TEST REPORT

APPLICANT	:	ZHEJIANG YONGYUAN TECHNOLOGY CO., LTD
PRODUCT NAME	:	Automatic Key Cutting Machine
MODEL NAME	:	XP-005L
BRAND NAME	:	Xhorse
FCC ID	:	2ATSV-XP05L1
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2021-06-15
TEST DATE	:	2021-06-16 to 2021-07-30
ISSUE DATE	:	2021-08-10

Edited by: Peng Mi (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

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Change History		
Version	Date	Reason for change
1.0	2021-08-10	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	ZHEJIANG YONGYUAN TECHNOLOGY CO., LTD
Applicant Address:	No.17 SHAODONG ROAD, YUYAO CITY, ZHEJIANG PROVINCE, China
Manufacturer:	ZHEJIANG YONGYUAN TECHNOLOGY CO., LTD
Manufacturer Address:	No.17 SHAODONG ROAD, YUYAO CITY, ZHEJIANG PROVINCE, China

1.2. Equipment Under Test (EUT) Description

Product Name:	Automatic Key Cutting Machine	
Sample No.:	2#	
Hardware Version:	VER.3	
Software Version:	V2.2.3	
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:	FPC Antenna	
Antenna Gain:	2dBi	
Accessory Information:	Battery	
	Brand Name:	Xhorse
	Model No.:	XP005B01
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	2550mAh
	Rated Voltage:	25.2V
	Charge Limit:	29.4V
	Manufacturer:	ZHEJIANG YONGYUAN TECHNOLOGY CO., LTD.

Accessory Information:	AC Adapter	
	Brand Name:	meanwell
	Model No.:	GST160A24
	Serial No.:	(N/A, marked #1 by test site)
	Rated Output:	24V⎓6.67A
	Rated Input:	100-240V~50/60Hz, 2A
	Manufacturer:	MEAN WELL Enterprises Co., Ltd.

Note 1: We use the dedicated software to control the EUT continuous transmission.

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Modulation Type and Data Rate of EUT

Modulation Technology	Modulation Type	Data Rate (Mbps) Note1
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	No deviation
2	N/A	Duty Cycle of Test Signal	Jul 21, 2021	Meng Shurui	PASS	No deviation
3	15.247(b)	Maximum Peak and Average Conducted Output Power	Jul 21, 2021	Meng Shurui	PASS	No deviation
4	15.247(a)	Bandwidth	Jul 21, 2021	Meng Shurui	PASS	No deviation
5	15.247(d)	Conducted Spurious Emission and Band Edge	Jul 21, 2021	Meng Shurui	PASS	No deviation
6	15.247(e)	Power Spectral Density	Jul 21, 2021	Meng Shurui	PASS	No deviation
7	15.207	Conducted Emission	Jun 16, 2021	Wu Runfeng	PASS	No deviation
8	15.247(d)	Restricted Frequency Bands	Jul 29&30, 2021	Gao Jianrou	PASS	No deviation
9	15.209, 15.247(d)	Radiated Emission	Jul 29&30, 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% 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

Inside of the EUT has a FPC antenna coupled with the I-PEX connector. Please refer to the EUT internal photos.

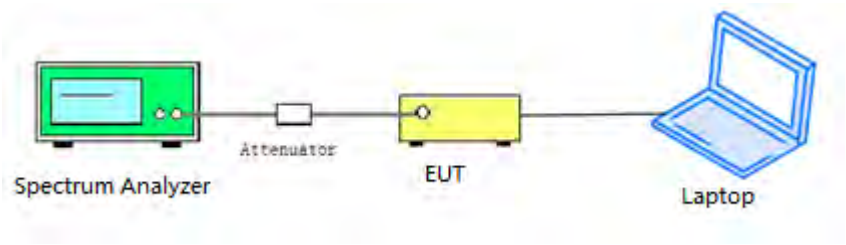
2.2. Duty Cycle of Test Signal

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:



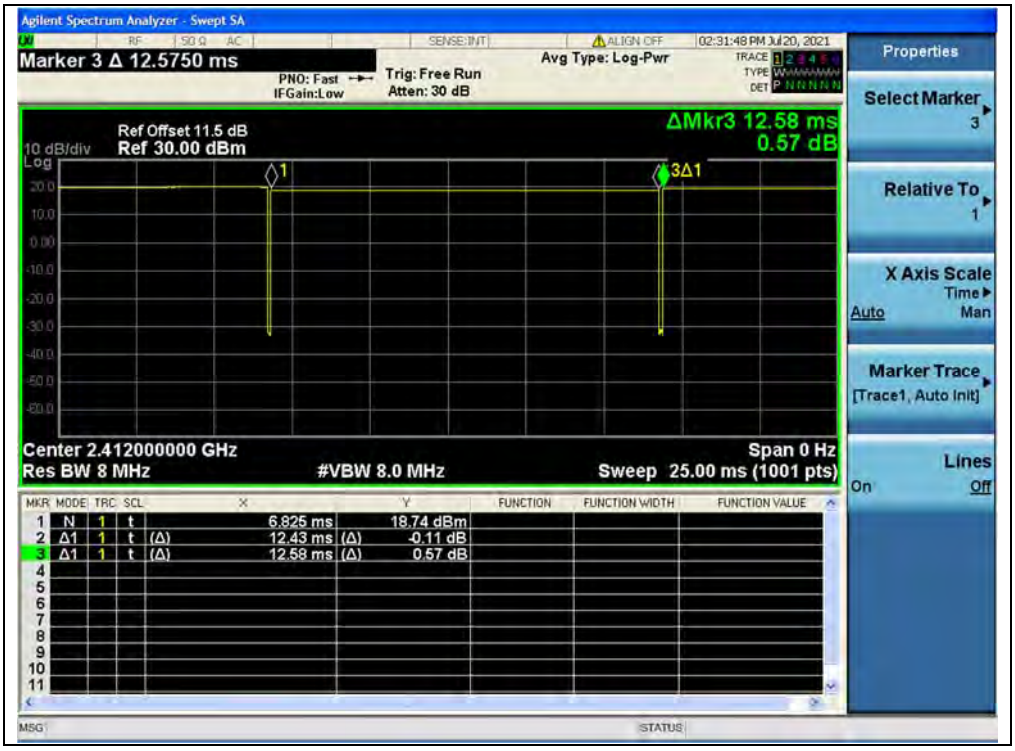
ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.

2.2.3. Test Result

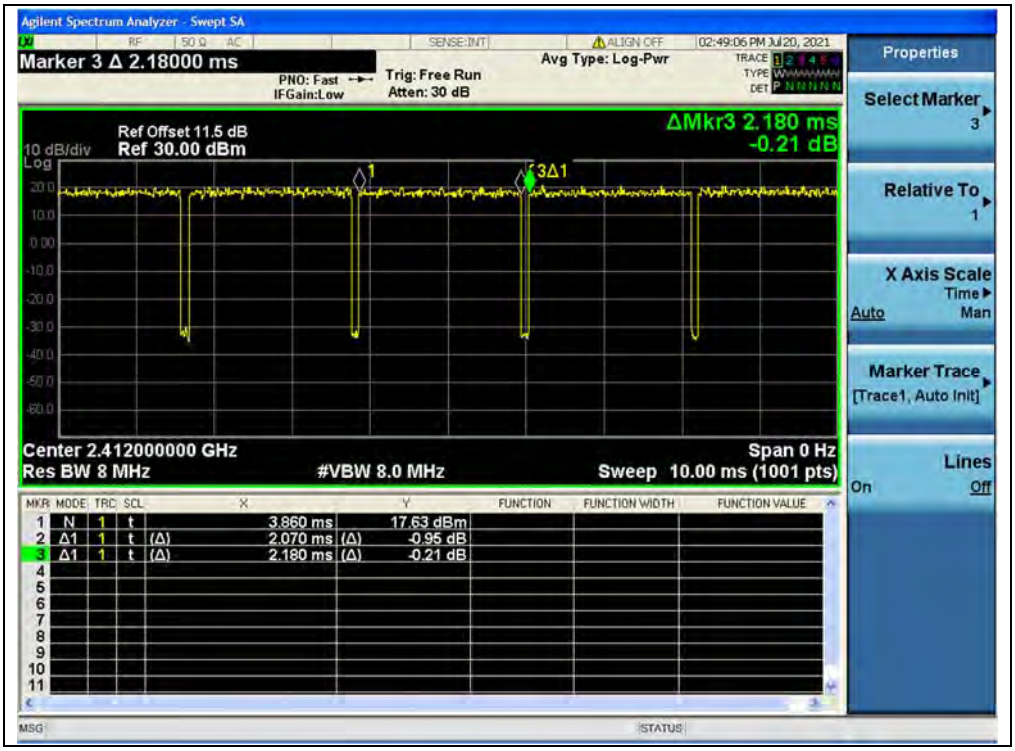
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*lg[1/D])
802.11b	98.81	0.05
802.11g	94.95	0.23
802.11n (HT20)	95.07	0.22
802.11n (HT40)	87.96	0.56

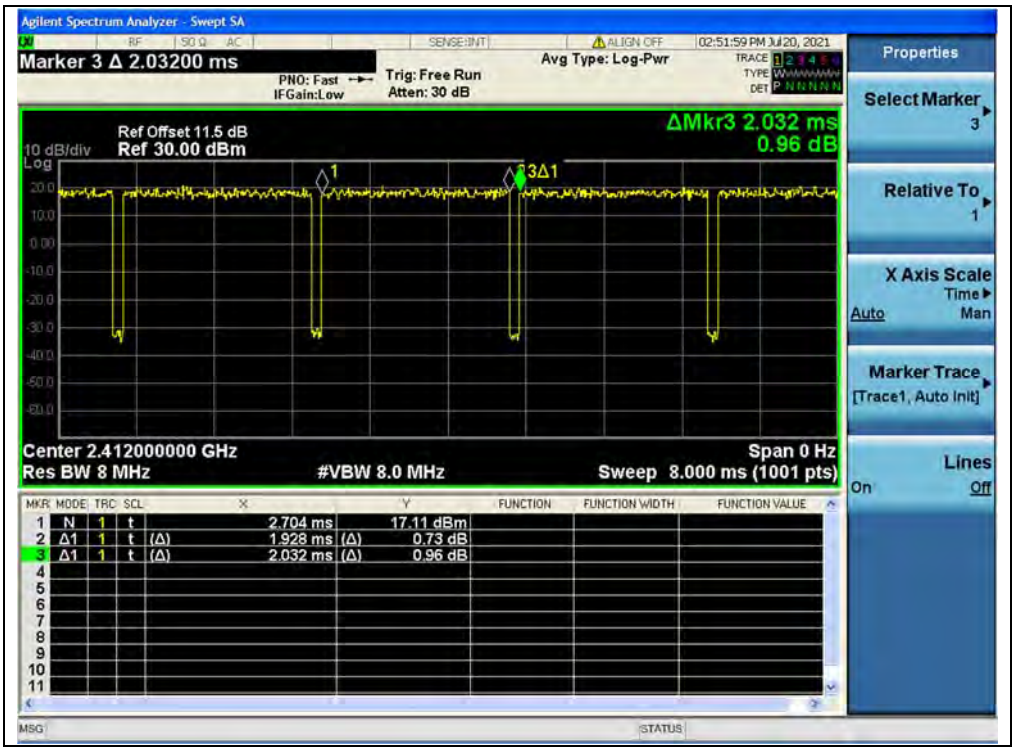
B. Test Plot:



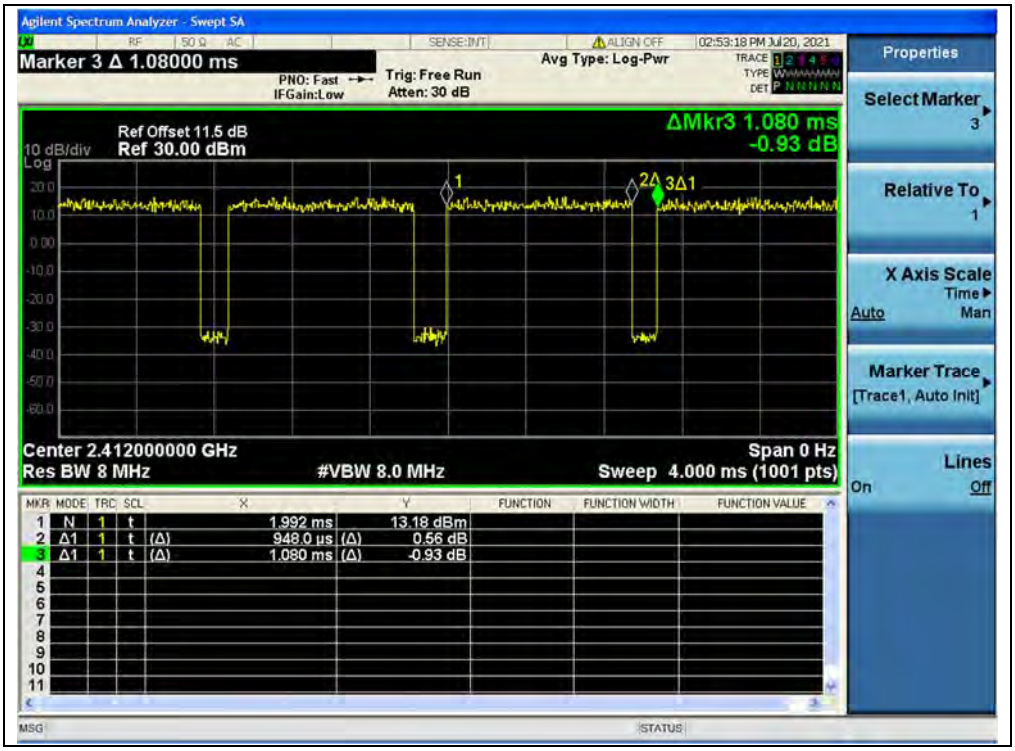
(Channel 1, 802.11b)



(Channel 1, 802.11g)



(Channel 1, 802.11n (HT20))



(Channel 3, 802.11n (HT40))

2.3. Maximum Peak and Average Conducted Output Power

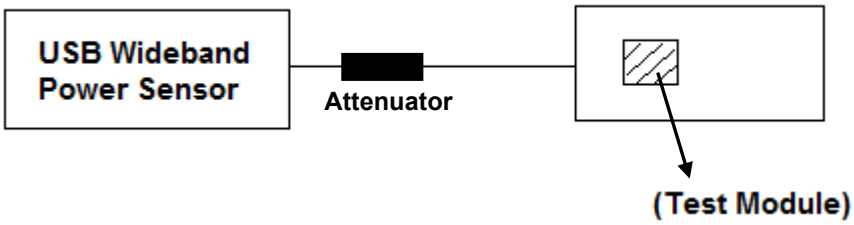
2.3.1. Requirement

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 Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	20.26	0.106	30	1	PASS
7	2442	19.48	0.089			PASS
13	2472	20.20	0.105			PASS

802.11g Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	21.72	0.149	30	1	PASS
7	2442	21.17	0.131			PASS
13	2472	**21.76**	**0.150**			PASS

802.11n (HT20) Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	20.98	0.125	30	1	PASS
7	2442	20.16	0.104			PASS
13	2472	20.95	0.124			PASS

802.11n (HT40) Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	20.34	0.108	30	1	PASS
7	2442	19.92	0.098			PASS
11	2462	20.91	0.123			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	18.28	0.05	18.33	0.068	30	1	PASS
7	2442	17.73		17.78	0.060			PASS
13	2472	18.37		**18.42**	**0.070**			PASS

802.11g Mode

Channel	Frequency (MHz)	Average Power				Limit		Verdict
		Measured	Duty Factor	Duty Factor Calculated				
		dBm		dBm	W	dBm	W	
1	2412	16.52	0.23	16.75	0.047	30	1	PASS
7	2442	15.93		16.16	0.041			PASS
13	2472	16.67		16.90	0.049			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	15.18	0.22	15.40	0.035	30	1	PASS
7	2442	14.61		14.83	0.030			PASS
13	2472	15.44		15.66	0.037			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	14.67	0.56	15.23	0.033	30	1	PASS
7	2442	14.37		14.93	0.031			PASS
11	2462	15.12		15.68	0.037			PASS

