

10Gbps 850nm VCSEL

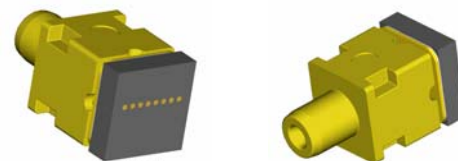
LC TOSA Package

Preliminary

HFE619x-3x1

Key Features:

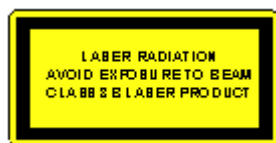
- LC TOSA HFE619x-321
- SC TOSA HFE639x-321
- High performance VCSEL
- Low electrical parasitic ceramic package
- Data rates from DC to 12.5Gbps
- Differential, Cathode or Anode driven versions available
- Complete isolation between the VCSEL and back monitor.



The HFE619x-321 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 50µm or 62.5µm multimode fiber and ensure launch conditioning requirements compatibility with enhanced bandwidth fiber as specified by TIA 455-203.

The HFE619x-321 incorporates a power monitoring photodiode that can be used for temperature compensation, average power control, and for compliance with Class 1 eye safety limits.

The HFE619x is designed to be paired with the HFD6x80 detector plus preamplifier in transceiver/transponder applications.



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	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

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

VCSEL Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Fiber coupled optical power	I _F =8mA Peak 50/125μm fiber	P _{OC}	400	600		μW	
Coupling Efficiency	I _F =10mA	PO_PCT	65			%	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	Δη/ΔT		-0.4		%/°C	
Peak Wavelength	I _F =8mA	λ _p	840		860	nm	
λ _p Temperature Variation	T _A =0 to 70°C	Δλ _p /ΔT		0.06		nm/°C	
RMS Spectral Bandwidth	I _F =8mA	Δλ			0.35	nm	
Laser Forward Voltage	I _F =8mA	V _F	1.6	1.8	2.2	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 =8mA	RIN ₁₂			-130	dB/Hz	5
Series Resistance	I _F =8mA	R	45	60	75	Ohms	
Series Resistance Temperature Variation	I _F =8mA	ΔR/ΔT		-0.2		%/°C	
Total Capacitance	I _F =8mA	C _T			0.5	pF	6
Encircled Flux Diameter	I _F =8mA	EF					7

Photodiode Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Monitor Current	P _{OC} =0.6mW	I _{PD}	20	50	200	μA	
Monitor Current Temperature Variation	P _{OC} =0.6mW T _A =0 to 70°C	ΔI _{PD} /ΔT		0.0		%/°C	
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	

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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. ΔI_{TH} is the maximum deviation from the 25°C value.
3. Slope efficiency is defined as $\Delta P_O / \Delta I_F$ 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. RIN_{12} is measured using the OMA technique with 12dB return.
6. Total capacitance is measured with the VCSEL forward biased at 8mA using a Network analyzer at 1GHz.
7. Encircled flux is measured per TIA-455-203 at 8mA average current.
8. To prevent VCSEL damage, short the VCSEL anode and cathode during BVR testing of the photodiode.

ORDER GUIDE:

Catalog Listing	Description
HFE6190-321	Cathode Driven, attenuated, LC TOSA
HFE6191-321	Anode Driven, attenuated, LC TOSA
HFE6192-321	Differentially Driven, attenuated, LC TOSA
HFE6190-351	Cathode Driven, attenuated, LC TOSA, with flex
HFE6191-351	Anode Driven, attenuated, LC TOSA, with flex
HFE6192-351	Differentially Driven, attenuated, LC TOSA, with flex

PINOUT

HFE6190-3x1		HFE6191-3x1		HFE6192-3x1	
Number	Function	Number	Function	Number	Function
1	GND	1	GND	1	GND
2	PDA	2	PDA	2	PDK
3	GND	3	GND	3	GND
4	LDA	4	LDA	4	LDA
5	LDK	5	LDK	5	LDK
6	GND	6	GND	6	GND
7	PDK	7	PDK	7	PDA
8	GND	8	GND	8	GND

