

APPLICATION FOR CERTIFICATION  
On Behalf of

Harmonix Music Systems, Inc.

Rock Band Xbox 360 wireless guitar

Model Number: XBGTS2

FCC ID: VFRHMXGTR02

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

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Report Number : ACS-F08338  
Date of Test : Jun.12~Jul.09, 2008  
Date of Report : Jul.21, 2008

## TABLE OF CONTENTS

Description	Page
<b>1. SUMMARY OF STANDARDS AND RESULTS.....</b>	<b>1-1</b>
1.1. Description of Standards and Results .....	1-1
<b>2. GENERAL INFORMATION .....</b>	<b>2-1</b>
2.1. Description of Device (EUT) .....	2-1
2.2. Test Facility .....	2-2
2.3. Measurement Uncertainty .....	2-2
<b>3. POWER LINE CONDUCTED EMISSION TEST .....</b>	<b>3-1</b>
<b>4. RADIATED EMISSION TEST .....</b>	<b>4-1</b>
4.1. Test Equipment .....	4-1
4.2. Block Diagram of Test Setup .....	4-1
4.3. Radiated Emission Limit .....	4-2
4.4. EUT Configuration on Test .....	4-2
4.5. Operating Condition of EUT .....	4-3
4.6. Test Procedure .....	4-3
4.7. Radiated Emission Test Results .....	4-3
<b>5. CARRIER FREQUENCY SEPARATION TEST .....</b>	<b>5-1</b>
5.1. Test Equipment .....	5-1
5.2. Test Information .....	5-1
5.3. Limit .....	5-1
5.4. Test Results (Pass.) .....	5-1
<b>6. 20 DB BANDWIDTH TEST .....</b>	<b>6-1</b>
6.1. Test Equipment .....	6-1
6.2. Test Information .....	6-1
6.3. Test Procedure .....	6-1
6.4. Test Results .....	6-1
<b>7. NUMBER OF HOPPING FREQUENCY TEST .....</b>	<b>7-1</b>
7.1. Test Equipment .....	7-1
7.2. Test Information .....	7-1
7.3. Test Results .....	7-1
<b>8. DWELL TIME .....</b>	<b>8-1</b>
8.1. Limit .....	8-1
<b>9. MAXIMUM PEAK OUTPUT POWER TEST .....</b>	<b>9-1</b>
9.1. Test Equipment .....	9-1
9.2. Test Procedure .....	9-1
9.3. Test Information .....	9-2
9.4. Test Results .....	9-2
<b>10. BAND EDGE COMPLIANCE TEST .....</b>	<b>10-1</b>
10.1. Test Equipment .....	10-1
10.2. Limit .....	10-1
10.3. Test Produce .....	10-1
10.4. Test Results .....	10-1
<b>11. ANTENNA REQUIREMENT .....</b>	<b>11-1</b>
<b>12. DEVIATION TO TEST SPECIFICATIONS.....</b>	<b>12-1</b>
<b>13. PHOTOGRAPH OF TEST .....</b>	<b>13-1</b>
13.1. Photos of Radiated Emission Test.....	13-1

## TEST REPORT CERTIFICATION

Applicant : Harmonix Music Systems, Inc.  
Manufacturer : Dong Guan Contel Electronics Co., Ltd.  
EUT Description : Rock Band Xbox 360 wireless guitar  
FCC ID : VFRHMXGTR02  
(A) MODEL NO. : XBGTS2  
(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: Jun.12~Jul.09, 2008


Prepared by:

YoYo Wang  
YoYo Wang / Assistant

Reviewer:

Jamy Yu  
Jamy Yu / Senior Engineer

Approved & Authorized Signer:

 信華科技(深圳)有限公司  
Audix Technology (Shenzhen) Co., Ltd.  
EMC 部門報告專用章  
Stamp only for EMC Dept. Report  
Signature: Ken Lu 7/14/08  
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
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
Band Edge Compliance Test	FCC Part 15: 15.247(d) 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 Xbox 360 wireless guitar
Model Number	:	XBGTS2
FCC ID	:	VFRHMXGTR02
Operation frequency	:	2.402GHz-----2.482GHz ISM Band
Operation Channel	:	41Channels
Modulation Technology		GMSK
Output power	:	1.86dBm(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	:	Jun.12~Jul.09, 2008
Date of Receipt	:	Jun.12, 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	$\pm 0.5 \times 10^{-7}$	
5.	RF power, conducted	$\pm 3$ 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	Jan 09, 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.	HF Cable	Hubersuhne	Sucoflex104	-	May 10, 08	1 Year

### 4.2. Block Diagram of Test Setup

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

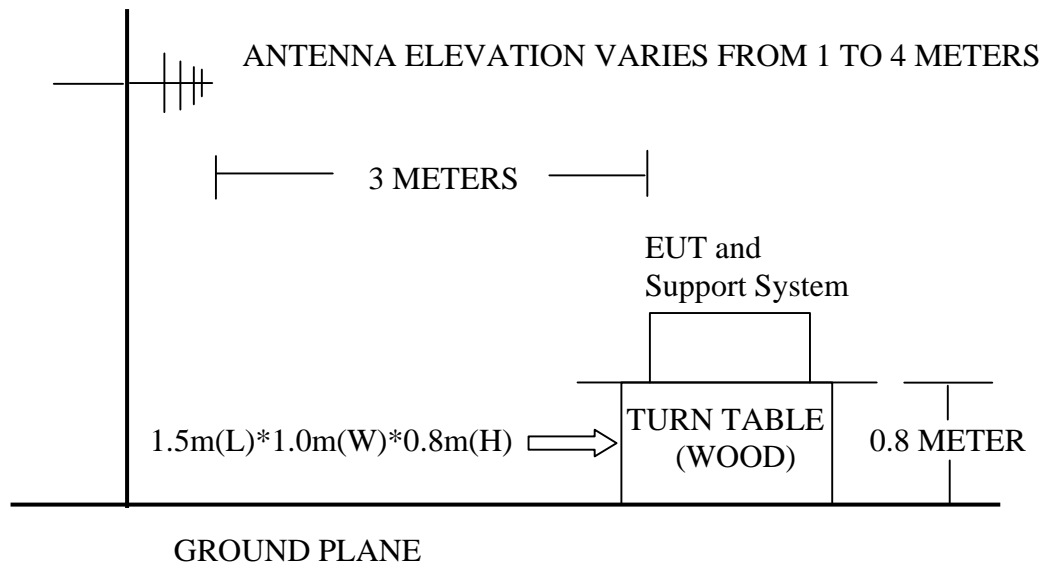
EUT

**(EUT: Rock Band Xbox 360 wireless guitar)**



#### 4.2.2. In Anechoic Chamber

##### ANTENNA TOWER



#### 4.3. Radiated Emission Limit

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 dB ( $\mu\text{V}$ )/m (Peak) 54.0 dB ( $\mu\text{V}$ )/m (Average)	

- Remark :
- (1) Emission level  $\text{dB}\mu\text{V} = 20 \log$  Emission level  $\mu\text{V}/\text{m}$
  - (2) The smaller limit shall apply at the cross point between two frequency bands.
  - (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

#### 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.

##### 4.4.1. Rock Band Xbox 360 wireless guitar (EUT)

Model Number : XBGTS2  
Serial Number : N/A

##### 4.4.2. Support Equipment : As Tested Supporting System Detail, in Section 2.2.

## 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 and this position was also the normal use position.

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 VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emission above 1GHz

The frequency ranges from 30MHz to 10<sup>th</sup>harmonic (25GHz) are checked.

## 4.7.Radiated Emission Test Results

**PASS.**

All the emissions from 18GHz~25GHz are Peak measured and comply with Average limit.

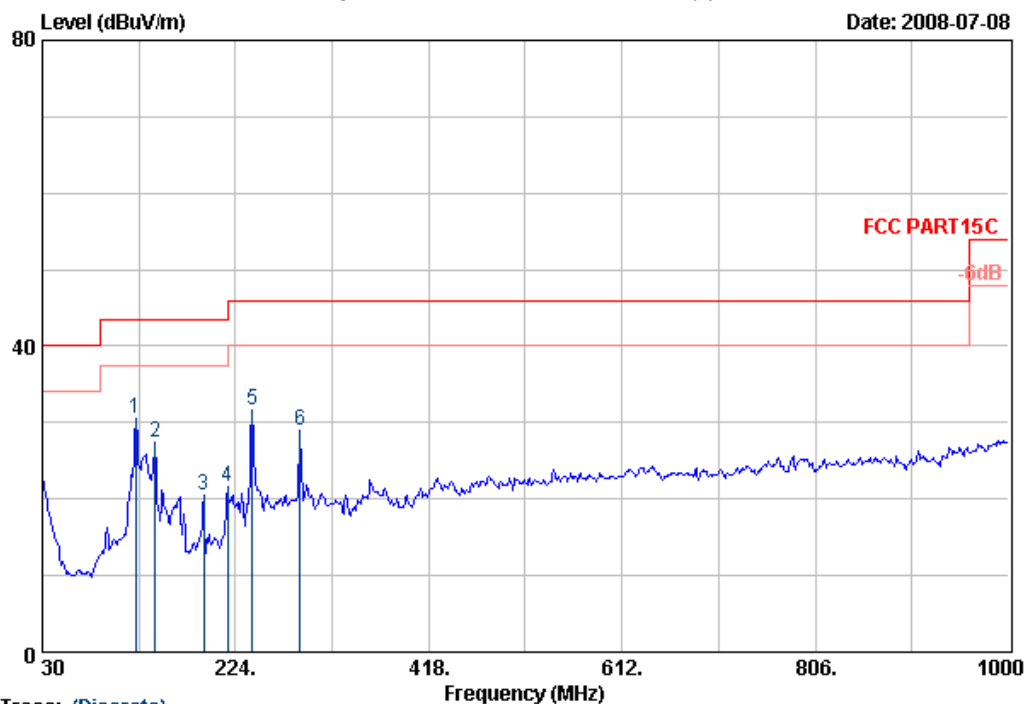
Test Frequency: 30MHz-1000MHz



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Data: 1 File: D:\2008 Report Data\C\CONTEL\ACS8Q986.EMI (6)

