TEST REPORT

Report Number: 30715861.011
Project Number: 3071586
February 28, 2005

Skyeread EA1 RFID Card Transmitter

FCC ID:

For
Urologix Inc.

Test Performed by:	Test Authorized by:
Intertek	Urologix Inc.
7250 Hudson Blvd. Suite 100	14405 21st Avenue North
Oakdale, MN 55128	Plymouth, MN 55447

Prepared by: _____ Date: February 28, 2005
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1.0 GENERAL DESCRIPTION

1.1 Related Submittals Grants

This is single application of the *SKYEREAD EA1 RFID Card Transmitter* for Certification under FCC Part 15, Subpart C.
There are no other simultaneous applications.

1.2 Product Description

SKYEREAD EA1 RFID Card Transmitter is operating at 13.56MHz. The intended use of the *RF ID Card Transmitter* is to generate and transmit a RF signal used to read ID tags.
The *SKYEREAD EA1 RFID Card Transmitter* powered at 120 VAC, 60 Hz.
The *SKYEREAD EA1 RFID Card Transmitter* antenna is a small footprint external antenna board connected to the transmitter via coaxial cable.

Sample Submitted: February 22, 2005
Test Work Started: February 22, 2005
Test Work Completed: February 23, 2005

1.3 Test Methodology

Emission measurements were performed according to the procedures in ANSI C63.4-2001. All field strength radiated emissions measurements were performed in the semi-anechoic chamber, and for each scan, the procedure for maximizing emissions in Appendices D and E were followed. All field strength radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The test site facility used to collect the radiated and conducted measurement data is located at 7250 Hudson Blvd., Suite 100, Oakdale, Minnesota. This test facility has been fully described in a report dated on March 2003 submitted to FCC. Please reference the site registration number: 90706, dated April 18, 2003.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

N/A

2.2 EUT Setup and Test Conditions

The EUT was setup as floor standing equipment with SKYEREAD EA1 RFID Card antenna connected to the transmitter inside the Control Unit (the PC tower) is m/n: 5000A, s/n: N122904-01via 6ft cable.
The EUT was powered at 120 VAC, 60 Hz. The transmitter was tested as a system.

Operating Frequency measurements were made at an ambient room temperature of 23°C, within the range of +15 to +25°C.

2.3 EUT Exercising Software

Urologix system "Hardware Interface Test" software was used to activated transmitter for continuous transmissions mode.

2.4 Special Accessories

There are no special accessories necessary for compliance of these products.

2.5 Equipment Modification

No modifications were installed during the testing.

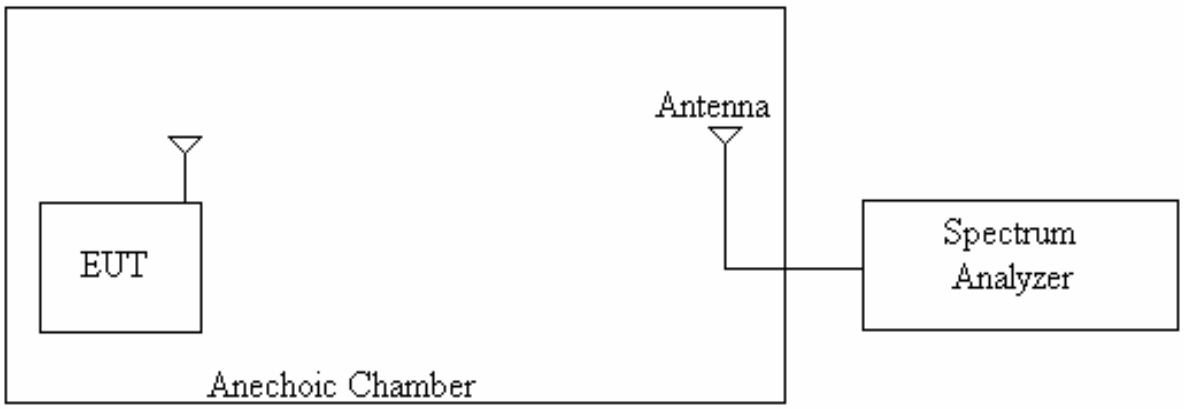
2.6 Support Equipment List and Description

N/A

2.7 Test Configuration Block Diagrams

The EUT was setup as floor standing equipment.
The EUT was powered at 120VAC, 60 Hz

Field Strength Measurements



3.0 TEST RESULTS

Data is included for the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs, data tables and graphical representations of the emissions are included.

