GaAs Narrow Beam Infrared Emitter

FPE104

Optoelectronic Products

General Description

The FPE104 narrow beam infrared emitter is a high-intensity source specifically intended for excitation of photosensors, especially photodiodes and transistors, when the separation distances are measured from mm to several meters.

The FPE104 is the invisible infrared beam companion device to the FLV104, visible beam LED. Both devices have identical optics and, therefore, identical radiation patterns.

Very High Axial Intensity
Narrow (4°) Beamwidth
Detectable At 30 Feet

Absolute Maximum Ratings

Maximum Temperature and Humidity

Storage Temperature	−55°C to +100°C
Junction Temperature	−55°C to +100°C
Pin Temperature (Soldering, 10 s)	260°C
Relative Humidity at 65°C	98%

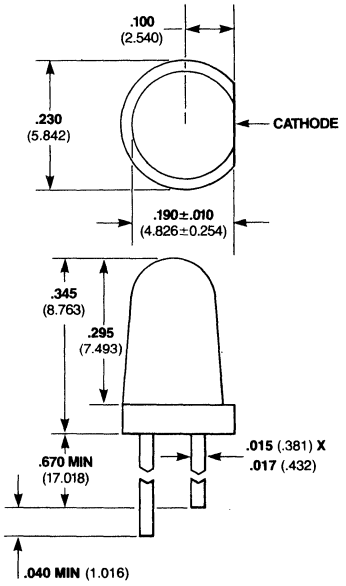
Maximum Power Dissipation

Total Dissipation at T_A = 25°C	200 mW
Derate Linearly from 25°C	2.6 mW/°C

Maximum Voltages and Currents

V_R	Reverse Voltage	3.0 V
I_F	Forward dc Current	1.0 A
I_{pk}	Peak Forward Current, 100 μs pulse, 1% duty cycle	100 mA

Package Outline



Notes
All dimensions in inches **bold** and millimeters (parentheses)
Tolerance unless specified = **±.015** (±.381)

Electrical Characteristics T_A = 25°C

Symbol	Characteristic	Min	Typ	Max	Units
V_F	Forward Voltage at I_F = 100 mA		1.3	1.9	V
BV_R	Reverse Breakdown Voltage (I_R = 100 μA)	3.0	6.0		V

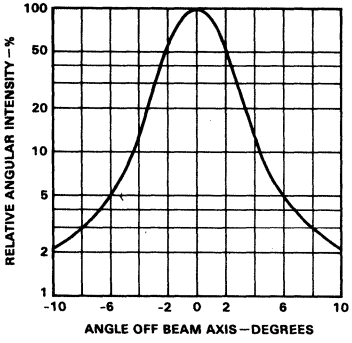
Typical Electrical Characteristics

FPE104

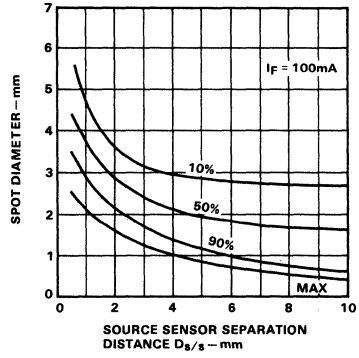
Optoelectronic Characteristics @ I_F = 100 mA T_A = 25°C

Symbol	Characteristic	Min	Typ	Max	Units
I_O	Axial Intensity	3.0	10		mW/sr
A_s	Effective Source Area (Axial)		0.028		cm^2
N	Average Effective Source Radiance (Axial)		360		$mW/sr/cm^2$
$\Delta I/\Delta T$	Temperature Coefficient of Intensity (Note 1)		0.5		%/°C
$\Delta I/\Delta I_F$	Excitation Coefficient of Intensity (Note 1)		1.0		%/mA
λ_{pk}	Peak Spectral Wavelength		890		nm
$\Delta\lambda$	Spectral Bandwidth		40		nm
$\Delta\lambda_{pk}/\Delta T$	Temperature Spectral Shift Coefficient (Note 2)		0.3		nm/°C
$\Delta\lambda_{pk}/\Delta I$	Excitation Spectral Shift Coefficient (Note 2)		0.1		nm/mA
$\theta_{1/2}$	Beam Angle at 50% Axial Intensity		4.3		degrees
$\Delta\theta_A$	Beam Axis to Mechanical Axis		1.5		degrees
t_r, t_f	Light Output Rise and Fall Time (Note 3)		10		ns
C_O	Capacitance (V = 0, f = 1.0 MHz)		100		pF

