# HEMT-3301/HEMT-1001

940 nm High Radiant Emitters

## Data Sheet

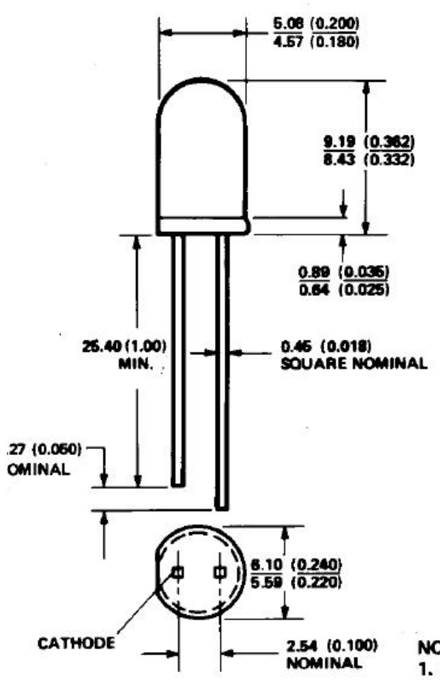
### Description

The HEMT-3301 and HEMT-1001are infrared emitters, using amesa structure GaAs on GaAs infrared diode, IRED, optimized for maximum quantum efficiency at a peak wavelength of 940 nm. The HEMT-3301 and HEMT-1001emitters 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.

### Features

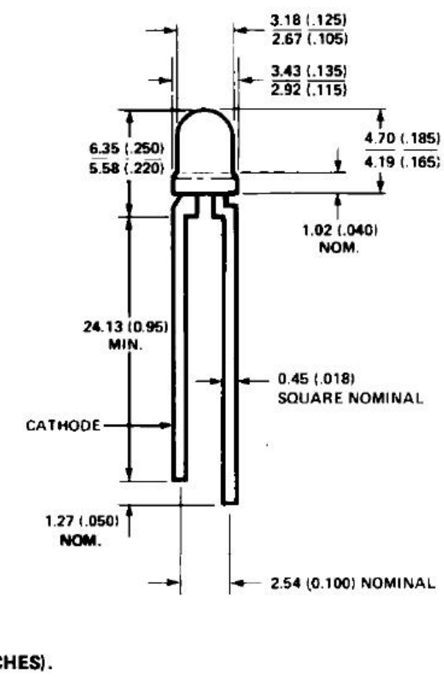
- Nonsaturating, High Radiant Flux Output
- Efficient at Low Currents, Combined with High Current Capability
- Three Package Styles
- Operating Temperature Range -40°C to +100°C
- Medium-Wide Radiation Patterns
- Radiated Spectrum Matches Response of Silicon Photodetectors

### 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 $T_A = 25°C$

| Description | Min. | Typ. | Max. | Units | Notes |
|---|---|---|---|---|---|
| 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 Temperature | -40 | | +100 | °C | |
| Storage Temperature | -40 | | +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<br>HEMT-3301<br>HEMT-1001 | <br>2.5<br>1.0 | <br>4.0<br>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 $\lambda_{PEAK}$ | 1 |
| $\Delta I/\Delta T$ | Temperature Coefficient for Peak Wavelength[2] | | 0.3 | | nm/°C | Measured at $\lambda_{PEAK}$ | 1 |
| $\lambda_{PEAK}$ | Peak Wavelength | | 940 | | nm | Measured at $\lambda_{PEAK}$ | 1 |
| $2\theta_{1/2}$ | Half Intensity[3]<br>Total Angle<br>HEMT-3301<br>HEMT-1001 | | <br><br>50<br>60 | | deg. | $I_F = 20$ mA | 8<br>9 |
| $t_r$ | Output Rise Time (10% to 90%) | | 1700 | | ns | $\lambda_{PEAK} = 20$ mA | |
| $t_f$ | Output Fall Time (90% to 10%) | | 700 | | ns | $\lambda_{PEAK} = 20$ mA | |
| C | Capacitance | | 30 | | pf | $V_F = 0$;<br>f = 1 MHz | |
| $V_R$ | Reverse Breakdown Voltage | 5.0 | | | V | $I_R = 10$ mA | |
| $V_F$ | Forward Voltage | | 1.30<br>1.15 | 1.50 | V | $I_F = 100$ mA<br>$I_F = 20$ mA | 2 |
| $R\theta_{J\text{-}PIN}$ | Thermal Resistance<br>HEMT-3301<br>HEMT-1001 | | <br>260<br>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: $\lambda_{PEAK}(T_A) = \lambda_{PEAK}(25°C) + (\Delta I/\Delta T)\ (T_A - 25°C)$.
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 $2\theta$: $\phi_e(2\theta) = [\phi_e(\theta)/I_e(0)]\ I_e\ (T_A)$; $\phi_e(\theta)/I_e(0)$ obtained from Figure 8 or 9.

