

LCM155W-20A

**2.5 Gb/s Co-packaged
Etalon Stabilised Laser
and III-V Mach-Zehnder**

Features

Voltage programmable output power control.

Very long haul performance with negligible penalty.

Integral Etalon wavelength stabilisation to within $\pm 20\text{pm}$ over life

Single 50 Ohm low voltage drive modulation input.

Integral thermo-electric cooler with precision NTC thermistor for temperature control.

Hermetically sealed 14 pin butterfly package with optical isolator.

ITU Wavelengths available from 1530nm to 1560nm.

Applications

Long and very long reach SONET/SDH STM-16/OC48 systems
DWDM systems to 50GHz channel spacing

Description

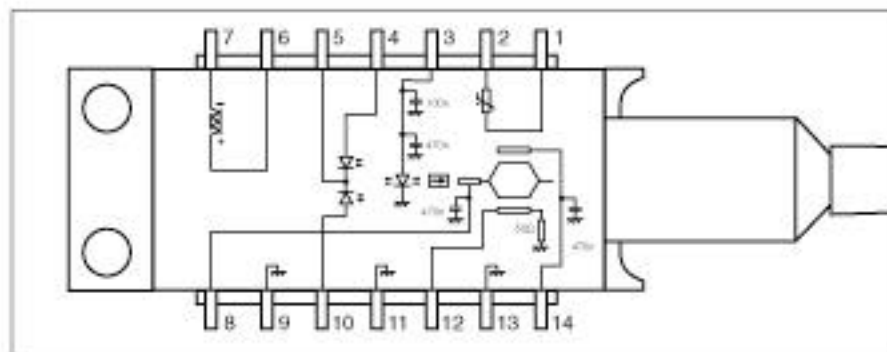
Designed for long reach 2.5Gb/s DWDM systems, the LCM155W-20A comprises a wavelength stabilised Laser, an integral III-V Mach-Zehnder modulator and voltage controlled output power.

The device incorporates two monitor photodiodes, each with a different spectral characteristic. When used with closed loop control, wavelength

stability of $\pm 20\text{pm}$ may be achieved.

The voltage controlled attenuator function may be used to set the desired output power.

When used on standard fibre (or any fibre with a positive dispersion coefficient), a 1dB dispersion penalty is achieved with 12800ps/nm dispersion.



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Characteristics

Conditions unless otherwise stated: Submount temperature $30^{\circ}\text{C} \pm 5^{\circ}\text{C}$ (for locked λ)
Monitor diode bias -5V
Output power (mean) 0.9mW min.

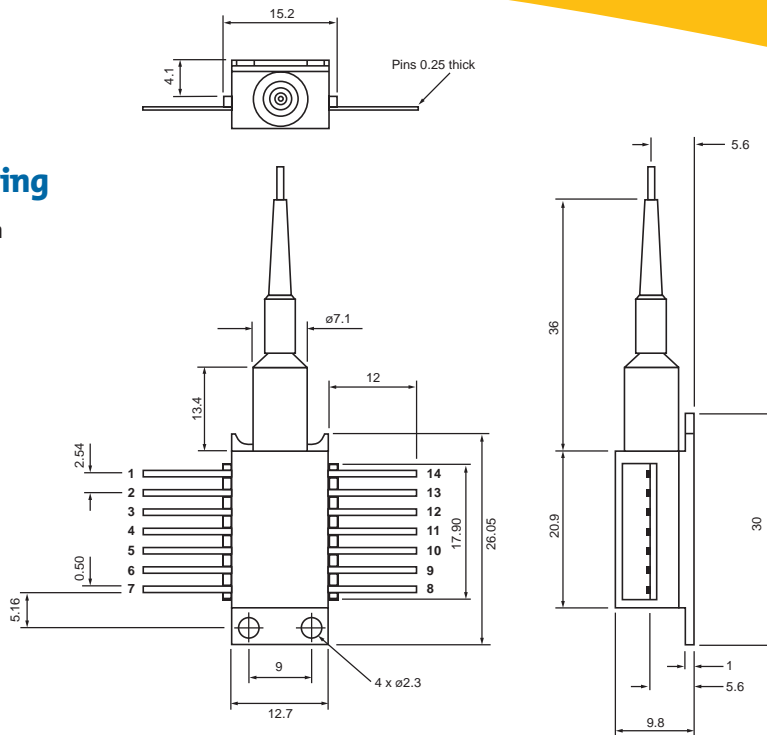
| Parameter | Conditions | Min | Typ | Max | Unit |
|------------------------------------|--|-----|-----|------|--------------------|
| Submount temperature | | 25 | | 35 | $^{\circ}\text{C}$ |
| Forward current | | | | 250 | mA |
| Output power | average at 50% duty at $T_{\text{case}} = 30^{\circ}\text{C}$ | 1.0 | | 3.0 | mW |
| Case temperature tracking error | | -1 | | 1 | dB |
| Power tuning range | 0 to -7.3V | 13 | | | dB |
| Laser forward voltage | | | | 2.75 | V |
| Line width | CW FWHM | | 2 | 20 | MHz |
| SMSR | | 40 | | | dB |
| Modulation voltage | | | | 3 | V |
| Extinction ratio | | 11 | | | dB |
| RIN | | | | -130 | dB/Hz |
| Locking photo current | | 0.2 | | 2.0 | mA |
| Monitor dark current | | | | 50 | nA |
| Heatpump current | $70^{\circ}\text{C case}/30^{\circ}\text{C chip}$ | | | 1.4 | A |
| S11 | 0 - 2.5GHz | | | -12 | dB |
| S21 | | 5 | | | GHz |

