Nemko USA, Inc.
11696 Sorrento Valley Rd., Suite F
San Diego, CA 92121-1024
Phone (858) 755-5525 Fax (858) 452-1810

EMC DIRECTIVE 89/336/EEC

HEAVY INDUSTRY EQUIPMENT
CE EVALUATION

TEST REPORT

PER IEC 61000-6-4, IEC 61000-6-2 AND IEC 61204-3

For The **Power Supply**

MODEL: **LZS-A1000-3**

PREPARED FOR

Lambda Electronics Inc.
3055 Del Sol Blvd.
San Diego, CA 92154

PREPARED ON June 7, 2006

REPORT NUMBER 2006 0600459 EMC Rev.1

PROJECT NUMBER: 26-459-LAM

DOCUMENT HISTORY

REVISION	DATE	COMMENTS
-Rev. 1	July 5, 2006	Prepared By: Rodel Resolme
-Rev.1	July 13, 2006	Revision Release: Mike Krumweide Page 3 – change RF Immunity Criterion to "B". Page 4 – corrected model number. Page 44 – change Criteria to "B" and added comment. Page 45 – Verified Field Probe to within tolerance. Page 48 & 49 – Added note concerning calibration. Corrected typing errors to the following pages: 1, 2, 5, 9, 12, 13, 18, 22, 26, 30, and 44. Changed Appendix page numbers to Alpha-numeric numbers

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 May 22, 2006. Testing was performed on the unit described in this report on May 22, 2006 to June 7, 2006.
- 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.

TABLE OF CONTENTS

TEST SETUP DIAGRAMS

TEST CONFIGURATION PHOTOGRAPHS

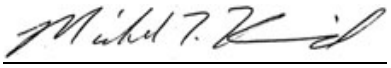
APPENDICES

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 documents EN 61000-6-4: 2001, EN 61000-6-2: 2001, and EN 61204-3: 2000 the testing and test methods were accomplished in accordance with both the International Electrotechnical Committee (IEC) publications and European Norms EN 55011 specifications for Industrial, Scientific and Medical Equipment (ISM).

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: Lambda Electronics Inc.
3055 Del Sol Blvd.
San Diego, CA 92154
Phone

CONTACT: Lyn Dinoso

DATE (S) OF TEST: May 22, 2006 to June 7, 2006

EQUIPMENT UNDER TEST (EUT): Power Supply

MODEL: LZS-A1000-3

CONDITION UPON RECEIPT: Suitable for Test

TEST SPECIFICATIONS: Radio Frequency Emissions in accordance with EN 61000-6-4: 2001 and EN 61204-3: 2000. Electromagnetic Immunity tests EN 61000-6-2: 2001 and EN 61204-3: 2000 as follows:

TEST TYPE	TECHNICAL DOCUMENT	DOCUMENT TITLE
Conducted and Radiated Emissions	EN 55011: 1998/A1: 1999/A2: 2002	Specification for Limits and Methods of Measurement of Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment
Power Line Harmonics Emissions	EN 61000-3-2: 2000/A1: 2001/A2: 2005	Electromagnetic Compatibility, Limits for Harmonic Current Emissions, Equipment Input Current less than or equal to 16A
Power Line Flicker Emissions	EN 61000-3-3: 1995/A1: 2001	Electromagnetic Compatibility, Limitation of Voltage Fluctuations and Flicker In Low-Voltage Supply Systems for Equipment with Rated Current less than or equal to 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 - Testing and Measurement Techniques - Radiated Radio Frequency Electromagnetic Field Immunity Test
Electrical Fast Transient Burst Immunity	IEC 61000-4-4: 2004	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment Electrical Fast Transient / Burst Requirements

Test specifications continued:

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
Power Frequency Magnetic Field	IEC 61000-4-8: 1993/A1: 2000	Electromagnetic Compatibility, Testing and Measurement Techniques for Power Frequency Magnetic Field, 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

1.2 Test Summary

1.2.1 Emissions Test Summary

Specification	*Frequency Range*	*Compliance Status*
EN 55011: 1998/A1: 1999/A2: 2002, Class "B" Conducted Emissions	0.15 MHz – 30 MHz	**PASS**
EN 55011: 1998/A1: 1999/A2: 2002, Class "B" Radiated Emissions	30 MHz – 1000 MHz	**PASS**
EN 61000-3-2: 2000/A1: 2001/A2: 2005 -Power Line Harmonics	up to the 40th Harmonic	**PASS**
EN 61000-3-3: 1995/A1: 2001 -Power Line Flicker	less than or equal to 4% Maximum Relative Voltage Change; Value of D(T) less than or equal to 3% for more than 200 Ms	**PASS**

1.2.2 Immunity Test Summary

Specification	*Minimum Criterion Level Required as per IEC 61000-6-2 and IEC 61204-3*	*Criterion Level Tested*	*Compliance Status*
IEC 61000-4-2: 1995/A1: 1998/A2: 2000 - ESD Immunity	**Criterion B** ±8 kV Air Discharge, ±4 kV Contact Discharge	**Criterion B** ±8 kV Air Discharge, ±6 kV Contact Discharge	**PASS**
IEC 61000-4-3: 2006 -Radio Frequency Immunity	**Criterion A** 10 V/m from 80-1000 MHz (80% AM at 1kHz)	**Criterion B** 10 V/m from 80-2500 MHz (80% AM at 1kHz)	**PASS**
IEC 61000-4-4: 2004 -Electrical Fast Transient Immunity	**Criterion B** Power Line Pulses of +/- 2 kV; up to ±2kV process/control lines; I/O Line Pulses of +/- 1 kV	**Criterion B** Power Line Pulses of +/- 2 kV; up to ±2kV process/control lines;	**PASS**
IEC 61000-4-5: 2005 -Surge Immunity	**Criterion B** +/-0.5kV Common Mode Surges, +/-0.5kV Differential Mode Surges	**Criterion B** +/-2.0kV Common Mode Surges, +/-1.0kV Differential Mode Surges	**PASS**
IEEE C62.41 -Surge Immunity	**Criterion B** 2,4 and 6kV Common Mode and Differential Mode Surges Ring Wave	**Criterion B** 2,4 and 6kV Common Mode and Differential Mode Surges Ring Wave	**PASS**
IEC 61000-4-6: 2003/A1: 2004/A2:2006 -RF Common Mode Immunity	**Criterion A** 150 kHz - 80 MHz at $10V_{rms}$ 1kHz 80% amplitude modulated	**Criterion A** 150 kHz - 80 MHz at 10Vrms 1kHz 80% amplitude modulated	**PASS**
IEC 61000-4-8: 1993/A1: 2000 Power Frequency Magnetic Field	**Criterion A** Helmholtz coil at 50 Hz, to 30 amps (rms) per meter	**Criterion A** Helmholtz coil at 50 Hz, to 30 amps (rms) per meter	**PASS**
IEC 61000-4-11: 2004 - Voltage Dips and Short Interruptions	**Criterion B and C** Voltage Dips of 30% and 60%; Interruptions of >95%.	**Criterion B and C** Voltage Dips of 30% and 60%; Interruptions of >95%.	**PASS**

Test Supervisor: Michael T. Krumweide

Michael T. Krumweide, Nemko USA, Inc.

2. SYSTEM DESCRIPTION AND CONFIGURATION

2.1 Description and Method of Exercising the EUT

The LZS-A1000-3 is a Power Supply. Its main function is to provide DC power from a single phase power source. The applications for the EUT include industrial power supply for factory automation, process control, NC-machining, automotive, packaging equipment, materials handling, chemical processing, robots and much more. The EUT was exercised by attaching it to a 1000W resistive load (24VDC@42A). During Immunity testing, the output of the EUT will be recorded in real time. Any change in the output voltage will be evaluated to the corresponding test criteria (+/-1.0 volt variation) for that particular test.

2.2 System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Power Supply	Lambda Electronics Inc. LZS-A1000-3 Serial #:061426000043	1.8 meters, unshielded, 16AWG x 3, IEC Type
Support Equipment – Load Resistor	Lambda Electronics Inc. 1.1Ω total resistance	N/A
Support Equipment – Scope meter	Fluke 105B Scopemeter Series II 9444 201 05003	Via AC/DC Adapter
Support Equipment – Scope meter AC/DC Adapter	Fluke PM 8907/803 1697	Direct Wall Plug-In

2.3 Device Interconnection and I/O Cables

CONNECTION	I/O CABLE
EUT to Load	1.7 meters, 10AWG x 2, twisted together

2.4 Design Modifications for Compliance

Device: **Power Supply**

Model: **LZS-A1000-3**

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

1. Changed C103 from .47uF to 1uF
2. Added 330pF cap in parallel with C101 & C108.
3. Added .1uF cap in parallel with C425 & C426.

Nemko USA, Inc. recommends a safety review be completed in reference to the above listed design modification. The purpose of this review is to ensure that no safety issues are introduced as a result of these design modifications.

3. DESCRIPTION OF TEST SITE AND EQUIPMENT

3.1 Description of Test Site

The test site is located at 11696 Sorrento Valley Road, Suite F, San Diego, CA 92121. The site is physically located 18 miles Northwest of downtown San Diego. The general area is a valley 1.5 miles east of the Pacific Ocean. This particular part of the valley tends to minimize ambient levels, i.e. radio and TV broadcast stations and land mobile communications. The three and ten-meter Open Area Test Site (OATS) is located behind the office/lab building. It conforms to the normalized site attenuation limits and construction specifications as set in the EN 55022: 1998/A1: 2000/A2: 2003, CISPR 16 (2003) and ANSI C63.4 (2004) documents. The OATS normalized site attenuation characteristics are verified for compliance every year, and registered with the Federal Communications Commission under Registration Number 90579.

4. DESCRIPTION OF TESTING METHODS

4.1 Introduction

Nemko USA, Inc. is accredited to ISO/IEC 17025 by the National Voluntary Laboratory Accreditation Program (NVLAP) for Electromagnetic Compatibility and Telecommunications testing. Part of the accreditation process involves the demonstration of competence in various test methods.

Prior to the beginning of work, Nemko personnel work with their clients to ensure the proper test standards and test methods are utilized. Applicable tests and the minimum criteria for a pass condition are listed in the administrative section of this report.

For General Test Configuration please refer to Photograph 1 on the following page.

Photograph 1. General EUT Test Setup Diagram

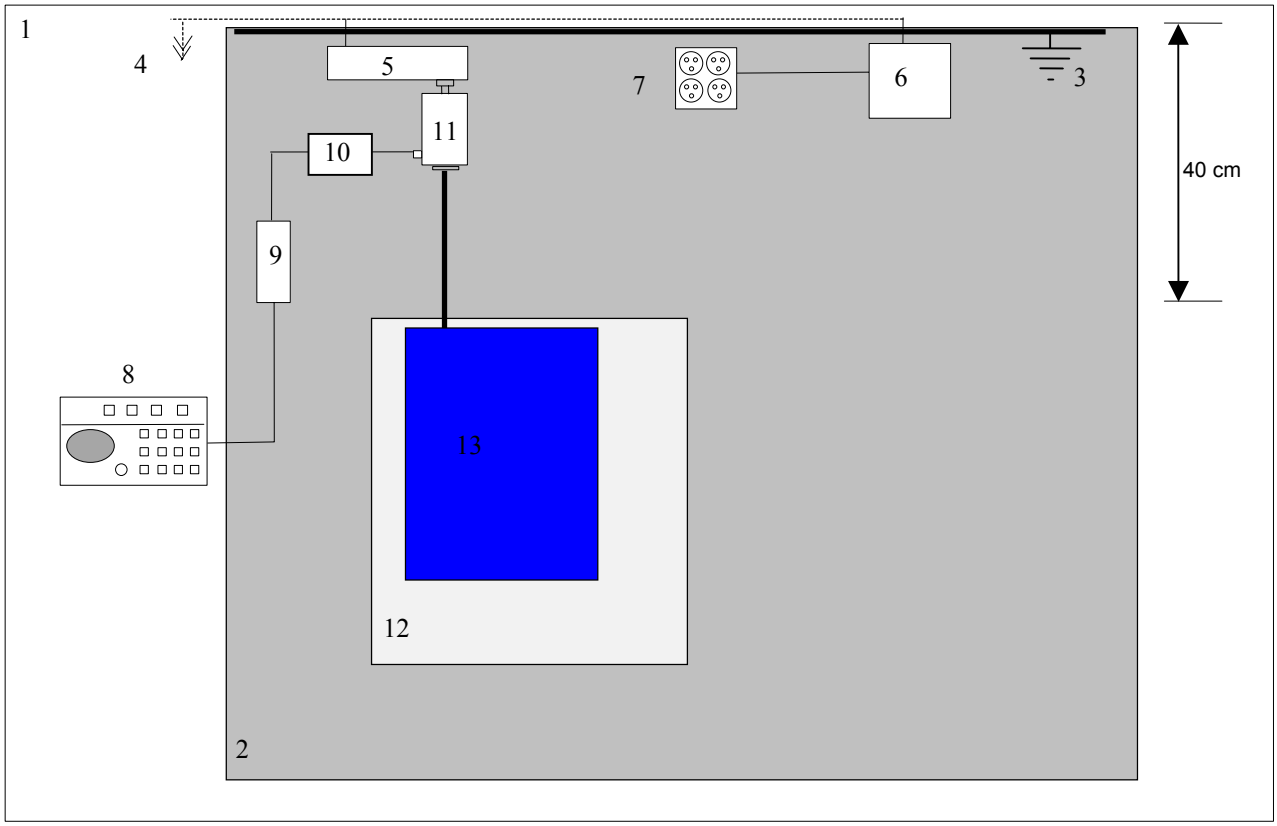
4.2 Configuration and Methods of Measurements for Conducted Emissions

EN 61000-6-4 specifies EN 55011 for the general configuration of the EUT and associated equipment, as well as the test platform for conducted emissions testing. Floor-standing devices are placed 10 centimeters above a ground plane floor and 40 centimeters from a vertical ground plane wall. 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 EN 55011 limits to determine compliance.

EN 61000-6-4 also calls out the requirement for making, *where applicable*, Discontinuous Disturbance (i.e., "Click") measurements per the limits and methods of Clause 4.2 of EN 55014 (2000). Clause 4.2 of EN 55014 (2000) defines a two-part procedure for this. First, a determination is made as to whether or not there are "clicks" of sufficient magnitude/duration/frequency of occurrence to be subject to limits. Second, *and only if there are "clicks" of sufficient magnitude/duration/frequency of occurrence to be subject to limits*, the "Clicks" are measured and recorded. Otherwise, no "Click" measurements are to be made. "Click" Disturbances are rarely found to occur in Laboratory Instrumentation; consequently, the requirement is not usually applicable.

For Conducted Emissions Test Configuration please refer to Figure 1 on the next page.

