

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



### **DESCRIPTION**

VSMB2948SL is an infrared, 940 nm, side looking emitting diode in GaAlAs multi quantum well (MQW) technology with high radiant power and high speed, molded in clear, untinted plastic package (with lens) for surface mounting (SMD).

#### **APPLICATIONS**

- IR touch panels

#### **FEATURES**

Package type: surface mount

• Package form: side view



Peak wavelength: λ<sub>p</sub> = 940 nm

· High reliability

· High radiant power

· High radiant intensity

• Angle of half intensity:  $\varphi = \pm 25^{\circ}$ 

· Low forward voltage

• Suitable for high pulse current operation

• Package matches with detector VEMD2023SLX01 and VEMT2023SLX01

• Floor life: 4 weeks, MSL 2a, acc. J-STD-020

• Material categorization: For definitions of compliance please see www.vishay.com/doc?99912





<u>(5-2008)</u>

· Remote control

| PRODUCT SUMMARY |                        |         |                     |                     |  |
|-----------------|------------------------|---------|---------------------|---------------------|--|
| COMPONENT       | I <sub>e</sub> (mW/sr) | φ (deg) | λ <sub>p</sub> (nm) | t <sub>r</sub> (ns) |  |
| VSMB2948SL      | 20                     | ± 25    | 940                 | 15                  |  |

### Note

· Test conditions see table "Basic Characteristics"

| ORDERING INFORMATION |               |                              |              |  |
|----------------------|---------------|------------------------------|--------------|--|
| ORDERING CODE        | PACKAGING     | REMARKS                      | PACKAGE FORM |  |
| VSMB2948SL           | Tape and reel | MOQ: 3000 pcs, 3000 pcs/reel | Side view    |  |

#### 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   |   | $V_R$             | 5             | V    |
| Forward current   |   | I <sub>F</sub>    | 100           | mA   |
| Surge forward current   | t <sub>p</sub> = 100 μs                   | I <sub>FSM</sub>  | 500           | mA   |
| 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   | according figure 9, J-STD-020             | T <sub>sd</sub>   | 260           | °C   |
| Thermal resistance junction/ambient   | J-STD-051, leads 7 mm,<br>soldered on PCB | R <sub>thJA</sub> | 250           | K/W  |



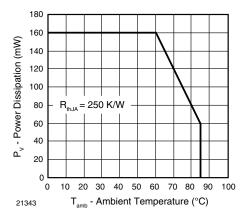


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

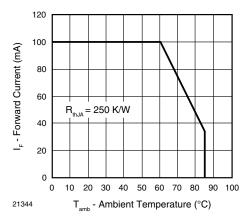


Fig. 2 - Forward Current Limit vs. Ambient Temperature

| <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     |
|   | $I_F = 500 \text{ mA}, t_p = 100 \mu \text{s}$                | $V_{F}$          |      | 1.8   |      | V     |
| Temperature coefficient of V <sub>F</sub>   | I <sub>F</sub> = 1 mA   | TK <sub>VF</sub> |      | - 1.5 |      | mV/K  |
| Reverse current   | V <sub>R</sub> = 5 V  | I <sub>R</sub>   |      |       | 10   | μA    |
| Junction capacitance  | $V_R = 0 \text{ V, f} = 1 \text{ MHz, E} = 0 \text{ mW/cm}^2$ | CJ               |      | 21    |      | pF    |
| Radiant intensity   | $I_F = 100 \text{ mA}, t_p = 20 \text{ ms}$                   | l <sub>e</sub>   | 10   | 20    | 30   | mW/sr |
|   | $I_F = 500 \text{ mA}, t_p = 100 \mu \text{s}$                | l <sub>e</sub>   |      | 90    |      | mW/sr |
| Radiant power   | $I_F = 100 \text{ mA}, t_p = 20 \text{ ms}$                   | фe               |      | 40    |      | mW    |
| Temperature coefficient of radiant power  | I <sub>F</sub> = 1 mA   | TKφ <sub>e</sub> |      | - 1.1 |      | %/K   |
| Angle of half intensity   |   | φ                |      | ± 25  |      | deg   |
| Peak wavelength   | I <sub>F</sub> = 30 mA  | λρ               | 920  | 940   | 960  | nm    |
| Spectral bandwidth  | I <sub>F</sub> = 30 mA  | Δλ               |      | 25    |      | nm    |
| Temperature coefficient of $\lambda_p$  | I <sub>F</sub> = 30 mA  | TKλ <sub>p</sub> |      | 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>   |      | 23    |      | MHz   |

