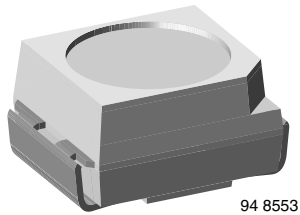


# High Speed Infrared Emitting Diode, 870 nm, GaAIAs Double Hetero



## DESCRIPTION

VSMF4720 is an infrared, 870 nm emitting diode in GaAIAs double hetero (DH) technology with high radiant power and high speed, molded in a PLCC-2 package for surface mounting (SMD). A 19" chip provides outstanding low forward voltage and radiant intensity even at 1 A pulse current.

## 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
- Peak wavelength:  $\lambda_p = 870$  nm
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity:  $\phi = \pm 60^\circ$
- Low forward voltage
- Suitable for high pulse current operation
- High modulation band width:  $f_c = 24$  MHz
- Good spectral matching with Si photodetectors
- Floor life: 168 h, MSL 3, acc. J-STD-020
- Lead (Pb)-free reflow soldering
- AEC-Q101 qualified
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Find out more about Vishay's Automotive Grade Product requirements at: [www.vishay.com/applications](http://www.vishay.com/applications)



## APPLICATIONS

- High speed IR data transmission
- High power emitter for low space applications
- High performance transmissive or reflective sensors

## PRODUCT SUMMARY

| COMPONENT | $I_e$ (mW/sr) | $\phi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
|-----------|---------------|--------------|------------------|------------|
| VSMF4720  | 16            | $\pm 60$     | 870              | 15         |

### Note

Test conditions see table "Basic Characteristics"

## ORDERING INFORMATION

| ORDERING CODE | PACKAGING     | REMARKS                      | PACKAGE FORM |
|---------------|---------------|------------------------------|--------------|
| VSMF4720-GS08 | Tape and reel | MOQ: 7500 pcs, 1500 pcs/reel | PLCC-2       |
| VSMF4720-GS18 | Tape and reel | MOQ: 8000 pcs, 8000 pcs/reel | PLCC-2       |

### Note

MOQ: minimum order quantity

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

| ABSOLUTE MAXIMUM RATINGS            |                                |            |               |      |
|-------------------------------------|--------------------------------|------------|---------------|------|
| PARAMETER                           | TEST CONDITION                 | SYMBOL     | VALUE         | UNIT |
| Reverse voltage                     |                                | $V_R$      | 5             | V    |
| Forward current                     |                                | $I_F$      | 100           | mA   |
| Peak forward current                | $t_p/T = 0.5, t_p = 100 \mu s$ | $I_{FM}$   | 200           | mA   |
| Surge forward current               | $t_p = 100 \mu s$              | $I_{FSM}$  | 1             | A    |
| Power dissipation                   |                                | $P_V$      | 160           | mW   |
| Junction temperature                |                                | $T_j$      | 100           | °C   |
| Operating temperature range         |                                | $T_{amb}$  | - 40 to + 85  | °C   |
| Storage temperature range           |                                | $T_{stg}$  | - 40 to + 100 | °C   |
| Soldering temperature               | Acc. figure 8, J-STD-020       | $T_{sd}$   | 260           | °C   |
| Thermal resistance junction/ambient | J-STD-051, soldered on PCB     | $R_{thJA}$ | 250           | K/W  |

