

# **FCC 47 CFR PART 15 SUBPART C TEST REPORT**

**For**

**Product Name: ClickShare CS-100**

**Brand Name: Barco**

**Model No.: R9861510**

**Series Model.: N/A**

**FCC ID: 2AAED-R9861510**

**IC: 9393B-R9861510**

**Test Report Number:**

**C151211R02-RPB**

**Issued for**

**Barco NV**

**President Kennedypark 35, 8500 Kortrijk, Belgium**

**Issued by**

**Compliance Certification Services Inc.**

**Kun shan Laboratory**

**No.10 Weiye Rd., Innovation park, Eco&Tec,  
Development Zone, Kunshan City, Jiangsu, China**

**TEL: 86-512-57355888**

**FAX: 86-512-57370818**



TESTING CERT #2541.01

**Note:** This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by A2LA or any government agencies. The test results in the report only apply to the tested sample.

## TABLE OF CONTENTS

<b>1.</b>	<b>TEST RESULT CERTIFICATION .....</b>	<b>3</b>
<b>2.</b>	<b>EUT DESCRIPTION .....</b>	<b>4</b>
<b>3.</b>	<b>TEST METHODOLOGY .....</b>	<b>5</b>
3.1	EUT CONFIGURATION .....	5
3.2	EXERCISEEUT .....	5
3.3	GENERAL TEST PROCEDURES .....	5
3.4	TEST MODE.....	6
3.5	FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS.....	7
<b>4.</b>	<b>INSTRUMENT CALIBRATION .....</b>	<b>8</b>
<b>5.</b>	<b>FACILITIES AND ACCREDITATIONS .....</b>	<b>8</b>
5.1	FACILITIES.....	8
5.2	EQUIPMENT.....	8
5.3	LABORATORY ACCREDITATIONS AND LISTING .....	8
5.4	TABLE OF ACCREDITATIONS .....	9
5.5	LIST OF MEASURING EQUIPMENT .....	10
5.6	SETUP CONFIGURATION .....	11
5.7	SUPPORT EQUIPMENT .....	11
<b>6.</b>	<b>FCC PART 15.247 REQUIREMENTS .....</b>	<b>12</b>
6.1	PEAK POWER .....	12
6.2	20DB BANDWIDTH & 99% BANDWIDTH MEASUREMENT .....	14
6.3	HOPPING CHANNEL SEPARATION.....	19
6.4	NUMBER OF HOPPING FREQUENCY .....	22
6.5	TIME OF OCCUPANCY (DWELL TIME) .....	25
6.6	CONDUCTED BAND EDGES MEASUREMENT .....	30
6.7	CONDUCTED SPURIOUS EMISSION MEASUREMENT .....	35
6.8	RADIATED BAND EDGE AND SPURIOUS EMISSION MEASUREMENT .....	42
6.9	POWERLINE CONDUCTED EMISSIONS .....	58

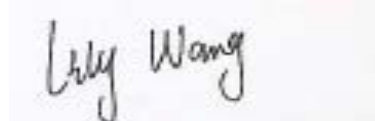
**1. TEST RESULT CERTIFICATION**

<b>Product Name:</b>	ClickShare CS-100
<b>Trade Name:</b>	Barco
<b>Model Name:</b>	R9861510
<b>Series Model:</b>	N/A
<b>Applicant Discrepancy:</b>	Initial
<b>Device Category:</b>	Portable device
<b>Date of Test:</b>	December 20, 2015 ~ January 10, 2016
<b>Applicant:</b>	<b>Barco NV</b> President Kennedypark 35, 8500 Kortrijk, Belgium
<b>Manufacturer:</b>	<b>Barco NV</b> President Kennedypark 35, 8500 Kortrijk, Belgium
<b>Application Type:</b>	Certification

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted
Canada RSS-247 Issue 1	No non-compliance noted
Canada RSS-Gen Issue 4	No non-compliance noted

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

**Approved by:****Tested by:**

Jeff.Fang  
RF Manager  
Compliance Certification Services Inc.

Lily.Wang  
Test Engineer  
Compliance Certification Services Inc.

## 2. EUT DESCRIPTION

<b>Product Name:</b>	ClickShare CS-100
<b>Brand Name:</b>	Barco
<b>Model Name:</b>	R9861510
<b>Series Model:</b>	N/A
<b>Model Discrepancy:</b>	N/A
<b>Power Adapter:</b>	Brand Name: GLOBTEK Model :GT-46180-1812 Input: 100-240V~0.6A 50-60Hz Output: DC12V 1.5A
<b>Frequency Range :</b>	Bluetooth:2402 ~ 2480 MHz
<b>Transmit Power :</b>	Bluetooth:3.66dBm
<b>Modulation Technique :</b>	Bluetooth: FHSS
<b>Transmit Data Rate :</b>	Bluetooth: GFSK(1 Mbps), $\pi/4$ -DQPSK(2 Mbps),8-DPSK(3 Mbps)
<b>Number of Channels :</b>	Bluetooth: 79 Channels
<b>Antenna Specification:</b>	PCB antenna for 2.4GHz Gain 1.88 dBi

**Remark:**

- 1.The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
- 2.This submittal(s) (test report) is intended for **FCC ID: 2AAED-R9861510** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
- 3.This submittal(s) (test report) is intended for **IC: 9393B-R9861510** filing to comply with Canada RSS-247 Issue 1 and Canada RSS-Gen Issue 4 Rules.

### 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209, 15.247.

#### 3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### 3.2 EXERCISE EUT

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### 3.3 GENERAL TEST PROCEDURES

##### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### Radiated Emissions

Under 1GHz

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10.

Above 1GHz

The EUT is placed on a turn table, which is 1.5 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.10.

### 3.4 TEST Mode

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Antenna
Peak Output Power	GFSK	1 Mbps	0/39/78	1
	8DPSK	3 Mbps		
Hopping Channel Bandwidth	GFSK	1 Mbps	0/39/78	1
	8DPSK	3 Mbps		
Hopping Channel Separation	GFSK	1 Mbps	38-39	1
	8DPSK	3 Mbps		
Number of Hopping Frequency	GFSK	1 Mbps	0-78	1
	8DPSK	3 Mbps		
Dwell Time	DH1/DH3/DH5	1 Mbps	39	1
	3DH1/3DH3/3DH5	3 Mbps		
Spurious Emission	GFSK	1 Mbps	0/39/78	1
	8DPSK	3 Mbps		
Band Edge Emissions	GFSK	1 Mbps	0/78	1
	8DPSK	3 Mbps		
Radiated Emissions Below 1GHz	Normal link	1 Mbps	-	1
Radiated Emissions Above 1GHz	GFSK	1 Mbps	0/39/78	1
	8DPSK	3 Mbps		
AC Power Conducted Emissions	CTX	-	-	-

**3.5 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS**

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.0900 - 0.1100	16.420 - 16.423	399.9 - 410.0	4.50 - 5.15
0.4950 - 0.505 <sup>(1)</sup>	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960.0 - 1240	7.25 - 7.75
4.1250 - 4.1280	25.50 - 25.67	1300 - 1427	8.025 - 8.500
4.17725 - 4.17775	37.50 - 38.25	1435.0 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73.0 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.2150 - 6.2180	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108.00 - 121.94	1718.8 - 1722.2	13.25 - 13.40
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.50
8.2910 - 8.2940	149.90 - 150.05	2310 - 2390	15.35 - 16.20
8.3620 - 8.3660	156.52475 - 156.52525	2483.5 - 2500.0	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.1700	3260 - 3267	23.6 - 24.0
12.2900 - 12.2930	167.72 - 173.20	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345 - 3358	36.43 - 36.5 <sup>(2)</sup>
12.57675 - 12.57725	322.0 - 335.4	3600 - 4400	
13.3600 - 13.4100			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

## **4. INSTRUMENT CALIBRATION**

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards. facilities and accreditations

## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILTIES**

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.10 and CISPR Publication 22.

### **5.2 EQUIPMENT**

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **5.3 LABORATORY ACCREDITATIONS AND LISTING**

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 200581-0 to perform Electromagnetic Interference tests according to FCC Part 15 or 18 requirements. In addition, the test facilities are listed with Federal Communication Commission, Laboratory Division, 424105 for 10m chamber, 238958 for 3m chamber .



## 5.4 TABLE OF ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

<b>Taiwan</b>	TAF
<b>USA</b>	A2LA

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

<b>Canada</b>	Industry Canada
<b>Japan</b>	VCCI
<b>Taiwan</b>	BSMI
<b>USA</b>	FCC

Copies of granted accreditation certificates are available for downloading from our web site,  
<http://www.ccsrf.com>

**5.5 LIST OF MEASURING EQUIPMENT**

Conducted Emissions Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Data	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2015-4-9	2016-4-8
DETECTOR NEGATIVE	Agilent	8473B	MY42240176	2015-5-11	2016-5-10
OSCILLOSCOPE	Agilent	DSO6104A	MY44002585	2015-3-16	2016-3-15
Power meter	Anritsu	ML2495A	1445010	2015-04-24	2016-04-23
Power sensor	Anritsu	MA2411B	1339220	2015-04-24	2016-04-23
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	N.C.R	N.C.R
DC Power Supply	AGILENT	E3632A	MY50340053	N.C.R	N.C.R
Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	2015-1-22	2016-1-21
Test Software			EZ-EMC		

977 Chamber					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Data	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2015-4-9	2016-4-8
EMI Test Receiver	R&S	ESCI	101378	2015-1-22	2016-1-21
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	2015-1-22	2016-1-21
Pre-Amplifier	Miteq	JS41-00101800-32-10P	1675713	2015-1-22	2016-1-21
Bilog Antenna	Sunol	JB1	A062604	2015-3-6	2016-3-5
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2015-3-7	2016-3-6
Turn Table	CT	CT123	4165	N.C.R	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R	N.C.R
Controller	CT	CT100	95637	N.C.R	N.C.R
Test Software			EZ-EMC		

Conducted Emission					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Data	Calibration Due
EMI TEST RECEIVER	R&S	ESCI	100781	2015-3-16	2016-3-15
V (V-LISN)	SCHWARZBECK	NNLK 8129	8129-143	N.C.R	N.C.R
LISN (EUT)	FCC	FCC-LISN-50/ 250-50-2-02	05012	2015-3-16	2016-3-15
Pulse LIMITER	R&S	ESH3-Z2	100524	2015-9-24	2016-9-23
Test Software			EZ-EMC		

**Remark:** Each piece of equipment is scheduled for calibration once a year.

## 5.6 SETUP CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

## 5.7 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID
	Notebook	DELL	E5430	CN8YYW1	N/A

**Remark:**

- 1.All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2.Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 6. FCC PART 15.247 REQUIREMENTS

### 6.1 PEAK POWER

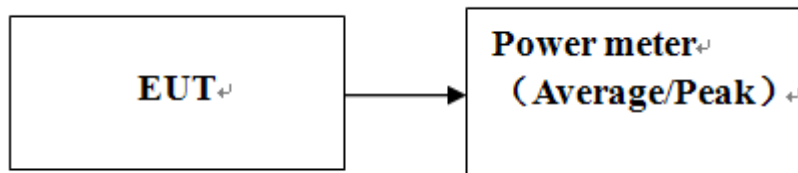
#### Limit

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
2. According to §15.247(b)(1), For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.
3. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
4. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**Remark:** Each piece of equipment is scheduled for calibration once a year.

#### Test Configuration



#### Test Procedure

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r03.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

**Test Results***No non-compliance noted***Test RESULTS****1M GFSK Modulation mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (mW)	Result
Low	2402	3.44	2.208	125	PASS
Mid	2441	3.66	2.323		PASS
High	2480	3.12	2.051		PASS

**3M 8-DPSK Modulation mode**

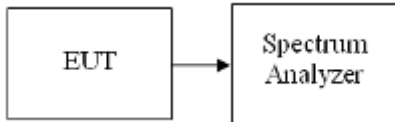
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (mW)	Result
Low	2402	1.60	1.445	125	PASS
Mid	2441	2.06	1.607		PASS
High	2480	1.80	1.514		PASS

## 6.2 20DB BANDWIDTH & 99% bandwidth MEASUREMENT

### Limit

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### Test Configuration



### Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 30kHz, VBW = 300kHz, Span = 3MHz, Sweep = auto.
4. Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

**Test Results of Bandwidth***No non-compliance noted*

Operation Mode:	1 Mbps	Test Date:	January 2, 2016
Temperature:	24°C	Tested by:	Lily.Wang

Channel	Frequency (MHz)	20dB Bandwidth (B) (MHz)	99% Bandwidth (B) (MHz)
00	2402	0.917	0.868
39	2441	0.880	0.842
78	2480	0.903	0.845

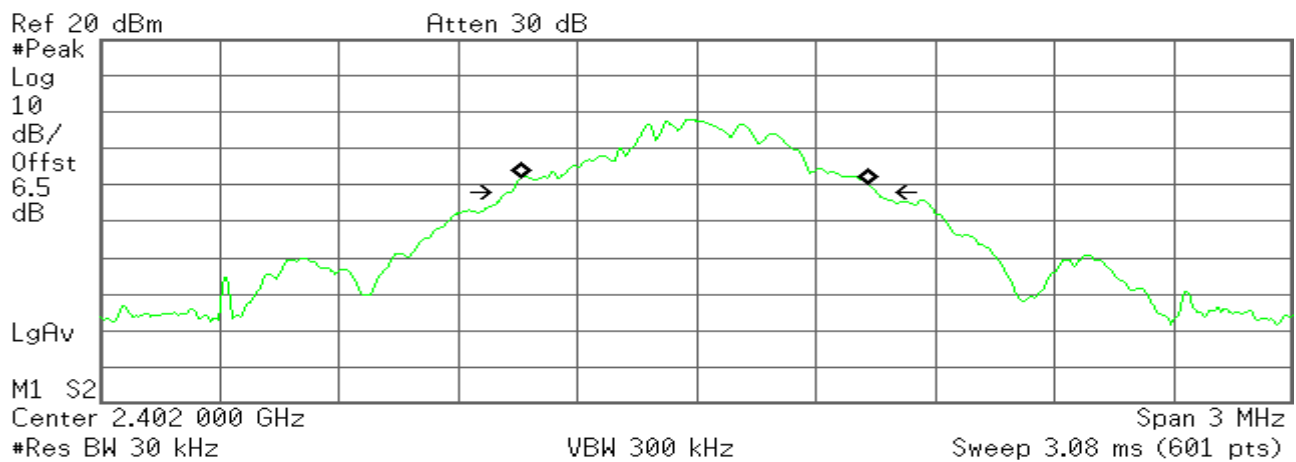
Operation Mode:	3 Mbps	Test Date:	January 2, 2016
Temperature:	24°C	Tested by:	Lily.Wang

Channel	Frequency (MHz)	20dB Bandwidth (B) (MHz)	99% Bandwidth (B) (MHz)
00	2402	1.241	1.1526
39	2441	1.251	1.1595
78	2480	1.224	1.1565

**Test Plot****1M Channel 00**

Agilent

R T

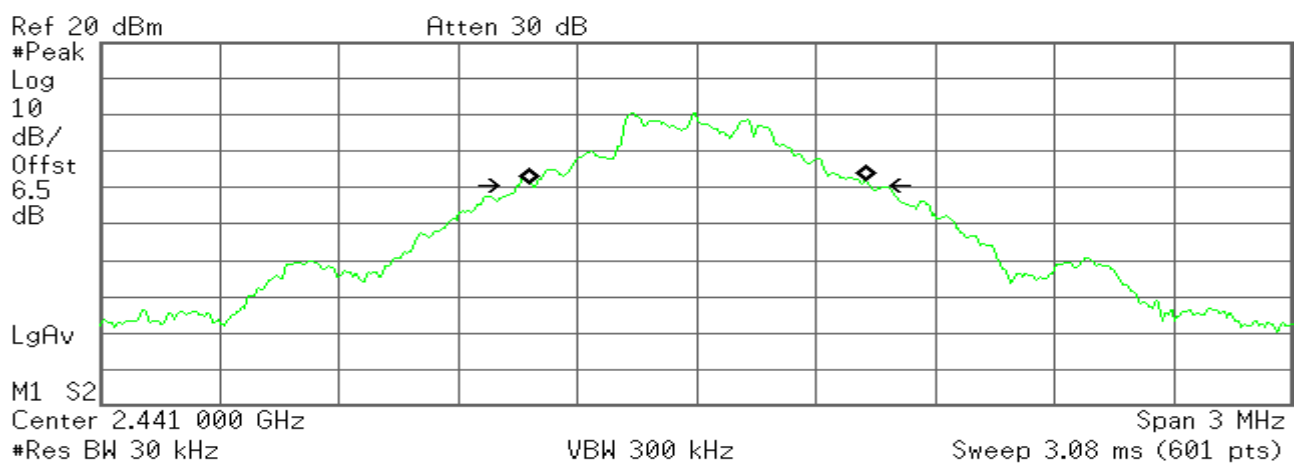


Transmit Freq Error -3.660 kHz  
x dB Bandwidth 917.481 kHz

**1M Channel 39**

Agilent

R T



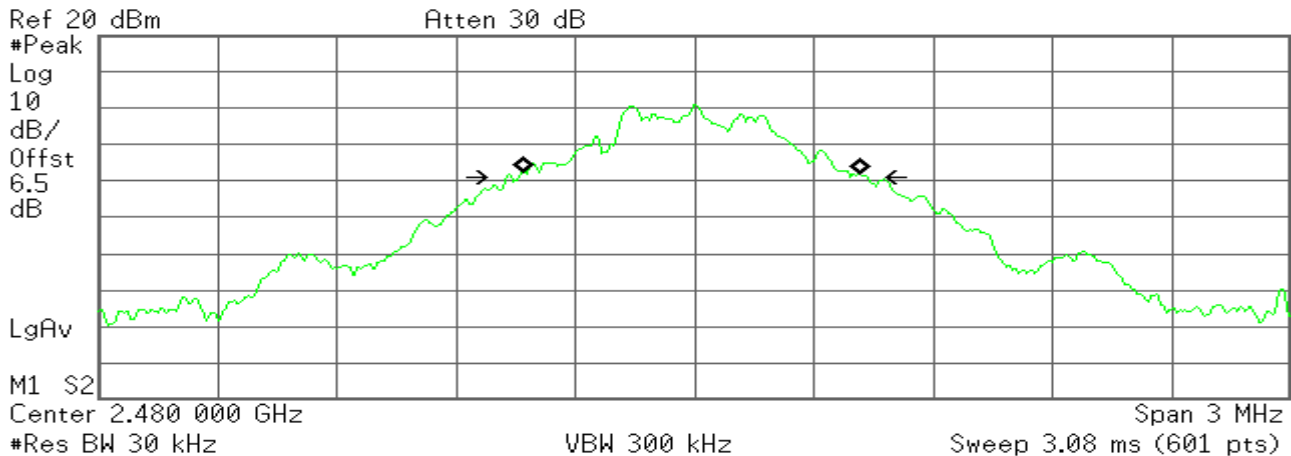
Transmit Freq Error 1.636 kHz  
x dB Bandwidth 880.477 kHz



## 1M Channel 78

Agilent

R T



**Occupied Bandwidth**  
**844.9121 kHz**

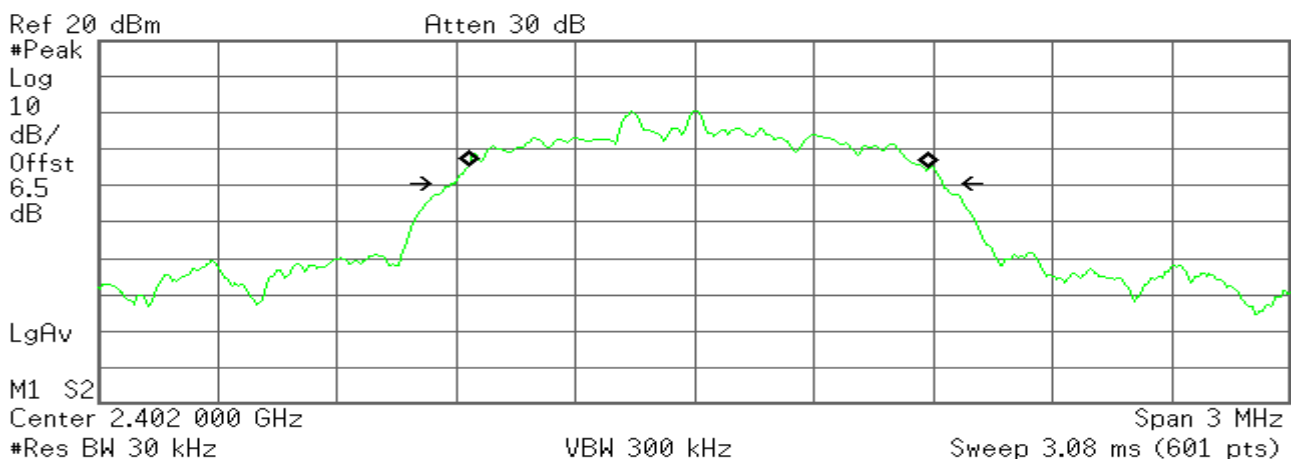
**Occ BW % Pwr** 99.00 %  
**x dB** -20.00 dB

**Transmit Freq Error** -5.178 kHz  
**x dB Bandwidth** 902.832 kHz

## 3M Channel 00

Agilent

R T



**Occupied Bandwidth**  
**1.1526 MHz**

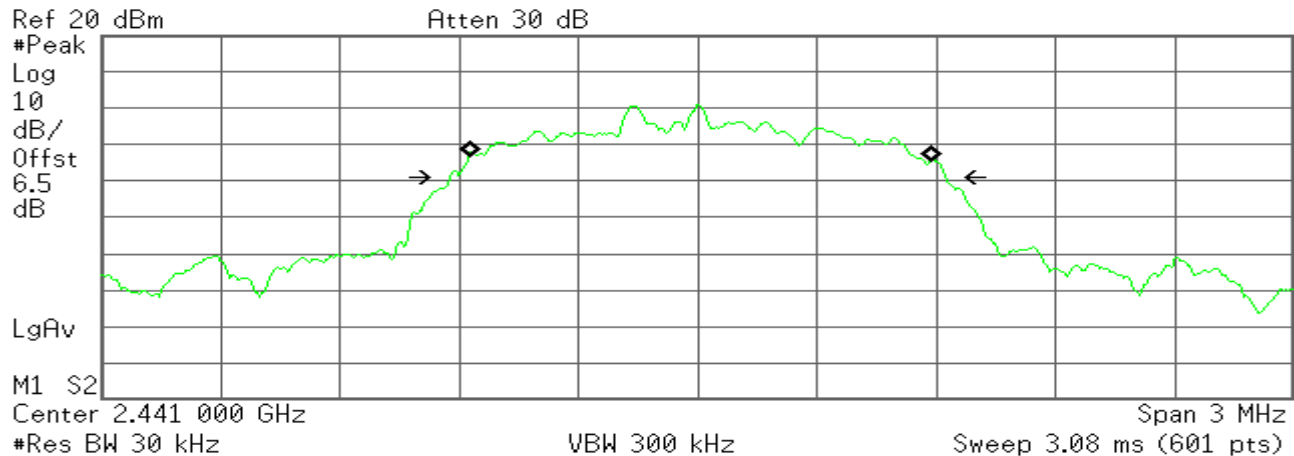
**Occ BW % Pwr** 99.00 %  
**x dB** -20.00 dB