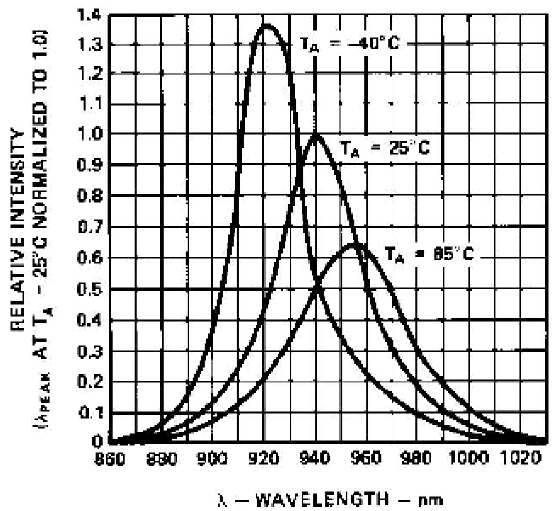



Figure 1. Radiated Spectrum.

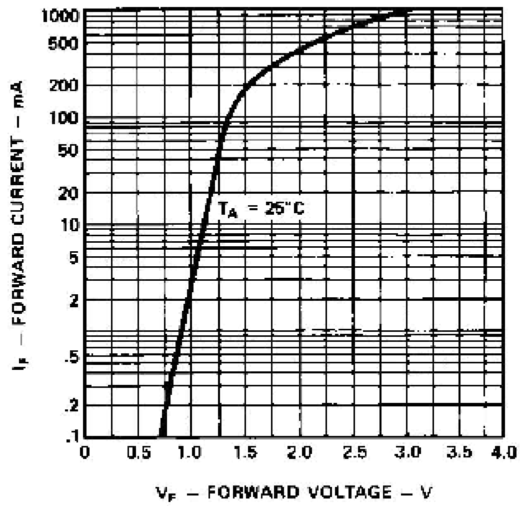



Figure 2. Forward Current vs. Forward Voltage.

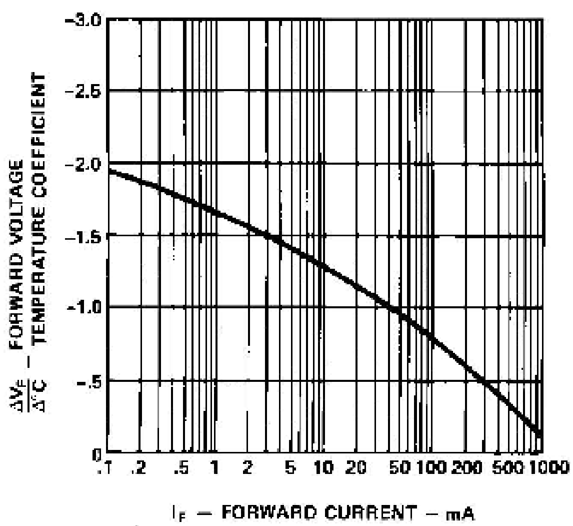



Figure 3. Forward Voltage Temperature Coefficient vs. Forward Current.

