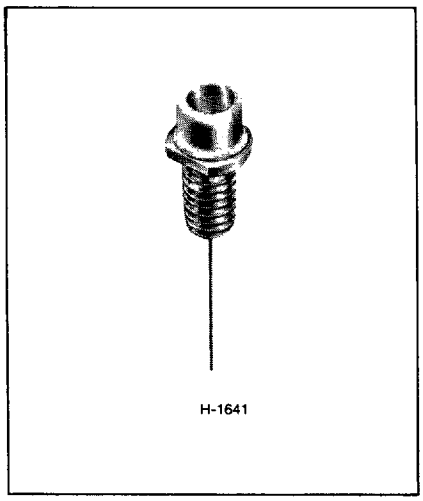
RCA Electro Optics and Devices

Solid State Emitters
Developmental Types

C86039E, C86040E Series



Gallium Aluminum Arsenide Injection Lasers for Pulsed Operation at Room Temperature

- **Wavelength of Peak Radiant Intensity - nanometers**
  - **C86039EW1: 810 ± 10**
  - **C86039EW2: 830 ± 10**
  - **C86039EW3: 850 ± 10**
  - **C86039EW4: 895 ± 10**
  - **C86040EW1: 810 ± 10**
  - **C86040EW2: 830 ± 10**
  - **C86040EW3: 850 ± 10**
  - **C86040EW4: 895 ± 10**
- **Minimum Power Output -**
  C86039E Series: 1.5 W @ IFM = 8 A
  C86040E Series: 3.0 W @ IFM = 17.5 A
- **Small Emitting Areas**
- **Coaxial Packages for Simple Mounting and Good Thermal Dissipation Capability**
- **Variants With Reverse-Case Polarity Available**

The RCA C86039E and C86040E Series of single diode gallium aluminum arsenide injection lasers emit radiant flux in the spectral range from 800 to 900 nanometers and will provide peak power output minimums of 1.5 and 3 watts within this spectral range. The construction of these devices uses the LOC (Large Optical Cavity) material synthesis technology for improved carrier and photon confinement, thus assuring both low threshold current and high efficiency operation. The laser diode chip is mounted geometrically centered within a hermetically sealed package.

These diodes are intended for a wide variety of applications including industrial control equipment and fiber optic test systems.

Variants of these devices in other package configurations can be supplied on request.

Maximum Ratings, Absolute-Maximum Values

Peak Forward Current, I_{FM}

At Case Temperature, $T_C \geq 27°$ C:

Type C86039E Series	8	A
Type C86040E Series	17.5	A
At Case Temperatures, $T_C < 27°$ C	See **Figure 2**	

Forward Current Pulse Conditions

For Case Temperature (T_C) Range of -55° to +70° C (See **Figure 2**)

Pulse Duration, t_w (50% points)	100	ns
Duty Factor, du	0.05	%
Peak Reverse Voltage, V_{RM}	2	V

Temperature

Storage, T_{stg}	-55 to 100	°C
Operating, Case, T_C	-55 to +70	°C

Lead Temperature During Soldering:

At a distance of 0.8 mm (1/32 in) from seating plane for 10 s max.	230	°C

Typical Characteristics (Except as noted)

At $T_C = 27°$ C, prr = 1 kHz, t_w = 100 ns, and $i_F = i_{FM}$ = 8 A (C86039E Series) and 17.5 A (C86040E Series)

	C86039E Series	C86040E Series	
Electrical			
Minimum Total Peak Radiant Flux, Φ_M (Power Output)	1.5	3.0	W
Minimum Radiant Flux @ iFM in F/2.5 Cone	0.5	1.0	W
Threshold Current, I_{th}	3.0	6.0	A
Peak Forward Voltage, V_F:	6.0	8.0	V
Radiant Flux			
Wavelength of Peak Radiant Intensity, λ_M:			
Type W1	810 ± 10	810 ± 10	nm
Type W2	830 ± 10	830 ± 10	nm
Type W3	850 ± 10	850 ± 10	nm
Type W4	895 ± 10	895 ± 10	nm
Spectral Bandwidth, $\Delta\lambda$, at 50% Intensity Points	5.0	5.0	nm
Half-Angle Beam Spread at 50% Intensity Points:			
In plane parallel to junction	7.5	7.5	deg
In plane normal to junction	15	15	deg
Switching			
Rise Time of Emitted Pulse, t_r (10% to 90%)	< 1	< 1	ns
Mechanical			
Emitting Region Dimensions	76.2x2 3x0.08	152.4x2 6x0.08	μm mils

9000-4077

1135 D-10

For further information or application assistance, contact your RCA Sales Representative or write Solid State Electro Optics Marketing, RCA, Lancaster, PA 17604.

