REPORT No.: SZ17040180W01

FCC RF TEST REPORT

APPLICANT	:	Shinano Kenshi Co., Ltd.
PRODUCT NAME	:	Plextalk Pocket
MODEL NAME	:	PTP1, PTP1/LINK
TRADE NAME	:	Plextalk
BRAND NAME	:	Plextor
FCC ID	:	WNU-PTP1B
STANDARD(S)	:	47 CFR Part 15 Subpart C
ISSUE DATE	:	2017-05-15

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

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

DIRECTORY

TEST REPORT DECLARATION ····· 4

1. TECHNICAL INFORMATION ····· 5

1.1 APPLICANT INFORMATION ····· 5
1.2 EQUIPMENT UNDER TEST (EUT) DESCRIPTION ····· 5
2.8.1 IDENTIFICATION OF ALL USED EUTS ····· 6
2.9 TEST STANDARDS AND RESULTS ····· 6
2.9.1 TEST ENVIRONMENT CONDITIONS ····· 6

3 47 CFR PART 15C REQUIREMENTS ····· 7

2.1 ANTENNA REQUIREMENT ····· 7
2.1.1 APPLICABLE STANDARD ····· 7
2.1.2 RESULT: COMPLIANT ····· 7
2.2 PEAK OUTPUT POWER ····· 7
2.2.1 REQUIREMENT ····· 7
2.2.2 TEST DESCRIPTION ····· 7
2.2.3 TEST RESULT ····· 8
2.3 BANDWIDTH ····· 9
2.3.1 REQUIREMENT ····· 9
2.3.2 TEST DESCRIPTION ····· 9
2.3.3 TEST RESULT ····· 9
2.4 CONDUCTED SPURIOUS EMISSIONS AND BAND EDGE ····· 14
2.4.1 REQUIREMENT ····· 14
2.4.2 TEST DESCRIPTION ····· 14
2.4.3 TEST RESULT ····· 14
2.5 POWER SPECTRAL DENSITY (PSD) ····· 21
2.5.1 REQUIREMENT ····· 21
2.5.2 TEST DESCRIPTION ····· 21
2.5.3 TEST RESULT ····· 22
2.6 RESTRICTED FREQUENCY BANDS ····· 26
2.6.1 REQUIREMENT ····· 26
2.6.2 TEST DESCRIPTION ····· 26
2.6.3 TEST RESULT ····· 27

2.7 CONDUCTED EMISSION 33
2.7.1 REQUIREMENT 33
2.7.2 TEST DESCRIPTION 33
2.1.1 TEST RESULT 34
2.8 RADIATED EMISSION 36
2.8.1 REQUIREMENT 36
2.8.2 TEST DESCRIPTION 37
2.8.3 TEST RESULT 39

ANNEX A GENERAL INFORMATION 46

Change History		
Issue	Date	Reason for change
1.0	2017-05-15	First edition

TEST REPORT DECLARATION

Applicant	Shinano Kenshi Co., Ltd.
Applicant Address	1078, Kami-Maruko, Ueda-Shi, Nagano-Ken, 386-0498, Japan
Manufacturer	Group Sense Mobile-Tech Limited
Manufacturer Address	Units 13-24, 2/F, Sino Industrial Plaza, 9 Kai Cheung Road, Kowloon Bay, Kowloon, Hong Kong
Product Name	Plextalk Pocket
Model Name	PTP1, PTP1/LINK
Brand Name	Plextor
HW Version	MP
SW Version	MP
Test Standards	47 CFR Part 15 Subpart C
Test Date	2017-04-18 to 2017-04-25
Test Result	PASS

Tested by : Tu Ya'nan

Tu Ya'nan (Test Engineer)

Approved by : Qiu Xiaojun

Qiu Xiaojun (Supervisor)

1. TECHNICAL INFORMATION

Note: Provide by applicant.

1.1 Applicant Information

Company:	Shinano Kenshi Co., Ltd.
Address	1078, Kami-Maruko, Ueda-Shi, Nagano-Ken, 386-0498, Japan

1.2 Equipment under Test (EUT) Description

Brand Name:	Plextor
Trade Name:	Plextalk
Model Name:	PTP1, PTP1/LINK
Frequency Range:	802.11b/g: 2.412GHz - 2.462GHz
Channel Number:	802.11b/g: 11
Modulation Type:	DSSS, OFDM
Antenna Type:	Ceramic Antenna
Antenna Gain:	2.8 dBi

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

For 802.11b/g (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).

Note2: 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. And the duty cycle is 100%.

Note3: There are two models of samples (PTP1 and PTP1/LINK). The model PTP1 and model PTP1/LINK(IC: 7911A-PTP1A) are accordant in both hardware platform and software. Following is the highlighted items which are same in PTP1 and PTP1/LINK:

a. The number of PCB used in the product.
b. The PCB layout.
c. CPU.NAND Flash, Power management IC,USB transceiver and WIFI module
d. AC adaptor.
e. Accessories such as earphone and USB cable.

These two models only differ in application information, memory size and color of plastic Enclosure. The detail difference for PTP1, application is as below:

a. The new additional model name is:PTP1/LINK;
b. The memory size for mobile DDR has been changed from 64MB to 128MB.The PCB layout is exactly the same, as the memory chip is pin-to-pin compatible.
c. The color of plastic enclosure has been changed.

Note4: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

2.8.1 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	MP	MP

2.9 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 (10-1-15 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	Apr 25, 2017	**PASS**
3	15.247(a)	Bandwidth	Apr 25, 2017	**PASS**
4	15.247(d)	Conducted Spurious Emission and Band Edge	Apr 25, 2017	**PASS**
5	15.247(d)	Restricted Frequency Bands	Apr 21&24, 2017	**PASS**
6	15.207	Conducted Emission	Apr 21, 2017	**PASS**
7	15.209 ,15.247(d)	Radiated Emission	Apr 21, 2017	**PASS**
8	15.247(e)	Power spectral density (PSD)	Apr 25, 2017	**PASS**

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 v03r05 (04/08/2016).

2.9.1 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

3 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

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, all test result in power meter.

B. Equipments List:

Please reference ANNEX A(1.5).

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	19.60	0.0912	30	1	PASS
6	2437	19.08	0.0809			PASS
11	2462	18.03	0.0635			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	16.56	0.0453	30	1	PASS
6	2437	16.18	0.0415			PASS
11	2462	16.07	0.0405			PASS

2.2.3.2 802.11g Test mode

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	18.43	0.0697	30	1	PASS
6	2437	18.01	0.0632			PASS
11	2462	17.57	0.0571			PASS

Channel	Frequency (MHz)	Measured Output Average Power		Limit		Verdict
		dBm	W	dBm	W	
1	2412	11.22	0.0132	30	1	PASS
6	2437	11.17	0.0131			PASS
11	2462	12.24	0.0167			PASS

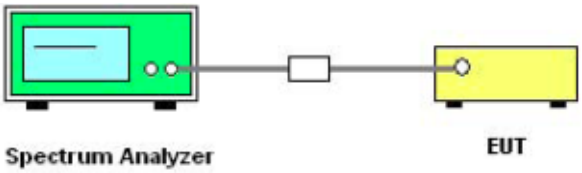
2.3 Bandwidth

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(1.5).

2.3.3 Test Result

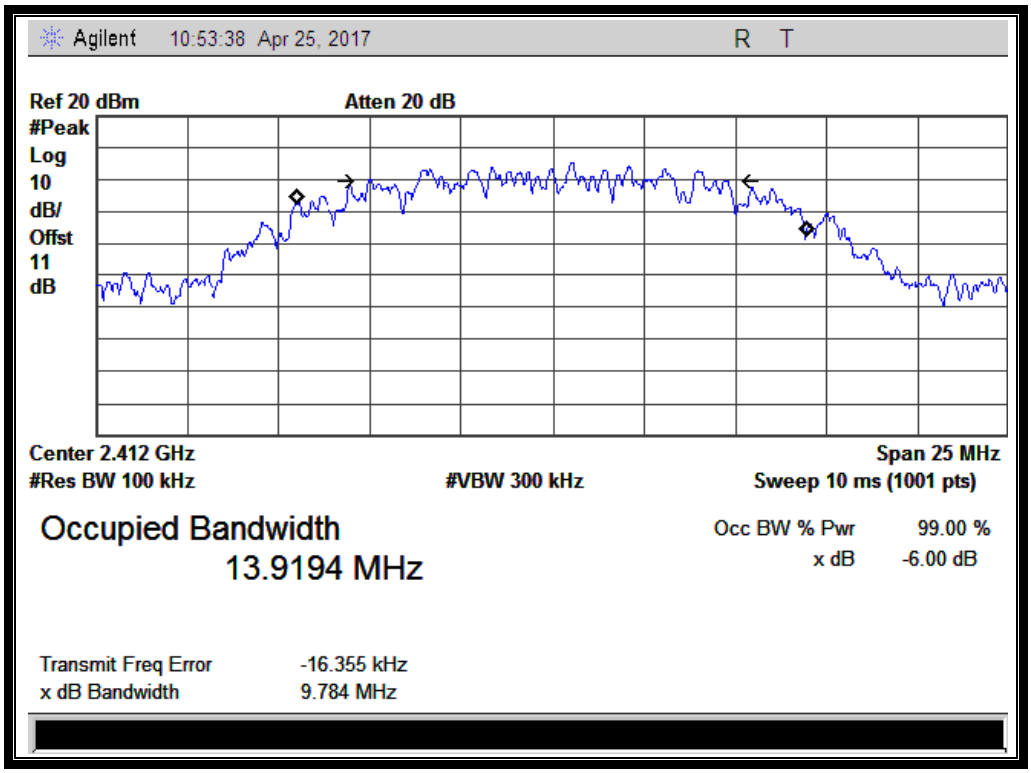
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1 802.11b Test mode

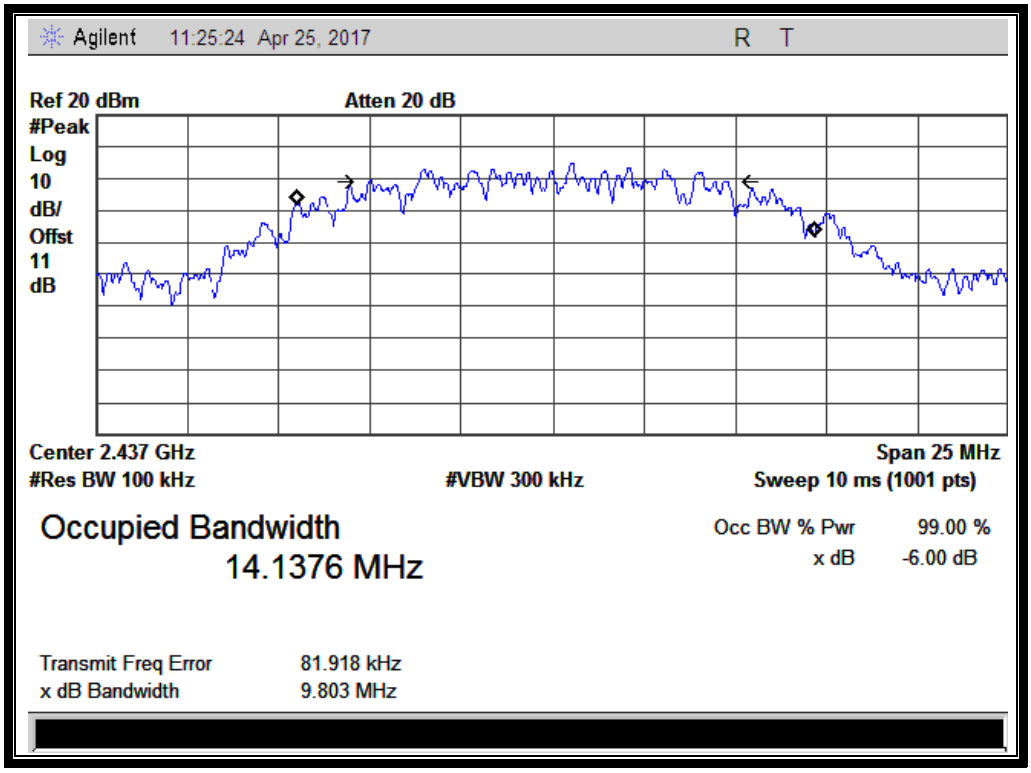
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	9.784	≥500	PASS
6	2437	9.803	≥500	PASS
11	2462	9.808	≥500	PASS

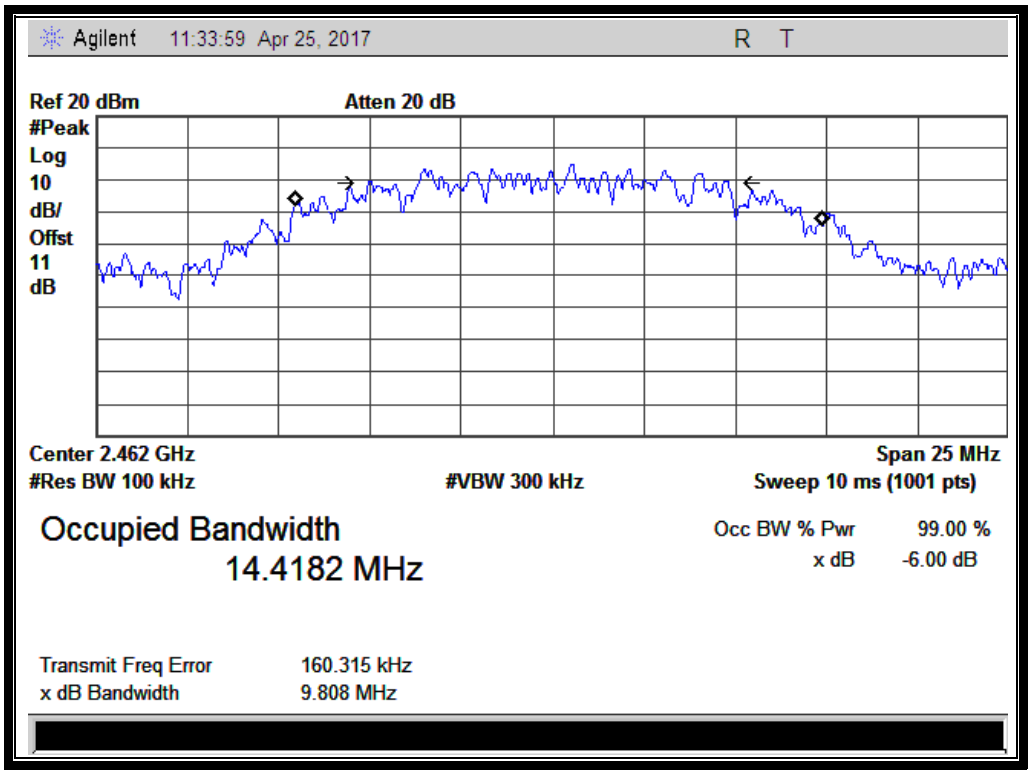
B. Test Plots



(Channel 1: 2412MHz @ 802.11b)



(Channel 6: 2437 MHz @ 802.11b)



