SPL S1L90A_3 A01

SMT Laser
1 Channel SMT Laser in QFN package

Applications

- 3D Sensing
- CCTV Surveillance
- Industrial Automation (Machine Controls, Light Barriers, Vision Controls)
- LIDAR, Pre-Crash, ACC
- Measurement Levelling

Features:

- Qualifications: The product qualification test plan is based on the guidelines of AEC-Q102, failure mechanism based Stress Test Qualification for Discrete Optoelectronic Semiconductors in Automotive applications.
- Laser wavelength 905 nm
- 1 channel pulsed laser module
- Suited for short laser pulses from 1 to 100 ns
- SMT device

Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>Peak output power</th>
<th>Ordering Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPL S1L90A_3 A01</td>
<td>120 W</td>
<td>Q65112A6166</td>
</tr>
</tbody>
</table>
# Maximum Ratings

$T_s = 25 \, ^\circ\text{C}$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>$T_{op}$</td>
<td>$\text{min.}$: $-40 , ^\circ\text{C}$, $\text{max.}$: $105 , ^\circ\text{C}$</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{stg}$</td>
<td>$\text{min.}$: $-40 , ^\circ\text{C}$, $\text{max.}$: $125 , ^\circ\text{C}$</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>$T_j$</td>
<td>$\text{max.}$: $125 , ^\circ\text{C}$</td>
</tr>
<tr>
<td>Output power</td>
<td>$P_{opt}$</td>
<td>$\text{max.}$: $0.24 , \text{W}$</td>
</tr>
<tr>
<td>Forward current $\text{dc} = 0.2 ,$%</td>
<td>$I_F$</td>
<td>$\text{max.}$: $40 , \text{A}$</td>
</tr>
<tr>
<td>Pulse width (FWHM)</td>
<td>$t_p$</td>
<td>$\text{max.}$: $100 , \text{ns}$</td>
</tr>
<tr>
<td>Duty cycle</td>
<td>$\text{dc}$</td>
<td>$\text{max.}$: $0.2 ,$%</td>
</tr>
<tr>
<td>Reverse voltage $^1$</td>
<td>$V_R$</td>
<td>$\text{max.}$: $45 , \text{V}$</td>
</tr>
</tbody>
</table>
### Characteristics

$I_F = 40 \text{ A}; \ t_p = 100 \text{ ns}; \ D = 0.01 \%; \ T_s = 25 ^\circ \text{C}$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels</td>
<td>$N$</td>
<td>typ. 1</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>$V_{op}$</td>
<td>typ. 11 V</td>
</tr>
<tr>
<td>Centroid wavelength</td>
<td>$\lambda_{\text{centroid}}$</td>
<td>min. 895 nm; typ. 905 nm; max. 915 nm</td>
</tr>
<tr>
<td>Spectral bandwidth (FWHM)</td>
<td>$\Delta \lambda$</td>
<td>min. 3 nm; typ. 7 nm; max. 12 nm</td>
</tr>
<tr>
<td>Peak output power</td>
<td>$P_{opt}$</td>
<td>min. 105 W; typ. 125 W; max. 145 W</td>
</tr>
<tr>
<td>Beam divergence (FWHM) parallel to pn-junction</td>
<td>$\Theta_\parallel$</td>
<td>min. 3°; typ. 10°; max. 13°</td>
</tr>
<tr>
<td>Beam divergence (FWHM) perpendicular to pn-junction</td>
<td>$\Theta_\perp$</td>
<td>min. 20°; typ. 25°; max. 30°</td>
</tr>
<tr>
<td>Beam divergence ($1/e^2$) parallel to pn-junction</td>
<td>$\Theta_\parallel$</td>
<td>min. 10°; typ. 13°; max. 16°</td>
</tr>
<tr>
<td>Beam divergence ($1/e^2$) perpendicular to pn-junction</td>
<td>$\Theta_\perp$</td>
<td>min. 35°; typ. 40°; max. 50°</td>
</tr>
<tr>
<td>Threshold current</td>
<td>$I_{th}$</td>
<td>typ. 0.6 A</td>
</tr>
<tr>
<td>Laser aperture (FWHM) parallel to pn-junction</td>
<td>$W_\parallel$</td>
<td>typ. 220 µm</td>
</tr>
<tr>
<td>Laser aperture (FWHM) perpendicular to pn-junction</td>
<td>$W_\perp$</td>
<td>typ. 10 µm</td>
</tr>
<tr>
<td>Thermal resistance junction solder point real 2)</td>
<td>$R_{\text{thJS real}}$</td>
<td>typ. 31 K / W; max. 36 K / W</td>
</tr>
</tbody>
</table>
Relative Spectral Emission \(^3\), \(^4\)

\[ I_{rel} = f(\lambda); I_F = 40\, \text{A}; P_{opt} = 125\, \text{W}; t_p = 100\, \text{ns}; D = 0.01\% \]

Far-Field Distribution Perpendicular to pn-Junction \(^3\), \(^4\)

\[ I_{rel} = f(\Theta_\perp); P_{opt} = 125\, \text{W}; t_p = 100\, \text{ns}; D = 0.01\% \]
Far-Field Distribution Parallel to pn-Junction \(^3\), \(^4\)

\[ I_{\text{rel}} = f(\Theta_{\text{II}}); P_{\text{opt}} = 125\text{W}; t_p = 100\text{ns}; D = 0.01\% \]

Near-Field Distribution Parallel to pn-Junction \(^3\), \(^4\)

\[ I_{\text{rel}} = f(\Theta_{\text{II}}); P_{\text{opt}} = 125\text{W}; t_p = 100\text{ns}; D = 0.01\% \]
Near-Field Distribution Perpendicular to pn-Junction \(^{3, 4}\)

\[ I_{\text{rel}} = f(\Theta_\perp); P_{\text{opt}} = 125\text{W}; t_p = 100\text{ns}; D = 0.01\% \]

