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EMC DIRECTIVE 89/336/EEC

CE EVALUATION

TEST REPORT

PER EN 61326-1

For The Fiber Optic Testing Kit

Model: FiberMaster 33-927, 33-926

PREPARED FOR:

Ideal Industries
9650 Chesapeake
San Diego, CA 92123

PREPARED ON MARCH 21, 2008

REPORT NUMBER: 2008 0311875 EMC

PROJECT NUMBER: 11875-1

NEX NUMBER: 104114

DOCUMENT HISTORY

REVISION	DATE	COMMENTS
-	March 21, 2008	Prepared By: Ferdinand Custodio
-	March 21, 2008	Initial Release: M. Krumweide

NOTE: Nemko USA, Inc. hereby makes the following statements so as to conform to the Subclause 5.10 Requirements of ISO/IEC 17025 "General Criteria For the Competence Of Testing and Calibration Laboratories":

- The unit described in this report was received at Nemko USA, Inc.'s facilities on March 20, 2008.
- Testing was performed on the unit described in this report on March 20-21, 2008.
- The Test Results reported herein apply only to the Unit actually tested, and to substantially identical Units.
- This report does not imply the endorsement of the Federal Communications Commission (FCC), NVLAP or any other government agency.

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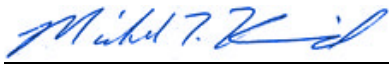
CERTIFICATION

The compatibility testing and this report have been prepared by Nemko USA, Inc., an independent electromagnetic compatibility consulting and test laboratory.

As specified by European Union harmonized document EN 61326, the testing and test methods were accomplished in accordance with European Norm's specifications for Electrical Equipment for Measurement, Control, and Laboratory Use.

I certify the data evaluation and equipment configuration herein to be a true and accurate representation of the sample's immunity and emission characteristics, as of the test date(s), and for the design of the test sample utilized to compile this report.



Michael T. Krumweide
EMC Supervisor

1. ADMINISTRATIVE DATA AND TEST SUMMARY

1.1. Administrative Data

CLIENT:	Ideal Industries 9650 Chesapeake San Diego, CA 92123 858-715-7081 (858) 451-6012--fax
CONTACT:	Jarek Kanikula
EMAIL:	jarek@knikula@idealindustries.com
DATE (S) OF TEST:	March 20-21, 2008
EQUIPMENT UNDER TEST (EUT):	Fiber Optic Testing Kit
MODEL	FiberMaster 33-927, 33-926
CONDITION UPON RECEIPT	Suitable for Test
TEST SPECIFICATION:	Radio Frequency Emissions and Electromagnetic Immunity tests in accordance with requirements of EN 61326-1: 2006.
EMC TEST PLAN:	Please see Section 1.3 to Section 2.4 for details.
PERFORMANCE CRITERIA:	Continuous monitored operation

1.2. Test Standards

Test Type	*In Accordance with Document*	*Document Title*
Conducted and Radiated Emissions	EN 61326-1: 2006, Class "B"	Electrical equipment for measurement, control and laboratory use - EMC requirements
Power Line Harmonics	EN 61000-3-2: 2000/A2: 2005	Electromagnetic Compatibility, Limits for Harmonic Current Emissions, Equipment Input Current ≤ 16A
Power Line Flicker	EN 61000-3-3: 1995/A1: 2001/A2: 2005	Electromagnetic Compatibility, Limitation of Voltage Fluctuations and Flicker In Low-Voltage Supply Systems for Equipment with Rated Current ≤ 16A
Electrostatic Discharge Immunity	IEC 61000-4-2: 1995/A1: 1998/A2: 2000	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Electrostatic Discharge Requirements
Radio Frequency Immunity	IEC 61000-4-3: 2006	Electromagnetic Compatibility, Basic Immunity Standard, Radiated Radio Frequency Electromagnetic Field, Immunity Test
Electrical Fast Transient Burst Immunity	IEC 61000-4-4: 2004 +Corrigendum 1: 2006	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Electrical Fast Transient / Burst Requirements
Power Line Surge Immunity	IEC 61000-4-5: 2005	Electromagnetic Compatibility, Power Line Surge Immunity
RF Common Mode Immunity	IEC 61000-4-6: 2003/A1: 2004/A2: 2006	Electromagnetic Compatibility - Basic Immunity Standard - Conducted Disturbances Induced By Radio-Frequency Fields - Immunity Test
Voltage Dips and Short Interruptions Immunity	IEC 61000-4-11: 2004	Electromagnetic Compatibility - Testing and Measurement Techniques - Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

1.3. Test Summary

1.3.1. Emissions Test Summary

Specification	*Frequency Range*	*Compliance Status*
EN 61326-1: 2006, Class "B" Conducted Emissions	0.15 MHz – 30 MHz	**N/A**
EN 61326-1: 2006, Class "B" Radiated Emissions	30 MHz – 1000 MHz	**PASS**
EN 61000-3-2: 2000/A2: 2005 Power Line Harmonics	up to the 40th Harmonic	**N/A**
EN 61000-3-3: 1995/A1: 2001/A2: 2005 Power Line Flicker	$\leq$ 4% Maximum Relative Voltage Change; Value of D(T) $\leq$ 3% for more than 200 Ms	**N/A**

N/A – Test not required for Portable test and measurement equipment that is powered by battery.

Test Supervisor: 

Michael T. Krumweide, Nemko USA, Inc

1.3.2. Immunity Test Summary

Specification	*Minimum Criterion Level Required as per EN 61326*	*Criterion Level Tested*	*Compliance Status*
IEC 61000-4-2: 1995/A1: 1998/A2: 2000 - ESD Immunity	**Criterion B** ±4 kV air discharge, ±4 kV contact discharge	**Criterion B** ±8 kV air discharge, ±4 kV contact discharge	**PASS**
IEC 61000-4-3: 2006 -Radio Frequency Immunity	**Criterion A** 3 V/m from 80-1000 MHz (80% AM at 1kHz)	**Criterion A** 3 V/m from 80-6000 MHz (80% AM at 1kHz)	**PASS**
IEC 61000-4-4: 2004 +Corrigendum 1: 2006 -Electrical Fast Transient Immunity	**Criterion B** Power line pulses of ± 1 kV; I/O line pulses of ± 0.5 kV	**Criterion B** Power line pulses of ± 1 kV I/O line pulses of ± 0.5 kV	**N/A**
IEC 61000-4-5: 2005 -Surge Immunity	**Criterion B** ±1kV common mode surges, ±0.5kV differential mode surges	**Criterion B** ± 1kV common mode surges, ± 0.5kV differential mode surges	**N/A**
IEC 61000-4-6: 2003/A1: 2004/A2: 2006-RF Common Mode Immunity	**Criterion A** 150 kHz - 80 MHz at 3 Vrms 1 kHz 80% amplitude modulated	**Criterion A** 150 kHz - 80 MHz at 3 Vrms 1 kHz 80% amplitude modulated	**N/A**
IEC 61000-4-8: 1993/A1: 2000 Power Frequency Magnetic Field Immunity	**Criterion A** Loop Antenna at 50 Hz and 60Hz, to 30 amps (rms) per meter	**Criterion A** Loop Antenna at 50 Hz and 60Hz, to 30 amps (rms) per meter	**N/A**
IEC 61000-4-11: 2004 - Voltage Dips and Short Interruptions	**Criterion B** Voltage Reductions of 100% for 1 cycle.	**Criterion B** Voltage Reductions of 100% for 1 cycle.	**N/A**

Refer to the test results section for further details.

