REPORT No.: SZ15080164W03

FCC RF TEST REPORT

APPLICANT	:	Solnik S.A.
PRODUCT NAME	:	TBW9613A8
MODEL NAME	:	HY2-3169BL
TRADE NAME	:	N.A
BRAND NAME	:	HYUNDAI
FCC ID	:	2AFRUKY23169NE
STANDARD(S)	:	47 CFR Part 15 Subpart C
ISSUE DATE	:	2015-10-12

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Change History		
Issue	Date	Reason for change
1.0	2015-10-12	First edition

TEST REPORT DECLARATION

Applicant	Solnik S.A.
Applicant Address	Dr Emilio Ravignani 1724 - C.A.B.A. - República Argentina
Manufacturer	Beijing Benywave Wireless Communication Co. Ltd.,
Manufacturer Address	No 55, Jiachuang second road, Zhongguancun science Park OPTO－Mechatronics Industrial Park, Tongzhou District, Beijing, China 101111
Product Name	TBW9613A8
Model Name	HY2-3169BL
Brand Name	HYUNDAI
HW Version	TBW9613_P2.2_001
SW Version	961315_9783_VXXXX
Test Standards	47 CFR Part 15 Subpart C
Test Date	2015-8-20 to 2015-9-20
Test Result	PASS

Tested by : Zou Jian

Zou Jian(Test Engineer)

Reviewed by : Qiu Xiaojun

Qiu Xiaojun(RF Manager)

Approved by : Zeng Dexin

Zeng Dexin(Chief Engineer)

1. TECHNICAL INFORMATION

Note: Provide by applicant.

1.1 Applicant Information

Company:	Solnik S.A.
Address:	Dr Emilio Ravignani 1724 - C.A.B.A. - República Argentina

1.2 Equipment under Test (EUT) Description

Brand Name:	HYUNDAI
Trade Name:	N.A
Model Name:	HY2-3169BL
Frequency Range:	802.11b/g/n-20MHz: 2.412GHz - 2.462GHz
Channel Number:	802.11b/g/n-20MHz: 11
Modulation Type:	DSSS, OFDM
Antenna Type:	PIFA Antenna
Antenna Gain:	1.55dbi

NOTE:

The EUT is a TBW9613A8, it contains WIFI Module 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-20MHz (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).

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

The antenna connector of EUT is designed with permanent attachment and no consideration of replacement.

1.2.1 Identification of all used EUTs

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
A01	TBW9613_P2.2_001	961315_9783_VXXXX

1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-13 Edition)	Radio Frequency Devices

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

No.	Section	Description	Test Date	Result
1	15.203	Antenna Requirement	N.A	PASS
2	15.247(b)	Peak Output Power	Aug 31, 2015	PASS
3	15.247(a)	Bandwidth	Aug 31, 2015	PASS
4	15.247(d)	Conducted Spurious Emission and Band Edge	Aug 31, 2015	PASS
5	15.247(d)	Restricted Frequency Bands	Sep 06, 2015	PASS
6	15.207	Conducted Emission	Aug 31, 2015	PASS
7	15.209 ,15.247(d)	Radiated Emission	Aug 26, 2015	PASS
8	15.247(e)	Power spectral density (PSD)	Aug 31,2015& Sep 09, 2015	PASS
9	15.247(i), 1.1307&2.1093	RF exposure evaluation	N.A	PASS

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10: 2013 and ANSI C63.4: 2009.

These RF tests were performed according to the method of measurements prescribed in KDB558074 D01 v03r03 (09/06/2015).

1.3.1 Test Environment 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 Peak Output Power

2.2.1 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.

2.2.2 Test Description

KDB 558074 Section 9.1.3 was used in order to prove compliance.

The measured output power was calculated by the reading of the Power Meter and calibration.

A. Test Setup:

The EUT (Equipment under the test) which is coupled to the Power Meter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in power meter.

B. Equipments List:

Please reference ANNEX A(1.4).

2.2.3 Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

2.2.3.1 802.11b Test Mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	14.45	0.027861212	30	1	PASS
6	2437	11.60	0.014454398			PASS
11	2462	11.52	0.014190575			PASS

2.2.3.2 802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	9.39	0.008689604	30	1	PASS
6	2437	9.87	0.0097051			PASS
11	2462	10.02	0.010046158			PASS

2.2.3.3 802.11n-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	6.15	0.004120975	30	1	PASS
6	2437	6.13	0.004102041			PASS
11	2462	6.12	0.004092607			PASS

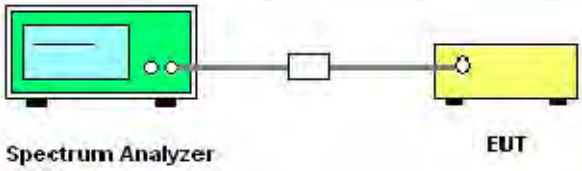
2.3 Bandwidth

2.3.1 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.

2.3.2 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 reference ANNEX A(1.4).

2.3.3 Test Result

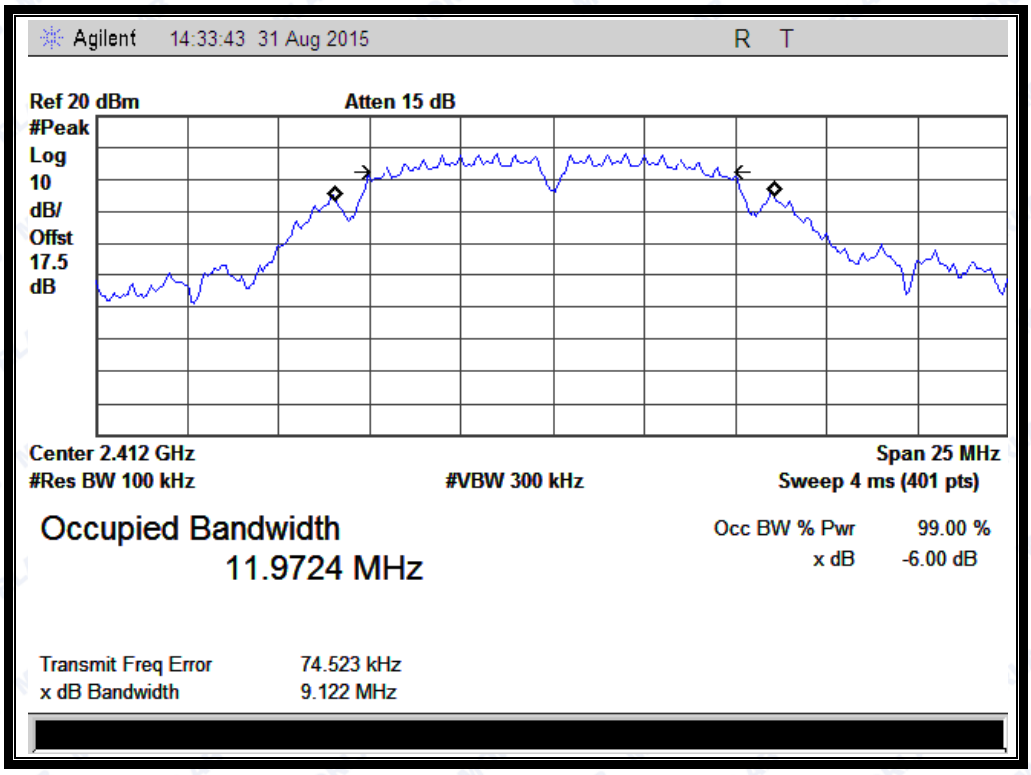
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1 802.11b Test mode

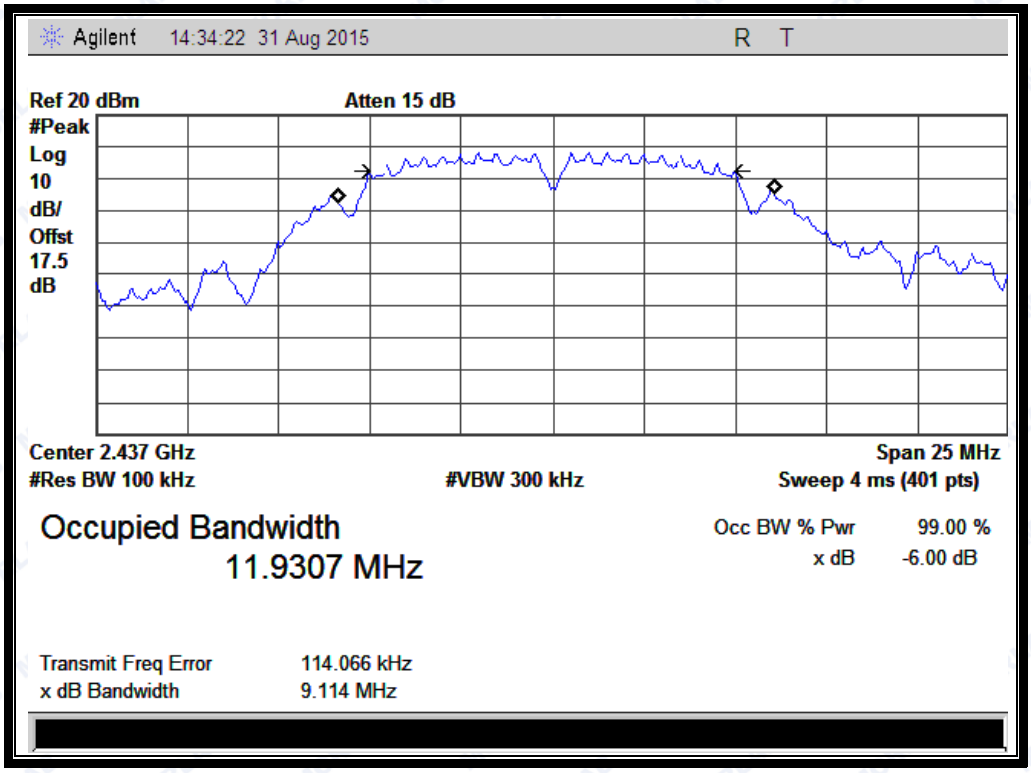
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	9.122	≥500	PASS
6	2437	9.114	≥500	PASS
11	2462	9.140	≥500	PASS

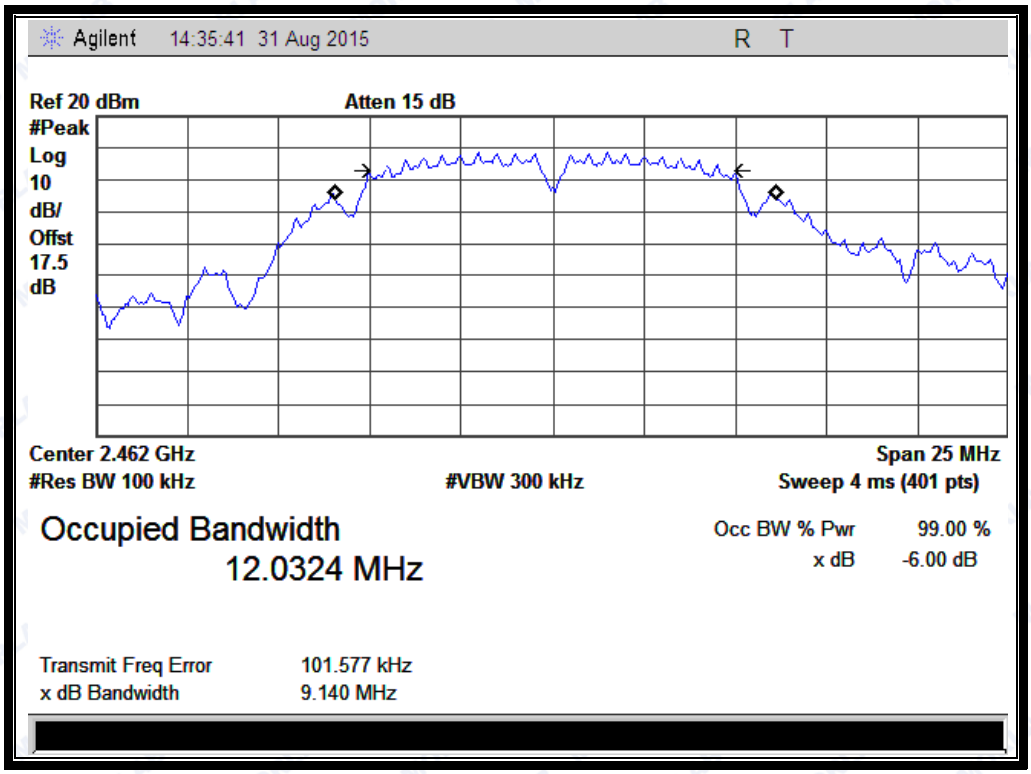
B. Test Plots



(Channel 1: 2412MHz @ 802.11b)



(Channel 6: 2437 MHz @ 802.11b)



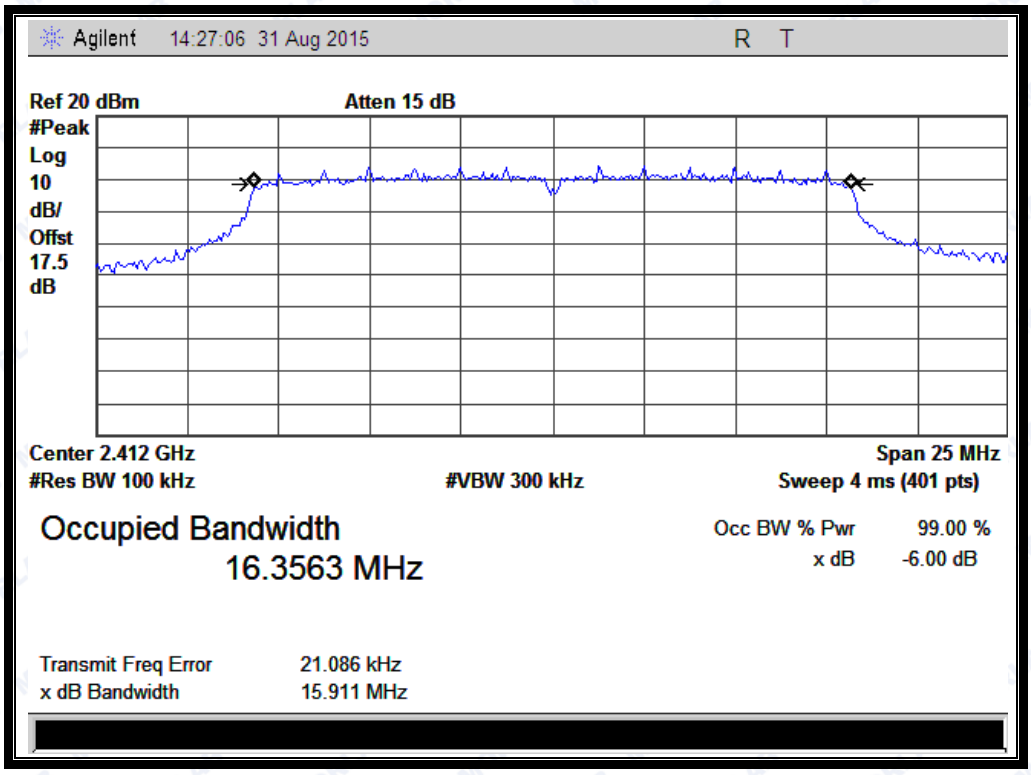
(Channel 11: 2462MHz @ 802.11b)

2.3.3.2 802.11g Test mode

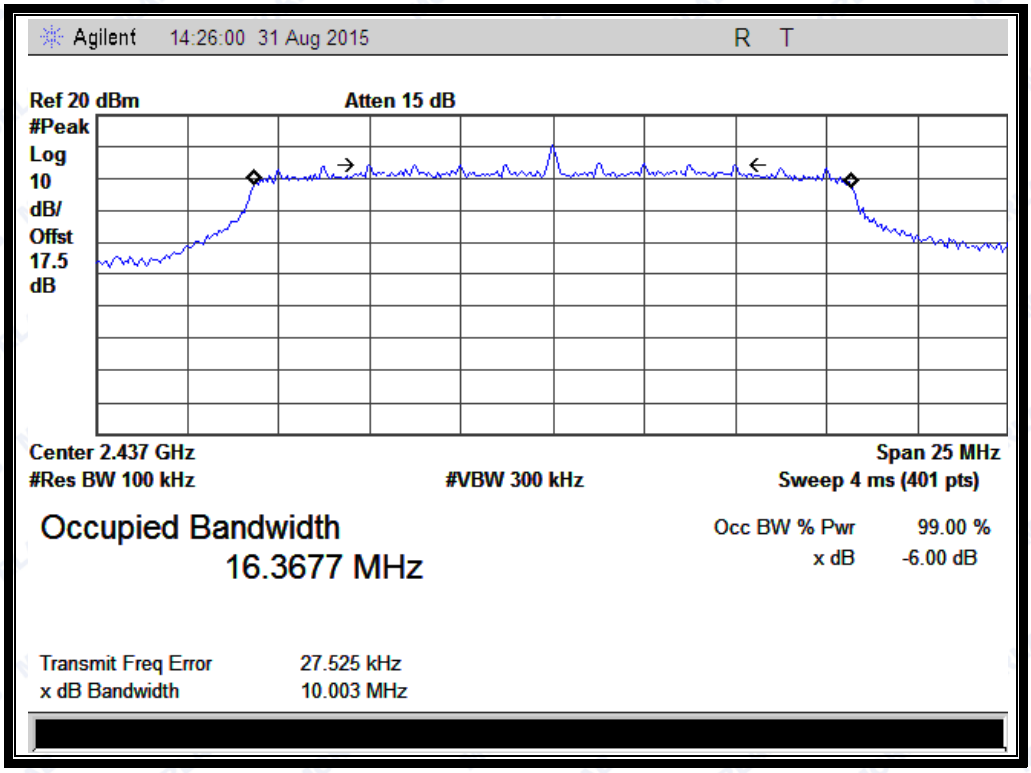
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	15.911	≥500	PASS
6	2437	10.003	≥500	PASS
11	2462	16.272	≥500	PASS

