1155CX "CE" APPROVAL FILE
FROM: DAVE BETTS
DATE: March 14, 2008

CE regulations allow for self-certification when there is reasonable technical basis for doing so.

The 1155CX is built using a subset of the components, the same processor, the same board, the same display, and the same housing as the 1197C. The 1197C passed CE testing (EN50081-1: 1992 and EN50082-1: 1997) in December of 2007 (Retlif Test Report R-12242, January 7, 2008)

The same microprocessor, operating at the same speed, is used in both products. The software used in the 1155CX is a subset of the code used in 1197C.

Based on this information we certify that the 1155CX meets CE requirements.

Dave Betts
R&D Manager
Techsonic Industries Inc.

Certificate of Conformance
European Community
Council Directive 2004/108/EC

Date of Issue: January, 2008

Issued By: Retlif Testing Laboratories
795 Marconi Avenue
Ronkonkoma, NY 11779

Issued To: Johnson Outdoors, Inc.
1 Humminbird Lane
Eufaula, AL 36027

Reference: Retlif Report Number R-12242

Retlif Testing Laboratories hereby acknowledges that compliance testing in accordance with the below listed standards was performed on a representative sample of the equipment listed below. Retlif Testing Laboratories further acknowledges that the test sample listed below was found to be in compliance with these standards.
This certificate is hereby issued to the above named grantee and is valid only for the equipment identified below.

Manufacturer:	Johnson Outdoors, Inc.
Equipment Tested:	SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps
Model Number:	1197C
Brand Name:	Humminbird
Product Type:	Generic Light Industrial

Note(s): 1) See attached report R-12242 for details and/or conditions pertaining to this certificate.
2) Conforms to the emissions requirements of EN 61000-6-3; 2001:

EN 55011:1998/A1:2002/A2:2003	Radiated Emissions, 150 kHz to 30 MHz
EN 55022:1998/A1:1999/A2:2002	Class B, Radiated Emissions, 30 MHz to 1 GHz

3) Conforms to the immunity requirements of EN 61000-6-1;2001:

IEC 61000-4-2:1995/A1:1998/A2:2001	Electrostatic Discharge
IEC 61000-4-3:2002/A1:2002	Radiated Immunity
IEC 61000-4-4:1995/A1:2001/A2:2002	EFT/Burst, Power and I/O Leads
IEC 61000-4-6:1996/A1:2001	Conducted Immunity, Power and I/O Leads

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CERTIFICATE OF CONFORMANCE
FCC Part 15, Subpart B
Industry Canada, ICES-003

Issued to: Johnson Outdoors, Inc.
1 Humminbird Lane
Eufaula, Alabama 36027

Reference: Retlif Report Number R-12242

Retlif Testing Laboratories hereby acknowledges that compliance testing in accordance with the below listed standards was performed on a representative sample of the equipment listed below. Retlif Testing Laboratories further acknowledges that the test sample listed below was found to be in compliance with these standards.
This certificate is hereby issued to the above-named grantee and is valid only for the equipment identified below.

Manufacturer:	Johnson Outdoors 1 Humminbird Lane Eufaula, AL 36027
Equipment Tested:	SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps
Model Number:	1197C
Brand Name:	Humminbird
Equipment Type:	Digital Device
Equipment Class:	B
Authorization:	Verification

Note(s): 1) See attached report R-12242 for details and/or conditions pertaining to this certificate.
2) Conforms to the requirements of:
FCC:
Para. 15.109(a) for Radiated Emissions, 30 MHz to 1GHz
IC:
Section 5.4, Radiated Emissions, 30 MHz to 1 GHz

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Retlif Testing Laboratories

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REGULATORY OFFICE
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MEMBER ACIL

January 7, 2008

Johnson Outdoors, Inc.
1 Humminbird Lane
Eufaula, AL 36027

Dear Mr. David Vernon:

Enclosed you will find the Retlif Testing Laboratories Test Report Number R-12242, which covers the EMC testing of your SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, Model Number: 1197C. This testing was performed and test report generated in accordance with your Purchase Order Number: 844279.

The following table is a brief description of the test methods and results that were performed on the SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, please refer to the Test Program Summary page for an overview of all testing performed.

Test Method	Test Results
EN 55011, Radiated Emissions	Complied
EN 55022, Radiated Emissions	Complied
IEC 61000-4-2, Electrostatic Discharge	Complied
IEC 61000-4-3, Radiated Immunity	Complied
IEC 61000-4-4, Electrical Fast Transients	Complied
IEC 61000-4-6, Conducted Immunity	Complied

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Thank you for the opportunity to be of service to you. Should you have any questions regarding the enclosed report please feel free to contact me.

Sincerely,

Retlif Testing Laboratories

Dawn Harter
Publications Supervisor
dharter@retlif.com

Enc. (as stated)

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EMC Test Report
On

Johnson Outdoors, Inc.
SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps
Model Number: 1197C

Customer Name:	Johnson Outdoors, Inc.
Customer P.O:	844279
Date of Report:	January 7, 2008
Test Report No:	R-12242
Test Start Date:	December 13, 2007
Test Finish Date:	December 19, 2007
EMC Test Technicians:	S. Carley, K. McDonald, K. O'Connor, R. Soodoo
EMC Test Engineer:	D. Lerner
EMC Laboratory Supervisor:	N. Dragotta
Report Prepared By:	R. Frino

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Certification and Signatures

We certify that this report is a true report of the results obtained from the tests of the equipment stated, and relates only to the equipment tested. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.

Donald Lerner
Lead EMC Test Engineer

Nicholas Dragotta
EMC Laboratory Supervisor

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Non-Warranty Provision
The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

Non-Endorsement
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This report must not be used by the client to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Revision History

Revisions to this document are listed below; the latest revised document supersedes all previous issues of this document.

Revision	Date	Pages Affected
-	January 7, 2008	Original Release

Test Program Summary

Report Number:	R-12242
Customer:	Johnson Outdoors, Inc.
Address:	1 Humminbird Lane
	Eufaula, AL 36027
Test Sample:	SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps
Model Number:	1197C

Test Specification:
EN 61000-6-1:2001, Electromagnetic Compatibility - Generic Standards - Immunity for Residential, Commercial and Light - Industrial Environments.
EN 55011:1998, Specification for Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical (ISM) Equipment.
EN 55022:1998, Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment.

Mode of Operation:
During the performance of all testing specified herein, the EUT was continuously displaying bottom contour and water temperature information, received from the depth transducer, and battery voltage information on the display.

Susceptibility Criteria:
The following were considered indications of EUT susceptibility:

- Any loss of display characters
- Any deviations in depth measurements greater than +/- 1 foot
- Any change in the returns, however, the display between the returns was allowed to change or disappear temporarily during testing.

Test Methods:
The test methods performed on the EUT and the corresponding test results are shown in Table 1:

Table 1 - Test Methods

Paragraph	Standard	Method	Test Results
6.1	EN 55011	Radiated Emissions, Class B	Complied
6.1	EN 55022	Radiated Emissions, Class B	Complied
6.2	EN 61000-6-1	IEC 61000-4-2, Electrostatic Discharge	Did Not Comply(1)
6.2	EN 61000-6-1	IEC 61000-4-2, Electrostatic Discharge Retest	Complied
6.3	EN 61000-6-1	IEC 61000-4-3, Radiated Immunity	Complied
6.4	EN 61000-6-1	IEC 61000-4-4, Electrical Fast Transient/Burst, Power and I/O Leads	Complied
6.5	EN 61000-6-1	IEC 61000-4-6, Conducted Immunity, Power and I/O Leads	Complied

(1) **IEC 61000-4-2, Electrostatic Discharge**
December 14, 2007
The unit proved susceptible in the 4kV range at the left rear bottom outside frame screw next to the brass screw hole. The unit reset upon the application of the 4 kV charges.

IEC 61000-4-2, Electrostatic Discharge Retest
December 19, 2007
After the modifications stated in paragraph 5.8, the EUT was found to comply with the requirements specified for this method.

1.0 Scope

The purpose of this testing program was to determine the compliance of the SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, Model Number: 1197C, manufactured by Johnson Outdoors, Inc., as described in paragraph 5.0 of this report, to the emissions and immunity requirements of European Community Council Directive 2004/108/EC, the EMC Directive. The SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps here after will be referred to as EUT.

2.0 Applicable Documents

The following documents form a part of this test report to the extent specified herein:

RCM-001	-	Retlif Testing Laboratories, Calibration Manual.
RQM-001		Retlif Testing Laboratories, Quality Assurance Manual.
ISO/IEC 17025	-	General Requirements for the Competence of Testing and Calibration Laboratories.
ANSI/NCSL Z-540-1	-	Calibration Laboratories and Measuring and Test Equipment General Requirements.
IEEE-Std-299	-	Attenuation Measurements for Enclosures, Electromagnetic Shielding for Electronic Test Purposes.
EN 61000-6-1:2001	-	Electromagnetic Compatibility - Generic Immunity Standard, Part 1, Residential, Commercial and Light Industrial Environments.
EN 55011:1998		Limits and methods of measurement of radio disturbance characteristics of Industrial, Scientific, and Medical (ISM) equipment
EN 55022:1998		Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
IEC 61000-4-2:1995	-	Electrostatic discharge immunity test.
IEC 61000-4-3:2002	-	Radiated, radio frequency, electromagnetic field immunity test.
IEC 61000-4-4:2004	-	Electrical fast transient burst immunity test.
IEC 61000-4-6:1996	-	Conducted disturbances induced by radio frequency fields, immunity test.

3.0 Acronyms and Definitions

The following acronyms maybe used within this test report:

BCI:	Bulk Cable Injection
CE:	Conducted Emissions
CS:	Conducted Susceptibility
dB:	Decibel
dBµA:	Decibels Relative to One Microampere
dBµV:	Decibels Relative to One Microvolt
dBµV/m:	Decibels Relative to One Microvolt per Meter
EMC:	Electromagnetic Compatibility
EMI:	Electromagnetic Interference
EUT:	Equipment Under Test
GHz:	Gigahertz
Hz:	Hertz
ISM:	Industrial, Scientific and Medical
kHz:	Kilohertz
LISN:	Line Impedance Stabilization Network
mA:	Milliampere
mS:	Millisecond
mΩ:	Milliohm
MHz:	Megahertz
RE:	Radiated Emissions
RF:	Radio Frequency
RS:	Radiated Susceptibility
RMS:	Root Mean Square
µA:	Microampere
µF:	Microfarad
µH:	Microhenry
µV:	Microvolt
µV/m:	Microvolts per Meter
V/m:	Volts per Meter
Ω:	Ohm

4.0 General Requirements

4.1 Test Environment

All testing was performed at Retlif Testing Laboratories facility. Each test method was performed in the environment specified within the test standard. Where the test environment deviated from that specified, it is noted in the applicable test method.

4.1.1 Shielded Enclosures

All testing which required the use of a shielded enclosure was performed in a solid steel, double wall, modular type. The attenuation characteristics of the enclosure were in accordance with IEEE-Std-299. All input power lines to the enclosure were filtered utilizing filters manufactured in accordance with MIL-PRF-15733H and tested in accordance with MIL-STD-220B. The walls of the enclosure were treated with a combination of carbon impregnated foam and ferrite tile. For EN 61000-4-3, the floor between the EUT and test antenna was treated with tile and the enclosure met the field uniformity requirements contained therein.

4.1.2 Conducted Emissions

All conducted emissions testing described herein was performed on a conducting ground plane. The conducting ground plane for measuring AC power line conducted emissions consisted of a floor-earth grounded conducting surface. The conducting surface was 3.0 m x 2.5 m in size and extended at least 0.5 m beyond the vertical projection (footprint) of the EUT. The ground plane was covered by insulating material 1 mm thick.

4.1.3 Radiated Emissions

4.1.3.1 Preliminary

Where possible, preliminary radiated emissions measurements were performed in a shielded enclosure.

4.1.3.2 Formal

Formal radiated emissions testing was performed on an OATS. The test site was covered with a conducting ground plane. The equipment under test was placed in an RF transparent enclosure on top of a flush mounted, metallic turntable. The test site met the test site attenuation requirements specified in ANSI C63.4.

4.2 Test Instrumentation

A listing of all test instrumentation utilized is contained within each applicable test method. These listings indicate the model, manufacturer, frequency range, last calibration date and calibration due date of all instrumentation utilized. All instrumentation utilized was calibrated prior to use in accordance with the procedures set forth in Retlif Testing Laboratories standard manuals RCM-001 and RQM-001 which are in accordance with the requirements of ANSI/NCSL Z-540-1.

4.3 Detector Function

For the radiated emissions testing described herein a Quasi-Peak detector function was utilized as specified in CISPR 16.

5.0 Description of Equipment Under Test

The equipment under test was a SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, hereafter referred to as EUT. The EUT was manufactured by Johnson Outdoors, Inc. of Eufaula, AL 36027.

5.1 EUT Functions

The EUT displays battery voltage, water temperature, speed, GPS location, fish locator, and side imaging.

5.2 Intended Installation

The EUT is intended to be installed in a main cabin of a boat.

5.3 EUT Parameters

5.3.1 Physical Characteristics

Table 2 details the physical characteristics of all EUT components:

Table 2 - Physical Characteristics

System Component	Depth (cm)	Width (cm)	Height (cm)	Weight (kg)
SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps	33.0	7.0	23.0	4.5

5.3.2 Electrical Characteristics

5.3.2.1 Power Input

Table 3 details the electrical power requirements of all EUT components:

Table 3 - Power Input

System Component	Input Voltage	Current
SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps	12 VDC	5 Amps Max

5.4 EUT Configuration

For all test methods, the EUT was configured as shown in the General Test Setup drawing, Figure 1.

5.4.1 Interconnecting Leads and Cables

All system cabling, including cable length, routing and type were as specified in Table 4:

Table 4 - Interconnecting Cable Configurations

System Component/Ports	Cable Length (Meters)	Signal Description	S/U[1]	Cable Description	Routed to
SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, Power Input Port	1.9	+12 VDC	U	2-Conductor	+12 VDC Power Source
SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, Transducer Port	6.1	Temperature/ Depth Analog Data	S	5-Conductor	Temperature/Depth Transducer
SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, Transducer Port	6.1	Temperature/ Speed Analog Data	S	Multi-Conductor	Temperature/Speed Transducer
SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, GPS Port	6.1	GPS Signal	S	Multi-Conductor	GPS Receiver
Interlink Port	6.1	Interlink Signal	S	Multi-Conductor	Interlink Transducer

5.4.2 Input Power Leads

All power inputs to the EUT, including cable length, were as specified in Table 5:

Table 5 - Input Power Leads

System Component	Signal Name	Cable Characteristics	Length
SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps	+12 VDC	2-Conductor	1.9
	+12 VDC Return	2-Conductor	1.9

5.5 Mode of Operation

During the performance of all testing specified herein, the EUT was continuously displaying bottom contour and water temperature information, received from the depth transducer, and battery voltage information on the display.