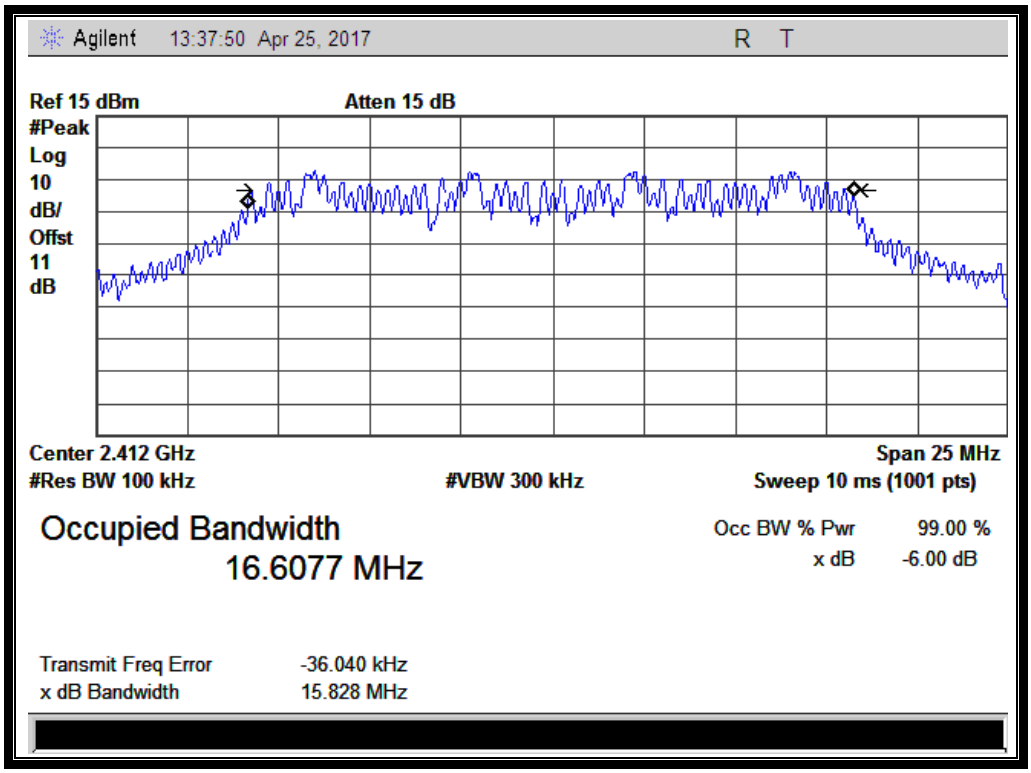
(Channel 11: 2462MHz @ 802.11b)

2.3.3.2 802.11g Test mode

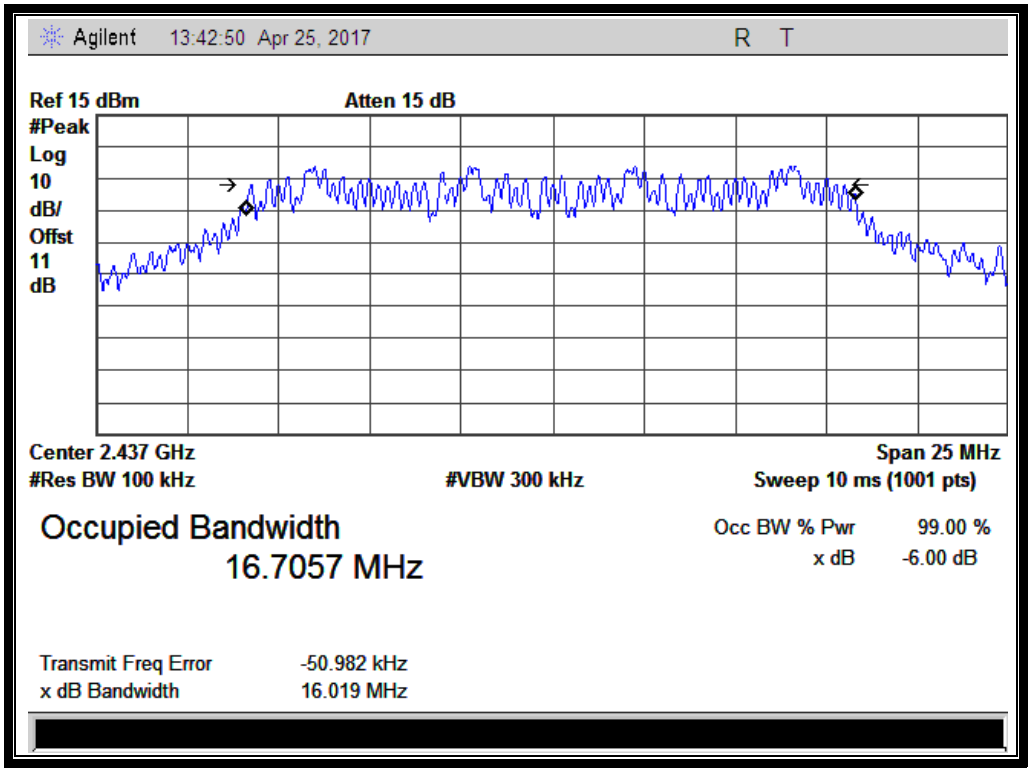
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits (kHz)	Result
1	2412	15.828	≥500	PASS
6	2437	16.019	≥500	PASS
11	2462	15.811	≥500	PASS

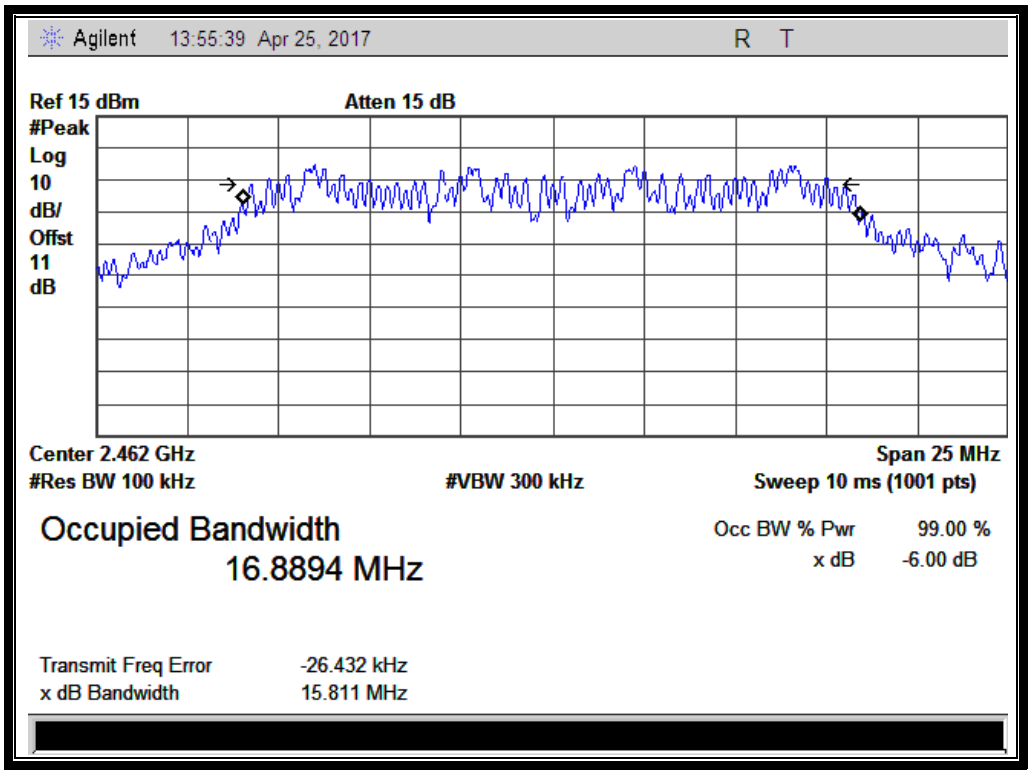
B. Test Plots:



(Channel 1: 2412MHz @ 802.11g)



(Channel 6: 2437MHz @ 802.11g)



(Channel 11: 2462MHz @ 802.11g)

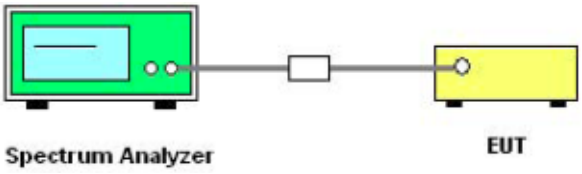
2.4 Conducted Spurious Emissions and Band Edge

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(1.5).

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.

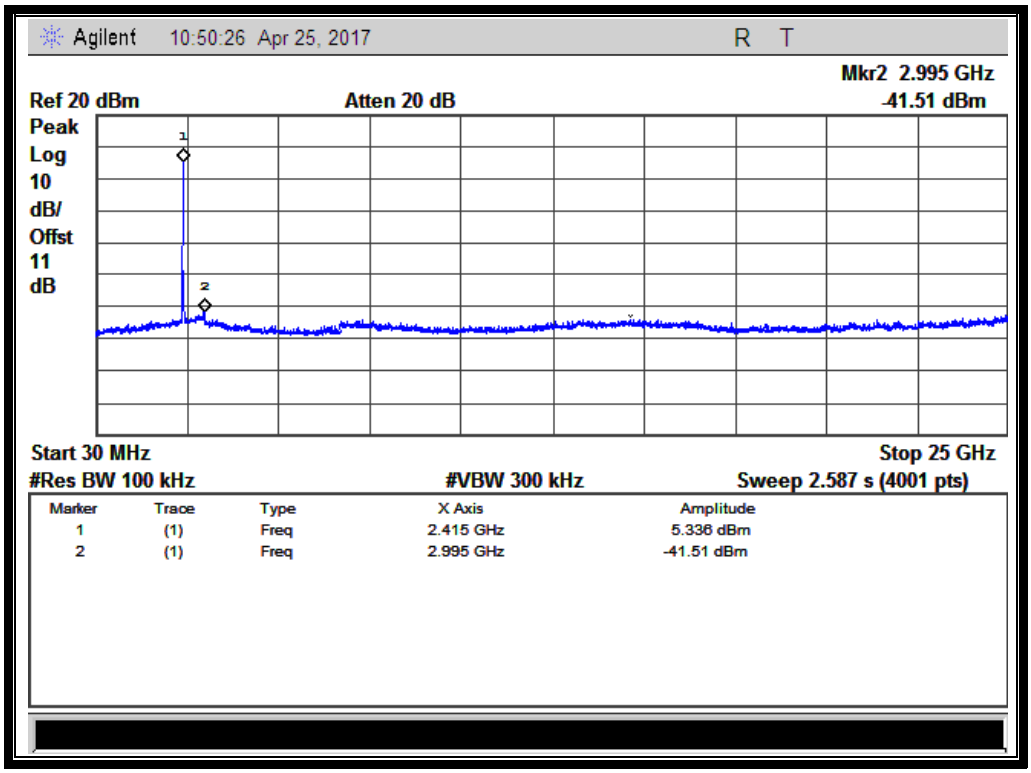
2.4.3.1 802.11b Test mode

A. Test Verdict:

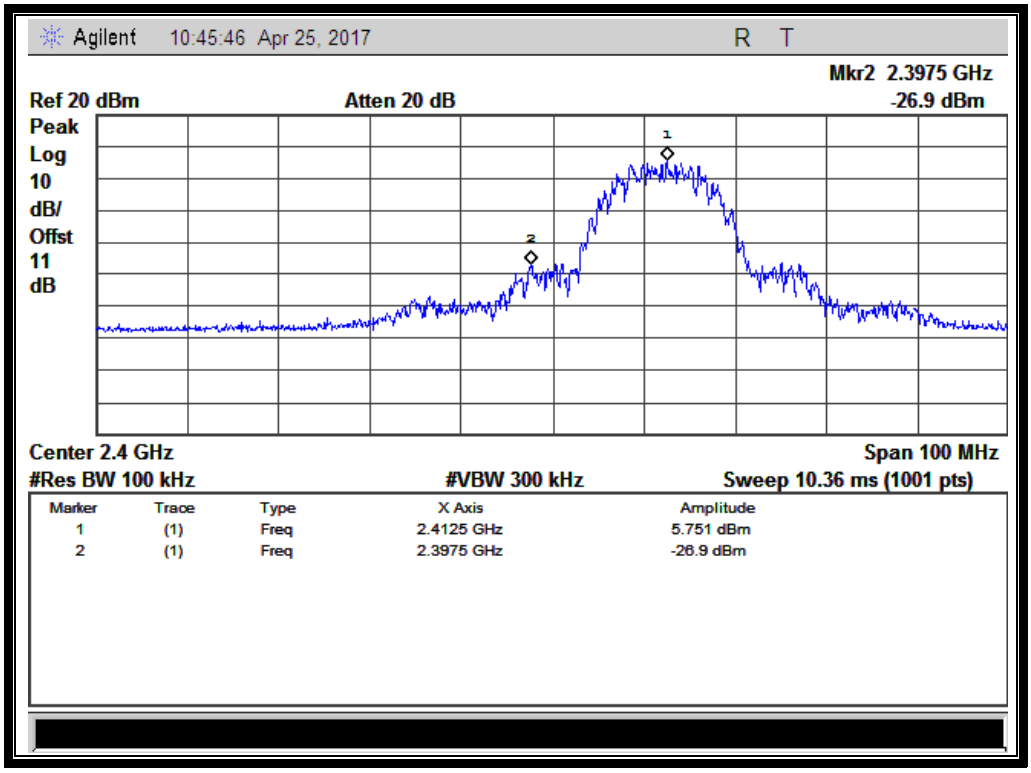
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-41.51	5.34	-14.66	PASS
6	2437	-42.26	4.57	-15.43	PASS
11	2462	-42.02	4.78	-15.22	PASS

B. Test Plots:

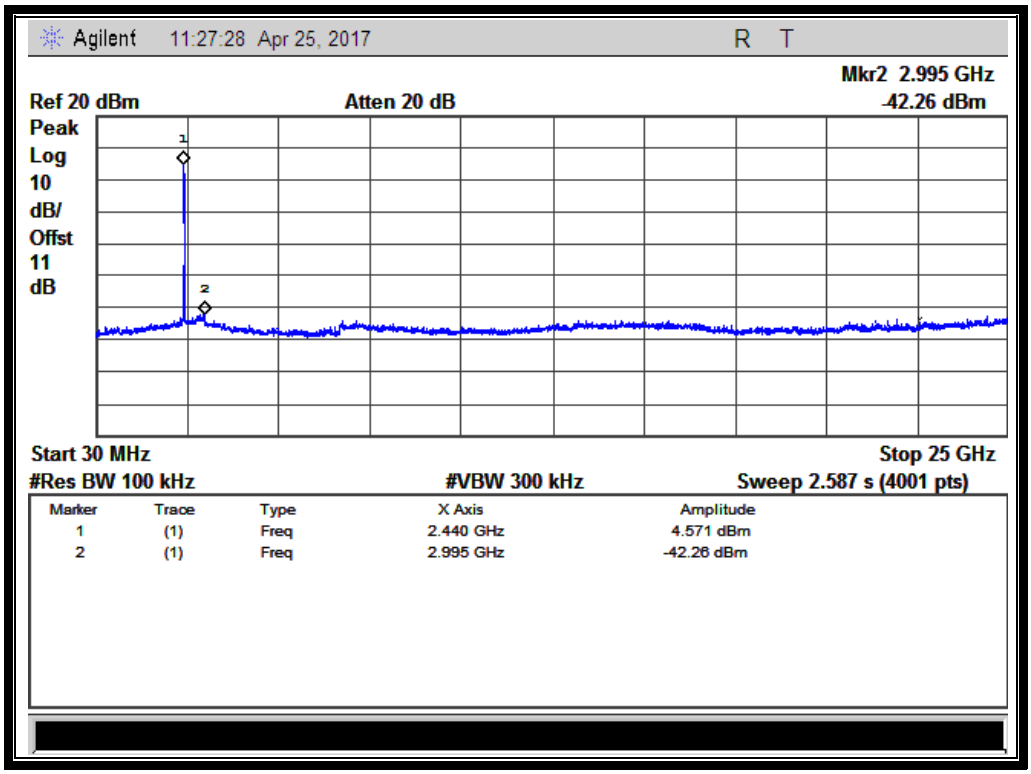
Note: the power of the Module transmitting frequency should be ignored.