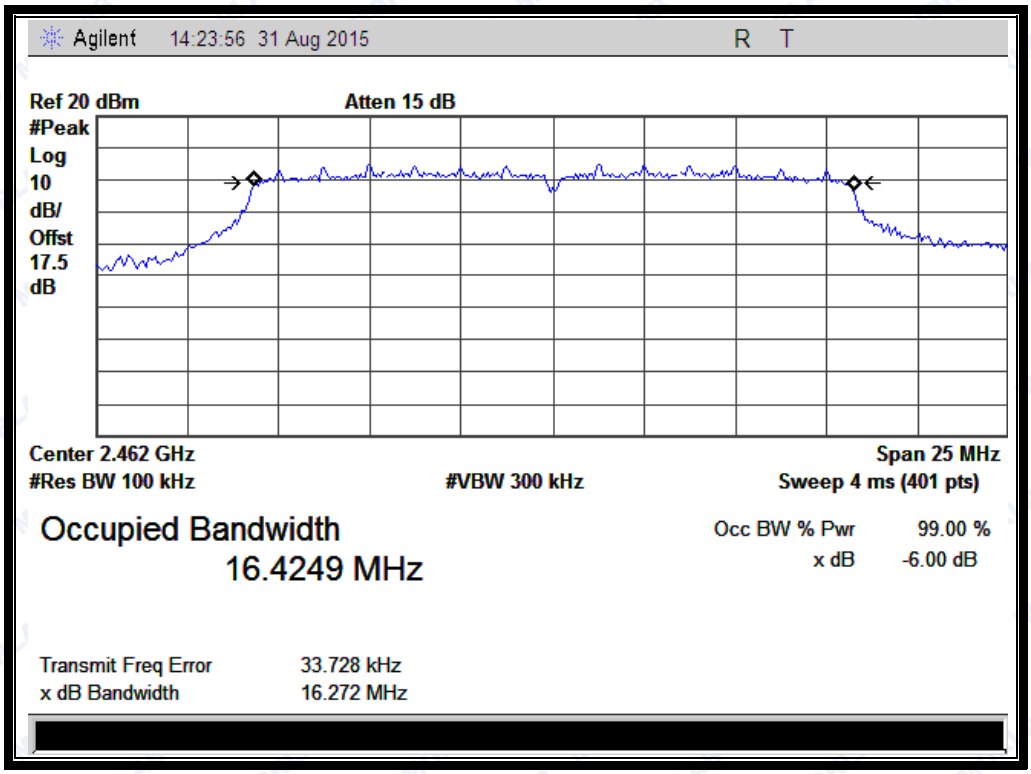
B. Test Plots:



(Channel 1: 2412MHz @ 802.11g)



(Channel 6: 2437MHz @ 802.11g)



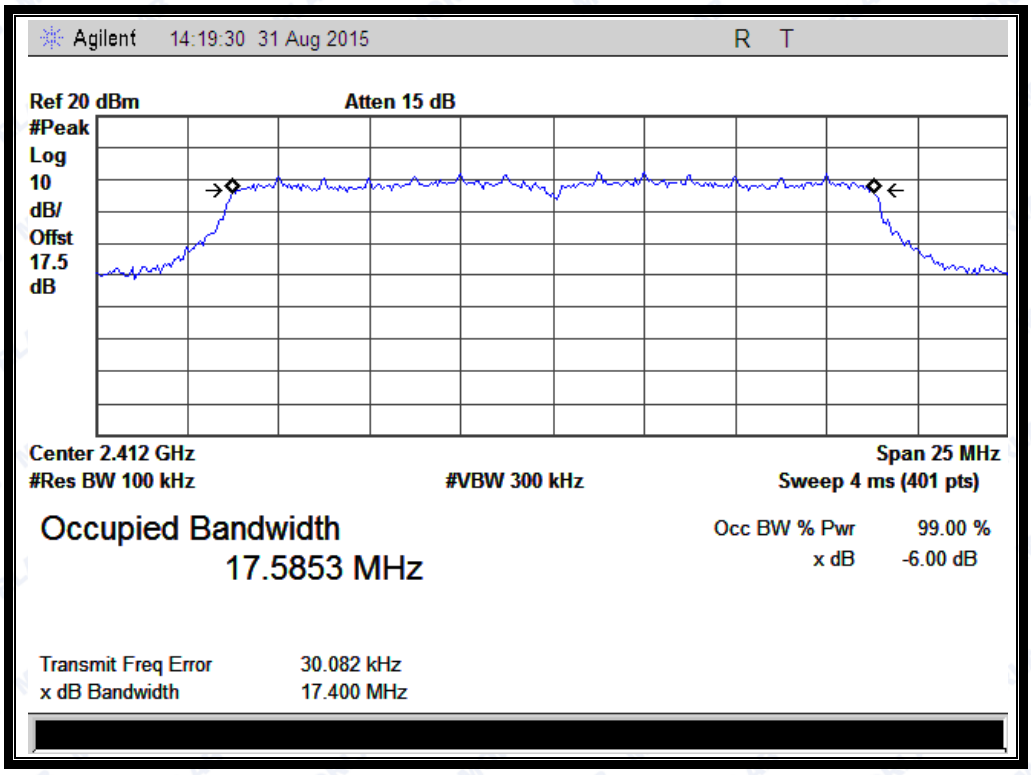
(Channel 11: 2462MHz @ 802.11g)

2.3.3.3 802.11n-20 Test mode

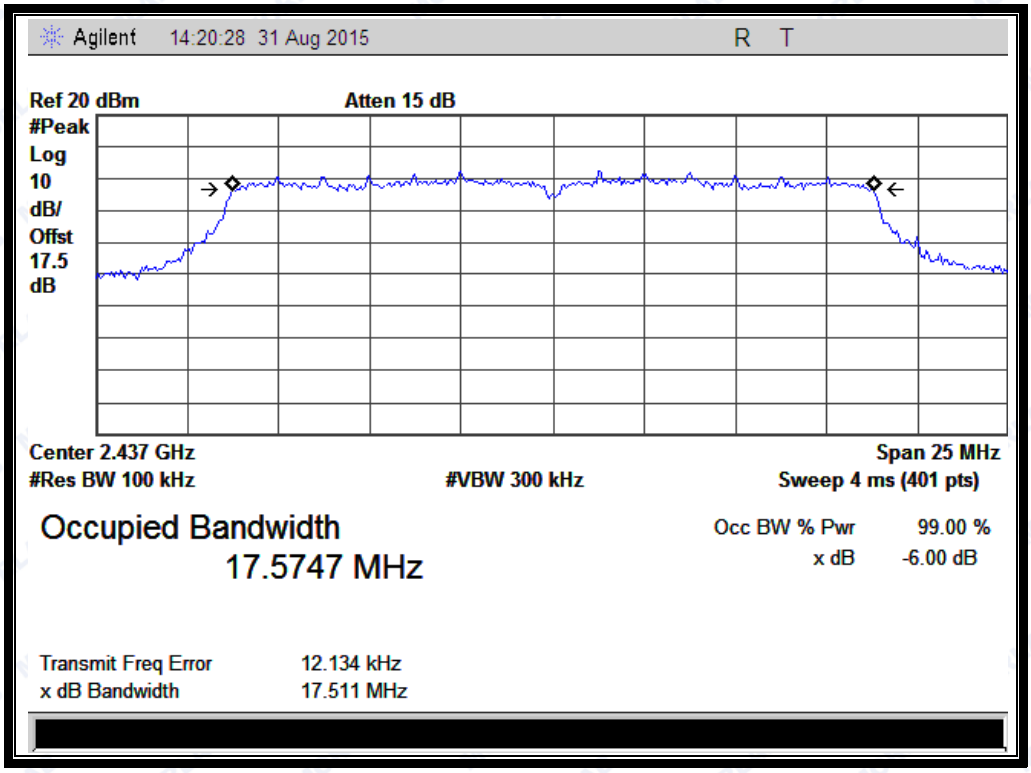
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	17.400	≥500	PASS
6	2437	17.511	≥500	PASS
11	2462	17.413	≥500	PASS

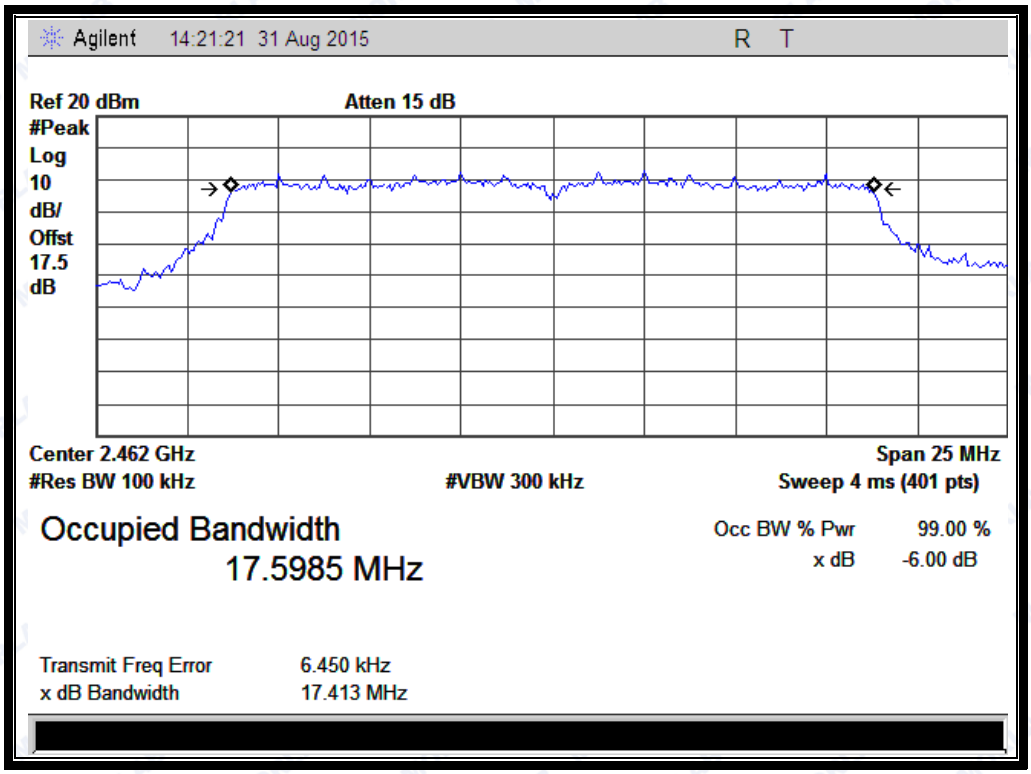
B. Test Plots:



(Channel 1: 2412MHz @ 802.11n-20)



(Channel 6: 2437MHz @ 802.11n-20)



(Channel 11: 2462MHz @ 802.11n-20)

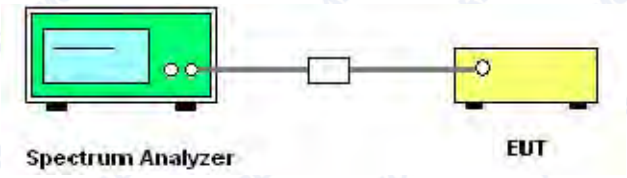
2.4 Conducted Spurious Emissions and Band Edge

2.4.1 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.

2.4.2 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 11.0 was used in order to prove compliance.

B. Equipments List:

Please reference ANNEX A(1.4).

2.4.3 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

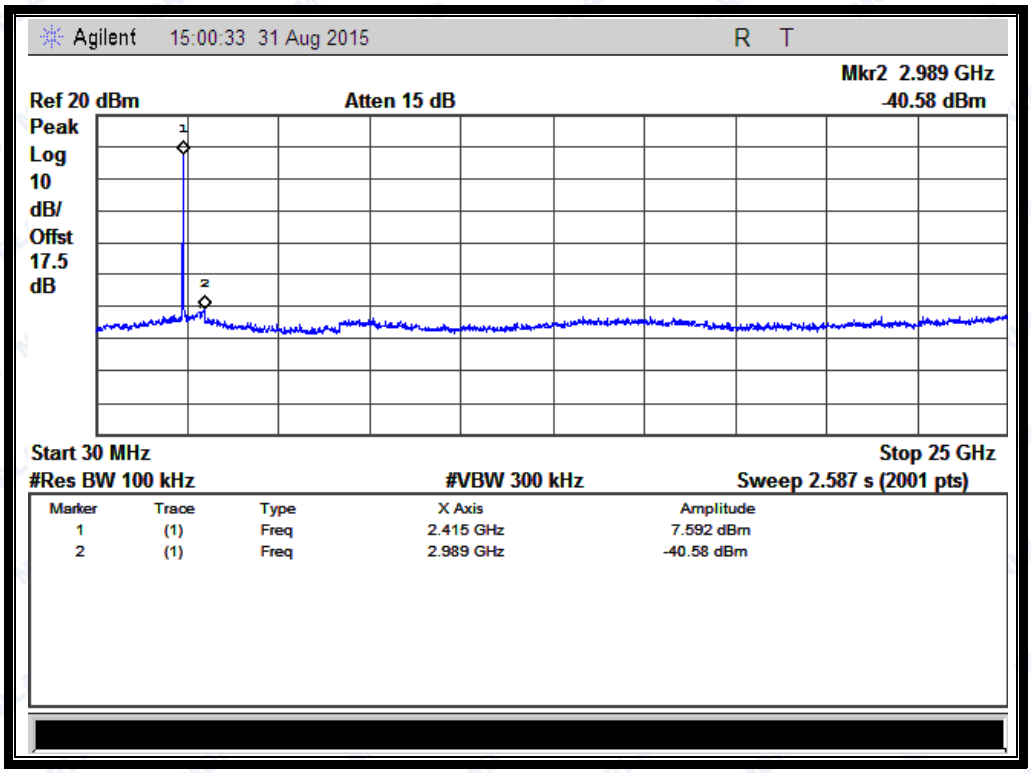
2.4.3.1 802.11b Test mode

A. Test Verdict:

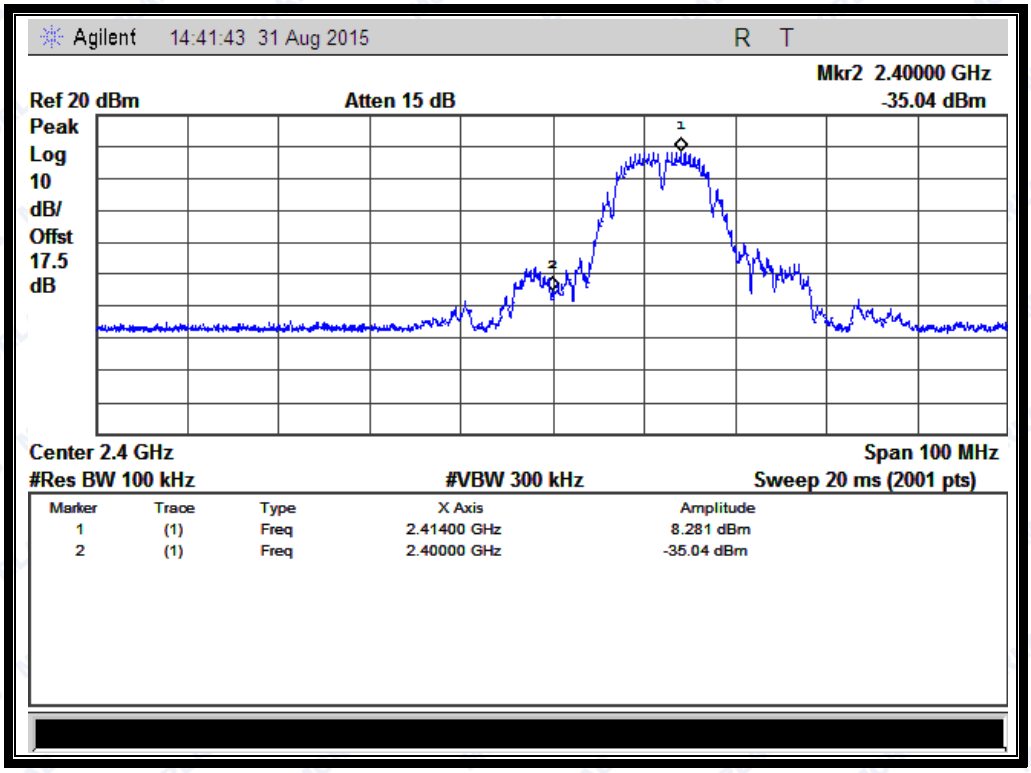
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-40.58	7.592	-12.408	PASS
6	2437	-41.78	7.224	-12.776	PASS
11	2462	-41.29	6.965	-13.035	PASS

B. Test Plots:

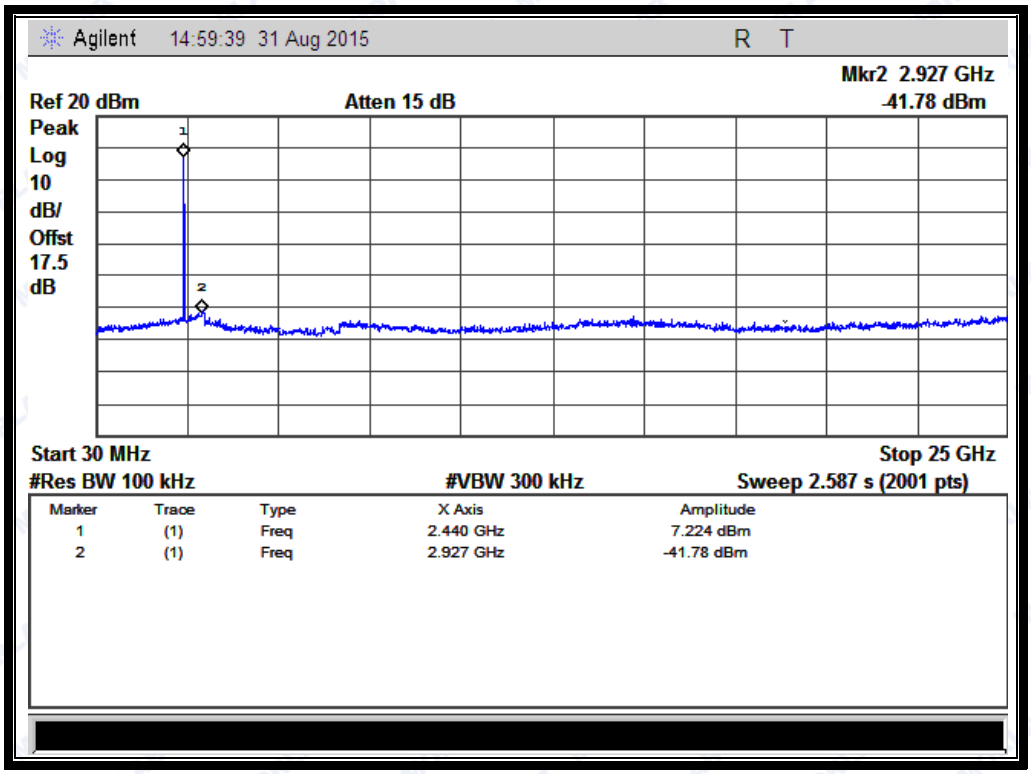
Note: the power of the Module transmitting frequency should be ignored.



