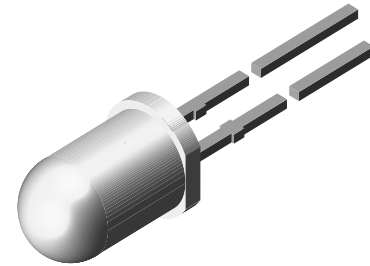


## High Speed Infrared Emitting Diode, 870 nm, GaAIAs Double Hetero

### Description

TSHF5400 is a high speed infrared emitting diode in GaAIAs on GaAIAs double hetero (DH) technology, molded on copper frame, in a clear, untinted plastic package.

The new technology combines the high speed of DH-GaAIAs with the efficiency of standard GaAIAs and the low forward voltage of the standard GaAs technology.



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### Features

- High modulation bandwidth (10 MHz)
- Extra high radiant power and radiant intensity
- Low forward voltage
- Suitable for high pulse current operation
- Standard T-1 $\frac{3}{4}$  ( $\varnothing$  5 mm) package
- Angle of half intensity  $\varphi = \pm 22^\circ$
- Peak wavelength  $\lambda_p = 870$  nm
- High reliability
- Good spectral matching to Si photodetectors
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

### Applications

Infrared high speed remote control and free air data transmission systems with high modulation frequencies or high data transmission rate requirements.

TSHF5400 is ideal for the design of transmission systems according to IrDA requirements and for carrier frequency based systems (e.g. ASK / FSK - coded, 450 kHz or 1.3 MHz).

### Absolute Maximum Ratings

$T_{amb} = 25^\circ\text{C}$ , unless otherwise specified

| Parameter                           | Test condition                          | 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               | $t_p = 100 \mu\text{s}$                 | $I_{FSM}$  | 1.5           | A                |
| Power Dissipation                   |   | $P_V$      | 160           | mW               |
| Junction Temperature                |   | $T_j$      | 100           | $^\circ\text{C}$ |
| Operating Temperature Range         |   | $T_{amb}$  | - 40 to + 100 | $^\circ\text{C}$ |
| Storage Temperature Range           |   | $T_{stg}$  | - 40 to + 100 | $^\circ\text{C}$ |
| Soldering Temperature               | $t \leq 5$ sec, 2 mm from case          | $T_{sd}$   | 260           | $^\circ\text{C}$ |
| Thermal Resistance Junction/Ambient |   | $R_{thJA}$ | 270           | K/W              |

### Basic Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

| Parameter                        | Test condition                                      | Symbol           | Min | Typ.     | Max | Unit          |
|----------------------------------|---|------------------|-----|----------|-----|---------------|
| Forward Voltage                  | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $V_F$            |     | 1.35     | 1.6 | V             |
|                                  | $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | $V_F$            |     | 2.4      | 3.0 | V             |
| Temp. Coefficient of $V_F$       | $I_F = 100\text{ mA}$                               | $TK_{V_F}$       |     | -1.7     |     | mV/K          |
| Reverse Current                  | $V_R = 5\text{ V}$                                  | $I_R$            |     |          | 10  | $\mu\text{A}$ |
| Junction capacitance             | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$   | $C_j$            |     | 160      |     | pF            |
| Radiant Intensity                | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $I_e$            | 25  | 40       | 125 | mW/sr         |
|                                  | $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | $I_e$            |     | 400      |     | mW/sr         |
| Radiant Power                    | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $\phi_e$         |     | 35       |     | mW            |
| Temp. Coefficient of $\phi_e$    | $I_F = 100\text{ mA}$                               | $TK_{\phi_e}$    |     | -0.7     |     | %/K           |
| Angle of Half Intensity          |   | $\phi$           |     | $\pm 22$ |     | deg           |
| Peak Wavelength                  | $I_F = 100\text{ mA}$                               | $\lambda_p$      |     | 870      |     | nm            |
| Spectral Bandwidth               | $I_F = 100\text{ mA}$                               | $\Delta\lambda$  |     | 40       |     | nm            |
| Temp. Coefficient of $\lambda_p$ | $I_F = 100\text{ mA}$                               | $TK_{\lambda_p}$ |     | 0.2      |     | nm/K          |
| Rise Time                        | $I_F = 100\text{ mA}$                               | $t_r$            |     | 30       |     | ns            |
| Fall Time                        | $I_F = 100\text{ mA}$                               | $t_f$            |     | 30       |     | ns            |
| Virtual Source Diameter          | method: 63 % encircled energy                       | $\emptyset$      |     | 2.1      |     | mm            |

