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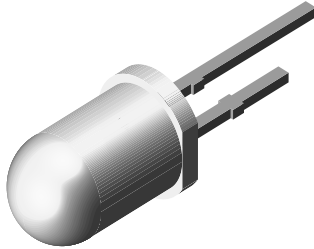
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# Infrared Emitting Diode, 950 nm, GaAs



94 8390

## DESCRIPTION

TSUS5400 is an infrared, 950 nm emitting diode in GaAs technology molded in a blue-gray tinted plastic package.

## FEATURES

- Package type: leaded
- Package form: T-1 $\frac{3}{4}$
- Dimensions (in mm):  $\varnothing$  5
- Leads with stand-off
- Peak wavelength:  $\lambda_p = 950$  nm
- High reliability
- Angle of half intensity:  $\varphi = \pm 22^\circ$
- Low forward voltage
- Suitable for high pulse current operation
- Good spectral matching with Si photodetectors
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



## Note

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

## APPLICATIONS

- Infrared remote control and free air transmission systems with low forward voltage and small package requirements
- Emitter in transmissive sensors
- Emitter in reflective sensors

| PRODUCT SUMMARY |               |                 |                  |            |
|-----------------|---------------|-----------------|------------------|------------|
| COMPONENT       | $I_e$ (mW/sr) | $\varphi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
| TSUS5400        | 14            | $\pm 22$        | 950              | 800        |
| TSUS5401        | 17            | $\pm 22$        | 950              | 800        |
| TSUS5402        | 20            | $\pm 22$        | 950              | 800        |

## Note

- Test conditions see table "Basic Characteristics"

| ORDERING INFORMATION |           |                              |                   |
|----------------------|-----------|------------------------------|-------------------|
| ORDERING CODE        | PACKAGING | REMARKS                      | PACKAGE FORM      |
| TSUS5400             | Bulk      | MOQ: 4000 pcs, 4000 pcs/bulk | T-1 $\frac{3}{4}$ |
| TSUS5401             | Bulk      | MOQ: 4000 pcs, 4000 pcs/bulk | T-1 $\frac{3}{4}$ |
| TSUS5402             | Bulk      | MOQ: 4000 pcs, 4000 pcs/bulk | T-1 $\frac{3}{4}$ |

## Note

- MOQ: minimum order quantity

| 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   |  | $I_F$      | 150           | mA               |
| Peak forward current  | $t_p/T = 0.5, t_p = 100 \mu\text{s}$   | $I_{FM}$   | 300           | mA               |
| Surge forward current   | $t_p = 100 \mu\text{s}$                | $I_{FSM}$  | 2.5           | A                |
| Power dissipation   |  | $P_V$      | 170           | mW               |
| Junction temperature  |  | $T_j$      | 100           | $^\circ\text{C}$ |
| Operating temperature range   |  | $T_{amb}$  | - 40 to + 85  | $^\circ\text{C}$ |
| Storage temperature range   |  | $T_{stg}$  | - 40 to + 100 | $^\circ\text{C}$ |
| Soldering temperature   | $t \leq 5$ s, 2 mm from case           | $T_{sd}$   | 260           | $^\circ\text{C}$ |
| Thermal resistance junction/ambient   | J-STD-051, leads 7 mm, soldered on PCB | $R_{thJA}$ | 230           | K/W              |

