



Report No: 040355\_02\_15.209  
Client: Secura Key  
FCC ID: NNHETAG4-LPA1

023



NVLAP LAB CODE: 200413-0

April 13, 2004

**Test Record**

**Product Verification**  
**According to FCC Part 15 Subpart B**

**for**

**Secura Key**

**MODEL: ETO-RE-AOB**

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## Revision History

| Revision | Date            | Description of Changes            | Author   |
|----------|-----------------|-----------------------------------|----------|
| 0.1      | 13 April, 2004  | Initial document                  | S. Sohn  |
| 0.2      | 20 April , 2004 | Correction on page 14 to 0.15 MHz | L. Kogan |
|          |                 |                                   |          |

## Introduction – Test Plan

This report describes the results of radiated and conducted emission measurements made on an ITE which falls under the class of unintentional radiator by the FCC Rules and Regulations.

This EUT is designated: **e\*Tag Quasar Reader**  
Model: ETO-RE-AOB

This product is designed and manufactured by **Secura Key**.

The EUT should be in full compliance with the FCC Part 15, Class B Regulations using the methods of ANSI C63.4.

## 1.0 CERTIFICATION OF TEST DATA

### Verification statement.

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the test sample (EUT), and EMC characteristics and measurements obtained as of the dates and the times of the test under the conditions specified and to the methods of ANSI C63.4: 2000

All measurements are traceable to the National Institute of Standards and Technology (NIST).

The test results provided with this report, indicate that the equipment tested:  
e\*Tag Quasar Reader. Model: ETO-RE-AOB is compliant with the following Rules and Regulations without any modifications of the design:

- A. 47 Code of Federal Regulations, Part 15, Subpart B, 2002. Performance Criterion: class B (15.207 and 15.209)
- B. ICES-003 Interference-Causing Equipment Standard: 1997. Performance Criterion: class B
- C. ANSI C63.4: 2000

Tests performed by:

\_\_\_\_\_  
Sandra Sohn  
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Report prepared by:

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Report approved by:



\_\_\_\_\_  
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Technical Director,

JMR Compliance Engineering, 20400 Plummer Street, Chatsworth CA 91311.  
E-mail: emc@jmr.com

## **2.0 General Information**

### **2.1 Client Information**

Company Name: Secura Key.  
Contact: Charley Lee  
Company Address: 20447 Nordhoff Street  
Chatsworth, CA 91311  
Phone: 818.882-0020

### **2.2 Administrative Data**

Device tested: e\*Tag Quasar Reader  
Model: ETO-RE-AOB  
Accessories: N/A  
Expository Statement: This device is intended for use in commercial and residential environments.  
Equipment category: Intentional Radiators, Low Power Unlicensed Transmitter  
Purpose of test: Demonstrate compliance with FCC Rules, Part 15, Subpart B, Class B.  
Date of test: April 6-12, 2004  
Place of the test: JMR Electronics, Inc.  
Compliance Engineering Laboratory  
20400 Plummer Street  
Chatsworth, CA 91311  
Phone: (818) 993-4801

### **3.0 Description of Equipment Under Test (EUT)**

#### **3.1 Brief Description of the EUT**

The ETO-RE-AOB is Vicinity RFID reader/writer which is used for a wide variety of Automatic Identification and Data Collection applications. Compliant with ISO 15693 standards. The unit consists of Antenna Board and Embedded Reader Board.

|                               |                                                             |
|-------------------------------|-------------------------------------------------------------|
| <b>Operating Frequencies:</b> | 13.56MHz                                                    |
| <b>Number of Channel:</b>     | 1                                                           |
| <b>Type of Modulation:</b>    | FSK                                                         |
| <b>Modulation depth:</b>      | 100%                                                        |
| <b>Antenna:</b>               | Antenna uses a unique coupling to the intentional radiator. |

#### **3.2 Test Run**

The EUT exercise program was designed to generated its frequency continuously for the duration of the testing. The above mentioned set-up allowed the article to perform sufficiently for the test purposes and required time.

### 3.3 Support Equipment List:

|           |                              |
|-----------|------------------------------|
| Equipment | Printer, DataMax Corporation |
| Model No. | DMX-I-4210                   |

|           |                        |
|-----------|------------------------|
| Equipment | AC Adaptor, Secura Key |
| Model No. | 4897                   |

### 3.4 Cabling Configuration

#### Power Cords:

|          |         |
|----------|---------|
| Unit     | Printer |
| MFG      | Generic |
| Shielded | No      |
| Length   | 1.8 m   |

|          |            |
|----------|------------|
| Unit     | AC Adaptor |
| MFG      | Generic    |
| Shielded | No         |
| Length   | 1.8 m      |

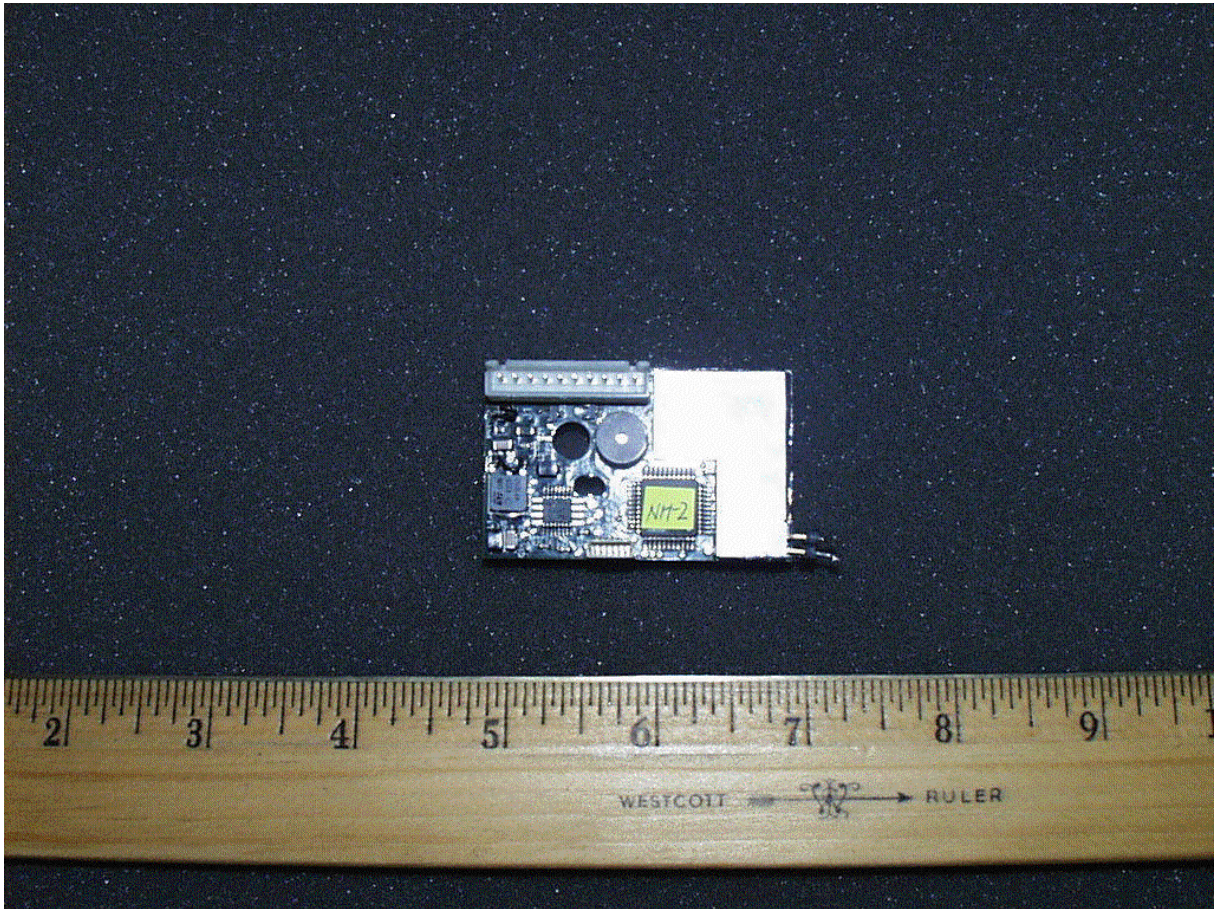
#### I / O Cables External:

|            |                   |
|------------|-------------------|
| Connection | Printer to Reader |
| MFG        | Secura Key        |
| Shielded?  | No                |
| Length     | 30 cm             |

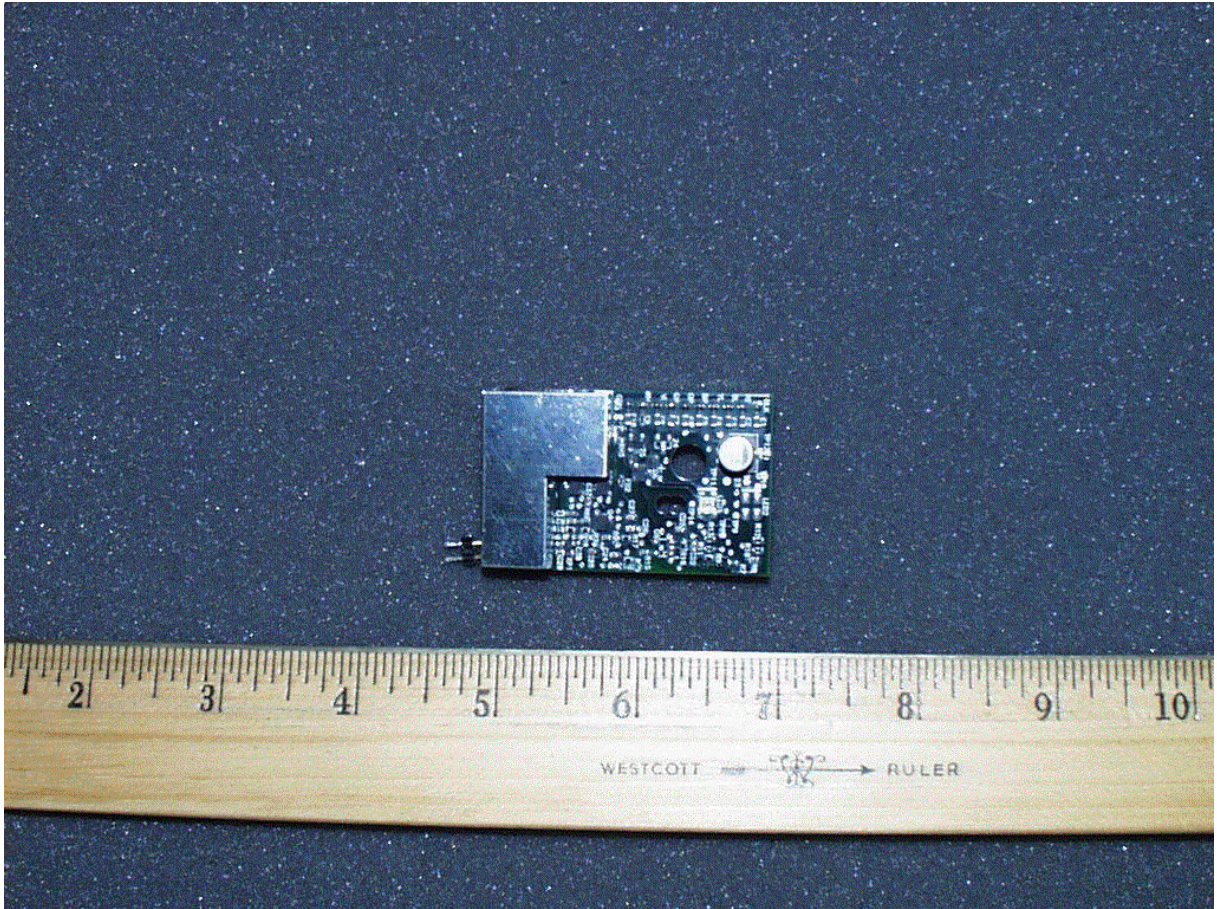
### 3.5 Photographs of the EUT



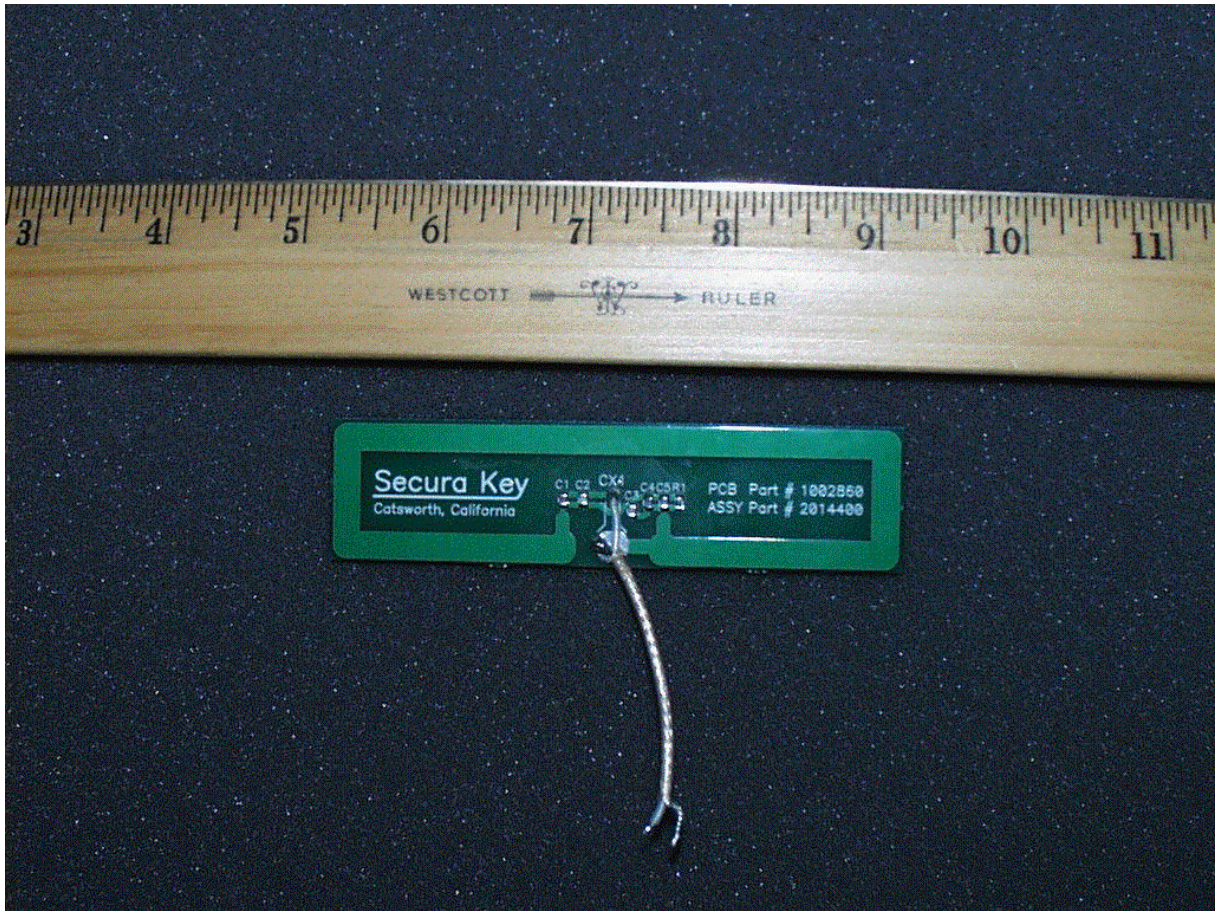
**Exterior View  
(EUT Location)**



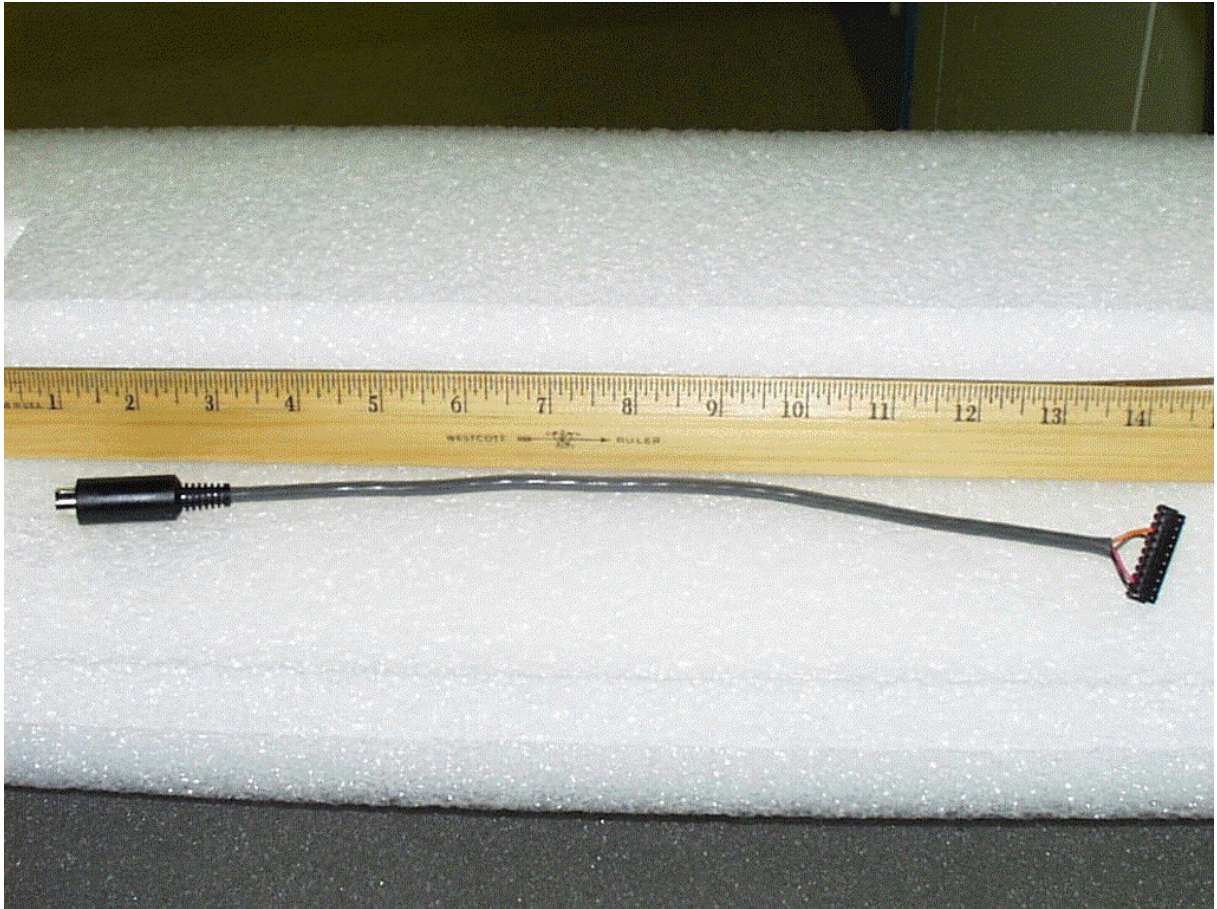
**Interior View  
(Reader Component Side)**



**Interior View  
(Reader Solder Side)**



Interior View  
(Antenna)



**Interior View  
(Cable)**

### **3.6 EUT Modifications**

N/A

### **3.7 Photographs of EUT Modifications**

N/A

## **4.0 Radiated and Conducted Emissions**

### **4.1 Test Specifications**

|                |                                                                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specification: | ANSI C63.4: 2000                                                                                                                                                     |
| Title:         | 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. |
| Specification: | FCC 47 CFR, Part 15, Subpart B, Class B: 2002                                                                                                                        |
| Title:         | Code of Federal Regulations, Telecommunication                                                                                                                       |
| Specification: | JMR Work Procedure W090-5205                                                                                                                                         |
| Title:         | Conducted Emission Test                                                                                                                                              |
| Specification: | JMR Work Procedure W090-5206                                                                                                                                         |
| Title:         | Radiated Emission Test                                                                                                                                               |

#### **4.1.1 Test Requirements.**

The EUT must meet Performance Criterion : Class B.

