REPORT No.: SZ19050100W02

TEST REPORT

APPLICANT	:	dormakaba EAD GmbH
PRODUCT NAME	:	data collection terminal
MODEL NAME	:	9600-K6 BLE WiFi
BRAND NAME	:	dormakaba
FCC ID	:	NVI-KT9600K6BWL
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2019-05-20
TEST DATE	:	2019-06-21 to 2019-07-02
ISSUE DATE	:	2019-07-08

Edited by: Zeng Xiaoying (Rapporteur)

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DIRECTORY

Change History		
Version	**Date**	**Reason for change**
1.0	2019-07-08	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	dormakaba EAD GmbH
Applicant Address:	Albertistr. 3, 78056 Villingen-Schwenningen, Germany
Manufacturer:	In-Tech Electronics Ltd
Manufacturer Address:	Unit A,13/F, Wing Tai Centre,12 Hing Yip Street, Kwun Tong Kowloon, Hong Kong

1.2. Equipment Under Test (EUT) Description

Product Name:	data collection terminal	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	02	
Software Version:	V5	
Equipment type:	WLAN2.4G	
Modulation Type:	DSSS, OFDM	
Operating Frequency Range:	802.11b/g/ n(HT20): 2.412GHz - 2.462GHz 802.11 n(HT40): 2.422GHz - 2.452GHz	
Antenna Type:	PCB Antenna	
Antenna Gain:	4.6 dBi	
Accessory Information:	Battery	
	Brand Name:	Renata
	Model No.:	CR2450N
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	540mAh
	Rated Voltage:	3.0V
	Charge Limit:	N/A

Note 1: We use the dedicated software to control the EUT continuous transmission. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 2: This test report is updated from the original report (Report No.: SZ17070027W35, FCC ID: NVI-KT9600K6LWL), based on the similarity between before, the motherboard, WIFI modules are the same as before, except that the RFID module has some changes. The changes are as follows: BT module is installed in the BT position reserved on the RFID board. The changes do not affect the results of Conducted Emission, Restricted Frequency Bands and Radiated Emission, for other test results we had tested and recorded in this report.

1.3. 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)**
n(HT40)	**3**	**2422**	8	2447
	4	2427	**9**	**2452**
	5	2432		
	6	**2437**		
	7	2442		

Note1: The Lowest Channel (1), Middle Channel (6) and Highest Channel (11) was selected test for 802.11b/g/n(HT20) mode;

Note2: The Lowest Channel (3), Middle Channel (6) and Highest Channel (9) was selected test for n(HT40) mode;

1.4. 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
1	15.203	Antenna Requirement	N/A	N/A	**PASS**
2	N/A	Duty Cycle Of Test Signal	Jun 21, 2019	Wang Meng	**PASS**
3	15.247(b)	Maximum Peak and Average Conducted Output Power	Jul 02, 2019	Wang Meng	**PASS**
4	15.247(a)	Bandwidth	Jun 21, 2019	Wang Meng	**PASS**
5	15.247(d)	Conducted Spurious Emission and Band Edge	Jun 21, 2019	Wang Meng	**PASS**
6	15.247(e)	Power spectral density (PSD)	Jun 21, 2019	Wang Meng	**PASS**
7	15.207	Conducted Emission	Nov 10, 2017	Peng Xuewei	**PASS**$_{Note1}$
8	15.247(d)	Restricted Frequency Bands	Nov 10&26, 2017	Peng Xuewei	**PASS**$_{Note1}$
9	15.209, 15.247(d)	Radiated Emission	Nov 10&26, 2017	Peng Xuewei	**PASS**$_{Note1}$

Note 1: The test results of these test items in this report refer to the test report (Report No.: SZ17070027W35).

Note 2: The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013, KDB558074 D01 v05r02 and KDB594280 D01 v02r01.

Note 3: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 12dB contains two parts that cable loss 2dB and Attenuator 10dB.

1.5. 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. Result: Compliant

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

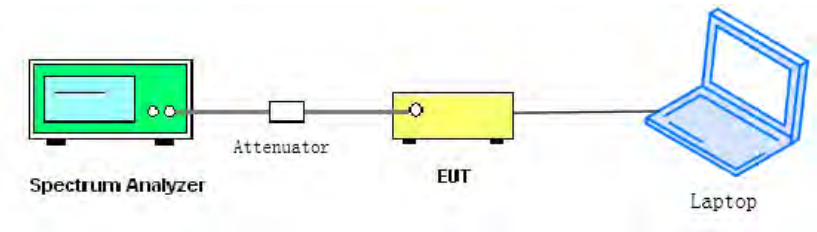
2.2. Duty Cycle Of Test Signal

2.2.1. Requirement

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

2.2.2. Test Description

A. Test Set:



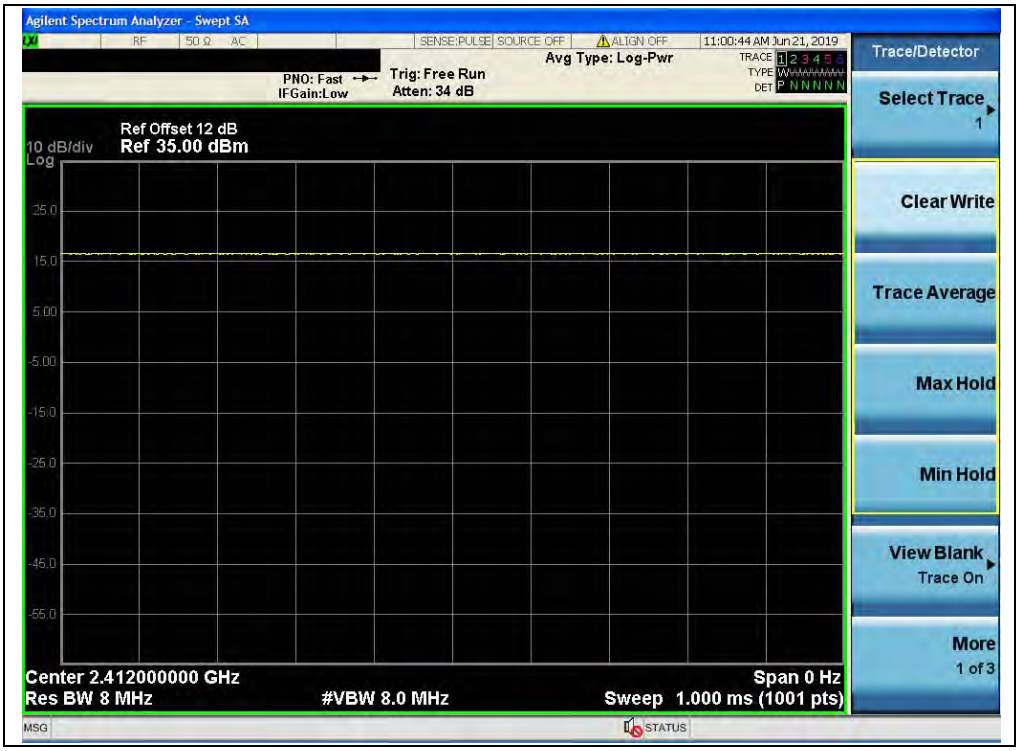
ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.

2.2.3. Test Result

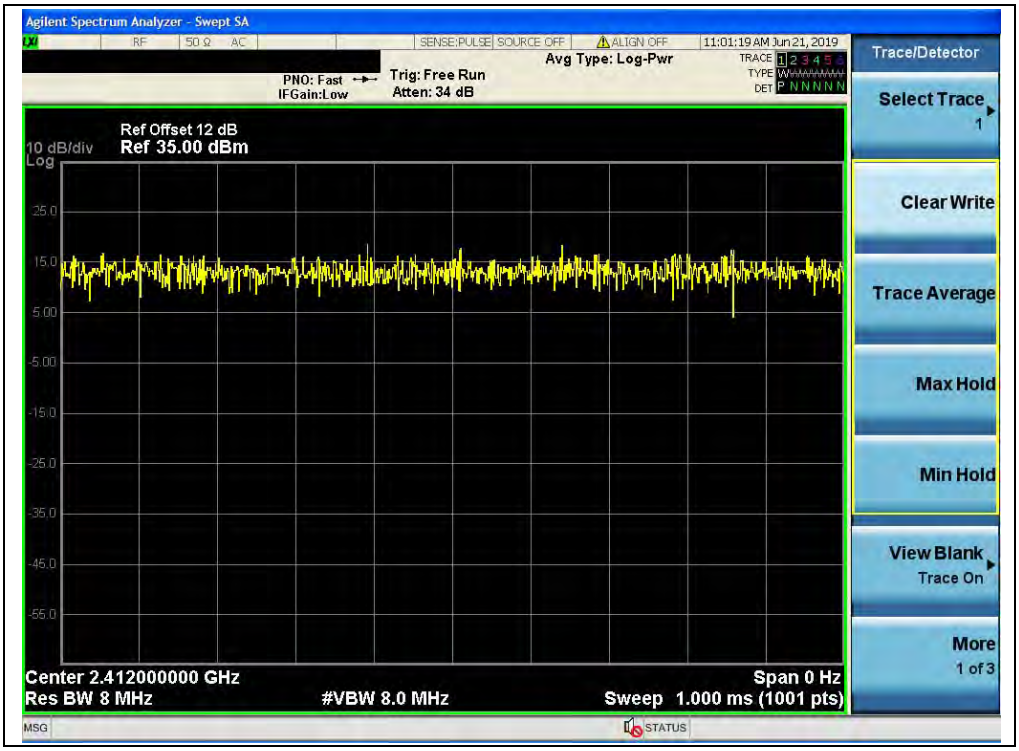
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*lg[1/D])
802.11b	100.00	0.00
802.11g	100.00	0.00
802.11n(HT20)	100.00	0.00
802.11n(HT40)	100.00	0.00

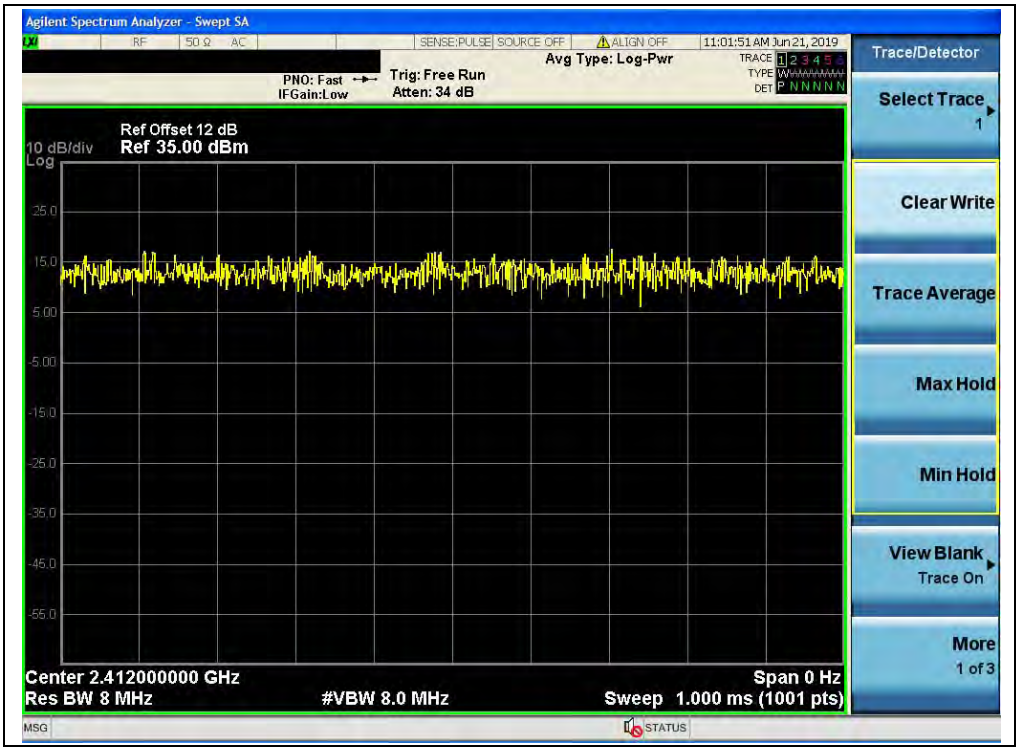
B. Test Plots



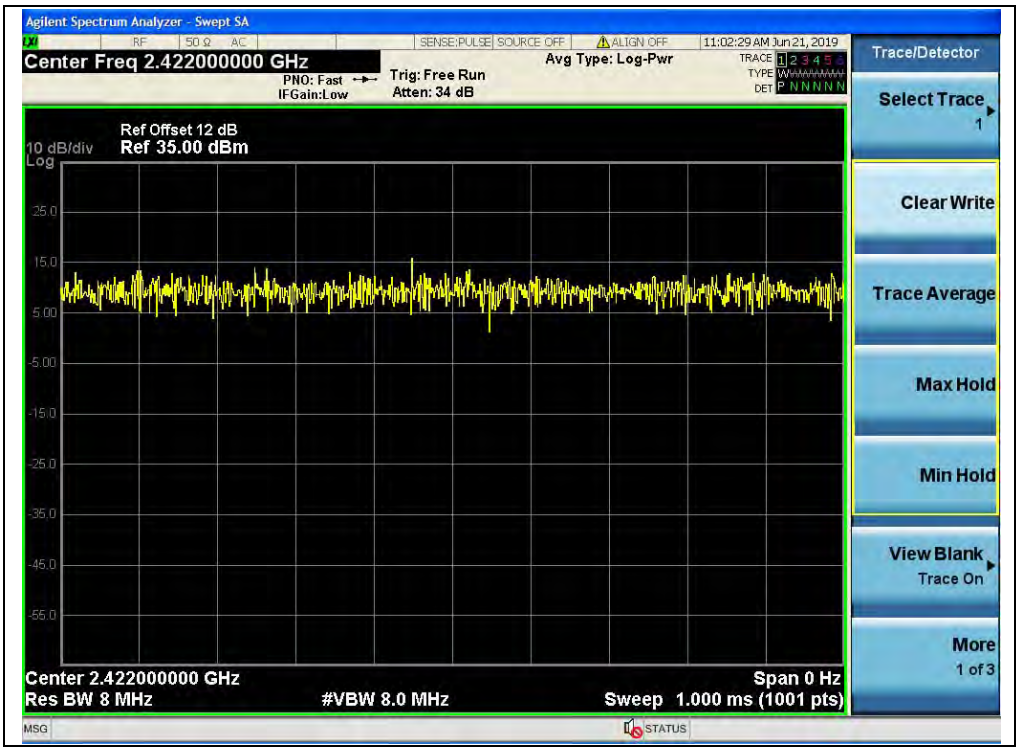
(Channel 1, 2412MHz, 802.11b)



(Channel 1, 2412MHz, 802.11g)



(Channel 1, 2412MHz, 802.11 n(HT20))



(Channel 3, 2422MHz, 802.11 n(HT40))

2.3. Maximum Peak and Average Conducted Output Power

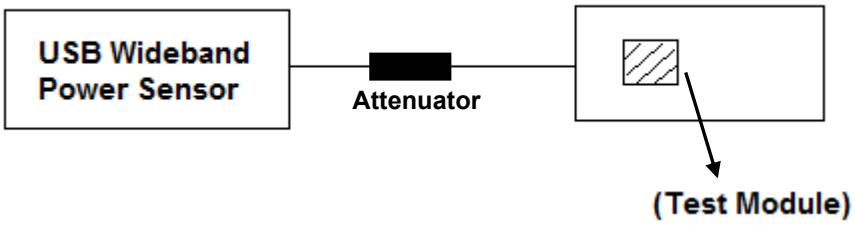
2.3.1. Requirement

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.