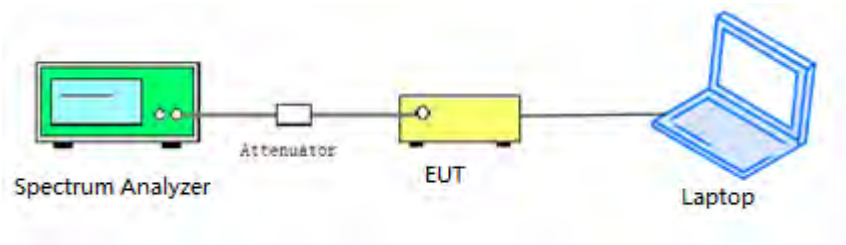
2.4. Bandwidth

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 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	8.064	≥500	PASS
7	2442	8.064	≥500	PASS
13	2472	8.063	≥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	15.13	≥500	PASS
7	2442	15.12	≥500	PASS
13	2472	15.30	≥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	15.14	≥500	PASS
7	2442	14.15	≥500	PASS
13	2472	15.12	≥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	35.10	≥500	PASS
7	2442	35.10	≥500	PASS
11	2462	35.11	≥500	PASS

B. Test Plot:

(Channel 3, 802.11n (HT40))

(Channel 7, 802.11n (HT40))

(Channel 11, 802.11n (HT40))

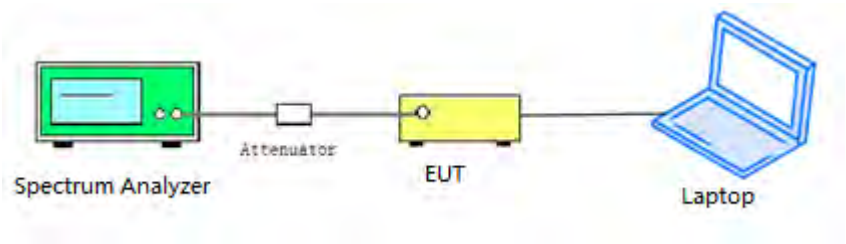
2.5. Conducted Spurious Emissions and Band Edge

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

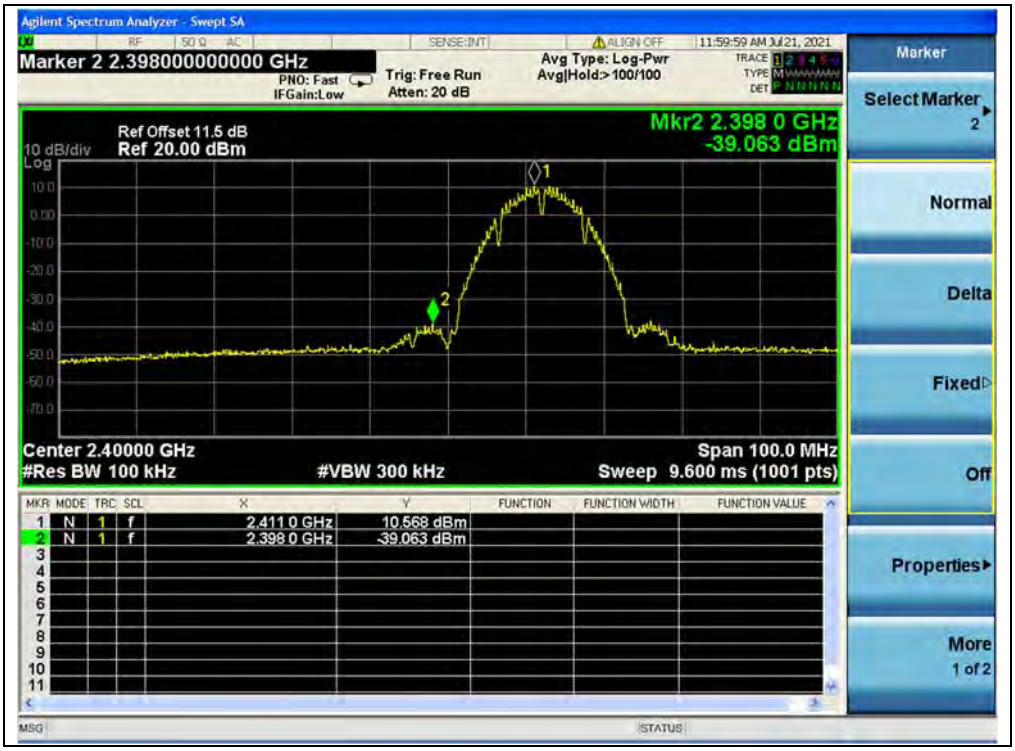
802.11b Mode

A. Test Verdict:

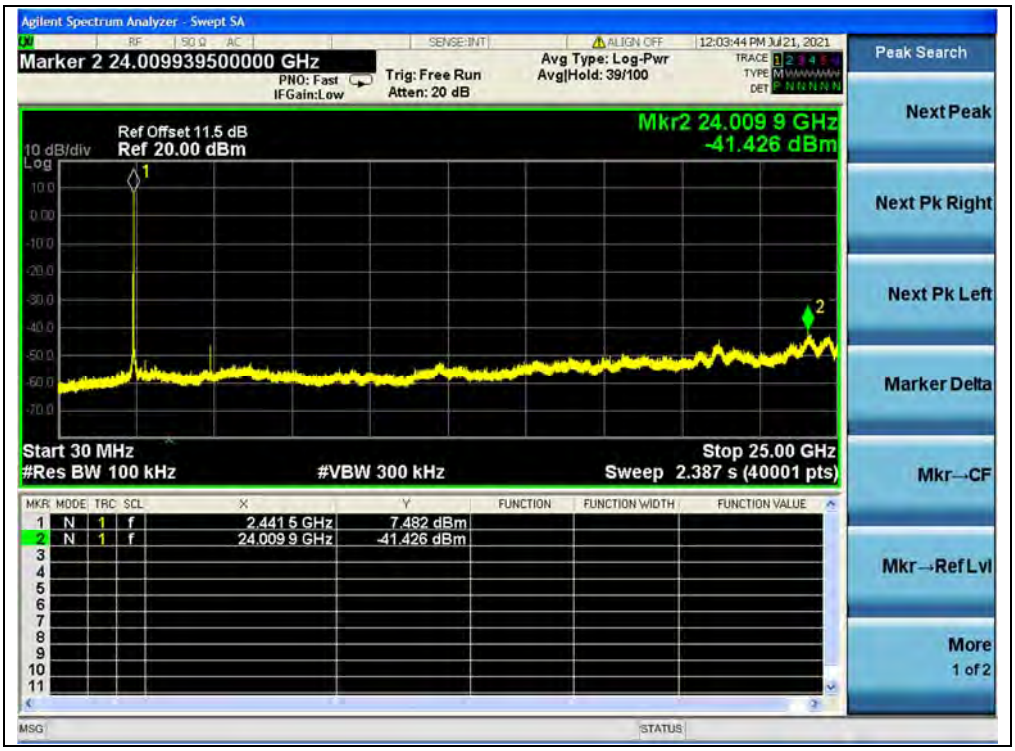
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.65	10.53	-9.47	PASS
7	2442	-41.43	7.48	-12.52	PASS
13	2472	-42.88	8.97	-11.03	PASS

B. Test Plot:

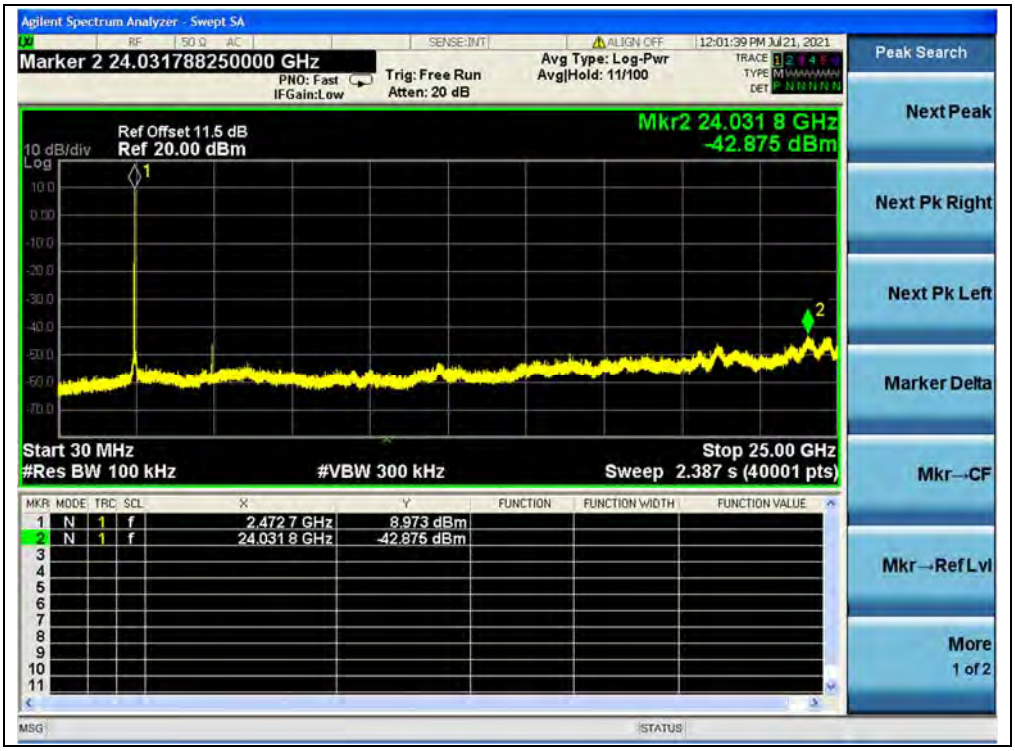
(30MHz to 25GHz, Channel 1, 802.11b)



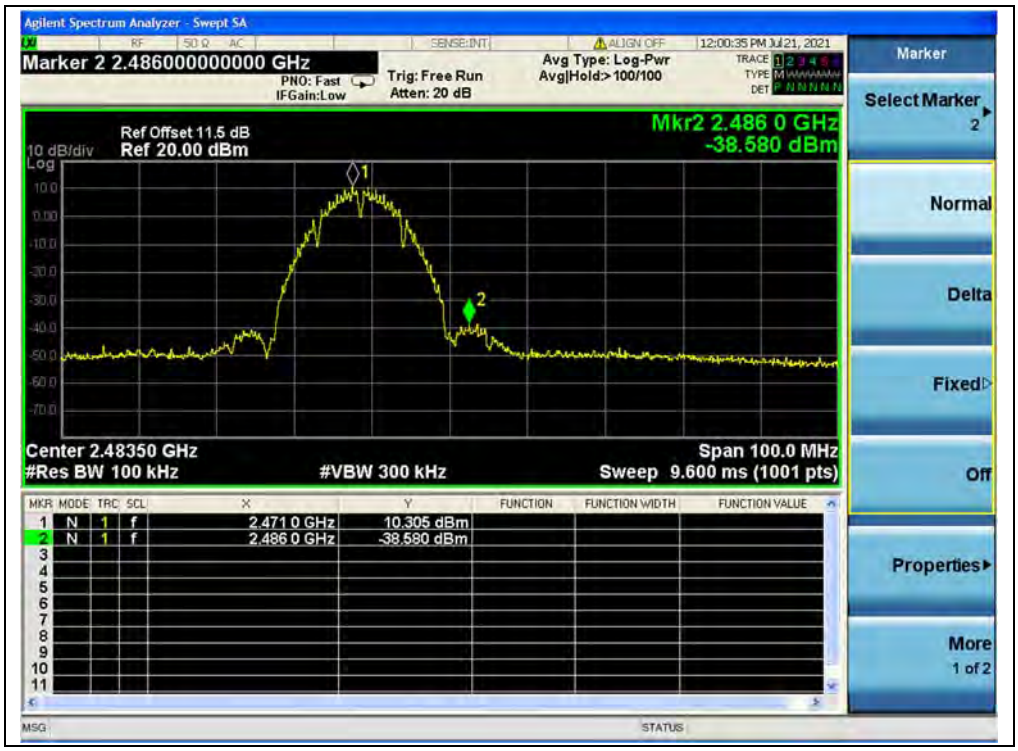
(Band Edge, Channel 1, 802.11b)



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



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



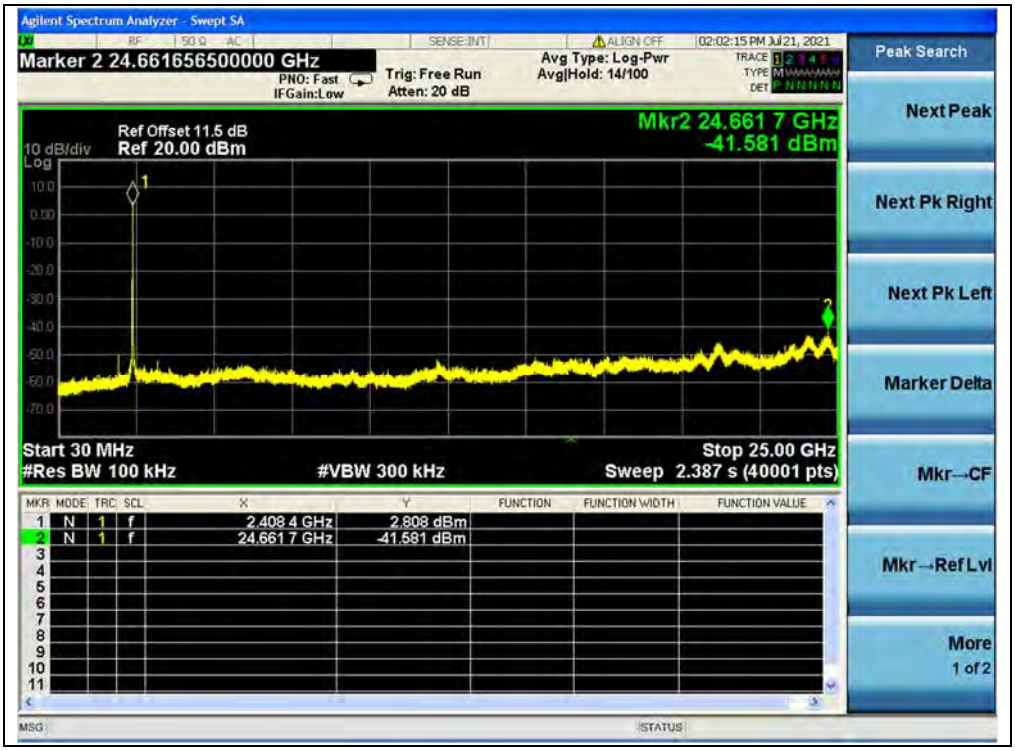
(Band Edge, Channel 13, 802.11b)

802.11g Mode

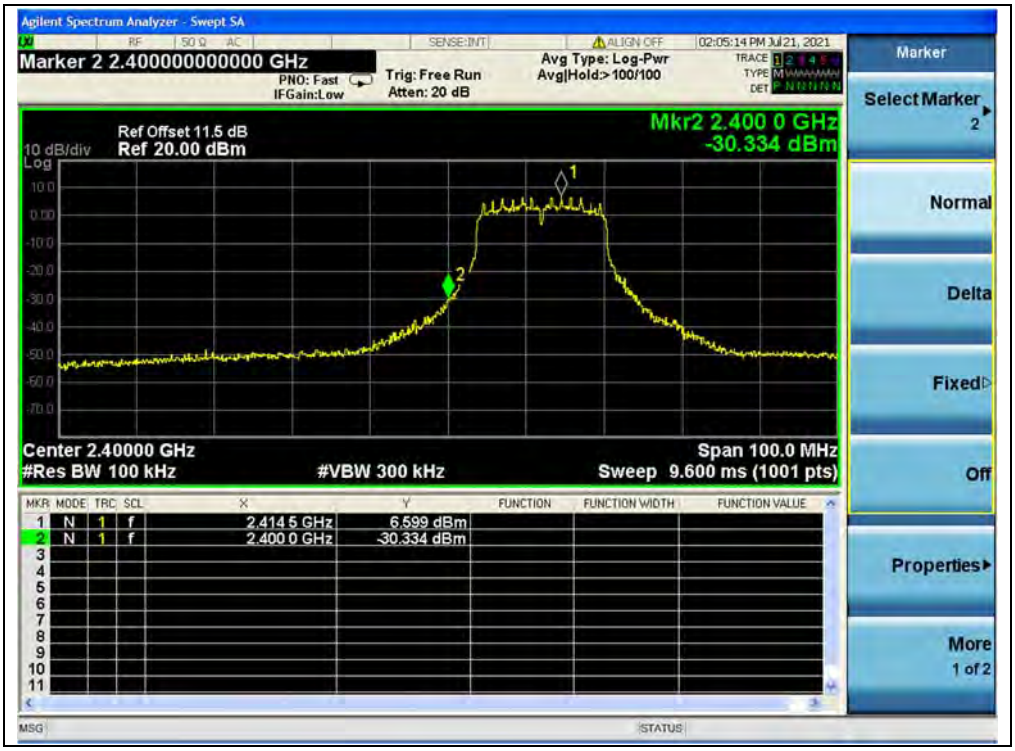
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.58	2.81	-17.19	PASS
7	2442	-42.91	2.94	-17.06	PASS
13	2472	-43.22	5.55	-14.45	PASS

