TEST REPORT

APPLICANT	:	Borqs BeiJing Ltd.
PRODUCT NAME	:	Lively Mobile 2
MODEL NAME	:	GCR4
BRAND NAME	:	GreatCall
FCC ID	:	2ABDK-GCR4
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2018-09-29
TEST DATE	:	2018-10-23 to 2019-01-18
ISSUE DATE	:	2019-01-25

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Peng Huarui (Supervisor)

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MORLAB
SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China
Tel: 86-755-36698555 Fax: 86-755-36698525
Http://www.morlab.cn E-mail: service@morlab.cn

DIRECTORY

1. Technical Information ····· 4
1.1. Applicant and Manufacturer Information ····· 4
1.2. Equipment Under Test (EUT) Description ····· 4
1.3. Test Standards and Results ····· 6
1.4. Environmental Conditions ····· 6
2. 47 CFR Part 15C Requirements ····· 7
2.1. Antenna requirement ····· 7
2.2. Duty Cycle Of Test Signal ····· 7
2.3. Peak Output Power ····· 11
2.4. Bandwidth ····· 14
2.5. Conducted Spurious Emissions and Band Edge ····· 23
2.6. Power spectral density (PSD) ····· 36
2.7. Conducted Emission ····· 45
2.8. Restricted Frequency Bands ····· 49
2.9. Radiated Emission ····· 61
Annex A Test Uncertainty ····· 77
Annex B Testing Laboratory Information ····· 78

Change History		
Version	**Date**	**Reason for change**
1.0	2019-01-25	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Borqs BeiJing Ltd.
Applicant Address:	Tower A, Building B23, Universal Business Park, No. 10 Jiuxianqiao Road, Chaoyang District Beijing, 100015 China
Manufacturer:	Borqs BeiJing Ltd.
Manufacturer Address:	Tower A, Building B23, Universal Business Park, No. 10 Jiuxianqiao Road, Chaoyang District Beijing, 100015 China

1.2. Equipment Under Test (EUT) Description

Product Name:	Lively Mobile 2	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	DVT3	
Software Version:	054	
Modulation Type:	DSSS, OFDM	
Modulation Mode:	802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40)	
Operating Frequency Range:	802.11b/g/ n(HT20): 2.412GHz - 2.462GHz 802.11 n(HT40): 2.422GHz - 2.452GHz	
Channel Number:	802.11b/g/ n(HT20): 11 802.11 n(HT40): 7	
Antenna Type:	FPC Antenna	
Antenna Gain:	0.7 dBi	
Accessory Information:	Battery	
	Brand Name:	N/A
	Model No.:	ZWD553634V
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	930mAh
	Rated Voltage:	3.8V
	Charge Limit:	4.35V

Note1: The EUT is operating at 2.4GHz ISM; it supports 802.11b, 802.11g, 802.11n and they are all tested in this report.

For 802.11b/g/n(HT20) (2.4GHz band), the frequencies allocated is F (MHz) =2412+5*(n-1) (1<=n<=11). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz).

Note 2: The EUT connected to the serial port of the computer with a serial communication cable, we use the dedicated software to control the EUT continuous transmission.

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

1.3. 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	Oct 23, 2018	Zhou Zijiang	PASS
3	15.247(b)	Peak Output Power	Jan 18, 2019	Zhou Zijiang	PASS
4	15.247(a)	Bandwidth	Oct 23, 2018	Zhou Zijiang	PASS
5	15.247(d)	Conducted Spurious Emission and Band Edge	Oct 23, 2018	Zhou Zijiang	PASS
6	15.247(e)	Power spectral density (PSD)	Oct 23, 2018	Zhou Zijiang	PASS
7	15.207	Conducted Emission	Dec 06, 2018	Wang Dalong	PASS
8	15.247(d)	Restricted Frequency Bands	Dec 29, 2018 Jan 18, 2019	Wang Dalong	PASS
9	15.209, 15.247(d)	Radiated Emission	Dec 29, 2018	Wang Dalong	PASS

Note1: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013 and KDB558074 D01 v05.
Note2: 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.

1.4. Environmental Conditions

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

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

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

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

2.1.2. Result: Compliant

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

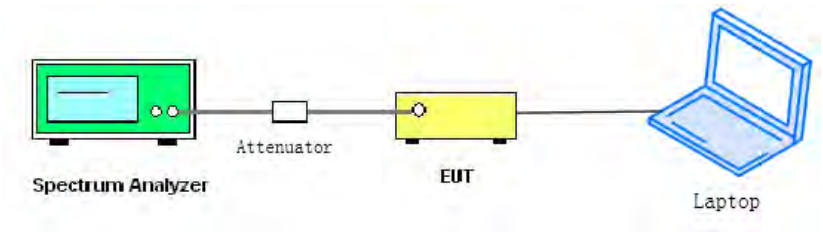
2.2. Duty Cycle Of Test Signal

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.

B. Equipments List:

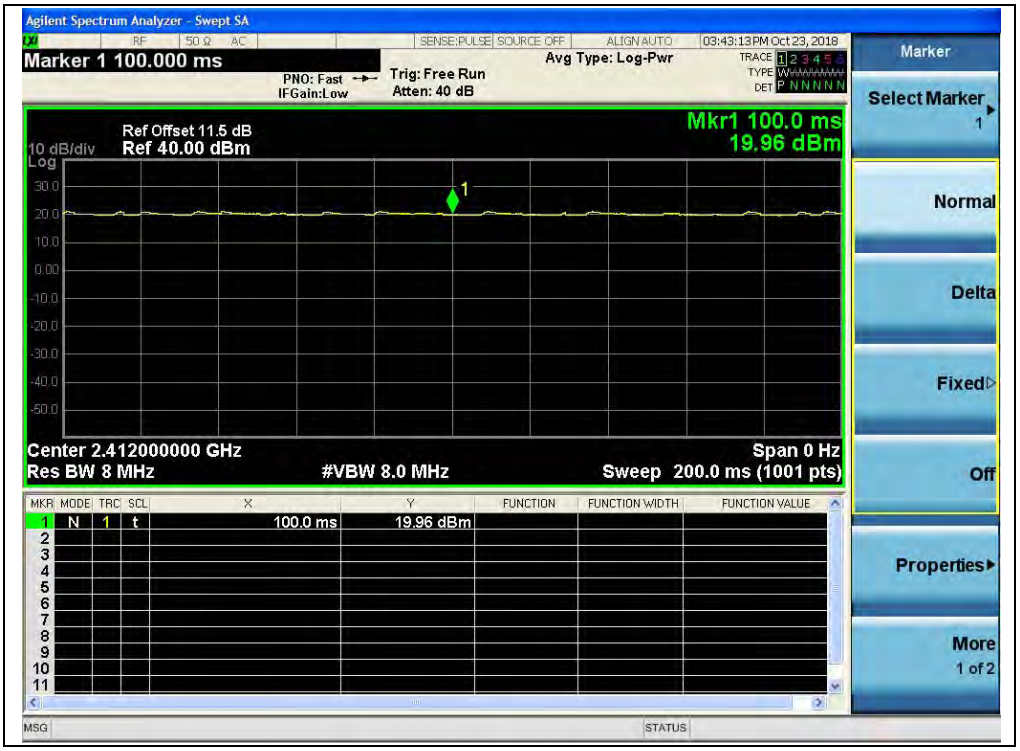
Please refer ANNEX B(4).

2.2.3. Test Result

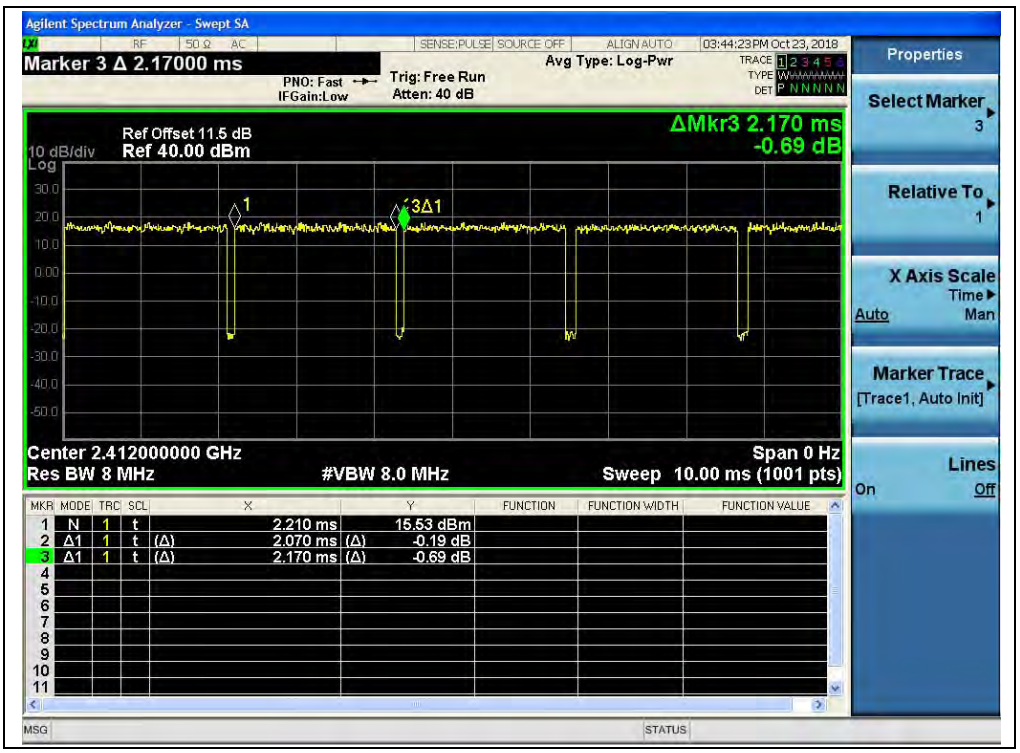
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*lg[1/D])
802.11b	100.00	0.00
802.11g	95.39	0.20
802.11n(HT20)	92.79	0.33
802.11n(HT40)	89.57	0.48

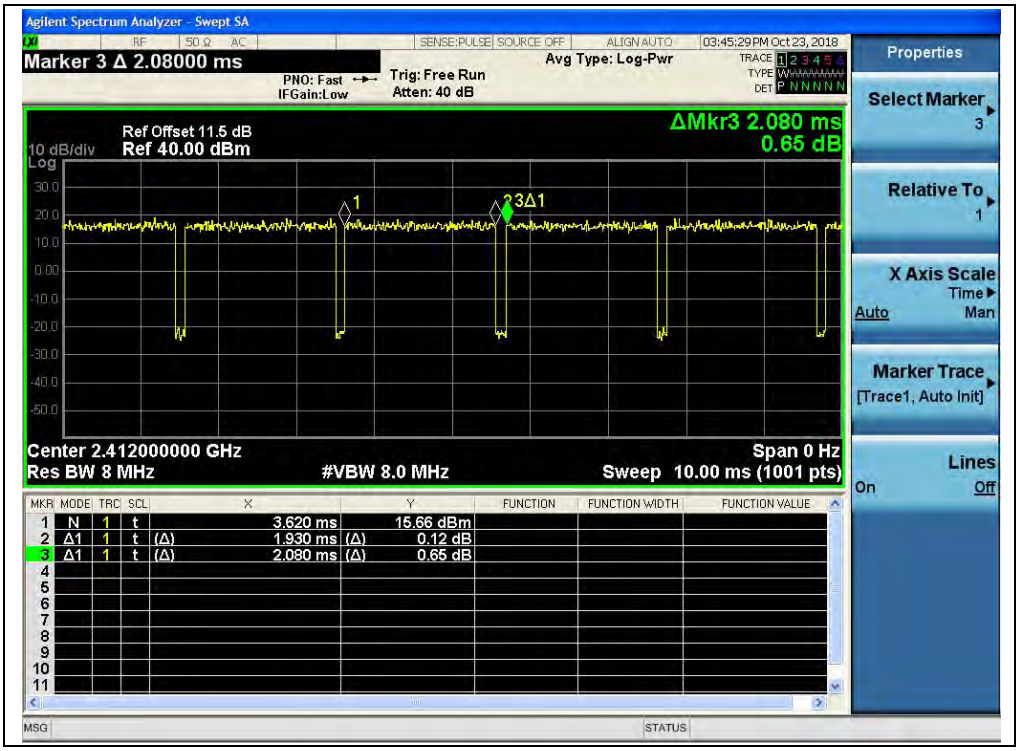
B. Test Plots



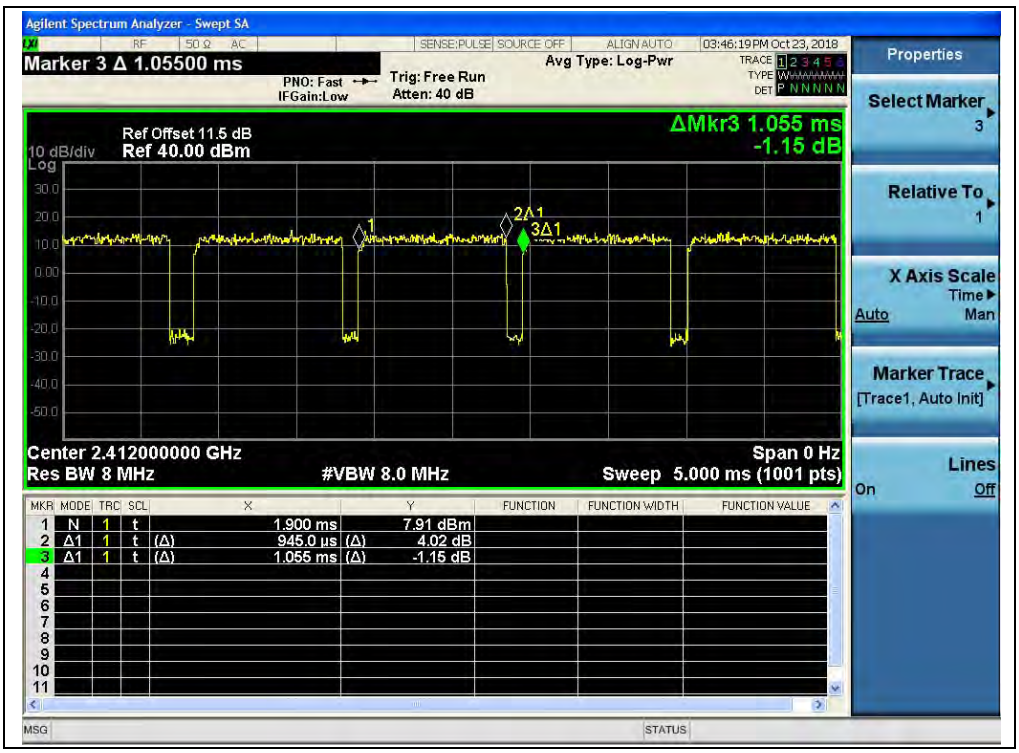
(Channel 1, 2412MHz, 802.11b)



(Channel 1, 2412MHz, 802.11g)



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



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

2.3. Peak Output Power

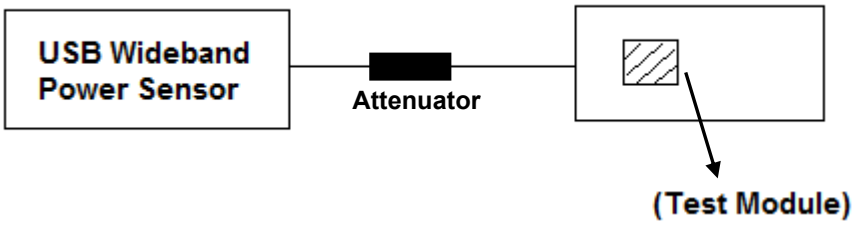
2.3.1. Requirement

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.

