



Report No:040355 rev.01 15.225
FCC ID: NNHETAG4-LPA
Client: Secura Key

023



NVLAP LAB CODE: 200413-0

April 14, 2004

Test Record

**Product Verification
According to FCC Part 15 Subparts C**

for

**Secura Key, division of Soundcraft Inc
MODEL: ETO-RE-AOB**

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Revision History

Revision	Date	Description of Changes	Author
0.1	14 Apr. 2004	Initial document	S..Sohn

Introduction – Test Plan

This report describes the results of all measurements made on Vicinity RFID Reader which falls under the class of intentional radiator, Low Power Unlicensed Transmitter, by the FCC Part 15 Subpart C Rules and Regulations.

This EUT is designated: **e*Tag Quasar Reader**

Model : **ETO-RE-AOB**

The EUT was tested in full compliance with the FCC Regulations using the methods of FCC Part 15 Subpart C “Intentional Radiators”; ANSI C63.4: 2000 and Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”. The results of the testing indicate that the ETO-RE-AOB met the Part 15 C Low Power Unlicensed Transmitter limits and requirements.

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 characteristics and measurements obtained as of the dates and the times of the test under the conditions specified and to the methods of FCC Part 15, Subpart C “Intentional Radiators” and Part 2 “Frequency Allocations and radio Treaty Matters; General Rules and regulations”

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

- A. 47 CFR, Subpart 15.225(a) Field Strength of Emissions within band
- B. 47 CFR, Subpart 15.225(b) Field Strength of Emissions outside the band
(Report 040355_15.209)
- C. 47CFR, Subpart 15.225(c) Frequency tolerance of the carrier
- D. 47 CFR, Subpart 15.207 Line Conducted Emissions (Report 040355_15.209)
- E. 47 CFR, Subpart 15.203 Antenna Requirements

Report approved by:



Leon Kogan
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, division of Soundcraft Inc
Contact: Randy Watkins
Company Address: 20447 Nordoff Street
Chatsworth, CA 91311
Phone: 818.882-0020

2.2 Administrative Data

Device tested: e*Tag Quasar, Vicinity RFID Reader
Model: ETO-RE-AOB
Equipment category: Intentional Radiators, Low Power Unlicensed Transmitter
Accessories: N/A
Purpose of test: Compliance to FCC Rules and Regulations, Part 15, Subpart C
Date of test: 04/06/04 – 04/14/04
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.

Operating Frequencies: 13.56MHz

Number of Channel: 1

Type of Modulation: FSK

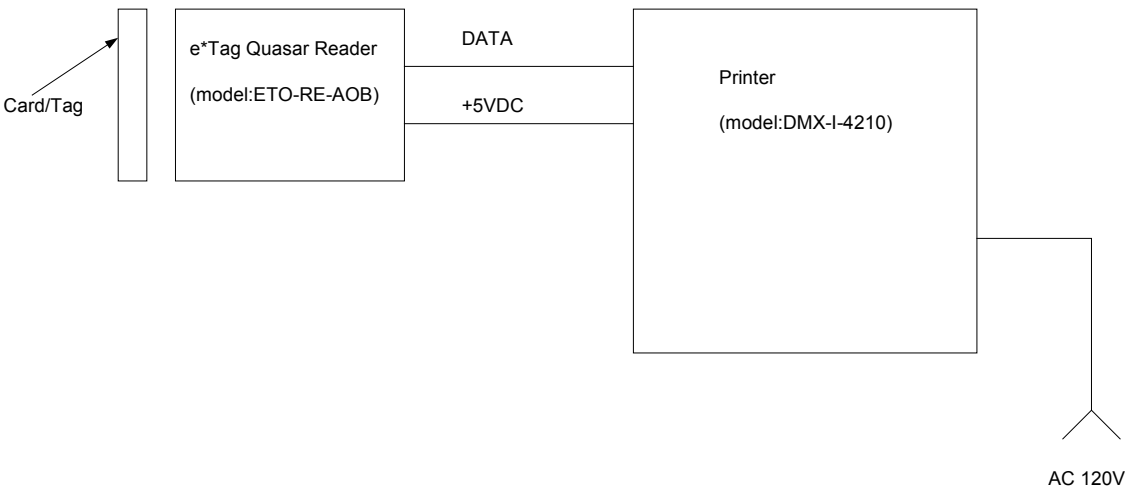
Modulation depth: 100%

Antenna: 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 Block Diagram of the Test Setup



3.4 Support Equipment List:

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

3.5 Cabling Configuration

Power Cords:

Unit	Printer
MFG	Generic
Shielded	No
Length	1.8 m

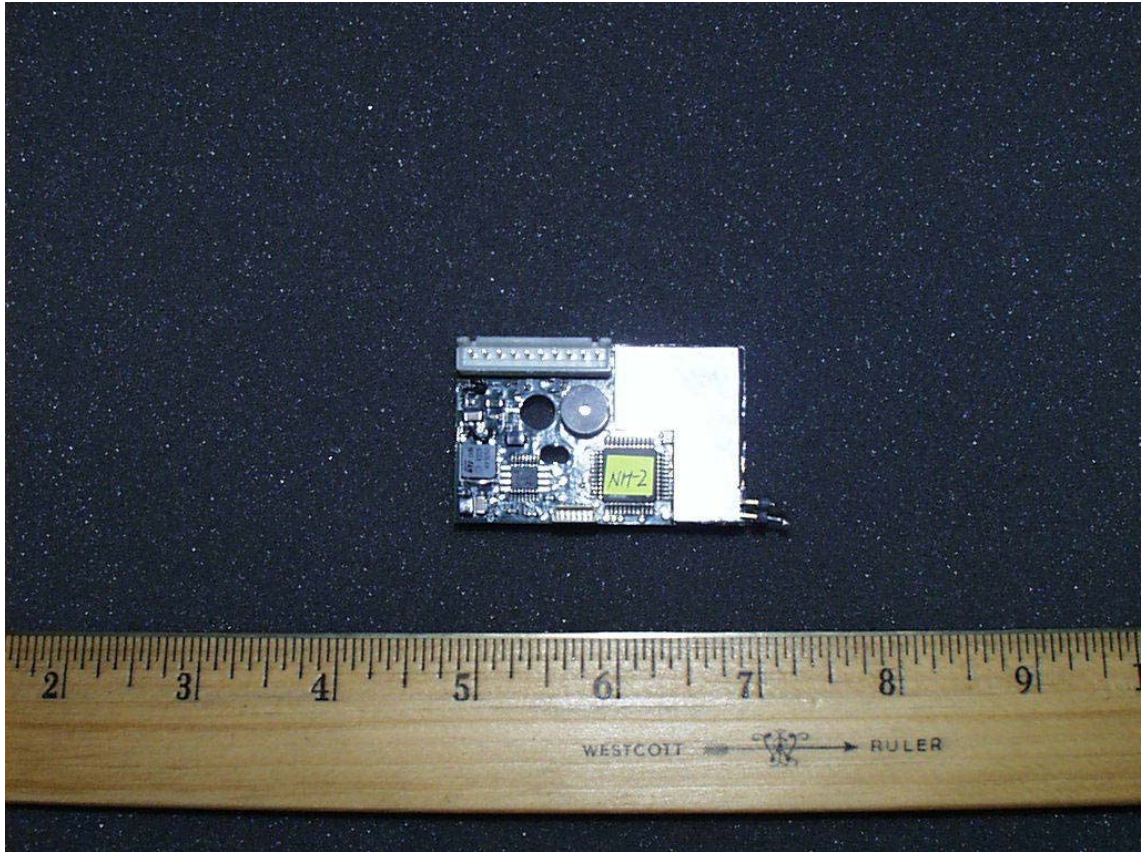
I / O Cables External:

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

3.6 Photos of the EUT

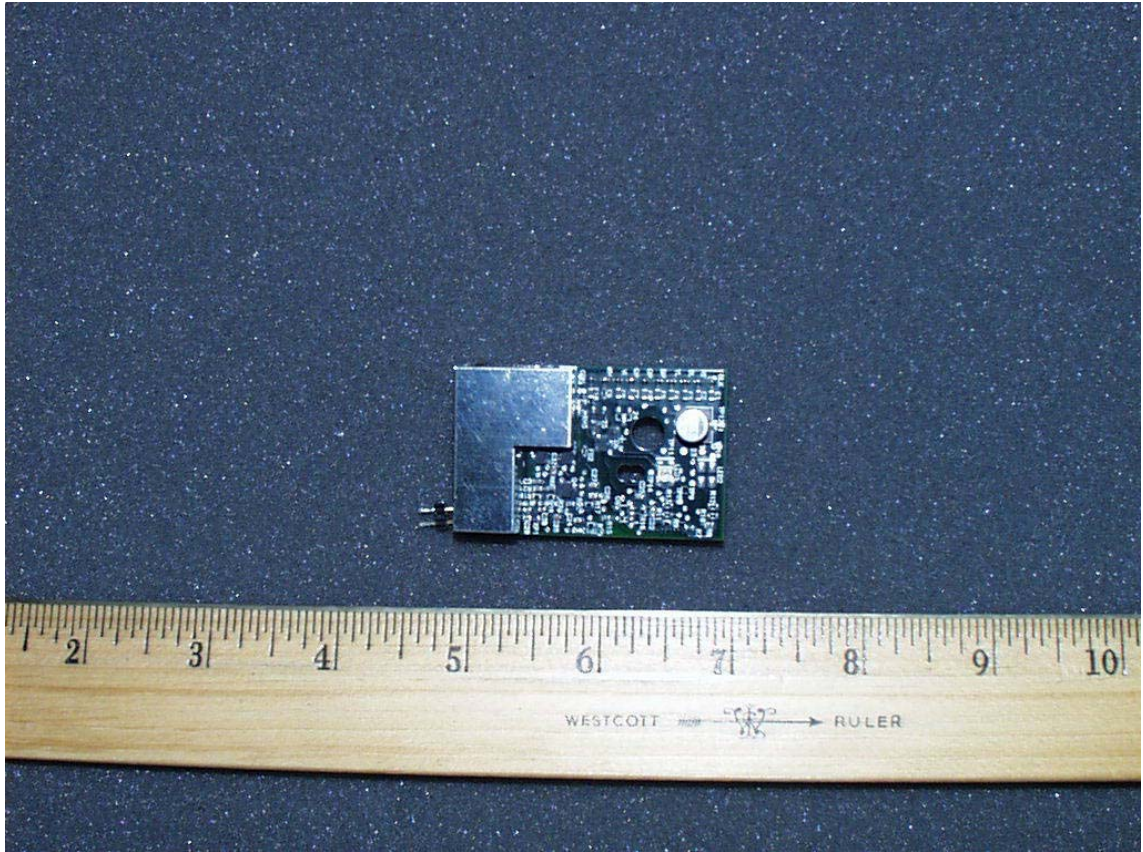


EUT: e*Tag Quasar.
MODEL : ETO-RE-AOB



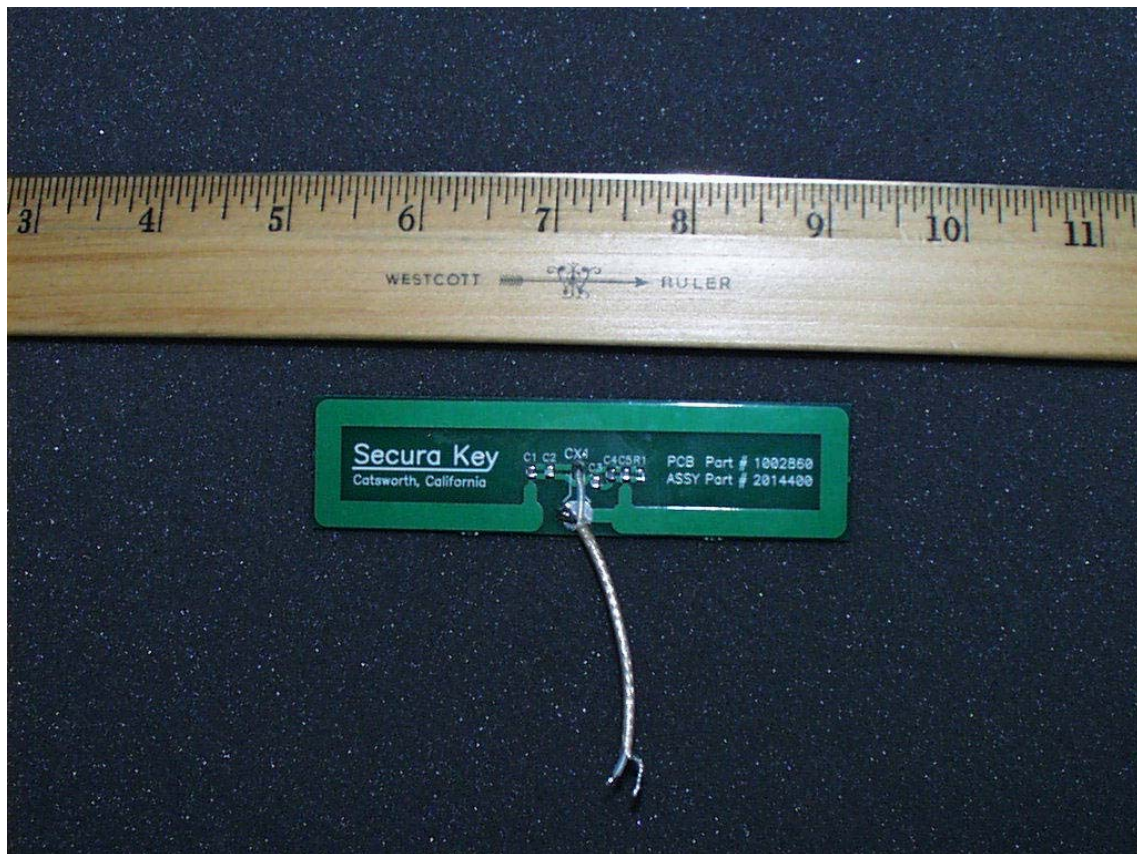
EUT: e*Tag Quasar.
MODEL : ETO-RE-AOB

RFID Reader Board ETO-RE
(PCB Component side)



**EUT: e*Tag Quasar.
MODEL : ETO-RE-AOB**

**RFID Reader Board ETO-RE
(PCB solder side)**



EUT: e*Tag Quasar.
MODEL : ETO-RE-AOB

Antenna
PCB components side

3.7 EUT Modifications

N/A

3.8 Photographs of EUT Modifications

N/A

4.0 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	09/186/05
Loop Antenna	Electro-Metrics EM-6876	212	04/06/04	04/06/05
Analyzer	HP8590A	2618A01059	11/05/03	11/05/04
Amplifier	HP 8447F	3113A05772	3/11/04	3/11/05
Temp. chamber	Industrial oven & equipment IndoCo	5966B	N/A	N/A
Thermocouple Monitor	SR600	34202	12/16/03	12/16/04
Voltmeter	Fluke 83	65530501	01/13/04	01/13/05

5.0 Field Strength of Fundamental and Emissions within permitted band.

Test Requirements: FCC Part 15 : Subclause 15.225 (a)

Test Method: ANSI C63.4: 2000

Limit : The maximum Field Strength authorized within the band
13.553-13.567 MHz is 10,000 uV/m @ 30m

Mode of operation: with modulation.

Field Strength Calculation:

The Field Strength (FS) is calculated by adding the Antenna Factor (AF) and Cable Factor, and subtracting the Amplifier Gain from the measured reading

