High volume 5.6mm TO metal package laser diode “LU” series

Introduction

Excelitas Technologies’ multi-epi 905 nm pulsed semiconductor lasers consists of a series of devices having up to four active lasing layers epitaxially grown on a single GaAs substrate chip. This multi-layer design multiplies the output power by the number of epi-layers.

The laser diode is epoxy mounted within a metal 5.6mm CD hermetic package, which is designed for high volume commercial and consumer applications where cost is a key driver in the system design.

This series of lasers comes in emitting cavity widths of 37.5, 75 and 225µm. Peak wavelength is centered near the maximum responsivity of most silicon photodiodes. The LU series lasers match especially well with devices from the Excelitas epi-APD family C30737.

Key Features

- Multiplying the output power from a single epi-cavity chip with a small active area
- High reliability
- High volume hermetic metal 5.6mm TO package
- Multi epi-cavity Quantum well structure
- High peak pulsed power into aperture
- Excellent power stability with temperature
- RoHS Compliant

Applications

- LIDAR
- Laser range finding
- Laser-based speed enforcement
- IR-illumination
- Laser skin therapy

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Table 1: Maximum Ratings

Parameter	Symbol	Min	Max	Units
Peak reverse voltage	V_{RM}		6	V
Pulse duration	t_W		100	ns
Duty factor	du		0.1	%
Storage temperature	T_S	-55	105	°C
Operating temperature	T_{OP}	-55	85	°C
Soldering for 5 seconds (leads only)			+260	°C

Table 2: Generic Electro Optical Specifications at 23°C

Parameter	Symbol	Min	Typ	Max	Units
Center wavelength of spectral envelope	λ_C	895	905	915	nm
Spectral bandwidth at 50% intensity points	$\Delta\lambda$		5		nm
Wavelength temperature coefficient	$\Delta\lambda/\Delta T$		0.25		nm/°C
Beam spread (50% peak intensity) parallel to junction plane	$\Theta_{\|\|}$		10		degrees
Beam spread (50% peak intensity) perpendicular to junction plane	$\Theta_{\perp}$		25		degrees

Table 3: Electro-optical characteristics - Typical electro-optical characteristics, @100ns, 1 kHz

Characteristics	Symbol	LDPGAU1S03	LTPGAU1S1.5	LTPGAU1S03	LTPGAU1S09	LQPGAU1S1.5	LQPGAU1S03	Units
# of Emitting stripes / cavities		2	3	3	3	4	4	
Emitting area		75x5	37.5X10	75x10	225x10	37.5x15	75x15	µm
Optical Power at i_F - Minimum - Typical	P_o	 14 16	 8 9.5	 21 24	 70 75	 9.5 11	 25 30	 W W
Maximum Peak forward Current (100ns 1KHz)	i_F	10	5	10	30	5	10	A
Typical Lasing threshold current	i_{th}	0.75	0.5	0.75	1.75	0.5	0.75	A
Typical Forward voltage[1] at i_F	V_F	6.67	9.25	10.6	12.8	13	14.7	V
Typical Series Resistance	R_S	0.257	0.55	0.41	0.21	0.685	0.52	Ω
Typical Band gap Voltage Drop	V_g	4.1	6.5	6.5	6.5	9.5	9.5	V

Note 1: As estimated by $V_F = R_S i_F + V_g$.

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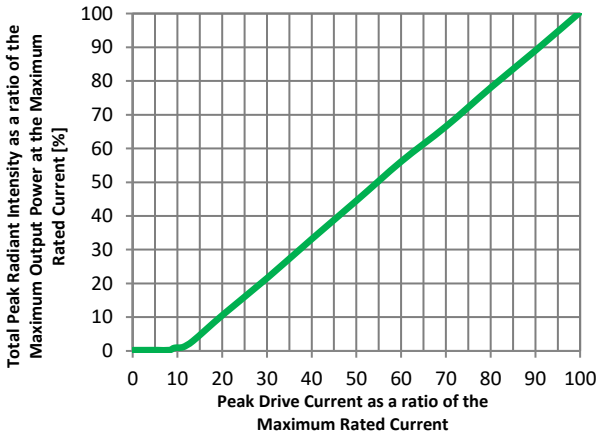
Electro-Optical Characteristics



