

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



21531

### DESCRIPTION

As part of the [SurfLight™](#) portfolio, the VSMY1940X01 is an infrared, 940 nm emitting diode based on GaAlAs surface emitter chip technology with high radiant intensity, high optical power and high speed, molded in clear, untinted 0805 plastic package for surface mounting (SMD).

### FEATURES

- Package type: surface mount
- Package form: 0805
- Dimensions (L x W x H in mm): 2 x 1.25 x 0.85
- AEC-Q101 qualified
- Peak wavelength:  $\lambda_p = 940$  nm
- High reliability
- High radiant power
- High radiant intensity
- High speed
- Angle of half sensitivity:  $\phi = \pm 60^\circ$
- Suitable for high pulse current operation
- 0805 standard surface-mountable package
- Floor life: 168 h, MSL 3, according to 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)

### APPLICATIONS

- IrDA compatible data transmission
- Miniature light barrier
- Photointerrupters
- Optical switch
- Emitter source for proximity sensors
- IR touch panels
- IR flash
- IR illumination
- 3D TV

| PRODUCT SUMMARY |               |              |                  |            |
|-----------------|---------------|--------------|------------------|------------|
| COMPONENT       | $I_e$ (mW/sr) | $\phi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
| VSMY1940X01     | 10            | $\pm 60$     | 940              | 10         |

#### Note

- Test conditions see table "Basic Characteristics"

| ORDERING INFORMATION |               |                              |              |
|----------------------|---------------|------------------------------|--------------|
| ORDERING CODE        | PACKAGING     | REMARKS                      | PACKAGE FORM |
| VSMY1940X01          | Tape and reel | MOQ: 3000 pcs, 3000 pcs/reel | 0805         |

#### Note

- MOQ: minimum order quantity



| ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |            |             |                    |
|---|---|------------|-------------|--------------------|
| PARAMETER   | TEST CONDITION                              | SYMBOL     | VALUE       | UNIT               |
| Reverse voltage   |   | $V_R$      | 5           | V                  |
| Forward current   |   | $I_F$      | 100         | mA                 |
| 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   |   | $P_V$      | 180         | 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   | According to Fig. 10, J-STD-020             | $T_{sd}$   | 260         | $^{\circ}\text{C}$ |
| Thermal resistance junction / ambient   | JESD 51                                     | $R_{thJA}$ | 250         | K/W                |

