REPORT No. : SZ17100040W04

TEST REPORT

APPLICANT	:	Anker Technology Co., Limited
PRODUCT NAME	:	Nebula capsule
MODEL NAME	:	D4111
BRAND NAME	:	N/A
FCC ID	:	2AB7K-D4111
STANDARD(S)	:	47 CFR Part 15 Subpart E
TEST DATE	:	2017-10-17 to 2017-11-05
ISSUE DATE	:	2017-11-17

Tested by: Su Hang

Su Hang (Test Engineer)

Approved by: Andy Yeh

Andy Yeh (Technical Director)

MORLAB

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DIRECTORY

Change History		
Issue	**Date**	**Reason for change**
1.0	2017-11-17	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Anker Technology Co., Limited
Applicant Address:	Room 1318-19,Hollywood Plaza,610 Nathan Road, Mongkok, Kowloon, Hong Kong
Manufacturer:	Anker Technology Co., Limited
Manufacturer Address:	Room 1318-19,Hollywood Plaza,610 Nathan Road, Mongkok, Kowloon, Hong Kong

1.2. Equipment Under Test (EUT) Description

Product Name:	Nebula capsule
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	V0.4
Software Version:	V1.0.6
Modulation Type:	DSSS, OFDM
Operating Frequency Range:	802.11a /n: 5.150GHz- 5.250GHz 5.725GHz- 5.850GHz
Channel Number:	Refer to Note2
Modulation Type:	DSSS, OFDM
Antenna Type:	Monopole Antenna
Antenna Gain:	0 dBi

Note 1: The U-NII band is applicable to this report, another bands of operation (2.4GHz) is documented in a separate report.

Note 2: The following tables are the channel number and frequency of the EUT, the black bold channels were selected for test.

20MHz Bandwidth:

Frequency Range	5150~5250MHz				5725~5850MHz				
Channel Number	**36**	40	**44**	**48**	**149**	153	**157**	161	**165**
Frequency (MHz)	**5180**	5200	**5220**	**5240**	**5745**	5765	**5785**	5805	**5825**

40MHz Bandwidth:

Frequency Range	5150~5250 MHz		5725~5850 MHz	
Channel Number	**38**	**151**	**159**	**46**
Frequency (MHz)	**5190**	**5755**	**5795**	**5230**

Note 3: During test, the duty cycle of the EUT was setting to 100%.

Note 4: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart E (UNII 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
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	15.407(a) (e)	Emission Bandwidth	Oct 23, 2017	Su Hang	PASS
3	15.407(a)	Maximum conducted output Power	Oct 23, 2017	Su Hang	PASS
4	15.407(a)	Peak Power spectral density	Oct 23, 2017	Su Hang	PASS
5	15.407(b)	Restricted Frequency Bands	Nov 04&17, 2017	Peng Shiqing	PASS
6	15.407(g)	Frequency Stability	Oct 23, 2017	Su Hang	PASS
7	15.207	Conducted Emission	Oct 17, 2017	Peng Shiqing	PASS
8	15.407(b)	Radiated Emission	Nov 05, 2017	Peng Shiqing	PASS
9	15.407(c)	Automatically discontinue transmission requirement	N/A	N/A	PASS

Note1: EUT is a Client Device Without Radar Detection, WIFI hotspot does not support U-NII band; A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

Note2: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013.

Note3: These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 v01r04 (05/02/2017), KDB905462 D03 v01r02 (08/22/2016) and KDB644545 D03 v01 (08/14/2014).

1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. 2.1.2 Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

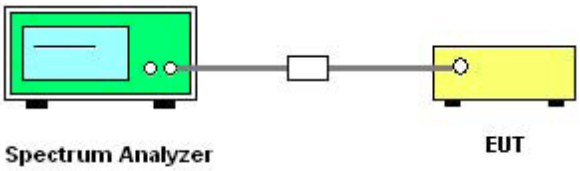
2.2. Emission Bandwidth

2.2.1. 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.

2.2.2. Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Test Procedure

1. KDB 789033 Section C) 1) Emission Bandwidth was used in order to prove compliance

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) 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 the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.
b) Set the 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.

2.2.3. Test Result

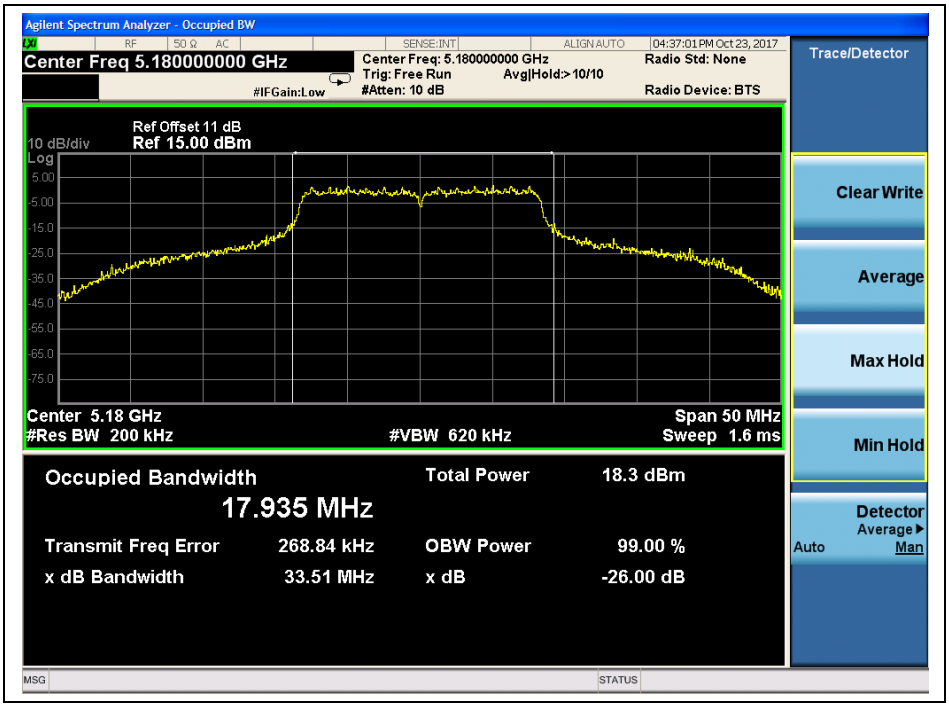
The lowest, middle and highest channels are selected to perform testing to record the 26 dB bandwidth of the Module.

802.11a-20MHz Test mode

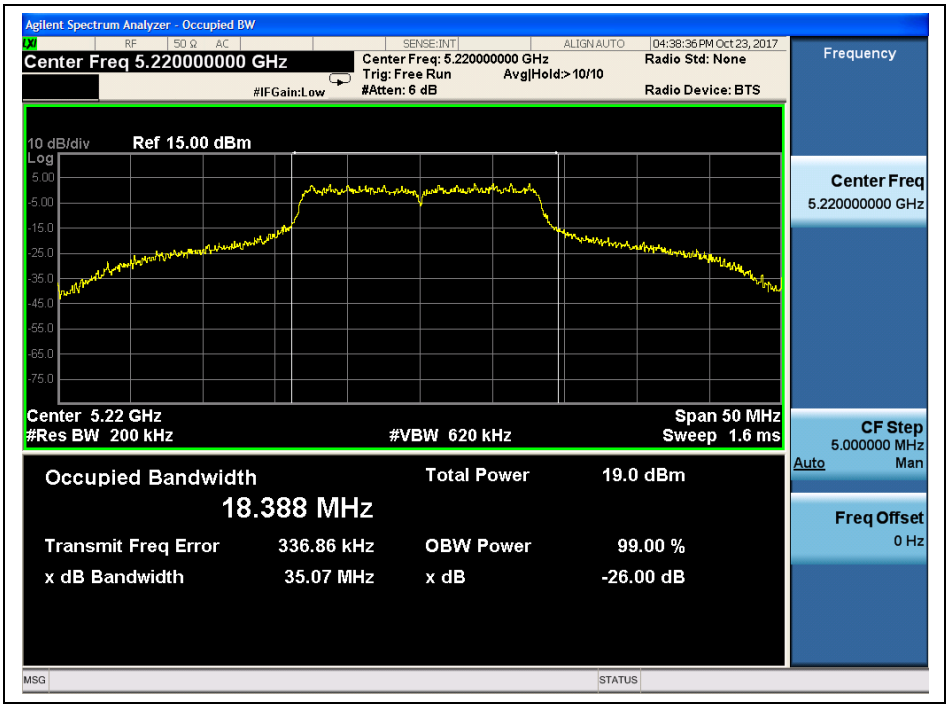
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	33.51
44	5220	35.07
48	5240	38.36
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	16.40
157	5785	16.41
165	5825	16.42

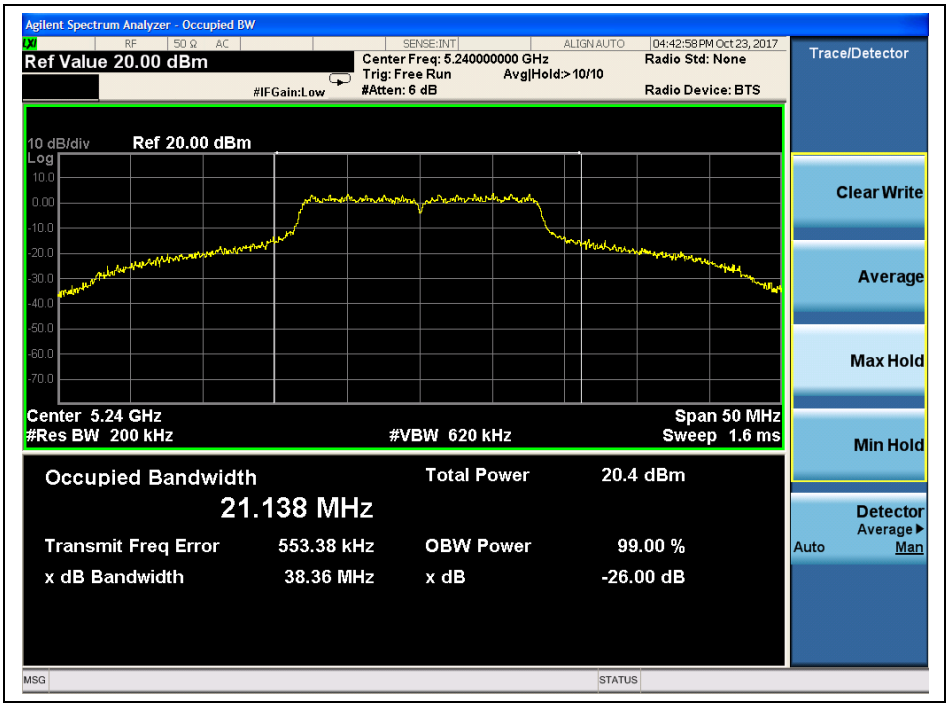
B. Test Plots



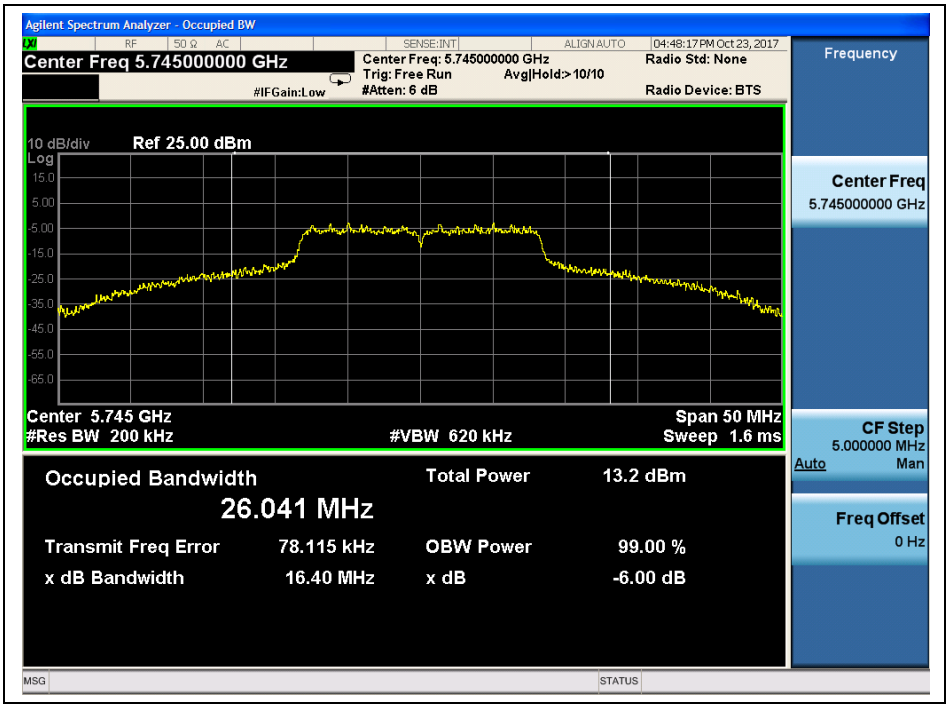
(Channel 36: 5180MHz @ 802.11a)



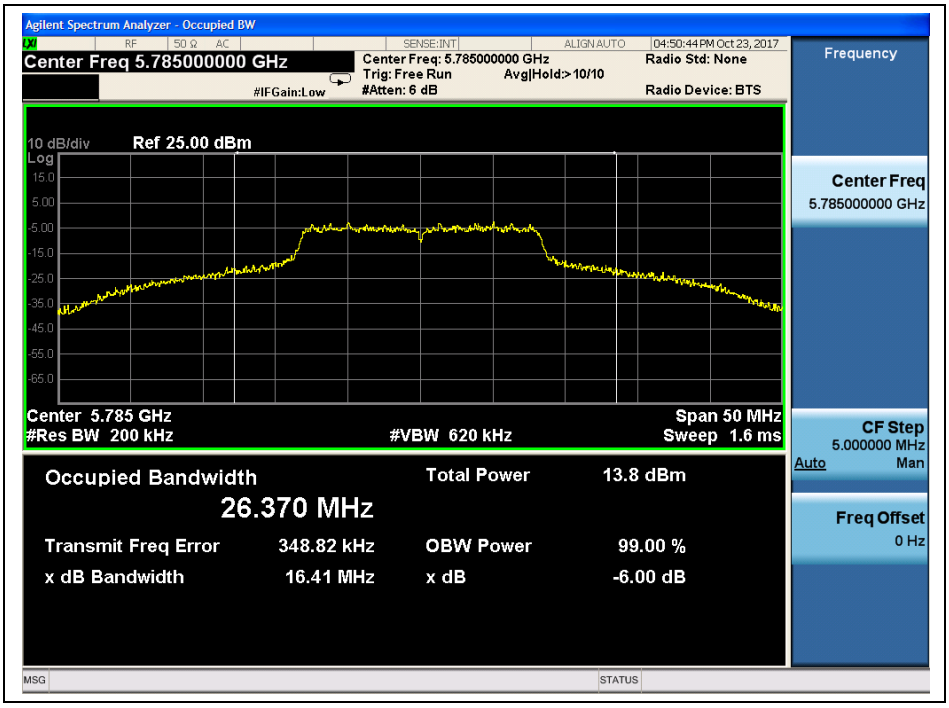
(Channel 44: 5220 MHz @ 802.11a)



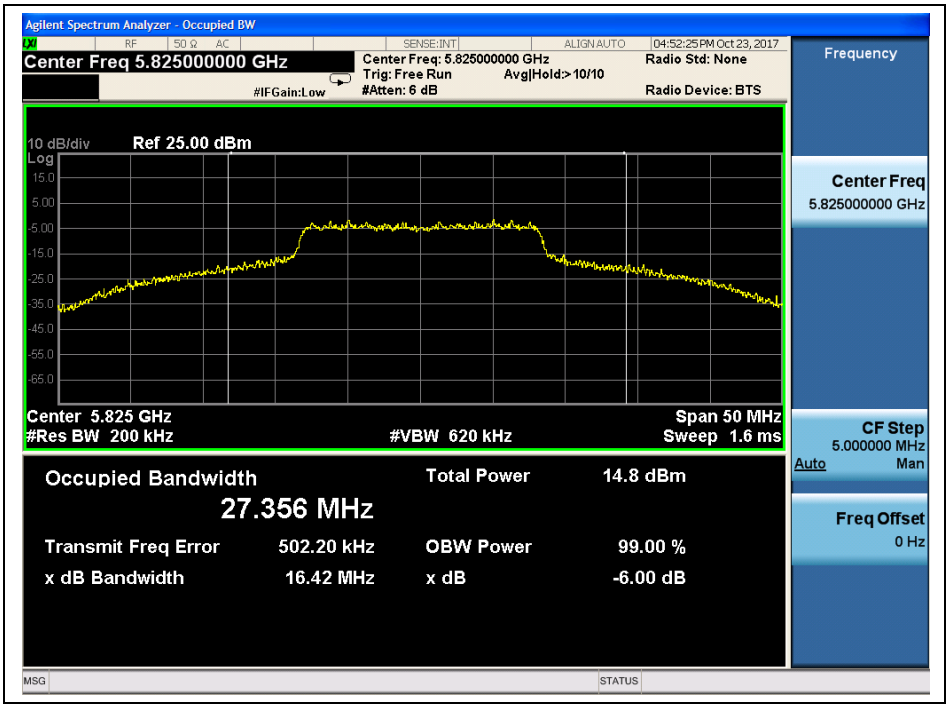
(Channel 48: 5240MHz @ 802.11a)



(Channel 149: 5745MHz @ 802.11a)



(Channel 157: 5785MHz @ 802.11a)



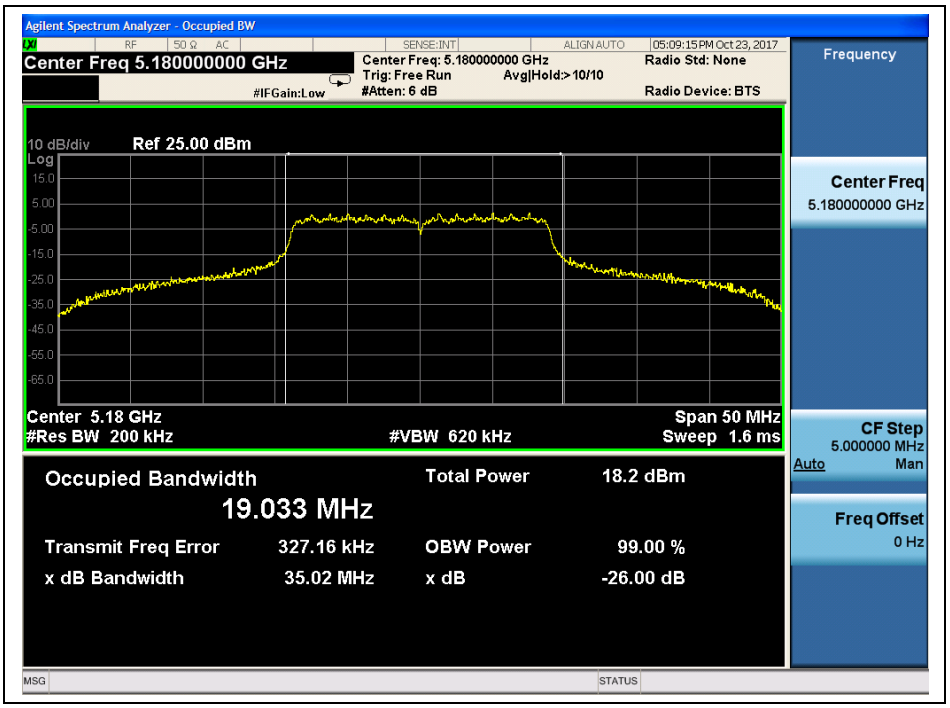
(Channel 165: 5825MHz @ 802.11a)

