FCC/IC RADIO TEST REPORT

TESTING
CNAS L3572

Issued to

Stollmann E+V GmbH

For

Bluetooth LE Module on test jig

Model Name:	BlueMod+S
Trade Name:	BlueMod+S
Brand Name:	N/A
FCC ID:	RFRMS
IC Number:	4957A-MS
Standard:	47 CFR Part 15 Subpart C
	RSS-GEN
	RSS-210
Test date:	2014-2-11 to 2014-2-25
Issue date:	2014-3-10

by

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Tested by	Nie Quan	*Approved by*	Zeng Dexin	*Reviewed by*	Peng Huarui
	Nie Quan		Zeng Dexin		Peng Huarui
	(Test Engineer)		(Chief Engineer)		(Dept. Manager)
Date	2014.3.10	*Date*	2014.3.10	*Date*	2014.3.10

TABLE OF CONTENTS

Change History		
Issue	Date	Reason for change
1.0	March 10, 2014	First edition

1. GENERAL INFORMATION

1.1. EUT Description

EUT Type.....:	Bluetooth LE Module on test jig
Serial No. .....:	(n.a, marked #1 by test site)
Hardware Version.....:	V1
Software Version.....:	V1
Applicant.....:	Stollmann E+V GmbH Mendelssohnstrasse. 15d, 22761 Hamburg, Germany
Manufacturer .....:	Stollmann E+V GmbH Mendelssohnstrasse. 15d, 22761 Hamburg, Germany
Frequency Range.....:	The frequency range used is 2402MHz - 2480MHz (40 channels, at intervals of 2MHz);
Modulation Type.....:	GFSK
Antenna Type .....:	ceramic antenna
Antenna Gain.....:	2.0dBi

Note :

1. The EUT is Bluetooth LE Module on test jig, it contain Bluetooth 4.0 LE Module operating at 2.4GHz ISM band; the frequencies allocated for the Bluetooth 4.0 LE is F(MHz)=2402+2*n (0<=n<=39). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 19 (2440MHz) and 39 (2480MHz).
2. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.2. 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 Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-13 Edition)	Radio Frequency Devices
2	RSS-GEN: Issue 3, December 2010	General Requirements and Information for the Certification of Radio Apparatus
3	RSS-210: Issue 8, December 2010	Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

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

No.	Section in CFR 47	Section in RSS-GEN, RSS-210	Description	Result
1	15.203	7.1.4	Antenna Requirement	**PASS**
2	15.247(b)	A8.4 (2)	Peak Output Power	**PASS**
3	15.247(b)	A8.4 (2)	Average power	**PASS**
4	15.247(a)	A8.2 (a)	6dB Bandwidth&99% Bandwidth	**PASS**
5	15.247(d)	A8.5	Conducted Spurious Emission and Band Edge	**PASS**
6	15.247(d)	A8.5	Restricted Frequency Bands	**PASS**
7	15.207	7.2.4	Conducted Emission	**N/A**
8	15.209 15.247(d)	A8.5	Radiated Emission	**PASS**
9	15.247(e)	A8.2(b)	Power spectral density (PSD)	**PASS**
10	15.247(i). §1.1307&2.1093	RSS-102	RF exposure evaluation	**PASS**

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

These RF tests were performed according to the method of measurements prescribed in KDB558074 D01 v03r01 (04/09/2013).

1.3. Facilities and Accreditations

1.3.1. Facilities

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 2009, ANSI C63.4 2009 and CISPR Publication 22; the FCC registration number is 695796.

The IC registration number is 7183A-2.

1.3.2. 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

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

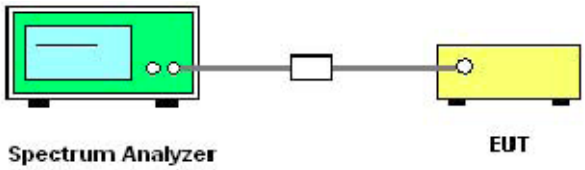
2.2.1. Requirement

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 exceed 1 Watt.

2.2.2. Test Description

The measured output power was calculated by the reading of the spectrum analyzer and calibration.

A. Test Setup:



The EUT (Equipment under the test) which is powered by the Battery 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, all test result in Spectrum analyzer.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E4407B	MY45101810	2013.05.12	2014.05.11

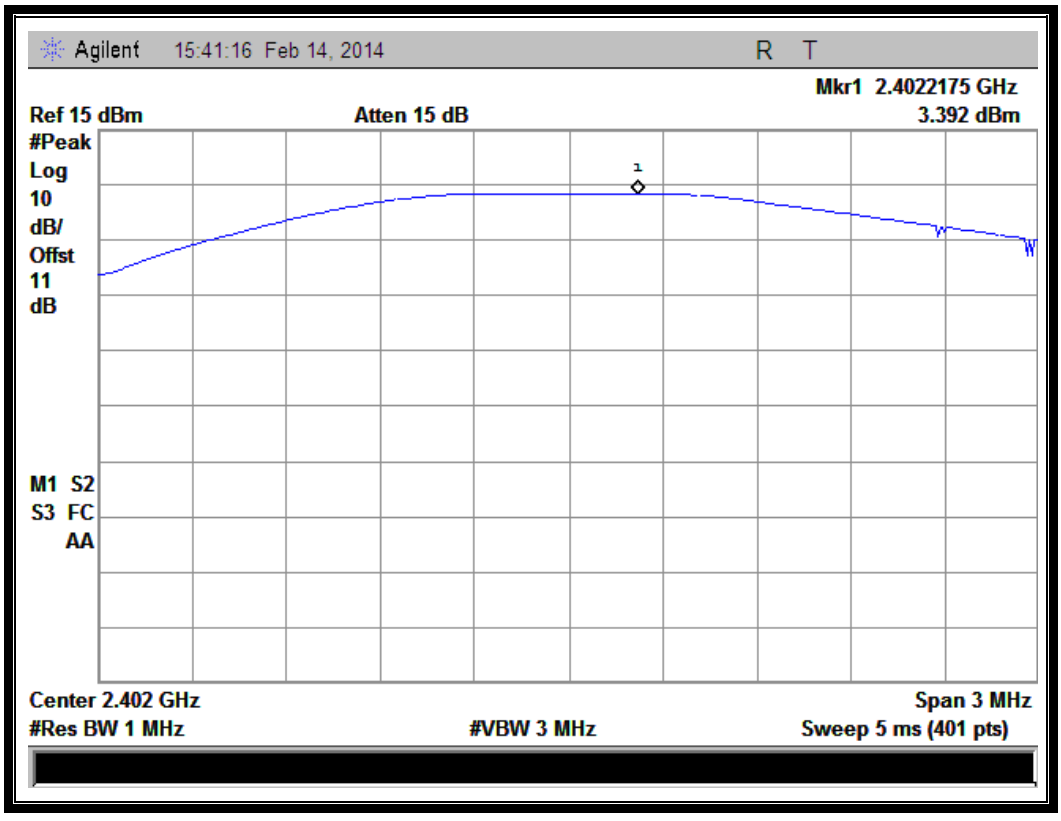
2.2.3. Test Result

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

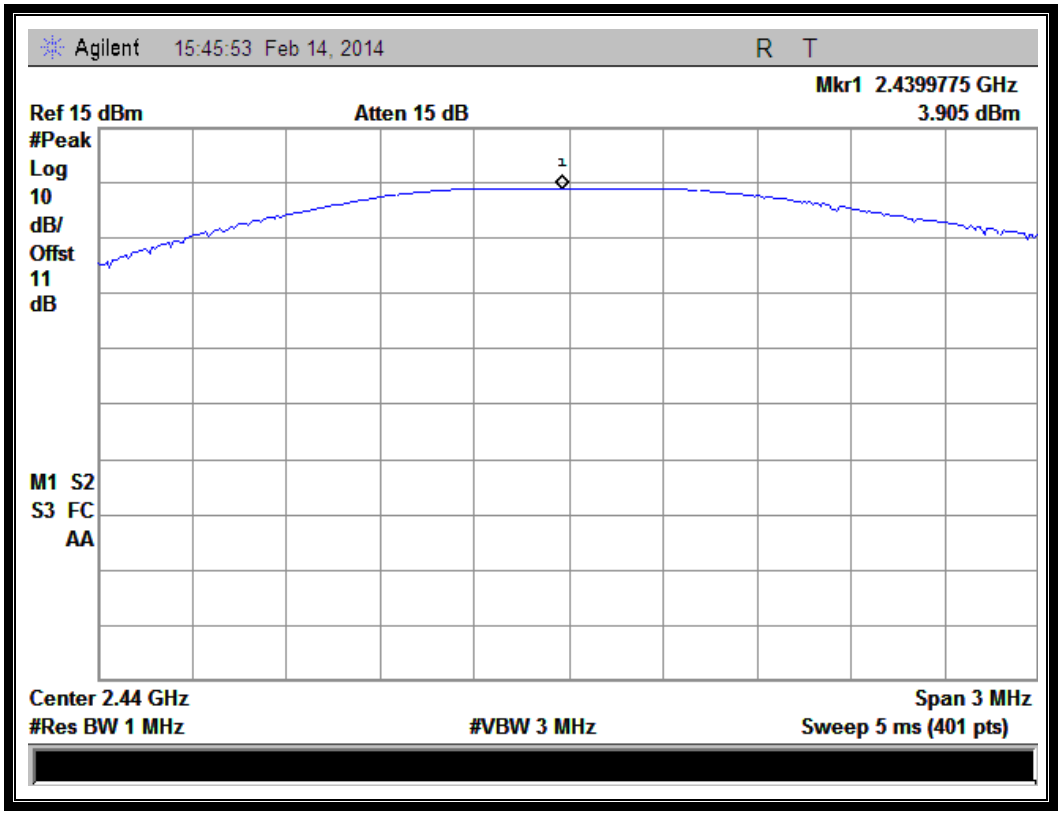
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Refer to Plot	Limit		Verdict
		dBm	W		dBm	W	
0	2402	3.392	0.002184	Plot A	30	1	PASS
19	2440	3.905	0.002458	Plot B			PASS
39	2480	4.051	0.002542	Plot C			PASS

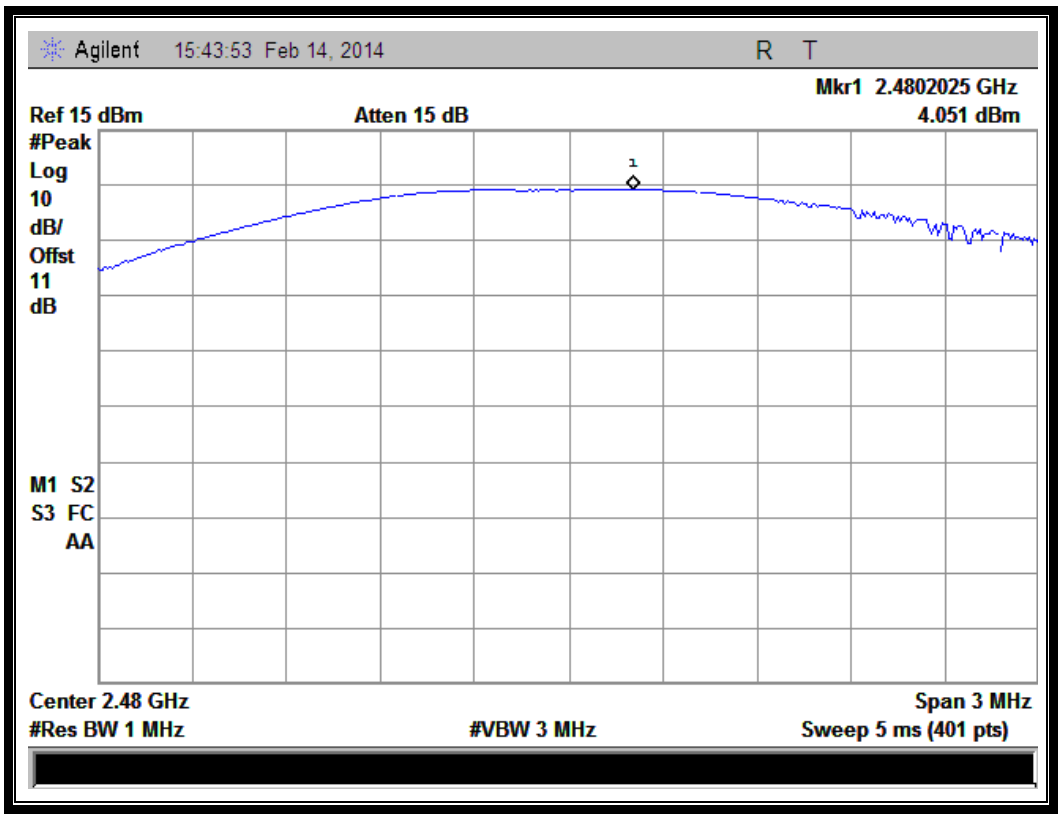
B. Test Plots:



(Plot A: Channel 0: 2402MHz)



(Plot B: Channel 19: 2440MHz)



(Plot C: Channel 39: 2480MHz)

2.3. Average power

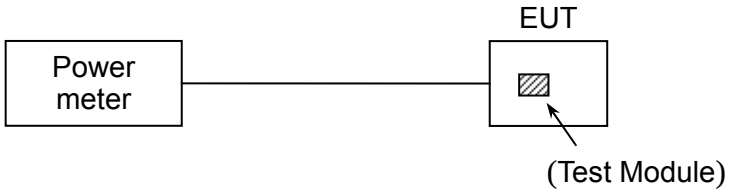
2.3.1. Requirement

None; for reporting purposes only.

