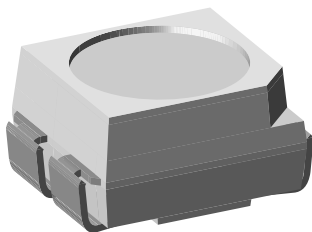


## Bicolor SMD LED PLCC-3



19140\_1

### DESCRIPTION

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

The package of the VLMV3100 is the PLCC-3.

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-3
- Product series: bicolor
- Angle of half intensity:  $\pm 60^\circ$

### FEATURES

- SMD LED with exceptional brightness
- Multicolored
- Luminous intensity categorized
- Compatible with automatic placement equipment
- EIA and ICE standard package
- 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: Backlighting in dashboards and switches
- Telecommunication: Indicator and backlighting in telephone and fax
- Indicator and backlight for audio and video equipment
- Indicator and backlight in office equipment
- Flat backlight for LCDs, switches, and symbols
- General use

### PARTS TABLE

| PART          | COLOR | LUMINOUS INTENSITY (mcd) |      |      | at $I_F$ (mA) | WAVELENGTH (nm) |      |      | at $I_F$ (mA) | FORWARD VOLTAGE (V) |      |      | at $I_F$ (mA) | TECHNOLOGY   |
|---------------|-------|--------------------------|------|------|---------------|-----------------|------|------|---------------|---------------------|------|------|---------------|--------------|
|               |       | MIN.                     | TYP. | MAX. |               | MIN.            | TYP. | MAX. |               | MIN.                | TYP. | MAX. |               |              |
| VLMV3100-GS08 | Red   | 2.8                      | 10   | -    | 10            | 612             | 620  | 625  | 10            | -                   | 2.0  | 3    | 20            | GaAsP on GaP |
| VLMV3100-GS08 | Green | 2.8                      | 8    | -    | 10            | 562             | 571  | 575  | 10            | -                   | 2.2  | 3    | 20            | GaP on GaP   |
| VLMV3100-GS18 | Red   | 2.8                      | 10   | -    | 10            | 612             | 620  | 625  | 10            | -                   | 2.0  | 3    | 20            | GaAsP on GaP |
| VLMV3100-GS18 | Green | 2.8                      | 8    | -    | 10            | 562             | 571  | 575  | 10            | -                   | 2.2  | 3    | 20            | GaP on GaP   |

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**VLMV3100**

| PARAMETER                                | TEST CONDITION                                       | SYMBOL     | VALUE         | UNIT               |
|------------------------------------------|------------------------------------------------------|------------|---------------|--------------------|
| Reverse voltage per diode <sup>(1)</sup> | $I_R = 10\text{ }\mu\text{A}$                        | $V_R$      | 6             | V                  |
| DC forward current per diode             | $T_{amb} \leq 60\text{ }^{\circ}\text{C}$            | $I_F$      | 30            | mA                 |
| Surge forward current per diode          | $t_p \leq 10\text{ }\mu\text{s}$                     | $I_{FSM}$  | 0.5           | A                  |
| Power dissipation per diode              |                                                      | $P_V$      | 100           | mW                 |
| Junction temperature                     |                                                      | $T_j$      | 100           | $^{\circ}\text{C}$ |
| 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> ) | $R_{thJA}$ | 400           | K/W                |

**Note**

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

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**VLMV3100, RED**

| PARAMETER                         | TEST CONDITION                          | SYMBOL      | MIN. | TYP.     | MAX. | UNIT          |
|-----------------------------------|-----------------------------------------|-------------|------|----------|------|---------------|
| Luminous intensity <sup>(1)</sup> | $I_F = 10\text{ mA}$                    | $I_V$       | 2.8  | 10       | -    | mcd           |
| Dominant wavelength               | $I_F = 10\text{ mA}$                    | $\lambda_d$ | 612  | 620      | 625  | nm            |
| Peak wavelength                   | $I_F = 10\text{ mA}$                    | $\lambda_p$ | -    | 635      | -    | nm            |
| Angle of half intensity           | $I_F = 10\text{ mA}$                    | $\phi$      | -    | $\pm 60$ | -    | deg           |
| Forward voltage per diode         | $I_F = 20\text{ mA}$                    | $V_F$       | -    | 2.0      | 3    | V             |
| Reverse current per diode         | $V_R = 6\text{ V}$                      | $I_R$       | -    | -        | 10   | $\mu\text{A}$ |
| Junction capacitance per diode    | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | $C_j$       | -    | 15       | -    | pF            |