Figure 1. Conducted Emissions Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

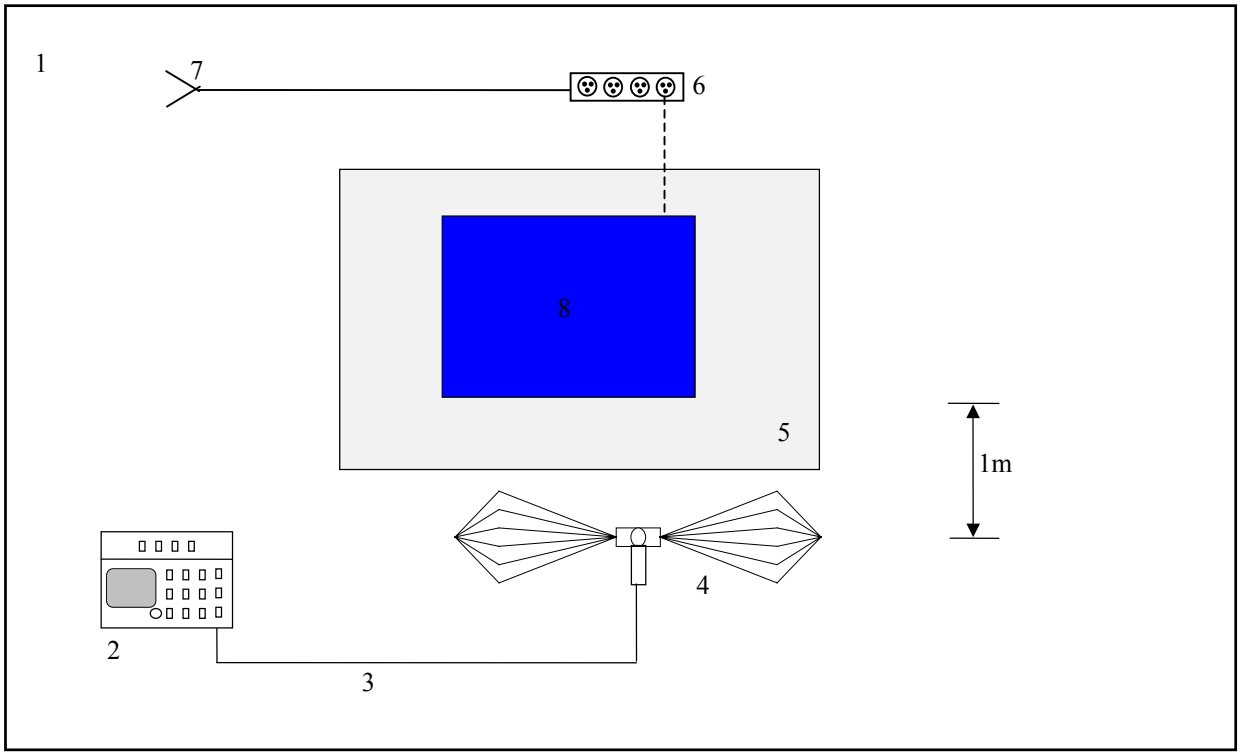
1. Test Laboratory (6 X 6 meters)
2. Ground Plane (15 square meters)
3. Vertical Conducting Wall (Grounded through Ground Plane via 10' ground rod)
4. AC Power for Devices
5. Power Line Filter, Lindgren, 120 dB, 30 amp
6. Artificial Mains Network (AMN) for peripheral devices
7. Power Distribution Box for peripheral devices
8. Spectrum Analyzer with Quasi-Peak Adapter
9. High Pass Filter
10. Coax input from EUT AMN to Spectrum Analyzer
11. AMN for EUT
12. Non-Conducting table 80 cm above ground plane
13. EUT: **Power Supply** and Associated System

4.3 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. Ambients 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.

For Frequency ID Test Configuration please refer to Figure 2 on the following page.

Figure 2. Frequency ID of Radiated Emissions Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test Laboratory
2. Spectrum Analyzer with Quasi-Peak Adapter
3. Coax interconnect from Antenna to Spectrum Analyzer
4. Receive Antenna (basic relative position)
5. Non-Conducting table 80 cm above ground plane
6. Power strip for EUT and peripherals
7. AC power for devices
8. EUT: **Power Supply** and Associated System

4.4 Configuration and Methods of Measurements for Radiated Emissions

EN 61000-6-4 specifies EN 55011 for radiated emissions testing. Initially, the primary emission frequencies are identified inside a shielded anechoic 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 over 360 Degrees to determine the worst emitting configuration. The numerical results of the test are included herein to demonstrate compliance.

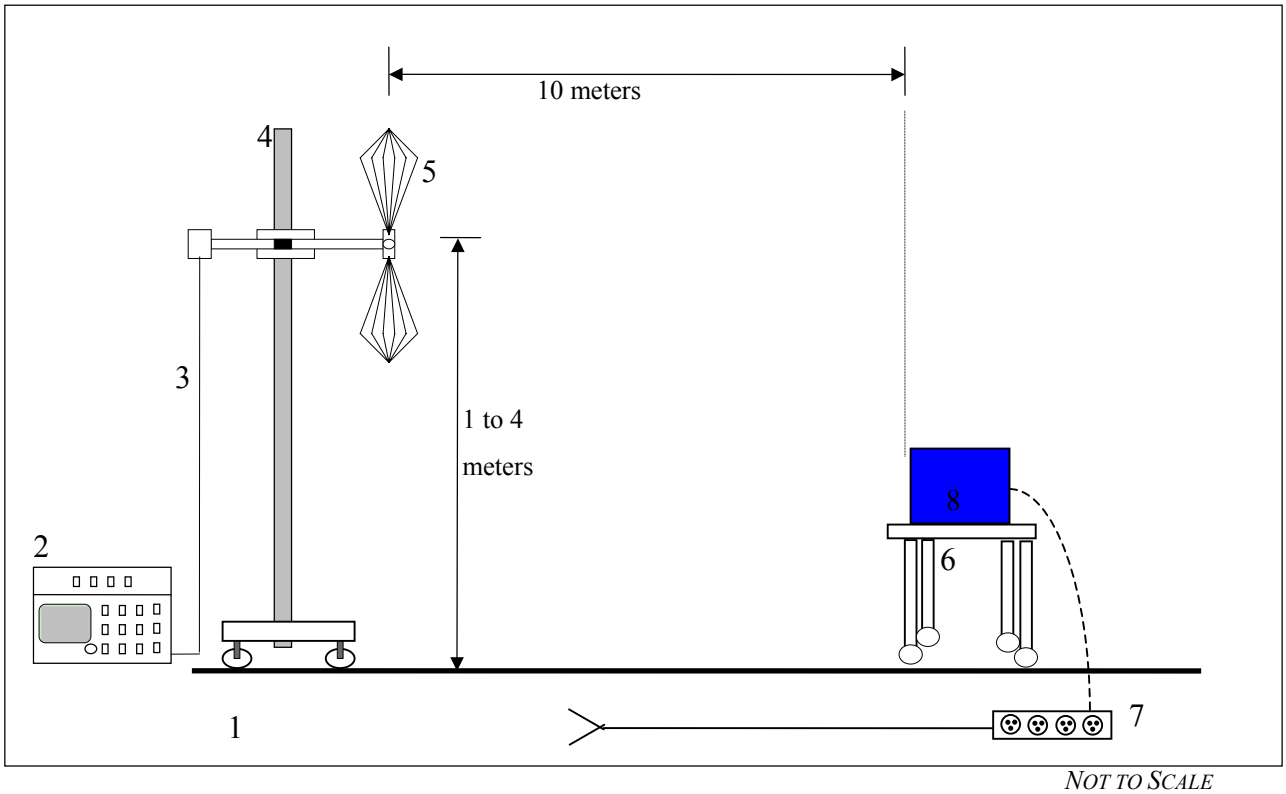
The numerical results that are applied to the emissions limits are arrived at by the following method:
Example: A=RR+CL+AF
A = Amplitude dBuV/M
RR = Receiver Reading dBuV
CL = cable loss dB
AF = antenna factor dBm-1

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.

For Radiated Emissions Test Configuration please refer to Figure 3 on the following page.

Figure 3. Radiated Emissions Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Ground plane (11 X 17 meters)
2. Spectrum Analyzer with Quasi-Peak Adapter
3. Coax interconnect from Receive Antenna to Spectrum Analyzer
4. Antenna Mast with motorized mounting assembly
5. Receive Antenna (basic relative position)
6. Non-Conducting table 80 cm above ground plane
7. AC power for devices
8. EUT: **Power Supply** and Associated System

4.5 Power Line Harmonics

This section of the EN 61000-3-2 is applicable to electrical and electronic equipment having an input current up to and including 16 amps per phase, and intended to be connected to public low-voltage distribution systems. The objective of this standard is to set limits for harmonic emissions of equipment onto the AC Power Line.

Basic requirements of the AC source include a +/- 2% voltage regulation and a +/- 0.5% frequency limit. A low distortion sine wave output is required to ensure that the AC source does not adversely contribute distortion to the load, meeting the following limits:

- 0.9% for 3rd order harmonics
- 0.4% for 5th order harmonics
- 0.3% for 7th order harmonics
- 0.2% for 9th order harmonics
- 0.2% for even harmonics of order 2 to 10
- 0.1% for odd harmonic order from 11 to 40

For further information, please refer to the technical sections in the EN 61000-3-2 publication (2000) in addition to the test results section and photographs of the test set-up provided in this report.

For Harmonics Test Configuration please refer to Figure #4 on the next page.

4.6 Power Line Fluctuations/Flicker

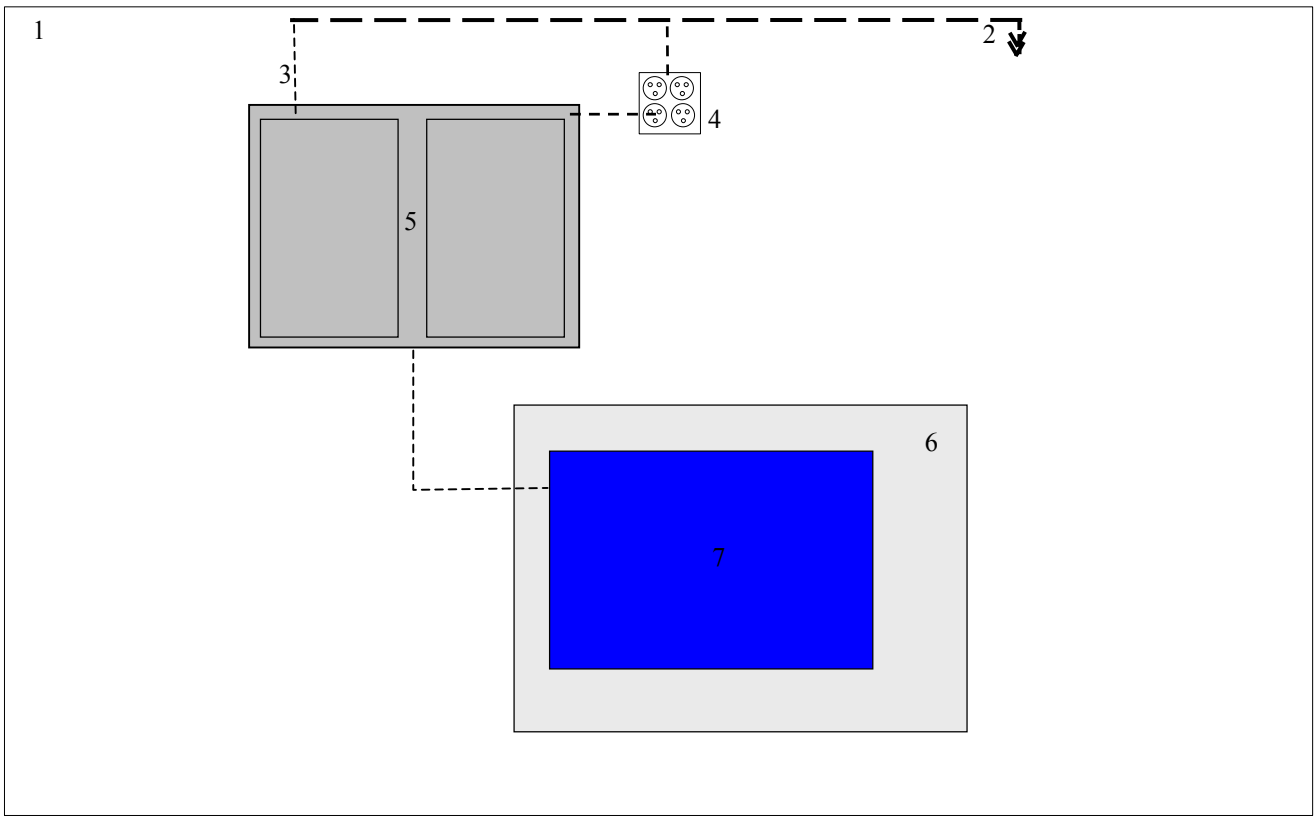
This section of the EN 61000-3-3 is applicable to household appliances and similar electrical and electronic equipment having an input current up to and including 16 amps per phase. The objective of this standard is to set limits for voltage fluctuations of equipment within its scope, and ensures that home appliances and certain other electrical equipment do not adversely affect lighting equipment when connected to the same utility power line. Large current variations combined with high utility line power impedance can cause excessive changes in the AC supply voltage. If these voltage changes are repeated at short intervals, objectionable fluctuations of luminance (flicker) could be generated in illumination sources connected to the same utility line network.

This test requires an AC power source with a standard impedance network and a power analyzer. Measurements of steady state and fluctuating harmonics, along with flicker and voltage deviations, are conducted using a power analyzer, often called a "flickermeter."

For further information, please refer to the technical sections in the EN 61000-3-3 publication (1995) in addition to the test results section and photographs of the test set-up provided in this report.

For Flicker Test Configuration please refer to Figure #4 on the next page.

Figure 4. Harmonics & Flicker Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test Laboratory (6 X 6 meters)
2. AC Power for Devices
3. 120/208VAC/60Hz Power for Harmonics/Flicker Test Equipment
4. 115V/60 Hz Power Distribution Box
5. Power Source Rack with Computer Analysis System
6. Non-conducting table
7. EUT: **Power Supply** and Associated System

4.7 Statistical Sampling Required for Continued Compliance

For quality assurance of ongoing productions to comply with RFI interference limits, CISPR 11 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.

4.8 Device Performance Criteria for Immunity Tests

Equipment tested to EN 61000-6-2 must be evaluated to determine whether or not the "operate as intended" requirement is met. Three criteria of acceptable performance are defined by EN 61000-6-2, as follows:

- **Criterion A** - The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level, which may be specified by the manufacturer as a permissible loss of performance.

- **Criterion B** - The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover from any malfunction. Again, the manufacturer defines some minimal performance. No change in operating state or loss of data is permitted.

- **Criterion C** - Temporary loss of function is allowed. Operation of the EUT may stop, as long as it is either automatically reset or can be manually restored by operation of the controls.

For each test method, EN 61000-6-2 specifies the appropriate criterion to be met.