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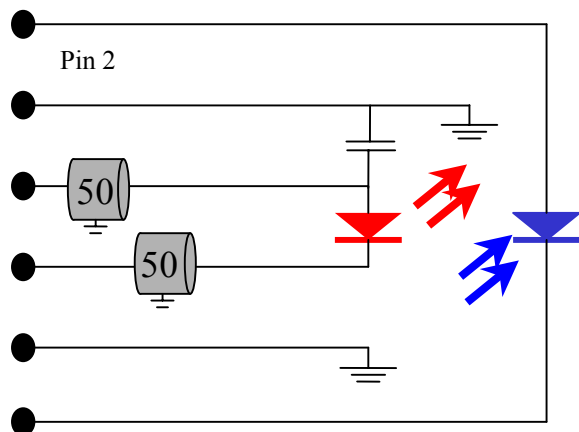
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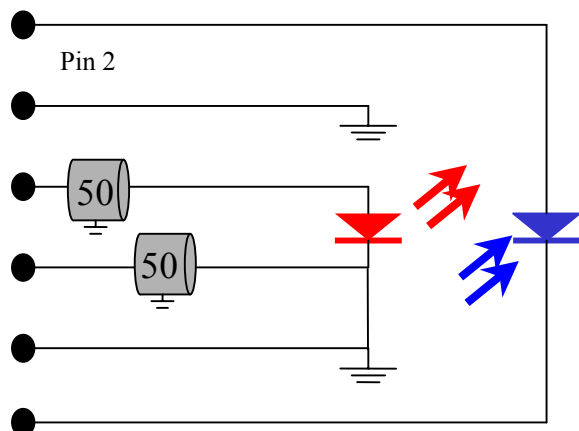
HFE619x-3x1