**Note**

<sup>(1)</sup> In one packing unit  $I_{Vmax}/I_{Vmin.} \leq 1.6$

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**VLMV3100, GREEN**

| PARAMETER                         | TEST CONDITION                          | SYMBOL      | MIN. | TYP.     | MAX. | UNIT          |
|-----------------------------------|-----------------------------------------|-------------|------|----------|------|---------------|
| Luminous intensity <sup>(1)</sup> | $I_F = 10\text{ mA}$                    | $I_V$       | 2.8  | 8        | -    | mcd           |
| Dominant wavelength               | $I_F = 10\text{ mA}$                    | $\lambda_d$ | 562  | 571      | 575  | nm            |
| Peak wavelength                   | $I_F = 10\text{ mA}$                    | $\lambda_p$ | -    | 565      | -    | nm            |
| Angle of half intensity           | $I_F = 10\text{ mA}$                    | $\phi$      | -    | $\pm 60$ | -    | deg           |
| Forward voltage per diode         | $I_F = 20\text{ mA}$                    | $V_F$       | -    | 2.2      | 3    | V             |
| Reverse current per diode         | $V_R = 6\text{ V}$                      | $I_R$       | -    | -        | 10   | $\mu\text{A}$ |
| Junction capacitance per diode    | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | $C_j$       | -    | 15       | -    | pF            |

**Note**

<sup>(1)</sup> In one packing unit  $I_{Vmax}/I_{Vmin.} \leq 1.6$

| LUMINOUS INTENSITY CLASSIFICATION |                       |      |      |
|-----------------------------------|-----------------------|------|------|
| GROUP                             | LIGHT INTENSITY (mcd) |      |      |
| STANDARD                          | OPTIONAL              | MIN. | MAX. |
| H                                 | 1                     | 2.8  | 3.55 |
|                                   | 2                     | 3.55 | 4.5  |
| J                                 | 1                     | 4.5  | 5.6  |
|                                   | 2                     | 5.6  | 7.1  |
| K                                 | 1                     | 7.1  | 9.0  |
|                                   | 2                     | 9.0  | 11.2 |
| L                                 | 1                     | 11.2 | 14.0 |
|                                   | 2                     | 14.0 | 18.0 |
| M                                 | 1                     | 18.0 | 22.4 |
|                                   | 2                     | 22.4 | 28.0 |

**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.

| COLOR CLASSIFICATION |                      |      |
|----------------------|----------------------|------|
| GROUP                | GREEN                |      |
|                      | DOM. WAVELENGTH (nm) |      |
|                      | MIN.                 | MAX. |
| 3                    | 562                  | 565  |
| 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.

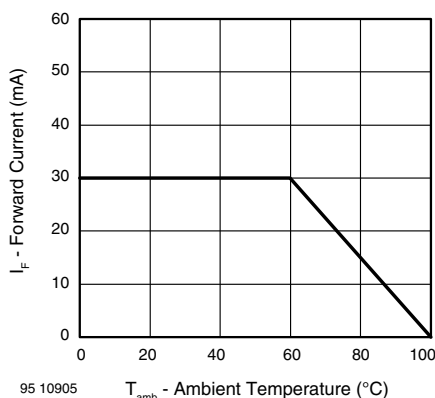
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