The EUT is intended for operation under the requirements of Part 15 Subpart C. Specific test requirements include the following:

47 CFR 15.225(a)	Field Strength of Fundamental
47 CFR 15.225(b), 15.209	Field Strength of Spurious Emissions
47 CFR 15.225(b), 15.209	Out of Band Spurious Emissions
47 CFR 15.215(c)	Bandwidth of Emissions
47 CFR 15.207	Conducted Emissions

3.1 Field Strength of Radiated Emissions, FCC 15.225(a)(b), 15.209

Field Strength of Fundamental and Harmonics Emissions measurements were made with Fundamental frequency at 13. 56 MHz. The Harmonics emissions were tested up to 1000MHz.

The Tables 3-1-1 and 3-1-2 below show the Field Strength of Fundamental Radiation and Harmonics Emissions.

Radiated Emissions at Fundamental Frequency & 2nd Harmonic **Date:** 2/22/05

Company: Urologix
Model: Skyread EA1 RFID Card Transmitter
Test Engineer: Uri Spector
Standard: FCC Part 15.215(b), 15.209
Test Site: 10m distance Open Area Test Site
Note: Readings below 30MHz were taken with RBW 10KHz
Measurements were taken with CISPR Peak detector

Table # 3-1-1

Frequency	Antenna			Amplifier	Peak Reading	Net at 10m.	30m Limit	Margin	Comments
MHz	Polarity	Hts(cm)	Factor(dB/m)	Gain (dB)	$dB_{\mu}V$	$dB_{\mu}V/m$	$dB_{\mu}V/m$	dB	
13.560	V	100	9.24	0.0	62.7	71.9	80.0	-8.1	Fund.
13.560	H	100	9.24	0.0	55.1	64.3	80.0	-15.7	Fund.
27.120	V	100	12.49	28.4	36.8	20.9	29.5	-8.6	2-nd Harm.
27.120	H	100	12.49	28.4	36.2	20.3	29.5	-9.2	2-nd Harm.

Radiated Emissions		**Date:**	2/22/2005
Company:	Urologix		
Model:	Skyread EA1RF ID Card Transmitter		
Test Engineer:	Uri Spector		
Special Info:	FCC Part 15.225, 15.209		
Standard:	3m OATS, 3m measurement distance		
Test Site:	The table shows the worst case radiated emissions		
Note:	All measurements were taken using a CISPR Quasi-peak detector		

Table # 3-1-2

Frequency	Antenna			Total QP	QP Limit	Margin	Comments
MHz	Polarity	Hts(cm)	Factor (dB1/m)	dBµV/m	dBµV/m	dB	
40.68	V	100	13.7	39.9	40.0	-0.1	
54.24	V	100	8.2	32.8	40.0	-7.2	
67.80	V	100	7.2	30.5	40.0	-9.5	
81.36	H	200	8.5	28.5	40.0	-11.5	
94.92	H	200	10.9	37.5	44.0	-6.5	
108.48	H	100	13.2	27.4	44.0	-16.6	
122.84	H	183	13.8	30.3	44.0	-13.7	
216.96	H	132	11.9	34.0	46.0	-12.0	
230.52	H	125	12.6	29.5	46.0	-16.5	
257.64	V	226	16.1	28.5	46.0	-17.5	
284.76	V	196	16.0	26.8	46.0	-19.2	
298.32	V	190	16.3	29.1	46.0	-16.9	
312.06	H	100	16.6	40.7	46.0	-5.3	
325.44	H	100	17.0	34.2	46.0	-11.8	
339.00	H	100	17.3	34.0	46.0	-12.0	
352.56	H	100	17.7	30.8	46.0	-15.2	
366.12	H	100	17.9	33.8	46.0	-12.2	
379.68	H	100	18.2	29.0	46.0	-17.0	
406.80	V	100	18.9	31.0	46.0	-15.0	
433.12	V	154	19.9	34.2	46.0	-11.8	

