



## Communication Certification Laboratory

November 29, 2006

Mr. Samuel Smith  
Adept Systems Inc.  
2966 Fort Hill road  
Eagle Mountain, UT 84005

Dear Sam:

Communication Certification Laboratory has completed testing of the Adept Systems Inc. GRouter4 GR4-E and GRouter4 GR4-W to EN 55024:1998 specifications. Enclosed is a copy of the documentation for your files.

In order to market your equipment to the European market, the manufacturer or importer must make a declaration of conformity stating that the equipment complies with all applicable Directives that apply to their equipment. Once all applicable Directives have been met, the manufacturer or importer must then label the equipment with the "CE" marking.

This documentation must be kept on file for a period of ten years following the placement of the last piece of equipment on the market.

Please let us know if we can be of further assistance in meeting your testing needs.

Sincerely yours,

COMMUNICATION CERTIFICATION LABORATORY

Joseph W. Jackson  
VP Marketing

Enclosures  
83-1086:jd

# COMMUNICATION CERTIFICATION LABORATORY

1940 West Alexander Street  
Salt Lake City, UT 84119  
801-972-6146

## Test Report

Declaration of Conformity

TEST OF:

GRouter4 GR4-E and GRouter4 GR4-W

To EN 55024:1998, EN 61000-3-2 and EN 61000-3-3

Test Report Serial No: 83-1086

Applicant:

Adept Systems Inc.  
2966 Fort Hill Road  
Eagle Mountain, UT 84005  
U.S.A.

Equipment Receipt Date: November 28, 2006

Date of Test: November 28, 2006

Issue Date: November 29, 2006

Accredited Testing Laboratory By:



NVLAP Lab Code 100272-0


**CERTIFICATION OF ENGINEERING REPORT**


This report has been prepared by Communication Certification Laboratory to verify compliance of the device described below with the requirements of EN 55024:1998, EN 61000-3-2 and EN 61000-3-3. This report may be reproduced in full, partial reproduction may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

- Applicant: Adept Systems Inc.
- Manufacturer: Adept Systems Inc.
- Brand Name: Adept Systems Inc.
- Model Name: GRouter4 GR4-E and GRouter4 GR4-W

On this 29<sup>th</sup> day of November 2006 I, individually, and for Communication Certification Laboratory, certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

COMMUNICATION CERTIFICATION LABORATORY

  
Checked by: Thomas C. Jackson  
President

  
Tested by: Jeffrey L. Draney  
EMC Technician

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**SECTION 1.0 CLIENT INFORMATION**

**1.1 Applicant:**

Company Name: Adept Systems Inc.  
2966 Fort Hill Road  
Eagle Mountain, UT 84005  
U.S.A.

Contact Name: Samuel Smith  
Title: President

**1.2 Manufacturer:**

Company Name: Adept Systems Inc.  
2966 Fort Hill Road  
Eagle Mountain, UT 84005  
U.S.A.

Contact Name: Samuel Smith  
Title: President

**1.3 Party Responsible for Declaration of Conformity:**

Company Name: Adept Systems Inc.  
2966 Fort Hill Road  
Eagle Mountain, UT 84005  
U.S.A.

Contact Name: Samuel Smith  
Title: President

Signature: \_\_\_\_\_

**SECTION 2.0 EQUIPMENT UNDER TEST (EUT)****2.1 Identification of EUT:**

Brand Name: Adept Systems Inc.  
 Model Name or Number: GRouter4 GR4-E, Grouter4 GR4-W  
 Serial Number: None  
 Options Fitted: N/A  
 Country of Manufacture: U.S.A.

**2.2 Description of EUT:**

The GRouter4 is a device for use in LonWorks systems to allow bi-directional communications between EIA 709.1 and IP based systems. The GR4-E provides an Ethernet port while the GR4-W provides a WiFi radio link for connecting to the network. The GRouter4 receives power from a customer supplied 5 VDC source. Power for testing was provided by an Addonics ST-7.5W 5 VDC power adapter.

**2.3 EUT and Support Equipment:**

The FCC ID numbers for all the EUT and support equipment used during the test (including inserted cards) are listed below:

Brand Name Model Number Serial No.	FCC ID Number	Description	Name of Interface Ports / Interface Cables
BN: Adept Systems Inc. MN: GRouter4 GR4-E (Note 1)	DoC	Lontalk/ Ethernet IP Router	See Section 2.4
BN: Adept Systems Inc. MN: GRouter4 GR4-W (Note 1)	DoC	Lontalk/ WiFi IP Router	See Section 2.4
BN: TRENDnet MN: TE100-S8P (Note 3)	Verification	8 port LAN hub	Ethernet/Cat 5e cable w/RJ45 connectors

Brand Name Model Number Serial No.	FCC ID Number	Description	Name of Interface Ports / Interface Cables
BN: Adept Systems Inc. MN: Termination Assembly	None	Lontalk Termination	Lontalk / Unshielded twisted pair cable (Note 2)
BN: D-Link MN: D1-624	KA2D1624VC2	Wireless Router	Ethernet/1-3 meter cat 5 cable to GR-E, 1-8 meter cat 5 cable to Ethernet switch. WiFi/ RF link to GR4-W.
BN: Dell MN: Inspiron 3800	DoC	Laptop Computer	Lontalk / Unshielded twisted pair cable (Note 2). Ethernet/Cat 5 cable connected to Wireless Router.

Note: (1) EUT.  
(2) Interface port connected to EUT (See Section 2.4)  
(3) Equipment located outside of the chamber.

The support equipment listed above was not modified in order to achieve compliance with this standard.

#### **2.4 Interface Ports on EUT:**

##### **GR4-E**

Name of Ports	No. of Ports Fitted to EUT.	Cable Descriptions/Length
VDC	1	Unshielded twisted pair cable with Phoenix connector/8 meters
Ethernet	1	Cat 5 cable with RJ-45 connectors/3 meters

Name of Ports	No. of Ports Fitted to EUT.	Cable Descriptions/Length
Lontalk	1	Unshielded twisted pair cable with Phoenix connector/8 meters

**GR4-W**

Name of Ports	No. of Ports Fitted to EUT.	Cable Descriptions/Length
VDC	1	Unshielded twisted pair cable with Phoenix connector/8 meters
WiFi	1	Antenna/RF link
Lontalk	1	Unshielded twisted pair cable with Phoenix connector/8 meters

**2.5 Modification Incorporated/Special Accessories on EUT:**

There were no modifications or special accessories required to comply with the specification.

Signature: \_\_\_\_\_

Typed Name: Samuel Smith

Title: President



**SECTION 3.0 TEST SPECIFICATION, METHODS & PROCEDURES****3.1 Test Specification:**

Title: EN 55024:1998+A1+A2

Information technology equipment - Immunity characteristics - Limits and methods of measurement

Purpose of Test: The tests were performed to demonstrate initial compliance.

**3.2 Methods & Procedures:****3.2.1 EN 55024 Refers to the Following Basic Standards:**

Basic Standard	Date	Title
EN 61000-4-2 (IEC 61000-4-2)	2001	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2 Electrostatic Discharge immunity test.
EN 61000-4-3 (IEC 61000-4-3)	2006	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3 Radiated, radio frequency, electromagnetic field immunity test.
EN 61000-4-4 (IEC 61000-4-4)	2004	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4 Electrical fast transient/burst immunity test.
EN 61000-4-5 (IEC 61000-4-5)	2005	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5 Surge immunity test.