B. Equipments List:

Please refer ANNEX B(4).

2.3.3. Test Result

802.11b Test Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	7.14	0.005	30	1	PASS
6	2437	5.38	0.003			PASS
11	2462	7.20	0.005			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	4.24	0.003	30	1	PASS
6	2437	2.68	0.002			PASS
11	2462	4.34	0.003			PASS

802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	10.19	0.010	30	1	PASS
6	2437	8.72	0.007			PASS
11	2462	10.18	0.010			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	3.48	0.002	30	1	PASS
6	2437	2.14	0.002			PASS
11	2462	3.41	0.002			PASS

802.11n(HT20) Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	10.31	0.011	30	1	PASS
6	2437	8.66	0.007			PASS
11	2462	10.47	0.011			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	3.32	0.002	30	1	PASS
6	2437	2.02	0.002			PASS
11	2462	3.04	0.002			PASS

802.11n(HT40) Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	10.34	0.011	30	1	PASS
6	2437	9.34	0.009			PASS
9	2452	9.96	0.010			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
3	2422	2.54	0.002	30	1	PASS
6	2437	2.63	0.002			PASS
9	2452	2.36	0.002			PASS

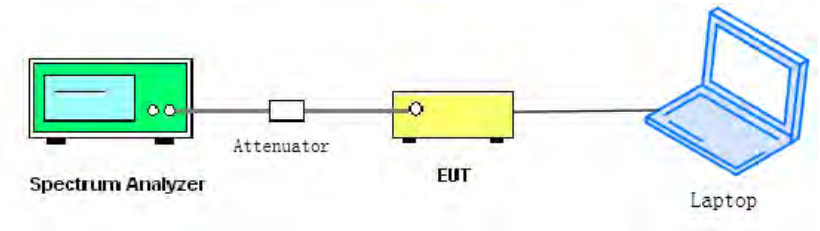
2.4. Bandwidth

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.

KDB 558074 Section 8.1 Option 1 was used in order to prove compliance.

B. Equipments List:

Please refer ANNEX B(4).

2.4.3. Test Result

802.11b Test mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	8.046	≥500	PASS
6	2437	8.069	≥500	PASS
11	2462	8.035	≥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	15.10	≥500	PASS
6	2437	15.53	≥500	PASS
11	2462	15.10	≥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	15.11	≥500	PASS
6	2437	15.45	≥500	PASS
11	2462	15.11	≥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	32.51	≥500	PASS
6	2437	35.71	≥500	PASS
9	2452	33.82	≥500	PASS

B. Test Plots:

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

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

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

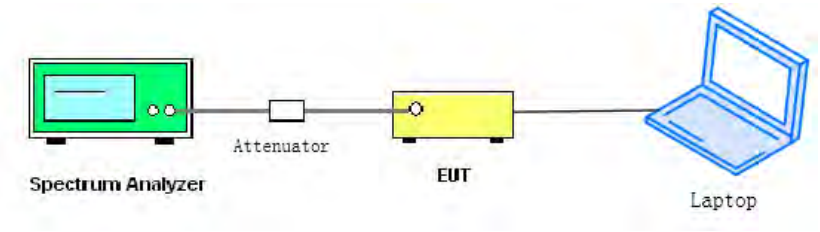
2.5. Conducted Spurious Emissions and Band Edge

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.

KDB 558074 Section 11.0 was used in order to prove compliance.

B. Equipments List:

Please refer ANNEX B(4).

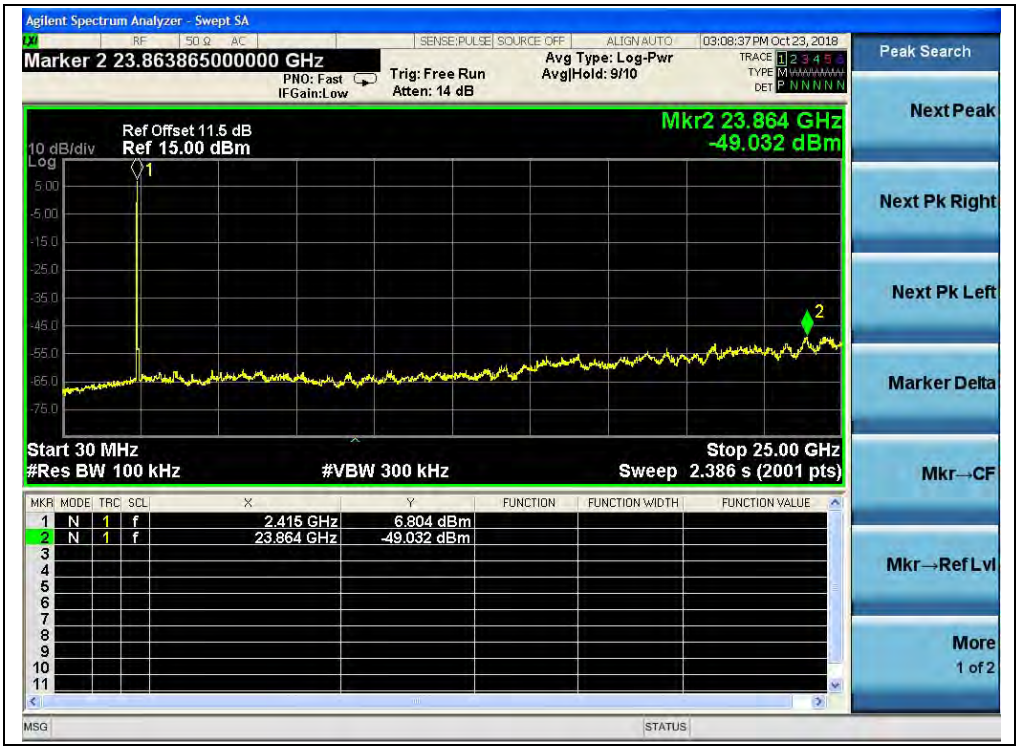
2.5.3. Test Result

802.11b Test mode

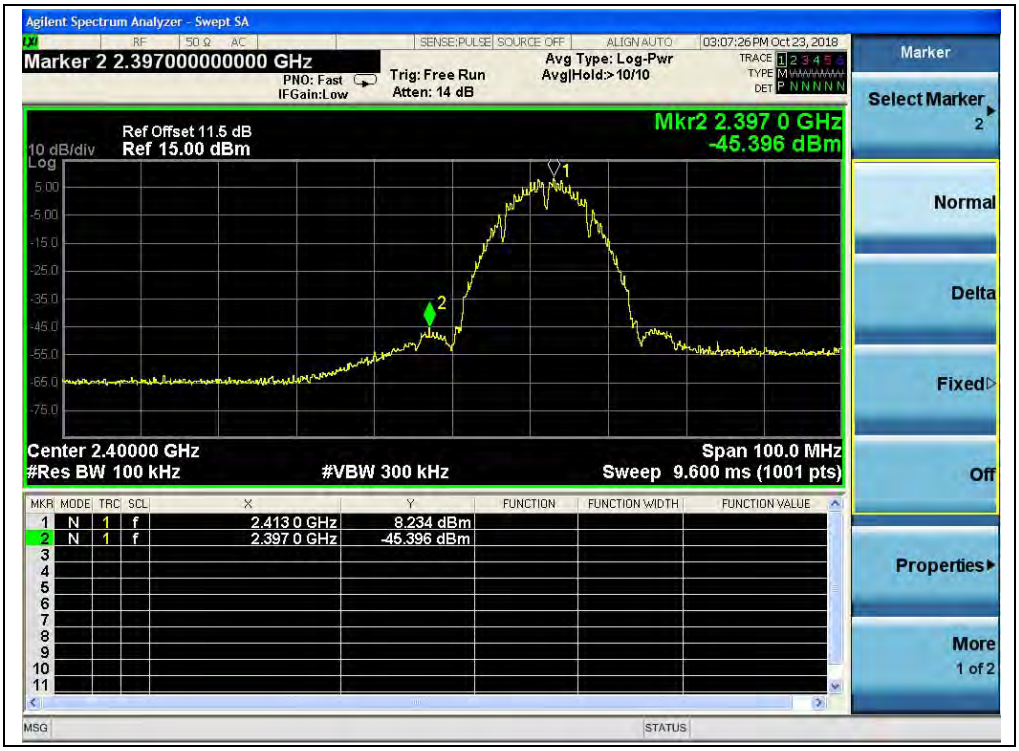
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-49.03	6.80	-13.20	PASS
6	2437	-50.89	5.18	-14.82	PASS
11	2462	-50.90	6.13	-13.87	PASS

B. Test Plots:



(Channel = 1, 30MHz to 25GHz)



(Band Edge, Channel = 1)

(Channel = 6, 30MHz to 25GHz)

(Channel = 11, 30MHz to 25GHz)

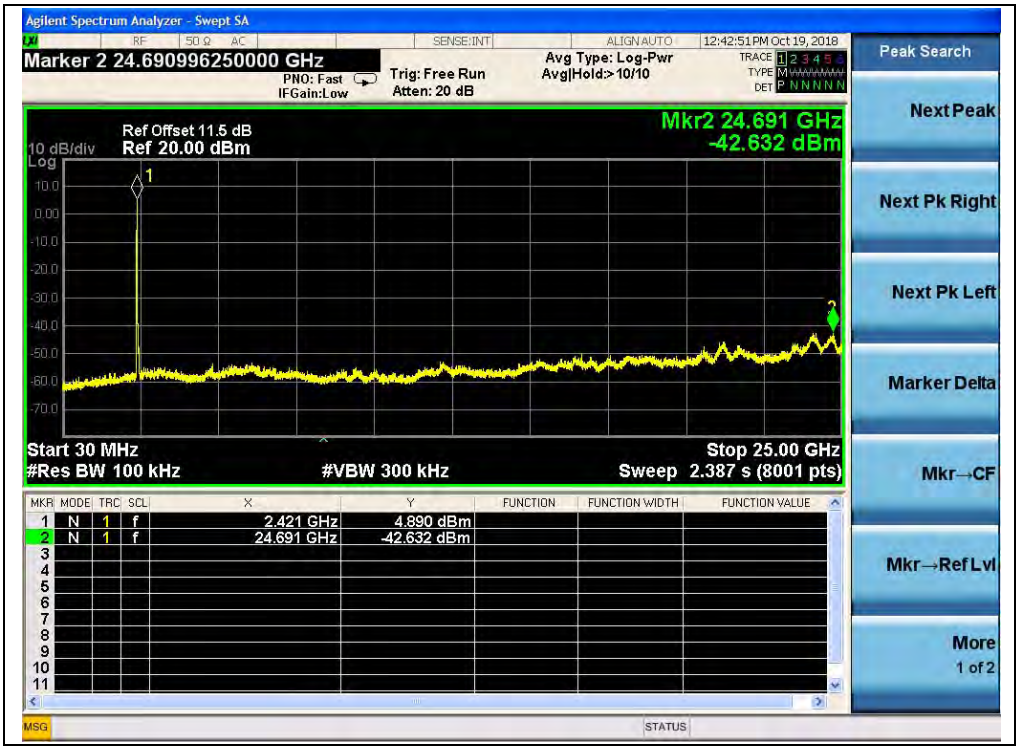
(Band Edge, Channel = 11)

802.11g Test mode

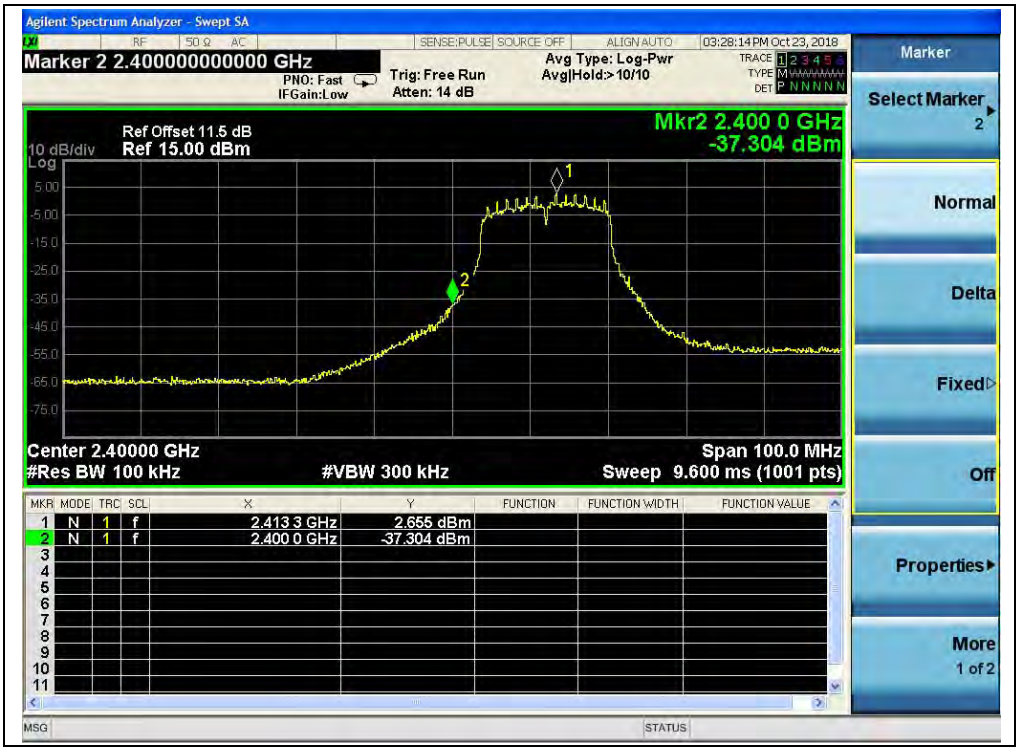
A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-42.63	4.89	-15.11	PASS
6	2437	-41.98	6.77	-13.23	PASS
11	2462	-42.87	5.66	-14.34	PASS

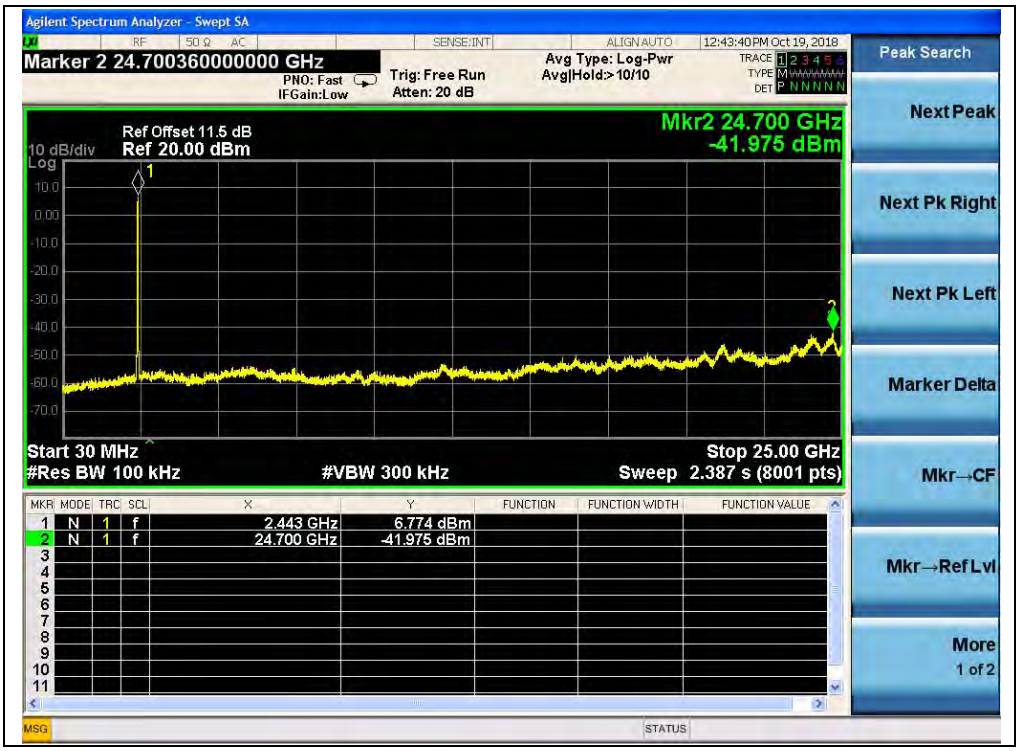
B. Test Plots:



