56.00	46.00		PASS
6	1.6085	33.42	20.13	56.00	46.00		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

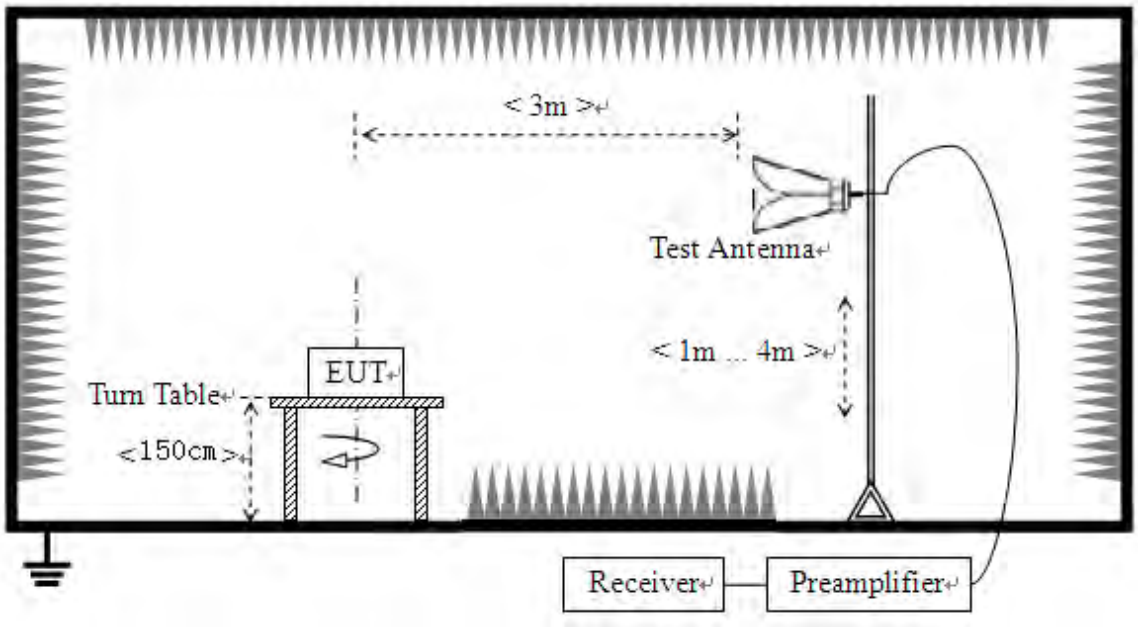
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following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

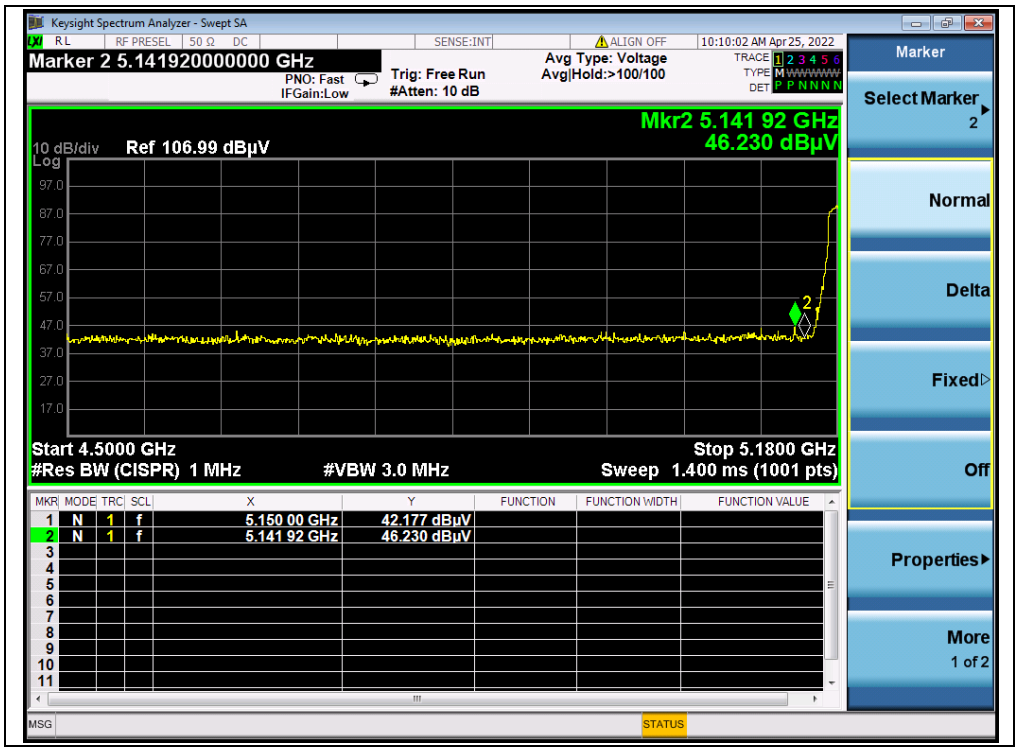
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]$-G_{preamp}$ [dB]
A_T: Total correction Factor except Antenna; U_R: Receiver Reading
G_{preamp}: Preamplifier 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

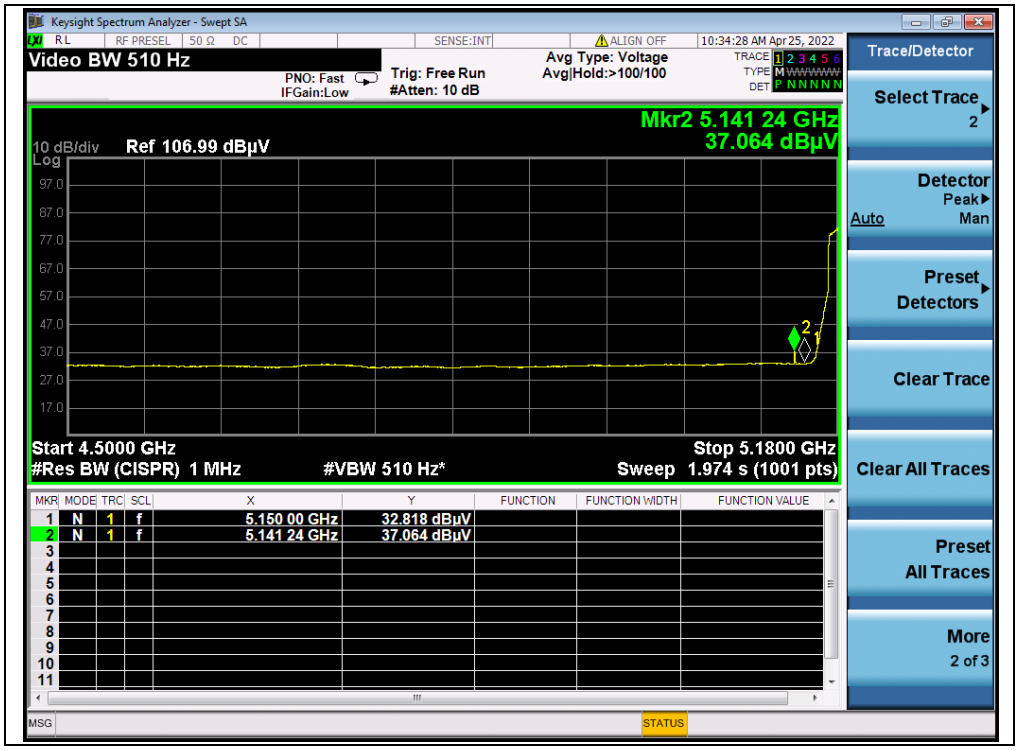
A.Test Verdict:

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	5141.92	PK	46.23	-19.54	32.20	58.89	74	PASS
36	5141.24	AV	37.06	-19.54	32.20	49.72	54	PASS
48	5357.92	PK	43.02	-19.54	32.20	55.68	74	PASS
48	5355.28	AV	31.46	-19.54	32.20	44.12	54	PASS
149	5650.00	PK	43.12	-19.01	32.20	56.31	68.23	PASS
165	5855.00	PK	40.86	-19.01	32.20	54.05	110.83	PASS

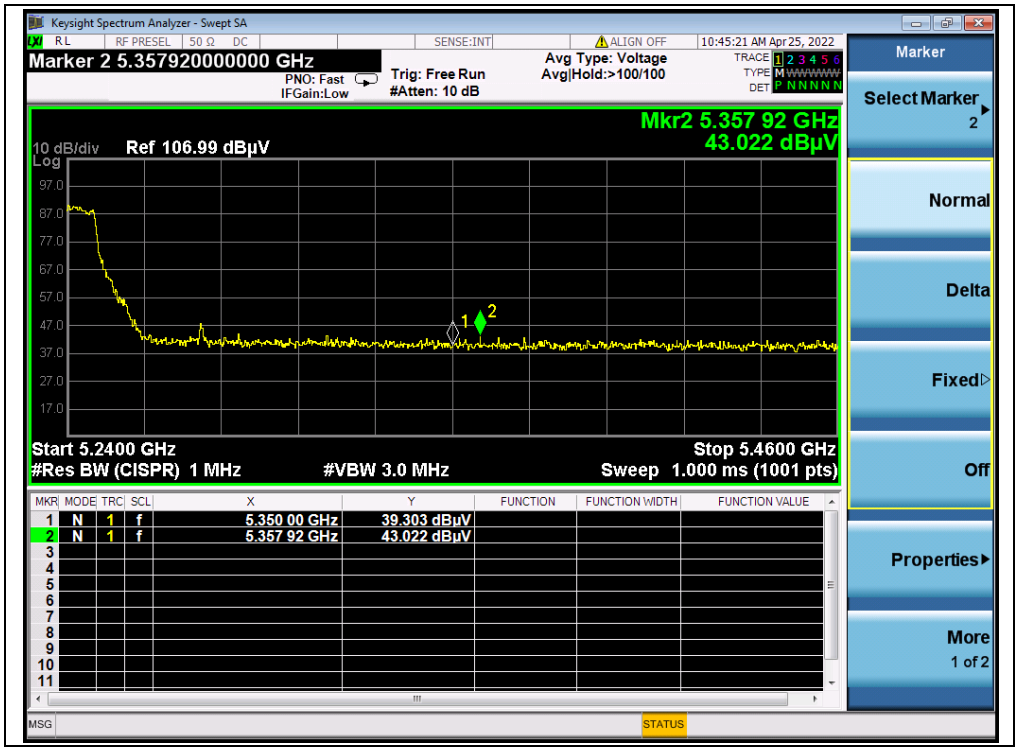
B.Test Plot:



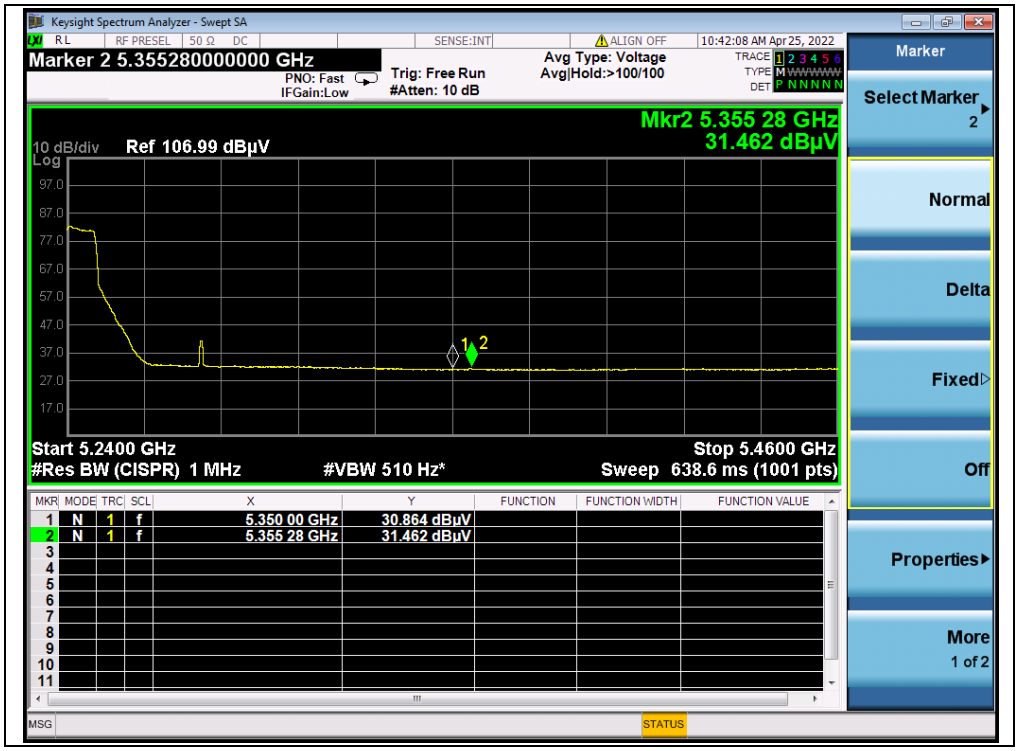
(PEAK, Channel 36, 802.11a)



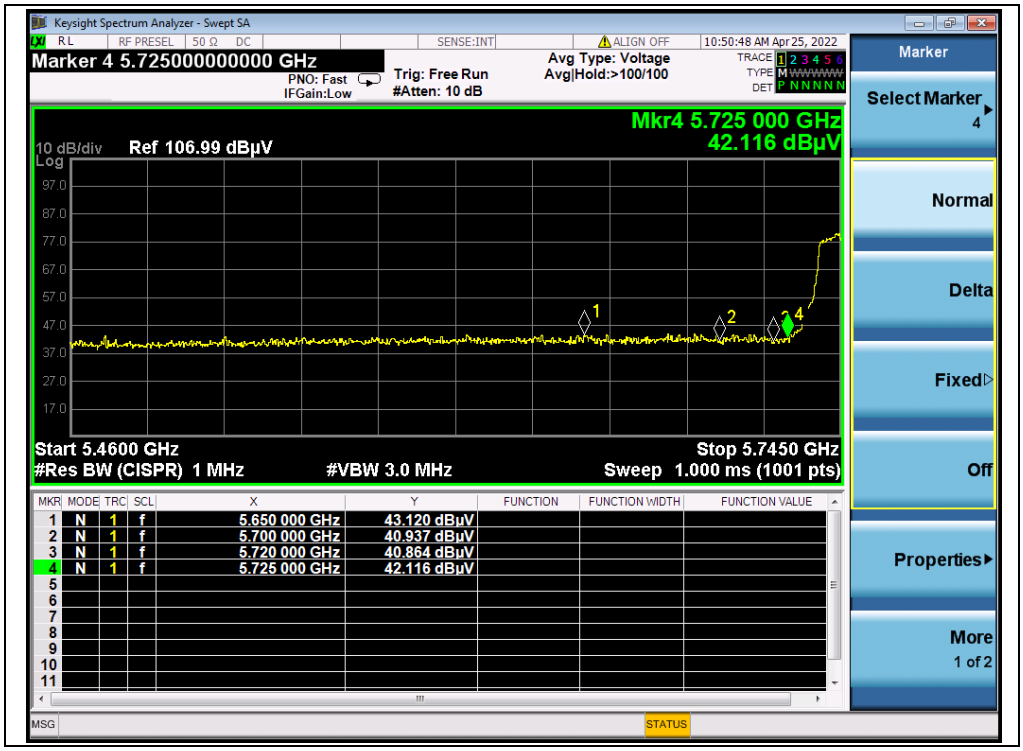
(AVERAGE, Channel 36, 802.11a)



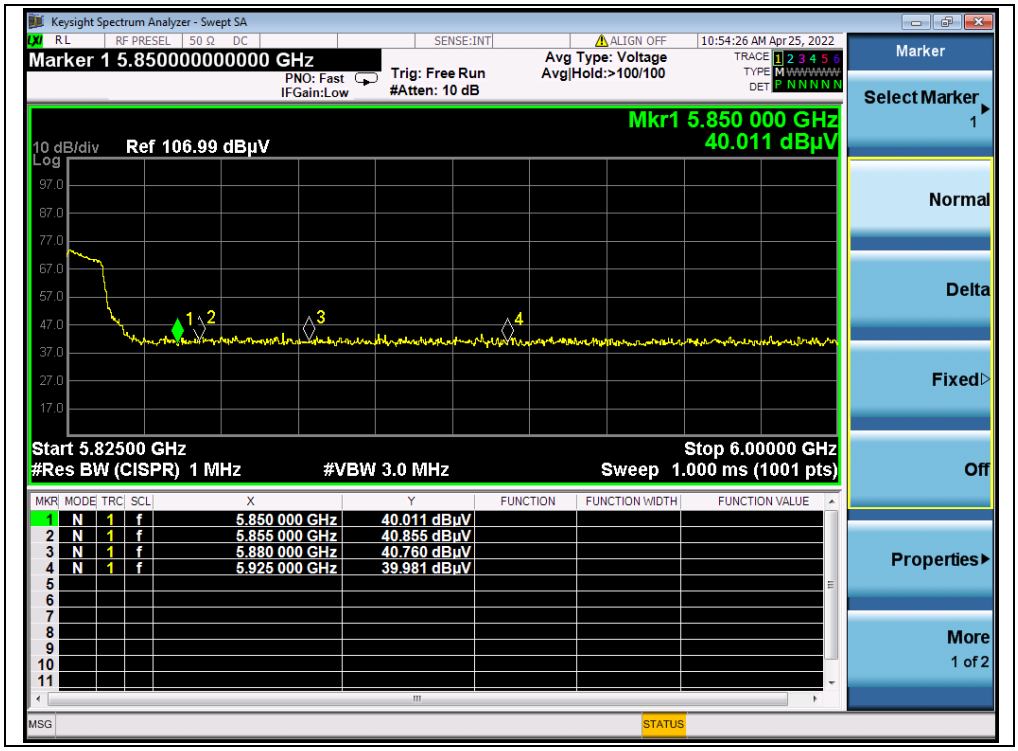
(PEAK, Channel 48, 802.11a)



(AVERAGE, Channel 48, 802.11a)



(PEAK, Channel 149, 802.11a)



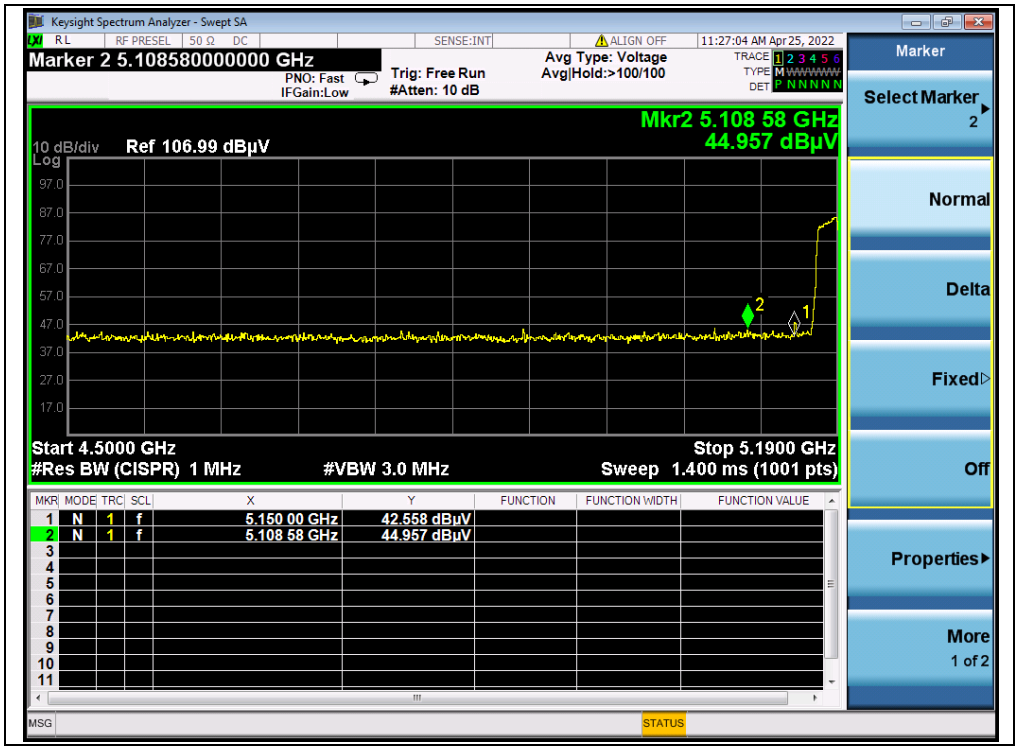
(PEAK, Channel 165, 802.11a)