The equation is as follows: $FS = RA + AF + CF - AG$

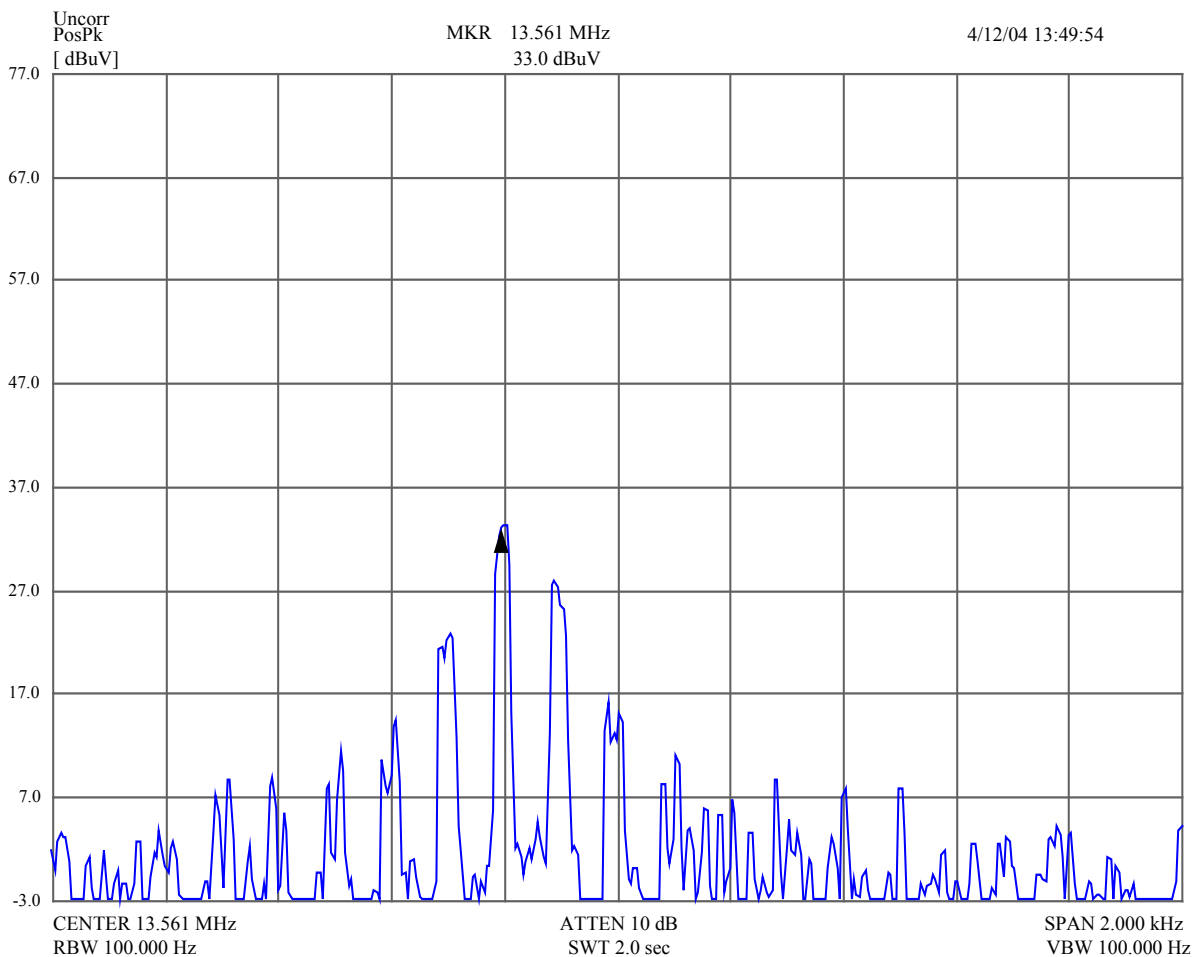
The test facility consists of a shielded semi-anechoic chamber with attached shielded control room. The semi-anechoic chamber is approximately 18 feet wide by 28 feet long by 19 feet high. A hybrid absorber combines high performance anechoic polyurethane foam with a ferrite tile base to achieve high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

The EUT had been placed at the 0.8 m height on the non-conducting table. Transmitter had been turned on All data was obtained via a HP 85876A EMI measurement software package using an HP 85462A Receiver which is compliant to CISPR 16. The EUT was configured in various geometric patterns to find the geometric configuration and EUT attitude that produced the largest RF power.

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

5.1. Radiated Emissions at fundamental frequency

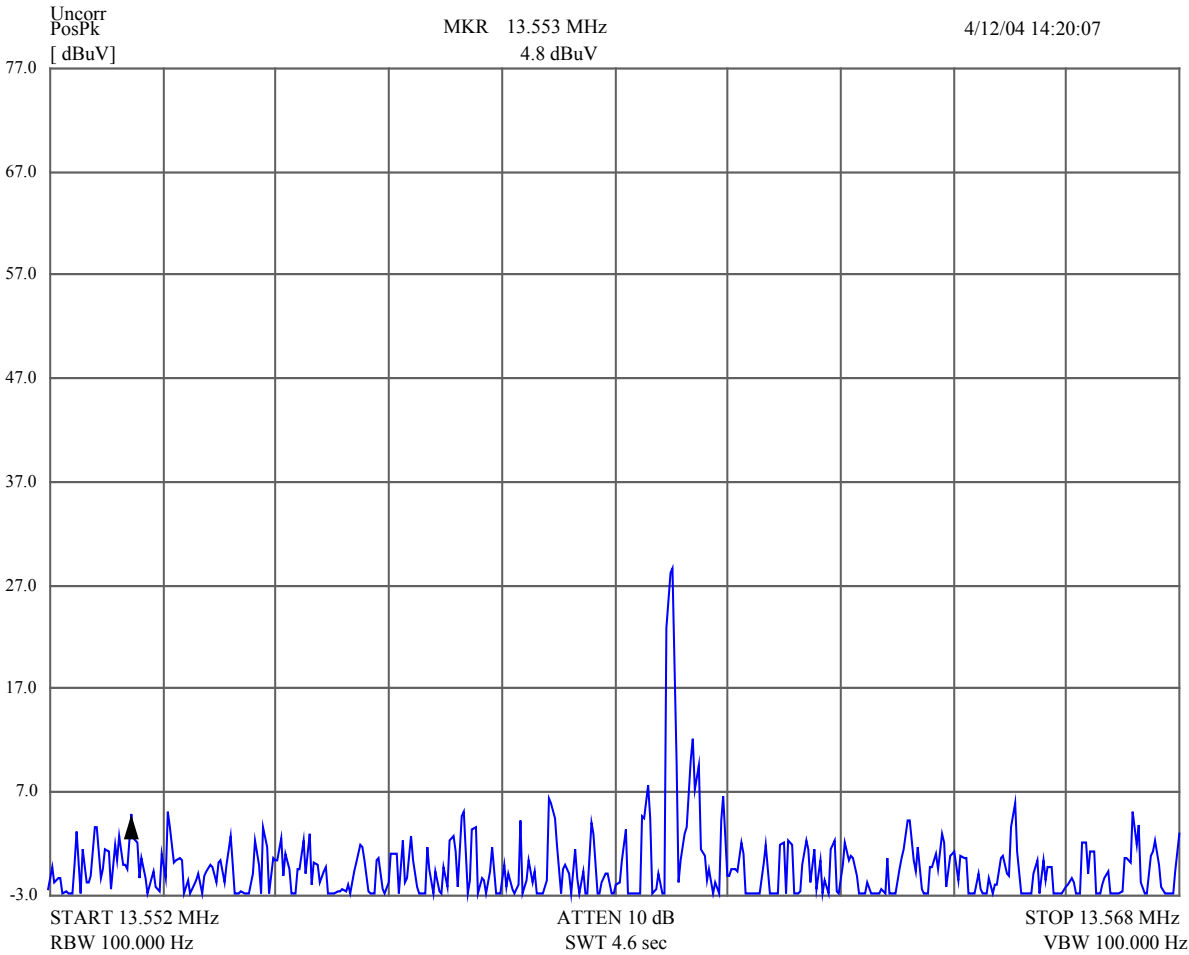
Frequency MHz	Peak dBuV/m	Ant Fac dB/m	Cabling dB	Tot Corr dB	Peak Lmt dBuV/m	Comment	Status
13.560795	53.89	20.29	0.61	20.90	--. --		



