



REPORT No.: SZ21040148W03

TEST REPORT

APPLICANT : Sonim Technologies, Inc.

PRODUCT NAME : GSM, WCDMA, LTE Cell Phone

MODEL NAME : XP3900

BRAND NAME : Sonim

FCC ID : WYPP14303

STANDARD(S) : 47 CFR Part 15 Subpart C

RECEIPT DATE : 2021-04-23

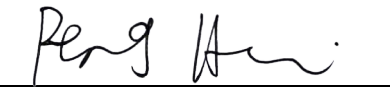
TEST DATE : 2021-04-28 to 2021-05-27

ISSUE DATE : 2021-06-03

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DIRECTORY

1. Technical Information	3
1.1. Applicant and Manufacturer Information	3
1.2. Equipment Under Test (EUT) Description	3
1.3. Modulation Type and Data Rate of EUT	5
1.4. The Channel Number and Frequency	6
1.5. Test Standards and Results	7
1.6. Environmental Conditions	8
2. 47 CFR Part 15C Requirements	9
2.1. Antenna Requirement	9
2.2. Duty Cycle of Test Signal	10
2.3. Maximum Peak and Average Conducted Output Power	14
2.4. Bandwidth	17
2.5. Conducted Spurious Emissions and Band Edge	26
2.6. Power Spectral Density	39
2.7. Conducted Emission	48
2.8. Restricted Frequency Bands	52
2.9. Radiated Emission	65
Annex A Test Uncertainty	81
Annex B Testing Laboratory Information	82

Change History		
Version	Date	Reason for change
1.0	2021-06-03	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Sonim Technologies, Inc.
Applicant Address:	6836 Bee Cave Road, Building 1, Suite 279, Austin, Texas 78746, USA
Manufacturer:	Sonim Technologies, Inc.
Manufacturer Address:	6836 Bee Cave Road, Building 1, Suite 279, Austin, Texas 78746, USA

1.2. Equipment Under Test (EUT) Description

Product Name:	GSM, WCDMA, LTE Cell Phone	
Serial No.:	N/A	
IMEI:	Conducted	001080002706142
	Radiated	001080002707256
Hardware Version:	P14303: 0200 P14403: 0201(Non-camera)	
Software Version:	3P.2.0-01-11.0.0-19.20.16	
Modulation Technology:	DSSS, OFDM	
Modulation Type:	Refer to section 1.3	
Operating Frequency Range:	802.11b/g/n (HT20): 2412MHz–2462MHz 802.11n (HT40): 2422MHz–2452MHz	
Antenna Type:	Monopole Antenna	
Antenna Gain:	1.64dBi	
Accessory Information:	Battery	
	Brand Name:	Sonim
	Model No.:	BAT-02300-01S
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	2300mAh
	Rated Voltage:	3.85V
	Charge Limit:	4.2V
	Manufacturer:	Tianjin Lishen Battery Joint-Stock Co., Ltd.



Accessory Information:	AC Adapter	
	Brand Name:	Sonim
	Model No.:	UC13US
	Serial No.:	(N/A, marked #1 by test site)
	Rated Output:	5V=2A
	Rated Input:	100-240V~50/60Hz, 0.35A
	Manufacturer:	Jiangsu Chenyang Electron Co., Ltd.

Note 1: According to the certificate holder, they declare that the model XP3900 (FCC ID: WYPP14303) has two types, namely "P14303" and "P14403", the difference is as follows. The main measuring model is XP3900 (Type: P14303), only the results for XP3900 (Type: P14303) were recorded in this report.

Model name	Type name	Variant
XP3900	P14303	With camera
	P14403	Without camera

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

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Modulation Type and Data Rate of EUT

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

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

1.4. The Channel Number and Frequency

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

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



1.5. Test Standards and Results

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

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

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

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	N/A	Duty Cycle Of Test Signal	Apr 28, 2021	Su Xiaoxian	PASS	No deviation
3	15.247(b)	Maximum Peak and Average Conducted Output Power	Mar 23, 2021	Su Xiaoxian	PASS	No deviation
4	15.247(a)	Bandwidth	May 06, 2021	Su Xiaoxian	PASS	No deviation
5	15.247(d)	Conducted Spurious Emission and Band Edge	May 06&27, 2021	Su Xiaoxian	PASS	No deviation
6	15.247(e)	Power Spectral Density	May 06, 2021	Su Xiaoxian	PASS	No deviation
7	15.207	Conducted Emission	May 08, 2021	Wu Runfeng	PASS	No deviation
8	15.247(d)	Restricted Frequency Bands	May 12&25, 2021	Gao Jianrou	PASS	No deviation
9	15.209, 15.247(d)	Radiated Emission	May 14, 2021	Gao Jianrou	PASS	No deviation

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

Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting

in the test equipments. The ref offset 11.5dB contains two parts that cable loss 1.5dB and Attenuator 10dB.

Note 3: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

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

1.6. Environmental Conditions

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

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



2. 47 CFR Part 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

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

2.1.2. Test Result: Compliant

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

2.2. Duty Cycle of Test Signal

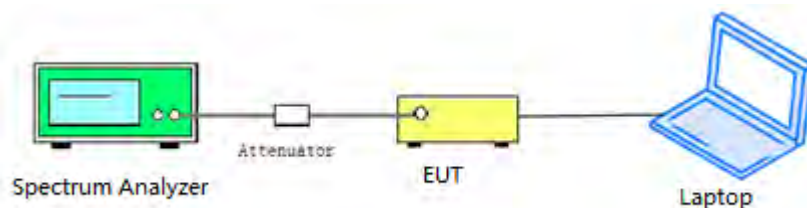
2.2.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than $\pm 2\%$; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

Test Setup:



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

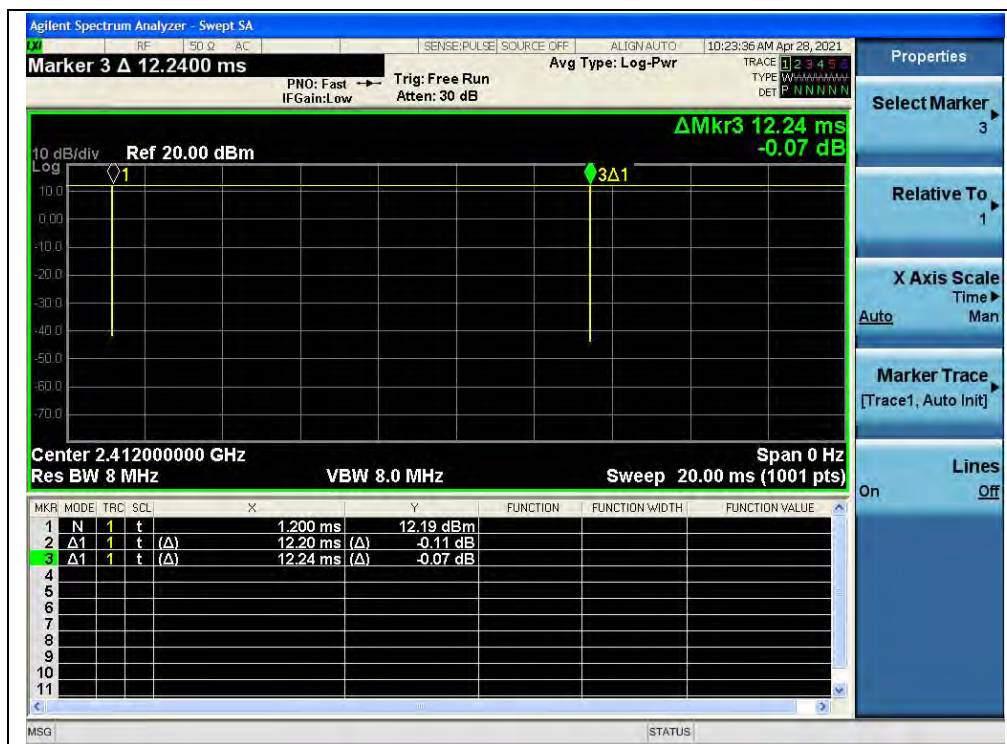


2.2.3. Test Result

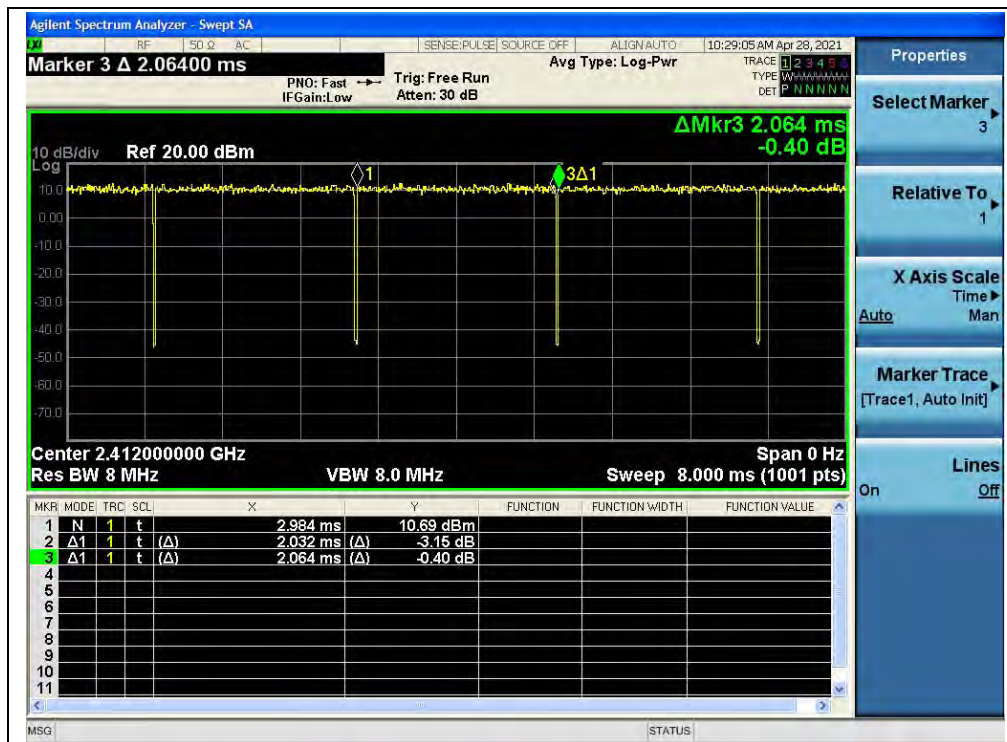
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor ($10 \cdot \lg[1/D]$)
802.11b	99.67	0.01
802.11g	99.90	0.00
802.11n (HT20)	97.93	0.09
802.11n (HT40)	94.69	0.24

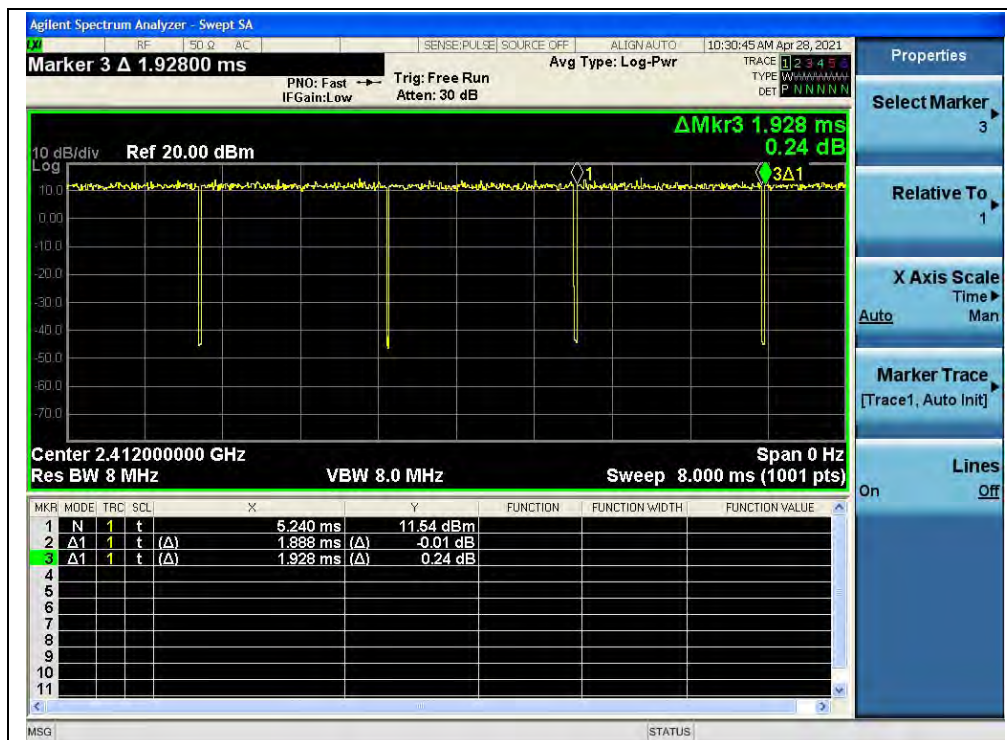
B. Test Plot:



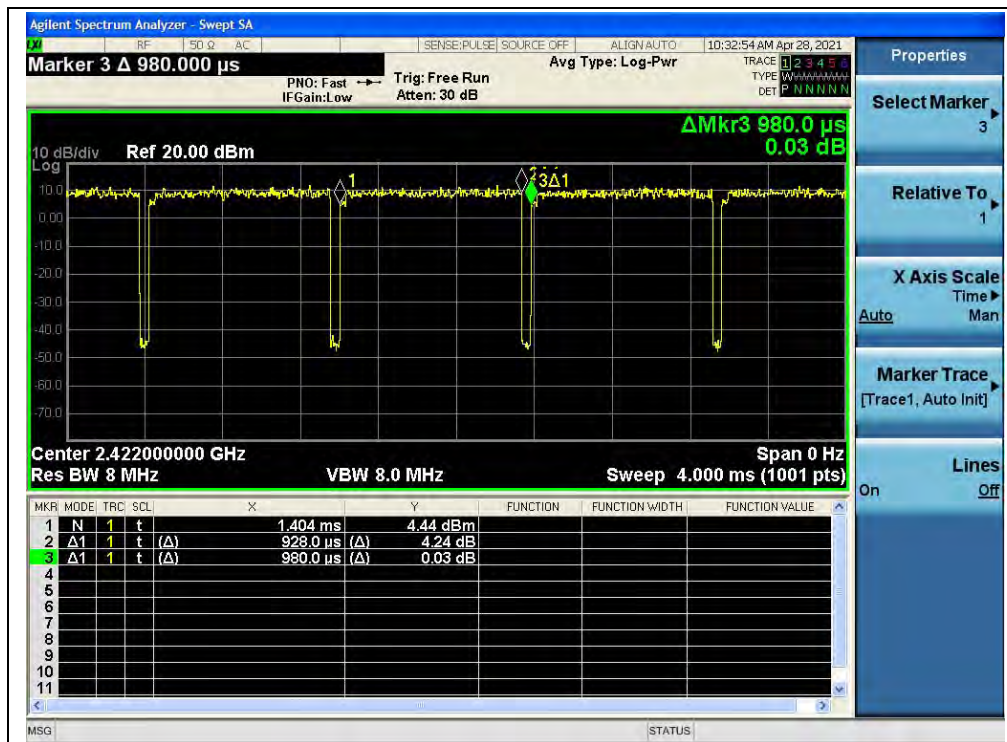
(Channel 1, 802.11b)



(Channel 1, 802.11g)



(Channel 1, 802.11n (HT20))



(Channel 3, 802.11n (HT40))

2.3. Maximum Peak and Average Conducted Output Power

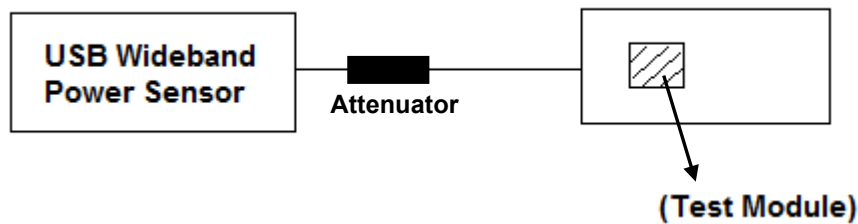
2.3.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

2.3.2. Test Description

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

Test Setup:



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



2.3.3. Test Result

Maximum Peak Conducted Output Power

802.11b Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	14.49	0.028	30	1	PASS
6	2437	12.64	0.018			PASS
11	2462	13.37	0.022			PASS

802.11g Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	22.64	0.184	30	1	PASS
6	2437	22.74	0.188			PASS
11	2462	24.39	0.275			PASS

802.11n (HT20) Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	23.08	0.203	30	1	PASS
6	2437	22.34	0.171			PASS
11	2462	23.39	0.218			PASS

802.11n (HT40) Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	20.33	0.108	30	1	PASS
6	2437	23.40	0.219			PASS
9	2452	23.69	0.234			PASS

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

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	11.89	0.01	11.90	0.015	30	1	PASS
6	2437	10.13		10.14	0.010			PASS
11	2462	10.81		10.82	0.012			PASS

802.11g Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	17.09	0.00	17.09	0.051	30	1	PASS
6	2437	20.04		20.04	0.101			PASS
11	2462	19.15		19.15	0.082			PASS

802.11n (HT20) Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	17.73	0.09	17.82	0.061	30	1	PASS
6	2437	19.11		19.20	0.083			PASS
11	2462	18.10		18.19	0.066			PASS

802.11n (HT40) Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
3	2422	14.82	0.24	15.06	0.032	30	1	PASS
6	2437	19.85		20.09	0.102			PASS
9	2452	17.97		18.21	0.066			PASS

