

## APPLICATION FOR CERTIFICATION

On Behalf of

Harmonix Music Systems, Inc.

Rock Band Wireless Guitar For ADAM

Model Number: XBGTS2-A

FCC ID: VFRHMXGTR05

Prepared for : Harmonix Music Systems, Inc.  
625 Massachusetts Ave 2nd Floor Cambridge, MA 02139  
United States

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Report Number : ACS-F08443  
Date of Test : Nov.11~19, 2008  
Date of Report : Nov.20, 2008

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## TEST REPORT CERTIFICATION

Applicant : Harmonix Music Systems, Inc.  
Manufacturer : Dong Guan Contel Electronics Co., Ltd.  
EUT Description : Rock Band Wireless Guitar For ADAM  
FCC ID : VFRHMXGTR05

(A) MODEL NO. : XBGTS2-A

(B) SERIAL NO. : N/A

(C) POWER SUPPLY : DC 4.5V

(D) TEST VOLTAGE : DC 4.5V

Test Procedure Used:

FCC Rules and Regulations Part 15 Subpart C 2007

The device described above is tested by AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both radiated and conducted emissions.

The test results are contained in this test report and AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. is assumed full responsibility for the accuracy and completeness of these tests. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

Date of Test:

Nov.11~19, 2008

Prepared by:

Selina Liu  
Selina Liu / Assistant

Reviewer:

Jamy Yu  
Jamy Yu / Senior Engineer

Approved & Authorized Signer:

Ken Lu 11/15/08  
Ken Lu / Deputy Manager



# 1. SUMMARY OF STANDARDS AND RESULTS

## 1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item(FHSS)	Standard	Results
Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.4: 2003	N/A
Radiated Emission Test	FCC Part 15: 15.209 ANSI C63.4: 2003	PASS
Band Edge Compliance Test	FCC Part 15: 15.247(d) DA 00-705	PASS
Carrier Frequency Separation Test	FCC Part 15: 15.247(a)(1) DA 00-705	PASS
20 dB Bandwidth Test	FCC Part 15: 15.247(a)(1) DA 00-705	PASS
Number Of Hopping Frequency Test	FCC Part 15: 15.247(a)(1)(iii) DA 00-705	PASS
Dwell Time Test	FCC Part 15: 15.247(a)(1)(iii)	PASS
Maximum Peak Output Power Test	FCC Part 15: 15.247(b)(1) DA 00-705	PASS
Antenna requirement	FCC Part 15: 15.203	PASS
N/A is an abbreviation for Not Applicable.		

## 2. GENERAL INFORMATION

### 2.1.Description of Device (EUT)

Description	:	Rock Band Wireless Guitar For ADAM
Model Number	:	XBGTS2-A
FCC ID	:	VFRHMXGTR05
Operation frequency	:	2.402GHz-----2.482GHz ISM Band
Operation Channel	:	41Channels
Modulation Technology		GMSK
Output power	:	2.60dBm(maximum measured)
Antenna Assembly Gain	:	0dBi(maximum)
Applicant	:	Harmonix Music Systems, Inc.
		625 Massachusetts Ave 2nd Floor Cambridge, MA 02139 United States
Manufacturer	:	Dong Guan Contel Electronics Co., Ltd.
		2 <sup>nd</sup> Industrial Park, DiChong District, GaoBu Town, Dong Guan City, Guang Dong Province, China
Date of Test	:	Nov.11~19, 2008
Date of Receipt	:	Nov.08, 2008
Sample Type	:	Prototype production

## 2.2. Test Facility

### Site Description

- Name of Firm : Audix Technology (Shenzhen) Co., Ltd.  
No. 6, Ke Feng Rd., 52 Block, Shenzhen  
Science & Industrial Park, Nantou, Shenzhen,  
Guangdong, China
- 3m Anechoic Chamber : Jun. 13, 2006 File on Federal Communication  
Commission  
Registration Number: 90454
- 3m & 10m Anechoic Chamber : Jan. 31, 2007 File on Federal Communication  
Commission  
Registration Number: 794232
- EMC Lab. : Accredited by DATech, German  
Registration Number: DAT-P-091/99-01  
Feb. 02, 2004
- Accredited by NVLAP, USA  
NVLAP Code: 200372-0  
Apr. 01, 2008

## 2.3. Measurement Uncertainty

No.	Item	MU	Remark
1.	Uncertainty for Conducted Emission Test	2.02dB	
2.	Uncertainty for Radiation Emission test in 3m chamber	3.44 dB	Polarize: V
		3.96 dB	Polarize: H
3.	Uncertainty for Radiation Emission test in 10m chamber	3.46 dB	Distance: 10m Polarize: V
		3.82 dB	Distance: 10m Polarize: H
		3.64 dB	Distance: 3m Polarize: V
		4.02 dB	Distance: 3m Polarize: H
4.	RF frequency	$\pm 1 \times 10^{-9}$	
5.	RF power, conducted	$\pm 0.34$ dB	

### **3. POWER LINE CONDUCTED EMISSION TEST**

According to Paragraph (f) of FCC Part 15 section 15.207, Tests to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.



## 4. RADIATED EMISSION TEST

### 4.1. Test Equipment

Frequency rang: 30~1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber	AUDIX	N/A	N/A	Jun 09,08	1/2 Year
2.	EMI Spectrum	Agilent	E7403A	MY42000106	May 10, 08	1 Year
3.	Test Receiver	Rohde & Schwarz	ESVS20	830350/005	May 10, 08	1 Year
4.	Amplifier	HP	8447D	2648A04738	Jul.08.08	1/2 Year
5.	Bilog Antenna	Schaffner	CBL6112D	25237	Feb 21, 08	1 Year
6.	RF Cable	JINGCHENG	KLMR400	3# Chamber No.1	Jan 09, 08	1/2 Year
7.	RF Cable	JINGCHENG	JBV400	3# Chamber No.2	Jan 09, 08	1/2 Year
8.	RF Cable	JINGCHENG	JBV400	3# Chamber No.3	Jan 09, 08	1/2 Year
9.	RF Cable	JINGCHENG	JBV400	3# Chamber No.4	Jan 09, 08	1/2 Year
10.	Coaxial Switch	Anritsu	MP59B	M73989	Jan 09, 08	1/2 Year

Frequency rang: above 1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	MY41440292	May 10, 08	1 Year
2.	Amp	HP	8449B	3008A00863	May 10, 08	1 Year
3.	Antenna	EMCO	3115	9607-4877	May 27, 08	1.5 Year
4.	Antenna	EMCO	3116	00060088	May 28, 07	1.5Year
5.	RF Cable	Hubersuhner	SUCOFLEX102	271473/4	May,28, 08	1Year
6	RF Cable	Hubersuhner	SUCOFLEX 102	29091/2	May,28, 08	1Year
7	RF Cable	Hubersuhner	SUCOFLEX 102	28620/2	May,28, 08	1Year
8	RF Cable	Hubersuhner	SUCOFLEX 102	271471/4	May,28, 08	1Year
9	RF Cable	Hubersuhner	SUCOFLEX 102	29086/2	May,28, 08	1Year

### 4.2. Block Diagram of Test Setup

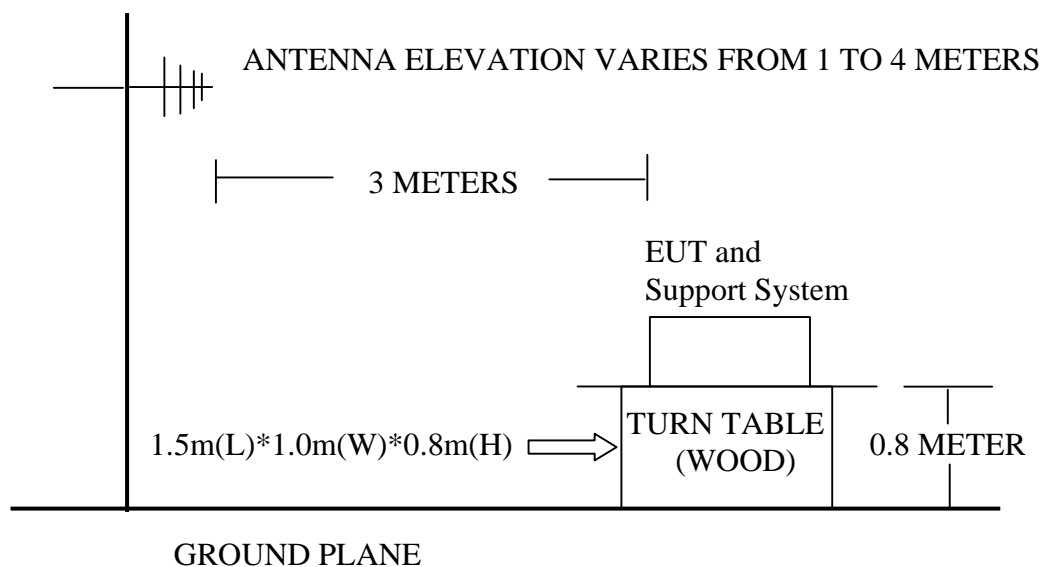
#### 4.2.1. Block diagram of connection between the EUT and simulators

EUT

***(EUT: Rock Band Wireless Guitar For ADAM)***

## 4.2.2. In Anechoic Chamber

## ANTENNA TOWER



## 4.3. Radiated Emission Limit

## 4.3.1.15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

- Remark :
- (1) Emission level  $\text{dB}\mu\text{V} = 20 \log \text{Emission level } \mu\text{V}/\text{m}$
  - (2) The smaller limit shall apply at the cross point between two frequency bands.

## 4.3.2. 15.205 Restricted bands of operation

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	2690 - 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> )

All the emissions appearing within these frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

## 4.4.EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application

. A new battery was used for this test.

## 4.4.1.Rock Band Wireless Guitar For ADAM (EUT)

Model Number : NWGTS2  
Serial Number : N/A

## 4.5.Operating Condition of EUT

4.5.1.Setup the EUT as shown in Section 4.2..

4.5.2.Let the EUT work in test modes (TX Mode) and test it.

## 4.6.Test Procedure

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it work normally, we use a keyboard test soft ware, let EUT working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

This test was performed with EUT in X, Y, Z position, and the worse case was found when EUT in X position as the test photo indicated.

The bandwidth of the EMI test receiver (R&S ESVS20) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz

The duty cycle factor was use to calculate Average Level above 1 GHz.

The frequency range from 30MHz to 10<sup>th</sup> harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

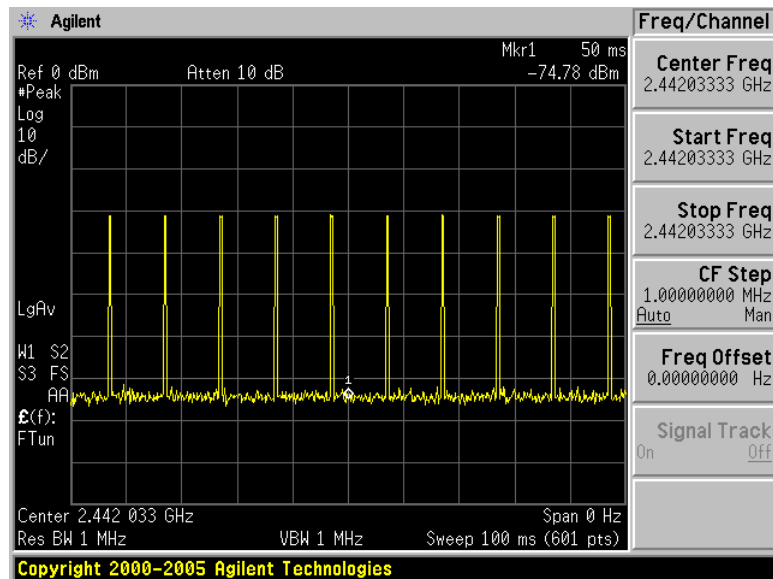
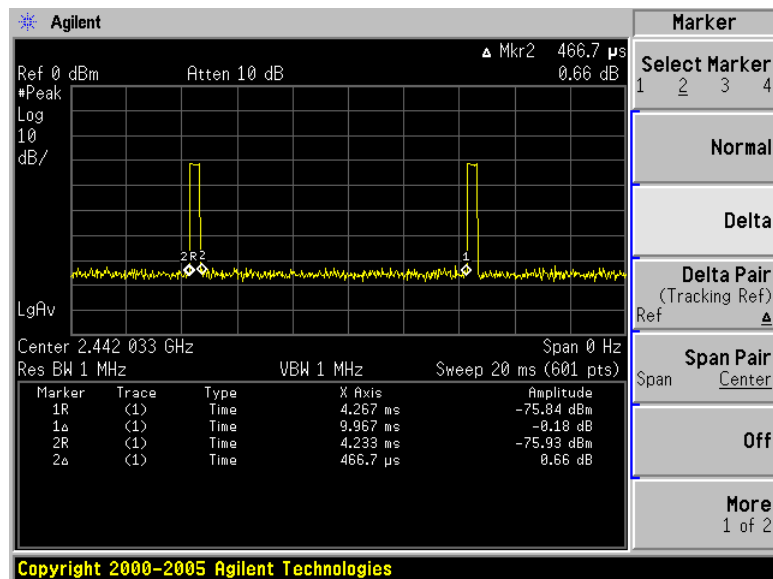
#### 4.7.Radiated Emission Test Results

