

# Infrared Emitting Diode, 950 nm

## RoHS Compliant, Released for Lead (Pb)-free Solder Process

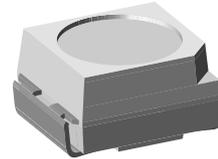
### Description

VSMS3700 is a standard GaAs infrared emitting diode in a miniature PLCC-2 package.

Wide aperture and flat window enables easy design of external optics.

### Features

- High reliability
- Low forward voltage
- Suitable for DC and high pulse current operation
- Wide angle of half intensity:  $\phi = \pm 60^\circ$
- Peak wavelength:  $\lambda_p = 950 \text{ nm}$
- Surface mount package
- Compatible with automatic placement equipment
- Lead (Pb)-free reflow soldering acc. J-STD-020
- Lead (Pb)-free component in accordance with RoHS 2002/95/EC and WEEE 2002/96/EC



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### Applications

- Infrared source in tactile keyboards
- IR diode in low space applications
- PCB mounted infrared sensors
- Emitter in miniature photo-interrupters

### Order Instructions

Part	Ordering Code	Remarks
VSMS3700	VSMS3700-GS08	MOQ: 7500 pcs, 1500 pcs/reel
VSMS3700	VSMS3700-GS18	MOQ: 8000 pcs, 8000 pcs/reel

### Absolute Maximum Ratings

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

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		$V_R$	5	V
Forward current		$I_F$	100	mA
Peak forward current	$t_p/T = 0.5, t_p = 100 \mu\text{s}$	$I_{FM}$	200	mA
Surge forward current	$t_p = 100 \mu\text{s}$	$I_{FSM}$	1.5	A
Power dissipation		$P_V$	170	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	Acc. fig. 11, J-STD020B	$T_{sd}$	260	$^\circ\text{C}$
Thermal resistance junction / ambient		$R_{thJA}$	400	K/W

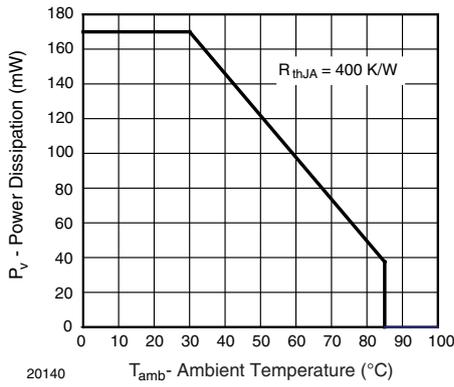


Figure 1. Power Dissipation Limit vs. Ambient Temperature

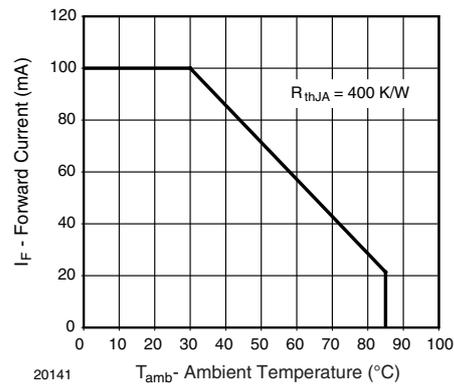


Figure 2. Forward Current Limit vs. Ambient Temperature

## Basic Characteristics

T<sub>amb</sub> = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I <sub>F</sub> = 100 mA, t <sub>p</sub> = 20 ms	V <sub>F</sub>		1.3	1.7	V
	I <sub>F</sub> = 1 A, t <sub>p</sub> = 100 μs	V <sub>F</sub>		1.8		V
Temp. coefficient of V <sub>F</sub>	I <sub>F</sub> = 100 mA	TK <sub>V<sub>F</sub></sub>		- 1.3		mV/K
Reverse current	V <sub>R</sub> = 5 V	I <sub>R</sub>			100	μA
Junction capacitance	V <sub>R</sub> = 0 V, f = 1 MHz, E = 0	C <sub>j</sub>		30		pF
Radiant intensity	I <sub>F</sub> = 100 mA, t <sub>p</sub> = 20 ms	I <sub>e</sub>	1.6	4.5	8.0	mW/sr
	I <sub>F</sub> = 1.5 A, t <sub>p</sub> = 100 μs	I <sub>e</sub>		35		mW/sr
Radiant power	I <sub>F</sub> = 100 mA, t <sub>p</sub> = 20 ms	φ <sub>e</sub>		15		mW
Temp. coefficient of φ <sub>e</sub>	I <sub>F</sub> = 100 mA	TKφ <sub>e</sub>		- 0.8		%/K
Angle of half intensity		φ		± 60		deg
Peak wavelength	I <sub>F</sub> = 100 mA	λ <sub>p</sub>		950		nm
Spectral bandwidth	I <sub>F</sub> = 100 mA	Δλ		50		nm
Temp. coefficient of λ <sub>p</sub>	I <sub>F</sub> = 100 mA	TKλ <sub>p</sub>		0.2		nm/K
Rise time	I <sub>F</sub> = 20 mA	t <sub>r</sub>		800		ns
	I <sub>F</sub> = 1 A	t <sub>r</sub>		400		ns
Fall time	I <sub>F</sub> = 20 mA	t <sub>f</sub>		800		ns
	I <sub>F</sub> = 1 A	t <sub>f</sub>		400		ns
Virtual source diameter	EN 60825-1	d		0.5		mm

