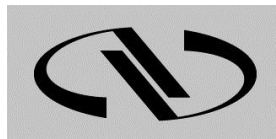


# Model SDM638-H

## 638 nm Spectrum Stabilized Laser Module



User's Manual



**Newport**<sup>®</sup>

Experience | Solutions

## Declaration of Conformity

We declare that the accompanying product, identified with the **CE** mark, complies with requirements of the Electromagnetic Compatibility Directive, 2004/108/EC and the Low Voltage Directive 2006/95/EC.

**Model Numbers: SDM Series**

**Year **CE** mark affixed: 2015**

**Type of Equipment:** Electrical equipment for measurement, control and laboratory use in industrial locations.

**Manufacturer:** Innovative Photonic Solutions  
4250 US Route 1, Suite 1  
Monmouth Junction, NJ 08535  
United States of America

**Importer:** Newport Corporation  
1791 Deere Avenue  
Irvine, CA 92606  
United States of America

**Standards Applied:**

Compliance was demonstrated to the following standards to the extent applicable:

BS EN61326-1: 2006 “Electrical equipment for measurement, control and laboratory use – EMC requirements”.

This equipment meets the CISPR 11:2009+A1:2010 Class A Group 1 radiated and conducted emission limits.

BS EN 61010-1:2010, “Safety requirements for electrical equipment for measurement, control and laboratory use”.



Mark Carroll  
Sr. Director, Instruments Business  
Newport Corporation  
1791 Deere Ave, Irvine, CA92606 USA

## Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever first occurs.

### Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. NEWPORT CORPORATION SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ITS PRODUCTS.

First printing 2016

© 2016 by Newport Corporation, Irvine, CA. All rights reserved. No part of this manual may be reproduced or copied without the prior written approval of Newport Corporation.

This manual has been provided for information only and product specifications are subject to change without notice. Any change will be reflected in future printings.

Newport Corporation  
1791 Deere Avenue  
Irvine, CA, 92606  
USA

## **Confidentiality & Proprietary Rights**

### **Reservation of Title**

The Newport programs and all materials furnished or produced in connection with them ("Related Materials") contain trade secrets of Newport and are for use only in the manner expressly permitted. Newport claims and reserves all rights and benefits afforded under law in the Programs provided by Newport Corporation.

Newport shall retain full ownership of Intellectual Property Rights in and to all development, process, align or assembly technologies developed and other derivative work that may be developed by Newport. Customer shall not challenge, or cause any third party to challenge the rights of Newport.

### **Preservation of Secrecy and Confidentiality and Restrictions to Access**

Customer shall protect the Newport Programs and Related Materials as trade secrets of Newport, and shall devote its best efforts to ensure that all its personnel protect the Newport Programs as trade secrets of Newport Corporation. Customer shall not at any time disclose Newport's trade secrets to any other person, firm, organization, or employee that does not need (consistent with Customer's right of use hereunder) to obtain access to the Newport Programs and Related Materials. These restrictions shall not apply to information (1) generally known to the public or obtainable from public sources; (2) readily apparent from the keyboard operations, visual display, or output reports of the Programs; (3) previously in the possession of Customer or subsequently developed or acquired without reliance on the Newport Programs; or (4) approved by Newport for release without restriction.

### **Trademarks**

The Newport Corporation logo and name are registered trademarks of Newport Corporation in Mexico, Israel, Singapore, European Union, Taiwan, Hong Kong, China, Japan, Korea, Canada, Australia, and the United States.

### **Service Information**

This section contains information regarding factory service for the source. The user should not attempt any maintenance or service of the system or optional equipment beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport.

## Technical Support Contacts

### North America

#### Newport Corporation

1791 Deere Ave, Irvine, CA 92606

Telephone: (877) 835-9620

Telephone: (949) 863-3144

### Asia

#### Newport Opto-Electronics Technologies

中国 上海市 爱都路 253号 第3号楼 3层

C部位, 邮编 200131

253 Aidu Road, Bld #3, Flr 3, Sec C,  
Shanghai 200131, China

Telephone: +86-21-5046 2300

Fax: +86-21-5046 2323

### Europe

#### Newport/MICRO-CONTROLE S.A.

Zone Industrielle

45340 Beaune la Rolande, FRANCE

Telephone: (33) 02 38 40 51 56

## Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling 1-800-222-6440 or by visiting our website at [www.newport.com/returns](http://www.newport.com/returns) within the warranty period to obtain a **Return Material Authorization Number (RMA#)**. Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will either repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#.