(Channel = 1, 30MHz to 25GHz)



(Band Edge, Channel = 1)



(Channel = 6, 30MHz to 25GHz)

(Channel = 11, 30MHz to 25GHz)

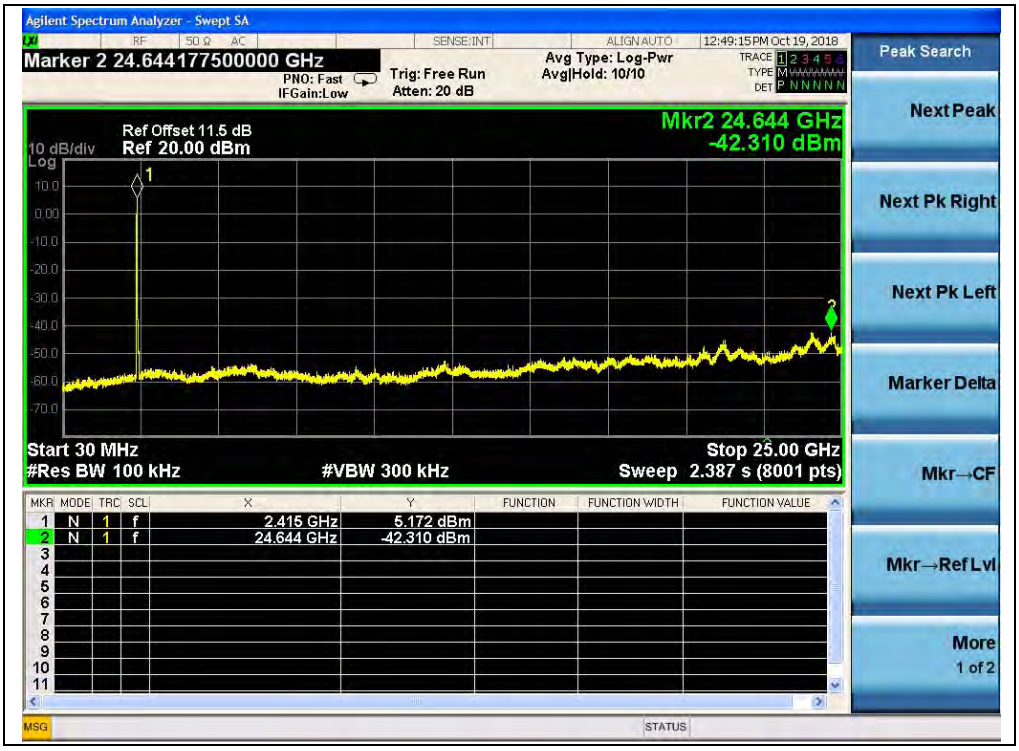
(Band Edge, Channel = 11)

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	-42.31	5.17	-14.83	PASS
6	2437	-43.51	3.27	-16.73	PASS
11	2462	-43.32	3.37	-16.63	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)

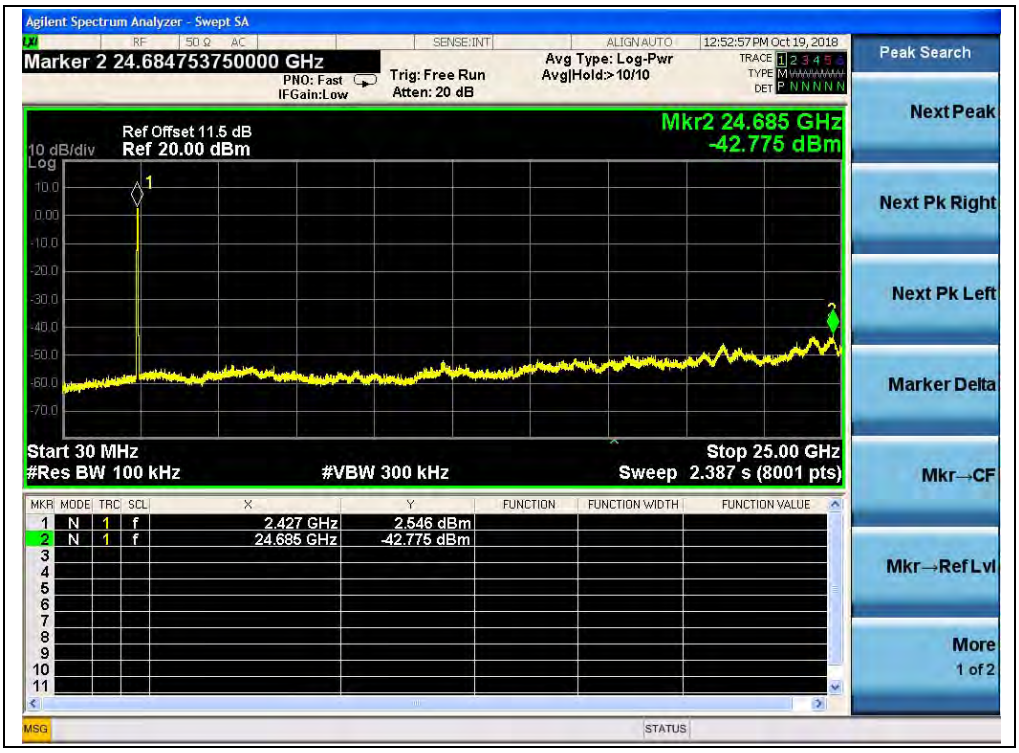
802.11n(HT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
3	2422	-42.78	2.55	-17.45	PASS
6	2437	-42.81	2.83	-17.17	PASS
9	2452	-43.12	1.90	-18.10	PASS

B. Test Plots:

Note: The power of the Module transmitting frequency should be ignored.



(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.

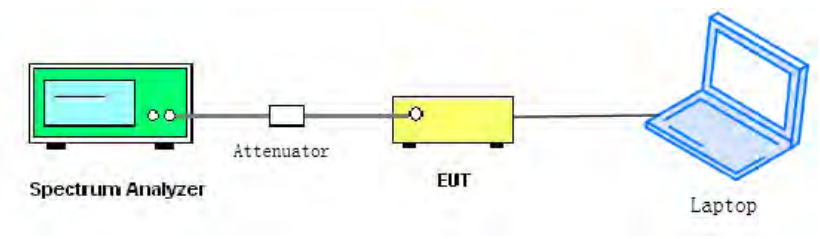
2.6.2. Test Description

A. Test procedure

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:

a) Set analyzer center frequency to channel center frequency.
b) Set the span to 1.5 times DTS
c) Set the RBW to 3 kHz
d) Set the VBW to 10 kHz
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

B. 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.

KDB 558074 Section 10.2 was used in order to prove compliance.

C. Equipments List:

Please refer ANNEX B(4).

2.6.3. 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	4.90	8	PASS
6	2437	2.65	8	PASS
11	2462	-9.23	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	-14.43	8	PASS
6	2437	-15.57	8	PASS
11	2462	-14.52	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	-13.66	8	PASS
6	2437	-17.70	8	PASS
11	2462	-14.32	8	PASS

B. Test Plots:

(Channel = 1, 802.11n(HT20))

(Channel = 6, 802.11n(HT20))

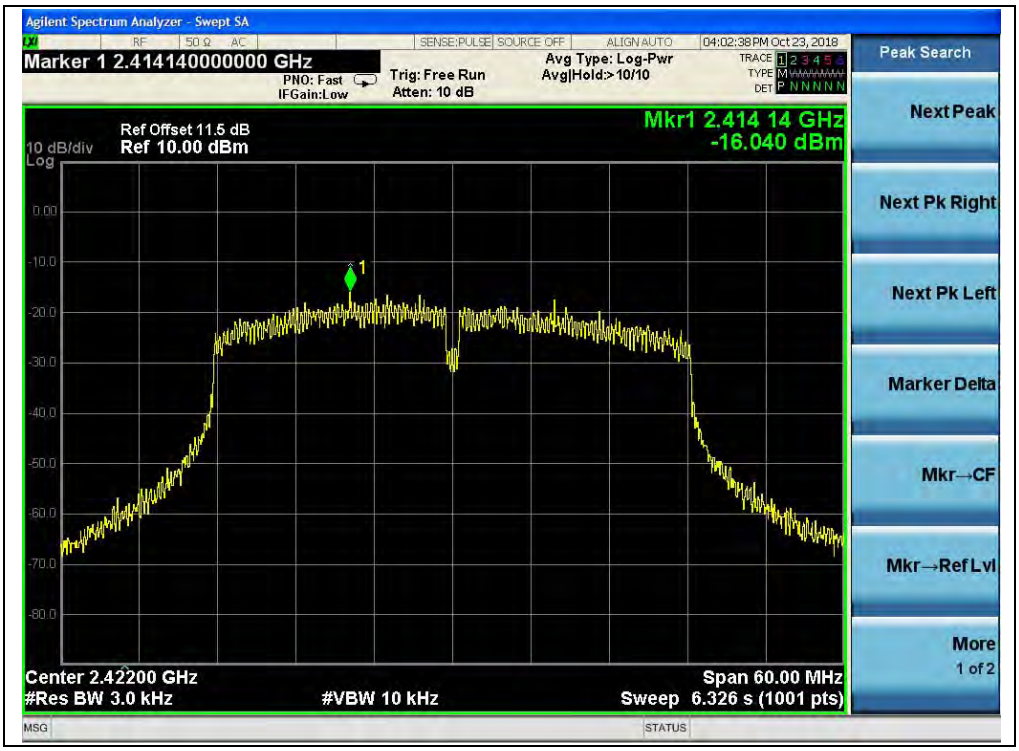
(Channel = 11, 802.11n(HT20))

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	-16.04	8	PASS
6	2437	-18.41	8	PASS
9	2452	-15.79	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

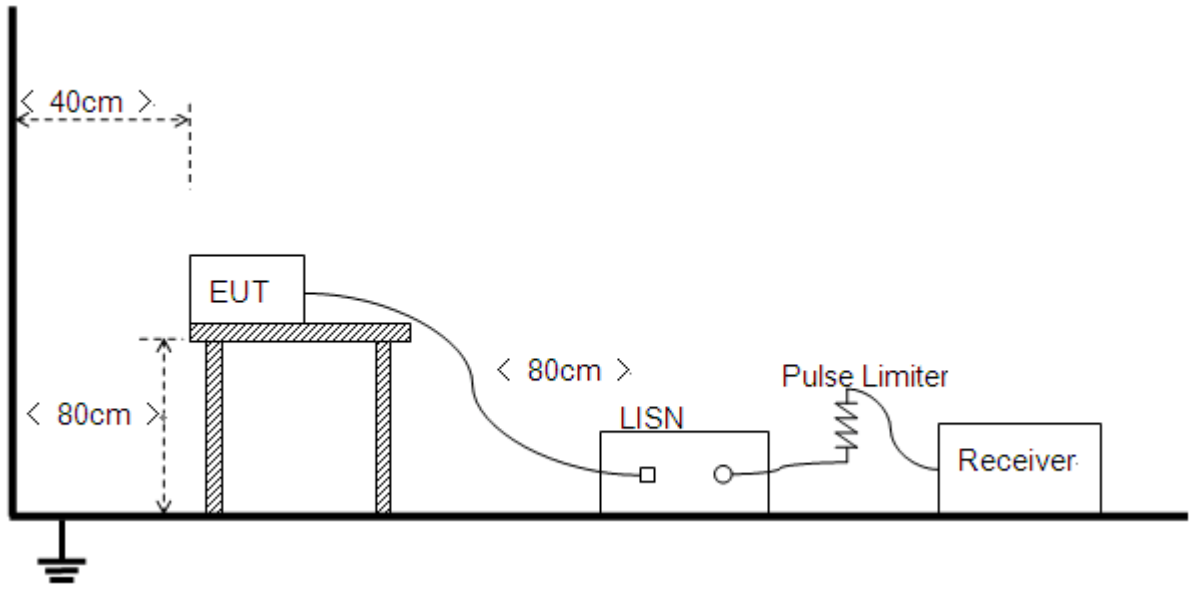
NOTE:

(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.

B. Equipments List:

Please refer ANNEX B(4).

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+ Lively Mobile 2 Charging Cradle(Only use for testing)+Adapter(Only use for testing)+WIFI TX

Test Voltage: AC 120V/60Hz

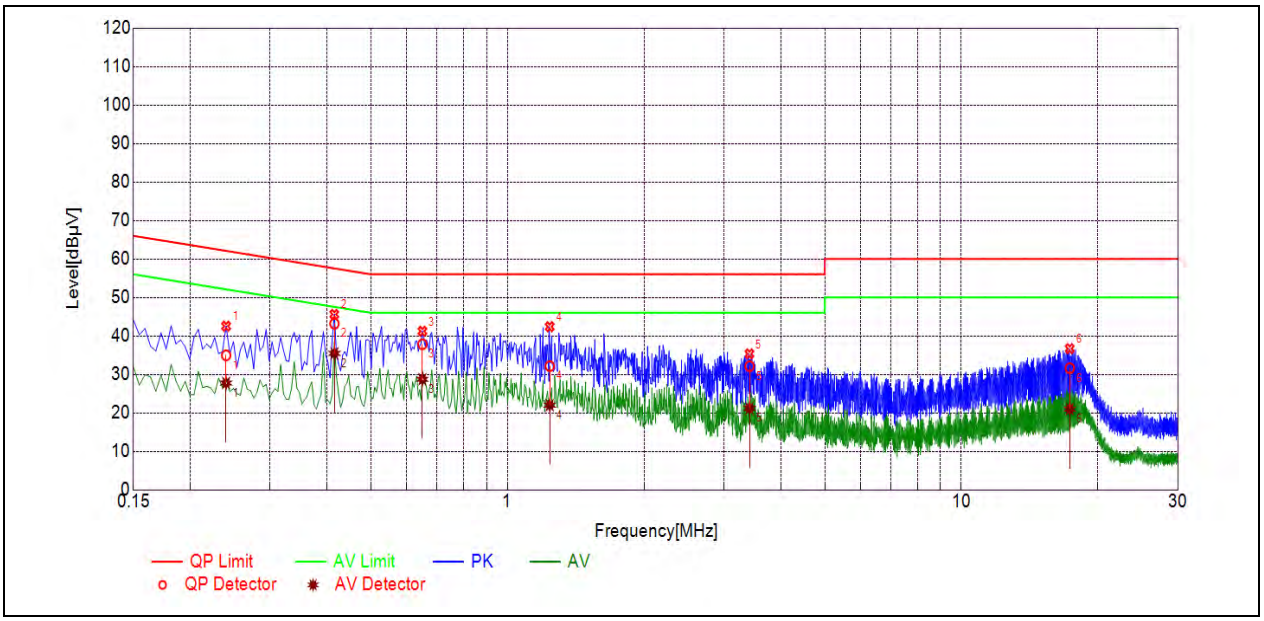
The measurement results are obtained as below:

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

U_R: Receiver Reading

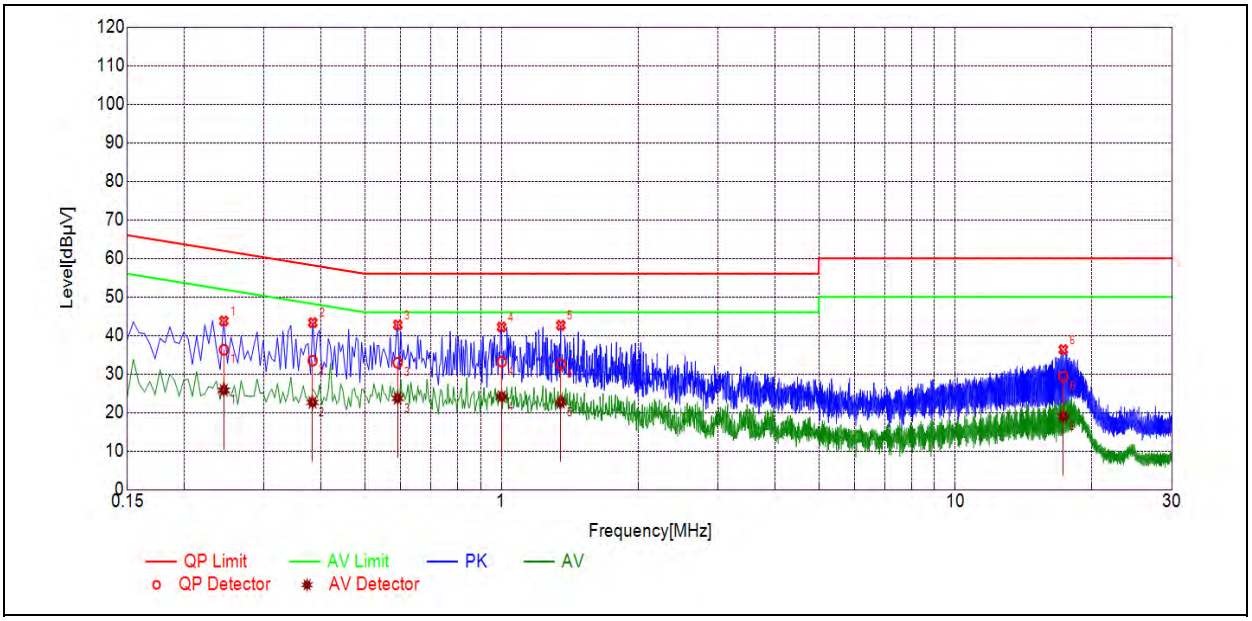
A_{Factor}: Voltage division factor of LISN

B. Test Plots:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.2400	34.95	27.76	62.10	52.10	Line	PASS
2	0.4157	43.18	35.46	57.53	47.53		PASS
3	0.6496	37.83	28.72	56.00	46.00		PASS
4	1.2392	32.15	22.02	56.00	46.00		PASS
5	3.4134	32.13	21.17	56.00	46.00		PASS
6	17.3293	31.61	20.98	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	0.2445	36.30	25.80	61.94	51.94	Neutral	PASS
2	0.3836	33.46	22.62	58.20	48.20		PASS
3	0.5906	32.92	23.68	56.00	46.00		PASS
4	1.0015	33.22	24.13	56.00	46.00		PASS
5	1.3510	32.57	22.63	56.00	46.00		PASS
6	17.2940	29.34	19.00	60.00	50.00		PASS

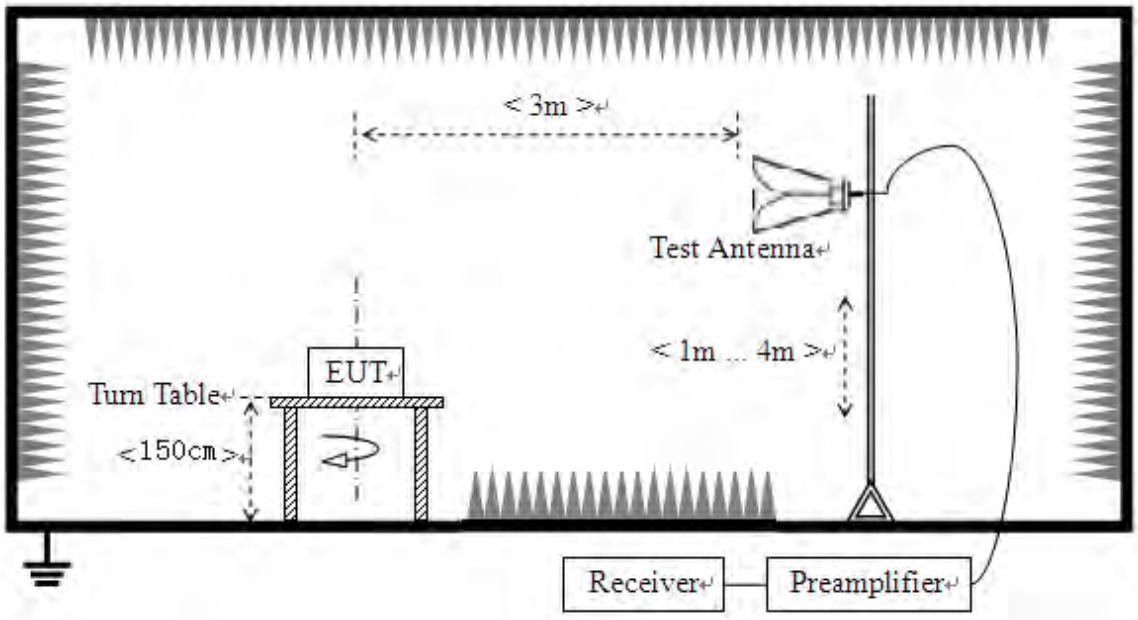
2.8. Restricted Frequency Bands

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.

KDB 558074 Section 12.1 was used in order to prove compliance.

B. Equipments List:

Please refer ANNEX B(4).

2.8.3. Test Result

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

The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; $A_T = L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m

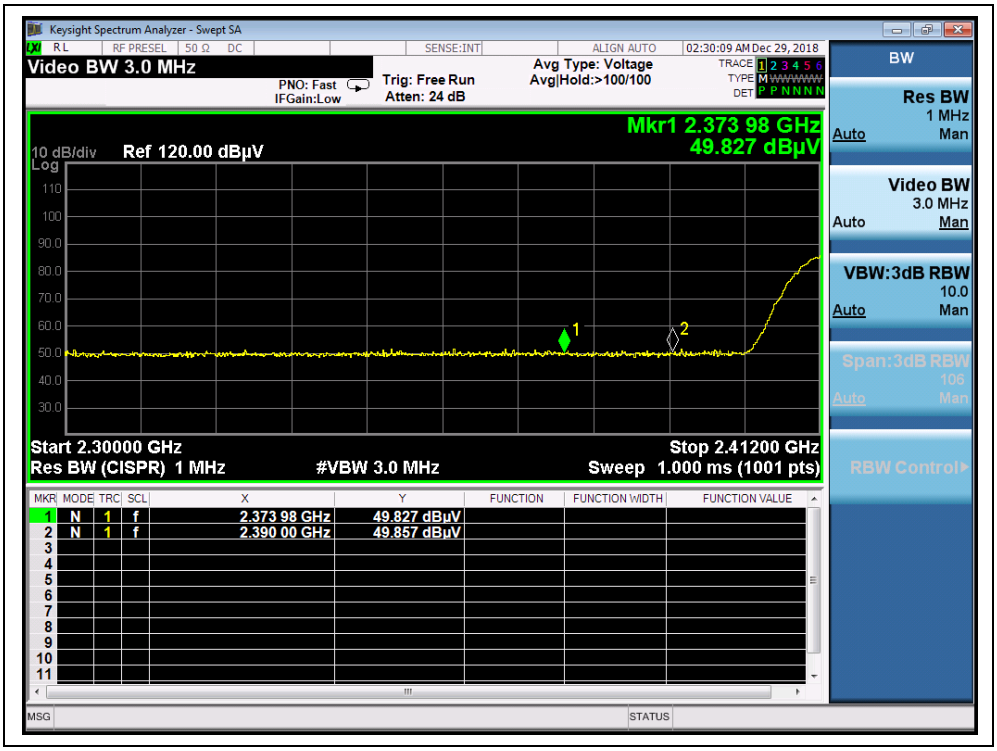
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

802.11b Test mode

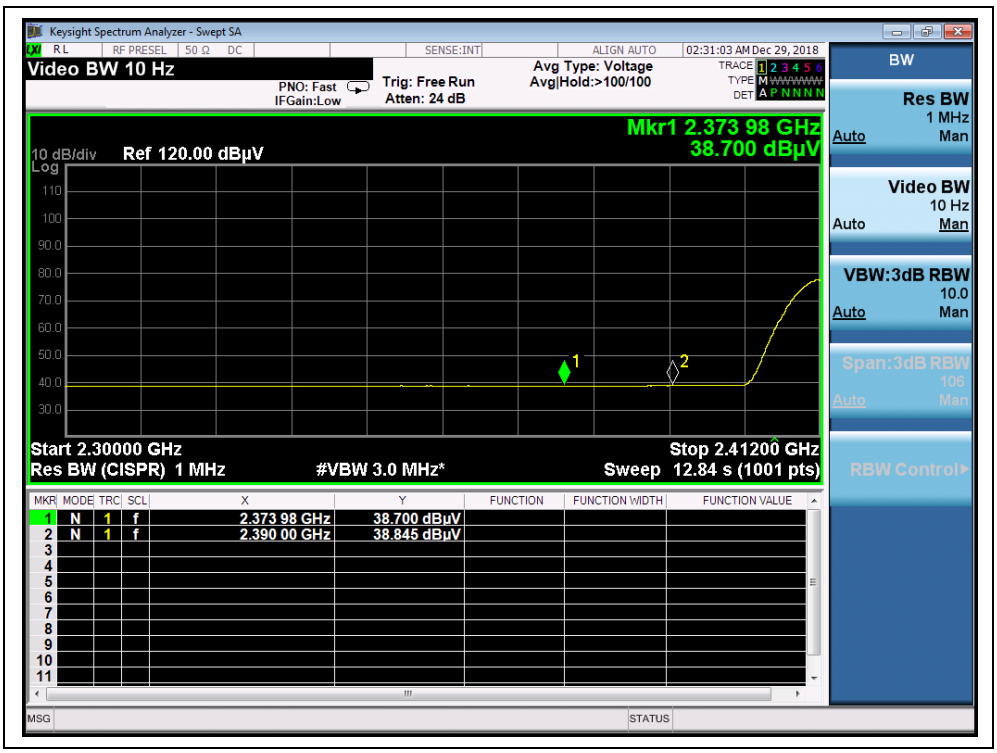
A. Test Verdict:

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	2390.00	PK	49.86	-29.67	32.56	52.75	74	PASS
1	2390.00	AV	38.85	-29.67	32.56	41.74	54	PASS
11	2484.56	PK	51.18	-29.67	32.56	54.07	74	PASS
11	2483.50	AV	40.69	-29.67	32.56	43.58	54	PASS

B. Test Plots:



(Channel = 1 PEAK, 802.11b)



(Channel = 1 AVG, 802.11b)

(Channel = 11 PEAK, 802.11b)

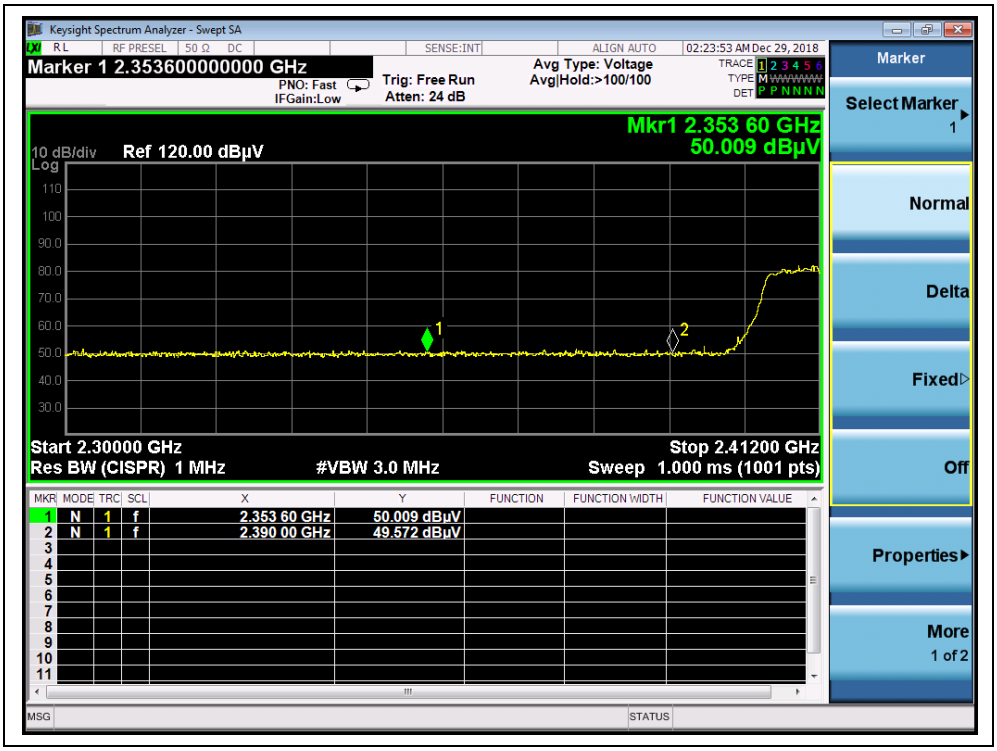
(Channel = 11 AVG, 802.11b)

802.11g Test mode

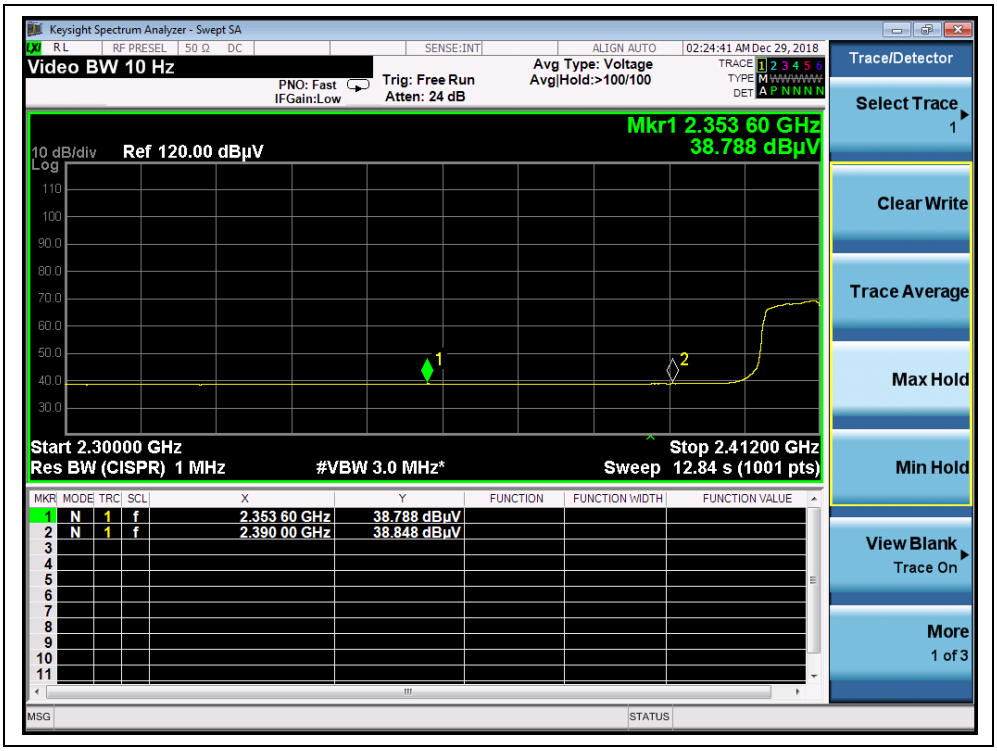
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2353.60	PK	50.01	-29.67	32.56	52.90	74	PASS
1	2390.00	AV	38.85	-29.67	32.56	41.74	54	PASS
11	2486.21	PK	50.82	-29.67	32.56	53.71	74	PASS
11	2483.50	AV	38.87	-29.67	32.56	41.76	54	PASS

