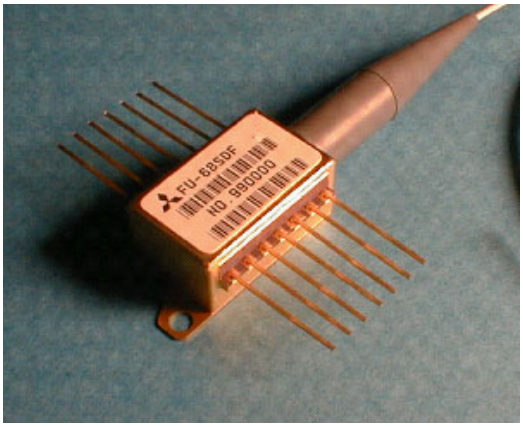
FU-68SDF-x31MyyF

1.5 μm DFB-LD MODULE WITH SINGLEMODE FIBER PIGTAIL

DESCRIPTION

Module type FU-68SDF-x31MyyF is a 1.5μm band DFB-LD module with single-mode optical fiber.
This module is suitable to a directly modulated light source for use in high power optical repieter for mobile communication system.



FEATURES

- High liniality multi quantum wells (MQW) DFB-LD
- Emission wavelength is in 1.5μm band
- Built-in optical isolator
- Thermo electric cooler for laser temperature control
- With photodiode for optical output monitor
- RoHS (2002/95/EC) compliant

APPLICATION

Repeater systems
Radio on fiber
Analog transmission systems

ABSOLUTE MAXIMUM RATINGS (Tld=25°C)

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 (Tc= 25°C, Tld=Tset unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Threshold current	Ith	CW	-	10	25	mA
Operating current	Iop	CW, Pf=10mW	-	60	100	mA
Operating voltage	Vop	CW, Pf=10mW	-	1.3	1.8	V
Input impedance	Zin	Pf=10mW	-	25	-	Ω
Light-emission central wavelength	λc	CW, Pf=10mW	See Ordering Information and Table 1			nm
Central wavelength drift with case temp.	Δλc/ΔTc	Tc=-20~70°C	-1	-	0	pm/°C
Laser operating temperature	Tset	-	15	-	35	°C
Side mode suppression ratio	Sr	CW, Pf=10mW	33	40	-	dB
3rd order distortion	D3	2 tone test f1=1997MHz, f2=2003MHz m=20%/tone, If(average)=Iop (Note 1) (Note 2)	-	-65	-56	dBc
Cutoff frequency (-1.5dB optical)	fc	Pf=10mW	3.5	-	-	GHz
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	0.12	0.2	0.35	mW/mA
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) If: LD forward current
Note 2) Optical return loss of the connectors should be greater than 40dB in order to ensure the specified performance.
Note 3) Er=max|10×log(Pf / Pf@25°C)|

THERMAL CHARACTERISTICS (Tld=25°C, Tc=-20~70°C)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Thermistor resistance	Rth	-	9.5	10	10.5	kΩ
B constant of Rth	B	-	-	3950	-	K
Cooling capacity	ΔT	Pf=10mW, Tc=70°C	55	-	-	°C
Cooler current	Ipe	Pf=10mW, Tc=70°C	-	0.6	1	A
Cooler voltage	Vpe	Pf=10mW, Tc=70°C	-	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	See Ordering information	-
Optical return loss of connector		

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DOCUMENTATION (Tld=Tset)

- Fiber output power vs. Laser forward current Tc=25°C
- Threshold current (Ith)
- Laser forward current (Iop) at Pf=10mW
- Laser forward voltage (Vop) at Pf=10mW
- 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
- Laser temperature (Tset)
- Central wavelength (λc)

ORDERING INFORMATION

FU - 68SDF – _ 31M _ _ F

λ code	**See table 1**

	Connector
W	**SC/PC**
V	**FC/PC**

Table 1.

