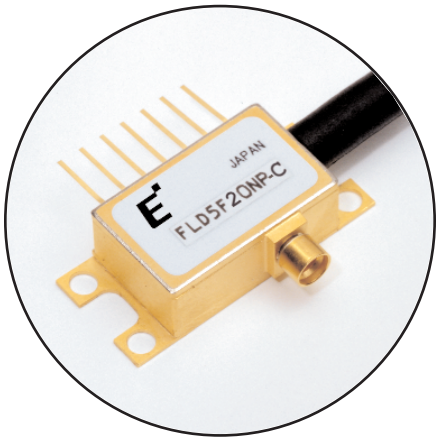
1,550nm Modulator Integrated DFB Laser — FLD5F20NP-C

FEATURES

- Modulator Integrated DFB Laser Diode Module
- CW operation of DFB laser section
- Modulation voltage applied only to modulator section
- High speed butterfly package with GPO connection
- Built-in optical isolator, monitor photodiode, thermistor, and thermo-electric cooler



APPLICATION

This MI DFB laser is intended for long reach applications (≤80km) at 10Gb/s.

DESCRIPTION

The Modulator Integrated DFB Laser (MI DFB Laser) has an electro-absorption modulator monolithically integrated with a conventional Distributed Feed-Back (DFB) laser. The modulation voltage is applied to the modulator section while the laser section operates CW allowing extremely low wavelength chirping. Extinction ratios of more than 10 dB can be achieved with 2.6 Vp-p modulation. The MI laser is installed in a butterfly type package. The module incorporates a highly stable optical coupling system. The module includes an optical isolator, monitor photodiode, thermistor and a thermo-electric cooler.

ABSOLUTE MAXIMUM RATINGS (T_{op}=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Rating		Unit
			Min.	Max.	
Operating Case Temperature	T_{op}	-	-20	+70	°C
Storage Temperature	T_{stg}	-	-40	+85	°C
Optical Output Power	P_f	CW	-	5	mW
Laser Forward Current	I_F	CW	-	150	mA
Laser Reverse Voltage	V_R	CW	-	2	V
Modulator Forward Voltage	V_m	CW	-5	+1	V
Photodiode Forward Current	-	-	-	1	mA
Photodiode Reverse Voltage	V_{DR}	-	-	10	V
TEC Voltage	V_c	Cooling	-	+2.5	V
		Heating	-2.5	-	
TEC Current	I_c	Cooling	-	+1.4	A
		Heating	-0.9	-	
Thermistor Temperature	Tth	ATC Operation	-20	+70	°C
Lead Soldering Time	-	260°C	-	10	sec

OPTICAL & ELECTRICAL CHARACTERISTICS (T_L= 25°C, T_{op} = 25°C, & BOL, unless otherwise specified)

Parameter	Symbol	Test Condition	Limits			Unit
			Min.	Type	Max.	
Peak Wavelength	W_p	Note (1)	1530	-	1565	nm
Threshold Current	I_{th}	CW, V_m=V_o	-	-	30	mA
Threshold Power	P_{th}	CW, I_F=I_{th}, V_m=V_o	-	-	75	μW
Operating Current	I_{op}	-	40	-	100	mA
Forward Voltage	V_F	CW, I_F=I_{op}	-	1.4	2.0	V
Output Power	P_f	Note (1)	-1.0	-	-	dBm
Tracking Error	TE	CW, I_F=I_{op}, V_m=V_o, Im-APC, Tc=-20 to 70°C	-0.5	-	+0.5	dB
Spectral Width	Δλp	10Gb/s, NRZ, PRBS=2^{23}-1, I_F=I_{op}, V_m=V_o & (V_o-V_{mod}), -3dB, FWHM	-	-	0.04	nm
		10Gb/s, NRZ, PRBS=2^{23}-1, I_F=I_{op}, V_m=V_o & (V_o-V_{mod}), -20dB, FWHM	-	-	0.30	
Sidemode Suppression Ratio	SSR	Note (1)	35	-	-	dB
Relative Intensity Noise	RIN	f=10MHz to 8.5GHz, V_m=V_o, I_F=I_{op}, 8% Reflection	-	-	-120	dB/Hz
Kink	K	I_{th} +5mA to 1.5 x I_{op}	No Kink			-
Mode Hops	-	I_{th} +5mA to 1.5 x I_{op}	No Mode Hops			-
Optical Isolation	I_s	Tc=-20 to +70°C	25	35	-	dB
On Level Modulation	V_o	-	-0.7	-	0	V
Modulator Drive Voltage	V_{mod}	(V_o-V_{mod})-3.3V, Rext=10dB	-	-	2.6	Vpp