## Typical Characteristics

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

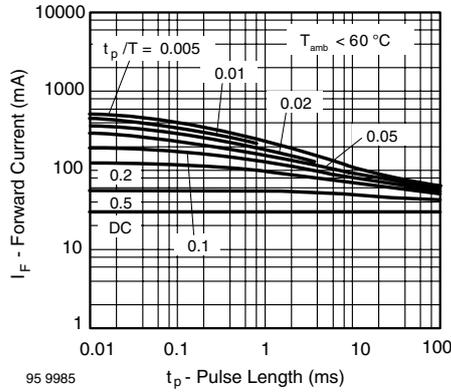


Figure 3. Pulse Forward Current vs. Pulse Duration

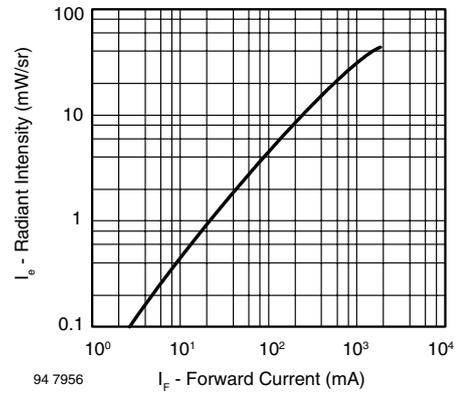


Figure 6. Radiant Intensity vs. Forward Current

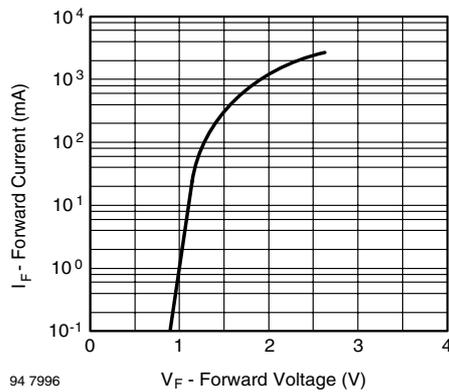


Figure 4. Forward Current vs. Forward Voltage

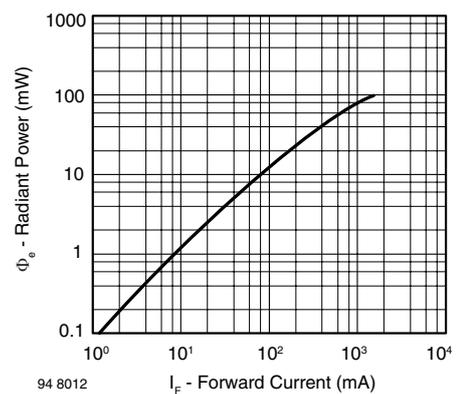


Figure 7. Radiant Power vs. Forward Current

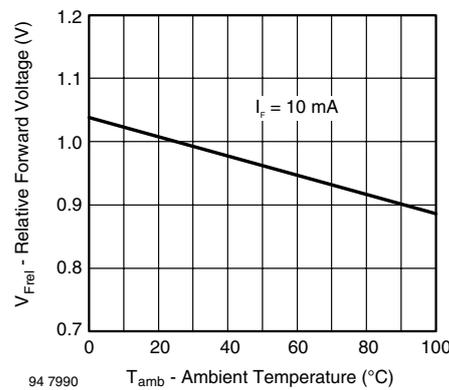


Figure 5. Relative Forward Voltage vs. Ambient Temperature

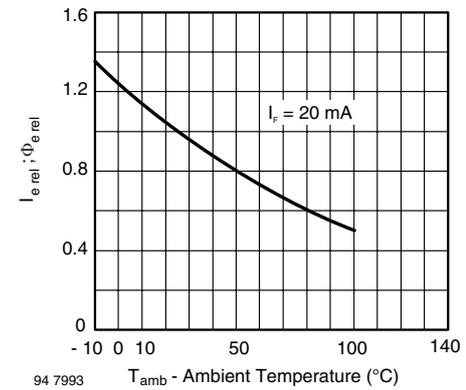


Figure 8. Rel. Radiant Intensity/Power vs. Ambient Temperature

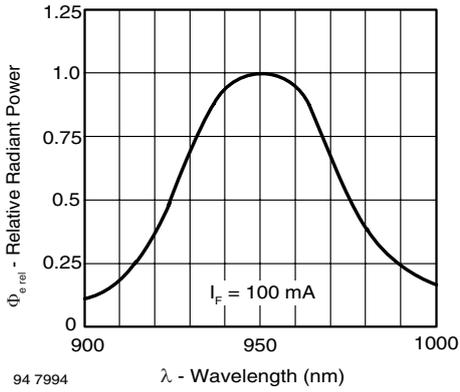


Figure 9. Relative Radiant Power vs. Wavelength

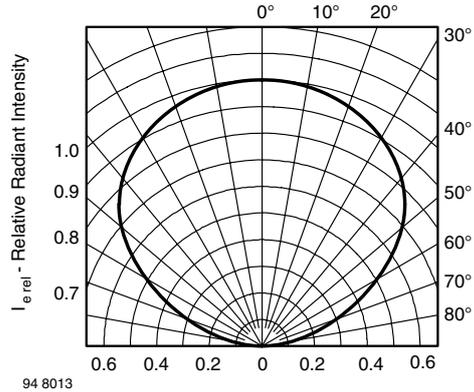
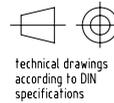
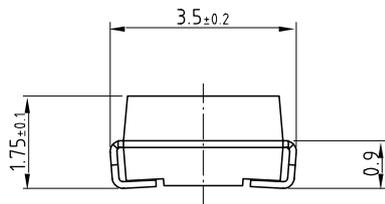


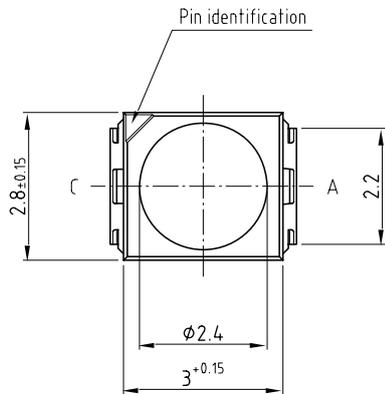