A. Test Setup:



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

2.3.3. Test Result

Maximum Peak Conducted Output Power

802.11b Test Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	15.34	0.034	30	1	PASS
6	2437	14.78	0.030			PASS
11	2462	14.60	0.029			PASS

802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	22.12	0.163	30	1	PASS
6	2437	21.77	0.150			PASS
11	2462	20.67	0.117			PASS

802.11n(HT20) Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	22.21	0.166	30	1	PASS
6	2437	21.57	0.144			PASS
11	2462	20.80	0.120			PASS

802.11n(HT40) Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	20.71	0.118	30	1	PASS
6	2437	20.40	0.110			PASS
9	2452	20.27	0.106			PASS

Maximum Average Conducted Output Power

802.11b Test Mode

Channel	Frequency (MHz)	Average Power			Limit		Verdict
		Measured	Duty factor Calculated				
		dBm	dBm	W	dBm	W	
1	2412	13.09	13.09	0.020	30	1	PASS
6	2437	12.45	12.45	0.018			PASS
11	2462	12.28	12.28	0.017			PASS

802.11g Test mode

Channel	Frequency (MHz)	Average Power			Limit		Verdict
		Measured	Duty factor Calculated				
		dBm	dBm	W	dBm	W	
1	2412	11.24	11.24	0.013	30	1	PASS
6	2437	10.66	10.66	0.012			PASS
11	2462	10.37	10.37	0.011			PASS

802.11n(HT20) Test mode

Channel	Frequency (MHz)	Average Power			Limit		Verdict
		Measured	Duty factor Calculated				
		dBm	dBm	W	dBm	W	
1	2412	11.28	11.28	0.013	30	1	PASS
6	2437	10.61	10.61	0.012			PASS
11	2462	19.09	10.28	0.011			PASS

802.11n(HT40) Test mode

Channel	Frequency (MHz)	Average Power			Limit		Verdict
		Measured	Duty factor Calculated				
		dBm	dBm	W	dBm	W	
3	2422	9.81	9.81	0.010	30	1	PASS
6	2437	9.38	9.38	0.009			PASS
9	2452	9.15	9.15	0.008			PASS

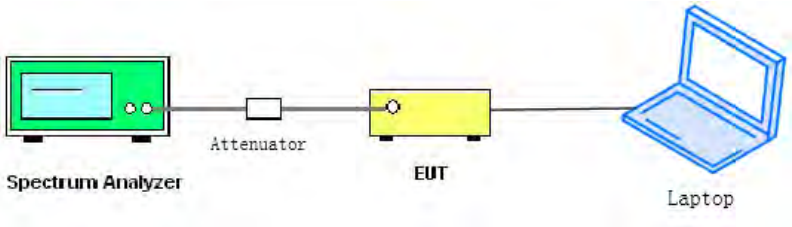
2.4. Bandwidth

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

A. Test Set:



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

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 Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	10.07	≥500	PASS
6	2437	10.10	≥500	PASS
11	2462	10.08	≥500	PASS

B. Test Plots

(Channel 1, 2412MHz, 802.11b)

(Channel 6, 2437 MHz, 802.11b)

(Channel 11, 2462MHz, 802.11b)

802.11g Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	16.57	≥500	PASS
6	2437	16.54	≥500	PASS
11	2462	16.57	≥500	PASS

B. Test Plots:

(Channel 1, 2412MHz, 802.11g)

(Channel 6, 2437MHz, 802.11g)

(Channel 11, 2462MHz, 802.11g)

802.11n(HT20) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	17.80	≥500	PASS
6	2437	17.81	≥500	PASS
11	2462	17.76	≥500	PASS

B. Test Plots:

(Channel 1, 2412MHz, 802.11n(HT20))

(Channel 6, 2437MHz, 802.11n(HT20))

(Channel 11, 2462MHz, 802.11n(HT20))

802.11n(HT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
3	2422	36.59	≥500	PASS
6	2437	36.57	≥500	PASS
9	2452	36.58	≥500	PASS

B. Test Plots:

(Channel 3, 2422Mz, 802.11n(HT40))

(Channel 6, 2437MHz, 802.11n(HT40))

(Channel 9, 2452MHz, 802.11n(HT40))

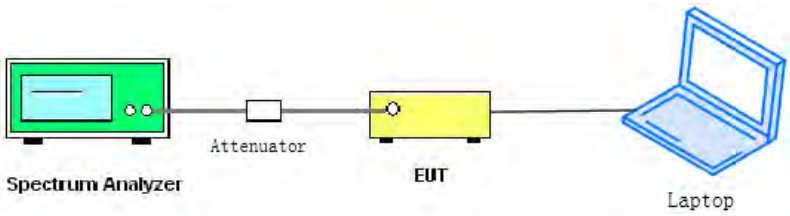
2.5. Conducted Spurious Emissions and Band Edge

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

A. Test Set:



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

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

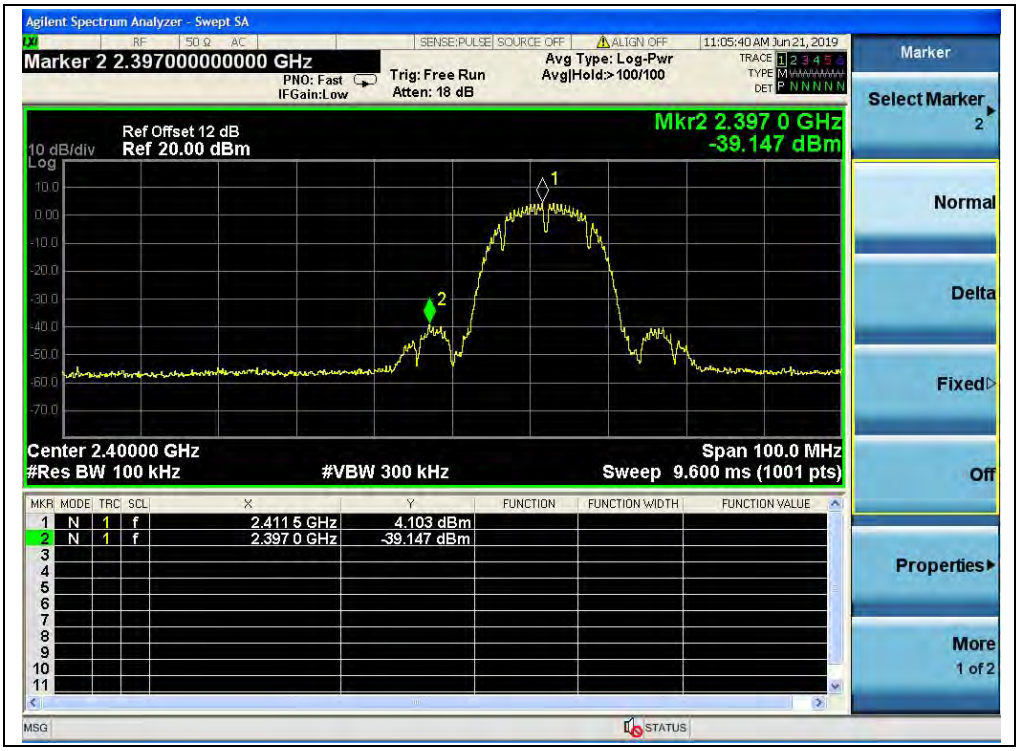
802.11b Test mode

A. Test Verdict:

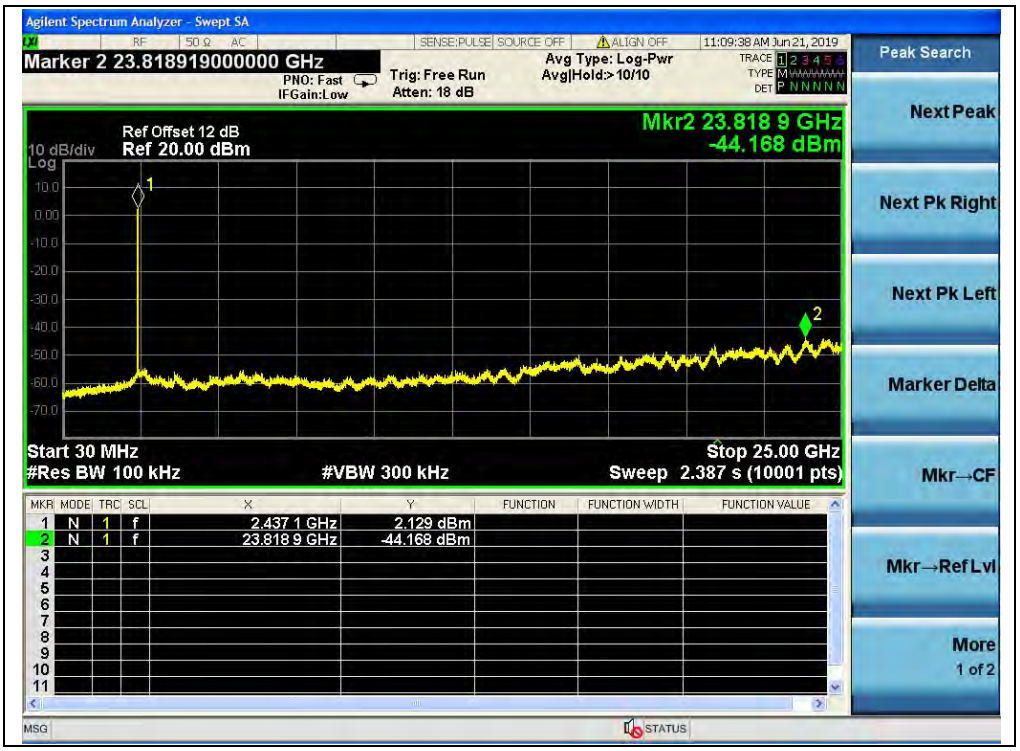
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-43.27	3.49	-16.51	PASS
6	2437	-44.17	2.13	-17.87	PASS
11	2462	-45.10	2.75	-17.25	PASS

B. Test Plots:

(Channel = 1, 30MHz to 25GHz)

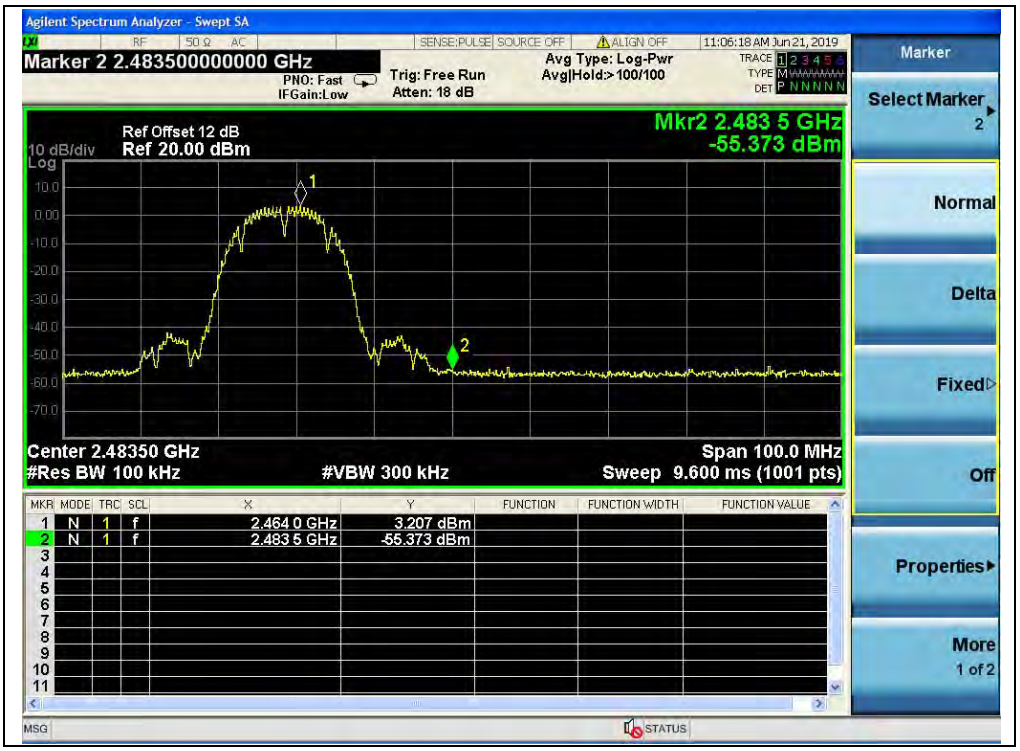


(Band Edge, Channel = 1)



(Channel = 6, 30MHz to 25GHz)

(Channel = 11, 30MHz to 25GHz)



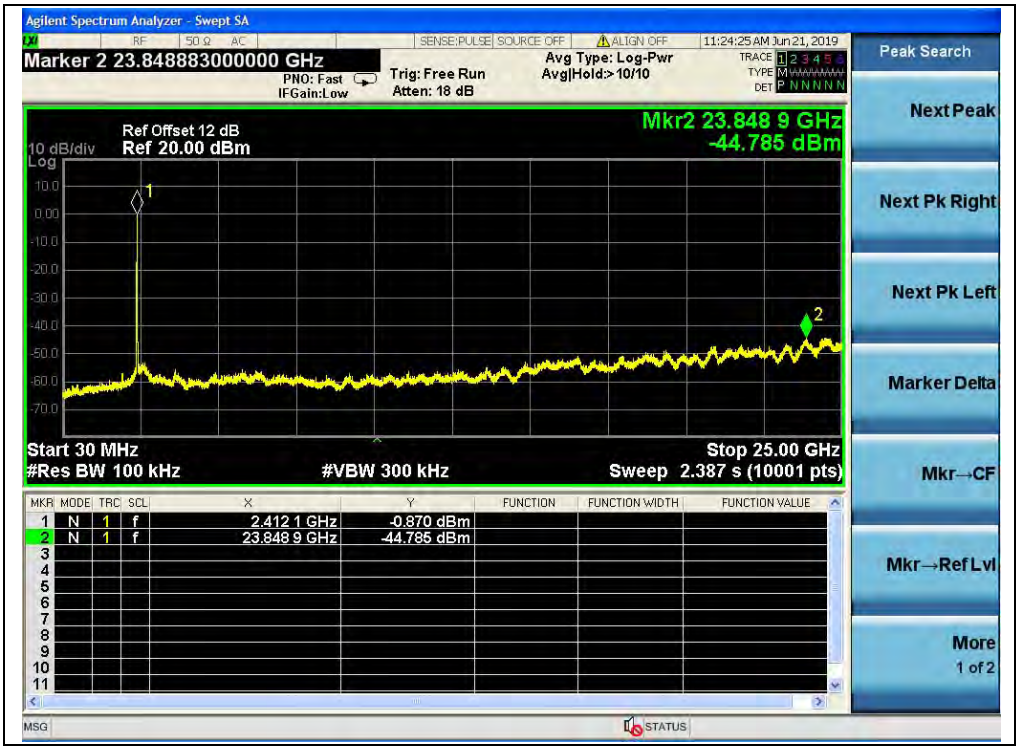
(Band Edge, Channel = 11)

