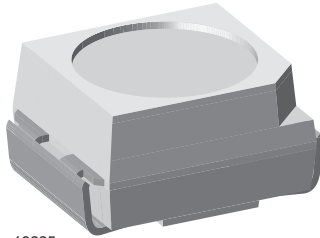




## Power SMD LED PLCC-2



19225

### DESCRIPTION

The VLM.335.. series is an advanced modification of the Vishay VLM.31.. series. It is using the advanced, high efficient AllnGaP/Si chip technology, capable of withstanding a 50 mA drive current.

The package of the VLM.335.. 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: power
- Angle of half intensity:  $\pm 60^\circ$

### FEATURES

- Utilizing latest advanced AllnGaP technology
- Available in 8 mm tape
- Luminous intensity and color categorized per packing unit
- Luminous intensity ratio per packing unit  $I_{Vmax}/I_{Vmin} \leq 1.6$
- Thermal resistance  $R = 400 \text{ K/W}$
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B
- Preconditioning according to JEDEC® level 2a
- Compatible with reflow, vapor phase and wave solder processes according to CECC 00802 and J-STD-020
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Traffic signals and signs
- Interior and exterior lighting
- Dashboard illumination
- Indicator and backlighting purposes for audio, video, LCDs switches, symbols, illuminated advertising etc

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.		
VLMS335T1U2-GS08	Super red	280	390	710	20	626	630	639	20	1.8	2	2.6	20	AllnGaP on Si
VLMS335T1U2-GS18	Super red	280	390	710	20	626	630	639	20	1.8	2	2.6	20	AllnGaP on Si
VLMR335U1V2-GS08	Red	450	560	1120	20	619	625	631	20	1.8	2	2.6	20	AllnGaP on Si
VLMR335U1V2-GS18	Red	450	560	1120	20	619	625	631	20	1.8	2	2.6	20	AllnGaP on Si
VLMK335U1V2-GS08	Amber	450	630	1120	20	611	616	622	20	1.8	2.1	2.6	20	AllnGaP on Si
VLMK335U1V2-GS18	Amber	450	630	1120	20	611	616	622	20	1.8	2.1	2.6	20	AllnGaP on Si
VLMO335U2AA-GS08	Soft orange	560	700	1400	20	600	605	611	20	1.8	2.1	2.6	20	AllnGaP on Si
VLMO335U2AA-GS18	Soft orange	560	700	1400	20	600	605	611	20	1.8	2.1	2.6	20	AllnGaP on Si
VLMY335U1V2-GS08	Yellow	450	600	1120	20	583	589	594	20	1.8	2.15	2.6	20	AllnGaP on Si
VLMY335U1V2-GS18	Yellow	450	600	1120	20	583	589	594	20	1.8	2.15	2.6	20	AllnGaP on Si

ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
VLM.335...				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage <sup>(1)</sup>	Short term application only	V <sub>R</sub>	5	V
DC forward current	T <sub>amb</sub> ≤ 73 °C (400 K/W)	I <sub>F</sub>	50	mA
Power dissipation		P <sub>V</sub>	130	mW
Junction temperature		T <sub>j</sub>	125	°C
Operating temperature range		T <sub>amb</sub>	-40 to +100	°C
Storage temperature range		T <sub>stg</sub>	-40 to +100	°C
Thermal resistance junction-to-ambient	Mounted on PC board (pad size > 16 mm <sup>2</sup> )	R <sub>thJA</sub>	400	K/W

#### Note

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



<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>VLMS335.., SUPER RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMS335T1U2	$I_V$	280	390	710	mcd
Luminous flux/luminous intensity			$\phi_V/I_V$	-	3	-	mlm/mcd
Dominant wavelength	$I_F = 20\text{ mA}$		$\lambda_d$	626	630	639	nm
Peak wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	639	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	18	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$		$\phi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$	1.8	2	2.6	V
Reverse current	$V_R = 5\text{ V}$		$I_R$	-	0.01	10	$\mu\text{A}$

