

Approved	Approved	Charged
	<i>T. Nambara</i>	<i>H. Ueda</i>

Preliminary

Specification of cooled and semi-cooled DFB-LD Module
for 10Gb/s Applications
(STM-64, OC192 and 10G Ethernet)

Module type :

FU-484SDF-x1Mxx (Cooled DFB-LD Module, Tc=-20~75°C, Tld=25°C)

FU-484SDF-x2Mxx (Semi-cooled DFB-LD Module, Tc=-20~85°C, Tld=0~65°C)

A	B	C	D
	x		
Date		Approved	
9.Jan.'02		T.Nambara	

MITSUBISHI ELECTRIC CORPORATION

* Mitsubishi Electric Corp. reserves the right to change product design and specification without notice.

MITSUBISHI (OPTICAL DEVICES)

FU-484SDF-x1Mxx, -x2Mxx

**1.3 mm COOLED AND SEMICOOLED DFB-LD MODULE WITH SINGLEMODE FIBER PIGTAIL
FOR 10Gb/s (BIAS CIRCUIT INTEGRATED, DIGITAL APPLICATION)**

DESCRIPTION

Module type FU-484SDF-x1Mxx and FU-484SDF-x2Mxx is a 1.3um Cooled DFB-LD module with single-mode optical fiber. This module is suitable to a light source for use in 10Gb/s digital optical communication systems.

FEATURES

- Input impedance is 50Ω
- Distributed feedback (DFB) Laser Diode
- Emission wavelength is the 1.3μm band
- Single-mode optical fiber pig-tail
- Built-in optical isolator
- Built-in bias T
- Built-in thermistor and thermoelectric cooler
- With photodiode for optical output monitor
- 7-pin Butterfly package with GPO connector

APPLICATION

- High speed transmission systems (~10Gb/s)

1. ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

ITEM		SYMBOL	CONDITION	RATING	UNIT
Laser diode	Optical output power	Pf	CW	6	mW
	Forward current	If	CW	100	mA
	Reverse voltage	Vrl	-	2	V
Photo diode	Reverse voltage	Vrd	-	20	V
	Forward current	Ifd	-	2	mA
Thermoelectric cooler(Note1)	Current	Ipe	-	1.5	A
	Voltage	Vpe	-	3	V
Operating case temperature	FU-484SDF-x1Mxx (Cooled type)	Tc	-	-20 ~ 75 (Tld= 25)	°C
	FU-484SDF-x2Mxx (Semi-cooled type)	Tc	-	-20 ~ 85 (Tld= 0 ~ 65)	°C
Storage temperature		Tstg	-	-40 ~ 85	°C

Note1

Even if the thermoelectric cooler (TEC) is operated within the rated conditions, uncontrolled current loading or operation without heat sink 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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2. ELECTRICAL/ OPTICAL CHARACTERISTICS of FU-484SDF-x1Mxx

(Tc=-20~75°C, Tld=25°C, unless otherwise noted)

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Threshold current	Ith	CW	-	10	25	mA
Optical output power at threshold current	Pth	CW, I _{bias} =Ith	-	-	50	μW
Operating current	Iop	CW, P _f =1mW	-	30	50	mA
Operating voltage	Vop	CW, P _f =1mW	-	1.2	1.8	V
Input impedance	Zin	-	-	50	-	Ω
Optical output power from fiber end	P _f	CW, nominal	-	1	-	mW
Light-emission central wavelength	λ _c	CW, P _f =1mW	1290	1310	1330	nm
Wavelength temperature coefficient	λ _{ct}	-	-	0.09	0.1	nm/°C
Spectral width	Δλ	-20dB full width	-	-	0.8	nm
Side mode suppression ratio	Sr		35	45	-	dB
Extinction ratio	Ex		-	6.5	-	dB
Dispersion penalty	P _p	40ps/nm disp.	-	-	1.0	dB
Relative intensity noise	Nr	CW, P _f =1mW	-	-145	-130	dB/Hz
Tracking error [Note 1]	Er	CW, APC (I _{mon} =Const.), ATC, Tc=-20~75°C	-	0.5	1.0	dB
Differential efficiency	η	CW, Tc=25°C	0.005	-	0.15	mW/mA
Monitor current	I _{mon}	CW, P _f =1mW, V _{rd} =5V	0.05	-	1.5	mA
Optical isolation	Iso	-	20	-	-	dB
Dark current (PD)	I _d	V _{rd} =5V	-	-	0.1	μA
Capacitance (PD)	C _t	V _{rd} =5V, f=1MHz	-	-	10	pF
Thermistor resistance	R _{th}	Tc=25°C	9.5	10	10.5	kΩ
B constant of R _{th}	B	-	-	3950	-	K
Cooler current	I _{pe}	If=Iop, Tc=75°C	-	0.7	1.3	A
Cooler voltage	V _{pe}	If=Iop, Tc=75°C	-	1.7	2.5	V

