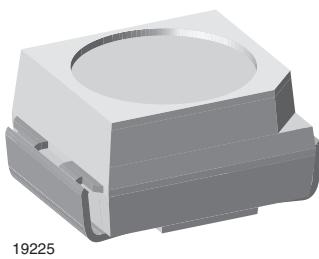


## Standard SMD LED PLCC-2



### DESCRIPTION

This device has been designed to meet the increasing demand for white SMD LED.

The package of the VLMW45R1S1-5K6L-08 is the PLCC-2.

It consists of a lead frame which is embedded in a white thermoplastic. The reflector inside this package is filled with a mixture of epoxy and TAG phosphor.

The TAG phosphor converts the blue emission partially to yellow, which mixes with the remaining blue to give white.

### PRODUCT GROUP AND PACKAGE DATA

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

### FEATURES

- High efficient InGaN technology
- Chromaticity coordinate categorized according to CIE1931 per packing unit
- Typical color temperature 5500 K
- EIA and ICE standard package
- Compatible with reflow, vapor phase and wave solder processes according to CECC 00802 and J-STD-020
- Available in 8 mm tape reel
- Preconditioning according to JEDEC® level 2a
- ESD-withstand voltage: up to 2 kV HBM according to JESD22-A114-B
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Camera flash light
- Signal and symbol luminaire
- Marker lights
- Interior and exterior automotive lighting: brake lights, turn lights, backlighting, side markers
- Indicator lighting

### PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at $I_F$ (mA)	COORDINATE (x, y)			at $I_F$ (mA)	FORWARD VOLTAGE (V)			at $I_F$ (mA)	TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
VLMW45R1S1-5K6L-08	White	112	160	224	5	-	0.33, 0.33	-	5	-	3.3	4.2	20	InGaN / TAG on sapphire

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ C$ , unless otherwise specified)

**VLMW45R1S1-5K6L-08**

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
DC forward current	$T_{amb} \leq 80^\circ C$	$I_F$	20	mA
Surge forward current	$t_p \leq 10 \mu s$	$I_{FSM}$	0.1	A
Power dissipation		$P_V$	84	mW
Junction temperature		$T_j$	110	°C
Storage temperature range		$T_{stg}$	-40 to +100	°C
Operating temperature range		$T_{amb}$	-40 to +100	°C
Thermal resistance junction / ambient	Mounted on PC board (pad size > 16 mm <sup>2</sup> )	$R_{thJA}$	360	K/W

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)  
**VLMW45R1S1-5K6L-08, WHITE**

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 5 \text{ mA}$	$I_V$	112	160	224	mcd
Chromaticity coordinate x acc. to CIE 1931	$I_F = 5 \text{ mA}$	x	-	0.33	-	
Chromaticity coordinate y acc. to CIE 1931	$I_F = 5 \text{ mA}$	y	-	0.33	-	
Angle of half intensity	$I_F = 5 \text{ mA}$	$\phi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 20 \text{ mA}$	$V_F$	-	3.3	4.2	V
Temperature coefficient of $V_F$	$I_F = 5 \text{ mA}$	$TC_{VF}$	-	-3	-	mV/K
Temperature coefficient of $I_V$	$I_F = 5 \text{ mA}$	$TC_{IV}$	-	-0.4	-	%/K

**Note**

- Not designed for reverse operation

LUMINOUS INTENSITY CLASSIFICATION			
GROUP	LIGHT INTENSITY (mcd)		
STANDARD	OPTIONAL	MIN.	MAX.
R	1	112	140
	2	140	180
S	1	180	224

**Note**

- Luminous intensity is tested at a current pulse duration of 25 ms and an accuracy of  $\pm 11\%$ . These 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 are 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 are not be orderable.

CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED		
	X	Y
5L	0.291	0.268
	0.285	0.279
	0.307	0.312
	0.310	0.297
5K	0.296	0.259
	0.291	0.268
	0.310	0.297
	0.313	0.284
6L	0.310	0.297
	0.307	0.312
	0.330	0.347
	0.330	0.330
6K	0.313	0.284
	0.310	0.297
	0.330	0.330
	0.330	0.310

**Note**

- Chromaticity coordinate groups are tested at a current pulse duration of 25 ms and a tolerance of  $\pm 0.01$ .

