DATA SHEET

10GBPS 850NM VCSEL LC AND SC TOSA PACKAGE

HFE6X92-562

FEATURES:

- LC TOSA HFE6192-562
- SC TOSA HFE6392-562
- High performance VCSEL
- Low electrical parasitic TO package with flexible interface
- Data rates from DC to 12.5Gbps
- Differential, Cathode or Anode driven versions available
- Complete isolation between the VCSEL, Monitor Photodiode and Case
- Mechanically compatible with all 10Gbps MSAs

The HFE6x92-562 uses a high-performance Vertical Cavity Surface Emitting Laser (VCSEL) designed to meet performance requirements for 10Gbps data communication over multimode optical fiber. Applications include Ethernet, Fibre Channel and ATM protocols. The optical assembly is designed to interface either 50um or 62.5um multimode fiber and ensure launch conditioning requirements compatibility with enhanced bandwidth fiber as specified by TIA 455-203.

The HFE6x92-562 incorporates a power monitoring photodiode that can be used for temperature compensation, average power control, and for compliance with Class 1 eye safety limits.

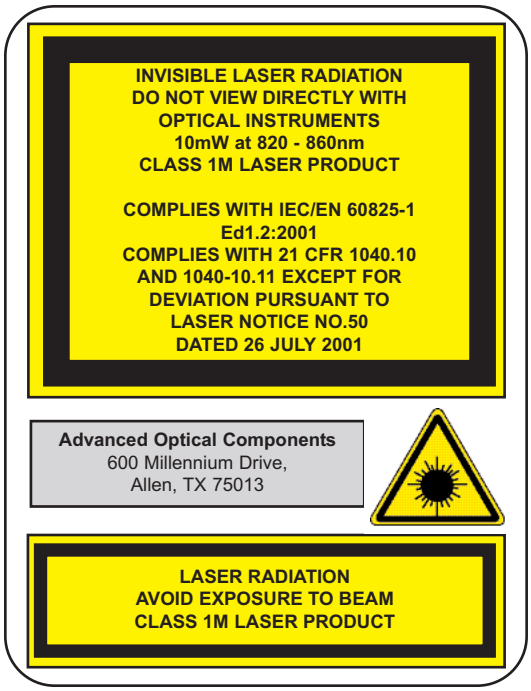
LC TOSA

SC TOSA

Part Number	Description
HFE6192-562	Differentially Driven, attenuated, LC TOSA, with 50Ω flex
HFE6392-562	Differentially Driven, attenuated, SC TOSA, with 50Ω flex

Finisar
Advanced Optical Components Division

ABSOLUTE MAXIMUM RATINGS



Parameter	Rating
Storage temperature	-40°C to +85°C
Case operating temperature	0 to +85°C
Lead solder temperature	260°C, 10 seconds
Reverse Power Supply Voltage	5V
Peak continuous forward current	12mA

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

VCSEL Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Fiber coupled optical power	I_F=6.5mA Peak 50/125μm fiber	P_{OC}	400	600		μW	
Coupling Efficiency	I_F=6.5mA	PO_PCT	70			%	1
Threshold Current		I_{TH}		1	2	mA	
Threshold Current Temperature Variation	T_A=0 to 70°C	ΔI_{TH}			1	mA	2
Slope Efficiency	P_{OC}=0.6mW	η	0.05	0.075	0.2	mW/mA	3
Slope Efficiency Temperature Variation	T_A=0 to 70°C	$\Delta\eta/\Delta T$		-0.4		%/°C	
Peak Wavelength	I_F=6.5mA	λ_P	840		860	nm	
λ_P Temperature Variation	T_A=0 to 70°C	$\Delta\lambda_P/\Delta T$		0.06		nm/°C	
RMS Spectral Bandwidth	I_F=6.5mA	$\Delta\lambda$			0.4	nm	
Laser Forward Voltage	I_F=6.5mA	V_F	1.6	1.8	2.4	V	
Laser Reverse Voltage	I_R=10μA	V_R	5	10		V	
Rise/Fall Time	Bias above threshold 20%-80%	T_R T_F			40 40	ps	4
Relative Intensity Noise	I_F=6.5mA	RIN_{12}			-130	dB/Hz	5
Series Resistance	I_F=6.5mA	R	45	60	75	Ohms	
Series Resistance Temperature Variation	I_F=6.5mA	$\Delta R/\Delta T$		-0.2		%/°C	
Total Capacitance	I_F=6.5mA	C_T			0.5	pF	6
Encircled Flux Diameter	I_F(avg)=6.5mA	EF					7

