

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



948553

### DESCRIPTION

As part of the [SurfLight™](#) portfolio, the VSMY3940X01 is an infrared, 940 nm emitting diode based on surface emitter technology with high radiant intensity, high optical power and high speed, molded in a PLCC-2 package for surface mounting (SMD).

### FEATURES

- Package type: surface mount
- Package form: PLCC-2
- Dimensions (L x W x H in mm): 3.5 x 2.8 x 1.75
- AEC-Q101 qualified
- Peak wavelength:  $\lambda_p = 940$  nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity:  $\phi = \pm 60^\circ$
- Suitable for high pulse current operation
- Floor life: 168 h, MSL 3, acc. J-STD-020
- Lead (Pb)-free reflow soldering
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE

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

### RELEASED FOR APPLICATIONS

Infrared radiation source for operation with CMOS cameras (illumination)

- High speed IR data transmission
- IR touch panels
- 3D TV
- Light curtain

### PRODUCT SUMMARY

| COMPONENT   | $I_e$ (mW/sr) | $\phi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
|-------------|---------------|--------------|------------------|------------|
| VSMY3940X01 | 15            | $\pm 60$     | 940              | 10         |

#### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE    | PACKAGING     | REMARKS                      | PACKAGE FORM |
|------------------|---------------|------------------------------|--------------|
| VSMY3940X01-GS08 | Tape and reel | MOQ: 7500 pcs, 1500 pcs/reel | PLCC-2       |
| VSMY3940X01-GS18 | Tape and reel | MOQ: 8000 pcs, 8000 pcs/reel | PLCC-2       |

#### Note

- MOQ: minimum order quantity

| <b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |            |             |                    |
|--|--|------------|-------------|--------------------|
| PARAMETER  | TEST CONDITION                                 | SYMBOL     | VALUE       | UNIT               |
| Reverse voltage  |  | $V_R$      | 5           | V                  |
| Forward current  |  | $I_F$      | 100         | mA                 |
| Pulse peak forward current   | $t_p/T = 0.5$ , $t_p = 100\text{ }\mu\text{s}$ | $I_{FM}$   | 200         | mA                 |
| Surge forward current  | $t_p = 100\text{ }\mu\text{s}$                 | $I_{FSM}$  | 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  | acc. figure 10, J-STD-020                      | $T_{sd}$   | 260         | $^{\circ}\text{C}$ |
| Thermal resistance junction/ambient  | J-STD-051, soldered on PCB                     | $R_{thJA}$ | 250         | K/W                |