<b>Basic Standard</b>	<b>Date</b>	<b>Title</b>
EN 61000-4-6 (IEC 61000-4-6)	2006	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6 Immunity to conducted disturbances, induced by radio frequency fields immunity test.
EN 61000-4-8 (IEC 61000-4-8)	1993	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 8 Power frequency magnetic field immunity test.
EN 61000-4-11 (IEC 61000-4-11)	2004	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 11 Voltage dips, short interruptions and voltage variations immunity test.
EN 55024:A1+A2 Annex A	1998	Telecommunication Terminal Equipment

**SECTION 4.0 OPERATION OF EUT DURING TESTING:****4.1 Operating Environment:**

Power Supply: 230 VAC  
AC Mains Frequency: 50 HZ

**4.2 Operating Modes:**

The GRouter4 GR4-E and GRouter4 GR4-W were receiving continuous data from the Ethernet/WiFi connection and outputting the data on the Lontalk network.

**4.3 Configuration & Peripherals:**

The GRouter4 GR4-E and GRouter4 GR4-W was placed on the table and connected to the support equipment listed in Section 2.3 via each port listed in Section 2.4. Shown in Section 4.6 is a block diagram of the test configuration.

**4.4 Performance Criteria**

For this EUT, the client has stated that the performance criteria defined in EN 55024:1998 should be applied as follows: The EUT shall continue to operate as intended, with some degradation of performance allowed.

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. 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 (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

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. 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

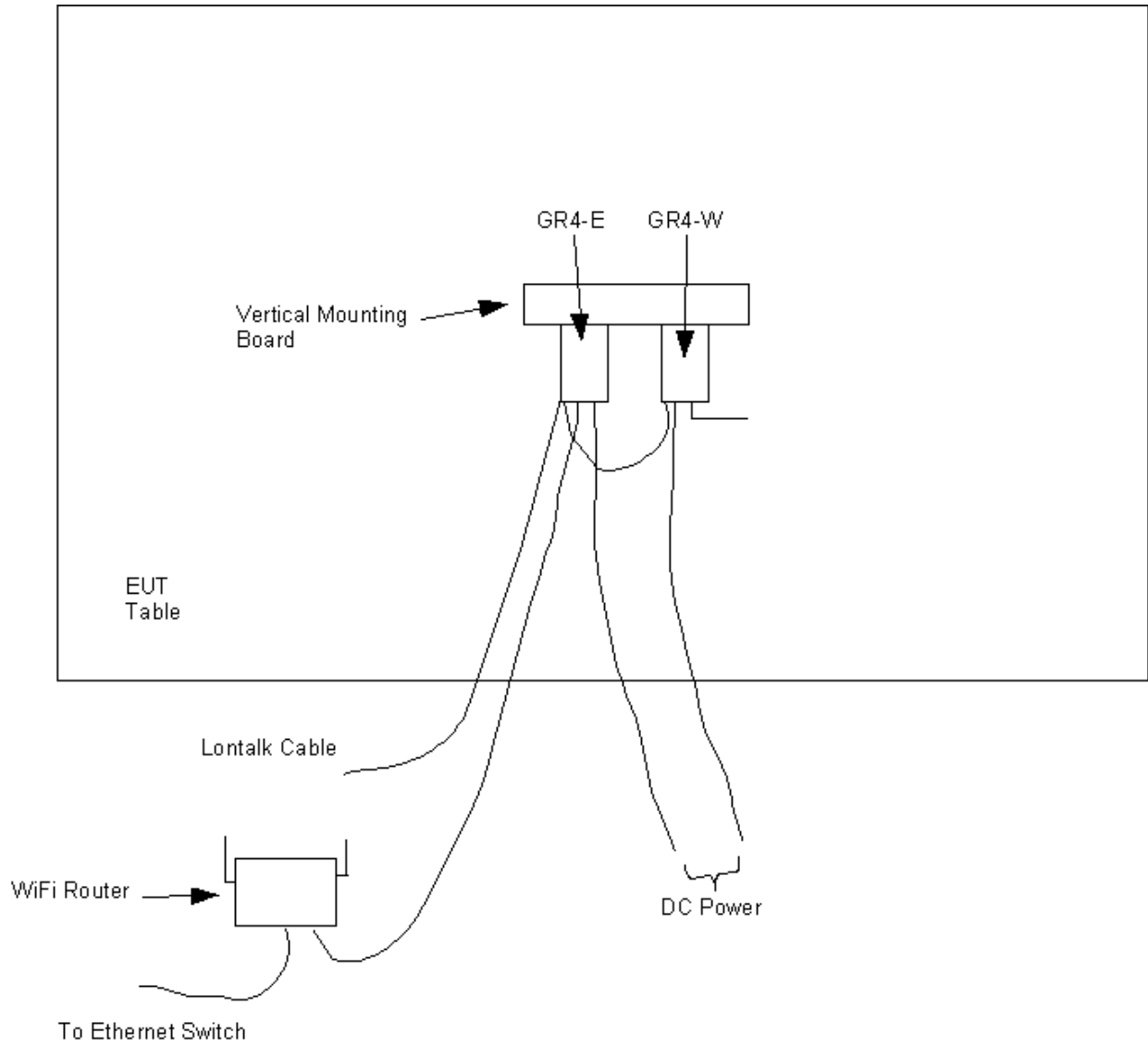
either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Criteria C: Temporary loss of function is allowed; provided that normal function is automatically restored when the test stimulus is removed, or can be restored by operation of the controls.

#### **4.5 Monitoring of the EUT**

The GRouter4 GR4-E and GRouter4 GR4-W were connected to a computer located outside of the chamber. The GRouter4 GR4-E and GRouter4 GR4-W were monitored using the laptop computer connected to the Ethernet port and Lontalk port of the EUT.

**4.6 Block Diagram of Test Configuration:**



**SECTION 5.0 SUMMARY OF TEST RESULTS****5.1 Summary of Tests (EN 55024)**

<b>Enclosure Port</b>			
<b>Basic Standard</b>	<b>Test No.</b>	<b>Environmental Phenomena</b>	<b>Result</b>
EN 61000-4-8 (IEC 61000-4-8)	1.1	Power-frequency magnetic field	Note 1
EN 61000-4-3 (IEC 61000-4-3)	1.2	Radio Frequency Electromagnetic Field (Amplitude modulated)	Complied
EN 61000-4-2 (IEC 61000-4-2)	1.3	Electrostatic Discharge	Complied
Note 1: The EUT does not contain any elements that are susceptible to magnetic fields, therefore; testing to this standard is not applicable.			

<b>Ports for signal lines and telecommunication lines</b>			
<b>Basic Standard</b>	<b>Test No.</b>	<b>Environmental Phenomena</b>	<b>Result</b>
EN 61000-4-6 (IEC 61000-4-6)	2.1	Radio-frequency continuous conducted	Complied
EN 61000-4-5 (IEC 61000-4-5)	2.2	Lightning Surge	Note 1
EN 61000-4-4 (IEC 61000-4-4)	2.3	Electrical fast transient/burst	Complied
EN 55024:1998+A1 +A2 Annex A	2.4	Telecommunication Terminal Equipment	Note 1
Note 1: The EUT is not equipped with any ports of this type, therefore; testing to this port is not applicable.			
Note 2: The signal and telecommunication cables do not connect directly to outdoor cables, therefore; testing to this port is not applicable.			