802.11n (HT40) Mode

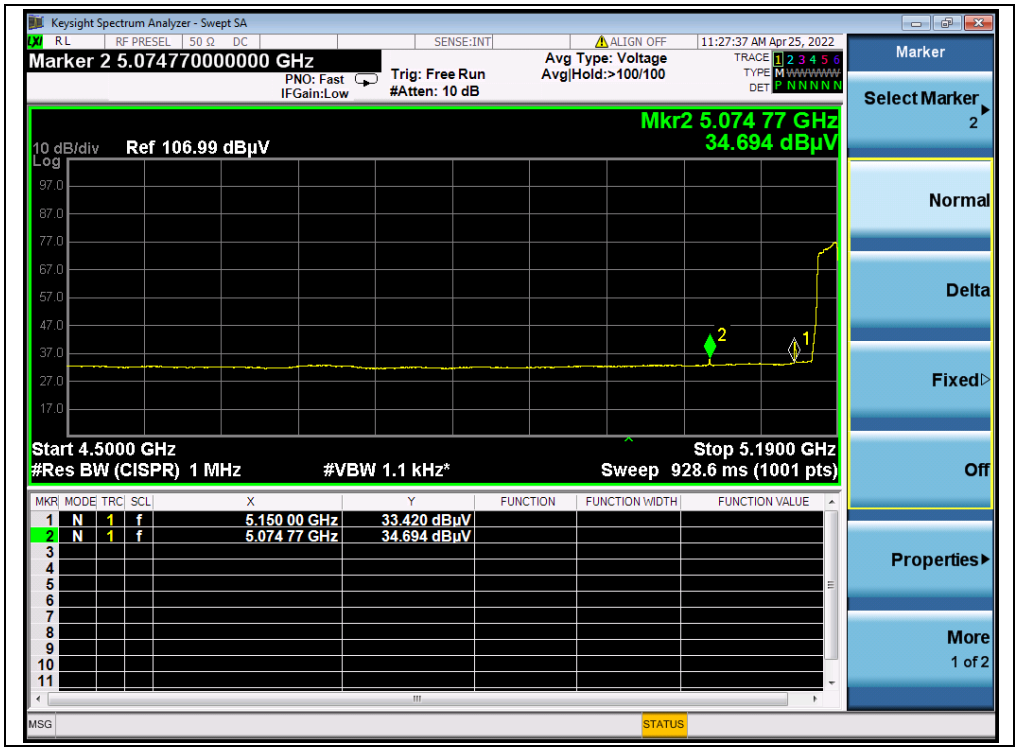
A.Test Verdict:

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	5108.58	PK	44.96	-19.54	32.20	57.62	74	PASS
38	5074.77	AV	34.69	-19.54	32.20	47.35	54	PASS
48	5351.10	PK	40.96	-19.54	32.20	53.62	74	PASS
48	5351.10	AV	31.35	-19.54	32.20	44.01	54	PASS
151	5650.00	PK	41.70	-19.01	32.20	54.89	68.23	PASS
159	5850.00	PK	43.27	-19.01	32.20	56.46	122.23	PASS

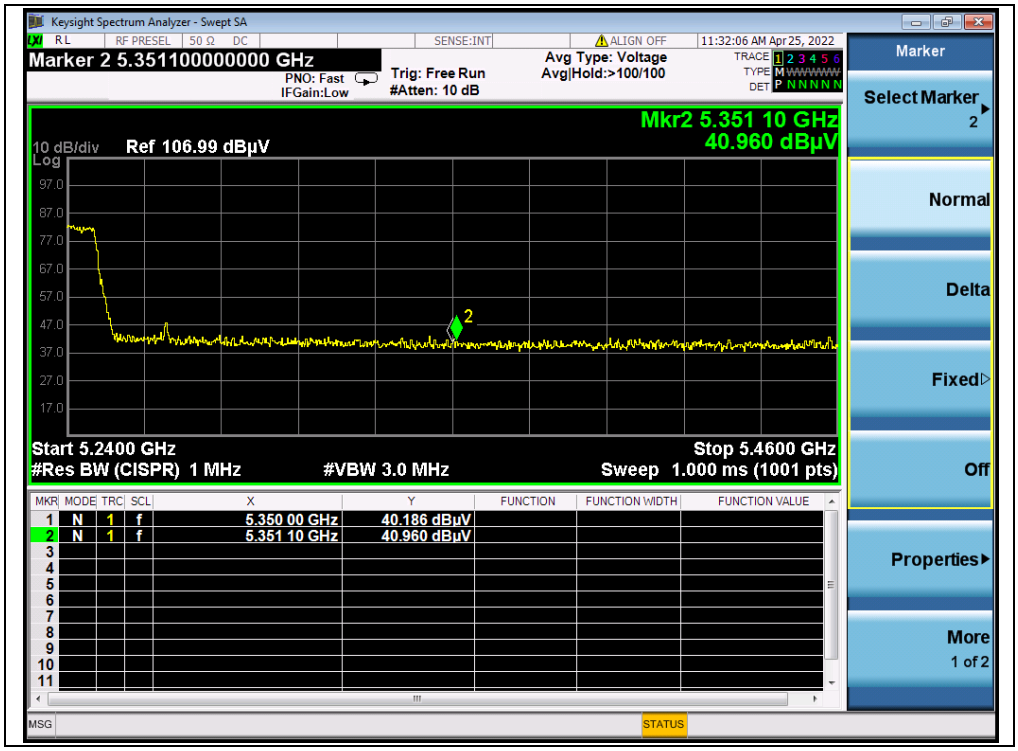
B.Test Plot:



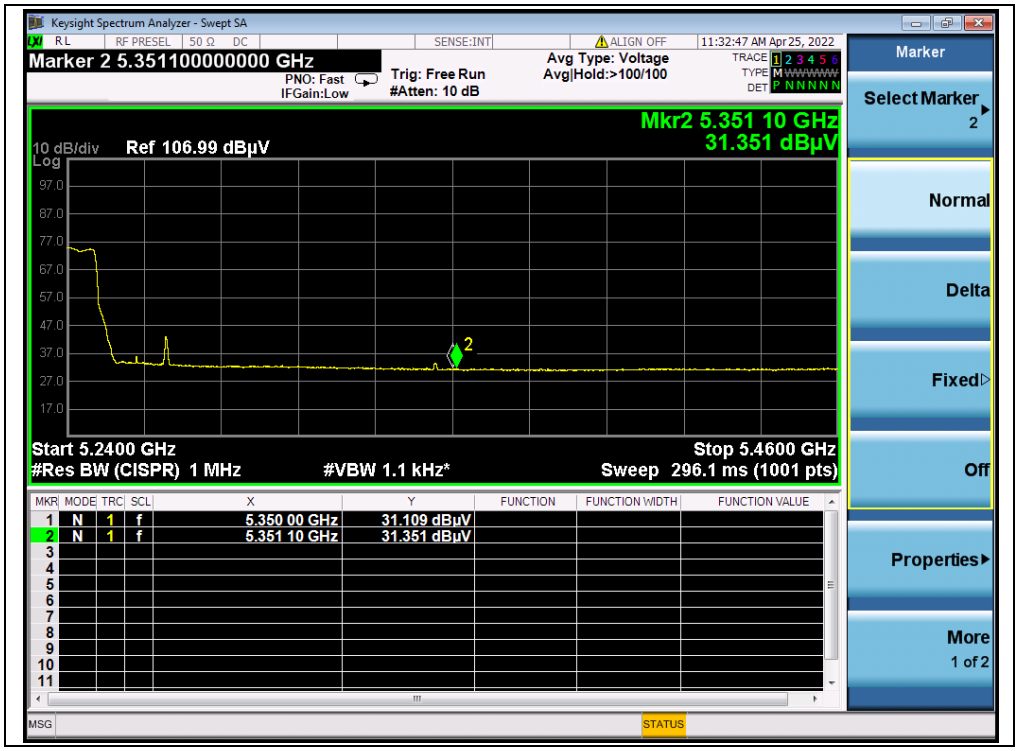
(PEAK, Channel 38, 802.11n (HT40))



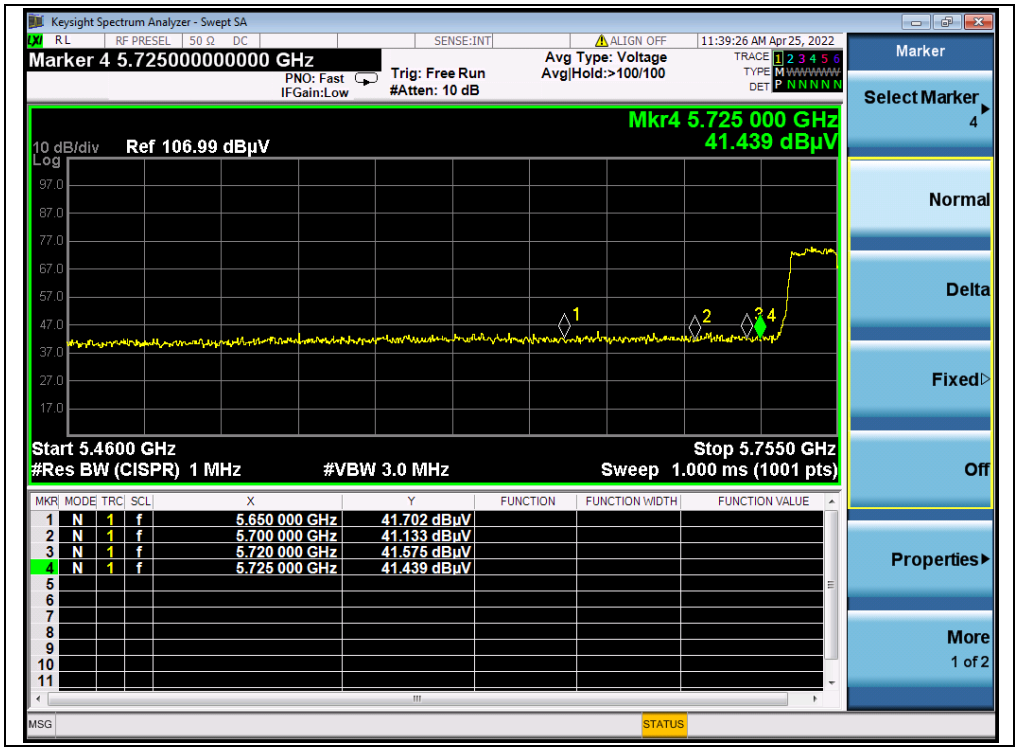
(AVERAGE, Channel 38, 802.11n (HT40))



