

# 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: λ<sub>p</sub> = 940 nm

High reliability

High radiant power

· High radiant intensity

• Angle of half intensity:  $\varphi = \pm 60^{\circ}$ 

· Low forward voltage

• Suitable for high pulse current operation

• High modulation bandwidth: f<sub>c</sub> = 24 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.vishav.com/doc?99912

#### **APPLICATIONS**

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

PRODUCT SUMMARY					
COMPONENT	I <sub>e</sub> (mW/sr)	φ <b>(°)</b>	$\lambda_{\mathbf{p}}$ (nm)	t <sub>r</sub> (ns)	
VSMB3940X01	13	± 60	940	15	

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



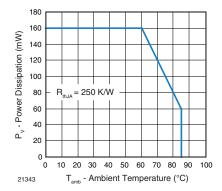








ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)					
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT	
Reverse voltage		V <sub>R</sub>	5	V	
Forward current		I <sub>F</sub>	100	mA	
Peak forward current	$t_p/T = 0.5, t_p = 100 \mu s$	I <sub>FM</sub>	200	mA	
Surge forward current	t <sub>p</sub> = 100 μs	I <sub>FSM</sub>	1.5	Α	
Power dissipation		P <sub>V</sub>	160	mW	
Junction temperature		T <sub>j</sub>	100	°C	
Operating temperature range		T <sub>amb</sub>	-40 to +85	°C	
Storage temperature range		T <sub>stg</sub>	-40 to +100	°C	
Soldering temperature	t ≤ 5 s, 2 mm from case	T <sub>sd</sub>	260	°C	
Thermal resistance junction/ambient	J-STD-051, leads 7 mm, soldered on PCB	R <sub>thJA</sub>	250	K/W	



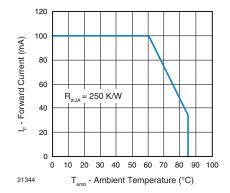


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

Fig. 2 - Forward Current Limit vs. Ambient Temperature

<b>BASIC CHARACTERISTICS</b> (T <sub>amb</sub> = 25 °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
	$I_F = 1 \text{ A}, t_p = 100 \ \mu\text{s}$	$V_{F}$		2.2		V
Table and the second state of the second state of the second seco	I <sub>F</sub> = 1 mA	$TK_{VF}$		-1.8		mV/K
Temperature coefficient of V <sub>F</sub>	I <sub>F</sub> = 100 mA	TK <sub>VF</sub>		-1.1 10 70 13 21 130 40 -1.1	mV/K	
Reverse current	V <sub>R</sub> = 5 V	I <sub>R</sub>			10	μΑ
Junction capacitance	$V_R = 0 \text{ V, f} = 1 \text{ MHz, E} = 0 \text{ mW/cm}^2$	CJ		70		pF
Dedient intensity	$I_F = 100 \text{ mA}, t_p = 20 \text{ ms}$	l <sub>e</sub>	7	13	21	mW/sr
Radiant intensity	$I_F = 1 \text{ A}, t_p = 100 \mu \text{s}$	l <sub>e</sub>		130		mW/sr
Radiant power	$I_F = 100 \text{ mA}, t_p = 20 \text{ ms}$	φ <sub>e</sub>		40		mW
Tamananatura anofficient of t	I <sub>F</sub> = 1 mA	TΚφ <sub>e</sub>		-1.1		%/K
Temperature coefficient of $\phi_{\text{e}}$	$I_F = 100 \text{ mA}$	TKφ <sub>e</sub>		-0.51		%/K
Angle of half intensity		φ		± 60		٥
Peak wavelength	I <sub>F</sub> = 30 mA	$\lambda_{p}$		940		nm
Spectral bandwidth	I <sub>F</sub> = 30 mA	Δλ		25		nm
Temperature coefficient of $\lambda_p$	$I_F = 30 \text{ mA}$	$TK\lambda_p$		0.25		nm/K
Rise time	I <sub>F</sub> = 100 mA, 20 % to 80 %	t <sub>r</sub>		15		ns
Fall time	I <sub>F</sub> = 100 mA, 20 % to 80 %	t <sub>f</sub>		15		ns
Cut-off frequency	I <sub>DC</sub> = 70 mA, I <sub>AC</sub> = 30 mA pp	f <sub>c</sub>		24		MHz
Virtual source diameter		d		0.5		mm