Figure 10. Relative Radiant Intensity vs. Angular Displacement

## Package Dimensions

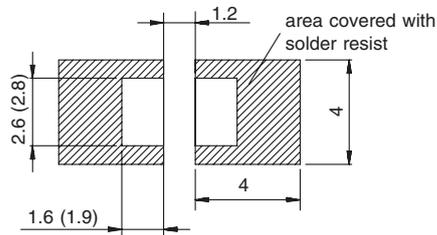


technical drawings according to DIN specifications

Dimensions in mm



### Mounting Pad Layout



20541\_1  
Drawing-No.: 6.541-5067.01-4  
Issue: 2; 27.06.06

### Die Position (for reference only)

X = +/- 0.2 mm central

Y = +/- 0.2 mm central

Z = 1.13 mm +/- 0.25 mm, from top of die to bottom of component

## Solder Profile

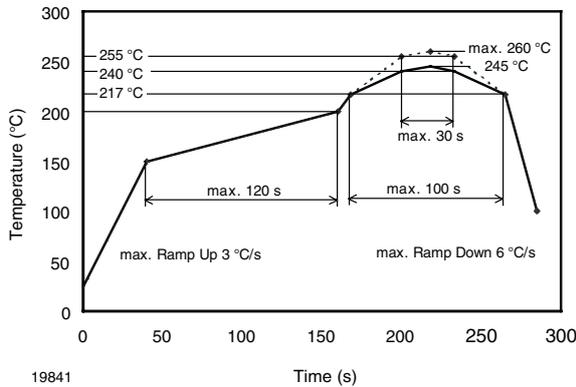


Figure 11. Lead (Pb)-free Reflow Solder Profile acc. J-STD-020B for Preconditioning acc. to JEDEC, Level 2a

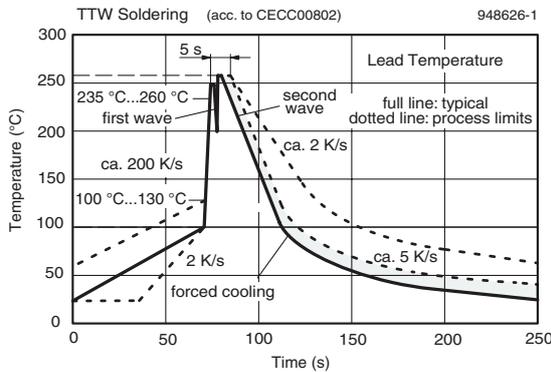


Figure 12. Double Wave Solder Profile for Opto Components

## 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: 4 weeks

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

Moisture Sensitivity Level 2a, acc. to J-STD-020B.

