Description

The DFB-1xxx-C5-2-2.5-xx series of Multi-Quantum Well (MQW) Distributed Feedback (DFB) lasers have been designed specifically to satisfy the requirements of SONET CWDM transmission. The devices feature high output power and wide operating temperature range.

Their uncooled, hermetically sealed, coaxial fiber-pigtailed packages are a cost-effective means of providing a high-speed light source for intermediate-reach and long-reach applications.

Features
- Advanced Multiple Quantum Well (MQW) Distributed Feedback (DFB) Laser Design
- High-speed up to 2.5 Gbps
- Engineered Specifically for SONET transmitter applications
- Low-Cost Uncooled Laser Technology
- 1.2 meter SMF-28 Fiber Pigtail
- 5.6-mm TO-style package

Applications
- SONET 2.5 Gbps transmitter
- Intermediate and long-distance fiber-optic transmitter
### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Case Temperature</td>
<td>( T_c )</td>
<td>( I=I_{th} )</td>
<td>-20</td>
<td>85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>( T_{stg} )</td>
<td>--</td>
<td>-40</td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>Laser Forward Current</td>
<td>( I_f )</td>
<td>--</td>
<td>--</td>
<td>120</td>
<td>mA</td>
</tr>
<tr>
<td>Laser Reverse Bias</td>
<td>( V_r )</td>
<td>--</td>
<td>--</td>
<td>2</td>
<td>V</td>
</tr>
<tr>
<td>Photodiode Reverse Bias</td>
<td>( V_{rpd} )</td>
<td>--</td>
<td>--</td>
<td>10</td>
<td>V</td>
</tr>
</tbody>
</table>

### Electrical and Optical Characteristics

Parameters are over operating temperature range unless otherwise noted.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>( T )</td>
<td>-20*</td>
<td>--</td>
<td>85*</td>
<td>°C</td>
<td>( P_o=2.0 ) mW, ( T=25 ) °C</td>
</tr>
<tr>
<td>Optical Output Power</td>
<td>( P_o )</td>
<td>2.0</td>
<td>--</td>
<td>--</td>
<td>mW</td>
<td>CW</td>
</tr>
<tr>
<td>Threshold Current</td>
<td>( I_{th} )</td>
<td>--</td>
<td>14</td>
<td>20</td>
<td>mA</td>
<td>( T=25 ) °C</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>( V_f )</td>
<td>--</td>
<td>1.2</td>
<td>1.7</td>
<td>V</td>
<td>( P_o=2.0 ) mW</td>
</tr>
<tr>
<td>Modulation Current</td>
<td>( I_{mod} )</td>
<td>13</td>
<td>20</td>
<td>33</td>
<td>mA</td>
<td>( P_o=2.0 ) mW, ( T=25 ) °C</td>
</tr>
<tr>
<td>Slope Efficiency</td>
<td>( SE )</td>
<td>50</td>
<td>--</td>
<td>125</td>
<td>( \mu W/mA )</td>
<td>( CW, P_o=2.0 ) mW, ( T=25 ) °C</td>
</tr>
<tr>
<td>Center Wavelength</td>
<td>( \lambda_c )</td>
<td>1270</td>
<td>--</td>
<td>1610</td>
<td>nm</td>
<td>( P_o=2.0 ) mW, CW</td>
</tr>
<tr>
<td>Center Wavelength Accuracy</td>
<td>( \Delta \lambda_c )</td>
<td>-2*</td>
<td>--</td>
<td>+2*</td>
<td>nm</td>
<td>( T=25 ) °C</td>
</tr>
<tr>
<td>Spectral Width (-20 dB)</td>
<td>( \Delta \lambda )</td>
<td>--</td>
<td>0.1</td>
<td>1.0</td>
<td>nm</td>
<td>( P_o=2.0 ) mW</td>
</tr>
<tr>
<td>Wavelength temperature coefficient</td>
<td>( \Delta \lambda / \Delta T )</td>
<td>--</td>
<td>0.11</td>
<td>0.12</td>
<td>nm/°C</td>
<td></td>
</tr>
<tr>
<td>Side-mode Suppression Ratio</td>
<td>( SMSR )</td>
<td>-30</td>
<td>-40</td>
<td>--</td>
<td>dB</td>
<td>( P_o=2.0 ) mW</td>
</tr>
<tr>
<td>Rise/Fall Times</td>
<td>( t_{R, F} )</td>
<td>--</td>
<td>--</td>
<td>0.1</td>
<td>ns</td>
<td>( P_{peak}=2.0 ) mW, 20% to 80%</td>
</tr>
<tr>
<td>Relaxation Oscillation</td>
<td>( f_k )</td>
<td>--</td>
<td>4.5</td>
<td>--</td>
<td>GHz</td>
<td>( P_o=2.0 ) mW</td>
</tr>
<tr>
<td>Monitor Current</td>
<td>( I_{mon} )</td>
<td>25</td>
<td>--</td>
<td>375</td>
<td>( \mu A/mW )</td>
<td>( V_{rpd}=5 ) V</td>
</tr>
<tr>
<td>Monitor Dark Current</td>
<td>( I_{D} )</td>
<td>--</td>
<td>--</td>
<td>200</td>
<td>nA</td>
<td>( V_{rpd}=5 ) V</td>
</tr>
<tr>
<td>Optical Isolation**</td>
<td>( ISO )</td>
<td>30</td>
<td>--</td>
<td>--</td>
<td>dB</td>
<td>( CW, T=20-85 ) °C</td>
</tr>
<tr>
<td>Relative Intensity Noise</td>
<td>( RIN )</td>
<td>--</td>
<td>140**</td>
<td>130**</td>
<td>dB/Hz</td>
<td>( P_o=2.0 ) mW</td>
</tr>
<tr>
<td>Tracking Error</td>
<td>( \gamma )</td>
<td>-1</td>
<td>--</td>
<td>1</td>
<td>dB</td>
<td>( I_{mon} ) = const, ( \gamma=10 \log (P_o/2.0) ) [dB]</td>
</tr>
</tbody>
</table>

