REPORT No. : SZ21110175W01

TEST REPORT

APPLICANT	:	SamKnows Limited
PRODUCT NAME	:	SamKnows Whitebox 8.0+
MODEL NAME	:	SK-WB8+
BRAND NAME	:	SamKnows
FCC ID	:	2AGPP-SKWB8V4
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2020-11-11
TEST DATE	:	2020-11-29 to 2020-12-29
ISSUE DATE	:	2022-06-13

Edited by: Peng Mi (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

MORLAB

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DIRECTORY

Change History		
Version	Date	Reason for change
1.0	2022-06-13	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	SamKnows Limited
Applicant Address:	94 New Bond Street, London W1S 1SJ, United Kingdom
Manufacturer:	Taicang T & W Electronics Co., Ltd
Manufacturer Address:	No. 89, Jiangnan Road, Loudong Street, Taicang, Jiangsu Province 215412, P. R. China

1.2. Equipment Under Test (EUT) Description

Product Name:	SamKnows Whitebox 8.0+	
Sample No.:	4#	
Hardware Version:	3	
Software Version:	20160115	
Modulation Technology:	DSSS, OFDM	
Modulation Type:	Refer to section1.3	
Operating Frequency Range:	802.11b/g/ n (HT20): 2412MHz–2472MHz 802.11n (HT40): 2422MHz–2462MHz	
Antenna Type:	External Antenna	
Antenna Gain:	ANT 0: 5.00dBi; ANT 1: 5.00dBi	
Directional Gain:	8.01dBi$_{\text{Note 3}}$	
Accessory Information:	AC Adapter	
	Brand Name:	N/A
	Model No.:	S24B72-120A200-0K
	Serial No.:	(N/A, marked #1 by test site)
	Rated Output:	12V⎓2A
	Rated Input:	100-240V~50/60Hz, 0.8A
	Manufacturer:	Shenzhen Gongjin Electronics Co., Ltd.

Note 1: This test report is variant from the original report (Report No.: SZ20110143W01, FCC ID: 2AGPP-SKWB8V3), based on the similarity between before, o a second Wi-Fi(2.4G) chip needs to be added. The Wi-Fi(2.4G) chip is Pin-to-Pin and the supplier is the same to the before. New Wi-Fi(2.4G) chip's basic function is the same with old chip and no any change in radio parameters has occurred. Except for the above differences, their electrical circuit design, layout, components used and internal wiring are identical. The changes do not affect the results in this report.

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

Note 3: The EUT has two antennas, only 802.11n modulation mode supports a MIMO function.

Note 4: According to KDB 662911 D01, the directional gain = G_{ANT} + 10log(N_{ANT}) dBi, where G_{ANT} is the maximum antenna gain in dBi, N_{ANT} is the number of outputs.

Note 5: For conducted test item Conducted Output Power and Power Spectral Density of each modulation mode, we recorded the test result of two antennas separately, for other conducted test items both of the two antennas were tested separately, we only recorded the worst test result (ANT 0) in this report.

Note 6: Radiation test items for all modulation operate at 2Tx mode during the test, only the worst test result(ANT0) was recorded in this report.

Note 7: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Modulation Type and Data Rate of EUT

Modulation technology	Modulation Type	Data Rate (Mbps) Note1
DSSS (802.11b)	DBPSK	**1**
	DQPSK	2
	CCK	5.5/ 11
OFDM (802.11g)	BPSK	**6** / 9
	QPSK	12 / 18
	16QAM	24 / 36
	64QAM	48 / 54
OFDM (802.11n (HT20))	BPSK	**6.5**
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65
OFDM (802.11n (HT40))	BPSK	**13.5**
	QPSK	27/40.5
	16QAM	54/81/108
	64QAM	121.5/135

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

1.4. The Channel Number and Frequency

Test Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11b/g/ n (HT20)	**1**	**2412**	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	**13**	**2472**
	7	**2442**		
Test Mode	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
802.11n (HT40)	**3**	**2422**	8	2447
	4	2427	9	2452
	5	2432	10	2457
	6	2437	**11**	**2462**
	7	**2442**		

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

1.5. Test Standards and Results

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

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

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

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	$PASS_{Note1}$	No deviation
2	N/A	Duty Cycle of Test Signal	Dec 26, 2020	Ouyang Feng	$PASS_{Note1}$	No deviation
3	15.247(b)	Maximum Peak and Average Conducted Output Power	Dec 29, 2020	Ouyang Feng	$PASS_{Note1}$	No deviation
4	15.247(a)	Bandwidth	Dec 26, 2020	Ouyang Feng	$PASS_{Note1}$	No deviation
5	15.247(d)	Conducted Spurious Emission and Band Edge	Dec 24, 2020	Ouyang Feng	$PASS_{Note1}$	No deviation
6	15.247(e)	Power Spectral Density	Dec 24, 2020	Ouyang Feng	$PASS_{Note1}$	No deviation
7	15.207	Conducted Emission	Nov 29, 2020	Huang Zhiye	$PASS_{Note1}$	No deviation
8	15.247(d)	Restricted Frequency Bands	Dec 20, 2020	Gao Jianrou	$PASS_{Note1}$	No deviation
9	15.209, 15.247(d)	Radiated Emission	Nov 30&Dec 04&14, 2020	Gao Jianrou	$PASS_{Note1}$	No deviation

Note 1: The test results of these test items in this report refer to the test report (Report No.: SZ22110143W01).

Note 2: The tests were performed according to the method of measurements prescribed in

ANSIC63.10-2013, KDB558074 D01 v05r02.

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 12dB contains two parts that cable loss 2dB 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 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

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

2.1.2. Test Result: Compliant

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

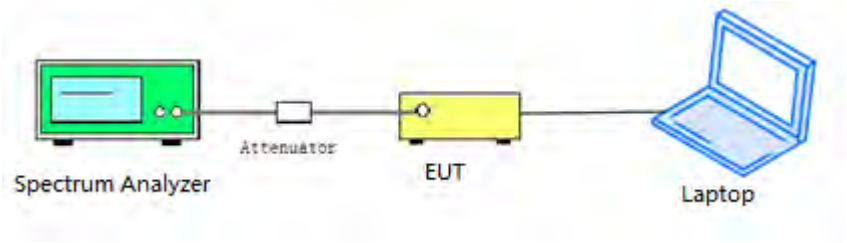
2.2. Duty Cycle of Test Signal

2.2.1. Requirement

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

2.2.2. Test Description

Test Setup:



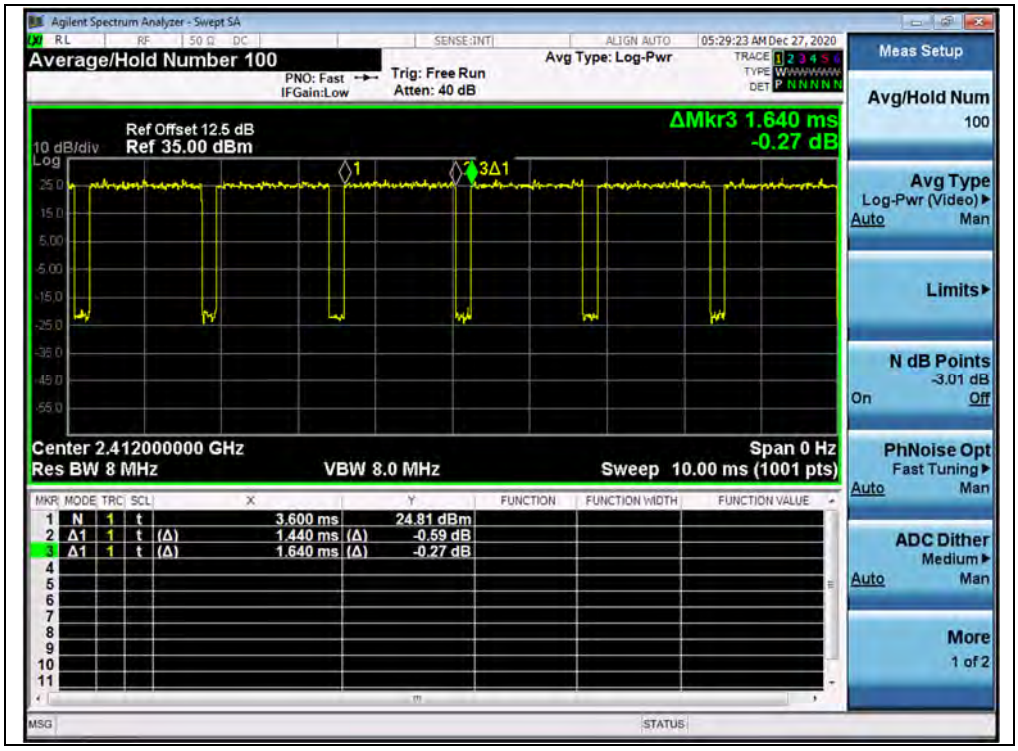
ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.

2.2.3. Test Result

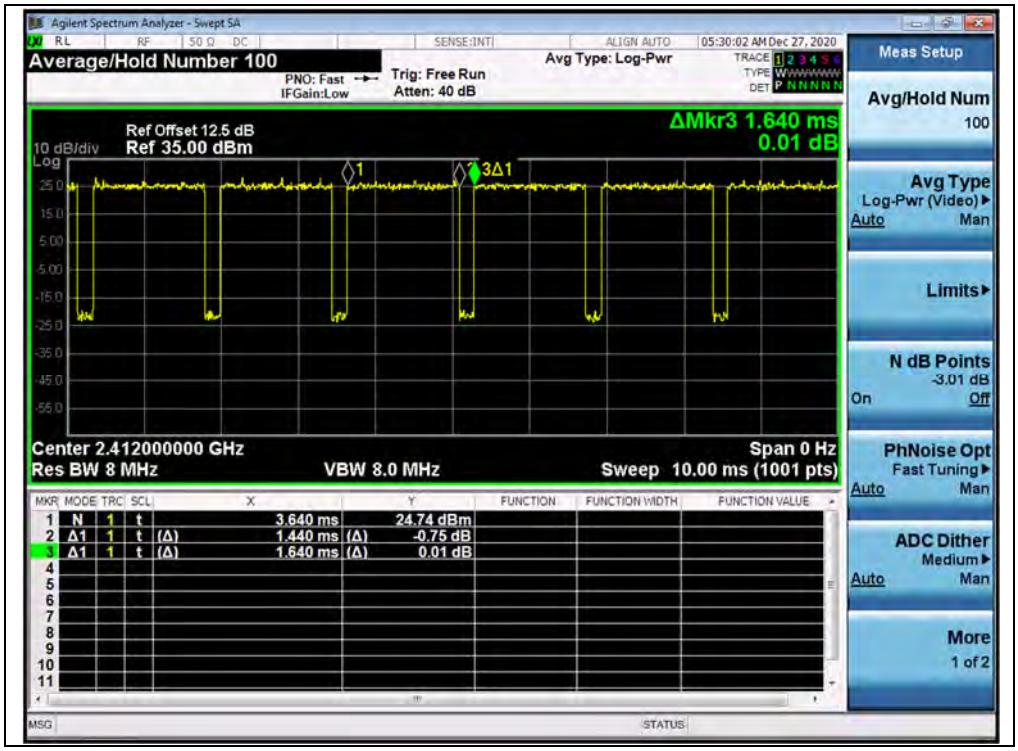
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*lg[1/D])
802.11b	87.80	0.57
802.11g	87.80	0.57
802.11n (HT20)	86.54	0.63
802.11n (HT40)	76.55	1.16

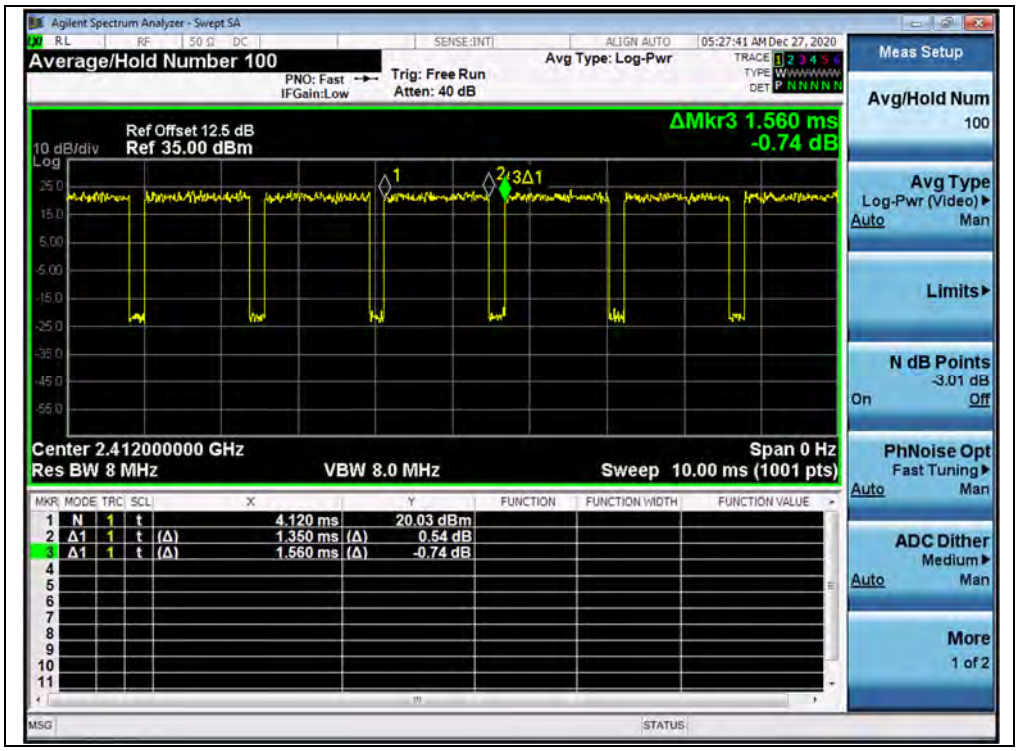
B. Test Plot:



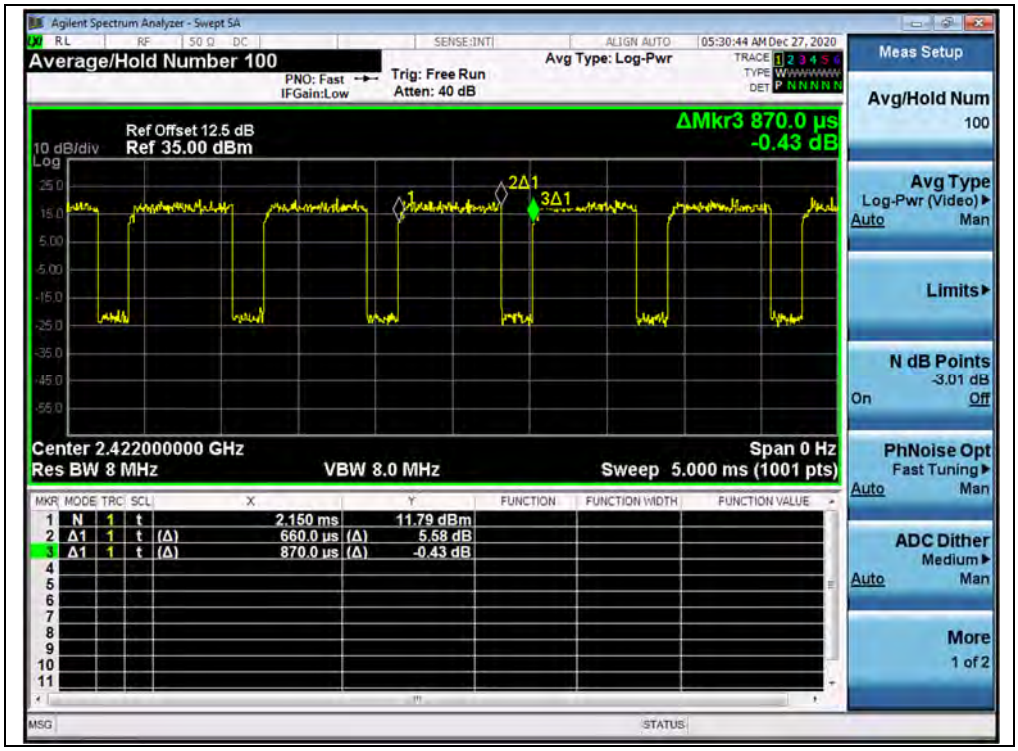
(Channel 1, 802.11b)



(Channel 1, 802.11g)



(Channel 1, 802.11n (HT20))



(Channel 3, 802.11n (HT40))

2.3. Maximum Peak and Average Conducted Output Power

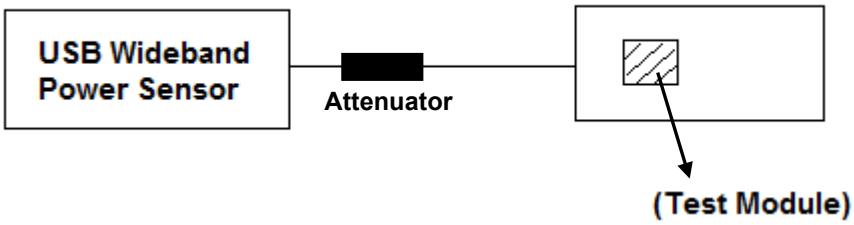
2.3.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed1 Watt.

2.3.2. Test Description

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

Test Setup:



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

2.3.3. Test Result

Maximum Peak Conducted Output Power

802.11b Mode

Channel	Frequency (MHz)	Measured Peak Power				Limit (dBm)		Verdict
		ANT 0		ANT 1				
		dBm	W	dBm	W	dBm	W	
1	2412	22.99	0.199	21.23	0.133	30	1	PASS
7	2442	22.47	0.177	20.25	0.106			PASS
13	2472	22.54	0.179	19.18	0.083			PASS

802.11g Mode

Channel	Frequency (MHz)	Measured Peak Power				Limit (dBm)		Verdict
		ANT 0		ANT 1				
		dBm	W	dBm	W	dBm	W	
1	2412	**25.57**	0.361	**25.00**	0.316	30	1	PASS
7	2442	25.57	0.361	24.75	0.299			PASS
13	2472	25.25	0.335	24.39	0.275			PASS

802.11n (HT20) Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
1	2412	25.30	24.50	27.93	0.621	27.99	0.63	PASS
7	2442	25.39	24.51	**27.98**	**0.628**			PASS
13	2472	25.14	24.22	27.72	0.591			PASS
Note: Directional gain = 5.00dBi +10log(2) = 8.01dBi＞6dBi, so the power limit shall be reduced to 30-(8.01-6)=27.99dBm.								