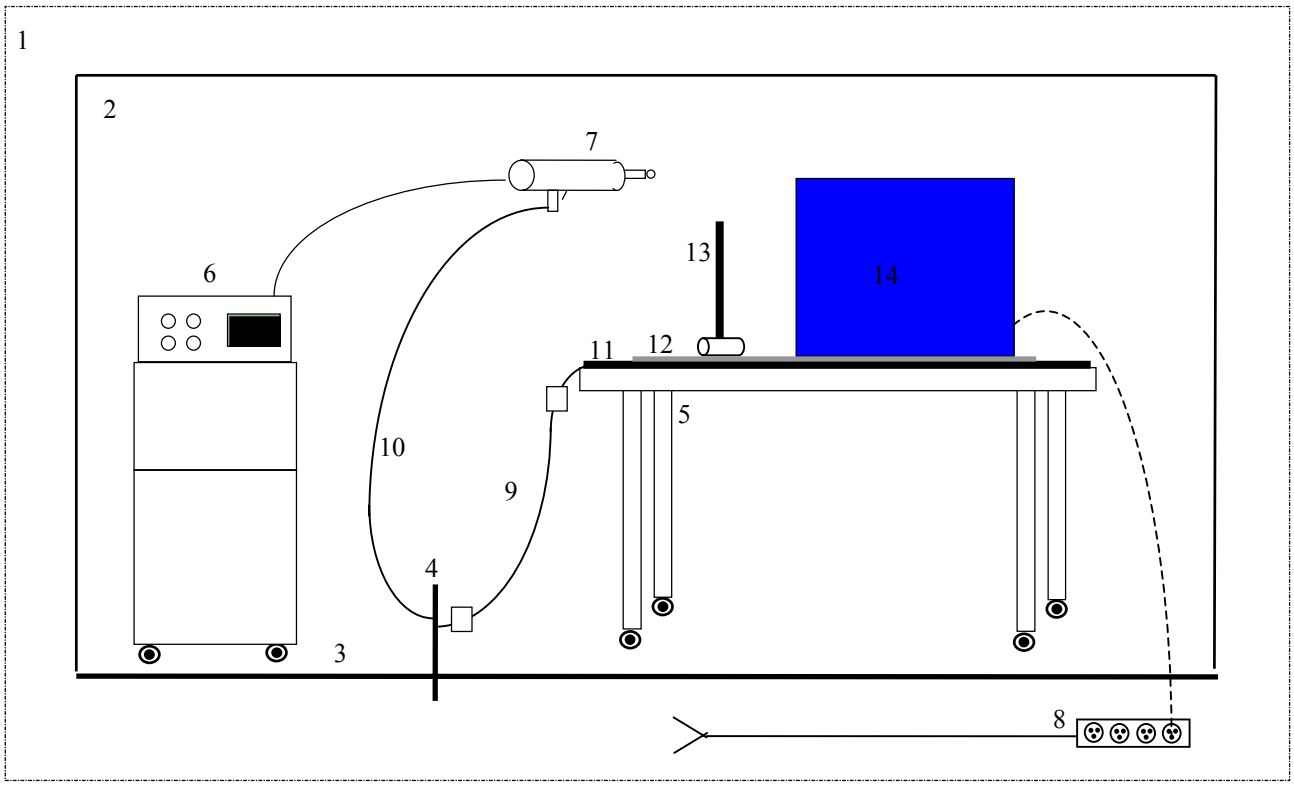
4.9 Electrostatic Discharge Immunity

EN 61000-6-2 specifies Part 2 of the IEC 61000-4 Standard as the basic procedure for ESD testing. The standard configuration as outlined in IEC 61000-4-2 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). For further information, please refer to the technical sections in the IEC 61000-4-2 publication in addition to the test results section and photographs of the test set-up provided in this report.

For ESD tests, EN 61000-6-2 requires that the EUT meet at least performance Criterion B for discharges of up to ±8 kV air discharge and ±4 kV contact discharge.

For ESD Immunity Test Configuration please refer to Figure 5 on the following page.

Figure 5. ESD Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test Laboratory (6 x 7 meters)
2. Vertical Conducting Wall (3 x 3 m, grounded)
3. Ground Plane (14 square meters)
4. Ground Rod extending 3 m under ground plane
5. Non-Conducting table for ESD Simulator Control Box
6. ESD Simulator Control Box on cart
7. Electro-Static Discharge (ESD) Gun (hand held, grounded to grounding rod)
8. AC power for devices
9. Ground strap with two 470kOhm resistors
10. Grounding Strap
11. Horizontal Coupling Plane, grounded to Grounding Rod
12. Insulating Mat
13. Vertical Coupling Plane
14. EUT: **Power Supply** and Associated System

4.10 Radio Frequency Immunity

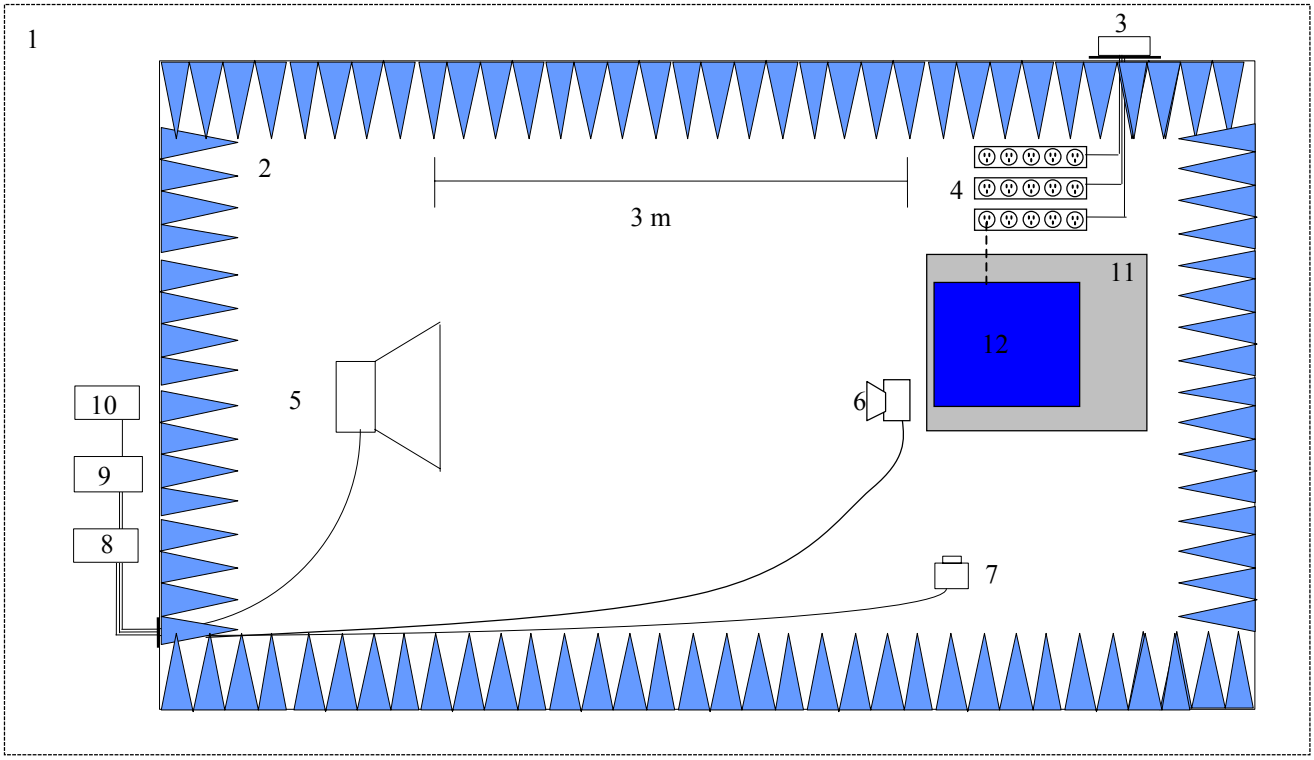
The radio frequency immunity test for a device entails subjecting the device under test to a uniform field of radiated electromagnetic energy of a specified field strength and frequency, and monitoring the functionality of the device as the frequency is swept over a specified frequency range. The IEC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

The IEC 61000-4-3 specifies a transmit antenna to EUT distance of 3 m and a frequency range of 80 MHz to 1000 MHz (80% amplitude modulated at 1 kHz). 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 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 61000-6-2 specifies that the EUT meet performance Criterion A for a minimum field strength of 10 V/m.

For RF Immunity Test Configuration please refer to Figure 6 on the following page.

Figure 6. Radio Frequency Immunity Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test laboratory
2. Shielded anechoic chamber (Anechoic absorber material on walls and ceiling; ferrite tiles on floor)
3. Power Line filters and power distribution breaker box
4. Power strip for EUT and peripherals
5. Transmit antennas
6. E-Field sensor
7. Monitoring camera for EUT
8. Broadband power amplifiers
9. E-Field probe monitoring system
10. Signal Generators
11. Non-Conducting table
12. EUT: **Power Supply** and Associated System

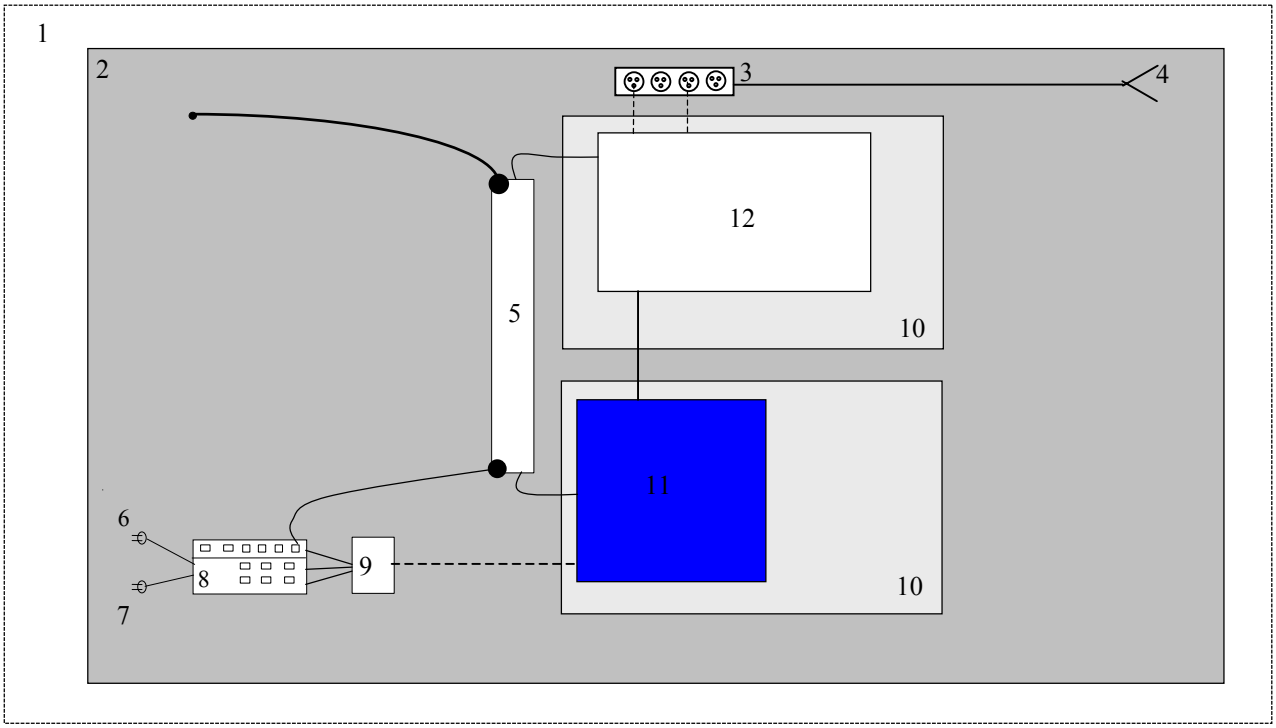
4.11 Electrical Fast Transient Immunity

EN 61000-6-2 specifies Part 4 of the IEC 61000-4 Standard as the basic procedure for electrical fast transient testing. IEC 61000-4-4 defines the immunity requirements and test methods for equipment that are required to withstand high-voltage transients coupled on the power mains. The standard configuration for "type tests" outlined in IEC 61000-4-4 is used. For further information, please refer to the technical sections in the IEC 61000-4-4 in addition to the test results section and photographs of the test set-up provided in this report.

For electrical fast transient/burst tests, EN 61000-6-2 requires that the EUT meet at least performance Criterion B for +/- 2 kV Power and Process lines and +/- 1 kV signal and data lines transients.

For EFT Immunity Test Configuration please refer to Figure 7 on the following page.

Figure 7. EFT Immunity Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test Laboratory (6 x 7 meters)
2. Ground Plane
3. Power Strip for Peripherals from power line filter
4. AC Power for Devices
5. Capacitive Coupling Clamp (grounded)
6. Mains Power for EUT
7. AC Power for Fast Transient Noise Generator (120V)
8. Fast Transient Noise Generator
9. Coupling Network
10. 10cm Non-Conducting Platform
11. EUT: **Power Supply**
12. Associated System

4.12 Power Line Surge Immunity

EN 61000-6-2 specifies Part 5 of the IEC 61000-4 Standard as the basic procedure for power line surge immunity tests. This standard relates to the immunity requirements, test methods, and range of recommended test levels for low voltage equipment to unidirectional surges caused by overvoltages from switching and lightning transients. The standard configuration as outlined in IEC 61000-4-5, section 7 was used.

Each device was tested in a total of three surge configurations:

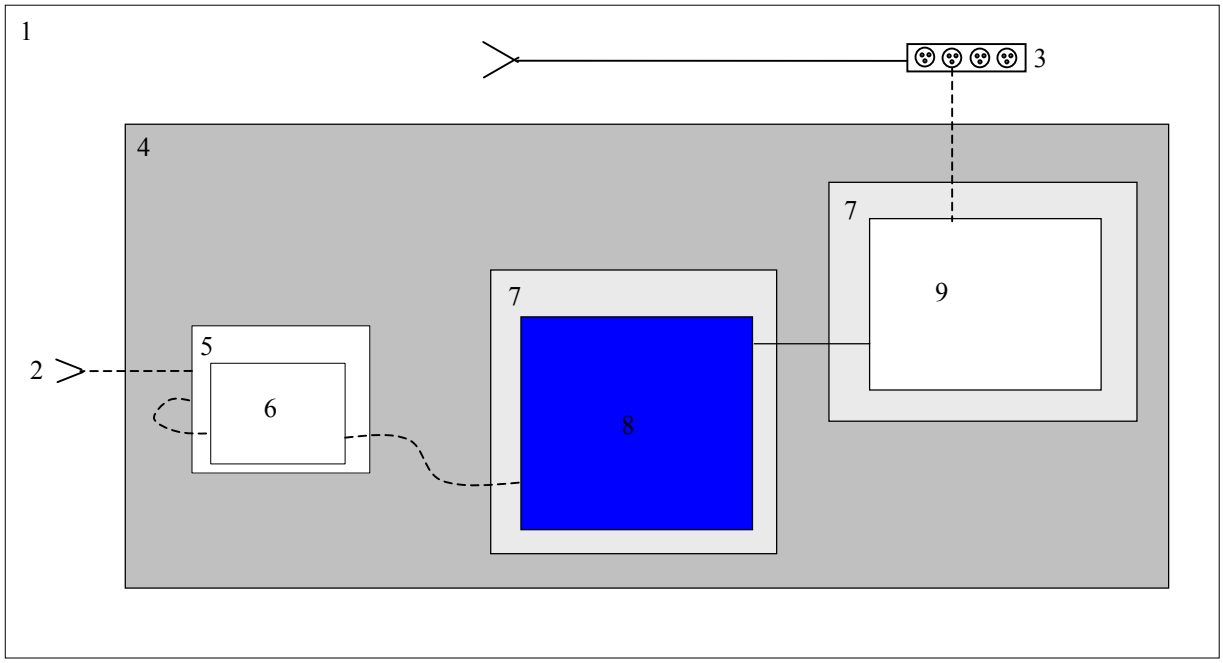
Surge #1: Combination Wave, Line to Protective Earth with 9uF and 10Ohm, common mode, generator earthed.
Surge #2: Combination Wave, Neutral to Protective Earth with 9uF and 10Ohm, common mode, generator earthed.
Surge #3: Combination Wave, Line to Neutral with 18uF, differential mode, generator floated.

For further information, please refer to the technical sections in the IEC 61000-4-5 in addition to the test results section and photographs of the test set-up provided in this report.