802.11n-20MHz Test mode

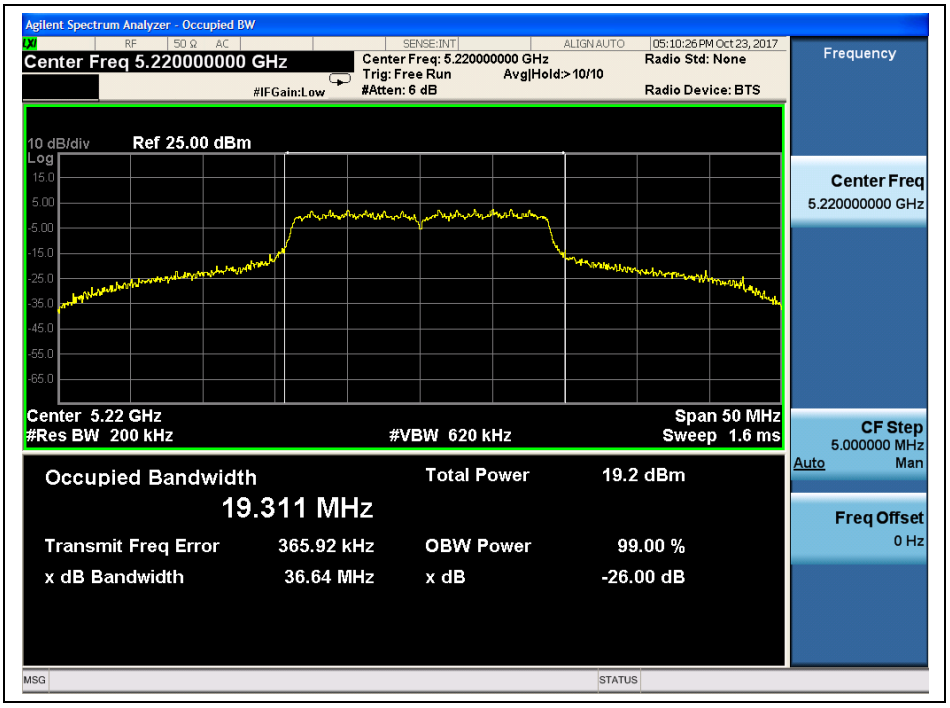
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	35.02
44	5220	36.64
48	5240	39.15
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	17.65
157	5785	17.64
165	5825	17.59

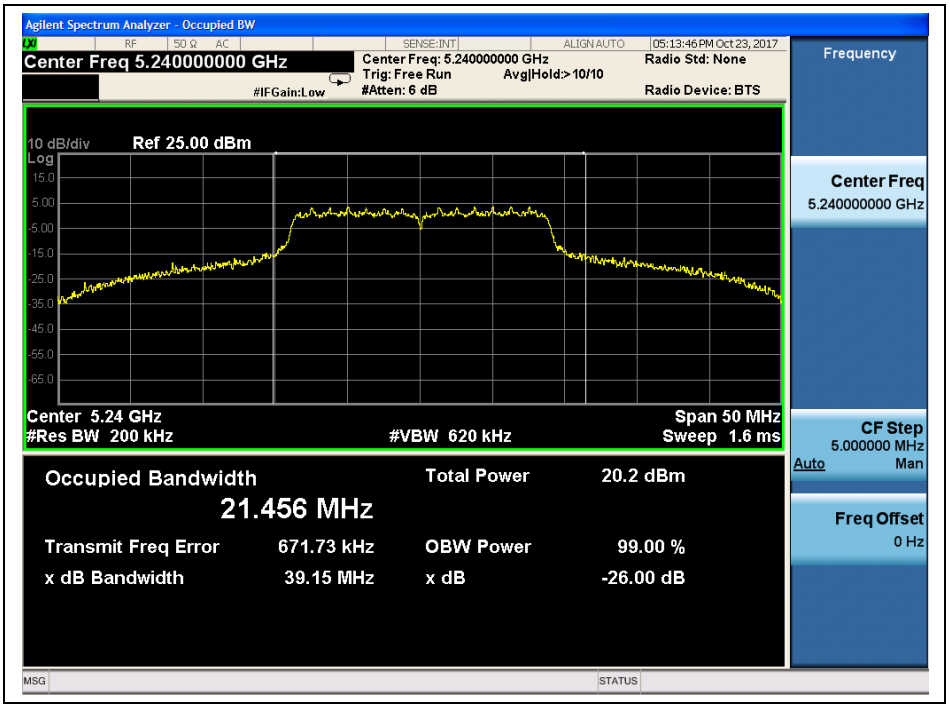
B. Test Plots



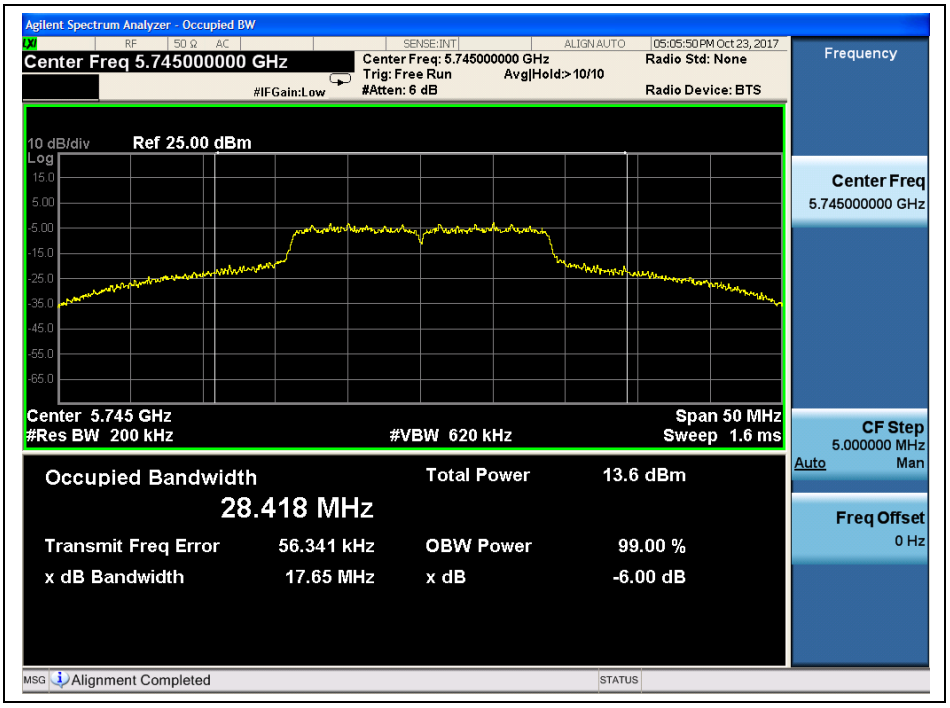
(Channel 36: 5180MHz @ 802.11n-20MHz)



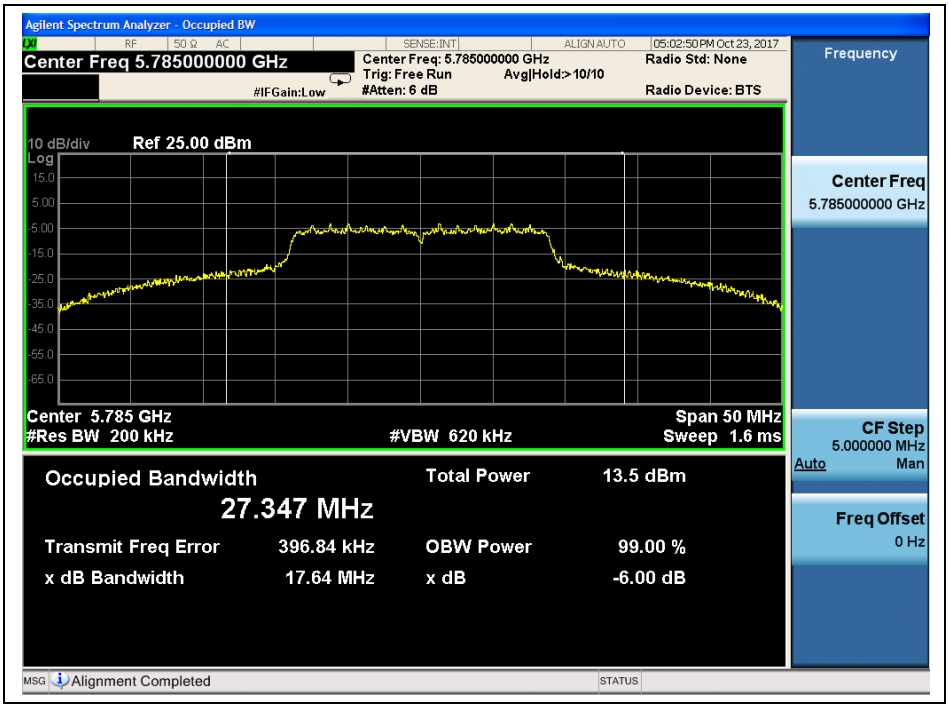
(Channel 44: 5220 MHz @ 802.11n-20MHz)



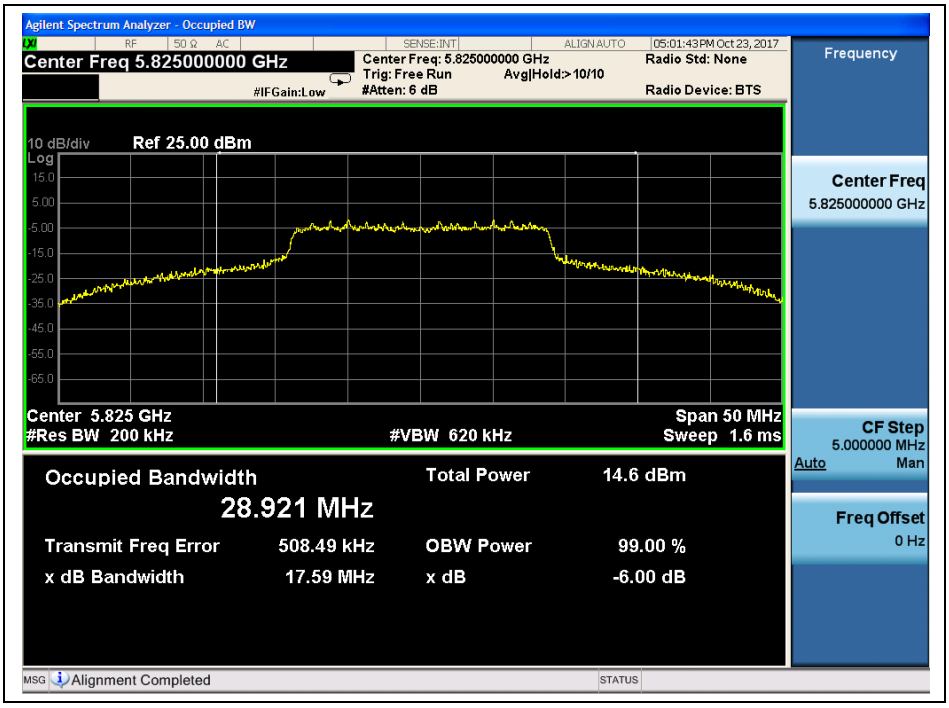
(Channel 48: 5240MHz @ 802.11n-20MHz)



(Channel 149: 5745MHz @ 802.11n-20MHz)



(Channel 157: 5785MHz @802.11n-20MHz)



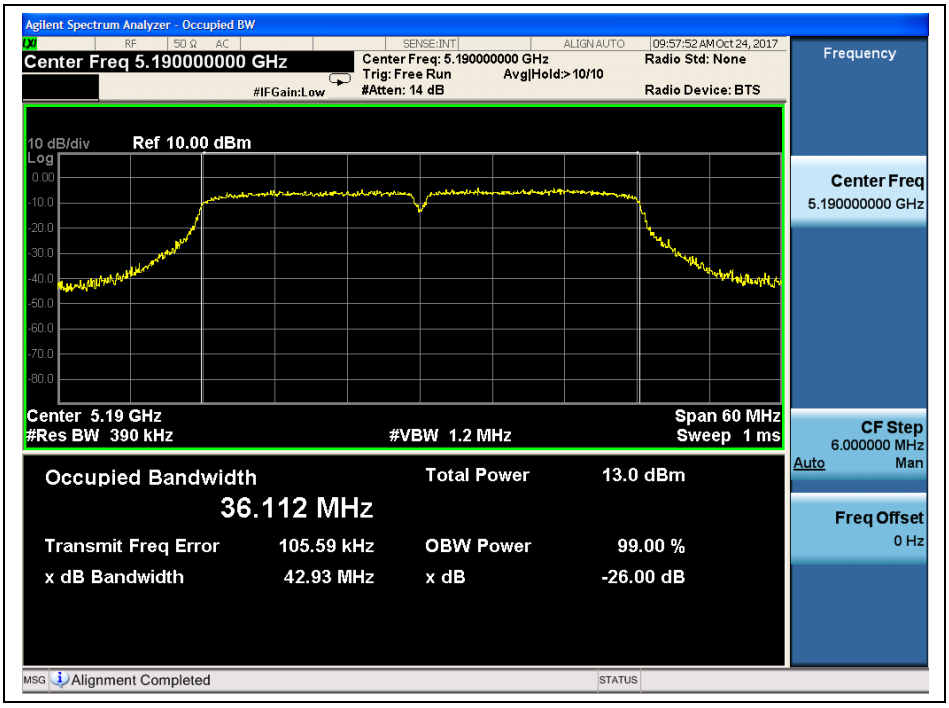
(Channel 165: 5825MHz @ 802.11n-20MHz)

802.11n-40MHz Test mode

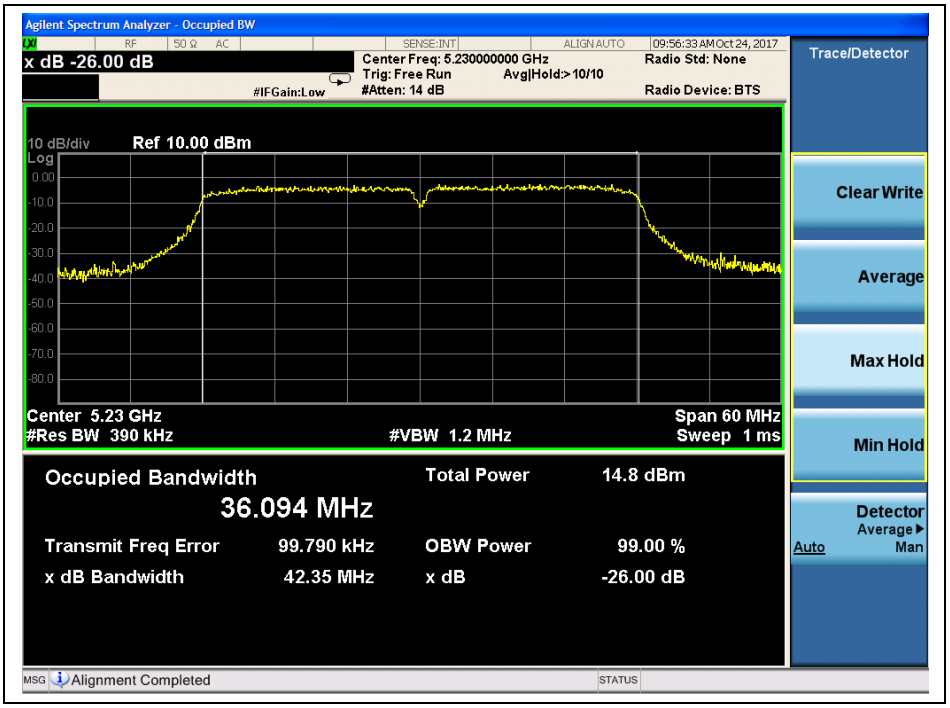
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	42.93
46	5230	42.35
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
151	5755	36.16
159	5795	36.15

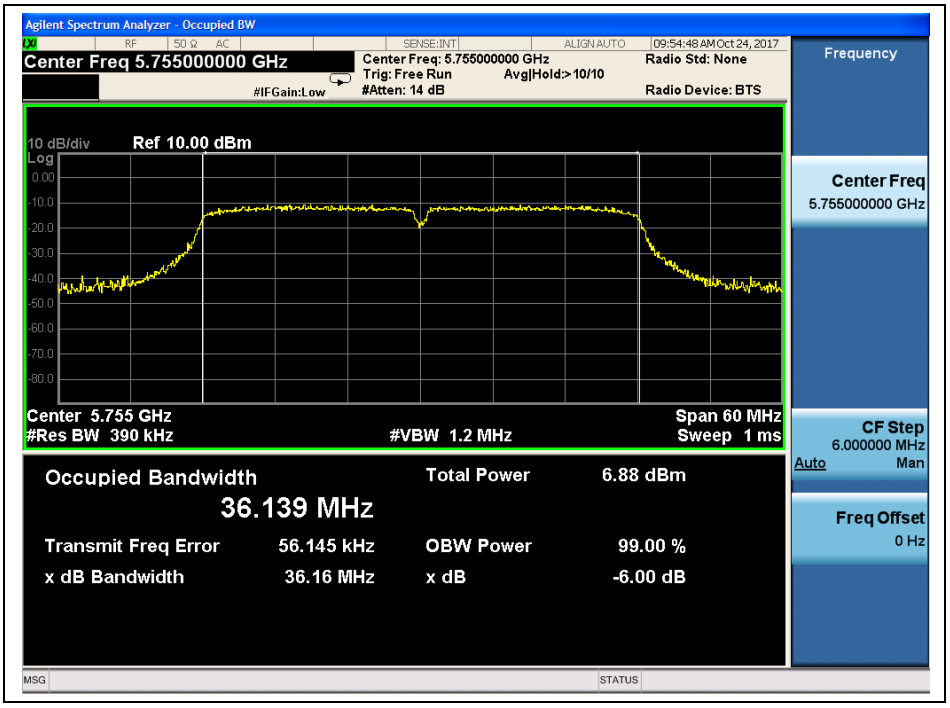
B. Test Plots



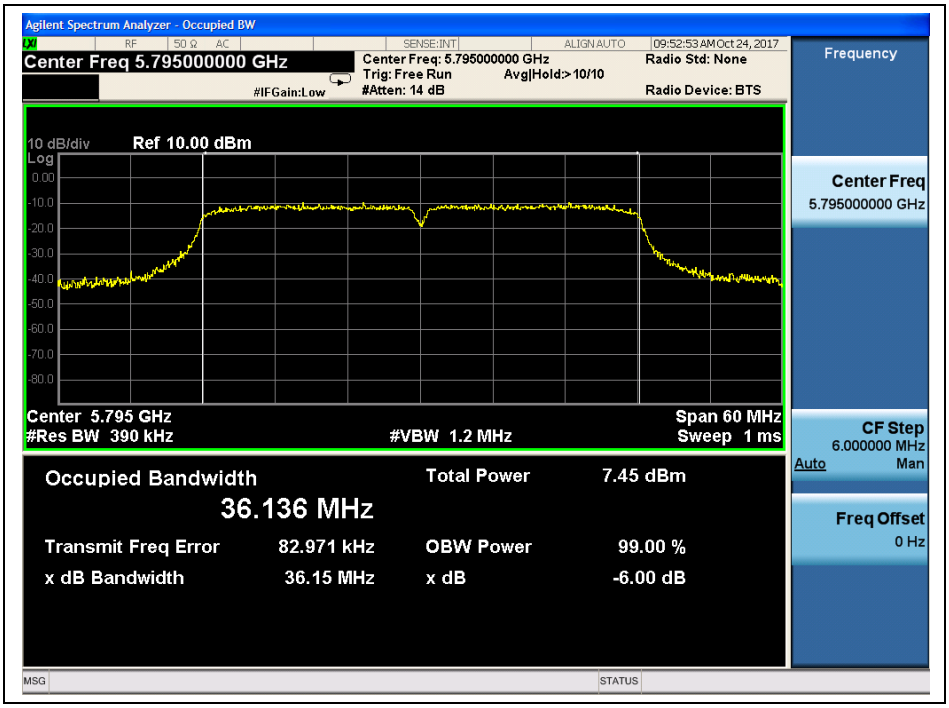
(Channel 38: 5190MHz @ 802.11n-40)



(Channel 46: 5230 MHz @ 802.11n-40)



(Channel 151: 5755MHz @ 802.11n-40)



(Channel 159: 5795MHz @ 802.11n-40)

2.3. Maximum conducted output power

2.3.1. Requirement

(1) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.
(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 + 10log 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.
According FCC KDB644545 D03 D)1)b)3) requirement:
a) The maximum conducted output power within each band of operation shall comply with the limits for that band.
b) The limit on maximum conducted output power in each U-NII band is computed based on the portion of the emission bandwidth contained within that band
If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

2.3.2. Test Description

Section E) 3) of KDB 789033 defines a methodology using an RF average power meter.