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>VLMR335.., RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMR335U1V2	$I_V$	450	560	1120	mcd
Luminous flux/luminous intensity			$\phi_V/I_V$	-	3	-	mlm/mcd
Dominant wavelength	$I_F = 20\text{ mA}$		$\lambda_d$	619	625	631	nm
Peak wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	632	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	18	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$		$\phi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$	1.8	2	2.6	V
Reverse current	$V_R = 5\text{ V}$		$I_R$	-	0.01	10	$\mu\text{A}$

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>VLMK335.., AMBER</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMK335U1V2	$I_V$	450	630	1120	mcd
Luminous flux/luminous intensity			$\phi_V/I_V$	-	3	-	mlm/mcd
Dominant wavelength	$I_F = 20\text{ mA}$		$\lambda_d$	611	616	622	nm
Peak wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	622	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	18	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$		$\phi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$	1.8	2.1	2.6	V
Reverse current	$V_R = 5\text{ V}$		$I_R$	-	0.01	10	$\mu\text{A}$

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>VLMO335.., SOFT ORANGE</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMO335U2AA	$I_V$	560	700	1400	mcd
Luminous flux/luminous intensity			$\phi_V/I_V$	-	3	-	mlm/mcd
Dominant wavelength	$I_F = 20\text{ mA}$		$\lambda_d$	600	605	611	nm
Peak wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	611	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	17	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$		$\phi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$	1.8	2.1	2.6	V
Reverse current	$V_R = 5\text{ V}$		$I_R$	-	0.01	10	$\mu\text{A}$



<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
<b>VLMY335.., YELLOW</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMY335U1V2	$I_V$	450	600	1120	mcd
Luminous flux/luminous intensity			$\phi_V/I_V$	-	3	-	mlm/mcd
Dominant wavelength	$I_F = 20\text{ mA}$		$\lambda_d$	583	589	594	nm
Peak wavelength	$I_F = 20\text{ mA}$		$\lambda_p$	-	591	-	nm
Spectral bandwidth at 50 % $I_{rel\ max.}$	$I_F = 20\text{ mA}$		$\Delta\lambda$	-	17	-	nm
Angle of half intensity	$I_F = 20\text{ mA}$		$\varphi$	-	$\pm 60$	-	deg
Forward voltage	$I_F = 20\text{ mA}$		$V_F$	1.8	2.15	2.6	V
Reverse current	$V_R = 5\text{ V}$		$I_R$	-	0.01	10	$\mu\text{A}$

<b>COLOR CLASSIFICATION</b>						
GROUP	DOM. WAVELENGTH (nm)					
	AMBER		SOFT ORANGE		YELLOW	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1	611	618	-	-	-	-
2	614	622	600	603	583	586
3	-	-	602	605	585	588
4	-	-	604	607	587	590
5	-	-	606	609	589	592
6	-	-	608	611	591	594

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms

<b>LUMINOUS INTENSITY CLASSIFICATION</b>			
GROUP	LIGHT INTENSITY (mcd)		
STANDARD	OPTIONAL	MIN.	MAX.
T	1	280	355
	2	355	450
U	1	450	560
	2	560	710
V	1	710	900
	2	900	1120
A	A	1120	1400

