

APPLICATION FOR CERTIFICATION

On Behalf of

Powertech Industrial Co., Ltd.

Surge Protective Devices

Model No. : R9P136A600

FCC ID : NHS-R9P136

Prepared for : Powertech Industrial Co., Ltd.
10F, No. 407, Chung Shan Rd., Sec 2
Chung Ho City, New Taipei City, 235
Taiwan, R.O.C.

Prepared by : AUDIX Technology Corporation
EMC Department
No. 53-11, Dingfu, Linkou Dist., New Taipei
City 244, Taiwan, R.O.C.

Tel : (02) 2609-9301, 2609-2133

Fax: (02) 2609-9303

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Date of Report : Aug. 15, 2012

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TEST REPORT CERTIFICATION

Applicant : Powertech Industrial Co., Ltd.
 Manufacturer : Dongguan Quan Sheng Electric Co., Ltd.
 EUT Description : Surge Protective Devices
 FCC ID : NHS-R9P136
 (A) Model No. : R9P136A600
 (B) Serial No. : N/A
 (C) Power Supply : AC 120V/60Hz
 (D) Test Voltage : AC 120V/60Hz

Measurement Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C, Oct. 2011
 (FCC CFR 47 Part 15C, §15.207, §15.249, §15.209)
 AND ANSI C63.4/2003

The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C limits.

The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test : Jul. 03, 2012 Date of Report : Aug. 15, 2012

Producer : Annie Yu
 (Annie Yu/Assistant Administrator)

Signatory: Leon Liu
 (Leon Liu/Deputy General Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	Surge Protective Devices
FCC ID	:	NHS-R9P136
Model Number	:	R9P136A600
Applicant	:	Powertech Industrial Co., Ltd. 10F, No. 407, Chung Shan Rd., Sec 2 Chung Ho City, New Taipei City, 235 Taiwan, R.O.C.
Manufacturer	:	Dongguan Quan Sheng Electric Co., Ltd. Chu-Tang 2nd Industrial Park Hou-Chieh Town Dongguan Guangdong 523963 China.
Fundamental Range	:	2405MHz ~ 2480MHz
Frequency Channel	:	16 channels
Radio Technology	:	OQPSK Modulation
Date of Receipt of Sample	:	Jun. 25, 2012
Date of Test	:	Jul. 03, 2012

1.2. Tested Supporting System Details

1.2.1. AC SOCKET

Model Number : N/A
 Manufacturer : N/A
 Power Cord : Non-Shielded, Detachable, 1.8m

1.2.2. BULBS LOAD (60W)

Model Number : AS100
 Manufacturer : PHILIPS
 Power Cord : Non-Shielded, Detachable, 1.8m

1.3. Description of Test Facility

Name of Firm : **AUDIX Technology Corporation**
EMC Department
 No. 53-11, Dingfu, Linkou Dist., New Taipei City
 244, Taiwan, R.O.C.

Test Facility & Location (C4/AC) : **No. 4 Shielded Room &**
 No. 67-4, Dingfu, Linkou Dist., New Taipei City
 244, Taiwan, R.O.C.

Semi-Anechoic Chamber
 No. 53-11, Dingfu, Linkou Dist., New Taipei City
 244, Taiwan, R.O.C.
 Renewal on May 11, 2012
 Federal Communication Commission
 Registration Number: 90993

NVLAP Lab. Code : 200077-0

TAF Accreditation No : 1724

1.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	±1.73dB
Radiation Test (Distance: 3m)	30MHz~300MHz	± 2.91dB
	300MHz~1000MHz	± 2.94dB
	Above 1GHz	± 5.02dB

Remark : Uncertainty = $ku_c(y)$

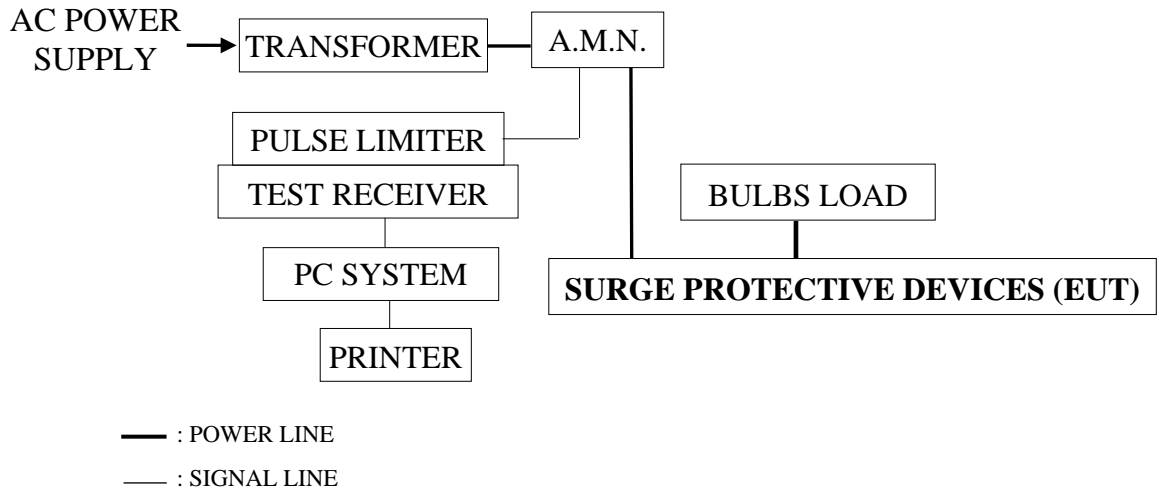
2. POWERLINE CONDUCTED EMISSION MEASUREMENT

2.1. Test Equipment

The following test equipment was used during the conducted emission measurement :
(No. 4 Shielded Room)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R & S	ESCS30	100339	Mar. 08, 12'	Mar. 07, 13'
2.	A.M.N.	R&S	ESH2-Z5	890485/023	Apr. 20, 12'	Apr. 19, 13'
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1430-6	Jan. 06, 12'	Jan. 05, 13'

2.2. Block Diagram of Test Setup



2.3. Powerline Conducted Emission Limit (§15.207)

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark1.: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2.: The lower limit applies at the band edges.

2.4. Operating Condition of EUT

- 2.4.1. Setup the **EUT (Surge Protective Devices)** as shown on 2.2.
- 2.4.2. Turn on the power of all equipment.
- 2.4.3. The **EUT (Surge Protective Devices)** was on transmitting function at work during all testing.

2.5. Test Procedure

The EUT (link to bulbs load) was put on table which was above the ground by 80cm and it's power cord was connected to power mains through an Artificial Mains Network (A.M.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.) Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions simulators of the interface cables should be manipulated according to ANSI C63.4-2003 during conducted measurement.

The bandwidth of the R & S Test Receiver ESCS 30 was set at 9kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. (Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

2.6. Powerline Conducted Emission Measurement Results

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

The EUT was measured during this section testing and all the test results are listed in next pages.

