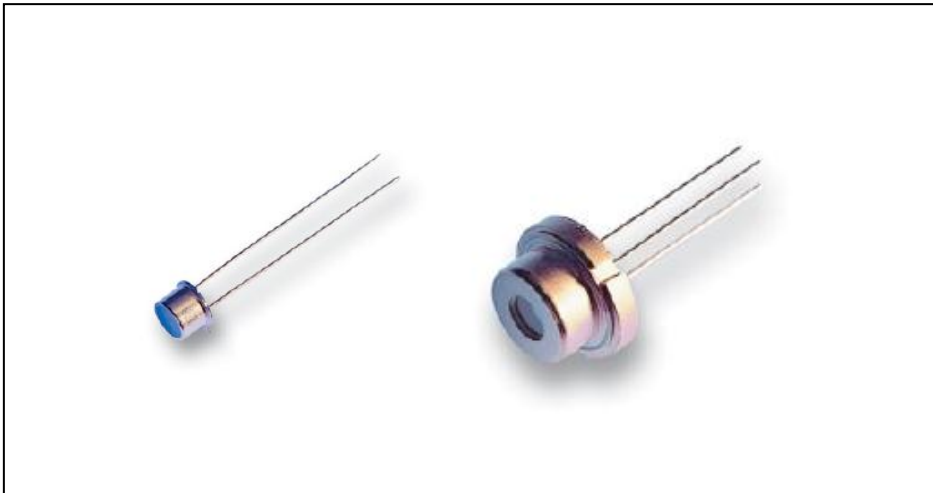


PVG Series of Single-epitaxial-layer 1550 nm Pulsed Semiconductor Lasers **High Power Laser-Diode Family for Eye-Safe Range Finding**



Available in several package types, the PVG series laser chips feature stripe widths of 150 or 300 μm and can be stacked to further increase output power. Other stripe widths and packages options are available upon request.

Key Features

- Peak power to 90 Watts
- Good temperature stability
- Range of single element and stacked devices
- Possibility of high peak power Class I operation
- Package options available
- High reliability

Applications

- Eye-safe Laser Range Finder (LRF)
- Optical beacons
- Covert illumination
- Sensing
- Industrial metrology
- Laser safety curtains
- “Friend or Foe” identification

Excelitas Technologies’ PVG series of high power pulsed laser diodes are multi-quantum well devices with active layers fabricated using advanced MOCVD epitaxial growth techniques. The devices are offered housed in two convenient hermetic package configurations. The “S” style package is a TO-18 style low inductance package ($\sim 5.2\text{nH}$) and the “R” style is a CD 9 mm outline providing increased thermal dissipation with the option of accommodating a rear facet monitor photodiode.

This series of devices are wavelength-centered at 1550nm primarily to take advantage of a significant increase over AlGaAs and InGaAs lasers in the maximum permitted emission level with respect to Laser Institute of America or International Electrotechnical Commission (IEC) requirements. It should be possible therefore to incorporate these diodes into a system and operate them at relatively high average powers within Class I conditions. It is however the responsibility of the user to certify their equipment as Class I and ensure that it meets the requirements of its appropriate local regulatory agency.

The output wavelength of this series is well matched to the near peak spectral response of Excelitas InGaAs photodiodes types C30617H, C30618H, C30619H, C30645H and C30662H, amongst others.

PVG Series of 1550 nm Pulsed Semiconductor Lasers

High Power Laser-Diode Family for Industrial Range Finding

Table 1 – Characteristics at $T_{OP} = 23^{\circ}C$, $t_w = 150ns$, $prr = 1kHz$

Parameter		PVGS1S06H	PVGS2S06H	PVGR1S12H	PVGR4S12H	Units
Minimum Optical Power at i_F	P_{Omin}	5	10	12	45	W
Typical Optical Power at i_F	P_{Otyp}	6	12	12.5	50	W
Peak forward Current	i_F	20	20	40	40	A
Typical Optical Power at i_{FM} (note 1)	$P_{Otyp.M}$	12	23	23	90	W
Maximum Peak forward Current (note 1)	i_{FM}	40	40	80	80	A
Lasing threshold current, typical	i_{TH}	0.8	0.8	1.5	1.5	A
Peak Forward Voltage, typical	V_F	4	6.5	7	35	V
Number of Elements	-	1	2	1	4	
Emitting area (width x height)		150 x 1.5	150 x 125	300 x 1.5	300 x 350	μm

Note: 1. Operating drive condition under reduced duty factor.

