

CHOMERICS TEST SERVICES
77 Dragon Court
Woburn, Massachusetts 01888

CERTIFICATE OF CONFORMANCE

Date of Issue: October 8, 2001
Issued To: Evergreen Solar Inc.
259 Cedar Hill Street
Marlboro, Massachusetts 01752
Reference: Chomerics Test Services Test Report Number
EMI3158.01

Chomerics Test Services hereby acknowledges that EMC and Safety testing was performed in accordance with the standards as listed below. Chomerics Test Services further acknowledges that the test sample as described within this certificate was found to be in compliance with these standards.

This certificate is hereby issued to Evergreen Solar Inc. and is valid only for the equipment and standards as described within this certificate. For further details regarding the equipment under test, reference Chomerics Test Services Test Report Number EMI3158.0198.00.

Manufacturer: Evergreen Solar Inc.
Equipment Tested: Model EC100 Solar Panel

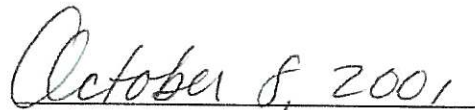
EU EMC Directive 89/336/EEC:

EN50082-1:1997 EC generic immunity standard - Part 1: Residential, commercial and light industrial
EN61000-4-2 (1995) Electrostatic discharge immunity
EN61000-4-3 (1997) Radiated electromagnetic field requirements
ENV50204 (1996) Radiated electromagnetic field from digital radio telephones
EN61000-4-4 (1995) Electrically fast transient/burst Immunity
EN61000-4-5 (1995) Surge Immunity
EN61000-4-6 (1996) Immunity to conducted radio frequency disturbances

For Chomerics Test Services:

Date:


David C. Inman, Manager




**EMC EVALUATION OF THE
EVERGREEN SOLAR INC.
MODEL EC100 SOLAR PANEL
IN ACCORDANCE WITH
EC GENERIC IMMUNITY STANDARD EN50082-1 (1997)**

Prepared For: EVERGREEN SOLAR INC.
259 CEDAR HILL STREET
MARLBORO, MASSACHUSETTS 01752
ATTENTION: BRUCE NEWELL

Prepared By: PATRICK KERBEIN
CHOMERICS TEST SERVICES
77 DRAGON COURT
WOBURN, MASSACHUSETTS 01888

Date: OCTOBER 4, 2001

Test Report Number: EMI3158.01

Test Technician or Engineer: 

CTS Approved Signatory: 

This report shall not be reproduced except in full without the written approval of Chomerics Test Services.

TABLE OF CONTENTS**1.0 General****1.1 Introduction**

- 1.1.1 Purpose
- 1.1.2 Requirements

1.2 Test Summary

- 1.2.1 Summary of Recommendations

1.3 Administrative Data

- 1.3.1 Test Facility
- 1.3.2 Equipment Calibration
- 1.3.3 Test Personnel

1.4 Test Set-up

- 1.4.1 Test Site Matrix
- 1.4.2 Test Site Descriptions
- 1.4.3 Equipment Under Test
- 1.4.4 Block Diagram

1.5 Pass/Fail Criteria**2.0 Immunity Tests Performed****2.1 EN61000-4-2 (1995) Electrostatic Discharge Immunity**

- 2.1.1 Equipment Used
- 2.1.2 Test Conditions
- 2.1.3 Test Method
- 2.1.4 Results
- 2.1.5 Test Data
- 2.1.6 Photographic Documentation

2.2 EN61000-4-3 (1997) ENV 50204 (1996) RF Immunity

- 2.2.1 Equipment Used
- 2.2.2 Test Conditions
- 2.2.3 Test Method
- 2.2.4 Results
- 2.2.5 Test Data
- 2.2.6 Photographic Documentation

2.3 EN61000-4-4 (1995) Electric Fast Transient Burst Immunity

- 2.3.1 Equipment Used
- 2.3.2 Test Conditions
- 2.3.3 Test Method
- 2.3.4 Results
- 2.3.5 Test Data
- 2.3.6 Photographic Documentation

**TABLE OF CONTENTS
(continued)**

- 2.4 EN61000-4-5 (1995) Surge Immunity**
 - 2.4.1 Equipment Used
 - 2.4.2 Test Conditions
 - 2.4.3 Test Method
 - 2.4.4 Results
 - 2.4.5 Test Data
 - 2.4.6 Photographic Documentation
- 2.5 EN61000-4-6 (1996) Radio-Frequency Common Mode Immunity**
 - 2.5.1 Equipment Used
 - 2.5.2 Test Conditions
 - 2.5.3 Test Method
 - 2.5.4 Results
 - 2.5.5 Test Data
 - 2.5.6 Photographic Documentation

Appendix A: Test Log

LIST OF DEFINITIONS/ABBREVIATIONS

AC	Alternating Current
BB	Broadband
BW	Bandwidth
cm	Centimeter
CPU	Calibrate Prior to Use
dB	Decibel
DC	Direct Current
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ER	Electric Radiation
EUT	Equipment Under Test
GHz	Gigahertz
Hz	Hertz
I-face	Interface
kHz	Kilohertz
m	Meter
MHz	Megahertz
mm	Millimeter
mS	Millisecond
mV	Millivolt
MR	Magnetic Radiation
NB	Narrowband
NCR	No Calibration Required
PLC	Power Line Conduction
PPS	Pulses Per Second
uF	Microfarad
uH	Microhenry
uS	Microsecond
uV	Microvolt
UWC	Use With Calibrated Equipment

