

## Low Current SMD LED



### FEATURES

- SMD LED with exceptional brightness
- Compatible with automatic placement equipment
- EIA and ICE standard package
- Compatible with IR reflow, vapor phase and wave solder processes according to CECC 00802 and J-STD-020
- Available in 8 mm tape
- Low profile package
- Non-diffused lens: excellent for coupling to light pipes and backlighting
- Very low power consumption
- Luminous intensity ratio in one packaging unit  $I_{Vmax.}/I_{Vmin.} \leq 1.6$
- ESD withstand voltage: up to 2 kV according to JESD22-A114-B
- Preconditioning: according to JEDEC level 2a
- AEC-Q101 qualified
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### DESCRIPTION

These new devices have been designed to meet the increasing demand for AlInGaP based low current SMD LEDs.

The package of the VLM.30.. is the PLCC-2 package. It consists of a lead frame which is embedded in a white thermoplast. The reflector inside this package is filled up with clear epoxy.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD PLCC-2
- Product series: low current
- Angle of half intensity:  $\pm 60^\circ$

### APPLICATIONS

- Automotive: backlighting in dashboards and switches
- Telecommunication: indicator and backlighting in telephone and fax
- Indicator and backlight for audio and video equipment
- Indicator and backlight for battery driven equipment
- Indicator and backlight in office equipment
- Flat backlight for LCDs, switches and symbols
- General use

| PARTS TABLE     |   |            |
|-----------------|---|------------|
| PART            | COLOR, LUMINOUS INTENSITY                     | TECHNOLOGY |
| VLMS3000-GS08   | Super red, $I_V > 2.8$ mcd                    | AlInGaP    |
| VLMS3000-GS18   | Super red, $I_V > 2.8$ mcd                    | AlInGaP    |
| VLMS30J1K2-GS08 | Super red, $I_V = (4.5 \text{ to } 11.2)$ mcd | AlInGaP    |
| VLMS30J1K2-GS18 | Super red, $I_V = (4.5 \text{ to } 11.2)$ mcd | AlInGaP    |
| VLMS30K1L2-GS08 | Super red, $I_V = (7.1 \text{ to } 18)$ mcd   | AlInGaP    |
| VLMS30K1L2-GS18 | Super red, $I_V = (7.1 \text{ to } 18)$ mcd   | AlInGaP    |

| PARTS TABLE     |   |            |
|-----------------|---|------------|
| PART            | COLOR, LUMINOUS INTENSITY                             | TECHNOLOGY |
| VLMS30J1L2-GS08 | Super red, $I_V = (4.5 \text{ to } 18) \text{ mcd}$   | AllnGaP    |
| VLMS30J1L2-GS18 | Super red, $I_V = (4.5 \text{ to } 18) \text{ mcd}$   | AllnGaP    |
| VLMS30J2K2-GS08 | Super red, $I_V = (5.6 \text{ to } 11.2) \text{ mcd}$ | AllnGaP    |
| VLMS30J2K2-GS18 | Super red, $I_V = (5.6 \text{ to } 11.2) \text{ mcd}$ | AllnGaP    |
| VLMS30K2L2-GS08 | Super red, $I_V = (9 \text{ to } 18) \text{ mcd}$     | AllnGaP    |
| VLMO3000-GS08   | Orange, $I_V > 5.6 \text{ mcd}$                       | AllnGaP    |
| VLMO3000-GS18   | Orange, $I_V > 5.6 \text{ mcd}$                       | AllnGaP    |
| VLMO30K1L2-GS08 | Orange, $I_V = (7.1 \text{ to } 18) \text{ mcd}$      | AllnGaP    |
| VLMO30K1L2-GS18 | Orange, $I_V = (7.1 \text{ to } 18) \text{ mcd}$      | AllnGaP    |
| VLMO30L1M2-GS08 | Orange, $I_V = (11.2 \text{ to } 28) \text{ mcd}$     | AllnGaP    |
| VLMO30L1M2-GS18 | Orange, $I_V = (11.2 \text{ to } 28) \text{ mcd}$     | AllnGaP    |
| VLMO30K1M2-GS08 | Orange, $I_V = (7.1 \text{ to } 28) \text{ mcd}$      | AllnGaP    |
| VLMO30K1M2-GS18 | Orange, $I_V = (7.1 \text{ to } 28) \text{ mcd}$      | AllnGaP    |
| VLMY3000-GS08   | Yellow, $I_V > 4.5 \text{ mcd}$                       | AllnGaP    |
| VLMY3000-GS18   | Yellow, $I_V > 4.5 \text{ mcd}$                       | AllnGaP    |
| VLMY3001GS08    | Yellow, $I_V = (7.1 \text{ to } 18) \text{ mcd}$      | AllnGaP    |
| VLMY3001-GS18   | Yellow, $I_V = (7.1 \text{ to } 18) \text{ mcd}$      | AllnGaP    |
| VLMY30J2L1-GS08 | Yellow, $I_V = (5.6 \text{ to } 14) \text{ mcd}$      | AllnGaP    |
| VLMY30J2L1-GS18 | Yellow, $I_V = (5.6 \text{ to } 14) \text{ mcd}$      | AllnGaP    |
| VLMY30K2M1-GS08 | Yellow, $I_V = (9 \text{ to } 22.4) \text{ mcd}$      | AllnGaP    |
| VLMY30K2M1-GS18 | Yellow, $I_V = (9 \text{ to } 22.4) \text{ mcd}$      | AllnGaP    |
| VLMY30J2M1-GS08 | Yellow, $I_V = (5.6 \text{ to } 22.4) \text{ mcd}$    | AllnGaP    |
| VLMY30J2M1-GS18 | Yellow, $I_V = (5.6 \text{ to } 22.4) \text{ mcd}$    | AllnGaP    |