Table 2 – Generic Electro-Optical Specifications at $23^{\circ}C$

Parameter	Symbol	Min	Typical	Max	Units
Center wavelength of spectral envelope	λ_c	1520	1550	1580	nm
Spectral bandwidth at 50% intensity points	$\Delta\lambda$		13		nm
Wavelength temperature coefficient	$\Delta\lambda/\Delta T$		0.5		nm/ $^{\circ}C$
Beam spread (FWHM) parallel to junction plane	$\Theta_{ }$		19		degrees
Beam spread (FWHM) perpendicular to junction plane	Θ_{\perp}		38		degrees

Table 3 – Maximum Ratings

Parameter	Symbol	Min	Max	Units
Peak reverse voltage	V_{RM}		2	V
Pulse width	t_w		150	ns
Duty factor	du		0.1	%
Storage temperature	T_S	-55	105	$^{\circ}C$
Operating temperature	T_{op}	-55	85	$^{\circ}C$
Soldering for 5 seconds (leads only)			260	$^{\circ}C$

High Power Laser-Diode Family for Industrial Range Finding

Ordering Guide

	P	G	A	X	X	S	XX	H
Pulsed	P							
1550 nm center wavelength (typical)		V						
±30 nm center wavelength tolerance			G					
S package				S				
R package				R				
Single chip stack					1			
Dual chip stack					2			
Quadruple chip stack					4			
Stackable chip						S		
0.006" wide laser stripe (150 μm)							06	
0.012" wide laser stripe (300 μm)							12	
RoHS compliance								H

Electro-Optical Characteristics

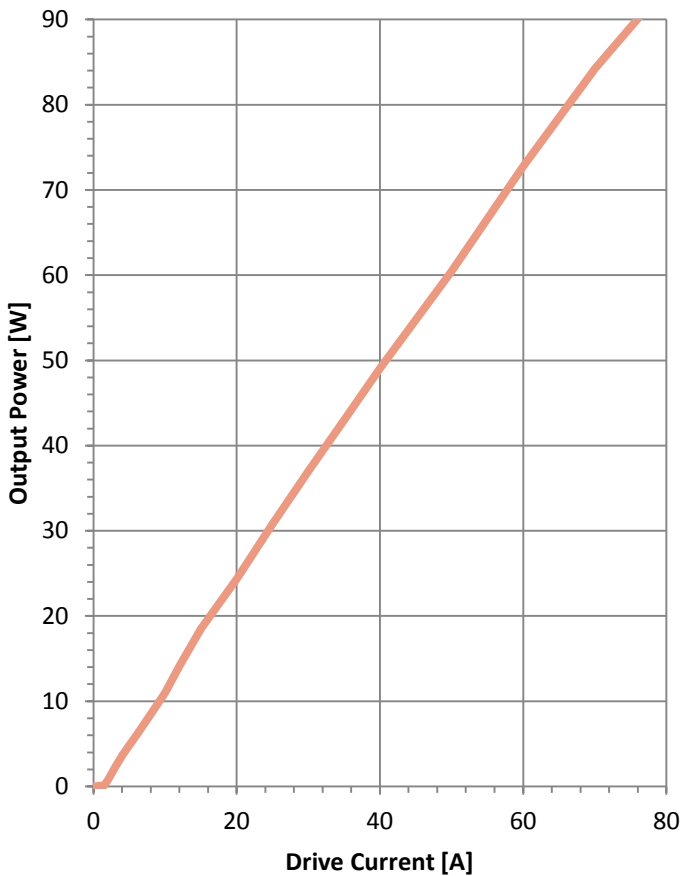


Figure 1 – Optical power vs. drive current for quad-element 300 μm stripe width at room temperature, reduced duty factor