3.2 Out of Band Spurious Emissions, FCC 15.225(b), 15.209

Out-of-band measurements were made for frequencies:
- 15.553MHz
- 15.567MHz.

The Table 3-2-1 shows the Out of Band Spurious Emissions.

Out of Band Spurious Emissions **Date:** 02-22-2005

Company: Urologix
Model: RF ID Card Transmitter
Test Engineer: Uri Spector
Special Config. Info: Open Area Test Site, 10m measurement Distance
Standard: FCC Part 15.225 and 15.209
Note: All warst-case measurements were taken using a Peak detector and RBW 1kHz.

Table # 3-2-1

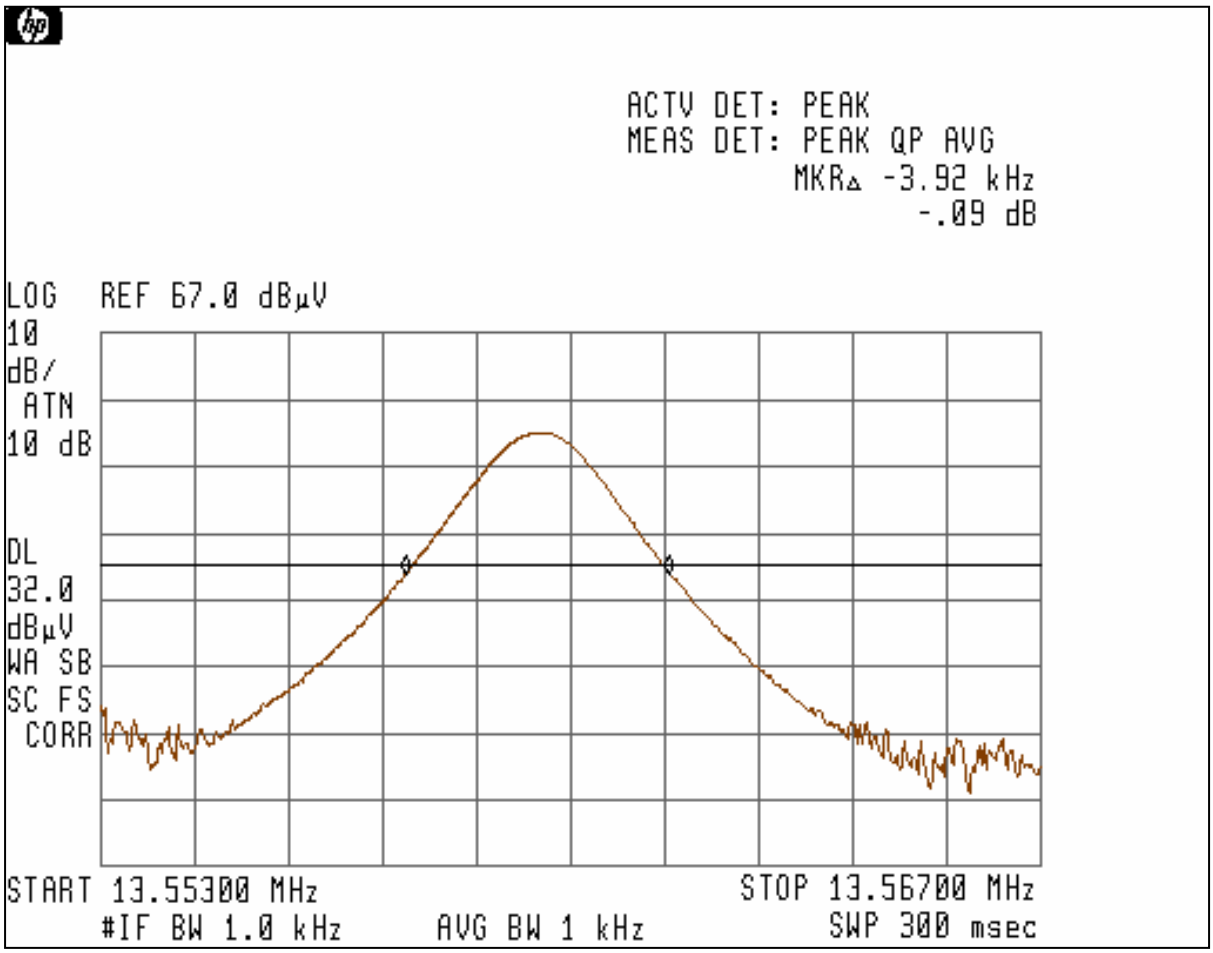
Frequency MHz	Peak Reading $dB_{\mu}V$	. Factor dB/m	Pre-amp. Gain (dB)	Net at 10m. $dB_{\mu}V/m$	Limit at 30m $dB_{\mu}V/m$	Margin dB	Comments
13.553	13.45	9.25	0.00	22.70	29.50	-6.80	
13.567	7.63	9.22	0.00	16.85	29.50	-12.65	