### **4.2 Radiated Emissions Test**

#### **4.2.1 Procedure of Radiated Emissions Test**

The EMC radiated test facility consists of a shielded semi-anechoic chamber with attached shielded control room. The semi-anechoic chamber is approximately 18 feet wide by 28 feet long by 19 feet high. A hybrid absorber combines high performance anechoic polyurethane foam with a ferrite tile base to achieve high levels of absorption and power dissipation capability.

The test site is designed according to the ANSI 63.4 -2000 requirements and the anechoic treatment of the chamber is sufficient to achieve the requirements of CISPR 22 and ANSI C63.4. The test site description along with the site attenuation data has been filed with the FCC and a letter of compliance with the requirements of Section 2.948 of the FCC Rules was issued on August 20,1998 by the FCC.

The EUT was tested in compliance with Section 11 of the ANSI C63.4 standard. All data was obtained via the HP 85876A EMI measurement software package using the HP 85462A Receiver.

After determination of the maximum emissions configuration the distance of the EUT to the scanning antenna was set to 3 meters.

Radiated emissions were then monitored from the EUT over a frequency range of 30 MHz to 2000 MHz in horizontal polarization with the scanning antenna repeatedly moving from 1 to 4 meters in elevation while the turntable rotated through a 360 degree arc. This procedure was then repeated in vertical polarization to confirm the strongest signals and polarization orientation. This part of the test sequence the spectrum check is done in a manual mode.

After it is determined by the results of the spectrum check scan that the article is compliant the EUT is then measured in completely automatic mode using a Hewlett Packard 8546A EMI Receiver (9 kHz - 6.5 GHz) and HP 85876A EMI Measurement Software test system.

The HP Software, after scanning the EUT in Peak mode, automatically selects the strongest signal from the EUT and then Quasi-Peaks and Averages those strong signals to determine EUT compliance to the standards.

The measurement values are data reduced and then presented as both graphical results of the spectrum check and tabulated QP and Averages of the strongest signals in this report.

### **4.3 Conducted Emissions Test**

#### **4.3.1 Procedures of Conducted Emission Test**

Conducted emission test is done in the "Peak Detector" mode for Line 1, which is high line to ground over a frequency range of 0.15 MHz to 30 MHz. Then the RFI emissions are measured from Line 2, or neutral to ground over the same frequency range.. When Peak amplitudes are found to be above the limits, or within 10 dB of the limits, a Quasi-Peak Detector Mode and Average Detector Mode for the line or lines with excessive RFI is then performed.

For AC power line conducted tests, the following option may be exercised if the EUT Peak Mode emissions exceed the average limit when performing the tests. If the level of the emission measured using instrumentation with Quasi-Peak detection is 6 dB, or more, higher than the level of the same emission measured with instrumentation having an Average Detector with a 9 kHz minimum bandwidth, that emission is considered to be broadband and the level obtained with the Quasi-Peak detector may be reduced by 13 dB for comparison to the limit.

The EUT is configured as a system with peripherals connected, so that at least one interface port of each type is connected to one external peripheral when tested for conducted emissions according to ANSI C63.4.

The test data was obtained using a Hewlett Packard 8546A EMI Receiver (9 kHz - 6.5 GHz) and HP 85876A EMI Measurement Software.

The conducted test for table-top configurations is performed on a 1.0 X 2.5 X 0.8 meter non-metallic test table which is set up inside a shielded test room, measuring 12 feet by 10 feet by 9 feet tall. The separation between the EUT and screen room wall is 0.4 m, according to ANSI C63.4.

The EUT is powered through an appropriate Line Impedance Stabilization Network (LISN), bonded to the ground plane as described in CISPR 16.

The power input cables to the LISN and the RFI measurement system are arranged so that they will not influence the measurement results. To ensure that RFI from the auxiliary instrumentation or support equipment does not influence the test readings, the LISN power is isolated from other power by RFI filters. Excess power cord is folded back and forth to form a non-inductive bundle.

#### 4.4 Test Equipment Used

##### 4.4.1 Radiated Emission Test

**Table 4-1: Test Equipment Used**

| Device                            | Model No.        | Serial No. | Last Cal. | Next Cal |
|-----------------------------------|------------------|------------|-----------|----------|
| Cable 1                           | 8214             | CBL-006    | 02/19/04  | 02/19/05 |
| Analyzer                          | HP85462A         | 3325A00120 | 04/11/04  | 04/11/05 |
| Cable 2                           | 8268             | CBL-002    | 02/19/04  | 02/19/05 |
| Preselector                       | HP85460A         | 3330A00117 | 04/11/04  | 04/11/05 |
| Qpeak Adapter                     | HP85462 Internal | Internal   | 04/11/04  | 04/11/05 |
| Pre-Amplifier                     | None             |            |           |          |
| Tower 1                           | EMCO 1050        | 9310-1786  | N/A       | N/A      |
| Turntable 1                       | EMCO 1060        | 9409-1753  | N/A       | N/A      |
| Bilog Antenna                     | CBL6112B         | 2604       | 09/03/03  | 09/03/04 |
| Shielded Semi-Anechoic Chamber    | RANTEC           | N/A        | 03/16/04  | 03/16/05 |
| Temperature and Humidity Recorder | Dickson TH8-24C  | 5097755    | 09/16/03  | 09/18/05 |

#### 4.4.2 Conducted Emission Test

**Table 4-2: Test Equipment Used**

| Device                            | Model No.        | Serial No. | Last Cal. | Next Cal |
|-----------------------------------|------------------|------------|-----------|----------|
| Cable 1                           | RG-214/U         | CBL-001    | 02/19/04  | 02/19/05 |
| Analyzer                          | HP85462A         | 3325A00120 | 04/11/04  | 04/11/05 |
| Preselector                       | HP85460A         | 3330A00117 | 04/11/04  | 04/11/05 |
| QPeak Adapter                     | HP85462 Internal | Internal   | 04/11/04  | 04/11/05 |
| Pre-Amplifier                     | None             |            |           |          |
| LISN                              | 3825/2 LISN      | 9406-2232  | 01/21/04  | 01/21/05 |
| Switch 1                          | N/A              | N/A        | N/A       | N/A      |
| Attenuator 1                      | 33-10-34         | BA9146     | 02/19/04  | 02/19/05 |
| Temperature and Humidity Recorder | Dickson TH8-24C  | 5097755    | 09/16/03  | 09/16/05 |

