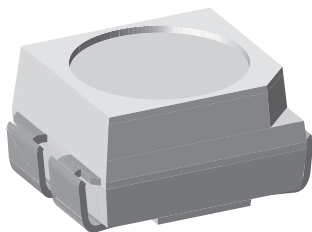


## Power SMD LED PLCC-4



19210

### DESCRIPTION

The VLMPG32.. is an advanced development in terms of heat dissipation.

The leadframe profile of this PLCC-4 SMD package is optimized to reduce the thermal resistance.

This allows higher drive current and doubles the light output compared to Vishay's high intensity SMD LED in PLCC-2 package.

### PRODUCT GROUP AND PACKAGE DATA

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

### FEATURES

- Available in 8 mm tape
- High brightness SMD LED
- Luminous intensity and color categorized per packing unit
- Luminous intensity ratio per packing unit  $I_{Vmax}/I_{Vmin.} \leq 1.6$
- ESD-withstand voltage: Up to 2 kV according to JESD22-A114-B
- Suitable for all soldering methods according to CECC 00802 and J-STD-020C
- Preconditioning according to JEDEC level 2a
- Qualified according to JEDEC moisture sensitivity level 2a
- AEC-Q101 qualified
- Compatible with IR reflow solder processes according to CECC 00802 and J-STD-020C
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### APPLICATIONS

- Interior and exterior lighting
- Indicator and backlighting purposes for audio, video, LCDs, switches, symbols, illuminated advertising etc.
- Illumination purpose, alternative to incandescent lamps
- 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. |               |                 |
| VLMPG32P1Q1-GS08 | Pure green | 45                       | -    | 90   | 50            | 555.5           | -    | 564.5 | 50            | -                   | 2.1  | 2.6  | 50            | AlInGaP on GaAs |

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

#### VLMPG32..

| PARAMETER                           | TEST CONDITION          | SYMBOL     | VALUE         | UNIT             |
|-------------------------------------|-------------------------|------------|---------------|------------------|
| Reverse voltage <sup>(1)</sup>      |                         | $V_R$      | 12            | V                |
| Forward current                     |                         | $I_F$      | 70            | mA               |
| Power dissipation                   |                         | $P_{tot}$  | 180           | 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 FR4 | $R_{thJA}$ | 290           | K/W              |

#### Note

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

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)  
**VLMPG32..., PURE GREEN**

| PARAMETER                                 | TEST CONDITION       | PART        | SYMBOL          | MIN.  | TYP.     | MAX.  | UNIT          |
|-------------------------------------------|----------------------|-------------|-----------------|-------|----------|-------|---------------|
| Luminous intensity <sup>(1)</sup>         | $I_F = 50\text{ mA}$ | VLMPG32P1Q1 | $I_V$           | 45    |          | 90    | mcd           |
| Dominant wavelength                       | $I_F = 50\text{ mA}$ |             | $\lambda_d$     | 555.5 |          | 564.5 | nm            |
| Spectral bandwidth at 50 % $I_{rel\ max}$ | $I_F = 50\text{ mA}$ |             | $\Delta\lambda$ |       | 18       |       | nm            |
| Angle of half intensity                   | $I_F = 50\text{ mA}$ |             | $\phi$          |       | $\pm 60$ |       | deg           |
| Forward voltage <sup>(2)</sup>            | $I_F = 50\text{ mA}$ |             | $V_F$           |       | 2.1      | 2.6   | V             |
| Reverse current                           | $V_R = 5\text{ V}$   |             | $I_R$           |       | 0.01     | 10    | $\mu\text{A}$ |

**Notes**
<sup>(1)</sup> In one package unit  $I_{Vmax}/I_{Vmin} \leq 1.6$ 
<sup>(2)</sup> Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of  $\pm 0.1\text{ V}$ 
**LUMINOUS INTENSITY CLASSIFICATION**

| GROUP | LIGHT INTENSITY (mcd) |      |
|-------|-----------------------|------|
|       | MIN.                  | MAX. |
| P1    | 45                    | 56   |
| P2    | 56                    | 71   |
| Q1    | 71                    | 90   |

**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 | PURE GREEN           |       |
|-------|----------------------|-------|
|       | DOM. WAVELENGTH (nm) |       |
|       | MIN.                 | MAX.  |
| X     | 555.5                | 558.5 |
| Y     | 558.5                | 561.5 |
| Z     | 561.5                | 564.5 |

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of  $\pm 1\text{ nm}$ .