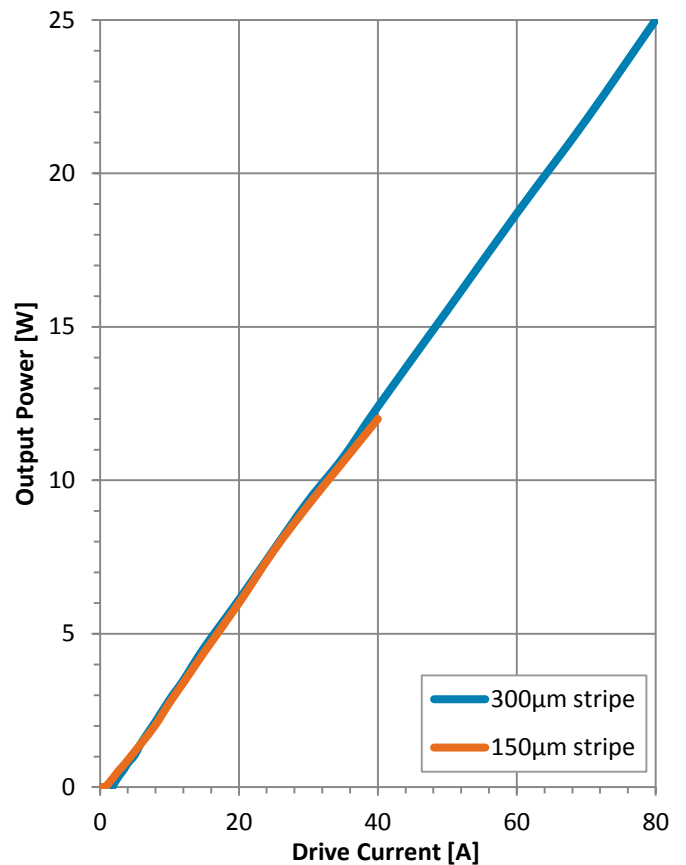


Figure 2 – Optical power vs. drive current for single-stack 150 and 300 μm stripe

High Power Laser-Diode Family for Industrial Range Finding

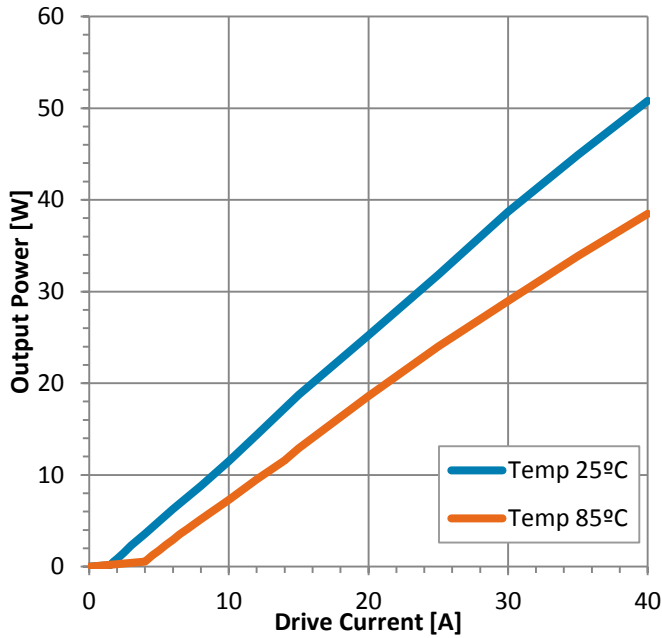


Figure 3 – Optical power vs. drive current for quad-stack 300 μm stripe width as a function of temperature