802.11g Test mode

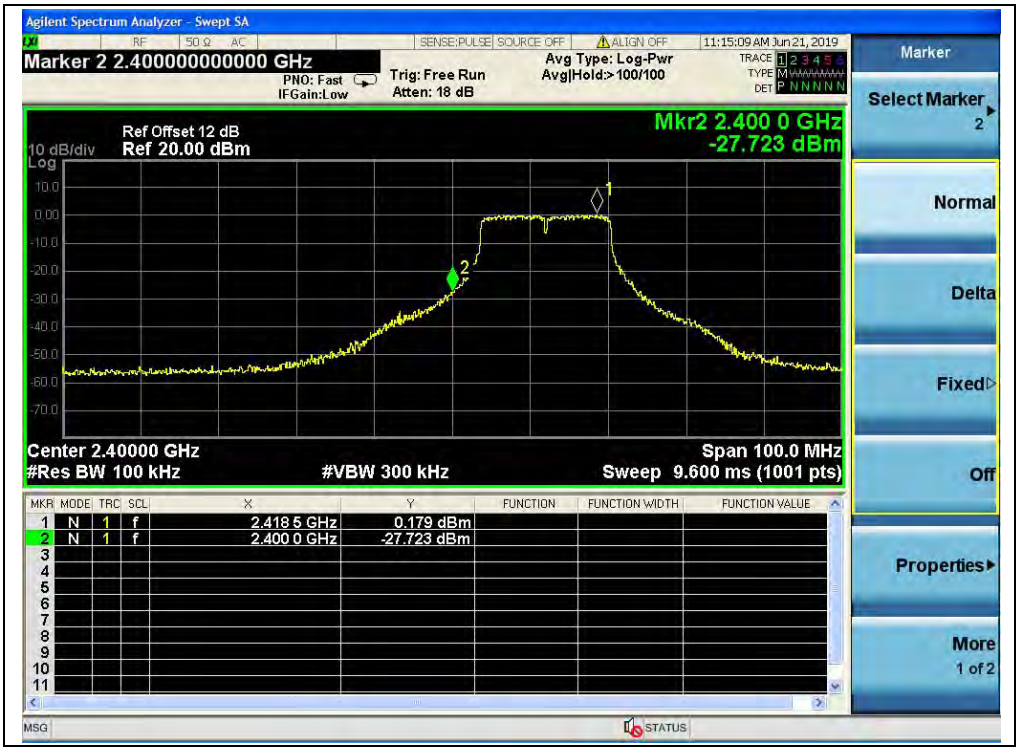
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-44.79	-0.87	-20.87	PASS
6	2437	-43.92	-1.44	-21.44	PASS
11	2462	-45.06	-1.32	-21.32	PASS

B. Test Plots:



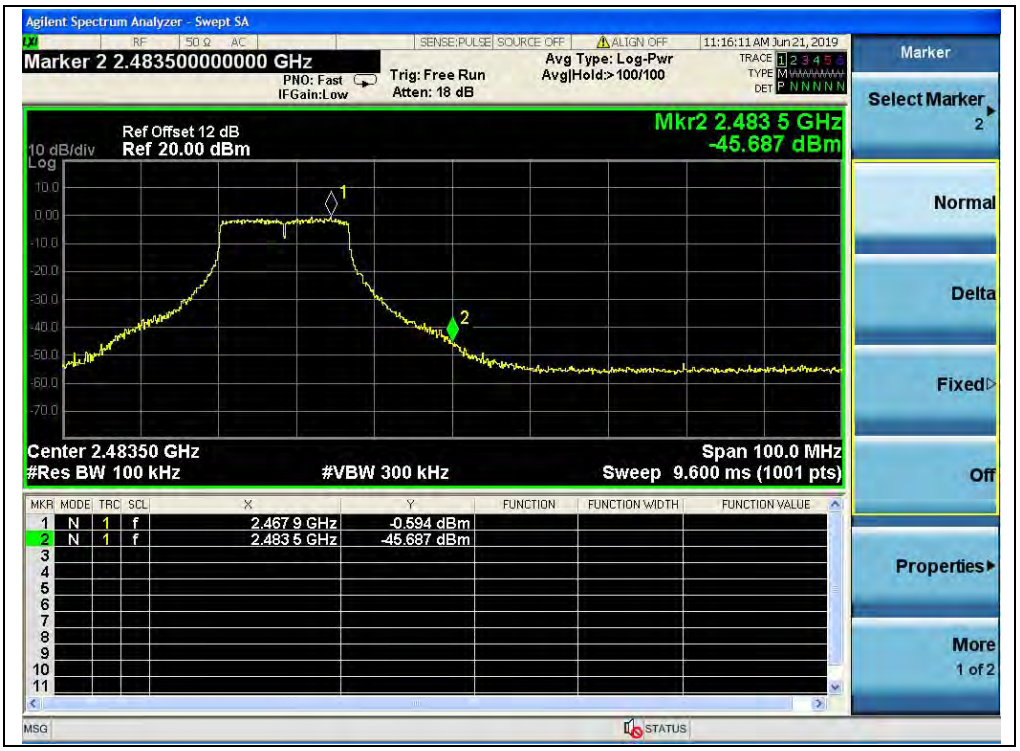
(Channel = 1, 30MHz to 25GHz)



(Band Edge, Channel = 1)

(Channel = 6, 30MHz to 25GHz)

(Channel = 11, 30MHz to 25GHz)



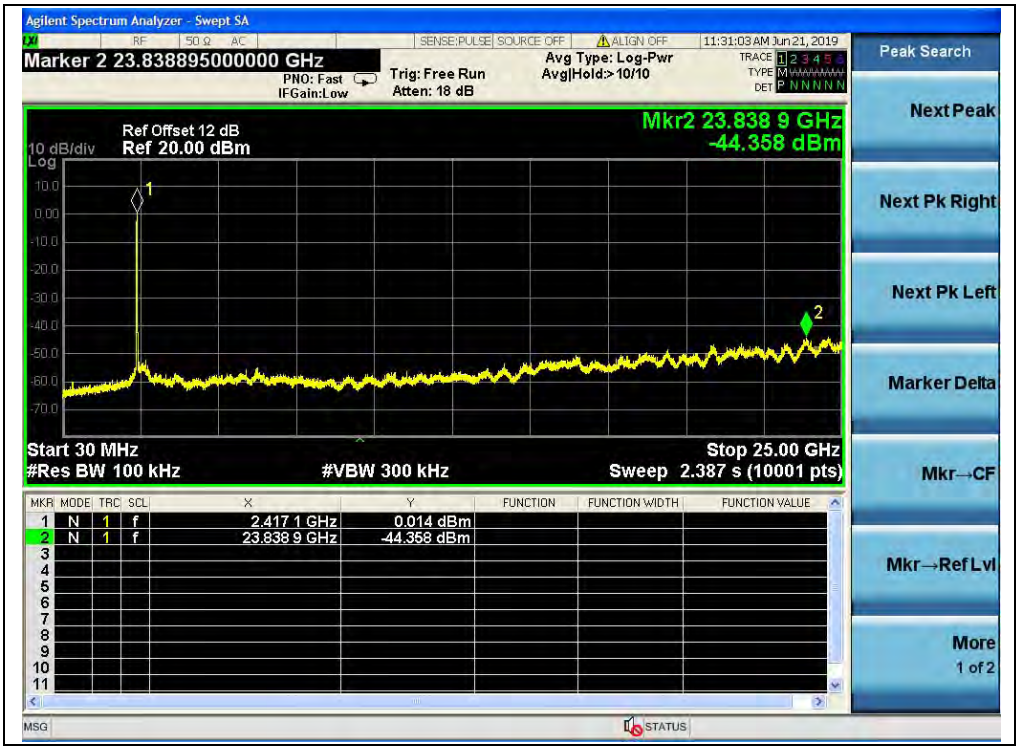
(Band Edge, Channel = 11)

802.11n(HT20) Test mode

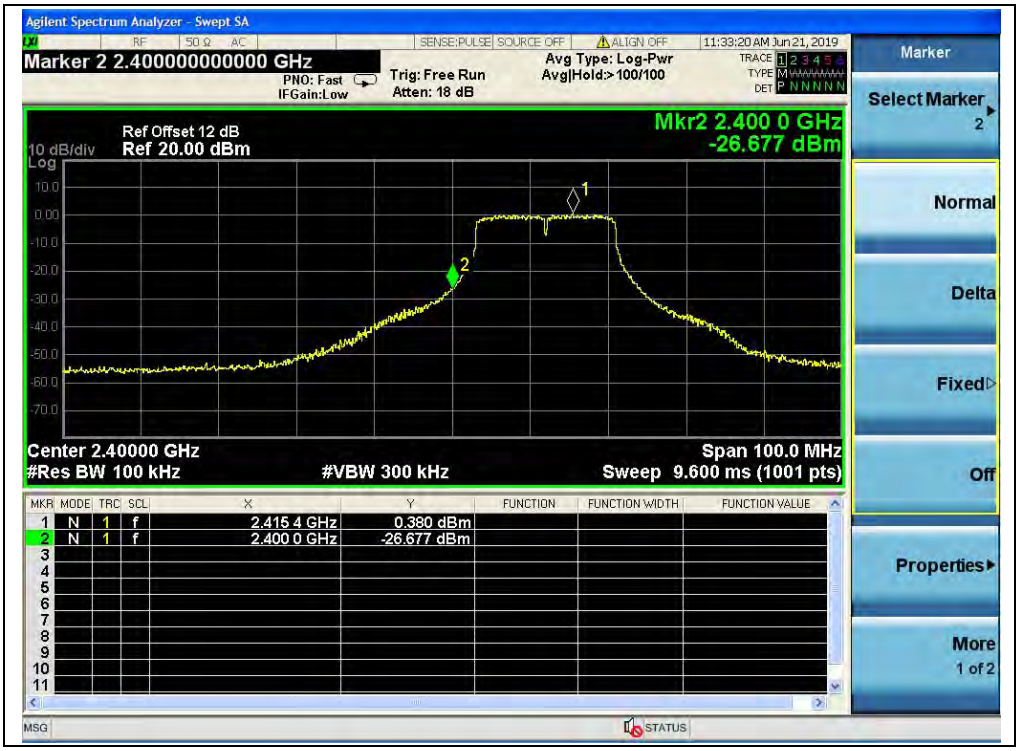
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-44.36	0.01	-19.99	PASS
6	2437	-42.97	-1.72	-21.72	PASS
11	2462	-43.13	-1.47	-21.47	PASS

B. Test Plots:



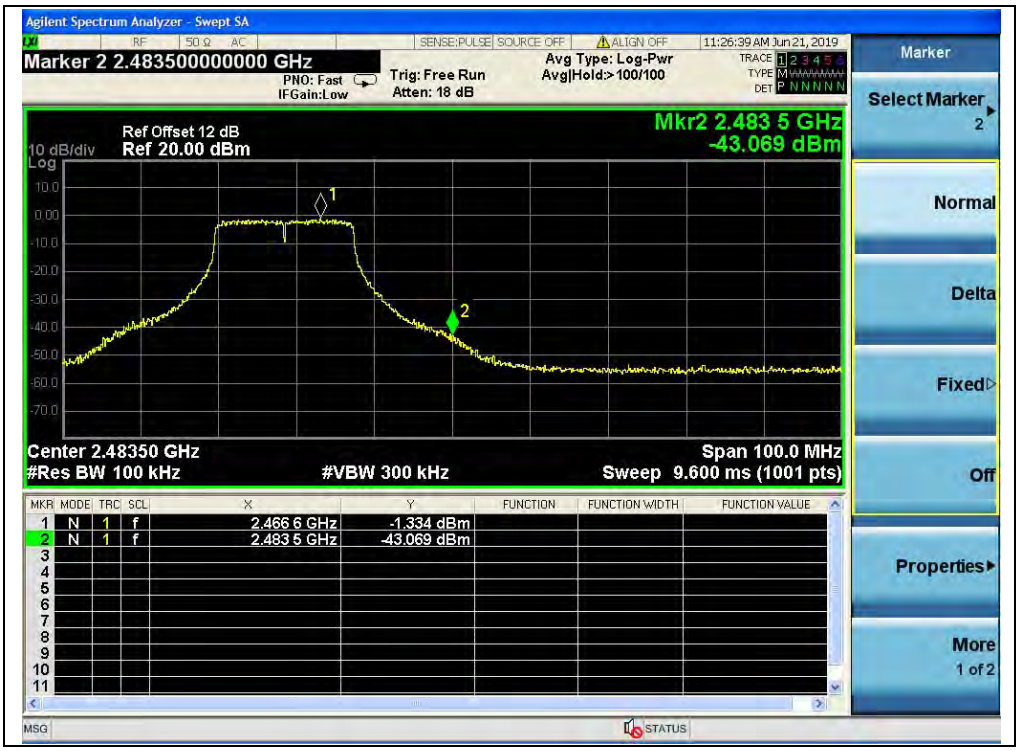
(Channel = 1, 30MHz to 25GHz)



(Band Edge, Channel = 1)

(Channel = 6, 30MHz to 25GHz)

(Channel = 11, 30MHz to 25GHz)



