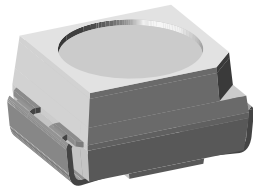


## Standard SMD LED in PLCC-2



94 8553

### DESCRIPTION

These devices have been designed to meet the increasing demand for surface mounting technology. The package of the VLMG31-series is the PLCC-2. 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: standard
- Angle of half intensity:  $\pm 60^\circ$

### FEATURES

- Lead (Pb)-free product-RoHS compliant
- SMD LEDs with exceptional brightness
- Luminous intensity categorized
- 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-020C
- Available in 8 mm tape
- Low profile package
- Non-diffused lens: excellent for coupling to light pipes and backlighting
- Low power consumption
- Luminous intensity ratio in one packaging unit  $I_{Vmax}/I_{Vmin} \leq 1.6$
- Preconditioning: acc. to JEDEC level 2a
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B



### 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 in office equipment
- Flat backlight for LCDs, switches and symbols
- General use

PARTS TABLE		
PART	COLOR, LUMINOUS INTENSITY	TECHNOLOGY
VLMG31K1L2-GS08	Green, $I_V = (7.1 \text{ to } 18) \text{ mcd}$	GaP on GaP
VLMG31K1L2-GS18	Green, $I_V = (7.1 \text{ to } 18) \text{ mcd}$	GaP on GaP
VLMG31K1M2-GS08	Green, $I_V = (7.1 \text{ to } 28) \text{ mcd}$	GaP on GaP
VLMG31K1M2-GS18	Green, $I_V = (7.1 \text{ to } 28) \text{ mcd}$	GaP on GaP
VLMG31L1M2-GS08	Green, $I_V = (11.2 \text{ to } 28) \text{ mcd}$	GaP on GaP
VLMG31L1M2-GS18	Green, $I_V = (11.2 \text{ to } 28) \text{ mcd}$	GaP on GaP



ABSOLUTE MAXIMUM RATINGS <sup>1)</sup> VLMG31..				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage <sup>2)</sup>		$V_R$	6	V
DC forward current	$T_{amb} \leq 60\text{ }^\circ\text{C}$	$I_F$	30	mA
Surge forward current	$t_p \leq 10\text{ }\mu\text{s}$	$I_{FSM}$	0.5	A
Power dissipation		$P_V$	100	mW
Junction temperature		$T_j$	100	$^\circ\text{C}$
Operating temperature range		$T_{amb}$	- 40 to + 100	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	- 40 to + 100	$^\circ\text{C}$
Thermal resistance junction/ ambient	mounted on PC board (pad size > 16 mm <sup>2</sup> )	$R_{thJA}$	400	K/W

Note:

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

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

OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> VLMG31.., GREEN							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity <sup>2)</sup>	$I_F = 10\text{ mA}$	VLMG31K1L2	$I_V$	7.1		18	mcd
		VLMG31K1M2	$I_V$	7.1		28	mcd
		VLMG31L1M2	$I_V$	11.2		28	mcd
Dominant wavelength	$I_F = 10\text{ mA}$		$\lambda_d$	562		575	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$		565		nm
Angle of half intensity	$I_F = 10\text{ mA}$		$\varphi$		$\pm 60$		deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$		2.2	2.8	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	15		V
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$		$C_j$		15		pF

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
K	1		7.1	9
	2		9	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 on each 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 on any one reel.

In order to ensure availability, single wavelength groups will not be orderable.

COLOR CLASSIFICATION		
GROUP	GREEN	
	DOM. WAVELENGTH (NM)	
	MIN.	MAX.
3	562	565
4	564	567
5	566	569
6	568	571
7	570	573
8	572	575

Note:

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

CROSSING TABLE	
VISHAY	OSRAM
VLMG31K1L2	LGT670-K1L2
VLMG31K1M2	LGT670-K1M2
VLMG31L1M2	LGT670-L1M2

**TYPICAL CHARACTERISTICS**

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

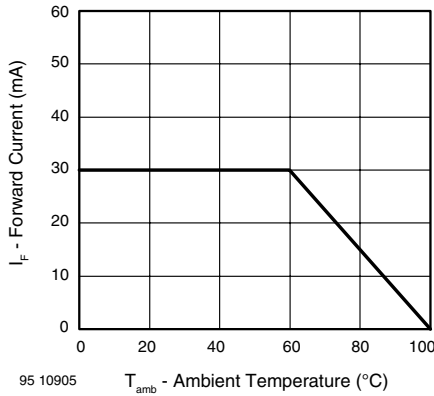


Figure 1. Forward Current vs. Ambient Temperature

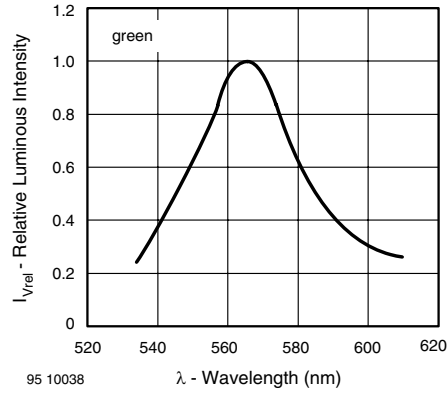


Figure 4. Relative Intensity vs. Wavelength

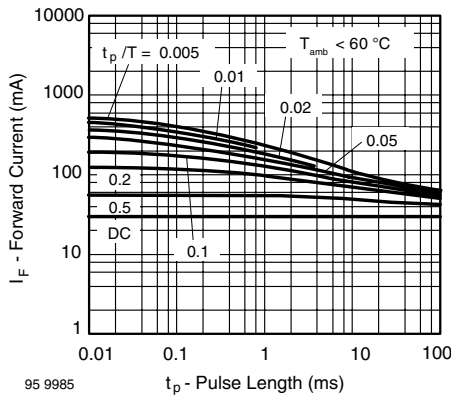


Figure 2. Pulse Forward Current vs. Pulse Duration

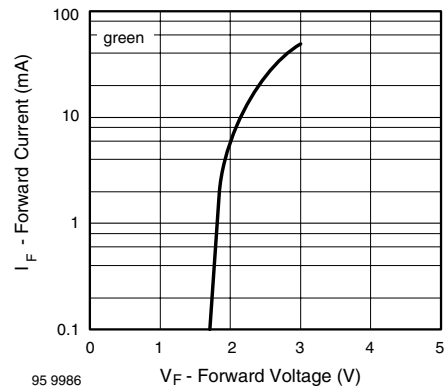


Figure 5. Forward Current vs. Forward Voltage

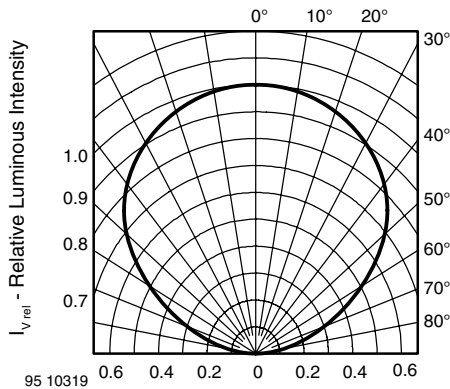


Figure 3. Rel. Luminous Intensity vs. Angular Displacement

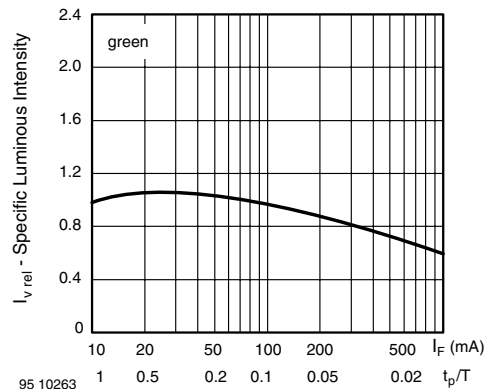


Figure 6. Specific Luminous Intensity vs. Forward Current

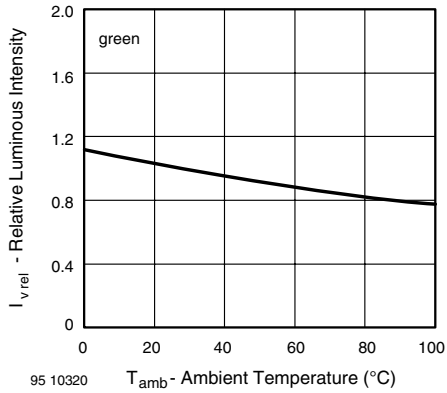
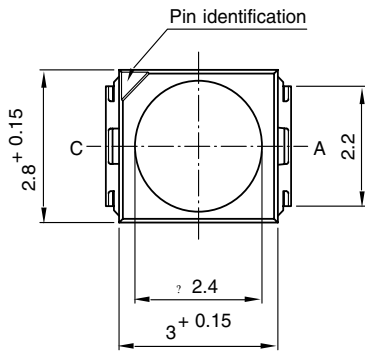
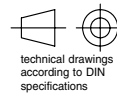
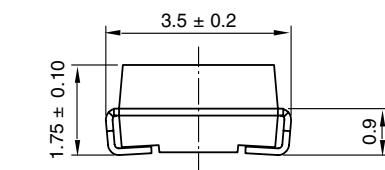
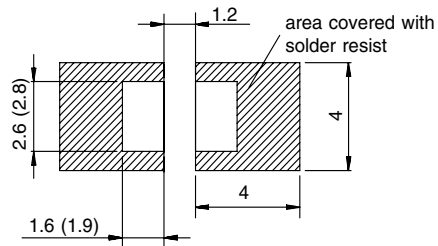


