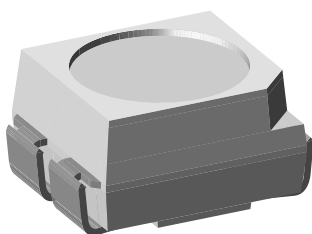


## Bicolor SMD LED



19211

### DESCRIPTION

These devices have been designed to meet the increasing demand for surface mounting technology.

The package of the VLMKG3400 is the PLCC-4.

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

This SMD device consists of a red and green chip. So it is possible to choose the color in one device.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD PLCC-4
- Product series: bicolor
- Angle of half intensity:  $\pm 60^\circ$

### FEATURES

- SMD LED with exceptional brightness
- Multicolored
- Luminous intensity categorized
- EIA and ICE standard package
- Compatible with automatic placement equipment
- Compatible with IR reflow, vapor phase and wave soldering 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
- Low power consumption
- Luminous intensity ratio in one packaging unit  $I_{Vmax}/I_{Vmin.} \leq 1.6$
- Preconditioning according to JEDEC level 2a
- ESD-withstand voltage: Up to 2 kV 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

- Automotive: Dashboards, switches, and optical indicators
- Telecommunication: Indicator and backlighting in telephone and fax
- Indicator and backlight in office equipment
- Flat backlight for LCDs, switches, and symbols
- General use

### PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at I <sub>F</sub> (mA)	WAVELENGTH (nm)			at I <sub>F</sub> (mA)	FORWARD VOLTAGE (V)			at I <sub>F</sub> (mA)	TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
VLMKG3400-GS08	Super red	56	-	140	20	627	633	639	20	-	1.9	2.6	20	AlInGaP on GaAs
	Green	35.5	-	90	20	564	570	575	20	-	2.0	2.6	20	AlInGaP on GaAs
VLMKG3400-GS18	Super red	56	-	140	20	627	633	639	20	-	1.9	2.6	20	AlInGaP on GaAs
	Green	35.5	-	90	20	564	570	575	20	-	2.0	2.6	20	AlInGaP on GaAs

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMKG3400**

PARAMETER	TEST CONDITION		SYMBOL	VALUE	UNIT
Reverse voltage per diode <sup>(1)</sup>	$I_R = 10\text{ }\mu\text{A}$		$V_R$	5	V
DC forward current per diode	$T_{amb} \leq 65\text{ }^{\circ}\text{C}$	1 chip on	$I_F$	30	mA
Surge forward current per diode			$I_{FSM}$	0.1	A
Power dissipation per diode			$P_V$	80	mW
Junction temperature			$T_j$	125	$^{\circ}\text{C}$
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> )	1 chip on 2 chips on	$R_{thJA}$	560 780	K/W

**Note**

<sup>(1)</sup> Driving the LED in reverse direction is suitable for short term application

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMKG3400, SUPER RED**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMKG3400	$I_V$	56	-	140	mcd
Dominant wavelength	$I_F = 20\text{ mA}$		$\lambda_d$	627	633	639	nm
Peak wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	643	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$		$\phi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$	-	1.9	2.6	V
Reverse current	$V_R = 5\text{ V}$		$I_R$	-	-	10	$\mu\text{A}$
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_j$	-	15	-	pF

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**VLMKG3400, GREEN**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMKG3400	$I_V$	35.5	-	90	mcd
Dominant wavelength	$I_F = 20\text{ mA}$		$\lambda_d$	564	570	575	nm
Peak wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	572	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$		$\phi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$	-	2.0	2.6	V
Reverse current	$V_R = 5\text{ V}$		$I_R$	-	-	10	$\mu\text{A}$
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_j$	-	15	-	pF

**CROSSING TABLE**

VISHAY	OSRAM
VLMKG3400	LSGT676

**LUMINOUS INTENSITY CLASSIFICATION AND GROUP COMBINATIONS, VLMKG3400**

		SUPER RED			
		P2 56 mcd to 71 mcd	Q1 71 mcd to 90 mcd	Q2 90 mcd to 112 mcd	R1 112 mcd to 140 mcd
GREEN	N2 35.5 mcd to 45 mcd	VLMKG3400	VLMKG3400	VLMKG3400	VLMKG3400
	P1 45 mcd to 56 mcd	VLMKG3400	VLMKG3400	VLMKG3400	VLMKG3400
	P2 56 mcd to 71 mcd	VLMKG3400	VLMKG3400	VLMKG3400	VLMKG3400
	Q2 710 mcd to 90 mcd	VLMKG3400	VLMKG3400	VLMKG3400	VLMKG3400

**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 in any one reel.  
In order to ensure availability, single wavelength groups will not be orderable.