EUT : Surge Protective Devices Model No. : R9P136A600

Test Date : Jul. 03, 2012 Temperature : 25 Humidity : 55%

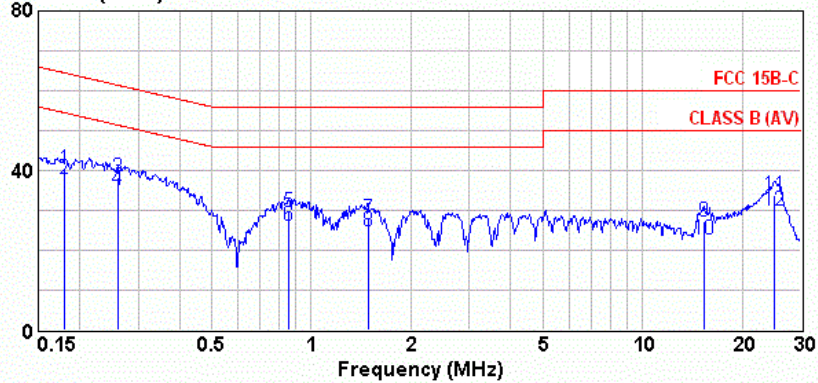
The details are as follows :

Mode	Reference Test Data	
	Neutral	Line
1.	# 2	# 1



AUDIX Technology Corp. EMC Department
 No.53-11, Dingfu, Linkou Dist., New Taipei
 City 244, Taiwan R.O.C.
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:emc@audixtech.com

Data: 2 File: D:\TEST-DATA\REPORT\2012\1C1M1206XXX\1C1M1206243-C-D.EMI Date: 2012-07-03



Site : NO.4 Shielded Room Data : 2
 Condition : ESH2-Z5 Phase : NEUTRAL
 Limit : FCC 15B-C
 Env. / Ins. : 25°C/55% ESCS 30 (339) Engineer: Fate
 EUT : RPP136A600
 Power Rating : 120Vac / 60Hz
 Test Mode : OPERATING

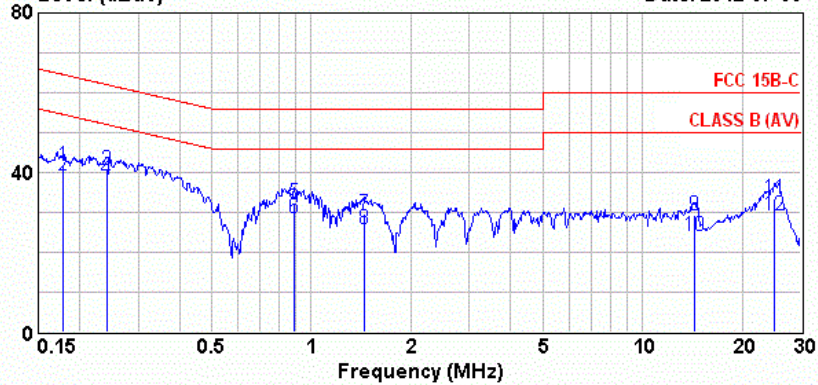
	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.180	0.23	0.25	40.00	40.48	64.50	24.03	QP
2	0.180	0.23	0.25	37.43	37.91	54.50	16.60	AVERAGE
3	0.262	0.24	0.28	37.76	38.28	61.38	23.09	QP
4	0.262	0.24	0.28	34.65	35.17	51.38	16.20	AVERAGE
5	0.853	0.29	0.39	28.84	29.52	56.00	26.48	QP
6	0.853	0.29	0.39	25.62	26.30	46.00	19.70	AVERAGE
7	1.487	0.36	0.40	27.10	27.86	56.00	28.14	QP
8	1.487	0.36	0.40	24.06	24.82	46.00	21.18	AVERAGE
9	15.307	0.81	0.70	25.71	27.22	60.00	32.78	QP
10	15.307	0.81	0.70	21.37	22.88	50.00	27.12	AVERAGE
11	24.922	1.00	0.70	32.11	33.81	60.00	26.19	QP
12	24.922	1.00	0.70	28.48	30.18	50.00	19.82	AVERAGE

Remarks: 1.Emission Level= AMN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



AUDIX Technology Corp. EMC Department
 No.53-11, Dingfu, Linkou Dist., New Taipei
 City 244, Taiwan R.O.C.
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:emc@audixtech.com

Data: 1 File: D:\TEST-DATA\REPORT\2012\1C1M1206XXX\1C1M1206243-C-D.EMI Date: 2012-07-03



Site : NO.4 Shielded Room Data : 1
 Condition : ESH2-Z5 Phase : LINE
 Limit : FCC 15B-C
 Env. / Ins. : 25°C/55% ESCS 30 (339) Engineer: Fate
 EUT : RPP136A600
 Power Rating : 120Vac / 60Hz
 Test Mode : OPERATING

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.179	0.23	0.25	41.29	41.77	64.55	22.78	QP
2	0.179	0.23	0.25	38.70	39.18	54.55	15.37	AVERAGE
3	0.243	0.24	0.28	40.18	40.70	62.00	21.30	QP
4	0.243	0.24	0.28	37.63	38.15	52.00	13.85	AVERAGE
5	0.885	0.29	0.39	31.69	32.37	56.00	23.63	QP
6	0.885	0.29	0.39	28.04	28.72	46.00	17.28	AVERAGE
7	1.441	0.35	0.40	28.86	29.61	56.00	26.39	QP
8	1.441	0.35	0.40	25.19	25.94	46.00	20.06	AVERAGE
9	14.364	0.78	0.70	27.77	29.25	60.00	30.75	QP
10	14.364	0.78	0.70	22.59	24.07	50.00	25.93	AVERAGE
11	24.922	1.00	0.70	31.72	33.42	60.00	26.58	QP
12	24.922	1.00	0.70	27.67	29.37	50.00	20.63	AVERAGE

Remarks: 1.Emission Level= AMN Factor + Cable Loss + Reading.
 2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipment was used during the radiated emission measurement:

3.1.1. For Frequency Range 30MHz~1000MHz (at Semi-Anechoic Chamber)

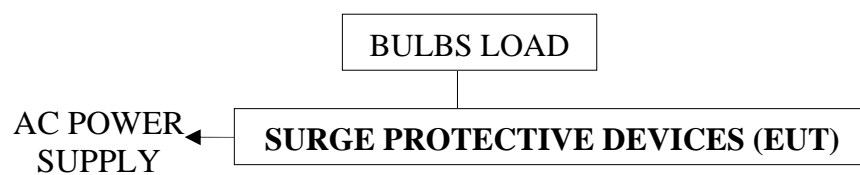
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 04, 11'	Aug. 03, 12'
2.	Test Receiver	R & S	ESCS30	100265	Aug. 25, 11'	Aug. 24, 12'
3.	Pre-Amplifier	HP	8447D	2944A06305	Feb. 13, 12'	Feb. 11, 13'
4.	Biconical Antenna	CHASE	VBA6106A	1264	Mar. 03, 12'	Mar. 02, 13'
5.	Log Periodic Antenna	Schwarzbeck	UHALP91 08-A	0810	Mar. 03, 12'	Mar. 02, 13'