**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



TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

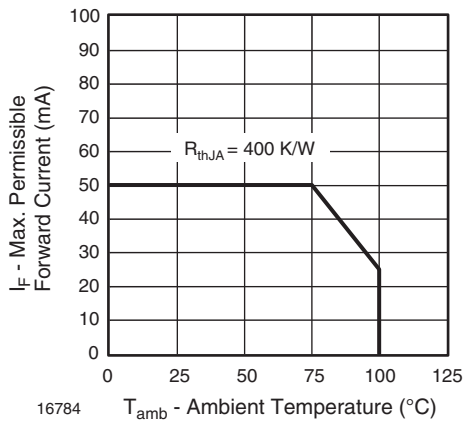


Fig. 1 - Maximum Permissible Forward Current vs. Ambient Temperature

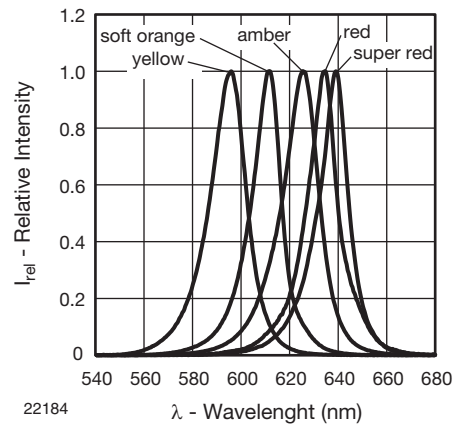


Fig. 4 - Relative Intensity vs. Wavelength

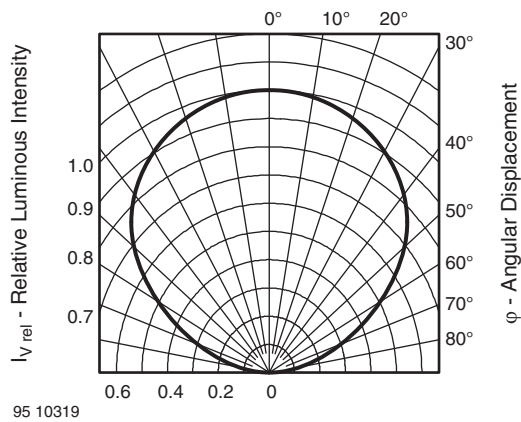


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

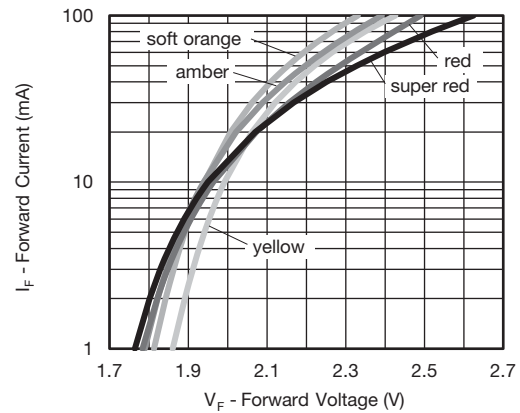


Fig. 5 - Forward Current vs. Forward Voltage

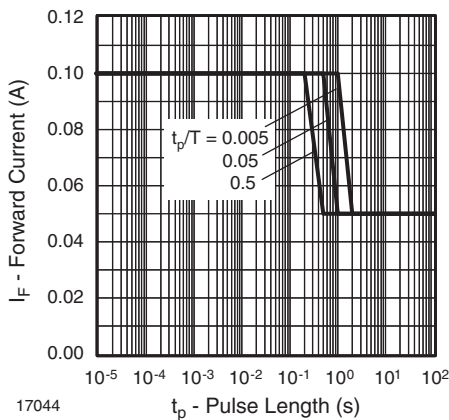


