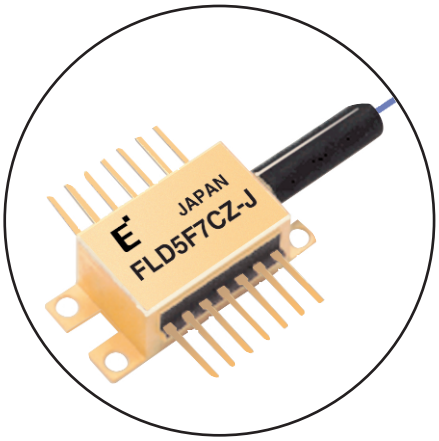
1,550nm DFB DWDM Direct Modulation Laser

FLD5F7CZ-J

FEATURES

- Direct Modulation DFB Laser
- Built-in TEC, Thermistor and Monitor PD
- 14-Pin Butterfly Type Module
- QAM Transmission Application
- 10mW Output Power
- Low Residual Chirp
- Selected wavelengths according to ITU-T grid available



APPLICATIONS

This laser is intended for use in Dense Wavelength Division Multiplexed (DWDM) systems that employ Quadrature Amplitude Modulation (QAM) on Quadrate Phase Shift Keying (QPSK). Transmission spans up to 60 km are possible without ampification.

DESCRIPTION

This Laser is a high power laser capable of QAM 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 modules also include a monitor photodiode, a thermoelectric cooler (TEC) and thermistor. This device is designed for 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	+70	°C
Operating Case Temperature	T_{op}	-	-20	+65	°C
Optical Output Power	P_f	CW	-	20	mW
LD Forward Current	I_F	CW	-	150	mA
LD Reverse Voltage	V_R	-	-	2	V
PD Reverse Voltage	V_{DR}	-	-	20	V
PD Forward Current	I_{PD}	-	-	10	mA
TEC Voltage	V_c	Cooling	-	+2.5	V
		Heating	-2.0	-	
TEC Current	I_c	Cooling	-	+1.4	A
		Heating	-0.5	-	
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}	-	20	25	35	°C
Threshold Current	I_{th}	CW	-	25	40	mA
Operating Current	I_{op}	CW, Pf=10mW	-	70	120	mA
Forward Voltage (Pin No. 3)	V_{FDC}	CW, Pf=10mW	-	1.2	2.5	V
Slope Efficiency	S	CW, Pf=10mW	0.14	0.20	-	mW/mA
Tracking Error	ΔPf	Note (1)	-0.5	-	+0.5	dB
Monitor Current	I_m	CW, IF=Iop, V_{DR}=5V	100	300	2000	μA
Monitor Dark Current	I_D	V_{DR}=5V	-	0.02	0.1	μA
Monitor PD Capacitance	C_t	V_{DR}=5V, freq =1 MHz	-	4	10	pF
Peak Wavelength	λ_p	CW, Pf=10mW	Note (2)	-	-	nm
Chirp	nFM	Note (3)	20	70	120	MHz/mA
Linewidth (FWHM)		CW, Pf=10mW	-	3	6	MHz
Side Mode Suppression Ratio	Sr	CW, Pf=10mW	33	40	-	dB
2nd Order Intermodulation Distortion	IMD2	Note (4)	-	-	-44	dBc
3nd Order Intermodulation Distortion	IMD3	Note (4)	-	-	-53	dBc
Relative Intensity Noise	RIN	Note (5)	-	-	-157	dB/Hz
Input Impedance (Pin No. 12)	Zin	CW, Pf=10mW	-	25	-	Ω
Bandwidth (-1dB)	f_c	Note (6)	2.2	-	-	GHz
RF Return Loss	S_{11}	f=5MHz-870MHz	7	-	-	dB
Isolation	Is	-20<Tc<65°C	25	35	-	dB

Note 1. Total change in Pf over -20<Tc+65°C Test Conditions: Pf=10mW at TL=Tset, Tc=25°C Constant Current Operation with TEC operating
Note 2. Test Conditions: TL=Tset