<b>DC input and DC output power ports</b>			
<b>Basic Standard</b>	<b>Test No.</b>	<b>Environmental Phenomena</b>	<b>Result</b>
EN 61000-4-6 (IEC 61000-4-6)	3.1	Radio-frequency continuous conducted	Complied
EN 61000-4-5 (IEC 61000-4-5)	3.2	Lightning Surge	Note 2
EN 61000-4-4 (IEC 61000-4-4)	3.3	Electrical fast transient/burst	Complied
Note 1:	The EUT is not equipped with a DC Input or Output DC power port, therefore; testing to this port is not applicable.		
Note 2:	The DC power cable does not connect directly to outdoor cables, therefore; testing to this port is not applicable.		

<b>AC input and AC output power ports</b>			
<b>Basic Standard</b>	<b>Test No.</b>	<b>Environmental Phenomena</b>	<b>Result</b>
EN 61000-4-6 (IEC 61000-4-6)	4.1	Radio-frequency continuous conducted	Note 1
EN 61000-4-11 (IEC 61000-4-11)	4.2	Voltage Dips	Note 1
EN 61000-4-11 (IEC 61000-4-11)	4.3	Voltage Interruptions	Note 1
EN 61000-4-5 (IEC 61000-4-5)	4.4	Lightning Surge	Note 1
EN 61000-4-4 (IEC 61000-4-4)	4.5	Electrical fast transient/burst	Note 1
Note 1:	The EUT is not equipped with an AC Input or Output AC power port, therefore; testing to this port is not applicable.		

## **5.2 Result**

In the configuration tested, the EUT complied with the requirements of the specification.

**SECTION 6.0 MEASUREMENTS, EXAMINATIONS AND DERIVED RESULTS****6.1. General Comments**

This section contains the test results only. Details of the test methods, etc., can be found in Appendix 1 of this report.

**6.2. Test Results****6.2.1 Test No. 1.2 Radio Frequency Electromagnetic Field**

Port: Enclosure

Basic Standard: EN 61000-4-3:2006 (IEC 61000-4-3:2006)

Performance Criterion: A

Limit: 3 V/m

Modulation: 1 kHz 80% Amplitude Modulated

Frequency (MHz)	Level (V/m)	Exposed Area	Comment	Result
80 - 1000	3.8	Front	Note 1	Complied
80 - 1000	3.8	Right Side	Note 1	Complied
80 - 1000	3.8	Left Side	Note 1	Complied
80 - 1000	3.8	Rear	Note 1	Complied
Note 1: There was no observable degradation in the performance of the EUT				

**Measurement Uncertainty**

The measurement uncertainty (with a 95% confidence level) for this test was:  $\pm 0.8$  V/m

**RESULT**

In the configuration tested, the EUT complied with the specification.



**6.2.2 Test No. 1.3. Electrostatic Discharge**

Port: Enclosure

Basic Standard: EN 61000-4-2:2001 (IEC 61000-4-2:2001)

Performance Criterion: B

Limit: 4 kV Contact Discharge

8 kV Air Discharge

Temperature during testing: 21°C (15°C to 35°C)

Relative Humidity during testing: 30% (30% to 60%)

Atmospheric Pressure during testing: 1005 mbar (860 to 1060 mbar)

Discharge Point	Discharge Voltage (kV)	Discharge Type	Comment	Result
Vertical Coupling Plane	4	Contact	Note 2	Complied
Horizontal Coupling Plane	4	Contact	Note 2	Complied
1 - 10	4	Contact	Note 2	Complied
1 - 60	8	Air	Note 2	Complied
Note 1: There was no observable degradation in the performance of the EUT.				
Note 2: Both units needed to be power cycled to return to normal operation.				

**RESULT**

In the configuration tested, the EUT complied with the specification.

**6.2.3 Test No. 2.1 Radio Frequency Continuous Conducted**

Port: Signal lines and telecommunication lines  
Basic Standard: EN 61000-4-6:2004 (IEC 61000-4-6:2004)  
Performance Criterion: A  
Limit: 3 V  
Modulation: 1 kHz 80% Amplitude Modulated

Frequency (MHz)	Level (V)	Exposed Cable	Comment	Result
0.15 - 80	3.8	Lontalk	Note 1	Complied
0.15 - 80	3.8	Ethernet	Note 1	Complied
Note 1: There was no observable degradation in the performance of the EUT				
Note 2: This cable is not greater than 3 meters; therefore, this test is not applicable.				

Measurement Uncertainty

The measurement uncertainty (with a 95% confidence level) for this test was:  $\pm 0.8$  V

RESULT

In the configuration tested, the EUT complied with the specification.

**6.2.4 Test No. 2.3 Fast Transients: Common Mode.**

Port: Signal lines and telecommunication lines  
Basic Standard: EN 61000-4-4:2004 (IEC 61000-4-4:2004)  
Performance Criterion: B  
Limit: 0.5 kV

Temperature during testing: 21°C (15°C to 35°C)  
Relative Humidity during testing: 30% (30% to 60%)  
Atmospheric Pressure during testing: 1005 mbar (860 to 1060 mbar)

Line	Severity Level (kV)	Polarity	Duration	Comment	Result
Lontalk	0.5	Pos & Neg	2 Min	Note 1	Complied
Ethernet	0.5	Pos & Neg	2 Min	Note 1	Complied
Note 1: There was no observable degradation in the performance of the EUT					
Note 2: This cable is not greater than 3 meters; therefore, this test is not applicable.					

**RESULT**

In the configuration tested, the EUT complied with the specification.

**6.2.5 Test No. 3.1 Radio Frequency Continuous Conducted**

Port: Input DC Power

Basic Standard: EN 61000-4-6:2006 (IEC 61000-4-6:2006)

Performance Criterion: A

Limit: 3 V

Modulation: 1 kHz 80% Amplitude Modulated

<b>Frequency (MHz)</b>	<b>Level (V)</b>	<b>Exposed Cable</b>	<b>Comment</b>	<b>Result</b>
0.15 - 80	3.8	DC Power	Note 1	Complied
Note 1: There was no observable degradation in the performance of the EUT				

Measurement Uncertainty

The measurement uncertainty (with a 95% confidence level) for this test was:  $\pm 0.8$  V

RESULT

In the configuration tested, the EUT complied with the specification.

**6.2.6 Test No. 3.3 Fast Transients: Common Mode.**

Port: Input DC Power

Basic Standard: EN 61000-4-4:2004 (IEC 61000-4-4:2004)

Performance Criterion: B

Limit: 1.0 kV

Temperature during testing: 21°C (15°C to 35°C)

Relative Humidity during testing: 30% (30% to 60%)

Atmospheric Pressure during testing: 1005 mbar (860 to 1060 mbar)

Line	Severity Level (kV)	Polarity	Duration	Comment	Result
DC	0.5	Pos & Neg	2 Min	Note 2	Complied
Note 1: There was no observable degradation in the performance of the EUT					
Note 2: The GR4-E and GR4-W reset during the test. Both units returned to normal after the test.					

**RESULT**

In the configuration tested, the EUT complied with the specification.

**APPENDIX 1 TEST PROCEDURES AND TEST EQUIPMENT****A.1.1 Electrostatic Discharge - EN 61000-4-2:2001 (IEC 61000-4-2:2001)**

The GRouter4 GR4-E and GRouter4 GR4-W were tested to the test procedures outlined in EN 61000-4-2:2001 Part 2 Section 8.

