

APPLICATION FOR CERTIFICATION  
On Behalf of

Intec Inc.

PS2 2.4G RF Wireless Controller

Model Number: G7090

Prepared for : Intec Inc.  
5255 NW 159<sup>TH</sup> Street Miami, FL 33014 U.S.A.

Prepared By : Audix Technology (Shenzhen) Co., Ltd.  
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Report Number : ACS-F03180  
Date of Test : Apr. 21~23, 2003  
Date of Report : Aug. 12, 2003

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## TEST REPORT DECLARATION

Applicant : Intec Inc.  
 Manufacturer : Vision Electronics Co., Ltd.  
 EUT Description : PS2 2.4G RF Wireless Controller  
 (A) MODEL NO. : G7090  
 (B) SERIAL NO. : F2003081201  
 (C) POWER SUPPLY : DC 3V

Test Procedure Used:  
 FCC Rules and Regulations Part 15 Subpart C Mar 2003.

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.

This report must not be used by the applicant to claim product endorsement by NVLAP or any agency of the U.S. Government.

Date of Test : Apr.21~23, 2003

Jane Dai

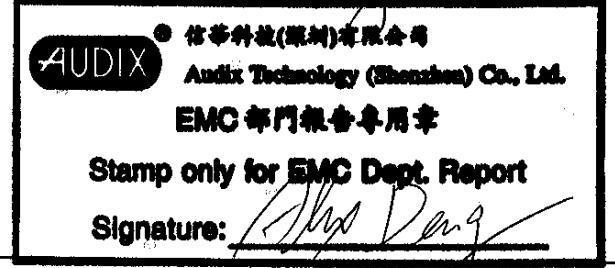
Jane Dai / Assistant

Prepared by :

Lake Wang

Lake Wang / Supervisor

Reviewer :



Approved & Authorized Signer :

Alex Deng / Assistant Manager

Name of the Representative of the Responsible Party : \_\_\_\_\_

Signature :

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

Description : PS2 2.4G RF Wireless Controller  
(Note: The receiver and EUT are separate, and the receivers are not part of this application for certification.)

Modulation Technique : DSSS  
Range With -5dBi antenna : >10m (~33ft) indoor

Model Number : G7090

Applicant : Intec Inc.  
5255 NW 159<sup>TH</sup> Street Miami, FL 33014 U.S.A.

Manufacturer : Vision Electronics Co., Ltd.  
11F-6, No.400 Huan Pei Rd., Chung Li City,  
Tai Wan, R.O.C.

Date of Test : Apr. 21~23, 2003

### 1.2. Tested Supporting System Details

Play Station 2 : Manufacturer: SONY  
M/N: SCPH-30001  
S/N: U1567971  
Data Cable: Shielded, Detachable, 1.8m  
Power Cord: Unshielded, Detachable, 1.5m

Receiver : Manufacturer: Vision  
M/N: 2476

### 1.3. Test Facility

#### Site Description

3m Anechoic Chamber : Certificated by FCC, USA  
Aug. 24, 2000

EMC Lab.

Certificated by DATech, German  
Feb. 02, 1999

Certificated by NVLAP, USA  
NVLAP Code: 200372-0  
Mar. 31, 2003

Name of Firm : Audix Technology (Shenzhen) Co., Ltd.

Site Location : No. 6, Ke Feng Rd., 52 Block,  
Shenzhen Science & Industrial Park,  
Nantou, Shenzhen, Guangdong, China

### 1.4. Test Uncertainty

Conducted Emission Uncertainty = ± 2.66dB

Radiated Emission Uncertainty = ± 4.26dB

## 2. POWER LINE CONDUCTED EMISSION TEST

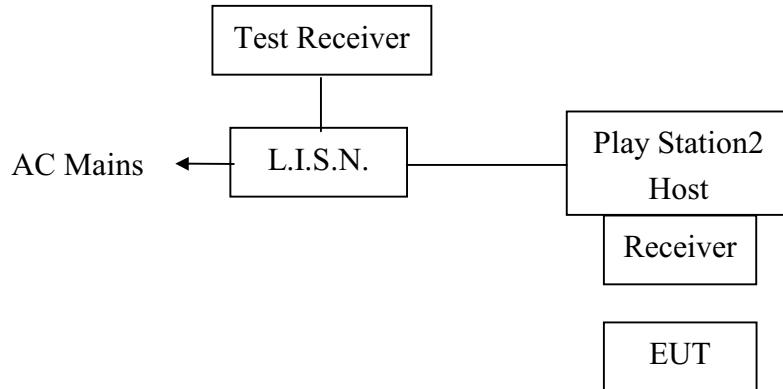
### 2.1. Test Equipment

The following test equipments are used during the power line conducted emission test:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESHS20	836600/006	Jun. 02, 02	1 Year
2.	L.I.S.N. #1	Kyoritsu	KNW-407	8-541-4	Jun. 02, 02	1 Year
3.	L.I.S.N. #2	R&S	ESH2-Z5	834066/011	Jun. 02, 02	1 Year
4.	Terminator	EMCO	50Ω	No. 1	Jun. 02, 02	1 Year
5.	Terminator	EMCO	50Ω	No. 2	Jun. 02, 02	1 Year
6.	RF Cable	FUJIKURA	RG-55/U	LISN Cable	Feb. 22, 03	1/2 Year
7.	Coaxial Switch	Anritsu	MP59B	M74389	Nov. 30, 02	1/2 Year
8.	PC	N/A	586ATXS	N/A	N/A	N/A
9.	Printer	HP	Laserjet2100	SGGJ092351	N/A	N/A

### 2.2. Block Diagram of Test Setup

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



(EUT: PS2 2.4G RF Wireless Controller)

### 2.3. Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150KHz ~ 500KHz	66 ~ 56*	56 ~ 46*
500KHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. \* Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

## 2.4.Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

### 2.4.1.PS2 2.4G RF Wireless Controller (EUT)

Model Number : G7090  
Serial Number : F2003081201  
Manufacturer : Vision Electronics Co., Ltd.

2.4.2.Support Equipment : As Tested Supporting System Detail, in Section 1.2..

## 2.5.Operating Condition of EUT

2.5.1.Setup the EUT and simulator as shown as Section 2.2.

2.5.2.Turn on the power of all equipment.

2.5.3.Let the EUT work in test mode (Running) and test it.

## 2.6.Test Procedure

The play station2 is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm coupling impedance for the play station2. Please refer the block diagram of the test setup and photographs. 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. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4-1992 on Conducted Emission Test.

The bandwidth of test receiver (R & S ESHS20) is set at 10KHz.

The frequency range from 150KHz to 30MHz is checked.

The test result are reported on Section 2.7., all the scanning waveforms for Conducted Emission Test are attached in Appendix I.

## 2.7. Power Line Conducted Emission Test Results

**PASS.**

The frequency range from 150KHz to 30 MHz is investigated.

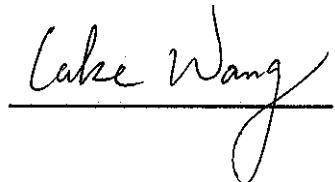
All emissions not reported below are too low against the prescribed limits.

Date of Test :	Apr. 22, 2003	Temperature :	24.6°C
EUT :	PS2 2.4G RF Wireless Controller	Humidity :	54%
Model No. :	Controller: G7090, Receiver: 2476	Test Mode :	Running
Test Engineer :	Sean Xing		

Frequency (MHz)	Reading (dB $\mu$ V)				Limit (dB $\mu$ V)	
	VA		VB			
	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.157	*	*	60.46	52.46	65.62	55.62
0.161	55.29	51.99	*	*	65.41	55.41
0.317	*	*	40.17	32.47	59.79	49.79
0.342	41.06	33.16	*	*	59.15	49.15
0.466	32.20	25.30	33.32	26.12	56.58	46.48
0.835	*	*	33.07	26.47	56.00	46.00
1.800	*	*	40.14	35.74	56.00	46.00
1.832	31.24	23.54	*	*	56.00	46.00
3.350	32.45	26.05	*	*	56.00	46.00
3.881	*	*	29.95	21.85	56.00	46.00
3.920	32.64	26.94	*	*	56.00	46.00

"\*" As the QP value is too low against AV limit, So AV Value had been omitted.