2.3.2. Test Description

The transmitter output is connected to a power meter.

A. Test Setup:



B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EPM Series Power Meter	Agilent	E4418B	GB43318055	2013.05.12	2014.05.11

2.3.3. Results

The cable assembly insertion loss of 1.5dB was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power	
		dBm	W
0	2402	2.96	0.001977
19	2440	3.46	0.002218
39	2480	3.62	0.002301

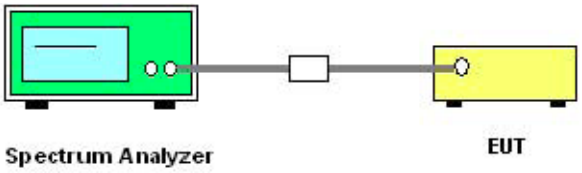
2.4. 6dB & 99%Bandwidth

2.4.1. Requirement

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.4.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, 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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E4407B	MY45101810	2013.05.12	2014.05.11

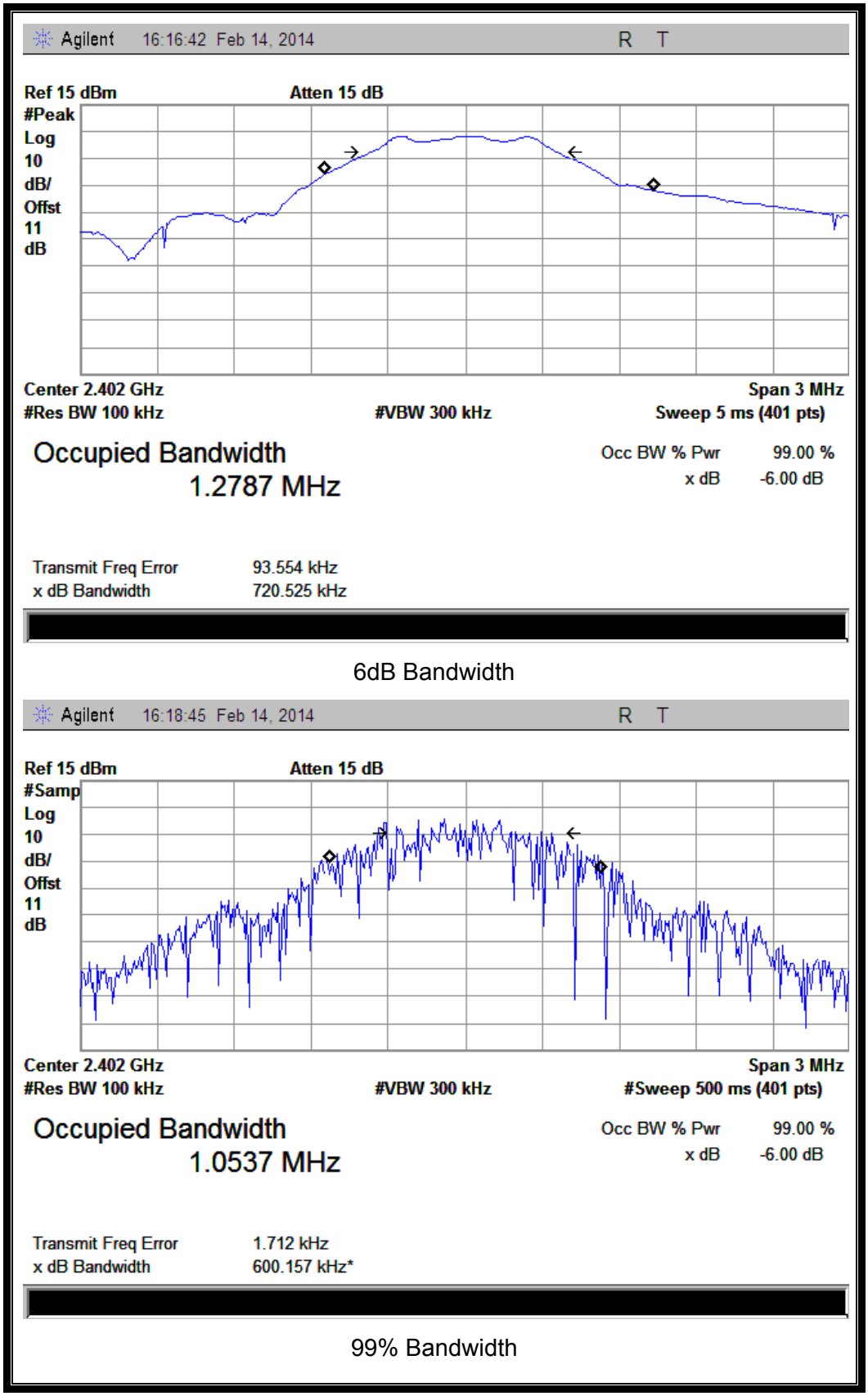
2.4.3. Test Result

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

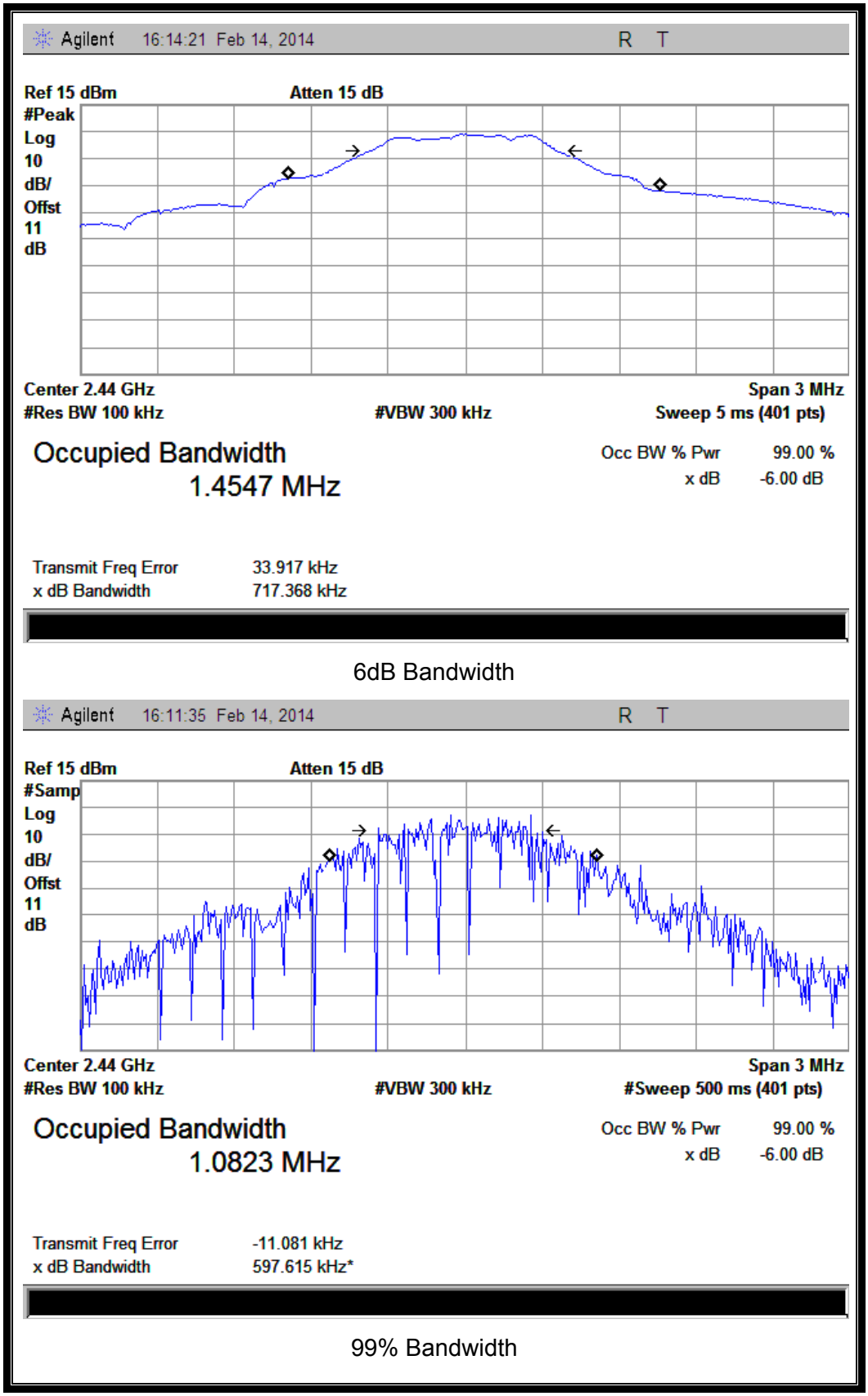
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	Refer to Plot	Limits(kHz)	Result
0	2402	0.7205	1.0537	Plot A	≥500	PASS
19	2440	0.7174	1.0823	Plot B	≥500	PASS
39	2480	0.7177	1.0754	Plot C	≥500	PASS

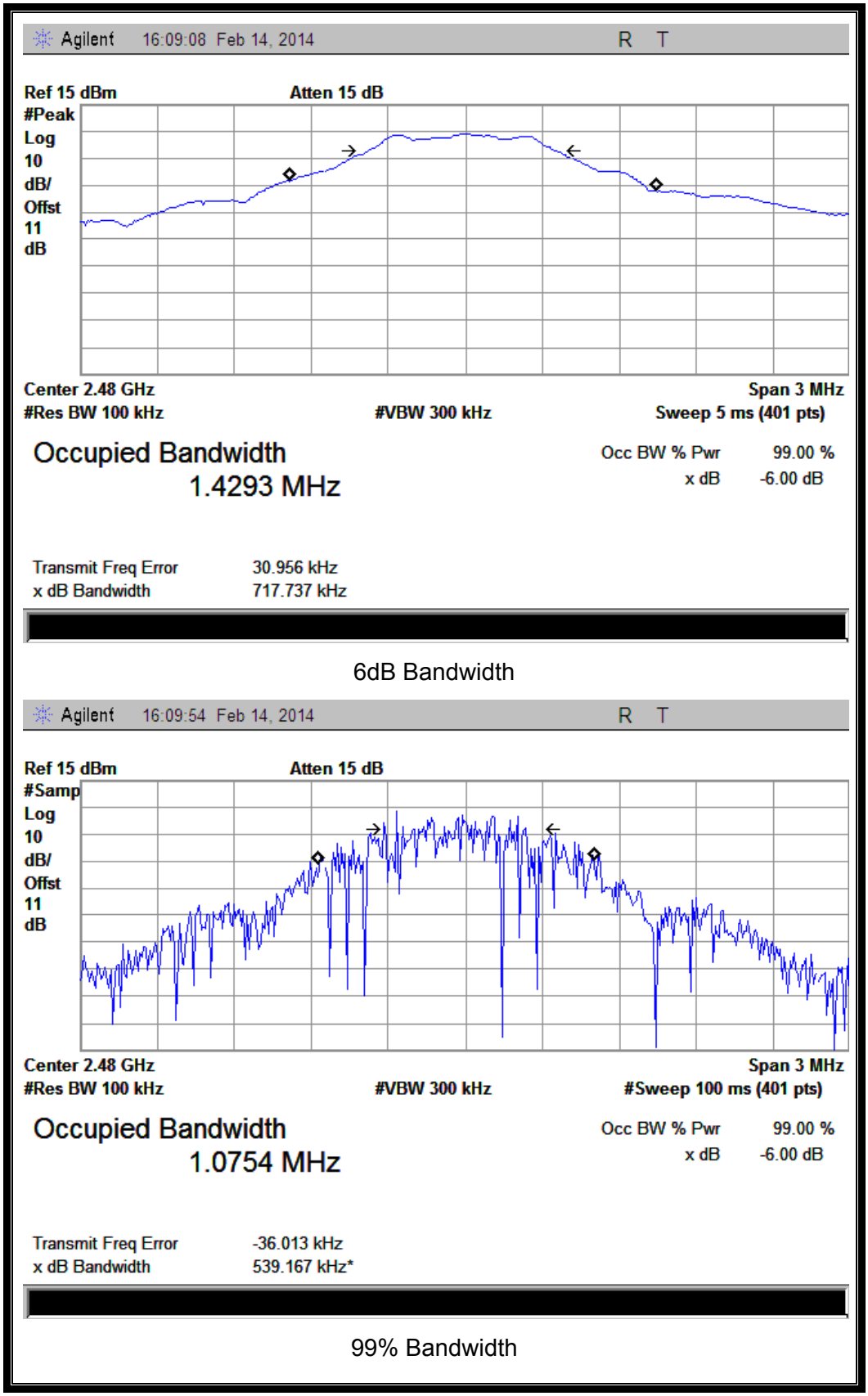
B. Test Plots:



(Plot A: Channel 0: 2402MHz)



(Plot B: Channel 19: 2440 MHz)



(Plot C: Channel 39: 2480MHz)

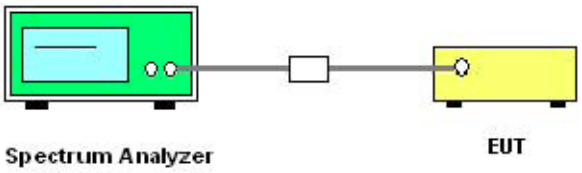
2.5. Conducted Spurious Emissions and Band Edge

2.5.1. Requirement

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.5.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, 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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E4407B	MY45101810	2013.05.12	2014.05.11

2.5.3. Test Result

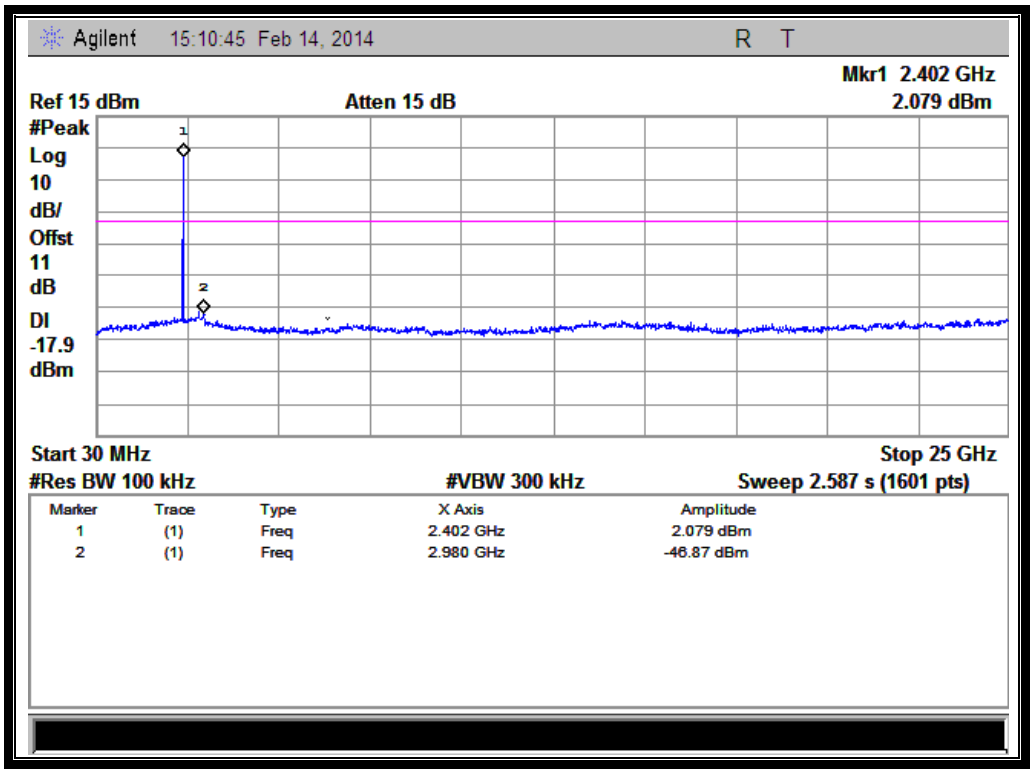
The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

A. Test Verdict:

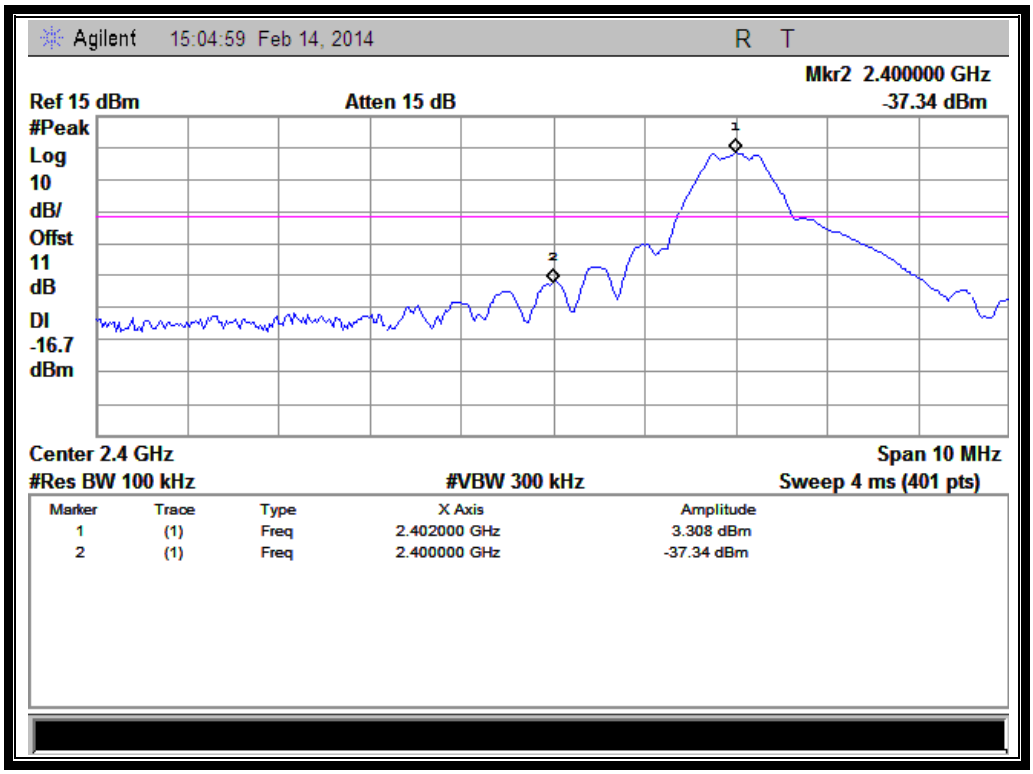
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-46.87	Plot A.1	2.079	-18.0	PASS
19	2440	-45.81	Plot B.1	1.825	-18.2	PASS
39	2480	-46.06	Plot C.1	2.824	-17.2	PASS

B. Test Plots:

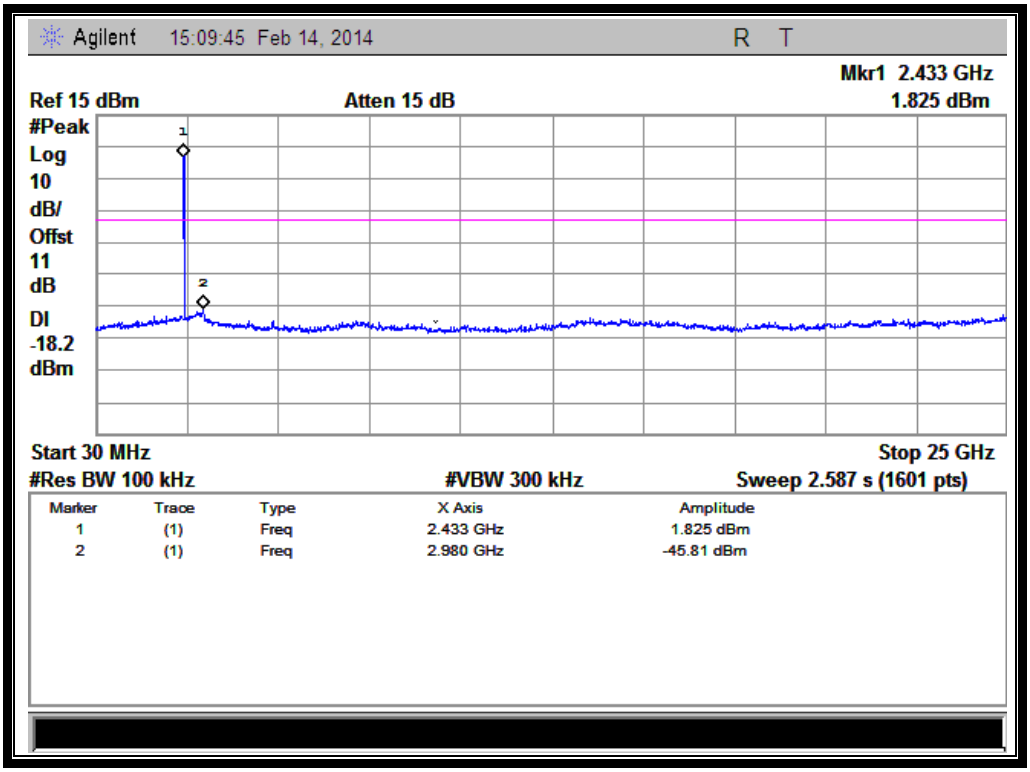
Note: the power of the Module transmitting frequency should be ignored.