**CROSSING TABLE**

| VISHAY      | OSRAM       |
|-------------|-------------|
| VLMPG32P1Q1 | LPE675-P1Q1 |

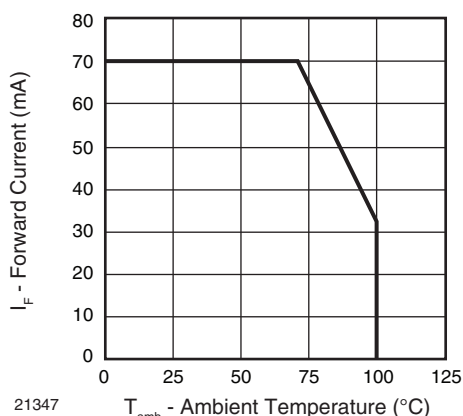
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ , unless otherwise specified)


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

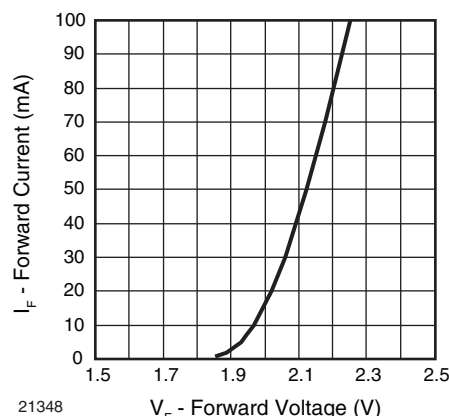


Fig. 2 - Forward Current vs. Forward Voltage

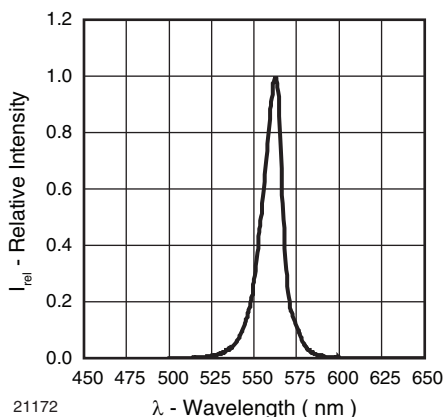


Fig. 3 - Relative Intensity vs. Wavelength

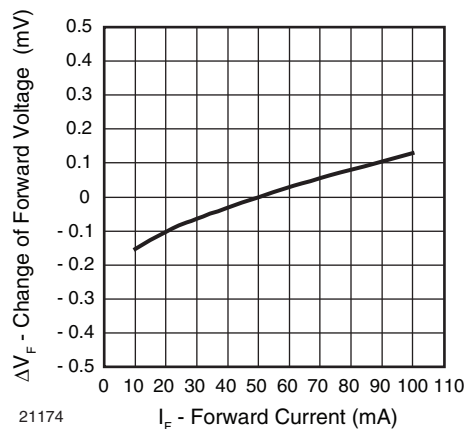