Fig. 3 - Forward Current vs. Pulse Length

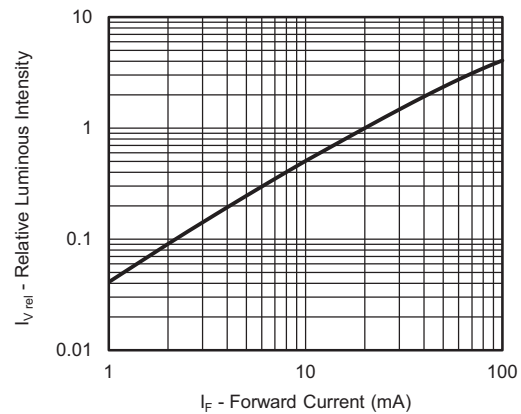


Fig. 6 - Relative Luminous Intensity vs. Forward Current

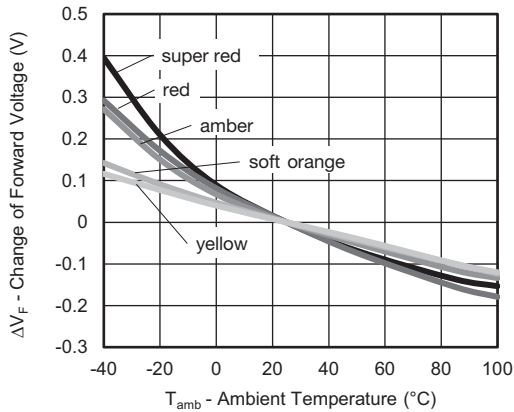


Fig. 7 - Change of Forward Voltage vs. Ambient Temperature

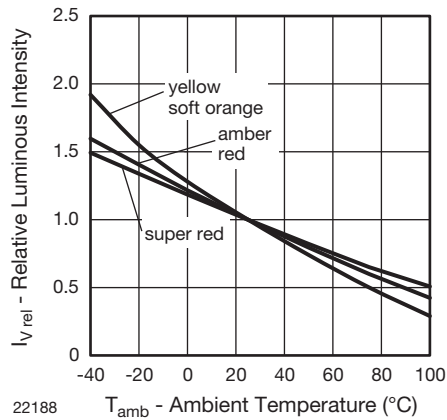


Fig. 8 - Relative Luminous Intensity vs. Ambient Temperature

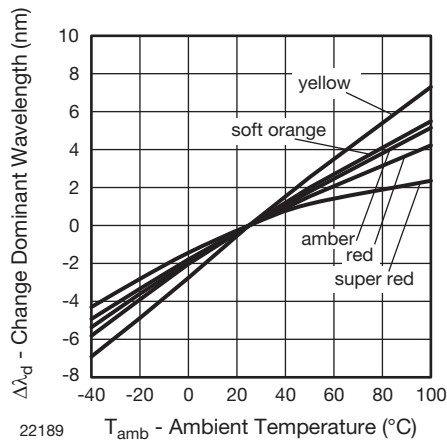
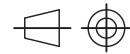
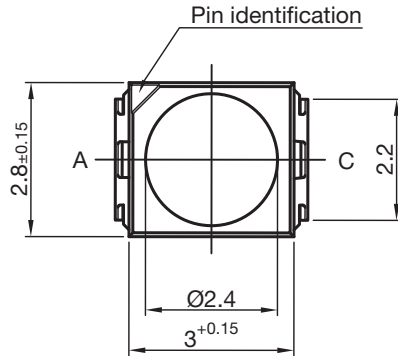
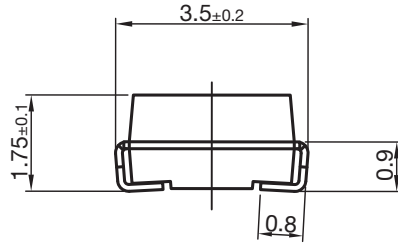


