940 nm High Radiant Emitters

Technical Data

HEMT-3301
HEMT-1001

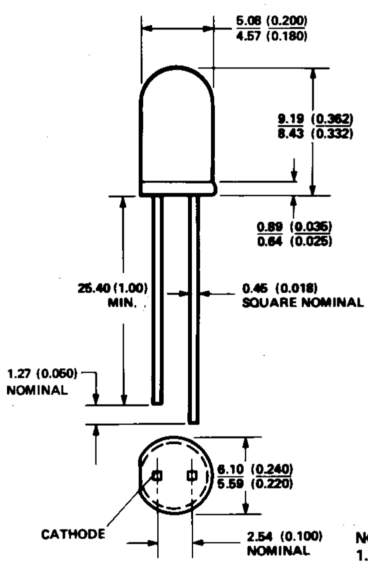
Features

- **Nonsaturating, High Radiant Flux Output**
- **Efficient at Low Currents, Combined with High Current Capability**
- **Three Package Styles**
- **Operating Temperature Range -55°C to +100°C**
- **Medium-Wide Radiation Patterns**
- **Radiated Spectrum Matches Response of Silicon Photodetectors**

Description

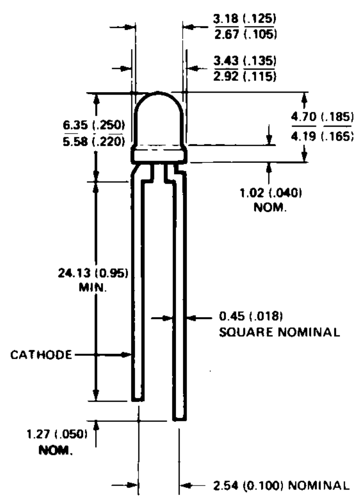
The HEMT-3301 and HEMT-1001 are infrared emitters, using a mesa structure GaAs on GaAs infrared diode, IRED, optimized for maximum quantum efficiency at a peak wavelength of 940 nm. The HEMT-3301 and HEMT-1001 emitters are untinted, undiffused plastic packages with medium-wide radiation patterns. These medium-wide and wide radiation patterns eliminate the beam focusing problems that are encountered with emitters that have narrow radiation patterns. Applications include optical transducers, optical part counters, smoke detectors, covert identification, paper tape and card readers, and optical encoders.

Package Dimensions



HEMT-3301

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES (INCHES).
2. AN EPOXY MENISCUS MAY EXTEND ABOUT 1 mm (0.040") DOWN THE LEADS.



HEMT-1001

Absolute Maximum Ratings at T_A = 25°C

Power Dissipation .... 150 mW
DC Forward Current .... 100 mA
(Derate as specified in Figure 6)
Peak Forward Current .... 1000 mA
(Time average current as determined from Figure 7)
IRED Junction Temperature .... 110°C
Operating and Storage Temperature .... -55°C to +100°C
Lead Soldering Temperature .... 260°C for 5 seconds
(1.6 mm (0.063 in.) from emitter body)

Electrical/Optical Characteristics at T_A = 25°C

Symbol	Description	Min.	Typ.	Max.	Units	Test Conditions	Fig.
I_e	Radiant Intensity HEMT-3301 HEMT-1001	 2.5 1.0	 4.0 2.0		mW/sr	I_F = 20 mA	4, 5
$\Delta I_e/\Delta T$	Temperature Coefficient for Radiant Intensity[1]		-0.58		%/°C	Measured at λ_{PEAK}	1
$\Delta\lambda/\Delta T$	Temperature Coefficient for Peak Wavelength[2]		0.3		nm/°C	Measured at λ_{PEAK}	1
λ_{PEAK}	Peak Wavelength		940		nm	Measured at λ_{PEAK}	1
$2\theta_{1/2}$	Half Intensity[3] Total Angle HEMT-3301 HEMT-1001		 50 60		deg.	I_F = 20 mA	 8 9
t_r	Output Rise Time (10% to 90%)		1700		ns	I_{PEAK} = 20 mA	
t_f	Output Fall Time (90% to 10%)		700		ns	I_{PEAK} = 20 mA	
C	Capacitance		30		pf	V_F = 0; f = 1 MHz	
V_R	Reverse Breakdown Voltage	5.0			V	I_R = 10 µA	
V_F	Forward Voltage		1.30 1.15	1.50	V	I_F = 100 mA I_F = 20 mA	2
$R\theta_{J-PIN}$	Thermal Resistance HEMT-3301 HEMT-1001		 260 290		°C/W	IRED Junction to to Cathode Lead	

Notes:
1. Radiant intensity at ambient temperature $I_e(T_A) = I_e(25°C) + (\Delta I_e/\Delta T)(T_A - 25°C)/100$.
2. Peak wavelength at ambient temperature: $\lambda_{PEAK}(T_A) = \lambda_{PEAK}(25°C) + (\Delta\lambda/\Delta T)(T_A - 25°C)$.
3. $\theta_{1/2}$ is the off-axis angle from emitter centerline where the radiant intensity is half the on-axis value.
4. Approximate radiant flux output within a cone angle of 2θ: $\phi_e(2\theta) = [\phi_e(\theta)/I_e(0)]\, I_e(T_A)$; $\phi_e(\theta)/I_e(0)$ obtained from Figure 8 or 9.

