SCA Laser

Quick Start Guide

Manufactured by

Riscure BV

Delftechpark 49, 2628 XJ Delft, The Netherlands

Phone: +31 15 251 40 90, Fax: +31 15 251 40 99

Email: inforequest@riscure.com

Web: www.riscure.com

What is in the box

The box contains a SCA Diode Laser source, an optional power supply unit and cables to connect it to control equipment.

Box content checklist

Quantity	Description		Identifier (*)
1	SCA Laser, class-4		-
1	Fiber Coupler **Optional**		
1	Power supply unit, 12 VDC input 100 V to 240 V AC, 50 Hz to 60 Hz Included: power cable with country specific jack **NOT** present if shipment includes the Riscure Safety Box, or the customer already owns one.[1]	 	PSU
1	Signal cables: - SMB-to-SMB, 50 Ω, 6 ft.		SMB2SMB

[1] By default, the Safety Box is shipped together with SCA Laser module and serves as the power supply of it. Under rare circumstances, where the Safety Box is specifically excluded from the order, the discrete power supply is shipped.

Depending on your order, the laser has one the following wavelengths:

- 1310 nm, single mode, 130mw
- 1425 nm, single mode, 500mw

What does it do

The SCA Laser is a source of light produced by laser diodes with energy levels up to 500mW power. SCA Lasers are designed to operate in continuous wave mode.

The SCA Laser is normally attached to the Laser Station and operated for failure analysis methods applied for side channel analysis. An example is

Thermal laser Stimulation (TLS) on semiconductors.

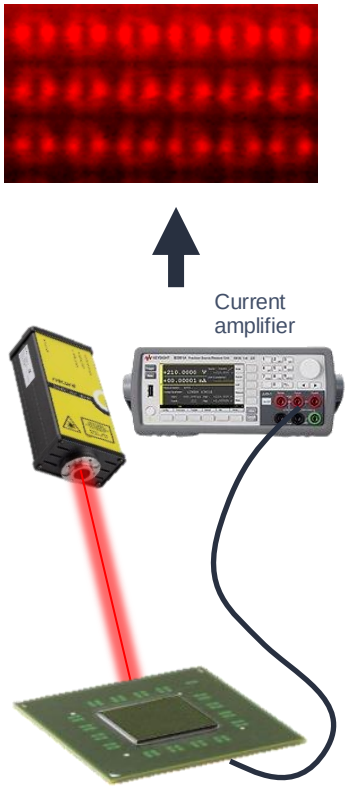
Figure 1 SCA Diode Laser.

Thermal Laser Stimulation (TLS)

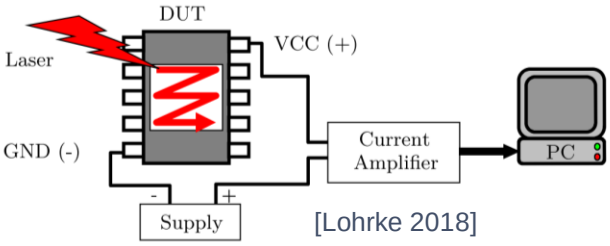
- Concept
  1. Create thermal variation on chip using laser
  2. Observe response

E.g. measure current/voltage difference caused by temperature difference between two semiconductor or metal nodes

- As TLS reveals circuit behavior, we can use it for side-channel analysis. For example to observe stored data in memory cells



Thermal Laser Stimulation (TLS)



[Lohrke 2018]

Laser Wavelength: ~ 1300nm-1400nm
⇒ Photon energy < bandgap
⇒ mainly heating occurs

How to build a setup

Follow the next steps to install the SCA Laser on the Laser Station.

Installing the laser

1. Installing the selected laser.

   Note: Which laser to choose (1310nm/1425nm) is outside the scope of this guide.

2. Fasten the FC/APC connector from the SCA Laser to the fiber coupler.

Figure 2 Fiber coupler

Figure 3 Fiber coupler Attached to SCA Laser

3. Insert the laser on top of the spot size reducer.

Verification of the setup

Follow the next checks to verify you have built a working setup.