Schematics / Interface Configurations

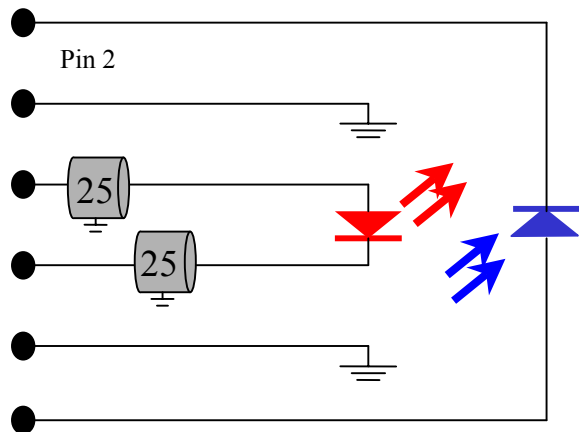
Cathode Driven: HFE6190-3x1



Anode Driven: HFE6191-3x1



Differentially Driven: HFE6192-3x1



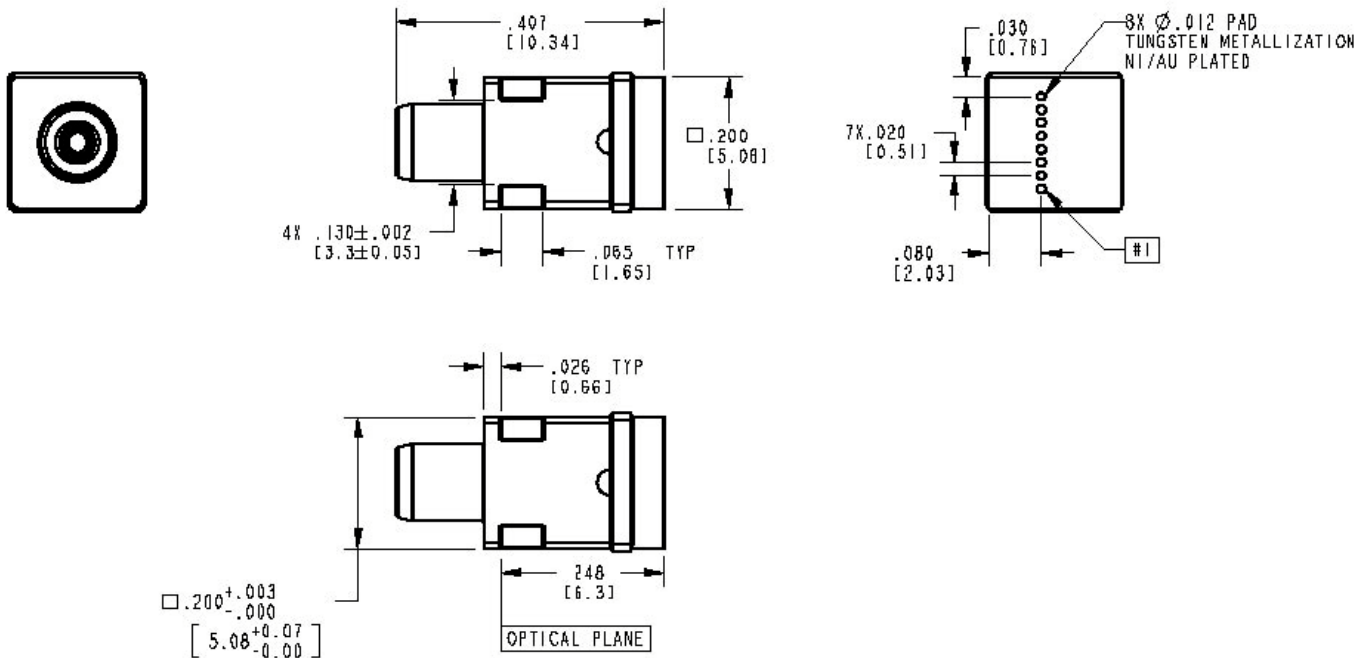
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Dimensions

