

# High Speed Infrared Emitting Diode, 940 nm, Surface Emitter Technology



22114

## FEATURES

- Package type: leaded
- Package form: T-1 $\frac{3}{4}$
- Dimensions (in mm):  $\varnothing$  5
- Leads with stand-off
- Peak wavelength:  $\lambda_p = 940$  nm
- High reliability
- High radiant power
- High radiant intensity
- Narrow angle of half intensity:  $\varphi = \pm 3^\circ$
- Suitable for high pulse current operation
- Good spectral matching with CMOS cameras
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## DESCRIPTION

As part of the [SurfLight™](#) portfolio, the VSLY5940 is an infrared, 940 nm emitting diode based on GaAlAs surface emitter chip technology with extreme high radiant intensity, high optical power and high speed, molded in a clear, untinted plastic package, with a parabolic lens.

## APPLICATIONS

- Infrared radiation source for operation with CMOS cameras
- High speed IR data transmission
- Smoke-automatic fire detectors
- IR Flash

## PRODUCT SUMMARY

| COMPONENT | $I_e$ (mW/sr) | $\varphi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
|-----------|---------------|-----------------|------------------|------------|
| VSLY5940  | 600           | $\pm 3$         | 940              | 10         |

### Note

- Test conditions see table “Basic Characteristics”

## ORDERING INFORMATION

| ORDERING CODE | PACKAGING | REMARKS                      | PACKAGE FORM      |
|---------------|-----------|------------------------------|-------------------|
| VSLY5940      | Bulk      | MOQ: 4000 pcs, 4000 pcs/bulk | T-1 $\frac{3}{4}$ |
| VSLY5940-CS21 | Reel      | MOQ: 5000 pcs, 1000 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                     |                                         | $I_F$      | 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           | A                |
| Power dissipation                   |                                         | $P_V$      | 190         | 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              |

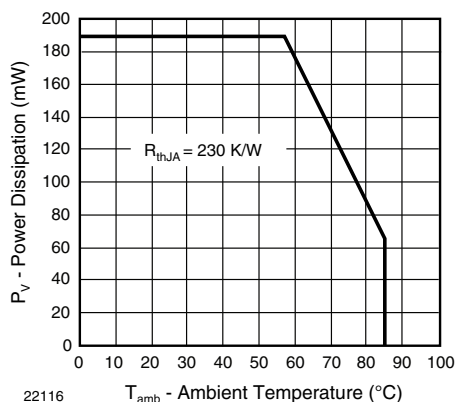


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

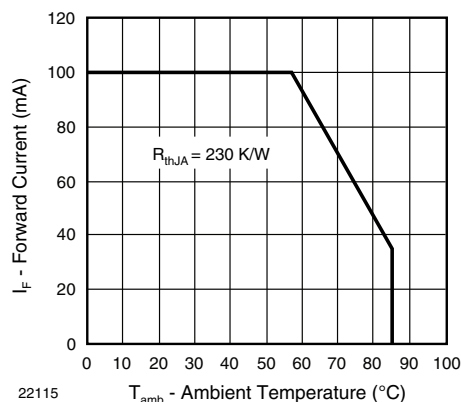


Fig. 2 - Forward Current Limit vs. Ambient Temperature

| <b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                     |                  |                                    |         |      |               |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------|------------------------------------|---------|------|---------------|
| PARAMETER                                                                                           | TEST CONDITION                                      | SYMBOL           | MIN.                               | TYP.    | MAX. | UNIT          |
| Forward voltage                                                                                     | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $V_F$            |                                    | 1.65    | 1.9  | V             |
|                                                                                                     | $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | $V_F$            |                                    | 2.9     |      | V             |
| Temperature coefficient of $V_F$                                                                    | $I_F = 1\text{ mA}$                                 | $TK_{VF}$        |                                    | -1.45   |      | mV/K          |
|                                                                                                     | $I_F = 10\text{ mA}$                                | $TK_{VF}$        |                                    | -1.25   |      | mV/K          |
| Reverse current                                                                                     |                                                     | $I_R$            | not designed for reverse operation |         |      | $\mu\text{A}$ |
| Junction capacitance                                                                                | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$   | $C_j$            |                                    | 125     |      | pF            |
| Radiant intensity                                                                                   | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $I_e$            | 300                                | 600     | 900  | mW/sr         |
|                                                                                                     | $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | $I_e$            |                                    | 5100    |      | mW/sr         |
| Radiant power                                                                                       | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $\phi_e$         |                                    | 55      |      | mW            |
| Temperature coefficient of $\phi_e$                                                                 | $I_F = 100\text{ mA}$                               | $TK_{\phi_e}$    |                                    | -0.35   |      | %/K           |
| Angle of half intensity                                                                             |                                                     | $\varphi$        |                                    | $\pm 3$ |      | deg           |
| Peak wavelength                                                                                     | $I_F = 100\text{ mA}$                               | $\lambda_p$      | 920                                | 940     | 960  | nm            |
| Spectral bandwidth                                                                                  | $I_F = 100\text{ mA}$                               | $\Delta\lambda$  |                                    | 35      |      | nm            |
| Temperature coefficient of $\lambda_p$                                                              | $I_F = 100\text{ mA}$                               | $TK_{\lambda_p}$ |                                    | 0.25    |      | nm/K          |
| Rise time                                                                                           | $I_F = 100\text{ mA}$                               | $t_r$            |                                    | 10      |      | ns            |
| Fall time                                                                                           | $I_F = 100\text{ mA}$                               | $t_f$            |                                    | 10      |      | ns            |