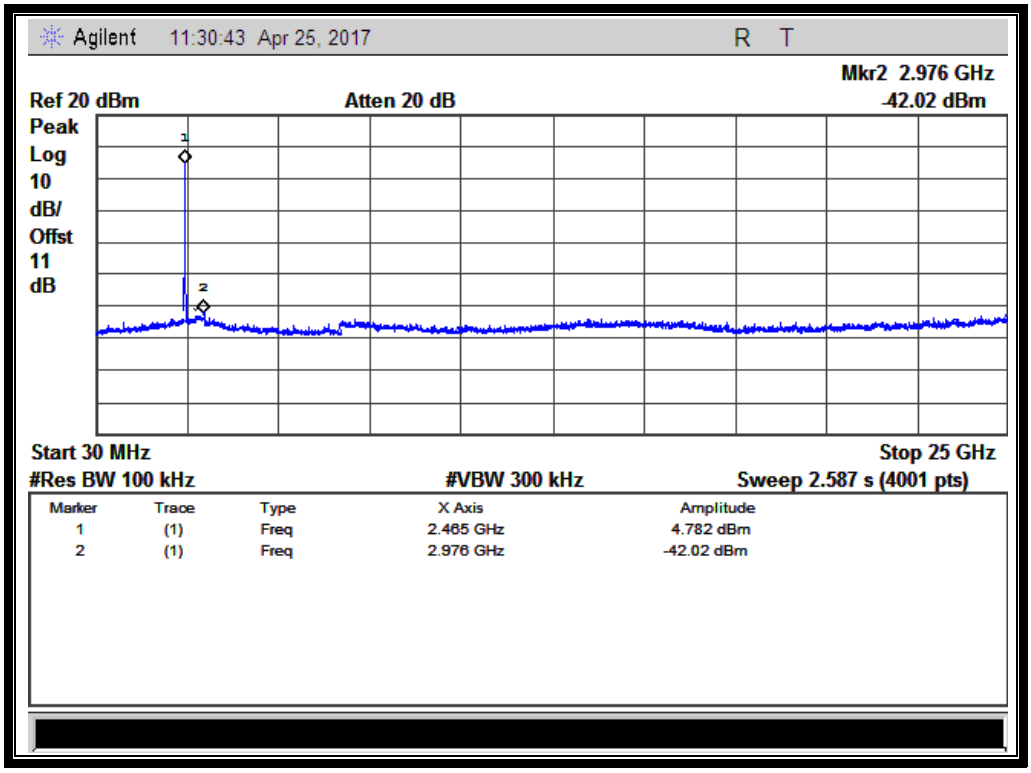
(Channel = 1, 30MHz to 25GHz)



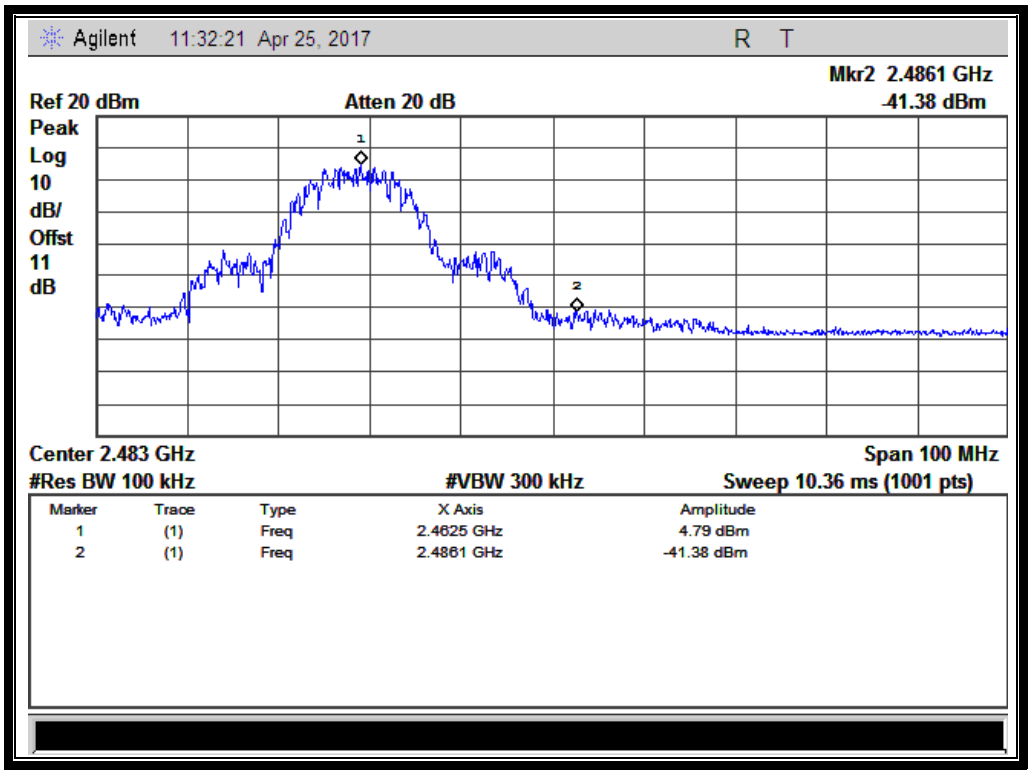
(Band Edge @ Channel = 1)



(Channel = 6, 30MHz to 25GHz)



(Channel = 11, 30MHz to 25GHz)



(Band Edge @ Channel = 11)

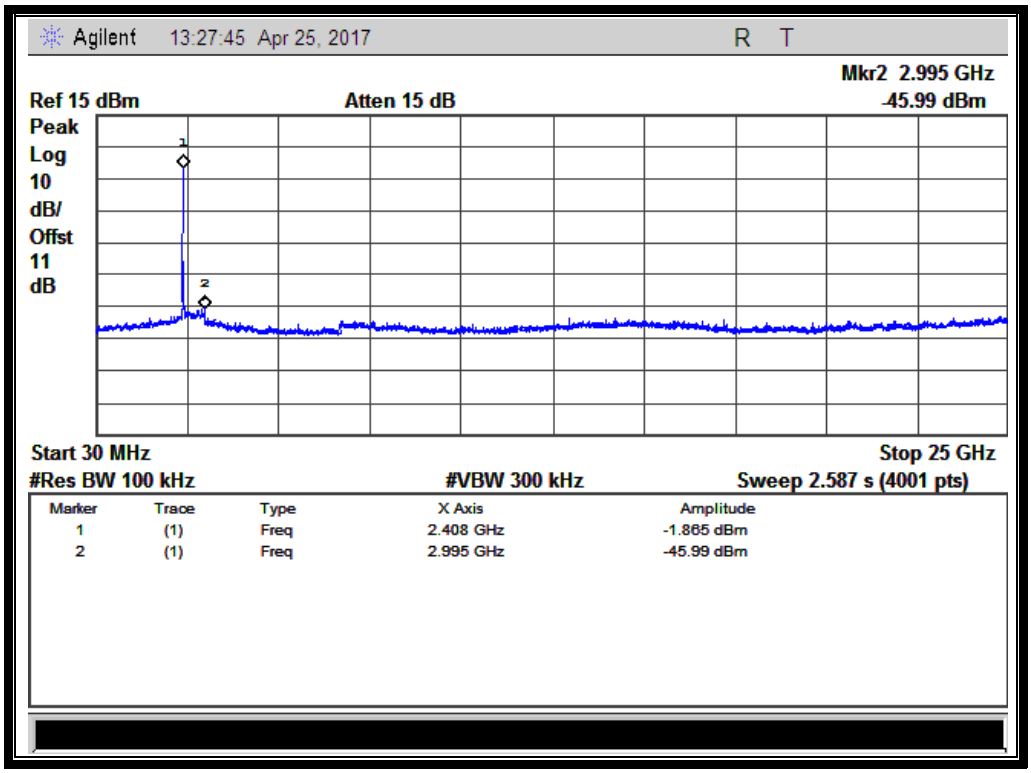
2.4.3.2 802.11g Test mode

A. Test Verdict:

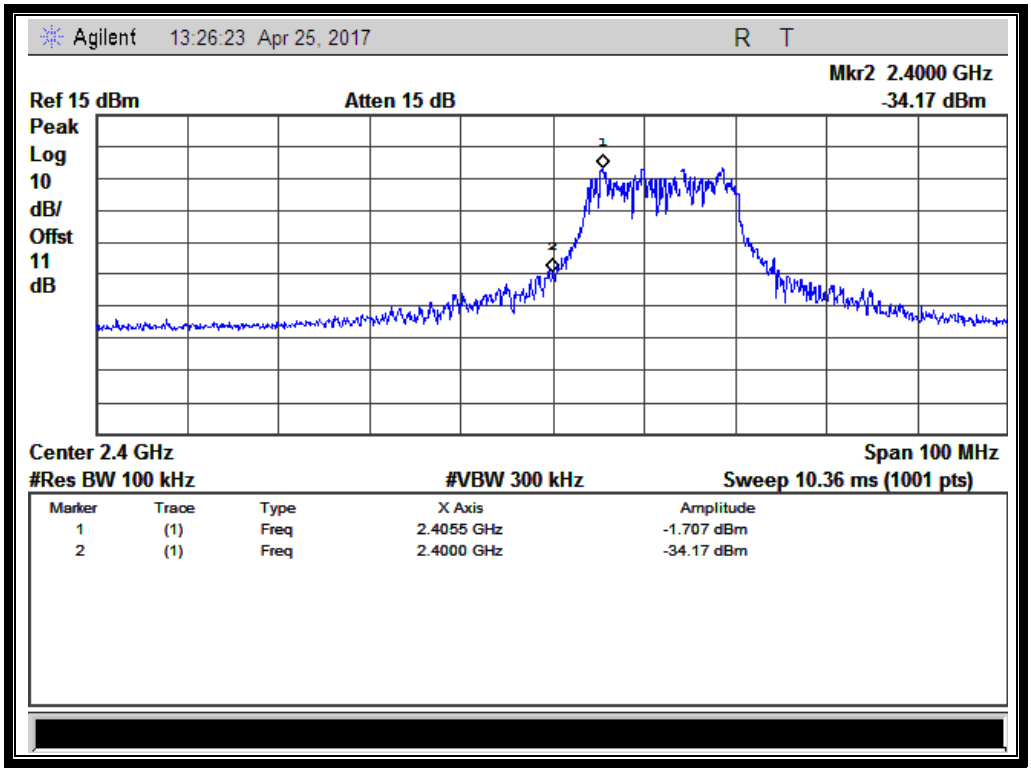
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBc Limit	
1	2412	-45.99	-1.87	-21.87	PASS
6	2437	-46.33	-1.47	-21.47	PASS
11	2462	-46.33	-0.36	-20.36	PASS

B. Test Plots:

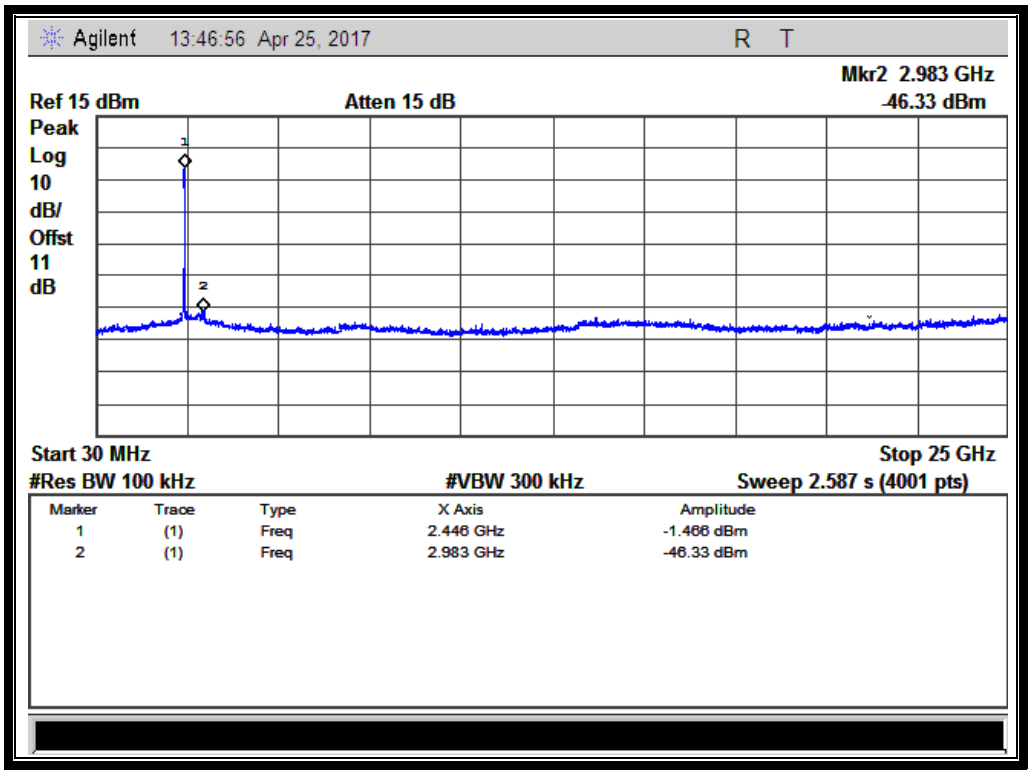
Note: the power of the Module transmitting frequency should be ignored.