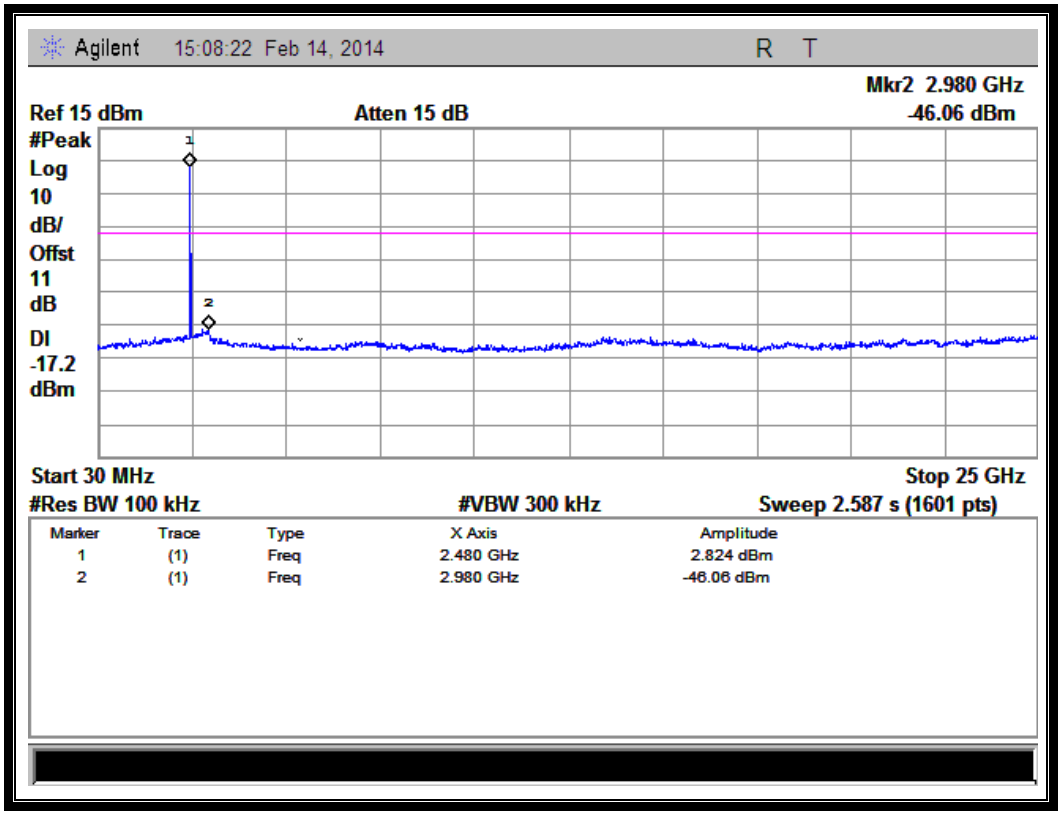
(Plot A.1: Channel = 0, 30MHz to 25GHz)



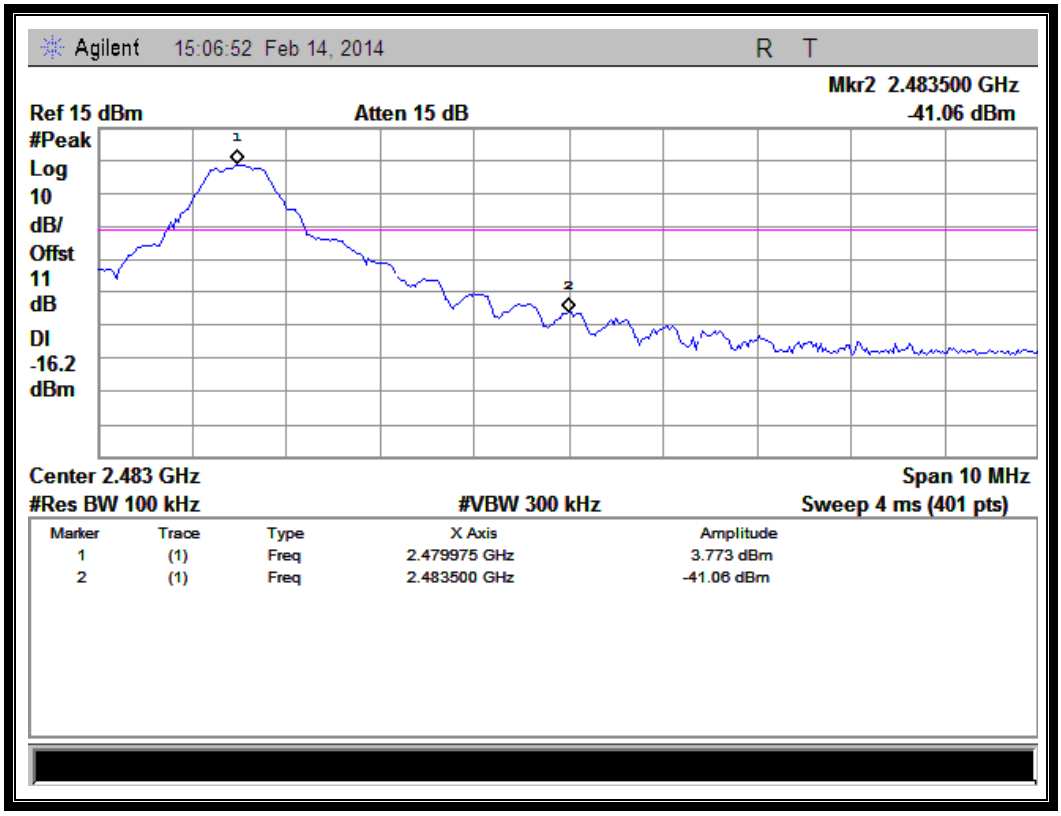
(Band Edge@ Channel = 0)



(Plot B.1: Channel = 19, 30MHz to 25GHz)



(Plot C.1: Channel = 39, 30MHz to 25GHz)



(Band Edge@ Channel = 39)

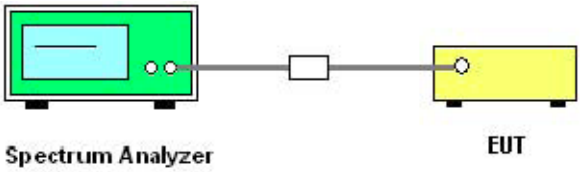
2.6. Power spectral density (PSD)

2.6.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density

2.6.2. Test Description

A. Test Set:



The EUT which is powered by the Battery, 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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum analyzer	Agilent	E4407B	MY45101810	2013.05.12	2014.05.11

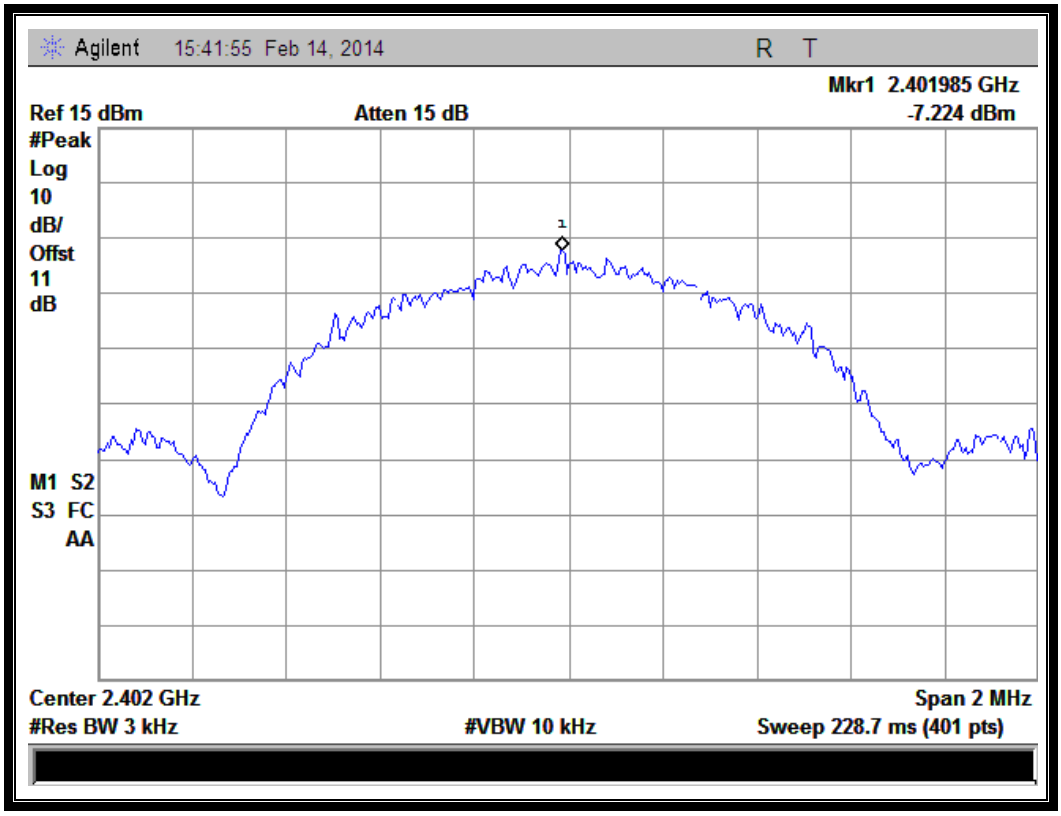
2.6.3. Test Result

The lowest, middle and highest channels are tested.

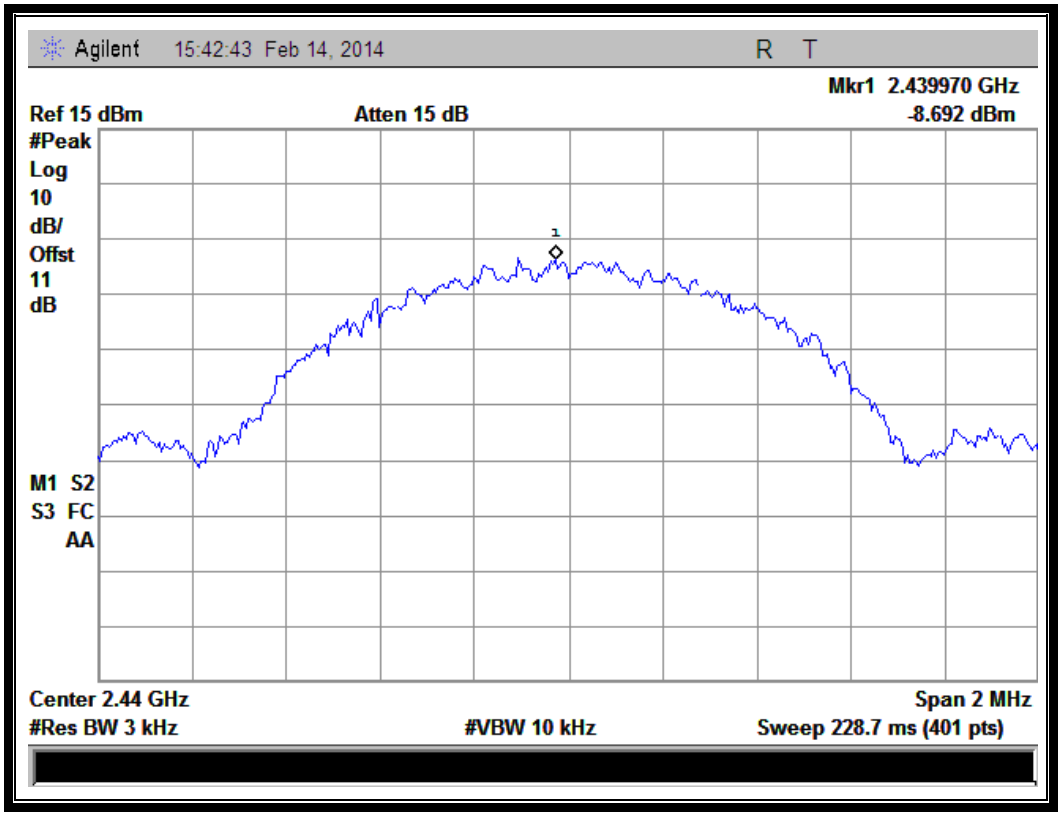
A. Test Verdict:

Spectral power density (dBm/3kHz)					
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to Plot	Limit (dBm/3kHz)	Verdict
0	2402	-7.224	Plot A	8	PASS
19	2440	-8.692	Plot B	8	PASS
39	2480	-9.003	Plot C	8	PASS
Measurement uncertainty: ±1.3dB					

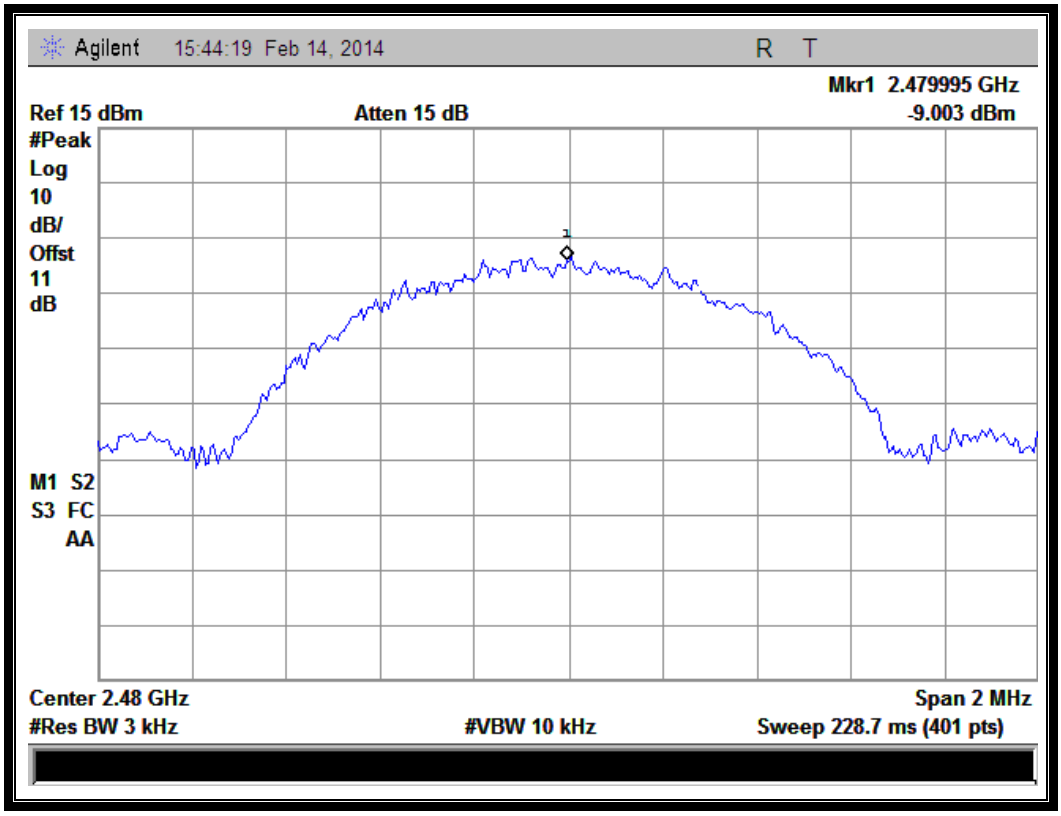
B. Test Plots:



(Plot A: Channel = 0)



(Plot B: Channel = 19)



(Plot C: Channel = 39)

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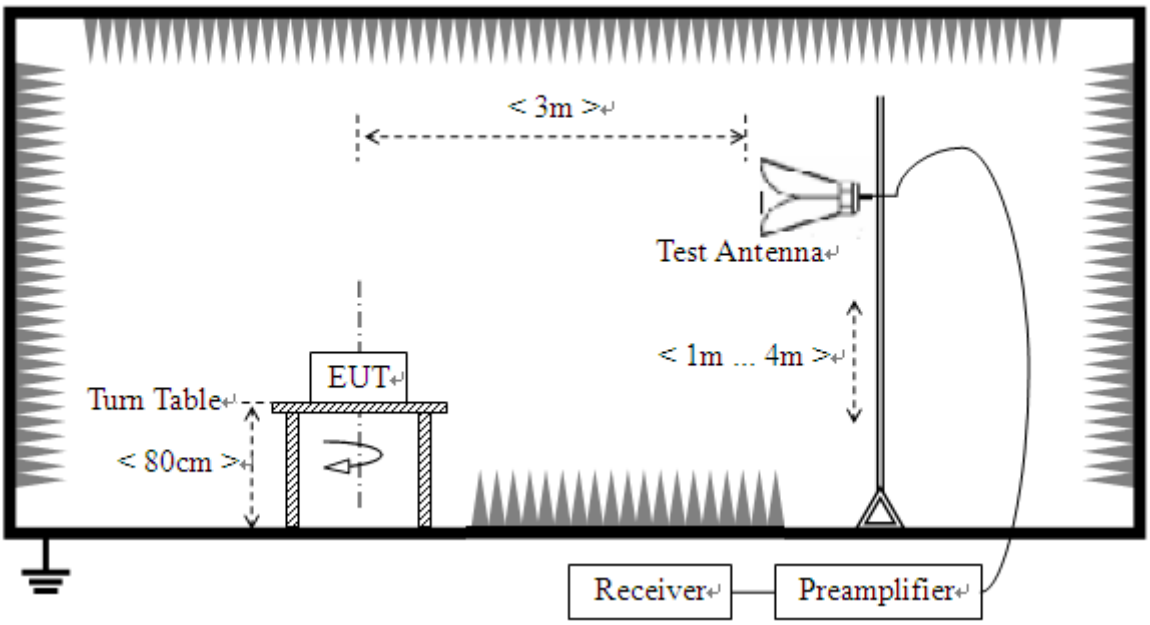
2.7. Restricted Frequency Bands

2.7.1. Requirement

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).

2.7.2. 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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2013.05.12	2014.05.11
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2013.05.12	2014.05.11
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	9120D-963	2013.05.12	2014.05.11

2.7.3. Test Result

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

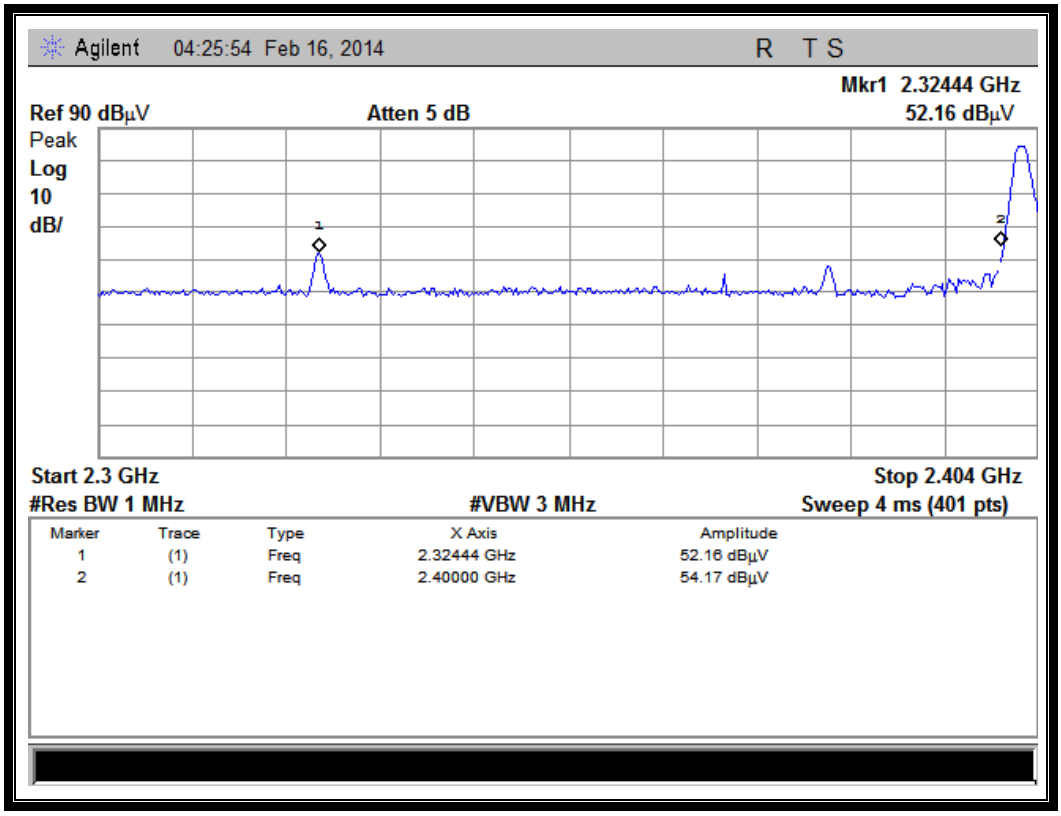
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; A_T =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m

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.

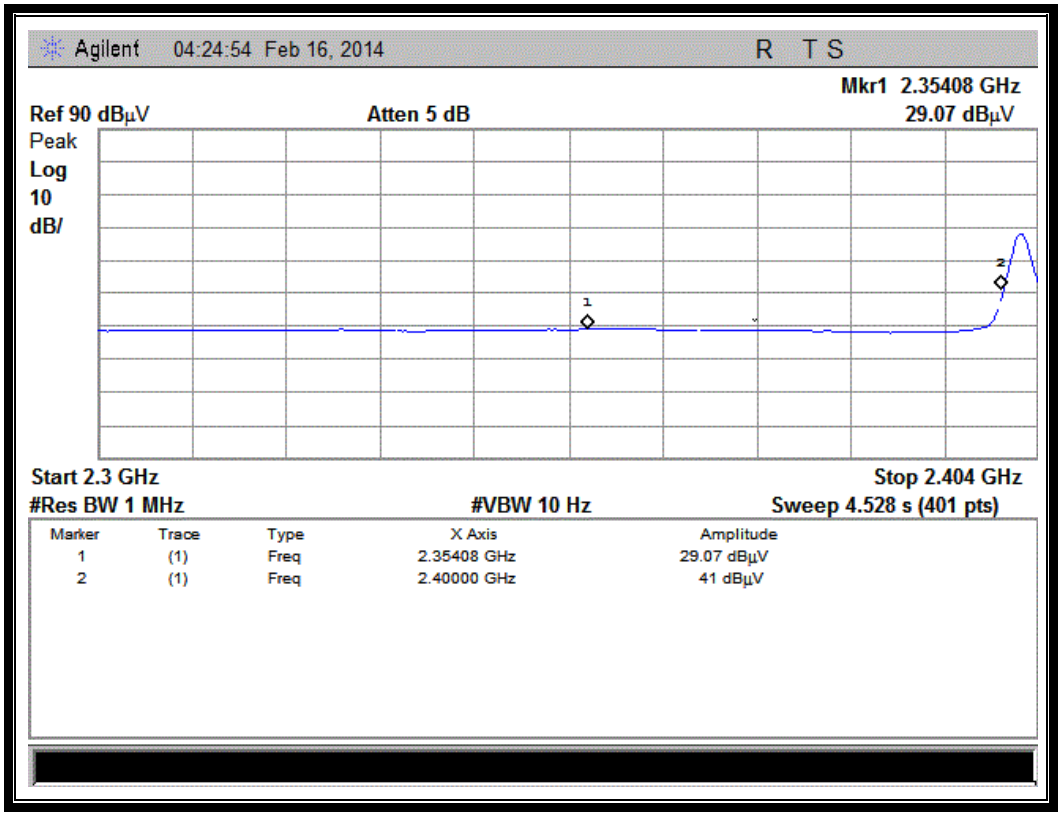
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
0	2324.44	PK	52.16	-30.93	32.56	53.79	74	Pass
0	2354.08	AV	29.07	-30.93	32.56	30.70	54	Pass
39	2396.48	PK	45.40	-29.05	32.50	48.85	74	Pass
39	2483.50	AV	29.14	-29.05	32.50	32.59	54	Pass

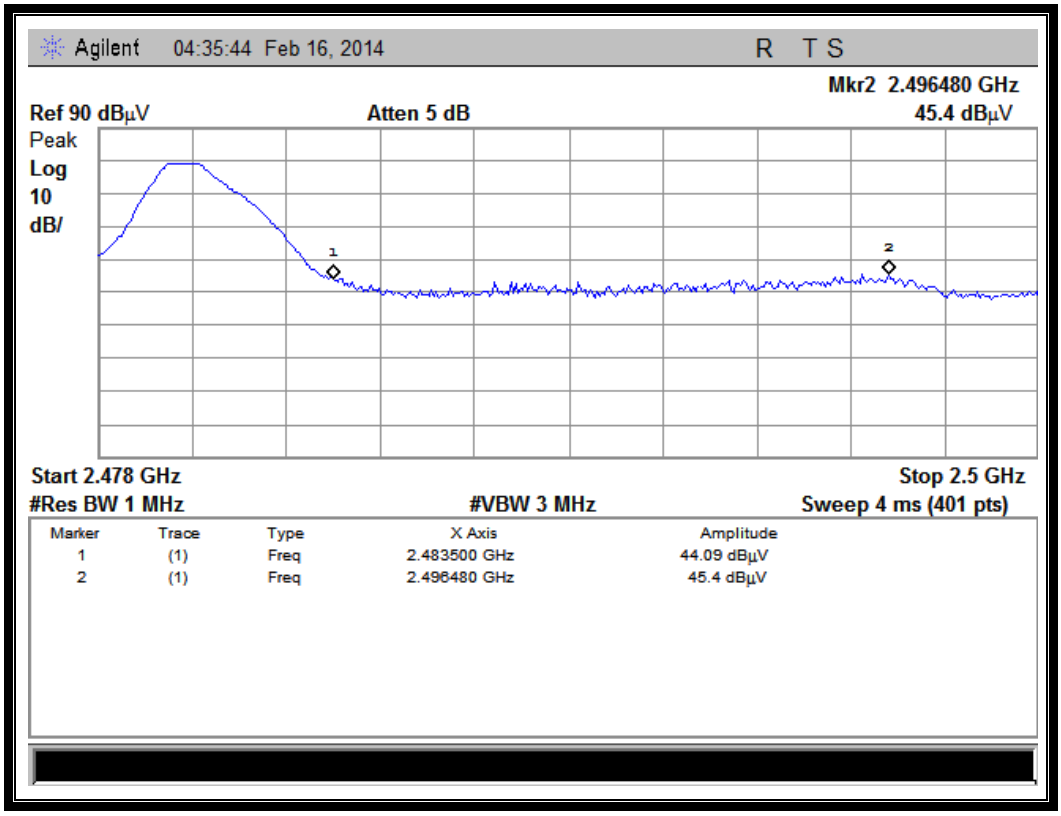
B. Test Plots:



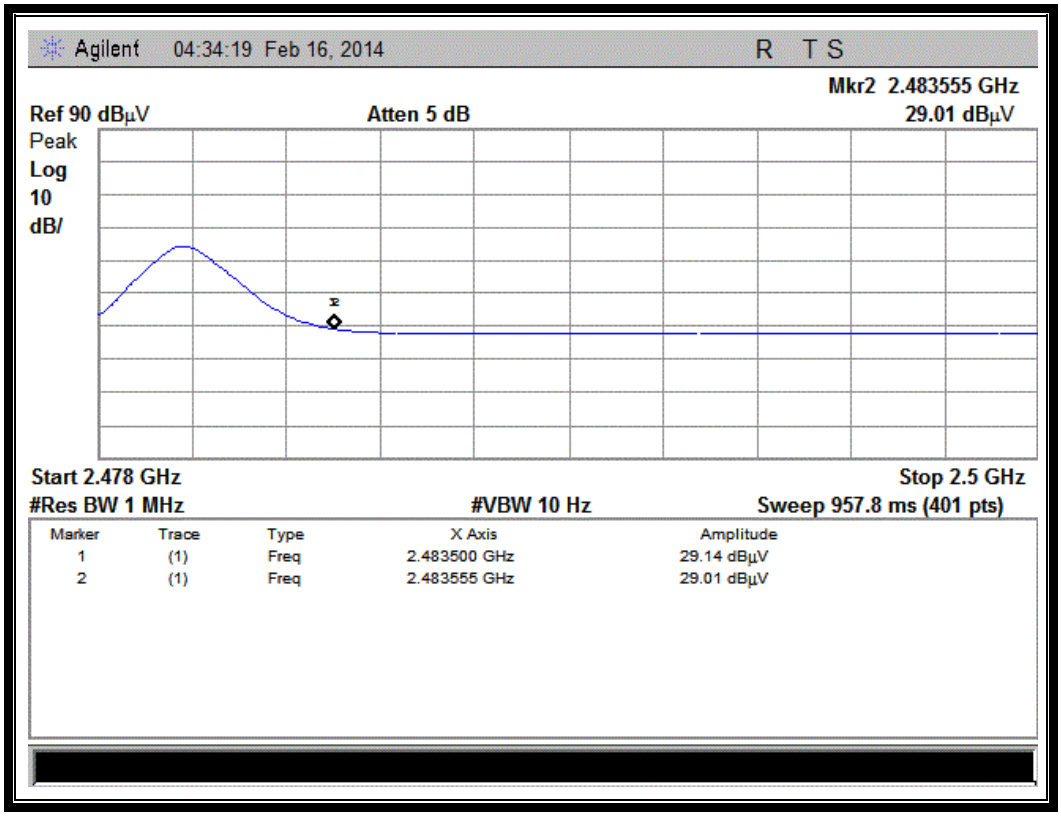
(Plot A1: Channel = 0 PEAK)



(Plot A2: Channel = 0 AVG)



(Plot B1: Channel = 39 PEAK)



(Plot B2: Channel = 39 AVG)

2.8. Conducted Emission

2.8.1. Requirement

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

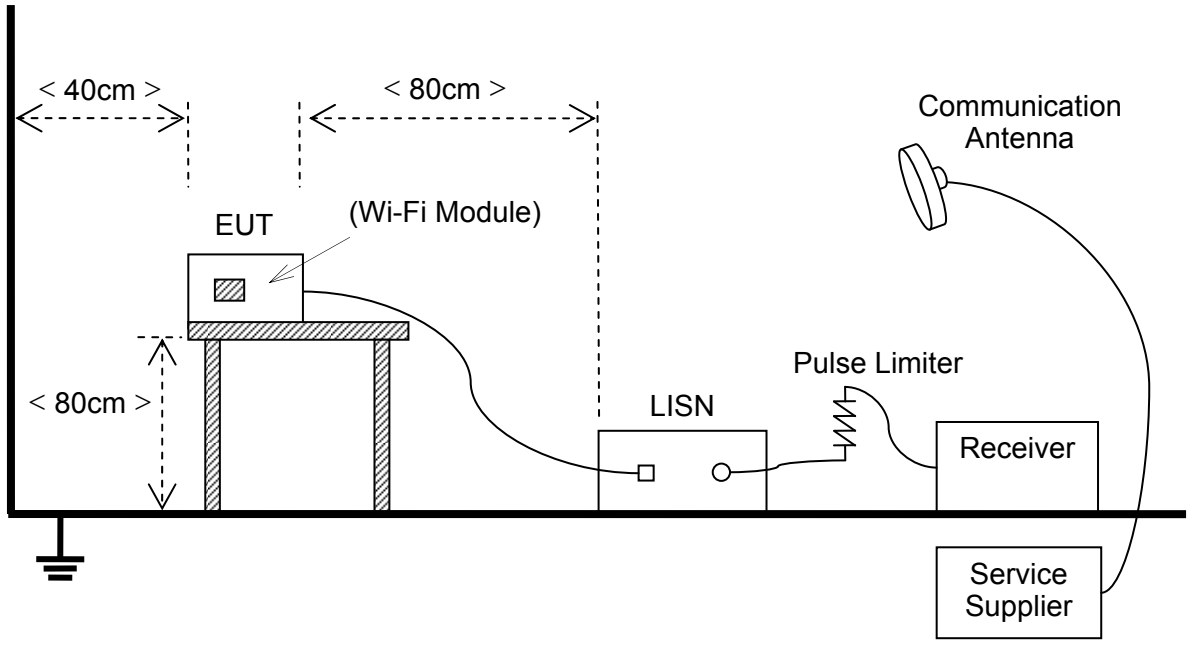
NOTE:

(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.

2.8.2. 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:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2013.05.12	2014.05.11
LISN	Schwarzbeck	NSLK 8127	812744	2013.05.12	2014.05.11
Service Supplier	R&S	CMU200	100448	2013.05.12	2014.05.11
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	(n.a.)	(n.a.)

2.8.3. Test Result

This test item is not applicable, since the EUT powered by test jig.

2.9. Radiated Emission

2.9.1. Requirement

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:

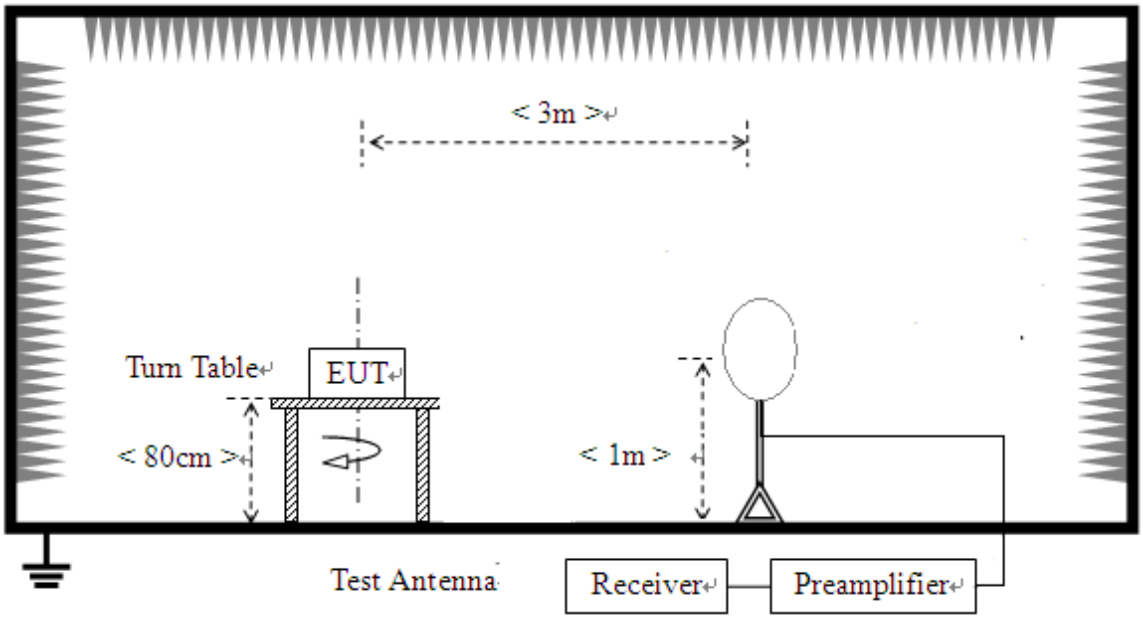
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

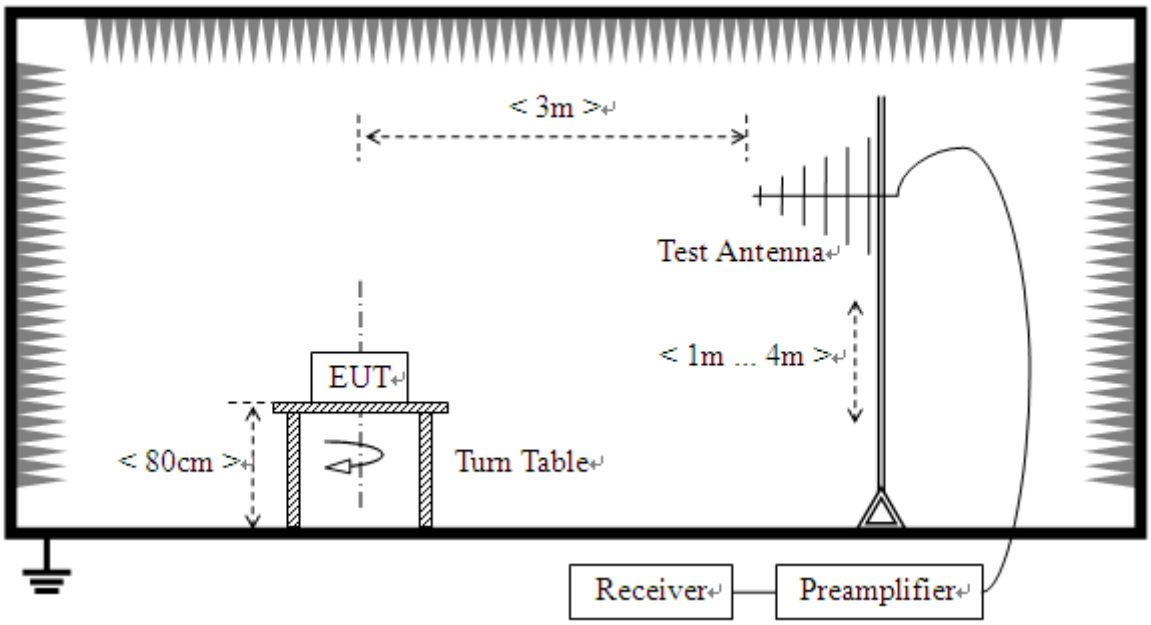
2.9.2. Test Description

A. Test Setup:

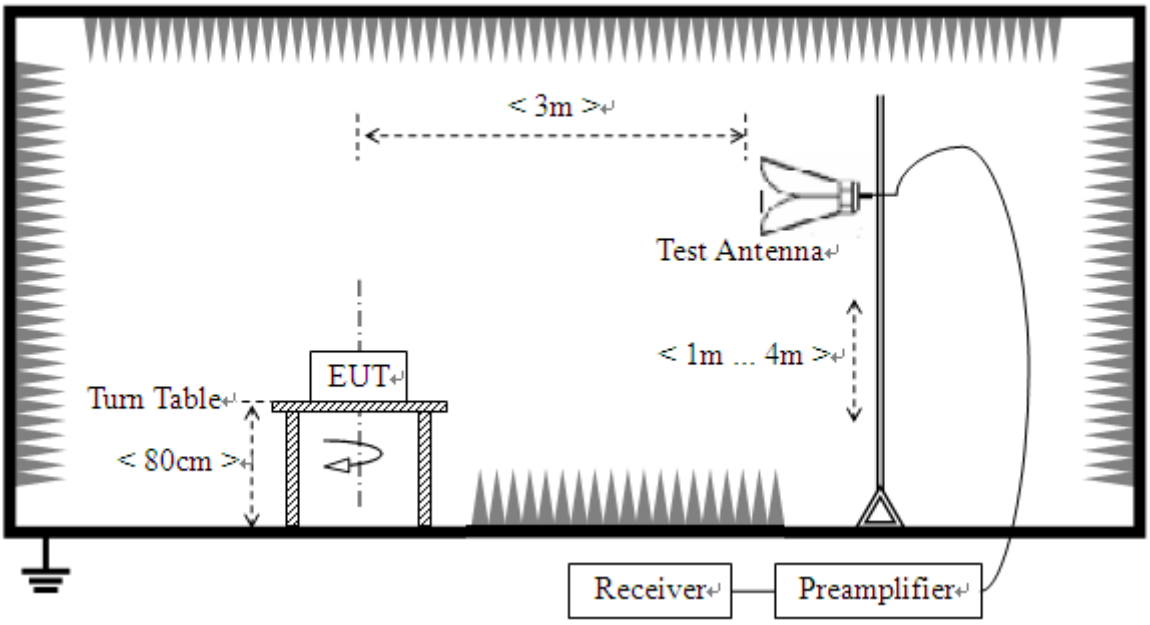
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The 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 of the EUT is powered by the Battery charged with the AC Adapter which is powered by 120V, 60Hz AC mains supply. 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. During the measurement, the EUT is activated and controlled by the Wireless Router via a Common Antenna, and is set to operate under hopping-on test mode.

