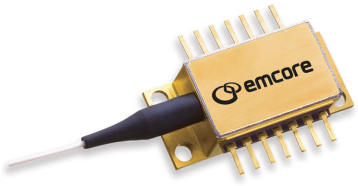



# 1751A 1550 nm DWDM DFB Laser Module

The 1751 laser module is a Dense Wavelength-Division Multiplexing (DWDM) laser for analog applications. It features a distributed feedback chip that has been designed specifically for Radio Frequency (RF) applications. The 1751 laser module has a wide temperature range for reliable performance in harsh node environments and narrow transmitter designs. It also features low adiabatic chirp to maximize signal quality in short and long lengths of fiber. The laser's excellent inherent linearity minimizes degradation of the broadcast signals caused by quadrature amplitude modulated (QAM) channels. The versatile 1751 laser module reduces cable network architecture fiber needs and lessens equipment reqirements in the hub.

The 1751 is available in a wide range of standard ITU wavelengths. The lasers are offered as either forward-path (40 MHz- 860 MHz) or return-path (5 MHz-210 MHz) modules.

## Applications

- **Node capability**
- **Narrow transmitter housing**
- **Networks with limited fiber**
- **Architectures using separate optical wavelengths to carry targeted services**

## Features

- **Standard ITU grid wavelengths**
- **Advanced analog chip design**
- **Reduces equipment requirements in the hub**
- ***Telcordia Technologies*™ 468 compliant**
- **Wide temperature range—stable even in harsh environments**

## Performance Highlights

| | | Min | Typical | Max | Units |
|---|---|---|---|---|---|
| Available wavelengths (ITU Grid) | | 1527.99 | - | 1562.23 | nm |
| Optical Output Power (multiple versions) | | 6-10 | - | - | mW |
| Temperature Case Temperature Range | | -40 | - | +85 | °C |
| Frequency Range: | Return Path | 5 | - | 210 | MHz |
| | Forward Path | 40 | - | 860 | MHz |
| Composite Second Order | | 50 | - | - | dBc |
| Composite Triple Beat | | 60 | - | - | dBc |
| Adiabatic Chirp (measured at 500 MHz) | | 40 | - | 100 | MHz/mA |

See following pages for complete specifications and conditions.

## Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter | Symbol | Condition | Min | Max | Units |
|---|---|---|---|---|---|
| Operating Case Temperature | $T_C$ | continuous | -40 | +85 | °C |
| Storage Temperature | $T_{STG}$ | - | -40 | +85 | °C |
| Laser Forward dc Current | - | - | - | 150 | mA |
| Reverse Voltage Photodiode | $V_{RPD}$ | - | - | 10 | V |
| Laser Reverse Voltage, dc | $V_R$ | - | - | 1 | V |
| ESD | - | HBM: R = 1500 Ohm, C = 100 pF | -500 | 500 | V |
| TEC Current | $I_{TEC}$ | continuous | -1.7 | 1.7 | A |
| RF Input Power | $P_{RFIN}$ | $I_F = I_{OP}$ | - | 62 | dBmV |