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

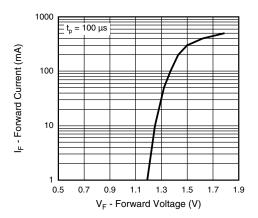


Fig. 3 - Forward Current vs. Forward Voltage

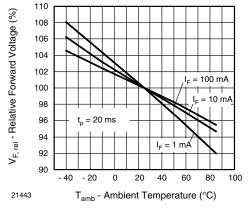


Fig. 4 - Relative Forward Voltage vs. Ambient Temperature

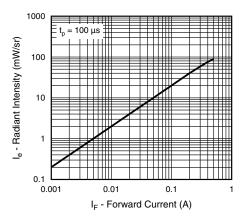


Fig. 5 - Radiant Intensity vs. Forward Current

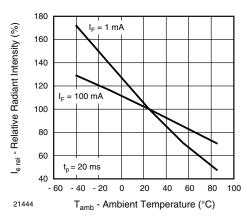


Fig. 6 - Relative Radiant Intensity vs. Ambient Temperature

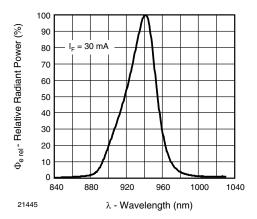


Fig. 7 - Relative Radiant Power vs. Wavelength

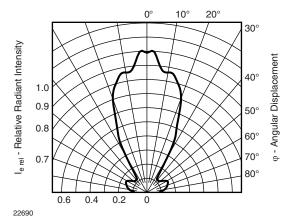


Fig. 8 - Relative Radiant Intensity vs. Angular Displacement



### **SOLDER PROFILE**

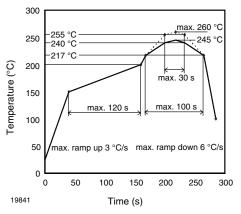


Fig. 9 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020

### **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: 4 weeks

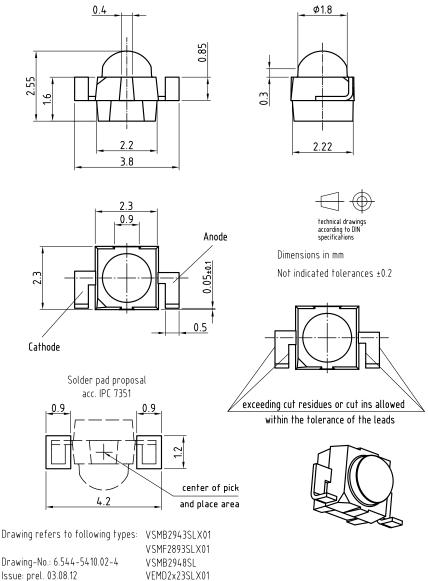
Conditions: T<sub>amb</sub> < 30 °C, RH < 60 %

Moisture sensitivity level 2a, acc. to J-STD-020.

#### **DRYING**

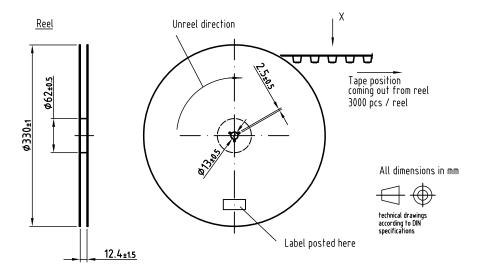
In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at 40  $^{\circ}$ C (+ 5  $^{\circ}$ C), RH < 5  $^{\circ}$ K.

### PACKAGE DIMENSIONS in millimeters: VSMB2948SL

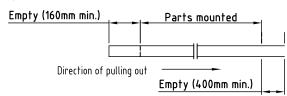




### TAPING AND REEL DIMENSIONS in millimeters: VSMB2948SL

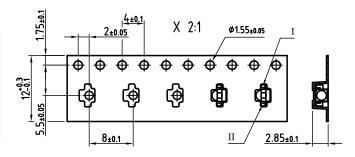


Leader and trailer tape:



| Tanminal      | nosition   | :-   | +      |
|---------------|------------|------|--------|
| i erillili al | 1105111011 | 1111 | 1 4111 |

| Lead I    | Lead II                 |
|-----------|-------------------------|
|           |                         |
|           |                         |
| c 11 1    |                         |
| Larnode   | Anode                   |
|           |                         |
|           |                         |
| C. II     | F-111                   |
| Collector | Emitter                 |
| Anode     | Cathode                 |
|           | Cathode Collector Anode |



Drawing refers to following types: see table Reel dimensions and tape

Drawing-No.: 9.800-5123.01-4 Issue: prel; 01.02.13



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