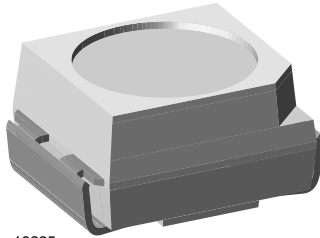




## Power SMD LED PLCC-2



19225

### DESCRIPTION

The VLM.333.. series is an advanced modification of the Vishay VLM.31.. series. It is designed to incorporate larger chips, therefore, capable of withstanding a 50 mA drive current.

The package of the VLM.333.. 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.		
VLMS333T2V2-GS08	Super red	355	550	1120	20	626	630	639	20	1.8	2	2.6	20	AllnGaP on Si
VLMS333T2V2-GS18	Super red	355	550	1120	20	626	630	639	20	1.8	2	2.6	20	AllnGaP on Si
VLMR333U1AA-GS08	Red	450	750	1400	20	619	625	631	20	1.8	2	2.6	20	AllnGaP on Si
VLMR333U1AA-GS18	Red	450	750	1400	20	619	625	631	20	1.8	2	2.6	20	AllnGaP on Si
VLMK333U2AB-GS08	Amber	560	850	1800	20	611	616	622	20	1.8	2.1	2.6	20	AllnGaP on Si
VLMK333U2AB-GS18	Amber	560	850	1800	20	611	616	622	20	1.8	2.1	2.6	20	AllnGaP on Si
VLMO333U2AB-GS08	Soft orange	560	950	1800	20	600	605	611	20	1.8	2.1	2.6	20	AllnGaP on Si
VLMO333U2AB-GS18	Soft orange	560	950	1800	20	600	605	611	20	1.8	2.1	2.6	20	AllnGaP on Si
VLMY333U1AA-GS08	Yellow	450	750	1400	20	583	589	594	20	1.8	2.15	2.6	20	AllnGaP on Si
VLMY333U1AA-GS18	Yellow	450	750	1400	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.333...				
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>VLMS333.., SUPER RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMS333T2V2	$I_V$	355	550	1120	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>VLMR333.., RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMR333U1AA	$I_V$	450	750	1400	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>VLMK333.., AMBER</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMK333U2AB	$I_V$	560	850	1800	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>VLMO333.., SOFT ORANGE</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMO333U2AB	$I_V$	560	950	1800	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>VLMY333.., YELLOW</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity	$I_F = 20\text{ mA}$	VLMY333U1AA	$I_V$	450	750	1400	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	$I_F = 20\text{ mA}$		$\phi$	-	$\pm 60$	-	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	2		355 / 450
U	1		450 / 560
	2		560 / 710
V	1		710 / 900
	2		900 / 1120
A	A		1120 / 1400
	B		1400 / 1800

<b>CROSSING TABLE</b>	
VISHAY	OSRAM
VLMS333T2V2	LS T67F-T2V2-1-1
VLMR333U1AA	LR T67F-U1AA-1-1
VLMK333U2AB	LA T67F-U2AB-24-1
VLMO333U2AB	LO T67F-U2AB-24-1
VLMY333U1AA	LY T67F-U1AA-36-1

