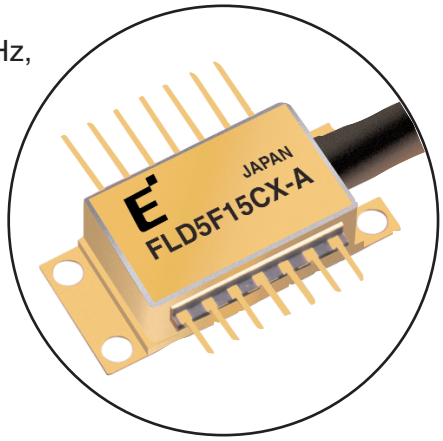
1,550nm DWDM Direct Modulation DFB Laser — FLD5F15CX-A

FEATURES

- Direct Modulated DFB Laser for WDM systems
- Optimized for Long Distance Transmission (Dispersion 3200ps/nm)
- Peak wavelength 1527.99 to 1563.05nm (C Band: 191.8 to 196.2THz, 100GHz spacing)
- Output Power: 10mW
- 14-pin Butterfly type package
- Power monitor PIN-PD (InGaAs), Thermistor, cooler
- Built-in optical isolator
- Single mode fiber



APPLICATIONS

This laser is intended for the application of 2.5 Gb/s long haul Dense Wavelength Division Multiplexing (DWDM). Transmission spans of 3200ps/nm are possible.

DESCRIPTION

This high power laser is capable of 2.5 Gb/s transmission. It is packaged in a “butterfly” type module. The module employs a high efficiency 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 designed for use in DWDM direct modulation transmission systems. Selected wavelengths specified to the ITU-T grid are available.

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

Parameter	Symbol	Condition	Ratings		Unit
			Min.	Max.	
Storage Temperature	T_{stg}	-	-40	+85	°C
Operating Case Temperature	T_{op}	-	-20	+70	°C
Optical Output Power	P_f	CW	-	12.0	mW
LD Forward Current	I_F	CW	-	150	mA
LD Reverse Voltage	V_R	-	-	2	V
Photodiode Reverse Voltage	V_{DR}	-	-	20	V
Photodiode Forward Current	I_{PF}	-	-	10	mA
Cooler Voltage	V_c	Cooling	-	2.5	V
		Heating	-2.5	-	
Cooler Current	I_c	Cooling	-	1.4	A
		Heating	-0.9	-	
Thermistor Temperature	T_{th}	ATC Operation	-20	+70	°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	%

Eudyna

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

Parameter	Symbol	Conditions	Limits			Unit
			Min.	Typ.	Max.	
Laser Set Temperature	T_{set}	-	20	-	35	°C
Threshold Current	I_{th}	CW	4	-	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	10.0	-	-	mW
Slope Efficiency	η	CW, Pf=10mW	0.14	-	-	mW/mA
Threshold Power	P_{th}	CW, I_F=I_{th}	-	-	150	μW
Tracking Error (Note 1)	TE	Im-APC, T_C=-20 to 70°C	-0.5	-	+0.5	dB
Monitor Current	I_m	CW, Pf=10mW, V_{DR}=5V	0.25	-	2.5	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	f_{cm}	V_{DR}=5V, 50Ω load	100	-	-	MHz
Peak Wavelength	λ_p	Note (2)		Note (4)		nm
Wavelength Drift	Δλ	Note (2), after 20 years	-100	-	+100	pm
Wavelength Stabilty with Case Temperature	dλ/dTc	Tc=-20 to +70°C	-1.0	-	+1.0	pm/°C
Side Mode Suppression	Sr	Note (2)	35	40	-	dB
Spectral Width (-20dB)	δλ	Note (2)	-	-	0.3	nm
Rise/Fall Time	T_r, T_f	20% to 80%	-	-	0.125	nsec
Cutoff Frequency	f_c	P_f=10mW, -3 dB	3.5	-	-	GHz
RF Return Loss	S_{11}	f=50 MHz to 2 GHz	8	-	-	dB
		f=2 GHz to 3 GHz	6	-	-	dB
		f=3 GHz to 5 GHz	3	-	-	dB

