



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

# **TEST REPORT**

**For**

**Product Name: USB/MIDI WIRELESS KEYTAR CONTROLLER**

**Brand Name: ALESIS**

**Model No.: VORTEX WIRELESS**

**Series Model: N/A**

**FCC ID:Y4O-LQPJTX**

**Test Report Number:**

**C131229E01-RPW**

**Issued for**

**inMusic Brands,Inc.**

**200 Scenic View Drive,Suite 201 Cumberland,RI02864,U.S.A.**

**Issued by**

**Compliance Certification Services Inc.**

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**SUMMARY OF TEST RESULT**

Report Section	FCC Rule	Description	Limit	Result
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass
3.2	15.247(b)	Peak Output Power	$\leq 30\text{dBm}$	Pass
3.5	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass
3.4	15.247(d)	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	Pass
3.5	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass
3.6	15.207	AC Conducted Emission	15.207(a)	Pass
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass



## 1. TEST RESULT CERTIFICATION

<b>Product Name:</b>	USB/MIDI WIRELESS KEYTAR CONTROLLER
<b>Trade Name:</b>	ALESIS
<b>Model Name.:</b>	VORTEX WIRELESS
<b>Series Model:</b>	N/A
<b>Applicant Discrepancy:</b>	Initial
<b>Device Category:</b>	Mobile unit
<b>Date of Test:</b>	December 19, 2013
<b>Applicant:</b>	inMusic Brands, Inc. 200 Scenic View Drive, Suite 201 Cumberland, RI 02864, U.S.A.
<b>Manufacturer:</b>	Shanghai Huaxin Musical Instrument Co., Ltd. 35 Lao Shan Yi Cun, Shanghai 200120, China
<b>Application Type:</b>	Certification

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

### We hereby certify that:

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 C63.4: 2009 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:**

Jeff.Fang  
RF Manager  
Compliance Certification Service Inc.

**Tested by:**

Blent.Wang  
Test Engineer  
Compliance Certification Service Inc.



## 2. EUT DESCRIPTION

<b>Product Name:</b>	USB/MIDI WIRELESS KEYTAR CONTROLLER
<b>Brand Name:</b>	ALESIS
<b>Model Name:</b>	VORTEX WIRELESS
<b>Series Model:</b>	N/A
<b>Model Discrepancy:</b>	N/A
<b>Power Rating :</b>	Power supply: Model:HX08-0501A(618) INPUT: 100-240V 50/60Hz Output:DC 5V 1A
<b>Frequency Range:</b>	2402~2478MHz
<b>Transmit Power:</b>	4.49dBm(0.0028W)
<b>Modulation Technique:</b>	OPQSK(offset quadrature phase shift keyed)
<b>Number of Channels:</b>	6 Channels
<b>Antenna Specification:</b>	PCB antenna:3.3 dBi gain (Max)

### 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: Y4O-LQPJTX** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



### 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 2003 and FCC CFR 47 15.207, 15.209 and 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 EUT EXERCISE

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 C63.4 2009 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

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 C63.4 2009.



## 3.4 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
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<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.



## 3.5 DESCRIPTION OF TEST MODES

The EUT had been tested under the operating condition.

The model was scanned during the preliminary test. After the preliminary scan, the following test mode was found to produce the worst case.

Zigbee: 6 Channels (2402MHz, 2408MHz, 2419MHz, 2444MHz, 2464MHz, 2478MHz)

These channels have been tested as following:

Test Items	Frequency (MHz)
6dB Bandwidth	2402,2444,2478
Peak Output Power	2402,2444,2478
Average Out Power	2402,2444,2478
Power Spectral Density	2402,2444,2478
Spurious Emissions	2402,2444,2478
Radiated Emissions	2402, 2478
Powerline Conducted Emissions	-

Remark: For radiated test cases below 1GHz, the worst mode data rate channel 39 was reported only, because this data rate has the highest RF output power at preliminary tests.





## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING 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.

#### Equipment Used for Emissions Measurement

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2014-5-12
DETECTOR NEGATIVE	Agilent	8473B	MY42240176	2014-5-12
OSCILLOSCOPE	Agilent	DSO6104A	MY44002585	2014-3-24
Peak and Avg Power Sensor	Agilent	E9327A	US40441788	2014-3-24
EPM-P Series Power Meter	Agilent	E4416A	GB41292714	2014-5-12
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	2014-5-12
DC POWER SUPPLY	GW instek	GPS-3303C	E903131	2014-5-12
Temp. / Humidity Chamber	Kingson	THS-M1	242	2014-3-12
Test Software	EZ-EMC			

977 Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	2014-5-12
EMI Test Receiver	R&S	ESPI3	101026	2014-3-15
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	2014-5-12
Pre-Amplifier	Miteq	NSP4000-NF	870629	2014-5-12
Bilog Antenna	Sunol	JB1	A110204-2	2014-5-12
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2014-6-7
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Test Software	EZ-EMC			



Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI TEST RECEIVER	R&S	ESCI3	100781	2014-3-15
V (V-LISN)	Schwarzbeck	NNLK 8129	8129-143	2014-3-15
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	SN:05012	2014-3-15
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	2014-4-7
Test Software	EZ-EMC			

**Remark:** The measurement uncertainty is less than +/- 2.81dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Expanded Uncertainty (95% CONFIDENCE INTERVAL): K=2



## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

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 C63.7, ANSI C63.4 2009 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 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC5743 for 10m chamber 10m, IC5743 for 10m chamber 3m.



## 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	47 CFR FCC Part 15/18 (using ANSI C63.4 :2003); VCCI V3; CNS 13438; CNS 13439; CNS 13803; CISPR 11; EN 55011; CISPR 13; EN 55013; CISPR 22:2005; CISPR 22:1997 +A1 :2000+A2 :2002; EN 55022:2006; EN55022 :1998 +A1 :2001+A2 :2003; EN 61000-6-3 (excluding discontinuous interference); EN 61000-6-4; AS/NZS CISPR 22; CAN/CSA-CEI/IEC CISPR 22; EN 61000-3-2; EN 61000-3-3; EN550024; EN 61000-4-2; EN 61000-4-3; EN61000-4-4; EN 61000-4-5; EN 61000-4-6; IEC 61000-4-8; EN 61000-4-11; IEC61000-3-2; IEC61000-3-3; IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4; IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-8; IEC 61000-4-11; EN 300 220-3; EN 300 328; EN 300 330-2; EN 300 440-1; EN 300-440-2; EN 300 893; EN 301 489-01; EN 301 489-3; EN 301 489-07; EN 301 489-17; 47 CFR FCC Part 15, 22, 24	 TESTING CERT #2541.01
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	 93105, 90471
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	<b>VCCI</b> R-1600 C-1707 G-216

\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

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

### 6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID
1	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.



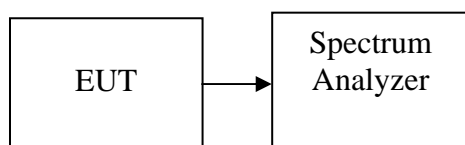
## 7. FCC PART 15.247 REQUIREMENTS

### 7.1 6 DB EMISSION BANDWIDTH

#### LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

#### Test Configuration



#### TEST PROCEDURE

KDB 558074 D01 DTS Measurement Guidance v03r01 dated 04-09-2013.

