

## GaAlAs Infrared Emitting Diodes in $\varnothing$ 3 mm (T-1) Package

### Description

The TSHA44...series are high efficiency infrared emitting diodes in GaAlAs on GaAlAs technology, molded in a clear, untinted plastic package.

In comparison with the standard GaAs on GaAs technology these high intensity emitters feature about 50 % radiant power improvement.



### Features

- Extra high radiant power
- High radiant intensity for long transmission distance
- Suitable for high pulse current operation
- Standard T-1( $\varnothing$  3 mm) package for low space application
- Angle of half intensity  $\phi = \pm 20^\circ$
- Peak wavelength  $\lambda_p = 875$  nm
- High reliability
- Good spectral matching to Si photodetectors

### Applications

Infrared remote control and free air transmission systems with high power requirements in combination with PIN photodiodes or phototransistors.

Because of the very low radiance absorption in glass at the wavelength of 875 nm, this emitter series is also suitable for systems with panes in the transmission range between emitter and detector.

### Absolute Maximum Ratings

$T_{amb} = 25^\circ\text{C}$

| Parameter                           | Test Conditions                       | Symbol     | Value        | Unit             |
|-------------------------------------|---------------------------------------|------------|--------------|------------------|
| Reverse Voltage                     |                                       | $V_R$      | 5            | V                |
| Forward Current                     |                                       | $I_F$      | 100          | mA               |
| Peak Forward Current                | $t_p/T=0.5$ , $t_p=100\ \mu\text{s}$  | $I_{FM}$   | 200          | mA               |
| Surge Forward Current               | $t_p=100\ \mu\text{s}$                | $I_{FSM}$  | 2            | A                |
| Power Dissipation                   |                                       | $P_V$      | 180          | mW               |
| Junction Temperature                |                                       | $T_j$      | 100          | $^\circ\text{C}$ |
| Operating Temperature Range         |                                       | $T_{amb}$  | $-55...+100$ | $^\circ\text{C}$ |
| Storage Temperature Range           |                                       | $T_{stg}$  | $-55...+100$ | $^\circ\text{C}$ |
| Soldering Temperature               | $t \leq 5\text{sec}$ , 2 mm from case | $T_{sd}$   | 260          | $^\circ\text{C}$ |
| Thermal Resistance Junction/Ambient |                                       | $R_{thJA}$ | 450          | K/W              |

## Basic Characteristics

T<sub>amb</sub> = 25 °C

| Parameter                           | Test Conditions                                 | Symbol                      | Min | Typ  | Max | Unit |
|-------------------------------------|-------------------------------------------------|-----------------------------|-----|------|-----|------|
| Forward Voltage                     | I <sub>F</sub> = 100 mA, t <sub>p</sub> = 20 ms | V <sub>F</sub>              |     | 1.5  | 1.8 | V    |
|                                     | I <sub>F</sub> = 1.5 A, t <sub>p</sub> = 100 μs | V <sub>F</sub>              |     | 3.2  | 4.9 | V    |
| Temp. Coefficient of V <sub>F</sub> | I <sub>F</sub> = 100mA                          | TK <sub>V<sub>F</sub></sub> |     | -1.6 |     | mV/K |
| Reverse Current                     | V <sub>R</sub> = 5 V                            | I <sub>R</sub>              |     |      | 100 | μA   |
| Junction Capacitance                | V <sub>R</sub> = 0 V, f = 1 MHz, E = 0          | C <sub>J</sub>              |     | 20   |     | pF   |
| Temp. Coefficient of φ <sub>c</sub> | I <sub>F</sub> = 100 mA                         | TK <sub>φ<sub>c</sub></sub> |     | -0.7 |     | %/K  |
| Angle of Half Intensity             |                                                 | φ                           |     | ±20  |     | deg  |
| Peak Wavelength                     | I <sub>F</sub> = 100 mA                         | λ <sub>p</sub>              |     | 875  |     | nm   |
| Spectral Bandwidth                  | I <sub>F</sub> = 100 mA                         | Δλ                          |     | 80   |     | nm   |
| Temp. Coefficient of λ <sub>p</sub> | I <sub>F</sub> = 100 mA                         | TK <sub>λ<sub>p</sub></sub> |     | 0.2  |     | nm/K |
| Rise Time                           | I <sub>F</sub> = 100 mA                         | t <sub>r</sub>              |     | 600  |     | ns   |
|                                     | I <sub>F</sub> = 1.5 A                          | t <sub>r</sub>              |     | 300  |     | ns   |
| Fall Time                           | I <sub>F</sub> = 100 mA                         | t <sub>f</sub>              |     | 600  |     | ns   |
|                                     | I <sub>F</sub> = 1.5 A                          | t <sub>f</sub>              |     | 300  |     | ns   |