E-mail: [rma.service@newport.com](mailto:rma.service@newport.com)

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

## Table of Contents

Declaration of Conformity .....	ii
Warranty.....	iii
Technical Support Contacts .....	v
Table of Contents .....	vi
List of Figures .....	viii
<b>1 Safety Precautions</b>	<b>9</b>
1.1 Definitions and Symbols .....	9
1.1.1 General Warning or Caution .....	9
1.1.2 Electric Shock.....	9
1.1.3 European Union CE Mark .....	9
1.1.4 On .....	10
1.1.5 Off.....	10
1.1.6 Ground.....	10
1.2 Warnings and Cautions.....	11
1.2.1 General Warnings .....	11
1.2.2 General Cautions .....	11
1.2.3 Summary of Warnings and Cautions.....	12
<b>2 Features &amp; Specifications</b>	<b>14</b>
2.1 System Overview.....	14
2.2 Specifications .....	15
2.2.1 Performance Specifications .....	15
2.2.2 Electrical Specifications .....	15
2.2.3 Mechanical Specifications.....	16
2.2.4 Environmental Specifications.....	16
2.2.5 Laser Safety Eyewear Specifications .....	16
<b>3 Getting Started</b>	<b>17</b>
3.1 Unpacking and Inspection .....	17
3.2 Included Components.....	17
3.3 Fuse Replacement.....	17
<b>4 System Operation</b>	<b>18</b>

---

4.1	Laser Start-Up (Controlling Via Front Panel) .....	18
4.2	Laser Start-Up (Pulse Power Control Mode) .....	19
4.3	Laser Power in External Mode .....	19
4.4	Laser Shut Down .....	19
4.5	Performance Features .....	19
4.5.1	Remote Interlock .....	19
4.5.2	Manual Laser Reset .....	20

## **5 Maintenance and Service 21**

---

5.1	Enclosure Cleaning.....	21
5.2	Technical Support.....	21
5.3	Service .....	22
5.4	Obtaining Service .....	22
5.5	Warranty .....	22
5.6	Service Form .....	23

## List of Figures

Figure 1	General Warning or Caution Symbol .....	9
Figure 2	Electrical Shock Symbol.....	9
Figure 3	CE Mark.....	9
Figure 4	On Symbol .....	10
Figure 5	Off Symbol.....	10
Figure 6	Ground Symbol.....	10



---

# 1 Safety Precautions

## 1.1 Definitions and Symbols

---

The following terms and symbols are used in this documentation and also appear on the Model SDM638-H laser module where safety-related issues occur.

### 1.1.1 General Warning or Caution



Figure 1

*General Warning or Caution Symbol*

The Exclamation Symbol in the figure above appears on the product and in Warning and Caution tables throughout this document. This symbol designates that documentation needs to be consulted to determine the nature of a potential hazard, and any actions that have to be taken.

### 1.1.2 Electric Shock



Figure 2

*Electrical Shock Symbol*

The Electrical Shock Symbol in the figure above appears throughout this manual and on the product. This symbol indicates a hazard arising from dangerous voltage. Any mishandling could result in irreparable damage to the equipment, and personal injury or death.

### 1.1.3 European Union CE Mark



Figure 3

*CE Mark*

The presence of the CE Mark on Newport equipment means that this instrument has been designed, tested and certified compliant to all applicable European Union (CE) regulations and recommendations.

**1.1.4 On**

Figure 4

*On Symbol*

The symbol in the figure above represents a power switch position on a Model SDM638-H laser module. This symbol represents a Power On condition.

**1.1.5 Off**

Figure 5

*Off Symbol*

The symbol in the figure above represents a power switch position on the Model SDM638-H laser module. This symbol represents a Power Off condition.