**PASS.**

All the emissions from 30MHz to 25 GHz are comply with 15.209 limits

Duty cycle factor

$$DCF = 20 \log(1/\text{duty cycle}) = 20 \log(1/0.0468) = 26.60$$



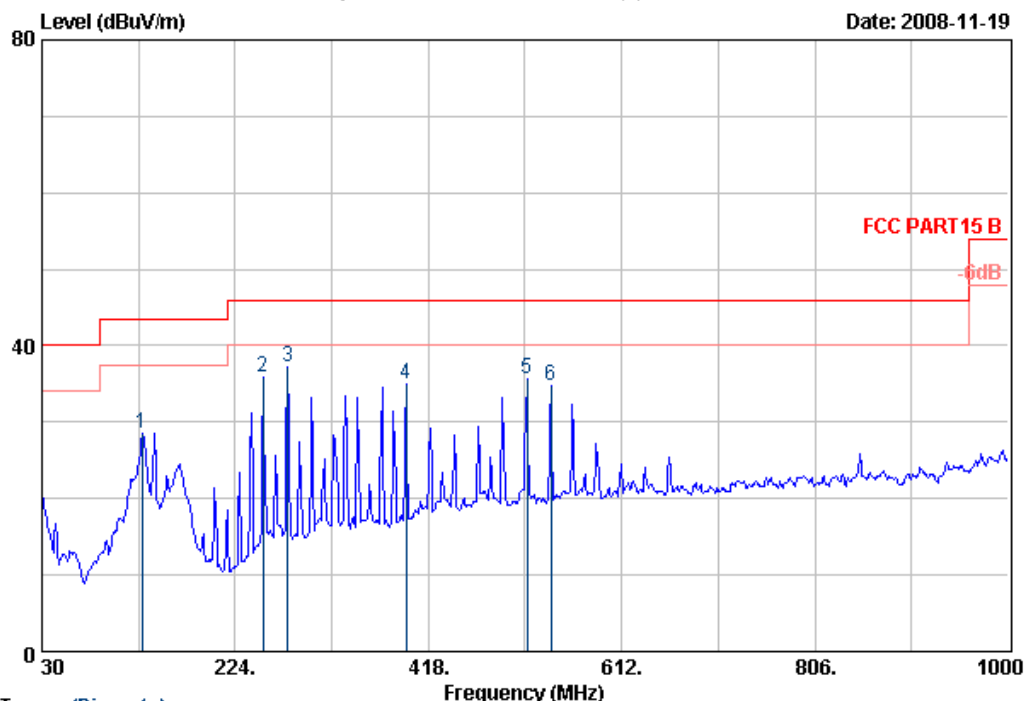
Test Frequency: 30MHz-1000MHz



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Data: 1 File: D:\2008 Report Data\CWCS8Q1658.EMI (6)

Date: 2008-11-19



Trace: (Discrete)

Site no. : AUDIX 3m chamber Data no. : 1  
Dis. / Ant. : 3m CBL6112D Ant. pol. : HORIZONTAL  
Limit : FCC PART15 B  
Env. / Ins. : 29.5°C/55% ESVS 20 Engineer : Sunny  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test Mode : Tx Mode  
M/N : XBGTS2-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	130.88	12.13	1.16	15.33	28.62	43.50	14.88	QP
2	252.13	12.63	1.58	21.78	35.99	46.00	10.01	QP
3	276.38	12.99	1.50	22.83	37.32	46.00	8.68	QP
4	395.69	14.75	1.87	18.28	34.90	46.00	11.10	QP
5	516.94	17.80	2.18	15.73	35.71	46.00	10.29	QP
6	541.19	18.08	2.09	14.59	34.76	46.00	11.24	QP

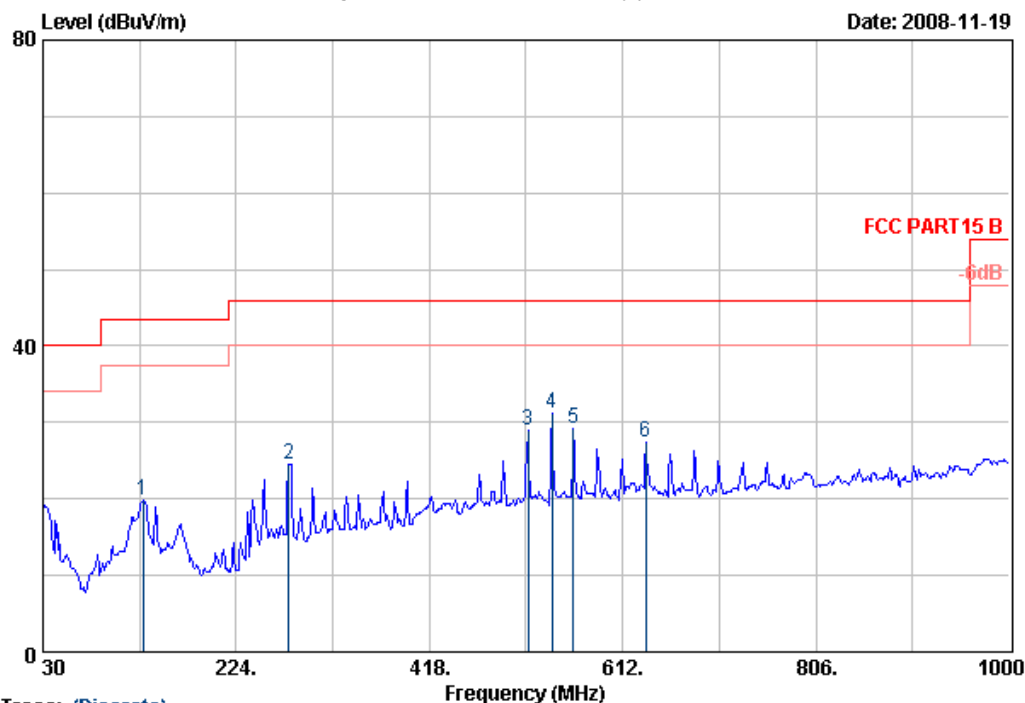
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.



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Data: 2 File: D:\2008 Report Data\ACS8Q1658.EMI (6)

Date: 2008-11-19



Trace: (Discrete)

Site no. : AUDIX 3m chamber Data no. : 2  
Dis. / Ant. : 3m CBL6112D Ant. pol. : VERTICAL  
Limit : FCC PART15 B  
Env. / Ins. : 29.5°C/55% ESVS 20 Engineer : Sunny  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test Mode : Tx Mode  
M/N : XBGTS2-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	130.88	12.13	1.16	6.49	19.78	43.50	23.72	QP
2	276.38	12.99	1.50	10.11	24.60	46.00	21.40	QP
3	516.94	17.80	2.18	9.05	29.03	46.00	16.97	QP
4	541.19	18.08	2.09	11.05	31.22	46.00	14.78	QP
5	562.53	18.66	2.16	8.31	29.13	46.00	16.87	QP
6	635.28	18.82	2.32	6.29	27.43	46.00	18.57	QP

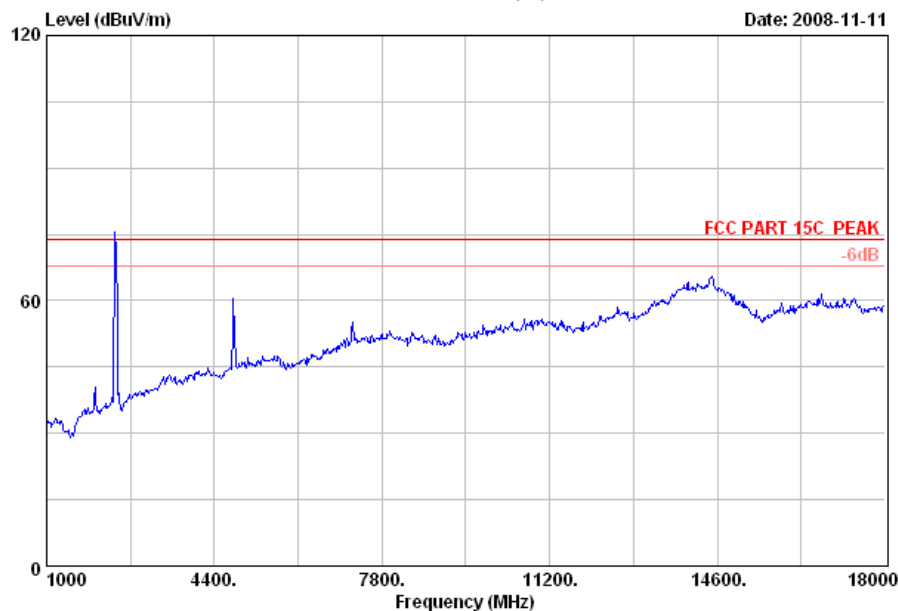
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Test Frequency: 1GHz-18GHz



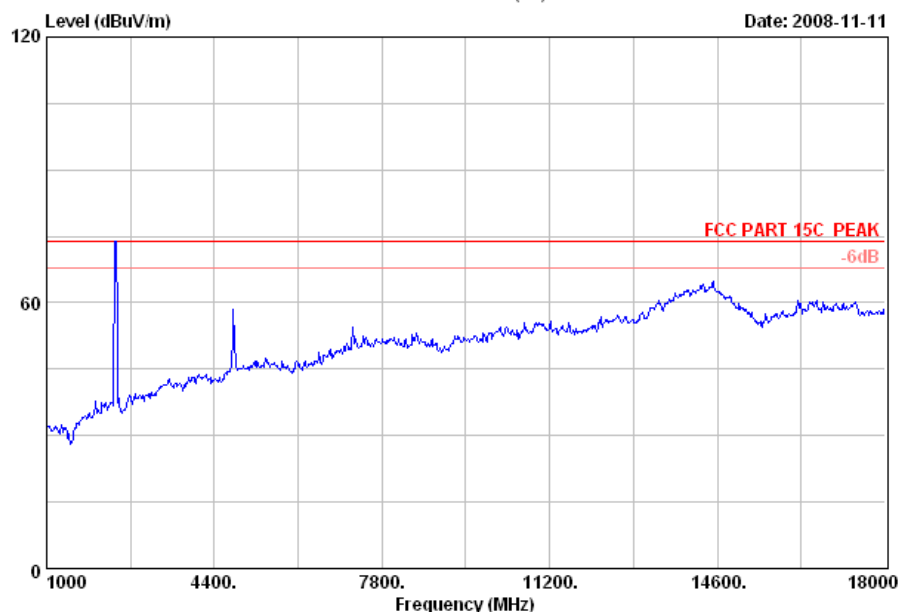
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Postcode:518057

Data: 1 File: E:\2008 test data\C\2008-11-11.EMI (32)



Site no. : 3# Chamber Data no. : 1  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2402MHz  
M/N : XBGTS2-A

Data: 3 File: E:\2008 test data\C\2008-11-11.EMI (32)



Site no. : 3# Chamber Data no. : 3  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2402MHz  
M/N : XBGTS2-A



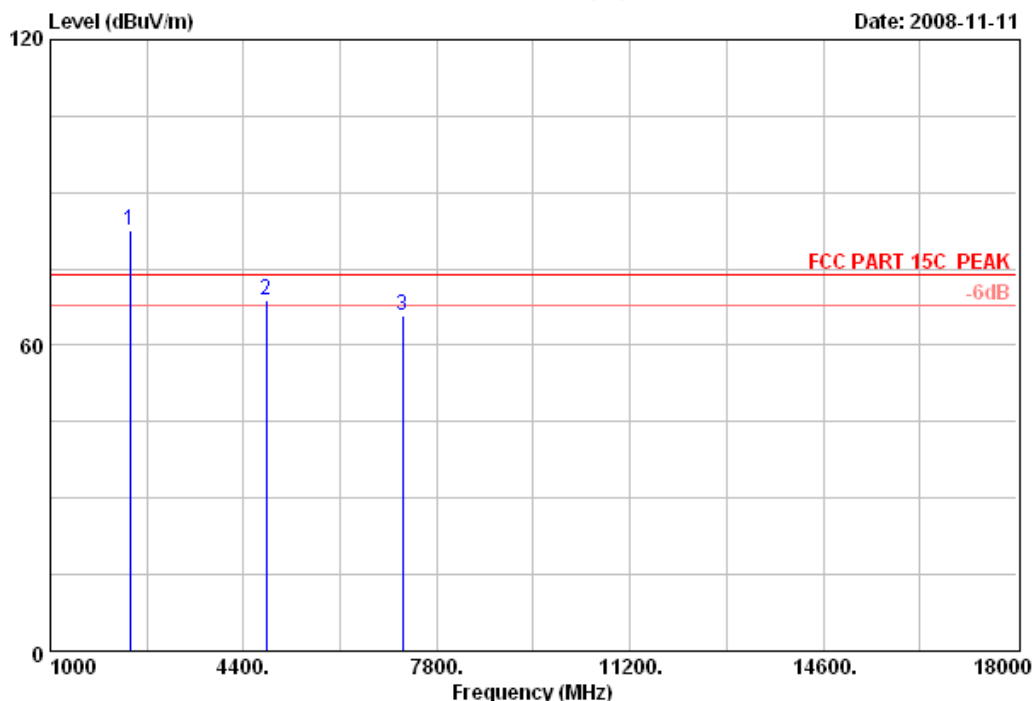


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Data: 2

File: E:\2008 test data\2008-11-11.EMI (32)

