

Approved	Approved	Charged
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Preliminary specification of uncooled DFB-LD module
For Coarse WDM

Module type: FU-645SDF-x2Mxx
(ES product)

A	B	C	D
	x		
Date		Approved	
7.Sep.'01		T.Nambara	

MITSUBISHI ELECTRIC CORPORATION

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MITSUBISHI (OPTICAL DEVICES)
FU-645SDF-x2Mxx
(ES Product)
1.55 mm UNCOOLED DFB-LD MODULE WITH SINGLEMODE FIBER PIGTAIL
(BIAS CIRCUIT INTEGRATED, DIGITAL APPLICATION)

DESCRIPTION

Module type FU-645SDF-x2Mxx is a 1.55μm Uncooled DFB-LD module with single-mode optical fiber.

This module is suitable to a light source for use in 2.5Gb/s coarse WDM digital optical communication systems. This module is ES product.

FEATURES

- λ/4 shifted 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 thermistor and bias T
- 8-pin Mini-DIL package with Gull wing leads
- With photodiode for optical output monitor

APPLICATION

High speed transmission systems (~2.5Gb/s)
Coarse WDM (CWDM)

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Parameter		Symbol	Conditions	Rating	Unit
Laser diode	Optical output power	Pf	CW	6	mW
	Forward current	If	CW	100	mA
	Reverse voltage	Vrl	-	2	V
Photodiode	Reverse voltage	Vrd	-	20	V
	Forward current	Ifd	-	2	mA
Operating case temperature		Tc	-	-5 ~ +70	°C
Storage temperature		Tstg	-	-40 ~ +85	°C

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ELECTRICAL/OPTICAL CHARACTERISTICS (Tc=-5~70°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits			Unit	
			Min.	Typ.	Max.		
Threshold current	Ith	CW, Tc=25°C	-	12	25	mA	
		CW	4	-	40		
Optical output power at threshold current	Pth	CW, Ibias=Ith	-	-	50	μW	
Operating current	Iop	CW, Pf=2mW, Tc=25°C	-	42	70	mA	
		CW, Pf=2mW, Tc=70°C	-	65	90		
Operating voltage	Vop	CW, Pf=2mW, Tc=25°C	-	1.2	1.5	V	
		CW, Pf=2mW, Tc=70°C	-	1.6	1.8		
Input impedance	Zin	-	-	25	-	Ω	
Optical output power from fiber end	Pf	CW, nominal	-	2	-	mW	
Light-emission central wavelength	λc	CW, Pf=1mW, Tc=25°C (Note1)	-x2Mx4	1507	1510	1513	nm
			-x2Mx5	1527	1530	1533	
			-x2Mx6	1547	1550	1553	
			-x2Mx7	1567	1570	1573	
Wavelength temperature coefficient	λct	-	-	0.10	0.11	nm/°C	
Spectral width	Δλ	(Note2), -20dB	-	-	0.4	nm	
Side mode suppression ratio	Sr	(Note2)	30	45	-	dB	
Cutoff frequency (-1.5dB optical)	fc	Pf=1mW	3.5	-	-	GHz	
Rise and fall time (10~90%)	tr, tf	(Note2)	-	125	150	psec	
Dispersion penalty	Pp	(Note2), +1800ps/nm disp.	-	-	2	dB	
Relative intensity noise	Nr	CW, Pf=1mW, f=1GHz	-	-150	-140	dB/Hz	
Tracking error (Note 3)	Er	CW, APC(Imon=const.)	-	0.5	1.25	dB	
Differential efficiency	η	CW, Tc=25°C	0.06	-	0.1	mW/ mA	
		CW	0.03	-	0.15		
Monitor current	Imon	CW, Pf=1mW, Vrd=5V	0.05	-	1	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	Tc=25°C	9.5	10	10.5	kΩ	
B constant of Rth	B	-	-	3950	-	K	

Note 1) "x"s in type number are decided with types of optical connector and lead form. Please refer TYPE NUMBER INFORMATION in the next page.

Note 2) 2.48832Gb/s NRZ, 2²³-1, Pf_ave=1mW, Extinction ratio 10dB, optical return loss from the line should be greater than 24dB in order to ensure the specified performance.

