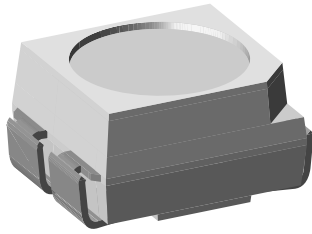


Power SMD LED PLCC-4



19210

DESCRIPTION

The VLMS322.., VLMK322.., VLMO322.., and VLMY322.. series are 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

- 3 cathode pins, 1 anode pin
- 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-020
- Preconditioning according to JEDEC level 2a
- Qualified according to JEDEC moisture sensitivity level 2a
- Compatible with IR reflow 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

AUTOMOTIVE GRADE


RoHS
 COMPLIANT
 HALOGEN
FREE
GREEN
 (5-2008)

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. | | |
| VLMS322T2V1-GS08 | Super red | 355 | 450 | 900 | 50 | 625 | 630 | 640 | 50 | 1.7 | 2.1 | 2.6 | 50 | AllInGaP on GaAs |
| VLMK322U1V2-GS08 | Amber | 450 | 750 | 1125 | 50 | 610 | - | 621 | 50 | - | 1.9 | 2.6 | 50 | AllInGaP on GaAs |
| VLMO322U1V2-GS08 | Soft orange | 450 | 750 | 1125 | 50 | 600 | 605 | 612 | 50 | 1.7 | 2.1 | 2.6 | 50 | AllInGaP on GaAs |
| VLMY322U1V2-GS08 | Yellow | 450 | 750 | 1125 | 50 | 582 | 588 | 594 | 50 | 1.7 | 2.1 | 2.6 | 50 | AllInGaP on GaAs |

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25^\circ\text{C}$, unless otherwise specified) **VLMS322.., VLMK322.., VLMO322.., VLMY322..**

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|-------------------------------------|-------------------------|------------|---------------|------------------|
| Reverse voltage ⁽¹⁾ | | V_R | 5 | V |
| Forward current | | I_F | 70 | mA |
| Power dissipation | at RT | P_{tot} | 225 | 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

⁽¹⁾ 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)
VLMS322.., SUPER RED

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|--|----------------------|-------------|-----------------|------|----------|------|---------------|
| Luminous intensity ⁽¹⁾ | $I_F = 50\text{ mA}$ | VLMS322T2V1 | I_V | 355 | 450 | 900 | mcd |
| Dominant wavelength | $I_F = 50\text{ mA}$ | | λ_d | 625 | 630 | 640 | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F = 50\text{ mA}$ | | $\Delta\lambda$ | - | 18 | - | nm |
| Angle of half intensity | $I_F = 50\text{ mA}$ | | φ | - | ± 60 | - | deg |
| Forward voltage ⁽²⁾ | $I_F = 50\text{ mA}$ | | V_F | 1.7 | 2.1 | 2.6 | V |
| Reverse current | $V_R = 5\text{ V}$ | | I_R | - | 0.01 | 10 | μA |

Notes

- (1) In one packing unit $I_{Vmax.}/I_{Vmin.} \leq 1.6$
(2) Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of $\pm 0.1\text{ V}$

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)
VLMK322.., AMBER

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|--|----------------------|-------------|-----------------|------|----------|------|---------------|
| Luminous intensity ⁽¹⁾ | $I_F = 50\text{ mA}$ | VLMK322U1V2 | I_V | 450 | 750 | 1125 | mcd |
| Dominant wavelength | $I_F = 50\text{ mA}$ | | λ_d | 610 | - | 621 | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F = 50\text{ mA}$ | | $\Delta\lambda$ | - | 18 | - | nm |
| Angle of half intensity | $I_F = 50\text{ mA}$ | | φ | - | ± 60 | - | deg |
| Forward voltage ⁽²⁾ | $I_F = 50\text{ mA}$ | | V_F | 1.7 | 2.1 | 2.6 | V |
| Reverse current | $V_R = 5\text{ V}$ | | I_R | - | 0.01 | 10 | μA |

Notes

- (1) In one packing unit $I_{Vmax.}/I_{Vmin.} \leq 1.6$
(2) Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of $\pm 0.1\text{ V}$