Figure 7. Rel. Luminous Intensity vs. Ambient Temperature

**PACKAGE DIMENSIONS** in millimeters



**Mounting Pad Layout**



Drawing-No.: 6.541-5025.01-4  
 Issue: 8; 22.11.05  
 95 11314-1

**METHOD OF TAPING/POLARITY AND TAPE AND REEL**
**SMD LED (VLM3 - 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.

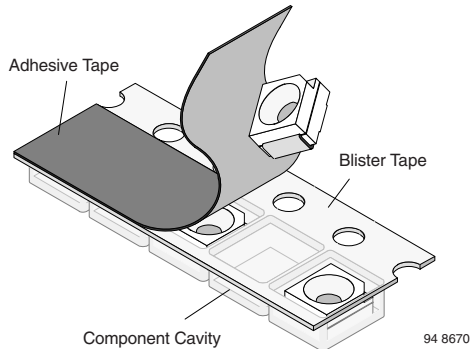
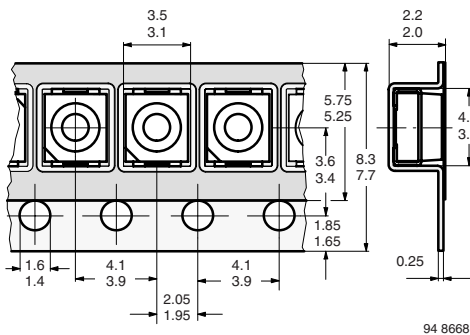

**TAPING OF VLM.3..**


Figure 8. Tape Dimensions in mm for PLCC-2

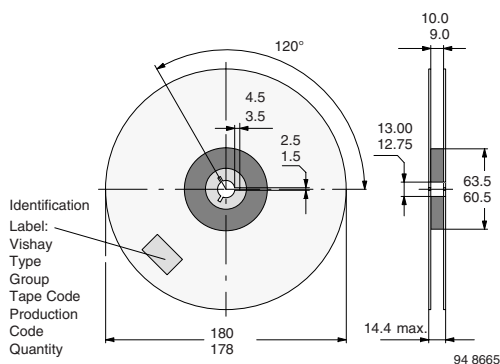
**REEL PACKAGE DIMENSION IN MM FOR SMD LEDs, TAPE OPTION GS08 (= 1500 PCS.)**


Figure 9. Reel Dimensions - GS08

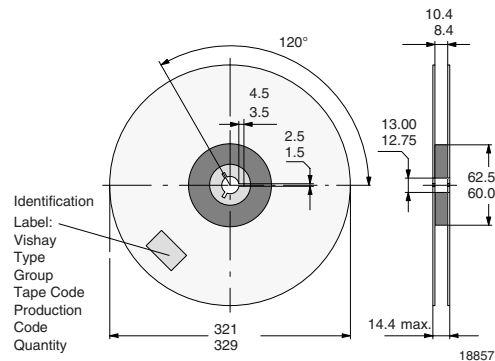
**REEL PACKAGE DIMENSION IN MM FOR SMD LEDs, TAPE OPTION GS18 (= 8000 PCS.) PREFERRED**


Figure 10. Reel Dimensions - GS18

**SOLDERING PROFILE**

IR Reflow Soldering Profile for Lead (Pb)-free Soldering  
Preconditioning acc. to JEDEC Level 2a

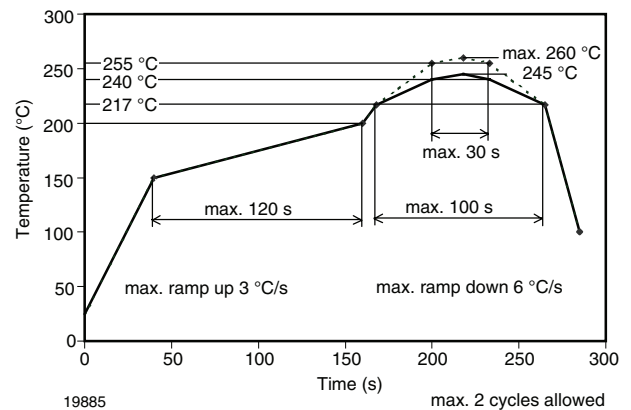


Figure 11. Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

TTW Soldering (acc. to CECC00802)