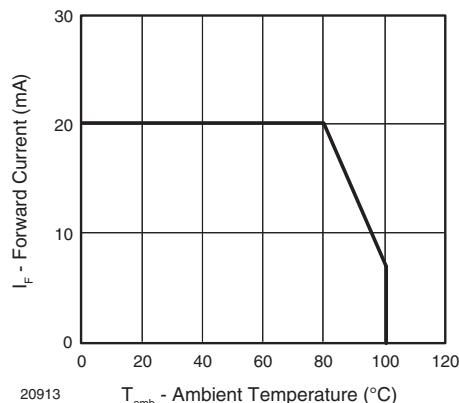
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

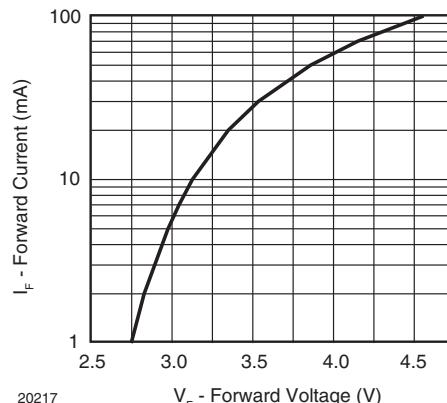


Fig. 4 - Forward Current vs. Forward Voltage

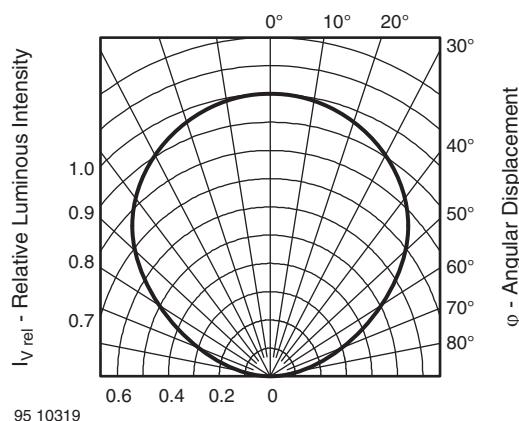


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

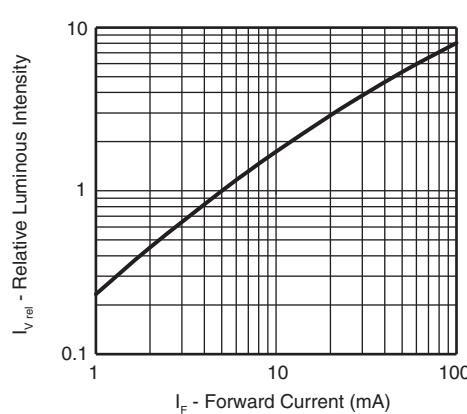


Fig. 5 - Relative Luminous Intensity vs. Forward Current

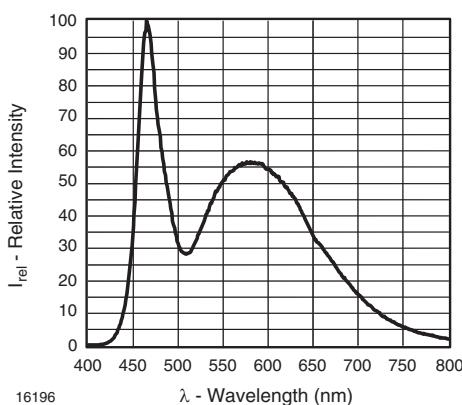


Fig. 3 - Relative Intensity vs. Wavelength

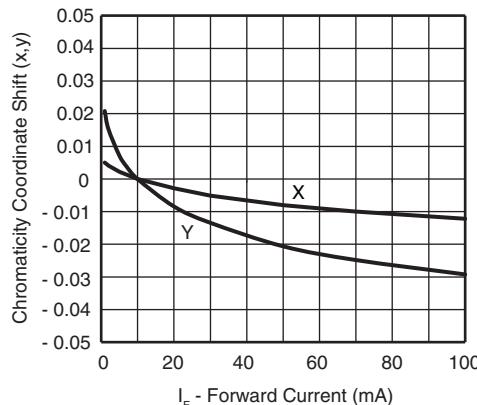


