DATA SHEET

1310NM FP LASER FOR 10GBASE-LRM SC AND LC TOSA

FP-1310-10LRM-X

FEATURES:

- 1310nm FP laser
- Very low power dissipation
- SC and LC optical receptacles
- 10Gbps direct modulation
- Impedance matching inside the laser package
- Differential electrical interface
- Compatible with all 10GBE MSAs (XFP, X2, XPAK, XENPAK)

The HFE6x62-561 is specifically designed for applications based on the IEEE 10GBASE-LRM optical standard. The TOSA is designed to meet the fiber launch conditions specified for the multimode and single mode optical fiber options. Excellent optical performance is achieved by matching the electrical characteristics of the TOSA and laser to the external circuitry. Separate, differential laser bias and modulation pins significantly reduce the amount of electrical power required at the module level, and help to reduce the overall electro-magnetic emissions. The TOSA is designed to be paired with the linear ROSA HFD6x40-417 available at www.finisar.com/aoc.php.

Part Number	Description
FP-1310-10LRM-SCA	1310nm SC TOSA with FP laser
FP-1310-10LRM-LCA	1310nm LC TOSA with FP laser

Finisar
Advanced Optical Components Division

ABSOLUTE MAXIMUM RATINGS

Parameter	Rating
Storage temperature	-40°C to +90°C
Case Operating temperature	-5 to +85°C
Lead solder temperature	260°C, 10 seconds
Continuous Optical Power	20 mW
Laser Diode Reverse Voltage	2V
Laser Diode Continuous Forward Current	130 mA
Monitor Photodiode Reverse Current	2 mA
Monitor Photodiode Reverse Voltage	10V

NOTICE: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operations section for extended periods of time may affect reliability.

NOTICE: The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation to equipment, take normal ESD precautions when handling this product.

