Please read this data sheet before purchasing and keep it on file for future reference. It contains important information on the product specifications.

Optocom
Optoelectronics Group

OPT3345-5Ø
OC-24 Optical Transmitter

Data Sheet
2004/5

Optocom Corporation
210 Andover Street, Wilmington, MA 01887
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General

Description
The OPT3345-5∅ is a 20-pin DIP fiber optic transmitter module which converts electrical data signals to lightwaves in the 1310 nm band at data rates from 1 Mbps to 1.25 Gbps. The transmitter consists of a hermetic, 1.3 µm InGaAsP/InP MQW DFB laser and a circuitry providing modulation, automatic optical power control, and thermal compensation.

Applications
The device is designed for data communication systems and telecommunication transmission systems over singlemode fiber.

Standards Met
The specifications met are the SONET/SDH STS-24/STM-8 interface, the Long Reach OC-24 Optical Parameters (LR-1) of Bellcore GR-253-CORE, the Long-haul Recommendation (L-8.1) of ITU-T G.957, and the monitor & alarm requirements of Bellcore GR-253-CORE & ITUT G783 and G958.

Function

Operation Features
The OPT3345-5∅ optical transmitter operates using either a single +5 V or -5 V power supply. The device maintains electrical and optical stability over the specified temperature and voltage ratings. Outputs include the laser bias current monitor (LBM) voltage and the laser backface monitor (BFM).

Operation Suggestions
Operator can disable optical output through a user-provided electrical input.

User Options
For further uses of LBM and BFM refer to Bellcore GR-253-CORE & ITU-T G.783.

Ratings

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage*</td>
<td>Vcc-Vee</td>
<td>0</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>Operating Case Temperature Range</td>
<td>Tc</td>
<td>-40</td>
<td>85</td>
<td>°C</td>
</tr>
<tr>
<td>Operating Relative Humidity (non-condensing)</td>
<td>Hr</td>
<td>—</td>
<td>85</td>
<td>%</td>
</tr>
<tr>
<td>Lead Soldering Temperature/Time</td>
<td>Tst</td>
<td>250</td>
<td>10</td>
<td>°C/s</td>
</tr>
<tr>
<td>Minimum Fiber Bend Radius</td>
<td>Rf</td>
<td>32/1.25</td>
<td>—</td>
<td>mm/in</td>
</tr>
<tr>
<td>Storage Case Temperature Range</td>
<td>Tstg</td>
<td>-40</td>
<td>65</td>
<td>°C</td>
</tr>
</tbody>
</table>

* With Vcc and Vee connected to (+5 V, 0 V) respectively, or with Vcc and Vee connected to (0 V, -5.2 V) respectively.
## Operating Characteristics

### Electrical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>dc Power Supply Voltage</td>
<td>V&lt;sub&gt;C&lt;/sub&gt; - V&lt;sub&gt;E&lt;/sub&gt;</td>
<td>4.75</td>
<td>50</td>
<td>5.25</td>
<td>V</td>
</tr>
<tr>
<td>dc Power Supply Current</td>
<td>I&lt;sub&gt;C&lt;/sub&gt; or I&lt;sub&gt;E&lt;/sub&gt;</td>
<td>—</td>
<td>140</td>
<td>200</td>
<td>mA</td>
</tr>
<tr>
<td>Input Data Voltage&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>V&lt;sub&gt;L&lt;/sub&gt;</td>
<td>-1.95</td>
<td>-18</td>
<td>-1.45</td>
<td>V</td>
</tr>
<tr>
<td>Input Data Voltage&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>V&lt;sub&gt;H&lt;/sub&gt;</td>
<td>-1.16</td>
<td>-09</td>
<td>-0.07</td>
<td>V</td>
</tr>
<tr>
<td>Input Swing&lt;sup&gt;3&lt;/sup&gt;</td>
<td>V&lt;sub&gt;PP&lt;/sub&gt;</td>
<td>200</td>
<td>—</td>
<td>1600</td>
<td>mV</td>
</tr>
<tr>
<td>Common Mode Range</td>
<td>V&lt;sub&gt;CM&lt;/sub&gt;</td>
<td>V&lt;sub&gt;C&lt;/sub&gt; - 1.49</td>
<td>—</td>
<td>V&lt;sub&gt;C&lt;/sub&gt; - 0.4</td>
<td>V</td>
</tr>
<tr>
<td>Input Transition Time&lt;sup&gt;4&lt;/sup&gt;</td>
<td>t&lt;sub&gt;I&lt;/sub&gt;</td>
<td>—</td>
<td>08</td>
<td>—</td>
<td>ns</td>
</tr>
<tr>
<td>Transmitter Disable Voltage&lt;sup&gt;5&lt;/sup&gt;</td>
<td>V&lt;sub&gt;D&lt;/sub&gt;</td>
<td>V&lt;sub&gt;E&lt;/sub&gt; + 20</td>
<td>—</td>
<td>V&lt;sub&gt;C&lt;/sub&gt;</td>
<td></td>
</tr>
<tr>
<td>Transmitter Enable Voltage</td>
<td>V&lt;sub&gt;N&lt;/sub&gt;</td>
<td>V&lt;sub&gt;E&lt;/sub&gt;</td>
<td>—</td>
<td>V&lt;sub&gt;E&lt;/sub&gt; + 0.8</td>
<td>V</td>
</tr>
<tr>
<td>Laser Bias Voltage&lt;sup&gt;6&lt;/sup&gt;</td>
<td>V&lt;sub&gt;B&lt;/sub&gt;</td>
<td>0.01</td>
<td>—</td>
<td>0.45</td>
<td>V</td>
</tr>
<tr>
<td>Laser Facet Voltage&lt;sup&gt;7&lt;/sup&gt;</td>
<td>V&lt;sub&gt;F&lt;/sub&gt;</td>
<td>0.01</td>
<td>—</td>
<td>0.20</td>
<td>V</td>
</tr>
</tbody>
</table>