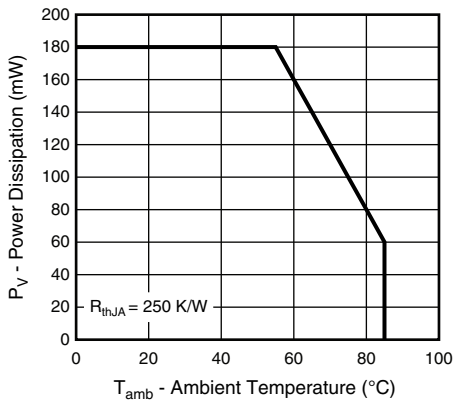


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

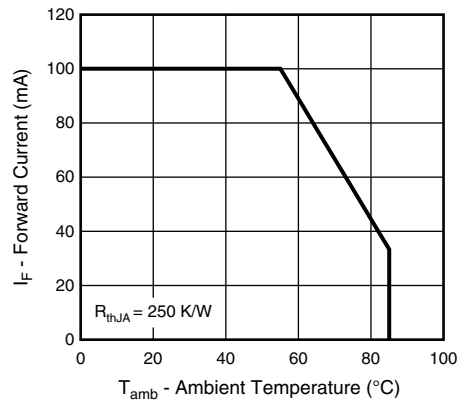


Fig. 2 - Forward Current Limit vs. Ambient Temperature

| BASIC CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |                  |                                    |          |      |               |
|--|--|------------------|------------------------------------|----------|------|---------------|
| PARAMETER  | TEST CONDITION   | SYMBOL           | MIN.                               | TYP.     | MAX. | UNIT          |
| Forward voltage  | $I_F = 100\text{ mA}, t_p = 20\text{ ms}$                  | $V_F$            | -                                  | 1.45     | 1.8  | V             |
|  | $I_F = 1\text{ A}, t_p = 100\text{ }\mu\text{s}$           | $V_F$            | -                                  | 2.2      | -    | V             |
| Temperature coefficient of $V_F$   | $I_F = 100\text{ mA}$                                      | $TK_{V_F}$       | -                                  | -2       | -    | mV/K          |
| Reverse current  |  | $I_R$            | Not designed for reverse operation |          |      | $\mu\text{A}$ |
| Junction capacitance   | $V_R = 0\text{ V}, f = 1\text{ MHz}, E = 0\text{ mW/cm}^2$ | $C_J$            | -                                  | 125      | -    | pF            |
| Radiant intensity  | $I_F = 100\text{ mA}, t_p = 20\text{ ms}$                  | $I_e$            | 5                                  | 10       | 15   | mW/sr         |
|  | $I_F = 1\text{ A}, t_p = 100\text{ }\mu\text{s}$           | $I_e$            | -                                  | 75       | -    | mW/sr         |
| Radiant power  | $I_F = 100\text{ mA}, t_p = 20\text{ ms}$                  | $\phi_e$         | -                                  | 50       | -    | mW            |
| Temperature coefficient of radiant power   | $I_F = 100\text{ mA}$                                      | $TK_{\phi_e}$    | -                                  | -0.2     | -    | %/K           |
| Angle of half intensity  |  | $\phi$           | -                                  | $\pm 60$ | -    | deg           |
| Peak wavelength  | $I_F = 100\text{ mA}$                                      | $\lambda_p$      | 920                                | 940      | 960  | nm            |
| Spectral bandwidth   | $I_F = 100\text{ mA}$                                      | $\Delta\lambda$  | -                                  | 40       | -    | nm            |
| Temperature coefficient of $\lambda_p$   | $I_F = 30\text{ mA}$                                       | $TK_{\lambda_p}$ | -                                  | 0.25     | -    | nm/K          |
| Rise time  | $I_F = 100\text{ mA}, 20\% \text{ to } 80\%$               | $t_r$            | -                                  | 10       | -    | ns            |
| Fall time  | $I_F = 100\text{ mA}, 20\% \text{ to } 80\%$               | $t_f$            | -                                  | 10       | -    | ns            |