#### TEST RESULTS

*No non-compliance noted*

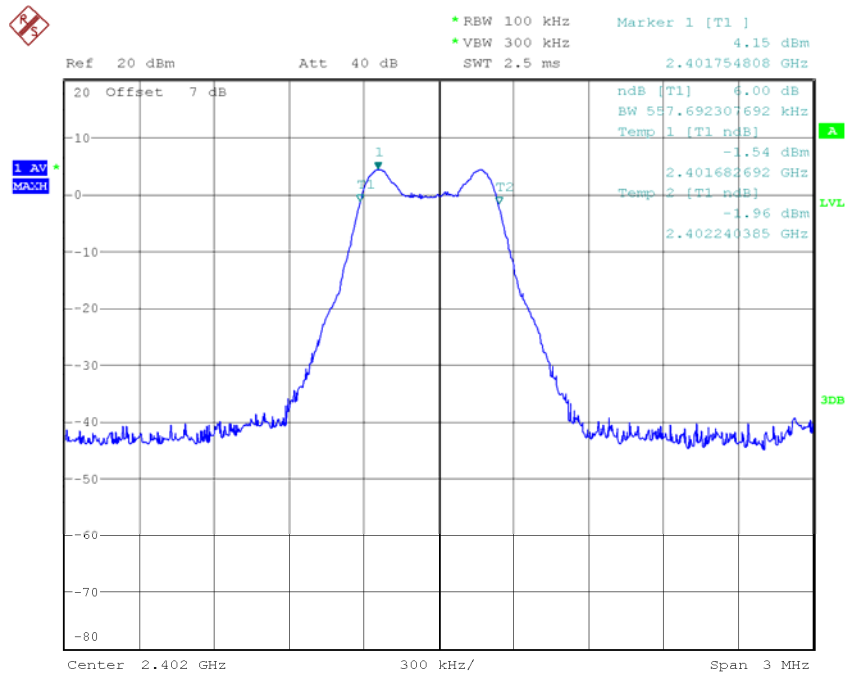
#### Test Data

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2402	0.558	>500	PASS
Mid	2444	0.558		PASS
High	2478	0.567		PASS



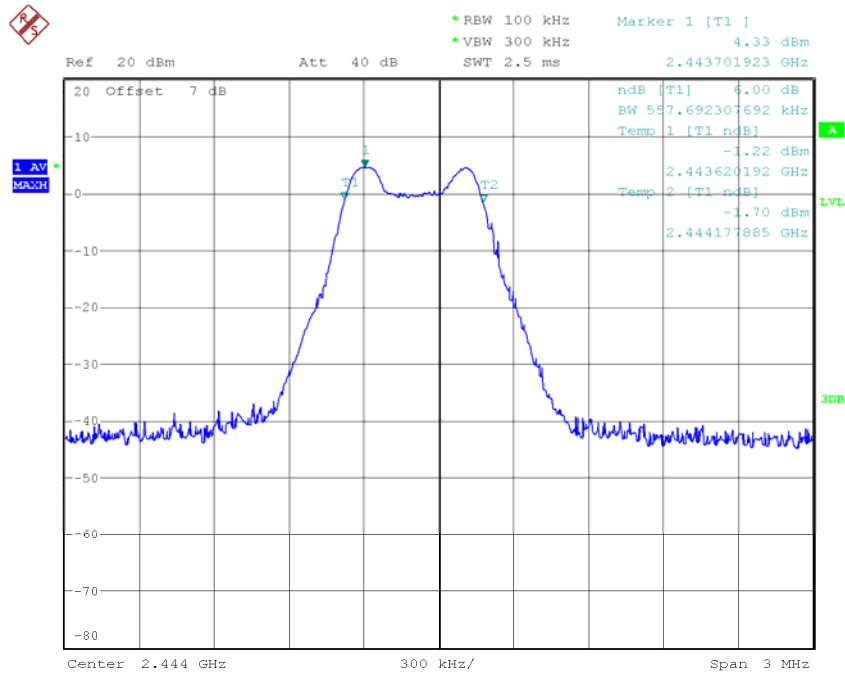
## Test Plot

### CH Low



Date: 9.JAN.2014 14:00:40

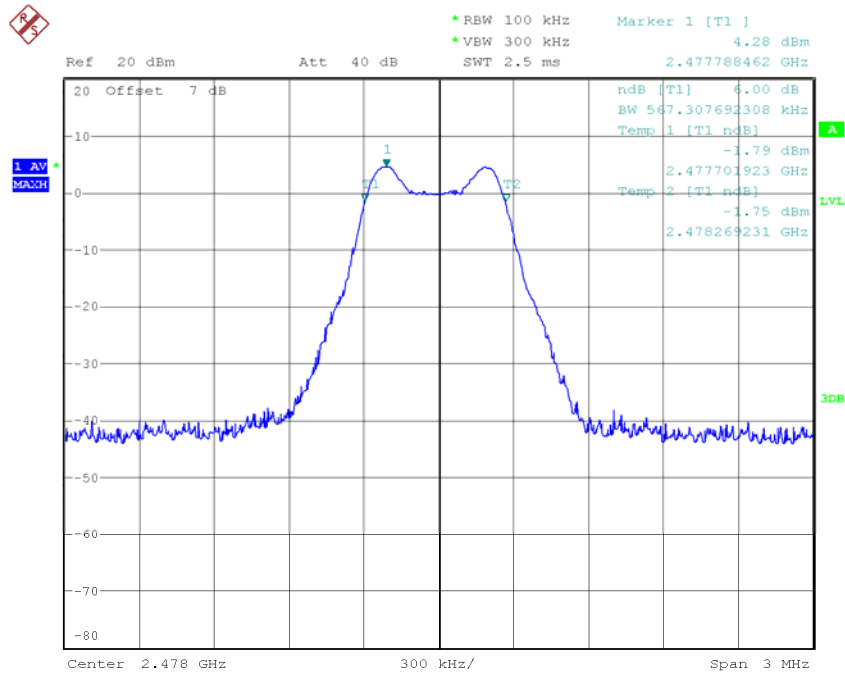
### CH Mid



Date: 9.JAN.2014 13:59:09



## CH High



Date: 9.JAN.2014 14:01:18





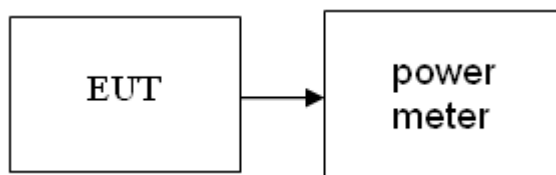
## 7.2 PEAK POWER

### LIMIT

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

1. 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.
2. 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.

### Test Configuration



### TEST PROCEDURE

Per KDB 558074 V02

The transmitter output is connected to the power meter. The power meter is set to the peak power detection.

### TEST RESULTS

*No non-compliance noted*

### Test Data

#### Peak Power

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (dBm)	Result
Low	2402	4.29	2.685	30.00	PASS
Mid	2444	4.49	<b>2.812</b>	30.00	PASS
High	2478	4.44	2.780	30.00	PASS

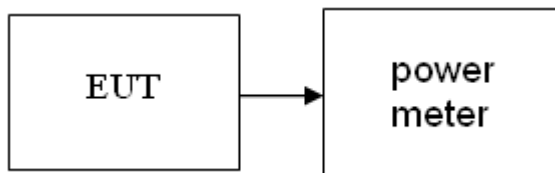


## 7.3 AVERAGE POWER

### LIMIT

None;for reporting purposes only.

### TEST CONFIGURATION



### TEST PROCEDURE

Per KDB 558074 V02

The transmitter output is connected to the power meter.The power meter is set to the peak power detection.

### TEST RESULTS

*No non-compliance noted*

#### Test Data

##### Average Power

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)
Low	2402	4.14	2.594
Mid	2444	4.33	<b>2.710</b>
High	2478	4.30	2.692

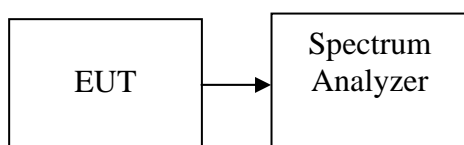


## 7.4 PEAK POWER SPECTRAL DENSITY

### LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

### Test Configuration



### TEST PROCEDURE

KDB 558074 V02

1. Place the EUT on the table and set it in transmitting mode. remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW=3kHz, VBW=10 kHz, span=1.5\*bandwidth, sweep=auto.
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