OPTICAL & ELECTRICAL CHARACTERISTICS (T_L= 25°C, T_{op} = 25°C, & BOL, unless otherwise specified)

Parameter	Symbol	Test Condition	Limits			Unit
			Min.	Type	Max.	
RF Extinction Ratio	R_{ext}	I_F=I_{op}, V_m=V_o at On-Level, V_m=V_o-V_{mod} at Off-Level	10	-	-	dB
Transmission Penalty due to Dispersion	P_d	Note (2)	-	-	2.0	dB
Rise/Fall Time	T_r, T_f	I_F=I_{op}, V_m=V_o, 20% to 80%	-	20	25	ps
Cut-off Frequency	S_{21}	-3dB, I_F=I_{op},V_m=V_o-0.5|V_{mod}|	10	-	-	GHz
In-Band Ripple	ΔG	I_F=I_{op}, 0.1 to 10GHz, V_m=V_o-0.5|V_{mod}|	-1.0	-	+1.0	dB
RF Return Loss	S_{11}	DC to 5GHz, V_m=V_o, I_F=I_{op}, 50Ω Test Set	8	-	-	dB
		5 to 10GHz, V_m=V_o, I_F=I_{op}, 50Ω Test Set	5	-	-	dB
Monitor Current	I_m	Note (1), V_{DR}=5V	0.04	-	1.5	mA
Monitor Dark Current	I_d	V_{DR}=5V	-	2	100	nA
Monitor Diode Capacitance	C_t	V_{DR}=5V, f=10MHz	-	2	15	pF
TEC Capacity	ΔT	PTEC=2.4W, I_F=I_{op}	45	-	-	°C
TEC Current	ITEC	I_F=I_{op}, ΔT=45°C	-	-	1.0	A
TEC Voltage	VTEC	I_F=I_{op}, ΔT=45°C	-	-	2.4	V
TEC Power Dissipation	PTEC	I_F=I_{op}	-	-	2.4	W
Thermal Resistance	R_{th}	TL=25°C	9.5	-	10.5	kΩ
Thermistor B Constant	B	-	3270	3450	3630	K

Note (1) Eudyna Test System, 9.95328Gb/s, PRBS=2^{23}-1, I_F=I_{op}, V_m=V_o and (V_o-V_{mod})

Note (2) Eudyna Test System, 9.95328Gb/s, PRBS=2^{23}-1, I_F=I_{op}, V_m=V_o and (V_o-V_{mod})
Dispersion=1600ps/nm, Dispersion Penalty at Bit-Error-Rate=1.0E-10