**Transmit Freq Error** 10.161 kHz  
**x dB Bandwidth** 1.241 MHz

## 3M Channel 39

Agilent

R T



Occupied Bandwidth  
1.1595 MHz

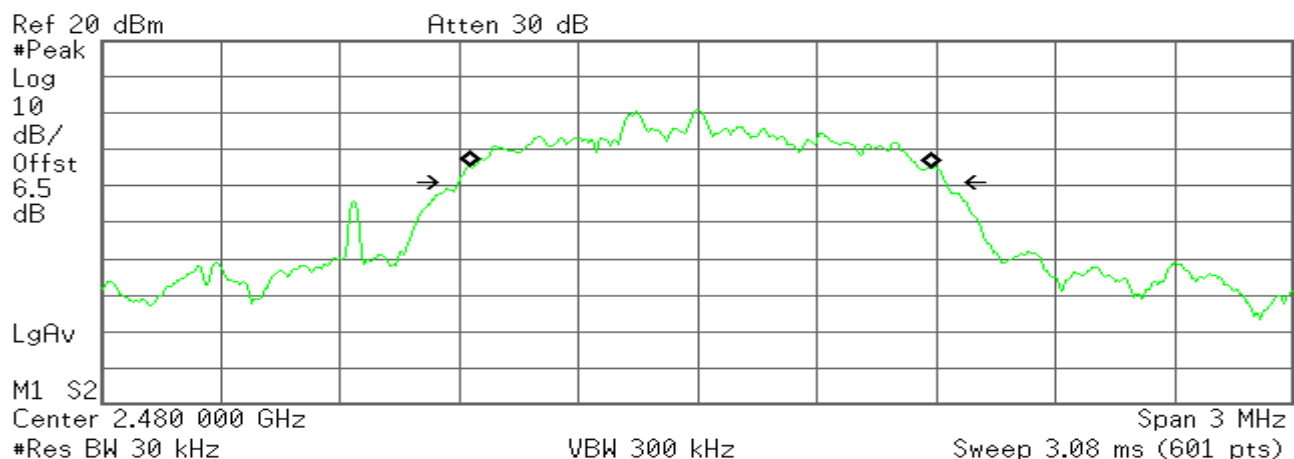
Occ BW % Pwr 99.00 %  
x dB -20.00 dB

Transmit Freq Error 7.372 kHz  
x dB Bandwidth 1.251 MHz

## 3M Channel 78

Agilent

R T



Occupied Bandwidth  
1.1565 MHz

Occ BW % Pwr 99.00 %  
x dB -20.00 dB

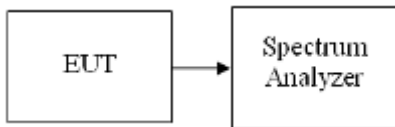
Transmit Freq Error 9.093 kHz  
x dB Bandwidth 1.224 MHz

## 6.3 HOPPING CHANNEL SEPARATION

### LIMIT

According to §15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel.
4. Set the spectrum analyzer as RBW = 30kHz, VBW = 100kHz, Span = 3MHz, Sweep = auto.
5. Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

**TEST RESULTS**

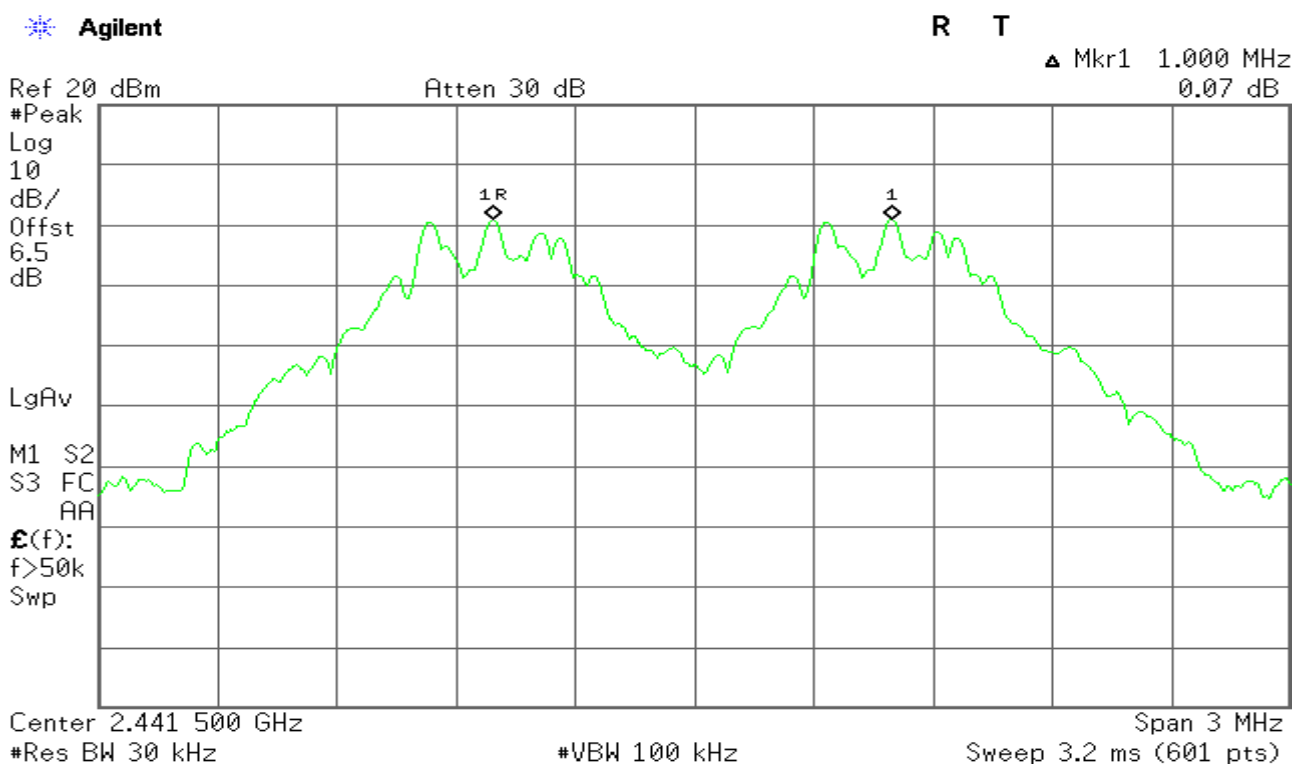
No non-compliance noted

Operation Mode:	1 Mbps	Test Date:	January 3, 2016
Temperature:	24°C	Tested by:	Lily.Wang

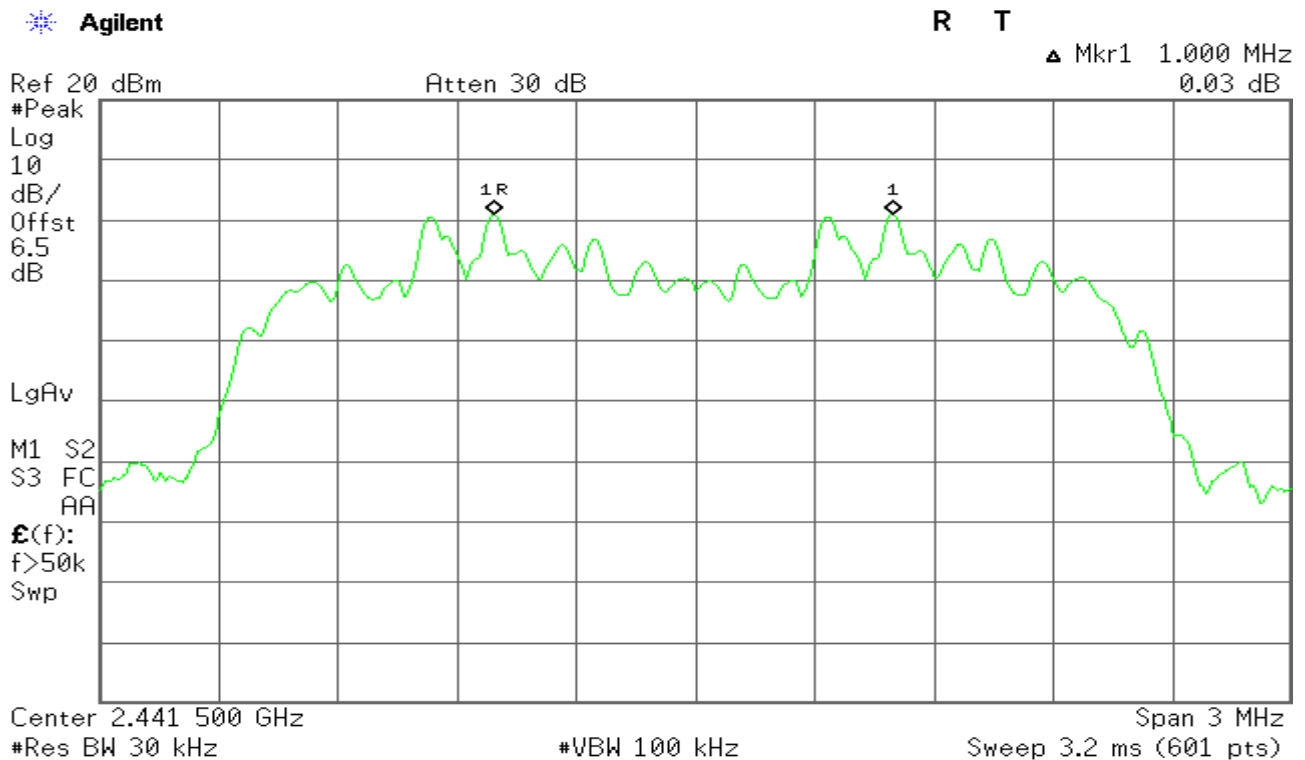
Channel	Frequency	Separation	(2/3 of 20dB BW)	Result
	(MHz)	(MHz)	Limits (MHz)	
39~40	2441~2442	1.000	0.611	Pass

Operation Mode:	3 Mbps	Test Date:	January 3, 2016
Temperature:	24°C	Tested by:	Lily.Wang

Channel	Frequency	Separation	(2/3 of 20dB BW)	Result
	(MHz)	(MHz)	Limits (MHz)	
39~40	2441~2442	1.000	0.834	Pass

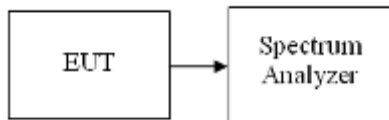
**1M Channel Separation Plot on Channel 39-40**

**3M Channel Separation Plot on Channel 39-40**



**6.4 NUMBER OF HOPPING FREQUENCY****LIMIT**

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

**Test Configuration****TEST PROCEDURE**

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2441.5MHz, Sweep = auto and Start=2441.5MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=1MHz.
5. Max hold, view and count how many channel in the band.

**TEST RESULTS**

*No non-compliance noted*

**Test Data**

Operation Mode:	1 Mbps	Test Date:	January 2, 2016
Temperature:	24°C	Tested by:	Lily.Wang

Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS

Operation Mode:	3 Mbps	Test Date:	January 2, 2016
Temperature:	24°C	Tested by:	Lily.Wang

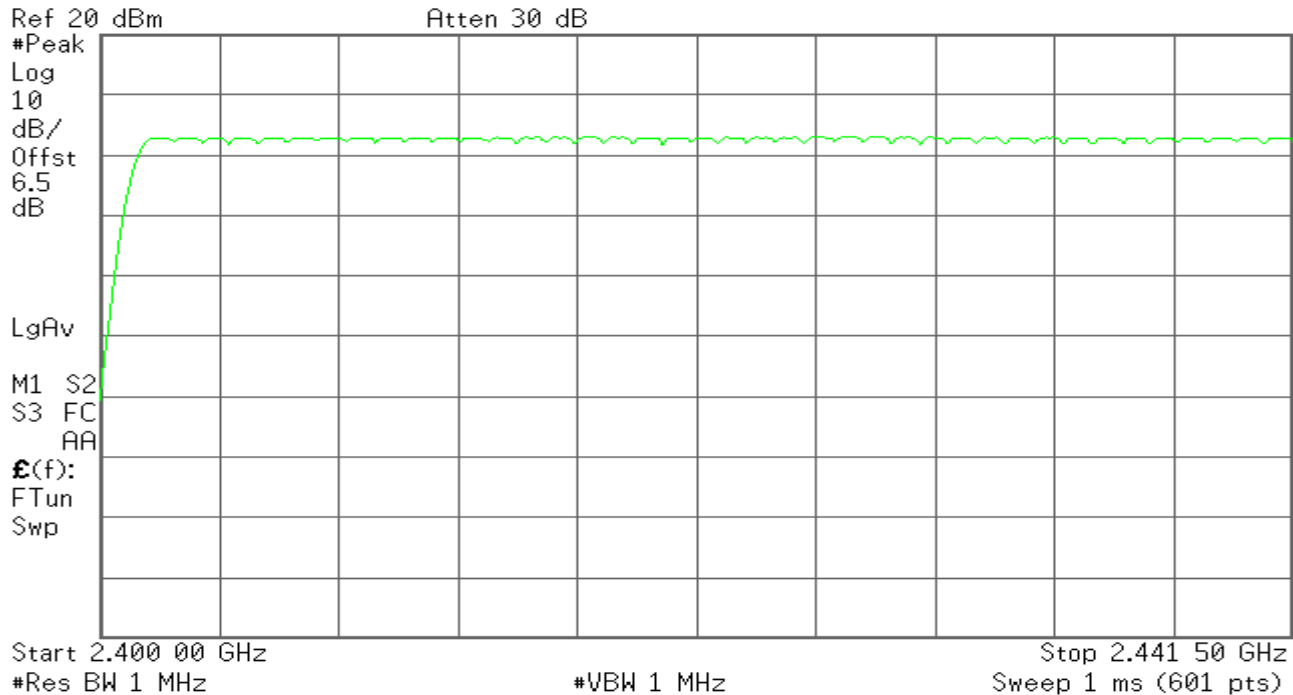
Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS

## Test Plot:1M

### Channel Number 2.4 GHz – 2.441.5 GHz

Agilent

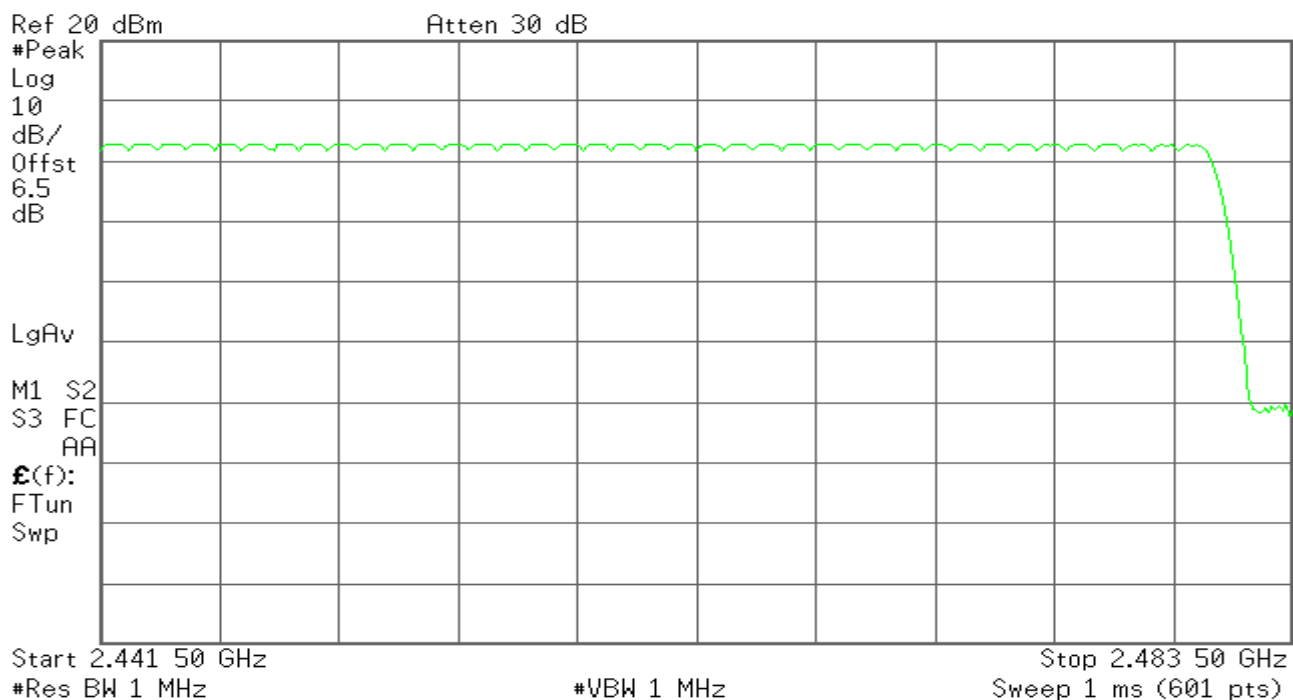
R T



### Channel Number 2.441.5 GHz – 2.4835 GHz

Agilent

R T

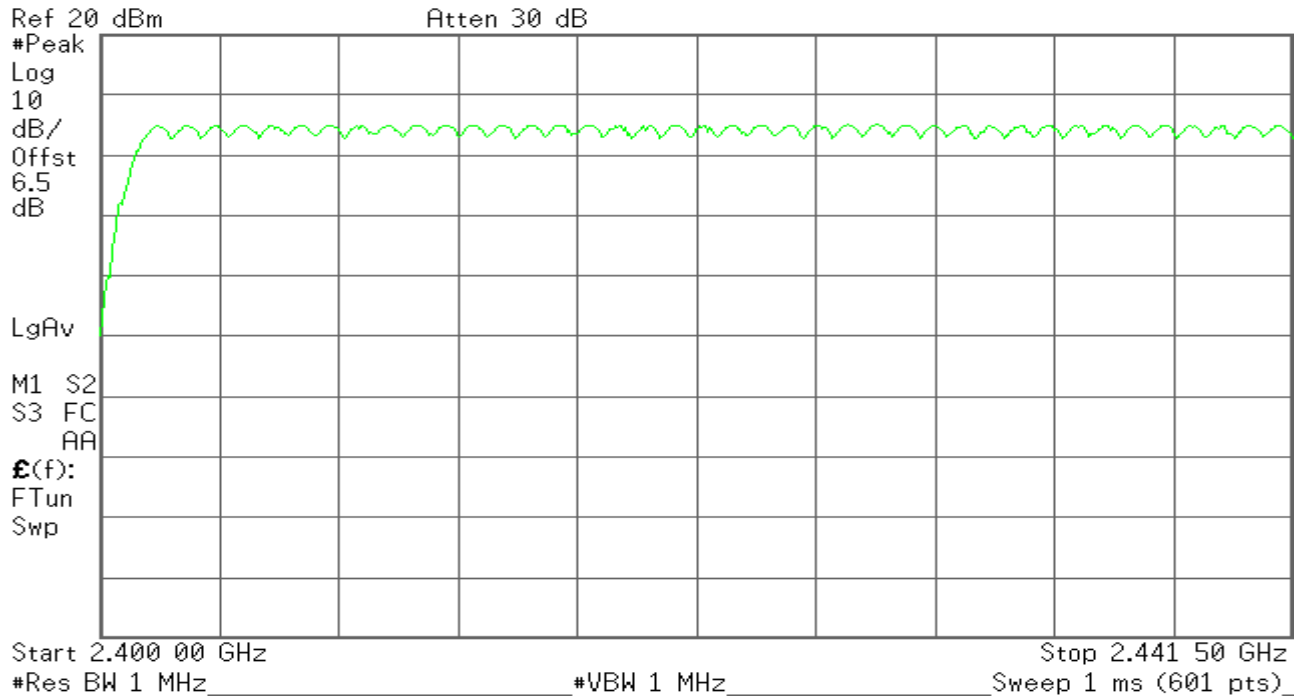


## Test Plot:3M

### Channel Number 2.4 GHz – 2.441.5 GHz

Agilent

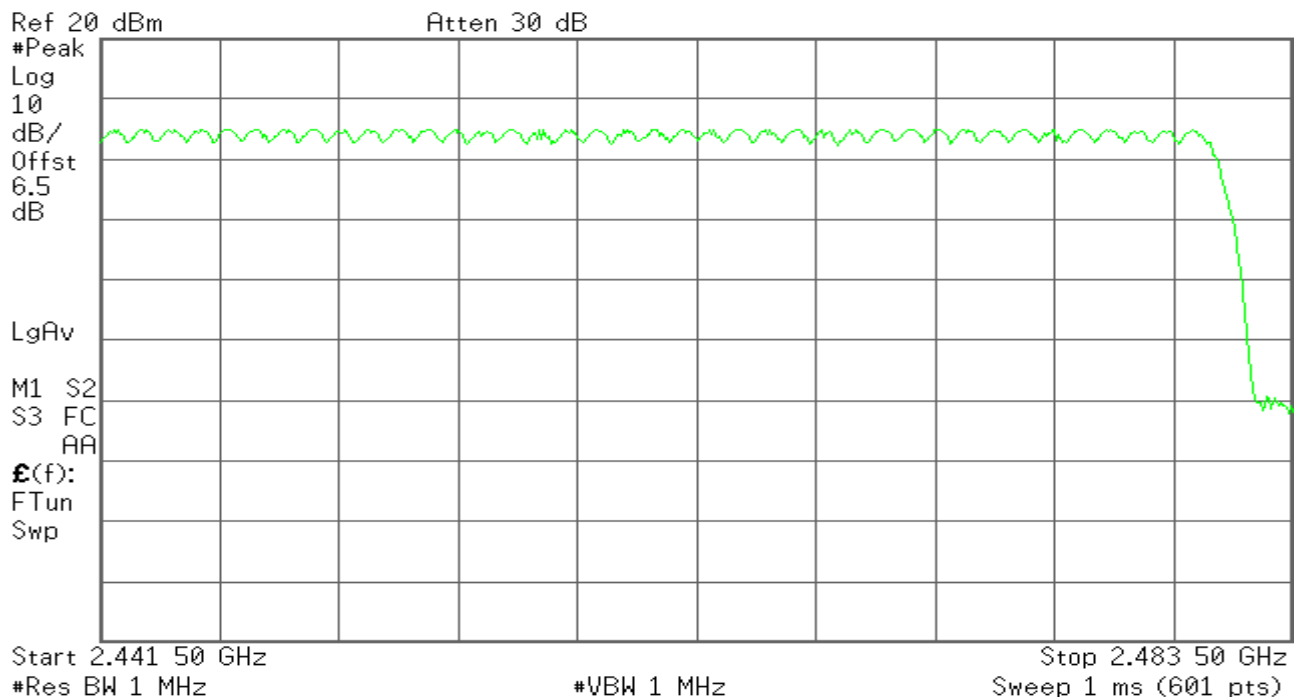
R T



### Channel Number 2.441.5 GHz – 2.4835 GHz

Agilent

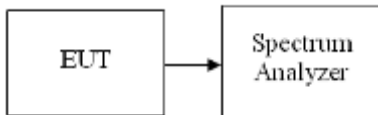
R T





**6.5 TIME OF OCCUPANCY (DWELL TIME)****LIMIT**

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

**Test Configuration****TEST PROCEDURE**

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
5. Repeat above procedures until all frequency measured were complete.