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

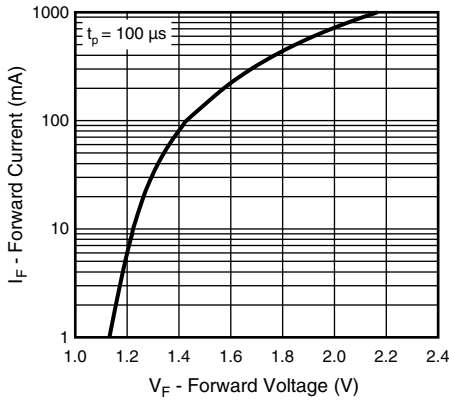


Fig. 3 - Forward Current vs. Forward Voltage

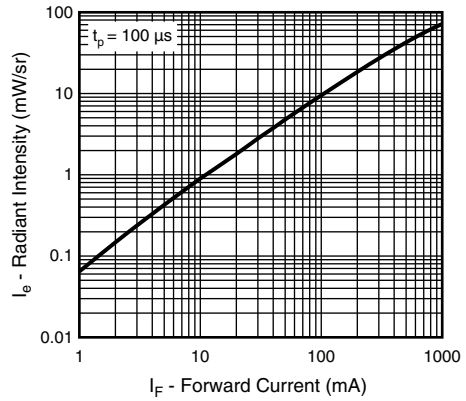


Fig. 6 - Radiant Intensity vs. Forward Current

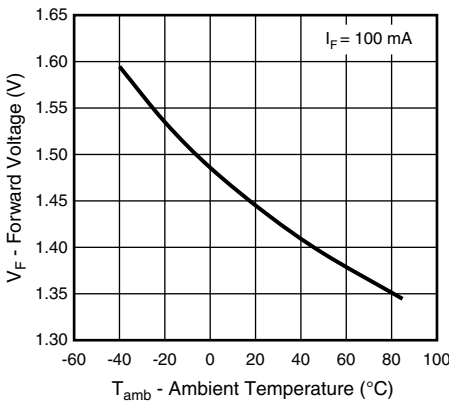


Fig. 4 - Forward Voltage vs. Ambient Temperature

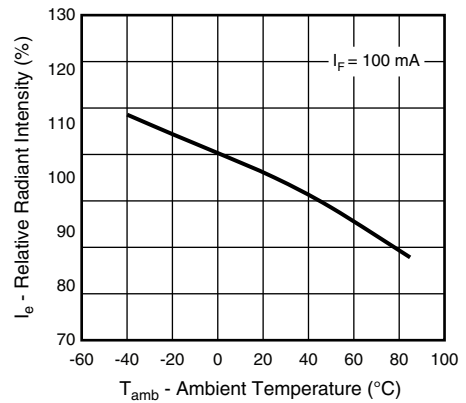


Fig. 7 - Relative Radiant Intensity vs. Ambient Temperature

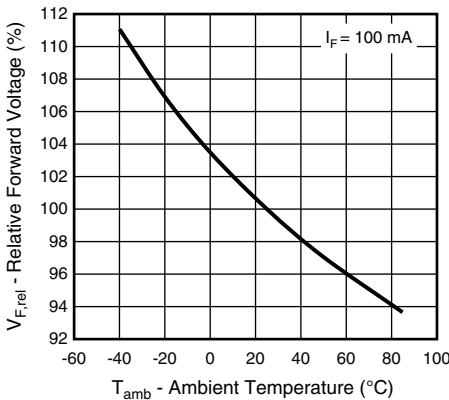


Fig. 5 - Relative Forward Voltage vs. Ambient Temperature

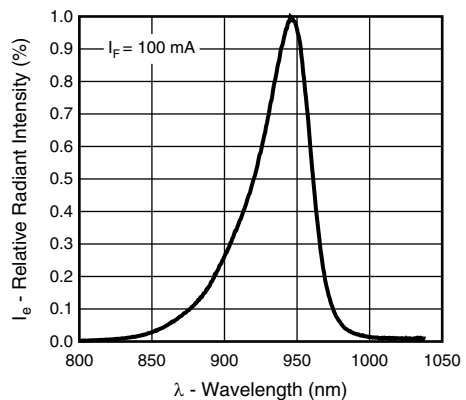


Fig. 8 - Relative Radiant Intensity vs. Wavelength

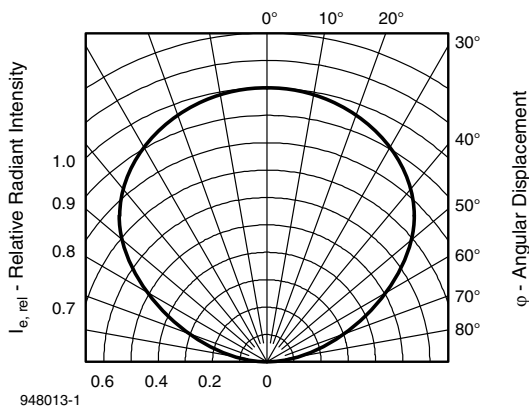


Fig. 9 - Relative Radiant Intensity vs. Angular Displacement

**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**

Time between soldering and removing from MBB must not exceed the time indicated in J-STD-020:

Moisture sensitivity: level 3

Floor life: 168 h

Conditions:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ ,  $\text{RH} < 60\text{ } \%$

**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  $40\text{ }^{\circ}\text{C}$  ( $+ 5\text{ }^{\circ}\text{C}$ ),  $\text{RH} < 5\text{ } \%$ .