Fig. 6 - Chromaticity Coordinate Shift vs. Forward Current

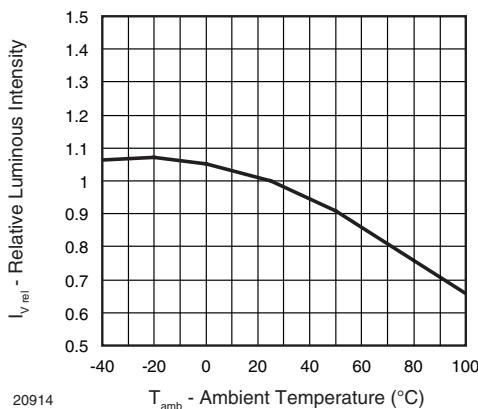


Fig. 7 - Relative Luminous Intensity vs. Ambient Temperature

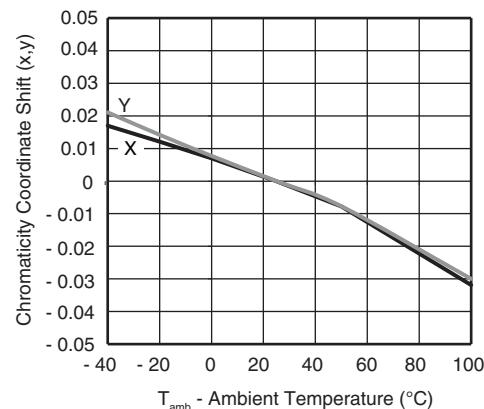


Fig. 9 - Chromaticity Coordinate Shift vs. Ambient Temperature

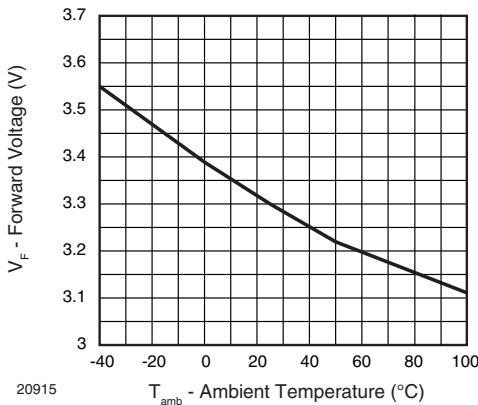


Fig. 8 - Forward Voltage vs. Ambient Temperature

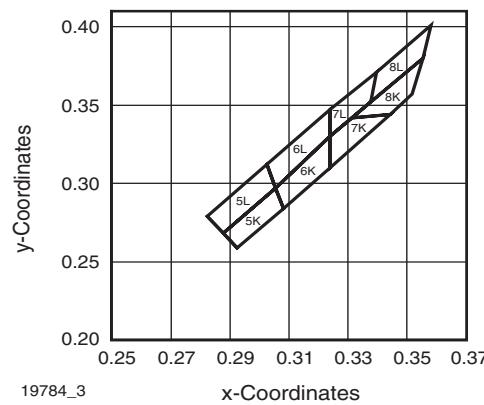
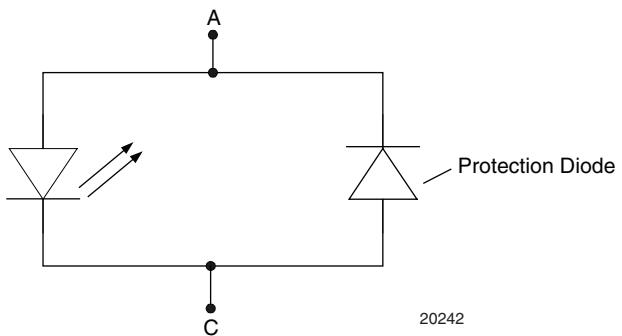
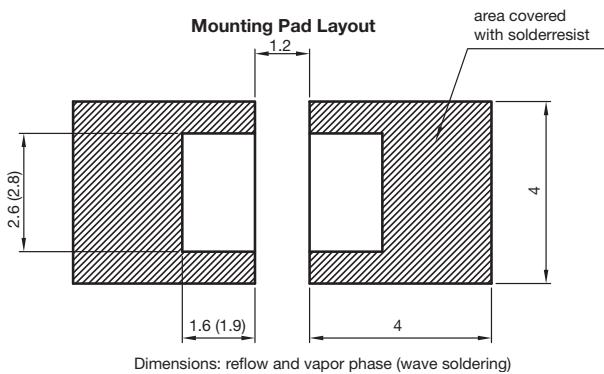
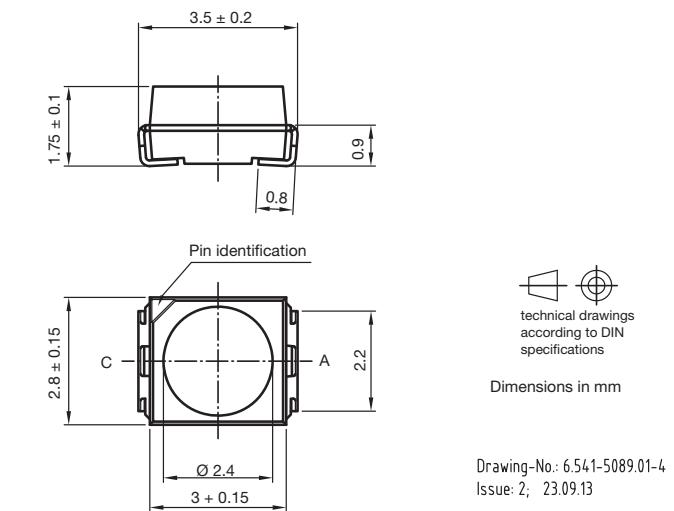