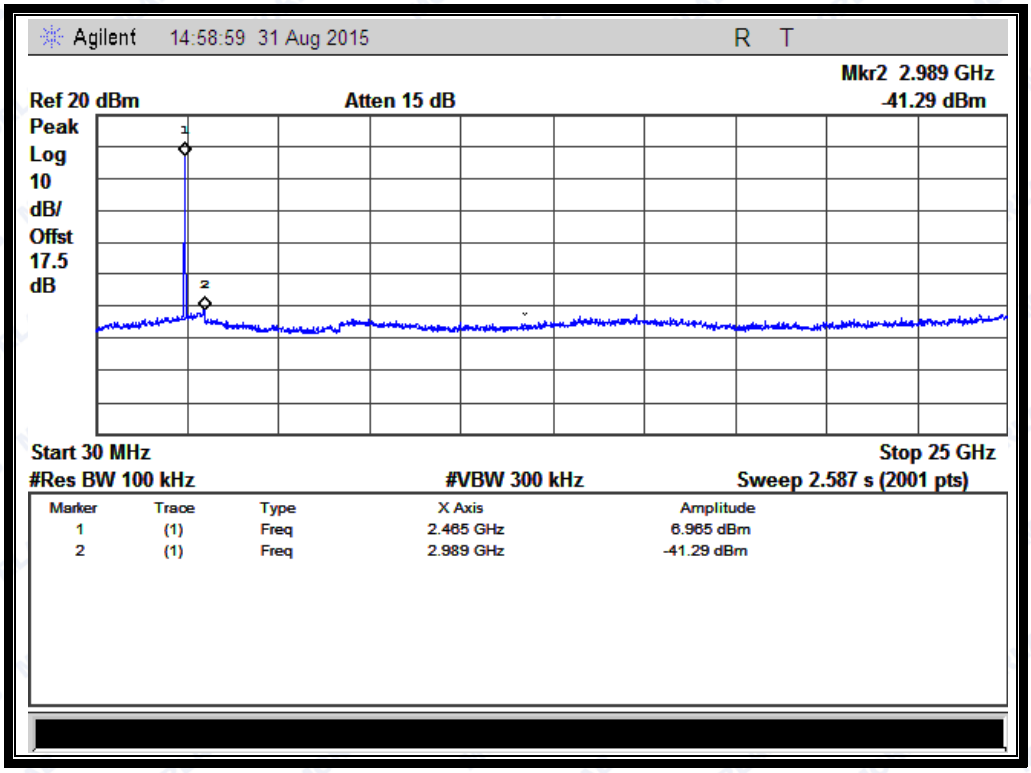
(Channel = 1, 30MHz to 25GHz)



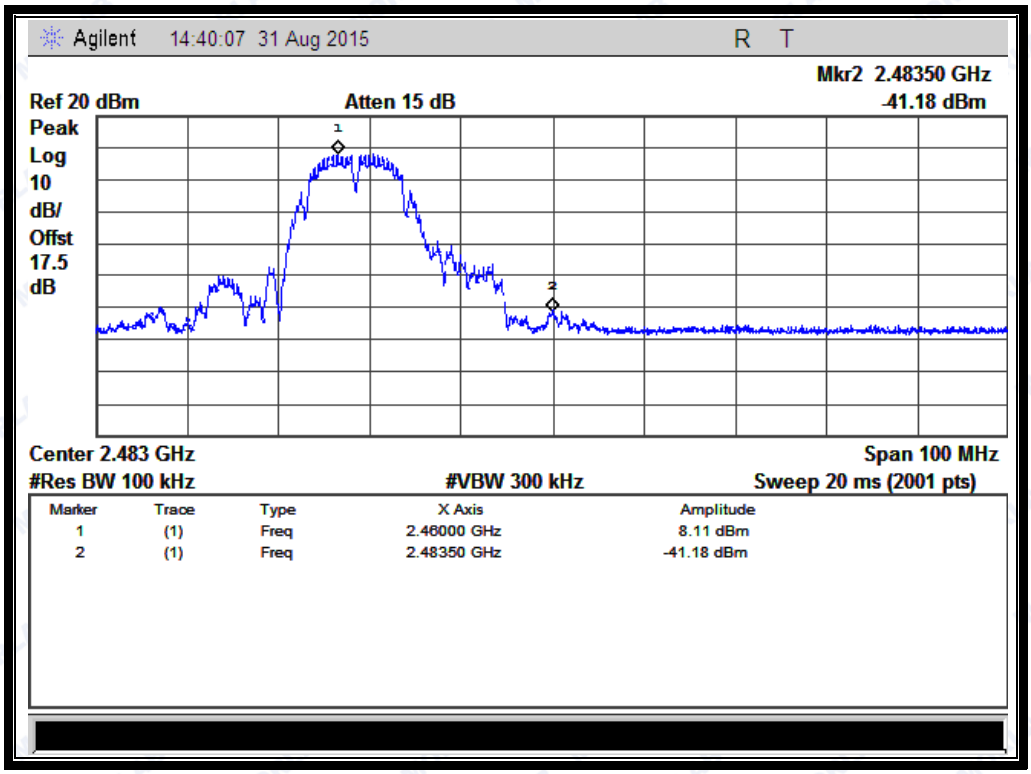
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

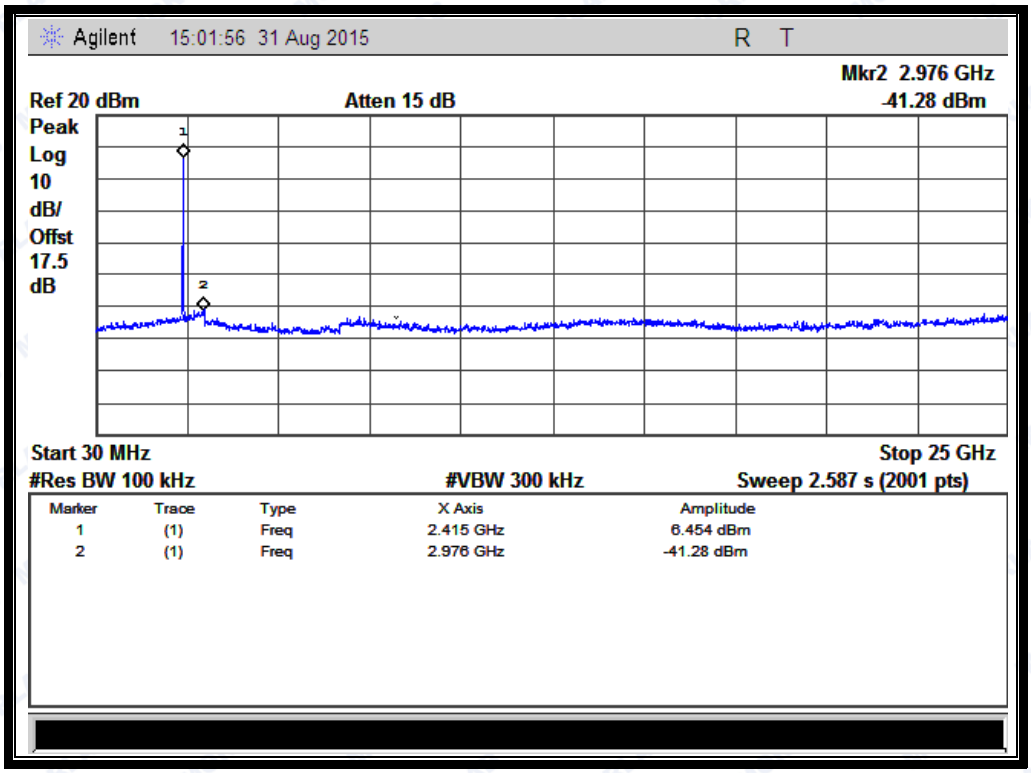
2.4.3.2 802.11g Test mode

A. Test Verdict:

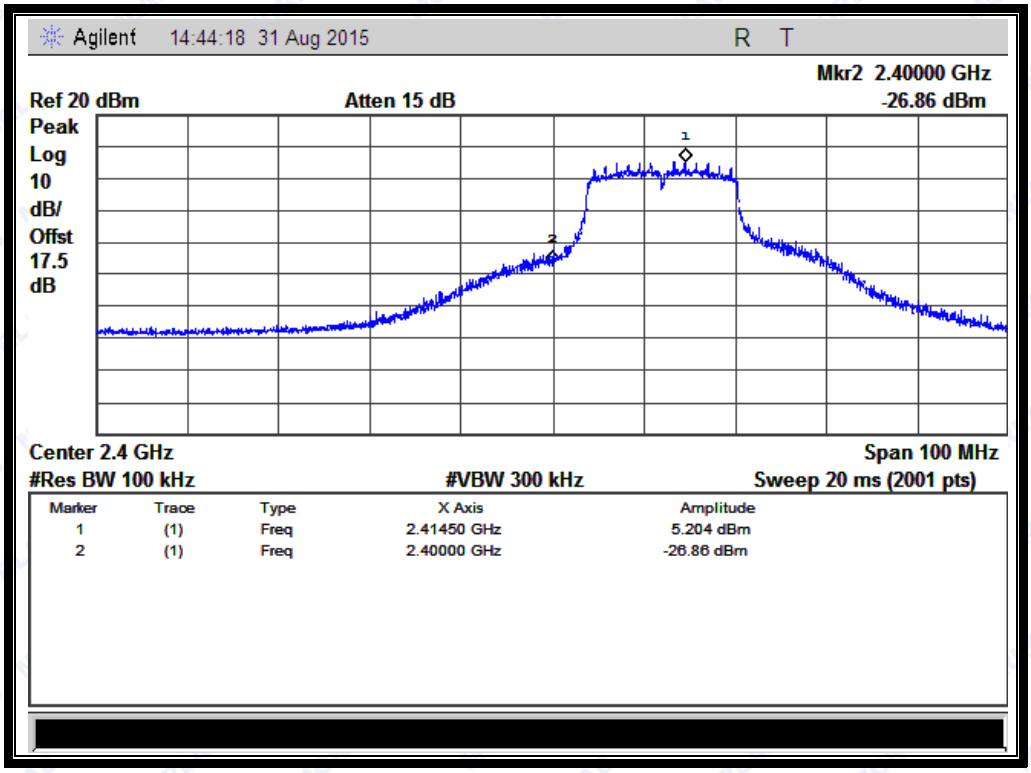
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.28	6.454	-13.546	PASS
6	2437	-42.12	3.29	-16.71	PASS
11	2462	-41.93	4.423	-15.577	PASS

B. Test Plots:

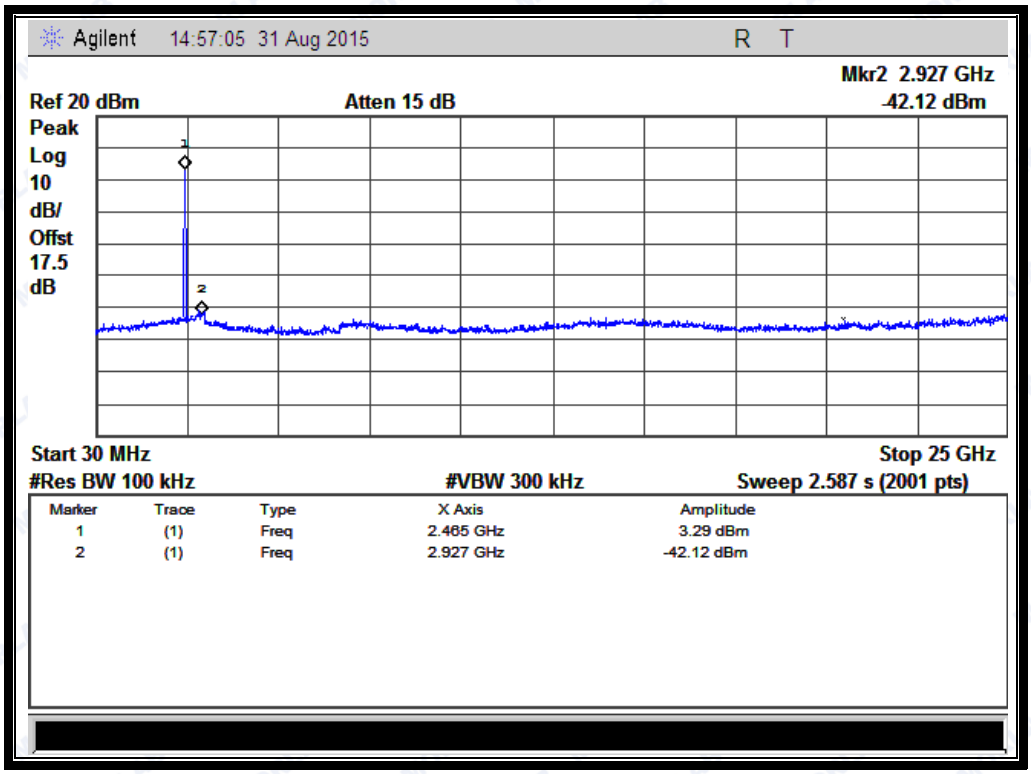
Note: the power of the Module transmitting frequency should be ignored.



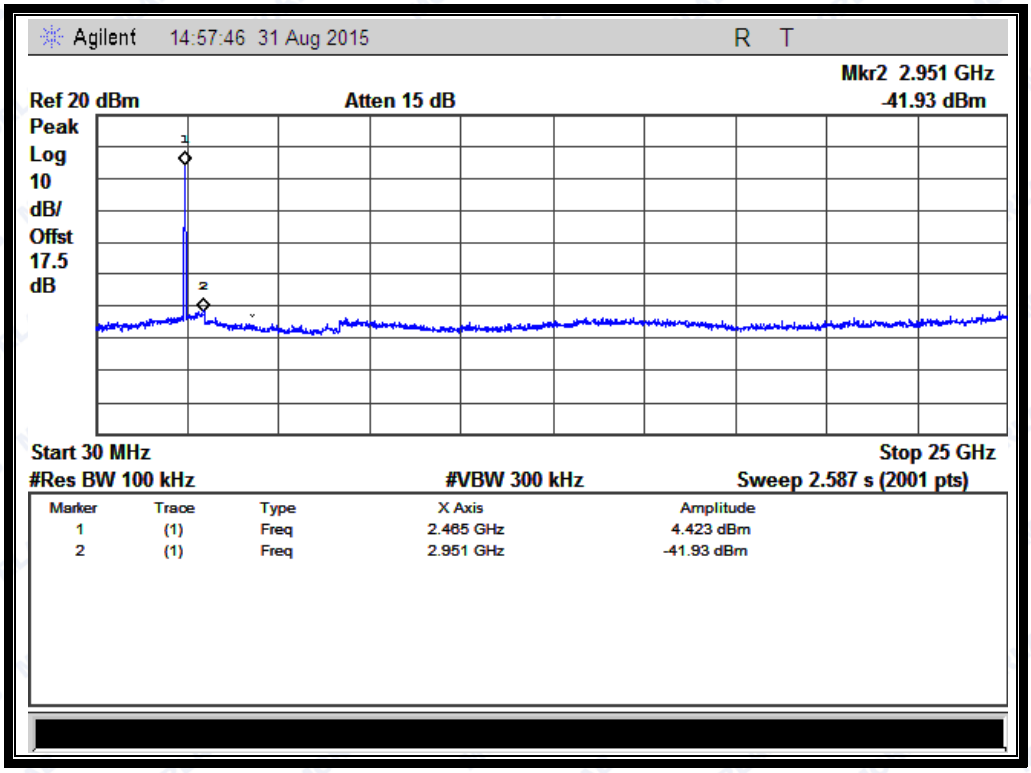
(Channel = 1, 30MHz to 25GHz)



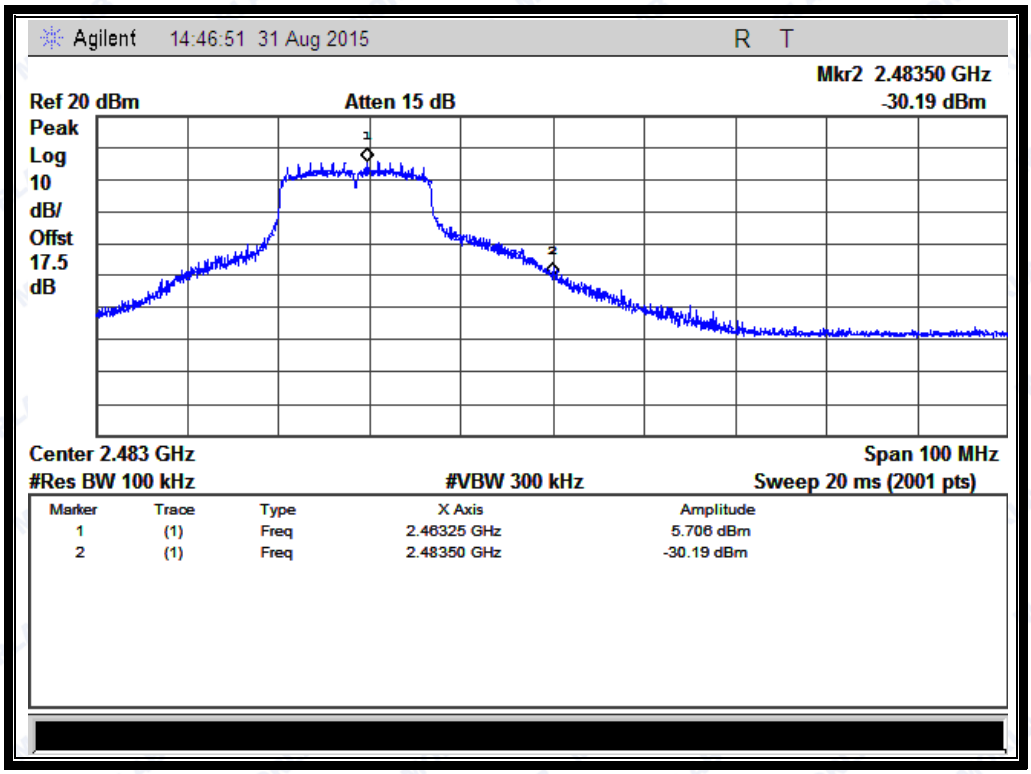
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