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C86039E, C86040E Series

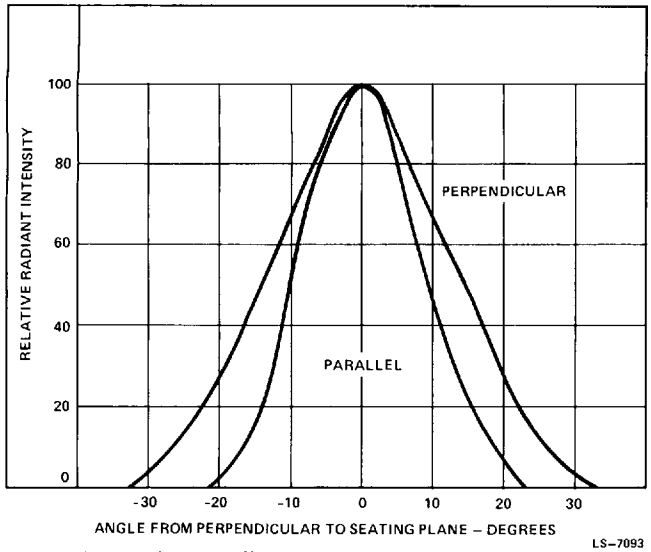


Figure 1 - Typical Radiation Pattern

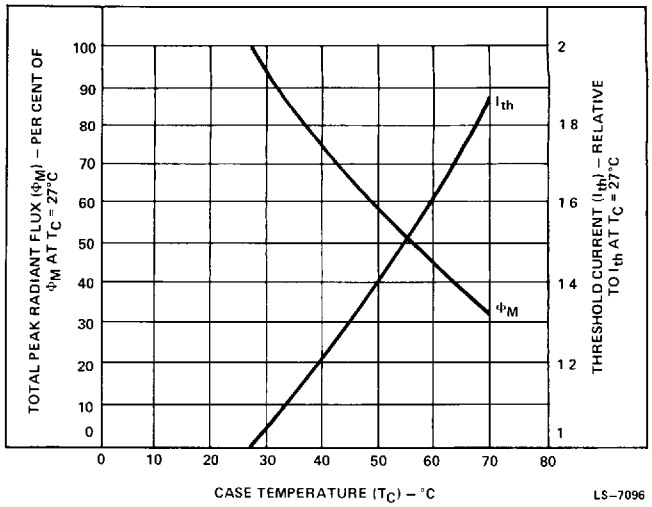


Figure 4 - Typical Total Peak Radiant Flux and Threshold Current vs Case Temperature