Date: 2008-07-08



Trace: (Discrete)

Site no. : 3# Chamber Radiation Data no. : 1  
Dis. / Ant. : 3m CBL6112D Ant. pol. : HORIZONTAL  
Limit : FCC PART15 C  
Env. / Ins. : 24°C/56% ESVS20 Engineer : LONGE  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating : DC 4.5V  
Test Mode : TX  
M/N : XBGTS2

		Ant.	Cable		Emission			
Freq.		Factor	Loss	Reading	Level	Limits	Margin	Remark
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	124.09	12.72	0.86	17.03	30.61	43.50	12.89	QP
2	143.49	10.28	0.97	16.27	27.52	43.50	15.98	QP
3	191.99	8.99	1.09	10.39	20.47	43.50	23.03	QP
4	216.24	9.11	1.07	11.39	21.57	46.00	24.43	QP
5	240.49	11.18	1.20	19.26	31.64	46.00	14.36	QP
6	288.99	12.80	1.33	14.89	29.02	46.00	16.98	QP

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

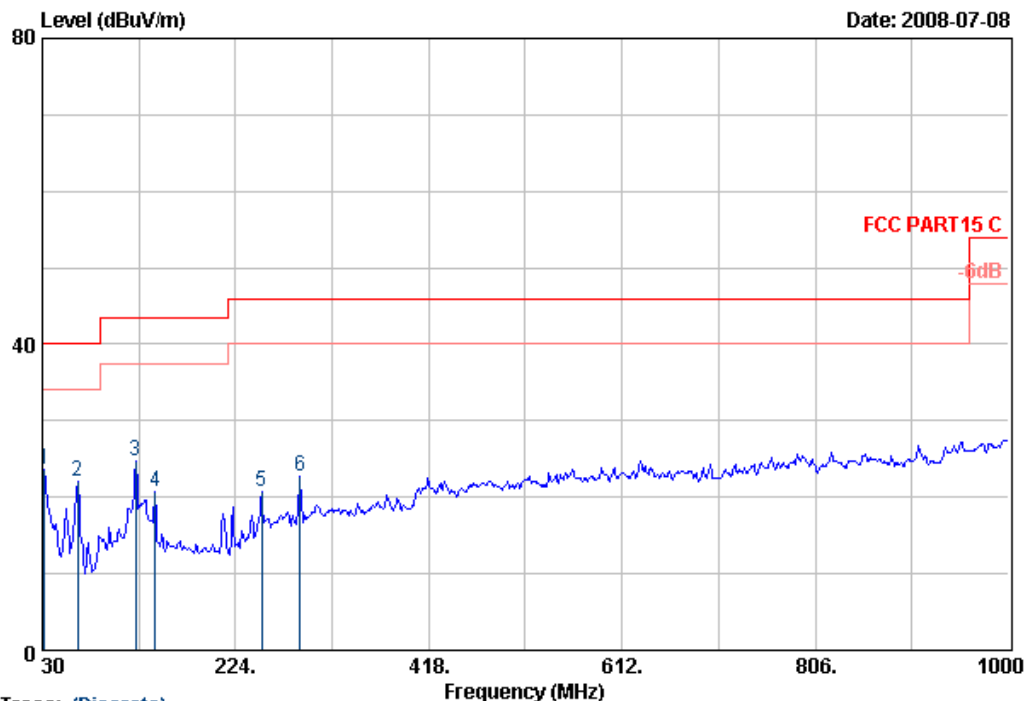


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Data: 2

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Date: 2008-07-08



Trace: (Discrete)

Site no. : 3# Chamber Radiation Data no. : 2  
Dis. / Ant. : 3m CBL6112D Ant. pol. : VERTICAL  
Limit : FCC PART15 C  
Env. / Ins. : 24°C/56% ESVS20 Engineer : LONGE  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating : DC 4.5V  
Test Mode : TX  
M/N : XBGTS2

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	31.94	18.40	0.54	4.66	23.60	40.00	16.40	QP
2	65.89	6.33	0.66	15.11	22.10	40.00	17.90	QP
3	124.09	12.72	0.86	11.07	24.65	43.50	18.85	QP
4	143.49	10.28	0.97	9.55	20.80	43.50	22.70	QP
5	250.19	12.38	1.19	7.12	20.69	46.00	25.31	QP
6	288.99	12.80	1.33	8.62	22.75	46.00	23.25	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

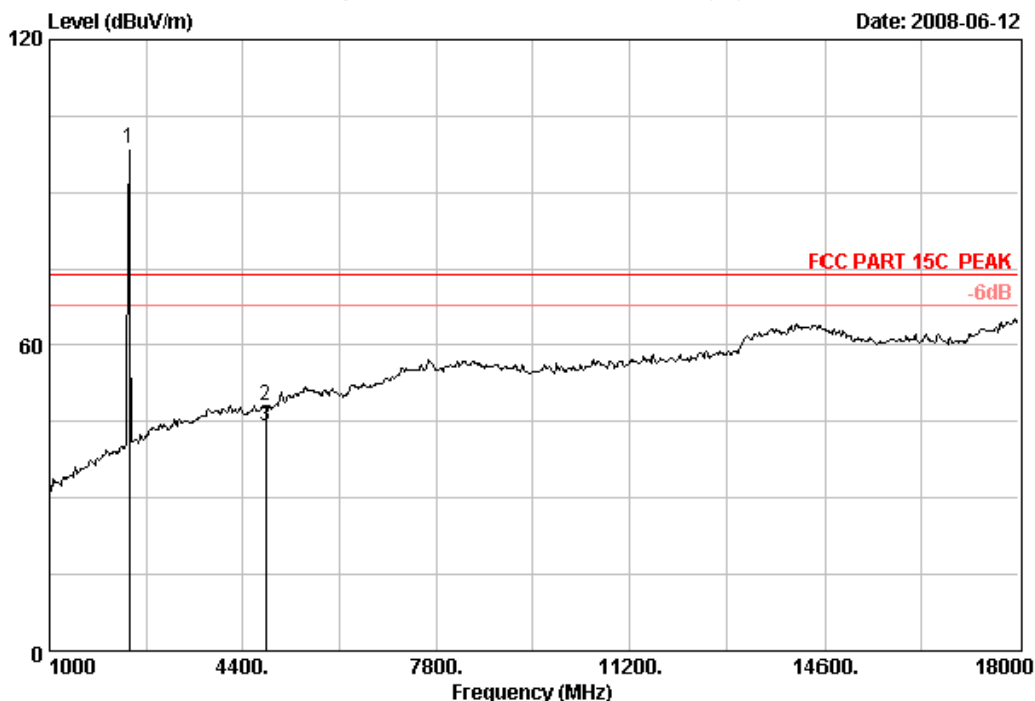


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Data: 1

File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)

Date: 2008-06-12



Site no. : 3# Chamber Data no. : 1  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 24°C/50% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2402MHz  
M/N : XBGTS2

		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	28.99	6.73	35.18	97.95	98.49	114.00	15.51	Peak
2	4804.00	33.98	10.53	34.50	38.06	48.07	74.00	25.93	Peak
3	4804.00	33.98	10.53	34.50	34.12	44.13	54.00	9.87	Average

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.

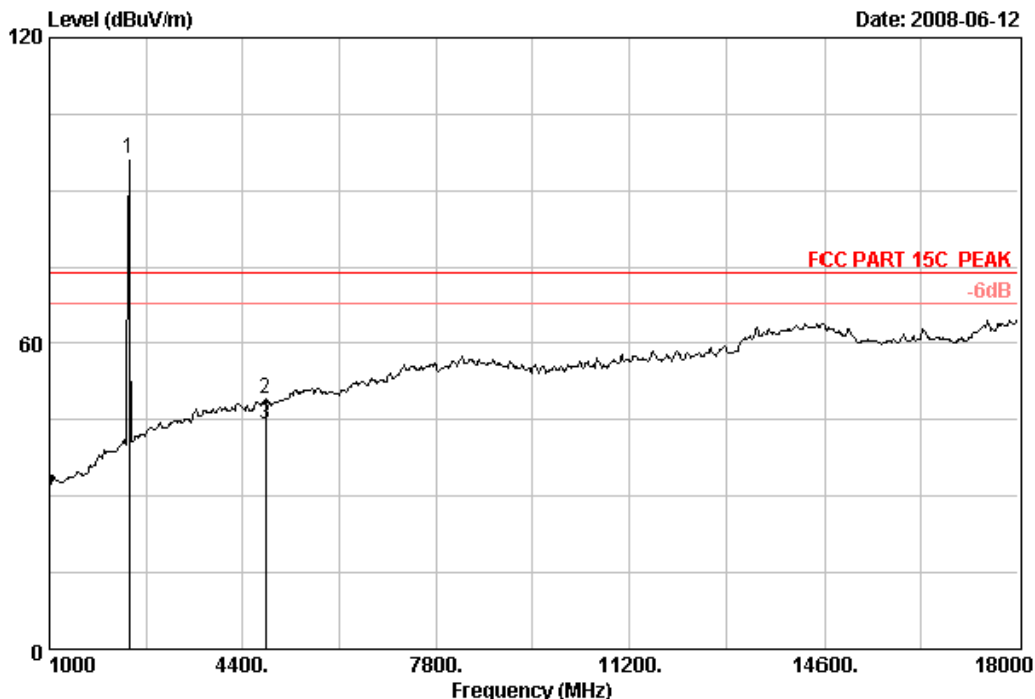


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Data: 2

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Date: 2008-06-12



Site no. : 3# Chamber Data no. : 2  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 24°C/50% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2402MHz  
M/N : XBGTS2

		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	28.99	6.73	35.18	95.57	96.11	114.00	17.89	Peak
2	4804.00	33.98	10.53	34.50	39.14	49.15	74.00	24.85	Peak
3	4804.00	33.98	10.53	34.50	34.12	44.13	54.00	9.87	Average

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.