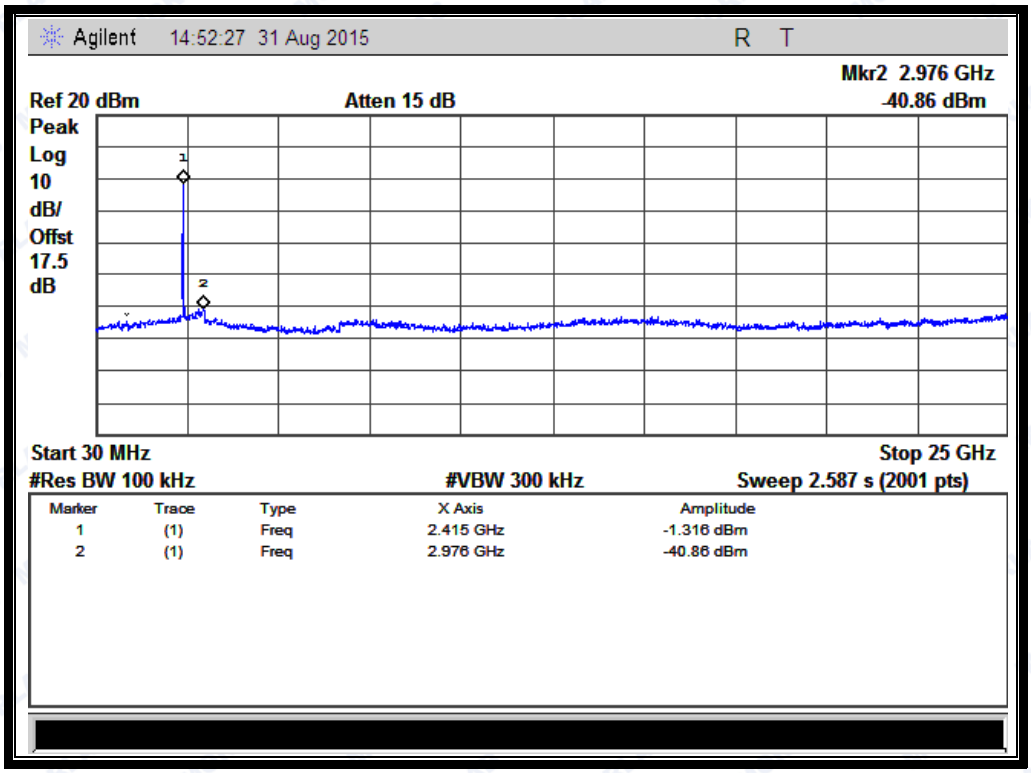
2.4.3.3 802.11n -20MHz Test mode

A. Test Verdict:

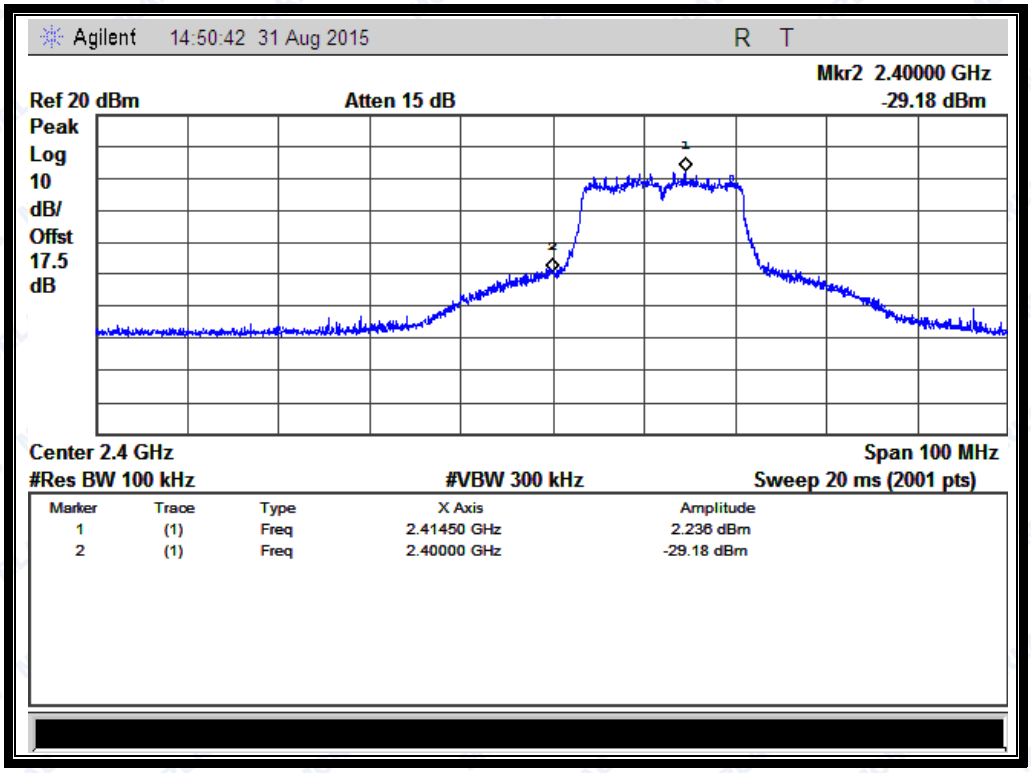
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-40.86	-1.316	-21.316	PASS
6	2437	-42.9	2.183	-17.817	PASS
11	2462	-41.22	2.019	-17.981	PASS

B. Test Plots:

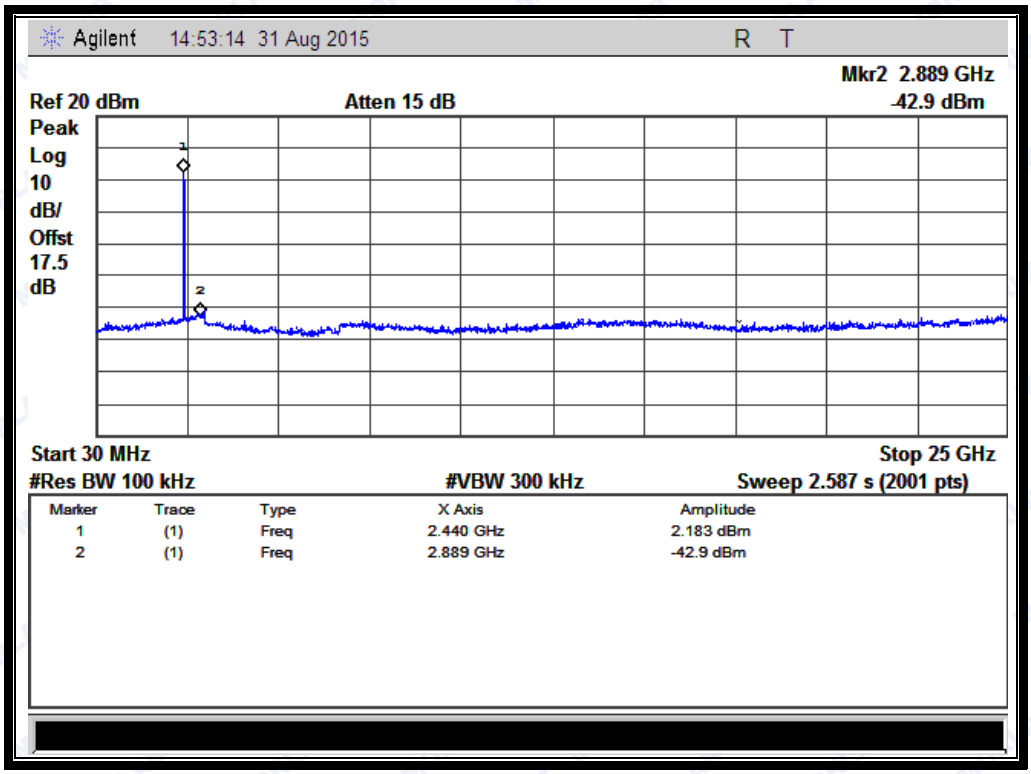
Note: the power of the Module transmitting frequency should be ignored.



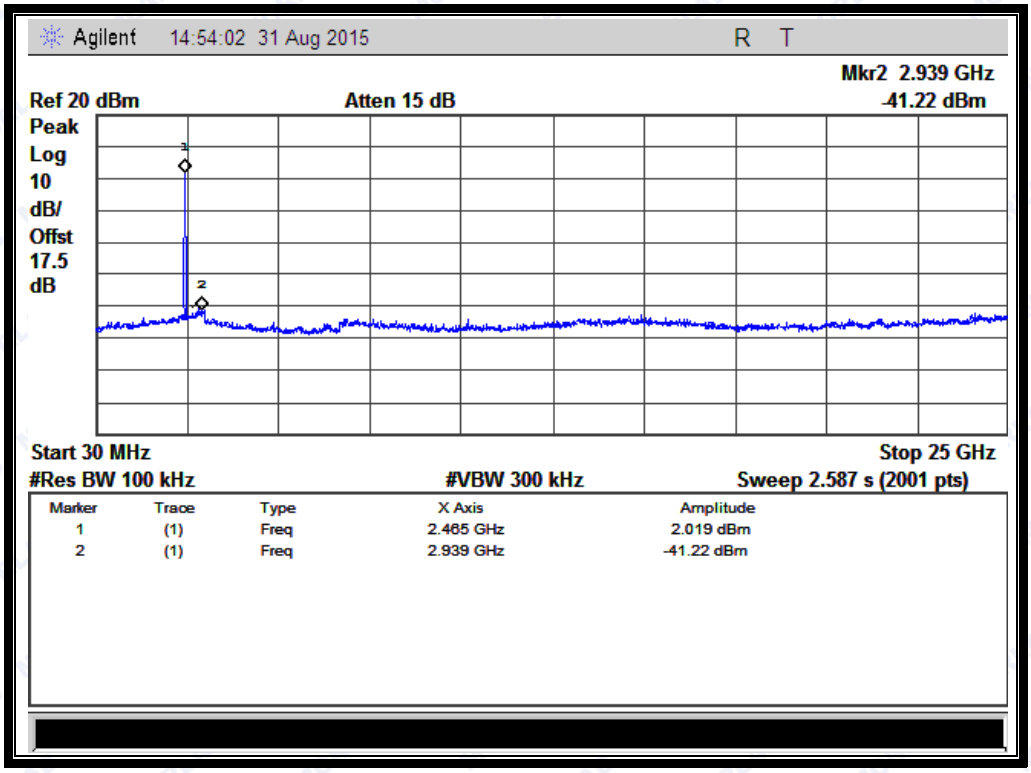
(Channel = 1, 30MHz to 25GHz)



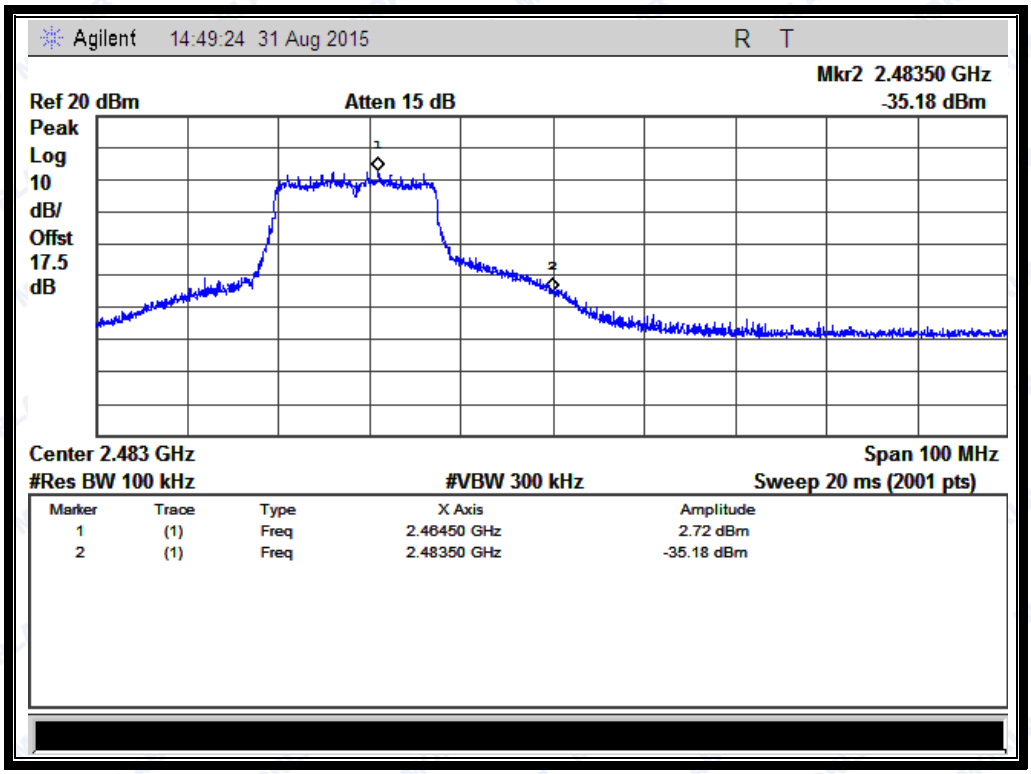
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

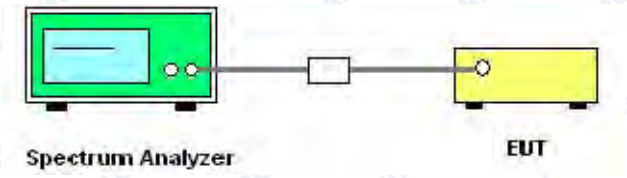
2.5 Power spectral density (PSD)

2.5.1 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.

2.5.2 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.

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

B. Equipments List:

Please reference ANNEX A(1.4).

2.5.3 Test Result

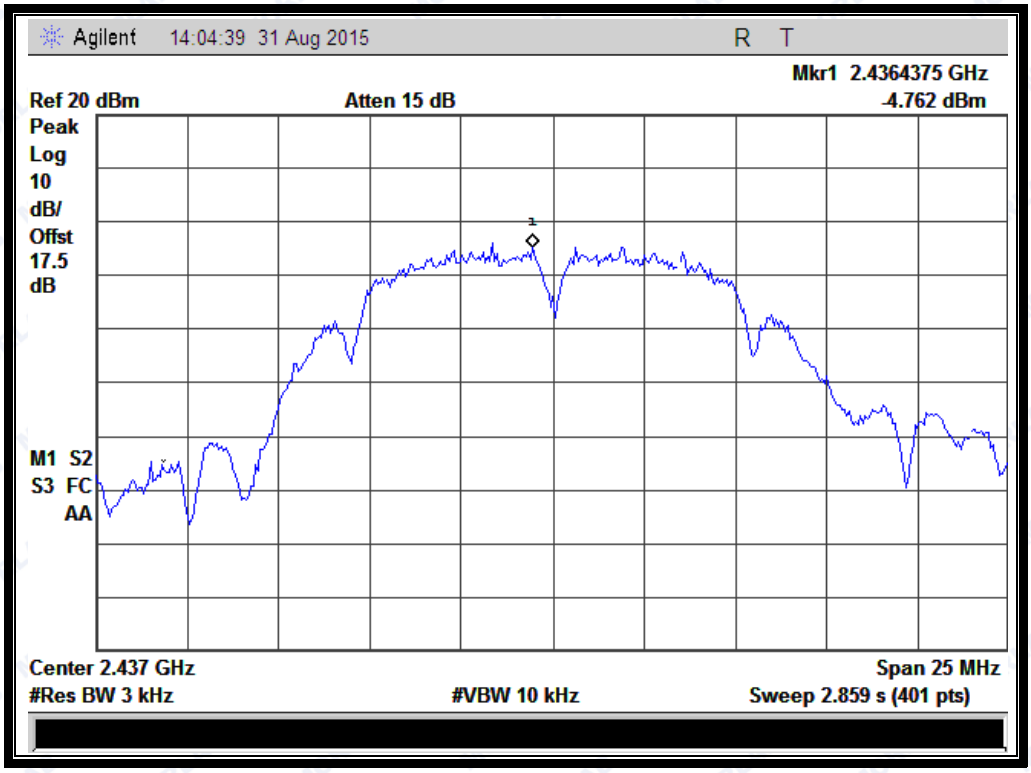
2.5.3.1 802.11b Test mode

A. Test Verdict:

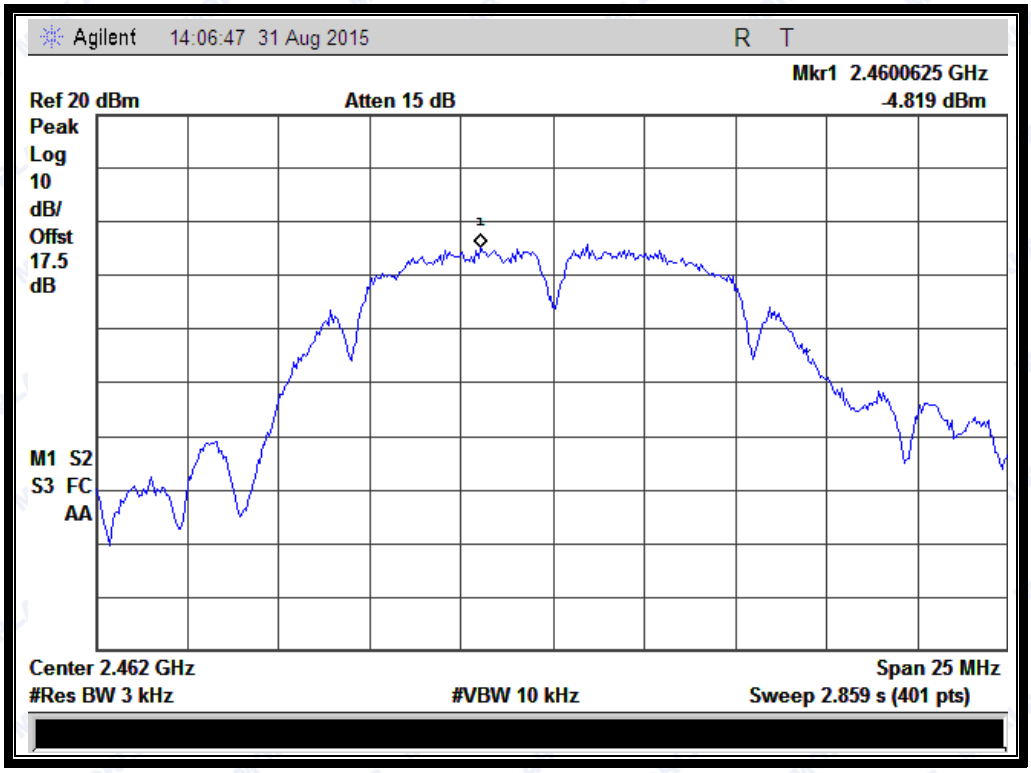
Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-4.496	8	PASS
6	2437	-4.762	8	PASS
11	2462	-4.819	8	PASS
Measurement uncertainty: ±1.3dB				

B. Test Plots:

(Channel = 1 @ 802.11b)



(Channel = 6 @ 802.11b)



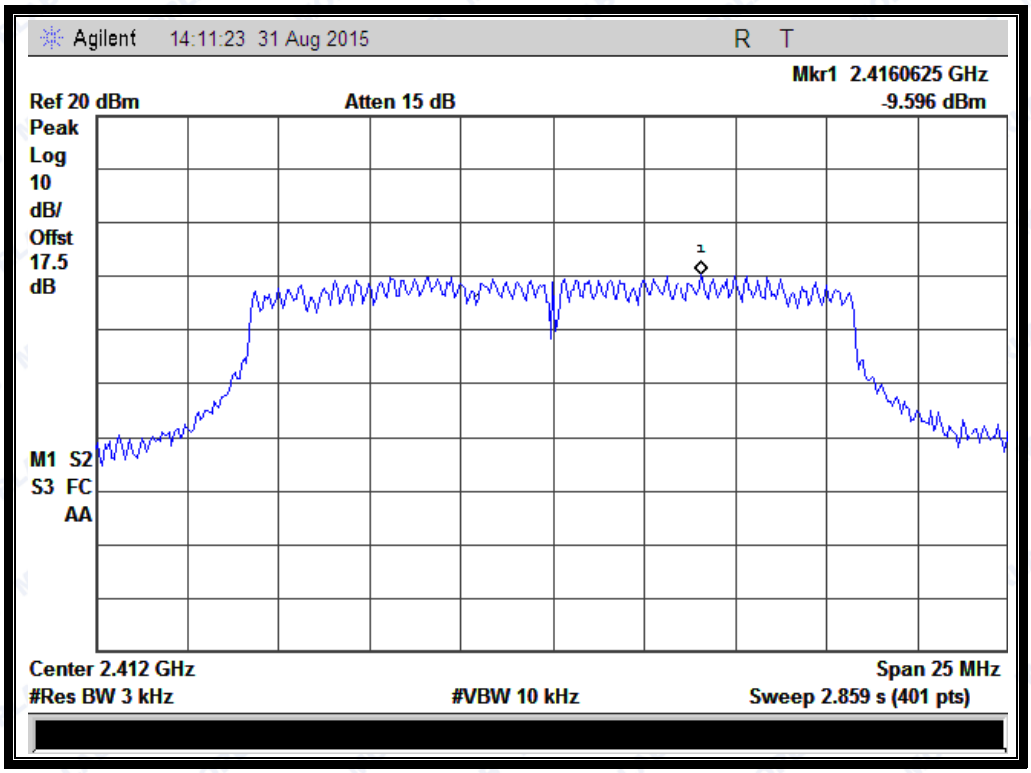
(Channel = 11 @ 802.11b)