3.3 Bandwidth of Emissions, FCC 15.215(c)

Bandwidth of Emissions measurements was made for frequency of 13.56MHz.

Bandwidth of Emissions at –20dB level was measured at 3.92kHz.

Graph 3-3-1



3.4 Frequency Tolerance, FCC 15.225(c)

Frequency Stability with variation of ambient temperature was measured from –20 degrees C to +50 degrees C at frequency 13.56 MHz and rated power input 120VAC/60Hz.

Frequency Stability with variation of primary supply voltage was measured at 85% (102V) and 115% (138V) of rated AC Power Supply input voltage of 120V at frequency 13.56 MHz.

Table 3-4-1 below shows the frequency stability vs. temperature ambient and supply voltage.

Frequency Stability **Date:** 2-23-2005
Company: Urologix
Model: Skyread EA1 RFID Transmitter
Test Engineer: Uri Spector
Standard: FCC 15.225(c)

Table # 3-4-1

Temperature Degree C	Output Frequency MHz	Frequency Stability Hz	Freq. Tolerance + /- 0.01% Hz	Test Result
-20	13.56	30	1356	Pass
-10	13.56	24	1356	Pass
0	13.56	17	1356	Pass
10	13.56	8	1356	Pass
20	13.56	0	1356	Pass
30	13.56	7	1356	Pass
40	13.56	24	1356	Pass
50	13.56	30	1356	Pass
55	13.56	41	1356	Pass
Input Power AC Voltage V	Output Frequency MHz	Frequency Stability Hz	Freq. Tolerance + /- 0.01% Hz	Test Result
102	13.56	0.0	1356	Pass
110	13.56	0.0	1356	Pass
120	13.56	0.0	1356	Pass
130	13.56	0.0	1356	Pass
138	13.56	0.0	1356	Pass

3.5 Conducted Emissions, FCC 15.207

Conducted Emissions testing was performed in frequency range from 150kHz to 30MHz.
The Table # 3-5-1and Graph # 3-5-1 shows the Conducted Emissions.