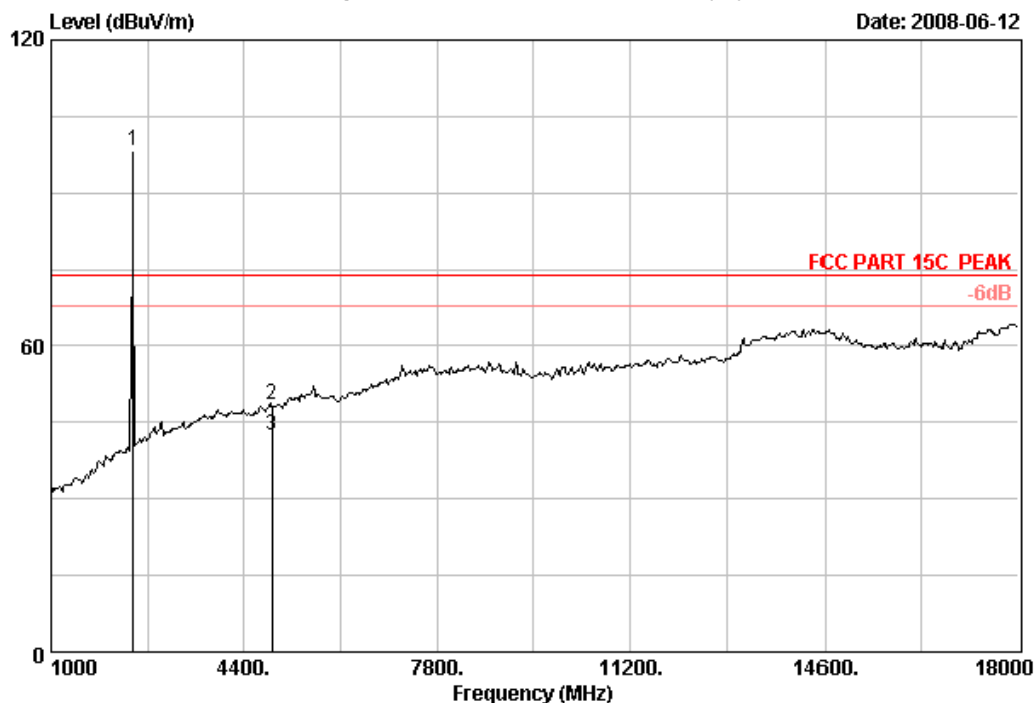


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Data: 4

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Date: 2008-06-12



Site no. : 3# Chamber Data no. : 4  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 24°C/50% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2442MHz  
M/N : XBGTS2

		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	2442.00	29.11	6.80	35.17	97.42	98.16	114.00	15.84	Peak
2	4884.00	34.16	10.57	34.48	38.11	48.36	74.00	25.64	Peak
3	4884.00	34.16	10.57	34.48	32.33	42.58	54.00	11.42	Average

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.

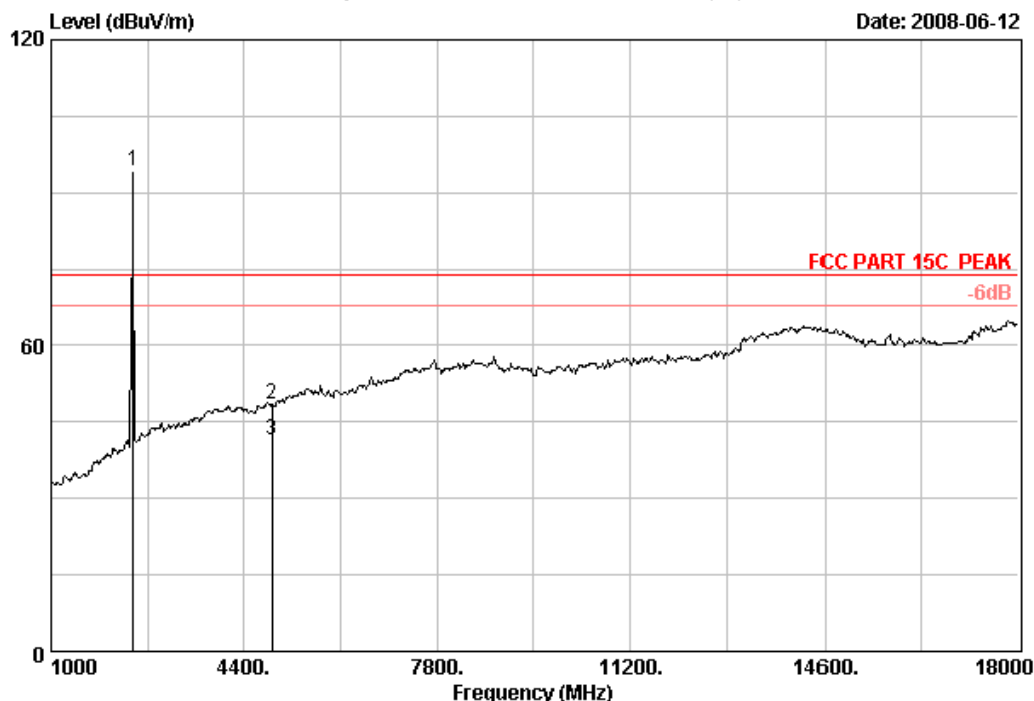


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Data: 3

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Date: 2008-06-12



Site no. : 3# Chamber Data no. : 3  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 24°C/50% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2442MHz  
M/N : XBGTS2

		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	2442.00	29.11	6.80	35.17	93.44	94.18	114.00	19.82	Peak
2	4884.00	34.16	10.57	34.48	38.14	48.39	74.00	25.61	Peak
3	4884.00	34.16	10.57	34.48	31.15	41.40	54.00	12.60	Average

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.



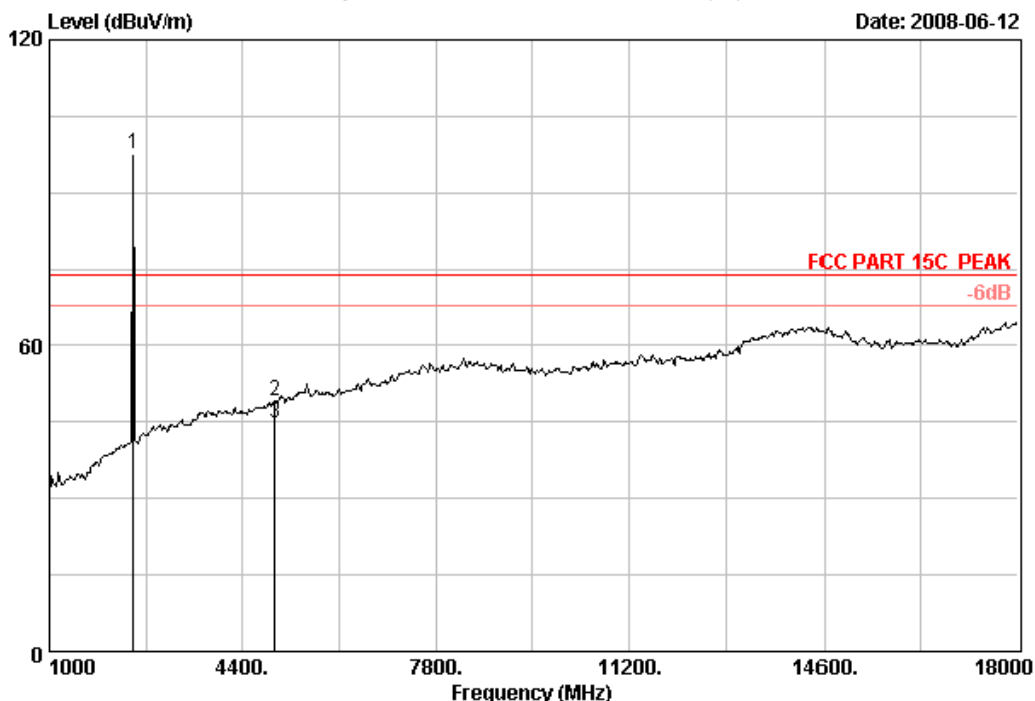


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Site no. : 3# Chamber Data no. : 5  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 24°C/50% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2482MHz  
M/N : XBGTS2

		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	2482.00	29.19	6.87	35.16	96.61	97.51	114.00	16.49	Peak
2	4964.00	34.38	10.59	34.46	38.49	49.00	74.00	25.00	Peak
3	4964.00	34.38	10.59	34.46	34.12	44.63	54.00	9.37	Average

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.