### TEST RESULTS

*No non-compliance noted*

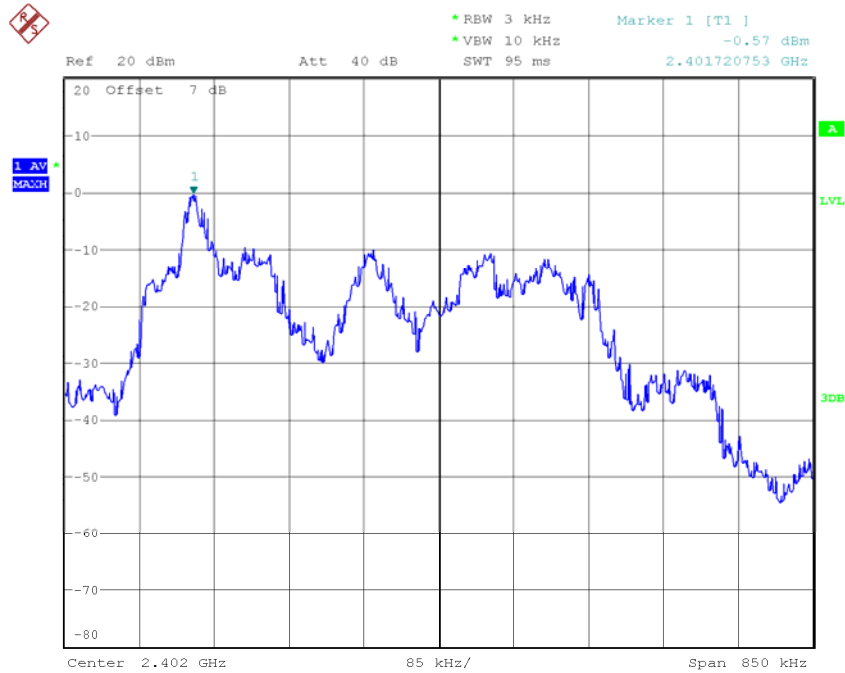
### Test Data

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2402	-0.57	8.00	PASS
Mid	2444	-0.15	8.00	PASS
High	2478	-0.48	8.00	PASS



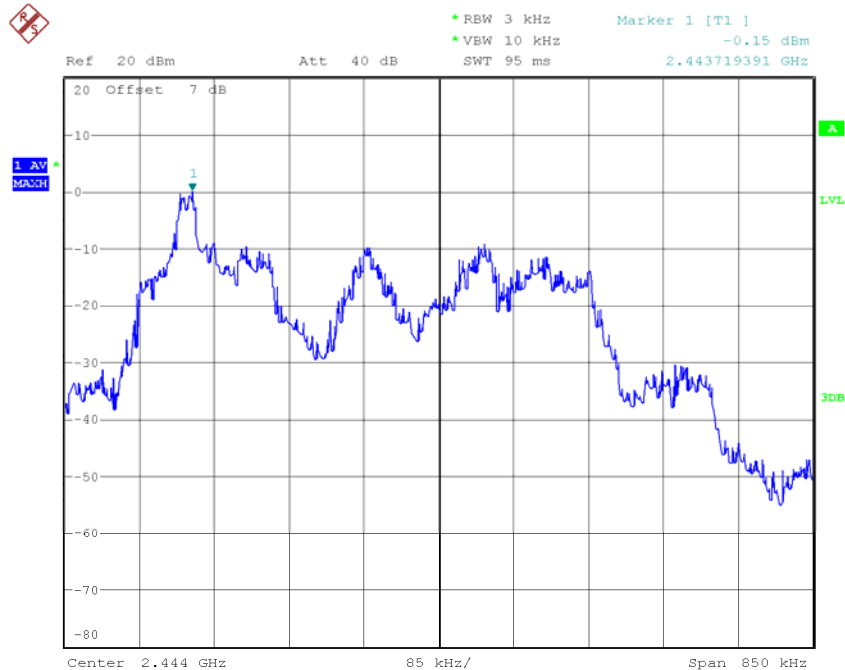
## Test Plot

### PPSD (CH Low)



Date: 9.JAN.2014 14:03:56

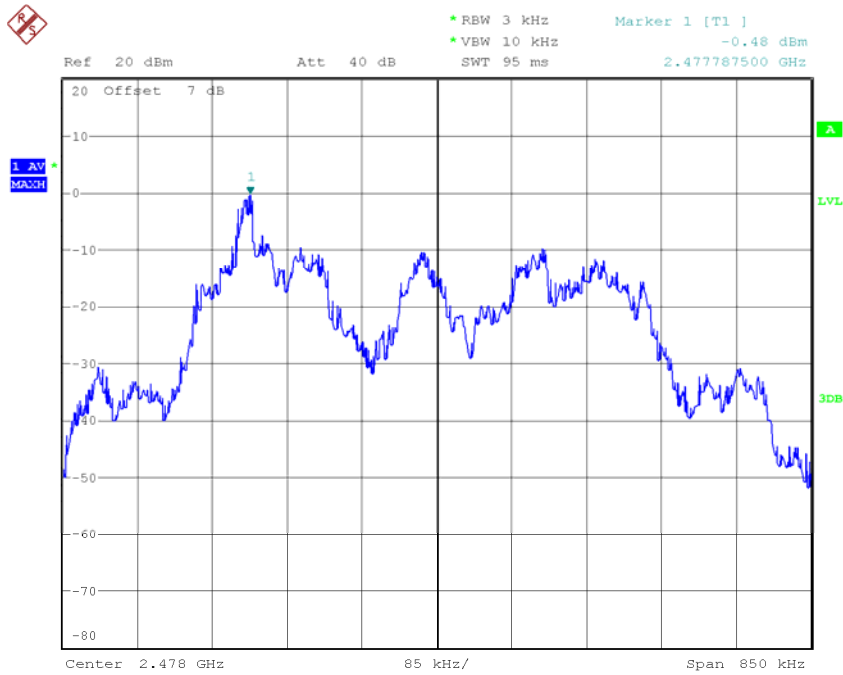
### PPSD (CH Mid)



Date: 9.JAN.2014 14:03:16



## PPSD (CH High)



Date: 9.JAN.2014 14:04:37

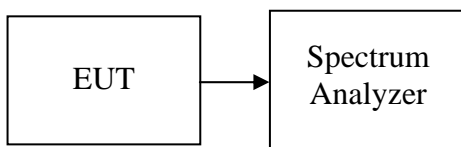


## 7.5 SPURIOUS EMISSIONS Conducted Measurement

### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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, provided the transmitter demonstrates compliance with the peak conducted power limits. 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) (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