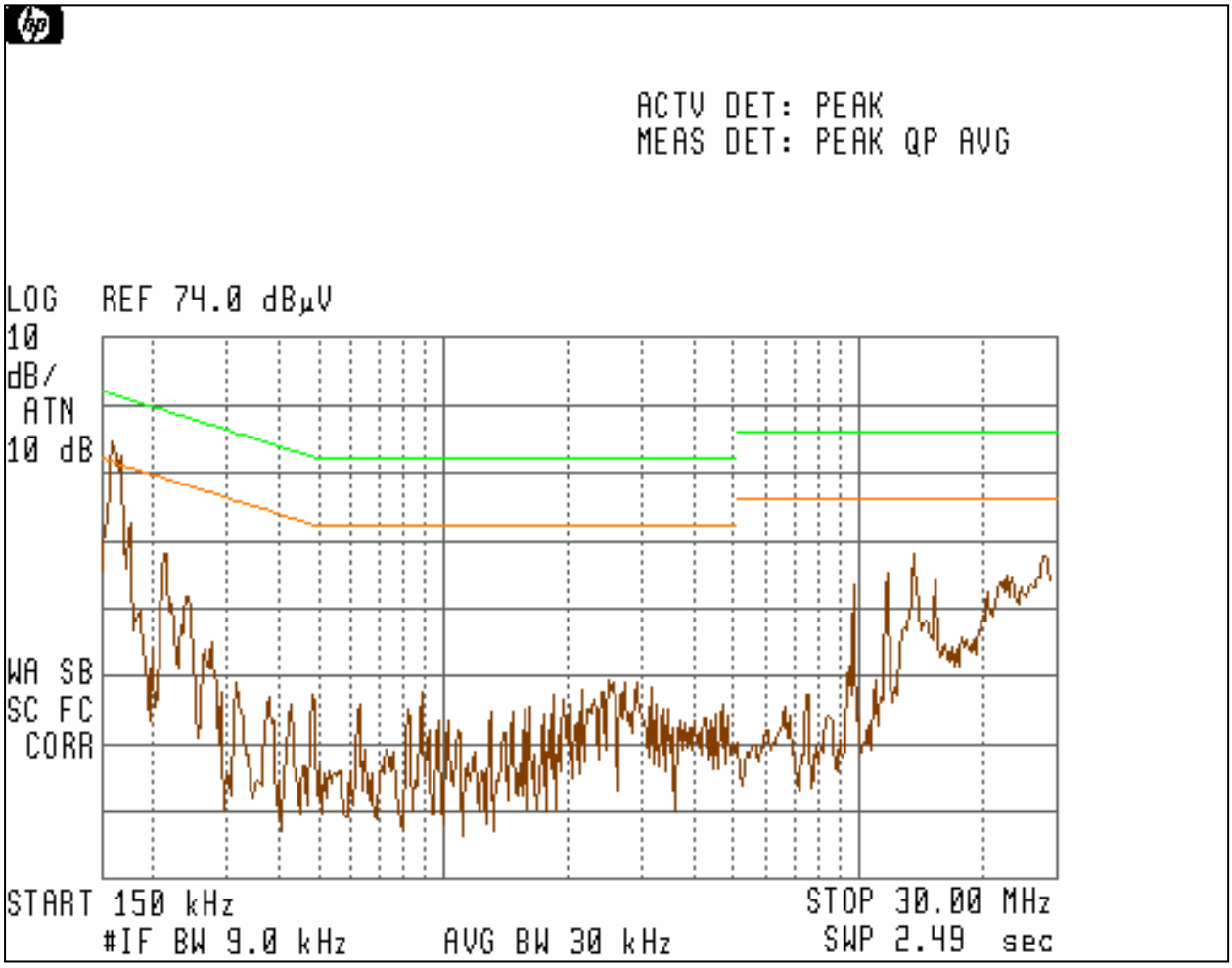
Conducted Emissions **Date:** 2/23/05

Company: Urologix
Model: Skyeread EA1 RF ID Card Transmitter
Test Engineer: Uri Spector
Standard: FCC Part 15.207
Note: The table shows the worst case conducted emissions
All measurements were taken using a CISPR Quasi-peak detector