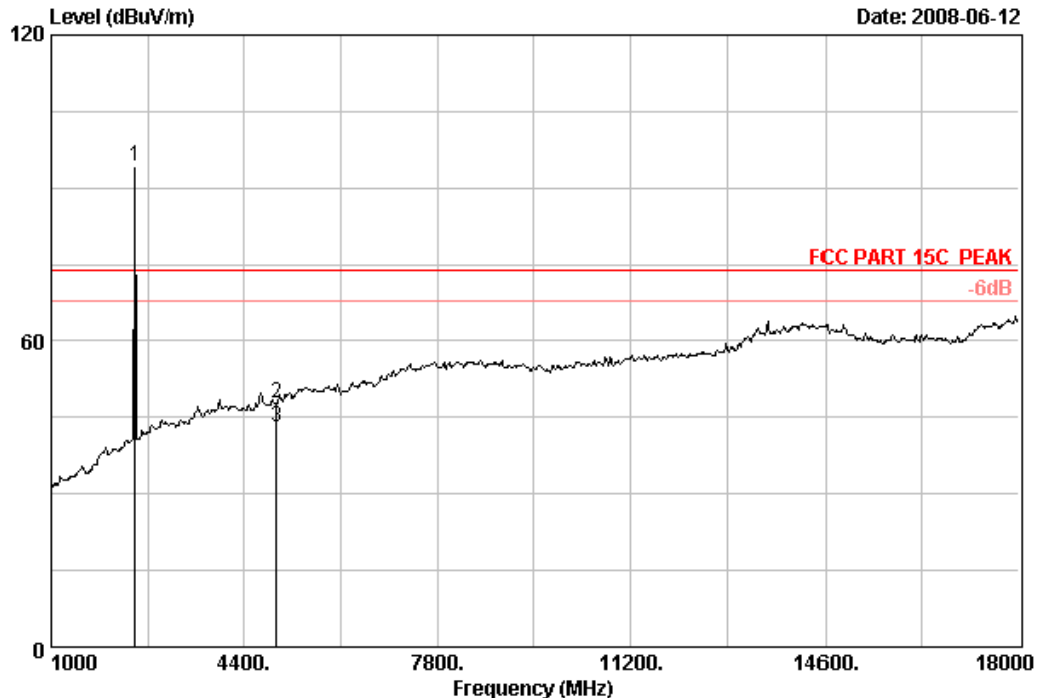


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Postcode:518057

Data: 6

File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)

Date: 2008-06-12



Site no. : 3# Chamber Data no. : 6  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 24°C/50% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2482MHz  
M/N : XBGTS2

		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	2482.00	29.19	6.87	35.16	93.43	94.33	114.00	19.67	Peak
2	4964.00	34.38	10.59	34.46	37.23	47.74	74.00	26.26	Peak
3	4964.00	34.38	10.59	34.46	32.56	43.07	54.00	10.93	Average

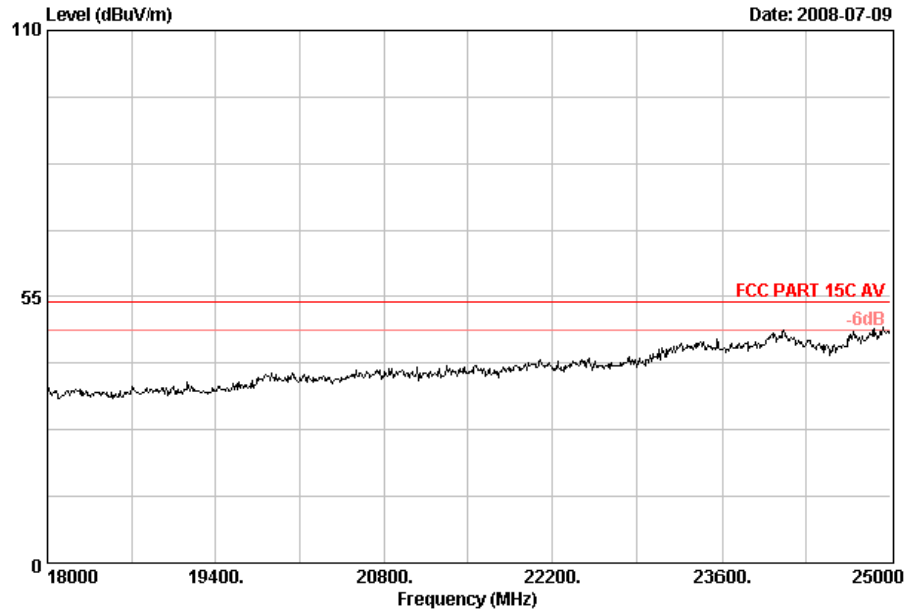
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

Test Frequency: 18GHz-25GHz



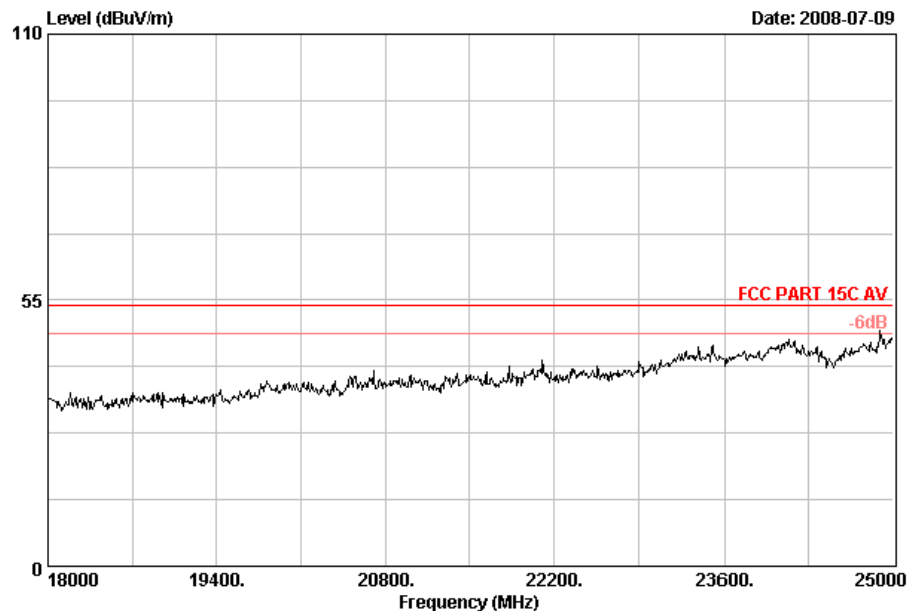
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Fax:+86-755-26632877  
Postcode:518057

Data: 12 File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16) Date: 2008-07-09



Site no. : 3# Chamber Data no. : 12  
Dis. / Ant. : 3m 3116 FACTOR Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C AV  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2402MHz  
M/N : XBGTS2

Data: 11 File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16) Date: 2008-07-09

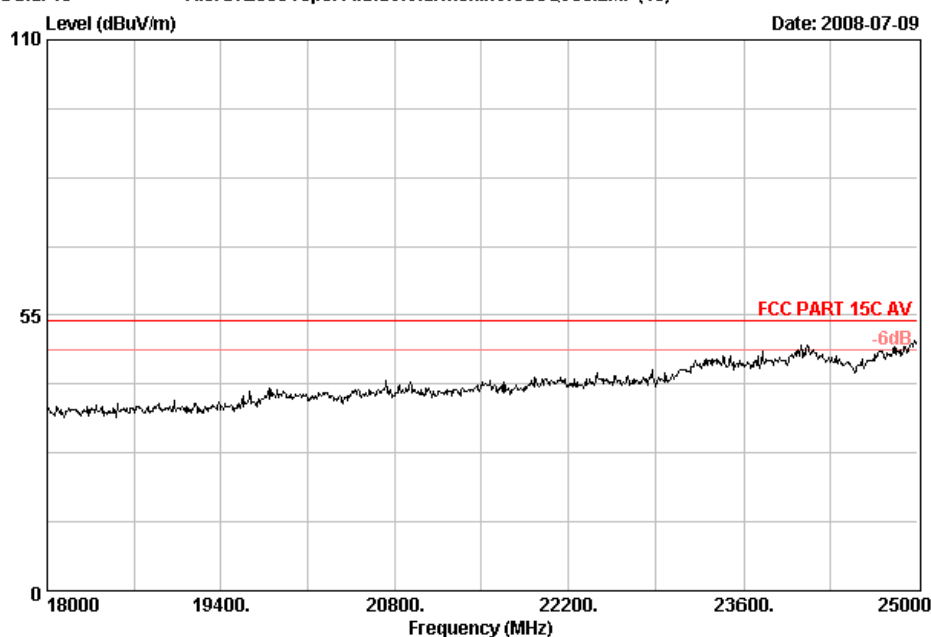


Site no. : 3# Chamber Data no. : 11  
Dis. / Ant. : 3m 3116 FACTOR Ant. pol. : VERTICAL  
Limit : FCC PART 15C AV  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2402MHz  
M/N : XBGTS2



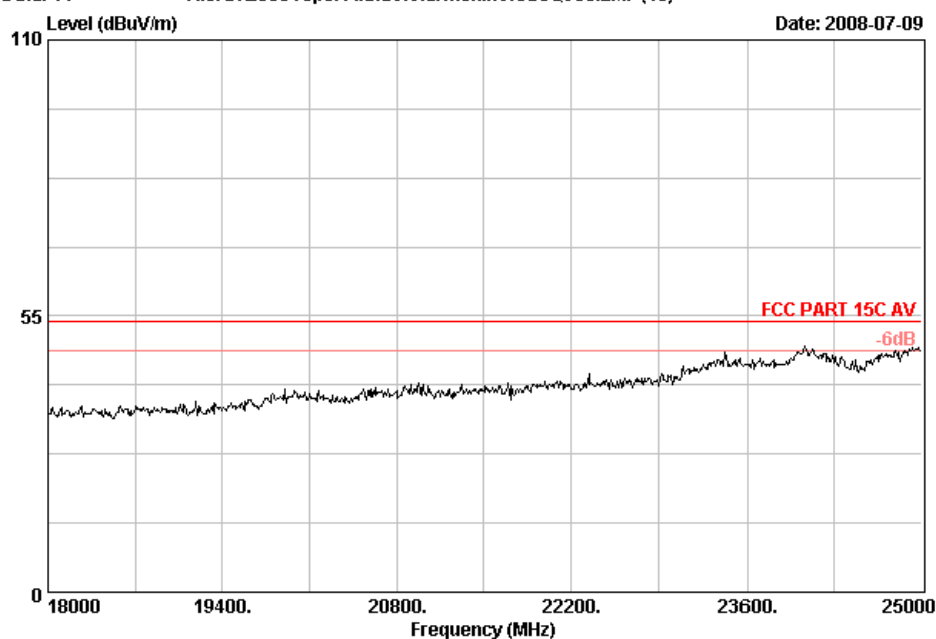
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Postcode:518057