802.11n (HT40) Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
3	2422	24.30	23.59	26.97	0.498	27.99	0.63	PASS
7	2442	24.46	23.37	26.96	0.497			PASS
11	2462	24.38	23.23	26.86	0.485			PASS
Note: Directional gain = 5.00dBi +10log(2) = 8.01dBi＞6dBi, so the power limit shall be reduced to 30-(8.01-6)=27.99dBm.								

Maximum Average Conducted Output Power

802.11b Mode

Frequency (MHz)	Average Power							Limit		Verdict
	Measured		Duty Factor	Duty Factor Calculated						
	ANT0	ANT1		ANT0		ANT1				
	dBm	dBm		dBm	W	dBm	W	dBm	W	
2412	20.06	17.97	0.57	20.63	0.116	18.54	0.071	30	1	PASS
2442	19.33	16.82		19.90	0.098	17.39	0.055			PASS
2472	19.28	15.85		19.85	0.097	16.42	0.044			PASS

802.11g Mode

Frequency (MHz)	Average Power							Limit		Verdict
	Measured		Duty Factor	Duty Factor Calculated						
	ANT0	ANT1		ANT0		ANT1				
	dBm	dBm		dBm	W	dBm	W	dBm	W	
2412	19.08	17.21	0.57	19.65	0.092	17.78	0.060	30	1	PASS
2442	18.45	16.34		19.02	0.080	16.91	0.049			PASS
2472	18.68	15.38		19.25	0.084	15.95	0.039			PASS

802.11n (HT20) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
2412	18.48	16.77	0.63	**21.34**	**0.136**	27.99	0.63	PASS
2442	18.36	15.55		20.83	0.121			PASS
2472	18.47	14.77		20.64	0.116			PASS
Note: Directional gain = 5.00dBi +10log(2) = 8.01dBi＞6dBi, so the power limit shall be reduced to 30-(8.01-6)=27.99dBm.								

802.11n (HT40) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
2412	17.66	16.17	1.16	**21.14**	**0.130**	27.99	0.63	PASS
2442	17.58	15.21		20.72	0.118			PASS
2462	17.48	15.09		20.61	0.115			PASS
Note: Directional gain = 5.00dBi +10log(2) = 8.01dBi＞6dBi, so the power limit shall be reduced to 30-(8.01-6)=27.99dBm.								

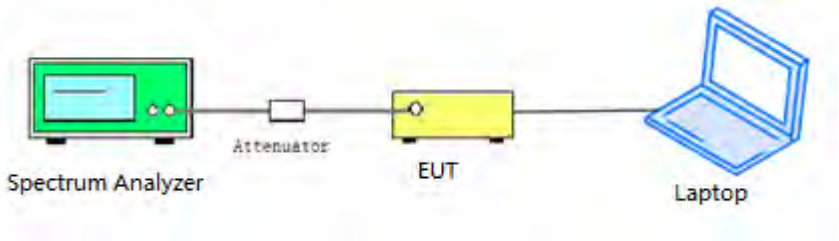
2.4. Bandwidth

2.4.1. Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.4.2. Test Description

Test Setup:



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

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

2.4.3. Test Procedure

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

2.4.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	9.554	≥500	PASS
7	2442	9.108	≥500	PASS
13	2472	9.566	≥500	PASS

B. Test Plot:

(Channel 1, 802.11b)

(Channel 7, 802.11b)

(Channel 13, 802.11b)

802.11g Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	15.10	≥500	PASS
7	2442	15.34	≥500	PASS
13	2472	15.79	≥500	PASS

B. Test Plot:

(Channel 1, 802.11g)

(Channel 7, 802.11g)

(Channel 13, 802.11g)

802.11n (HT20) Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	15.12	≥500	PASS
7	2442	14.08	≥500	PASS
13	2472	15.94	≥500	PASS

B. Test Plot:

(Channel 1, 802.11n (HT20))

(Channel 7, 802.11n (HT20))

(Channel 13, 802.11n (HT20))

802.11n (HT40) Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
3	2422	35.19	≥500	PASS
7	2442	35.19	≥500	PASS
11	2462	35.17	≥500	PASS

B. Test Plot:

(Channel 3, 802.11n (HT40))

(Channel 7, 802.11n (HT40))

(Channel 11, 802.11n (HT40))

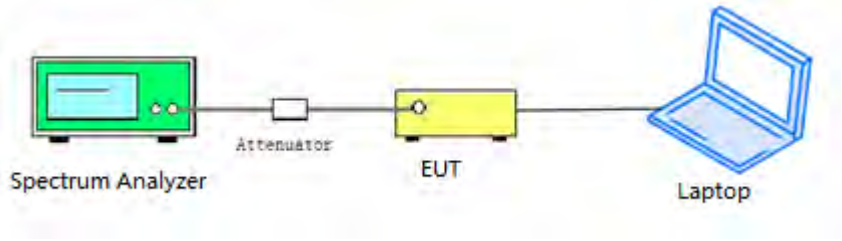
2.5. Conducted Spurious Emissions and Band Edge

2.5.1. Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.5.2. Test Description

Test Setup:



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

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

2.5.3. Test Procedure

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

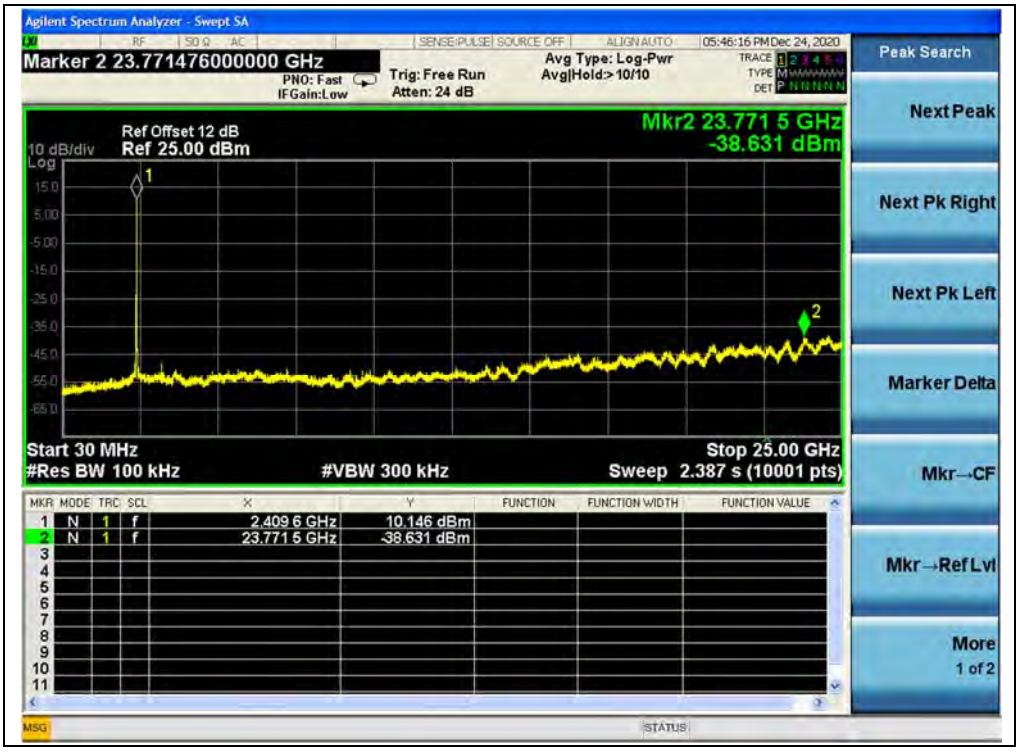
2.5.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-38.63	10.15	-9.85	PASS
7	2442	-39.08	9.74	-10.26	PASS
13	2472	-37.44	8.00	-12.00	PASS

B. Test Plot:



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

(Band Edge, Channel 1, 802.11b)

(30MHz to 25GHz, Channel 7, 802.11b)

(30MHz to 25GHz, Channel 13, 802.11b)

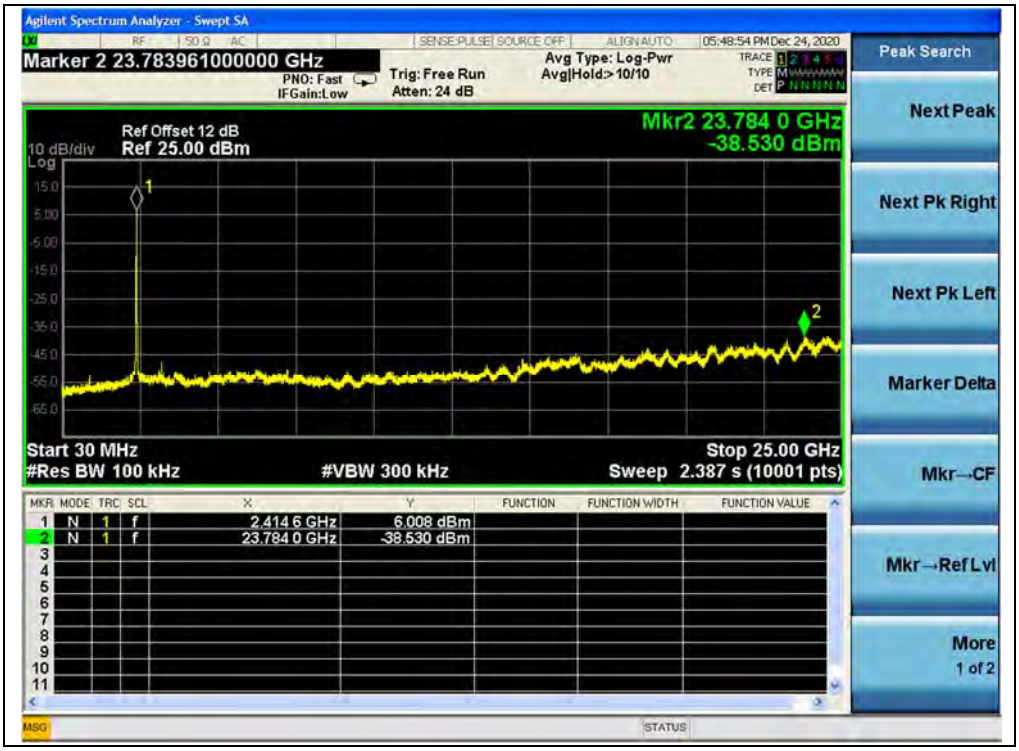
(Band Edge, Channel 13, 802.11b)

802.11g Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-38.53	6.01	-13.99	PASS
7	2442	-39.83	5.12	-14.88	PASS
13	2472	-38.04	6.46	-13.54	PASS

B. Test Plot:



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

(Band Edge, Channel 1, 802.11g)

(30MHz to 25GHz, Channel 7, 802.11g)

(30MHz to 25GHz, Channel 13, 802.11g)

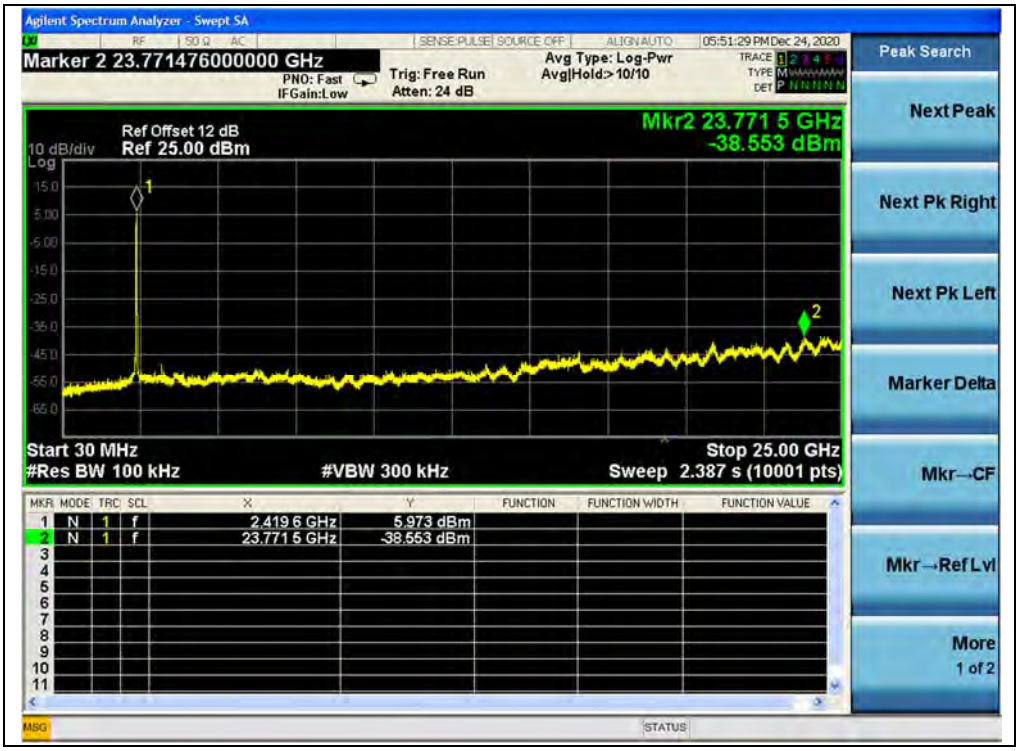
(Band Edge, Channel 13, 802.11g)

802.11n (HT20) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-38.55	5.97	-14.03	PASS
7	2442	-37.49	7.32	-12.68	PASS
13	2472	-38.21	6.21	-13.79	PASS

B. Test Plot:



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

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

(30MHz to 25GHz, Channel 7, 802.11n (HT20))

(30MHz to 25GHz, Channel 13, 802.11n (HT20))

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

802.11n (HT40) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-38.40	5.91	-14.09	PASS
7	2442	-37.31	5.61	-14.39	PASS
11	2462	-37.31	5.61	-14.39	PASS

B. Test Plot:

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

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

(30MHz to 25GHz, Channel 7, 802.11n (HT40))

(30MHz to 25GHz, Channel 11, 802.11n (HT40))

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

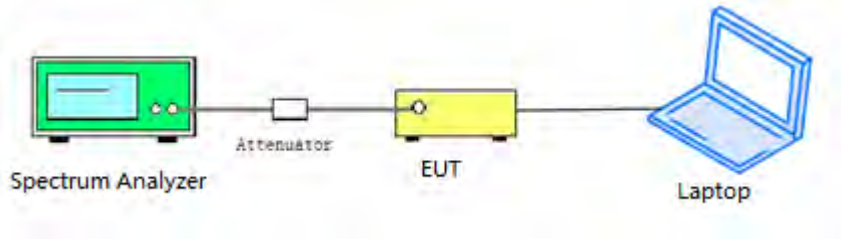
2.6. Power Spectral Density

2.6.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.6.2. Test Description

Test Setup:



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

2.6.3. Test Procedure

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

2.6.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1		
1	2412	-4.34	-4.09	8	PASS
7	2442	-5.53	-5.18	8	PASS
13	2472	-5.97	-5.97	8	PASS

B. Test Plot:

(Channel 1, 802.11b, ANT0)

(Channel 7, 802.11b, ANT0)

(Channel 13, 802.11b, ANT0)

(Channel 1, 802.11b, ANT1)

(Channel 7, 802.11b, ANT1)

(Channel 13, 802.11b, ANT1)

802.11g Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1		
1	2412	-6.45	-5.65	8	PASS
7	2442	-7.02	-8.19	8	PASS
13	2472	-7.73	-6.25	8	PASS

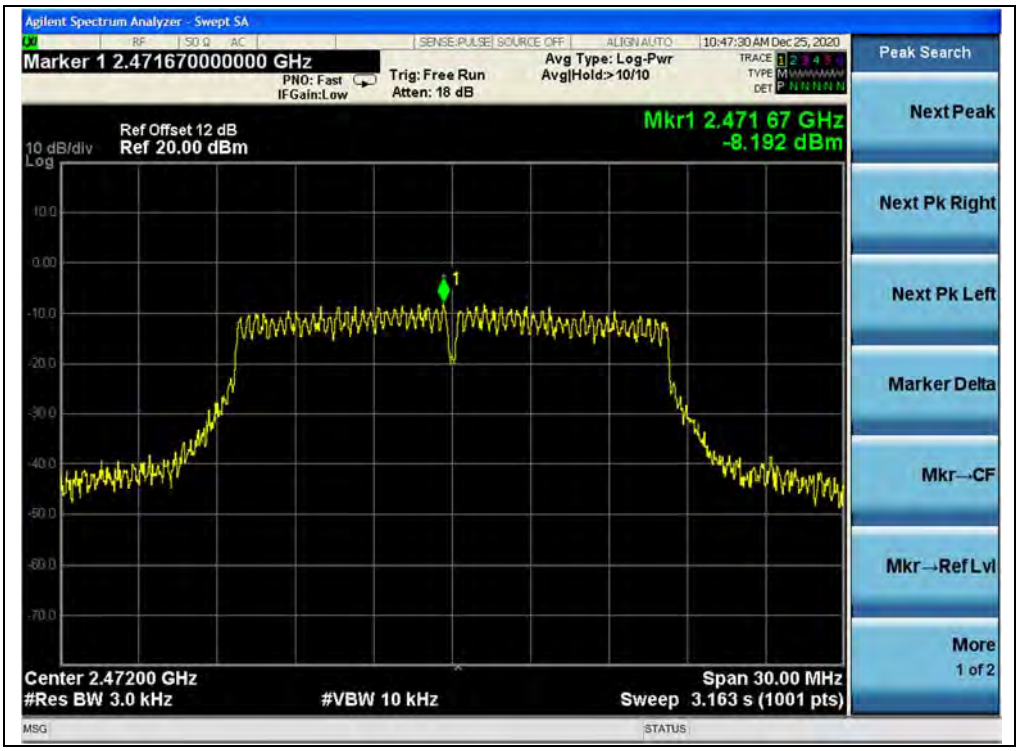
B. Test Plot:

(Channel 1, 802.11g, ANT0)

