

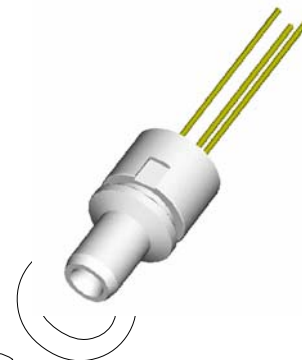
1.25Gbps 850nm VCSEL

SC TOSA Package

HFE4380-521. HFE4381-521

Key Features:

- TO-46 tilt window metal can component, prealigned into SC Sleeve
- Designed for drive currents between 5 and 15 mA
- Optimized for low dependence of electrical properties over temperature
- High speed ≥ 1 GHz
- Two different laser/ photodiode polarities
- Attenuating coating
- Packaged with a photodetector



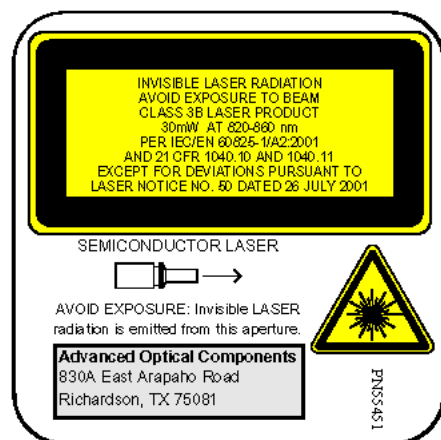
The HFE438x-521 is a high-performance 850 nm VCSEL (Vertical Cavity Surface-Emitting Laser) packaged for high-speed data communications. This product combines all the performance advantages of the VCSEL with a custom designed power monitor diode. The power monitor diode can be used with appropriate feedback control circuitry to set a maximum power level for each VCSEL. In addition, built-in power attenuation reduces the effective slope efficiency. These combined features simplify design for high data rate communication and eye safety.

Packaged in a fiber receptacle sleeve, this high radiance VCSEL is designed to convert electrical current into optical power that can be used in fiber optic communications and other applications. As the current varies above threshold, the light intensity increases proportionally. Data rates can vary from DC to above 2 Gb/s.

The HFE438x-521 is designed to be used with inexpensive silicon or gallium arsenide detectors, but excellent performance can also be achieved with some indium gallium arsenide detectors (see HFD3381-108).

The low drive current requirement makes direct drive from PECL (Positive Emitter Coupled Logic) or EML (Emitter Coupled Logic) gates possible and eases driver design.

The HFE438x-521 is a prealigned and focused fiber optic transmitter designed to interface with 50/125 and 62.5/125 μm multimode fiber.

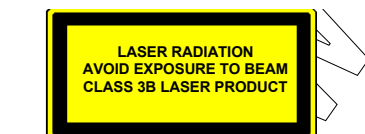


ABSOLUTE MAXIMUM RATINGS

Parameter	Rating
Storage Temperature	-40 to +85°C
Operating Temperature	0 to +70°C
Lead Solder Temperature	260°C, 10 sec.
Continuous Optical Output Power (Any Current)	5 mW
Laser Diode Reverse Voltage ($I_R=10 \mu\text{A}$)	5 V
Laser Continuous Forward Current, Heat-Sinked	15 mA
PIN Photodiode Forward Current	10 mA

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.



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ELECTRO-OPTICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ unless otherwise stated)

VCSEL Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Average Fiber Coupled Power	$I_F=12\text{ mA}$	P_{OC}		350		μW	2
				-4.5		dBm	2
Coupling Efficiency	$I_F=12\text{ mA}$	PO_PCT	65			%	2
Threshold Current		I_{TH}		3.5	6	mA	3
Threshold Current Temperature Variation	$T_A = 0^\circ\text{C}$ to 70°C	ΔI_{TH}	-1.5		1.5	mA	3
Slope Efficiency	$P_{OC}=0.35\text{ mW}$	η	0.02	0.04	0.1	mW/mA	4
Slope Efficiency Temperature Variation	$T_A = 0^\circ\text{C}$ to 70°C	$\Delta\eta/\Delta T$		-0.5		$\%/^\circ\text{C}$	
Peak Wavelength	$I_F=12\text{ mA}$	λ_p	830	850	860	nm	
λ_p Temp Coefficient	$I_F=12\text{ mA}$	$\Delta\lambda_p/\Delta T$		0.06		$\text{nm}/^\circ\text{C}$	
Spectral Bandwidth	$I_F=12\text{ mA}$, FWHM	$\Delta\lambda$			1.0	nm	
Laser Forward Voltage	$I_F=12\text{ mA}$	V_F	1.6	1.8	2.2	V	
Laser Reverse Voltage	$I_R=10\ \mu\text{A}$	BVR_{LD}	5	10		V	
Rise and Fall Time	Bias Above Threshold (20%-80%)	t_R t_F		150 200	300 300	ps	5
Relative Intensity Noise	1 GHz BW	RIN		-128	-122	dB/Hz	
Series Resistance	$I_F=12\text{ mA}$	R_S	15	25	50	Ohms	

