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Introduction

With its D-Lightsys® range, Radiall offers optical transceiver components dedicated to harsh environments within the aerospace, space and defense markets. The optoelectronic D-Lightsys® modules are among the best performing in the world with very low power consumption and a minimum footprint. A complete range, from the transceiver to multichannel products, allows these devices to meet performance requirements in a large number of stringent applications.

They are dedicated to high speed data communications and provide data rates from 0.1 to 10 Gbps. D-Lightsys® modules offer high performance at very low consumption levels. Operational temperature from -55°C to +125°C and highly resistant to shock and vibrations, they can withstand the most demanding environments with unrivaled reliability. Modules are qualified per various MIL-AERO standards (ARINC 804) and are 100% tested over the whole operating temperature range. A full range of evaluation boards are also available for testing the D-Lightsys® modules.

MARKETS AND APPLICATIONS

D-Lightsys® devices are robustly designed for use in harsh environment applications such as:

Civil Aerospace
- Airframe, avionics, In-Flight Entertainment (IFE), Heads Up Display (HUD), Power and flight management, pressurized/unpressurized areas transmissions, sensors

Military Aerospace
- Avionics, weapons systems, power and flight management, sensors

Data Transmissions
- High speed data networking

Radars
- Remote antennas, phase array radar, satellite

Navy & Shipboard
- Missile systems, communication

Geophysics
- Oil and gas, mining, exploration with streamers arrays, roofers and shearing equipment

INTERNATIONAL STANDARD DOCUMENTS COMPLIANCE

- IEEE standard 802.3z Gigabit Ethernet 1000 Base-Sx PMD
- ARINC 804, 815, and 818 standards
- Control and monitoring compliant with SFF-8472 standard

FEATURES AND BENEFITS

- Data rate up to 10 Gbps
- Use 850 nm VCSEL emitters
- Control and monitor compliant with MSA SFF-8472
- Monitoring of the optical power of emitters over the temperature range
- Low power consumption
- Standard electrical SMT interface or solderless interface option
- Pigtailed optical interconnect solutions (MultiMode fibers)
- Very small form factor

PRODUCT RANGE OVERVIEW

D-lightsys® products are divided in two main families:

- S-light: single channel modules
- D-light: multichannel modules
The S-Light range includes single channel optical transceivers for harsh environment applications available in transmitter, receiver and transceiver modules. Several package options are offered from surface mount, pluggable and custom packages.

**FEATURES**
- Uses 850 nm VCSEL’s
- Controls and monitoring compliant with SFF-8472 standard
- Monitoring of the optical power over the temperature range
- Standard electrical SMT interface or pluggable interface option
- Provided with 50/125 μm or 62.5/125 μm optical fiber

All the D-Lightsys® devices can be fully monitored and/or controlled through a I²C 2-wire serial interface and are suitable for a variety of applications:
- Average and modulation currents of the VCSEL laser are both digitally programmable through the 2-wire serial interface.
- A versatile input stage allows 100 Ω differential or 50 Ω to ground termination resistors to comply with CML or LVDS signaling levels.
- Analog outputs allow the monitoring of the module state and performance.

**KEY PARAMETERS**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data rate (max)</td>
<td>10</td>
<td>Gbps</td>
<td>2 ranges available 0.1-4.25 Gbps 0.5-10 Gbps</td>
</tr>
<tr>
<td>Transceiver case operating temperature</td>
<td>-55/+125</td>
<td>°C</td>
<td>Qualified temperature range -40°C/+90°C</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>3.3</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Transceiver power consumption (max)</td>
<td>&lt;300</td>
<td>mW</td>
<td>Over the full temperature range</td>
</tr>
<tr>
<td>Average output power (min)</td>
<td>-4</td>
<td>dBm</td>
<td>S-Light family transmitters are Class 1M laser products according to IEC 60825-1 standard</td>
</tr>
<tr>
<td>Optical extinction ratio</td>
<td>9</td>
<td>dB</td>
<td>Ω2.5 Gbps ER= 5 dB Ω10 Gbps</td>
</tr>
<tr>
<td>Optical sensitivity</td>
<td>-20</td>
<td>dBm</td>
<td>Ω2.5 Gbps, for BER=10^-12 measured with a 2^7 -1 PRBS signal -10 dBm 10 Gbps</td>
</tr>
</tbody>
</table>

Detailed technical datasheets are available upon request. Please contact your local representative.