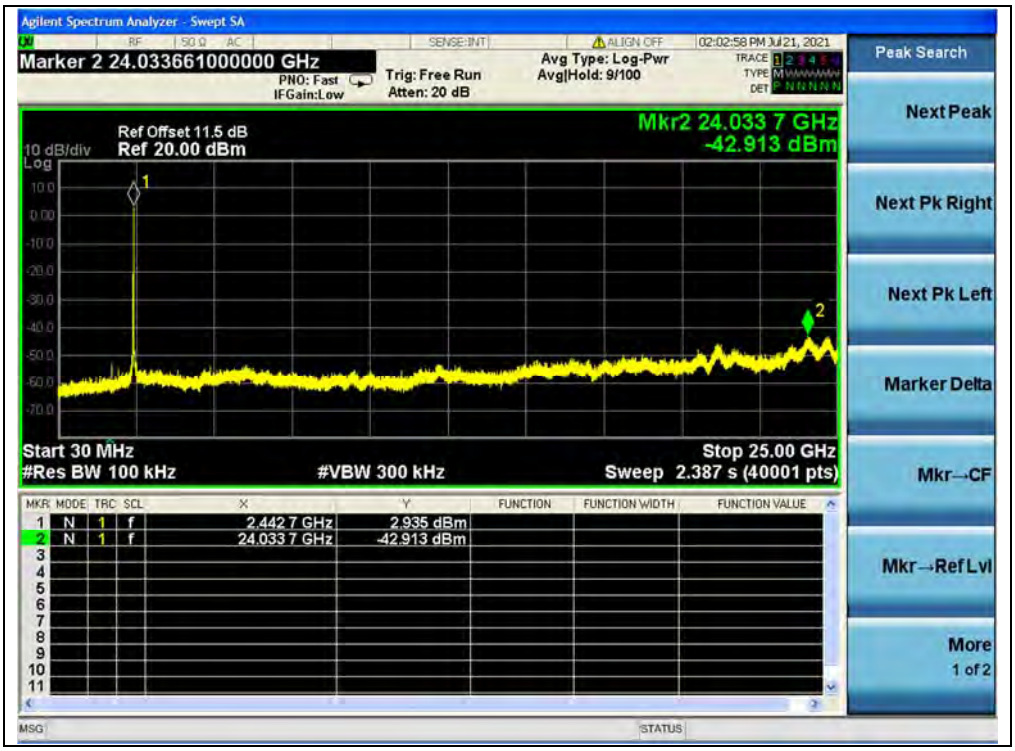
B. Test Plot:



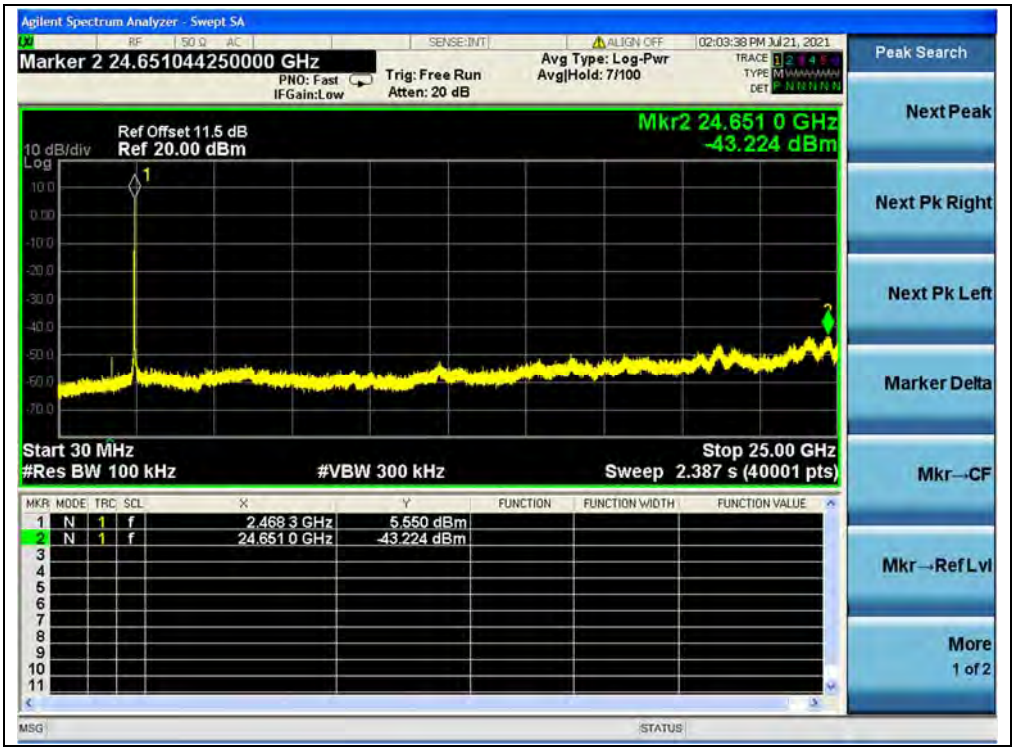
(30MHz to 25GHz, Channel 1, 802.11g)



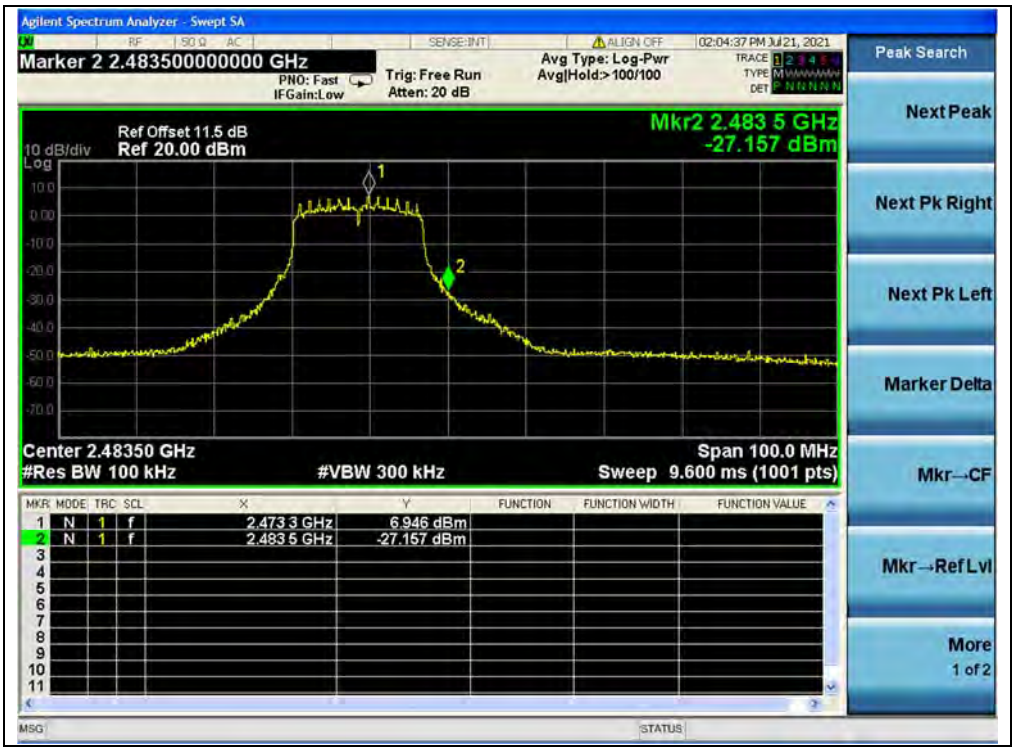
(Band Edge, Channel 1, 802.11g)



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



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



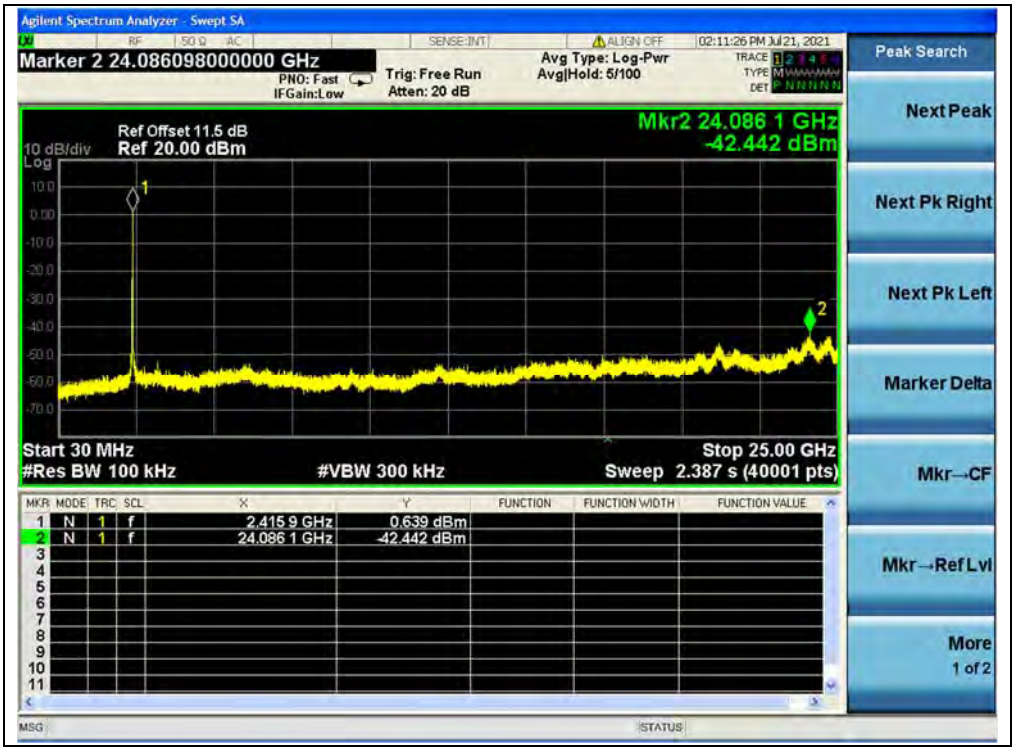
(Band Edge, Channel 13, 802.11g)

802.11n (HT20) Mode

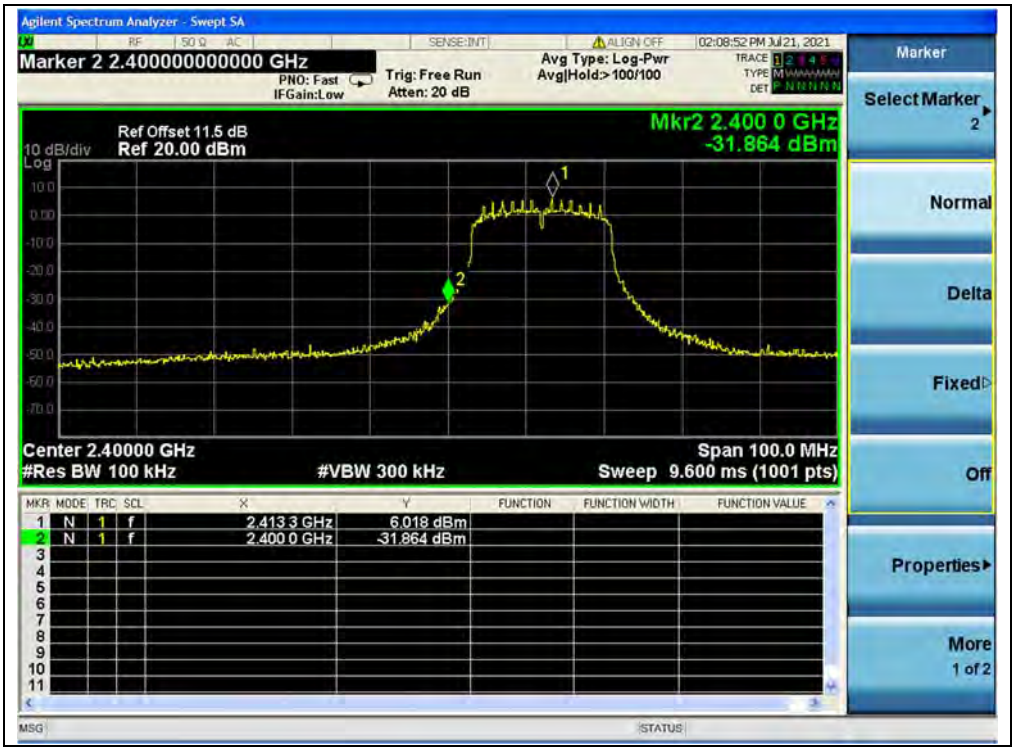
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-42.44	0.64	-19.36	PASS
7	2442	-41.83	1.30	-18.70	PASS
13	2472	-42.63	2.48	-17.52	PASS

B. Test Plot:

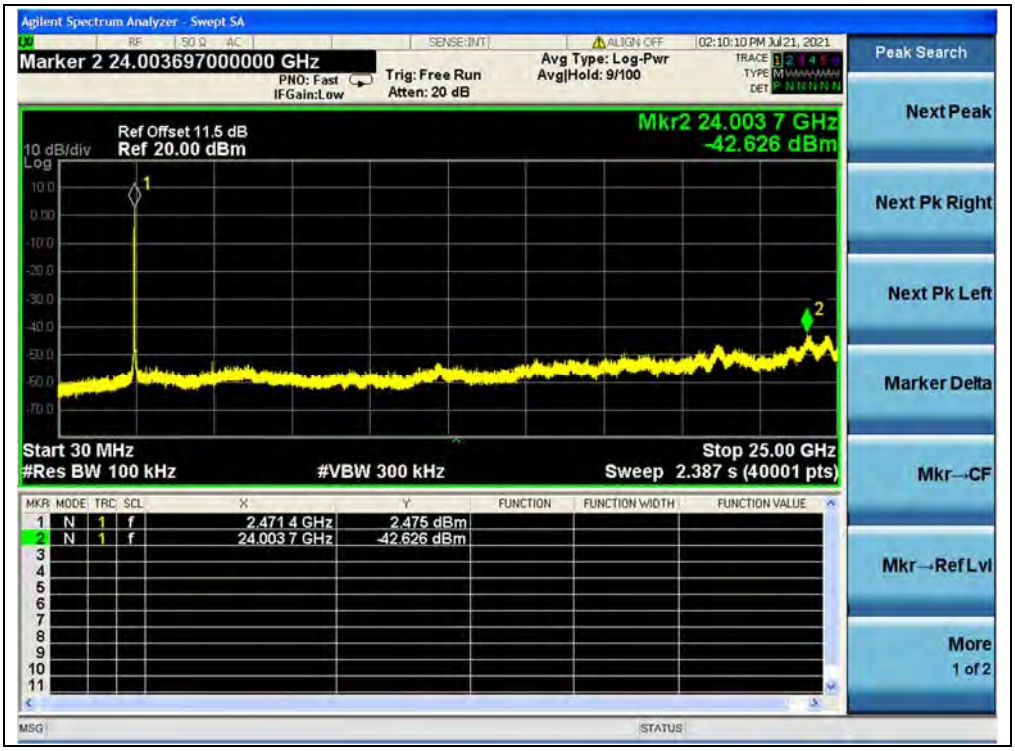


(30MHz to 25GHz, Channel 1, 802.11n (HT20))