Fig. 9 - Change of Dominant Wavelength vs. Ambient Temperature



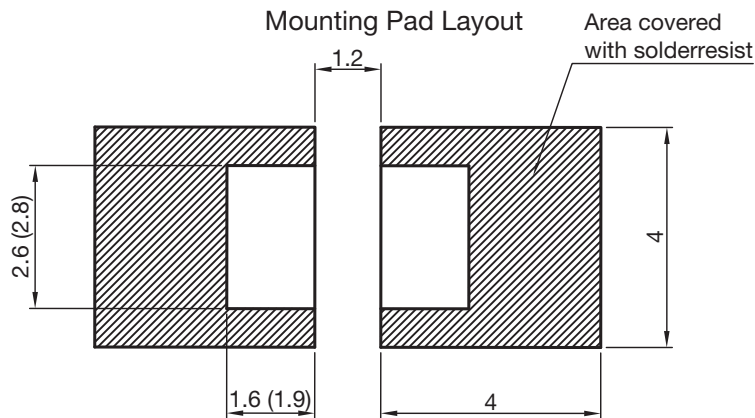
**PACKAGE DIMENSIONS** in millimeters



Technical drawings according to DIN specifications

Dimensions in mm

Drawing-No.: 6.541-5067.02-4  
Issue: 5; 23.09.13



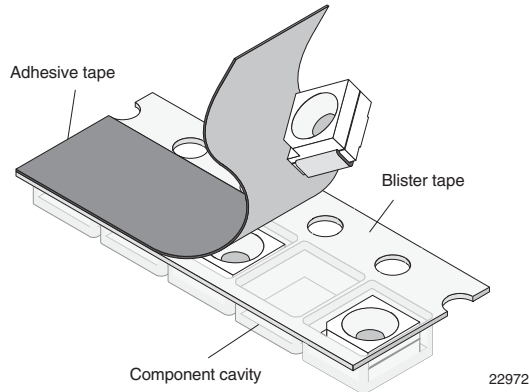
Dimensions: Reflow and vapor phase (wave soldering)



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

**SMD LED (VLMx335..-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**

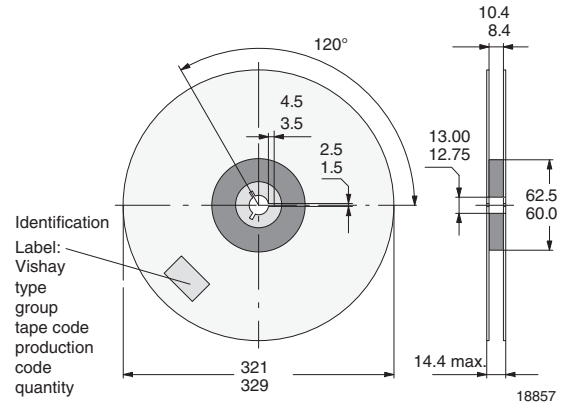


Fig. 12 - Reel Dimensions - GS18

**TAPING OF VLMx335..**

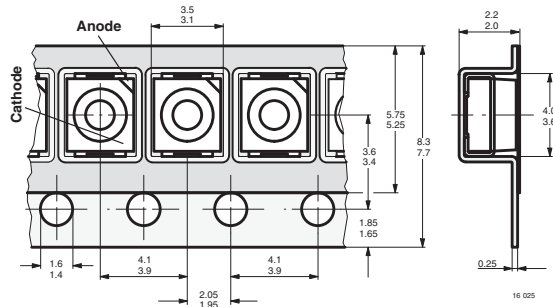


Fig. 10 - Tape Dimensions in mm for PLCC-2

**SOLDERING PROFILE**

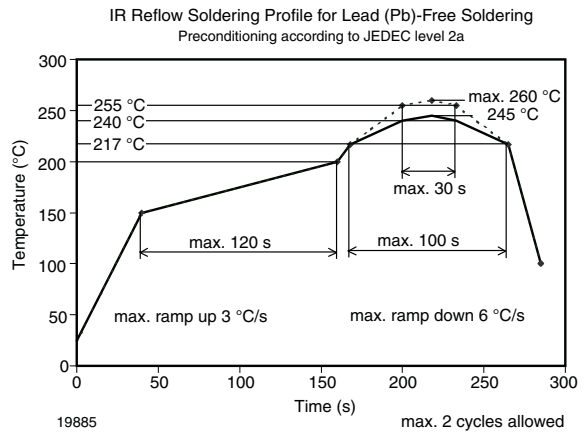


Fig. 13 - Vishay Lead (Pb)-free Reflow Soldering Profile (according to J-STD-020)