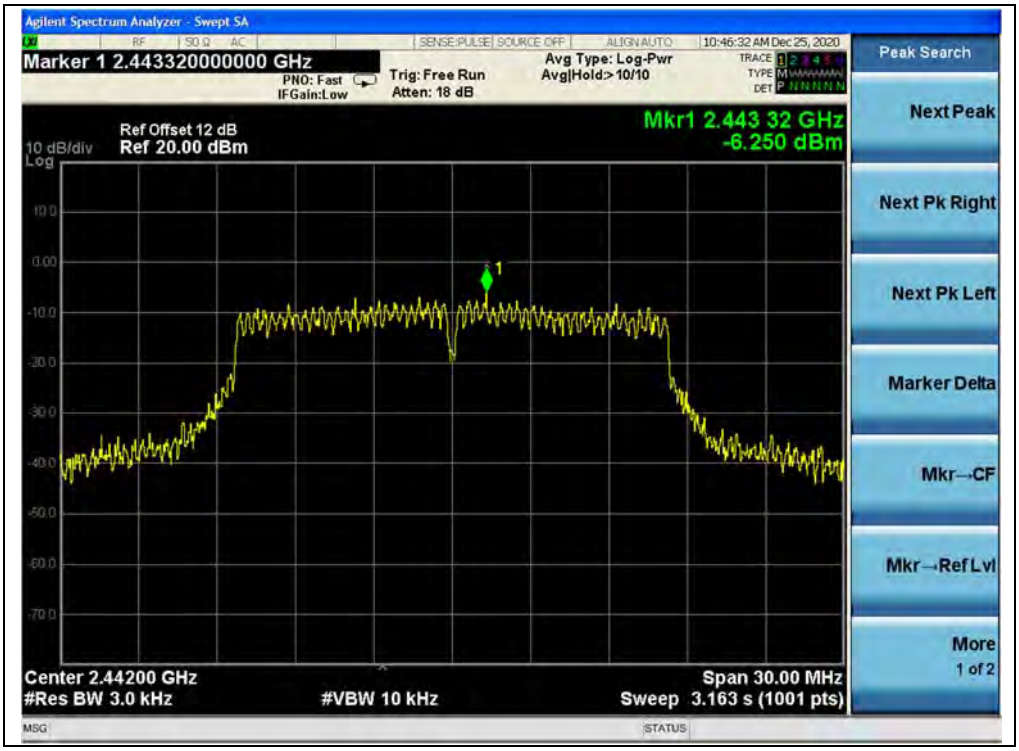
(Channel 7, 802.11g, ANT0)

(Channel 13, 802.11g, ANT0)

(Channel 1, 802.11g, ANT1)



(Channel 7, 802.11g, ANT1)



(Channel 13, 802.11g, ANT1)

802.11n (HT20) Mode

A. Test Verdict:

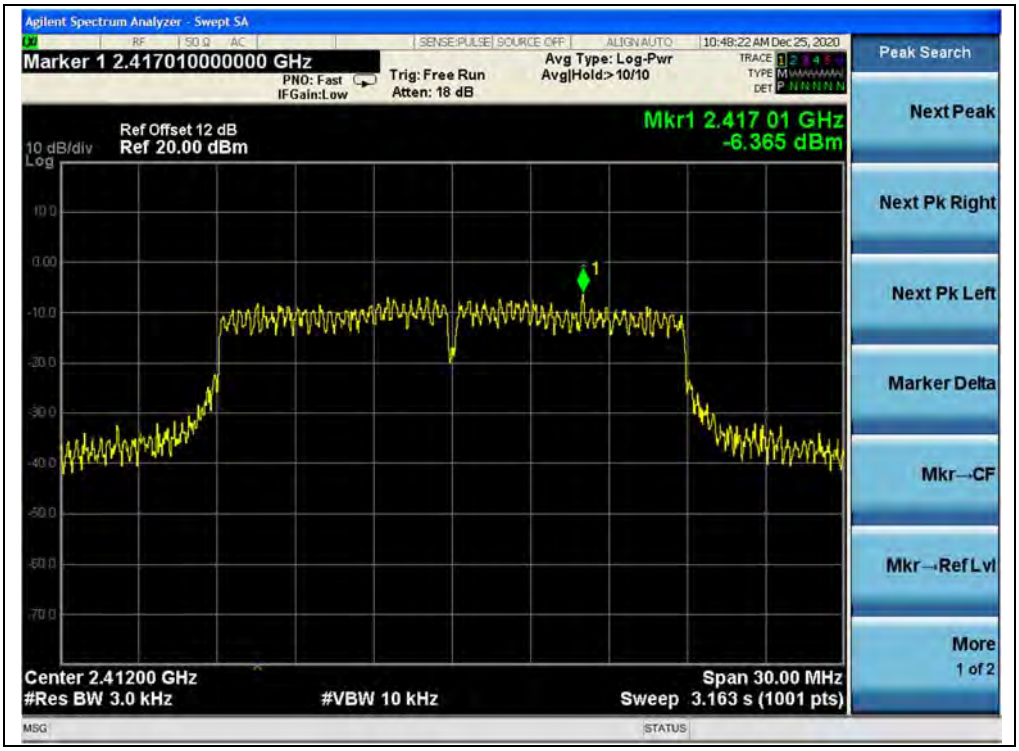
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
1	2412	-7.13	-6.37	-3.72	5.99	PASS
7	2442	-7.07	-5.60	-3.26	5.99	PASS
13	2472	-8.51	-7.98	-5.23	5.99	PASS
Note: Directional gain = 5.00dBi +10log(2) = 8.01dBi＞6dBi, so the power density limit shall be reduced to 8-(8.01-6)=5.99dBm.						

B. Test Plot:

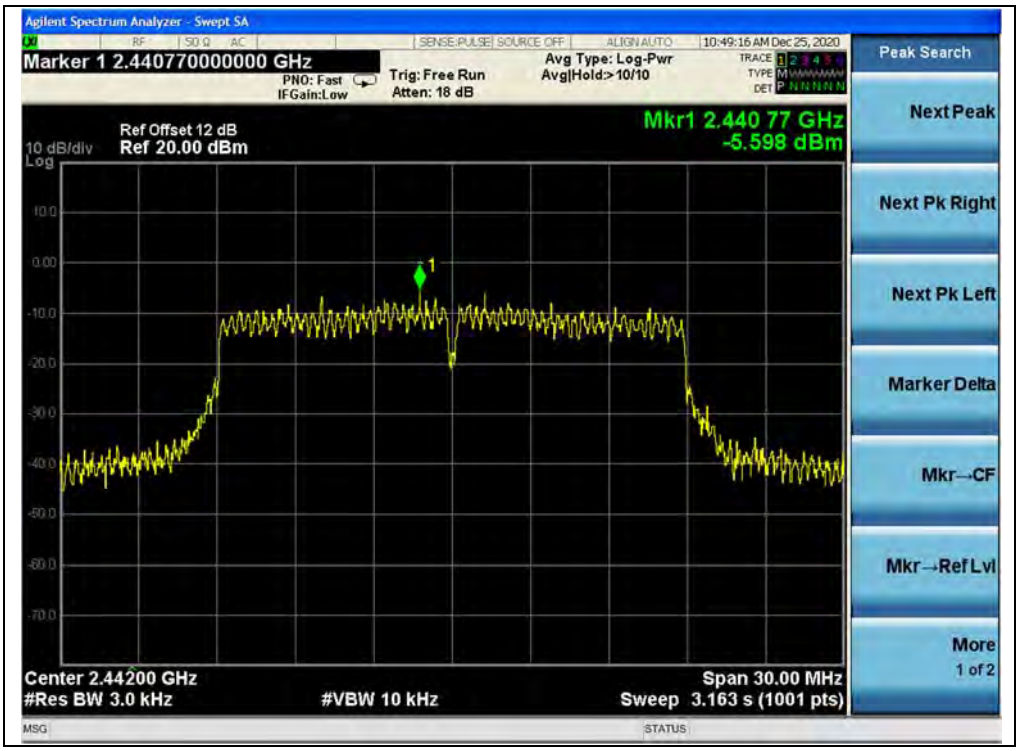
(Channel 1, 802.11n (HT20), ANT0)

(Channel 7, 802.11n (HT20), ANT0)

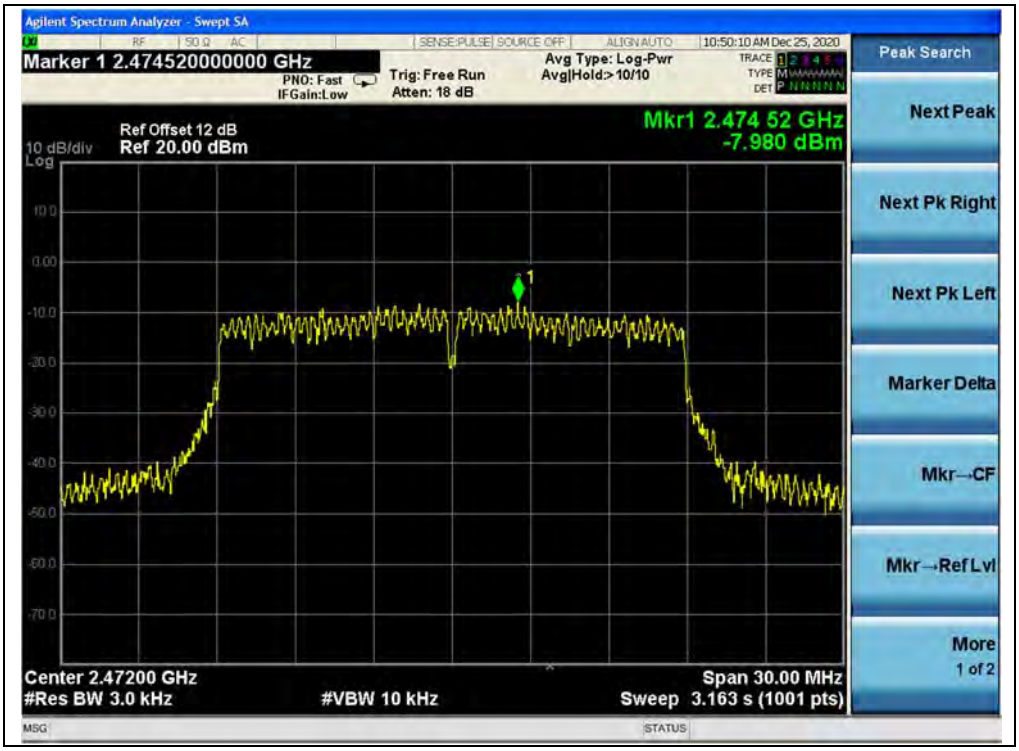
(Channel 13, 802.11n (HT20), ANT0)



(Channel 1, 802.11n (HT20), ANT1)



(Channel 7, 802.11n (HT20), ANT1)



(Channel 13, 802.11n (HT20), ANT1)

802.11n (HT40) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
		ANT 0	ANT 1			
3	2422	-8.81	-9.08	-5.93	5.99	PASS
7	2442	-9.28	-9.14	-6.20	5.99	PASS
11	2462	-10.63	-10.14	-7.37	5.99	PASS
Note: Directional gain = 5.00dBi +10log(2) = 8.01dBi＞6dBi, so the power density limit shall be reduced to 8-(8.01-6)=5.99dBm.						

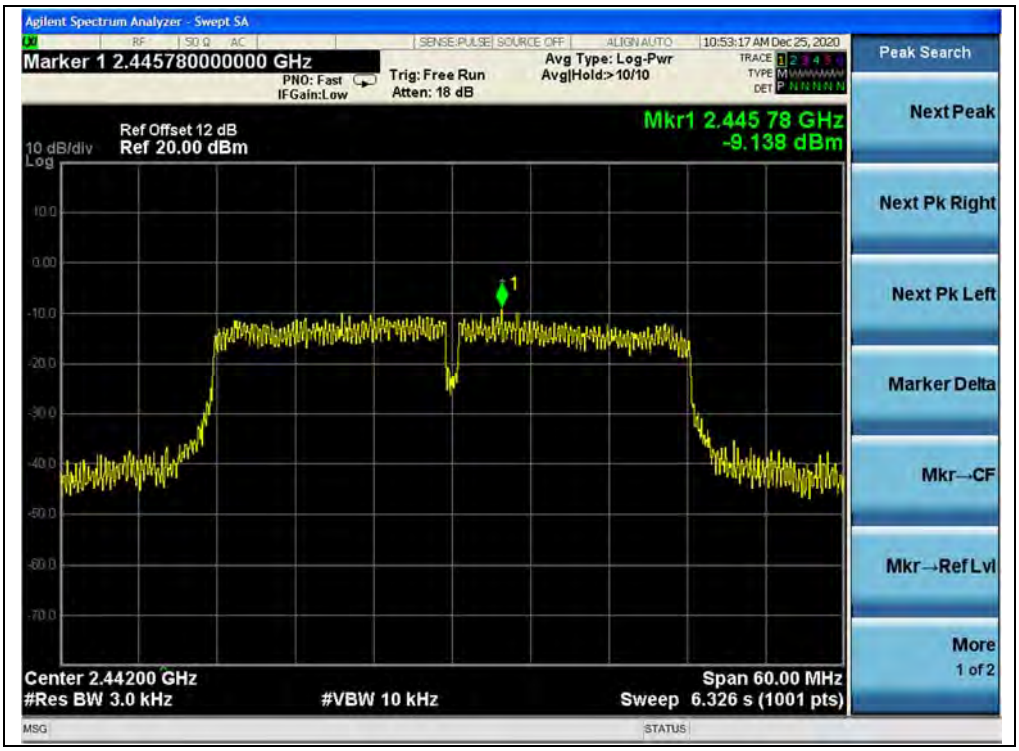
B. Test Plot:

(Channel 3, 802.11n (HT40), ANT0)

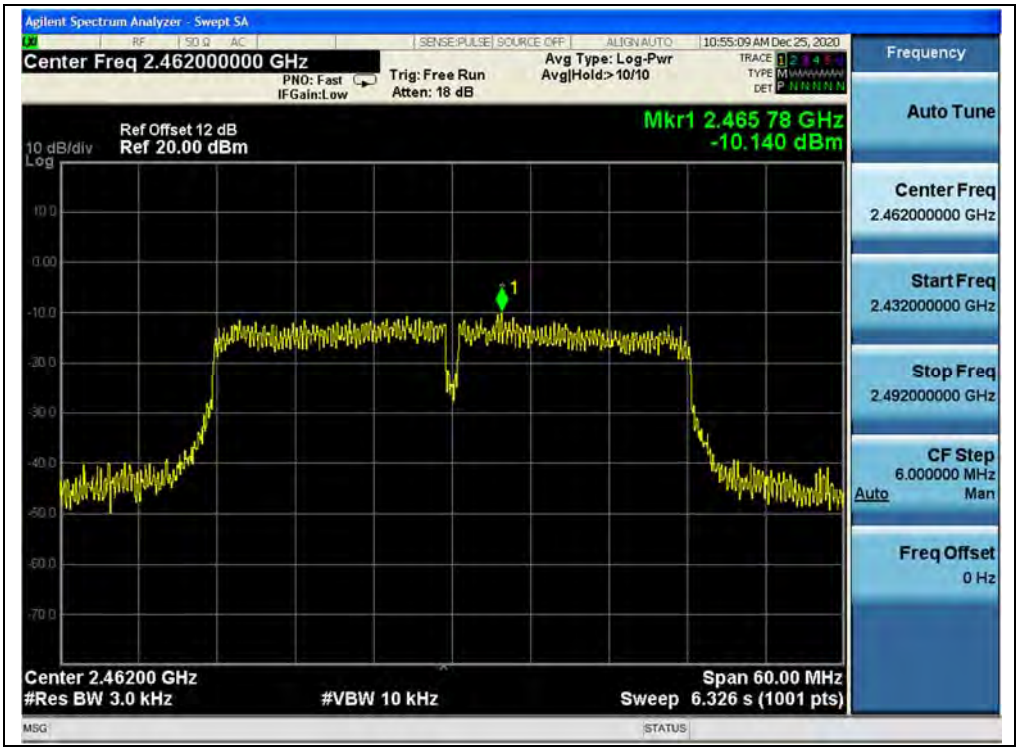
(Channel 7, 802.11n (HT40), ANT0)

(Channel 11, 802.11n (HT40), ANT0)

(Channel 3, 802.11n (HT40), ANT1)



(Channel 7, 802.11n (HT40), ANT1)



(Channel 11, 802.11n (HT40), ANT1)

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

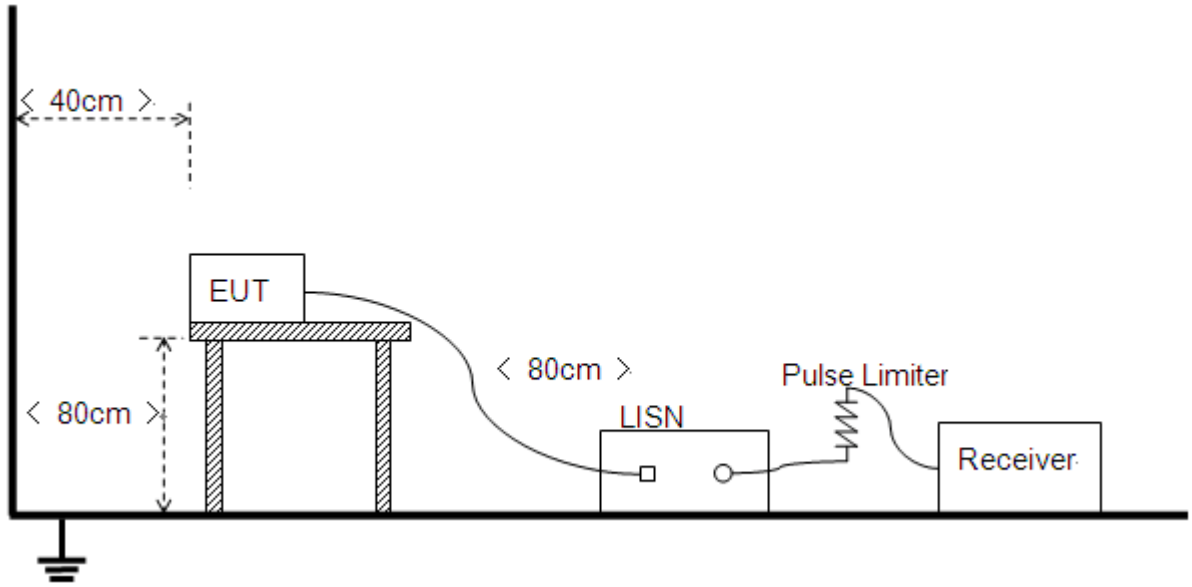
NOTE:

(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/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT+ ADAPTER + WIFI TX

Test Voltage: AC 120V/60Hz

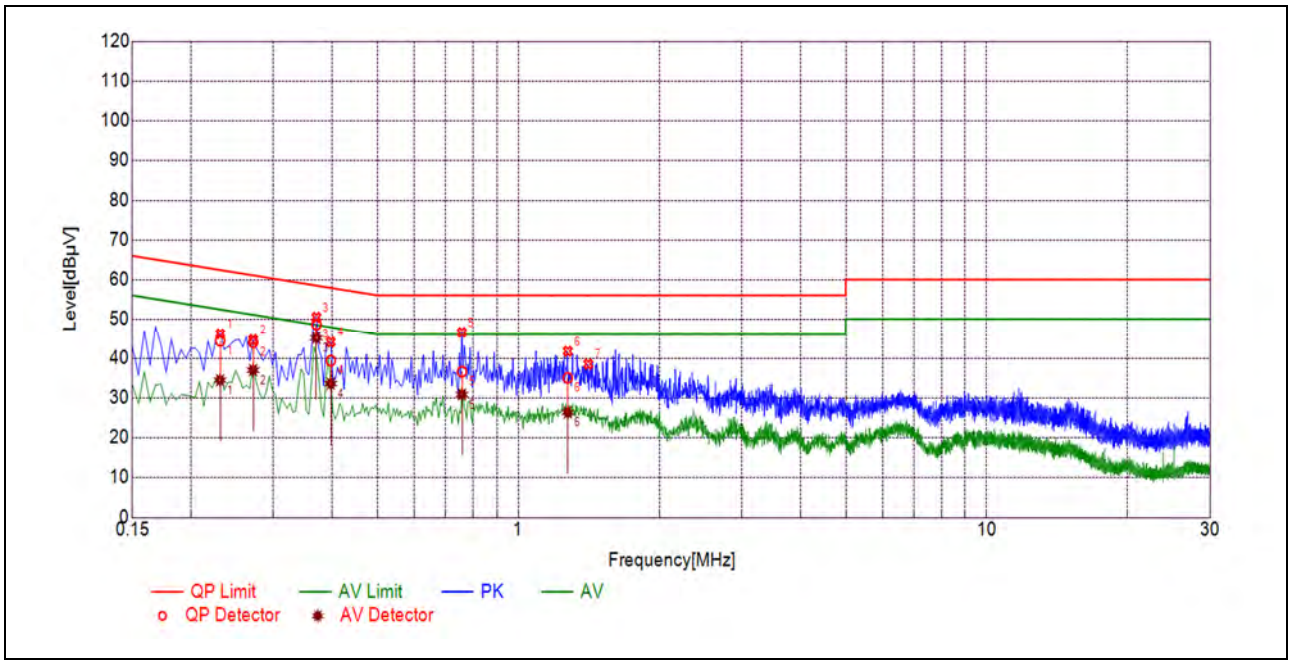
The measurement results are obtained as below:

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

U_R: Receiver Reading

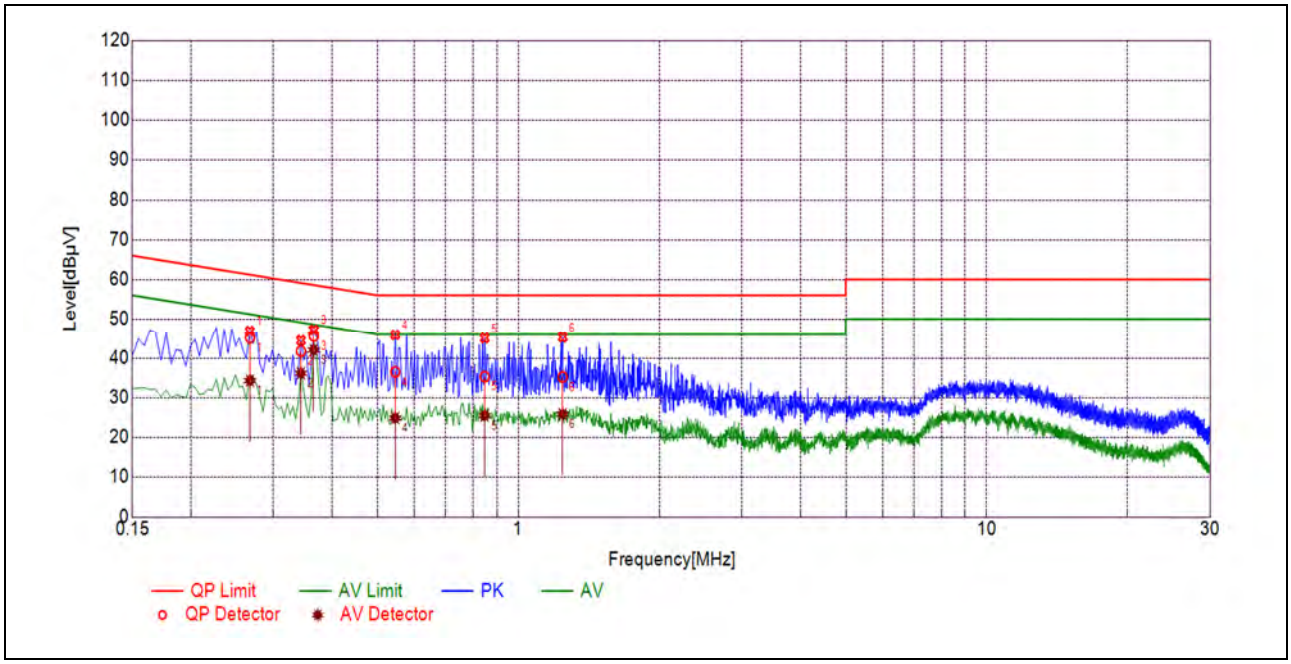
A_{Factor}: Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.2308	44.38	34.42	62.42	52.42	Line	PASS
2	0.2714	43.99	36.96	61.08	51.08		PASS
3	0.3705	48.60	45.12	58.49	48.49		PASS
4	0.3976	39.35	33.55	57.90	47.90		PASS
5	0.7579	36.57	30.85	56.00	46.00		PASS
6	1.2750	34.98	26.28	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	0.2672	45.19	34.29	61.20	51.20	Neutral	PASS
2	0.3433	41.74	36.14	59.12	49.12		PASS
3	0.3657	45.61	42.04	58.60	48.60		PASS
4	0.5459	36.47	24.82	56.00	46.00		PASS
5	0.8474	35.29	25.44	56.00	46.00		PASS
6	1.2433	35.20	25.81	56.00	46.00		PASS

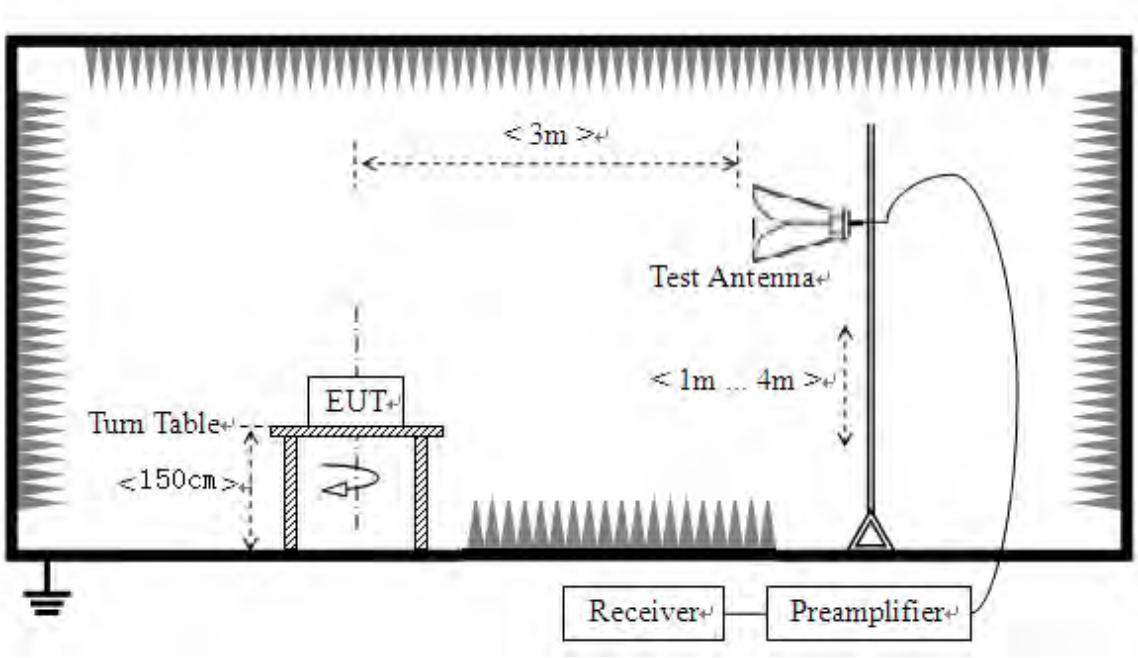
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.8.2. Test Description

Test Setup



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

For the Test Antenna:
Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

2.8.3. Test Procedure

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

2.8.4. Test Result

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

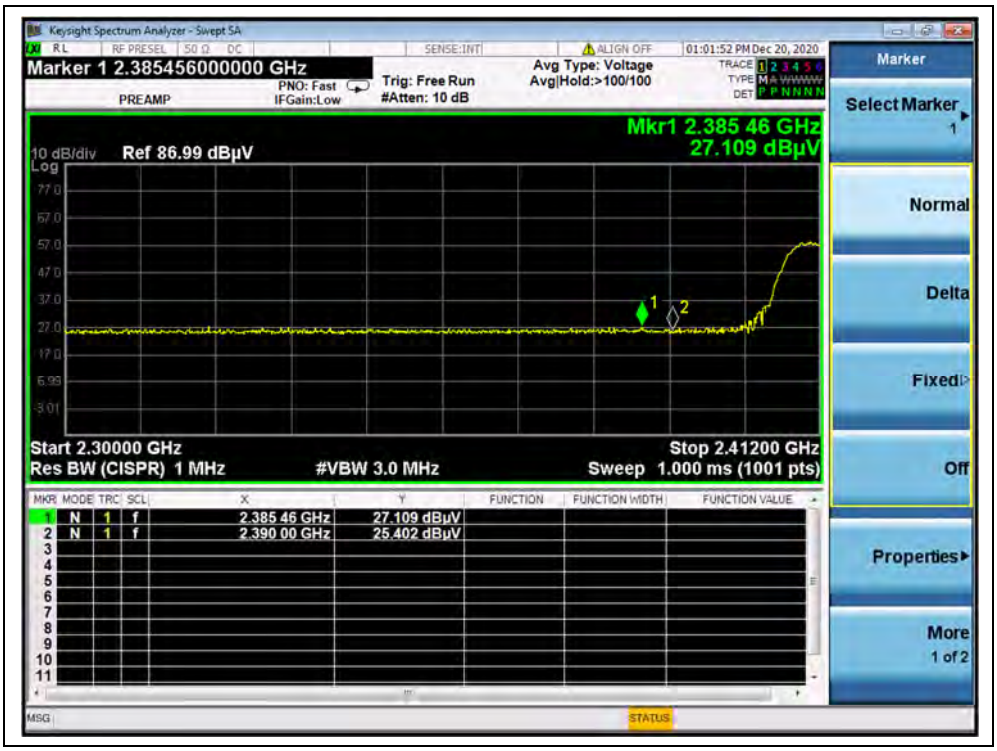
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

802.11b Mode

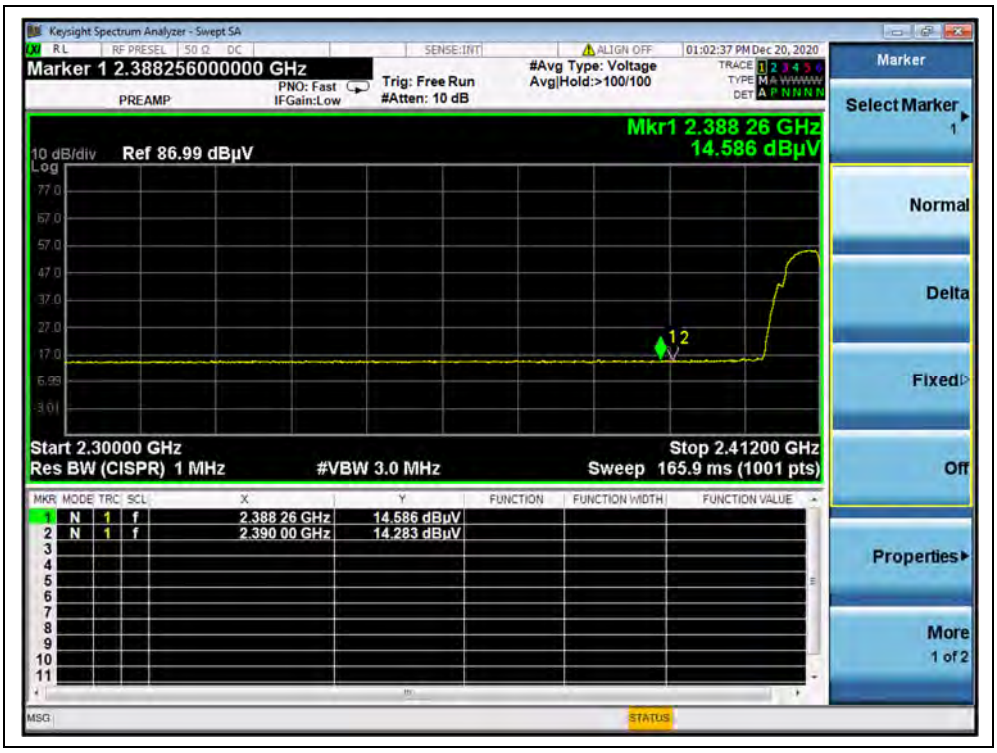
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
1	2385.46	PK	27.11	6.74	27.20	61.05	74	PASS
1	2388.26	AV	14.59	6.74	27.20	48.53	54	PASS
13	2484.65	PK	25.86	6.74	27.20	59.80	74	PASS
13	2483.50	AV	15.11	6.74	27.20	49.05	54	PASS

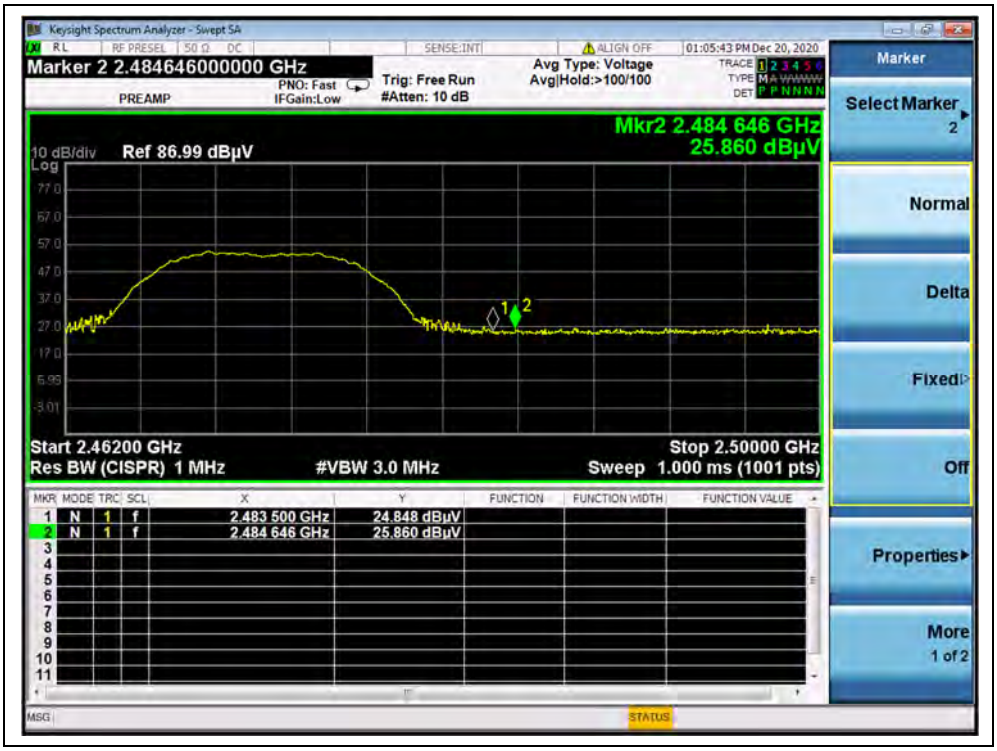
B. Test Plot:



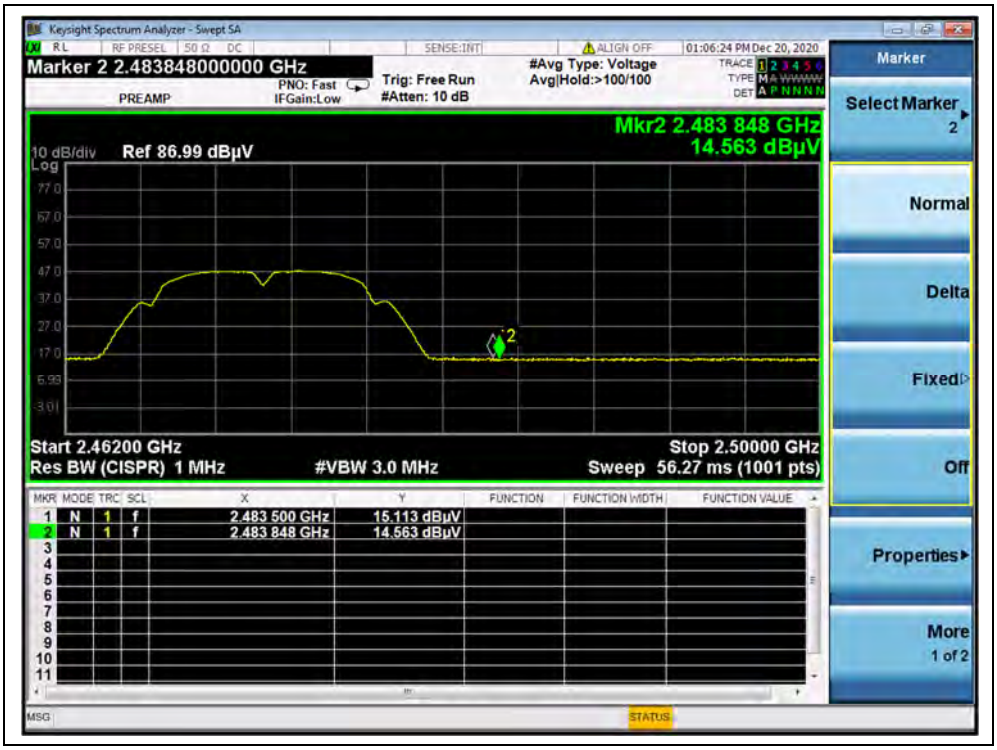
(PEAK, Channel 1, 802.11b)