**TEST RESULTS**

*No non-compliance noted*

**Test Data**

1M

DH 1

$$0.400 * (1600/2)/79 * 31.6 = 128.00(\text{ms})$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.400	128.00	31.60	400	PASS

DH 3

$$1.667 * (1600/4)/79 * 31.6 = 266.72 (\text{ms})$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.667	266.72	31.60	400	PASS

DH 5

$$2.967 * (1600/6)/79 * 31.6 = 316.48 (\text{ms})$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.967	316.48	31.60	400	PASS

3M

DH 1

$$0.420 * (1600/2)/79 * 31.6 = 134.40 \text{ (ms)}$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.420	134.40	31.60	400	PASS

DH 3

$$1.683 * (1600/4)/79 * 31.6 = 269.28 \text{ (ms)}$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.683	269.28	31.60	400	PASS

DH 5

$$2.967 * (1600/6)/79 * 31.6 = 316.48 \text{ (ms)}$$

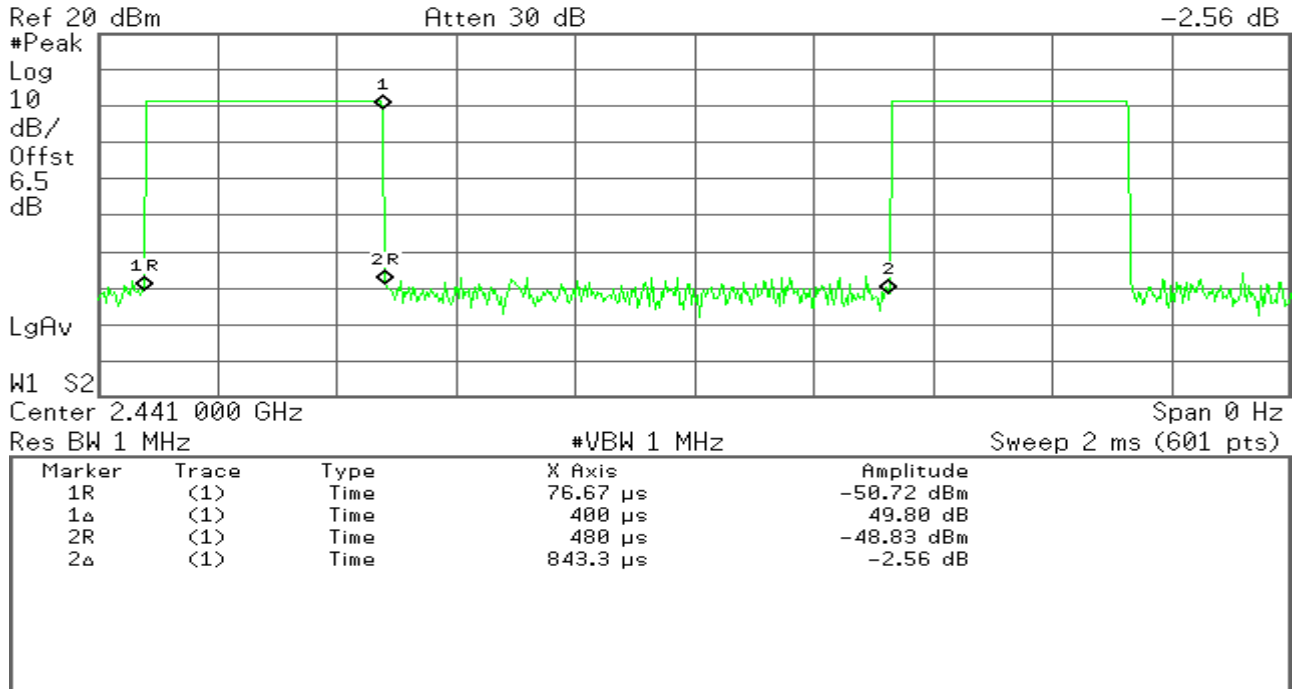
Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.967	316.48	31.60	400	PASS

## 1M-DH1

Agilent

R T

Δ Mkr2 843.3 μs  
-2.56 dB

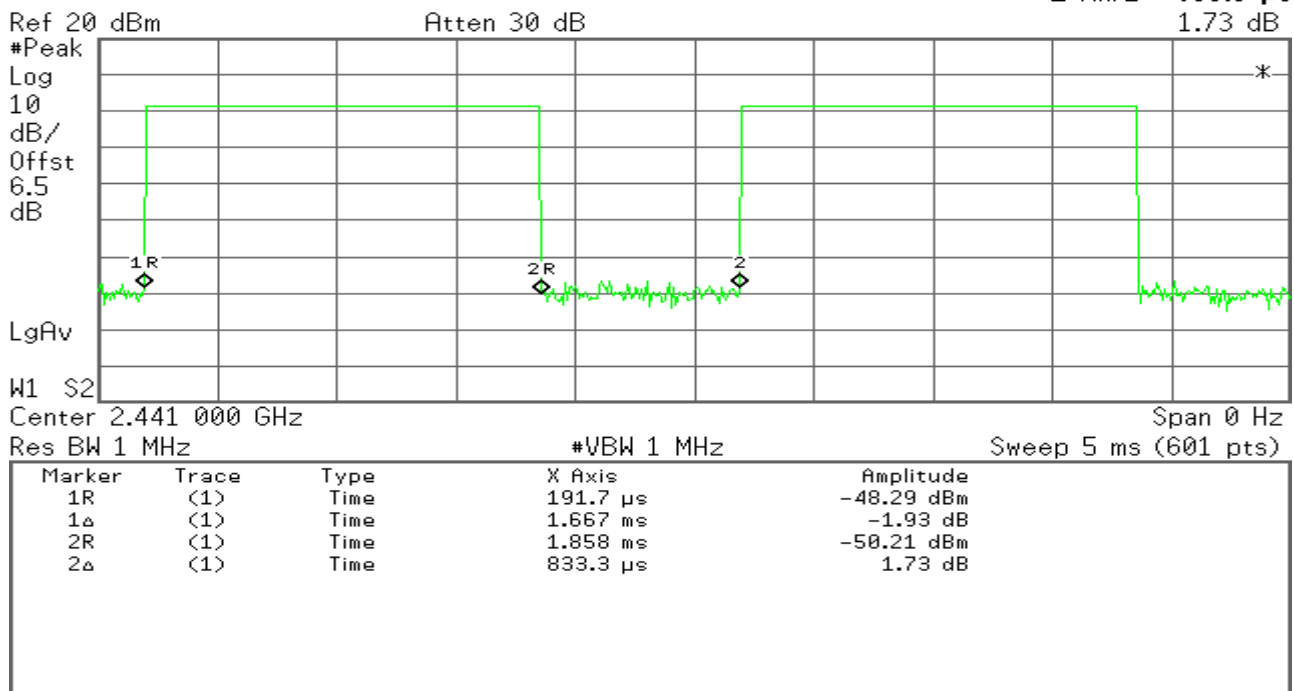


## 1M-DH3

Agilent

R T

Δ Mkr2 833.3 μs  
1.73 dB



**1M-DH5**

Agilent

R T

Δ Mkr2 800 μs  
-2.61 dB

Ref 20 dBm

Atten 30 dB

#Peak  
Log  
10  
dB/  
Offst  
6.5  
dB

LgAv

W1 S2

Center 2.441 000 GHz

Span 0 Hz

Res BW 1 MHz

#VBW 1 MHz

Sweep 10 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	1.75 ms	-46.86 dBm
1Δ	(1)	Time	2.967 ms	-2.16 dB
2R	(1)	Time	4.717 ms	-49.02 dBm
2Δ	(1)	Time	800 μs	-2.61 dB

**3M-DH1**

Agilent

R T

Δ Mkr2 826.7 μs  
2.54 dB

Ref 20 dBm

Atten 30 dB

#Peak  
Log  
10  
dB/  
Offst  
6.5  
dB

LgAv

W1 S2

Center 2.441 000 GHz

Span 0 Hz

Res BW 1 MHz

#VBW 1 MHz

Sweep 2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	273.3 μs	-55.47 dBm
1Δ	(1)	Time	420 μs	6.51 dB
2R	(1)	Time	693.3 μs	-48.96 dBm
2Δ	(1)	Time	826.7 μs	2.54 dB

**3M-DH3**

Agilent

R T

Δ Mkr2 808.3 μs  
-1.70 dB

Ref 20 dBm

Atten 30 dB

#Peak  
Log  
10  
dB/  
Offst  
6.5  
dB

LgAv

W1 S2

Center 2.441 000 GHz

Span 0 Hz

Res BW 1 MHz

#VBW 1 MHz

Sweep 5 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	258.3 μs	-50.63 dBm
1Δ	(1)	Time	1.683 ms	2.82 dB
2R	(1)	Time	1.942 ms	-47.81 dBm
2Δ	(1)	Time	808.3 μs	-1.70 dB

**3M-DH5**

Agilent

R T

Δ Mkr2 800 μs  
-2.52 dB

Ref 20 dBm

Atten 30 dB

#Peak  
Log  
10  
dB/  
Offst  
6.5  
dB

LgAv

W1 S2

Center 2.441 000 GHz

Span 0 Hz

Res BW 1 MHz

#VBW 1 MHz

Sweep 10 ms (601 pts)

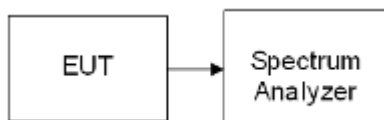
Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Time	2.283 ms	-49.01 dBm
1Δ	(1)	Time	2.967 ms	2.13 dB
2R	(1)	Time	5.25 ms	-46.88 dBm
2Δ	(1)	Time	800 μs	-2.52 dB

## 6.6 Conducted Band Edges Measurement

### LIMIT

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

### Test Configuration



### TEST PROCEDURE

1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz ( $\geq 1\%$  span=10MHz), VBW = 300kHz ( $\geq 3$ RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

### TEST RESULTS

*No non-compliance noted*

## Test Result of Conducted Band Edges

Operation Mode:	1 Mbps	Test Date:	January 2, 2016
Test Channel:	00 and 78	Tested by:	Lily.Wang
Humidity:	52 % RH	Temperature:	24°C

### Low Band Edge Plot on Channel 00

Agilent

R T

Mkr2 2.400 000 GHz  
-50.51 dBm

Ref 20 dBm

Atten 30 dB

#Peak

Log

10

dB/

Offst

6.5

dB

DI

-17.1

dBm

LgAv

M1 S2

Start 2.395 000 GHz

Stop 2.405 000 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.401 833 GHz	2.85 dBm
2	(1)	Freq	2.400 000 GHz	-50.51 dBm

### High Band Edge Plot on Channel 78

Agilent

R T

Mkr3 2.488 56 GHz  
-52.65 dBm

Ref 20 dBm

Atten 30 dB

#Peak

Log

10

dB/

Offst

6.5

dB

DI

-17.3

dBm

LgAv

M1 S2

Start 2.477 50 GHz

Stop 2.489 50 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 1.16 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.479 84 GHz	2.71 dBm
2	(1)	Freq	2.483 50 GHz	-54.87 dBm
3	(1)	Freq	2.488 56 GHz	-52.65 dBm

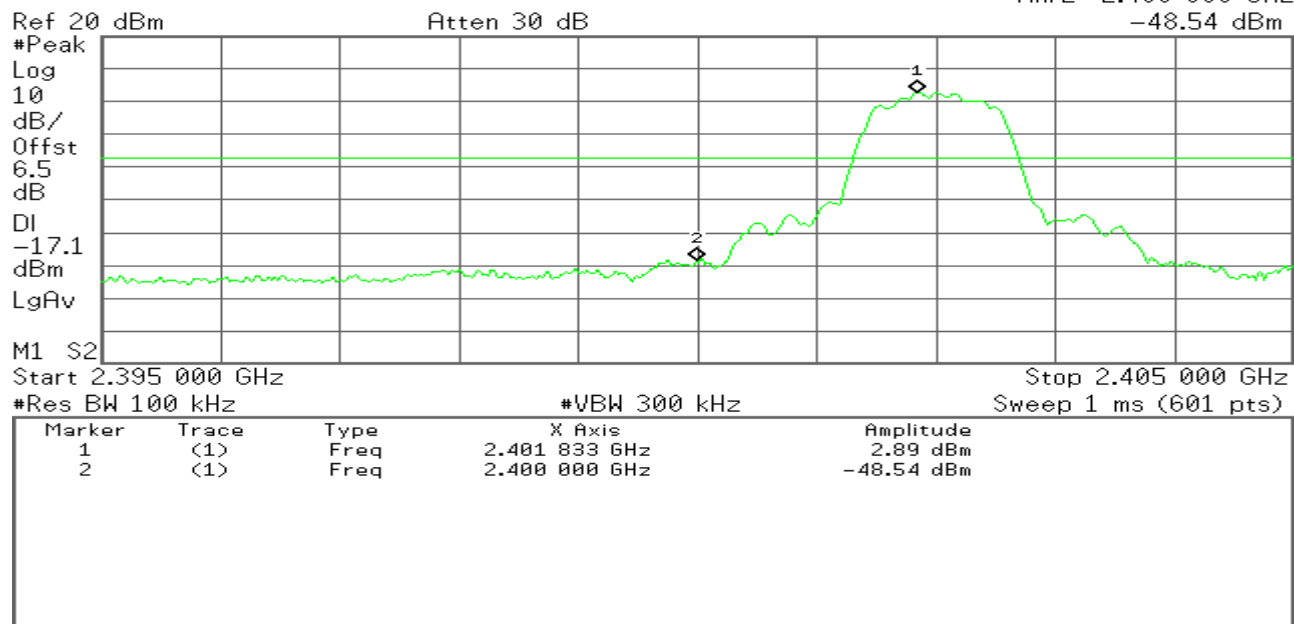
Operation Mode:	3 Mbps	Test Date:	January 2, 2016
Test Channel:	00 and 78	Tested by:	Lily.Wang
Humidity:	52 % RH	Temperature:	24°C

## Low Band Edge Plot on Channel 00

Agilent

R T

Mkr2 2.400 000 GHz  
-48.54 dBm

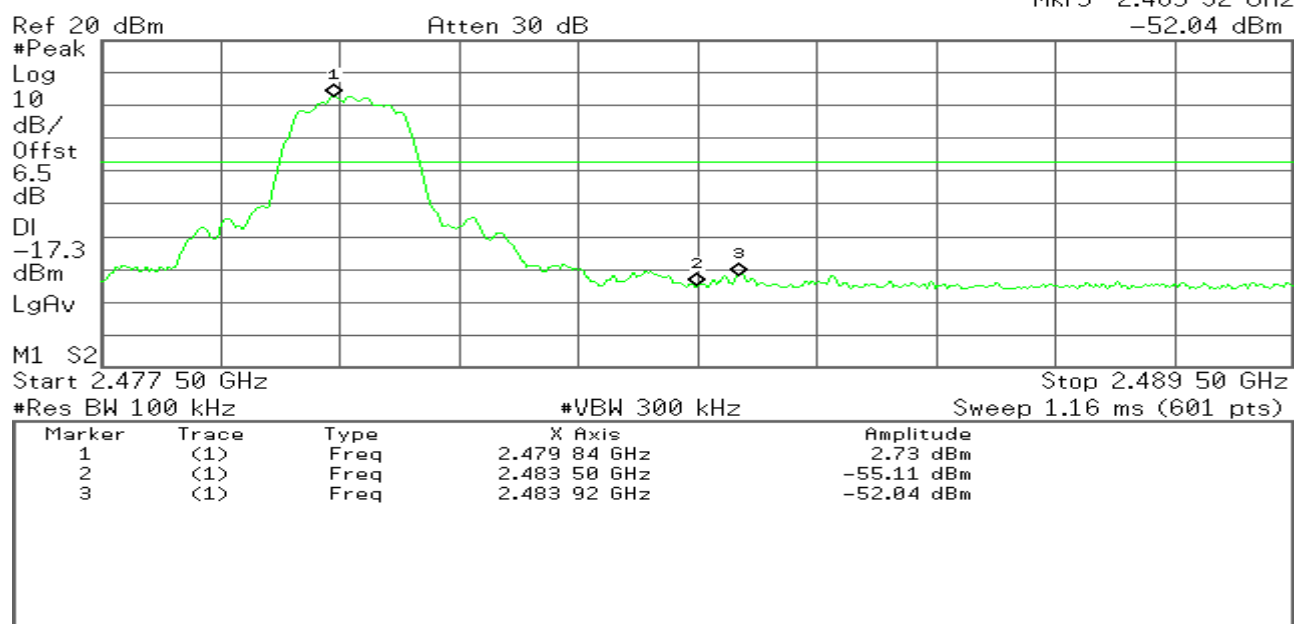


## High Band Edge Plot on Channel 78

Agilent

R T

Mkr3 2.483 92 GHz  
-52.04 dBm

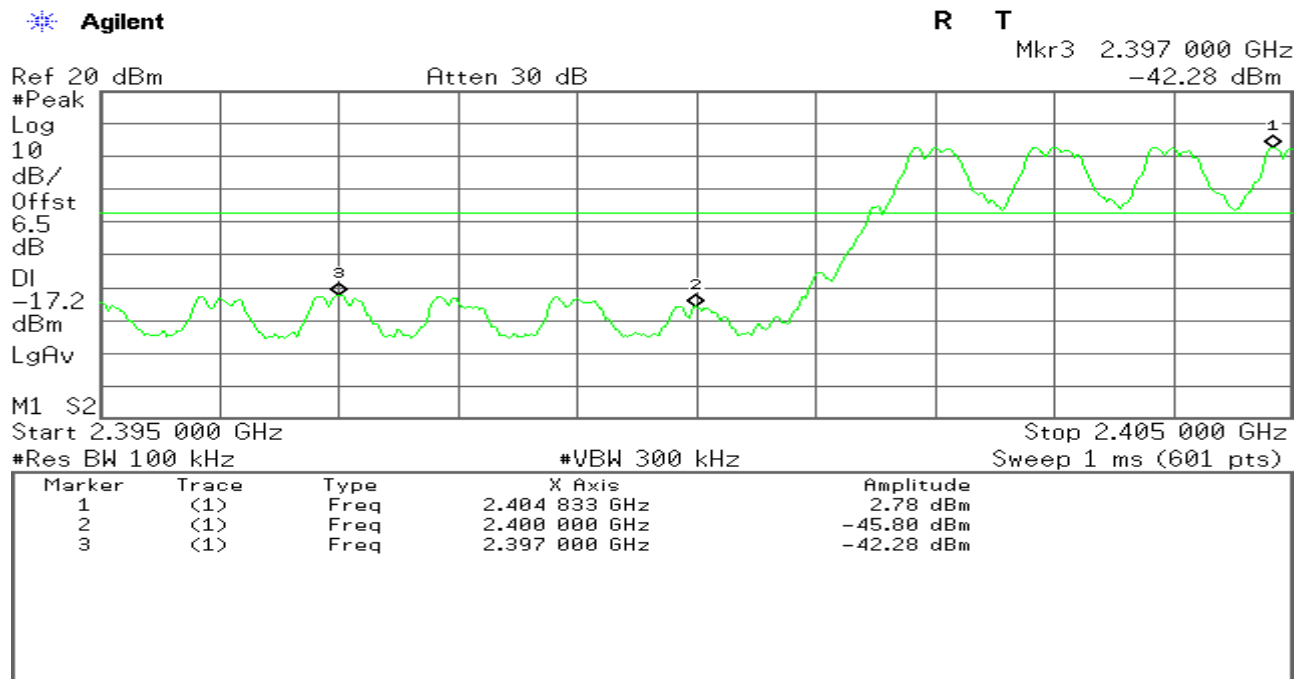




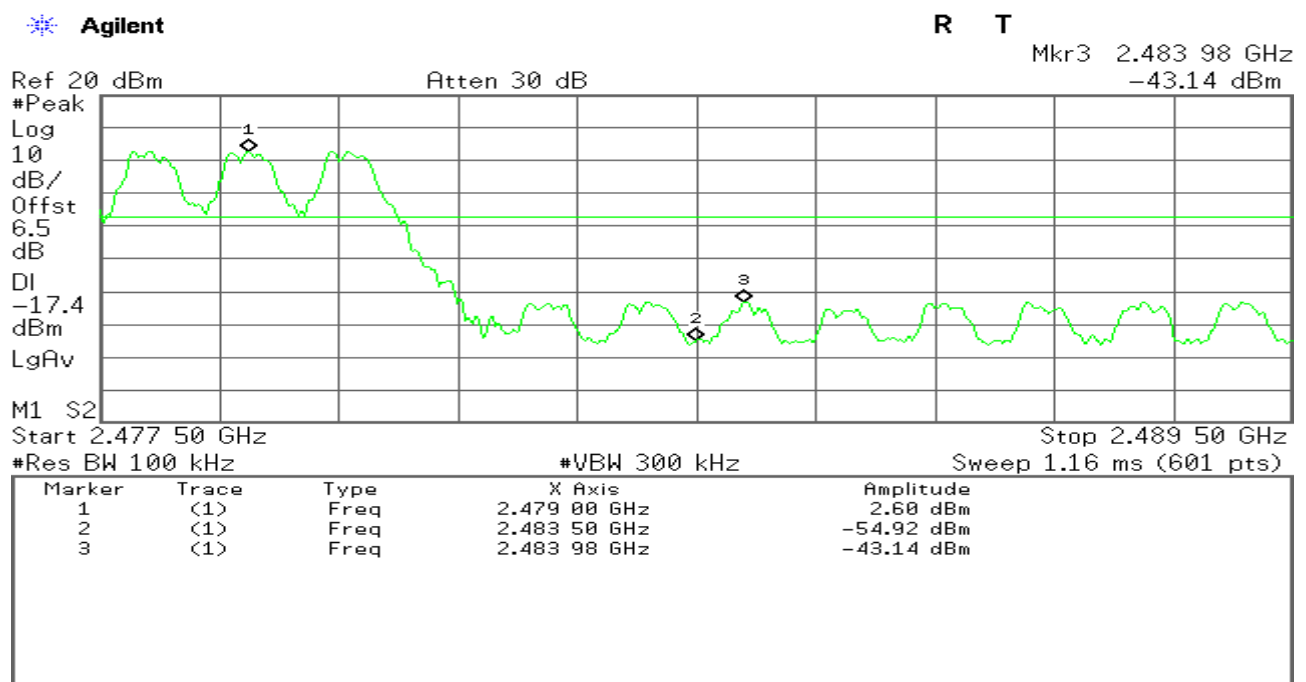
## Test Result of Conducted Hopping Mode Band Edges