3.1.2. For Frequency Above 1GHz (at Semi-Anechoic Chamber)

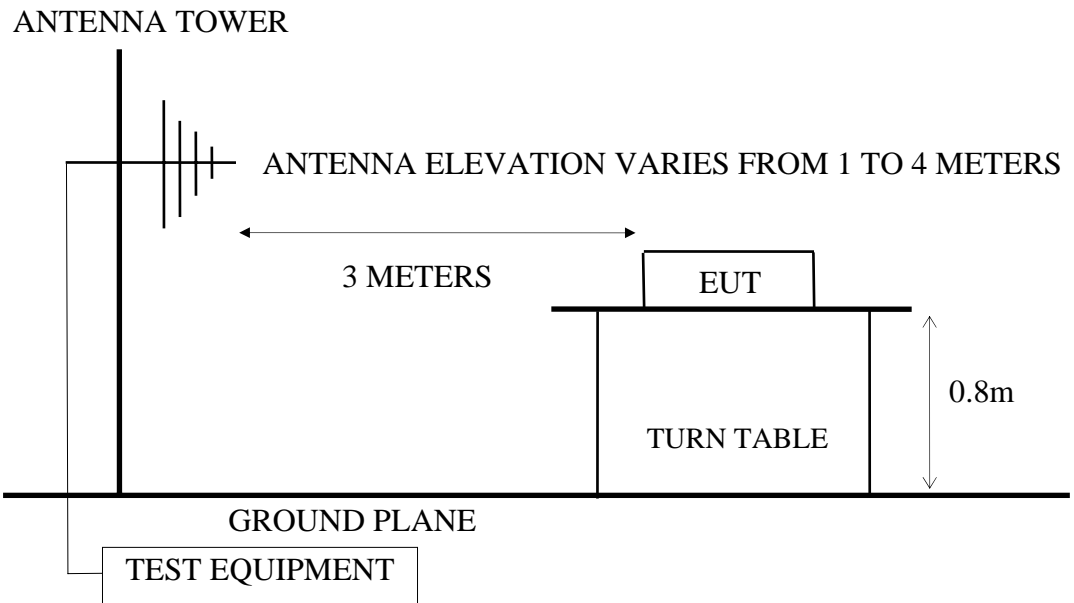
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 04, 11'	Aug. 03, 12'
2.	Pre-Amplifier	HP	8449B	3008A00529	Dec. 09, 11'	Dec. 08, 12'
3.	Horn Antenna	ETS-Lindgren	3115	00114104	Mar. 27, 12'	Mar. 26, 13'

3.2. Block Diagram of Test Setup

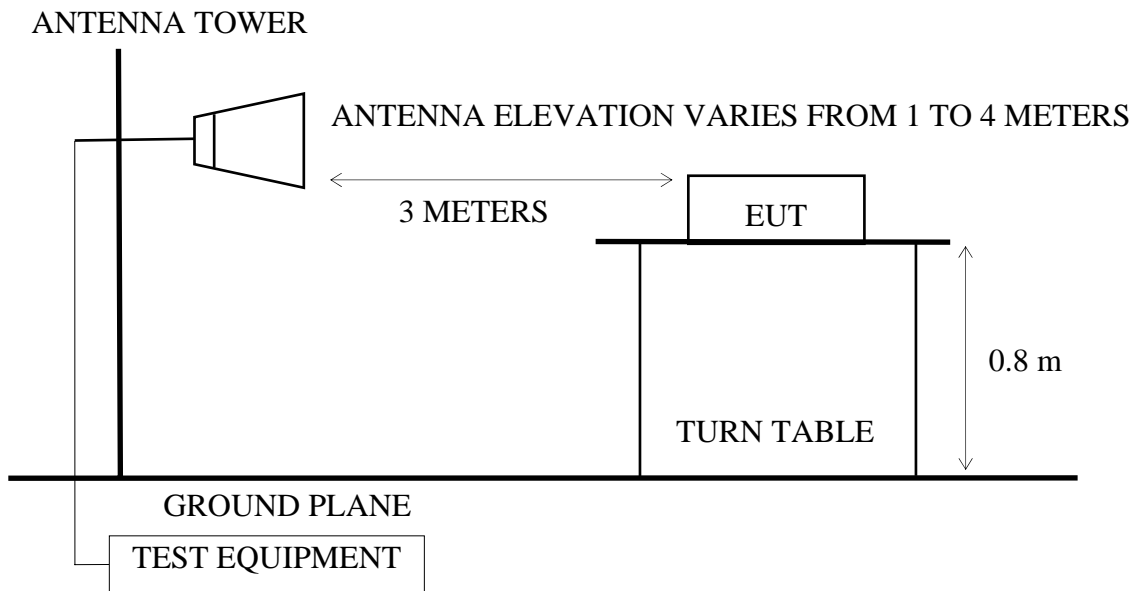
3.2.1. Block Diagram of connection between EUT and simulators



3.2.2. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000MHz



3.2.3. Semi-Anechoic Chamber (3m) Setup Diagram for above 1GHz



3.3. Radiated Emission Limits (§15.209)

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

Remark : (1) Emission level ($\text{dB}\mu\text{V/m}$) = $20 \log$ Emission level ($\mu\text{V/m}$)

(2) The tighter limit applies at the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).

(5) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).

3.4. Fundamental Frequency Limits [§15.249(a)]

FUNDAMENTAL FREQUENCY MHZ	LIMITS
2400-2485	114 $\text{dB}\mu\text{V/m}$ (Peak)
	94 $\text{dB}\mu\text{V/m}$ (Average)

3.5. Operating Condition of EUT

3.5.1. Setup the **EUT (Surge Protective Devices)** as shown on 3.2.

3.5.2. Turn on the power of all equipment.

3.5.3. The EUT was set to continuously transmit signals at 2405Hz, 2450MHz and 2480MHz during testing.

3.6. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set to 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antennas such as calibrated biconical and log-periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003 regulation.

The bandwidth of the R & S Test Receiver ESCS 30 was set at 120kHz.
(For 30MHz to 1000MHz)

The resolution bandwidth and video bandwidth of test spectrum analyzer is 1MHz for peak detection (PK) at frequency above 1GHz.

The frequency range from 30MHz to 25GHz (Up to 10th harmonics from fundamental frequency) was checked.

Above 1GHz was measured with peak and average detector. For frequency from 2.68GHz to 25GHz, we checked it in 1 meter distance and with a shorter cable 2 meter instead of original's. There is no signal exist

3.7. Radiated Emission Measurement Test Results

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

EUT : Surge Protective Devices Model No. : R9P136A600

Test Date : Jul. 03, 2012 Temperature : 25 Humidity : 59%

For Frequency Range 30MHz~1000MHz:

The EUT was measured during this section testing and all the test results are listed in section 3.7.1.

Mode	Channel	Frequency	Test Mode	Reference Test Data	
				Horizontal	Vertical
1.	11	2405MHz	Transmit	# 1	# 2
2.	20	2450MHz		# 1	# 2
3.	26	2480MHz		# 2	# 1

* Above all final readings were measured with Quasi-Peak detector.

For Frequency above 1GHz:

Mode	Chnnel	Frequency	Test Mode	Test Frequency Range
1.	11	2405MHz	Transmit	1000-2680MHz
2.				2680-4000MHz
3.				4000-5500MHz
4.				5500-7500MHz
5.				7500-18000MHz
6.				18000-25000MHz
7.	20	2450MHz	Transmit	1000-2680MHz
8.				2680-4000MHz
9.				4000-5500MHz
10.				5500-7500MHz
11.				7500-18000MHz
12.				18000-25000MHz
13.	26	2480MHz	Transmit	1000-2680MHz
14.				2680-4000MHz
15.				4000-5500MHz
16.				5500-7500MHz
17.				7500-18000MHz
18.				18000-25000MHz

- Note: 1. Above all final readings were measured with Peak and Average detector.
2. The emissions (up to 25GHz) not reported are too low to be measured.

