

# FCC PART 15.109

## MEASUREMENT AND TEST REPORT

### FOR

**Guangzhou Aolong Electronic Technology Co., Ltd.**

**No2, Hualian Industry District, No.3 Economic Zone, Lianbian Village, Xinshi**

**Town, Baiyun District, Guangzhou, China**

**FCC ID: UZMKB2188EM**

<b>Report Concerns:</b> Original Report	<b>Equipment Type:</b> Computer Keyboard
<b>Model:</b>	<u>2188E</u>
<b>Report No.:</b>	<u>STR09038057I</u>
<b>Test/Witness Engineer:</b>	<u>Seven Song</u>
<b>Test Date:</b>	<u>2009-03-11 to 2009-03-13</u>
<b>Issue Date:</b>	<u>2009-03-14</u>
<b>Prepared By:</b>	<b>SEM.Test Compliance Service Co., Ltd.</b> 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C. (518101)
<b>Approved &amp; Authorized By:</b>	 _____ Jandy So / PSQ Manager

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Guangzhou Aolong Electronic Technology Co., Ltd.  
Address of applicant: No2, Hualian Industry District, No.3 Economic Zone,  
Lianbian Village, Xinshi Town, Baiyun District, Guangzhou,  
China

Manufacturer: Guangzhou Aolong Electronic Technology Co., Ltd.  
Address of manufacturer: No2, Hualian Industry District, No.3 Economic Zone,  
Lianbian Village, Xinshi Town, Baiyun District, Guangzhou,  
China

#### General Description of E.U.T

Items	Description
EUT Description:	Computer Keyboard
Trade Name:	Aisonic
Model No.:	2188E
Adding Model:	2188EM
Rated Voltage:	USB 5V
Packaging Size:	30.2X15.5X1.4 cm
For more information refer to the circuit diagram form and the user's manual.	

*The test data is gathered from a production sample, provided by the manufacturer. The other model listed in the report has different appearance only of 2188E without circuit and electronic construction changed, declared by the manufacturer*

### 1.2 Test Standards

The following report is prepared on behalf of the Guangzhou Aolong Electronic Technology Co., Ltd. in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15.107, and 15.109 rules.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

### 1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

## 1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible susceptibility against the tested phenomena. The test modes were adapted accordingly in reference to the Operating Instructions.

## 1.5 Test Facility

FCC – Registration No.: **994117**

SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

Industry Canada (IC) Registration No.: **7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

## 1.6 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the system components. The test software, provided by the customer, is started while the EUT is on to simulate the normal work. under the Windows XP terminal.

## 1.7 Accessories Equipment List and Details

Manufacturer	Description	Model	Serial Number
IBM	Notebook	T22	LV14893
TP-LINK	Modem	TM-EC5658V	KT99CTQC-508
Lenovo	Printer	3110	OD65133711480

## 1.8 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.24	Unshielded	Without Core

2. SUMMARY OF TEST RESULTS

Description of Test	Result
§15.107 (a) Conducted Emission	Compliant
§15.109(a) Radiated Emission	Compliant