Note 3) Er=max|10×log(Pf / Pf@25°C)|

FIBER PIGTAIL SPECIFICATIONS

Parameter	Limits	Unit
Type	SM	-
Mode field diameter	10±1	μm
Cladding diameter	125±2	μm
Secondary coating outer diameter	0.9±0.1	mm
Connector	See Table 1.	-
Optical return loss of connector	40 (min)	dB

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FU-645SDF-x2Mxx

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**1.55 mm UNCOOLED DFB-LD MODULE WITH SINGLEMODE FIBER PIGTAIL
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DOCUMENTATION

- Threshold current (I_{th}) at T_c=25, 70°C
- Operating current (I_{op}) at T_c=25, 70°C
- Operating voltage (V_{op}) at T_c=25°C
- Light-emission central wavelength (λ_c) at T_c=25°C
- Monitor current (I_{mon}) at T_c=25°C
- Optical output power from fiber end (P_f)

TYPE NUMBER INFORMATION

FU-645SDF-x2Mxx

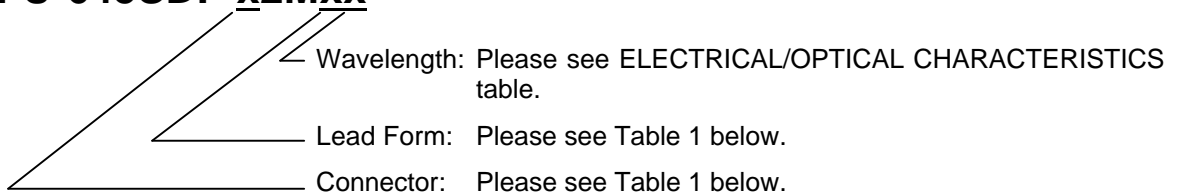


Table 1.

Type number	Connector type	L (Note 3)	Outline diagram
FU-645SDF-2M1x	None (Note 4)	-	(1)
FU-645SDF-V2M1x	FC/PC	28.4	
FU-645SDF-W2M1x	SC/PC	34.5	
FU-645SDF-2M2x	None (Note 4)	-	(2)
FU-645SDF-V2M2x	FC/PC	28.4	
FU-645SDF-W2M2x	SC/PC	34.5	

Note 3) 'L' 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.

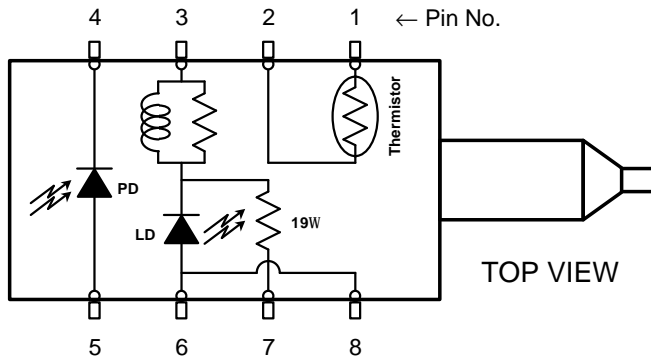
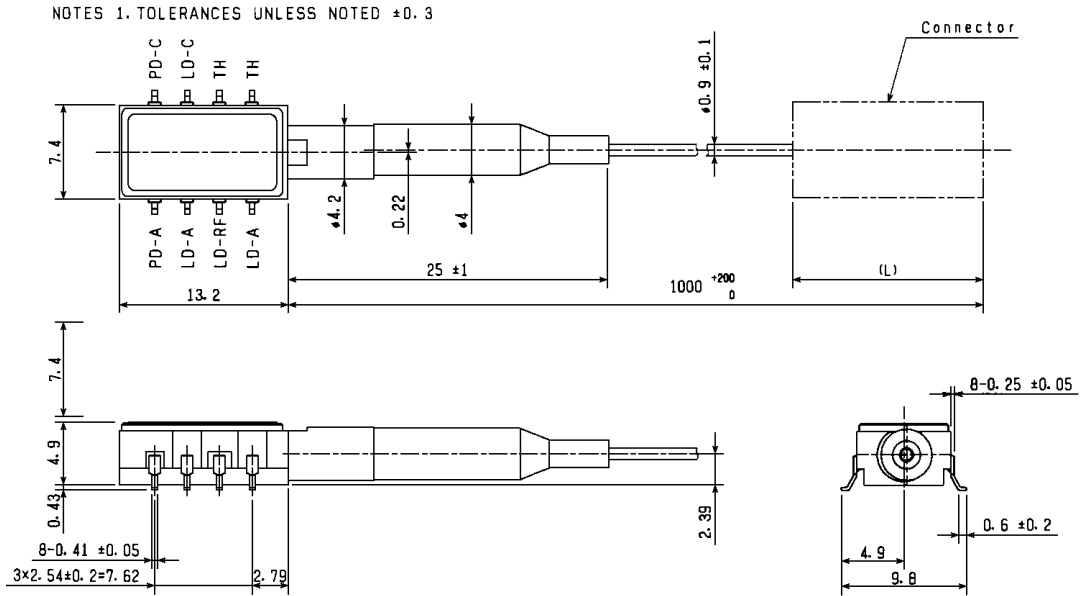
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OUTLINE DIAGRAM (1)