#### 4.5 Photographs of Test Set-Up



**Radiated Emission Test  
(Front View)**



**Radiated Emission Test  
(Rear View)**



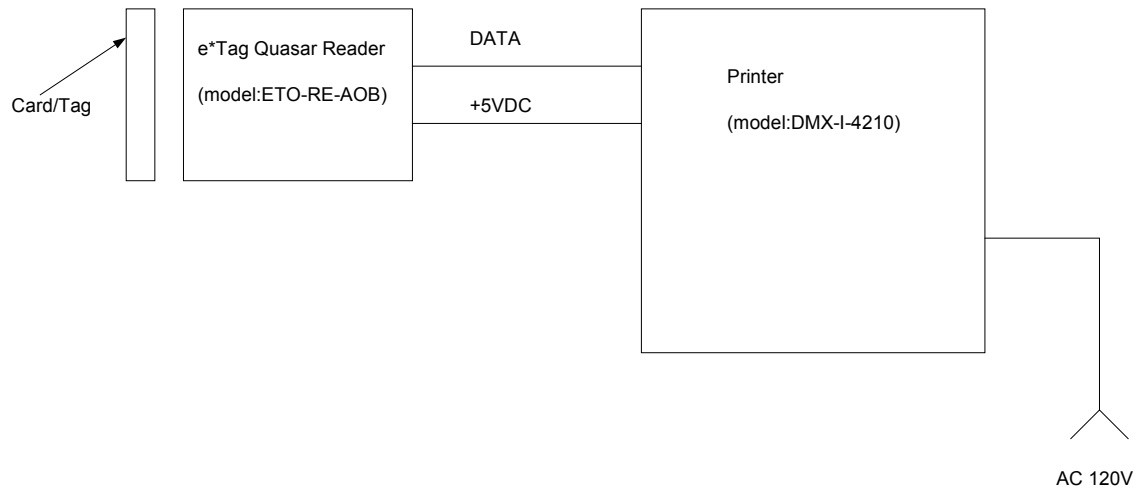
**Conducted Emission Test  
(Front View)**



**Conducted Emission Test  
(Rear View)**

## 4.6 Test Results

### 4.6.1 Block Diagram of the Radiation Emissions Test Setup



#### 4.6.2 Radiated Emissions Test Results

Measurements expanded uncertainty equals 3.26 dB with 95% confidence level.

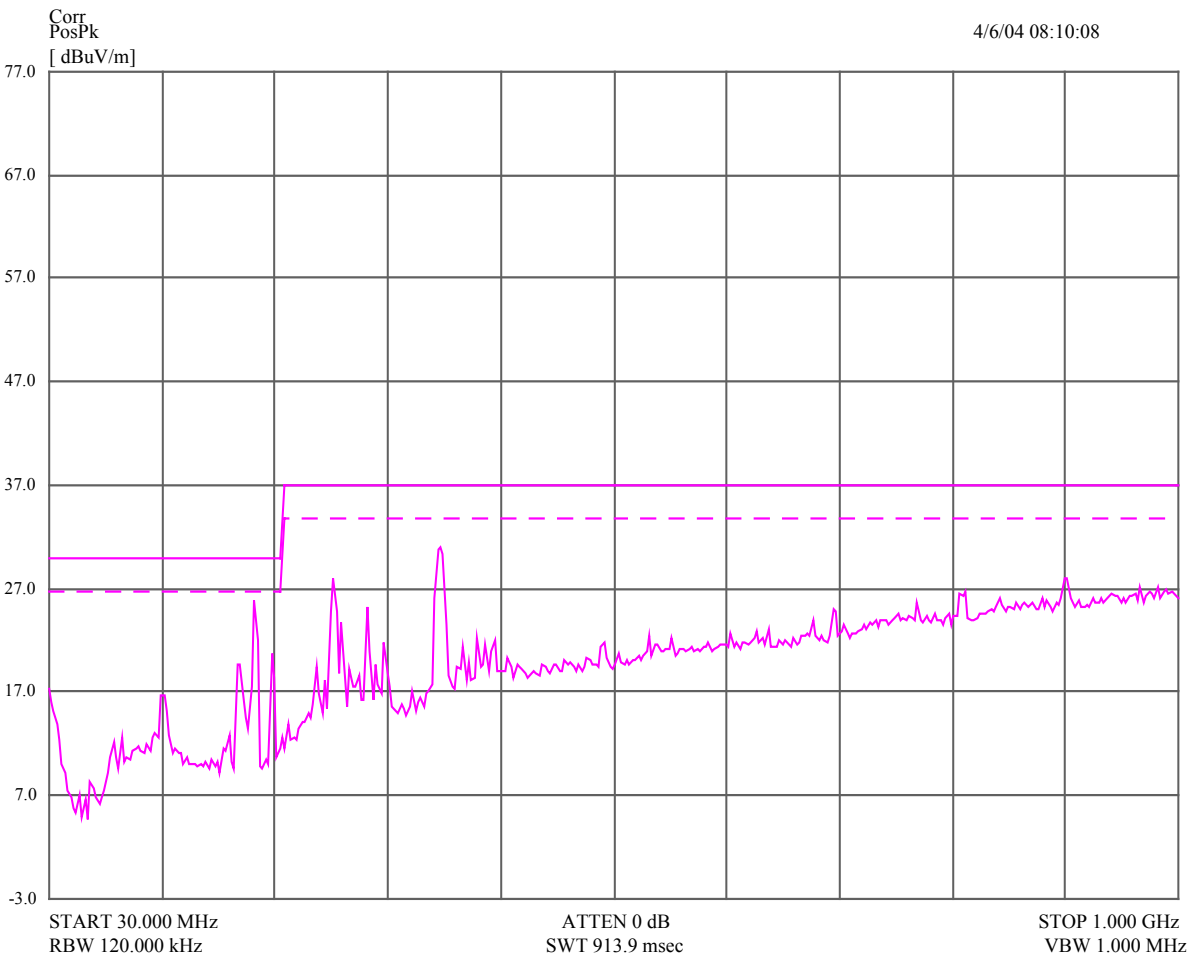
Room Ambient Temperature: 20°C±1°C  
Relative Humidity: 31%±5%

Below are the Quasi-Peak and Average readings of the highest value signals observed throughout the 30 MHz to 1000 MHz frequency range.