Absolute Ratings

| Parameter | Conditions | Min | Typ | Max | Unit |
|---|-----------------|-----|-----|-----|--------------------|
| Case operating temperature | | 0 | | +70 | $^{\circ}\text{C}$ |
| Storage temperature | | -40 | | +85 | $^{\circ}\text{C}$ |
| Laser forward current above I_{th} | | | | 300 | mA |
| Laser reverse voltage | | | | 2 | V |
| Monitor diode bias | | | | -18 | V |
| Fibre bend radius | | 30 | | | mm |
| Modulation input | AC + DC bias | | | 6 | V |
| Power tuning pin | reverse bias | -8 | | 0 | V |
| Power tuning pin | Reverse current | 0 | | 25 | mA |

Outline Drawing

Dimensions in mm
Tolerances ± 0.25
Finish : Gold plate



Instructions for Use - LCM155W-20A

Pin 1 and Pin 2 Thermistor

The thermistor is used in the control loop for keeping the internal temperature at a constant value. It has a nominal resistance of 8.2 k Ω at the typical operating temperature of 30 °C and is not polarity sensitive. Operating current should be limited to less than 100 μ A to prevent self-heating errors. The exact thermistor value will be supplied with the LCM155W variant to ensure correct operating wavelength.

Pin 3 Laser Bias (+) (Anode)

Laser bias current (positive with respect to package ground) is applied via this pin, which is internally decoupled to ground. The laser is operated with a forward bias current up to 250 mA at 2.75 V (typical). Threshold current is typically 30 mA at 30 °C. Laser cathode is internally connected to case ground.

Pin 4 Monitor Anode (short), Pin 10 Monitor Anode (long) and Pin 5 Monitor Cathodes

The two back facet monitor diodes are used in a control loop, which maintains constant laser wavelength. Each diode

has a different spectral response, which overlaps at the “locked” wavelength. The loop can control submount temperature and/or laser bias current to maintain the two monitor diode currents at equal values, corresponding to the locked wavelength. The diode cathodes are commoned on pin 5 and are operated with a reverse 5 V bias.

Pin 6 TEC (+) and Pin 7 TEC (-)

Applying a positive voltage on Pin 6 with respect to Pin 7 will cause the internal optics to be cooled relative to the case temperature. Reversing the applied voltage will cause the internal structures to be heated. The power supply for the heatpumps should be capable of sourcing up to 1.2 A at 5 V.

Pin 8 Power Adjust

A negative DC voltage in the range 0 V to -7.3 V applied to this pin will attenuate the output power by up to 20 dB. The supply should be capable of sinking up to 30 mA from this pin.

Pin 9, 11, 13 Package Ground

Pins 11 and 13 specifically need to be good RF grounds, since these pin

positions are on either side of the RF input.

Pin 12 Data Input

This pin provides both the DC bias to the MZ and the data input (modulation voltage). The DC bias value and required modulation voltage are supplied with the device. The DC bias source is required to deliver about -2.0 V at up to 10 mA and should be connected via an inductor. The modulation input has characteristic impedance of 50 Ω and should be AC coupled to a suitable driver using 50 Ω tracks. Modulation voltage for optimum extinction ratio is supplied with the device and may be up to 3.0 Vpp.

Pin 14 MZ Bias

DC bias voltage for the fixed MZ arm. This pin must be connected to a negative DC voltage (typically around -2.0 V) which is defined in the deliverable data. The bias voltage source must be capable of delivering up to 10 mA to this pin.

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Connections

| | | | |
|-------|-----------------|--------|-----------------------|
| Pin 1 | Thermistor | Pin 14 | Bias for fixed MZ arm |
| 2 | Thermistor | 13 | Ground |
| 3 | Laser bias (+) | 12 | Data (DC coupled) |
| 4 | BFM Anode short | 11 | Ground |
| 5 | BFM Cathode | 10 | BFM Anode long |
| 6 | Cooler (+) | 9 | Ground |
| 7 | Cooler (-) | 8 | Power adjust |

Device Ordering Information

Order Code No. LCM155W**** - 20A (Connector Type)

Where **** = Last four digits of wavelength value i.e for $\lambda_p = 1545.32\text{nm}$ **** = 4532

For wavelength information see Nortel Networks WDM wavelength plan.

Connector type SC = C28, FC/PC = C33, no suffix = 2.5mm o.d ceramic ferrule (Std)

An Applications Note AN0002 is also available for this device.

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PB0095 ISSUE 2 July 2000

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