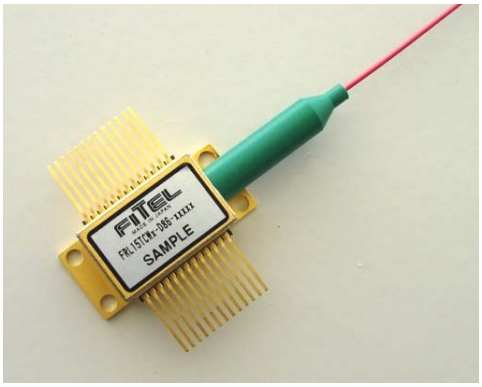
Data Sheet

FRL15TCWx-D86-xxxxx

Mar. 2010

Full Band Tunable DFB Laser Module



Applications

- **Long Haul or Metropolitan DWDM Transmission Systems**
- **Dynamic Wavelength Provisioning and Add/Drop Multiplexer**

Descriptions

- FRL15TCWx-D86 series is full band tunable DFB laser module 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.
- Full band thermally tunable DFB laser diode chip is integrated with an optical isolator, thermo-electric coolers (TEC), thermistors, a power monitor photodiode, and a wavelength monitor photodiode in a hermetically sealed 26 pin butterfly package with same foot print as an industry standard 14 pin butterfly package.
- Full band thermally tunable DFB laser diode chip consists of DFB laser array and semiconductor optical amplifier (SOA). Each DFB laser is biased under constant current and output power is maintained by adjusting SOA current under automatic power control. By selecting an appropriate DFB laser and tuning the laser temperature, FRL15TCWx-D86 series can provide any ITU channel in 35 nm tuning range.
- This laser module complies with telecom requirements described in Telcordia™ GR-468 and is manufactured in an ISO™9001 certified production line.

Features

- 35nm tunability (88 ITU channels at 50GHz spacing) available in C or L band
- Stable wavelength with integrated wavelength monitor
- High optical output power up to 20mW for C band
- High side mode suppression ratio(SMSR) in entire tuning range
- 26 pin butterfly package
- Low TEC power consumption
- Polarization maintaining fiber pigtail
- RoHS compliant package

Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit	Conditions
Storage Temperature	Tstg	-40	85	°C	
Operating Case Temperature	Tc	-5	70	°C	
LD Operating Temperature	T_{LD}	8	52	°C	
Filter Operating Temperature	T_f	30	55	°C	
LD Forward Current	If_{LD}	-	200	mA	
LD Reverse Voltage	Vr_{LD}	-	2	V	
SOA Forward Current	If_{SOA}	-	400	mA	
SOA Reverse Voltage	Vr_{SOA}	-	2	V	
PD Forward Current	If_{PD}	-	5	mA	
PD Reverse Voltage	Vr_{PD}	-	20	V	
TEC1 Current (LD)	Itec1	-	1.4	A	
TEC1 Voltage (LD)	Vtec2	-	3.4	V	
TEC2 Current (Filter)	Itec1	-	2.1	A	
TEC2 Voltage (Filter)	Vtec2	-	5.1	V	
Relative Humidity	RH	0	85	%	
Fiber Bend Radius	-	30	-	mm	
Fiber Axial Pull Force	-	-	10	N	
Lead Soldering Temperature	-	-	350	°C	
Lead Soldering Duration	-	-	10	sec	
Torque Force	-	-	0.1	Nm	Flatness : <20μm
Electrostatic Discharge (ESD)	-	-	500	V	HBM, C=100pF, R=1.5kΩ