**COLOR CLASSIFICATION**

GROUP	DOMINANT WAVELENGTH (nm)	
	GREEN	
	MIN.	MAX.
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.

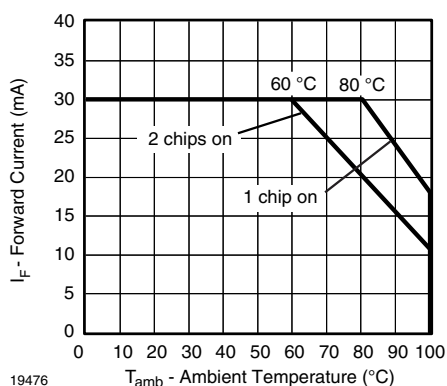
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

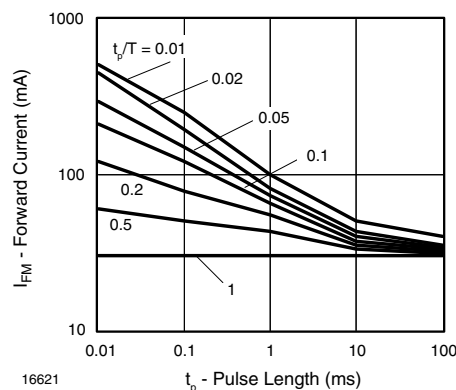


Fig. 2 - Forward Current vs. Pulse Duration

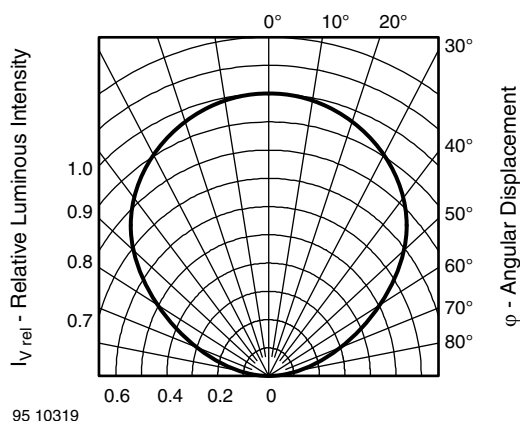


Fig. 3 - Relative Luminous Intensity vs. Angular Displacement

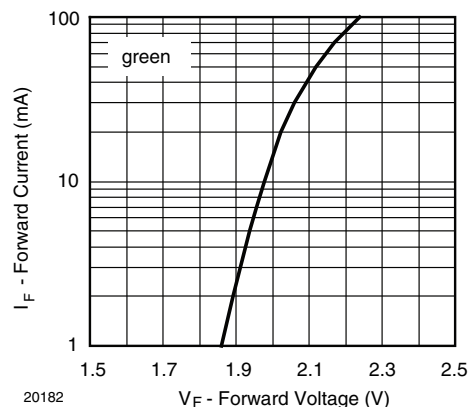


Fig. 6 - Relative Forward Voltage vs. Ambient Temperature

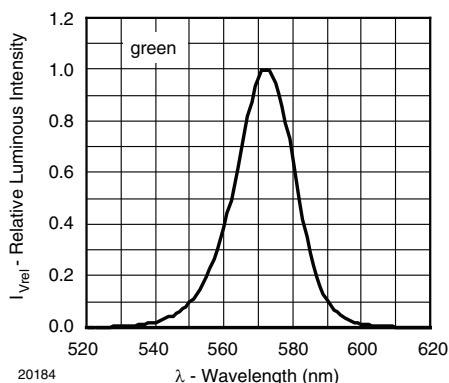