The GRouter4 GR4-E and GRouter4 GR4-W were configured for normal operation as described in Sections 4.2 and 4.3.

The tests were performed in a shielded room that provides a ground reference plane (GRP) on the floor of the room, and is large enough to provide a minimum distance of 1 m between the equipment under test (EUT) and the walls of the room. The test set-up consists of a wooden table, 0.8 m high, standing on the GRP. A horizontal coupling plane (HCP), 1.6 m x 0.8 meters is placed on the top of the table and connected to the GRP via a cable with a 470 K $\Omega$  resistor located at each end. The EUT is isolated from the HCP by an insulating support 0.5 mm thick. A vertical coupling plane (VCP), 0.5 m x 0.5 m, is placed vertical 0.1 m from the EUT and connected to the GRP via a cable with a 470 K $\Omega$  resistor located at each end. The HCP and VCP are used to simulate discharges to objects placed or installed near the EUT.

The test voltage was increased from the minimum severity level to the selected test severity level, in order to determine any threshold of failure. Ten single discharges were applied on pre-selected points in both the vertical and horizontal polarities. The time interval between successive single discharges was a minimum of 1 sec or longer in order to determine whether a system failure had occurred. The ESD generator was held perpendicular to the surface to which the discharge was applied.

For contact discharges, the tip of the discharge electrode touched the EUT before the discharge switch was operated. In the case of painted surfaces covering a conducting substrate, the following procedure was adopted:

If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting surface. Coating declared as insulating by the manufacturer shall only be submitted to air discharges.

For air discharges, the round discharge tip of the discharge electrode was approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) was removed from the EUT and the generator was then re-triggered for a new single discharge.

In order to simulate discharges to objects placed or installed near the EUT discharges of the ESD generator to a coupling plane were applied in the contact discharge mode.

For the HCP 10 single discharges (in the most sensitive polarity) were applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1 m from the front of the EUT. The long axis of the discharge electrode was in the plane of the HCP and perpendicular to the front edge during the discharge.

For the VCP ten single discharges (in the most sensitive polarity) were applied to the center of on vertical edge of the coupling plane. The coupling plane was placed parallel to and positioned at a distance of 0.1 m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different position that the four faces of the EUT were completely illuminated.

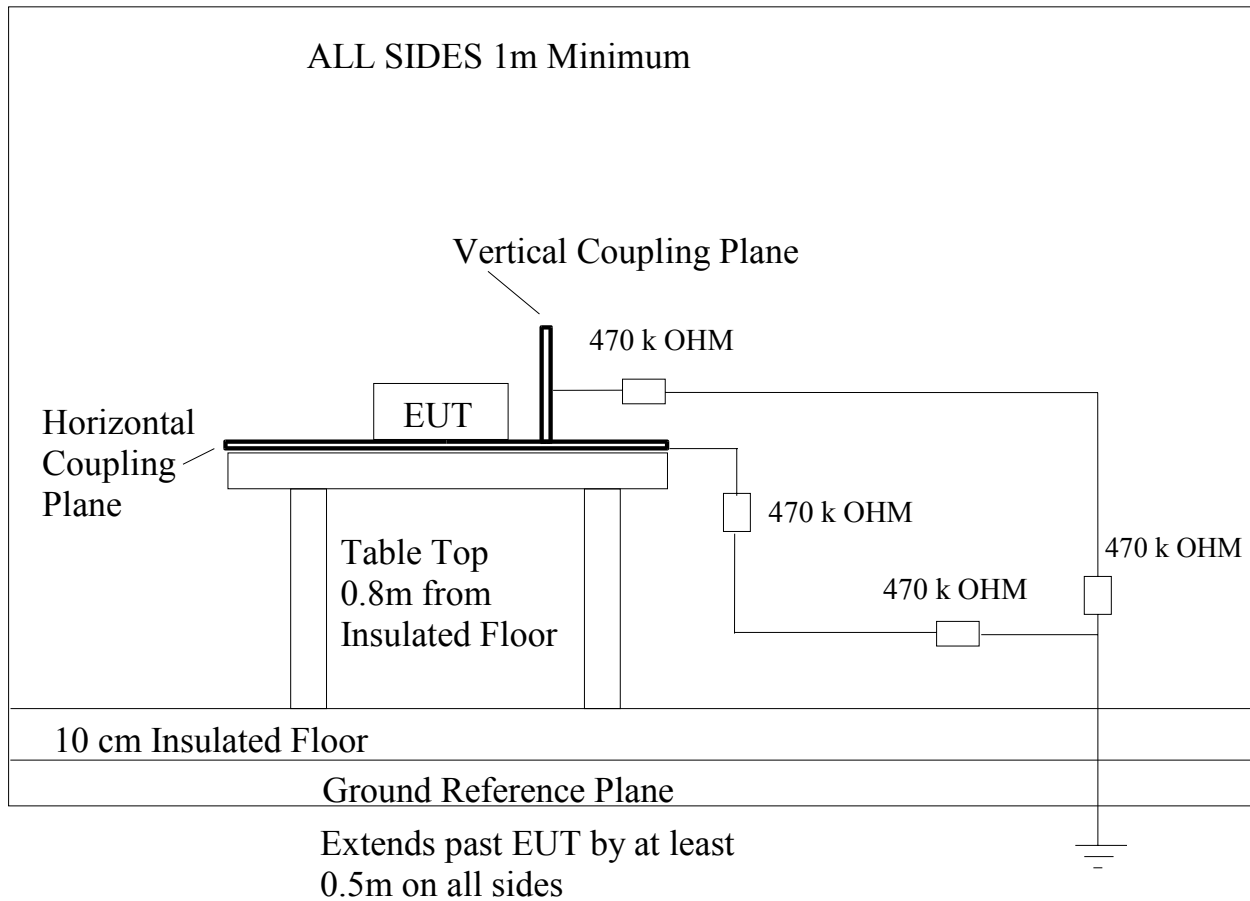
DISCHARGE POINTS FOR CONTACT DISCHARGE		
DISCHARGE POINT	DESCRIPTION	REFERENCE TO PHOTOGRAPH NO. (APPENDIX 2)
1 - 5	GR4-E Ethernet Module	2
6 - 10	GR4-W WiFi Module	3

DISCHARGE POINTS FOR AIR DISCHARGE		
DISCHARGE POINT	DESCRIPTION	REFERENCE TO PHOTOGRAPH NO. (APPENDIX 2)
1 - 30	GR4-E Case, and Cables	1
31 - 60	GR4-W Case, and Cables	1

Type of Equipment	Manufacturer	Model Number	Serial Number
Electrostatic Discharge Simulator	Electro-Tech Systems, Inc.	930C	129
Screen Room	Lindgren RF Enclosures	1000	N/A

An independent calibration laboratory calibrates all the equipment listed above every 12 months or the equipment is calibrated by CCL personal following outlined calibration procedures.

### Shielded Enclosure





**A.1.2 Radiated Electromagnetic Field - EN 61000-4-3:2006 (IEC 61000-4-3:2006)**

The GRouter4 GR4-E and GRouter4 GR4-W were tested to the test procedures outlined in EN 61000-4-3:2006 Part 3 Section 8.

The GRouter4 GR4-E and GRouter4 GR4-W were configured for normal operation as described in Sections 4.2 and 4.3.

