Handling and Safety precautions for High Power Semiconductor Diode Lasers

The following note is to help facilitate a successful experience with operating high power semiconductor lasers. Areas to be covered by this note are:

- ESD handling
- Laser Safety
- Fiber handling

ESD handling

The semiconductor laser is extremely sensitive to electro-static discharge. As a precaution, certain guidelines should be considered when handling the module or device:

- All tests should be performed at a static-controlled work station.
- Shorting clips should be attached to anode and cathode pins when the module is disconnected from the operational circuit.
- Ground operators, equipment, work-in-progress (WIP) transport carts/trays and work surface to eliminate static electricity.
- Only use confirmed ESD dissipative coatings/surface finishes on fixtures/tooling used to assemble the lasers.
- When working with lasers, use ESD protective smocks, gloves and shoes/covers, dissipative bench-top mats, and ESD protective flooring or matting.
- Remove or control static generating sources to voltages below the specified maximum for safe ESD handling.
- Install air ionizers as necessary for additional environmental control.
- Use electrically grounded soldering irons for soldering the laser to the mounting surface.
- Use electrostatic shielding containers and antistatic or dissipative carriers.

Laser Safety

Products incorporating these laser diodes will normally be classified as **CLASS IV** laser products according to IEC 60825-1 in a normal operation mode. Direct exposure of the human eye with laser radiation is therefore hazardous and must be strictly avoided.

Testing and maintenance of these products shall be performed only by personnel who are trained in laser safety. For details please refer to relevant local safety regulations and to the manufacturers requirements according to IEC-60825-1.

Persons working with high power diode lasers must wear suitable laser protection glasses.

Fiber Handling

If this device is equipped with a fiber optic pigtail or connectorized fiber, it should be handled by qualified operators with specific training on handling fiber devices. Always wear eye protection when handling optical fiber. It is recommended to where gloves when handling bare fiber.

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Bend radius

Bending an optical fiber affects both the optical performance and the mechanical reliability of the device. In terms of optical performance, 0.15NA fibers are more sensitive to bending than 0.22NA fibers. Keeping bend radii as high as possible will maximize optical power measured at the fiber output. Coiling the fiber to a bending radius small than about 30mm can entail significantly the device performance, especially if the fiber numerical aperture is 0.15.

The absolute minimum bending radius for a 105µm fiber is 25mm. Any bend on a smaller radius could limit the lifetime of the device, either causing an immediate fiber break or a non-apparent damage leading to premature device failure.

Hand oil, adhesive tape, grease, glue and other materials deposited on the fiber surface can absorb optical power. Those absorption sites can lead to failure, especially at bending locations. Keeping fibers clean and as straight as possible is of particular importance for fiber carrying high optical power, such as the output pigtails on our multi-chip modules.

Fiber Tip

Most of our fiber-coupled devices come with either an SMA-905 or FC/UPC (fiber connector/ultra-polished connector) connector. Make sure the connector end or the fiber tip is free from debris and contaminants. The fiber or connector tip should be inspected periodically, especially if the device is operated elsewhere than in a clean room. If the fiber tip is damaged, it is not recommended to re-cleave the fiber without also re-coating the tip with the appropriate anti-reflective coating at the specific wavelength of interest.