Fig. 6 - Change of Forward Voltage vs. Forward Current

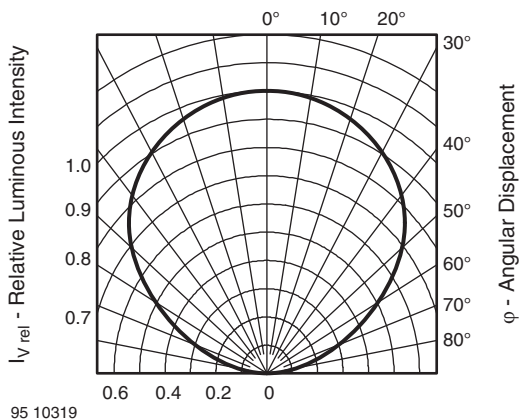


Fig. 4 - Relative Luminous Intensity vs. Angular Displacement

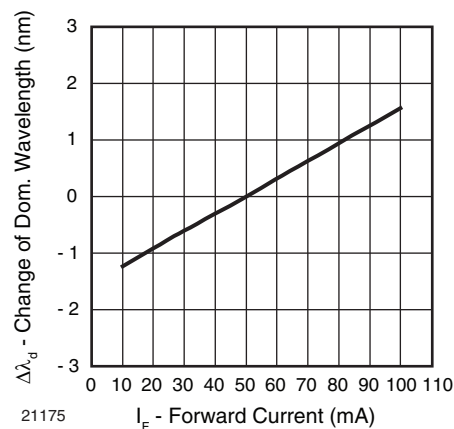


Fig. 7 - Change of Dominant Wavelength vs. Forward Current

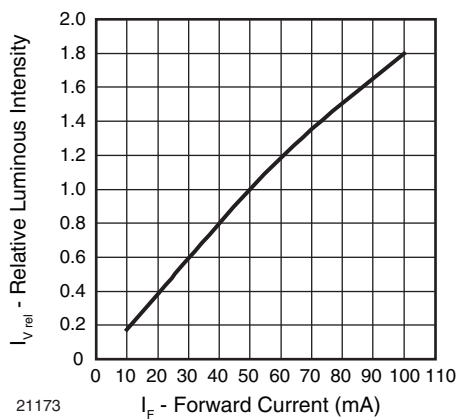


Fig. 5 - Relative Luminous Intensity vs. Forward Current

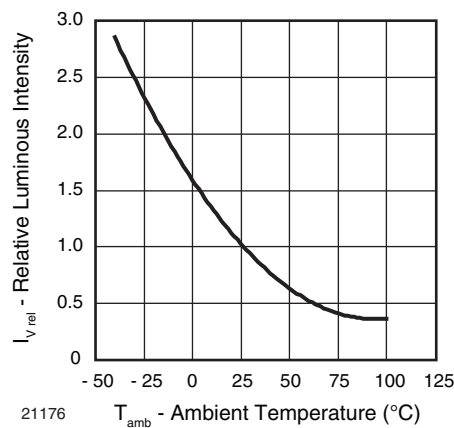


Fig. 8 - Relative Luminous Intensity vs. Ambient Temperature

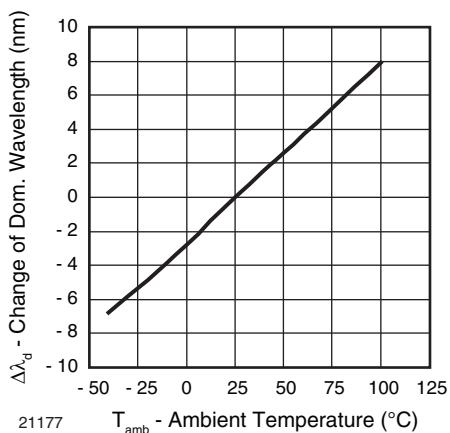


Fig. 9 - Change of Dominant Wavelength vs. Ambient Temperature

