# LC25W*A / LC25EW*A 2.5 Gb/s Buried Het Laser 175 km Reach With Optional Etalon Stabilization

## Features

2.5 Gb/s operation

+/- 100 pm wavelength stability over life

Optional etalon wavelength stabilization to within +/- 32 pm over life

Narrow spectral line-width

Internal TEC with precision NTC thermistor for temperature control

Entire C & L-band ITU wavelengths available (1527 nm to 1605 nm)

Code reduction with single product for reaches up to 175 km

GaInAsP SLMQW DFB single frequency laser chip

InGaAs monitor photo-diode

Hermetically sealed 14-pin butterfly package with optical isolator

## Applications

WDM

On-off ramps

Long-Haul

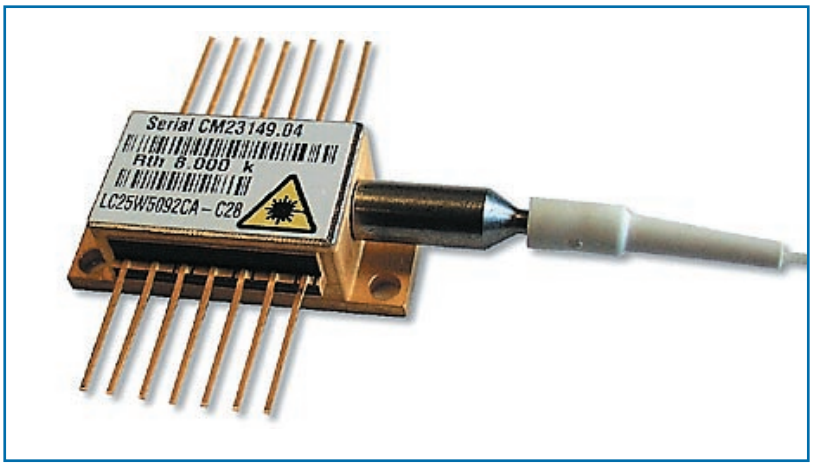
DWDM on ITU Grid

## Description

*This laser module employs the Nortel Networks strained layer MQW Buried Heterostructure DFB laser chip, and has been designed specifically for use in Wavelength Division Multiplexed (WDM) 2.5 Gb/s long distance optical fiber trunk systems. The device is packaged in a hermetically sealed 14-pin butterfly package incorporating an isolator and monitor photodiode for control of the power of the laser over life and all operating conditions.*

*The device is available with a number of power options depending on application and link span requirements.*

*An optional internal etalon is available for wavelength stabilization for DWDM applications.*




NORTEL NETWORKS™

## Parameters

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Threshold current (Ith) | | | 10 | 22 | mA |
| Slope efficiency by product | 2 mW<br>3 mW<br>4 mW<br>10 mW | 0.04<br>0.06<br>0.08<br>0.143 | | 0.09<br>0.13<br>0.17<br>0.43 | mW/mA |
| RF input reflection coef (S11) | (1) | | | -10 | dB |
| Forward voltage | | | 1.3 | 1.8 | V |
| Peak wavelength (λp) | (2) | 1527 | | 1605 | nm |
| Dispersion penalty at 175 km | (3) | | | 2 | dB |
| Time averaged spectral linewidth | -20 dB | | 0.1 | 0.6 | nm |
| Side-mode suppression | | 32 | 40 | | dB |
| Optical rise/fall time | (4) | | | 125 | ps |
| Monitor photo current | Unlocked<br>Etalon locked | 50<br>40 | 250<br>250 | 1200<br>360 | μA |
| Monitor dark current | | | | 100 | nA |
| Thermistor resistance | | | 10 | | kΩ |
| Heatpump current | 70°C case temperature | 250 | 600 | 900 | mA |
| Heatpump voltage | 70°C case temperature | | 1.0 | 2.4 | V |
| Change of λp with temp. | 20 to 35 | | 0.09 | | nm/°C |
| Change in λ over life and operating conditions | Unlocked (5)<br>Etalon locked | -100<br>-32 | | 100<br>32 | pm |

(1) 50 Ω measurement system, f = dc - 3 GHz
(2) Submount temperature between 20°C & 35°C start of life to achieve required λ p
(3) Standard product dispersion penalty will be compliant to the specified link length of 175 km using an extinction ratio of 10 dB. Fiber dispersion characteristics are derived from the following equation

$$D(\lambda) = \frac{So}{4}(\lambda - \frac{\lambda_0^{\ 4}}{\lambda^3}) ps/(nm.km)$$

Where So = 0.092 ps/(nm².km) and λ = 1302 nm
(4) Measurements determined from 20 - 80% pk - pk
(5) For more information on wavelength control and drift over life refer to applications note DR1670

## Absolute Maximum Ratings

| Parameter | Min | Max | Unit |
|---|---|---|---|
| Case operating temperature | 0 | 70 | °C |
| Laser submount operating temperature (1) | 20 | 35 | °C |
| Storage temperature | -40 | 85 | °C |
| Laser current above Ith | | 100 | mA |
| Laser reverse voltage | | 1.0 | V |
| Laser reverse current | | 10 | μA |
| Monitor diode bias | | -10 | V |
| Heatpump voltage | | 2.4 | V |
| Fiber bend radius | 30 | | mm |

Notes:
(1) Product without locker can be tuned onto the next 100 GHz ITU channel in the red shift direction (2x100 GHz tunability) by increasing the submount temperature to a maximum of 43°C

## Reliability/Quality

Meets Qualification requirements of Telcordia / Bellcore GR468-Core for central office environment.