A. Test Setup:

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

2.3.3. Test Result

802.11a-20MHz Test mode

Channel	Frequency (MHz)	Measured Peak Power(dBm)	Limit (dBm)	Verdict
36	5180	15.14	24	PASS
44	5220	16.65		
48	5240	17.63		
149	5745	8.51	30	
157	5785	8.89		
165	5825	9.95		

Channel	Frequency (MHz)	Measured Average Power(dBm)	Limit (dBm)	Verdict
36	5180	6.59	24	PASS
44	5220	8.78		
48	5240	9.97		
149	5745	0.09	30	
157	5785	0.84		
165	5825	2.07		

802.11n-20MHz Test mode

Channel	Frequency (MHz)	Measured Peak Power(dBm)	Limit (dBm)	Verdict
36	5180	14.81	24	PASS
44	5220	17.06		
48	5240	17.71		
149	5745	8.49	30	
157	5785	9.07		
165	5825	9.95		

Channel	Frequency (MHz)	Measured Average Power(dBm)	Limit (dBm)	Verdict
36	5180	6.52	24	PASS
44	5220	8.94		
48	5240	10.08		
149	5745	0.25	30	
157	5785	1.02		
165	5825	2.29		

802.11n-40MHz Test mode

Channel	Frequency (MHz)	Measured Peak Power(dBm)	Limit (dBm)	Verdict
38	5190	16.43	24	PASS
46	5230	18.41		
151	5755	9.40	30	
159	5795	9.67		

Channel	Frequency (MHz)	Measured Average Power(dBm)	Limit (dBm)	Verdict
38	5190	7.48	24	PASS
46	5230	9.81		
151	5755	0.56	30	
159	5795	1.17		

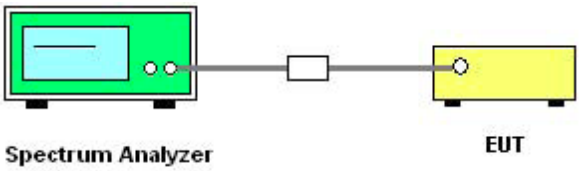
2.4. Peak Power spectral density

2.4.1. Requirement

(1) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
(2) For the 5.25–5.35 GHz and 5.47–5.725GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500KHz band.
According FCC KDB644545 D03 D)1)b)2) requirement:
Emissions in each band shall comply with the PSD limits applicable to that band under the appropriate rule section.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

2.4.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, 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.

B. 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 = 1 MHz. Set VBW ≥ 3 MHz.
3) Number of points in sweep ≥ 2 Span / RBW. Sweep time = auto.
4) Detector = RMS (i.e., power averaging)
5) Trace average at least 100 traces in power averaging (i.e., RMS) mode
6) Record the max value

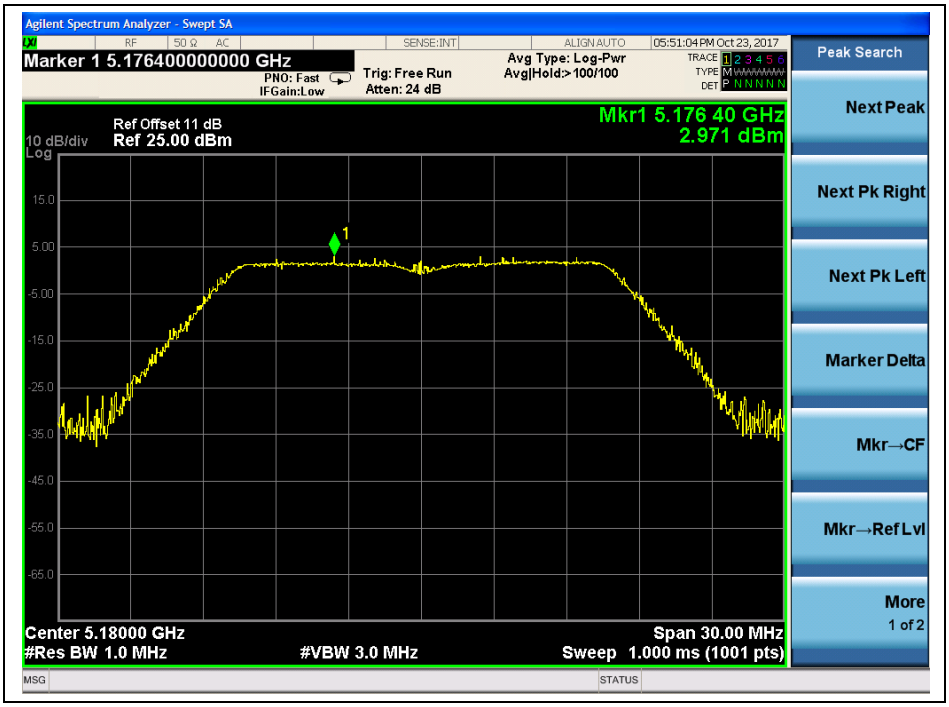
2.4.3. Test Result

802.11a Test mode

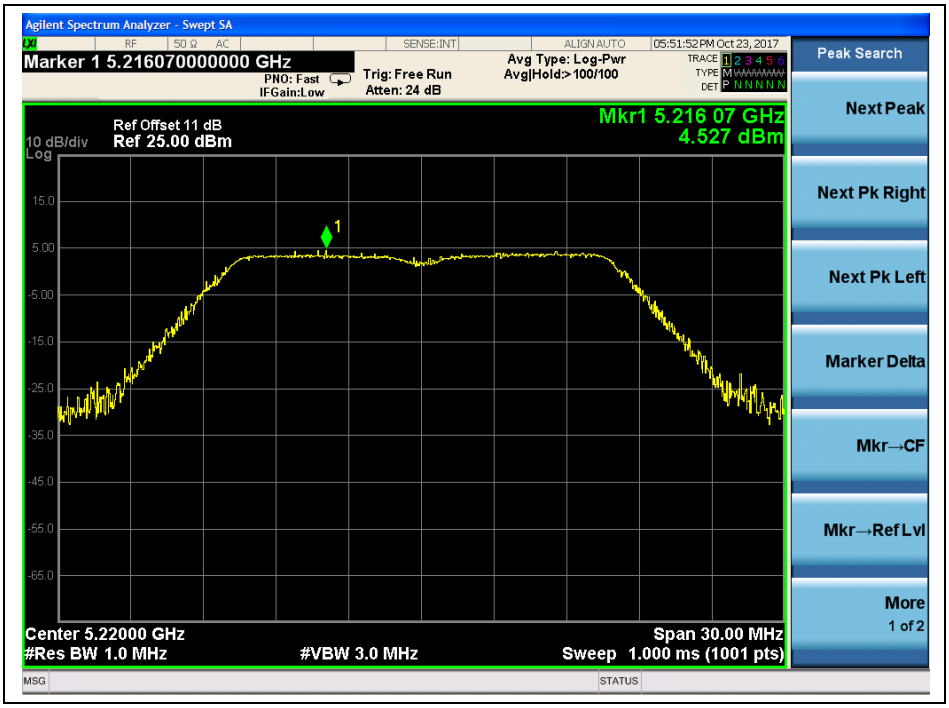
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	2.97	11	PASS
44	5220	4.53		
48	5240	6.77		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	-1.85	30	PASS
157	5785	-1.89		
165	5825	-0.40		

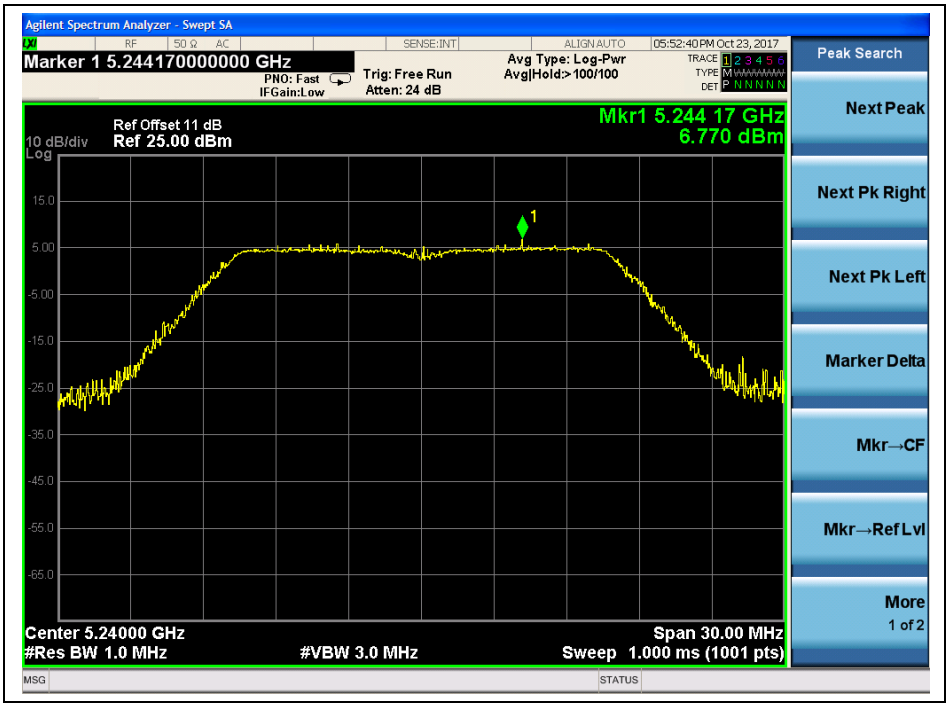
B. Test Plots



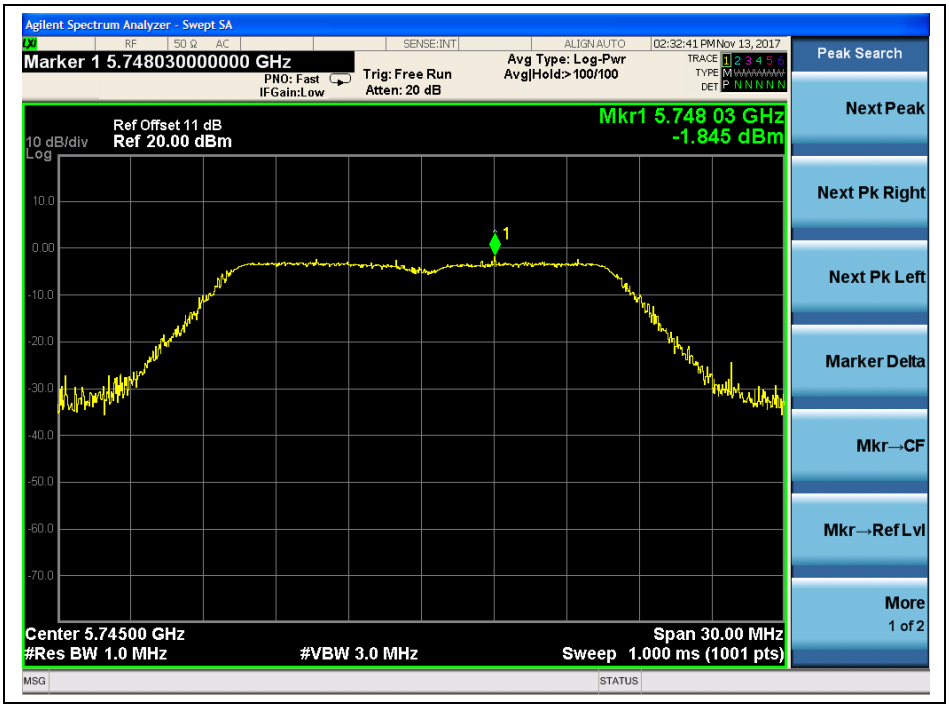
(Channel 36: 5180MHz @ 802.11a)



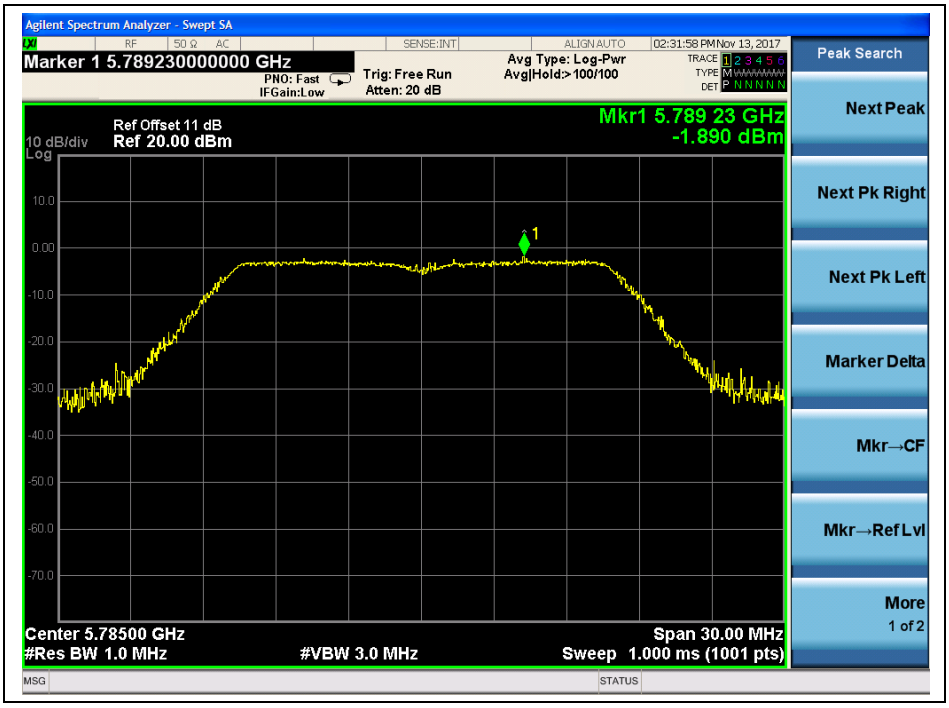
(Channel 44: 5220 MHz @802.11a)



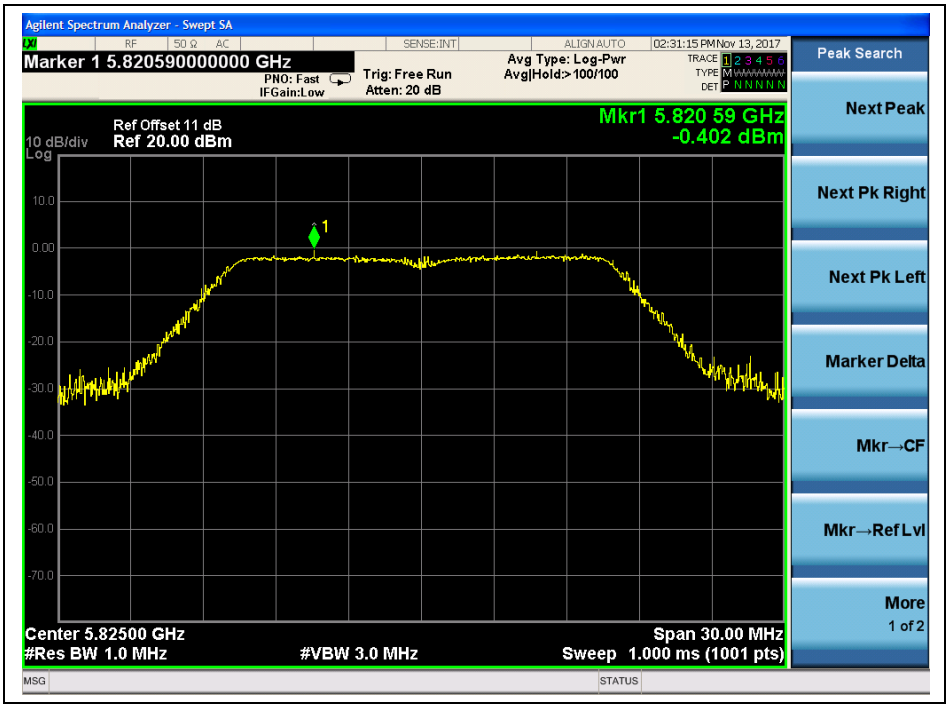
(Channel 48: 5240MHz @802.11a)



(Channel 149: 5745MHz @ 802.11a)



(Channel 157: 5785MHz @ 802.11a)



(Channel 165: 5825MHz @ 802.11a)

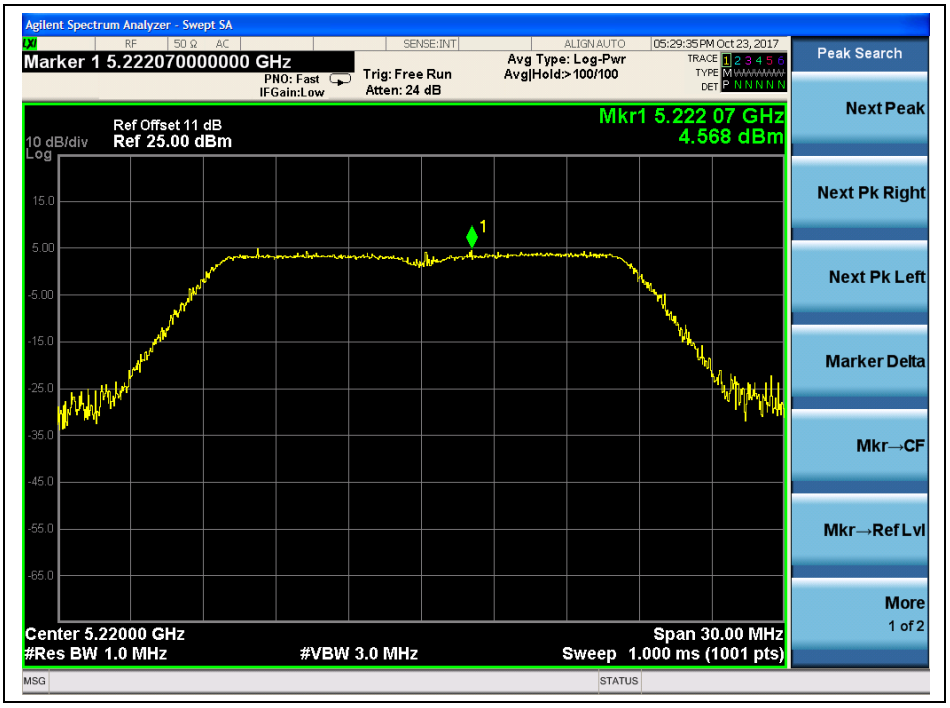
802.11n-20MHz Test mode

A. Test Verdict:

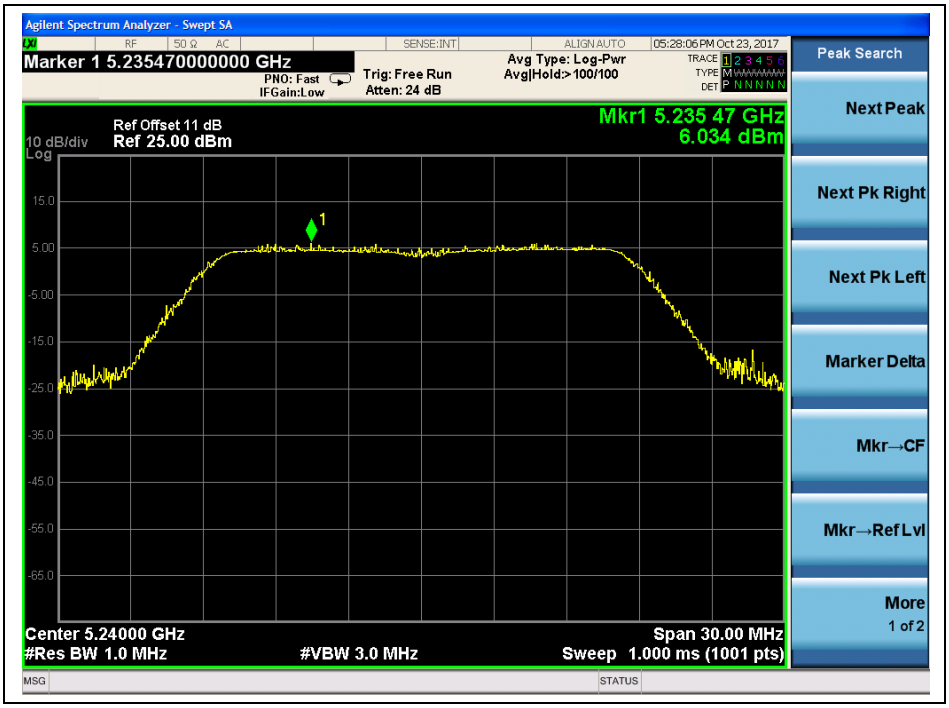
Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	2.42	11	PASS
44	5220	4.57		
48	5240	6.03		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	-1.73	30	PASS
157	5785	-1.67		
165	5825	-0.89		