**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)

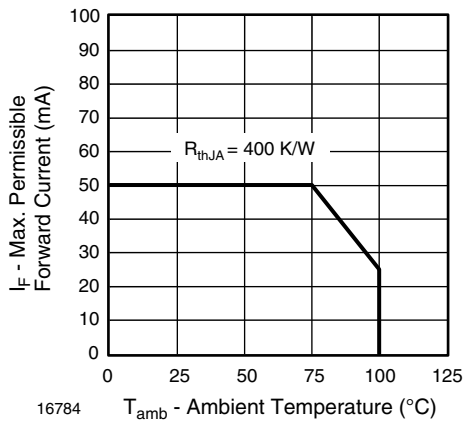


Fig. 1 - Maximum Permissible Forward Current vs. Ambient Temperature

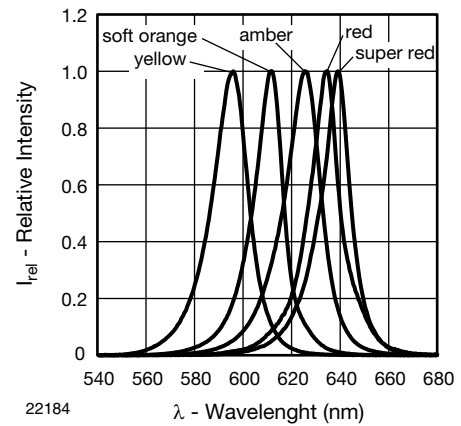


Fig. 4 - Relative Intensity vs. Wavelength

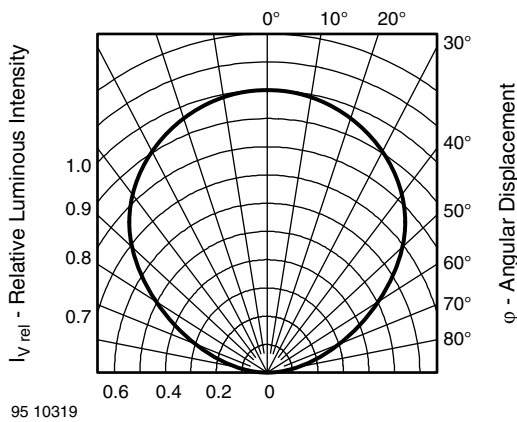


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

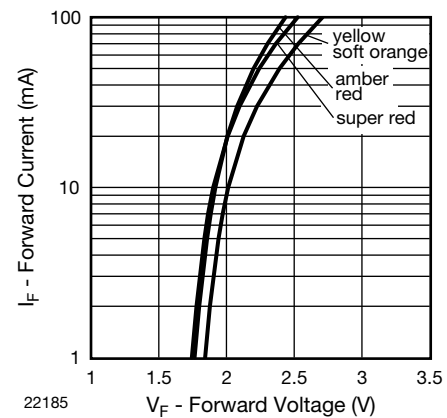


Fig. 5 - Forward Current vs. Forward Voltage



Fig. 3 - Forward Current vs. Pulse Length

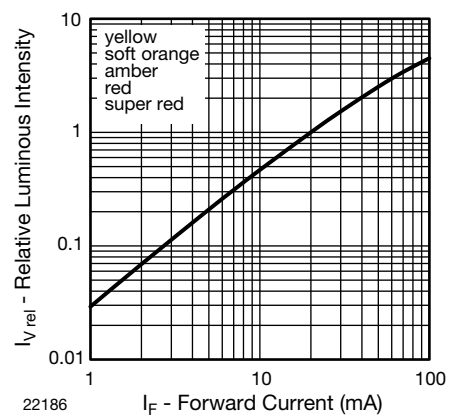


Fig. 6 - Relative Luminous Intensity vs. Forward Current

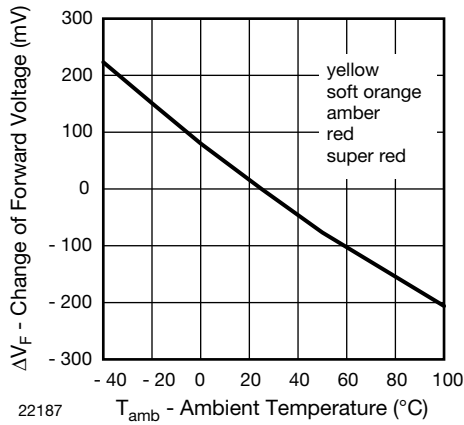


Fig. 7 - Change of Forward Voltage vs. Ambient Temperature

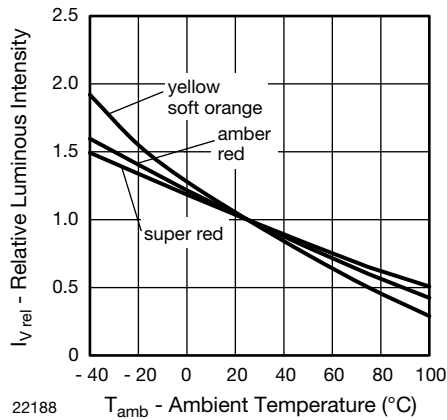


Fig. 8 - Relative Luminous Intensity vs. Ambient Temperature

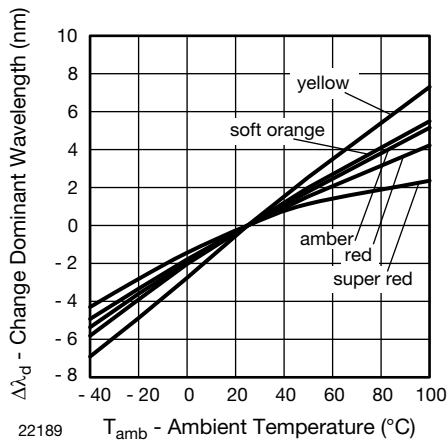
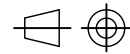
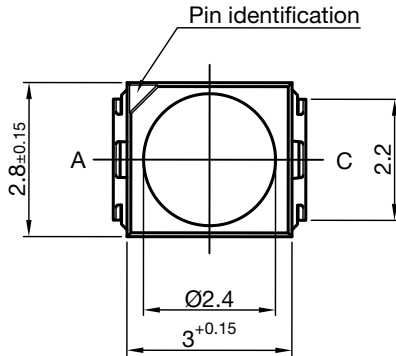
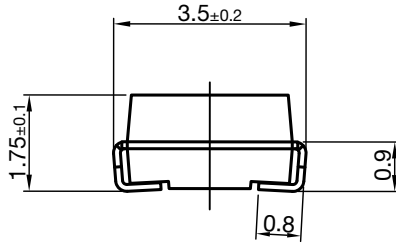


