Model 1995 1550 nm High Power CW Source
DFB Laser for LiDAR

ORTEL®
A Photonics Foundries Enterprise

PRELIMINARY PRODUCT BRIEF | JANUARY 2024 OPTICAL SENSING

Ortel's 1995 cooled TOSA laser module is characterized for use as a CW coherent optical source laser for LiDAR technology. The 1995 is DC-coupled with a built-in TEC, thermistor, and monitor photodiode. The device is in hermetic TO56 package with 6+1 pins. The 1995 incorporates a high-efficiency coupling scheme to deliver 15 dBm of CW optical power.

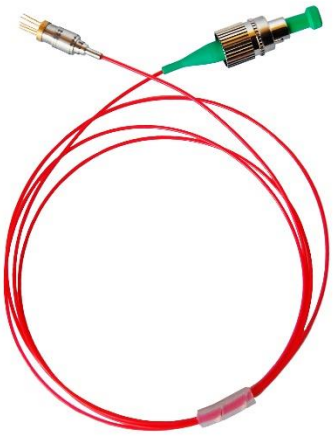
Ortel's design provides a compact, robust solution for Frequency Modulation Continuous Wavelength (FMCW) sensing for autonomous vehicles and wide variety of other optical sensing applications. It is highly immune to mode or optical frequency hopping typically found with single isolator, external cavity designs. Mode or optical frequency hopping causes false readings in FMCW LiDAR, whereas Ortel's laser technology maintains optical frequency stability over temperature suppressing false readings.

Applications

- LiDAR
- Free Space Optics
- Frequency Modulated Continuous Wavelength Sensing

Features

- 15dBm Optical Output Power
- Monitor Photodiode
- Double Optical Isolator
- OC-48 Pin Out
- Telcordia Technologies® GR-468 Compliant
- RoHS



Performance Highlights

Parameter	Min	Typ	Max	Units
Operating Case Temperature	-20		+70	°C
Wavelength		1550 +/- 10		nm
Optical Output Power	14	15	-	dBm
Threshold Current	-	-	40	mA
Operating Current	-	-	250	mA
Frequency Noise @ 100 kHz[1]	-		32	kHz^2/Hz
Optical Isolation	40	50	-	dB
Maximum Laser Output Power (Eye Safety)	-	-	27	dBm
SMSR[1]	50		-	dB
Polarization Extinction Ratio (PMF pigtail)	17	-	-	dB
Optical Return Loss	40	-	-	dB

1. @ Operating current

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Sym	Condition	Min	Max	Units
Operating Case Temperature	T_C	continuous	-20	+70	°C
Storage Case Temperature	T_{STG}	continuous	-40	+85	°C
Laser Forward dc Current	-	continuous	-	600	mA
Photodiode Reverse Voltage	$V_{R,MPD}$	continuous	-	10	V
Laser Reverse Voltage	-	continuous	-	2	V
TEC Current	I_{TEC}	continuous	-	1.7	A
Maximum Laser Output Power	P_{max}	Continuous	-	27	dBm
ESD	-	HBM: R = 1500 Ω, C = 100 pF	-500	500	V
Relative Humidity	RH	Non-condensing			

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Electrical/Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating Case Temperature[1]	T_C	Measured at the bottom of the package	-20		+70	°C
Optical Output Power	P_O	T_{OP}, I_{OP} = 200 mA	14	15	-	dBm
Operating Current	I_{OP}	-	-	200	250	mA
Operating Laser Temperature	T_{OP}	Laser temperature setpoint (thermistor reading) to align λ_{OP} with a designated wavelength channel, for I_{OP} = 200 mA	37		53	°C
Laser Bias Forward Voltage	V_{OP}	T_{OP}, I_{OP} = 250 mA	1.0	-	1.8	V
Wavelength	λ_{OP}	T_{OP}, I_{OP} = 200 mA	1550 ± 10			nm
Wavelength change over life	$\Delta\lambda_L$	T_{OP}, I_{OP} = 200 mA, 10,000 hours	-0.1		+0.1	nm
Frequency Noise @ 100 kHz	Δv	$T = T_{OP}$, $I_F = I_{OP}$	-	-	32	kHz^2/Hz
Optical Isolation	ISO	-	40	50	-	dB
Threshold Current	I_{TH}	T_{OP}	-		40	mA
Sidemode Suppression Ratio	SMSR	T_{OP}, I_{OP} = 200 mA	50	-	-	dB
Polarization Extinction Ratio	PER	T_{OP}, I_{OP} = 200 mA	17	-	-	dB
Wavelength Tuning with Bias Current	dv/dI	T_{OP}, I_{OP} = 200 mA, bias current modulation with a triangle wave @50KHz, for >1 GHz tuning	100	-	350	MHz/mA
Wavelength thermal tuning coefficient	$d\lambda$ /dT			0.08		nm/°C
Monitor PD Current	I_{MPD}	I_{OP} = 200 mA, V_{MPD} = -5 V	100	-	2500	µA
Monitor PD Dark Current	I_D	I_{OP} = 0 mA , V_{MPD} = -5 V	-	-	0.2	µA
Thermistor Resistance[2]	R_{TH}	T_{OP} = 25 °C	9.0	10.0	11.0	KΩ
TEC Current [3]	I_{TEC}	T_{OP}, I_{OP} = 200 mA	-1.0	-	+0.8	A
TEC Voltage [3]	V_{TEC}	T_{OP}, I_{OP} = 200 mA	-2.5	-	+2.2	V

