

23 August, 2001

Approved	Approved	Charged
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Customer	Approved	Approved

SPECIFICATION PROPOSAL
for
FU-68PDF-V620MxxB

(4ch, 150GHz range temperature tunable, Tc=-20~70degC)

A	B	C	D
	x		
Date		Approved	
24.Aug.'01		T.Nambara	

MITSUBISHI (OPTICAL DEVICES)

FU-68PDF-V620MxxB**1.55 μ m DFB-LD MODULE WITH POLARIZATION MAINTAINING FIBER PIGTAIL
(WAVELENGTH SELECTED, BIAS CIRCUIT INTEGRATED, DIGITAL APPLICATION)****DESCRIPTION**

Module type FU-68PDF-V620MxxB is a 1.55 μ m DFB-LD module with polarization maintaining optical fiber. This module is suitable to a CW light source for external modulator for use in 2.5Gb/s and 10Gb/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 25 Ω
- Emission wavelength is in 1.55 μ m band
- Polarization maintaining optical fiber pig-tail
- Built-in optical isolator
- Built-in thermal electric cooler
- Butterfly package
- With photodiode for optical output monitor
- Temperature tunable 150GHz

APPLICATION

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

ABSOLUTE MAXIMUM RATINGS (T_{ld}=T_{set})

Parameter		Symbol	Conditions	Rating	Unit
Laser diode	Optical output power	Pf	CW	24	mW
	Forward current	I _f	CW	150	mA
	Reverse voltage	V _{rl}	-	2	V
Photodiode	Reverse voltage	V _{rd}	-	20	V
	Forward current	I _{fd}	-	2	mA
Thermo-electric cooler (Note)	Cooler current	I _{pe}	-	1.8	A
	Cooler voltage	V _{pe}	-	4.8	V
Operating case temperature		T _c	-	-20 ~ 70	°C
Storage temperature		T _{stg}	-	-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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(WAVELENGTH SELECTED, BIAS CIRCUIT INTEGRATED, DIGITAL APPLICATION)****ELECTRICAL/OPTICAL CHARACTERISTICS** (T_{ld}=T_{set1} or T_{set2}, T_c=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Threshold current	I _{th}	CW	-	10	25	mA
Operating current	I _{op}	CW, P _f =20mW	-	-	130	mA
Operating voltage	V _{op}	CW, P _f =20mW	-	-	2	V
Input impedance	Z _{in}	P _f =20mW	-	25	-	Ω
Light-emission central wavelength	λ_1	CW, P _f =20mW, T _{ld} =T _{set1}	(Note 1)			nm
	λ_2	CW, P _f =20mW, T _{ld} =T _{set2}				
Central wavelength drift with case temp.	$\Delta\lambda_c/\Delta T_c$	T _c =-20~70°C	-1	-	0	pm/°C
Laser operating temperature	T _{set1}	-	15	-	35	°C
	T _{set2}					
Spectral line width	Δf	CW, P _f =20mW	-	-	20	MHz
Side mode suppression ratio	S _r	CW, P _f =20mW	33	40	-	dB
Cutoff frequency (-1.5dB optical)	f _c	P _f =20mW	0.5	-	-	GHz
Polarization extinction ratio	E _x	CW, P _f =20mW	20	25	-	dB
Relative intensity noise	N _r	CW, P _f =20mW, 0.5~3GHz	-	-155	-145	dB/Hz
Tracking error (Note 2)	E _r	T _c =-20~70°C, APC, ATC	-	-	0.5	dB
Differential efficiency	η	CW, P _f =20mW	0.15	-	-	mW/ mA
Monitor current	I _{mon}	CW, P _f =20mW, V _{rd} =5V	0.2	-	4	mA
Optical isolation	I _{so}	T _c =25°C	35	-	-	dB
		T _c =-20~70°C	23	-	-	
Dark current (PD)	I _d	V _{rd} =5V, T _c =-20~70°C	-	-	0.1	μA
Capacitance (PD)	C _t	V _{rd} =5V, f=1MHz	-	-	10	pF

Note 1) See Table 1.

Note 2) E_r=max|10×log(P_f / P_f@25°C)|

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Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Thermistor resistance	Rth	T _{ld} =25°C	9.5	10	10.5	k Ω
B constant of Rth	B	-	-	3950	-	K
Cooling capacity	ΔT	Pf=20mW, T _c =70°C	55	-	-	°C
Cooler current	I _{pe}	Pf=20mW, T _c =70°C, T _{ld} =T _{set1}	-	-	1.5	A
Cooler voltage	V _{pe}	Pf=20mW, T _c =70°C, T _{ld} =T _{set1}	-	-	4	V

