SENSOR SOLUTION

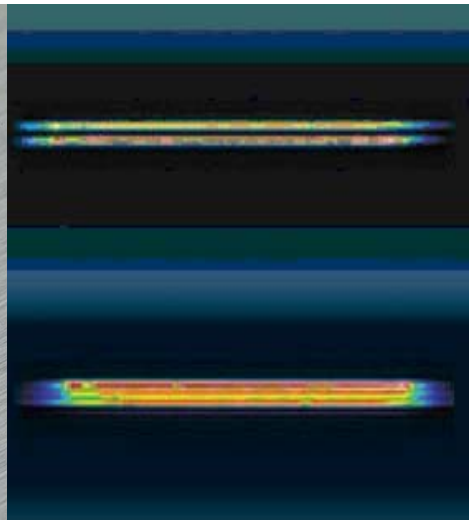
DATASHEET

Multi EPI-Cavity Plastic Lasers

DPGEW & TPGEW Series

905nm Pulsed Laser Diodes

- preliminary -



Overview

The double (DPGEW) and triple (TPGEW) EPI-cavity structure laser families employ PerkinElmer's novel multi active area laser chips to deliver high output power in a small emitting area.

The active areas are monolithically grown on the GaAs substrate and are separated by grown separation regions (tunnel junctions). The structures are fabricated using metal organic chemical vapour deposition (MOCVD). With this approach, a doubling or tripling of the available optical output power from a single chip is achieved. This power enhancement comes with only a slight increase in the near-field transverse active area dimension.

This series of lasers are offered with chips stripe width from 75 to 225 µm. A single triple cavity laser chip TPGEW with 225 µm width has a minimum peak power output of 65 W.

The EPI-cavity structure possesses 25º beam divergence in the perpendicular direction.

Where fiber coupling applications are concerned, the transverse spacing of the EPI-cavity active area concentrates more optical power into a smaller geometry allowing for increased optical power coupling into optical fibers.

Peak wavelength is centered near the maximum responsivity of most silicon photodiodes. The DPGEW and TPGEW lasers match up well with the Perkinelmer C30724, C30737 and C30902 series Si APDs in many applications.

The devices are ideally suited for light duty applications where cost is a primary concern and high volume production capacity is required.

Features and Benefits

- Doubling or tripling of the output power from a single EPI-cavity chip with a small active area
- Peak power up to 65 W at 30 A drives current and 100 ns pulse width.
- High reliability.
- Small emitting areas allow ease of fiber coupling.
- Lower cost plastic packaging for high volume
- RoHS compliant

Applications

- Laser Range Finding
- Lidar
- Automotive adaptive cruise control
- Laser radar

PerkinElmer® precisely.

Table of Contents

Table 1: Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Peak Reverse Voltage	V_{RM}	-	-	2	V
Pulse Duration	t_w	-	-	100	ns
Duty Factor	du	-	-	0.1	%
Storage Temperature	T_s	-40	-	100	ºC
Operating Temperature	T_{op}	-40	-	85	ºC
Soldering for 5 seconds (leads only)		-	-	+260	ºC

Table 2: Generic electro-optic specifications at 23°C

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Center Wavelength of spectral envelope	λc	885	905	925	nm
Spectral bandwidth at 50% intensity points	Δλ		5		nm
Wavelength temperature coefficient	Δλ/ ΔT		0.25		nm/º C
Beam spread (50% peak intensity) parallel to junction plane	θ_H		10		degrees
Beam spread (50% peak intensity) perpendicular to junction	θ_V		25		degrees

Table 3: Double Cavity Laser Typical Characteristics at t_c = 23°C, t_w = 100ns, prr = 1KHz

Parameter	DPGEW1S03H			DPGEW1S09H			Units
	Min	Typ	Max	Min	Typ	Max	
Po at i_{FM} (P_O)	12	13	-	42	45	-	W
# of Elements		1			1		
Emitting Area	-	75x10	-	-	225x10	-	µm
Maximum peak forward current (i_{FM})	-	-	10	-	-	30	A
Threshold Current (i_{th})	-	1.0	-	-	1.5	-	A
Forward Voltage @ i_{FM} (V_f)	-	7	-	-	8.5	-	V