[Note 1] Er=max | 10*log(P_f / P_f@25°C) |

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3. ELECTRICAL/ OPTICAL CHARACTERISTICS of FU-484SDF-x2Mxx

(Tc=-20~85°C, Tld=0~65°C, unless otherwise noted)

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Threshold current	Ith	CW, Tld=25°C	-	10	25	mA
Optical output power at threshold current	Pth	CW, Ibias=Ith	-	-	50	μW
Operating current	Iop	CW, Pf=1mW, Tld=25°C	-	30	50	mA
Operating voltage	Vop	CW, Pf=1mW, Tld=25°C	-	1.2	1.8	V
Input impedance	Zin	-	-	50	-	Ω
Optical output power from fiber end	Pf	CW, nominal	-	1	-	mW
Light-emission central wavelength	λc	CW, Pf=1mW	1290	1310	1330	nm
Wavelength temperature coefficient	λct	-	-	0.09	0.1	nm/°C
Spectral width	Δλ	-20dB full width	-	-	0.8	nm
Side mode suppression ratio	Sr		35	45	-	dB
Extinction ratio	Ex		-	6.5	-	dB
Dispersion penalty	Pp	40ps/nm disp.	-	-	1.0	dB
Relative intensity noise	Nr	CW, Pf=1mW	-	-145	-130	dB/Hz
Tracking error [Note 1]	Er	CW, APC (Imon=Const.), ATC, Tc=-20~85°C	-	0.5	1.0	dB
Differential efficiency	η	CW, Tld=25°C	0.005	-	0.15	mW/mA
Monitor current	Imon	CW, Pf=1mW, Vrd=5V	0.05	-	1.5	mA
Optical isolation	Iso	-	20	-	-	dB
Dark current (PD)	Id	Vrd=5V	-	-	0.1	μA
Capacitance (PD)	Ct	Vrd=5V, f=1MHz	-	-	10	pF
Thermistor resistance	Rth	Tld=25°C	9.5	10	10.5	kΩ
B constant of Rth	B	-	-	3950	-	K
Cooler current	Ipe	Tc=85°C, Tld=65°C	-	-	1.0	A
Cooler voltage	Vpe	Tc=85°C, Tld=65°C	-	-	1.5	V
Power consumption of cooler	Ppe	Tc=85°C, Tld=65°C	-	-	0.5	W

[Note 1] Er=max | 10*log(Pf / Pf@25°C) |

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3. FIBER PIGTAIL SPECIFICATIONS

ITEM	SPECIFICATION	UNIT
Type	SM	-
Mode field diameter	9.3 ± 1	μm
Cladding diameter	125 ± 2	μm
Jacket diameter	0.9 ± 0.1	mm
Connector	See Table 1.	-
Optical return loss of connector	40 (min)	dB

Table 1.

(Unit; mm)

Type number	Connector type	Optical fiber length L1 (Note 3)	Optical conector length L2 (Note 3)
FU-484SDF-1M1	None (Note 4)	1000+200/-0	-
FU-484SDF-V1M1	FC/PC	1000+200/-0	28.4
FU-484SDF-W1M1	SC/PC	1000+200/-0	34.5
FU-484SDF-2M1	None (Note 4)	1000+200/-0	-
FU-484SDF-V2M1	FC/PC	1000+200/-0	28.4
FU-484SDF-W2M1	SC/PC	1000+200/-0	34.5

Note 3) Optical fiber length "L1" and Optical conector length 'L2' is defined in OUTLINE DIAGRAMs.

Note 4) There are some cases where a connector for testing is shipped with the product.

Then the fiber length not including the connector is more than 1000mm.

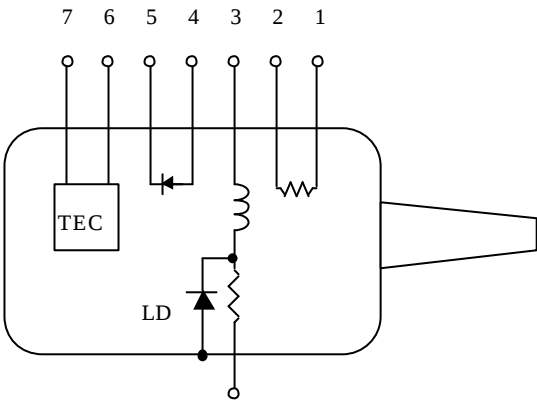
DOCUMENTATION

- Threshold current (I_{th}) at $T_c=25^\circ\text{C}$
- Operating current (I_{op}) at $T_c=25^\circ\text{C}$
- Operating voltage (V_{op}) at $T_c=25^\circ\text{C}$
- Light-emission central wavelength (λ_c) at $T_c=25^\circ\text{C}$
- Monitor current (I_{mon}) at $T_c=25^\circ\text{C}$
- Optical output power from fiber end (P_f) at $T_c=25^\circ\text{C}$