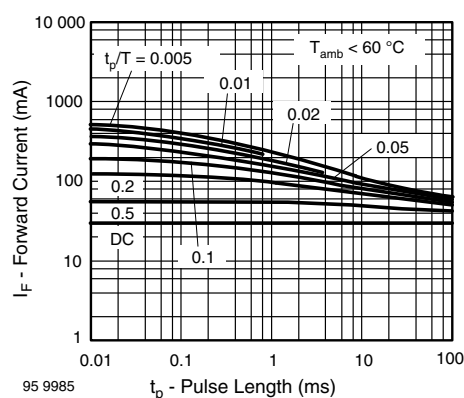


Fig. 2 - Pulse Forward Current vs. Pulse Duration

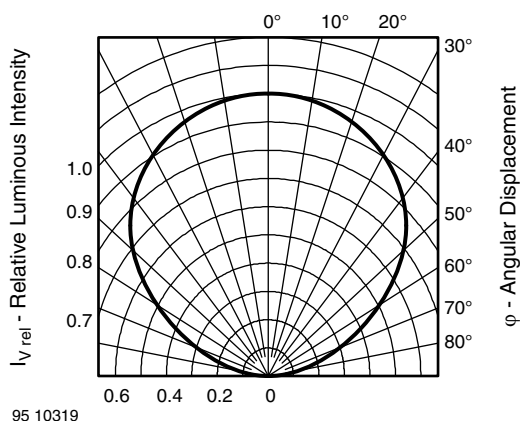


Fig. 3 - Relative Luminous Intensity vs. Angular Displacement

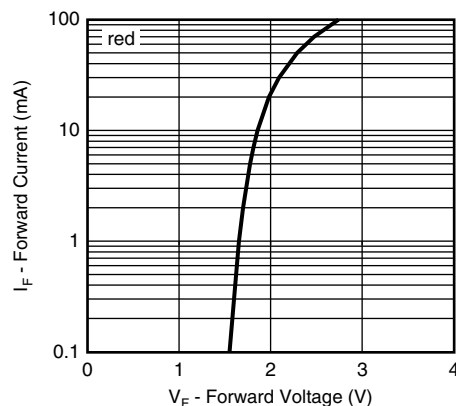


Fig. 6 - Forward Current vs. Forward Voltage

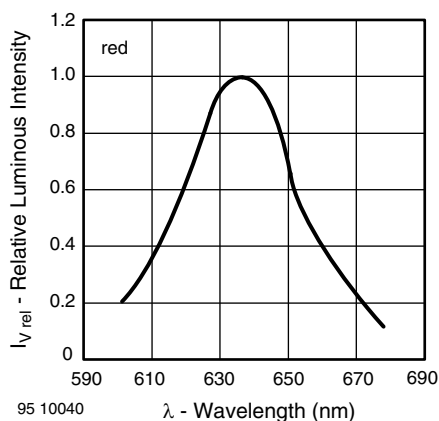


Fig. 4 - Relative Intensity vs. Wavelength

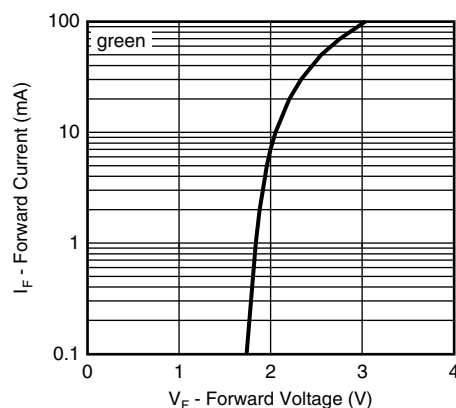


Fig. 7 - Forward Current vs. Forward Voltage

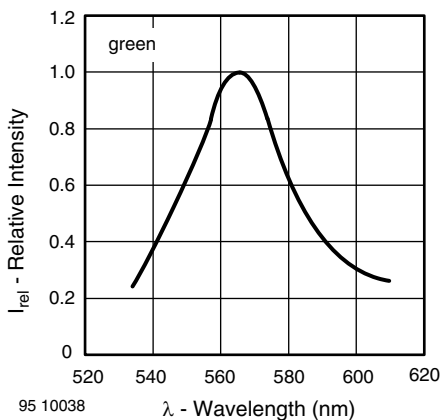


Fig. 5 - Relative Intensity vs. Wavelength

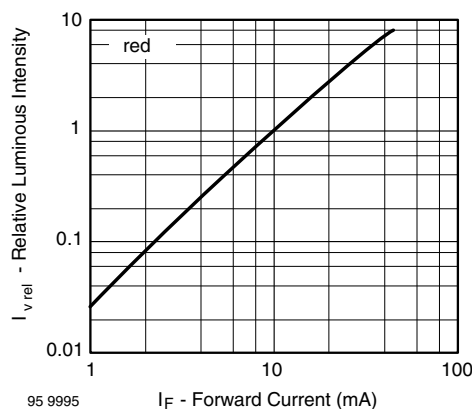


Fig. 8 - Relative Luminous Intensity vs. Forward Current