Part Number	Wavelength (nm)	Tolerance (nm)
FLD5F7CZ-J21	1560.61	±0.4
-J23	1558.98	±0.4
-J25	1557.36	±0.4
-J27	1555.75	±0.4
-J29	1554.13	±0.4
-J31	1552.52	±0.4
-J33	1550.92	±0.4
-J35	1549.32	±0.4

Note 3. Test Conditions: Pf=10mW, measured at 500MHz.
Note 4. Test Conditions: Pf=10mW, Optical Modulation Index OMI=35.0%/ch, 2 unmodulated carriers (f1=553.25MHz, f2=595.25MHz)
1310nm Zero-dispersion single-mode fiber: 50km, Optical Reflection=-40dB (excluding reflection from long-haul fiber)
Measured Frequency: IMD2: f=42MHz IMD3: f=511.25MHz
Note 5. Test Condiitons: CW, Pf=10mW, f=500MHz, Optical Reflection <-40dB (No long-haul fiber is used in the measurement)
Note 6. Test Condiitons: Pf=10mW, no matching network is used in the measurement

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

Parameter	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
TEC Capacity	ΔT	I_C=1A	45	-	-	°C
TEC Current	I_C	TL=Tset, Pf=10mW, Tc=65°C	-	0.5	1.0	A
TEC Voltage	V_C	TL=Tset, Pf=10mW, Tc=65°C	-	1.2	2.4	V
Cooler Power	PTEC	TL=Tset, Pf=10mW, Tc=65°C	-	0.6	2.4	W
Thermistor Set Resistance	Rset	TL=Tset	6.3	10.0	12.6	kΩ
Thermistor B Constant	B	-	3,270	3,450	3,630	K

Fig. 1 Forward Current vs Output Power

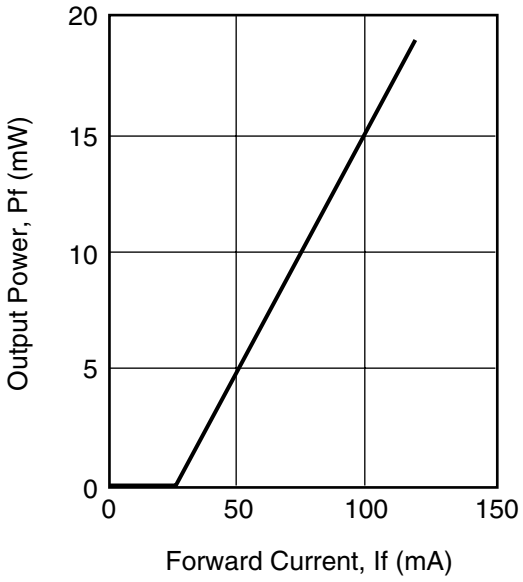


Fig. 2 Laser Temperature Dependence of Wavelength (ACC)