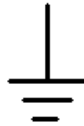
**1.1.6 Ground**

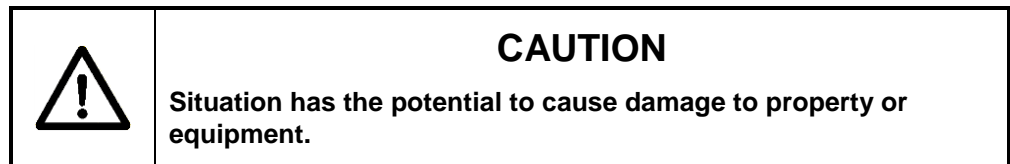
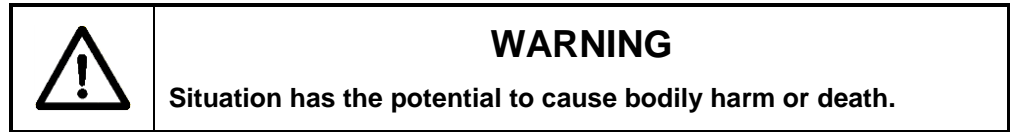
Figure 6

*Ground Symbol*

The symbol in the figure above appears on the Model SDM638-H laser module to indicate the frame or chassis terminal.

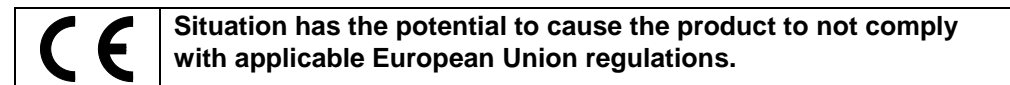
## 1.2 Warnings and Cautions

The following are definitions of the Warnings, Cautions and Notes that are used throughout this manual to call your attention to important information regarding your safety, the safety and preservation of your equipment or an important tip.



### NOTE

Additional information the user or operator should consider.



### 1.2.1 General Warnings

Observe these general warnings when operating or servicing this equipment:

- Heed all warnings on the unit and in the operating instructions.
- Do not use this equipment in or near water.
- Route power cords and other cables so that they are not likely to be damaged.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp lint-free cloth.
- Lockout all electrical power sources before servicing the equipment.
- To avoid fire hazard, use only the specified fuse(s) with the correct type number, voltage and current ratings as referenced in the appropriate locations in the service instructions or on the equipment. Only qualified service personnel should replace fuses.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Qualified service personnel should perform safety checks after any service.

### 1.2.2 General Cautions

Observe these cautions when operating this equipment:

- If this equipment is used in a manner not specified in this manual, the protection provided by this equipment may be impaired.

- To prevent damage to equipment when replacing fuses, locate and correct the problem that caused the fuse to blow before re-applying power.
- Do not block ventilation openings.
- Do not position this product in such a manner that would make it difficult to disconnect the power cord
- Position the equipment so that access to the mains disconnect On/Off switch is readily available.
- Use only the specified replacement parts.
- Follow precautions for static sensitive devices when handling this equipment.
- This product should only be powered as described in the manual.
- There are no user-serviceable parts inside the Model SDM638-H laser module.
- Adhere to good laser safety practices when using this equipment.

### 1.2.3 Summary of Warnings and Cautions

The following general warning and cautions are applicable to this instrument:



#### **WARNING**

Before operating the Model SDM638-H laser module, please read and understand all of Section 1.



#### **WARNING**

Do not attempt to operate this equipment if there is evidence of shipping damage or you suspect the unit is damaged. Damaged equipment may present additional hazards to you. Contact Newport technical support for advice before attempting to plug in and operate damaged equipment.



#### **WARNING**

Do not point laser or allow laser light to be directed or reflected toward other people or reflective objects.



#### **WARNING**

Do not modify unit or remove protective covers or housings.



#### **WARNING**

Laser light emitted from this equipment may be sufficient to ignite some materials and initiate fire.

**WARNING**

Never operate laser if unit is defective or if safety covers, interlocks, and labels are damaged or missing.

**WARNING**

If this equipment is used in a manner not specified in this manual, the protection provided by this equipment may be impaired and may result in hazardous radiation exposure.