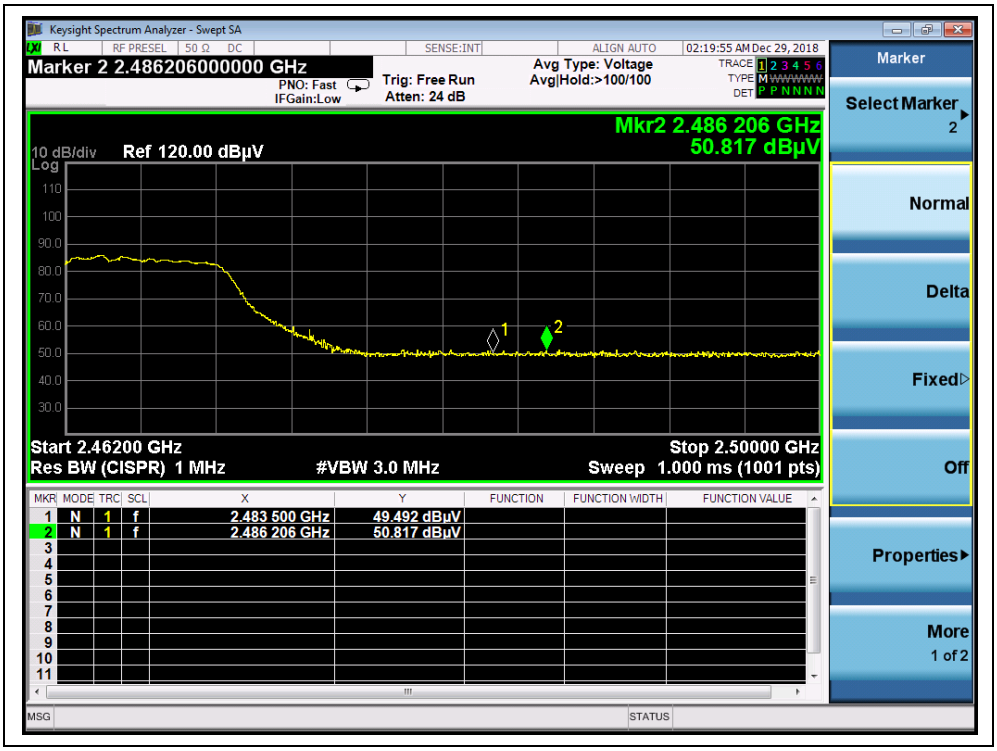
B. Test Plots:



(Channel = 1 PEAK, 802.11g)



(Channel = 1 AVG, 802.11g)



(Channel = 11 PEAK, 802.11g)

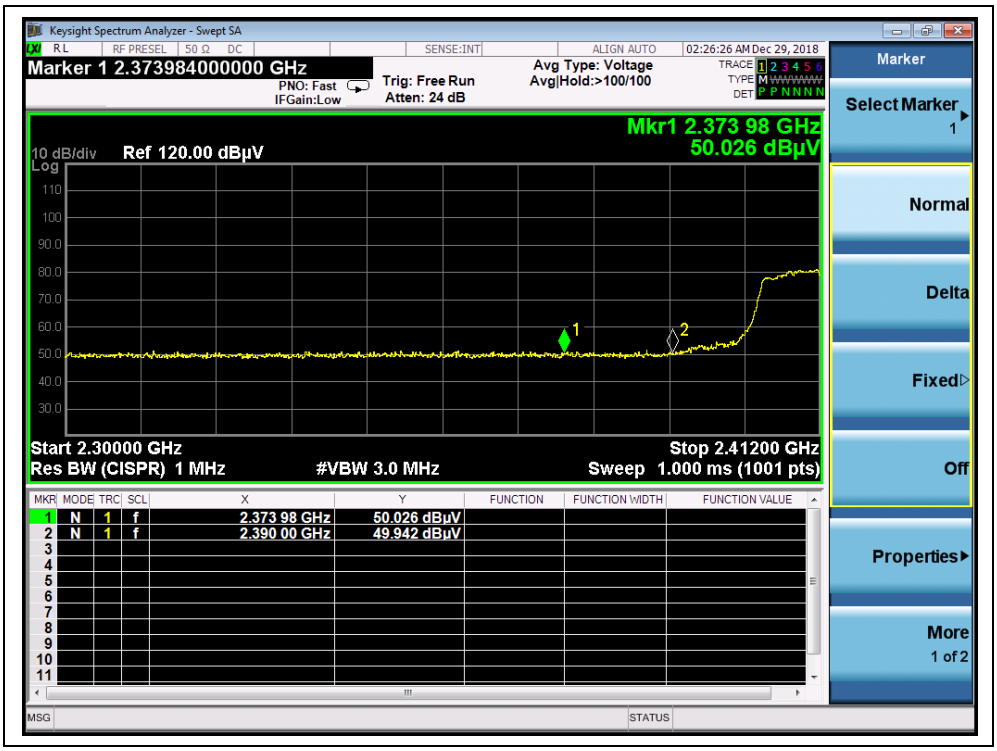
(Channel = 11 AVG, 802.11g)

802.11n(HT20) Test mode

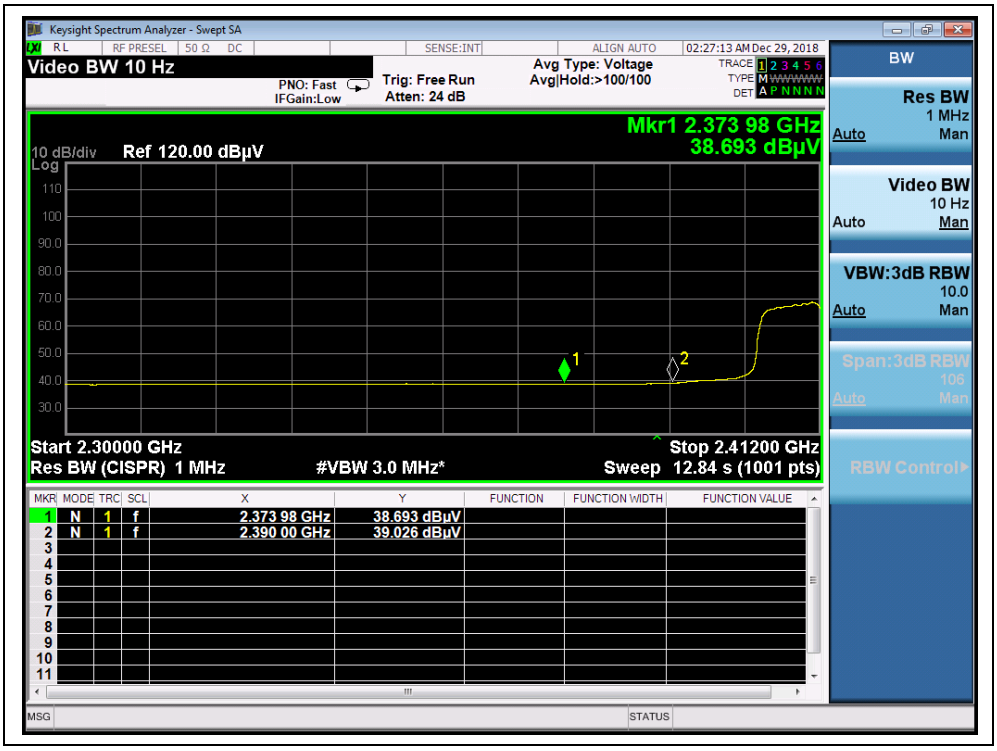
A. Test Verdict:

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	2373.98	PK	50.03	-29.67	32.56	52.92	74	PASS
1	2390.00	AV	39.03	-29.67	32.56	41.92	54	PASS
11	2483.50	0	53.58	-29.67	32.56	56.47	74	PASS
11	2483.50	AV	39.98	-29.67	32.56	42.87	54	PASS

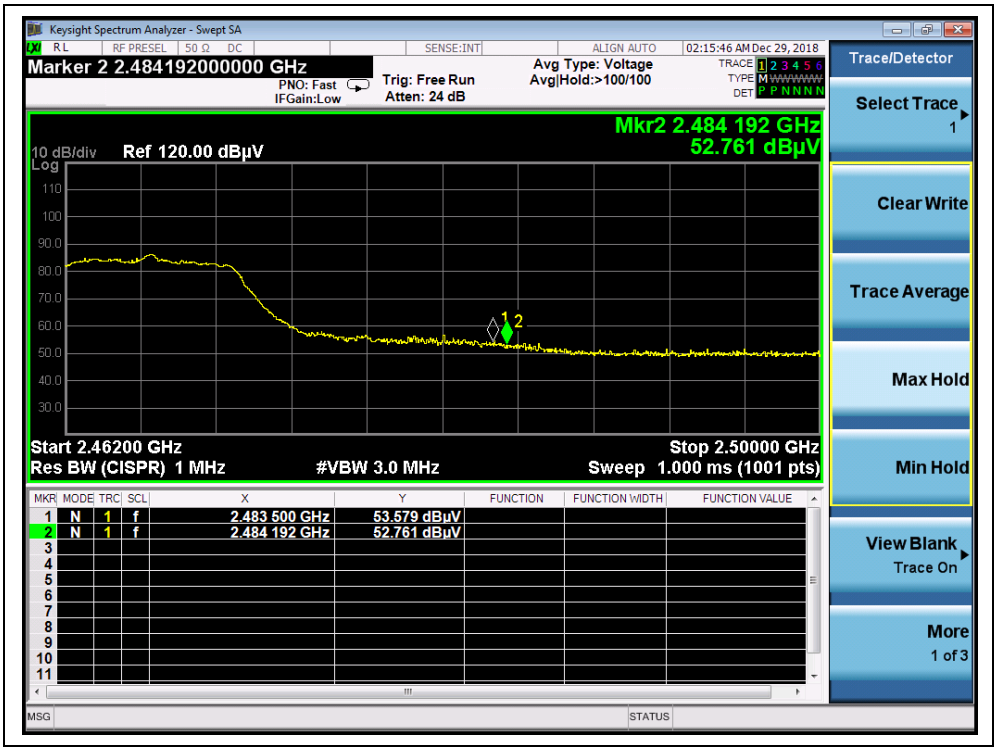
B. Test Plots:



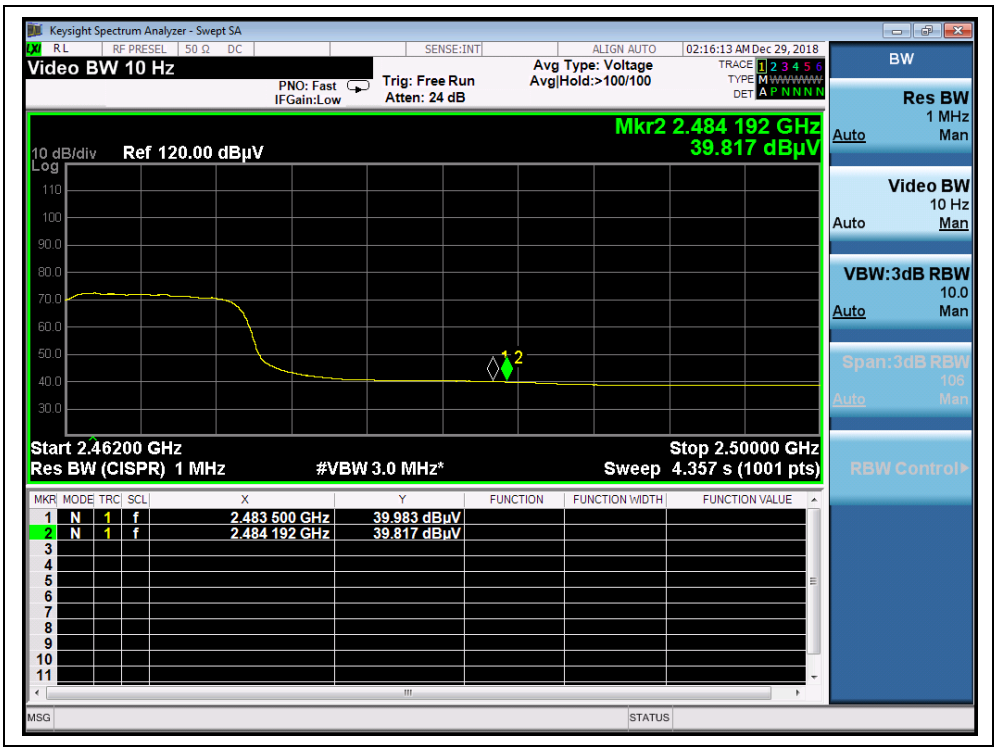
(Channel = 1 PEAK, 802.11n(HT20))



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



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



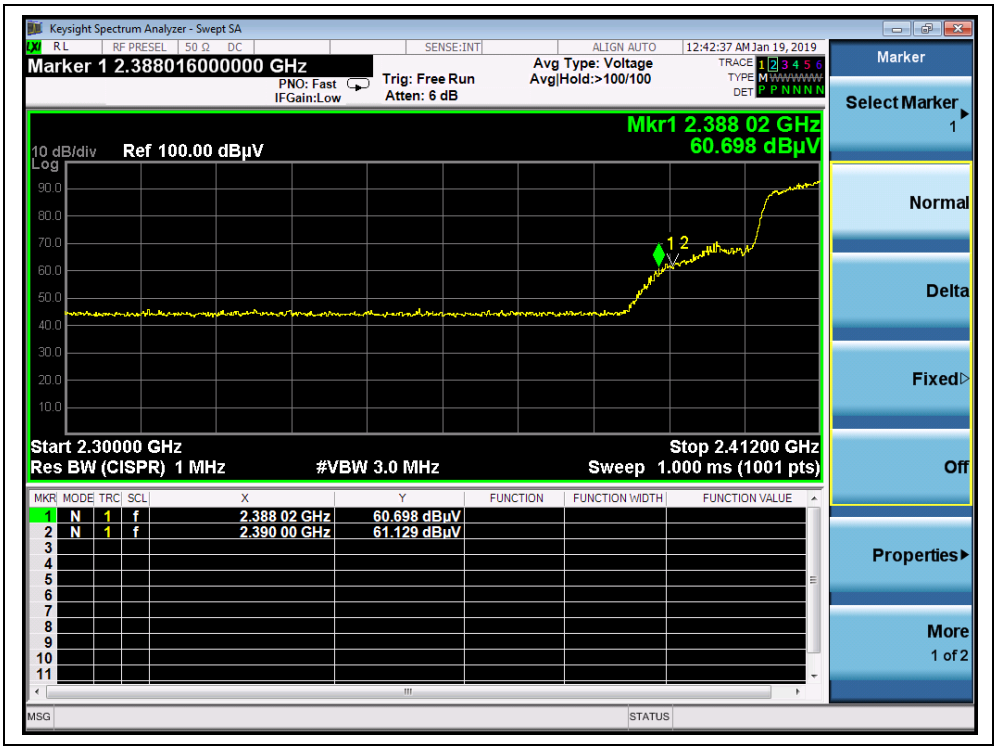
(Channel = 11 AVG, 802.11n(HT20))