(AVERAGE, Channel 1, 802.11b)



(PEAK, Channel 13, 802.11b)



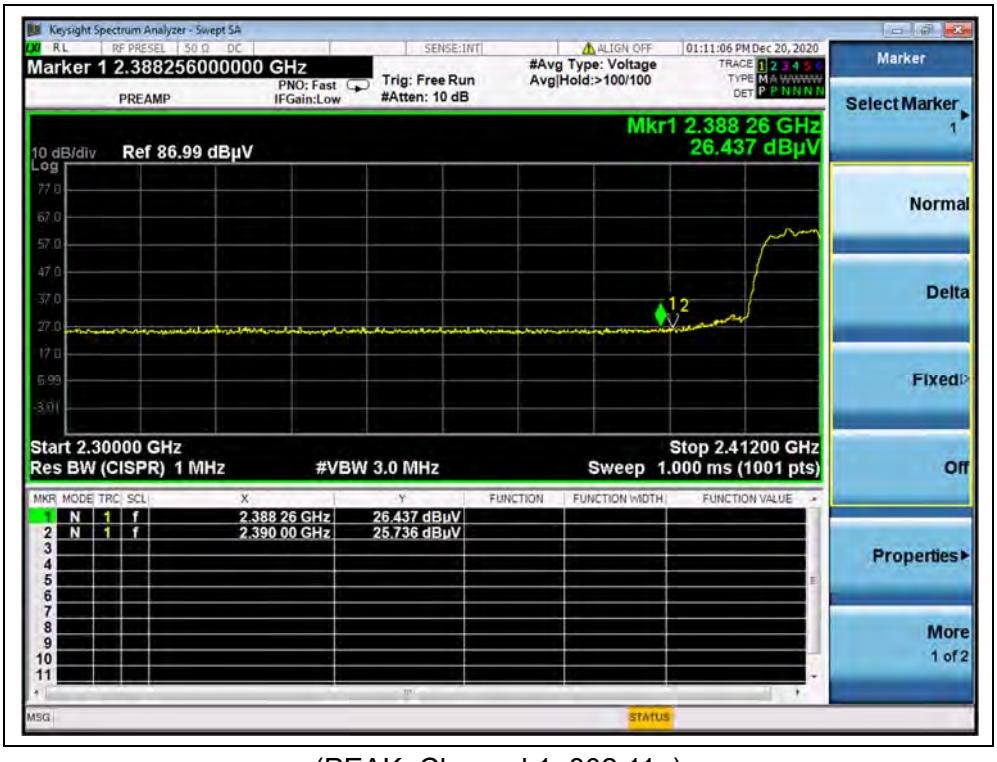
(AVERAGE, Channel 13, 802.11b)

802.11g Mode

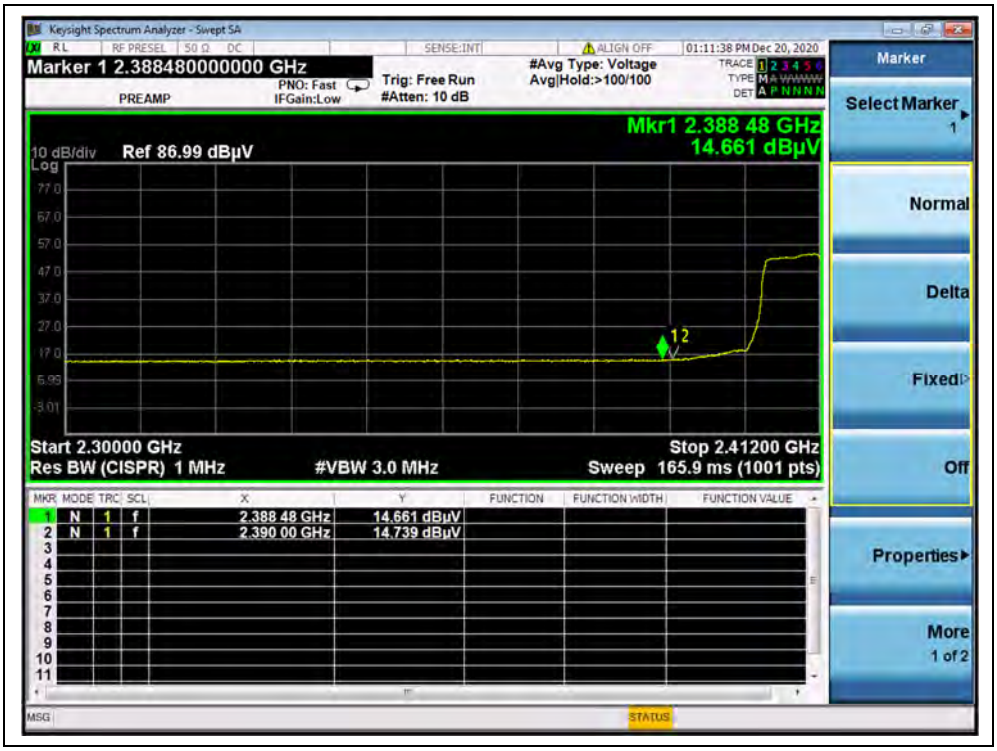
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
1	2388.26	PK	26.44	6.74	27.20	60.38	74	PASS
1	2390.00	AV	14.74	6.74	27.20	48.68	54	PASS
13	2487.72	PK	26.35	6.74	27.20	60.29	74	PASS
13	2483.50	AV	15.74	6.74	27.20	49.68	54	PASS

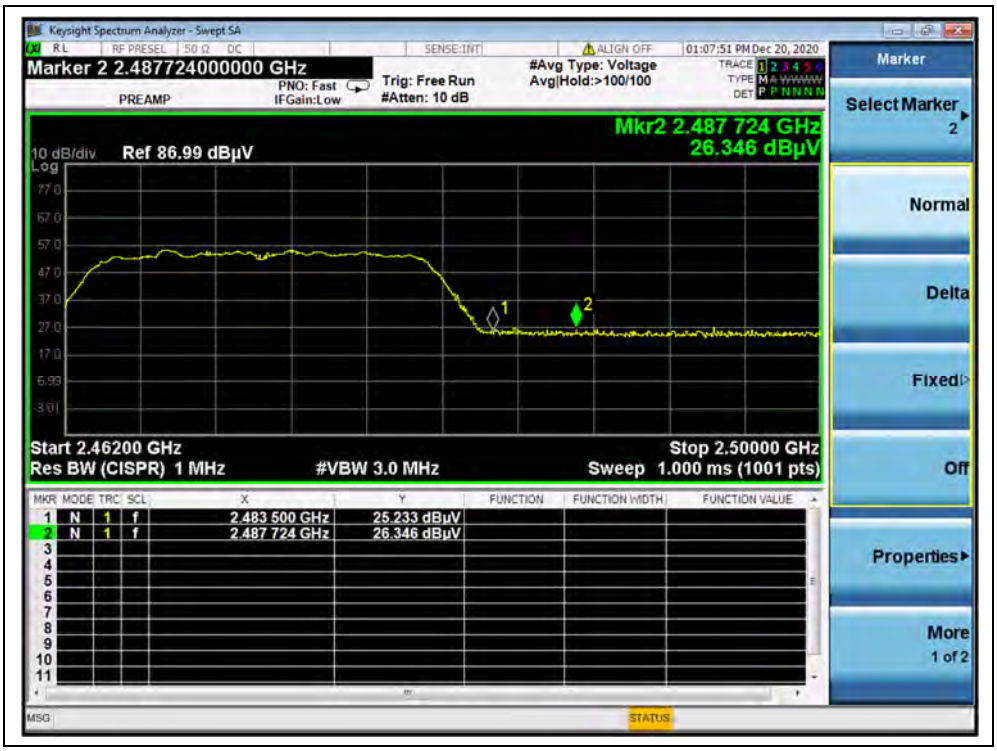
B. Test Plot:



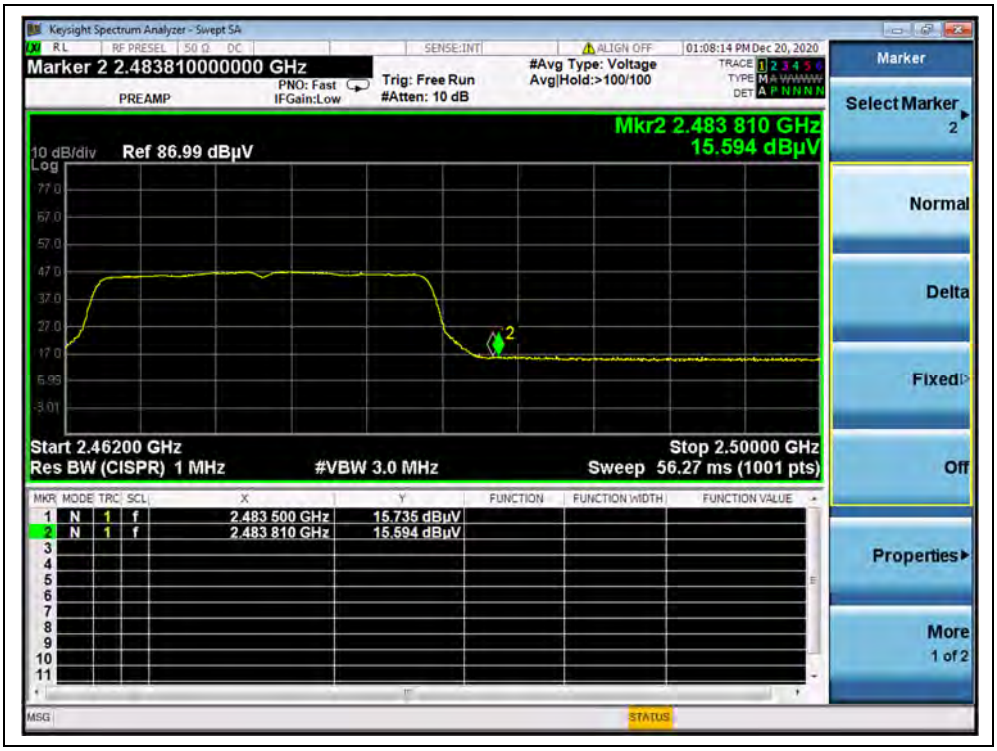
(PEAK, Channel 1, 802.11g)



(AVERAGE, Channel 1, 802.11g)



(PEAK, Channel 13, 802.11g)



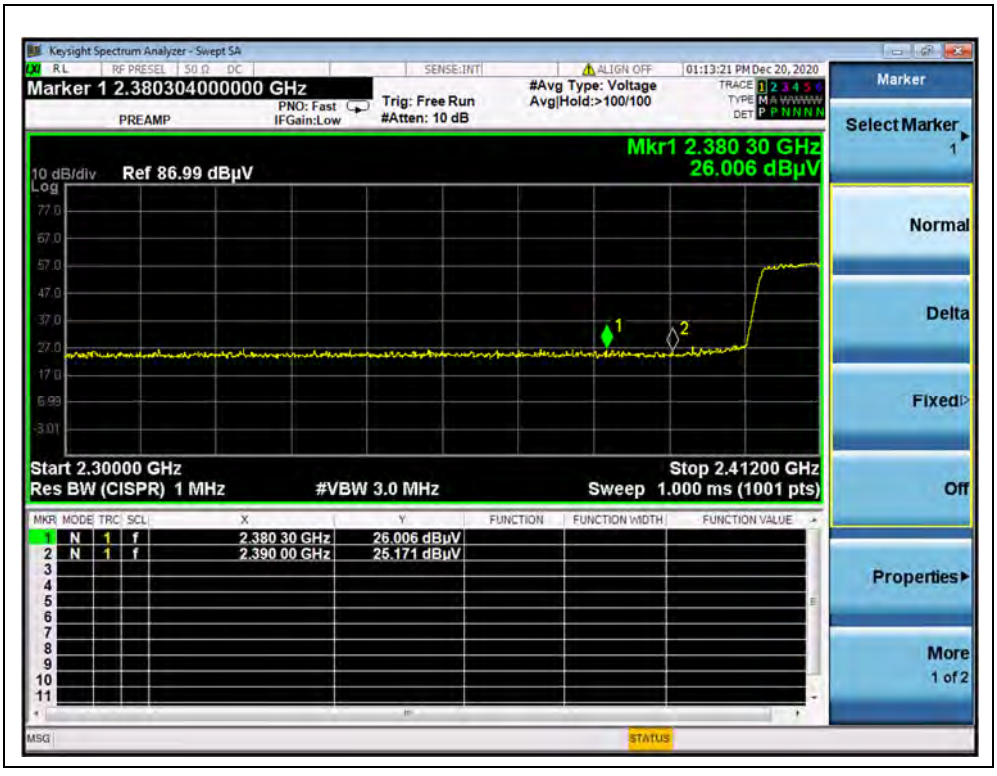
(AVERAGE, Channel 13, 802.11g)

802.11n (HT20) Mode

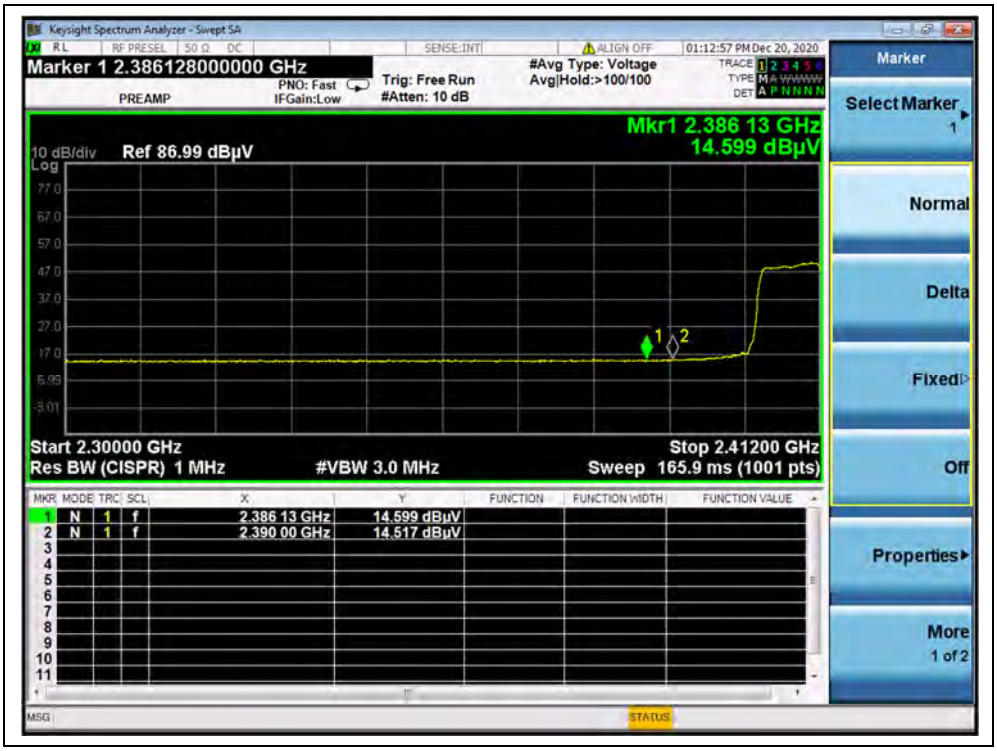
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
1	2380.30	PK	26.01	6.74	27.20	59.95	74	PASS
1	2386.13	AV	14.60	6.74	27.20	48.54	54	PASS
13	2483.77	PK	27.82	6.74	27.20	61.76	74	PASS
13	2483.50	AV	16.10	6.74	27.20	50.04	54	PASS

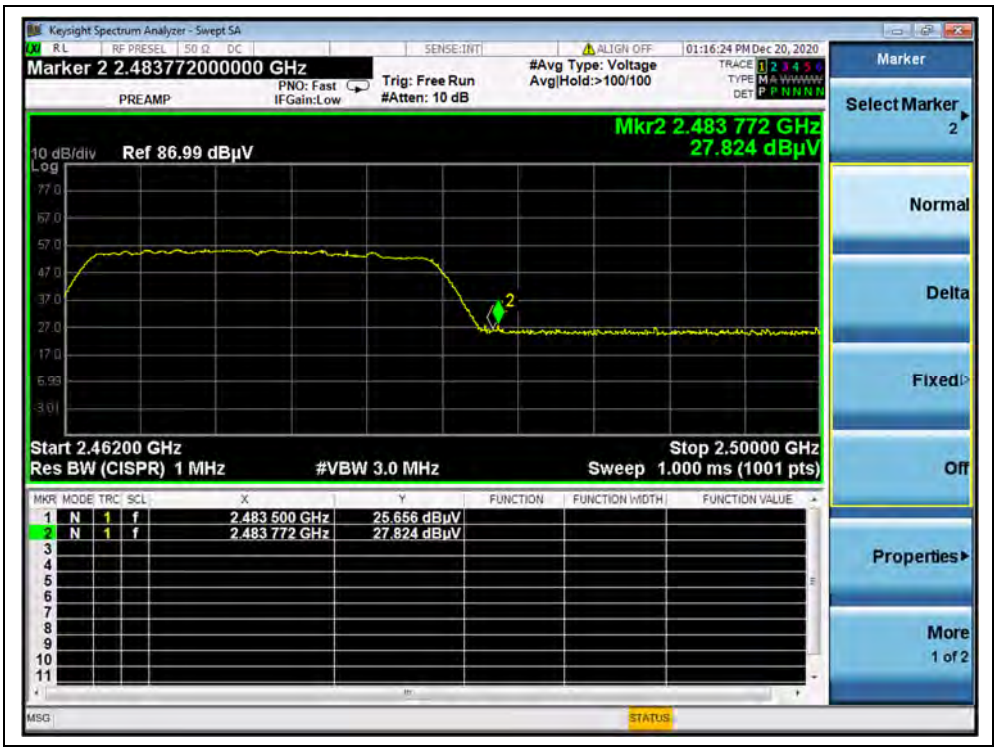
B. Test Plot:



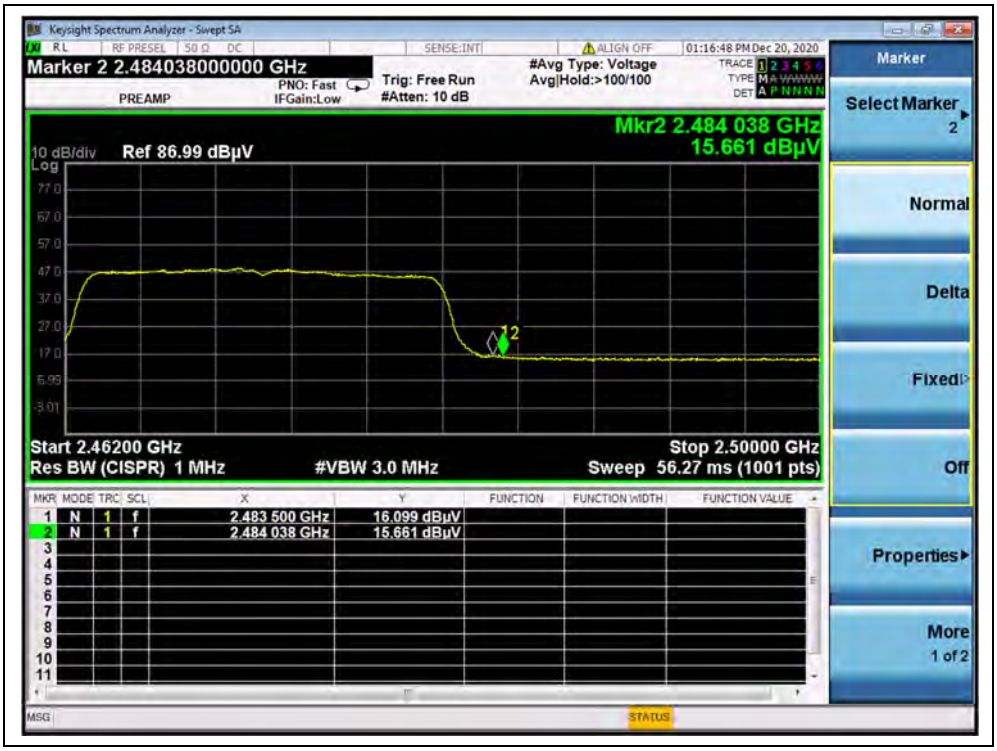
(PEAK, Channel 1, 802.11n (HT20))



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



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



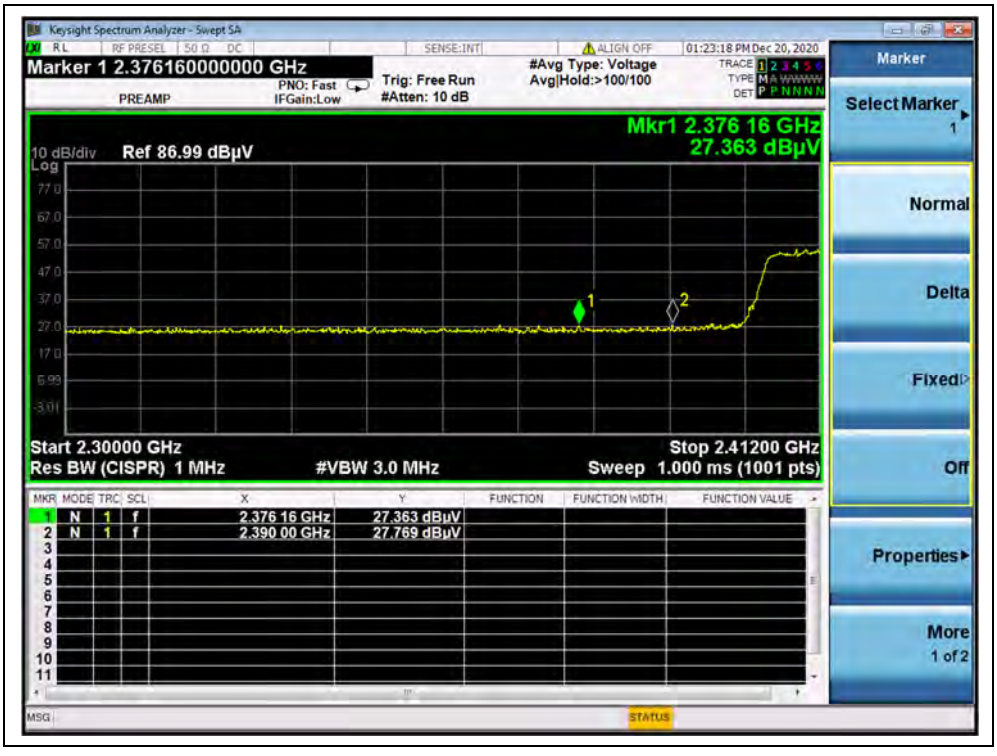
(AVERAGE, Channel 13, 802.11n (HT20))

802.11n (HT40) Mode

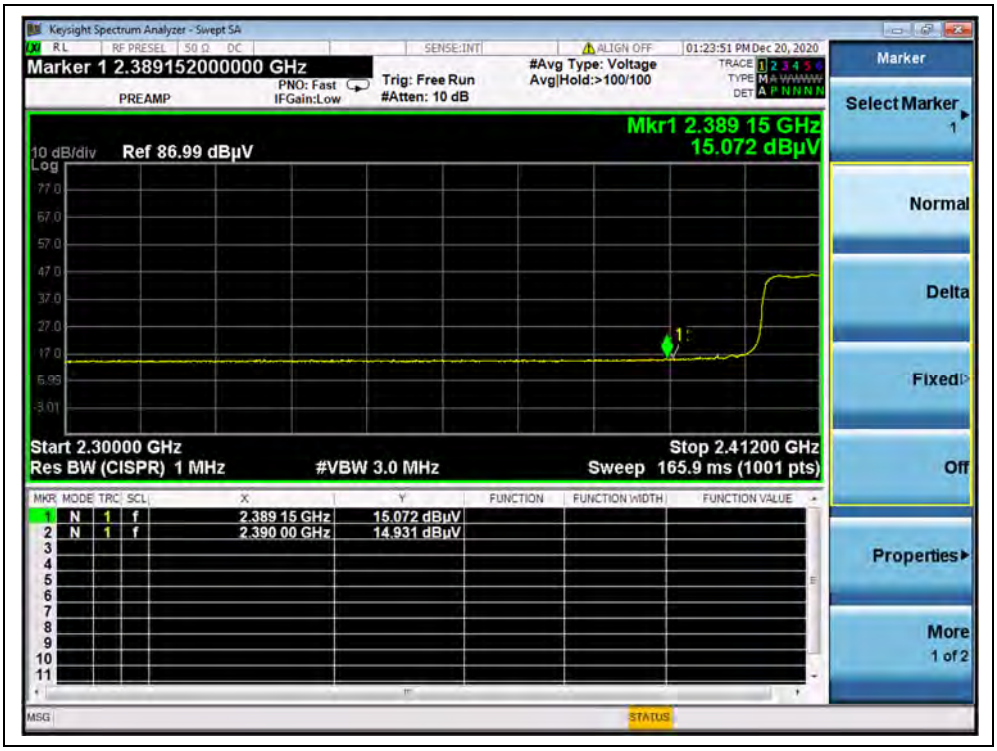
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
3	2390.00	PK	27.77	6.74	27.20	61.71	74	PASS
3	2389.15	AV	15.07	6.74	27.20	49.01	54	PASS
11	2483.50	PK	25.75	6.74	27.20	59.69	74	PASS
11	2483.50	AV	15.86	6.74	27.20	49.80	54	PASS

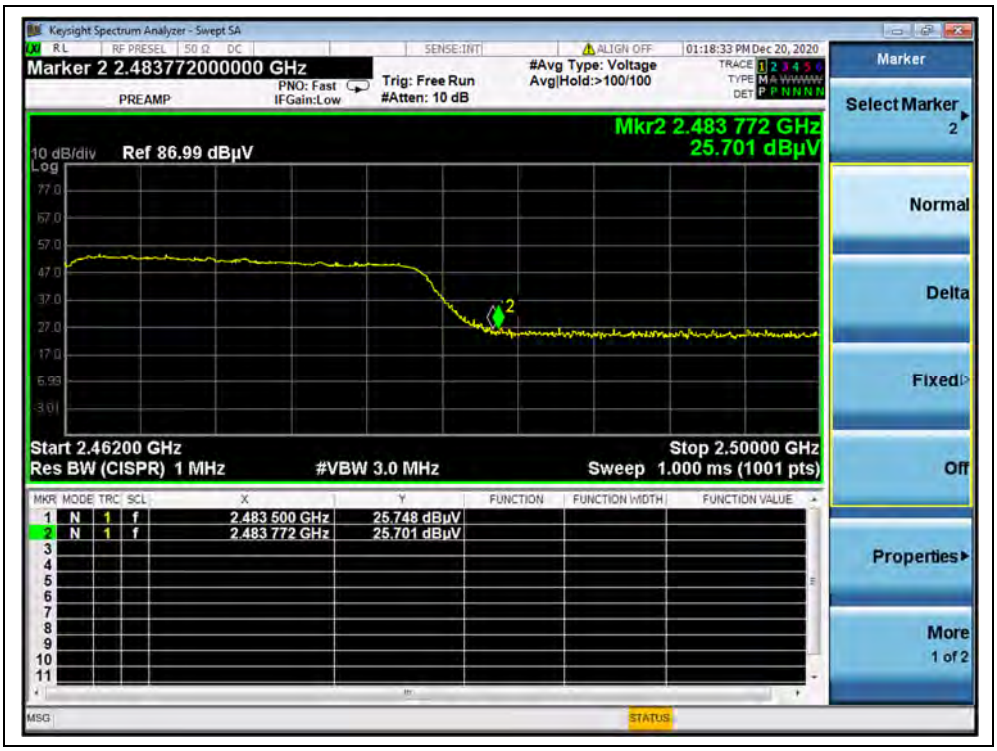
B. Test Plot:



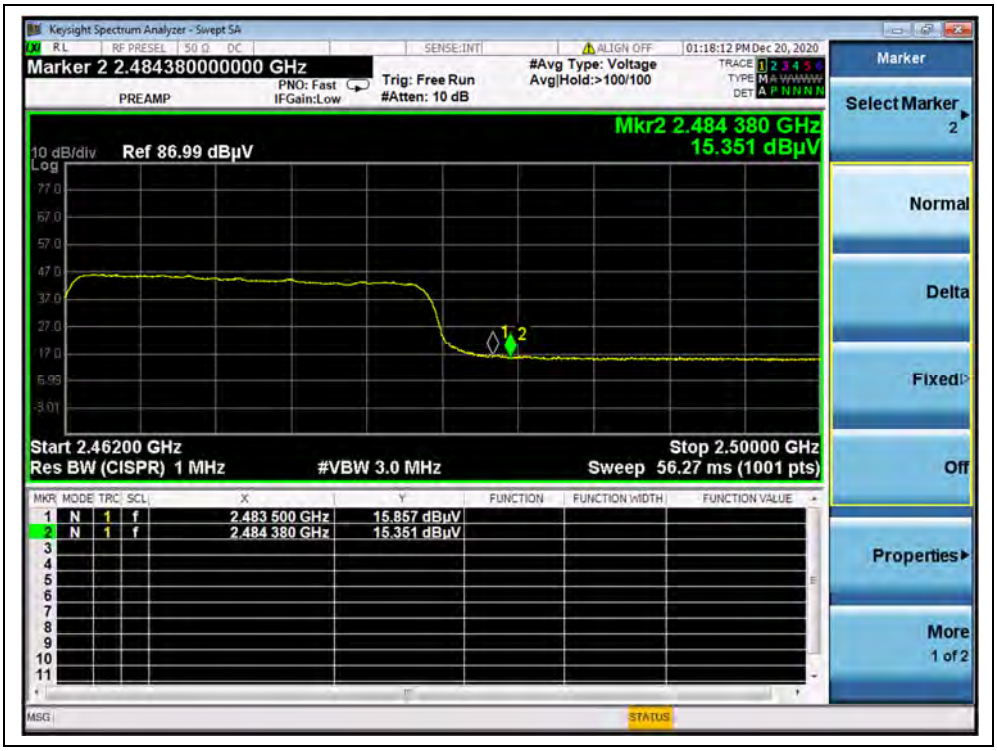
(PEAK, Channel 3, 802.11n (HT40))



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



(PEAK, Channel 11, 802.11n (HT40))



(AVERAGE, Channel 11, 802.11n (HT40))

2.9. Radiated Emission

2.9.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

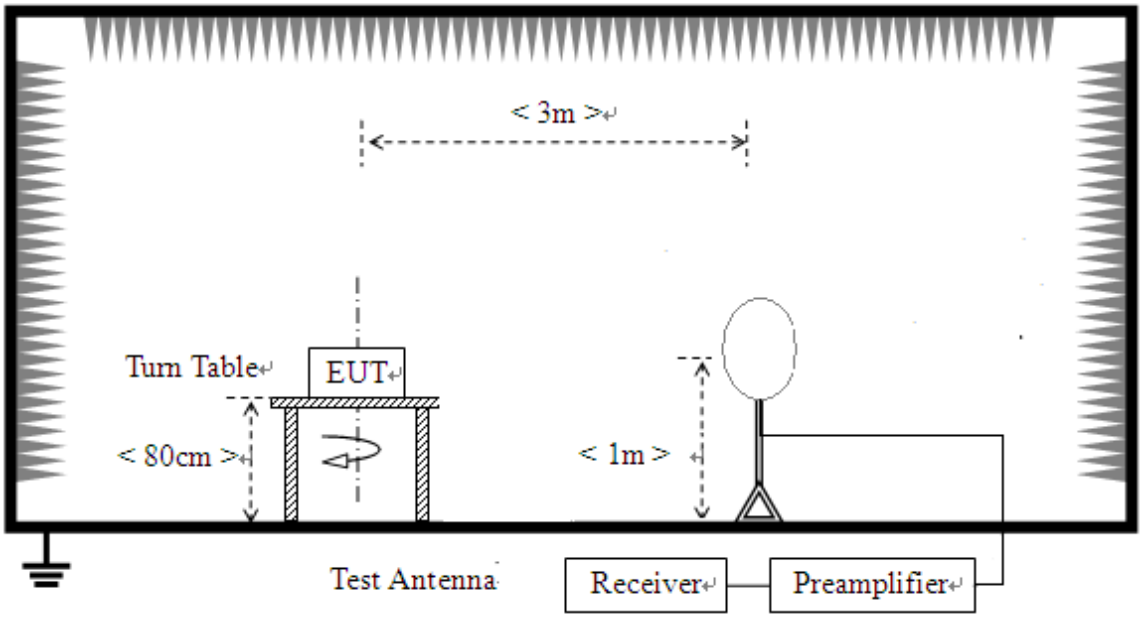
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note1: For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
Note2: For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK). In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

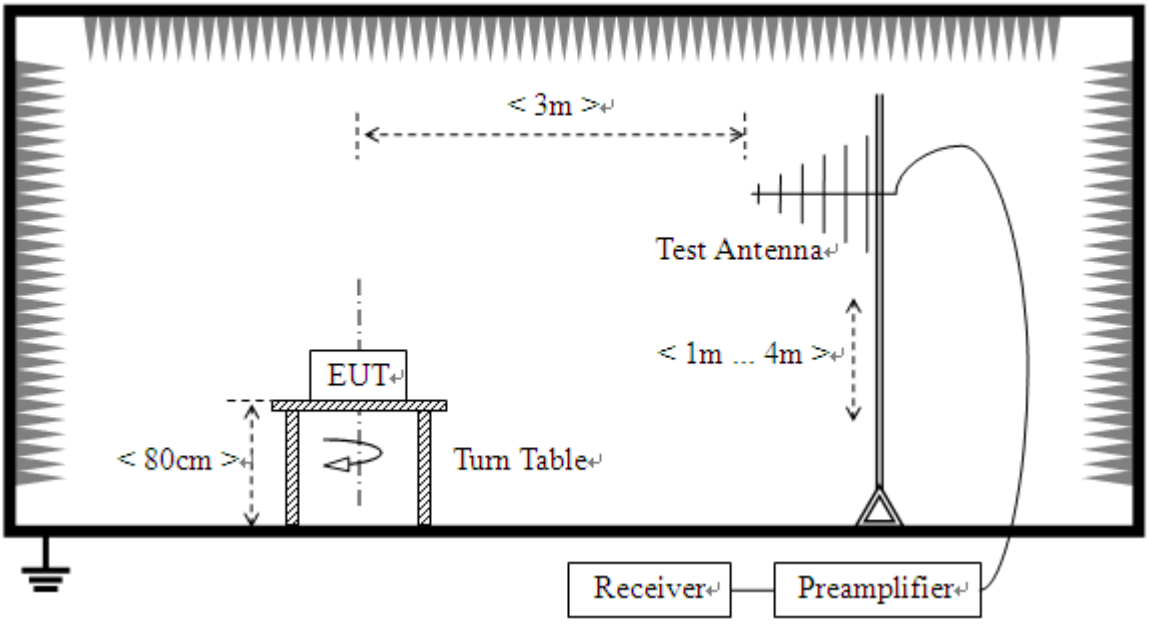
2.9.2. Test Description

Test Setup:

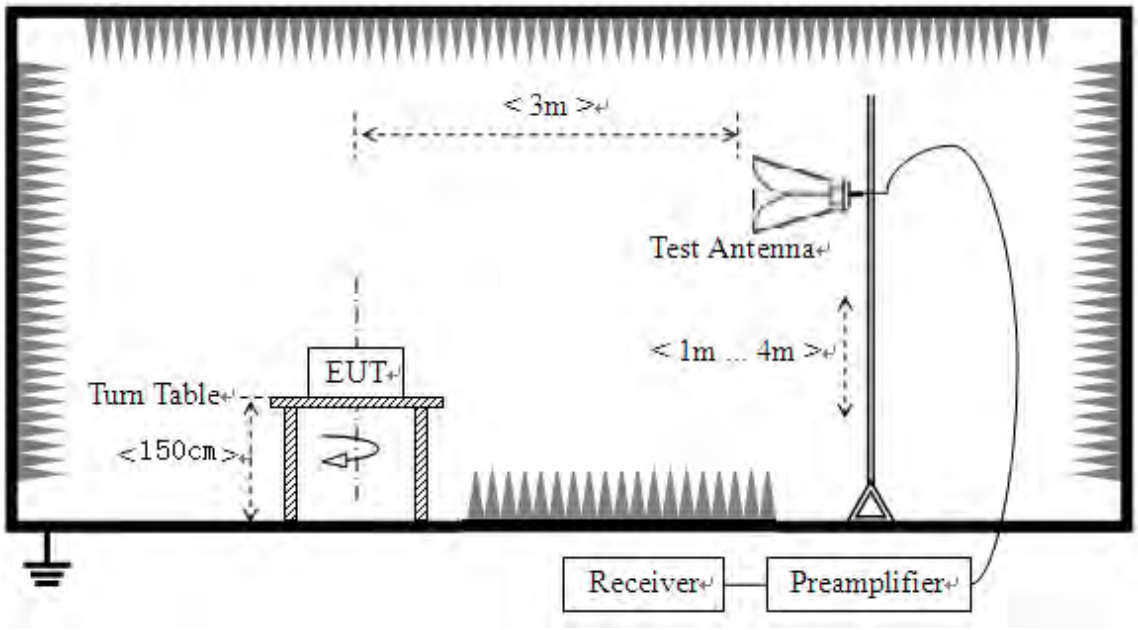
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz 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:

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

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.

