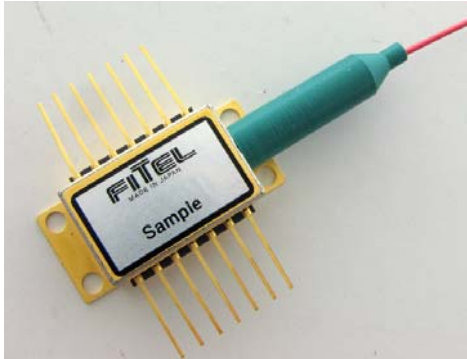


## DWDM CW DFB Laser Module



### Applications

- OC-192/STM-64 DWDM Transmission Systems

### Descriptions

- FRL15DCWx series of DFB laser module is designed for long haul DWDM applications with external intensity modulator.
- The polarization maintaining fiber pigtail enables to directly connect a modulator without polarization control. The polarization state of output laser beam is maintained to a consistent orientation.
- A strained multi-quantum well DFB laser diode chip is integrated with optical isolator, thermo-electric cooler (TEC), thermistor and power monitor photodiode in an industry standard hermetically sealed 14 pin butterfly package.
- This laser module complies with telecom requirements described in Telcordia™ GR-468 and is manufactured in an ISO™9001 certified production line.

### Features

- High optical output power up to 40mW
- High side mode suppression ratio(SMSR)
- Selected wavelength according to ITU-T Grid, C and L-band available
- 50GHz spacing available
- Narrow linewidth available
- RoHS compliant package

### Absolute Maximum Ratings

Parameters	Sym.	Min.	Max.	Unit
Storage Temperature	Tstg	-40	85	°C
Operating Case Temperature	Tc	-5	70	°C
LD Reverse Voltage	V <sub>rLD</sub>	-	2	V
LD Forward Current	I <sub>fLD</sub>	-	350	mA
LD Operating Temperature	T <sub>LD</sub>	20	35	°C
Relative Humidity	RH	0	85	%
Fiber Bend Radius	-	30	-	mm
Fiber Axial Pull Force	-	-	9.8	N

Parameters	Sym.	Min.	Max.	Unit
PD Reverse Voltage	V <sub>rPD</sub>	-	20	V
PD Forward Current	I <sub>fPD</sub>	-	5	mA
TEC Current	I <sub>tec</sub>	-	1.6	A
TEC Voltage	V <sub>tec</sub>	-	2.6	V
Lead Soldering	-	-	260	°C
Lead Soldering Duration	-	-	10	sec
Torque Force (Flatness : <20μm)	-	-	0.1	Nm

## Specifications (T<sub>c</sub>=25°C, BOL\*<sup>1</sup> unless otherwise specified)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
Optical Output Power						
FRL15DCWA	Pf	10	-	-	mW	CW
FRL15DCWB		20	-	-		
FRL15DCWD		40	-	-		
LD Forward Current						
FRL15DCWA	If	-	-	80	mA	Rated power, CW
FRL15DCWB		-	-	150		
FRL15DCWD		-	-	300		
LD Operating Temperature	T <sub>LD</sub>	20	-	35	°C	Rated power, CW
LD Forward Voltage						
FRL15DCWA, B	Vf	-	-	1.8	V	Rated power, CW
FRL15DCWD		-	-	2.5		
Threshold Current	I <sub>th</sub>	-	15	40	mA	
Wavelength	λ	λ <sub>ITU</sub> -0.1	λ <sub>ITU</sub>	λ <sub>ITU</sub> +0.1	nm	Rated power, CW See Table.1
Linewidth (-3dB fullwidth)						
Standard	Δv	-	-	10	MHz	Rated Power, CW Option C is available only for FRL15DCWD.
Option A		-	-	5		
Option B		-	-	2		
Option C		-	-	1		
Side Mode Suppression Ratio	SMSR	35	45	-	dB	Rated power, CW
Optical Isolation	Iso	30	-	-	dB	
Relative Intensity Noise						
FRL15DCWA	RIN	-	-	-133	dB/Hz	Rated power, CW O <sub>pRL</sub> <-25dB* <sup>2</sup> 100MHz<f<10GHz
FRL15DCWB		-	-	-138		
FRL15DCWD		-	-	-140		
Monitor Current						
FRL15DCWA	Im	0.05	-	1	mA	Rated power, CW V <sub>rPD</sub> =5V
FRL15DCWB		0.1	-	2		
FRL15DCWD		0.15	-	3		
Monitor Dark Current	I <sub>d</sub>	-	-	100	nA	V <sub>rPD</sub> =5V
Tracking Error	TE	-0.5	-	0.5	dB	I <sub>m</sub> =constant, T <sub>c</sub> =-5 to 70°C
TEC Current	I <sub>tec</sub>	-	-	1.2	A	T <sub>c</sub> =70°C, Rated power, CW
TEC Voltage	V <sub>tec</sub>	-	-	2.4	V	T <sub>c</sub> =70°C, Rated power, CW
Thermistor B constant	B	-	3900	-	K	
Thermistor Resistance	R	9.5	-	10.5	kΩ	T <sub>LD</sub> =25°C
Polarization Extinction Ratio	Er	20	-	-	dB	Rated power, CW

