


# LambdaFLEX™ iTLA

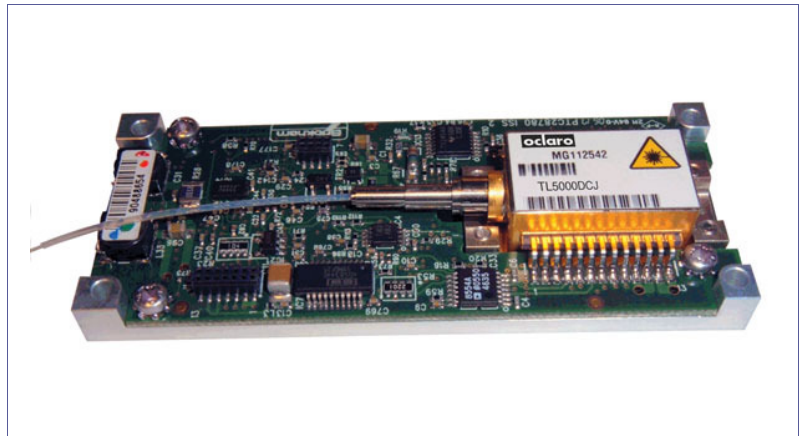
## TL5000DLJ Integrable Tunable Laser Assembly

### Features:

- Full L-Band tunable source (1568.7-1607.5nm) based on OIF iTLA footprint
- High power +10dBm EOL
- High speed electronic tuning control (<10ms channel to channel)
- Electronic shutter for dark tuning
- Low power dissipation, 3.8W typical
- Narrow line-width, 5MHz maximum
- Excellent SMSR >40dB
- Low RIN
- Wavelength stabilized for 50GHz or 100GHz ITU-T channel spacing
- Optical power monitor
- FM Dither / Trace tone capability
- Case operating temperature range -5°C to +75°C
- Simple RS232 interface
- RoHS compliant 
- Telcordia Qualified to GR 468

### Applications:

- Long Haul/Ultra Long Haul
- Regional Metro
- Test and Measurement



The Oclaro LambdaFLEX™ iTLA is a high performance continuous wave (CW) tunable laser source for use in the L-band window covering 1568nm to 1607nm. Based on the OIF iTLA standard, the laser and control electronics are pre-mounted on a dedicated circuit board for easy production installation. The iTLA features shuttered tuning, trace tone and FM dither circuitry. Comprehensive control and system reporting is provided over the RS232 interface.

The iTLA implements the Oclaro DSDBR wideband tunable laser. This laser is a fully monolithic InP chip designed for high volume, low cost manufacturing. With no moving parts, it is a low voltage electronically tuned device enabling rapid wavelength switching with straightforward control electronics. The integrated semiconductor optical amplifier (SOA) provisions the optical power control and also acts as a shutter to allow dark tuning when reverse biased.

Laser chip operation is at a fixed temperature. Wavelength stability is guaranteed by an internal wavelength locker for control to a 50GHz or 100GHz ITU wavelength grid. Front facet output power monitoring is also provided by the wavelength locker for feedback control through the SOA. The device is provided with polarization maintaining fibre for use with an external modulator.

## Optical Characteristics

The following parametric limits detailed are for a case temperature range of -5°C to 75°C.