**Note**

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

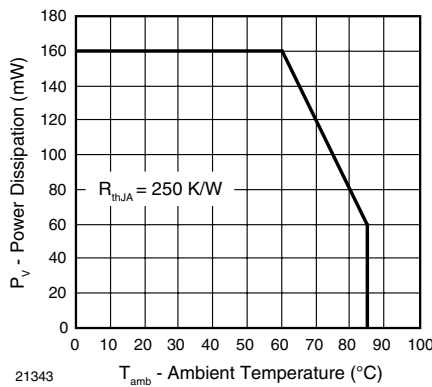


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

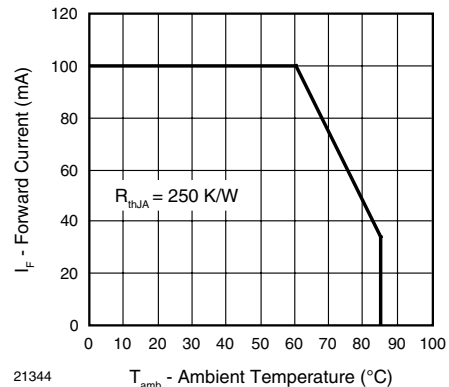


Fig. 2 - Forward Current Limit vs. Ambient Temperature

| BASIC CHARACTERISTICS                  |   |                  |      |          |      |               |
|--|---|------------------|------|----------|------|---------------|
| PARAMETER                              | TEST CONDITION                                      | SYMBOL           | MIN. | TYP.     | MAX. | UNIT          |
| Forward voltage                        | $I_F = 100 \text{ mA}, t_p = 20 \text{ ms}$         | $V_F$            |      | 1.45     | 1.6  | V             |
|  | $I_F = 1 \text{ A}, t_p = 100 \mu s$                | $V_F$            |      | 2.1      |      | V             |
| Temperature coefficient of $V_F$       | $I_F = 1 \text{ mA}$                                | $TK_{V_F}$       |      | - 1.8    |      | mV/K          |
| Reverse current                        | $V_R = 5 \text{ V}$                                 | $I_R$            |      |          | 10   | $\mu\text{A}$ |
| Junction capacitance                   | $V_R = 0 \text{ V}, f = 1 \text{ MHz}, E = 0$       | $C_j$            |      | 125      |      | pF            |
| Radiant intensity                      | $I_F = 100 \text{ mA}, t_p = 20 \text{ ms}$         | $I_e$            | 10   | 16       | 30   | mW/sr         |
|  | $I_F = 1 \text{ A}, t_p = 100 \mu s$                | $I_e$            |      | 150      |      | mW/sr         |
| Radiant power                          | $I_F = 100 \text{ mA}, t_p = 20 \text{ ms}$         | $\phi_e$         |      | 50       |      | mW            |
| Temperature coefficient of $\phi_e$    | $I_F = 100 \text{ mA}$                              | $TK_{\phi_e}$    |      | - 0.35   |      | %/K           |
| Angle of half intensity                |   | $\varphi$        |      | $\pm 60$ |      | deg           |
| Peak wavelength                        | $I_F = 100 \text{ mA}$                              | $\lambda_p$      |      | 870      |      | nm            |
| Spectral bandwidth                     | $I_F = 100 \text{ mA}$                              | $\Delta\lambda$  |      | 40       |      | nm            |
| Temperature coefficient of $\lambda_p$ | $I_F = 100 \text{ mA}$                              | $TK_{\lambda_p}$ |      | 0.25     |      | nm/K          |
| Rise time                              | $I_F = 100 \text{ mA}$                              | $t_r$            |      | 15       |      | ns            |
| Fall time                              | $I_F = 100 \text{ mA}$                              | $t_f$            |      | 15       |      | ns            |
| Cut-off frequency                      | $I_{DC} = 70 \text{ mA}, I_{AC} = 30 \text{ mA pp}$ | $f_c$            |      | 24       |      | MHz           |
| Virtual source diameter                |   | $d$              |      | 0.67     |      | mm            |

**Note**

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

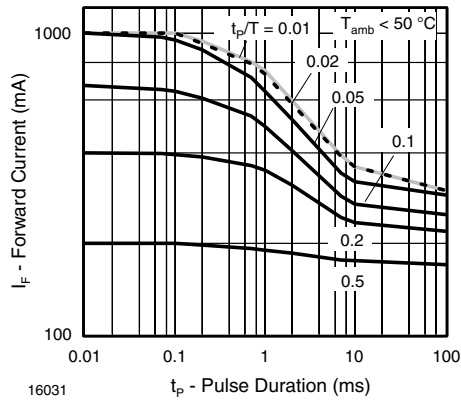
**BASIC CHARACTERISTICS**
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified


Fig. 3 - Pulse Forward Current vs. Pulse Duration

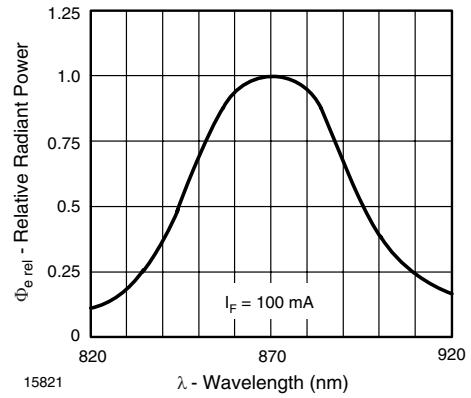


Fig. 6 - Relative Radiant Power vs. Wavelength

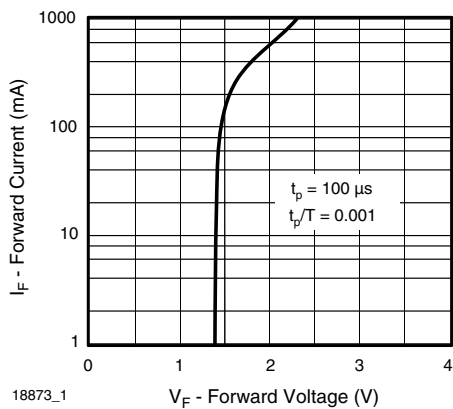


Fig. 4 - Forward Current vs. Forward Voltage

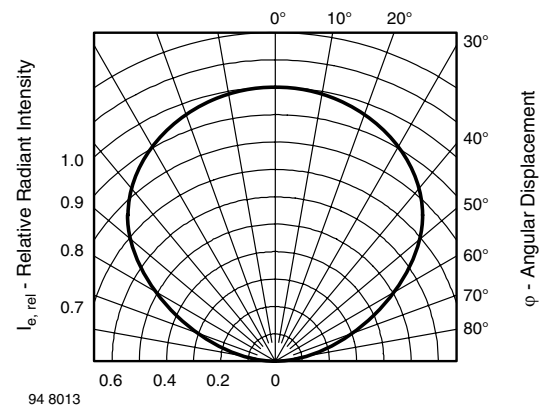


Fig. 7 - Relative Radiant Intensity vs. Angular Displacement

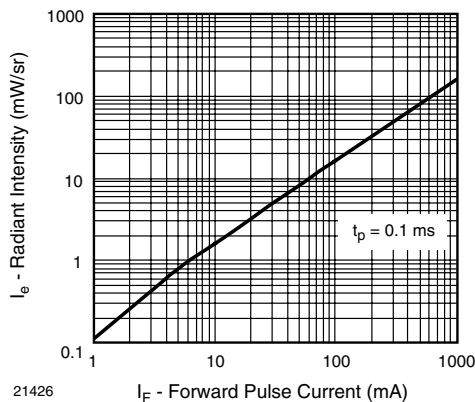
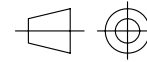
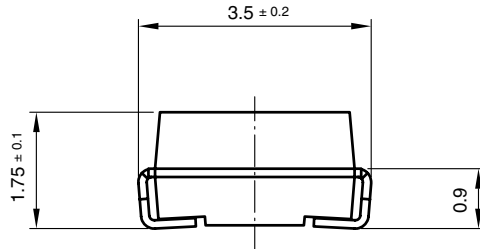
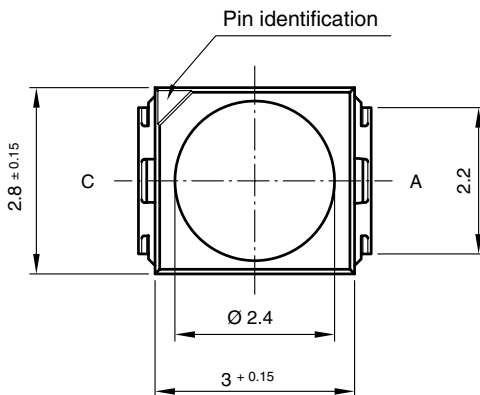