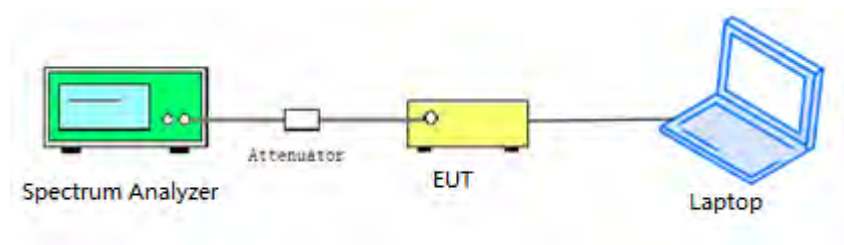
2.4. Bandwidth

2.4.1. Requirement

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

2.4.2. Test Description

Test Setup:



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

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

2.4.3. Test Procedure

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



2.4.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	9.059	≥500	PASS
6	2437	9.050	≥500	PASS
11	2462	8.561	≥500	PASS

B. Test Plot:



(Channel 1, 802.11b)



(Channel 6, 802.11b)



(Channel 11, 802.11b)



(Channel 6, 802.11g)



(Channel 11, 802.11g)

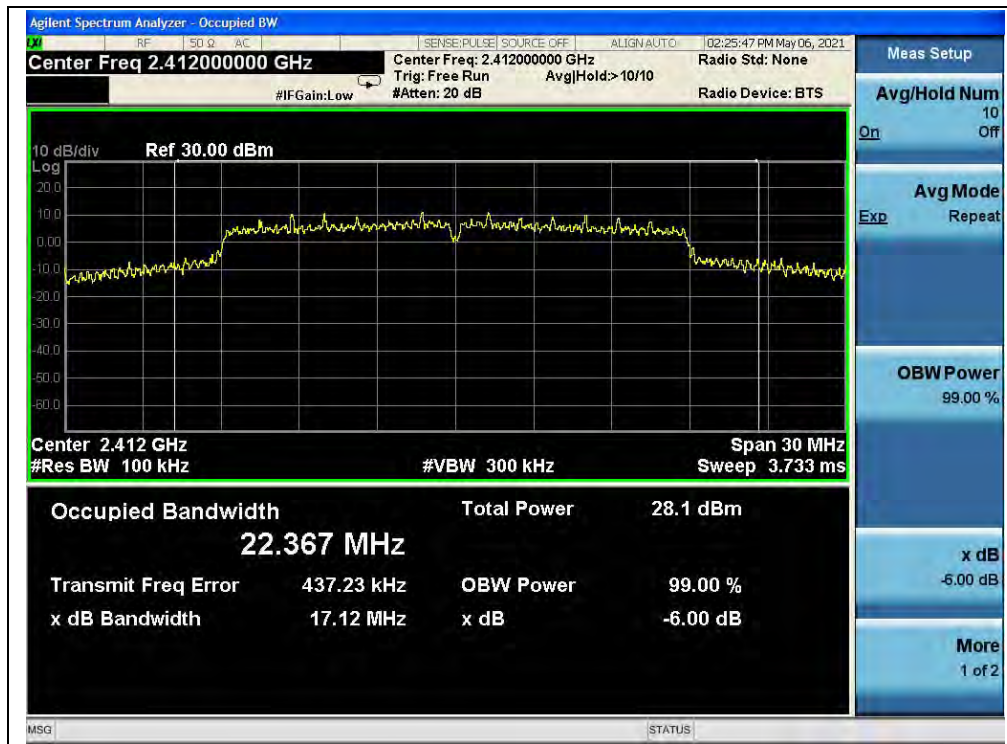


802.11n (HT20) Mode

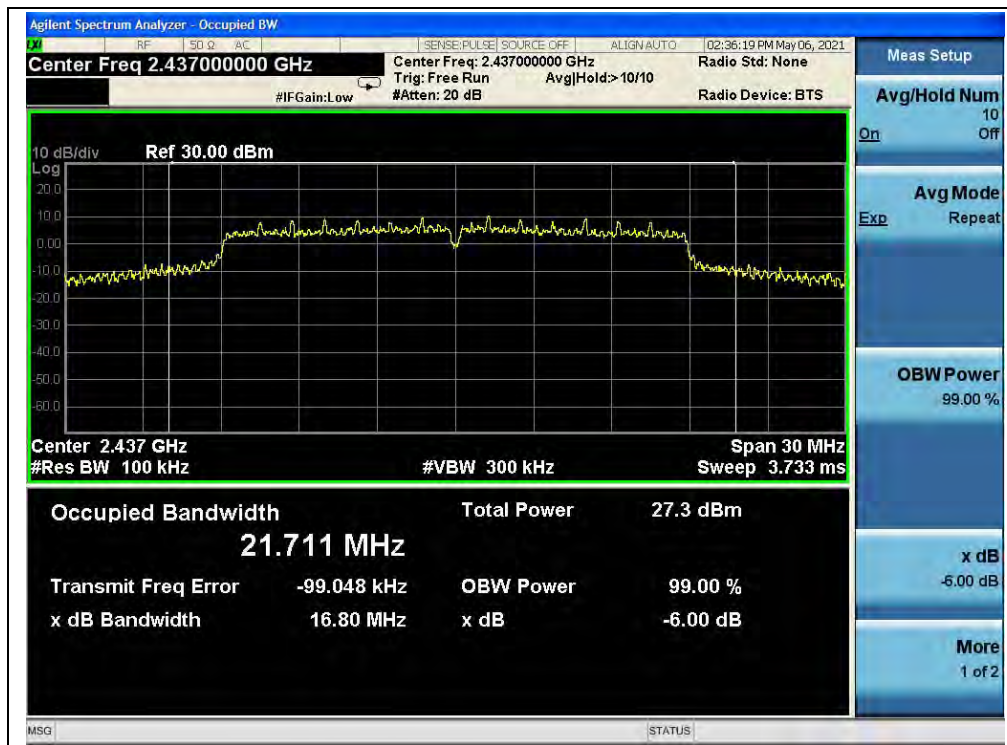
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	17.12	≥500	PASS
6	2437	16.80	≥500	PASS
11	2462	16.91	≥500	PASS

B. Test Plot:



(Channel 1, 802.11n (HT20))



(Channel 6, 802.11n (HT20))



(Channel 11, 802.11n (HT20))



802.11n (HT40) Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
3	2422	36.06	≥500	PASS
6	2437	36.40	≥500	PASS
9	2452	35.71	≥500	PASS

B. Test Plot:



(Channel 3, 802.11n (HT40))



(Channel 6, 802.11n (HT40))



(Channel 9, 802.11n (HT40))

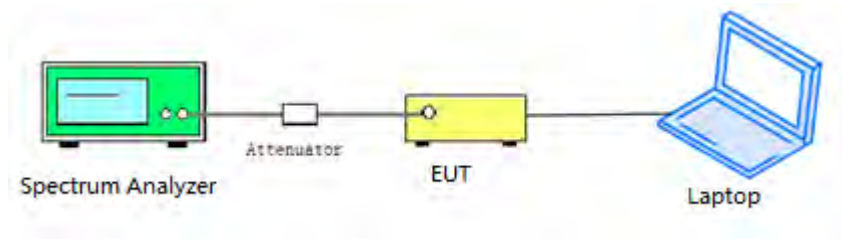
2.5. Conducted Spurious Emissions and Band Edge

2.5.1. Requirement

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

2.5.2. Test Description

Test Setup:



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

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

2.5.3. Test Procedure

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



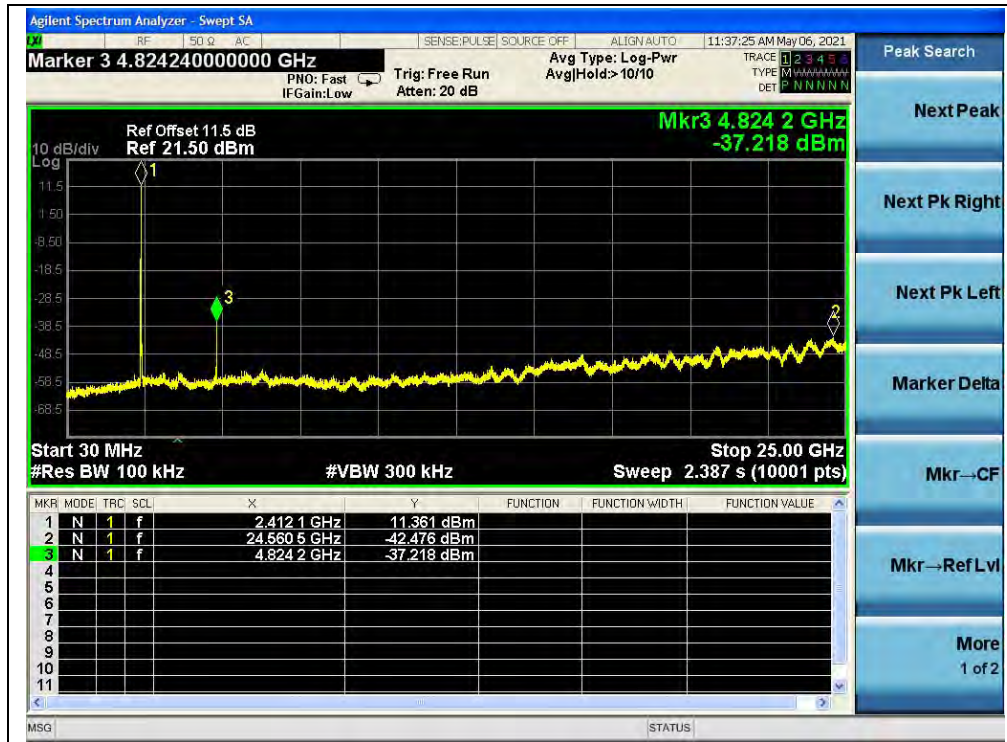
2.5.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-37.22	11.36	-8.64	PASS
6	2437	-40.76	7.50	-12.50	PASS
11	2462	-41.99	8.91	-11.09	PASS

B. Test Plot:



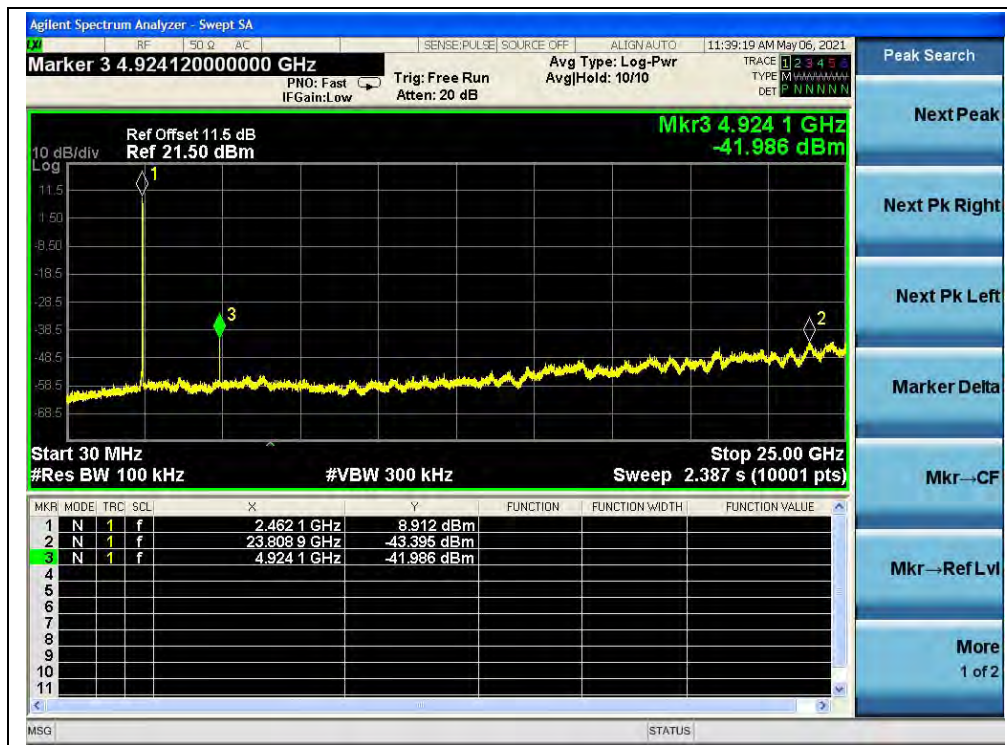
(30MHz to 25GHz, Channel 1, 802.11b)



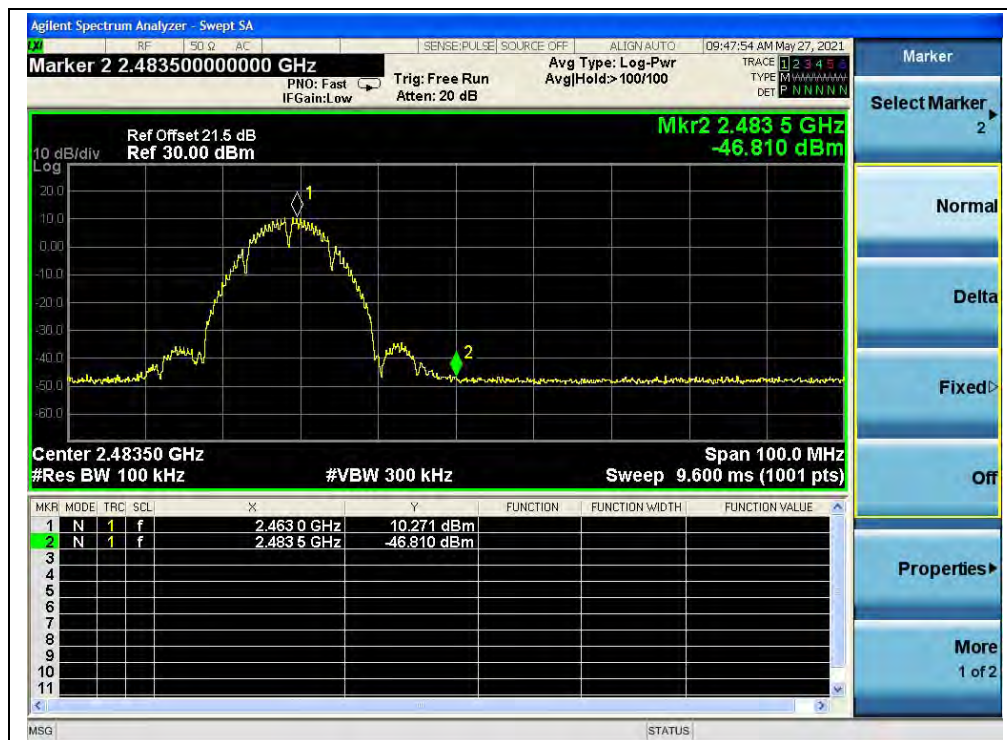
(Band Edge, Channel 1, 802.11b)



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



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



(Band Edge, Channel 11, 802.11b)

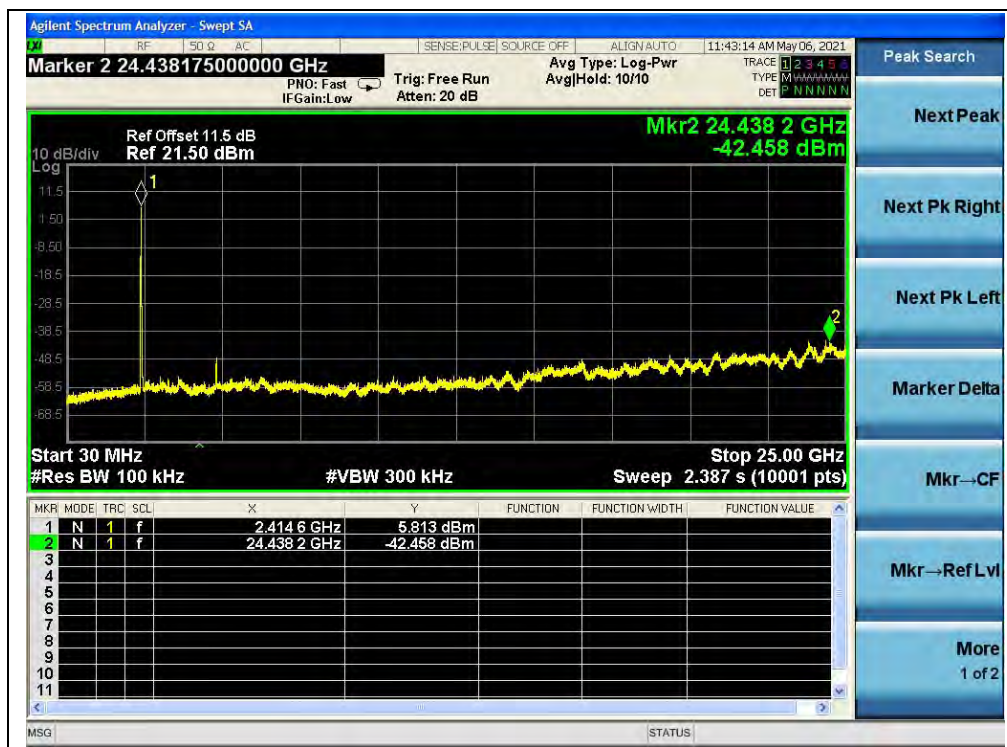


802.11g Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-42.46	5.81	-14.19	PASS
6	2437	-42.50	-0.85	-20.85	PASS
11	2462	-42.53	4.72	-15.28	PASS

B. Test Plot:



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



(Band Edge, Channel 1, 802.11g)



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



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



(Band Edge, Channel 11, 802.11g)

