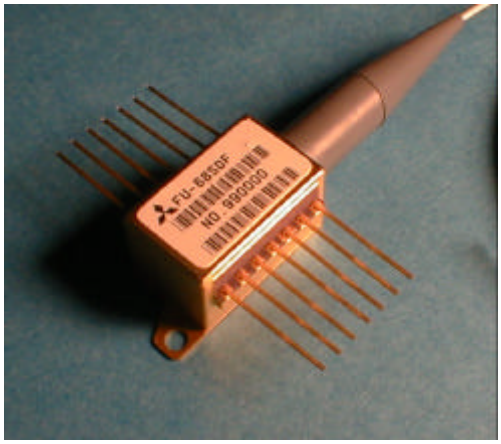
MITSUBISHI (OPTICAL DEVICES)

TENTATIVE FU-68SDF-V810MxxxB

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

DESCRIPTION

Module type FU-68SDF-V810MxxB is a 1.58μm (L-Band) 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 to expand the wavelength channels into L-Band for Dense-WDM transmission.



FEATURES

- Multi quantum wells (MQW) DFB Laser Diode module
- Input impedance is 25Ω
- Emission wavelength is in 1.58μm 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

OPTION

- Wavelength option:
  1565nm~1625nm are available

ABSOLUTE MAXIMUM RATINGS (Tld=Tset)

Parameter		Symbol	Conditions	Rating	Unit
Laser diode	Optical output power	Pf	CW	15	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	-	-	150	μW
Operating current	Iop	CW, Pf=10mW	-	50	95	mA
Operating voltage	Vop	CW, Pf=10mW	-	1.3	1.8	V
Input impedance	Zin	Pf=10mW	-	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=10mW	3.5	-	-	GHz
Rise and fall time (10~90%)	tr, tf	(Note 1)	-	-	150	psec
Relative intensity noise	Nr	CW, Pf=10mW, 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=10mW	0.15	0.25	0.35	mW/mA
Linearity	Δη	CW, Pf=1~12mW, (Note 4)	-20	-	20	%
Monitor current	Imon	CW, Pf=10mW, Vrd=5V	0.2	-	3	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=5mW, 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 1mW and 10mW.

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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°C	9.5	10	10.5	kΩ
B constant of Rth	B	-	-	3950	-	K
Cooling capacity	ΔT	Pf=10mW, Tc=70°C	50	-	-	°C
Cooler current	Ipe	Pf=10mW, Tc=70°C, Tld=Tset	-	0.6	1	A
Cooler voltage	Vpe	Pf=10mW, 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=10mW
- Laser forward voltage (Vop) at Pf=10mW
- Laser operating temperature (Tset) at λc (Note 5)
- Monitor current (Imon) at Pf=10mW
- Thermistor resistance (Rth)
- Cooler current (Ipe) at Pf=10mW and Tc=70°C
- Cooler voltage (Vpe) at Pf=10mW 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)	Type number	λc (nm)
FU-68SDF-V810M103B	1567.13	FU-68SDF-V810M139B	1582.02	FU-68SDF-V810M175B	1597.19
FU-68SDF-V810M104B	1567.54	FU-68SDF-V810M140B	1582.44	FU-68SDF-V810M176B	1597.62
FU-68SDF-V810M105B	1567.95	FU-68SDF-V810M141B	1582.85	FU-68SDF-V810M177B	1598.04
FU-68SDF-V810M106B	1568.36	FU-68SDF-V810M142B	1583.27	FU-68SDF-V810M178B	1598.47
FU-68SDF-V810M107B	1568.77	FU-68SDF-V810M143B	1583.69	FU-68SDF-V810M179B	1598.89
FU-68SDF-V810M108B	1569.18	FU-68SDF-V810M144B	1584.11	FU-68SDF-V810M180B	1599.32
FU-68SDF-V810M109B	1569.59	FU-68SDF-V810M145B	1584.53	FU-68SDF-V810M181B	1599.75
FU-68SDF-V810M110B	1570.01	FU-68SDF-V810M146B	1584.95	FU-68SDF-V810M182B	1600.17
FU-68SDF-V810M111B	1570.42	FU-68SDF-V810M147B	1585.36	FU-68SDF-V810M183B	1600.60
FU-68SDF-V810M112B	1570.83	FU-68SDF-V810M148B	1585.78	FU-68SDF-V810M184B	1601.03
FU-68SDF-V810M113B	1571.24	FU-68SDF-V810M149B	1586.20	FU-68SDF-V810M185B	1601.46
FU-68SDF-V810M114B	1571.65	FU-68SDF-V810M150B	1586.62	FU-68SDF-V810M186B	1601.88
FU-68SDF-V810M115B	1572.06	FU-68SDF-V810M151B	1587.04	FU-68SDF-V810M187B	1602.31
FU-68SDF-V810M116B	1572.48	FU-68SDF-V810M152B	1587.46	FU-68SDF-V810M188B	1602.74
FU-68SDF-V810M117B	1572.89	FU-68SDF-V810M153B	1587.88	FU-68SDF-V810M189B	1603.17
FU-68SDF-V810M118B	1573.30	FU-68SDF-V810M154B	1588.30	FU-68SDF-V810M190B	1603.60
FU-68SDF-V810M119B	1573.71	FU-68SDF-V810M155B	1588.73	FU-68SDF-V810M191B	1604.03
FU-68SDF-V810M120B	1574.13	FU-68SDF-V810M156B	1589.15	FU-68SDF-V810M192B	1604.46
FU-68SDF-V810M121B	1574.54	FU-68SDF-V810M157B	1589.57	FU-68SDF-V810M193B	1604.88
FU-68SDF-V810M122B	1574.95	FU-68SDF-V810M158B	1589.99	FU-68SDF-V810M194B	1605.31
FU-68SDF-V810M123B	1575.37	FU-68SDF-V810M159B	1590.41	FU-68SDF-V810M195B	1605.74
FU-68SDF-V810M124B	1575.78	FU-68SDF-V810M160B	1590.83	FU-68SDF-V810M196B	1606.17
FU-68SDF-V810M125B	1576.20	FU-68SDF-V810M161B	1591.26	FU-68SDF-V810M197B	1606.60
FU-68SDF-V810M126B	1576.61	FU-68SDF-V810M162B	1591.68	FU-68SDF-V810M198B	1607.04
FU-68SDF-V810M127B	1577.03	FU-68SDF-V810M163B	1592.10	FU-68SDF-V810M199B	1607.47
FU-68SDF-V810M128B	1577.44	FU-68SDF-V810M164B	1592.52	FU-68SDF-V810M200B	1607.90
FU-68SDF-V810M129B	1577.86	FU-68SDF-V810M165B	1592.95	FU-68SDF-V810M201B	1608.33
FU-68SDF-V810M130B	1578.27	FU-68SDF-V810M166B	1593.37	FU-68SDF-V810M202B	1608.76
FU-68SDF-V810M131B	1578.69	FU-68SDF-V810M167B	1593.79	FU-68SDF-V810M203B	1609.19
FU-68SDF-V810M132B	1579.10	FU-68SDF-V810M168B	1594.22	FU-68SDF-V810M204B	1609.62
FU-68SDF-V810M133B	1579.52	FU-68SDF-V810M169B	1594.64	FU-68SDF-V810M205B	1610.06
FU-68SDF-V810M134B	1579.93	FU-68SDF-V810M170B	1595.06	FU-68SDF-V810M206B	1610.49
FU-68SDF-V810M135B	1580.35	FU-68SDF-V810M171B	1595.49	FU-68SDF-V810M207B	1610.92
FU-68SDF-V810M136B	1580.77	FU-68SDF-V810M172B	1595.91	FU-68SDF-V810M208B	1611.35
FU-68SDF-V810M137B	1581.18	FU-68SDF-V810M173B	1596.34	FU-68SDF-V810M209B	1611.79
FU-68SDF-V810M138B	1581.60	FU-68SDF-V810M174B	1596.76		