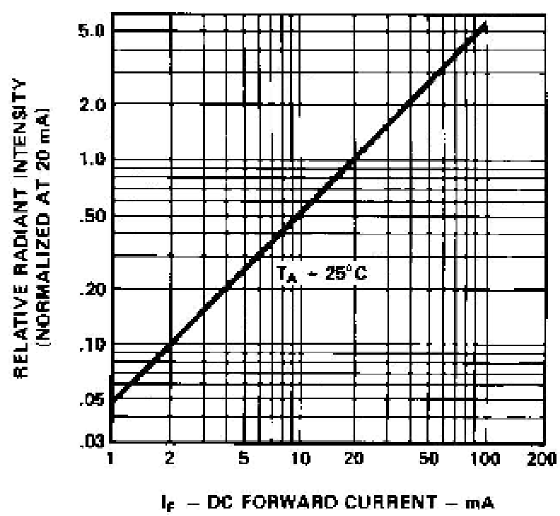



Figure 4. Relative Radiant Intensity vs. DC Forward Current.

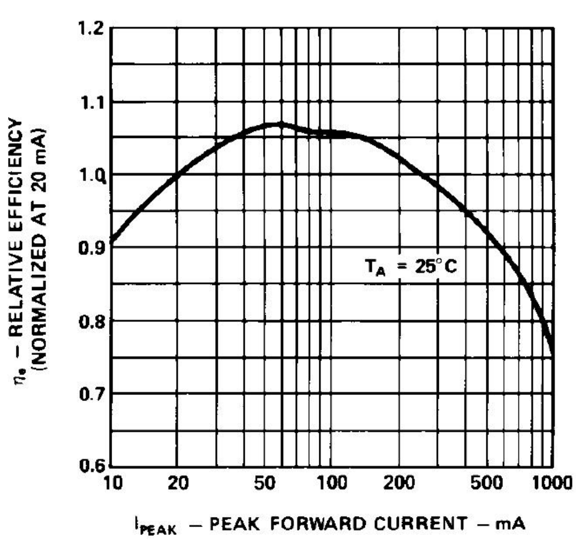



Figure 5. Relative Efficiency vs. Peak Forward Current.

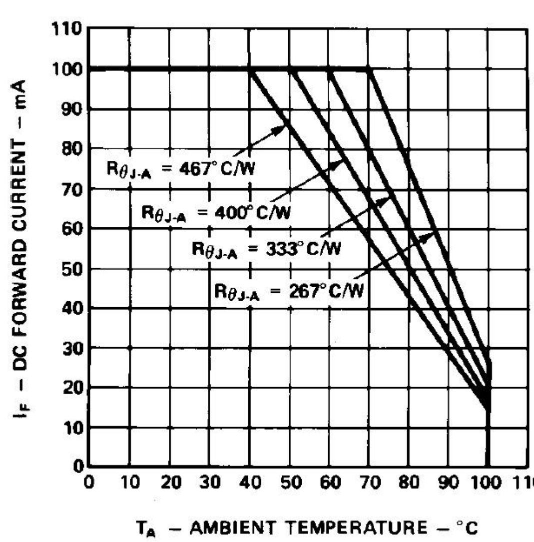



Figure 6. Maximum DC Forward Current vs. Ambient Temperature. Derating Based on TJMAX = 110°C.

