

# NV4V31MF

Blue-Violet Laser Diode

405 nm Blue-Violet Laser Light Source

R08DS0045EJ0300

Rev.3.00

Aug 28, 2020

## DESCRIPTION

The NV4V31MF 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) at up to 85°C. The NV4V31MF can provide excellent linearity from low to high output at high temperatures, and reduces the unevenness of beam divergence.

## FEATURES

- High optical output power  $P_o = 175 \text{ mW @CW}$
- Peak emission wavelength  $\lambda_p = 405 \text{ nm TYP.}$
- Single transverse mode (lateral)
- Wide operating temperature range  $T_C = -5 \text{ to } +85^\circ\text{C}$
- $\phi 3.8 \text{ mm}$  small CAN package

## APPLICATIONS

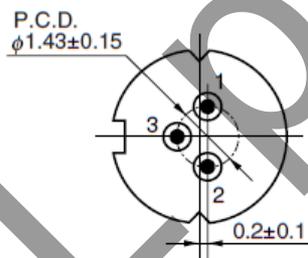
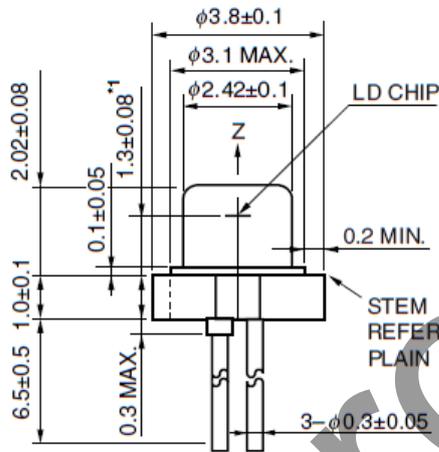
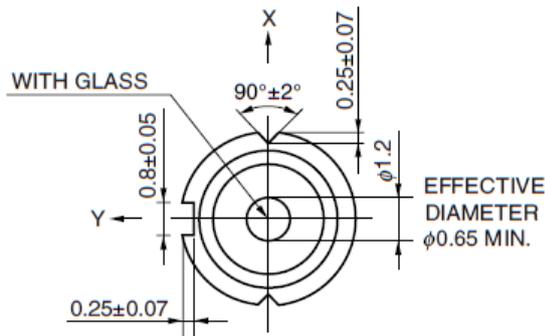
- Blue-violet laser light source



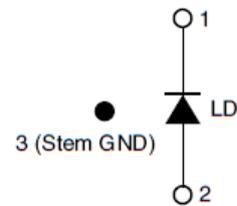
The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PACKAGE DIMENSIONS (UNIT: mm)



BOTTOM VIEW



PIN CONNECTIONS

- Remarks 1.** Cap glass thickness:  $0.25 \pm 0.03 \text{ mm}$   
 Cap glass refractive index:  $1.53 (\lambda = 405 \text{ nm})$
- 2.** Position accuracy of the LD chip based on the center of stem  
 $\Delta x = \pm 80 \mu\text{m}$   
 $\Delta y = \pm 80 \mu\text{m}$   
 $\Delta z = \pm 80 \mu\text{m} (^{*1})$

<R> ORDERING INFORMATION

| Part Number | Order Number  | Rank | Packing Style                                  |
|-------------|---------------|------|--|
| NV4V31MF    | NV4V31MF-A    | GV   | Tray Packing (250 p/Tray), Without data        |
|             | NV4V31MF-SA-A | KV   | Individual Packing (for samples), Without data |

**ABSOLUTE MAXIMUM RATINGS (T<sub>c</sub> = 25°C, unless otherwise specified)**

| Parameter                  | Symbol           | Ratings    | Unit |
|----------------------------|------------------|------------|------|
| Optical Output Power (CW)  | P <sub>o</sub>   | 180        | mW   |
| Reverse Voltage of LD      | V <sub>R</sub>   | 2          | V    |
| Operating Case Temperature | T <sub>c</sub>   | -5 to +85  | °C   |
| Storage Temperature        | T <sub>stg</sub> | -40 to +85 | °C   |