f [THz]	λc [nm]	λ code
193.50	1549.32	59
193.30	1550.92	63
193.10	1552.52	67
192.90	1554.13	71
192.70	1555.75	75
192.50	1557.36	79
192.30	1558.98	83
192.10	1560.61	87

All wavelengths are referred to vacuum. Tolerance is λc+/-0.4nm

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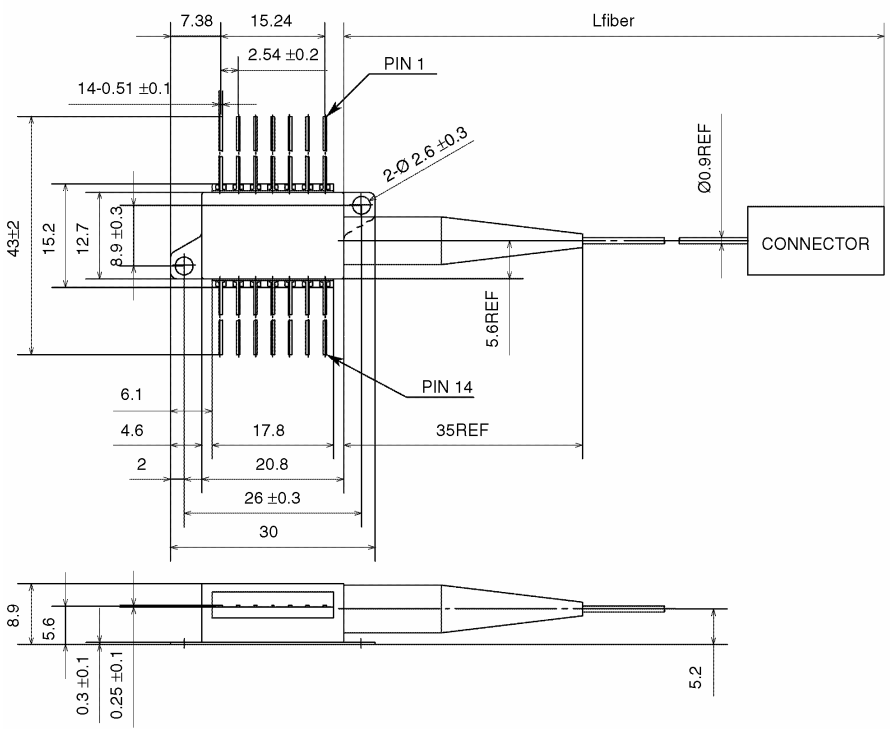
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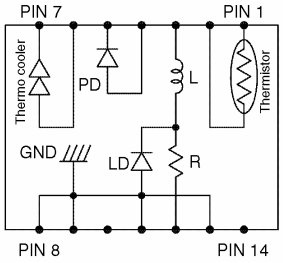
OUTLINE DIAGRAM

Unless otherwise noted +/-0.5mm

(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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Safety Cautions for Use of Optoelectronic Devices

General:

Although the manufacturer is always striving to improve the reliability of its product, problems and errors may occur with semiconductor products. Therefore, the user's products are required to be designed with full safety regard to prevent any accidents that results in injury, death, fire or environmental damage even when semiconductor products happen to error. Especially it is recommended to take in consideration about redundancy, fire prevention, error prevention safeguards. And the following requirements must be strictly observed.

Warning!

1. Eye safety : Seminductor laser radiates laser light during operation. Laser light is very dangerous when shot directly into human eyes. Don't look at laser light directly, or through optics such as a lens. The laser light should be observed using the ITV camera, IR-viewer, or other appropriate instruments.

2. Product handling : The product contains GaAs (gallium arsenide). It is safe for regular use, but harmful to the human body if made into powder or steam. Be sure to avoid dangerous process like smashing, burning, chemical etching. Never put this product in one's mouth or swallow it.

3. Product disposal : This product must be disposed of as special industrial waste. It is necessary to separate it from general industrial waste and general garbage.

