

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

The 1751A 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 1751A 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 1751A laser module reduces cable network architecture fiber needs and lessens equipment requirements in the hub.

The 1751A is available in a wide range of standard ITU wavelengths. The lasers are offered as either forward-path (40 MHz-1 GHz) or return-path (5 MHz-210 MHz) modules.

Performance Highlights

Parameters	Min	Typical	Max	Units
Available Wavelengths (ITU Grid)	1526	-	1563	nm
Optical Output Power (multiple versions)	6-16	-	-	mW
Temperature Case Temperature Range	-40	-	+85	°C
Frequency Range: Return Path	5	-	210	MHz
Forward Path	40 MHz	-	1	GHz
Composite Second Order	50	-	-	dBc
Composite Triple Beat	60	-	-	dBc
Adiabatic Chirp (measured at 500 MHz)	40	-	100	MHz/mA



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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Wavelength ¹	λ_{OP}	$I_F = I_{OP}$, $T = T_{OP}$	1526.0	-	1563.1	nm
Optical Output Power	P_O	1751xxxx-06 version -08 version -10 version -16 version	6 8 10 16	- - - -	- - - -	mW mW mW 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, $T = T_{OP}$, T_C varied from min→max	-	-	0.04	nm
Threshold Current	I_{TH}		-	-	20	mA
Operating Current	I_{OP}		-	-	120	mA
Monitor PD Responsivity	r_{PD}	$V_{RM} = 5$ V	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 $I_F = 100$ 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 ± 0.05 nm.

RF Characteristic

Parameter	Symbol	Condition	Min	Typ	Max	Units
Frequency Range ¹ Return Path Forward Path	F	$I_F = 60 \text{ mA}$	5 40 MHz	- -	210 1	MHz GHz
Frequency Response ¹ Return Path Version 5-210 MHz Forward Path Version 40- 860 MHz	- -	$I_F = 60 \text{ mA}$, $T_{OP} = 25 \text{ }^\circ\text{C}$	- -	± 0.5 ± 0.5	- -	dB dB
RF Return Loss ¹	S11	-	16	-	-	dB
Composite Second Order	CSO	$I_F = I_{OP}$ Note 2, 3, 4 and 5	50	-	-	dBc
Composite Triple Beat	CTB	$I_F = I_{OP}$ Note 2, 3, 4 and 5	60	-	-	dBc
Carrier to Noise Ratio	CNR	$I_F = I_{OP}$ Note 2, 3, 4 and 5	51	-	-	dB
Adiabatic Chirp	FM	$I_F = 60 \text{ mA}$, $T = 25 \text{ }^\circ\text{C}$, measured at 500 MHz	40	-	100	MHz/m A
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, λ_{OP} are obtained.
3. 8 channel loading with 10% OMI and 40 km fiber length.
4. Receiver thermal noise $8 \text{ pA} \cdot \text{Hz}^{-0.5}$, 0.5 mA at $I_{th} + 40 \text{ mA}$, photodiode responsivity $\sim 1.1 \text{ A/W}$, 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 $\pm 0.05 \text{ nm}$.

Electrical Schematics

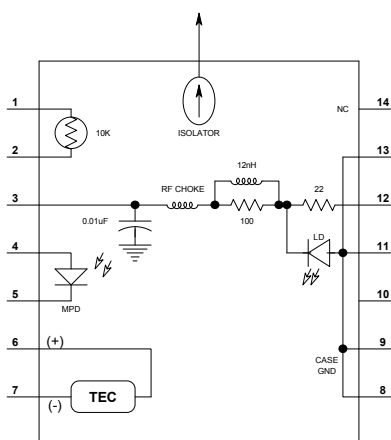


Figure 1. 1751A Laser Simplified Schematic

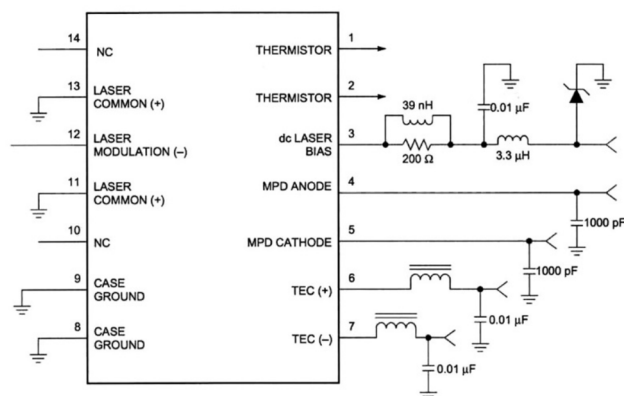
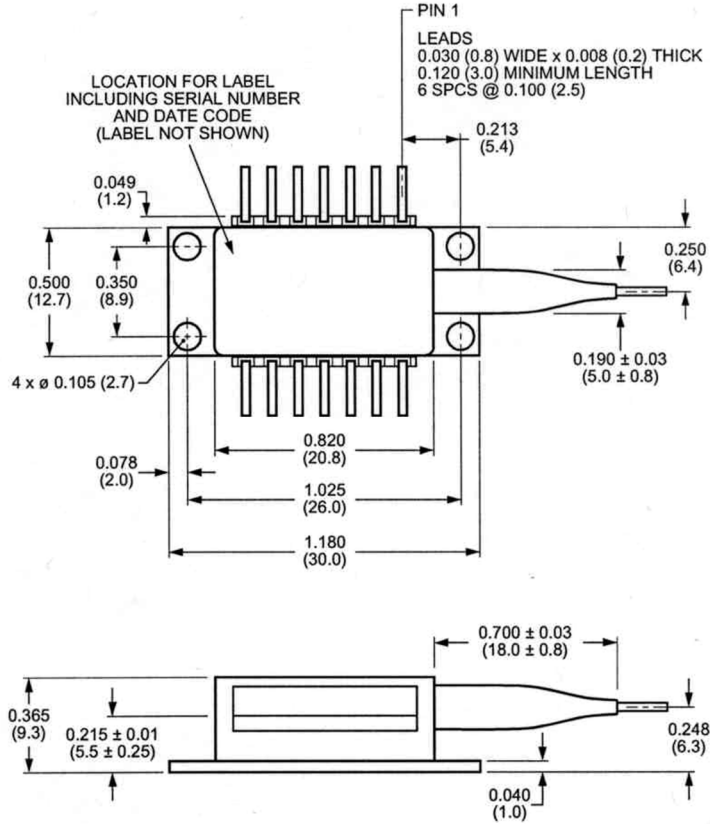