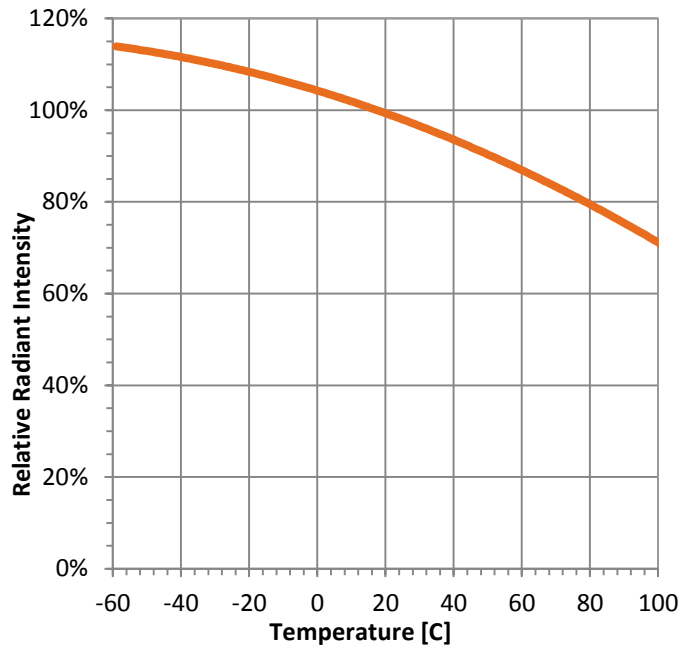


Figure 4 – Typical Peak Radiant Intensity as a Function of Temperature

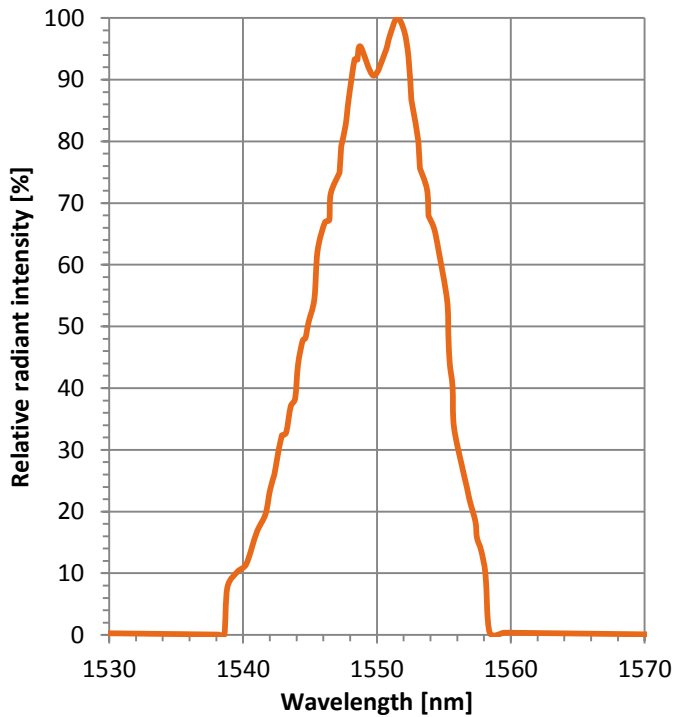


Figure 5 – Typical peak wavelength spectrum

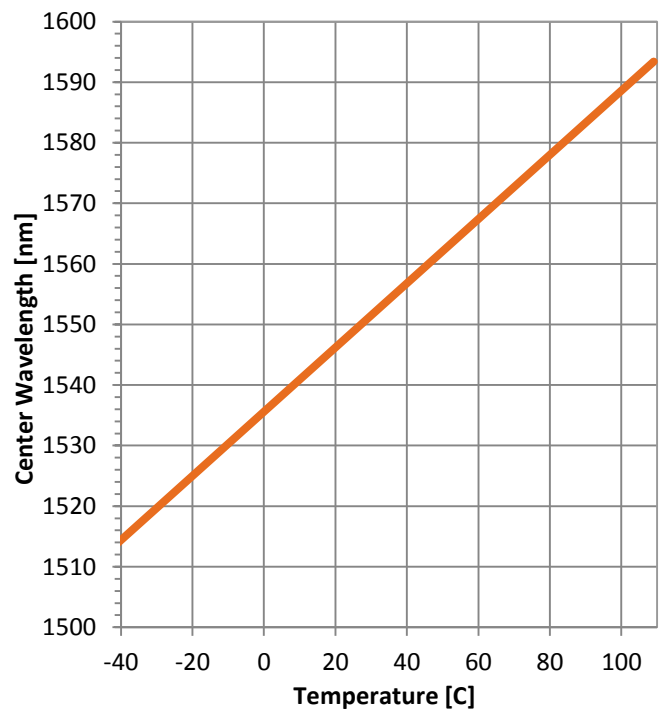


Figure 6 – Typical Center Wavelength as a Function of Temperature

High Power Laser-Diode Family for Industrial Range Finding