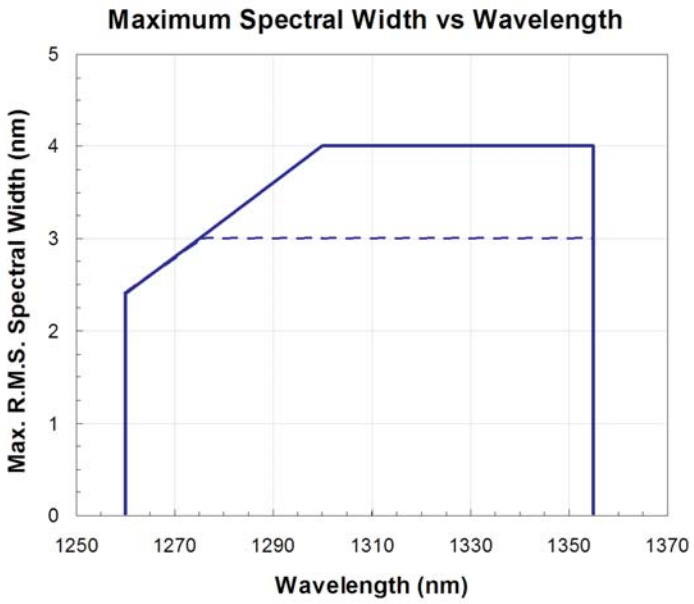
ELECTRICAL-OPTICAL CHARACTERISTICS

T_{CASE} = 25°C, $T_{RANGE, CASE}$ = -5 to 80°C, 10.3125 Gbps, PRBS 2^{31}-1

Parameter	Test Conditions	Symbol	Minimum	Typical	Maximum	Unit	Notes
Threshold current	T=25°C T=T_{RANGE}	I_{TH}	10		 25	mA	
Operating current	T=25°C T=T_{RANGE}	I_{OP}		45	 70	mA	1
Modulation current	T=25°C T=T_{RANGE}	I_{MOD}		25	 60	mA	ER ~ 4.5dB ER ~ 6.5dB
Output Power	$I_F = I_{OP}$	L_{OP}	-3		0.5	dBm	2
Slope Efficiency	T=25°C, SMF	η		0.018		mW/mA	
Encircled Flux	r < 5 μm r < 11 μm	EF_5 EF_{10}	30 86			%	3
Extinction Ratio	T=T_{RANGE}		3.5		6.0	dB	4
LA (wiggle)		LA			1.5	dB	5
Wavelength	T=25°C T=T_{RANGE}	λ	1295 1265		1315 1355	nm	
Spectral Width	T=25°C T=T_{RANGE}	$\Delta\lambda$		 1.4	30	nm, rms	6
Relative Intensity Noise	I=I_{OP}	$RIN_{20}OMA$			-136	dB/root Hz	7
		$RIN_{12}OMA$			-130		
Modulation Bandwidth	I=I_{OP}, T=25°C I=I_{OP}, T=T_{RANGE}	$S_{21,3dB}$	 8	9.5		GHz	
Rise / Fall time		T_r T_f		35 35	50 50	ps	8
Transmitter Wavelength Dispersion Penalty		TWDP			4.7	dB	9
Forward Voltage	T=T_{RANGE}, I=I_{OP}	V_f	1		1.6	V	
Laser Resistance	T=T_{RANGE}, I=I_{OP}	R_L	6	8	12	Ohms	10
Monitor Current	T=25°C, I=I_{OP}, V_B=-2.5V	I_{MON}	200		2000	μA	
Tracking Error	T=T_{MAX} T=T_{MIN}	TE	-1.25 -1.25		1.25 1.25	dB	11
Monitor Dark Current	T=T_{RANGE} V_B=-2.5V	I_D			100	nA	
Monitor Diode Capacitance	V_B=-2.5V	C_{MON}			10	pF	
Optical Return Loss Tolerance		ORLT	12			dB	
Input Impedance (Diff)		R_{DIFF}	44	50	56	Ohms	
Diff. Return Loss	0.1<f<7.5 GHz 7.5<f<12.5 GHz	S_{DD11}			-10 -6	dB	
Case to Signal Isolation		R_{ISO}	10			KΩ	