\*<sup>1</sup> BOL : Beginning of Life\*<sup>2</sup> O<sub>pRL</sub> : Optical Return Loss

Table 1

$\lambda_{ITU}$ [nm]	ITU Freq. [THz]	Wavelength code	$\lambda_{ITU}$ [nm]	ITU Freq. [THz]	Wavelength code	$\lambda_{ITU}$ [nm]	ITU Freq. [THz]	Wavelength code
1529.55	196.00	19600	1556.55	192.60	19260	1584.53	189.20	18920
1530.33	195.90	19590	1557.36	192.50	19250	1585.36	189.10	18910
1531.12	195.80	19580	1558.17	192.40	19240	1586.20	189.00	18900
1531.90	195.70	19570	1558.98	192.30	19230	1587.04	188.90	18890
1532.68	195.60	19560	1559.79	192.20	19220	1587.88	188.80	18880
1533.47	195.50	19550	1560.61	192.10	19210	1588.73	188.70	18870
1534.25	195.40	19540	1561.42	192.00	19200	1589.57	188.60	18860
1535.04	195.30	19530	1562.23	191.90	19190	1590.41	188.50	18850
1535.82	195.20	19520	1563.05	191.80	19180	1591.26	188.40	18840
1536.61	195.10	19510	1563.86	191.70	19170	1592.10	188.30	18830
1537.40	195.00	19500	1564.68	191.60	19160	1592.95	188.20	18820
1538.19	194.90	19490	1565.50	191.50	19150	1593.79	188.10	18810
1538.98	194.80	19480	1566.31	191.40	19140	1594.64	188.00	18800
1539.77	194.70	19470	1567.13	191.30	19130	1595.49	187.90	18790
1540.56	194.60	19460	1567.95	191.20	19120	1596.34	187.80	18780
1541.35	194.50	19450	1568.77	191.10	19110	1597.19	187.70	18770
1542.14	194.40	19440	1569.59	191.00	19100	1598.04	187.60	18760
1542.94	194.30	19430	1570.42	190.90	19090	1598.89	187.50	18750
1543.73	194.20	19420	1571.24	190.80	19080	1599.75	187.40	18740
1544.53	194.10	19410	1572.06	190.70	19070	1600.60	187.30	18730
1545.32	194.00	19400	1572.89	190.60	19060	1601.46	187.20	18720
1546.12	193.90	19390	1573.71	190.50	19050	1602.31	187.10	18710
1546.92	193.80	19380	1574.54	190.40	19040	1603.17	187.00	18700
1547.72	193.70	19370	1575.37	190.30	19030	1604.03	186.90	18690
1548.51	193.60	19360	1576.20	190.20	19020	1604.88	186.80	18680
1549.32	193.50	19350	1577.03	190.10	19010	1605.74	186.70	18670
1550.12	193.40	19340	1577.86	190.00	19000	1606.60	186.60	18660
1550.92	193.30	19330	1578.69	189.90	18990	1607.47	186.50	18650
1551.72	193.20	19320	1579.52	189.80	18980	1608.33	186.40	18640
1552.52	193.10	19310	1580.35	189.70	18970	1609.19	186.30	18630
1553.33	193.00	19300	1581.18	189.60	18960	1610.06	186.20	18620
1554.13	192.90	19290	1582.02	189.50	18950	1610.92	186.10	18610
1554.94	192.80	19280	1582.85	189.40	18940	1611.79	186.00	18600
1555.75	192.70	19270	1583.69	189.30	18930			