The measurements are performed in a semi anechoic chamber, 6.2 m x 8.5 m. The EUT is placed 2 m from the back of the chamber and at least 2 m from each side. The radiating antenna is placed 3 m from the EUT and 1 m from the back of the chamber.

The field strength is calibrated via an IBM compatible computer running custom software. The computer, signal generator, amplifier, and field monitor are located on the outside of the chamber during the tests. Two field sensor probes are placed inside the chamber, in the area in which the EUT will occupy, to monitor the calibration. The software is designed to monitor the field strength as the frequency is swept incrementally from 80 MHz to 2000 MHz. The step size shall not exceed 1% of the fundamental. The signal level to the radiating system is then adjusted until the required field intensity is indicated. This signal level is stored by the computer, without the EUT present, to be used during the testing routine.

The radiating antenna was placed 3 m from the front of the EUT, in the exact position used during calibration.

The EUT is placed on a wooden table that is 0.8 m from the floor of the chamber, at the distance specified above. The frequency range is swept incrementally from 80 MHz to 1000 MHz using the previously recorded power levels to re-establish the field. The EUT is rotated in 90° increments to ensure that all four sides are exposed to the radiating field.

The dwell time at each frequency shall be not less than the time necessary for the EUT to be exercised, and be able to respond. The sensitive frequencies, the clock frequency (ies) and harmonics or frequencies of dominant interest are analyzed separately.

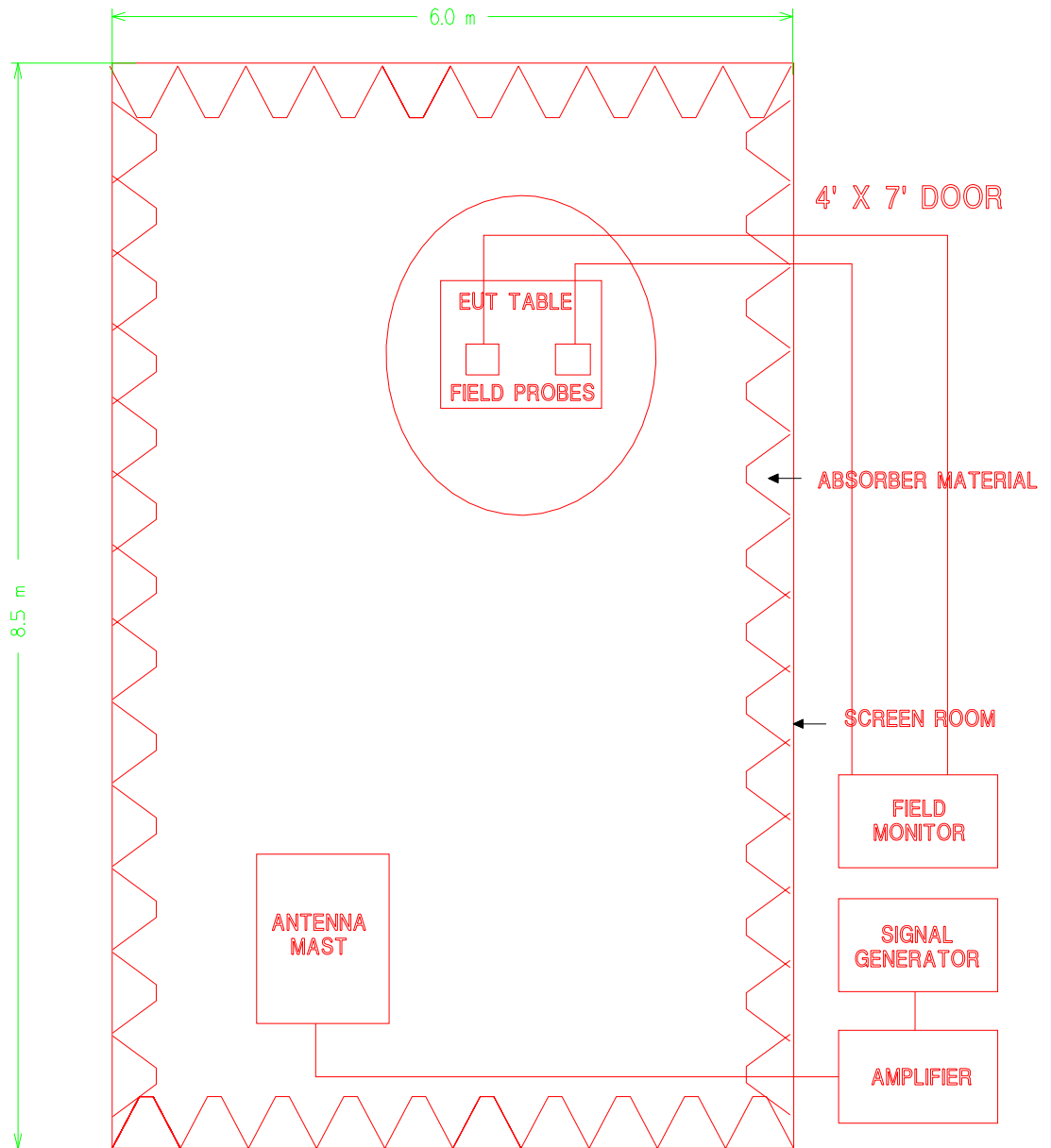
The chamber is calibrated for field uniformity every twelve months. A vertical plane that is 1.5 m by 1.5 m defines the uniformity of the chamber. The bottom of this vertical plane is 0.8 m above the floor of the chamber. Sixteen points are defined in this vertical plane located 0.5-m apart arranged in a grid pattern in the plane (as per EN 61000-4-3:2006). The uniformity

of the chamber is met if 12 of the 16 points are within -0 to +6 dB of the nominal field level. The point with the lowest level measured is used for the reference level when determining the field level at that frequency.

The uniformity of the chamber is determined by placing an isotropic field strength probe 3-m from the transmitting antenna at a height of 0.8 m from the floor of the chamber (calibration position). The frequency range is swept incrementally (1% of fundamental) from 80 MHz to 2000 MHz. The output level of the signal generator required to produce the desired field strength is measured and recorded. The probe is moved to position #1. The frequency range is again swept with the signal generator outputting the level that was recorded with the probe in the calibration position, at the appropriate frequency. The level from the probe is measured and recorded. After the entire frequency range has been swept the probe is moved to the next position and the process is repeated until all 16 positions have been measured and recorded.

Type of Equipment	Manufacturer	Model Number	Serial Number
Field Monitor	Amplifier Research	FM2000	12785
Isotropic Field Probes	Amplifier Research	FP2000	12794 12921
Isotropic Field Probe	Amplifier Research	FP2036	300138
BiconiLog Antenna	EMCO	3141	1045
Double Ridge Guide Antenna	EMCO	3115	9604-4779
Cable B	N/A	Radiated	N/A
RF Power Amp	Amplifier Research	25W1000M7	12572
RF Power Amp	Amplifier Research	15S1G3	303669
Signal Generator	Hewlett Packard	8647A	3247A00548

An independent calibration laboratory calibrates all the equipment listed above every 12 months or the equipment is calibrated by CCL personal following outlined calibration procedures.



**A.1.3 Fast Transients: Common Mode - EN 61000-4-4:2004 (IEC 61000-4-4:2004)**

The GRouter4 GR4-E and GRouter4 GR4-W were tested to the test procedures outlined in EN 61000-4-4:2004 Part 4 Section 8.

The GRouter4 GR4-E and GRouter4 GR4-W were configured for normal operation as described in Section 4.2 and 4.3.

