DATA SHEET

PHOTOREFLECTIVE SENSOR DOME LENS PACKAGE

HVS6003-001

FEATURES:

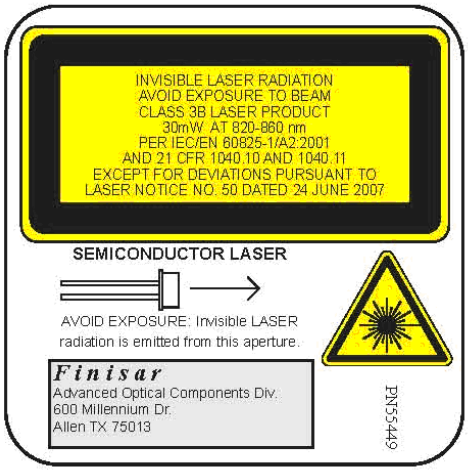
- Highly reliable Vertical Cavity Surface Emitting Laser
- Low power consumption
- Integrated phototransistor
- Excellent sensitivity for low reflectance objects

The HVS6003-001 uses a high-performance Vertical Cavity Surface Emitting Laser (VCSEL) in combination with a phototransistor to enable reflective sensing applications. The VCSEL is a high optical radiance device that requires minimal electrical power consumption. Beam focusing optics are included in the TO style can.



Part Number	Description
HVS6003-001	Reflective Sensor

Finisar
Advanced Optical Components Division



ABSOLUTE MAXIMUM RATINGS

Parameter	Rating
Storage Temperature	-40 to +85°C
Case Operating Temperature	0 to +85°C
Lead Solder Temperature	260°C, 10 sec.
Reverse Power Supply Voltage	5V
Peak continuous forward current	15mA
Laser peak forward current with pulse width less than 1μs	18mA
ESD Exposure (Human Body Model)	200V[1]
Collector-Emitter Voltage	30V
Emitter-Collector Voltage	5V
Power Dissipation	100mW

[1] Heel and wrist straps must be used on a properly grounded workstation

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

VCSEL ELECTRO-OPTICAL CHARACTERISTICS

T_A=25°C unless otherwise stated

VCSEL Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Peak Operating Current	Adjustable to establish operating power	I_{peak}		7	15	mA	1
Optical Power Output	I_F=7mA	Po		2		mW	1
Threshold Current		I_{TH}		1.8	2.5	mA	
Threshold Current Temperature Variation	T_A = 0°C to 70°C	ΔI_{TH}	-1.5		1.5	mA	2
Slope Efficiency	Po =2mW	η	0.225	0.4	0.6	mW/mA	3
Slope Efficiency Temperature variation	T_A = 0°C to 70°C	$\Delta\eta / \Delta T$		-0.4		%/ °C	
Peak Wavelength	I_F=7mA	λ_P	830	850	860	nm	
Laser Forward Voltage	I_F=7 mA	V_F	1.6	1.8	2.2	V	
Rise and Fall Times	Prebias Above Threshold, 20%-80%	t_r/t_f			500	ps	4
Series Resistance	I_F=7 mA	R_S	25	35	50	Ohms	
Focus position	I_F=7 mA	FL	8	10	12	mm	

NOTES:

1. Operating power is set by the peak operating current $I_{PEAK}=I_F+I_{MODULATION}$
2. Operation at temperatures outside the specified range may result in the threshold current exceeding the maximums defined in the electro-optical characteristic table.
3. Slope efficiency is defined as $\Delta Po/\Delta IF$ at a total power output of 2 mW.
4. Rise and fall times are sensitive to drive electronics.

RECOMMENDED APPLICATION NOTES AVAILABLE AT www.finisar.com

1. VCSEL SPICE Model
2. Pulsed Operation for High Peak Power Use
3. DC Electrical Interface Examples for VCSELs
4. Modulating VCSELs
5. Laser Safety Requirements
6. "VCSEL Based Reflective Sensors Tackle More Demanding Applications," in Laser Focus World," pp.79ff, September 2003.