Wavelength values are referenced to vacuum.

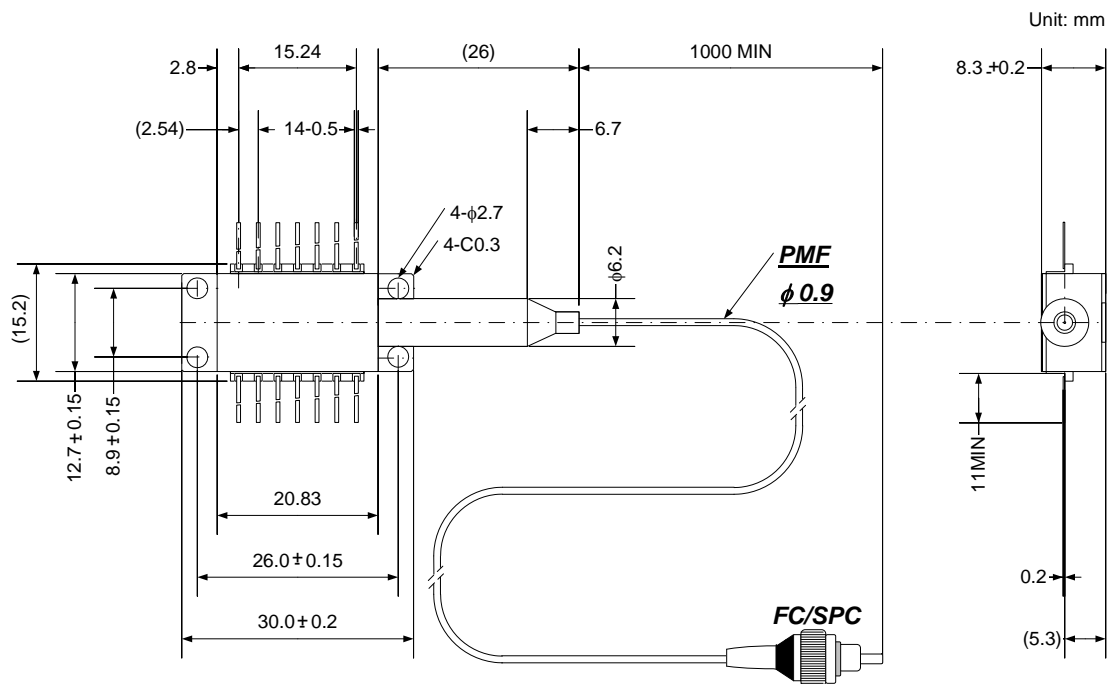
50GHz spacing is also available.

Other ITU wavelengths may be available. Please ask to the regional contacts.

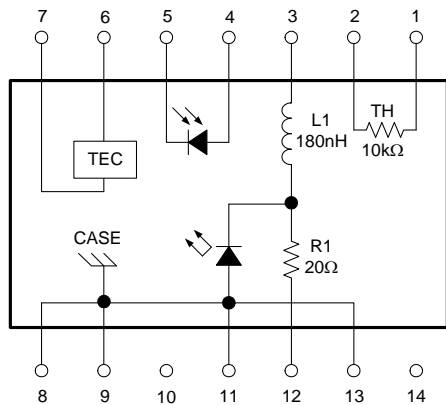
Wavelength ( $\lambda$ ) and ITU frequency (f) have a relationship of  $\lambda[\text{nm}] = 299792458 / f [\text{THz}] / 1000$ .