Operation Mode:	1 Mbps	Test Date:	January 2, 2016
Humidity:	52 % RH	Temperature:	24°C

### 1Mbps Hopping Mode Low Band Edge Plot



### 1Mbps Hopping Mode High Band Edge Plot

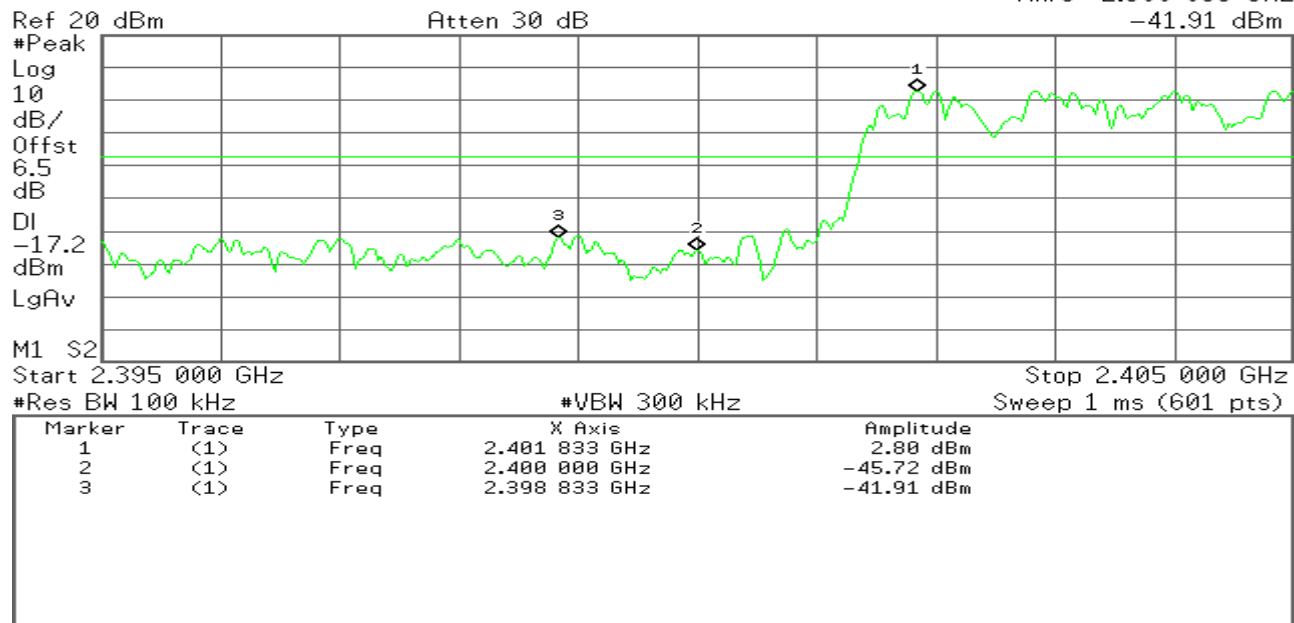


Operation Mode:	3 Mbps	Test Date:	January 2, 2016
Humidity:	52 % RH	Temperature:	24°C

**3Mbps Hopping Mode Low Band Edge Plot**

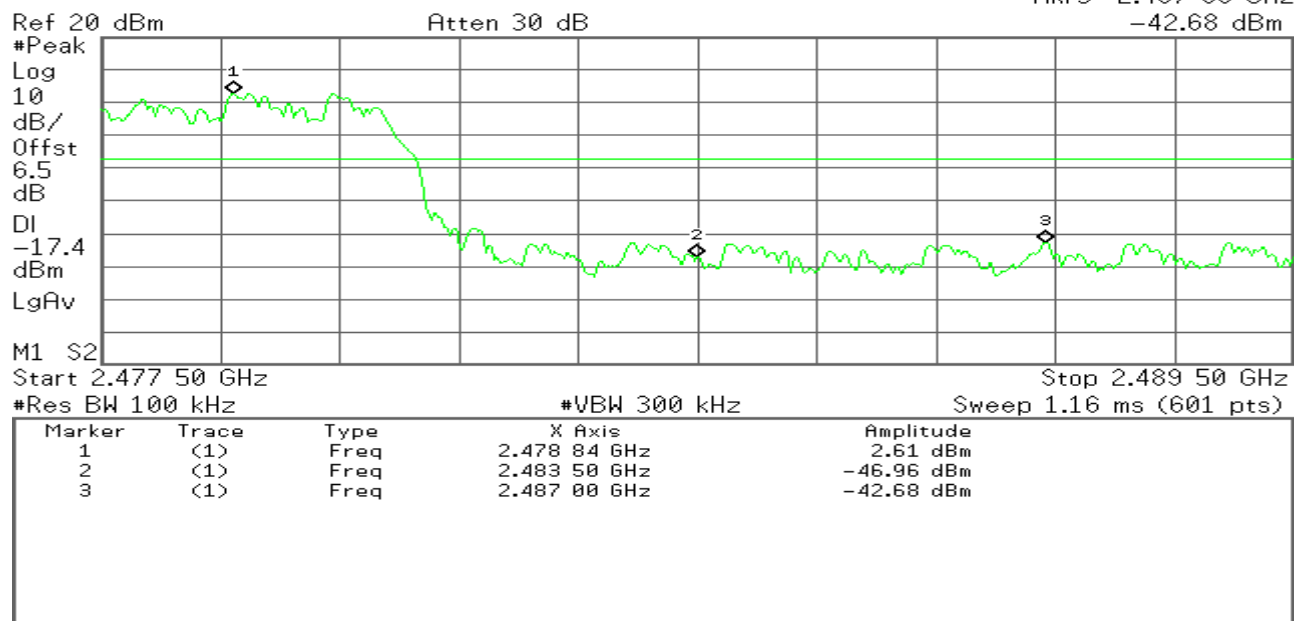
\* Agilent

R T

Mkr3 2.398 833 GHz  
-41.91 dBm**3Mbps Hopping Mode High Band Edge Plot**

\* Agilent

R T

Mkr3 2.487 00 GHz  
-42.68 dBm

## 6.7 Conducted Spurious Emission Measurement

### LIMIT

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### Test Configuration



### TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 KHz. The video bandwidth is set to 300 KHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

### TEST RESULTS

*No non-compliance noted*

Operation Mode:	1 Mbps	Test Date:	January 2, 2016
Test Channel:	00	Tested by:	Lily.Wang
Humidity:	52 % RH	Temperature:	24°C

Agilent

R T

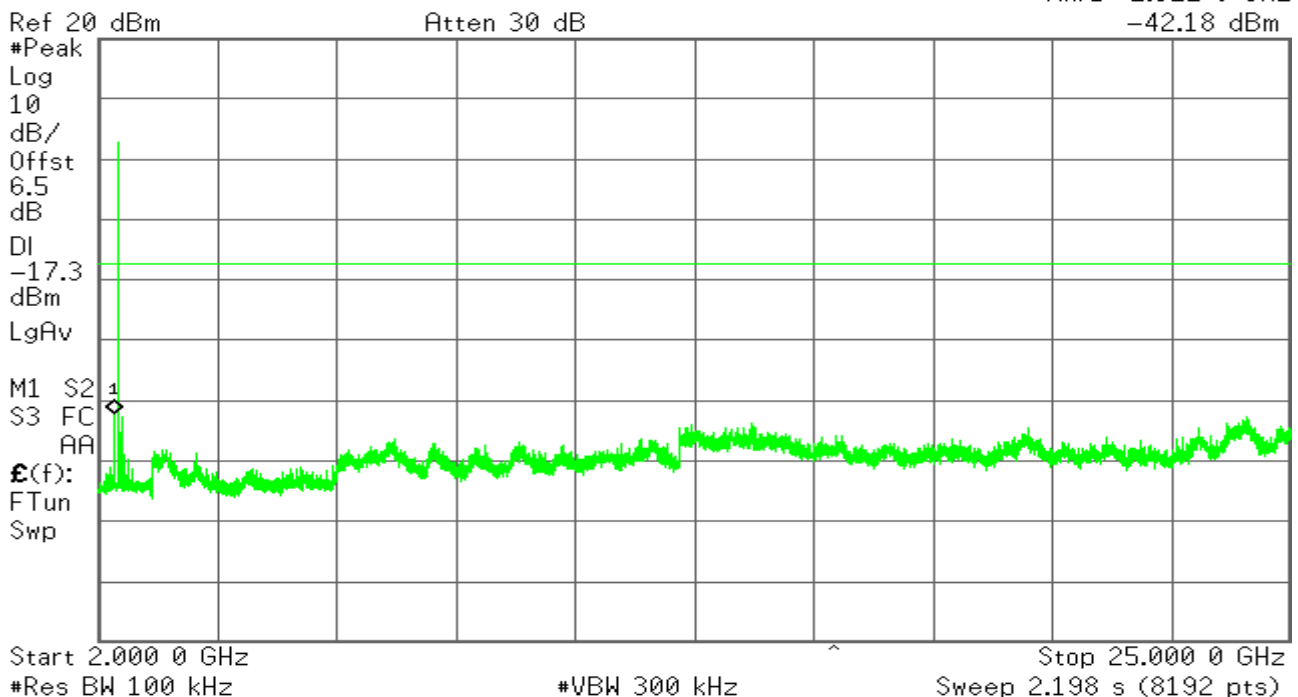
Mkr1 2.322 0 GHz  
-42.18 dBm



Agilent

R T

Mkr1 2.322 9 GHz  
-42.18 dBm



Operation Mode:	1 Mbps	Test Date:	January 2, 2016
Test Channel:	39	Tested by:	Lily.Wang
Humidity:	52 % RH	Temperature:	24°C

Agilent

R T

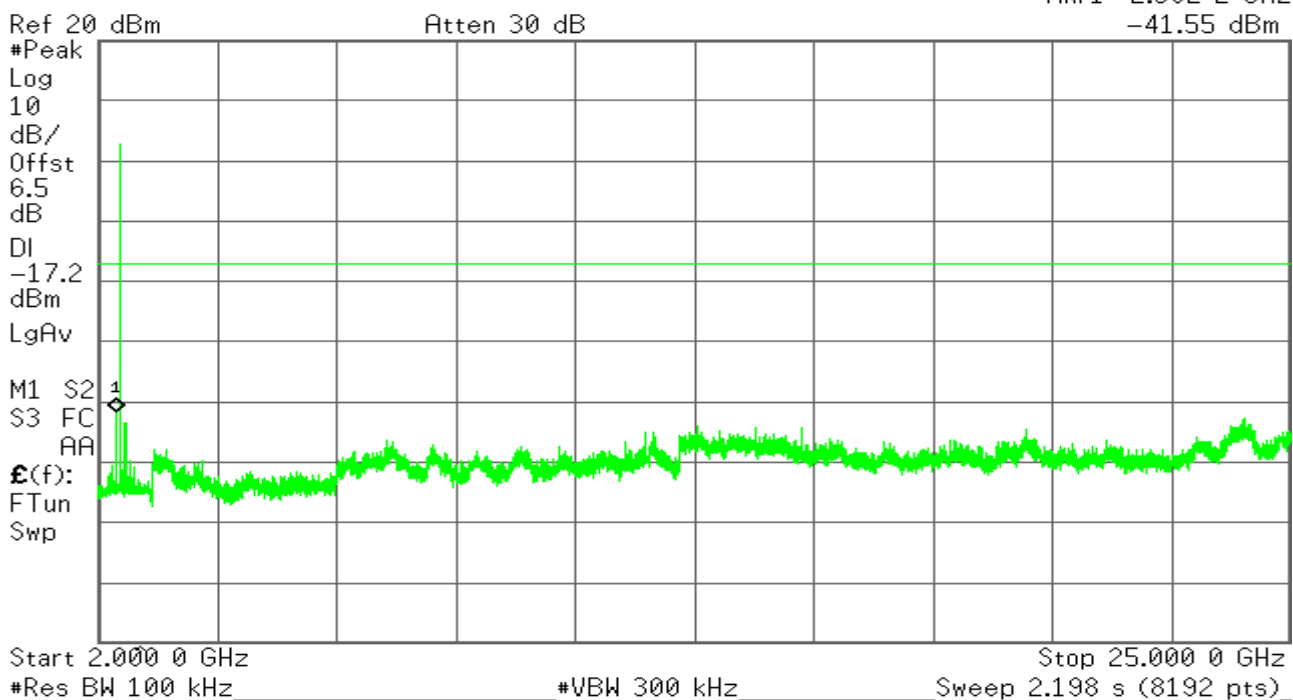
Mkr1 2.361 1 GHz  
-41.55 dBm



Agilent

R T

Mkr1 2.362 2 GHz  
-41.55 dBm

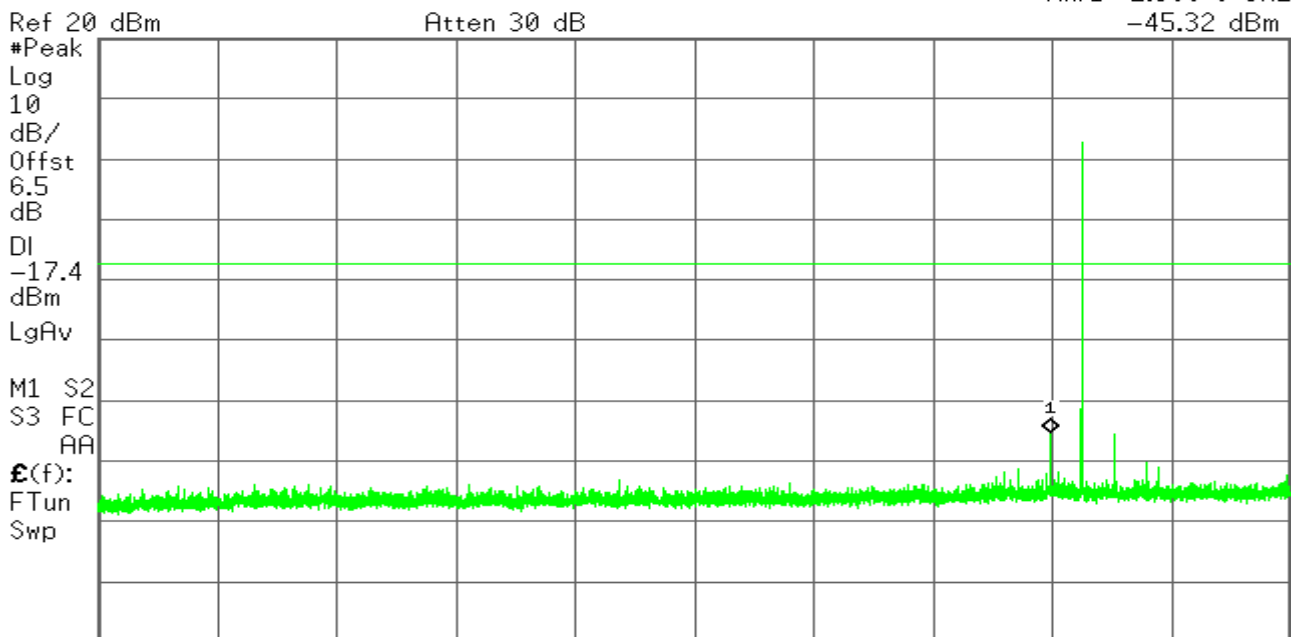


Operation Mode:	1 Mbps	Test Date:	January 2, 2016
Test Channel:	78	Tested by:	Lily.Wang
Humidity:	52 % RH	Temperature:	24°C

Agilent

R T

Mkr1 2.399 9 GHz  
-45.32 dBm

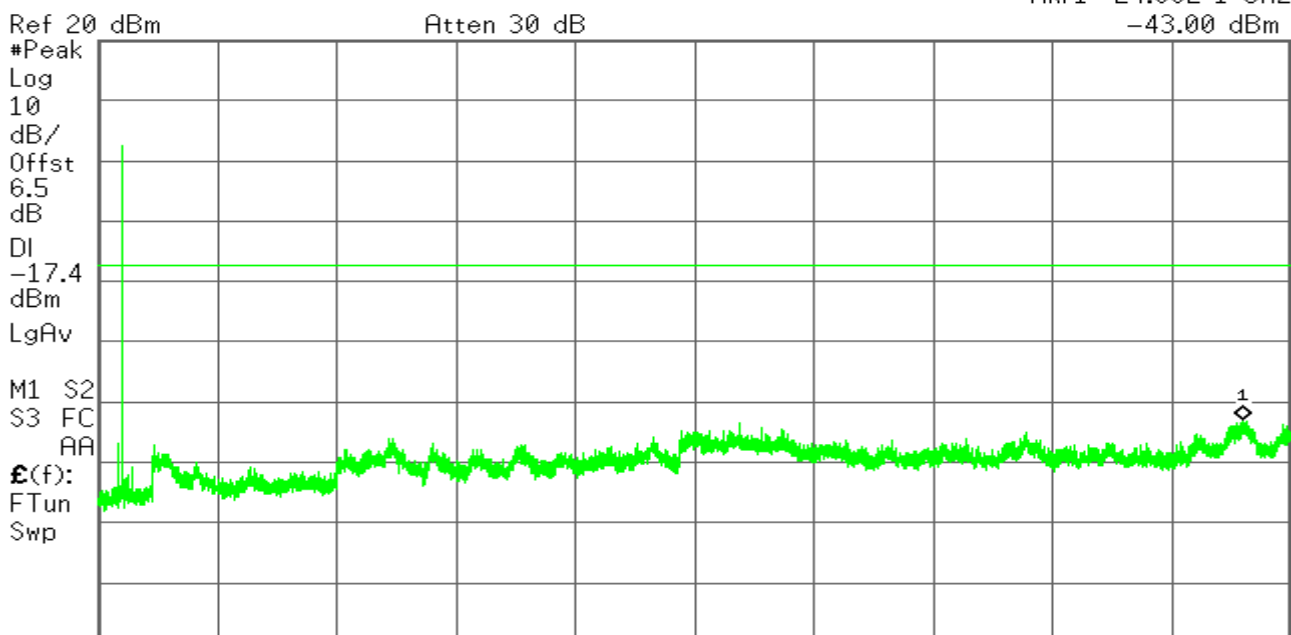


Start 30.0 MHz Stop 3.000 0 GHz  
#Res BW 100 kHz #VBW 300 kHz Sweep 284 ms (8192 pts)\_

Agilent

R T

Mkr1 24.062 1 GHz  
-43.00 dBm



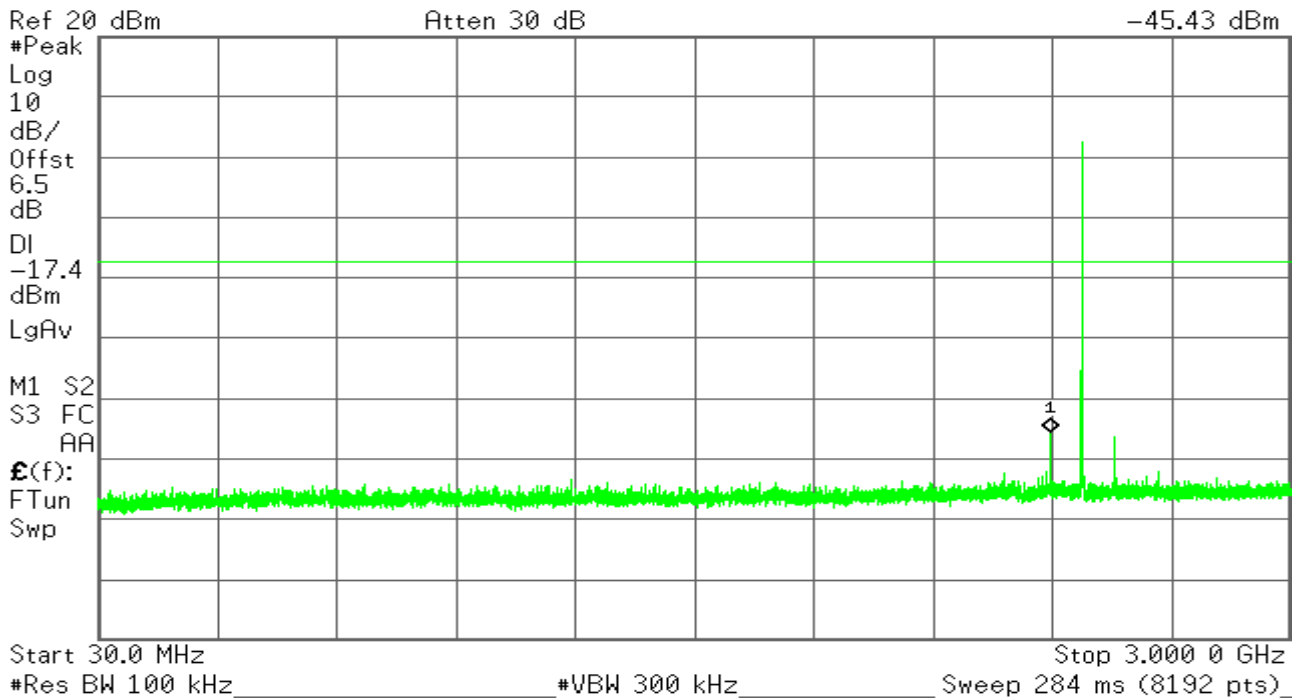
Start 2.000 0 GHz Stop 25.000 0 GHz  
#Res BW 100 kHz #VBW 300 kHz Sweep 2.198 s (8192 pts)\_

Operation Mode:	3 Mbps	Test Date:	January 2, 2016
Test Channel:	00	Tested by:	Lily.Wang
Humidity:	52 % RH	Temperature:	24°C