Photodiode Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Monitor Current	$P_{OC}=0.35\text{ mW}$	I_{PD}	0.09		0.58	mA	
Monitor Current Temperature Variation	$P_{OC}=0.35\text{ mW}$	$\Delta I_{PD}/\Delta T$		0.0		$\%/^\circ\text{C}$	
Dark Current	$P_0=0\text{ mW}$, $V_R=3\text{ V}$	I_D			20	nA	
PD Reverse Voltage	$P_0=0\text{ mW}$, $I_R=10\ \mu\text{A}$	BVR_{PD}	30	115		V	
PD Capacitance	$V_R=0\text{ V}$, Freq=1 MHz	C		75	100	pF	
	$V_R=3\text{ V}$, Freq=1 MHz			40	55		

Notes:

- 1) Reliability is a function of temperature, see www.adopco.com for details.
- 2) For the purpose of these tests, I_F is DC current.
- 3) Threshold current varies as $(T_A - T_0)^2$. It may either increase or decrease with temperature, depending upon relationship of T_A to T_0 . The magnitude of the change is proportional to the threshold at T_0 .
- 4) Slope efficiency is defined as $\Delta P_{OC}/\Delta I_F$.
- 5) Rise and fall times specifications are the 20% - 80%. Most of the devices will measure <135ps fall time. Rise and fall times are sensitive to drive electronics.

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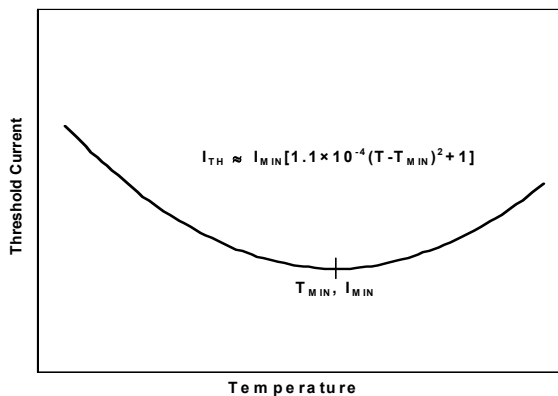
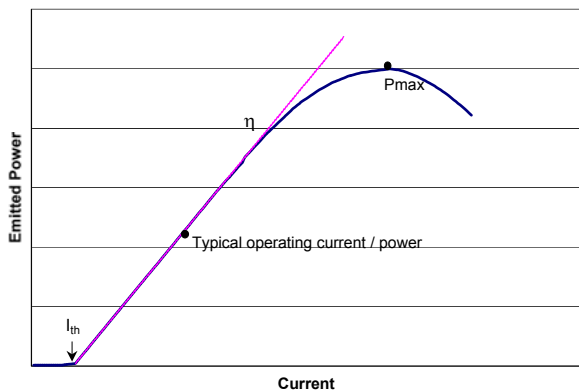
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TYPICAL PERFORMANCE CURVES:

Emitted Power vs. Current: Power varies approximately linearly with current above threshold.