### BASIC CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

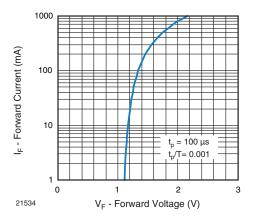


Fig. 3 - Forward Current vs. Forward Voltage

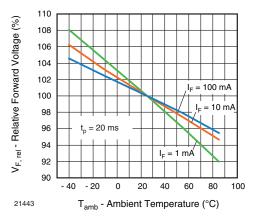


Fig. 4 - Relative Forward Voltage vs. Ambient Temperature

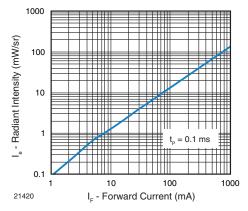


Fig. 5 - Radiant Intensity vs. Forward Current

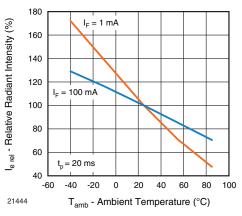


Fig. 6 - Relative Radiant Intensity vs. Ambient Temperature

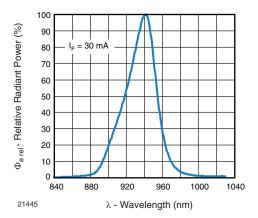


Fig. 7 - Relative Radiant Power vs. Wavelength

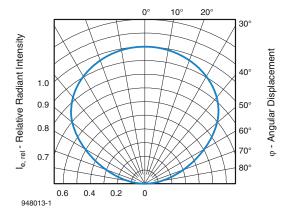
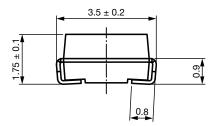
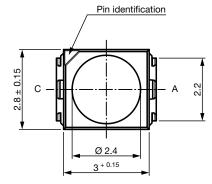


Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

### **PACKAGE DIMENSIONS** in millimeters

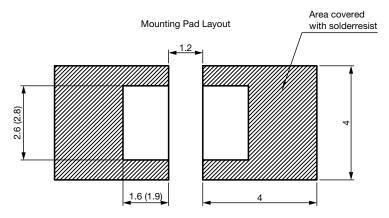






Not indicated tolerances ± 0.1 mm

Drawing-No.: 6.541-5067.01-4 Issue: 10; 02.05.2023



Dimensions: reflow and vapor phase (wave soldering)

#### **SOLDER PROFILE**

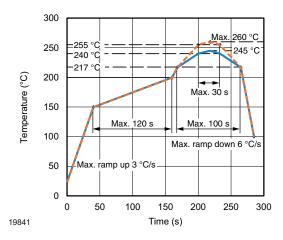


Fig. 9 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

#### **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 °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  $^{\circ}$ C (+ 5  $^{\circ}$ C), RH < 5  $^{\circ}$ M.

#### **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.

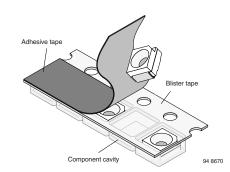


Fig. 10 - Blister Tape

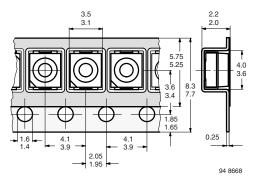


Fig. 11 - Tape Dimensions in mm for PLCC-2

#### **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.

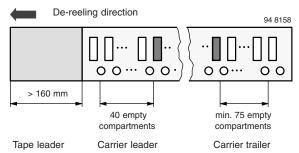


Fig. 12 - Beginning and End of Reel

The tape leader is at least 160 mm and is followed by a carrier tape leader with at least 40 empty compartements. 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 compartements and sealed with cover tape.

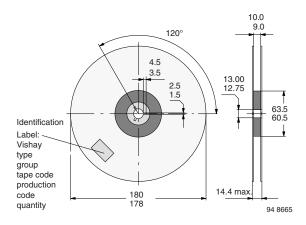


Fig. 13 - Dimensions of Reel-GS08

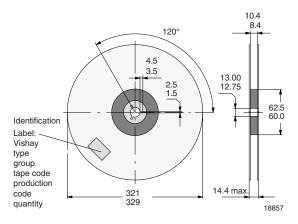


Fig. 14 - Dimensions of Reel-GS18

#### **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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