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

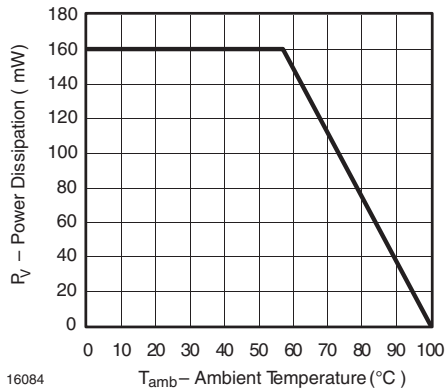


Figure 1. Power Dissipation vs. Ambient Temperature

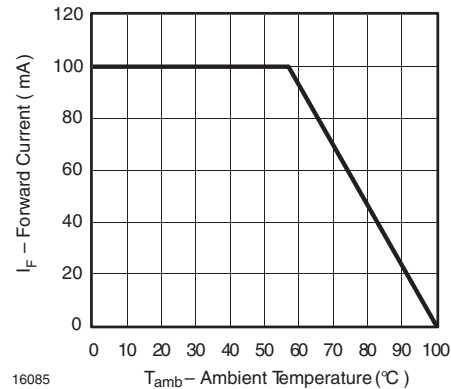


Figure 2. Forward Current vs. Ambient Temperature

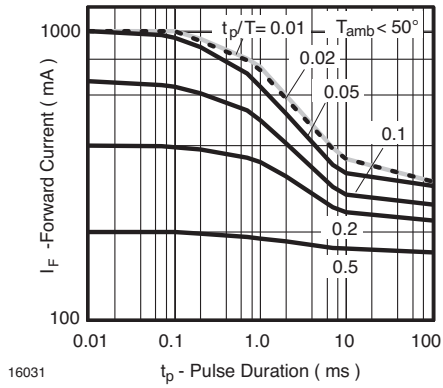


Figure 3. Pulse Forward Current vs. Pulse Duration

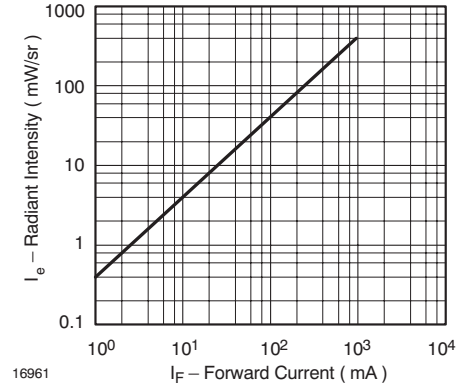


Figure 6. Radiant Intensity vs. Forward Current

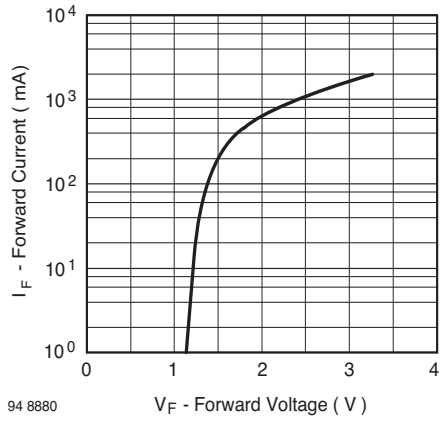


Figure 4. Forward Current vs. Forward Voltage

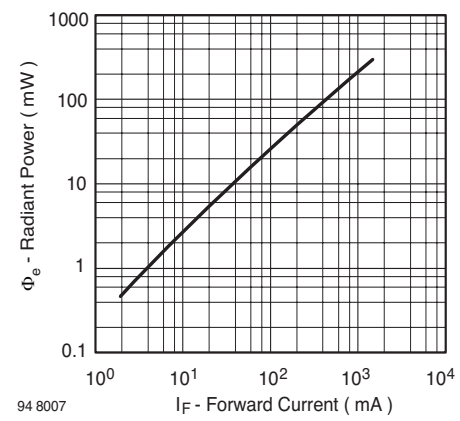


Figure 7. Radiant Power vs. Forward Current

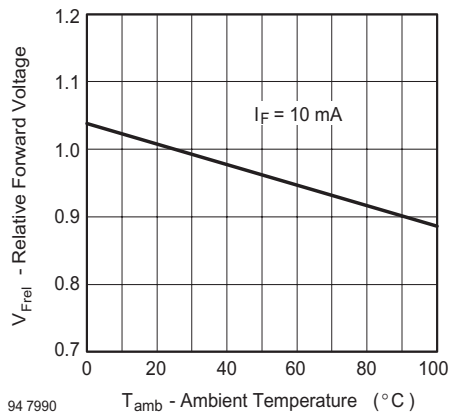


