

1,550nm DFB DWDM Direct Modulation Laser

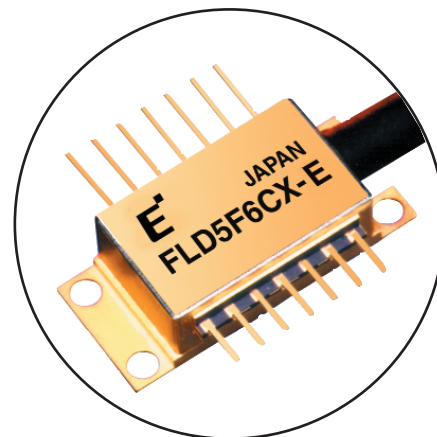
FLD5F6CX-E

FEATURES

- Direct Modulation DFB Laser
- Built-in TEC, Thermistor and Monitor PD
- 14-Pin Butterfly Type Module
- Low Residual Chirp
- Optimized for 2.5 Gb/s Modulation Rates
- Selected wavelengths according to ITU-T grid available

APPLICATIONS

This laser is intended for application in 2.5 Gb/s long haul Dense Wavelength Division Multiplexing (DWDM) systems. Transmission spans of 100 km (1800ps/nm) are possible.



DESCRIPTION

The FLD5FCX-E is capable of 2.5 Gb/s transmission. It is packaged in a “butterfly” type module. The module employs a highly stable optical coupling system, coupling the laser output through a built-in optical isolator into a single mode fiber pigtail. The module also includes a monitor photodiode, a thermoelectric cooler (TEC) and thermistor. This device is optimally designed for use in DWDM direct modulation transmission systems. Selected wavelengths are available to the specified ITU-T grid.

ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Rating		Unit
			Min.	Max.	
Storage Temperature	T _{stg}	-	-40	+70	°C
Operating Case Temperature	T _{op}	-	-20	+65	°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
Photodiode Forward Current	-	-	-	10	mA
Photodiode Reverse Voltage	V _{DR}	-	-	20	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	T _{th}	ATC Operation	-20	+65	°C
Lead Soldering Time	T _{sold}	260°C	-	10	sec
Environmental Operating Humidity	X _{op}	Top<30°C	-	95	%
Environmental Storage Humidity	X _{st}	Tstg<30°C	-	95	%

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_L=T_{set}, T_C=25°C, BOL, unless otherwise specified)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Laser Set Temperature	T _{set}	-	15	-	35	°C
Threshold Current	I _{th}	CW	3	-	40	mA
Forward Voltage	V _{FDC}	CW, I _F =30 mA, pin 12-13	-	1.6	1.75	V
Series Resistance	R _S	CW, pin 12-13	22	25	28	Ω
Optical Output Power	P _f	CW	2.0	-	-	mW
Slope Efficiency	η	CW, P _f =2.0mW	0.035	-	-	mW/mA
Threshold Power	P _{th}	I _F =I _{th} , CW	-	-	50	μW
Tracking Error (Note 1)	TE	P _f =2.0mW, T _C =-20 to 65°C	-0.5	-	+0.5	dB
Monitor Current	I _m	CW, P _f =2.0mW, V _{DR} =5V	0.10	-	1.0	mA
Photodiode Dark Current	I _D	V _{DR} =5V	-	2	100	nA
Photodiode Capacitance	C _t	V _{DR} =5V, f=1 MHz	-	-	10	pF
Photodiode Cutoff Frequency	f _{cm}	V _{DR} =5V, 50Ω load	100	-	-	MHz
Peak Wavelength	λ _p	Note (2)	Note (4)			nm
Wavelength Drift	-	after 20 years	-200	-	+200	pm
Wavelength Stability with Case Temperature	dλ/dT _C	T _C =-20 to 65°C	-1	-	+1	pm/°C
Side Mode Suppression	S _r	Note (2)	33	35	-	dB
Spectral Width (-20dB)	-	Note (2)	-	-	0.5	nm
Rise Time (10%-90%)	t _r	Note (2)	-	0.1	0.125	nsec
Fall Time (10%-90%)	t _f	Note (2)	-	0.1	0.125	nsec
Cutoff Frequency	f _c	P _f =2.0mW, -3 dB	4.0	-	-	GHz
In-Band Ripple (Window)	S ₂₁	f=50 MHz~3 GHz	-1.5	-	+1.5	dB
RF Return Loss	S ₁₁	f=50 MHz~2 GHz	8	-	-	dB
		f=2 GHz~3 GHz	6	-	-	dB
		f=3 GHz~5 GHz	3	-	-	dB
Optical Isolation	I _S	T _C =-20 to 65°C	25	35	-	dB
Relative Intensity Noise	RIN	f=2.5 GHz P _f =2.0 mW, ORL=24 dB	-	-	-140	dB/Hz
Kinks	Kns	up to 2.4 mW	None			
Pulsation	-	-	None			
BER Performance	ER	Note (3)	No Floor			
Power Penalty	PP	Note (3)	-	-	1.5	dB