1. Is the SCA Laser powered?
2. Is the SCA Laser connected?
3. Is the SCA Laser power switch in the right position?

Please ensure that a check is successful, before proceeding to the next check.

If a check is not successful, refer to section “**Error! Reference source not found.**”.

Check 1 - Is the SCA Laser powered?

There are no signals if the power supply is applied.

Check 2 - Is the SCA Laser connected?

The interlock connector coming from the Safety Box 2 must be inserted into the back of the SCA Laser.

Check 3 - Is the SCA Laser power switch in the right position?

In the lower position, the SCA Laser is at 100% power.

In the upper position, the SCA Laser is at 50% power.

Temperature lock

The SCA Laser has a thermoelectric cooler (TEC) that regulates the laser temperature.

When 3.3v is applied to the “operate laser” input.

The “optimal operation temp.” status LED will go from blinking to continuous illumination.

This is not the case with the 1310nm SCA laser.

Because of the low heat emission of the 1310nm SCA laser the temperature will not reach the threshold temperature easily.

Only when “operate laser” is driven with 3.3V.

“Optimal operation temp.” status LED will continuous illuminate.

Figure 4 Status LED blinking

Figure 5 Status LED continues illuminated

Power output switch

The SCA Laser has a power output switch.

For 100% power or 50% power.

Do not switch while the SCA Laser is active.

Do not switch while the SCA Laser is active.

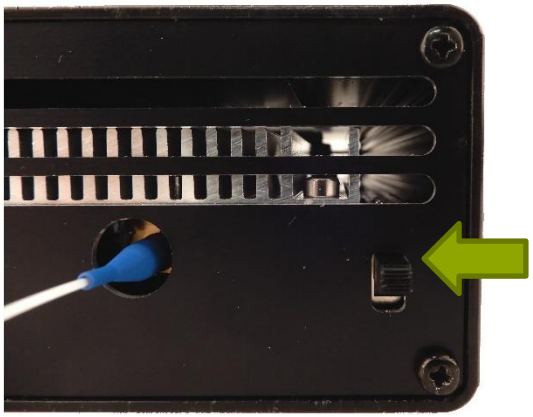


Figure 6 50% power out

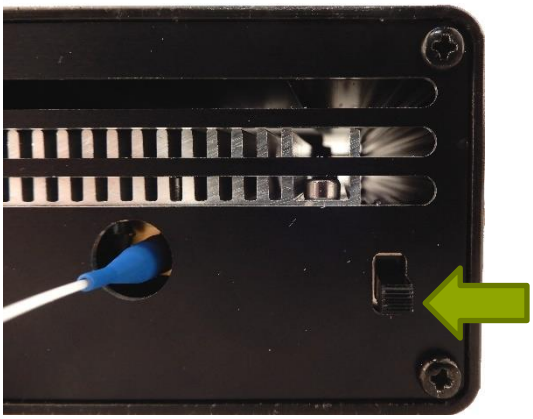


Figure 7 100% power out

Airflow

The SCA Laser has openings on the front and the backside to regulate airflow.

Under no circumstance may these openings be blocked.

Blocking the openings will lead to overheating.

Thereby damaging the SCA Laser.

