Approved	Approved	Charged
	T.Nambara	**K.Masuda**

Specification of wavelength monitor integrated DFB-LD module

Module type: FU-675PDF-V620Mxx

- 4ch for 50GHz spacing, 150GHz range thermally wavelength tunable

A	B	C	D
	x		
Date		Approved	
5.Oct.'01		T.Nambara	

MITSUBISHI ELECTRIC CORPORATION

MITSUBISHI (OPTICAL DEVICES)

FU-675PDF-V620Mxx

WAVELENGTH MONITOR INTEGRATED 1.55 μm DFB-LD MODULE WITH POLARIZATION MAINTAINING FIBER PIGTAIL (WAVELENGTH SELECTED, DIGITAL APPLICATION)

DESCRIPTION

Module type FU-675PDF-V620Mxx is a wavelength monitor integrated 1.55μm 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 can be prepared in accordance with ITU-T recommendation wavelength channel plan for Dense-WDM transmission.

FEATURES

- Multi quantum wells (MQW) DFB Laser Diode module
- Emission wavelength is in 1.55μm band
- Polarization maintaining optical fiber pig-tail
- Built-in optical isolator
- Built-in thermal electric cooler
- Butterfly package
- With 2 photodiodes for wavelength monitor and optical output power monitor
- 150GHz range thermally wavelength tunable

APPLICATION

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

ABSOLUTE MAXIMUM RATINGS (Tld=Tset)

Parameter		Symbol	Conditions	Rating	Unit
Laser diode	Optical output power	Pf	CW	24	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	-	1.8	A
	Cooler voltage	Vpe	-	4.8	V
Operating case temperature		Tc	-	-20 ~ 70	°C
Storage temperature		Tstg	-	-40 ~ 70	°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=Tset1 or Tset2, Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Threshold current	Ith	CW	-	10	25	mA
Operating current	Iop	CW, Pf=20mW	-	-	130	mA
Operating voltage	Vop	CW, Pf=20mW	-	-	2	V
Light-emission central wavelength	λc1	CW, Pf=20mW, Tld=Tset1	(Note 1)			nm
	λc2	CW, Pf=20mW, Tld=Tset2				
Wavelength drift after 15 years	Δλc	CW, Pf=20mW, APC, ATC, AFC (Note 2)	-30	-	30	pm
Laser operating temperature	Tset1	-	15	-	35	°C
	Tset2					
Spectral line width	Δf	CW, Pf=20mW	-	-	20	MHz
Side mode suppression ratio	Sr	CW, Pf=20mW	33	40	-	dB
Polarization extinction ratio	Ex	CW, Pf=20mW	20	25	-	dB
Relative intensity noise	Nr	CW, Pf=20mW, 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=20mW	0.15	-	-	mW/mA
Power monitor current	Ipm	CW, Pf=20mW, Vrd=5V	35	-	700	μA
Wavelength monitor current	Iwm	CW, Pf=20mW, Vrd=5V	15	-	700	μA
Wavelength discriminator slope (Note 4)	Ds	CW, Pf=20mW, Vrd=5V	-	0.15	-	μA/GHz
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	-	-	30	pF

Note 1) See Table 1.
Note 2) Includes case temperature variation and aging.
Note 3) Er=max|10×log(Pf / Pf@25°C)|
Note 4) See Figure 1.

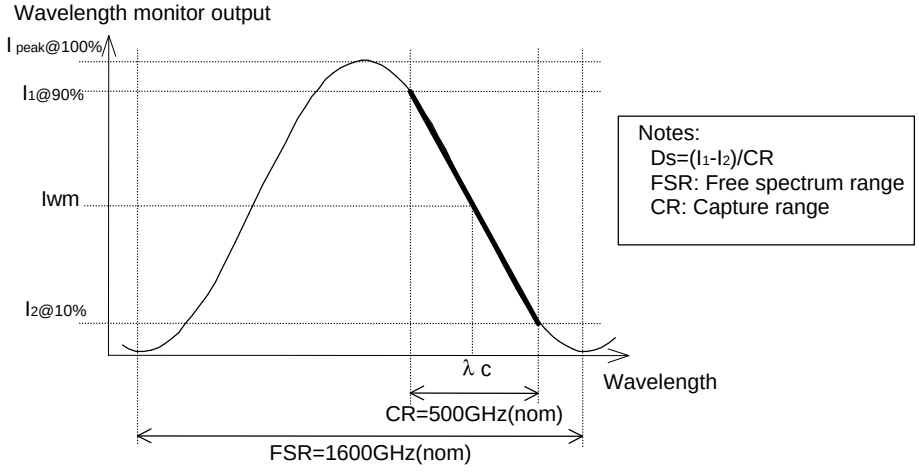

Figure 1. Wavelength discriminator curve

MITSUBISHI (OPTICAL DEVICES)