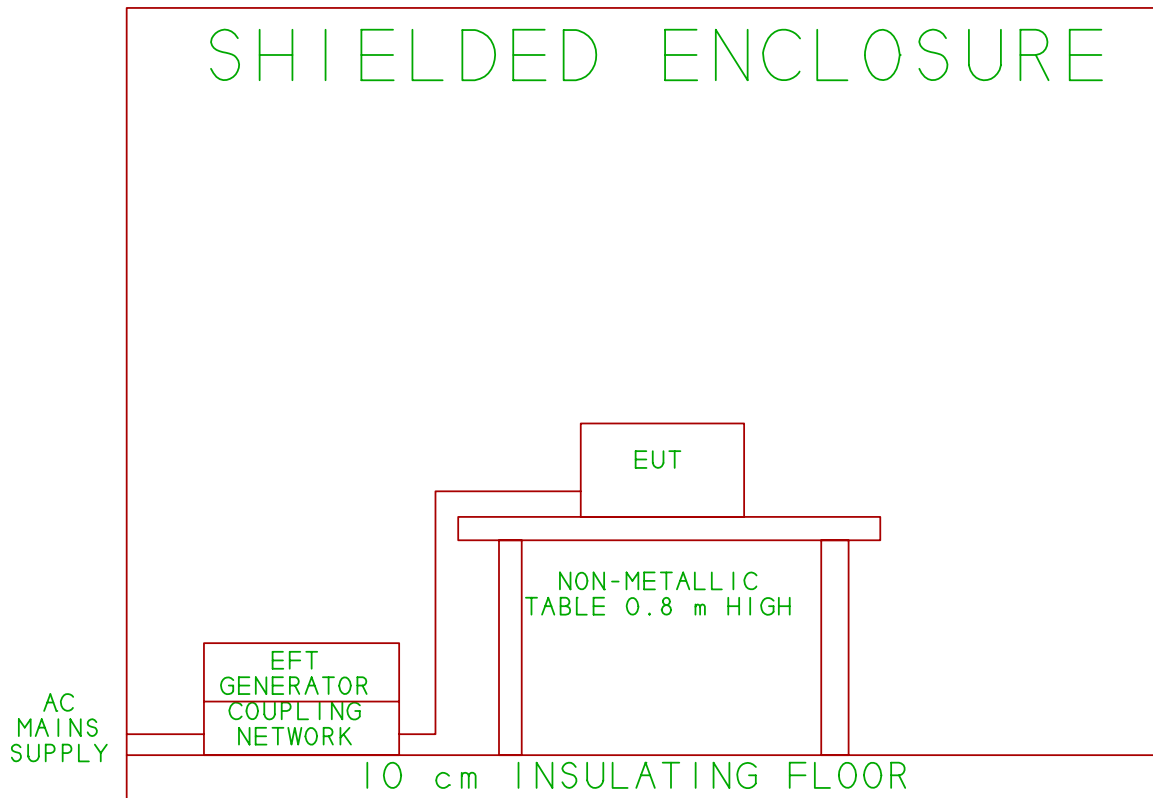
The tests were performed in a shielded room that provides a ground reference plane (GRP) on the floor of the room, and is large enough to provide a minimum distance of 1 m between the EUT and the walls of the room. The test set-up consists of a wooden table, 0.8 m high, standing on the GRP.

The Electrical Fast Transients (EFT) are coupled to the EUT's power supply lines via a coupling network that is equipped with a mains socket to supply power to the EUT. The coupling network provides the capability of applying the transients to L1/E/L2 in any number of combinations. The selected test voltage is applied to the following lines for duration of 2 minutes in both the positive and negative polarities: L1 L2 & E.

The EFT is coupled to any signal and control lines via a capacitive coupling clamp. The coupling clamp provides the capability of applying the transients to cables with diameters of 4 mm to 40 mm (1/16" to 1.5"). The selected test voltage is applied to the cable for duration of 2 minutes in both the positive and negative polarities.

Type of Equipment	Manufacturer	Model Number	Serial Number
Electrical Fast Transient - Generator	Schaffner	NSG 1025	3529146
Capacitive Coupling Clamp	Schaffner	CDN 125	12565
Screen Room	Lindgren RF Enclosures	1000	N/A

An independent calibration laboratory calibrates all the equipment listed above every 12 months or the equipment is calibrated by CCL personal following outlined calibration procedures.



#### **A.1.4 Surge Immunity - EN 61000-4-5:2005 (IEC 61000-4-5:2005)**

The GRouter4 GR4-E and GRouter4 GR4-W were tested to the test procedures outlined in EN 61000-4-5:2005 Part 4 Section 8.

The GRouter4 GR4-E and GRouter4 GR4-W were configured for normal operation as described in Section 4.2 and 4.3.

The surge is coupled to the EUT's power supply lines via the coupling/decoupling network specified in Figures 6 and 7 of EN 61000-4-5. The coupling/decoupling network is equipped with a main socket to supply power to the EUT. The coupling network

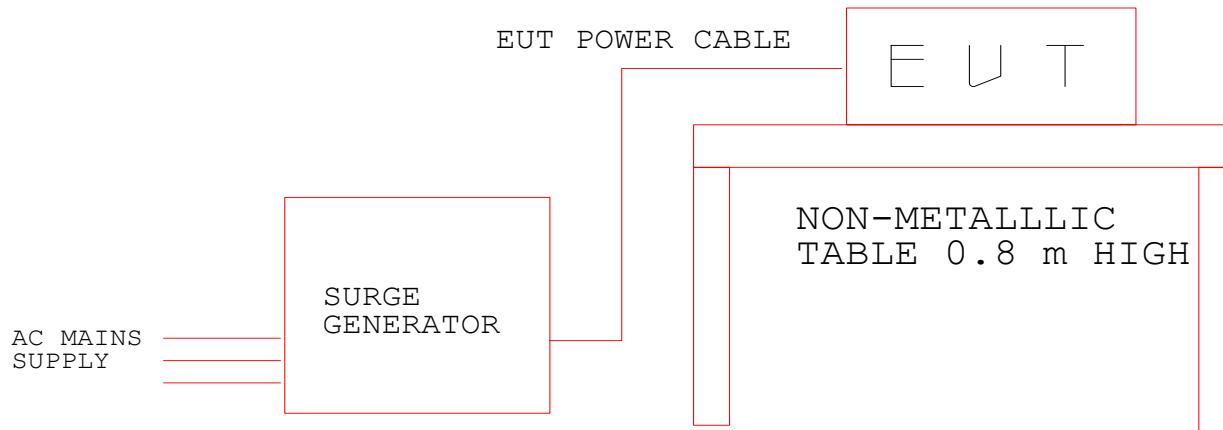
provides the capability of applying the surge from line to neutral, line to earth ground and neutral to earth ground. The surges are applied synchronized to the voltage phase at the zero crossing ( $0^{\circ}$  &  $180^{\circ}$ ) and the peak value of the AC voltage wave both positive and negative ( $90^{\circ}$  &  $270^{\circ}$ ).

The selected test voltage is applied in both the positive and negative polarities. To find the critical points of the duty cycle five positives and five negative pulses were applied at each selected test point. All lower levels including the selected test level shall be satisfied. For testing the secondary protection, the output voltage of the generator shall be increased up to the worst case voltage breakdown level (let-through level) of the primary protection.

The repetition rate between each pulse was 1 minute.