N/A – Test not required for Portable test and measurement equipment that is powered by battery.

Test Supervisor: 

Michael T. Krumweide, Nemko USA, Inc.

2. SYSTEM CONFIGURATION

2.1. Description and Method of Exercising the EUT

The FiberMaster 33-927, 33-926 is a Fiber Optic Testing Kit. Its function is to measure absolute power and calculate the loss of fiber optic links at several wavelengths. The EUT was exercised by continuously measuring absolute power and by checking cable loss. If the measurements are disrupted as seen/indicated by the LCD display, or there is loss of functionality, may be considered a failure.

The EUT's performance during test was evaluated against the performance criterion specified by applicable test standards. Performance results are detailed in the test results section of this report.

2.2. System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Fiber Optic Testing Kit (Power Meter)	Ideal Industries Model: FiberMaster 33-927 Serial #: N/A	(3X) AAA Alkaline Batteries
EUT – Fiber Optic Testing Kit (Light Source)	Ideal Industries Model: FiberMaster 33-926 Serial #: N/A	(3X) AAA Alkaline Batteries

2.3. Device Interconnection and I/O Cables

Connection	I/O Cable
Fiber Optic Cables (2) with calibration coupler	2 meter,Optical Cable Corporation AX01-030N-ALS-900, 50/125UM

2.4. Design Modifications for Compliance

Device: Fiber Optic Testing Kit

Model: FiberMaster 33-927, 33-926

The following design modifications were made to the EUT during testing.

None. No design modifications were made to the EUT during testing.

3. DESCRIPTION OF TESTING METHODS

3.1. Introduction

Under the EMC Directive 89/336/EEC (as amended by 92/31/EEC) of the European Union (EU), a device is required to be constructed so that "the electromagnetic disturbance it generates does not exceed a level allowing radio and telecommunications equipment and other apparatus to operated as intended" and that the device "has an adequate level of intrinsic immunity of electromagnetic disturbance to enable it to operate as intended." The Directive requires that all products brought into service within the EU comply with all applicable EMC requirements published as harmonized documents known as European Norms (EN).

The methods employed to test the emissions and immunity characteristics of the Equipment Under Test are those mandated by the European Standard EN 61326-1: 2006, Which is the harmonized document published for Measurement, Control and Laboratory use equipment. The applicable tests are listed in the administrative section of this report.

For General Test Configuration please refer to the following page.

Photograph 1. General EUT Test Configuration

3.2. Configuration and Methods of Measurements for Conducted Emissions

EN 61326-1 specifies the general configuration of the EUT and associated equipment, as well as the test platform for conducted emissions testing. Floor standing devices are placed on a ground plane floor and 40 centimeters from a vertical ground plane wall. The EUT was powered via an Artificial Mains Network (AMN). Both quasi-peak and average detector measurement modes are used. If however, the average limit is met while using a quasi-peak detector, the test unit is deemed to meet both the limits, and measurement with the average detector receiver is unnecessary. The quasi-peak and average emission levels are then recorded and compared to the applicable limits to determine compliance.

3.3. Configuration and Methods of Measurements for Frequency Identification

When performing all testing of equipment, the actual emissions of the EUT are segregated from ambient signals present within the laboratory or the open-field test range. Preliminary testing is performed to ensure that ambient signals are sufficiently low to allow for proper observation of the emissions from the EUT. Ambient signals within the laboratory are compared to those noted at the nearby open-field site to discriminate between signals produced from the EUT and ambient signals. In the event that a significant emission is produced by the EUT at a frequency that is also demonstrating significant ambient signals, the spectrum analyzer is placed in the peak mode, the bandwidth is narrowed and the EUT's signal is centered on the analyzer. The scan width is expanded to 50 kHz while monitoring the audio to ensure that only the EUT signal is present, the analyzer is switched to quasi-peak mode, and the level of the EUT signal is recorded.

3.4. Configuration and Methods of Measurements for Radiated Emissions

EN 61326 also specifies limits and methodology for radiated emissions testing. Initially, the primary emission frequencies are identified inside a shielded chamber by positioning a broadband receive antenna one meter from the EUT. Next, the EUT and associated system are placed on a turntable on a ten-meter open area test site (OATS) with known attenuation characteristics and all significant radiated emissions are recorded. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to produce horizontal and vertical polarities, and the turntable is also rotated to determine the worst emitting configuration. The numerical results of the test are included herein to demonstrate compliance. The numerical results of the test are included herein to demonstrate compliance.

The numerical results that are applied to the emissions limits are arrived at by the following method:
Example: A=RR+CL+AF
A = Amplitude dBuV/M
RR = Receiver Reading dBuV
CL = cable loss dB
AF = antenna factor dBm-1

Example Frequency = 110MHz
18.5 dBuV (spectrum analyzer reading)
+3.0 dB (cable loss @ frequency)
21.5 dBuV
+15.4 dBm-1 (antenna factor @ frequency)
36.9 dBuV/M Final adjusted value

The final adjusted value is then compared to the appropriate emission limit to determine compliance.

3.5. Statistical Sampling Required for Continued Compliance

For quality assurance of ongoing productions to comply with RFI interference limits, CISPR 22 Clause 7 stipulates a statistical sampling procedure. In summary, this rule states that the manufacturer should ensure 80% of the units must be in compliance with an 80% confidence level. Refer to CISPR Publication 22,, Clause 7 for a detailed description of the sampling procedure.

3.6. Device Performance Criteria for Immunity Tests

Three criteria of acceptable performance are defined by EN 61326. These are as follows

- **Criterion A** - The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

- **Criterion B** - During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention. The performance level may be replaced by a permissible loss of performance. If the manufacturer does not specify the minimal performance level (or the permissible performance loss), then either of these may be derived from the product description and documentation, or by what the user may reasonably expect from the equipment if used as intended.

- **Criterion C** - Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

For each test method, EN 61326 specifies the appropriate criterion to be met.

3.7. Electrostatic Discharge Immunity: IEC 61000-4-2: 1995/A1: 1998/A2: 2000

EN 61326 specifies the IEC 61000-4-2 Standard as the basic procedure for ESD testing. The standard configuration as outlined in IEC 61000-4-2: 1995/A1: 1998/A2: 2000 is used. Tabletop devices are placed on an insulated mat on a horizontal coupling plane. Air discharges and contact charges are made to the EUT on connectors and conducting surfaces (as illustrated in the Test Results section of this Test Report). The discharges shall be applied in two ways:

a) Contact Discharges to the conductive surfaces and to coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test pints (a minimum of 50 discharges at each point). One of the test points shall be subjected to at least 50 indirect discharges (contact) to the center of the front edge of the horizontal-coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode.

b) Air Discharge at slots and apertures, and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. This investigation should be restricted to those areas normally handled by the user. A minimum of 10 single air discharges of each polarity and test level shall be applied to the selected test point for each area.

For further information, please refer to the technical sections in the IEC 61000-4-2: 1995/A1: 1998/A2: 2000 publication in addition to the test results section and photographs of the test set-up provided in this report.

For ESD tests, EN 61326 requires that the EUT meet at least performance Criterion B for discharges of up to ±4 kV air discharge and ±4 kV contact discharge.

3.8. Radio Frequency Immunity: IEC 61000-4-3: 2006

EN 61326 specifies the IEC 61000-4-3 Standard for radio frequency (RF) immunity requirements and test methods for equipment that is required to withstand electromagnetic (EM) fields. The RF immunity test entails subjecting the equipment under test to a uniform field of radiated electromagnetic energy of a specified field strength and frequency, and monitoring the functionality of the device as the frequency is swept over a specified frequency range.