1. Effective heatsinking is required for safe operation of the product. Case temperature should be monitored as a part of the laser control loop, and it should never exceed 85 C. Laser shut-down mechanism should be implemented to avoid catastrophic damage.
2. Thermistor temperature-resistance formula: **$1/T = A + B*Ln(R) + C*(Ln(R))^3$** where T is temperature in Kelvin, R is resistance in Ohm, $A=1.129x10^{-3}$, $B=2.341x10^{-4}$, $C=8.775x10^{-8}$.
3. Values for steady state operation.

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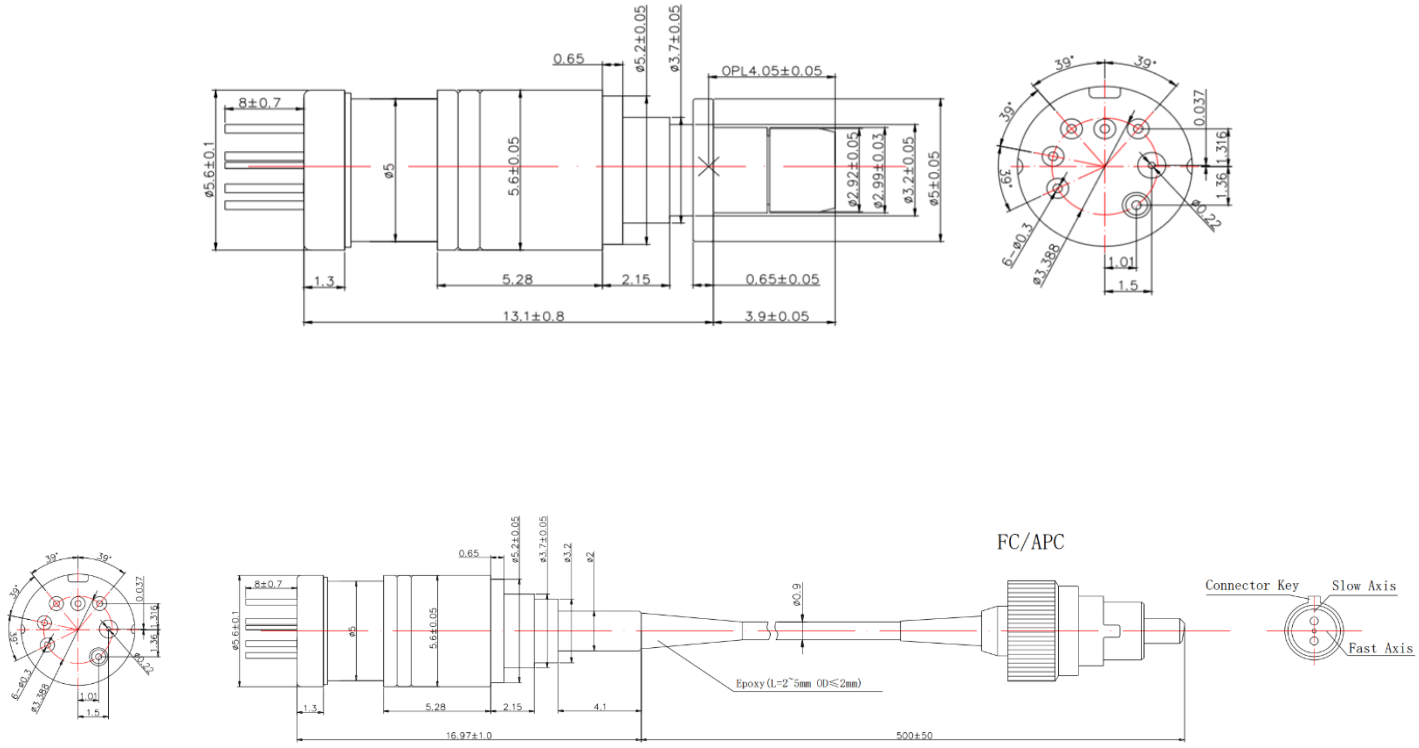
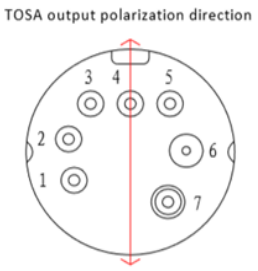
Outline Drawings



Pin Assignments



Pin	Description
1	Laser Cathode (-)
2	Thermistor
3	MPD Cathode (+)
4	Thermo-electric Cooler (-)
5	Thermo-electric Cooler (+)
6	Laser Anode (+)
7	Case Ground/MPD Anode (-)/Thermistor