Fig. 9 - Change of Dominant Wavelength vs. Ambient Temperature



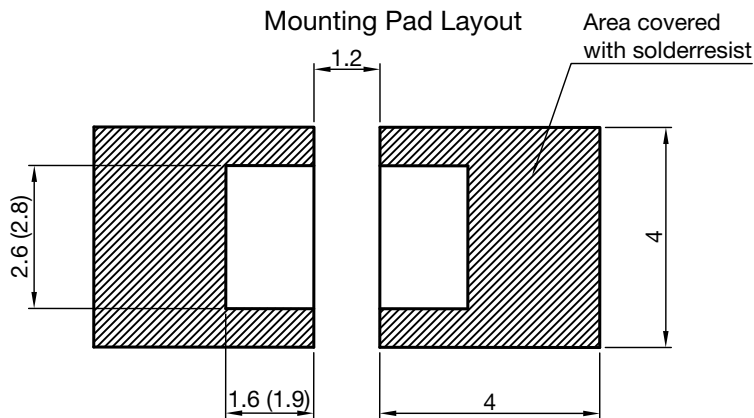
**PACKAGE DIMENSIONS** in millimeters



Technical drawings according to DIN specifications

Dimensions in mm

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



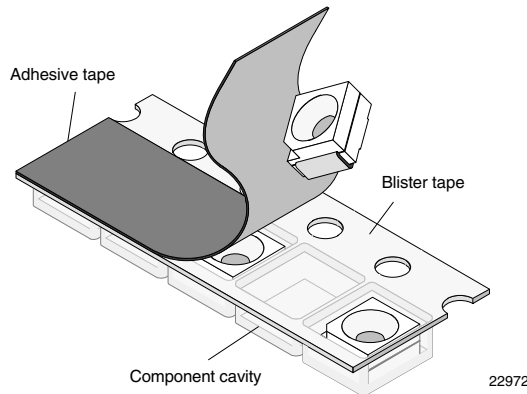
Dimensions: Reflow and vapor phase (wave soldering)



METHOD OF TAPING / POLARITY AND TAPE AND REEL

SMD LED (VLMx333..-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

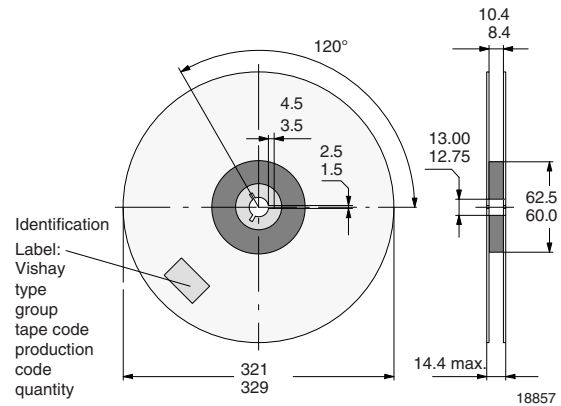


Fig. 12 - Reel Dimensions - GS18

TAPING OF VLMx333..

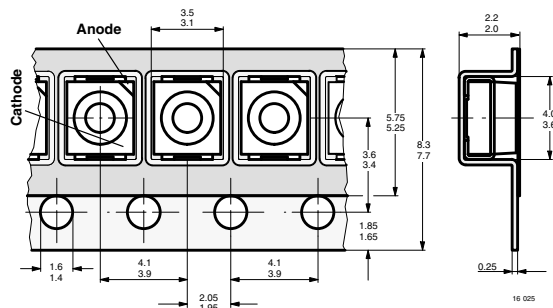


Fig. 10 - Tape Dimensions in mm for PLCC-2

SOLDERING PROFILE

IR Reflow Soldering Profile for Lead (Pb)-Free Soldering Preconditioning according to JEDEC level 2a