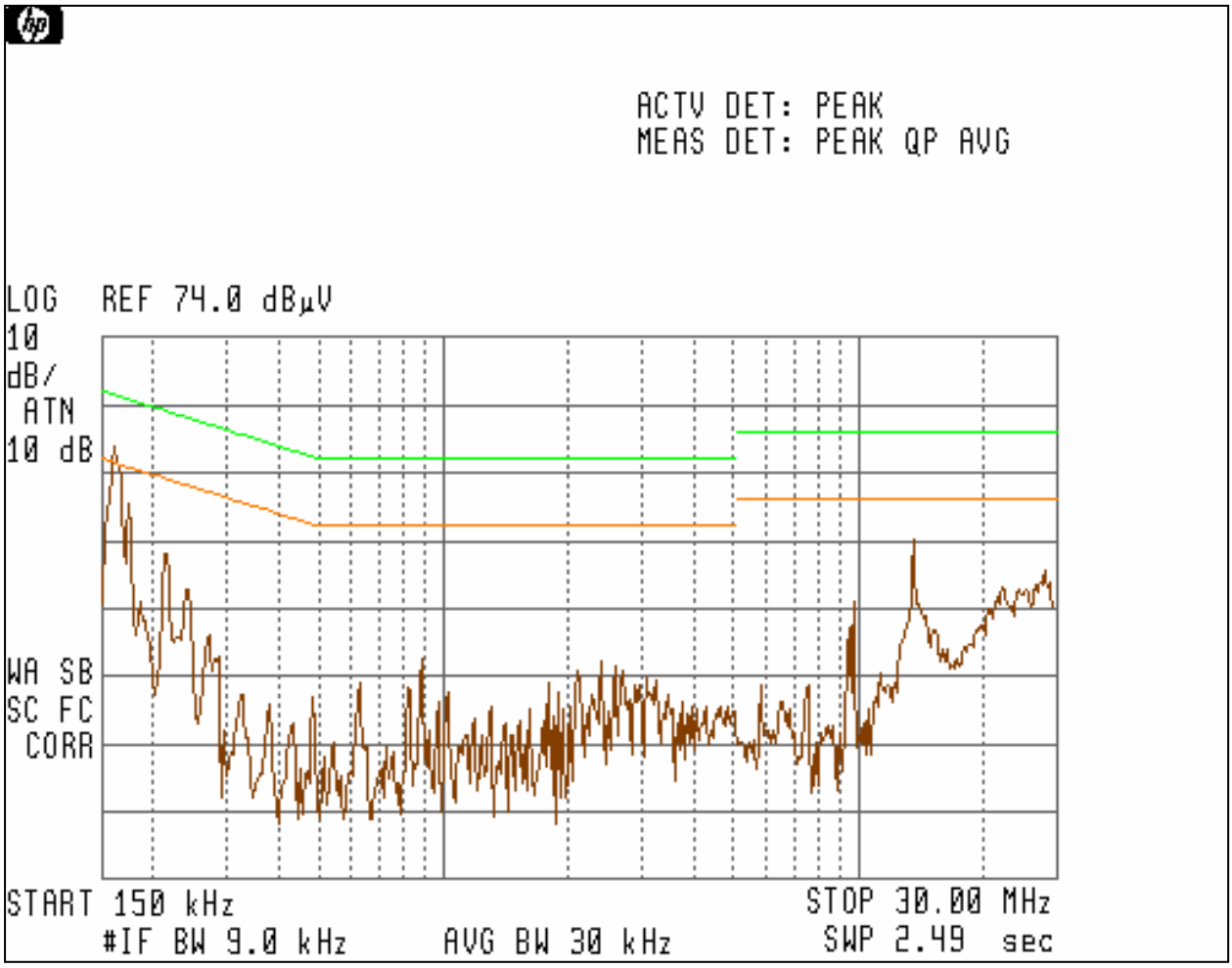
Table # 3-5-1

Frequency MHz	Line 1 QP (dBµV)	Line 2 QP (dBµV)	Line 1 AVG (dBµV)	Line 2 AVG (dBµV)	QP limit dBµV	AVG limit dBµV	QP Margin dB	AVG Margin dB
0.164	57.8	57.1	54.7	54.1	65.2	55.2	-7.4	-0.5
0.244	36.4	36.7	N/A	N/A	61.9	51.9	-25.2	N/A
1.249	15.6	17.2	N/A	N/A	56.0	46.0	-38.8	N/A
2.721	24.6	24.8	N/A	N/A	56.0	46.0	-31.2	N/A
5.389	12.5	15.1	N/A	N/A	60.0	50.0	-44.9	N/A
11.244	20.9	19.9	N/A	N/A	60.0	50.0	-39.1	N/A
13.560	45.6	45.5	N/A	N/A	60.0	50.0	-14.4	N/A
13.687	34.5	33.0	N/A	N/A	60.0	50.0	-25.5	N/A
19.845	28.7	27.3	N/A	N/A	60.0	50.0	-31.3	N/A
27.965	38.5	37.1	N/A	N/A	60.0	50.0	-21.5	N/A

Graph 3-5-1
Line 1 Conducted Emissions for Skyeread E1 RFID Card Transmitter



Graph 3-5-2
Line 2 Conducted Emissions for Skyeread E1 RFID Card Transmitter



3.6 Test Procedure

Field Strength Measurements

The EUT was placed on a non-conductive table 0.8m above the ground plane inside the Anechoic Chamber. The table was centered on a motorized turntable, which allows 360-degree rotation. The measurement antenna was positioned at 3m distance. The Bicono-Log antenna was used in frequency range from 30MHz to 1GHz. The radiated emissions were maximized by configuring the EUT, by rotating the EUT, by changing antenna polarization, and by changing antenna height from 1 to 4m. Method of the direct Field Strength Calculation is shown in Section 3.4.

Frequency Tolerance

The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output. The Chamber was programmed to cool from room temperature to minus 20 degrees C and then step in 10-degree increments to plus 55 degrees C. For Frequency Stability testing with variation of primary supply voltage the EUT power supply was powered at rated supply voltage at 120VAC/60Hz and then at 102VAC/60Hz and 138VAC/60Hz

Conducted Emissions