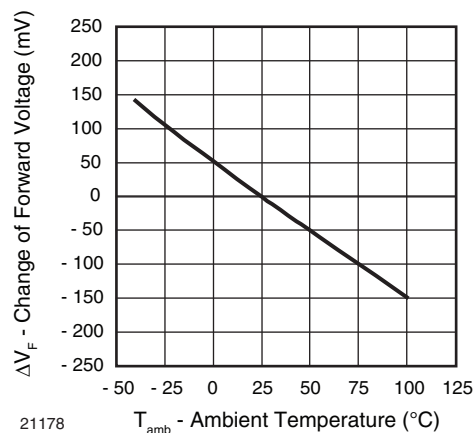
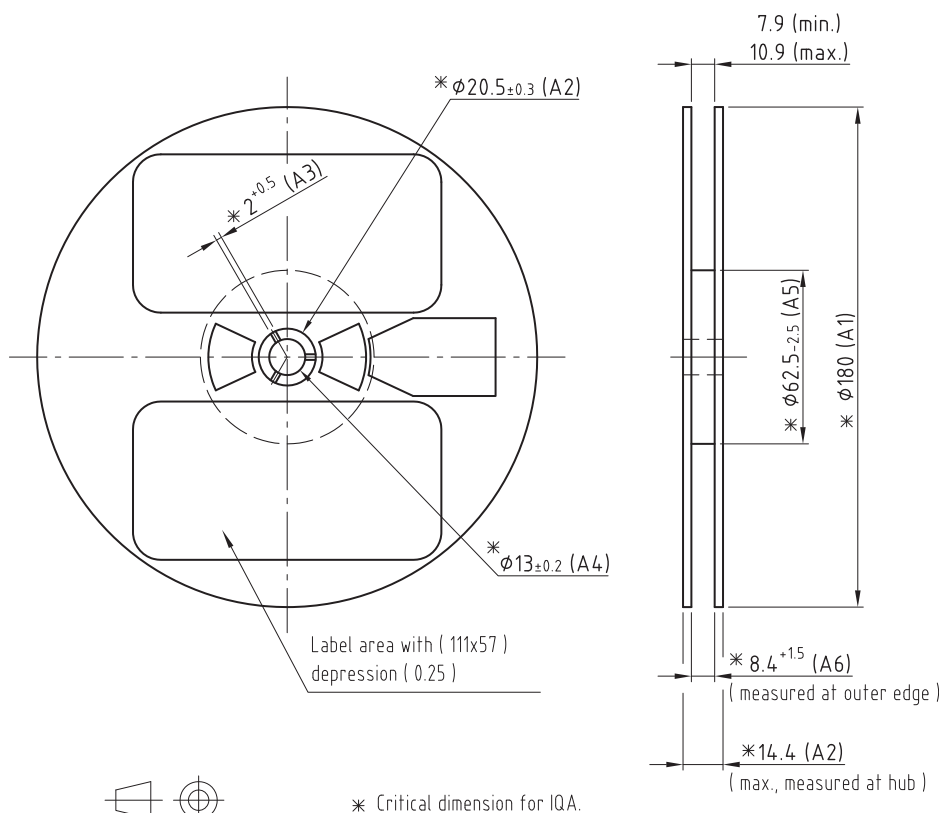
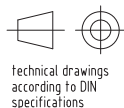


Fig. 10 - Change of Forward Voltage vs. Ambient Temperature

### REEL DIMENSIONS in millimeters



\* Critical dimension for IQA.



Not indicated tolerances  $\pm 0.05$   
Material: black static dissipative

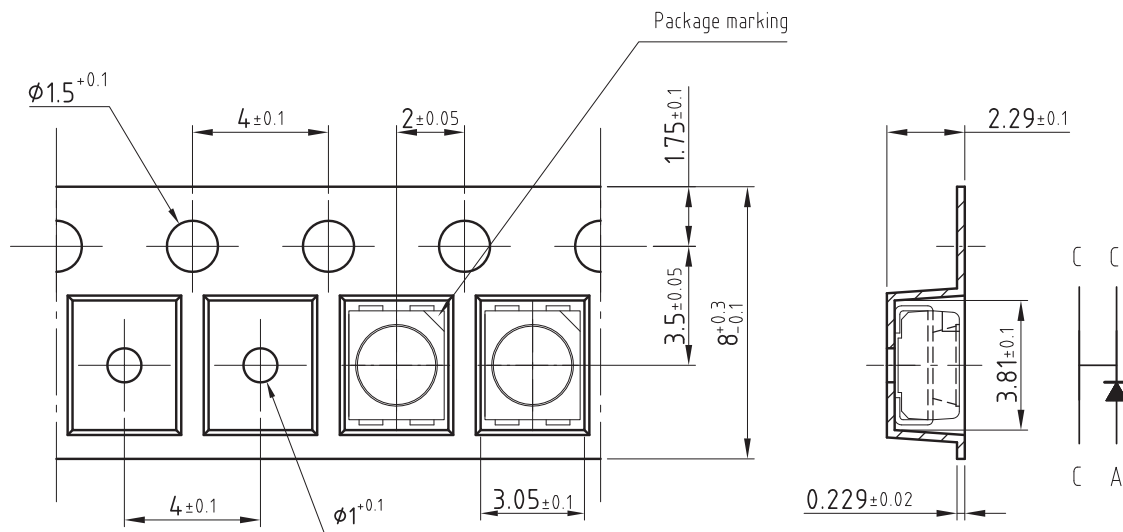
Drawing refers to following types:  $\phi 180$  mm Plastic reel  
Drawing-No.: 9.800-5086.01-4  
Issue: 2; 05.05.08  
20983