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)
VLMO322.., SOFT ORANGE

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|--|----------------------|-------------|-----------------|------|----------|------|---------------|
| Luminous intensity ⁽¹⁾ | $I_F = 50\text{ mA}$ | VLMO322U1V2 | I_V | 450 | 750 | 1125 | mcd |
| Dominant wavelength | $I_F = 50\text{ mA}$ | | λ_d | 600 | 605 | 612 | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F = 50\text{ mA}$ | | $\Delta\lambda$ | - | 18 | - | nm |
| Angle of half intensity | $I_F = 50\text{ mA}$ | | φ | - | ± 60 | - | deg |
| Forward voltage ⁽²⁾ | $I_F = 50\text{ mA}$ | | V_F | 1.7 | 2.1 | 2.6 | V |
| Reverse current | $V_R = 5\text{ V}$ | | I_R | - | 0.01 | 10 | μA |

Notes

- (1) In one packing unit $I_{Vmax.}/I_{Vmin.} \leq 1.6$
(2) Forward voltages are tested at a current pulse duration of 1 ms and a tolerance of $\pm 0.1\text{ V}$

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)
VLMY322.., YELLOW

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|--|----------------------|-------------|-----------------|------|----------|------|---------------|
| Luminous intensity ⁽¹⁾ | $I_F = 50\text{ mA}$ | VLMY322U1V2 | I_V | 450 | 750 | 1125 | mcd |
| Dominant wavelength | $I_F = 50\text{ mA}$ | | λ_d | 582 | 588 | 594 | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F = 50\text{ mA}$ | | $\Delta\lambda$ | - | 18 | - | nm |
| Angle of half intensity | $I_F = 50\text{ mA}$ | | φ | - | ± 60 | - | deg |
| Forward voltage ⁽²⁾ | $I_F = 50\text{ mA}$ | | V_F | 1.7 | 2.1 | 2.6 | V |
| Reverse current | $V_R = 5\text{ V}$ | | I_R | - | 0.01 | 10 | μA |

Notes

- (1) In one packing unit $I_{Vmax.}/I_{Vmin.} \leq 1.6$
(2) 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) | |
| STANDARD | MIN. | MAX. |
| T2 | 355 | 450 |
| U1 | 450 | 560 |
| U2 | 560 | 715 |
| V1 | 715 | 900 |
| V2 | 900 | 1125 |

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 | YELLOW | | SOFT ORANGE | | AMBER | |
| | DOM. WAVELENGTH (nm) | | | | | |
| | MIN. | MAX. | MIN. | MIN. | MAX. | MAX. |
| W | 582 | 585 | 600 | 603 | 610 | 615 |
| X | 585 | 588 | 603 | 606 | 615 | 621 |
| Y | 588 | 591 | 606 | 609 | | |
| Z | 591 | 594 | 609 | 612 | | |

Note

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of ± 1 nm.

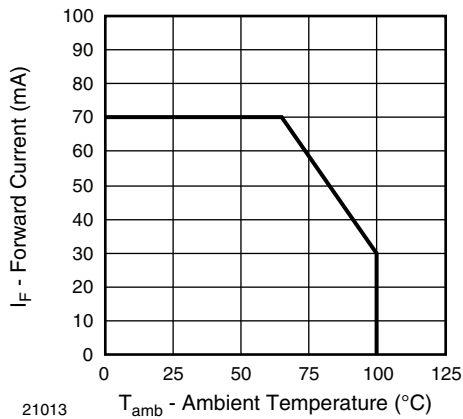
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