For Power line surge tests, the EUT meet at least performance Criterion B for +/-0.5kV common mode and +/-0.5kV differential mode surges in the DC power supply configuration.

For Surge Immunity Test Configuration please refer to Figure 8 on the following page.

Figure 8. Power Line Surge Immunity Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test Laboratory
2. AC power for Devices
3. Power strip for associated devices from power line filter
4. Copper Ground Plane
5. Surge Generator
6. Surge Coupling Network
7. Nonconductive tables 80cm above Ground Plane
8. EUT: **Power Supply**
9. Associated System

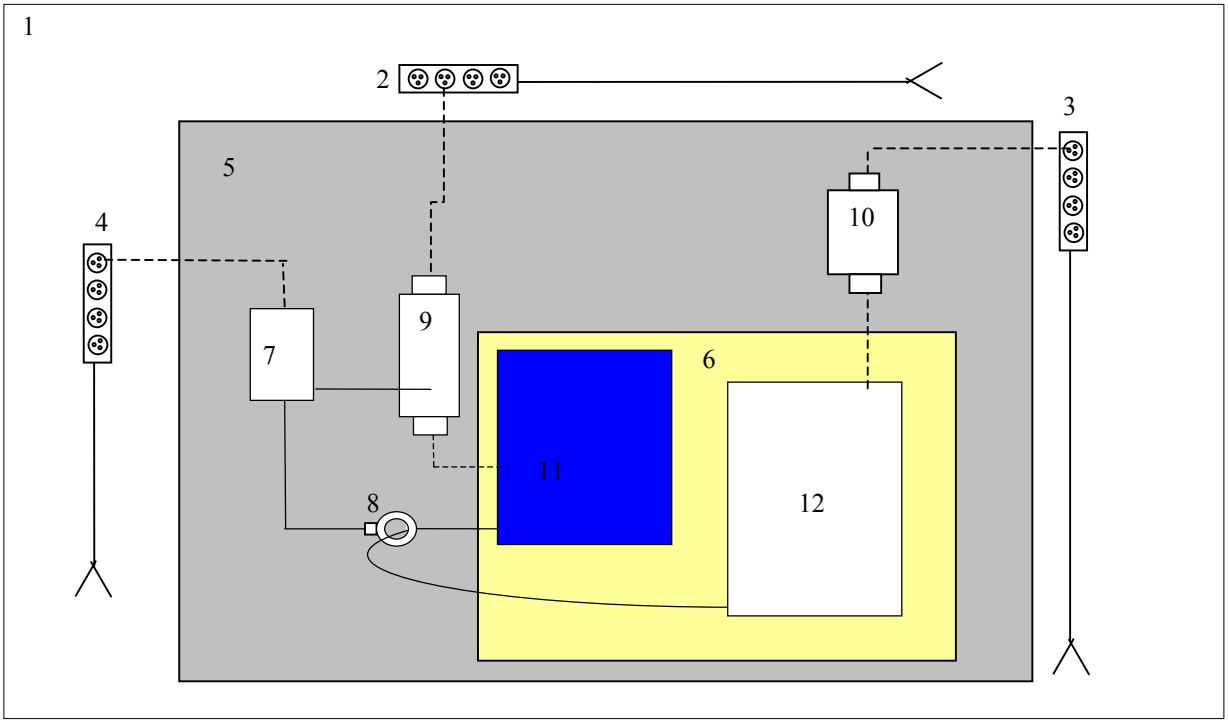
4.13 Radio Frequency Conducted Common Mode Immunity

EN 61000-6-2 specifies Part 6 of the IEC 61000-4 Standard as the basic standard for radio frequency conducted common mode disturbance testing. This standard relates to the immunity requirements, test methods, and range of recommended test levels for immunity to conducted disturbances induced by radio-frequency fields in the 150 kHz to 80 MHz frequency range. The standard configuration as outlined in the IEC 61000-4-6 was used. For further information, please refer to the technical sections of the IEC 61000-4-6 publication in addition to the test results section and photographs of the test set-up provided in this report.

For RF induced conducted common mode disturbances, EN 61000-6-2 specifies that the EUT meet at least performance Criterion B for 10Vrms, 1 kHz, 80% amplitude modulated waveform.

For RF Common Mode Test Configuration please refer to Figure 9 on the following page.

Figure 9. RF Common Mode Immunity Test Setup Diagram



NOT TO SCALE

CONFIGURATION LEGEND

1. Test Laboratory
2. AC power for EUT
3. AC power for Support Equipment
4. AC power for Test Devices
5. Ground Plane
6. 10cm wooden Platform
7. Test Generator
8. Current Probe
9. Coupling/Decoupling Network for EUT
10. Coupling/Decoupling Network for Support Equipment
11. EUT: **Power Supply**
12. Associated System

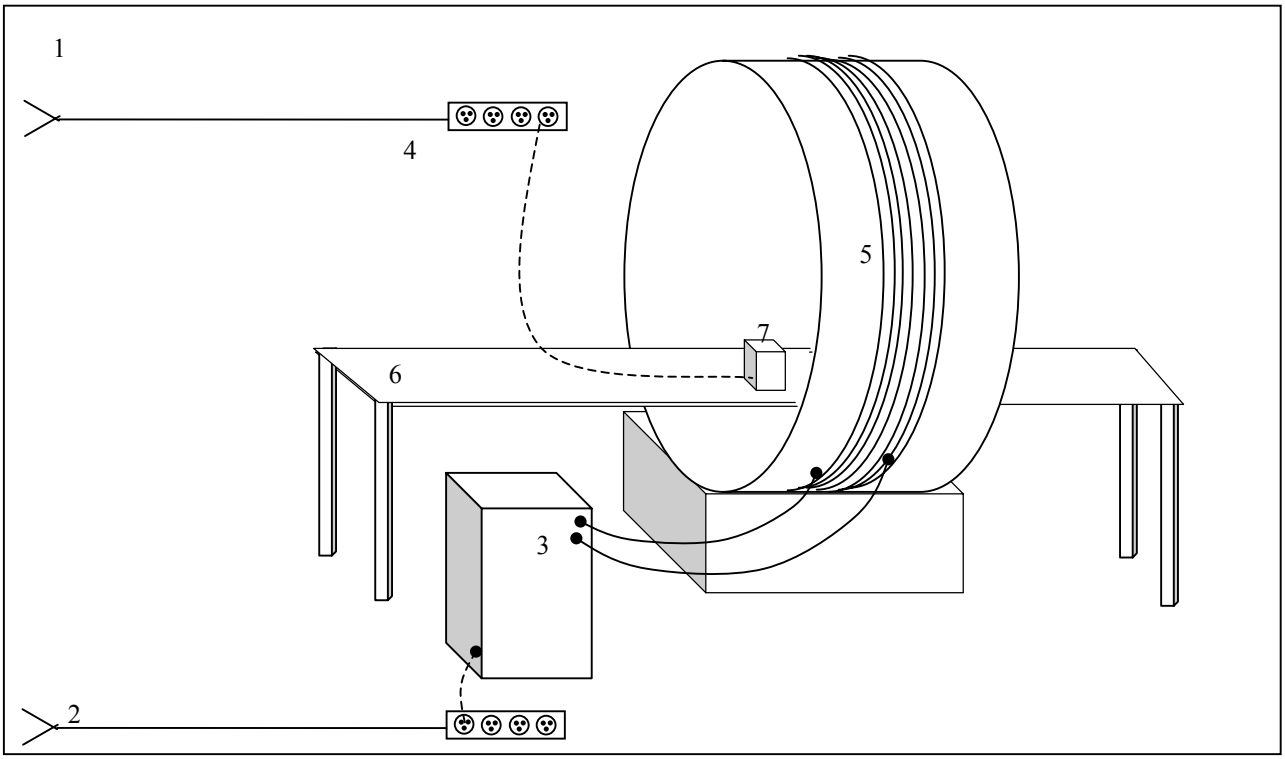
4.14 Power Frequency Magnetic Field Immunity

EN 61000-6-2 specifies Part 8 of the IEC 61000-4 Standard as the basic procedure for testing apparatus containing devices susceptible to magnetic fields, e.g. Hall Effect sensors, electrodynamic microphones, etc., and to CRT's. The standard configuration as outlined in the EN 61000-4-8 was used. A ground plane was placed inside a Helmholtz coil and at a height of 80cm. The monitors from the EUT were removed and placed on 10cm wood blocks on the ground plane with I/O cables extended to the EUT. For further information, please refer to the technical sections of the EN 61000-4-8 in addition to the test results section and photographs of the test set-up provided in this report.

For power-frequency magnetic field immunity tests, EN 61000-6-2 requires that the EUT meet at least performance Criterion A using a Helmholtz Coil at 50 Hz, to a field strength of 30 amperes (rms) per meter.

For Power-Frequency Magnetic Field Immunity Test Configuration please refer to Figure 10 on the next page.

Figure 10. Power Frequency Magnetic Field Immunity Test Setup



NOT TO SCALE

CONFIGURATION LEGEND

1. Test laboratory
2. AC Power for Test Equipment
3. AC Power Supply
4. AC Mains for EUT
5. Helmholtz Coil
6. Non-Conductive Table
7. EUT: **Power Supply** and Associated Equipment

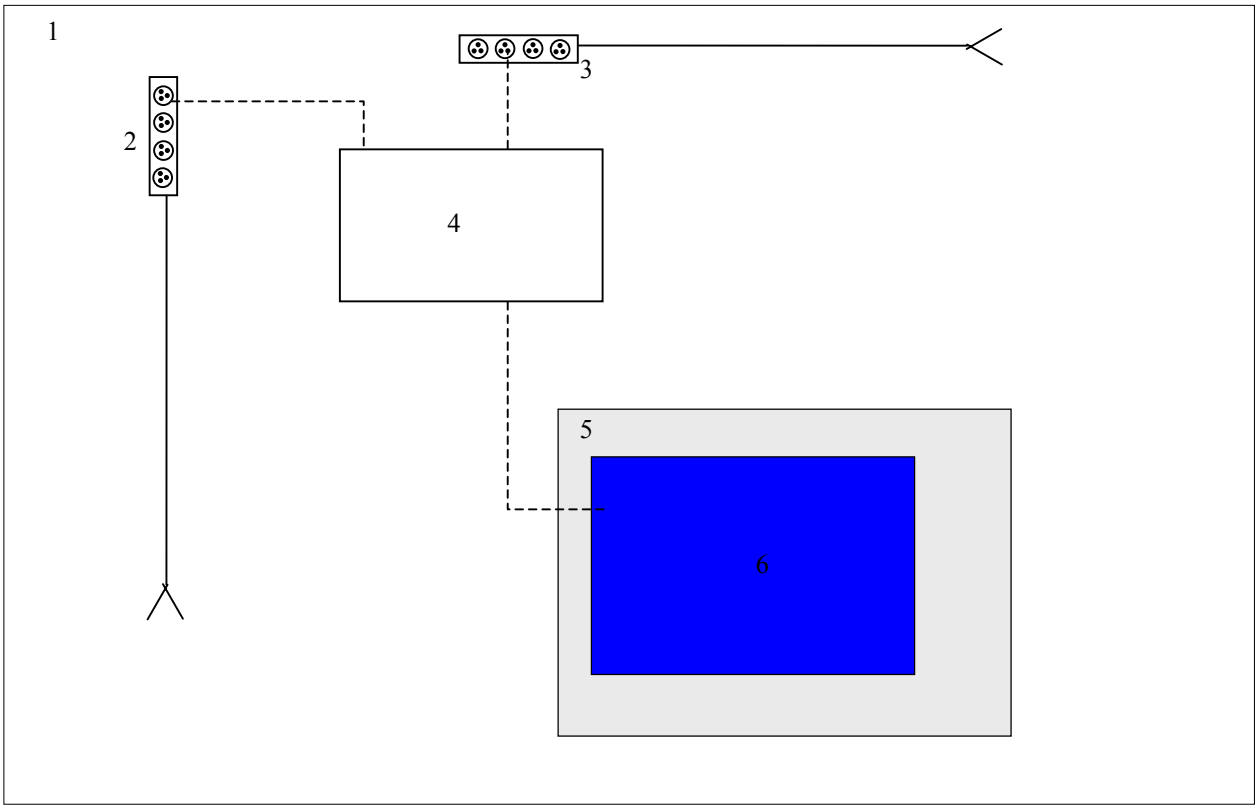
4.15 Voltage Dips and Short Interruptions

EN 61000-6-2 specifies IEC 61000-4-11 Standard as the basic standard for voltage variations immunity testing. This standard relates to the immunity requirements, test methods, and range of recommended test levels for immunity to variations in AC line voltage. The standard configuration as outlined in the IEC 61000-4-11 was used. The EUT is powered up to a nominal voltage of 230 VAC 50 Hz, and then software-controlled voltage dips and interruptions are introduced. The EUT is tested with a > 95% reduction for 0.5 periods, repeated once per minute for 3 repetitions. Next the dip is changed to a 30% reduction for 25 periods with the same rate for 3 repetitions. Finally a voltage interruption is performed with a >95% reduction for 250 periods. This is also repeated 3 times at 1-minute intervals.

For further information, please refer to the technical sections of the IEC 61000-4-11 publication in addition to the test results section and photographs of the test set-up provided in this report.

For Voltage Dips Test Configuration please refer to Figure 11 on the following page.