(Unit : mm)



PIN	FUNCTION
1	THERMISTOR
2	THERMISTOR
3	LD BIAS, CATHODE
4	PD CATHODE
5	PD ANODE
6	LD ANODE
7	LD RF, CATHODE
8	LD ANODE

FU-645SDF-x2M1x

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FU-645SDF-x2Mxx

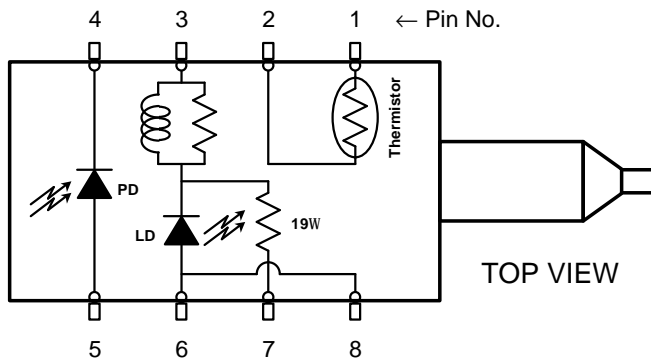
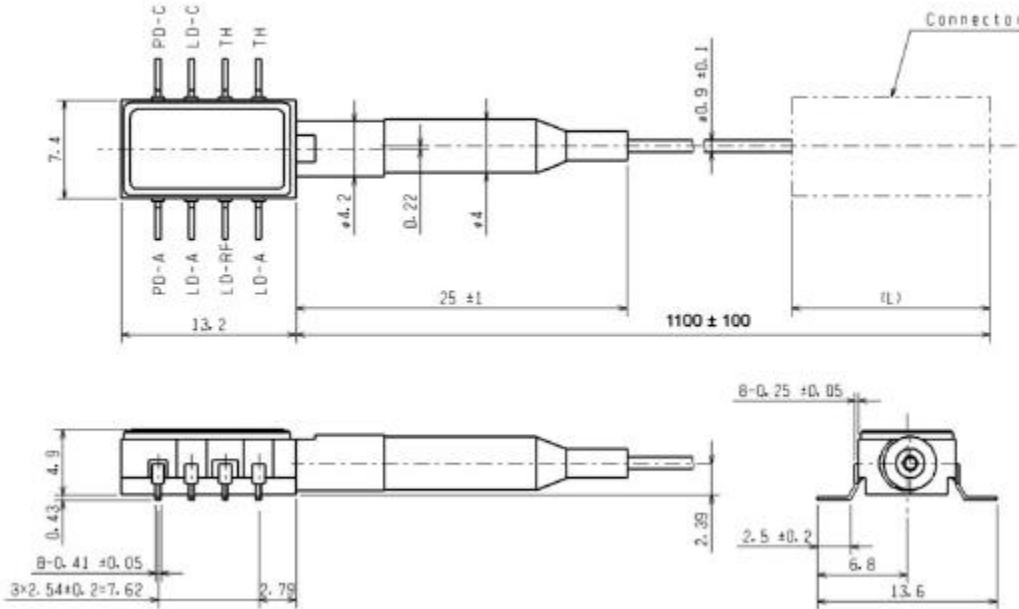
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OUTLINE DIAGRAM (2)

(Unit : mm)

NOTES 1. TOLERANCES UNLESS NOTED ±0.3



PIN	FUNCTION
1	THERMISTOR
2	THERMISTOR
3	LD BIAS, CATHODE
4	PD CATHODE
5	PD ANODE
6	LD ANODE
7	LD RF, CATHODE
8	LD ANODE

FU-645SDF-x2M2x