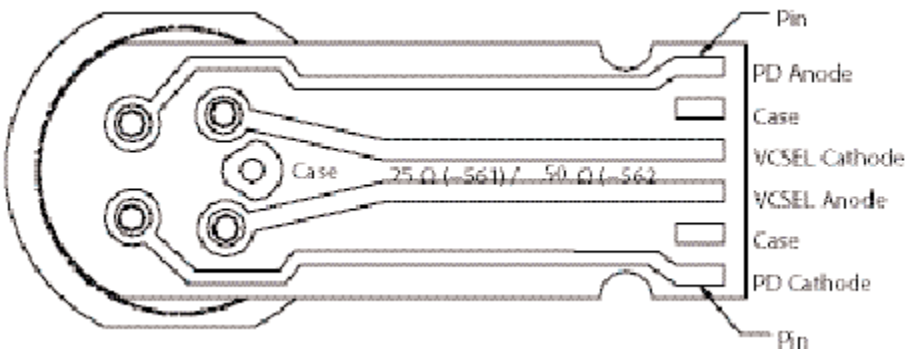
Photodiode Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Monitor Current	P_{OC}=0.6mW, V_R=3V	I_{PD}	50	150	300	μA	
Monitor Current Temperature Variation	P_{OC}=0.6mW T_A=0 to 70°C	$\Delta I_{PD}/\Delta T$		0.0		%/°C	
Tracking Ratio Variation (Open Bore)	P_{OB} = -2.5dBm, T_A=0 to 70°C	ΔTR	-0.5		+0.5	dB	
Dark Current	P_{OC}=0mW, V_R=3V	I_{DARK}			20	nA	
PD Reverse Voltage	P_{OC}=0mW, I_R=10μA	BVR_{PD}	30	115		V	8
PD Capacitance	V_R=0V, Freq=1MHz V_R=3V, Freq=1MHz	C_{PD}		75 40	100 55	pF	

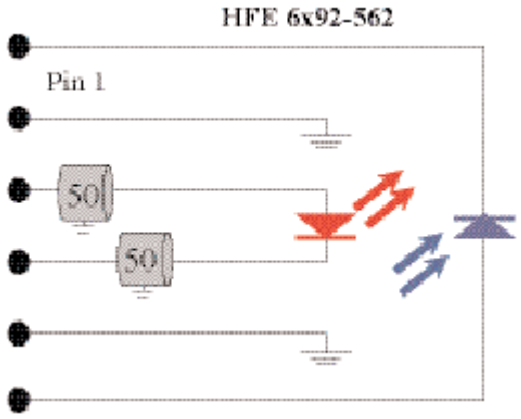
ELECTRO-OPTICAL CHARACTERISTICS (T_A=25 °C unless otherwise stated)

