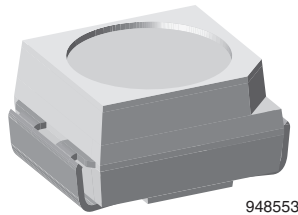




High Speed Infrared Emitting Diode, 940 nm, GaAlAs Double Hetero



DESCRIPTION

VSMB3940X01 is an infrared, 940 nm emitting diode in GaAlAs double hetero (DH) technology with high radiant 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
- Peak wavelength: $\lambda_p = 940 \text{ nm}$
- 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 bandwidth: $f_c = 24 \text{ MHz}$
- Good spectral matching with Si photodetectors
- Floor life: 168 h, MSL 3, acc. J-STD-020
- Lead (Pb)-free reflow soldering acc. J-STD-020
- AEC-Q101 qualified
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- IrDA compatible data transmission
- Miniature light barrier
- Photointerrupters
- Optical switch
- Control and drive circuits
- Shaft encoders

| PRODUCT SUMMARY | | | | |
|-----------------|---------------|--------------|------------------|------------|
| COMPONENT | I_e (mW/sr) | ϕ (deg) | λ_p (nm) | t_r (ns) |
| VSMB3940X01 | 13 | ± 60 | 940 | 15 |

Note

- Test conditions see table "Basic Characteristics"

| ORDERING INFORMATION | | | |
|----------------------|---------------|------------------------------|--------------|
| ORDERING CODE | PACKAGING | REMARKS | PACKAGE FORM |
| VSMB3940X01-GS08 | Tape and reel | MOQ: 7500 pcs, 1500 pcs/reel | PLCC-2 |
| VSMB3940X01-GS18 | Tape and reel | MOQ: 8000 pcs, 8000 pcs/reel | PLCC-2 |

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} | 1.5 | A |
| Power dissipation | | P_V | 160 | 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 | $t \leq 5\text{ s}$, 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} | 250 | K/W |

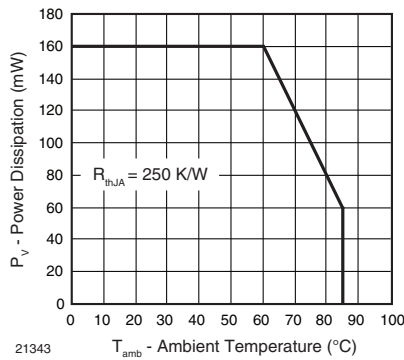


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

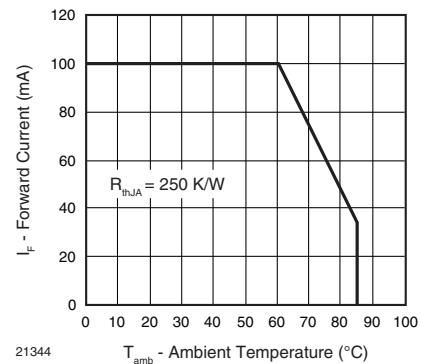
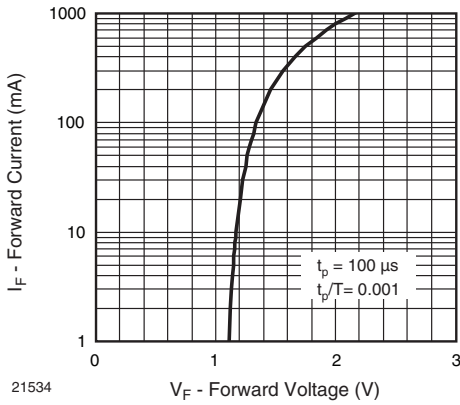


