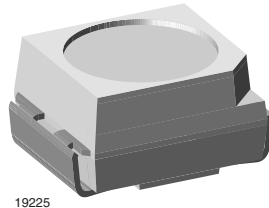


## Power SMD LED in PLCC-2 Package



### FEATURES

- Available in 8 mm tape
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B
- Compatible with IR reflow, vapor phase and wave solder processes according to CECC 00802 and J-STD-020C
- Preconditioning: acc. to JEDEC level 2a
- Automotive qualified
- Lead (Pb)-free device
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



### DESCRIPTION

The VLMK33.. series is an advanced modification of the Vishay VLMK33.. series. It is designed to incorporate larger chips, therefore, capable of withstanding a 50 mA drive current.

The package of the VLMK33.. is the PLCC-2 (equivalent to a size B tantalum capacitor).

It consists of a lead frame which is embedded in a white thermoplast. The reflector inside this package is filled up with clear epoxy.

### APPLICATIONS

- Interior and exterior lighting
- Indicator and backlighting purposes for audio, video, LCDs, switches, symbols, illuminated advertising etc.
- Illumination purpose, alternative to incandescent lamps
- Automotive qualified
- General use

### PRODUCT GROUP AND PACKAGE DATA

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

PARTS TABLE		
PART	COLOR, LUMINOUS INTENSITY	TECHNOLOGY
VLMK33Q2T1-GS08	Red, $I_V > (90 \text{ to } 355) \text{ mcd}$	AllnGaP on GaAs
VLMK33Q2T1-GS18	Red, $I_V > (90 \text{ to } 355) \text{ mcd}$	AllnGaP on GaAs
VLMK33R1S2-GS08	Red, $I_V = (112 \text{ to } 280) \text{ mcd}$	AllnGaP on GaAs
VLMK33R1S2-GS18	Red, $I_V = (112 \text{ to } 280) \text{ mcd}$	AllnGaP on GaAs
VLMK33S1T1-GS08	Red, $I_V = (180 \text{ to } 355) \text{ mcd}$	AllnGaP on GaAs
VLMK33S1T1-GS18	Red, $I_V = (180 \text{ to } 355) \text{ mcd}$	AllnGaP on GaAs



ABSOLUTE MAXIMUM RATINGS <sup>1)</sup> VLMK33..				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage <sup>2)</sup>		$V_R$	5	V
DC Forward current		$I_F$	50	mA
Power dissipation		$P_V$	130	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
Soldering temperature	$t \leq 5$ s	$T_{sd}$	260	°C
Thermal resistance junction/ambient	mounted on PC board (pad size > 16 mm <sup>2</sup> )	$R_{thJA}$	400	K/W

Note:

1)  $T_{amb} = 25$  °C unless otherwise specified

2) Driving LED in reverse direction is suitable for a short term application

OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> VLMK33.., RED							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN	TYP.	MAX	UNIT
Luminous intensity	$I_F = 20$ mA	VLMK33Q2T1	$I_V$	90		355	mcd
		VLMK33R1S2	$I_V$	112		280	mcd
		VLMK33S1T1	$I_V$	180		355	mcd
Luminous flux/Luminous intensity			$\phi_V/I_V$		3.14		mlm/mcd
Dominant wavelength	$I_F = 20$ mA		$\lambda_d$	611	617	624	nm
Peak wavelength	$I_F = 20$ mA		$\lambda_p$		624		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	$I_F = 20$ mA		$\Delta\lambda$		18		nm
Angle of half intensity	$I_F = 20$ mA		$\phi$		± 60		deg
Forward voltage	$I_F = 20$ mA		$V_F$		1.9	2.5	V
Reverse current	$V_R = 5$ V		$V_R$		0.01	10	µA

Note:

1)  $T_{amb} = 25$  °C unless otherwise specified

LUMINOUS INTENSITY CLASSIFICATION		
GROUP	LUMINOUS INTENSITY (MCD)	
	MIN	MAX
Q1	71	90
Q2	90	112
R1	112	140
R2	140	180
S1	180	224
S2	224	280
T1	280	355
T2	355	450

Note:

Luminous intensity is tested at a current pulse duration of 25 ms and an accuracy of ± 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 be not 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 be not orderable.