5.5.1 Support Equipment

All equipment that was utilized to achieve the EUT operating state specified in paragraph 5.5 is listed in Table 6:

Table 6 - Support Equipment

Description	Manufacturer	Serial Number
GPS Reciever	Humminbird	41216220006
Speed Transducer	N/A	N/A
12V Battery	Diehard	N/A
Network Interlink	Humminbird	6010499-0221
Depth/Temperature Monitor	N/A	N/A

5.6 Susceptibility Criteria

The following was considered indication of EUT susceptibility:

- Any loss of display characters
- Any deviations in depth measurements greater than +/- 1 foot
  Any change in the returns, however, the display between the returns was allowed to change or disappear temporarily during testing.

The following performance criteria, as outlined in EN 61000-6-1, were used to determine compliance with the requirements:

IEC 61000-4-2 - Performance Criteria B
IEC 61000-4-3 - Performance Criteria A
IEC 61000-4-4 - Performance Criteria B
IEC 61000-4-6 - Performance Criteria A

Performance Criteria A: The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases 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 what the user may reasonably expect from the apparatus if used as intended.

Performance Requirements (con't.)

Performance Criteria B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. 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 what the user may reasonably expect from the apparatus if used as intended.

5.6.1 Monitoring Equipment

All equipment that was utilized to monitor the EUT for indications of degradation or malfunction (susceptibility) as detailed in paragraph 5.6 is listed in Table 7:

Table 7 - Monitoring Equipment

Description	Manufacturer	Model Number
EUT Display	Techsonic	997c SI Combo

5.7 Leads Tested

The following leads of the EUT were tested during the course of this testing program as specified in each applicable test method:

Power Leads:

- +12 VDC
- +12 VDC Return

Input / Output Leads:

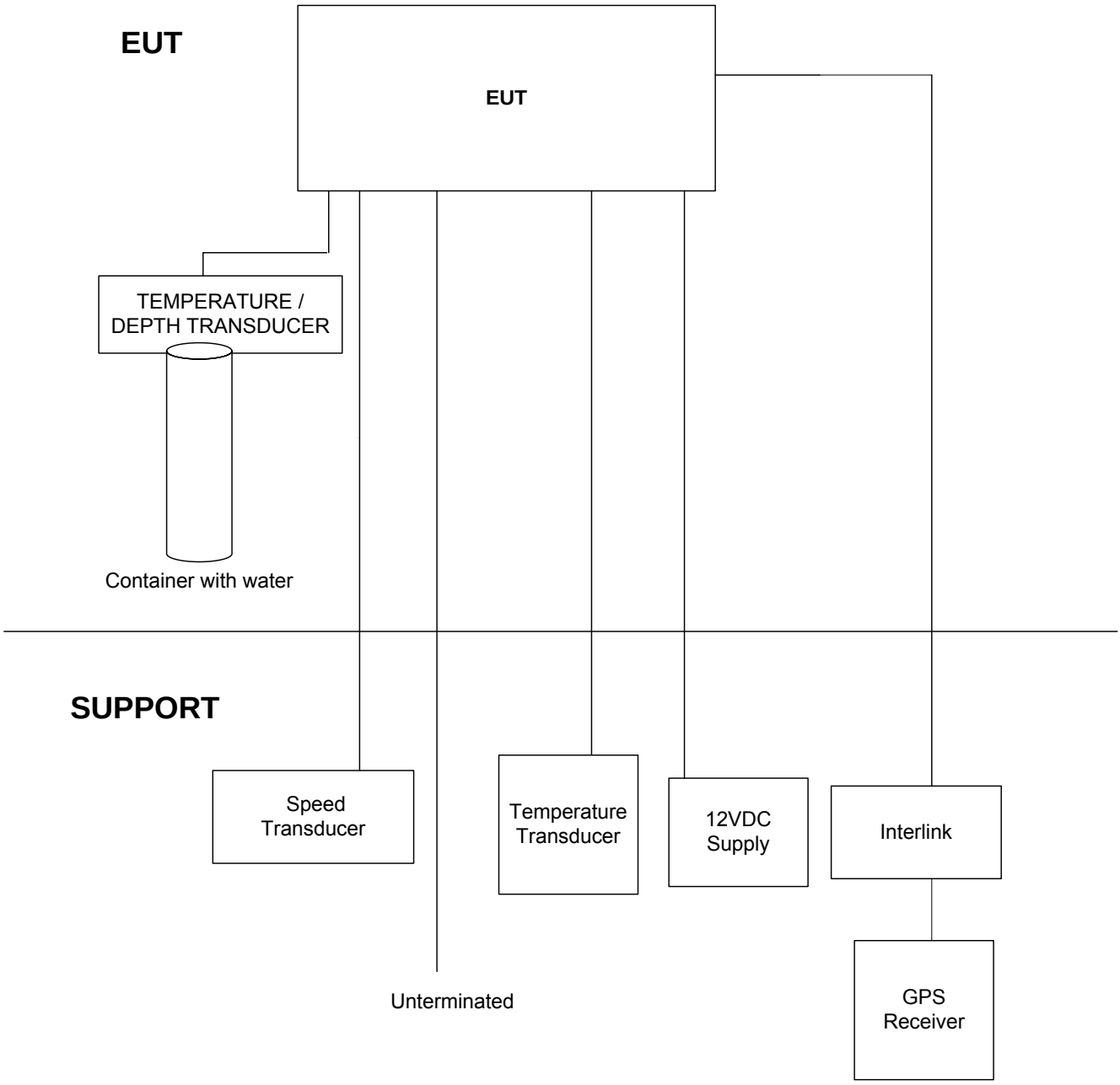
- Temperature/Speed Transducer Cable
- Temperature/Depth Transducer Cable
- GPS Receiver Cable
- Interlink Cable

5.8 Modifications

The following modifications were made to the EUT during the course of this testing program in order to demonstrate compliance:

- **December 19, 2007, Electrostatic Discharge Retest**
  A 0.25" FORMEX plug was placed over the offending screw for the ESD test.

Figure 1 - Test Sample Block Diagram



6.0 Test Sequence and Results

The following test methods were performed on the SI Combo NVD Side Imaging Combo Depth Finder with NVD Maps, Model Number: 1197C, to the requirements of EN 61000-6-1 and EN 61000-6-3 as specified by EN 61000-6-1:2001, Electromagnetic Compatibility - Generic Standards - Immunity for Residential, Commercial and Light - Industrial Environments. EN 55011:1998, Specification for Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical (ISM) Equipment. EN 55022:1998, Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment. All testing documented herein was performed in the sequence shown in Table 8:

Table 8 - Test Sequence and Results

Testing Date(s)	Paragraph	Standard	Test Method	Results
December 13, 2007	6.3	EN 61000-6-1	IEC 61000-4-3, Radiated Immunity	Complied
December 14, 2007	6.4	EN 61000-6-1	IEC 61000-4-4, Electrical Fast Transient/Burst, Power and I/O Leads	Complied
December 14, 2007	6.2	EN 61000-6-1	IEC 61000-4-2, Electrostatic Discharge	Did Not Comply
December 17, 2007	6.5	EN 61000-6-1	IEC 61000-4-6, Conducted Immunity, Power and I/O Leads	Complied
December 18, 2007	6.1	EN 55011	Radiated Emissions, Class B	Complied
December 18, 2007	6.1	EN 55022	Radiated Emissions, Class B	Complied
December 19, 2007	Modification: Inserted a 0.25" FORMEX plug over the offending screw for the ESD test.			
December 19, 2007	6.2	EN 61000-6-1	IEC 61000-4-2, Electrostatic Discharge Retest	Complied

See individual test methods contained in paragraphs 6.1 through 6.5 of this test report for a full description of the test procedures utilized and the results obtained.

6.1 EN 55011 & EN55022, Radiated Emissions, Class B, 150 kHz to 1 GHz

6.1.1 Purpose

The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the EUT via radiation from the enclosure and connected cabling in the frequency range of 150 kHz to 1 GHz.

6.1.2 Test Limits

The limits shown in Table 9 were used to determine compliance of the EUT to the radiated emissions requirements on EN 55011 and EN 55022:

Table 9 - Radiated Emissions, Test Limits

Frequency Range	Class B Quasi-Peak Limits at 10.0 Meters
150 kHz to 30.0 MHz	39 - 3 dBµA/m
30.0 MHz to 230.0 MHz	30.0 dBµA/m
230.0 MHz to 1.0 GHz	37.0 dBµA/m

6.1.3 Test Setup

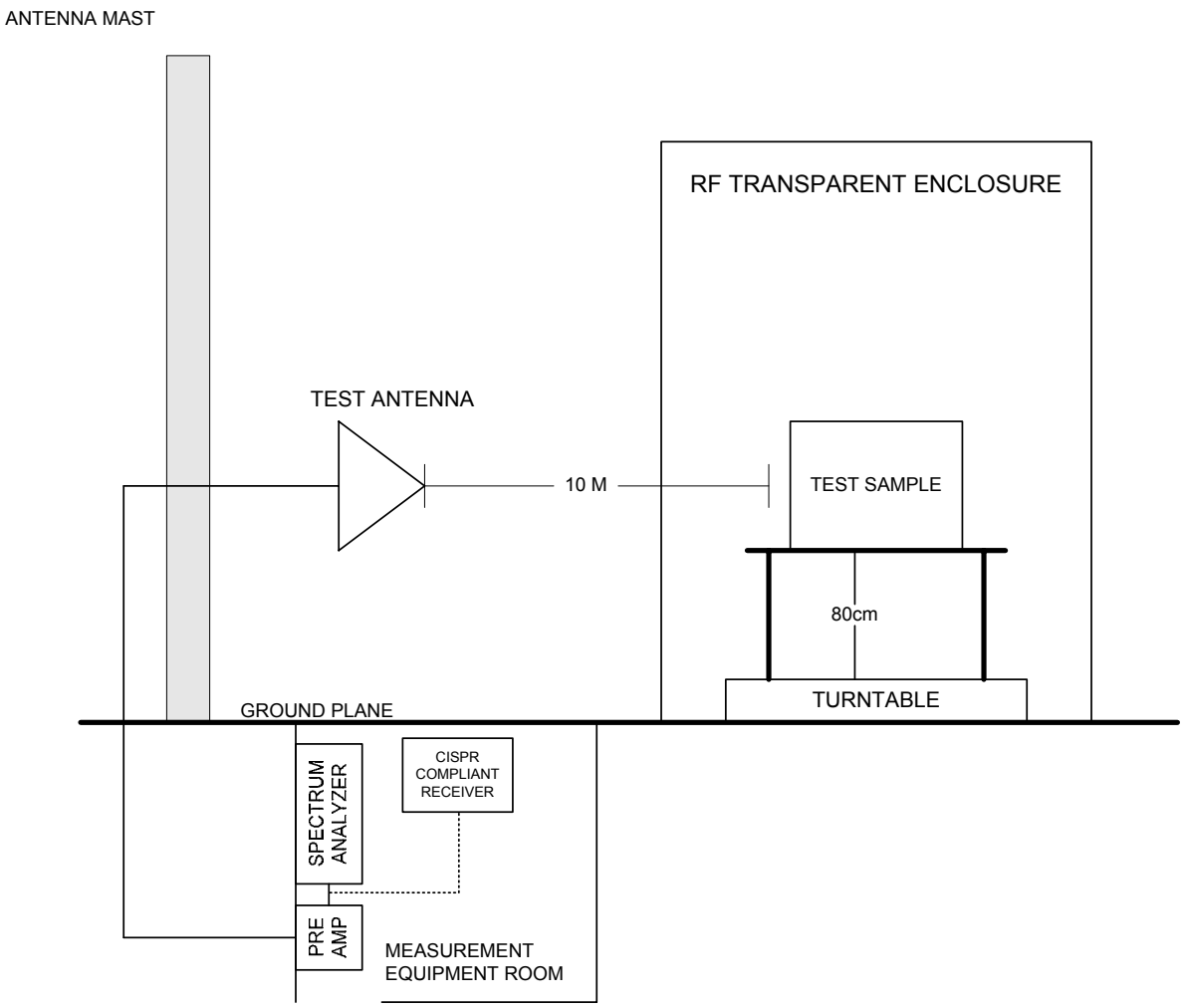
The EUT was configured as shown in the attached photograph(s) and detailed in paragraph 5.4 herein. This configuration was based on the test setup shown in Figure 2. The EUT was placed on an 80 cm high wooden test stand above the ground plane of the shielded enclosure for preliminary measurements and the OATS (Open Area Test Site) for final measurements. The rear of the EUT, including support peripherals were aligned and flush with the rear of the test stand. The test stand was placed directly on the flush mounted turntable. The turntable positions were relative to the EUT as follows: When facing the EUT the front is at 0^{o}, the rear is at 180^{o} and the left side is at 270^{o}. The test stand was situated such that the boundary of the EUT was located 3.0 m from the measuring antenna. The EUT was arranged on the test stand as specified in paragraph 5.4 herein.

Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the EUT. Excess interface cable length was draped over the back edge of the test stand. Draped cables closer than 40 cm to the conducting ground plane were bundled in the center in a serpentine fashion using 40 cm lengths to maintain a 40 cm height above the ground plane.

The DC power cables of the EUT and non-EUT equipment did not require bundling. The DC power cables were draped over the rear edge of the test stand and routed down to the DC mains outlet located on top of the turntable. Excess power cable length was left on the surface of the turntable.

The antenna was located a distance of 3.0 m from the envelope of the EUT. The antenna was connected via coaxial cable to a broadband pre-amplifier, which in turn was connected to a spectrum analyzer and/or a CISPR compliant receiver located in the measurement equipment room. The spectrum analyzer display for each frequency range was recorded on a graphics plotter.

Figure 2 - Radiated Emissions, Test Setup



6.1.4 Test Equipment

The details of the test equipment utilized during the performance of this test method are shown below:

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
012	Loop Antenna, Active	EMCO	9 kHz - 30 MHz	6502	7/18/2007	7/18/2008
067	Open Area Test Site	Retlif	3/10 Meter	RNY	9/12/2006	9/12/2009
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	6/27/2007	6/27/2008
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	4/27/2007	4/27/2008
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	4/27/2007	4/27/2008
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	6/27/2007	6/27/2008
512	Graphics Plotter	Hewlett Packard	N/A	7470A	10/19/2007	10/19/2008
523	Biconilog	Electro-Mechanics	26 - 2000 MHz	3142B	10/24/2007	10/24/2008
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	10/24/2007	10/24/2008

6.1.5 Test Procedure

With the test instrumentation and the EUT configured as stated above, the following steps were performed:

1. The EUT was arranged with cables terminated as specified in Paragraph 5.2 herein.
2. The spectrum analyzer was configured to display the frequency range of 30 MHz to 80 MHz.
3. With the test antenna horizontally polarized, the EUT cabling was relocated in order to maximize the radiated emissions.
4. The operating mode of the EUT was varied in order to determine the operating mode which produced maximum radiated emissions with respect to the limit.
5. Once the configuration, both cabling and operating mode, which produced maximum emissions was determined the EUT was maintained in this configuration for the duration of testing.
6. A max hold spectrum analyzer trace, trace A, was obtained with the EUT operating.
7. The EUT was powered off and a max hold spectrum analyzer trace, trace B, was obtained to denote the ambient interference levels.
8. The two obtained traces were analyzed in order to determine which recorded emissions were produced by the EUT.
9. At each frequency upon which an emission was determined to be from the EUT the following steps were performed in order to further maximize the observed emissions:
    a. The test antenna height was varied from 1 to 4 meters.
    b. The test antenna polarization was varied from vertical to horizontal.
    c. The EUT was rotated 360° about its vertical axis.
10. The test antenna RF cable was connected to the CISPR compliant receiver.