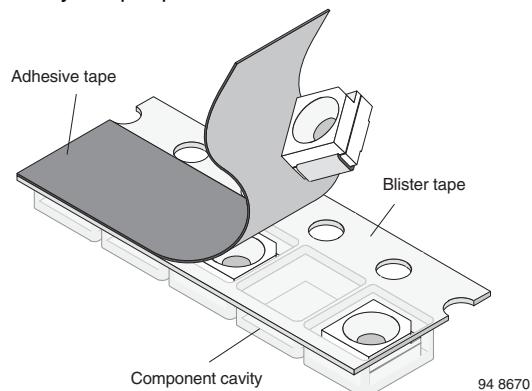
Fig. 10 - Coordinates of Colorgroups

**PACKAGE DIMENSIONS** in millimeters


## METHOD OF TAPING / POLARITY AND TAPE AND REEL

### SMD LED (VLM.3..., VLM.4...-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..., VLM.4...

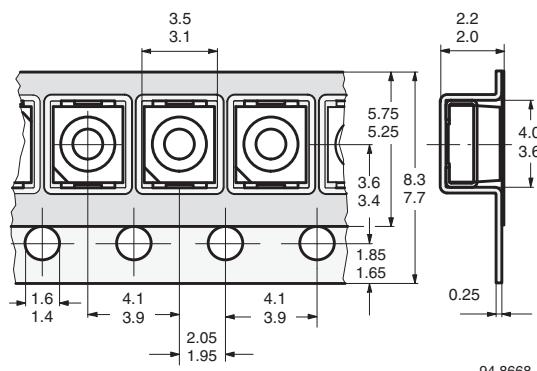


Fig. 11 - Tape Dimensions in mm for PLCC-2

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

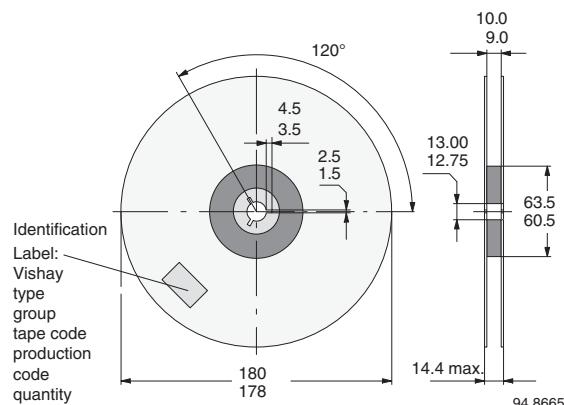


Fig. 12 - Reel Dimensions - GS08

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

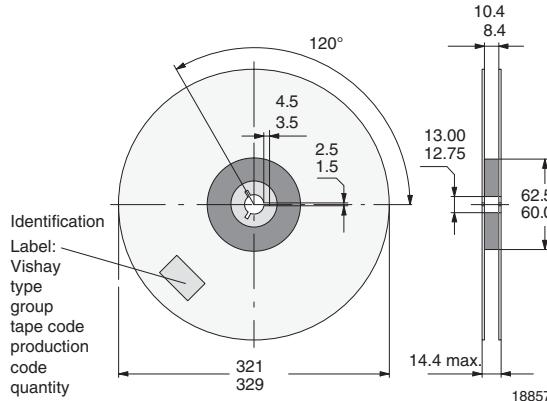


Fig. 13 - Reel Dimensions - GS18

## SOLDERING PROFILE

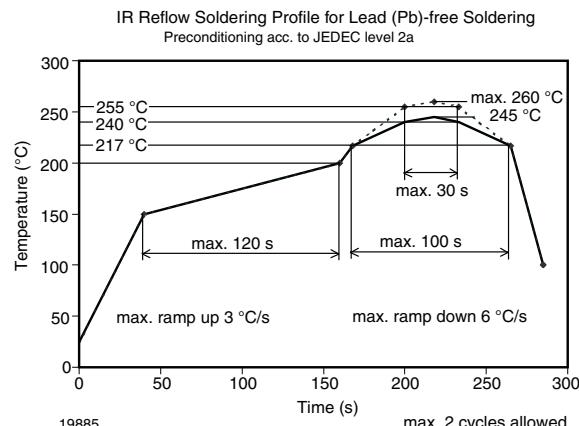


Fig. 14 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

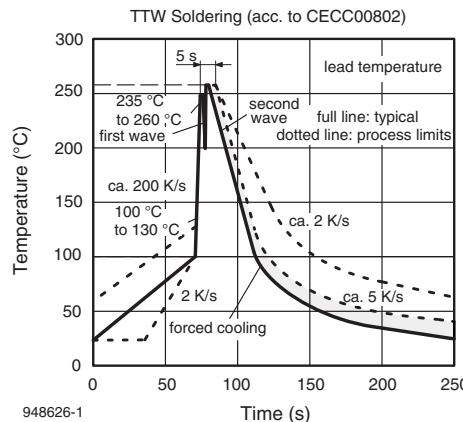
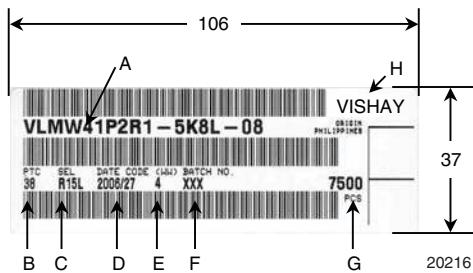


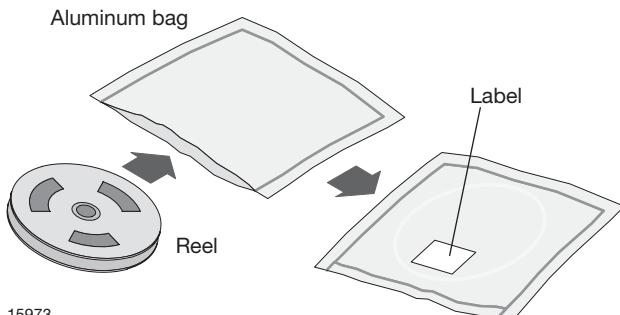
Fig. 15 - Double Wave Soldering of Opto Devices (all Packages)

