

## Laser Diode in TO-220 Package 1.0 W cw (Class 4 Laser Product)

**SPL 2Yxx**  
(SFH 4874x1)

### Features

- Efficient radiation source for pulsed and cw-operation
- Reliable InGa(Al)As strained layer quantum-well material
- Small TO-220 package with efficient thermal coupling
- Includes thermistor to control temperature/wavelength
- Single emitting area  $200\text{ }\mu\text{m} \times 1\text{ }\mu\text{m}$
- Cylindrical correction for a near circular farfield pattern



### Applications

- Pumping solid state lasers (Nd: YAG, Yb: YAG, ...)
- Medical applications
- Laser soldering
- Energy transmission
- Testing and measuring applications

| Type     | Old Type<br>(as of Oct. 1996) | Wavelength <sup>*)</sup> | Ordering Code |
|----------|-------------------------------|--------------------------|---------------|
| SPL 2Y81 | SFH 487401                    | 808 nm                   | Q62702-P367   |
| SPL 2Y85 | SFH 487421                    | 850 nm                   | Q62702-P1677  |
| SPL 2Y94 | SFH 487441                    | 940 nm                   | Q62702-P1630  |
| SPL 2Y98 | —                             | 980 nm                   | on request    |

\*) Other wavelengths in the range of 780 nm ... 980 nm are available on request.

### Maximum Ratings

( $T_A = 25\text{ }^{\circ}\text{C}$ )

| Parameter   | Symbol           | Values |      |      | Unit               |
|---|------------------|--------|------|------|--------------------|
|   |                  | min.   | typ. | max. |                    |
| Output power (continuous wave) <sup>1)</sup>  | $P_{\text{opt}}$ | —      | —    | 1.1  | W                  |
| Output power (quasi-continuous wave) <sup>1)</sup><br>( $t_p \leq 150\text{ }\mu\text{s}$ , duty cycle $\leq 1\%$ ) | $P_{\text{qcw}}$ | —      | —    | 1.5  | W                  |
| Reverse voltage   | $V_R$            | —      | —    | 3    | V                  |
| Operating temperature   | $T_{\text{op}}$  | — 10   | ...  | + 60 | $^{\circ}\text{C}$ |
| Storage temperature   | $T_{\text{stg}}$ | — 40   | ...  | + 85 | $^{\circ}\text{C}$ |
| Maximum soldering temperature, max. 5 s   | $T_s$            | —      | —    | 250  | $^{\circ}\text{C}$ |

1) Optical power measurements refer to a detector with NA = 0.6

## Diode Characteristics

( $T_A = 25\text{ °C}$ )

| Parameter  | Symbol                                | Values                     |                      |                      | Unit                 |     |
|--|---------------------------------------|----------------------------|----------------------|----------------------|----------------------|-----|
|  |                                       | min.                       | typ.                 | max.                 |                      |     |
| Emission wavelength <sup>1)</sup>                    | $\lambda_{\text{peak}}$               | 803<br>840<br>935          | 808<br>850<br>940    | 813<br>860<br>945    | nm                   |     |
| Spectral width (FWHM) <sup>1)</sup>                  | $\Delta\lambda$                       | 2                          |                      |                      | nm                   |     |
| Output power <sup>2)</sup>                           | $P_{\text{opt}}$                      | 1.0                        |                      |                      | W                    |     |
| Differential efficiency <sup>2)</sup>                | $\eta$                                | 808 nm<br>850 nm<br>940 nm | 0.75<br>0.75<br>0.70 | 0.95<br>0.85<br>0.80 | 1.1<br>1.0<br>0.9    | W/A |
| Threshold current                                    | $I_{\text{th}}$                       | 808 nm<br>850 nm<br>940 nm | 0.40<br>0.30<br>0.30 | 0.45<br>0.40<br>0.35 | 0.55<br>0.50<br>0.40 | A   |
| Operating current <sup>1)</sup>                      | $I_{\text{op}}$                       | 808 nm<br>850 nm<br>940 nm | 1.3<br>1.3<br>1.4    | 1.5<br>1.5<br>1.6    | 1.8<br>1.8<br>1.8    | A   |
| Operating voltage <sup>1)</sup>                      | $V_{\text{op}}$                       | 2.0                        |                      |                      | V                    |     |
| Differential series resistance                       | $r_{\text{s}}$                        | —                          | 0.2                  | 0.4                  | $\Omega$             |     |
| Characteristic temperature (threshold) <sup>3)</sup> | $T_0$                                 | 150                        |                      |                      | K                    |     |
| Temperature coefficient of operating current         | $\partial I_{\text{op}} / \partial T$ | 0.5                        |                      |                      | %/K                  |     |
| Temperature coefficient of wavelength <sup>4)</sup>  | $\partial \lambda / \partial T$       | 0.25                       | 0.27                 | 0.30                 | nm/K                 |     |
| Thermal resistance (junction → heat sink)            | $R_{\text{th JA}}$                    | 10                         |                      |                      | K/W                  |     |