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 2GHz) and Horn Test Antenna (above 2GHz) 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:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	R&S	CMU200	100448	2013.05.12	2014.05.11
Receiver	Agilent	E7405A	US44210471	2013.05.12	2014.05.11
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2012.05.12	2014.05.11
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2013.05.12	2014.05.11
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	9120D-963	2013.05.12	2014.05.11
Test Antenna - Horn	R&S	HL050S7	71688	2013.05.12	2014.05.11
Test Antenna -Loop	Schwarzbeck	FMZB 1519	1519-022	2013.05.12	2014.05.11

2.9.3. 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

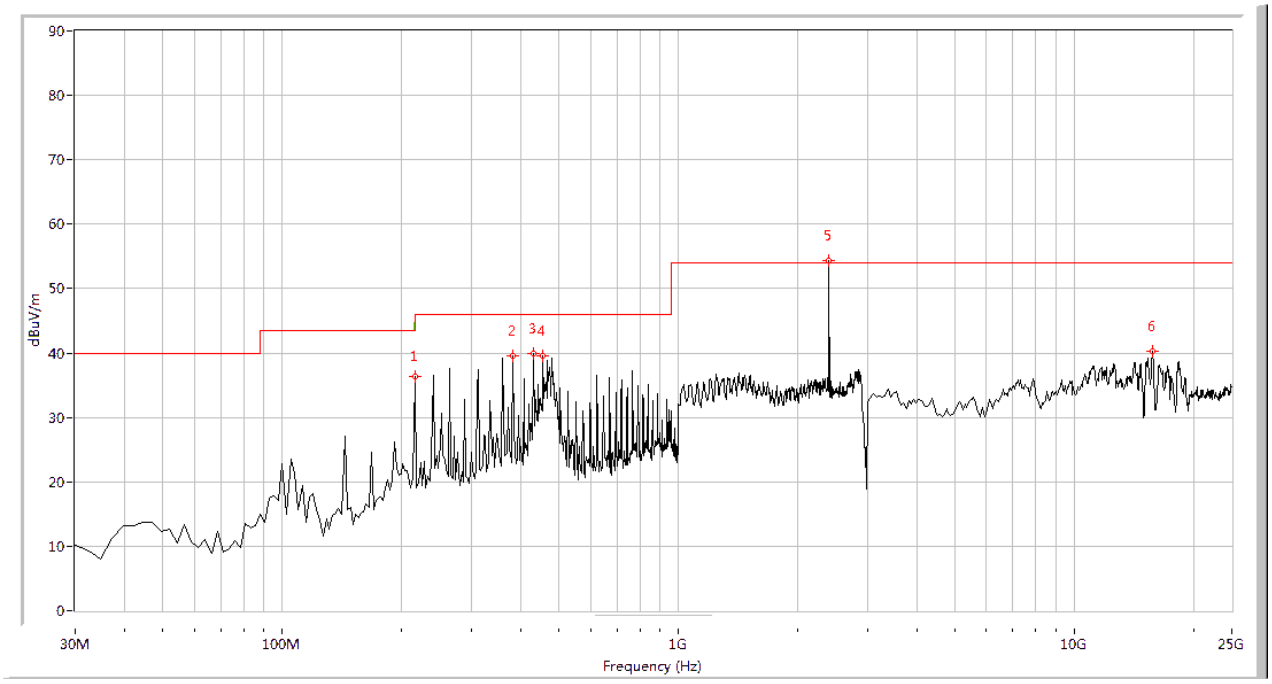
During the test, the total correction Factor A_T and A_{Factor} were built in test software.

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.

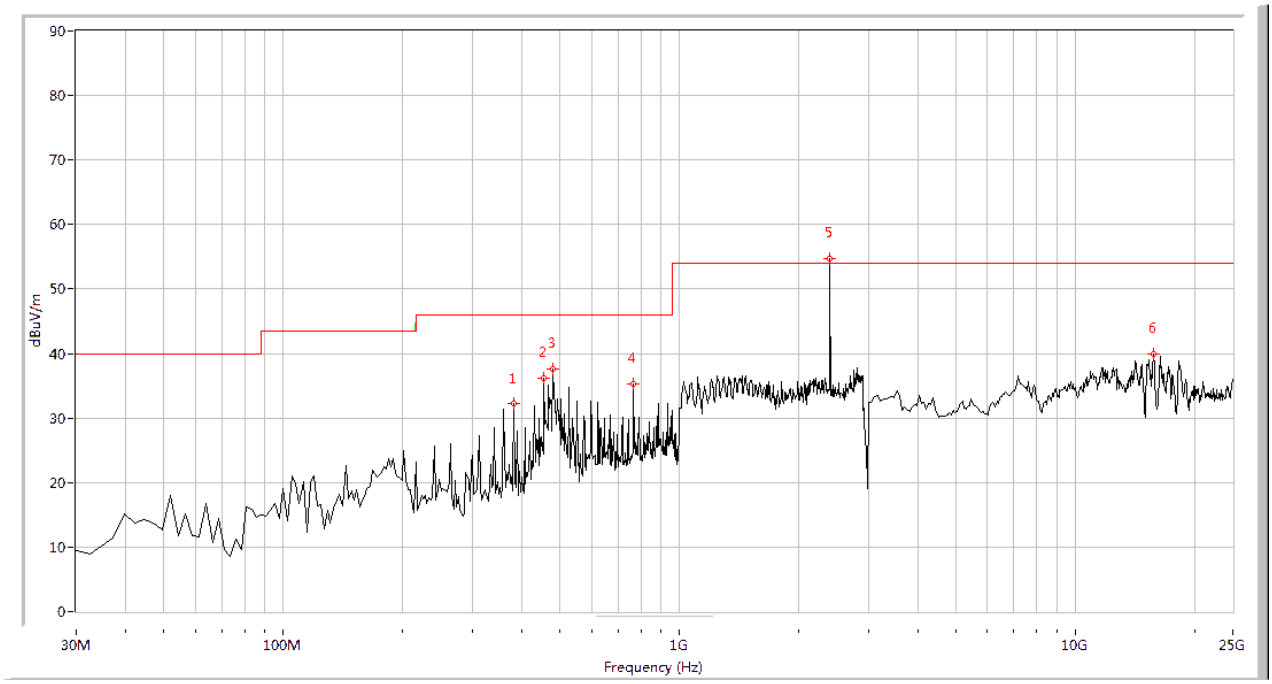
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
216.259	36.39	N.A	N.A	N.A	46.0	N.A	191.9	Horizontal	PASS
383.167	39.57	N.A	N.A	N.A	46.0	N.A	186.9	Horizontal	PASS
431.546	39.88	N.A	N.A	N.A	46.0	N.A	205.8	Horizontal	PASS
455.736	39.62	N.A	N.A	N.A	46.0	N.A	224.6	Horizontal	PASS
2402.000	54.37	N.A	N.A	N.A	N.A	N.A	65.3	Horizontal	N.A
15728.180	40.21	N.A	N.A	74.0	N.A	54.0	263.5	Horizontal	PASS

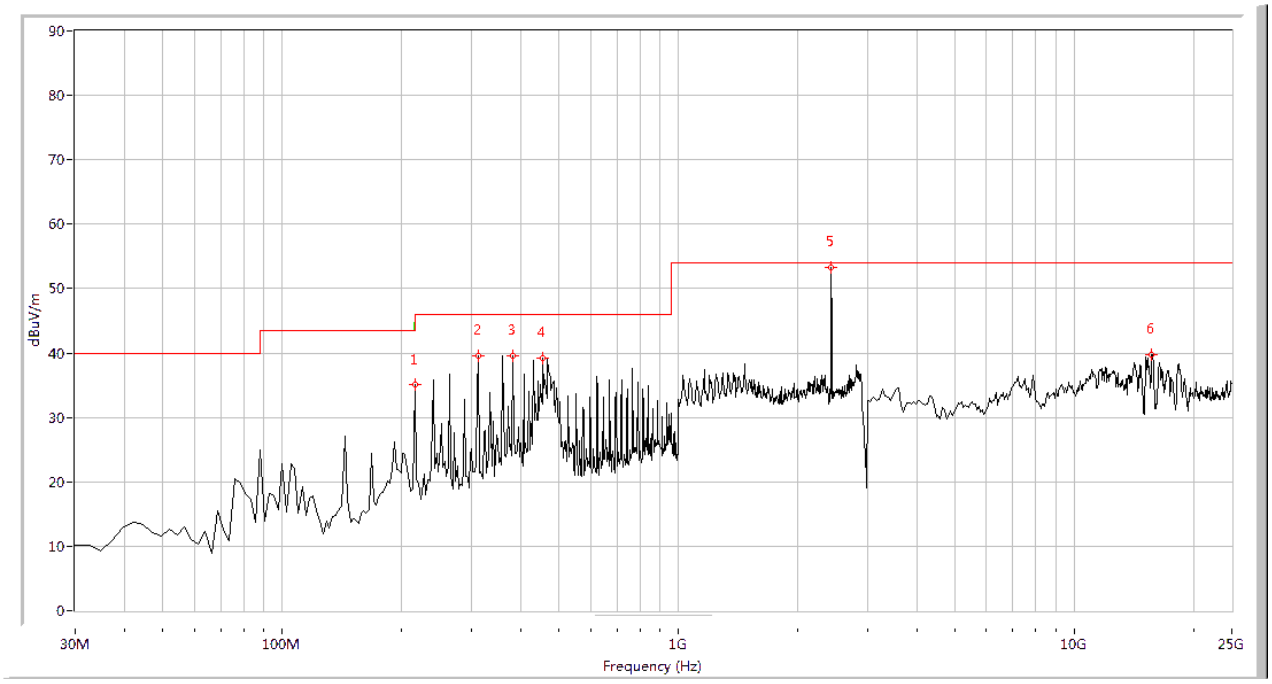
(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
383.167	32.29	N.A	N.A	N.A	46.0	N.A	360.0	Vertical	PASS
455.736	36.25	N.A	N.A	N.A	46.0	N.A	87.5	Vertical	PASS
479.925	37.66	N.A	N.A	N.A	46.0	N.A	194.9	Vertical	PASS
767.781	35.22	N.A	N.A	N.A	46.0	N.A	262.2	Vertical	PASS
2402.000	54.72	N.A	N.A	N.A	N.A	N.A	63.7	Vertical	N.A
15783.042	39.90	N.A	N.A	74.0	N.A	54.0	359.0	Vertical	PASS