FITEL wavelength code is expressed as a 5-digit integer rounded from  $100 \times f [\text{THz}]$ .

## Dimensions and Pin Assignments

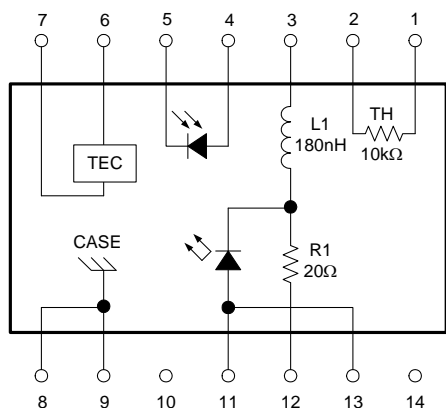


### LD Anode Ground



PIN No.	Function	PIN No.	Function
1	Thermistor	8	Case Ground
2	Thermistor	9	Case Ground
3	LD Cathode(-)	10	No Connect
4	Monitor Anode(-)	11	LD Anode(+), Case Ground
5	Monitor Cathode(+)	12	LD Cathode(RF)
6	TEC(+)	13	LD Anode(+), Case Ground
7	TEC(-)	14	No Connect

### LD Anode Float

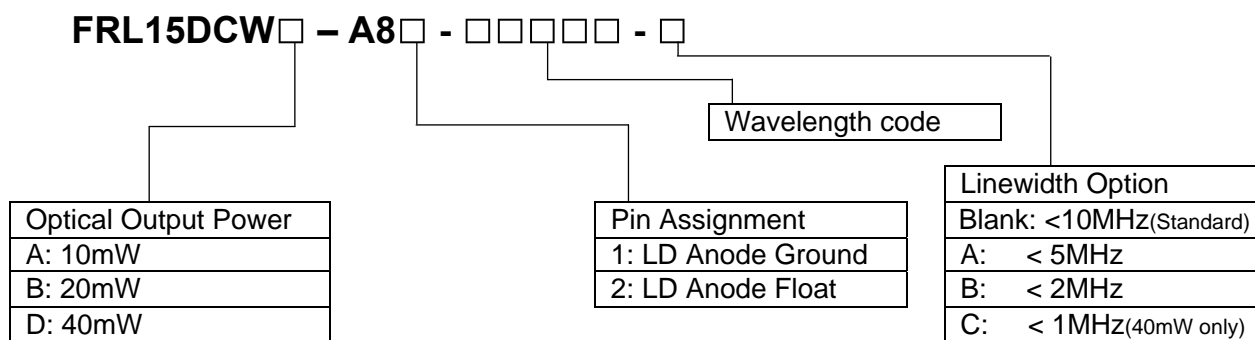


PIN No.	Function	PIN No.	Function
1	Thermistor	8	Case Ground
2	Thermistor	9	Case Ground
3	LD Cathode(-)	10	No Connect
4	Monitor Anode(-)	11	LD Anode(+)
5	Monitor Cathode(+)	12	LD Cathode(RF)
6	TEC(+)	13	LD Anode(+)
7	TEC(-)	14	No Connect

## Optical Fiber Pigtail Specifications

Parameters	Specification	Unit
Fiber Type	Polarization maintaining(PANDA) fiber Frame retardant Hytrel™ coating(φ0.9mm)	-
Nominal Fiber Length	Min.1,000	mm
Connector Type	FC/SPC Connector	-
Polarization Axis	Slow Axis	-

## Ordering Information



## Safety Information

This product complies with 21 CFR 1040.10 and 1040.11, Class 3b laser product. Invisible laser radiation is emitted from the end of the fiber or connector. Avoid direct exposure to the beam.

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ISO is a trademark of The International Organization for Standardization.  
Hytrel is a trademark of DuPont.



Furukawa Electric reserves the right to improve, enhance and modify the features and specifications of FITEL products without prior notifications.

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