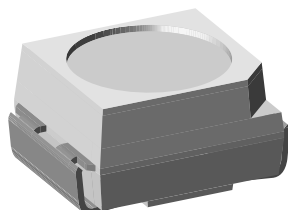


## High Speed Infrared Emitting Diode, 940 nm, GaAlAs, MQW



### DESCRIPTION

VSMB3940X01 is an infrared, 935 nm emitting diode in GaAlAs multi quantum well 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:  $\lambda_p = 935$  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
- Spectral matching with Si photodetectors
- Floor life: 168 h, MSL 3, according to J-STD-020
- Lead (Pb)-free reflow soldering according to J-STD-020
- AEC-Q101 qualified
- 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

- Miniature light barrier
- Photointerrupters
- Optical switch
- Control and drive circuits
- Shaft encoders

### PRODUCT SUMMARY

COMPONENT	$I_e$ (mW/sr)	$\phi$ (°)	$\lambda_p$ (nm)	$t_r$ (ns)
VSMB3940X01	4.2	$\pm 60$	935	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
Surge forward current	$t_p = 10\text{ }\mu\text{s}$ , $t_p/T = 0.1$	$I_{FSM}$	1	A
Power dissipation		$P_V$	170	mW
Junction temperature		$T_J$	105	$^{\circ}\text{C}$
Ambient 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 to ambient	J-STD-051, leads 7 mm, soldered on PCB	$R_{thJA}$	250	K/W

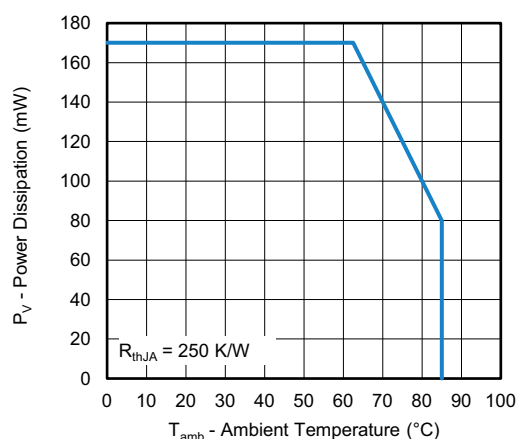


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

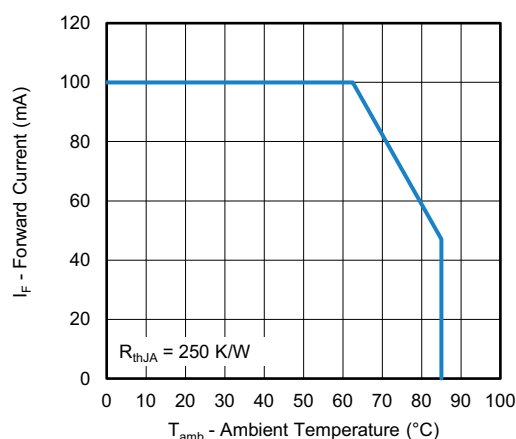


Fig. 2 - Forward Current Limit vs. Ambient Temperature

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

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$	$V_F$	-	1.35	1.7	V
	$I_F = 1\text{ A}$ , $t_p = 500\text{ }\mu\text{s}$	$V_F$	-	1.94	-	V
Temperature coefficient of $V_F$	$I_F = 1\text{ mA}$	$TK_{VF}$	-	-1.6	-	mV/K
	$I_F = 100\text{ mA}$	$TK_{VF}$	-	-0.9	-	mV/K
Reverse current	$V_R = 5\text{ V}$	$I_R$	-	-	10	$\mu\text{A}$
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0\text{ mW/cm}^2$	$C_J$	-	43	-	pF
Radiant power	$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$	$\phi_e$	-	11	-	mW
Temperature coefficient of $\phi_e$	$I_F = 1\text{ mA}$	$TK_{\phi_e}$	-	-1.03	-	%/K
	$I_F = 100\text{ mA}$	$TK_{\phi_e}$	-	-0.46	-	%/K
Angle of half intensity		$\phi$	-	$\pm 60$	-	$^{\circ}$
Peak wavelength	$I_F = 30\text{ mA}$	$\lambda_p$	-	935	-	nm
Spectral bandwidth	$I_F = 30\text{ mA}$	$\Delta\lambda$	-	44	-	nm
Temperature coefficient of $\lambda_p$	$I_F = 30\text{ mA}$	$TK_{\lambda_p}$	-	0.26	-	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