Test Procedure (con't)

11. For all emissions found to be within 20 dB of the specified limit, the following was recorded on the x-y plot:
    a. Frequency of emission
    b. Quasi-Peak detector receiver meter reading.
    c. Correction factor consisting of antenna factor, cable loss and pre-amp gain.
    d. Test antenna height and polarization.
    e. Turntable position.
12. Steps 6 through 11 above were repeated for the following frequency ranges: 80 to 130 MHz, 130 to 200 MHz, 200 to 500 MHz, 500 to 750 MHz and 750 MHz to 1 GHz.
13. The Biconilog Antenna was replaced with the loop antenna mounted on a one (1) meter high tripod.
14. The spectrum analyzer was configured to display the frequency range of 150 kHz to 30 MHz.
15. Steps 6 through 11 were repeated with the loop antenna mounted on a one (1) meter high tripod.

6.1.6 Test Results

The EUT was found to comply with the requirements specified for this method. No emissions which exceeded the specified Class B limits of EN 55011 & EN 55022 were observed.

See the following two (2) data sheets for a full presentation of the results obtained.

Test Photograph(s)
Radiated Emissions
See the following Test Photograph(s) for test instrumentation and the EUT configuration.

Test Photograph(s)
Radiated Emissions

Test Setup, Front View

Test Setup, Rear View

Radiated Emissions
Test Data

CONFIDENTIAL

EN 55011 Radiated Emissions, Class B, 150 kHz to 30 MHz
Test Data

CONFIDENTIAL

Test Method:	**EN 55011 Radiated Emissions, Class B, 150 kHz to 30 MHz.**		
Customer:	Johnson Outdoors, Inc.	**Job No.**	R-12242
Test Sample:	SI Combo NVD side imaging combo depthfinder with NVD maps		
Model No.:	1197C		
Serial No.	N/A		
Operating Mode	Continuously displaying the bottom contour from depth transducer, water temperature and battery voltage information on EUT display.		
Test Specification	EN 55011:1998; Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment- Radio Disturbance Characteristics- Limits and Methods of Measurements.		
Technician:	R. Soodoo	**Date:**	December 18, 2007.

Notes: Test Distance: 3 Meters Temp: 7.0ºC Humidity:56.0%
Detector: Quasi-Peak

Test Freq.	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading		Limit
MHz	(V/H) / Meters	Degrees	dBuV	dB	dBuV/M		dBµA/M
0.15							39.0
30.0							3.0

No emissions observed at the specified test distance

The EUT was scanned from 150 kHz to 30 MHz

The emissions observed from the EUT do not exceed the specified limits. All emissions not recorded were more than 20dB below the specified limit

CONFIDENTIAL

EN 55022 Radiated Emissions, Class B, 30 MHz to 1 GHz
Test Data

CONFIDENTIAL

Test Method:	**EN 55022 Radiated Emissions, Class B, 30 MHz to 1 GHz.**		
Customer:	Johnson Outdoors, Inc.	**Job No.**	R-12242
Test Sample:	SI Combo NVD side imaging combo depthfinder with NVD maps		
Model No.:	1197C		
Serial No.	N/A		
Operating Mode	Continuously displaying the bottom contour information from depth transducer, water temperature and the battery voltage information on EUT display.		
Test Specification	EN 61000-6-3:2001; Electromagnetic Compatibility (EMC)- Part 6-3: Generic Standards for Residential, Commercial and Light-Industrial Environment,		
Technician:	R. Soodoo	**Date:**	December 18, 2007.

Notes: Test Distance: 10 Meters Temp:7.0 ºC Humidity:56.0%
Detector: Quasi-Peak

Test Freq.	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading		Limit
MHz	(V/H) / Meters	Degrees	dBµV	dB	dBµV/M		dBµV/M
30.0							30.0
I							I
116.5	V / 4.0	200.0	10.0	9.7	19.7		I
160.4	V / 1.0	152.0	11.0	12.4	23.4		I
189.1	V / 1.0	200.0	8.0	13.1	21.1		I
200.3	V / 1.0	159.0	11.0	13.2	24.2		I
I							I
230.0							30.0
230.0							37.0
I							I
240.6	H / 3.1	200.0	9.0	15.0	24.0		I
267.4	V / 1.0	50.0	10.0	16.4	26.4		I
280.7	H / 4.0	132.0	9.0	16.8	25.8		I
292.6	H / 4.0	200.0	4.0	16.8	20.8		I
320.8	H / 2.8	200.0	9.0	18.1	27.1		I
331.6	V / 1.0	67.0	5.0	18.3	23.3		I
341.3	V / 1.0	200.0	13.0	19.0	32.0		I
375.1	H / 1.8	116.0	12.0	20.3	32.3		I
390.5	H / 1.0	156.0	4.0	20.4	24.4		I
401.0	V / 1.0	84.0	8.0	20.6	28.6		I
467.7	H / 1.0	121.0	13.0	22.2	35.2		I
489.3	H / 1.0	99.0	3.0	23.2	26.2		I
500.1	H / 1.0	70.0	12.0	23.2	35.2		I
681.3	H / 1.7	144.0	8.0	27.5	35.5		I
801.8	V / 1.0	200.0	5.0	29.2	34.2		I
I							I
1000.0							37.0
	The EUT was scanned from 30 MHz to 1000 MHz.						
	The emissions observed from the EUT do not exceed the specified limits. All emissions not recorded						
	were more than 20dB below the specified limit						

6.2 IEC 61000-4-2, Electrostatic Discharge

6.2.1 Purpose

The purpose of this test method was to determine the ability of the EUT to withstand electrostatic discharges applied directly to the EUT and those applied to objects adjacent to the EUT.

6.2.2 Test Parameters

The critical parameters of the electrostatic discharge generator and the applied voltage waveform are shown below:

Air:

Discharge Voltage:	2.0 kV, 4.0 kV, 8.0 kV
Discharge Polarity:	Positive/Negative
Discharge Rate:	1 PPS
Rise Time:	0.7 to 1 nanosecond
Pulse Duration:	20 nanoseconds
Storage Capacitor:	150 picofarads
Discharge Resistor:	330 Ohms

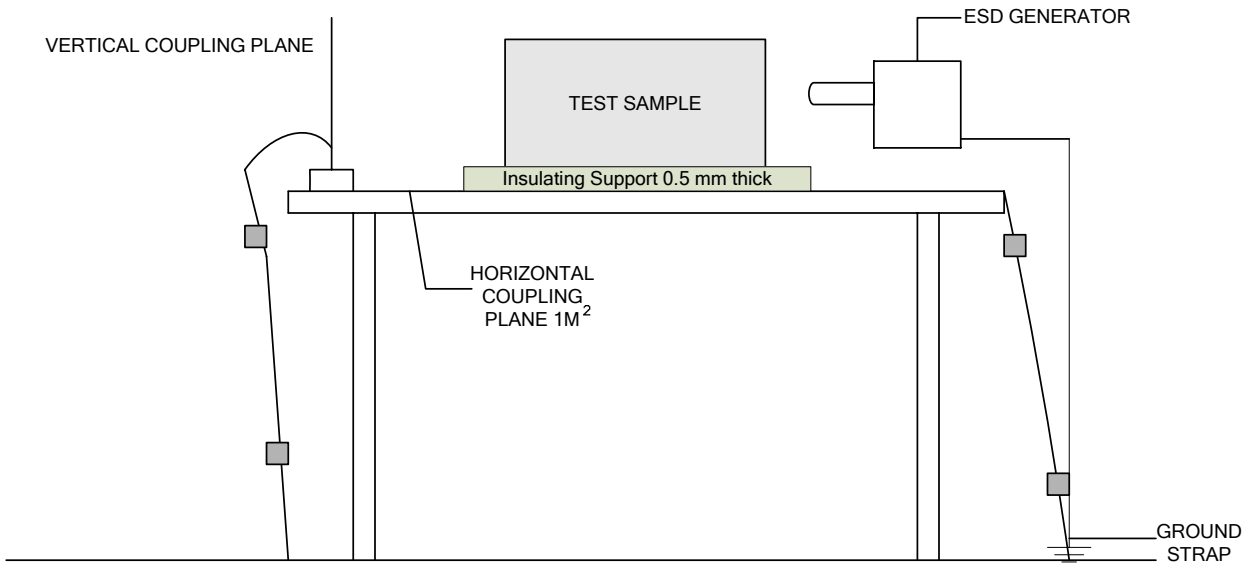
Contact:

Discharge Voltage:	2.0 kV, 4.0kV
Discharge Polarity:	Positive/Negative
Discharge Rate:	1 PPS
Rise Time:	0.7 to 1 nanosecond
Pulse Duration:	20 nanoseconds
Storage Capacitor:	150 picofarads
Discharge Resistor:	330 Ohms

6.2.3 Test Setup

The test instrumentation and EUT were configured as shown in the attached photograph(s) and detailed in paragraph 5.4 herein. This configuration was based upon the test setup shown in Figure 3 and the requirements of IEC 61000-4-2. The EUT was placed on an 80 cm high wooden test stand above the test enclosure floor. The EUT was placed on an insulating support 0.5 mm in thickness. The insulating support was placed on a horizontal coupling plane. The horizontal coupling plane was bonded to the earth reference plane by means of a ground strap with two 470 kΩ series resistors, one at either end. The vertical coupling plane was connected to the ground reference plane in the same manner. The EUT was configured above the horizontal coupling plane as specified above.

Figure 3 - Electrostatic Discharge, Test Setup



NOTE: TEST SAMPLE AND VERTICAL COUPLING PLANE PLACED ON 0.5MM INSULATED SUPPORTS

= 470kOHMS

6.2.4 Test Equipment

The details of the test equipment utilized during the performance of this test method are shown below:

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
224	Shielded Enc. (24x20x12)	Universal Shielding	100dB, 14kHz -	1	5/1/2007	5/1/2008
553	ESD Gun	Schaffner	N/A	NSG-435	6/29/2007	6/29/2008

6.2.5 Test Procedure

With the EUT and test instrumentation configured as stated above, the following steps were performed:

1. The ESD generator was configured to apply 2.0 kV contact discharges.
2. 10 positive contact discharges were then applied to each test point indicated in the contact discharge test points indicated on the following data sheet at a repetition rate of 1.0 PPS.
3. The ESD generator was configured to apply negative discharges and step 2 was repeated.
4. The output of the ESD generator was increased to 4.0 kV and steps 2 and 3 were repeated.
5. The ESD generator was then configured to apply 2.0 kV air discharges.
6. 10 positive air discharges were then applied to each test point indicated in the contact discharge test points indicated on the following data sheet at a repetition rate of 1.0 PPS.
7. The ESD generator was configured to apply negative discharges and step 6 was repeated.
8. The output of the ESD generator was increased to 4.0 kV and steps 6 and 7 were repeated.
9. The output of the ESD generator was then increased to 8.0 kV and steps 6 and 7 were repeated.

6.2.6 Test Results

December 14, 2007

The EUT did not comply with the requirements specified for this test method. The test sample exhibited malfunction and degradation of performance beyond that allowed under performance criteria B when subjected to the electrostatic discharges specified above.

December 19, 2007

After the modifications stated in paragraph 5.8, the EUT was found to comply with the requirements specified for this method.

See the following four (4) data sheets for a complete presentation of the results obtained.

Test Photograph(s)
Electrostatic Discharge
See the following Test Photograph(s) for test instrumentation and the EUT configuration.

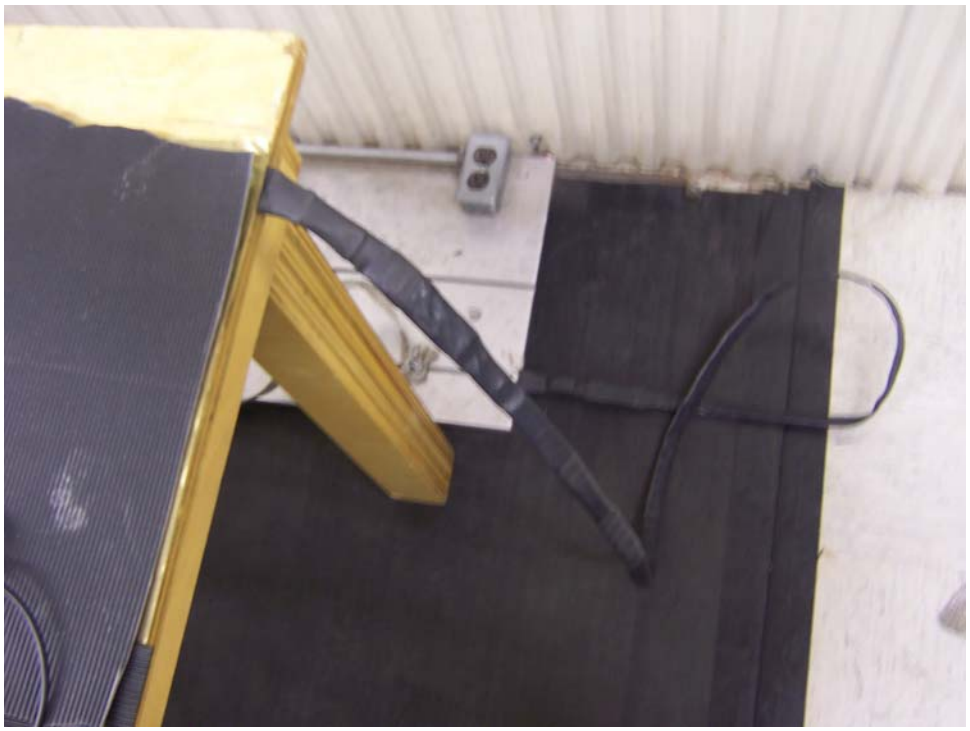
Test Photograph(s)
Electrostatic Discharge

December 19, 2007, Air Discharge

December 19, 2007, Contact Discharge

CONFIDENTIAL

Test Photograph(s)
Electrostatic Discharge



December 19, 2007, Ground Strap

December 19, 2007, Modification Close-up

Electrostatic Discharge
Test Data

CONFIDENTIAL

IEC 61000-4-2; Electrostatic Discharge
December 19, 2007, Retest Data

CONFIDENTIAL

SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-2; Electrostatic Discharge RETEST**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197C	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards --- Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 1: Section 1.3
Operating Mode	Continuously displaying the bottom contour from depth transducer, water temperature and battery voltage information on EUT display.	
Technician	KO	
Date	December 19, 2007	

Notes: The EUT was subjected to ten positive and negative 2 kV & 4 kV direct discharges at a rate of 1 pps at each of the test points listed below. Temperature: 22.2°C Humidity: 30%

Repetition Rate	Threshold	Level	Test Point
PPS	kV		
1.0	----------	2.0 / 4.0	20 Rear Frame Screws
|	|	|	4 Rear Brass Screw Holes
|	|	|	11 Rear Center Screws
|	|	|	Mounting Bracket
|	|	|	
|	|	|	Horizontal Coupling Plane, Front side of EUT
|	|	|	Left Side of EUT
|	|	|	Right Side of EUT
|	|	|	Rear of EUT
|	|	|	
|	|	|	Vertical Coupling Plane, Front side of EUT
|	|	|	Left Side of EUT
↓	↓	↓	Right Side of EUT
1.0	----------	2.0 / 4.0	Rear of EUT

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

Sheet 1 of 2

SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-2; Electrostatic Discharge RETEST**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197C	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards --- Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 1: Section 1.3
Operating Mode	Continuously displaying the bottom contour from depth transducer, water temperature and battery voltage information on EUT display.	
Technician	KO	
Date	December 19, 2007	

Notes: The EUT was subjected to ten positive and negative 2 kV, 4 kV, and 8 kV direct air discharges at a rate of 1 pps at each of the test points listed below. Temperature: 22.2°C Humidity: 30%

Repetition Rate	Threshold	Level	Test Point
PPS	kV		
1.0	----------	2.0 / 4.0 / 8.0	Power Button
|	|	|	Memory (bottom)
|	|	|	Memory (middle)
|	|	|	Memory (top)
|	|	|	Exit Button
|	|	|	Menu Button
|	|	|	View Button
|	|	|	Zoom (+ Button)
|	|	|	Zoom (- Button)
|	|	|	Info Button
|	|	|	Mark Button
|	|	|	Go To Button
|	|	|	Screen
↓	↓	↓	Seams around Panel
1.0	----------	2.0 / 4.0 / 8.0	Directional Pad

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

Sheet 2 of 2

6.3 IEC 61000-4-3, Radiated Immunity, 80 MHz to 1000 MHz

6.3.1 Purpose

The purpose of this test method was to determine if the EUT was so constructed as to have an adequate level of intrinsic immunity to radiated electromagnetic fields in the frequency range of 80 to 1000 MHz, enabling the EUT to operate as intended.