B. Test Plots

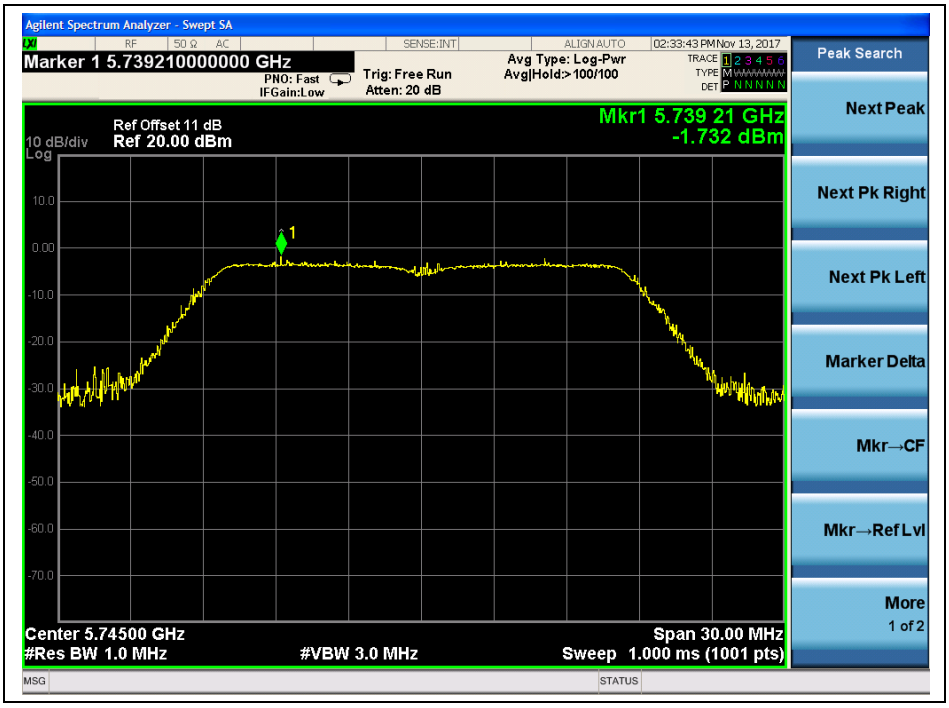
(Channel 36: 5180MHz @ 802.11n-20MHz)



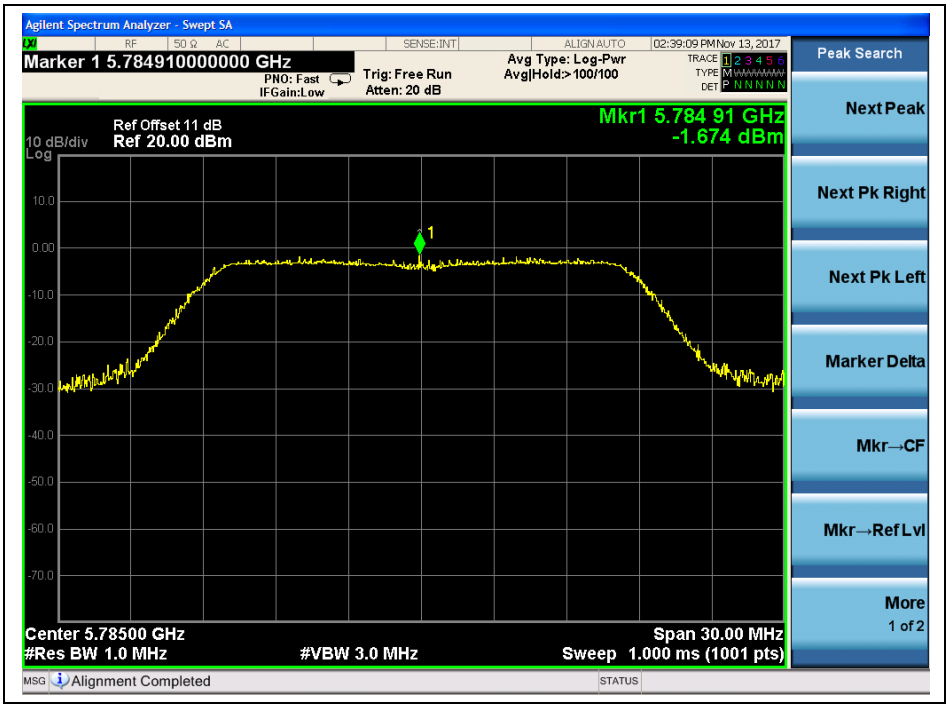
(Channel 44: 5220 MHz @ 802.11n-20MHz)



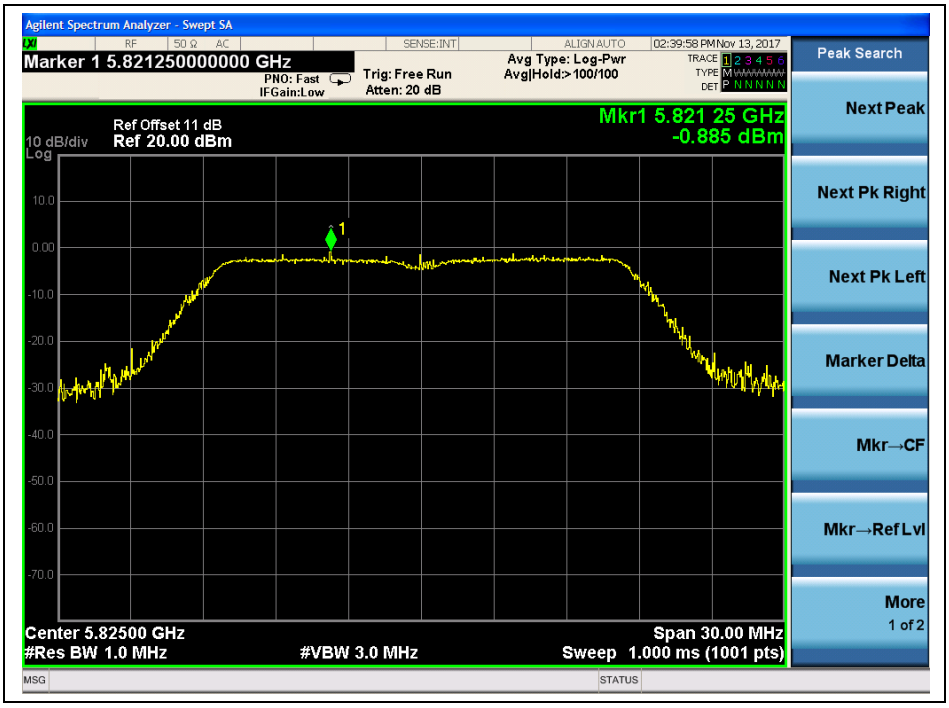
(Channel 48: 5240MHz @ 802.11n-20MHz)



(Channel 149: 5745MHz @ 802.11n-20MHz)



(Channel 157: 5785MHz @802.11n-20MHz)



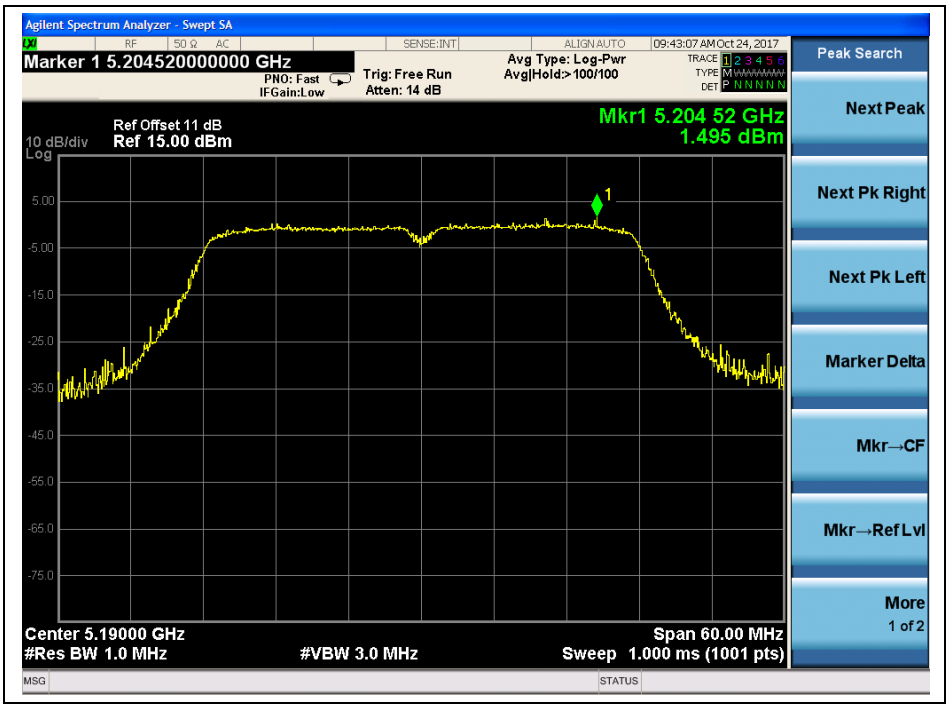
(Channel 165: 5825MHz @ 802.11n-20MHz)

802.11n-40MHz Test mode

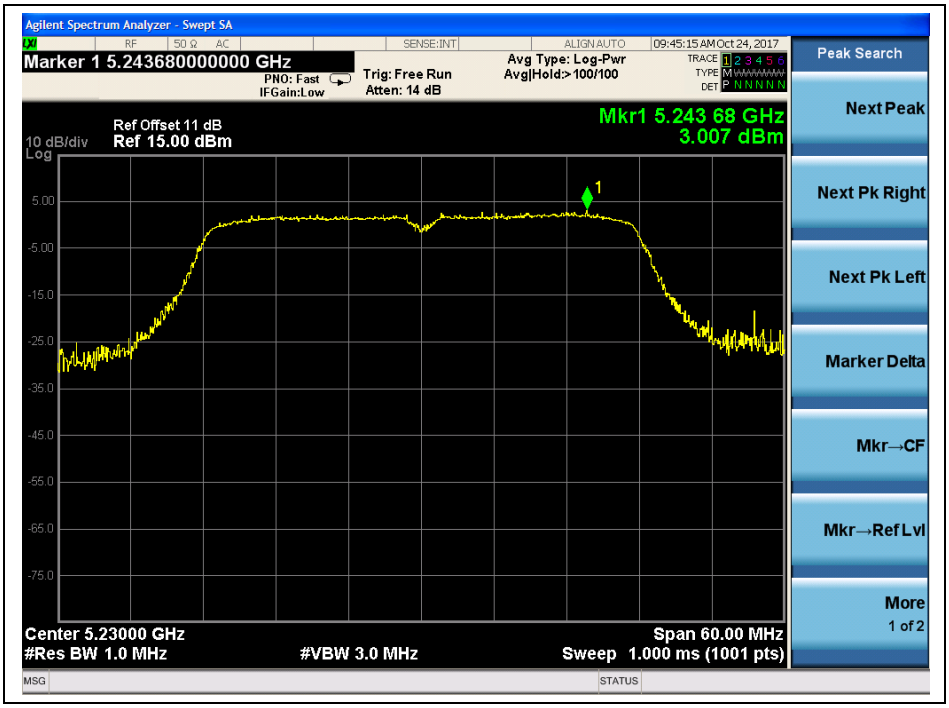
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	1.50	11	PASS
46	5230	3.01		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-8.82	30	PASS
159	5795	-7.89		

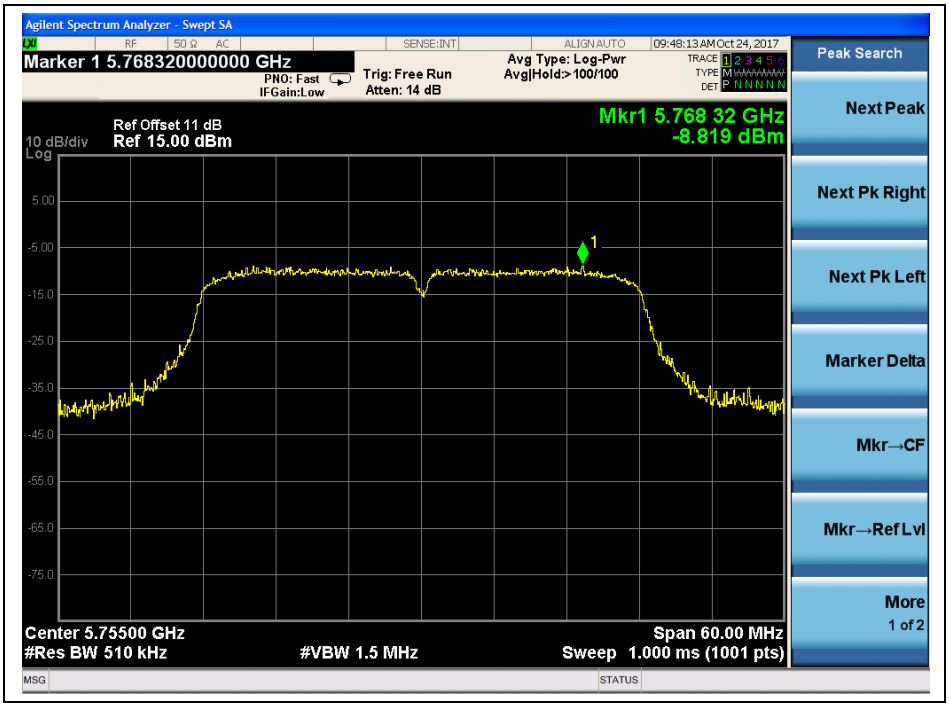
B. Test Plots



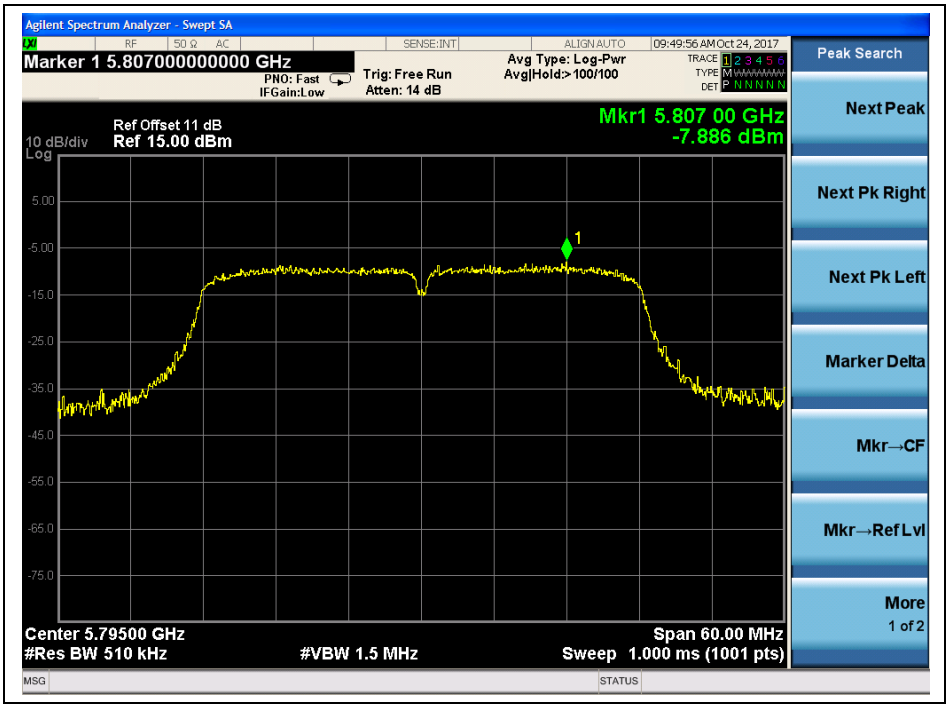
(Channel 38: 5190MHz @ 802.11n-40)



(Channel 46: 5230 MHz @ 802.11n-40)



(Channel 151: 5755MHz @ 802.11n-40)



(Channel 159: 5795MHz @ 802.11n-40)

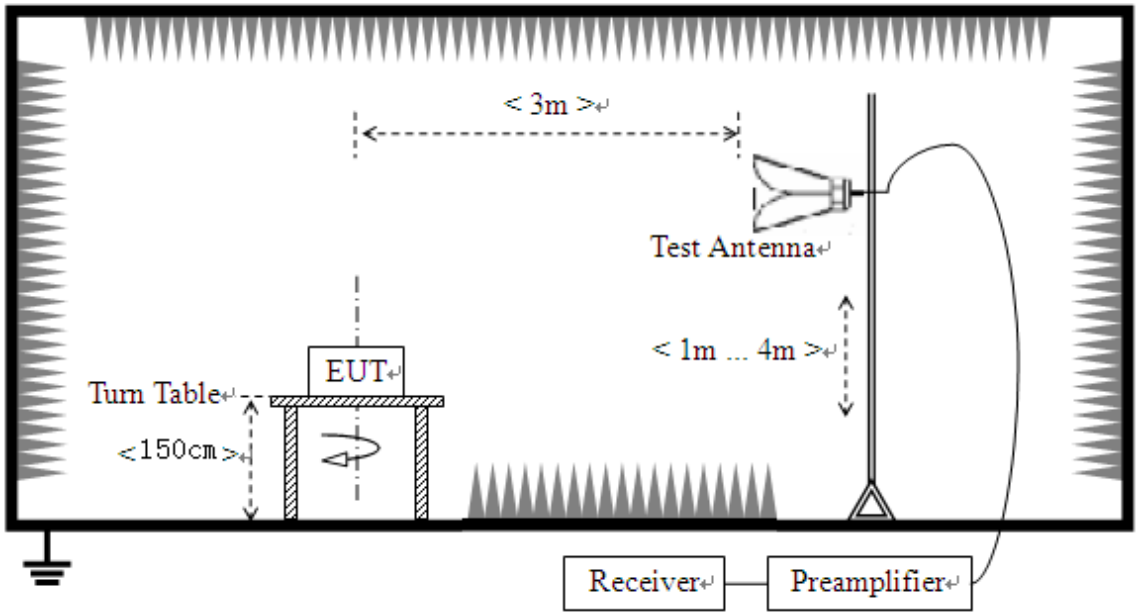
2.5. Restricted Frequency Bands

2.5.1. Requirement

According to FCC section 15.407(b)(7), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.5.2. Test Description

A. Test Setup



The Module 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.

2.5.3. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; A_T =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m

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

802.11a Test mode

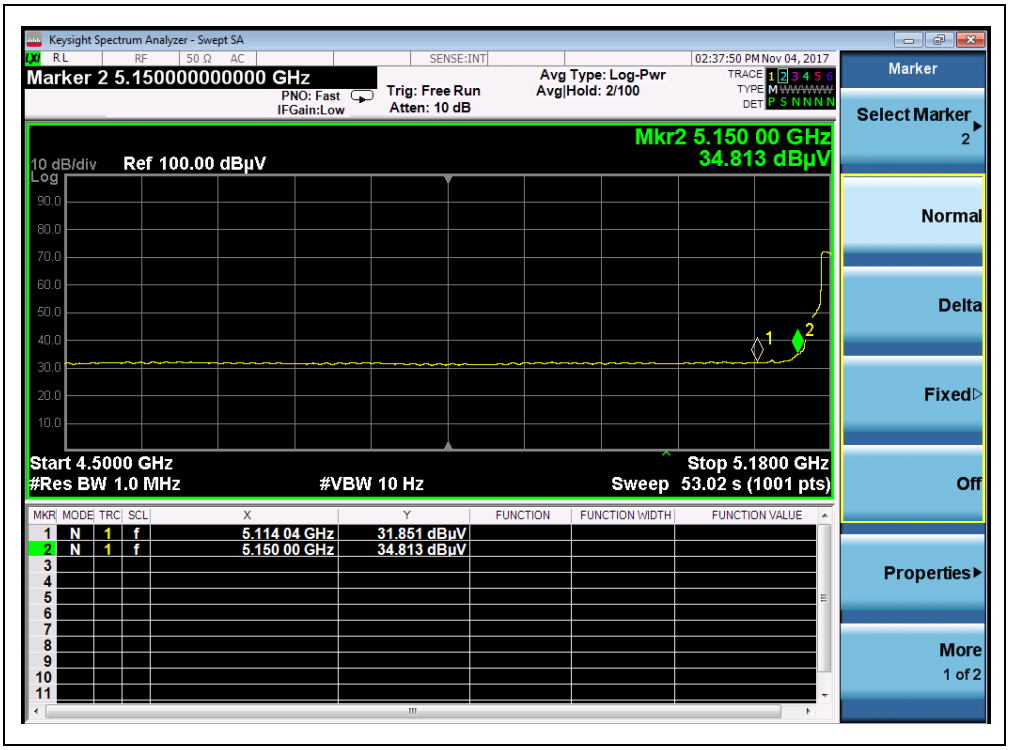
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

