



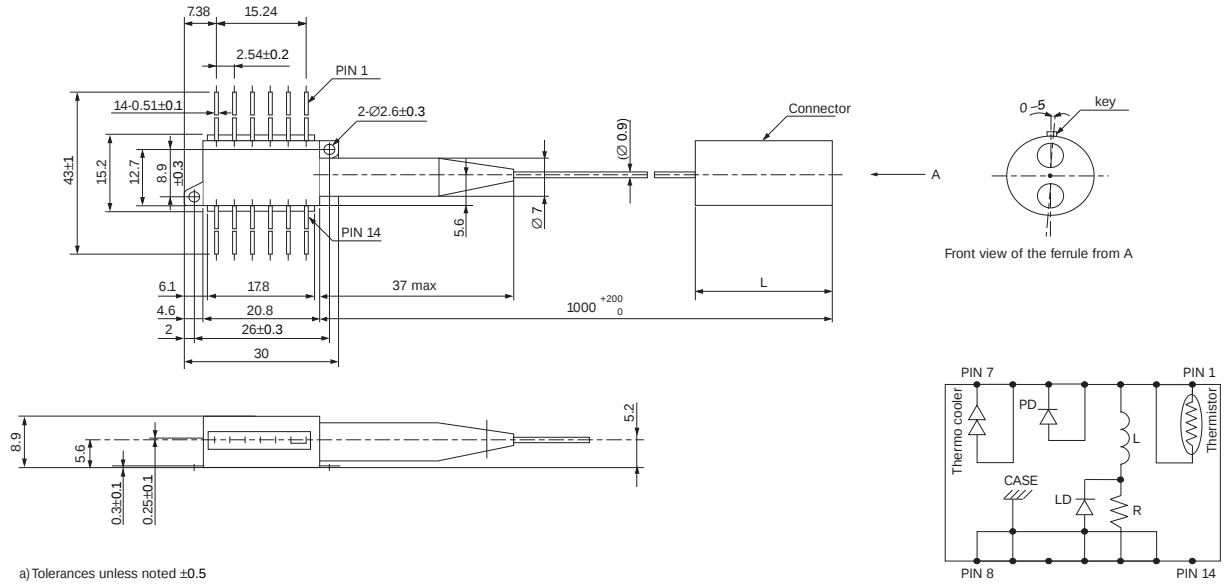
V23845-Lxy(*)11-z(**)113

1.55 μm DFB LD Module for WDM

Direct modulated 2.5 Gbit/s, 1800 ps nm, 2 mW

Preliminary

Dimensions in mm



FEATURES

- Input impedance is 25 Ω
- Distributed feedback (DFB) Laser Diode
- Emission wavelength is the 1.55 μm band
- Single mode optical fiber pigtail
- Built-in optical isolator
- Built-in thermal electrical cooler
- Butterfly package

Absolute Maximum Ratings

Operating case temperature (T_C) -20 to +70°C
 Storage temperature (T_{stg}) -40 to +85°C

Laser diode

Optical output power (P_F) 6 mW
 Forward current (I_F) 150 mA
 Reverse Voltage (V_F) 2 V

Photo diode

Reverse voltage (V_{RD}) 20 V
 Forward current (I_{FD}) 2 mA

Thermo-electric cooler⁽¹⁾

Cooler current (I_{pe}) 1.3 A
 Cooler voltage (V_{pe}) 3.1 V

Note

- 1 Even if the thermo-electric cooler (TEC) is operated within the rated conditions, uncontrolled current loading or operation heatsink may easily damage the module by exceeding the storage temperature range. Thermistor resistance should be properly monitored by the feedback circuit during TEC operation to avoid the catastrophic damage.

Pin Description

Pin#	Description
1	Thermistor
2	Thermistor
3	LD BIAS (-)
4	PD Anode
5	PD Cathode
6	Cooler Anode
7	Cooler Cathode
8	GND
9	GND
10	NC
11	LD Anode, GND
12	LD RF
13	LD Anode, GND
14	NC