Note 1. TE=10*log(pf(Tcase)/Pf(Tc=25°C))dB, APC

Note 2. 2.5 Gb/s NRZ, pseudo-random, Pb=0.2mW, Ppeak=2.0mW

Note 3. Bit rate=2.48832 Gb/s, PRBS=2²³-1, Dispersion=1,800 ps/nm, Ppeak=2.0mW,

Pbias=0.2mW (Extinction ratio=10dB), B.E.R.=1x10⁻¹⁰

Decision point: Center of Back-to-Back at 10⁻⁹, Receiver: Eudyna Standard Receiver

Note 4. The selected wavelengths available are listed in Fig. 8

TEC AND THERMISTOR CHARACTERISTICS ($T_L=T_{set}$, $T_C=25^\circ\text{C}$, BOL, unless otherwise specified)

Parameter	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
TEC Current	I_C	$T_L=T_{set}$, $P_f=2\text{mW}$, $T_C=65^\circ\text{C}$	-	-	1.0	A
TEC Voltage	V_C	$T_L=T_{set}$, $P_f=2\text{mW}$, $T_C=65^\circ\text{C}$	-	-	2.4	V
Cooler Power	P_C	$T_L=T_{set}$, $P_f=2\text{mW}$, $T_C=65^\circ\text{C}$	-	-	2.4	W
TEC Resistance	R_C	$T_L=T_{set}$, $P_f=2\text{mW}$, $T_C=65^\circ\text{C}$	2.0	2.4	3.2	Ω
Thermistor Resistance	R_{tr}	$T_L=25^\circ\text{C}$	9.5	10.0	10.5	k Ω
Thermistor B Constant	B	-	3,270	3,450	3,630	K