2.5.3.2 802.11g Test mode

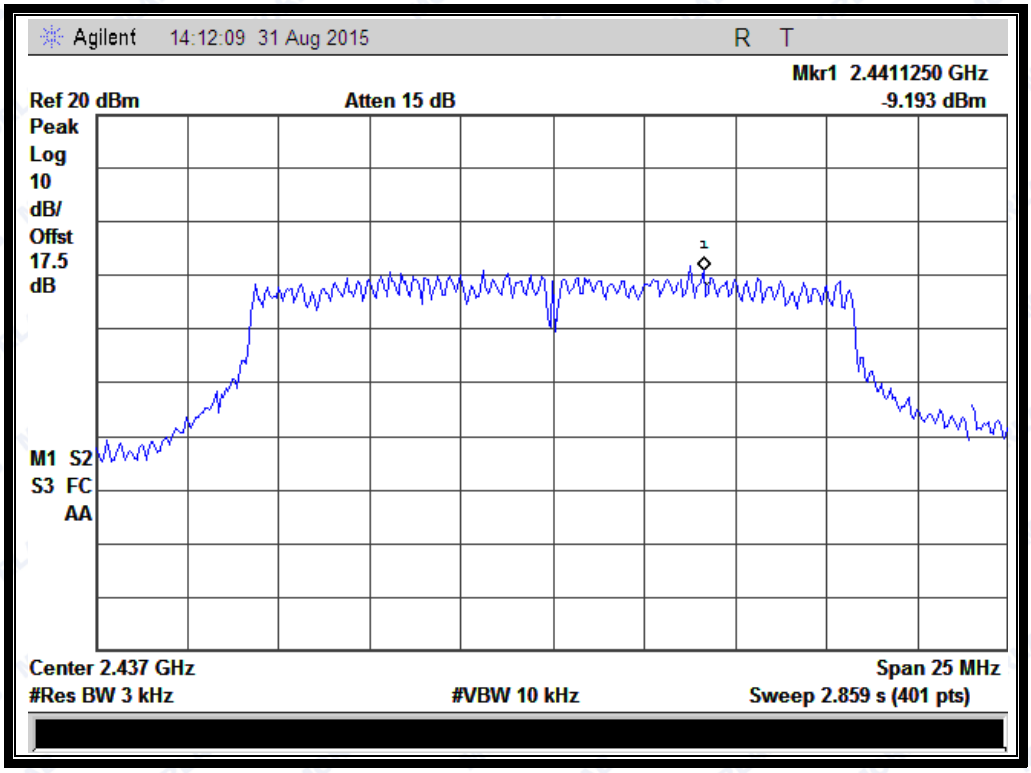
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-9.596	8	PASS
6	2437	-9.193	8	PASS
11	2462	-8.514	8	PASS
Measurement uncertainty: ±1.3dB				

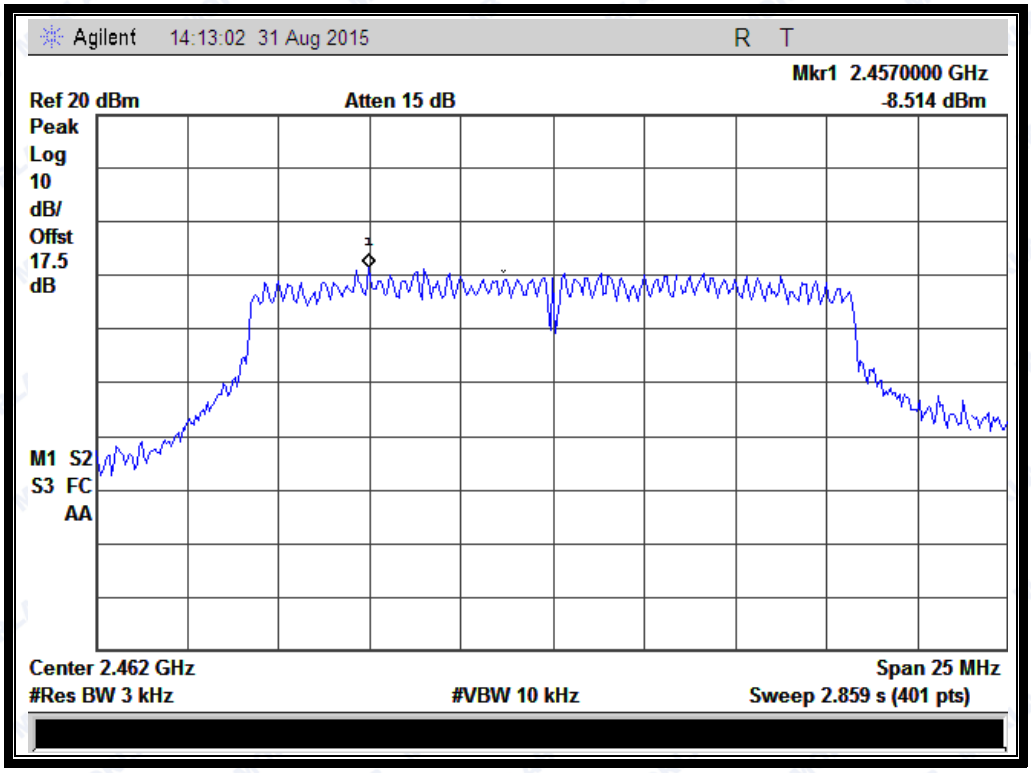
B. Test Plots:



(Channel = 1 @ 802.11g)



(Channel = 6 @ 802.11g)



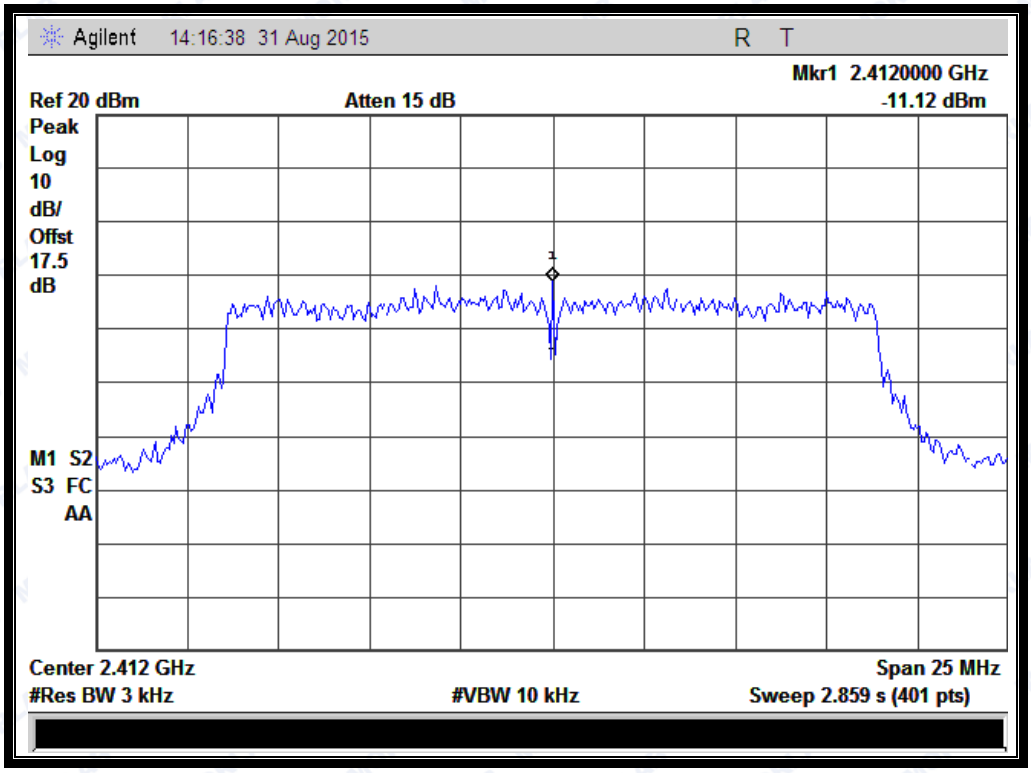
(Channel = 11 @ 802.11g)

2.5.3.3 802.11n-20MHz Test mode

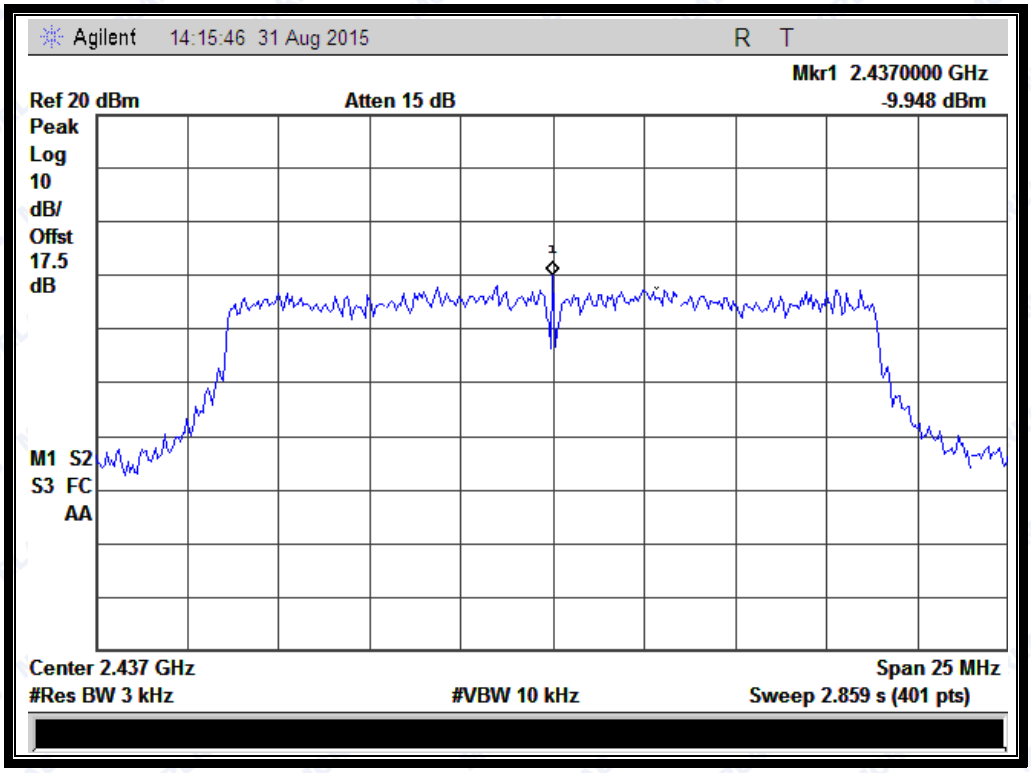
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-11.12	8	PASS
6	2437	-9.948	8	PASS
11	2462	-9.808	8	PASS
Measurement uncertainty: ±1.3dB				

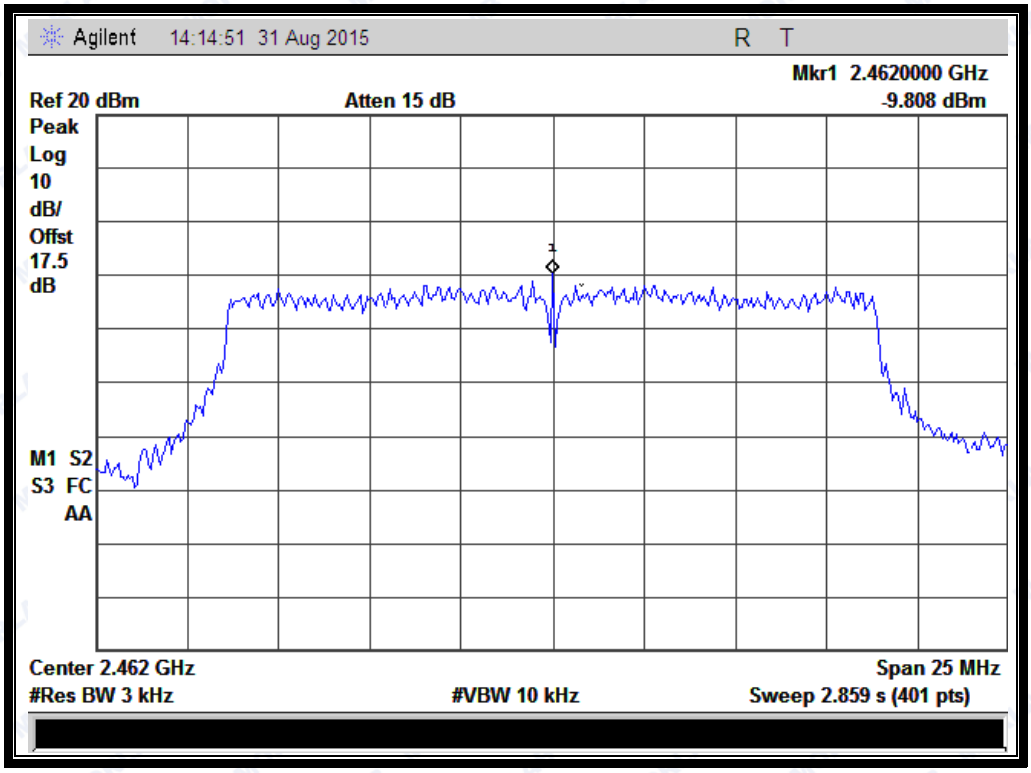
B. Test Plots:



(Channel = 1 @ 802.11n-20MHz)



(Channel = 6 @ 802.11n-20MHz)



(Channel = 11 @ 802.11n-20MHz)

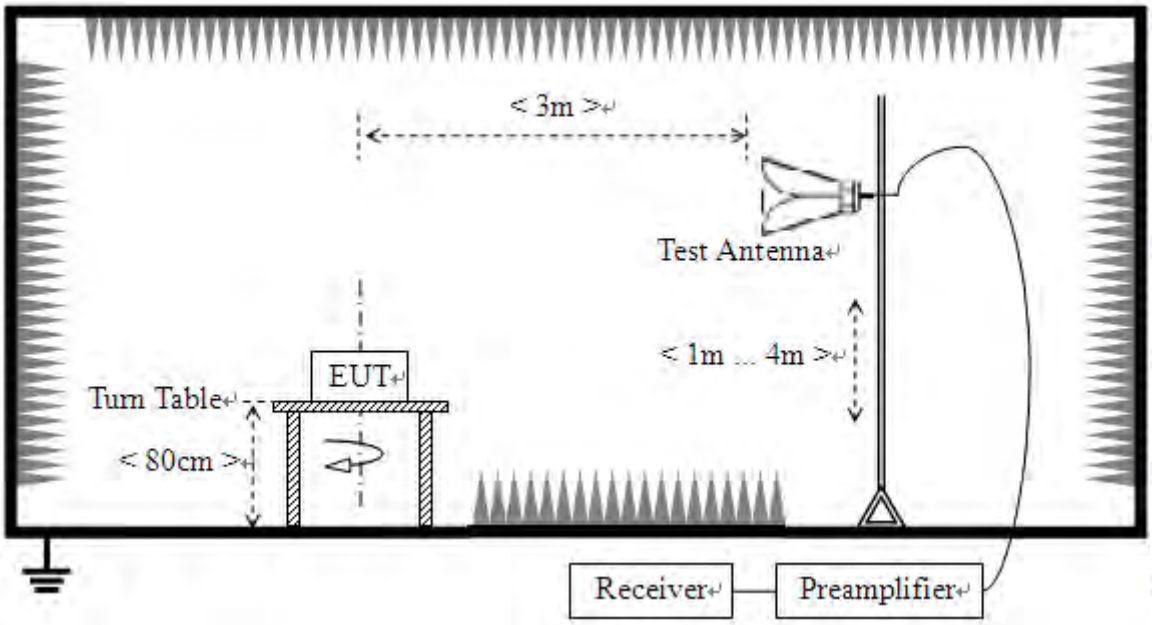
2.6 Restricted Frequency Bands

2.6.1 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).

2.6.2 Test Description

A. Test Setup



The Module 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 reference ANNEX A(1.4).

2.6.3 Test Result

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

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

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.

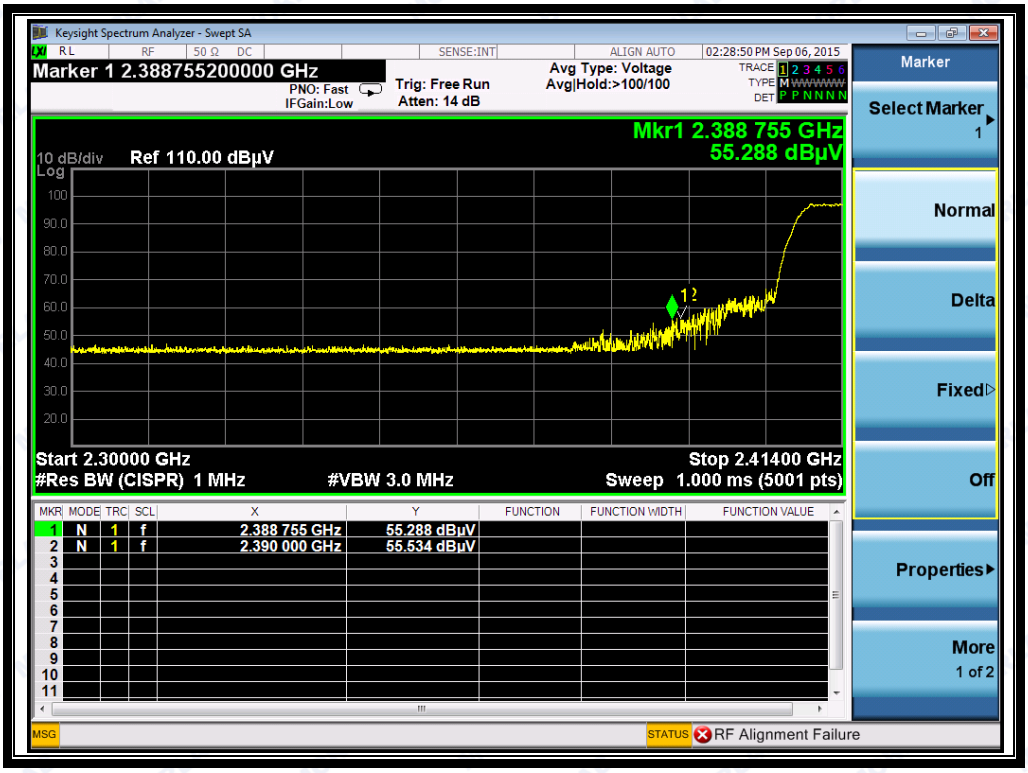
2.6.3.1 802.11b Test mode

The lowest and highest channels are tested to verify the band edge emissions.

