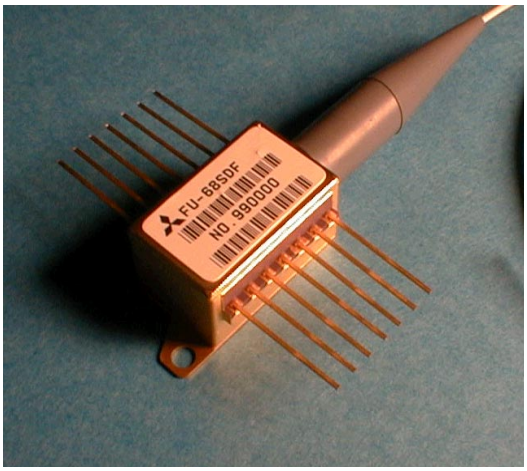
MITSUBISHI (OPTICAL DEVICES)

FU-68SDF-V802MxxB

1.55 μm DFB-LD MODULE WITH SINGLEMODE FIBER PIGTAIL
(WAVELENGTH SELECTED, BIAS CIRCUIT INTEGRATED, DIGITAL APPLICATION)

DESCRIPTION

Module type FU-68SDF-V802MxxB is a 1.55μm DFB-LD module with single-mode optical fiber.
This module is suitable to a directly modulated light source for use in 2.5Gb/s digital optical communication systems.
This module is prepared in accordance with ITU-T recommendation wavelength channel plan for Dense-WDM transmission.



FEATURES

- Multi quantum wells (MQW) DFB Laser Diode module
- Input impedance is 25Ω
- Emission wavelength is in 1.55μm band
- High-speed response
- Built-in optical isolator
- Built-in thermal electric cooler
- Butterfly package
- With photodiode for optical output monitor

APPLICATION

High speed transmission systems (~2.5Gb/s)
Dense-WDM systems

ABSOLUTE MAXIMUM RATINGS (Tld=Tset)

Parameter		Symbol	Conditions	Rating	Unit
Laser diode	Optical output power	Pf	CW	6	mW
	Forward current	If	CW	150	mA
	Reverse voltage	Vrl	–	2	V
Photodiode	Reverse voltage	Vrd	–	20	V
	Forward current	Ifd	–	2	mA
Thermo-electric cooler (Note)	Cooler current	Ipe	–	1.3	A
	Cooler voltage	Vpe	–	3.1	V
Operating case temperature		Tc	–	-20 ~ 70	°C
Storage temperature		Tstg	–	-40 ~ 85	°C

Note) Even if the thermo-electric cooler (TEC) is operated within the rated conditions, uncontrolled current loading or operation without 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.

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ELECTRICAL/OPTICAL CHARACTERISTICS (Tld=Tset, Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Threshold current	Ith	CW	-	10	25	mA
Optical output power at threshold current	Pth	CW, If=Ith	-	-	100	μW
Operating current	Iop	CW, Pf=2mW	-	40	65	mA
Operating voltage	Vop	CW, Pf=2mW	-	1.3	1.8	V
Input impedance	Zin	Pf=2mW	-	25	-	Ω
Light-emission central wavelength	λc	(Note 1)	(Note 2)			nm
Central wavelength drift with case temp.	Δλc/ΔTc	Tc=-20~70°C	-1	-	0	pm/°C
Laser operating temperature	Tset	-	20	-	35	°C
Spectral width	Δλ	(Note 1), -20dB	-	0.2	0.4	nm
Side mode suppression ratio	Sr	(Note 1)	33	40	-	dB
Dispersion penalty	Pp	(Note 1), at 10^{-10} BER, +1800ps/nm	-	-	2	dB
Cutoff frequency (-1.5dB optical)	fc	Pf=2mW	3.5	-	-	GHz
Rise and fall time (10~90%)	tr, tf	(Note 1)	-	-	150	psec
Relative intensity noise	Nr	CW, Pf=2mW, 0.5~3GHz	-	-155	-145	dB/Hz
Tracking error (Note 3)	Er	Tc=-20~70°C, APC, ATC	-	-	0.5	dB
Differential efficiency	η	CW, Pf=2mW	0.057	0.07	0.15	mW/mA
Linearity	Δη	CW, Pf=0.2~2.4mW, (Note 4)	-20	-	20	%
Monitor current	Imon	CW, Pf=2mW, Vrd=5V	0.1	-	2	mA
Optical isolation	Iso	Tc=25°C	35	-	-	dB
		Tc=-20~70°C	23	-	-	
Dark current (PD)	Id	Vrd=5V, Tc=-20~70°C	-	-	0.1	μA
Capacitance (PD)	Ct	Vrd=5V, f=1MHz	-	-	10	pF