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Pin No.	Pin assignments
1	Thermistor
2	Thermistor
3	LD DC bias (Cathode)
4	Monitor PD (Anode)
5	Monitor PD (Cathode)
6	Cooler (Anode)
7	Cooler (Cathode)

RF CONECTOR

Figure4.Pin Assignments

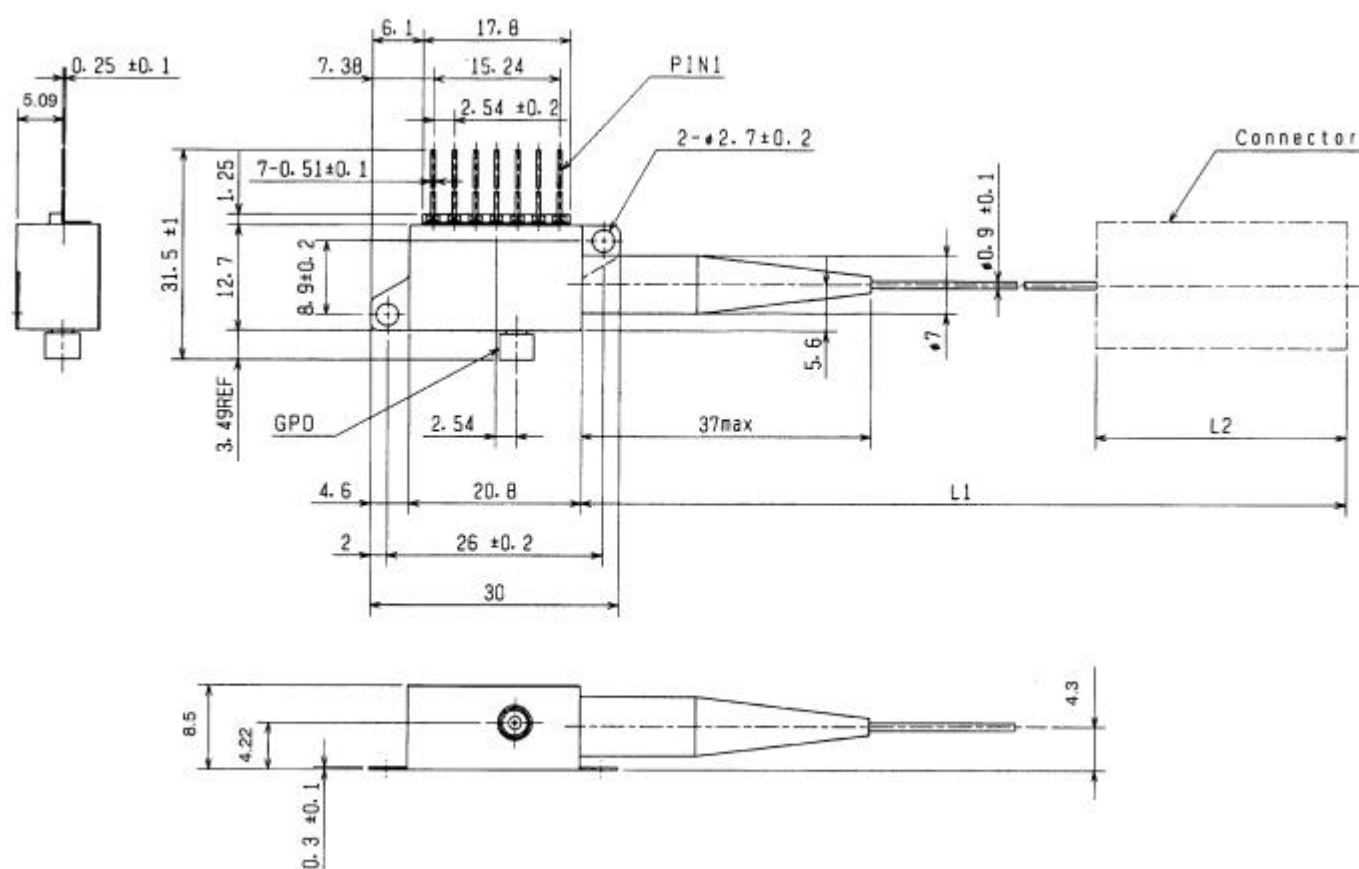
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OUTLINE DIAGRAM

(Unit : mm)



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