Reviewer:



### 3. RADIATED EMISSION TEST

#### 3.1. Test Equipment

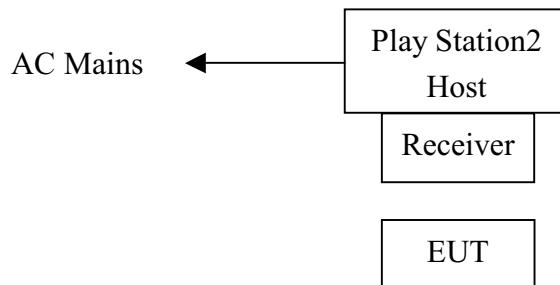
The following test equipments are used during the radiated emission test:

##### 3.1.1. For Anechoic Chamber

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Spectrum	HP	85422E	3625A00181	Jun. 02, 02	1 Year
2.	Test Receiver	Rohde & Schwarz	ESVS10	834468/011	Jun. 02, 02	1 Year
3.	Amplifier	HP	8447D	2944A07794	Mar.19, 03	1/2 Year
4.	Bilog Antenna	Schaffner	CBL6111C	2598	Jan. 14, 03	1 Year
5.	PC	N/A	586ATX3	N/A	N/A	N/A
6.	Printer	HP	Laserjet6P	SGCF019673	N/A	N/A
7.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.1	Feb. 03, 03	1/2 Year
8.	RF Cable	MIYAZAKI	5D-2W	3# Chamber No.2	Feb. 03, 03	1/2 Year
9.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.3	Feb. 03, 03	1/2 Year
10.	RF Cable	FUJIKURA	RG-55/U	3# Chamber No.4	Feb. 03, 03	1/2 Year
11.	Coaxial Switch	Anritsu	MP59B	M73989	Nov. 30, 02	1/2 Year
12.	Spectrum	Agilent	E4407B	MY41440292	Mar.28, 03	1 Year
13.	Amp	HP	8449B	3008A00863	Jun.02, 02	1 Year
14.	Antenna	EMCO	3115	9607-4877	Dec. 04, 02	1.5 Year

#### 3.2. Block Diagram of Test Setup

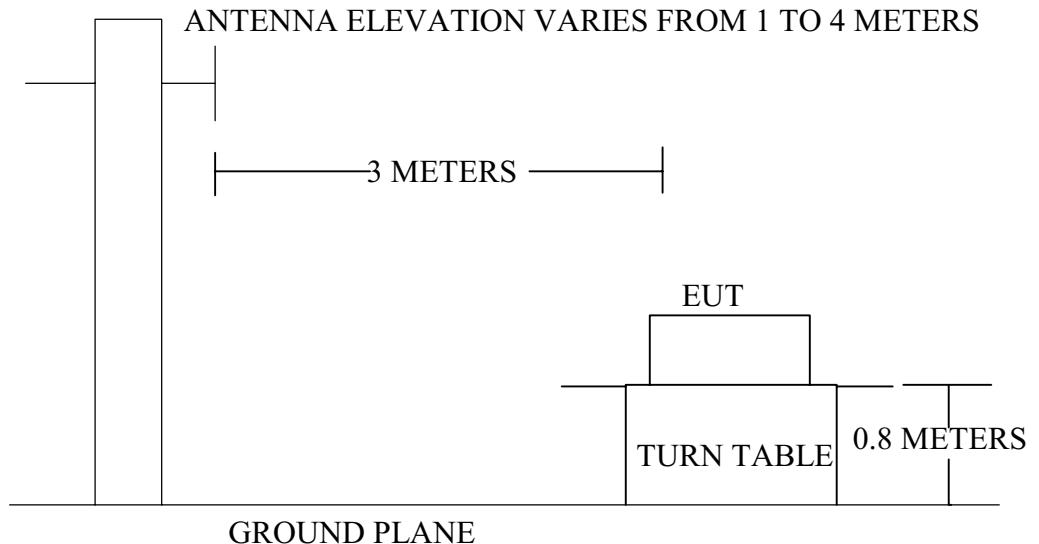
##### 3.2.1. Block diagram of connection between the EUT and simulators



(EUT: PS2 2.4G RF Wireless Controller)

### 3.2.2.In Anechoic Chamber

#### ANTENNA TOWER



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

- Remark :
- (1) Emission level ( $\text{dB}(\mu\text{V})$ ) =  $20 \log_{10}$  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.

### 3.4.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.

#### 3.4.1.PS2 2.4G RF Wireless Controller (EUT)

Model Number : G7090  
 Serial Number : F2003081201  
 Manufacturer : Vision Electronics Co., Ltd.

3.4.2.Support Equipment : As Tested Supporting System Detail, in Section 1.2.

### 3.5.Operating Condition of EUT

1. Setup the EUT as shown in Section 3.2..
2. Let the EUT work in test mode (Running) and test it.

### 3.6.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.

The bandwidth of the EMI test receiver (R&S ESVS20) is set at 120KHz.

The frequency range from 30MHz to 24.44GHz is checked.

The test mode (Running) is tested in Anechoic Chamber, and all the scanning waveforms are attached in Appendix II.

### 3.7.Radiated Emission Test Result

**PASS.**

The frequency range from 30MHz to 1000MHz is investigated.  
Please see the following pages.

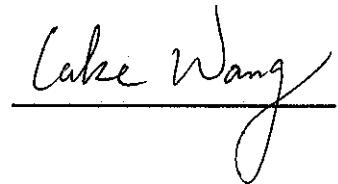
Date of Test :	Apr. 23, 2003	Temperature :	23°C
EUT :	PS2 2.4G RF Wireless Controller	Humidity :	58%
Model No. :	Controller: G7090, Receiver: 2476	Test Mode :	Running
Test Engineer: Sean Xing			

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Horizontal dB $\mu$ V	Emission Level Horizontal dB $\mu$ V/m	Over Limits dB	Limits dB $\mu$ V/m
203.580	9.74	3.04	24.80	37.58	-5.92	43.50
295.720	13.19	3.76	23.80	40.75	-5.25	46.00
<b>392.800</b>	<b>16.10</b>	<b>4.54</b>	<b>21.90</b>	<b>42.54</b>	<b>-3.46</b>	<b>46.00</b>
589.740	18.84	6.14	15.20	40.18	-5.82	46.00
785.600	21.60	7.02	13.10	41.73	-4.27	46.00
884.550	22.12	7.42	9.70	39.23	-6.77	46.00

Remark: 1. All readings are Quasi-Peak values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading

Reviewer:



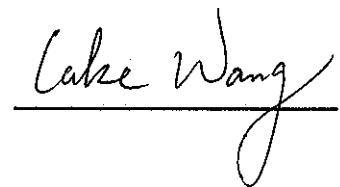
Date of Test :	Apr. 23, 2003	Temperature :	23°C
EUT :	PS2 2.4G RF Wireless Controller	Humidity :	58%
Model No. :	Controller: G7090, Receiver: 2476	Test Mode :	Running
Test Engineer:	Sean Xing		