Agilent

R T

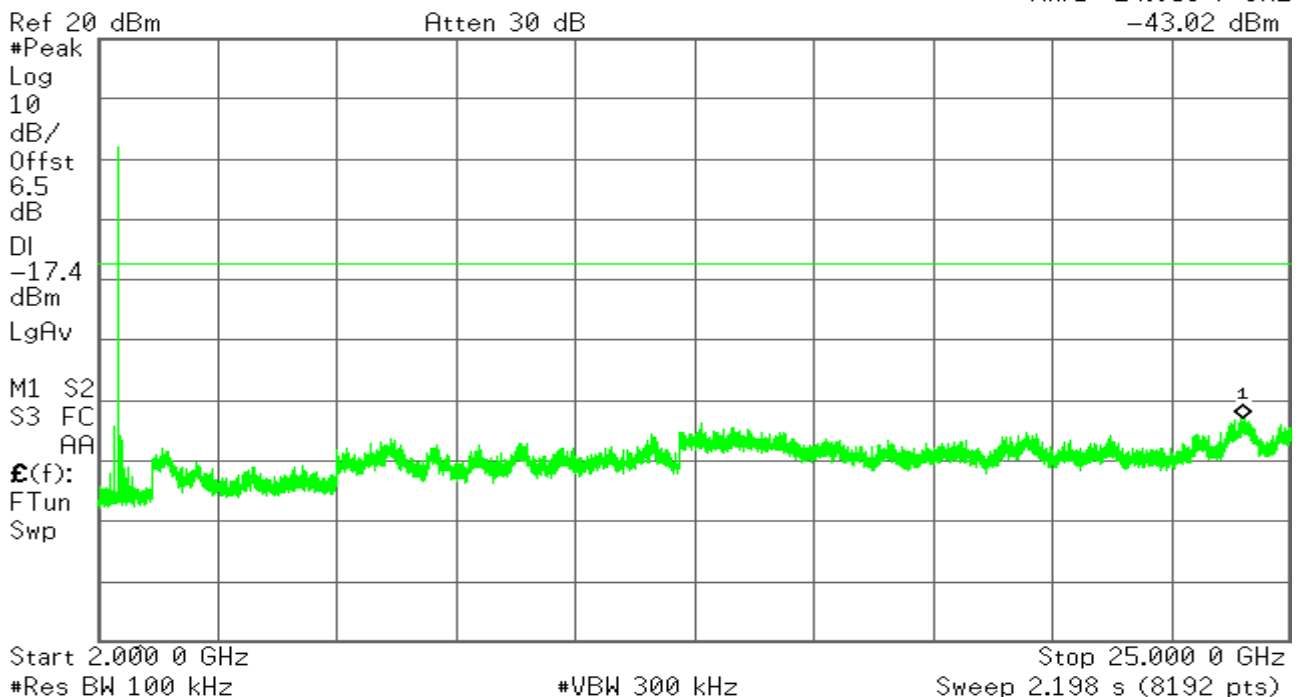
Mkr1 2.399 9 GHz  
-45.43 dBm



Agilent

R T

Mkr1 24.053 7 GHz  
-43.02 dBm



Operation Mode:	3 Mbps	Test Date:	January 2, 2016
Test Channel:	39	Tested by:	Lily.Wang
Humidity:	52 % RH	Temperature:	24°C

Agilent

R T

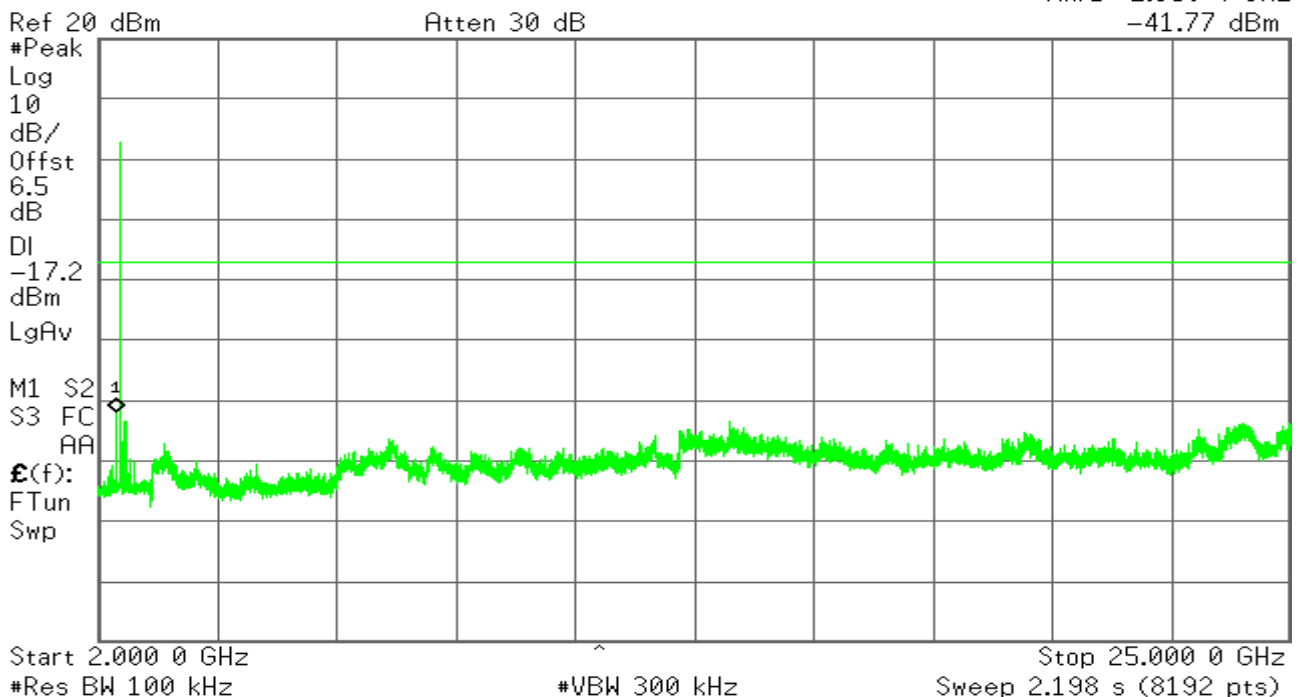
Mkr1 2.360 7 GHz  
-41.77 dBm



Agilent

R T

Mkr1 2.359 4 GHz  
-41.77 dBm



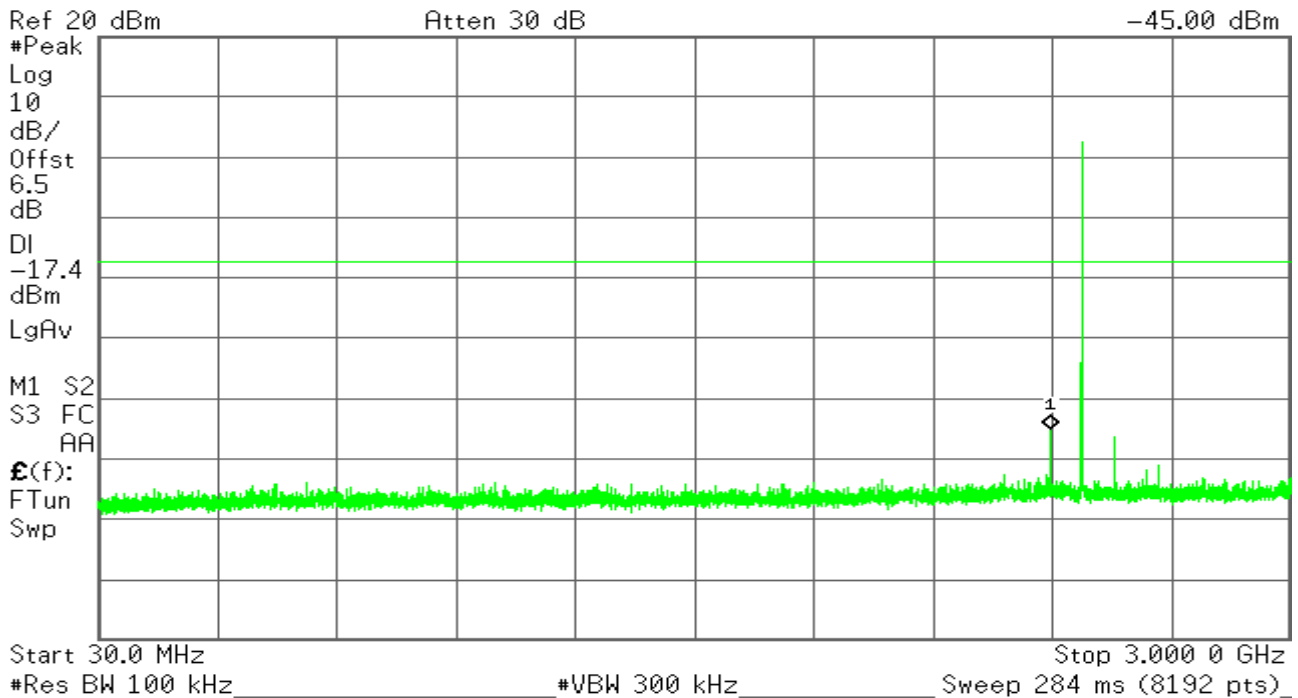


Operation Mode:	3 Mbps	Test Date:	January 2, 2016
Test Channel:	78	Tested by:	Lily.Wang
Humidity:	52 % RH	Temperature:	24°C

Agilent

R T

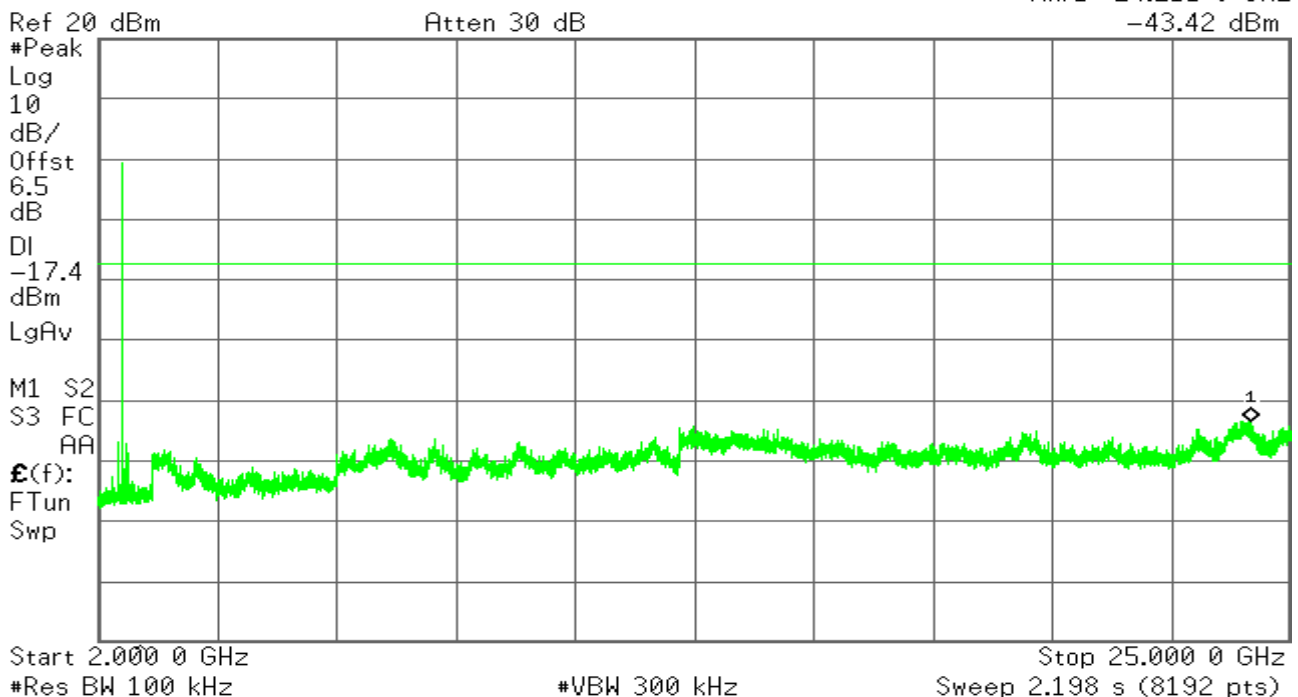
Mkr1 2.399 9 GHz  
-45.00 dBm



Agilent

R T

Mkr1 24.211 0 GHz  
-43.42 dBm



## 6.8 Radiated Band Edge and Spurious Emission Measurement

### LIMIT

- 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 (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

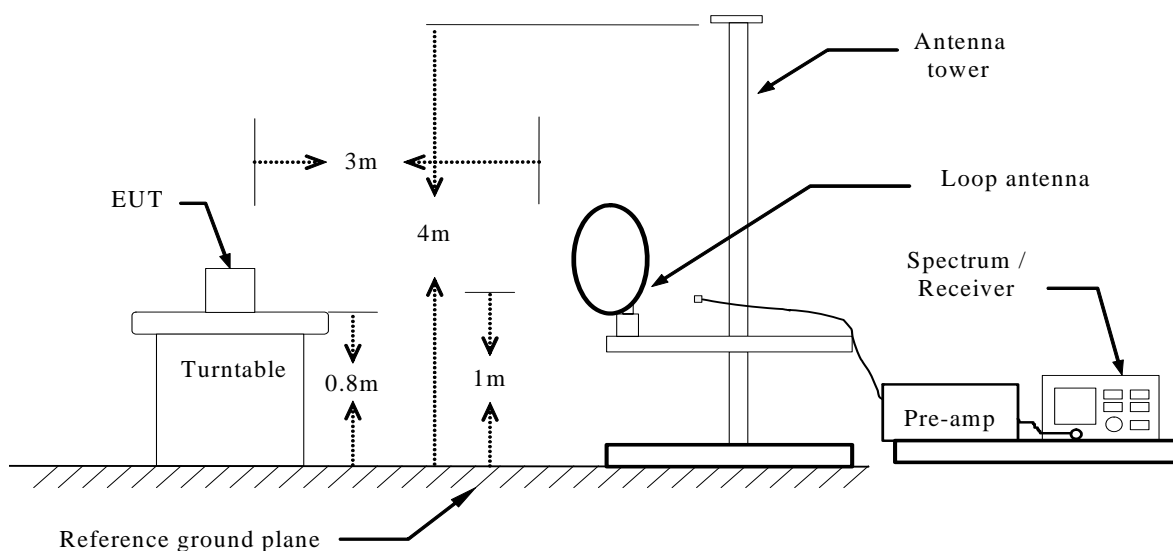
**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

- In the above emission table, the tighter limit applies at the band edges.

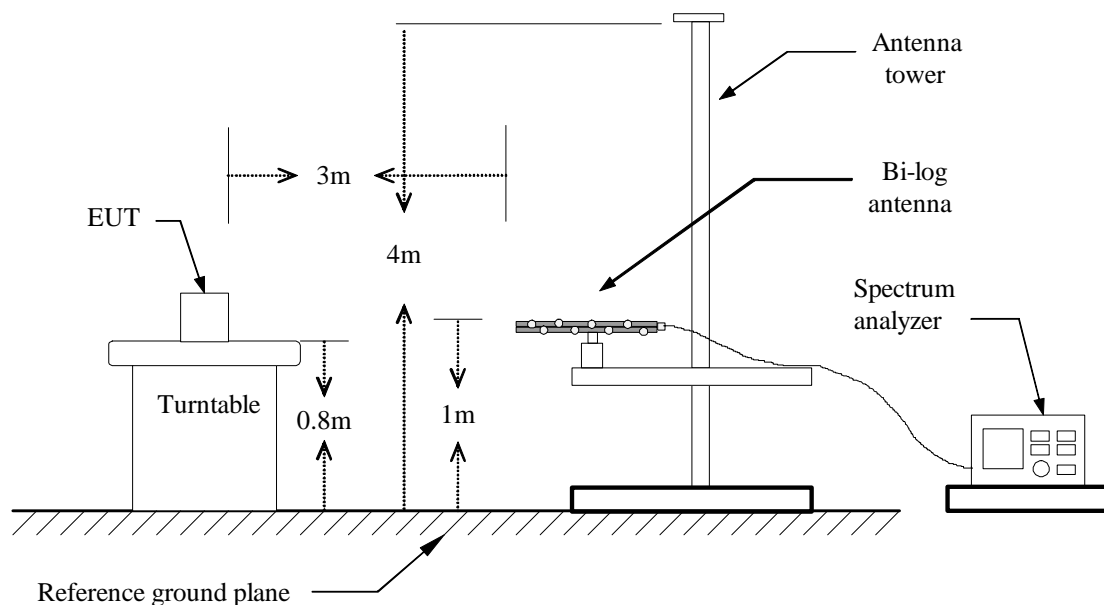
Frequency (Hz)	Field Strength ( $\mu\text{V/m}$ at 3-meter)	Field Strength ( $\text{dB}\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

### Test Configuration

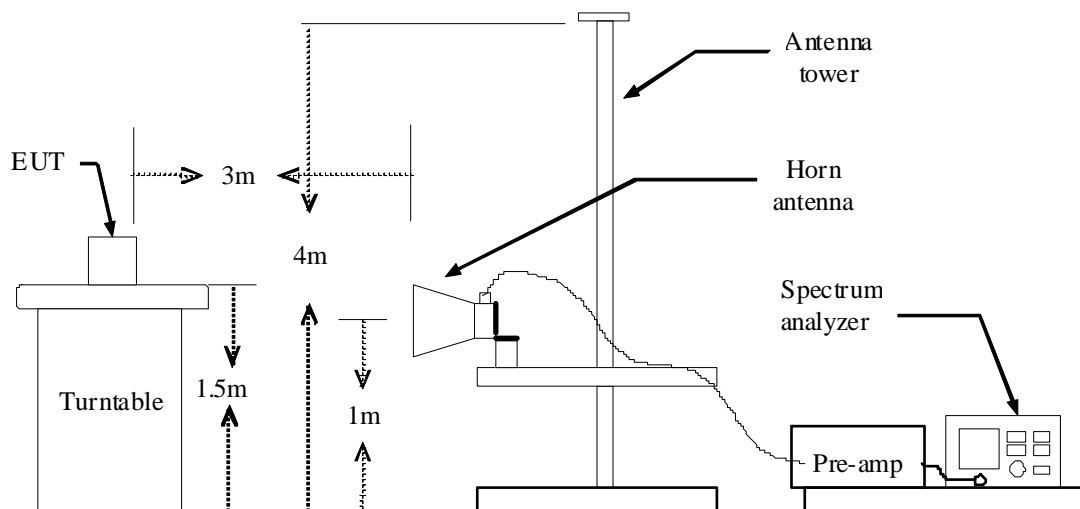
#### Below 30MHz



**Below 1 GHz**



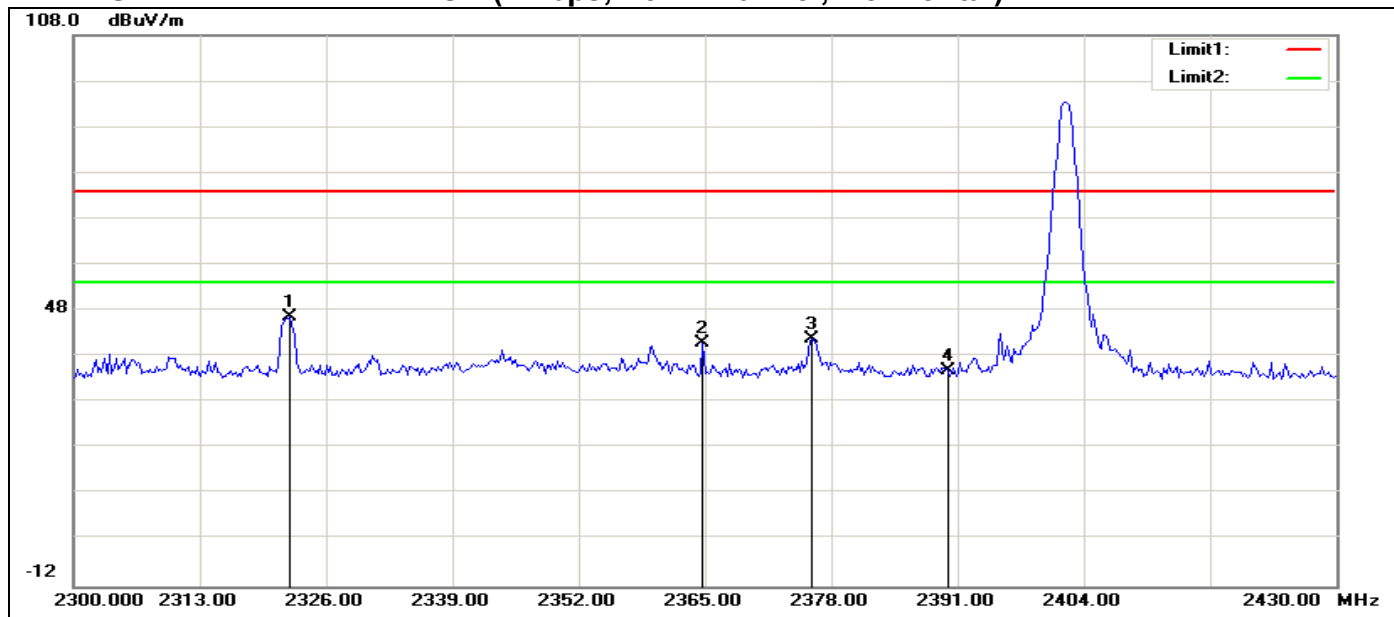
**Above 1 GHz**



**TEST PROCEDURE**

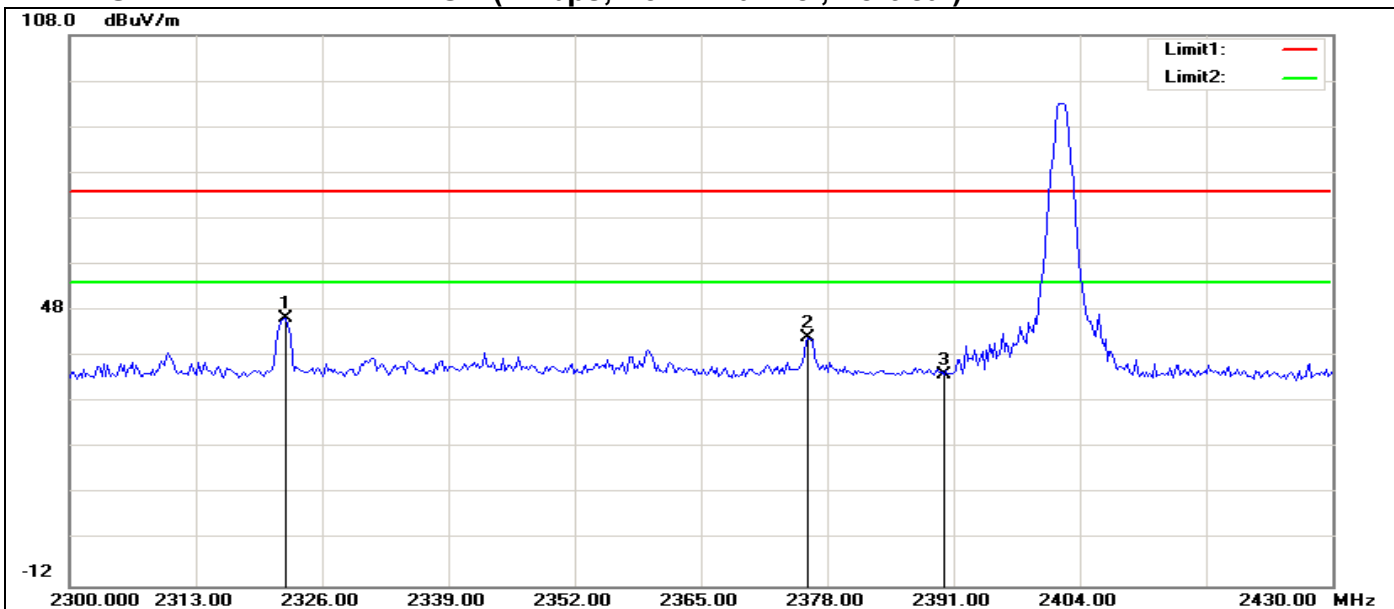
1. The EUT is placed on a turntable above ground plane, which is 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:  
Below 1GHz:  
RBW=100kHz / VBW=300kHz / Sweep=AUTO  
Above 1GHz:  
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO  
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