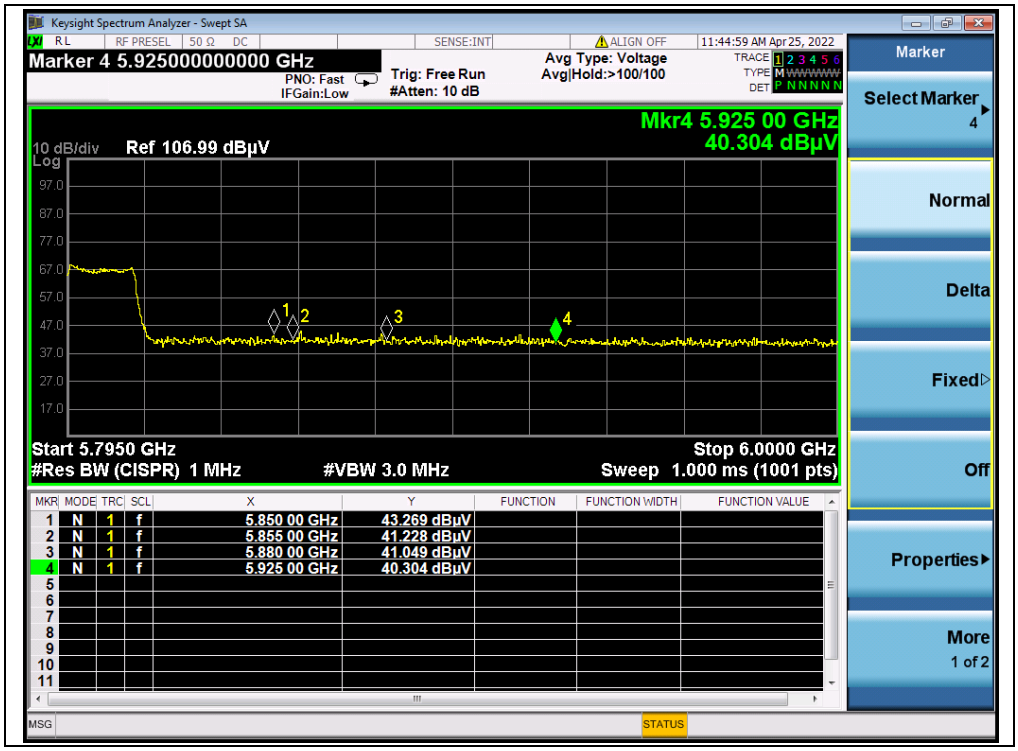
(PEAK, Channel 48, 802.11n (HT40))



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



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



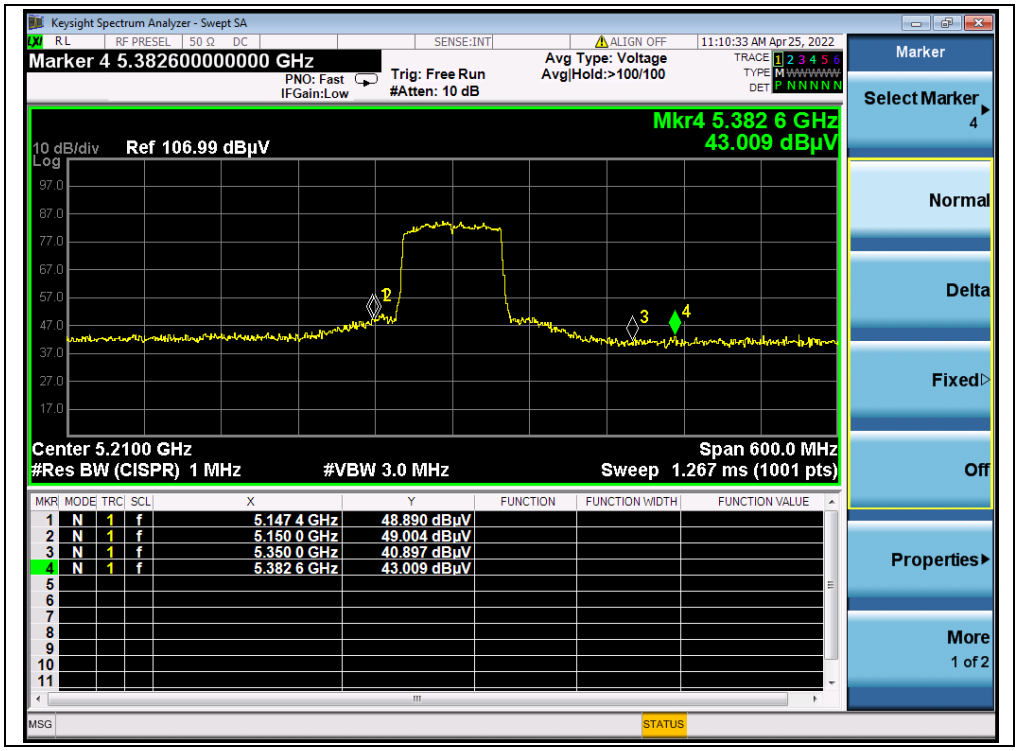
(PEAK, Channel 159, 802.11n (HT40))

802.11 ac (VHT80) Mode

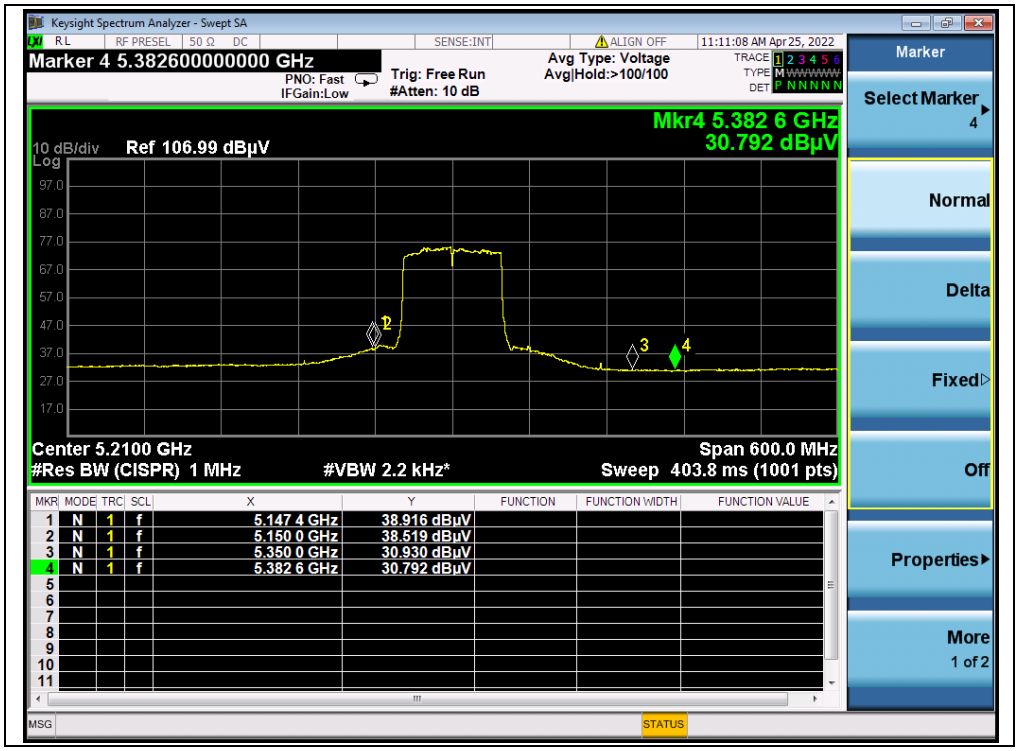
A.Test Verdict:

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	5150.00	PK	49.00	-19.54	32.2	61.66	74	PASS
42	5147.40	AV	38.92	-19.54	32.2	51.58	54	PASS
42	5147.40	PK	48.89	-19.54	32.2	61.55	74	PASS
42	5350.00	AV	30.93	-19.54	32.2	43.59	54	PASS
155	5700.00	PK	44.01	-19.01	32.2	57.20	105.23	PASS
155	5850.00	PK	43.06	-19.01	32.2	56.25	122.23	PASS

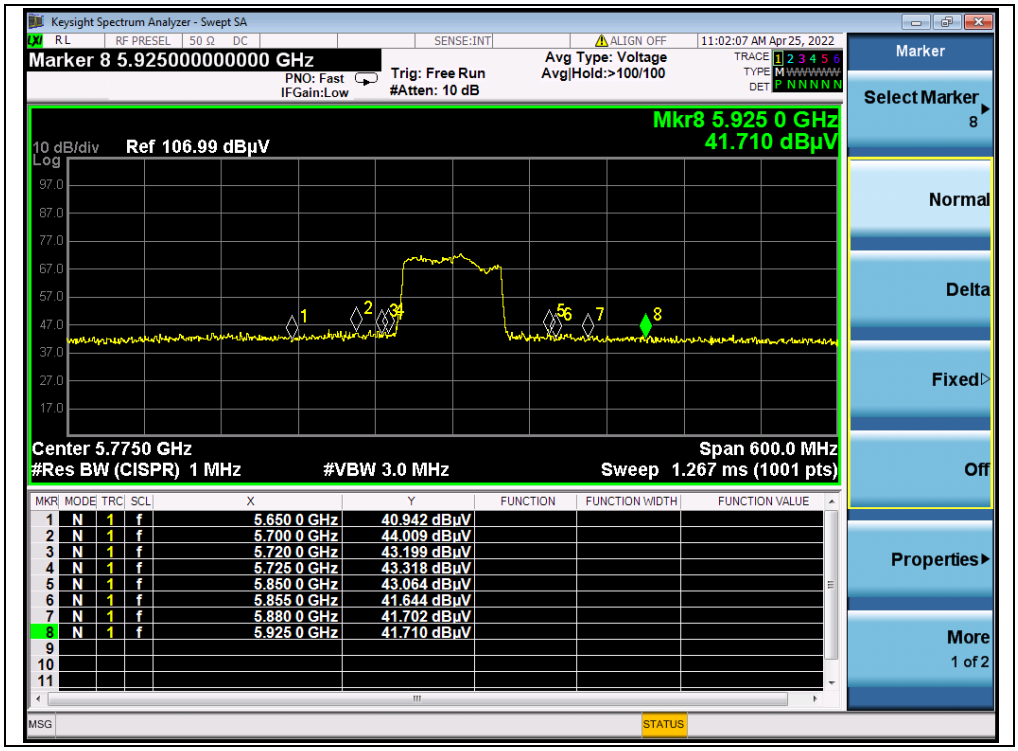
B.Test Plot:



(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:

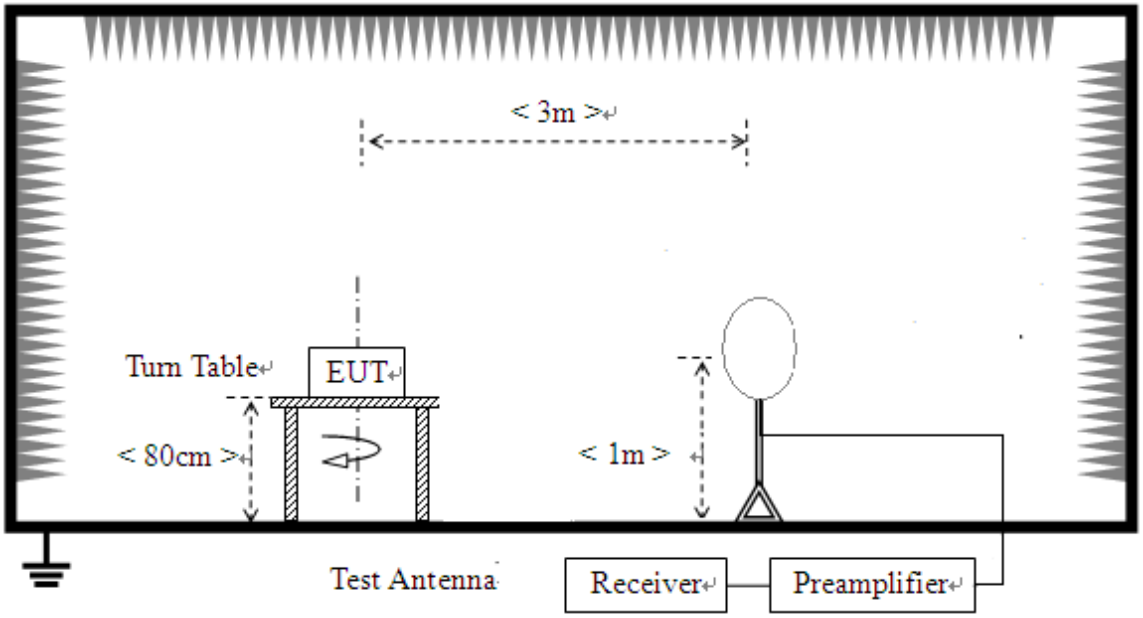
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

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).

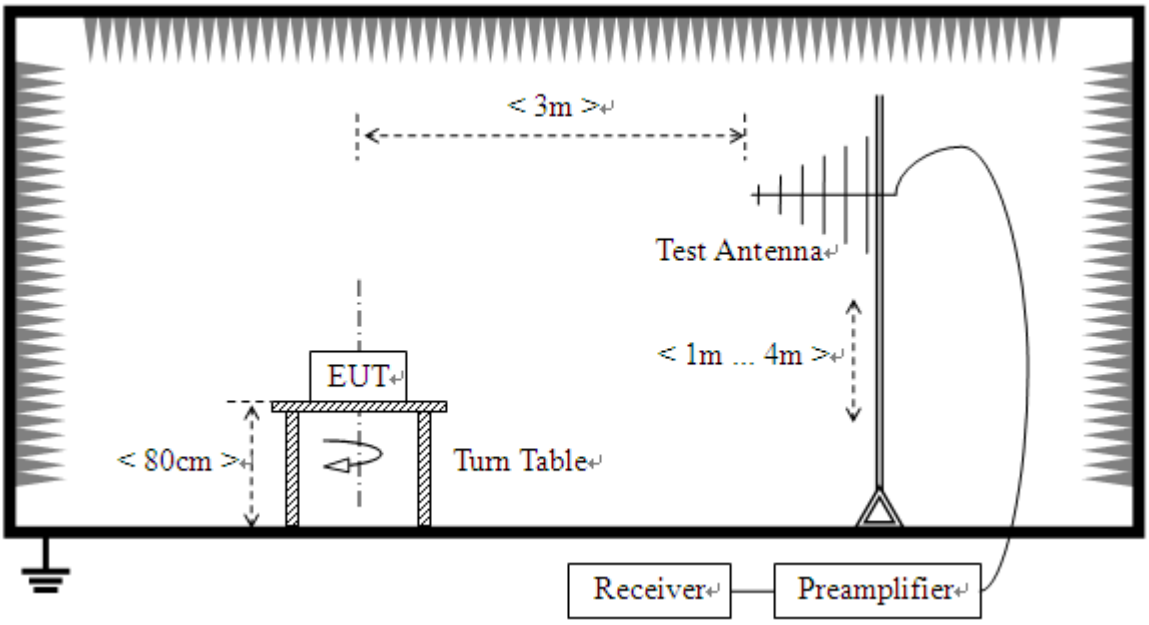
2.9.2. Test Description

Test Setup:

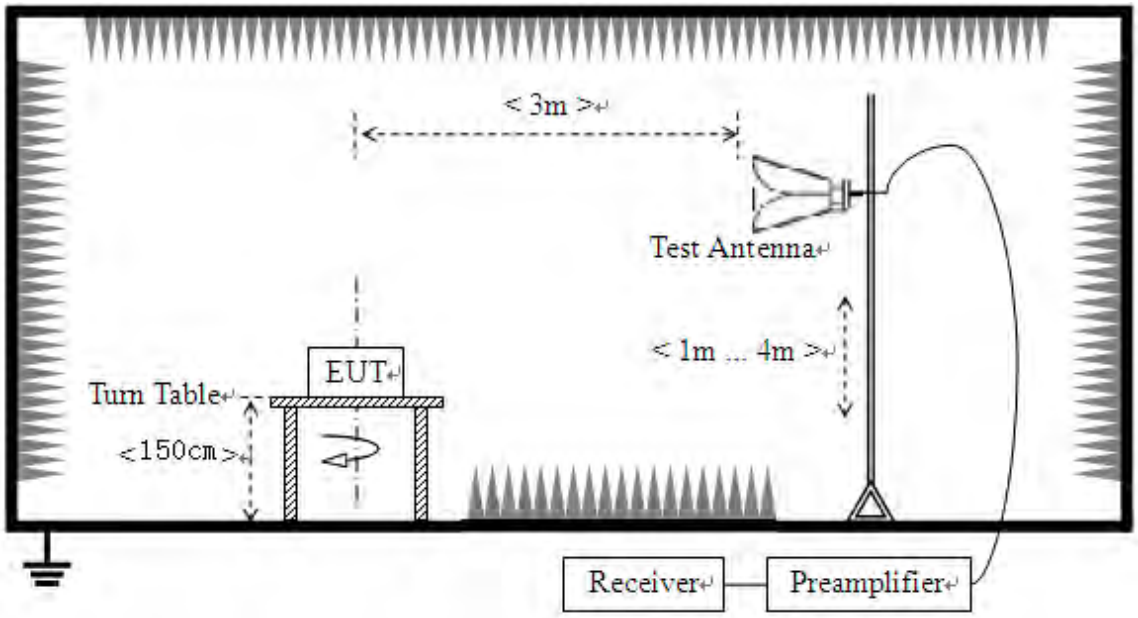
1) For radiated emissions from 9kHz to 30MHz



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.

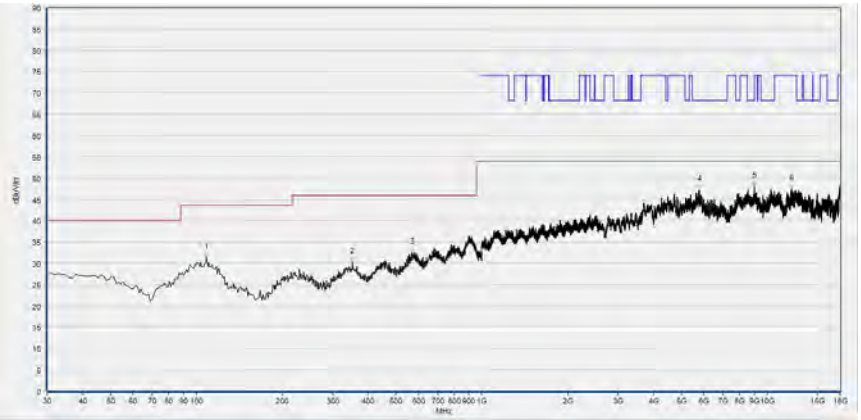
Note 2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

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.