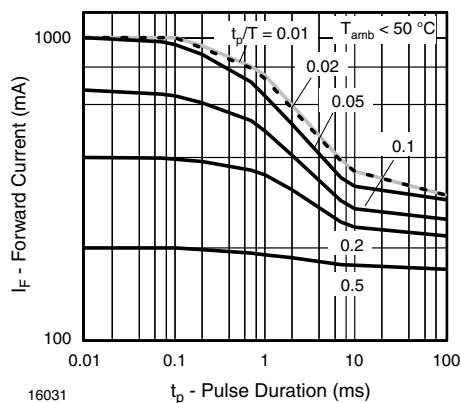
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 3 - Pulse Forward Current vs. Pulse Duration

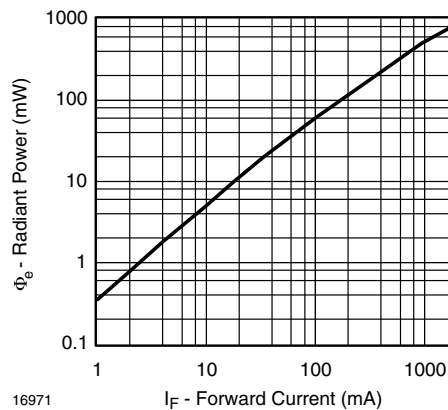


Fig. 6 - Radiant Power vs. Forward Current

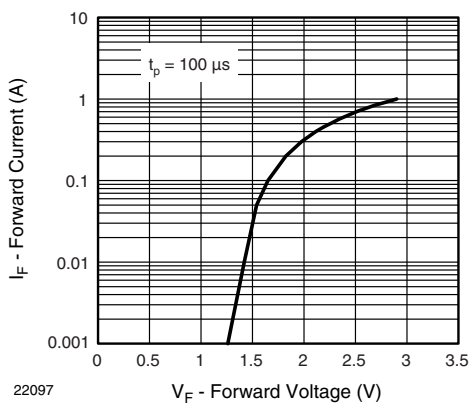


Fig. 4 - Forward Current vs. Forward Voltage

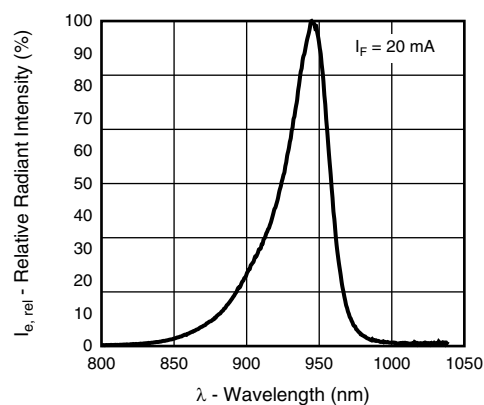


Fig. 7 - Relative Radiant Power vs. Wavelength

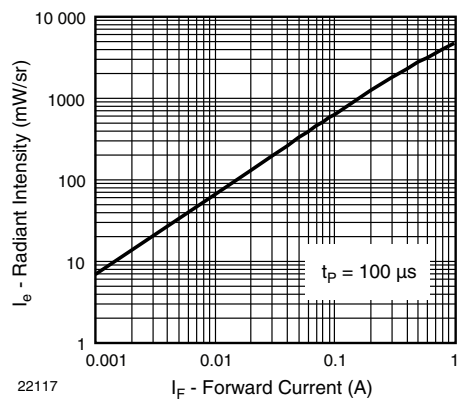