Table 4: Triple Cavity Laser Typical Characteristics at t_c = 23°C, t_w = 100ns, prr=1KHz

Parameter	TPGEW1S03H			TPGEW1S09H			Units
	Min	Typ	Max	Min	Typ	Max	
Po at i_{FM} (P_O)	18	20	-	65	70	-	W
# of Elements		1			1		
Emitting Area	-	75x10	-	-	225x10	-	µm
Maximum peak forward current (i_{FM})	-	-	10	-	-	30	A
Threshold Current (i_{th})	-	1.0	-	-	1.5	-	A
Forward Voltage @ i_{FM} (V_f)	-	10	-	-	12.6	-	V

Operating Conditions

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

The PerkinElmer Optoelectronics 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, particularly for the larger stacks and when operated at maximum duty factor.

Forward Voltage

The forward voltage of the device is a combination of: a static voltage drop resulting from band gaps and material characteristics; a dynamic series resistance resulting from the contact area dimensions, the resistivity of the contact layers and the inductive voltage drop of the package. Voltages due to the inductive elements are additional and, therefore, are considered separately since they depend on the package inductance, the pulse rise time and the peak current.

Warning - Personal Safety Hazard

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 feasible to operate the diodes within Class I laser operation, but 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 DHHS or appropriate authority. Further details may be obtained in the publication FDA 88-8035:

US Department of Health and Human Services
Food and Drug Administration
Center for Devices and Radiological Health
1390 Picard Drive Rockville, MD 20850 U.S.A.

PerkinElmer Optoelectronics has used the data in the above document to calculate “Accessible Emission Limits” in terms of radiation power output and plotted them against pulse width for 850 nm and 1500 nm lasers. Ask for Technical Report “A Comparison of the Accessible Emission Limits (AEL’s) for Laser Radiation at 850 nm and 1500 nm”.

RoHS Compliance

This series of laser diodes are designed and built to be fully compliant with the European Union Directive 2002/95EEC – Restriction of the use of certain Hazardous Substances in Electrical and Electronic equipment.

Warranty

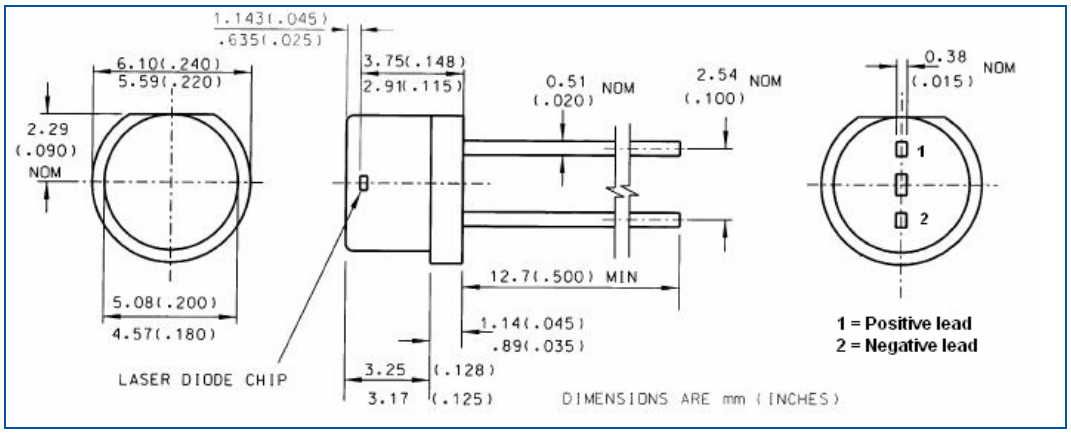
A standard 12-month warranty following shipment applies. The warranty applies only to devices operated within the maximum rating, as specified in Table 1. Exceeding these conditions is likely to cause permanent “burn off” damage to the laser facet and consequently a significant reduction in optical power. Operating the devices at increased duty cycles will ultimately and irreparably damage the crystal structure due to internal heating effects.

