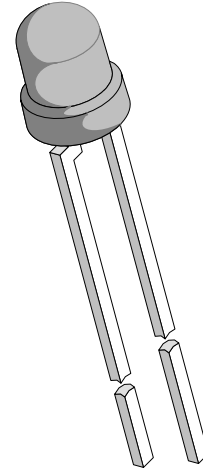


# GaAlAs Infrared Emitting Diodes in $\varnothing$ 3 mm (T-1) Package

## 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.



94 8398

## 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  $\varphi = \pm 20^\circ$
- 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               | $t \leq 5\text{sec}, 2 \text{ mm from case}$ | $T_{sd}$   | 260        | $^\circ\text{C}$ |
| Thermal Resistance Junction/Ambient |  | $R_{thJA}$ | 450        | K/W              |

### Basic Characteristics

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

| Parameter                        | Test Conditions                                    | Symbol           | Min | Typ      | Max | Unit          |
|----------------------------------|--|------------------|-----|----------|-----|---------------|
| Forward Voltage                  | $I_F = 100\text{ mA}, t_p = 20\text{ ms}$          | $V_F$            |     | 1.5      | 1.8 | V             |
|                                  | $I_F = 1.5\text{ A}, t_p = 100\text{ }\mu\text{s}$ | $V_F$            |     | 3.2      | 4.9 | V             |
| Temp. Coefficient of $V_F$       | $I_F = 100\text{ mA}$                              | $TK_{V_F}$       |     | -1.6     |     | mV/K          |
| Reverse Current                  | $V_R = 5\text{ V}$                                 | $I_R$            |     |          | 100 | $\mu\text{A}$ |
| Junction Capacitance             | $V_R = 0\text{ V}, f = 1\text{ MHz}, E = 0$        | $C_j$            |     | 20       |     | pF            |
| Temp. Coefficient of $\phi_e$    | $I_F = 100\text{ mA}$                              | $TK_{\phi_e}$    |     | -0.7     |     | %/K           |
| Angle of Half Intensity          |  | $\phi$           |     | $\pm 20$ |     | deg           |
| Peak Wavelength                  | $I_F = 100\text{ mA}$                              | $\lambda_p$      |     | 875      |     | nm            |
| Spectral Bandwidth               | $I_F = 100\text{ mA}$                              | $\Delta\lambda$  |     | 80       |     | nm            |
| Temp. Coefficient of $\lambda_p$ | $I_F = 100\text{ mA}$                              | $TK_{\lambda_p}$ |     | 0.2      |     | nm/K          |
| Rise Time                        | $I_F = 100\text{ mA}$                              | $t_r$            |     | 600      |     | ns            |
|                                  | $I_F = 1.5\text{ A}$                               | $t_r$            |     | 300      |     | ns            |
| Fall Time                        | $I_F = 100\text{ mA}$                              | $t_f$            |     | 600      |     | ns            |
|                                  | $I_F = 1.5\text{ A}$                               | $t_f$            |     | 300      |     | ns            |

### Type Dedicated Characteristics

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

| Parameter         | Test Conditions                                    | Type     | Symbol   | Min | Typ | Max | Unit  |
|-------------------|--|----------|----------|-----|-----|-----|-------|
| Radiant Intensity | $I_F = 100\text{ mA}, t_p = 20\text{ ms}$          | TSHA4400 | $I_e$    | 12  | 20  |     | mW/sr |
|                   |  | TSHA4401 | $I_e$    | 16  | 30  |     | mW/sr |
|                   | $I_F = 1.5\text{ A}, t_p = 100\text{ }\mu\text{s}$ | TSHA4400 | $I_e$    | 140 | 240 |     | mW/sr |
|                   |  | TSHA4401 | $I_e$    | 190 | 360 |     | mW/sr |
| Radiant Power     | $I_F = 100\text{ mA}, t_p = 20\text{ ms}$          | TSHA4400 | $\phi_e$ |     | 20  |     | mW    |
|                   |  | TSHA4401 | $\phi_e$ |     | 24  |     | mW    |