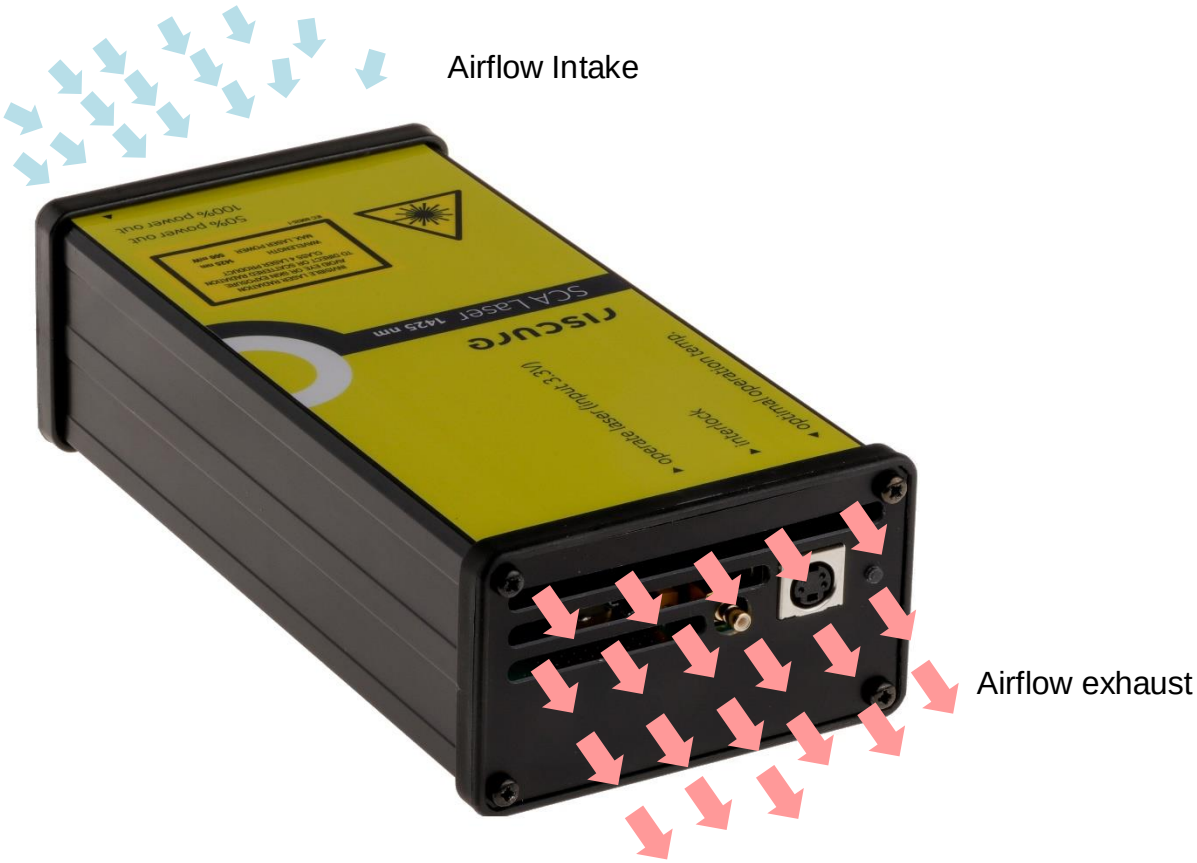


Figure 8 Airflow thru the SCA Laser

Help and troubleshooting

Still have questions?

Visit the Riscure Support portal: http://support.riscure.com.

Technical specifications

Operational conditions

- Room temperature 20 - 30 °C, (68 – 86 °F), preferred

Power supply input

- 12 V DC, max 2.5 A

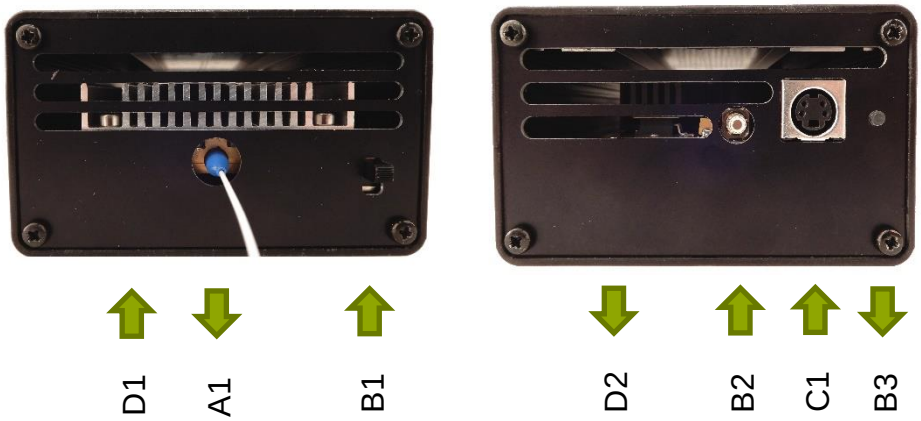
Laser

- Diode laser Class-4
- Wavelength 1310nm, 130 mW, single mode
- Wavelength 1425 nm, 500 mW, single mode
- Activation duration, continuous wave.
- Laser activation, 3.3V
- Fiber, FC/APC connector

