

## FEATURES

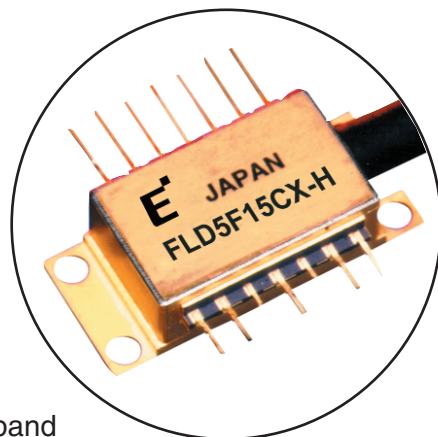
- Continuous Wave (CW) Light Source for DWDM System
- Output Power: 16dBm
- Available at C-band ITU-T Wavelengths between 1528.773 to 1569.594nm
- Built-in TEC, Thermistor, Monitor PIN PD and Optical Isolator
- Polarization maintaining (PANDA) fiber

## APPLICATIONS

10 and 40 Gb/s long haul DWDM Transmission systems.

## DESCRIPTION

The laser is for a high power (16dBm) CW operation, at selected C-band ITU-T grid wavelengths. The module includes an optical isolator monitor photodiode, thermistor and a thermo-electric cooler. This laser is designed for use with external modulation components (such as LiNbO<sub>3</sub> modulators). The device comes in “butterfly” type, 14-pin package, and operates between 0 to 70°C.



## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub>=25°C, unless otherwise specified)

| Parameter                  | Symbol           | Condition     | Rating |      | Unit |
|----------------------------|------------------|---------------|--------|------|------|
|                            |                  |               | Min.   | Max. |      |
| Storage Temperature        | T <sub>stg</sub> | -             | -40    | +85  | °C   |
| Operating Case Temperature | T <sub>op</sub>  | -             | 0      | +70  | °C   |
| Optical Output Power       | P <sub>f</sub>   | CW            | -      | 50   | mW   |
| LD Forward Current         | I <sub>F</sub>   | CW            | -      | 420  | mA   |
| LD Reverse Voltage         | V <sub>R</sub>   | CW            | -      | 2    | V    |
| PD Reverse Voltage         | V <sub>DR</sub>  | -             | -      | 20   | V    |
| PD Forward Current         | I <sub>PF</sub>  | -             | -      | 10   | mA   |
| Cooler Voltage             | V <sub>c</sub>   | Cooling       | -      | 5.00 | V    |
|                            |                  | Heating       | -2.50  | -    |      |
| Cooler Current             | I <sub>c</sub>   | Cooling       | -      | 1.85 | A    |
|                            |                  | Heating       | -0.60  | -    |      |
| Thermistor Temperature     | T <sub>th</sub>  | ATC Operation | 0      | +70  | °C   |
| Lead Soldering Time        | -                | 260°C         | -      | 10   | sec  |