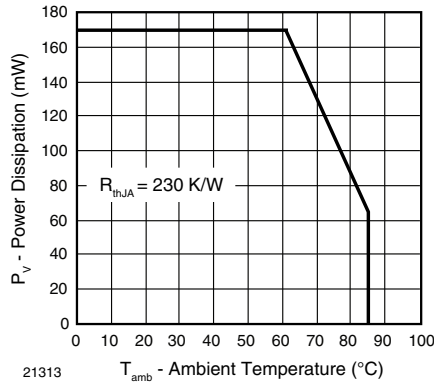


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

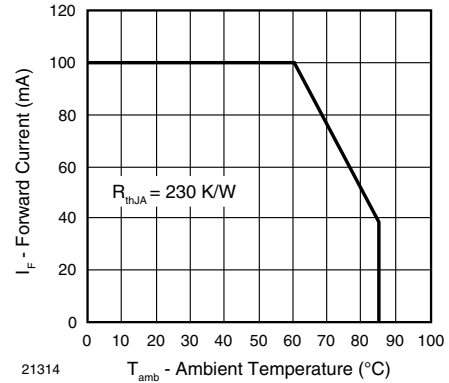


Fig. 2 - Forward Current Limit vs. Ambient Temperature

**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                              | TEST CONDITION                                    | SYMBOL           | MIN. | TYP.     | MAX. | UNIT          |
|--|---|------------------|------|----------|------|---------------|
| Forward voltage                        | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$      | $V_F$            |      | 1.3      | 1.7  | V             |
| Temperature coefficient of $V_F$       | $I_F = 100\text{ mA}$                             | $TK_{V_F}$       |      | -1.3     |      | mV/K          |
| Reverse current                        | $V_R = 5\text{ V}$                                | $I_R$            |      |          | 100  | $\mu\text{A}$ |
| Junction capacitance                   | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ | $C_j$            |      | 30       |      | pF            |
| Temperature coefficient of $\phi_e$    | $I_F = 20\text{ mA}$                              | $TK_{\phi_e}$    |      | -0.8     |      | %/K           |
| Angle of half intensity                |   | $\phi$           |      | $\pm 22$ |      | deg           |
| Peak wavelength                        | $I_F = 100\text{ mA}$                             | $\lambda_p$      |      | 950      |      | nm            |
| Spectral bandwidth                     | $I_F = 100\text{ mA}$                             | $\Delta\lambda$  |      | 50       |      | nm            |
| Temperature coefficient of $\lambda_p$ | $I_F = 100\text{ mA}$                             | $TK_{\lambda_p}$ |      | 0.2      |      | nm/K          |
| Rise time                              | $I_F = 100\text{ mA}$                             | $t_r$            |      | 800      |      | ns            |
|  | $I_F = 1.5\text{ A}$                              | $t_r$            |      | 400      |      | ns            |
| Fall time                              | $I_F = 100\text{ mA}$                             | $t_f$            |      | 800      |      | ns            |
|  | $I_F = 1.5\text{ A}$                              | $t_f$            |      | 400      |      | ns            |
| Virtual source diameter                |   | $d$              |      | 2.9      |      | mm            |

**TYPE DEDICATED CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER         | TEST CONDITION  | PART     | SYMBOL   | MIN. | TYP. | MAX. | UNIT  |
|-------------------|---|----------|----------|------|------|------|-------|
| Forward voltage   | $I_F = 1.5\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | TSUS5400 | $V_F$    |      | 2.2  | 3.4  | V     |
|                   |   | TSUS5401 | $V_F$    |      | 2.2  | 3.4  | V     |
|                   |   | TSUS5402 | $V_F$    |      | 2.2  | 2.7  | V     |
| Radiant intensity | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$          | TSUS5400 | $I_e$    | 7    | 14   | 35   | mW/sr |
|                   |   | TSUS5401 | $I_e$    | 10   | 17   | 35   | mW/sr |
|                   |   | TSUS5402 | $I_e$    | 15   | 20   | 35   | mW/sr |
|                   | $I_F = 1.5\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | TSUS5400 | $I_e$    | 60   | 140  |      | mW/sr |
|                   |   | TSUS5401 | $I_e$    | 85   | 160  |      | mW/sr |
|                   |   | TSUS5402 | $I_e$    | 120  | 190  |      | mW/sr |
| Radiant power     | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$          | TSUS5400 | $\phi_e$ |      | 13   |      | mW    |
|                   |   | TSUS5401 | $\phi_e$ |      | 14   |      | mW    |
|                   |   | TSUS5402 | $\phi_e$ |      | 15   |      | mW    |