6.3.2 Test Parameters

The critical parameters of the applied electromagnetic field are as shown in Table 10.

Table 10 - Radiated Immunity, Test Parameters

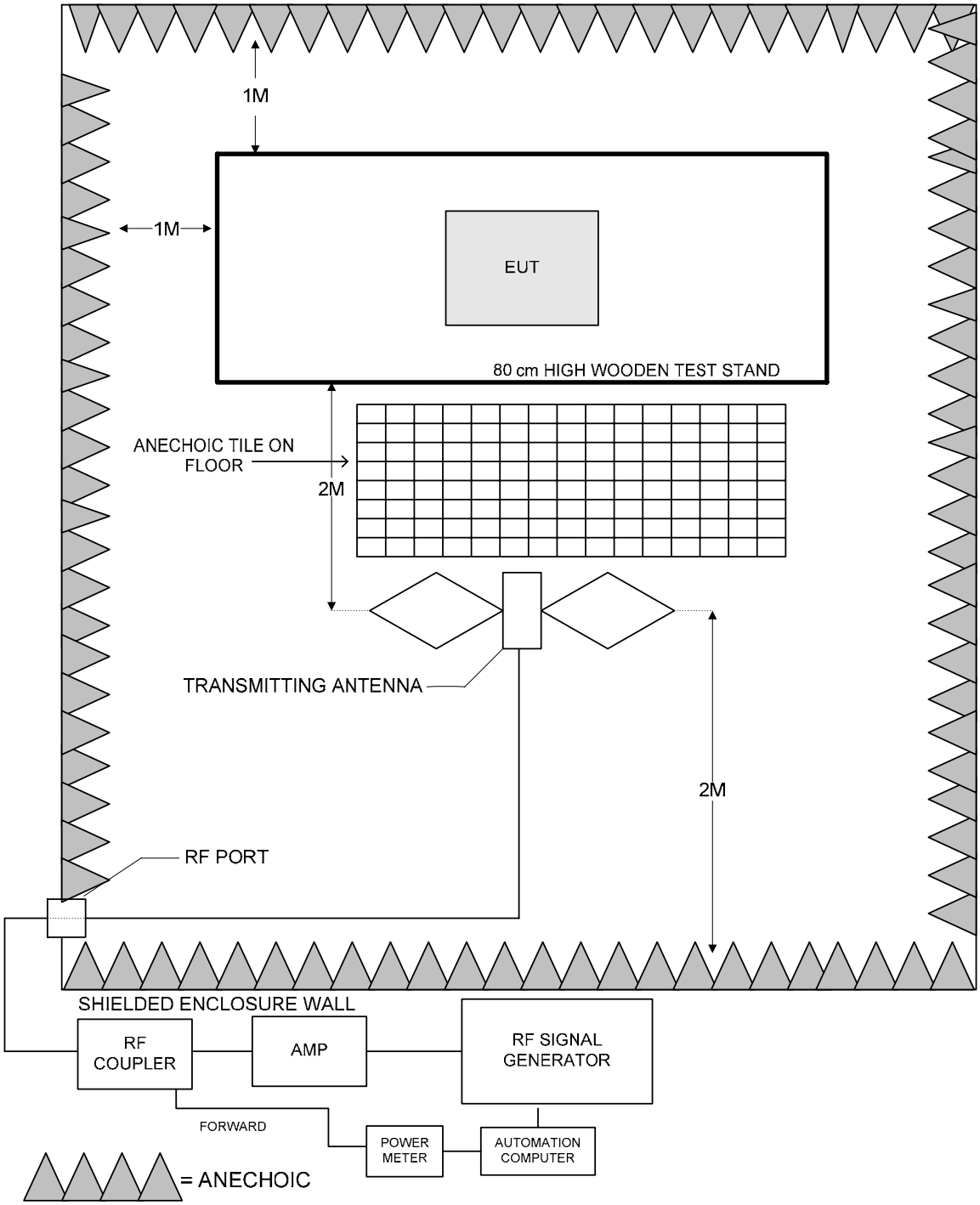
Frequency Range:	80 to 1000 MHz
Field Strength:	3 V/m
Modulation:	1 kHz, 80%, AM
Test Distance:	2 Meters
Polarization of Applied Field:	Horizontal and Vertical

6.3.3 Test Setup

The test instrumentation and EUT were configured as shown in the attached photograph(s) and detailed in paragraph 5.4 herein. This configuration was based upon the test setup shown in Figure 4 and the requirements of IEC 61000-4-3. The EUT was placed on an 80 cm high wooden test stand above the test enclosure floor. The cabling of the EUT was routed to the edge of the 1.5 m by 1.0 m test stand top, then directly to the enclosure floor. If necessary, lossy ferrite tubes were placed around the Input/Output cables prior to entering the support room, in order to absorb RF. The field strength generating antenna was placed at a distance of 2.0 m from the periphery of the EUT and the associated cabling. An RF signal generator was connected to the input of the RF power amplifier. The output of the RF power amplifier was connected to an RF coupler which in turn was connected to the test antenna. A power meter was connected to the forward power port of the RF coupler. The RF signal generator and power meter were connected to an automation computer in order to maintain the required field strength during testing.

The test enclosure ceiling, walls and portions of the floor were treated with a mixture of ferrite tile and carbon impregnated foam absorber. Prior to testing, the field was calibrated as specified in paragraph 6.2 of IEC 61000-4-3. A uniform area, 1.5 m x 1.5 m, 80 cm above the ground plane, was established. Sixteen (16) evenly spaced calibration points were assigned within the 1.5 m x 1.5 m grid. The field was calibrated in both the Vertical and Horizontal polarizations in one percent steps in the frequency range of 80 MHz to 1000 MHz. The field was considered uniform if 12 of 16 points (75%) were within - 0dB to + 6 dB of nominal. Additionally, three percent of the frequencies were allowed to be within - 0 dB to + 10 dB of nominal.

Figure 4 - Radiated Immunity, Test Setup



6.3.4 Test Equipment

The details of the test equipment utilized during the performance of this test method are shown below:

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
224	Shielded Enc. (24x20x12)	Universal Shielding	100dB, 14kHz -	1	5/1/2007	5/1/2008
224B	Shielded Enc. (8x8x12)	Universal Shielding	100dB, 14kHz -	1B	5/1/2007	5/1/2008
648B	Power Meter	Boonton Electronics	10 kHz - 100 GHz	4232A	12/8/2007	12/8/2008
649B	Power Sensor	Boonton Electronics	10 kHz - 8 GHz	51011-EMC	6/11/2007	6/11/2008
707	DC Power Supply	EPSCO INC.	32V-15A	NFB	6/15/2007	6/15/2008
762	AM/FM Signal Generator	Marconi Instru.	10 kHz - 1.2 GHz	2023	7/24/2007	7/24/2008
767	Biconilog	EMCO	26 - 2000 MHz	3142B	11/1/2007	11/1/2008
8042	Amplifier	Amplifier Research	1 - 1000 MHZ, 100W	100W1000	8/31/2006	2/28/2008
965	High Power Dir Coupler	Werlatone Inc.	10 kHz - 1 GHz	C5571-13	1/29/2007	1/29/2008

6.3.5 Test Procedure

With the EUT configured as described above, the following steps were performed:

1. The Biconilog Antenna was horizontally polarized facing the front of the EUT.
2. The signal generator was adjusted for a frequency of 80 MHz and 80 % AM 1 kHz modulation.
3. The output level of the generator was increased until the power meter measured 3 V/m.
4. The automation computer was programmed to incrementally sweep the frequency range of 80 to 1000 MHz in step sizes not exceeding 1% of the fundamental.
5. The field strength, as measured on the power meter, was continuously adjusted as necessary by the automation computer to maintain the test level at 3 V/m utilizing the power meter readings obtained during calibration.
6. The EUT was continuously monitored for degradation or malfunction as specified in paragraph 5.6.
7. The Biconilog Antenna was vertically polarized and steps 2 through 6 were repeated.
8. Steps 1 through 7 were repeated on each of the rear, left and right sides of the test sample.

6.3.6 Test Results

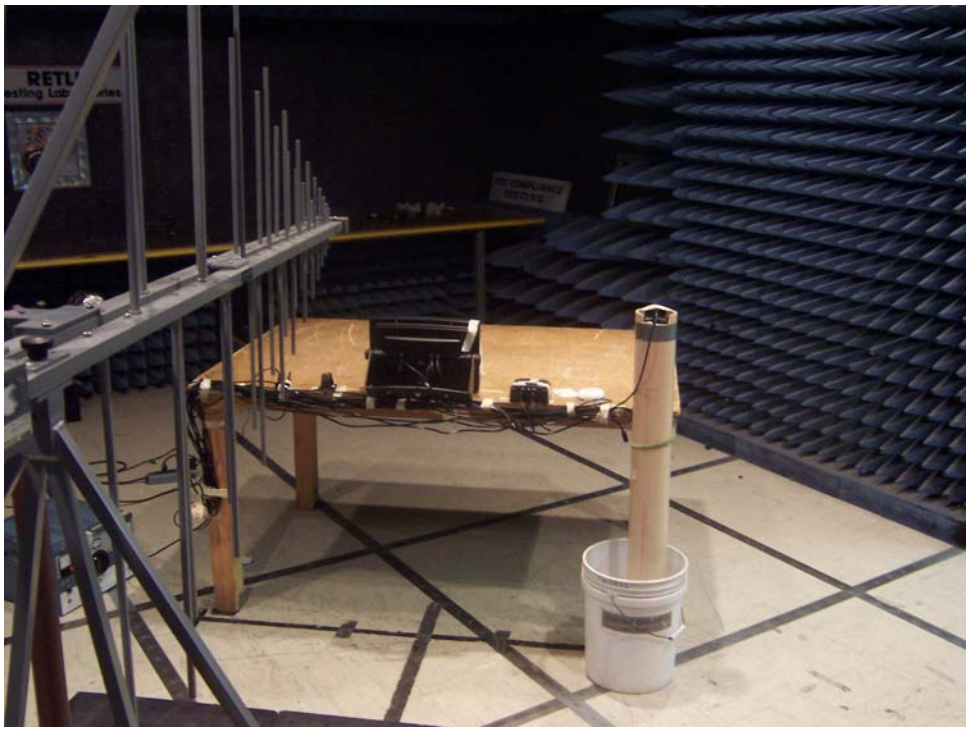
The EUT was found to comply with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance Criteria A when subjected to the radiated electromagnetic energy specified above.

See the following one (1) data sheet for a complete presentation of test results.

Test Photograph(s)
Radiated Immunity

See the following Test Photograph(s) for test instrumentation and the EUT configuration.

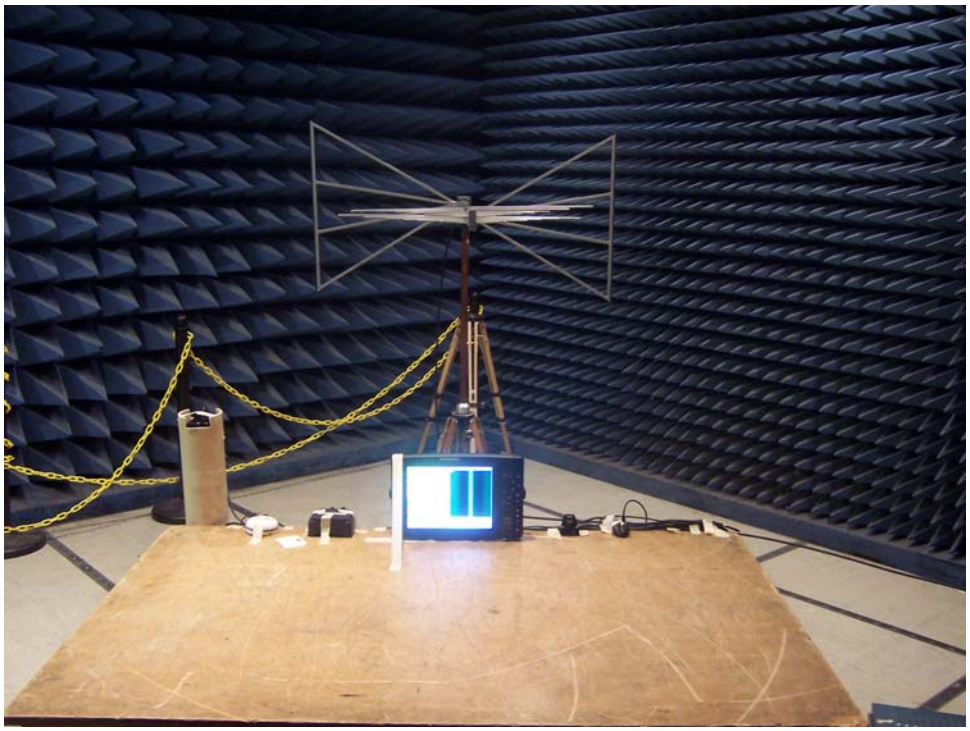
Test Photograph(s)
Radiated Immunity



Cabling

Vertical Polarity

Test Photograph(s)
Radiated Immunity



Horizontal Polarity

IEC 61000-4-3: Radiated Immunity, 80 MHz to 1000 MHz
Test Data

SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-3: Radiated Immunity, 80 MHz to 1000 MHz**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197C	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards - Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 1; Sect. 1.2
Operating Mode	Continuously displaying the bottom contour from depth transducer, water temperature and battery voltage information on EUT display.	
Technician	K. McDonald, S. Carley	
Date	December 13, 2007	

Notes: The indicated frequency range was stepped at a rate a 1% of the fundamental frequency. All four faces of the EUT were tested facing the test antenna. Temperature 24.4°C Humidity 36%

Frequency	Threshold	Limit	Antenna Polarization	Modulation	
MHz	Volts / meter				
80	----------	3	Vertical and Horizontal	80% AM, 1 kHz Sine wave	
83	*				
	*				
93	*				
1000	----------	3	Vertical and Horizontal	80% AM, 1 kHz Sine wave	

* Within this frequency range, white lines became evident on the depth display with a corresponding change in the depth reading. Temperature and voltage readings were not affected.