The specification limits and technical parameters for testing are outlined in the IEC 61000-4-3: 2006 Standard. This edition of the publication specifies a transmit antenna to EUT distance of 3m and a frequency range of 80 MHz to 1000 MHz (80% amplitude modulated at a 1 kHz rate). The standard configuration as outlined in IEC 61000-4-3: 2006 is used. The EUT is set up inside a shielded, semi-anechoic chamber with a radiating antenna at a distance of 3 meters from the EUT. For further information, please refer to the technical sections in the IEC 61000-4-3: 2006 publication in addition to the test results section and photographs of the test set-up provided in this report.

For radio frequency immunity tests, EN 61326 specifies that the EUT meet performance Criterion A for a minimum field strength of 3 V/m.

4. Test Results

4.1. Radiated Emissions Test Data

NEMKO USA, Inc.

San Diego Headquarters:
11696 Sorrento Valley Rd.
San Diego, CA 92121
Tel: (858) 755-5525
Fax: (858) 452-1810

Radiated Emissions Data

Job # :	11875-1	Date :	3-18-08	Page	1 of 1
NEX #:	104114	Time :	11:00A		
		Staff :	J. Garcia		
Client Name :	Ideal Industries			EUT Voltage :	
EUT Name :	Measurement Device			EUT Frequency :	
EUT Model # :	FiberMaster 33-927, 33-926			Phase:	
EUT Serial # :				NOATS	x
EUT Config. :	Battery-Powered			SOATS	
				Distance < 1000 MHz:	10 m
				Distance > 1000 MHz:	3 m
Specification :	EN61326: Class B				
Loop Ant. #:	NA				
Bicon Ant.#:	114	Temp. (°C) :	14.6		
Log Ant.#:	755	Humidity (%) :	66		
DRG Ant. #	NA	Spec An.#:	711		
Cable LF#:	NOATS	Spec An. Display #:	404		
Cable HF#:		QP #:	421		
Preamp LF#:	901	PreSelect#:	NA		
Preamp HF#					

Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	1 MHz
	Video Bandwidth	3 MHz
Average	RBW:	1 MHz
	Video Bandwidth	10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
32.1	25.4	29.9	Q	B	1.0	29.86	11.7	30.0	-18.3	Pass	
46.8	21.5	37.4	Q	R	2.5	37.38	18.3	30.0	-11.7	Pass	
70.2	24.3	44.6	Q	B	1.0	44.58	22.9	30.0	-7.1	Pass	
78.4	23.8	42.4	Q	L	1.0	42.37	19.5	30.0	-10.5	Pass	
87.9	23.1	41.1	Q	B	1.0	41.05	18.9	30.0	-11.1	Pass	
205.0	24.9	24.6	Q	B	1.0	24.92	9.2	30.0	-20.8	Pass	
924.0	24.8	24.0	Q	B/L	1.0	24.82	21.2	37.0	-15.8	Pass	

Radiated Emissions Test Equipment

Client	Ideal Industries	EUT Name	Fiber Optic Testing Kit
PAN #	11875-1	EUT Model	FiberMaster 33-927, 33-926

Nemko ID	Device	Manu.	Model	Serial Number	Cal Date	Cal Due Date
114	Antenna, Bicon	EMCO	3104	2997	10-Jan-08	10-Jan-09
755	Antenna, LPA	EMCO	3147	1246	10-Oct-07	10-Oct-09
901	pre amp	Sonoma	310 N	185803	10-Jul-07	10-Jul-08
711	Spectrum Analyzer	HP	8566B	2747A04729	21-Feb-08	21-Aug-08
404	Spectrum Analyzer Display	HP	85662A	2648A15448	27-Jun-07	27-Jun-08
421	Quasi-Peak Adapter	HP	85650A	3145A01672	21-Feb-08	21-Feb-09

4.2. Electrostatic Discharge Immunity Test Results & Test Points

Client:	Ideal Industries	Temperature:	73	degF
PAN #:	11875-1	Relative Humidity:	37	%
EUT Name:	Fiber Optic Testing Kit	Barometric Pressure:	30.53	Hg
EUT Model:	FiberMaster 33-927, 33-926	Test Location	West Ground Plane	
Governing Doc:	EN 61326	Test Engineer	Juan Garcia	
Basic Standard:	IEC 61000-4-2	Date:	3/20/08	
Voltage:	230VAC/ 50Hz			

Discharge Rep. Rate	X	≥ 1 per second		
Number of Discharges	X	≥ 10 per location		

Equipment Used

Device Type	*Model #*	*Asset #*	*Used*	*Cal Done*	*Cal Due*
ESD Gun, Haefely	PSD-25B	639			
ESD Generator	Transient 2000	845	X	5/30/07	5/30/08
ESD Gun, EMC-Partner	ESD 2000	890	X	5/29/07	5/29/08

Location of Discharge

Contact Discharge

Voltage (kV)	Polarity		Test Points	HCP	VCP
	Pos	Neg			
2	X	X		X	X
4	X	X		X	X

Comments: No ESD events. EUT functions as intended.

Air Discharge

Voltage (kV)	Polarity		Test Points
	Pos	Neg	
2	X	X	
4	X	X	
8	X	X	

Comments: No ‘Spark’ Event Occurred. EUT functions as intended.