Fig. 4 - Relative Intensity vs. Wavelength

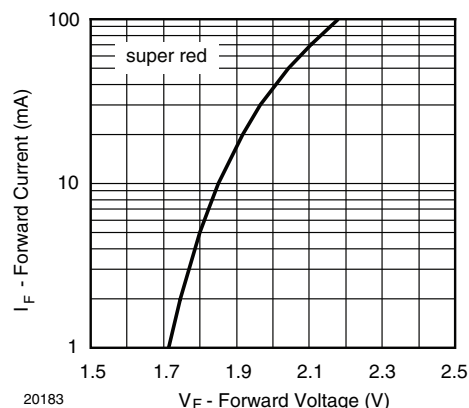


Fig. 7 - Relative Forward Voltage vs. Ambient Temperature

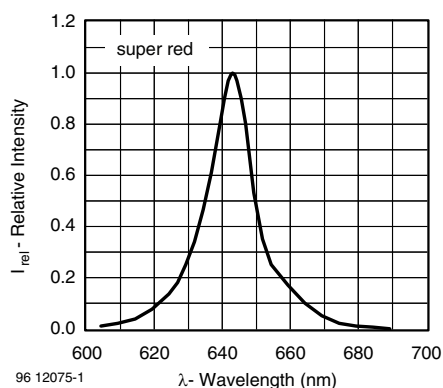


Fig. 5 - Relative Intensity vs. Wavelength

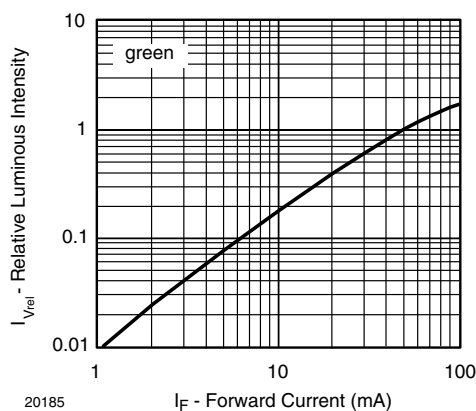


Fig. 8 - Relative Luminous Intensity vs. Forward Current

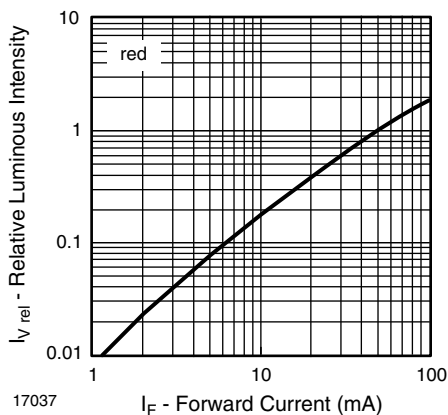


Fig. 9 - Relative Luminous Intensity vs. Forward Current

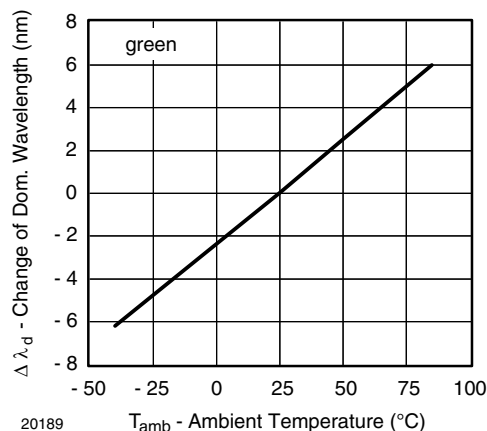


Fig. 12 - Change of Dominant Wavelength vs. Ambient Temperature

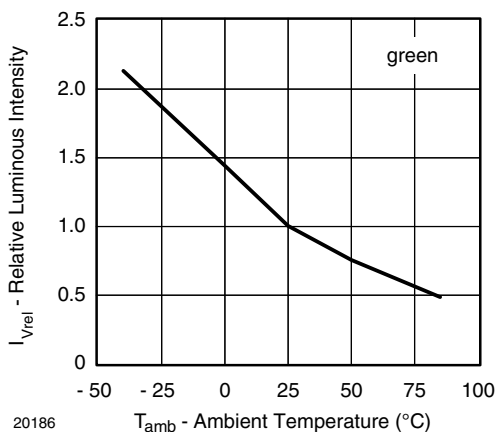