Sheet 1 of 1

6.4 IEC 61000-4-4, Electrical Fast Transient / Burst

6.4.1 Purpose

The purpose of this test method was to determine if the EUT was so constructed as to have an adequate level of intrinsic immunity to electrical fast transient bursts applied to input power and signal and control leads, enabling the EUT sample to operate as intended.

6.4.2 Test Parameters

The critical parameters of the electrical fast transient/burst generator and the applied waveform are shown below:

Transient Voltage:	Power Input Leads: +/- 0.5 kV, 1.0 kV
	I/O Leads: +/- 0.25 kV, 0.5 kV
Transient Polarity:	Positive and Negative
Repetition Rate:	5 kHz
Rise Time of Pulse:	5 ns + 30%
Pulse Duration:	50 ns + 30%
Burst Period:	300 ms
Burst Duration:	15 ms

The above parameters were verified prior to testing.

6.4.3 Leads Tested

The following leads of the EUT were tested separately in order to demonstrate compliance:

Power Input Leads:

- +12 VDC
- +12 VDC Return

Input/Output Leads:

- Temperature/Speed Transducer Cable
- Temperature/Depth Transducer Cable
- GPS Receiver Cable
- Interlink Cable

6.4.4 Test Setup

The test instrumentation and EUT were configured as shown in the attached photographs and detailed in paragraph 4.2 herein. This configuration was based upon the test setup shown in Figure 5, Figure 6 and the requirements of IEC 61000-4-4. The EUT was placed 10cm above the test enclosure floor. The EUT was situated such that it was at least 50 cm from the enclosure wall. The cabling of the EUT was routed directly along the enclosure floor. Power leads were routed through the internal coupler of the transient generator. Each I/O cable was routed individually, through the capacitive coupling clamp.

Figure 5 - Electrical Fast Transient Burst, Power Leads Test Setup

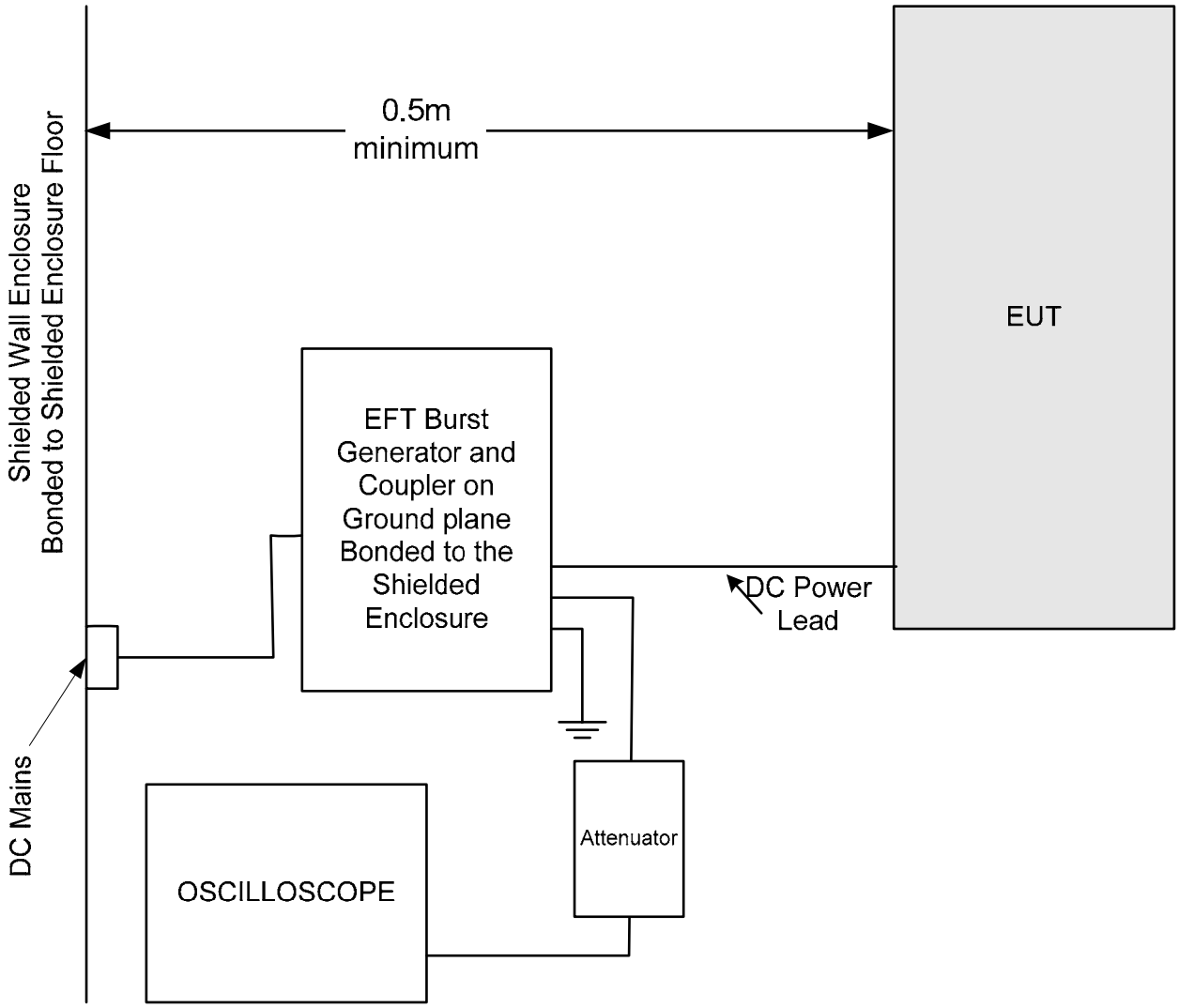
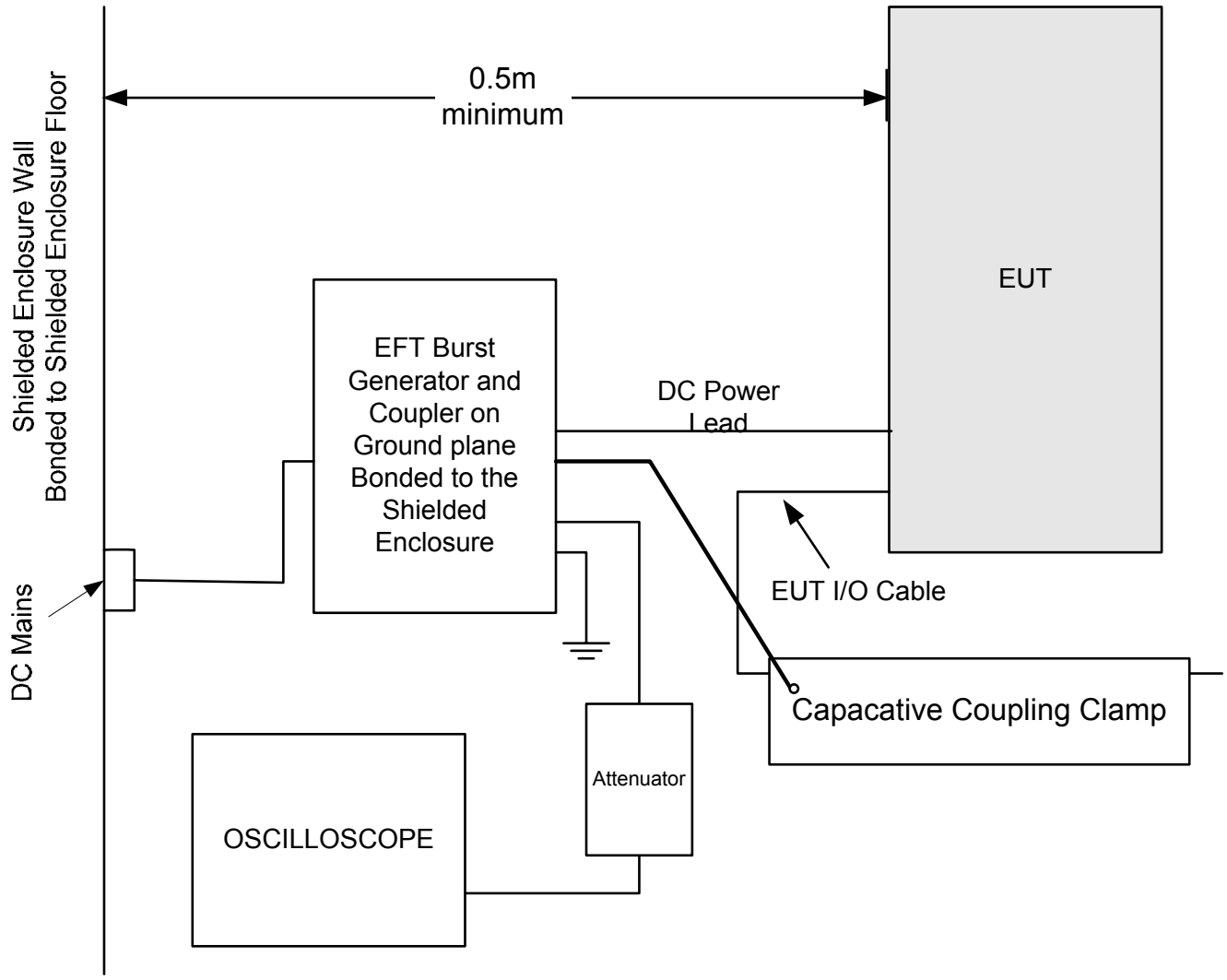


Figure 6 - Electrical Fast Transient Burst, I/O Leads Test Setup



6.4.5 Test Equipment

The details of the test equipment utilized during the performance of this test method are shown below:

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
027	Oscilloscope	Tektronix	DC - 500 MHz	2440	8/8/2007	8/8/2008
224	Shielded Enc. (24x20x12)	Universal Shielding	100dB, 14kHz -	1	5/1/2007	5/1/2008
424	Graphics Plotter	Hewlett Packard	N/A	7470A	6/19/2007	6/19/2008
467	EFT/Burst Generator	Schaffner	0 - 4.4 KV	NSG 2025-4	12/5/2006	12/19/2007
467A	200 Watt Attenuator	Bird Electronics	Dc to 500 MHz,60dB	8325	12/11/2007	12/11/2008
468	Capac. Coupling Clamp	Retlif	N/A	RTLCC-01	6/27/2007	6/27/2008

6.4.6 Test Procedure

After verification of the transient generator output parameters, the following steps were performed:

1. The DC input of the EUT was routed through the coupling/decoupling network of the transient generator.
2. The transient generator was configured to apply 250 volt transients.
3. 250 positive volt transients were applied to the DC leads in the coupling modes specified on the test data sheets for a period of 1 minute for each mode.
4. The EUT was continuously monitored for malfunction or degradation as specified in Paragraph 5.6 herein.
5. The transient generator was configured to apply negative transient and steps 3 and 4 were repeated.
6. The test voltage was then increased to 500 volts and step 3 was repeated.
7. The first I/O Cable to be tested was then placed in the capacitive coupling clamp.
8. The transient generator output was connected to the clamp, at the side nearest the EUT.
9. The transient generator was configured to apply 250 volt transients.
10. Steps 3 through 5 were then repeated for the I/O Cable.
11. The test voltage was then increased to 500 volts and Step 10 was repeated.
12. Steps 7 through 11 were repeated for each additional I/O cable subjected to this requirement.

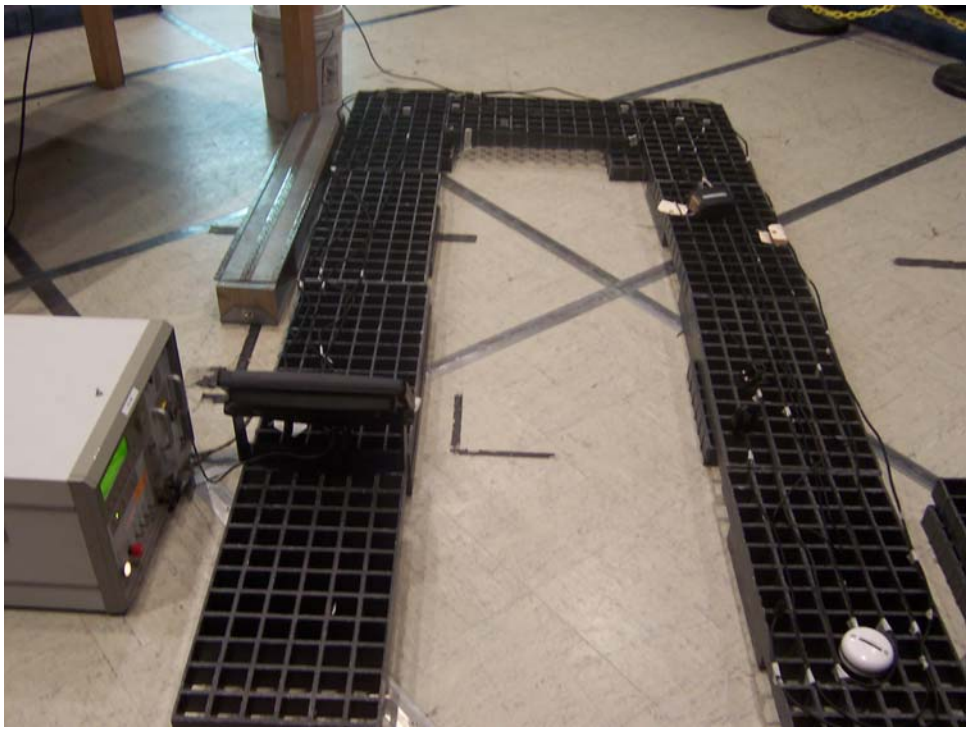
6.4.7 Test Results

The EUT was found to comply with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance Criteria B when subjected to the electrical fast transients/bursts specified above.