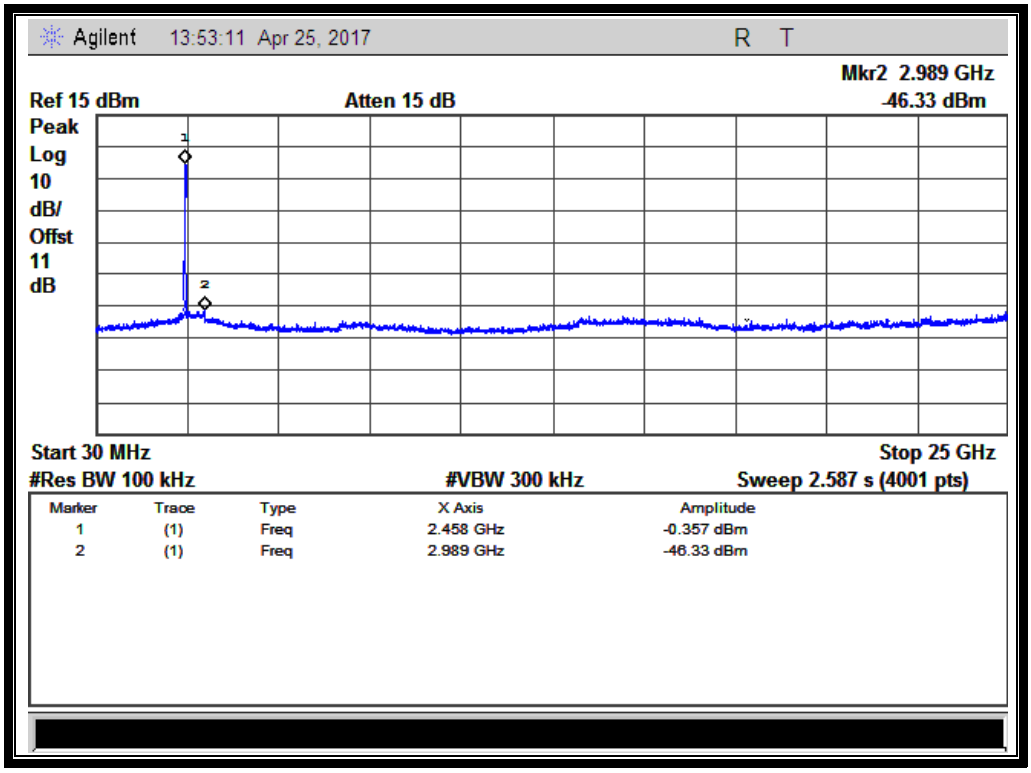
(Channel = 1, 30MHz to 25GHz)



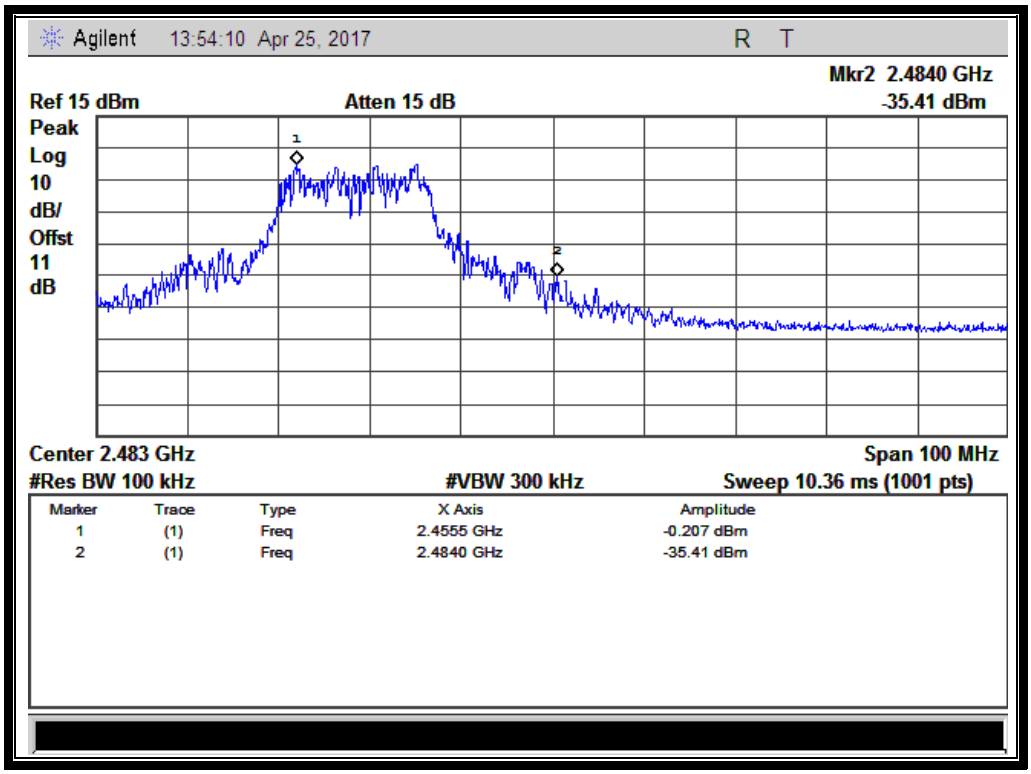
(Band Edge @ Channel = 1)



(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.

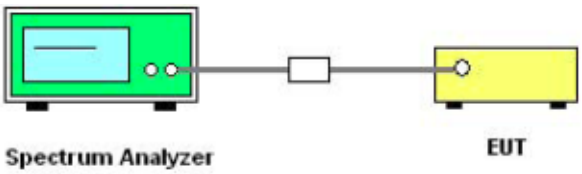
2.5.2 Test Description

A. Test 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 30MHz
c) Set the RBW to 3 kHz
d) Set the VBW to 10KHz
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 reference ANNEX A(1.5).

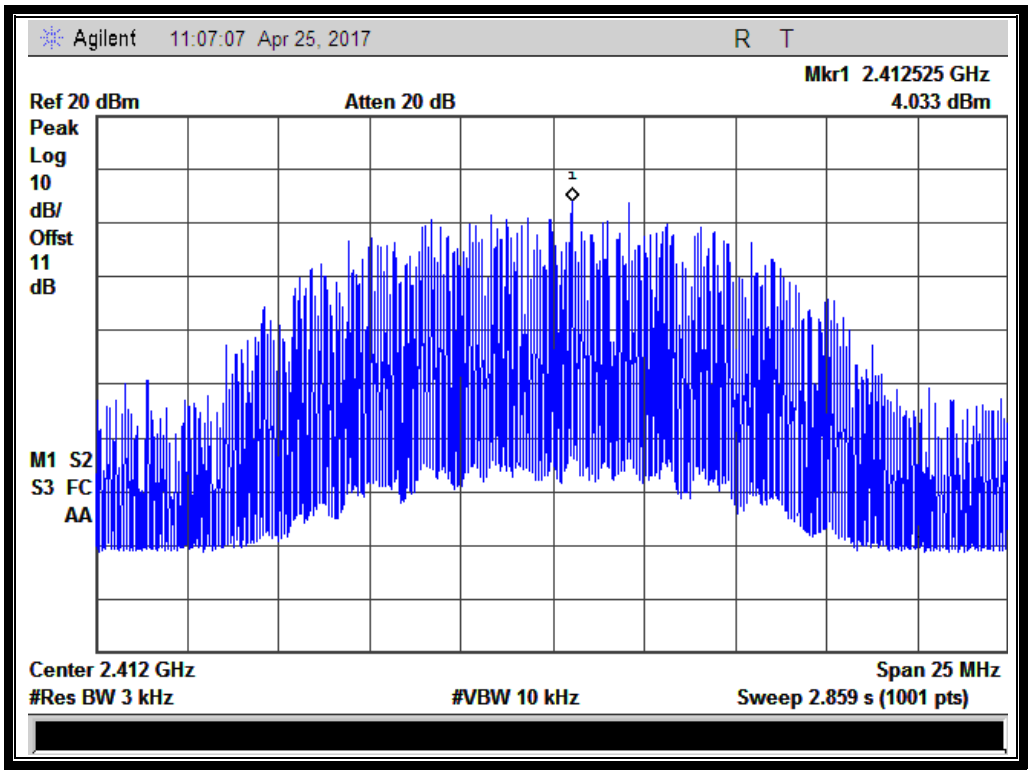
2.5.3 Test Result

2.5.3.1 802.11b Test mode

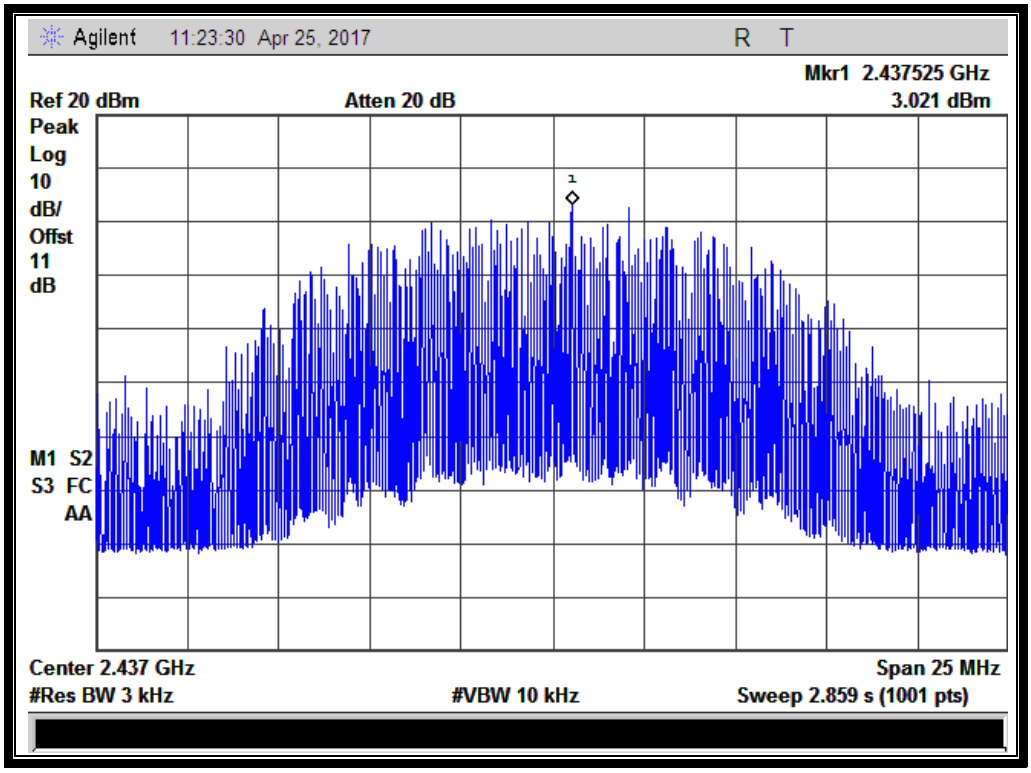
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	4.03	8	PASS
6	2437	3.02	8	PASS
11	2462	4.90	8	PASS
Measurement uncertainty: ±1.3dB				

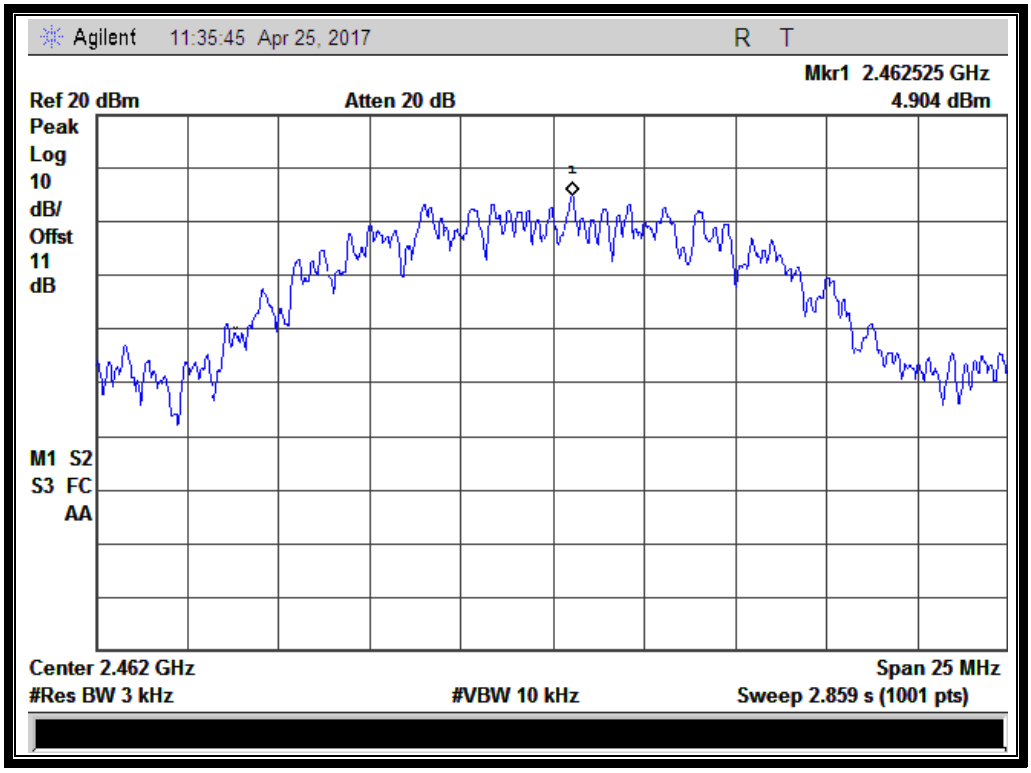
B. Test Plots:



(Channel = 1 @ 802.11b)



(Channel = 6 @ 802.11b)



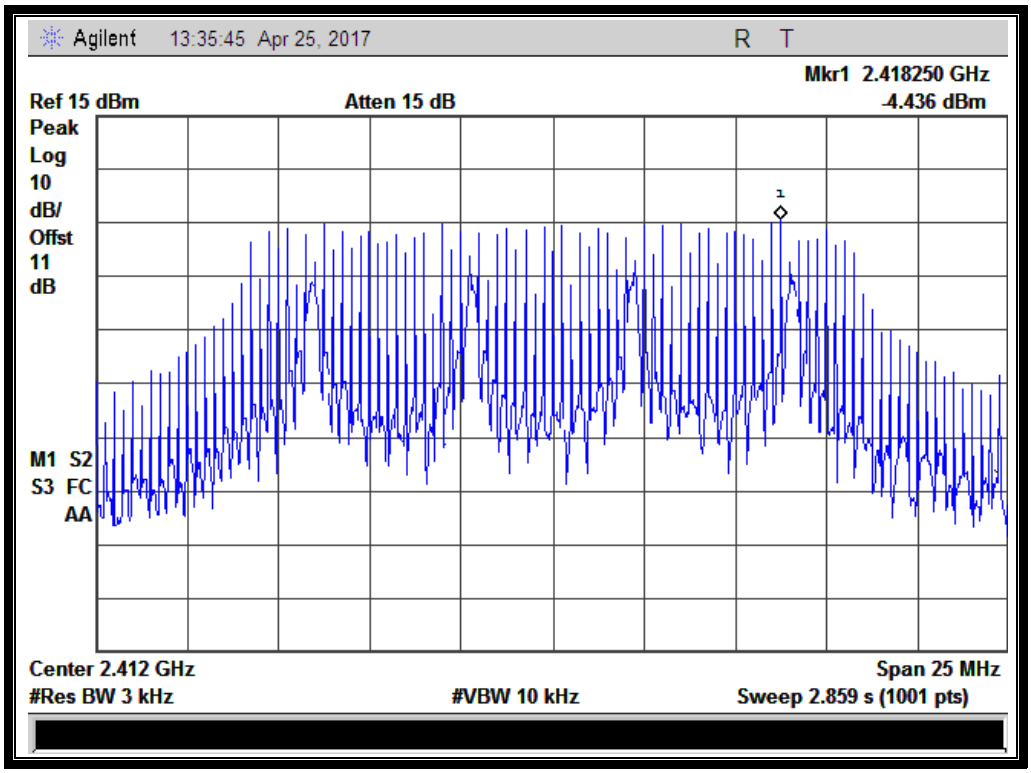
(Channel = 11 @ 802.11b)