TYPE DEDICATED CHARACTERISTICS ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	BINNED GROUP	SYMBOL	MIN.	MAX.	UNIT
Radiant intensity	$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$	A	$I_e$	2.4	3.7	mW/sr
		B		3.3	4.7	
		C		4.3	6.0	

**Note**

- Each 1500 reel will contain a single group. The label on the bag will indicate which binned group is the bag. A specific group cannot be ordered. Production shipment containing multiple bags will likely include multiple groups. Please design accordingly

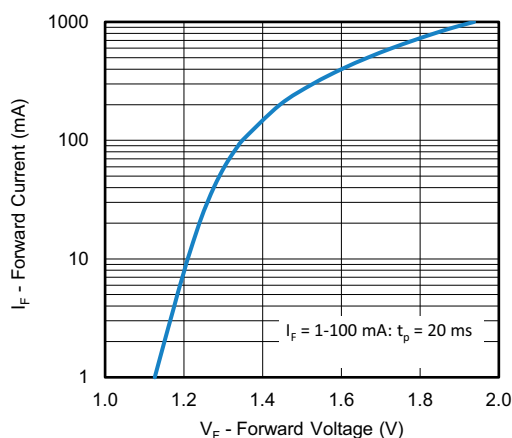
**BASIC CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)


Fig. 3 - Forward Current vs. Forward Voltage

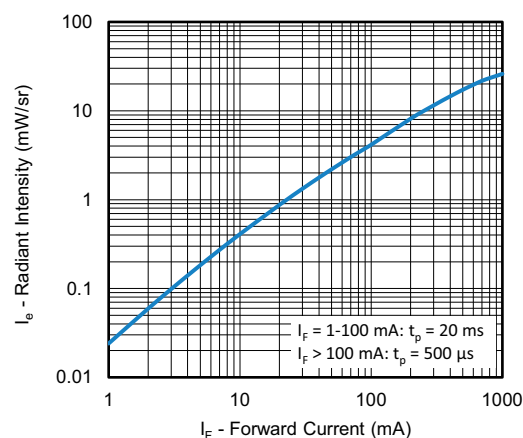


Fig. 5 - Radiant Intensity vs. Forward Current

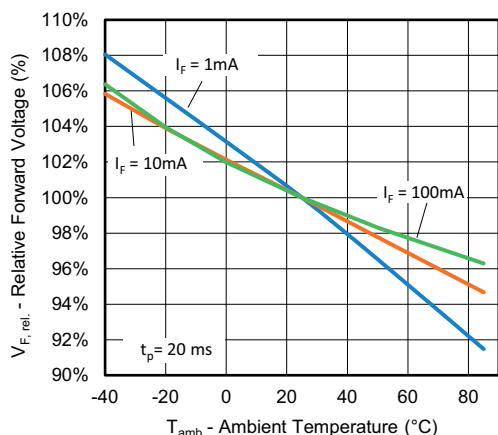