NOTES

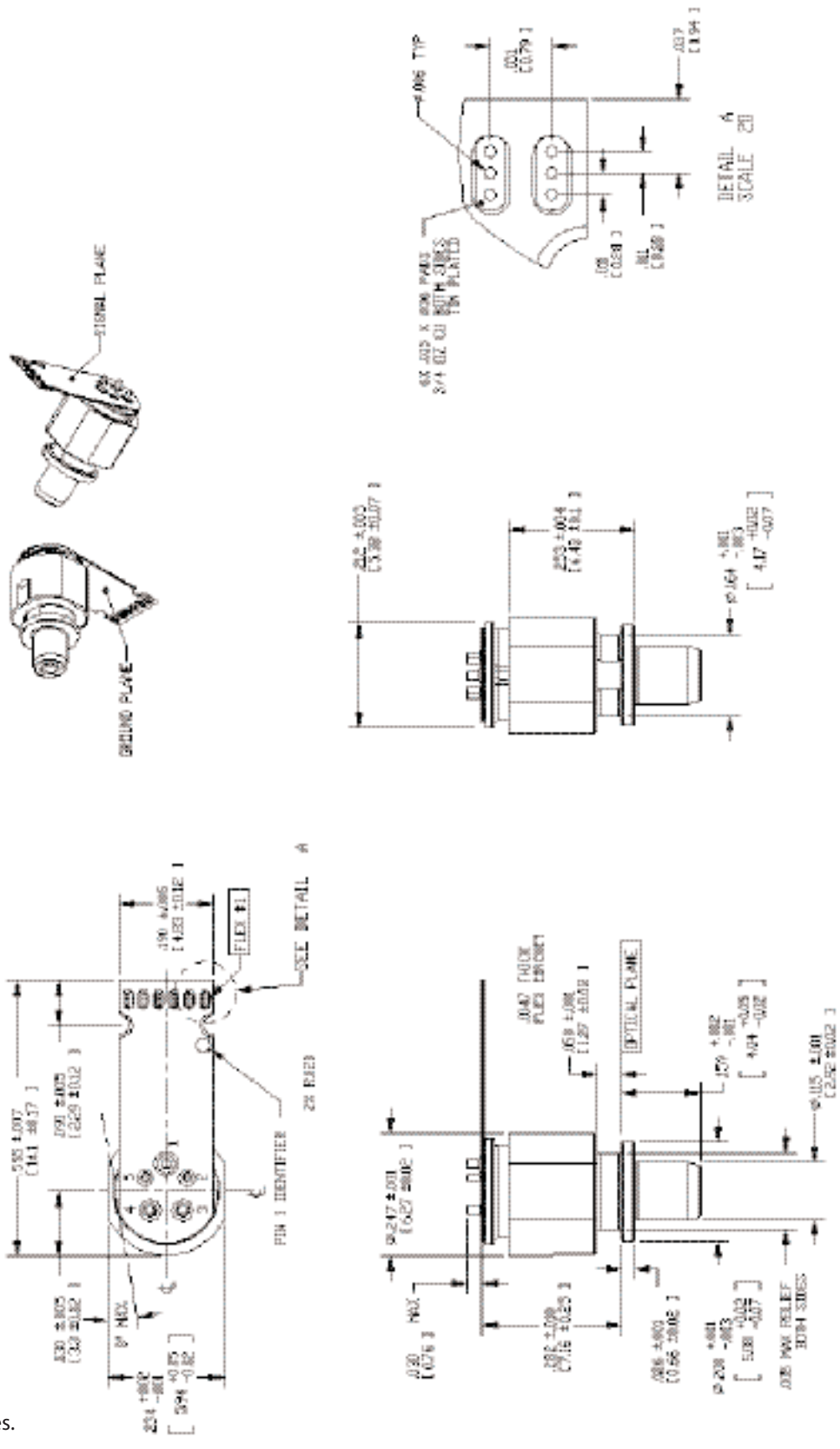
1. PO_PCT is defined as the ratio of the coupled power into a 50/125 micron fiber to the total power output from the optical front end as measured on a large area detector.
2. Operation outside of the specified range may result in the threshold current exceeding the maximums defined in the electro-optical characteristics table. ΔITH is the maximum deviation from the 25ºC value.
3. Slope efficiency is defined as ΔPO/ΔIF at a total power output of 0.6mW. Slope efficiency is intentionally lowered to the value shown by attenuation.
4. Rise and fall times are sensitive to drive electronics. Rise and fall times are measured 20%-80% using a 1GHz square wave AC coupled to the VCSEL using a bias-T. The DC current is adjusted to achieve a minimum OMA of -4dBm. Corrections are made for finite detector bandwidth.
5. RIN12 is measured using the OMA technique with 12dB return.
6. Total capacitance is measured with the VCSEL forward biased using a Network analyzer at 1GHz.
7. Encircled flux is measured per TIA-455-203.
8. To prevent VCSEL damage, short the VCSEL anode and cathode during BVR testing of the photodiode.

PIN OUT


Pin
PD Anode
Case
VCSEL Cathode
VCSEL Anode
Case
PD Cathode
Pin
Case
25 Ω (-561) / 50 Ω (-562