948626-1

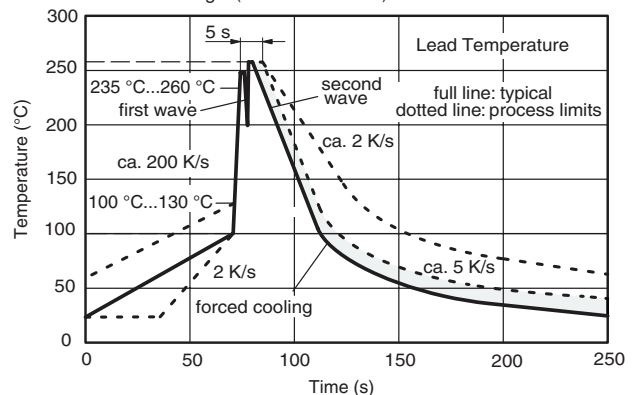
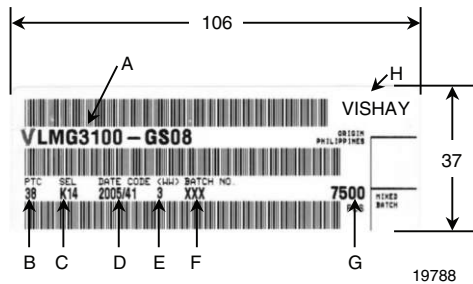


Figure 12. Double Wave Soldering of Opto Devices (all Packages)

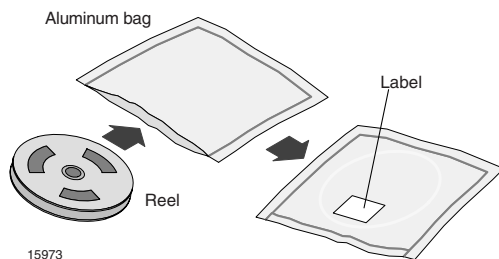
**BAR CODE PRODUCT LABEL  
EXAMPLE:**



- A) Type of component
- B) Manufacturing plant
- C) SEL - selection code (bin):  
e.g.: K1 = code for luminous intensity group  
4 = code for color group
- D) Date code year/week
- E) Day code (e.g. 2: Tuesday)
- F) Batch no.
- G) Total quantity
- H) Company code

**DRY PACKING**

The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.



**FINAL PACKING**

The sealed reel is packed into a cardboard box. A secondary cardboard box is used for shipping purposes.

**RECOMMENDED METHOD OF STORAGE**

Dry box storage is recommended as soon as the aluminium bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

After more than 672 h under these conditions moisture content will be too high for reflow soldering.

In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

- 192 h at 40 °C + 5 °C/- 0 °C and < 5 % RH (dry air/ nitrogen) or
- 96 h at 60 °C + 5 °C and < 5 % RH for all device containers or
- 24 h at 100 °C + 5 °C not suitable for reel or tubes.

An EIA JEDEC standard JESD22-A112 level 2a label is included on all dry bags.

**CAUTION**  
This bag contains  
MOISTURE - SENSITIVE DEVICES

LEVEL

2a

1. Shelf life in sealed bag 12 months at <40°C and < 90% relative humidity (RH)
2. After this bag is opened devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing (peak package body temp. 260°C) must be:
  - a) Mounted within **672 hours** at factory condition of ≤ 30°C/60%RH or
  - b) Stored at ≤10% RH.
3. Devices require baking before mounting if:
  - a) Humidity Indicator Card is >10% when read at 23°C ± 5°C or
  - b) 2a or 2b is not met.
4. If baking is required, devices may be baked for:
 

<b>192 hours</b> at 40°C + 5°C/-0°C and <5%RH (dry air/nitrogen)	<b>or</b>
<b>96 hours</b> at 60±5°C and <5%RH	<b>For all device containers or</b>
<b>24 hours</b> at 100±5°C	<b>Not suitable for reels or tubes</b>

Bag Seal Date: \_\_\_\_\_  
(If blank, see bar code label)

Note: LEVEL defined by EIA JEDEC Standard JESD22-A113

Example of JESD22-A112 level 2a label

**ESD PRECAUTION**

Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electro-static sensitive devices warning labels are on the packaging.

**VISHAY SEMICONDUCTORS STANDARD  
BAR CODE LABELS**

The Vishay Semiconductors standard bar code labels are printed at final packing areas. The labels are on each packing unit and contain Vishay Semiconductors specific data.

**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.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



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