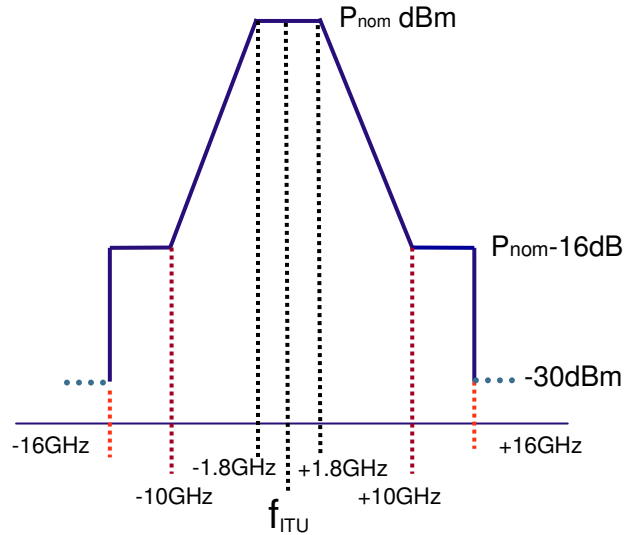
| Parameter   | Min     | Typ   | Max          | Unit  | Conditions                                       |
|---|---------|-------|--------------|-------|--|
| Output Power  | +10     | +10.8 | +11.5        | dBm   | EOL  |
| Optical output power tolerance                              | -0.8    |       | +0.7         | dB    | Note [5]   |
| Variation in optical output power over the wavelength range |         | 0.3   | 0.5          | ±dB   | Fixed set power value and fixed case temperature |
| Frequency Range   | 186.5   |       | 191.1        | THz   | L band, 93 channels, 50GHz spacing               |
| Wavelength Range  | 1568.77 |       | 1607.47      | nm    | L Band   |
| No of Channels  | 93      |       |              |       | 50GHz spacing                                    |
| SMSR  | 40      | 45    |              | dB    |  |
| Linewidth   |         | 1     | 5            | MHz   | Lorentzian                                       |
| RIN (10MHz-1GHz)<br>(1-10GHz)                               |         |       | -110<br>-145 | dB/Hz | Average RIN                                      |
| OSNR  | 50      | 55    |              | dB    | 0.1nm optical bandwidth                          |
| Polarization extinction ratio                               | 20      |       |              | dB    |  |
| Return Loss   |         | -50   | -40          | dB    |  |
| Back Reflection Tolerance                                   | -8.2    |       |              | dB    | For RIN <-140dB/Hz                               |
| Locked frequency accuracy                                   | -1.8    |       | +1.8         | GHz   | EOL [4]  |
| Shuttered output power                                      |         | -35   | -30          | dBm   |  |
| Linewidth for Brillouin suppression                         | 250     |       | 1000         | MHz   |  |
| Brillouin frequency selection                               | 10      |       | 100          | kHz   | Note [1]   |
| Trace Tone Frequency  | 10      |       | 500          | kHz   | Note [1]   |
| Trace Tone Modulation Depth                                 |         | 4     | 10           | %     |  |
| Tuning Speed  |         |       | 10           | ms    | Various scenarios apply [2]                      |
| iTLA 'cold-start' initialisation time                       |         |       | 60           | s     | Note [3]   |

### Notes:

- [1] The Oclaro iTLA incorporates a single onboard oscillator which is used to provide either non-linearity suppression or Trace Tone functionality, but cannot provide both functions simultaneously. However the iTLA MFR1 input can be used to enable an external frequency source to be applied enabling both non-linearity suppression and Trace Tone functionality.
- [2] The Oclaro laser is guaranteed to tune within 10ms which is to comply with the OIF "Application A" (SONET/SDH Protection), however, this applies only for tuning between channels, with or without the laser enabled (host sending the change channel command only). Enabling the laser from a disabled state will take longer, as the tuning has to be executed more slowly, in order to comply with the ramped power vs frequency mask specification. In either case, the host must monitor, process and respond appropriately to the status bits of the iTLA out-bound (module to host) response packet, generated in response to each host command.
- [3] Time required from application of Vcc and Vee supplies for the iTLA to reach an operational state . Complies with the OIF MSA module warm up time.
- [4] Better than specified iTLA OIF MSA V01.1 Applications requirements, section 10.1.2
- [5] Specified over product life, operational temperature range and channel optical power budget.

## iTLA Frequency versus Power Mask

The iTLA is guaranteed to comply with the frequency versus power mask shown below. This mask applies during iTLA power enable and disable operations and also during channel changing operations.