Operating reliability <500 FITs[1] in 15 years.

*1- Assumes laser die submount held at <35°C by internal thermoelectric cooler, mean forward current of 35 mA, and end of life limits based on 10 mA increase in Ith and 25% change in laser efficiency.*

## Outline Drawing

Dimensions in mm

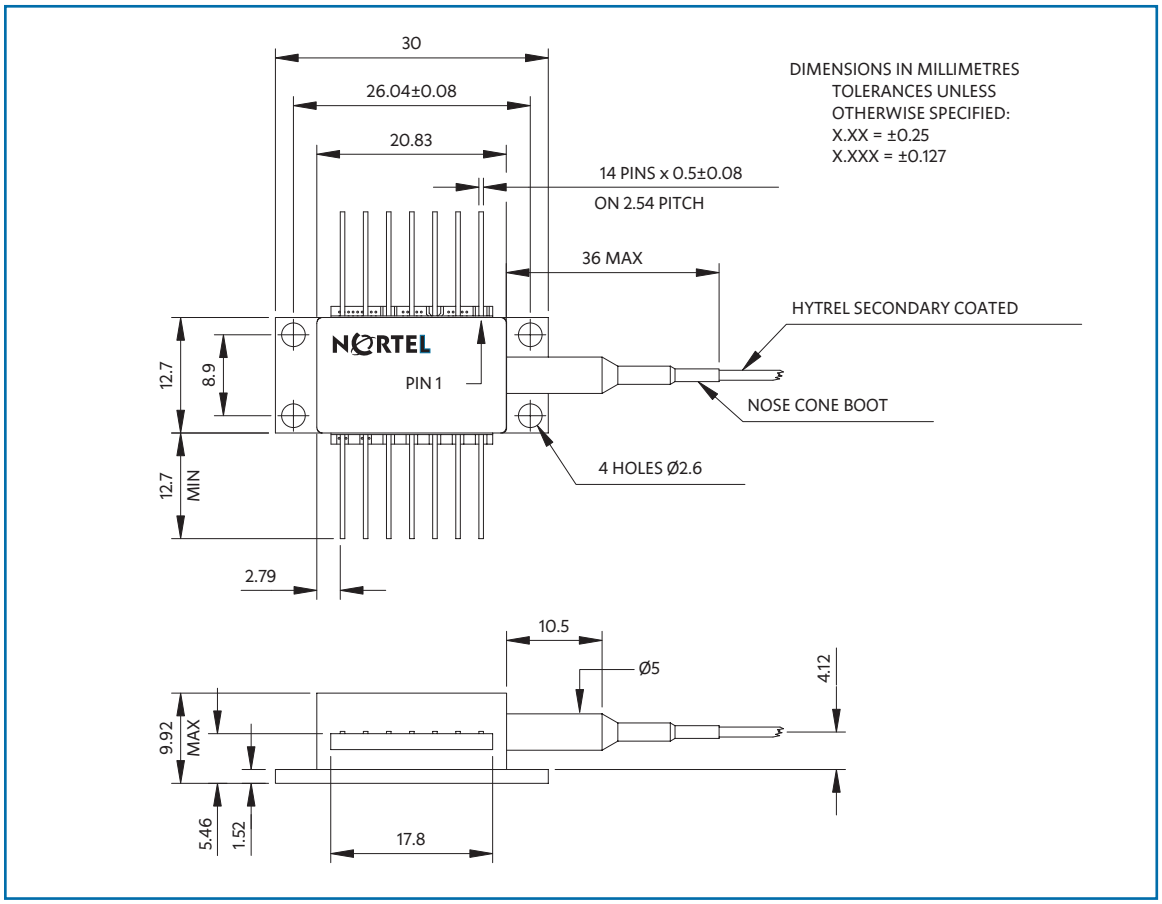



*Figure 1: Outline Drawing*

## Instructions for Use – LC25W*A and LC25EW*A

### Pin 1 and Pin 2 Thermistor

The thermistor is used in a control loop in conjunction with the thermo-electric cooler to maintain the laser submount temperature at the required value for wavelength. Operating current should be less than 100 µA to prevent self-heating errors.