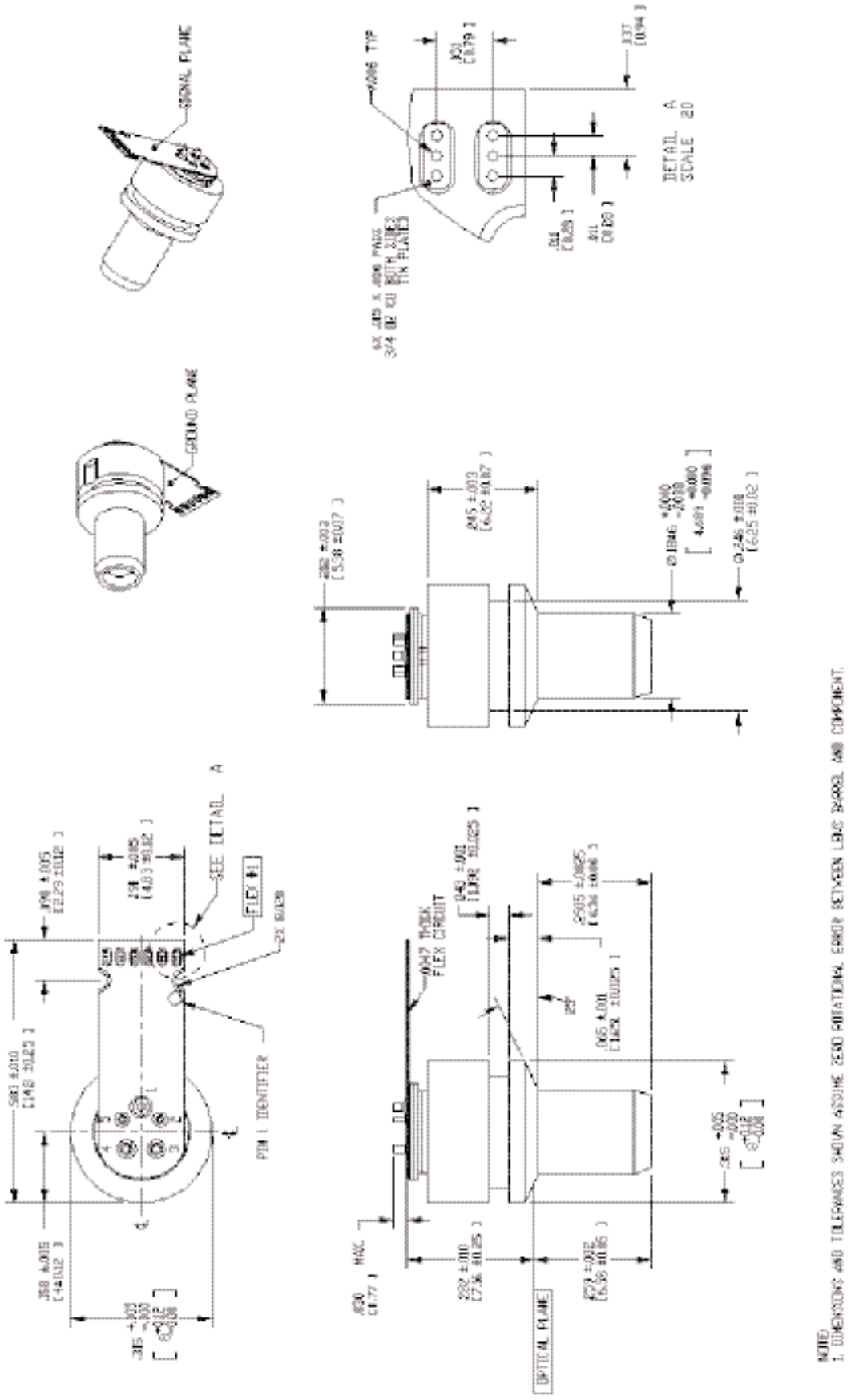

HFE 6x92-562
Pin 1
50
50

MOUNTING DIMENSIONS - LC TOSA WITH FLEX



(for reference only):
All dimensions are in inches.