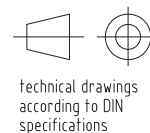
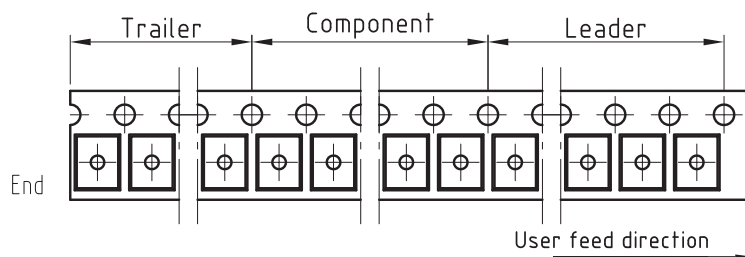
GS08 = 2000 pcs

**TAPING DIMENSIONS** in millimeters

Taping and orientation

Reels come in quantity of 2000 units.

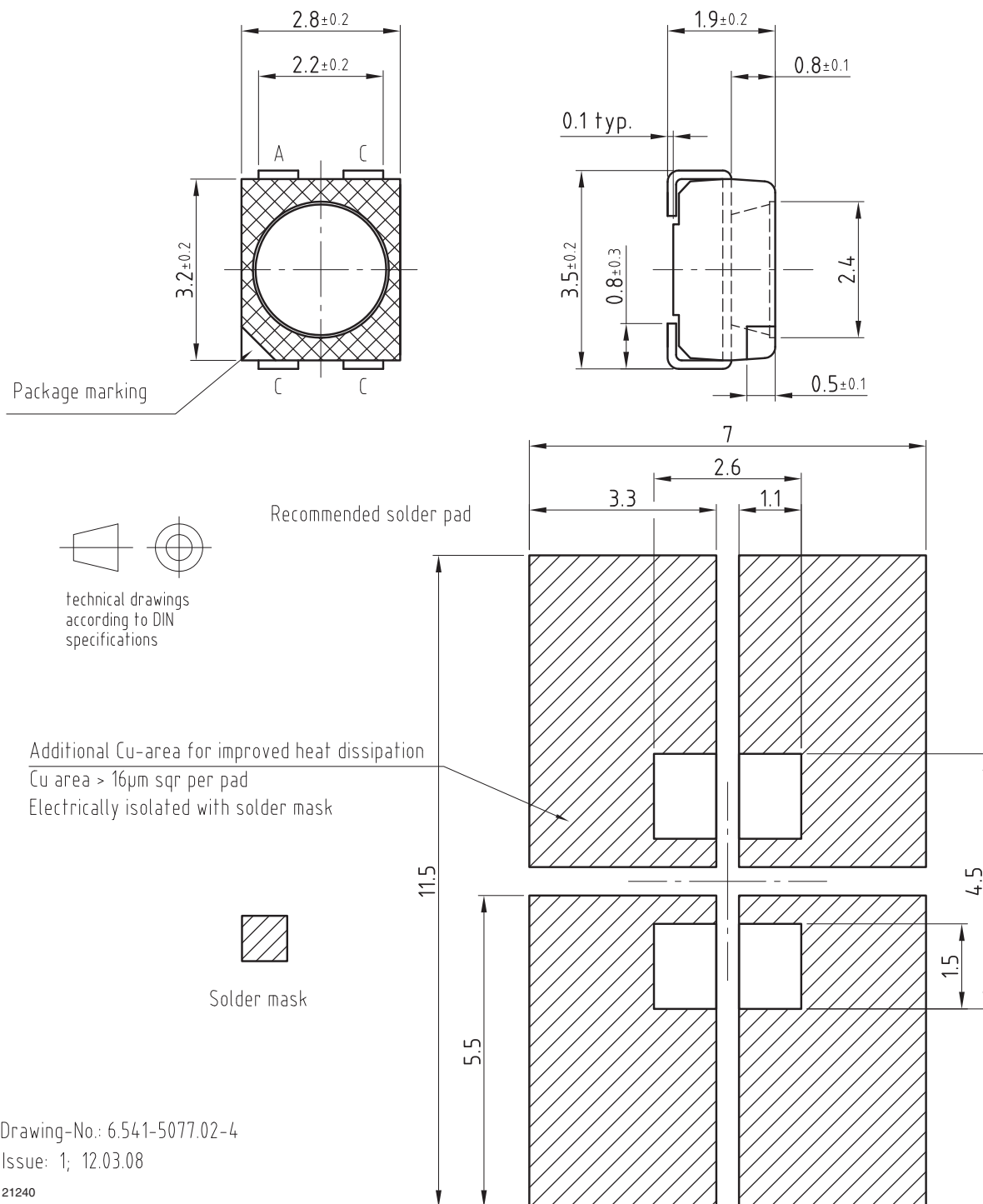

200mm min. for  $\phi 180$  reel

480mm min. for  $\phi 180$  reel


Drawing-No.: 9.700-5334.02-4