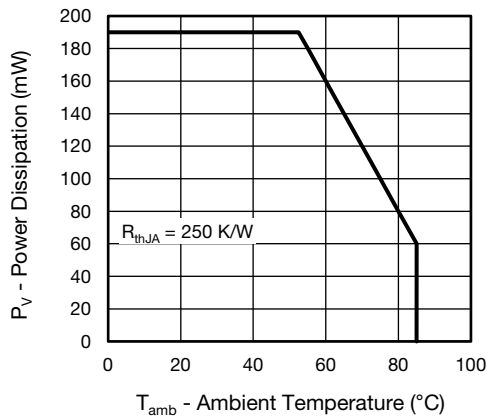


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

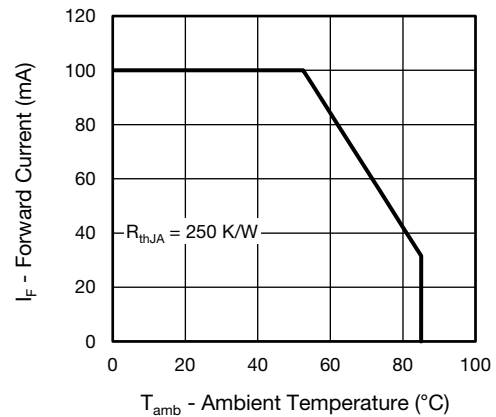


Fig. 2 - Forward Current Limit vs. Ambient Temperature

| <b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |                  |                                    |          |      |               |
|---|---|------------------|------------------------------------|----------|------|---------------|
| PARAMETER   | TEST CONDITION                                      | SYMBOL           | MIN.                               | TYP.     | MAX. | UNIT          |
| Forward voltage   | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $V_F$            |                                    | 1.44     | 1.9  | V             |
|   | $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | $V_F$            |                                    | 2.2      |      | V             |
| Temperature coefficient of $V_F$  | $I_F = 100\text{ mA}$                               | $TK_{V_F}$       |                                    | -1.6     |      | 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   | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $I_e$            | 8                                  | 15       | 24   | mW/sr         |
|   | $I_F = 1\text{ A}$ , $t_p = 100\text{ }\mu\text{s}$ | $I_e$            |                                    | 120      |      | mW/sr         |
| Radiant power   | $I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$        | $\phi_e$         |                                    | 55       |      | mW            |
| Temperature coefficient of $\phi_e$   | $I_F = 100\text{ mA}$                               | $TK_{\phi_e}$    |                                    | -0.25    |      | %/K           |
| Angle of half intensity   |   | $\phi$           |                                    | $\pm 60$ |      | deg           |
| Peak wavelength   | $I_F = 20\text{ mA}$                                | $\lambda_p$      | 920                                | 940      | 960  | nm            |
| Spectral bandwidth  | $I_F = 30\text{ mA}$                                | $\Delta\lambda$  |                                    | 40       |      | 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)