2.5.3.2 802.11g Test mode

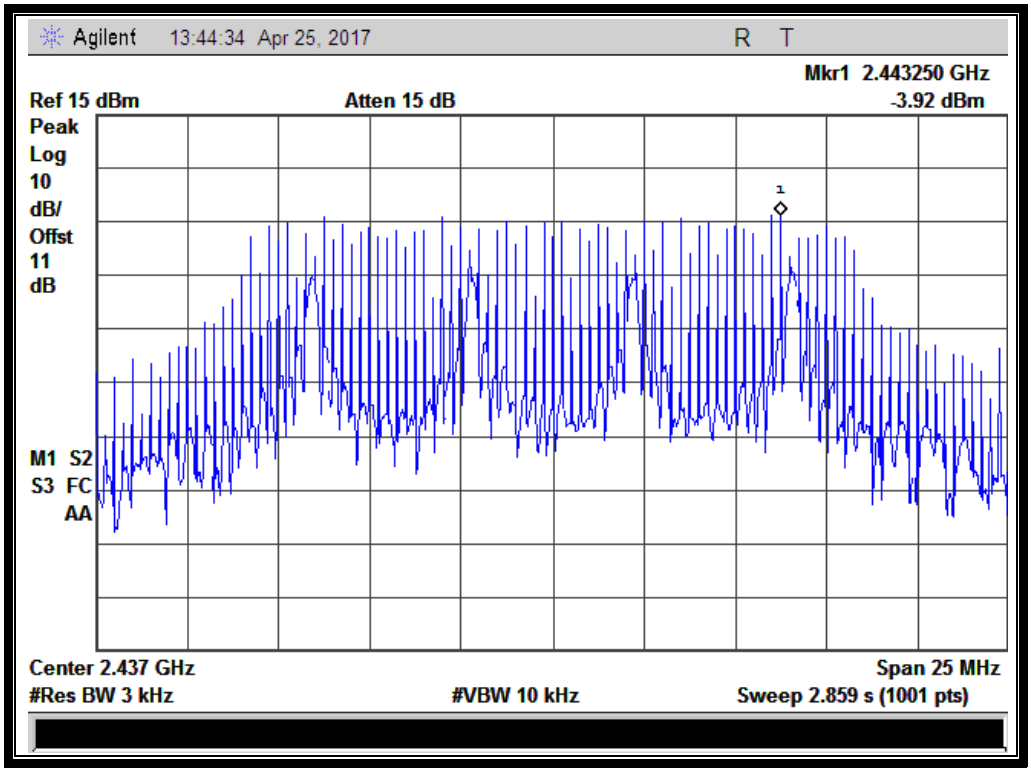
A. Test Verdict:

Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
1	2412	-4.44	8	PASS
6	2437	-3.92	8	PASS
11	2462	-3.07	8	PASS
Measurement uncertainty: ±1.3dB				

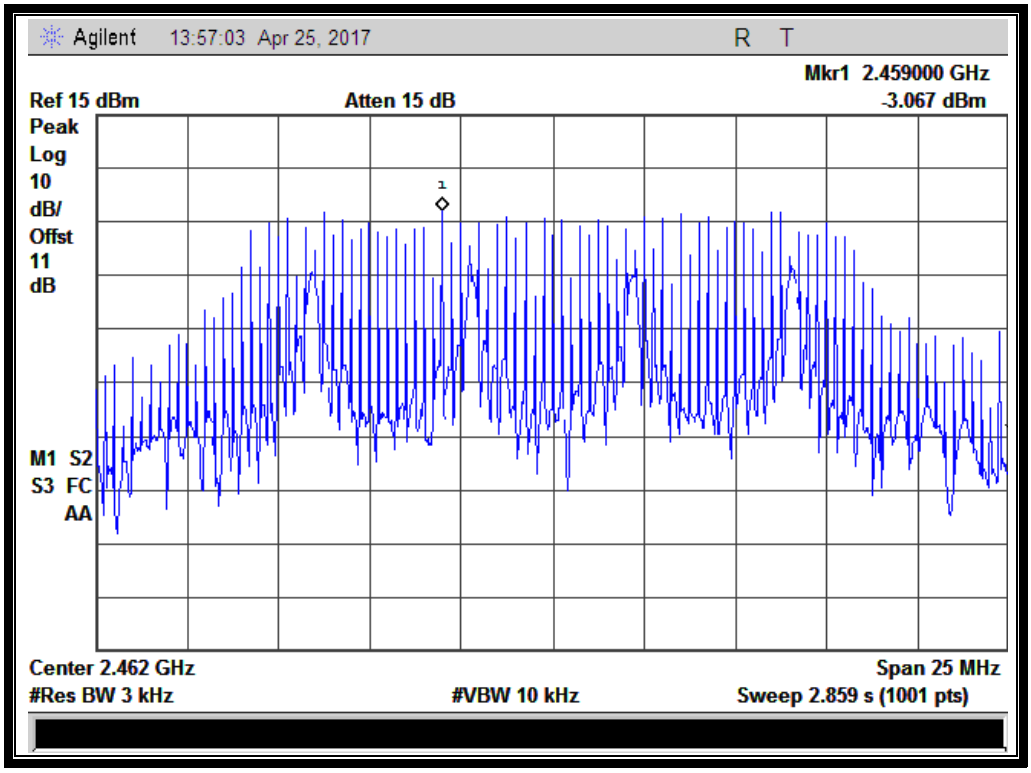
B. Test Plots:



(Channel = 1 @ 802.11g)



(Channel = 6 @ 802.11g)



(Channel = 11 @ 802.11g)

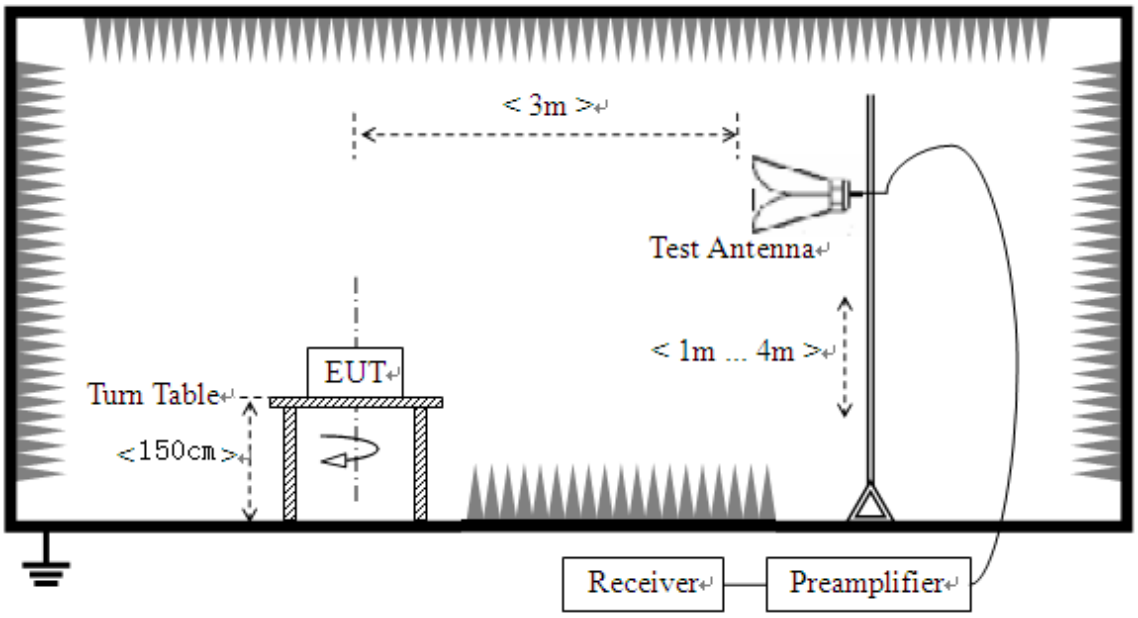
2.6 Restricted Frequency Bands

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 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 reference ANNEX A(1.5).

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 [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.

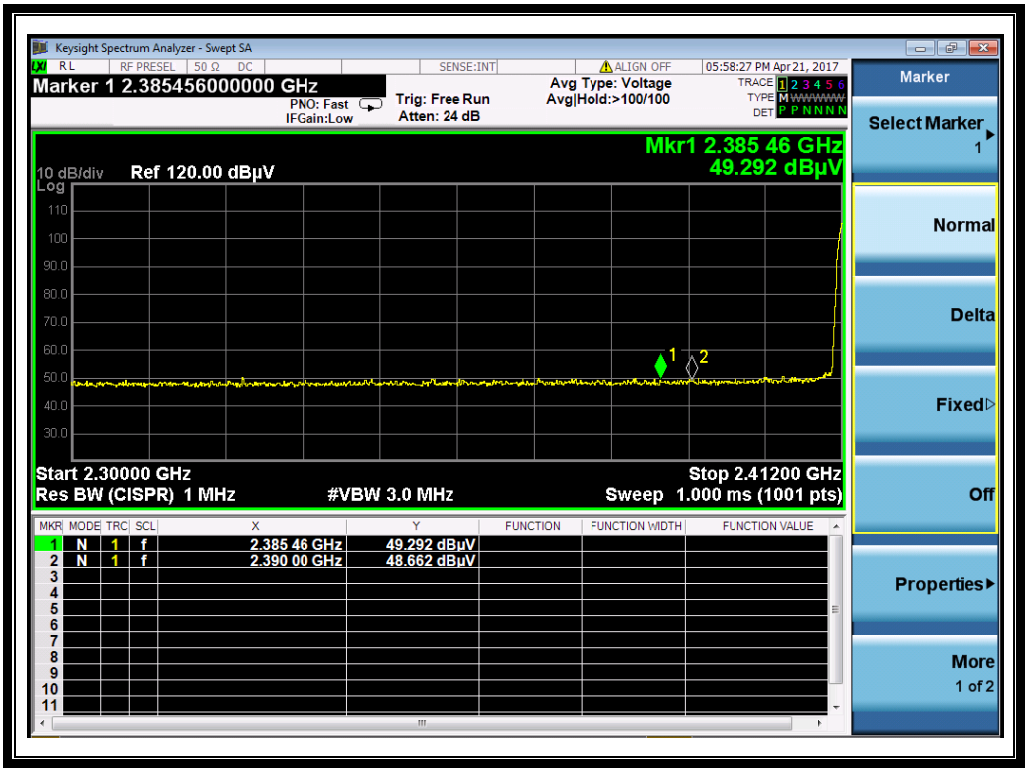
2.6.3.1 802.11b Test mode

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

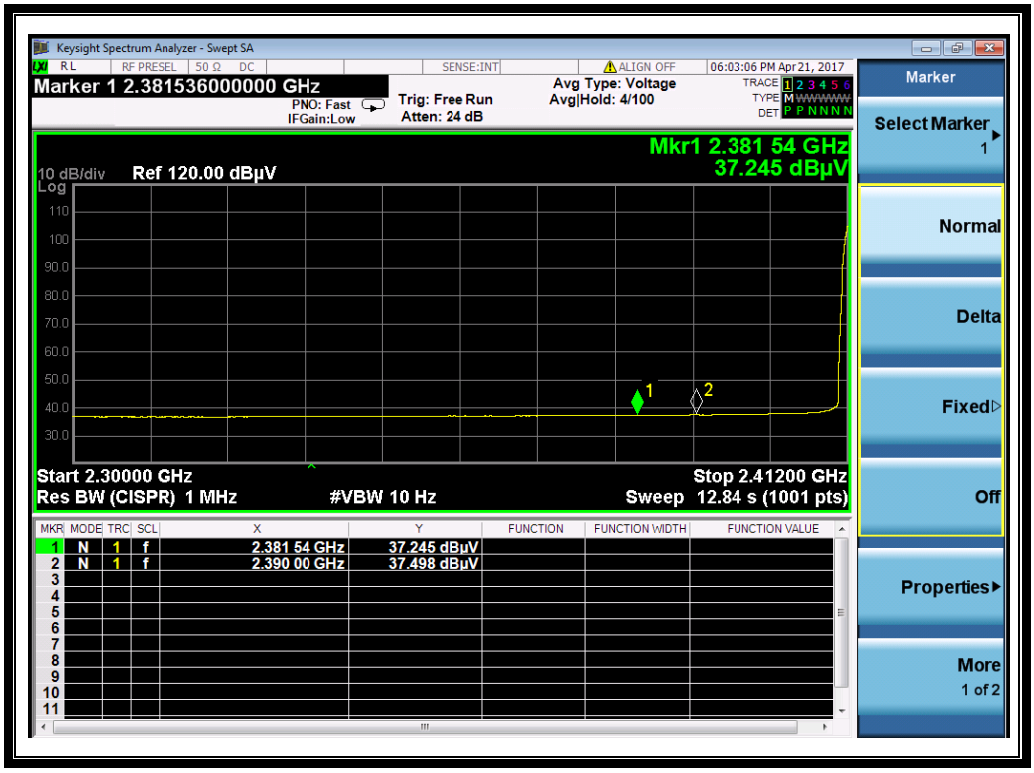
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2385.46	PK	49.29	-33.63	32.56	48.22	74	Pass
1	2381.54	AV	37.25	-33.63	32.56	36.18	54	Pass
11	2484.22	PK	48.50	-33.18	32.5	47.82	74	Pass
11	2487.08	AV	37.33	-33.18	32.5	36.65	54	Pass

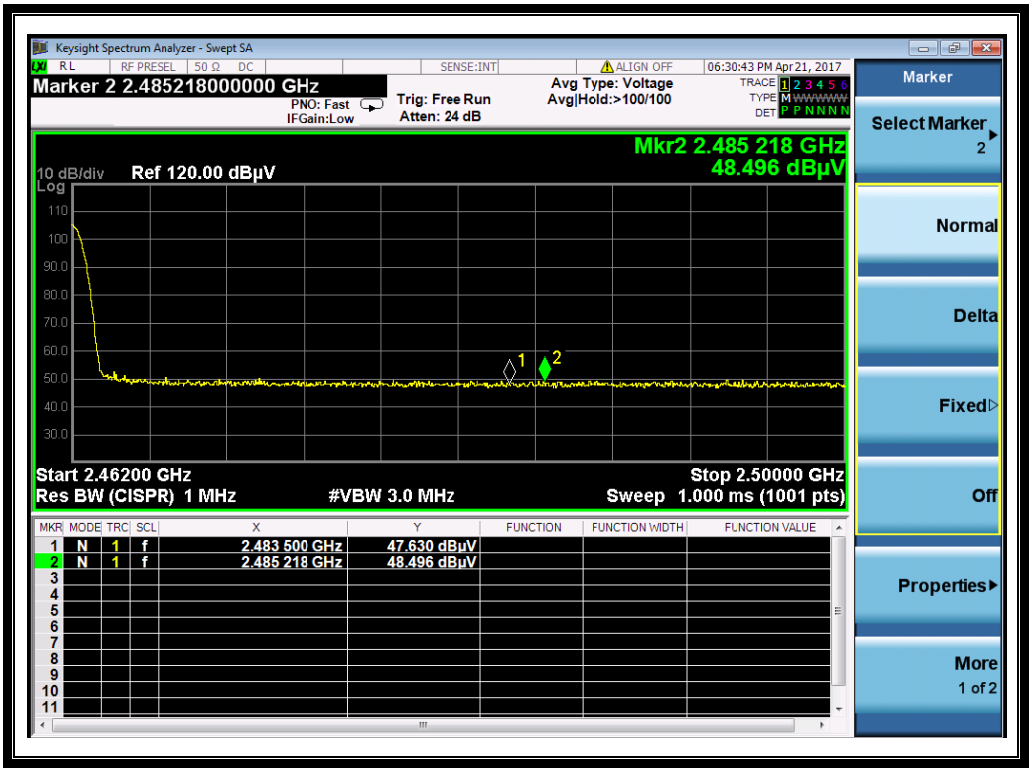
B. Test Plots:



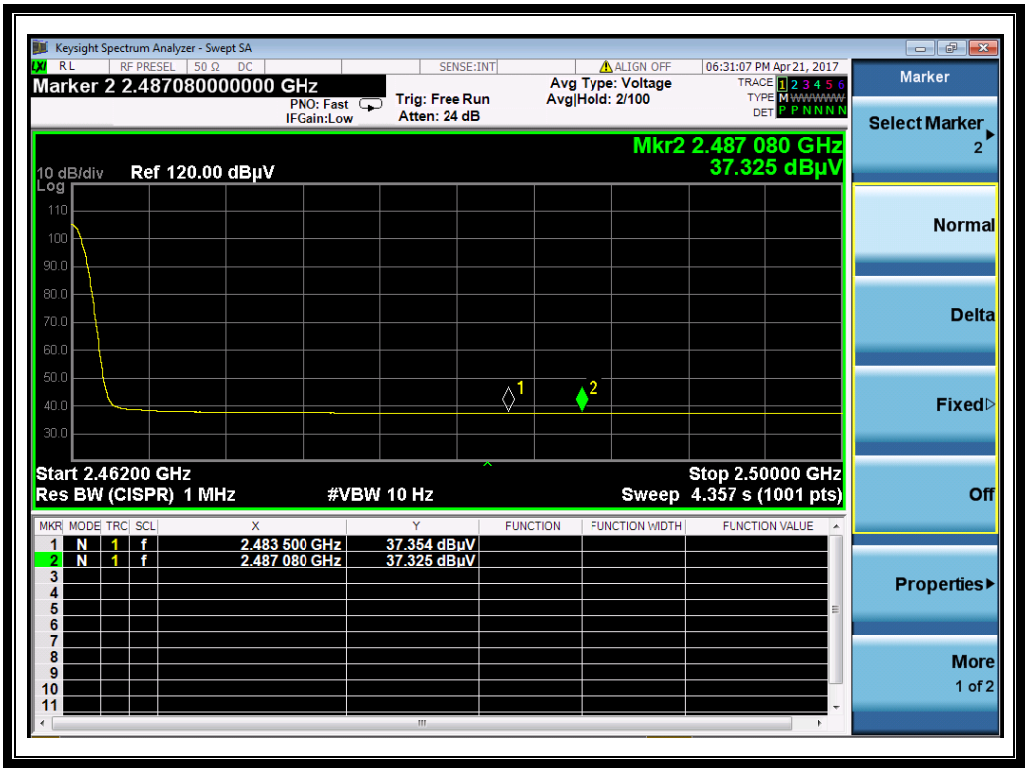
(Plot A1: Channel = 1 PEAK @ 802.11b)



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



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



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

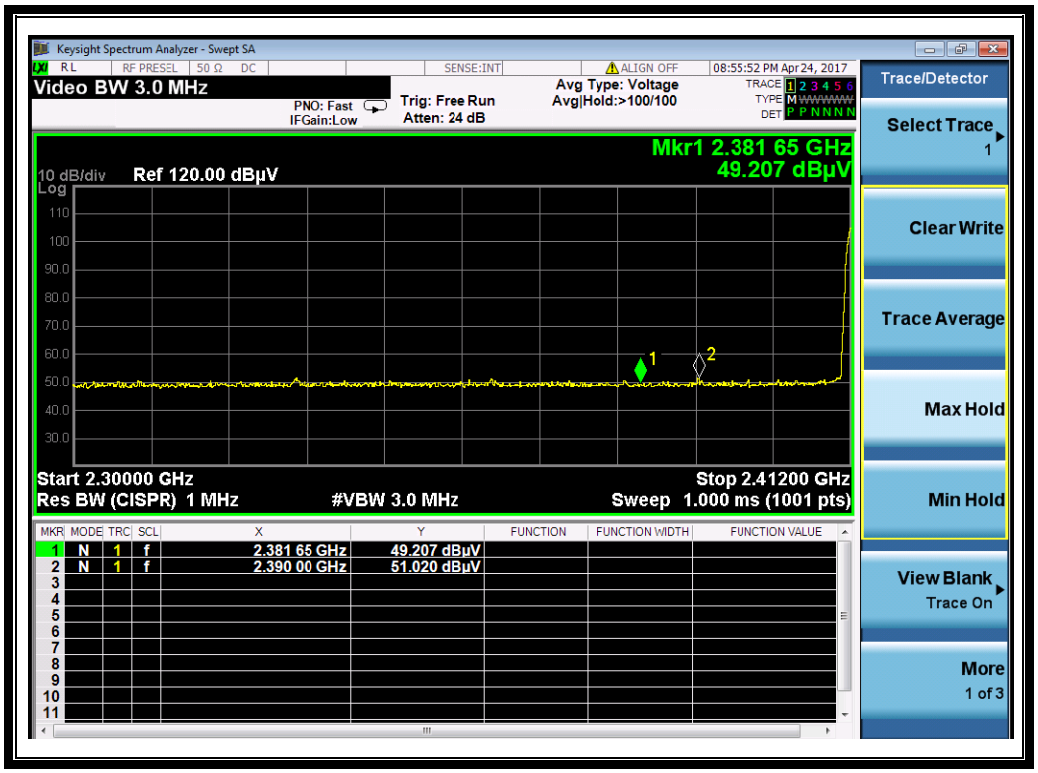
2.6.3.2 802.11g Test mode

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

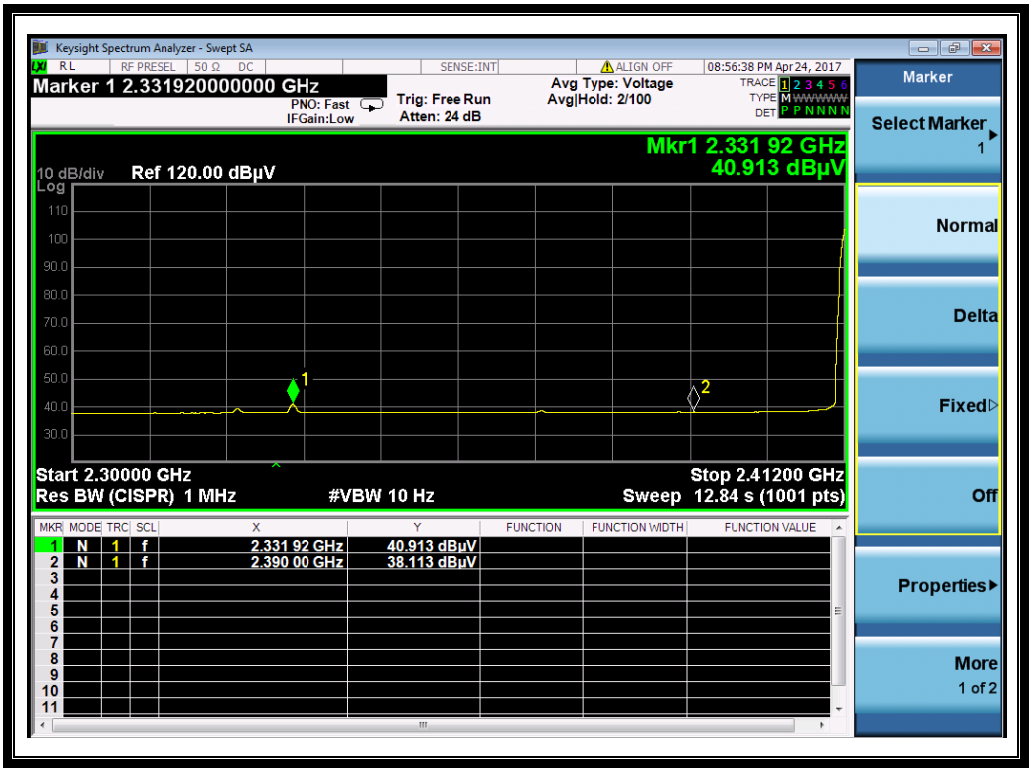
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
1	2381.65	PK	49.21	-33.63	32.56	48.14	74	Pass
1	2331.92	AV	40.91	-33.63	32.56	39.84	54	Pass
11	2489.28	PK	48.25	-33.18	32.5	47.57	74	Pass
11	2487.76	AV	37.32	-33.18	32.5	36.64	54	Pass

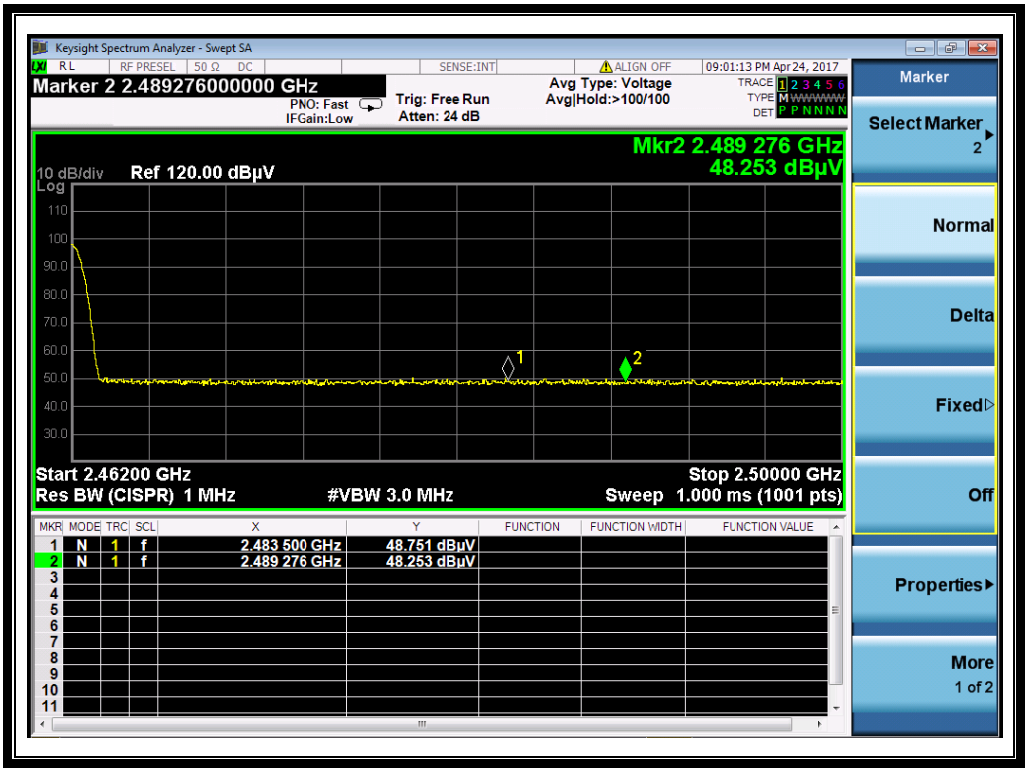
B. Test Plots:



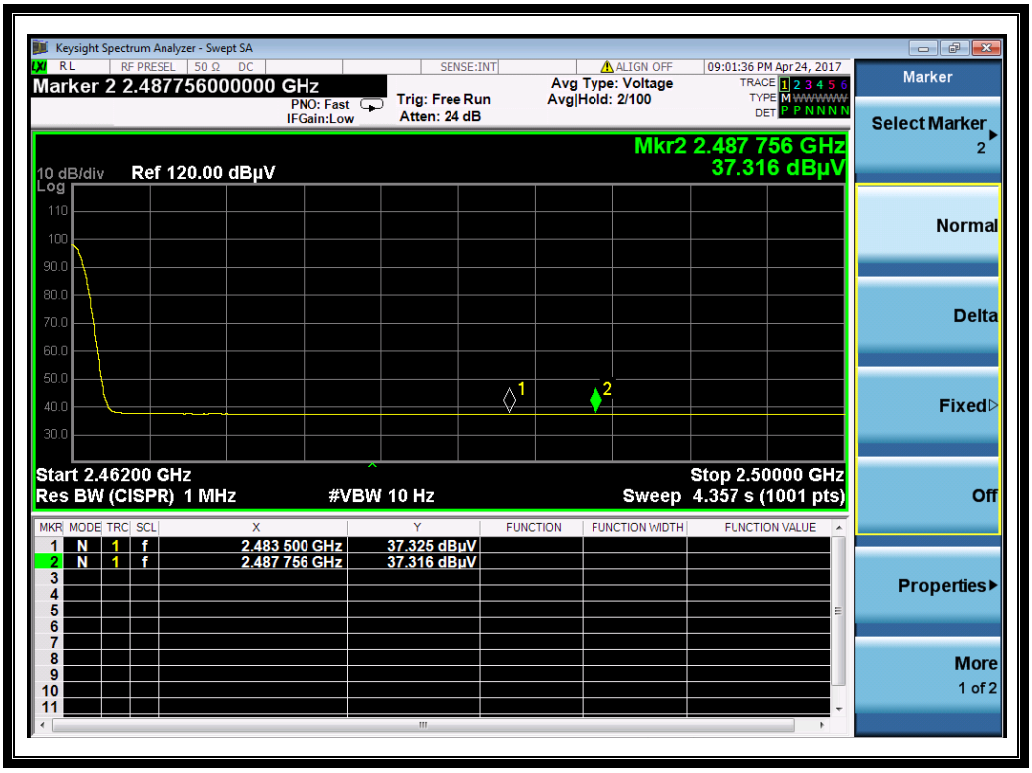
(Plot C1: Channel = 1 PEAK @ 802.11g)



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



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



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

2.7 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

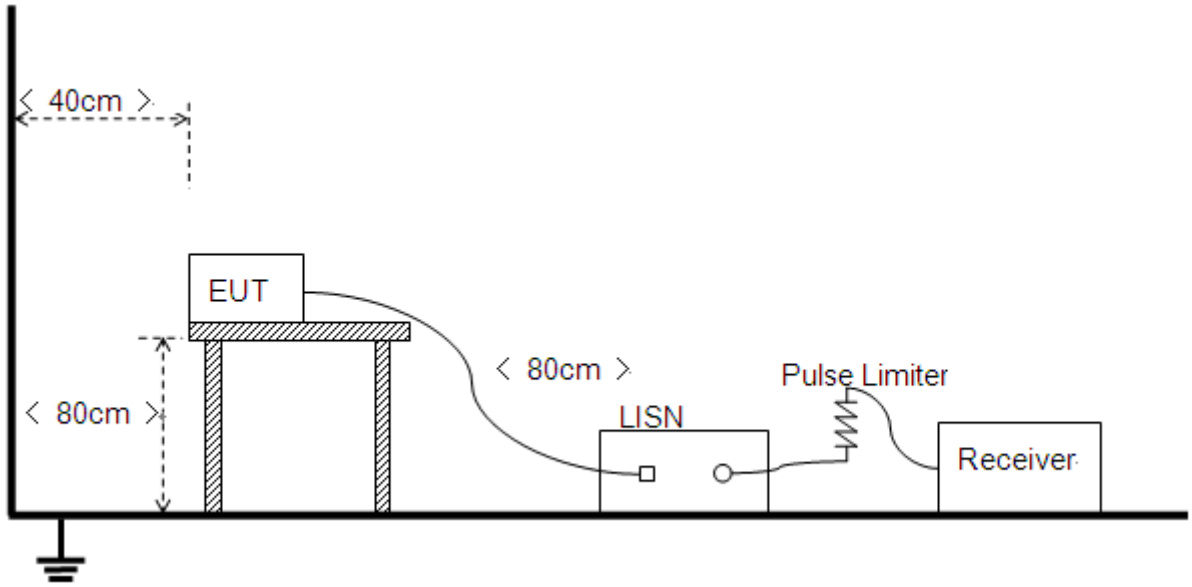
NOTE:

(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 reference ANNEX A(1.5).