Issue: 2; 07.04.08

21241

**PACKAGE/SOLDERING PADS DIMENSIONS** in millimeters


## SOLDERING PROFILE

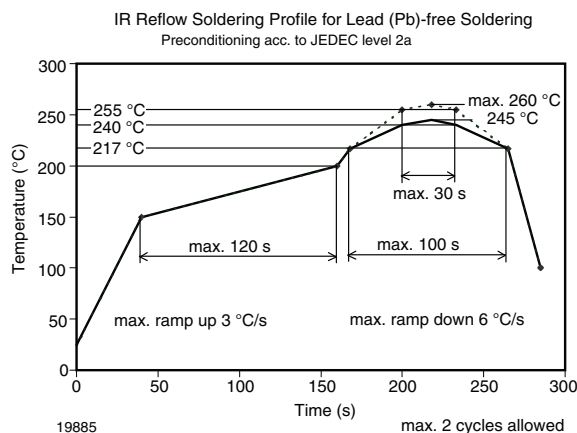


Fig. 11 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

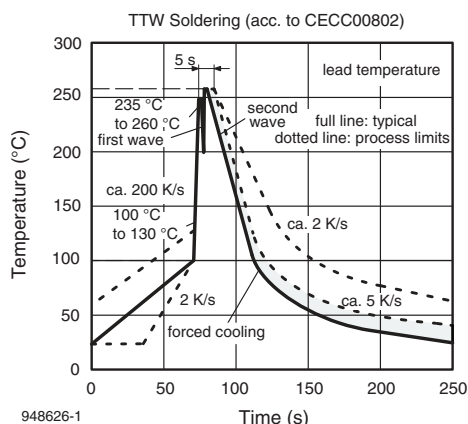
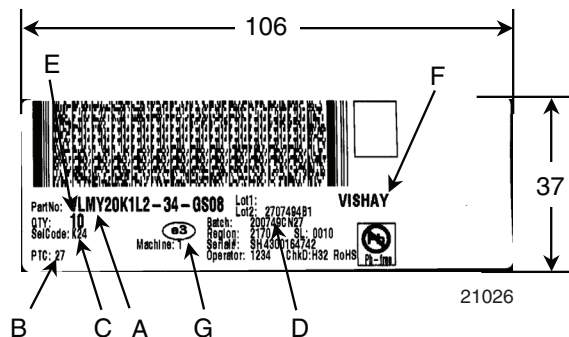


Fig. 12 - Double Wave Soldering of Opto Devices (all Packages)