1) Standard operating conditions refer to 1 W cw measured with NA = 0.6

2) Optical power measurements refer to a detector with NA = 0.6

3) Model for the thermal behavior of threshold current:  $I_{\text{th}}(T_2) = I_{\text{th}}(T_1) \times \exp(T_2 - T_1)/T_0$

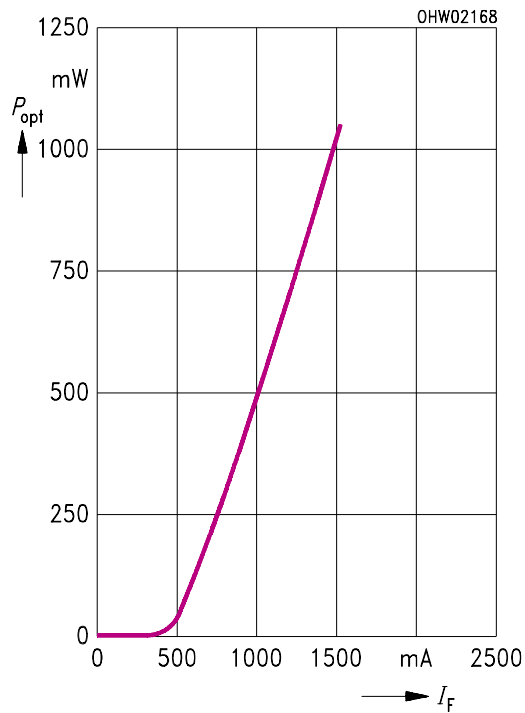
4) Depending on emission wavelength

## NTC Thermistor

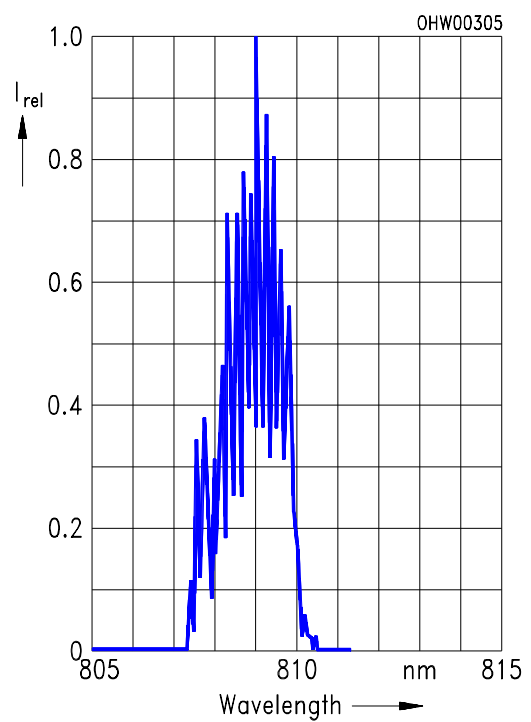
| Parameter                              | Symbol           | Typ. Values | Unit       |
|--|------------------|-------------|------------|
| Resistance at room temperature (25 °C) | $R_{\text{NTC}}$ | 10          | k $\Omega$ |