## 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  $^{\circ}\text{C}$ ), 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.

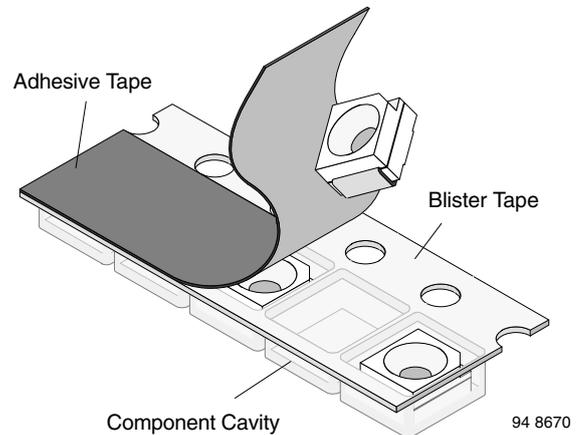


Figure 13. Blister Tape

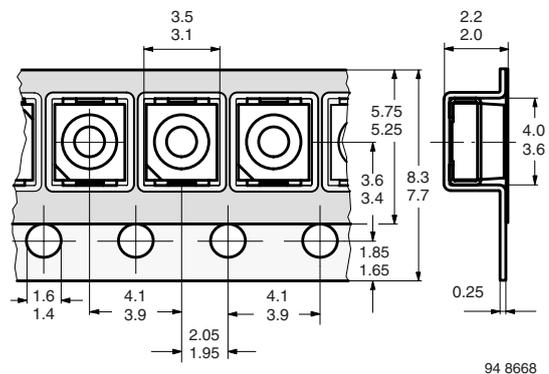


Figure 14. Tape Dimensions in mm for PLCC-2

## 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.

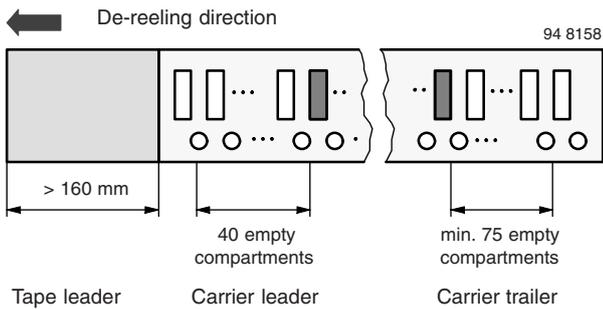


Figure 15. Beginning and End of Reel

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.

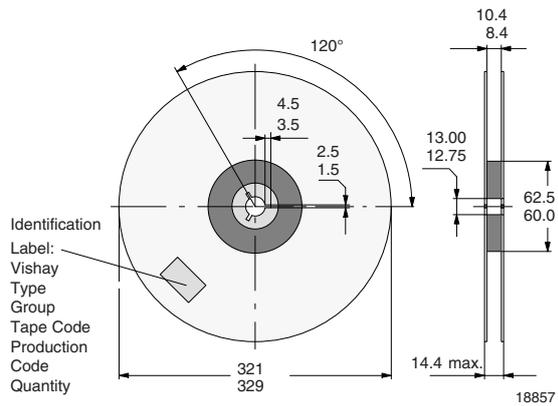


Figure 17. Dimensions of Reel-GS18

## 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.

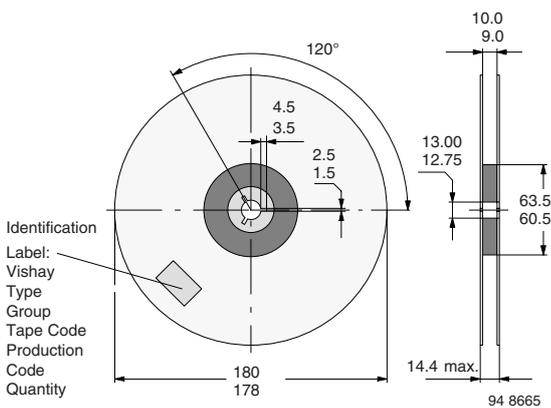


Figure 16. Dimensions of Reel-GS08



## **Ozone Depleting Substances Policy Statement**

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

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