For Restricted Bands:

The EUT was tested in restricted bands and all the test results are listed in section 3.7.2. (The restricted bands defined in part 15.205(a))

Mode	Channel	Frequency	Test Mode	Reference Test Data	
				Horizontal	Vertical
1.	11	2405MHz	Transmit	# 10	# 9
2.	26	2480MHz		# 3	# 4

For Fundamental Frequency:

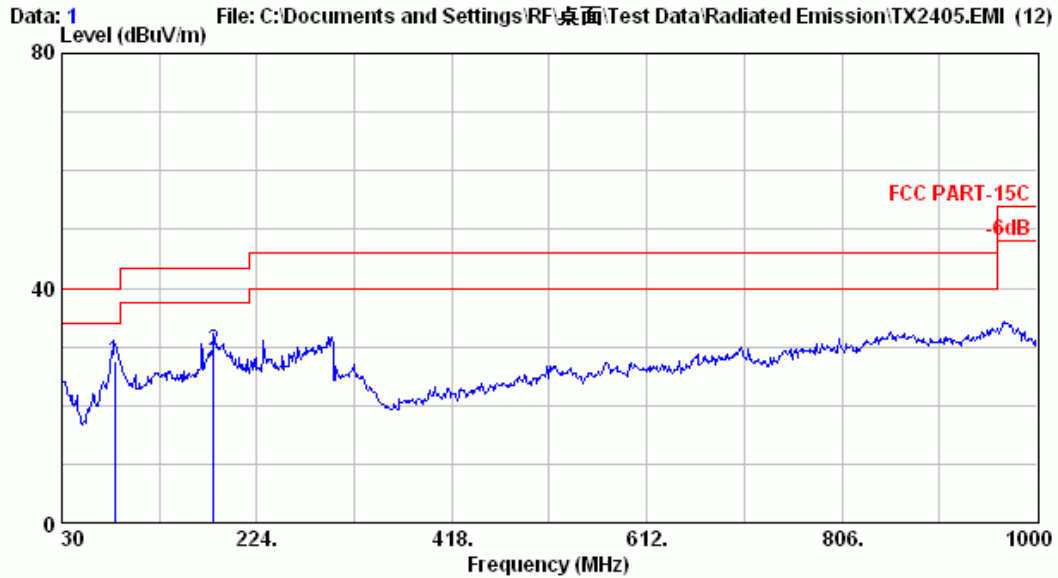
The EUT was measured during this section testing and all the test results are listed in section 3.7.3.

Mode	Channel	Frequency	Test Mode	Reference Test Data
1.	11	2405MHz	Transmit	# 8
2.	20	2450MHz		# 6
3.	26	2480MHz		# 2

3.7.1. Frequency Range 30-1000MHz



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw



Site no. : A/C Chamber Data no. : 1
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2405 MHz (Radiated Emission)

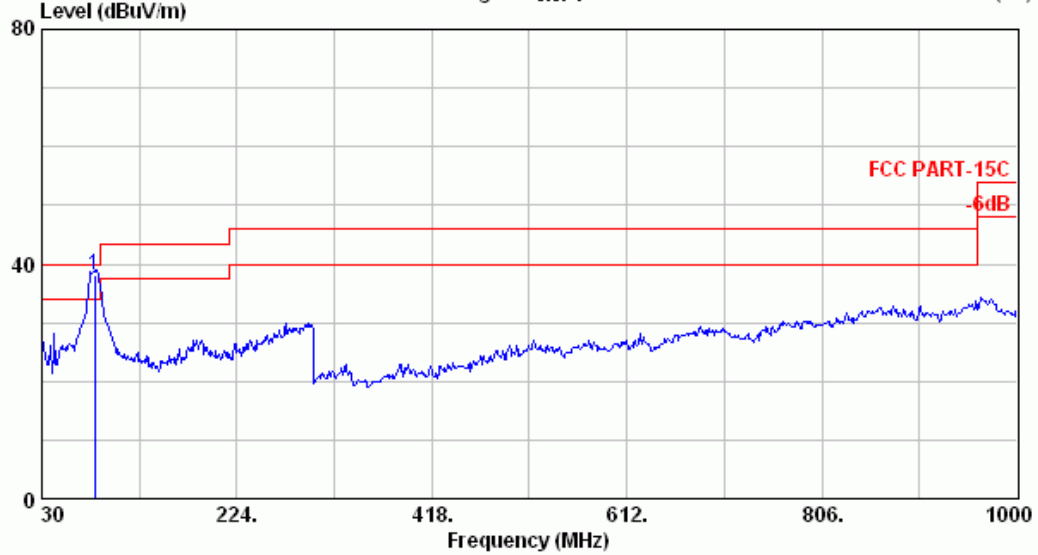
	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	14.19	1.90	11.49	27.58	40.00	12.42	QP
2	21.32	2.90	5.07	29.29	43.50	14.21	QP

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



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw

Data: 2 File: C:\Documents and Settings\RF桌面\Test Data\Radiated Emission\TX2405.EMI (12)



Site no. : A/C Chamber Data no. : 2
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2405 MHz (Radiated Emission)

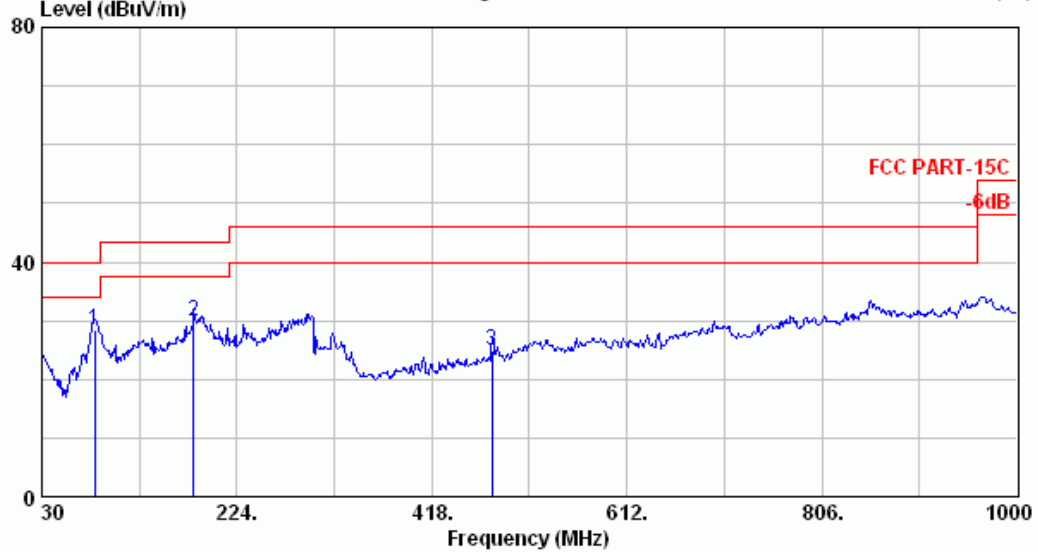
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark	
-----	1	82.380	14.19	1.90	21.88	37.97	40.00	2.03	QP

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



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw

Data: 1 File: C:\Documents and Settings\RF桌面\Test Data\Radiated Emission\TX2450.EMI (12)



Site no. : A/C Chamber Data no. : 1
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2450MHz (Radiated Emission)