## BASIC CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

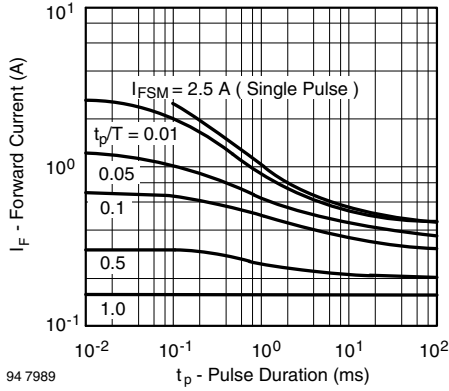


Fig. 3 - Pulse Forward Current vs. Pulse Duration

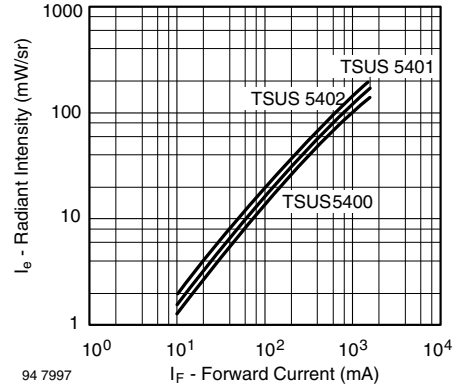


Fig. 6 - Radiant Intensity vs. Forward Current

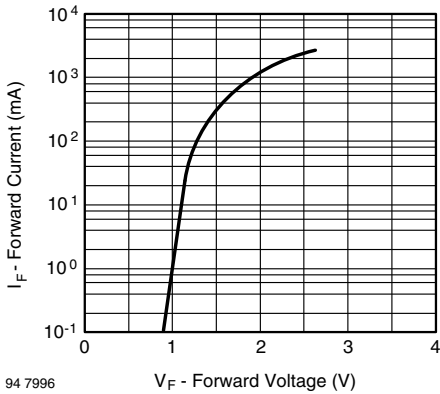


Fig. 4 - Forward Current vs. Forward Voltage

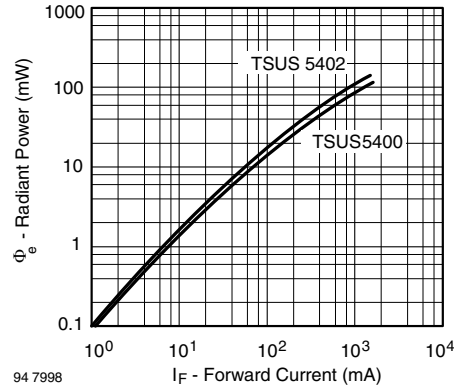


Fig. 7 - Radiant Power vs. Forward Current

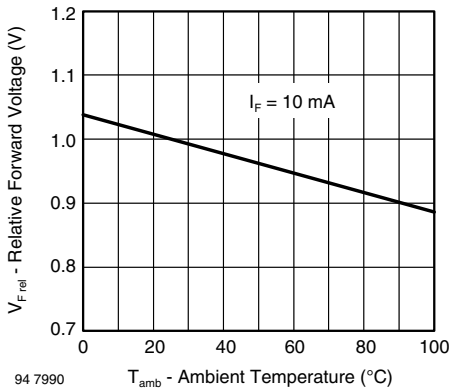