### 3. §15.107 (a)- CONDUCTED EMISSION

### 3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is  $\pm 1.5$  dB.

### 3.2 Test Equipment List and Details

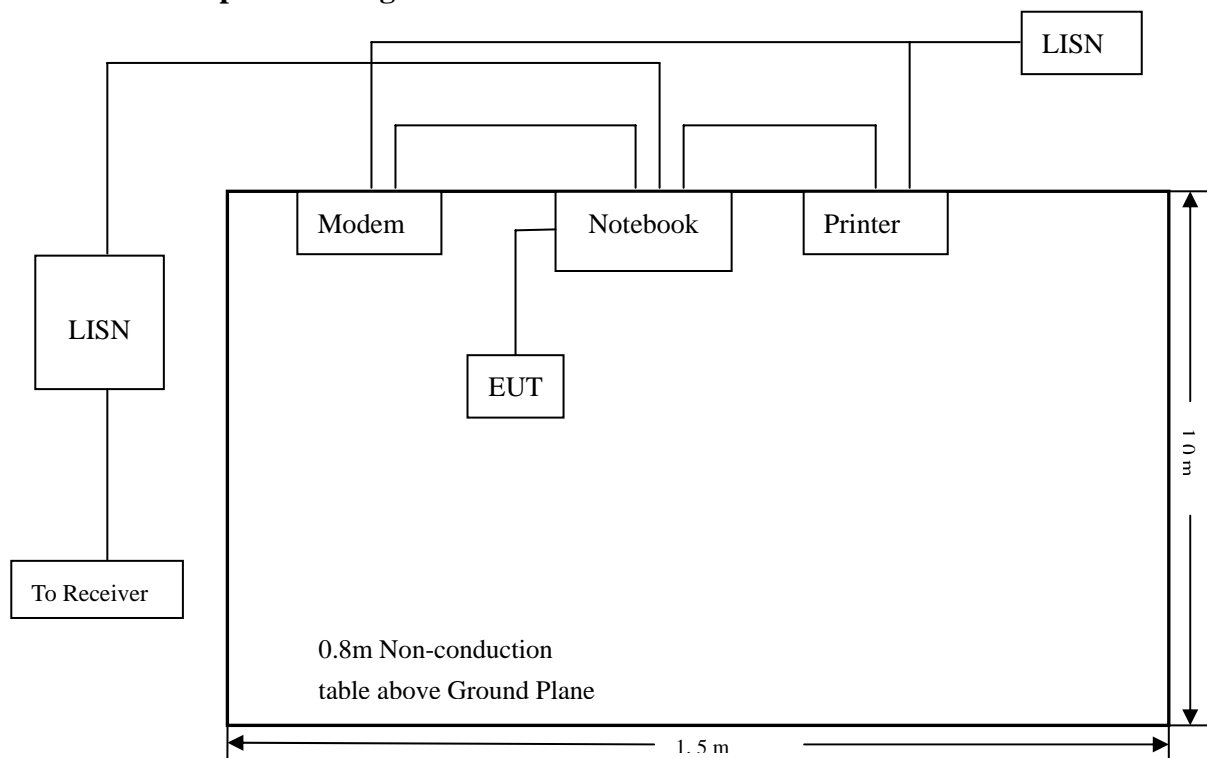
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2008-07-08	2009-07-07
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2008-07-08	2009-07-07
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2008-07-08	2009-07-07
AMN	Rohde & Schwarz	ESH3-Z5	828304/014	2008-07-08	2009-07-07

### 3.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.107 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

### 3.4 Basic Test Setup Block Diagram



### 3.5 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

### 3.6 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency ..... 150 kHz  
 Stop Frequency..... 30 MHz  
 Sweep Speed ..... Auto  
 IF Bandwidth..... 10 kHz  
 Quasi-Peak Adapter Bandwidth ..... 9 kHz  
 Quasi-Peak Adapter Mode ..... Normal

### 3.7 Summary of Test Results/Plots

According to the data in section 3.8, the EUT complied with the FCC 15B Conducted margin for a Class B device, with the *worst* margin reading of:

**-9.67 dB $\mu$ V at 0.210 MHz in the Neutral, Peak detector, 0.15-30MHz**

### 3.7 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15.107	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dB $\mu$ V	QP/Ave/Pk	Line/Neutral	dB $\mu$ V	dB
0.210	53.44	Pk	Neutral	63.11	-9.67
0.210	42.57	Ave	Neutral	53.20	-10.63
0.174	53.30	Pk	Line	64.76	-11.46
4.090	33.69	Ave	Line	45.99	-12.30
0.634	32.98	Ave	Neutral	45.99	-13.01
0.282	37.38	Ave	Line	50.75	-13.37
4.798	32.13	Ave	Neutral	46.00	-13.87
0.634	31.80	Ave	Line	46.00	-14.20
1.342	29.27	Ave	Neutral	45.99	-16.72
0.986	29.26	Ave	Line	45.99	-16.73
7.122	32.81	Ave	Line	49.99	-17.18
7.902	32.45	Ave	Neutral	49.99	-17.54
3.594	38.05	Pk	Line	55.99	-17.94
4.658	37.57	Pk	Neutral	55.99	-18.42
0.390	39.31	Pk	Line	58.05	-18.74

