NV4V31SF
Blue-Violet Laser Diode
405 nm Blue-Violet Laser Light Source

DESCRIPTION
The NV4V31SF is a blue-violet laser diode with a wavelength of 405 nm. A newly developed LD chip structure achieves a high optical power output of 175 mW (CW). The NV4V31SF can provide excellent linearity from low to high output at high temperatures, and reduces the unevenness of beam divergence.

FEATURES
- High optical output power $P_o = 175$ mW @CW
- Peak wavelength $\lambda_p = 405$ nm TYP.
- Single transverse mode (lateral)
- Wide operating temperature range $T_C = -5$ to $+85^\circ$C
- $\phi 5.6$ mm CAN package

APPLICATIONS
- Blue-violet laser light source
PACKAGE DIMENSIONS (UNIT: mm)

Remark
Cap glass thickness : 0.25±0.03 mm
Cap glass refractive index : 1.53 (λ = 405 nm)
ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Order Number</th>
<th>Rank</th>
<th>Packing Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>NV4V31SF</td>
<td>NV4V31SF-A</td>
<td>HV</td>
<td>Tray Packing (100 p/Tray), With data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>XV</td>
<td>Individual Packing (for samples), With data</td>
</tr>
</tbody>
</table>

ABSOLUTE MAXIMUM RATINGS ($T_C = 25°C$, unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Output Power (CW)</td>
<td>$P_o$</td>
<td>210</td>
<td>mW</td>
</tr>
<tr>
<td>Reverse Voltage of LD</td>
<td>$V_R$</td>
<td>2</td>
<td>V</td>
</tr>
<tr>
<td>Operating Case Temperature</td>
<td>$T_C$</td>
<td>−5 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>$T_{stg}$</td>
<td>−40 to +85</td>
<td>°C</td>
</tr>
</tbody>
</table>

RECOMMENDED OPERATING CONDITIONS
($T_C = 25°C$, unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Output Power (CW)</td>
<td>$P_o$</td>
<td>175</td>
<td>mW</td>
</tr>
</tbody>
</table>

ELECTRO-OPTICAL CHARACTERISTICS
($T_C = 25°C$, unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Current</td>
<td>$I_n$</td>
<td>CW</td>
<td>35</td>
<td>55</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Operating Current</td>
<td>$I_{op}$</td>
<td>CW, $P_o = 175$ mW</td>
<td>150</td>
<td>200</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>$V_{op}$</td>
<td>CW, $P_o = 175$ mW</td>
<td>5.0</td>
<td>6.5</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Slope Efficiency</td>
<td>$\eta_d$</td>
<td>CW, $P_o = 20$ mW, 175 mW</td>
<td>1.1</td>
<td>1.55</td>
<td></td>
<td>W/A</td>
</tr>
<tr>
<td>Peak Wavelength</td>
<td>$\lambda_p$</td>
<td>CW, $P_o = 175$ mW</td>
<td>400</td>
<td>405</td>
<td>410</td>
<td>nm</td>
</tr>
<tr>
<td>Beam Divergence (lateral)</td>
<td>$\theta_//_{//}$</td>
<td>CW, $P_o = 175$ mW</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>deg.</td>
</tr>
<tr>
<td>Beam Divergence (vertical)</td>
<td>$\theta_\perp$</td>
<td>$P_o = 175$ mW</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>deg.</td>
</tr>
<tr>
<td>Position Accuracy Angle (lateral)</td>
<td>$\Delta \theta_//_{//}$</td>
<td>CW, $P_o = 175$ mW</td>
<td>−3</td>
<td>0</td>
<td>3</td>
<td>deg.</td>
</tr>
<tr>
<td>Position Accuracy Angle (vertical)</td>
<td>$\Delta \theta_\perp$</td>
<td>$P_o = 175$ mW</td>
<td>−3</td>
<td>0</td>
<td>3</td>
<td>deg.</td>
</tr>
</tbody>
</table>
TYPICAL CHARACTERISTICS
(T_C = 25°C, unless otherwise specified)

**OPTICAL OUTPUT POWER vs. FORWARD CURRENT**

**FORWARD VOLTAGE vs. FORWARD CURRENT**

**POWER DEPENDENCE OF PEAK WAVELENGTH**

**TEMPERATURE DEPENDENCE OF PEAK WAVELENGTH**

**FFP (LATERAL)**

**FFP (VERTICAL)**

**Remark** The graphs indicate nominal characteristics.
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NOTES ON HANDLING

1. Recommended soldering conditions
   - Peak Temperature \( \leq 350^\circ C \)
   - Time \( \leq 3 \) seconds
   - Soldering of leads should be made at the point 2.0 mm from the root of the lead
   - This device cannot be mounted using reflow soldering.

2. Usage cautions
   (1) Take the following steps to ensure that the device is not damaged by static electricity.
       - Wear an antistatic wrist strap when soldering the device.
         We recommend a strap with a 1 M\( \Omega \) resistor.
       - Make sure that the work table and soldering iron are grounded.
       - Make sure that the soldering iron does not leak.
   (2) Do not subject the package to undue stress.
       The package has a tensile strength of 1N or less.
       Do not exceed this rating. Also, avoid bending the leads as much as possible.
       If the leads must be bent, bend them only once, making sure to anchor the stem base of the lead.
   (3) Do not allow the cap glass of the package to become scratched or dirty.
       Also, do not subject the cap glass to external force.
   (4) Be sure to attach a heat sink to sufficiently dissipate heat.
   (5) Use the device as soon as possible after opening the bag.
SAFETY INFORMATION ON THIS PRODUCT

**DANGER**

VISIBLE LASER RADIATION

AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION

OUTPUT POWER 3W MAX
WAVELENGTH 400 to 600nm
CLASS 3B LASER PRODUCT

**SEMICONDUCTOR LASER**

AVOID EXPOSURE-Invisible
Laser Radiation is emitted from
this aperture

<table>
<thead>
<tr>
<th>Warning</th>
<th>Laser Beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>A laser beam is emitted from this diode during operation. If the laser beam or its reflection enters your eye, it may cause injury to the eye or loss of eyesight. (Note that, depending on the wavelength of the beam, the laser beam might not be visible.)</td>
<td></td>
</tr>
<tr>
<td>• Do not look directly into the laser beam.</td>
<td></td>
</tr>
<tr>
<td>• Avoid exposure to the laser beam, any reflected or collimated beam.</td>
<td></td>
</tr>
</tbody>
</table>
## Revision History

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Date</th>
<th>Page</th>
<th>Description</th>
<th>Summary</th>
</tr>
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<tbody>
<tr>
<td>0.01</td>
<td>Jan 23, 2013</td>
<td>–</td>
<td>First edition issued</td>
<td></td>
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<tr>
<td>1.00</td>
<td>Jun 20, 2013</td>
<td>p.2</td>
<td>Modification of PACKAGE DIMENSIONS</td>
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<td></td>
<td></td>
<td>p.3</td>
<td>Modification of ORDERING INFORMATION</td>
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