Note 1) 2.48832Gb/s NRZ, 2^{23}-1, Pf_ave=1mW, Extinction ratio 10dB, optical return loss of the connectors should be greater than 40dB in order to ensure the specified performance.

Note 2) See Table 1.

Note 3) Er=max|10×log(Pf / Pf@25°C)|

Note 4) Variation of the differential efficiency from the straight line between 0.2mW and 2mW.

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THERMAL CHARACTERISTICS (Tld=Tset, Tc=-20~70°C)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Thermistor resistance	Rth	Tld=25℃	9.5	10	10.5	kΩ
B constant of Rth	B	-	-	3950	-	K
Cooling capacity	ΔT	Pf=2mW, Tc=70°C	50	-	-	°C
Cooler current	Ipe	Pf=2mW, Tc=70°C, Tld=Tset	-	0.6	1	A
Cooler voltage	Vpe	Pf=2mW, Tc=70°C, Tld=Tset	-	1.2	2	V

FIBER PIGTAIL SPECIFICATIONS

Parameter	Limits	Unit
Type	SM	-
Mode field diameter	9.5±1	μm
Cladding diameter	125±2	μm
Secondary coating outer diameter	0.9±0.1	mm
Connector	FC/PC	-
Optical return loss of connector	40 (min)	dB

DOCUMENTATION (Tld=Tset)

- Fiber output power vs. Laser forward current at Tld=Tset and Tc=-20,25,70°C
- BER curves at 2.48832Gb/s modulation
- Threshold current (Ith)
- Laser forward current (Iop) at Pf=2mW
- Laser forward voltage (Vop) at Pf=2mW
- Laser operating temperature (Tset) at λc (Note 5)
- Monitor current (Imon) at Pf=2mW
- Thermistor resistance (Rth)
- Cooler current (Ipe) at Pf=2mW and Tc=70°C
- Cooler voltage (Vpe) at Pf=2mW and Tc=70°C

Note 5) Tset is attached as a reference data. Rth should be used in order to tune the wavelength to the specified value accurately.

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Table 1.

Type number	λc (nm)	Type number	λc (nm)
FU-68SDF-802M9B	1529.55	FU-68SDF-802M53B	1546.92
FU-68SDF-802M11B	1530.33	FU-68SDF-802M55B	1547.72
FU-68SDF-802M13B	1531.12	FU-68SDF-802M57B	1548.51
FU-68SDF-802M15B	1531.90	FU-68SDF-802M59B	1549.32
FU-68SDF-802M17B	1532.68	FU-68SDF-802M61B	1550.12
FU-68SDF-802M19B	1533.47	FU-68SDF-802M63B	1550.92
FU-68SDF-802M21B	1534.25	FU-68SDF-802M65B	1551.72
FU-68SDF-802M23B	1535.04	FU-68SDF-802M67B	1552.52
FU-68SDF-802M25B	1535.82	FU-68SDF-802M69B	1553.33
FU-68SDF-802M27B	1536.61	FU-68SDF-802M71B	1554.13
FU-68SDF-802M29B	1537.40	FU-68SDF-802M73B	1554.94
FU-68SDF-802M31B	1538.19	FU-68SDF-802M75B	1555.75
FU-68SDF-802M33B	1538.98	FU-68SDF-802M77B	1556.55
FU-68SDF-802M35B	1539.77	FU-68SDF-802M79B	1557.36
FU-68SDF-802M37B	1540.56	FU-68SDF-802M81B	1558.17
FU-68SDF-802M39B	1541.35	FU-68SDF-802M83B	1558.98
FU-68SDF-802M41B	1542.14	FU-68SDF-802M85B	1559.79
FU-68SDF-802M43B	1542.94	FU-68SDF-802M87B	1560.61
FU-68SDF-802M45B	1543.73	FU-68SDF-802M89B	1561.42
FU-68SDF-802M47B	1544.53	FU-68SDF-802M91B	1562.23
FU-68SDF-802M49B	1545.32	FU-68SDF-802M93B	1563.05
FU-68SDF-802M51B	1546.12	FU-68SDF-802M95B	1563.86