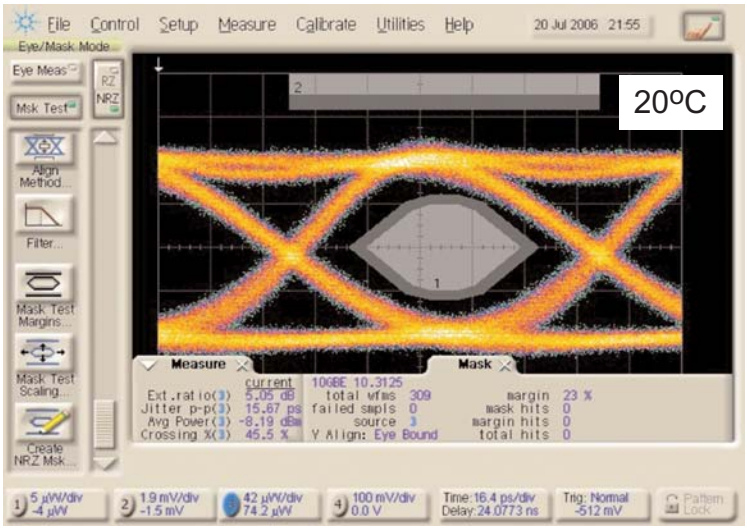
NOTES

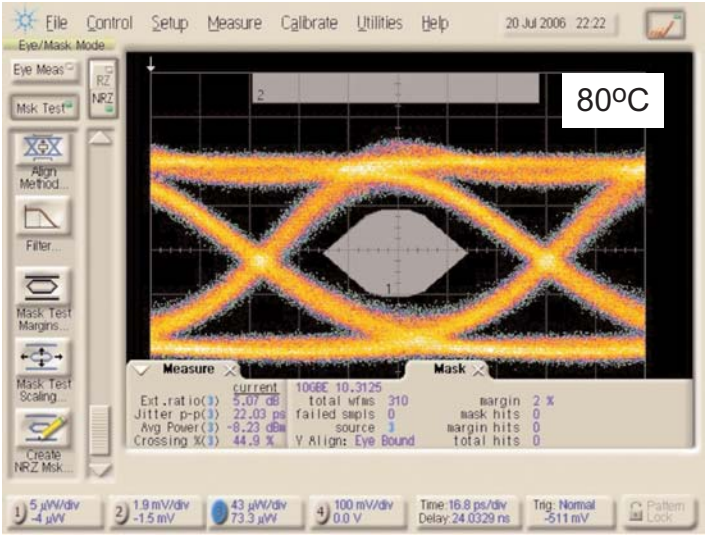
1. 1. Operating current is the average bias current required to meet the ER, rise/fall, and bandwidth specifications. The target operating condition is 35 mA over threshold at high temperature, 30mA over threshold at RT.
2. Output power specification must be met into both single-mode fiber and 62/125 multi-mode fiber.
3. Encircled flux is measured at the end of a 10m patchcord through a fiber shaker per IEC 61280-1-4.
4. TOSA would be capable of meeting other specifications when modulated over this ER range.
5. Maximum change in power as fiber is rotated by 360º.
6. See Figure 1 below for the present 10GBASE-LRM spectral width vs. wavelength specification, and TOSA requirement curve that is further restricted to 3 nm for margin, but is limited by the IEEE curve below 1275nm.