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

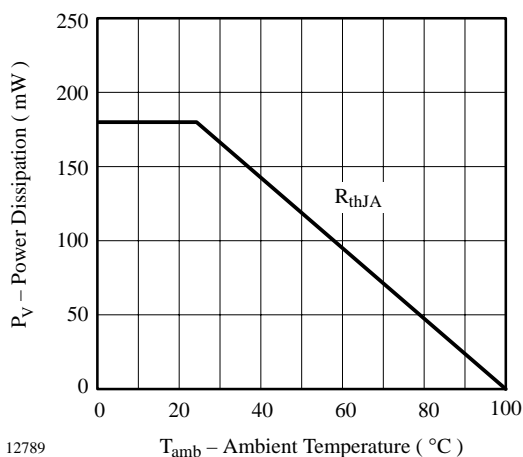


Figure 1. Power Dissipation vs. Ambient Temperature

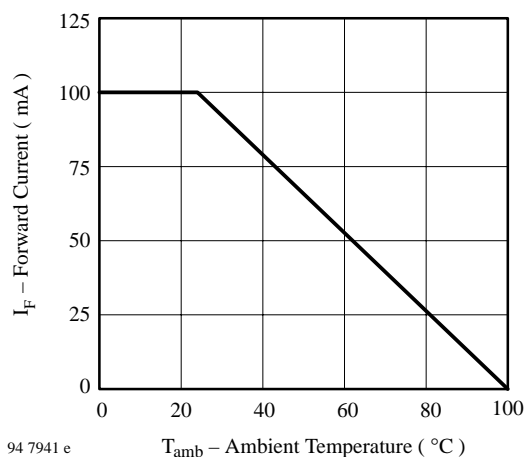
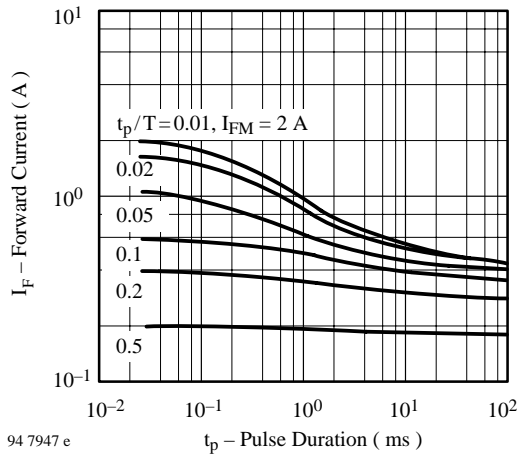
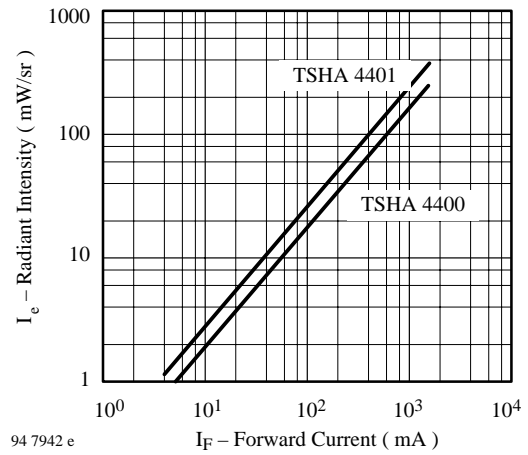