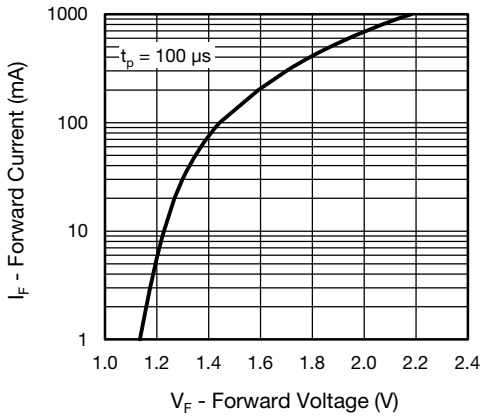


Fig. 3 - Forward Current vs. Forward Voltage

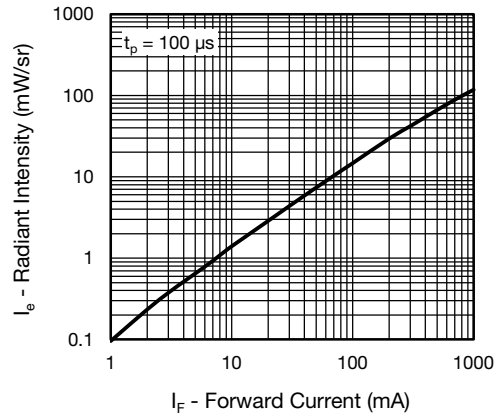


Fig. 6 - Radiant Intensity vs. Forward Current

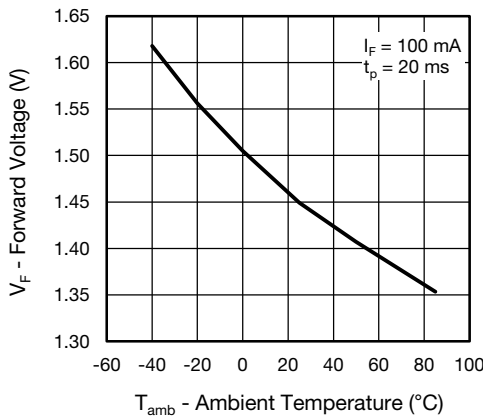


Fig. 4 - Forward Voltage vs. Ambient Temperature

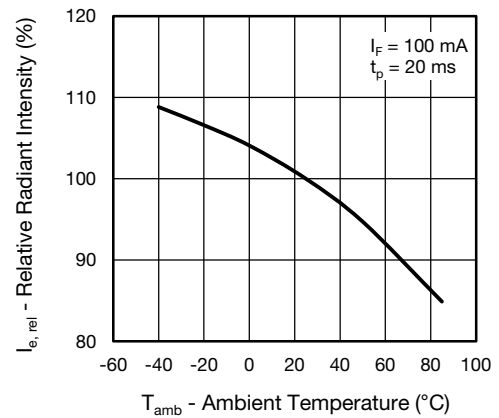


Fig. 7 - Relative Radiant Intensity vs. Ambient Temperature

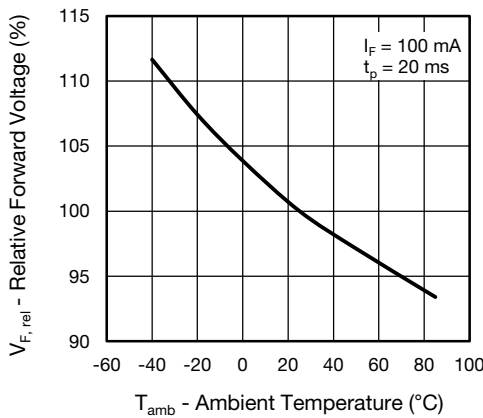


Fig. 5 - Relative Forward Voltage vs. Ambient Temperature

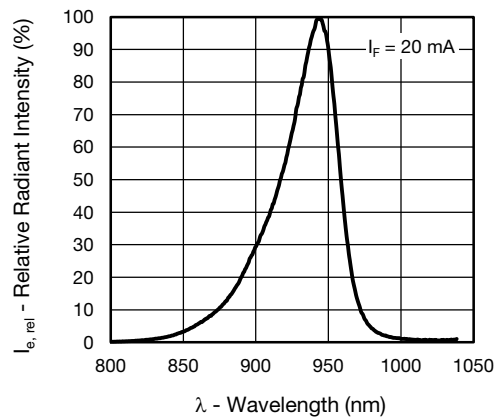
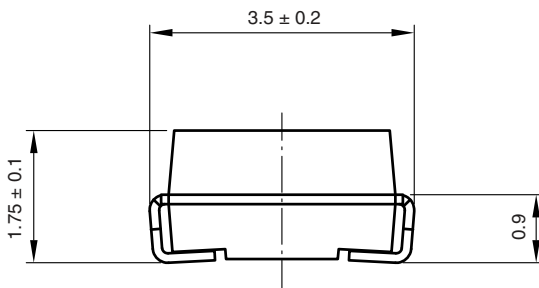


Fig. 8 - Relative Radiant Intensity vs. Wavelength

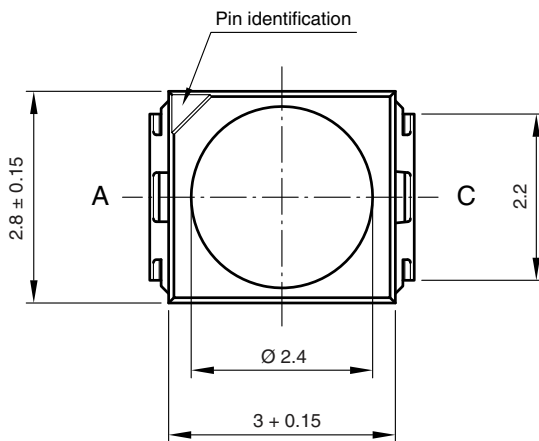


Fig. 9 - Relative Radiant Intensity vs. Angular Displacement

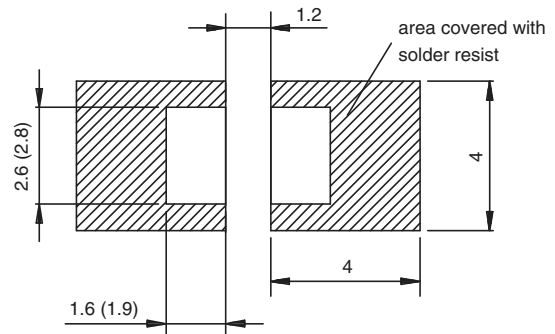
**PACKAGE DIMENSIONS** in millimeters



technical drawings according to DIN specifications



**Mounting Pad Layout**



Drawing-No.: 6.541-5067.02-4  
 Issue: 4; 19.07.10  
 20767

**SOLDER PROFILE**

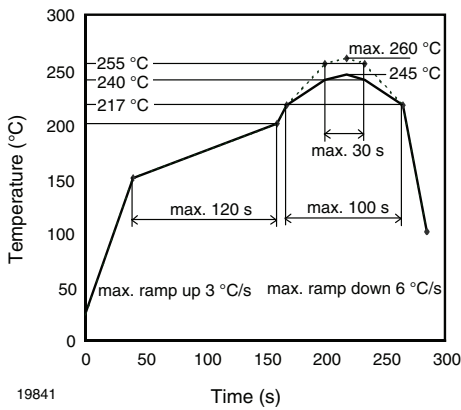


Fig. 10 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

**DRYPACK**

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

**FLOOR LIFE**

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:  
 Floor life: 168 h  
 Conditions:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ ,  $\text{RH} < 60\%$   
 Moisture sensitivity level 3, acc. to J-STD-020.

**DRYING**

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at  $40\text{ }^{\circ}\text{C}$  (+  $5\text{ }^{\circ}\text{C}$ ),  $\text{RH} < 5\%$ .