<sup>1</sup> It is recommended for optimum performance to use DATA & DATA inputs simultaneously.
<sup>2</sup> Data inputs are 10X, 10KH, 100K, 10E, and 100E ECL compatible. Voltage is in reference to VCC.
<sup>3</sup> The input swing is measured as the absolute difference between DATA & DATA inputs.
<sup>4</sup> Between 10% and 90% (50% duty cycle).
<sup>5</sup> The transmitter remains enabled and requires the user to provide an external voltage to disable.
<sup>6</sup> The laser bias current is determined to be the ratio of the voltage to an internal 10K current-sensing resistor.
<sup>7</sup> Laser facet current is determined to be the ratio of the voltage to an internal 200K current-sensing resistor.

### Optical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Power Output&lt;sup&gt;1&lt;/sup&gt;</td>
<td>P&lt;sub&gt;0&lt;/sub&gt;</td>
<td>-25</td>
<td>—</td>
<td>+2</td>
<td>dBm</td>
</tr>
<tr>
<td>Operating Wavelength Range</td>
<td>λ</td>
<td>1280</td>
<td>—</td>
<td>1335</td>
<td>nm</td>
</tr>
<tr>
<td>20 dB Spectral Width (SLM Laser)</td>
<td>Δλ&lt;sub&gt;20&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>nm</td>
</tr>
<tr>
<td>Side-mode Suppression Ratio (SLM Laser)</td>
<td>SSR&lt;sub&gt;lm&lt;/sub&gt;</td>
<td>30</td>
<td>—</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td>Extinction Ratio&lt;sup&gt;2&lt;/sup&gt;</td>
<td>ER</td>
<td>10</td>
<td>—</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td>Optical Rise &amp; Fall Times&lt;sup&gt;3&lt;/sup&gt;</td>
<td>t&lt;sub&gt;RI&lt;/sub&gt;</td>
<td>—</td>
<td>—</td>
<td>0.3</td>
<td>ns</td>
</tr>
<tr>
<td>Jitter Generation, rms&lt;sup&gt;4&lt;/sup&gt;</td>
<td>η</td>
<td>—</td>
<td>—</td>
<td>0.015</td>
<td>U</td>
</tr>
<tr>
<td>Output Waveform&lt;sup&gt;5&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> It is recommended for optimum performance to use DATA & DATA inputs simultaneously.
<sup>2</sup> The laser bias current is determined to be the ratio of the voltage to an internal 10K current-sensing resistor.
<sup>3</sup> The input swing is measured as the absolute difference between DATA & DATA inputs.
<sup>4</sup> Between 10% and 90% (50% duty cycle).
<sup>5</sup> The transmitter remains enabled and requires the user to provide an external voltage to disable.
<sup>6</sup> The laser bias current is determined to be the ratio of the voltage to an internal 10K current-sensing resistor.
Operating Characteristics - continued

1 Measured using an electrical input with a $2^{23} - 1$ pseudorandom word having a 50% duty factor. It is also suitable to use additional measurement parameters and techniques specified in ITU Rec. G.787 and Bellcore GR-253-CORE. Optical loss of pigtail termination connector and measurement uncertainty is included in the numbers specified.