**AVAILABLE OPTIONS**

<table>
<thead>
<tr>
<th>Part Definition</th>
<th>Available Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module type</td>
<td>Transmitter</td>
<td>1 emitting channel (1 fiber)</td>
</tr>
<tr>
<td></td>
<td>Receiver</td>
<td>1 receiving channel (1 fiber)</td>
</tr>
<tr>
<td></td>
<td>Transceiver</td>
<td>1 emitting channel + 1 receiving channel (2 fibers)</td>
</tr>
</tbody>
</table>

For any additional information, please contact your local Radiall representative. Reliability and qualification reports are available upon request.
### S-Light

<table>
<thead>
<tr>
<th>Available Package Options</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 pin LCC package (Direct board soldering)</td>
<td><img src="image1.png" alt="Diagram" /></td>
</tr>
<tr>
<td>10 pin SFF package</td>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
<tr>
<td>40 pin SAMTEC YFT (Socket pluggable)</td>
<td><img src="image3.png" alt="Diagram" /></td>
</tr>
<tr>
<td>40 pin SAMTEC YFT (Narrow socket)</td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**AVAILABLE TERMINI/CONNECTORS:**
- LuxCis® ARINC 801/EN4639
- ABS1379/EN4531
- LC
- FC
- ST
- SC

**AVAILABLE OPTICAL FIBERS:**
- MultiMode 50/125 μm OM2
- MultiMode 62.5/125 μm

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*For any additional information, please contact your local Radiall representative.*
S-Light

SINGLE-CHANNEL OPTICAL TRANSMITTERS, RECEIVERS AND TRANSCEIVERS FOR HARSH ENVIRONMENTS

PART NUMBER BUILDER

SLx-www-Ix-Pyz-Lvv

- **vuv**: Pigtail length
- **Length in cm**
- **z**: Optical cable
- **N**: Nexans 132574 [62.5/125/900 µm]
- **G**: Gore FON1307 [50/125/1200 µm]
- **H**: Gore FON1371 [62.5/125/1200 µm]
- **y**: Pigtail termini
- **X**: 2 LuxCis Termi [ARINC801]
- **E**: 2 ABS1379 Termi
  - Contact sales for additional connector options
- **x**: Packaging option
- **L**: 48-Pin LCC package
- **GY**: 8x5 YFT-08-05-H-05-SB socket
- **GN**: 8x5 YFT-08-05-H-05-SB socket _ smaller package
  - Contact sales for additional connector options
- **www**: data rate
- **251**: Up to 4.25 Gbps
- **1001**: Up to 10 Gbps
- **x**: Module type
- **T**: Transmitter
- **R**: Receiver
- **M**: Transceiver

To validate your part number please contact your local Radiall representative. Technical datasheets are available upon request.
D-Light

The D-Light range includes multi channel optical transceivers for harsh environment applications available in transmitter, receiver and transceiver modules with 4 channels (4 Rx + 4 Tx). Several package options are offered from surface mount to pluggable packages.

KEY PARAMETERS

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data rate (Max)</td>
<td>10</td>
<td>Gbps</td>
<td>Several ranges available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For emitters &amp; receivers:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.1-4.5 Gbps (per channel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5-10 Gbps (per channel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For transceivers:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.1-3.25 Gbps (per channel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5-10 Gbps (per channel)</td>
</tr>
<tr>
<td>Transceiver case operating</td>
<td>-55/-100</td>
<td>°C</td>
<td>Qualified temperature range</td>
</tr>
<tr>
<td>temperature</td>
<td></td>
<td></td>
<td>-40°C/+85°C</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>3.3</td>
<td>V</td>
<td>Over the full temperature range per channel</td>
</tr>
<tr>
<td>Transceiver power consumption</td>
<td>125</td>
<td>mW</td>
<td></td>
</tr>
<tr>
<td>(Max)</td>
<td></td>
<td></td>
<td>D-Light family transmitters are Class 1M laser products according to</td>
</tr>
<tr>
<td>Average output power</td>
<td>-4</td>
<td>dBm</td>
<td>IEC 60825-1 standard</td>
</tr>
<tr>
<td>(min/channel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical extinction ratio</td>
<td>9</td>
<td>dB</td>
<td>Ø2.5 Gbps</td>
</tr>
<tr>
<td>Optical sensitivity</td>
<td>-19</td>
<td>dBm</td>
<td>Ø2.5 Gbps, for BER=10^-12 measured with a 2^7-1 PRBS signal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-16 dBm @ 3.25 Gbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-12 dBm @ 10Gbps</td>
</tr>
</tbody>
</table>

AVAILABLE OPTIONS

<table>
<thead>
<tr>
<th>Part Definition</th>
<th>Available Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmitter</td>
<td>2 or 12 emitting</td>
<td>2 or 12 emitting channels</td>
</tr>
<tr>
<td>Receiver</td>
<td>2 or 12 receiving</td>
<td>2 or 12 receiving channels</td>
</tr>
<tr>
<td>Transceiver</td>
<td>4 emitting channels + 4 receiving channels</td>
<td></td>
</tr>
</tbody>
</table>

Reliability and qualification reports are available upon request.