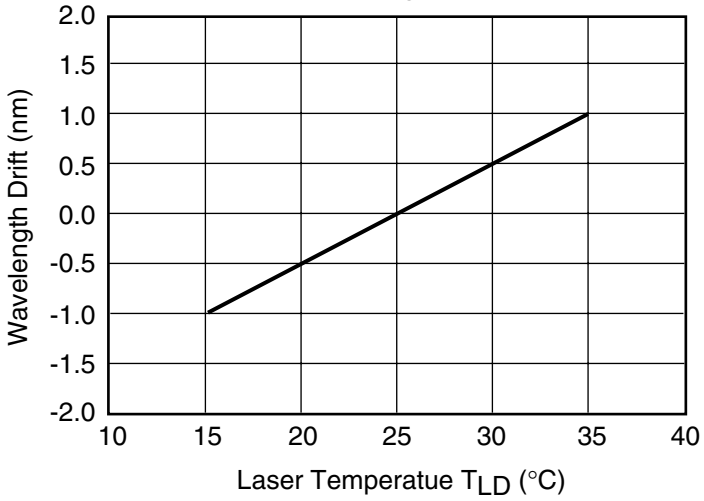


Fig. 3 Case Temperature Dependence of Wavelength

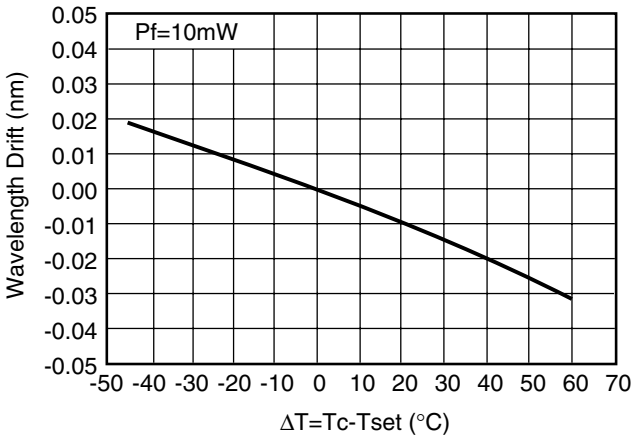


Fig. 4 Case Temperature Dependence of TEC Performance

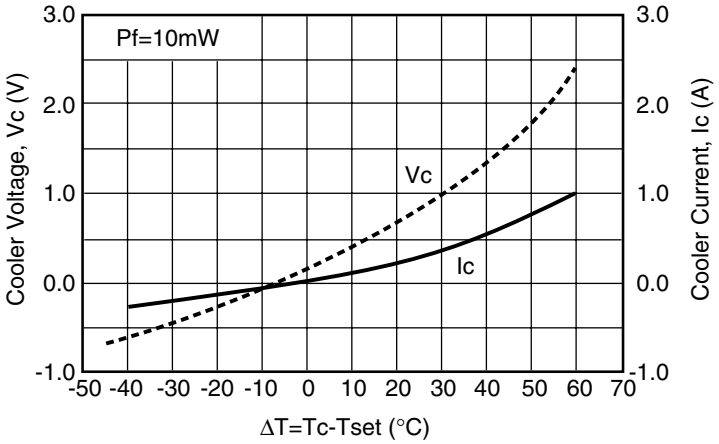


Fig. 5 Tracking Error Characteristics

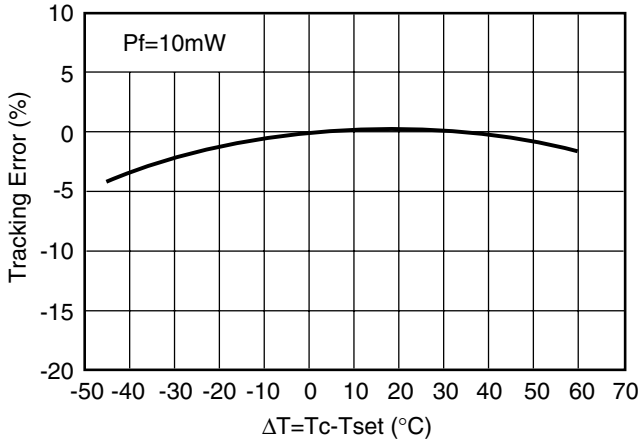


Fig. 6 Frequency Response

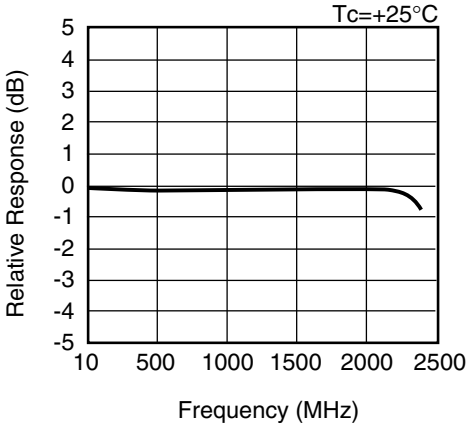


Fig. 7 IMD_3 vs. Optical Modulation Index

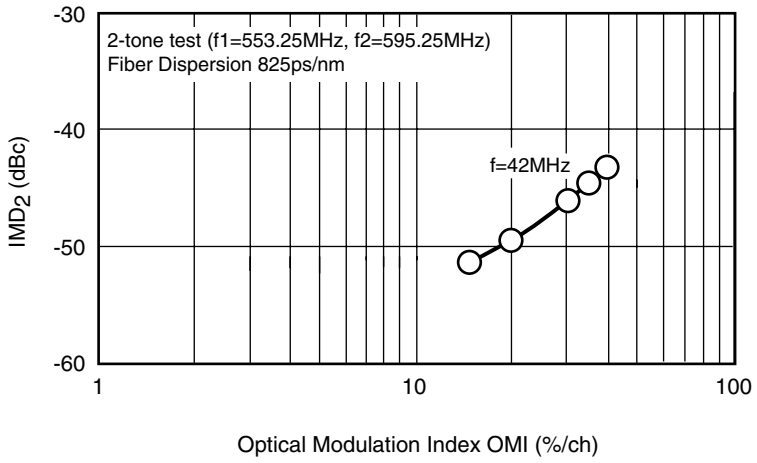
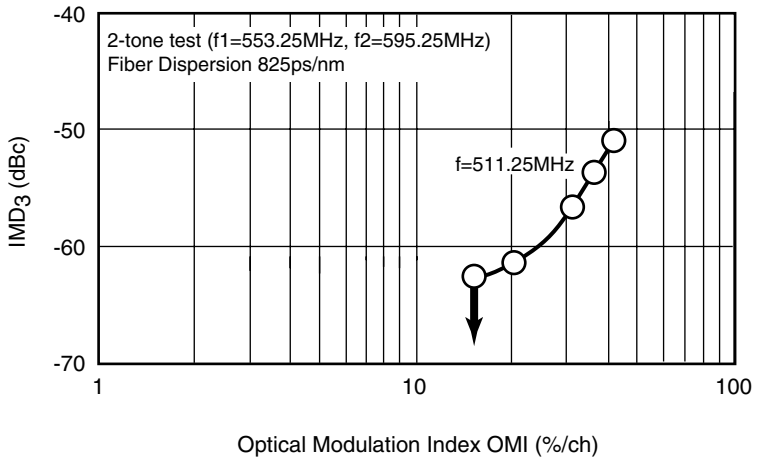