Fig. 1 Lasing Spectrum

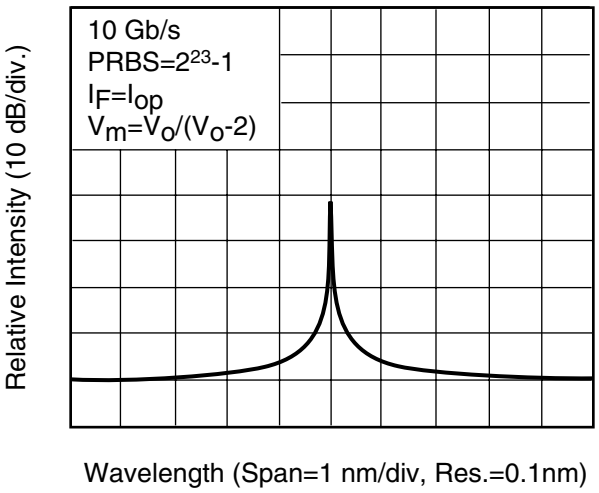


Fig. 2 Output Power & Monitor Current vs. Forward Current

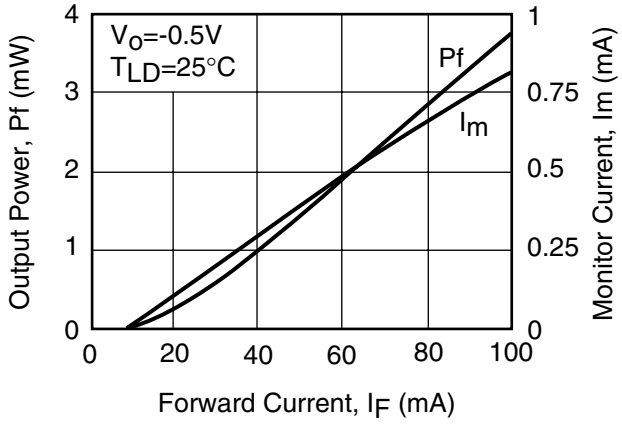


Fig. 3 Extinction Ratio vs. Modulation Applied Voltage

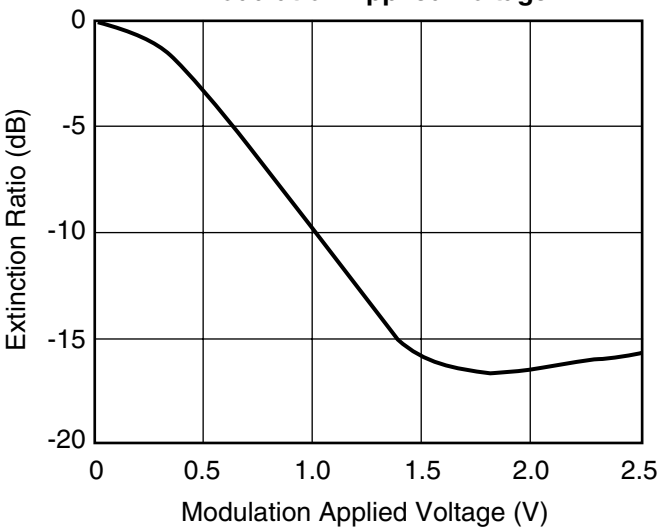


Fig. 4 Cut-off Frequency (S21)

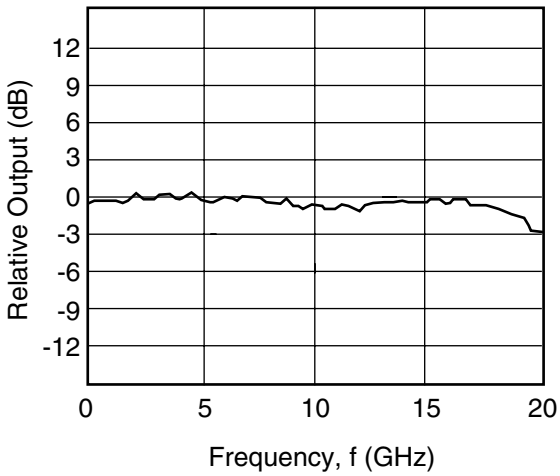


Fig. 5 RF Return Loss (S11)