7. Measured per IEEE 802.3ae specifications.
8. Measured with an optical receiver with a 10.3125 Gb/s filter (4th order Bessel-Thomson filter with 3 dB bandwidth = 0.75*bitrate).
9. TWDP is measured as defined in IEEE 802.3aq.
10. Laser slope resistance is measured between “Bias+” and “Bias-“ pins.
11. Tracking error is defined as the coupled power difference at Tmax or Tmin (relative to 25 C) where the back monitor current, Imon, is held constant at the value found at 25 C at I=Iop.

TYPICAL PERFORMANCE CHARACTERISTICS

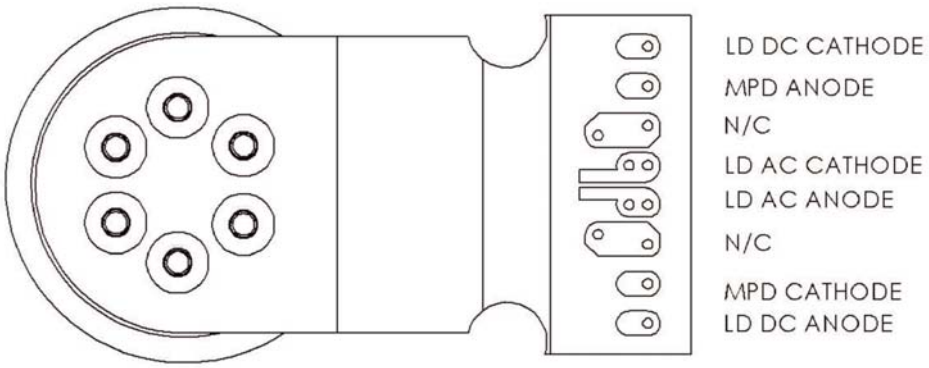




10.7Gbps, SONET Mask

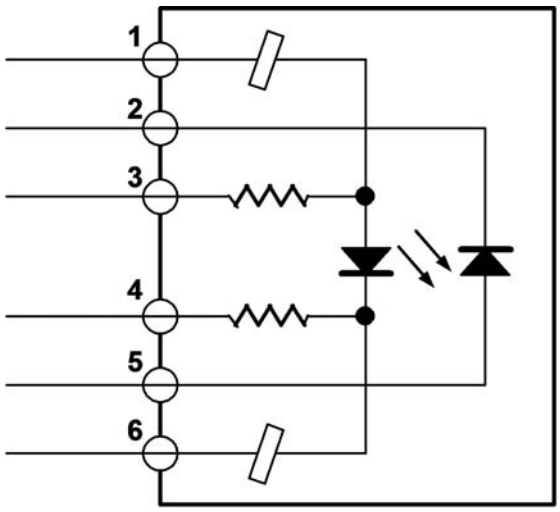
PINOUT

PIN	Function
1	Laser BIAS +
2	MPD Cathode
3	Ground
4	Laser MOD +
5	Laser MOD -
6	Ground
7	MPD Anode
8	Laser BIAS -