FU-675PDF-V620Mxx

WAVELENGTH MONITOR INTEGRATED 1.55 μm DFB-LD MODULE WITH POLARIZATION MAINTAINING FIBER PIGTAIL (WAVELENGTH SELECTED, DIGITAL APPLICATION)

THERMAL CHARACTERISTICS (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=20mW, Tc=70°C	55	-	-	°C
Cooler current	Ipe	Pf=20mW, Tc=70°C, Tld=Tset1	-	-	1.5	A
Cooler voltage	Vpe	Pf=20mW, Tc=70°C, Tld=Tset1	-	-	4	V

FIBER PIGTAIL SPECIFICATIONS

Parameter	Limits	Unit
Type	PM (Note 5)	-
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 5) PMF - Sumitomo Panda fiber (PM-155)

DOCUMENTATION

- Fiber output power vs. Laser forward current at Tld=Tset2 and Tc=-20,25,70°C
- Threshold current (Ith) at Tld=Tset2 and Tc=25°C
- Laser forward current (Iop) at Pf=20mW, Tld=Tset2 and Tc=25°C
- Laser forward voltage (Vop) at Pf=20mW, Tld=Tset2 and Tc=25°C
- Laser operating temperature (Tset1 and Tset2) at λc (Note 6)
- Power monitor current (Ipm1) at Pf=20mW, Tld=Tset1 and Tc=25°C
- Power monitor current (Ipm2) at Pf=20mW, Tld=Tset2 and Tc=25°C
- Wavelength monitor current (Iwm1) at Pf=20mW, λc, Tld=Tset1 and Tc=25°C
- Wavelength monitor current (Iwm2) at Pf=20mW, λc, Tld=Tset2 and Tc=25°C
- Thermistor resistance (Rth1) at Tld=Tset1 and Tc=25°C
- Thermistor resistance (Rth2) at Tld=Tset2 and Tc=25°C
- Cooler current (Ipe) at Pf=20mW, Tld=Tset1 and Tc=70°C
- Cooler voltage (Vpe) at Pf=20mW, Tld=Tset1 and Tc=70°C

Note 6) 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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WAVELENGTH MONITOR INTEGRATED 1.55 μm DFB-LD MODULE WITH POLARIZATION MAINTAINING FIBER PIGTAIL (WAVELENGTH SELECTED, DIGITAL APPLICATION)

Table 1.