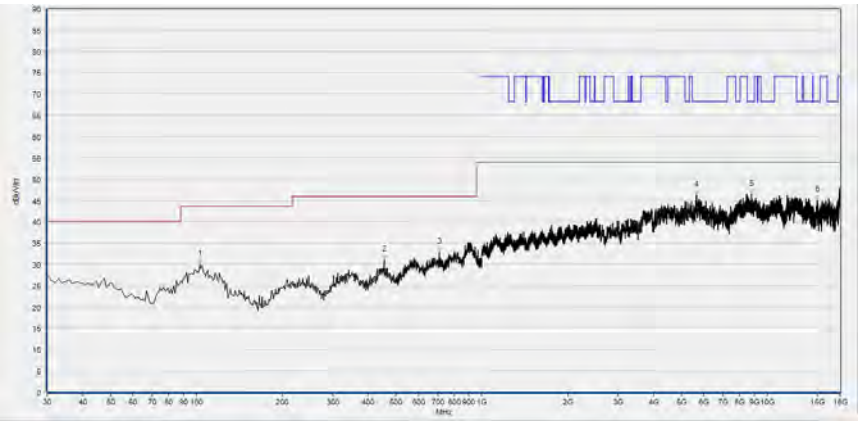
802.11a Mode

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
108.649	31.30	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
352.362	30.31	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
570.831	32.49	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5773.035	47.20	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
9004.601	48.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12156.071	47.45	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

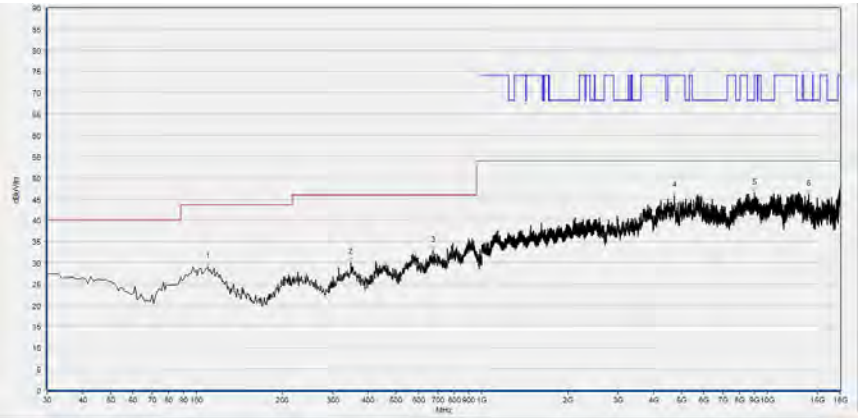
(Antenna Horizontal, 30MHz to 18GHz)



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
102.823	29.93	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
454.314	30.96	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
710.651	32.90	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5637.487	46.28	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8819.764	46.47	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
14987.157	45.11	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

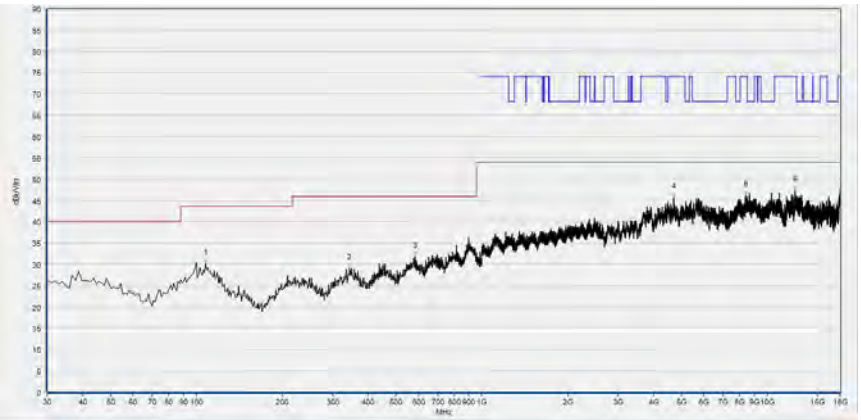
(Antenna Vertical, 30MHz to 18GHz)

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	29.06	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
347.508	29.94	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
674.725	32.89	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4719.464	45.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8995.359	46.44	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
13985.957	46.01	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

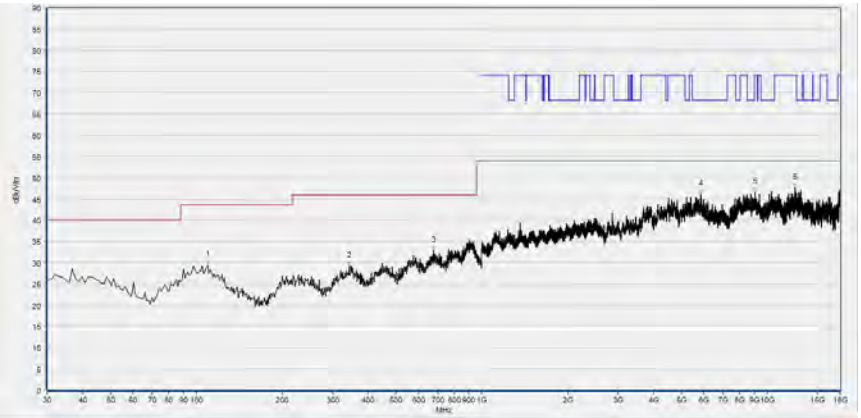
(Antenna Horizontal, 30MHz to 18GHz)



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
107.678	30.11	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
343.624	28.96	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
583.453	31.80	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4704.061	45.83	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8406.961	46.26	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12522.665	47.44	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

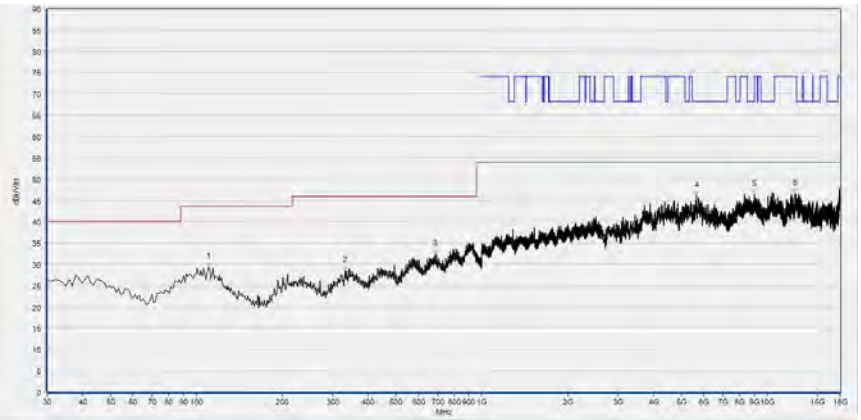
(Antenna Vertical, 30MHz to 18GHz)

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
109.620	29.57	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
342.653	29.20	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
676.667	32.78	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5846.969	46.01	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
9078.536	46.57	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12507.261	47.66	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

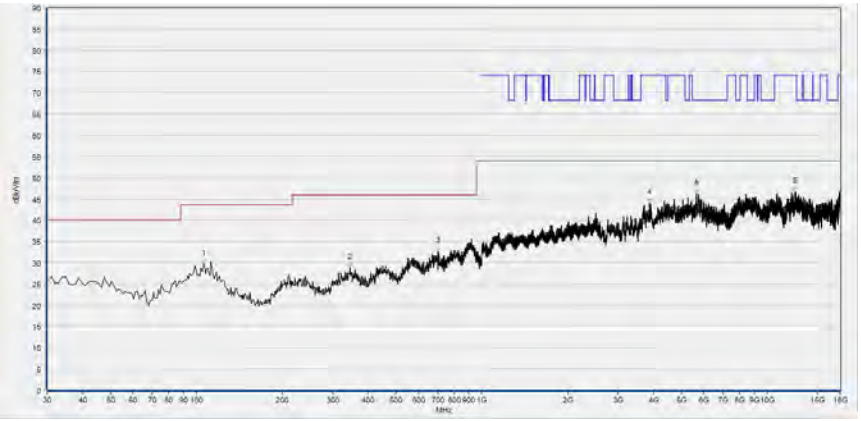
(Antenna Horizontal, 30MHz to 18GHz)



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
110.591	29.32	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
331.001	28.54	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
686.376	32.39	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5655.971	46.13	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8992.278	46.42	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12544.229	46.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

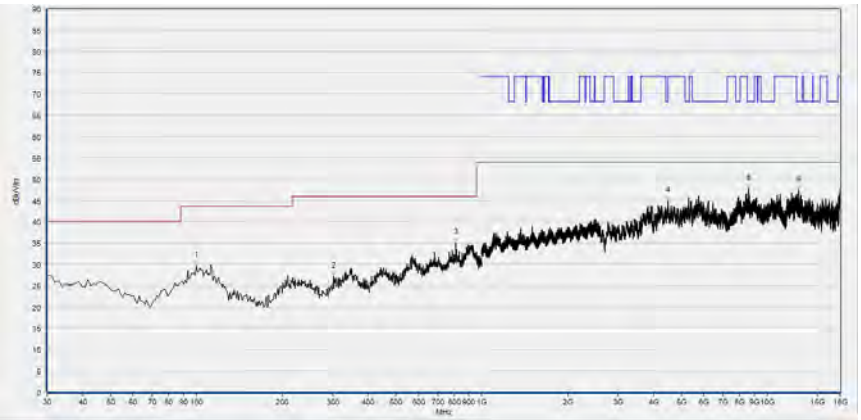
(Antenna Vertical, 30MHz to 18GHz)

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
105.736	29.60	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
344.595	28.79	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
700.941	32.63	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3869.214	44.08	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5655.971	46.32	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12507.261	46.73	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

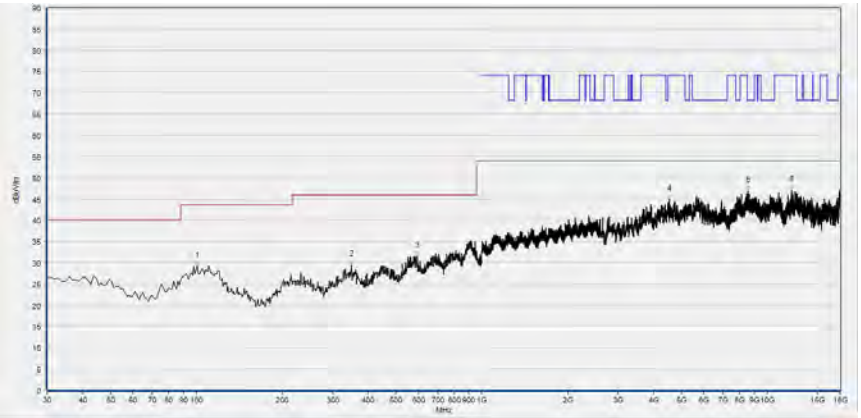
(Antenna Horizontal, 30MHz to 18GHz)



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	29.74	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
301.872	27.07	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
809.690	35.01	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4482.256	44.88	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8585.637	47.70	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12870.774	47.43	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