Compliant	X		Non-Compliant			Photo X

Figure 1. ESD Test Points

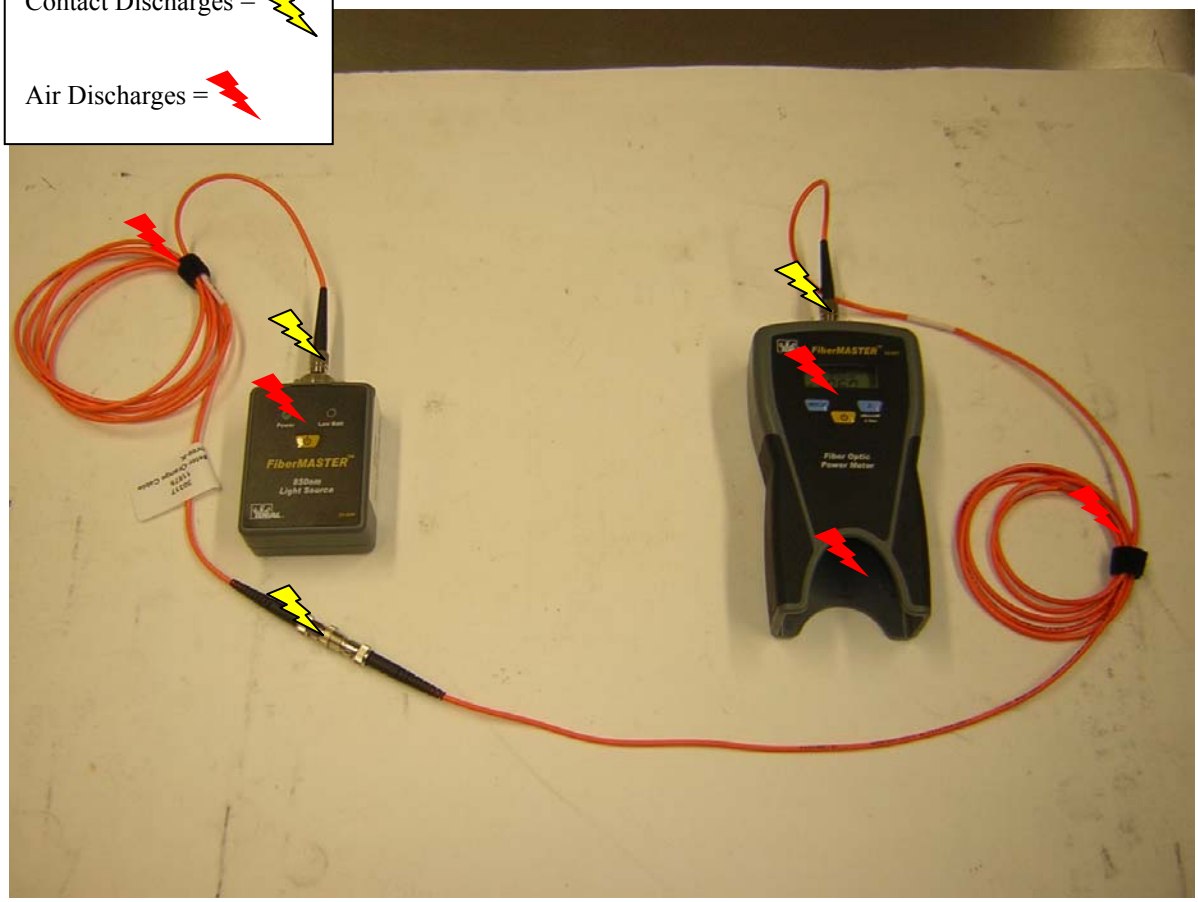


Figure 2. ESD Test Points

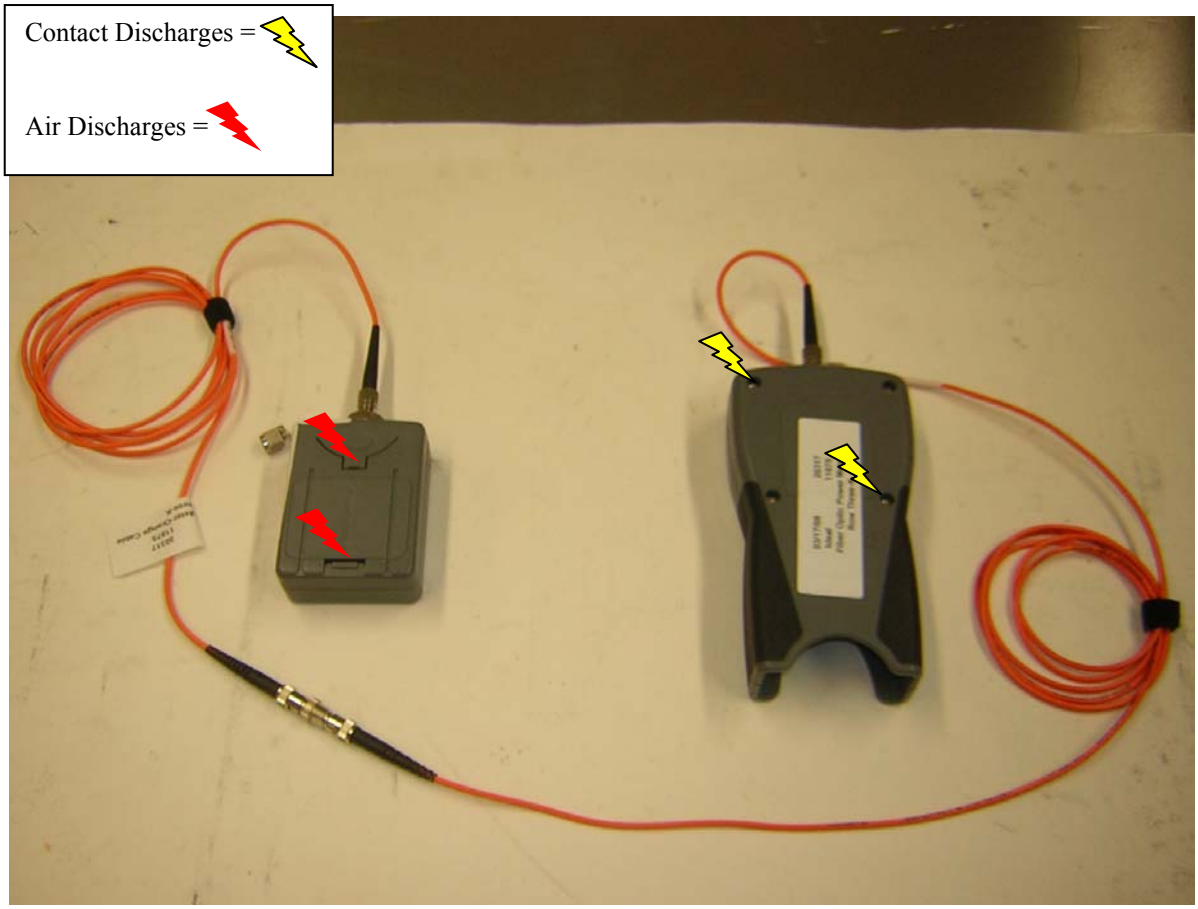


Figure 3. ESD Test Points

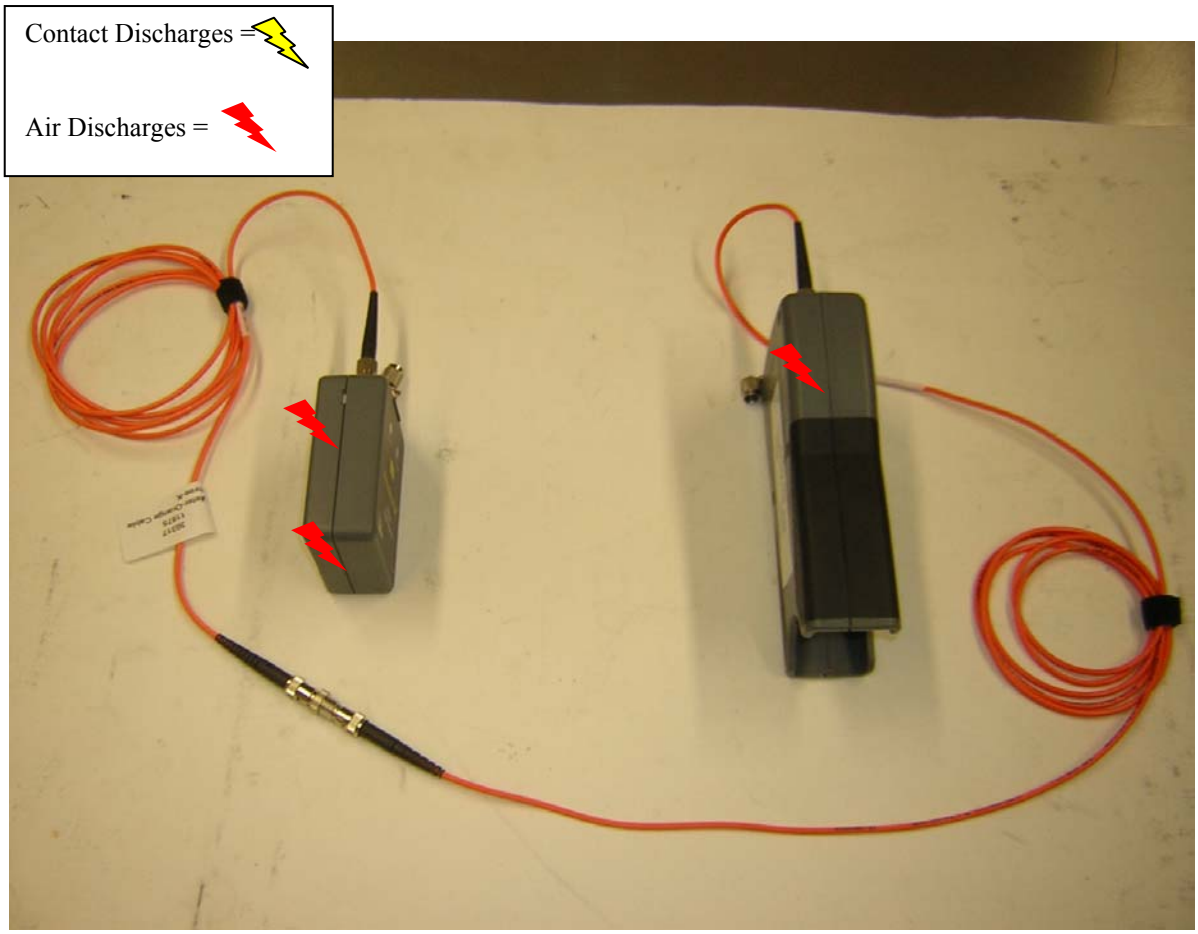
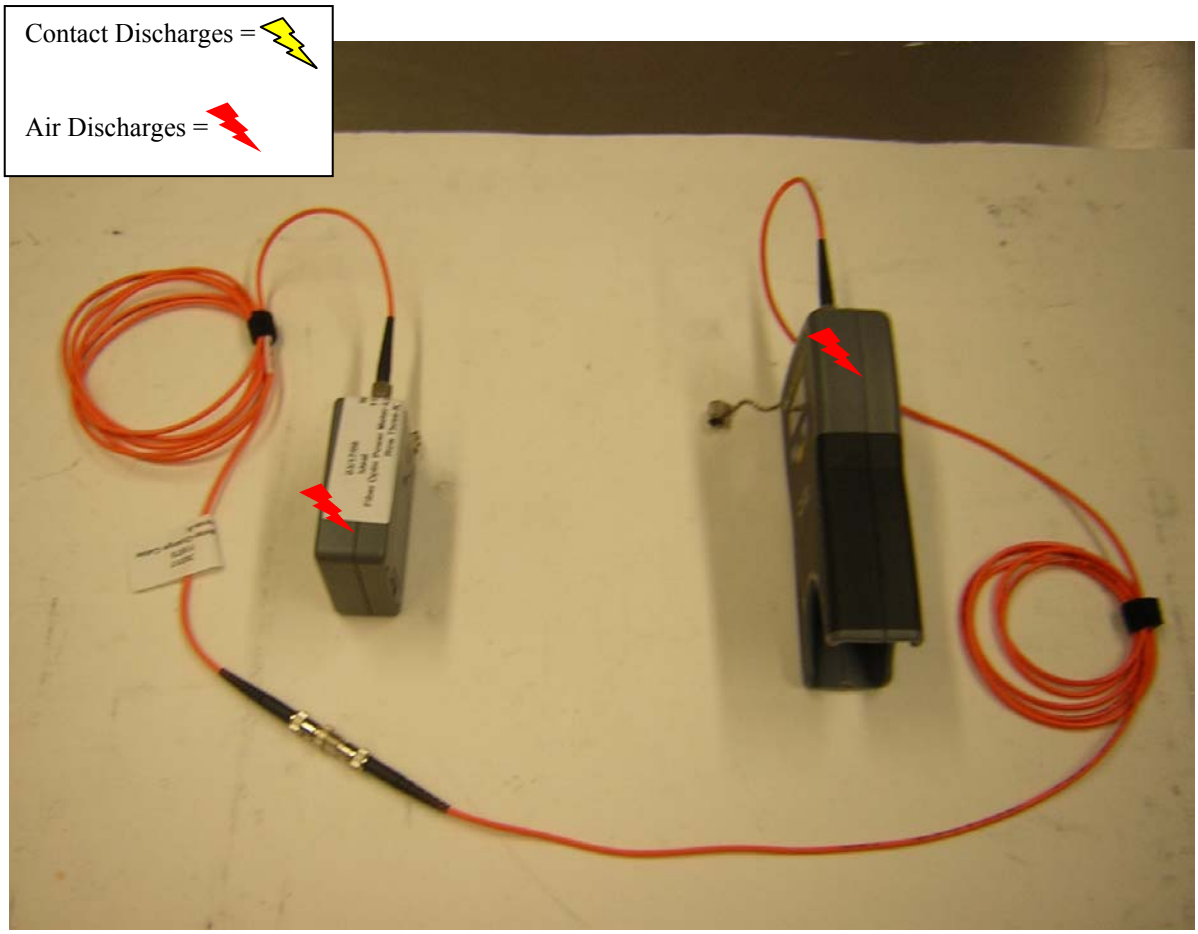


Figure 4. ESD Test Points



4.3. Radio Frequency Immunity Test Results

Client:	Ideal Industries	Temperature:	74 °F
PAN #:	11875-1	Relative Humidity:	37 %
EUT Name:	Fiber Optic Testing Kit	Barometric Pressure:	30.51 Hg
EUT Model:	FiberMaster 33-927, 33-926	Test Location	Anechoic Chamber
Governing Doc:	EN 61326	Test Engineer	Juan Garcia
Basic Standard:	IEC 61000-4-3	Date:	March 20, 2008
Voltage:	230VAC/ 50Hz		

Threat Levels

Frequency (MHz):		27-500		80-1000		26-1000	X	80-2700
Test Level:		1V/m	X	3V/m		10V/m		200V/m
Modulation:		None (CW)	X	80% AM, 1kHz		50% PM, 200Hz		
Frequency Step:	X	1%		3%				
Dwell Time:	X	1 sec		3 sec		10 sec		
Performance Criteria:	X	A		B		C		

Frequency (MHz)	Antenna Polarization		Compliant		Orientation F: Front R: Rear SL: Side, Left SR: Side, Right	Comments