Fig. 5 - Relative Forward Voltage vs. Ambient Temperature

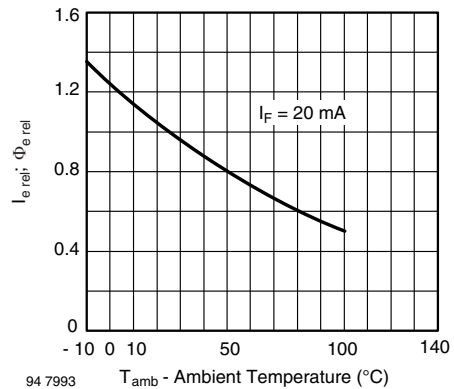


Fig. 8 - Relative Radiant Intensity/Power vs. Ambient Temperature

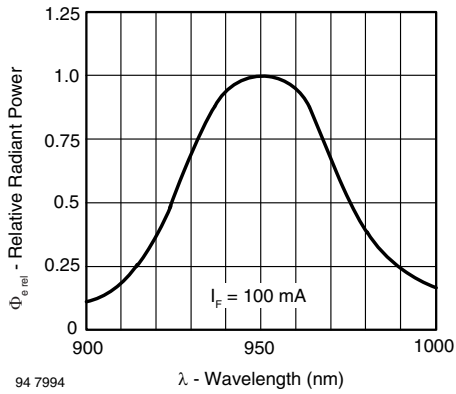


Fig. 9 - Relative Radiant Power vs. Wavelength

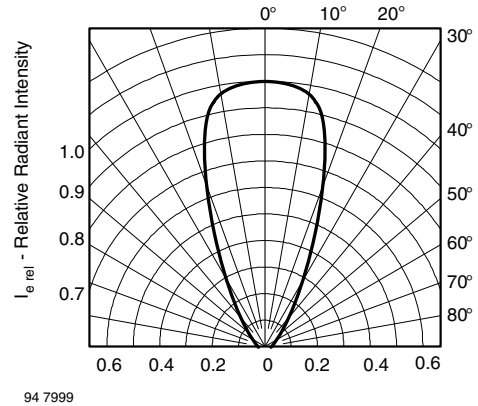
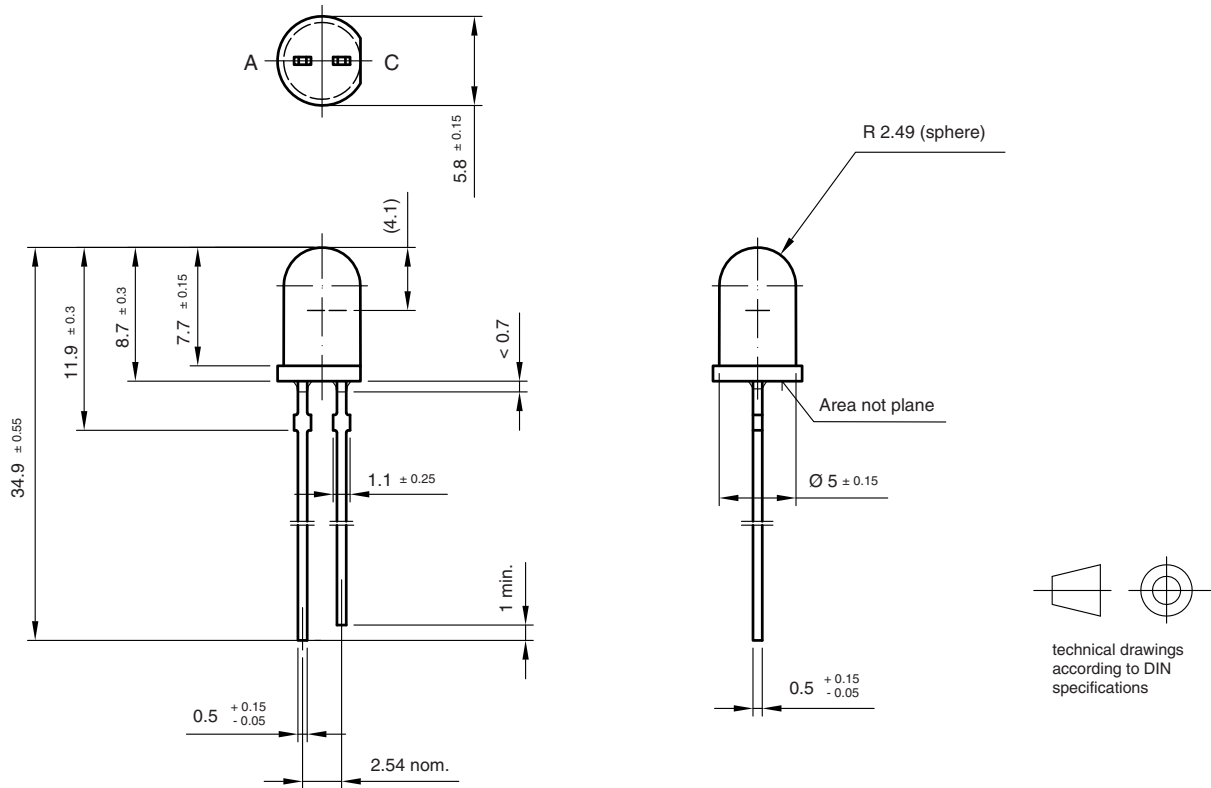


Fig. 10 - Relative Radiant Intensity vs. Angular Displacement

**PACKAGE DIMENSIONS** in millimeters



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