MOUNTING DIMENSIONS - SC TOSA WITH FLEX



(for reference only):
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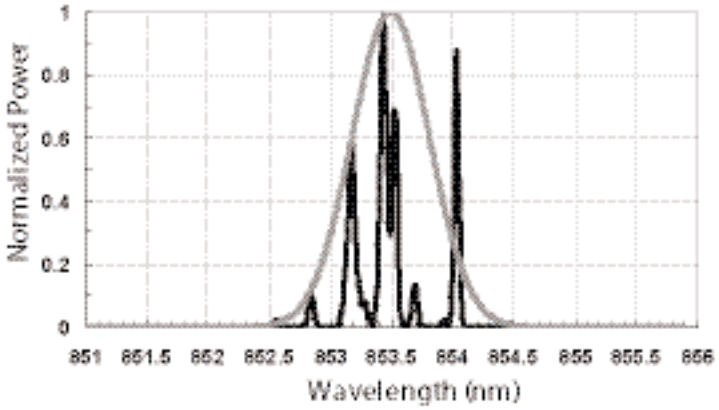
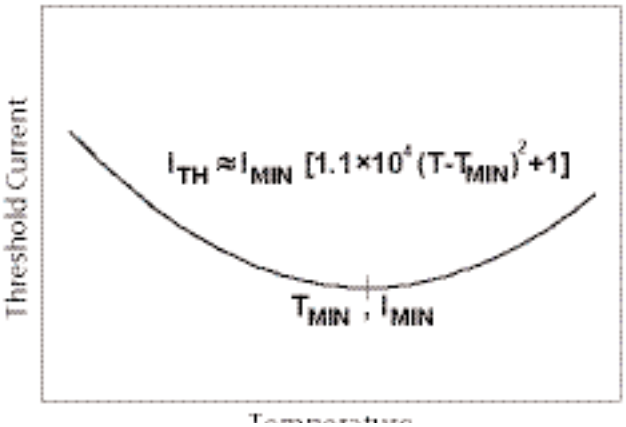
TYPICAL PERFORMANCE CURVES

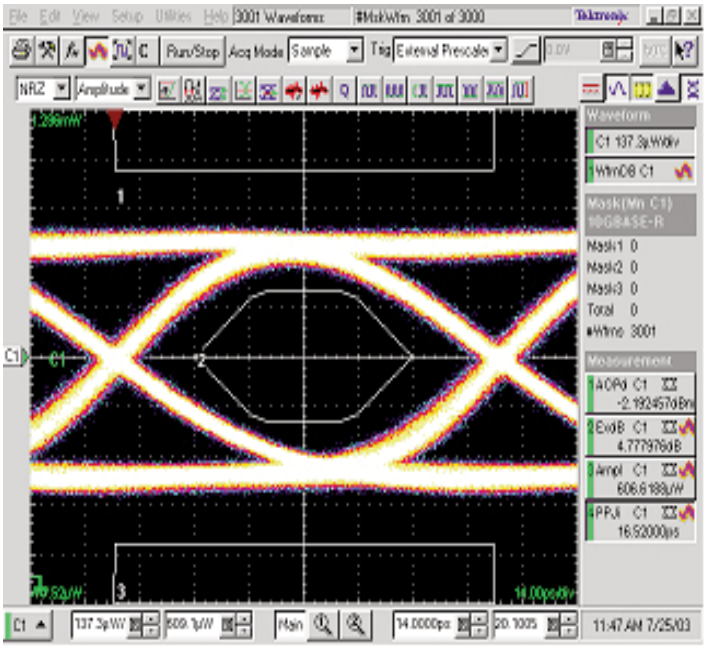
RMS Spectral Width is defined and measured using TIA-455-127

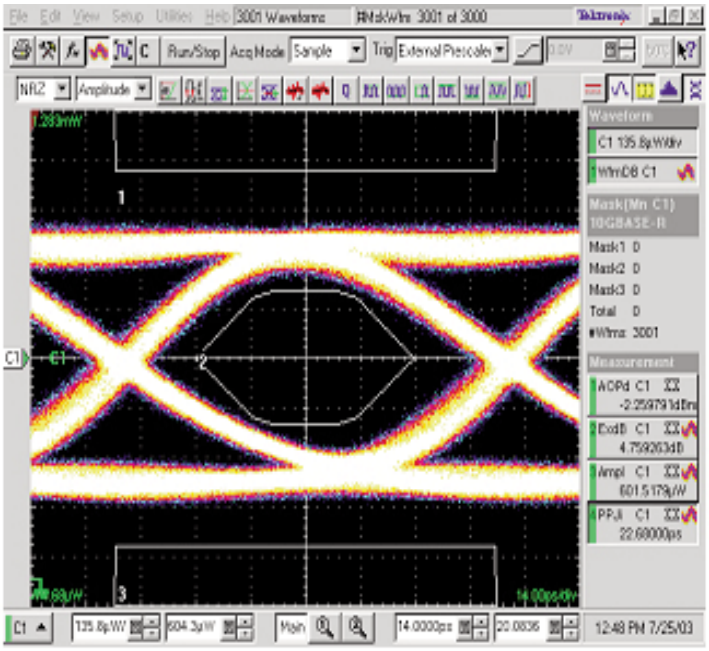


HFE 6x90-561

Threshold Current vs. Temperature: Threshold current varies parabolically with temperature; thus it can be nearly constant for a limited temperature range.







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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