**TAPE AND REEL**

PLCC-2 components are packed in antistatic blister tape (DIN IEC (CO) 564) for automatic component insertion. Cavities of blister tape are covered with adhesive tape.

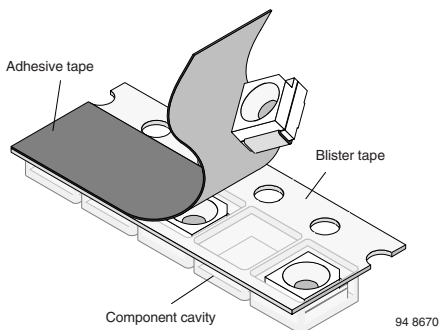


Fig. 11 - Blister Tape

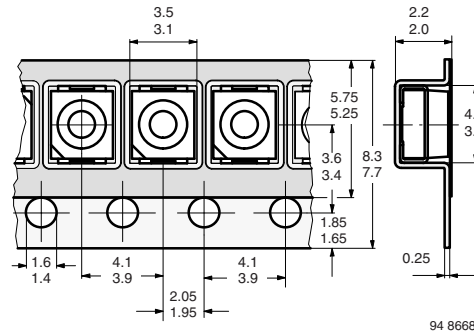


Fig. 12 - Tape Dimensions in mm for PLCC-2

**MISSING DEVICES**

A maximum of 0.5 % of the total number of components per reel may be missing, exclusively missing components at the beginning and at the end of the reel. A maximum of three consecutive components may be missing, provided this gap is followed by six consecutive components.

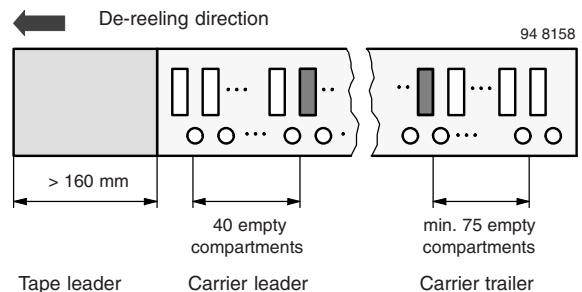


Fig. 13 - Beginning and End of Reel

The tape leader is at least 160 mm and is followed by a carrier tape leader with at least 40 empty compartments. The tape leader may include the carrier tape as long as the cover tape is not connected to the carrier tape. The least component is followed by a carrier tape trailer with a least 75 empty compartments and sealed with cover tape.

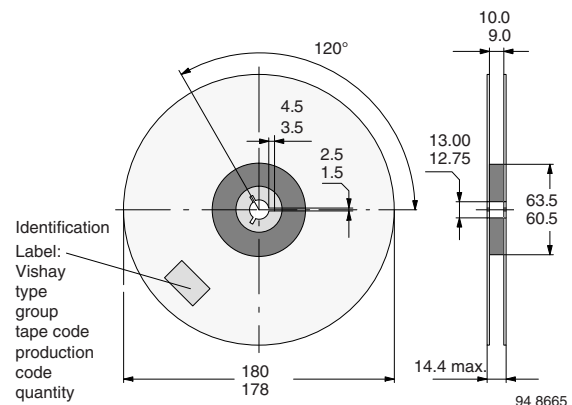


Fig. 14 - Dimensions of Reel-GS08

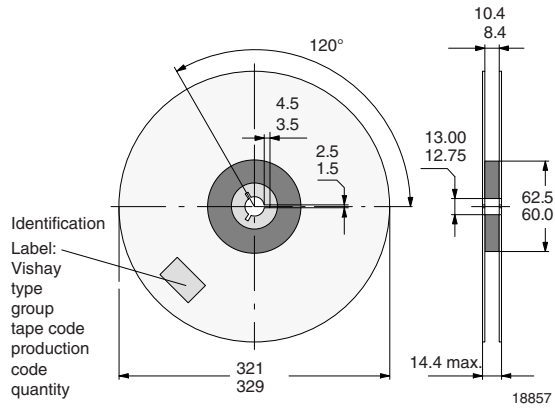


Fig. 15 - Dimensions of Reel-GS18

**COVER TAPE REMOVAL FORCE**

The removal force lies between 0.1 N and 1.0 N at a removal speed of 5 mm/s. In order to prevent components from popping out of the blisters, the cover tape must be pulled off at an angle of 180° with regard to the feed direction.



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