**WARNING**

Before cleaning the enclosure of the Model SDM638-H laser module, the power cord must be disconnected from the wall socket.

**CAUTION**

There are no user serviceable parts inside the Model SDM638-H laser module. Work performed by persons not authorized by Newport will void the warranty.

**WARNING**

While the Model SDM638-H laser module's rear panel switch turns power OFF to the internal electronics, it should not be depended upon to fully disconnect the unit from MAINS power. Disconnect the power cord to fully isolate the Model 6700 from MAINS power.



The Model SDM638-H laser module is intended for use in an industrial laboratory environment. Use of this product in other environments, such as residential, may result in electromagnetic compatibility difficulties due to conducted as well as radiated disturbances.

## 2 Features & Specifications

### 2.1 System Overview

---

The SDM638-H 638 nm Spectrum Stabilized Laser Module provides the user with a powerful and extremely stable laser source that is ideal for scientific applications including Raman Spectroscopy and Illumination.

Note: This module is designed to be used in an open beam configuration – Users should design their optical layout in a manner that minimizes or eliminates the possibility of inadvertent exposure to hazardous laser radiation.

The SDM638-H is a Class 3B laser product with laser emission at 638 nm and output power levels exceeding 35 mW. Extreme care should be taken when operating this unit to avoid potentially hazardous exposure to both eyes and skin. Users should wear eye protection when operating this unit and should avoid exposure to the output beam.

## 2.2 Specifications

### 2.2.1 Performance Specifications

	Minimum	Typical	Maximum
<b>Wavelength</b>	637.5 nm	638 nm	638.5 nm
<b>Spectral Linewidth</b>		50-100 MHz	0.02 nm
<b>Output Power</b>			
<b>-35 Version</b>	35 mW		80 mW
<b>-60 Version</b>	60 mW		80 mW
<b>Modulation Rate*</b>	Continuous		1 kHz
<b>Pulse Length**</b>	20 $\mu$ s		Continuous
<b>Beam Divergence</b>		1 mrad	1 mrad
<b>Beam Profile</b>	Single-mode Gaussian – TEM00		
<b>Beam Diameter</b>		1.5 mm	2 mm
<b>Maximum Permissible Exposure</b>			1.9 mW/cm <sup>2</sup>
<b>Nominal Ocular Hazard Distance</b>	260 m		

\* Based upon user defined input signal and operation in “External” mode configuration (CW to 10 kHz at 50% duty cycle or CW to 1 kHz at 10-100% duty cycle)

\*\* Peak power level cannot exceed CW output power level

### 2.2.2 Electrical Specifications

<b>Input Power</b>	100-240 VAC, 50-60 Hz, 0.4 A
<b>Fuse Rating</b>	250 V, 1 A, Fast Blow, 5 mm x 20 mm, 2 each

### 2.2.3 Mechanical Specifications

<b>Controller Module Dimensions</b>	9.45" x 6.94" x 4.14"
<b>Controller Module Weight</b>	48 oz
<b>Tethered Head Dimensions</b>	2.694" x 1.2" x 1"
<b>Tethered Head Weight</b>	8 oz

### 2.2.4 Environmental Specifications

<b>Operating Temperature</b>	+10 to +35 deg C
<b>Storage Temperature</b>	-10 to +55 deg C
<b>Humidity</b>	<80%, non-condensing

### 2.2.5 Laser Safety Eyewear Specifications

<b>Optical Density</b>	ND5 or higher at 638 nm, ND1 or lower at 600 nm
<b>Shielding</b>	Top and side shield protection
<b>Certification</b>	CE certified



---

## 3 Getting Started

### 3.1 Unpacking and Inspection

---

The SDM638-H is carefully assembled, tested, and inspected before shipment. Upon receiving this instrument, check for any obvious signs of physical damage that might have occurred during shipment. Report any such damage to the shipping agent immediately.

---

**NOTE**

**Retain the original packing materials in case reshipment becomes necessary.**

### 3.2 Included Components

---

The SDM638-H 638 nm Spectrum Stabilized Laser Module comes complete with an internal spectrum stabilized laser module that contains an integral Thermo-Electric Cooler (TEC), thermistor for monitoring the internal temperature of the laser platform, and an integral laser line filter. The unit comes complete with a laser enable switch for safety, a safety key lockout, a remote interlock, and an emergency shut-off switch.