2.1.1 Test Result

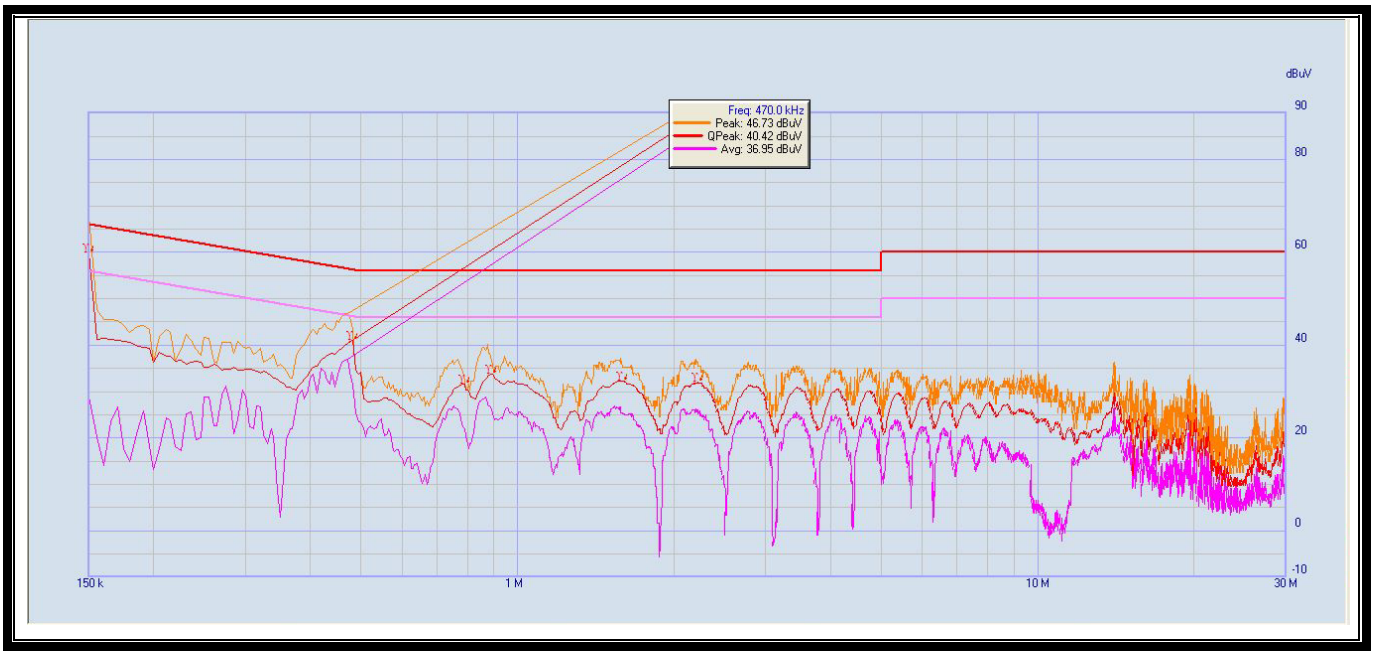
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT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

A. Test setup:

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

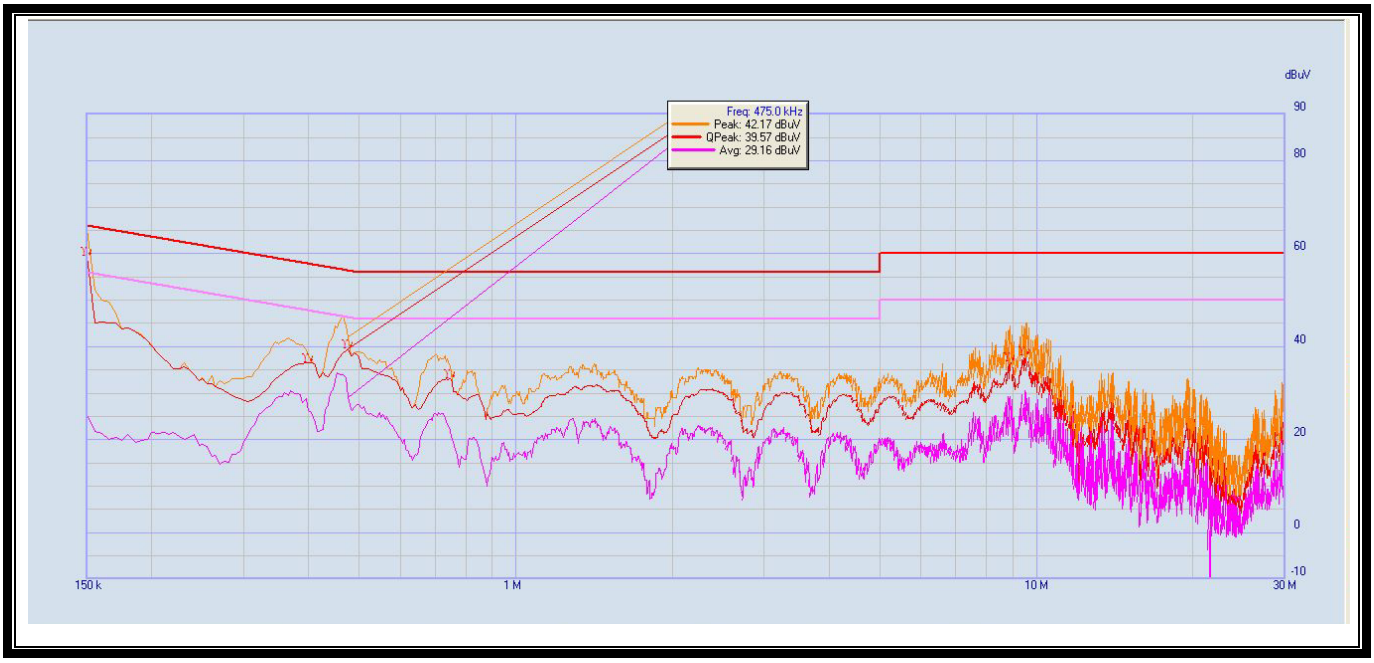
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)

NO.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.275	34.81	31.20	62.43	52.43	Line	PASS
2	0.295	34.71	30.33	61.86	51.86		PASS
3	0.385	31.96	30.32	59.29	49.29		PASS
4	0.405	35.33	33.69	58.71	48.71		PASS
5	0.42	36.68	35.06	58.29	48.29		PASS
6	0.47	40.42	36.95	56.86	46.86		PASS



(Plot B: N Phase)

NO.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.15	59.56	25.41	66.00	56.00	Neutral	PASS
2	0.4	36.59	26.18	58.86	48.86		PASS
3	0.175	39.57	29.16	65.29	55.29		PASS
4	0.745	33.10	22.07	56	46		PASS
5	8.915	36.14	27.70	60	50		PASS
6	9.49	37.50	28.96	60	50		PASS

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.

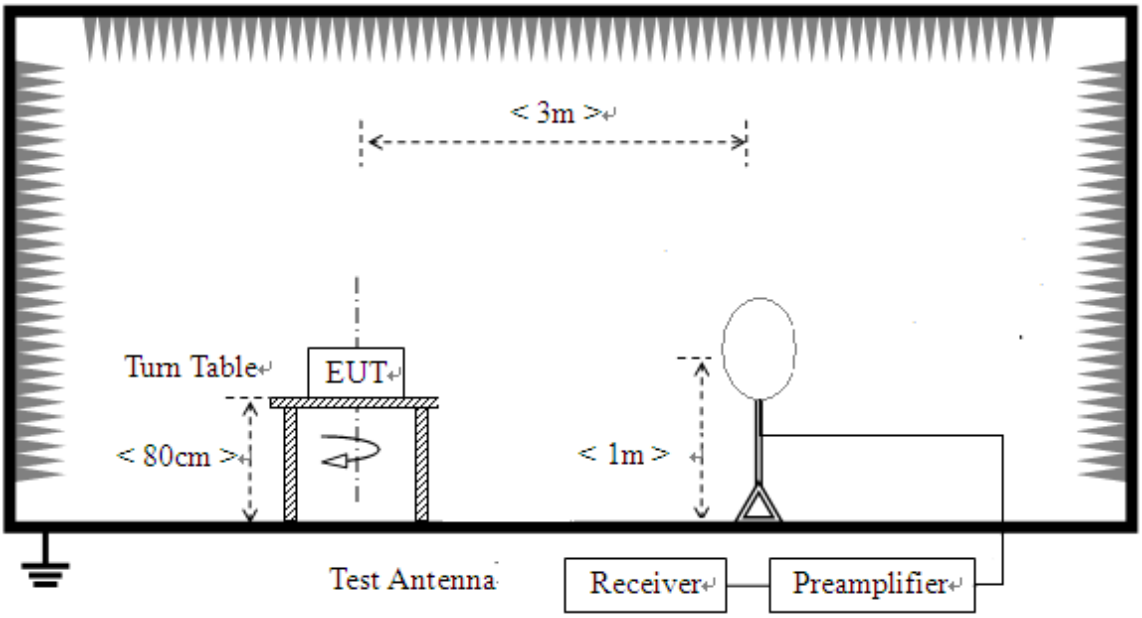
For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

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)

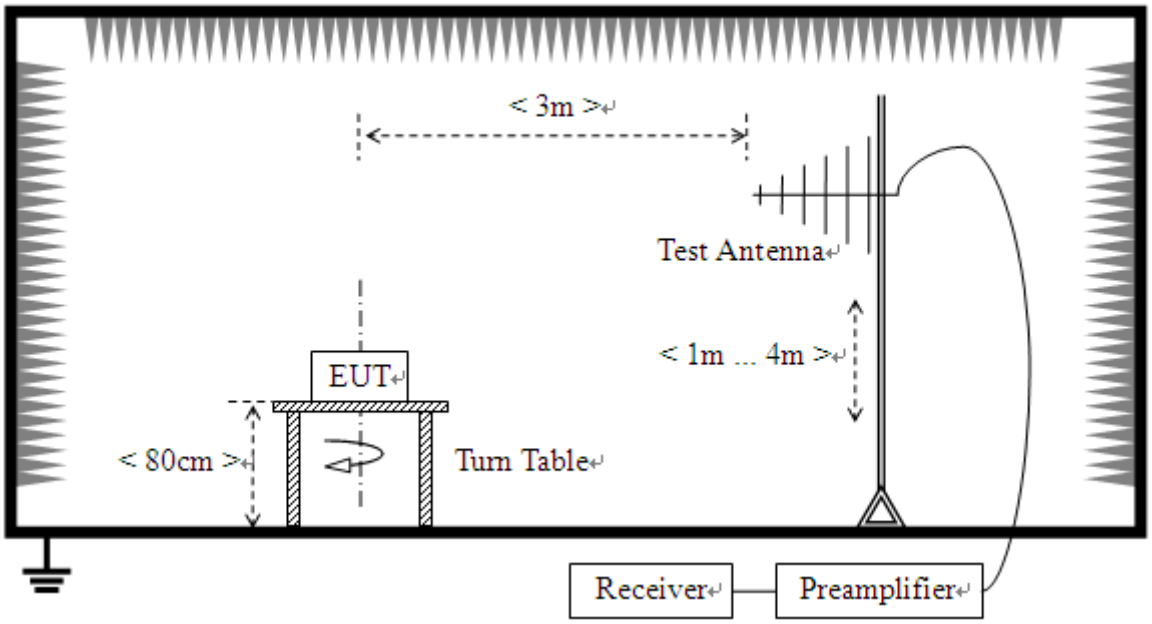
2.8.2 Test Description

A. Test Setup:

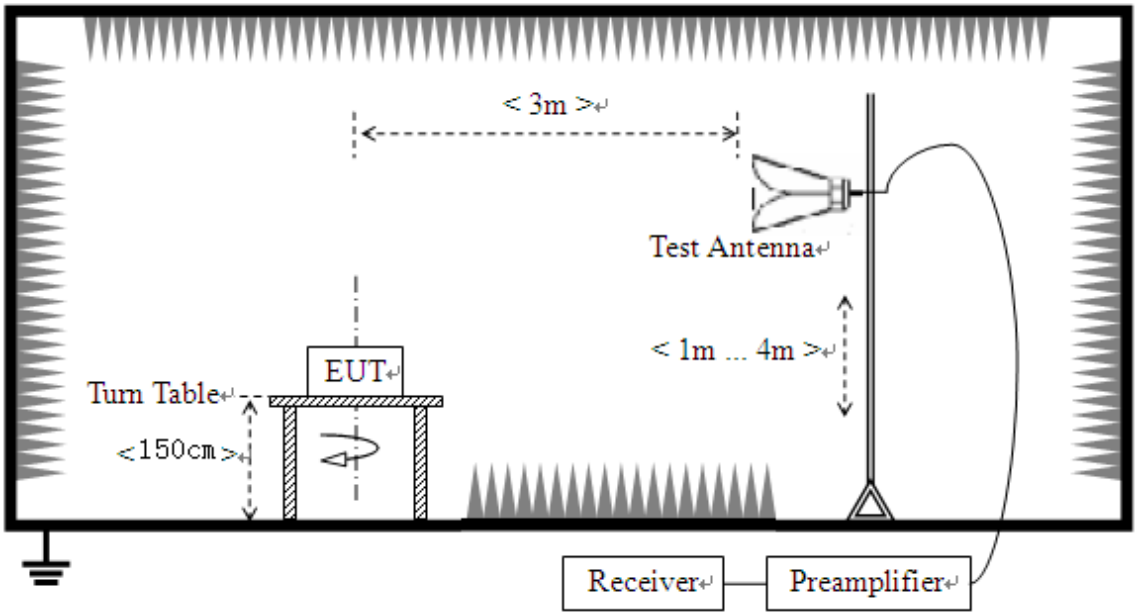
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The 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.

B. Equipments List:

Please reference ANNEX A(1.5).

2.8.3 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

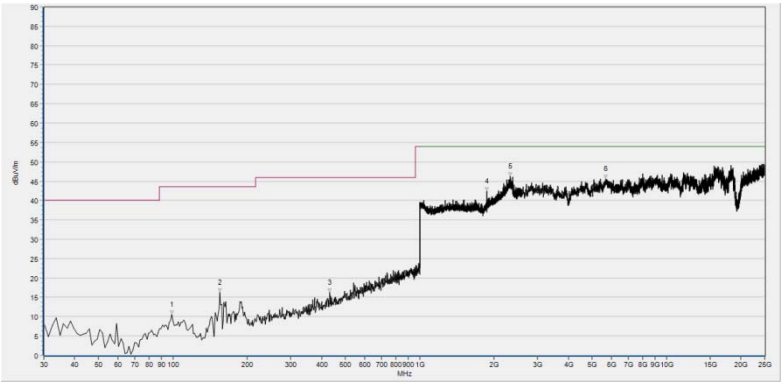
During the test, the total correction Factor A_T and A_{Factor} were built in test software.