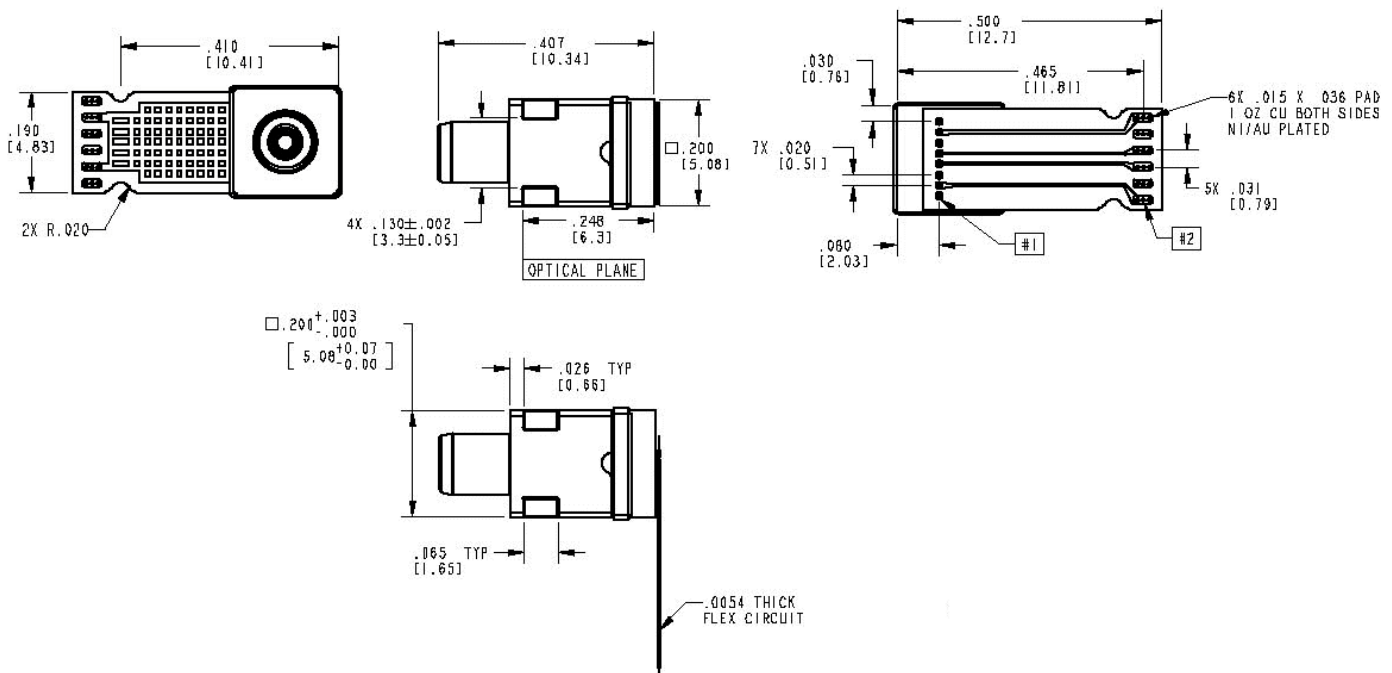
LC TOSA without Flex

Dimensions in Inches



LC TOSA with Flex

Dimensions in Inches



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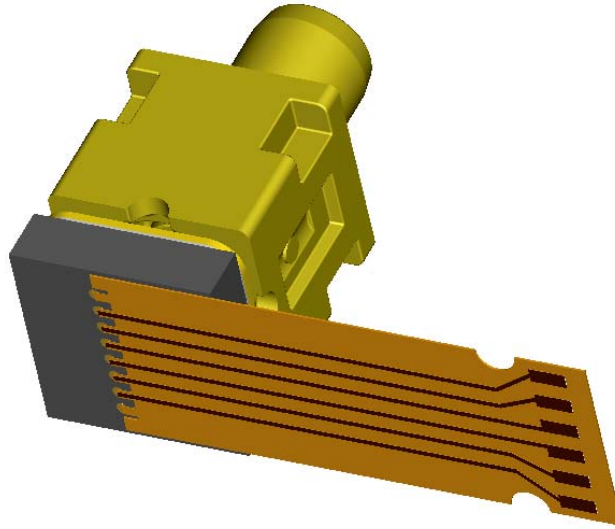
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LC TOSA Package