FIBER PIGTAIL SPECIFICATIONS

Parameter	Limits	Unit
Type	PM (Note 3)	-
Mode field diameter	10.5+/-1	μm
Cladding diameter	125+/-3	μm
Secondary coating outer diameter	0.9+/-0.1	mm
Polarization axis	slow axis	-
Connector	FC/PC	-
Optical return loss of connector	40 (min)	dB

Note 3) PMF - Sumitomo Panda fiber (PM-155)

DOCUMENTATION

- Fiber output power vs. Laser forward current at T_{ld}=T_{set2} and T_c=25°C
- Threshold current (I_{th}) at T_{ld}=T_{set2} and T_c=25°C
- Laser forward current (I_{op}) at Pf=20mW, T_{ld}=T_{set2} and T_c=25°C
- Laser forward voltage (V_{op}) at Pf=20mW, T_{ld}=T_{set2} and T_c=25°C
- Laser operating temperature (T_{set1} and T_{set2}) (Note 4)
- Monitor current (I_{mon}) at Pf=20mW, T_{ld}=T_{set2} and T_c=25°C
- Thermistor resistance (R_{th1}) at Pf=20mW, T_{ld}=T_{set1} and T_c=25°C
- Thermistor resistance (R_{th2}) at Pf=20mW, T_{ld}=T_{set2} and T_c=25°C
- Cooler current (I_{pe}) at Pf=20mW, T_{ld}=T_{set1} and T_c=70°C
- Cooler voltage (V_{pe}) at Pf=20mW, T_{ld}=T_{set1} and T_c=70°C

Note 4) T_{set} is attached as a reference data. R_{th} should be used in order to tune the wavelength to the specified value accurately.

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Table 1.

Type number	λ_1 (nm)	λ_2 (nm)	Type number	λ_1 (nm)	λ_2 (nm)
FU-68PDF-V620M07B	1528.77	1529.94	FU-68PDF-V620M51B	1546.12	1547.32
FU-68PDF-V620M08B	1529.16	1530.33	FU-68PDF-V620M52B	1546.52	1547.72
FU-68PDF-V620M09B	1529.55	1530.72	FU-68PDF-V620M53B	1546.92	1548.11
FU-68PDF-V620M10B	1529.94	1531.12	FU-68PDF-V620M54B	1547.32	1548.51
FU-68PDF-V620M11B	1530.33	1531.51	FU-68PDF-V620M55B	1547.72	1548.91
FU-68PDF-V620M12B	1530.72	1531.90	FU-68PDF-V620M56B	1548.11	1549.32
FU-68PDF-V620M13B	1531.12	1532.29	FU-68PDF-V620M57B	1548.51	1549.72
FU-68PDF-V620M14B	1531.51	1532.68	FU-68PDF-V620M58B	1548.91	1550.12
FU-68PDF-V620M15B	1531.90	1533.07	FU-68PDF-V620M59B	1549.32	1550.52
FU-68PDF-V620M16B	1532.29	1533.47	FU-68PDF-V620M60B	1549.72	1550.92
FU-68PDF-V620M17B	1532.68	1533.86	FU-68PDF-V620M61B	1550.12	1551.32
FU-68PDF-V620M18B	1533.07	1534.25	FU-68PDF-V620M62B	1550.52	1551.72
FU-68PDF-V620M19B	1533.47	1534.64	FU-68PDF-V620M63B	1550.92	1552.12
FU-68PDF-V620M20B	1533.86	1535.04	FU-68PDF-V620M64B	1551.32	1552.52
FU-68PDF-V620M21B	1534.25	1535.43	FU-68PDF-V620M65B	1551.72	1552.93
FU-68PDF-V620M22B	1534.64	1535.82	FU-68PDF-V620M66B	1552.12	1553.33
FU-68PDF-V620M23B	1535.04	1536.22	FU-68PDF-V620M67B	1552.52	1553.73
FU-68PDF-V620M24B	1535.43	1536.61	FU-68PDF-V620M68B	1552.93	1554.13
FU-68PDF-V620M25B	1535.82	1537.00	FU-68PDF-V620M69B	1553.33	1554.54
FU-68PDF-V620M26B	1536.22	1537.40	FU-68PDF-V620M70B	1553.73	1554.94
FU-68PDF-V620M27B	1536.61	1537.79	FU-68PDF-V620M71B	1554.13	1555.34
FU-68PDF-V620M28B	1537.00	1538.19	FU-68PDF-V620M72B	1554.54	1555.75
FU-68PDF-V620M29B	1537.40	1538.58	FU-68PDF-V620M73B	1554.94	1556.15
FU-68PDF-V620M30B	1537.79	1538.98	FU-68PDF-V620M74B	1555.34	1556.55
FU-68PDF-V620M31B	1538.19	1539.37	FU-68PDF-V620M75B	1555.75	1556.96
FU-68PDF-V620M32B	1538.58	1539.77	FU-68PDF-V620M76B	1556.15	1557.36
FU-68PDF-V620M33B	1538.98	1540.16	FU-68PDF-V620M77B	1556.55	1557.77
FU-68PDF-V620M34B	1539.37	1540.56	FU-68PDF-V620M78B	1556.96	1558.17
FU-68PDF-V620M35B	1539.77	1540.95	FU-68PDF-V620M79B	1557.36	1558.58
FU-68PDF-V620M36B	1540.16	1541.35	FU-68PDF-V620M80B	1557.77	1558.98
FU-68PDF-V620M37B	1540.56	1541.75	FU-68PDF-V620M81B	1558.17	1559.39
FU-68PDF-V620M38B	1540.95	1542.14	FU-68PDF-V620M82B	1558.58	1559.79
FU-68PDF-V620M39B	1541.35	1542.54	FU-68PDF-V620M83B	1558.98	1560.20
FU-68PDF-V620M40B	1541.75	1542.94	FU-68PDF-V620M84B	1559.39	1560.61
FU-68PDF-V620M41B	1542.14	1543.33	FU-68PDF-V620M85B	1559.79	1561.01
FU-68PDF-V620M42B	1542.54	1543.73	FU-68PDF-V620M86B	1560.20	1561.42
FU-68PDF-V620M43B	1542.94	1544.13	FU-68PDF-V620M87B	1560.61	1561.83
FU-68PDF-V620M44B	1543.33	1544.53	FU-68PDF-V620M88B	1561.01	1562.23
FU-68PDF-V620M45B	1543.73	1544.92	FU-68PDF-V620M89B	1561.42	1562.64
FU-68PDF-V620M46B	1544.13	1545.32	FU-68PDF-V620M90B	1561.83	1563.05
FU-68PDF-V620M47B	1544.53	1545.72	FU-68PDF-V620M91B	1562.23	1563.45
FU-68PDF-V620M48B	1544.92	1546.12	FU-68PDF-V620M92B	1562.64	1563.86
FU-68PDF-V620M49B	1545.32	1546.52	FU-68PDF-V620M93B	1563.05	1564.27
FU-68PDF-V620M50B	1545.72	1546.92	FU-68PDF-V620M94B	1563.45	1564.68