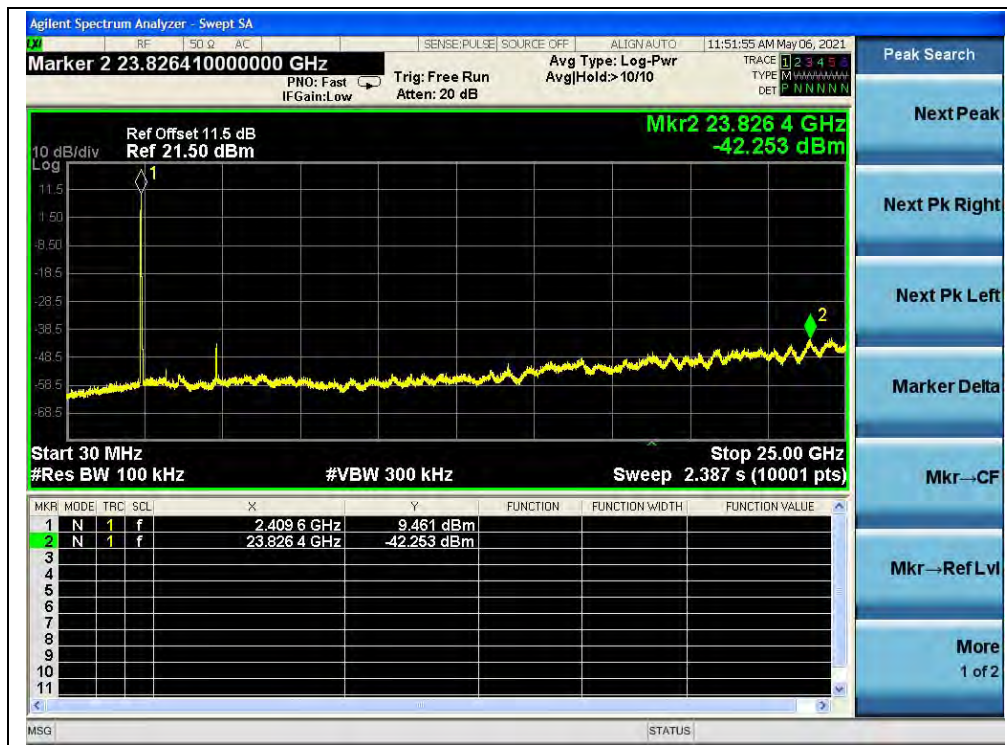


802.11n (HT20) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-42.25	9.46	-10.54	PASS
6	2437	-41.82	7.96	-12.04	PASS
11	2462	-42.41	6.50	-13.50	PASS

B. Test Plot:



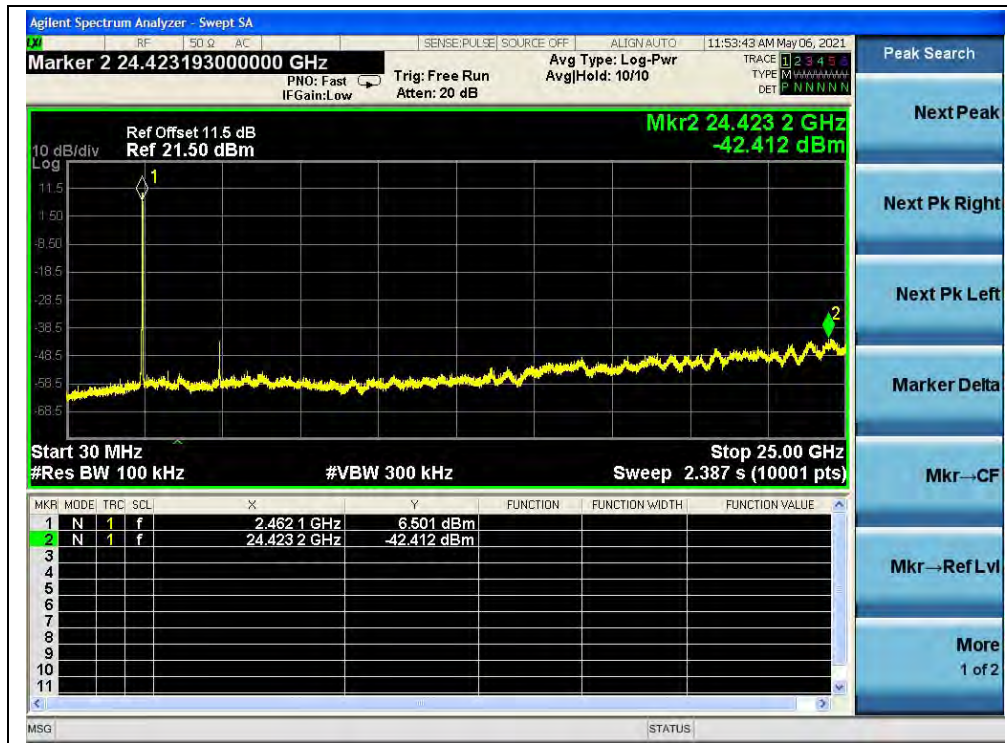
(30MHz to 25GHz, Channel 1, 802.11n (HT20))



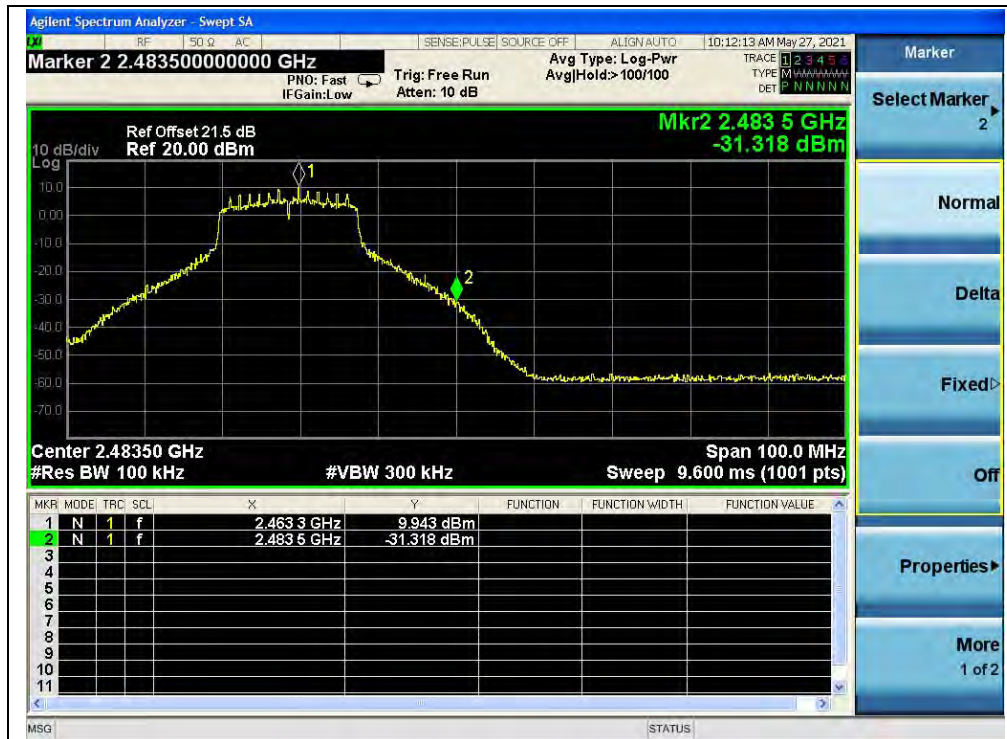
(Band Edge, Channel 1, 802.11n (HT20))



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



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



(Band Edge, Channel 11, 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	-42.91	5.05	-14.95	PASS
6	2437	-42.23	-3.49	-23.49	PASS
9	2452	-42.71	-2.32	-22.32	PASS

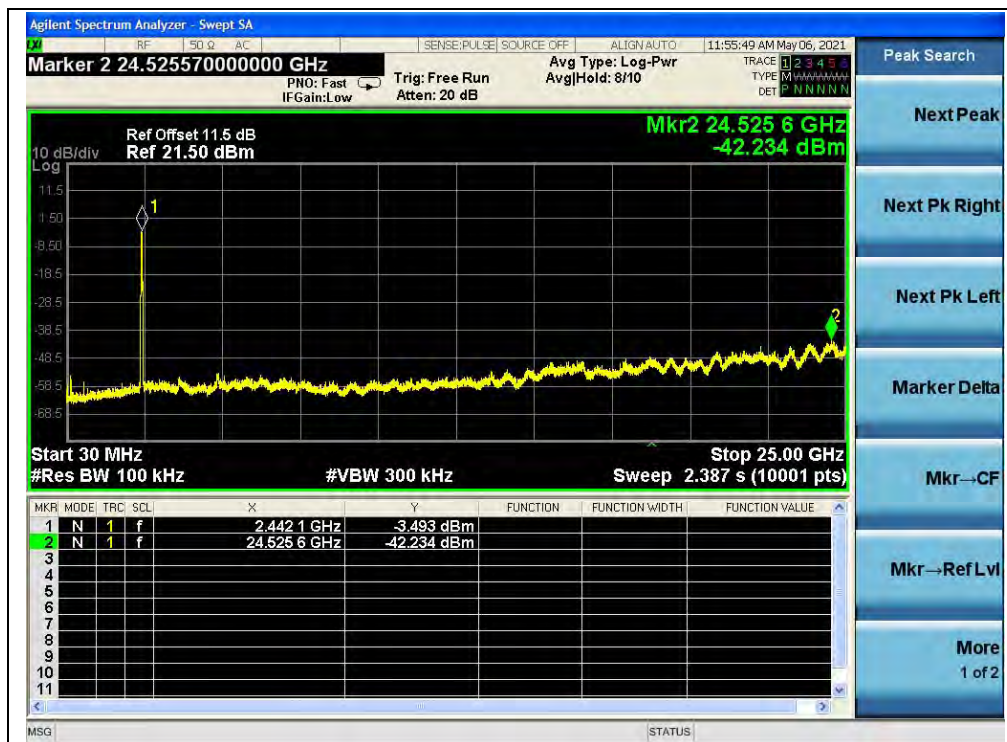
B. Test Plot:



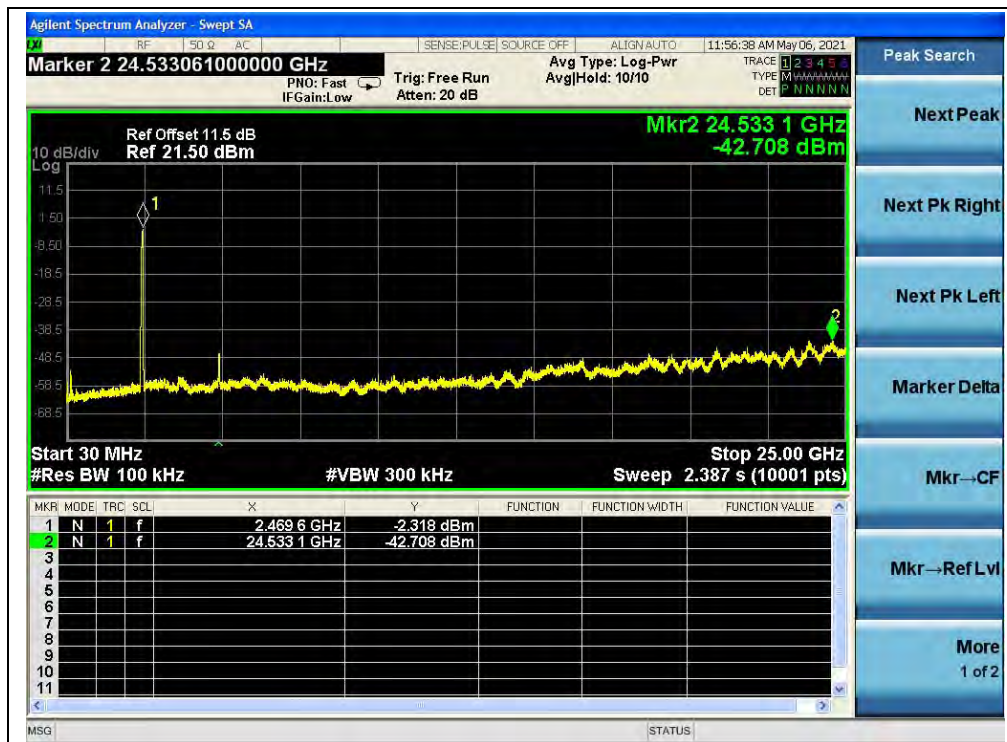
(30MHz to 25GHz, Channel 3, 802.11n (HT40))



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



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



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



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

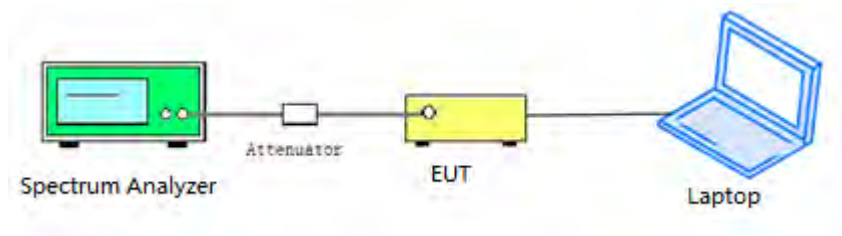
2.6. Power Spectral Density

2.6.1. Requirement

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

2.6.2. Test Description

Test Setup:



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

2.6.3. Test Procedure

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



2.6.4. Test Result

802.11b Mode

A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-1.76	8	PASS
6	2437	-5.56	8	PASS
11	2462	-4.37	8	PASS

B. Test Plot:



(Channel 1, 802.11b)



(Channel 6, 802.11b)



(Channel 11, 802.11b)



A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-1.38	8	PASS
6	2437	-2.39	8	PASS
11	2462	-1.54	8	PASS

Agilent Spectrum Analyzer - Swept SA

RF SQW AC SENSE:PULSE SOURCE OFF ALIGN:AUTO 02:58:41 PM May 06, 2021

Marker 1 2.41323000000 GHz PNO: Fast IFGain:Low Trig: Free Run Atten: 20 dB Avg Type: Log-Pwr AvgHold>10/10 TRACE 1 2 3 4 5 TYPE M W A V H A N I A N DET N N N N N N

Ref Offset 11.5 dB
Ref 21.50 dBm

**Mkr1 2.413 23 GHz
-1.383 dBm**

10 dB/div
Log

Center 2.41200 GHz Span 30.00 MHz
#Res BW 3.0 kHz #VBW 10 kHz Sweep 3.163 s (1001 pts)

MSG STATUS

Peak Search

Next Peak

Next Pk Right

Next Pk Left

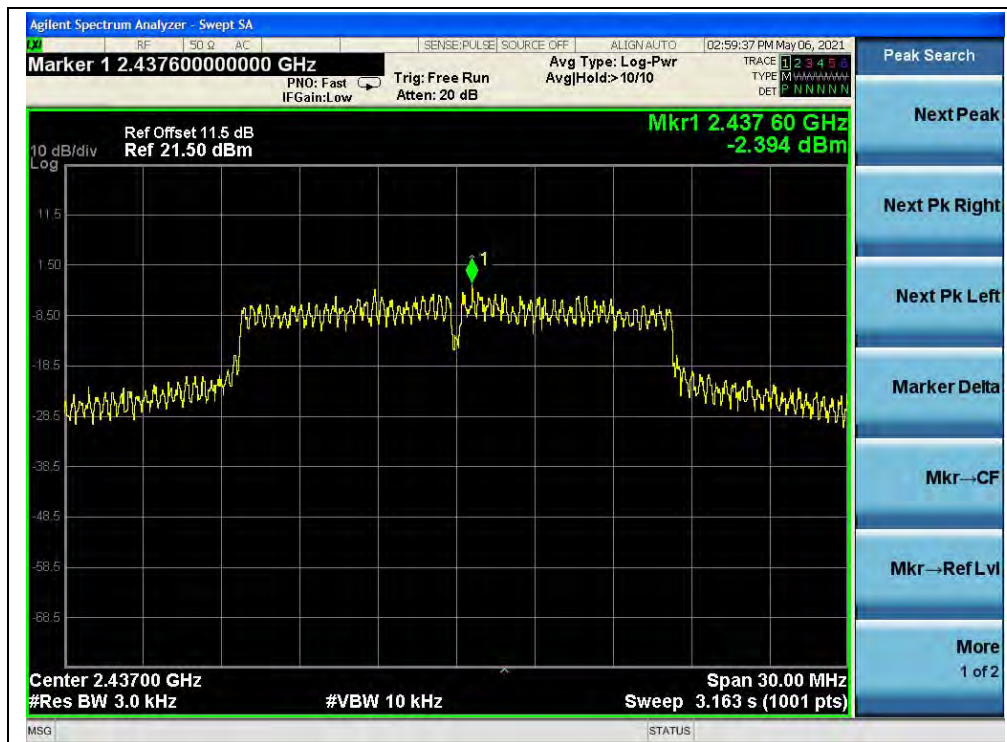
Marker Delta

Mkr→CF

Mkr→Ref Lvl

More
1 of 2

(Channel 1, 802.11g)



(Channel 6, 802.11g)