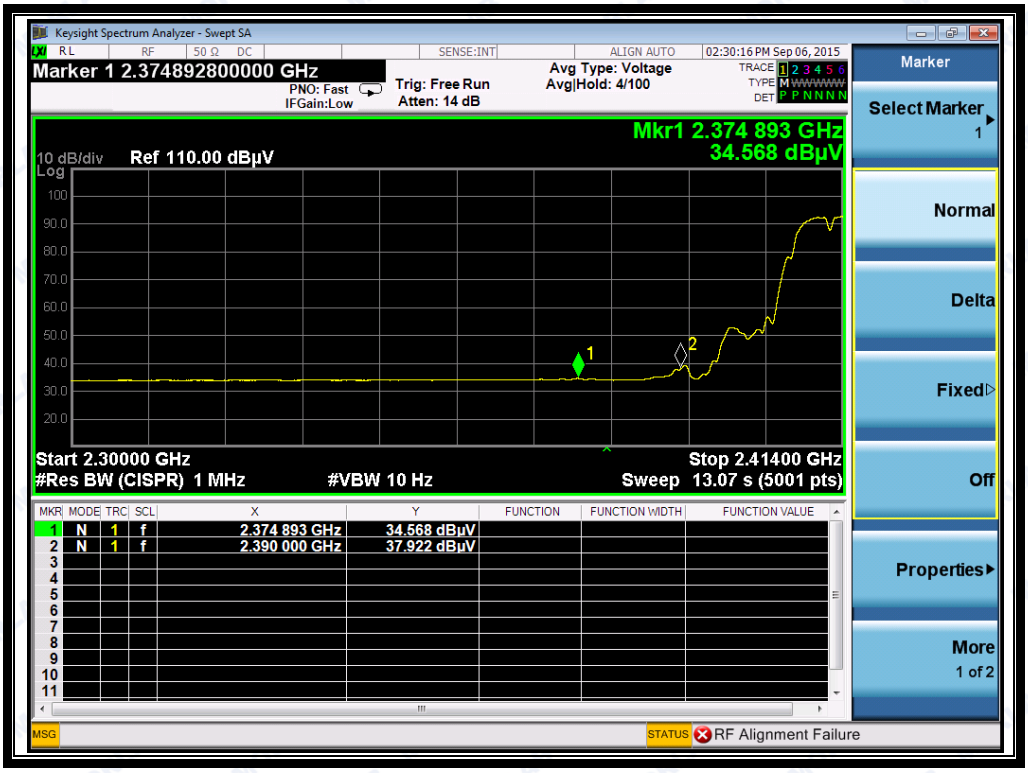
A. Test Verdict:

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	2388.76	PK	55.29	-33.63	32.56	54.22	74	Pass
1	2374.89	AV	34.57	-33.63	32.56	33.50	54	Pass
11	2483.95	PK	55.47	-33.18	32.5	54.79	74	Pass
11	2483.90	AV	38.22	-33.18	32.5	37.54	54	Pass

B. Test Plots:



(Plot A1: Channel = 1 PEAK @ 802.11b)



(Plot A2: Channel = 1 AVG @ 802.11b)

(Plot B1: Channel = 11 PEAK @ 802.11b)

(Plot B2: Channel = 11 AVG @ 802.11b)

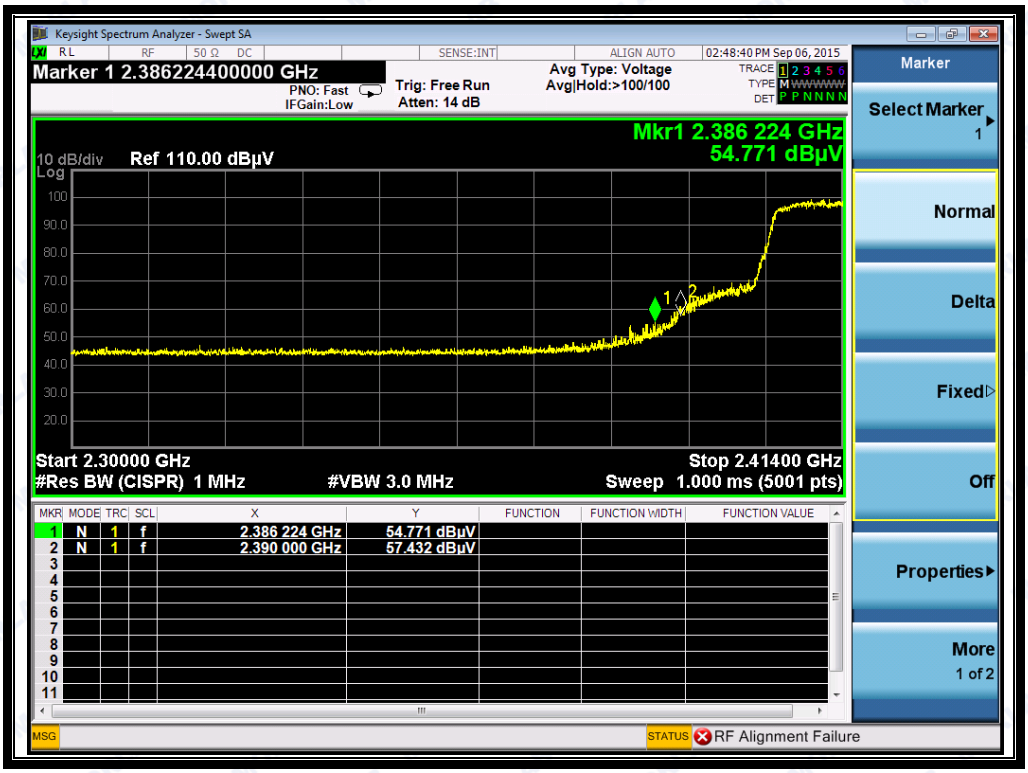
2.6.3.2 802.11g Test mode

The lowest and highest channels are tested to verify the band edge emissions.

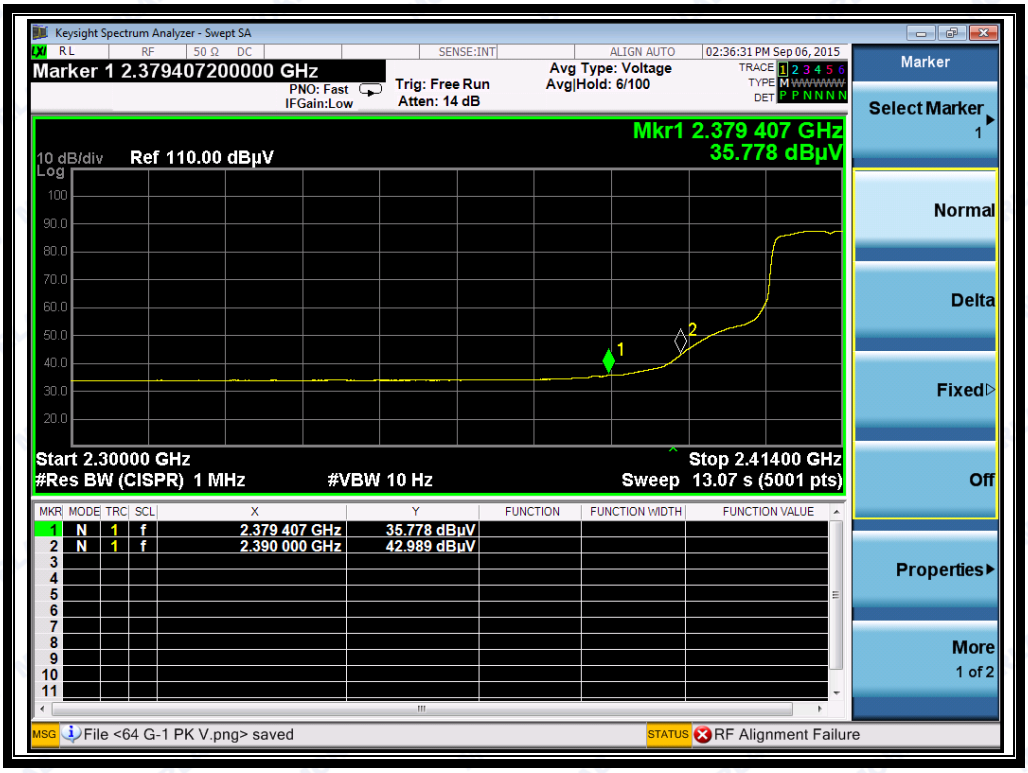
A. Test Verdict:

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	2386.22	PK	54.77	-33.63	32.56	53.70	74	Pass
1	2379.41	AV	35.78	-33.63	32.56	34.71	54	Pass
11	2484.28	PK	65.96	-33.18	32.5	65.28	74	Pass
11	2484.13	AV	41.03	-33.18	32.5	40.35	54	Pass

B. Test Plots:

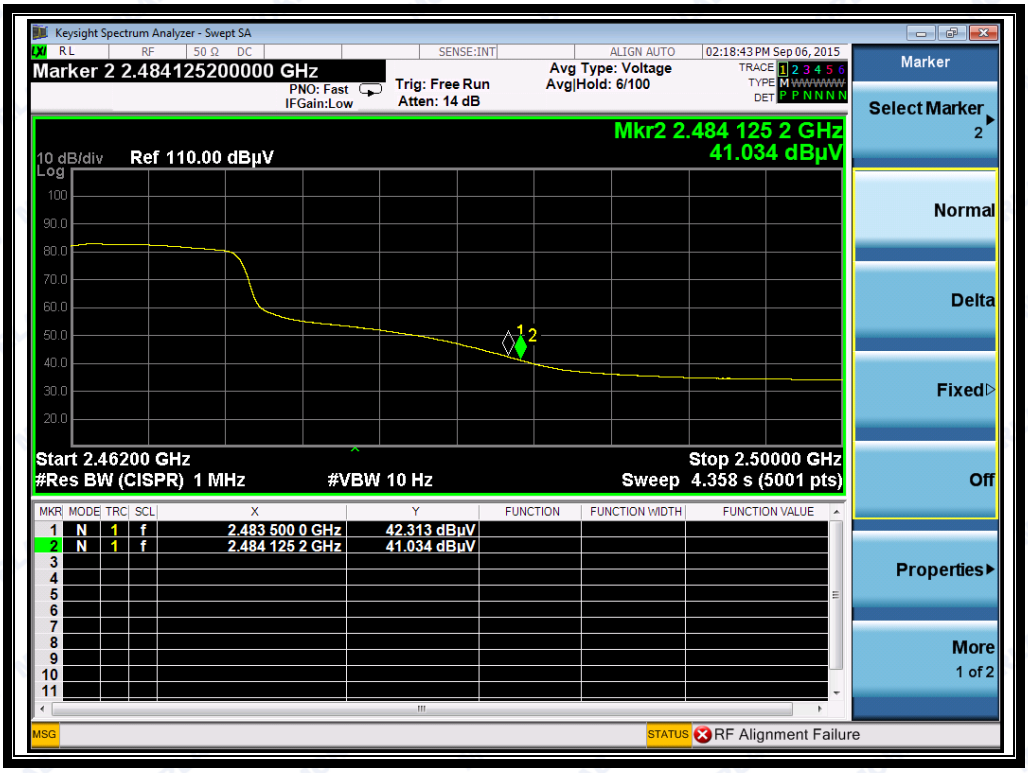


(Plot C1: Channel = 1 PEAK @ 802.11g)



(Plot C2: Channel = 1 AVG @ 802.11g)

(Plot D1: Channel = 11 PEAK @ 802.11g)



(Plot D2: Channel = 11 AVG @ 802.11g)

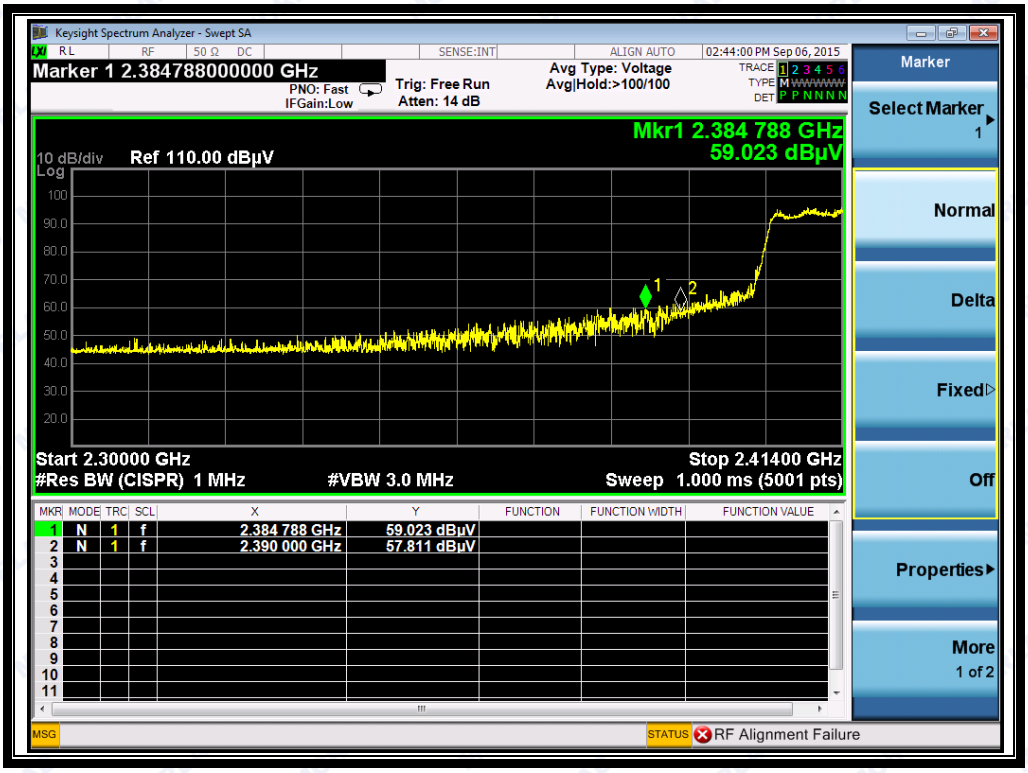
2.6.3.3 802.11n-20MHz Test mode

The lowest and highest channels are tested to verify the band edge emissions.

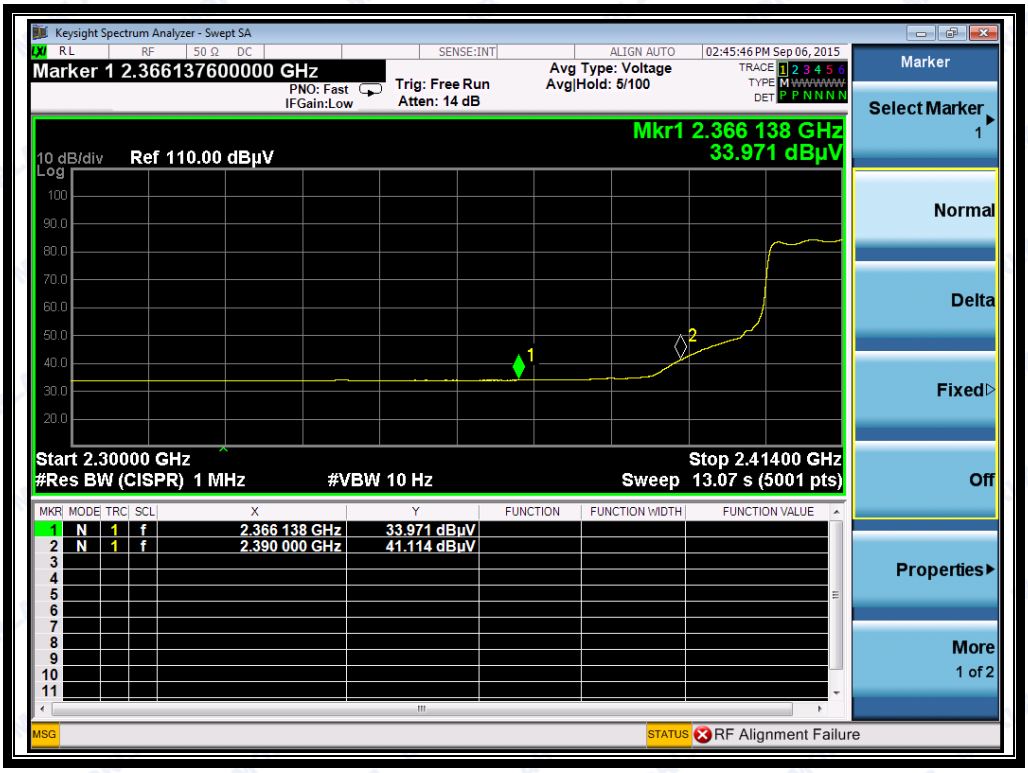
A. Test Verdict:

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	2384.79	PK	59.02	-33.63	32.56	57.95	74	Pass
1	2366.14	AV	33.97	-33.63	32.56	32.90	54	Pass
11	2484.60	PK	65.00	-33.18	32.5	64.32	74	Pass
11	2484.20	AV	46.80	-33.18	32.5	46.12	54	Pass

B. Test Plots:

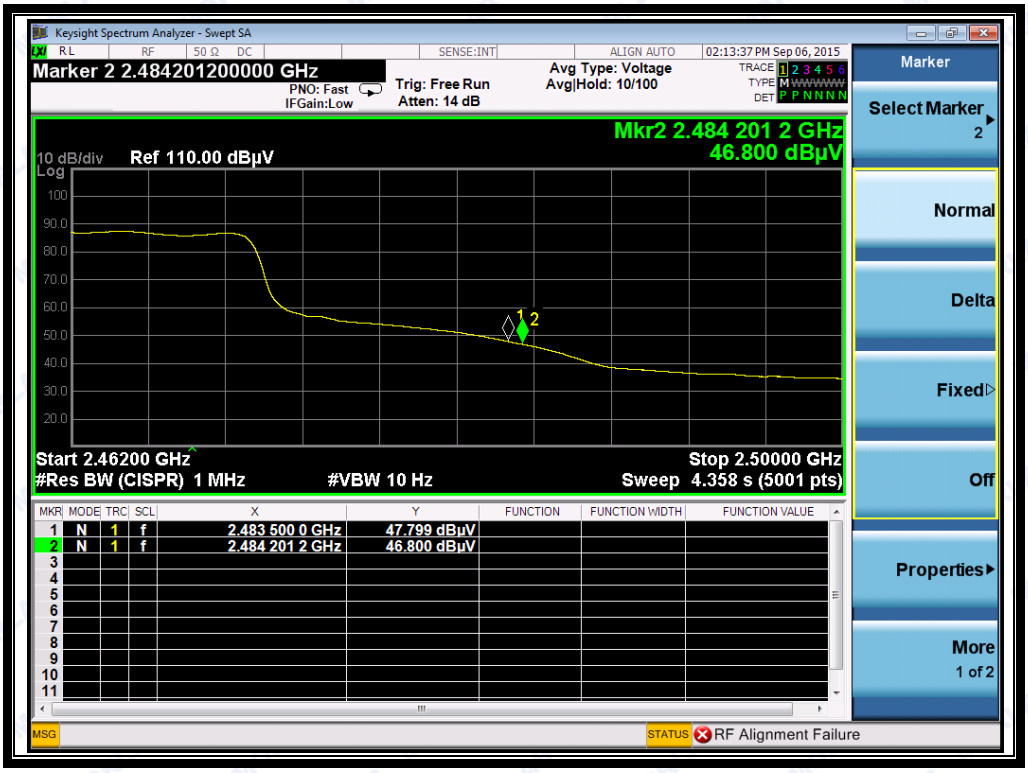


(Plot E1: Channel = 1 PEAK @ 802.11n-20)