All wavelengths are referred to vacuum.
Tolerance is λc+/-0.05nm.

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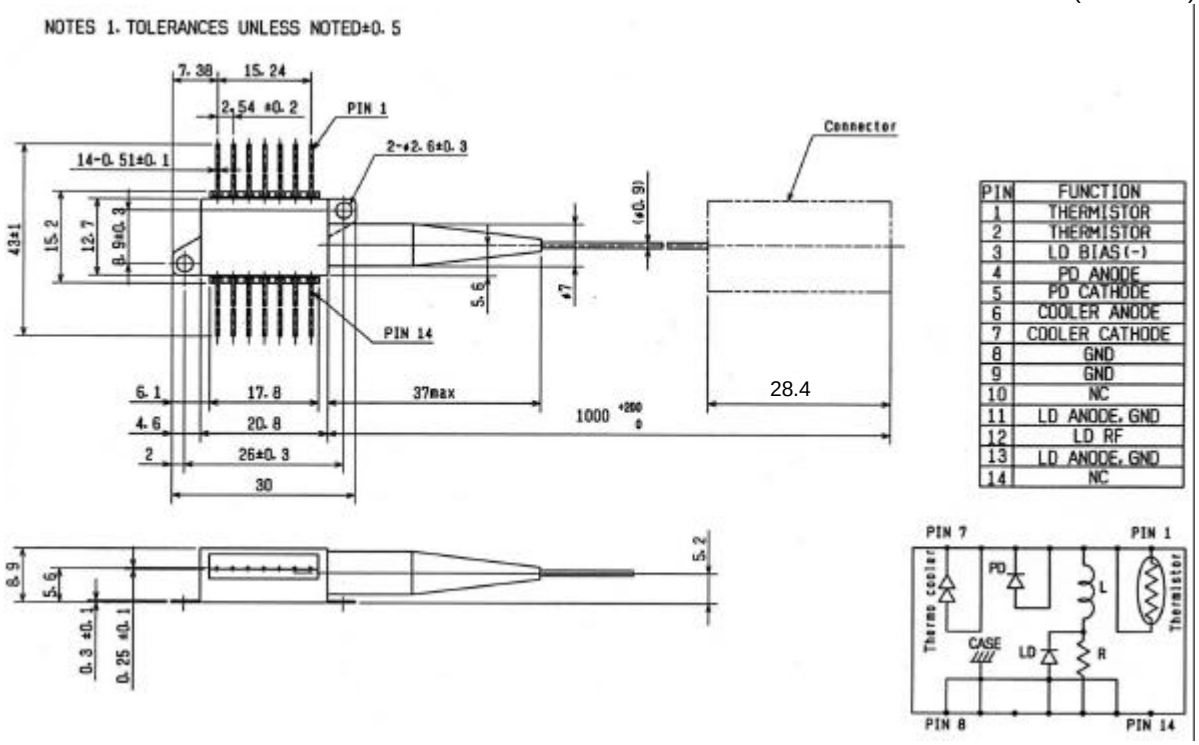
OUTLINE DIAGRAM

(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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