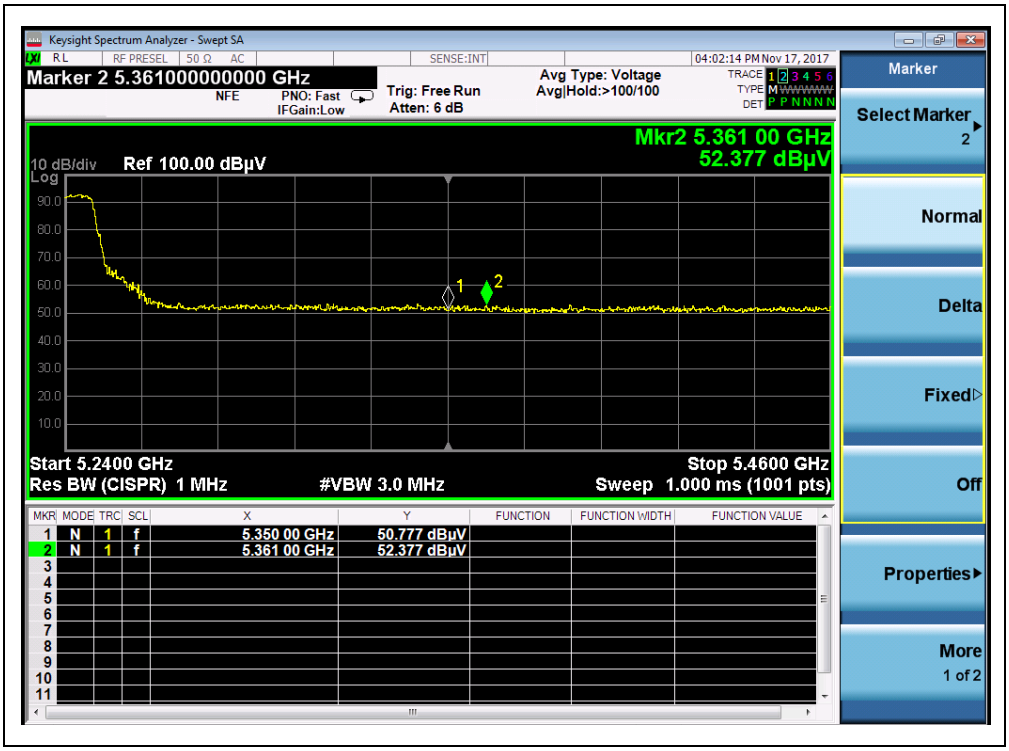
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
36	5114.04	PK	52.12	-50.65	32.11	33.58	74	Pass
36	5114.04	AV	31.85	-50.65	32.11	13.31	54	Pass
48	5361.00	PK	52.38	-50.65	32.11	33.84	74	Pass
48	5361.00	AV	40.64	-50.65	32.11	22.10	54	Pass

B. Test Plots:

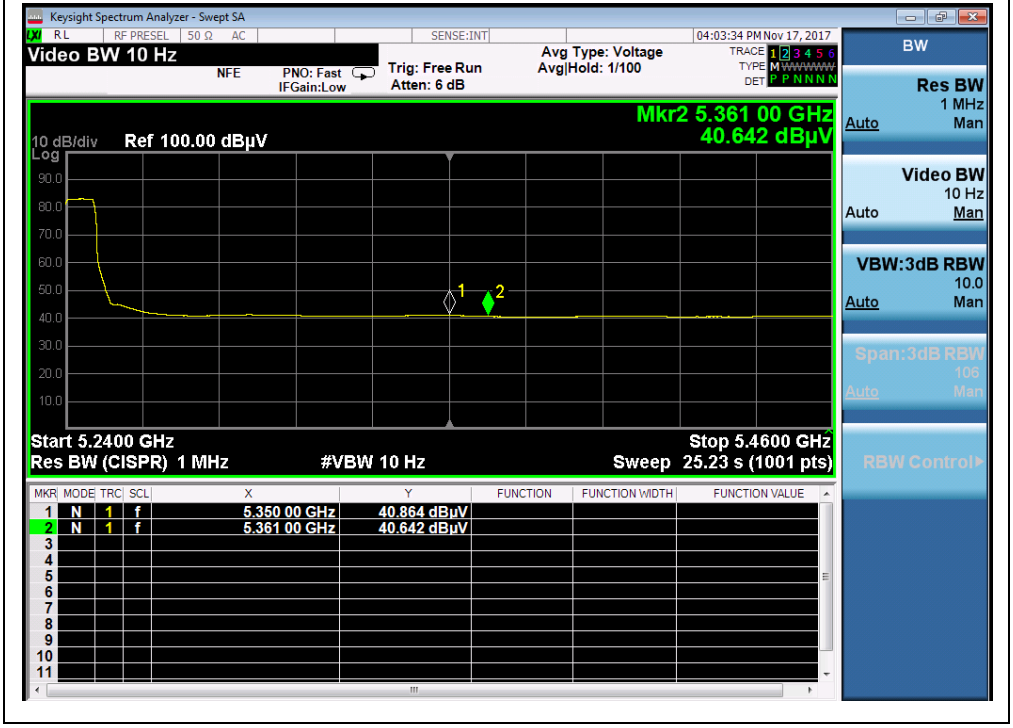
(Channel = 36 PEAK @ 802.11a)



(Channel = 36 AVG @ 802.11a)



(Channel = 48 PEAK @ 802.11a)



(Channel = 48 AVG @ 802.11a)

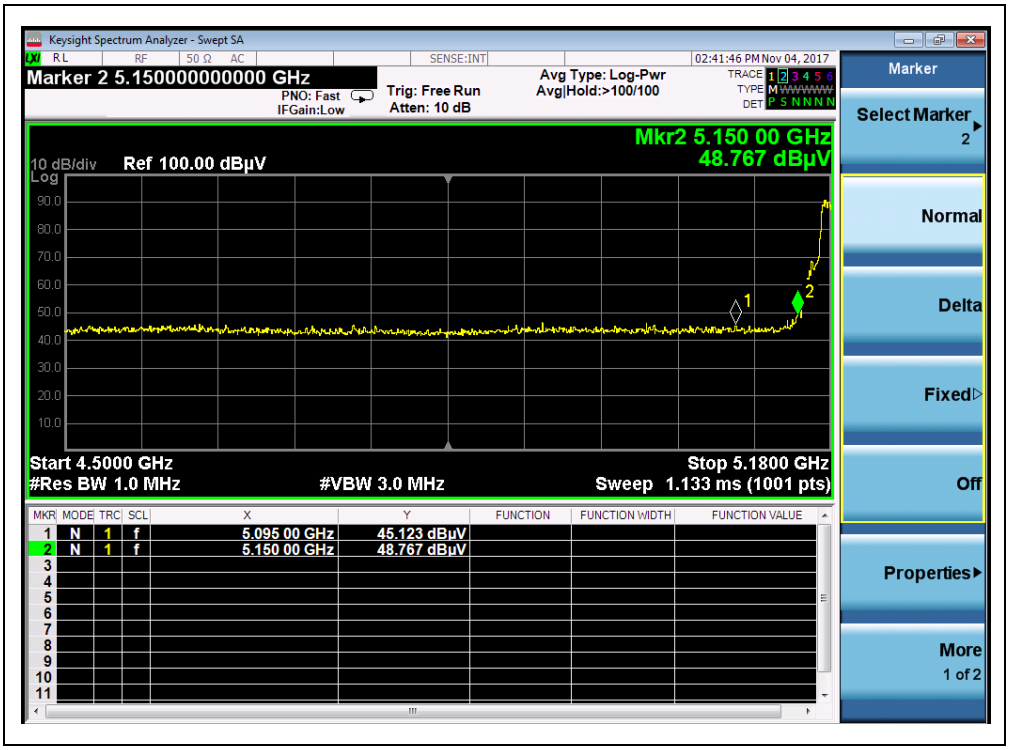
802.11n-20MHz Test mode

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

A. Test Verdict:

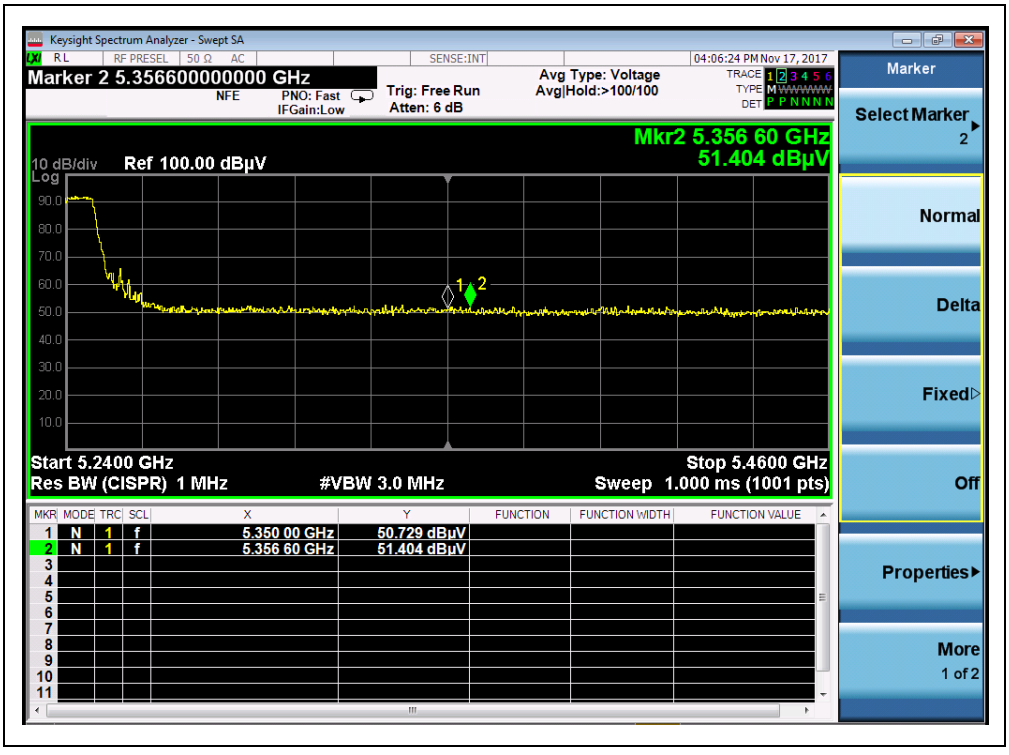
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
36	5095.00	PK	45.12	-50.65	32.11	26.58	74	Pass
36	5095.00	AV	31.80	-50.65	32.11	13.26	54	Pass
48	5356.90	PK	51.40	-50.65	32.11	32.86	74	Pass
48	5356.60	AV	40.75	-50.65	32.11	22.21	54	Pass

B. Test Plots:

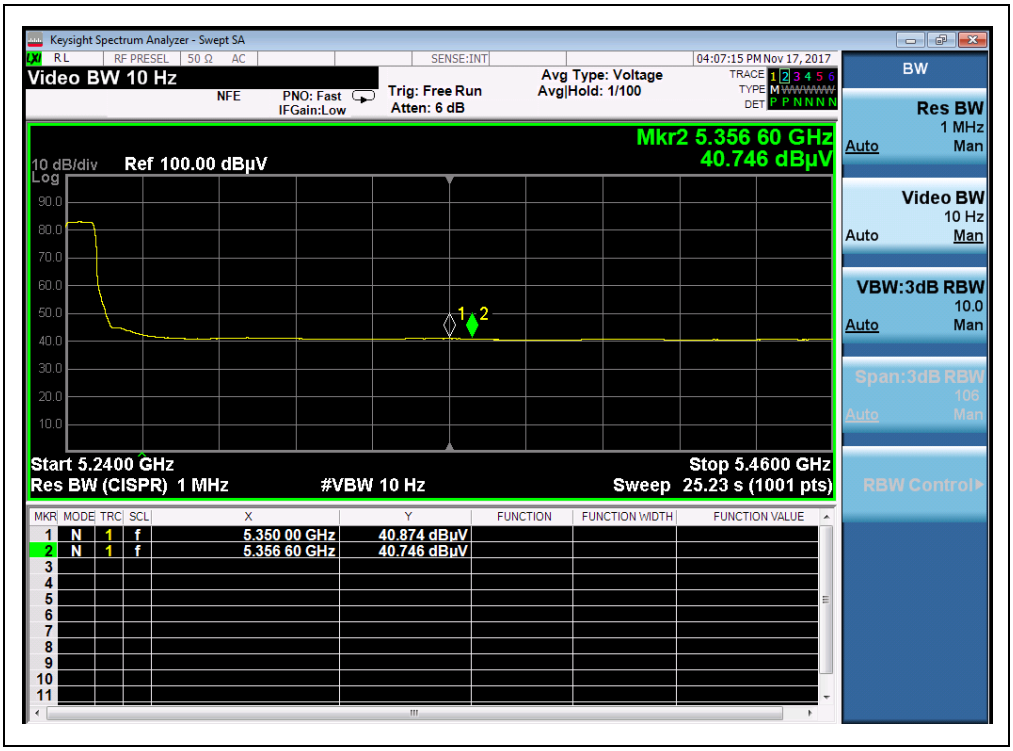


(Channel = 36 PEAK @ 802.11n 20MHz)

(Channel = 36 AVG @ 802.11n 20MHz)



(Channel = 48 PEAK @ 802.11n 20MHz)



(Channel = 48 AVG @ 802.11n 20MHz)

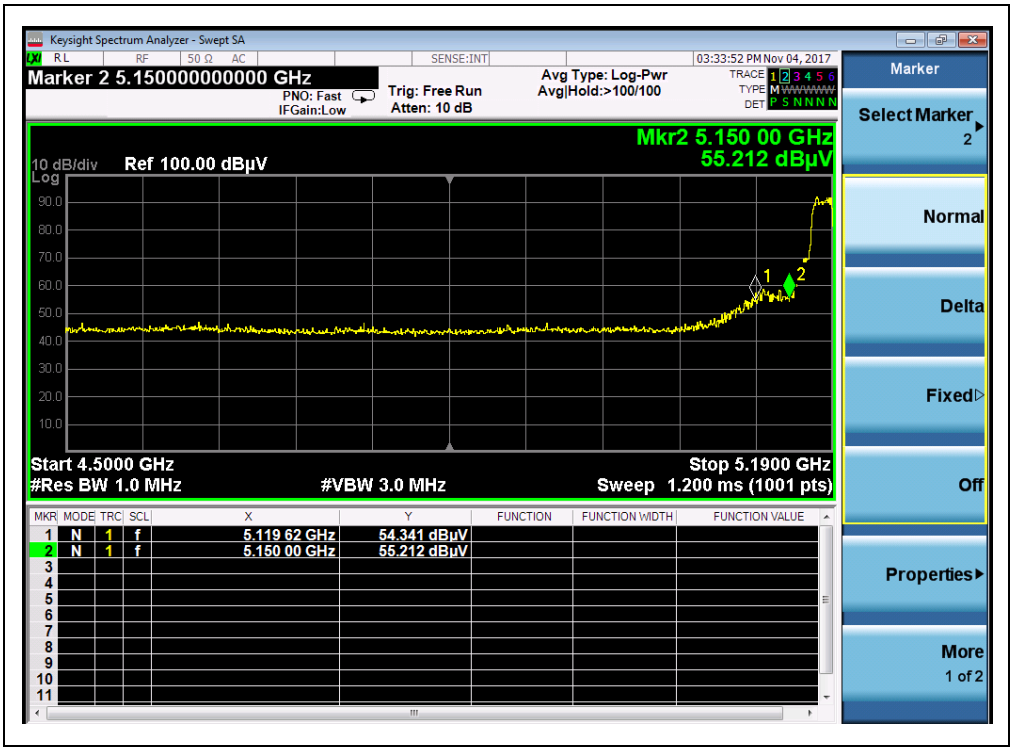
802.11n-40MHz Test mode

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

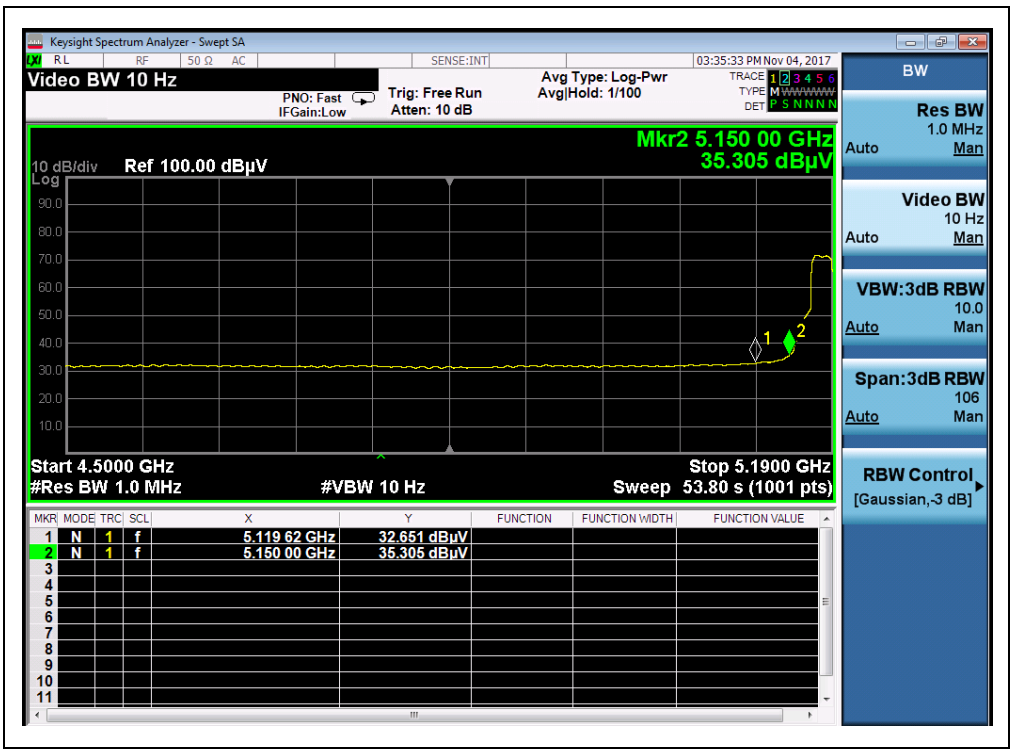
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
		PK/ AV						
38	5119.62	PK	54.34	-50.65	32.11	35.80	74	Pass
38	5119.62	AV	32.65	-50.65	32.11	14.11	54	Pass
46	5372.22	PK	51.42	-50.65	32.11	32.88	74	Pass
46	5372.22	AV	40.27	-50.65	32.11	21.73	54	Pass

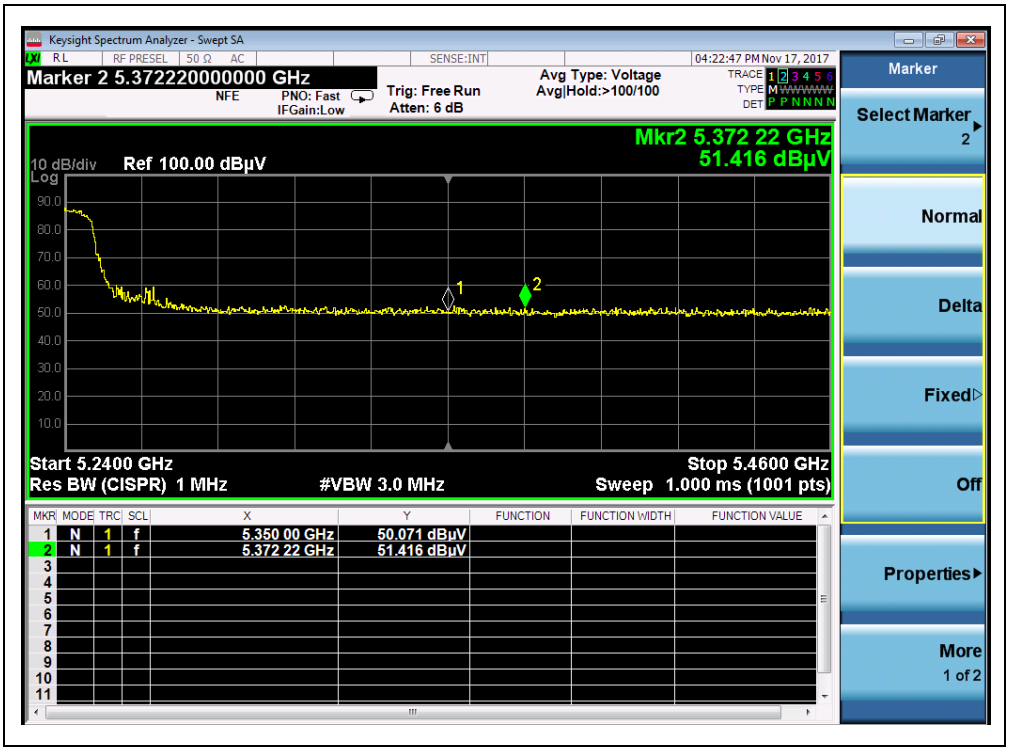
B. Test Plots:



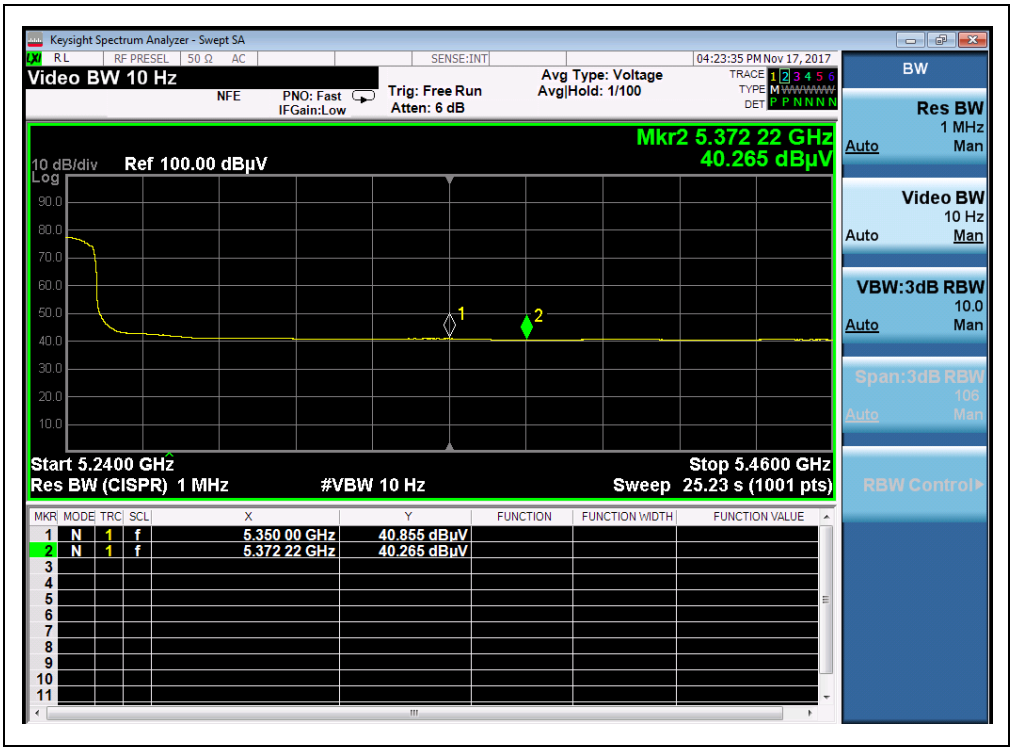
(Channel = 38 PEAK @ 802.11 n-40)



(Channel = 38 AVG @ 802.11 n-40)



(Channel = 46 PEAK @ 802.11 n-40)



(Channel = 46 AVG @ 802.11n-40)

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 -30°C and +50°C. The temperature was incremented by 10^{o} 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

Frequency Stability Measurements for UNII Band 1 (Ch. 36)

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq Dev. (Hz)	Deviation (%)
100%	14.52	+20(Ref)	5,179,999,955	45	0.0000009
100%		-30	5,180,000,025	25	0.0000005
100%		-20	5,179,999,985	15	0.0000003
100%		-10	5,179,999,985	15	0.0000003
100%		0	5,180,000,025	25	0.0000005
100%		+10	5,180,000,021	21	0.0000004
100%		+20	5,179,999,989	11	0.0000002
100%		+30	5,179,999,995	5	0.0000001
100%		+40	5,180,000,014	14	0.0000003
100%		+50	5,180,000,012	12	0.0000002
85%	12.00	+20	5,179,999,996	4	0.0000001
115%	16.80	+20	5,179,999,985	15	0.0000003

Frequency Stability Measurements for UNII Band 3 (Ch. 149)

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq Dev. (Hz)	Deviation (%)
100%	14.52	+20(Ref)	5,745,000,041	41	0.0000007
100%		-30	5,744,999,996	4	0.0000001
100%		-20	5,745,000,014	14	0.0000002
100%		-10	5,744,999,984	16	0.0000003
100%		0	5,745,000,002	2	0.0000000
100%		+10	5,744,999,986	14	0.0000002
100%		+20	5,745,000,022	22	0.0000004
100%		+30	5,745,000,011	11	0.0000002
100%		+40	5,744,999,996	4	0.0000001
100%		+50	5,745,000,023	23	0.0000004
85%	12.00	+20	5,744,999,997	3	0.0000001
115%	16.80	+20	5,745,000,014	14	0.0000002

Note: Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

2.7. Conducted Emission

2.7.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

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

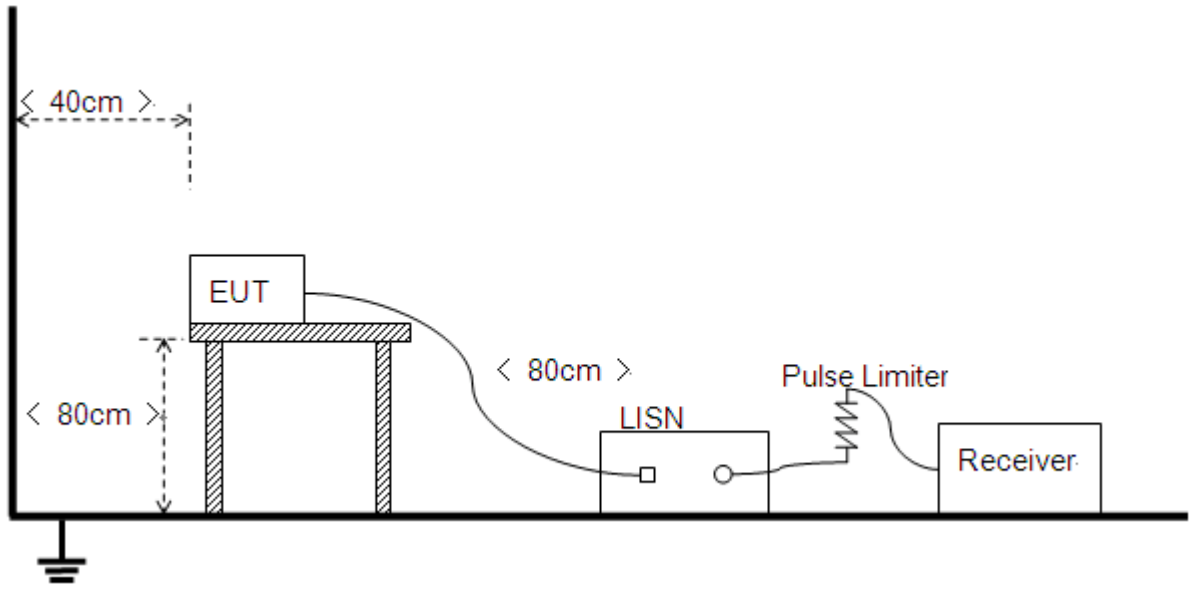
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

2.7.3. Test Result

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

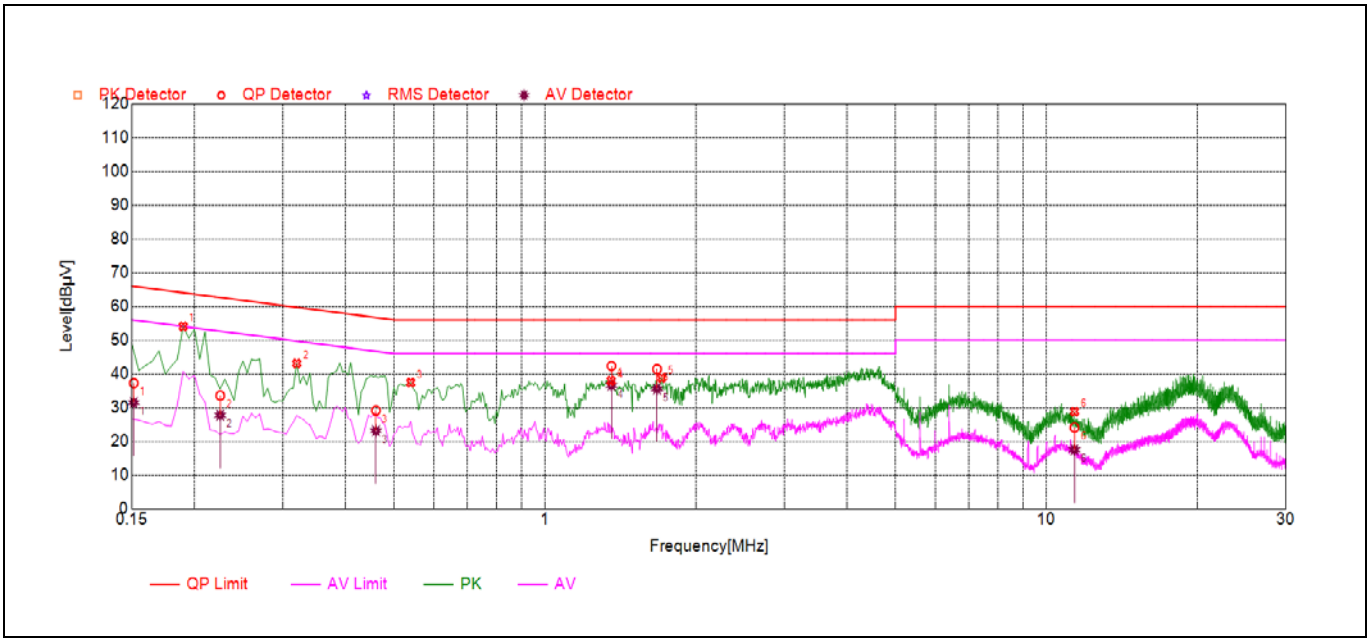
Note: All test modes are performed, only the worst case is recorded in this report.

A. Test setup:

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

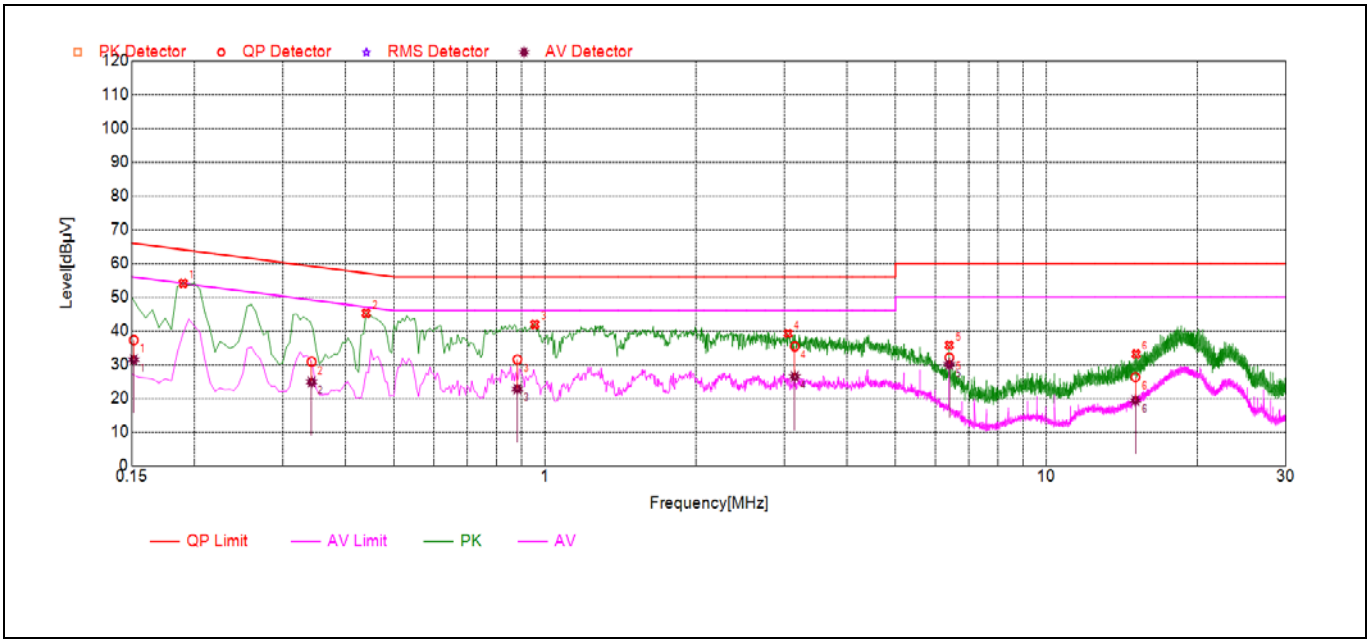
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1514	37.24	31.48	65.92	55.92	Line	PASS
2	0.2252	33.54	27.75	62.62	52.62		PASS
3	0.4604	29.17	23.15	56.69	46.69		PASS
4	1.3574	42.33	36.58	56.00	46.00		PASS
5	1.6732	41.43	35.56	56.00	46.00		PASS
6	11.372	24.09	17.50	60.00	50.00		PASS



(Plot B: N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1514	37.25	31.45	65.92	55.92	Line	PASS
2	0.3426	30.86	24.86	59.14	49.14		PASS
3	0.8812	31.50	22.78	56.00	46.00		PASS
4	3.1494	35.39	26.46	56.00	46.00		PASS
5	6.4028	32.04	30.04	60.00	50.00		PASS
6	15.0474	26.31	19.41	60.00	50.00		PASS

2.8. Radiated Emission

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: 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(eirp) 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

Note:

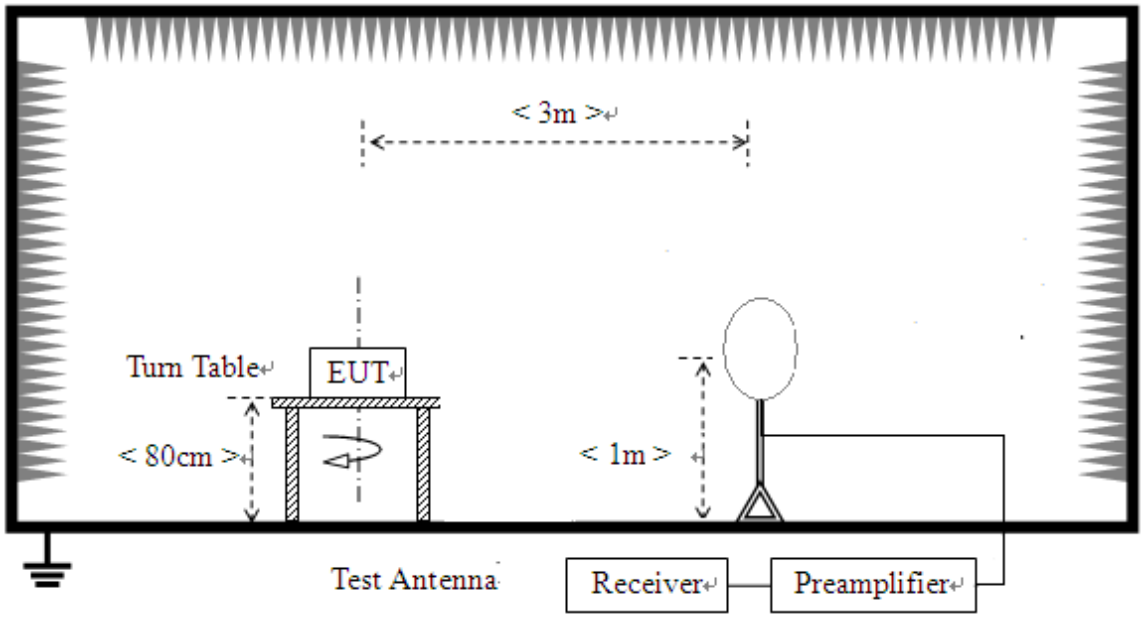
For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

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

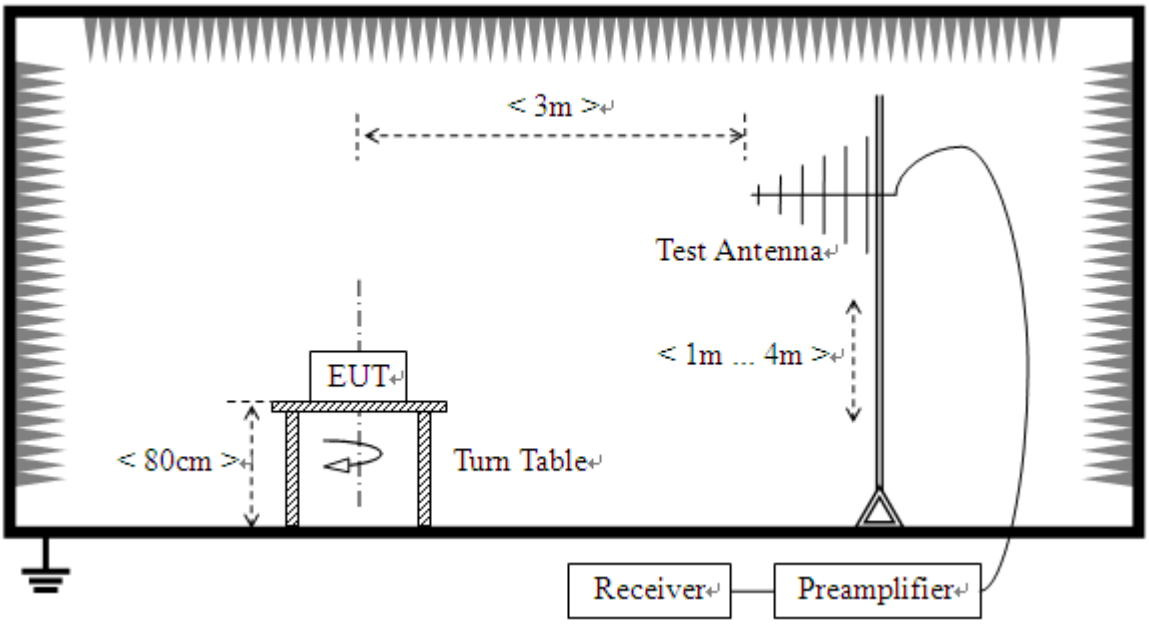
2.8.2. Test Description

A. Test Setup:

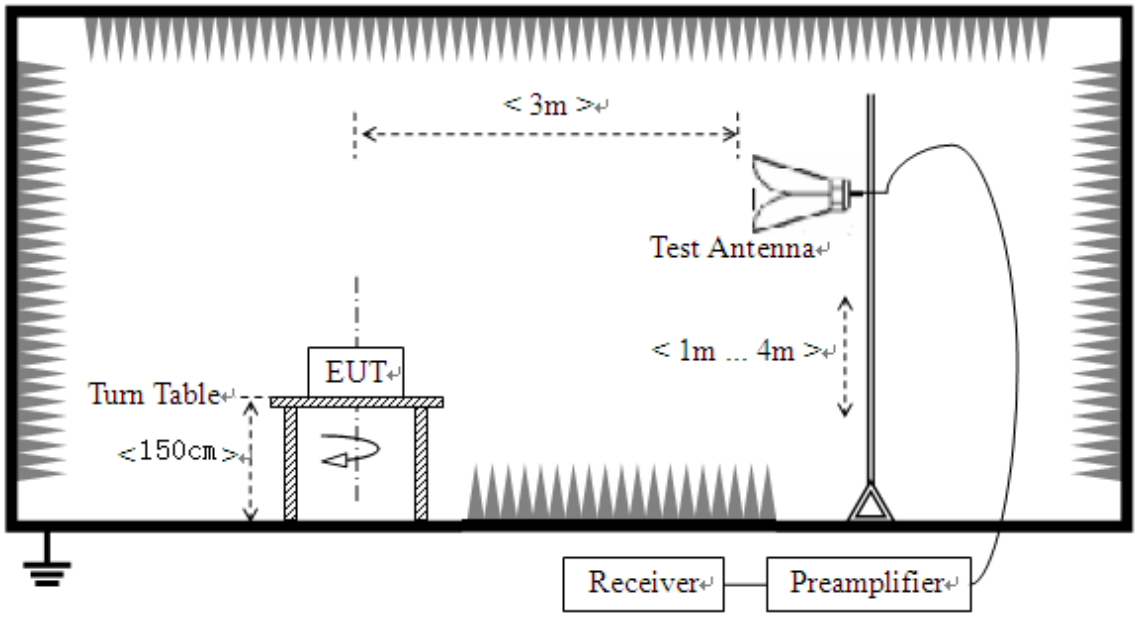
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The RF absorbing material used on the reference ground plane and on the turntable have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz. Test site have a minimum area of the ground plane covered with RF absorbing material as specified in Figure 6 of ANSI C63.4: 2014.

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2013). For radiated emissions below or equal to 1GHz, The EUT was

set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Place the test antenna at 3m away from area of the EUT, while keeping the test antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The test antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final test antenna elevation shall be that which maximizes the emissions. The test antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. The emission levels at both horizontal and vertical polarizations should be tested.