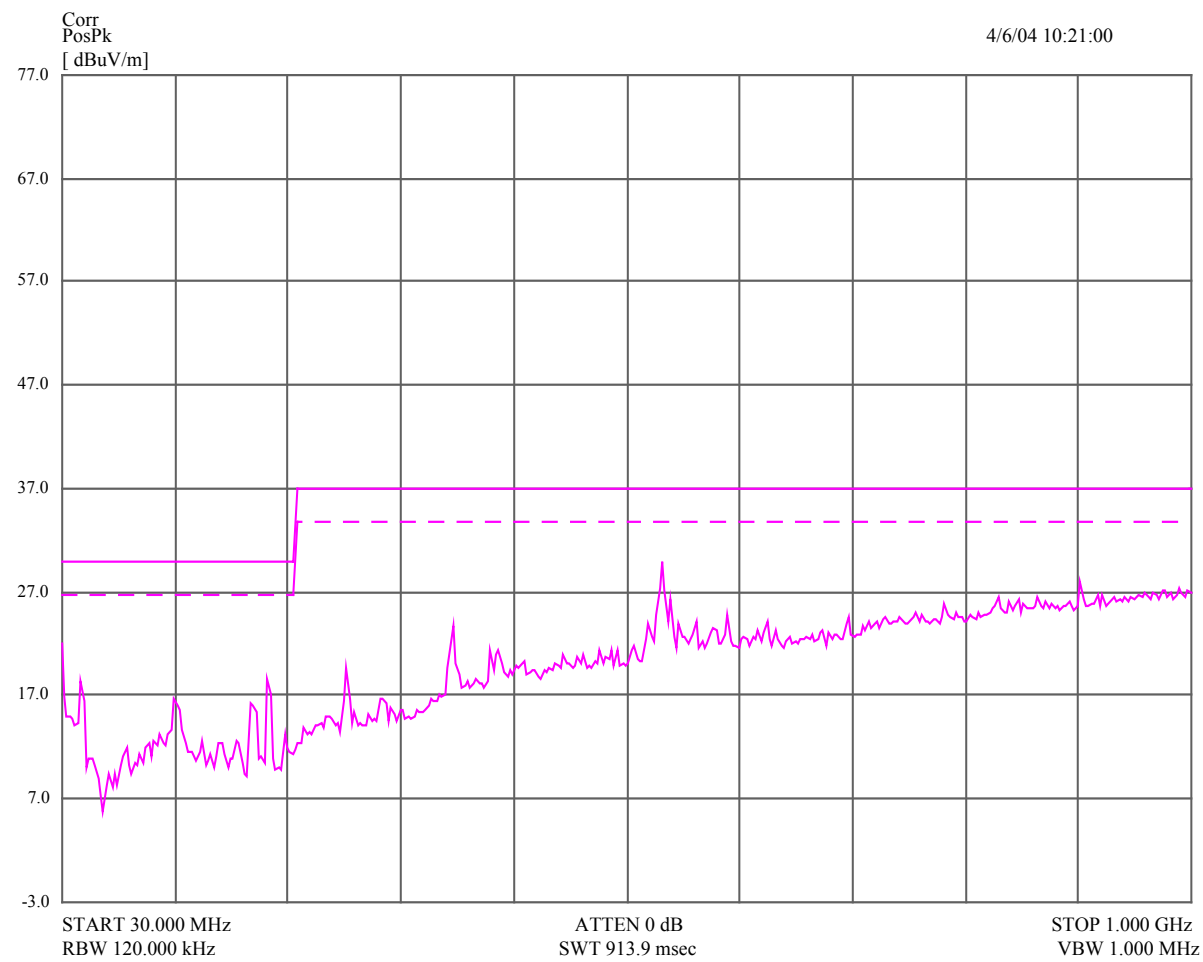
| Frequency<br>MHz | QP<br>dBuV/m | QP Lmt<br>dBuV/m | DelLim-QP<br>dB | Pol  | Hgt<br>cm | Angle<br>deg | Status |
|------------------|--------------|------------------|-----------------|------|-----------|--------------|--------|
| 44.983752        | 12.58        | 30.00            | -17.42          | Vert | 95        | 113          | PASS   |
| 124.366248       | 13.38        | 30.00            | -16.62          | Vert | 147       | 314          | PASS   |
| 124.374248       | 13.05        | 30.00            | -16.95          | Horz | 180       | 330          | PASS   |
| 175.233744       | 10.19        | 30.00            | -19.81          | Horz | 215       | 342          | PASS   |
| 187.223008       | 13.52        | 30.00            | -16.48          | Horz | 222       | 99           | PASS   |
| 189.829248       | 12.99        | 30.00            | -17.01          | Vert | 95        | 204          | PASS   |
| 189.836256       | 16.91        | 30.00            | -13.09          | Horz | 179       | 72           | PASS   |
| 203.395008       | 15.73        | 30.00            | -14.27          | Vert | 95        | 175          | PASS   |
| 203.398752       | 25.42        | 30.00            | -4.58           | Horz | 127       | 64           | PASS   |
| 216.956256       | 18.83        | 30.00            | -11.17          | Horz | 153       | 54           | PASS   |
| 270.161248       | 24.86        | 37.00            | -12.14          | Horz | 95        | 335          | PASS   |
| 277.587488       | 13.84        | 37.00            | -23.16          | Horz | 95        | 338          | PASS   |
| 300.000000       | 15.95        | 37.00            | -21.05          | Horz | 100       | 50           | PASS   |
| 360.215488       | 27.98        | 37.00            | -9.02           | Horz | 95        | 133          | PASS   |
| 360.227488       | 17.66        | 37.00            | -19.34          | Vert | 95        | 311          | PASS   |
| 540.396224       | 23.84        | 37.00            | -13.16          | Vert | 95        | 181          | PASS   |

A horizontal and vertical polarization spectrum traces of the magnitude of all the signals throughout the band may be seen below. In this graph the magnitude of the largest signal is plotted for the configuration that produced the largest signal.

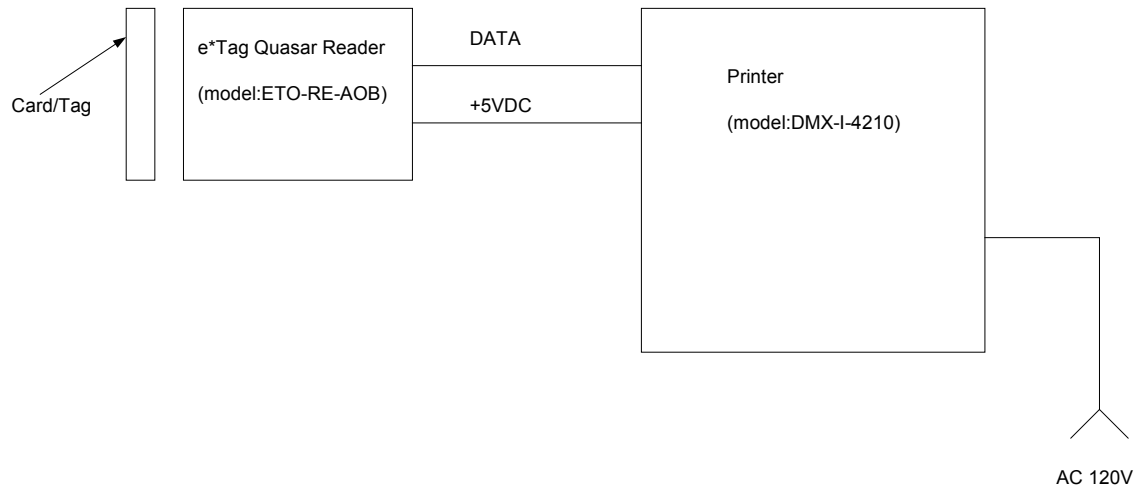
Horizontal:



Vertical:



#### 4.6.3 Block Diagram of the Conducted Emissions Test Setup w/Printer Power Supply



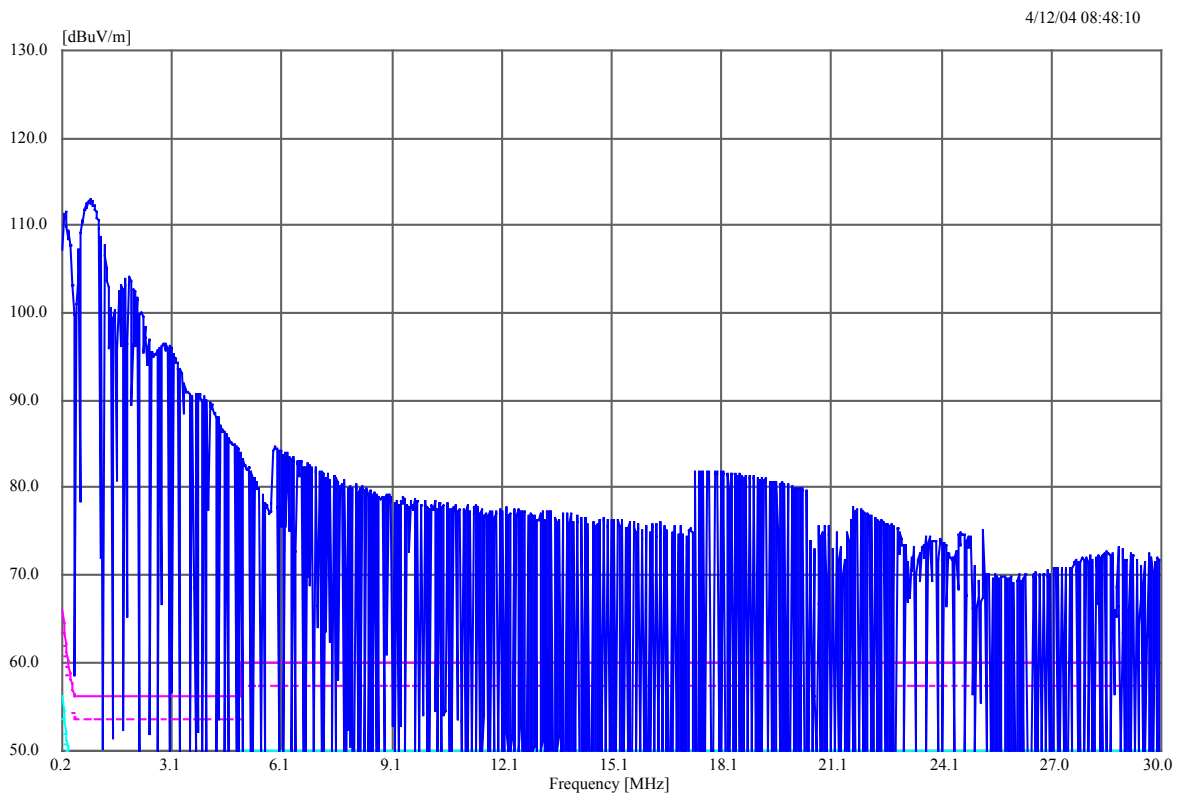
#### 4.6.4 Conducted Emissions Test Results w/Printer Power Supply

Measurements expanded uncertainty equals 2.62 dB with 95% confidence level.