## Type Dedicated Characteristics

T<sub>amb</sub> = 25 °C

| Parameter         | Test Conditions                             | Type     | Symbol         | Min | Typ | Max | Unit  |
|-------------------|---------------------------------------------|----------|----------------|-----|-----|-----|-------|
| Radiant Intensity | I <sub>F</sub> =100mA, t <sub>p</sub> =20ms | TSHA4400 | I <sub>e</sub> | 12  | 20  |     | mW/sr |
|                   |                                             | TSHA4401 | I <sub>e</sub> | 16  | 30  |     | mW/sr |
|                   | I <sub>F</sub> =1.5A, t <sub>p</sub> =100μs | TSHA4400 | I <sub>e</sub> | 140 | 240 |     | mW/sr |
|                   |                                             | TSHA4401 | I <sub>e</sub> | 190 | 360 |     | mW/sr |
| Radiant Power     | I <sub>F</sub> =100mA, t <sub>p</sub> =20ms | TSHA4400 | φ <sub>e</sub> |     | 20  |     | mW    |
|                   |                                             | TSHA4401 | φ <sub>e</sub> |     | 24  |     | mW    |

**Typical Characteristics** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise specified)

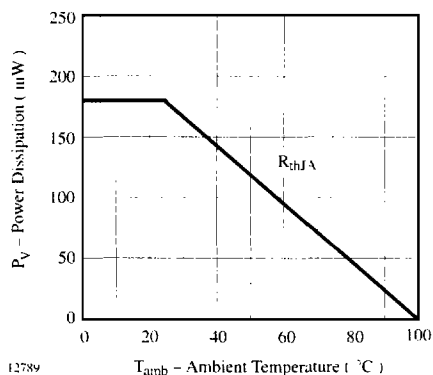