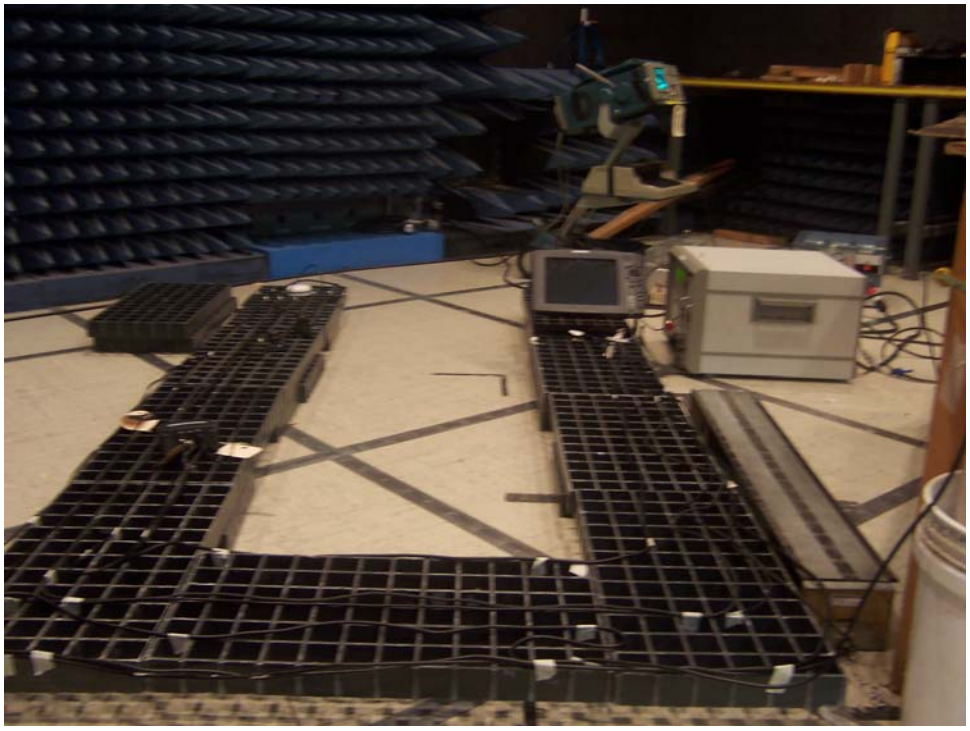
See the following two (2) data sheets for a full presentation of the results obtained.

Test Photograph(s)
Electrical Fast Transient/Burst
See the following Test Photograph(s) for test instrumentation and the EUT configuration.

Test Photograph(s)
Electrical Fast Transient/Burst



Power Input Setup



I/O Leads Setup

Electrical Fast Transient / Burst
Test Data

CONFIDENTIAL

IEC 61000-4-4: Electrical Fast Transients
Measurement System Verification Data

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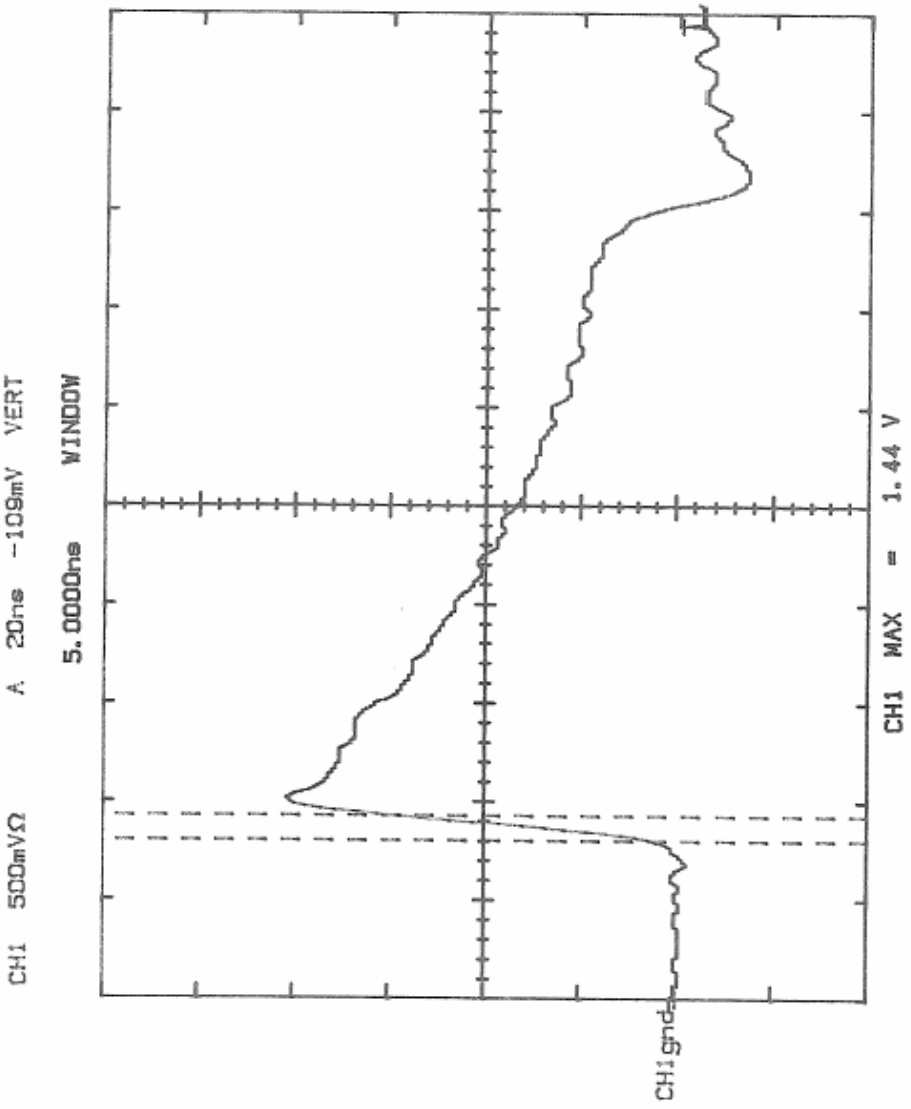
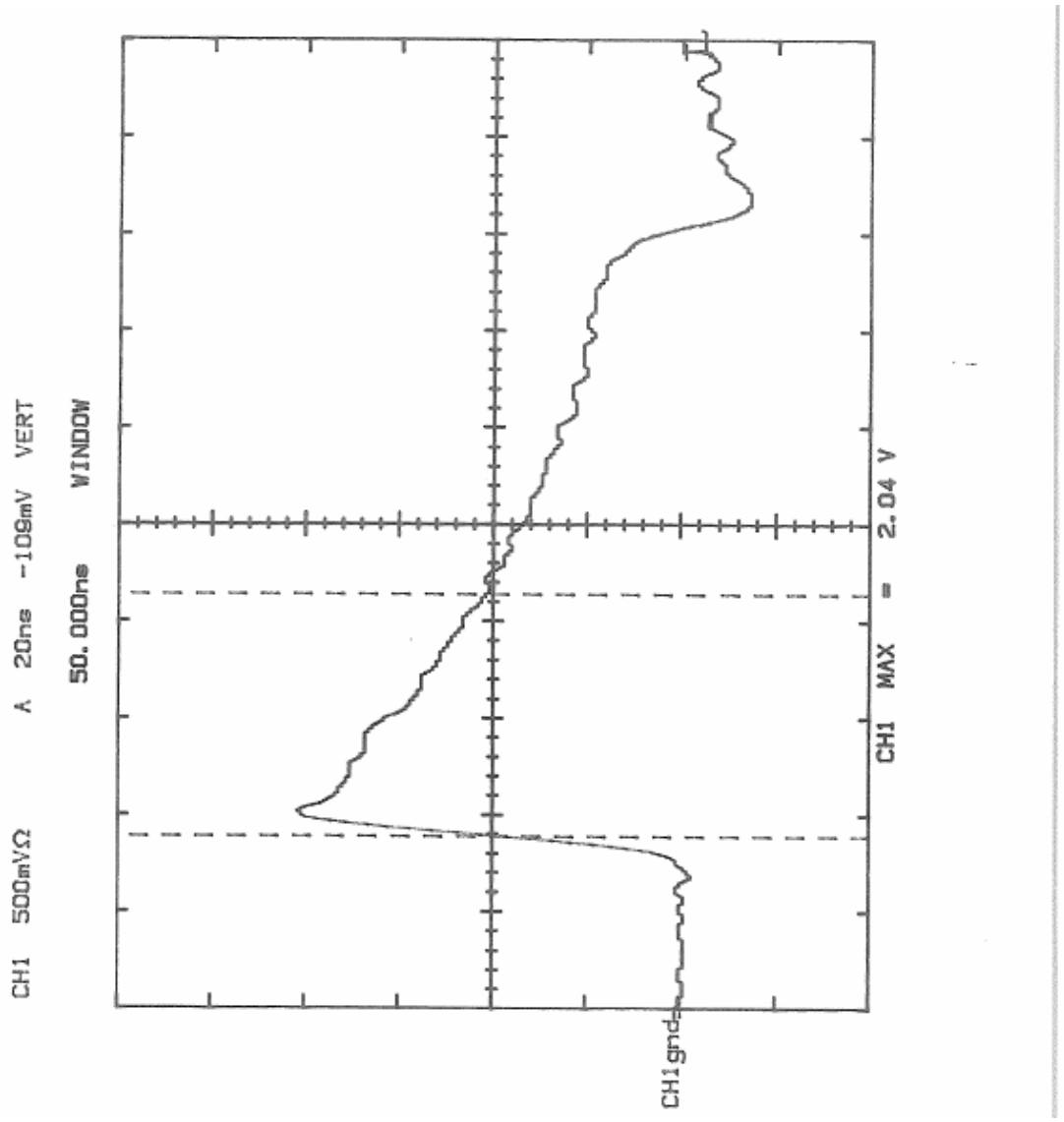


IEC 61000-4-4: Electrical Fast Transients
5 Nanosecond rise time (10 to 90%) verification and 4 kV peak pulse amplitude verification into a 50-ohm load with 60 dB attenuation in line. (4 kV into 50-ohms= 2.0 VΩ +/- 10%

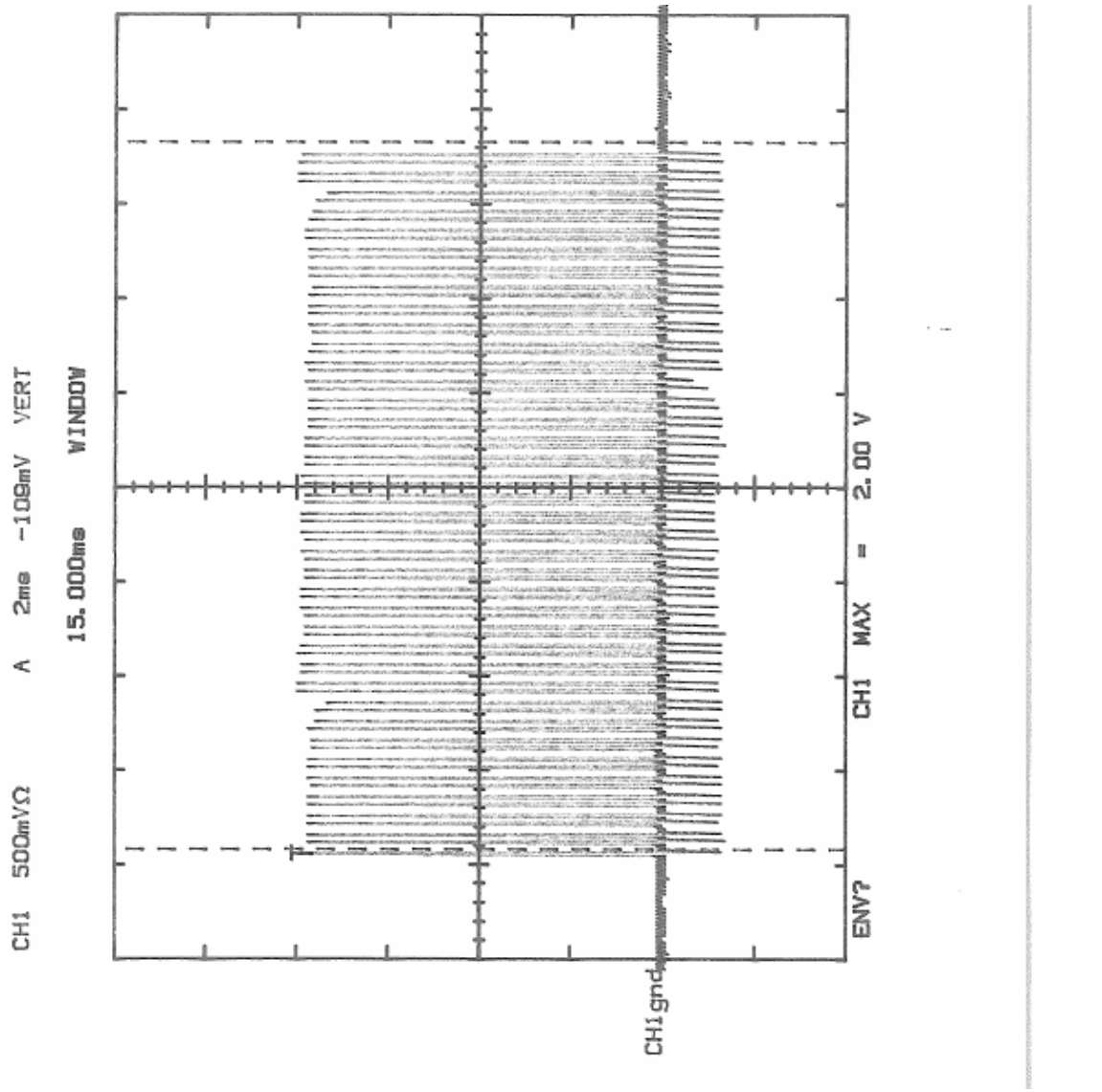
Customer	Johnson Outdoors, Inc.	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197C	
Date: Dec. 14, 2007	Tech: KO	Sheet 1 of 4