	H	**V**	**Y**	**N**		
80-200MHz	X	X	X		F	EUT functions as intended
80-200MHz	X	X	X		SR	EUT functions as intended
80-200MHz	X	X	X		R	EUT functions as intended
80-200MHz	X	X	X		SL	EUT functions as intended
200MHz – 1GHz	X	X	X		F	Variance observed – see notes
200MHz – 1GHz	X	X	X		SR	Variance observed – see notes
200MHz – 1GHz	X	X	X		R	Variance observed – see notes
200MHz – 1GHz	X	X	X		SL	Variance observed – see notes
1000 to 2700 MHz	X	X	X		F	EUT functions as intended
1000 to 2700 MHz	X	X	X		SR	EUT functions as intended
1000 to 2700 MHz	X	X	X		R	EUT functions as intended
1000 to 2700 MHz	X	X	X		SL	EUT functions as intended
2700 to 6000 MHz	X	X	X		F	EUT functions as intended
2700 to 6000 MHz	X	X	X		SR	EUT functions as intended
2700 to 6000 MHz	X	X	X		R	EUT functions as intended
2700 to 6000 MHz	X	X	X		SL	EUT functions as intended

Test Notes:
A 0.05dBm variance was observed during testing. A 0.05dBm change is well within the 5% accuracy level as described in the manual from the measurement range of -60 to +3dBm.