Date: 2008-11-11



Site no. : 3# Chamber Data no. : 2  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2402MHz  
M/N : XBGT52-A

	Freq.	Ant.	Cable	Amp	Emission				
	(MHz)	Factor	Loss	Factor	Reading	Level	Limits	Margin	Remark
		(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	2402.00	28.46	6.73	35.95	83.33	82.57	114.00	31.43	Peak
2	4804.00	34.36	10.53	35.23	59.21	68.87	74.00	5.13	Peak
3	7206.00	38.36	12.16	35.03	50.46	65.95	74.00	8.05	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

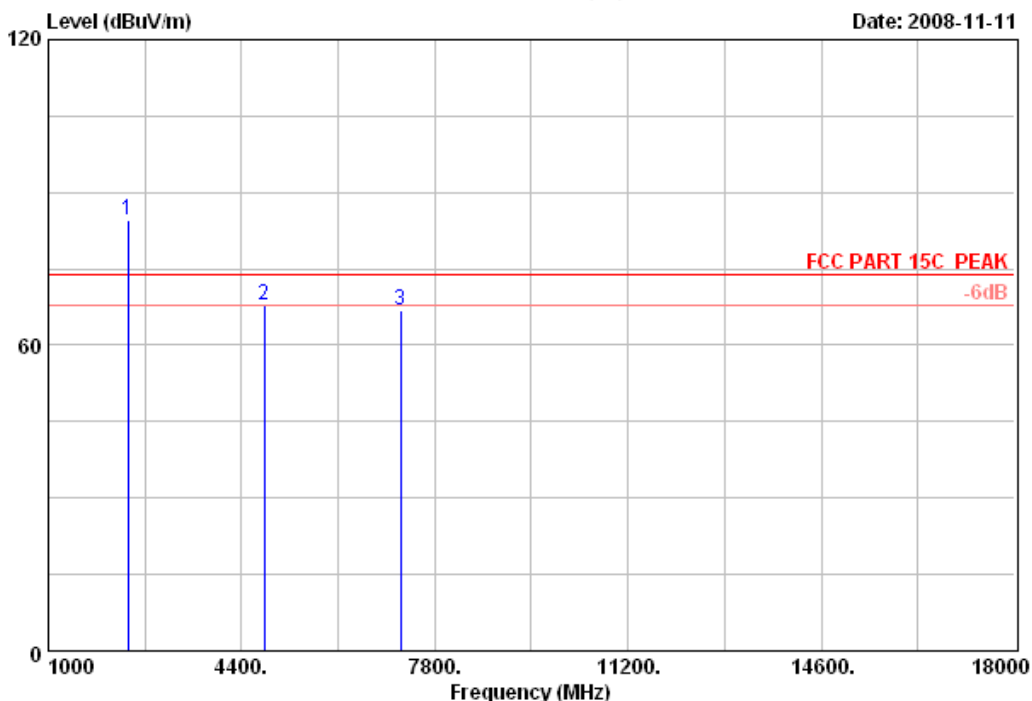
Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4804.00	68.87	26.6	42.27	54	11.73
7206.00	65.95	26.6	39.35	54	14.65



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Postcode:518057

Data: 4 File: E:\2008 test data\2008-11-11.EMI (32)

Date: 2008-11-11



Site no. : 3# Chamber Data no. : 4  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2402MHz  
M/N : XBGS2-A

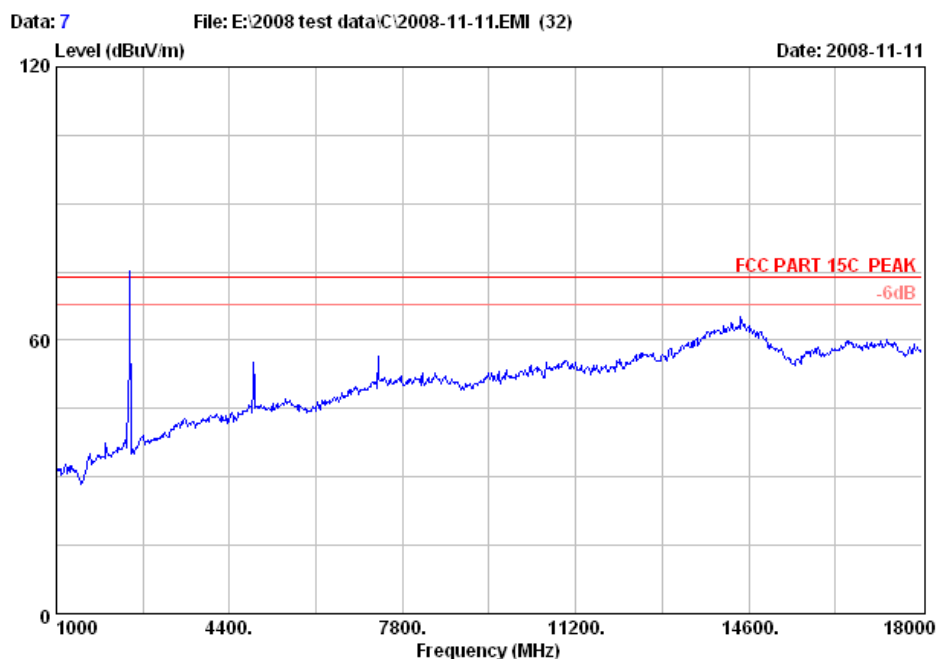
		Ant.	Cable	Amp	Emission				
	Freq.	Factor	Loss	Factor	Reading	Level	Limits	Margin	Remark
	(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	2402.00	28.46	6.73	35.95	85.29	84.53	114.00	29.47	Peak
2	4804.00	34.36	10.53	35.23	58.22	67.88	74.00	6.12	Peak
3	7206.00	38.36	12.16	35.03	51.39	66.88	74.00	7.12	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

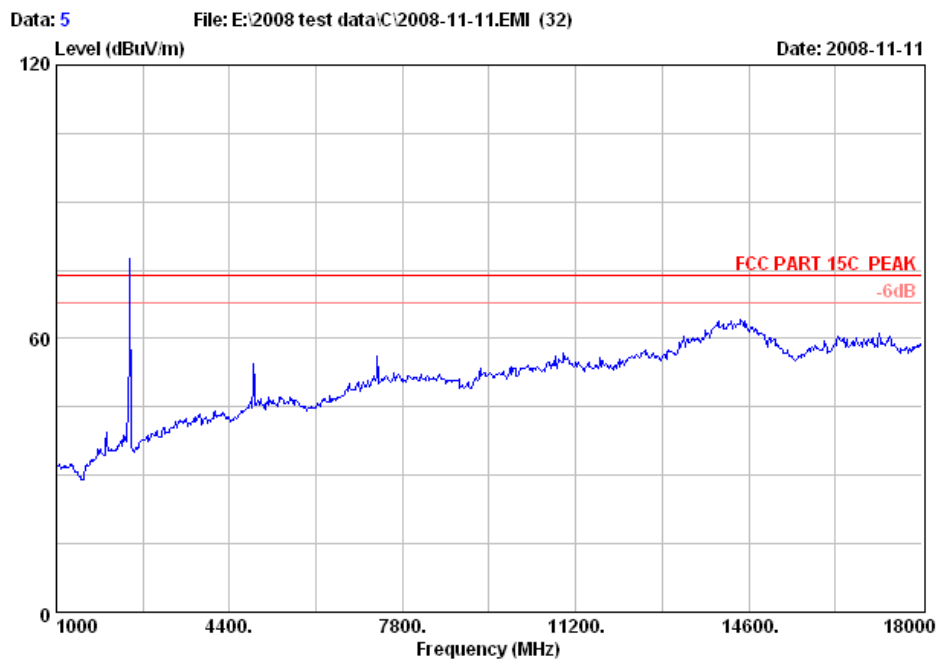
Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4804.00	67.88	26.6	41.28	54	12.72
7206.00	66.88	26.6	40.28	54	13.72



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Postcode:518057



Site no. : 3# Chamber Data no. : 7  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2442MHz  
M/N : XBGTS2-A



Site no. : 3# Chamber Data no. : 5  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2442MHz  
M/N : XBGTS2-A

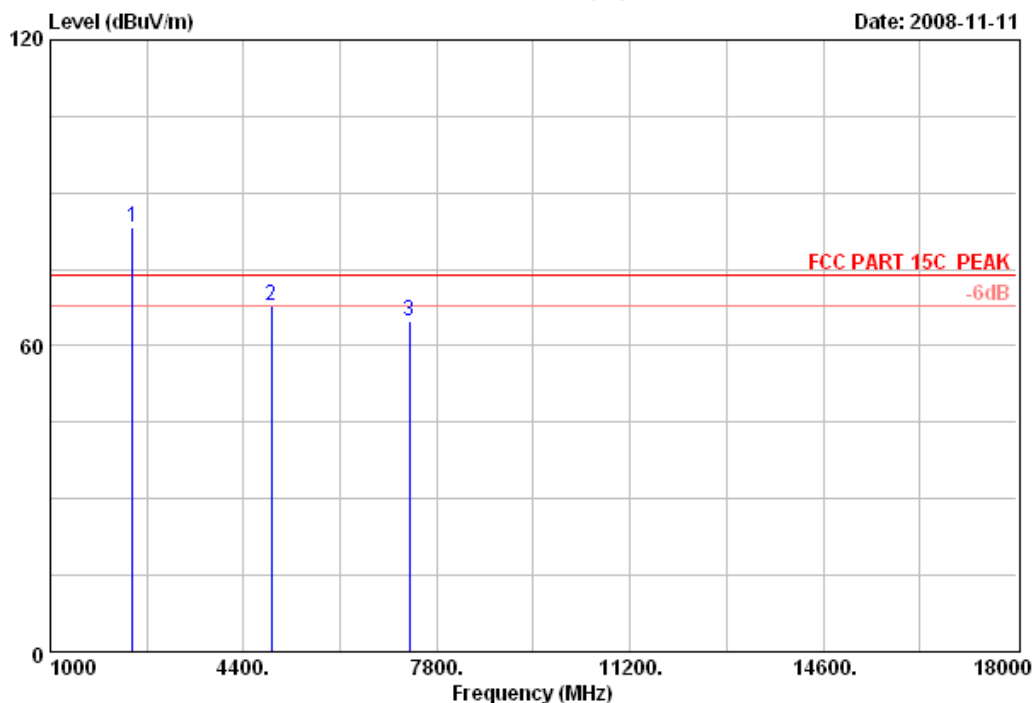


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Data: 8

File: E:\2008 test data\C\2008-11-11.EMI (32)

Date: 2008-11-11



Site no. : 3# Chamber Data no. : 8  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2442MHz  
M/N : XBGTS2-A

	Freq.	Ant.	Cable	Amp	Emission				
	(MHz)	Factor	Loss	Factor	Reading	Level	Limits	Margin	Remark
		(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	2442.00	28.53	6.80	35.96	83.75	83.12	114.00	30.88	Peak
2	4884.00	34.78	10.57	35.13	57.53	67.75	74.00	6.25	Peak
3	7326.00	38.62	12.20	34.96	49.07	64.93	74.00	9.07	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limt (dBuV/m)	Margin (dB)
4884.00	67.75	26.6	41.15	54	12.85
7326.00	64.93	26.6	38.33	54	15.67

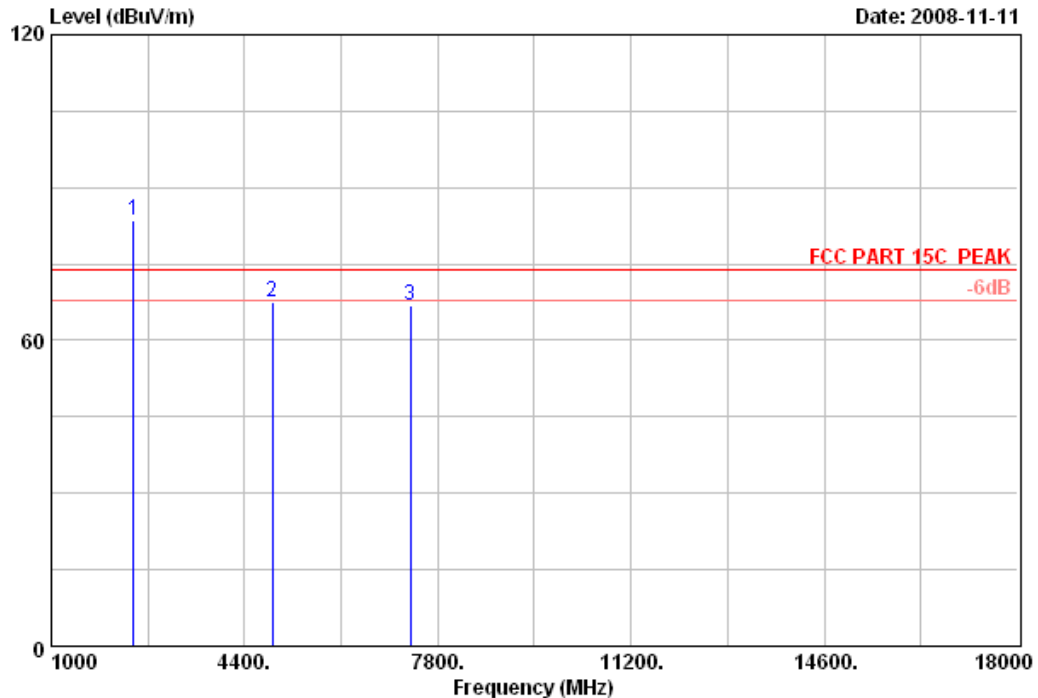


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Data: 6

File: E:\2008 test data\C\2008-11-11.EMI (32)