HFE619x-3x1

Flex electrical interface

Minimum bend radius = 0.010 inches



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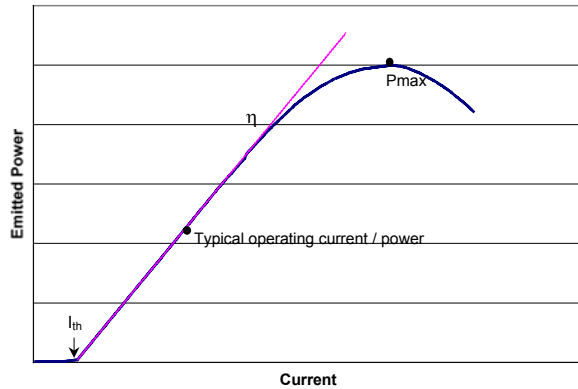
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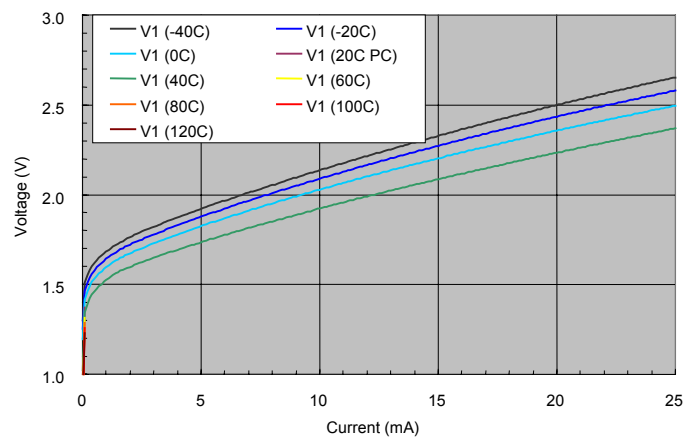
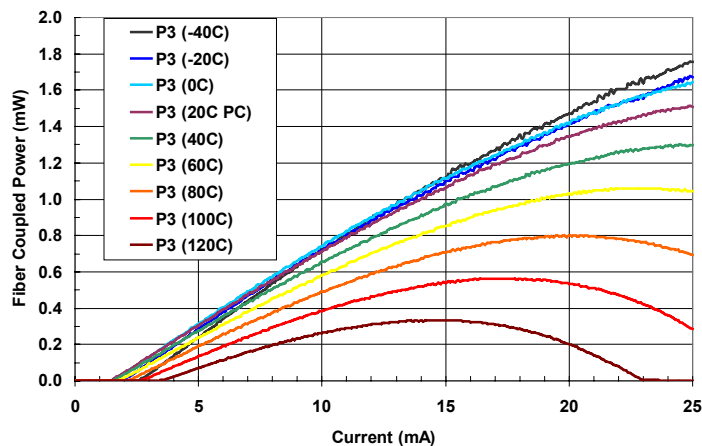
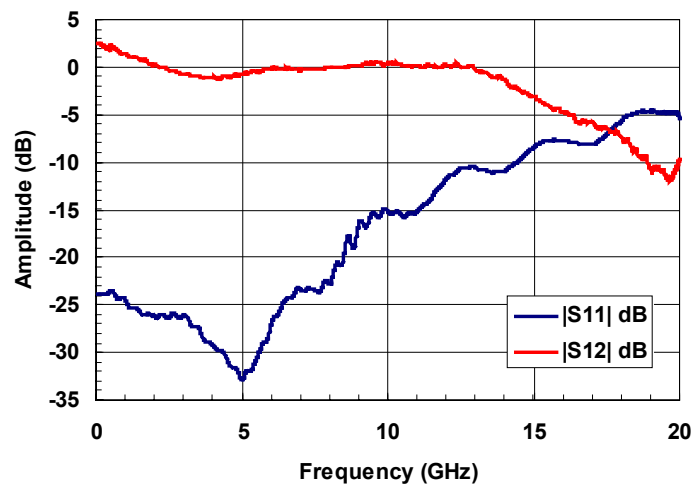
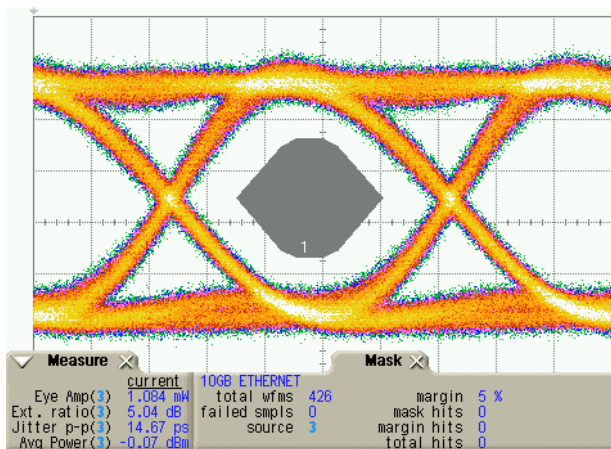
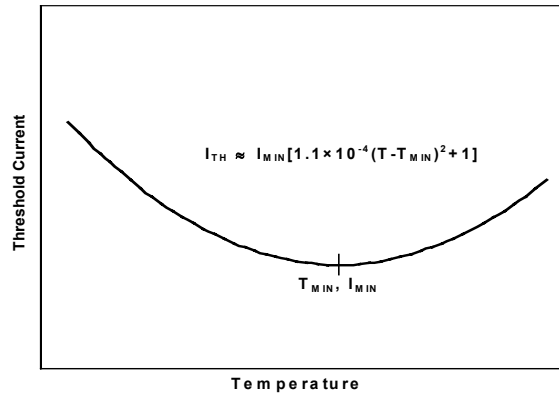
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TYPICAL PERFORMANCE CURVES:

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.



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WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Commencing with the date of shipment, Honeywell's warranty runs for 18 months. If warranted goods are returned to Honeywell during that period of coverage, Honeywell 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.

HONEYWELL CAPABILITIES

Honeywell VCSEL Optical Products 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 (including arrays) are enabling solutions not possible with other optical technologies. Honeywell'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

Juarez, Mexico

- SC, LC, MU, SMD, PSMD, PE

Minneapolis, MN

- Materials research

SALES AND SERVICE

Honeywell VCSEL Optical Products 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)
1-972-470-4660 USA (Direct dial)
44 (0) 118 982 0266 Europe
03 5440-1425 Asia

FAX

1-972-470-4654 USA
44 (0) 979 445 2047 Europe
03 5440-1368 Asia