**RECOMMENDED OPERATING CONDITIONS (T<sub>c</sub> = 25°C, unless otherwise specified)**

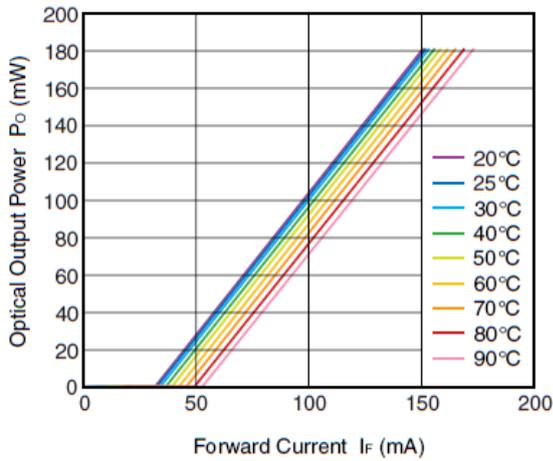
| Parameter                 | Symbol         | MAX. | Unit |
|---------------------------|----------------|------|------|
| Optical Output Power (CW) | P <sub>o</sub> | 175  | mW   |

**ELECTRO-OPTICAL CHARACTERISTICS (T<sub>c</sub> = 25°C, unless otherwise specified)**

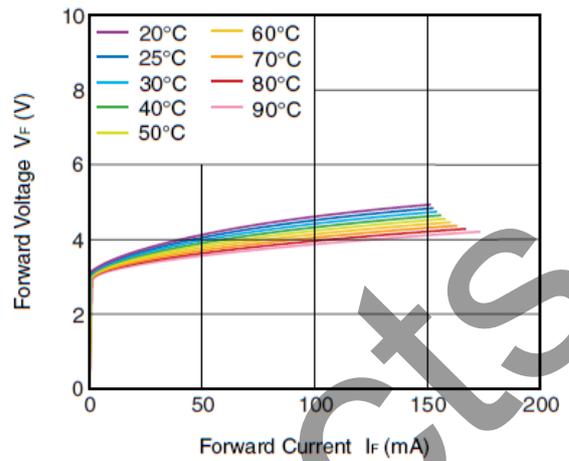
| Parameter                          | Symbol          | Conditions                         | MIN. | TYP. | MAX. | Unit |
|------------------------------------|-----------------|------------------------------------|------|------|------|------|
| Threshold Current                  | I <sub>th</sub> | CW                                 |      | 35   | 55   | mA   |
| Operating Current                  | I <sub>op</sub> | CW, P <sub>o</sub> = 175 mW        |      | 150  | 200  | mA   |
| Optical Voltage                    | V <sub>op</sub> | CW, P <sub>o</sub> = 175 mW        |      | 5.0  | 6.5  | V    |
| Slope Efficiency                   | η <sub>d</sub>  | CW, P <sub>o</sub> = 20 mW, 175 mW | 1.1  | 1.55 |      | W/A  |
| Peak Wavelength                    | λ <sub>p</sub>  | CW, P <sub>o</sub> = 175 mW        | 400  | 405  | 415  | nm   |
| Beam Divergence (lateral)          | θ <sub>l</sub>  | CW, P <sub>o</sub> = 175 mW        | 6    | 9    | 12   | deg. |
| Beam Divergence (vertical)         | θ <sub>v</sub>  |                                    | 15   | 20   | 25   |      |
| Position Accuracy Angle (lateral)  | Δθ <sub>l</sub> | CW, P <sub>o</sub> = 175 mW        | -3   | 0    | 3    | deg. |
| Position Accuracy Angle (vertical) | Δθ <sub>v</sub> |                                    | -3   | 0    | 3    |      |