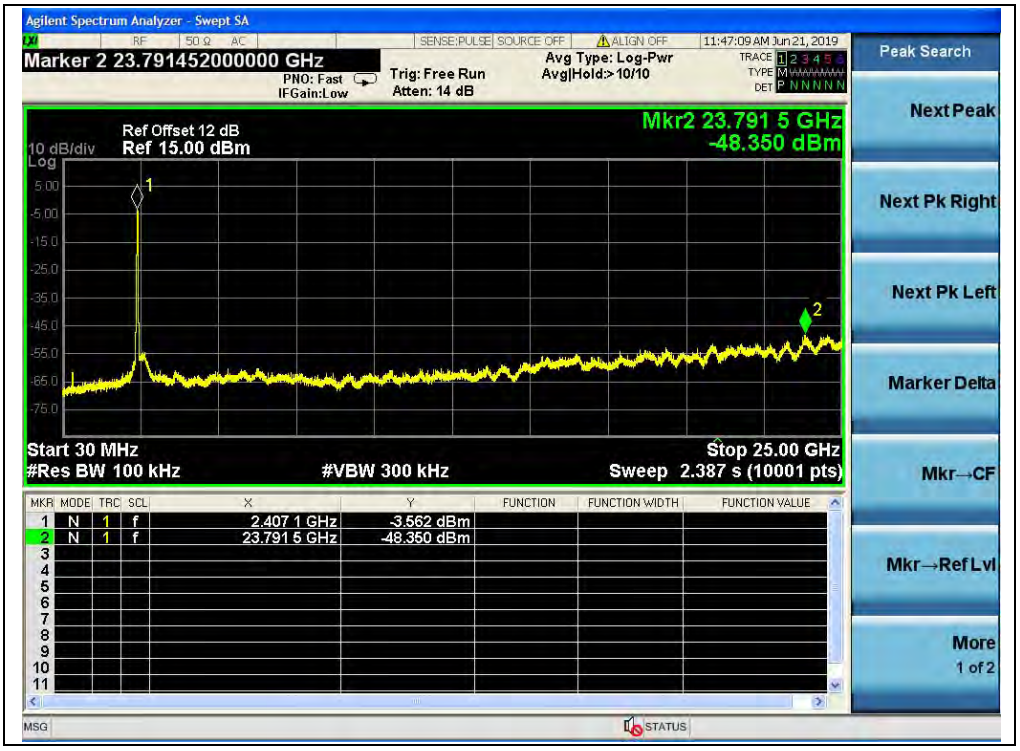
(Band Edge, Channel = 11)

802.11n(HT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-48.35	-3.56	-23.56	PASS
6	2437	-46.49	-3.59	-23.59	PASS
9	2452	-47.76	-3.83	-23.83	PASS

B. Test Plots:



(Channel = 3, 30MHz to 25GHz)

(Band Edge, Channel = 3)

(Channel = 6, 30MHz to 25GHz)

(Channel = 9, 30MHz to 25GHz)

(Band Edge, Channel = 9)

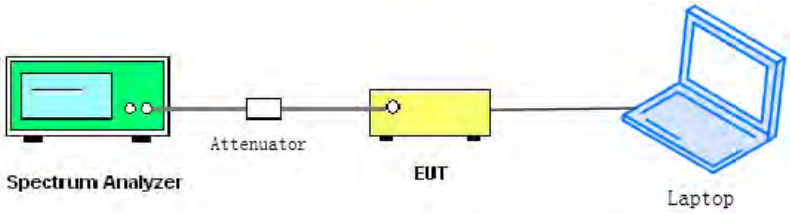
2.6. Power spectral density (PSD)

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

A. Test Set:



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

2.6.3. Test procedure

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

2.6.4. Test Result

802.11b Test mode

A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-10.11	8	PASS
6	2437	-9.84	8	PASS
11	2462	-9.51	8	PASS

B. Test Plots:

(Channel = 1, 802.11b)

(Channel = 6, 802.11b)

(Channel = 11, 802.11b)

802.11g Test mode

A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-12.74	8	PASS
6	2437	-13.54	8	PASS
11	2462	-13.72	8	PASS

B. Test Plots:

(Channel = 1, 802.11g)

(Channel = 6, 802.11g)

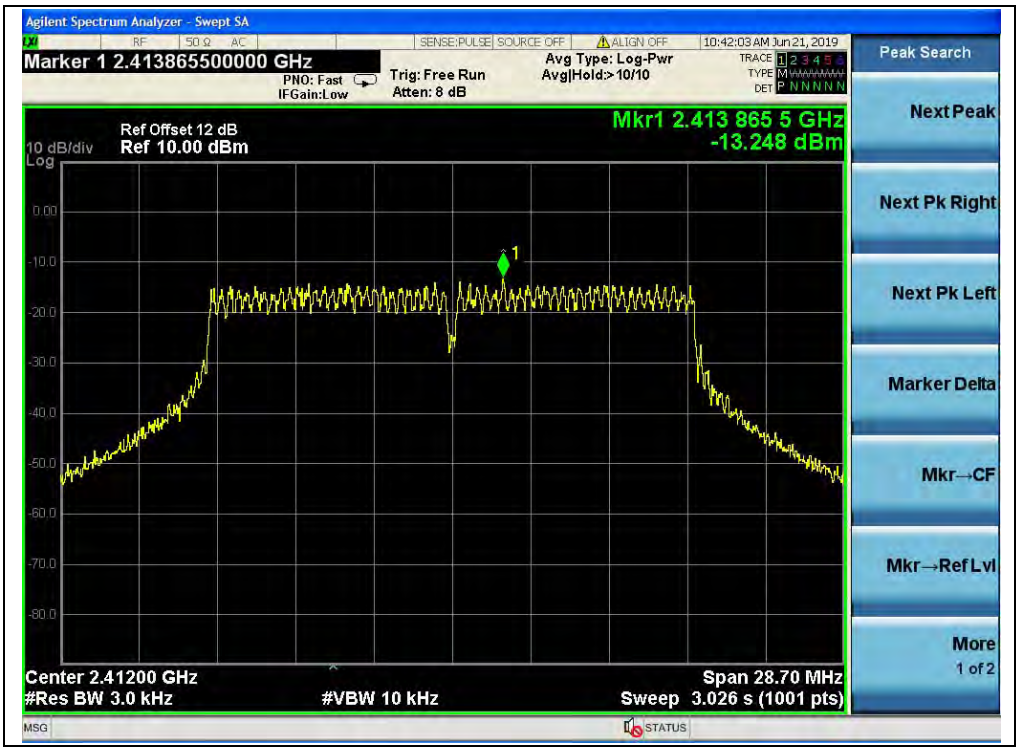
(Channel = 11, 802.11g)

802.11n(HT20) Test mode

A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-13.25	8	PASS
6	2437	-13.35	8	PASS
11	2462	-13.78	8	PASS

B. Test Plots:



(Channel = 1, 802.11n(HT20))

(Channel = 6, 802.11n(HT20))

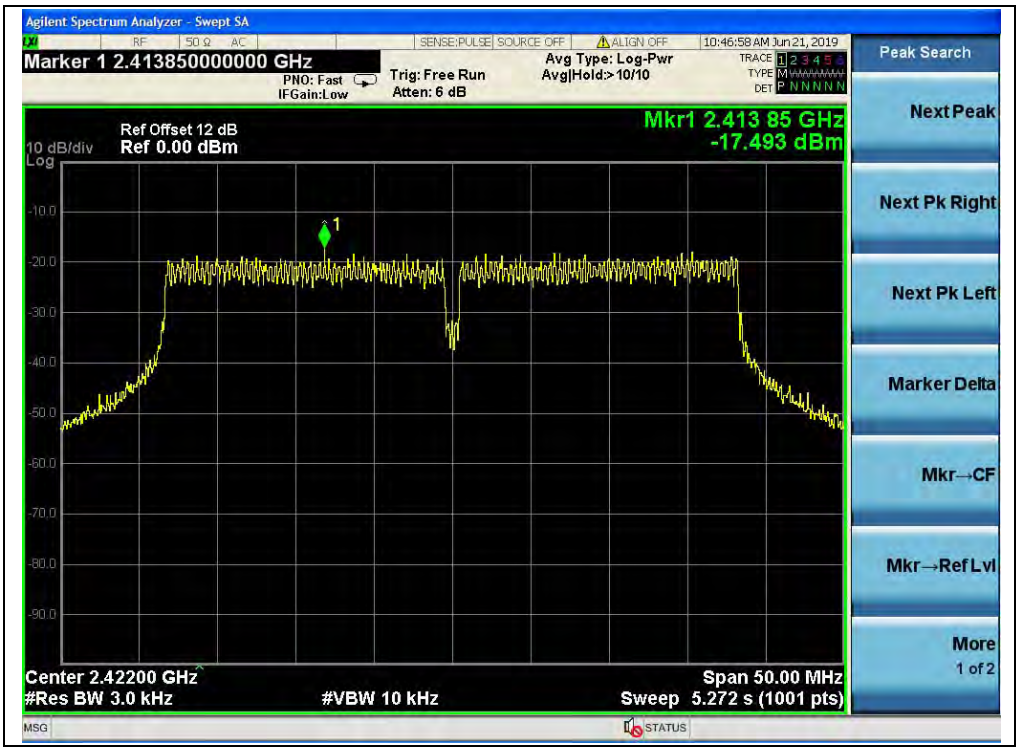
(Channel = 11, 802.11n(HT20))

802.11n(HT40) Test mode

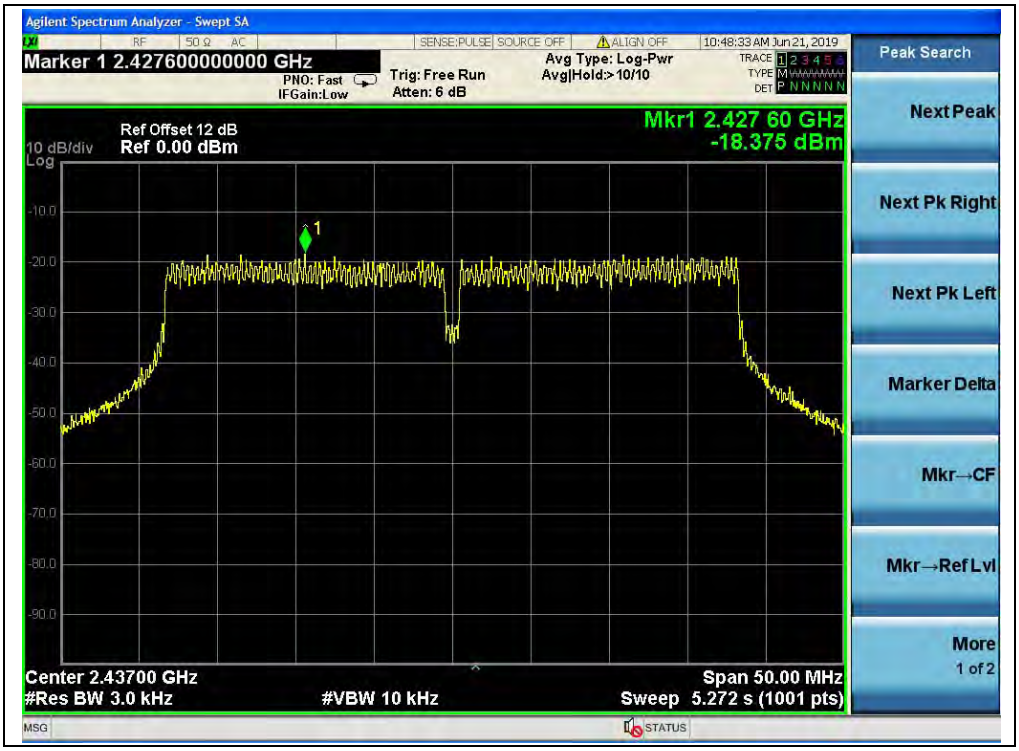
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
3	2422	-17.49	8	PASS
6	2437	-18.38	8	PASS
9	2452	-18.16	8	PASS

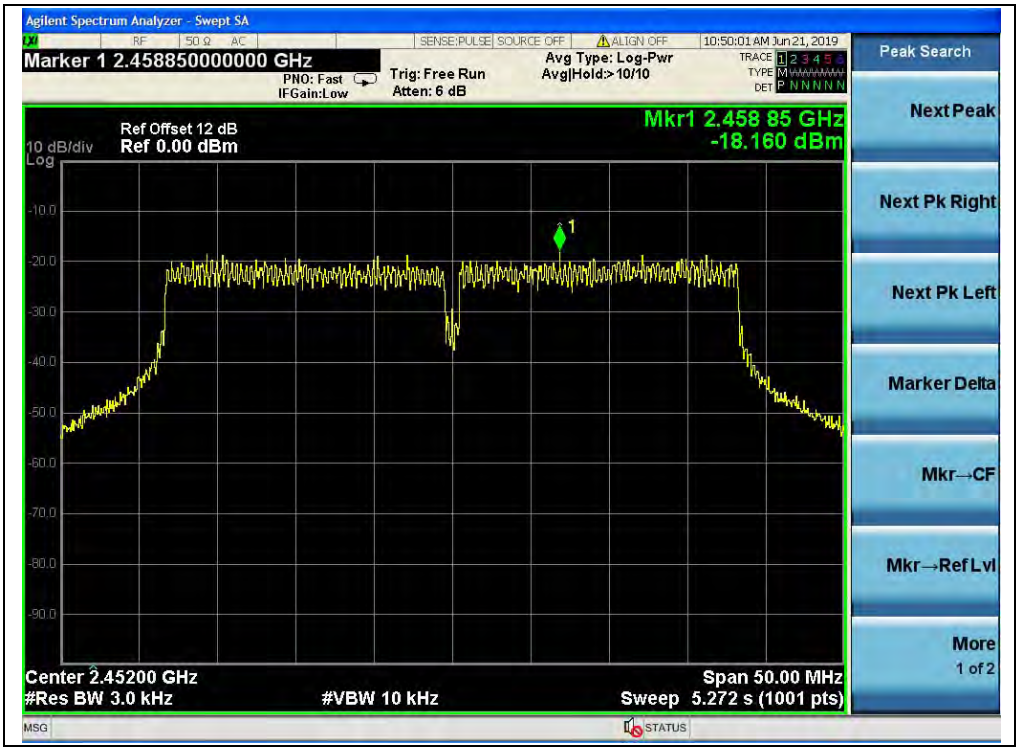
B. Test Plots:



(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 50μH/50Ω line impedance stabilization network (LISN).