Figure 2. Forward Current vs. Ambient Temperature



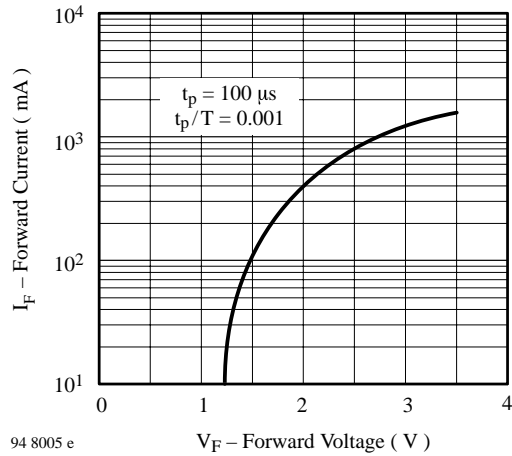
94 7947 e

Figure 3. Pulse Forward Current vs. Pulse Duration



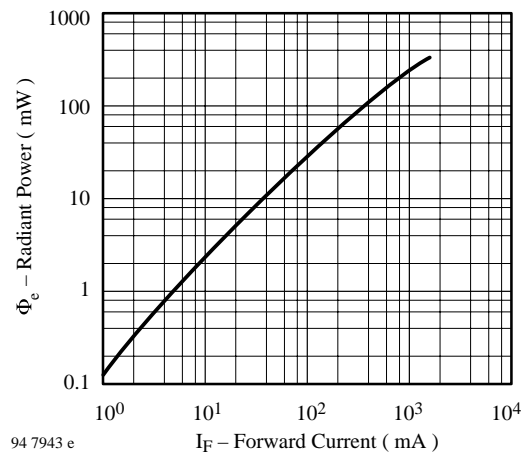
94 7942 e

Figure 6. Radiant Intensity vs. Forward Current



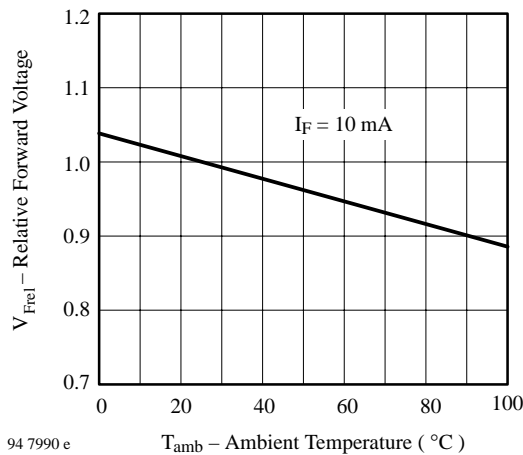
94 8005 e

Figure 4. Forward Current vs. Forward Voltage



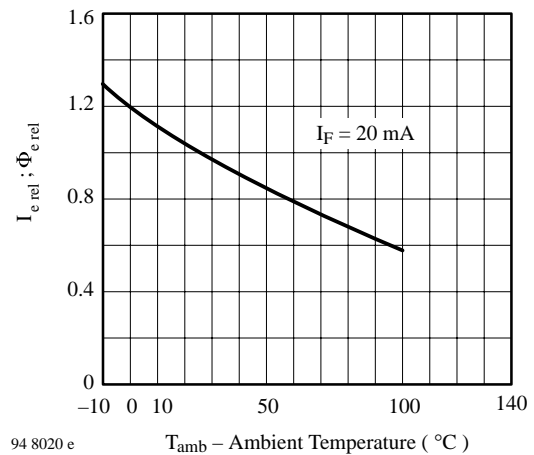
94 7943 e

Figure 7. Radiant Power vs. Forward Current



94 7990 e

Figure 5. Relative Forward Voltage vs. Ambient Temperature



94 8020 e

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

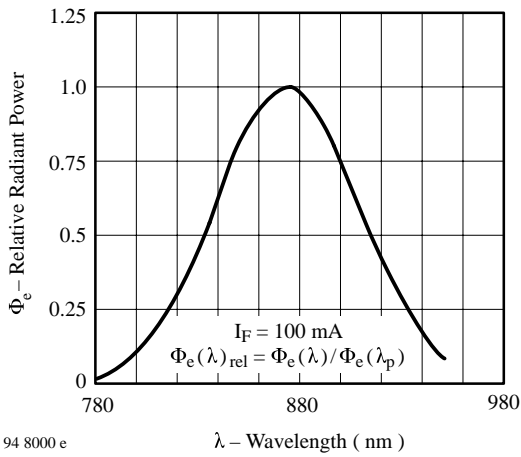


Figure 9. Relative Radiant Power vs. Wavelength

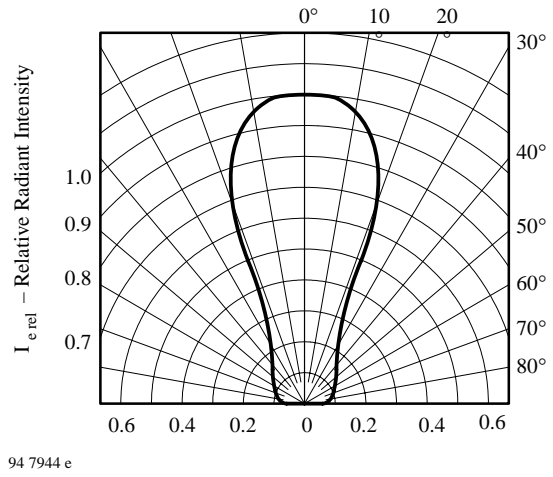