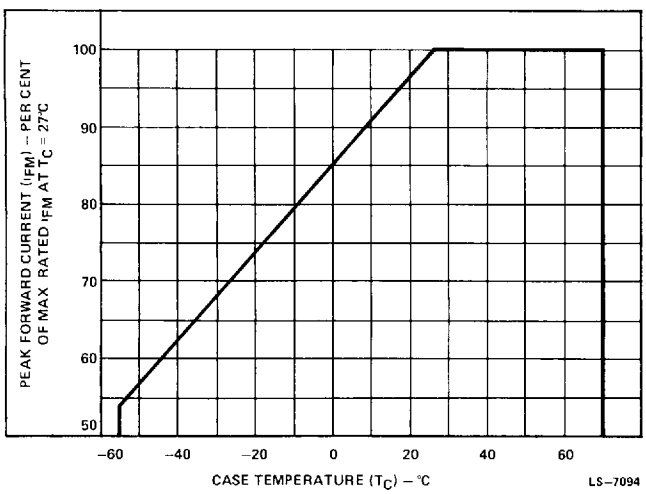


Figure 2 - Percent of Maximum Peak Forward Current vs Case Temperature

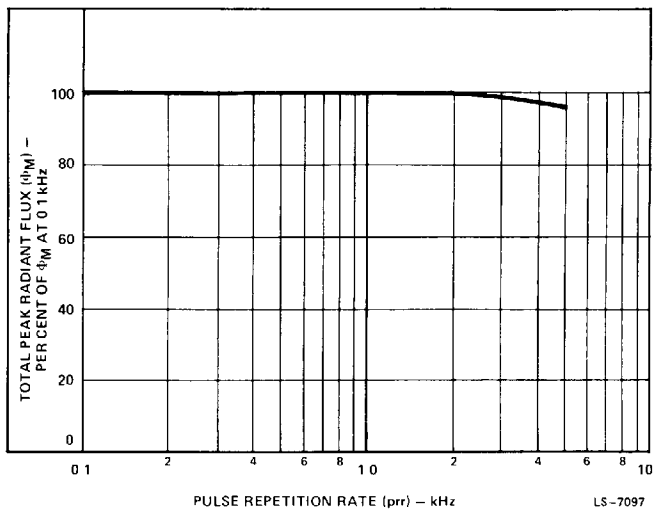


Figure 5 - Typical Total Peak Radiant Flux vs Repetition Rate

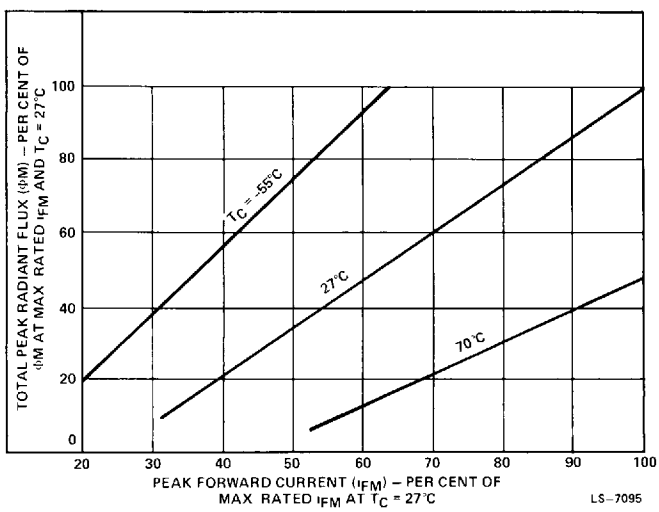


Figure 3 - Typical Total Peak Radiant Flux vs Peak Forward Current

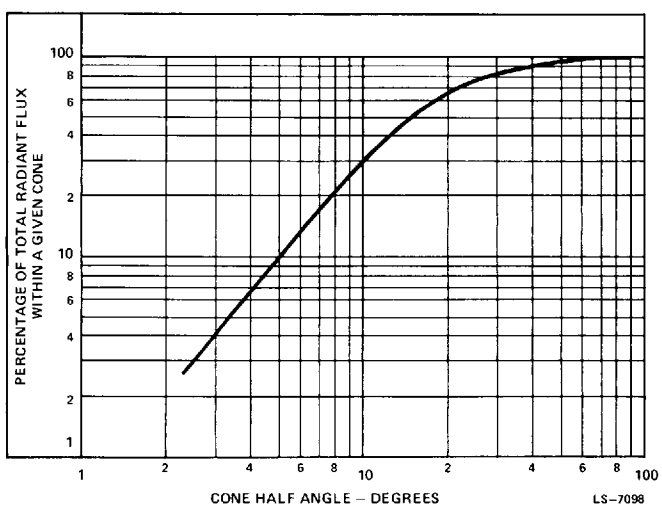


Figure 6 - Percentage of Total Radiant Flux Within a Given Cone Angle

Operating Considerations

The C86039E and C86040E Series lasers are operated by pulsing the devices in the forward-bias direction.

At temperatures of 27° C and higher, the forward current must be limited to the specified peak forward current rating; below 27° C, the peak forward current is derated.

The maximum rated pulse durations and duty factors must never be exceeded. If the specified pulse duration or duty cycle is exceeded, the lasing action may damage the diode and eventually cause it to be destroyed. However, the repetition rate may be increased if the pulse duration is reduced.

Warning - Personal Safety Hazards

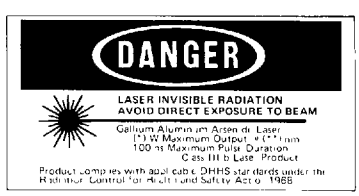
Laser Radiation - This device in operation produces invisible electromagnetic radiation which may be harmful to the human eye.