FS was measured with Loop Antenna

5.2 In-band Emissions

Frequency MHz	Peak dBuV/m	Ant Fac dB/m	Cabling dB	Dist dB	Corr dB	Peak Lmt dBuV/m	Margin	Status
13.553160	4.80	12.21	0.61		20	80	- 42.38	PASS
13.567360	5.89	12.21	0.61		20	80	- 41.29	PASS



FS was measured with Loop Antenna

6.0 Spurious Radiated Emissions below 30 MHz.

Test Requirements: FCC Part 15 : Subclause 15.225 (b)

Test Method: ANSI C63.4: 2000

Limit : 15.209

Mode of operation: with modulation.

Field Strength Calculation:

The Field Strength (FS) is calculated by adding the Antenna Factor (AF) and Cable Factor, and subtracting the Amplifier Gain from the measured reading

The equation is as follows: $FS = RA + AF + CF - AG$

The 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.

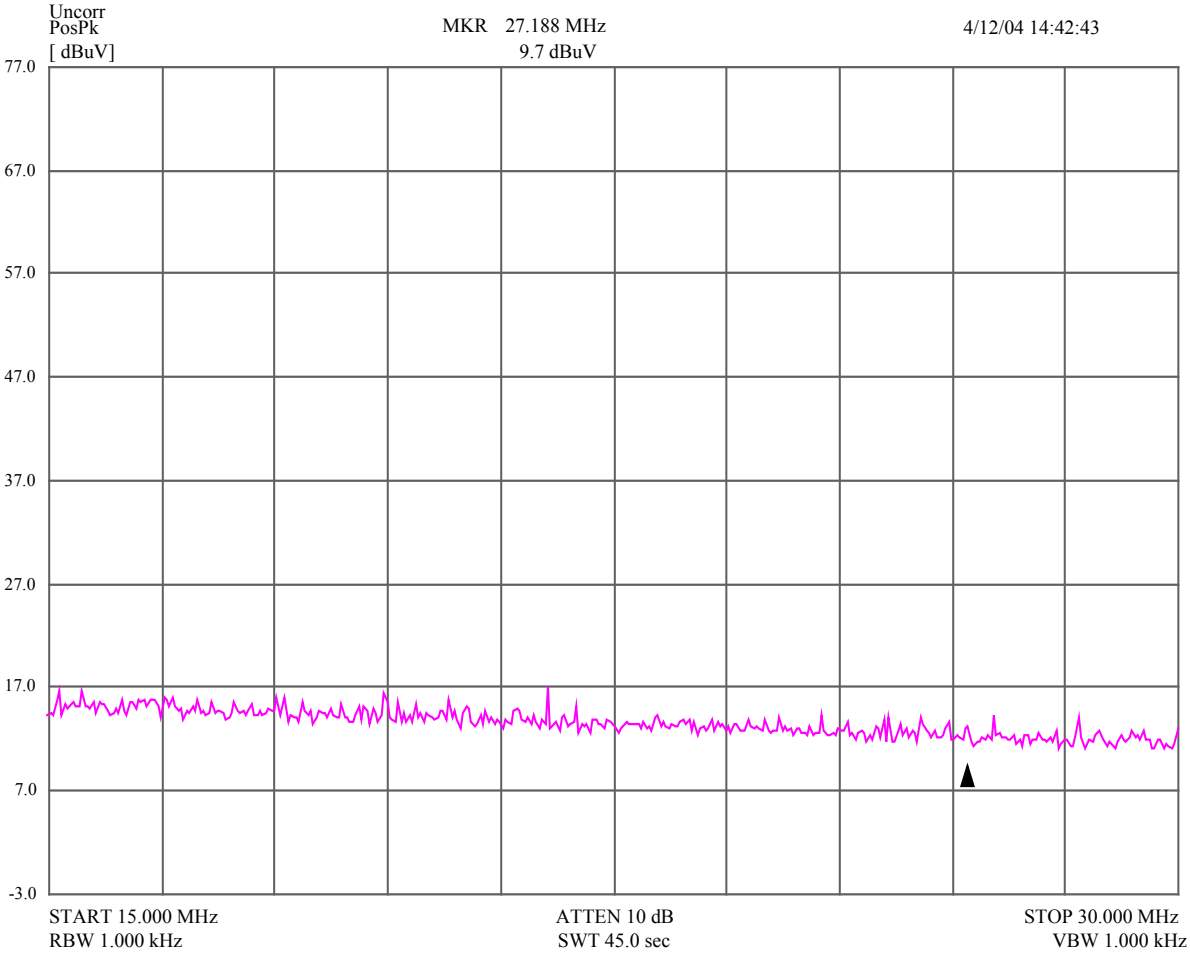
The EUT had been placed at the 0.8 m height on the non-conducting table. Transmitter had been turned on All data was obtained via a HP 85876A EMI measurement software package using an HP 85462A Receiver which is compliant to CISPR 16. The EUT was configured in various geometric patterns to find the geometric configuration and EUT attitude that produced the largest RF power.