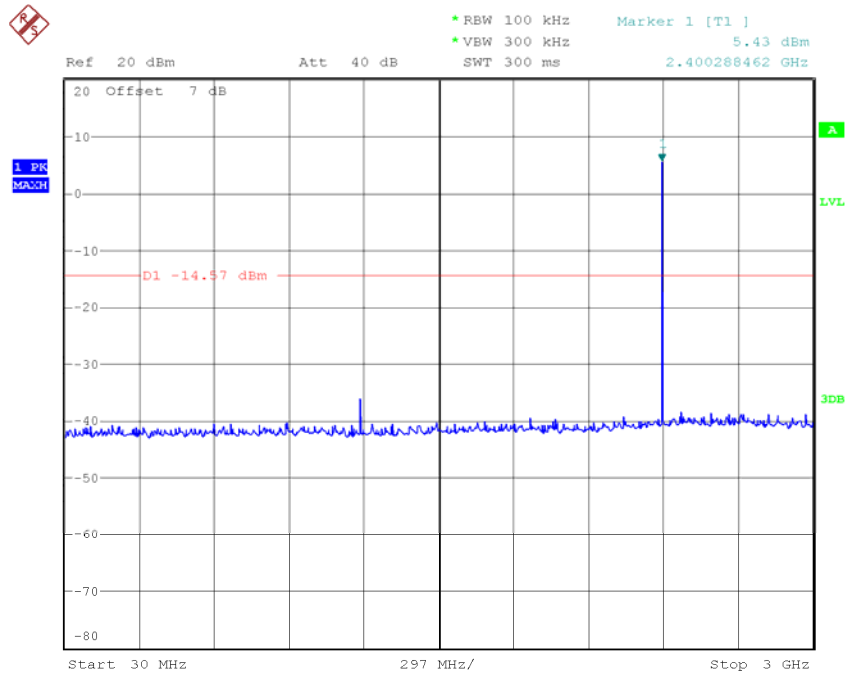
*No non-compliance noted*



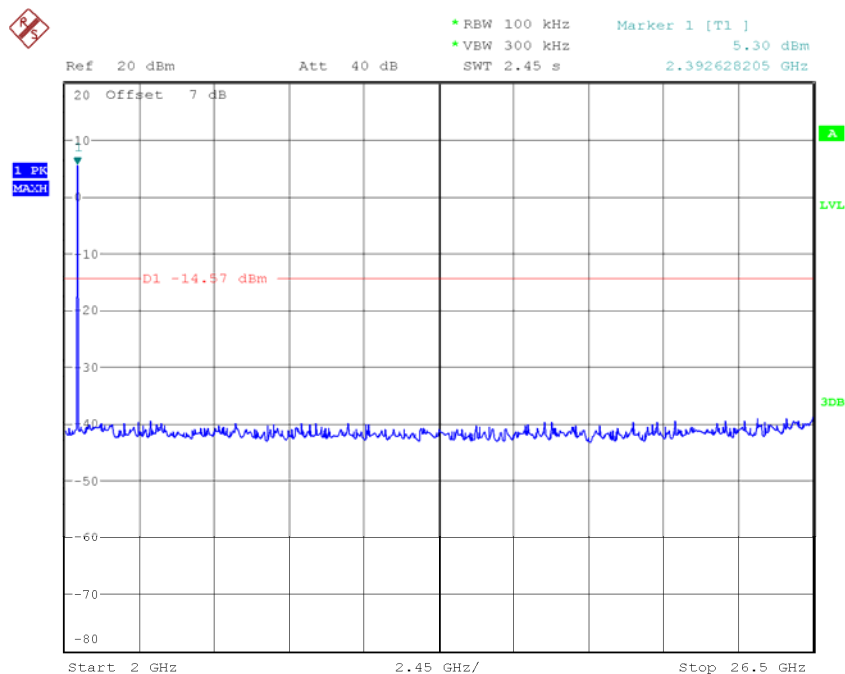
## Test Plot

### Spurious Emissions

#### CH Low



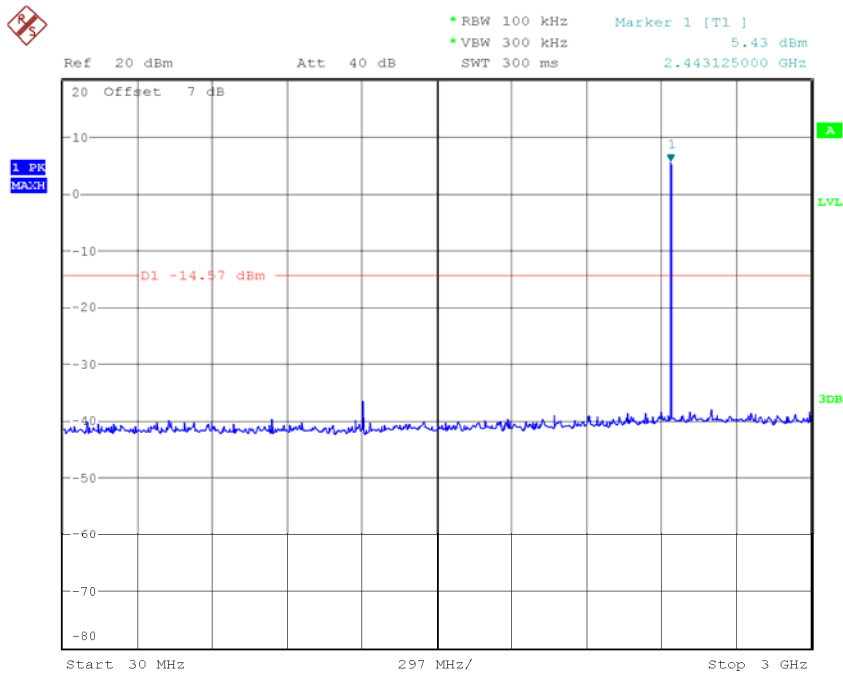
Date: 10.JAN.2014 17:43:42



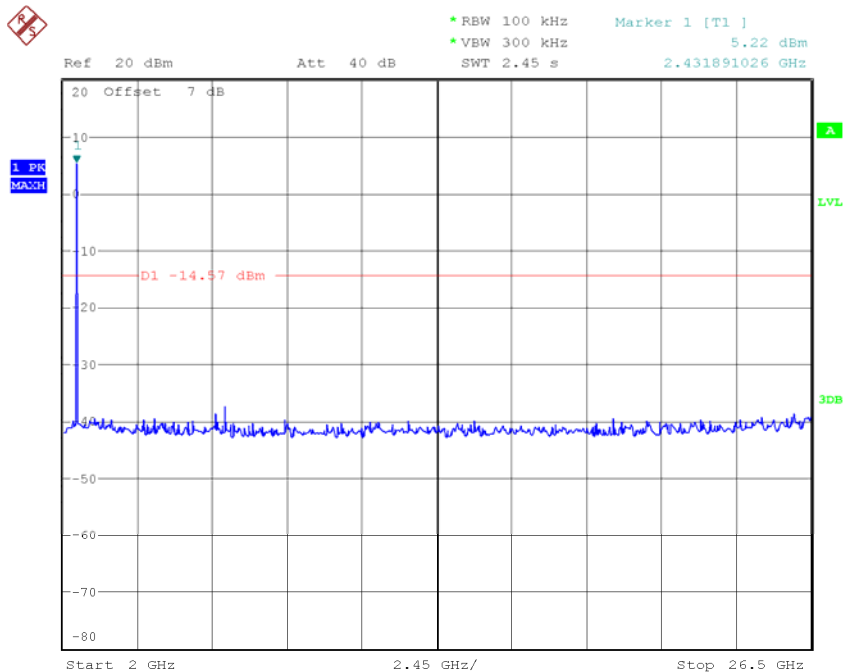
Date: 10.JAN.2014 17:44:30



## CH Mid



Date: 10.JAN.2014 17:47:03



Date: 10.JAN.2014 17:47:29





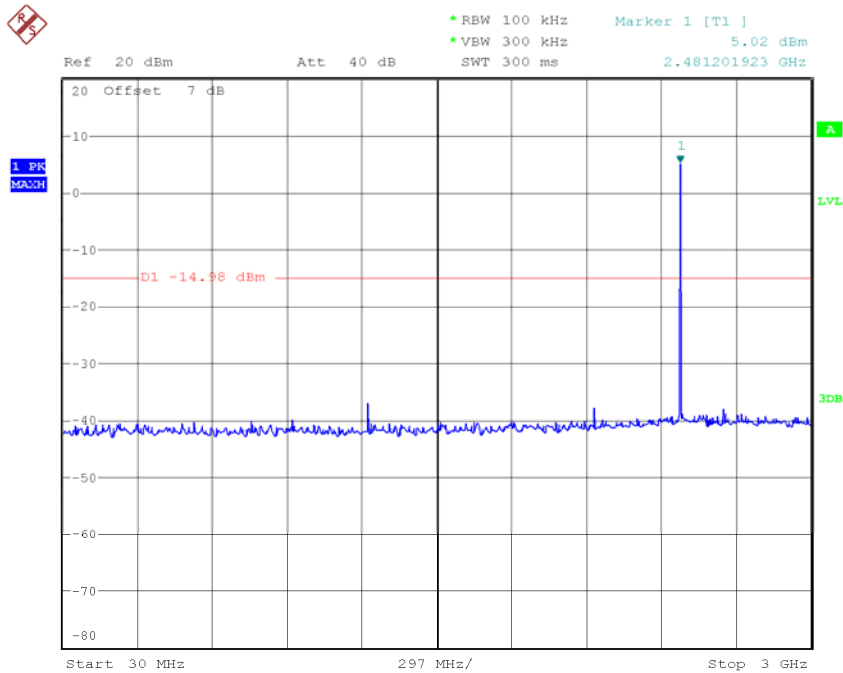
# Compliance Certification Services Inc.