**TYPICAL CHARACTERISTICS (T<sub>c</sub> = 25°C, unless otherwise specified)**

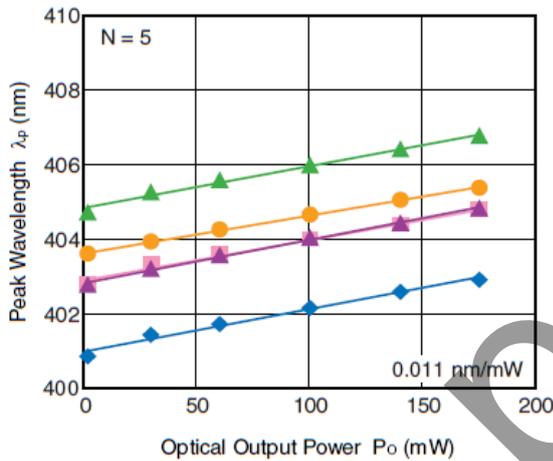
**OPTICAL OUTPUT POWER vs. FORWARD CURRENT**



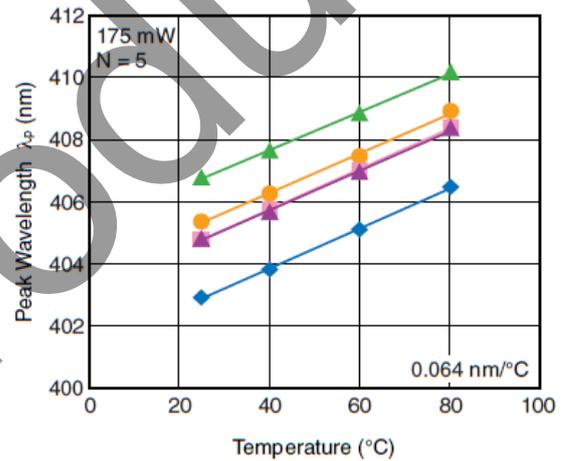
**FORWARD VOLTAGE vs. FORWARD CURRENT**



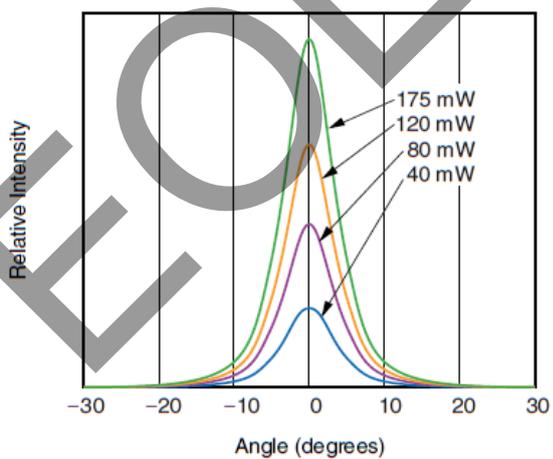
**POWER DEPENDENCE OF PEAK WAVELENGTH**



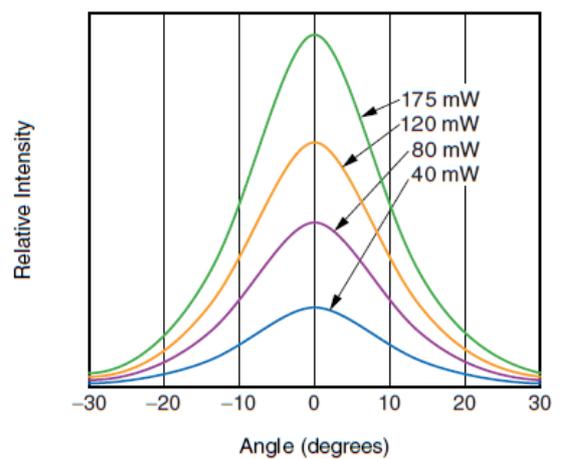
**TEMPERATURE DEPENDENCE OF PEAK WAVELENGTH**