For etalon stabilised devices the thermistor is used for the initial set up of the submount temperature at the required wavelength value. Operating current should be less than 100 µA to prevent self-heating errors. Once the initial submount temperature has been achieved control of the TEC current is handed over to the etalon locking circuit to achieve fine tuning.

### Pin 3 Laser DC bias (-)

Laser bias current (negative with respect to package ground) is applied via this pin which forms one side of the bias-T connection to the laser cathode.

### Pin 4 Monitor anodes, Pin 5 Common Monitor cathode

The back facet monitor provides a mean power reference for the laser and is normally operated with a 5 V reverse bias.

For etalon stabilized devices the monitor diodes are arranged in the package such that they give an equal monitor current when the laser wavelength is matched to the ITU grid. A reverse bias must be applied equally across each of the monitors, this is commonly achieved by applying 5 V to Pin 5.

### Pin 6 TEC (+), Pin 7 TEC (-)

Applying a positive voltage on pin 6 with respect to pin 7 will cause the internal submount to be cooled relative to the case temperature. Reversing the polarity will raise the submount temperature relative to the case. The TEC supply should be capable of delivering up to 0.9 A at 2.4 V.

### Pin 8, 9, 11, 13 Case ground

These pins must be grounded in all applications

### Pin 10

This pin is not connected for the LC25W product and it should be grounded if possible. For the Etalon locked product this pin is used for the monitor long anode. The monitor diodes are arranged such that they give an equal monitor current when the laser wavelength is matched to the ITU grid. A reverse bias must be applied equally across each of the monitors, this is commonly achieved by applying 5 V to pin 5.

### Pin 12 Laser modulation (-)

The data input (modulation current) is applied via this pin which is a nominal 25 Ohm impedance coplanar line.

### Pin 14 N/C

This pin is not connected. It should be grounded if possible.

## Connections

| | Without Etalon | | With Etalon |
|---|---|---|---|
| Pin | Function | Pin | Function |
| 1 | Thermistor | 1 | Thermistor |
| 2 | Thermistor | 2 | Thermistor |
| 3 | Laser DC bias (-) | 3 | Laser DC bias (-) |
| 4 | Monitor Anode (-) | 4 | Monitor Short Anode (-) |
| 5 | Monitor Cathode (+) | 5 | Monitor Cathode (+) |
| 6 | TEC (+) | 6 | TEC (+) |
| 7 | TEC (-) | 7 | TEC (-) |
| 8 | Case Ground | 8 | Case Ground |
| 9 | Case Ground | 9 | Case Ground |
| 10 | Not Connected | 10 | Monitor Long Anode (-) |
| 11 | Case Ground | 11 | Case Ground |
| 12 | Laser Modulation (-) | 12 | Laser Modulation (-) |
| 13 | Case Ground | 13 | Case Ground |
| 14 | Not Connected | 14 | Not Connected |

## Safety Information

Laser safety classifications:
IEC 60825-1:1993 +A1:1997 Class 3A
IEC 60825-1:1993 +A1:1997 +A2:2000 Class 1M
21 CFR Ch.1 (4-1-97 Edition) Class IIIb

Electrostatic discharge:
ESD threshold >500 V
TA-TSY-000870 class 3.


REFERENCE IEC 60825-1: Edition 1.2


THIS PRODUCT COMPLIES WITH 21 CFR 1040.10


## Ordering Information

| LC25 | [Etalon Option] | [Wavelength] | [Power Option] | [Reach] | [Connector] |
|---|---|---|---|---|---|
| | **W** = none | **** | **E** = 2 mWpk | **A** = 175 km | **C28** = SC/PC |
| | **EW** = Etalon | | **C** = 3 mWpk | | **C34** = FC/PC |
| | | | **A** = 4 mWpk | | **C57** = LC |
| | | | **B** = 10 mWpk | | **C59** = MU |

**** = Last four digits of wavelength value E.g. for λp = 1545.32 nm **** = 4532

Product without locker can be tuned onto the next 100 GHz ITU channel in the red shift direction (2x100 GHz tunability) i.e. an LC25W4135CA-C28 can be tuned to service the 1542.14 nm ITU channel.

Fiber length 1130 to 1190 mm

Other connector types are available on request.

E.g. **LC25W4532BA-C28** is a 10 mW 1545.32 nm device with an SC connector for use in a 175 km application.

E.g. **LC25EW4532EA-C28** is a 2 mW 1545.32 nm device with an SC connector for use in a 175 km application with optional etalon stabilization.


Certificate No. FM 15040


Certificate No. EMS 35100

NORTEL NETWORKS™

**Nortel Networks**
**Optical Components**
185 Corkstown Road
Ottawa, Ontario
Canada K2H 8V4

**www.nortelnetworks.com/opticalcomponents**



For more information, please contact your local Nortel Networks representative.
Tel: 800.4.NORTEL/800.466.7835
or outside North America 506.674.5471
Email:
sales-opticalcomponents@nortelnetworks.com

Publication # NN100361-0602 Issue 2 Dated 06/13/02