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Meter Reading Vertical dB $\mu$ V	Emission Level Vertical dB $\mu$ V/m	Over Limits dB	Limits dB $\mu$ V/m
111.475	11.79	2.06	46.00	35.30	-8.20	43.50
295.880	13.58	3.76	48.00	41.12	-4.88	46.00
480.110	18.13	5.35	42.10	39.74	-6.26	46.00
588.750	19.26	6.08	42.10	41.23	-4.77	46.00
<b>808.950</b>	<b>21.45</b>	<b>6.91</b>	<b>39.10</b>	<b>41.25</b>	<b>-4.75</b>	<b>46.00</b>
884.600	23.51	7.42	35.90	41.14	-4.86	46.00

Remark: 1. All readings are Quasi-Peak values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading

Reviewer:



Date of Test :	Apr. 22, 2003	Temperature :	23°C
EUT :	PS2 2.4G RF Wireless Controller	Humidity :	58%
Model No. :	Controller: G7090	Test Mode :	Running
Test Engineer:	Sean Xing		

Frequency MHz	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Meter Reading	Emission Level	Over Limits	Limits	Remark
				Horizontal dB $\mu$ V	Horizontal dB $\mu$ V/m	dB $\mu$ V/m	dB $\mu$ V/m	
1180.000	23.88	35.52	3.36	61.63	53.35	-20.65	74.00	Peak
1180.000	23.88	35.52	3.36	59.73	51.45	-22.55	54.00	Average
2440.000	28.14	34.98	5.74	72.30	71.20	-	-	Peak
2440.000	28.14	34.98	5.74	62.26	61.16	-	-	Average

Remark: 1. All readings are Peak and Average values.

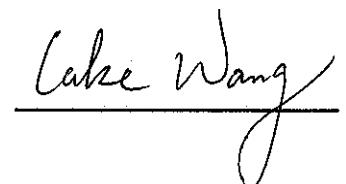
2. Emission Level = Antenna Factor + Cable Loss + Meter Reading – Preamp Factor
3. The bandwidth of the RBW is set at 1MHz and VBW is set at 1MHz.

Frequency MHz	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Meter Reading	Emission Level	Over Limits	Limits	Remark
				Vertical dB $\mu$ V	Vertical dB $\mu$ V/m	dB $\mu$ V/m	dB $\mu$ V/m	
1180.000	23.88	35.52	3.36	68.97	60.69	-13.31	74.00	Peak
1180.000	23.88	35.52	3.36	57.40	49.12	-24.88	54.00	Average
2440.000	28.14	34.98	5.74	72.13	71.03	-	-	Peak
2440.000	28.14	34.98	5.74	62.99	61.89	-	-	Average
4881.000	33.08	34.46	8.01	46.41	53.04	-20.96	74.00	Peak
4881.000	33.08	34.46	8.01	31.46	38.09	-35.91	54.00	Average

Remark: 1. All readings are Peak and Average values.

2. Emission Level = Antenna Factor + Cable Loss + Meter Reading – Preamp Factor
3. The bandwidth of the RBW is set at 1MHz and VBW is set at 1MHz.

Reviewer:



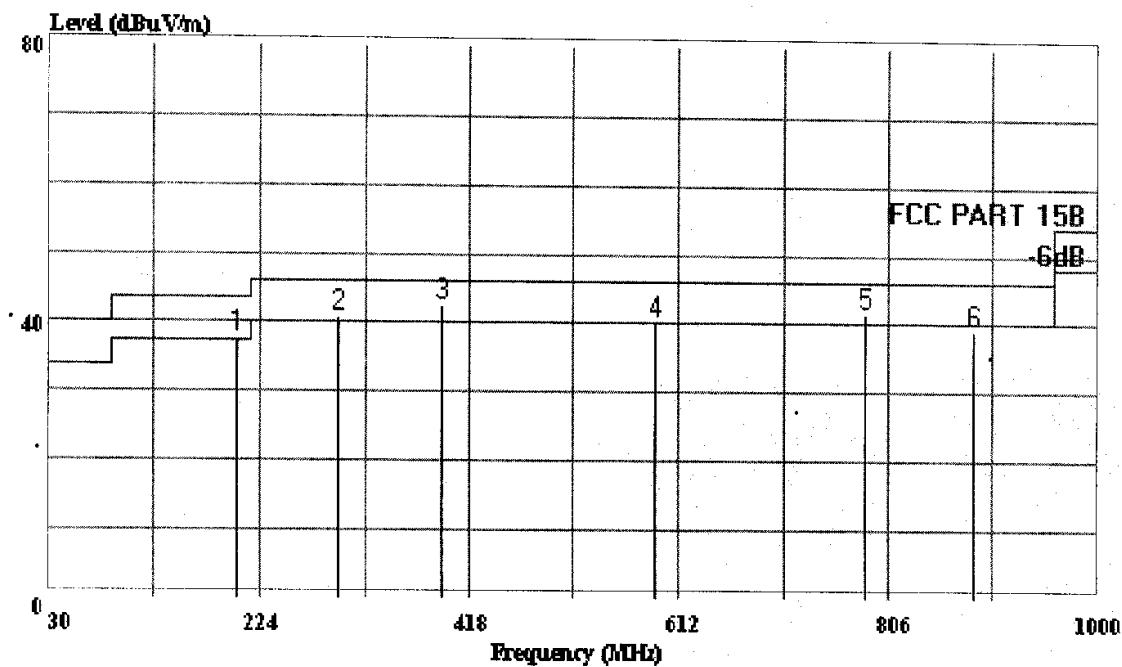


AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

Shenzhen Science & Ind. Park  
 Tel: 0755-26639495~7  
 Fax: 0755-26632877

Data#: 16

Date: 2003-04-23 Time: 23:33:08



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (3# Chamber)

Trace:

Ref Trace:

Condition: FCC PART 15B 3m 2.598FACTOR HORIZONTAL  
 FUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller: G7090. Receiver: 2476  
 Power : Host 120V/60Hz DC 3V  
 Test Engineer: Sean Xina  
 Comment : Temp: 23' C Humi: 58%  
 Memo : Running

Page: 1

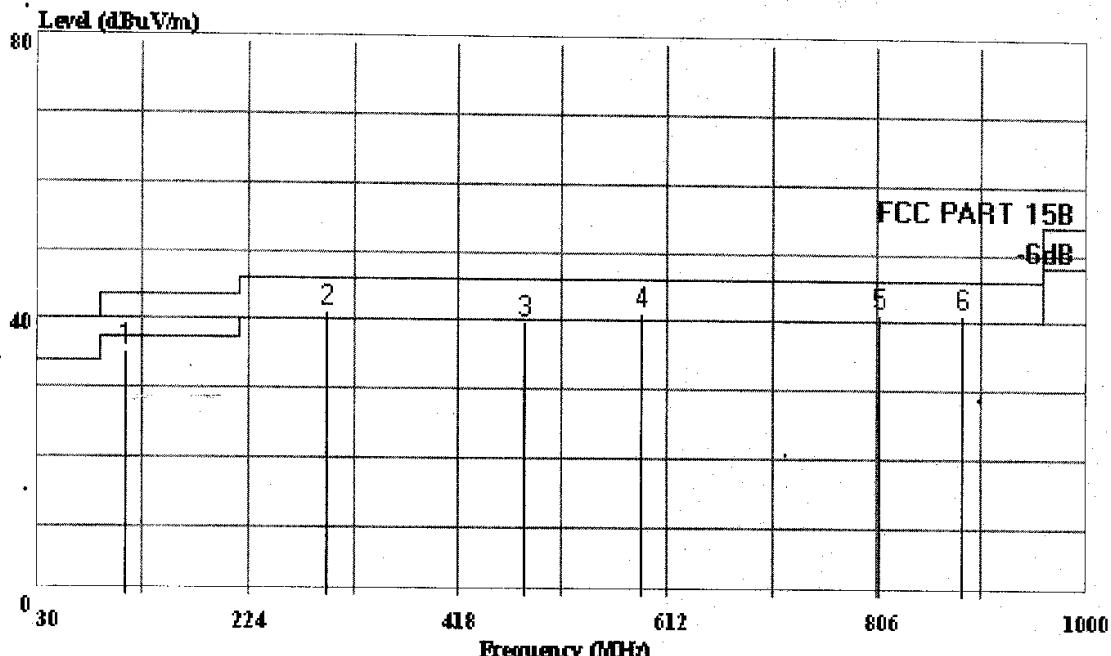
	Freq	Limit	Over	Read	Probe	Cable
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB
1 !	203.580	37.58	43.50	-5.92	24.80	9.74
2 !	295.720	40.75	46.00	-5.25	23.80	13.19
3 !	392.800	42.54	46.00	-3.46	21.90	16.10
4 !	589.740	40.18	46.00	-5.82	15.20	18.84
5 !	785.600	41.73	46.00	-4.27	13.10	21.60
6	884.550	39.23	46.00	-6.77	9.70	22.12



Shenzhen Science & Ind. Park  
Tel: 0755-26639495~7  
Fax: 0755-26632877 .