Fig. 1 Forward Current vs Output Power

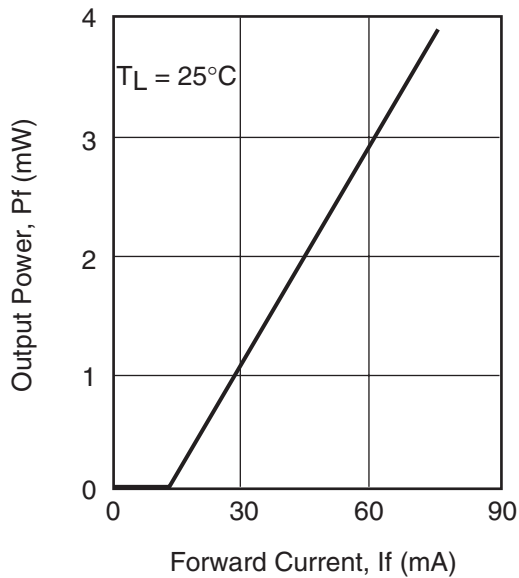


Fig. 2 Frequency Response

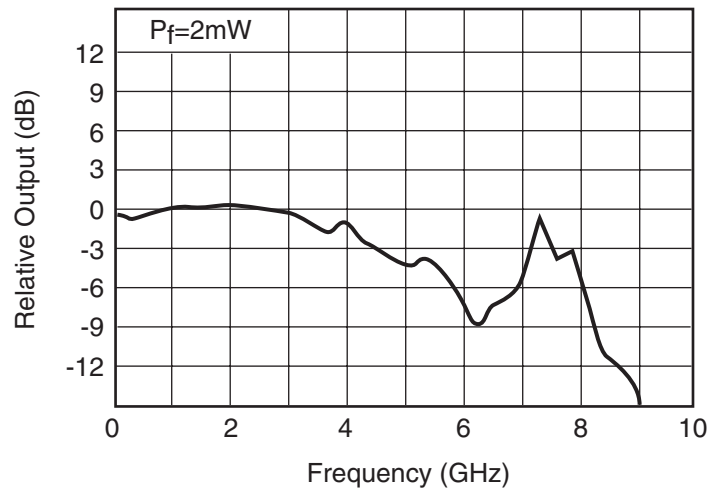


Fig. 3 RF Return Loss

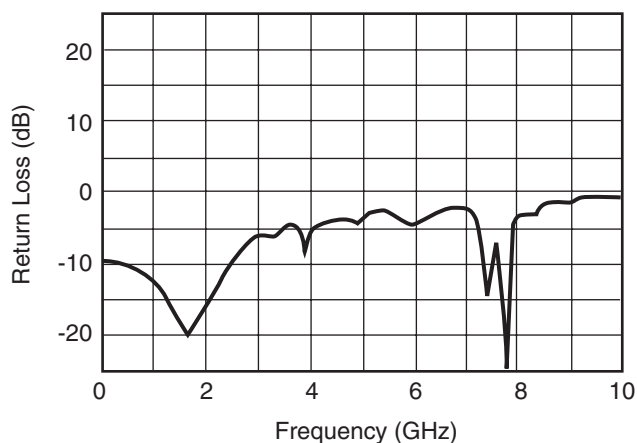


Fig. 4 Cooler Voltage -Current

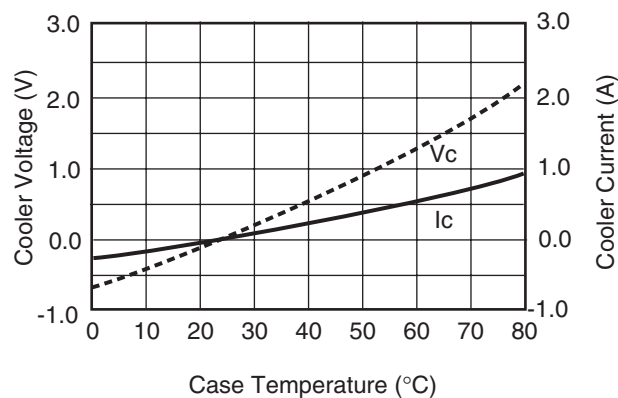


Fig. 5 Spectrum

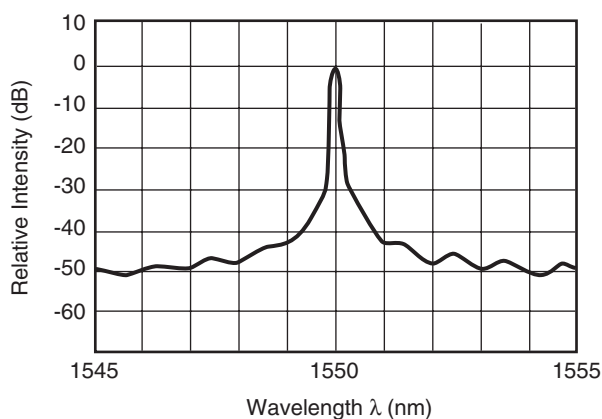


Fig. 6 Temperature Dependence of Wavelength(ACC Operation)