(Plot E2: Channel = 1 AVG @ 802.11n-20)

(Plot F1: Channel = 11 PEAK @ 802.11n-20)



(Plot F2: Channel = 11 AVG @ 802.11n-20)

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

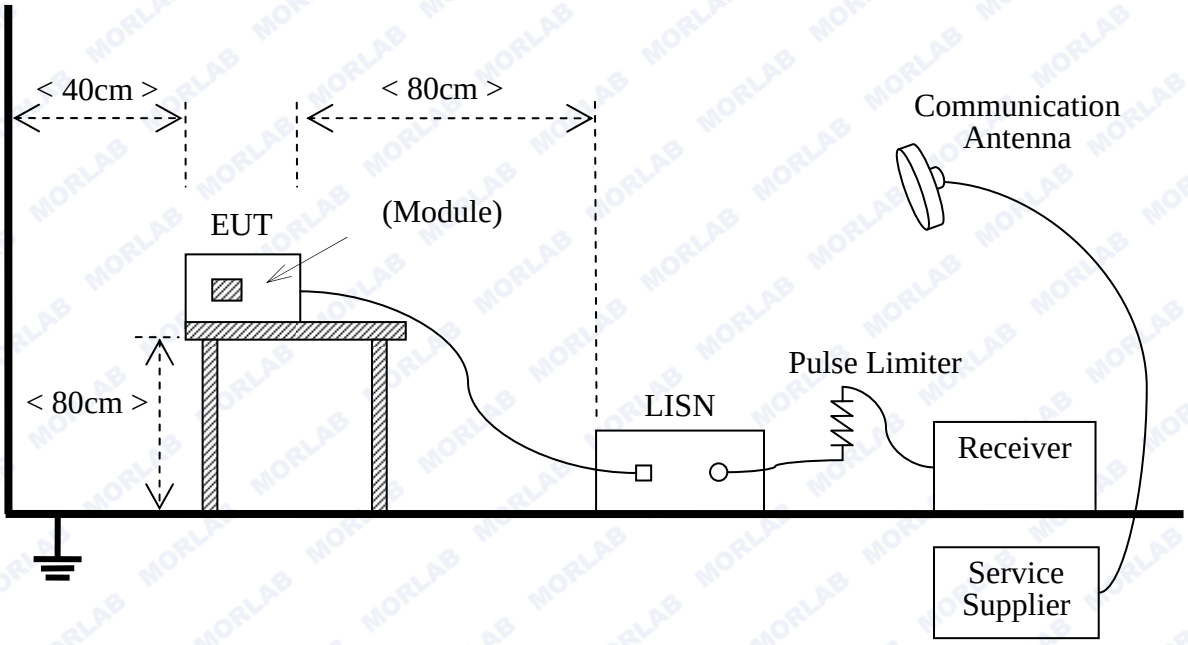
NOTE:

(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 C63.4:2009

B. Equipments List:

Please reference ANNEX A(1.4).

2.7.3 Test Result

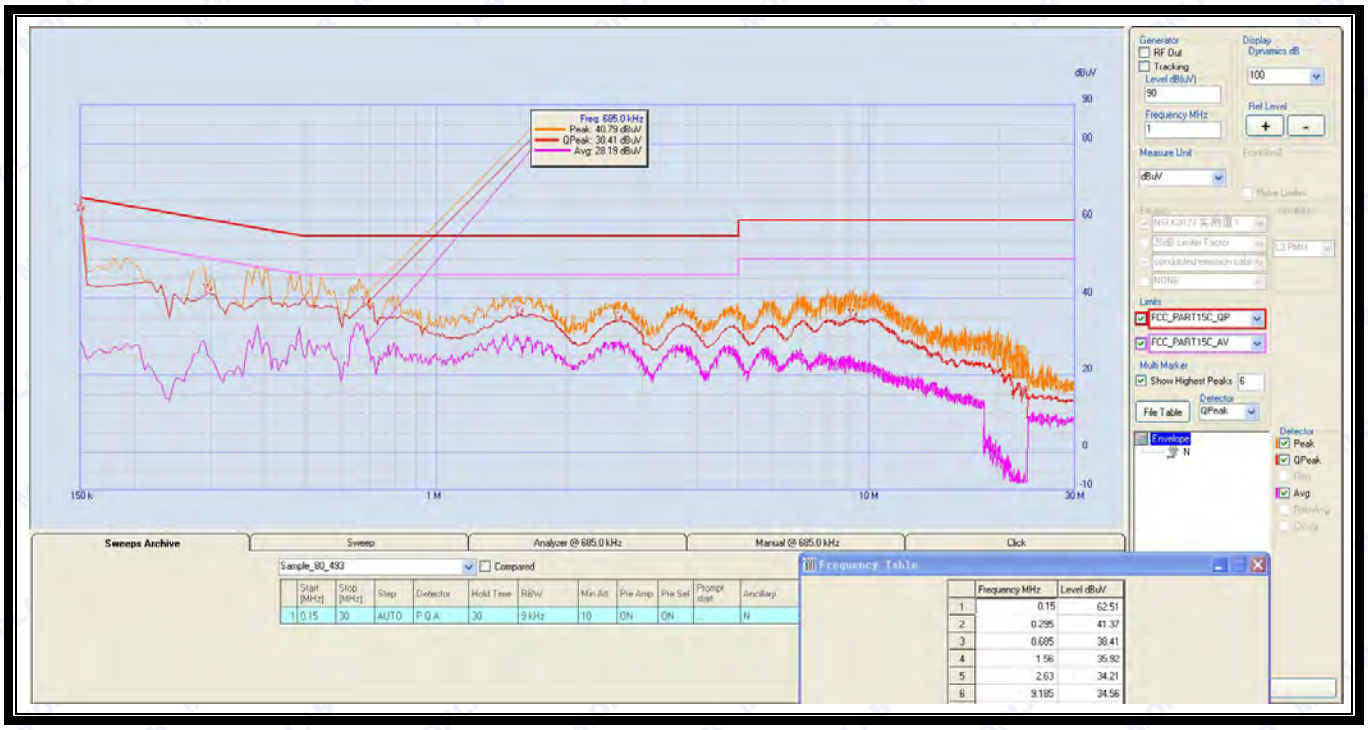
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT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

Note: All test modes are performed, only the worst case is recorded in this report.

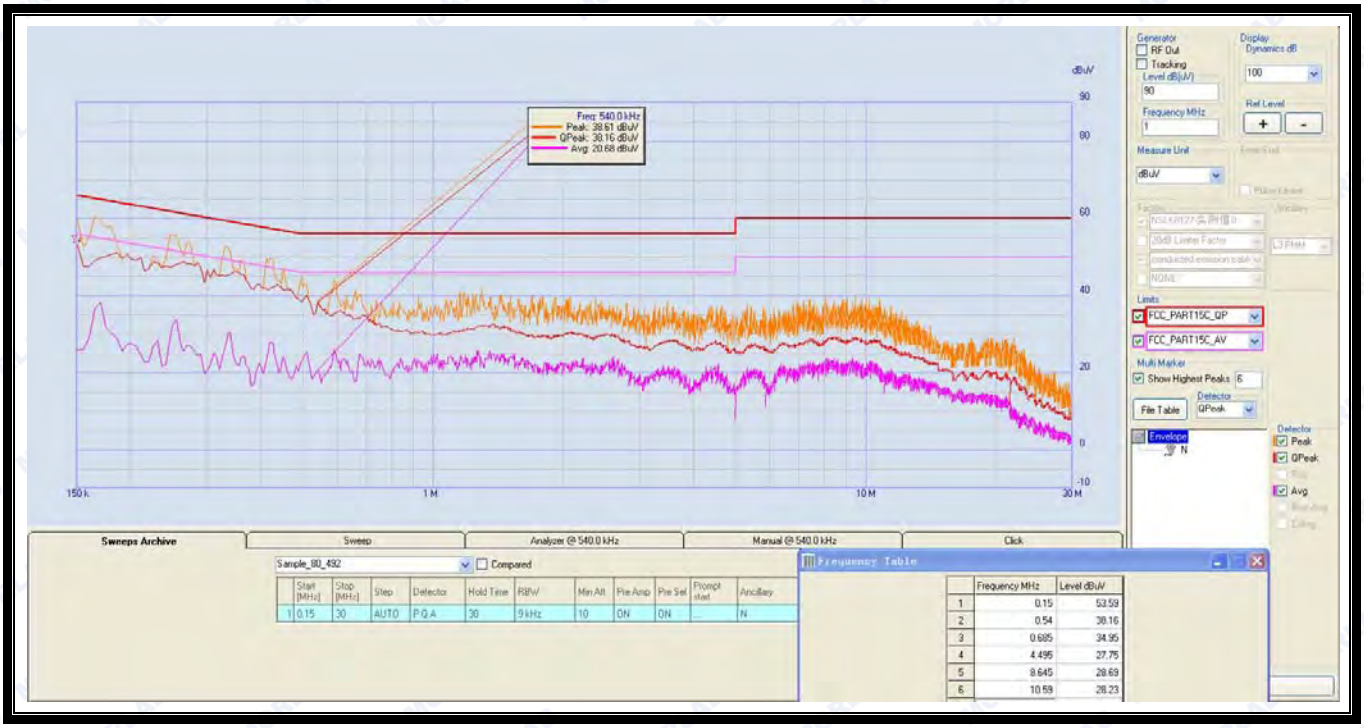
A. Test setup:

The EUT configuration of the emission tests is EUT + Link.

B. Test Plots:



(Plot A: L Phase)



(Plot B: N Phase)

2.8 Radiated Emission

2.8.1 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.

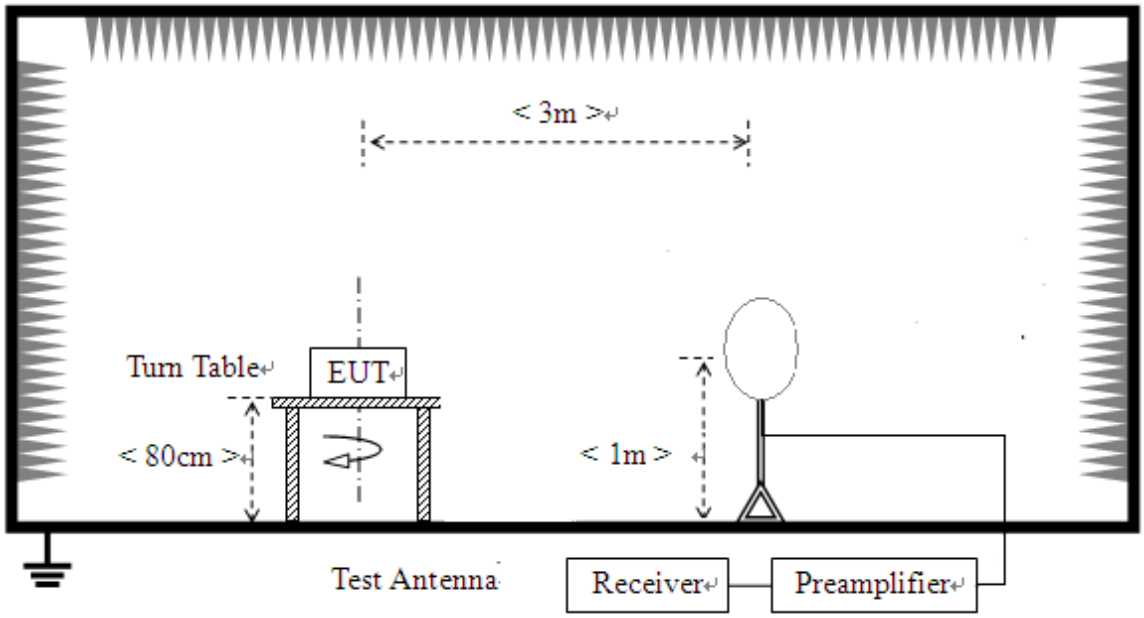
For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

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)

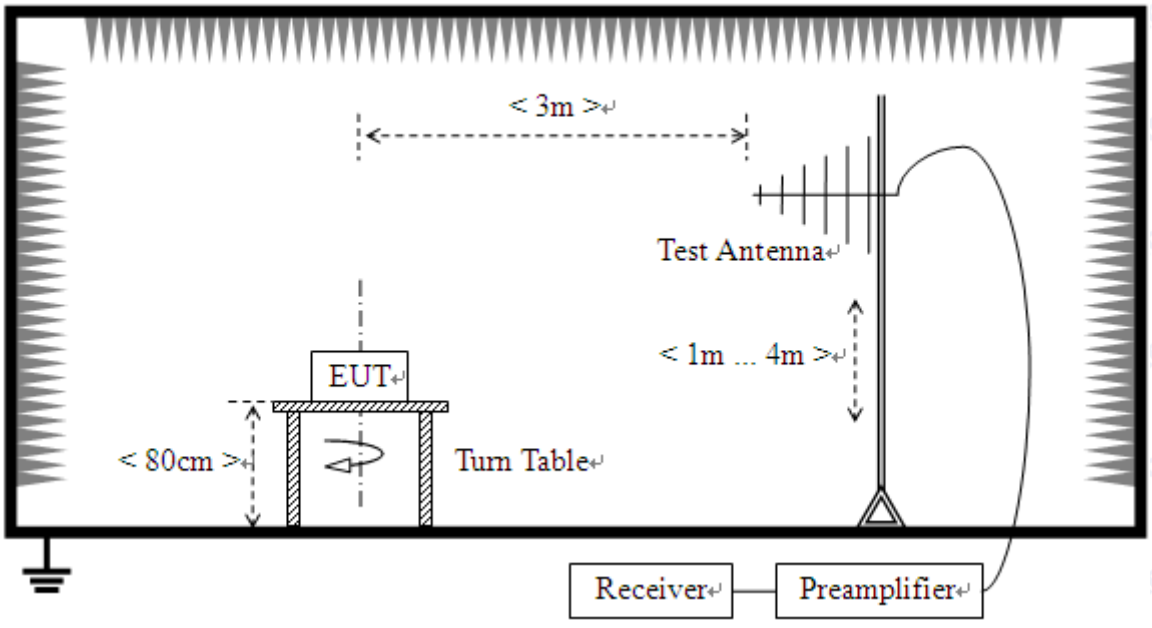
2.8.2 Test Description

A. Test Setup:

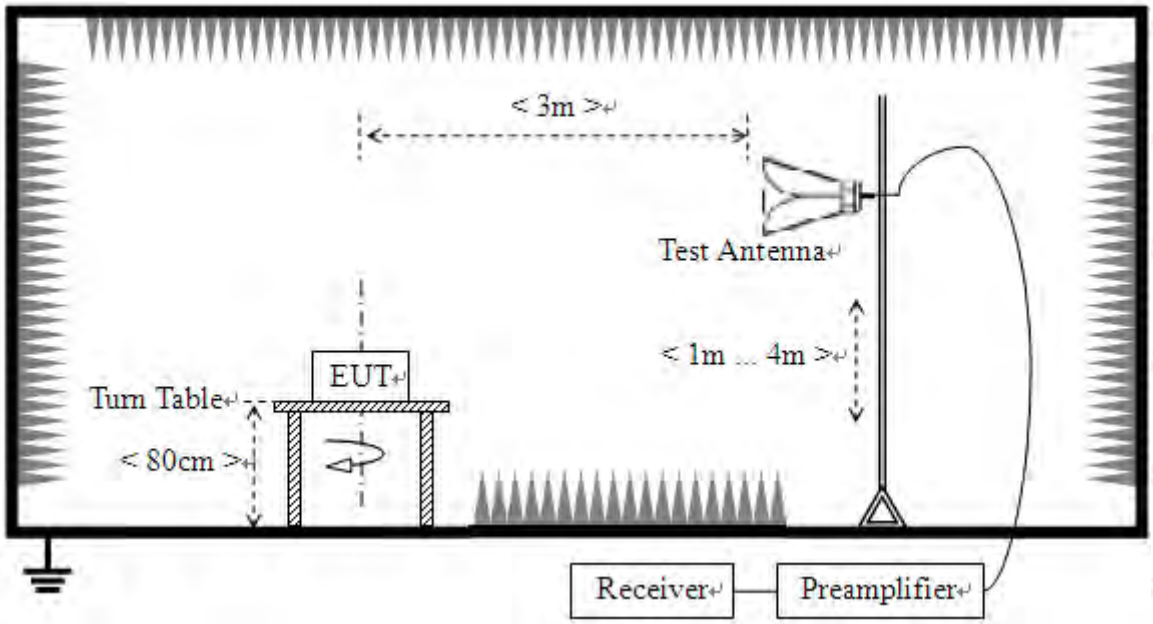
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

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. 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. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

Please reference ANNEX A(1.4).

2.8.3 Test Result

According to ANSI C63.4 selection 4.2.2, 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.

Note: 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.