2 The ratio of logic “1” to logic “0” average power levels calculated as $10\log_{10}(P_1/P_0)$ in dB.

3 Measured with a 50% duty factor from the 10% to 90% points.

4 ITU Rec. G.787 and Bellcore GR-253-CORE (for Category II interfaces) list a fraction of the maximum amount of allowable generated jitter to allow for additional sources of jitter within the system. These ITU and Bellcore documents include information for measurement bandwidth specifications and techniques.

5 The optical output meets the eye diagram mask determined by GR-253-CORE.

Physical

The device package conforms to the 20-pin DIP outline shown in Figure 1. Dimensions for the package are also given in its corresponding Dimensions table.

Outline Diagram
Physical - continued

Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Typ</th>
<th>Inches</th>
<th>Metric (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>1.300</td>
<td>33.0</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>0.635</td>
<td>16.13</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>1.000</td>
<td>25.40</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>0.365</td>
<td>9.27</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td>0.100</td>
<td>2.54</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>0.110</td>
<td>2.79</td>
</tr>
<tr>
<td>Ø G</td>
<td></td>
<td>0.018</td>
<td>0.46</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>0.400</td>
<td>10.16</td>
</tr>
<tr>
<td>Ø I</td>
<td></td>
<td>0.236</td>
<td>6.00</td>
</tr>
</tbody>
</table>

An assigned serial number in both barcode and human readable formats appear on this device.

All markings and labels are permanent and meet the requirements of MIL-STD-883C-2015.

Mounting and Connections

The pigtail consists of a single-mode (SM) fiber with an 8 µm core. The outer jacket has a nominal 900 µm diameter and is terminated with an ST®, FC, or SC connector. The minimal pigtail length is 1 meter (39.4 inches) long.

* ST® is a registered trademark of AT&T

Pin Designations

<table>
<thead>
<tr>
<th>Pin</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NC</td>
<td>LBM(+)</td>
<td>NC</td>
<td>LBM(+)</td>
<td>Vl</td>
<td>Vl</td>
<td>DISABLE</td>
<td>Vl</td>
<td>Vl</td>
<td>NC</td>
</tr>
<tr>
<td>Pin</td>
<td>20</td>
<td>19</td>
<td>18</td>
<td>17</td>
<td>16</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>NC</td>
<td>BFM(+)</td>
<td>Vl</td>
<td>BFM(+)</td>
<td>DATA(+)</td>
<td>DATA(+)</td>
<td>Vl</td>
<td>CasGND</td>
<td>Vl</td>
<td>CasGND</td>
</tr>
</tbody>
</table>
# Safety

## Laser Compliance Statement

The OPT3345-5.0 is classified as a:

- **Class 1 Laser Product**
- **Laser Klasse 1**
- **Luokan 1 Laser laite**
- **Appareil A Laser De Classe 1**
- **Klass 1 Laser Apparat**

The OPT3345-5.0 is certified in the US to conform to the requirements of the Department of Health & Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J of the FDA for Class 1 Laser Products.

⚠️ **Caution** - use of device other than those specified herein may result in hazardous laser radiation exposure. Please embrace all customary precautions & discretion while handling this device.

## Optical

- Avoid direct eye exposure to laser beam projection area or a broken fiber under operation.

## Electrical

- Warning against overvoltages or current surges as these may cause failure, electrical shock or fire.
  - Solder leads to electronics entirely so as to eschew short circuits.
  - Solder or plug in device while power is turned off.

## Other

- Avoid storage above maximum temperature rating & other extreme conditions.
  - Avoid device disassembly as damages may be incurred.
  - Avoid excessive force to fiber pigtail and bending beyond a 20 mm radius.
  - Take normal handling precautions as for all electrostatic sensitive devices.

## Appendix

### Terms

- BFM  indicates the laser output power
- LBM  indicates the total amount of dc current supplied to the laser
- NC   not connected
Additional Information

Contact:
For additional information, product specifications, or information about Optocom:

Internet: http://www.optocom.com
Email: Info@optocom.com
Tel: +1 978 988 8711
Fax: +1 978 988 8722