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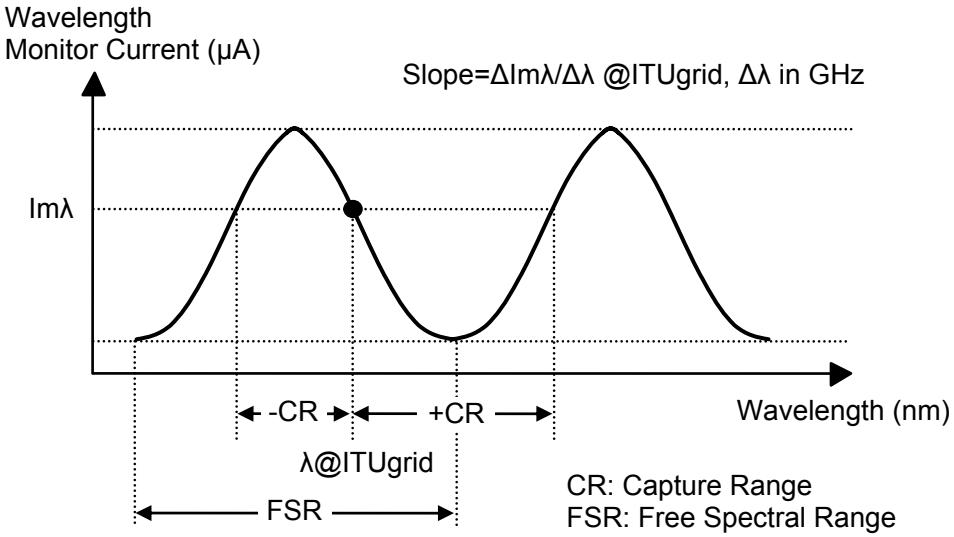
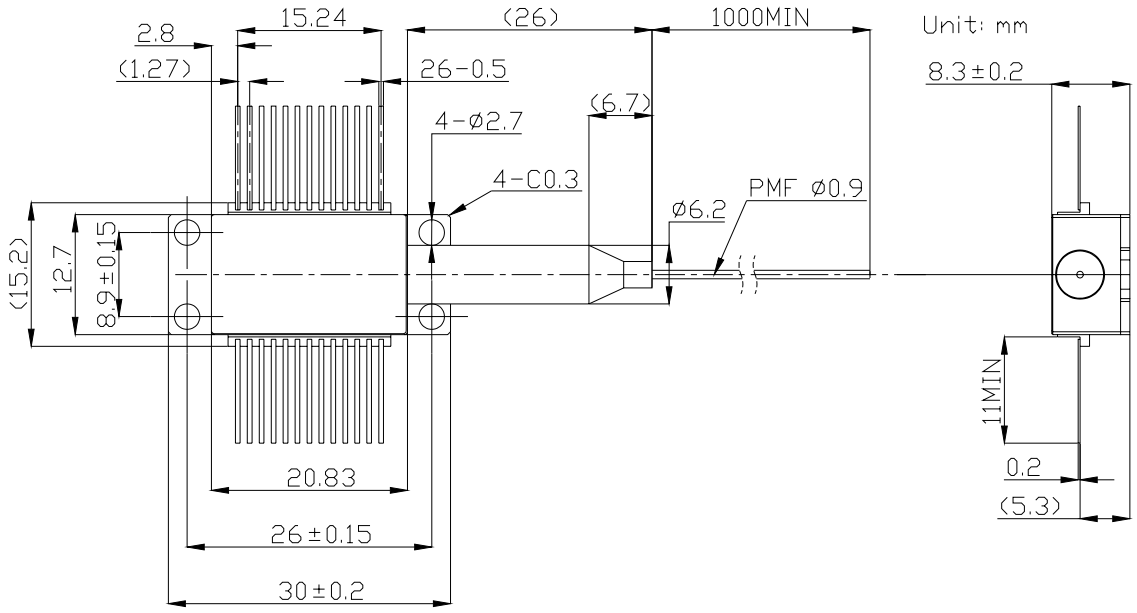
Specifications (Tc=25°C, BOL*1 unless otherwise specified)