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



www.vc-dk.com

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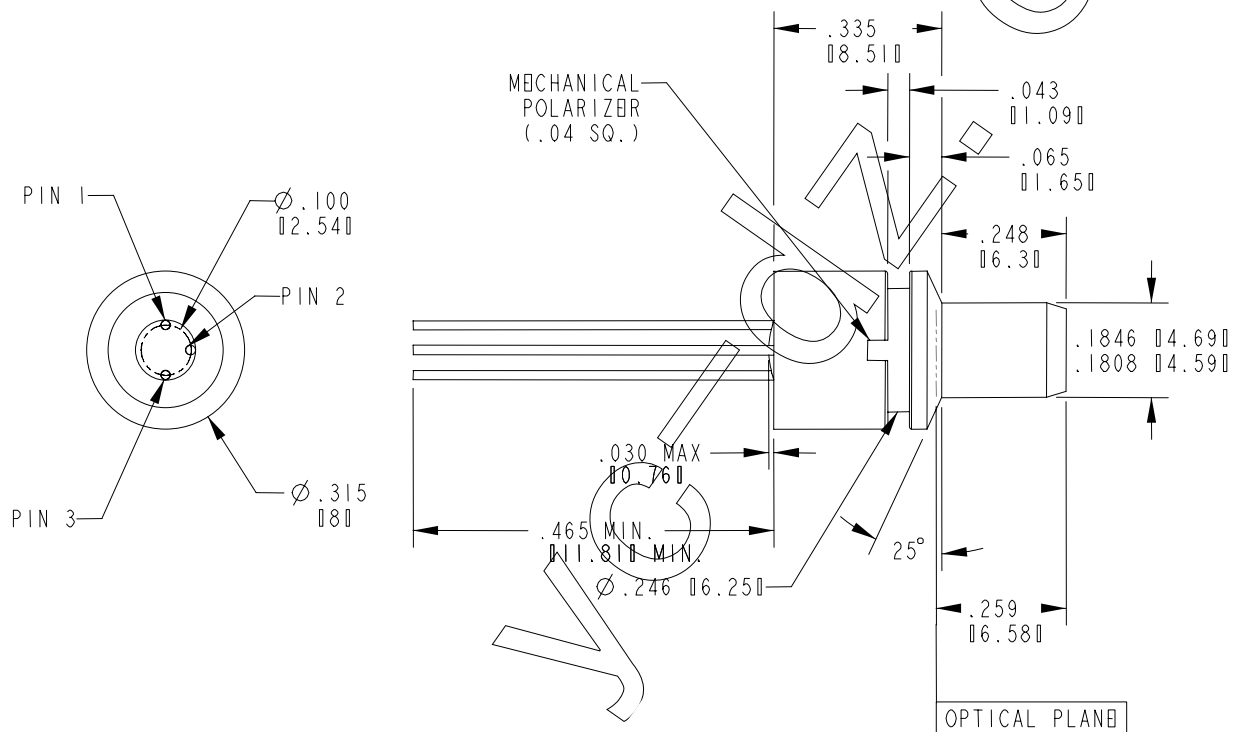
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ORDER GUIDE:

Catalog Listing	Description
HFE4380-521	SC TOSA with attenuated TO-46 component, VCSEL with Back Monitor Photodiode, Anode of VCSEL common with Photodiode Cathode
HFE4381-521	SC TOSA with attenuated TO-46 component, VCSEL with Back Monitor Photodiode, Cathode of VCSEL common with Photodiode Anode

MOUNTING DIMENSIONS (for reference only):

All dimensions are in inches.



PINOUT

HFE4380-521		HFE4381-521	
Number	Function	Number	Function
1	K _{LD}	1	A _{LD}
2	K _{PD} , A _{LD}	2	K _{LD} , A _{PD}
3	A _{PD}	3	K _{PD}

LEAD DESCRIPTIONS

A _{LD}	VCSEL Anode	A _{PD}	Monitor Photodiode Anode
K _{LD}	VCSEL Cathode	K _{PD}	Monitor Photodiode Cathode

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Warranty/Remedy

ADVANCED OPTICAL COMPONENTS warrants goods of its manufacture as being free of defective materials and faulty workmanship. Commencing with the date of shipment, ADVANCED OPTICAL COMPONENTS's warranty runs for 18 months. If warranted goods are returned to ADVANCED OPTICAL COMPONENTS during that period of coverage, ADVANCED OPTICAL COMPONENTS will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally and through our literature, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

ADVANCED OPTICAL COMPONENTS CAPABILITIES

ADVANCED OPTICAL COMPONENTS has led the industry in high volume VCSEL technology since 1996. VCSELs (Vertical Cavity Surface Emitting Lasers) are semiconductor lasers which are impacting advances in optical communication, and sensor applications. VCSELs' superior reliability, low drive current, high coupled power, narrow and circularly symmetric beam and versatile packaging options are enabling solutions not possible with other optical technologies. ADVANCED OPTICAL COMPONENTS's advanced capabilities include

- 10Gbps serial VCSEL solutions
- Proton-implanted and oxide VCSELs
- 850nm is currently available. 780nm, 670nm and additional wavelengths are in development
- Packaging: surface mount, TO, SC, LC, MU, arrays, plastic packaging
- Assemblies: chip on board, chip on chip, plastic components and optical subassemblies
- All configurations (polarities and attenuation) are available
- VCSEL and Detector arrays
- Long wavelength detectors
- Custom packaging options

LOCATIONS

Richardson, TX

- Business unit headquarters, wafer growth, wafer fabrication and TO package assembly

SALES AND SERVICE

On March 1st, 2004, Finisar Corp. purchased Honeywell VCSEL Optical Products Division and created a wholly separate division. ADVANCED OPTICAL COMPONENTS, a division of Finisar Corp. 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:

TELEPHONE

1-866-MY-VCSEL USA (toll free)

1-972-792-1800 USA (Direct dial)

44 (0) 174 336 5533 Europe

82-11-220-6153 Asia

886-935-409898 China

FAX

1-972-238-8670 USA