| ABSOLUTE MAXIMUM RATINGS <sup>1)</sup> VLM30.. |   |            |               |      |
|--|---|------------|---------------|------|
| PARAMETER                                      | TEST CONDITION  | SYMBOL     | VALUE         | UNIT |
| Reverse voltage <sup>2)</sup>                  |   | $V_R$      | 6             | V    |
| DC forward current                             |   | $I_F$      | 15            | mA   |
| Surge forward current                          | $t_p \leq 10 \mu\text{s}$                               | $I_{FSM}$  | 0.1           | A    |
| Power dissipation                              |   | $P_V$      | 40            | mW   |
| Junction temperature                           |   | $T_j$      | 125           | °C   |
| Operating temperature range                    |   | $T_{amb}$  | - 40 to + 100 | °C   |
| Storage temperature range                      |   | $T_{stg}$  | - 40 to + 100 | °C   |
| Thermal resistance junction/<br>ambient        | Mounted on PC board<br>(pad size > 16 mm <sup>2</sup> ) | $R_{thJA}$ | 400           | K/W  |

Note:

<sup>1)</sup>  $T_{amb} = 25 \text{ °C}$ , unless otherwise specified

<sup>2)</sup> Driving the LED in reverse direction is suitable for short term application

**OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> VLMS30..., RED**

| PARAMETER                        | TEST CONDITION                 | PART       | SYMBOL      | MIN. | TYP.     | MAX. | UNIT |
|----------------------------------|--------------------------------|------------|-------------|------|----------|------|------|
| Luminous intensity <sup>2)</sup> | $I_F = 2 \text{ mA}$           | VLMS3000   | $I_V$       | 2.8  |          |      | mcd  |
|                                  | $I_F = 10 \text{ mA}$          | VLMS3000   | $I_V$       |      | 20       |      | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMS30J1K2 | $I_V$       | 4.5  |          | 11.2 | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMS30K1L2 | $I_V$       | 7.1  |          | 18   | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMS30J1L2 | $I_V$       | 4.5  |          | 18   | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMS30J2K2 | $I_V$       | 5.6  |          | 11.2 | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMS30K2L2 | $I_V$       | 9    |          | 18   | mcd  |
| Dominant wavelength              | $I_F = 2 \text{ mA}$           |            | $\lambda_d$ | 624  |          | 636  | nm   |
| Peak wavelength                  | $I_F = 2 \text{ mA}$           |            | $\lambda_p$ |      | 635      |      | nm   |
| Angle of half intensity          | $I_F = 2 \text{ mA}$           |            | $\phi$      |      | $\pm 60$ |      | deg  |
| Forward voltage                  | $I_F = 2 \text{ mA}$           |            | $V_F$       |      | 1.8      | 2.2  | V    |
| Reverse voltage                  | $I_R = 10 \text{ }\mu\text{A}$ |            | $V_R$       | 6    | 15       |      | V    |

Note:

<sup>1)</sup>  $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified<sup>2)</sup> In one packing unit  $I_{Vmax}/I_{Vmin} \leq 1.6$ **OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> VLMO30..., ORANGE**

| PARAMETER                        | TEST CONDITION                 | PART       | SYMBOL      | MIN. | TYP.     | MAX. | UNIT |
|----------------------------------|--------------------------------|------------|-------------|------|----------|------|------|
| Luminous intensity <sup>2)</sup> | $I_F = 2 \text{ mA}$           | VLMO3000   | $I_V$       | 5.6  |          |      | mcd  |
|                                  | $I_F = 10 \text{ mA}$          | VLMO3000   | $I_V$       |      | 50       |      | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMO30K1L2 | $I_V$       | 7.1  |          | 18   | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMO30L1M2 | $I_V$       | 11.2 |          | 28   | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMO30K1M2 | $I_V$       | 7.1  |          | 28   | mcd  |
| Dominant wavelength              | $I_F = 2 \text{ mA}$           |            | $\lambda_d$ | 600  |          | 609  | nm   |
| Peak wavelength                  | $I_F = 2 \text{ mA}$           |            | $\lambda_p$ |      | 610      |      | nm   |
| Angle of half intensity          | $I_F = 2 \text{ mA}$           |            | $\phi$      |      | $\pm 60$ |      | deg  |
| Forward voltage                  | $I_F = 2 \text{ mA}$           |            | $V_F$       |      | 1.8      | 2.2  | V    |
| Reverse voltage                  | $I_R = 10 \text{ }\mu\text{A}$ |            | $V_R$       | 6    | 15       |      | V    |

Note:

<sup>1)</sup>  $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified<sup>2)</sup> In one packing unit  $I_{Vmax}/I_{Vmin} \leq 1.6$ **OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> VLMY30..., YELLOW**

| PARAMETER                        | TEST CONDITION                 | PART       | SYMBOL      | MIN. | TYP.     | MAX. | UNIT |
|----------------------------------|--------------------------------|------------|-------------|------|----------|------|------|
| Luminous intensity <sup>2)</sup> | $I_F = 2 \text{ mA}$           | VLMY3000   | $I_V$       | 4.5  |          |      | mcd  |
|                                  | $I_F = 10 \text{ mA}$          | VLMY3000   | $I_V$       |      | 50       |      | mcd  |
|                                  | $I_F = 10 \text{ mA}$          | VLMY3001   | $I_V$       | 7.1  |          | 18   | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMY30J2L1 | $I_V$       | 5.6  |          | 14   | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMY30K2M1 | $I_V$       | 9    |          | 22.4 | mcd  |
|                                  | $I_F = 2 \text{ mA}$           | VLMY30J2M1 | $I_V$       | 5.6  |          | 22.4 | mcd  |
| Dominant wavelength              | $I_F = 2 \text{ mA}$           |            | $\lambda_d$ | 581  |          | 594  | nm   |
| Peak wavelength                  | $I_F = 2 \text{ mA}$           |            | $\lambda_p$ |      | 585      |      | nm   |
| Angle of half intensity          | $I_F = 2 \text{ mA}$           |            | $\phi$      |      | $\pm 60$ |      | deg  |
| Forward voltage                  | $I_F = 2 \text{ mA}$           |            | $V_F$       |      | 1.8      | 2.2  | V    |
| Reverse voltage                  | $I_R = 10 \text{ }\mu\text{A}$ |            | $V_R$       | 6    | 15       |      | V    |

Note:

<sup>1)</sup>  $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified<sup>2)</sup> In one packing unit  $I_{Vmax}/I_{Vmin} \leq 1.6$



| LUMINOUS INTENSITY CLASSIFICATION |                       |      |      |
|-----------------------------------|-----------------------|------|------|
| GROUP                             | LIGHT INTENSITY (mcd) |      |      |
| STANDARD                          | OPTIONAL              | MIN. | MAX. |
| H                                 | 1                     | 2.8  | 3.55 |
|                                   | 2                     | 3.55 | 4.5  |
| J                                 | 1                     | 4.5  | 5.6  |
|                                   | 2                     | 5.6  | 7.1  |
| K                                 | 1                     | 7.1  | 9.0  |
|                                   | 2                     | 9.0  | 11.2 |
| L                                 | 1                     | 11.2 | 14.0 |
|                                   | 2                     | 14.0 | 18.0 |
| M                                 | 1                     | 18.0 | 22.4 |
|                                   | 2                     | 22.4 | 28.0 |

Note:

Luminous Intensity is tested at a current pulse duration of 25 ms and an accuracy of  $\pm 11\%$ . The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped in one reel (there will be no mixing of two groups on each reel). In order to ensure availability, single brightness groups will not be orderable. In a similar manner for colors where wavelength groups are measured and binned, single wavelength groups will be shipped in any one reel. In order to ensure availability, single wavelength groups will not be orderable.

| COLOR CLASSIFICATION |                      |      |        |      |
|----------------------|----------------------|------|--------|------|
| GROUP                | YELLOW               |      | ORANGE |      |
|                      | DOM. WAVELENGTH (nm) |      |        |      |
|                      | MIN.                 | MAX. | MIN.   | MAX. |
| 1                    | 581                  | 584  |        |      |
| 2                    | 583                  | 586  | 600    | 603  |
| 3                    | 585                  | 588  | 602    | 605  |
| 4                    | 587                  | 590  | 604    | 607  |
| 5                    | 589                  | 592  | 606    | 609  |
| 6                    | 591                  | 594  |        |      |

Note:

Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of  $\pm 1$  nm.

| CROSSING TABLE |             |
|----------------|-------------|
| VISHAY         | OSRAM       |
| VLMO30K1L2     | LOT67K-K1L2 |
| VLMO30K1M2     | LOT67K-K1M2 |
| VLMO30L1M2     | LOT67K-L1M2 |
| VLMS30J1K2     | LST67K-J1K2 |
| VLMS30J1L2     | LST67K-J1L2 |
| VLMS30K1L2     | LST67K-K1L2 |
| VLMY30J2L1     | LYT67K-J2L1 |
| VLMY30J2M1     | LYT67K-J2M1 |
| VLMY30K2M1     | LYT67K-K2M1 |

## TYPICAL CHARACTERISTICS

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



Figure 1. Forward Current vs. Ambient Temperature



Figure 2. Forward Current vs. Pulse Length



Figure 3. Rel. Luminous Intensity vs. Angular Displacement



Figure 6. Rel. Luminous Intensity vs. Ambient Temperature



Figure 4. Relative Intensity vs. Wavelength

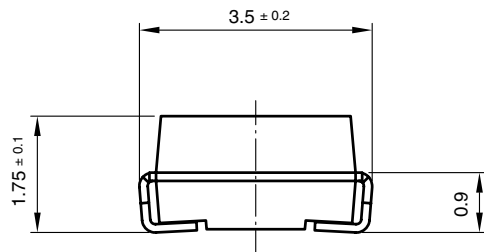


Figure 7. Forward Voltage vs. Ambient Temperature

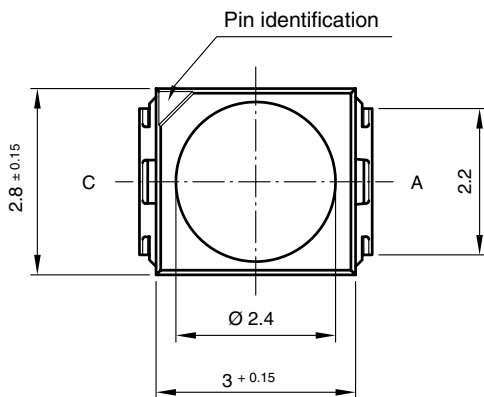


Figure 5. Forward Current vs. Forward Voltage

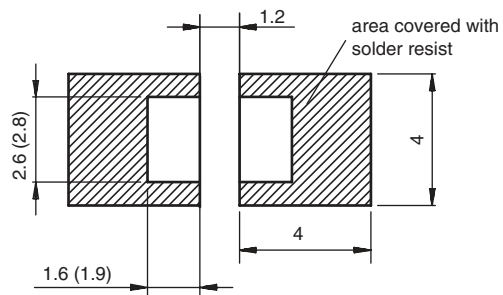
### PACKAGE DIMENSIONS in millimeters



technical drawings  
according to DIN  
specifications



### Mounting Pad Layout



Drawing-No.: 6.541-5067.01-4  
Issue: 5; 04.11.08  
20541

**METHOD OF TAPING/POLARITY AND TAPE AND REEL**

**SMD LED (VLM.3 - SERIES)**

Vishay's LEDs in SMD packages are available in an antistatic 8 mm blister tape (in accordance with DIN IEC 40 (CO) 564) for automatic component insertion. The blister tape is a plastic strip with impressed component cavities, covered by a top tape.