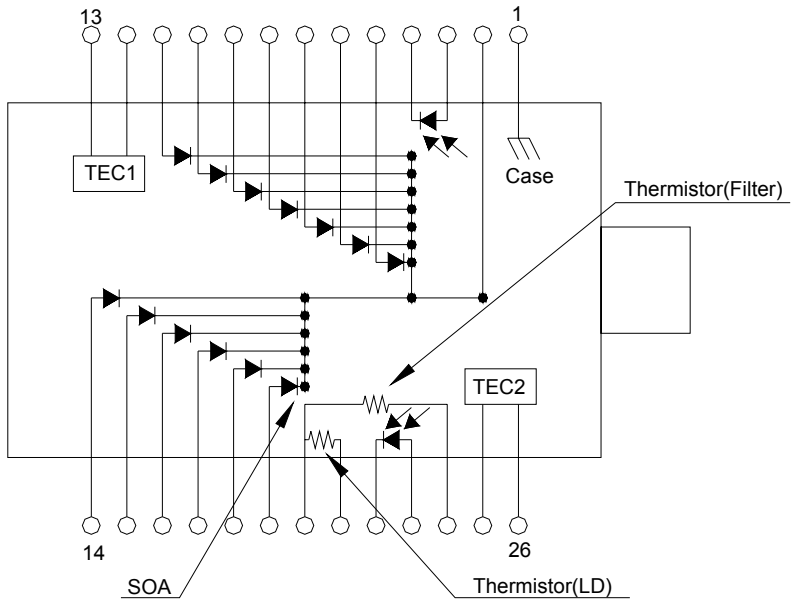
Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
Optical Output Power	Pf				mW	CW
FRL15TCWA			10			20mW is available only for -19610.
FRL15TCWB			20			
LD Operating Temperature	T_{LD}	10	-	50	°C	Rated power, CW
LD Forward Current	If_{LD}	-	150	-	mA	CW, fixed
LD Forward Voltage	Vf_{LD}	-	-	2.2	V	CW
SOA Forward Current	If_{SOA}	-	-	350	mA	Rated power, CW
SOA Forward Voltage	Vf_{SOA}	-	-	3.0	V	Rated power, CW
Wavelength	λ				nm	Rated power, CW 50GHz spacing, 88ch
-19610 (C band)		1528.773	-	1563.455		
-19090 (L band)		1570.416	-	1607.035		
Linewidth (-3dB fullwidth)	Δλ	-	-	10	MHz	Rated Power, CW
Side Mode Suppression Ratio	SMSR	35	-	-	dB	Rated power, CW
Optical Isolation	Iso	25	-	-	dB	
Relative Intensity Noise	RIN	-	-	-135	dB/Hz	Rated power, CW O_{pRL}<-25dB*2 100MHz<f<10GHz
Frequency Stability to ITU Grid	Δfs	-2.5	-	2.5	GHz	Rated Power
Filter Operating Temperature	T_f	35	-	50	°C	
Free Spectral Range *3	FSR	-	50	-	GHz	
Capture Range *3 (negative side)	-CR	5	-	35	GHz	
Capture Range *3 (positive side)	+CR	15	-	45	GHz	
Power Monitor Current	Im	10	-	500	μA	Rated power, CW Vr_{PD}=5V
Power Monitor Dark Current	Id	-	-	100	nA	Vr_{PD}=5V
Wavelength Monitor Current	Imλ	10	-	500	μA	Rated power, CW Vr_{PD}=5V
Wavelength Monitor Dark Current	Idλ	-	-	100	nA	Vr_{PD}=5V
Wavelength Monitor Current Slope *3	Slope	1	-	40	μA/GHz	Vr_{PD}=5V
Tracking Error	TE	-0.5	-	0.5	dB	Im=constant, Tc=-5 to 70°C
TEC Current (LD)	Itec1	-	-	1.2	A	Tc=70°C, Rated power, CW
TEC Voltage (LD)	Vtec1	-	-	3.0	V	Tc=70°C, Rated power, CW
TEC Current (Filter)	Itec2	-	-	1.7	A	Tc=70°C, Rated power, CW
TEC Voltage (Filter)	Vtec2	-	-	3.0	V	Tc=70°C, Rated power, CW
Total Power Consumption (P_{LD}+P_{SOA}+P_{TEC1}+P_{TEC2})	Ptotal	-	3.0	4.5	W	Tc=70°C, Rated power, CW
Thermistor B constant	B	-	3900	-	K	
Thermistor Resistance	R	9.5	-	10.5	kΩ	T_{LD}=25°C
Polarization Extinction Ratio	Er	20	-	-	dB	Rated power, CW

*1 BOL : Beginning of Life
*2 O_{pRL} : Optical Return Loss
*3 These parameters are defined in following wavelength discriminator curve.


Wavelength
Monitor Current (μA)
Slope=ΔImλ/Δλ @ITUgrid, Δλ in GHz
Imλ
-CR
+CR
Wavelength (nm)
λ@ITUgrid
FSR
CR: Capture Range
FSR: Free Spectral Range

Dimensions and Pin Assignments





Pin No.	Function	Pin No.	Function
1	Case Ground	14	LD6 Anode(+)
2	LD, SOA Cathode Common(−)	15	LD5 Anode(+)
3	Power Monitor PD Anode(−)	16	LD4 Anode(+)
4	Power Monitor PD Cathode(+)	17	LD3 Anode(+)
5	LD1 Anode(+)	18	LD2 Anode(+)
6	LD12 Anode(+)	19	SOA Anode(+)
7	LD11 Anode(+)	20	Thermistor Common
8	LD10 Anode(+)	21	Thermistor(LD)
9	LD9 Anode(+)	22	Wavelength Monitor PD Cathode(+)
10	LD8 Anode(+)	23	Wavelength Monitor PD Anode(−)
11	LD7 Anode(+)	24	Thermistor(Filter)
12	TEC1(LD)(+)	25	TEC2(Filter)(+)
13	TEC1(LD)(−)	26	TEC2(Filter)(−)

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Optical Fiber Pigtail Specifications

Parameters	Specification	Unit
Fiber Type	Polarization maintaining(PANDA) fiber Flame retardant Hytrel™ coating(ϕ0.9mm)	-
Nominal Fiber Length	Min.1,000	mm
Connector Type	No Connector	-
Polarization Axis	Slow Axis	-

Ordering Information

FRL15TCW□ – D86 - □□□□□

Optical Output Power
A: 10mW
B: 20mW (19610 only)

Wavelength code
19610: C band
19090: L band

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.

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

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