Date: 2008-11-11



Site no. : 3# Chamber Data no. : 6  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2442MHz  
M/N : XBGTS2-A

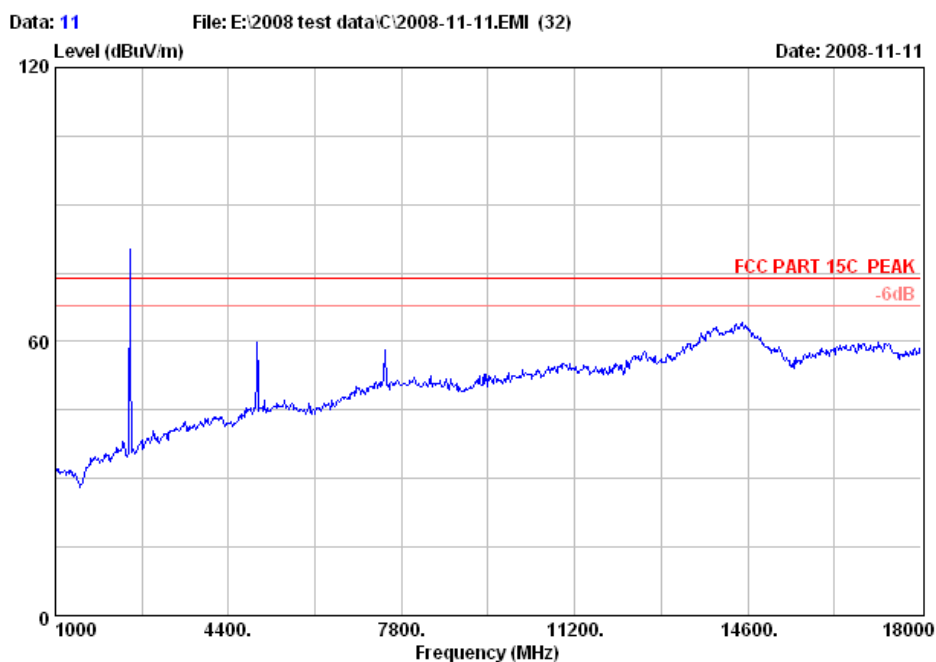
	Freq.	Ant.	Cable	Amp	Emission				
	(MHz)	Factor	Loss	Factor	Reading	Level	Limits	Margin	Remark
		(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	2442.00	28.53	6.80	35.96	84.35	83.72	114.00	30.28	Peak
2	4884.00	34.78	10.57	35.13	57.21	67.43	74.00	6.57	Peak
3	7326.00	38.62	12.20	34.96	51.09	66.95	74.00	7.05	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

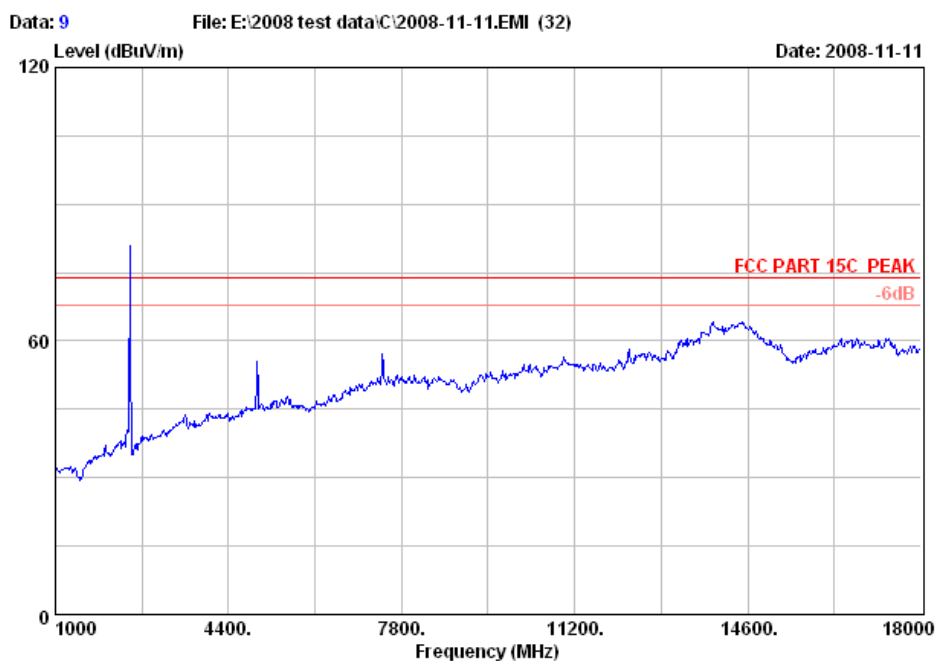
Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4884.00	67.43	26.6	40.83	54	13.17
7326.00	66.95	26.6	40.35	54	13.65



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Site no. : 3# Chamber Data no. : 11  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2482MHz  
M/N : XBGTS2-A



Site no. : 3# Chamber Data no. : 9  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2482MHz  
M/N : XBGTS2-A

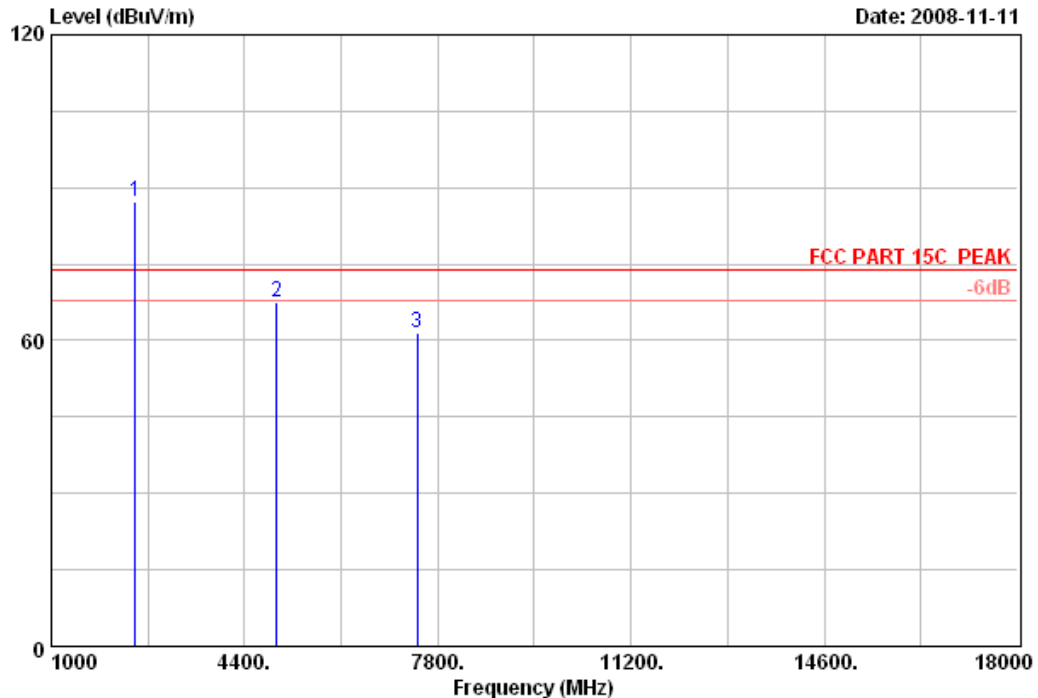


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Data: 12

File: E:\2008 test data\C\2008-11-11.EMI (32)

Date: 2008-11-11



Site no. : 3# Chamber Data no. : 12  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2482MHz  
M/N : XBGTS2-A

	Freq.	Ant.	Cable	Amp	Emission				
	(MHz)	Factor	Loss	Factor	Reading	Level	Limits	Margin	Remark
		(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	2482.00	28.58	6.87	35.96	87.71	87.20	114.00	26.80	Peak
2	4964.00	35.29	10.59	35.11	56.89	67.66	74.00	6.34	Peak
3	7446.00	38.89	12.32	34.99	45.31	61.53	74.00	12.47	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4964.00	67.66	26.6	41.06	54	12.94
7446.00	61.53	26.6	34.93	54	19.07

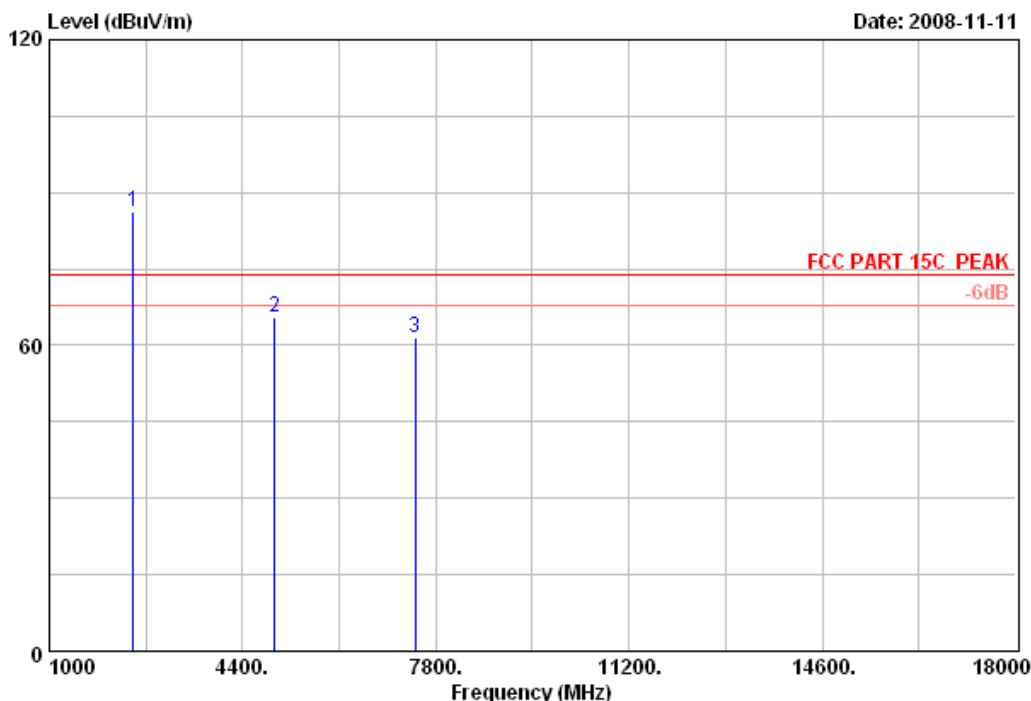


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Data: 10

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Date: 2008-11-11



Site no. : 3# Chamber Data no. : 10  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2482MHz  
M/N : XBGTS2-A

	Freq.	Ant.	Cable	Amp	Emission				
	(MHz)	Factor	Loss	Factor	Reading	Level	Limits	Margin	Remark
		(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	2482.00	28.58	6.87	35.96	86.90	86.39	114.00	27.61	Peak
2	4964.00	35.29	10.59	35.11	54.88	65.65	74.00	8.35	Peak
3	7446.00	38.89	12.32	34.99	45.34	61.56	74.00	12.44	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4964.00	65.65	26.6	39.05	54	14.95
7446.00	61.56	26.6	34.96	54	19.04



## 5. BAND EDGE COMPLIANCE TEST

### 5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4446A	US44300459	May.10, 08	1 Year
2	Horn Antenna	EMCO	3115	9607-4877	May.27, 08	1.5 Year
3	Amplifier	HP	8449B	3008A00863	May.10, 08	1 Year
4	RF Cable	Hubersuhner	SUCOFLEX102	271473/4	May.28, 08	1Year
5	RF Cable	Hubersuhner	SUCOFLEX 102	29091/2	May.28, 08	1Year
6	RF Cable	Hubersuhner	SUCOFLEX 102	28620/2	May.28, 08	1Year
7	RF Cable	Hubersuhner	SUCOFLEX 102	271471/4	May.28, 08	1Year
8	RF Cable	Hubersuhner	SUCOFLEX 102	29086/2	May.28, 08	1Year

### 5.2. Limit

According to §15.247(c), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

### 5.3. Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.(X position)
2. The turntable was 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 emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:

PEAK: RBW=VBW=1MHz / Sweep=AUTO PK detector

The average level was calculated use duty cycle factor

### 5.4. Test Results

Pass (The testing data was attached in the next pages.)