Data#: 14

Date: 2003-04-23 Time: 23:00:46



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (3# Chamber)

Trace:

Ref Trace:

Condition: FCC PART 15B 3m 2598FACTOR VERTICAL  
 RUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller: G7090. Receiver: 2476  
 Power : Host 120V/60Hz DC 3V  
 Test Engineer: Sean Xina  
 Comment : Temp: 23' C, Humi: 28%  
 Memo : Running

Page: 1

	Freq	Limit	Over	Read	Probe	Cable
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB
1	111.475	35.30	43.50	-8.20	46.00	11.79
2 !	295.880	41.12	46.00	-4.88	48.00	13.58
3	480.110	39.74	46.00	-6.26	42.10	18.13
4 !	588.750	41.23	46.00	-4.77	42.10	19.26
5 !	808.950	41.25	46.00	-4.75	39.10	21.45
6 !	884.600	41.14	46.00	-4.86	35.90	7.42

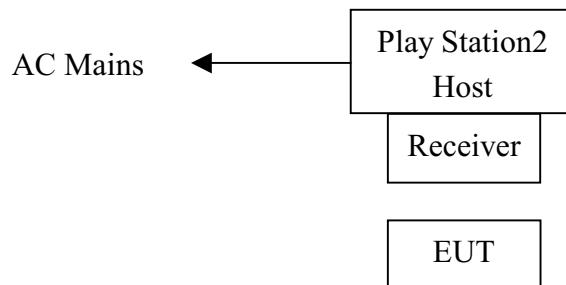
## 4. 6dB BANDWIDTH MEASUREMENT

### 4.1. Test Equipment

The following test equipment were used during the Emission Bandwidth Test :

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4407B	MY41440292	Mar.28, 03	1 Year
2.	Amp	HP	8449B	3008A00863	Jun.02, 02	1 Year
3.	Antenna	EMCO	3115	9607-4877	Dec. 04, 02	1.5 Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	Jun.02, 02	1 Year

### 4.2. Block Diagram of Test Setup



(EUT: PS2 2.4G RF Wireless Controller)

### 4.3. Specification Limits (§15.247(a)(2))

The minimum 6dB bandwidth shall be at least 500kHz.

### 4.4. Operating Condition of EUT

1. Setup the EUT as shown in Section 4.2..
2. Let the EUT work in test mode (Running) and test it.

#### 4.5. Test Procedure

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. Power on the EUT and let it work normally, we use a keyboard test software, 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. Horn antenna is used as receiving antenna.

The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

#### 4.6. Test Results

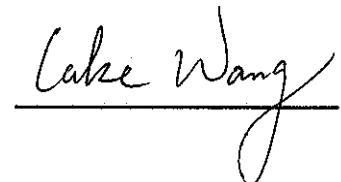
**PASSED.**

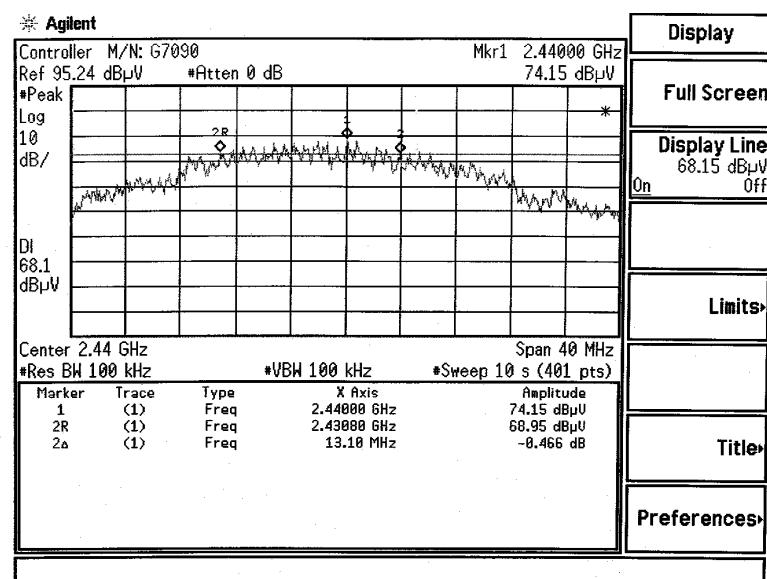
The testing data was attached in the next pages.

Date of Test :	Apr. 23, 2003	Temperature :	23°C
EUT :	PS2 2.4G RF Wireless Controller	Humidity :	58%
Model No. :	Controller: G7090	Test Mode :	Running
Test Engineer:	Sean Xing		

Channel.	Frequency	6dB Bandwidth
1	2.44000GHz	13.10MHz

Reviewer:





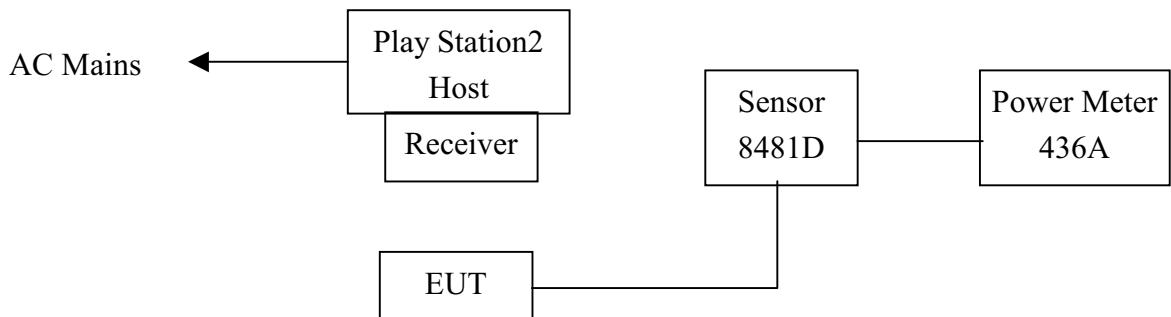
## 5. PEAK OUTPUT POWER MEASUREMENT

### 5.1. Test Equipment

The following test equipment were used during the Emission Bandwidth Test :

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4407B	MY41440292	Mar.28, 03	1 Year
2.	Amp	HP	8449B	3008A00863	Jun.02, 02	1 Year
3.	Antenna	EMCO	3115	9607-4877	Dec. 04, 02	1.5 Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	Jun.02, 02	1 Year
5.	Power meter	HP	436A	2016A07891	NCR	
6.	Power Sensor	HP	8481D	3318A13613	Jun.02, 02	1 Year

### 5.2. Block Diagram of Test Setup



(EUT: PS2 2.4G RF Wireless Controller)

### 5.3. Specification Limits (§15.247(b)-(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm)

### 5.4. Operating Condition of EUT

1. Setup the EUT as shown in Section 5.2..
2. Let the EUT work in test mode (Running) and test it.

## 5.5. Test Procedure

Setup the EUT as shown in Section 5.2. Turn on the play station 2 and let the EUT working . The EUT is via the power sensor link to power meter. The test value reading is from power meter.