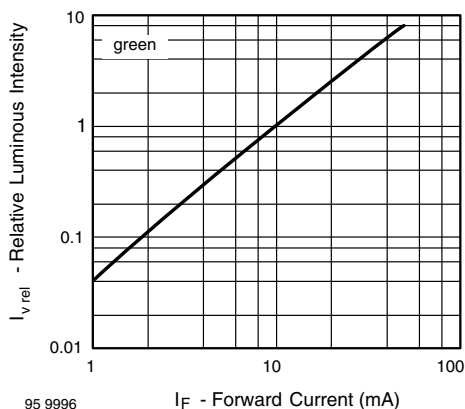


Fig. 9 - Relative Luminous Intensity vs. Forward Current

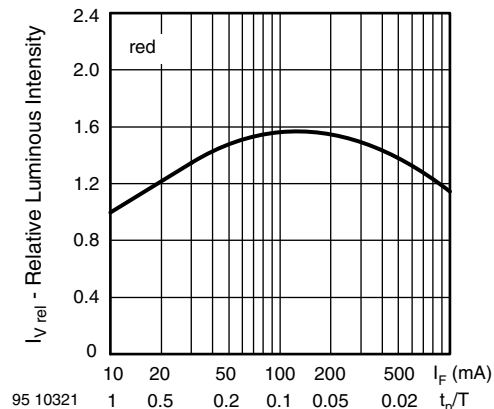


Fig. 12 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

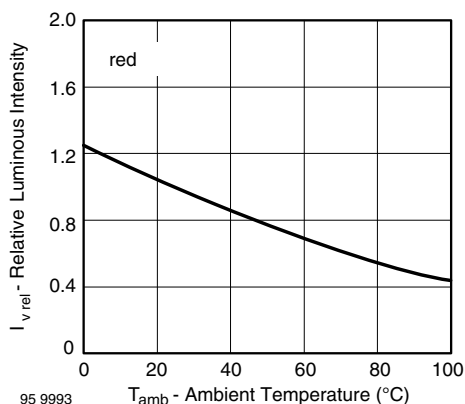


Fig. 10 - Relative Luminous Intensity vs. Ambient Temperature

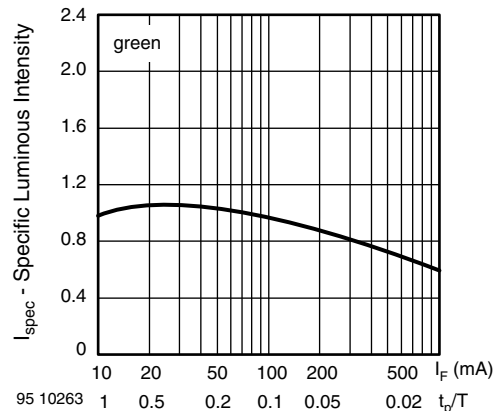


Fig. 13 - Specific Luminous Intensity vs. Forward Current

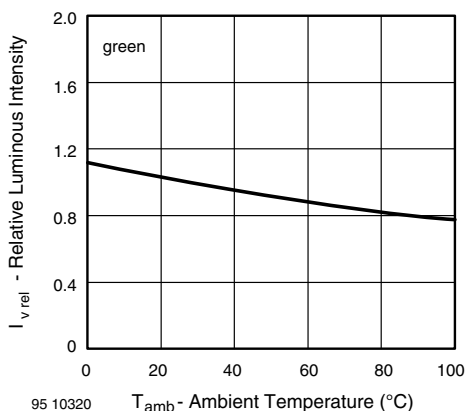
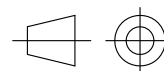
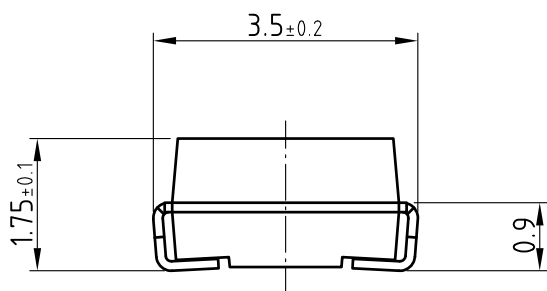
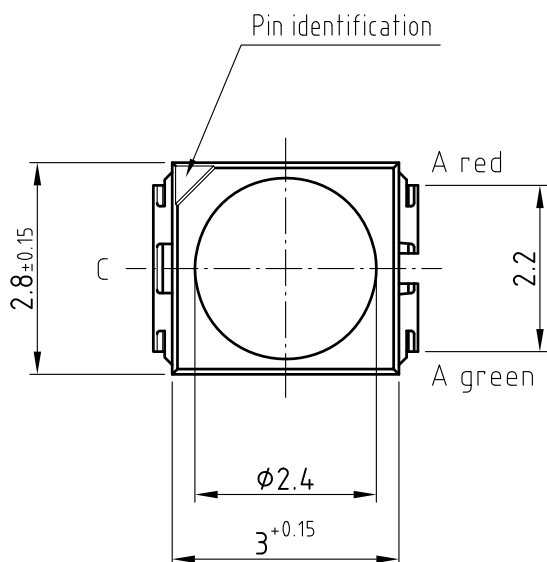
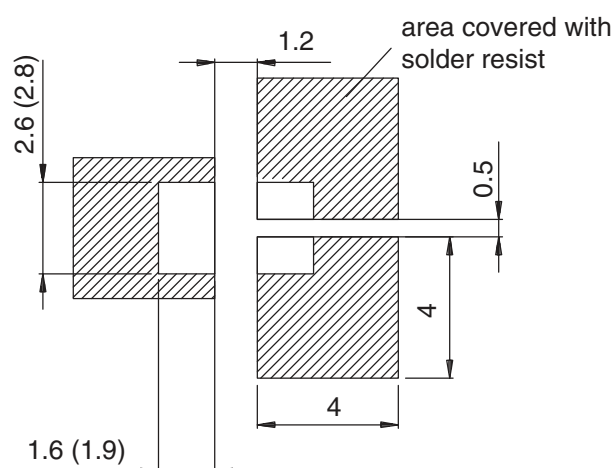