## Electrical/Optical Characteristics

Laser Temperature ($T_L$) = 25°C, $I_F$=$I_{OP}$, Beginning of Life (BOL)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Wavelength[1] | $\lambda_{OP}$ | $I_F = I_{OP}$, T = $T_{OP}$ | 1527.94 | - | 1563.1 | nm |
| Optical Output Power | $P_O$ | 1751xxxx-06 version<br>-08 version<br>-10 version | 6<br>8<br>10 | -<br>-<br>- | -<br>-<br>- | mW<br>mW<br>mW |
| Slope Efficiency | SE | Points measure @ $I_F = I_{TH}$ + 20 mA & $I_F = I_{TH}$ + 60 mA | 0.16 | 0.19 | - | mW/mA |
| Optical Isolation | ISO | | 30 | - | - | dB |
| Sidemode Suppression Ratio | SMSR | | 35 | - | - | dB |
| Laser Relative Intensity Noise | RIN | $I_F = I_{TH}$ + 70 mA, T = 25 °C | - | <-155 | - | dB/Hz |
| Wavelength Drift as Case Temp. is Changed | $\lambda\Delta$ | $I_F$ = 60 mA, T = $T_{OP}$, Tc varied from min→max | - | - | 0.04 | nm |
| Threshold Current | $I_{TH}$ | | - | - | 20 | mA |
| Operating Current | $I_{OP}$ | | - | - | 120 | mA |
| Monitor PD Responsivity | $r_{PD}$ | $V_{RM}$=5V | 10 | - | 200 | µA/mW |
| Thermistor Resistance | $R_{TH}$ | $T_{OP}$=25 °C | 9.5 | 10 | 10.5 | KΩ |
| Thermistor Temperature Coefficient | $TC_{TH}$ | $T_{OP}$=25 °C | - | -4.4 | - | %/°C |
| TEC Current | $I_{TEC}$ | -40<$T_C$<+85°C<br>$I_F$ = 100 mA | -1.5 | - | 1.6 | A |
| Fiber Length | - | May include splice | 1.0 | 1.5 | - | m |
| Fiber Buffer | - | - | - | 900 | - | µm |
| Fiber Core / Cladding | - | - | - | 9/125 | - | µm |

1. Measured Wavelength = Operating wavelength with a tolerance of ± 0.05nm.

## RF Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Frequency Range[1]<br>Return Path<br>Forward Path | F | $I_F$ = 60 mA | <br>5<br>40 | <br>-<br>- | <br>210<br>860 | <br>MHz<br>MHz |
| Frequency Response[1]<br>Return Path Version 5-210 MHz<br>Forward Path Version 40- 860 MHz | -<br>-<br>- | $I_F$ = 60 mA,<br>$T_{OP}$ = 25 °C | <br>-<br>- | <br>±0.5<br>±0.5 | <br>-<br>- | <br>dB<br>dB |
| RF Return Loss[1] | \| S11 \| | - | 16 | - | - | dB |
| Composite Second Order | CSO | $I_F = I_{OP}$<br>Note 2, 3, 4 and 5 | 50 | - | - | dBc |
| Composite Triple Beat | CTB | $I_F = I_{OP}$<br>Note 2, 3, 4 and 5 | 60 | - | - | dBc |
| Carrier to Noise Ratio | CNR | $I_F = I_{OP}$<br>Note 2, 3, 4 and 5 | 51 | - | - | dB |
| Adiabatic Chirp | FM | $I_F$ = 60 mA, T = 25 °C,<br>measured at 500 MHz | 40 | - | 100 | MHz/<br>mA |
| Nominal Input Impedance | $Z_{IN}$ | - | - | 25 | - | dB |

1. Measured on a 50Ω resistively matched system.
2. $I_{OP}$ is the bias point at which simultaneously the linearity, the min. optical power and the required operating wavelength, $\lambda_{OP}$ are obtained.
3. 8 channel loading with 10% OMI and 40 km fiber length.
4. Receiver thermal noise 8 pA*Hz$^{-0.5}$, 0.5mA at Ith+40mA, photodiode responsivity ~1.1A/W, noise bandwidth 4.2 MHz
5. Forward band (FB=45-870 MHz): Eight channel CW measurement: channel frequencies set at 553.25, 559.25, 565.25, 571.25, 577.25, 583.25, 589.25, and 595.25 MHz. CTB measured at 553.25, 577.25, and 595.25 MHz. CSO measured at 42 MHz
6. Measured Wavelength = Operating wavelength with a tolerance of ± 0.05 nm.