2.8.3. Test Result

According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

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

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

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

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

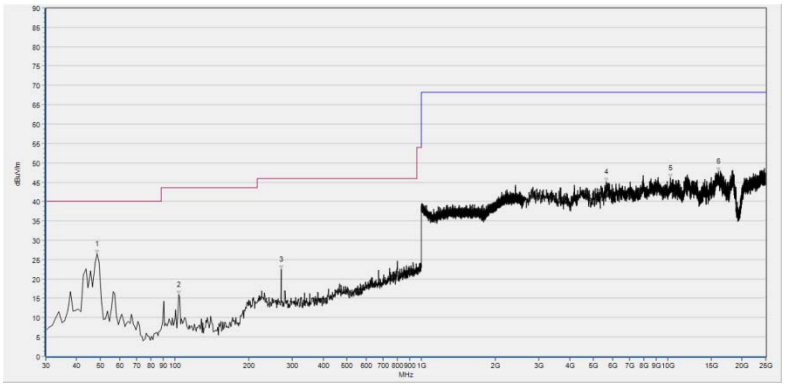
Note2: The low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

For the frequency, which started from 25G to 40G, was pre-scanned and the result which was 10dB lower than the limit.

802.11a-20MHz Test mode

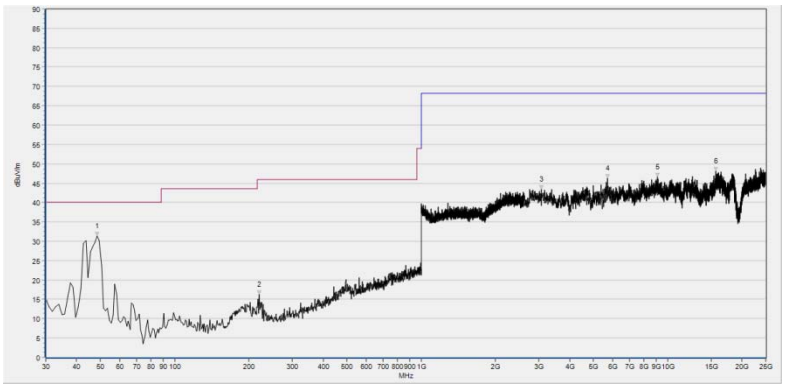
A. Test Plots for the Whole Measurement Frequency Range:

Plots 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
48.448	26.40	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
103.794	15.95	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
269.830	22.41	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
5624.605	45.09	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
10262.332	46.04	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
16087.497	47.81	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

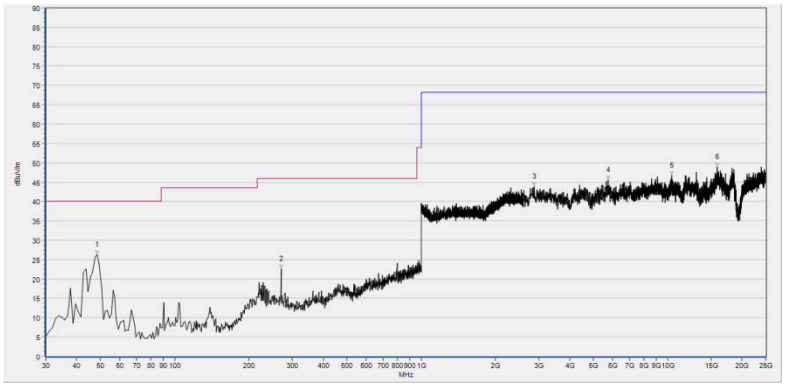
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.448	31.39	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
220.310	16.18	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3070.494	43.39	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5705.261	46.18	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
9074.895	46.59	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
15684.217	48.07	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

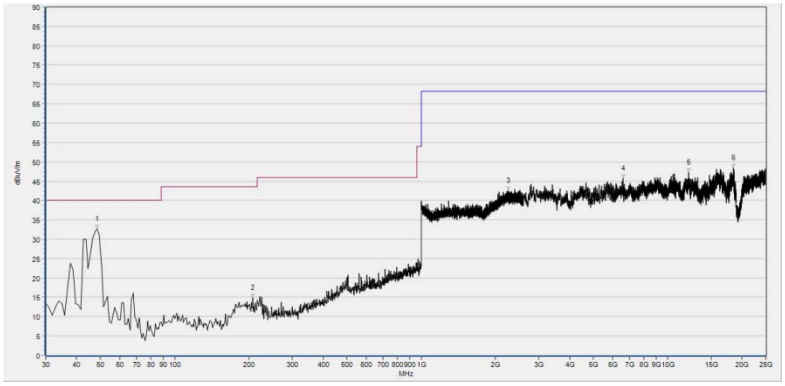
(Antenna Vertical, 30MHz to 25GHz)

Plots 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
48.448	26.23	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	22.67	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2882.296	43.91	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5718.704	45.51	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
10360.912	46.68	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
15827.606	48.86	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

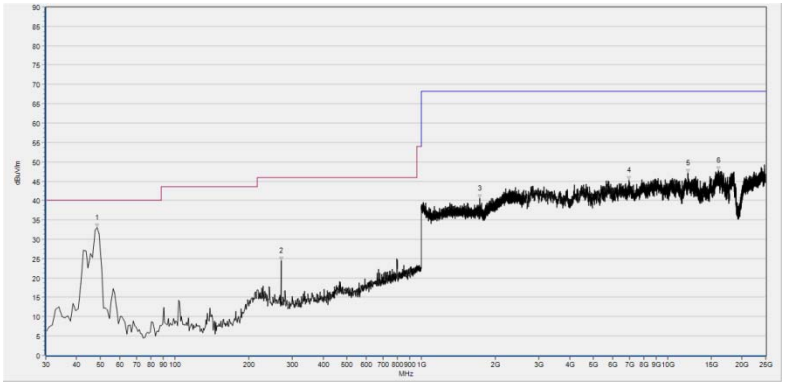
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.448	32.70	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
207.688	14.86	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
2255.885	42.53	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
6583.517	45.70	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12162.232	47.24	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
18520.624	48.46	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

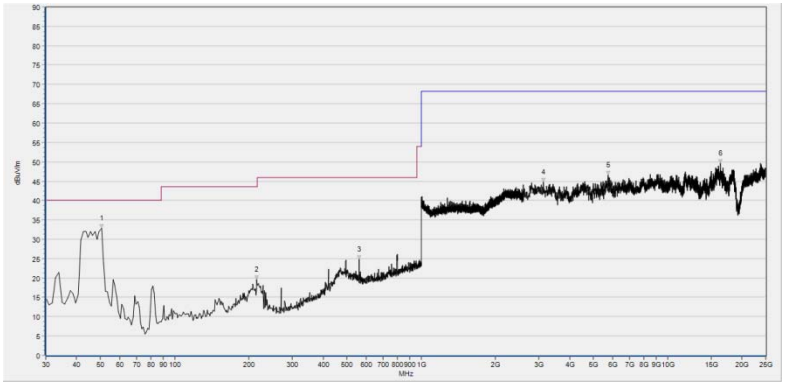
(Antenna Vertical, 30MHz to 25GHz)

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
48.448	32.96	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	24.55	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1725.575	40.63	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
6968.874	45.28	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12068.134	47.14	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
16020.284	47.82	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.390	32.82	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
215.455	19.63	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
560.150	24.86	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3137.708	44.72	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5718.704	46.58	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
16392.198	49.63	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

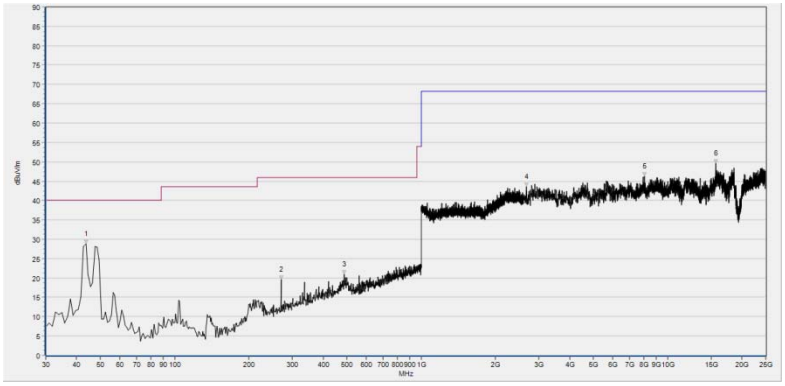
(Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 149

Channel	Frequency (MHz)	Antenna Horiz./ Vert.	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
149	5723.55	Horizontal	55.16	-50.65	32.11	36.62	78.2	Pass
149	5723.55	Vertical	37.45	-50.65	32.11	18.91	78.2	Pass

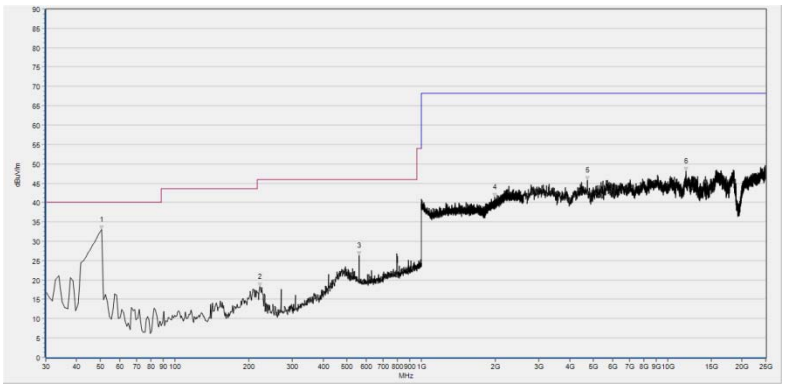
(Channel = 149 Horizontal @ 802.11a)

(Channel = 149 Vertical @ 802.11a)



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	28.81	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	19.62	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
487.327	20.98	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2667.213	43.53	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8039.808	46.23	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
15706.621	49.56	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

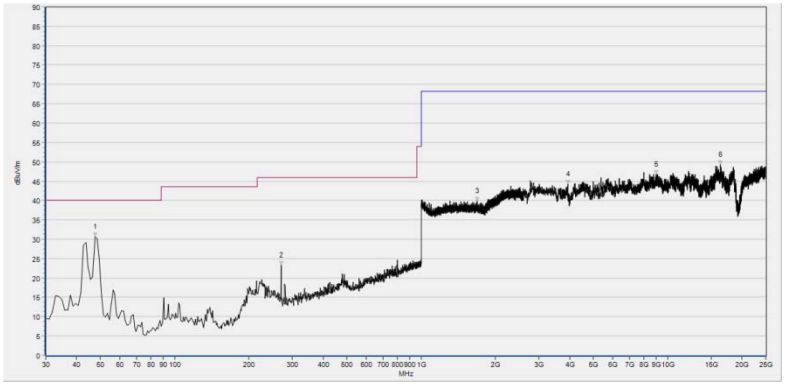
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.390	25.58	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
221.281	18.32	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
560.150	26.37	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1988.596	41.40	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4723.945	45.80	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
11853.051	48.17	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

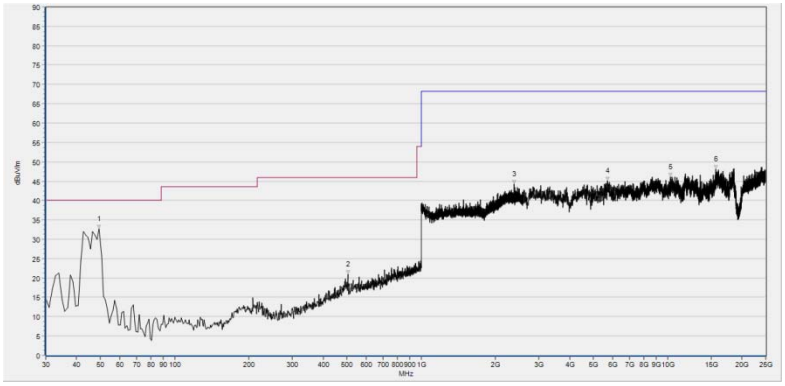
(Antenna Vertical, 30MHz to 25GHz)

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
47.477	30.63	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	23.26	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1688.229	39.97	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
3930.826	44.16	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
9003.201	46.69	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
16378.756	49.24	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.419	32.62	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
503.834	21.02	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2380.193	44.27	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5705.261	45.09	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
10257.852	46.09	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
15666.293	48.09	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

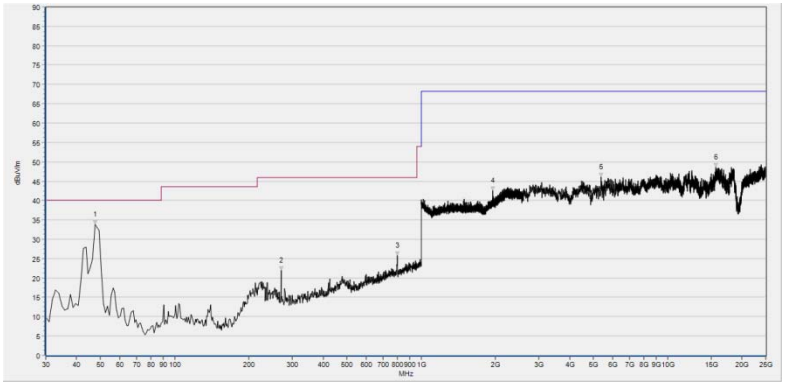
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 165

Channel	Frequency (MHz)	Antenna Horiz./ Vert.	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
165	5862.50	Horizontal	42.79	-50.65	32.11	24.25	78.2	Pass
165	5862.50	Vertical	30.93	-50.65	32.11	12.39	78.2	Pass

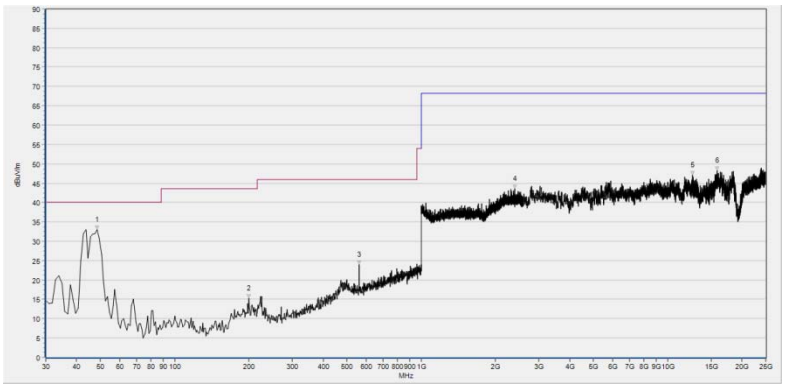
(Channel = 165 Horizontal @ 802.11a)

(Channel = 165 Vertical @ 802.11a)



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
47.477	33.88	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	21.94	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
799.980	25.83	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1949.650	42.59	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5369.194	46.10	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
15684.217	48.54	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



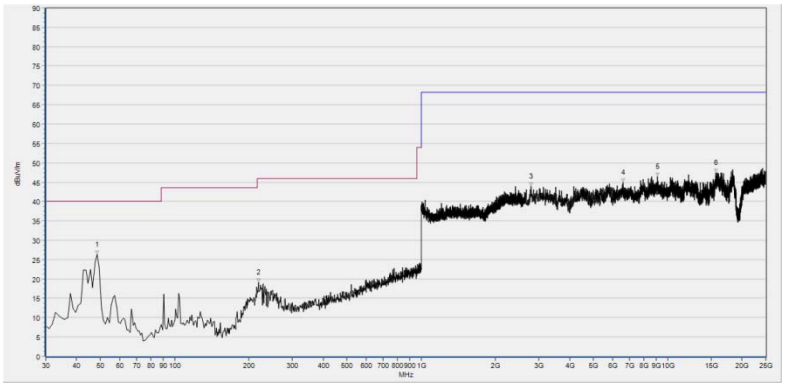
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.448	40.72	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
199.920	15.22	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
560.150	23.95	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2391.397	43.63	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12619.284	47.08	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
15823.125	48.34	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

802.11n-20MHz Test mode

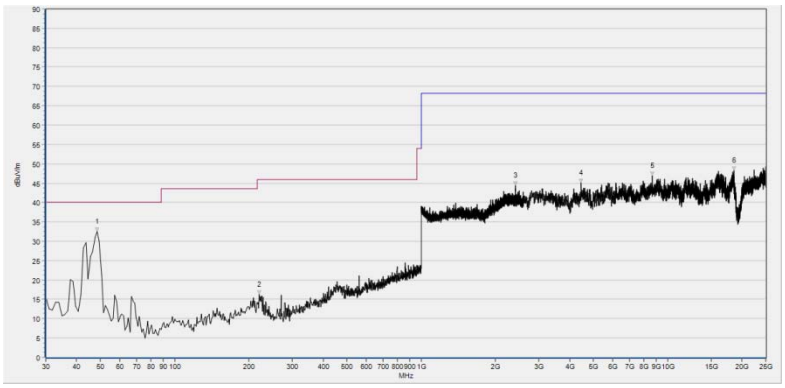
A. Test Plots for the Whole Measurement Frequency Range:

Plots 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
48.448	26.23	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
218.368	19.08	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2792.679	43.85	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
6583.517	44.87	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
9106.261	46.38	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
15652.851	47.49	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

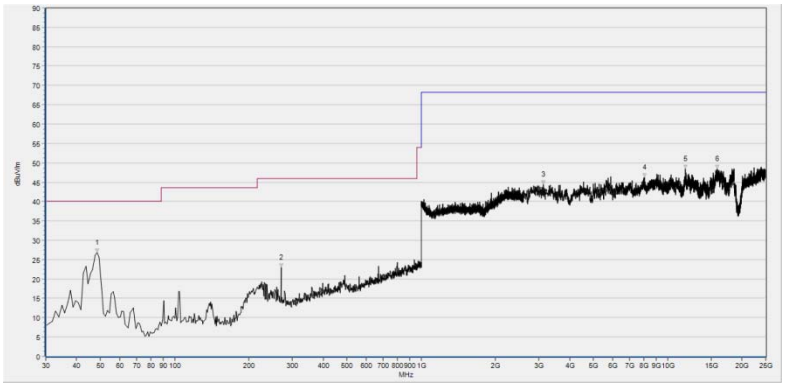
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.448	32.58	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
220.310	16.30	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2412.738	44.48	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4459.572	45.07	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8671.614	46.93	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
18583.357	48.22	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

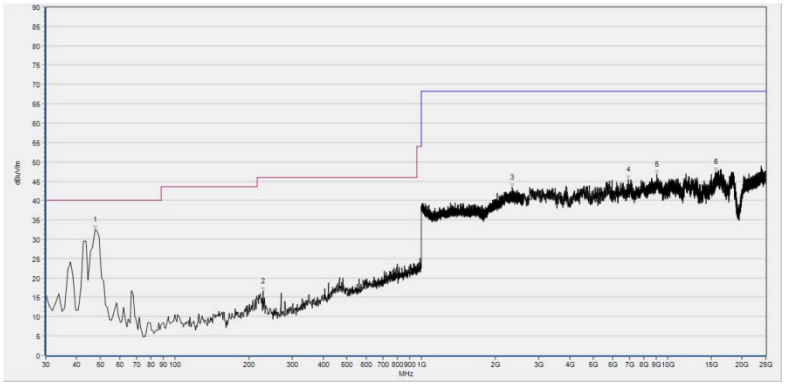
(Antenna Vertical, 30MHz to 25GHz)

Plots 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
48.448	26.88	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	23.04	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3133.227	44.48	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8039.808	46.19	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11772.394	48.44	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
15841.048	48.46	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

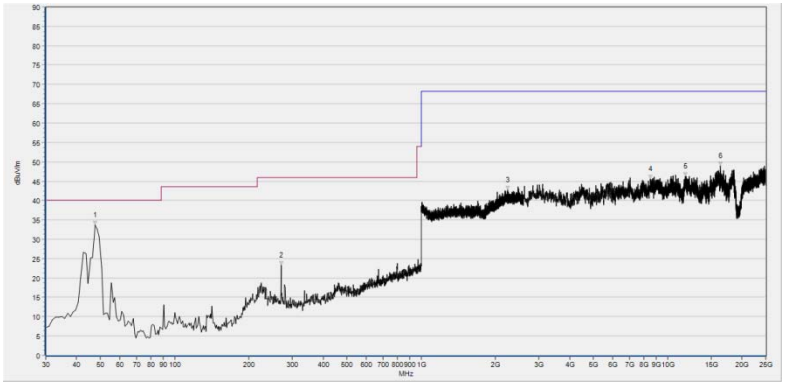
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
47.477	32.52	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
228.078	16.51	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2336.445	43.43	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
6937.508	45.45	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
9016.643	46.72	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
15675.255	47.35	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

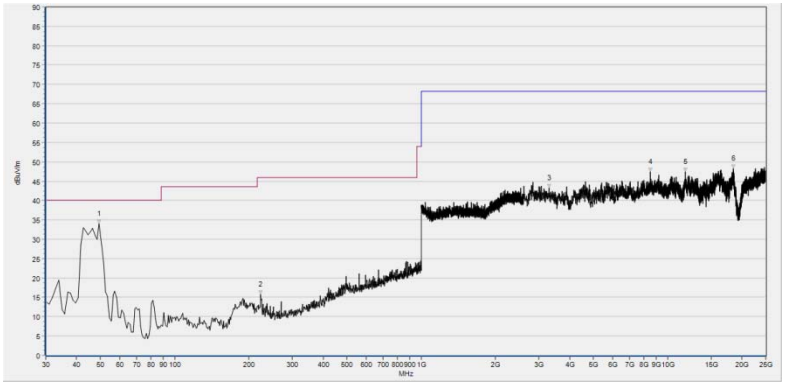
(Antenna Vertical, 30MHz to 25GHz)