Fig. 11 - Relative Luminous Intensity vs. Ambient Temperature

**PACKAGE DIMENSIONS** in millimeters


technical drawings  
according to DIN  
specifications


**Mounting Pad Layout**


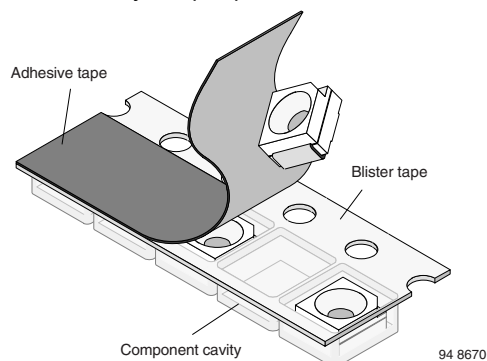
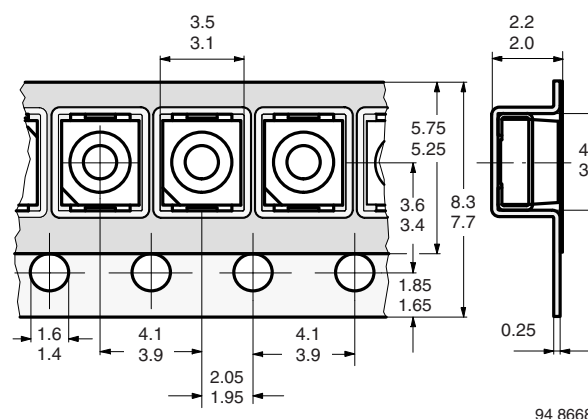
Dimensions: IR and Vaporphase  
(Wave Soldering)