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

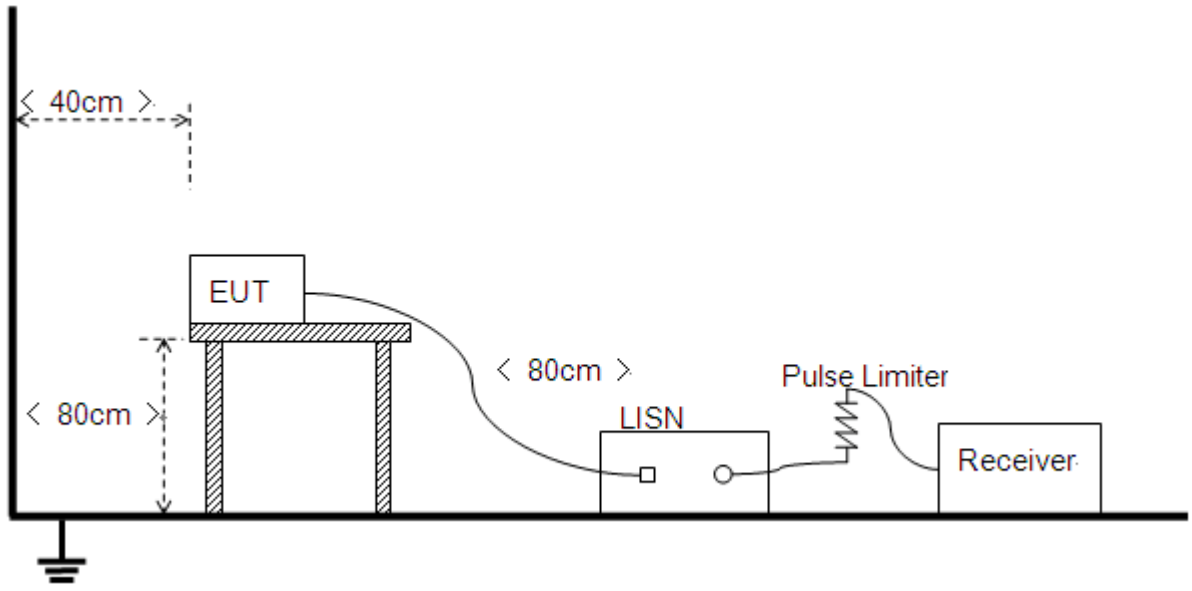
NOTE:

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

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

2.7.2. Test Description

A. Test Setup:



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

2.7.3. Test Result

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

Note: 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 + Network Cable + Ethernet POE Switch +Adapter+WIFI TX

Test Voltage: AC 120V/60Hz

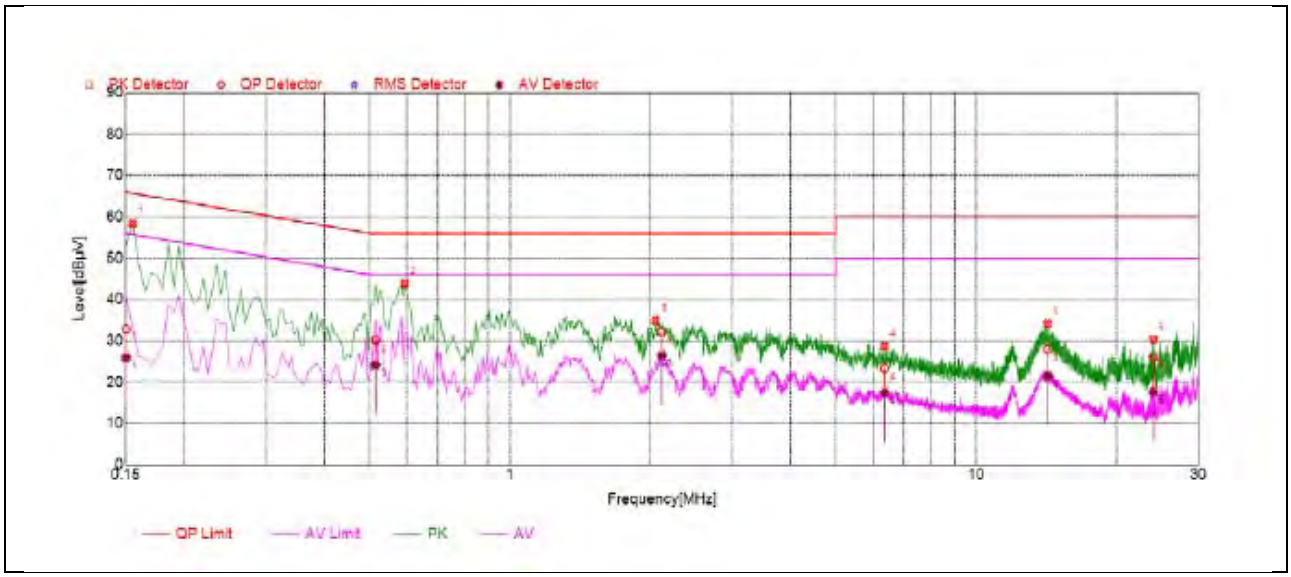
The measurement results are obtained as below:

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

U_R: Receiver Reading

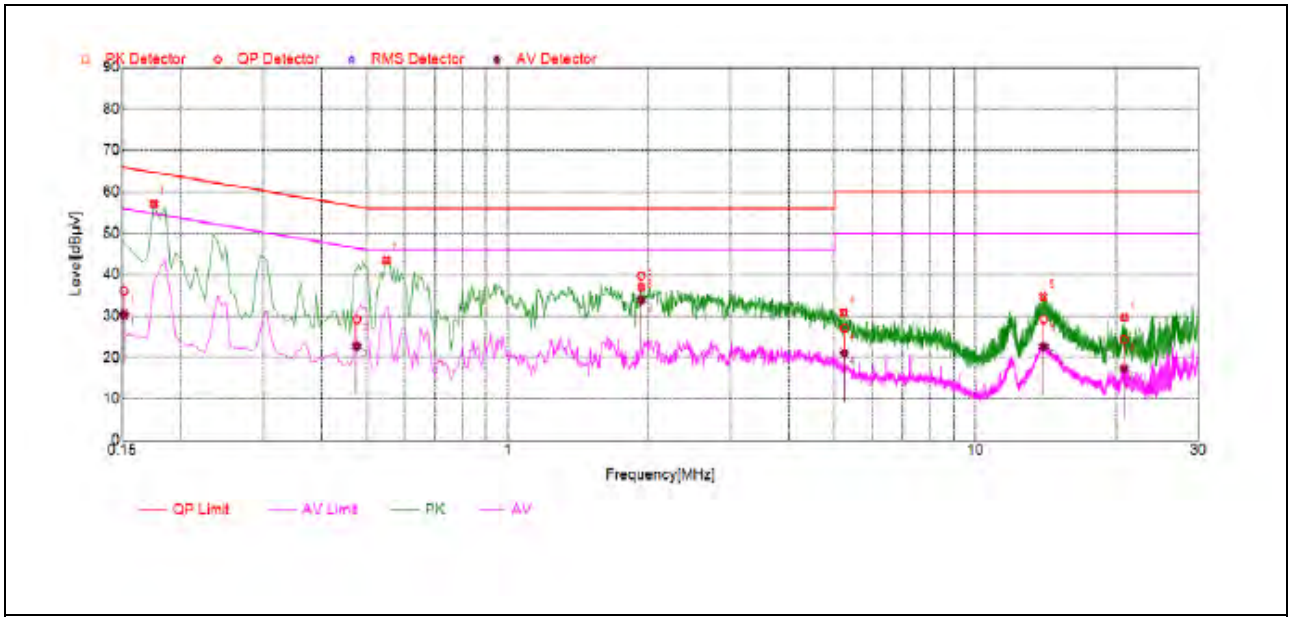
A_{Factor}: Voltage division factor of LISN

B. Test Plots:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1506	32.85	25.89	66.00	56.00	Line	PASS
2	0.3622	30.17	24.09	56.00	46.00		PASS
3	0.73	32.16	26.42	56.00	46.00		PASS
4	1.338	23.34	17.43	60.00	50.00		PASS
5	4.2648	27.95	21.57	60.00	50.00		PASS
6	24.0006	26.12	17.71	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	0.1546	36.12	30.35	65.94	55.94	Neutral	PASS
2	0.3538	29.16	22.71	56.43	46.43		PASS
3	0.7418	39.68	33.92	56.00	46.00		PASS
4	3.12	27.04	21.07	60.00	50.00		PASS
5	4.254	29.18	22.61	60.00	50.00		PASS
6	24.0004	24.32	17.29	60.00	50.00		PASS

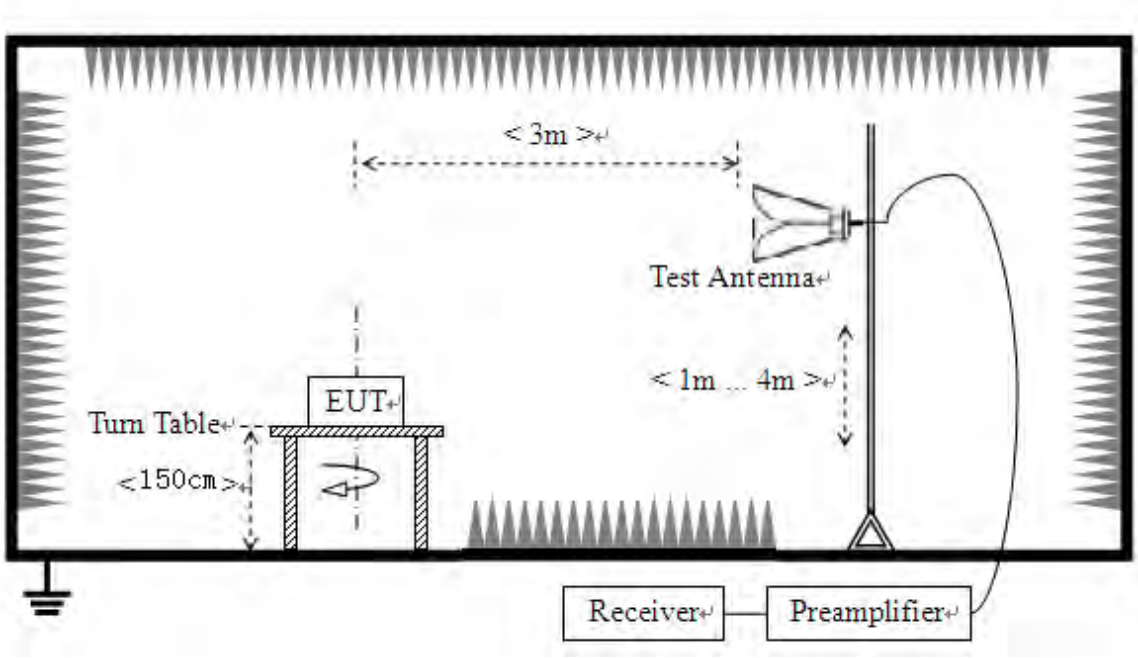
2.8. Restricted Frequency Bands

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

A. 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 Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
1	2387.47	PK	54.98	-47.23	32.60	40.35	74	PASS
1	2387.47	AV	41.80	-47.23	32.60	27.17	54	PASS
11	2484.83	PK	53.98	-47.31	32.60	39.27	74	PASS
11	2484.83	AV	41.41	-47.31	32.60	26.70	54	PASS

B. Test Plots:

(Channel = 1 PEAK, 802.11b)

(Channel = 1 AVG, 802.11b)

(Channel = 11 PEAK, 802.11b)

(Channel = 11 AVG, 802.11b)

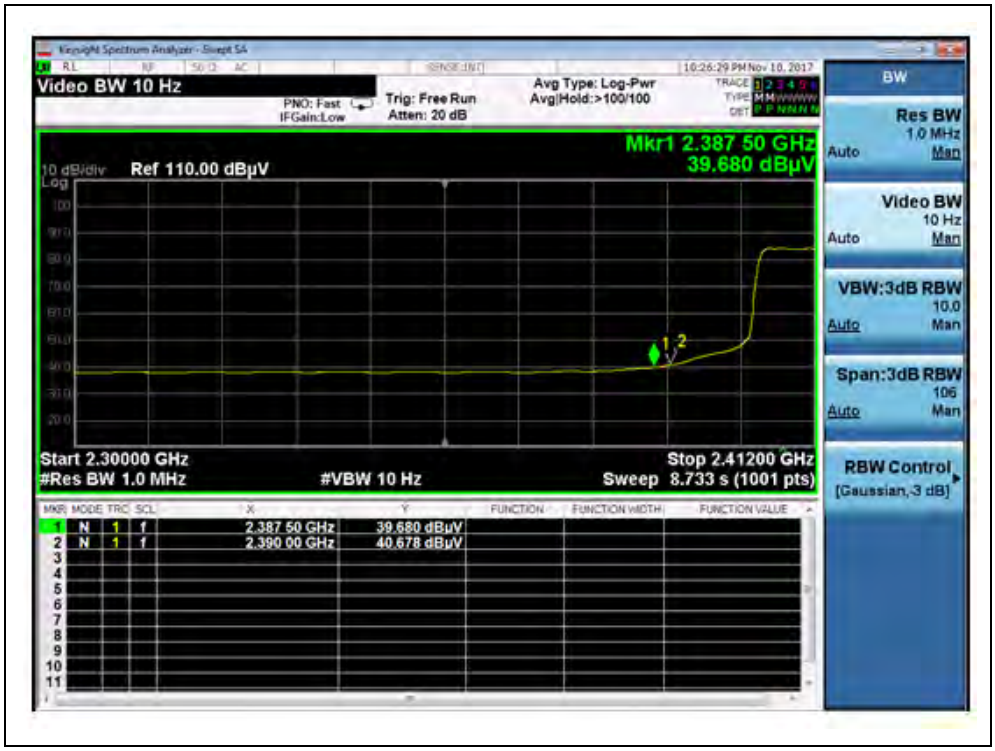
802.11g Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
1	2387.50	PK	56.27	-47.23	32.60	41.64	74	PASS
1	2387.50	AV	39.68	-47.23	32.60	25.05	54	PASS
11	2484.30	PK	53.90	-47.31	32.60	39.19	74	PASS
11	2484.30	AV	40.33	-47.31	32.60	25.62	54	PASS

B. Test Plots:

(Channel = 1 PEAK, 802.11g)



(Channel = 1 AVG, 802.11g)

(Channel = 11 PEAK, 802.11g)

(Channel = 11 AVG, 802.11g)

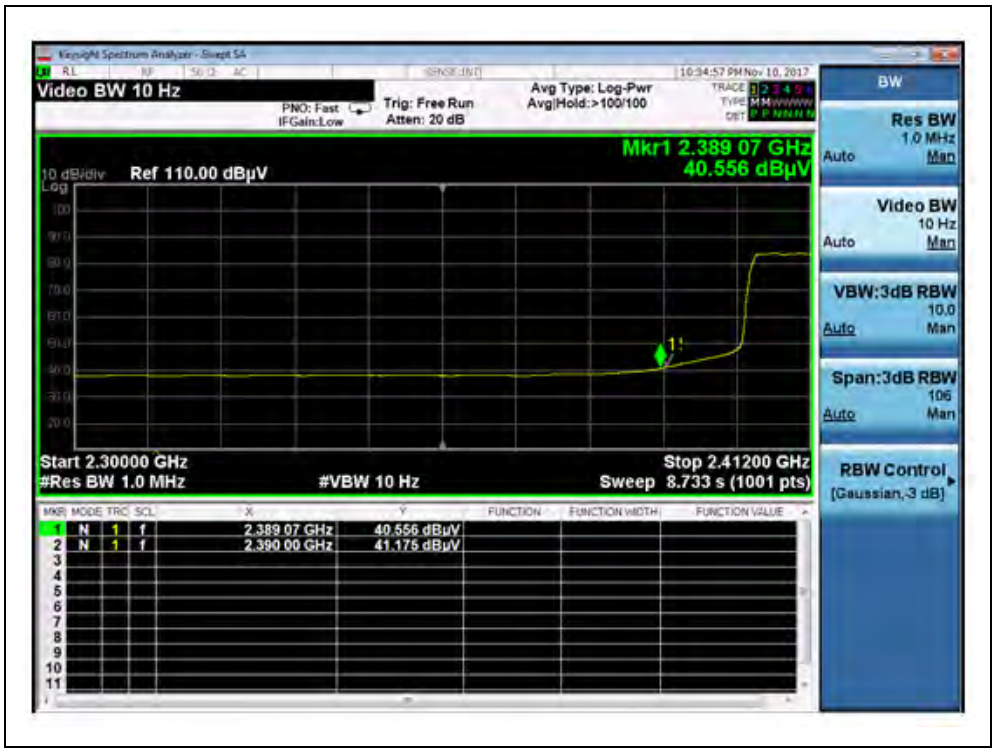
802.11 n(HT20) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
1	2389.07	PK	57.32	-47.23	32.60	42.69	74	PASS
1	2389.07	AV	40.56	-47.23	32.60	25.93	54	PASS
11	2484.30	PK	55.96	-47.31	32.60	41.25	74	PASS
11	2484.30	AV	41.30	-47.31	32.60	26.59	54	PASS