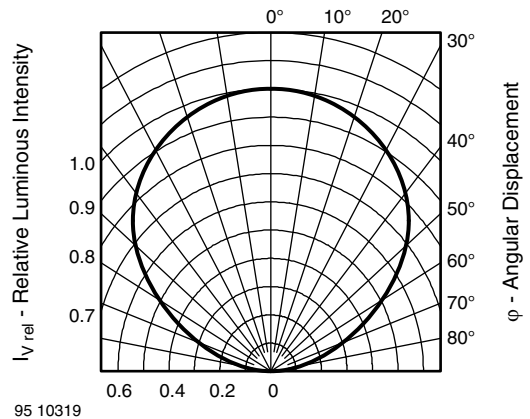


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

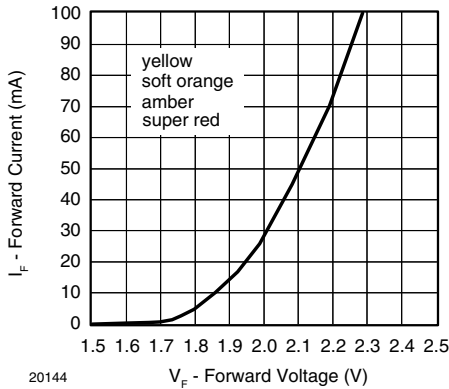


Fig. 3 - Relative Luminous Intensity vs. Forward Current

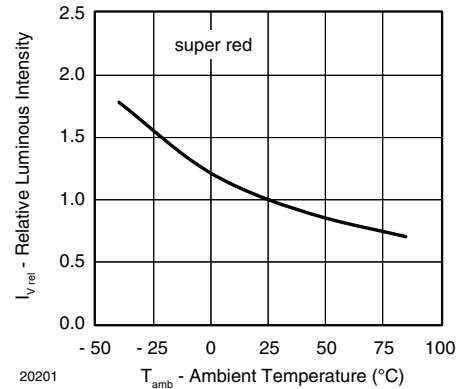


Fig. 6 - Relative Luminous Intensity vs. Ambient Temperature

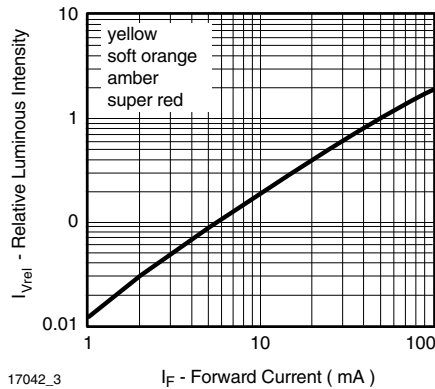


Fig. 4 - Relative Luminous Intensity vs. Forward Current

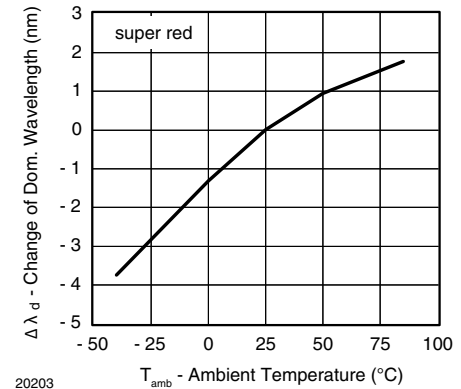


Fig. 7 - Change of Dominant Wavelength vs. Ambient Temperature

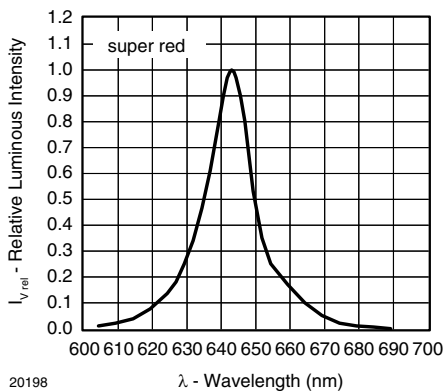


Fig. 5 - Relative Intensity vs. Wavelength

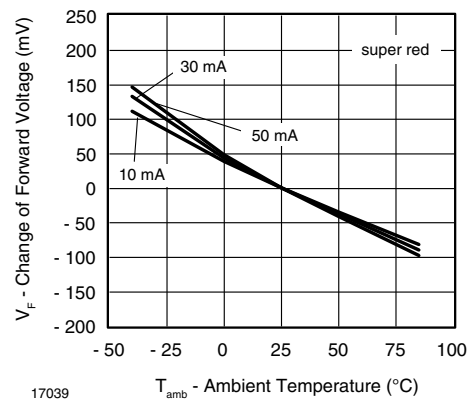