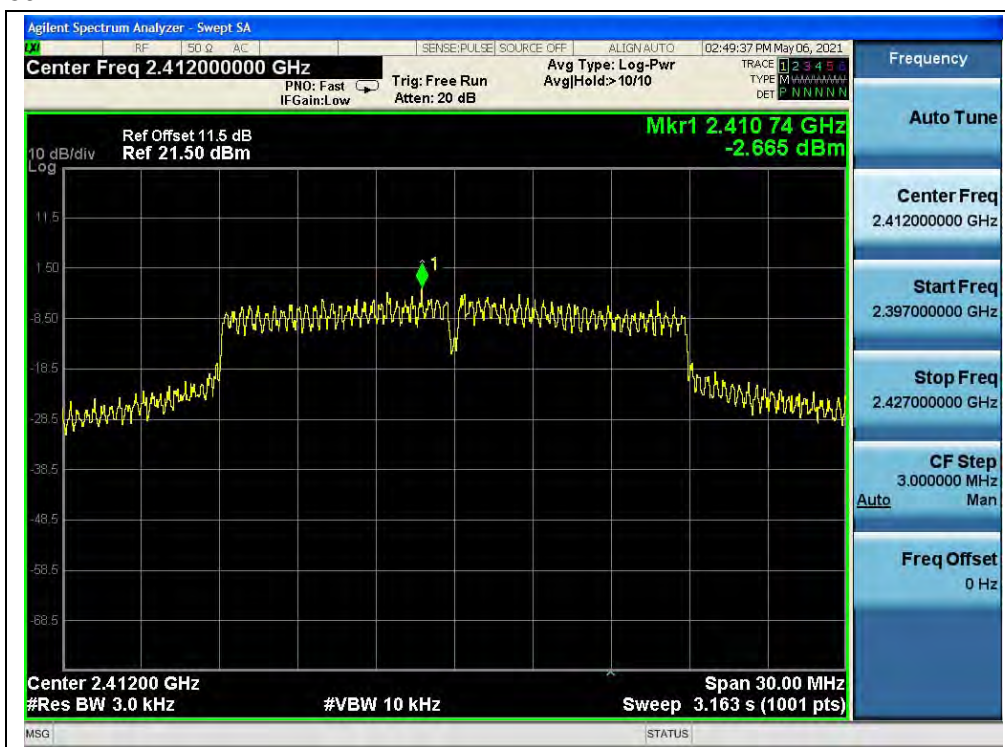
(Channel 11, 802.11g)



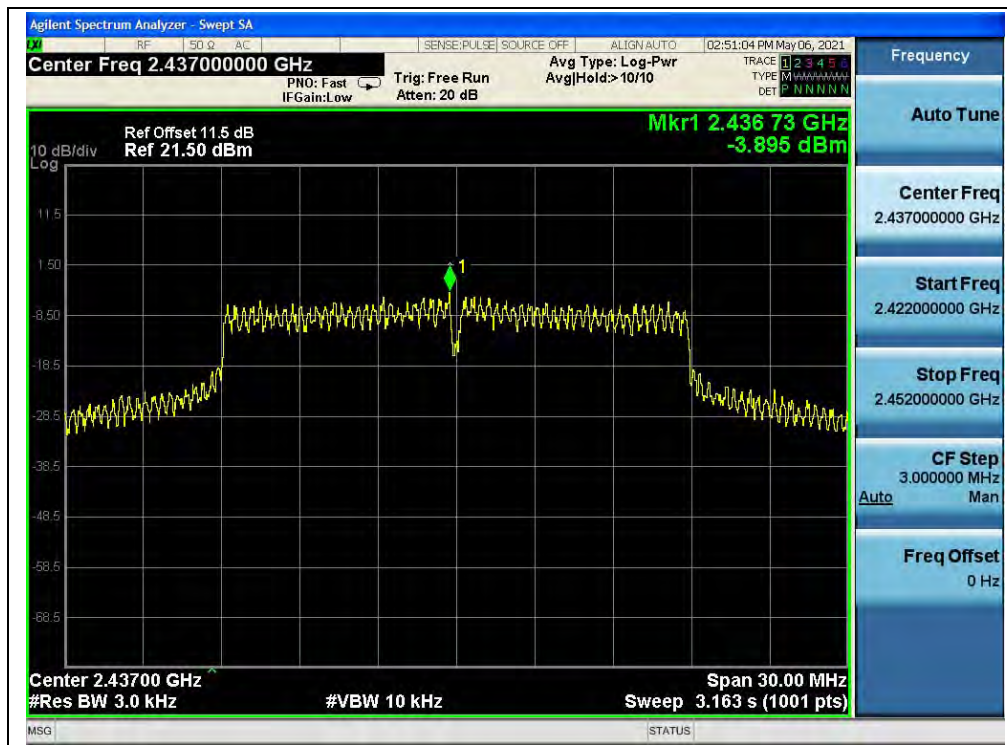
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-2.67	8	PASS
6	2437	-3.90	8	PASS
11	2462	-2.62	8	PASS

B. Test Plot:



(Channel 1, 802.11n (HT20))



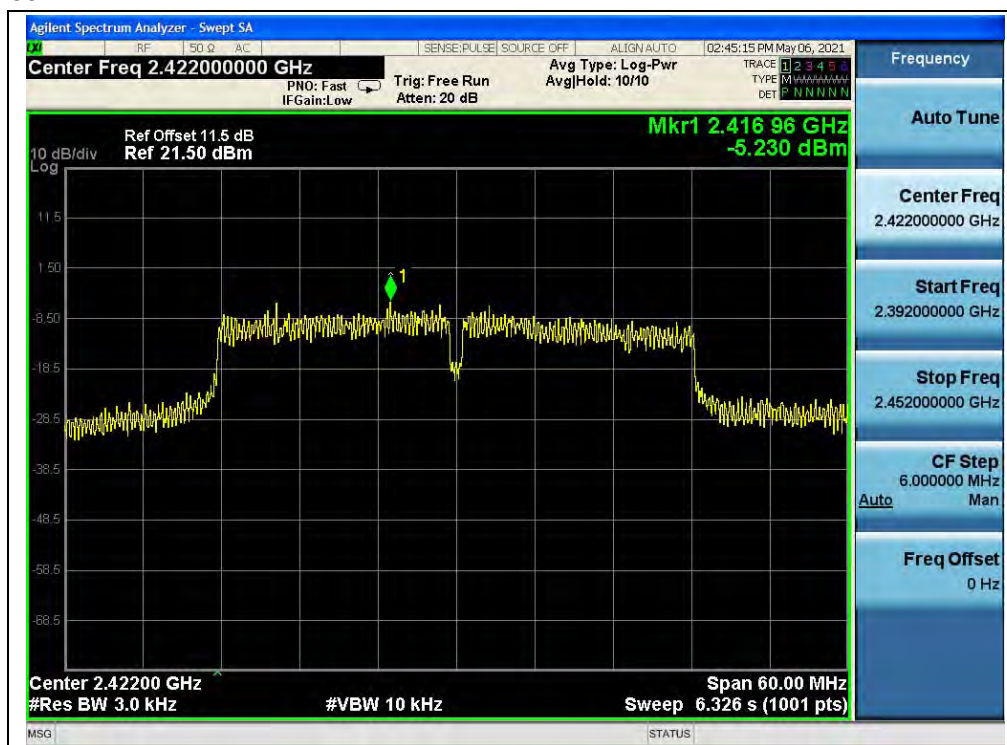
(Channel 6, 802.11n (HT20))



(Channel 11, 802.11n (HT20))

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

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
3	2422	-5.23	8	PASS
6	2437	-6.23	8	PASS
9	2452	-5.66	8	PASS

B. Test Plot:

(Channel 3, 802.11n (HT40))



(Channel 6, 802.11n (HT40))



(Channel 9, 802.11n (HT40))

2.7. Conducted Emission

2.7.1. Requirement

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

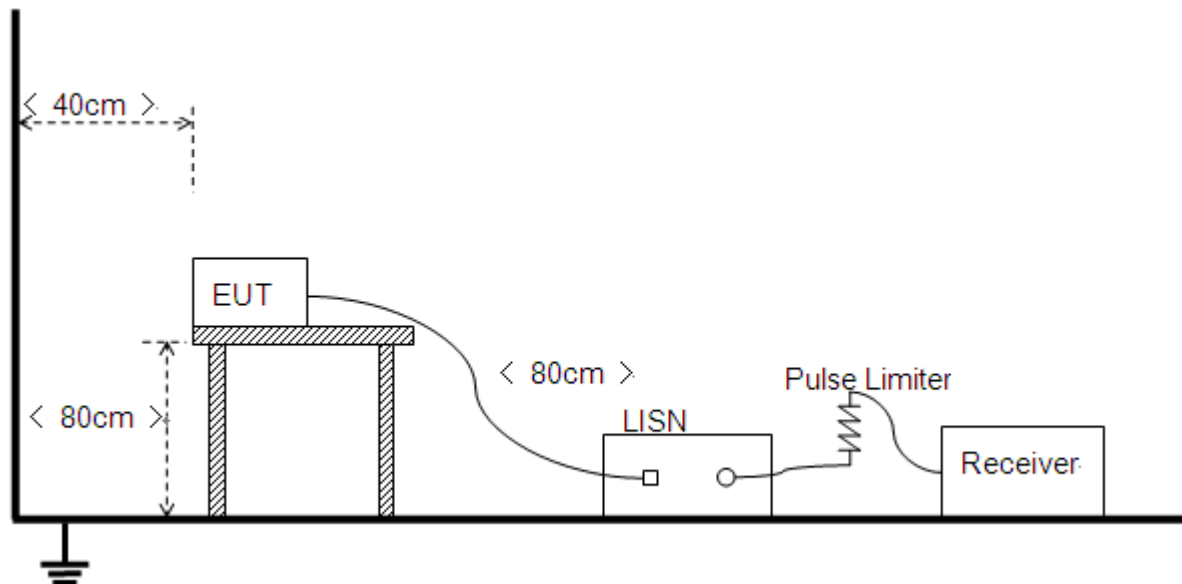
Frequency Range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

Test Setup:



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



2.7.3. Test Result

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

Test Voltage: AC 120V/60Hz

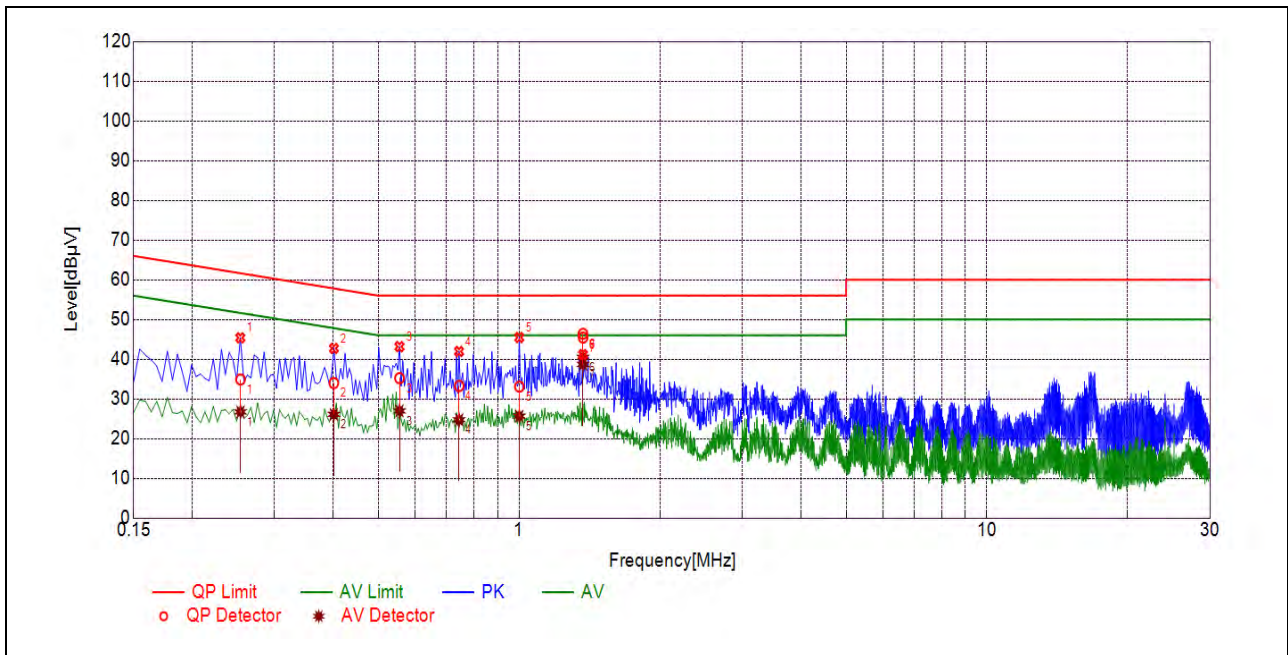
The measurement results are obtained as below:

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

U_R : Receiver Reading

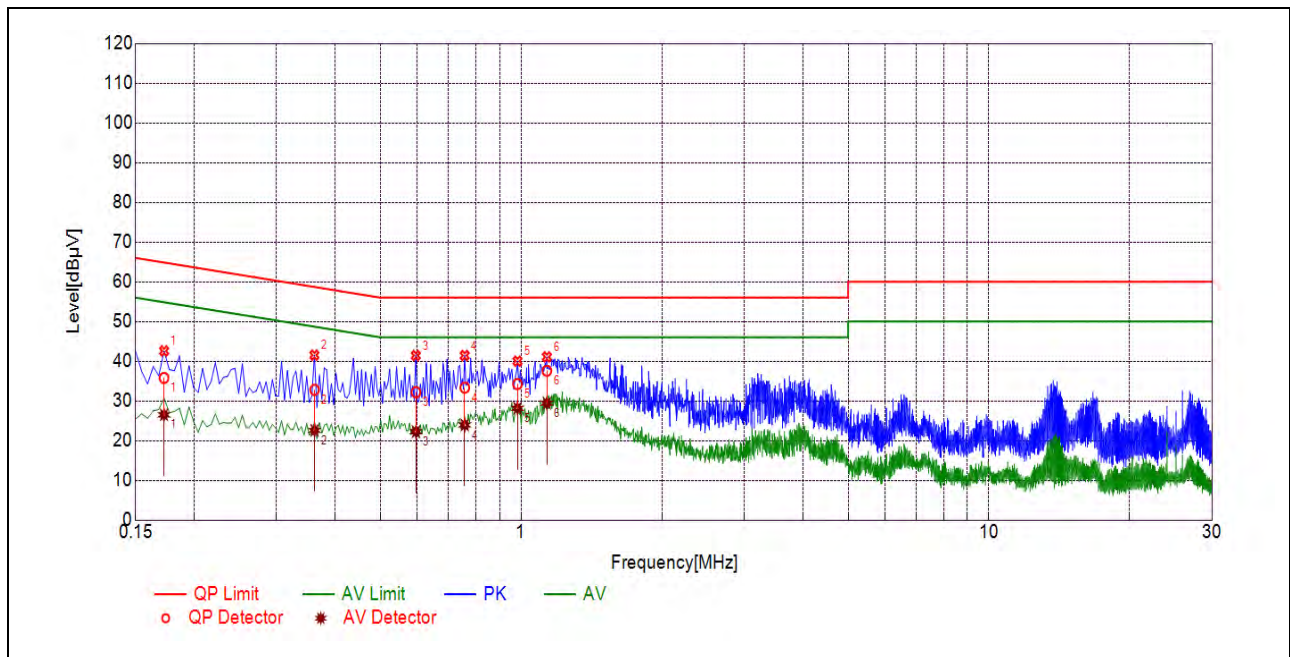
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.2537	34.89	26.74	61.64	51.64	Line	PASS
2	0.4016	33.99	26.12	57.82	47.82		PASS
3	0.5549	35.22	26.99	56.00	46.00		PASS
4	0.7444	33.26	24.74	56.00	46.00		PASS
5	1.0011	33.09	25.66	56.00	46.00		PASS
6	1.3693	46.41	40.49	56.00	46.00		PASS
7	1.3699	45.45	38.69	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	0.1724	35.79	26.51	64.84	54.84	Neutral	PASS
2	0.3617	32.81	22.57	58.69	48.69		PASS
3	0.5959	32.20	22.26	56.00	46.00		PASS
4	0.7577	33.34	23.93	56.00	46.00		PASS
5	0.9821	34.24	28.16	56.00	46.00		PASS
6	1.1349	37.58	29.43	56.00	46.00		PASS

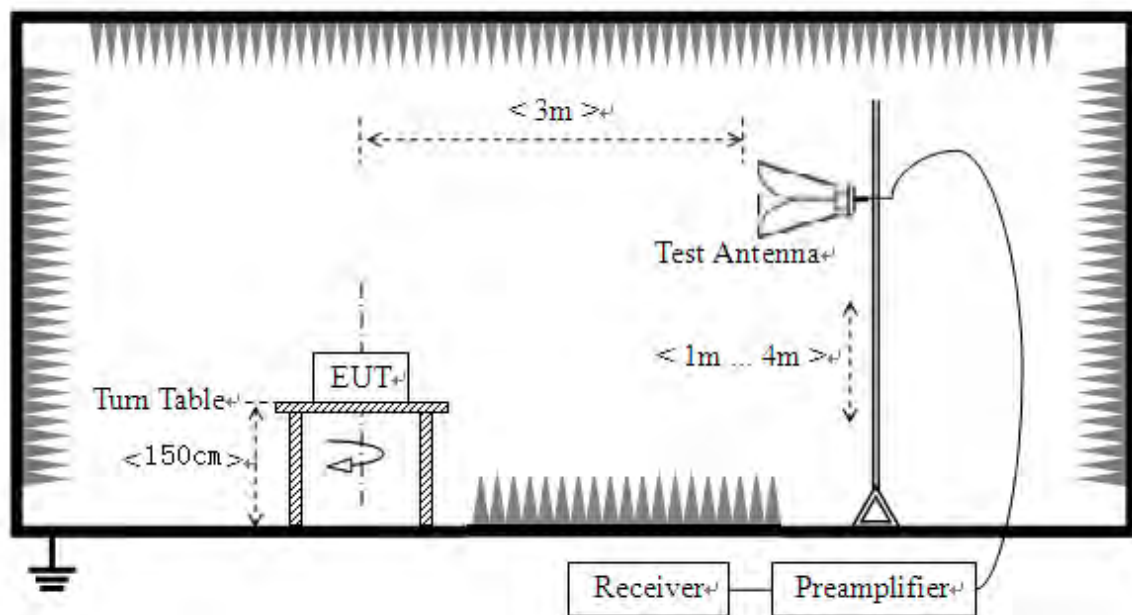
2.8. Restricted Frequency Bands

2.8.1. Requirement

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

2.8.2. Test Description

Test Setup



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

For the Test Antenna:

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



2.8.3. Test Procedure

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

2.8.4. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

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

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

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

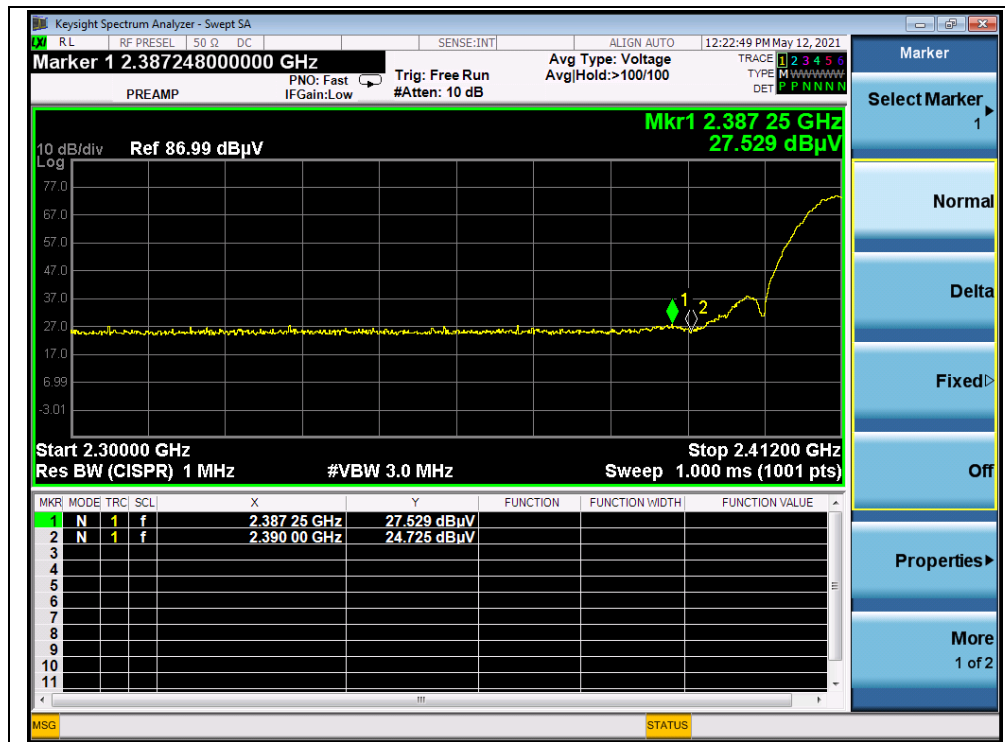
802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dB μ V)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV						
1	2387.25	PK	27.53	6.74	27.20	61.47	74	PASS
1	2387.47	AV	16.60	6.74	27.20	50.54	54	PASS
11	2487.99	PK	26.75	6.74	27.20	60.69	74	PASS
11	2484.08	AV	15.66	6.74	27.20	49.60	54	PASS



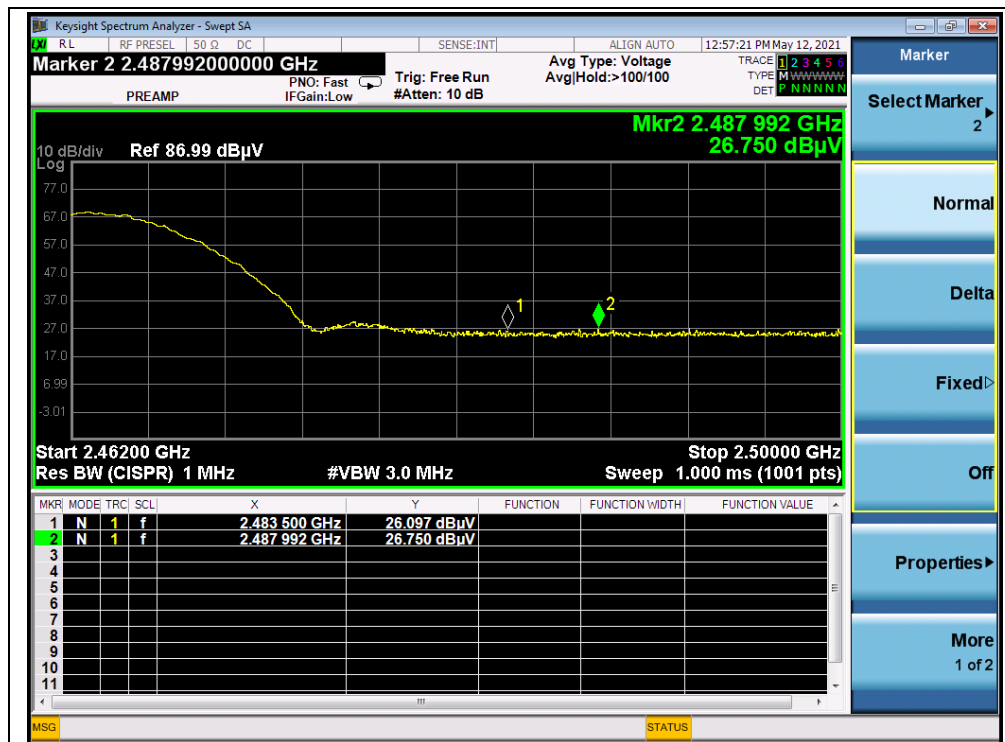
B. Test Plot:



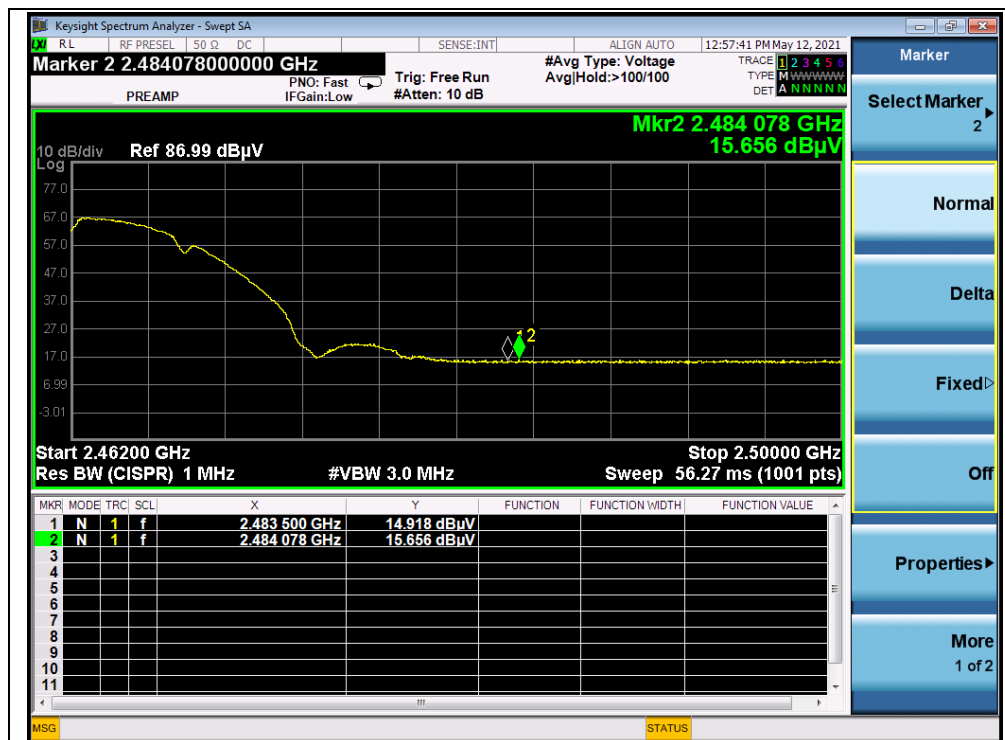
(PEAK, Channel 1, 802.11b)



(AVERAGE, Channel 1, 802.11b)



(PEAK, Channel 11, 802.11b)



(AVERAGE, Channel 11, 802.11b)

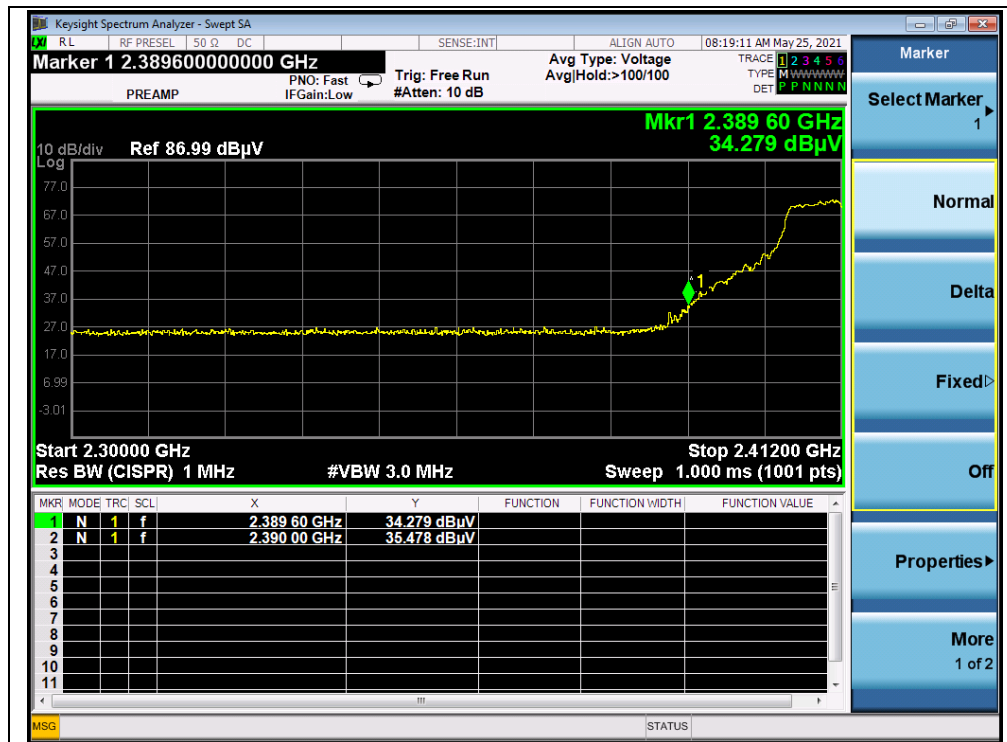


802.11g Mode

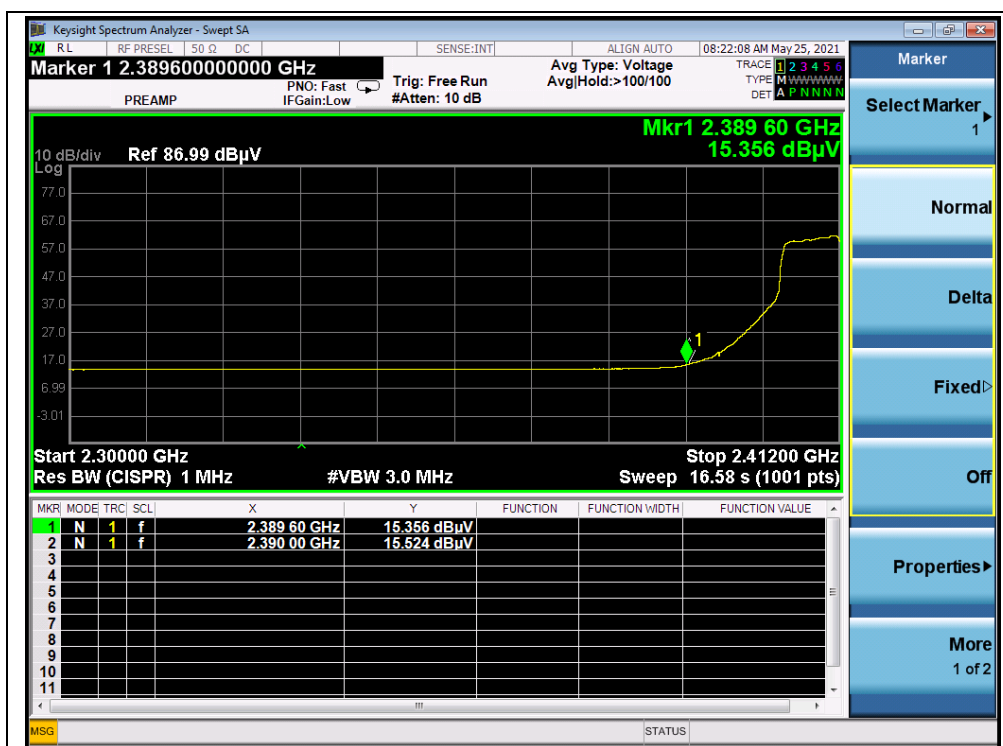
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
1	2390.00	PK	35.48	6.74	27.20	69.42	74	PASS
1	2390.00	AV	15.52	6.74	27.20	49.46	54	PASS
11	2483.50	PK	26.57	6.74	27.20	60.51	74	PASS
11	2483.50	AV	15.93	6.74	27.20	49.87	54	PASS

B. Test Plot:



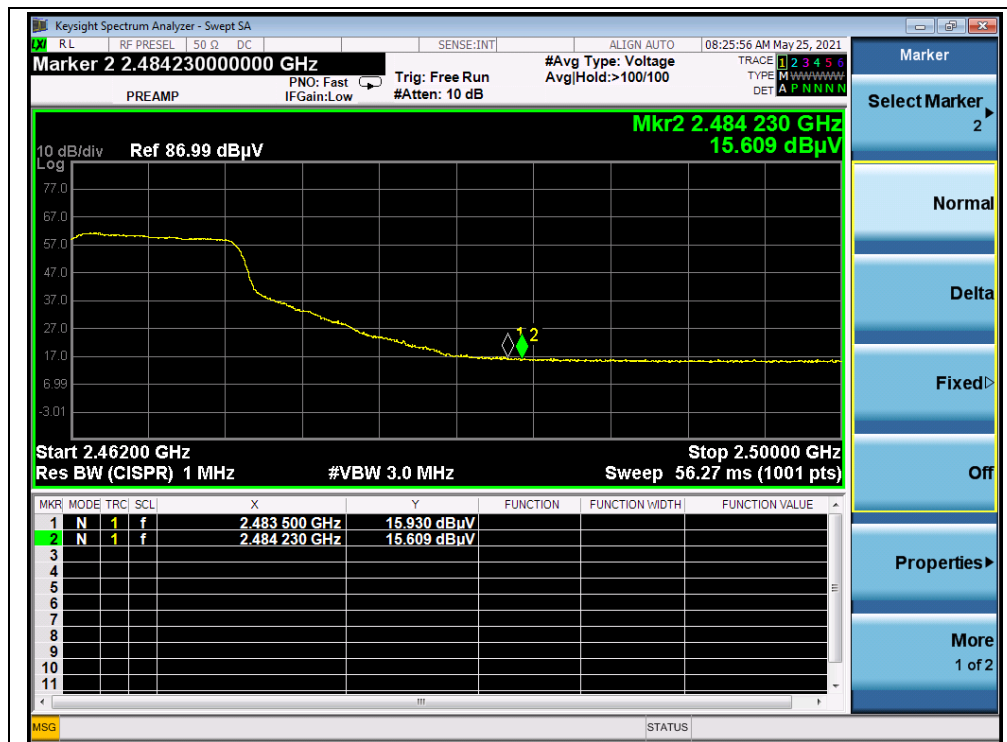
(PEAK, Channel 1, 802.11g)



(AVERAGE, Channel 1, 802.11g)



(PEAK, Channel 11, 802.11g)



(AVERAGE, Channel 11, 802.11g)