### 3.3 Fuse Replacement

---

The SDM638-H has 2 ea 250 V, 1 A Fast blow fuses located in a removable panel immediately above the AC power socket. Replacement fuses must be rated at 250 V, 1 A, Fast Blow and be 5 mm x 20 mm. To remove fuse panel, pinch panel retention clips on each side and gently pull. The fuses will be seated in sockets within the removed panel and can be gently lifted out. Once fuses have been checked or replaced, slide panel back in place until panel is firmly seated - an audible click will indicate when panel is seated properly.

# 4 System Operation

## 4.1 Laser Start-Up (Controlling Via Front Panel)

---

1. Connect the tethered optical head to the controller module by inserting the electrical connector on the end of the tether into the keyed receptacle on the controller module. Note: the connector is keyed in a manner to ensure proper electrical connection.
2. Insert AC power plug into the socket on the back of the laser module. Plug in the AC power plug into a standard 100 V – 240 V AC electrical outlet making sure that the Master Power key is set to the off (Vertical) position.
3. Mount optical head in desired location using 6 – 32 threaded holes on bottom of optical head, or by attaching the supplied top mount plate and bolting to an optical table. Note: the optical head must be mounted onto a suitable heat sink capable of removing a minimum of 2 W of heat.
4. Ensure that the Emergency Shut-off Switch (EMO) is in the “ready” position by turning the button clockwise until it pops out slightly.
5. Turn the master power key switch 90 degrees clockwise from the Vertical “off position” to the Horizontal “on position”. A green LED located on both the control module and on the laser head will light indicating that system power is on.
6. Depress the Laser On switch. A red LED on both the control module and on the tethered optical head will illuminate indicating that the laser is in operation and the laser will turn on roughly 2 seconds after the switch is depressed. Note that the laser enable switch is a momentary contact. Users should allow switch to return to its natural center position after depressing. It should also be noted that this switch will function as a manual reset. In the event of a power interruption, failure, or interlock break, the laser will be automatically disabled. To re-enable, simply toggle the laser enable to the on position once again.
7. Note: The laser is equipped with a sensor to detect the presence of an optical head. In the event that the optical head is disconnected while the laser is in operation, the system will be placed into standby mode. In order to re-enable the system, the user must re-insert the tethered head’s electrical cable and depress the laser enable button once again.

---

## 4.2 Laser Start-Up (Pulse Power Control Mode)

---

The SDM638-H is normally designed for fixed power, however users may wish to modulate or adjust the output power utilizing Pulse Width Modulation (PWM). The SDM638-H is equipped with an external BNC connector located on the back panel of the module. The following steps should be taken if the user wishes to control the laser output power remotely via a signal generator or a computer:

1. Ensure that the laser is not operating by pressing the laser ON switch and assuring that the laser on LED is not illuminated.
2. Switch the mode selection switch located on the back panel to the “Pulse” position (the Amber operating mode LED labeled “Pulse” will be illuminated).
3. Connect a BNC cable to the port labeled “Control” on the back panel. The user may apply a TTL signal on this port. The unit can be modulated at rates up to 1 kHz with 10-100% duty cycle to adjust the laser’s average output power via PWM.
4. Turn on the laser by momentarily depressing the Laser On switch on the front panel. The laser will now be “Enabled” and will output power when the TTL signal on the BNC connector is in the “HI” state.

---

## 4.3 Laser Power in External Mode

---

External mode is disabled in this module since use in this mode could cause the laser to mode hop and be un-stable.

---

## 4.4 Laser Shut Down

---

1. Depress the Laser On button on the front panel and assure that the Laser On LED is not illuminated.
2. Turn the master power key switch on the back panel counter clockwise from the horizontal “On” position to the vertical “Off” position.
3. Disconnect tethered optical head as needed.