Ordering Guide

X	P	G	A	W	X	S	XX	H	
D									Double Active Area
T									Triple Active Area
	P								Pulsed
		G							905 nm (nom.center wavelength)
			E						+/-20 nm center wavelength spread
				W					Plastic package
					1	S			Single Chip /Single element device
							03		0.003” wide laser stripe (75 µm)
							09		0.009” wide laser stripe (225 µm)
								H	RoHS compliant

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

Package Drawing



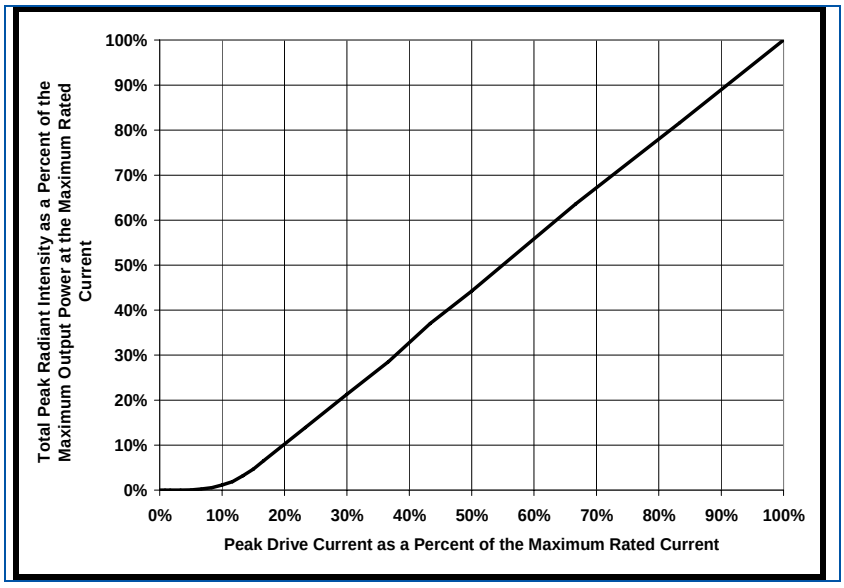


Figure 1
Total Peak Radiant Intensity vs. Peak Drive Current

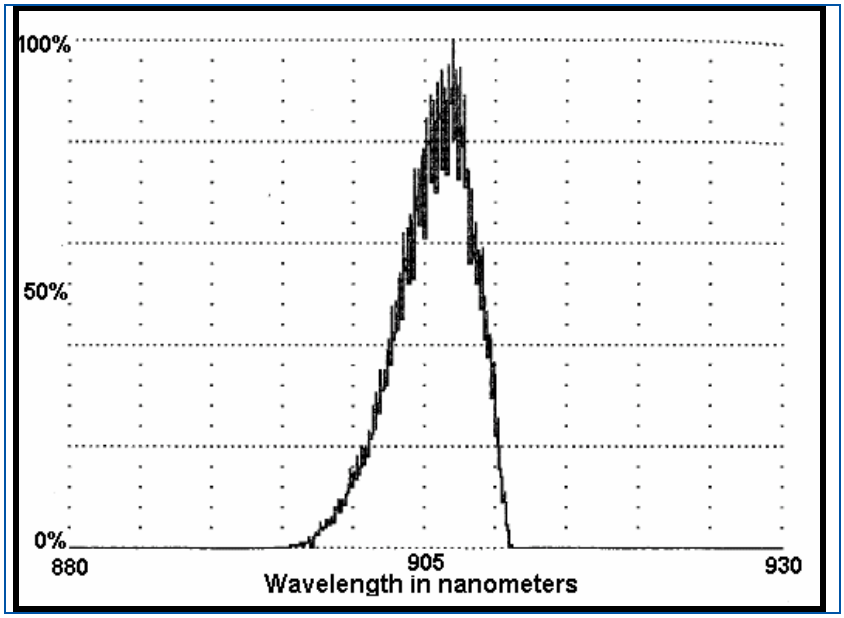


Figure 2
Spectral Plot Distribution

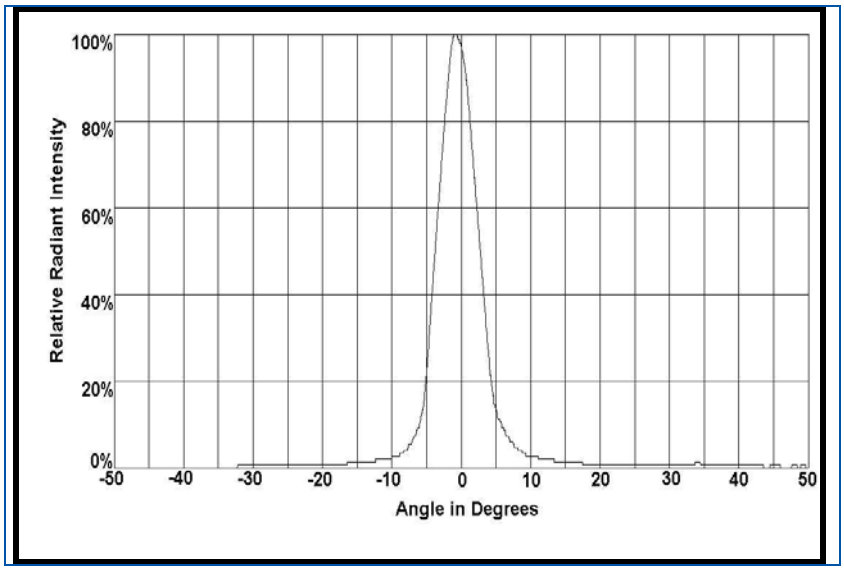


Figure 3
DPGEW Far Field Pattern
Parallel to Junction Plane