# FLD5F15CX-H 1,550nm Continuous Wave DFB Laser

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

| Parameter                                  | Symbol          | Test Conditions                                             | Limits   |       |       | Unit                 |
|--------------------------------------------|-----------------|-------------------------------------------------------------|----------|-------|-------|----------------------|
|                                            |                 |                                                             | Min.     | Typ.  | Max.  |                      |
| Laser Set Temperature (BOL)                | $T_{set}$       | -                                                           | 15       | -     | 35    | $^\circ\text{C}$     |
| Optical Output Power                       | $P_f$           | -                                                           | 40       | -     | -     | mW                   |
| Threshold Current                          | $I_{th}$        | -                                                           | 3        | -     | 45    | mA                   |
| Forward Voltage                            | $V_F$           | -                                                           | -        | -     | 3.0   | V                    |
| Slope Efficiency                           | $\eta$          | -                                                           | -        | 0.15  | -     | mW/mA                |
| Operating Forward Current                  | $I_{op}$        | -                                                           | -        | -     | 350   | mA                   |
| Peak Wavelength                            | $\lambda_p$     | ORL>40dB                                                    | Note (3) |       |       | nm                   |
| Wavelength Drift                           | $\Delta\lambda$ | 20 Years                                                    | -        | -     | 200   | pm                   |
| Wavelength Stability with Case Temperature | -               | $T_c=0$ to $+70^\circ\text{C}$                              | -1       | -     | 1     | pm/ $^\circ\text{C}$ |
| Spectral Width (-3dB)                      | $\Delta\lambda$ | ORL>40dB                                                    | -        | 5     | 10    | MHz                  |
| Side Mode Suppression                      | $S_r$           |                                                             | 35       | -     | -     | dB                   |
| Monitor Current                            | $I_m$           | $P_f=40\text{mW}$                                           | 0.1      | -     | 2.0   | mA                   |
| Monitor Dark Current                       | $I_{dm}$        | $V_{PD}=5\text{V}$                                          | -        | -     | 100   | nA                   |
| Monitor Capacitance                        | $C_t$           | $V_{PD}=5\text{V}$ , $f=1\text{ MHz}$                       | -        | -     | 10    | pF                   |
| Tracking Error (Note 1)                    | TE              | $I_m=\text{constant}$ ,<br>$T_c=0$ to $+70^\circ\text{C}$   | -0.5     | -     | +1.0  | dB                   |
| Optical Isolation                          | $I_S$           | $T_c=0$ to $+70^\circ\text{C}$                              | 22       | -     | -     | dB                   |
| Polarization Extinction Ratio              | PER             |                                                             | 20       | -     | -     | dB                   |
| Relative Intensity Noise                   | RIN             | CW, ORL>40dB<br>average of $f=\text{DC}$ to $7.5\text{GHz}$ | -        | -     | -140  | dB/Hz                |
| Cooler Current                             | $I_c$           | $T_L=T_{set}$ , $T_c=+70^\circ\text{C}$ ,                   | -        | -     | 1.4   | A                    |
| Cooler Voltage                             | $V_c$           |                                                             | -        | -     | 4.2   | V                    |
| Cooler Power                               | $P_c$           |                                                             | -        | -     | 5.9   | W                    |
| Thermistor Resistance                      | $R_{th}$        | $T_c$ , $T_L=25^\circ\text{C}$                              | 9.5      | 10.0  | 10.5  | k $\Omega$           |
| Thermistor B Constant (Note 2)             | B               |                                                             | 3,270    | 3,450 | 3,630 | K                    |

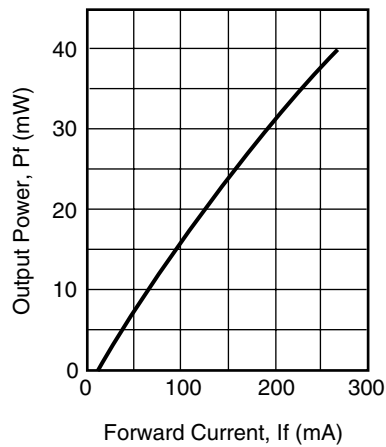
Note 1.  $TE=10\cdot\log[P_f(T_c)/P_f(25)]$

Note 2. Relation between resistance and temperature ( $^\circ\text{K}$ ) is:  $R_{th}(T) = R_{th}(25) \cdot \exp[B(1/T - 1/298)]$

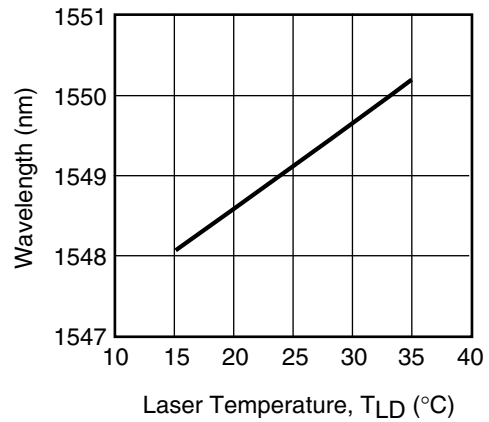
Note 3. The selected wavelength is available in accordance with Table 1.