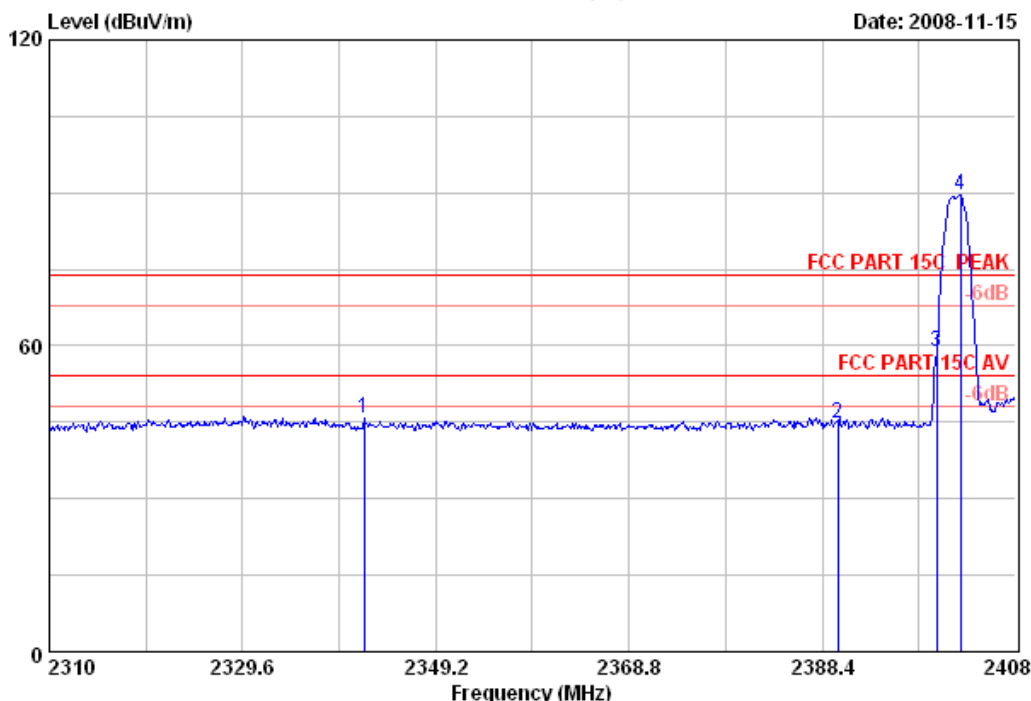


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Data: 33

File: E:\2008 test data\C\2008-11-11.EMI (40)

Date: 2008-11-15



Site no. : 3# Chamber Data no. : 33  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2402MHz Hopping Off  
M/N : XBGTS2-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2341.95	28.38	6.67	35.99	46.86	45.92	74.00	28.08	Peak
2	2390.00	28.46	6.71	35.95	45.43	44.65	74.00	29.35	Peak
3	2400.00	28.46	6.73	35.95	59.52	58.76	74.00	15.24	Peak
4	2402.41	28.46	6.73	35.95	90.18	89.42	74.00	-15.42	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Note: All the PK levels fall in the restricted bands comply with Average limit, so the average levels are deemed to comply with average limit.

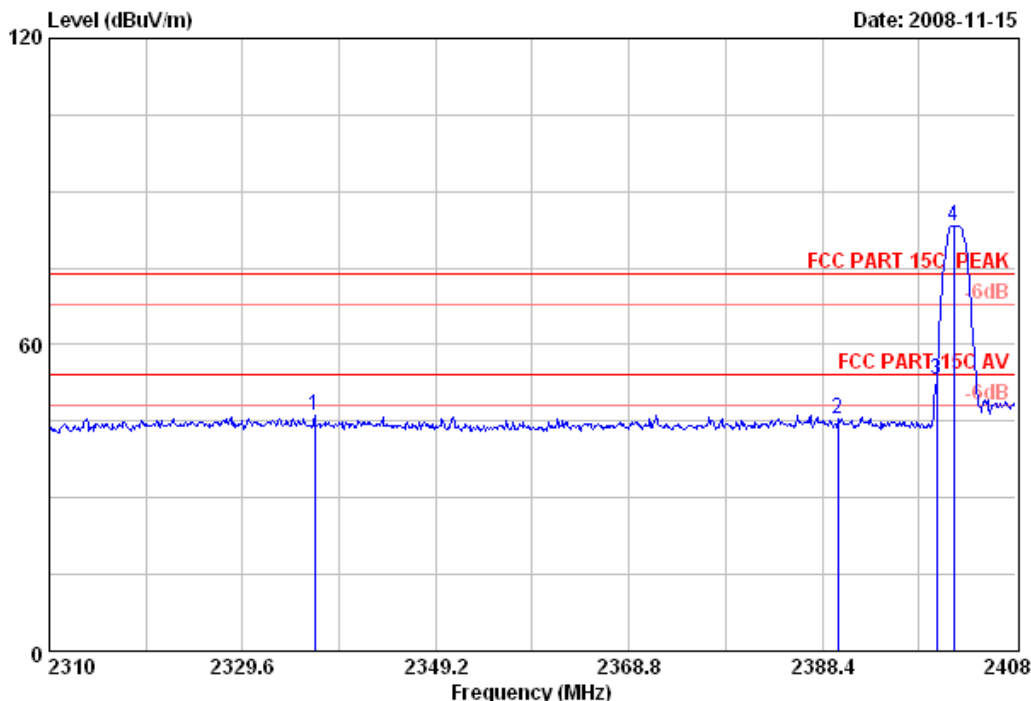


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Postcode:518057

Data: 34

File: E:\2008 test data\C\2008-11-11.EMI (40)

Date: 2008-11-15



Site no. : 3# Chamber Data no. : 34  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2402MHz Hopping Off  
M/N : XBGT52-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2336.95	28.38	6.67	36.00	47.05	46.10	74.00	27.90	Peak
2	2390.00	28.46	6.71	35.95	46.33	45.55	74.00	28.45	Peak
3	2400.00	28.46	6.73	35.95	53.89	53.13	74.00	20.87	Peak
4	2401.73	28.46	6.73	35.95	84.10	83.34	74.00	-9.34	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Note: All the PK levels fall in the restricted bands comply with Average limit, so the average levels are deemed to comply with average limit.

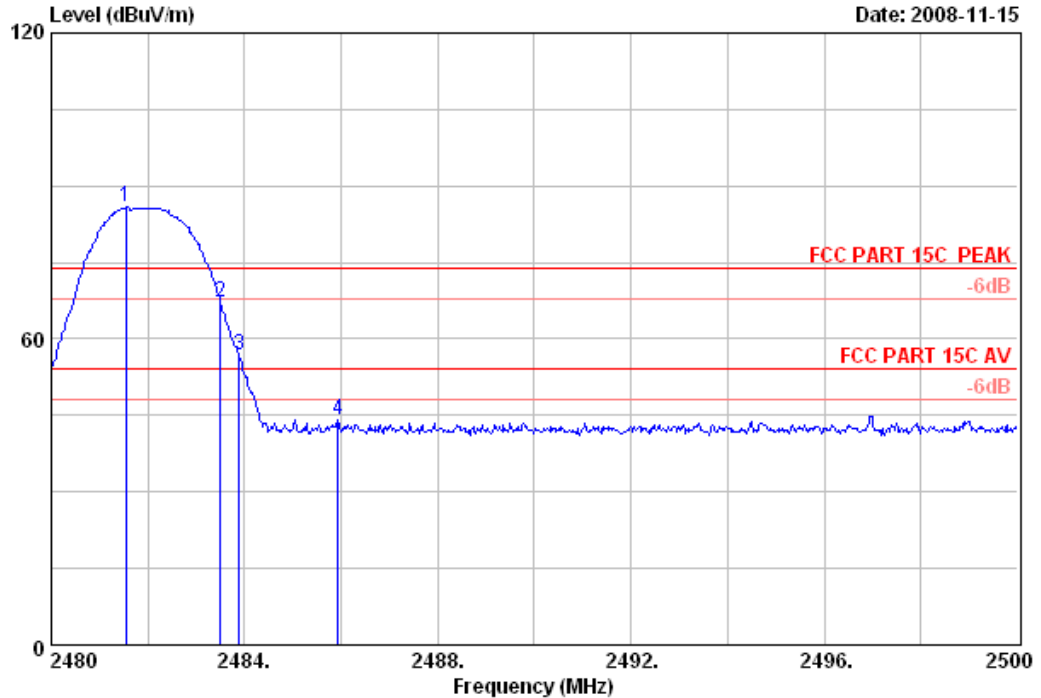


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Postcode:518057

Data: 35

File: E:\2008 test data\2008-11-11.EMI (40)

Date: 2008-11-15



Site no. : 3# Chamber Data no. : 35  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2482MHz Hopping Off  
M/N : XBGTS2-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2481.54	28.58	6.87	35.96	86.41	85.90	74.00	-11.90	Peak
2	2483.50	28.58	6.87	35.96	67.80	67.29	74.00	6.71	Peak
3	2483.90	28.58	6.87	35.96	57.40	56.89	74.00	17.11	Peak
4	2485.94	28.58	6.87	35.96	44.54	44.03	74.00	29.97	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.50	67.29	26.60	40.69	54	13.31
2483.90	56.89	26.60	30.29	54	23.71
2485.94	44.03	26.60	17.43	54	36.57

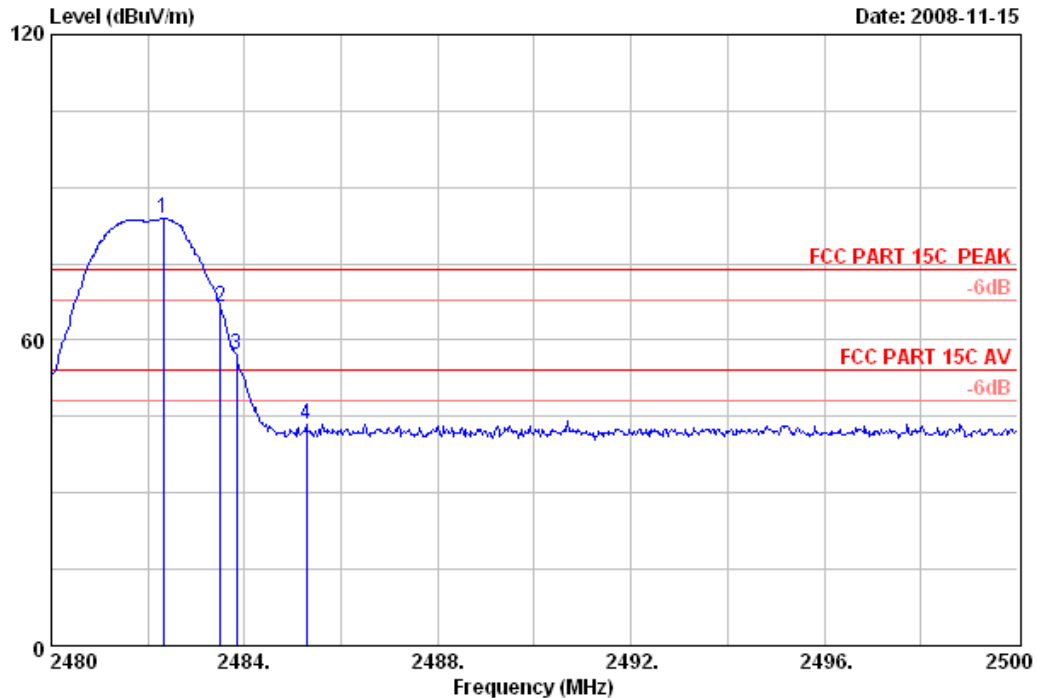


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Data: 36

File: E:\2008 test data\C\2008-11-11.EMI (40)

Date: 2008-11-15



Site no. : 3# Chamber Data no. : 36  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Tx 2482MHz Hopping Off  
M/N : XBGTS2-A  
Hopping Off

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2482.31	28.58	6.87	35.96	84.33	83.82	74.00	-9.82	Peak
2	2483.50	28.58	6.87	35.96	67.19	66.68	74.00	7.32	Peak
3	2483.83	28.58	6.87	35.96	57.71	57.20	74.00	16.80	Peak
4	2485.28	28.58	6.87	35.96	44.05	43.54	74.00	30.46	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.50	66.68	26.60	40.08	54	13.92
2483.83	57.20	26.60	30.6	54	23.4
2485.28	43.54	26.60	16.94	54	37.06

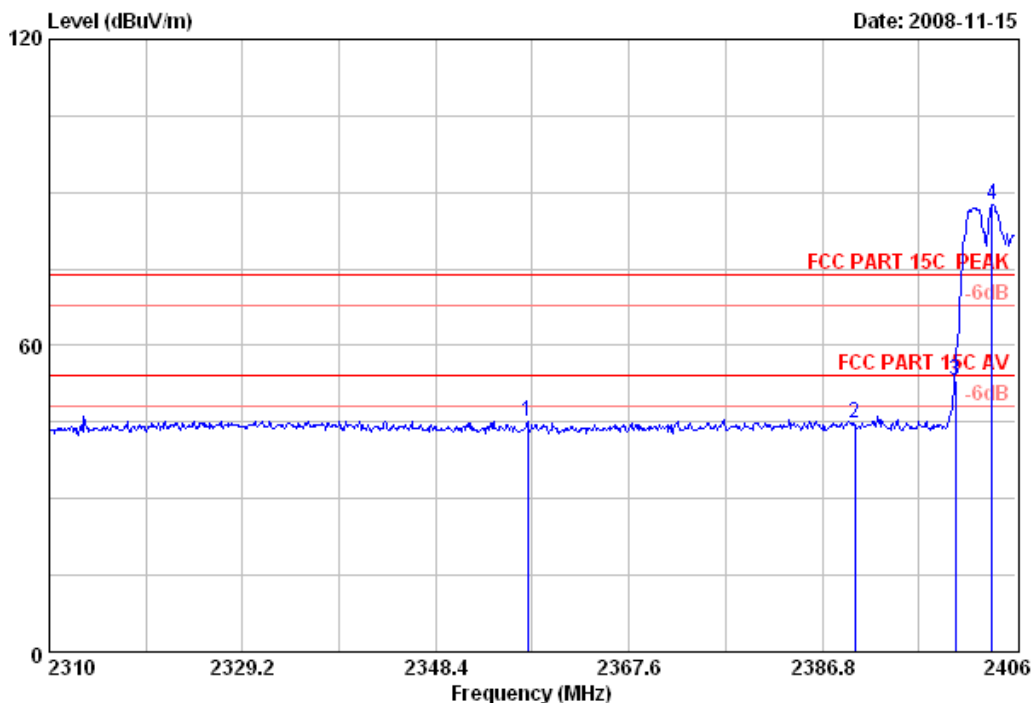


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Postcode:518057

Data: 37

File: E:\2008 test data\C\2008-11-11.EMI (40)

Date: 2008-11-15



Site no. : 3# Chamber Data no. : 37  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Hopping ON  
M/N : XBGTS2-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2357.52	28.41	6.69	35.99	46.15	45.26	74.00	28.74	Peak
2	2390.00	28.46	6.71	35.95	45.47	44.69	74.00	29.31	Peak
3	2400.00	28.46	6.73	35.95	53.91	53.15	74.00	20.85	Peak
4	2403.70	28.48	6.73	35.95	88.36	87.62	74.00	-13.62	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Note: All the PK levels fall in the restricted bands comply with Average limit, so the average levels are deemed to comply with average limit.