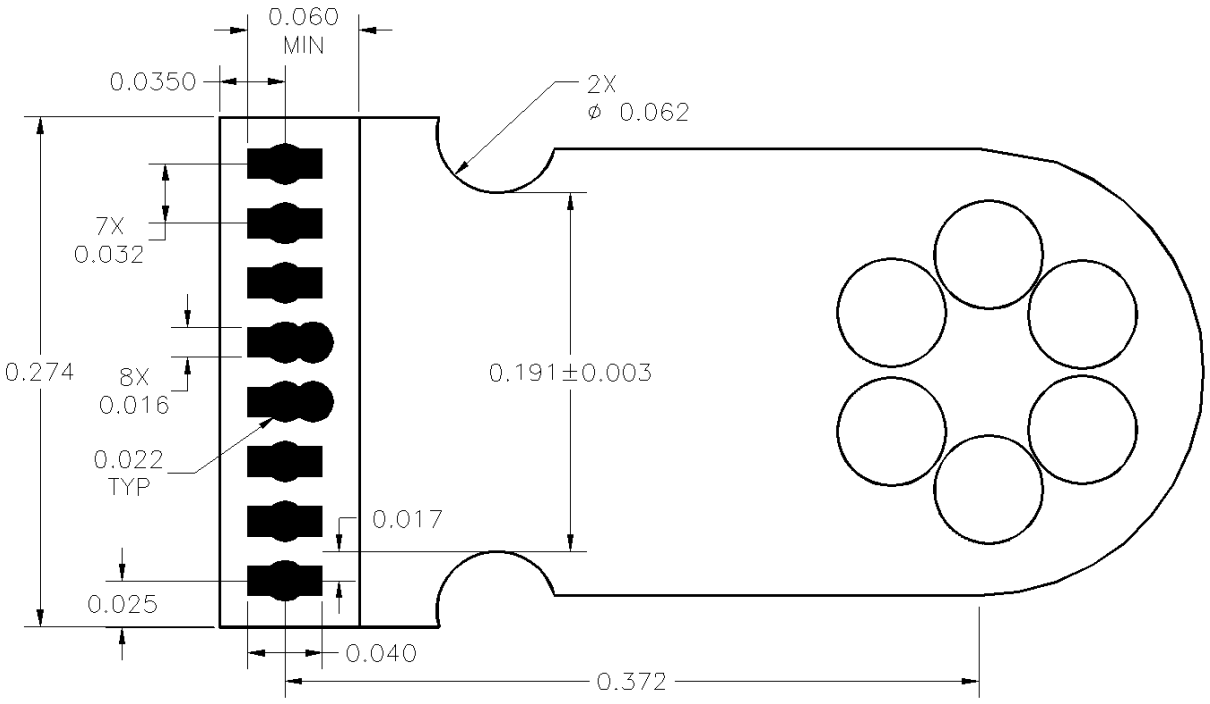


INTERNAL CONFIGURATION

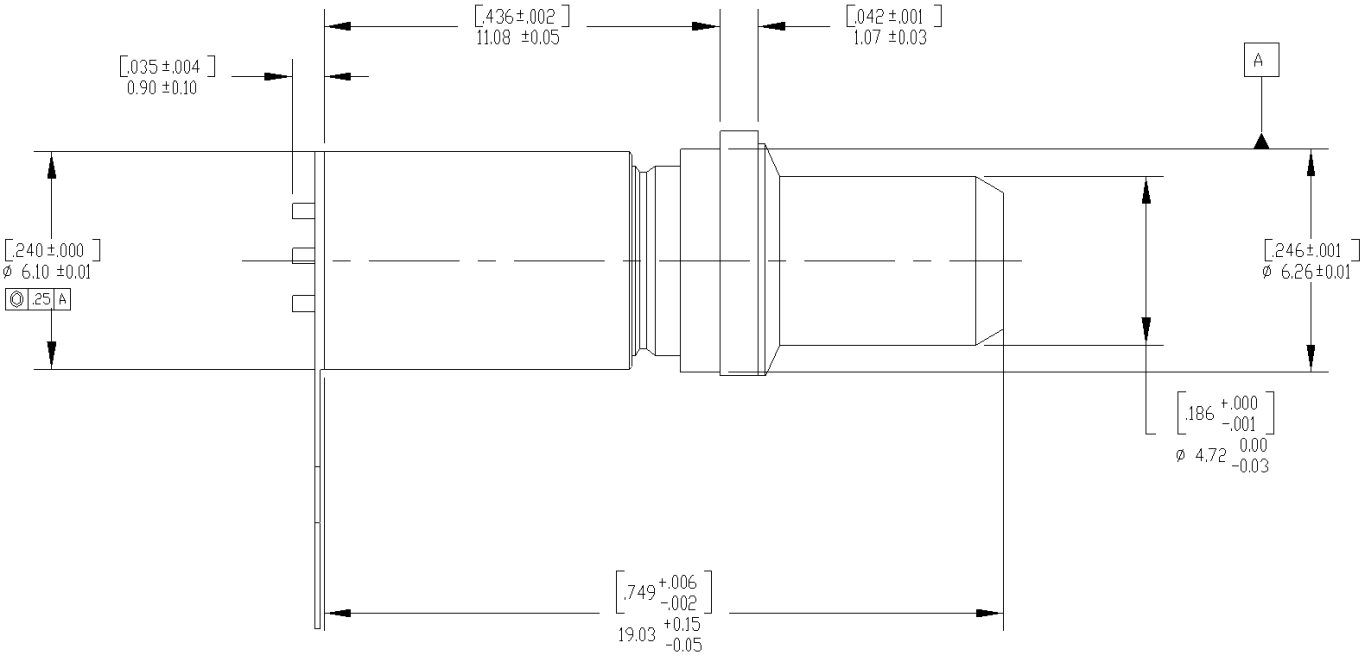
PIN	Function
1	Bias +
2	MPD-C
3	Mod +
4	Mod -
5	MPD-A
6	Bias -