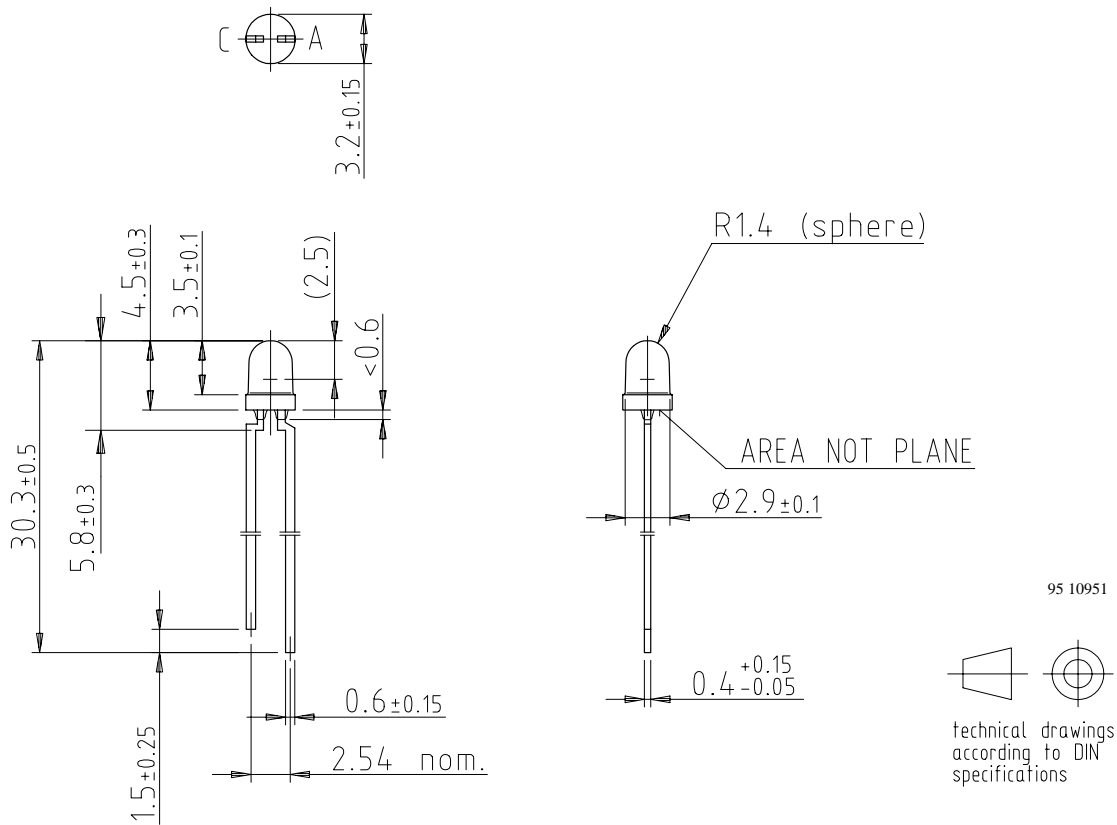


Figure 10. Relative Radiant Intensity vs. Angular Displacement

### Dimensions in mm





## **Ozone Depleting Substances Policy Statement**

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Vishay Semiconductor GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**Vishay Semiconductor GmbH** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

**We reserve the right to make changes to improve technical design and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay-Telefunken products for any unintended or unauthorized application, the buyer shall indemnify Vishay-Telefunken against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany  
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423