Type of Equipment	Manufacturer	Model Number	Serial Number
Surge Tester - Main Frame	Haefely-Trench	PSURGE 6.1	080 428-06
1.2/50 $\mu$ s and 8/20 $\mu$ s High Voltage Wave Shaping Plug-in	Haefely-Trench	PHV 30.2	080 511-09
AC/DC coupling/decoupling network	Haefely-Trench	FP-SURGE 32.1	080 688-01
I/O signal line coupling/decoupling network	Haefely-Trench	IP 6.2	080 640-04

An independent calibration laboratory calibrates all the equipment listed above every 12 months or the equipment is calibrated by CCL personal following outlined calibration procedures.



#### **A.1.5 Conducted Immunity - EN 61000-4-6:2006 (IEC 61000-4-6:2006)**

The GRouter4 GR4-E and GRouter4 GR4-W were tested to the test procedures outlined in EN 61000-4-6:2006 Part 3 Section 8.

The GRouter4 GR4-E and GRouter4 GR4-W were configured for normal operation as described in Sections 4.2 and 4.3.

The tests were performed in a shielded room that provides a ground reference plane (GRP) on the floor of the room, and is large enough to provide a minimum distance of 1 m between the EUT and the walls of the room. The test set-up consists of a wooden table, 0.8 m high, standing on the GRP.

The field strength is calibrated via an IBM compatible computer running custom software. The computer, signal generator, amplifier, and spectrum analyzer are located on the outside of the chamber during the tests. The CDN network or injection probe is configured into their calibration jigs and connected to the spectrum analyzer, to monitor the calibration. The software is designed to monitor the field strength as the frequency is swept incrementally from 150 kHz to 80 MHz. The step size shall not exceed 1% of the fundamental. The signal level to the coupling network is then adjusted until the required

field intensity is indicated on the spectrum analyzer. This signal level is stored by the computer, without the EUT present, to be used during the testing routine.

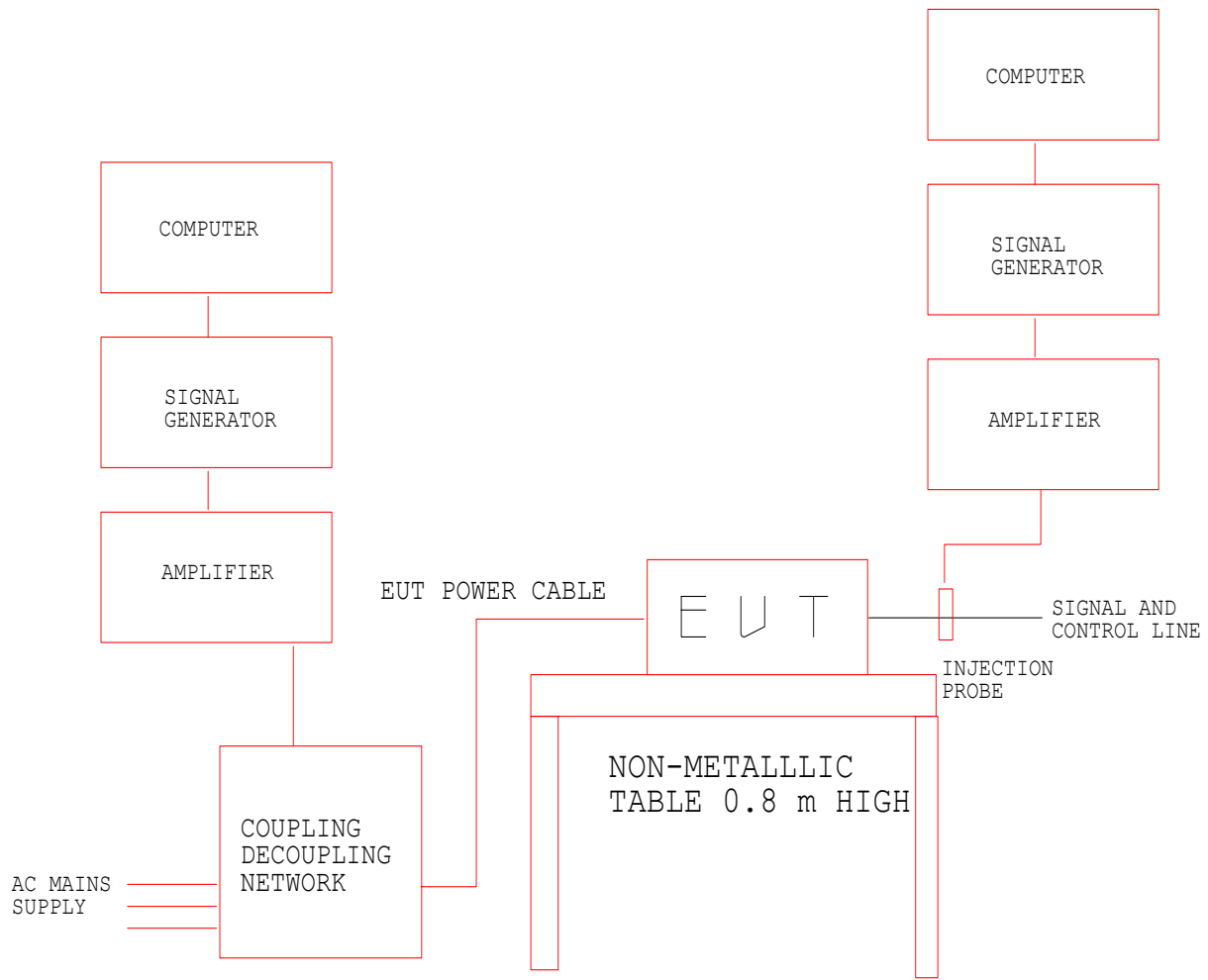
The EUT is placed on a wooden table that is 0.8 m from the floor of the chamber and connected to the coupling network. The frequency range is swept incrementally from 150 kHz to 80 MHz using the previously recorded power levels to re-establish the field.

The dwell time at each frequency shall be not less than the time necessary for the EUT to be exercised, and be able to respond. The sensitive frequencies, the clock frequencies and harmonics or frequencies of dominant interest are analyzed separately.

Type of Equipment	Manufacturer	Model Number	Serial Number
Coupling Decoupling Network (CDN)	Fischer Custom Communications, Inc.	FCC-801-M3-25	94
50-150 Ohm Adapter	Fischer Custom Communications, Inc.	FCC-150-50	366 367
Injection Probe Calibration Jig	Fischer Custom Communications, Inc.	FCC-BCICF-1	111
Injection Probe	Solar Electronics Inc.	9108-1N	921412
RF Cable	N/A	Cable B	N/A
RF Power Amp	Instruments For Industry	5300	N/A
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Signal Generator	Hewlett Packard	8648C	3537A01995