802.11n(HT40) Test mode

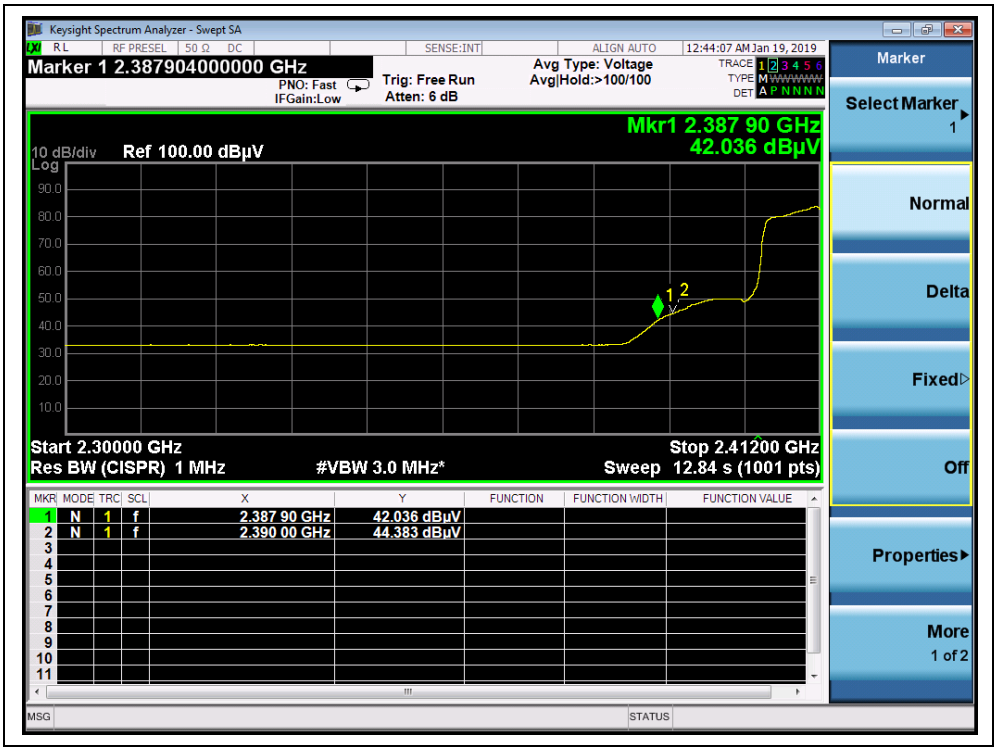
A. Test Verdict:

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	2390.00	PK	61.13	-29.67	32.56	64.02	74	PASS
3	2390.00	AV	44.38	-29.67	32.56	47.27	54	PASS
9	2483.50	PK	57.38	-29.67	32.56	60.27	74	PASS
9	2483.50	AV	44.38	-29.67	32.56	47.27	54	PASS

B. Test Plots:

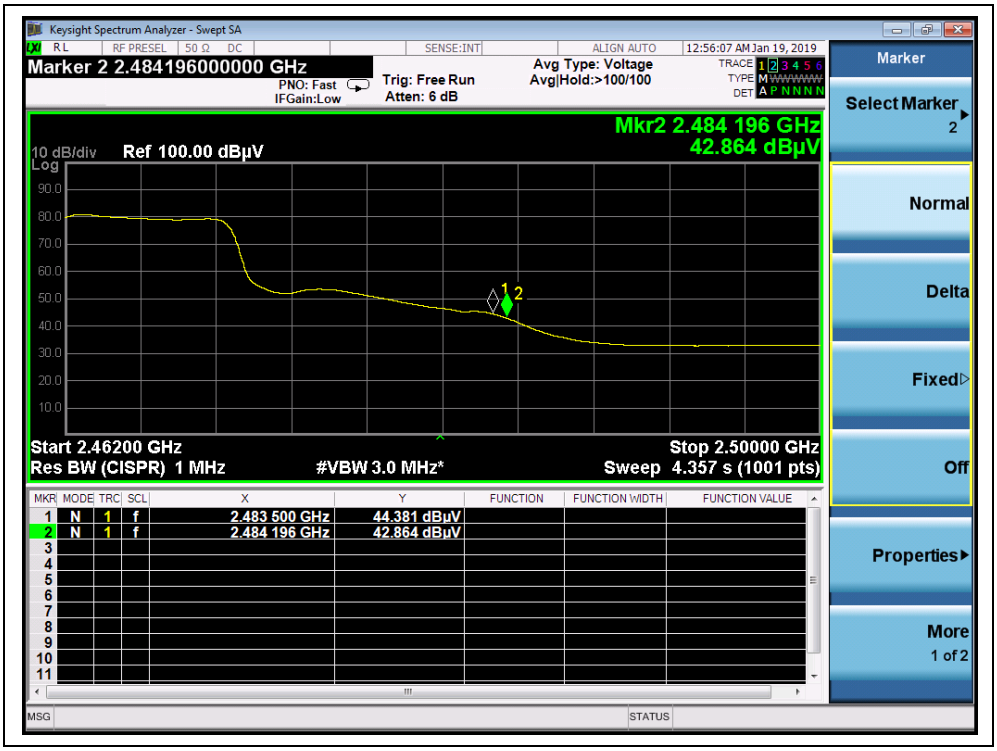


(Channel = 3 PEAK, 802.11n(HT40))



(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.

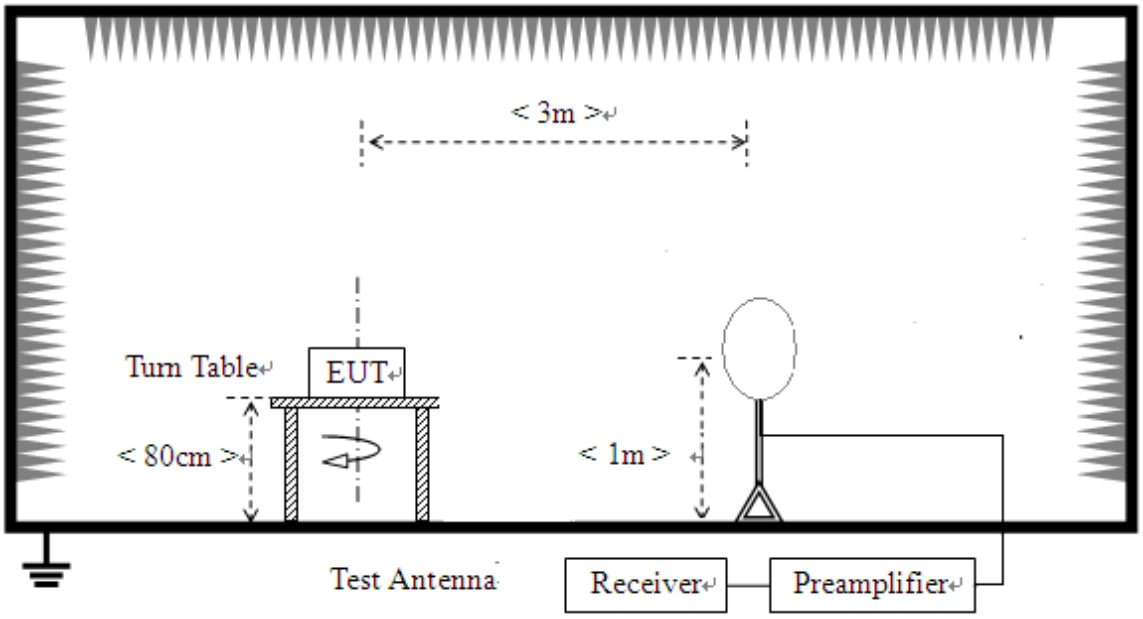
For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

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)

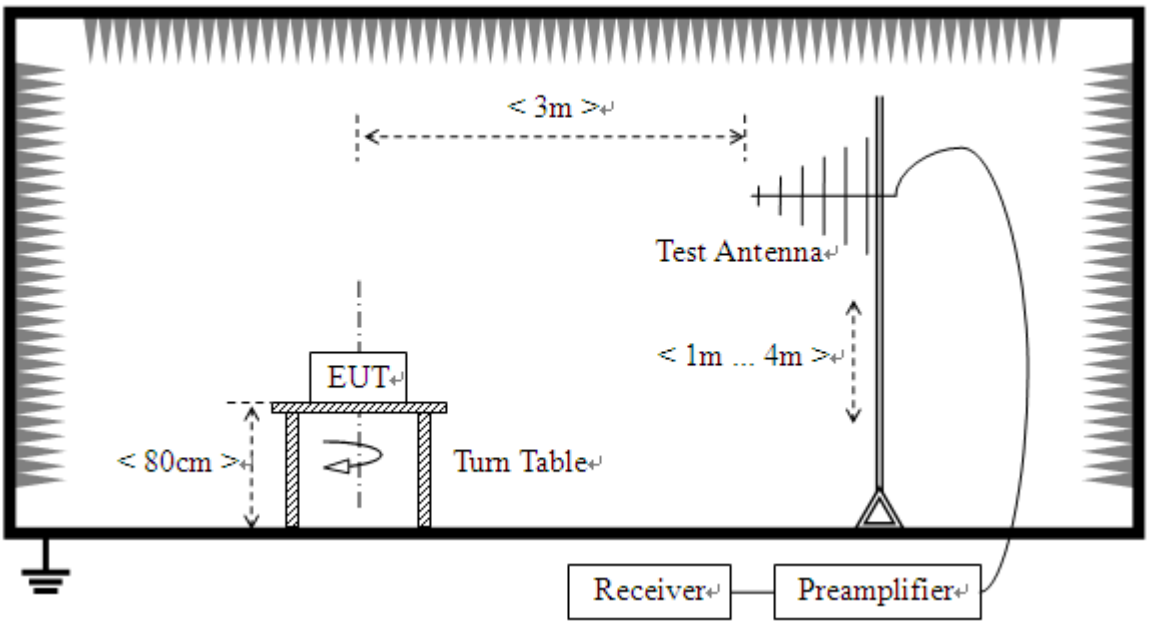
2.9.2. Test Description

A. Test Setup:

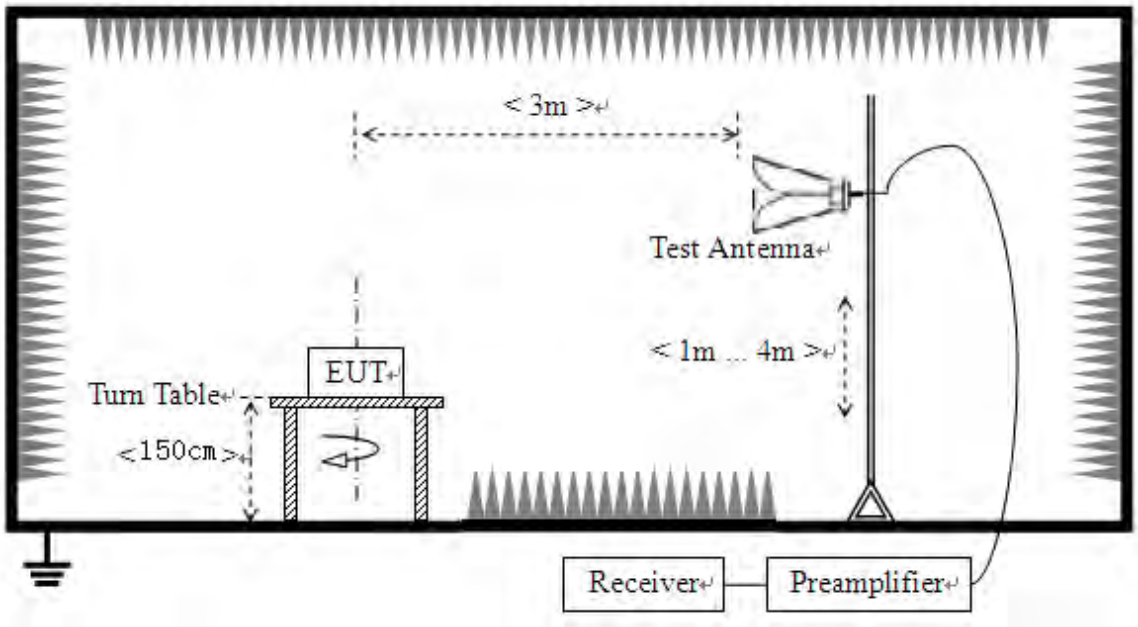
1) For radiated emissions from 9kHz to 30MHz



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.

A. Equipments List:

Please refere ANNEX B(4).

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 [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

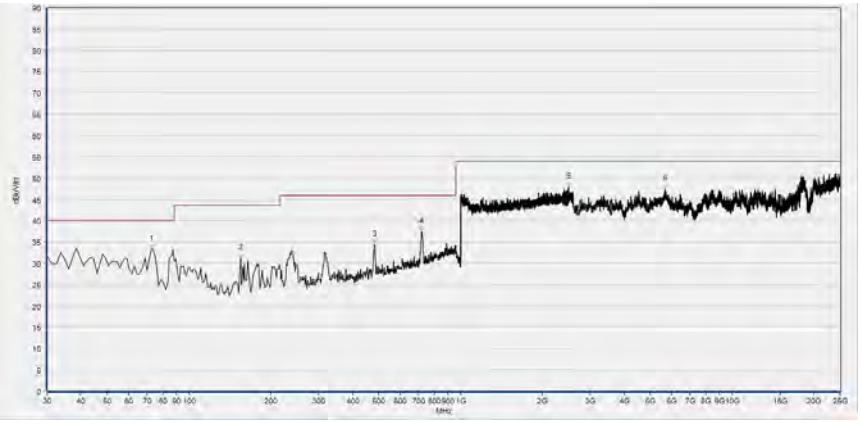
A_{Factor}: Antenna Factor at 3m

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 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.