Fig. 5 - Radiant Intensity vs. Forward Current

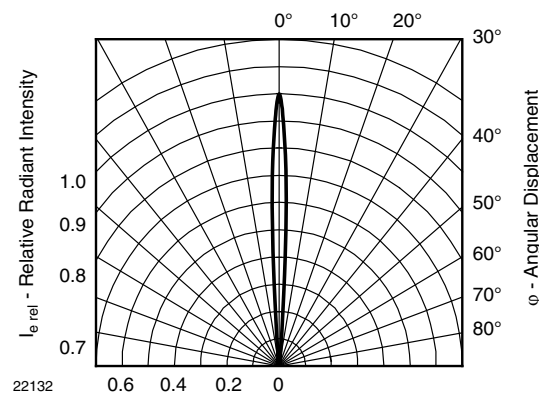
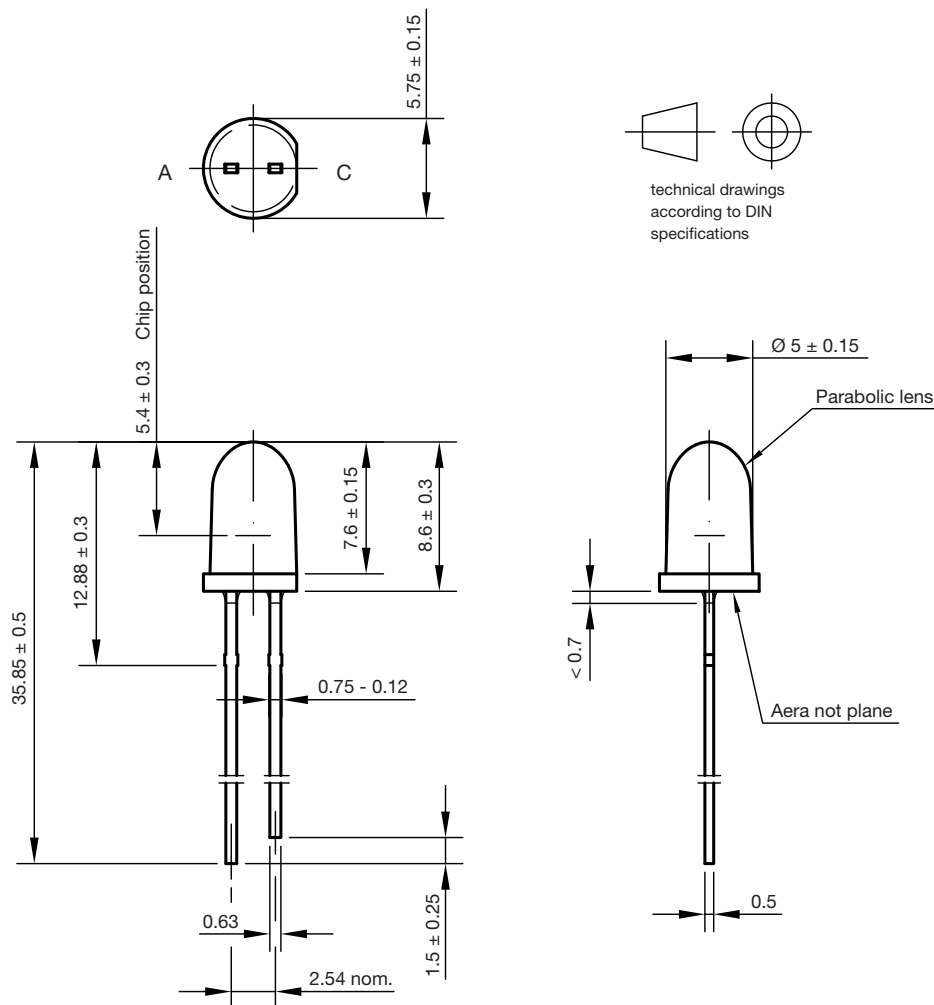


Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

**PACKAGE DIMENSIONS** in millimeters


technical drawings  
according to DIN  
specifications

Drawing-No.: 6.544-5385.01-4  
Issue: 2; 08.03.10  
20531

Not indicated tolerances  $\pm 0.1$



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