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

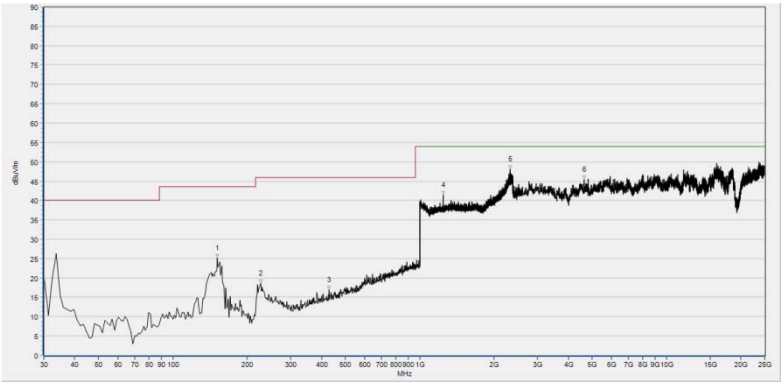
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
99.199	10.58	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
155.044	16.30	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
431.840	16.19	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1873.309	42.39	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2331.733	46.18	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5679.542	45.57	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

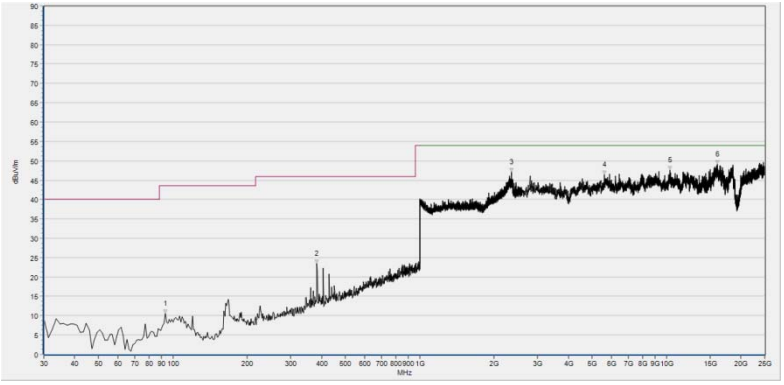
(Antenna Horizontal, 30MHz to 25GHz)



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
151.402	25.09	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
226.671	18.65	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
429.412	16.86	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
1242.017	41.39	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2324.050	48.11	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4628.587	45.46	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

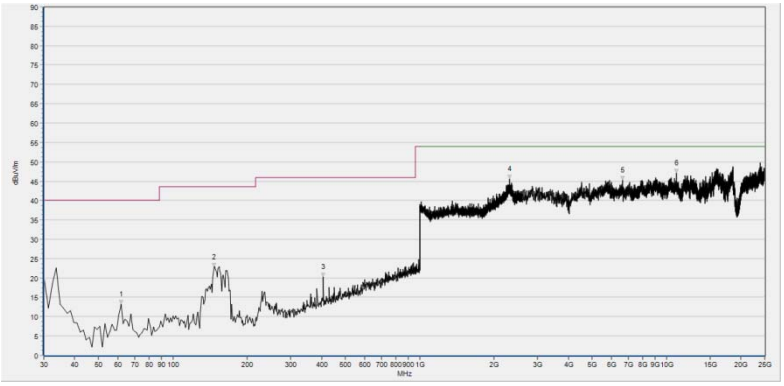
(Antenna Vertical, 30MHz to 25GHz)

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
93.129	10.57	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
383.279	23.49	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2356.703	47.08	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5606.219	46.50	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
10339.589	47.64	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
16066.885	49.10	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

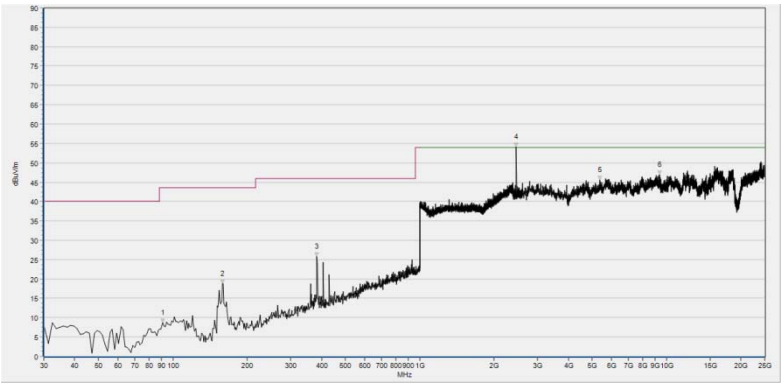
(Antenna Horizontal, 30MHz to 25GHz)



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
61.564	13.18	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
146.546	22.77	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
406.345	20.22	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2317.007	45.63	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
6636.807	45.31	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
10975.050	47.04	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

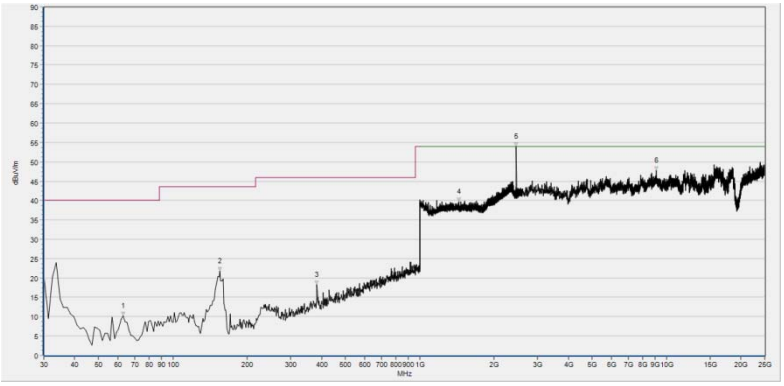
(Antenna Vertical, 30MHz to 25GHz)

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
90.701	8.71	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
158.686	18.73	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
383.279	25.75	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2462.000	52.08	50.89	49.28	74.0	N.A	54.0	Horizontal	PASS
5365.885	45.62	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
9374.177	46.92	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Antenna Horizontal, 30MHz to 25GHz)



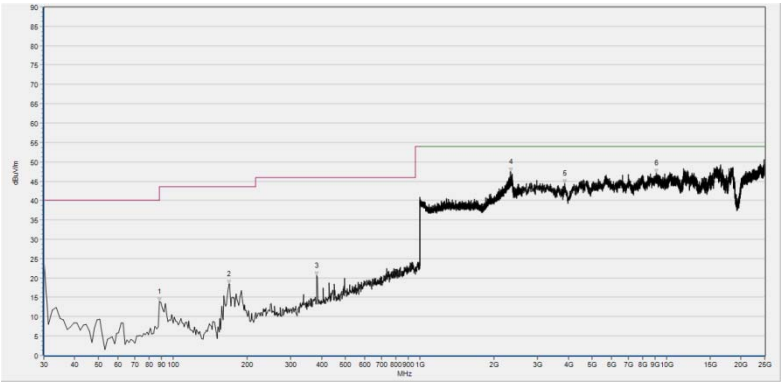
Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
62.778	10.25	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
155.044	21.84	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
383.279	18.27	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
1441.777	39.68	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2462.000	53.05	51.88	50.46	74.0	N.A	54.0	Vertical	PASS
9097.181	47.83	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

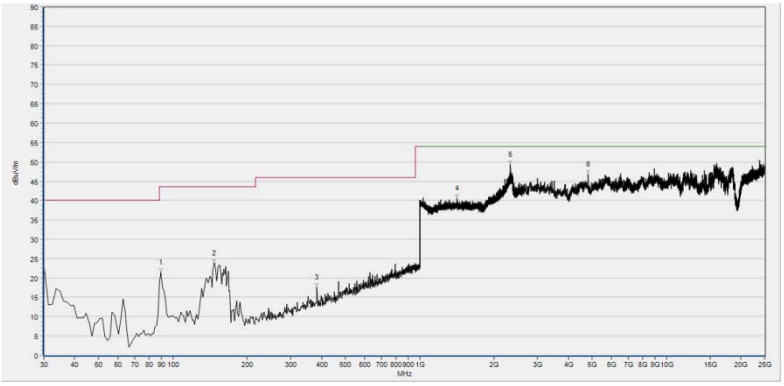
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
88.273	13.99	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
168.398	18.42	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
383.279	20.62	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2332.373	47.41	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
3879.069	44.47	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
9064.594	47.13	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

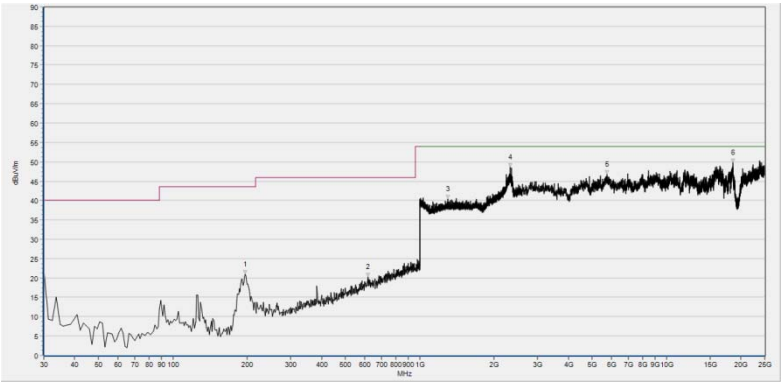
(Antenna Horizontal, 30MHz to 25GHz)



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
89.487	21.39	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
146.546	23.87	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
383.279	17.65	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
1418.727	40.61	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2331.733	49.25	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4824.113	46.73	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

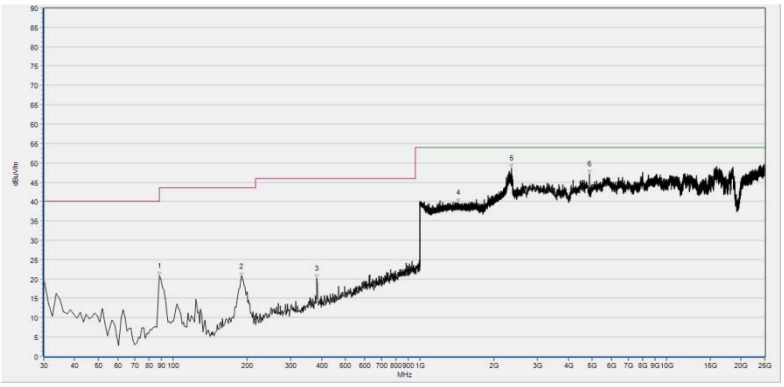
(Antenna Vertical, 30MHz to 25GHz)

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
196.320	20.93	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
617.584	20.27	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
1299.640	40.34	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2320.848	48.57	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5748.791	46.81	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
18527.260	49.74	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

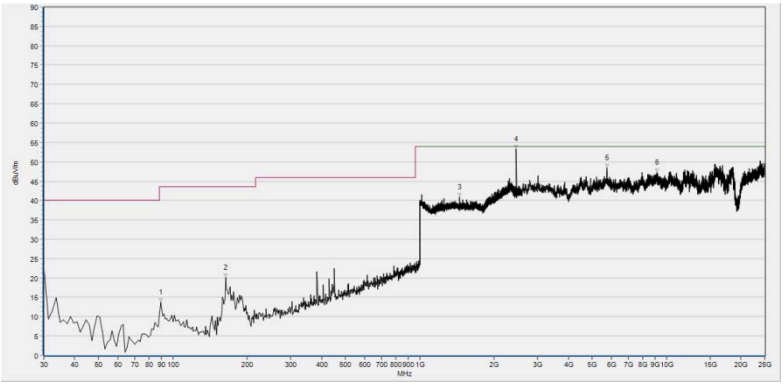
(Antenna Horizontal, 30MHz to 25GHz)



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
88.273	20.81	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
189.036	20.63	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
383.279	20.03	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
1434.094	39.64	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2356.703	48.57	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4872.995	47.06	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

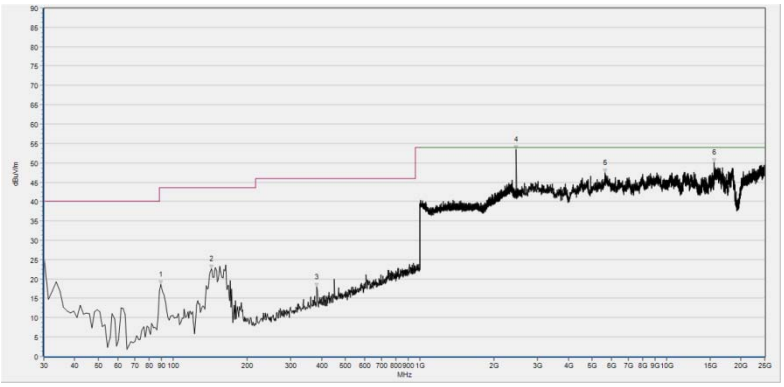
(Antenna Vertical, 30MHz to 25GHz)

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
89.487	13.67	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
163.542	20.06	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
1449.460	40.85	N.A	N.A	N.A	N.A	N.A	Horizontal	PASS
2462.000	52.43	50.97	49.37	74.0	N.A	54.0	Horizontal	PASS
5740.644	48.50	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
9154.210	47.22	N.A	N.A	74.0	N.A	54.0	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
89.487	18.53	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
142.904	22.59	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
383.279	17.94	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2461.900	53.51	52.28	50.88	74.0	N.A	54.0	Vertical	PASS
5626.587	47.38	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
15586.216	50.14	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Antenna Vertical, 30MHz to 25GHz)

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 and CISPR Publication 22; the FCC registration number is 695796.

1.4 Maximum measurement 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

1.5 Test Equipments Utilized

1.5.1 Conducted Test Equipments

Conducted Test Equipment						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Spectrum Analyzer	MY45101810	E4407B	Agilent	2016.06.02	2017.06.01
2	Power Splitter	NW521	1506A	Weinschel	2016.06.02	2017.06.01
3	Attenuator 1	(N/A.)	10dB	Resnet	2016.06.02	2017.06.01
4	Attenuator 2	(N/A.)	3dB	Resnet	2016.06.02	2017.06.01
5	EXA Signal Analzyer	MY53470836	N9010A	Agilent	2016.12.07	2017.12.06
6	RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
7	Coaxial cable	CB02	RF02	Morlab	N/A	N/A
8	SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.5.2 Conducted Emission Test Equipments

Conducted Emission Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Receiver	US44210471	E7405A	Agilent	2016.06.02	2017.06.01
2	LISN	812744	NSLK 8127	Schwarzbeck	2016.06.02	2017.06.01
3	Service Supplier	100448	CMU200	R&S	2016.06.02	2017.06.01
4	Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2016.06.02	2017.06.01
5	Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

1.5.3 Auxiliary Test Equipment

Auxiliary Test Equipment						
No.	**Equipment Name**	**Model No.**	**Brand Name**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Computer	T430i	Think Pad	Lenovo	N/A	N/A

1.5.4 Radiated Test Equipments

Radiated Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal.Due Date**
1	System Simulator	GB45360846	8960-E5515C	Agilent	2016.06.02	2017.06.01
2	Receiver	MY54130016	N9038A	Agilent	2016.06.02	2017.06.01
3	Test Antenna - Bi-Log	N/A	VULB9163	Schwarzbeck	2016.07.05	2017.07.04
4	Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2016.07.05	2017.07.04
5	Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2016.07.05	2017.07.04
6	Test Antenna - Horn	71688	BBHA 9120D	Schwarzbeck	2016.07.05	2017.07.04
7	Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
8	Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
9	Coaxial cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
10	1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2016.07.05	2017.07.04
11	18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2016.07.05	2017.07.04

1.5.5 Climate Chamber

Climate Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Climate Chamber	2004012	HL4003T	Yinhe	2017.01.11	2018.01.10

1.5.6 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	2017.01.11	2018.01.10

1.5.7 Anechoic Chamber

Anechoic Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Anechoic Chamber	N/A	9m*6m*6m	Changning	2017.01.11	2018.01.10

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