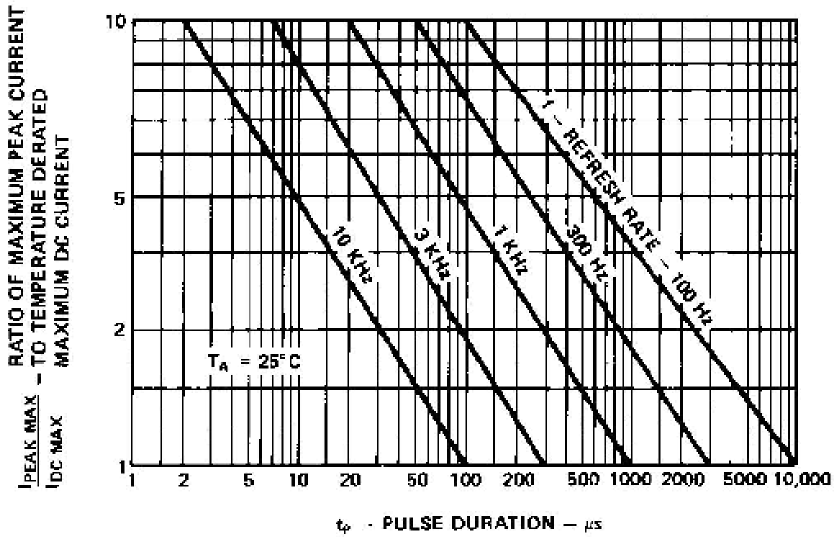



Figure 7. Maximum Tolerable Peak Current vs. Peak Determined from Temperature Derated IDC MAX).

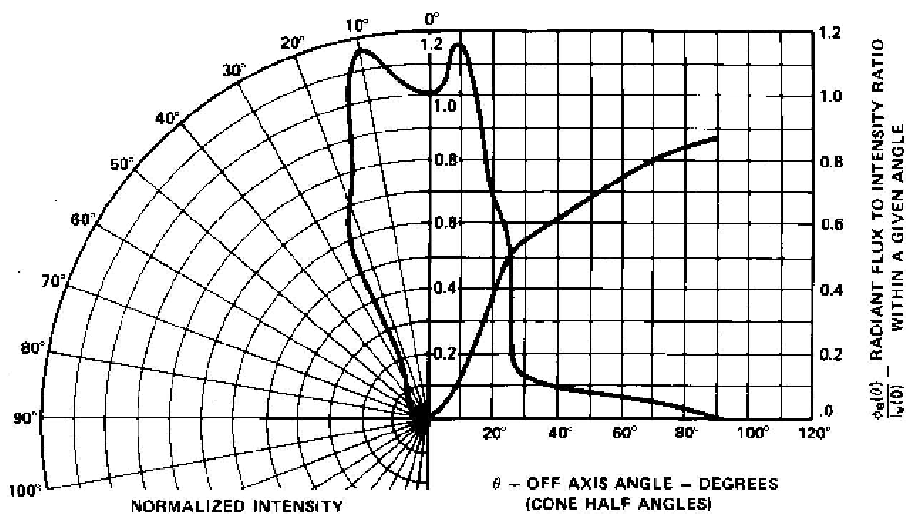



Figure 8. Far Field Radiation Pattern, HEMT-3301.

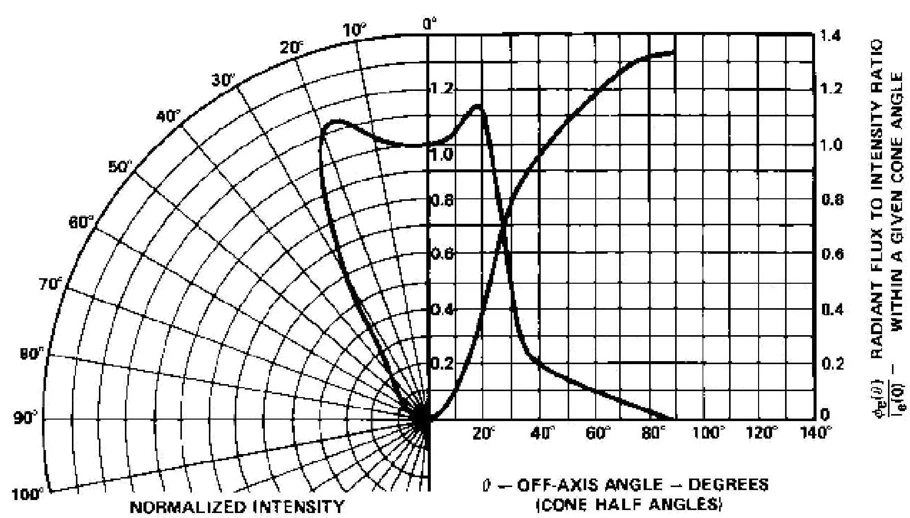



Figure 9. Far Field Radiation Pattern, HEMT-1001.

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**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