*Emission attenuated more than 20dB of the limit is not reported.*

Plot of Conducted Emissions Test Data

Conducted Disturbance

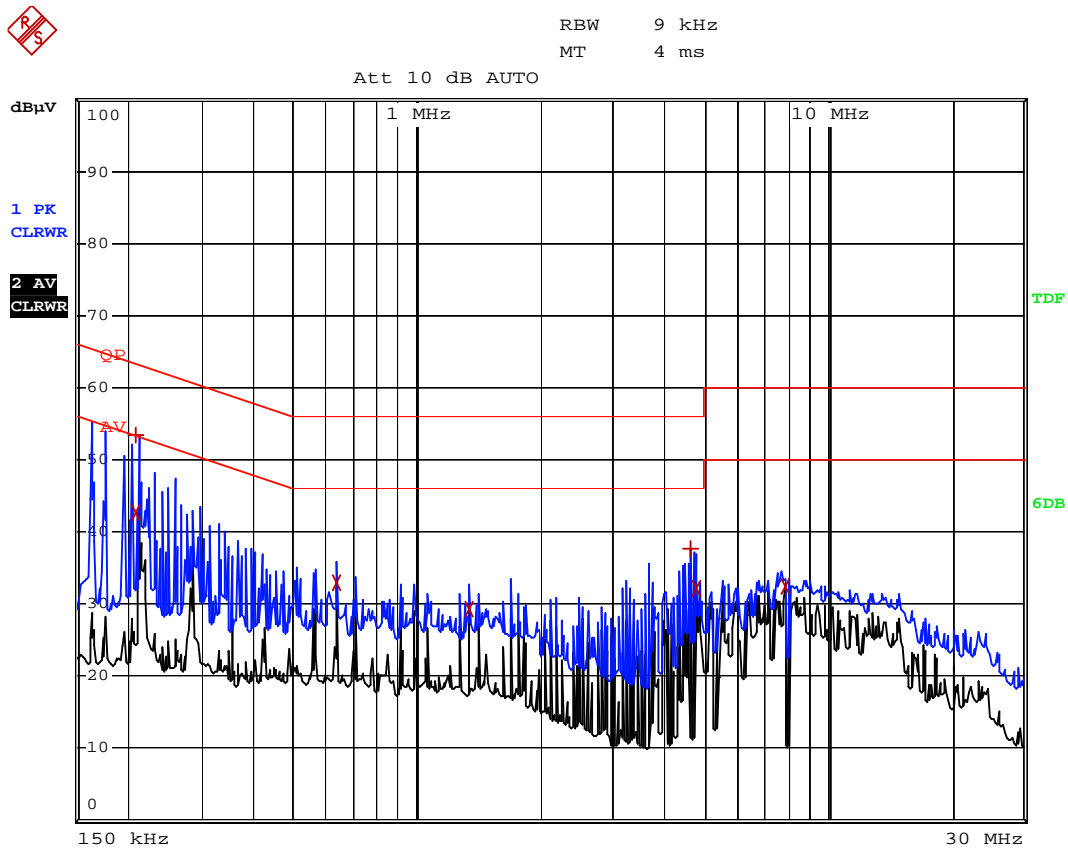
EUT: Computer Keyboard

M/N: 2188E

Operating Condition: Running with program

Test Specification: N

Comment: 120V/60Hz; USB 5V





Plot of Conducted Emissions Test Data

Conducted Disturbance

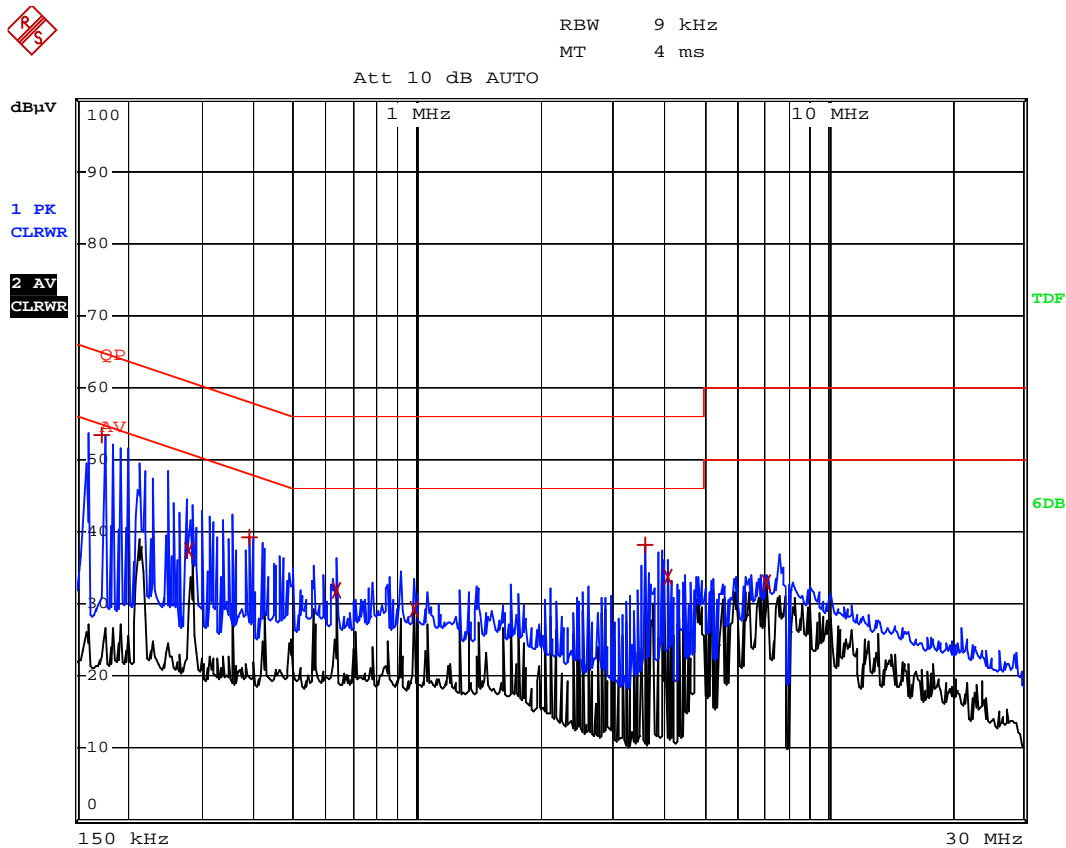
EUT: Computer Keyboard

M/N: 2188E

Operating Condition: Running with program

Test Specification: L

Comment: 120V/60Hz; USB 5V



## 4. §15.109(a)- RADIATED EMISSION

### 4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is  $\pm 3.0$  dB.

### 4.2 Test Equipment List and Details

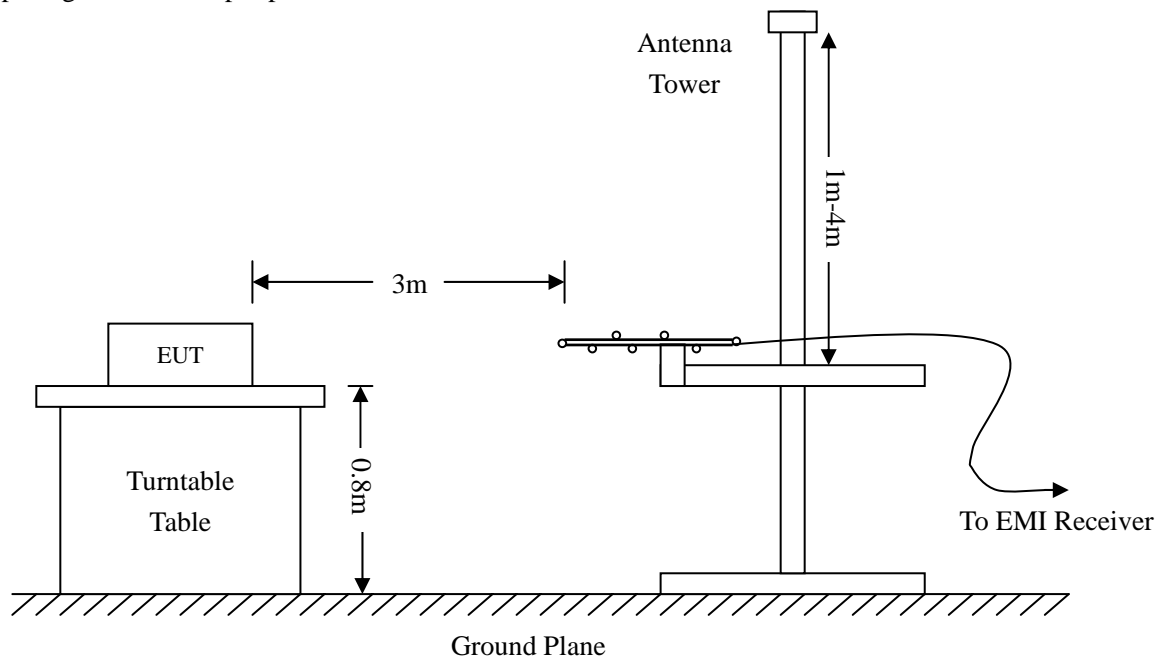
Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEA20	DE25181	2008-07-08	2009-07-07
Positioning Controller	C&C	CC-C-1F	N/A	2008-07-08	2009-07-07
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2008-07-08	2009-07-07
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2008-07-08	2009-07-07
RF Switch	EM	EMSW18	SW060023	2008-07-08	2009-07-07
Amplifier	Agilent	8447F	3113A06717	2008-07-08	2009-07-07
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2008-07-08	2009-07-07
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2008-07-08	2009-07-07