Product dimensions

- Length x Width x Height: 200 x 95 x 56 [mm], 7.8 x 3.7 x 2.2 [inch]

Connectors



Port	Label	Description
A1	-	Laser light fiber output
B1	**Power out**	Sets the power output to 50% or 100% power out Switch in down position = 100% power out Switch in upper position = 50% power out
B2	**Operate laser**	SMB. Analog input 0.0 – 3.3 V 1kΩ Laser power control: 0.0V = off, 3.3V = on
B3	**Optimal operating temp.**	LED indicator for TEC temperature. continuous illuminated LED = TEC temperature is optimal Blinking LED = TEC temperature is not yet set (continuous illuminated LED is only when SCA Laser is active)
C1	**interlock**	12 V DC Power supply connection from Safety Box PSU.
D1	-	Airflow intake
D2	-	Airflow exhaust

Safety instructions

Laser safety

The SCA Laser is power compatible with a Class 4 laser product as defined in international Standard IEC 60825-1.

The operator of the SCA Laser should observe the general precautions:

DO NOT attempt to use the laser sources outside the Safety Box.

DO NOT disassemble the laser source or the Safety Box, while the Safety Box is connected to a power supply

DO NOT attempt to disable the door interlocks of the Safety Box.

ONLY operate the laser
- when the SCA Laser source is mounted on the microscope together with the camera, light guide and objectives

Caution: Use of controls or adjustments or performance of procedures other than those specified may result in hazardous laser radiation exposure.

Recommendations for safe use of lasers

The standard reference for laser safety is the American Standard for the Safe Use of Lasers, Z136.1-2000, developed by the American National Standards Institute (ANSI). This reference is the basis for many of the federal regulations for laser and laser system manufacturers, and for the Occupational Safety and Health Administration (OSHA) laser safety guidelines. It contains detailed information concerning proper installation and use of laser systems.

While the ANSI standard itself does not have the force of law, its recommendations, including warning signage, training, and the designation of a laser safety officer, may be compulsory under local workplace regulations when operating laser systems above Class I. It is the operator's responsibility to ensure that the installation and operation of the laser source with safety box is performed in accordance with all applicable laws.

> Copies of ANSI Standard Z136.1-2000 are available from:
>
> Laser Institute of America
> 12424 Research Parkway, Suite 125
> Orlando, FL 32826
> (407) 380-1553

The safety features of the Riscure Safety Box are described in section Safety Features and Regulatory Compliance.

Electrical safety

The safety box is powered by a 12V power supply unit. The AC input to the 12V power supply unit is potentially lethal and is fully contained with the power supply unit.

DO NOT open the 12 V power supply unit while the unit is plugged in. Opening the power supply unit may expose the operator to the unit's AC input power.

DO NOT open the laser source while the laser source is plugged in. Opening the laser source may expose the operator to the internal voltage to drive the laser diode.

DO NOT open the laser source while the laser source is connected via the interlock plug to the safety box. Opening the laser source may expose the operator to the internal voltage to drive the laser diode.

DO NOT make or break any electrical connections to the system while the unit is switched on.

Fire safety

High power laser systems represent a fire hazard in combination with light absorbing surfaces and flammable or ignitable materials.

DO NOT use any flammable or combustible materials, explosives or volatile solvents such as acetone, alcohol or gasoline inside the safety box

ALWAYS keep a properly maintained and inspected fire extinguisher at hand.