## Optical Characteristics ( $T_A = 25\text{ °C}$ )

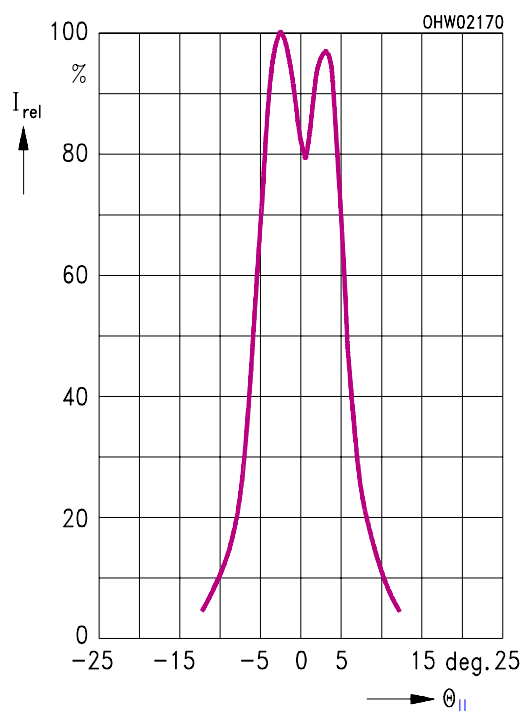
### Radiant Power $P_{\text{opt}}$ vs $I_F$



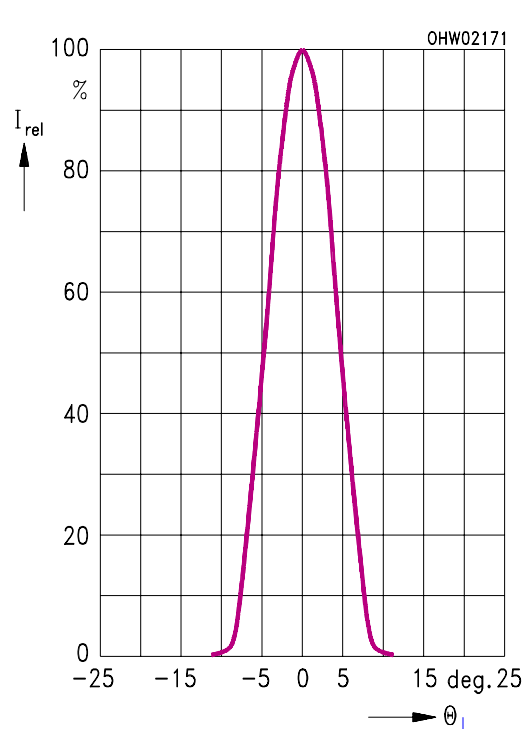
### Mode Spectrum $I_{\text{rel}}$ vs $\lambda$ ( $P_{\text{opt}} = 1.0\text{ W}$ )



### Farfield Distribution Parallel to Junction $I_{\text{rel}}$ vs $\theta_{\parallel}$



### Farfield Distribution Perpendicular to Junction $I_{\text{rel}}$ vs $\theta_{\perp}$



## Notes for Operation

### **1. Eye Protection**

This laser is a **Class 4 Laser** product.

Refer to the relevant safety regulations for protection during handling and operation.

### **2. Overload Protection**

The specified values are valid as long as the diode has not been not overloaded. Voltage spikes from the power supply unit, even when applied for nanoseconds only, may cause irreversible damage to the laser diode. Such spikes may occur when the power supply is turned on or off, or they may reach the laser diode from the line via the coupling capacitance of electronically controlled devices.

The power supply should therefore be provided with appropriate protection circuits.

## Handling Notes

### **1. Package**

To avoid electrostatic damage it is recommended to observe the same rules as for handling MOS-devices.

### **2. Mechanical Attachment**

#### **2.1 Mounting hole (suitable for M 2.5)**

Because of the good thermal conductivity of the TO 220 base plate (copper) the heat loss is properly dissipated even if the component is attached on one side only. Some mounting techniques are shown below (**Fig. 1 – 3**).

