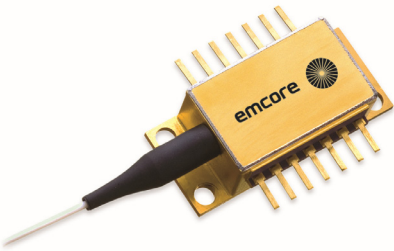


# Model 1790 1550 nm High Power CW Source DFB Laser for LiDAR



## Applications

- LiDAR
- Optical Sensing
- Frequency Modulated Continuous Wavelength Sensing
- Autonomous Vehicles
- Free Space Optics

## Features

- 18 dBm Optical Output Power
- OC-48 Pinout Compatible
- Telcordia Technologies® GR-468 Compliant
- Double Optical Isolator
- PM Fiber
- 20 °C to +65 °C Operating Temperature Range
- Monitor Photodiode
- RoHS

EMCORE's 1790 laser module is characterized for use as a CW coherent optical source DFB laser operated in the 1550 nm wavelength band for LiDAR technology. EMCORE'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.

The 1790 is DC-coupled with a built-in TEC, thermistor, and monitor photodiode. The device is in a 14-pin, OC-48 pinout compatible hermetic butterfly package with double optical isolator mounted on the TEC. 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 EMCORE's laser technology maintains optical frequency stability over temperature suppressing false readings. The 1790 incorporates a high-efficiency coupling scheme to deliver 18 dBm of CW optical output power.

## Performance Highlights

Parameter	Min	Typ	Max	Units
Operating Case Temperature	-20	25	+65	°C
Wavelength	1550 +/- 10			nm
Optical Output Power	17	18	-	dBm
Threshold Current	-	-	40	mA
Operating Current	-	-	500	mA
Frequency Noise @ 100 kHz	-	-	32	kHz <sup>2</sup> /Hz
Optical Isolation	-	50	-	dB
SMSR <sup>1</sup>	50	-	-	dB
Polarization Extinction Ratio (PMF pigtail)	17	-	-	dB
Optical Return Loss	40	-	-	dB

1. @ operating current

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## Electrical/Optical Characteristics