Safety features and regulatory compliance

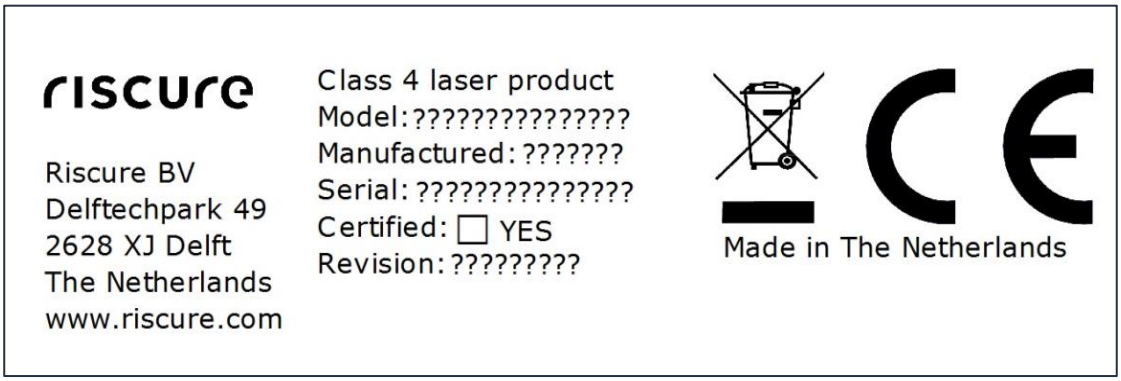
Riscure has incorporated specific safety features into the SCA Laser to meet the requirements of 21 CFR 1040 and the International Standard IEC 60825-1.

These safety features included in 21 CFR 1040 and IEC 60825-1 require that certification, identification, and warning labels be placed on laser products.

Reproductions of labels on the Riscure laser sources and Riscure safety box follow, with their locations specified:

1. **Certification/Identification Label**:

   This label is located on the backside of the safety box.

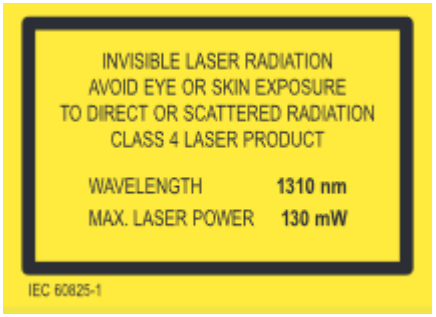


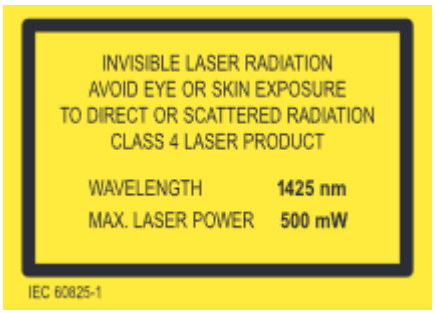
2. **Warning label**:

   This label is located on the front of the laser source.

3. **Explanatory labels**:

   These labels identify the classification of the laser sources in accordance with IEC 60825-1. The labels are located on the side of the laser source:





Interlocked protective housing safety label. This label is located on the door of the safety box.

Declaration of conformity

Warning:

Declaration of conformity nullified if the laser module is operated outside the Riscure Safety Box.

EC-DECLARATION OF CONFORMITY

Suppliers Details

Name

Riscure B.V.

Address

Frontier Building, Delftechpark 49, 2628 XJ Delft, The Netherlands

Product Details

Product Name

Inspector

Model Name(s)

Diode Laser Station

Trade Name

Riscure

Applicable Standards Details

Directives:

- MD (2006/42/EC) - LVD (2006/95/EC) - EMC directive (2004/108/EC)

Standards:

- IEC 60825-1; IEC 320 C8; IEC 60950-1; 21 CFR 1040; ANSI/ESD S20.20:2007; BS EN 61340-5-1:2007; EN55022-B; EN61000-4-2, 4-5; EN-ISO 12100:2010; CISPR 11; CISPR22-B; UL 1950

Supplementary Information

The appliance fulfils the relevant requirements of the above mentioned directives according to our technical documentation TCD-Diode Laser Station. Riskassessment according to the EN-ISO 12100:2010.

Declaration

I hereby declare under our sole responsibility that the product(s) mentioned above to which this declaration relates complies with the above mentioned standards and Directives

Name: Dr.ir. F.G. de Beer / Technical Director

Issued Date: 02 / 05 / 2013

Signature of representative

Riscure B.V.
Frontier Building
Delftechpark 49
2628 XJ Delft
The Netherlands
Tel.nr.: +31 (0) 15 251 4090