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

Frequency MHz	Peak dBuV/m	Ant Fac dB/m	Cabling dB	Dist Corr dB	Lmt dBuV/m	Margin	Status
27.187500	9.75	15.89	0.74	0	49.5	- 17.62	PASS

* FS was measured with Loop Antenna

* All other emissions not reported are at least 20 dB below the limit

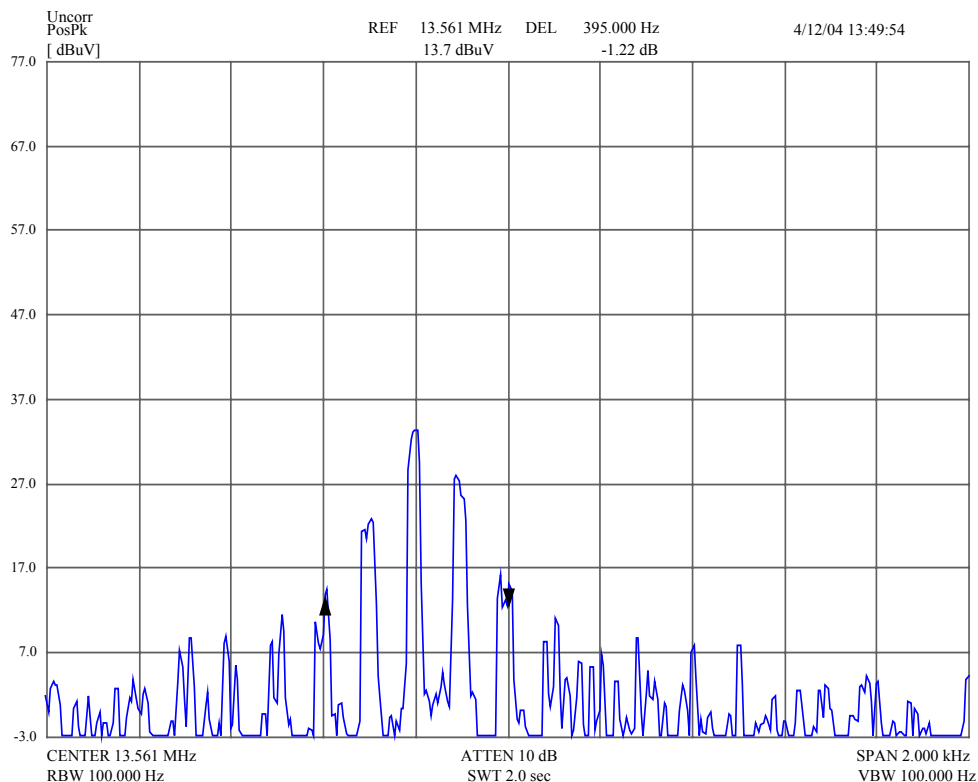


7.0 Occupied channel bandwidth

Test Method: **ANSI C63.4: 2000**
FCC Part 2 : Subclause 2.1049 © (1)

The channel Bandwidth (BW) is defined as the minimum declared bandwidth within which the transmitter's necessary bandwidth can be contained.

1. All measurements were conducted by the HP 85462A Spectrum Analyzer;
2. The fundamental frequency is typical modulated
3. The Channel BW was measured at an amplitude level reduced from the reference level by the 20 dB. :



The 20 dB bandwidth is about 395 Hz

8.0 Restricted Area 13.36 – 13.41 MHz

Test Requirements: FCC Part 15 : Subclause 15.225

Test Method: ANSI C63.4: 2000

Limit : 47 CFR Part 2, 15

Mode of operation: with modulation.

Field Strength Calculation:

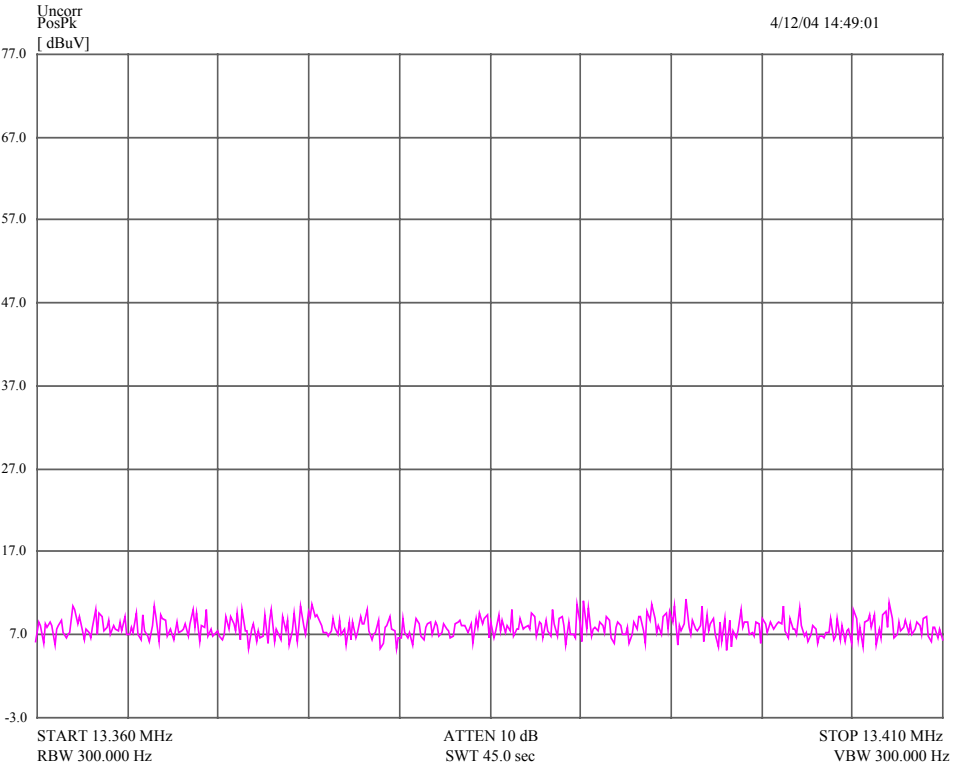
The Field Strength (FS) is calculated by adding the Antenna Factor (AF) and Cable Factor, and subtracting the Amplifier Gain from the measured reading

The equation is as follows: $FS = RA + AF + CF - AG$

The 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 EUT had been placed at the 0.8 m height on the non-conducting table. Transmitter had been turned on All data was obtained via a HP 85876A EMI measurement software package using an HP 85462A Receiver which is compliant to CISPR 16. The EUT was configured in various geometric patterns to find the geometric configuration and EUT attitude that produced the largest RF power.

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



The plot shows that there is no spurious emissions (noise only) in the restricted Band 13.36 – 13.41 MHz

9.0 Frequency Tolerance

9.1 Temperature variations

Test Requirements: FCC Part 15 : Subclause 15.225(c)
Test Method: 47 CFR Part 2
Limit : 0.01%
Mode of operation: without modulation.

The EUT was placed in the temperature chamber and set to transmit unmodulated carrier. The transmitter was powered from the Printer Power supply (+5 Vdc).

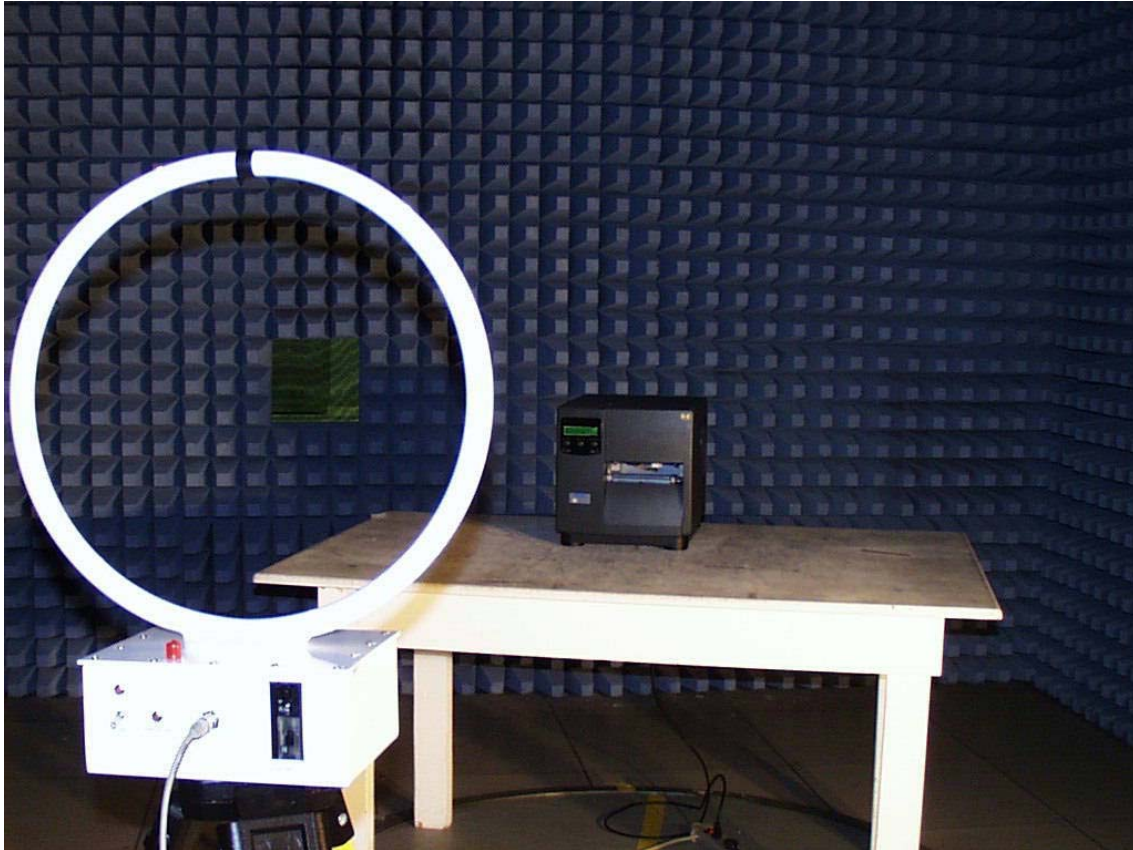
Frequency	Temperature C	Max.delta Hz	%	Limit %	Results
13.559650	+ 50	830	0.0061	0.01	PASS
13.560125	+ 40	670	0.0050	0.01	PASS
13.560615	+ 30	180	0.0010	0.01	PASS
13.560795	+ 20	0	0.0000	0.01	PASS
13.561059	+ 10	264	0.0020	0.01	PASS
13.561110	0	315	0.0020	0.01	PASS
13.561661	- 10	866	0.0063	0.01	PASS
13.561775	- 20	980	0.0072	0.01	PASS