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

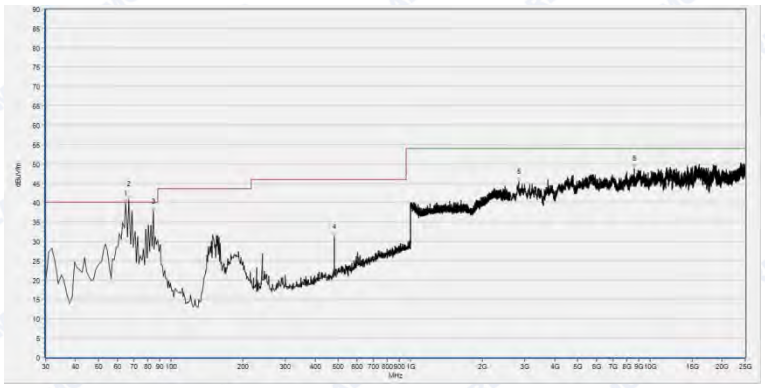
2.8.3.1 802.11b Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1

Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
149.310	31.12	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
240.490	30.96	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
481.050	26.45	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1622.329	43.57	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5667.321	47.90	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
8746.863	49.15	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

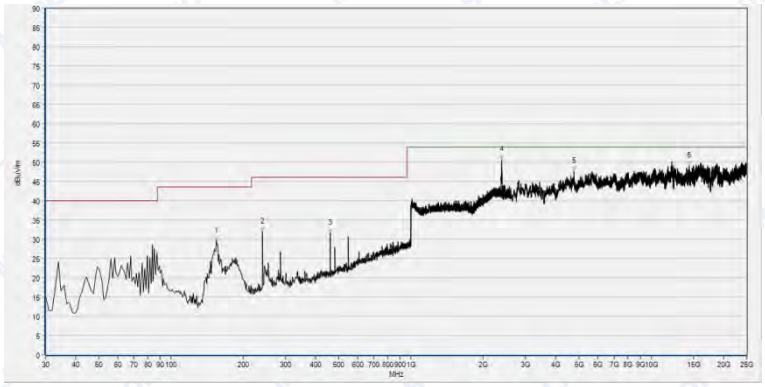
(Antenna Horizontal, 30MHz to 25GHz)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
67.125	39.62	32.41	24.42	N.A	40.00	N.A	Vertical	PASS
65.219	40.54	34.31	20.01	N.A	40.00	N.A	Vertical	PASS
84.320	37.72	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
481.050	31.18	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2832.188	45.49	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
8616.512	48.74	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6



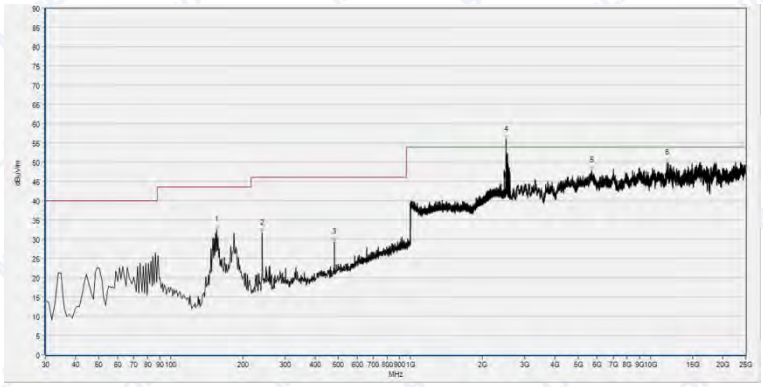
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
154.160	29.69	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
240.490	31.97	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
460.680	31.64	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2388.715	50.65	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4779.305	47.67	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
14372.322	49.09	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
64.920	37.93	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
82.380	36.81	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
481.050	30.78	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2390.636	50.22	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5667.321	47.90	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12188.943	50.84	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

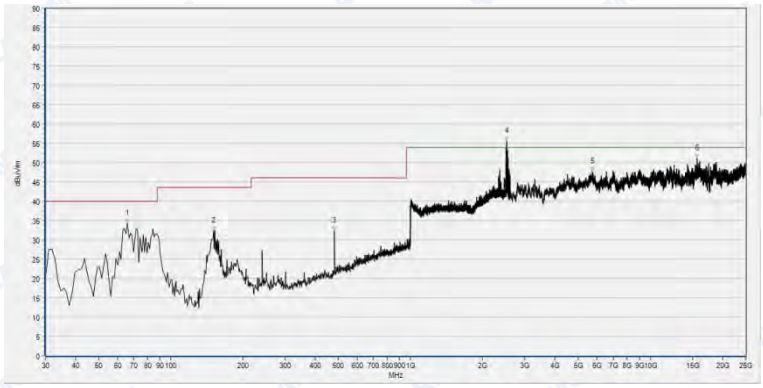
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
155.130	32.56	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
240.490	31.58	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
481.050	29.23	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2508.443	55.81	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5687.689	47.79	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
11744.935	49.85	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
65.890	37.19	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
150.280	32.30	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
481.050	32.28	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2517.407	55.59	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5740.644	47.64	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
15700.273	51.16	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

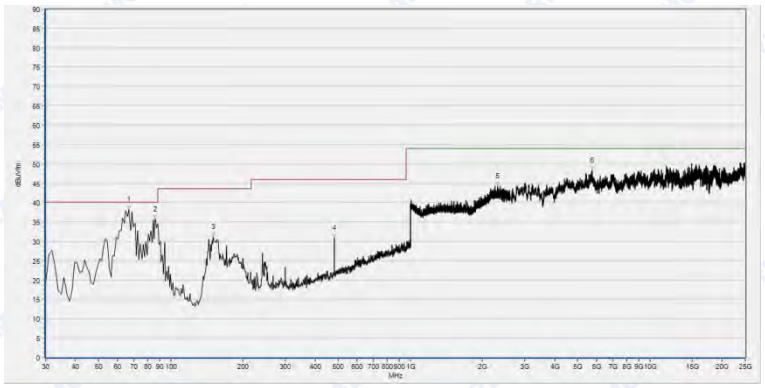
2.8.3.2 802.11g Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1

Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
154.160	31.38	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
240.490	31.98	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2205.602	43.61	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2991.053	45.18	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5671.395	47.60	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15618.803	50.55	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

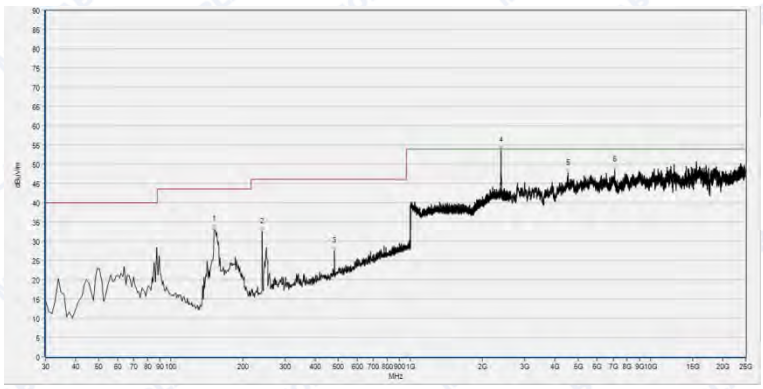
(Antenna Horizontal, 30MHz to 25GHz)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
66.860	38.14	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
86.260	35.67	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
150.280	31.15	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
481.050	30.76	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2308.683	44.21	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5740.644	48.20	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

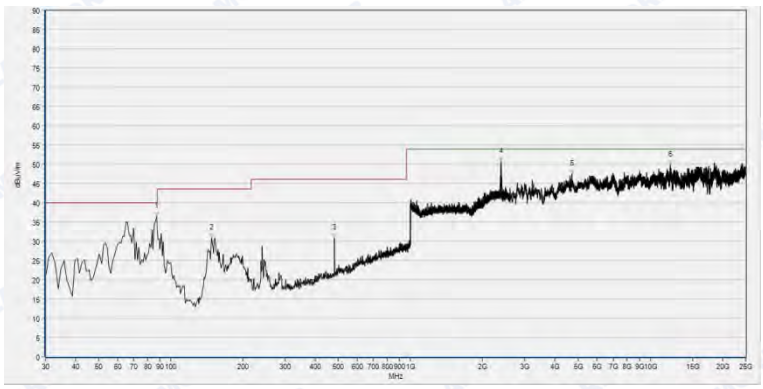
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
151.250	33.27	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
240.490	32.43	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
481.050	27.53	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2389.356	53.56	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4530.824	47.61	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
7101.182	48.61	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

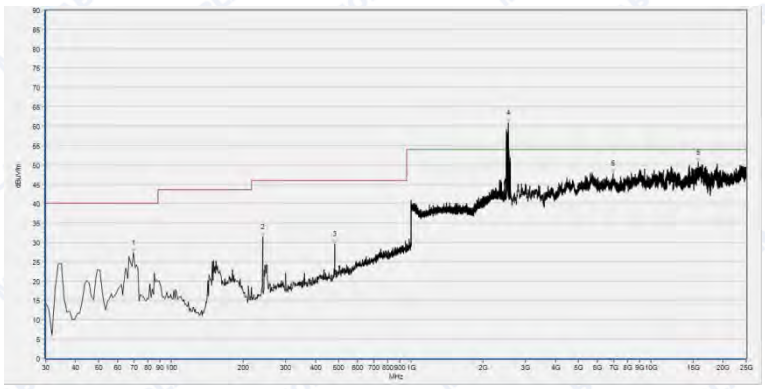
(Antenna Horizontal, 30MHz to 25GHz)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
87.230	36.38	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
148.340	30.93	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
481.050	30.89	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2383.593	50.66	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4718.203	47.57	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12119.694	49.79	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

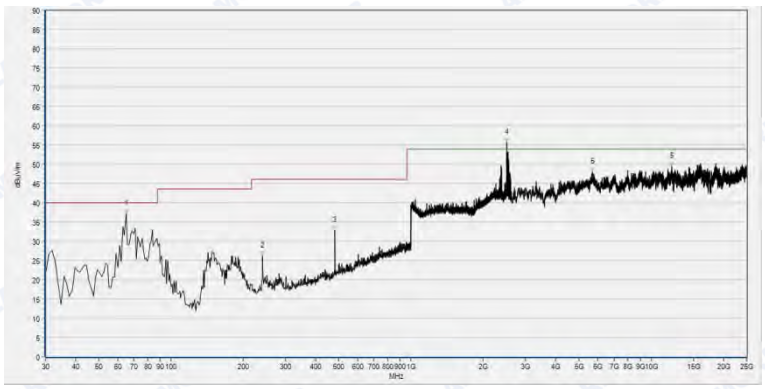
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
69.770	27.32	N.A	N.A	N.A	40.00	N.A	Horizontal	PASS
240.490	31.34	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
481.050	29.44	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2539.816	60.77	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
6958.611	47.77	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15773.595	50.62	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



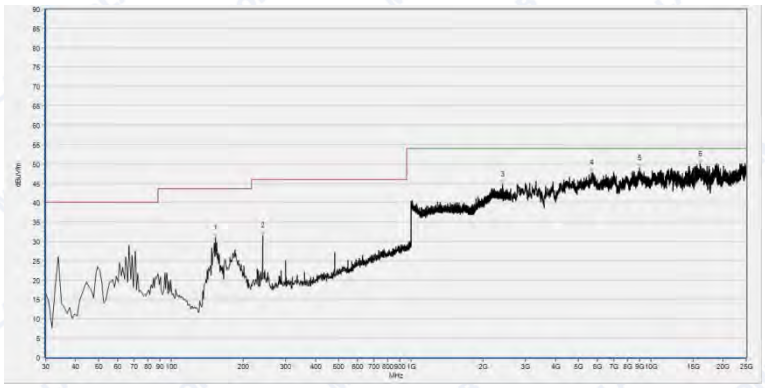
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
64.920	37.10	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
240.490	26.19	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
481.050	32.92	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2509.724	55.77	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5683.615	47.97	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12197.090	49.50	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.8.3.3 802.11n-20MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



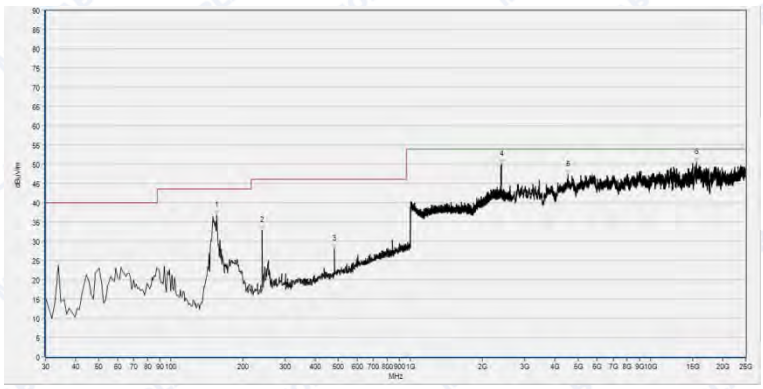
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
153.190	30.95	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
240.490	31.56	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2405.362	44.70	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5675.468	47.84	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
8987.198	48.91	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
16038.371	49.92	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)

Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
88.200	35.32	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
153.190	31.78	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
481.050	30.94	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2824.041	44.42	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5744.717	47.89	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12188.943	51.21	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

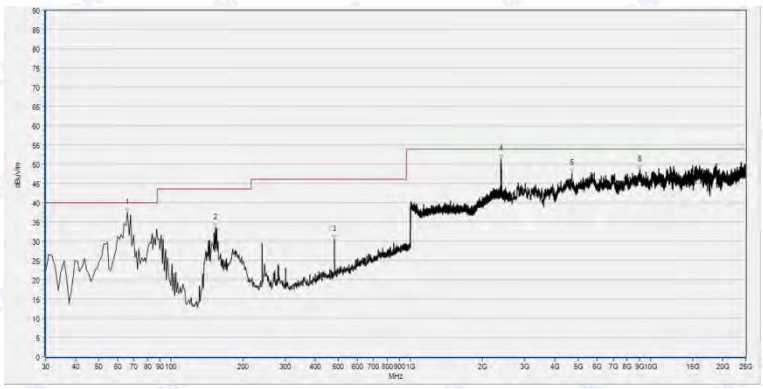
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 6



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
155.130	36.70	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
240.490	32.83	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
481.050	27.97	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2391.277	49.97	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4538.971	47.41	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15606.583	50.48	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

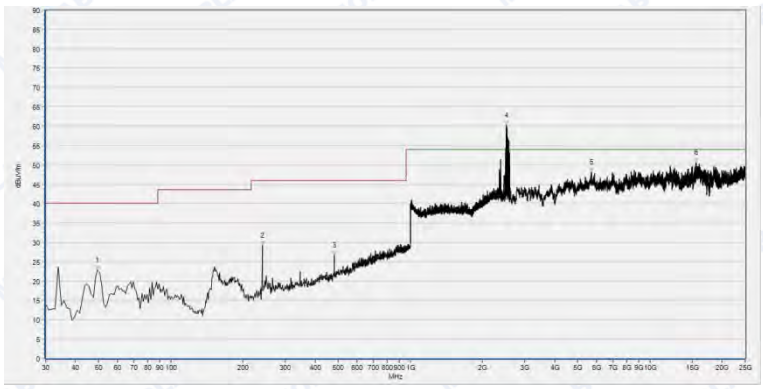
(Antenna Horizontal, 30MHz to 25GHz)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
65.890	37.51	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
153.190	33.54	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
481.050	30.51	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2385.514	51.35	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4701.909	47.67	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
9052.373	48.56	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

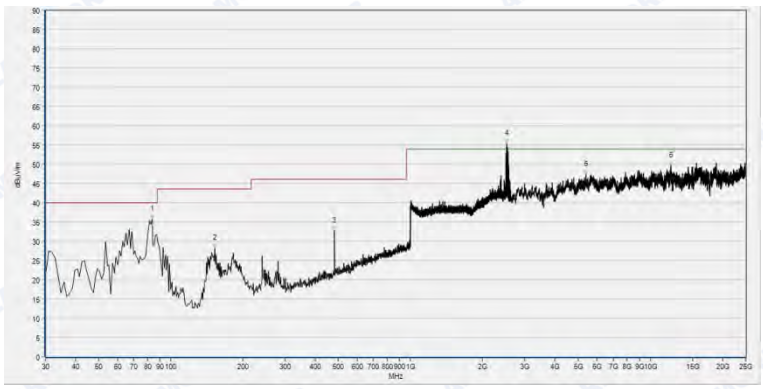
(Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 11



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
49.400	22.76	N.A	N.A	N.A	40.00	N.A	Horizontal	PASS
240.490	29.23	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
481.050	26.64	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2519.968	60.15	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5691.762	48.15	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15631.024	50.67	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
83.350	35.63	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
152.220	28.22	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
481.050	32.64	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2521.248	55.34	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5390.326	47.27	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12205.237	49.67	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

2.9 RF exposure evaluation

2.9.1 Requirement

According to § 1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy lever in excess of Commission's guideline.

2.9.2 Result

Please refer to SAR report.

ANNEX A GENERAL INFORMATION

1.1 Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

1.2 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

1.3 Facilities and Accreditations

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at FL.1, 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, ANSI C63.4: 2009 and CISPR Publication 22; the FCC registration number is 695796.

1.4 Test Equipments Utilized

1.4.1 Conducted Test Equipments

Conducted Test Equipment						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Spectrum Analyzer	MY45101810	E4407B	Agilent	2015.02.26	2016.02.25
2	Power Splitter	NW521	1506A	Weinschel	2015.02.26	2016.02.25
3	Attenuator 1	(n.a.)	10dB	Resnet	2015.02.26	2016.02.25
4	Attenuator 2	(n.a.)	3dB	Resnet	2015.02.26	2016.02.25
5	USB Wideband Power Sensor	MY52280010	U2021XA	Agilent	2015.02.26	2016.02.25
6	EXA Signal Analzyer	MY51440152	N9010A	Agilent	2015.02.26	2016.02.25
7	RF cable	CB01	RF01	Morlab	N/A	N/A
8	Coaxial cable	CB02	RF02	Morlab	N/A	N/A
9	SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.4.2 Conducted Emission Test Equipments

Conducted Emission Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Receiver	US44210471	E7405A	Agilent	2015.02.26	2016.02.25
2	LISN	812744	NSLK 8127	Schwarzbeck	2015.02.26	2016.02.25
3	Service Supplier	100448	CMU200	R&S	2015.02.26	2016.02.25
4	Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2015.02.26	2016.02.25
5	Coaxial cable(BNC)	CB01	EMC01	Morlab	N/A	N/A

1.4.3 Radiated Test Equipments

Radiated Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal.Due Date**
1	System Simulator	100448	CMU200	R&S	2015.02.26	2016.02.25
2	Receiver	US44210471	E7405A	Agilent	2015.02.26	2016.02.25
3	Test Antenna - Bi-Log	9163-274	9m*6m*6m	Albatross	2015.02.26	2016.02.25
4	Test Antenna - Horn	9120D-963	VULB 9163	Schwarzbeck	2015.02.26	2016.02.25
5	Test Antenna - Horn	71688	BBHA 9120D	Schwarzbeck	2015.02.26	2016.02.25
6	Test Antenna - Loop	1519-022	HL050S7	R&S	2015.02.26	2016.02.25
7	Reject Filter	(n.a.)	BRM50702	Micro-Tronics	2015.02.26	2016.02.25
8	Coaxial cable (N male)	CB02	EMC02	Morlab	N/A	N/A
9	Coaxial cable (N male)	CB03	EMC03	Morlab	N/A	N/A

1.4.4 Climate Chamber

Climate Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Climate Chamber	2004012	HL4003T	Yinhe	2015.02.26	2016.02.25

1.4.5 Vibration Table

Vibration Table						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Vibration Table	N/A	ACT2000-S015L	CMI-COM	2015.02.26	2016.02.25

1.4.6 Anechoic Chamber

Anechoic Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Anechoic Chamber	N/A	9m*6m*6m	Albatross	2015.02.26	2016.02.25

***** END OF REPORT *****