Optoelectronics Components Data Sheet

DE-0788

1.25Gbps APD-preamplifier Coaxial Module

**Description**
DE-0788 is a 1.25Gbps, optical receiver module of coaxial pigtail type. This module consists of an InGaAs avalanche photodiode (APD) with a trans-impedance amplifier (TIA), a single-mode fiber and a coaxial package. This module is suitable for building digital optical transmission systems up to 1.25Gbps.

**Features**
- Data rate : 1.25Gbps
- Optical sensitivity : -39dBm
- Differential output
- Built-in TIA
- Hermetically sealed APD-TIA device
- YAG laser spot welding for high reliability
- Coaxial Package
- -40 to +85 °C operating temperature range

**Applications**
- Gigabit Ethernet passive optical network (PON) systems
- Digital transmission systems
**Absolute Maximum Ratings**

(Tc=25°C, unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Ratings</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td>Vcc</td>
<td>4</td>
<td>V</td>
<td>---</td>
</tr>
<tr>
<td>Optical Input power</td>
<td>Pin</td>
<td>9</td>
<td>dBm</td>
<td>---</td>
</tr>
<tr>
<td>APD reverse voltage</td>
<td>Vrapd</td>
<td>Vbr (*1)</td>
<td>V</td>
<td>---</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-40 ~ +85</td>
<td>°C</td>
<td>---</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Tc</td>
<td>-40 ~ +85</td>
<td>°C</td>
<td>---</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>Ts</td>
<td>260</td>
<td>°C</td>
<td>10sec, &gt;2mm</td>
</tr>
</tbody>
</table>

Note (*1) Vbr : APD breakdown voltage

**Electrical and Optical Characteristics**

(Tc=-40 to 85°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>Power supply voltage</td>
<td>Vcc</td>
<td>---</td>
<td>3</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
</tr>
<tr>
<td>Power supply current</td>
<td>Icc</td>
<td>---</td>
<td>23</td>
<td>30</td>
<td>39</td>
<td>mA</td>
</tr>
<tr>
<td>APD responsivity</td>
<td>S</td>
<td>(\lambda=1310\text{nm}, M=1, Pin=-30\text{dBm})</td>
<td>0.75</td>
<td>---</td>
<td>---</td>
<td>A/W</td>
</tr>
<tr>
<td>APD breakdown voltage</td>
<td>Vbr</td>
<td>Id=10 (\mu\text{A}, Tc=25\text{°C})</td>
<td>35</td>
<td>45</td>
<td>57</td>
<td>V</td>
</tr>
<tr>
<td>Output voltage (Differential)</td>
<td>Vout</td>
<td>RL=50(\Omega), M=1</td>
<td>---</td>
<td>---</td>
<td>500</td>
<td>mVpp</td>
</tr>
<tr>
<td>Temperature coefficient of Vbr</td>
<td>(\gamma)</td>
<td>(\gamma=\Delta Vbr/\Delta Tc)</td>
<td>0.08</td>
<td>0.1</td>
<td>0.12</td>
<td>V/°C</td>
</tr>
<tr>
<td>Responsivity (Differential)</td>
<td>R</td>
<td>(\lambda=1550\text{nm}, RL=50\Omega, M=1)</td>
<td>---</td>
<td>20</td>
<td>---</td>
<td>kV/W</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>BW</td>
<td>RL=50(\Omega), Pin=-30dBm, -3dB</td>
<td>---</td>
<td>1</td>
<td>---</td>
<td>GHz</td>
</tr>
<tr>
<td>Operating bit rate</td>
<td>fop</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.25</td>
<td>Gbps</td>
</tr>
<tr>
<td>Output impedance</td>
<td>Rout</td>
<td>Single ended</td>
<td>35</td>
<td>50</td>
<td>65</td>
<td>Ω</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>Pmin</td>
<td>(fo\tan=1.25\text{Gbps}, ExR=10\text{dB})</td>
<td>---</td>
<td>-39</td>
<td>---</td>
<td>dBm</td>
</tr>
</tbody>
</table>

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Outline Drawings

All dimensions in mm
Tolerance: +/-0.2, unless otherwise noted.

Pin configuration

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OUT</td>
</tr>
<tr>
<td>2</td>
<td>APD cathode</td>
</tr>
<tr>
<td>3</td>
<td>Vcc</td>
</tr>
<tr>
<td>4</td>
<td>OUT</td>
</tr>
<tr>
<td>5</td>
<td>GND, Case</td>
</tr>
</tbody>
</table>
Optical Fiber Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber type</td>
<td>Single mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode field diameter</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>µm</td>
</tr>
<tr>
<td>Clad diameter</td>
<td>123</td>
<td>125</td>
<td>127</td>
<td>µm</td>
</tr>
<tr>
<td>Concentricity error</td>
<td>---</td>
<td>---</td>
<td>1</td>
<td>µm</td>
</tr>
<tr>
<td>Cladding non-circularity</td>
<td>---</td>
<td>---</td>
<td>2</td>
<td>%</td>
</tr>
<tr>
<td>Mode field non-circularity</td>
<td>---</td>
<td>---</td>
<td>6</td>
<td>%</td>
</tr>
<tr>
<td>Cut off wavelength</td>
<td>1270</td>
<td>---</td>
<td>---</td>
<td>nm</td>
</tr>
<tr>
<td>Jacket diameter</td>
<td>0.8</td>
<td>0.9</td>
<td>1</td>
<td>mm</td>
</tr>
<tr>
<td>Bending Radius</td>
<td>20</td>
<td>---</td>
<td>---</td>
<td>mm</td>
</tr>
<tr>
<td>Tensile strength fiber case</td>
<td>5</td>
<td>---</td>
<td>---</td>
<td>N</td>
</tr>
<tr>
<td>Length</td>
<td>---</td>
<td>(1000)</td>
<td>---</td>
<td>mm</td>
</tr>
<tr>
<td>Connector</td>
<td>FC type / SPC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SC type / SPC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MU type / SPC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ordering information

DE-0788-□□

<table>
<thead>
<tr>
<th>Code</th>
<th>Connector type</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>SC/SPC</td>
</tr>
<tr>
<td>F</td>
<td>FC/SPC</td>
</tr>
<tr>
<td>M</td>
<td>MU/SPC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Flange type</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No flange</td>
</tr>
<tr>
<td>H</td>
<td>Horizontal type</td>
</tr>
<tr>
<td>V</td>
<td>Vertical type</td>
</tr>
</tbody>
</table>

OPTOHUB Co., Ltd.

305 Live Tower Musashi Urawa
7-6-8 Bessho, Minami-ku, Saitama-shi
Saitama, 336-0021 JAPAN

URL : http://www.optohub.com
E-mail : info@optohub.com
TEL : +81-48-844-8899
FAX : +81-48-844-8902

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