Figure 11. Voltage Dips and Short Interruptions Test Setup Diagram



NOT TO SCALE

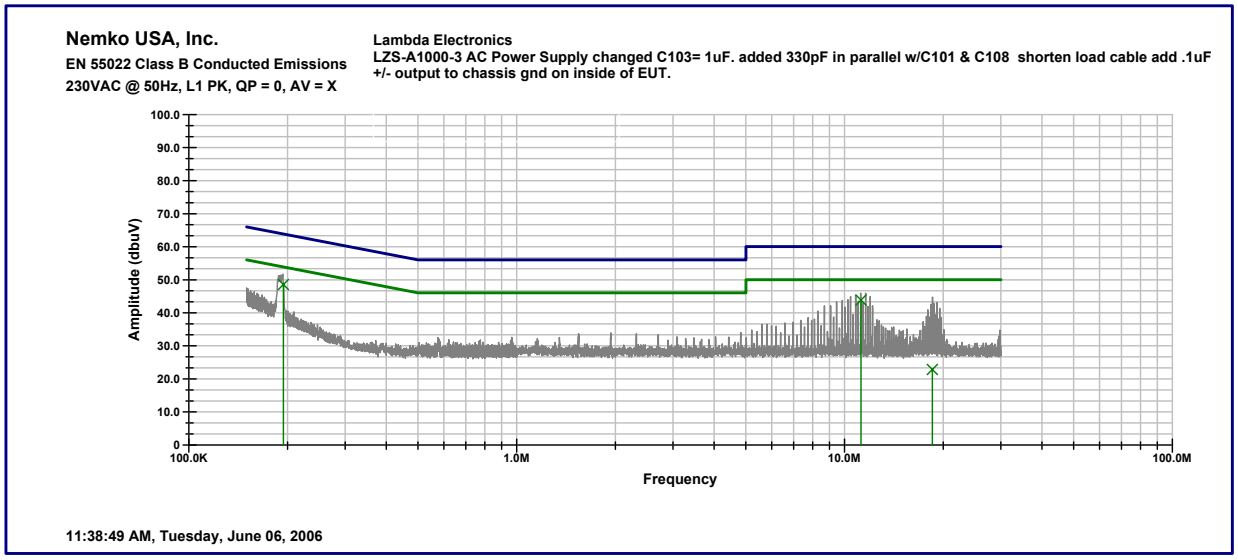
CONFIGURATION LEGEND

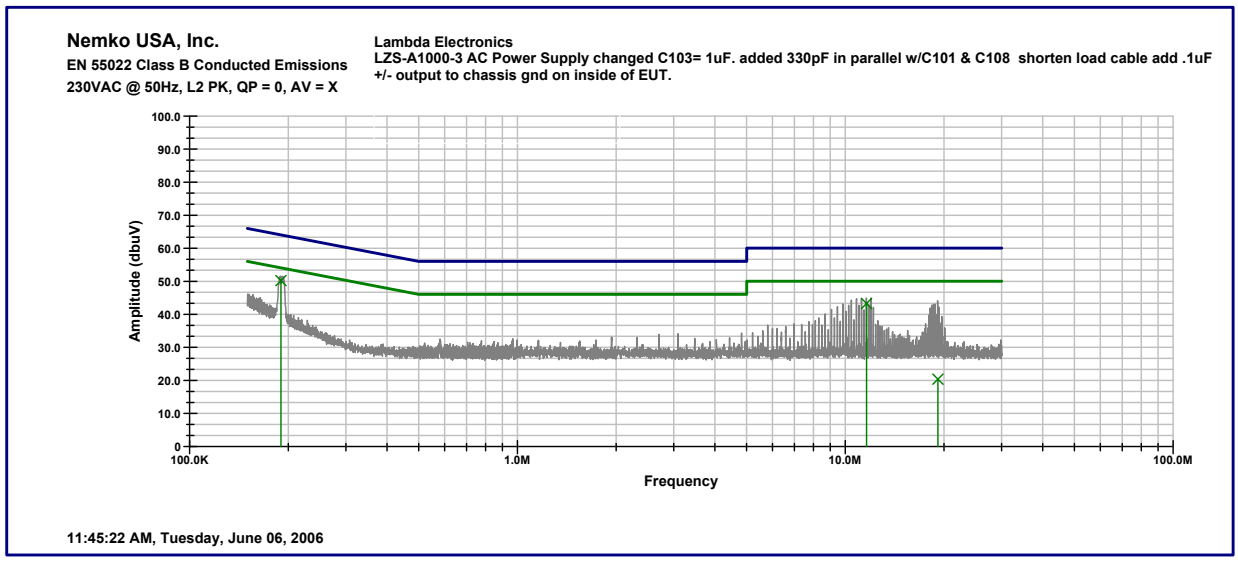
1. Test Laboratory (6 X 6 meters)
2. AC Power for Test Equipment
3. Mains Power EUT
4. Power Source Rack with Computer Analysis System
5. Non-conducting table
6. EUT: **Power Supply** and Associated System

5. TEST RESULTS

5.1 Conducted Emissions Test Results

Client	**Lambda Electronics Inc.**	Temperature	74	deg F
PAN #	26-459-LAM	Relative Humidity	49	%
EUT Name	**Power Supply**	Barometric Pressure	30.24	Hg
EUT Model	**LZS-A1000-3**	Test Location	Enclosure 1	
Governing Doc	EN 61000-6-4 (2001)	Test Engineer	Rodel Resolme	





Conducted Emissions Test Equipment

Client	**Lambda Electronics Inc.**	EUT Name	**Power Supply**
PAN #	26-459-LAM	EUT Model	**LZS-A1000-3**

Device Type	*Model #*	*Asset #*	*Used*	*Cal Done*	*Cal Due*
Filter / Limiter					
High Pass Filter, Solar	8310-1.0	559	X	03/01/06	03/01/07
Transient Limiter, HP	11947A	681	X	5/25/05	5/25/06
Transducer					
V-Network LISN, Solar	9348-50-R-24-BNC	395	X	01/18/06	01/18/07
Spectrum Analyzer / Receiver					
Quasi-Peak Adapter, HP Spectrum Analyzer Display, HP Spectrum Analyzer, HP	85650A 85662A 8566B	533 422 535	X	04/12/06	04/12/07

5.2 Radiated Emissions Test Results

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

Complete: X
Preliminary:
Job # : 26-459-LAM
Test # :
Page 1 of 1

Client Name : Lambda
EUT Name : AC Power Supply
EUT Model # : LZS-A1000-3
EUT Part # :
EUT Serial # :
EUT Config. :

Specification : EN55022: 1998, Class B
Reference :

Rod. Ant. #:	NA	Temp. (deg. C) :		Date :	6/6/2006
Bicon Ant.#:	906	Humidity (%) :		Time :	
Log Ant.#:	906	EUT Voltage :	230	Staff :	RR
DRG Ant. #	NA	EUT Frequency :	50	Photo ID:	
Dipole Ant.#:	NA	Phase:	single	Peak Bandwidth:	100 kHz
Cable#:	Noats	Location:	Noats	Video Bandwidth	100 kHz
Preamp#:	901	Distance:	10m		
Spec An.#:	674				
QP #:	676				
PreSelect#:	NA				

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
33	V		38	12.2	1.0	31.8	19.3	30.0	-10.7	Pass	
41.41	V		34	14.1	1.1	31.9	17.3	30.0	-12.7	Pass	
48.12	V		36	14.7	1.2	31.9	20.0	30.0	-10.0	Pass	
118.7	V		37	11.1	1.8	31.9	18.0	30.0	-12.0	Pass	
167.64	V		30.2	9.1	2.2	32.0	9.5	30.0	-20.5	Pass	ambient
220	V		27	10.6	2.5	31.9	8.2	30.0	-21.8	Pass	ambient
350	V		25	13.7	3.2	31.7	10.2	37.0	-26.8	Pass	ambient

Radiated Emissions Test Equipment

Client	**Lambda Electronics Inc.**	EUT Name	**Power Supply**
PAN #	26-459-LAM	EUT Model	**LZS-A1000-3**

Device Type	*Model #*	*Asset #*	*Used*	*Cal Done*	*Cal Due*
Pre-Amplifier					
pre amp, Sonoma Instrument	310	901	X	12/19/05	12/19/06
Antenna OATS #1 (North)					
Antenna, Bilog,	Com-Power	906	X	03/14/06	03/14/07
Spectrum Analyzer / Receiver					
Quasi-Peak Adaper, HP Spectrum Analyzer Display, HP Spectrum Analyzer, HP	85650A 85662A 8568B	676 675 674	X	02/15/06	08/15/06

5.3 Powerline Harmonics Test results

Xitron Technologies Inc. 2503AH
IEC1000-3-2 TEST REPORT

Nemko USA, Inc.

Test Station: XITRON-Harmonics **Date: 5/22/06**

Test By: Nemko USA **Tel: (858) 793-9911**

UUT Make: Lambda

UUT Model: LZS-A1000-3 AC Power Supply

Test Class: IEC1000-3-2 CLASS A, Fluctuating

Comments: 230VAC 50Hz

Test Duration: 31.00 min **Test Started: 13:14:26**

Time Elapsed: 31.00 min

Update Rate: 1.00 sec

Test Filename:

Test Result: PASS

Signed: 

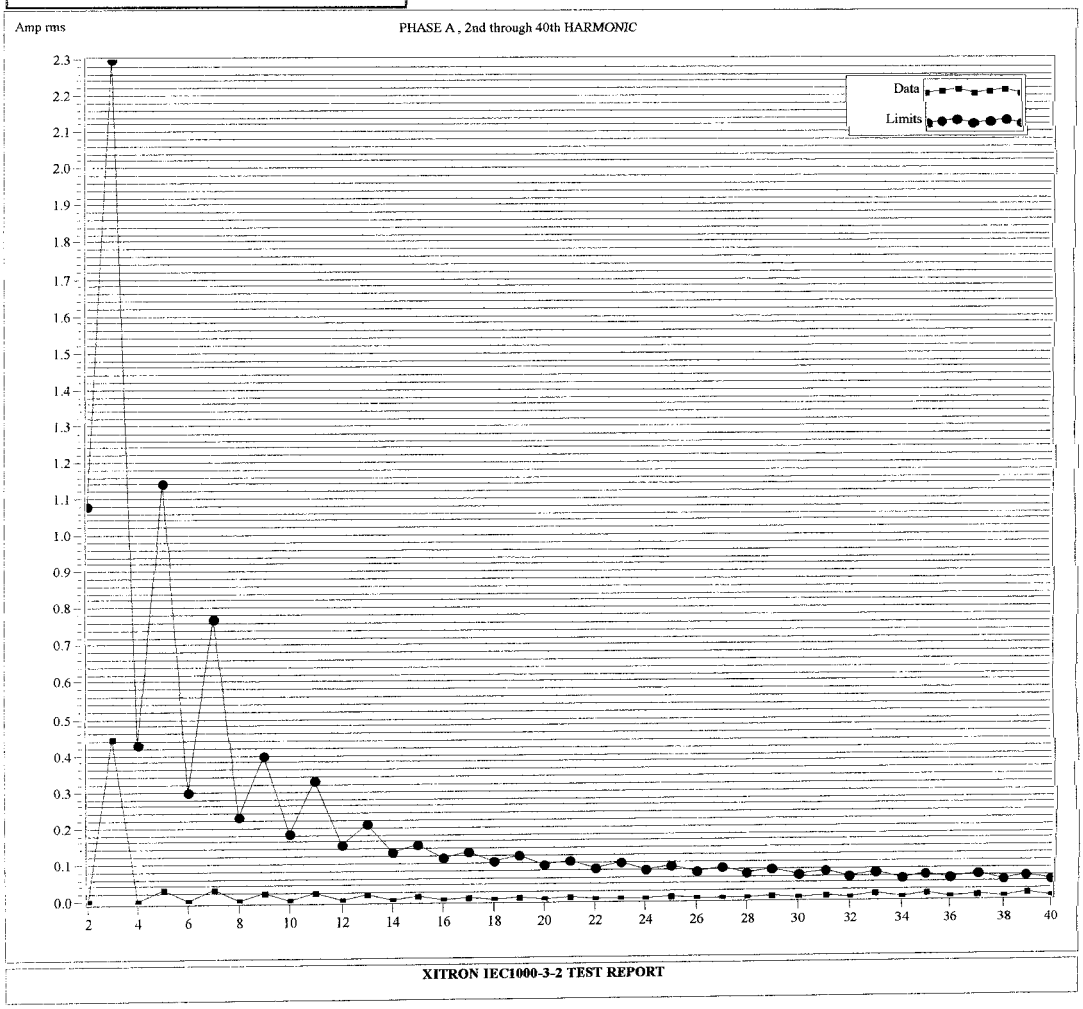
XITRON IEC1000-3-2 TEST REPORT

UUT: LZS-A1000-3 AC Power Supply | CLASS: IEC1000-3-2 CLASS A, Fluctuating | STATUS: PASS

TEST DURATION: 31.00 | TEST TIME ELAPSED: 31.00 min | REPORT PRINTED: 5/22/06 02:09 PM

Phase A

Vrms:	230.00	Status:	PASS Class A
Arms:	4.85	PF:	0.976
Watts:	1088.05	Fund:	4.82 Arms



XITRON IEC1000-3-2 TEST REPORT

Xitron Technologies Inc. 2503AH
IEC1000-3-2 TEST REPORT

Nemko USA, Inc.

Test Station: XITRON-Harmonics **Date:** 5/22/06

Test By: Nemko USA **Tel:** (858) 793-9911

UUT Make: Lambda

UUT Model: LZS-A1000-3 AC Power Supply

Test Class: IEC1000-3-2 CLASS A, Steady State

Comments: 230VAC 50Hz

Test Duration: 31.00 min **Test Started:** 12:37:33

Time Elapsed: 31.00 min

Update Rate: 1.00 sec

Test Filename:

Test Result: PASS

Signed: 

XITRON IEC1000-3-2 TEST REPORT

UUT: LZS-A1000-3 AC Power Supply

CLASS: IEC1000-3-2 CLASS A, Steady State

STATUS: PASS

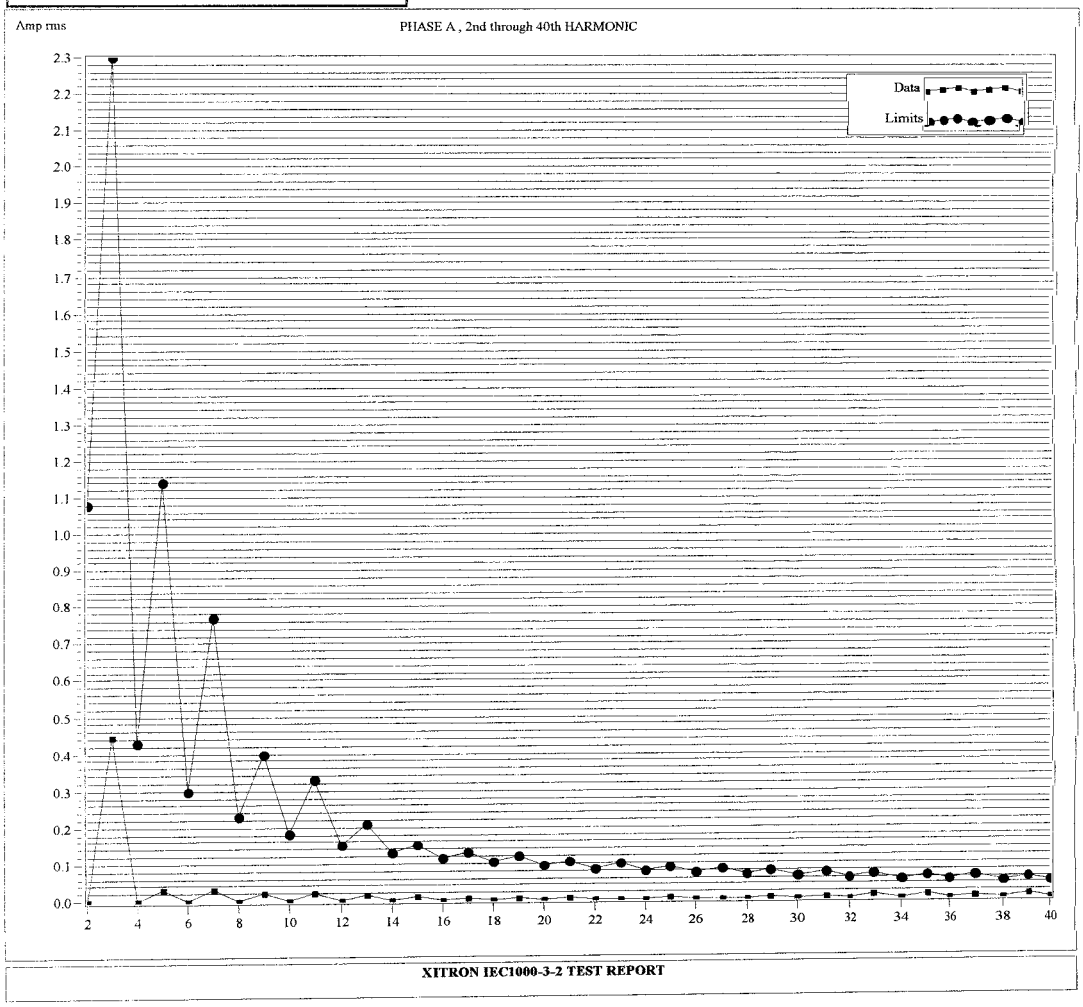
TEST DURATION: 31.00

TEST TIME ELAPSED: 31.00 min

REPORT PRINTED: 5/22/06 01:30 PM

Phase A

Vrms:	230.03	Status:	PASS Class A
Arms:	4.84	PF:	0.976
Watts:	1087.79	Fund:	4.82 Arms



XITRON IEC1000-3-2 TEST REPORT

5.4 Powerline Flicker Test Results

Xitron Technologies Inc. 2503AH
IEC1000-3-3 (IEC868) TEST REPORT

Nemko USA, Inc.