## RESTRICTED BANDEDGE (1Mbps, Low Channel, Horizontal)

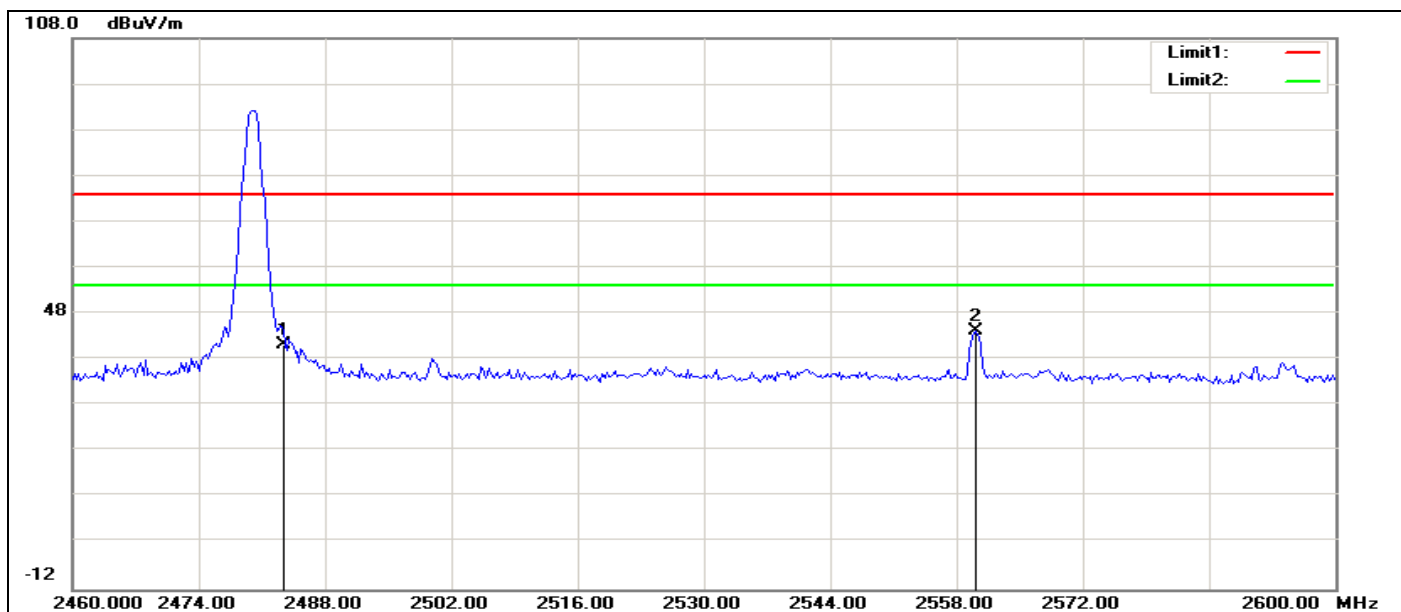


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2322.292	55.14	-8.62	46.52	74.00	-27.48	200	356	peak
2	2364.792	49.41	-8.54	40.87	74.00	-33.13	100	257	peak
3	2376.042	50.30	-8.51	41.79	74.00	-32.21	200	138	peak
4	2390.000	43.57	-8.49	35.08	74.00	-38.92	100	337	peak

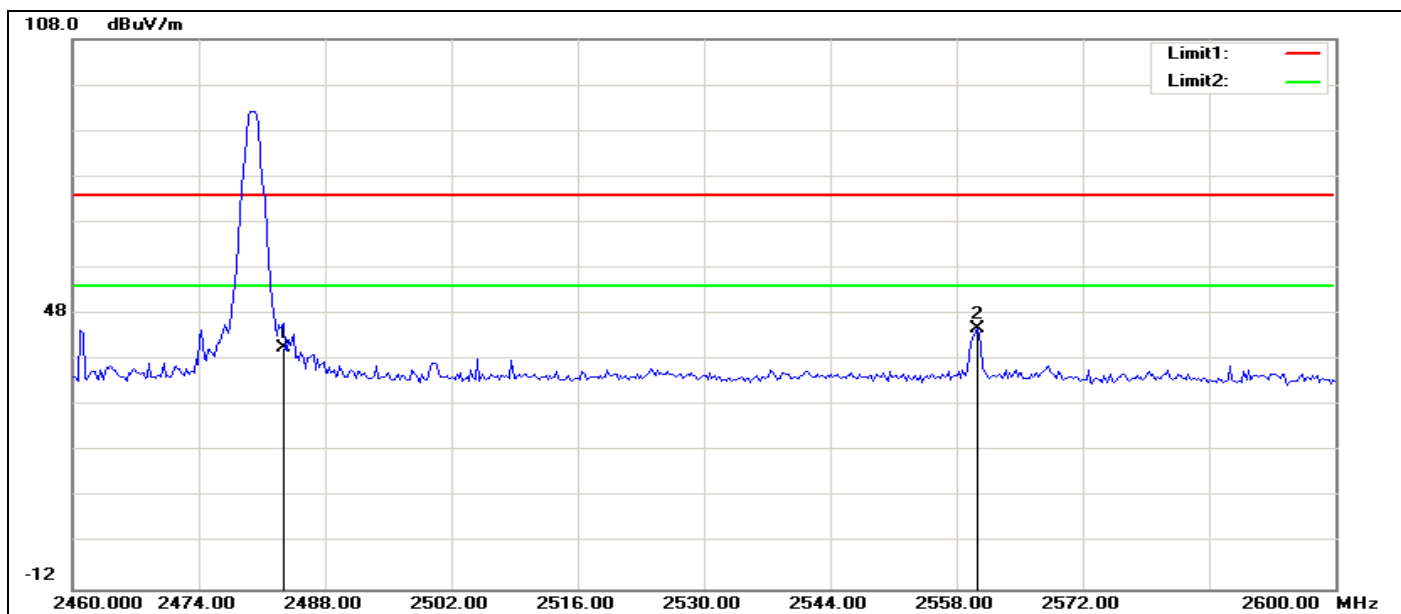
## RESTRICTED BANDEDGE (1Mbps, Low Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2322.292	54.96	-8.62	46.34	74.00	-27.66	200	0	peak
2	2376.042	50.55	-8.51	42.04	74.00	-31.96	200	120	peak
3	2390.000	42.68	-8.49	34.19	74.00	-39.81	100	291	peak

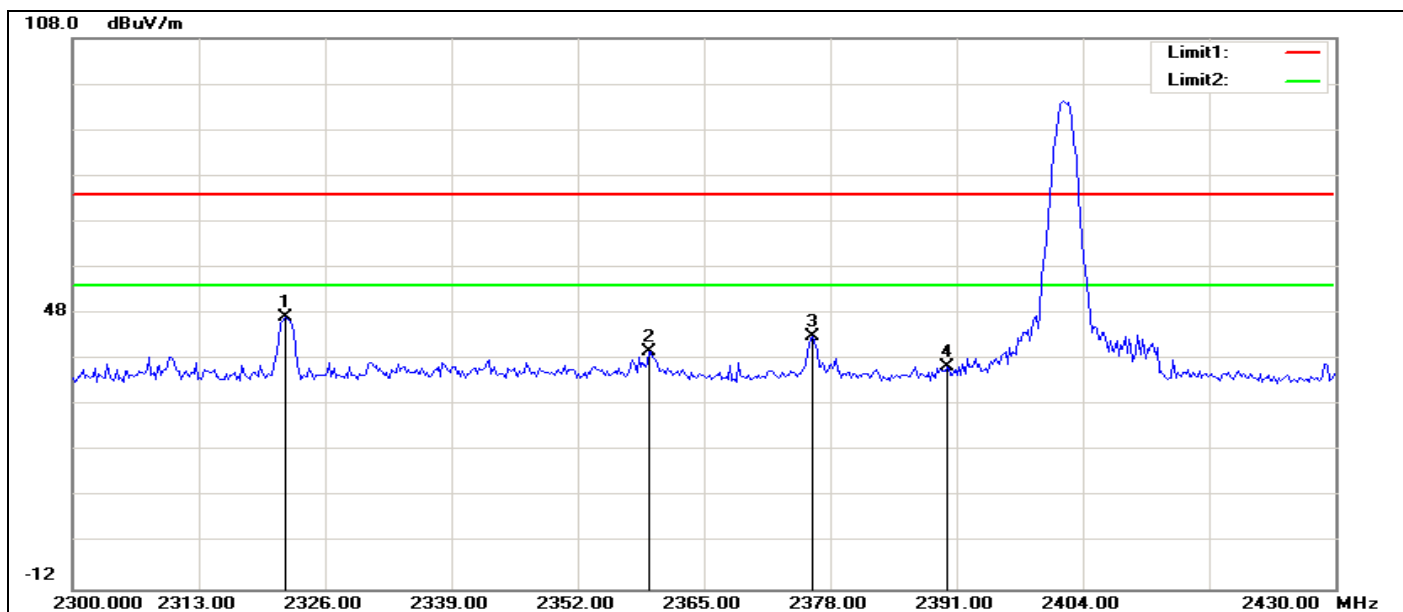
**RESTRICTED BANDEDGE (1Mbps Mode, High Channel, Horizontal)**

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	49.60	-8.30	41.30	74.00	-32.70	100	296	peak
2	2560.064	52.34	-8.15	44.19	74.00	-29.81	100	341	peak

**RESTRICTED BANDEDGE (1Mbps, High Channel, Vertical)**

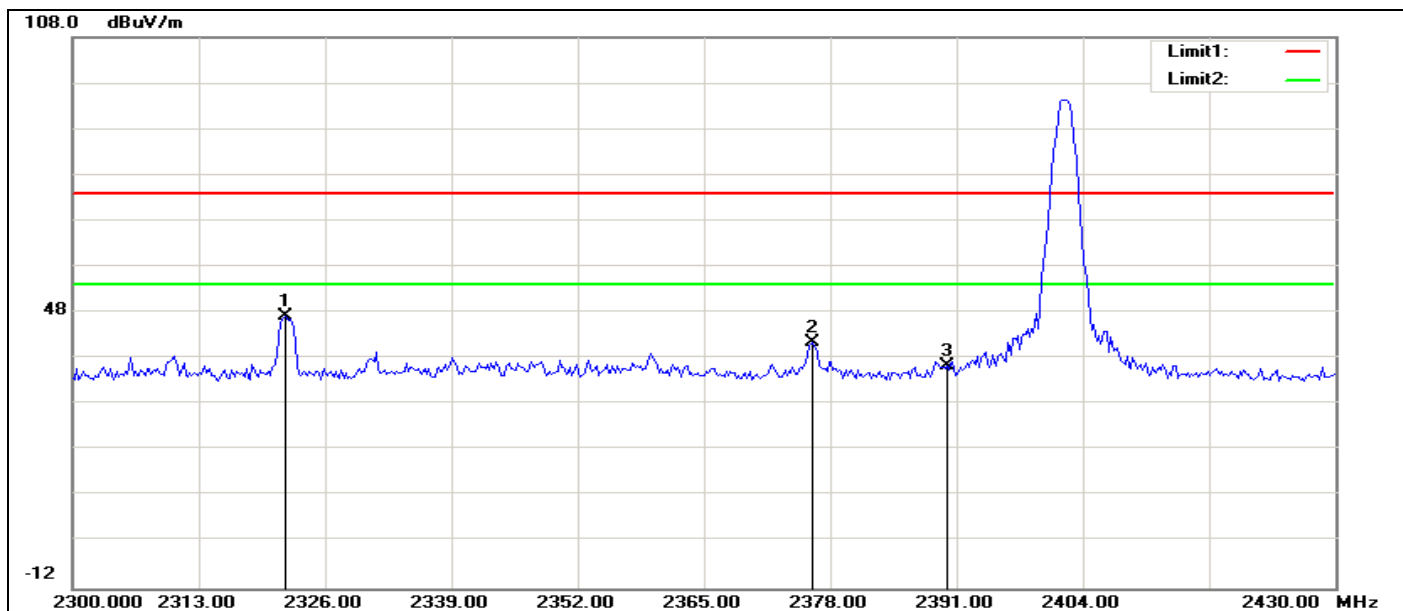
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	48.97	-8.30	40.67	74.00	-33.33	100	303	peak
2	2560.289	53.14	-8.15	44.99	74.00	-29.01	100	340	peak

## RESTRICTED BANDEDGE (3Mbps, Low Channel, Horizontal)



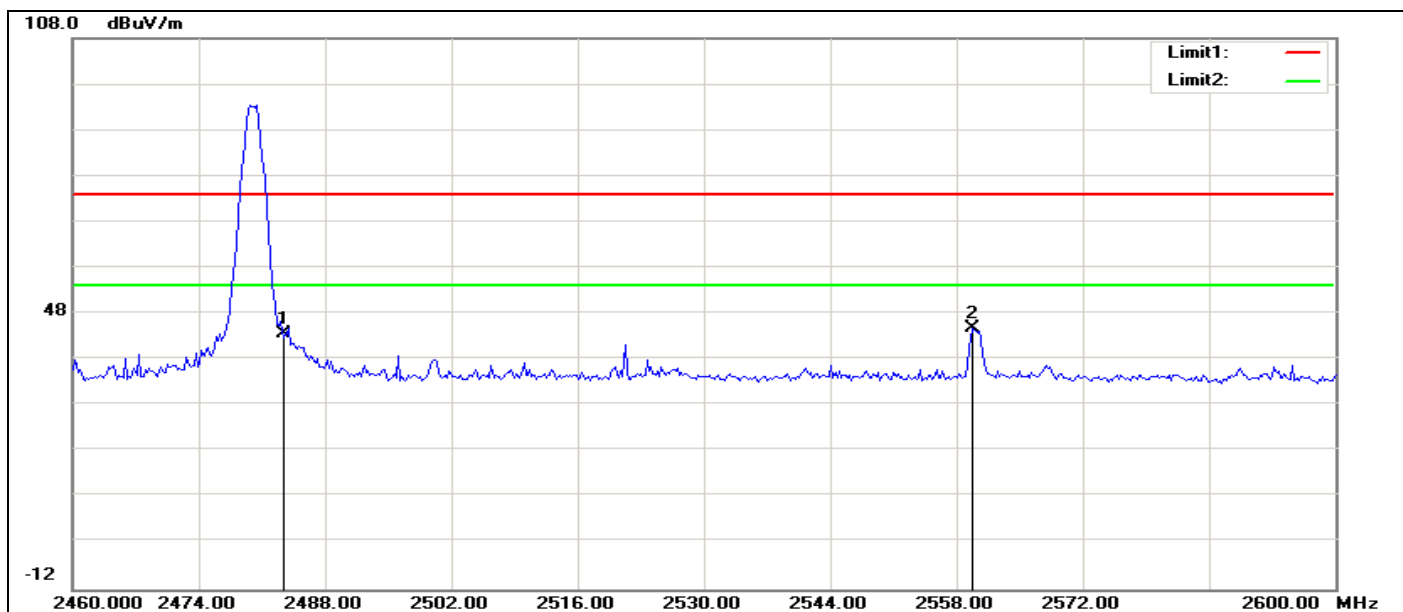
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2321.875	55.89	-8.62	47.27	74.00	-26.73	200	0	peak
2	2359.375	48.42	-8.55	39.87	74.00	-34.13	200	119	peak
3	2376.250	51.59	-8.51	43.08	74.00	-30.92	200	118	peak
4	2390.000	45.00	-8.49	36.51	74.00	-37.49	100	263	peak

## RESTRICTED BANDEDGE (3Mbps, Low Channel, Vertical)



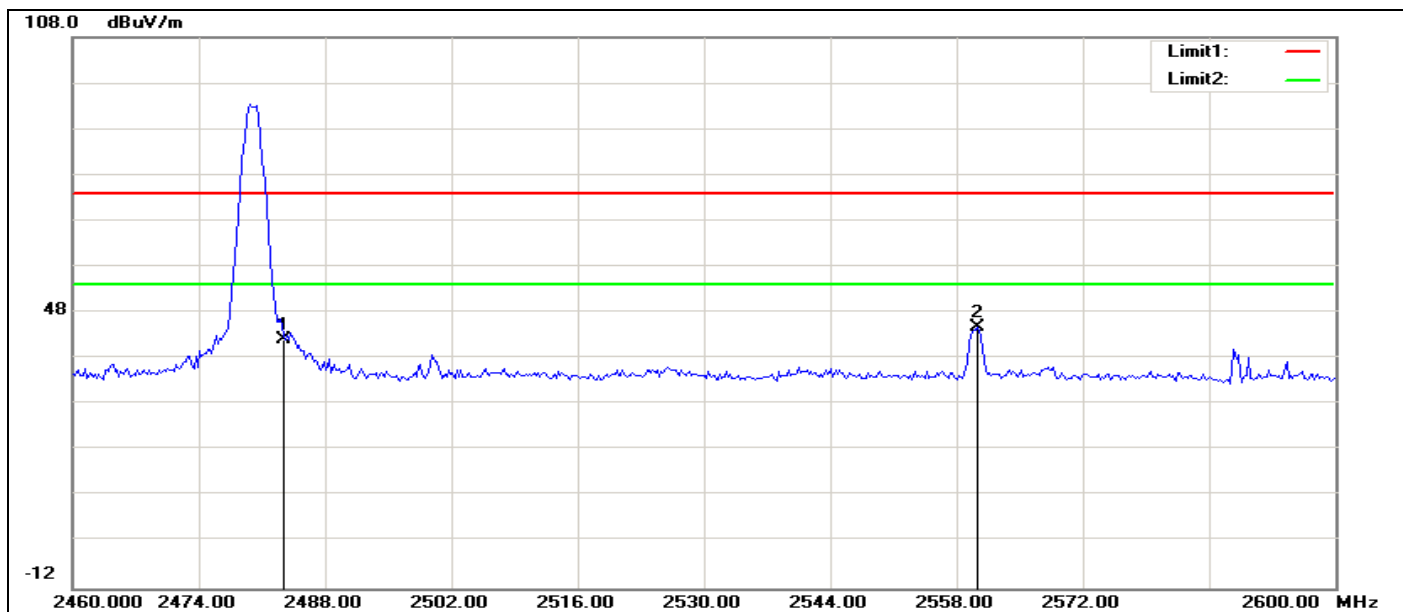
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2321.875	55.74	-8.62	47.12	74.00	-26.88	200	0	peak
2	2376.250	50.12	-8.51	41.61	74.00	-32.39	200	54	peak
3	2390.000	44.86	-8.49	36.37	74.00	-37.63	100	341	peak

## RESTRICTED BANDEDGE (3Mbps, High Channel, Horizontal)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	51.86	-8.30	43.56	74.00	-30.44	100	301	peak
2	2559.840	52.88	-8.15	44.73	74.00	-29.27	100	341	peak

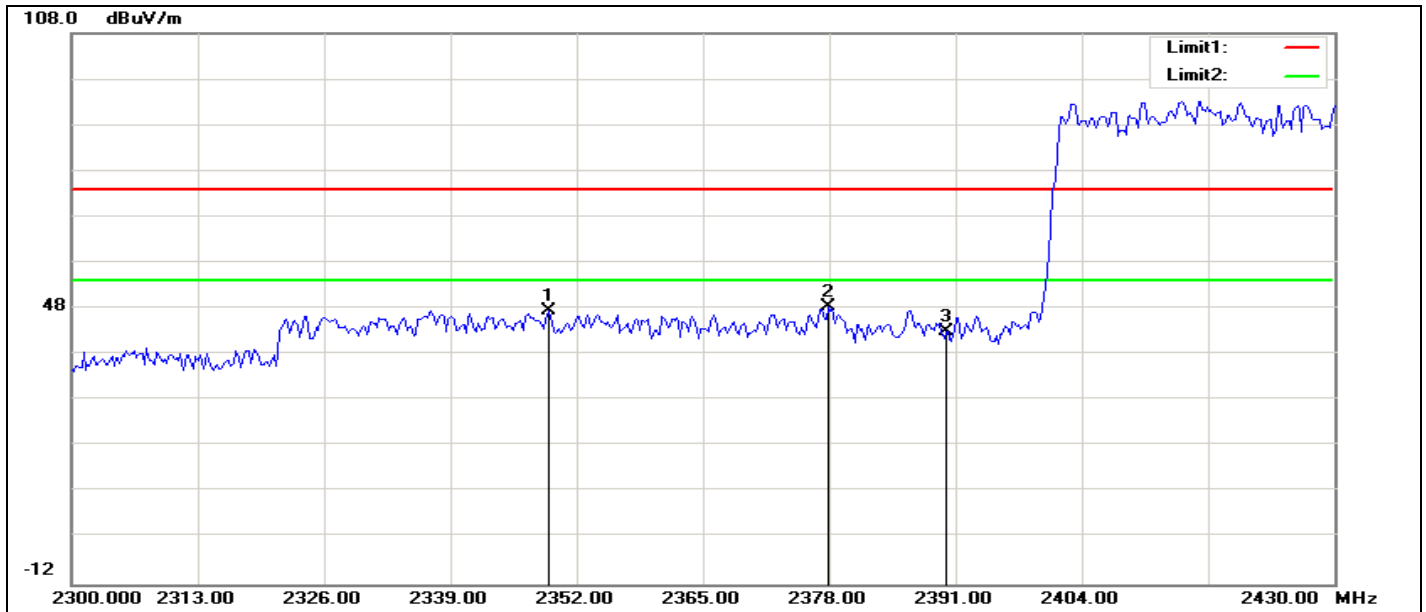
## RESTRICTED BANDEDGE (3Mbps, High Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	50.35	-8.30	42.05	74.00	-31.95	100	303	peak
2	2560.289	52.85	-8.15	44.70	74.00	-29.30	100	341	peak