Figure 5. Relative Forward Voltage vs. Ambient Temperature

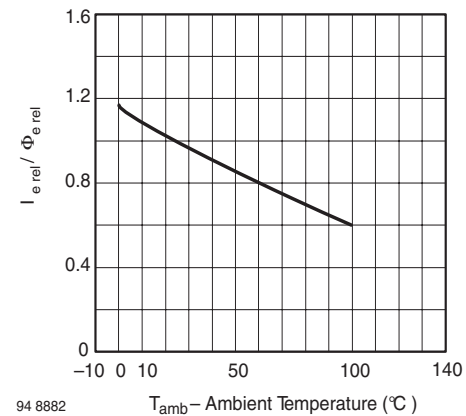


Figure 8. Rel. Radiant Intensity/Power vs. Ambient Temperature

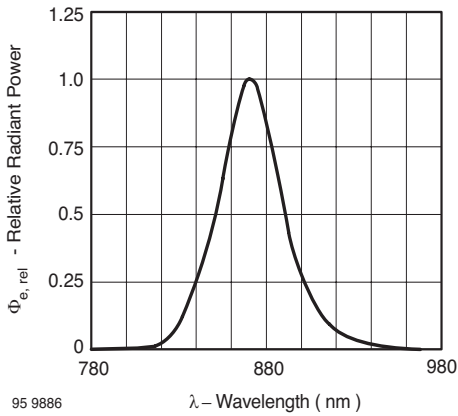


Figure 9. Relative Radiant Power vs. Wavelength

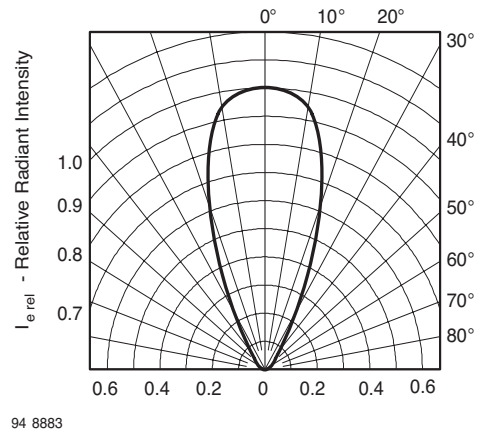
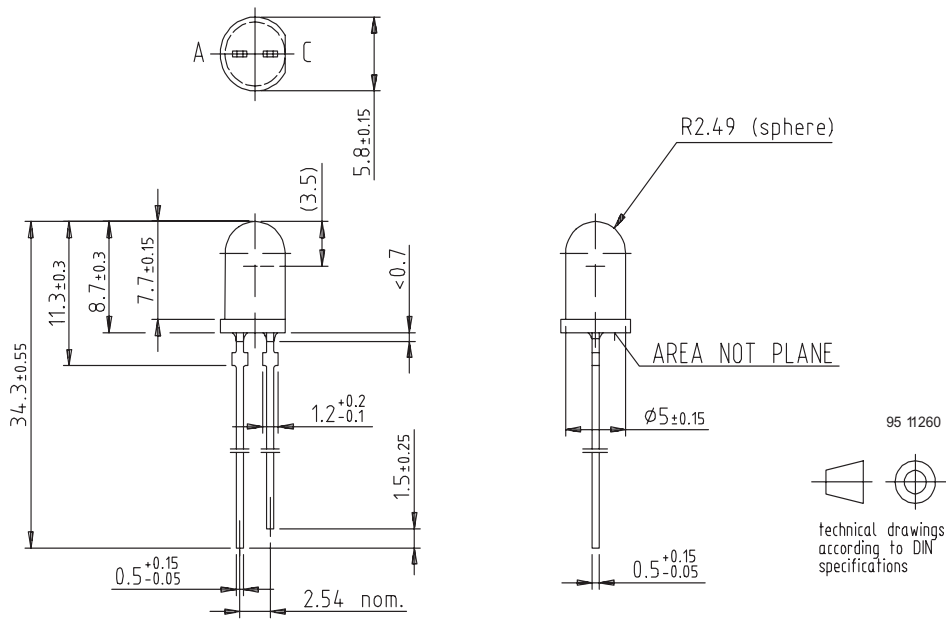


Figure 10. Relative Radiant Intensity vs. Angular Displacement

## Package 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 Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors 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.

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