COLOR CLASSIFICATION		
GROUP	DOMINANT WAVELENGTH (NM)	
	RED	
	MIN	MAX
1	611	618
2	614	622
3		
4		
5		
6		

Note:

Wavelength are tested at a current pulse duration of 25 ms and an accuracy of ± 1 nm

CROSSING TABLE	
VISHAY	OSRAM
VLMK33Q2T1	LAT676-Q2T1
VLMK33R1S2	LAT676-R1S2
VLMK33S1T1	LAT676-S1T1

**TYPICAL CHARACTERISTICS**

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

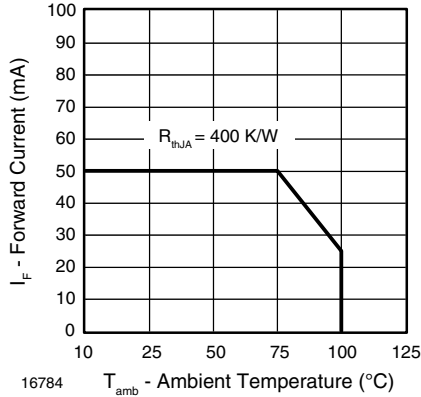


Figure 1. Forward Current vs. Ambient Temperature

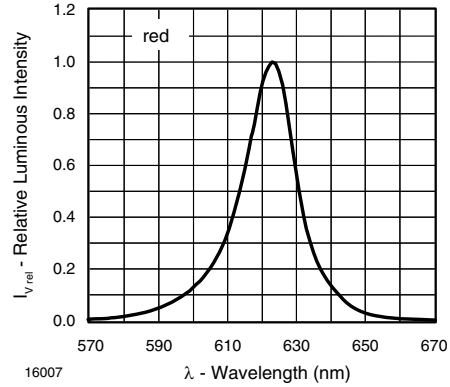


Figure 4. Rel. Luminous Intensity vs. Angular Displacement

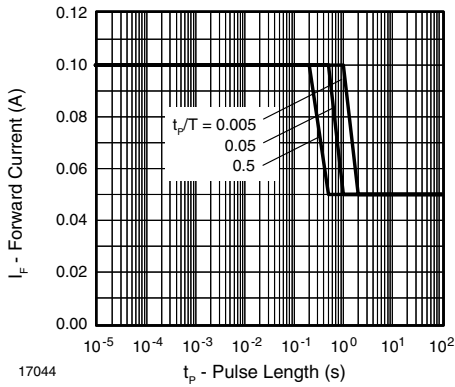


Figure 2. Forward Current vs. Pulse Length

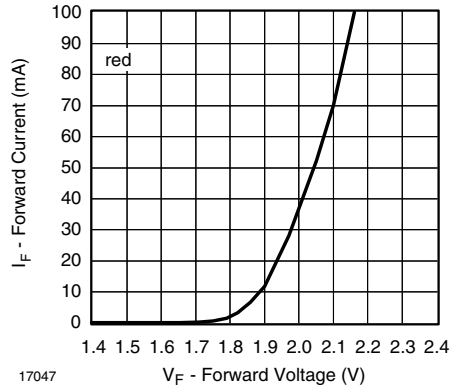


Figure 5. Forward Current vs. Forward Voltage

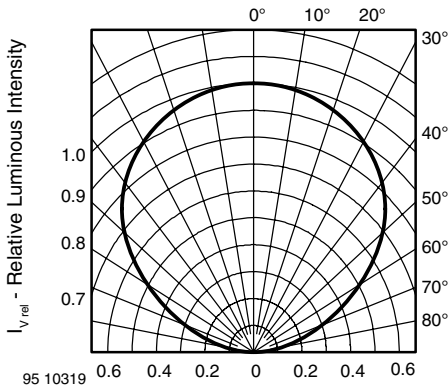