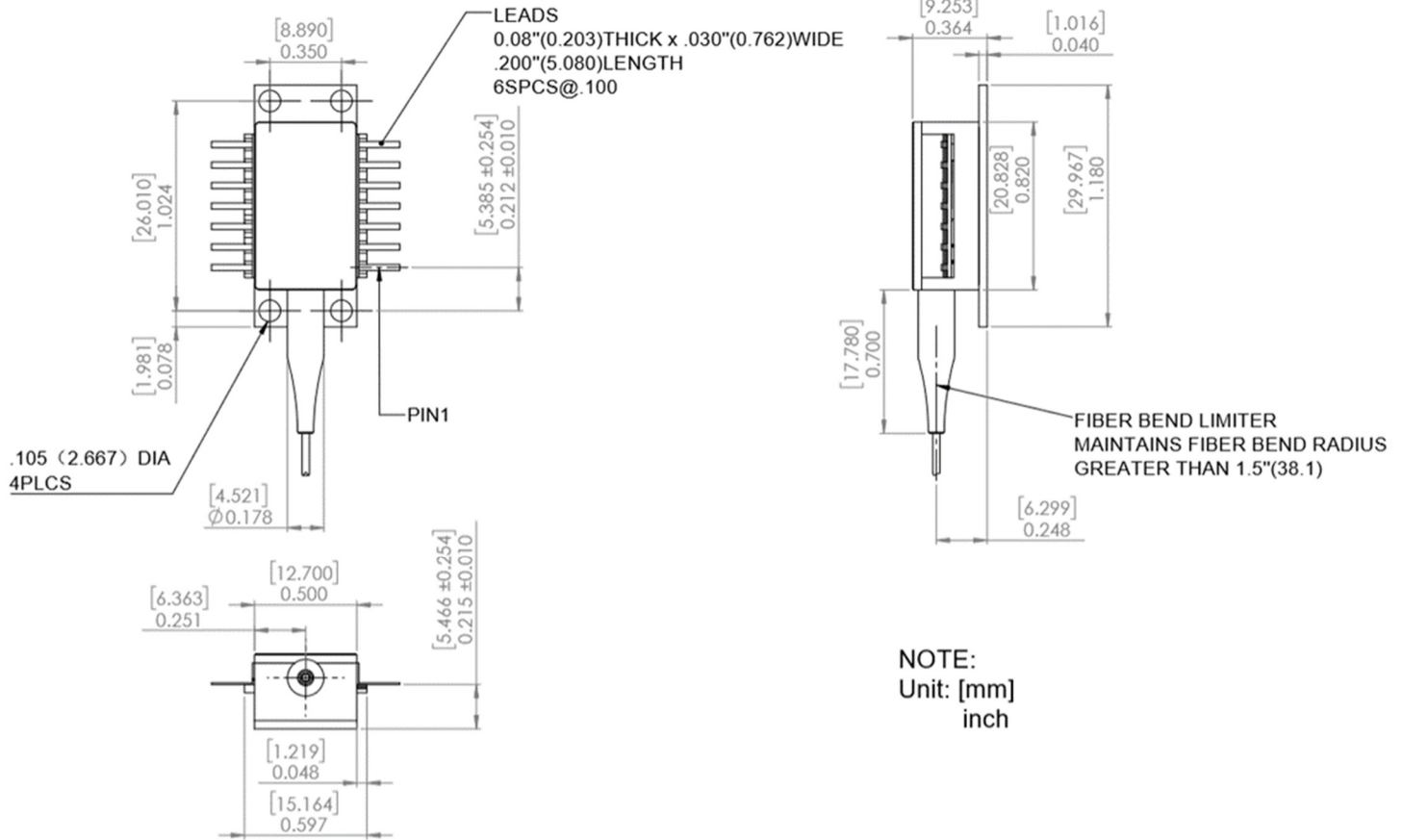
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating Case Temperature	$T_c$	-	-20	25	65	°C
Storage Temperature	$T_{STG}$		-40		+85	°C
Optical Output Power	$P_O$	$T = T_{OP}, I_F = I_{OP}$	17	18	-	dBm
Threshold Current	$I_{TH}$				40	mA
Operating Current	$I_{OP}$	$T = T_{OP}, @ 18 \text{ dBm}$	-	-	500	mA
Operating Laser Temperature	$T_{OP}$		18	25	35	°C
Laser Bias Forward Voltage	$V_{OP}$	$I_F = I_{OP}$	-	-	2.5	V
Wavelength	$\lambda_{OP}$	$T = T_{OP}, I_F = I_{OP}$	1550 ± 10			nm
Frequency Noise @ 100 kHz	$\Delta v$	$T = T_{OP}, I_F = I_{OP}$	-	-	32	kHz <sup>2</sup> /Hz
Optical Isolation	ISO	-	-	50	-	dB
Sidemode Suppression Ratio	SMSR	-	50	-	-	dB
Polarization Extinction Ratio	PER	$I_F = I_{OP}$	17	-	-	dB
Wavelength tuning with current		Measured with triangle wave @ 50 kHz modulation rate, and 10 μs integration time	100	-	400	MHz/mA
Monitor PD Current	$I_{MPD}$	$I_F = I_{OP}, V_{MPD} = -5 \text{ V}$	100	-	2500	μA
Monitor PD Dark Current	$I_D$	$I_{OP} = 0 \text{ mA}, V_{MPD} = -5 \text{ V}$	-	-	0.2	μA
Thermistor Resistance <sup>2</sup>	$R_{TH}$	$T_{OP} = 25 \text{ °C}$	9.5	10.0	10.5	KΩ
Thermistor Temp. Coefficients	$TC_{TH}$	$T_{OP} = 25 \text{ °C}$	-	-4.4	-	%/°C
TEC Current	$I_{TEC}$	$-10 \text{ °C} < T_c < +65 \text{ °C}$	-1.0	-	+1.5	A
TEC Voltage	$V_{TEC}$	$-10 \text{ °C} < T_c < +65 \text{ °C}$	-2.0	-	+3.0	V
ESD	-	HBM: R = 1500 Ω, C = 100 pF	-500		500	V
Fiber pigtail <sup>2</sup> length	$L_f$		1.0			m

1. Thermistor temperature-resistance formula:  $1/T = A + B \cdot \ln(R) + C \cdot (\ln(R))^2$  where T is temperature in Kelvin, R is resistance in Ohm, A=1.129x10<sup>-3</sup>, B=2.341x10<sup>-4</sup>, C=8.775x10<sup>-8</sup>.
2. PANDA 1550 nm polarization maintaining fiber or compatible, 400 μm buffer. Light is aligned to the slow axis of the PM fiber.

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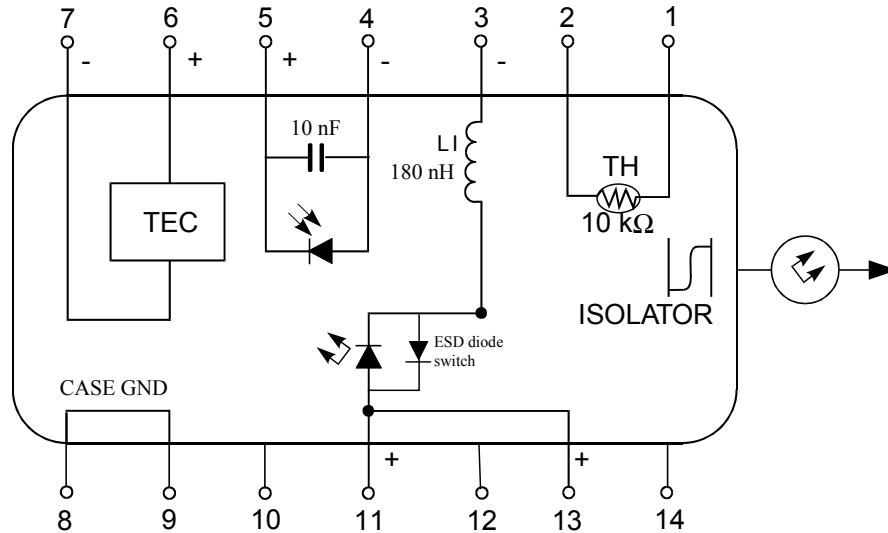
## Outline Drawing