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

Parameter	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
Cooler Current	I_C	T_L=Tset, P_f=10mW, Tc=70°C	-	-	1.0	A
Cooler Voltage	V_C		-	-	2.4	V
Cooler Power	P_C		-	-	2.4	W
Thermistor Resistance	Rtr	TL=25°C	9.5	10.0	10.5	kΩ
Thermistor B Constant	B		3270	3450	3630	K
Optical Isolation	I_S	Tc=-20 to 70°C	25	35	-	dB
Relative Intensity Noise	RIN	f=2.5 GHz Pf=10 mW, ORL=24 dB	-	-	-140	dB/Hz
Kink	Kns	up to 12mW		No Kink		-
Power Penalty	PP	Note (2)	-	-	2.0	dB

Note 1. TE=10*log{Pf(Tcase)/Pf(Tc=25°C)} (dB)
Note 2. 2.5 Gb/s NRZ, Ppeak=10.0mW, Rext=8.2dB, PRBS=2^{23}-1,
Note 3. Bit rate=2.48832 Gb/s, PRBS=2^{23}-1, Dispersion=3200ps/nm, Ppeak=10mW, Rext=8.2dB (min.)
Receiver: Eudyna Standard Receiver
Note 4. The selected wavelengths available are listed in Fig. 8

Fig. 1 Forward Current vs Output Power

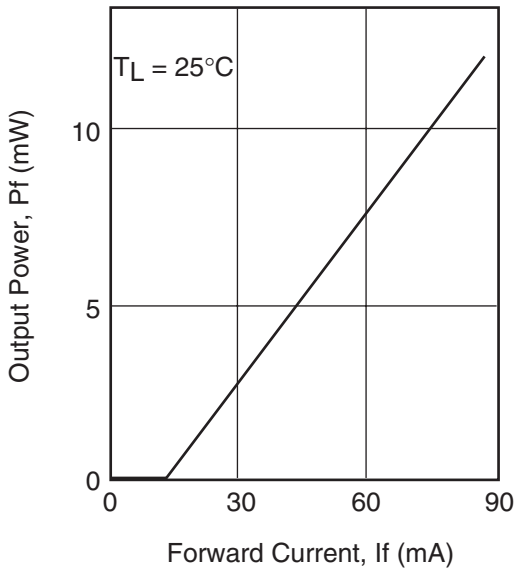


Fig. 2 Frequency Response

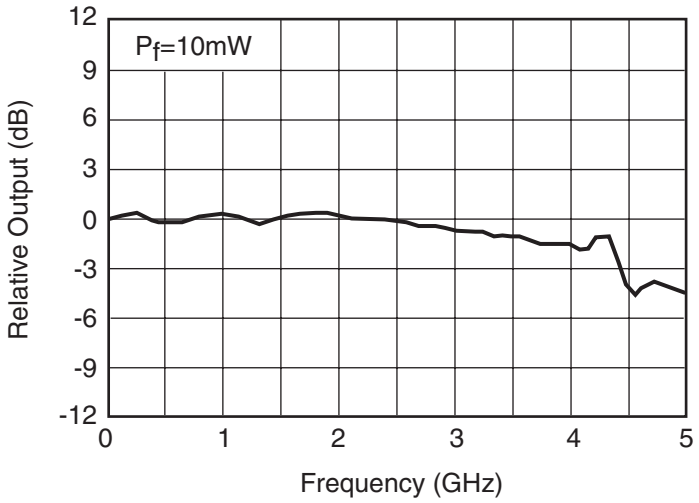


Fig. 3 RF Return Loss

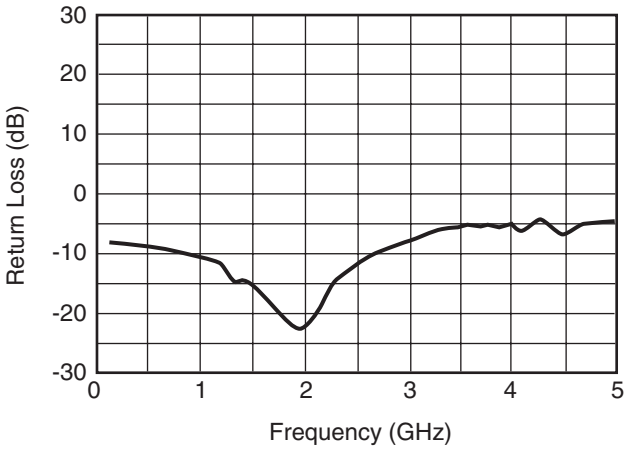


Fig. 4 Cooler Voltage -Current

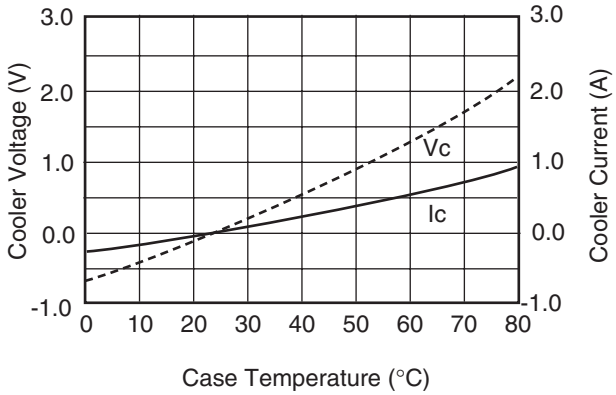


Fig. 5 Spectrum

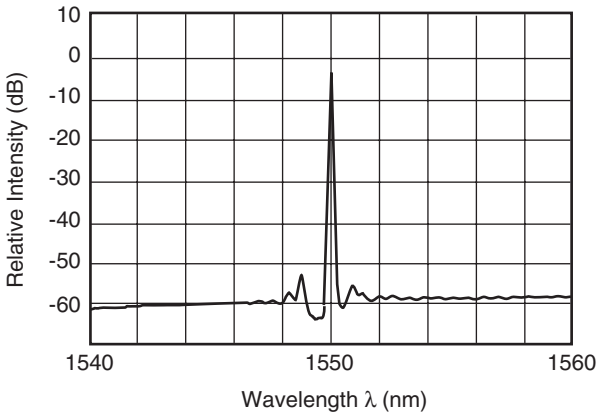


Fig. 6 Temperature Dependance of Wavelength (ACC Operation)