## 5.6. Test Results

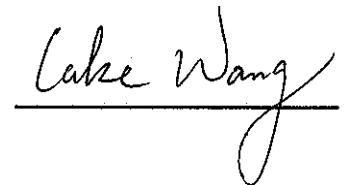
**PASSED.**

The testing data was attached in the next pages.

Date of Test :	Apr. 23, 2003	Temperature :	23°C
EUT :	PS2 2.4G RF Wireless Controller	Humidity :	58%
Model No. :	Controller: G7090	Test Mode :	Running
Test Engineer:	Sean Xing		

Frequency	Reading dB $\mu$ V	Cable Loss dBm	Poer Density dBm	Limit dBm
2440.0MHz	-25.18	0.2	-24.98	30.00

Reviewer:



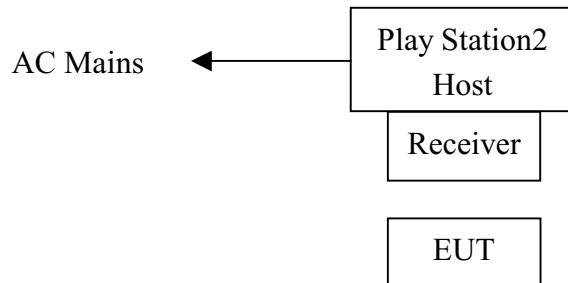
## 6. BAND EDGES MEASUREMENT

### 6.1. Test Equipment

The following test equipment were used during the Emission Bandwidth Test :

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4407B	MY41440292	Mar.28, 03	1 Year
2.	Amp	HP	8449B	3008A00863	Jun.02, 02	1 Year
3.	Antenna	EMCO	3115	9607-4877	Dec. 04, 02	1.5 Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	Jun.02, 02	1 Year

### 6.2. Block Diagram of Test Setup



(EUT: PS2 2.4G RF Wireless Controller)

### 6.3. Specification Limits (§15.247(c))

The highest level should be at least 20 dB below that in the 100kHz bandwidth.

### 6.4. Operating Condition of EUT

1. Setup the EUT as shown in Section 6.2..
2. Let the EUT work in test mode (Running) and test it.

## 6.5. Test Procedure

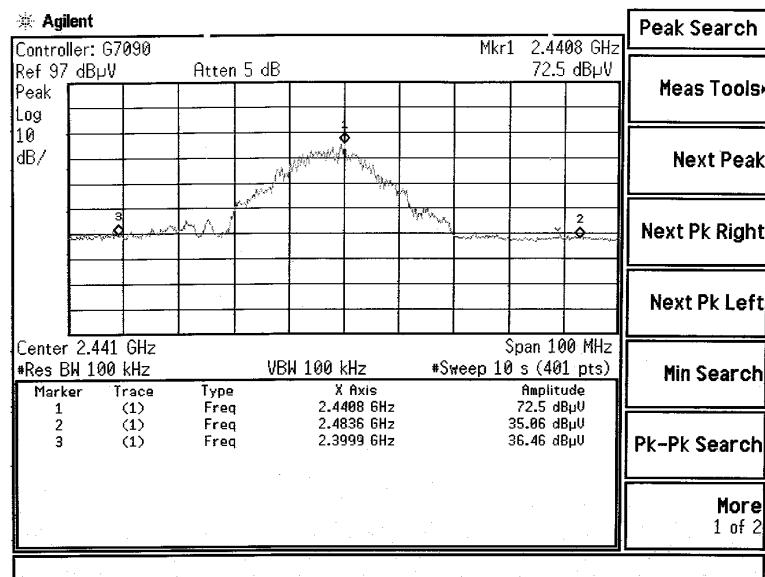
EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it work normally, we use a keyboard test soft ware, let EUT working in test mode, then test 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. Horn antenna is used as receiving antenna.

Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from bank edge.

## 6.6. Test Results

**PASSED.**

The testing data was attached in the next pages.



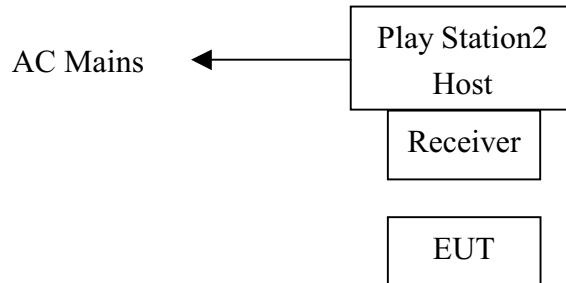
## 7. POWER SPECTRAL DESITY MEASUREMENT

### 7.1. Test Equipment

The following test equipment were used during the Emission Bandwidth Test :

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4407B	MY41440292	Mar.28, 03	1 Year
2.	Amp	HP	8449B	3008A00863	Jun.02, 02	1 Year
3.	Antenna	EMCO	3115	9607-4877	Dec. 04, 02	1.5 Year
4.	HF Cable	Hubersuhne	Sucoflex104	-	Jun.02, 02	1 Year

### 7.2. Block Diagram of Test Setup



(EUT: PS2 2.4G RF Wireless Controller)

### 7.3. Specification Limits (§15.247(d))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

### 7.4. Operating Condition of EUT

1. Setup the EUT as shown in Section 7.2..
2. Let the EUT work in test mode (Running) and test it.

## 7.5. Test Procedure

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. 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. Horn antenna is used as receiving antenna.

The bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz.

## 7.6. Test Results

**PASSED.**

The testing data was attached in the next pages.

Date of Test :	Apr. 23, 2003	Temperature :	23°C
EUT :	PS2 2.4G RF Wireless Controller	Humidity :	58%
Model No. :	Controller: G7090	Test Mode :	Running
Test Engineer:	Sean Xing		

Frequency	Reading dB $\mu$ V	Poer Density dBm	Limit dBm
2440.0303MHz	68.91	-21.37	8.00

Remark:

Formulas used to calculate Power Density.

Using the relationship between field strength and RF power into an isotropic transmit antenna:

$$P(\text{Watts}) = (E(\text{V/m}) \times D: \text{meters})^2 / 30G \quad D = \text{Distance}$$

Antenna gain = -5dBi

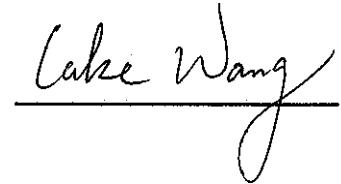
$$G(\text{numeric}) = 10^{(G(\text{dBi})/10)} = 10^{(-5\text{dBi}/10)} = 0.32$$

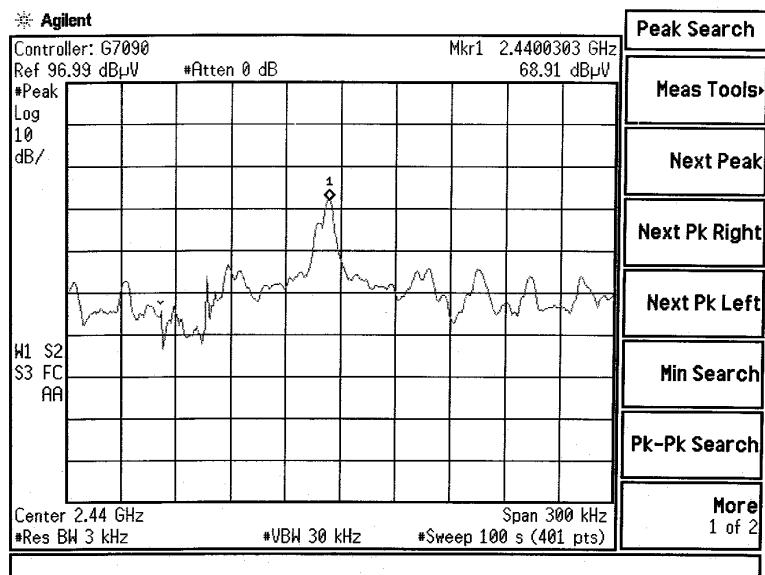
$$68.91 \text{ dB}\mu\text{V} = 0.0027893306 \text{ V/m}$$

$$P(\text{Watt}) = (0.0027893306 \text{ V/m} \times 3\text{m})^2 / 9.6 = 7.2940923 \times 10^{-6}$$

$$10 * \log 7.2940923 \times 10^{-6} \times 10^3 = -21.37 \text{ dBm}$$

Reviewer:





## 8. MAXIMUM PERMISSIBLE EXPOSURE

### CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E=Field Strength in Volts/meter

P=Power in Watts

G=Numeric antenna gain

d=distance in meters

S=Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of mW and cm, using:

$$P(\text{mW}) = P(\text{W}) / 1000 \text{ and}$$

$$d(\text{cm}) = 100 * d(\text{m})$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d=distance in cm

P=Power in mW

G=Numeric antenna gain

S=Power Density in mW/cm<sup>2</sup>

Substituting the logarithmic form of power and gain using:

$$P(\text{mW}) = 10^{(P(\text{dBm}) / 10)} \text{ and}$$

$$G(\text{numeric}) = 10^{(G(\text{dBi}) / 10)}$$

yields

$$d = 0.282 * 10^{((P + G) / 20) / \sqrt{S}} \quad \text{Equation(1)}$$

where

d=MPE safe distance in cm

P=Power in dBm

G=Antenna Gain in dBi

S=Power Density Limit in mW/cm<sup>2</sup>

## **RESULTS**

No non-compliance noted:

### **MAXIMUM PERMISSIBLE EXPOSURE (2.4GHZ BAND)**

EUT output power = -24.98 dBm

Antenna Gain = -5dBi

S = 1.0mW / cm<sup>2</sup> from 1.1310 Table 1

Substituting these parameters into Equation (1) above:

MPE Safe Distance = 0.009 cm

## 9. DEVIATION TO TEST SPECIFICATIONS

(None.)

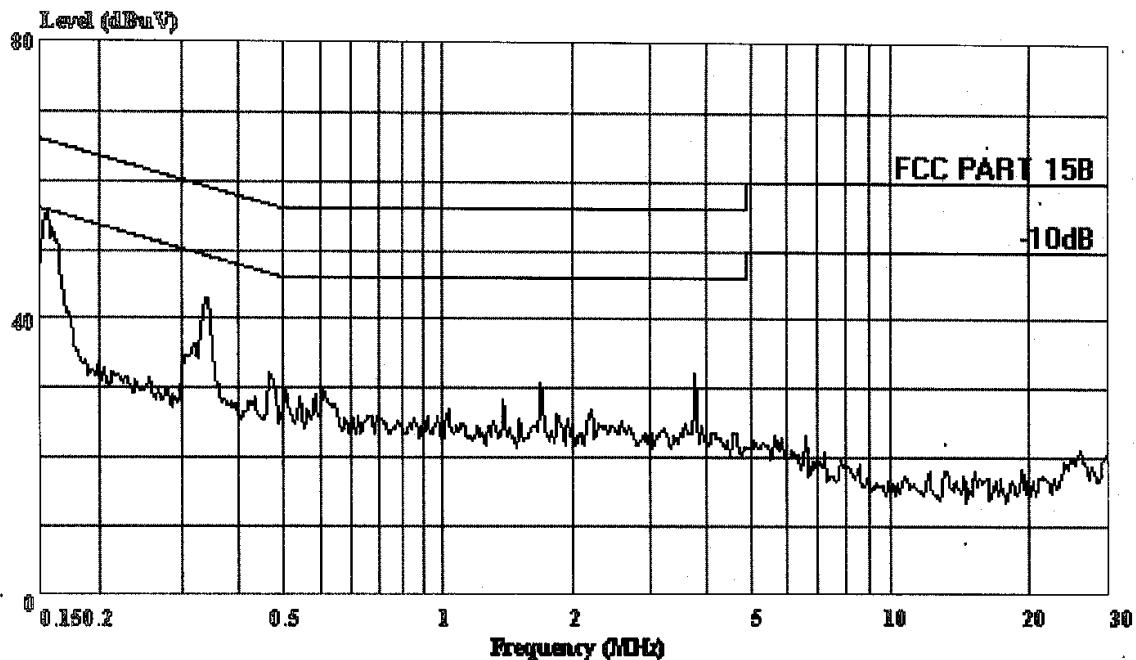
## APPENDIX I



Shenzhen Science & Ind Park  
Tel: 0755-26639496  
Fax: 26632877

Data#: 37

Date: 2003-04-22 Time: 18:41:08



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (Audix ATC)

Trace:

Ref Trace:

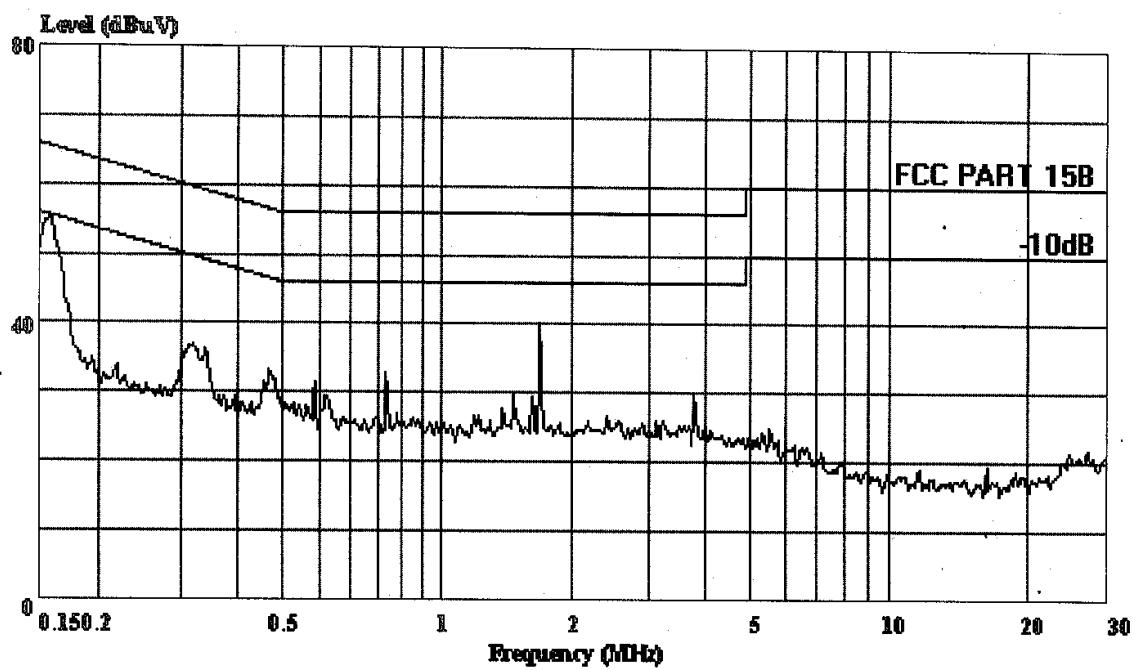
Condition: FCC PART 15B VA(KNW-407)  
 EUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller: G7090, Receiver: 2476  
 OP Cond : Running  
 Test Spec : 120V/60Hz, DC 3V  
 Test Engineer: Sean Xing  
 Comment : Temp:24.6'C Humi:54%



Shenzhen Science & Ind Park  
Tel: 0755-26639496  
Fax: 26632877

Data#: 39

Date: 2003-04-22 Time: 18:58:41



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (Audix ATC)

Trace:

Ref Trace:

Condition: FCC PART 15B VB(KNW-407)

EUT : PS2 2.4G RF Wireless Controller

M/N : Controller: G7090, Receiver: 2476

OP Cond : Running

Test Spec : 120V/60Hz, DC 3V

Test Engineer: Sean Xing

Comment : Temp:24.6'C Humi:54%

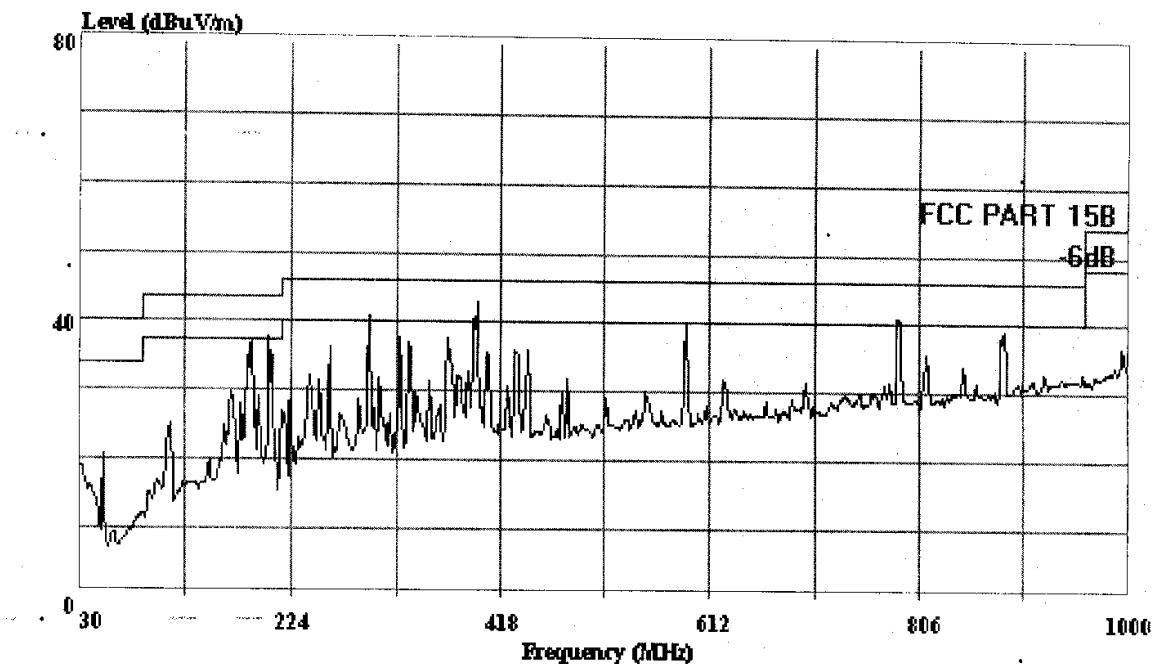
## APPENDIX II



Shenzhen Science & Ind. Park  
Tel: 0755-26639495~7  
Fax: 0755-26632877

Data#: 15

Date: 2003-04-23 Time: 23:10:50



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (3# Chamber)

Trace:

Ref Trace:

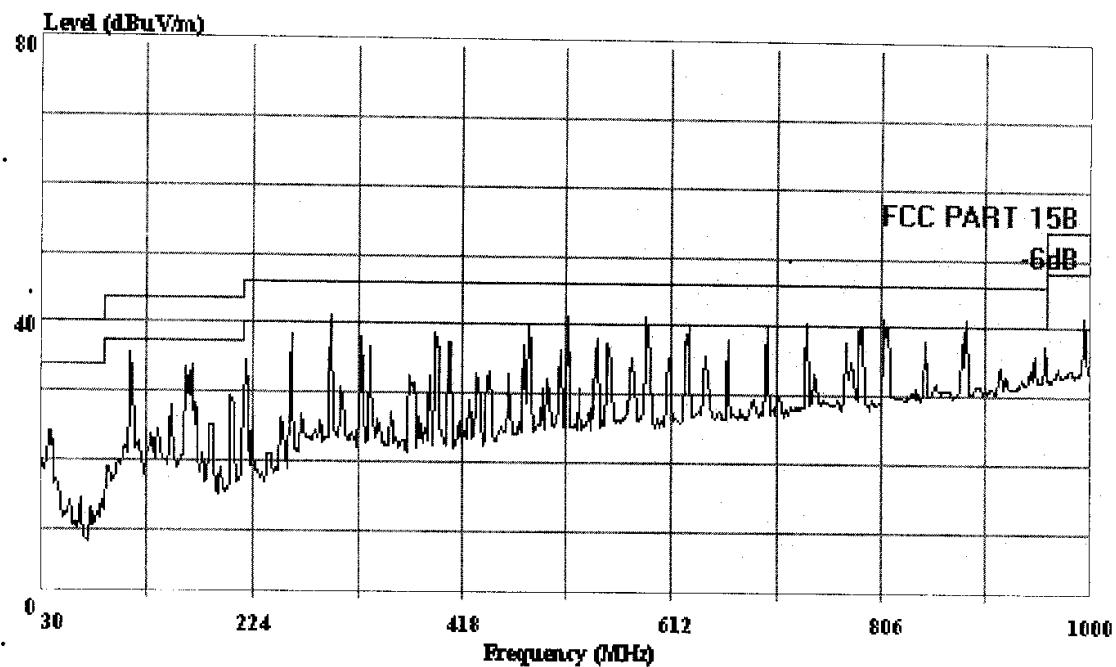
Condition: FCC PART 15B 3m 2598FACTOR HORIZONTAL  
 EUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller: G7090. Receiver: 2476  
 Power : Host 120V/60Hz DC 3V  
 Test Engineer: Sean Xina  
 Comment : Temp: 23' C Humi: 58%  
 Memo : Running



Shenzhen Science & Ind. Park  
Tel: 0755-26639495~7  
Fax: 0755-26632877

Data#: 13

Date: 2003-04-23 Time: 22:50:25



AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. (3# Chamber)

Trace:

Ref Trace:

Condition: FCC PART 15B 3m 2598FACTOR VERTICAL  
 EUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller: G7090, Receiver: 2476  
 Power : Host 120V/60Hz DC 3V  
 Test Engineer: Sean Xina  
 Comment : Temp: 23' C, Humi: 28%  
 Memo : Running

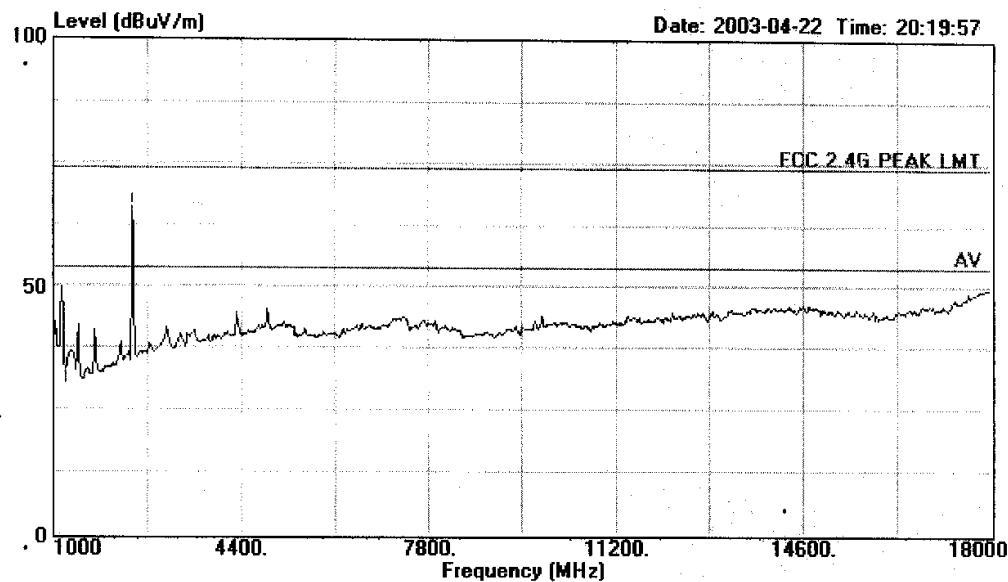


信華科技(深圳)有限公司

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 Shenzhen Science & Industry Park  
 Nantou, Shenzhen, Guangdong, China  
 Tel:+86-755-26639496 Fax:+86-755-26632877