Retlif Testing Laboratories

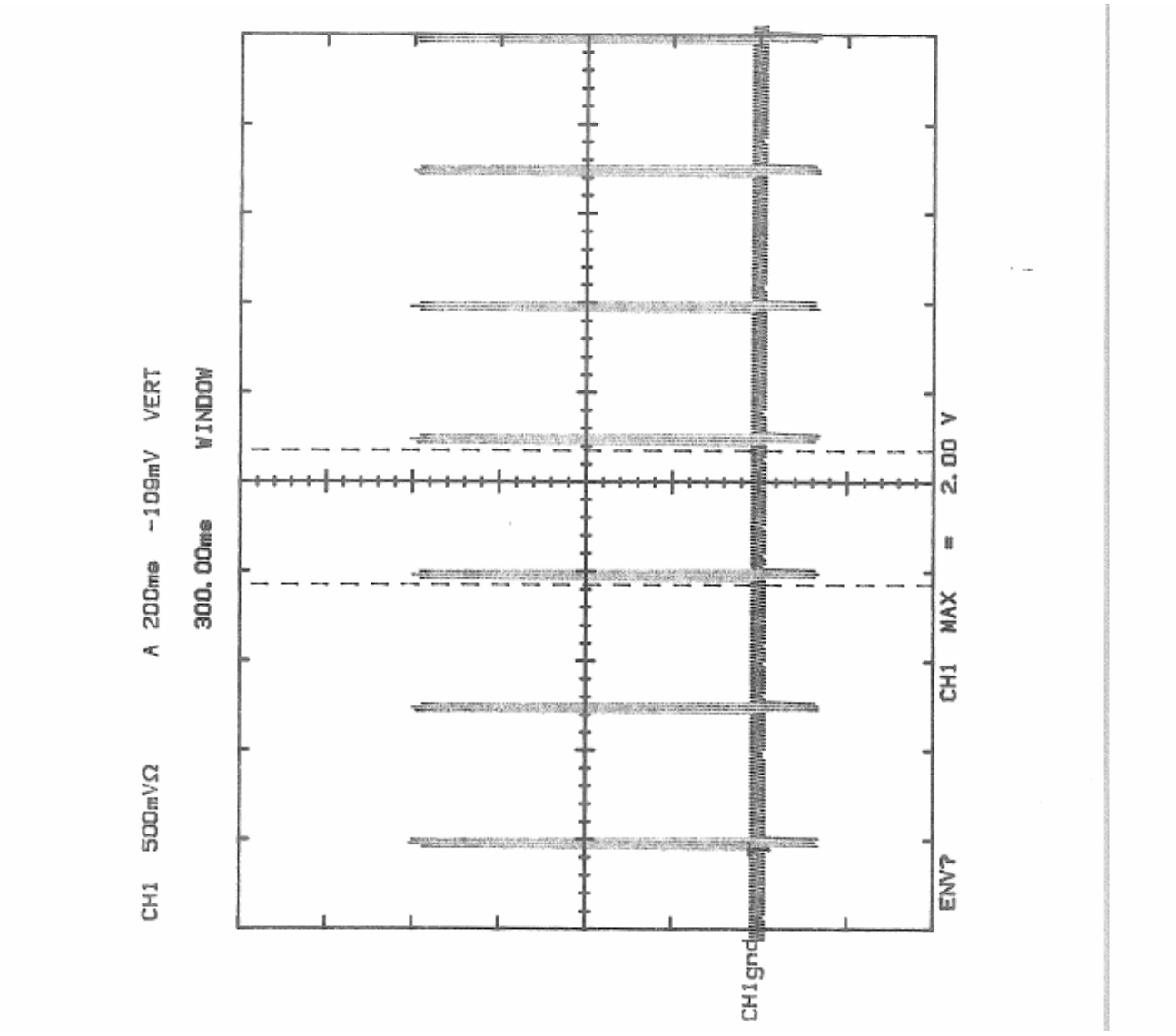
Report No. R-12242



IEC 61000-4-4: Electrical Fast Transients
50 NanoSecond, 50 % pulse duration verification into a 50-ohm load with 60 dB attenuation in line



IEC 61000-4-4: Electrical Fast Transients
15 ms burst duration verification into a 50-ohm load with 60 dB attenuation in line.



IEC 61000-4-4: Electrical Fast Transients
300 ms burst period verification into a 50-ohm load with 60 dB attenuation in line.

Customer	Johnson Outdoors, Inc.	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197C	
Date: Dec. 14, 2007	Tech: KO	Sheet 4 of 4

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Report No. R-12242

IEC 61000-4-4: Electrical Fast Transients
Test Data

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SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-4: Electrical Fast Transients**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197C	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards --- Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 3 Sec. 3.3
Operating Mode	Continuously displaying the bottom contour from depth transducer, water temperature and battery voltage information on EUT display.	
Lead Tested	12 VDC Power Input	
Technician	KO	
Date	December 14,2007	

Notes: The EUT was subjected to EFT burst applied to the power leads. The EFT burst had a burst period of 300ms and a burst duration of 15ms. Temperature 23.3°C Humidity 32%

Test Frequency	Threshold	Limit	Test Lead(s)	Test Duration	Polarity
kHz	Volts		Hot/Return	Minutes	+/-
5.0	----------	250 / 500	12VDC, Hot	1.0	+
|	|	|	12VDC, Return	|	+
↓	↓	↓	12VDC, Hot	↓	-
5.0	----------	250 / 500	12VDC, Return	1.0	-

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

Sheet 1 of 2

SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-4: Electrical Fast Transients**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197C	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards --- Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 2; Sect. 2.2
Operating Mode	Continuously displaying the bottom contour from depth transducer, water temperature and battery voltage information on EUT display.	
Lead Tested	Input / Output Leads: see below	
Technician	KO	
Date	December 14, 2007	

Notes: The EUT was subjected to EFT burst applied to the input / output leads. The EFT burst had a burst period of 300ms and a burst duration of 15ms. Temperature 23.3°C Humidity 32%

Test Frequency	Threshold	Limit	Test Lead(s)	Test Duration	Polarity
kHz	Volts			Minutes	+/-
5.0	----------	250 / 500	Temperature / Speed transducer cable	1.0	+
|	|	|	Temperature / Depth transducer cable	|	+
|	|	|	GPS receiver cable	|	+
|	|	|	Interlink cable	|	+
|	|	|		|	
|	|	|	Temperature / Speed transducer cable	|	-
|	|	|	Temperature / Depth transducer cable	|	-
↓	↓	↓	GPS receiver cable	↓	-
5.0	----------	250 / 500	Interlink cable	1.0	-

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

Sheet 2 of 2

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6.5 EN 61000-4-6, Conducted Immunity, 0.15 MHz to 80 MHz

6.5.1 Purpose

The purpose of this test method was to determine if the EUT was so constructed as to have an adequate level of intrinsic immunity to radio frequency electromagnetic energy injected into input power and I/O leads in the frequency range of 0.15 to 80 MHz, enabling the EUT to operate as intended.

6.5.2 Test Parameters

The critical parameters of the applied electromagnetic energy for testing the power input leads were as shown below:

Frequency Range:	0.15 to 80 MHz
Applied Signal Level:	3 Vrms
Modulation:	1 kHz, 80%, AM
Injection Method:	Power Input Leads - Coupling Decoupling Network (CDN) I/O Leads - Direct Injection

6.5.3 Leads Tested

The following leads of the EUT were tested in order to demonstrate compliance:

Power Input Leads:

- +12 VDC
- +12 VDC Return

Input / Output Cable:

- Temperature/Speed Transducer Cable
- Temperature/ Depth Transducer Cable
- GPS Receiver Cable
- Interlink Cable

6.5.4 Test Setup

The test instrumentation and EUT were configured as shown in the attached photograph(s) and detailed in paragraph 5.4 herein. This configuration was based upon the test setup shown in Figure 7, Figure 8 and the requirements of IEC 61000-4-6. The EUT was placed on 10 cm high insulating supports above a ground reference plane. The ground reference plane was mounted on an 80 cm table. A coupling / decoupling network was placed in the power input lead under test. All power and I/O leads were supported 5 cm above the ground reference. The signal generator was connected to the RF power amplifier which in turn, was connected to the injection device. A directional coupler was placed between the injection device and RF amplifier in order to monitor the level applied to the EUT.

Figure 7 - Conducted Immunity, Power Leads Test Setup

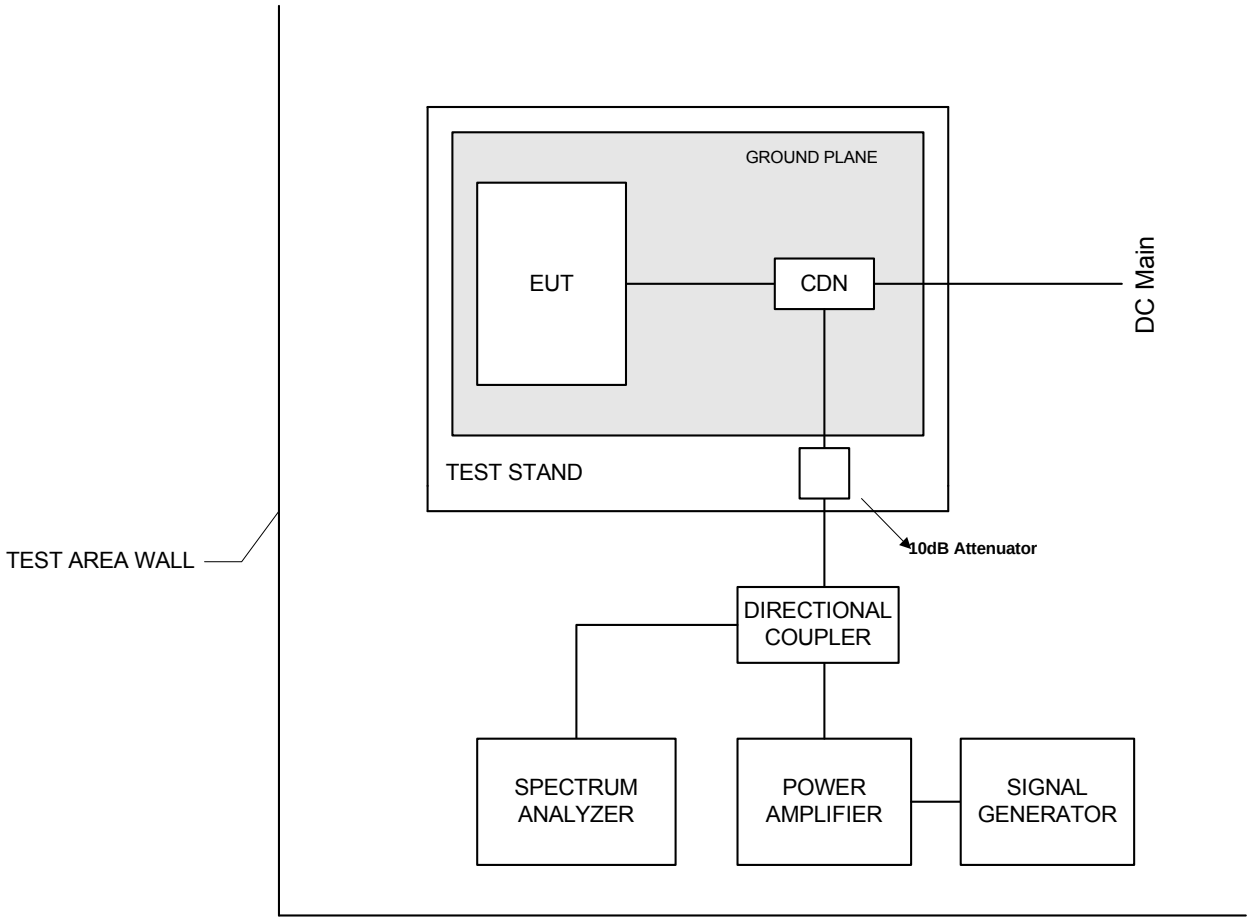
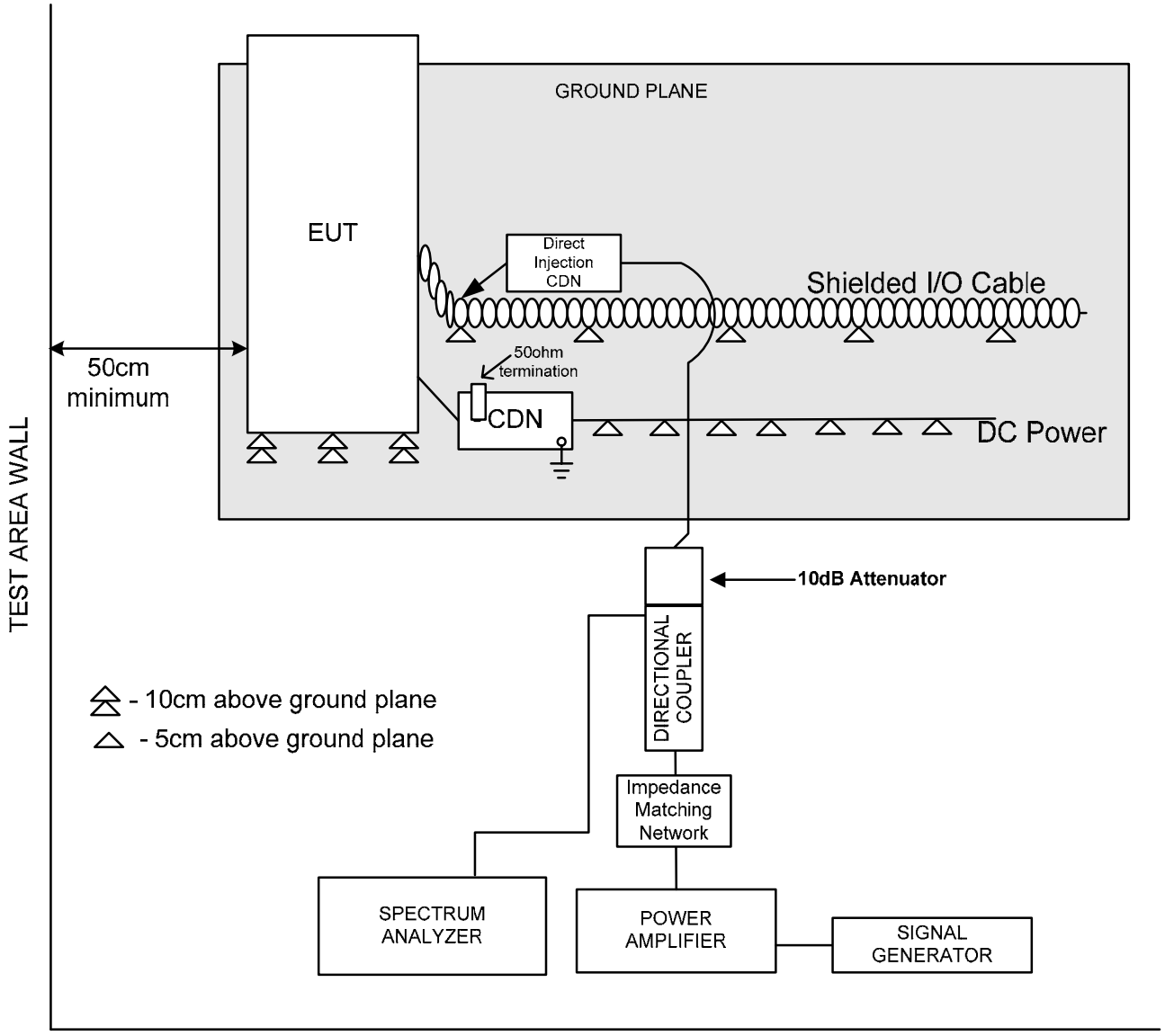


Figure 8 - Conducted Immunity, I/O Leads Test Setup



6.5.5 Test Equipment

The details of the test equipment utilized during the performance of this test method are shown below:

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
038	RF Millivoltmeter	Boonton Electronics	10 kHz - 1.2 GHz	92C	6/11/2007	6/11/2008
333	Attenuator	Narda	DC - 11 GHz	768-10	8/10/2007	8/10/2008
573	50-150 ohm Adapter	Retlif	N/A	ENV 50141	11/30/2007	11/30/2008
574	AM/FM Signal Generator	Marconi Instru.	9 kHz - 2.4 GHz	2024	7/24/2007	7/24/2008
748	Amplifier	IFI	.01 - 250 MHz/15W	5300	11/9/2007	11/9/2008
802	Coupling/Decoupling Net	FCC	150 kHz - 230 MHz	FCC-801-M2-50A	7/6/2007	7/6/2008
965	High Power Dir Coupler	Werlatone Inc.	10 kHz - 1 GHz	C5571-13	1/29/2007	1/29/2008

6.5.6 Test Procedure

With the test instrumentation and EUT configured as stated above, the following steps were performed:

1. The EUT was arranged with its cables terminated as specified in paragraph 5.4 herein.
2. The injection device was connected to the lead under test.
3. The output of the directional coupler was connected to the injection device for the lead under test.
4. The EUT was placed in the operating mode described in paragraph 5.5 herein.
5. The signal generator was set for a frequency of 150 kHz and the level was adjusted for 3 Vrms.
6. The signal was then amplitude modulated 80% by a 1 kHz sine wave.
7. The frequency range was incrementally swept from 150 kHz to 80 MHz, while maintaining the required forward power to the injection network.
8. The EUT was continuously monitored as described in paragraph 5.6 herein.
9. Steps 2 through 8 were repeated for each lead subjected to this requirement.