Data: 13 File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)



Site no. : 3# Chamber Data no. : 13  
Dis. / Ant. : 3m 3116 FACTOR Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C AV  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2442MHz  
M/N : XBGTS2

Data: 14 File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)

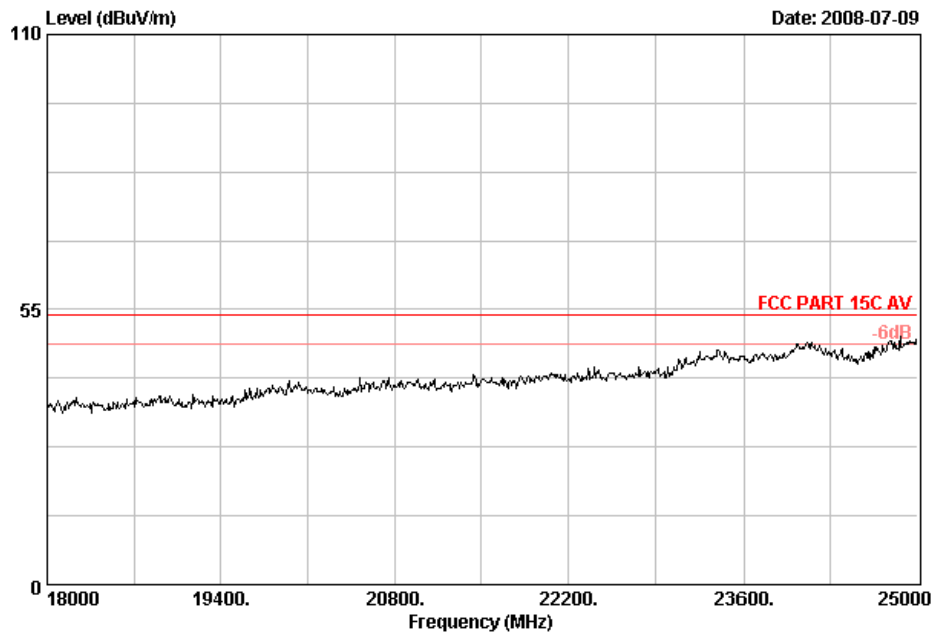


Site no. : 3# Chamber Data no. : 14  
Dis. / Ant. : 3m 3116 FACTOR Ant. pol. : VERTICAL  
Limit : FCC PART 15C AV  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2442MHz  
M/N : XBGTS2



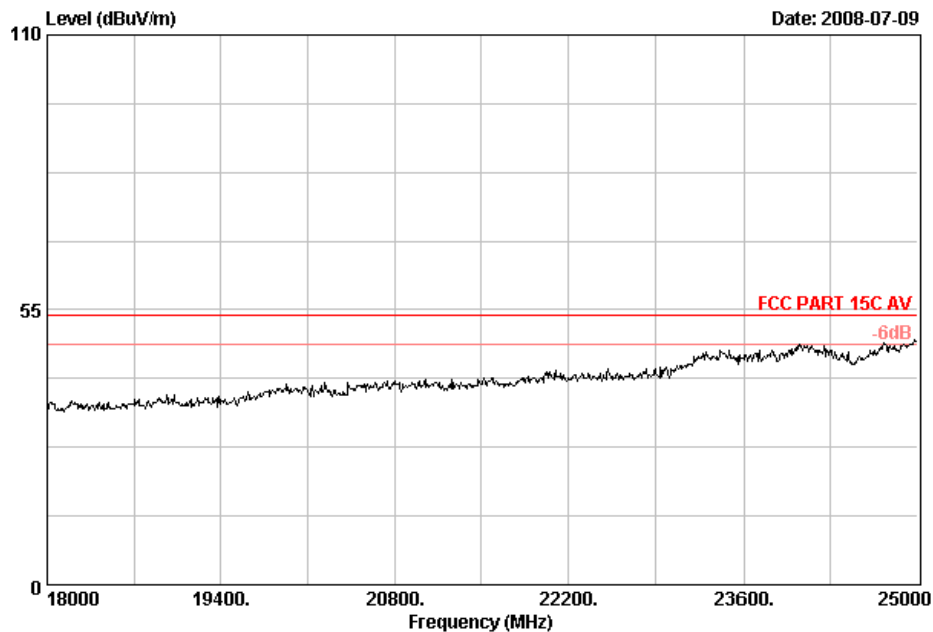
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Postcode:518057

Data: 16 File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)



Site no. : 3# Chamber Data no. : 16  
Dis. / Ant. : 3m 3116 FACTOR Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C AV  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2482MHz  
M/N : XBGTS2

Data: 15 File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)



Site no. : 3# Chamber Data no. : 15  
Dis. / Ant. : 3m 3116 FACTOR Ant. pol. : VERTICAL  
Limit : FCC PART 15C AV  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2482MHz  
M/N : XBGTS2

## 5. CARRIER FREQUENCY SEPARATION 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	RF Cable	Hubersuhner	SUCOFLEX 102	2861812	May,28, 08	1 Year
4	RF Cable	Hubersuhner	SUCOFLEX 102	28862212	May,28, 08	1 Year

### 5.2. Test Information

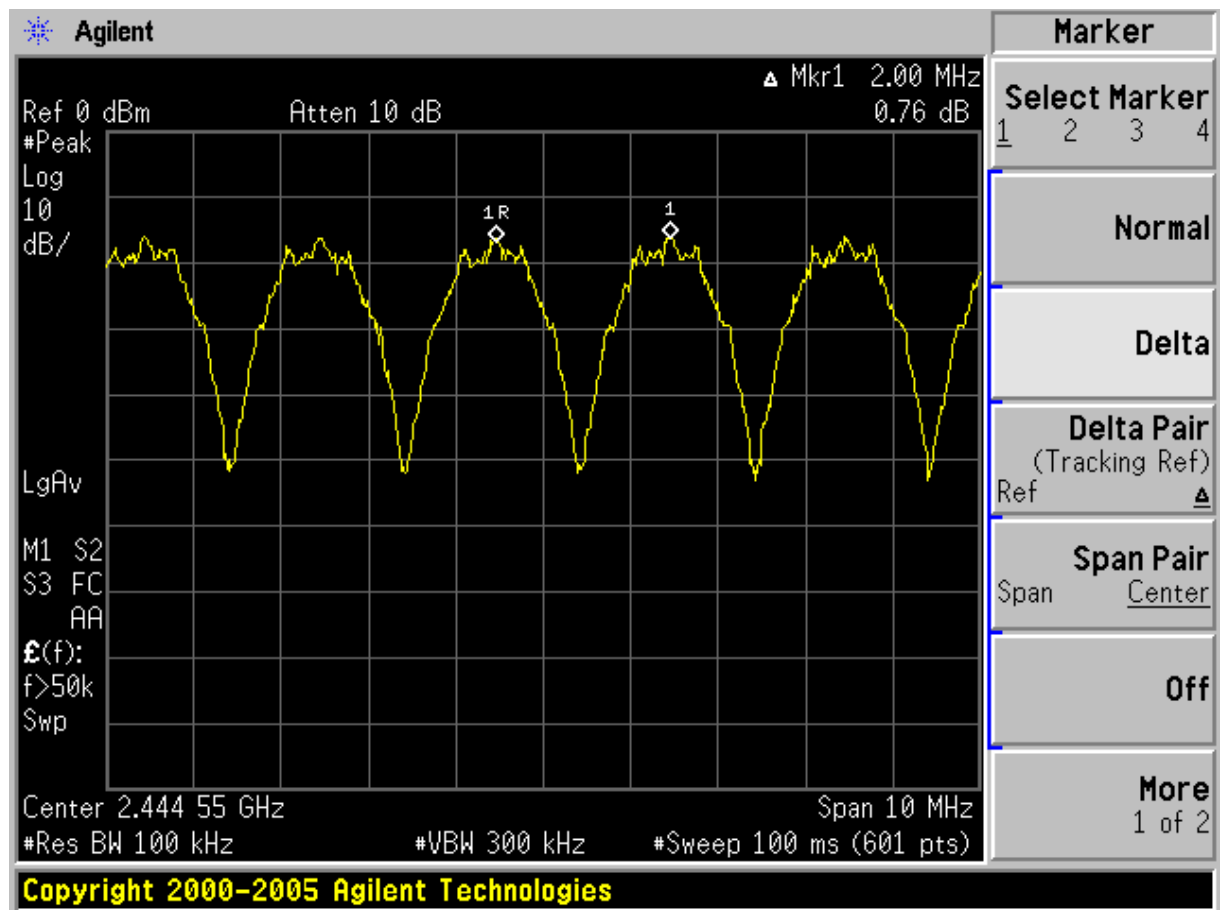
EUT:	Rock Band Xbox 360 wireless guitar
M/N:	XBGTS2
Test Date:	Jul.09, 2008
Ambient Temperature:	23°C
Relative Humidity:	54%
Test standard:	FCC PART 15C: 15.247(a)(1)
Test mode:	TX (Hopping on)
Test By:	Sunny

### 5.3. 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.

### 5.4. Test Results (Pass.)

carrier frequency separating	20dB Bandwidth (MHz)	Conclusion
2MHz	1.45(see below test data)	PASS



## 6. 20 DB BANDWIDTH 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
2	Attenuator	Agilent	8491B	MY39262165	May,28, 08	1 Year
3	Horn Antenna	EMCO	3115	9607-4877	May, 27, 08	1.5 Year
4	RF Cable	Hubersuhner	SUCOFLEX 102	2861812	May,28, 08	1 Year
5	RF Cable	Hubersuhner	SUCOFLEX 102	28862212	May,28, 08	1 Year