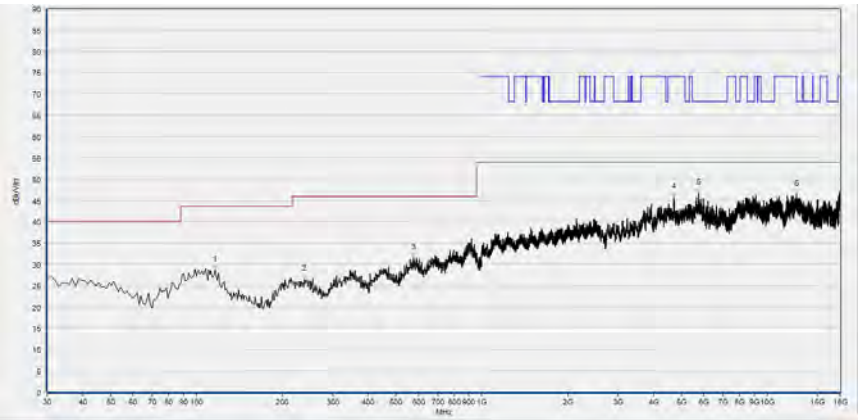
(Antenna Vertical, 30MHz to 18GHz)

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	29.08	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
348.478	29.46	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
595.105	31.57	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4531.546	44.99	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8579.476	46.93	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12183.797	47.07	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

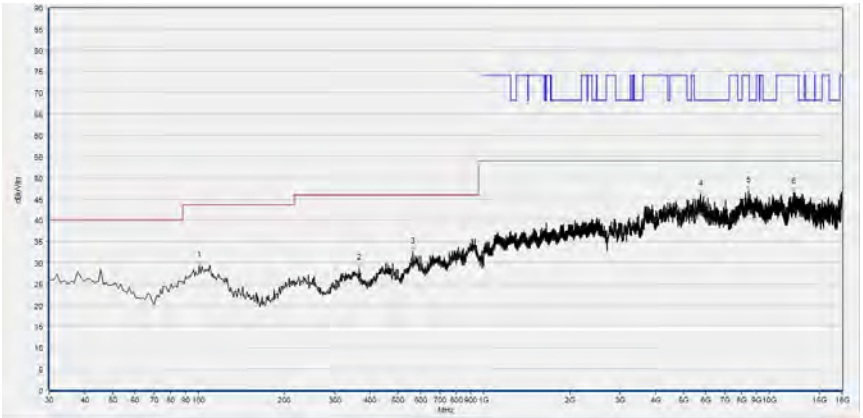
(Antenna Horizontal, 30MHz to 18GHz)



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
116.416	28.74	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
238.759	26.54	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
575.686	31.45	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4691.738	45.78	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5763.793	46.72	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12679.776	46.47	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

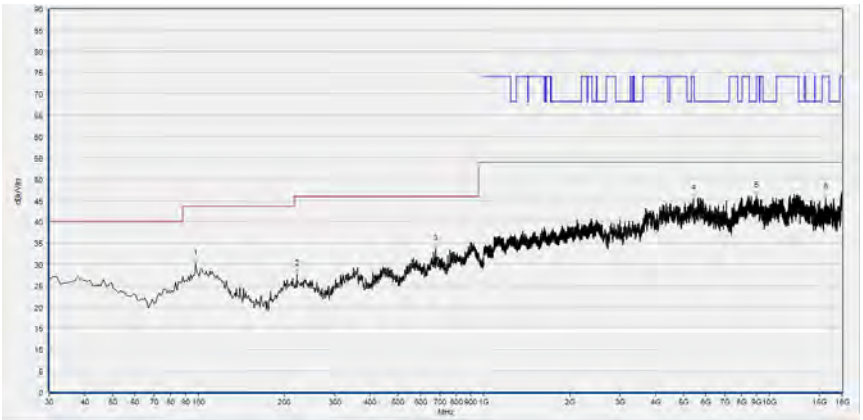
(Antenna Vertical, 30MHz to 18GHz)

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	29.36	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
365.956	28.67	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
565.005	32.50	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5754.551	46.01	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8437.768	46.85	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12196.119	46.57	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

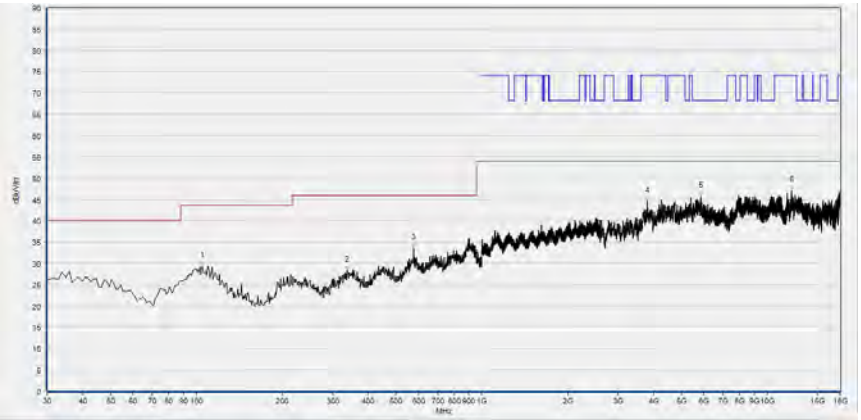


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
97.968	30.12	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
221.281	27.71	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
678.609	33.51	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5428.006	45.47	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9035.407	46.10	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
15760.392	45.63	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

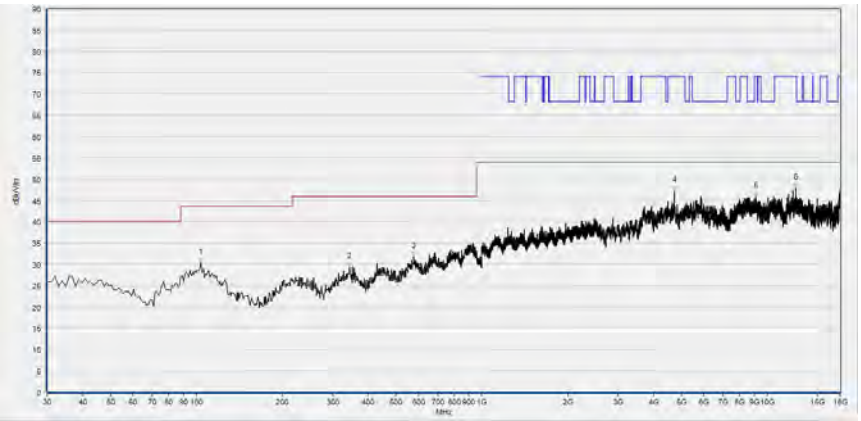
802.11n (HT40) Mode

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
104.765	29.25	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
336.827	28.35	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
576.657	33.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3798.360	44.55	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5862.372	45.78	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12149.910	47.10	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

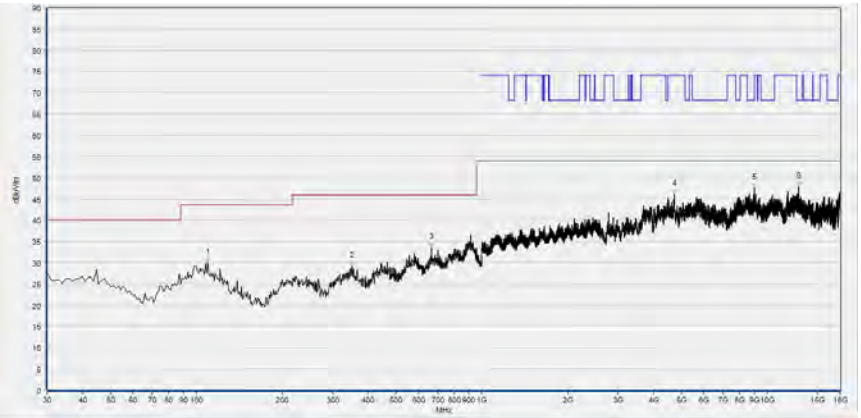
(Antenna Horizontal, 30MHz to 18GHz)



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	30.36	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
343.624	29.34	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
576.657	31.77	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
4719.464	47.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9143.229	45.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12615.083	47.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

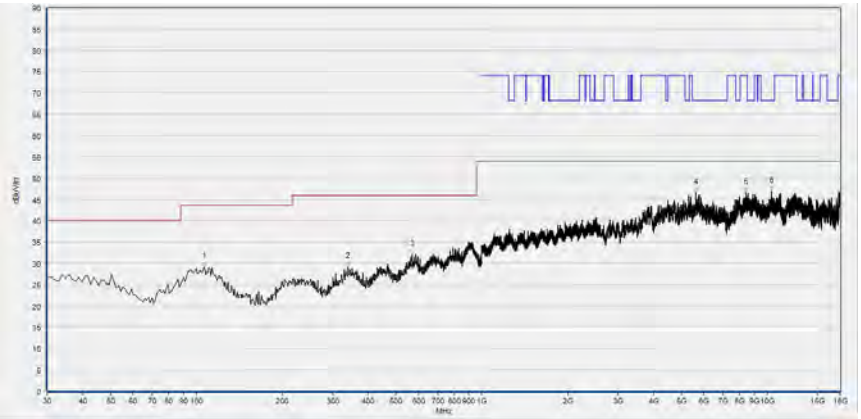
(Antenna Vertical, 30MHz to 18GHz)

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
109.620	29.94	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
351.391	29.17	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
665.986	33.55	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4719.464	46.15	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8995.359	47.56	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12892.338	47.90	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

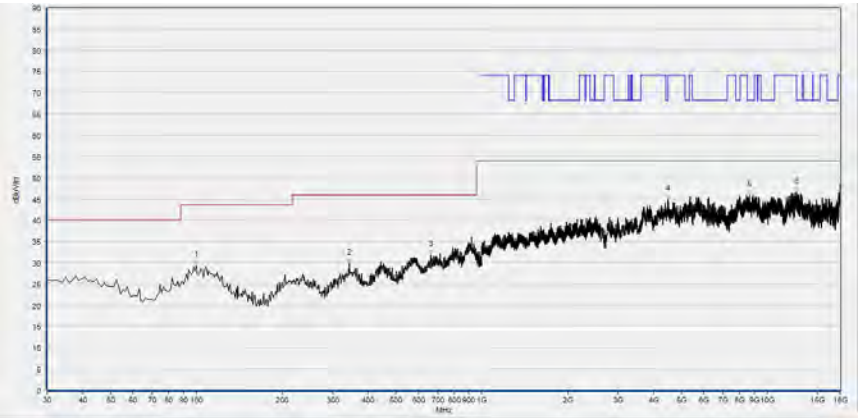
(Antenna Horizontal, 30MHz to 18GHz)