**BAR CODE PRODUCT LABEL (example)**


- A. Type of component
- B. Manufacturing plant
- C. SEL - selection code (bin):  
e.g.: R1 = code for luminous intensity group  
5L = code for chrom. coordinate group
- D. Date code year / week
- E. Day code (e.g. 4: Thursday)
- 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.



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**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 aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

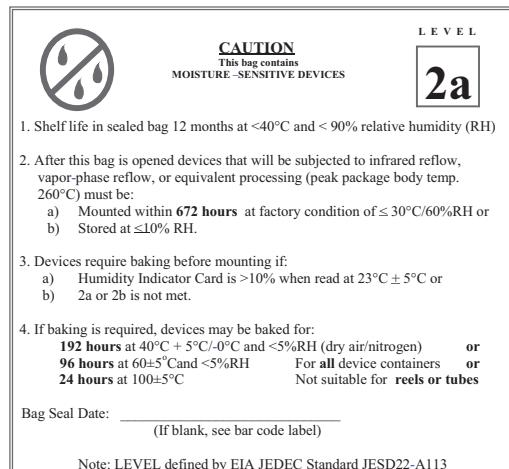
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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.



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. Electrostatic sensitive devices warning labels are on the packaging.

**VISHAY SEMICONDUCTORS STANDARD  
BAR CODE LABEL**

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.

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