Fig. 4 - Relative Forward Voltage vs. Ambient Temperature

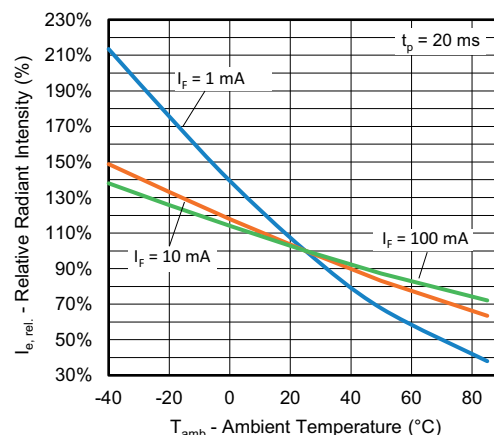


Fig. 6 - Relative Radiant Intensity vs. Ambient Temperature

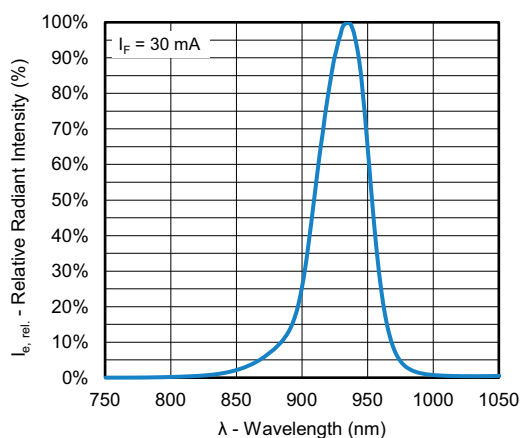


Fig. 7 - Relative Radiant Power vs. Wavelength

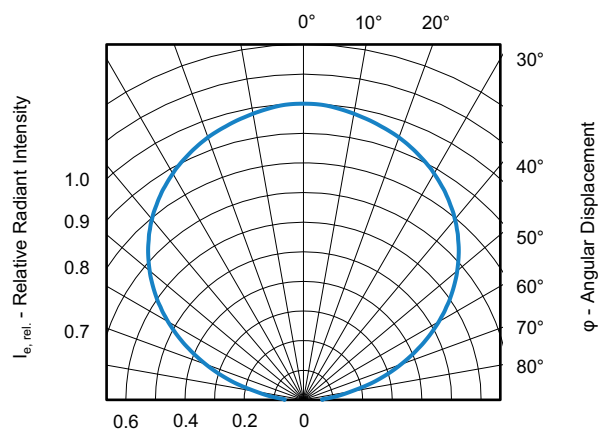
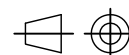
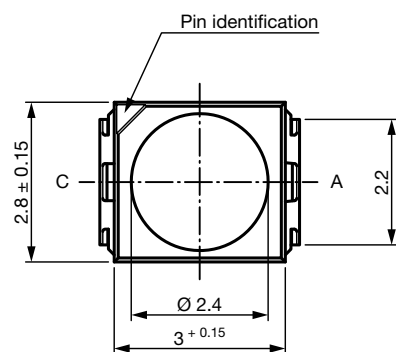
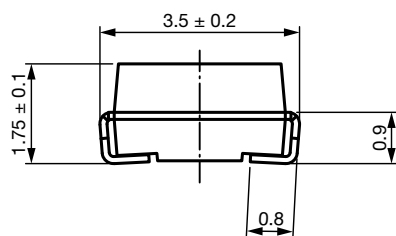


Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

### PACKAGE DIMENSIONS in millimeters

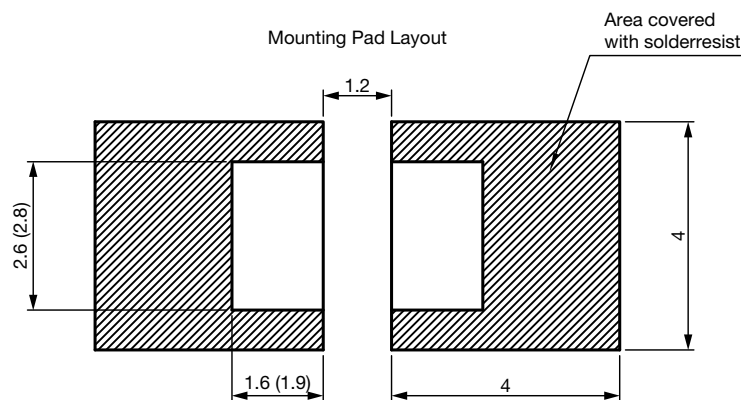


Technical drawings  
according to DIN  
specifications

Not indicated tolerances  $\pm 0.1$  mm

Drawing-No.: 6.541-5067.01-4

Issue: 10; 02.05.2023



Dimensions: reflow and vapor phase (wave soldering)