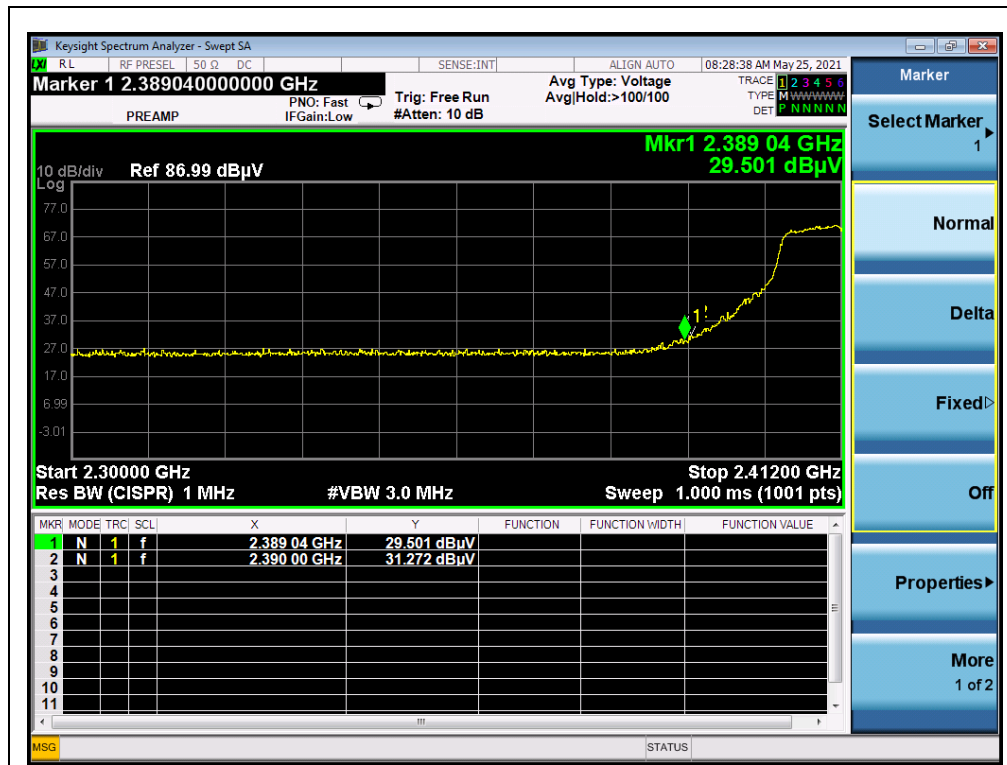


802.11n (HT20) Mode

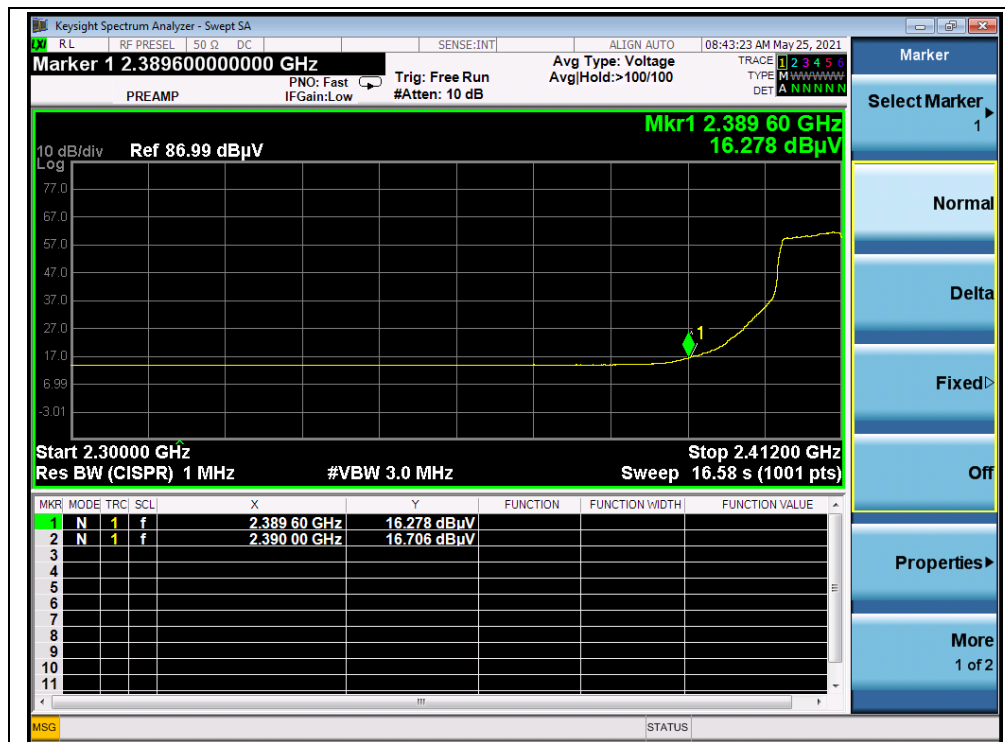
A. Test Verdict:

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	2390.00	PK	31.27	6.74	27.20	65.21	74	PASS
1	2390.00	AV	16.71	6.74	27.20	50.65	54	PASS
11	2483.50	PK	31.45	6.74	27.20	65.39	74	PASS
11	2483.50	AV	15.69	6.74	27.20	49.63	54	PASS

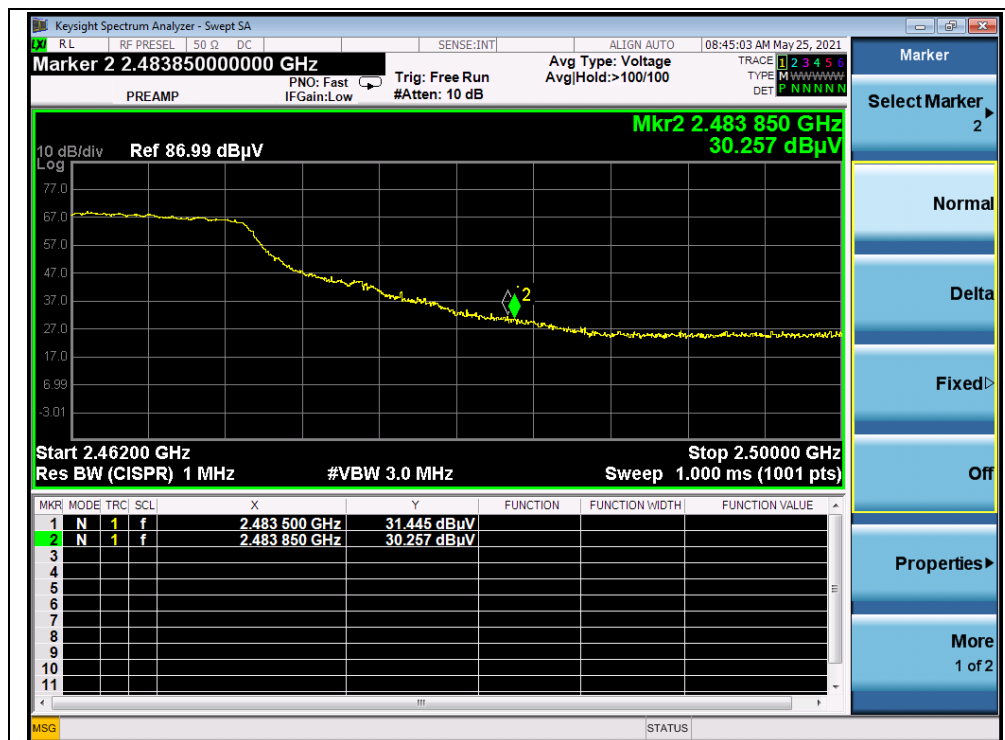
B. Test Plot:



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



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



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



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

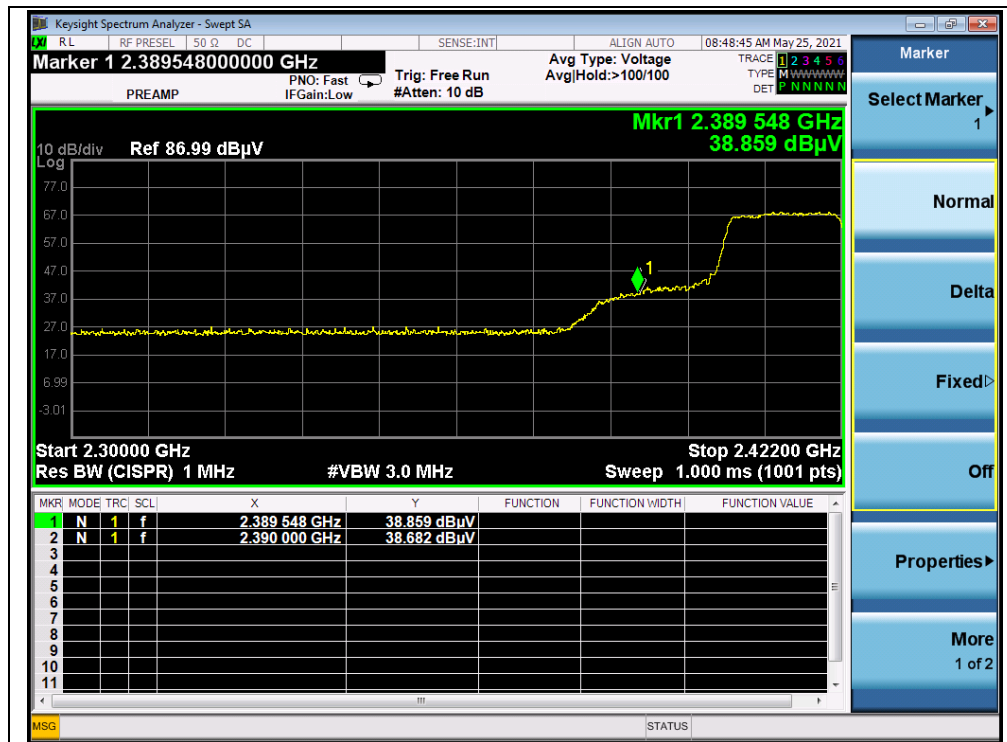


802.11n (HT40) Mode

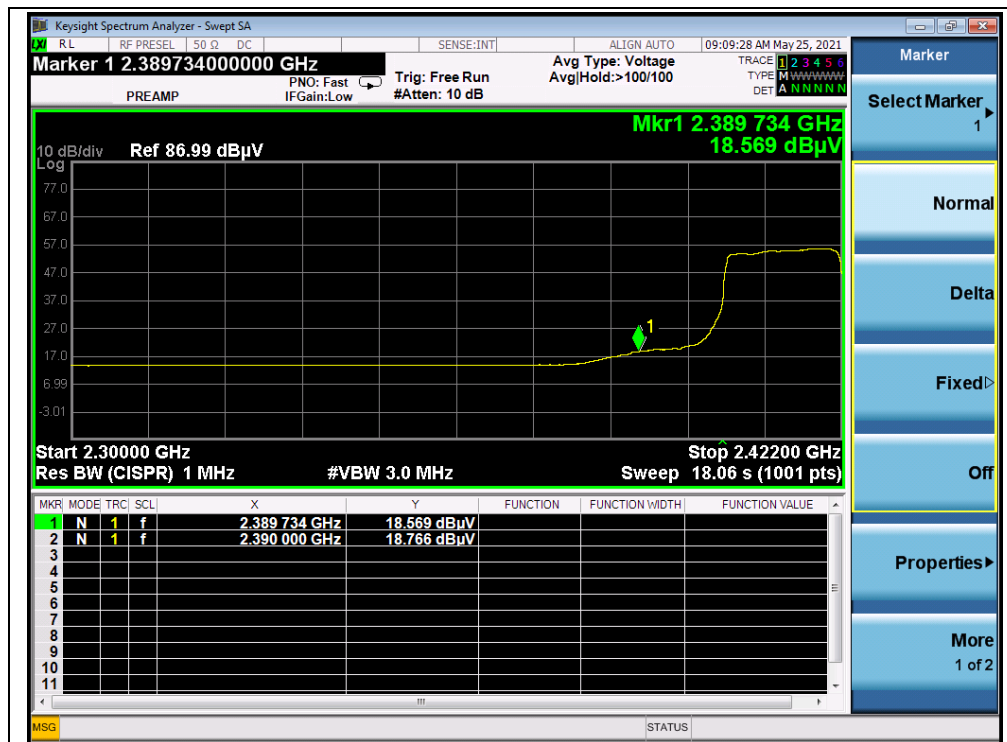
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
3	2389.55	PK	38.86	6.74	27.20	72.80	74	PASS
3	2390.00	AV	18.77	6.74	27.20	52.71	54	PASS
9	2485.36	PK	28.84	6.74	27.20	62.78	74	PASS
9	2483.50	AV	15.28	6.74	27.20	49.22	54	PASS

B. Test Plot:



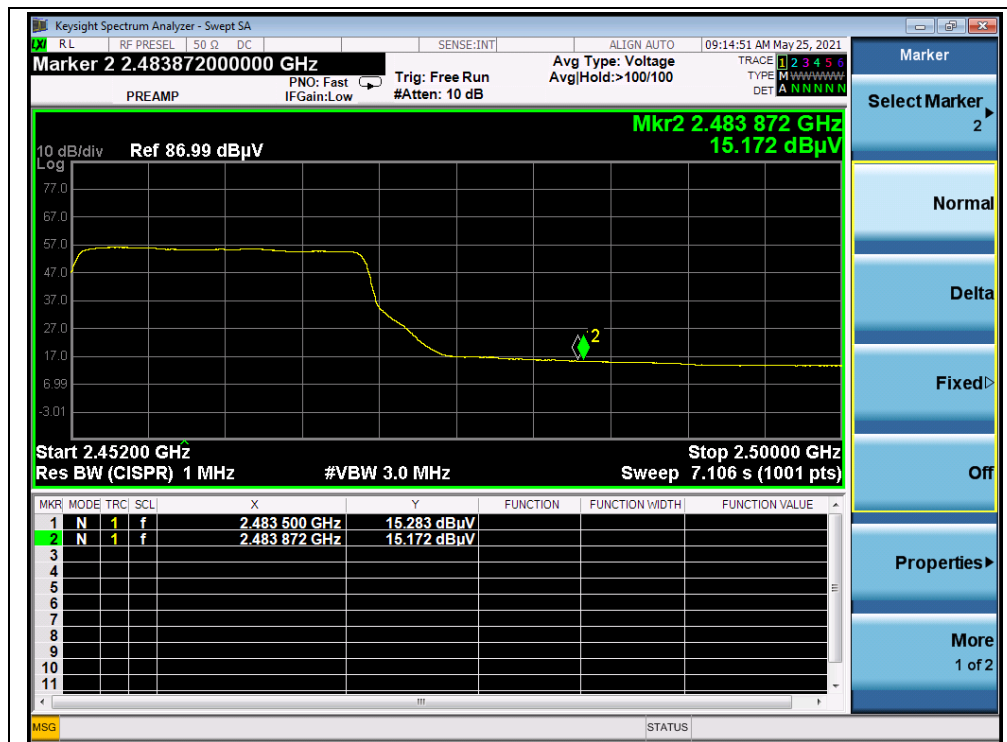
(PEAK, Channel 3, 802.11n (HT40))



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



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



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

2.9. Radiated Emission

2.9.1. Requirement

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

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

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

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

Note2: For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK). In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

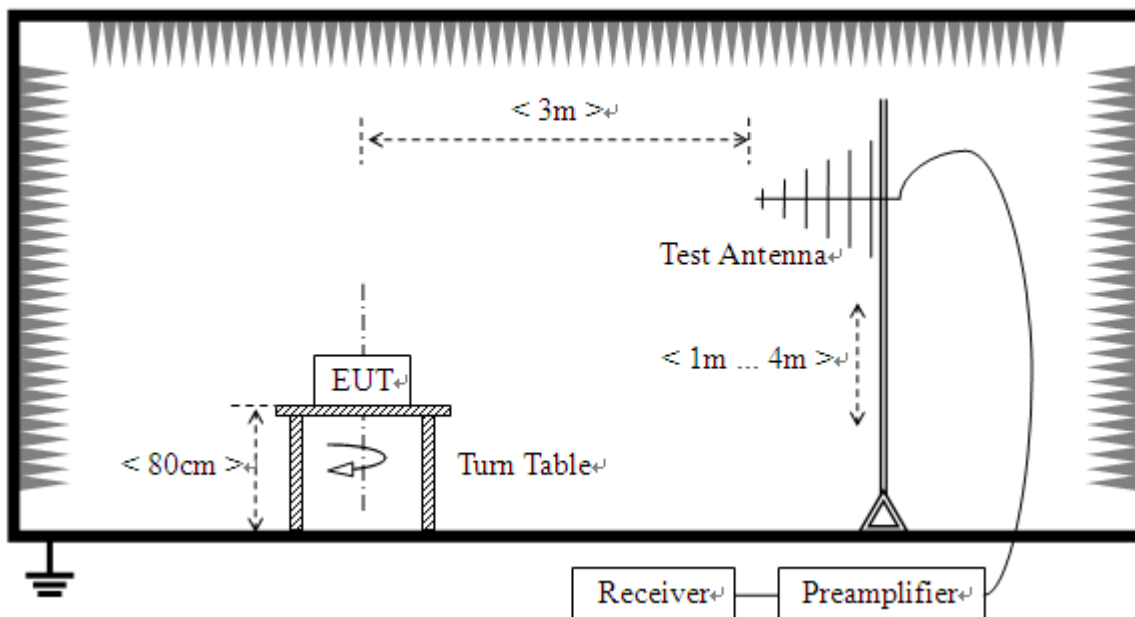
2.9.2. Test Description

Test Setup:

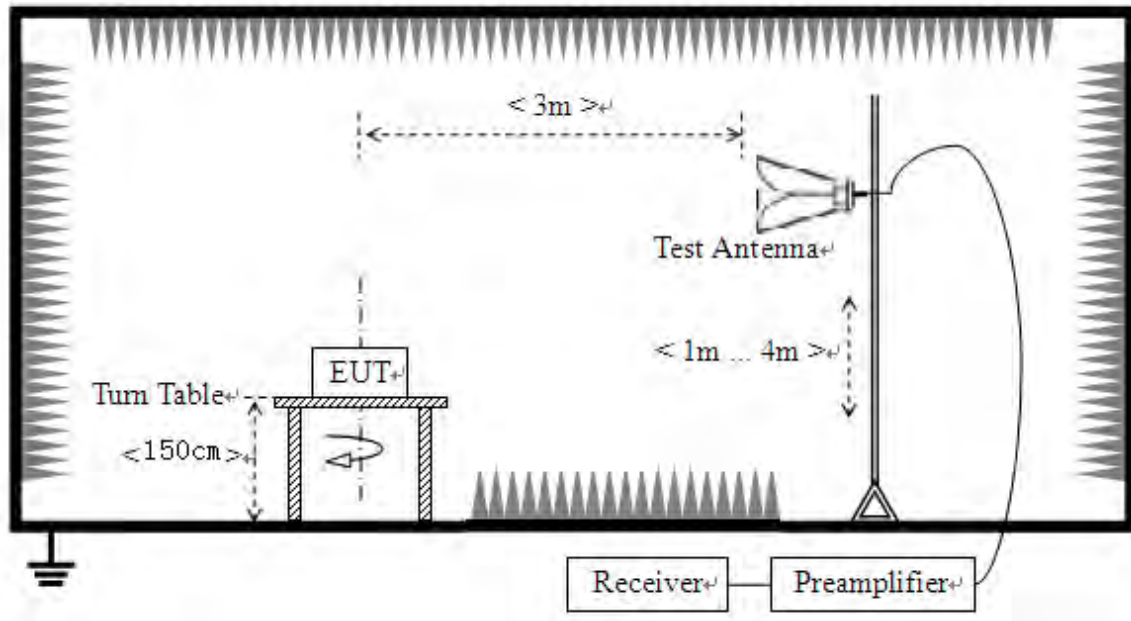
- 1) For radiated emissions from 9kHz to 30MHz