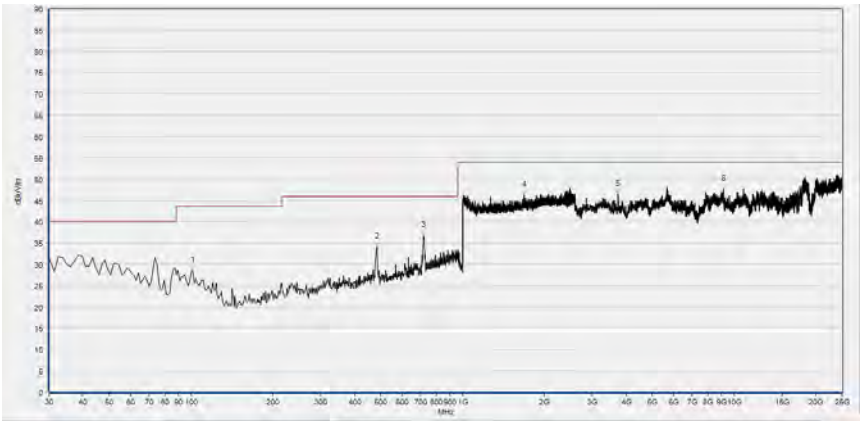
802.11b Test mode

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
72.491	33.43	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
155.044	31.25	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
481.615	34.36	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
718.348	37.43	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2493.717	47.97	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5671.395	47.46	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

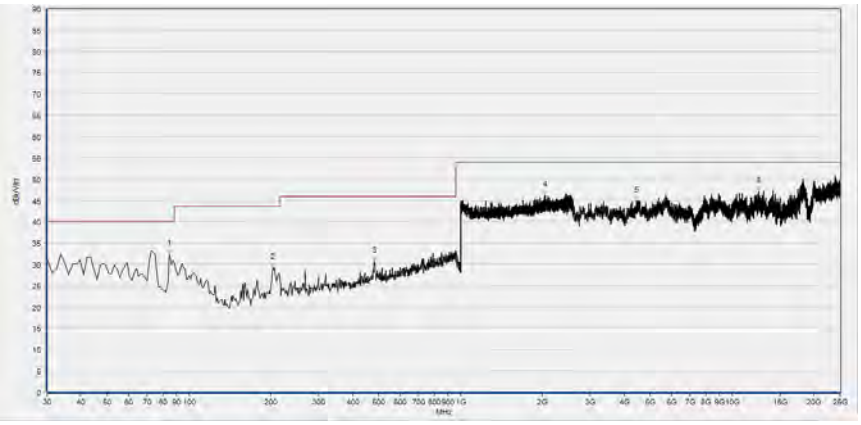
(Antenna Horizontal, 30MHz to 25GHz)



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
101.627	28.42	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
484.043	33.99	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
718.348	36.77	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1687.635	46.27	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3740.571	46.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9154.210	47.54	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

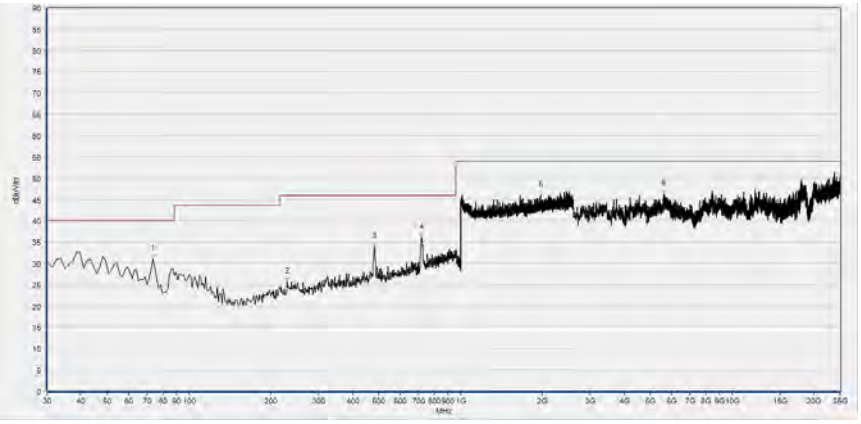
(Antenna Vertical, 30MHz to 25GHz)

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
84.631	32.40	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
203.605	29.08	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
480.401	30.74	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2046.819	46.27	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4445.281	44.92	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12551.482	47.03	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

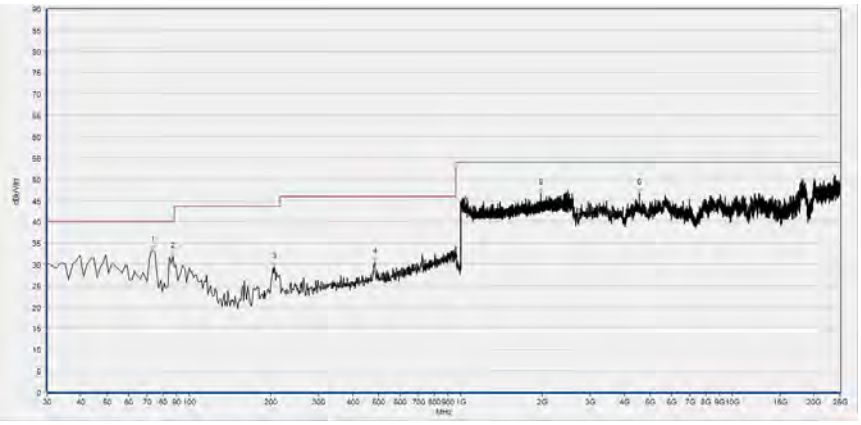
(Antenna Horizontal, 30MHz to 25GHz)



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
73.705	30.99	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
229.099	25.67	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
481.615	33.91	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
718.348	36.12	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1968.707	45.88	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5606.219	46.30	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

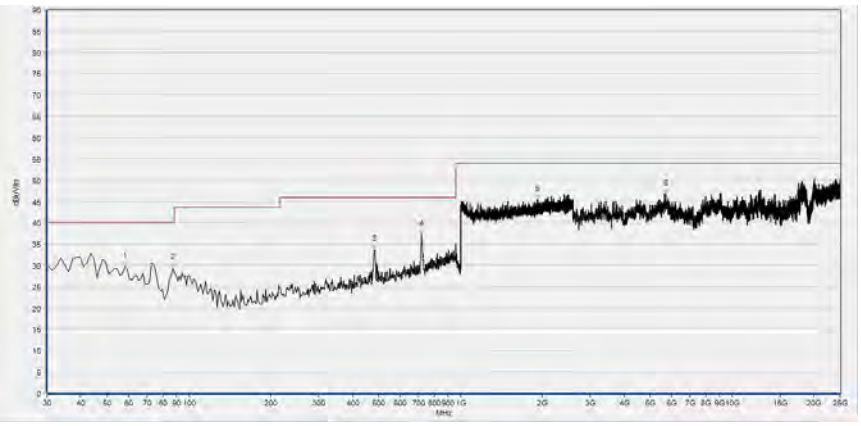
(Antenna Vertical, 30MHz to 25GHz)

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
73.705	33.29	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
87.059	31.90	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
206.033	29.32	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
484.043	30.47	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1969.988	46.71	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4547.118	46.76	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

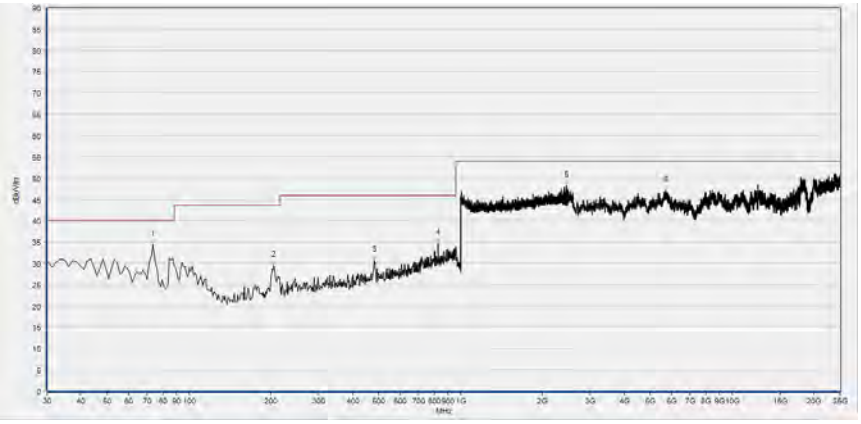


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
57.922	29.67	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
87.059	29.34	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
481.615	33.75	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
718.348	37.19	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1911.084	45.41	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5691.762	46.81	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

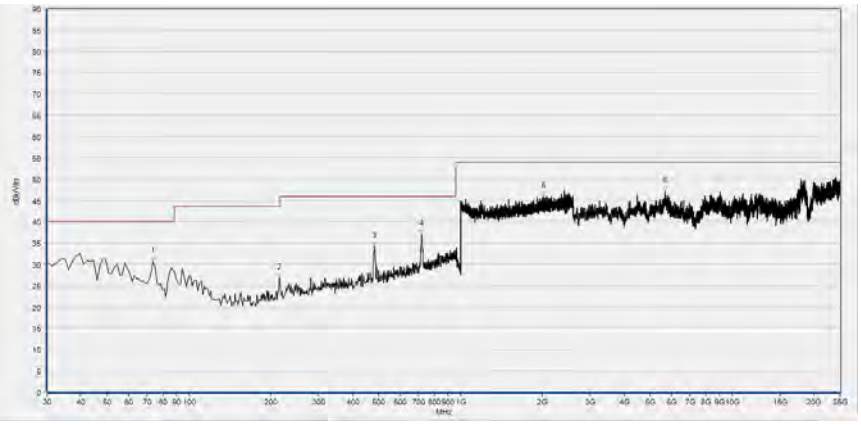
802.11g Test mode

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
73.705	34.44	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
204.819	29.42	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
481.615	30.70	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
826.395	34.68	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2458.503	48.25	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5703.983	47.17	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

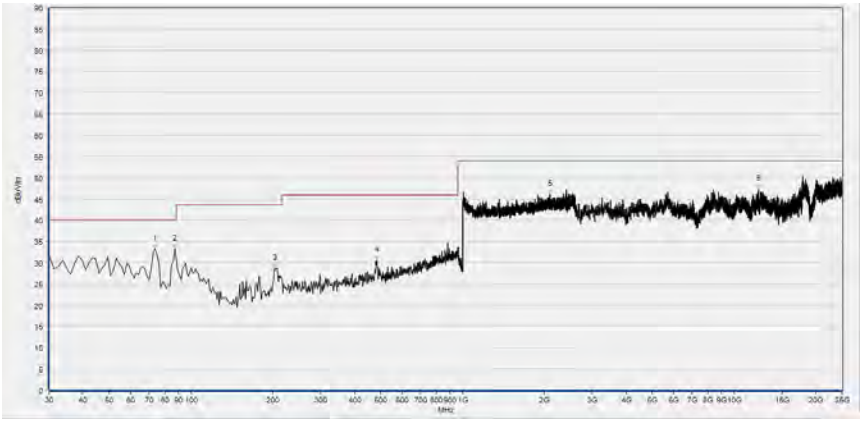
(Antenna Horizontal, 30MHz to 25GHz)



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
73.705	30.62	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
214.531	26.88	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
481.615	34.18	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
719.562	37.03	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2022.489	45.89	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5671.395	47.16	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

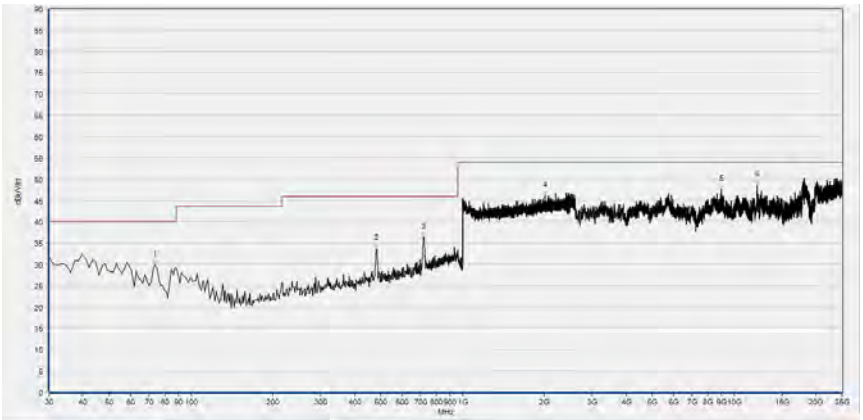
(Antenna Vertical, 30MHz to 25GHz)

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
73.705	33.21	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
87.059	33.15	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
203.605	28.64	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
482.829	30.48	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2096.759	46.06	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12298.927	47.21	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

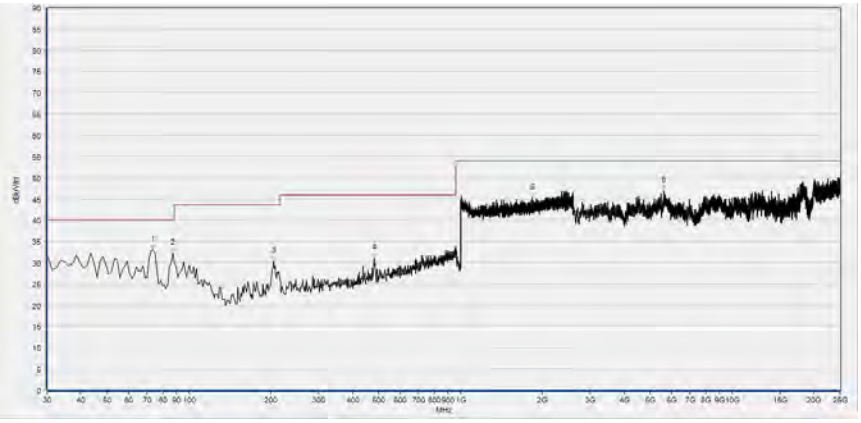
(Antenna Horizontal, 30MHz to 25GHz)



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
73.705	29.85	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
481.615	33.69	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
718.348	36.36	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2007.123	46.14	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
8995.345	47.66	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12135.988	48.60	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

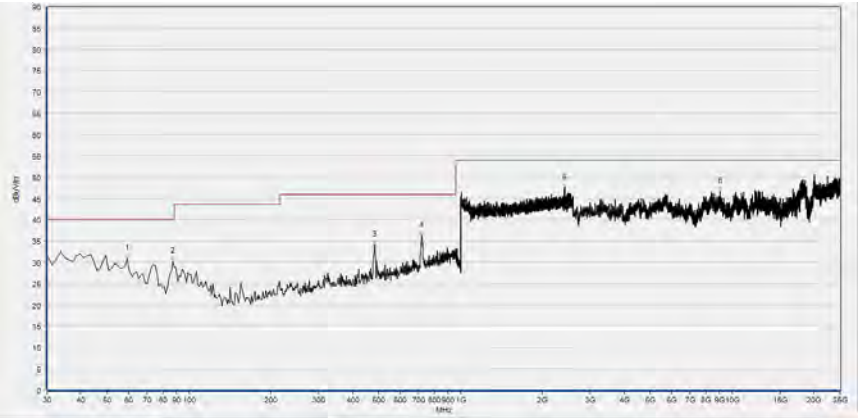
(Antenna Vertical, 30MHz to 25GHz)

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
73.705	33.08	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
87.059	32.20	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
204.819	30.37	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
480.401	31.09	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1837.455	45.20	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5614.366	46.91	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

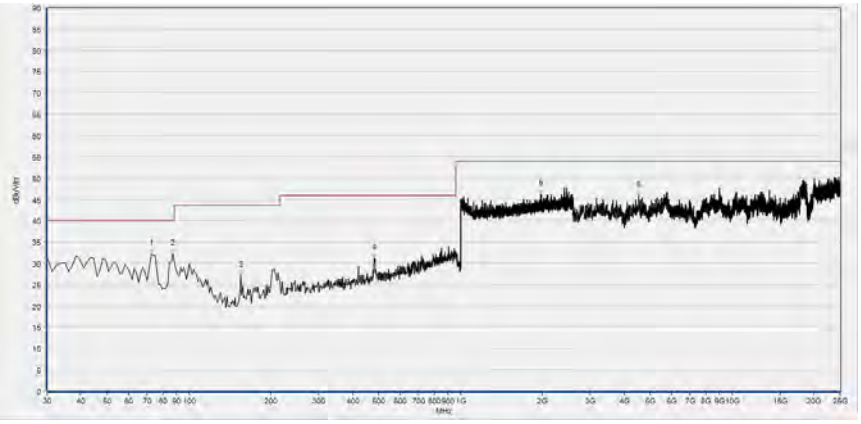


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
59.136	30.90	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
87.059	30.10	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
481.615	33.94	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
719.562	36.17	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2418.167	47.50	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
9019.785	46.55	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