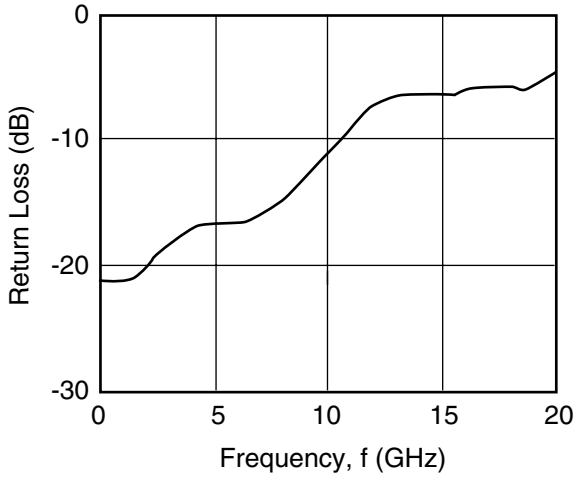
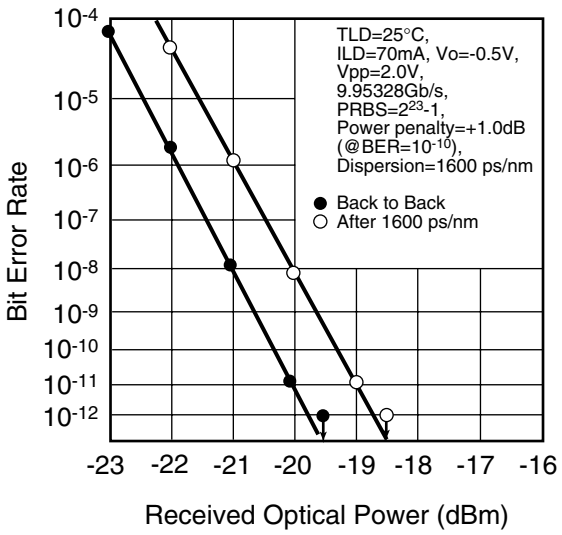
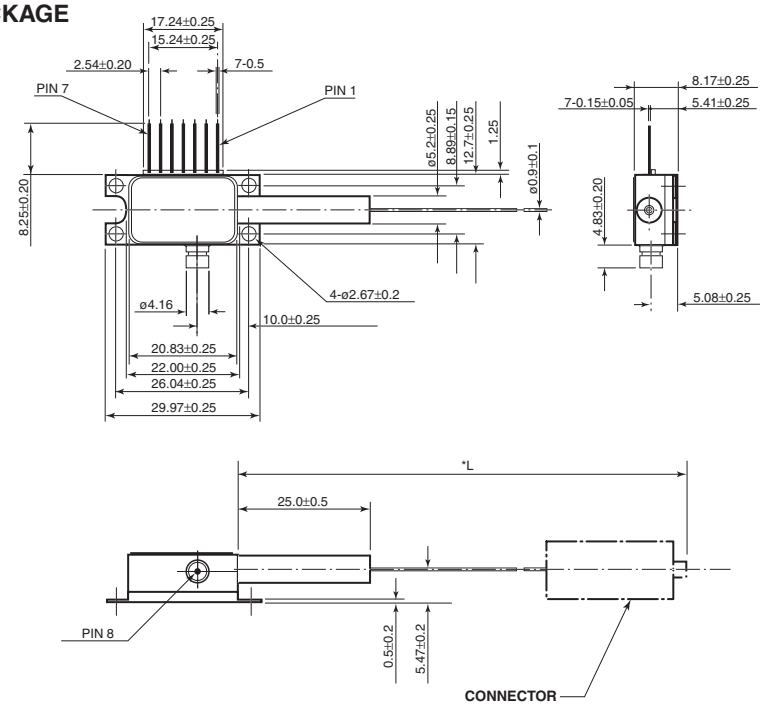
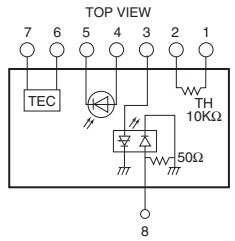


Fig. 6 Transmission Characteristics



"NP" PACKAGE **UNIT: mm**





#	PIN DESIGNATIONS
1	Thermistor
2	Thermistor
3	LD Anode
4	Power Monitor Anode
5	Power Monitor Cathode
6	Thermoelectirc Cooler (+)
7	Thermoelectric Cooler (-)
8	Modulator Anode (-)

Case Ground: LD Cathode

* Pigtail length (L) and connector type are specified in the detail (individual) specification.

For further information please contact:

Eudyna Devices USA Inc.
2355 Zanker Rd.
San Jose, CA 95131-1138, U.S.A.
TEL: (408) 232-9500
FAX: (408) 428-9111
www.us.eudyna.com

Eudyna Devices Europe Ltd.
Network House
Norreys Drive
Maidenhead, Berkshire SL6 4FJ
United Kingdom
TEL: +44 (0) 1628 504800
FAX: +44 (0) 1628 504888

Eudyna Devices Asia Pte Ltd.
Hong Kong Branch
Rm. 1101, Ocean Centre, 5 Canton Rd.
Tsim Sha Tsui, Kowloon, Hong Kong
TEL: +852-2377-0227
FAX: +852-2377-3921

Eudyna Devices Inc.
Sales Division
1, Kanai-cho, Sakae-ku
Yokohama, 244-0845, Japan
TEL: +81-45-853-8156
FAX: +81-45-853-8170

CAUTION

Eudyna Devices Inc. products contain **gallium arsenide (GaAs)** which can be hazardous to the human body and the environment. For safety, observe the following procedures:

- **Do not put this product into the mouth.**
- **Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.**
- **Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.**