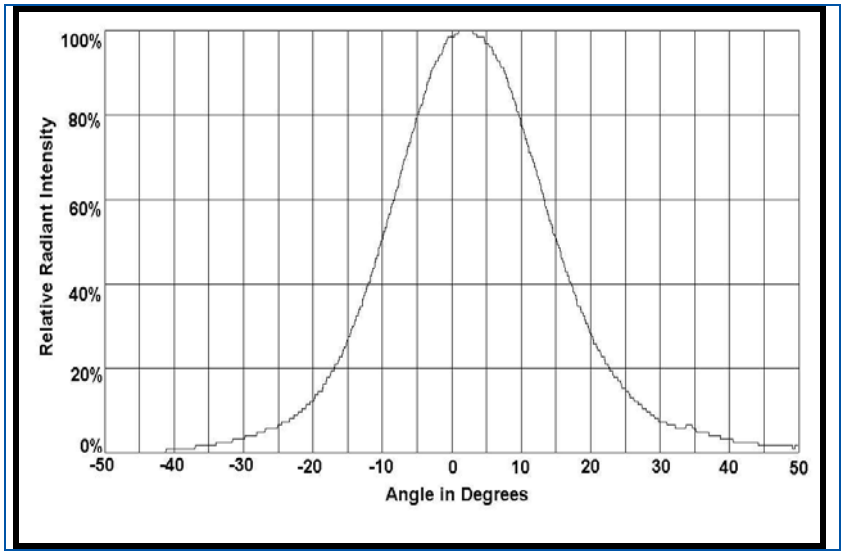


Figure 4
DPGEW Far Field Pattern
Perpendicular to Junction
Plane

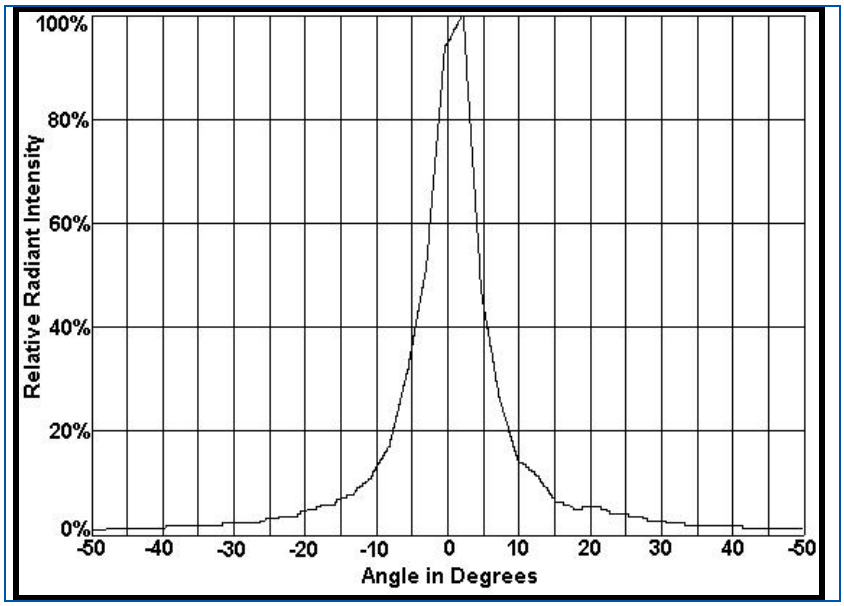


Figure 5
TPGEW Far Field Pattern
Parallel to Junction Plane

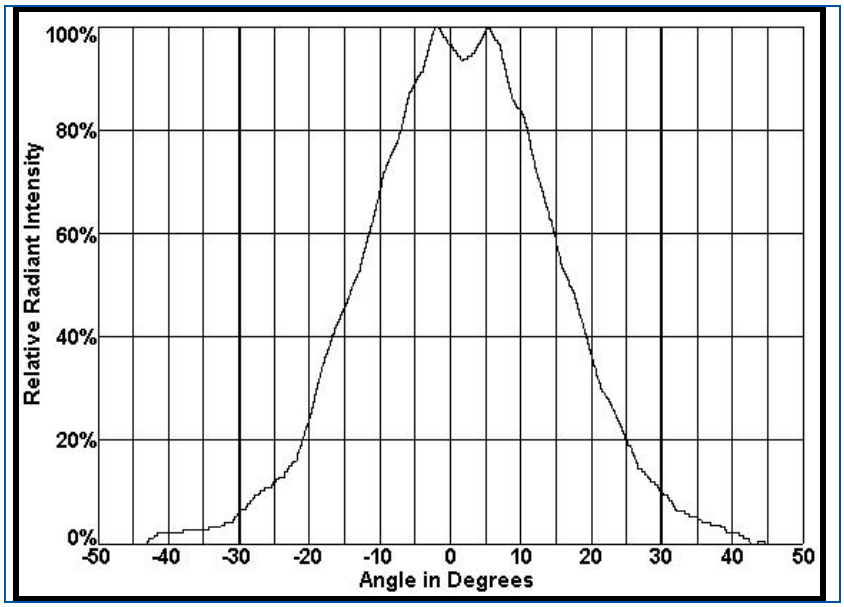


Figure 6
TPGEW Far Field Pattern Perpendicular to Junction Plane

"Your Partner of Choice"

With a broad customer base in all major markets, built on ninety years of solid trust and cooperation with our customers, PerkinElmer is recognized as a reliable partner that delivers high quantity, customized, and superior "one-stop" solutions. Our products – from single photocells to complex x-ray inspection systems - meet the highest quality and environmental standards.
Our worldwide Centres of Excellence, along with our Customer and Technical Support teams, always work with you to find the best solutions for your specific needs.

PerkinElmer Optoelectronics

PerkinElmer Optoelectronics is a global technology leader providing market-driven, integrated solutions for a wide range of applications, which leverage our lighting, sensors, and imaging expertise. Our technologies, services and support are fuelling the medical, genomic and digital revolutions by enhancing our customers' productivity, optimizing performance, and accelerating time to market.

So contact us and put PerkinElmer's expertise to work in your demanding applications. We will show how our innovations will help you deliver the perfect product.

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