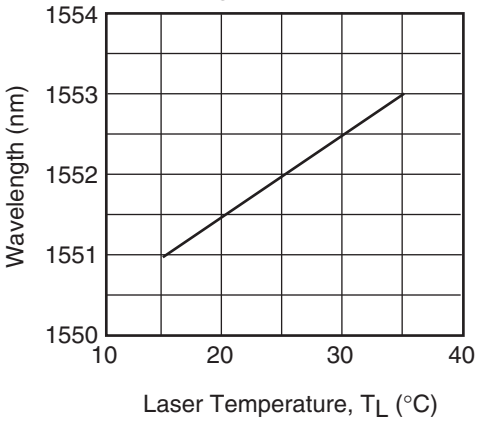


Fig. 7 Transmission Characteristics

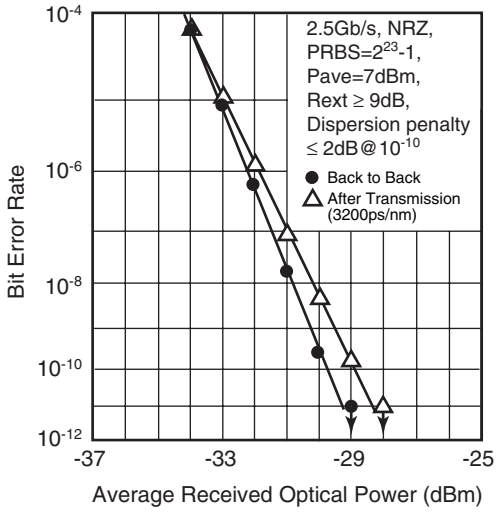
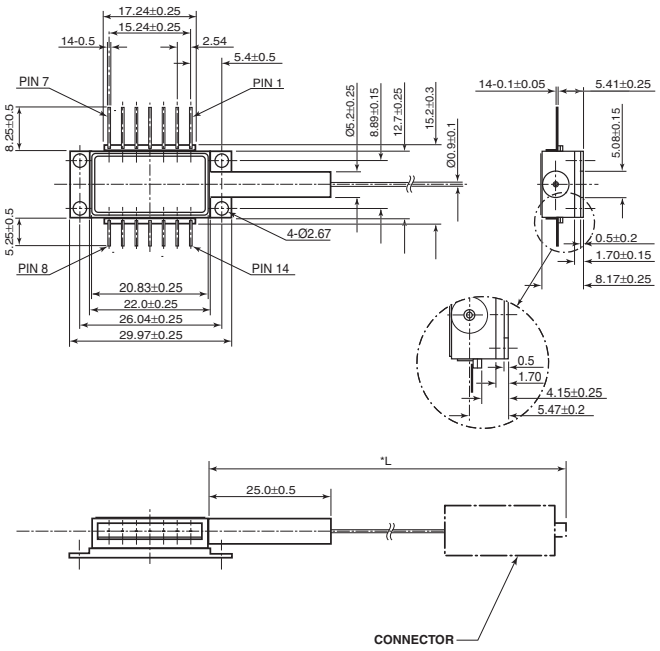


Fig. 8 Wavelength Table

Part Number	Wavelength (nm) (TL=Tset) (in vacuum)	Tolerance (nm)
FLD5F15CX-A9620	1527.99	±0.1
-A9610	1528.77	±0.1
-A9600	1529.55	±0.1
-A9590	1530.33	±0.1
-A9580	1531.12	±0.1
-A9570	1531.90	±0.1
-A9560	1532.68	±0.1
-A9550	1533.47	±0.1
-A9540	1534.25	±0.1
-A9530	1535.04	±0.1
-A9520	1535.82	±0.1
-A9510	1536.61	±0.1
-A9500	1537.40	±0.1
-A9490	1538.19	±0.1
-A9480	1538.98	±0.1
-A9470	1539.77	±0.1
-A9460	1540.56	±0.1
-A9450	1541.35	±0.1
-A9440	1542.14	±0.1
-A9430	1542.94	±0.1
-A9420	1543.73	±0.1
-A9410	1544.53	±0.1
-A9400	1545.32	±0.1
-A9390	1546.12	±0.1
-A9380	1546.92	±0.1
-A9370	1547.72	±0.1
-A9360	1548.51	±0.1
-A9350	1549.32	±0.1
-A9340	1550.12	±0.1
-A9330	1550.92	±0.1
-A9320	1551.72	±0.1
-A9310	1552.52	±0.1
-A9300	1553.33	±0.1
-A9290	1554.13	±0.1
-A9280	1554.94	±0.1
-A9270	1555.75	±0.1
-A9260	1556.55	±0.1
-A9250	1557.36	±0.1
-A9240	1558.17	±0.1
-A9230	1558.98	±0.1
-A9220	1559.79	±0.1
-A9210	1560.61	±0.1
-A9200	1561.42	±0.1
-A9190	1562.23	±0.1
-A9180	1563.05	±0.1

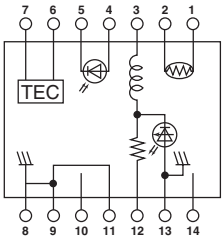
"CX" PACKAGE

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.



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