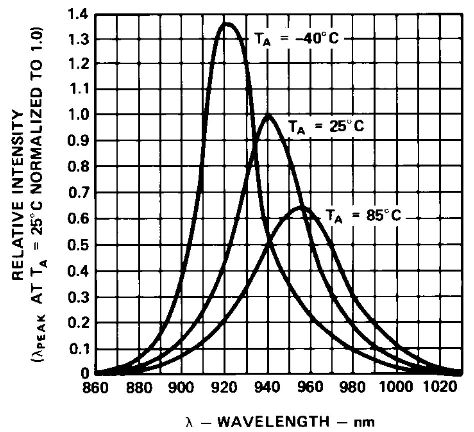


Figure 1. Radiated Spectrum.

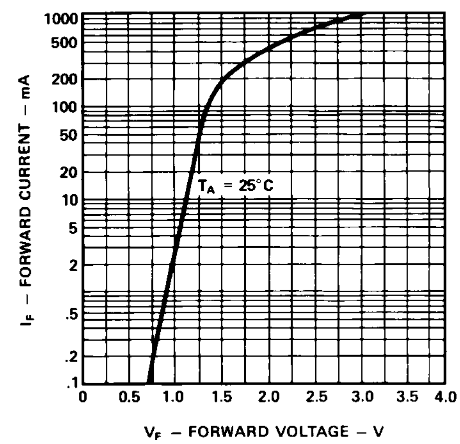


Figure 2. Forward Current vs. Forward Voltage.

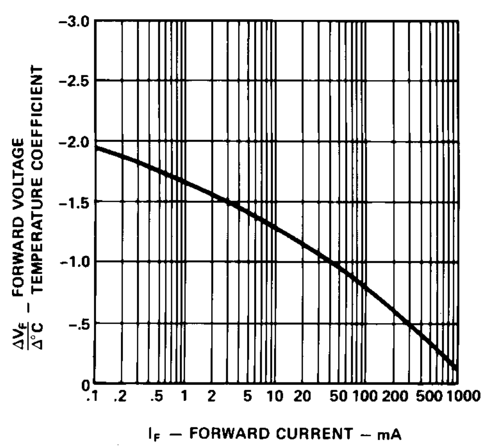


Figure 3. Forward Voltage Temperature Coefficient vs. Forward Current.

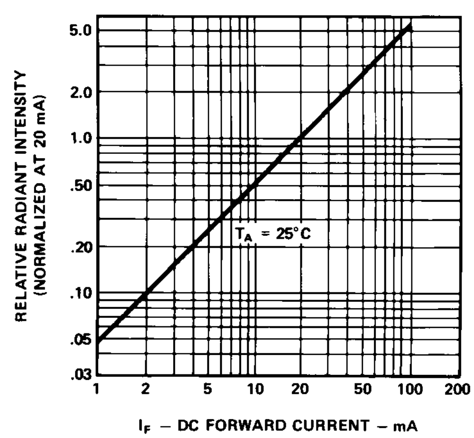


Figure 4. Relative Radiant Intensity vs. DC Forward Current.

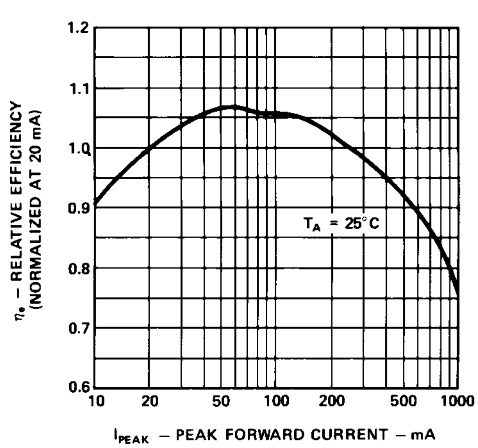


Figure 5. Relative Efficiency vs. Peak Forward Current.