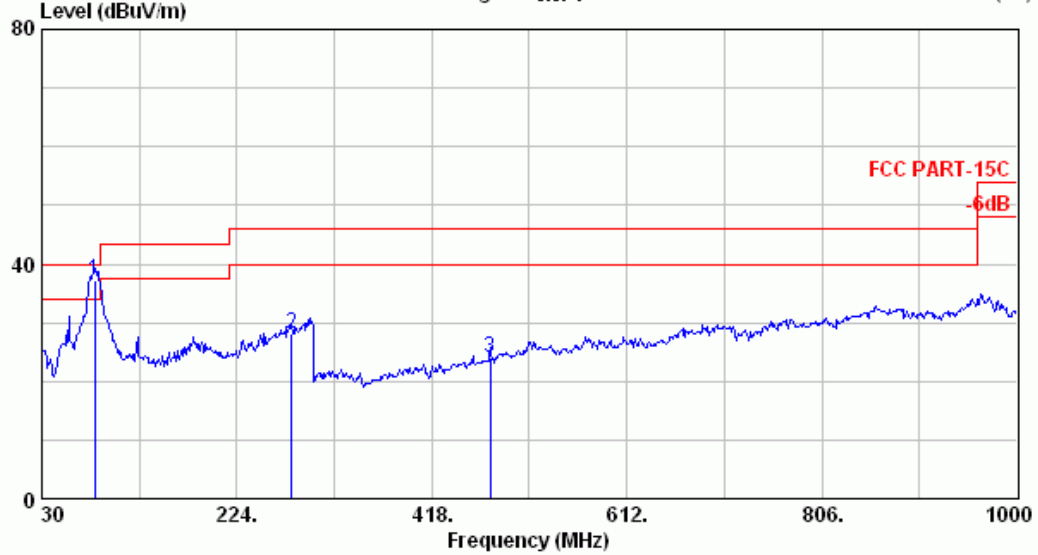
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	82.380	14.19	1.90	12.24	28.33	40.00	11.67	QP
2	181.320	21.32	2.90	5.66	29.88	43.50	13.62	QP
3	478.140	18.61	6.00	0.27	24.88	46.00	21.12	QP

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



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw

Data: 2 File: C:\Documents and Settings\RF桌面\Test Data\Radiated Emission\TX2450.EMI (12)



Site no. : A/C Chamber Data no. : 2
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2450MHz (Radiated Emission)

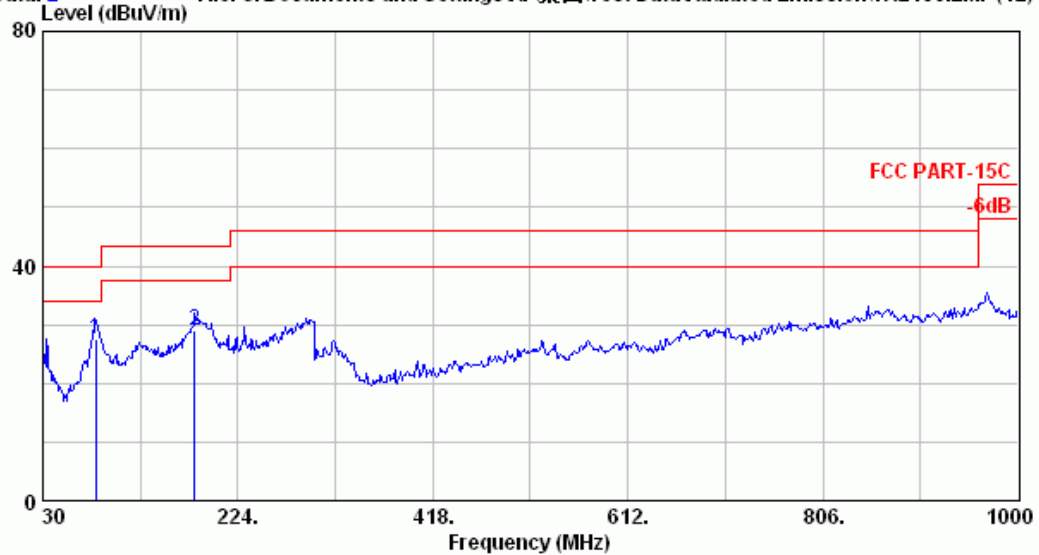
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	82.380	14.19	1.90	21.22	37.31	40.00	2.69	QP
2	278.320	25.25	3.80	-1.05	28.00	46.00	18.00	QP
3	476.200	18.55	6.00	-0.62	23.93	46.00	22.07	QP

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



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw

Data: 2 File: C:\Documents and Settings\RF\桌面\Test Data\Radiated Emission\TX2480.EMI (12)



Site no. : A/C Chamber Data no. : 2
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2480 MHz (Radiated Emission)

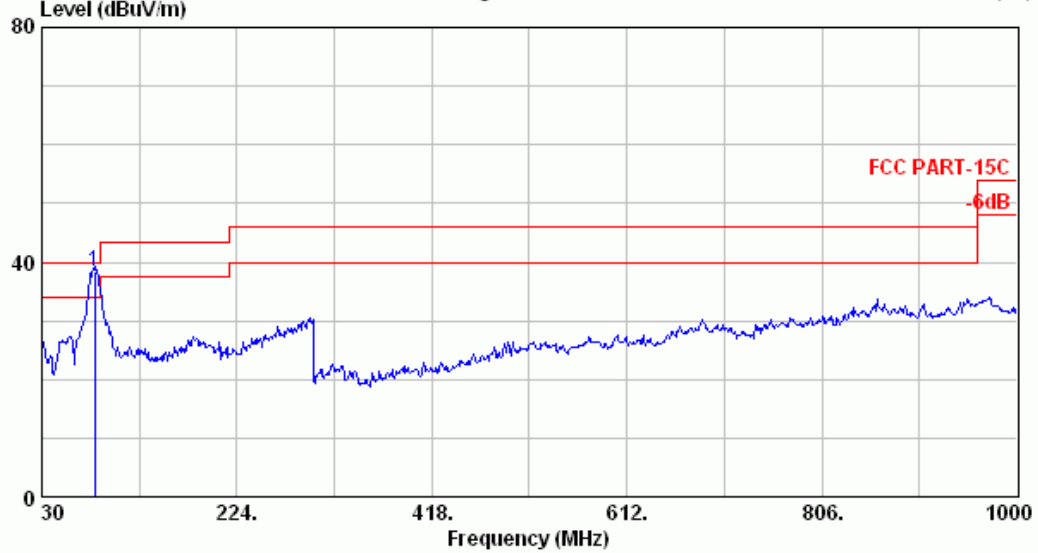
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	82.380	14.19	1.90	11.59	27.68	40.00	12.32	QP
2	181.320	21.32	2.90	4.73	28.95	43.50	14.55	QP

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



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw

Data: 1 File: C:\Documents and Settings\RF桌面\Test Data\Radiated Emission\TX2480.EMI (12)



Site no. : A/C Chamber Data no. : 1
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2480 MHz (Radiated Emission)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark	
-----	1	82.380	14.19	1.90	22.25	38.34	40.00	1.66	QP

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

3.7.2. Restricted Bands Measurement Results

Date of Test : Jul. 03, 2012 Temperature : 25
 EUT : Surge Protective Devices Humidity : 59%
 Test Mode : Transmit, Channel: 11, Frequency: 2405MHz

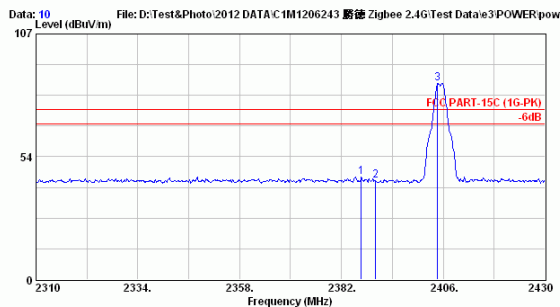
	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Peak *	2386.68	27.91	6.33	10.60	44.85	74.00	29.15

	Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average *	2386.68	44.85	-27.41	17.44	54.00	36.56

- Remark :
1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2430MHz).
 3. "*" The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.
 4. Duty Cycle Correction Factor = $20\log$ (cumulative on/T) = $20\log(0.885\text{ms}/20.785\text{ms})=-27.41$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 5. The pre-amplifier factor has been subtracted by test program actively.