Handling Cautions for Optoelectronic Devices

1. General:

(1) The products described in this specification are designed and manufactured for use in general communication systems or electronic devices, unless their applications or reliability are otherwise specified. Therefore, they are not designed or manufactured for installation in devices or systems that may affect human life or that are used in social infrastructure requiring high reliability.

(2) When the customer is considering to use the products in special applications, such as transportation systems (automobiles, trains, vessels), medical equipments, aerospace, nuclear power control, and submarine repeaters or systems, please contact Mitsubishi Electric or an authorized distributor.

2. Shipping Conditions:

(1) During shipment, place the packing boxes in the correct direction, and fix them firmly to keep them immovable. Placing the boxes upside down, tilting, or applying abnormal pressure onto them may cause deformation in the electrode terminals, breaking of optical fiber, or other problems.

(2) Never throw or drop the packing boxes. Hard impact on the boxes may cause break of the devices.

(3) Take strict precautions to keep the devices dry when shipping under rain or snow.

3. Storage Conditions:

When storing the products, it is recommended to store them following the conditions described below without opening the packing. Not taking enough care in storing may result in defects in electrical characteristics, soldering quality, visual appearance, and so on. The main points are described below (if special storage conditions are given to the product in the specification sheet, they have priority over the following general cautions):

(1) Appropriate temperature and humidity conditions, i.e., temperature range between 5~30°C, and humidity between 40~60 percent RH, should be maintained in storage locations. Controlling the temperature and humidity within this range is particularly important in case of long-term storage for six months or more.

(2) The atmosphere should be particularly free from toxic gases and dust.

(3) Do not apply any load on the product.

(4) Do not cut or bend the leads of the devices which are to be stored. This is to prevent corrosion in the cut or bent part of the lead causing soldering problems in the customer's assembling process.

(5) Sudden change in temperature may cause condensation in the product or packing, therefore, such locations should be avoided for storing. Temperature in storage locations should be stable.

(6) When storing ceramic package products for extended periods of time, the leads may turn reddish due to reaction with sulfur in the atmosphere.

(7) Storage conditions for bare chip and unsealed products shall be stated separately because bare chip and unsealed products require stricter controls than package sealed products.

4. Design Conditions and Environment under Use:

(1) Avoid use in locations where water or organic solvents adhere directly to the product, or where there is any possibility of the generation of corrosive gas, explosive gas, dust, salinity, or other troublesome conditions. Such environments will not only significantly lower the reliability, but also may lead to serious accidents.

(2) Operation in excess of the absolute maximum ratings can cause permanent damage to the device. The customers are requested to design not to exceed those ratings even for a short time.

5. ESD Safety Cautions:

The optoelectronic devices are sensitive to static electricity (ESD, electro-static discharge). The product can be broken by ESD. When handling this product, please observe the following countermeasures:

<Countermeasures against Static Electricity and Surge>

To prevent break of devices by static electricity or surge, please adopt the following countermeasures in the assembly line:

(1) Ground all equipments, machinery jigs, and tools in the process line with earth wires installed in them. Take particular care with hot plates, solder irons and other items for which the commercial power supplies are prone to leakage.

(2) Workers should always use earth bands. Use of antistatic clothing, electric conductive shoes, and other safety equipment while at work is highly recommended.

(3) Use conductive materials for this product's container, etc.

(4) It is recommended that grounding mats be placed on the surfaces of assembly line workbench and the surrounding floor in work area, etc.

(5) When mounting this product in parts or materials which can be electrically charged (printed wiring boards, plastic products, etc.), pay close attention to the static electricity in those parts. ESD may damage the product.

(6) Humidity in working environment should be controlled to be 40 percent RH or higher.

These countermeasures are most general, and there is a need to carefully confirm the line before starting mass production using this product (in the trial production, etc.). It is extremely important to prevent surge, eliminate it rapidly, and prevent it from spreading.

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