### 6.2. Test Information

EUT:	Rock Band Xbox 360 wireless guitar
M/N:	XBGTS2
Test Date:	Jul.09, 2008
Ambient Temperature:	23°C
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

### 6.3. Test Procedure

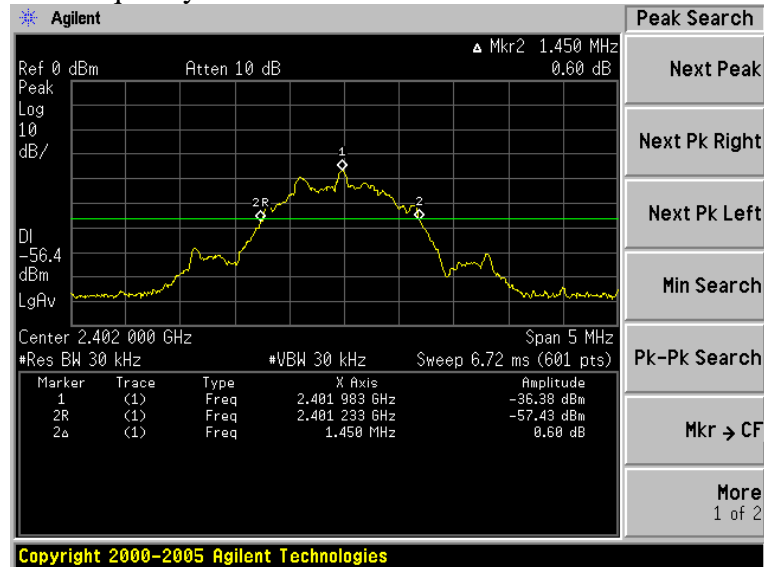
The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

### 6.4. Test Results

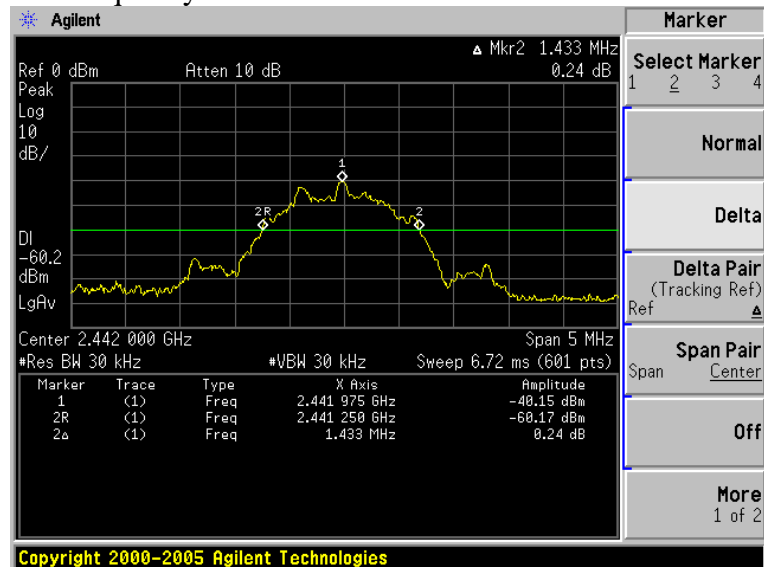
CH	20dB Bandwidth (MHz)	Limit (kHz)	Conclusion
(Low)	1.450	---	PASS
(Mid)	1.433	---	PASS
(High)	1.442	---	PASS



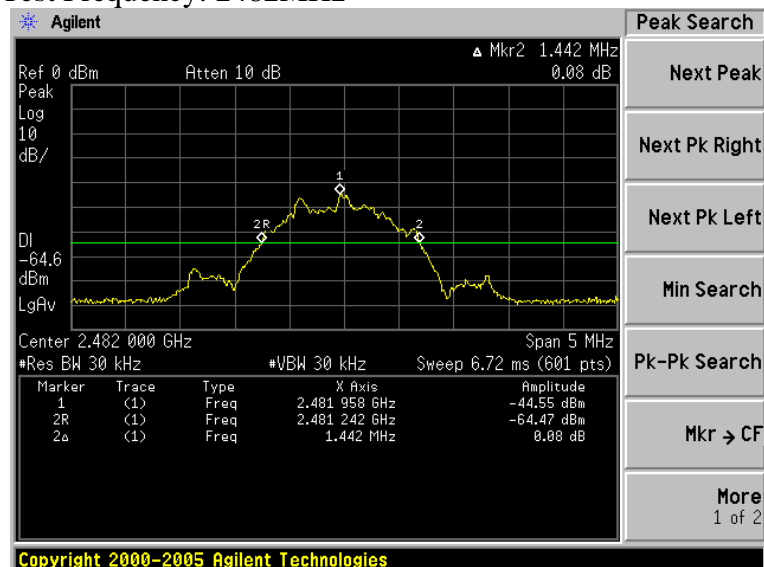
Test Frequency: 2402MHz



Test Frequency: 2442MHz



Test Frequency: 2482MHz



## 7. NUMBER OF HOPPING FREQUENCY TEST

### 7.1. Test Equipment

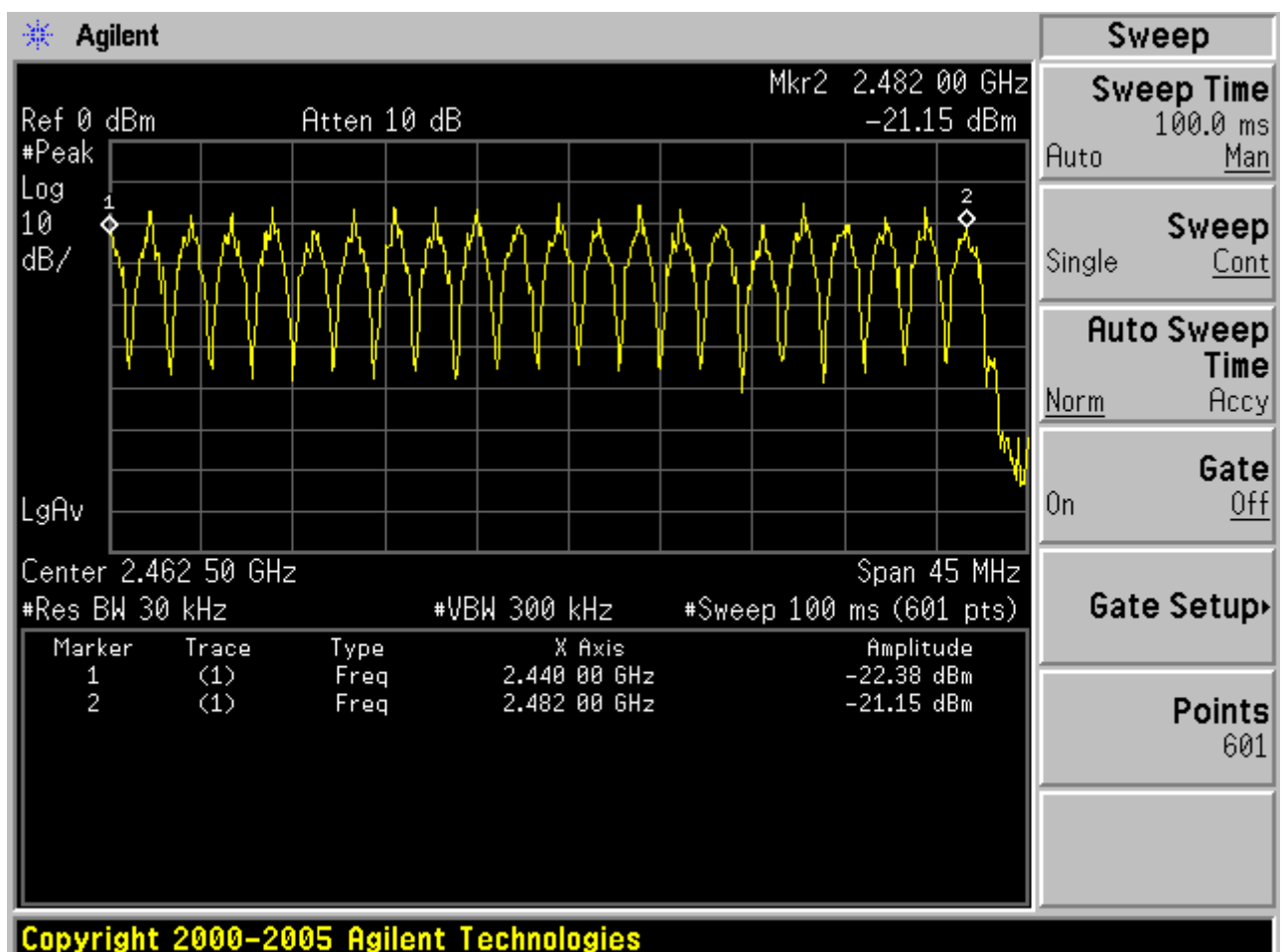
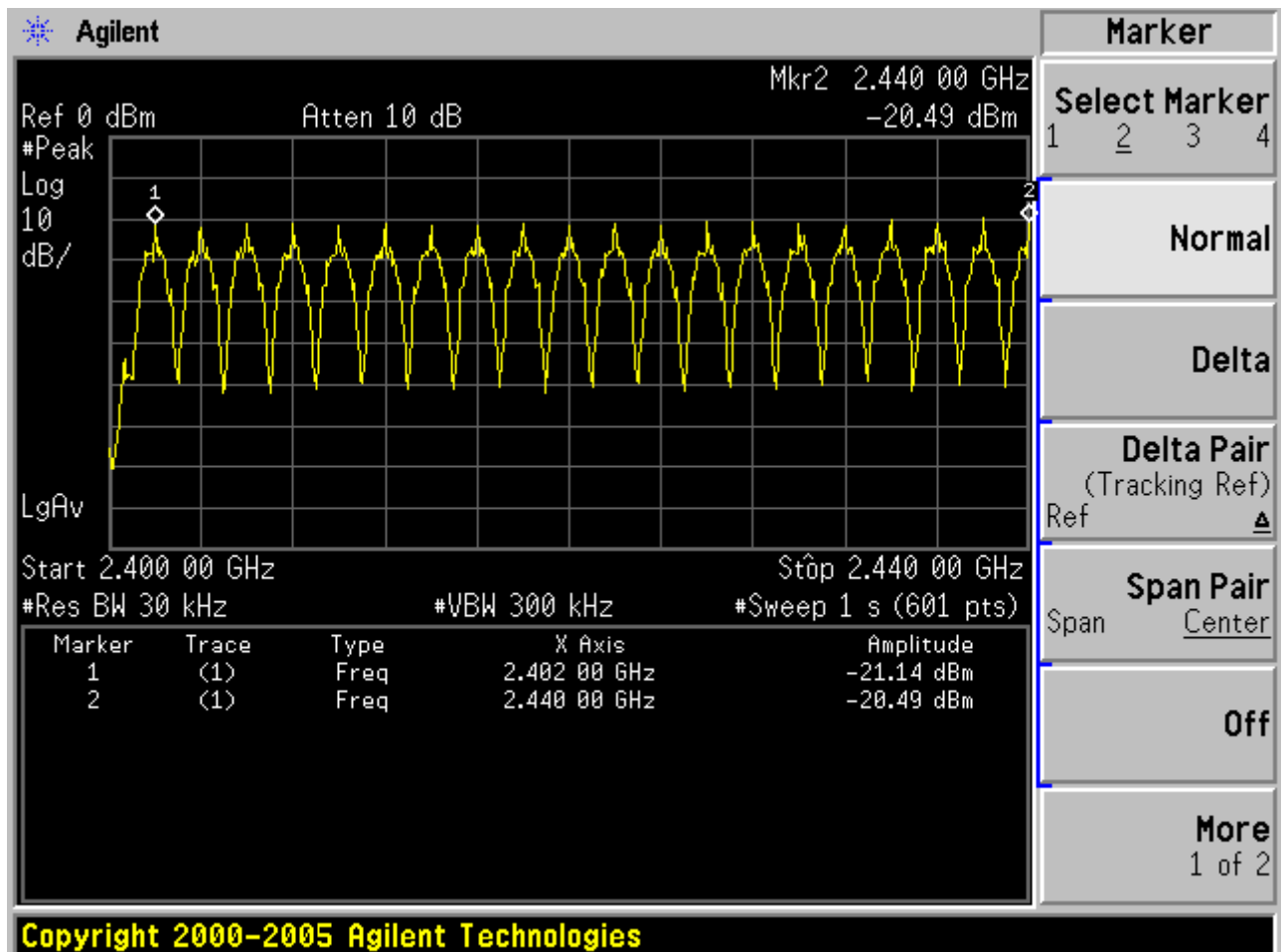
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4446A	US44300459	May,10, 08	1 Year
2	Attenuator	Agilent	8491B	MY39262165	May,28, 08	1 Year
3	Horn Antenna	EMCO	3115	9607-4877	May, 27, 08	1.5 Year
4	RF Cable	Hubersuhner	SUCOFLEX 102	2861812	May,28, 08	1 Year
5	RF Cable	Hubersuhner	SUCOFLEX 102	28862212	May,28, 08	1 Year