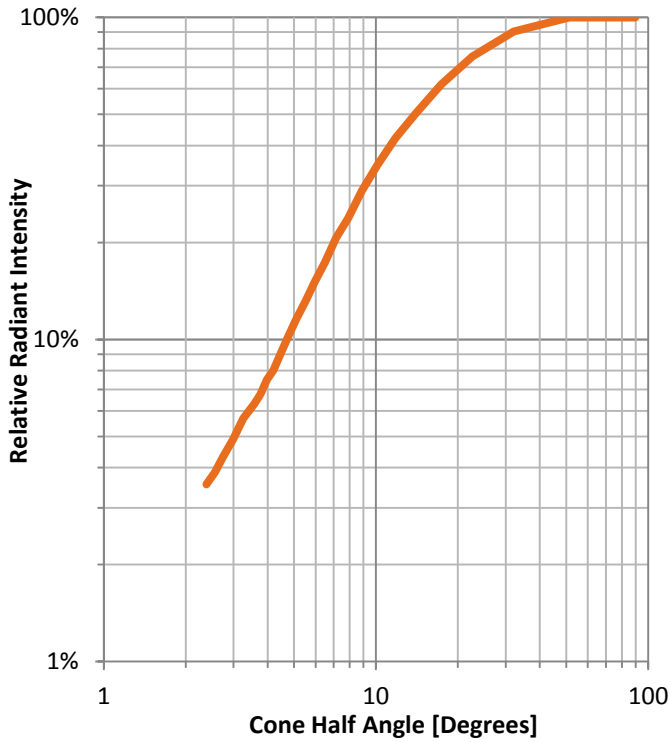


Figure 7 – Radiant Intensity as a function of Half Angle

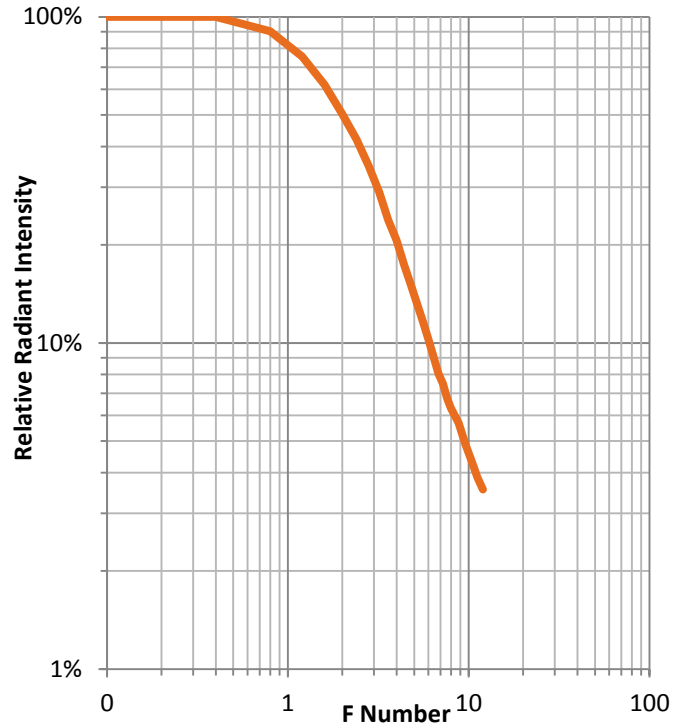


Figure 8 – Radiant Intensity as a function of F Number

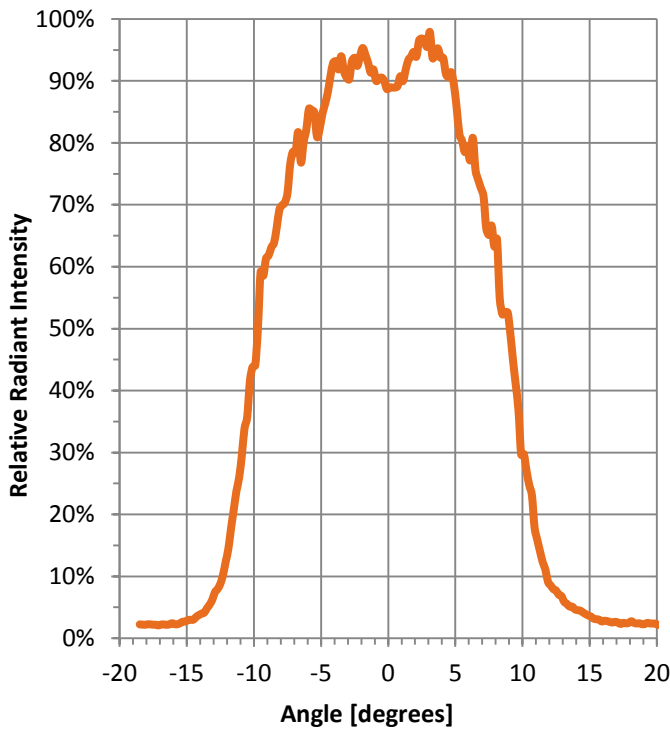


Figure 9 – Far Field Pattern Parallel to Junction Plane

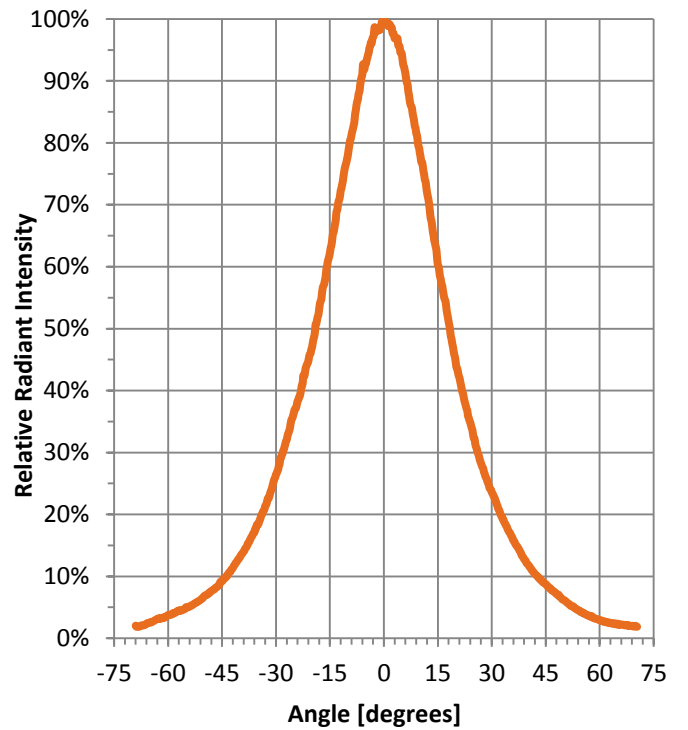