**REEL PACKAGE DIMENSION IN MILLIMETERS FOR SMD LEDS, TAPE OPTION GS08 (= 1500 PCS.)**

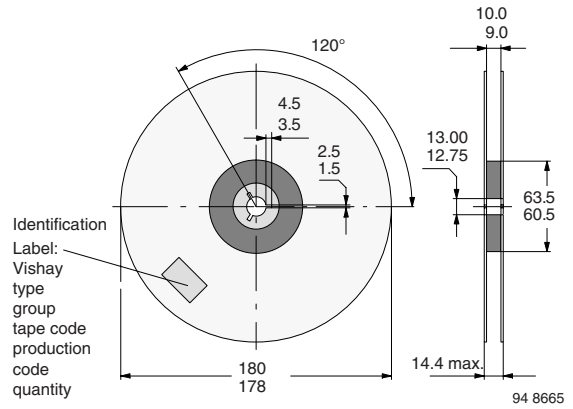


Figure 9. Reel Dimensions - GS08

**TAPING OF VLM.3...**



Figure 8. Tape Dimensions in mm for PLCC-2

**REEL PACKAGE DIMENSION IN MILLIMETERS FOR SMD LEDS, TAPE OPTION GS18 (= 8000 PCS.) PREFERRED**

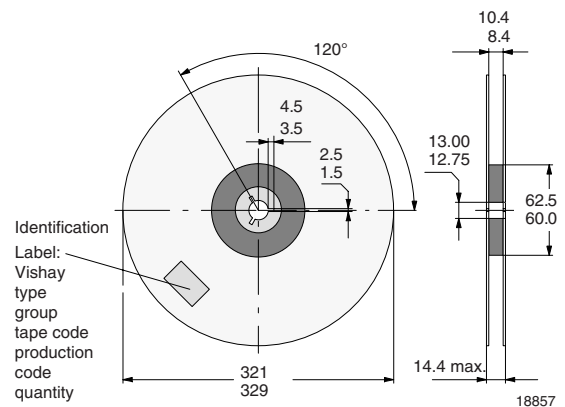


Figure 10. Reel Dimensions - GS18

## SOLDERING PROFILE

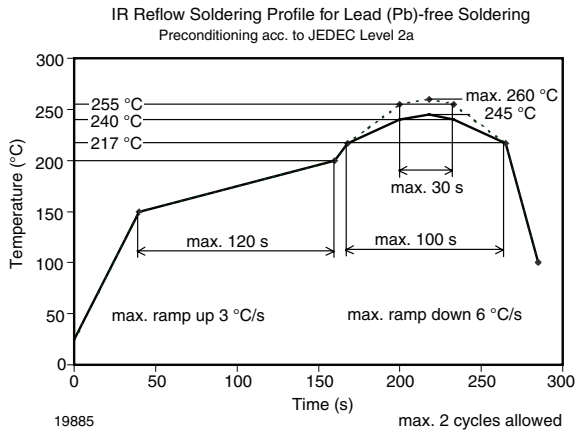


Figure 11. Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

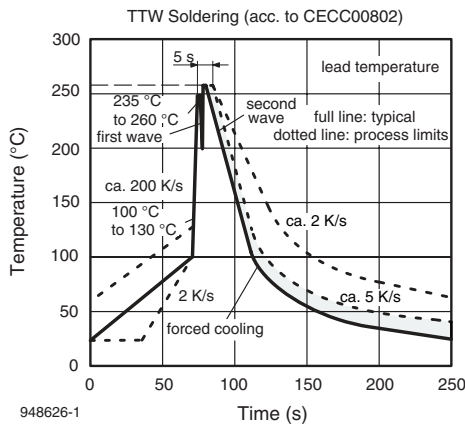
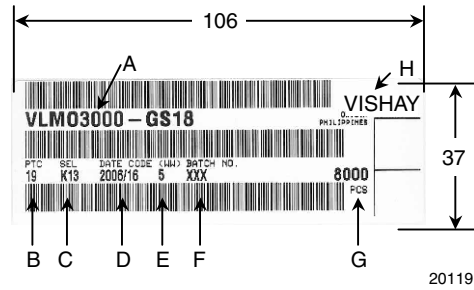


Figure 12. Double Wave Soldering of Opto Devices (all Packages)

## BAR CODE PRODUCT LABEL EXAMPLE:



- A) Type of component
- B) Manufacturing plant
- C) SEL - selection code (bin):  
e.g.: K1 = code for luminous intensity group  
3 = code for color group
- D) Date code year/week
- E) Day code (e.g. 5: Friday)
- F) Batch no.
- G) Total quantity
- H) Company code





## Disclaimer

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