Compliant	X	Not Compliant			Photo	X

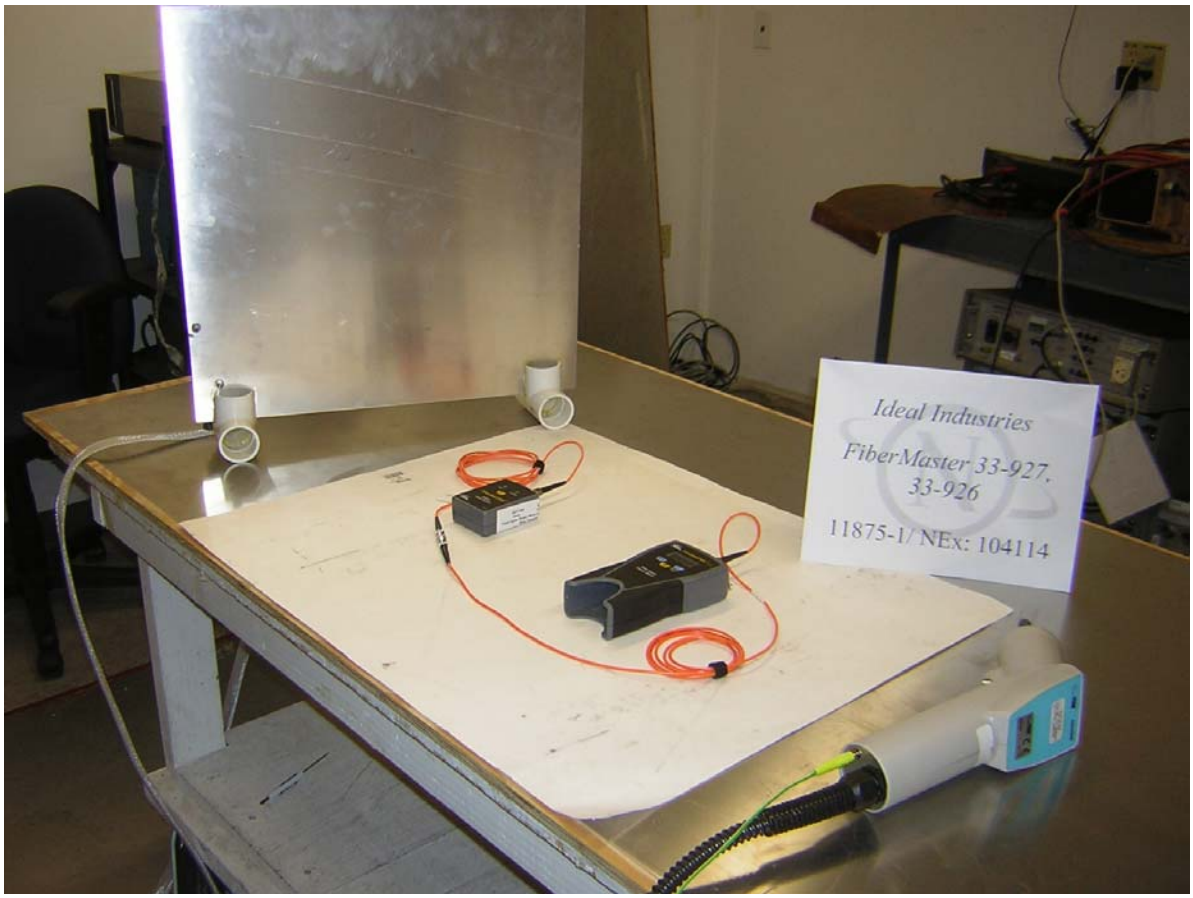
Radio Frequency Immunity Test Equipment

Client	Ideal Industries	EUT Name	Fiber Optic Testing Kit
PAN #	11875-1	EUT Model	FiberMaster 33-927, 33-926

Device Type	*Model #*	*Asset #*	*Used*	*Cal Done*	*Cal Due*
Signal Generator					
HP	8542B	751			
HP	8648	746			
Gigatronics	1018	440	X	7/10/07	7/10/08
Fluke	6060B	212			
Agilent	E8254A	836	X	12/4/07	12/4/08
Field Sensors					
AR	FP4000	730			
AR	FP4080	733	X	9/19/07	9/19/08
Amplifier / Directional Couplers					
AR	2500L:	739		NCR	NCR
AR	DC2035	727		NCR	NCR
AR	500W1000M5	740	X	NCR	NCR
AR	DC618D	747		NCR	NCR
AR	200T1G3M3	743	X	NCR	NCR
AR	DC714D	724		NCR	NCR
AR	200T2G8M4	744		NCR	NCR
AR	DC7280	726		NCR	NCR
AR	200T8G18M3	745		NCR	NCR
AR	DC7450	723		NCR	NCR
Antennas					
IFI	EFG-38	748		NCR	NCR
Bicon	3109	EA 2466	X	NCR	NCR
Electro-Metrics	RGA-25	372		NCR	NCR
Electro-Metrics	RGA-30	350	X	NCR	NCR
EMCO	3115	723		NCR	NCR
AR	AT4002A	728	X	NCR	NCR

Photograph 2. Radiated Emissions Test Configuration

Photograph 3. ESD Test Configuration



Photograph 4. Radio Frequency Immunity Test Configuration

APPENDIX A

A. Radiated Emissions Measurement Uncertainties

1. Introduction

ISO/IEC 17025:1999 and ANSI/NCSL Z540-1-1994 require that all measurements contained in a test report be "traceable". "Traceability" is defined in the *International Vocabulary of Basic and General Terms in Metrology* (ISO: 1993) as: "the property of the result of a measurement... whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, *all having stated uncertainties*".

The purposes of this Appendix are to "state the *Measurement Uncertainties*" of the conducted emissions and radiated emissions measurements contained in Section 5 of this Test Report, and to provide a practical explanation of the meaning of these measurement uncertainties.

2. Statement of the Worst-Case Measurement Uncertainties for the Conducted and Radiated Emissions Measurements Contained in This Test Report

Table 1: Worst-Case Expanded Uncertainty "U" of Measurement for a k=2 Coverage Factor

Radiated Emissions Measurement Detection Systems	Applicable Frequency Range	"U" for a k=2 Coverage Factor
Spectrum Analyzer with QPA & Preamplifier	30 MHz - 200 MHz	+3.9 dB, -4.0 dB
Spectrum Analyzer with QPA & Preamplifier	200 MHz-1000 MHz	+/- 3.5 dB
Spectrum Analyzer with Preamplifier	1 GHz - 18 GHz	+2.5 dB, -2.6 dB
Spectrum Analyzer with Preamplifier	18 GHz - 40 GHz	+/- 3.4 dB

NOTES:

1. Applies to 3 and 10 meter measurement distances
2. Applies to all valid combinations of Transducers (i.e. LISNs, Line Voltage Probes, and Antennas, as appropriate)
3. Excludes the Repeatability of the EUT

3. Practical Explanation of the Meaning of Radiated Emissions Measurement Uncertainties

In general, a "Statement of Measurement Uncertainty" means that with a certain (specified) confidence level, the "true" value of a measurand will be between a (stated) upper bound and a (stated) lower bound.