Room Ambient Temperature: 20°C±1°C

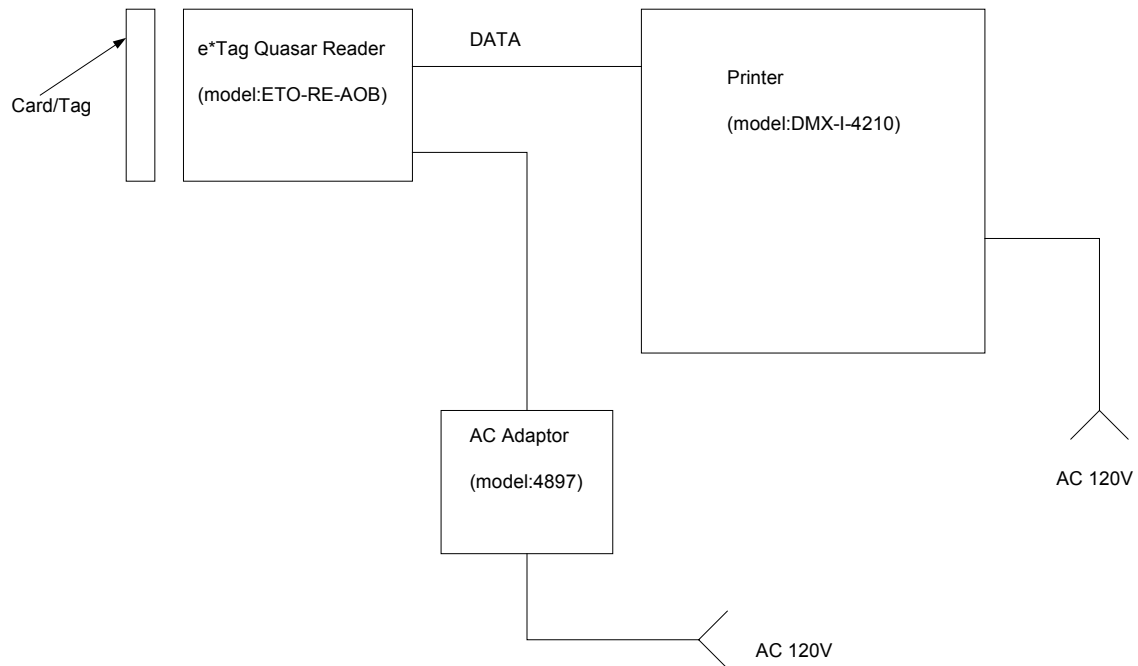
Relative Humidity: 31%±5%

#### Composite Trace



**Status : Test failed due to Printer.**

#### 4.6.5 Block Diagram of the Conducted Emissions Test Setup w/External Power Supply



#### 4.6.6 Conducted Emissions Test Results w/External Power Supply

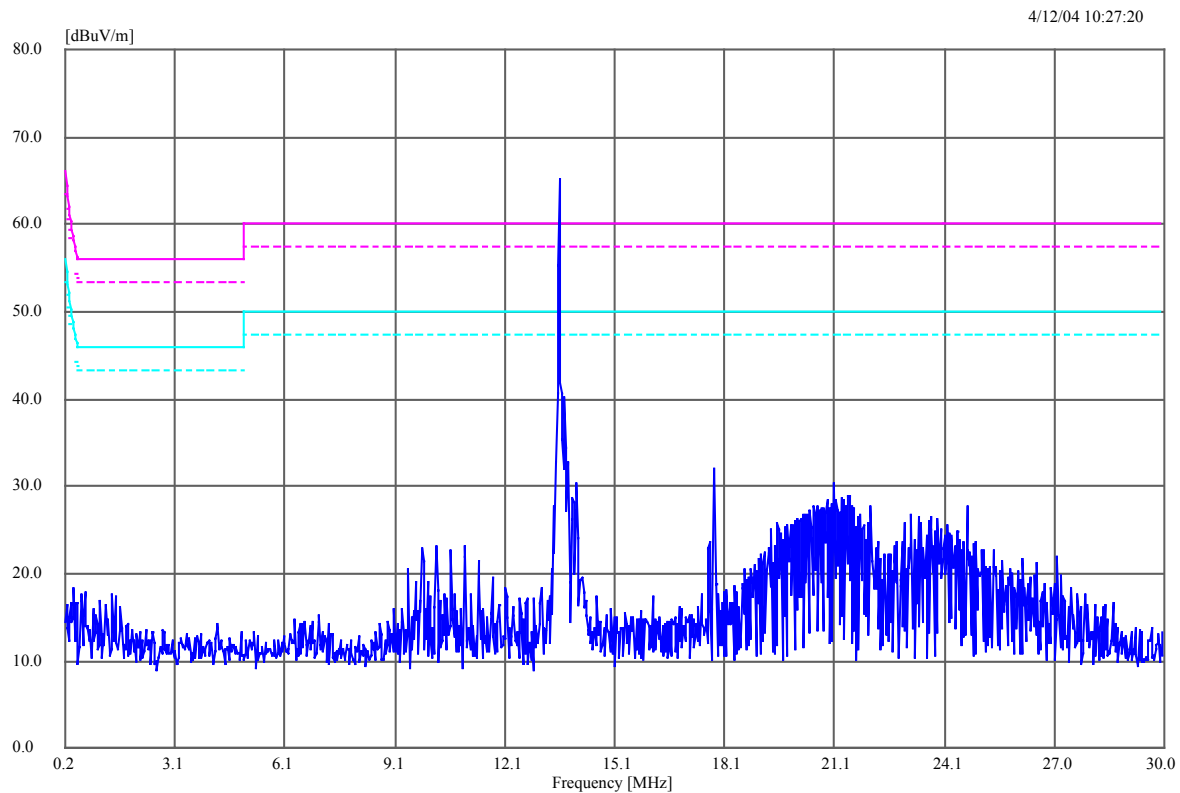
Measurements expanded uncertainty equals 2.62 dB with 95% confidence level.

Room Ambient Temperature: 20°C±1°C  
Relative Humidity: 31%±5%

##### Line 1

| Frequency<br>MHz | Avg<br>dBuV/m | Avg Lmt<br>dBuV/m | DelLim-Avg<br>dB | Status |
|------------------|---------------|-------------------|------------------|--------|
| 13.561000        | 43.93         | 50.00             | -6.07            | PASS   |
| 14.002500        | 11.31         | 50.00             | -38.69           | PASS   |
| 17.773250        | 27.38         | 50.00             | -22.62           | PASS   |
| 21.430250        | 26.47         | 50.00             | -23.53           | PASS   |

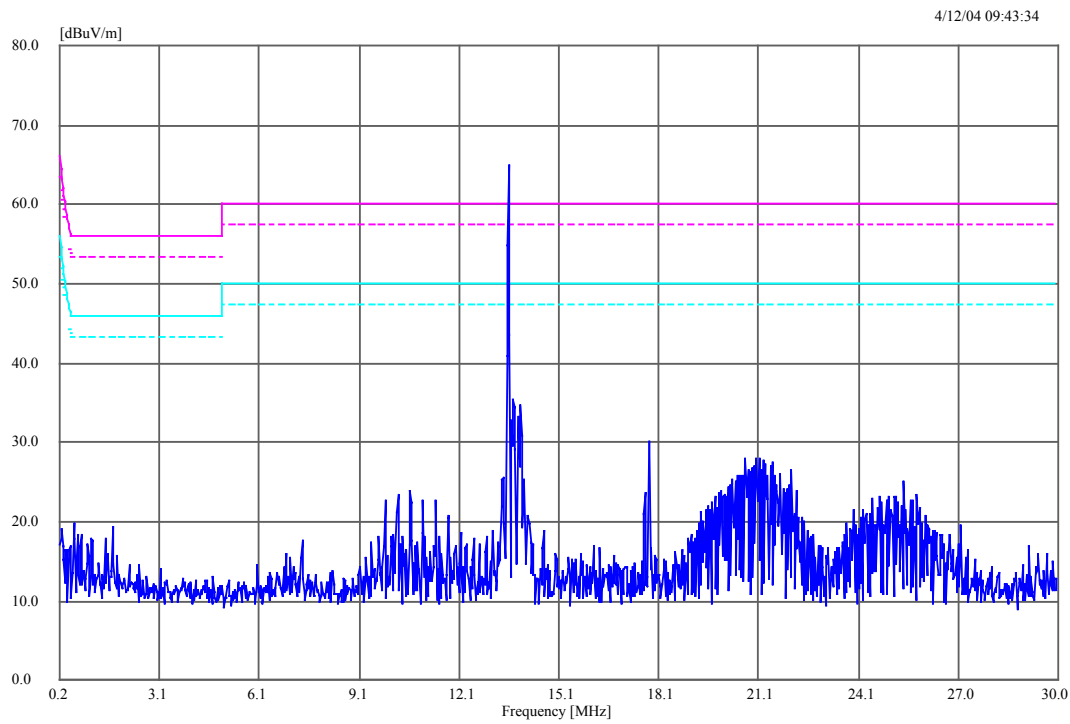
##### Composite Trace



## Line 2

| Frequency<br>MHz | Avg<br>dBuV/m | Avg Lmt<br>dBuV/m | DelLim-Avg<br>dB | Status |
|------------------|---------------|-------------------|------------------|--------|
| 13.556250        | 30.63         | 50.00             | -19.37           | PASS   |
| 13.562000        | 43.93         | 50.00             | -6.07            | PASS   |
| 13.854000        | 16.77         | 50.00             | -33.23           | PASS   |
| 17.775250        | 31.73         | 50.00             | -18.27           | PASS   |
| 21.258000        | 29.87         | 50.00             | -20.13           | PASS   |

## Composite Trace



**Status : Test passed w/External Power Supply**

## Appendix A.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| United States Department of Commerce<br>National Institute of Standards and Technology                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                |
| ISO/IEC GUIDE 25:1990<br>ISO 9002:1987                                                                                                                                                                                                                                                                                                                                                                                                                          | Certificate of Accreditation                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                |
| <b>JMR COMPLIANCE ENGINEERING</b><br>CHATSWORTH, CA                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                |
| <i>is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:</i> |                                                                                                                                                |
| <b>ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS</b>                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                |
| March 31, 2002<br>Effective through                                                                                                                                                                                                                                                                                                                                                                                                                             | <br>For the National Institute of Standards and Technology |
| NVLAP Lab Code: 200413-0                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                |