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
106.707	29.14	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
339.740	29.10	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
570.831	32.03	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5631.326	46.54	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8406.961	46.55	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10375.475	46.98	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

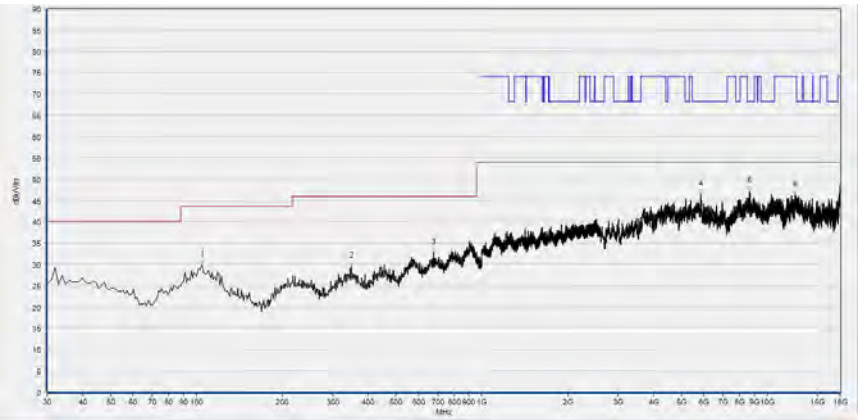
(Antenna Vertical, 30MHz to 18GHz)

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
99.910	29.25	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
343.624	29.79	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
661.131	31.78	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4482.256	44.89	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8638.008	45.93	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12692.098	46.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

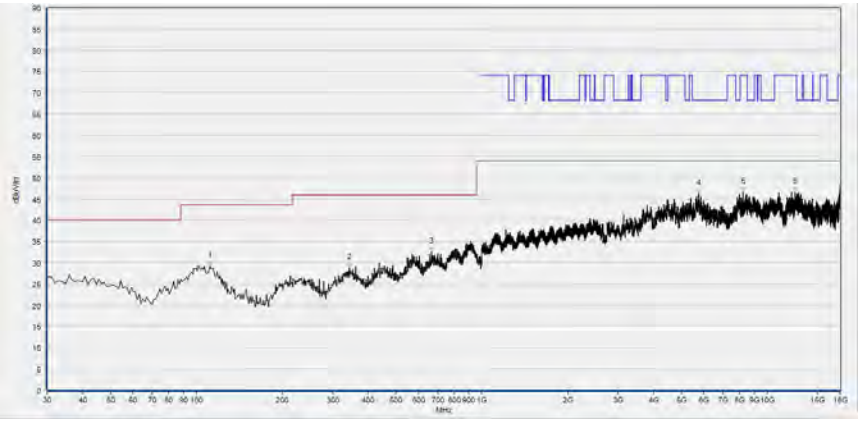
(Antenna Horizontal, 30MHz to 18GHz)



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
104.765	29.77	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
348.478	29.49	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
677.638	32.64	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5853.131	46.45	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8638.008	47.03	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12516.503	46.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

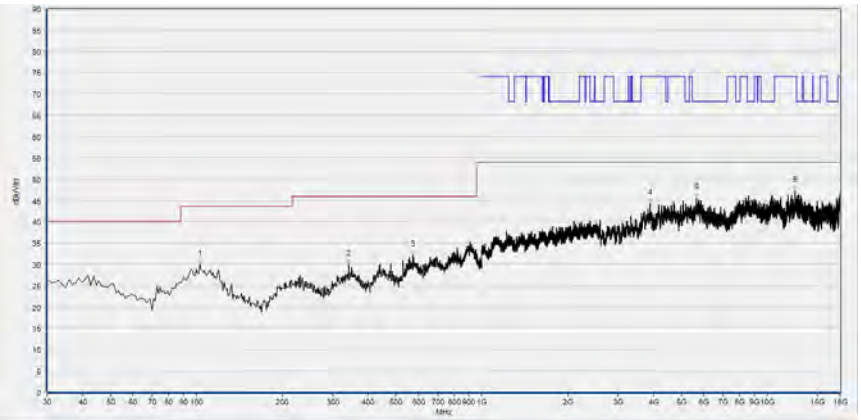
(Antenna Vertical, 30MHz to 18GHz)

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
111.562	29.14	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
342.653	28.86	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
666.957	32.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5754.551	46.22	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8209.802	46.58	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12531.906	46.52	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

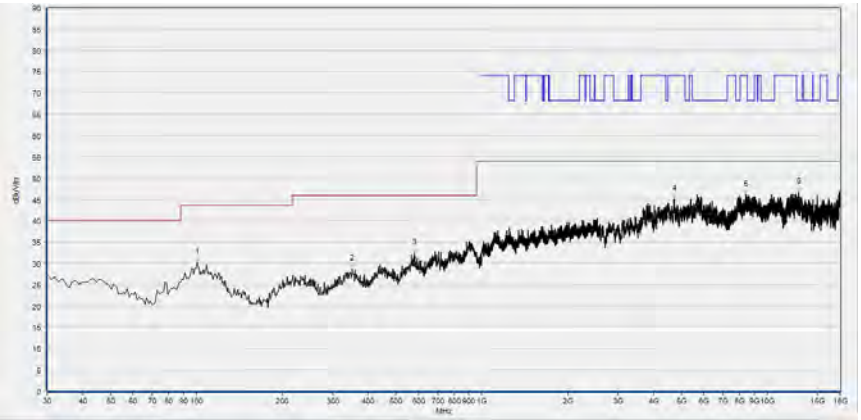


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
102.823	29.92	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
341.682	29.97	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
572.773	32.19	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3887.698	44.24	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5652.891	45.60	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12507.261	47.30	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

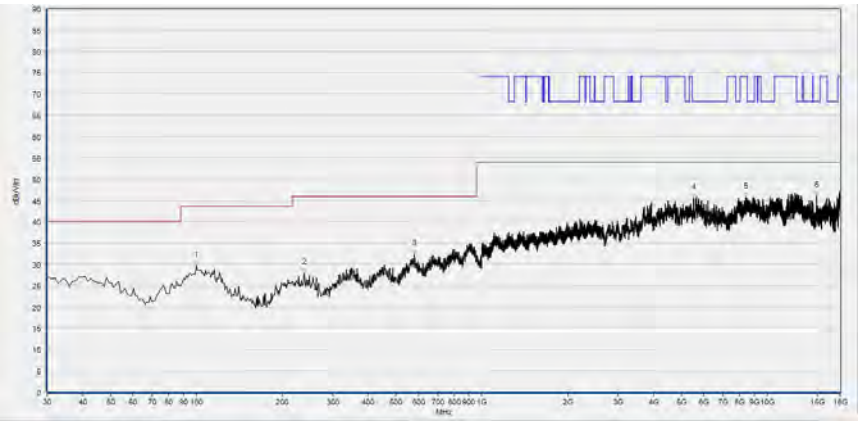
802.11ac (VHT80) Mode

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
100.881	30.14	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
351.391	28.63	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
579.570	32.27	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
4719.464	45.13	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8397.720	46.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12920.064	46.78	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

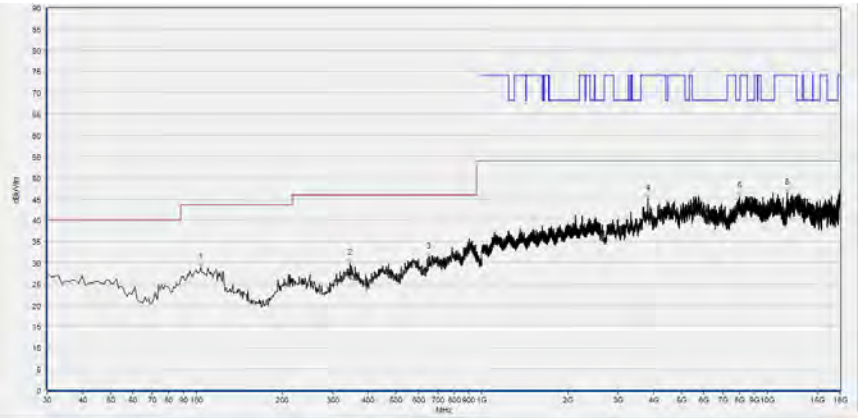
(Antenna Horizontal, 30MHz to 18GHz)



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	29.58	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
238.759	27.96	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
579.570	32.36	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5529.666	45.64	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8397.720	45.72	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
14860.852	46.04	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

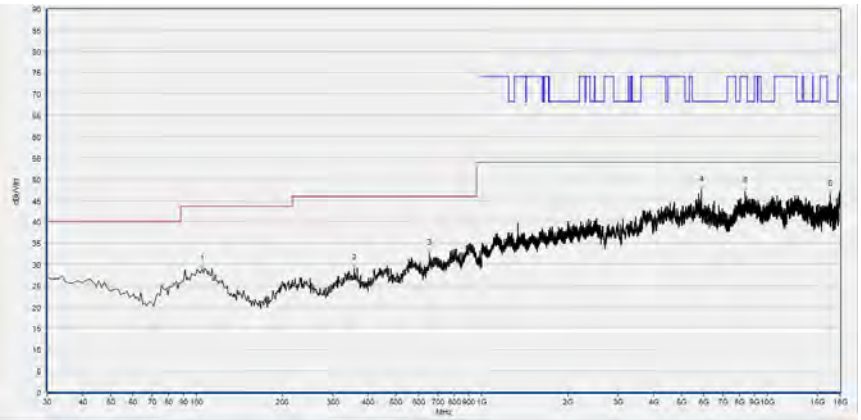
(Antenna Vertical, 30MHz to 18GHz)

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
103.794	28.90	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
345.566	29.89	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
650.450	31.39	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3810.682	45.16	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7997.239	45.66	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11743.269	46.37	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
104.765	28.81	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
357.217	29.03	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
654.334	32.46	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
5868.534	47.35	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8354.591	47.16	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
16582.917	46.45	N/A	N/A	68.23	N/A	N/A	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	2022.03.01	2023.02.28
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	2022.03.03	2023.03.02
LISN	812744	NSLK 8127	Schwarzbeck	2022.03.03	2023.03.02
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	2022.02.11	2025.02.10
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