In the specific case of EMC Measurements in this test report, the measurement uncertainties of the conducted emissions measurements and the radiated emissions measurements have been calculated in accordance with the method detailed in the following documents:

- *ANSI Z540.2 (2002) Guide to the Expression of Uncertainty in Measurement*
- NIS 81:1994, *The Treatment of Uncertainty in EMC Measurements* (NAMAS, 1994)
- NIST Technical Note 1297(1994), *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results* (NIST, 1994)

The calculation method used in these documents requires that the stated uncertainty of the measurements be expressed as *an "expanded uncertainty", U, with a k=2 coverage factor*. The practical interpretation of this method of expressing measurement uncertainty is shown in the following example:

EXAMPLE: Assume that at 39.51 MHz, the (measured) radiated emissions level was equal to +26.5 dBuV/m, and that the +/- 2 standard deviations (i.e. 95% confidence level) measurement uncertainty was +/- 3.4 dB.

In the example above, the phrase "k = 2 Coverage Factor" simply means that the measurement uncertainty is stated to cover +/-2 standard deviations (i.e. a 95% confidence interval) about the measurand. The measurand is the radiated emissions measurement of +26.5 dBuV/m at 39.51 MHz, and the 95% bounds for the uncertainty are –3.4 dB to + 3.4 dB. One can thus be 95% confident that the "true" value of the radiated emissions measurement is between +23.1 dBuV/m and +29.9 dBuV/m. *In effect, this means that in the above example there is only a 2.5% chance that the "true" radiated emissions value exceeds +29.9 dBuV/m.*

APPENDIX B

B. Nemko USA, Inc. Test Equipment & Facilities Calibration Program

Nemko USA, Inc. operates a comprehensive Periodic Calibration Program in order to ensure the validity of all test data. Nemko USA's Periodic Calibration Program is fully compliant to the requirements of NVLAP Policy Guide PG-1-1988, ANSI/NCSL Z540-1-1994, ISO 10012:2003, ISO/IEC 17025:1999, and ISO-9000: 2000. Nemko USA, Inc.'s calibrations program therefore meets or exceeds the US national commercial and military requirements [N.B. ANSI/NCSL Z540-1-1994 replaces MIL-STD-45662A].

Specifically, all of Nemko USA's *primary reference standard devices* (e.g. vector voltmeters, multimeters, attenuators and terminations, RF power meters and their detector heads, oscilloscope mainframes and plug-ins, spectrum analyzers, RF preselectors, quasi-peak adapters, interference analyzers, impulse generators, signal generators and pulse/function generators, field-strength meters and their detector heads, etc.) and certain *secondary standard devices* (e.g. RF Preamplifiers used in CISPR 11/22 and FCC Part 15/18 tests) are periodically recalibrated by:

- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratories by NIST; or,
- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratory by another accreditation body (such as A2LA) that is mutually recognized by NIST; or,
- A manufacturer of Measurement and Test Equipment (M&TE), if the manufacturer uses NIST-traceable standards and is ISO Guide 25-accredited as calibration laboratory either by NIST or by another accreditation body (such as A2LA) that is mutually recognized by NIST; or
- A manufacturer of M&TE (or by a Nemko USA-approved independent third party metrology laboratory) that is not ISO Guide 25-accredited. (In these cases, Nemko USA conducts an annual audit of the manufacturer or metrology laboratory for the purposes of proving traceabilty to NIST, ensuring that adequate and repeatable calibration procedures are being applied, and verifying conformity with the other requirements of ISO Guide 25).

In all cases, the entity performing the Calibration is required to furnish Nemko USA with a calibration test report and/or certificate of calibration, and a "calibration sticker" on each item of M&TE that is successfully calibrated.

Calibration intervals are normally one year, except when the manufacture advises a shorter interval or if US Government directives or client requirements demand a shorter interval. Items of instrumentation/related equipment which fail during routine use, or which suffer visible mechanical damage (during use or while in transit), are sidelined pending repair and recalibration. (Repairs are carried out either in-house [if minor] or by a Nemko USA-approved independent [third party] metrology laboratory, or by the manufacturer of the item of M&TE).

Each antenna used for CISPR 11 and CISPR 22 and FCC Part 15 and Part 18 radiated emissions testing (and for testing to the equivalent European Norms) is calibrated annually by either a NIST (or A2LA) ISO Standard 17025-Accredited third-party Antenna Calibration Laboratory or by the antenna's OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory. The antenna calibrations are performed using the methods specified in Annex G.5 of CISPR 16-1(2003) or ANSI C63.5-2004, including the "Three-Antenna Method". Certain other kinds of antennas (e.g. magnetic-shielded loop antennas) are calibrated annually by either a NIST (or A2LA) ISO Standard 17025-accredited third-party antenna calibration laboratory, or by the antenna's OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory using the procedures specified in the latest version of SAE ARP-958.

In accordance with FCC and other regulations, Nemko USA recalibrates its suite of antennas used for radiated emissions tests on an annual basis. These calibrations are performed as a precursor to the FCC-required annual revalidation of the Normalized Site Attenuation properties of Nemko USA's Open Area Test Site. Nemko USA, Inc. uses the procedures given in both Sub clause 16.6 and Annex G.2 of CISPR 16-1 (2003), and, ANSI C63.4-2003 when performing the normalized site attenuation measurements.

APPENDIX C
C. NVLAP Certification

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200116-0

Nemko USA, Inc. - San Diego EMC Division
San Diego, CA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).

2008-01-01 through 2008-12-31
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2006-09-13)

APPENDIX D

D. Nemko Authorization

Nemko

Nemko Laboratory Authorisation

Aut. No.: ELA 137- a

EMC Directive

EMC Laboratory: **Nemko USA, Inc.**
11696 Sorrento Valley Rd. Suite F
San Diego, CA 92121
USA

Scope of Authorization: **All standards for EMC and radio transmission that are listed on the accompanying page.**

Nemko has assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA -10. During the visit by the Nemko representative it was found that the Laboratory is capable of performing tests within the Scope of the Authorisation.

Accordingly, Nemko will normally accept test results from the laboratory on a partial or complete basis for certification of the products.

In order to maintain the Authorisation, the information given in the pertinent NLA-10 must be carefully followed. Nemko is to be promptly notified about any changes in the situation at the Laboratory, which may affect the basis for this Authorisation. The Authorisation may be withdrawn at any time if the conditions are no longer considered to be fulfilled.

The Authorisation is valid through 31 December 2008.

Oslo, 01 January 2006

For Nemko AS:

TB Ketterling

TB Ketterling, Nemko Group EMC Coordination

NLA 3 ED2-2003

Nemko

Nemko Laboratory Authorisation

Aut. No.: ELA 137- a

EMC Directive

SCOPE OF AUTHORIZATION

BASIC TESTS AND ASSOCIATED STANDARDS

Capability to perform a basic test implies also that any product (family) standard calling up this basic test is also within the scope if mentioned below or not.