Report No: C131229E01-RPW

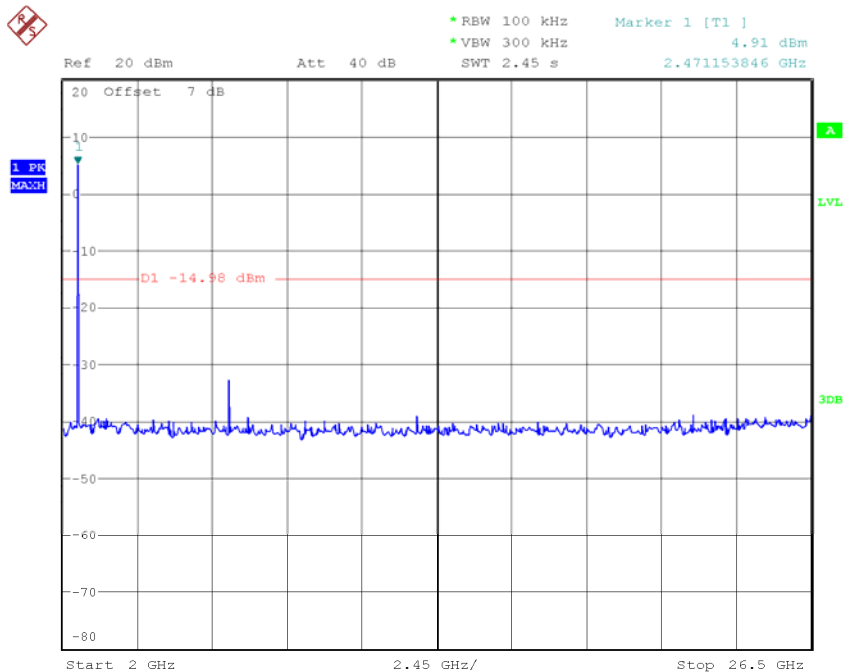
FCC ID: Y4O-LQPJTX

Date of Issue :January 13, 2014

## CH High



Date: 10.JAN.2014 17:49:44



Date: 10.JAN.2014 17:50:05



## 7.6 RADIATED EMISSIONS

### LIMIT

Radiated emissions from 9 kHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2009. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

1. According to §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:

FREQUENCIES(MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE(meters)
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

**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.

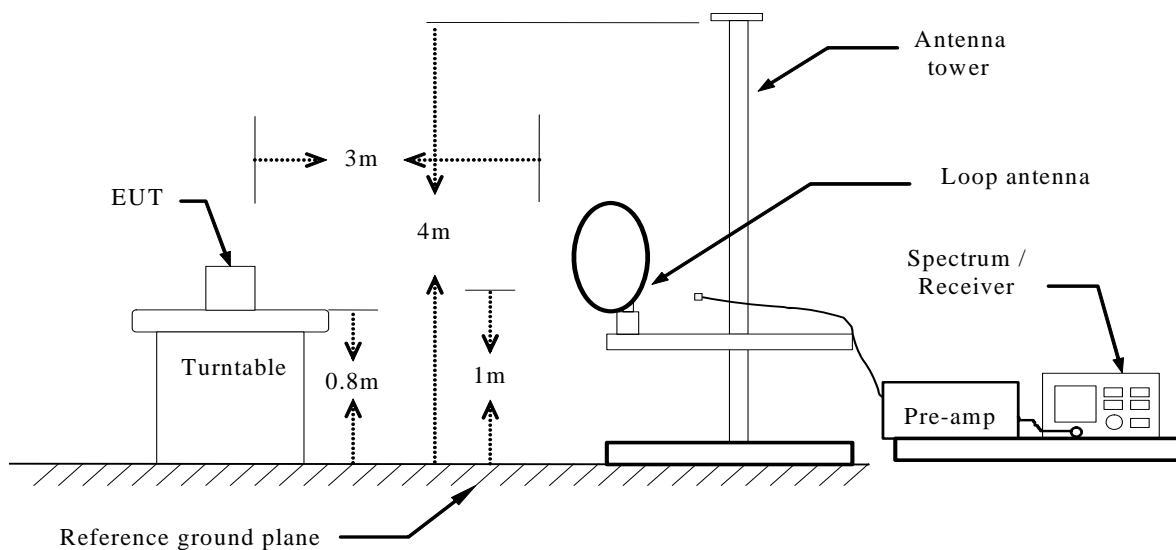
2. In the emission table above, the tighter limit applies at the band edges.