Figure 2. 1751A Circuit Schematic

Outline Diagrams (Dimensions are in inches and millimeters)

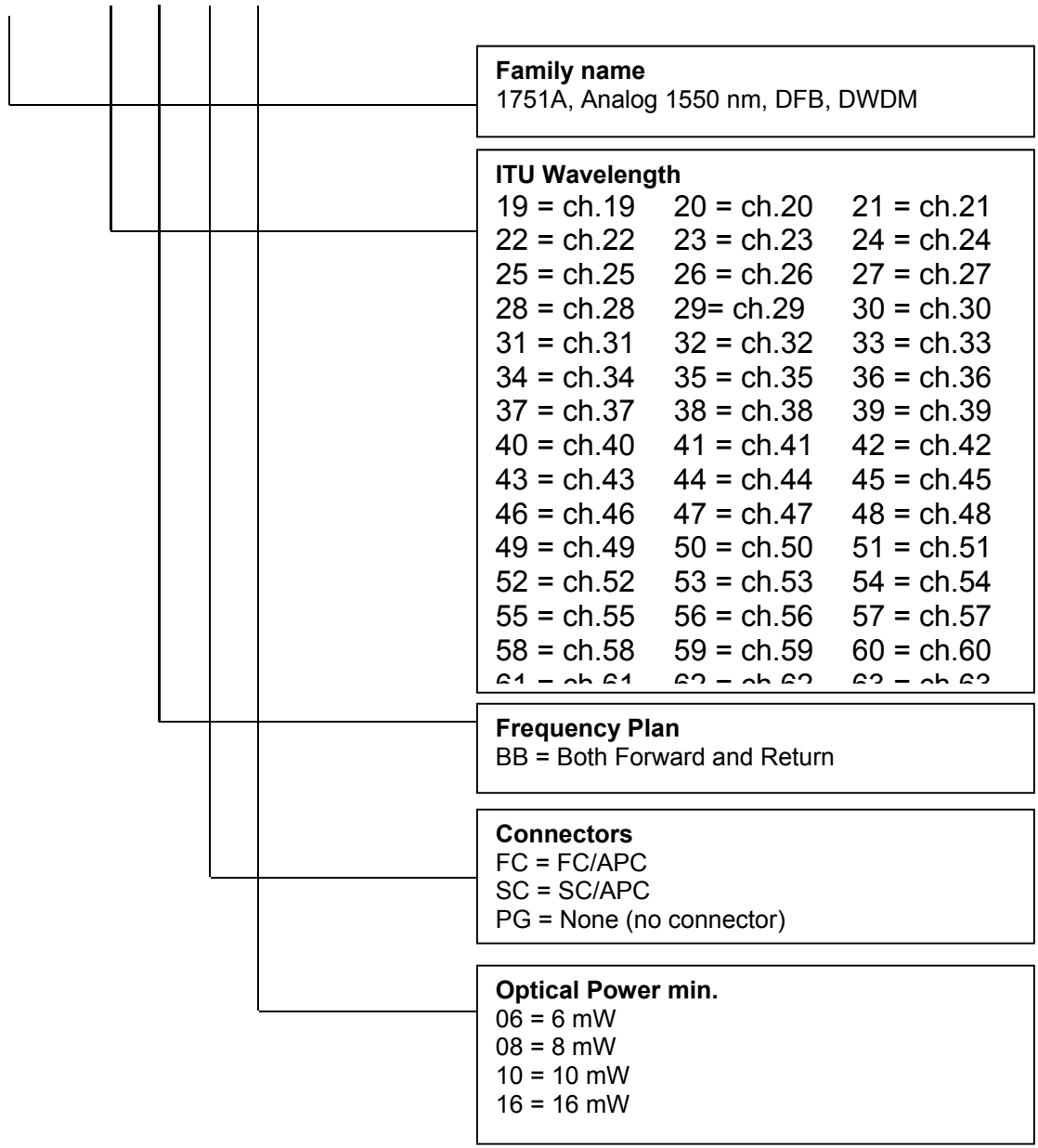


Pin Definitions

Pin	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 (+), Case GND
12	Laser Modulation (-)
13	Laser Common (+), Case GND
14	NC

Ordering Code Definitions

1751A-19-BB-SC-10



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

ITU Wavelength

19 = ch.19	20 = ch.20	21 = ch.21
22 = ch.22	23 = ch.23	24 = ch.24
25 = ch.25	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.47	48 = ch.48
49 = ch.49	50 = ch.50	51 = ch.51
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	63 = ch.63

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
16 = 16 mW

Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191.

All Versions of this laser are Class 1M laser product, tested according to IEC 60825-1:2014/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 1M 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. Viewing the laser output with telescopic optical instruments (for example, telescopes and binoculars) may pose an eye hazard and thus the user should not direct the beam into an area where such instruments are likely to be used.