Type number	λc1 (nm)	λc2 (nm)	Type number	λc1 (nm)	λc2 (nm)
FU-675PDF-V620M03	1527.22	1528.38	FU-675PDF-V620M52	1546.52	1547.72
FU-675PDF-V620M04	1527.60	1528.77	FU-675PDF-V620M53	1546.92	1548.11
FU-675PDF-V620M05	1527.99	1529.16	FU-675PDF-V620M54	1547.32	1548.51
FU-675PDF-V620M06	1528.38	1529.55	FU-675PDF-V620M55	1547.72	1548.91
FU-675PDF-V620M07	1528.77	1529.94	FU-675PDF-V620M56	1548.11	1549.32
FU-675PDF-V620M08	1529.16	1530.33	FU-675PDF-V620M57	1548.51	1549.72
FU-675PDF-V620M09	1529.55	1530.72	FU-675PDF-V620M58	1548.91	1550.12
FU-675PDF-V620M10	1529.94	1531.12	FU-675PDF-V620M59	1549.32	1550.52
FU-675PDF-V620M11	1530.33	1531.51	FU-675PDF-V620M60	1549.72	1550.92
FU-675PDF-V620M12	1530.72	1531.90	FU-675PDF-V620M61	1550.12	1551.32
FU-675PDF-V620M13	1531.12	1532.29	FU-675PDF-V620M62	1550.52	1551.72
FU-675PDF-V620M14	1531.51	1532.68	FU-675PDF-V620M63	1550.92	1552.12
FU-675PDF-V620M15	1531.90	1533.07	FU-675PDF-V620M64	1551.32	1552.52
FU-675PDF-V620M16	1532.29	1533.47	FU-675PDF-V620M65	1551.72	1552.93
FU-675PDF-V620M17	1532.68	1533.86	FU-675PDF-V620M66	1552.12	1553.33
FU-675PDF-V620M18	1533.07	1534.25	FU-675PDF-V620M67	1552.52	1553.73
FU-675PDF-V620M19	1533.47	1534.64	FU-675PDF-V620M68	1552.93	1554.13
FU-675PDF-V620M20	1533.86	1535.04	FU-675PDF-V620M69	1553.33	1554.54
FU-675PDF-V620M21	1534.25	1535.43	FU-675PDF-V620M70	1553.73	1554.94
FU-675PDF-V620M22	1534.64	1535.82	FU-675PDF-V620M71	1554.13	1555.34
FU-675PDF-V620M23	1535.04	1536.22	FU-675PDF-V620M72	1554.54	1555.75
FU-675PDF-V620M24	1535.43	1536.61	FU-675PDF-V620M73	1554.94	1556.15
FU-675PDF-V620M25	1535.82	1537.00	FU-675PDF-V620M74	1555.34	1556.55
FU-675PDF-V620M26	1536.22	1537.40	FU-675PDF-V620M75	1555.75	1556.96
FU-675PDF-V620M27	1536.61	1537.79	FU-675PDF-V620M76	1556.15	1557.36
FU-675PDF-V620M28	1537.00	1538.19	FU-675PDF-V620M77	1556.55	1557.77
FU-675PDF-V620M29	1537.40	1538.58	FU-675PDF-V620M78	1556.96	1558.17
FU-675PDF-V620M30	1537.79	1538.98	FU-675PDF-V620M79	1557.36	1558.58
FU-675PDF-V620M31	1538.19	1539.37	FU-675PDF-V620M80	1557.77	1558.98
FU-675PDF-V620M32	1538.58	1539.77	FU-675PDF-V620M81	1558.17	1559.39
FU-675PDF-V620M33	1538.98	1540.16	FU-675PDF-V620M82	1558.58	1559.79
FU-675PDF-V620M34	1539.37	1540.56	FU-675PDF-V620M83	1558.98	1560.20
FU-675PDF-V620M35	1539.77	1540.95	FU-675PDF-V620M84	1559.39	1560.61
FU-675PDF-V620M36	1540.16	1541.35	FU-675PDF-V620M85	1559.79	1561.01
FU-675PDF-V620M37	1540.56	1541.75	FU-675PDF-V620M86	1560.20	1561.42
FU-675PDF-V620M38	1540.95	1542.14	FU-675PDF-V620M87	1560.61	1561.83
FU-675PDF-V620M39	1541.35	1542.54	FU-675PDF-V620M88	1561.01	1562.23
FU-675PDF-V620M40	1541.75	1542.94	FU-675PDF-V620M89	1561.42	1562.64
FU-675PDF-V620M41	1542.14	1543.33	FU-675PDF-V620M90	1561.83	1563.05
FU-675PDF-V620M42	1542.54	1543.73	FU-675PDF-V620M91	1562.23	1563.45
FU-675PDF-V620M43	1542.94	1544.13	FU-675PDF-V620M92	1562.64	1563.86
FU-675PDF-V620M44	1543.33	1544.53	FU-675PDF-V620M93	1563.05	1564.27
FU-675PDF-V620M45	1543.73	1544.92	FU-675PDF-V620M94	1563.45	1564.68
FU-675PDF-V620M46	1544.13	1545.32	FU-675PDF-V620M95	1563.86	1565.09
FU-675PDF-V620M47	1544.53	1545.72	FU-675PDF-V620M96	1564.27	1565.50
FU-675PDF-V620M48	1544.92	1546.12	FU-675PDF-V620M97	1564.68	1565.90
FU-675PDF-V620M49	1545.32	1546.52	FU-675PDF-V620M98	1565.09	1566.31
FU-675PDF-V620M50	1545.72	1546.92	FU-675PDF-V620M99	1565.50	1566.72
FU-675PDF-V620M51	1546.12	1547.32			

All wavelengths are referred to vacuum.