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

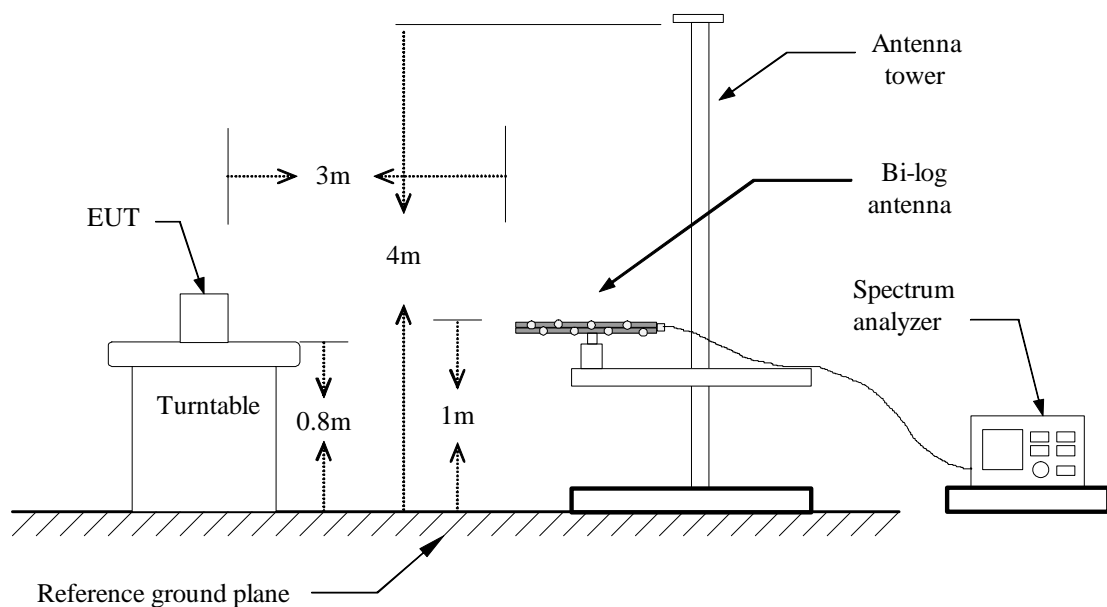
### Test Configuration



## Below 30MHz

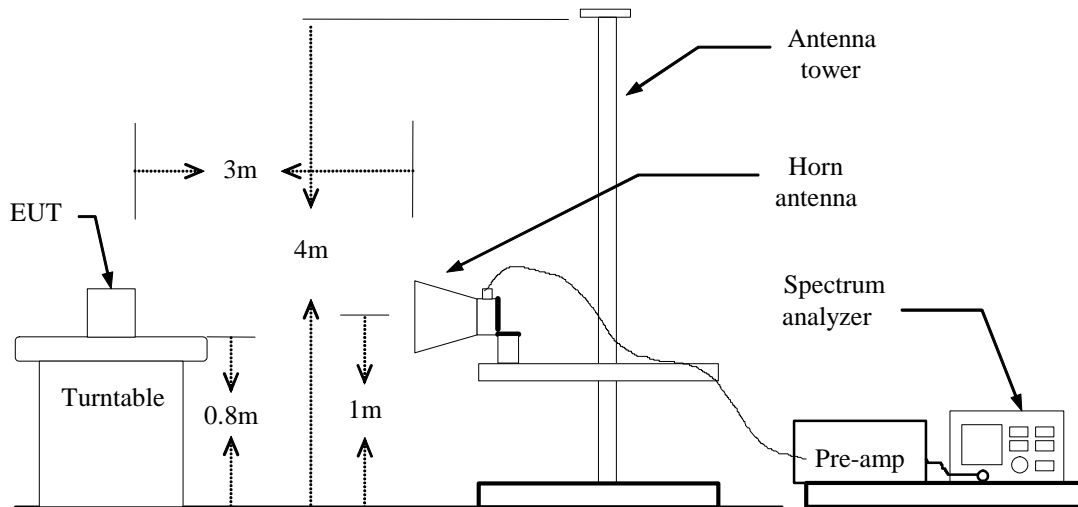


## Below 1 GHz





## Above 1 GHz



## TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
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

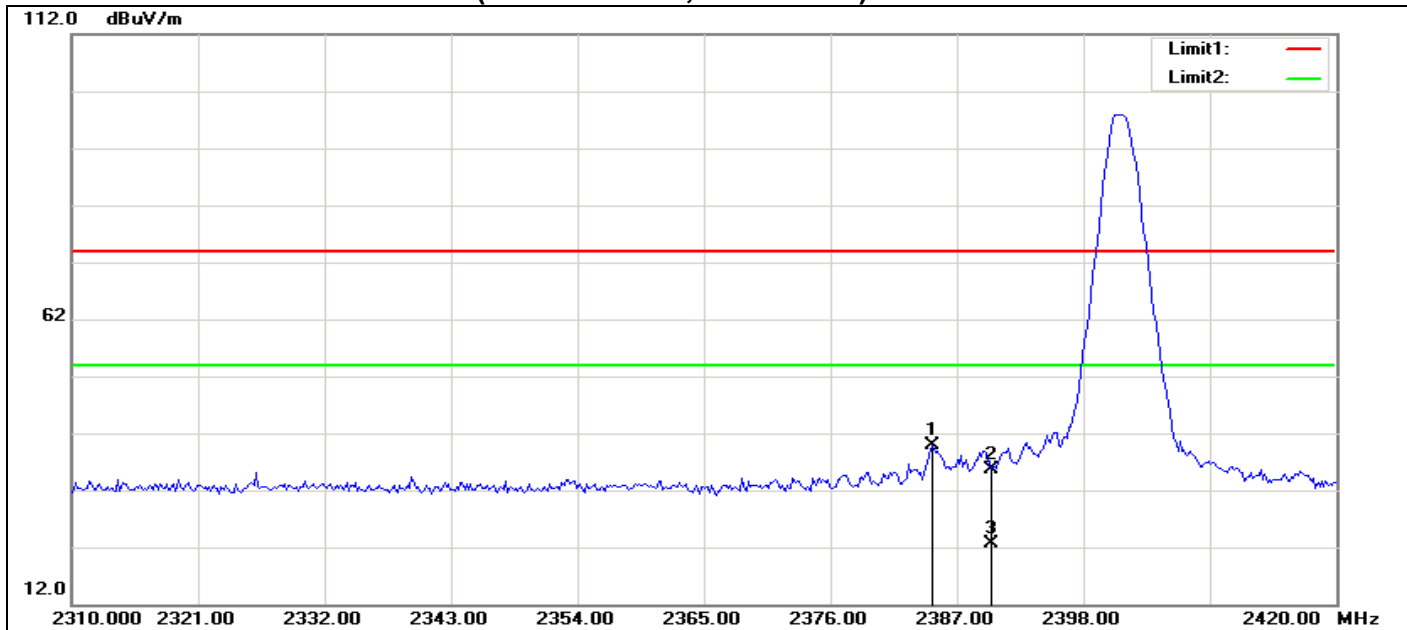
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.

## TEST RESULTS

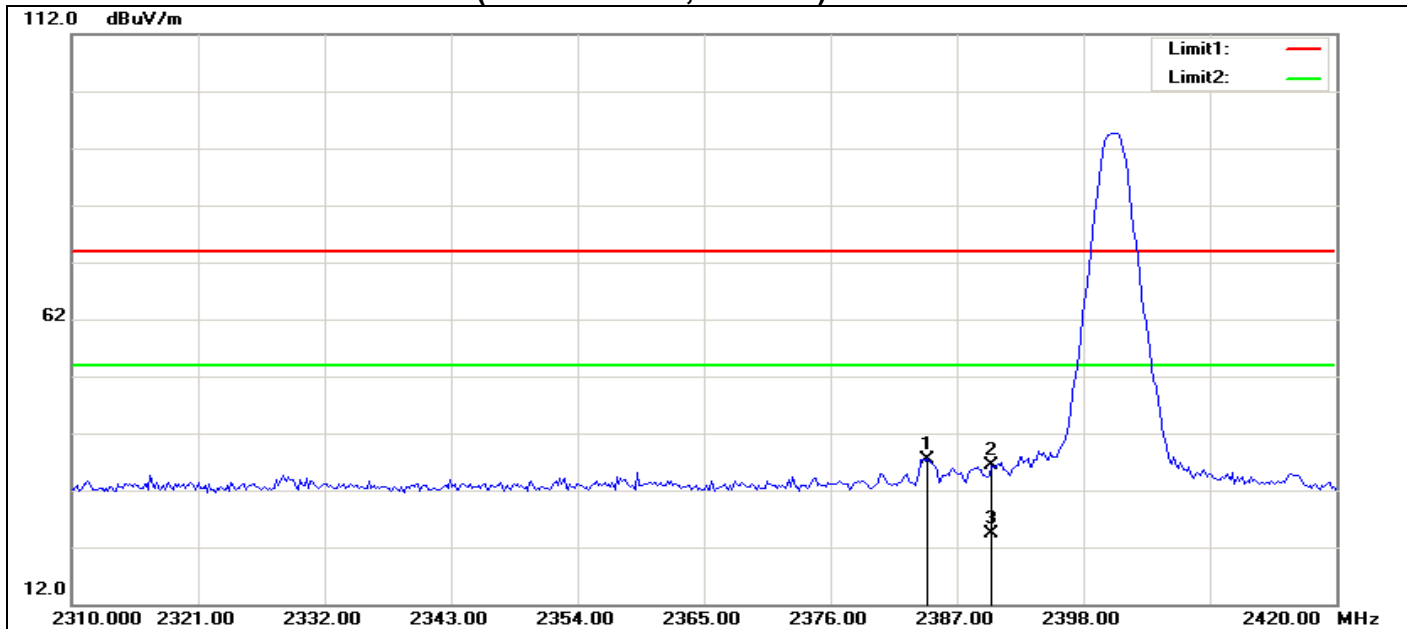


## RESTRICTED BANDEDGE (Low Channel, Horizontal)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2384.920	54.26	-14.29	39.97	74.00	-34.03	200	21	peak
2	2390.000	49.89	-14.28	35.61	74.00	-38.39	100	3	peak
3	2390.000	36.98	-14.28	22.70	54.00	-31.30	100	4	AVG

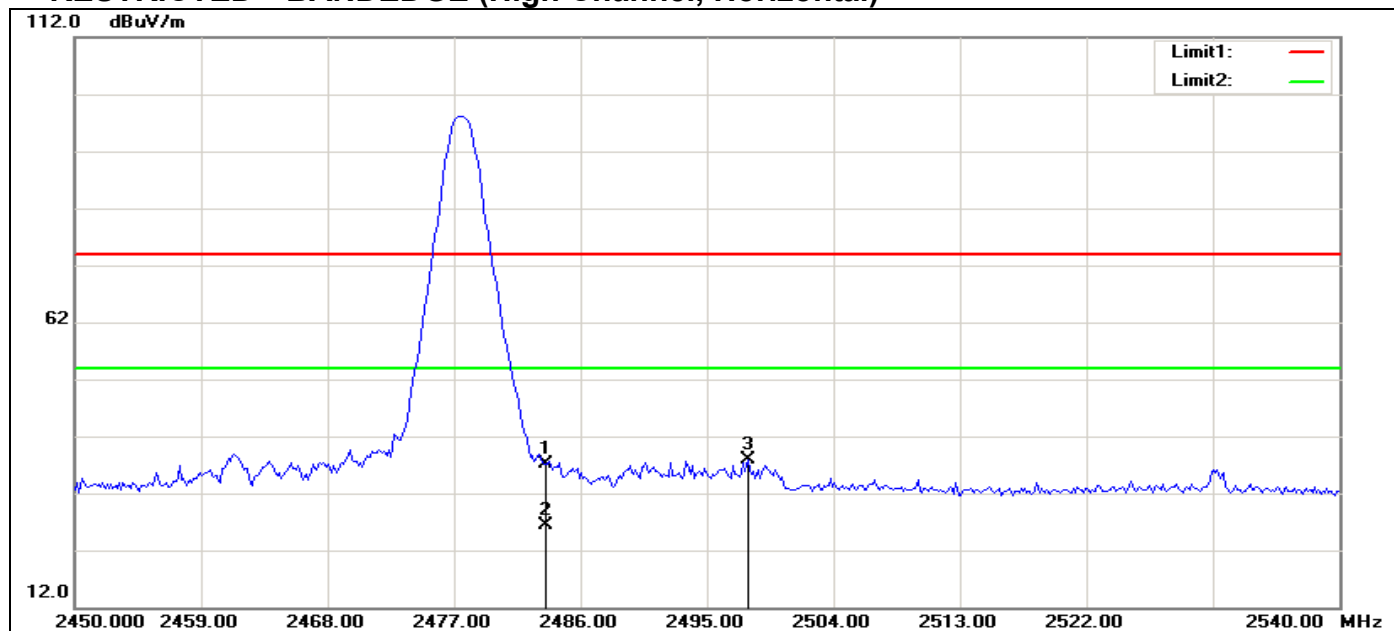
## RESTRICTED BANDEDGE (Low Channel, Vertical)