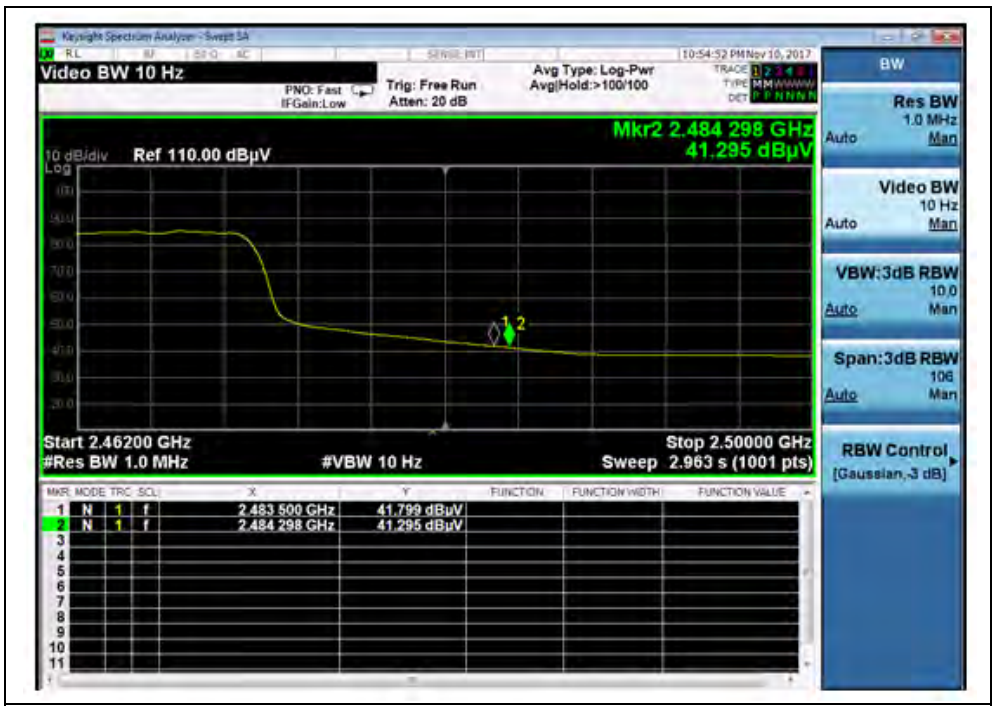
B. Test Plots:

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



(Channel = 1 AVG, 802.11n(HT20))

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



(Channel = 11 AVG, 802.11n(HT20))

802.11n(HT40) Test mode

A. Test Verdict:

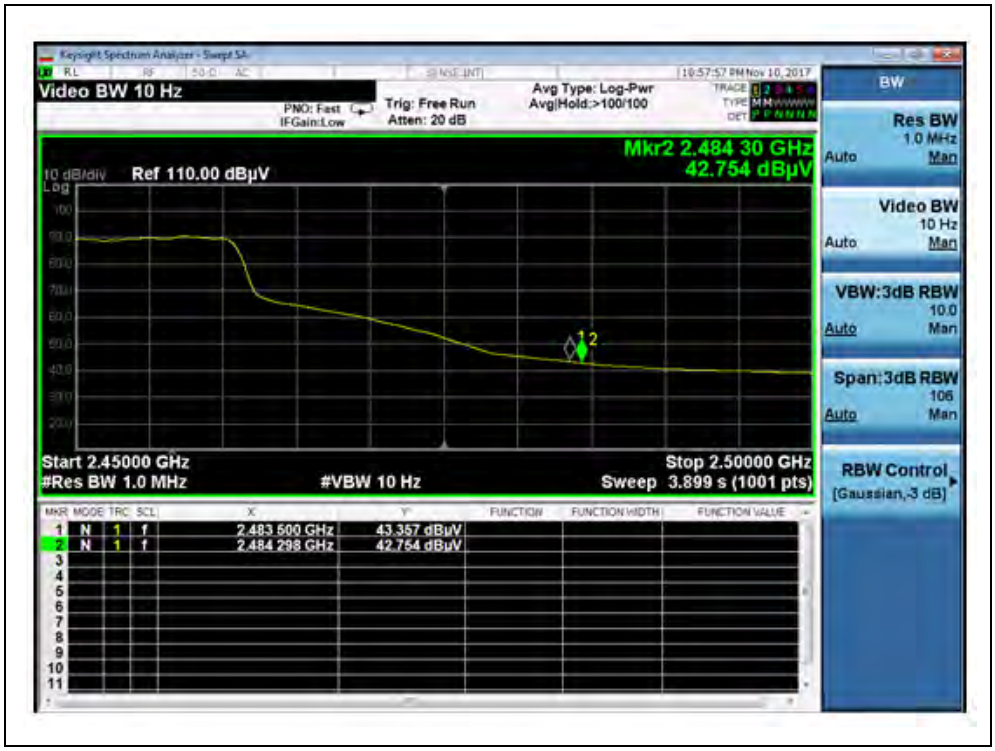
Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
3	2387.50	PK	62.43	-47.23	32.6	47.80	74	PASS
3	2387.50	AV	45.37	-47.23	32.6	30.74	54	PASS
9	2484.30	PK	56.36	-47.31	32.6	41.65	74	PASS
9	2484.30	AV	42.75	-47.31	32.6	28.04	54	PASS

B. Test Plots:

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

(Channel = 3 AVG, 802.11n(HT40))

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



(Channel = 9 AVG, 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

Note:

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

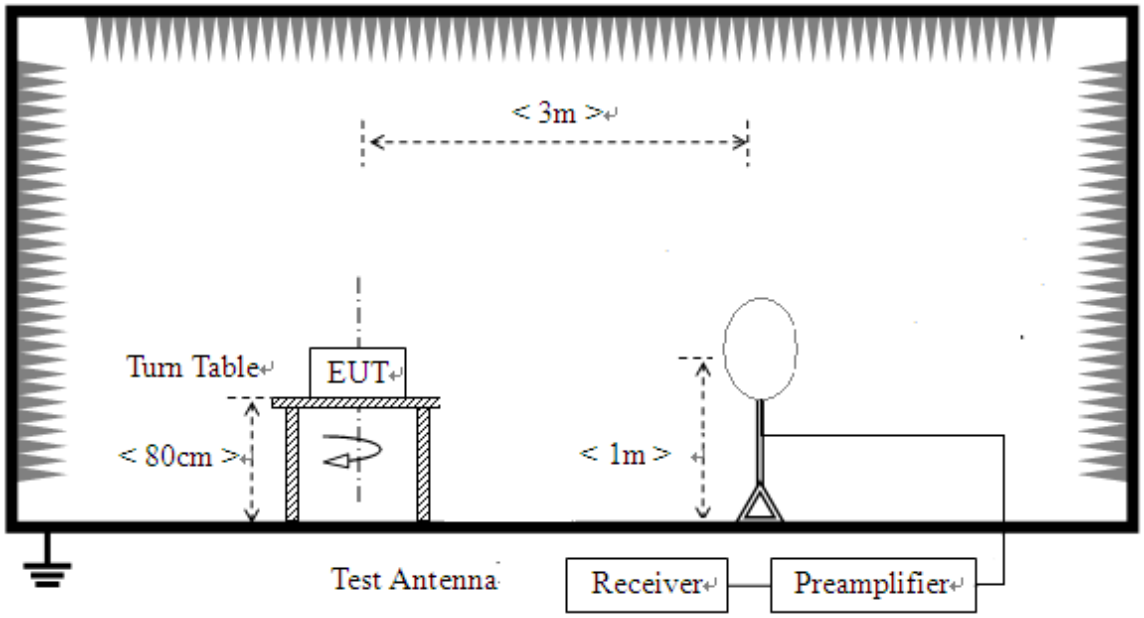
For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

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)

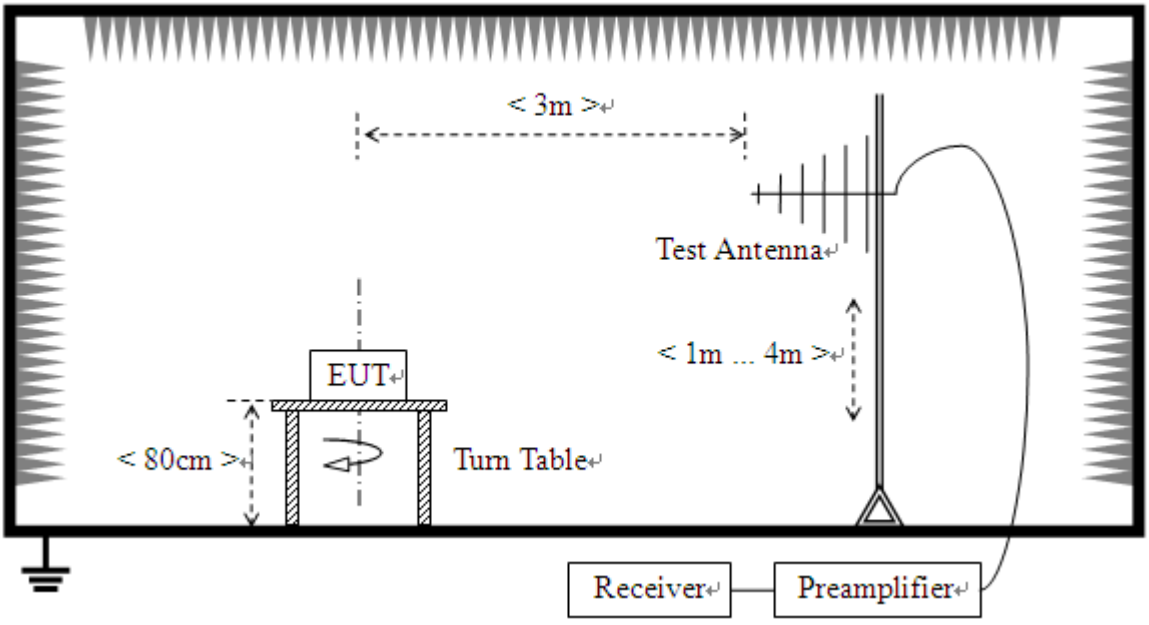
2.9.2. Test Description

A. Test Setup:

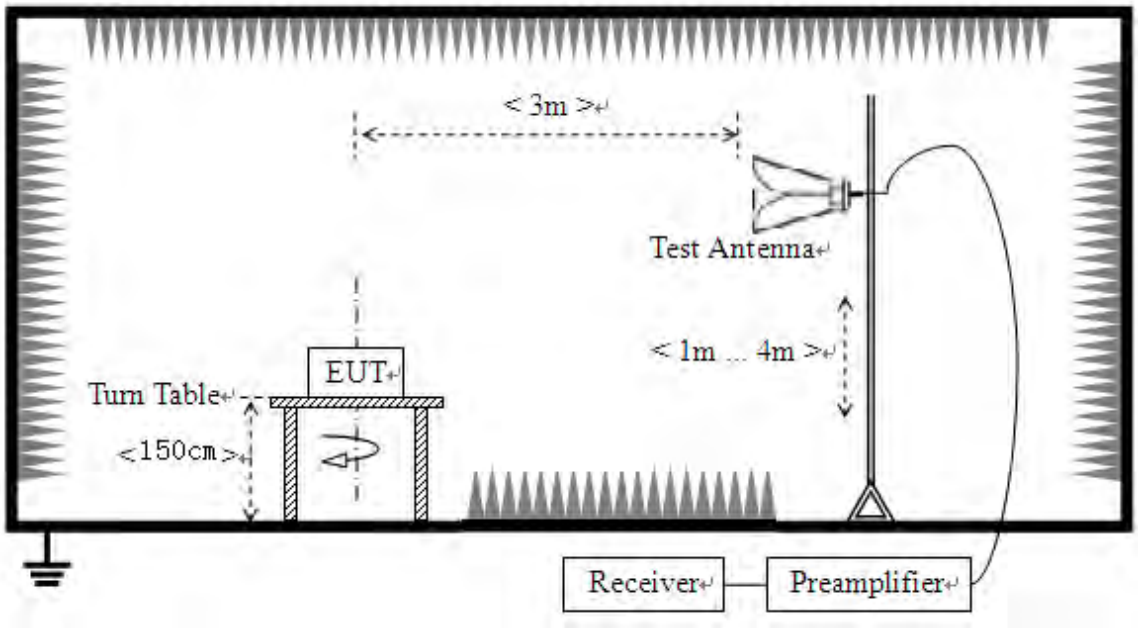
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



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

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2013). For radiated emissions below or equal to 1GHz, The EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading

For the Test Antenna:

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

2.9.3. Test Result

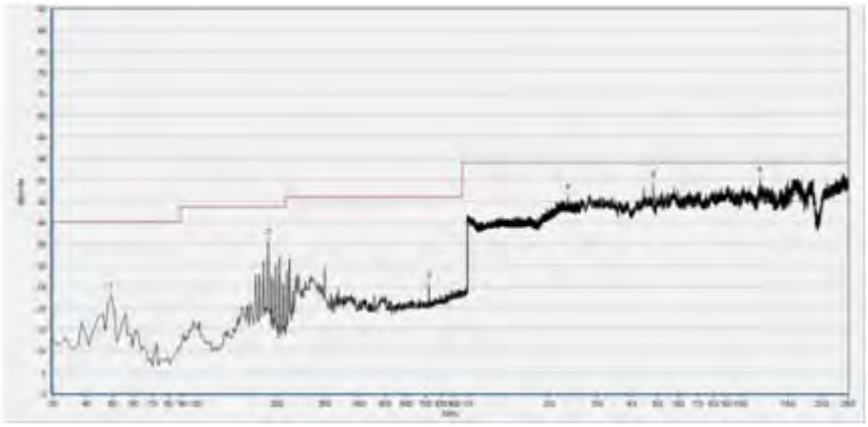
According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:
$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m
During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Note2: For the frequency, which started from 9 kHz 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 25GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