For any additional information, please contact your local Radiall representative.
**D-Light**

**AVAILABLE TERMINI/CONNECTORS:**
- 12 channels optical connector: MPO and/or connector compliant with IEC Standard 61754-7 and TIA 604-5
- 12 channels optical ferrule: MT ferrule only or MT ferrule with Radiall MT cartridge

**AVAILABLE OPTICAL FIBERS:**
- MultiMode 50/125 μm OM2 - ribbon 12 fibers (single fiber cable is available for DLR-02/DLT-02)
- MultiMode 62.5/125 μm - ribbon 12 fibers (single fiber cable is available for DLR-02/DLT-02)

For any additional information, please contact your local Radiall representative.
MULTI-CHANNEL OPTICAL TRANSMITTERS FOR HARSH ENVIRONMENTS

PART NUMBER BUILDER

DLT-cc-www-Ix-Pyz-Lvv

vv: Pigtail Length
Length in cm

z: Fiber Diameter
1: 50/125 μm bare ribbon fiber
2: 62.5/125 μm bare ribbon fiber

N: MT ferrule only
O: MPO connector
C: MT ferrule with MT-Cis
Contact sales for additional connector options

x: Packaging Option
L: 48-Pin LCC package
GM: 100-Pin Meg-Array socketed package
GN: 8x5 YFT-08-05-H-05-SB socket
(only for 2 channels)

www: Data Rate
251: Up to 4.25 Gbps
1000: Up to 10 Gbps

cc: Number of Channels
02: 2 channels
04: 4 channels
12: 12 channels

To validate your part number please contact your local Radiall representative.
Technical datasheets are available upon request.
MULTI-CHANNEL OPTICAL RECEIVERS FOR HARSH ENVIRONMENTS

PART NUMBER BUILDER
DLR-cc-www-ix-Pyz-Lvv

- **vu**: Pigtail Length
- **z**: Fiber Diameter
- **y**: Connector Type
- **x**: Packaging Option
- **www**: Data Rate
- **cc**: Number of Channels

Length in cm
1: 50/125 μm bare ribbon fiber
2: 62.5/125 μm bare ribbon fiber
N: MT ferrule only
O: MPO connector
C: MT ferrule with MT-Cis
Contact sales for additional connector options
L: 48-Pin LCC package
GM: 100-Pin Meg-Array socketed package
GN: 8x5 YFT-08-05-H-05-SB socket (only for 2 channels)
251: Up to 4.25 Gbps
1000: Up to 10 Gbps
02: 2 channels
04: 4 channels
12: 12 channels

To validate your part number please contact your local Radiall representative.
Technical datasheets are available upon request.
D-Light

**MULTI-CHANNEL OPTICAL TRANSCEIVERS FOR HARSH ENVIRONMENTS**

**PART NUMBER BUILDER**

**DLM-cc-www-Ix-Pyz-Lvv**

- **vv**: Pigtail Length
- **z**: Fiber Diameter
- **y**: Connector Type
- **x**: Packaging Option
- **www**: Data Rate
- **cc**: Number of Channels

- **vv**: Length in cm
- **z**: 1: 50/125 μm bare ribbon fiber
- **2**: 62.5/125 μm bare ribbon fiber
- **y**: **N**: MT ferrule only
- **O**: MPO connector
- **C**: MT ferrule with MT-Cis
  Contact sales for additional connector options
- **x**: **L**: 48-Pin LCC package
  **GM**: 100-Pin Meg-Array socketed package
- **www**: **251**: Up to 4.25 Gbps
  **1000**: Up to 10 Gbps
- **cc**: **04**: 4 channel transceiver (4Tx + 4Rx)

To validate your part number please contact your local Radiall representative. Technical datasheets are available upon request.
Evaluation Boards and Tooling

Radiall offers a full range of evaluation boards enabling full monitoring of S-Light and D-Light modules, either for the pluggable package or for the LCC package. A Windows PC-Based software is available for complete module monitoring and control.

Application notes for layout considerations are also available. Please contact your local representative for more information.

### GENERAL EVALUATION BOARD SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Type</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>External supply voltage</td>
<td>VCC</td>
<td>1.2</td>
<td>7.0</td>
<td>15</td>
<td>V</td>
</tr>
<tr>
<td>Supply voltage noise</td>
<td>NVCCx</td>
<td>-</td>
<td>-</td>
<td>150</td>
<td>mV</td>
</tr>
<tr>
<td>Supply current (Tx + Rx)</td>
<td>ICC</td>
<td>-</td>
<td>-</td>
<td>500</td>
<td>mA</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Top</td>
<td>-40</td>
<td>-</td>
<td>+100</td>
<td>°C</td>
</tr>
</tbody>
</table>

- 251: Up to 4.25 Gbps
- 1000: Up to 10 Gbps
- 04: 4 channel transceiver (4Tx + 4Rx)