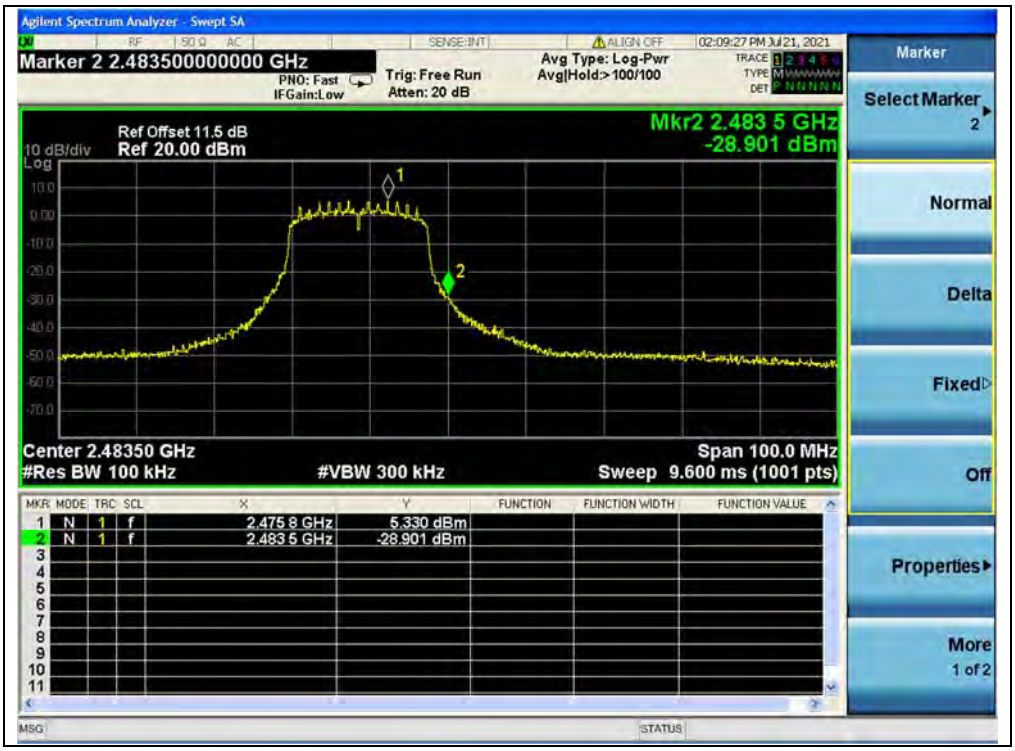


(Band Edge, Channel 1, 802.11n (HT20))

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



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



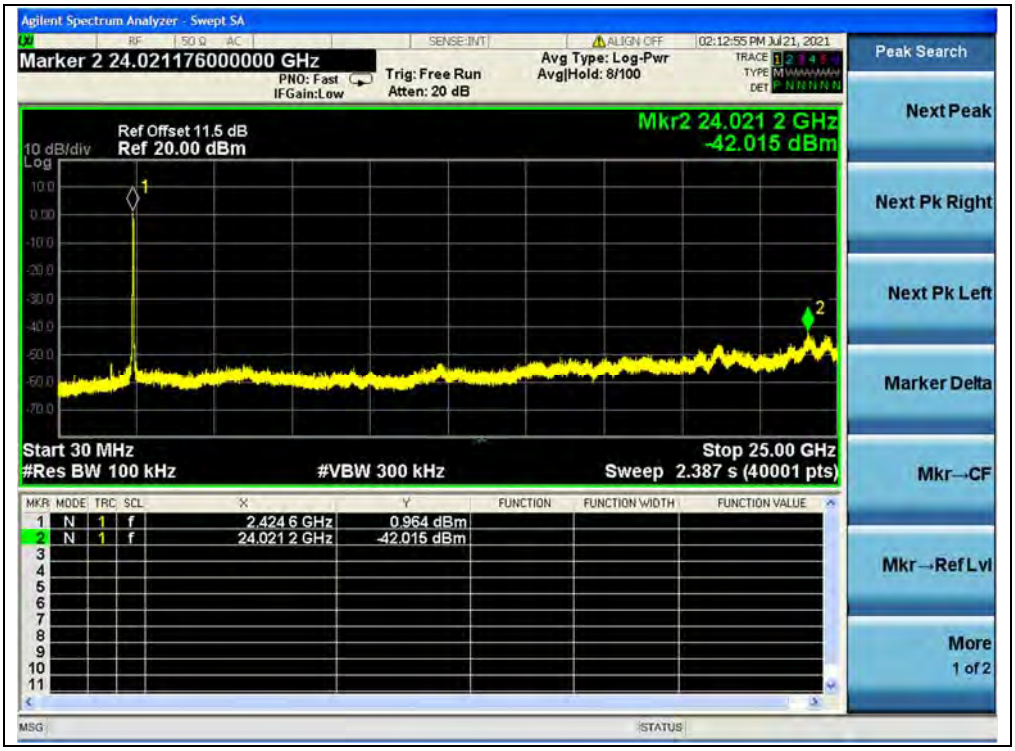
(Band Edge, Channel 13, 802.11n (HT20))

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	-42.02	0.96	-19.04	PASS
7	2442	-42.42	0.61	-19.39	PASS
11	2462	-41.78	-1.93	-21.93	PASS

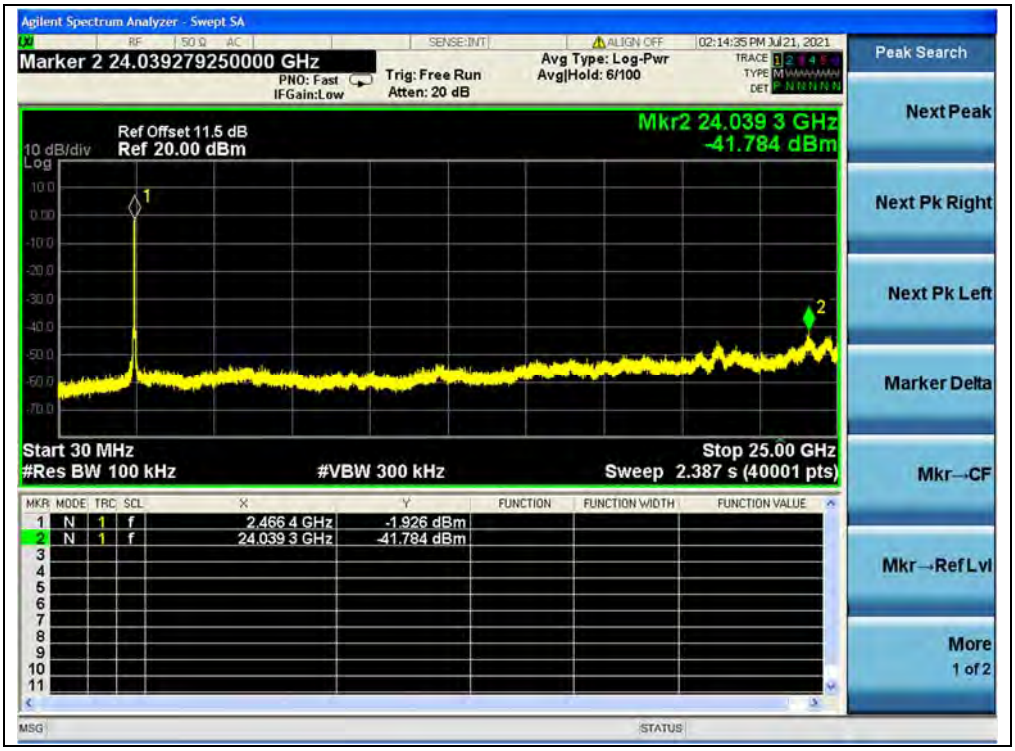
B. Test Plot:



(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))

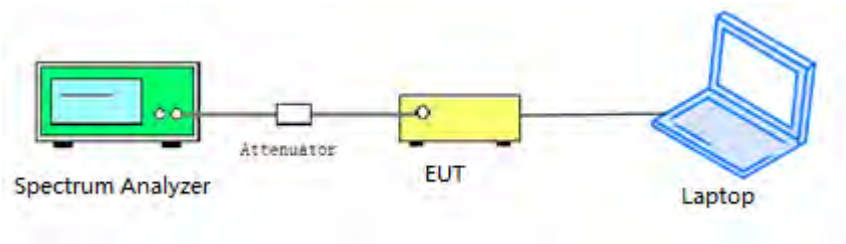
2.6. Power Spectral Density

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:

Spectral Power Density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-1.41	8	PASS
7	2442	-1.17	8	PASS
13	2472	2.48	8	PASS

B. Test Plot:

(Channel 1, 802.11b)

(Channel 7, 802.11b)

(Channel 13, 802.11b)

802.11g Mode

A. Test Verdict:

Spectral Power Density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-9.62	8	PASS
7	2442	-10.40	8	PASS
13	2472	-9.27	8	PASS

B. Test Plot:

(Channel 1, 802.11g)

(Channel 7, 802.11g)

(Channel 13, 802.11g)

802.11n (HT20) Mode

A. Test Verdict:

Spectral Power Density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-11.14	8	PASS
7	2442	-11.90	8	PASS
13	2472	-10.98	8	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:

Spectral Power Density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
3	2422	-12.76	8	PASS
7	2442	-13.54	8	PASS
11	2462	-13.09	8	PASS

B. Test Plot:

(Channel 3, 802.11n (HT40))

(Channel 7, 802.11n (HT40))

(Channel 11, 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 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

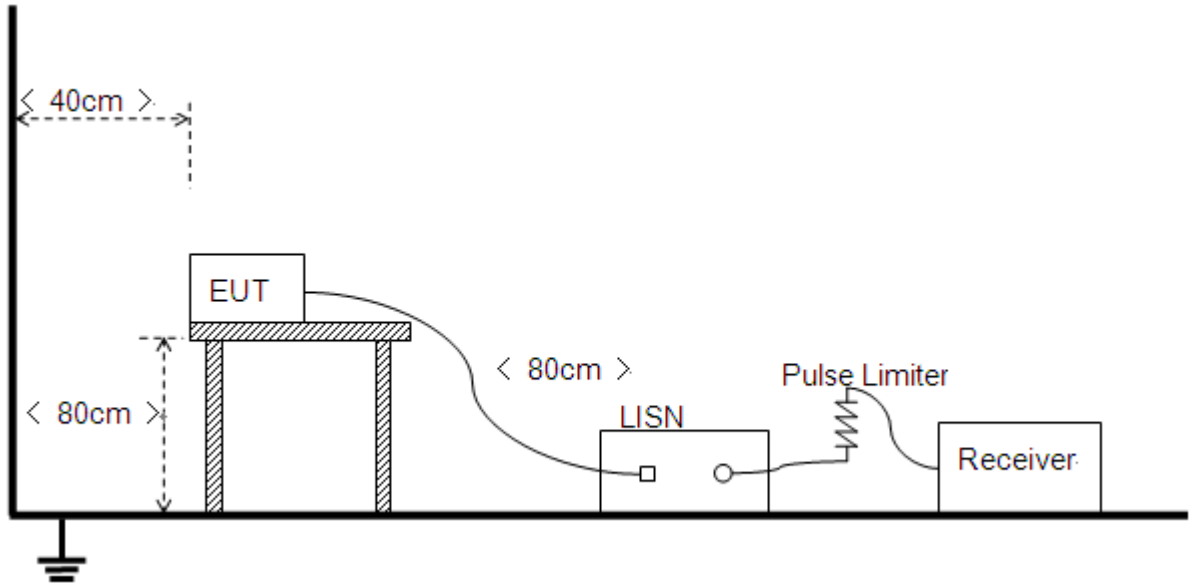
Note:

(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

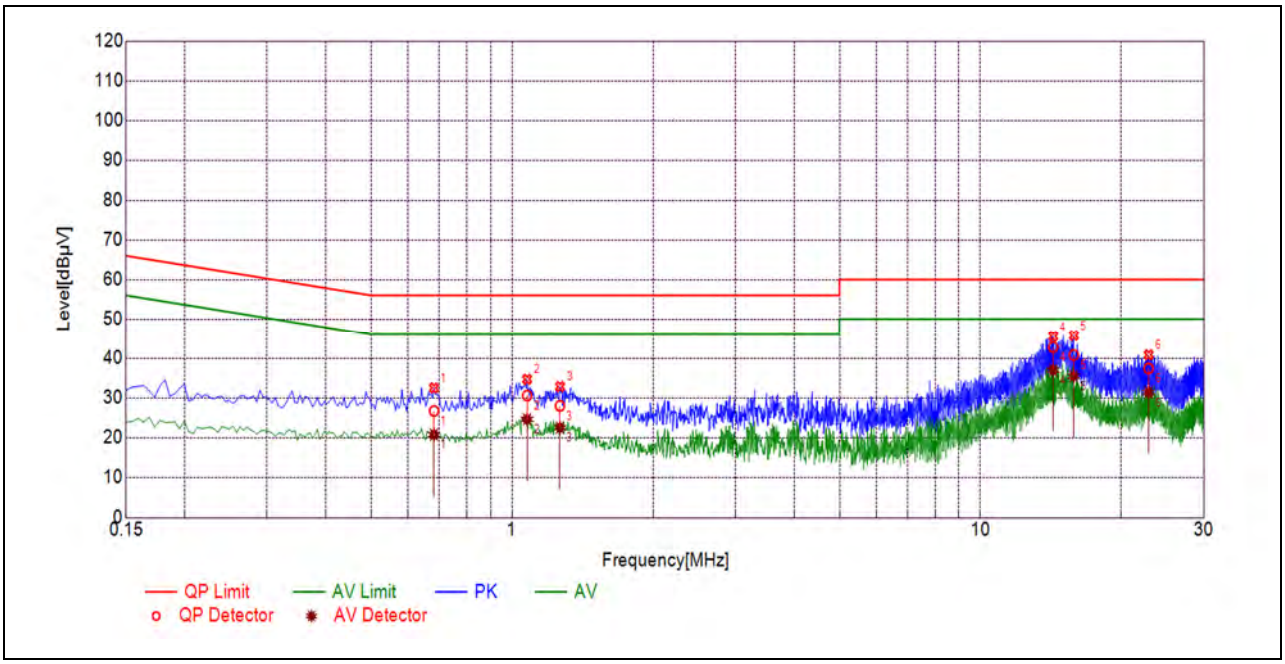
The measurement results are obtained as below:

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

U_R: Receiver Reading

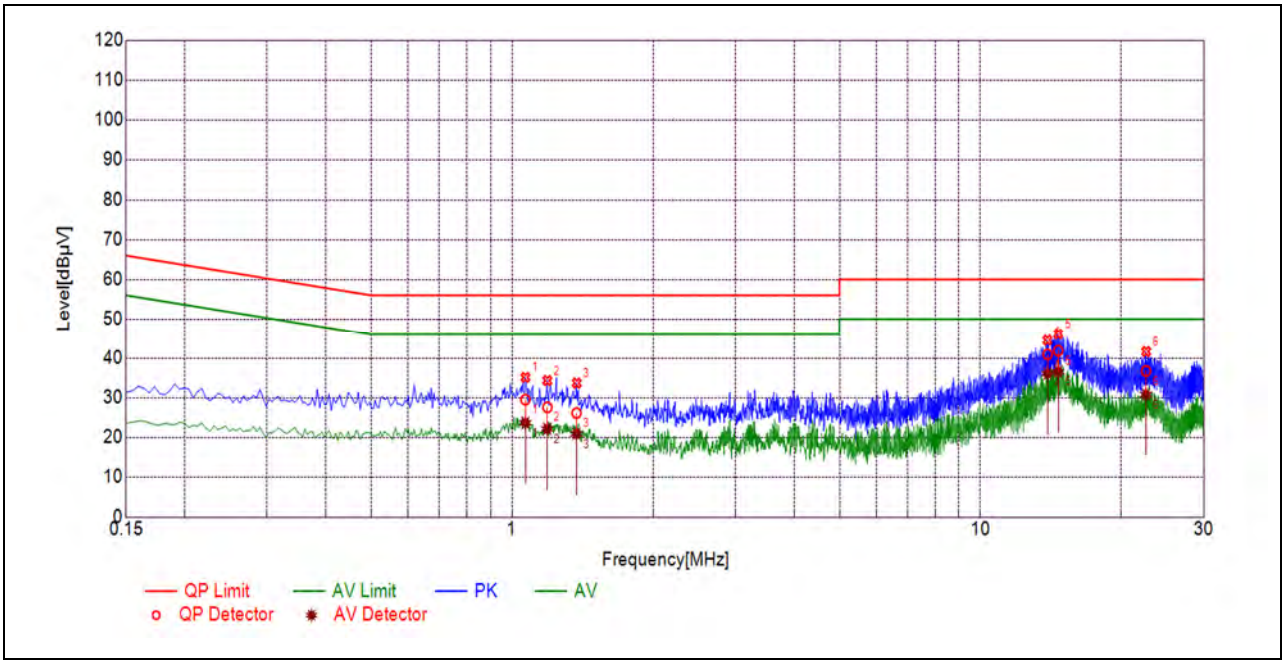
A_{Factor}: Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.6811	26.68	20.74	56.00	46.00	Line	PASS
2	1.0767	30.54	24.58	56.00	46.00		PASS
3	1.2654	27.96	22.49	56.00	46.00		PASS
4	14.2932	42.78	36.97	60.00	50.00		PASS
5	15.8193	40.79	35.42	60.00	50.00		PASS
6	22.8577	37.39	31.37	60.00	50.00		PASS