---

## 4.5 Performance Features

---

### 4.5.1 Remote Interlock

The SDM638-H is equipped with a remote interlock feature that may be utilized by the operator to shut down the laser in the event that a door or enclosure is opened. The interlock is located on the back panel and utilizes a RJ-11 plug. The remote interlock is normally open circuit, so the RJ-11 connector provided or a user configured closed loop interconnect is required to be emplaced for proper function of the laser module. Users may decide to enable a remote interlock mechanism when integrating into a laboratory or system environment. To enable the remote interlock, the user must obtain a RJ-11 plug (or modify the plug provided) and create a closed circuit between the 2 signal terminals of the plug and insert the closed circuit RJ-11 plug into the interlock jack. The laser will function normally when it

senses a closed circuit, however it will disable laser output when an open circuit is detected. To re-enable laser function, the user must assure that the interlock is closed circuit and manually reset the unit by toggling the laser enable switch on the front panel to the “ON” position.

#### **4.5.2 Manual Laser Reset**

The SDM638-H is equipped with a manual laser reset. In the event of a power interruption, power failure, or interlock breach, the laser will default to a laser off position. To re-enable the laser, the user must toggle the laser enable switch on the front panel to the “ON” position.

# 5 Maintenance and Service



## WARNING

There are no user serviceable parts inside the Model SDM638-H laser module. Work performed by persons not authorized by Newport Corporation will void the warranty.

### 5.1 Enclosure Cleaning

---



## WARNING

Before cleaning the enclosure of the SDM638-H laser module, the power cord must be disconnected from the wall socket and from the unit.

Clean module with soft cloth dampened with water as needed. Abrasives, chemical solvents and cleaning agents should not be used to clean laser module.

### 5.2 Technical Support

---

Information and advice about the operation of any Newport product is available from our technical support engineers. For quickest response, ask for “Technical Support” and know the model and serial number for your product.

**Hours:** 8:00–5:00 PST, Monday through Friday (excluding holidays).

**Toll Free:** 1-877-835-9620

Support is also available by fax and email:

**Fax:** 1-949-253-1479

**Email:** [service@newport.com](mailto:service@newport.com)

We typically respond to faxes and email within one business day.

### **5.3 Service**

---

Your SDM638-H laser module has been designed to provide years of trouble-free operation. Virtually no maintenance is required except for ensuring that the unit is not damaged, contaminated, or used in an unsafe manner.

### **5.4 Obtaining Service**

---

The SDM638-H laser module contains no user serviceable parts. To obtain information regarding factory service, contact Newport or your Newport representative. Please have the following information available:

1. Instrument model number (on the rear panel).
2. Instrument serial number (on rear panel or bottom of enclosure).
3. Description of the problem.

If the instrument is to be returned to Newport, you will be given a Return Number, which you should reference in your shipping documents. Please fill out a copy of the service form, located on the following page, and have the information ready when contacting Newport. Return the completed service form with the instrument.

### **5.5 Warranty**

---

Newport Corporation guarantees its products to be free of defects for one year from the date of shipment. During the warranty period, Newport will, at its option, either repair or replace products which prove to be defective. Opening, modification and or servicing of this unit is expressly prohibited and will result in nullification of product warranty. This is in lieu of all other guarantees, expressed or implied, and does not cover incidental or consequential loss. Warranty does not cover Catastrophic Optical Damage (COD) caused by 100% retro-reflection of the laser light. If retro-reflection of this magnitude is expected, then an optical isolator is required.

---

## 5.6 Service Form

---

Newport Corporation  
Office: 877-835-9620  
FAX: 949-253-1479

Name \_\_\_\_\_ Return Authorization # \_\_\_\_\_  
(Please obtain RA# prior to return of item)

Company \_\_\_\_\_  
(Please obtain RA # prior to return of item)

Address \_\_\_\_\_ Date \_\_\_\_\_

Country \_\_\_\_\_ Phone Number \_\_\_\_\_

P.O. Number \_\_\_\_\_ FAX Number \_\_\_\_\_

***Item(s) Being Returned:***

Model # \_\_\_\_\_ Serial # \_\_\_\_\_

Description \_\_\_\_\_

Reason for return of goods (please list any specific problems):

---

---

---

---

---

---