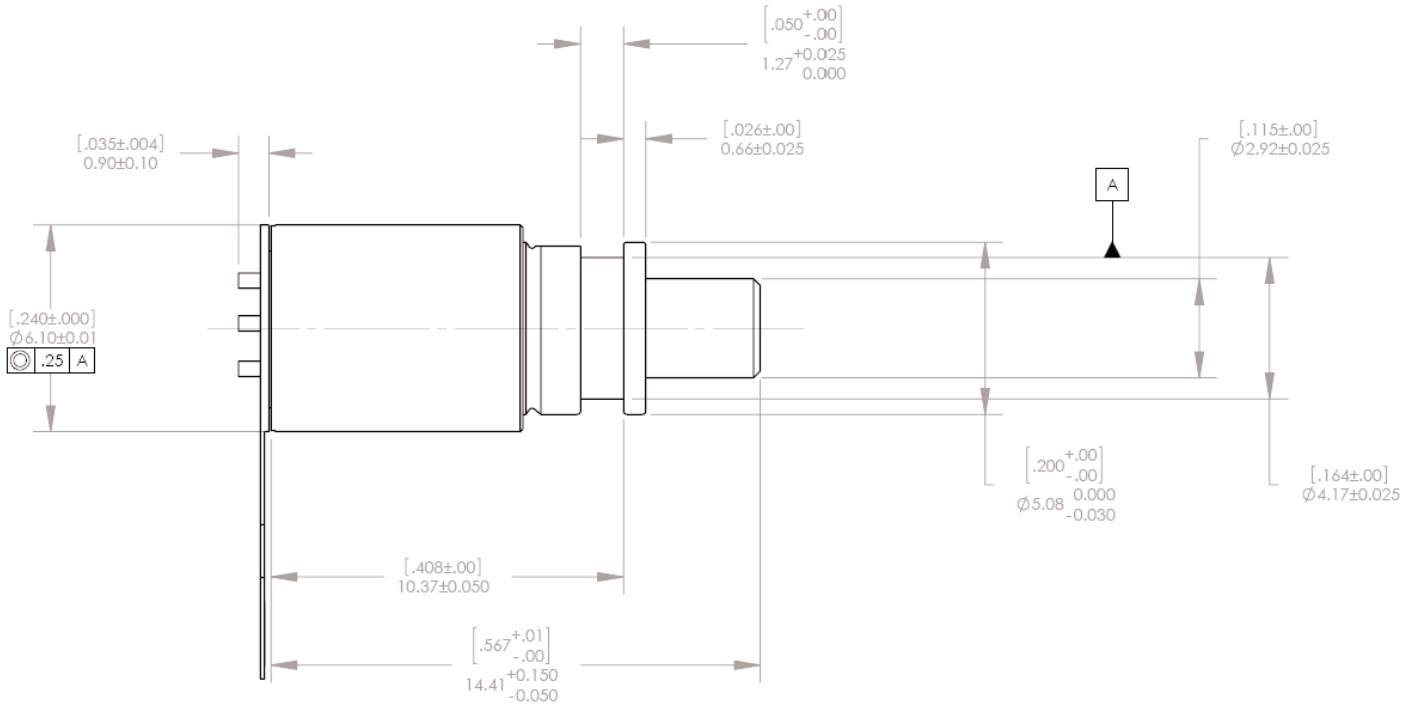
FLEX MOUNTING DIMENSIONS – DIMENSIONS IN INCHES



HFE6362-562 SC MOUNTING DIMENSIONS – DIMENSIONS IN MM [INCHES]



HFE6162-562 LC MOUNTING DIMENSIONS – DIMENSIONS IN MM [INCHES]



ADVANCED OPTICAL COMPONENTS

Finisar's ADVANCED OPTICAL COMPONENTS division was formed through strategic acquisition of key optical component suppliers. The company has led the industry in high volume Vertical Cavity Surface Emitting Laser (VCSEL) and associated detector technology since 1996. VCSELs have become the primary laser source for optical data communication, and are rapidly expanding into a wide variety of sensor applications. VCSELs' superior reliability, low drive current, high coupled power, narrow and circularly symmetric beam and versatile packaging options (including arrays) are enabling solutions not possible with other optical technologies. ADVANCED OPTICAL COMPONENTS is also a key supplier of Fabrey-Perot (FP) and Distributed Feedback (DFB) Lasers, and Optical Isolators (OI) for use in single mode fiber data and telecommunications networks

LOCATION

- Allen, TX - Business unit headquarters, VCSEL wafer growth, wafer fabrication and TO package assembly.
- Fremont, CA – Wafer growth and fabrication of 1310 to 1550nm FP and DFB lasers.
- Shanghai, PRC – Optical passives assembly, including optical isolators and splitters.

SALES AND SERVICE

Finisar's ADVANCED OPTICAL COMPONENTS division serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or call the number listed below.

AOC CAPABILITIES

ADVANCED OPTICAL COMPONENTS' advanced capabilities include:

- 1, 2, 4, 8, and 10Gbps serial VCSEL solutions
- 1, 2, 4, 8, and 10Gbps serial SW DETECTOR solutions
- VCSEL and detector arrays
- 1, 2, 4, 8, and 10Gbps FP and DFB solutions at 1310 and 1550nm
- 1, 2, 4, 8, and 10Gbps serial LW DETECTOR solutions
- Optical Isolators from 1260 to 1600nm range
- Laser packaging in TO46, TO56, and Optical subassemblies with SC, LC, and MU interfaces for communication networks
- VCSELs operating at 670nm, 780nm, 980nm, and 1310nm in development
- Sensor packages include surface mount, various plastics, chip on board, chipscale packages, etc.
- Custom packaging options

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