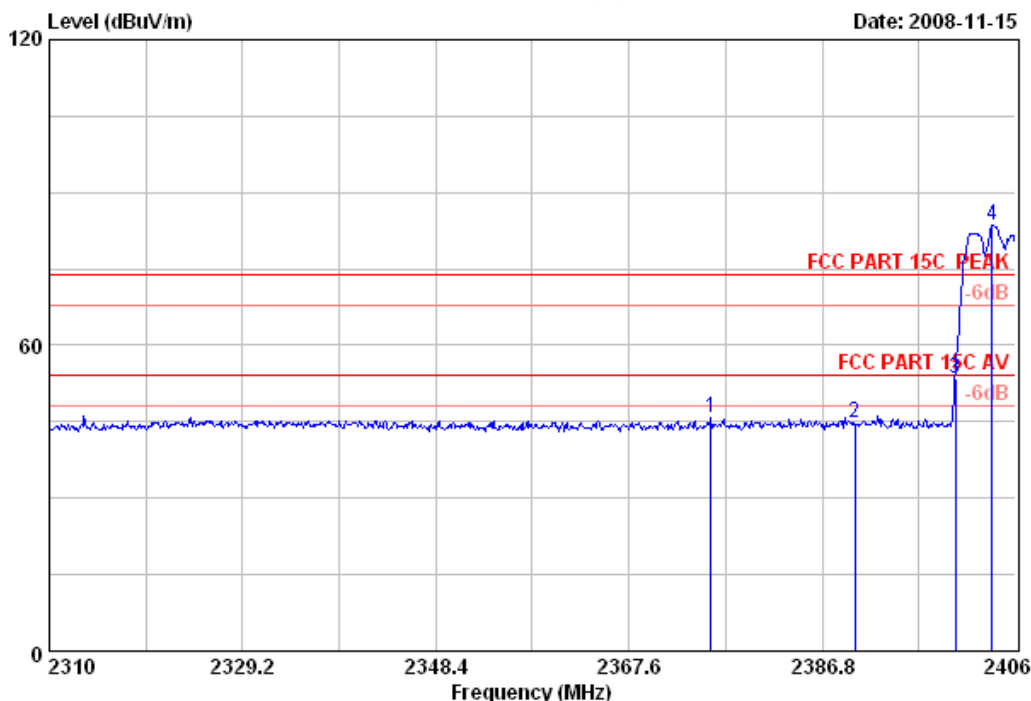


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Postcode:518057

Data: 38

File: E:\2008 test data\C\2008-11-11.EMI (40)

Date: 2008-11-15



Site no. : 3# Chamber Data no. : 38  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Hopping ON  
M/N : XBGTS2-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2375.76	28.43	6.71	35.97	46.64	45.81	74.00	28.19	Peak
2	2390.00	28.46	6.71	35.95	45.47	44.69	74.00	29.31	Peak
3	2400.00	28.46	6.73	35.95	54.15	53.39	74.00	20.61	Peak
4	2403.70	28.48	6.73	35.95	84.36	83.62	74.00	-9.62	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Note: All the PK levels fall in the restricted bands comply with Average limit, so the average levels are deemed to comply with average limit.

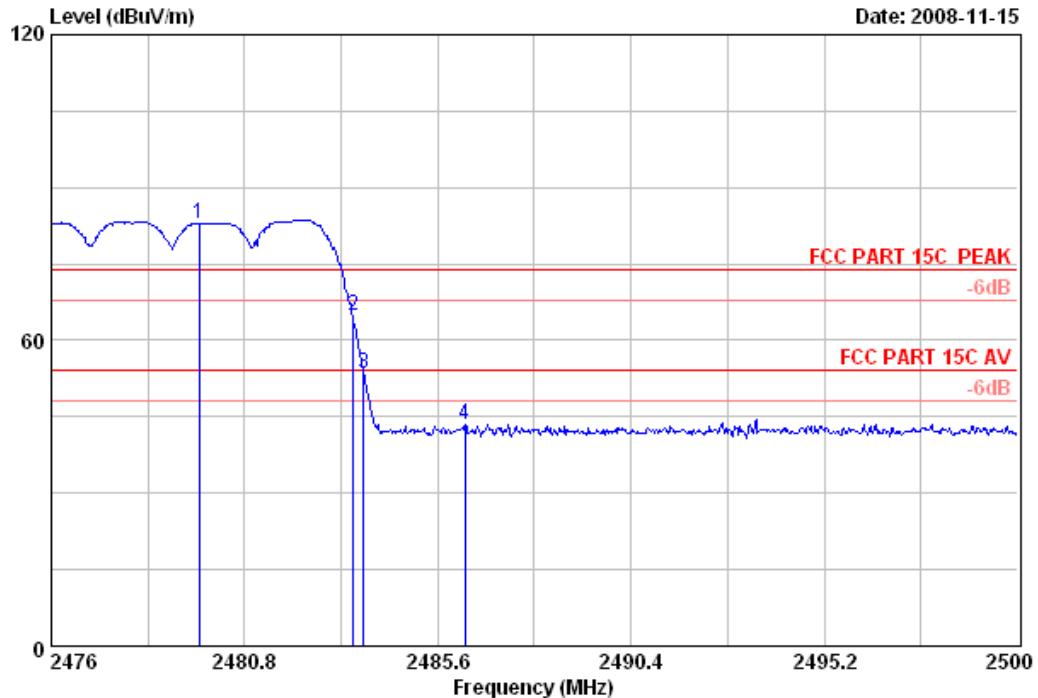


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Fax:+86-755-26632877  
Postcode:518057

Data: 39

File: E:\2008 test data\C\2008-11-11.EMI (40)

Date: 2008-11-15



Site no. : 3# Chamber Data no. : 39  
Dis. / Ant. : 3m 3115 Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Hopping ON  
M/N : XBGTS2-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.67	28.58	6.87	35.96	83.52	83.01	74.00	-9.01	Peak
2	2483.50	28.58	6.87	35.96	65.50	64.99	74.00	9.01	Peak
3	2483.75	28.58	6.87	35.96	54.13	53.62	74.00	20.38	Peak
4	2486.27	28.58	6.87	35.96	43.80	43.29	74.00	30.71	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.50	64.99	26.60	38.39	54	15.61
2483.75	53.62	26.60	27.02	54	26.98
2486.27	43.29	26.60	16.69	54	37.31



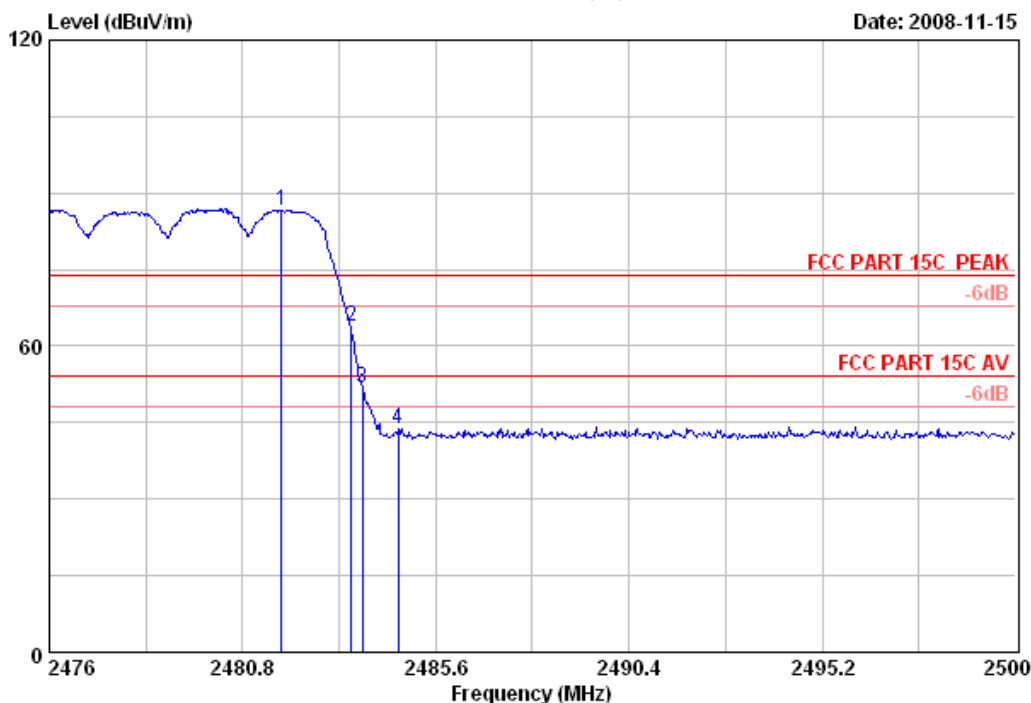


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Data: 40

File: E:\2008 test data\C\2008-11-11.EMI (40)

Date: 2008-11-15



Site no. : 3# Chamber Data no. : 40  
Dis. / Ant. : 3m 3115 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Wireless Guitar For ADAM  
Power Rating : DC 4.5V  
Test mode : Hopping ON  
M/N : XBGTS2-A

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2481.76	28.58	6.87	35.96	87.16	86.65	74.00	-12.65	Peak
2	2483.50	28.58	6.87	35.96	64.32	63.81	74.00	10.19	Peak
3	2483.78	28.58	6.87	35.96	52.33	51.82	74.00	22.18	Peak
4	2484.66	28.58	6.87	35.96	44.26	43.75	74.00	30.25	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	PK Measured level (dBuV/m)	Duty cycle factor (dB)	Average Level (dBuV/m)	Limt (dBuV/m)	Margin (dB)
2483.50	63.81	26.60	37.21	54	16.79
2483.78	51.82	26.60	25.22	54	28.78
2484.66	43.75	26.60	17.15	54	36.85