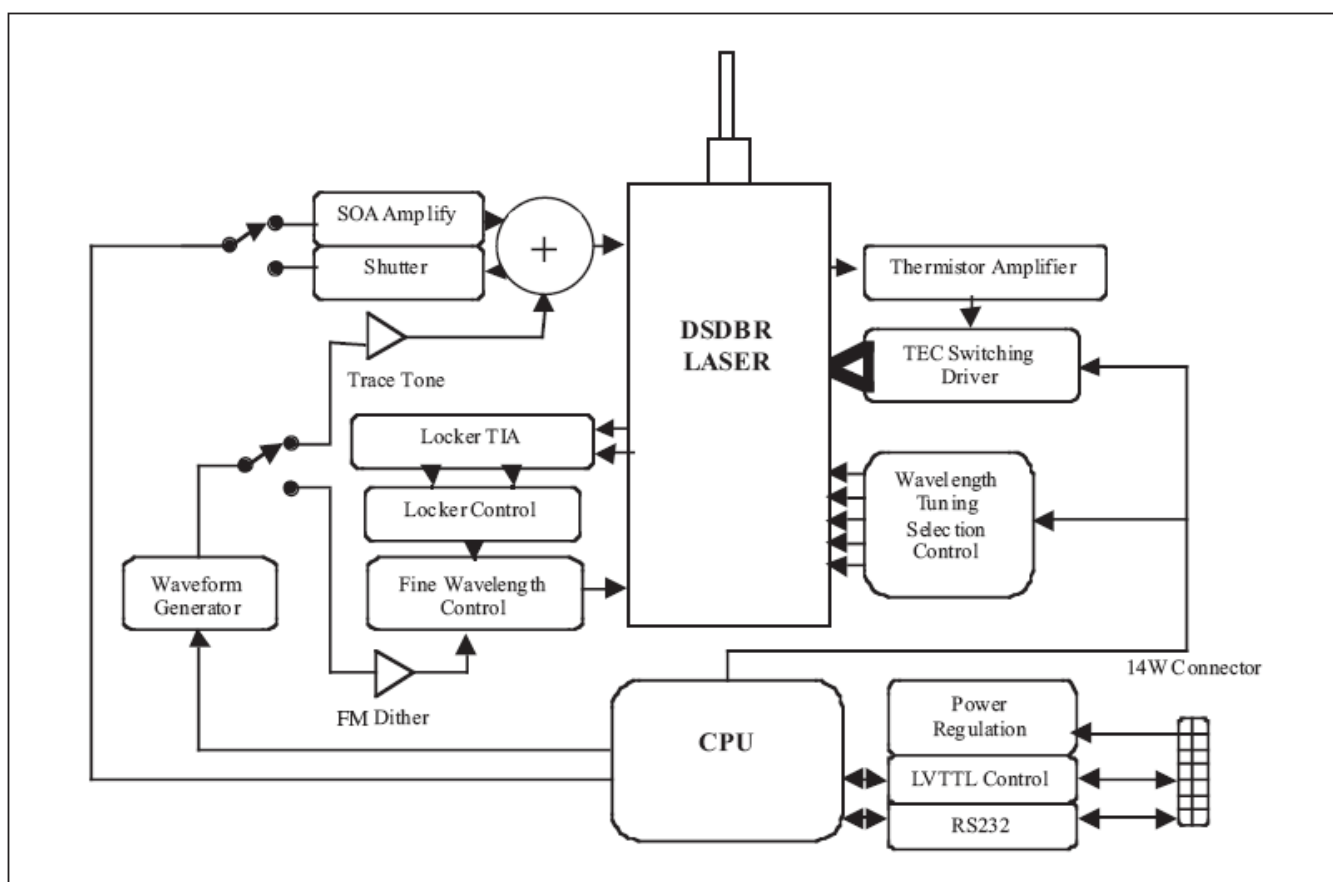
## Electrical Characteristics

| Parameter                   | Min   | Typ  | Max    | Unit | Conditions                   |
|-----------------------------|-------|------|--------|------|------------------------------|
| +3V3 supply voltage         | 3.15  | 3.3  | 3.45   | V    |                              |
| +3V3 supply current         |       | 1100 | 1500   | mA   |                              |
| -5.2V supply voltage        | -5.45 |      | -4.94  | V    |                              |
| -5.2V supply current        |       | 30   | 100    | mA   | For shuttered operation only |
| Power Dissipation           |       | 3.8  | 5.5    | W    |                              |
| LVTTL Input $V_{IN}$ LOW    |       |      | 0.8    | V    |                              |
| LVTTL Input $V_{IN}$ HIGH   | 2     |      |        | V    |                              |
| LVTTL Output $V_{OUT}$ LOW  |       |      | 0.5    | V    |                              |
| LVTTL Output $V_{OUT}$ HIGH | 2.4   |      |        | V    |                              |
| Power Supply Noise          |       |      | 1      | %rms | 100Hz to 20MHz               |
| RS232 Interface             | 9600  |      | 115200 | Baud | Default 9600 baud            |

## Environmental Characteristics

| Parameter               | Min | Typ | Max | Unit | Conditions                    |
|-------------------------|-----|-----|-----|------|-------------------------------|
| Storage Temperature     | -40 |     | +85 | °C   |                               |
| Operating Temperature   | -5  |     | +75 | °C   | With suitable heatsink        |
| Operating Humidity      | 5   |     | 85  | %RH  |                               |
| Electrostatic Discharge | 500 |     |     | V    | MIL-STD-883, Method 4         |
| Flammability            | V0  |     |     |      | Fibre coat UL94-HB <1 gm mass |