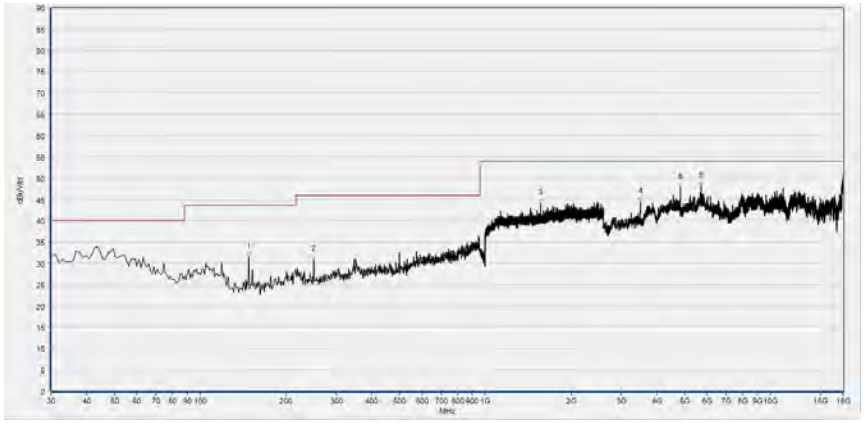
Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note3: For the frequency, which started from 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

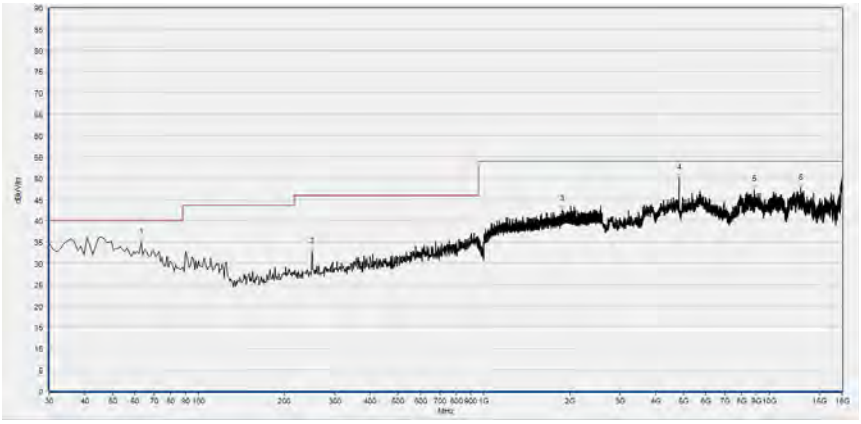
802.11b Mode

Plot for Channel 1



Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
148.340	31.54	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
250.190	30.88	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1566.400	44.11	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3493.200	44.46	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4823.760	47.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5723.120	48.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

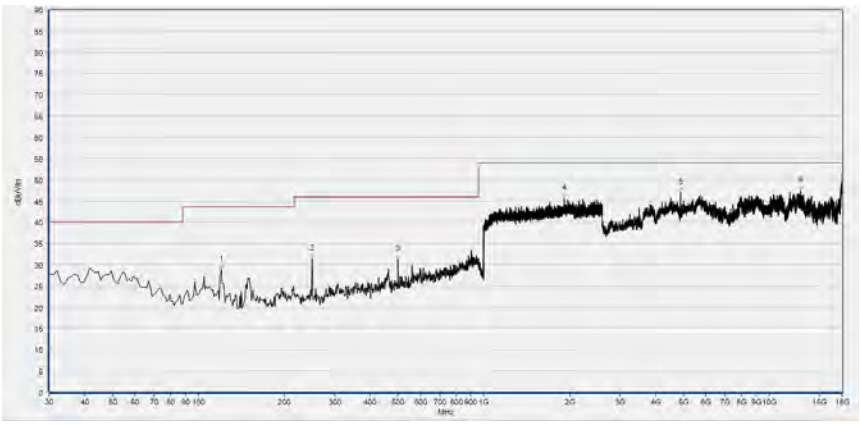
(Antenna Horizontal, 30MHz to 18GHz)



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
62.980	34.89	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
250.190	32.61	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1878.933	42.50	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4823.760	49.92	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8852.400	47.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12871.800	47.54	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

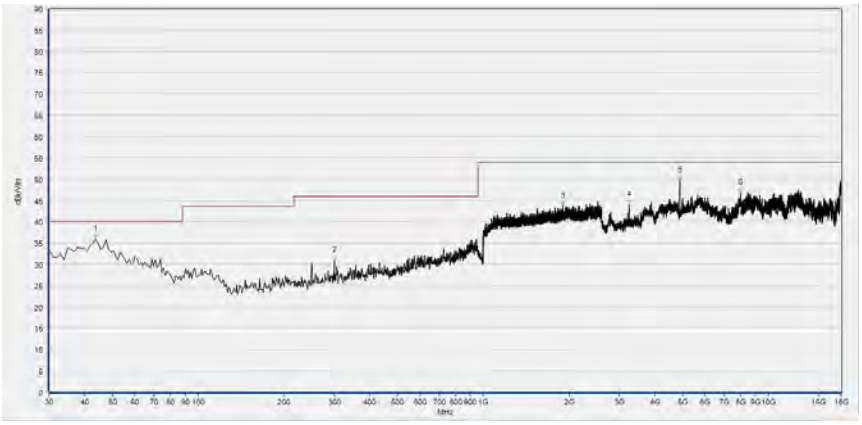
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 7



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
120.210	28.79	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
250.190	31.35	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
500.450	31.25	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1915.733	45.61	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4882.280	46.92	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12853.320	47.47	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

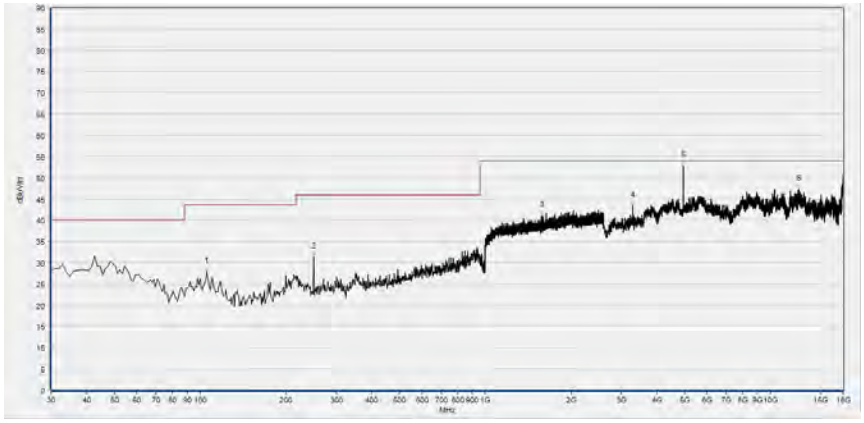
(Antenna Horizontal, 30MHz to 18GHz)



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
43.580	35.87	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
300.630	30.81	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1898.667	43.65	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3256.040	43.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4882.280	49.65	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7996.160	46.73	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

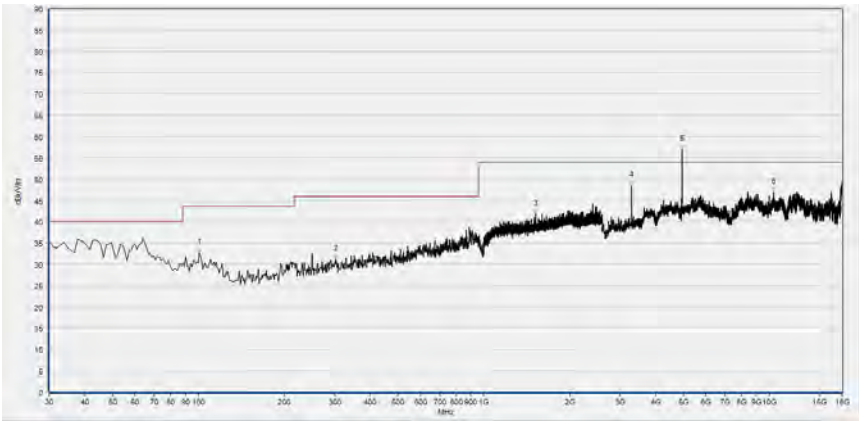
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 13



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
105.660	27.77	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
250.190	31.36	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1579.733	41.01	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3296.080	43.48	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4944.100	52.28	N/A	48.59	74.00	N/A	54.00	Horizontal	PASS
12591.520	47.23	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

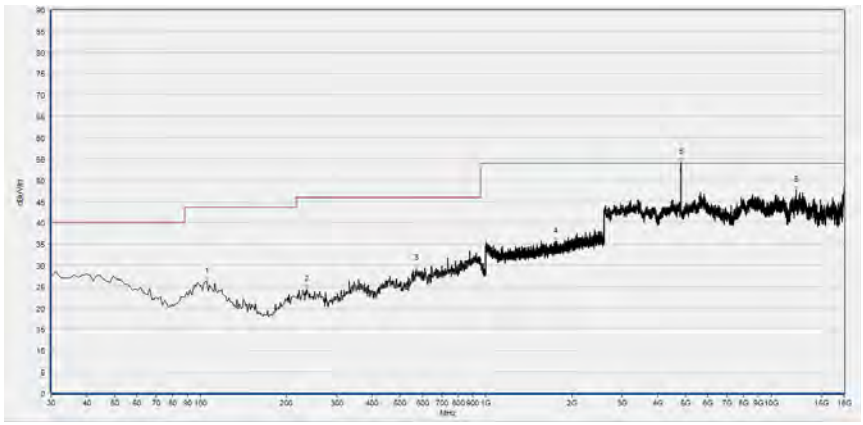


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
100.810	32.65	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
302.570	31.18	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1516.800	41.67	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3296.080	48.44	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4944.000	53.59	N/A	50.22	74.00	N/A	54.00	Vertical	PASS
10346.200	46.84	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

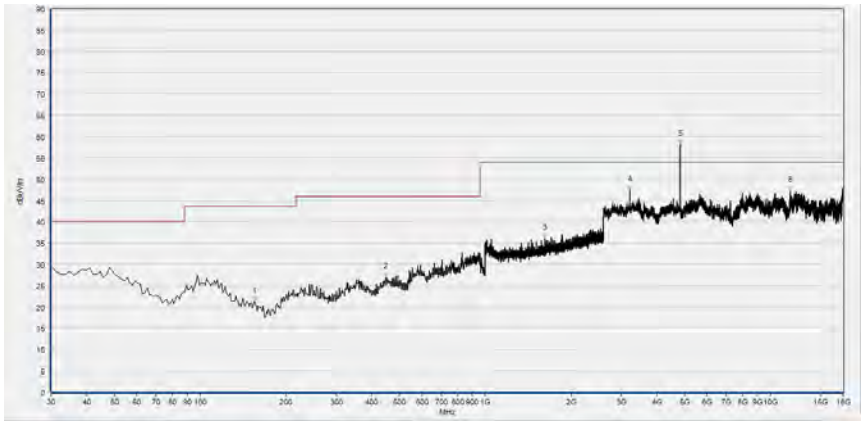
802.11g Mode

Plot for Channel 1



Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
105.269	26.18	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
236.383	24.37	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
571.452	29.23	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1749.740	35.46	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4820.400	59.22	N/A	43.53	74.00	N/A	54.00	Horizontal	PASS
12205.746	47.53	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

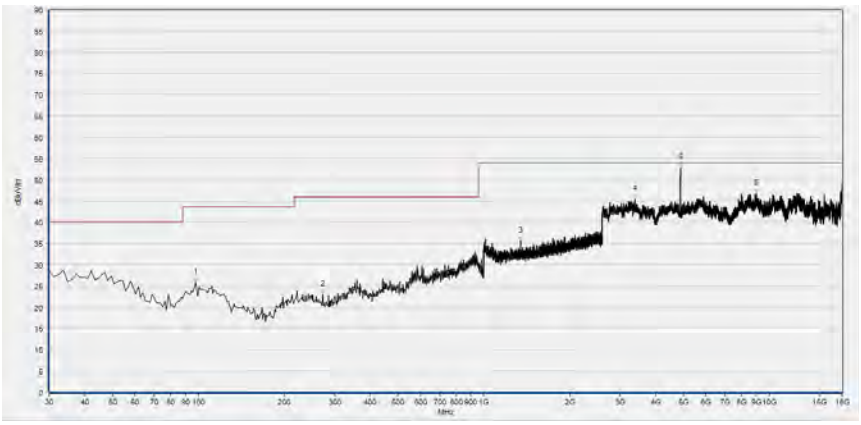
(Antenna Horizontal, 30MHz to 18GHz)



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
155.044	21.21	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
446.408	27.00	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1616.567	35.96	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3216.112	47.51	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4825.700	61.41	N/A	46.95	74.00	N/A	54.00	Vertical	PASS
11740.862	47.26	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

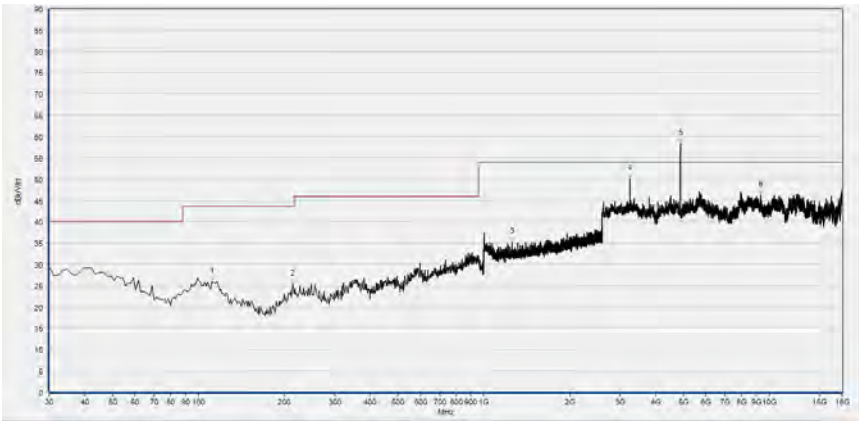
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 7



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
97.985	25.81	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
272.804	22.89	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1347.019	35.45	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3392.544	45.38	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4889.900	52.96	N/A	38.48	74.00	N/A	54.00	Horizontal	PASS
9007.565	46.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

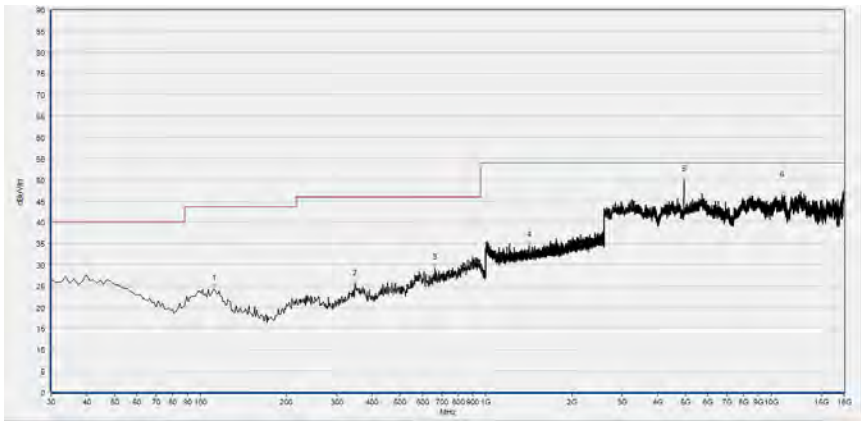
(Antenna Horizontal, 30MHz to 18GHz)



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
111.339	25.99	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
214.531	25.30	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1256.743	35.25	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3255.319	50.11	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4880.400	58.98	N/A	43.34	74.00	N/A	54.00	Vertical	PASS
9349.227	46.18	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

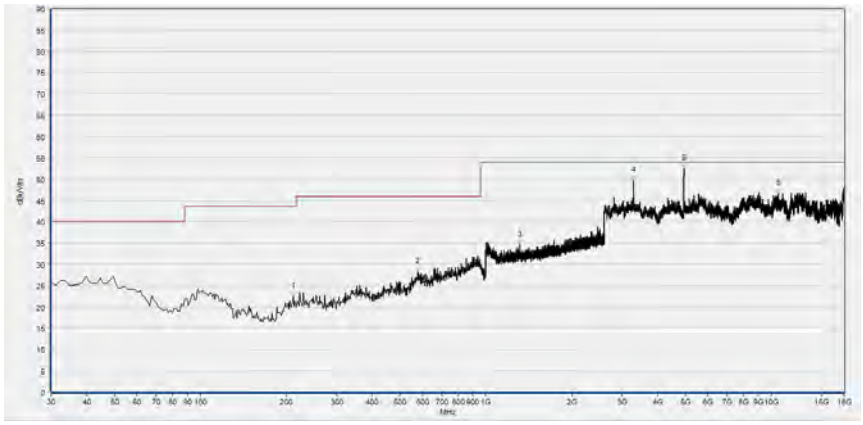
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 13