* see Table 1, p. 3

**Connectors available
 C = SC / PC
 F = FC / PC
 P = bare Fiber

Electro-Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Units
Threshold current	I _{th}	CW		10	25	mA
Optical output power at threshold current	P _{th}	CW, I _f =I _{th}			100	μW
Operating current	I _{op}	CW, P _F =2 mW		40	65	mA
Operating voltage	V _{op}	CW, P _F =2 mW		1.3	1.8	V
Input impedance	Z _{in}	P _F =2 mW		25		Ω
Light-emission central wavelength ⁽¹⁾⁽²⁾	λ _C					nm
Central wavelength drift with case temp.	Δλ _C /ΔT _C	T _C =-20~70°C	-1		0	pm/°C
Laser operating temperature	T _{set}		20		35	°C
Spectral width ⁽¹⁾	Δλ	-20 dB		0.2	0.4	nm
Side mode suppression ratio ⁽¹⁾	Sr		33	40		dB
Dispersion penalty ⁽¹⁾	Pp	at 10 ⁻¹⁰ BER, +1800 ps/nm			2	
Cut off frequency (-1.5dB optical)	f _c	P _F =2 mW	3.5			GHz
Rise and fall time ⁽¹⁾ (10~90%)	t _r , t _f				150	psec
Relative intensity noise	Nr	CW, P _F =2 mW, 0.5~3 GHz		-155	-145	dB/Hz
Tracking error ⁽³⁾	Er	T _C =-20~70°C, APC, ATC			0.5	dB
Differential efficiency	η	CW, P _F =2 mW	0.057	0.07	0.15	mW/mA
Linearity ⁽⁴⁾	Δη	CW, P _F =0.2~2.4 mW	-20		20	%
Monitor current	I _{mon}	CW, P _F =2 mW, V _{rd} =5 V	0.1		2	mA
Optical isolation	Iso	T _C =25°C	35			dB
		T _C =-20~70°C	23			
Dark current	I _d	V _{RD} =5 V, T _C =-20~70°C			0.1	μA
Capacitance	C _t	V _{RD} =5 V, f=1 MHz			10	pF

Notes

- 2.48832 Gb/s NRZ, 2²³-1, P_{f_ave}=1 mW, extinction ratio 10 dB, optical return loss of the connectors should be greater than 40 dB in order to ensure the specified performance.
- See Table 1
- Er=max | 10*log (P_f/P_f@25°C)
- Variation of the differential efficiency from the straight line between 0.2 mW and 2 mW.

Fiber Pigtail Specifications

Item	Specification	Unit
Type	SM	
Mode field diameter	9.5±1	μm
Cladding diameter	125±2	
Secondary coating outer diameter	0.9±0.1	mm
Connector ⁽¹⁾		
Optical return loss of connector	40 (min)	dB

Note

- No connector or FC/PC or SC/PC

Thermal characteristics (T_{ld}=T_{set}, T_C=-20~70°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Units
Thermistor resistance	R _{th}	T _{ld} =25°C	9.5	10	10.5	kΩ
B constant of R _{th}	B			3950		K
Cooling capacity	ΔT	P _F =2 mW T _C =70°C	50			°C
Cooler current	I _{pe}	P _F =2 mW T _C =70°C T _{ld} =T _{set}		0.6	1	A
Cooler voltage	V _{pe}	P _F =2 mW T _C =70°C T _{ld} =T _{set}		1.2	2	V

DOCUMENTATION

- Fiber output power vs. Laser forward current at $T_{ld}=T_{set}$ and $T_C=20, 25, 70^{\circ}C$
- BER curves at 2.48832 Gb/s modulation
- Threshold current (I_{th})
- Laser forward current (I_{op}) at $P_F=2$ mW
- Laser forward voltage (V_{op}) at $P_F=2$ mW
- Laser operating temperature (T_{set}) at $\lambda_C^{(1)}$
- Monitor current (I_{mon}) at $P_F=2$ mW
- Thermistor resistance (R_{th})
- Cooler current (I_{pe}) at $P_F=2$ mW and $T_C=70^{\circ}C$
- Cooler voltage (V_{pe}) at $P_F=2$ mW and $T_C=70^{\circ}C$

Note

- T_{set} is attached as a reference data. R_{th} should be used in order to tune the wavelength to the specified value accurately.

***Table 1**

λ_C (nm)	x	y	λ_C (nm)	x	y	λ_C (nm)	x	y
1529.55	0	9	1541.35	3	9	1553.33	6	9
1530.33	1	1	1542.14	4	1	1554.13	7	1
1531.12	1	3	1542.94	4	3	1554.94	7	3
1531.90	1	5	1543.73	4	5	1555.75	7	5
1532.68	1	7	1544.53	4	7	1556.55	7	7
1533.47	1	9	1545.32	4	9	1557.36	7	9
1534.25	2	1	1546.12	5	1	1558.17	8	1
1535.04	2	3	1546.92	5	3	1558.98	8	3
1535.82	2	5	1547.72	5	5	1559.79	8	5
1536.61	2	7	1548.51	5	7	1560.61	8	7
1537.40	2	9	1549.32	5	9	1561.42	8	9
1538.19	3	1	1550.12	6	1	1562.23	9	1
1538.98	3	3	1550.92	6	3	1563.05	9	3
1539.77	3	5	1551.72	6	5	1563.86	9	5
1540.56	3	7	1552.52	6	7			

All wavelengths are referred to vacuum.
Tolerance is $\lambda_C \pm 0.05$ nm.

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