(N Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	1.0674	29.47	23.63	56.00	46.00	Neutral	PASS
2	1.1894	27.57	22.12	56.00	46.00		PASS
3	1.3726	26.11	20.86	56.00	46.00		PASS
4	13.9101	40.93	36.08	60.00	50.00		PASS
5	14.6522	41.86	36.53	60.00	50.00		PASS
6	22.5677	36.73	30.79	60.00	50.00		PASS

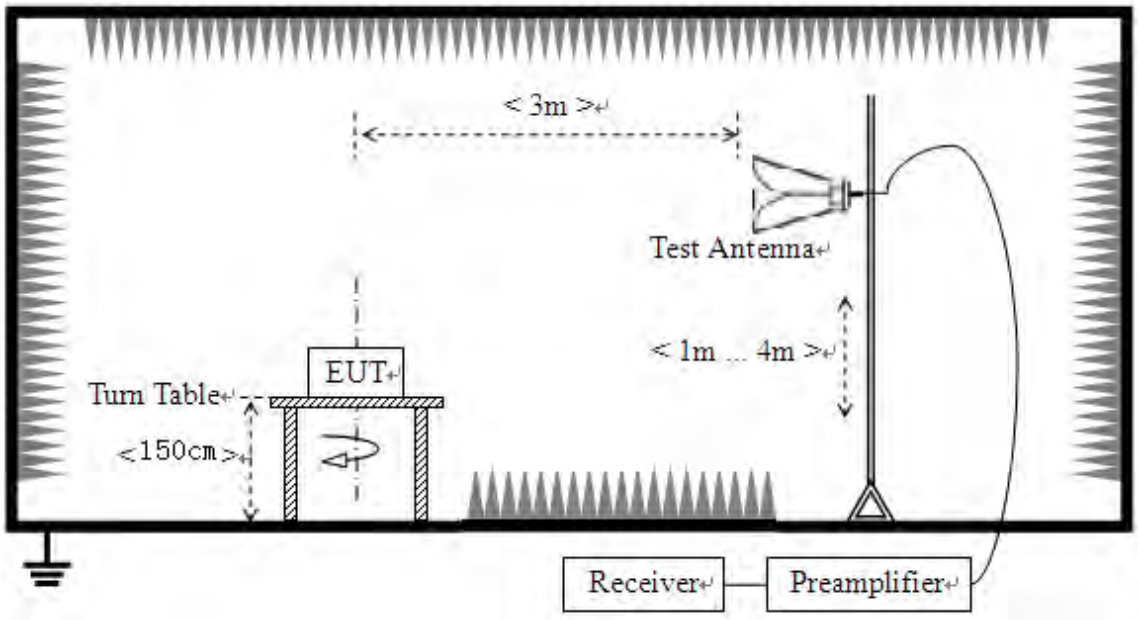
2.8. Restricted Frequency Bands

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

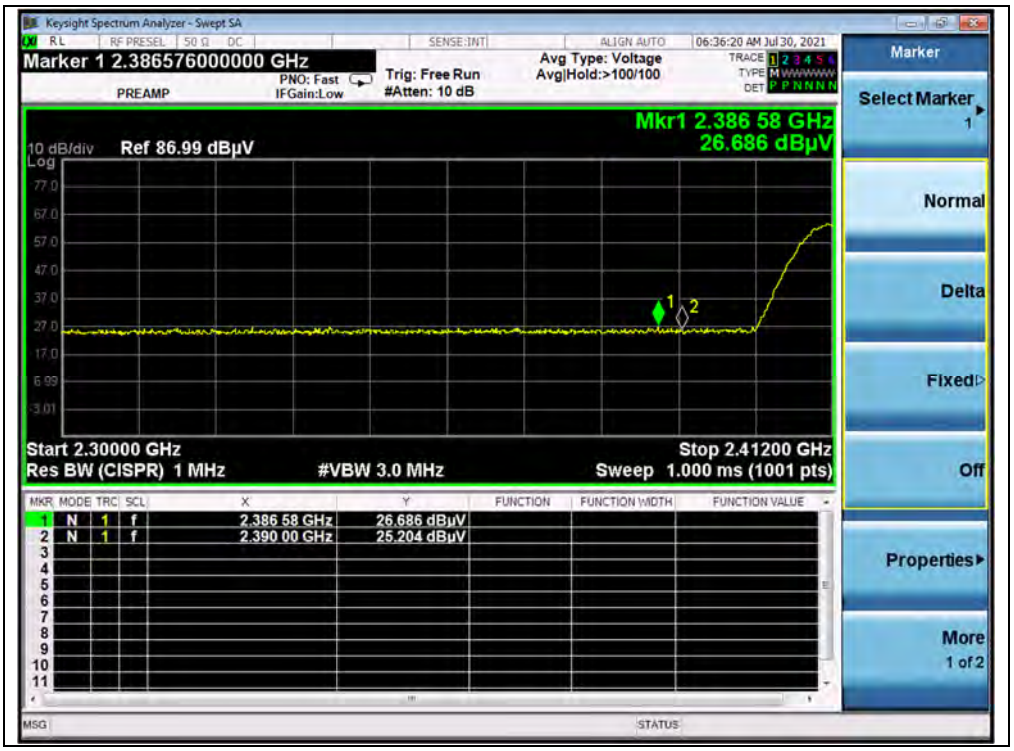
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2386.58	PK	26.69	6.74	27.20	60.63	74	PASS
1	2390.00	AV	14.24	6.74	27.20	48.18	54	PASS
13	2485.41	PK	27.15	6.74	27.20	61.09	74	PASS
13	2485.64	AV	15.61	6.74	27.20	49.55	54	PASS

B. Test Plot:



(PEAK, Channel 1, 802.11b)

(AVERAGE, Channel 1, 802.11b)

(PEAK, Channel 13, 802.11b)

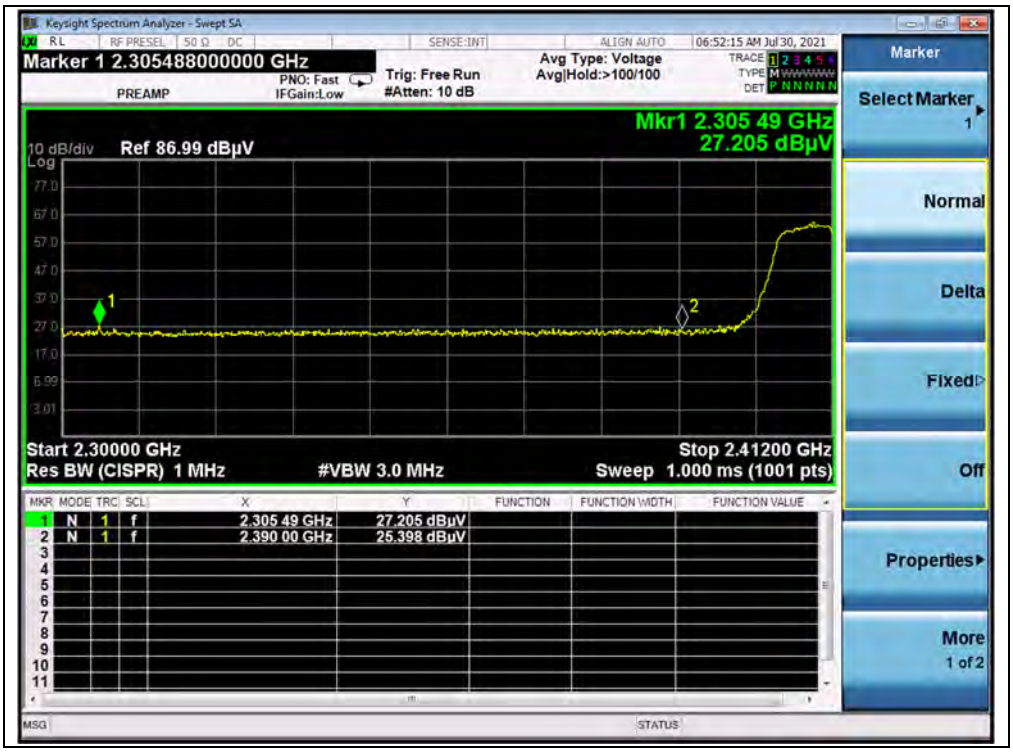
(AVERAGE, Channel 13, 802.11b)

802.11g Mode

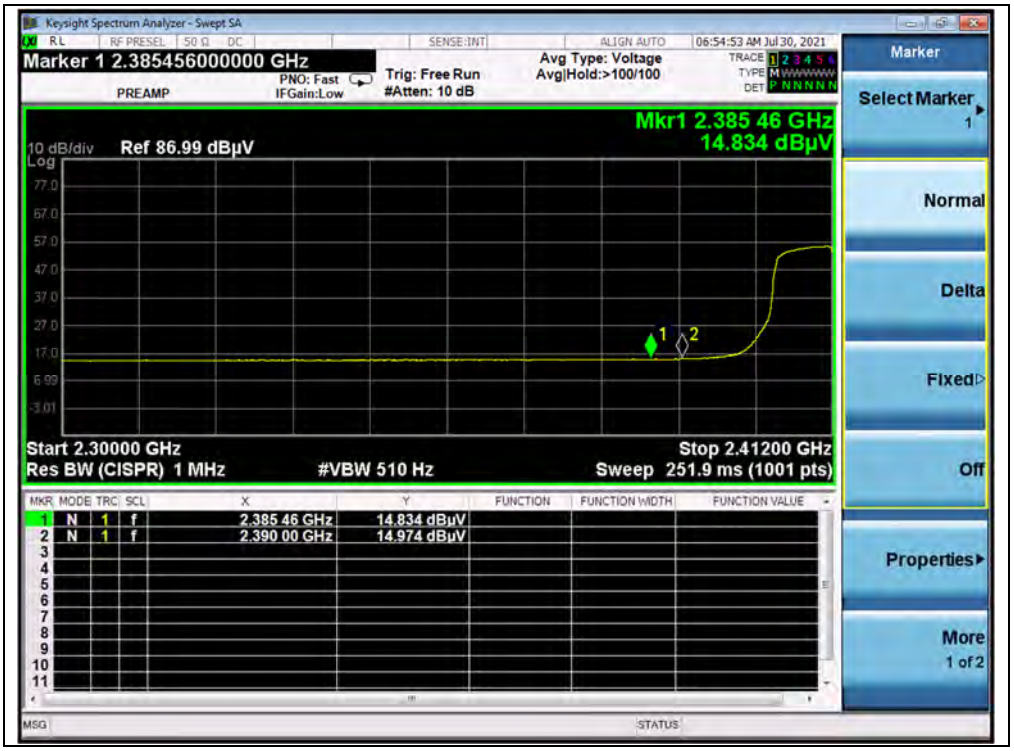
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2305.49	PK	27.21	6.74	27.20	61.15	74	PASS
1	2390.00	AV	14.97	6.74	27.20	48.91	54	PASS
13	2483.60	PK	29.99	6.74	27.20	63.93	74	PASS
13	2483.50	AV	18.05	6.74	27.20	51.99	54	PASS

B. Test Plot:



(PEAK, Channel 1, 802.11g)



(AVERAGE, Channel 1, 802.11g)

(PEAK, Channel 13, 802.11g)

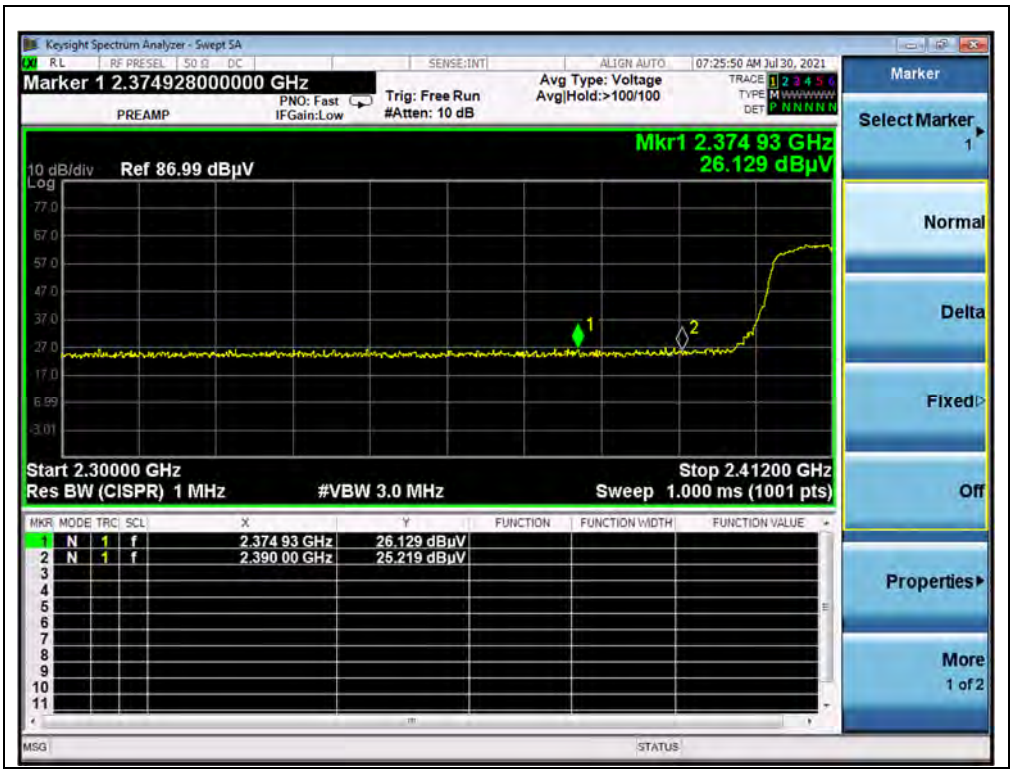
(AVERAGE, Channel 13, 802.11g)

802.11n (HT20) Mode

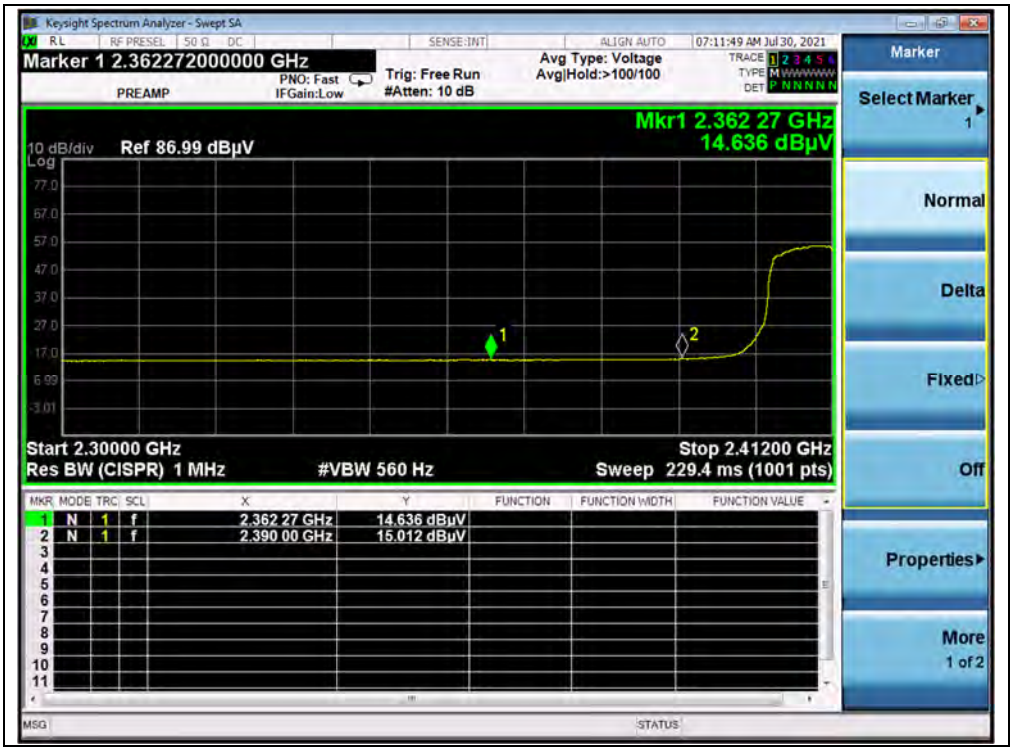
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2374.93	PK	26.13	6.74	27.20	60.07	74	PASS
1	2390.00	AV	15.01	6.74	27.20	48.95	54	PASS
13	2483.70	PK	30.20	6.74	27.20	64.14	74	PASS
13	2483.50	AV	17.18	6.74	27.20	51.12	54	PASS