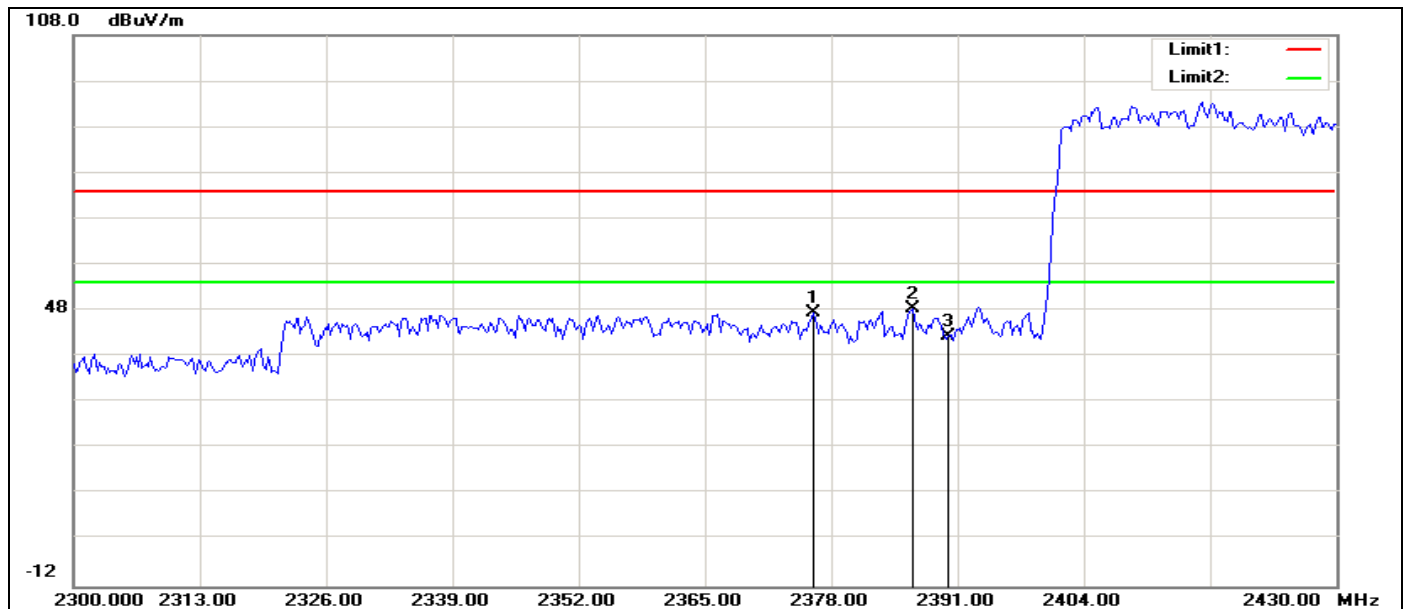


## RESTRICTED BANDEDGE (1Mbps, Low Channel, Horizontal,hopping)



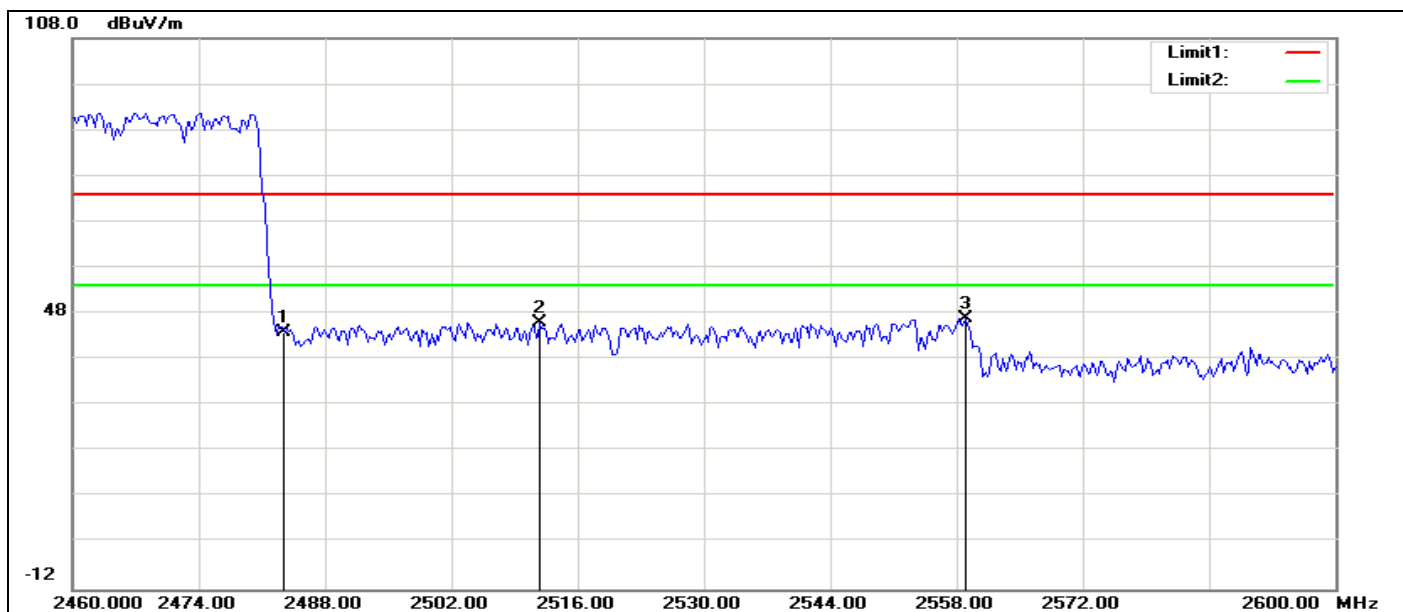
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2349.167	56.01	-8.57	47.44	74.00	-26.56	200	341	peak
2	2377.917	56.84	-8.51	48.33	74.00	-25.67	200	337	peak
3	2390.000	51.59	-8.49	43.10	74.00	-30.90	100	157	peak

## RESTRICTED BANDEDGE (1Mbps, Low Channel, Vertical,hopping)



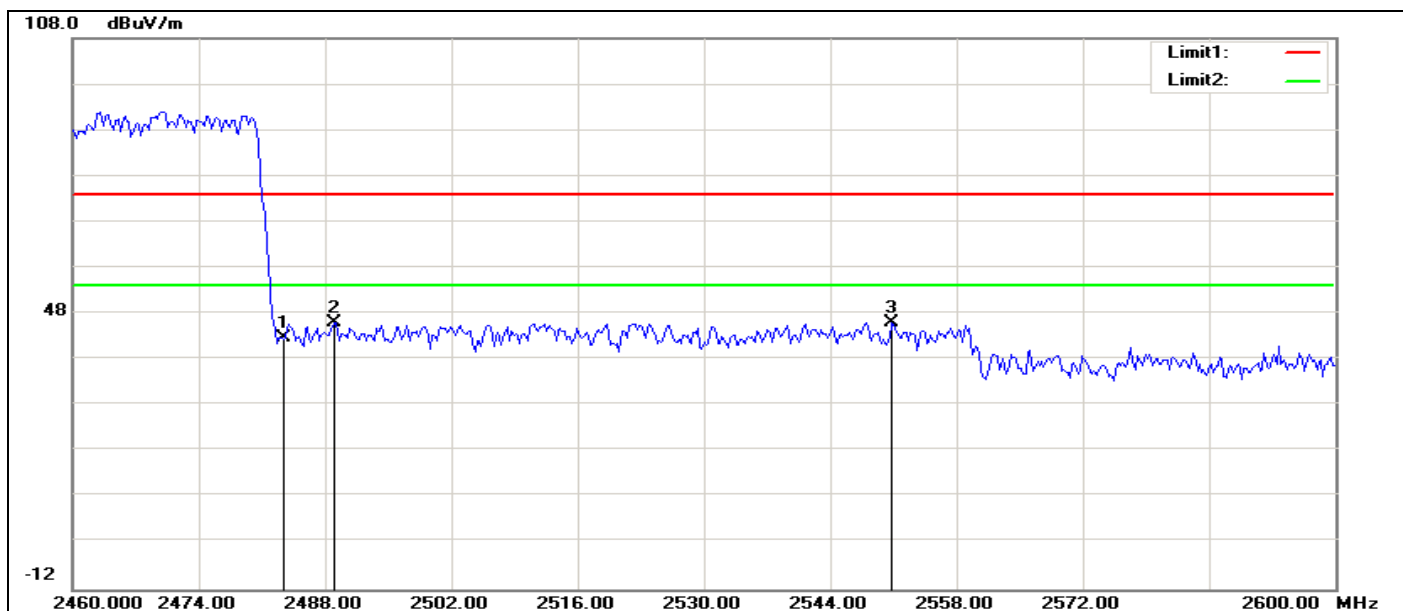
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2376.250	56.14	-8.51	47.63	74.00	-26.37	200	295	peak
2	2386.458	56.80	-8.49	48.31	74.00	-25.69	200	339	peak
3	2390.000	51.01	-8.49	42.52	74.00	-31.48	100	292	peak

## RESTRICTED BANDEDGE (1Mbps Mode, High Channel, Horizontal,hopping)



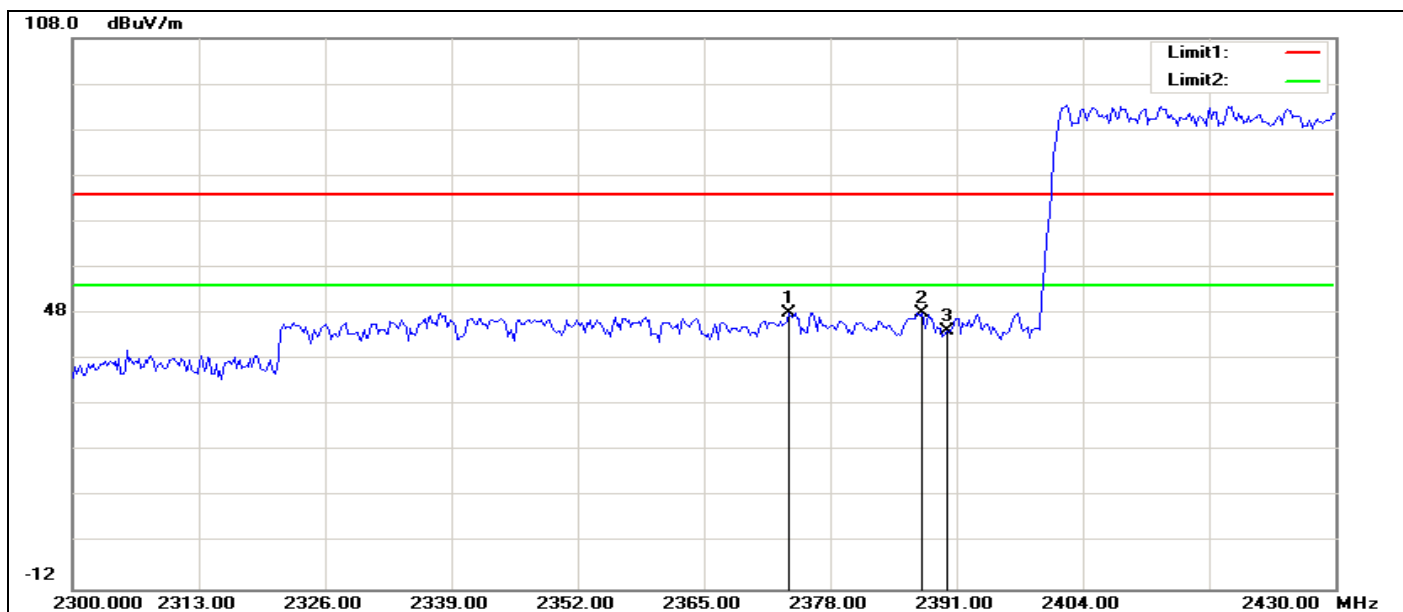
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	52.29	-8.30	43.99	74.00	-30.01	100	348	peak
2	2511.827	54.34	-8.25	46.09	74.00	-27.91	200	32	peak
3	2558.942	55.12	-8.15	46.97	74.00	-27.03	100	342	peak

## RESTRICTED BANDEDGE (1Mbps, High Channel, Vertical,hopping)



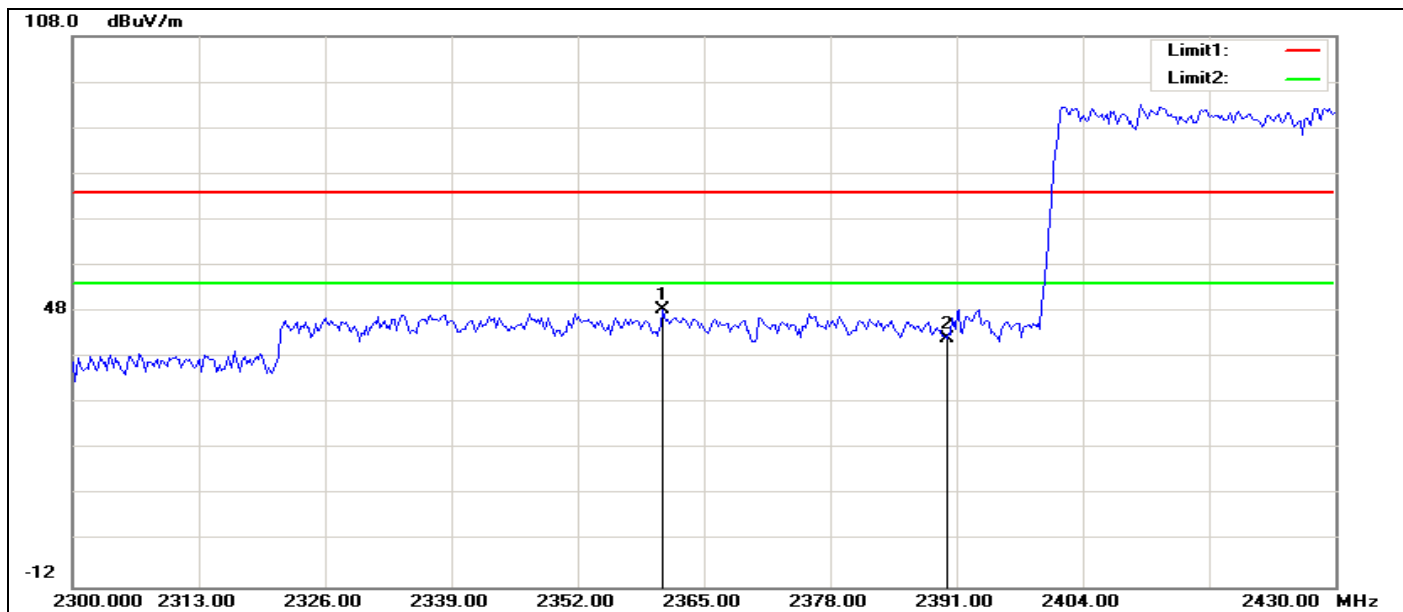
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	51.09	-8.30	42.79	74.00	-31.21	100	206	peak
2	2488.942	54.39	-8.29	46.10	74.00	-27.90	200	205	peak
3	2550.865	54.21	-8.17	46.04	74.00	-27.96	200	169	peak

## RESTRICTED BANDEDGE (3Mbps, Low Channel, Horizontal,hopping)



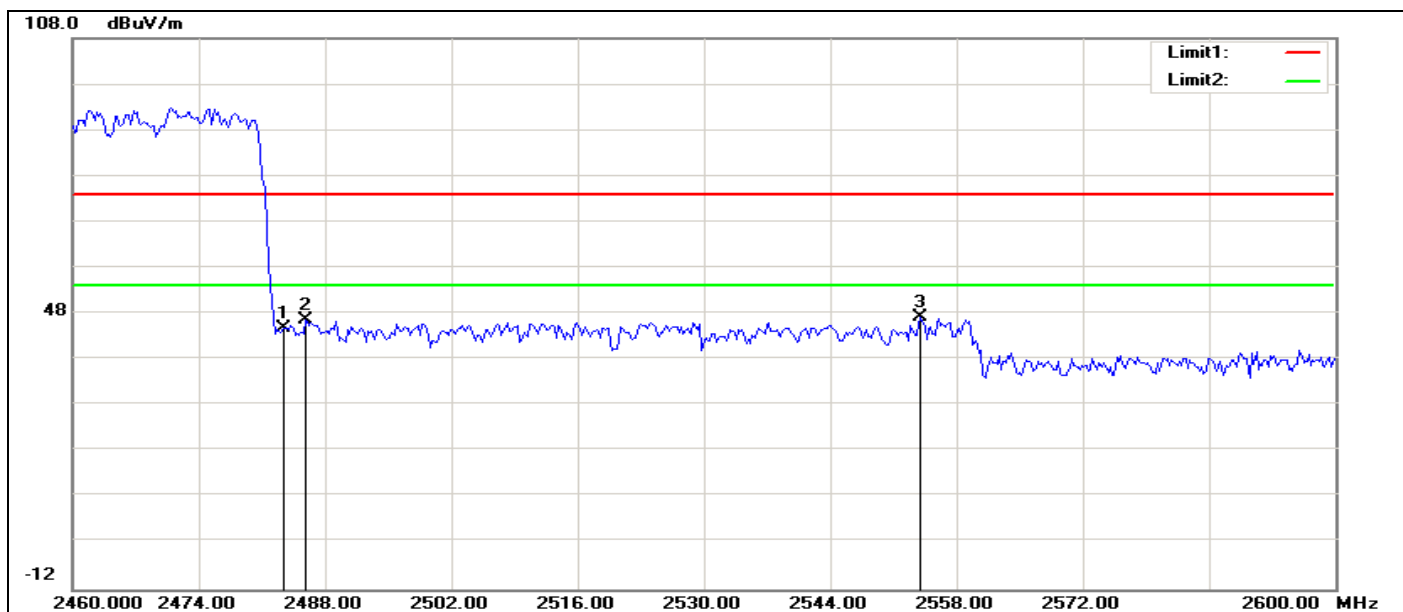
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2373.750	56.68	-8.52	48.16	74.00	-25.84	200	341	peak
2	2387.500	56.70	-8.49	48.21	74.00	-25.79	200	341	peak
3	2390.000	52.64	-8.49	44.15	74.00	-29.85	100	298	peak

## RESTRICTED BANDEDGE (3Mbps, Low Channel, Vertical,hopping)



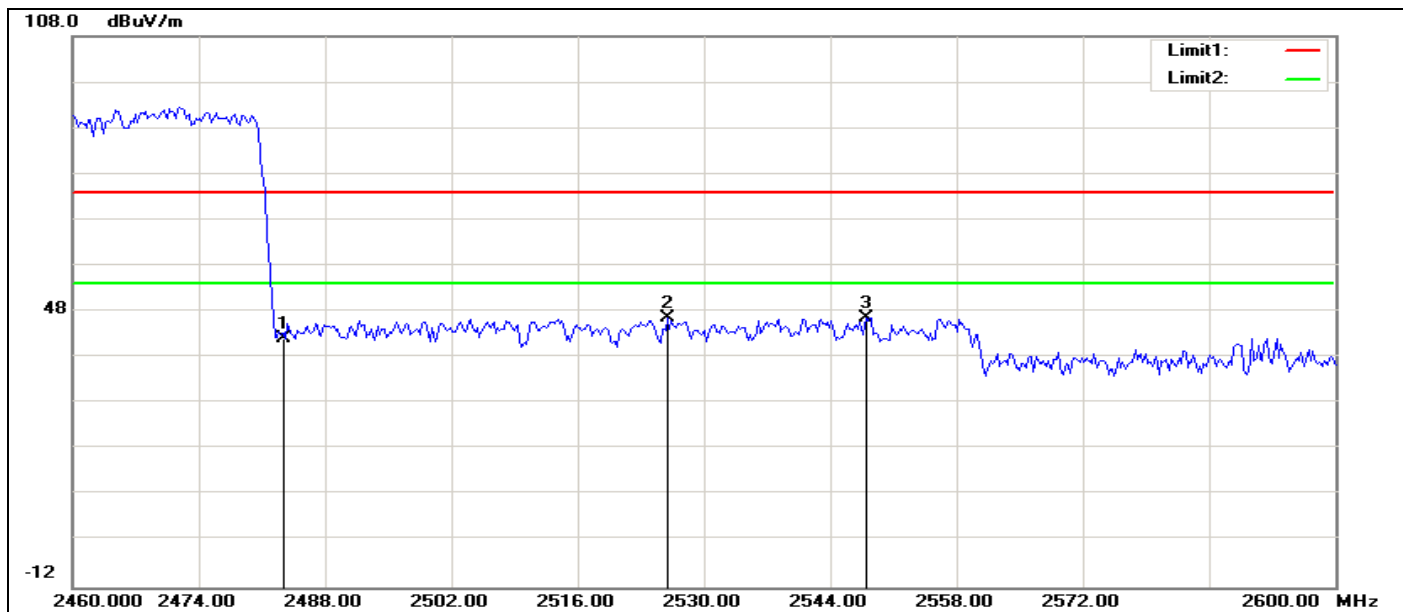
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2360.833	56.95	-8.54	48.41	74.00	-25.59	200	342	peak
2	2390.000	50.57	-8.49	42.08	74.00	-31.92	100	360	peak

## RESTRICTED BANDEDGE (3Mbps, High Channel, Horizontal,hopping)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	53.30	-8.30	45.00	74.00	-29.00	100	188	peak
2	2485.801	55.03	-8.30	46.73	74.00	-27.27	200	297	peak
3	2554.006	55.43	-8.16	47.27	74.00	-26.73	100	342	peak

## RESTRICTED BANDEDGE (3Mbps, High Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2483.500	50.58	-8.30	42.28	74.00	-31.72	100	290	peak
2	2525.961	54.81	-8.22	46.59	74.00	-27.41	200	38	peak
3	2547.949	54.82	-8.18	46.64	74.00	-27.36	100	341	peak

**TEST RESULT OF RADIATED EMISSION**

<b>Operation Mode:</b>	Normal Link	<b>Test Date:</b>	2015-12-27
<b>Temperature:</b>	25°C	<b>Tested by:</b>	Lily.Wang
<b>Humidity:</b>	48% RH	<b>Polarity:</b>	Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
32.9100	V	16.05	18.38	34.43	40.00	-5.57	peak
118.2700	V	25.49	11.97	37.46	43.50	-6.04	peak
154.1600	V	24.59	11.59	36.18	43.50	-7.32	peak
461.6500	V	17.48	18.64	36.12	46.00	-9.88	peak
723.5500	V	17.74	22.78	40.52	46.00	-5.48	peak
960.2300	V	16.07	24.78	40.85	54.00	-13.15	peak
32.9100	H	14.70	18.38	33.08	40.00	-6.92	peak
117.3000	H	21.20	11.98	33.18	43.50	-10.32	peak
154.1600	H	24.32	11.59	35.91	43.50	-7.59	peak
308.3900	H	18.52	14.59	33.11	46.00	-12.89	peak
720.6400	H	18.87	22.79	41.66	46.00	-4.34	peak
939.8600	H	15.05	24.68	39.73	46.00	-6.27	peak

**Notes:**

1. Measurements above show only up to maximum emissions noted, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
2. Radiated emissions measured in frequency range from 9 KHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.