Fig. 2 - Forward Current Limit vs. Ambient Temperature

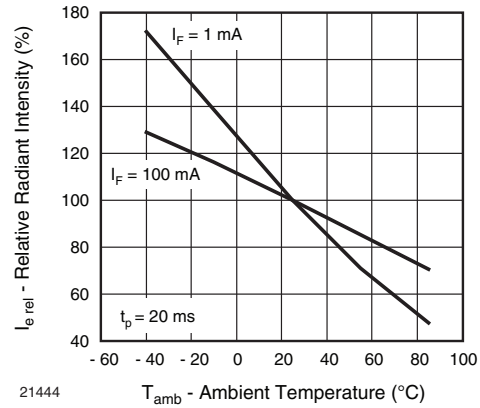
| BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|---|--|------------------|------|----------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Forward voltage | $I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$ | V_F | 1.15 | 1.35 | 1.6 | V |
| | $I_F = 1\text{ A}$, $t_p = 100\text{ }\mu\text{s}$ | V_F | | 2.2 | | V |
| Temperature coefficient of V_F | $I_F = 1\text{ mA}$ | TK_{V_F} | | -1.8 | | mV/K |
| | $I_F = 100\text{ mA}$ | TK_{V_F} | | -1.1 | | mV/K |
| Reverse current | $V_R = 5\text{ V}$ | I_R | | | 10 | μA |
| Junction capacitance | $V_R = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0\text{ mW/cm}^2$ | C_J | | 70 | | pF |
| Radiant intensity | $I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$ | I_e | 7 | 13 | 21 | mW/sr |
| | $I_F = 1\text{ A}$, $t_p = 100\text{ }\mu\text{s}$ | I_e | | 130 | | mW/sr |
| Radiant power | $I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$ | ϕ_e | | 40 | | mW |
| Temperature coefficient of ϕ_e | $I_F = 1\text{ mA}$ | TK_{ϕ_e} | | -1.1 | | %/K |
| | $I_F = 100\text{ mA}$ | TK_{ϕ_e} | | -0.51 | | %/K |
| Angle of half intensity | | φ | | ± 60 | | deg |
| Peak wavelength | $I_F = 30\text{ mA}$ | λ_p | | 940 | | nm |
| Spectral bandwidth | $I_F = 30\text{ mA}$ | $\Delta\lambda$ | | 25 | | nm |
| Temperature coefficient of λ_p | $I_F = 30\text{ mA}$ | TK_{λ_p} | | 0.25 | | nm/K |
| Rise time | $I_F = 100\text{ mA}$, 20 % to 80 % | t_r | | 15 | | ns |
| Fall time | $I_F = 100\text{ mA}$, 20 % to 80 % | 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 | | 0.5 | | mm |

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



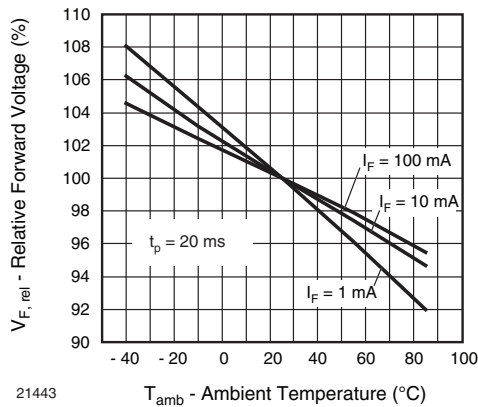
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Fig. 3 - Forward Current vs. Forward Voltage



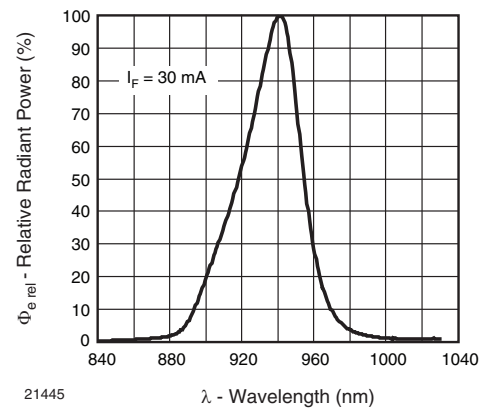
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Fig. 6 - Relative Radiant Intensity vs. Ambient Temperature