Figure 1. Power Dissipation vs. Ambient Temperature

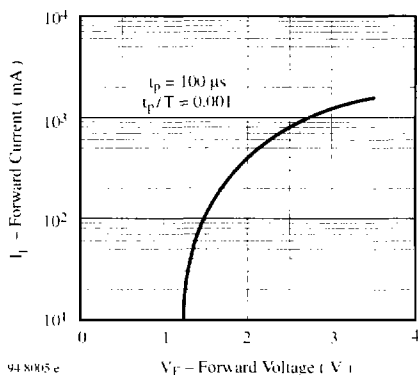


Figure 4. Forward Current vs. Forward Voltage

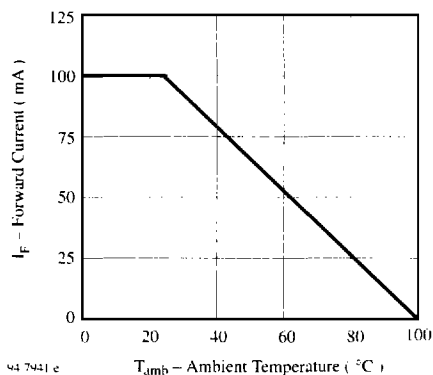


Figure 2. Forward Current vs. Ambient Temperature

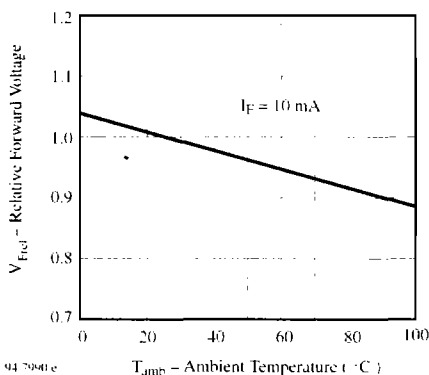


Figure 5. Relative Forward Voltage vs. Ambient Temperature

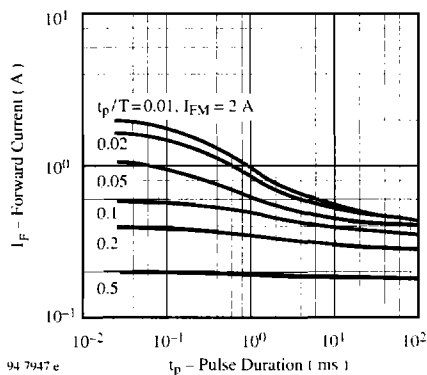


Figure 3. Pulse Forward Current vs. Pulse Duration

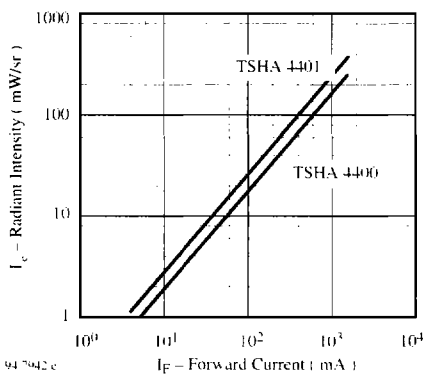


Figure 6. Radiant Intensity vs. Forward Current

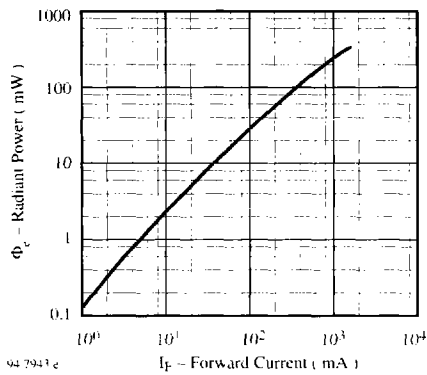


Figure 7. Radiant Power vs. Forward Current

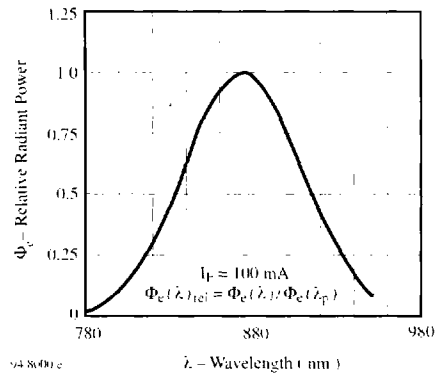


Figure 9. Relative Radiant Power vs. Wavelength

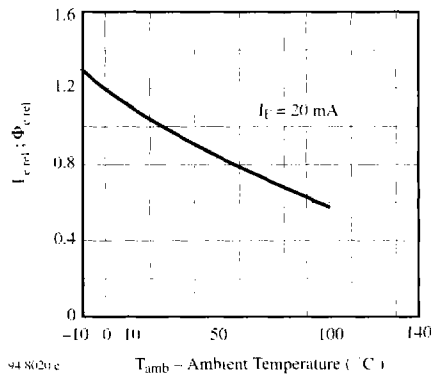


Figure 8. Rel. Radiant Intensity/Power vs. Ambient Temperature

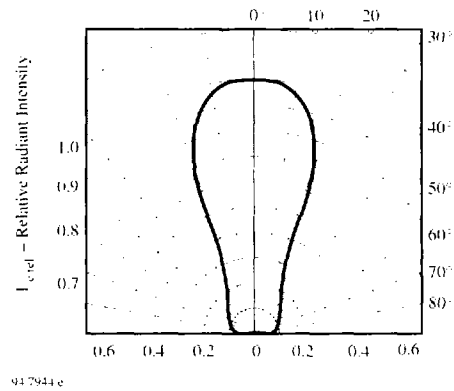
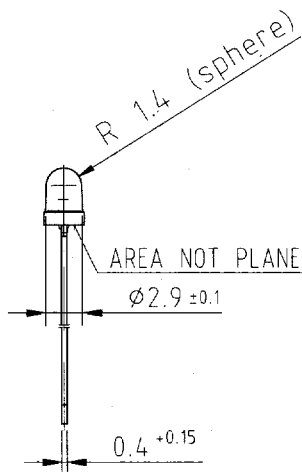
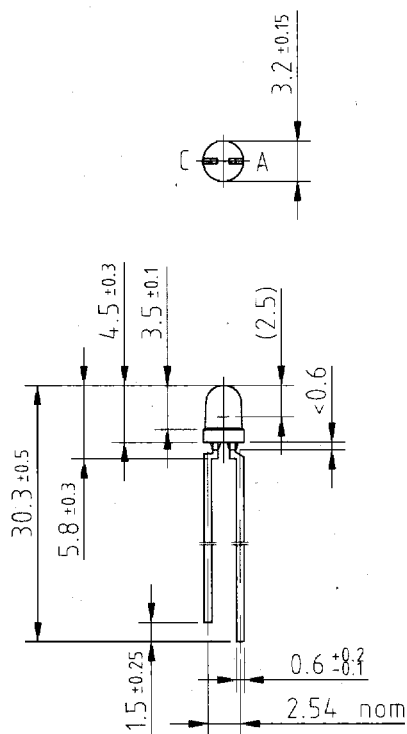


Figure 10. Relative Radiant Intensity vs. Angular Displacement

**Dimensions in mm**

95 10951



technical drawings  
according to DIN  
specifications