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



3) For radiated emissions above 1GHz



The 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:

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

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

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

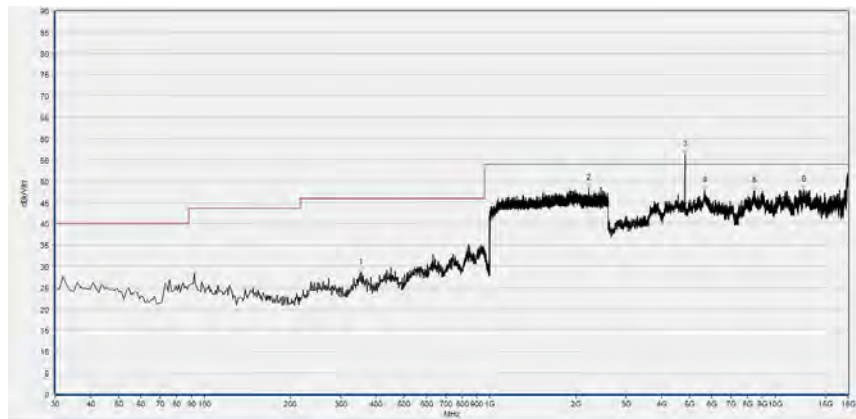
Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

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

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

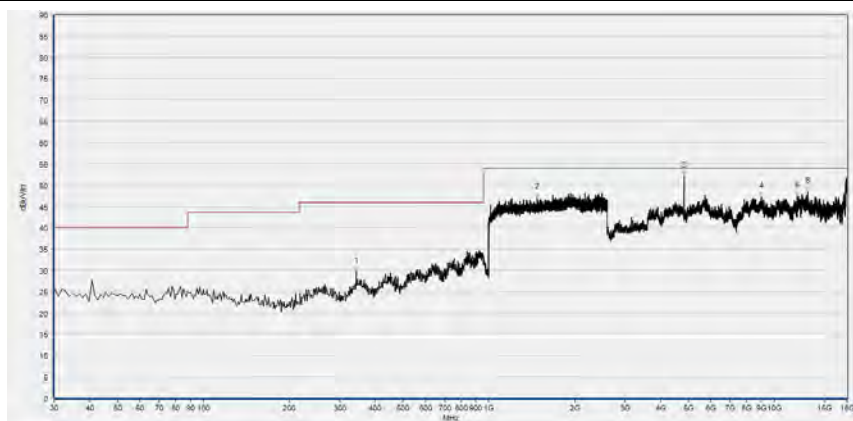
**802.11b Mode**

Plot for Channel 1



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
353.980	28.55	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2221.867	48.22	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4824.000	56.26	N/A	53.00	74.00	N/A	54.00	Horizontal	PASS
5658.440	47.73	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8467.400	47.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12606.920	47.95	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

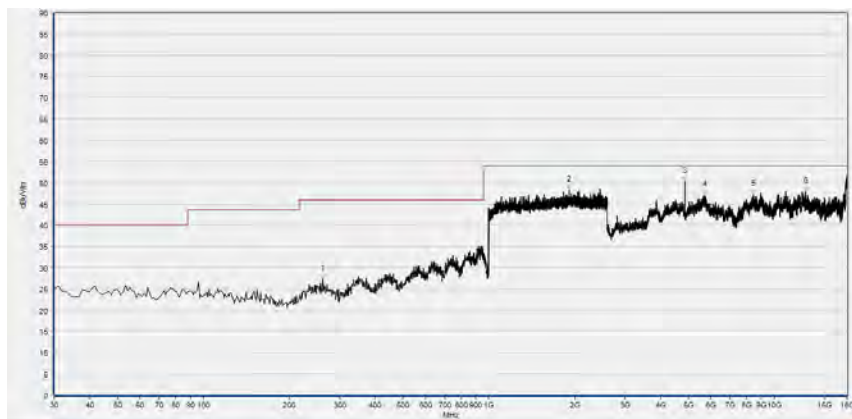
(Antenna Horizontal, 30MHz to 18GHz)



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
343.310	29.72	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1474.667	47.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4824.000	53.24	N/A	49.86	74.00	N/A	54.00	Vertical	PASS
9040.280	47.34	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12043.280	47.51	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
13093.560	48.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

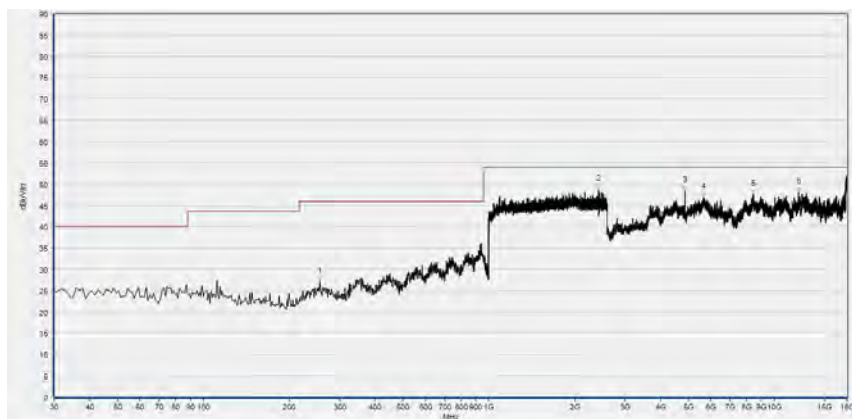
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 6



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
261.830	27.26	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1909.867	48.29	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4873.040	50.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5701.560	47.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8436.600	47.28	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12890.280	47.96	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

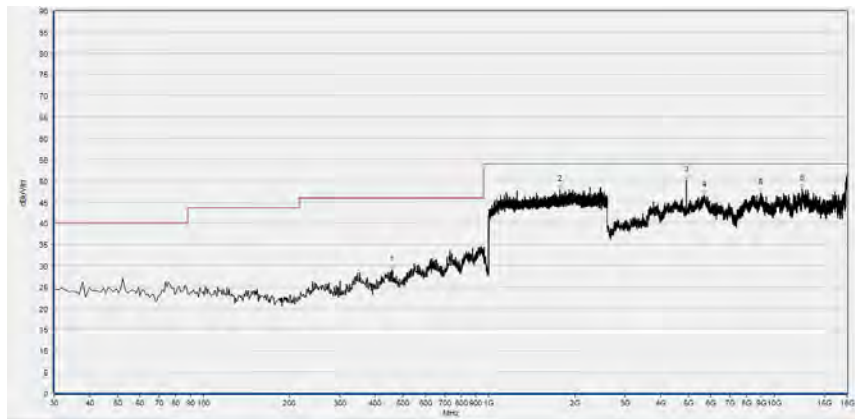
(Antenna Horizontal, 30MHz to 18GHz)



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
256.010	27.13	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2418.667	48.73	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4873.040	48.44	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5639.960	46.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8448.920	47.59	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12188.040	48.16	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

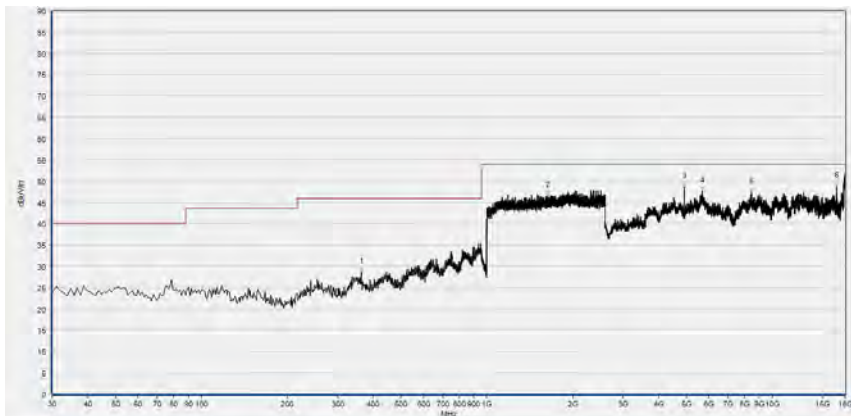
(Antenna Vertical, 30MHz to 18GHz)

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
456.800	29.04	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1770.667	47.85	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4922.320	50.19	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5686.160	46.61	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8963.280	47.05	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12511.440	48.15	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

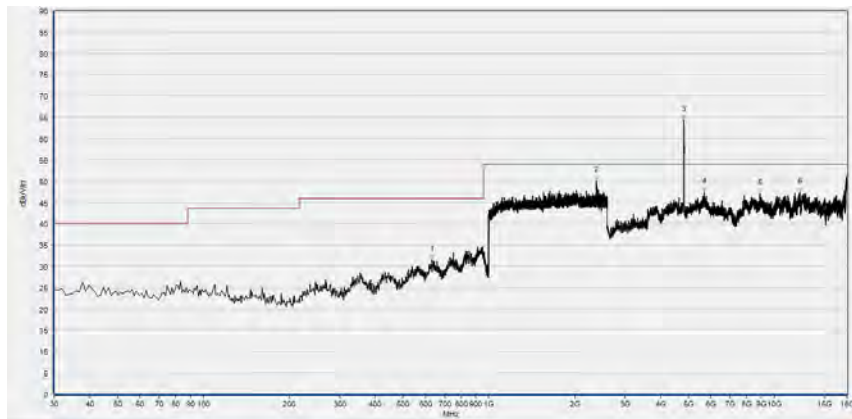


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
363.680	28.71	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1637.867	46.59	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4925.400	48.67	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5683.080	47.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8436.600	47.45	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
16820.360	48.75	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

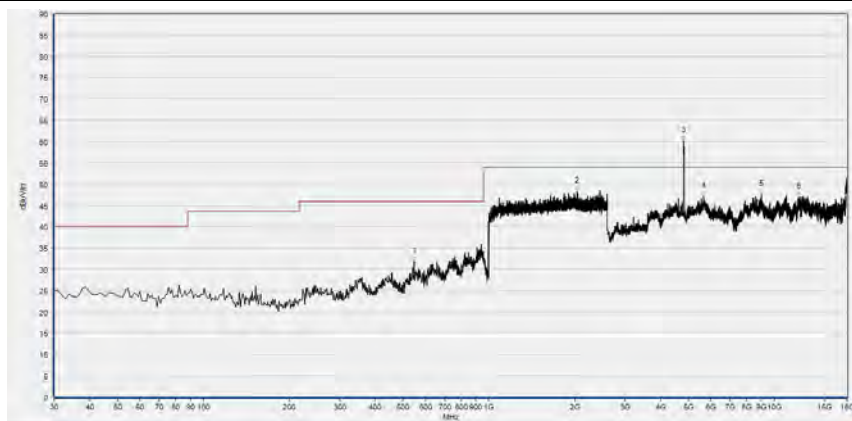
**802.11g Mode**

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
631.400	31.43	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2386.133	50.14	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4820.300	64.45	N/A	51.67	74.00	N/A	54.00	Horizontal	PASS
5689.240	47.47	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8901.680	47.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12295.840	47.50	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

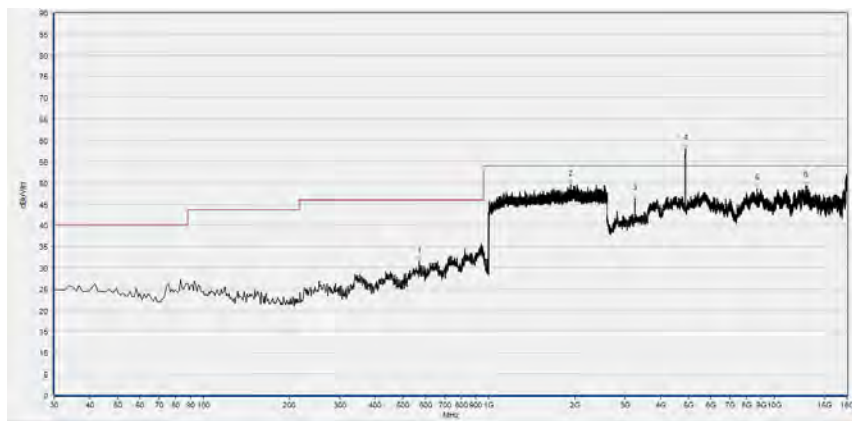
(Antenna Horizontal, 30MHz to 18GHz)



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
547.010	31.84	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2036.800	48.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4822.500	60.12	N/A	49.81	74.00	N/A	54.00	Vertical	PASS
5664.600	47.03	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9015.640	47.66	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12144.920	46.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

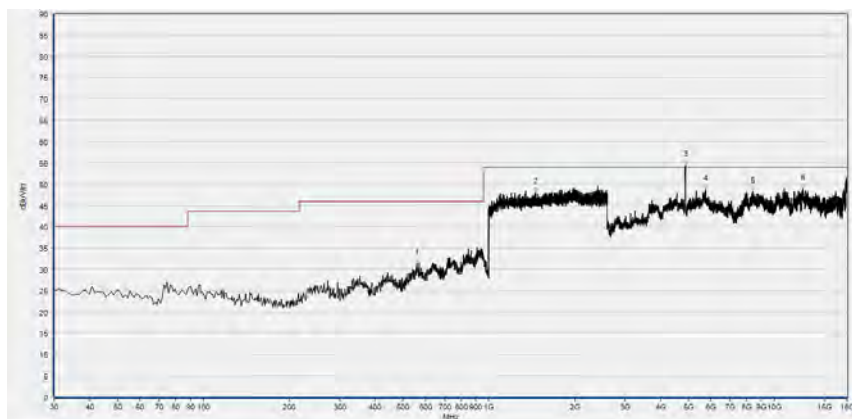
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 6



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
570.290	31.48	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1937.600	49.65	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3249.880	46.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4880.700	60.76	N/A	47.30	74.00	N/A	54.00	Horizontal	PASS
8732.280	48.60	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12887.200	49.25	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

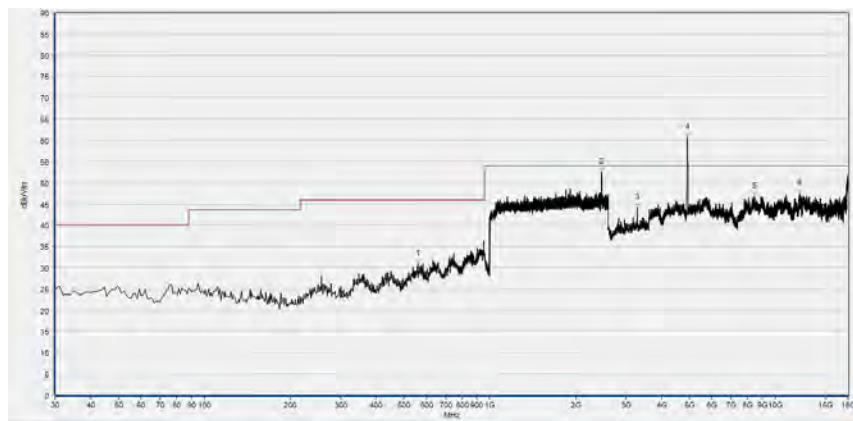


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
559.620	31.41	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1458.667	48.17	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4883.600	56.18	N/A	41.58	74.00	N/A	54.00	Vertical	PASS
5763.160	48.75	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8405.800	48.27	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12560.720	48.88	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

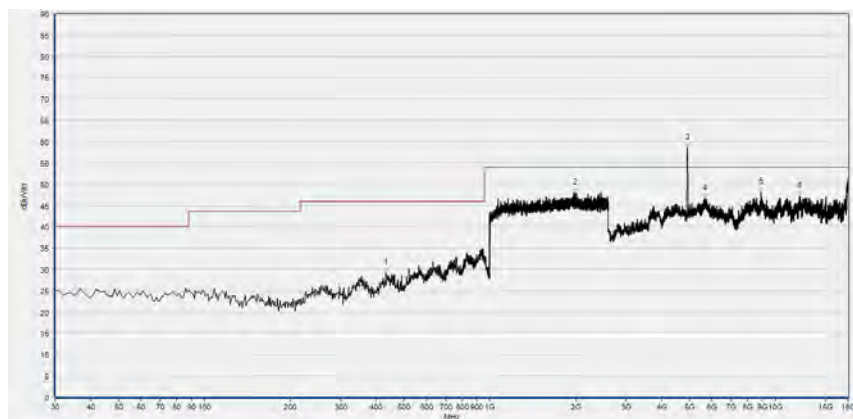


Plot for Channel 11



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
559.620	30.75	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2462.933	52.47	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3283.760	44.09	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4926.100	61.15	N/A	50.24	74.00	N/A	54.00	Horizontal	PASS
8455.080	46.78	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12129.520	47.40	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