Fig. 10 - Relative Luminous Intensity vs. Ambient Temperature

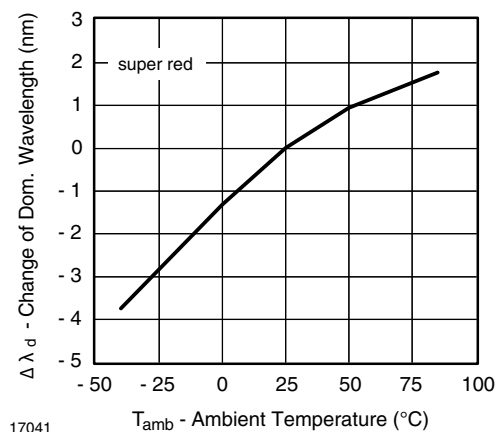


Fig. 13 - Change of Dominant Wavelength vs. Ambient Temperature

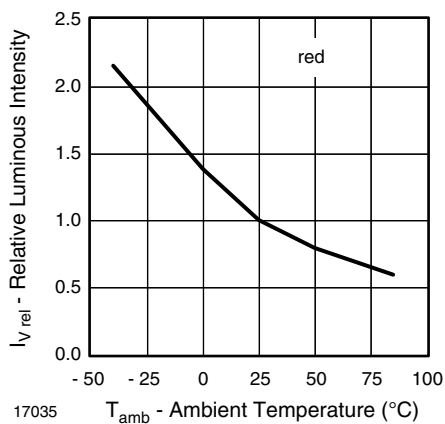


Fig. 11 - Relative Luminous Intensity vs. Ambient Temperature

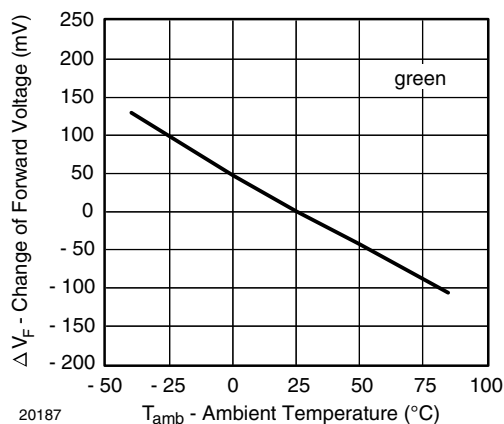


Fig. 14 - Change of Forward Voltage vs. Ambient Temperature

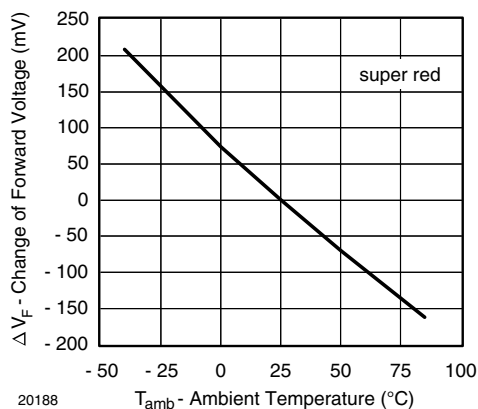
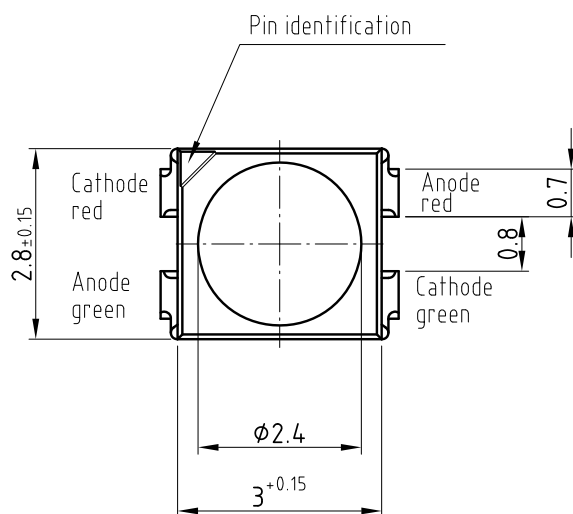
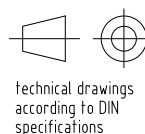
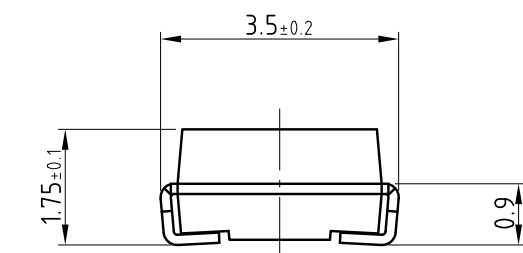
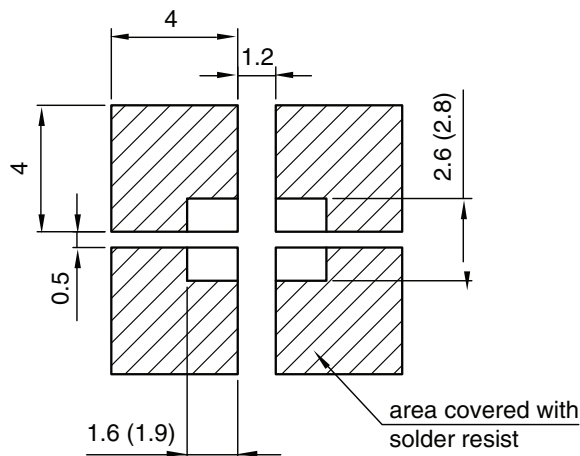