Fig. 8 - Change of Forward Voltage vs. Ambient Temperature

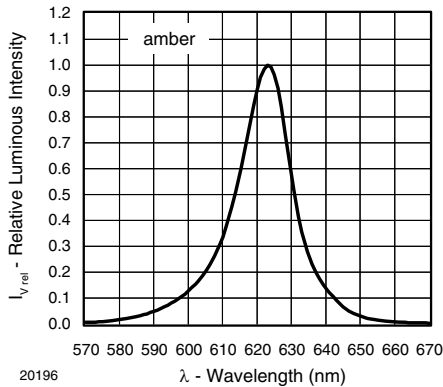


Fig. 9 - Relative Intensity vs. Wavelength

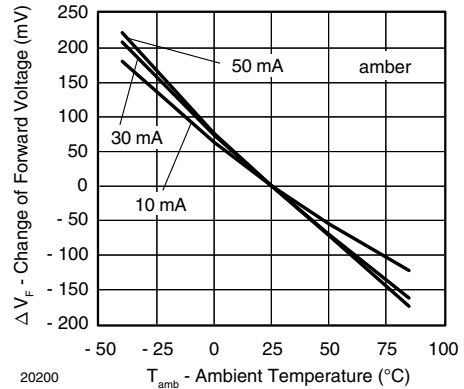


Fig. 12 - Change of Forward Voltage vs. Ambient Temperature

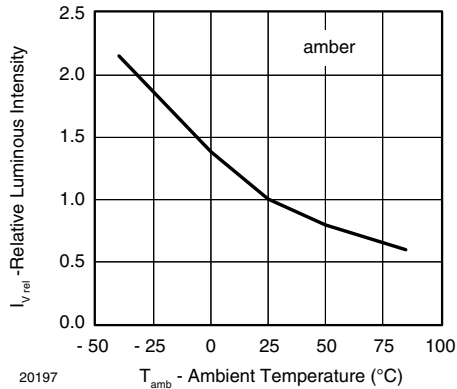


Fig. 10 - Relative Luminous Intensity vs. Ambient Temperature

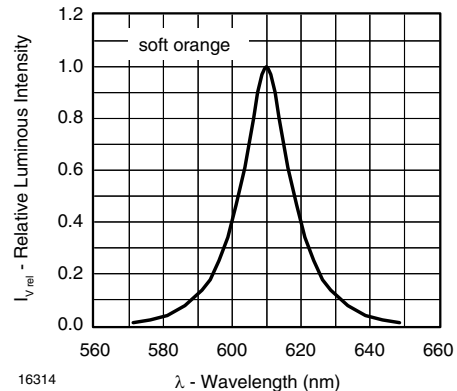


Fig. 13 - Relative Intensity vs. Wavelength

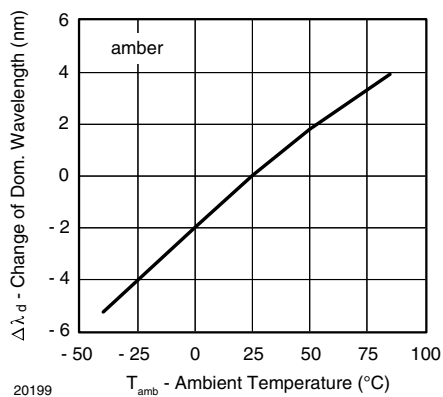


Fig. 11 - Change of Dominant Wavelength vs. Ambient Temperature

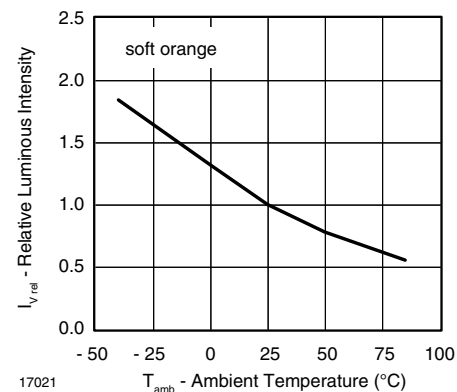