1.0 GENERAL

1.1 Introduction

1.1.1 Purpose

The purpose of this report is to document the performance of the Evergreen Solar Inc. Model EC100 Solar Panel during a variety of electromagnetic compatibility tests and record the test requirements and procedures used. At the request of Evergreen Solar Inc., the tests were performed by Chomerics Test Service (CTS) of Woburn, Massachusetts. The assessment will determine the compliance or non-compliance with the requirements set up by the European Community (EC) Electromagnetic Compatibility (EMC) Directive 89-336-EEC, as defined by the Generic Immunity Standard EN50082-1 (1997).

The Generic Immunity Standard EN50082-1 is designated for Residential, Commercial and Light Industrial Equipment.

No one from Evergreen Solar Inc. was present during testing. Testing was performed during the period of 14-19 September 2001 under purchase order number EGM-101074.

1.1.2 Requirements

The requirements for the sequence of tests performed on the Evergreen Solar Inc. Model EC100 Solar Panel are as follows:

EN61000-4-2 (1995) Electrostatic Discharge Immunity

The EN50082-1 standard requires that the EUT meets the requirements when subjected to: Level 3, air discharges (8kV) and Level 2, contact discharges and coupling planes (4kV).

Air Discharge Severity Level		Contact Discharge Severity Level	
Level	Voltage	Level	Voltage
1	2kV	1	2kV
2	4kV	2	4kV
3	8kV	3	6kV
4	15kV	4	8kV

EN61000-4-3 (1997) ENV 50204 (1996) RF Immunity

The EN50082-1 standard requires that the EUT meets the requirements when exposed to Level 2 (3V/m) fields (calibrated unmodulated, rms) from 80MHz to 1GHz. The test is to be performed with the signal Amplitude Modulated (AM) as defined in EN61000-4-3 and Pulse Modulated as defined in ENV 50204 (1996).

EN61000-4-3 Field Level	
Level	Level V/m
1	1
2	3
3	10
X	Special

EN61000-4-4 (1995) Electric Fast Transient Burst Immunity

The EN50082-1 standard requires that the EUT meets the requirements when exposed to Level 1 (.5kV) on DC input and output supply leads and functional earth ports, Level 2 (1kV) on AC input and output supply leads and Level 2 (.5kV) on ports for signal and control lines.

Supply Lead Severity Levels		Signal Lead Severity Levels	
Level	Voltage	Level	Voltage
1	0.5kV	1	0.25kV
2	1.0kV	2	0.5kV
3	2kV	3	1kV
4	4kV	4	2kV
X	Special	X	Special

EN61000-4-5 (1995) Surge Immunity

The EN50082-1 standard requires that the EUT meets the requirements when exposed to Level 1 (.5kV) on DC input and output supply leads (both line to line and line to earth), and Level 3 (2kV) for AC input and output supply leads with line to earth coupling, and Level 2 (1kV) for AC input and output supply leads with line to line coupling.

EN61000-4-5 Surge Level	
Level	Level kV
1	.5
2	1
3	2
4	4

Phase angles: 0° - 90° - 180° - 270°

EN61000-4-6 (1996) Radio Frequency Common Mode Immunity

The EN50082-1 standard requires that the EUT meets the requirements when exposed to 3V rms level on AC and DC input and output supply leads and functional earth ports and a 3V rms level on ports for signal and control lines. The test is to be performed with the signal Amplitude Modulated as defined within EN61000-4-6.

Test Voltage Severity Levels for Power Lines and Earth Ports

<u>Frequency</u>	<u>Voltage</u>
150kHz-80MHz	3Vrms (80%am at 1kHz)

Test Voltage Severity Levels for Interconnecting Signal, Data, and Control Lines

<u>Frequency</u>	<u>Voltage</u>
150kHz-80MHz	3Vrms (80%am at 1kHz)

Voltage level is calibrated unmodulated (rms).

1.2 TEST SUMMARY

The terms "Passed" or "Failed" in this section are intended to guide the reader as to whether or not the EUT met the minimum requirements that can be interpreted from the EN50082-1 Standard as defined in Section 1.5. The "Results" paragraph in each test section to follow and the test data sheets will outline specifically how the EUT performed during each test.

EN61000-4-2 Electrostatic Discharge Immunity	PASSED
EN61000-4-3 Radiated Electric Field Immunity	PASSED
EN61000-4-4 Electric Fast Transient Burst Immunity	PASSED
EN61000-4-5 Surge Immunity	PASSED
EN61000-4-6 RF Common Mode Immunity	PASSED

1.2.1 Summary of Recommendations

The Evergreen Solar Inc. Model EC100 Solar Panel will require no modifications in order to insure compliance with the Generic Immunity Standard EN50082-1 requirements.

Please note that if any modifications and or fixes were implemented to the EUT to achieve compliance, other approaches to solving the problem may exist. In addition, any EMI/EMC shielding products listed in this report may be substituted with an equivalent.