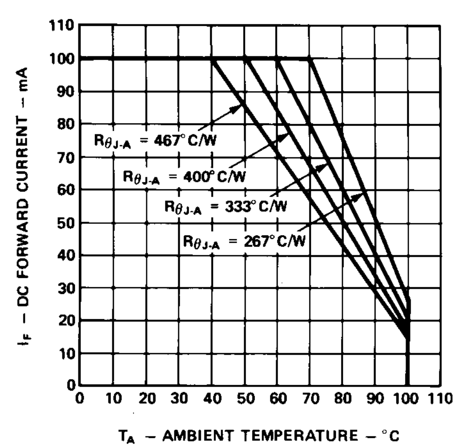


Figure 6. Maximum DC Forward Current vs. Ambient Temperature. Derating Based on T_{JMAX} = 110°C.

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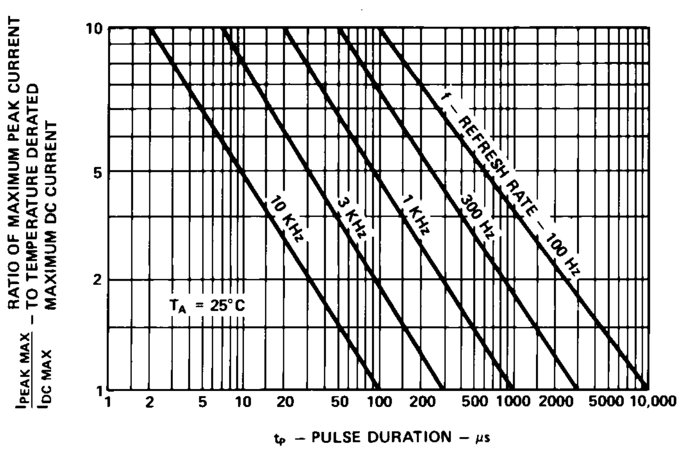

Figure 7. Maximum Tolerable Peak Current vs. Peak Duration ($I_{PEAK\ MAX}$ Determined from Temperature Derated $I_{DC\ MAX}$).

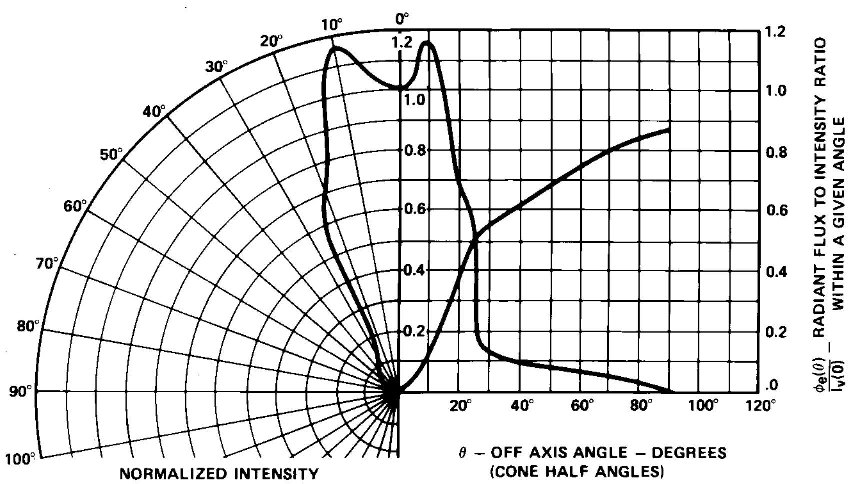

Figure 8. Far Field Radiation Pattern, HEMT-3301.

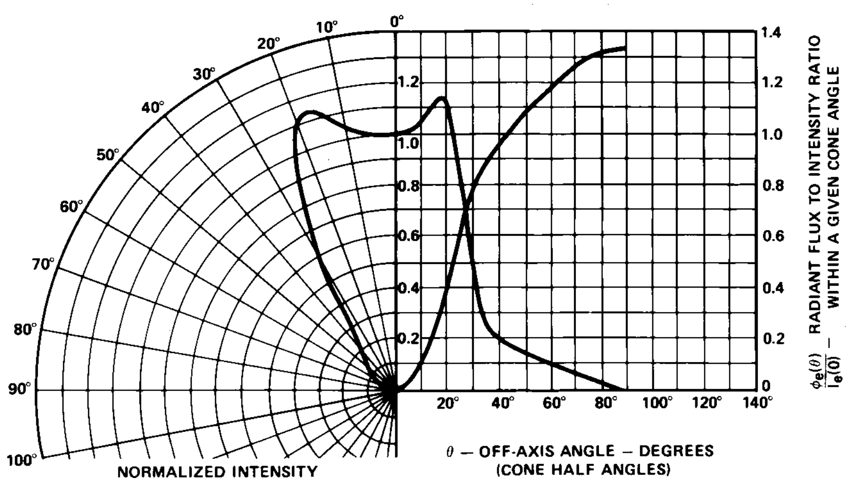

Figure 9. Far Field Radiation Pattern, HEMT-1001.

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Data subject to change.

Obsoletes 5954-8473E

5964-3813E (11/99)