## Electrical Schematics

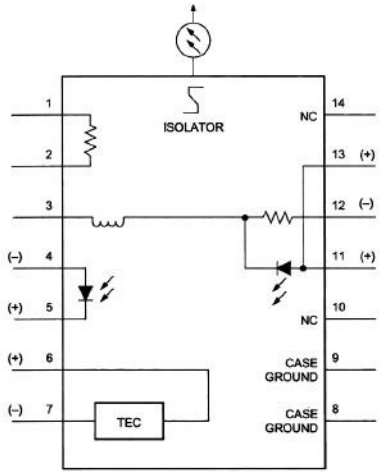



**Figure 1. 1751A Laser Schematic**

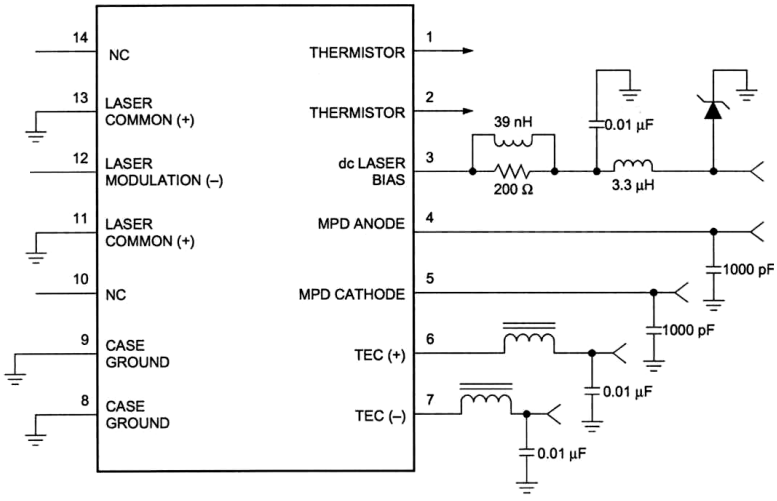
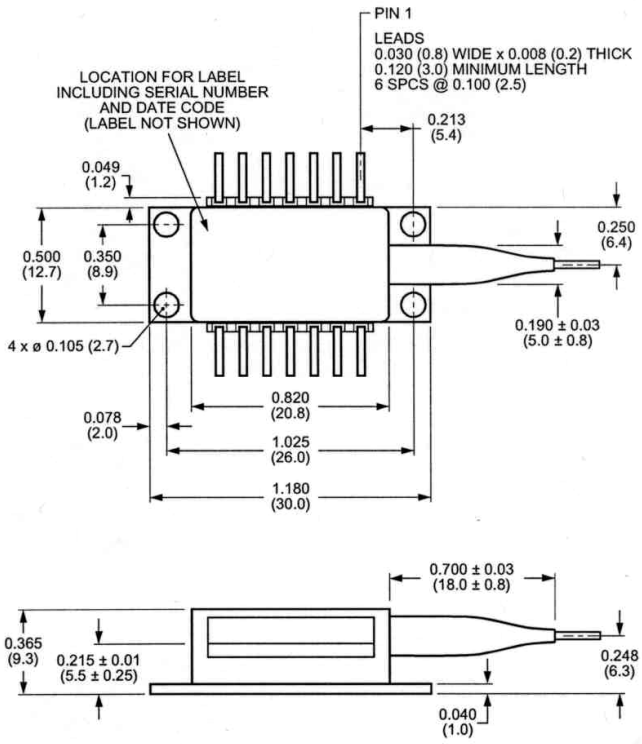



**Figure 2. 1751A Circuit Schematic**

## Outline Diagram

Dimensions are in inches and (millimeters)




## Pin Information

| Pin No. | Description |
|---|---|
| 1 | Thermistor |
| 2 | Thermistor |
| 3 | Dc Laser Bias (-) |
| 4 | MPD Anode (-) |
| 5 | MPD Cathode (+) |
| 6 | Thermal Electric Cooler (+) |
| 7 | Thermal Electric Cooler (-) |
| 8 | Case Ground |
| 9 | Case Ground |
| 10 | NC |
| 11 | Laser Common (+) |
| 12 | Laser Modulation (-) |
| 13 | Laser Common (+) |
| 14 | NC |

## Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1 laser product. This device has been classified with the FDA/CDRH under accession number 0220309.

All Versions of this laser are Class 1 laser product, tested according to IEC 60825-1:2007/EN 60825-1:2007

Single-mode fiber pigtail with SC/APC connectors (standard).