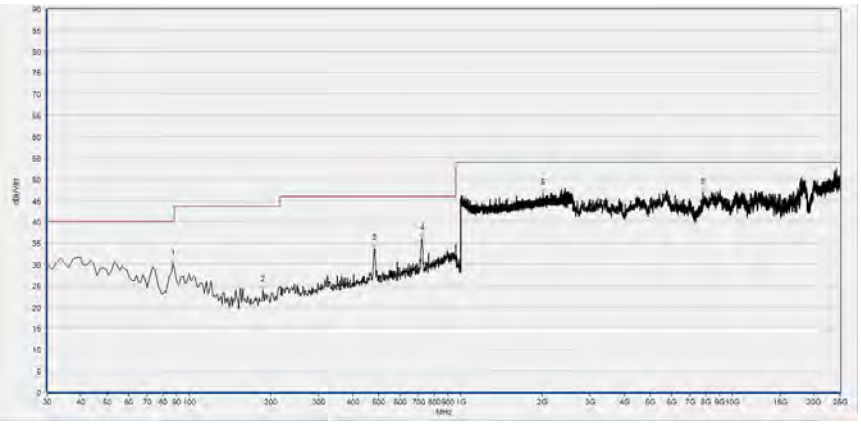
802.11n(HT20) Test mode

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
72.491	32.25	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
87.059	32.18	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
155.044	27.08	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
480.401	31.15	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1968.707	46.25	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4522.677	45.98	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

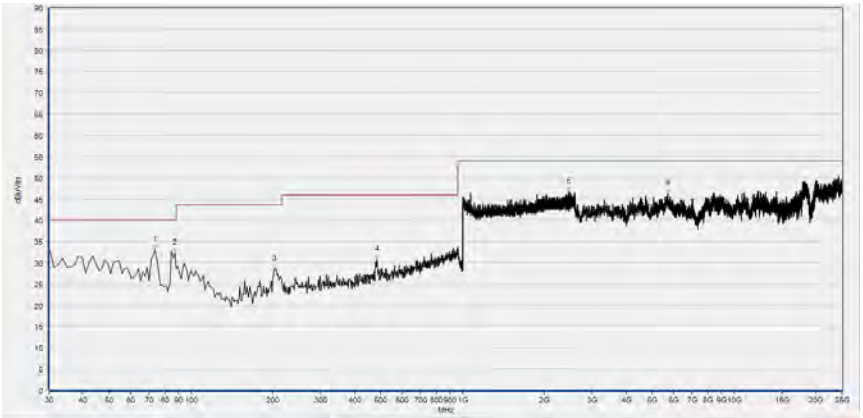
(Antenna Horizontal, 30MHz to 25GHz)



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
87.059	30.13	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
186.608	23.99	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
480.401	33.68	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
720.776	35.95	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2014.806	46.73	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
7826.259	46.97	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

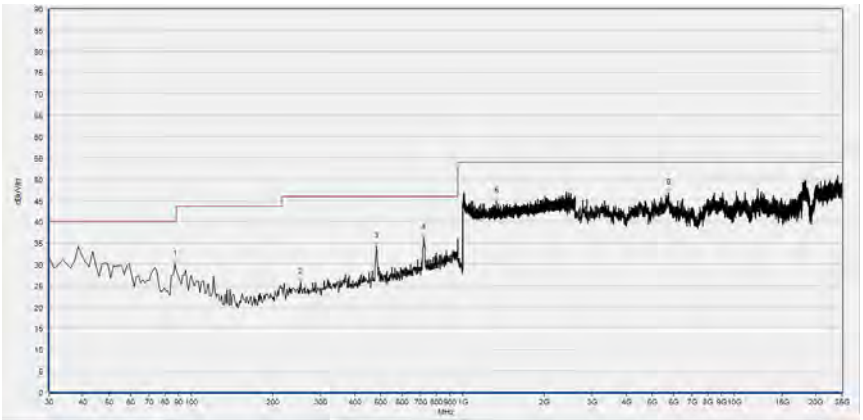
(Antenna Vertical, 30MHz to 25GHz)

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
73.705	33.10	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
87.059	32.14	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
202.390	28.52	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
482.829	30.70	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2448.259	46.54	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5695.836	46.21	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

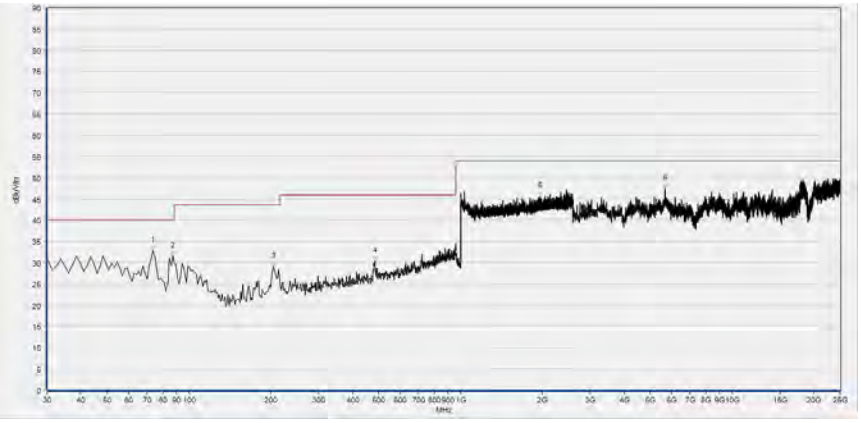
(Antenna Horizontal, 30MHz to 25GHz)



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
87.059	29.96	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
253.379	25.88	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
481.615	34.14	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
718.348	36.17	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1334.214	44.82	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5736.570	46.82	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

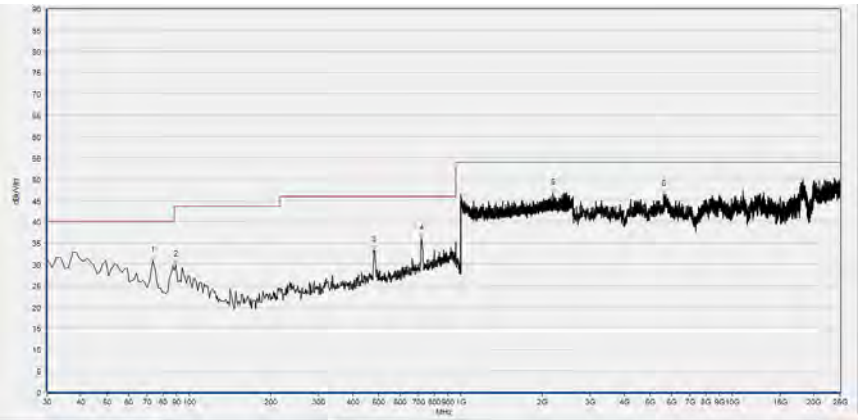
(Antenna Vertical, 30MHz to 25GHz)

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
73.705	32.84	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
87.059	31.53	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
204.819	29.01	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
482.829	30.41	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1967.427	45.55	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5651.027	47.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

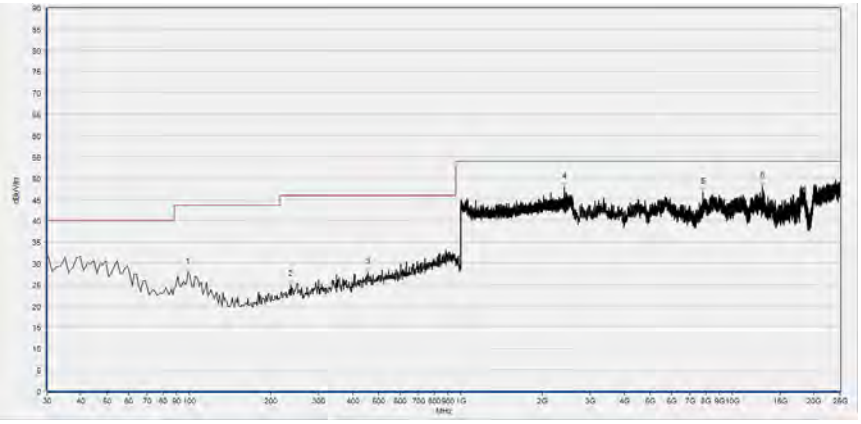


Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
73.705	30.90	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
89.487	29.80	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
479.186	33.43	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
715.920	36.09	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2184.474	46.81	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5606.219	46.49	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

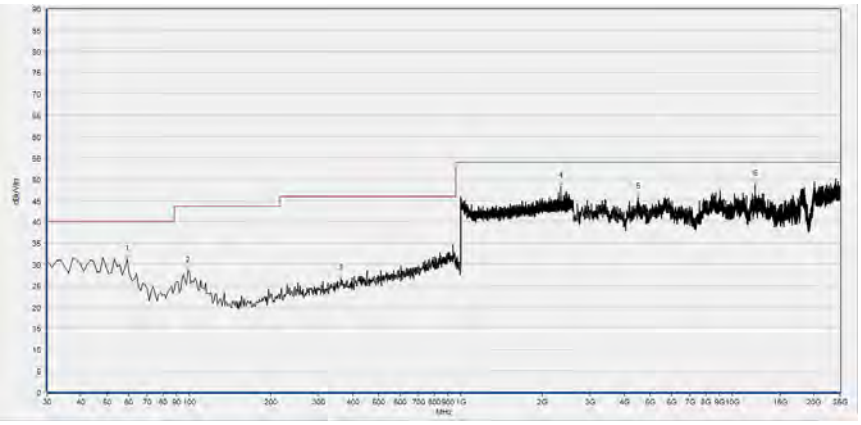
802.11 n(HT40) Test mode

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
99.199	27.76	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
236.383	24.90	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
456.120	27.87	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2409.844	47.91	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
7814.039	46.74	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12885.506	48.03	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

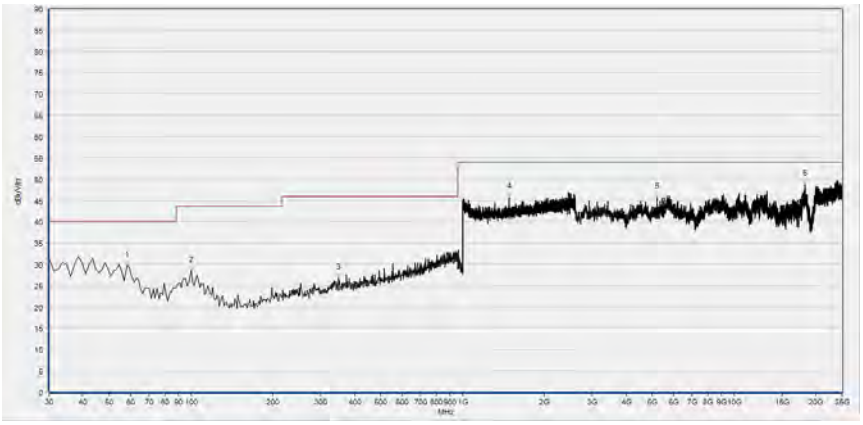
(Antenna Horizontal, 30MHz to 25GHz)



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	31.17	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
99.199	28.50	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
362.641	26.66	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2341.977	48.23	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4498.236	45.80	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12144.135	48.73	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

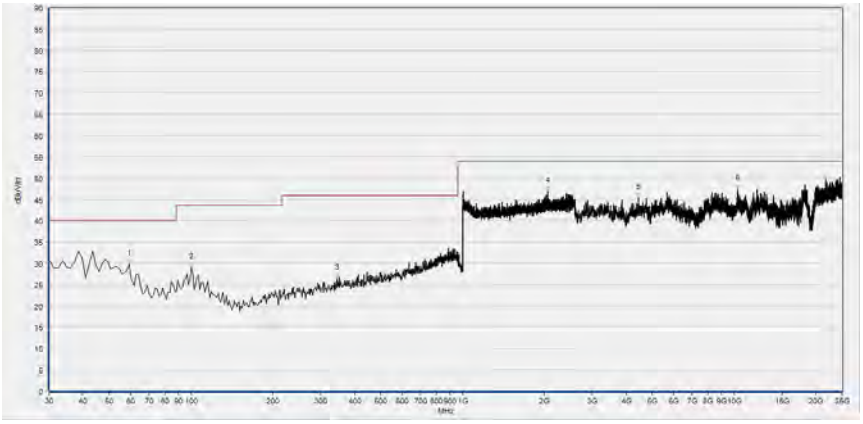
(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

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
57.922	29.58	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
100.413	28.43	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
349.287	26.88	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1480.832	45.77	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
5207.019	45.68	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
18201.382	48.83	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

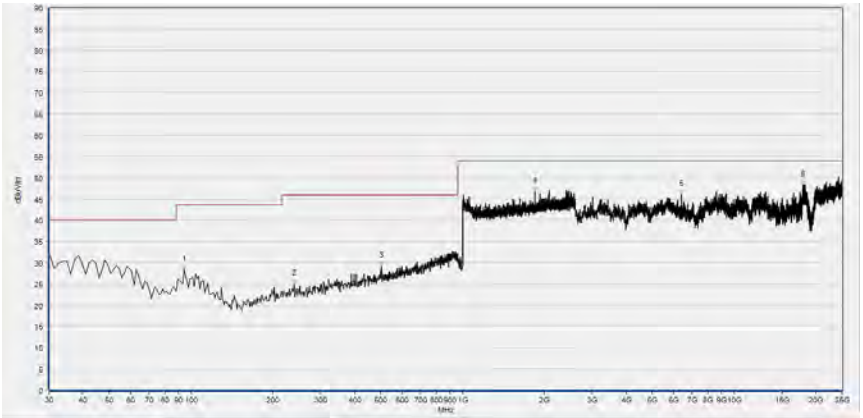
(Antenna Horizontal, 30MHz to 25GHz)



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	29.80	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
100.413	28.99	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
345.645	26.40	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2058.343	46.92	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4453.428	45.44	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
10339.589	47.48	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

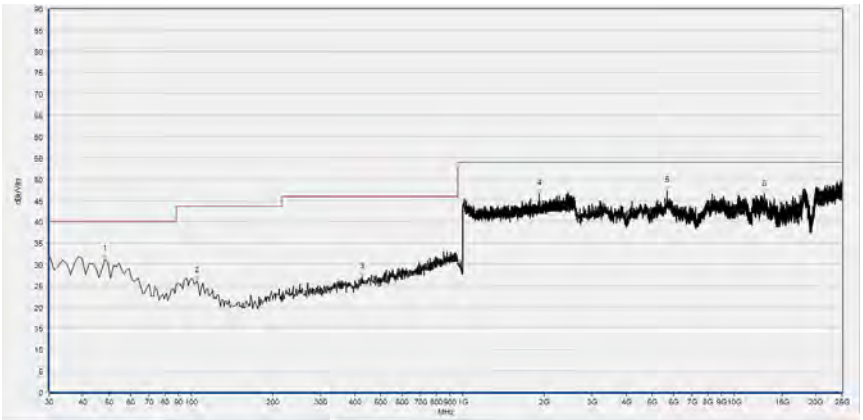
(Antenna Vertical, 30MHz to 25GHz)

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
94.343	28.33	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
240.025	24.95	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
503.467	29.10	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1842.577	46.75	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
6404.619	46.10	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
17871.431	48.22	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
48.210	31.17	N/A	N/A	N/A	40.00	N/A	Vertical	PASS
105.269	26.20	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
425.770	27.04	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1916.847	46.66	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5667.321	47.23	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
12905.874	46.38	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	2018.04.17	2019.04.16
EXA Signal Analzyer	MY53470836	N9010A	Agilent	2018.11.06	2019.11.05
USB Wideband Power Sensor	MY54210011	U2021XA	Agilent	2018.04.17	2019.04.16
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	2018.05.08	2019.05.07
LISN	812744	NSLK 8127	Schwarzbeck	2018.05.08	2019.05.07
Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2018.05.08	2019.05.07
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	2018.05.18	2019.05.17
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2018.03.03	2019.03.02
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	2018.05.08	2019.05.07
18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2018.05.08	2019.05.07
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