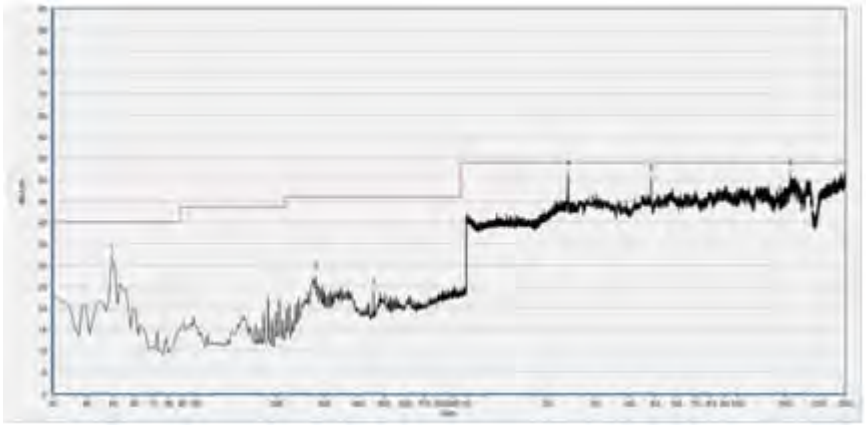
802.11b Test mode

Plots 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
49.424	22.71	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
185.394	35.14	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
723.204	25.00	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2344.538	45.73	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4824.113	48.56	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11834.552	49.84	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

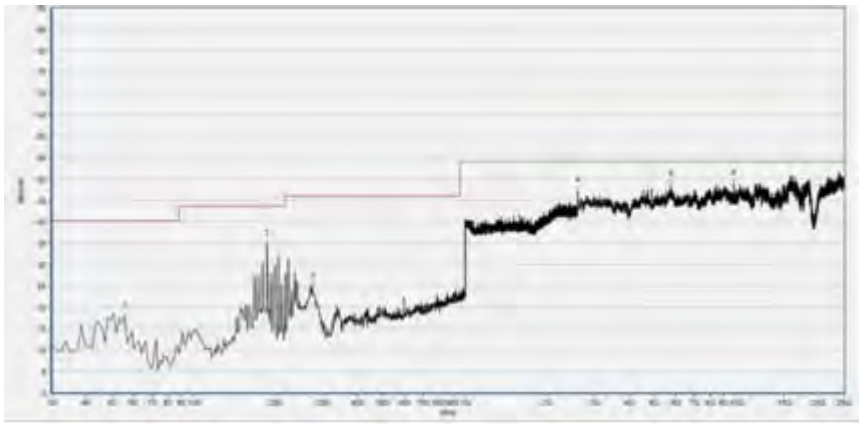
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
49.424	31.45	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
278.874	27.22	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
456.120	23.59	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2385.514	51.32	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4824.113	50.16	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
49.424	31.45	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

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
55.494	17.72	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
185.394	34.76	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
274.018	24.61	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2608.147	47.02	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5744.717	48.65	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
9748.936	48.80	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

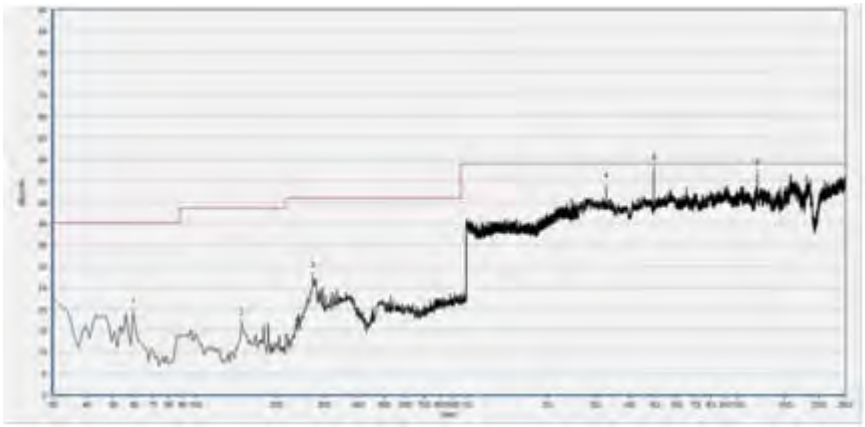
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
50.638	28.32	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
278.874	27.78	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
1895.718	42.05	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2811.820	47.65	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4872.995	52.58	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11740.862	49.51	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

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
55.494	15.79	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
185.394	35.23	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
480.401	20.32	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3272.122	46.53	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4925.950	50.87	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
15753.228	49.75	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

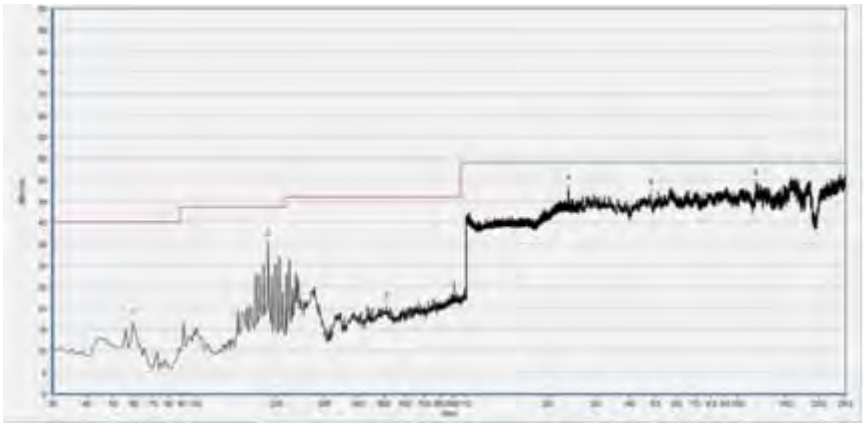


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
59.136	19.21	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
148.974	16.54	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
272.804	27.61	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
3284.343	48.65	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4925.950	52.73	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11871.213	51.56	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

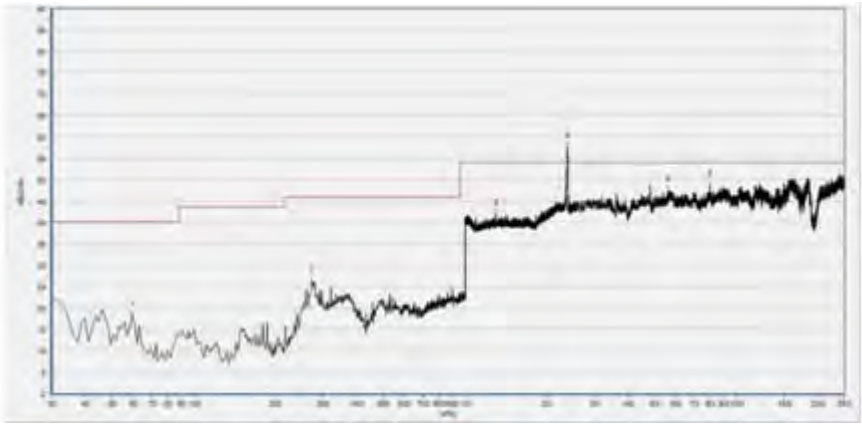
802.11g Test mode

Plots 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
59.136	16.32	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
185.394	34.78	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
508.323	20.39	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2384.234	47.94	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
4820.040	46.77	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS
11749.009	49.13	N/A	N/A	74.0	N/A	54.00	Horizontal	PASS

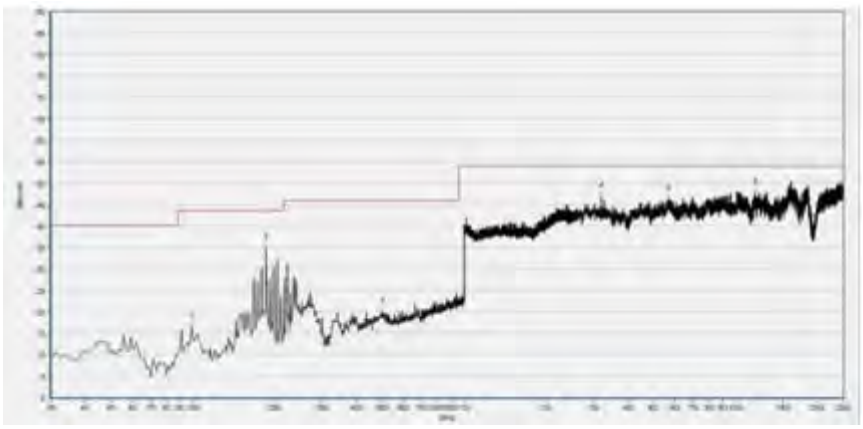
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
59.136	18.42	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
272.804	26.39	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1296.439	42.08	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
2384.400	58.51	N/A	44.89	74.0	N/A	54.00	Vertical	PASS
5606.219	47.57	N/A	N/A	74.0	N/A	54.00	Vertical	PASS
7985.125	48.75	N/A	N/A	74.0	N/A	54.00	Vertical	PASS

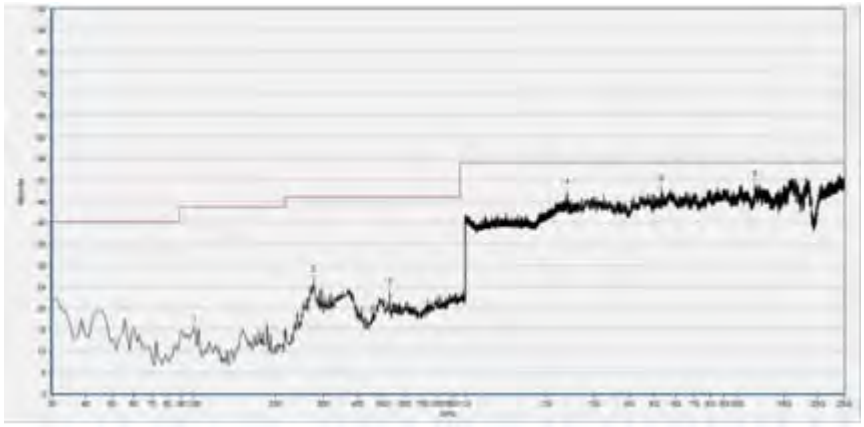
(Antenna Vertical, 30MHz to 25GHz)

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
99.199	16.48	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
185.394	34.86	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
498.611	19.97	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
3215.094	46.89	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5663.248	46.21	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11875.286	47.69	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

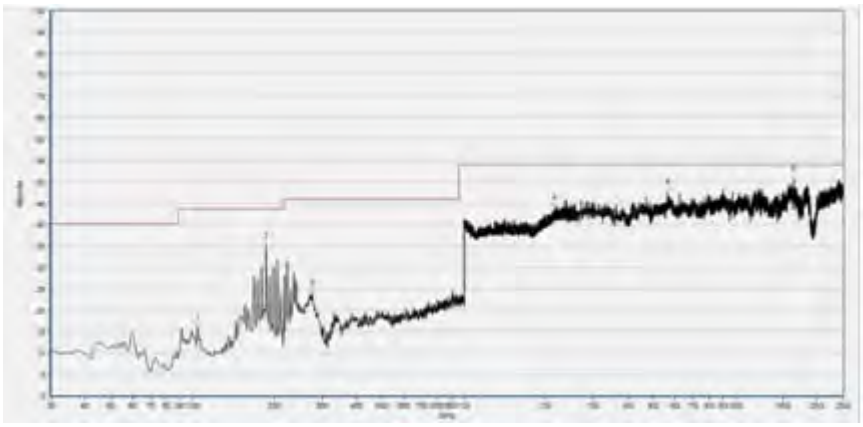
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
100.413	14.91	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
276.446	26.44	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
527.747	23.61	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2381.032	46.89	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5292.562	47.69	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11740.862	48.79	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

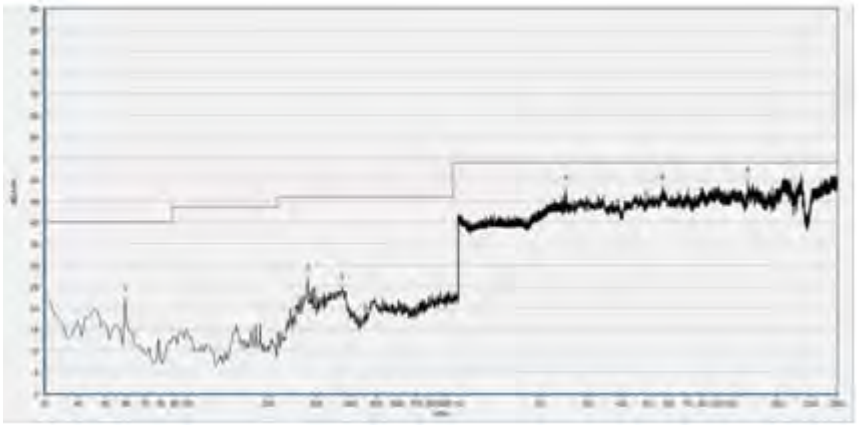
(Antenna Vertical, 30MHz to 25GHz)

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
104.055	15.86	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
185.394	34.82	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
275.232	23.83	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2145.418	43.82	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5634.734	47.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
16470.158	50.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

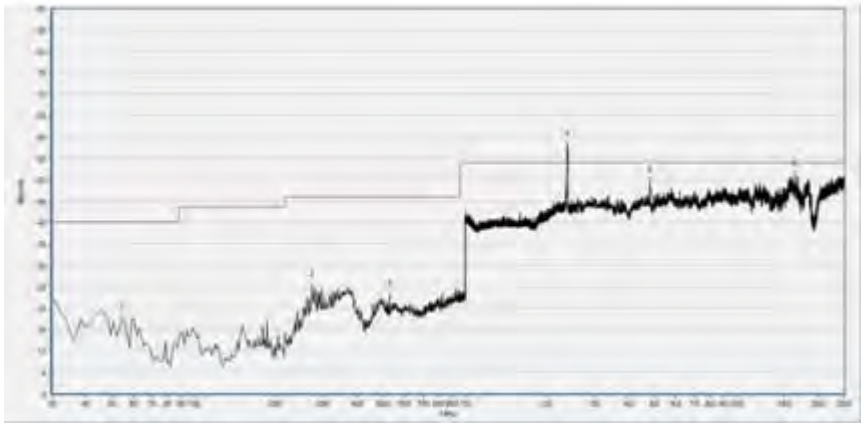


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
59.136	21.82	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
278.874	26.56	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
373.567	24.68	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2504.602	47.83	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5667.321	47.88	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
11757.156	49.63	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