**REFLOW SOLDER PROFILE**

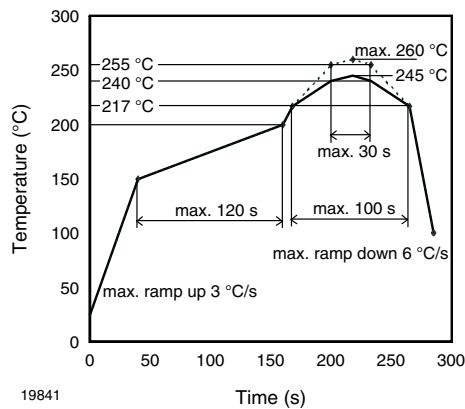
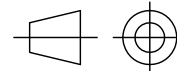
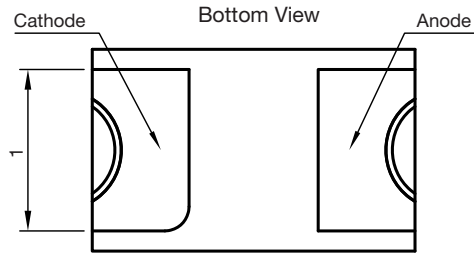


Fig. 10 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

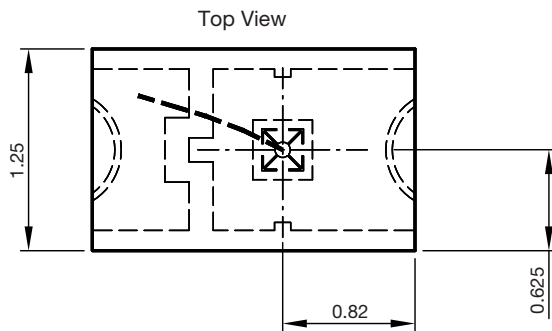
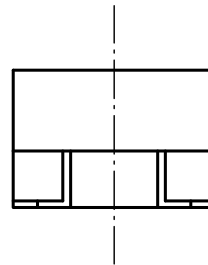
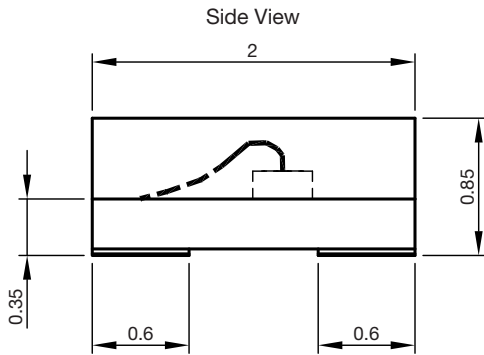


PACKAGE DIMENSIONS in millimeters

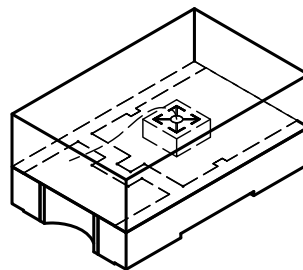
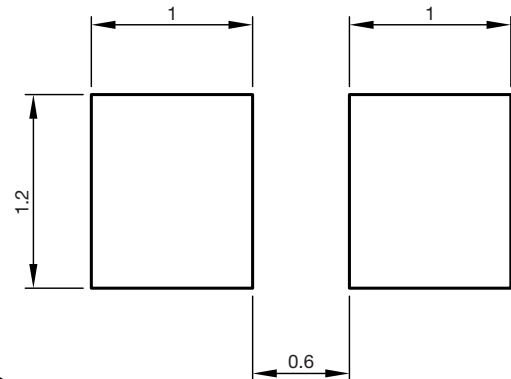