* See ordering options for available temperature ranges.
** RIN specification applies only if isolator option is ordered.
*** Optical Isolation applies only if isolator option is ordered.
**Dimensions**

![Dimensions Diagram](image)

**Ordering Options**

DFB-1xxx-C5-2-2.5-xx-x-x-xx-x

- **Wavelength**
  - 270=1270 nm
  - 290=1290 nm
  - 310=1310 nm
  - 330=1330 nm
  - 350=1350 nm
  - 370=1370 nm
  - 390=1390 nm
  - 410=1410 nm
  - 430=1430 nm
  - 450=1450 nm
  - 470=1470 nm
  - 490=1490 nm
  - 510=1510 nm
  - 530=1530 nm
  - 550=1550 nm
  - 570=1570 nm
  - 590=1590 nm
  - 610=1610 nm

- **A**= Pin Type A
- **B**= Pin Type B
- **C**= Pin Type C
- **I**= Single-stage Isolator
- **N**= No Isolator
- **P**= Pole Type P
- **T**= Pole Type T

- **Type A:**
  - **Wavelength:**
    - 00=±2 nm λacc
    - 01=±3 nm λacc
    - 02=±10 nm λacc
    - Blank=±3 nm λacc
    - (02 available for 1490nm and 1550nm only)

- **Type C:**
  - **Wavelength:**
    - 00=±2 nm λacc
    - 01=±3 nm λacc
    - 02=±10 nm λacc
    - Blank=±3 nm λacc

- **Ordering Options:**
  - 4 = 40 km
  - 8 = 80 km
  - Blank = 40km
Safety Information

All versions of this laser are Class 1M laser products per IEC\(^1\)/EN\(^2\) 60825-1:2001-08. Users should observe safety precautions such as those recommended by ANSI\(^3\) Z136.1-2000, ANSI Z36.2-1997 and IEC 60825-1:2001-08.

Notes about Laser Safety Class:

The Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) in the USA has decided to harmonize their requirements with 21 CFR 1040.10 and 1040.11 with the IEC/EN 60825-1 and IEC/EN 60601-2-22 standards. This process has not yet happened and in the interim, the CDRH agency has released Laser Notice No.50 to reduce the regulatory burden. This notice allows IEC/EN classification and labeling of lasers within the USA.

IEC\(^1\)/EN\(^2\) 60825-1 Laser Class

Class 1M: laser is safe for all conditions of use except when passed through magnifying optics such as microscopes and telescopes. Class 1M lasers produce large-diameter beams, or beams that are divergent. The MPE for a Class 1M laser cannot normally be exceeded unless focusing or imaging optics are used to narrow the beam. If the beam is refocused, the hazard of Class 1M lasers may be increased and the product class may be changed. A laser can be classified as Class 1M if the total output power is below (IEC/EN) class 3B but the power that can pass through the pupil of the eye is within Class 1.

FDA Laser Class

Class IIIB: moderate power lasers (cw: 5-500 mW, pulsed: 10 J/cm\(^2\) or the diffuse reflection limit, whichever is lower). In general Class IIIB lasers will not be a fire hazard, nor are they generally capable of producing a hazardous diffuse reflection. Specific controls are recommended.

This product does not conform to 21 CFR 1040.10 and 1040.11. Consequently, this laser module is only intended for use as a component by manufacturers of electronic products and equipment.

Wavelength = 1270 – 1610 nm
Maximum Power = 75mW
Single-mode fiber pigtail
Fiber Numerical Aperture = 0.14

Labeling is not affixed to the laser module due to size constraints; rather, labeling is placed on the outside of the shipping box.

This product is not shipped with a power supply.

Caution: use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

(1) IEC is a registered trademark of the International Electrotechnical Commission
(2) Within Europe the IEC standard has been adopted as a European Normative standard known as EN 60825, and each European country will have its own version of this standard, for example, the British Standards version known as BS EN 60825. There can be small differences between the different countries versions of EN 60825, and these are in part caused by the process of translating the standard into the native language of that country.
(3) ANSI is a registered trademark of the American National Standards Institute.