**Note:**

- [1] The global common tolerance for measurements is 0.005"[0.127 mm]
- [2] The module base plane metal finish structure: Au(0.7 μm)/Ni(1.0 μm)/CuW. Base flatness specification = 0.003"[0.0762 mm]

## Electrical Schematics

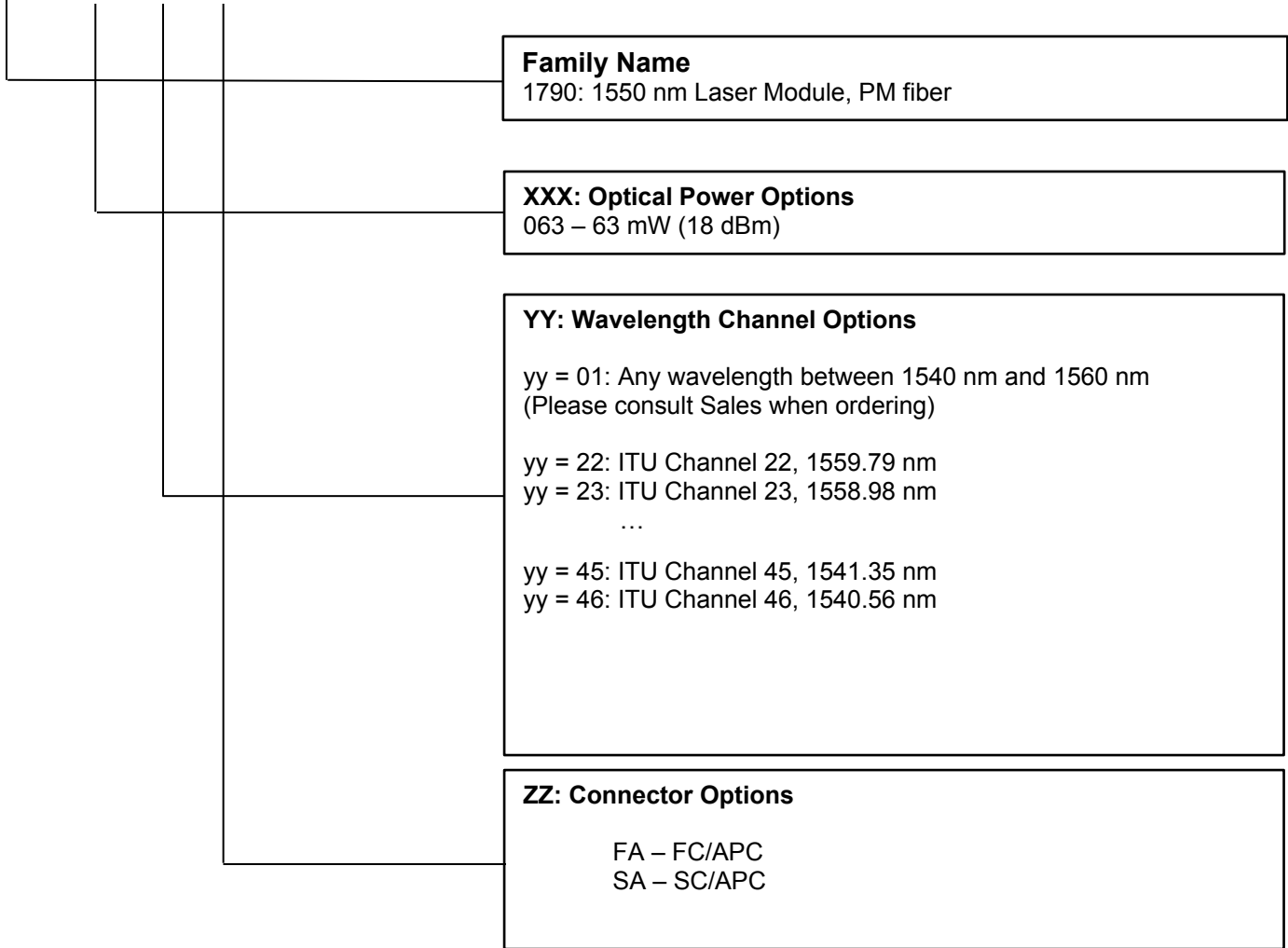


## Pin Assignment

Pin	Description
1	Thermistor
2	Thermistor
3	Laser Cathode (-)
4	MPD Anode (-)
5	MPD Cathode (+)
6	Thermo-electric Cooler (+)
7	Thermo-electric Cooler (-)
8	Case Ground
9	Case Ground
10	NC
11	Laser Anode (+)
12	NC
13	Laser Anode (+)
14	NC

## Ordering Code Definitions

1790A- XXX - YY - ZZ - PM



## Example

**1790A-063-01-FA:** 1550 nm Laser Module, PM fiber, 63 mW (18 dBm) optical power, Non-ITU 1540 nm – 1560 nm, FC/APC optical connector