## iTLA Block Diagram



## Connector Signal Function

| Name | Function            | Active       | Description                   |
|------|---------------------|--------------|-------------------------------|
| DIS  | Disable Laser       | LOW          | Optical output terminated     |
| SRQ  | Service Request     | LOW          | Service interrupt poll        |
| MS   | Module I/O reset    | L→H edge     | Resets I/O physical interface |
| TXD  | RS232 transmit data |              | LVTTTL RS232 Tx               |
| RXD  | RS232 receive data  |              | LVTTTL RS232 Rx               |
| RST  | Reset               | LOW          | Laser off, module in reset    |
| MFR1 | See note below      |              | Manufacturers connection only |
| OIF  | Reserved            | LVTTTL input | For future use                |

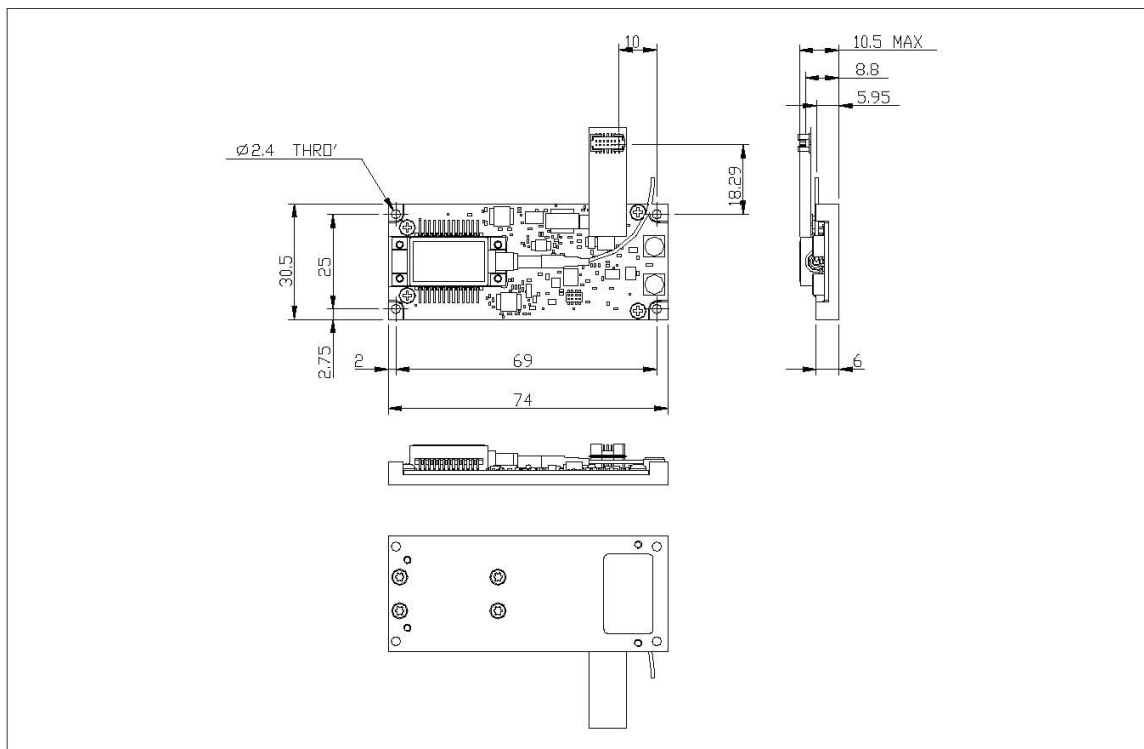
### Notes:

This pin can be factory configured to provide an external trace tone input. This allows an external sine wave signal to modulate the laser output power (AM). This input can be used simultaneously with the internal non-linearity suppression dither function.

This input will accept a signal amplitude between 0 and 1Vpp and has a -3dB frequency bandwidth of approximately 3KHz to 2MHz.

The transfer function is not controlled so that the user must monitor the resulting AM and adjust the input signal amplitude so as to produce the required modulation depth. This input is internally AC coupled. Absolute maximum input is 3Vpp.