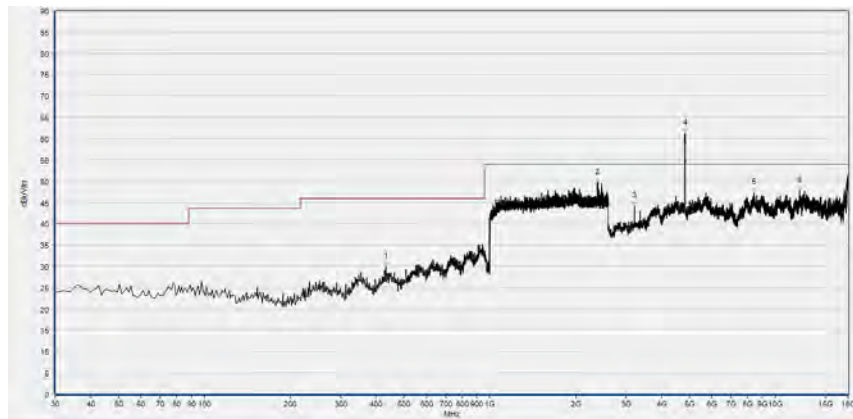


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
432.550	29.21	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1993.600	47.85	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4918.700	59.47	N/A	46.01	74.00	N/A	54.00	Vertical	PASS
5655.360	46.58	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8917.080	48.09	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12138.760	47.11	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

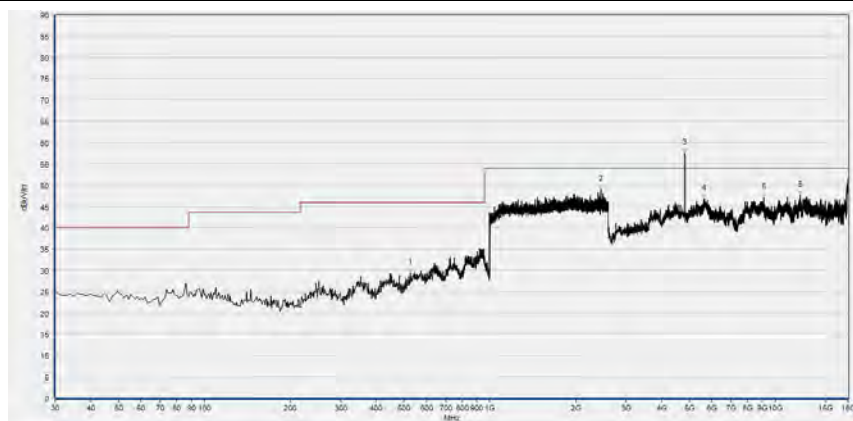
**802.11n (HT20) Mode**

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
431.580	29.77	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2386.133	49.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3216.000	44.01	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4820.000	62.12	N/A	49.49	74.00	N/A	54.00	Horizontal	PASS
8411.960	47.31	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12175.720	47.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

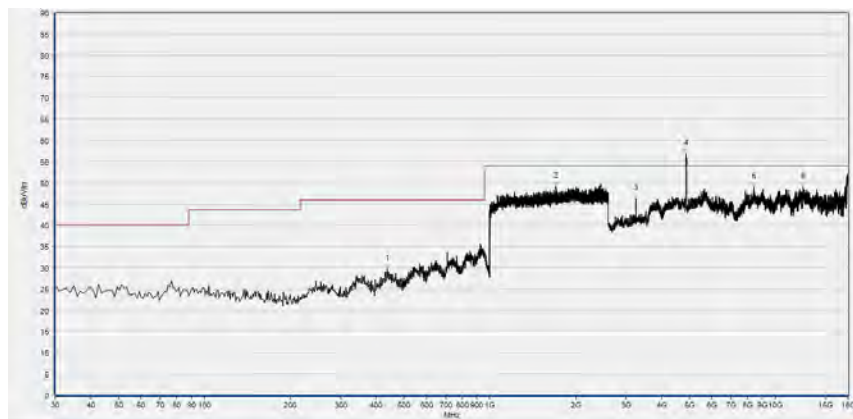
(Antenna Horizontal, 30MHz to 18GHz)



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
526.640	29.51	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2450.667	48.86	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4821.500	58.69	N/A	46.29	74.00	N/A	54.00	Vertical	PASS
5609.160	46.75	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9141.920	47.16	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12209.600	47.63	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

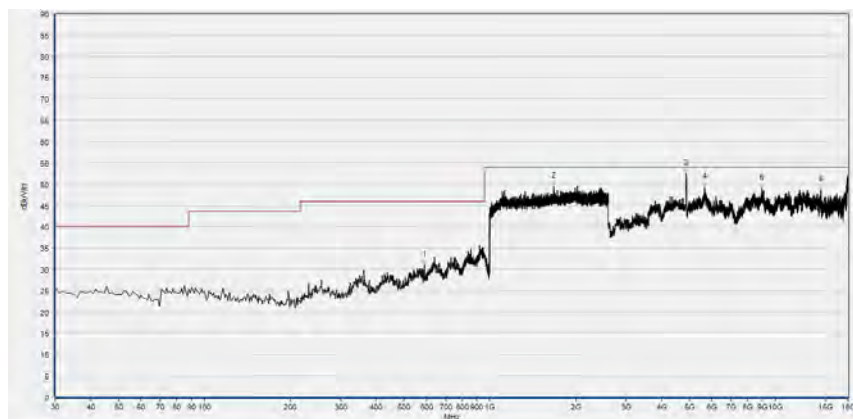
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 6



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
438.370	29.67	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1699.733	49.07	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3249.880	46.26	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4879.300	58.51	N/A	45.21	74.00	N/A	54.00	Horizontal	PASS
8421.200	48.88	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12514.520	48.96	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

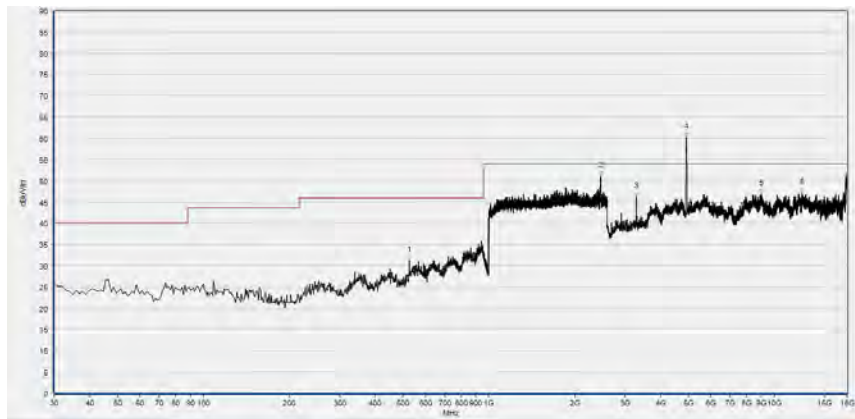


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
590.660	31.00	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1677.867	49.50	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4880.900	55.40	N/A	42.32	74.00	N/A	54.00	Vertical	PASS
5667.680	49.33	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8966.360	48.95	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
14424.120	48.68	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

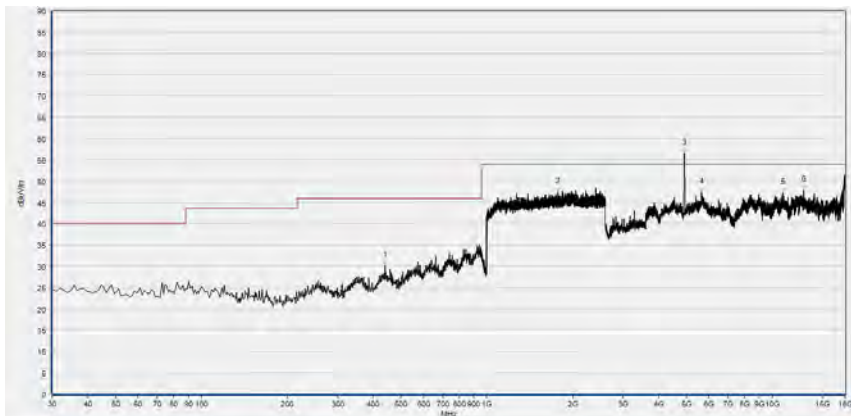


Plot for Channel 11



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
526.640	31.24	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2464.533	51.05	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3283.760	46.18	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4920.800	59.89	N/A	43.62	74.00	N/A	54.00	Horizontal	PASS
9024.880	46.92	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12529.920	47.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

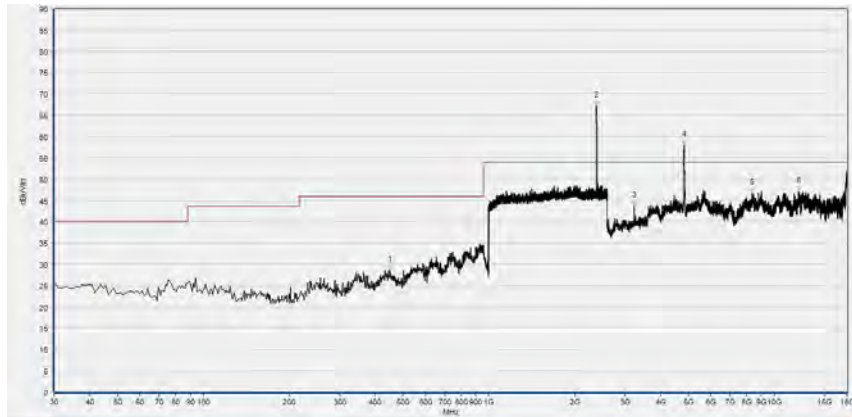


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
440.310	30.09	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1776.533	47.45	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4925.100	56.02	N/A	43.84	74.00	N/A	54.00	Vertical	PASS
5649.200	47.45	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10879.040	47.29	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12896.440	48.01	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

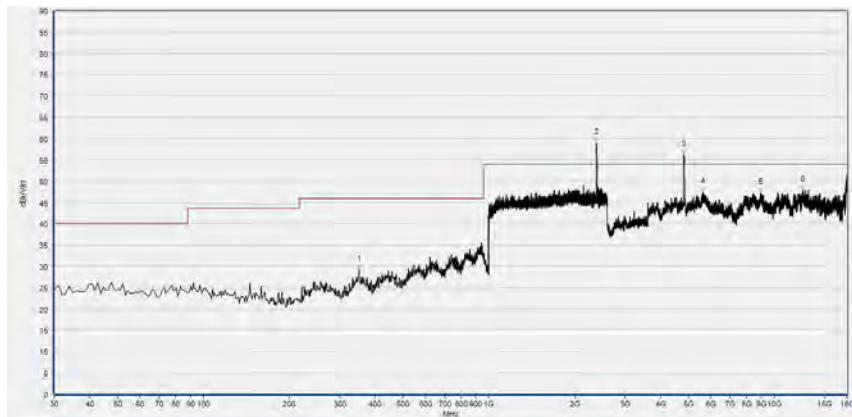
802.11n (HT40) Mode

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
450.980	28.72	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2384.700	67.95	N/A	53.05	74.00	N/A	54.00	Horizontal	PASS
3228.320	43.81	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4830.400	58.13	N/A	45.98	74.00	N/A	54.00	Horizontal	PASS
8347.280	46.78	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12197.280	47.07	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

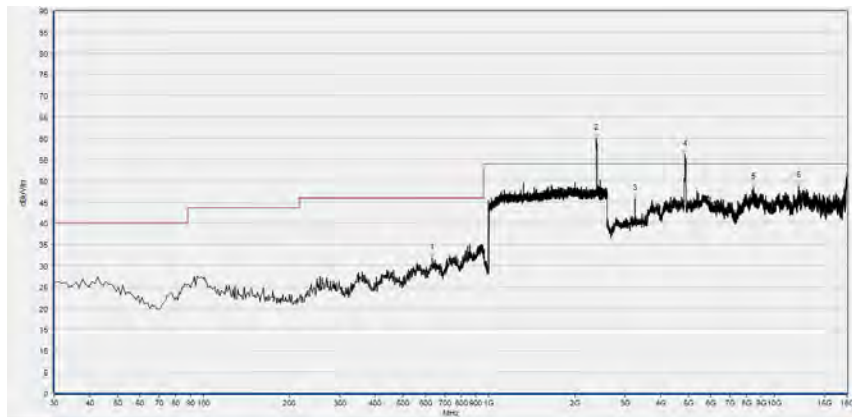
(Antenna Horizontal, 30MHz to 18GHz)



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
351.070	29.18	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2385.300	59.65	N/A	46.68	74.00	N/A	54.00	Vertical	PASS
4829.200	59.32	N/A	46.09	74.00	N/A	54.00	Vertical	PASS
5615.320	47.36	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8972.520	47.26	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12619.240	47.98	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

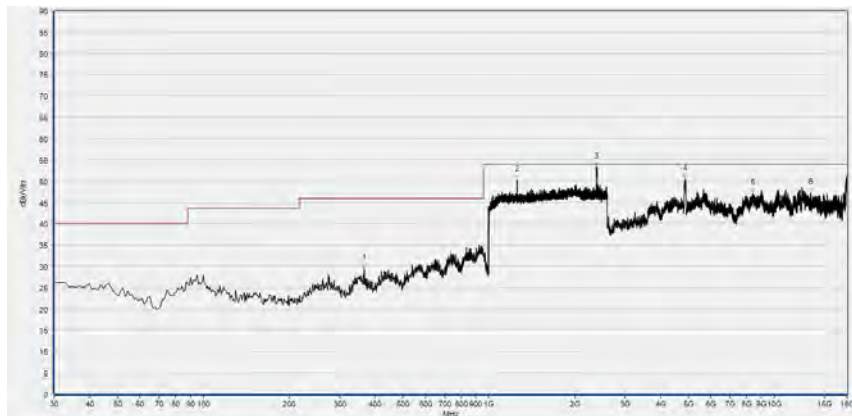
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 6



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
634.310	31.82	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2385.200	61.78	N/A	47.91	74.00	N/A	54.00	Horizontal	PASS
3249.880	45.82	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4881.600	53.35	N/A	40.44	74.00	N/A	54.00	Horizontal	PASS
8455.080	48.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12151.080	48.70	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

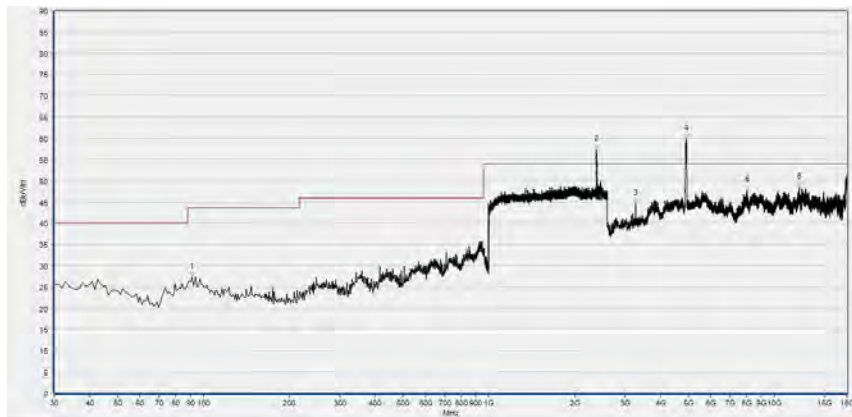
(Antenna Horizontal, 30MHz to 18GHz)



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
366.590	29.56	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1253.867	50.24	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2386.500	54.11	N/A	40.45	74.00	N/A	54.00	Vertical	PASS
4863.800	50.47	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8408.880	47.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
13413.880	47.28	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

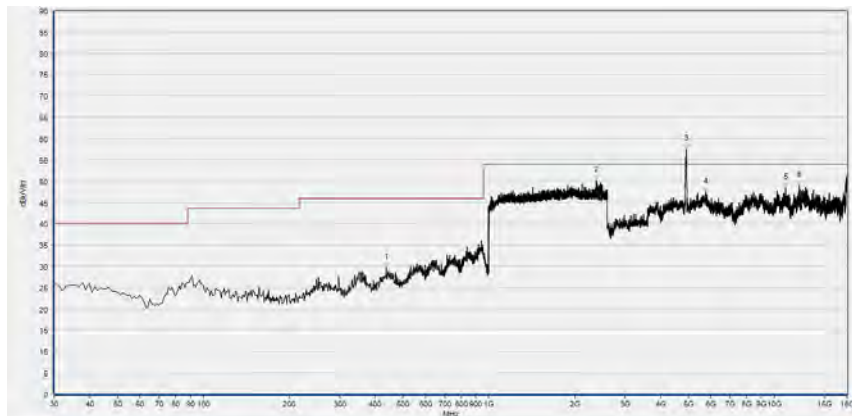
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 9



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
91.110	27.30	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
2384.700	57.24	N/A	43.36	74.00	N/A	54.00	Horizontal	PASS
3268.360	44.62	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4917.700	61.59	N/A	47.87	74.00	N/A	54.00	Horizontal	PASS
8039.280	47.72	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12203.440	48.50	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
436.430	29.73	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2385.600	50.10	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4919.000	56.95	N/A	43.00	74.00	N/A	54.00	Vertical	PASS
5753.920	47.43	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10977.600	48.46	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12203.440	48.91	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)



Annex A Test Uncertainty

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

Test Items	Uncertainty
Peak Output Power	$\pm 2.22\text{dB}$
Power Spectral Density	$\pm 2.22\text{dB}$
Bandwidth	$\pm 5\%$
Conducted Spurious Emission	$\pm 2.77\text{dB}$
Restricted Frequency Bands	$\pm 5\%$
Radiated Emission	$\pm 2.95\text{dB}$
Conducted Emission	$\pm 2.44\text{dB}$

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$



Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Morlab Laboratory of 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:	Morlab Laboratory of 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	2021.03.25	2022.03.24
USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2021.03.25	2022.03.24
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	2021.03.09	2022.03.08
LISN	812744	NSLK 8127	Schwarzbeck	2021.03.09	2022.03.08
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2020.07.24	2021.07.23
Coaxial Cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	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	S020180L32 03	Tonscend	2020.07.21	2021.07.20
18-26.5GHz pre-Amplifier	46732	S10M100L38 02	Tonscend	2020.07.21	2021.07.20
26-40GHz pre-Amplifier	56774	S40M400L40 02	Tonscend	2020.07.21	2021.07.20
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2020.07.21	2021.07.20
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

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