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-Fu Tsun, Lin-Kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code 24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:temc@temc.com.tw



Site no. : A/C Chamber Data no. : 10
 Dis. / Ant. : 3m 3115 (4104) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2405 MHz (Restricted Band)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2386.680	27.91	6.33	10.60	44.85	74.00	29.15	Peak
2	2390.040	27.91	6.34	8.84	43.09	74.00	30.91	Peak
3	2404.680	27.93	6.36	51.21	85.50	74.00	-11.50	Peak @

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

Date of Test : Jul. 03, 2012 Temperature : 25
 EUT : Surge Protective Devices Humidity : 59%
 Test Mode : Transmit, Channel: 11, Frequency: 2405MHz

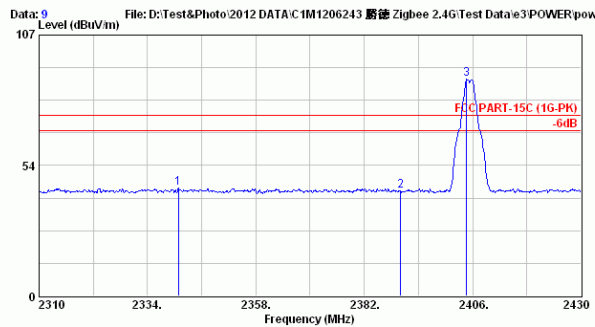
	Emission Frequency	Antenna Factor	Cable Loss	Meter Reading Vertical	Emission Level Horizontal	Limits	Margin
	(MHz)	(dB/m)	(dB)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
Peak *	2340.84	27.87	6.28	10.05	44.20	74.00	29.80

	Emission Frequency	Peak Value	Duty Cycle Correction Factor	Average Value	Limit	Margin
	(MHz)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Average *	2340.00	44.20	-27.41	16.79	54.00	37.21

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2430MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.
 4. Duty Cycle Correction Factor = $20\log$ (cumulative on/T) = $20\log(0.885\text{ms}/20.785\text{ms})=-27.41$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 5. The pre-amplifier factor has been subtracted by test program actively.



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-Fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099203
 Email:ttmc@ttmc.com.tw



Site no. : A/C Chamber Data no. : 9
 Dis. / Ant. : 3m 3115(4104) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-PR)
 Env. / Ins. : E4446A 25°C/59% Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2405 MHz (Restricted Band)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2340.840	27.87	6.28	10.05	44.20	74.00	29.80	Peak
2	2390.040	27.91	6.34	8.67	42.92	74.00	31.08	Peak
3	2404.680	27.93	6.36	54.55	88.84	74.00	-14.84	Peak

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

Date of Test : Jul. 03, 2012 Temperature : 25
 EUT : Surge Protective Devices Humidity : 59%
 Test Mode : Transmit, Channel: 25, Frequency: 2480MHz

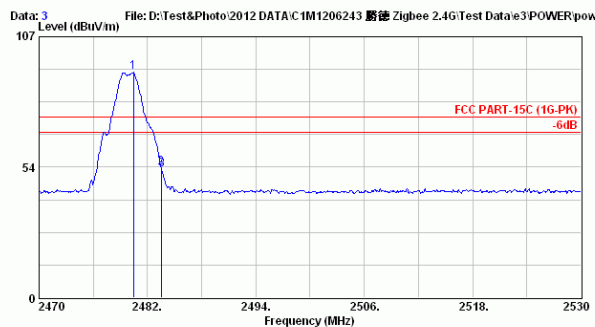
	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Peak *	2483.500	27.99	6.45	18.85	53.29	74.00	20.71

	Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average *	2483.50	53.29	-27.41	25.88	54.00	28.12

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2470-2530MHz).
 3. "*" The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.
 4. Duty Cycle Correction Factor = $20\log$ (cumulative on/T) = $20\log(0.885\text{ms}/20.785\text{ms})=-27.41$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 5. The pre-amplifier factor has been subtracted by test program actively.



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-Fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code 24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:itenc@ttenc.com.tw



Site no. : A/C Chamber Data no. : 3
 Dis. / Ant. : 3m 3115 (4104) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2480 MHz (Restricted Band)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.440	27.99	6.44	57.90	92.33	74.00	-18.33	Peak
2	2483.500	27.99	6.45	18.85	53.29	74.00	20.71	Peak
3	2483.560	27.99	6.45	17.99	52.43	74.00	21.57	Peak

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

Date of Test : Jul. 03, 2012 Temperature : 25
 EUT : Surge Protective Devices Humidity : 59%
 Test Mode : Transmit, Channel: 25, Frequency: 2480MHz

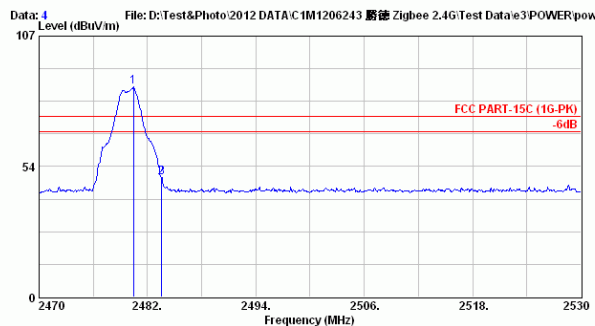
	Emission Frequency	Antenna Factor	Cable Loss	Meter Reading Vertical	Emission Level Horizontal	Limits	Margin
	(MHz)	(dB/m)	(dB)	(dBμV)	(dBμV/m)	(dBμV/m)	(dB)
Peak *	2483.500	27.99	6.45	14.71	49.15	74.00	24.85

	Emission Frequency	Peak Value	Duty Cycle Correction Factor	Average Value	Limit	Margin
	(MHz)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Average *	2483.50	49.15	-27.41	21.74	54.00	32.26

- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2470-2530MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.
 4. Duty Cycle Correction Factor = $20\log$ (cumulative on/T) = $20\log(0.885\text{ms}/20.785\text{ms})=-27.41$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 5. The pre-amplifier factor has been subtracted by test program actively.