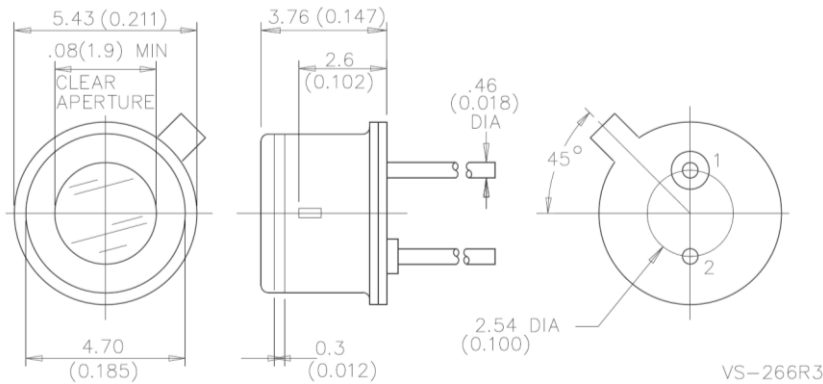


Figure 10 – Far Field Pattern Perpendicular to Junction Plane

PVG Series of 1550 nm Pulsed Semiconductor Lasers

High Power Laser-Diode Family for Industrial Range Finding

Package Drawings (Other packages available upon request)

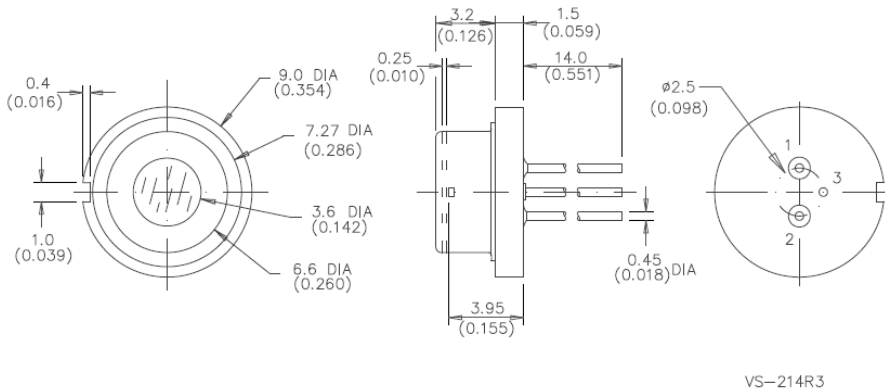


Package S:

Pin out

1. LD Cathode (-)
2. LD Anode (+), Case

Inductance 5.2 nH



Package R:

Pin out

1. LD Cathode (-)
2. NC
3. LD Anode (+)

Inductance 6.8 nH

For Your Safety

Laser Radiation:

Under operation, these devices produce invisible electromagnetic radiation that may be harmful to the human eye. To ensure that these laser components meet the requirements of Class IIIb laser products, they must not be operated outside their maximum ratings. Power supplies used with these components must be such that the maximum peak forward current cannot be exceeded. It is the responsibility of the user incorporating a laser into a system to certify the Class of use and ensure that it meets the requirements of the ANSI or appropriate authority.

Further details can be obtained in the following publications:

21CFR 1040.10 – “Performance Standards for Light Emitting Products (Laser Products)”

ANSI Z136.1 – “American National Standard for Safe Use of lasers”

IEC 60825-1 – “Safety of Laser Products”

PVG Series of 1550 nm Pulsed Semiconductor Lasers

High Power Laser-Diode Family for Industrial Range Finding

Operating Conditions

The laser is operated by pulsing current in the forward bias direction.

The Excelitas warranty applies only to devices operated within the maximum rating, as specified. Exceeding these conditions is likely to cause permanent damage to the laser and consequently a significant reduction in optical power.

Operating the devices at increased duty cycles will ultimately and irreparably damage the crystal structure due to internal heating effects. Diodes are static-sensitive and suitable precautions should be taken when removing the units from their antistatic containers. Circuits should be designed to protect the diodes from high current and reverse voltage transients. Voltages exceeding the reverse breakdown of the semiconductor junction are particularly damaging and have been shown to cause degradation of power output. Although the devices will continue to perform well at elevated temperatures for some thousands of hours, defect mechanisms are accelerated.

Optimum long term reliability will be attained with the semiconductor at or below room temperature. Adequate heat sinking should be employed, particularly for the larger stacks and when operated at maximum duty factor.

Ordering Information

The “preferred package” options on the list will normally be offered at lower cost and with shorter delivery times. To keep the costs down the standard devices are tested and burned-in under standard conditions.

While the devices are warranted over the entire specification, for a quantity purchase, customers are advised to discuss their requirements in advance so that any special test needs can be accommodated and yields optimized.

Excelitas has been routinely supplying lasers for military applications since the early 1990s. These diodes benefit from long years of experience from screened laser diodes to European and North American military specifications. Though the commercial products are not continuously screened, they are designed to meet demanding environmental conditions.

Typical qualification of these parts would include:

- High Temperature Storage
- Hermetic Seal
- Thermal Shock
- Random Vibration
- Acceleration
- Mechanical Shock

Excelitas is pleased to assist with advice and test procedures for your specific environmental needs.

PVG Series of 1550 nm Pulsed Semiconductor Lasers

High Power Laser-Diode Family for Industrial Range Finding

RoHS Compliance

This series of laser diodes are designed and built to be fully compliant with the European Union Directive 2011/65/EU – Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic equipment.



Warranty

A standard 12-month warranty following shipment applies. Any warranty is null and void if the package window has been opened.

About Excelitas Technologies

Excelitas Technologies is a global technology leader focused on delivering innovative, customized solutions to meet the lighting, detection and other high-performance technology needs of OEM customers.

Excelitas has a long and rich history of serving our OEM customer base with optoelectronic sensors and modules for more than 45 years beginning with PerkinElmer, EG&G, and RCA. The constant throughout has been our innovation and commitment to delivering the highest quality solutions to our customers worldwide.

From aerospace and defense to analytical instrumentation, clinical diagnostics, medical, industrial, and safety and security applications, Excelitas Technologies is committed to enabling our customers' success in their specialty end-markets. Excelitas Technologies has approximately 5,000 employees in North America, Europe and Asia, serving customers across the world.

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