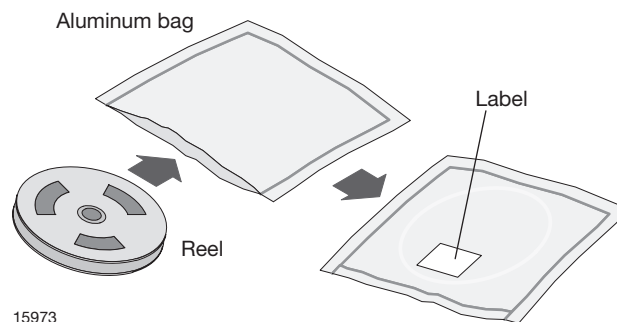
## BAR CODE PRODUCT LABEL (example)



- A. Type of component
- B. PTC = manufacturing plant
- C. SEL - selection code (bin):  
e.g.: K2 = code for luminous intensity group  
4 = code for color group
- D. Batch/date code
- E. Total quantity
- F. Company code
- G. Code for lead (Pb)-free classification (e3)

## 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  $\leq 60\%$  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.

## 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 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.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                   |                                                                                                       |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------|--|--------------------------------------------------------------------|----------------------------------|-----------|------------------------------------------------|----------------------------------------|--|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>CAUTION</b><br>This bag contains<br>MOISTURE-SENSITIVE DEVICES | LEVEL<br><div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>2a</b> </div> |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
| 1. Shelf life in sealed bag 12 months at $< 40^{\circ}\text{C}$ 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. $260^{\circ}\text{C}$ ) must be:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                   |                                                                                                       |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
| a) Mounted within <b>672 hours</b> at factory condition of $\leq 30^{\circ}\text{C}/60\%\text{RH}$ or<br>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<br>b) 2a or 2b is not met.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                   |                                                                                                       |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
| 4. If baking is required, devices may be baked for:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                   |                                                                                                       |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><b>192 hours</b> at <math>40^{\circ}\text{C} + 5^{\circ}\text{C}/-0^{\circ}\text{C}</math> and <math>&lt; 5\%\text{RH}</math> (dry air/nitrogen)</td> <td style="width: 5%; text-align: center;"><b>or</b></td> <td style="width: 45%;"></td> </tr> <tr> <td><b>96 hours</b> at <math>60 \pm 5^{\circ}\text{C}</math> and <math>&lt; 5\%\text{RH}</math></td> <td style="text-align: center;"><b>For all device containers</b></td> <td style="text-align: center;"><b>or</b></td> </tr> <tr> <td><b>24 hours</b> at <math>100 \pm 5^{\circ}\text{C}</math></td> <td colspan="2" style="text-align: center;"><b>Not suitable for reels or tubes</b></td> </tr> </table> |                                                                   |                                                                                                       | <b>192 hours</b> at $40^{\circ}\text{C} + 5^{\circ}\text{C}/-0^{\circ}\text{C}$ and $< 5\%\text{RH}$ (dry air/nitrogen) | <b>or</b> |  | <b>96 hours</b> at $60 \pm 5^{\circ}\text{C}$ and $< 5\%\text{RH}$ | <b>For all device containers</b> | <b>or</b> | <b>24 hours</b> at $100 \pm 5^{\circ}\text{C}$ | <b>Not suitable for reels or tubes</b> |  |
| <b>192 hours</b> at $40^{\circ}\text{C} + 5^{\circ}\text{C}/-0^{\circ}\text{C}$ and $< 5\%\text{RH}$ (dry air/nitrogen)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>or</b>                                                         |                                                                                                       |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
| <b>96 hours</b> at $60 \pm 5^{\circ}\text{C}$ and $< 5\%\text{RH}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>For all device containers</b>                                  | <b>or</b>                                                                                             |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
| <b>24 hours</b> at $100 \pm 5^{\circ}\text{C}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Not suitable for reels or tubes</b>                            |                                                                                                       |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
| Bag Seal Date: _____<br>(If blank, see bar code label)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                   |                                                                                                       |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |
| Note: LEVEL defined by EIA JEDEC Standard JESD22-A113                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                   |                                                                                                       |                                                                                                                         |           |  |                                                                    |                                  |           |                                                |                                        |  |

Example of JESD22-A112 level 2a label



## Disclaimer

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