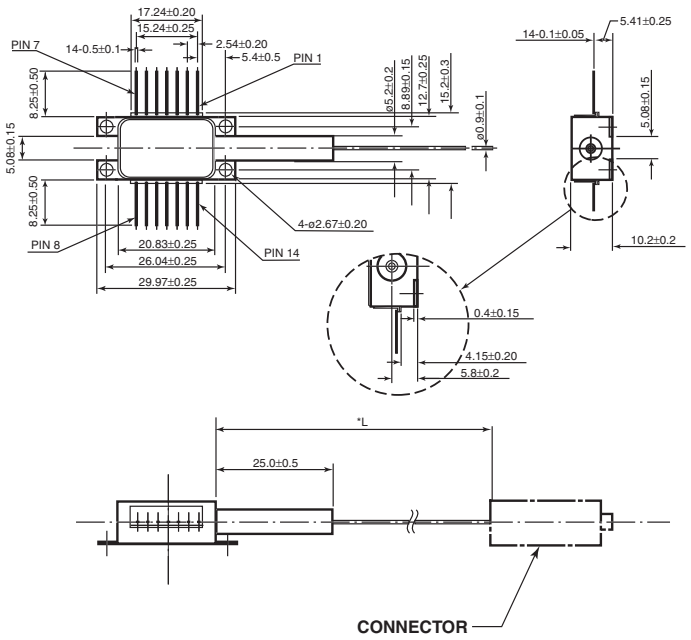


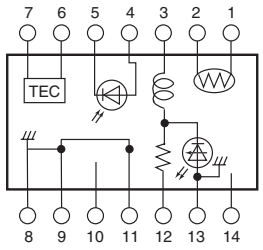
Fig. 8 IMD_3 vs. Optical Modulation Index



"CZ" PACKAGE

UNIT: mm





#	PIN DESIGNATIONS
1	Thermistor
2	Thermistor
3	LD Cathode
4	Power Monitor Anode
5	Power Monitor Cathode
6	Thermoelectric Cooler (+)
7	Thermoelectric Cooler (-)
8	Case Ground
9	Case Ground
10	NC
11	Case Ground
12	LD Modulation (-)
13	Case Ground
14	NC

Case Ground: LD Anode

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

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