All wavelengths are referred to vacuum.
Tolerance is $\lambda_c \pm 0.05\text{nm}$.

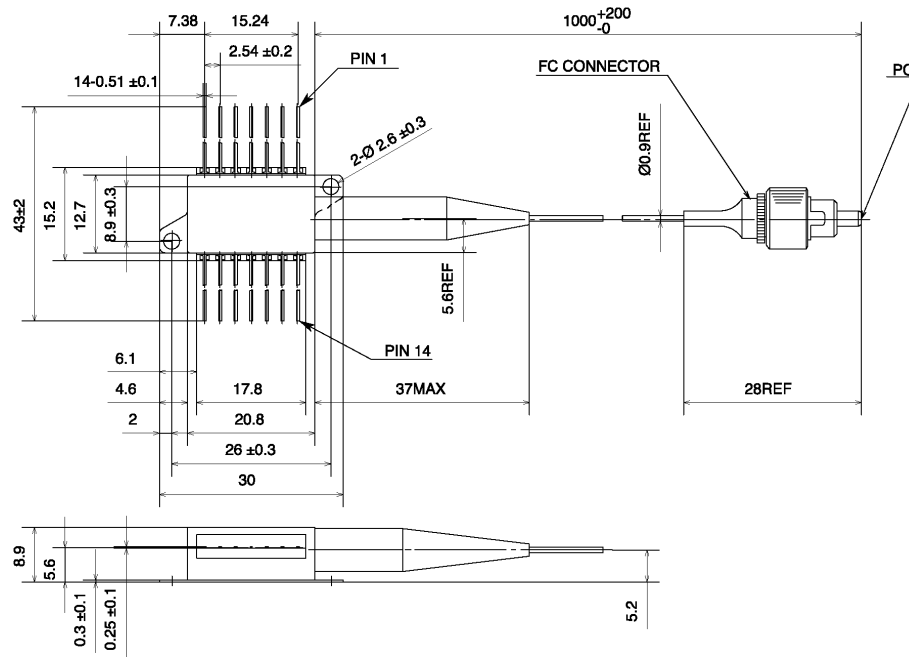
MITSUBISHI (OPTICAL DEVICES)

FU-68PDF-V620MxxB

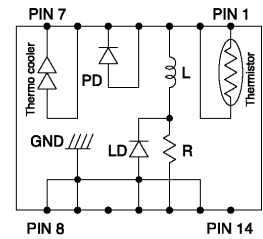
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OUTLINE DIAGRAM

Unit : mm
Tolerances unless noted ± 0.5



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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