Figure 3. Rel. Luminous Intensity vs. Angular Displacement

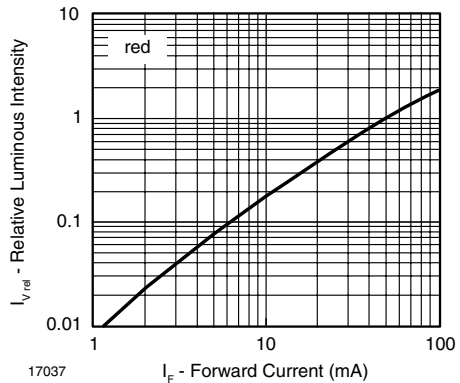


Figure 6. Change of Dominant Wavelength vs. Forward Current

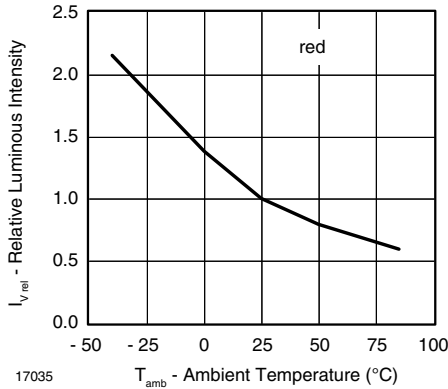


Figure 7. Relative Luminous Intensity vs. Amb. Temperature

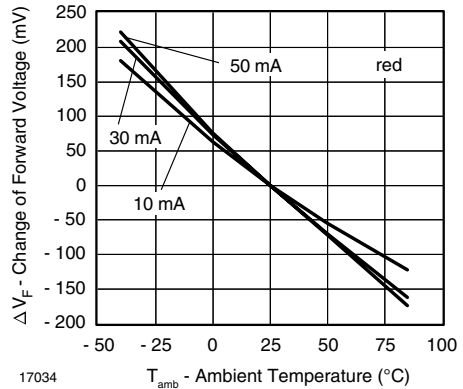


Figure 9. Change of Forward Voltage vs. Ambient Temperature

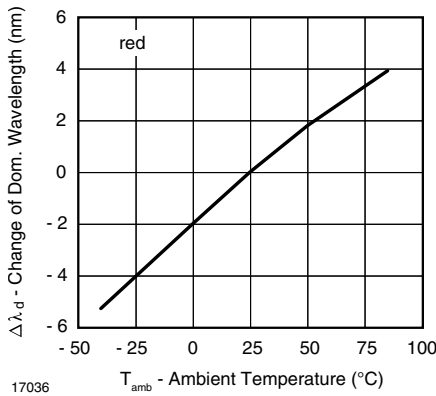
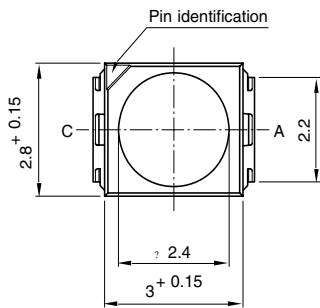
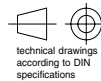
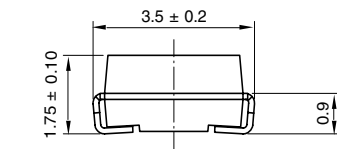
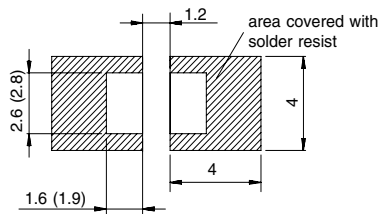


Figure 8. Change of Dominant Wavelength vs. Ambient Temperature

**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.

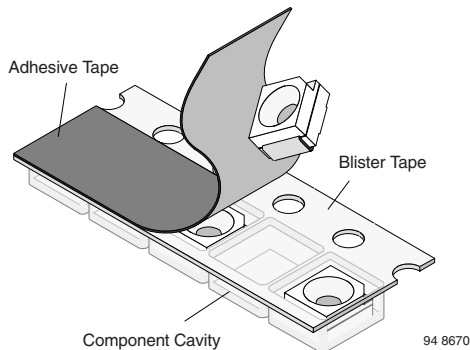
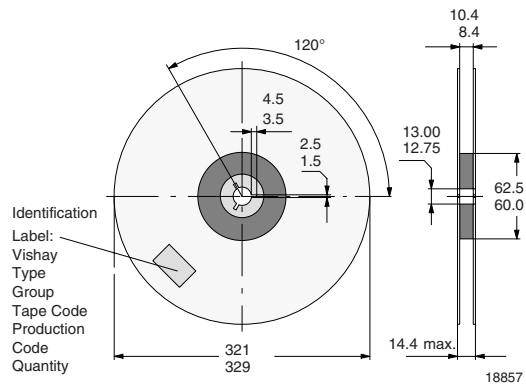