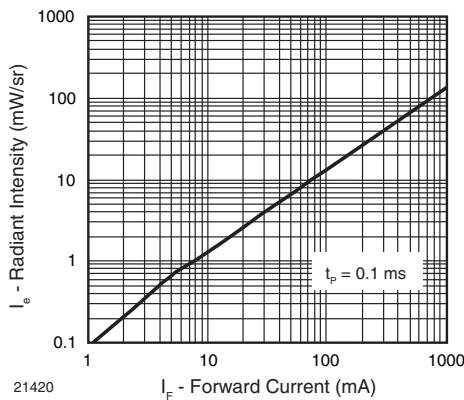
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Fig. 4 - Relative Forward Voltage vs. Ambient Temperature



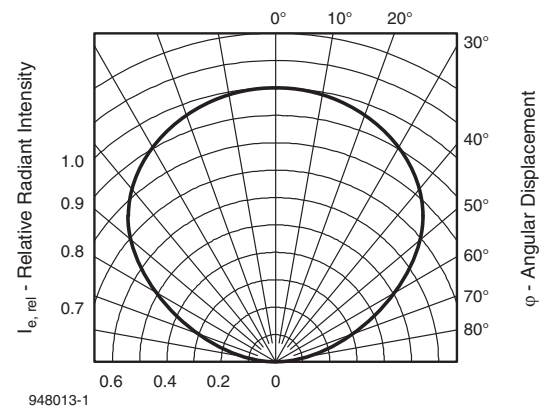
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Fig. 7 - Relative Radiant Power vs. Wavelength



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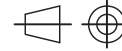
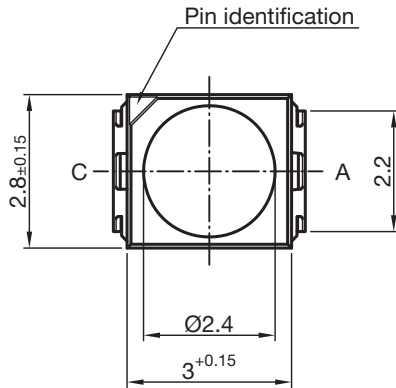
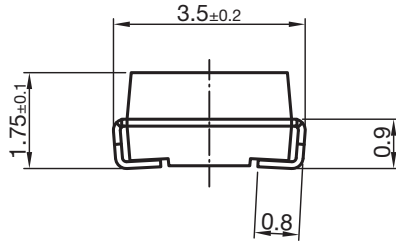
Fig. 5 - Radiant Intensity vs. Forward Current



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Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

PACKAGE DIMENSIONS in millimeters

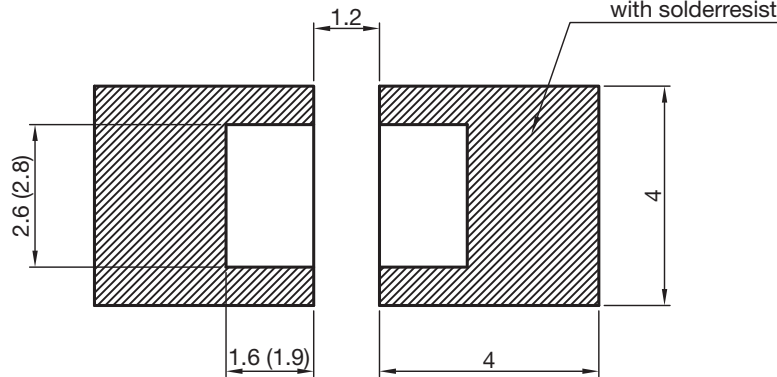


Technical drawings according to DIN specifications

Dimensions in mm

Drawing-No.: 6.541-5067.01-4
Issue: 6; 23.09.13

Mounting Pad Layout



Dimensions: Reflow and vapor phase (wave soldering)

SOLDER PROFILE

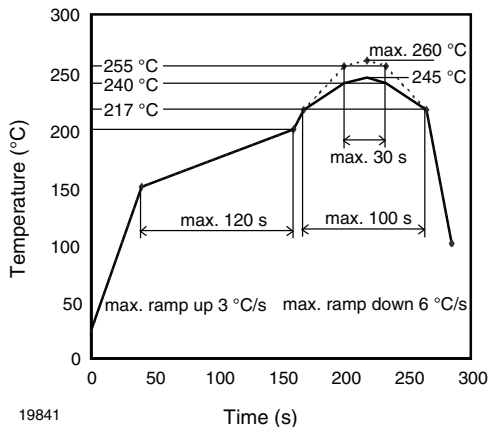


Fig. 9 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

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

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.