Disturbance emissions		
Electromagnetic radiation disturbance, 9 kHz to 30 MHz, re.: EN 55011 (CISPR 11), EN 60945 (IEC 60945)	***Electromagnetic radiation disturbance, 30 to 1000 MHz, re.:*** EN 55011 (CISPR 11), EN 55013 (CISPR 13), EN 55022 (CISPR 22), ANSI C63.4	***Electromagnetic radiation disturbance, above 1 GHz, re.:*** EN 55011 (CISPR 11), EN 55022 (CISPR 22)
Electromagnetic radiation disturbance, 9 kHz to 30 MHz, "Van Veen loop", re: EN 55015 (CISPR 15)	***Electromagnetic radiation disturbance, 50 Hz to 50 kHz, re:*** EN 55103-1	***Conducted common-mode disturbance power, 30-1000 MHz, re.:*** EN 55013 (CISPR 13) EN 55014-1 (CISPR 14-1)
Mains terminal disturbance voltage, re.: EN 55011 (CISPR 11), EN 55013 (CISPR 13), EN 55014-1 (CISPR 14-1), EN 55015 (CISPR 15), EN 55022 (CISPR 22), EN 60945 (IEC 60945), ANSI C63.4	***Conducted terminal disturbance, Hi-Z probe, re:*** EN 55011 (CISPR 11) EN 55014-1 (CISPR 14-1)	***Conducted discontinuous disturbance on power port, re.:*** EN 55014-1 (CISPR 14-1), section 4.2
Conducted common-mode disturbance at telecom/network ports, re.: EN 55022 (CISPR 22)	***Conducted antenna terminal disturbance, re:*** EN 55013 (CISPR 13)	***Luminaire insertion loss, re:*** EN 55015 (CISPR 15)
Mains inrush current, re: EN 55103-1	***Harmonic current emissions, re.:*** EN 61000-3-2 (IEC 61000-3-2)	***Voltage fluctuations and flicker in low-voltage supply systems, re.:*** EN 61000-3-3 (IEC 61000-3-3), EN 61000-3-11 (IEC 61000-3-11)
Immunity		
Electrostatic discharge immunity test, Re.: EN 61000-4-2 (IEC 61000-4-2)	***Radiated, radio-frequency, electromagnetic field immunity test, re.:*** EN 61000-4-3 (IEC 61000-4-3) ENV 50140:1993, ENV 50204:1995	***Power frequency magnetic field Immunity test, re.:*** EN 61000-4-8 (IEC 61000-4-8)
Radiated audio-frequency H-field, re: EN 55103-2	***Radiated E-field, 150 kHz to 150 MHz, re:*** EN 55020 (CISPR 20)	***Electrical fast transient/burst immunity test, re.:*** EN 61000-4-4 (IEC 61000-4-4)
Surge immunity test, re.: EN 61000-4-5 (IEC 61000-4-5) ENV 50142:1994	***Immunity to conducted disturbances, induced by radio-frequency fields, re.:*** EN 61000-4-6 (IEC 61000-4-6) ENV 50141:1993	***Immunity to voltage dips, short interruptions and voltage variation, re.:*** EN 61000-4-11 (IEC 61000-4-11)
Conducted antenna terminal, re: EN 55020 (CISPR 20)	***Conducted audio/video ports, re:*** EN 55020 (CISPR 20)	BLANK

Nemko

Nemko Laboratory Authorisation

Aut. No.: ELA 137- a

EMC Directive

PRODUCT-FAMILY STANDARDS

Unless specifically noted, only the sections of the standards below which are covered by the capability listing above are assumed covered by this authorisation. When the capability is expanded, more parts of the product standards will be covered.

Cable networks EN 50083-2 :2001 (doc=1.1.04) EN 50083-2:1995 + A1:1997 (docexp)	***UPS – Uninterruptible power supplies*** EN 50091-2:1995 (doc=exp)	***Alarm systems – immunity*** *EN 50130-4:1995 + A1:1998 (doc=exp)+A2:03*
Arc welding equipment *EN 50199:1995 (doc=exp)*	***ISM equipment, emission*** EN 55011:1998 + A1 :99 (doc=exp) + A2:2002 (doc=1.10.05) *CISPR 11:97 + A1 :1999 + A2 :2002*	***Broadcast receivers – emission*** EN 55013 :2001 (doc=1.9.04) + A1:2002 CISPR 13 :2001 (mod) +A1:2003 EN 55013:1990 + A12:1994 + A13:1996 + A14 :1999 (doc=exp) CISPR 13:1975 + A1:1983 mod.
Household appliances – emission EN 55014-1 :2000 (doc=1.8.03) + A1 :2001 (doc=1.10.04) + A2 :2002 (doc=1.10.05) CISPR 14-1 :2000 + A1 :2001 + A2 :2002	***Household appliances - immunity*** EN 55014-2:1997 (doc=exp) + A1:2001 (doc=1.12.04) CISPR 14-2:1997 + A1 :2001	***Electrical lighting – emission*** EN 55015 :2000 (doc=1.8.03) + A1 :2001 (doc=1.12.04) + A2 :2002 (doc=1.10.05) CISPR 15 :2000 + A1 :2000 + A2 :2002
Broadcast receives - immunity EN 55020:2002 (doc=1.4.05) CISPR 20:2002 A1:2002 to CISPR 20:2002 (not harm) EN 55020:1994 + A11:1996 + A12 :1999 + A13 :1999 + A14 :1999	***ITE - emission*** EN 55022:1998 + A1:2000 (doc=1.8.03) + A2:2003 CISPR 22:1997 + A1:2000 + A2:2002 EN 55022:1994 + A1:1995 + A2:1997 CISPR 22:1993 + A1:1995 + A2:1996	***ITE – immunity*** EN 55024:1998 (doc=exp) + A1 :2001 (doc=1.10.04) + A2 :2003 CISPR 24:1997 + A1 :2001 + A2 :2002
Professional AV – emission EN 55103-1:1996 (doc=exp)	***Professional AV - immunity*** EN 55103-2:1996 (doc=exp)	***Telecontrol equipment*** 60870-2-1:1996 (doc=exp) IEC 60870-2-1 :1995
Maritime navigation and radio EN 60945:2002 IEC 60945:2002 EN 60945:1997 IEC 60945:1996	***Harmonics*** EN 61000-3-2 :2000 +A2:2005 IEC 61000-3-2 :2000 (mod) + A1 :2001 +A2:2004	***Flicker*** EN 61000-3-3 :1995 (doc=exp) + A1 :2001 (doc=1.5.04) IEC 61000-3-3 :1994 + A1 :2001 EN 61000-3-11 :2000 (doc=1.11.03) IEC 61000-3-11 :2000
Generic immunity - light EN 61000-6-1:2001 (doc=1.7.04) IEC 61000-6-1:1997 (mod) EN 50082-1 :1997 (doc=exp)	***Generic immunity – Industrial*** EN 61000-6-2:2001 (doc=1.7.04) IEC 61000-6-2:1999 (mod)	*Generic emission – light* EN 61000-6-3 :2001 + A1:2004 IEC 61000-6-3 :1996 (mod) EN 50081-1:1992 (doc=exp)
Generic emission - industry EN 61000-6-4 :2001 (doc=1.7.04) IEC 61000-6-4:1997 (mod) *EN 50081-2:1993 (doc=exp)*	***PLC – Programmable Logic Controllers*** EN 61131-2 :2003 IEC 61131-2 :2003 *EN 61131-2 :1994 + A11 :1996 + A12 :2000 (doc=exp)* *IEC 61131-2 :1992*	***PS – Power supply*** *EN 61204-3:2000 (doc=1.11.03)* *IEC 61204-3:2000*
Laboratory equipment *EN 61326 :1997 + A1 :1998) + A2 :2001 +A3: 2003* *IEC 61326 :1997 + A1 1998 + A2 :2000*	***Electrical lighting – immunity*** *EN 61547 :1995 (doc=exp) + A1 :2000 (doc=1.11.03)* *IEC 61547 :1995 + A1 :2000*	***Power drives*** *EN 61800-3 :2004* *IEC 61800-3 :2004* *EN 61800-3 :1996 + A11 :2000 (doc=exp)* *IEC 61800-3 :1996*