## SOLDER PROFILE

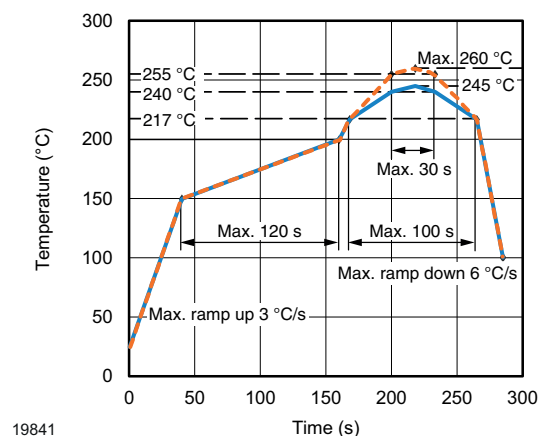


Fig. 9 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

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

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

## 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.

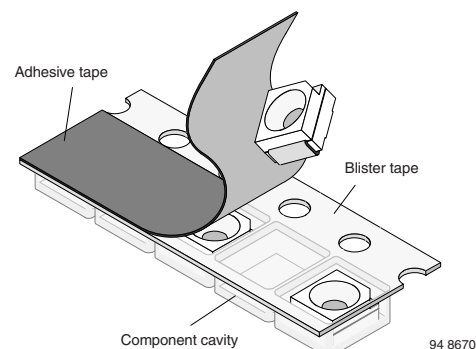


Fig. 10 - Blister Tape

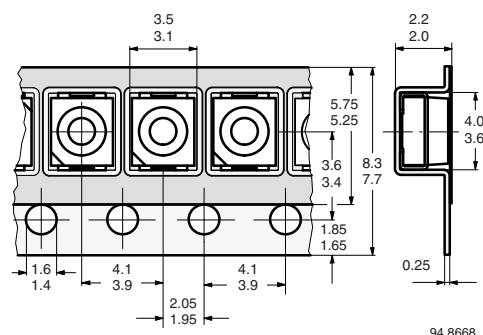


Fig. 11 - Tape Dimensions in mm for PLCC-2

## 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.

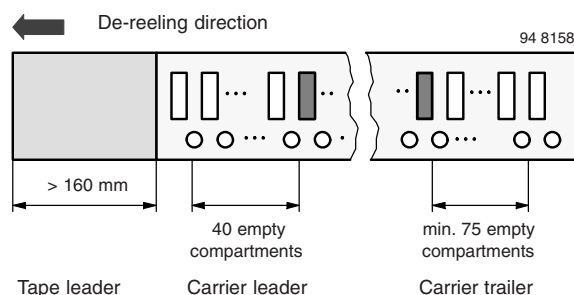


Fig. 12 - Beginning and End of Reel

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.

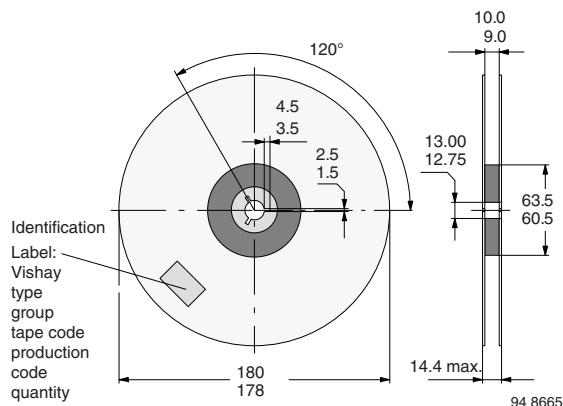


Fig. 13 - Dimensions of Reel-GS08

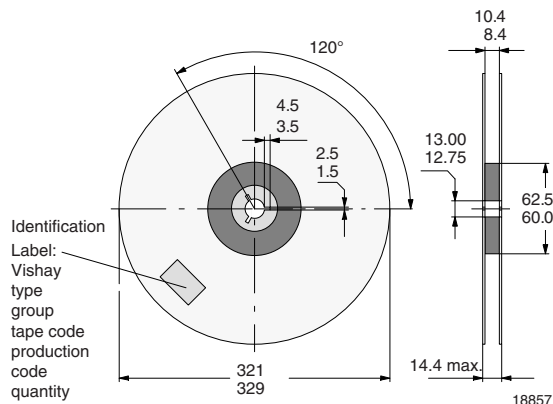


Fig. 14 - Dimensions of Reel-GS18



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