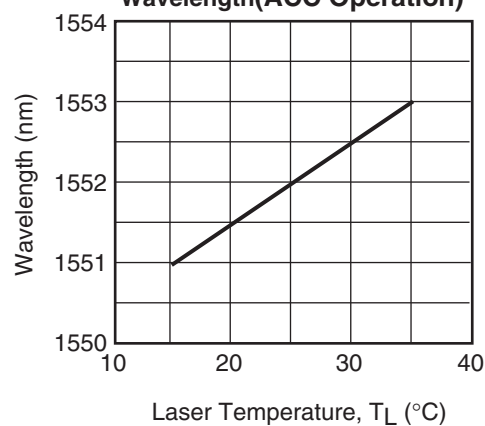


Fig. 7 Transmission Characteristics

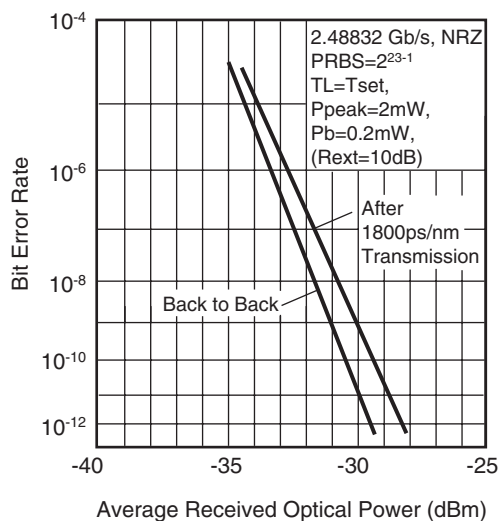


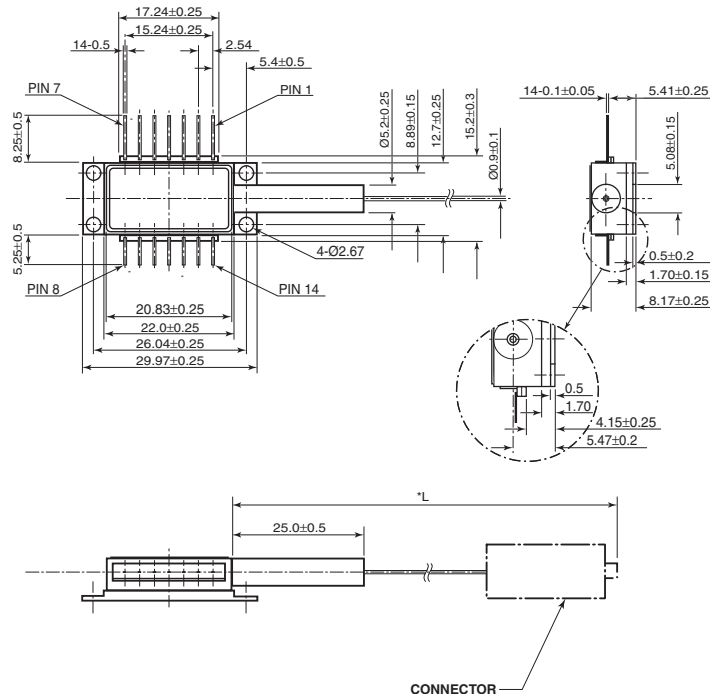
Fig. 8 Wavelength Table

Part Number	Wavelength (nm) (TL=Tset) (in vacuum)	Tolerance (nm)
FLD5F6CX-E62	1527.99	±0.1
-E61	1528.77	±0.1
-E60	1529.55	±0.1
-E59	1530.33	±0.1
-E58	1531.12	±0.1
-E57	1531.90	±0.1
-E56	1532.68	±0.1
-E55	1533.47	±0.1
-E54	1534.25	±0.1
-E53	1535.04	±0.1
-E52	1535.82	±0.1
-E51	1536.61	±0.1
-E50	1537.40	±0.1
-E49	1538.19	±0.1
-E48	1538.98	±0.1
-E47	1539.77	±0.1
-E46	1540.56	±0.1
-E45	1541.35	±0.1
-E44	1542.14	±0.1
-E43	1542.94	±0.1
-E42	1543.73	±0.1

-E41	1544.53	±0.1
-E40	1545.32	±0.1
-E39	1546.12	±0.1
-E38	1546.92	±0.1
-E37	1547.72	±0.1
-E36	1548.51	±0.1
-E35	1549.32	±0.1
-E34	1550.12	±0.1
-E33	1550.92	±0.1
-E32	1551.72	±0.1
-E31	1552.52	±0.1
-E30	1553.33	±0.1
-E29	1554.13	±0.1
-E28	1554.94	±0.1
-E27	1555.75	±0.1
-E26	1556.55	±0.1
-E25	1557.36	±0.1
-E24	1558.17	±0.1
-E23	1558.98	±0.1
-E22	1559.79	±0.1
-E21	1560.61	±0.1
-E20	1561.42	±0.1
-E19	1562.23	±0.1
-E18	1563.05	±0.1

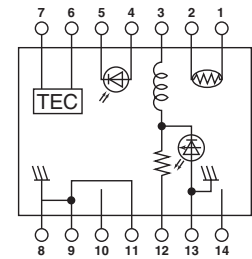
"CX" PACKAGE

UNIT: mm



Grounded Type

PIN #	FUNCTION
1.	Thermistor
2.	Thermistor
3.	Laser DC Bias (-)
4.	Monitor (Anode)
5.	Monitor (Cathode)
6.	Thermoelectric Cooler (+)
7.	Thermoelectric Cooler (-)
8.	Case Ground
9.	Case Ground
10.	N.C.
11.	Case Ground
12.	Laser Modulation (-)
13.	Case Ground
14.	N.C.



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.

Eudyna Devices Inc. reserves the right to change products and specifications without notice. The information does not convey any license under rights of Eudyna Devices Inc. or others.

© 2004 Eudyna Devices USA Inc.
Printed in U.S.A.