All wavelengths are referred to vacuum.
Tolerance is λc ± 0.05nm.

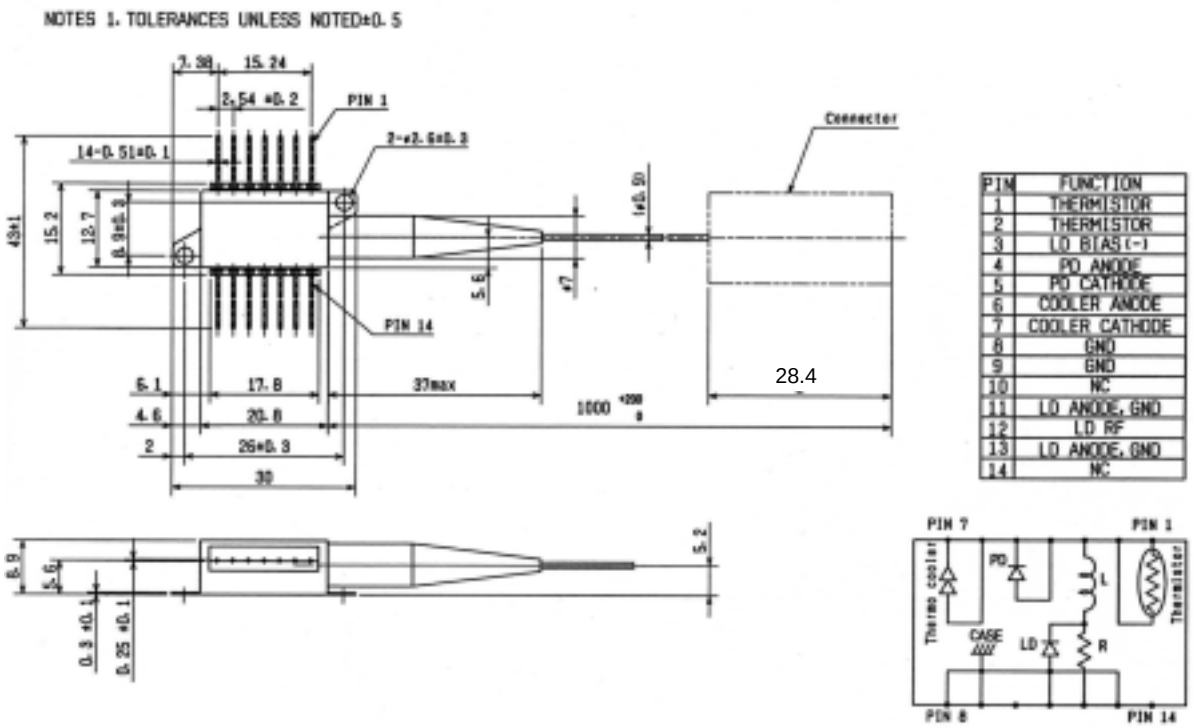
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OUTLINE DIAGRAM

(Unit : mm)



PIN	FUNCTION
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

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