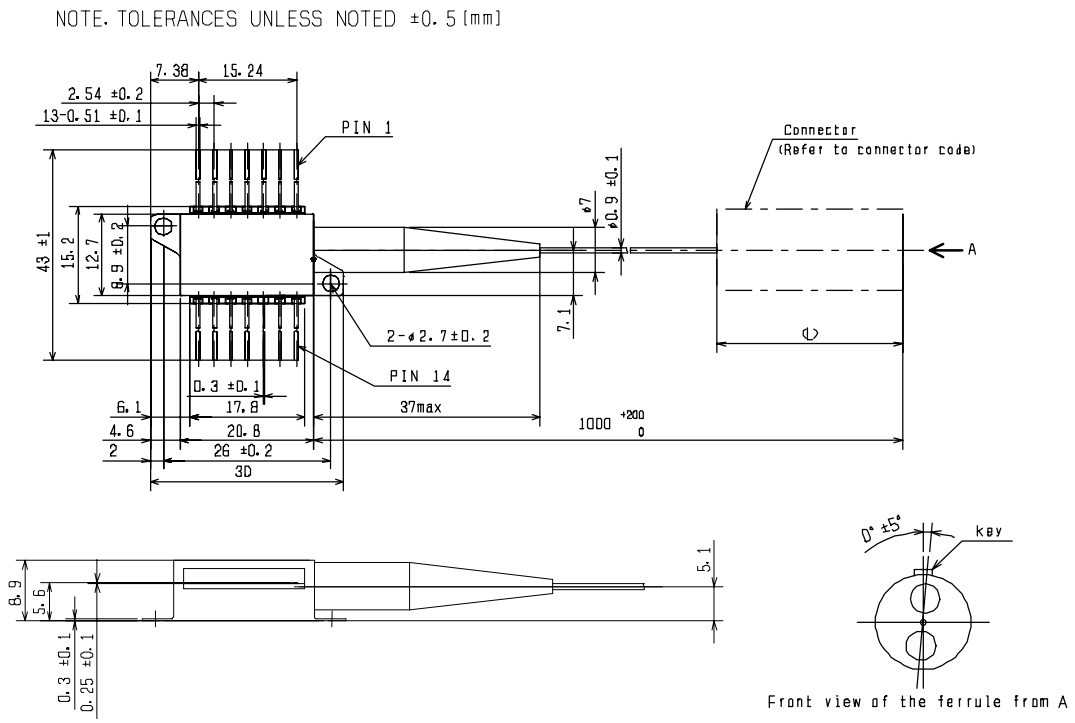
MITSUISHI (OPTICAL DEVICES)

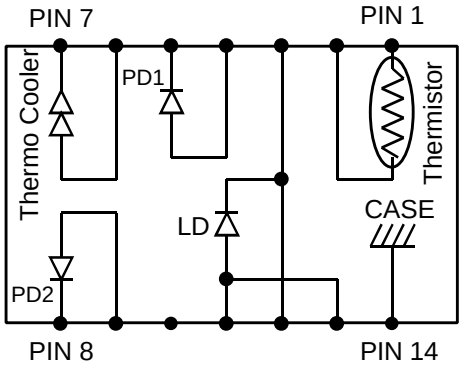
FU-675PDF-V620Mxx

WAVELENGTH MONITOR INTEGRATED 1.55 μm DF-LD MODULE WITH POLARIZATION MAINTAINING FIER PIGTAIL (WAVELENGTH SELECTED, DIGITAL APPLICATION)

OUTLINE DIAGRAM

(Unit : mm)





PIN	FUNCTION
1	THERMISTOR
2	THERMISTOR
3	LD CATHODE
4	POWER MONITOR PD1 ANODE
5	POWER MONITOR PD1 CATHODE
6	COOLER ANODE
7	COOLER CATHODE
8	WAVELENGTH MONITOR PD2 CATHODE
9	WAVELENGTH MONITOR PD2 ANODE
10	NC
11	LD ANODE
12	LD CATHODE
13	LD ANODE
14	GND