Fig. 5 - Radiant Intensity vs. Forward Current

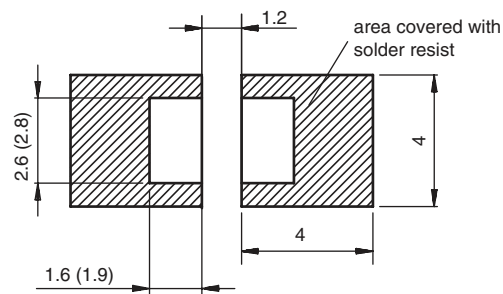
## PACKAGE DIMENSIONS in millimeters



technical drawings  
according to DIN  
specifications



### Mounting Pad Layout



Drawing-No.: 6.541-5067.01-4  
Issue: 5; 04.11.08  
20541

## SOLDER PROFILE

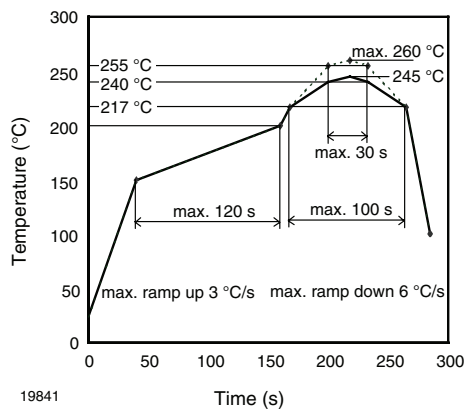


Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020 for Preconditioning acc. to JEDEC, Level 3

## 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:  $T_{amb} < 30\text{ °C}$ ,  $RH < 60\%$

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

**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.

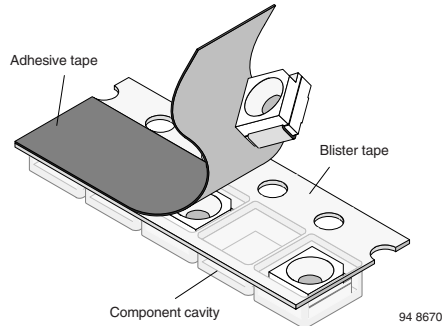


Fig. 9 - Blister Tape

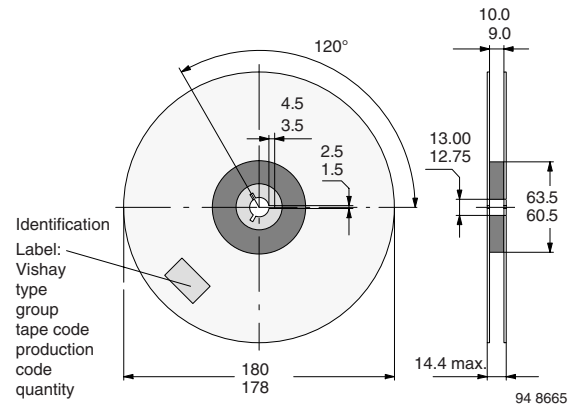


Fig. 12 - Dimensions of Reel-GS08

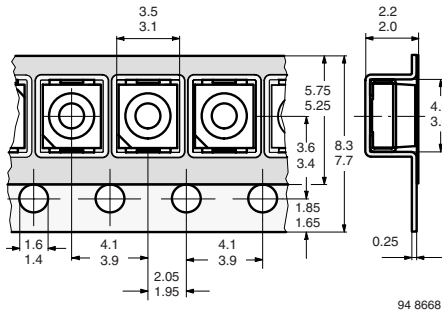


Fig. 10 - Tape Dimensions in mm for PLCC-2

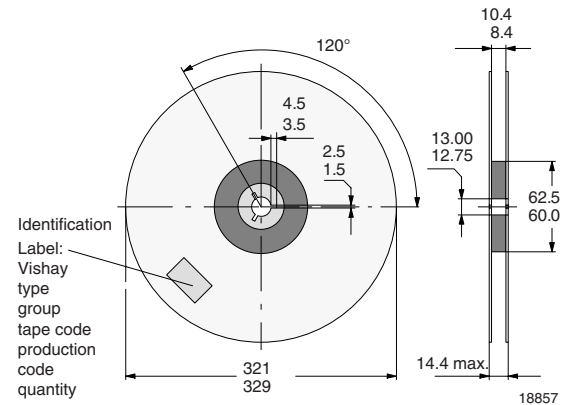


Fig. 13 - Dimensions of Reel-GS18

**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.

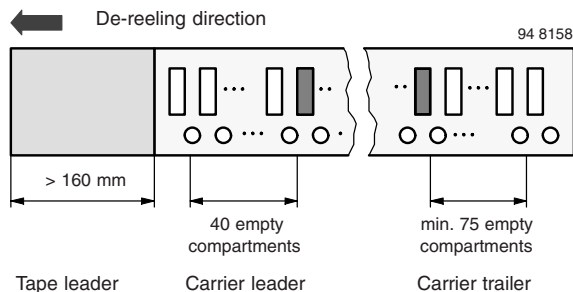


Fig. 11 - Beginning and End of Reel

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.

**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.



## Disclaimer

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