Personal Safety Hazards

Injection Laser Diodes emit electromagnetic radiation at wavelengths which may be invisible to the human eye. Suitable precautions must be taken to avoid possible damage to the eye from overexposure to this radiant energy. Precautionary measures include the following:

1. **In systems with no external lens**
   Avoid viewing the laser source at close range. Since the emitted beam is not collimated, increasing the distance to the laser source greatly reduces the risk of over-exposure.
2. **In systems utilizing external optics**
   Avoid viewing the emitter directly along the optical axis of the radiated beam.
3. **Reflections from surfaces**
   Minimize unwanted specular reflections in the system.

Because of the size of these devices, each of the labels shown below are attached to the individual laser-unit shipping container. They are illustrated here to comply with the requirements of DHHS standards under the Radiation Control for Health and Safety Act of 1968.

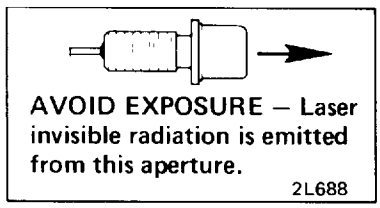


Warning and Certification Label (See Note)

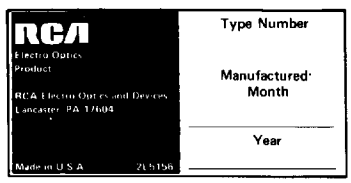
Note: The maximum accessible peak radiant flux output value (*) and the wavelength of peak radiant intensity value (**) for each individual laser type is entered in this position on the Warning and Certification Label. See Table I.

Table I

Type	Max. Output (W)	Wavelength (nm)
C86039EW1	9	810
C86039EW2	9	830
C86039EW3	9	850
C86039EW4	9	895
C86040EW1	18	810
C86040EW2	18	830
C86040EW3	18	850
C86040EW4	18	895



Aperture Label



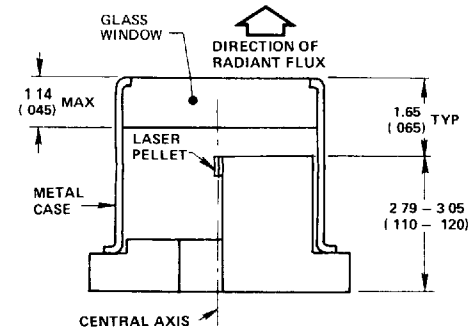
Identification Label

Maximum Peak Accessible Emission Levels (Power Output)

The maximum peak power output level, to which human access is possible, when the device is operated at its maximum forward current rating and pulse duration is shown below. This radiant flux level should not be considered as a characteristic range limit, it is based on product design and includes possible changes in device characteristics during life. Appropriate precautions should be taken to avoid harmful exposure.

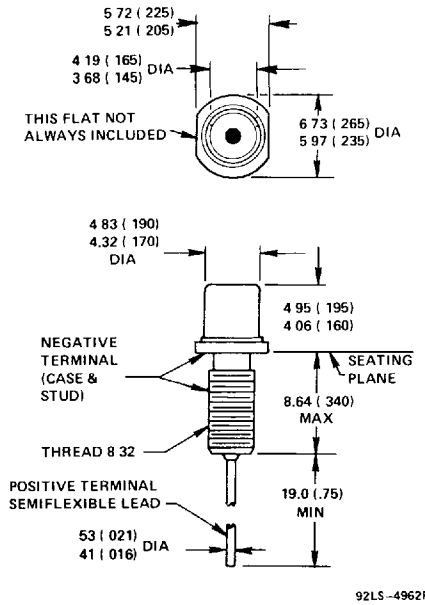
Type	Max. Forward Current (A)	Max. Accessible Peak Radiant Flux Output (W)
C86039E Series	8.0	9
C86040E Series	17.5	18

In order to insure that this laser component meets the requirements of Class IIIb laser products, the device must not be operated outside of its maximum ratings. Power supplies (laser energy sources) used with the component must be such that the maximum peak forward current can not be exceeded.



Dimensions in millimeters. Dimensions in parentheses are in inches.

Figure 7 - Cross Section of RCA OP-18 Package Showing Location of Single-Diode Laser Pellet



Dimensions in millimeters. Dimensions in parentheses are in inches.

Figure 8 - Dimensional Outline