Fig. 15 - Change of Forward Voltage vs. Ambient Temperature

### PACKAGE DIMENSIONS in millimeters



### Mounting Pad Layout



Dimensions: IR and Vaporphase  
(Wave Soldering)

Drawing-No.: 6.541-5057.02-4

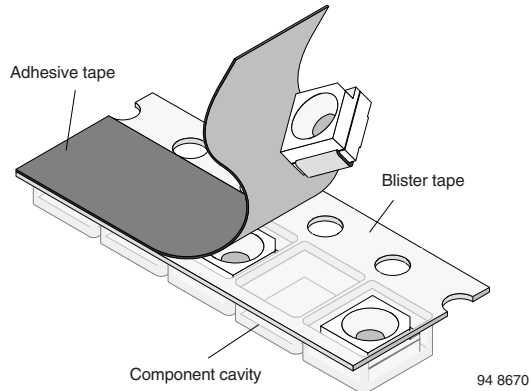
Issue: 2; 30.05.07

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## 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 GS18 (= 8000 PCS.) PREFERRED

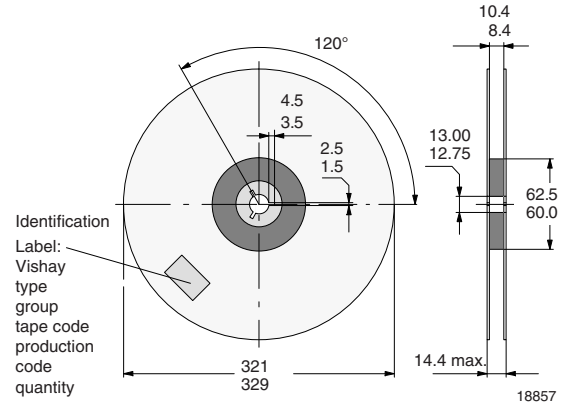


Fig. 18 - Reel Dimensions - GS18

### TAPING OF VLM.3...

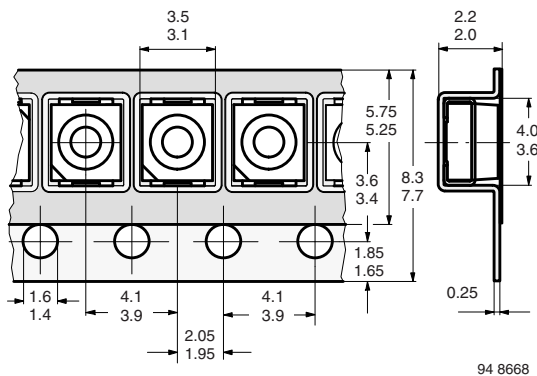


Fig. 16 - Tape Dimensions in mm for PLCC-2

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

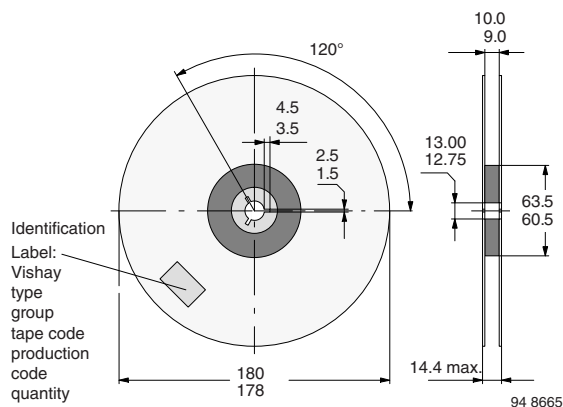


Fig. 17 - Reel Dimensions - GS08

### SOLDERING PROFILE

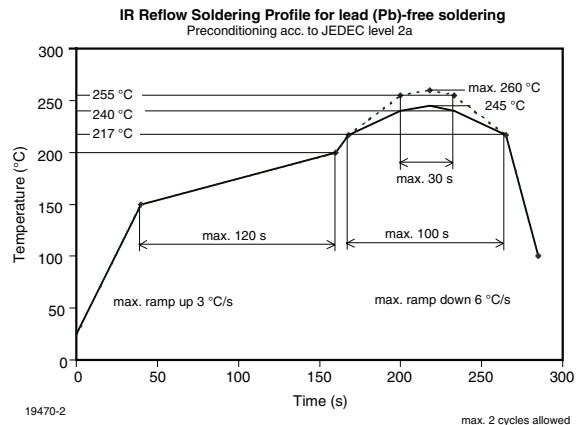


Fig. 19 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

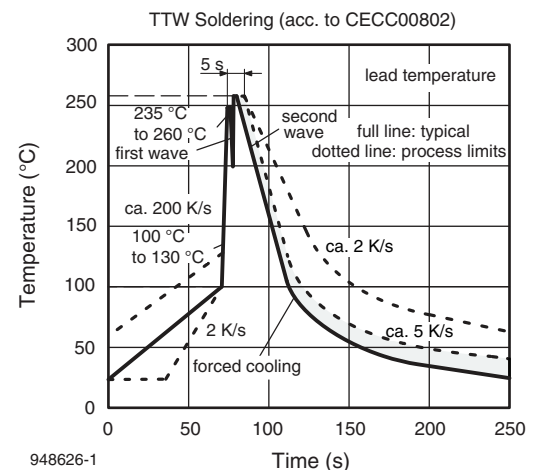
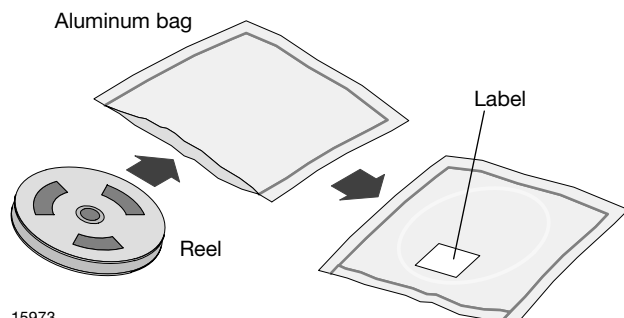


Fig. 20 - Double Wave Soldering of Opto Devices (all Packages)

## 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  $\leq 60\%$  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.

	<b>CAUTION</b> This bag contains MOISTURE-SENSITIVE DEVICES	LEVEL <b>2a</b>						
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 <b>672 hours</b> at factory condition of $\leq 30^\circ\text{C}/60\%\text{RH}$ or b) Stored at $\leq 10\%$ RH.								
3. Devices require baking before mounting if:								
a) Humidity Indicator Card is >10% when read at $23^\circ\text{C} \pm 5^\circ\text{C}$ or b) 2a or 2b is not met.								