### 7.2. Test Information

EUT:	Rock Band Xbox 360 wireless guitar
M/N:	XBGTS2
Test Date:	Jul.09, 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

### 7.3. Test Results

Number of channel	Limit	Conclusion
41	>=15	PASS



## 8. DWELL TIME

### 8.1.Limit

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

### 8.2 Result

<0.4s within a period of 0.4 seconds multiplied by the number of hopping channels  
For details data please see operation description.

## 9. MAXIMUM PEAK OUTPUT POWER TEST

### 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
2	Horn Antenna	EMCO	3115	9607-4877	May, 27, 08	1.5 Year
3	Horn Antenna	EMCO	3115	9510-4580	May,11, 07	1.5 Year
4	Signal Generator	HP	83732B	6K00003262	May,10, 08	1 Year
5	RF Cable	Hubersuhner	SUCOFLEX	182769/4	May,28, 08	1Year
6	RF Cable	Hubersuhner	SUCOFLEX	182768/4	May,28, 08	1Year
7	RF Cable	Hubersuhner	SUCOFLEX	182771/4	May,28, 08	1Year
8	RF Cable	Hubersuhner	SUCOFLEX 102	2861812	May,28, 08	1Year
9	RF Cable	Hubersuhner	SUCOFLEX 104	27147314	May,28, 08	1Year
10	Amplifier	HP	8449B	3008A00863	May,10, 08	1 Year

### 9.2. Test Procedure

- (1). The EUT was placed on a 0.8m high table in the chamber and turned on in continuously transmitting mode.
- (2). The maximum fundamental emission at 3m distance was measured and recorded with receive antenna in both vertical and horizontal by rotating the turntable and by lowering the receive antenna.
- (3). The EUT was then removed and replaced with a substitution antenna in the same position and the substitution antenna must have the same polarization with the receive antenna.
- (4). A signal which have the same frequency obtained in step 2 was fed to the substitution, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver, the level of the signal generator was adjusted until the measured field strength level in step 2 was obtained, recorded the level of the signal generator.
- (5). Repeated step 4 with both antenna polarizations
- (6). The radiated power is equal to the power supplied by the signal generator and corrections due to the gain of the substitution antenna and the cable loss between the signal generator and the substitution antenna.

## 9.3. Test Information

EUT:	Rock Band Xbox 360 wireless guitar
M/N:	XBGTS2
Test Date:	Jul.09, 2008
Ambient Temperature:	24°C
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

## 9.4. Test Results

CH	Freq (MHz)	Ant Pol.	Electric Field Strength (dBuV/m)	SG Reading (dBm)	Tx Cable Loss (dB)	Tx Ant. Gain (dBi)	Result (dBm)	Limit 0.125w 21(dBm)	Margin (dB)
Low	2402	H	98.49	-1.33	6.06	9.25	1.86	21	19.14
	2402	V	96.11	-2.98	6.06	9.25	0.21	21	20.79
Mid	2442	H	98.16	-1.77	6.08	9.3	1.45	21	19.55
	2442	V	94.18	-3.67	6.08	9.3	-0.45	21	21.45
Hig	2482	H	97.51	-1.95	6.15	9.33	1.23	21	19.77
	2482	V	94.33	-4.72	6.15	9.33	-1.54	21	22.54
Result = SG Reading – Tx Cable Loss + Tx Antenna Gain									

## 10.BAND EDGE COMPLIANCE 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
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	SUCOFLEX	182769/4	May,28, 08	1 Year
5	RF Cable	Hubersuhner	SUCOFLEX	182768/4	May,28, 08	1 Year
6	RF Cable	Hubersuhner	SUCOFLEX	182771/4	May,28, 08	1 Year

### 10.2.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).

### 10.3.Test Produce

1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
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:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

### 10.4.Test Results

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

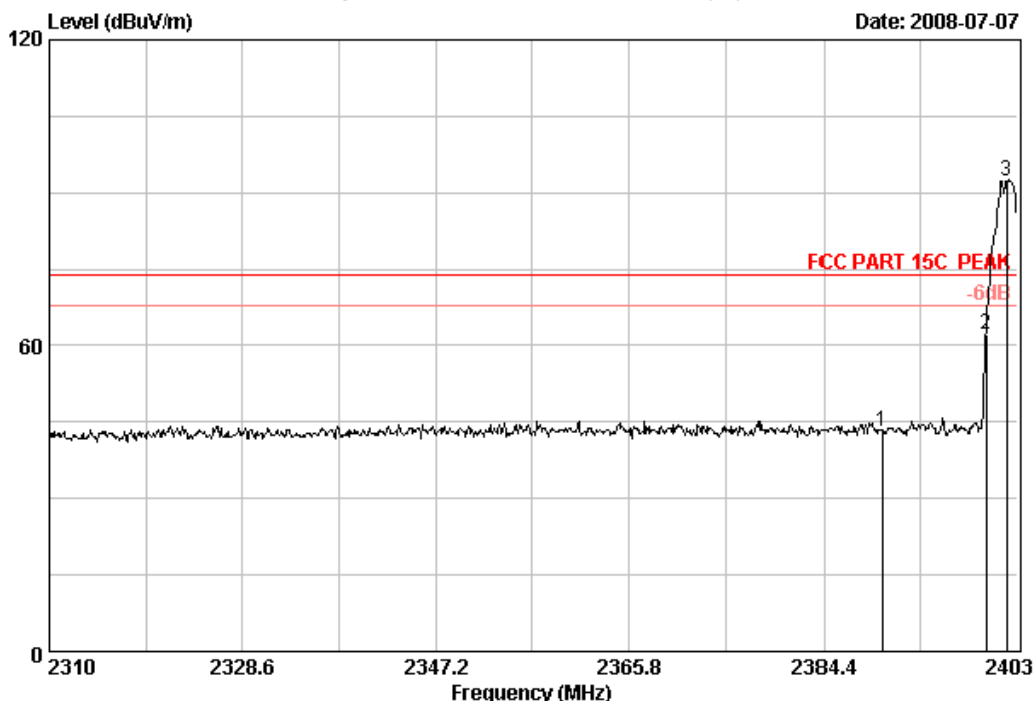


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Data: 9

File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)

Date: 2008-07-07



Site no. : 3# Chamber Data no. : 9  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2402MHz  
M/N : XBGTS2

		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	2390.00	28.99	6.71	35.18	42.63	43.15	74.00	30.85	Peak
2	2400.00	28.99	6.73	35.18	61.56	62.10	74.00	11.90	Peak
3	2401.98	28.99	6.73	35.18	91.73	92.27	74.00	-18.27	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.