Test Station: Xitron-Flicker **Date:** 5/22/06

Test By: NEMKO USA **Tel:** (858) 793-9911

UUT Make: Lambda

UUT Model: LZS-A1000-3 AC Power Supply

Comments: 230VAC 50Hz

Test Duration: 20.00 min **Test Started:** 11:17:47

Time Elapsed: 20.03 min

Update Rate: 1.00 sec

Test Result: PASSED

Pst/Plt used: YES

Signed: 

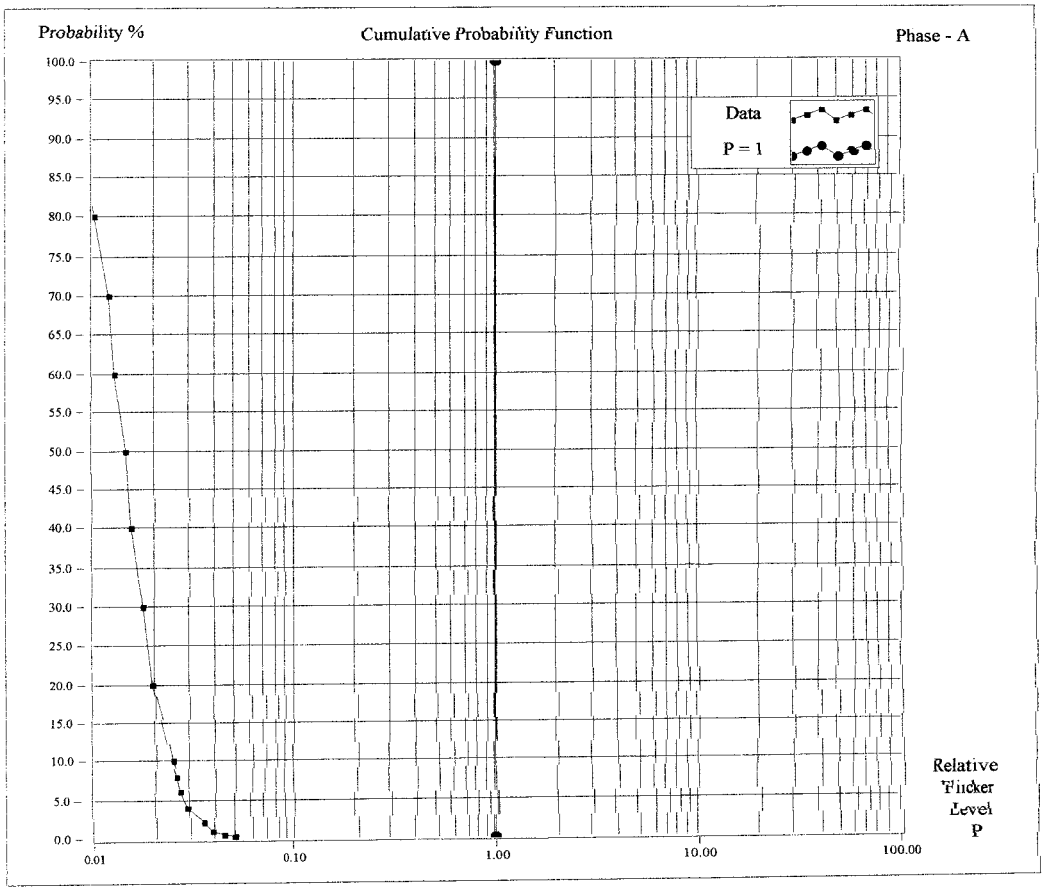
UUT: LZS-A1000-3 AC Power
TEST DURATION: 20.00 min

Pst/Plt INCLUDED: YES
TIME ELAPSED: 20.03

STATUS: PASSED
REPORT PRINTED: 5/22/06 12:01 PM

Updated		Phase A Maximum	
229.97	UT		
0.07	Plt		
0.12	Pst	0.13	
	dt > 3%	0.00	ms
0.00	dt	0.14	%
0.11	dmax	0.21	%
0.01	dc	0.03	%

STATUS: PASS



XITRON IEC1000-3-3 TEST REPORT

Powerline Harmonics and Flicker Test Equipment

Client	**Lambda Electronics Inc.**	Temperature	73	deg F
PAN #	26-459-LAM	Relative Humidity	47	%
EUT Name	**Power Supply**	Barometric Pressure	30.2	Hg
EUT Model	**LZS-A1000-3**	Test Location	West Ground Plane	
Governing Doc	EN 61204-3	Test Engineer	Rodel Resolme	
Basic Standard	IEC 61000-3-2 and IEC 61000-3-3	Date	5/22/06	

EUT Voltage: [X] **230VAC @ 50Hz** [ ] **120VAC @ 60Hz** [ ]

Equipment Used	**Used**	**Asset #**	**Cal Done**	**Cal Due**
California Instruments AC Power	**X**	604	NCR	NCR
Xitron 2520 Standard Impedance	**X**	581	1/3/06	1/3/07
Xitron 2503AH Power Analysis System	**X**	582	1/3/06	1/3/07

5.5 Electrostatic Discharge Immunity Test Results

Client:	**Lambda Electronics Inc.**	Temperature:	80	degF
PAN #:	26-459-LAM	Relative Humidity:	49	%
EUT Name:	**Power Supply**	Barometric Pressure:	30.30	Hg
EUT Model:	**LZS-A1000-3**	Test Location	West Ground Plane	
Governing Doc:	EN 61000-6-2	Test Engineer	Rodel Resolme	
Basic Standard:	IEC 61000-4-2	Date:	May 24, 2006	
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, Schaffner	NSG 435	818	X	1/19/06	1/19/07

Location of Discharge

Contact Discharge

Voltage (kV)	Polarity		Numbers	HCP	VCP
	Pos	Neg			
2	X	X	CD# 1-7	X	X
4	X	X	CD# 1-7	X	X
6	X	X	CD# 1-7	X	X

Comments: No susceptibility noted. No disruptions on the recorded output of the EUT.

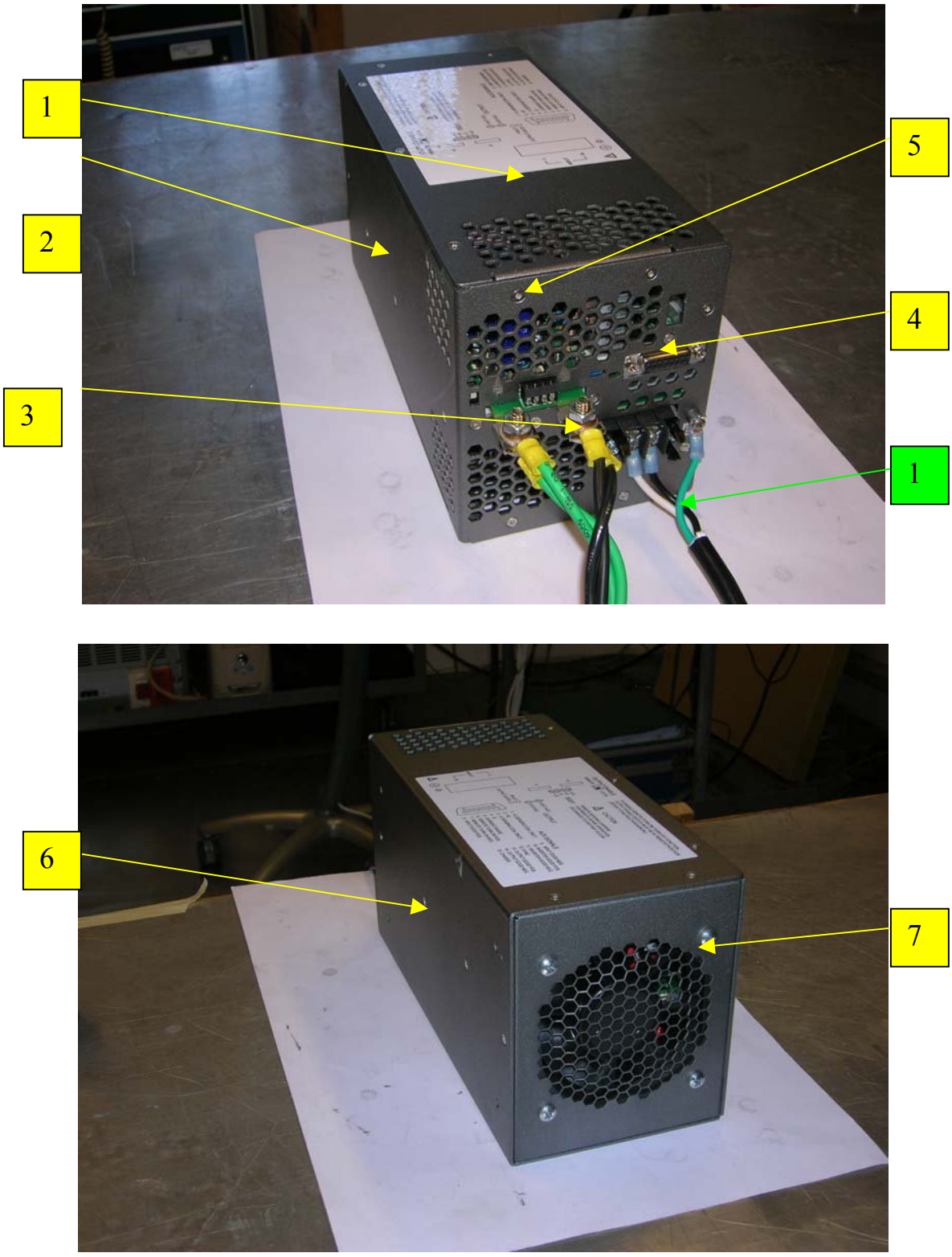
Air Discharge

Voltage (kV)	Polarity		Numbers
	Pos	Neg	
2	X	X	AD#1
4	X	X	AD#1
8	X	X	AD#1

Comments: : No susceptibility noted. No disruptions on the recorded output of the EUT.

Compliant	X		Non-Compliant			Photo	X

Figure 12. ESD Test Points



5.6 Radio Frequency Immunity Test Results

Radio Frequency Immunity

Client:	**Lambda Electronics Inc.**	Temperature:	74 degF
PAN #:	26-459-LAM	Relative Humidity:	46 %
EUT Name:	**Power Supply**	Barometric Pressure:	30.42 Hg
EUT Model:	**LZS-A1000-3**	Test Location	Anechoic Chamber
Governing Doc:	EN 61000-6-2	Test Engineer	Rodel Resolme
Basic Standard:	IEC 61000-4-3	Date:	June 7, 2006
Voltage:	230VAC/ 50Hz		

Threat Levels

Frequency (MHz):		27-500		80-1000		26-1000	X	80-2500
Test Level:		1V/m		3V/m	X	10V/m		200V/m
Modulation:		None (CW)	X	80% AM, 1kHz	X	50% PM, 200Hz		
Frequency Step:	X	1%		3%				
Dwell Time:	X	1 sec		3 sec		10 sec		
Criteria:		A	X	B		C		

Frequency (MHz)	Antenna Polarization H	V	Compliant Y	N	Orientation F: Front R: Rear SL: Side, Left SR: Side, Right	Comments
80 to 200	X	X	X		F	No susceptibility noted
80 to 200	X	X	X		R	No susceptibility noted
80 to 200	X	X	X		SL	No susceptibility noted
80 to 200	X	X	X		SR	No susceptibility noted
200 to 1000	X	X	X		F	No susceptibility noted
200 to 1000	X	X	X		R	A swing of +/- 30mV observed V & H
200 to 1000	X	X	X		SL	A swing of +/- 50mV observed V
200 to 1000	X	X	X		SR	A swing of +/- 60mV observed V & H
1000 to 2500	X	X	X		F	No susceptibility noted
1000 to 2500	X	X	X		R	No susceptibility noted
1000 to 2500	X	X	X		SL	No susceptibility noted
1000 to 2500	X	X	X		SR	No susceptibility noted
895 to 905	X	X	X		F	No susceptibility noted
895 to 905	X	X	X		R	No susceptibility noted
895 to 905	X	X	X		SL	No susceptibility noted
895 to 905	X	X	X		SR	No susceptibility noted
						Manufacturer accepts a lower Criterion for this test. Observed level change meets manufacturer's specification of +/- 1.0 Volt variation.

Compliant [X] Not Compliant [ ] Photo [X]

Radio Frequency Immunity Test Equipment

Client	**Lambda Electronics Inc.**	EUT Name	**Power Supply**
PAN #	26-459-LAM	EUT Model	**LZS-A1000-3**

Device Type	*Model #*	*Asset #*	*Used*	*Cal Done*	*Cal Due*
Signal Generator					
Gigatronics	1018	440	X	12/09/05	12/09/06
Field Sensors					
AR	FP4080	733	X	3/11/05	7/13/06 Verified
Amplifier / Directional Couplers					
AR	500W1000M5	740	X	NCR	NCR
AR	200T1G3M3	743	X	NCR	NCR
Antennas					
Biconical	3109	EA 2466	X	NCR	NCR
Electro-Metrics	RGA-30	350	X	NCR	NCR
AR	AT4002A	728	X	NCR	NCR

5.7 Electrical Fast Transient Burst Immunity Test Results

Client	**Lambda Electronics Inc.**					Temperature	74	deg F	
PAN #	26-459-LAM					Relative Humidity	47	%	
EUT Name	**Power Supply**					Barometric Pressure	30.24	Hg	
EUT Model	**LZS-A1000-3**					Test Location	West Ground Plane		
Governing Doc	EN 61000-6-2					Test Engineer	Rodel Resolme		
Basic Standard	IEC 61000-4-4					Date	May 22, 2006		
Test Level:									
AC / DC Mains / Control Ports	[ ] 0.5kV	[ ] 1.0kV	[X] 2.0kV	[ ] 4.0kV	[ ] _____				
Signal Ports	[ ] 0.25kV	[ ] 0.5kV	[ ] 1.0kV	[ ] 2.0kV	[ ] _____				
Test Duration:	[X] 61 sec	[ ] _____							

Test Equipment	**Asset #**	**Used**	**Calibration Done**	**Calibration Due**
EMC Partner, Transient 2000	845	X	03/15/06	03/15/07

Performance Criteria: [X] **A** [ ] **B** [ ] **C**

Direct Injection Output Path

Test Level	Polarity (+/-)	L1	L2	PE	Comments
2.0 kV	+/-	X			No susceptibility noted
2.0 kV	+/-		X		No susceptibility noted
2.0 kV	+/-			X	No susceptibility noted
2.0 kV	+/-	X	X		No susceptibility noted
2.0 kV	+/-	X		X	No susceptibility noted
2.0 kV	+/-		X	X	No susceptibility noted
2.0 kV	+/-	X	X	X	No susceptibility noted
0.0 kV	+/-				Coupling Clamp:

Cable Description (Clamp Injection)	**Polarity**
No I/O cable longer than 3 meters	

Compliant [X] Non-Compliant [ ] Photo [X]