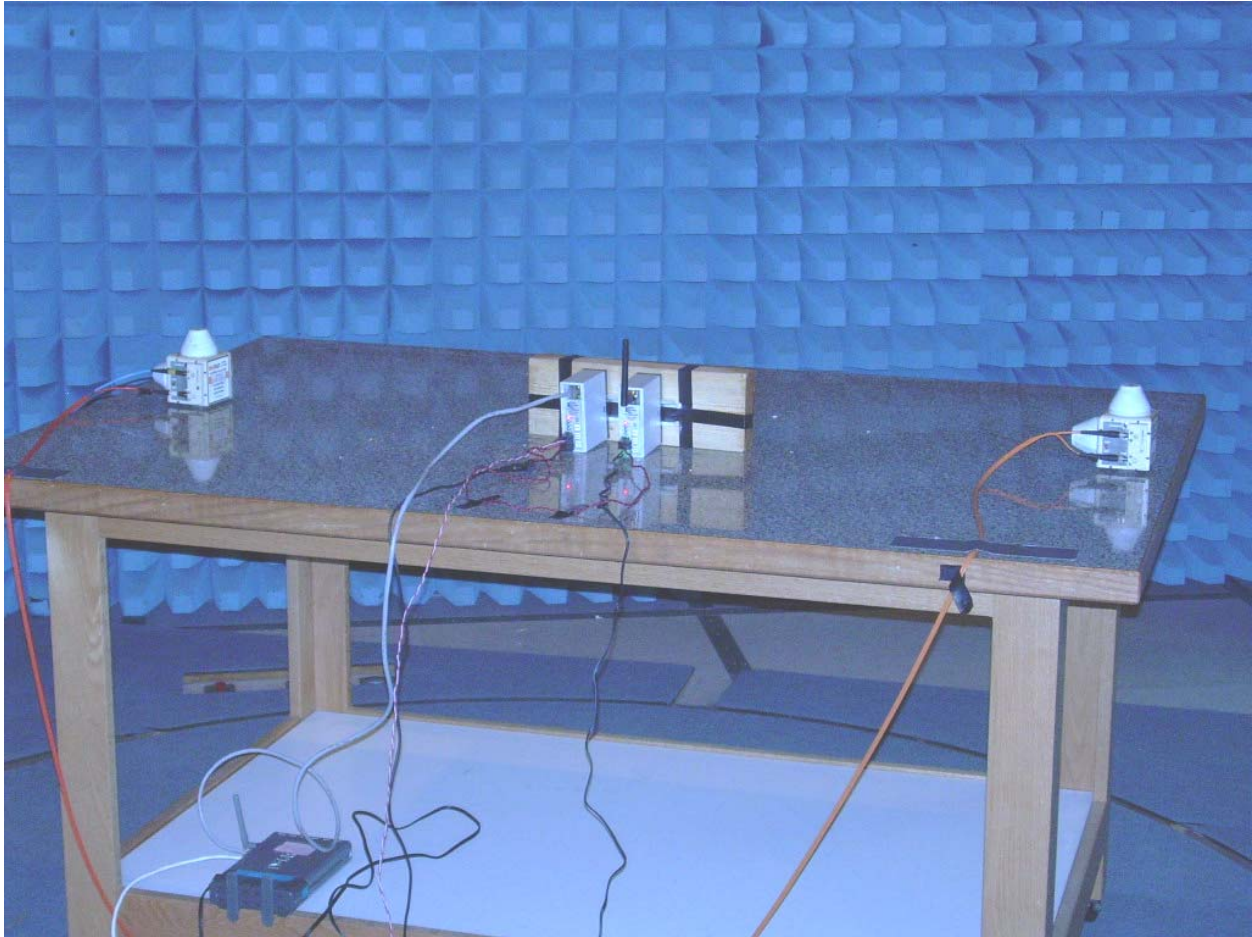
An independent calibration laboratory calibrates all the equipment listed above every 12 months or the equipment is calibrated by CCL personal following outlined calibration procedures.





**APPENDIX 2 PHOTOGRAPHS**

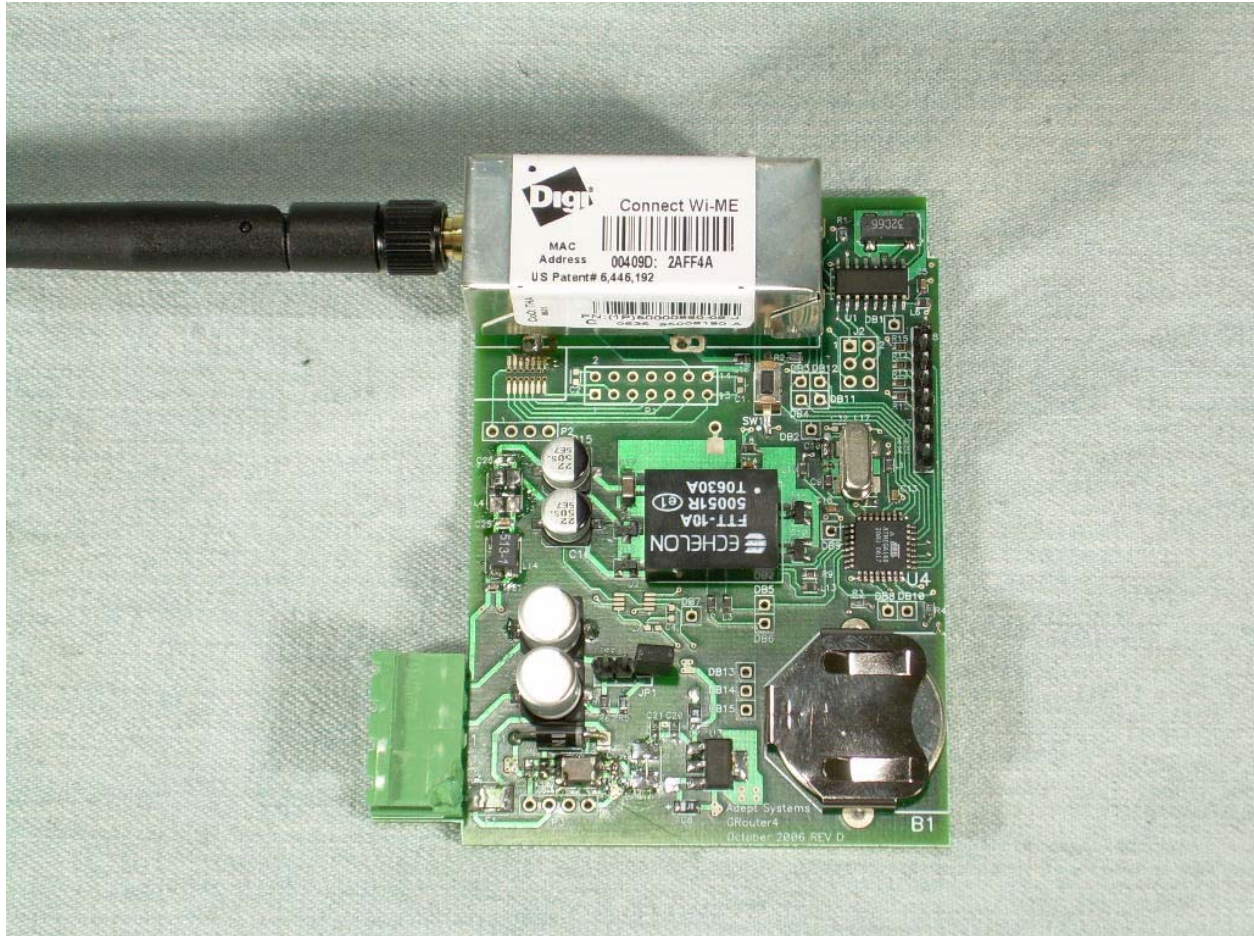
Photograph 1 - Shows the front view of the radiated test setup.



Photograph 2 - Front View of the EUT



Photograph 3 - Component Side of the PC Board with WiFi Module





Photograph 4 - Trace Side of the PC Board