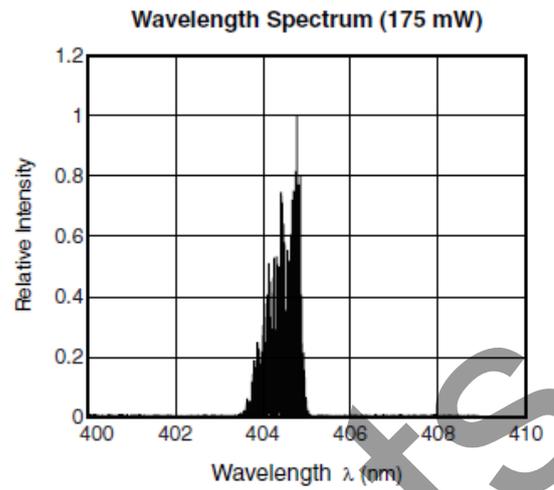
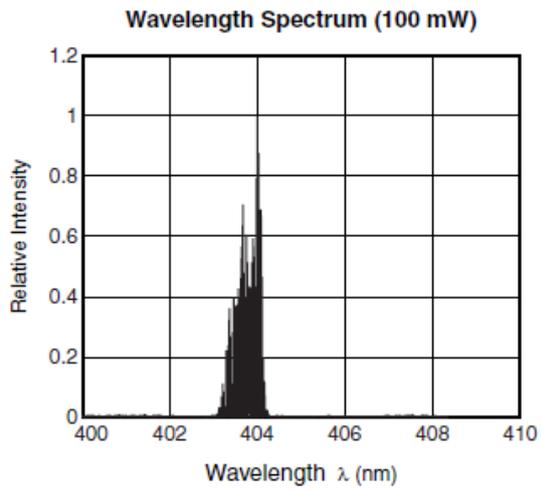
**FFP (LATERAL)**



**FFP (VERTICAL)**



**Remark** The graphs indicate nominal characteristics.



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## NOTES ON HANDLING

### 1. Recommended soldering conditions

- Peak Temperature  $\leq 350^{\circ}\text{C}$
- 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

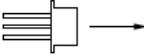


**VISIBLE LASER RADIATION  
AVOID EYE OR SKIN EXPOSURE TO  
DIRECT OR SCATTERED RADIATION**



**OUTPUT POWER 3W MAX  
WAVELENGTH 400 to 680nm  
CLASS IV LASER PRODUCT**

**SEMICONDUCTOR LASER**



**AVOID EXPOSURE-Invisible  
Laser Radiation is emitted from  
this aperture**

|                |            |   |
|----------------|------------|---|
| <b>Warning</b> | Laser Beam | <p>A laser beam is emitted from this diode during operation.<br/>If the laser beam or its reflection enters your eye, it may cause injury to the eye or loss of eyesight.<br/>(Note that, depending on the wavelength of the beam, the laser beam might not be visible.)</p> <ul style="list-style-type: none"> <li>• Do not look directly into the laser beam.</li> <li>• Avoid exposure to the laser beam, any reflected or collimated beam.</li> </ul> |
|----------------|------------|---|

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|                         |                            |
|-------------------------|----------------------------|
| <b>Revision History</b> | <b>NV4V31MF Data Sheet</b> |
|-------------------------|----------------------------|

| Rev. | Date         | Description |  |
|------|--------------|-------------|--|
|      |              | Page        | Summary  |
| 0.01 | Sep 08, 2011 | –           | First edition issued   |
| 1.00 | Mar 05, 2012 | Throughout  | Preliminary Data Sheet -> Data Sheet   |
|      |              | p.3         | Modification of <b>ORDERING INFORMATION</b>                                      |
|      |              | p.4, 5      | Addition of <b>TYPICAL CHARACTERISTICS</b>                                       |
| 2.00 | Jun 20, 2013 | p.1         | Modification of <b>FEATURES</b>  |
|      |              | p.2         | Modification of <b>PACKAGE DIMENSIONS</b>  |
|      |              | p.3         | Modification of <b>ORDERING INFORMATION</b>                                      |
|      |              |             | Modification of <b>ABSOLUTE MAXIMUM RATINGS</b>                                  |
|      |              | p.4         | Modification of <b>TYPICAL CHARACTERISTICS</b>                                   |
|      |              | p.6         | Modification of <b>NOTES ON HANDLING</b>   |
|      |              | p.7         | Modification of <b>SAFETY INFORMATION ON THIS PRODUCT</b>                        |
| 3.00 | Aug 28,2020  | p.3         | Modification of <b>ORDERING INFORMATION</b><br>(Newly established NV4V31MF-SA-A) |

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