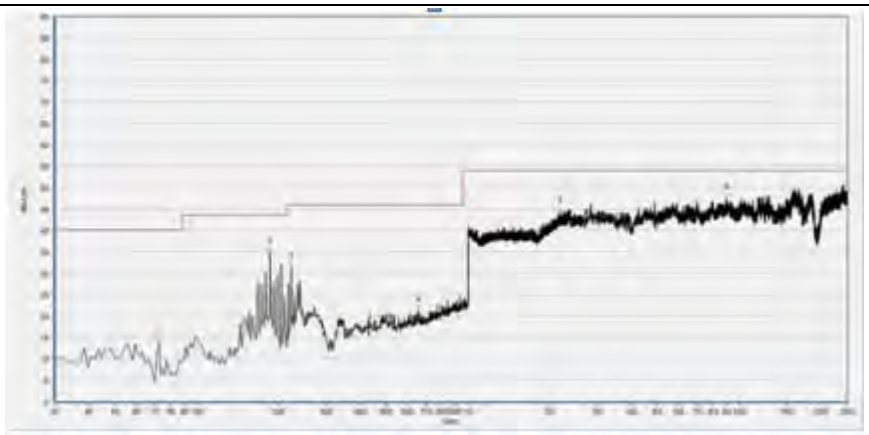
802.11n(HT20) Test mode

Plots 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
54.280	17.66	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
272.804	25.36	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
527.747	23.10	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2389.700	58.96	N/A	44.36	74.00	N/A	54.00	Horizontal	PASS
4815.967	49.62	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
16453.864	51.16	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

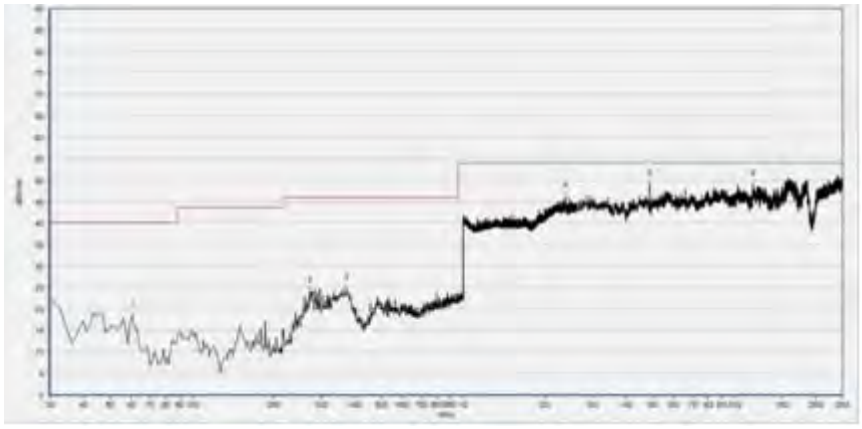
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
72.491	13.44	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
185.394	34.98	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
223.029	31.44	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
654.005	21.36	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2183.834	44.52	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8970.904	47.62	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

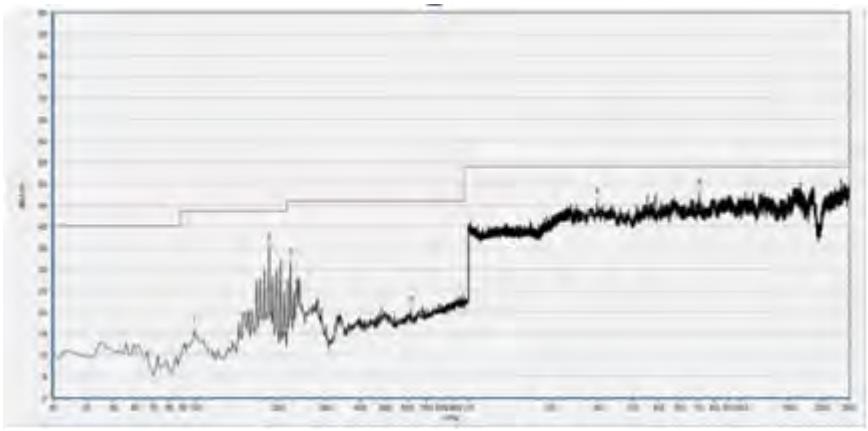
(Antenna Vertical, 30MHz to 25GHz)

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
60.350	18.21	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
271.589	24.21	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
371.139	24.72	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2382.313	46.24	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4877.069	49.15	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11736.789	48.95	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

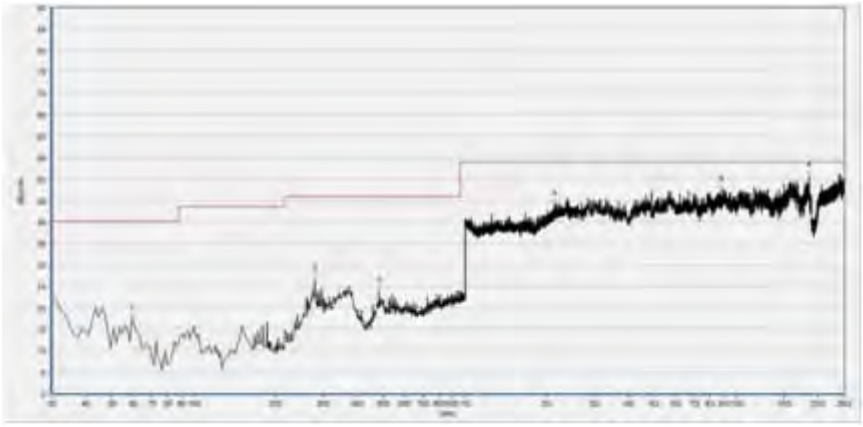
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
99.199	15.37	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
185.394	34.89	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
223.029	31.59	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
616.370	20.49	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2978.833	45.61	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7056.374	47.80	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

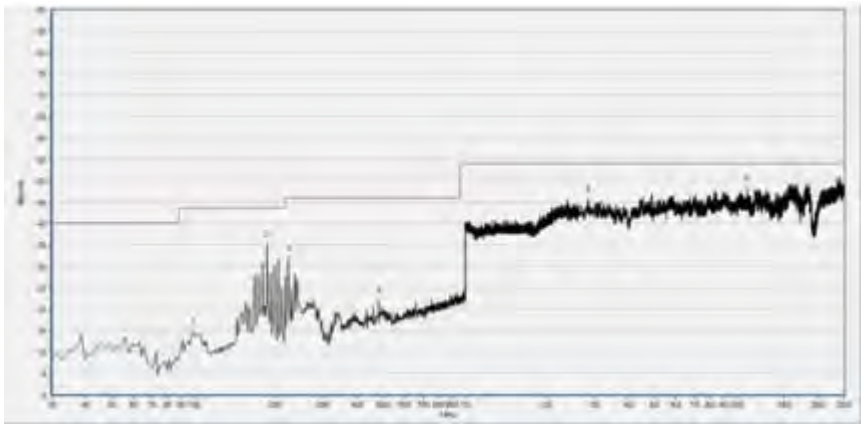
(Antenna Vertical, 30MHz to 25GHz)

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
59.136	17.39	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
278.874	26.28	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
480.401	23.79	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2133.253	44.11	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
8828.332	47.40	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
18531.333	50.82	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

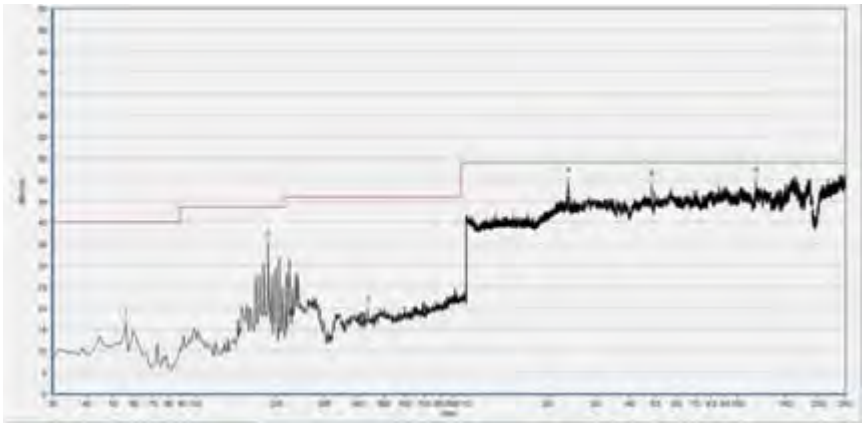


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
99.199	14.62	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
185.394	34.86	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
223.029	31.53	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
480.401	21.56	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2844.408	45.41	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10987.270	48.04	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

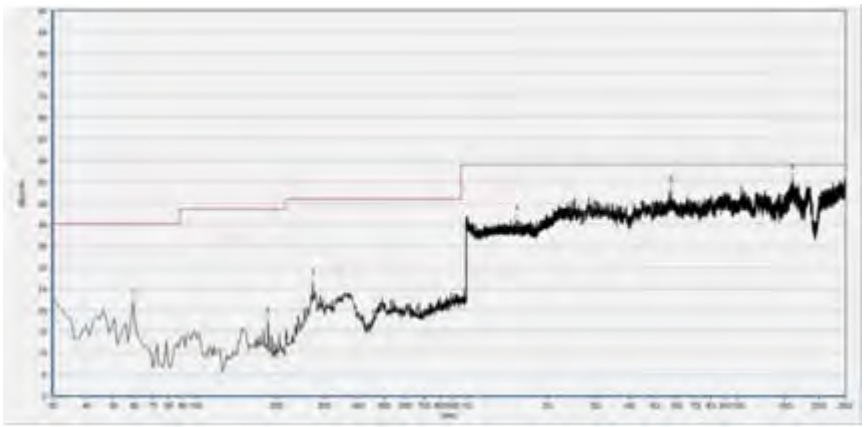
802.11n(HT40) Test mode

Plots 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
55.494	16.21	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
185.394	34.66	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
433.054	19.46	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2386.154	49.63	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4848.554	48.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
11744.935	49.59	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

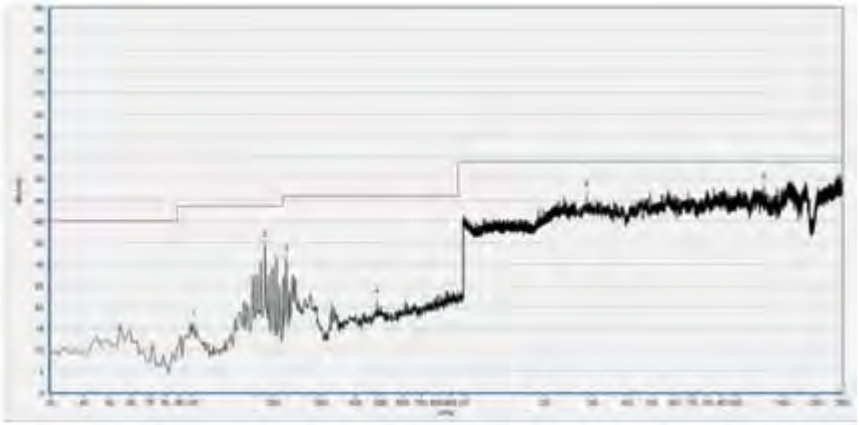
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
59.136	21.63	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
185.394	17.26	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
272.804	26.19	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1526.291	41.24	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5687.689	47.89	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
15977.269	50.70	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

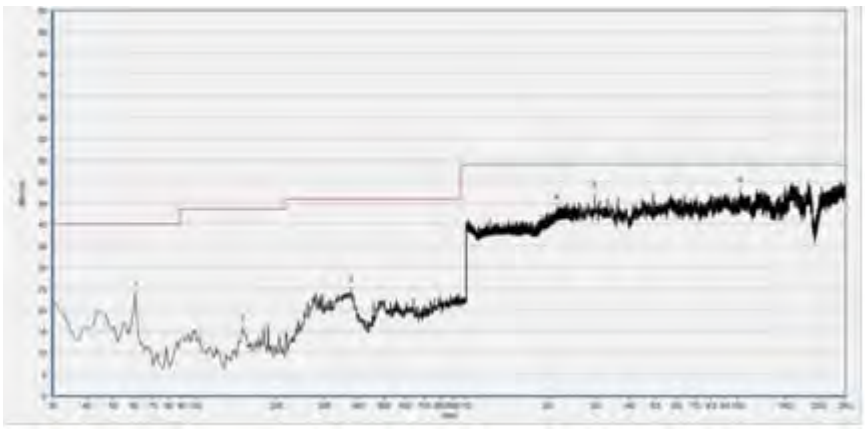
(Antenna Vertical, 30MHz to 25GHz)

Plots 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
101.627	15.80	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
185.394	34.59	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
223.029	31.10	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
480.401	21.08	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2852.555	46.01	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12893.653	48.14	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

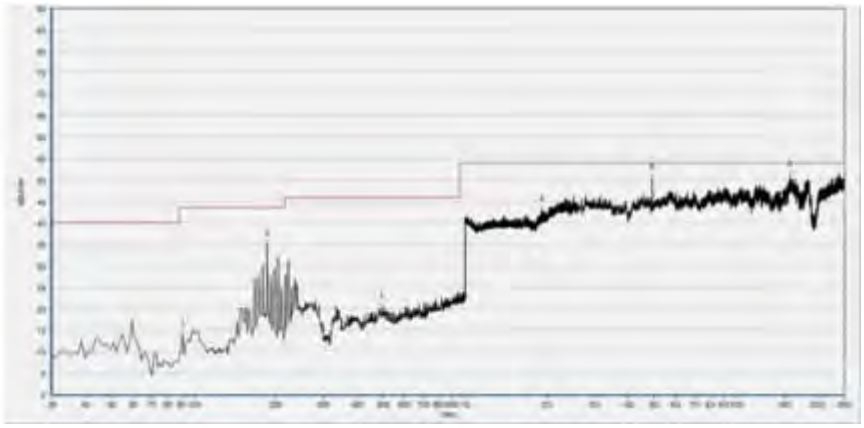
(Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
60.350	23.40	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
150.188	15.51	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
375.995	24.48	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2165.906	43.82	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2986.979	46.64	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10233.679	47.75	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

Plots 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
90.701	14.08	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
185.394	34.97	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
491.327	20.50	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1918.127	43.10	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4901.509	50.48	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
15765.448	51.05	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
59.136	20.33	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
185.394	16.04	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
378.423	24.89	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2106.363	43.85	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5675.468	47.90	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
15667.685	50.22	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

Annex A Test Uncertainty

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

Test items	Uncertainty
Peak Output Power	±2.22dB
Power spectral density (PSD)	±2.22dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77 dB
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. Morlab Laboratory
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. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

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	Cal. Due
Attenuator 1	(N/A.)	10dB	Resnet	N/A	N/A
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2019.04.09	2020.04.08
USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2019.04.16	2020.04.15
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	Cal. Due
Receiver	MY56400093	N9038A	KEYSIGHT	2019.05.08	2020.05.09
LISN	812744	NSLK 8127	Schwarzbeck	2019.05.08	2020.05.09
Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2019.05.08	2020.05.09
Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3 List of Software Used

Description	Manufacturer	Software Version
Test system	Tonscend	V2.6
Power Panel	Agilent	V3.8
MORLAB EMCR V1.2	MORLAB	V 1.0

4.4 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	MY54130016	N9038A	Agilent	2018.08.04	2019.08.03
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.08	2020.05.09
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2019.02.15	2020.02.14
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2018.08.06	2019.08.05
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2018.08.02	2019.08.01
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2019.05.08	2020.05.09
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2019.05.08	2020.05.09
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2018.12.01	2019.11.30
Anechoic Chamber	N/A	9m*6m*6m	CRT	2017.11.19	2020.11.18

END OF REPORT