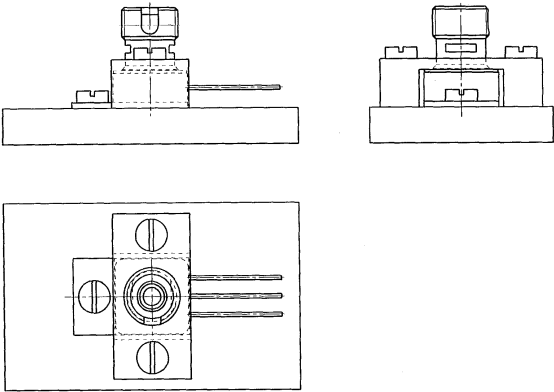
#### **2.2 For exact positioning of the TO component and other parts, e.g. lenses, the TO 220 package can be attached with appropriate clamping devices or screws (max. M 2.5).**

### **3. Soldering**

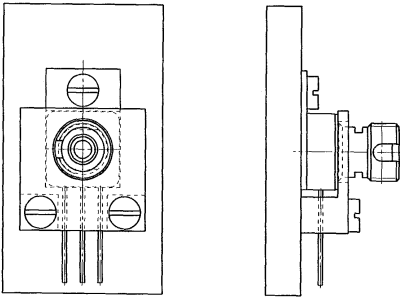
When soldering the TO base to a heat sink, do not exceed the following limits:

- max. soldering temperature: 125 °C
- max. soldering time: 1 min.

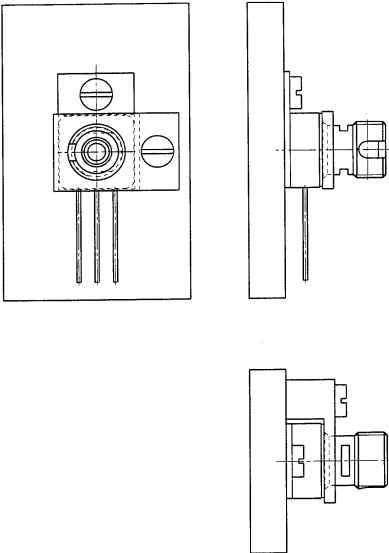
**Mounting Techniques**



**Figure 1**



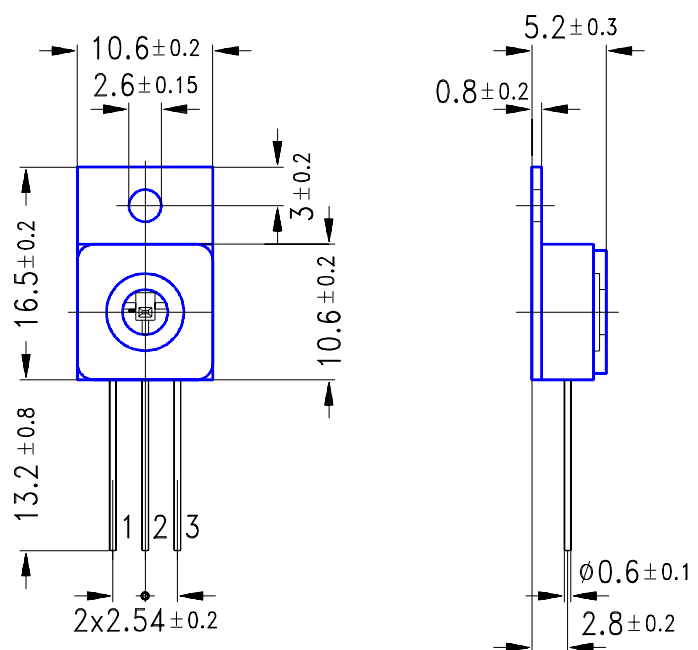
**Figure 2**



**Figure 3**

## Package Outlines

(Dimensions in mm, unless specified).



- 1 Laserdiode Cathode
- 2 NTC
- 3 NTC
- case Anode

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