technical drawings according to DIN specifications

Not indicated tolerances  $\pm 0.1$



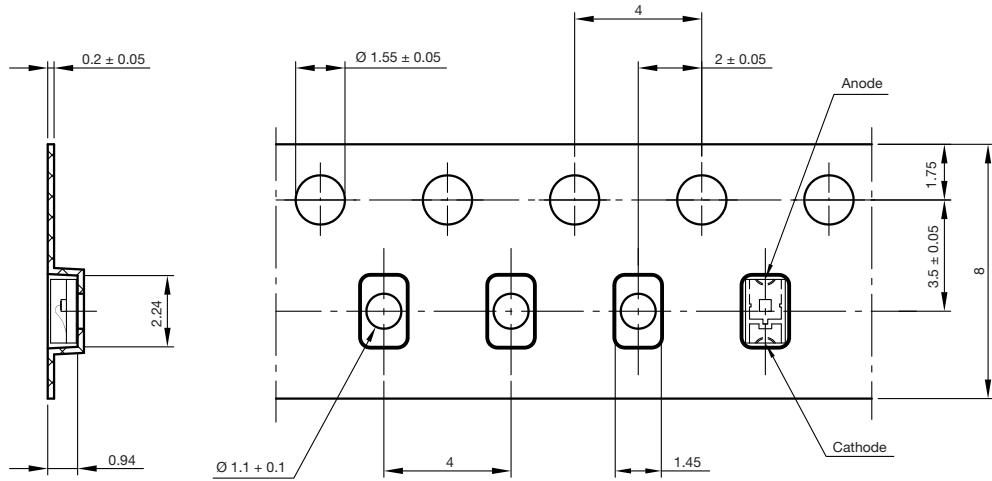
Recommended solder pad Footprint



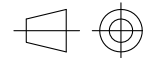
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Issue: 1; 29.03.10  
22111



**BLISTER TAPE DIMENSIONS** in millimeters



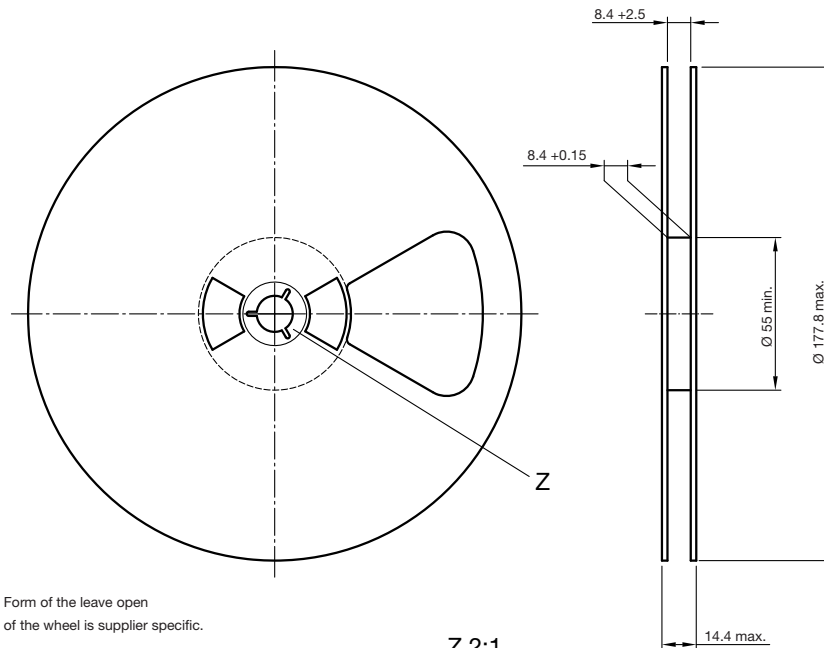
Not indicated tolerances ±0.1



technical drawings according to DIN specifications

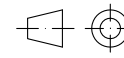
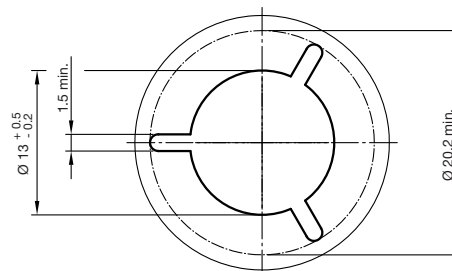
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Issue: 1; 13.04.10  
22112

**REEL DIMENSIONS** in millimeters



Form of the leave open of the wheel is supplier specific.

Z 2:1



technical drawings according to DIN specifications

Drawing-No.: 9.800-5096.01-4  
Issue: 2; 26.04.10  
20875



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