# 1,550nm Continuous Wave DFB Laser FLD5F15CX-H

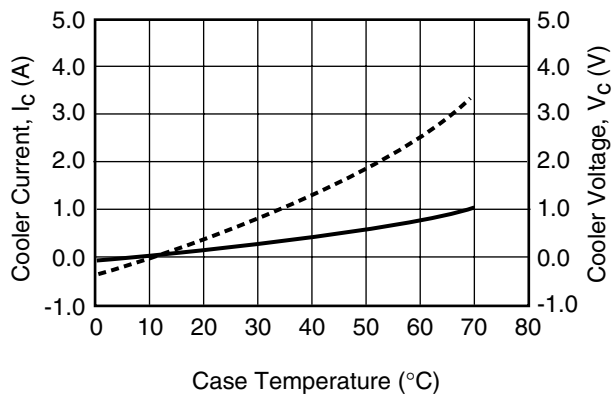
**Fig. 1 Forward Current vs Output Power**



**Fig. 2 Temperature Dependence of Wavelength(ACC Operation)**



**Fig. 3 Cooler Voltage -Current**



**Fig.4 Spectrum**

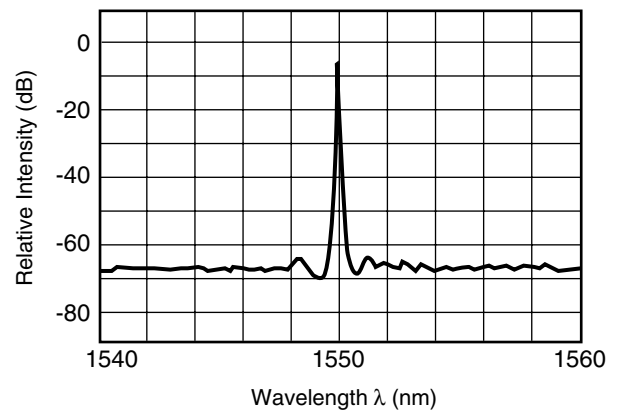


Table 1 Wavelength Table

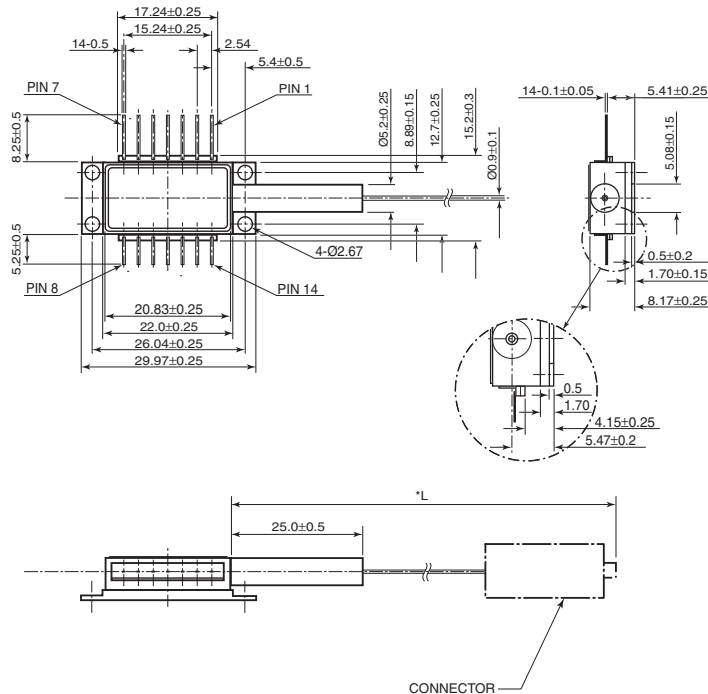
| Part Number     | Wavelength (nm)<br>(TL=Tset)<br>(in vacuum) | Tolerance (nm) |
|-----------------|---------------------------------------------|----------------|
| FLD5F15CX-H9610 | 1528.773                                    | ±0.01          |
| FLD5F15CX-H9600 | 1529.553                                    | ±0.01          |
| FLD5F15CX-H9590 | 1530.334                                    | ±0.01          |
| FLD5F15CX-H9580 | 1531.116                                    | ±0.01          |
| FLD5F15CX-H9570 | 1531.898                                    | ±0.01          |
| FLD5F15CX-H9560 | 1532.681                                    | ±0.01          |
| FLD5F15CX-H9550 | 1533.465                                    | ±0.01          |
| FLD5F15CX-H9540 | 1534.250                                    | ±0.01          |
| FLD5F15CX-H9530 | 1535.036                                    | ±0.01          |
| FLD5F15CX-H9520 | 1535.822                                    | ±0.01          |
| FLD5F15CX-H9510 | 1536.609                                    | ±0.01          |
| FLD5F15CX-H9500 | 1537.397                                    | ±0.01          |
| FLD5F15CX-H9490 | 1538.186                                    | ±0.01          |
| FLD5F15CX-H9480 | 1538.976                                    | ±0.01          |
| FLD5F15CX-H9470 | 1539.766                                    | ±0.01          |
| FLD5F15CX-H9460 | 1540.557                                    | ±0.01          |
| FLD5F15CX-H9450 | 1541.349                                    | ±0.01          |
| FLD5F15CX-H9440 | 1542.142                                    | ±0.01          |
| FLD5F15CX-H9430 | 1542.936                                    | ±0.01          |
| FLD5F15CX-H9420 | 1543.730                                    | ±0.01          |
| FLD5F15CX-H9410 | 1544.526                                    | ±0.01          |
| FLD5F15CX-H9400 | 1545.322                                    | ±0.01          |
| FLD5F15CX-H9390 | 1546.119                                    | ±0.01          |
| FLD5F15CX-H9380 | 1546.917                                    | ±0.01          |
| FLD5F15CX-H9370 | 1547.715                                    | ±0.01          |