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099203
 Email:ttenc@ttenc.com.tw



Site no. : A/C Chamber Data no. : 4
 Dis. / Ant. : 3m 3115 (4104) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : B4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2480 MHz (Restricted Band)

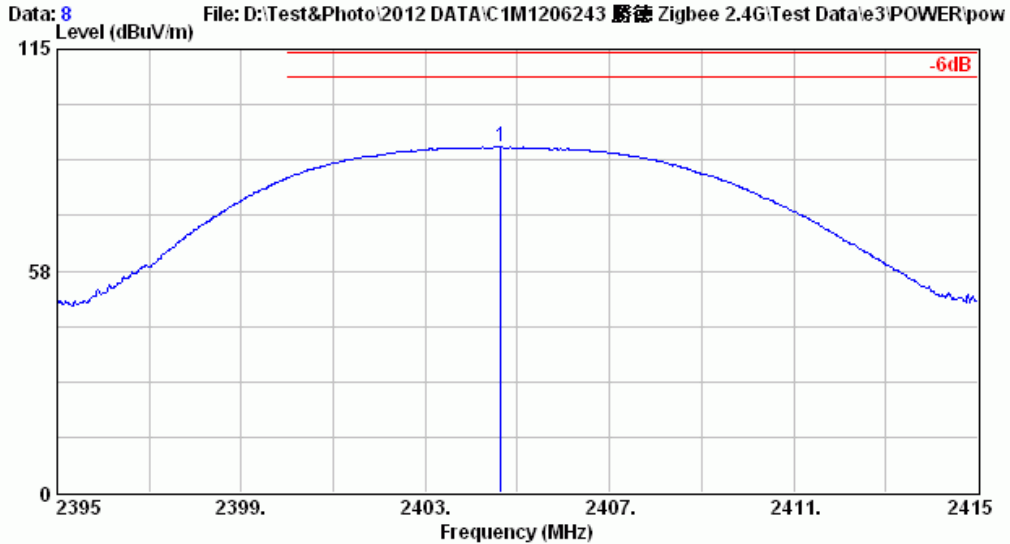
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.440	27.99	6.44	51.70	86.13	74.00	-12.13	Peak
2	2483.500	27.99	6.45	14.71	49.15	74.00	24.85	Peak
3	2483.560	27.99	6.45	14.56	49.00	74.00	25.00	Peak

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

3.7.3. Fundamental Frequency



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw



Site no. : A/C Chamber Data no. : 8
 Dis. / Ant. : 3m 3115(4104) Ant. pol. : VERTICAL
 Limit : FCC 15.249-PK
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2405 MHz (Peak Output Power)

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1 2404.640	27.93	6.36	55.32	89.61	114.00	24.39	Peak

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

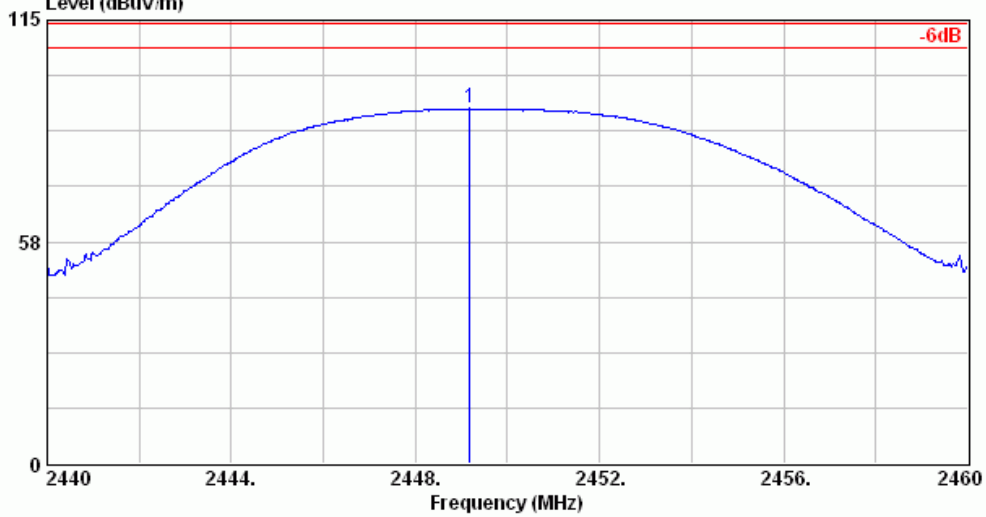
Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2405.00	89.61	-27.41	62.20	94.00	31.80

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/T) = 20\log(0.885\text{ms}/20.785\text{ms}) = -27.41$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor
 3. All final readings of measurement were with Average values.
 4. Vertical is the worst polarization, thus we don't list horizontal result.



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw

Data: 6 File: D:\Test&Photo\2012 DATA\C1M1206243 聯德 Zigbee 2.4G\Test Data\3\POWER\pow



Site no. : A/C Chamber Data no. : 6
 Dis. / Ant. : 3m 3115(4104) Ant. pol. : HORIZONTAL
 Limit : FCC 15.249-PK
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2450 MHz (Peak Output Power)

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1 2449.180	27.97	6.41	57.67	92.05	114.00	21.95	Peak

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

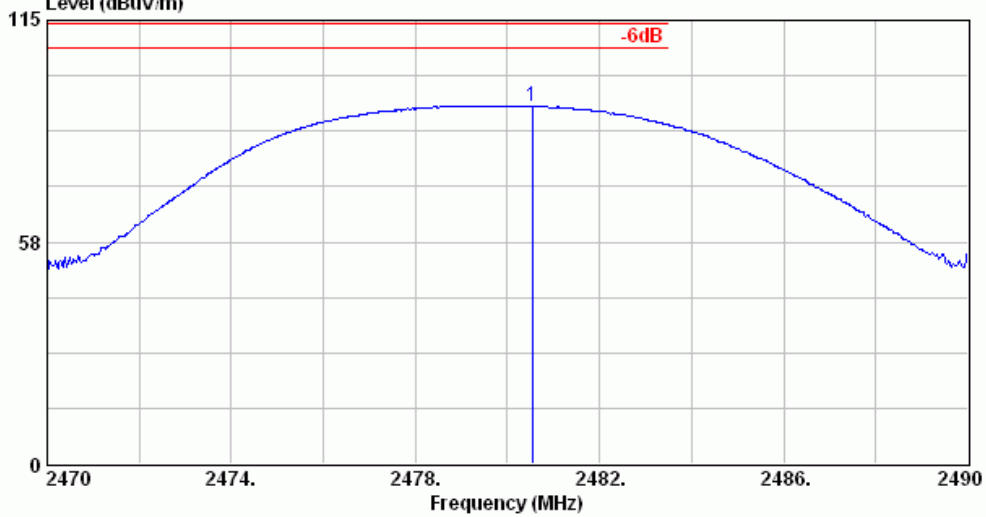
Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2450.00	92.05	-27.41	64.64	94.00	29.36

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/T) = 20\log(0.885\text{ms}/20.785\text{ms}) = -27.41$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor
 3. All final readings of measurement were with Average values.
 4. Horizontal is the worst polarization, thus we don't list vertical result.



AUDIX TECHNOLOGY Corp. EMC Laboratory
 No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
 County, Taiwan R.O.C. Post Code:24443
 Tel:+886-2-26092133 Fax:+886-2-26099303
 Email:ttemc@ttemc.com.tw

Data: 2 File: D:\Test&Photo\2012 DATA\C1M1206243 聯德 Zigbee 2.4G\Test Data\3POWER.pov



Site no. : A/C Chamber Data no. : 2
 Dis. / Ant. : 3m 3115(4104) Ant. pol. : HORIZONTAL
 Limit : FCC 15.249-PK
 Env. / Ins. : E4446A 25°C/59% □Vic Fong
 EUT : R9P136A600
 Power Rating : AC120V/60Hz
 Test Mode : TX2480 MHz (Peak Output Power)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2480.540	27.99	6.44	58.42	92.85	114.00	21.15	Peak

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

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2480.00	92.85	-27.40	65.45	94.00	28.55

Remarks: 1. Duty Cycle Correction Factor = $20\log(\text{cumulative on}/T) = 20\log(0.885\text{ms}/20.785\text{ms}) = -27.41$
 "T" means the period of the pulse train or 100ms if the pulse train length is greater than 100ms
 2. Average value=Peak value+ Duty Cycle Correction Factor
 3. All final readings of measurement were with Average values.
 4. Horizontal is the worst polarization, thus we don't list vertical result.