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2384.391	51.79	-14.29	37.50	74.00	-36.50	200	39	peak
2	2390.000	50.69	-14.28	36.41	74.00	-37.59	200	38	peak
3	2390.000	38.68	-14.28	24.40	54.00	-29.60	200	39	AVG

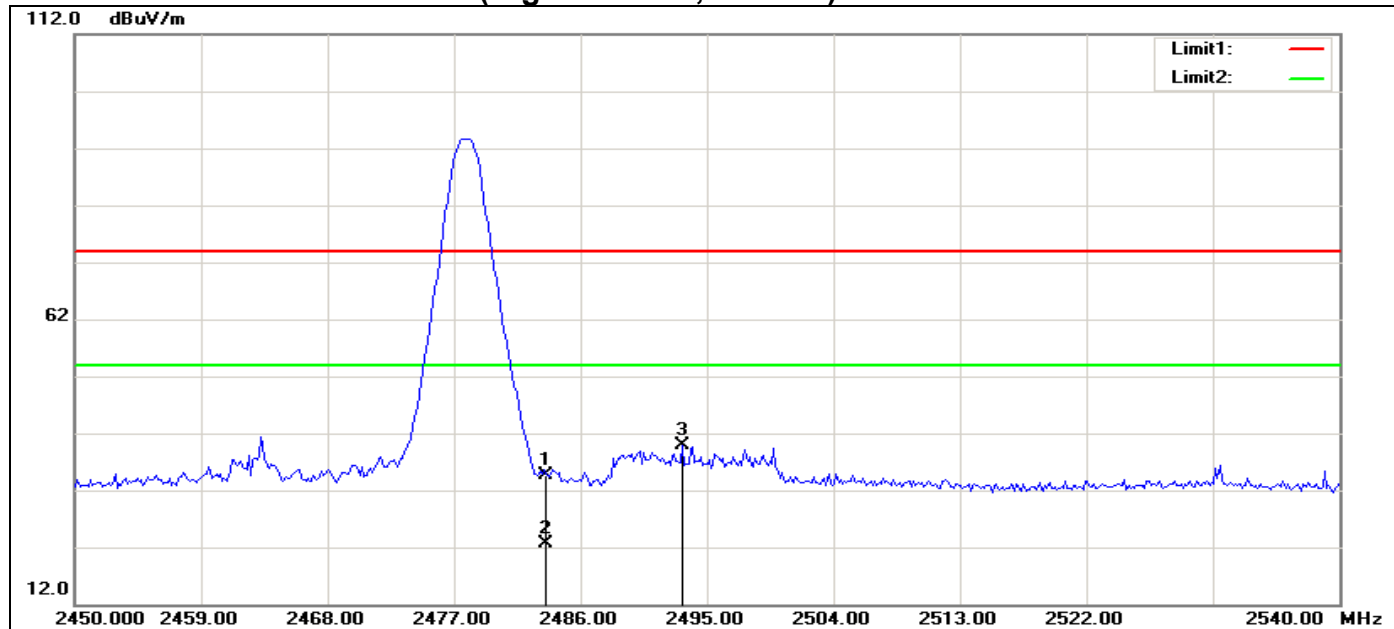


## RESTRICTED BANDEDGE (High Channel, Horizontal)



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	50.82	-13.65	37.17	74.00	-36.83	200	10	peak
2	2483.500	39.97	-13.65	26.32	54.00	-27.68	200	10	AVG
3	2497.885	51.39	-13.54	37.85	74.00	-36.15	106	360	peak

## RESTRICTED BANDEDGE (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	48.31	-13.65	34.66	74.00	-39.34	200	60	peak
2	2483.500	36.19	-13.65	22.54	54.00	-31.46	200	61	AVG
3	2493.269	53.35	-13.57	39.78	74.00	-34.22	100	338	peak

**Below 1GHz**

**Operation Mode:** Normal Link **Test Date:** 2013-12-19  
**Temperature:** 22°C **Tested by:** Blent.Wang  
**Humidity:** 48% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
30.9700	H	13.39	22.03	35.42	40.00	-4.58	peak
127.9700	H	17.80	15.63	33.43	43.50	-10.07	peak
191.0200	H	23.19	12.72	35.91	43.50	-7.59	peak
286.0800	H	25.73	15.14	40.87	46.00	-5.13	peak
544.1000	H	14.33	21.05	35.38	46.00	-10.62	peak
769.1400	H	14.28	23.43	37.71	46.00	-8.29	peak
30.9700	V	14.55	22.03	36.58	40.00	-3.42	peak
214.3000	V	17.48	13.22	30.70	43.50	-12.80	peak
286.0800	V	18.91	15.14	34.05	46.00	-11.95	peak
724.5200	V	14.67	22.80	37.47	46.00	-8.53	peak
832.1900	V	14.08	24.82	38.90	46.00	-7.10	peak
935.9800	V	15.99	25.30	41.29	46.00	-4.71	peak

**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz (No emission found between lowest internal used/generated frequency to 30 MHz).
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "N/A" remark, 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.
4.  $\text{Margin (dB)} = \text{Result (dBuV/m)} - \text{Limit (dBuV/m)}$ .



# Compliance Certification Services Inc.

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FCC ID: Y4O-LQPJTX

Date of Issue :January 13, 2014

## Above 1 GHz

Operation Mode: TX /CH Low      Test Date: 2013-12-19  
Temperature: 22°C      Tested by: Blent.Wang  
Humidity: 48 % RH      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	4786.859	64.55	-8.07	56.48	74.00	-17.52	200	333	peak
2	7211.538	60.22	-0.59	59.63	74.00	-14.37	100	324	peak

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4786.859	60.79	-8.07	52.72	74.00	-21.28	100	324	peak
2	7211.538	62.02	-0.59	61.43	74.00	-12.57	134	360	peak

Operation Mode: TX /CH Mid      Test Date: 2013-12-19  
Temperature: 22°C      Tested by: Blent.Wang  
Humidity: 48 % RH      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	4868.590	63.43	-7.72	55.71	74.00	-18.29	100	334	peak
2	7320.513	58.75	-0.83	57.92	74.00	-16.08	100	310	peak

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4868.590	59.75	-7.72	52.03	74.00	-21.97	100	326	peak
2	7320.513	61.62	-0.83	60.79	74.00	-13.21	142	0	peak

Operation Mode: TX /CH High      Test Date: 2013-12-19  
Temperature: 22°C      Tested by: Blent.Wang  
Humidity: 48 % RH      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	4950.320	62.19	-7.58	54.61	74.00	-19.39	164	360	peak
2	7429.487	59.64	-0.55	59.09	74.00	-14.91	200	313	peak

### Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4950.320	60.27	-7.58	52.69	74.00	-21.31	100	327	peak
2	7429.487	56.50	-0.55	55.95	74.00	-18.05	100	75	peak





## 7.7 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, 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 or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

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

\* Decreases with the logarithm of the frequency.