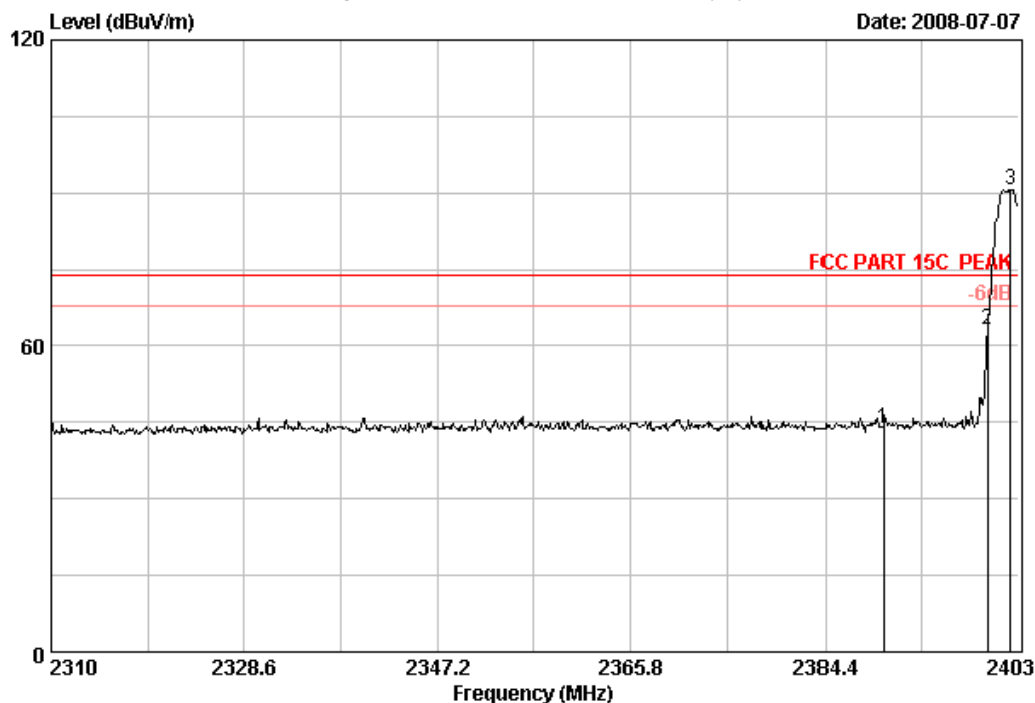


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Data: 10

File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)

Date: 2008-07-07



Site no. : 3# Chamber Data no. : 10  
Dis. / Ant. : 3m 3116 FACTOR Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2402MHz  
M/N : XBGT52

		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	2390.00	28.99	6.71	35.18	43.38	43.90	74.00	30.10	Peak
2	2400.00	28.99	6.73	35.18	62.78	63.32	74.00	10.68	Peak
3	2402.26	28.99	6.73	35.18	90.06	90.60	74.00	-16.60	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.

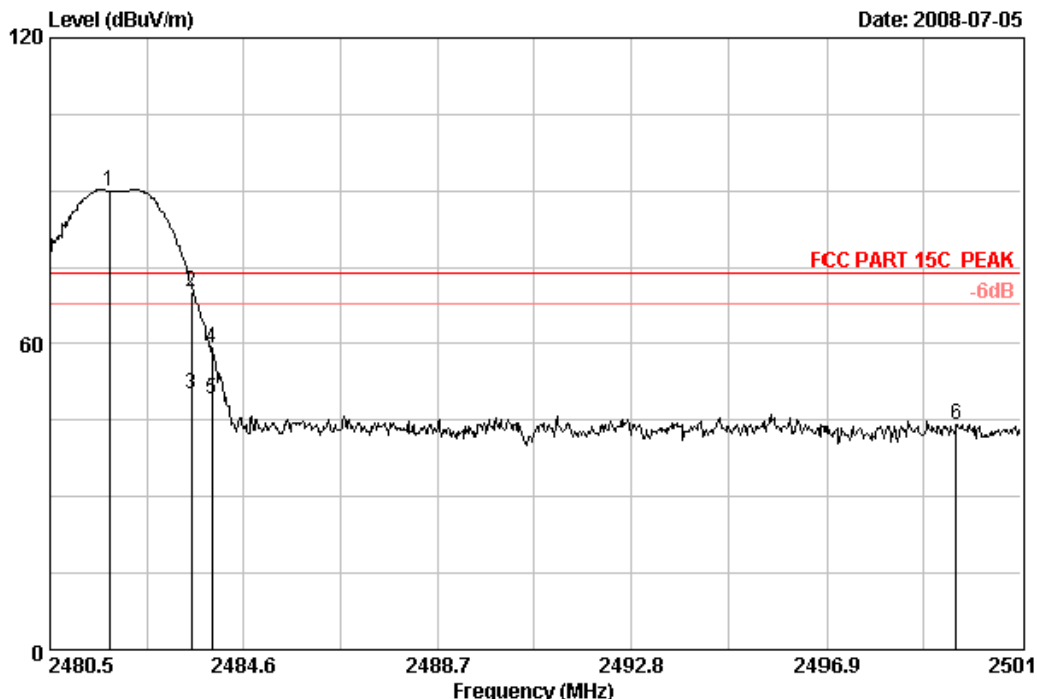


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Data: 8

File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)

Date: 2008-07-05



Site no. : 3# Chamber Data no. : 8  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2482MHz  
M/N : XBGTS2

		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	2481.76	29.19	6.87	35.16	89.11	91.01	74.00	-16.01	Peak
2	2483.50	29.19	6.87	35.16	69.34	70.24	74.00	3.76	Peak
3	2483.50	29.19	6.87	35.16	49.27	50.17	54.00	3.83	Average
4	2483.93	29.19	6.87	35.16	58.15	59.05	74.00	14.95	Peak
5	2483.93	29.19	6.87	35.16	48.13	49.03	54.00	4.97	Average
6	2499.64	29.23	6.91	35.15	43.24	44.23	74.00	29.77	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.

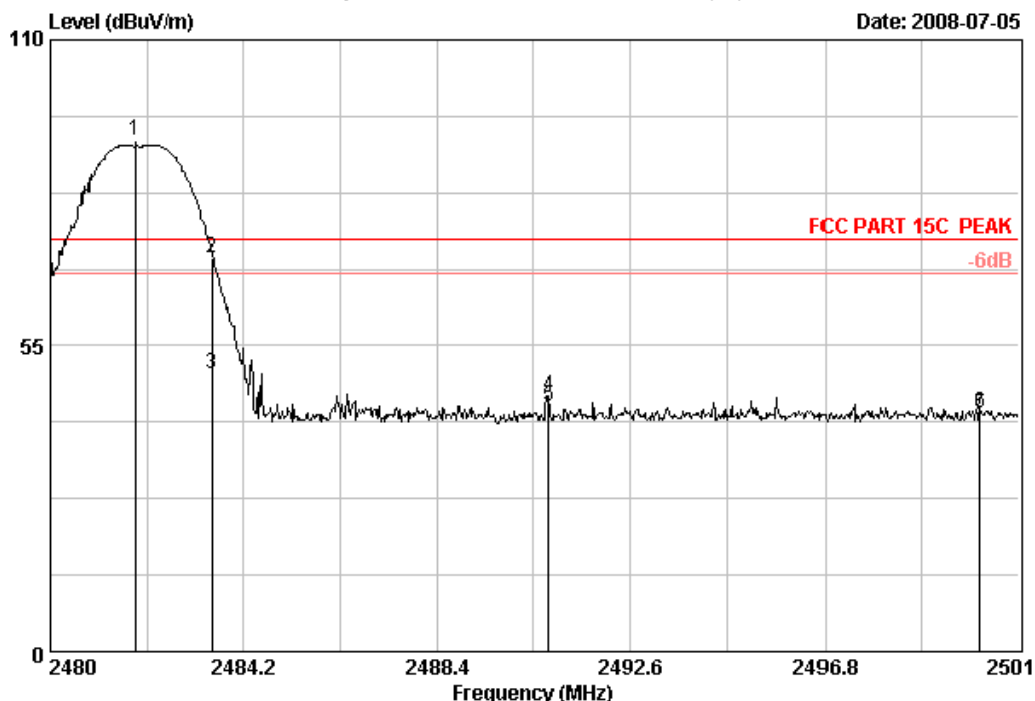


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Data: 7

File: D:\2008 report data\H\Harmonix\ACS8Q986.EMI (16)

Date: 2008-07-05



Site no. : 3# Chamber Data no. : 7  
Dis. / Ant. : 3m 3115 FACTOR Ant. pol. : VERTICAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : 23°C/54% Engineer : Power  
EUT : Rock Band Xbox 360 wireless guitar  
Power Rating: DC 4.5V  
Test Mode : Tx 2482MHz  
M/N : XBGTS2

	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	2481.85	29.19	6.87	35.16	90.96	91.86	74.00	-17.86	Peak
2	2483.50	29.19	6.87	35.16	69.75	70.65	74.00	3.35	Peak
3	2483.50	29.19	6.87	35.16	49.13	50.03	54.00	3.97	Average
4	2490.82	29.23	6.91	35.15	45.10	46.09	74.00	27.91	Peak
5	2490.82	29.23	6.91	35.15	43.10	44.09	54.00	9.91	Average
6	2500.16	29.23	6.91	35.15	41.76	42.75	74.00	31.25	Peak
7	2500.16	29.23	6.91	35.15	41.69	42.68	54.00	11.32	Average

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.

## **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]