For conducted emissions testing, the equipment is moved to an insulating platform over the ground plane, and the EUT is powered from a LISN. Both sides of the AC line are measured and the results are compared to the applicable limits. Measurements are taken using CISPR quasi-peak and average detectors when the peak readings approach or exceed the average limit. Only quasi-peak readings are taken when the emissions from the EUT meet the average limit as measured with the quasi-peak detector.

3.7 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.
The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

Where: FS = Field Strength in dB(µV/m)
RA = Receiver Amplitude in dB(µV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(m^{-1})
AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(µV) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(µV/m).

RA = 48.1 dB(µV)
AF = 7.4 dB(m^{-1})
CF = 1.6 dB
AG = 16.0 dB
FS = RA + AF + CF - AG
FS = 48.1 + 7.4 + 1.6 – 16.0
FS = 41.1 dB(µV/m)

In the tables the Cable correction factors are included to the Antenna Factors.

Tested by:

Uri Spector
EMC Project Engineer
Intertek ETL SEMKO

Signature

Date: February 28, 2005

4.0 TEST EQUIPMENT

Receivers/Spectrum Analyzers

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
HP85462A Receiver RF Section	3549A00306	01/05	01/06	X
HP85460A RF Filter Section	3448A00276	01/05	01/06	X

Antennas/Pre-Amplifiers

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
Schaffner-Chase Bicono-Log Antenna	2630	06/04	06/05	X
AH Systems, SAS-200/652B Loop Antenns	215	03/04	03/05	X

Artificial Mains Networks/Absorbing Clamps

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
FCC LISN-2	316	05/04	05/05	X

EXHIBIT 1
CONFIGURATION PHOTOS

Radiated Emissions Test Configuration

Radiated Emissions Test Configuration

Line Conducted Emissions Test Configuration

Line Conducted Emissions Test Configuration