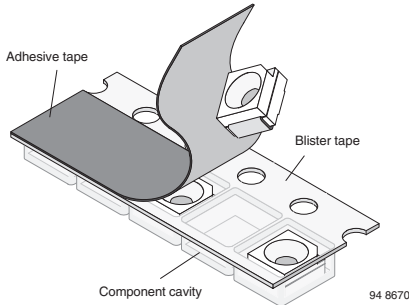


Fig. 10 - Blister Tape

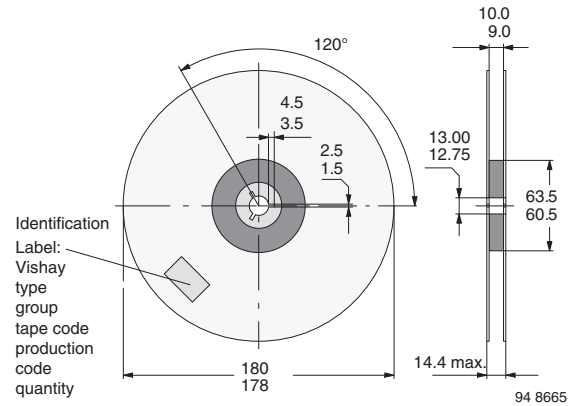


Fig. 13 - Dimensions of Reel-GS08

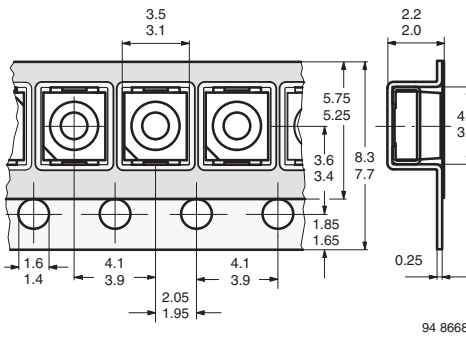


Fig. 11 - Tape Dimensions in mm for PLCC-2

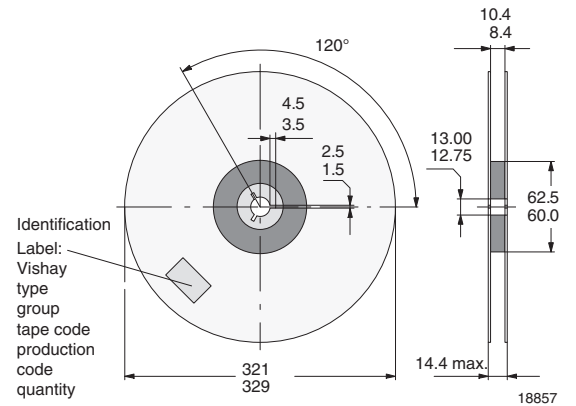


Fig. 14 - Dimensions of Reel-GS18

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.

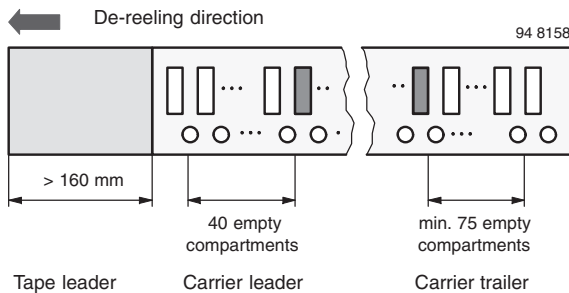


Fig. 12 - Beginning and End of Reel

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.



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