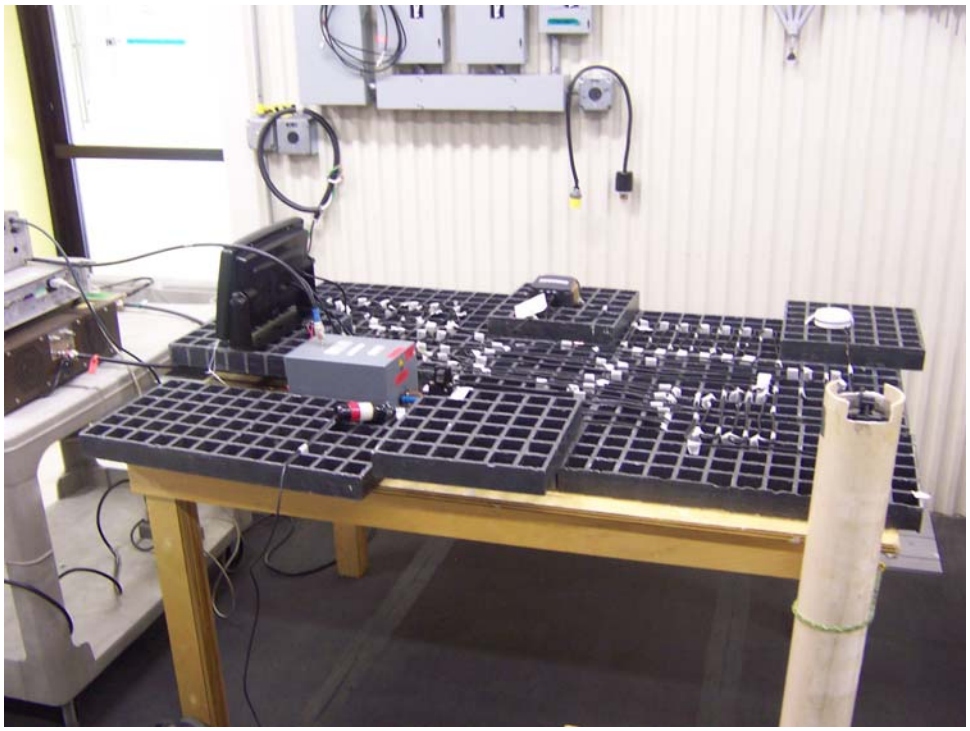
6.5.7 Test Results

The EUT was found to comply with the requirements specified for this test method. The test sample did not exhibit any malfunction or degradation of performance beyond that allowed under performance Criteria A when the input power leads and I/O leads were subjected to the conducted electromagnetic energy specified above.

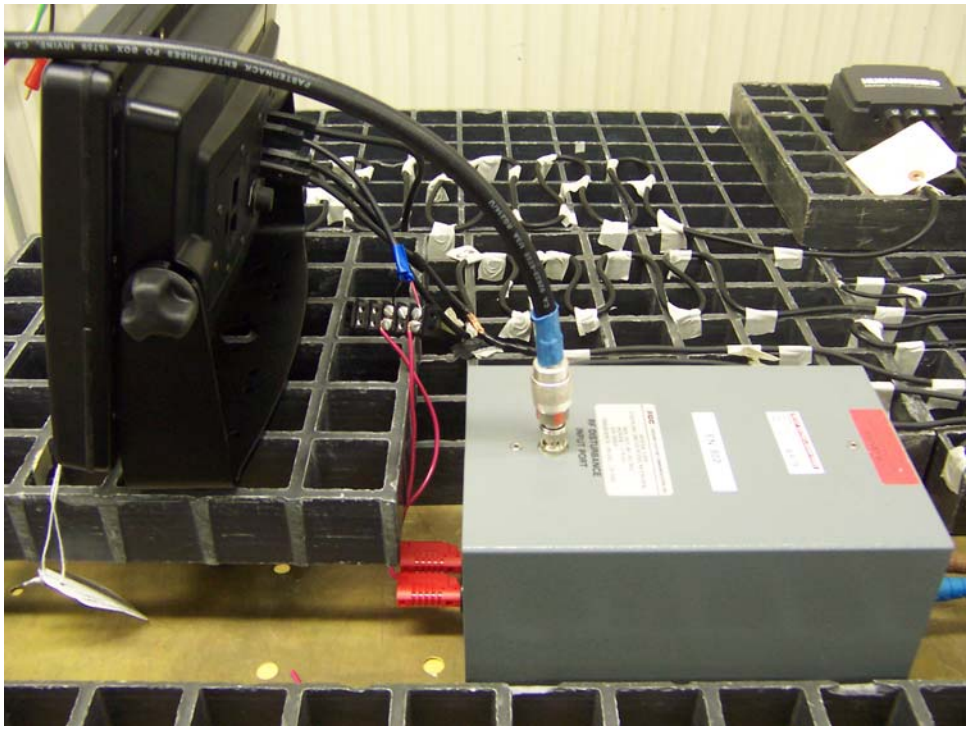
See the following five (5) data sheets for a complete presentation of test results.

Test Photograph(s)
Conducted Immunity
See the following Test Photograph(s) for test instrumentation and the EUT configuration.

Test Photograph(s)
Conducted Immunity



Test Setup



CDN Injection Point

Test Photograph(s)
Conducted Immunity

Direct Injection Point

Equipment Setup

IEC 61000-4-6; Conducted Disturbance Induced by Radio Frequency Fields, 150 kHz to 80 MHz
Test Data

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SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-6; Conducted Disturbance Induced by Radio Frequency Fields, 150 kHz to 80 MHz**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197c	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards - Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 4; Sect. 4.1
Operating Mode	Continuously displaying the bottom contour information from depth transducer, water temperature and battery voltage information on EUT display.	
Lead Tested	12 VDC Power Input	
Technician	K. McDonald	
Date	December 17, 2007	

Notes: Injection Method: Coupling-Decoupling Network (CDN)
Temperature: 22.8°C Humidity: 25%

Test Frequency	Threshold	Level	Modulation	
MHz	Volts			
0.15	----------	3	80% AM, 1 kHz Sine wave	
↓	↓	↓	↓	
80.0	----------	3	80% AM, 1 kHz Sine wave	

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

Sheet 1 of 5

SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-6; Conducted Disturbance Induced by Radio Frequency Fields, 150 kHz to 80 MHz**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197c	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards - Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 2 Sect. 2.1
Operating Mode	Continuously displaying the bottom contour information from depth transducer, water temperature and battery voltage information on EUT display.	
Lead Tested	Temperature / Speed Transducer Cable	
Technician	K. McDonald	
Date	December 17, 2007	

Notes: Injection Method: Direct
Temperature: 22.8°C Humidity: 25%

Test Frequency	Threshold	Level	Modulation	
MHz	Volts			
0.15	----------	3	80% AM, 1 kHz Sine wave	
↓	↓	↓	↓	
80.0	----------	3	80% AM, 1 kHz Sine wave	

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-6; Conducted Disturbance Induced by Radio Frequency Fields, 150 kHz to 80 MHz**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197c	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards - Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 2 Sect. 2.1
Operating Mode	Continuously displaying the bottom contour information from depth transducer, water temperature and battery voltage information on EUT display.	
Lead Tested	Temperature / Depth Transducer Cable	
Technician	K. McDonald	
Date	December 17, 2007	

Notes: Injection Method: Direct
Temperature: 22.8°C Humidity: 25%

Test Frequency	Threshold	Level	Modulation	
MHz	Volts			
0.15	----------	3	80% AM, 1 kHz Sine wave	
↓	↓	↓	↓	
80.0	----------	3	80% AM, 1 kHz Sine wave	

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

Sheet 3 of 5

SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-6; Conducted Disturbance Induced by Radio Frequency Fields, 150 kHz to 80 MHz**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197c	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards - Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 2 Sect. 2.1
Operating Mode	Continuously displaying the bottom contour information from depth transducer, water temperature and battery voltage information on EUT display.	
Lead Tested	GPS Receiver Cable	
Technician	K. McDonald	
Date	December 17, 2007	

Notes: Injection Method: Direct
Temperature: 22.8°C Humidity: 25%

Test Frequency	Threshold	Level	Modulation	
MHz	Volts			
0.15	----------	3	80% AM, 1 kHz Sine wave	
↓	↓	↓	↓	
80.0	----------	3	80% AM, 1 kHz Sine wave	

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

Sheet 4 of 5

SUSCEPTIBILITY TEST DATA SHEET

Test Method	**IEC 61000-4-6; Conducted Disturbance Induced by Radio Frequency Fields, 150 kHz to 80 MHz**	
Customer	Johnson Outdoors, Inc.	
Job Number	R-12242	
Test Sample	SI Combo NVD side imaging combo depthfinder with NVD maps	
Model Number	1197c	
Serial Number	N/A	
Test Specification	EN61000-6-1; 2001 Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards - Immunity for Residential, Commercial and Light Industrial Environments	**Paragraph** Table 2 Sect. 2.1
Operating Mode	Continuously displaying the bottom contour information from depth transducer, water temperature and battery voltage information on EUT display.	
Lead Tested	Interlink Cable	
Technician	K. McDonald	
Date	December 17, 2007	

Notes: Injection Method: Direct
Temperature: 22.8°C Humidity: 25%

Test Frequency	Threshold	Level	Modulation	
MHz	Volts			
0.15	----------	3	80% AM, 1 kHz Sine wave	
80.0	----------	3	80% AM, 1 kHz Sine wave	

The test sample did not exhibit any malfunction, degradation of performance or deviation from specified indication beyond the tolerances given in the individual equipment specifications or approved test plan when tested in accordance with the above stated test method.

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Appendix A: Labeling Information

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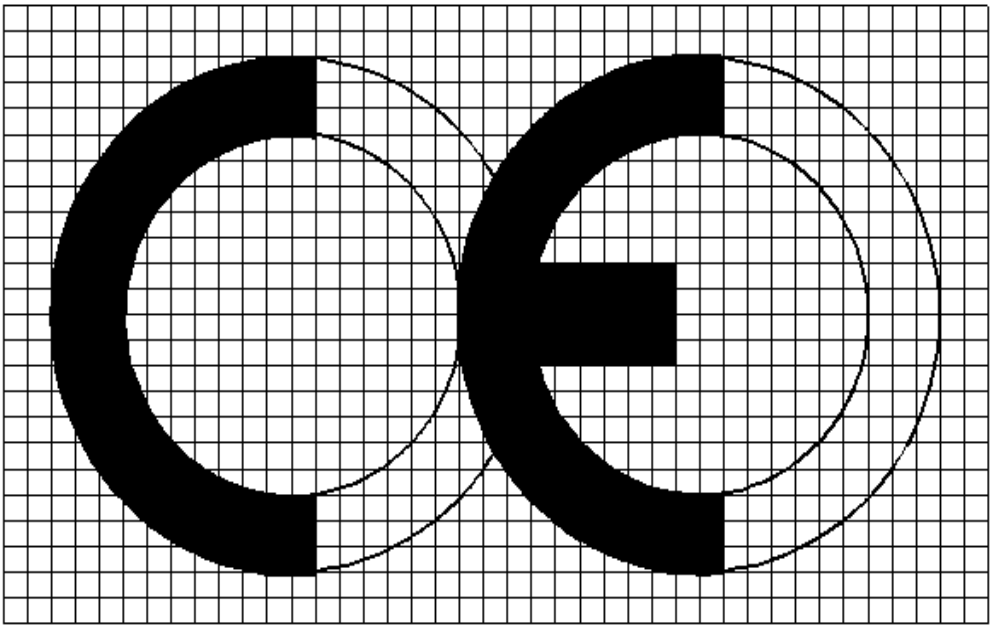
CE Marking as Required By



The CE Marking As Required By Council Directive 89/336/EEC, the EMC Directive, Amended By Council Directive 93/68/ EEC

The EMC Directive
General Marking Requirements

The EMC Directive does not require that a date be placed with the mark. The CE Marking can be placed in any one of the following locations:

a) on the device
b) on the packaging
c) in the instruction manual
d) on the warranty/guarantee certificate

The CE marking shall have a height of not less than 5 mm and shall maintain the proportions shown above.

Notes:
1) By placing the CE marking on a product, the manufacturer is stating that the device complies with ALL applicable EC directives. The test report in which this information is contained shows compliance of the device to the requirements of the EMC directive only, other directives may or may not be applicable at this time.
2) The information shown above is valid as of the issue date of the test report in which it is contained.

Appendix B: Declaration of Conformity

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Contents of the Declaration of
Conformity As Required By
The EMC Directive

The EC Declaration of Conformity must contain the following information:

- A description of the apparatus to which it applies.

- Reference to the specifications under which conformity is declared and where appropriate, to the national measures implemented to ensure the conformity of the apparatus with the provisions of the Directive. (The specifications under which conformity may be declared are located on the Certificate of Conformance issued with the test report in which this information is contained.)

- Identification of the signatory empowered to bind the manufacturer or his authorized representative.

Notes:

1) A Declaration of Conformity must be issued for each Directive for which conformance is claimed.

2) The Declaration of Conformity must be on file at the point of entry into the European Community.

The information shown above is valid as of the issue date of the test report in which it is contained.

Appendix C: Sample Declaration of Conformity

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Declaration of Conformity

Application of Council Directive(s): _____

Issued by: _____

Date of Issue: _____

Type of Equipment: _____

Brandname: _____

Model Number: _____

Standards to Which Conformity is Declared: _____

Manufacturer (if not issuing agent): _____

I, the undersigned, hereby declare that the equipment specified above conforms to the directive(s) and standard(s) as specified.

_____ _____

Signature Print Name

_____

Title

Please note that this information is provided as a guide and you or your manufacturer, are cautioned that specific requirements are contained within each directive.

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