| FLD5F15CX-H9360 | 1548.515                                    | ±0.01          |
| FLD5F15CX-H9350 | 1549.315                                    | ±0.01          |
| FLD5F15CX-H9340 | 1550.116                                    | ±0.01          |
| FLD5F15CX-H9330 | 1550.918                                    | ±0.01          |
| FLD5F15CX-H9320 | 1551.721                                    | ±0.01          |
| FLD5F15CX-H9310 | 1552.524                                    | ±0.01          |
| FLD5F15CX-H9300 | 1553.329                                    | ±0.01          |
| FLD5F15CX-H9290 | 1554.134                                    | ±0.01          |
| FLD5F15CX-H9280 | 1554.940                                    | ±0.01          |
| FLD5F15CX-H9270 | 1555.747                                    | ±0.01          |
| FLD5F15CX-H9260 | 1556.555                                    | ±0.01          |
| FLD5F15CX-H9250 | 1557.363                                    | ±0.01          |
| FLD5F15CX-H9240 | 1558.173                                    | ±0.01          |
| FLD5F15CX-H9230 | 1558.983                                    | ±0.01          |
| FLD5F15CX-H9220 | 1559.794                                    | ±0.01          |
| FLD5F15CX-H9210 | 1560.606                                    | ±0.01          |
| FLD5F15CX-H9200 | 1561.419                                    | ±0.01          |
| FLD5F15CX-H9190 | 1562.233                                    | ±0.01          |
| FLD5F15CX-H9180 | 1563.047                                    | ±0.01          |
| FLD5F15CX-H9170 | 1563.863                                    | ±0.01          |
| FLD5F15CX-H9160 | 1564.679                                    | ±0.01          |
| FLD5F15CX-H9150 | 1565.496                                    | ±0.01          |
| FLD5F15CX-H9140 | 1566.314                                    | ±0.01          |
| FLD5F15CX-H9130 | 1567.133                                    | ±0.01          |
| FLD5F15CX-H9120 | 1567.952                                    | ±0.01          |
| FLD5F15CX-H9110 | 1568.773                                    | ±0.01          |
| FLD5F15CX-H9100 | 1569.594                                    | ±0.01          |

# 1,550nm Continuous Wave DFB Laser

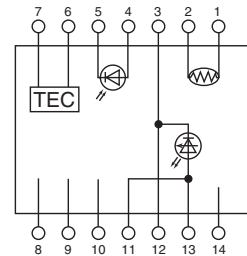
# FLD5F15CX-H

## "CX" PACKAGE

UNIT: mm



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



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

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