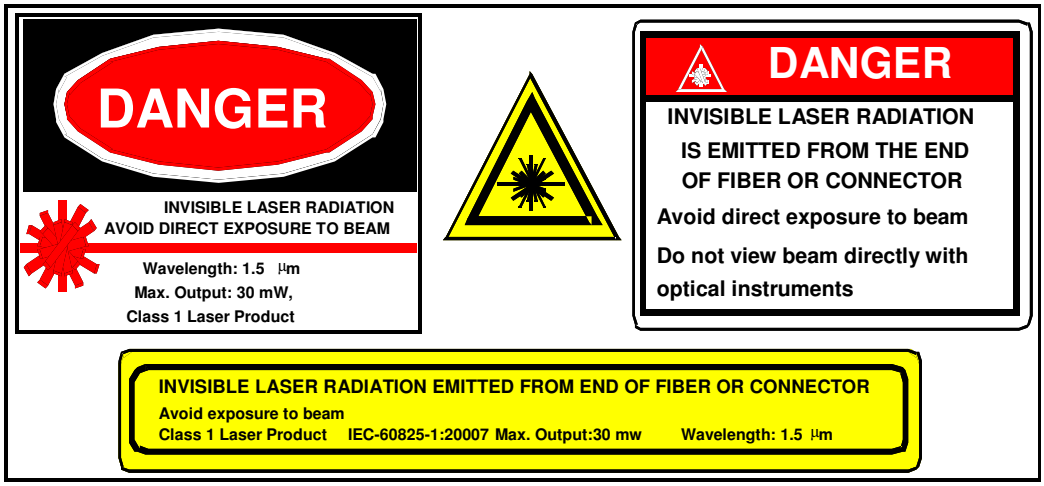
Wavelength = 1.5 µm.

Maximum power = 30 mW.

Because of size constraints, laser safety labeling (including an FDA class 1 label) is not affixed to the module, but attached to the outside of the shipping carton.

Product is not shipped with power supply.

**Caution: Use of controls, adjustments and procedures other than those specified herein may result in hazardous laser radiation exposure.**



## Ordering Information

Contact Ortel for ordering information at 626-293-3400.

### Ordering Code Definitions

**1751- 19- BB-SC-10**

**Family name**
1751A, Analog 1550 nm, DFB, DWDM

**ITU Wavelengths**

| | | |
|---|---|---|
| 19 = ch. 19 | 20 = ch. 20 | 21 = ch. 21 |
| 22 = ch. 22 | 23 = ch. 23 | 24 = ch. 24 |
| 25 = ch. 25 | 26 = ch. 26 | 26 = ch. 26 |
| 27 = ch. 27 | 28 = ch. 28 | 29 = ch. 29 |
| 30 = ch. 30 | 31 = ch. 31 | 32 = ch. 32 |
| 33 = ch. 33 | 34 = ch. 34 | 35 = ch. 35 |
| 36 = ch. 36 | 37 = ch. 37 | 38 = ch. 38 |
| 39 = ch. 39 | 40 = ch. 40 | 41 = ch. 41 |
| 42 = ch. 42 | 43 = ch. 43 | 44 = ch. 44 |
| 45 = ch. 45 | 46 = ch. 46 | 47 = ch. 48 |
| 49 = ch. 49 | 50 = ch. 50 | 51 = ch. 51 |
| 41 = ch .41 | 42 = ch .42 | 42 = ch .42 |
| 52 = ch. 52 | 53 = ch. 53 | 54 = ch. 54 |
| 55 = ch. 55 | 56 = ch. 56 | 57 = ch. 57 |
| 58 = ch. 58 | 59 = ch. 59 | 60 = ch. 60 |
| 61 = ch. 61 | 62 = ch. 62 | |

**Frequency Plan**
BB = Both Forward and Return

**Connectors**
FC = FC/APC
SC = SC/APC
PG = None (no connector)

**Optical Power, min.**
06 = 6 mW
08 = 8 mW
10 = 10 mW

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