9.2 Power variation

The EUT had been placed at the 0.8 m height on the non-conducting table. Transmitter had been turned on All data was obtained via a HP 85876A EMI measurement software package using an HP 85462A Receiver which is compliant to CISPR 16. The transmitter was powered from DC Power supply.

Frequency	Vdc V	Max.delta Hz	%	Limit %	Results
13.560795	5.00	0			
13.561315	5.75	520	0.0038	0.01	PASS
13.560449	4.25	346	0.0025	0.01	PASS

10. Photographs of Test Set-Up



EUT: e*Tag Quasar.
MODEL : ETO-RE-AOB

Tests per 15.225 (a)(b)



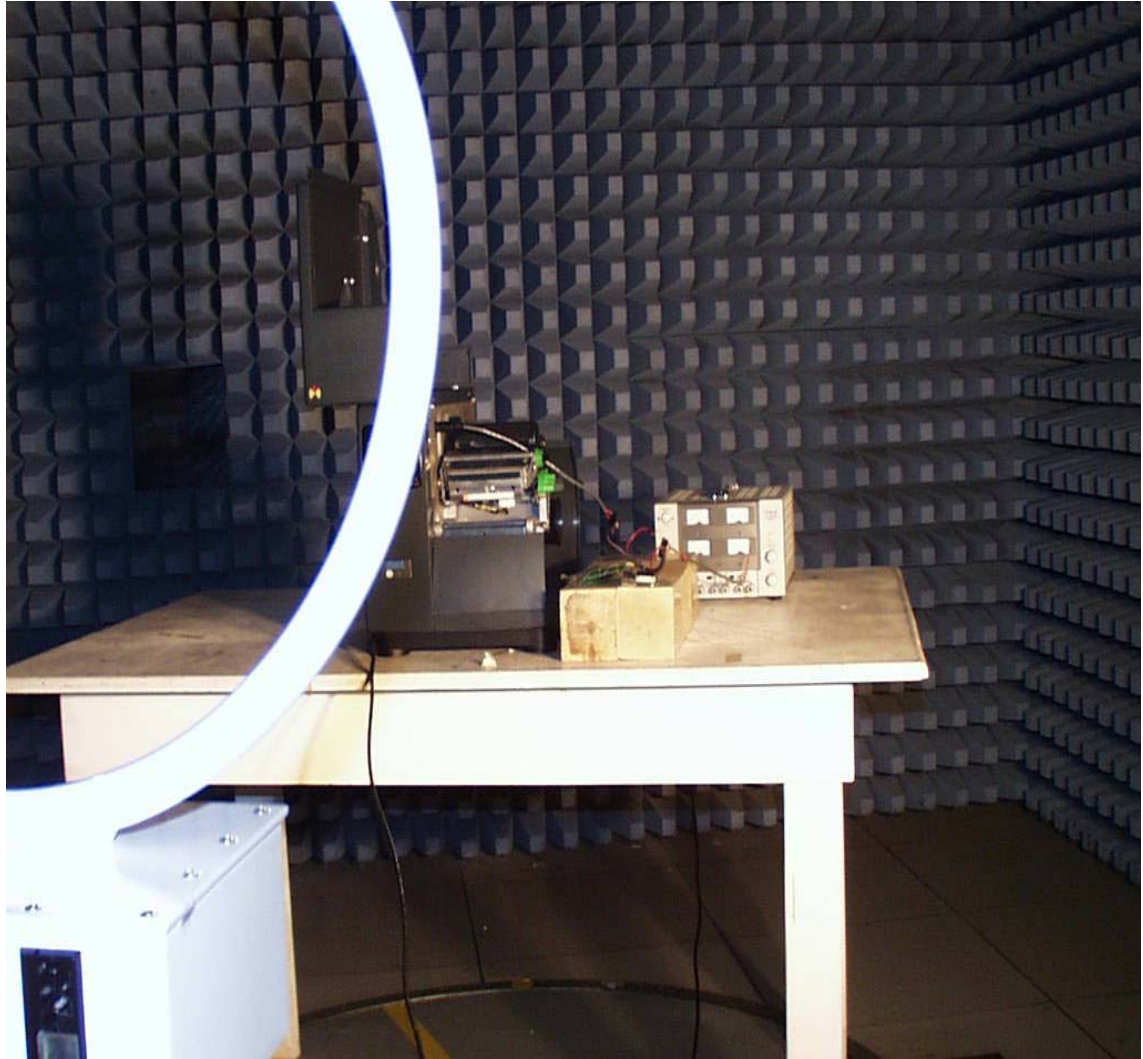
**EUT: e*Tag Quasar.
MODEL : ETO-RE-AOB**

**Frequency Tolerance
Temperature Test**



EUT: e*Tag Quasar.
MODEL : ETO-RE-AOB

Frequency Tolerance
Temperature Test



EUT: e*Tag Quasar.
MODEL : ETO-RE-AOB

Frequency Tolerance
Voltage variation Test