B. Test Plot:

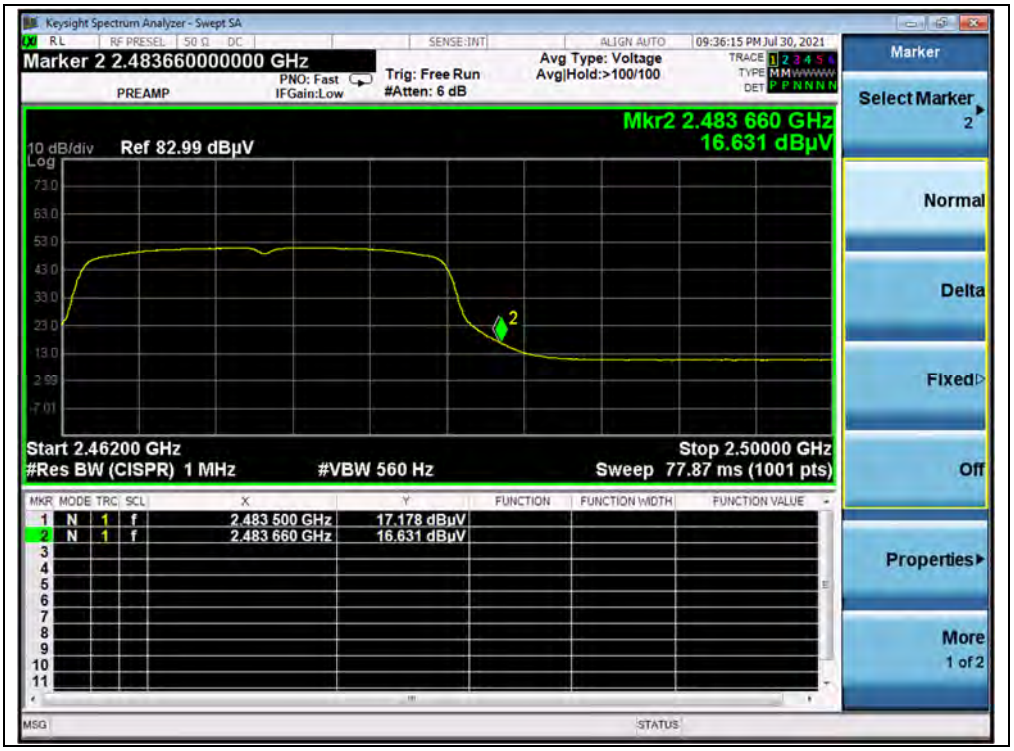


(PEAK, Channel 1, 802.11n (HT20))



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

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



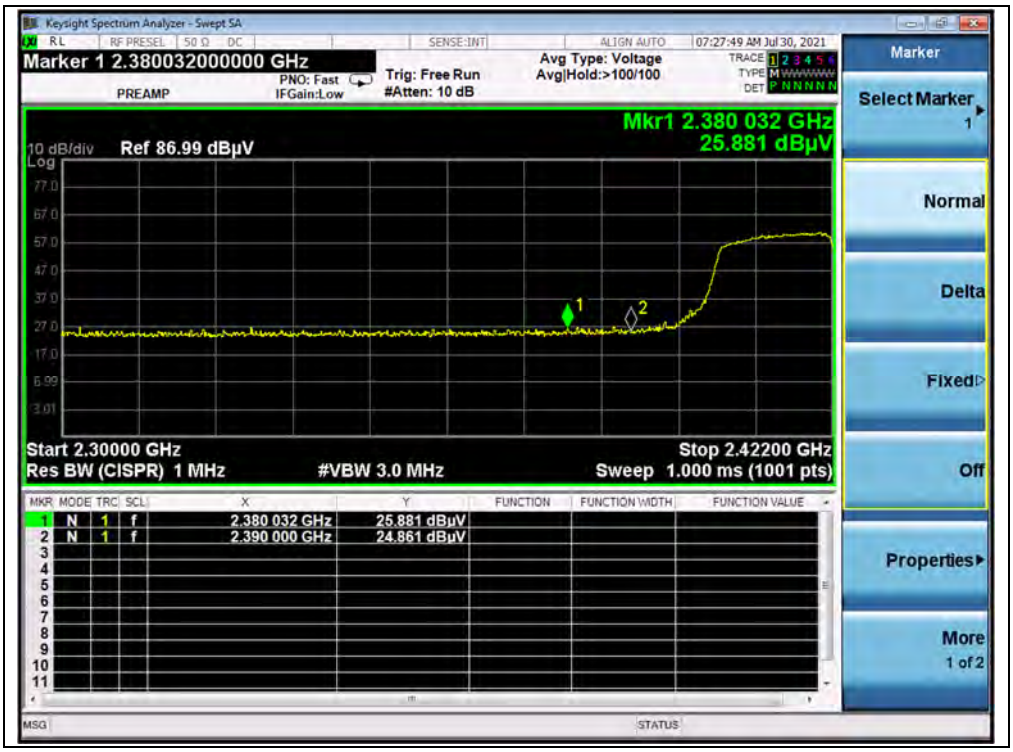
(AVERAGE, Channel 13, 802.11n (HT20))

802.11n (HT40) Mode

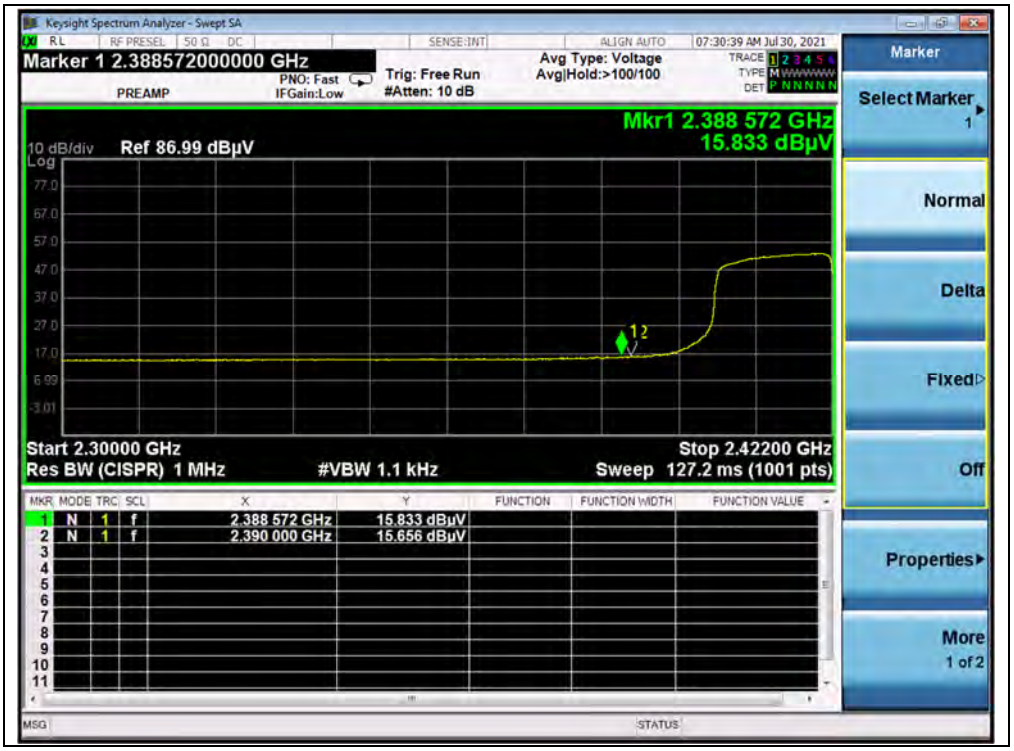
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBμV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
3	2380.03	PK	25.88	6.74	27.20	59.82	74	PASS
3	2388.57	AV	15.83	6.74	27.20	49.77	54	PASS
11	2484.19	PK	31.94	6.74	27.20	65.88	74	PASS
11	2483.50	AV	18.09	6.74	27.20	52.03	54	PASS

B. Test Plot:

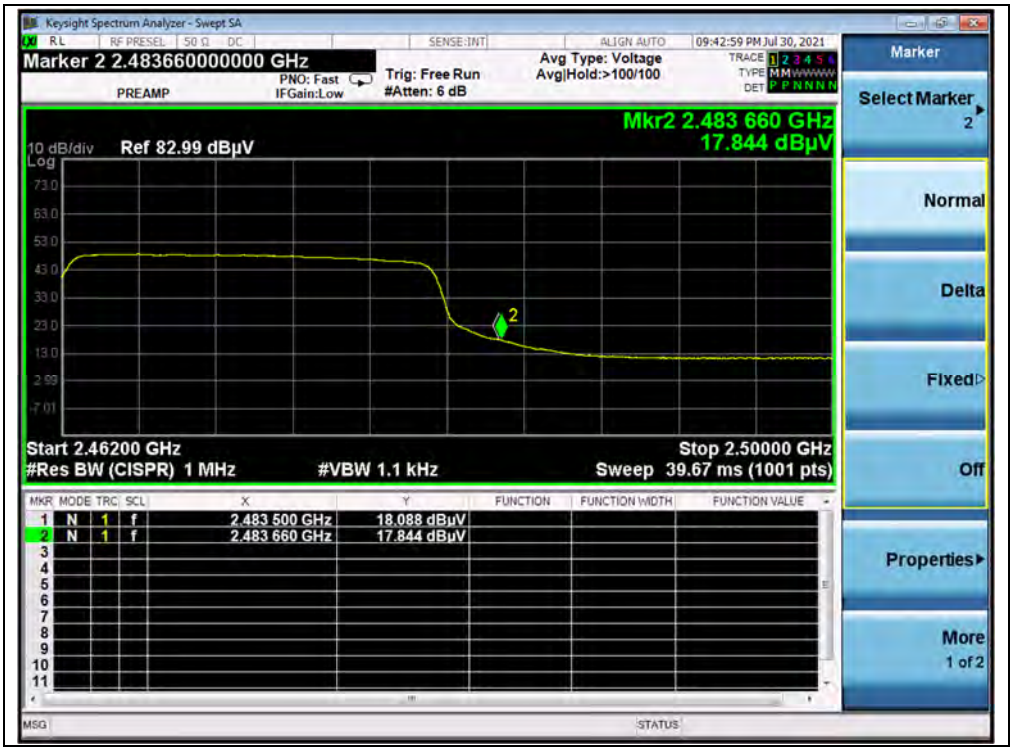


(PEAK, Channel 3, 802.11n (HT40))



(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

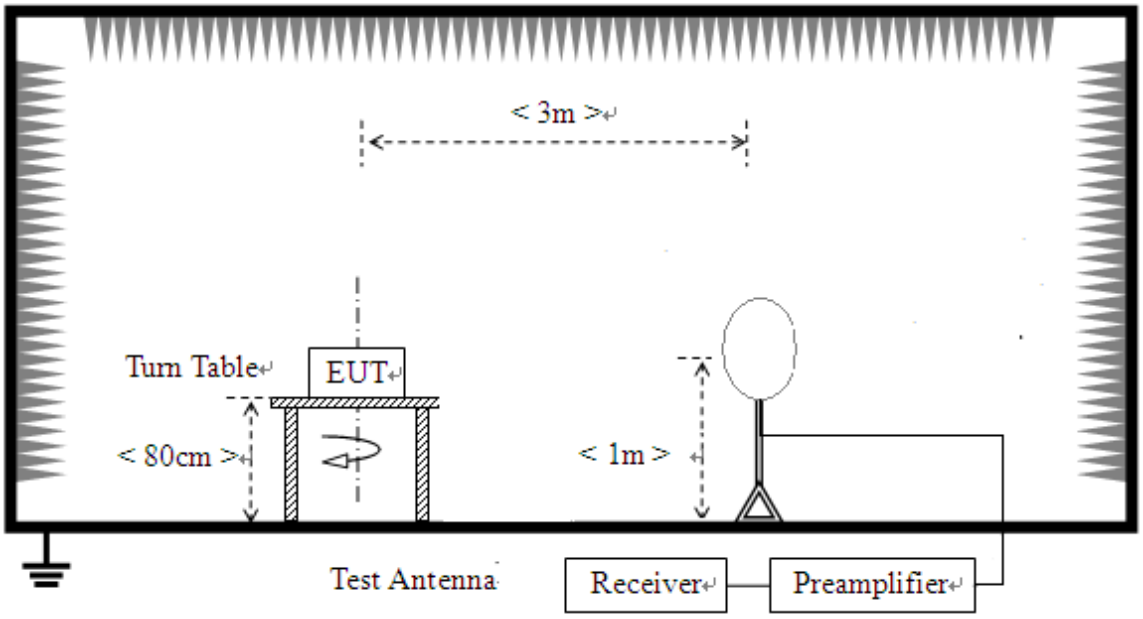
Note1: For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

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).

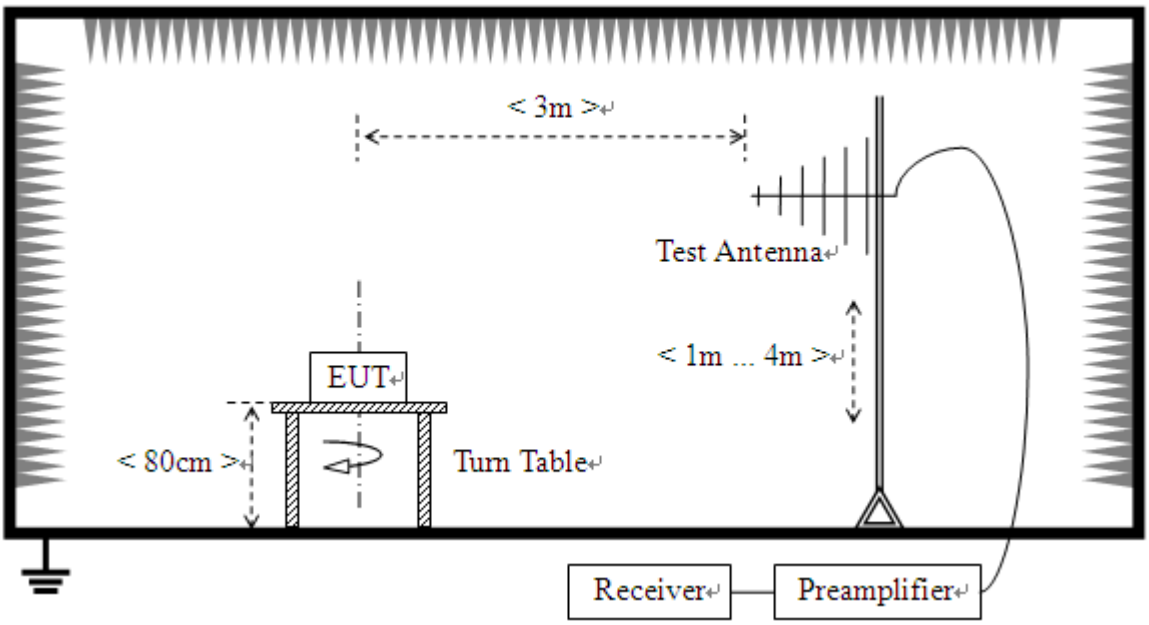
2.9.2. Test Description

Test Setup:

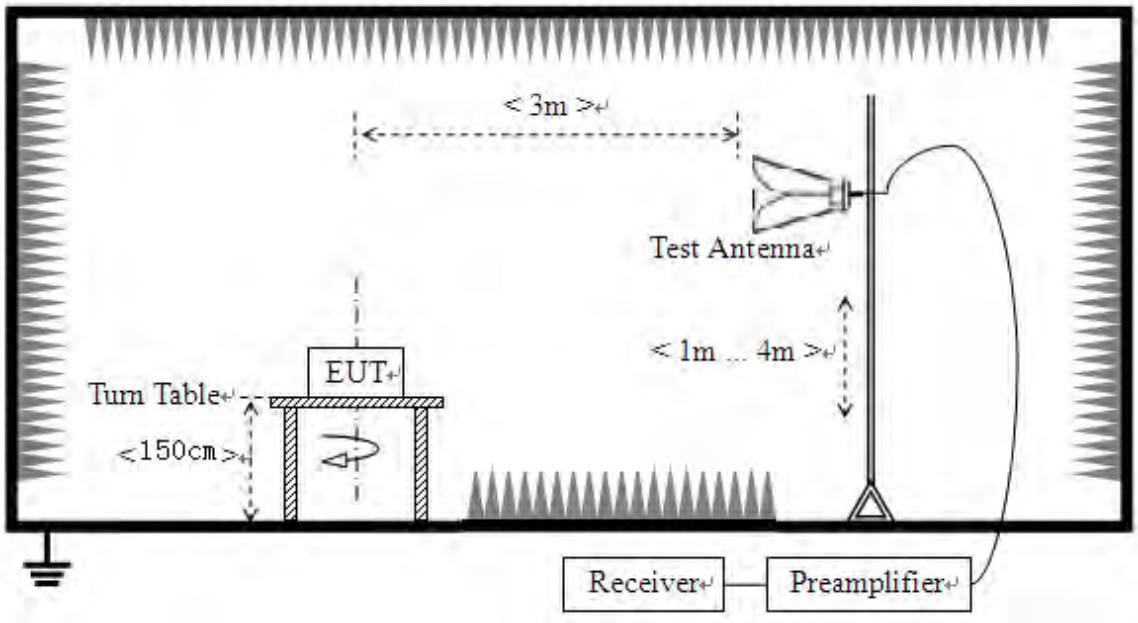
1) For radiated emissions from 9kHz to 30MHz



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

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

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

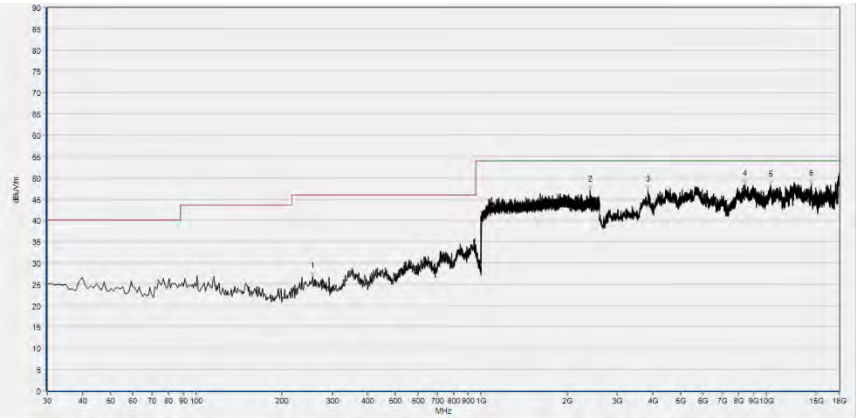
Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

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.

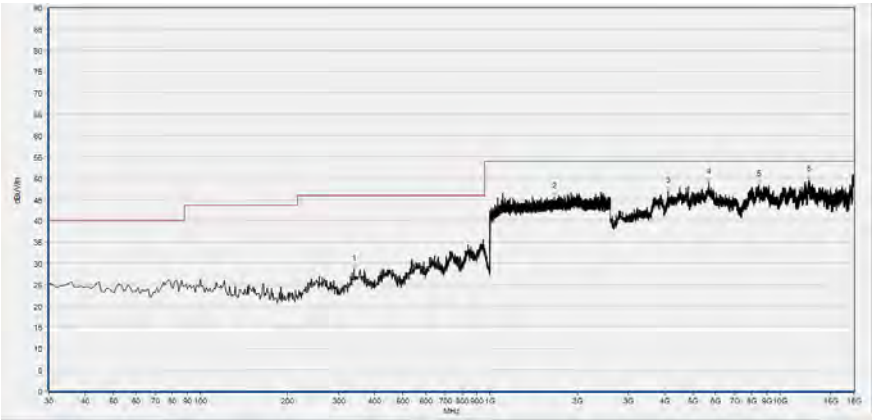
802.11b Mode

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
256.010	26.80	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2410.133	47.15	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3850.480	47.08	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8411.960	48.41	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10336.960	48.25	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
14402.560	48.41	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

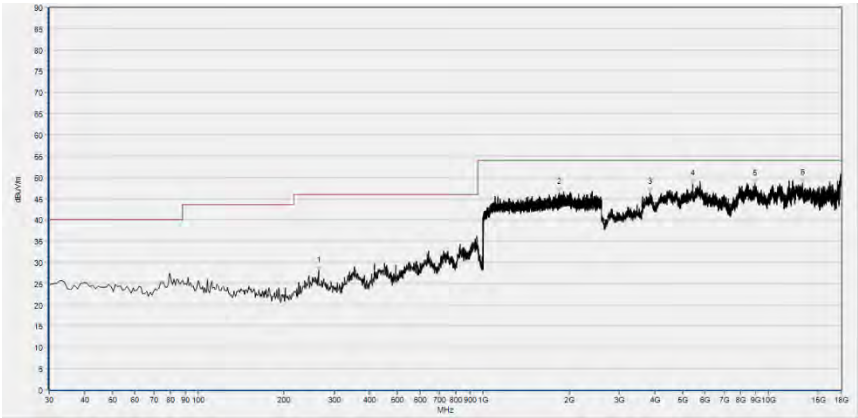
(Antenna Horizontal, 30MHz to 18GHz)



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
339.430	28.60	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1669.867	45.58	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4118.440	46.94	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5689.240	48.98	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8476.640	48.42	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12603.840	49.58	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

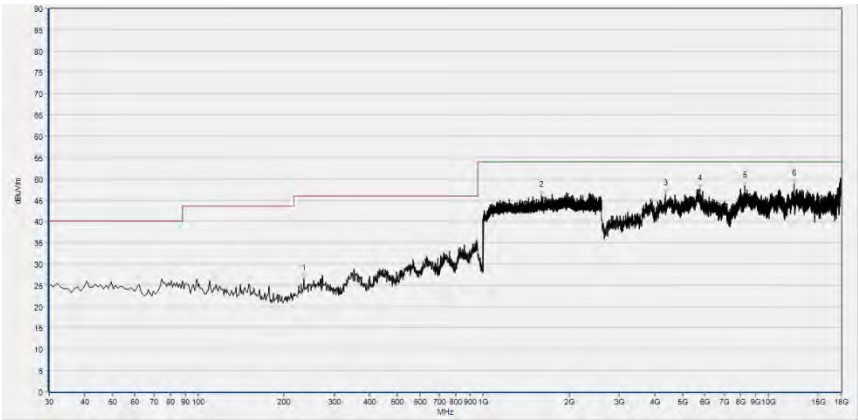
(Antenna Vertical, 30MHz to 18GHz)

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
264.740	27.99	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1848.000	46.44	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3835.080	46.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5430.520	48.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8954.040	48.41	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
13195.200	48.64	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

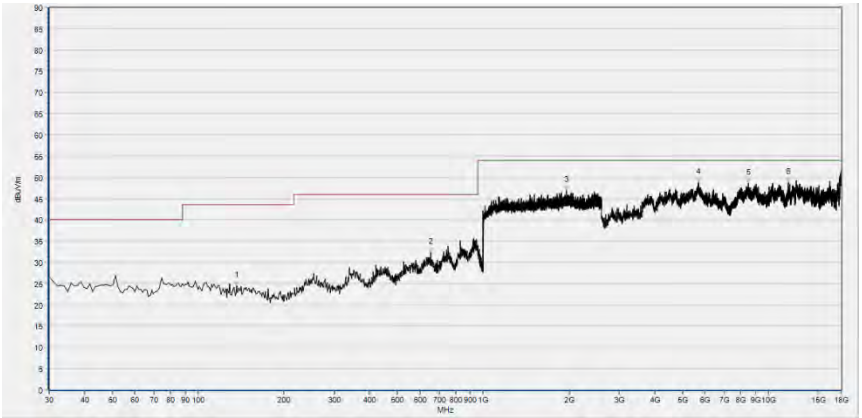
(Antenna Horizontal, 30MHz to 18GHz)



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
234.670	26.44	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1601.067	46.09	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4349.440	46.44	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5763.160	47.67	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8251.800	48.21	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12280.440	48.77	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

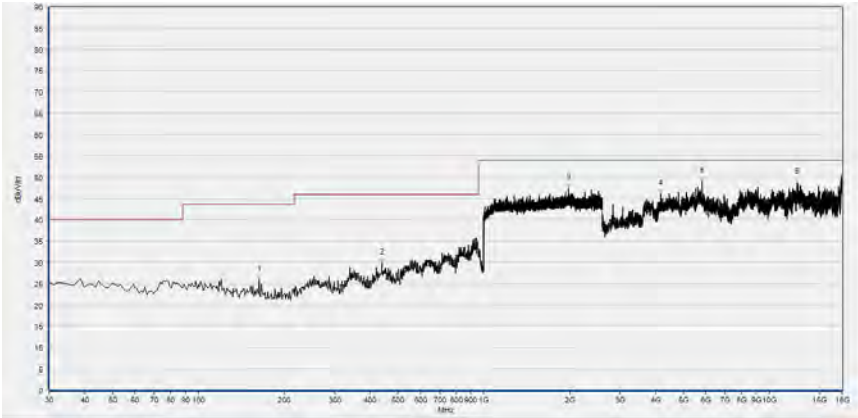
(Antenna Vertical, 30MHz to 18GHz)

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
136.700	24.51	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
654.680	32.31	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1954.667	46.86	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5670.760	48.85	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8513.600	48.52	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11719.880	48.80	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

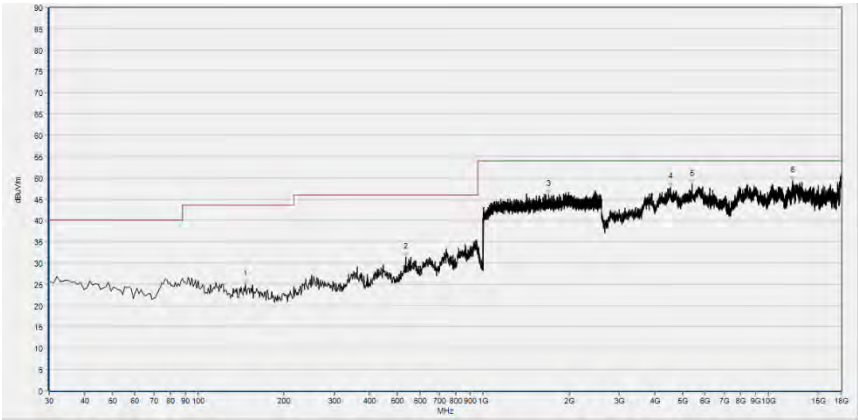


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
162.890	26.01	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
439.340	29.79	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1979.200	47.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4158.480	46.10	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5812.440	48.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12526.840	48.74	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

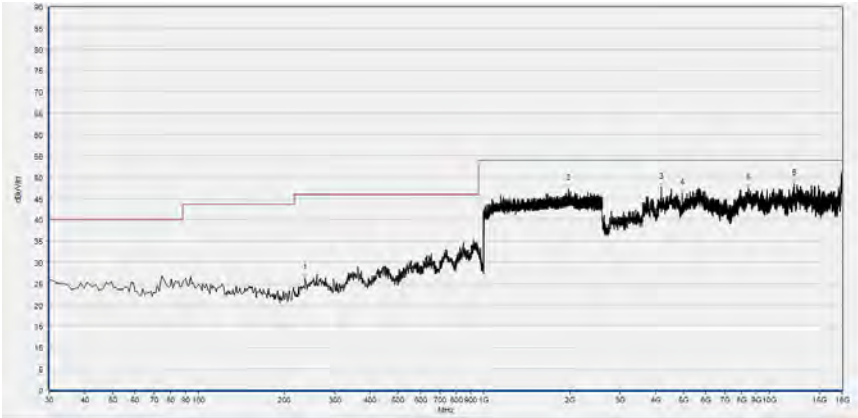
802.11g Mode

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
146.400	25.01	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
534.400	31.26	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1693.867	46.05	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4534.240	47.77	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5387.400	48.43	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12175.720	49.26	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

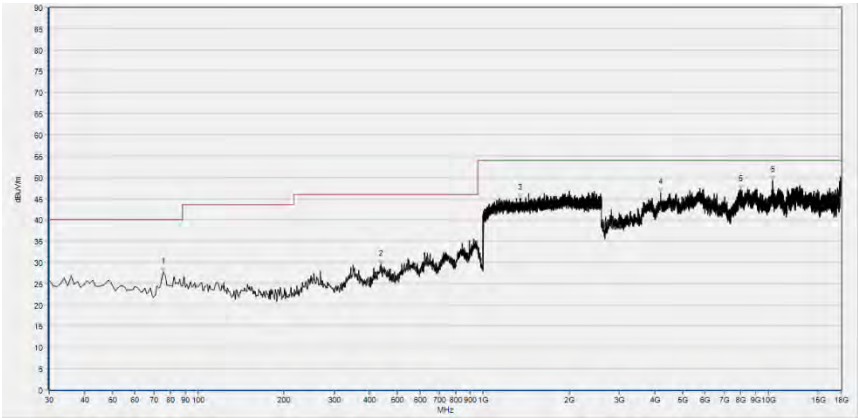
(Antenna Horizontal, 30MHz to 18GHz)



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
236.610	26.33	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1984.000	47.24	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4183.120	47.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4962.360	46.18	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8482.800	47.43	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12209.600	48.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

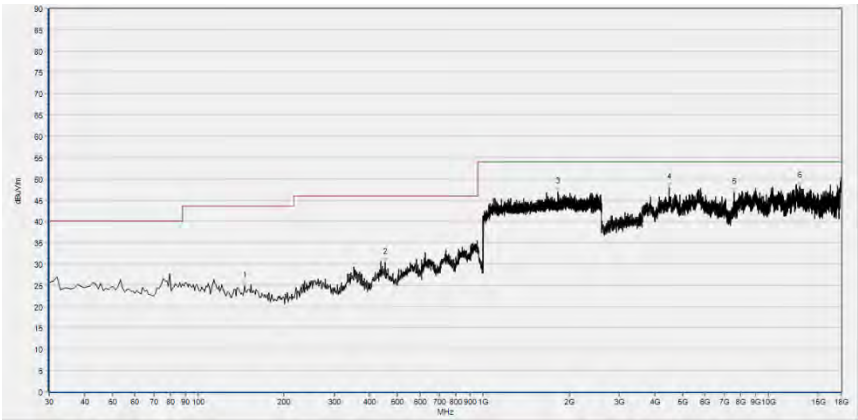
(Antenna Vertical, 30MHz to 18GHz)

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
75.590	27.69	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
438.370	29.57	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1343.467	45.03	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4192.360	46.49	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7996.160	47.15	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
10355.440	49.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

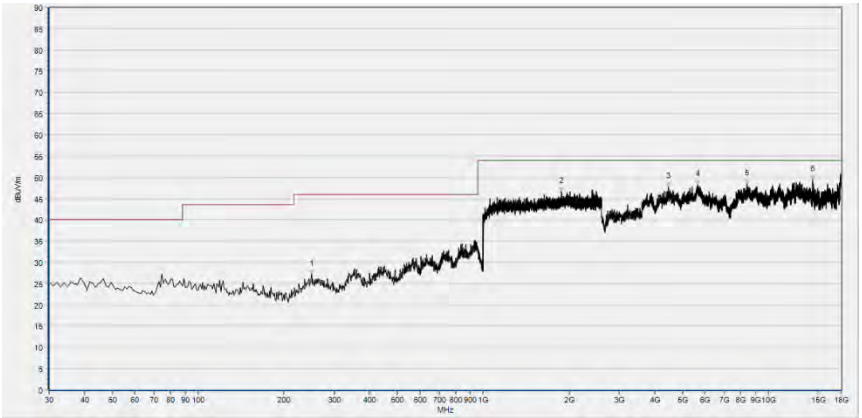
(Antenna Horizontal, 30MHz to 18GHz)



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
145.430	24.87	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
452.920	30.34	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1827.733	46.85	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4475.720	47.87	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7586.520	46.81	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12896.440	48.19	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