Drawing-No.: 6.541-5068.01-4

Issue: 2; 30.05.07

**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.


**TAPING OF VLM.3...**


94 8668

Fig. 14 - Tape Dimensions in mm for PLCC-2

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

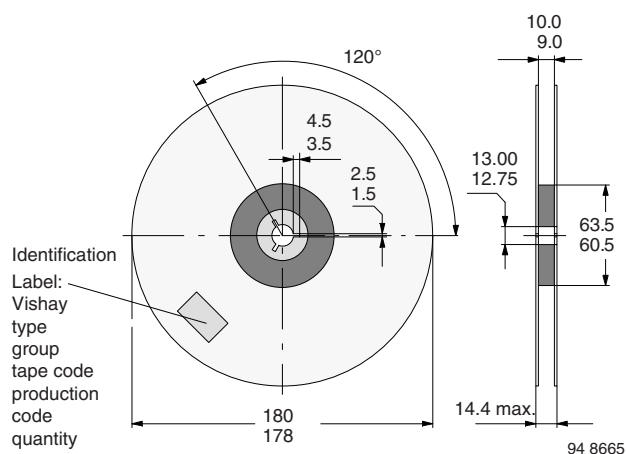


Fig. 15 - Reel Dimensions - GS08

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

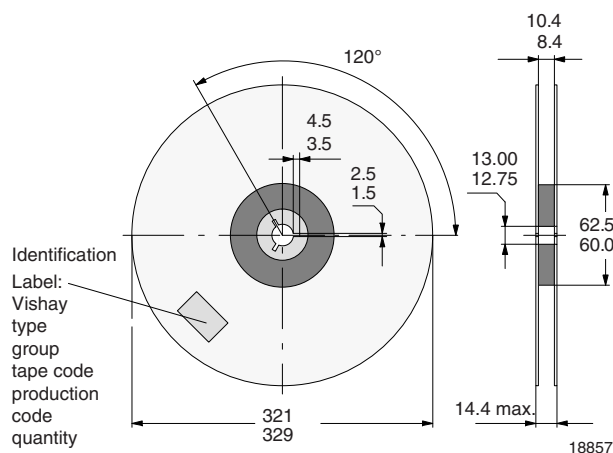


Fig. 16 - Reel Dimensions - GS18

## SOLDERING PROFILE

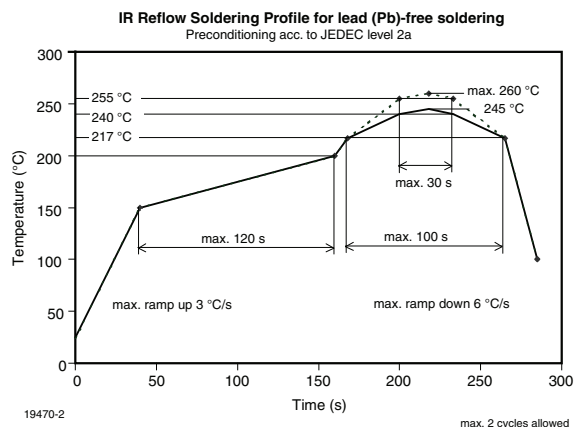


Fig. 17 - Vishay Lead (Pb)-free Reflow Soldering Profile  
(acc. to J-STD-020)

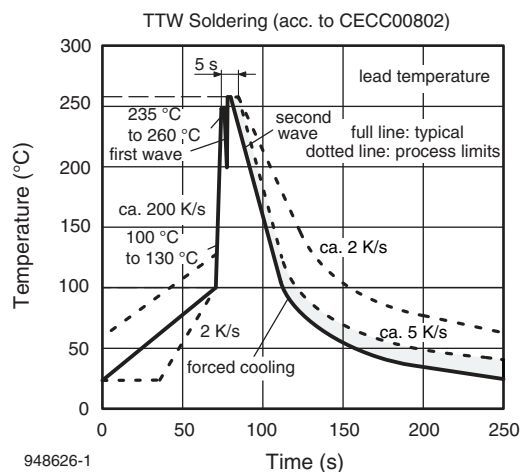
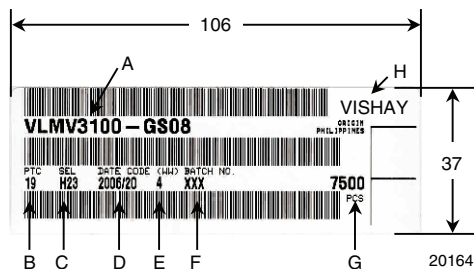


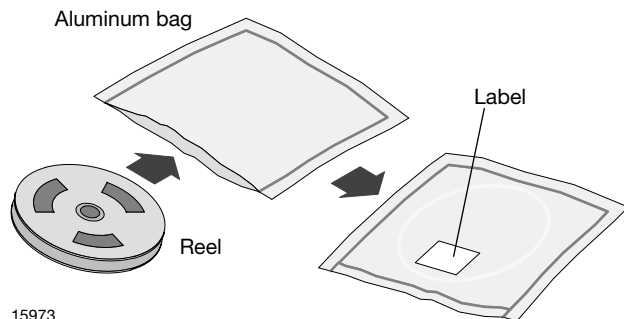
Fig. 18 - Double Wave Soldering of Opto Devices (all Packages)

**BAR CODE PRODUCT LABEL (example)**


- A. Type of component
- B. Manufacturing plant
- C. SEL - selection code (bin):  
e.g.: H2 = code for luminous intensity group  
3 = code for color 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.


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

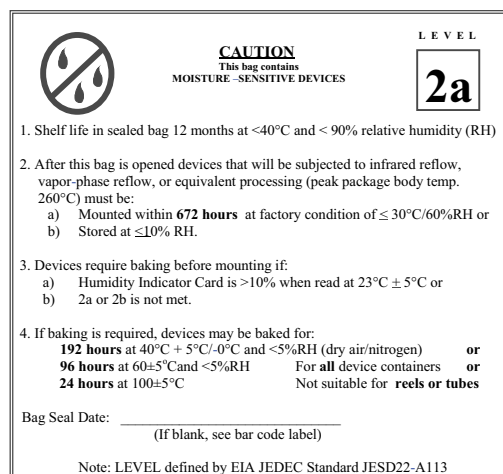
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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. 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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