5.8 Power Line Surge Immunity Test Results

Client	**Lambda Electronics Inc.**	Temperature	74	deg F
PAN #	26-459-LAM	Relative Humidity	46	%
EUT Name	**Power Supply**	Barometric Pressure	30.42	Hg
EUT Model	**LZS-A1000-3**	Test Location	West Ground Plane	
Governing Doc	EN 61000-6-2	Test Engineer	Rodel Resolme	
Basic Standard	IEC 61000-4-5	Date	May 23, 2006	

EUT Power:	**Number of Strikes per Polarity/Voltage:**	**Repetition #**	**Angle**
[X] 230VAC @ 50Hz	[X] Five (5)	1	0º
[ ] 230/400VAC @ 50 Hz	[ ] Twenty (20)	2	90º
[ ] 120VAC @ 60 Hz	[ ]	3	180º
[ ]	[ ]	4	270º
		5	360º

Waveform Generator Type: [ ] Ring Wave [X] Combination

Test Equipment:	**Asset #**	**Used**	**Calibration Done**	**Calibration Due**
EMC Partner, Transient 2000	845	X	03/15/06	03/15/07

Performance Criteria: [ ] A [X] B [ ] **C**

L - G	[X] 0.5kV (Level 1)	[X] 1.0kV (Level 2)	[X] 2.0kV (Level 3)	[ ] 4.0kV (Level 4)	[ ] ??kV (Special)
L - L	[X] 0.25kV (Level 1)	[X] 0.5kV (Level 2)	[X] 1.0kV (Level 3)	[ ] 2.0kV (Level 4)	[ ] ??kV (Special)

	Level 1				**Level 2**				**Level 3**				**Level 4**				**Special**			
	CM		DM		CM		DM		CM		DM		CM		DM		CM		DM	
	0.5kV		0.25kV		1.0kV		0.5kV		2.0kV		1.0kV		4.0kV		2.0kV					
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
N–Gnd	X	X			X	X			X	X										
L1–Gnd	X	X			X	X			X	X										
N-L1			X	X			X	X			X	X								

Compliant [X] Non-Compliant [ ] Photo [X]

Client	**Lambda Electronics Inc.**	Temperature	80	deg F
PAN #	26-459-LAM	Relative Humidity	49	%
EUT Name	**Power Supply**	Barometric Pressure	30.30	Hg
EUT Model	**LZS-A1000-3**	Test Location	West Ground Plane	
Basic Standard	IEEE C62.41	Test Engineer	Rodel Resolme	
		Date	May 24, 2006	

EUT Power:	**Number of Strikes per Polarity/Voltage:**	**Repetition #**	**Angle**
[X] 230VAC @ 50Hz	[X] Five (5)	1	0º
[ ] 230/400VAC @ 50 Hz	[ ] Twenty (20)	2	90º
[ ] 120VAC @ 60 Hz	[ ]	3	180º
[ ]	[ ]	4	270º
		5	360º

Waveform Generator Type: [X] Ring Wave [ ] Combination

Test Equipment:	**Asset #**	**Used**	**Calibration Done**	**Calibration Due**
Haefely PC6-288.1 Surge Tester	413	X	8/4/04	8/4/05
Haefely FP-Surge 16.1 Coupling Filter	412	X	NCR	NCR
Haefely PHV2 Ring Wave Plug-In	411	X	8/4/04	8/4/05

Performance Criteria: [ ] A [X] B [ ] **C**

L - G	[X] 2.0kV (Low)	[X] 4.0kV (Medium)	[X] 6.0kV (High)
L - L	[X] 2.0kV (Low)	[X] 4.0kV (Medium)	[X] 6.0kV (High)

	Low				**Medium**				**High**											
	CM		DM		CM		DM		CM		DM									
	2.0kV		2.0kV		4.0kV		4.0kV		6.0kV		6.0kV									
	+	-	+	-	+	-	+	-	+	-	+	-								
N–Gnd	X	X			X	X			X	X										
L1–Gnd	X	X			X	X			X	X										
N-L1			X	X			X	X			X	X								

Compliant [X] Non-Compliant [ ] Photo [X]

Note – Calibration extended. This Surge equipment is rarely used and was determined to be working properly prior to testing. The device is presently being calibrated. Corrective actions will be made according to ISO 17025 if device is determined to be out of tolerance.

5.9 RF Conducted Common Mode Disturbance Immunity Test Results

Client	**Lambda Electronics Inc.**		Temperature	74	deg F
PAN #	26-459-LAM		Relative Humidity	47	%
EUT Name	**Power Supply**		Barometric Pressure	30.42	Hg
EUT Model	**LZS-A1000-3**		Test Location	West Ground Plane	
Governing Doc	EN 61000-6-2		Test Engineer	Rodel Resolme	
Basic Standard	IEC 61000-4-6		Date	May 23, 2006	

Test Level:		3Vrms	X	10Vrms		
Modulation:		None (CW)	X	80%AM @ 1kHz		
Frequency Range:	X	0.15 – 80 MHz		0.15-230MHz		
Step:	X	1%		10%		1.5 x 10^{-3} /decade
Performance Criteria:	X	A		B		

1	Injection Point (Cable)	AC Mains	Injection Method:		Clamp	X CDN
Comments:	No susceptibility noted					
2	Injection Point (Cable)	DC Output	Injection Method:	X	Clamp	CDN
Comments:	Some susceptibility but less than +/- 1.0V variance. OK per customer.					
3	Injection Point (Cable)		Injection Method:		Clamp	CDN
Comments:						

Test Equipment Used	Asset #	X if Used	Calibration Done	Calibration Due
Hewlett Packard 8648B (Signal Generator)	746	X	10/31/05	10/31/06
FCC-801-M3-25 (CDN)	846		03/30/06	03/30/07
AR 10A250 (Amplifier)	402	X	NCR	NCR
RF Power Labs (Amplifier)	397	X	NCR	NCR
Solar 9144-1N (Clamp)	436	X	6/14/05	6/14/06
Agilent Oscilloscope	849	X	03/04/05	03/04/06 *

Compliant X Non-Compliant Photo X

Note – Calibration extended. The device is presently being calibrated. Corrective actions will be made according to ISO 17025 if device is determined to be out of tolerance.

5.10 Power Frequency Magnetic Field Immunity Test results

Client:	**Lambda Electronics Inc.**	Temperature:	80 degF
PAN #:	26-459-LAM	Relative Humidity:	49 %
EUT Name:	**Power Supply**	Barometric Pressure:	30.30 Hg
EUT Model:	**LZS-A1000-3**	Test Location	West Ground Plane
Governing Doc:	EN 61000-6-2	Test Engineer	Rodel Resolme
Basic Standard:	IEC 61000-4-8	Date:	May 24, 2006
Voltage:	220VAC/ 50Hz		

Frequency:		DC	X	60Hz	X	50Hz	
Threat Level:		1A/m		3A/m	X	30A/m	
Duration Per Axis:	X	5 Min					
Criteria:	X	A		B		C	

Test Equipment List

Equipment	Asset #	Used	Calibration Done	Calibration Due
Helmholtz Coil	803	X	NCR	NCR
ELGAR Power Supply	220	X	NCR	NCR
Narda B-Field Sensor, 100cm^2	852	X	3/1/05	3/1/07
Narda Exposure Level Tester, ELT-400	851	X	3/1/05	3/1/07

Test Axis	Compliant Y	Compliant N	Comments
X	X		No susceptibility noted (both 50Hz and 60Hz)
Y	X		No susceptibility noted (both 50Hz and 60Hz)
Z	X		No susceptibility noted (both 50Hz and 60Hz)

Photo X

5.11 Voltage Dips and Short Interruptions Test Results

Client	**Lambda Electronics Inc.**	Temperature	74	degF
PAN #	26-459-LAM	Relative Humidity	47	%
EUT Name	**Power Supply**	Barometric Pressure	30.24	Hg
EUT Model	**LZS-A1000-3**	Test Location	West Ground Plane	
Governing Doc	EN 61000-6-2	Test Engineer	Rodel Resolme	
Basic Standard	IEC 61000-4-11	Date	May 22, 20069	

EUT Voltage: [X] **230VAC @ 50Hz** [ ] **120VAC @ 60Hz** [ ]

Equipment Used	Used	Asset #	Cal Done	Cal Due
EMC Partner, Transient 2000	845	X	03/15/06	03/15/07

Changes Occur At: [X] **Zero Crossing** [ ]

Voltage Dips

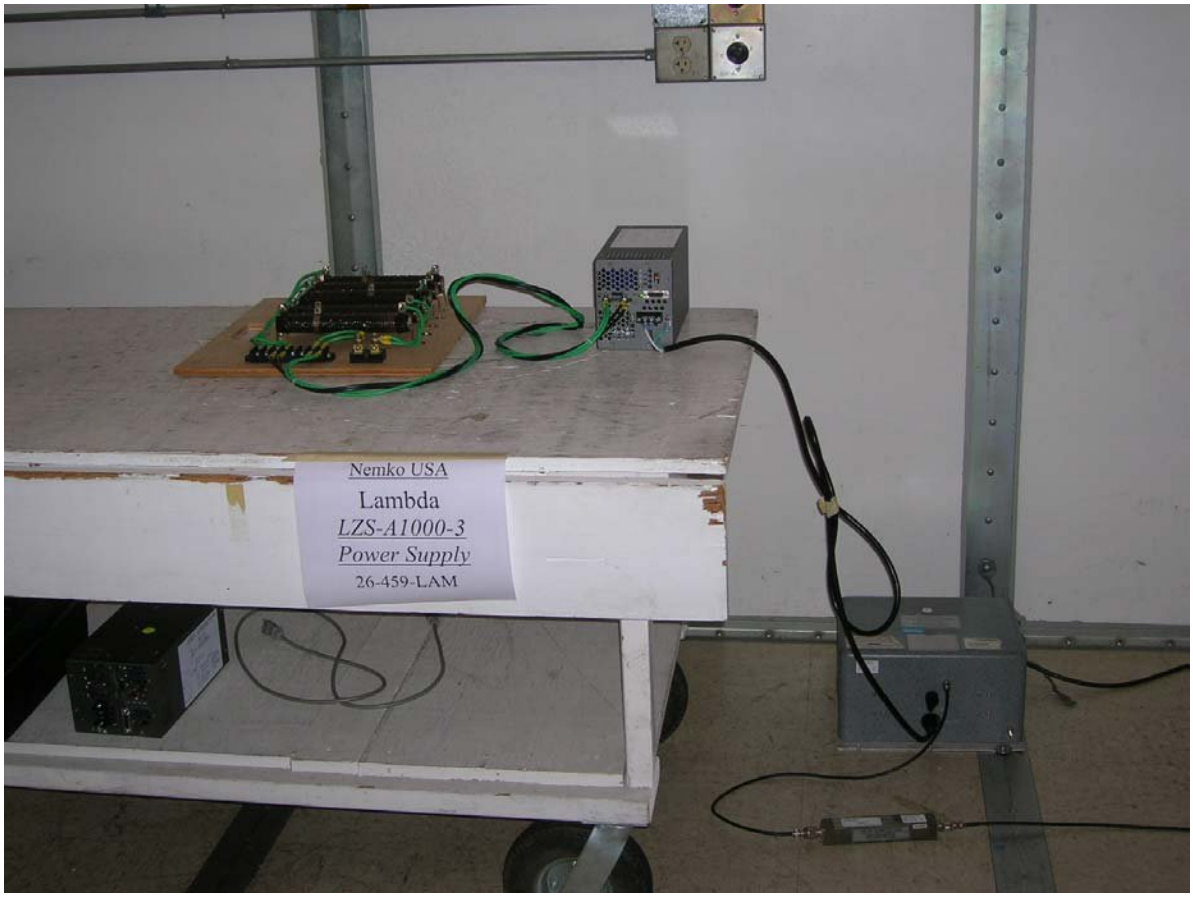
	% Reduction	Duration sec/period	Criteria A	Criteria B	Criteria C	Compliance Yes	Compliance No
[X]	>95%	10msec / 0.5	X			X	
[ ]	30%	10msec / 0.5					
[X]	30%	500msec / 25	X			X	
[X]	60%	100msec / 5	X			X	
[ ]	60%	1000msec/50					
[ ]	Not Required						

Voltage Interruptions

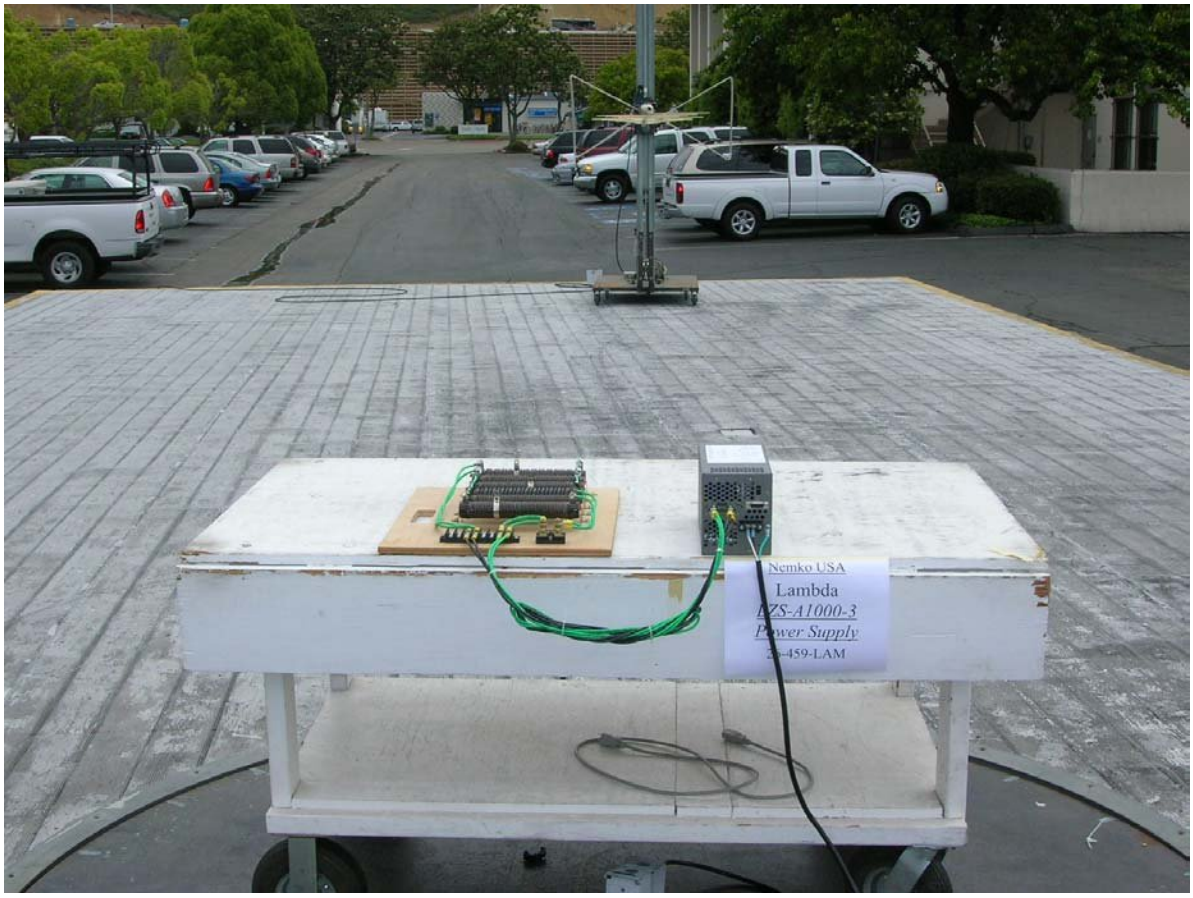
	% Reduction	Duration sec/period	Criteria A	Criteria B	Criteria C	Compliance Yes	Compliance No
[X]	>95%	5000msec / 250		X		X	
[ ]	100%	20msec / 1.0					
[ ]							
[ ]	Not Required						