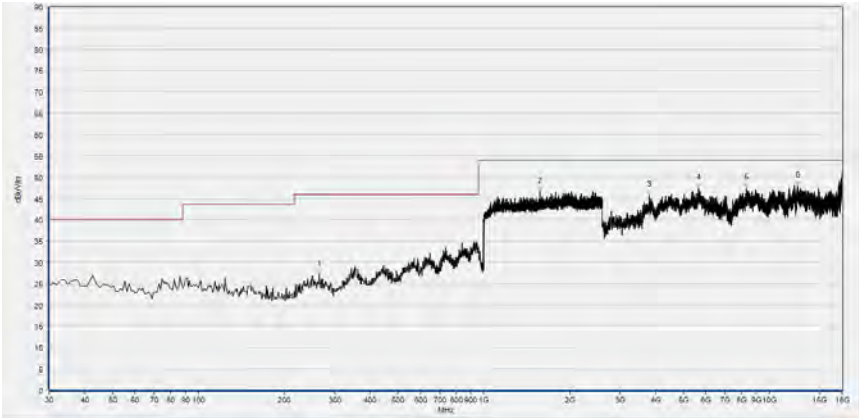
(Antenna Vertical, 30MHz to 18GHz)

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
250.190	27.22	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1880.533	46.62	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4457.240	47.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5646.120	48.26	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8411.960	48.43	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
14267.040	49.36	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

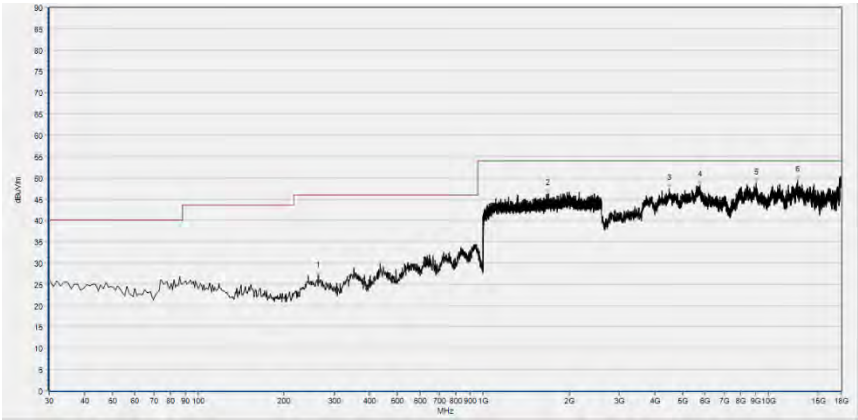


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
265.710	27.09	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1569.600	46.58	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3791.960	45.68	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5661.520	47.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8294.920	47.39	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12594.600	47.96	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

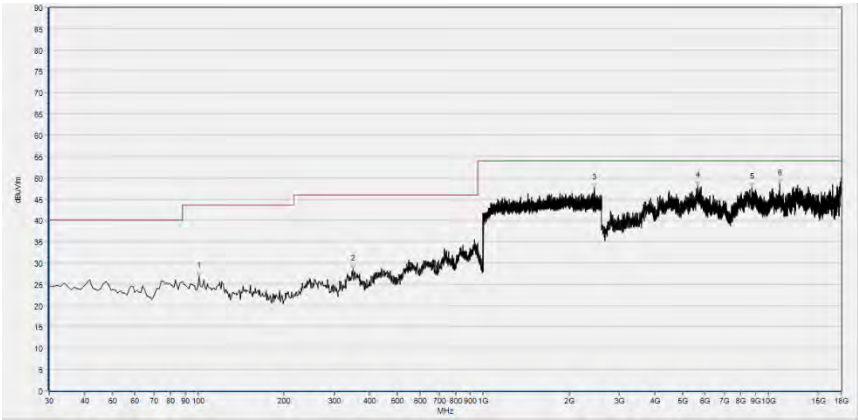
802.11n (HT20) Mode

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
263.770	27.05	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1684.267	46.29	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4481.880	47.37	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5766.240	48.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9071.080	48.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12687.000	49.38	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

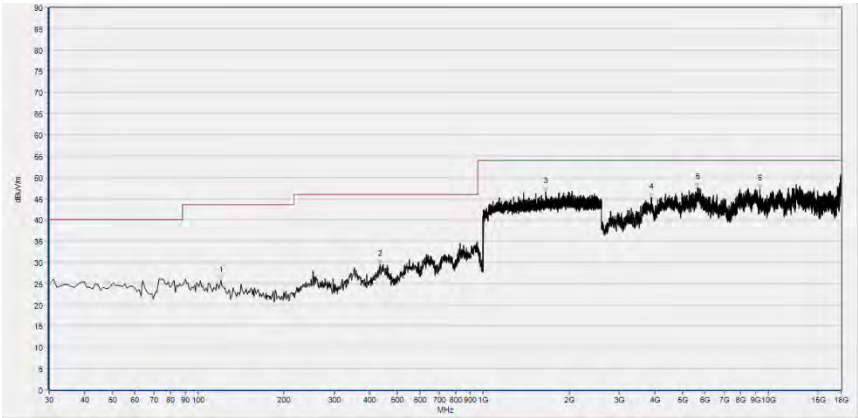
(Antenna Horizontal, 30MHz to 18GHz)



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	26.78	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
349.130	28.42	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2453.333	47.54	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5667.680	48.12	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8778.480	47.75	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10965.280	48.53	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

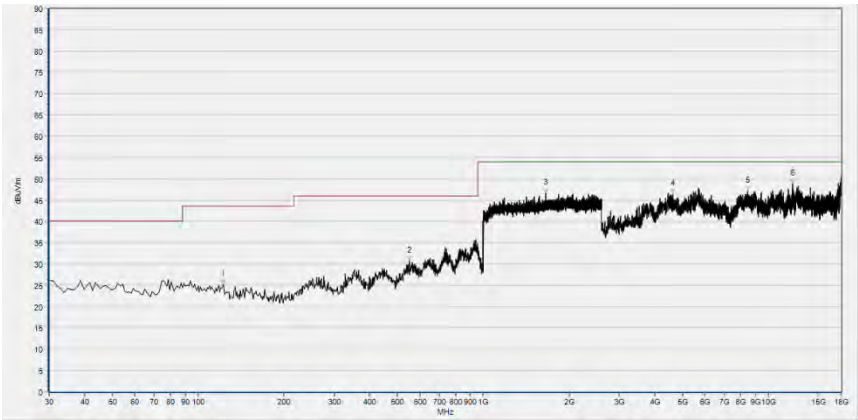
(Antenna Vertical, 30MHz to 18GHz)

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	25.71	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
435.460	29.45	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1657.600	46.53	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3887.440	45.20	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5646.120	47.68	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9308.240	47.20	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

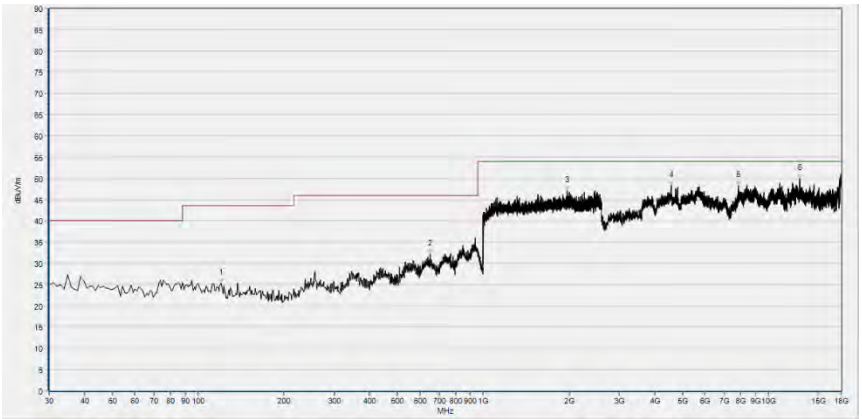
(Antenna Horizontal, 30MHz to 18GHz)



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
122.150	25.12	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
549.920	30.63	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1656.000	46.53	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4617.400	46.38	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8452.000	47.12	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12191.120	48.70	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
120.210	25.27	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
651.770	32.13	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1963.200	47.04	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4555.800	48.24	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7860.640	48.30	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12884.120	49.97	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

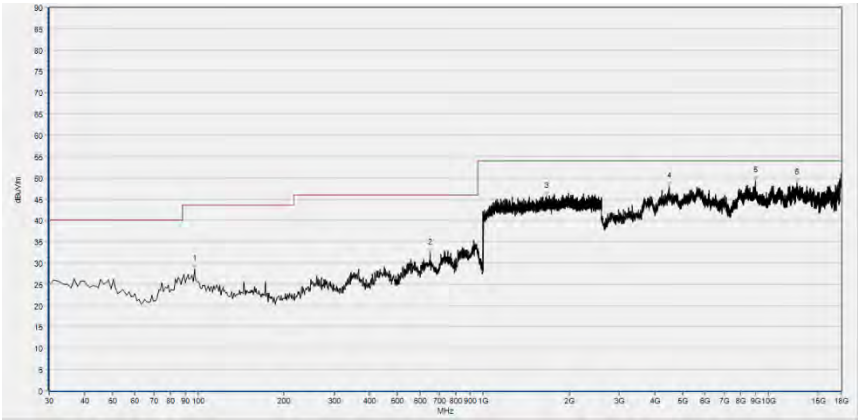
(Antenna Horizontal, 30MHz to 18GHz)

Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
99.840	26.43	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
730.340	34.72	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2042.133	45.88	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4488.040	46.46	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7949.960	47.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12203.440	48.88	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

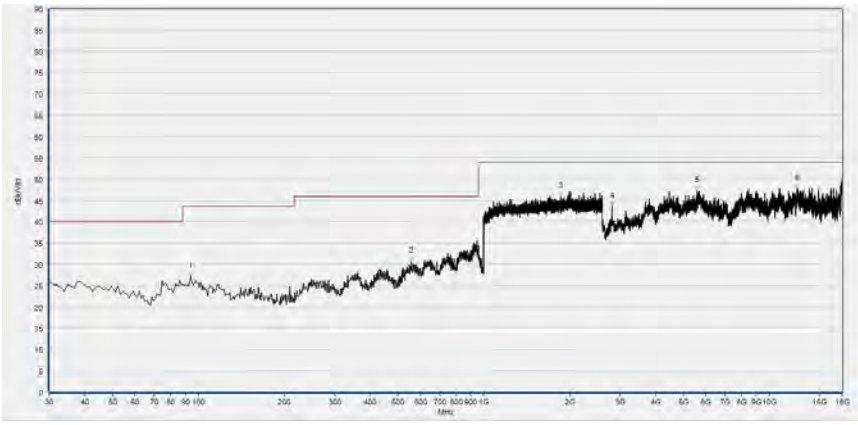
802.11n (HT40) Mode

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
96.930	28.55	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
651.770	32.33	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1663.467	45.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4488.040	47.95	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9012.560	49.36	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12579.200	48.76	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

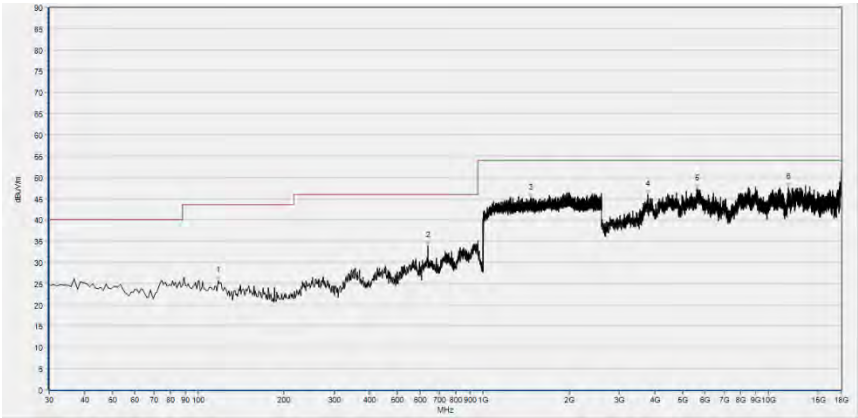
(Antenna Horizontal, 30MHz to 18GHz)



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
94.020	27.14	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
558.650	30.60	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1857.600	45.91	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2806.360	43.59	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5590.680	47.33	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12520.680	47.68	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

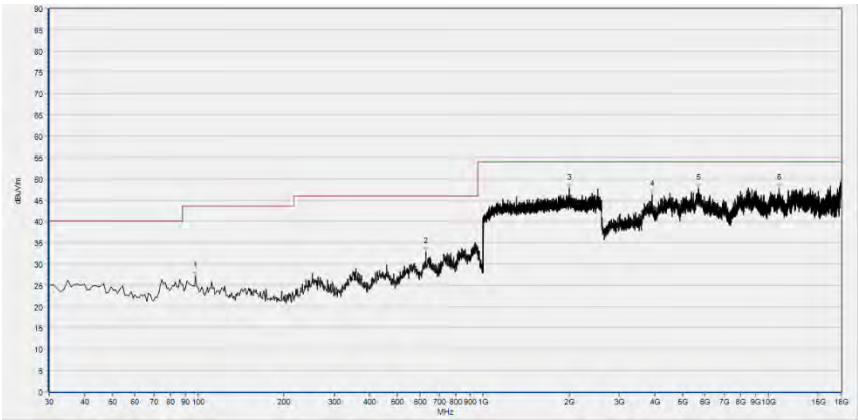
(Antenna Vertical, 30MHz to 18GHz)

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
117.300	25.62	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
639.160	33.81	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1466.667	45.09	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3785.800	45.93	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5627.640	47.28	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11766.080	47.67	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

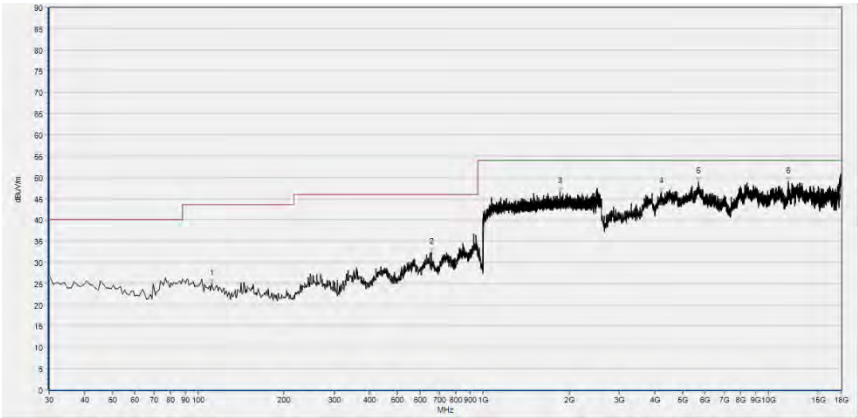
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
97.900	27.18	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
629.460	32.92	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2000.533	47.73	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3905.920	46.28	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5698.480	47.70	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10872.880	47.83	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

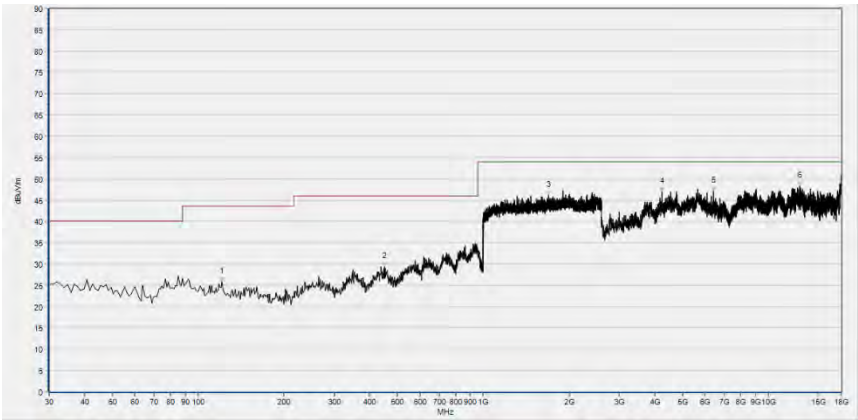
(Antenna Vertical, 30MHz to 18GHz)

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
111.480	24.91	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
659.530	32.34	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1857.600	46.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4201.600	46.51	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5683.080	49.00	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11759.920	48.90	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
121.180	25.78	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
450.010	29.35	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1694.400	46.02	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4244.720	46.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
6425.360	47.13	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12890.280	48.27	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	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
				2021.07.21	2022.07.20
Coaxial Cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3 List of Software Used

Description	Manufacturer	Software Version
Test System	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
				2021.07.16	2022.07.15
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
				2021.07.15	2022.07.14
18-26.5GHz pre-Amplifier	46732	S10M100L3802	Tonscend	2020.07.21	2021.07.20
				2021.07.15	2022.07.14
26-40GHz pre-Amplifier	56774	S40M400L4002	Tonscend	2020.07.21	2021.07.20
				2021.07.15	2022.07.14
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2020.07.21	2021.07.20
				2021.07.15	2022.07.14
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

END OF REPORT