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
111.339	24.36	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
348.073	25.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
663.717	29.09	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1417.447	34.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4941.226	50.03	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10925.914	46.39	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

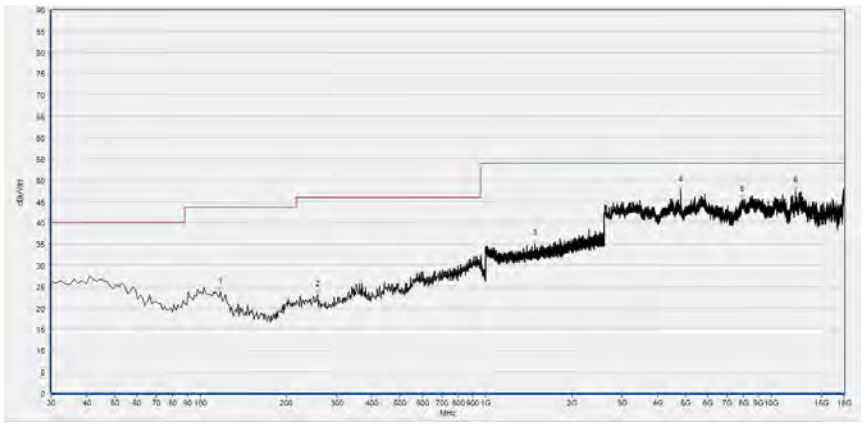


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
212.103	22.53	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
577.522	28.18	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1312.445	34.45	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3294.526	49.61	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4946.300	53.06	N/A	39.61	74.00	N/A	54.00	Vertical	PASS
10606.656	46.59	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

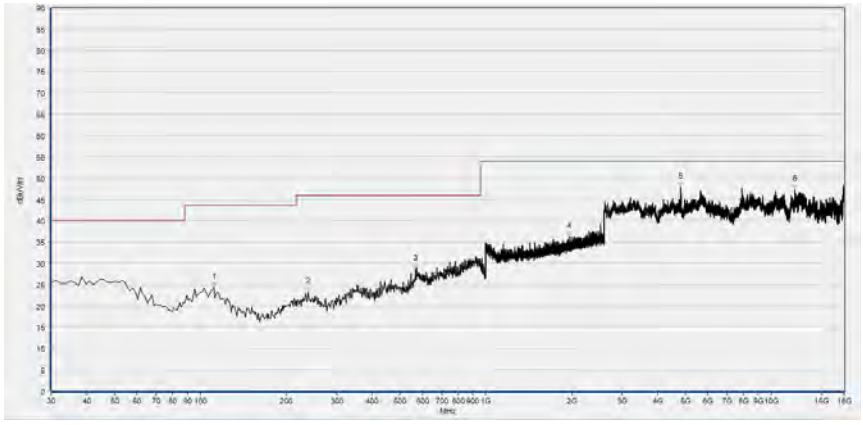
802.11n (HT20) Mode

Plot for Channel 1



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
117.409	23.83	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
257.021	23.06	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1480.192	34.96	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4823.604	47.62	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7887.361	45.35	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12149.736	47.43	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

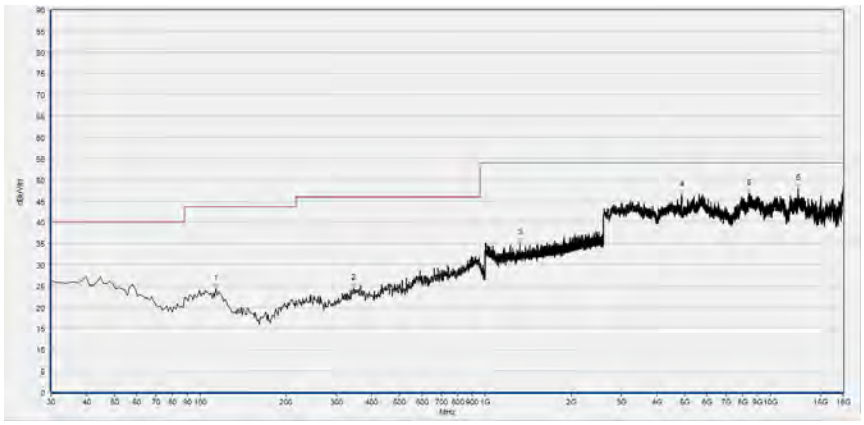
(Antenna Horizontal, 30MHz to 18GHz)



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
111.339	24.32	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
238.811	23.37	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
565.382	28.59	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1961.665	36.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4823.604	47.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12124.532	47.26	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

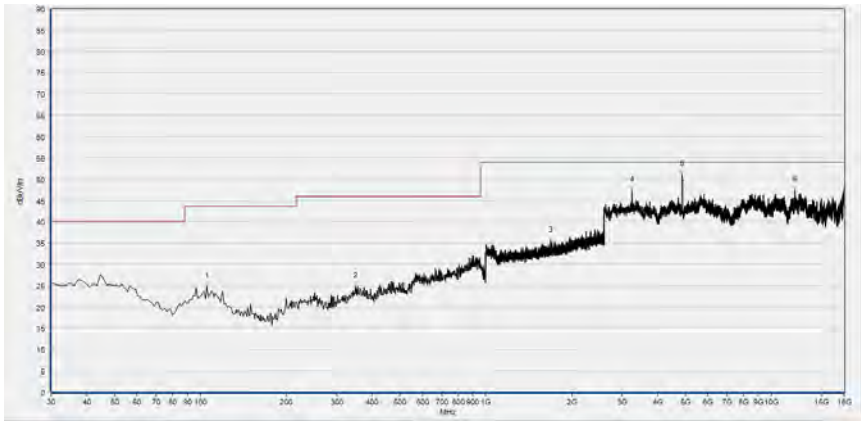
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 7



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
113.767	24.23	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
344.431	24.41	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1323.970	35.04	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4879.614	46.43	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8397.054	46.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12519.404	47.96	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

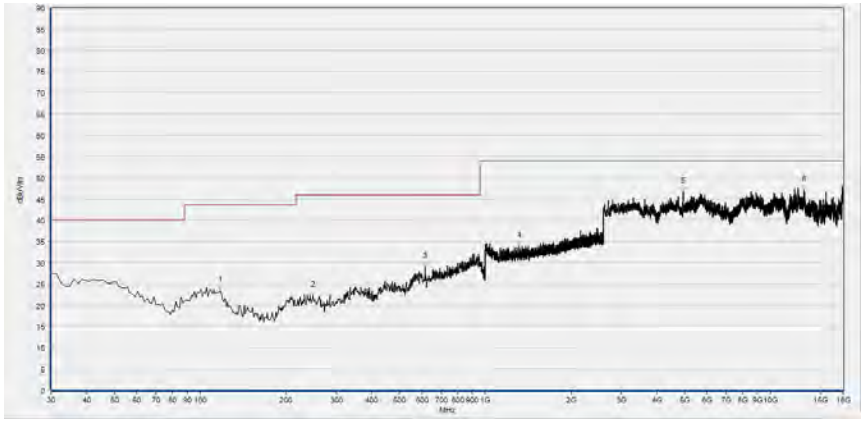
(Antenna Horizontal, 30MHz to 18GHz)



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
105.269	24.77	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
349.287	24.86	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1681.873	35.51	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3255.319	47.37	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4876.814	51.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12068.522	47.50	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

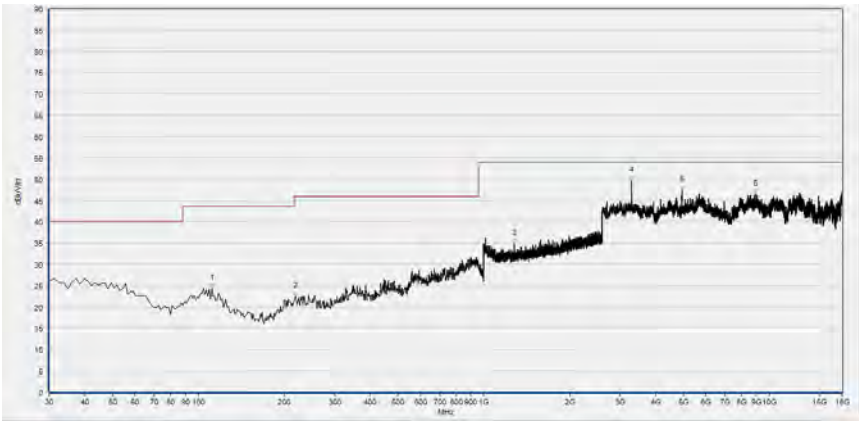
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 13



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
117.409	23.38	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
248.523	22.36	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
616.370	29.07	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1313.725	33.80	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4938.425	46.75	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
13104.710	47.07	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

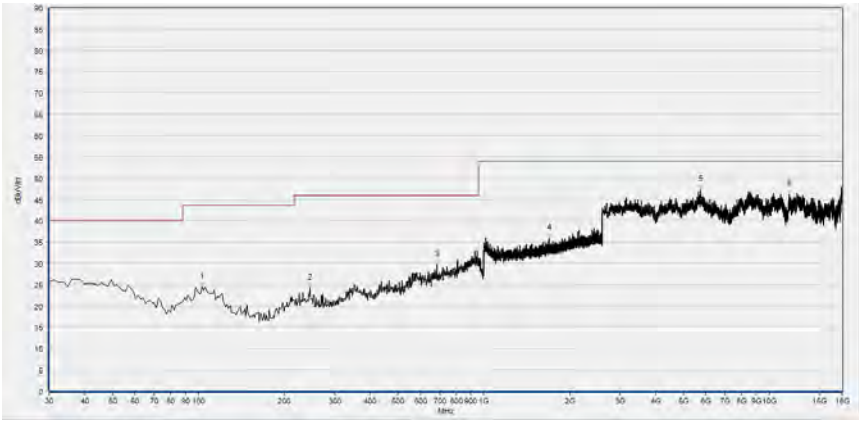


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
111.339	24.32	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
219.387	22.39	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1281.072	34.87	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3294.526	49.54	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4946.827	47.35	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8951.555	46.36	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

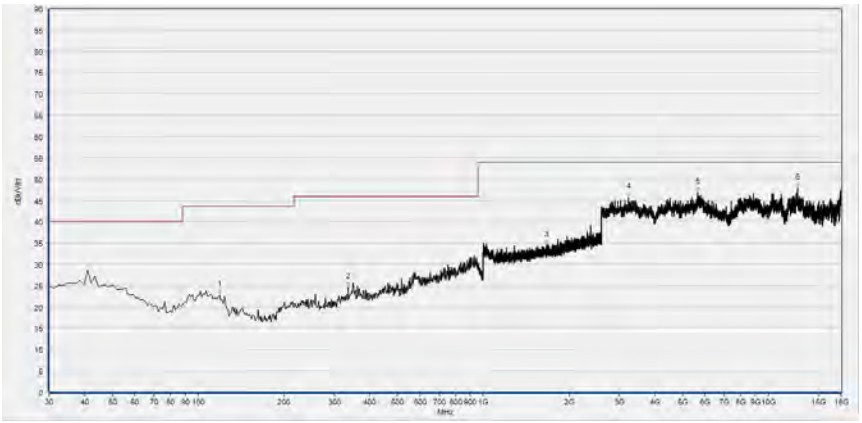
802.11n (HT40) Mode

Plot for Channel 3



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
102.841	24.46	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
246.095	24.07	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
684.355	29.62	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1690.836	35.84	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5736.570	47.31	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11732.460	46.27	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

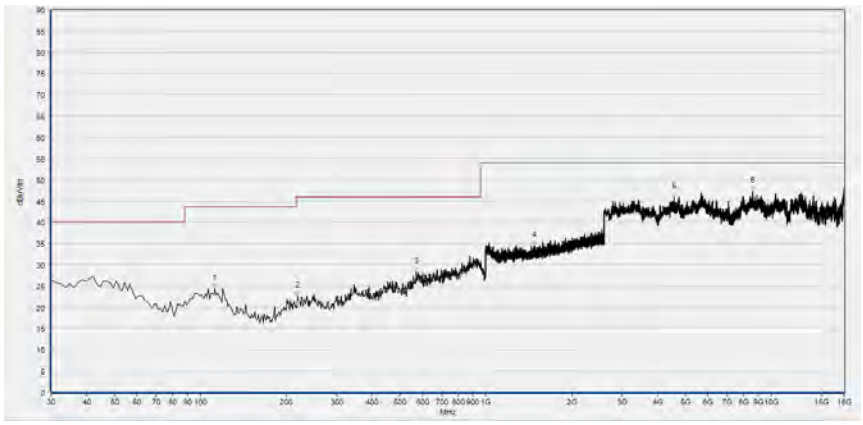
(Antenna Horizontal, 30MHz to 18GHz)



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
118.623	22.80	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
335.932	24.64	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1667.147	34.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3230.115	45.71	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5658.156	46.92	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12684.634	47.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

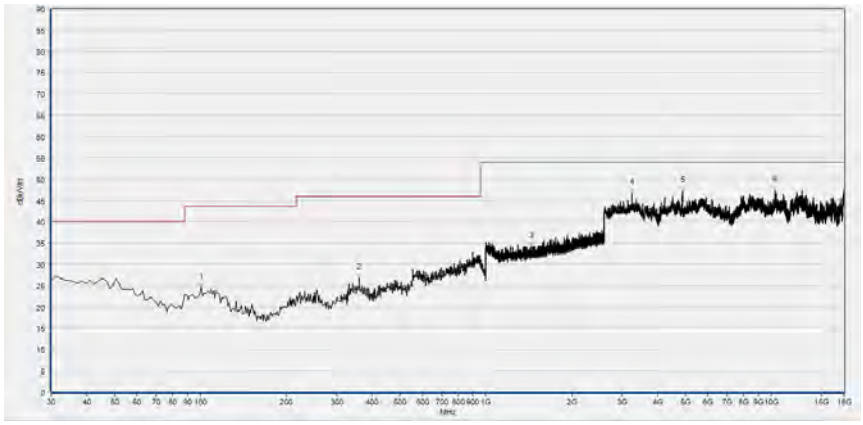
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 7



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
112.553	24.27	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
219.387	22.62	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
571.452	28.24	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1476.351	34.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4560.356	46.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8609.893	47.31	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

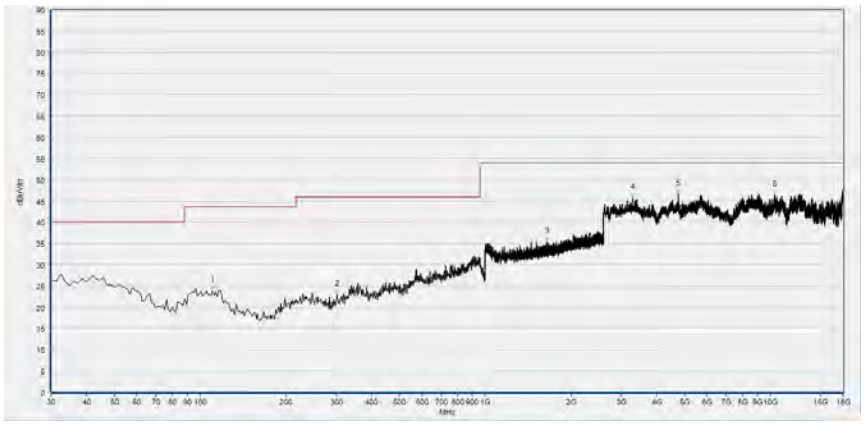
(Antenna Horizontal, 30MHz to 18GHz)



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
100.413	24.68	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
360.213	26.75	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1440.496	34.24	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3255.319	46.72	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4882.415	47.29	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10321.004	47.49	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

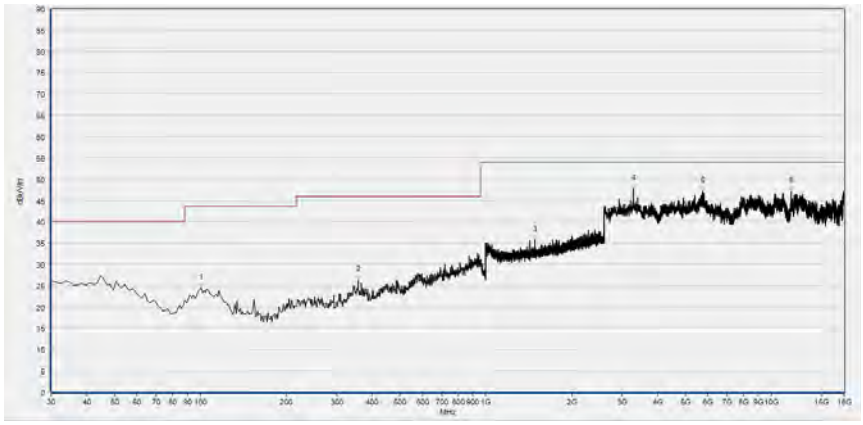
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 11



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
110.125	23.78	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
301.940	22.93	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1647.299	35.39	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3280.524	45.76	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4745.190	46.61	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10349.009	46.43	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
100.413	24.55	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
356.571	26.27	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1485.954	35.68	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3283.324	47.77	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5736.570	47.17	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11738.061	47.07	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

Annex A Test Uncertainty

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

Test Items	Uncertainty
Peak Output Power	±2.22dB
Power Spectral Density	±2.22dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77dB
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 C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Attenuator 1	(N/A.)	10dB	Resent	N/A	N/A
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2020.04.01	2021.03.31
USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2020.04.01	2021.03.31
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial Cable	CB02	RF02	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2020.03.26	2021.03.25
LISN	812744	NSLK 8127	Schwarzbeck	2020.03.26	2021.03.25
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2020.07.24	2021.07.23
Coaxial Cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A
Adapter	J5164200005	AK933JH	OPPO	N/A	N/A

4.3 List of Software Used

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

4.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2020.07.21	2021.07.20
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2019.02.14	2022.02.13
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2019.07.26	2022.07.25
Coaxial Cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-40GHz)	CB05	EMC05	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L3203	Tonscend	2020.07.21	2021.07.20
18-26.5GHz pre-Amplifier	46732	S10M100L3802	Tonscend	2020.07.21	2021.07.20
26-40GHz pre-Amplifier	56774	S40M400L4002	Tonscend	2020.07.21	2021.07.20
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2020.07.21	2021.07.20
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

END OF REPORT