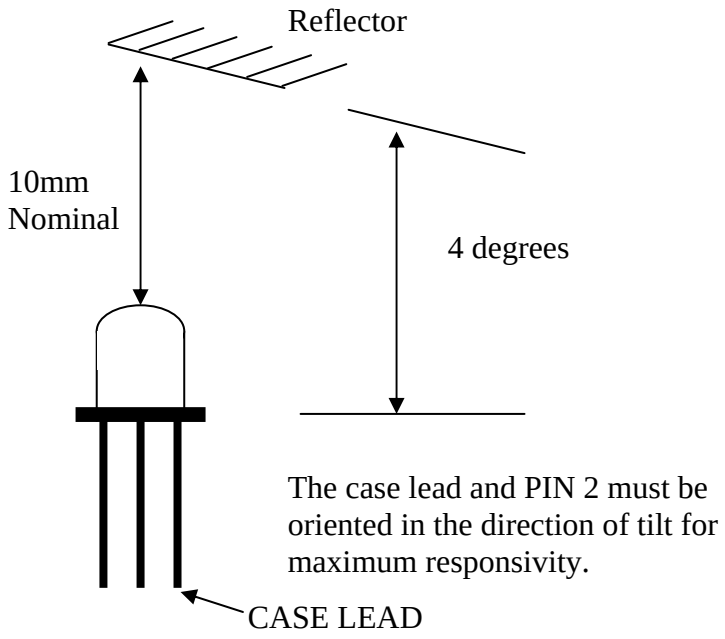
PHOTOTRANSISTOR ELECTRO-OPTICAL CHARACTERISTICS

T_A=25°C unless otherwise stated

Phototransistor Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Internal Reflectance Current	V_{CE} = 5V, I_{VCSEL} = 8mA, No reflector	IRI		1.0	3	mA	1
Contrast Ratio	V_{CE} = 5V, I_{VCSEL} = 8mA		5	18			1
Collector Dark Current	V_{CE} = 0V, I_{VCSEL}=0	I_{CEO}			100	nA	
Collector – Emitter Breakdown Voltage	I_C=100µA	V_{BR-CEO}	30			V	
Emitter – Collector Breakdown Voltage	I_E=100µA	V_{BR-ECO}	5			V	
Collector – Emitter Saturation Voltage	I_C=I_L/8,	V_{SAT-CE}			0.4	V	
Photocurrent Rise/Fall Time	V_{CC}=5V, I_L=1mA, R_L=1000Ω	T_R/T_F		10		µs	2

NOTES:

1. Configuration for measuring IRI and contrast ratio. Contrast ratio is defined as the ratio of photocurrent with the reflector in place to the internal reflectance with the reflector removed. The reflector should be of more than 90% reflectance (Alzac, polished Aluminum, etc.). Tested as shown in the figure below
2. The rise and fall times depend on the load resistor used.

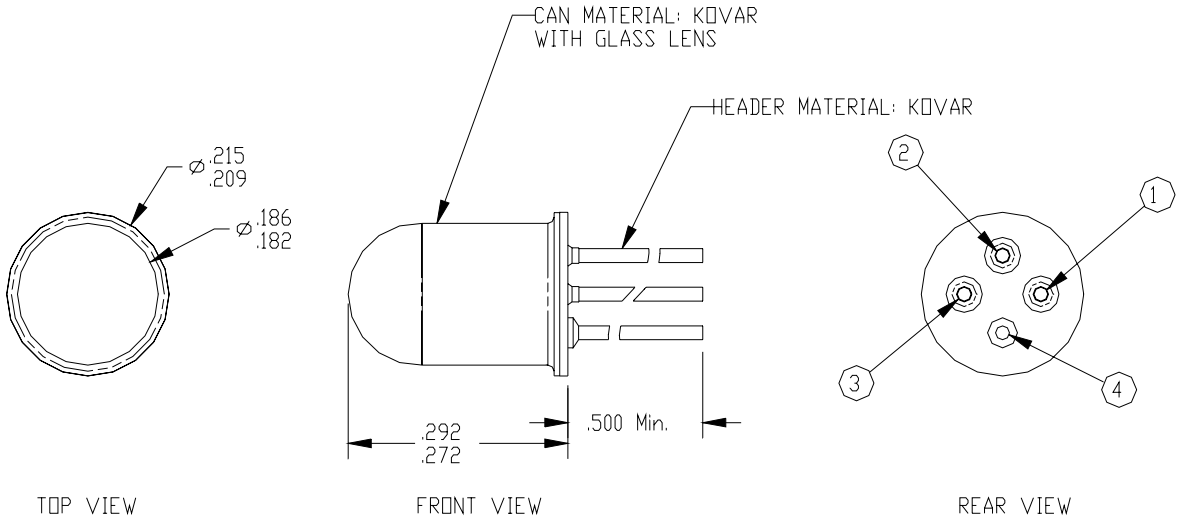


PINOUT:

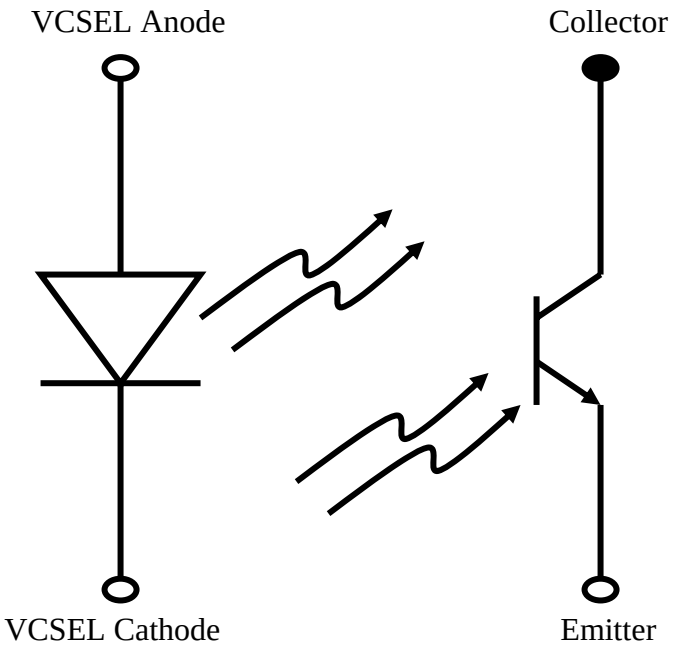
PIN	Description
1	PT Emitter
2	VCSEL Anode
3	VCSEL Cathode
4	PT Collector (case)

MOUNTING DIMENSIONS

Dimensions in mm/inches



ELECTRICAL SCHEMATIC



It is recommended in application that a 100-1000Ω load resistor be connected between the emitter and a negative power supply between 5 and 15V. The output can be read as the voltage across the resistor. Alternatively, the case can be connected to a power supply with the load resistor remaining connected to the emitter.

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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