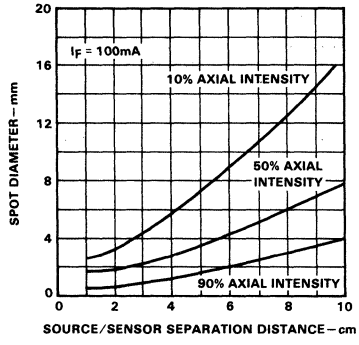
Beam Pattern of Intensity



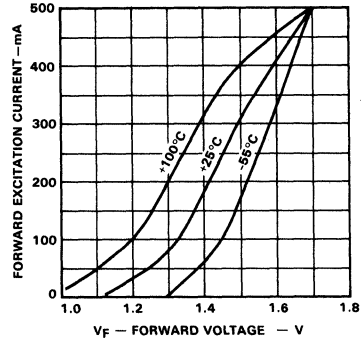
Spot Diameter vs Separation Distance (Near Field)



Spot Diameter vs Separation Distance (Near Field)



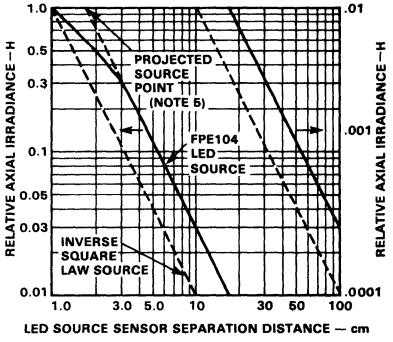
Forward V-I Characteristics



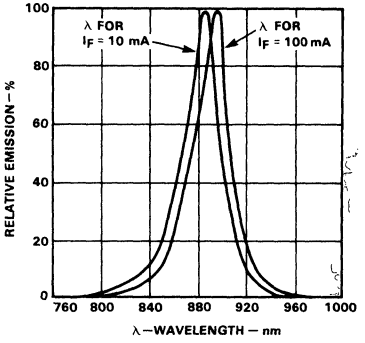
Typical Electrical Characteristic Curves Narrow Beam Shape

FPE104

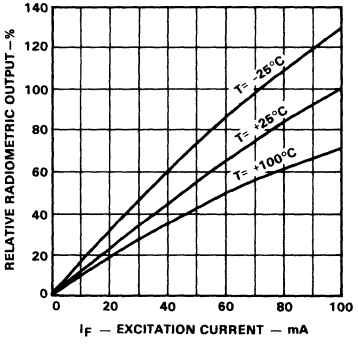
Average Axial Irradiance, H (Note 6)



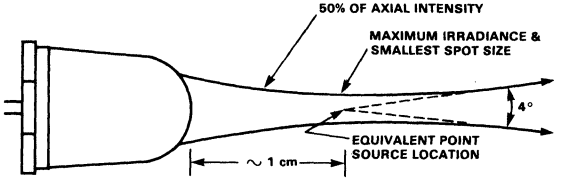
Emission Spectrum Infrared (GaAs) LED



Relative Radiometric Output—% (Note 4)



Narrow Beam Shape



Notes

1. $\Delta I/\Delta T$ and $\Delta I/\Delta I_F$ are the percentage derating factors for all radiometric output characteristics referenced to their typical value at 25°C ambient and I_F = 100 mA.
2. $\Delta\lambda_{pk}/\Delta T$ and $\Delta\lambda_{pk}/\Delta I_F$ are the derating factors for all wavelength characteristics referenced to their typical value at 25°C ambient and I_F = 100 mA.
3. Time for a 10%-90% change in light intensity with a step change in current.
4. Normalization: LED intensity $\simeq$ 10 mW/sr sensor 1 mm² area.
5. Projected source point is the distance, Sp from which LED inverse square LAW characteristics may be computed for S $\geq$ 5 cm.

$$H = \frac{1.0\ mW}{cm^2} \times \frac{SP^2}{(S - Sp)^2}, \quad 1 < Sp < 2\ cm$$

6. Irradiance (H) normalized to 4 mW/cm² @ S = 1 cm.