Photo [X]

Photograph 2. Conducted Emissions Test Configuration



Photograph 3. Radiated Emissions Test Configuration



Photograph 4. Powerline Harmonics and Flicker Test Configuration

Photograph 5. ESD Immunity Test Configuration

Photograph 6. Radio Frequency Immunity Test Configuration

Photograph 7. EFT Immunity Test Configuration

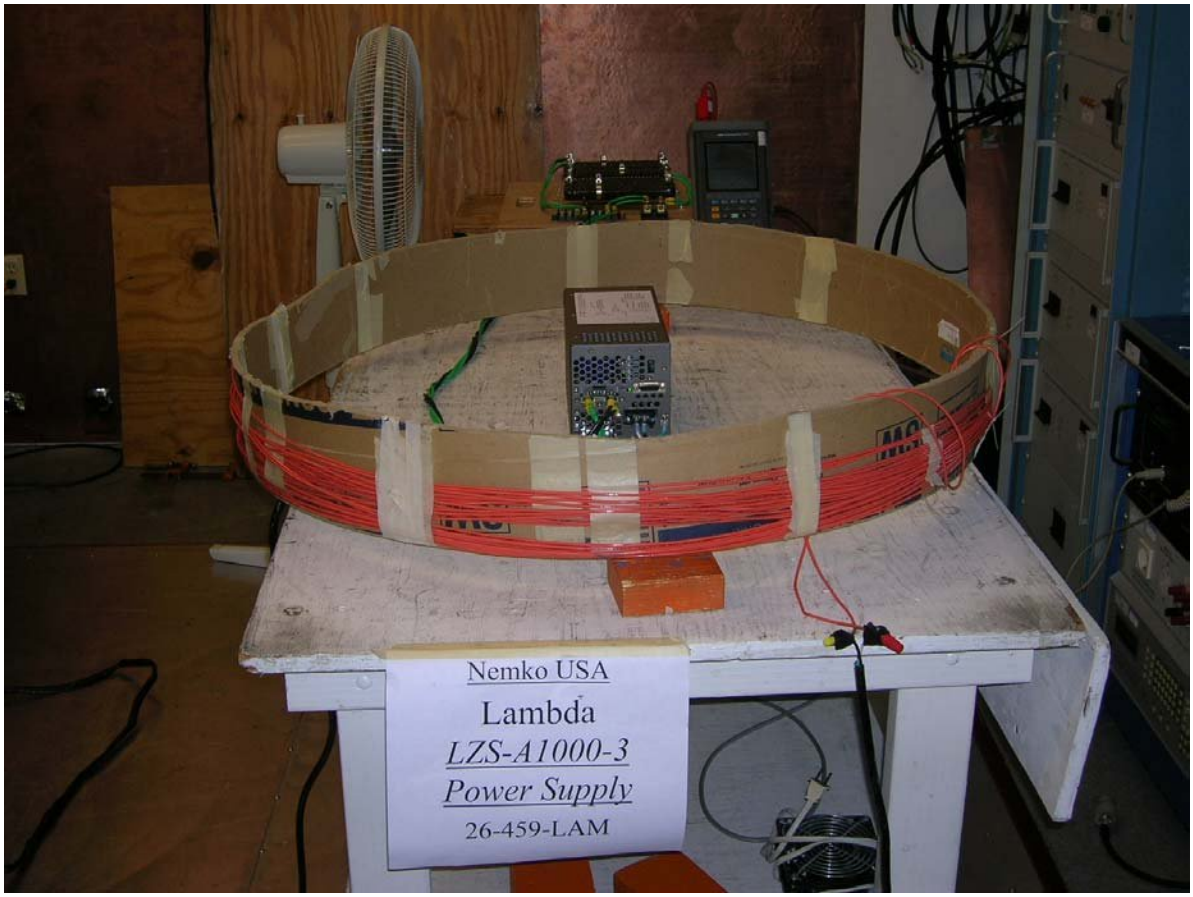
Photograph 8. Power Line Surge Immunity Test Configuration

Photograph 9. Power Line Surge (IEEE C62.41) Immunity Test Configuration

Photograph 10. RF Common Mode Immunity Test Configuration

Photograph 11. I/O RF Common Mode Immunity Test Configuration

Photograph 12. Magnetic Field Immunity Test Configuration



Photograph 13. Voltage Dips and Short Interruptions Immunity Test Configuration

APPENDIX A
A. Conducted & 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
HP8568B Spectrum Analyzer with QPA & HP8447F Preamplifier	30 MHz - 200 MHz	+4.0 dB, -4.1 dB
HP8568B Spectrum Analyzer with QPA & HP8447F Preamplifier	200 MHz-1000 MHz	+/- 3.5 dB
HP8566B Spectrum Analyzer with QPA & Preselector	30 MHz - 200 MHz	+3.9 dB, -4.0 dB
HP8566B Spectrum Analyzer with QPA & Preselector	200 MHz-1000 MHz	+/- 3.4 dB
HP8566B Spectrum Analyzer with QPA & HP 8449A Preamplifier	1 GHz - 18 GHz	+2.5 dB, -2.6 dB
HP8566B Spectrum Analyzer with QPA & HP8449A 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 +29.5 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 +29.5 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).

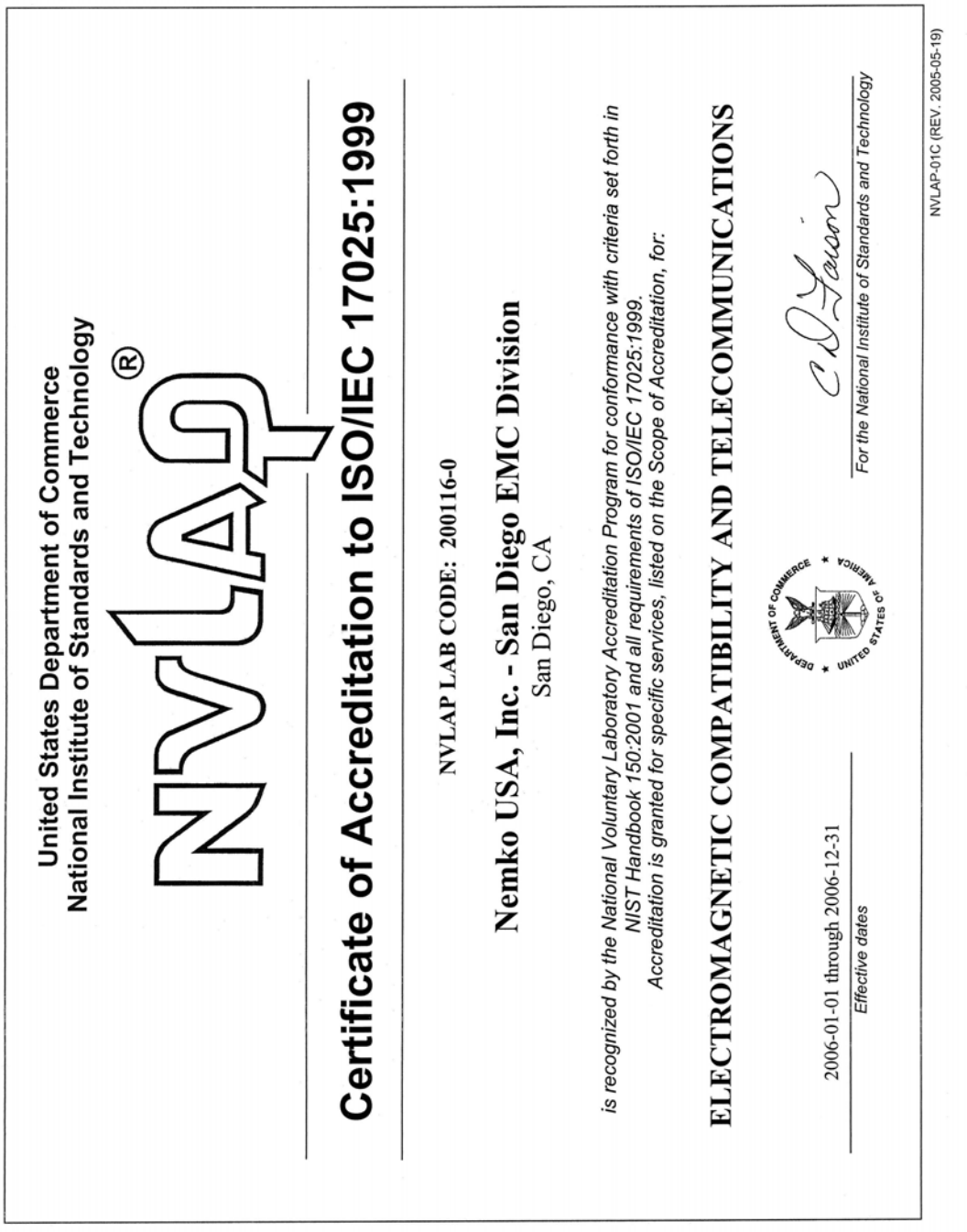
In all cases, the entity performing the Calibration is required to furnish Nemko USA with a calibration test report and/or certificate of calibration, and a "calibration sticker" on each item of M&TE that is successfully calibrated.

Calibration intervals are normally one year, except when the manufacture advises a shorter interval (e.g. the HP 8568B Spectrum Analyzer is recalibrated every six months) 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 C63.4-2004 when performing the normalized site attenuation measurements.

APPENDIX C
C. NVLAP Accreditation



United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:1999

NVLAP LAB CODE: 200116-0

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

is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in NIST Handbook 150:2001 and all requirements of ISO/IEC 17025:1999.
Accreditation is granted for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

2006-01-01 through 2006-12-31
Effective dates

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2005-05-19)

NVLAP® National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

Nemko USA, Inc. - San Diego EMC Division
11696 Sorrento Valley Road, Suite F
San Diego, CA 92121
Ms. Rhonda Saxon
Phone: 858-755-5525 x226 Fax: 858-793-9914
E-Mail: rhonda.saxon@nemko.com
URL: http://www.nemko.com

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS **NVLAP LAB CODE 200116-0**

NVLAP Code	*Designation / Description*
Emissions Test Methods:	
12/CIS14	CISPR 14-1 (March 30, 2000): Limits and Methods of Measurement of Radio interference Characteristics of Household Electrical Appliances, Portable Tools and Similiar Electrical Apparatus - Part 1: Emissions
12/CIS14a	EN 55014-1 (1993), A1 (1997), A2 (1999):
12/CIS14b	AS/NZS 1044 (1995):
12/CIS14c	CNS 13783-1: Electromagnetic Compatibility Requirements for household appliances, electric tools and similar apparatus - Part 1: Emissions
12/CIS15b	CNS 13439 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS22	IEC/CISPR 22 (1997) & EN 55022 (1998) + A1(2000): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993) and EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996)
12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment

2006-01-01 through 2006-12-31
Effective dates

For the National Institute of Standards and Technology

NVLAP-01S (REV. 2005-05-19)

NVLAP® National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS **NVLAP LAB CODE 200116-0**

NVLAP Code	*Designation / Description*
12/EM02a	IEC 61000-3-2, Edition 2.1 (2001-10), EN 61000-3-2 (2000), and AS/NZS 2279.1 (2000): Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A)
12/EM03b	IEC 61000-3-3, Edition 1.1(2002-03) & EN 61000-3-3, A1(2001): EMC - Part 3-3: Limits - Limitations of voltage changes, voltage flucuations and flicker, in public low-voltage supply-systems, for equipment with rated current <=16 A per phase and not subject to conditional connections
12/F18	FCC OST/MP-5 (1986): FCC Methods of Measurement of Radio Noise Emissions for ISM Equipment (cited in FCC Method 47 CFR Part 18 - Industrial, Scientific, and Medical Equipment)
12/T51a	AS/NZS CISPR 22 (2004): Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

Immunity Test Methods:

12/I01	IEC 61000-4-2, Ed. 1.2 (2001) + A1, A2; EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I02	IEC 61000-4-3, Ed. 2.0 (2002-03); EN 61000-4-3 (2002): Radiated Radio-Frequency Electromagnetic Field Immunity Test
12/I03	IEC 61000-4-4(1995), A1(2000), A2(2001); EN 61000-4-4: Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical Fast Transient/Burst Immunity Test
12/I04	IEC 61000-4-5, Ed. 1.1 (2001-04); EN 61000-4-5: Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
12/I05	IEC 61000-4-6, Ed. 2.0 (2003-05); EN 61000-4-6: Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
12/I06	IEC 61000-4-8, Ed. 1.1 (2001); EN 61000-4-8: Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test

2006-01-01 through 2006-12-31
Effective dates

For the National Institute of Standards and Technology

NVLAP-01S (REV. 2005-05-19)

NVLAP® National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

NVLAP LAB CODE 200116-0

NVLAP Code	*Designation / Description*
12/I07	IEC 61000-4-11, Ed. 1.1 (2001-03); EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

MIL-STD-462 : Conducted Emissions:

12/A13	MIL-STD-462 Version D Method CE101
12/A14	MIL-STD-462 Version D Method CE102
12/A15	MIL-STD-462 Version D Method CE106
12/A16	MIL-STD-461 Version E Method CE101
12/A17	MIL-STD-461 Version E Method CE102
12/A18	MIL-STD-461 Version E Method CE106

MIL-STD-462 : Conducted Susceptibility:

12/B12	MIL-STD-462 Version D Method CS101
12/B13	MIL-STD-462 Version D Method CS103
12/B14	MIL-STD-462 Version D Method CS104
12/B15	MIL-STD-462 Version D Method CS105
12/B16	MIL-STD-462 Version D Method CS109
12/B17	MIL-STD-462 Version D Method CS114
12/B18	MIL-STD-462 Version D Method CS115
12/B19	MIL-STD-462 Version D Method CS116
12/B20	MIL-STD-461 Version E Method CS101
12/B21	MIL-STD-461 Version E Method CS103
12/B22	MIL-STD-461 Version E Method CS104

2006-01-01 through 2006-12-31

Effective dates

For the National Institute of Standards and Technology

NVLAP® National Voluntary Laboratory Accreditation Program

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

NVLAP LAB CODE 200116-0

NVLAP Code	*Designation / Description*
12/B23	MIL-STD-461 Version E Method CS105
12/B24	MIL-STD-461 Version E Method CS109
12/B25	MIL-STD-461 Version E Method CS114
12/B26	MIL-STD-461 Version E Method CS115
12/B27	MIL-STD-461 Version E Method CS116
MIL-STD-462 : Radiated Emissions:	
12/D04	MIL-STD-462 Version D Method RE101
12/D05	MIL-STD-462 Version D Method RE102
12/D06	MIL-STD-462 Version D Method RE103
12/D07	MIL-STD-461 Version E Method RE101
12/D08	MIL-STD-461 Version E Method RE102
12/D09	MIL-STD-461 Version E Method RE103
MIL-STD-462 : Radiated Susceptibility:	
12/E08	MIL-STD-462 Version D Method RS101
12/E09	MIL-STD-462 Version D Method RS103
12/E10	MIL-STD-462 Version D Method RS105
12/E11	MIL-STD-461 Version E Method RS101
12/E12	MIL-STD-461 Version E Method RS103
12/E13	MIL-STD-461 Version E Method RS105

2006-01-01 through 2006-12-31

Effective dates

For the National Institute of Standards and Technology