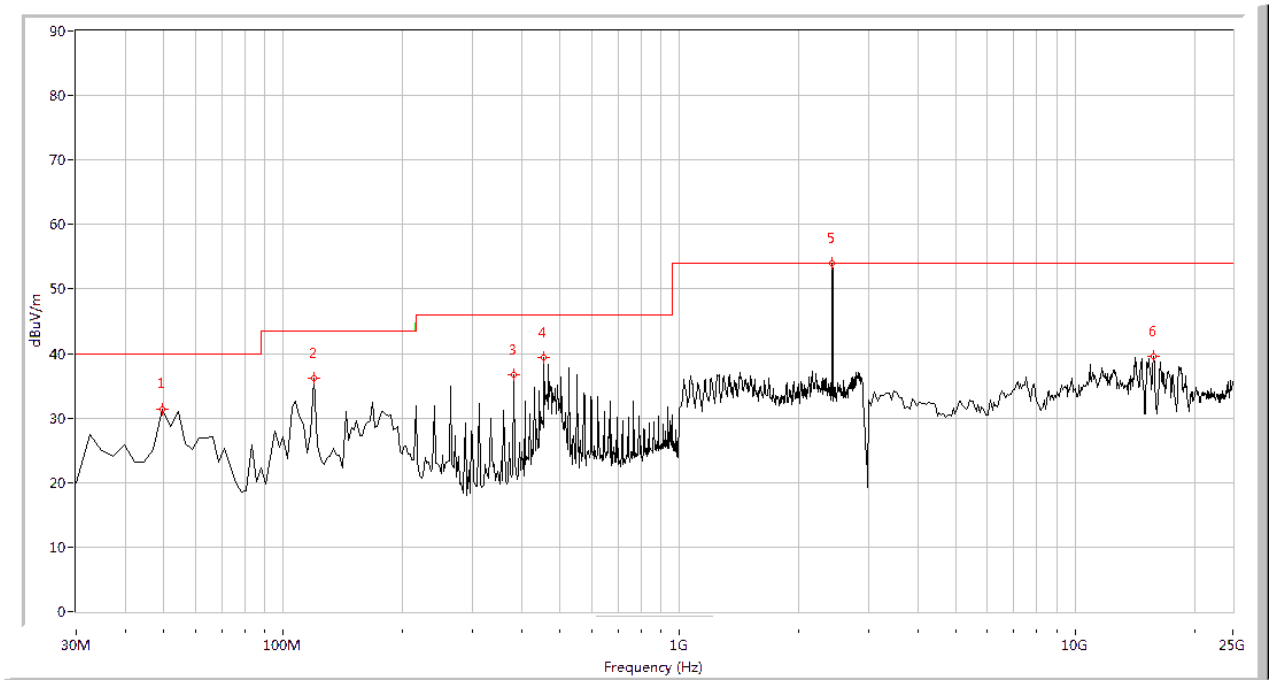
(Plot A.3: Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 19



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
216.259	35.16	N.A	N.A	N.A	46.0	N.A	25.8	Horizontal	PASS
313.017	39.50	N.A	N.A	N.A	46.0	N.A	207.2	Horizontal	PASS
383.167	39.61	N.A	N.A	N.A	46.0	N.A	184.4	Horizontal	PASS
455.736	39.27	N.A	N.A	N.A	46.0	N.A	198.0	Horizontal	PASS
2440.000	53.22	N.A	N.A	N.A	N.A	N.A	347.5	Horizontal	N.A
15673.317	39.82	N.A	N.A	74.0	N.A	54.0	123.2	Horizontal	PASS

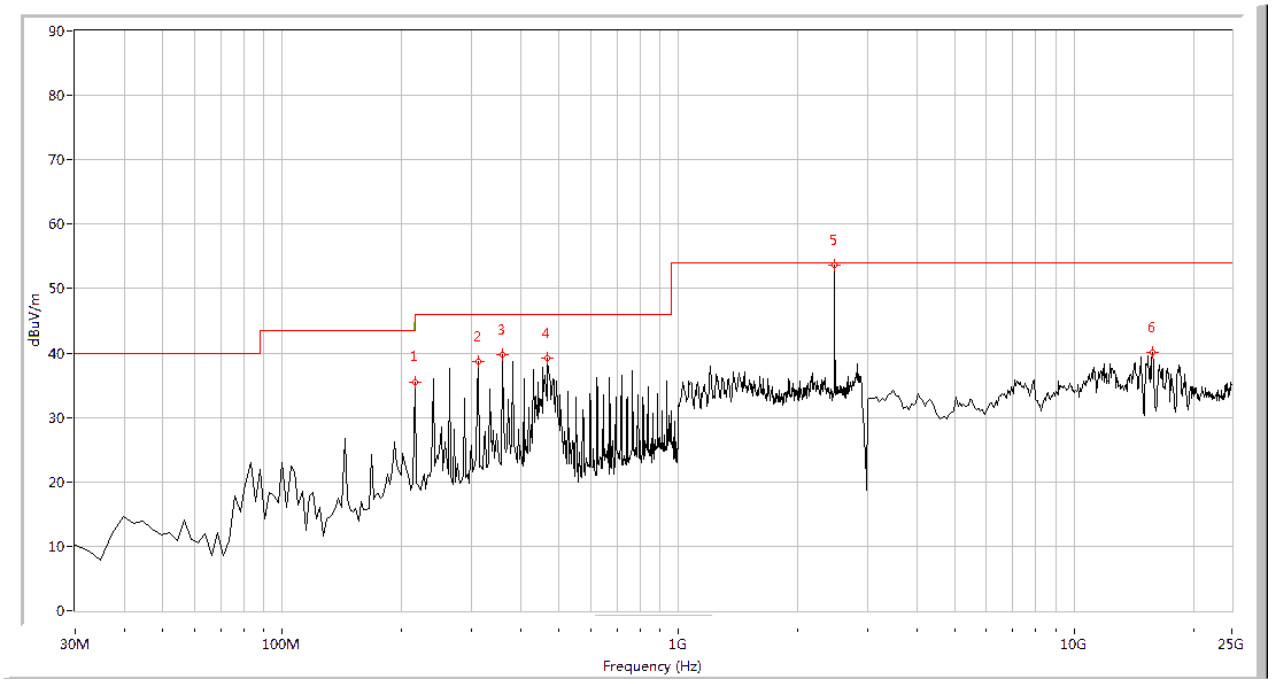
(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
49.352	31.34	N.A	N.A	N.A	40.0	N.A	295.3	Vertical	PASS
119.501	36.14	N.A	N.A	N.A	43.5	N.A	257.6	Vertical	PASS
383.167	36.64	N.A	N.A	N.A	46.0	N.A	0.0	Vertical	PASS
455.736	39.47	N.A	N.A	N.A	46.0	N.A	85.3	Vertical	PASS
2440.000	54.03	N.A	N.A	N.A	N.A	N.A	87.5	Vertical	N.A
15783.042	39.63	N.A	N.A	74.0	N.A	54.0	-0.0	Vertical	PASS

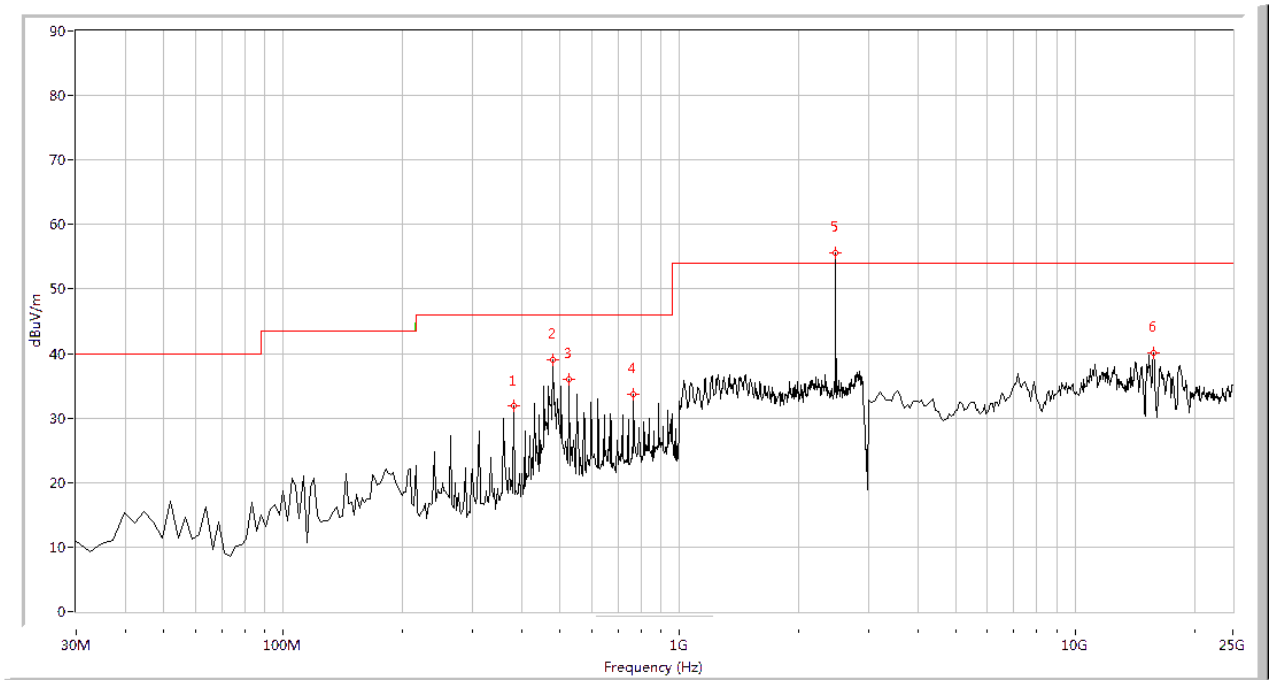
(Plot B.3: Antenna Vertical, 30MHz to 25GHz)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
216.259	35.48	N.A	N.A	N.A	46.0	N.A	196.2	Horizontal	PASS
313.017	38.69	N.A	N.A	N.A	46.0	N.A	215.0	Horizontal	PASS
358.978	39.78	N.A	N.A	N.A	46.0	N.A	215.0	Horizontal	PASS
467.830	39.28	N.A	N.A	N.A	46.0	N.A	215.0	Horizontal	PASS
2480.000	53.59	N.A	N.A	N.A	N.A	N.A	208.8	Horizontal	N.A
15728.180	40.12	N.A	N.A	74.0	N.A	54.0	223.1	Horizontal	PASS

(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
383.167	31.89	N.A	N.A	N.A	46.0	N.A	360.0	Vertical	PASS
479.925	38.99	N.A	N.A	N.A	46.0	N.A	199.6	Vertical	PASS
528.304	36.08	N.A	N.A	N.A	46.0	N.A	112.8	Vertical	PASS
767.781	33.60	N.A	N.A	N.A	46.0	N.A	261.3	Vertical	PASS
2480.000	55.60	N.A	N.A	N.A	N.A	N.A	247.5	Vertical	N.A
15783.042	40.06	N.A	N.A	74.0	N.A	54.0	30.1	Vertical	PASS

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

2.10. RF exposure evaluation

2.10.1. Requirement

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

2.10.2. Limits for Maximum Permissible Exposure

According to FCC Part 1.1307, systems operating under the provisions of this section shall be operated in a manner the ensures that the public is not exposed to radio frequency energy level in excess of the commission's guidelines.

According to FCC Part 1.1310 RF exposure is calculated.

Limits for General Population/ Uncontrolled Exposure			
Frequency Range (MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength (H)(A/m)	Power Density (S)(mW/cm2)
0.3-1.34	614	1.63	(100)*
1.34-30	824/f	2.19/f	(180/f2)*
30-300	27.5	0.073	0.2
300-1500			f/1500
1500-100,000			1.0

2.10.3. Test result

Maximum peak output power at antenna input terminal(dBm):	4.051
Maximum peak output power at antenna input terminal(mW):	2.541558
Source-based time-averaged output power:	--
Prediction distance(cm):	20
Predication frequency(MHz):	2480
Antenna Gain (typical) (dBi):	2
Power density at predication frequency at 20 cm(mW/cm^2):	0.000801
MPE limit for RF exposure at prediction frequency(mW/cm^2):	1

2.10.4. Conclusion

Since the test result is passed, the SAR measurement is not required.

** END OF REPORT **