4. If baking is required, devices may be baked for:								
<table border="0"> <tr> <td><b>192 hours</b> at <math>40^\circ\text{C} + 5^\circ\text{C}/-0^\circ\text{C}</math> and &lt;5%RH (dry air/nitrogen)</td> <td style="text-align: right;"><b>or</b></td> </tr> <tr> <td><b>96 hours</b> at <math>60 \pm 5^\circ\text{C}</math> and &lt;5%RH</td> <td style="text-align: right;">For all device containers</td> </tr> <tr> <td><b>24 hours</b> at <math>100 \pm 5^\circ\text{C}</math></td> <td style="text-align: right;">Not suitable for reels or tubes</td> </tr> </table>			<b>192 hours</b> at $40^\circ\text{C} + 5^\circ\text{C}/-0^\circ\text{C}$ and <5%RH (dry air/nitrogen)	<b>or</b>	<b>96 hours</b> at $60 \pm 5^\circ\text{C}$ and <5%RH	For all device containers	<b>24 hours</b> at $100 \pm 5^\circ\text{C}$	Not suitable for reels or tubes
<b>192 hours</b> at $40^\circ\text{C} + 5^\circ\text{C}/-0^\circ\text{C}$ and <5%RH (dry air/nitrogen)	<b>or</b>							
<b>96 hours</b> at $60 \pm 5^\circ\text{C}$ and <5%RH	For all device containers							
<b>24 hours</b> at $100 \pm 5^\circ\text{C}$	Not suitable for reels or tubes							
Bag Seal Date: _____ (If blank, see bar code label)								
Note: LEVEL defined by EIA JEDEC Standard JESD22-A113								

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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.



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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

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