Data#: 17



Site : 1# Chamber  
 Condition : FCC 2.4G PEAK LMT 3m 3115FACTOR HORIZONTAL  
 EUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller G7090  
 Power : DC 3V  
 Test Engineer : Sean Xing  
 Memo : Running

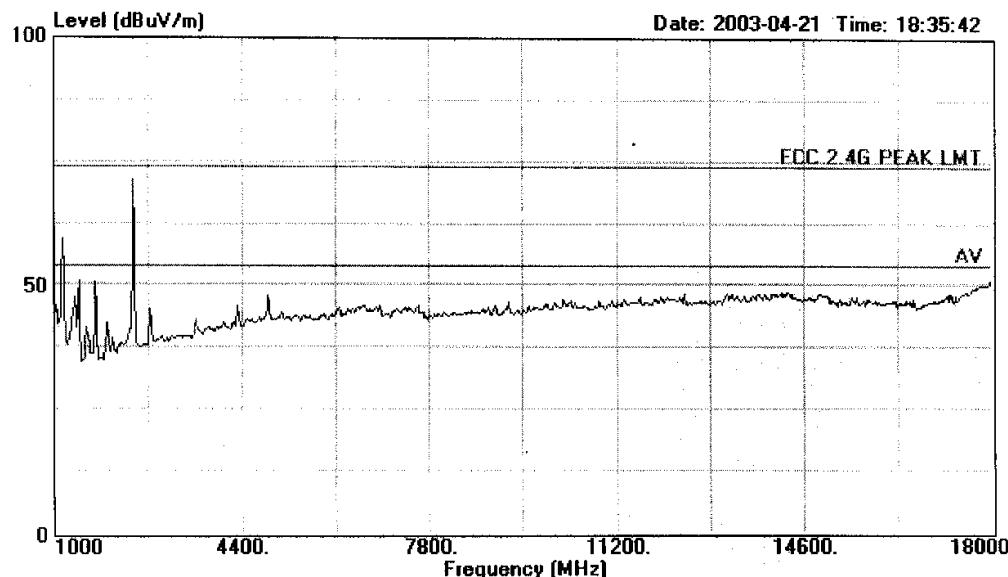


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 Tel:+86-755-26639496 Fax:+86-755-26632877

Data#: 8



Site : 1# Chamber  
 Condition : FCC 2.4G PEAK LMT 3m 3115FACTOR VERTICAL  
 EUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller G7090  
 Power : DC 3V  
 Test Engineer : Sean Xing  
 Memo : Running

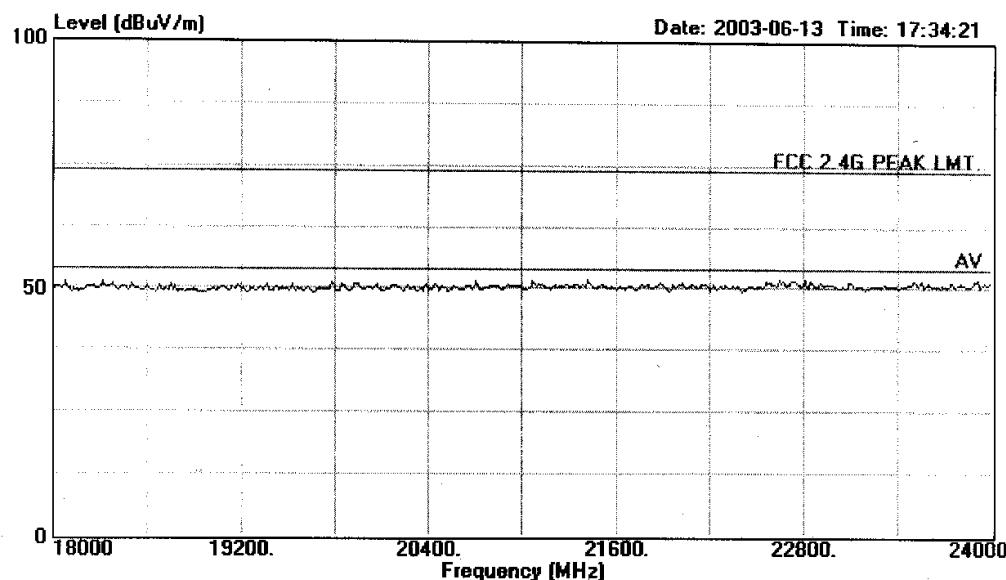


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 Shenzhen Science & Industry Park  
 Nantou, Shenzhen, Guangdong, China  
 Tel: +86-755-26639496 Fax: +86-755-26632877

Data#: 66



Site : 1# Chamber  
 Condition : FCC 2.4G PEAK LMT. 3m 3115FACTOR HORIZONTAL  
 EUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller G7090  
 Power : DC 3V  
 Test Engineer : Sean Xing  
 Memo : Running

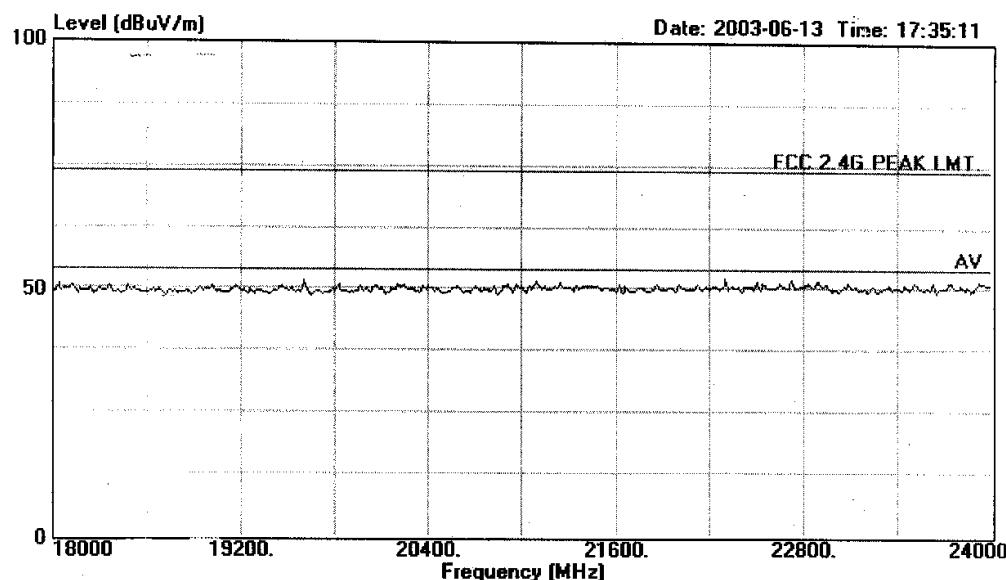


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Shenzhen Science & Industry Park  
Nantou, Shenzhen, Guangdong, China  
Tel:+86-755-26639496 Fax:+86-755-26632877

Data#: 67



Site : 1# Chamber  
 Condition : FCC 2.4G PEAK LMT. 3m 3115FACTOR VERTICAL  
 EUT : PS2 2.4G RF Wireless Controller  
 M/N : Controller G7090  
 Power : DC 3V  
 Test Engineer : Sean Xing  
 Memo : Running