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

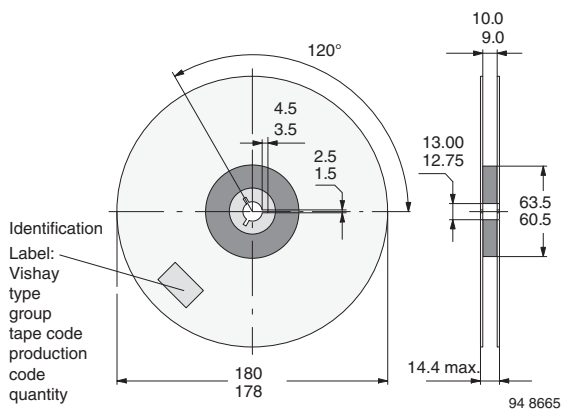


Fig. 11 - Reel Dimensions - GS08

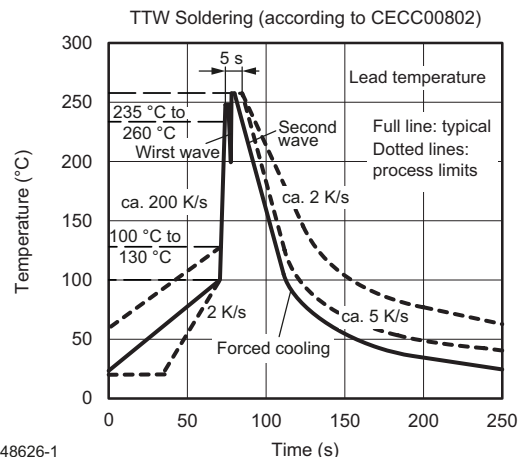
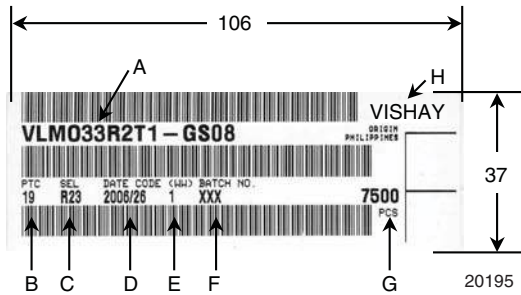


Fig. 14 - Double Wave Soldering of Opto Devices (all Packages)



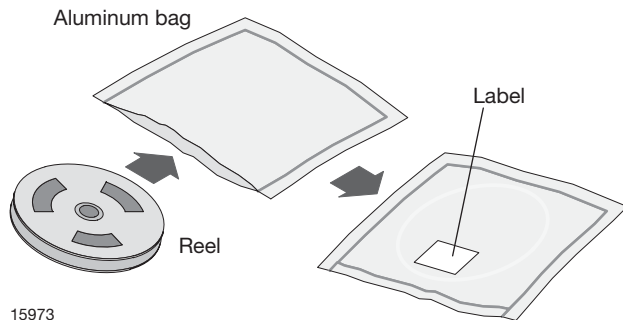
BAR CODE PRODUCT LABEL (example)



- A. Type of component
B. Manufacturing plant
C. SEL - selection code (bin)
D. Date code year/week
E. Day code (e.g. 1: Monday)
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

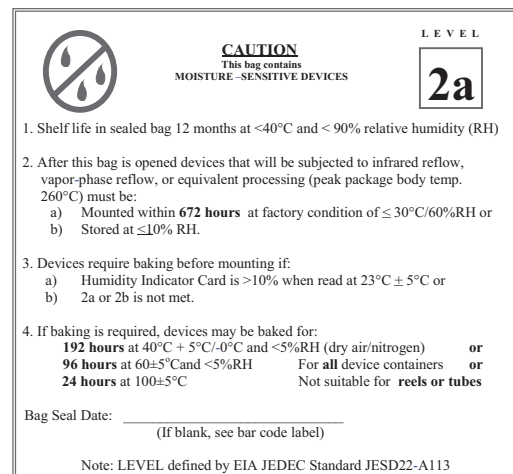
Dry box storage is recommended as soon as the aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- 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.





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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 in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

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