## 6. CARRIER FREQUENCY SEPARATION TEST

### 6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4446A	US44300459	May.10, 08	1 Year

### 6.2. Limit

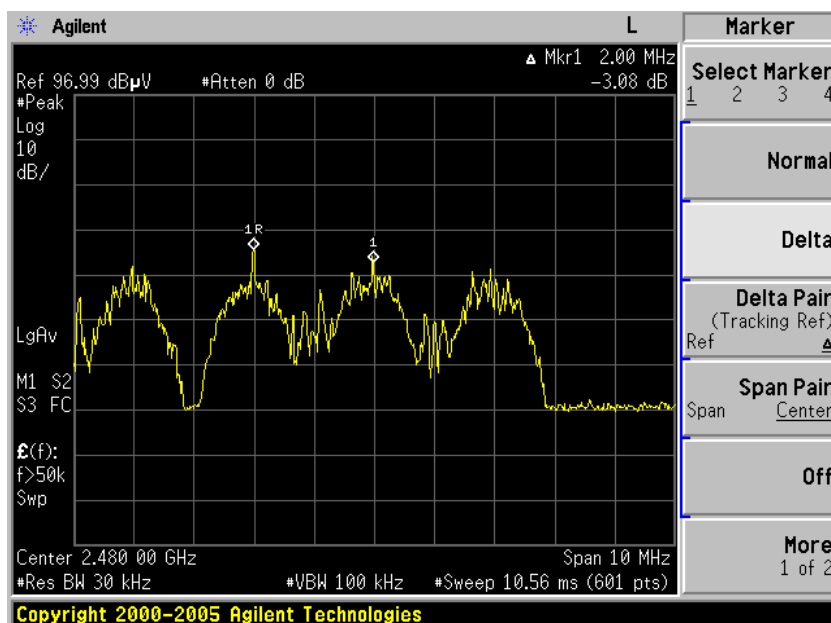
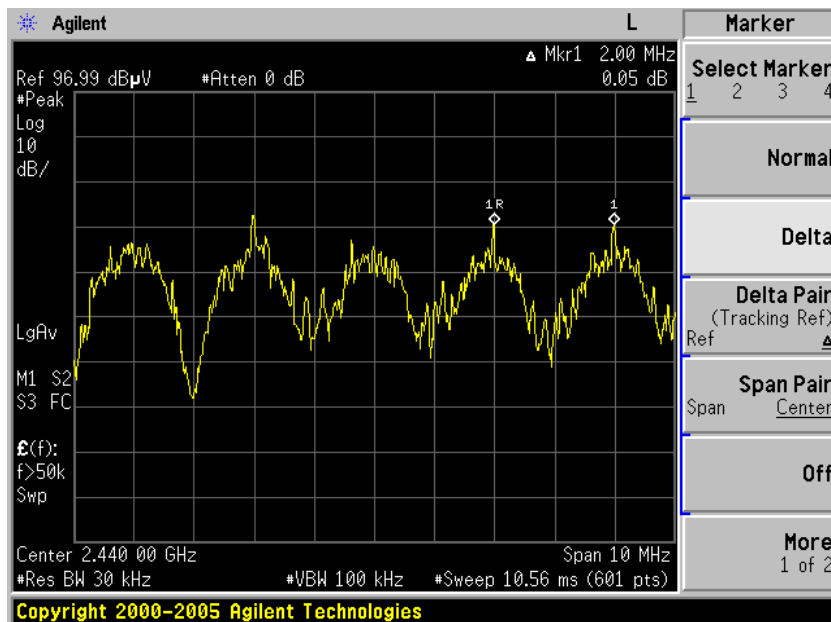
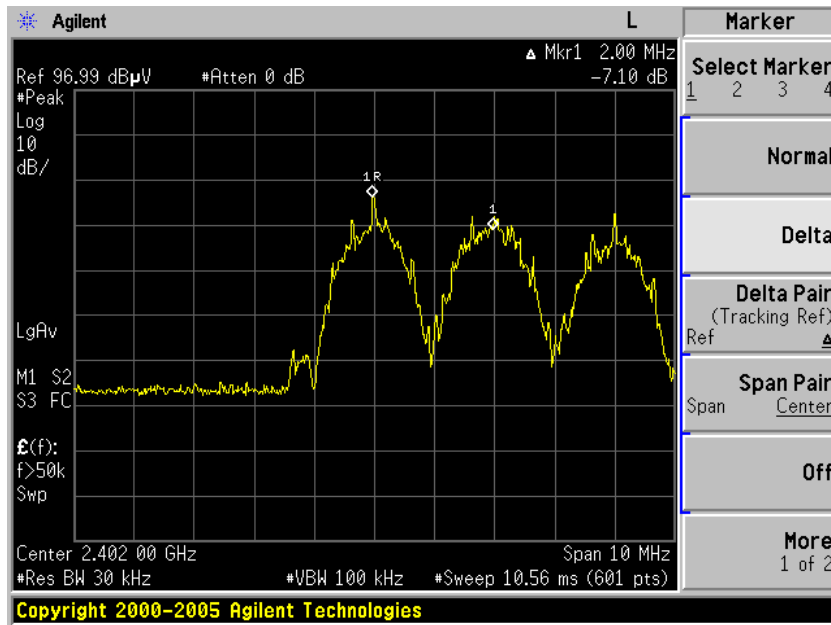
Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

### 6.3. Test Information

EUT:	Rock Band Wireless Guitar For ADAM
M/N:	XBGTS2-A.
Test Date:	Nov.11, 2008
Ambient Temperature:	23°C
Relative Humidity:	54%
Test standard:	FCC PART 15C: 15.247(a)(1)
Test mode:	TX (Hopping on)
Test By:	Sunny

### 6.4. Test Results (Pass.)

carrier frequency separating	20dB Bandwidth (MHz)	Conclusion
2MHz	1.45(see clause 7.4)	PASS



## 7. 20 DB BANDWIDTH TEST

### 7.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4446A	US44300459	May.10, 08	1 Year

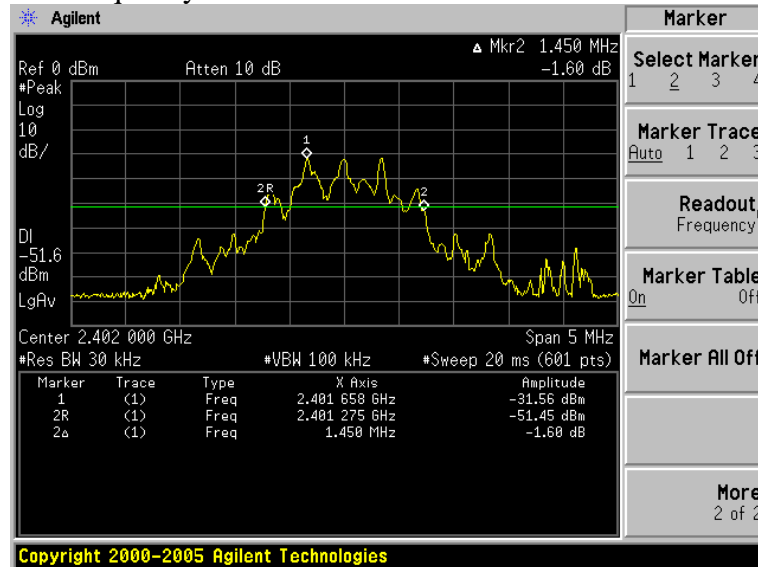
### 7.2.Test Information

EUT:	Rock Band Wireless Guitar For ADAM
M/N:	XBGTS2-A
Test Date:	Nov.11, 2008
Ambient Temperature:	23℃
Relative Humidity:	54%
Test standard:	FCC PART 15C: 15.247(a)(1)
Test mode:	TX (Hopping off)
Test Frequency:	Low: 2402MHz    Mid: 2442MHz    High: 2482MHz
Test By:	Jamy

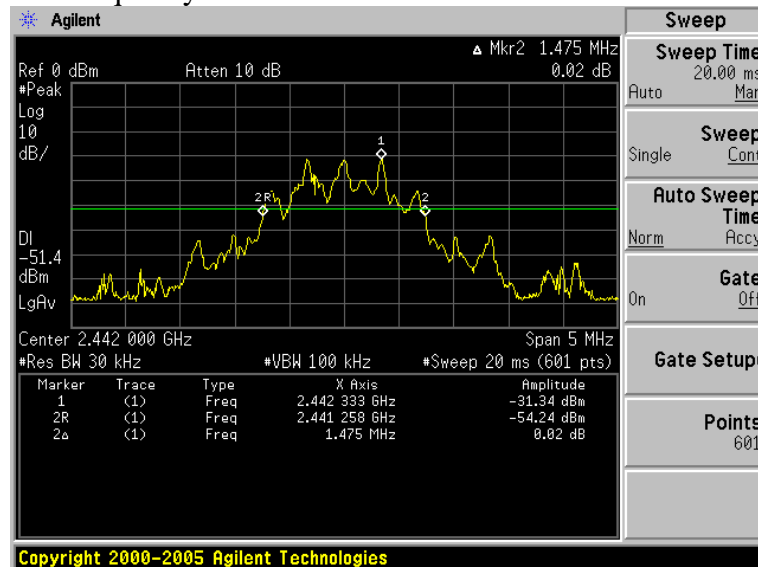
### 7.3.Test Results

CH	20dB Bandwidth (MHz)	Limit (kHz)	Conclusion
(Low)	1.450	---	PASS
(Mid)	1.475	---	PASS
(High)	1.450	---	PASS

## Test Frequency: 2402MHz



## Test Frequency: 2442MHz



## Test Frequency: 2476MHz



## 8. NUMBER OF HOPPING FREQUENCY TEST

### 8.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4446A	US44300459	May.10, 08	1 Year

### 8.2. Limit

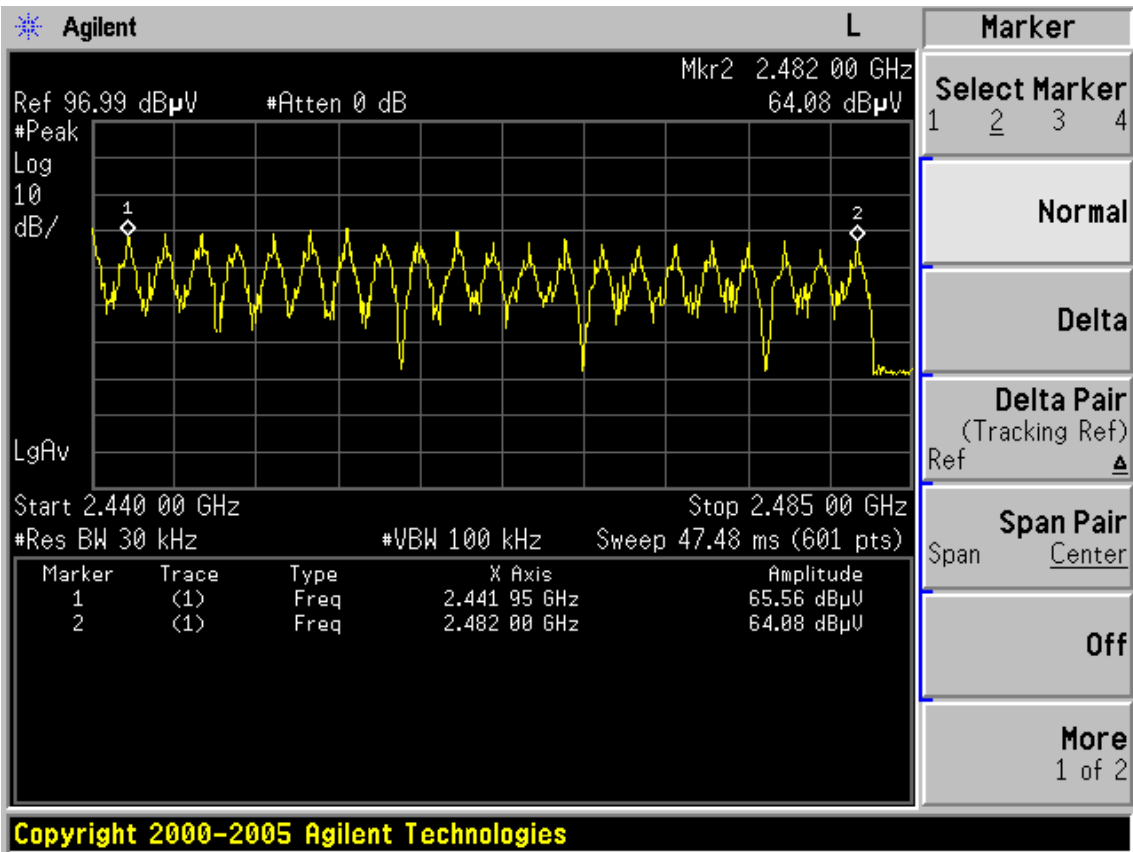
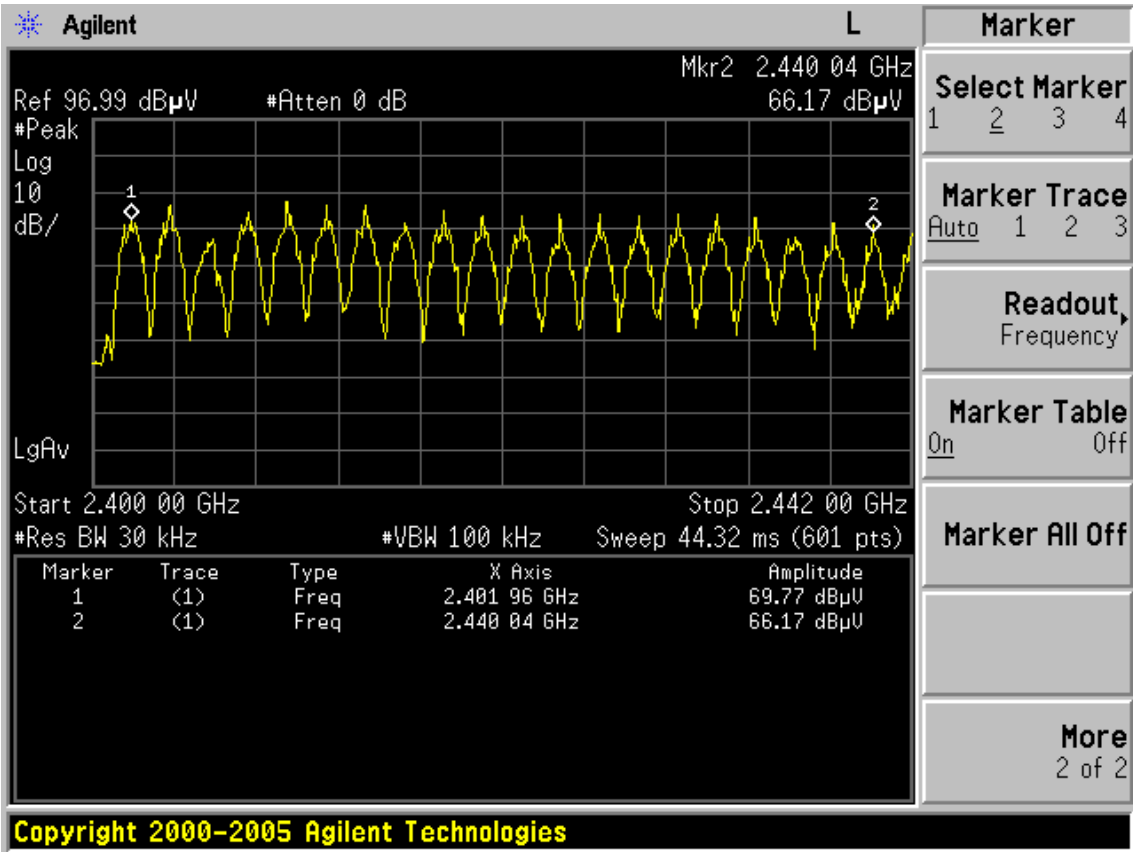
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### 8.3. Test Information