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
47.477	33.65	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	23.26	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2247.349	42.67	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8496.859	45.58	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11776.875	46.19	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
16324.985	49.02	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.419	39.06	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
223.223	15.81	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3294.539	43.29	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8523.745	47.38	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
11776.875	47.38	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
18484.777	48.26	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

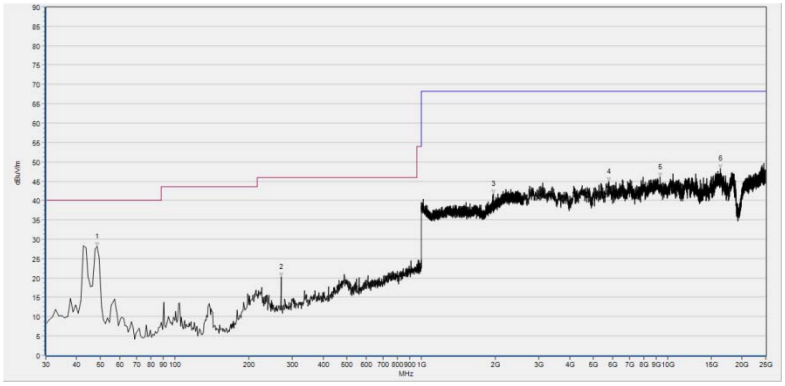
(Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 149

Channel	Frequency (MHz)	Antenna Horiz./ Vert.	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
149	5717.43	Horizontal	50.41	-50.65	32.11	31.87	78.2	Pass
149	5717.43	Vertical	32.24	-50.65	32.11	13.70	78.2	Pass

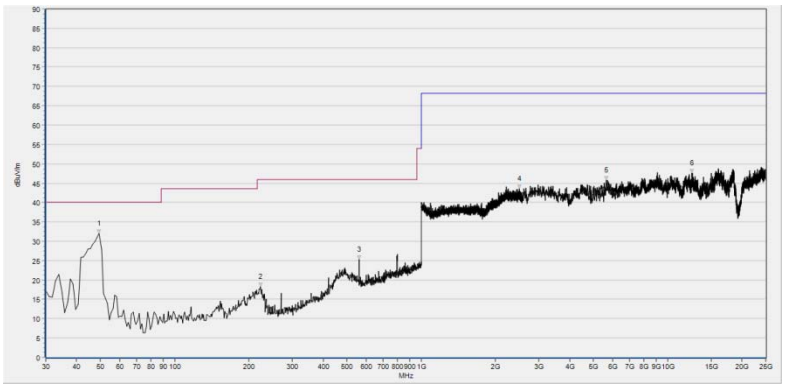
(Channel = 149 Horizontal @ 802.11n-20)

(Channel = 149 Vertical @ 802.11n-20)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.448	28.11	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	20.29	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1958.720	41.78	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5772.474	44.99	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
9307.902	46.04	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
16387.718	48.20	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

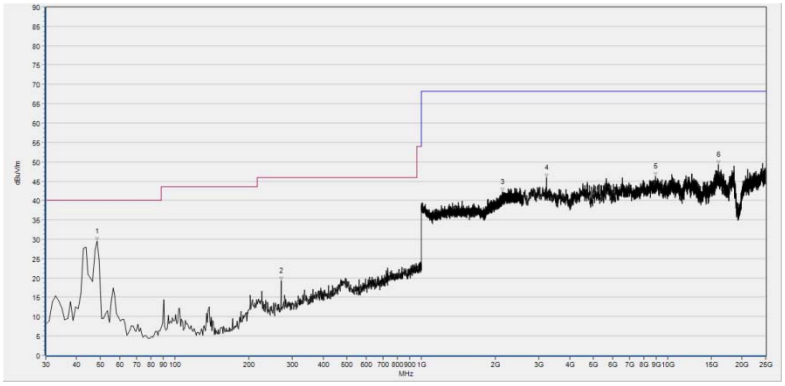
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.419	33.76	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
222.252	18.33	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
560.150	25.30	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2498.633	43.57	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5629.086	45.68	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12507.261	47.62	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

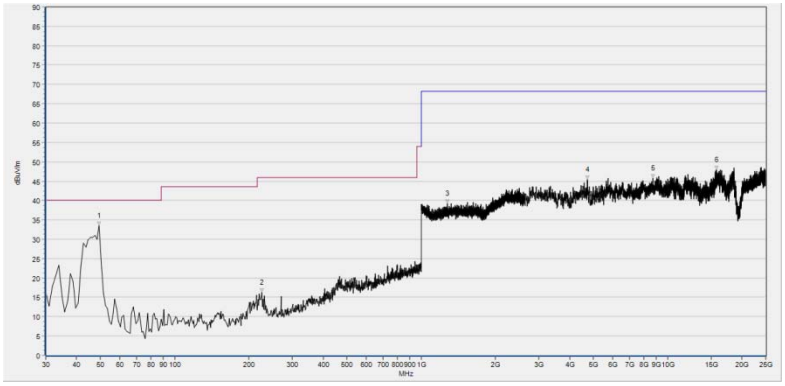
(Antenna Vertical, 30MHz to 25GHz)

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
48.448	29.48	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	19.32	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2133.178	42.18	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
3227.325	45.90	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
8900.140	46.20	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
16038.208	49.29	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.419	33.56	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
226.136	16.34	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1277.426	39.25	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4732.907	45.45	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8694.019	45.78	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
15809.682	48.02	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

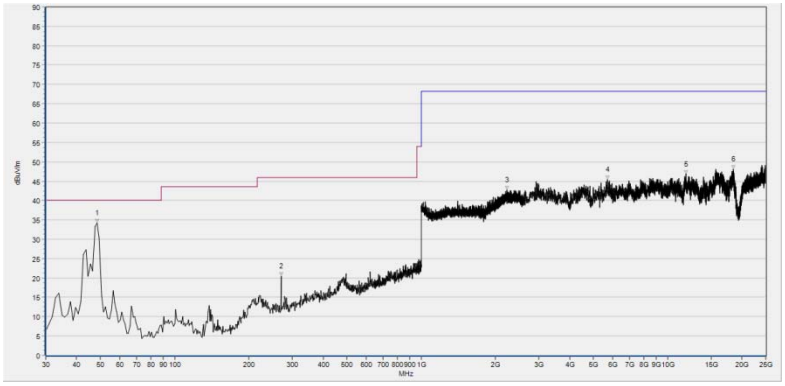
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 165

Channel	Frequency (MHz)	Antenna Horiz./ Vert.	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
165	5860.48	Horizontal	42.23	-50.65	32.11	23.69	78.2	Pass
165	5860.48	Vertical	30.98	-50.65	32.11	12.44	78.2	Pass

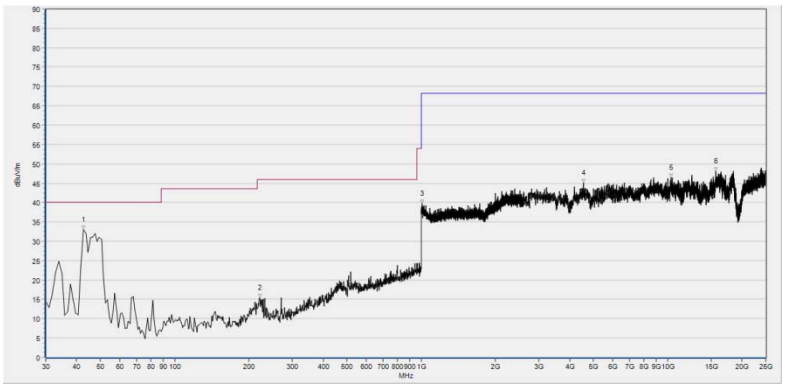
(Channel = 165 Horizontal @ 802.11n-20)

(Channel = 165 Vertical @ 802.11n-20)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.448	34.25	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	20.46	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2223.341	42.75	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5705.261	45.42	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11848.570	46.77	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
18466.853	48.02	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



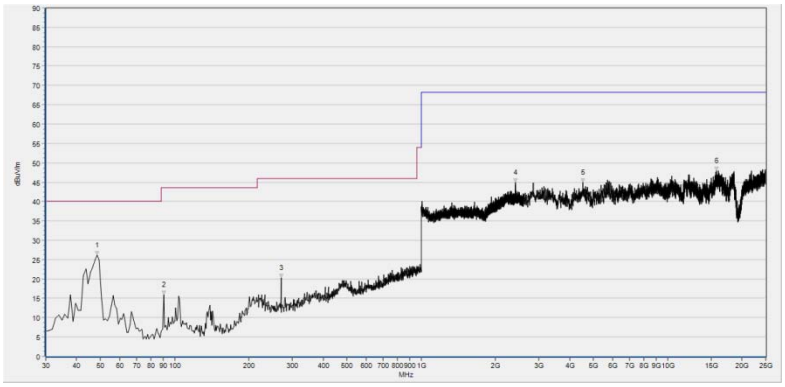
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
42.623	35.76	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
221.281	15.50	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1006.936	39.69	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
4544.709	45.11	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
10342.989	46.50	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
15670.774	48.18	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

802.11n-40MHz Test mode

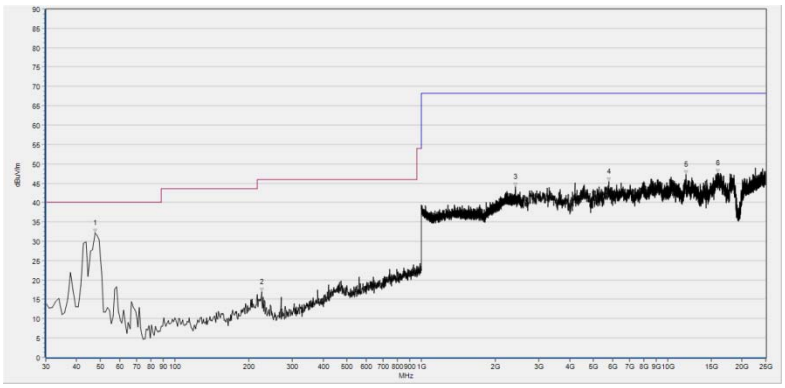
A. Test Plots for the Whole Measurement Frequency Range:

Plots 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
48.448	26.11	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
90.200	15.87	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
269.830	20.33	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2412.738	44.95	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
4531.266	44.84	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
15760.392	47.90	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

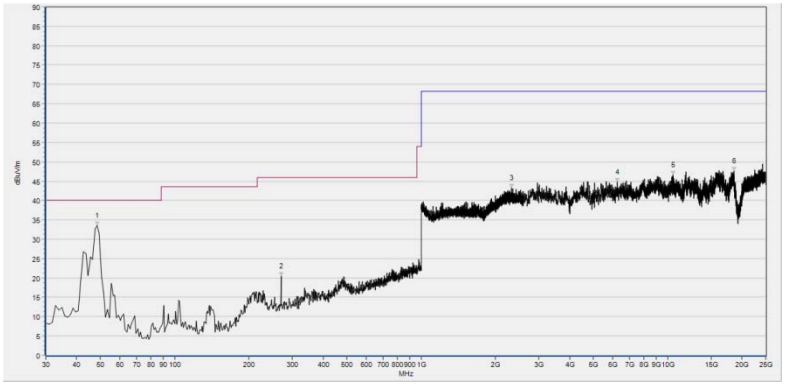
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
47.477	32.12	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
225.165	16.97	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2410.070	44.01	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5772.474	45.42	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
11853.051	47.33	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
15962.032	47.55	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

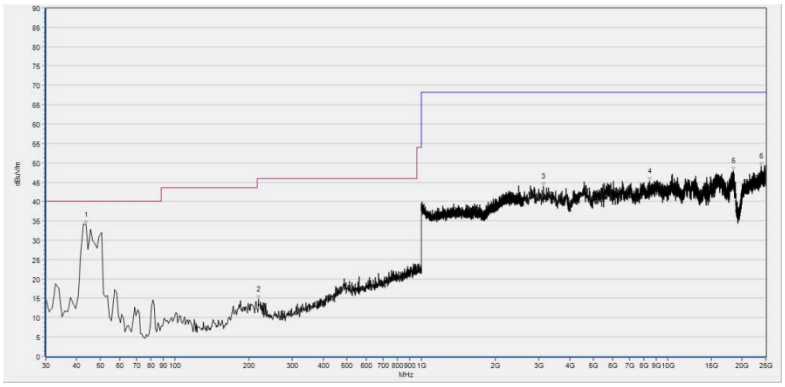
(Antenna Vertical, 30MHz to 25GHz)

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
48.448	33.47	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	20.43	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2331.110	43.16	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
6260.892	44.67	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
10522.224	46.57	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
18578.876	47.64	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
43.594	33.98	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
218.368	14.72	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3137.708	43.87	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
8461.012	45.23	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
18475.815	47.91	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
23897.700	49.09	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

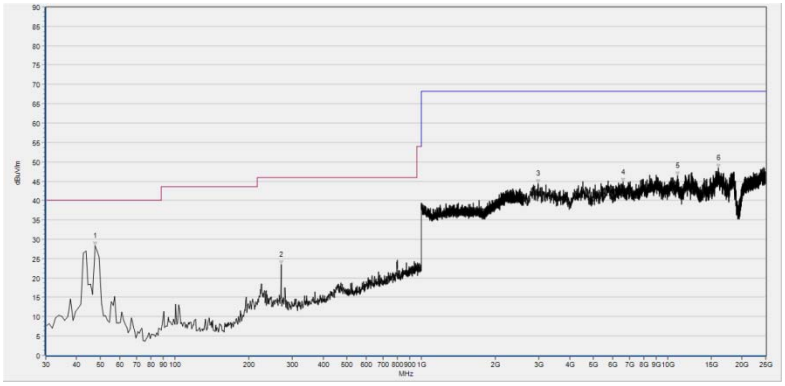
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 151

Channel	Frequency (MHz)	Antenna Horiz./ Vert.	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
151	5715.00	Horizontal	44.89	-50.65	32.11	26.35	78.2	Pass
151	5715.00	Vertical	31.56	-50.65	32.11	13.02	78.2	Pass

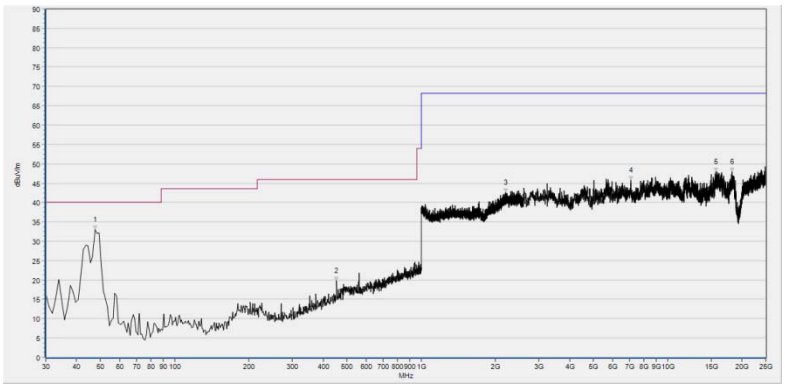
(Channel = 151 Horizontal @ 802.11n-40)

(Channel = 151 Vertical @ 802.11 n-40)



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
47.477	28.39	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	23.41	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2971.914	44.47	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
6587.998	44.67	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
10992.719	46.46	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
16033.727	48.46	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
47.477	34.17	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
453.343	19.80	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2199.867	42.60	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
7098.820	45.71	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
15661.812	48.00	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
18278.656	47.87	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

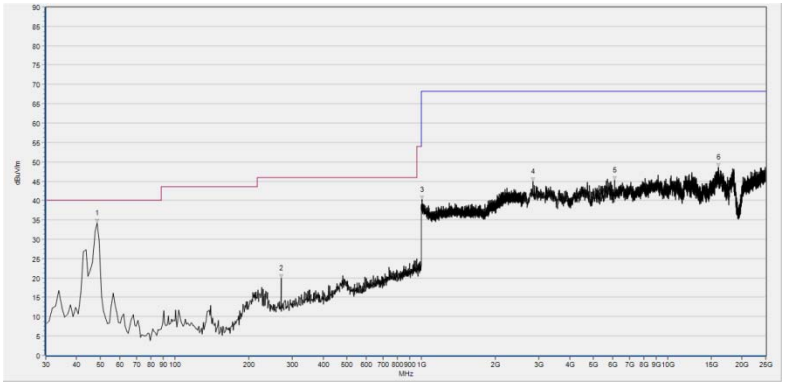
(Antenna Vertical, 30MHz to 25GHz)

Plots for Channel = 159

Channel	Frequency (MHz)	Antenna Horiz./ Vert.	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
159	5850.00	Horizontal	42.69	-50.65	32.11	24.15	78.2	Pass
159	5850.00	Vertical	31.04	-50.65	32.11	12.50	78.2	Pass

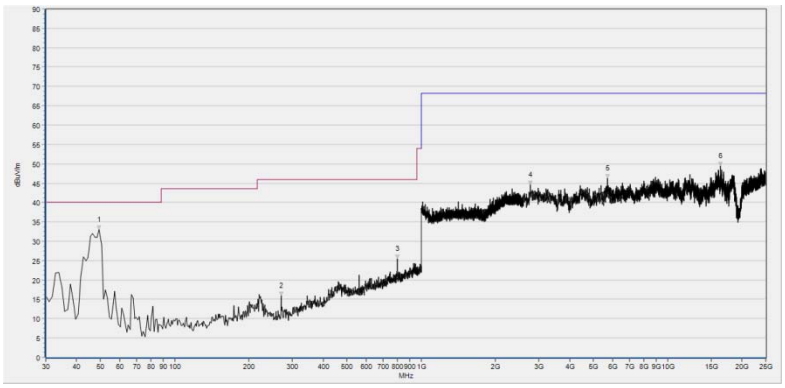
(Channel = 159 Horizontal @ 802.11 n-40)

(Channel = 159 Vertical @ 802.11 n-40)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
48.448	34.19	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
269.830	19.97	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1007.469	40.17	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
2841.968	44.96	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
6090.618	45.29	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
16015.803	48.64	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.419	38.93	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
269.830	16.00	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
799.980	25.46	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2770.274	44.57	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5700.780	46.26	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
16405.641	49.48	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.9. Automatically discontinue transmission requirement

2.9.1. Requirement

According to 15.407(c), the device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met

2.9.2. Result

The EUT will automatically discontinue transmission in case of either absence of information to transmit or operational failure.

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Peak Output Power	±2.22dB
Power spectral density (PSD)	±2.22dB
Bandwidth	±5%
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

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

2. Identification of the Responsible Testing Location

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

3. Facilities and Accreditations

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Spectrum Analyzer	MY45101810	E4407B	Agilent	2017.05.24	2018.05.23
Power Splitter	NW521	1506A	Weinschel	2017.05.24	2018.05.23
Attenuator 1	(N/A.)	10dB	Resnet	2017.05.24	2018.05.23
Attenuator 2	(N/A.)	3dB	Resnet	2017.05.24	2018.05.23
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2016.12.07	2017.12.06
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

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	US44210471	E7405A	Agilent	2017.05.17	2018.05.16
LISN	812744	NSLK 8127	Schwarzbeck	2017.05.17	2018.05.16
Service Supplier	100448	CMU200	R&S	2017.05.17	2018.05.16
Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2017.05.17	2018.05.16
Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3Auxiliary Test Equipment

Equipment Name	Model No.	Brand Name	Manufacturer	Cal.Date	Cal.Due Date
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal.Due Date
System Simulator	GB45360846	8960-E5515C	Agilent	2017.05.17	2018.05.16
Receiver	MY54130016	N9038A	Agilent	2017.05.17	2018.05.16
Test Antenna - Bi-Log	N/A	VULB9163	Schwarzbeck	2016.12.09	2017.12.08
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2017.03.30	2018.03.29
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2017.03.30	2018.03.29
Test Antenna - Horn	1774	BBHA 9120D	Schwarzbeck	2017.09.13	2018.09.12
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2017.05.17	2018.05.16
Climate Chamber	2004012	HL4003T	Yinhe	2017.01.11	2018.01.10
Vibration Table	N/A	ACT2000-S015L	CMI-COM	2017.01.11	2018.01.10
Anechoic Chamber	N/A	9m*6m*6m	Changning	2017.01.11	2018.01.10

END OF REPORT