**ML1212**

1310 nm FP Laser Diode in 5.6 mm TO-can

**Overview**

Modulight’s ML1212 series are high-performance Fabry-Pérot (FP) laser diodes in 5.6 mm TO-cans. The lasers emit single transverse mode at 1310 nm wavelength. The TO-can package includes an InGaAs monitor photodiode for feedback loop.

ML1212 series is designed for digital optical communication networks with up to 2.5 Gb/s modulation speeds. Products are available with flat window cap, ball lens cap or low-profile aspheric lens cap for highest single-mode fiber coupling efficiency.

**Applications**

**Communications**

Digital optical communication networks

**Electro-optical Characteristics**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Wavelength (25°C, $P_{OP}$ = 5mW)</td>
<td>$\lambda$</td>
<td>1290</td>
<td>1310</td>
<td>1330</td>
<td>nm</td>
</tr>
<tr>
<td>Peak Wavelength (-40...85°C, $P_{OP}$ = 5mW)</td>
<td>$\lambda$</td>
<td>1260</td>
<td>-</td>
<td>1355</td>
<td>nm</td>
</tr>
<tr>
<td>Rated Optical Power (kink-free)</td>
<td>$P_R$</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>mW</td>
</tr>
<tr>
<td>Operating Current (25°C, $P_{OP}$ = 5mW)</td>
<td>$I_{OP}$</td>
<td>-</td>
<td>21 [23]</td>
<td>32 [35]</td>
<td>mA</td>
</tr>
<tr>
<td>Operating Current (85°C, $P_{OP}$ = 5mW)</td>
<td>$I_{OP,85}$</td>
<td>-</td>
<td>37 [39]</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Operating Voltage ($P_{OP}$ = 5mW)</td>
<td>$V_{OP}$</td>
<td>-</td>
<td>1.1</td>
<td>1.6</td>
<td>V</td>
</tr>
<tr>
<td>Slope Efficiency (25°C, $P_{OP}$ = 5mW)</td>
<td>$\eta$</td>
<td>0.30 [0.2]</td>
<td>0.40 [0.34]</td>
<td>-</td>
<td>W/A</td>
</tr>
<tr>
<td>Slope Efficiency 2 (85°C, $P_{OP}$ = 5mW)</td>
<td>$\eta$</td>
<td>-</td>
<td>0.29 [0.25]</td>
<td>-</td>
<td>W/A</td>
</tr>
<tr>
<td>Serial resistance (25°C, $P_{OP}$ = 5mW)</td>
<td>$R_s$</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>$\Omega$</td>
</tr>
<tr>
<td>Threshold Current 2</td>
<td>$I_{TH}$</td>
<td>-</td>
<td>9</td>
<td>18</td>
<td>mA</td>
</tr>
<tr>
<td>Threshold Current 2 (85°C)</td>
<td>$I_{TH,85}$</td>
<td>-</td>
<td>20</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Spectral Width 3</td>
<td>$\delta\lambda$</td>
<td>-</td>
<td>0.85</td>
<td>2.0</td>
<td>nm</td>
</tr>
<tr>
<td>Wavelength - Temp. Coefficient</td>
<td>$\Delta\lambda/\Delta T$</td>
<td>-</td>
<td>0.46</td>
<td>-</td>
<td>nm/K</td>
</tr>
<tr>
<td>Parallel Beam Divergence (FWHM)</td>
<td>$\theta_{</td>
<td></td>
<td>}$</td>
<td>-</td>
<td>21 [6] (-)</td>
</tr>
<tr>
<td>Perpendicular Beam Divergence (FWMH)</td>
<td>$\theta_{\perp}$</td>
<td>-</td>
<td>38 [13] (-)</td>
<td>-</td>
<td>°</td>
</tr>
<tr>
<td>Modulation Bandwidth (kink-free, 25°C)</td>
<td>$f_{3dB}$</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>GHz</td>
</tr>
<tr>
<td>Monitor current</td>
<td>$I_m$</td>
<td>100</td>
<td>-</td>
<td>1000</td>
<td>$\mu$A</td>
</tr>
<tr>
<td>Monitor dark current</td>
<td>$I_{dm}$</td>
<td>-</td>
<td>0.1</td>
<td>1.0</td>
<td>$\mu$A</td>
</tr>
<tr>
<td>Monitor capacitance</td>
<td>$C_m$</td>
<td>-</td>
<td>5</td>
<td>10</td>
<td>pF</td>
</tr>
<tr>
<td>Tracking error ($I_m$=constant, $P_o$=3mW@25°C)</td>
<td>$\gamma$</td>
<td>-1</td>
<td>-</td>
<td>1</td>
<td>db</td>
</tr>
<tr>
<td>Focal length 4</td>
<td>$D_f$</td>
<td>-</td>
<td>[6.25] [7.46]</td>
<td>-</td>
<td>mm</td>
</tr>
<tr>
<td>Fiber coupling efficiency (SM fiber)</td>
<td>-</td>
<td>-</td>
<td>[15] [45]</td>
<td>-</td>
<td>%</td>
</tr>
</tbody>
</table>