EUT:	Rock Band Wireless Guitar For ADAM
M/N:	XBGTS2-A
Test Date:	Nov.11, 2008
Ambient Temperature:	23°C
Relative Humidity:	54%
Test standard:	FCC PART 15C: 15.247(a)(1)(iii)
Test mode:	TX (Hopping on)
Test Frequency:	From 2402MHz to 2482MHz
Test By:	Jamy

### 8.4. Test Results

Number of channel	Limit	Conclusion
41	>=15	PASS



## 9. DWELL TIME

### 9.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4446A	US44300459	May.10, 08	1 Year

### 9.2. Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 9.3. Test Information

EUT:	Rock Band Wireless Guitar For ADAM
M/N:	XBGTS2-A
Test Date:	Nov.11, 2008
Ambient Temperature:	23°C
Relative Humidity:	54%
Test standard:	FCC PART 15C: 15.247(a)(1)(iii)
Test mode:	Transmitting, Hopping off
Test Frequency:	Normal
Test By:	Jamy

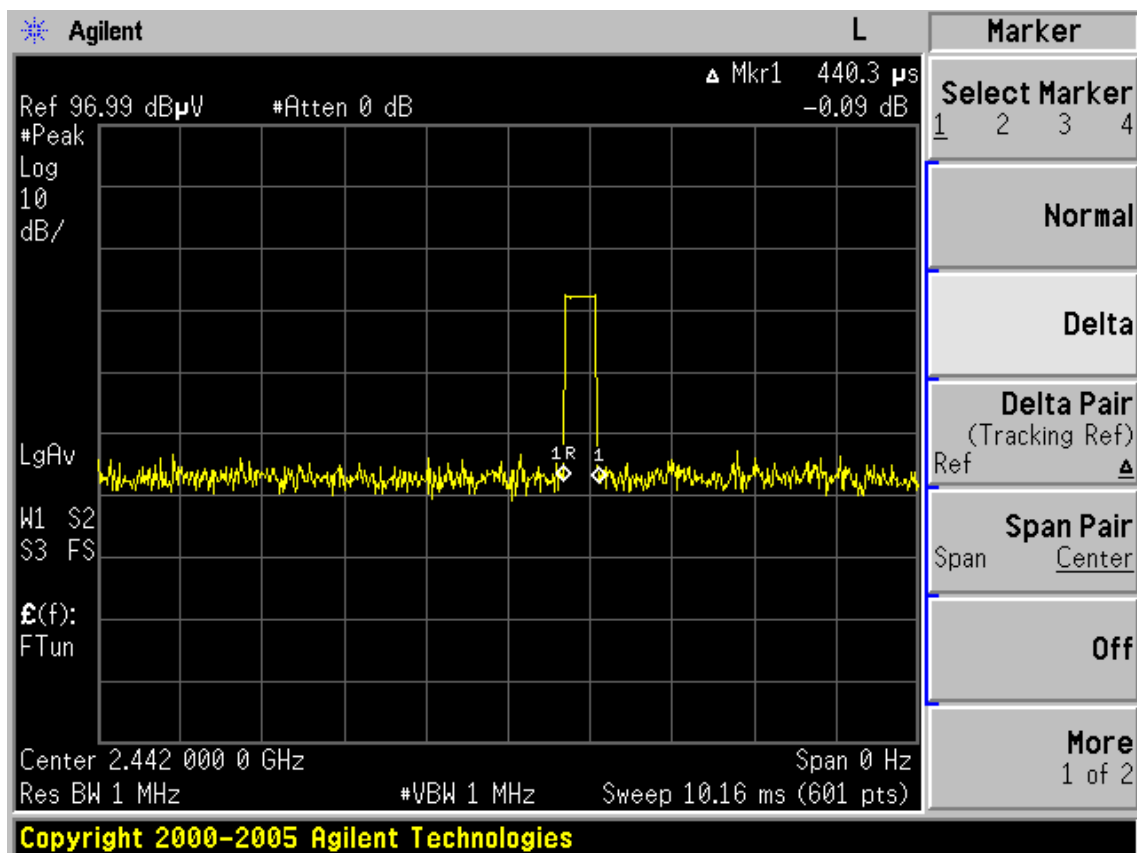
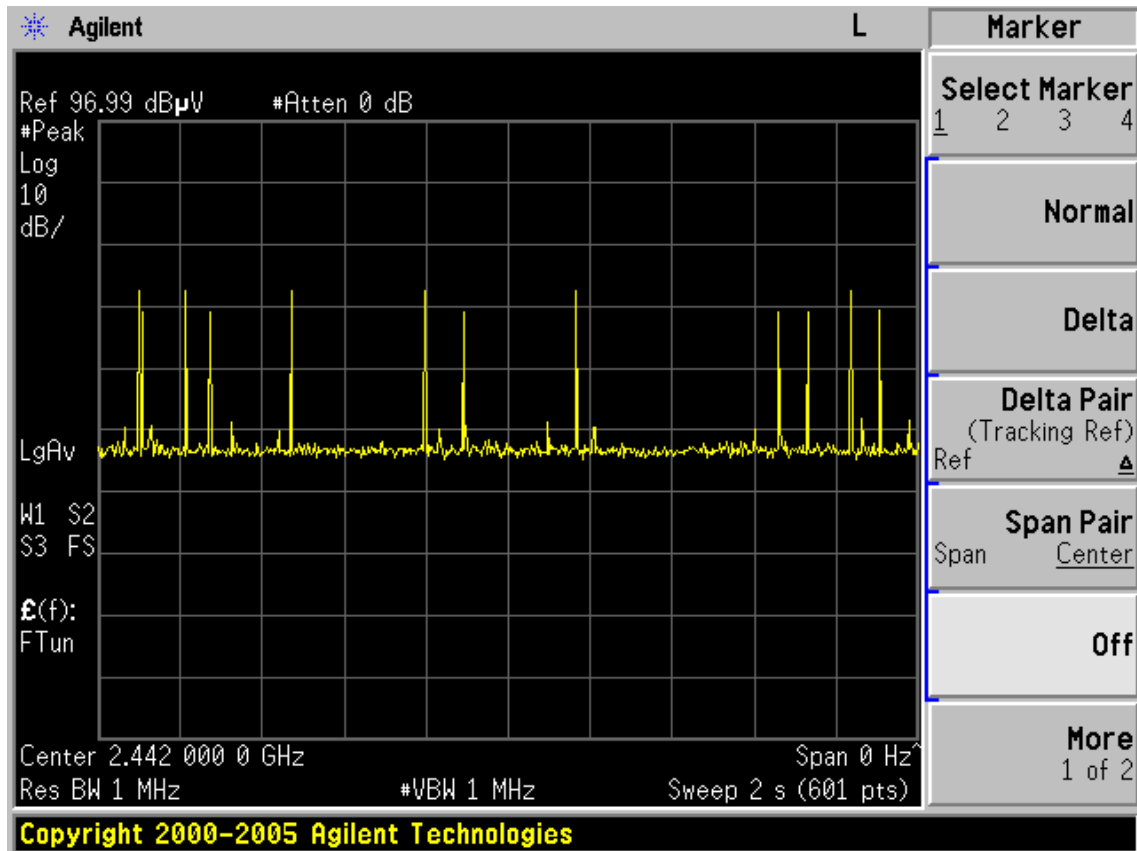
### 9.4. Test Results

This system hopping 11 hops in any 2s, and for each hop it transmit 1 pulses, the pulse dwell are 0.440ms, so the dwell times are:

$$11/2*41*0.4*0.44=39.688\text{ms}$$

dwell time	Limit	Conclusion
39.688ms	<400ms	PASS





## 10. MAXIMUM PEAK OUTPUT POWER TEST

### 10.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300459	May.10, 08	1 Year

### 10.2. Limit

For frequency hopping systems in 2400—2483.5MHz band, employing hopping channels

below 75, the maximum peak conducted output power shall not exceed 0.125W

### 10.3. Test Procedure

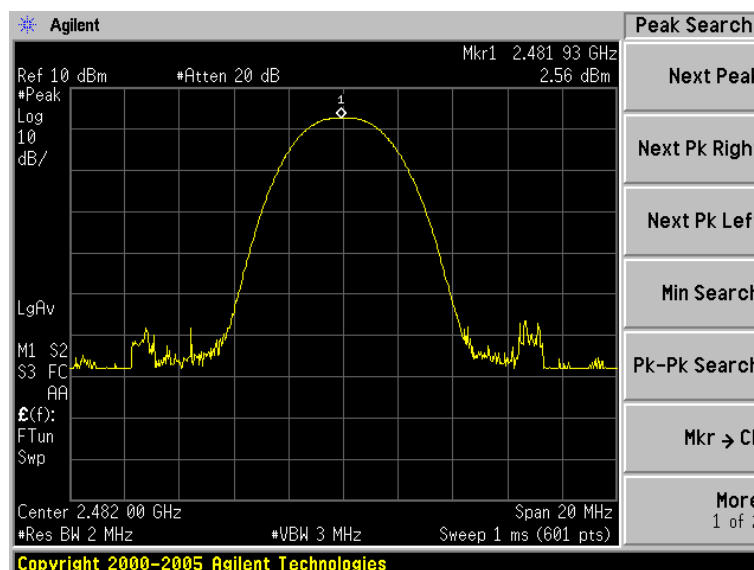
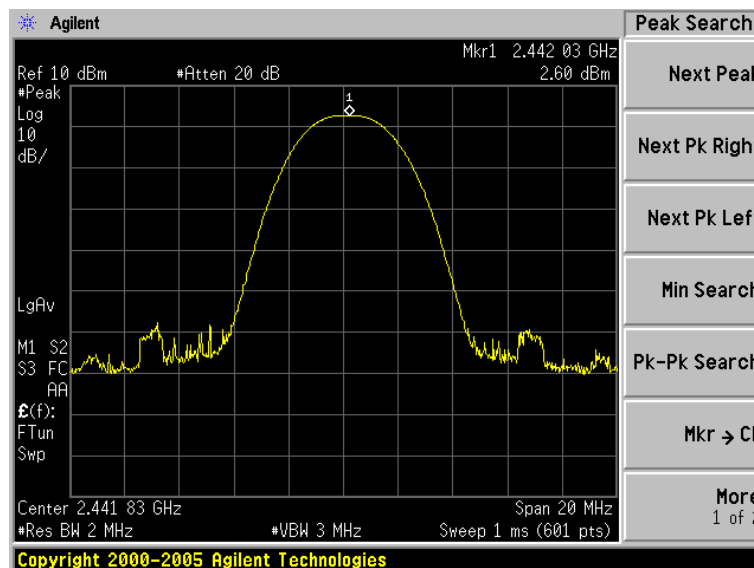
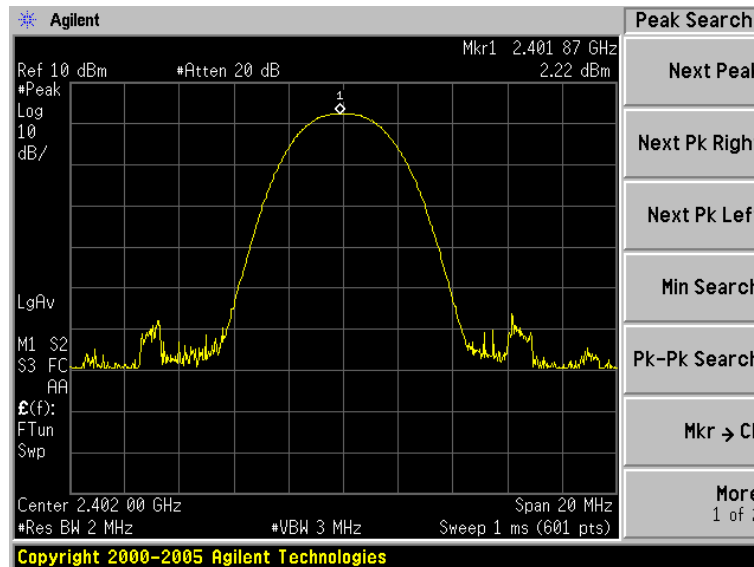
The transmitter's RF out was connected to a Spectrum Analyzer directly. Measure The output power with Spectrum Analyzer's RBW >20dB bandwidth of transmit signal.

### 10.4. Test Information

EUT:	Rock Band Wireless Guitar For ADAM		
M/N:	XBGTS2-A		
Test Date:	Nov.17, 2008		
Ambient Temperature:	24℃		
Relative Humidity:	58%		
Test standard:	FCC PART 15C: 15.247(b)(1)		
Test mode:	TX (Hopping off)		
Test Frequency:	Low: 2402MHz	Mid: 2442MHz	High: 2482MHz
Test By:	Jamy		

### 10.5. Test Results

Freq (MHz)	PK Output power (dBm)	Limit (dBm)	Margin (dB)
2402	2.22	21	18.78
2442	2.60	21	18.4
2483	2.56	21	18.44
<b>Conclusion: PASS</b>			



## **11. ANTENNA REQUIREMENT**

### **10.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **10.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used for this product is a PCB integral antenna that no antenna other than that furnished by the responsible party shall be used with the device, The maximum peak gain of this antenna is only 0dBi.

## **12.DEVIATION TO TEST SPECIFICATIONS**

[ NONE]