**REEL PACKAGE DIMENSION IN MM FOR SMD LED, TAPE OPTION GS18 (= 8000 PCS.) PREFERRED**


Figure 12. Reel dimensions - GS18

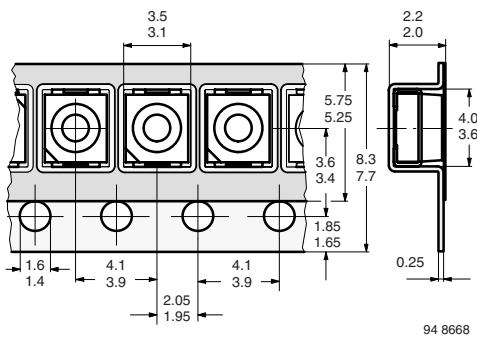
**TAPING OF VLM.3..**


Figure 10. Tape Dimensions in mm for PLCC-2

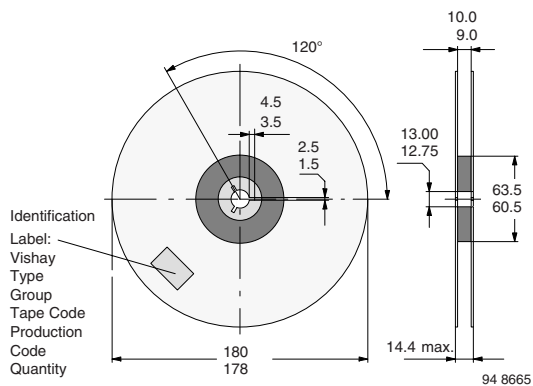
**REEL PACKAGE DIMENSION IN MM FOR SMD LED, TAPE OPTION GS08 (= 1500 PCS.)**


Figure 11. Reel Dimensions - GS08

**SOLDERING PROFILE**

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

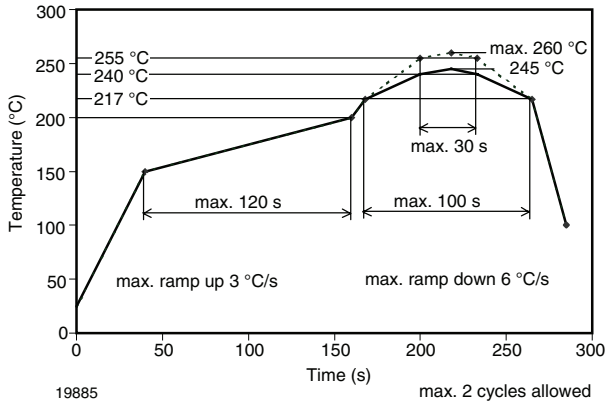


Figure 13. Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

TTW Soldering (acc. to CECC00802) 948626-1

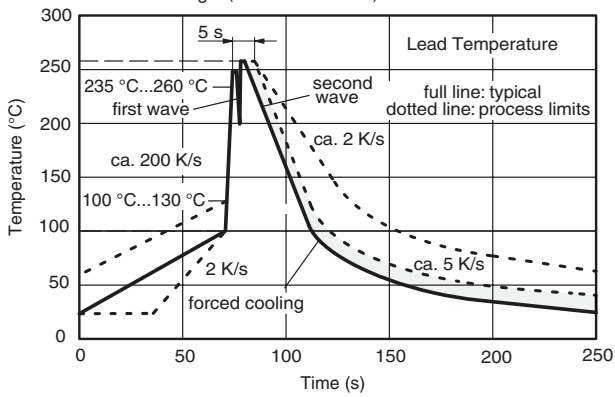


Figure 14. Double Wave Soldering of Opto Devices (all Packages)

**BAR CODE PRODUCT LABEL EXAMPLE:**



- A) Type of component
- B) Manufacturing plant
- C) SEL - selection code (bin):  
e.g.: Q2 = code for luminous intensity group
- D) Date code year/week
- E) Day code (e.g. 2: Tuesday)
- F) Batch no.
- G) Total quantity
- H) Company code

**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



## Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.