### 4.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 and FCC Part 15.109 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



#### 4.4 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency ..... 30 MHz  
 Stop Frequency..... 1000 MHz  
 Sweep Speed ..... Auto  
 IF Bandwidth..... 10 kHz  
 Quasi-Peak Adapter Bandwidth ..... 120 kHz  
 Quasi-Peak Adapter Mode ..... Normal

#### 4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15B Limit}$$

#### 4.6 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

#### 4.7 Summary of Test Results/Plots

According to the data, the EUT complied with the FCC 15B Class B standards, and had the worst margin of:

**-3.75 dB $\mu$ V at 36.0139 MHz in the Vertical polarization, 30 MHz to 1 GHz, 3Meters**

Plot of Radiation Emissions Test Data

Radiated Disturbance

EUT: Computer Keyboard

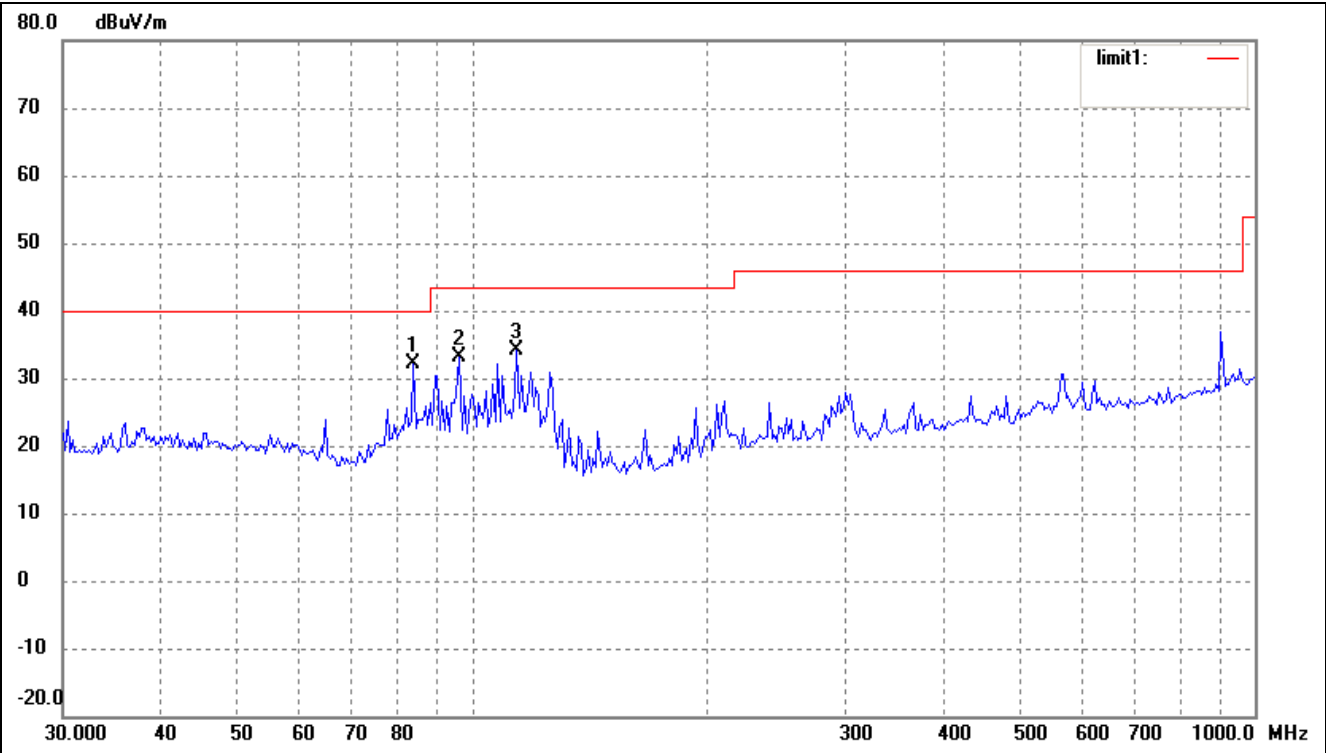
M/N: 2188E

Operating Condition: Running with Program

Test Specification: Horizontal & Vertical

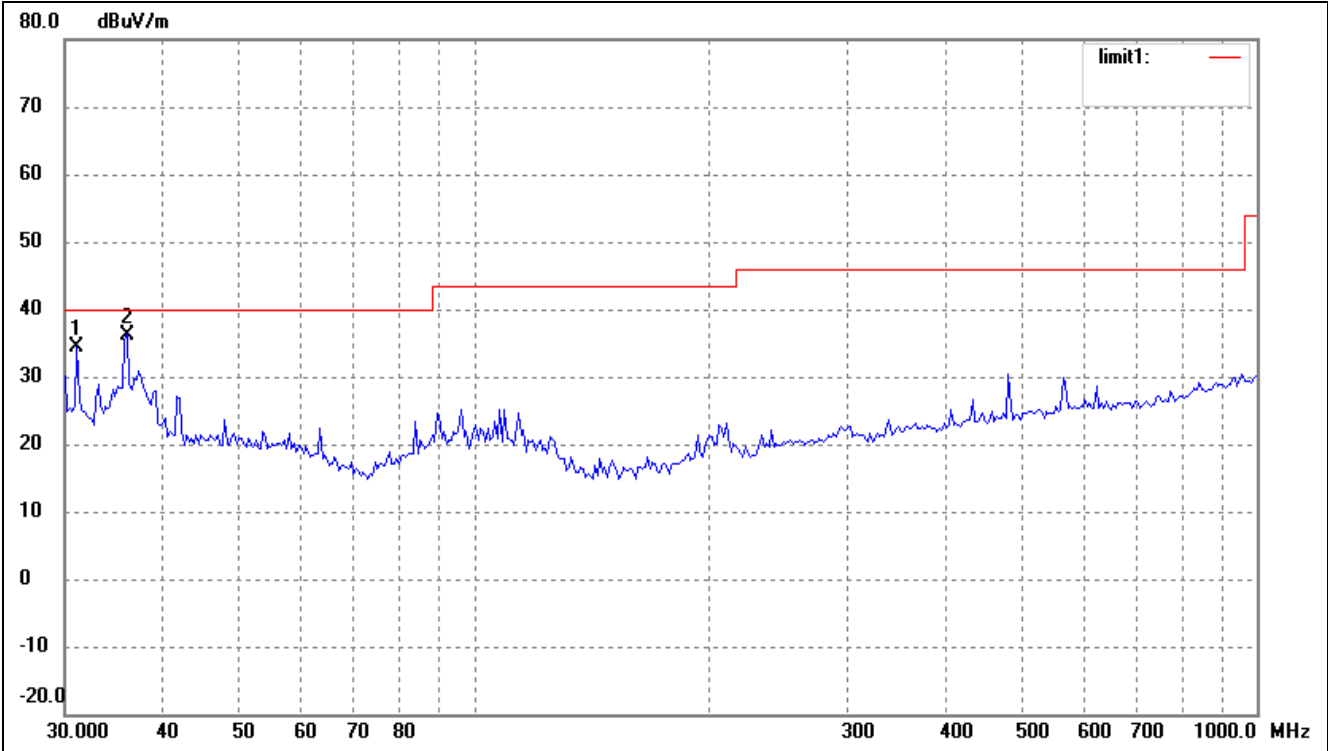
Comment: AC 120V/60Hz connect to PC, USB 5V

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	( ° )	(cm)	
1	84.2839	27.53	4.69	32.22	40.00	-7.78	223	203	peak
2	96.3230	25.46	7.56	33.02	43.50	-10.48	360	200	peak
3	114.0184	27.83	6.27	34.10	43.50	-9.40	205	104	peak

Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	31.0728	27.65	6.62	34.27	40.00	-5.73	220	100	QP
2	36.0139	29.38	6.87	36.25	40.00	-3.75	360	400	QP

\*\*\*\*\* END OF REPORT \*\*\*\*\*