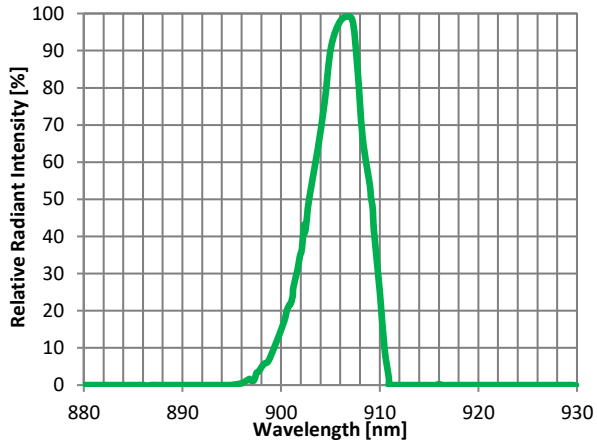
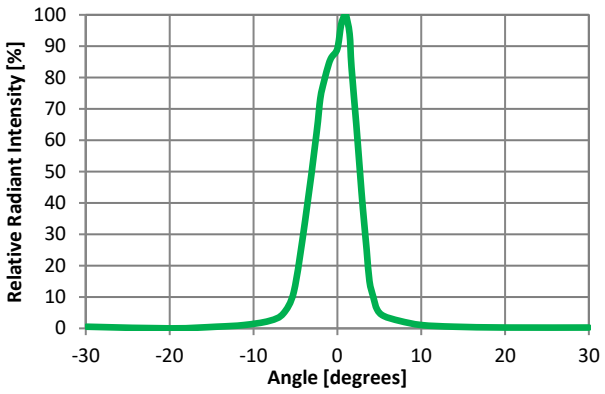


Figure 1

LEFT: Total Peak Radiant Intensity vs. Peak drive Current

RIGHT: Spectral Distribution Plot



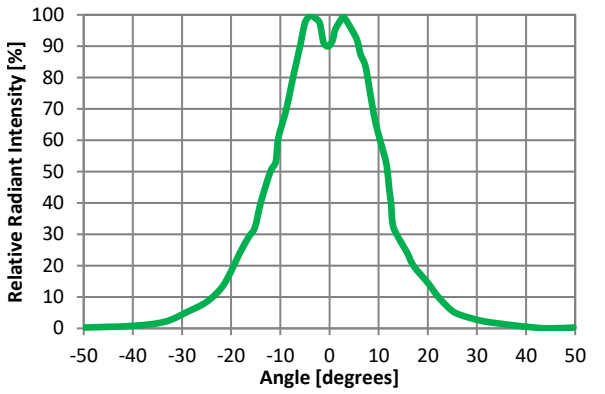
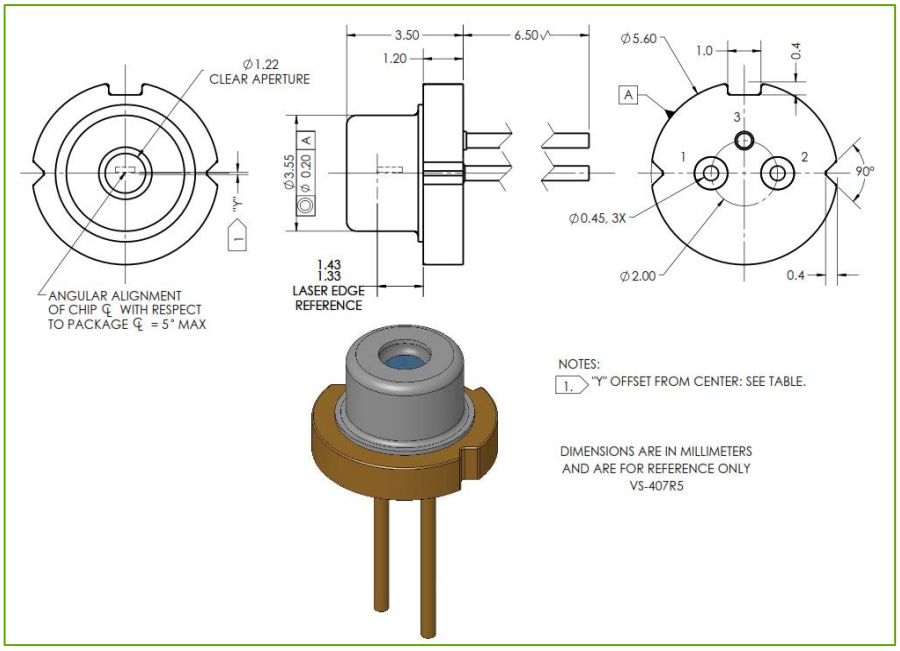


Figure 2

LEFT: Far field Pattern Parallel to Junction Plane

RIGHT: Far field Pattern Perpendicular to Junction Plane

Figure 4: Package Mechanical Dimensions



Package LU:

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

Package inductance: 5nH

CHIP POSITION CENTER OFFSET					
Part#	DIM	Min	Typ	Max	Unit
LDPGAU****	X	-0.050	0.000	0.050	mm
LTPGAU****					
LQPGAU****					
LDPGAU****	Y	-0.130	-0.080	-0.030	mm
LTPGAU****					
LQPGAU****		-0.080	-0.030	0.020	mm

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 “burn off” damage to the laser facet 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 when operated at maximum duty factor.

Warranty

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

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”

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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.

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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