Optical Output Power \(^{3, 4}\)

\[ P_{\text{opt}} = f(I_F) \]
### Centroid Wavelength $^{3)}$

\( \lambda_{\text{centroid}} = f(T_J); I_F = 40\, \text{A}; t_p = 100\, \text{ns}; D = 0.01\% \)

![Graph 1](image1)

![Graph 2](image2)

### Centroid Wavelength $^{3)}$

\( \lambda_{\text{centroid}} = f(T_S); I_F = 40\, \text{A}; t_p = 100\, \text{ns}; D = 0.01\% \)

![Graph 3](image3)

![Graph 4](image4)
**Peak Output Power**

\[ P_{\text{opt}} = f(T_J); \; I_F = 40A; \; t_p = 100\text{ns}; \; D = 0.01\% \]

**Permissible Pulse Handling Capability**

\[ I_F = f(t_p); \; D = \text{parameter}; \; P_{\text{opt, typ}}; \; R_{\text{jhs, typ}}; \; T_S = 85°C \text{ (typ)} \]

**Permissible Pulse Handling Capability**

\[ I_F = f(t_p); \; D = \text{parameter}; \; P_{\text{opt, min}}; \; R_{\text{jhs, max}}; \; T_S = 85°C \]
Permissible Pulse Handling Capability

\[ I_p = f(t_p); \quad D = \text{parameter}; \quad P_{\text{opt, typ}}, R_{\text{th Js, typ}}; \quad T_S = 105^\circ\text{C} \]
Dimensional Drawing

Further Information:

Approximate Weight: 8.0 mg
Recommended Solder Pad

Component Location on Pad

foot print  
Cu area  
solder resist  
solder stencil  
recommended stencil thickness 120µm
**Reflow Soldering Profile**

Product complies to MSL Level 3 acc. to JEDEC J-STD-020E

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**Profile Feature** | **Symbol** | **Pb-Free (SnAgCu) Assembly** | **Unit**
--- | --- | --- | ---
Ramp-up rate to preheat* | 2 | 3 | K/s
25 °C to 150 °C
Time $t_S$ | $t_S$ | 60 | 100 | 120 | s
Ramp-up rate to peak* | 2 | 3 | K/s
$T_{S_{\text{max}}} \to T_P$
Liquidus temperature | $T_L$ | 217 | °C
Time above liquidus temperature | $t_L$ | 80 | 100 | s
Peak temperature | $T_P$ | 245 | 260 | °C
Time within 5 °C of the specified peak temperature $T_P - 5$ K | $t_{p}$ | 10 | 20 | 30 | s
Ramp-down rate* | 3 | 6 | K/s
$T_P \to 100$ °C
Time | 25 °C to $T_P$ | 480 | s

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All temperatures refer to the center of the package, measured on the top of the component

* slope calculation $DT/DT$: $DT$ max. 5 s; fulfillment for the whole T-range
Taping

\[5\)
**Tape and Reel**

![Diagram of tape and reel setup]

**Reel Dimensions**

<table>
<thead>
<tr>
<th>A</th>
<th>W</th>
<th>( N_{\text{min}} )</th>
<th>( W_1 )</th>
<th>( W_{2_{\text{max}}} )</th>
<th>Pieces per PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>180 mm</td>
<td>12 + 0.3 / - 0.1 mm</td>
<td>60 mm</td>
<td>12.4 + 2 mm</td>
<td>18.4 mm</td>
<td>500</td>
</tr>
</tbody>
</table>

Leader: min. 400 mm *
Trailer: min. 160 mm *

*) Dimensions acc. to IEC 60286-3; EIA 481-D

OHAY0324
Barcode-Product-Label (BPL)

OSRAM Opto Semiconductors

LX XXXX
BIN1: XX-XX-X-XXX-X

RoHS Compliant

ML Temp ST
X XXX °C X

Pack: RXX
DEMY XXX
X_X123_1234.1234 X

OHA00563

Dry Packing Process and Materials

Moisture-sensitive label or print
Barcode label

Humidity indicator
Barcode label
Desiccant

Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.
Schematic Transportation Box 5)

Dimensions of Transportation Box

<table>
<thead>
<tr>
<th>Width</th>
<th>Length</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>195 ± 5 mm</td>
<td>195 ± 5 mm</td>
<td>30 ± 5 mm</td>
</tr>
</tbody>
</table>
Notes

Depending on the mode of operation, these devices emit highly concentrated visible and non visible light which can be hazardous to the human eye. Products which incorporate these devices have to follow the safety precautions given in IEC 60825-1.

Subcomponents of this device contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize device exposure to aggressive substances during storage, production, and use. Devices that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

Tape and Reel:
Packing unit can vary 2 % from the stated value.

For further application related information please visit www.osram-os.com/appnotes
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Packing
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Glossary

1) **Reverse Operation**: Reverse Operation of 10 hours is permissible in total. Continuous reverse operation is not allowed.

2) **Thermal resistance**: junction - soldering point, of the device only, mounted on an ideal heatsink (e.g. metal block)

3) **Typical Values**: Due to the special conditions of the manufacturing processes of semiconductor devices, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.

4) **Testing temperature**: $T_A = 25^\circ\text{C}$ (unless otherwise specified)

5) **Tolerance of Measure**: Unless otherwise noted in drawing, tolerances are specified with ±0.1 and dimensions are specified in mm.

6) **Tape and Reel**: All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.
## Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>2019-07-19</td>
<td>Initial Version</td>
</tr>
<tr>
<td>0.0</td>
<td>2019-09-27</td>
<td>Initial Version</td>
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