Unless otherwise noted, the above values represent operation @ 25°C. All temperatures refer to case temperature, $T_C$.

1 Where indicated, values in brackets [ ] apply for ball lens cap type, values in parenthesis ( ) apply for aspheric lens cap type
2 2nd derivative method
3
4
Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Output Power</td>
<td>$P_{OP}$</td>
<td>20</td>
<td>mW</td>
</tr>
<tr>
<td>LD Reverse Voltage</td>
<td>$V_{RLD}$</td>
<td>2</td>
<td>V</td>
</tr>
<tr>
<td>LD Forward Current</td>
<td>$I_{FLD}$</td>
<td>200</td>
<td>mA</td>
</tr>
<tr>
<td>PD reverse voltage</td>
<td>$V_{RPD}$</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>PD forward current</td>
<td>$I_{FPD}$</td>
<td>10</td>
<td>mA</td>
</tr>
<tr>
<td>Lead soldering temperature (&lt;10 s)</td>
<td>$T_{SLD}$</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Operating case temperature</td>
<td>$T_c$</td>
<td>-40-85°C</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{STG}$</td>
<td>-40-85°C</td>
<td>°C</td>
</tr>
</tbody>
</table>

Ordering information

<table>
<thead>
<tr>
<th>Product</th>
<th>Cap type</th>
<th>Pin layout</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML1212</td>
<td>Aspherical lens</td>
<td>3</td>
</tr>
<tr>
<td>ML1213</td>
<td>Ball lens</td>
<td>3</td>
</tr>
<tr>
<td>ML1214</td>
<td>Flat lens</td>
<td>2</td>
</tr>
<tr>
<td>ML1215</td>
<td>Flat lens</td>
<td>3</td>
</tr>
<tr>
<td>ML1247</td>
<td>Aspherical lens</td>
<td>1</td>
</tr>
<tr>
<td>ML1248</td>
<td>Aspherical lens</td>
<td>2</td>
</tr>
<tr>
<td>ML1249</td>
<td>Ball lens</td>
<td>1</td>
</tr>
<tr>
<td>ML1250</td>
<td>Ball lens</td>
<td>2</td>
</tr>
<tr>
<td>ML1251</td>
<td>Flat lens</td>
<td>1</td>
</tr>
</tbody>
</table>
Mechanical Specification ML1214, ML1215, ML1251

Bottom view pin layout

Pin layout 1

Pin layout 2

Pin layout 3
Mechanical Specification ML1213, ML1249, ML1250

Bottom view pin layout

Pin layout 1

Pin layout 2

Pin layout 3
Bottom view pin layout

Pin layout 1

Pin layout 2

Pin layout 3
Safety Information

- The laser light emitted from this laser device is invisible and potentially harmful to the human eye. Avoid eye and skin exposure to the beam, both direct and reflected.
- Products are subject to the risks normally associated with sensitive electronic devices including static discharge, transients, and overload. Please ensure ESD protection prior to handling the products.
- These Modulight products are not intended for use in systems where product malfunction can reasonably be expected to result in personal injury.

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