### 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



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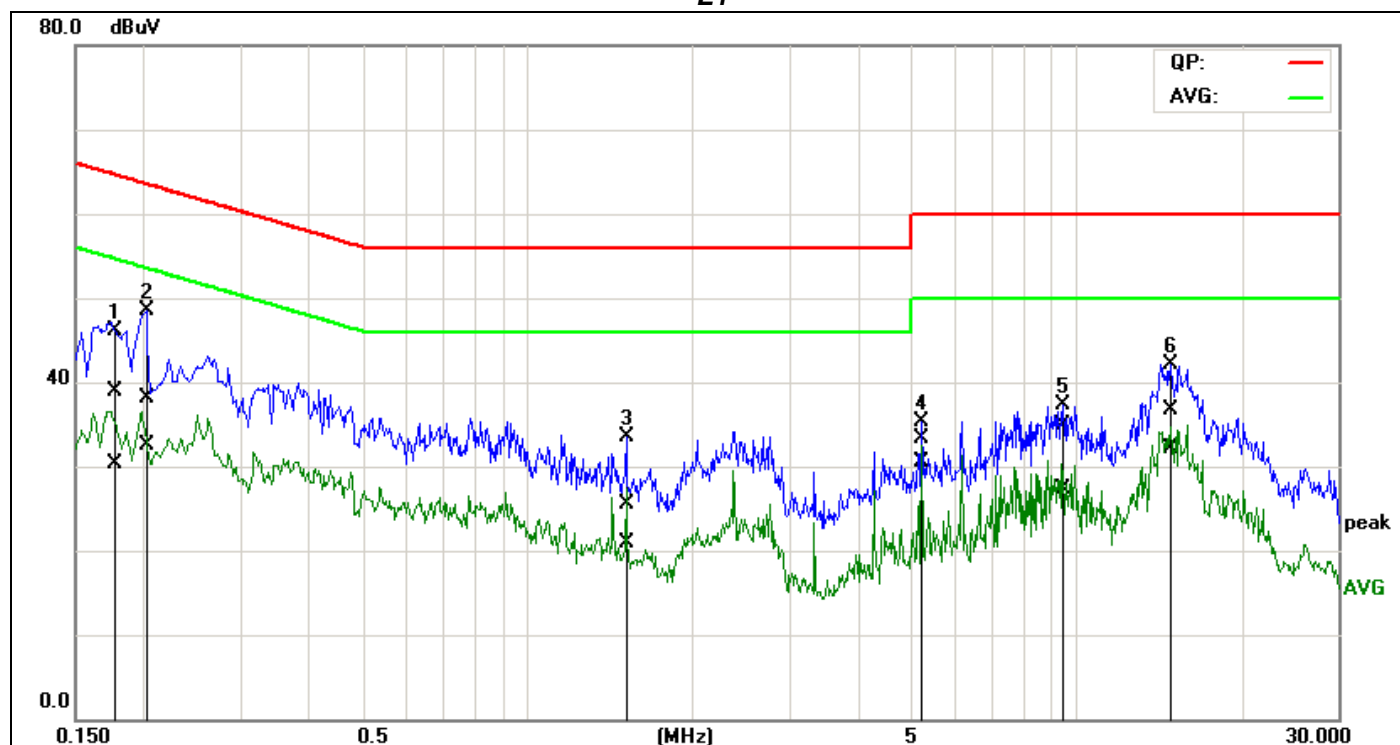
FCC ID: Y4O-LQPJTX

Date of Issue :January 13, 2014

Job No.: C131229E01-RPW  
Standard: FCC Class B  
Test item: Conduction test  
Line: L1  
Model: VORTEX WIRELESS

Date: 2013-12-31  
Time: 15:32:29  
Temp.(C)/Hum.(%): 22(C)/48%  
Test By: Blent.Wang  
Test Voltage: AC 120V/60Hz

## L1



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	0.1784	19.22	10.56	19.69	38.91	30.25	64.56	54.56	-25.65	-24.31	Pass
2	0.2024	18.55	12.84	19.60	38.15	32.44	63.51	53.51	-25.36	-21.07	Pass
3	1.5152	5.52	0.99	19.89	25.41	20.88	56.00	46.00	-30.59	-25.12	Pass
4	5.2450	12.89	10.15	20.32	33.21	30.47	60.00	50.00	-26.79	-19.53	Pass
5	9.4900	14.09	6.68	20.72	34.81	27.40	60.00	50.00	-25.19	-22.60	Pass
6*	14.8790	15.84	11.27	20.84	36.68	32.11	60.00	50.00	-23.32	-17.89	Pass

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



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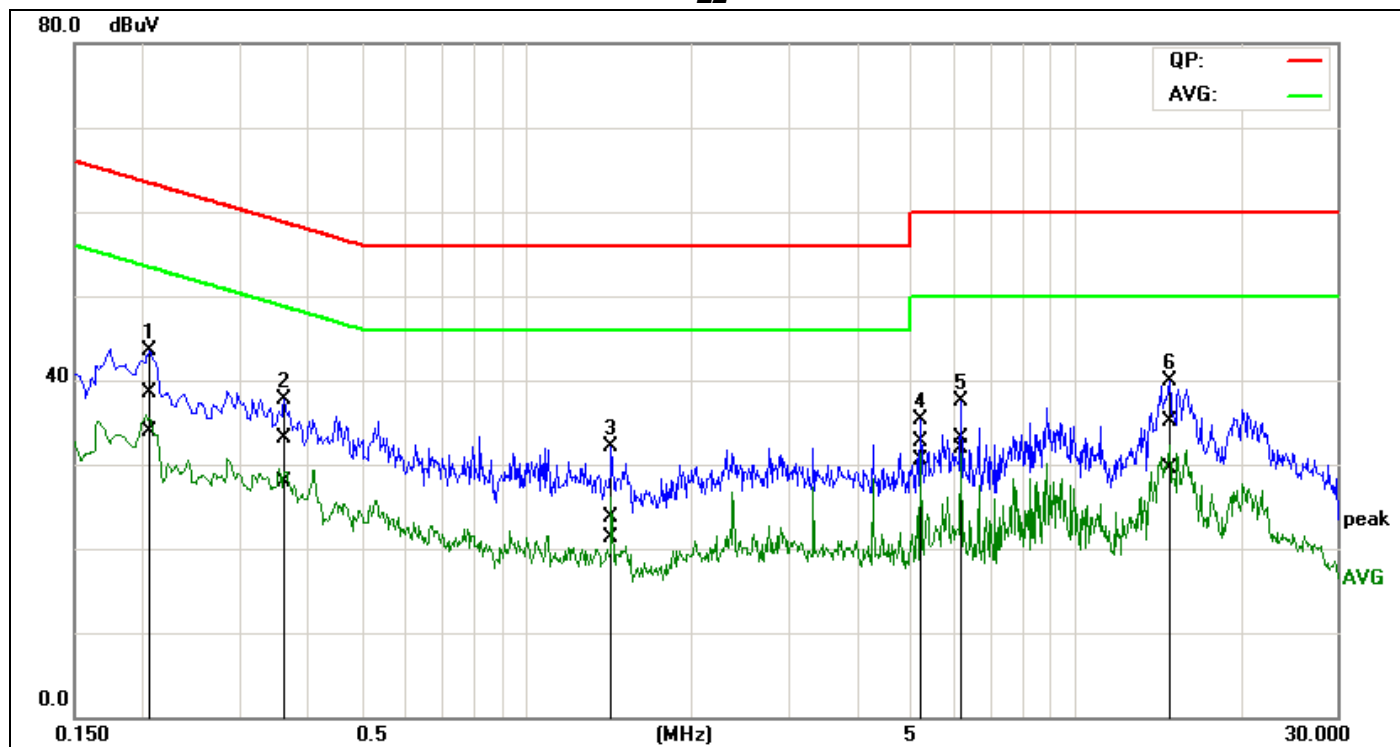
FCC ID: Y4O-LQPJTX

Date of Issue :January 13, 2014

Job No.: C131229E01-RPW  
Standard: FCC Class B  
Test item: Conduction test  
Line: L2  
Model: VORTEX WIRELESS

Date: 2013-12-31  
Time: 15:36:59  
Temp.(C)/Hum.(%): 22(C)/48%  
Test By: Blent.Wang  
Test Voltage: AC 120V/60Hz

## L2



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	0.2031	18.81	14.23	19.64	38.45	33.87	63.48	53.48	-25.03	-19.61	Pass
2*	0.3599	13.33	8.23	19.75	33.08	27.98	58.73	48.73	-25.65	-20.75	Pass
3	1.4260	3.78	1.45	19.88	23.66	21.33	56.00	46.00	-32.34	-24.67	Pass
4	5.2406	12.38	10.27	20.32	32.70	30.59	60.00	50.00	-27.30	-19.41	Pass
5	6.1965	12.76	11.43	20.42	33.18	31.85	60.00	50.00	-26.82	-18.15	Pass
6	14.8529	14.44	8.88	20.68	35.12	29.56	60.00	50.00	-24.88	-20.44	Pass

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

**END OF REPORT**