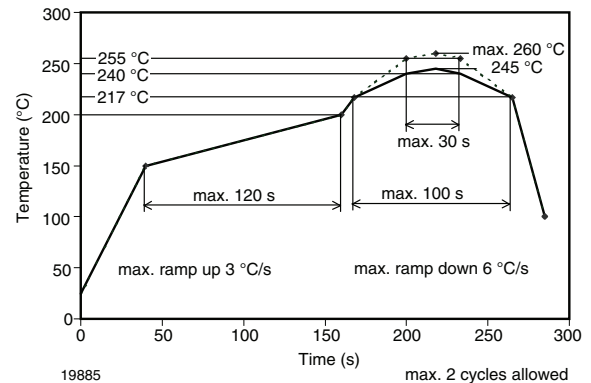


Fig. 13 - Vishay Lead (Pb)-free Reflow Soldering Profile (according to J-STD-020)

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

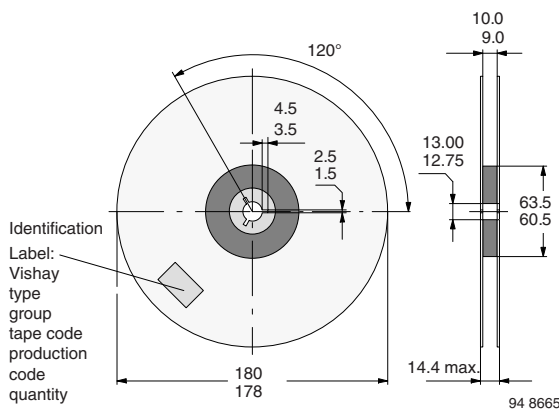


Fig. 11 - Reel Dimensions - GS08

TTW Soldering (according to CECC00802)

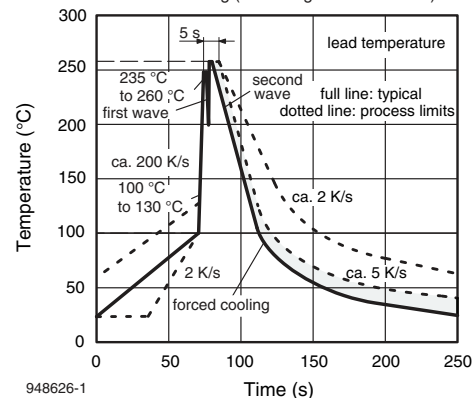
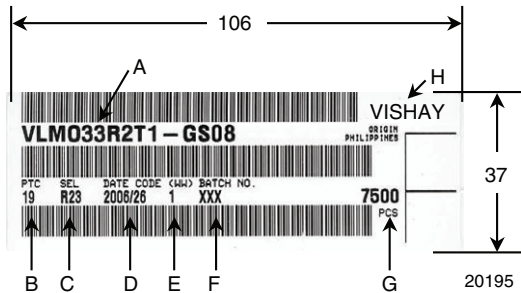


Fig. 14 - Double Wave Soldering of Opto Devices (all Packages)



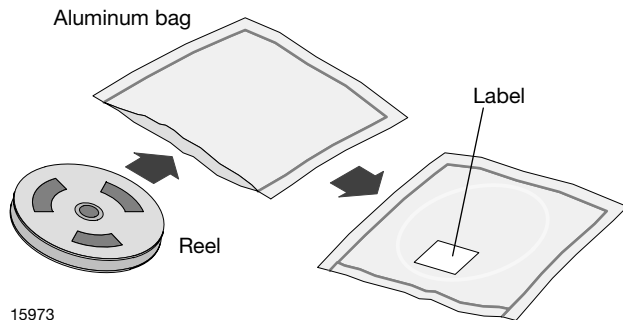
BAR CODE PRODUCT LABEL (example)



- 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

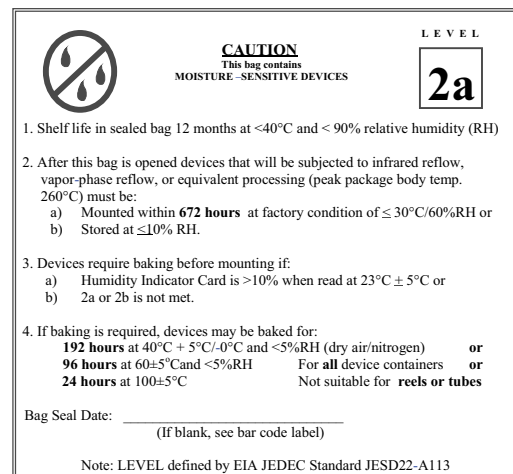
Dry box storage is recommended as soon as the aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- 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.





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