## Mechanical Detail (dimensions in mm)

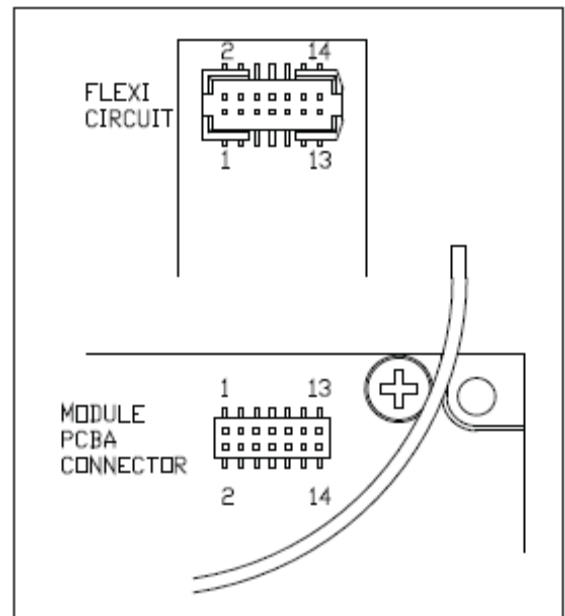


- 14 way Pin Connector designed to mate with Samtec P/N ASP-113466-019 or equivalent.
  - Module attached with 4 X M2 screws, clearance hole in iTLA, threaded in user housing.
- The module should be mounted to a flat heat sink or thermal pathway for correct device operation. The module thermal management should ensure that the case temperature does not exceed 75°C at the worst case end of life dissipation figure of 5.5 Watts.

## Physical Connectivity

### Pin Out Table

| Pin # | Function | Pin # | Function |
|-------|----------|-------|----------|
| 1     | 3V3      | 2     | DIS      |
| 3     | 3V3      | 4     | SRQ      |
| 5     | GND      | 6     | MS       |
| 7     | GND      | 8     | TXD      |
| 9     | -5.2V    | 10    | RXD      |
| 11    | -5.2V    | 12    | RST      |
| 13    | OIF      | 14    | MFR1     |



## Customer Support and Handling Recommendations

An iTLA evaluation kit is available which provides a hardware platform to test and characterise the Oclaro iTLA. It provides convenient connection for iTLA power supplies, LED power indicators and a selection of module enable/disable and software/hardware reset switches. This kit also includes a convenient GUI software applications interface which enables host/iTLA communications using the OIF MSA recommended packet structure via the RS232 interface, enabling comprehensive control and status interrogation.

Please refer to your local sales representative for iTLA evaluation kit availability.

iTLA product support documents are also available on request. The Oclaro applications document *Handling and Operation Recommendations for the Oclaro Integrable Tunable Laser Assembly (iTLA) D00041-AN*, provides recommendations and advice regarding handling, mounting and operation of the iTLA to enable straightforward integration of the iTLA into a clients' system card.

## Optical Fibre

|                     |  |
|---------------------|--|
| Fibre Length        | 1400mm +/- 100mm                           |
| Fibre coating       | 900um split loose tube                     |
| Fibre Type          | PANDA 9/125 polarization maintaining fibre |
| Minimum Bend Radius | 20mm                                       |
| Connector           | FC-UPC                                     |

## RoHS Compliance



Oclaro is fully committed to environment protection and sustainable development and has set in place a comprehensive program for removing polluting and hazardous substances from all of its products. The relevant evidence of RoHS compliance is held as part of our controlled documentation for each of our compliant products. RoHS compliance parts are available to order, please refer to the ordering information section for further details.

## Ordering Information:

TL5000DLJ

FC/UPC connector supplied as standard. This connector is present for testing purposes only. It is expected to be removed by the customer to allow connection splicing.

Evaluation Board Available on request.

## Patents

This product is protected by US patent numbers 6,658,035, 6,654,400, 6,687,278, 6,345,135, 7,145,923, 7,394,838, 7,680,374 and other patents and applications pending worldwide.

## Contact Information

[www.oclaro.com](http://www.oclaro.com)

## Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by Oclaro before they become applicable to any particular order or contract. In accordance with the Oclaro policy of continuous improvement specifications may change without notice. The publication of information in this data sheet does not imply freedom from patent or other protective rights of Oclaro or others. Further details are available from any Oclaro sales representative.



Caution - use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

D00100-PB Issue 05 February 2011

©Oclaro 2011. Oclaro the Oclaro, Inc. logo, and all other Oclaro, Inc product names and slogans are trademarks or registered trademarks of Oclaro, Inc. in the U.S.A. or other countries. Information in this datasheet is subject to change without notice.