4. DUTY CYCLE FACTOR

4.1. Test Equipment

The following test equipment was used during the duty cycle factor measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9010A-507	MY49061167	Oct. 20, 11'	Oct. 19, 12'

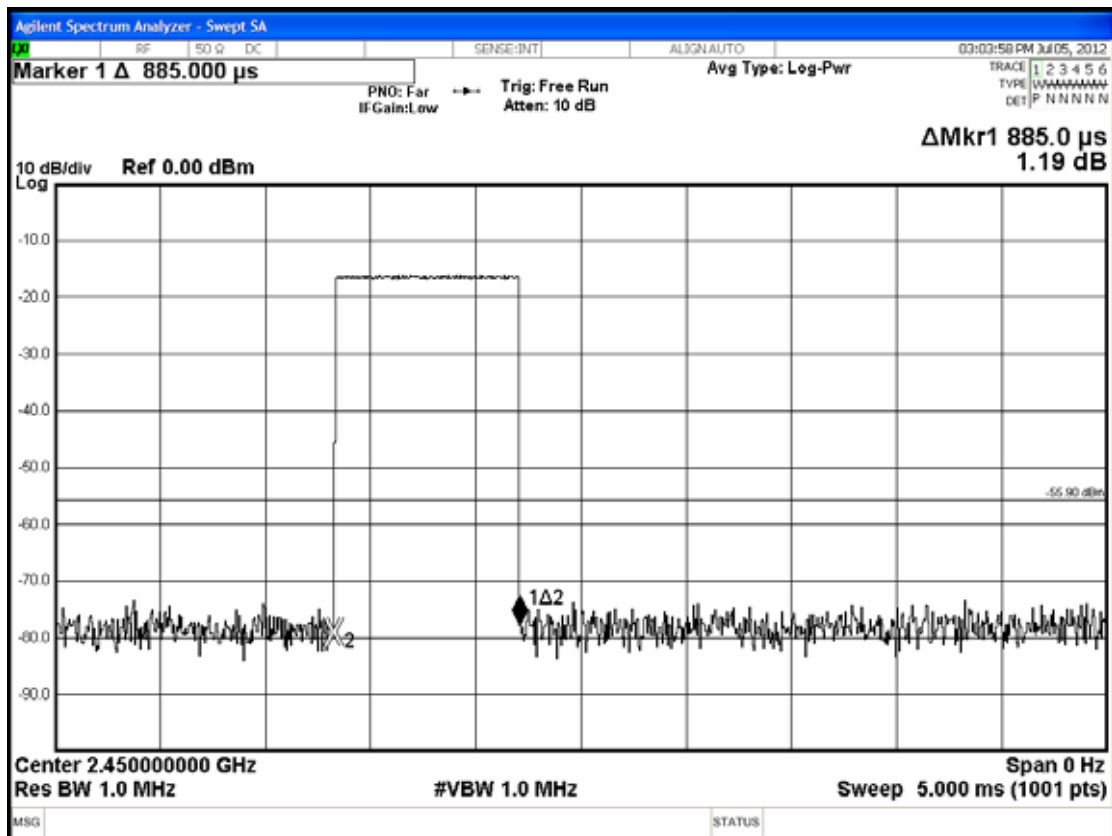
4.2. Block Diagram of Test Setup

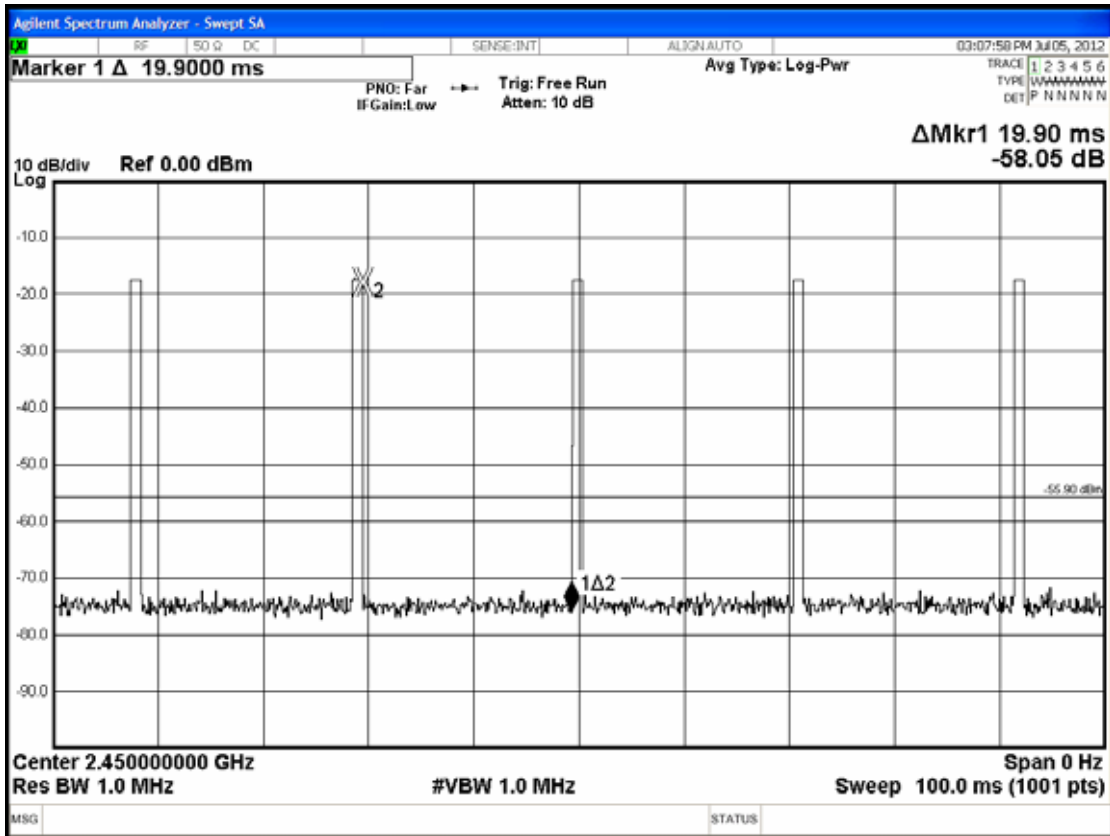


4.3. Test Results

PASSED. All the test results are attached in next pages.

Test Date: Jul. 05, 2012 Temperature : 25 Humidity : 59 %





$$T_{on} = 0.885\text{ms}$$

$$T_{on} + T_{off} = 0.885\text{ms} + 19.90\text{ms} = 20.785\text{ms}$$

5. DEVIATION TO TEST SPECIFICATIONS

【NONE】

6. PHOTOGRAPHS

6.1. Photos of Powerline Conducted Emission Measurement



FRONT VIEW OF CONDUCTED MEASUREMENT



BACK VIEW OF CONDUCTED MEASUREMENT

6.2. Photos of Radiated Emission Measurement at Semi-Anechoic Chamber

6.2.1. For Frequency Range 30MHz~1GHz



6.2.2. For Frequency Above 1GHz