# Compliance Certification Services Inc.

Date of Issue :January 13, 2016

Report No: C151211R02-RPB

FCC ID: 2AAED-R9861510

IC: 9393B-R9861510

## Above 1 GHz

Operation Mode: 1 Mbps

Test Date: December 29, 2015

Test Channel: CH00

Tested by: Lily.Wang

Temperature: 25°C

Polarity: Ver. / Hor.

## Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4814.103	42.56	-2.60	39.96	74.00	-34.04	100	64	peak
2	7701.923	41.47	3.55	45.02	74.00	-28.98	100	326	peak
N/A									

## Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4841.346	42.92	-2.52	40.40	74.00	-33.60	100	8	peak
2	7620.192	41.21	3.26	44.47	74.00	-29.53	100	310	peak
N/A									

Operation Mode: 1 Mbps

Test Date: December 29, 2015

Test Channel: CH39

Tested by: Lily.Wang

Temperature: 25°C

Polarity: Ver. / Hor.

## Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5004.808	43.72	-2.04	41.68	74.00	-32.32	200	297	peak
2	7701.923	41.68	3.55	45.23	74.00	-28.77	109	0	peak
N/A									

## Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	42.51	-2.28	40.23	74.00	-33.77	200	110	peak
2	7620.192	41.16	3.26	44.42	74.00	-29.58	200	2	peak
N/A									



# Compliance Certification Services Inc.

Date of Issue :January 13, 2016

Report No: C151211R02-RPB

FCC ID: 2AAED-R9861510

IC: 9393B-R9861510

Operation Mode: 1 Mbps

Test Date: December 29, 2015

Test Channel: CH78

Tested by: Lily.Wang

Temperature: 25°C

Polarity: Ver. / Hor.

## Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5004.808	42.68	-2.04	40.64	74.00	-33.36	200	295	peak
2	7293.269	40.96	2.12	43.08	74.00	-30.92	200	327	peak
N/A									

## Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4977.564	42.51	-2.12	40.39	74.00	-33.61	108	0	peak
2	7538.462	41.66	2.98	44.64	74.00	-29.36	100	1	peak
N/A									

Operation Mode: 3 Mbps

Test Date: December 29, 2015

Test Channel: CH00

Tested by: Lily.Wang

Temperature: 25°C

Polarity: Ver. / Hor.

## Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5059.295	42.60	-1.94	40.66	74.00	-33.34	200	127	peak
2	7783.654	41.25	3.83	45.08	74.00	-28.92	100	189	peak
N/A									

## Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5059.295	43.30	-1.94	41.36	74.00	-32.64	200	36	peak
2	7483.974	41.81	2.79	44.60	74.00	-29.40	101	0	peak
N/A									



# Compliance Certification Services Inc.

Date of Issue :January 13, 2016

Report No: C151211R02-RPB

FCC ID: 2AAED-R9861510

IC: 9393B-R9861510

Operation Mode: 3 Mbps

Test Date: December 29, 2015

Test Channel: CH39

Tested by: Lily.Wang

Temperature: 25°C

Polarity: Ver. / Hor.

## Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	5004.808	42.42	-2.04	40.38	74.00	-33.62	200	249	peak
2	7511.218	41.46	2.88	44.34	74.00	-29.66	100	214	peak
N/A									

## Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4705.128	43.32	-2.92	40.40	74.00	-33.60	200	2	peak
2	7429.487	42.02	2.60	44.62	74.00	-29.38	100	47	peak
N/A									

Operation Mode: 3 Mbps

Test Date: December 29, 2015

Test Channel: CH78

Tested by: Lily.Wang

Temperature: 25°C

Polarity: Ver. / Hor.

## Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	42.85	-2.28	40.57	74.00	-33.43	200	120	peak
2	7674.680	42.13	3.45	45.58	74.00	-28.42	200	347	peak
N/A									

## Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4923.077	42.76	-2.28	40.48	74.00	-33.52	200	323	peak
2	7620.192	42.29	3.26	45.55	74.00	-28.45	106	0	peak
N/A									



**Remark:**

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
  - a. *Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.*
  - b. *AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.*

## 6.9 POWERLINE CONDUCTED EMISSIONS

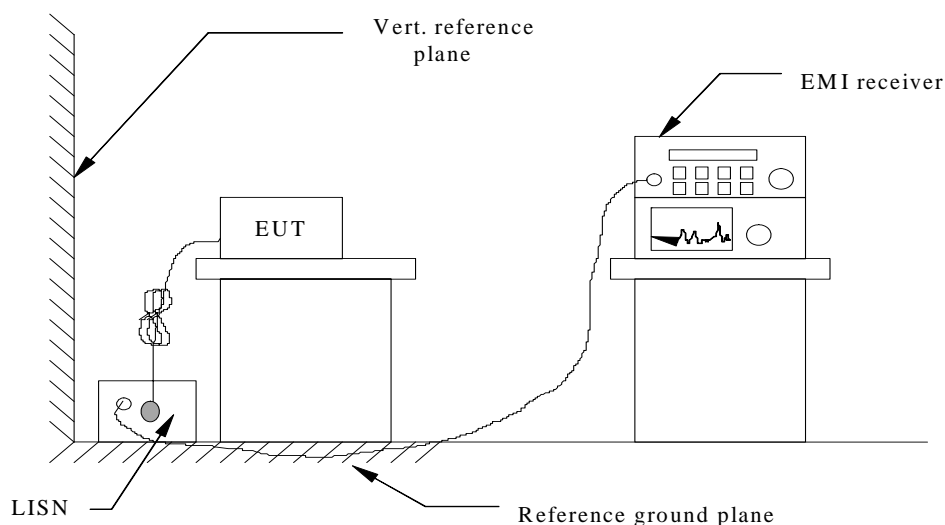
### LIMIT

For an intentional radiator which 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 or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### Test Configuration



See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### TEST PROCEDURE

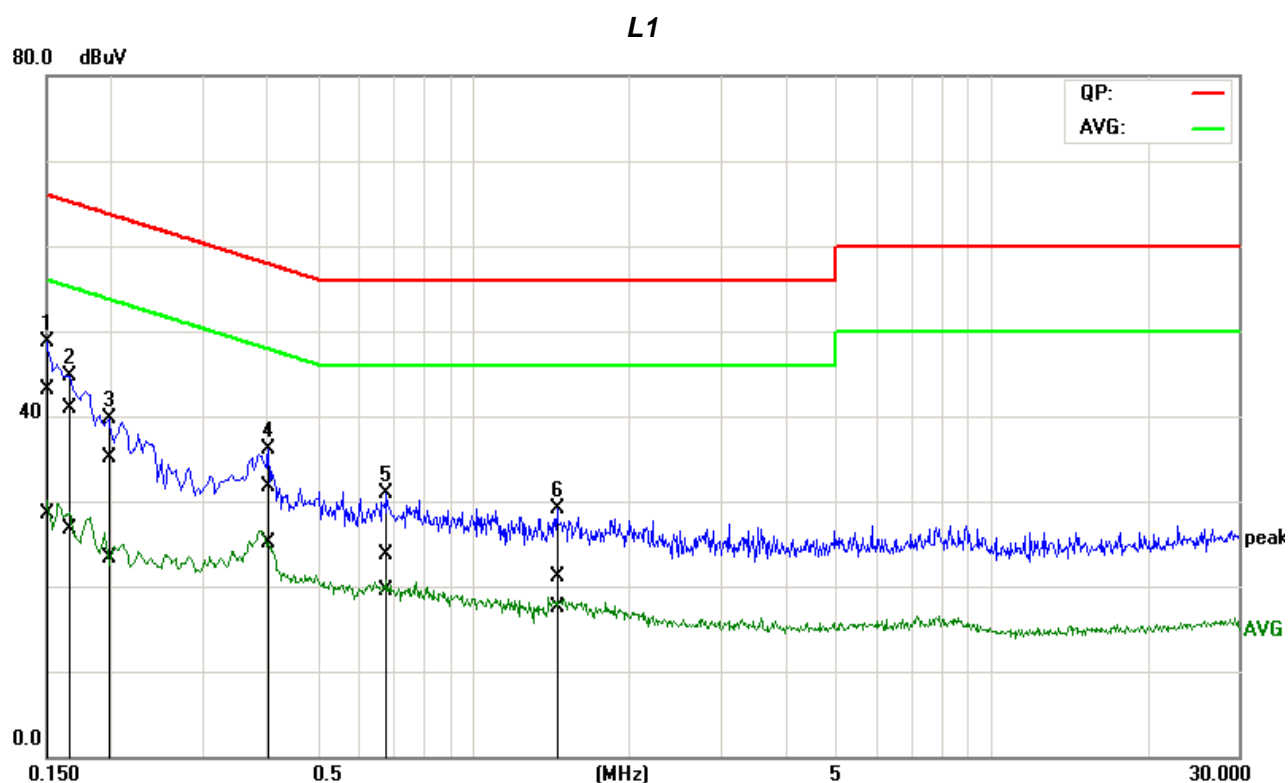
1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

**Test Data**

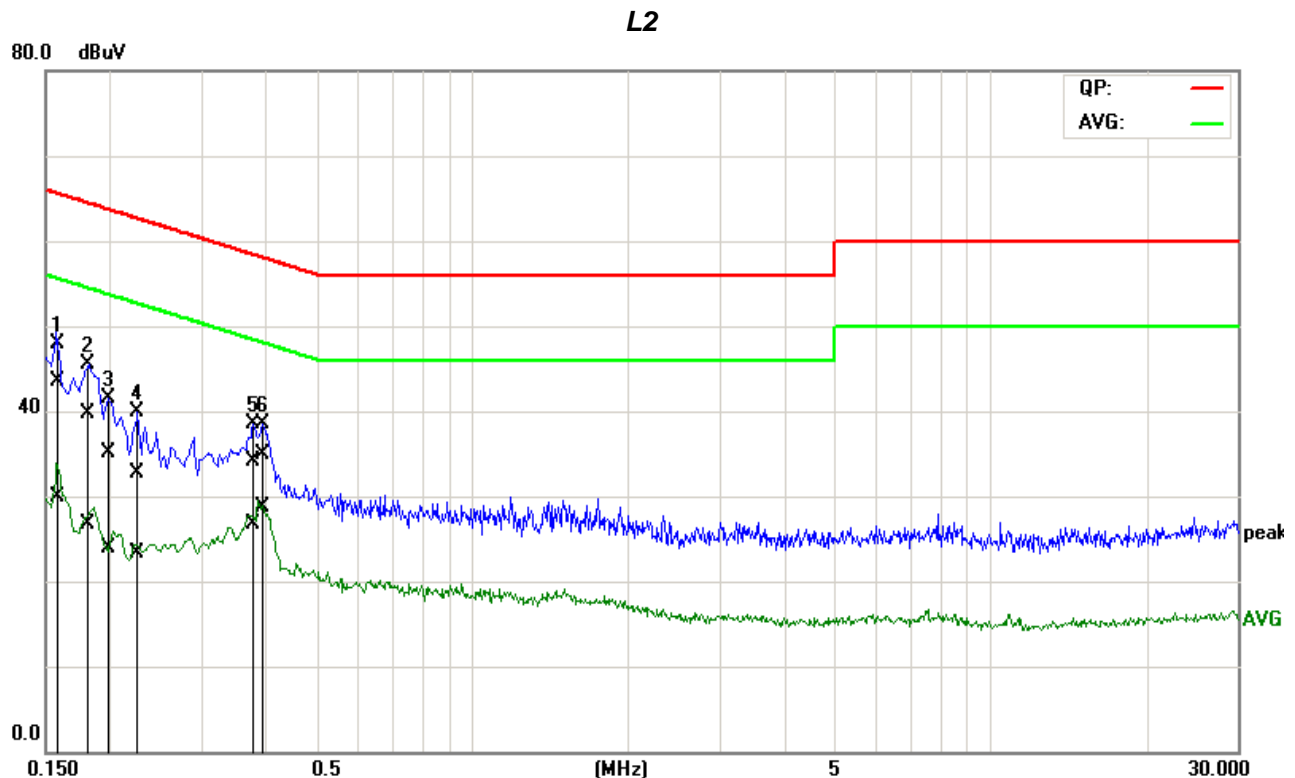
Job No.:	C151211R02	Date:	2016-1-9
Model No.:	R9861510	Time:	PM 04:39:12
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Lily.Wang
Line:	L1	Test Voltage:	AC 120V/60Hz
Model:		Description:	



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1510	23.40	8.67	19.78	43.18	28.45	65.94	55.94	-22.76	-27.49	Pass
2	0.1648	21.13	6.90	19.78	40.91	26.68	65.22	55.22	-24.31	-28.54	Pass
3	0.1955	15.25	3.49	19.79	35.04	23.28	63.80	53.80	-28.76	-30.52	Pass
4	0.3988	11.82	5.24	19.80	31.62	25.04	57.88	47.88	-26.26	-22.84	Pass
5	0.6757	3.83	-0.30	19.81	23.64	19.51	56.00	46.00	-32.36	-26.49	Pass
6	1.4449	1.30	-2.28	19.83	21.13	17.55	56.00	46.00	-34.87	-28.45	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

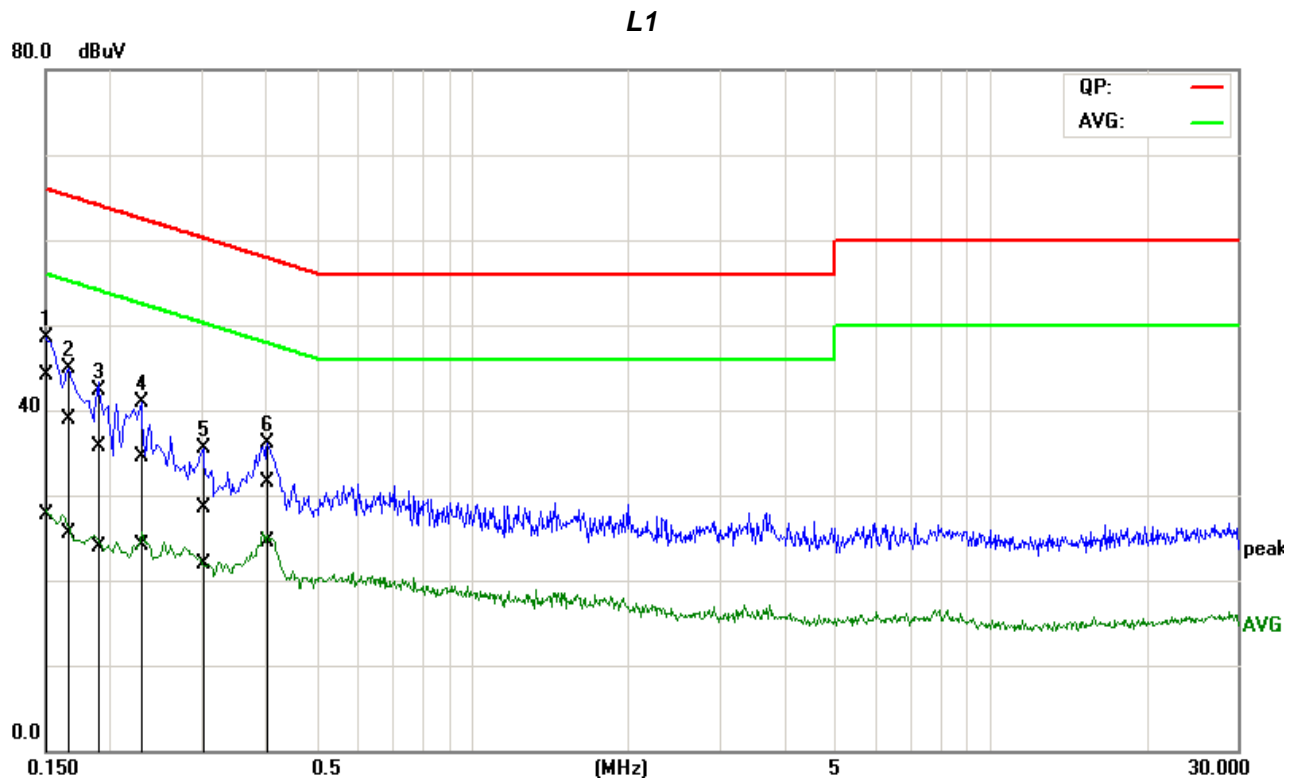
Job No.:	C151211R02	Date:	2016-1-9
Model No.:	R9861510	Time:	PM 04:34:02
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Lily.Wang
Line:	L2	Test Voltage:	AC 120V/60Hz
Model:		Description:	



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1599	23.79	10.09	19.73	43.52	29.82	65.47	55.47	-21.95	-25.65	Pass
2	0.1801	19.91	6.95	19.74	39.65	26.69	64.48	54.48	-24.83	-27.79	Pass
3	0.1975	15.46	4.20	19.74	35.20	23.94	63.72	53.72	-28.52	-29.78	Pass
4	0.2254	13.05	3.54	19.74	32.79	23.28	62.62	52.62	-29.83	-29.34	Pass
5	0.3762	14.37	7.01	19.75	34.12	26.76	58.36	48.36	-24.24	-21.60	Pass
6*	0.3936	15.21	8.94	19.75	34.96	28.69	57.99	47.99	-23.03	-19.30	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

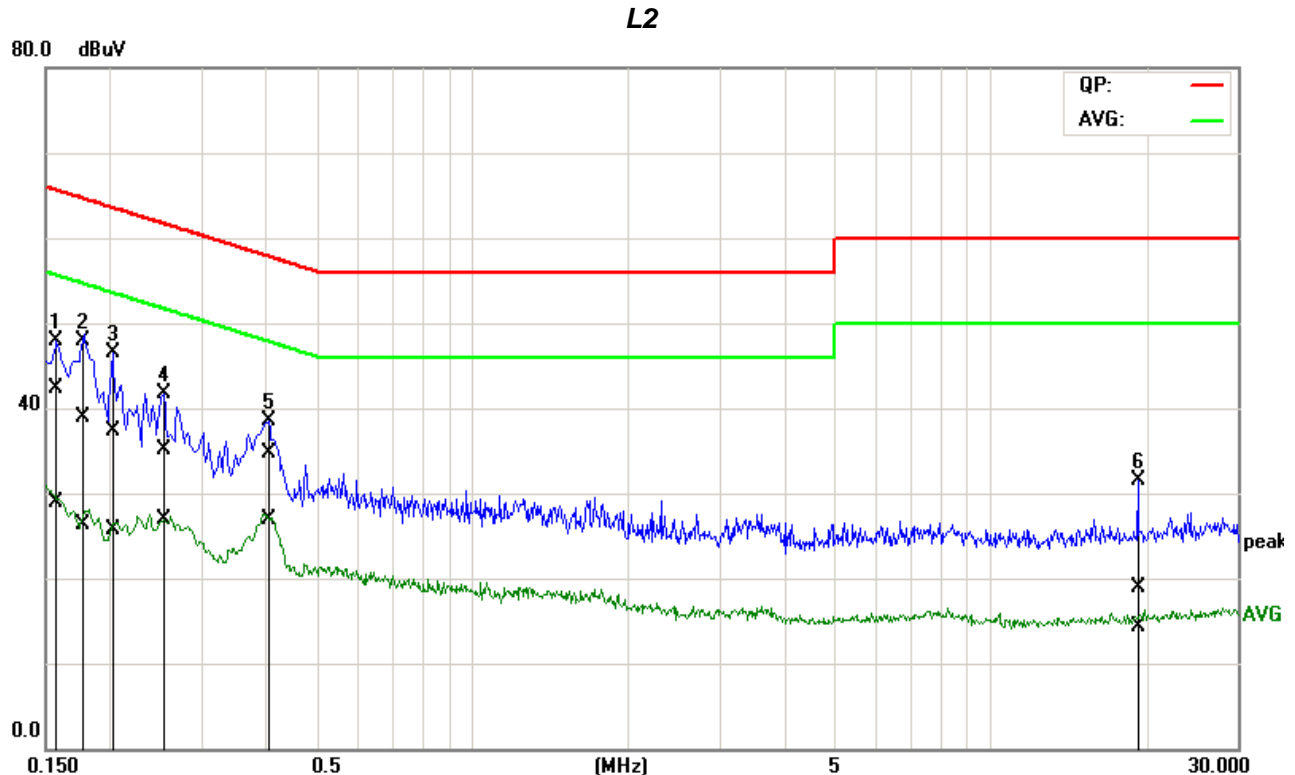
Job No.:	C151211R02	Date:	2016-1-9
Model No.:	R9861510	Time:	PM 04:44:19
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Lily.Wang
Line:	L1	Test Voltage:	AC 240V/60Hz
Model:		Description:	



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1514	24.34	7.83	19.78	44.12	27.61	65.92	55.92	-21.80	-28.31	Pass
2	0.1669	19.06	5.70	19.78	38.84	25.48	65.11	55.11	-26.27	-29.63	Pass
3	0.1913	16.00	4.09	19.79	35.79	23.88	63.98	53.98	-28.19	-30.10	Pass
4	0.2307	14.63	4.26	19.79	34.42	24.05	62.42	52.42	-28.00	-28.37	Pass
5	0.3040	8.65	2.19	19.80	28.45	21.99	60.13	50.13	-31.68	-28.14	Pass
6	0.4059	11.79	4.73	19.81	31.60	24.54	57.73	47.73	-26.13	-23.19	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Job No.:	C151211R02	Date:	2016-1-9
Model No.:	R9861510	Time:	PM 04:49:29
Standard:	FCC Class B	Temp.(C)/Hum.(%):	22(C)/48%
Test item:	Conduction test	Test By:	Lily.Wang
Line:	L2	Test Voltage:	AC 240V/60Hz
Model:		Description:	



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1	0.1584	22.48	9.11	19.73	42.21	28.84	65.55	55.55	-23.34	-26.71	Pass
2	0.1750	19.25	6.50	19.73	38.98	26.23	64.72	54.72	-25.74	-28.49	Pass
3	0.2007	17.62	5.90	19.74	37.36	25.64	63.58	53.58	-26.22	-27.94	Pass
4	0.2526	15.31	7.14	19.74	35.05	26.88	61.67	51.67	-26.62	-24.79	Pass
5*	0.4048	15.02	7.10	19.75	34.77	26.85	57.75	47.75	-22.98	-20.90	Pass
6	19.2696	-1.40	-6.00	20.27	18.87	14.27	60.00	50.00	-41.13	-35.73	Pass

**Note:** 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Remark:

- 1.The measuring frequencies range between 0.15 MHz and 30 MHz.
- 2.The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
- 3.“—” denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
- 4.The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.

**END OF REPORT**