Fig. 14 - Relative Luminous Intensity vs. Ambient Temperature

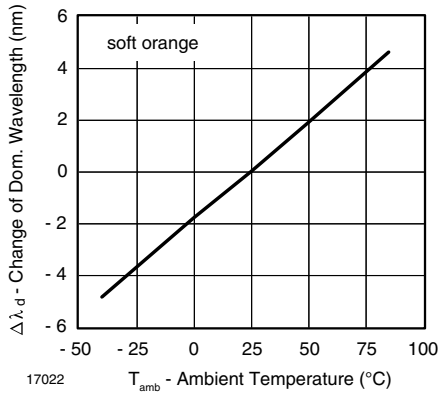


Fig. 15 - Change of Dominant Wavelength vs. Ambient Temperature

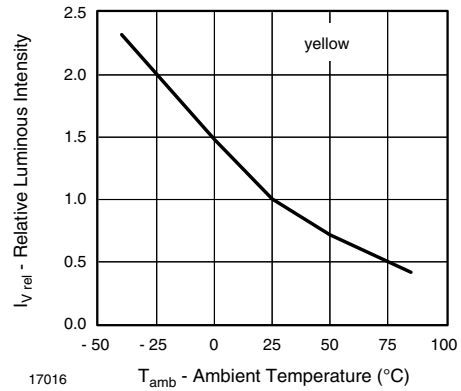


Fig. 18 - Relative Luminous Intensity vs. Ambient Temperature

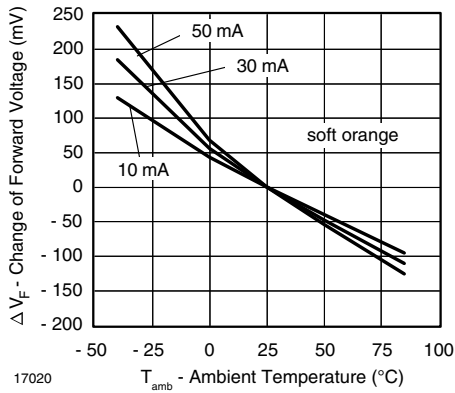


Fig. 16 - Change of Forward Voltage vs. Ambient Temperature

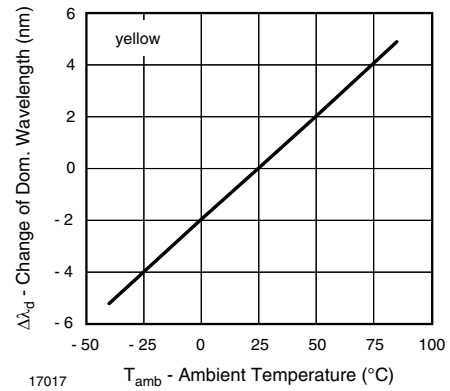


Fig. 19 - Relative Luminous Intensity vs. Ambient Temperature

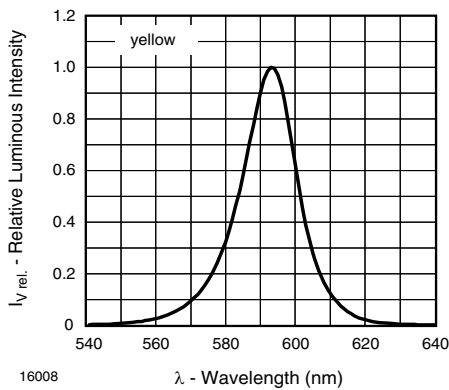


Fig. 17 - Relative Intensity vs. Wavelength

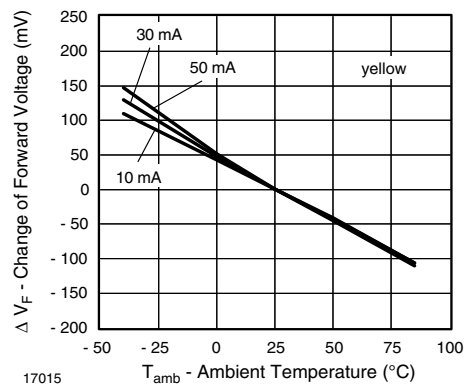
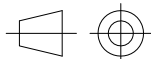
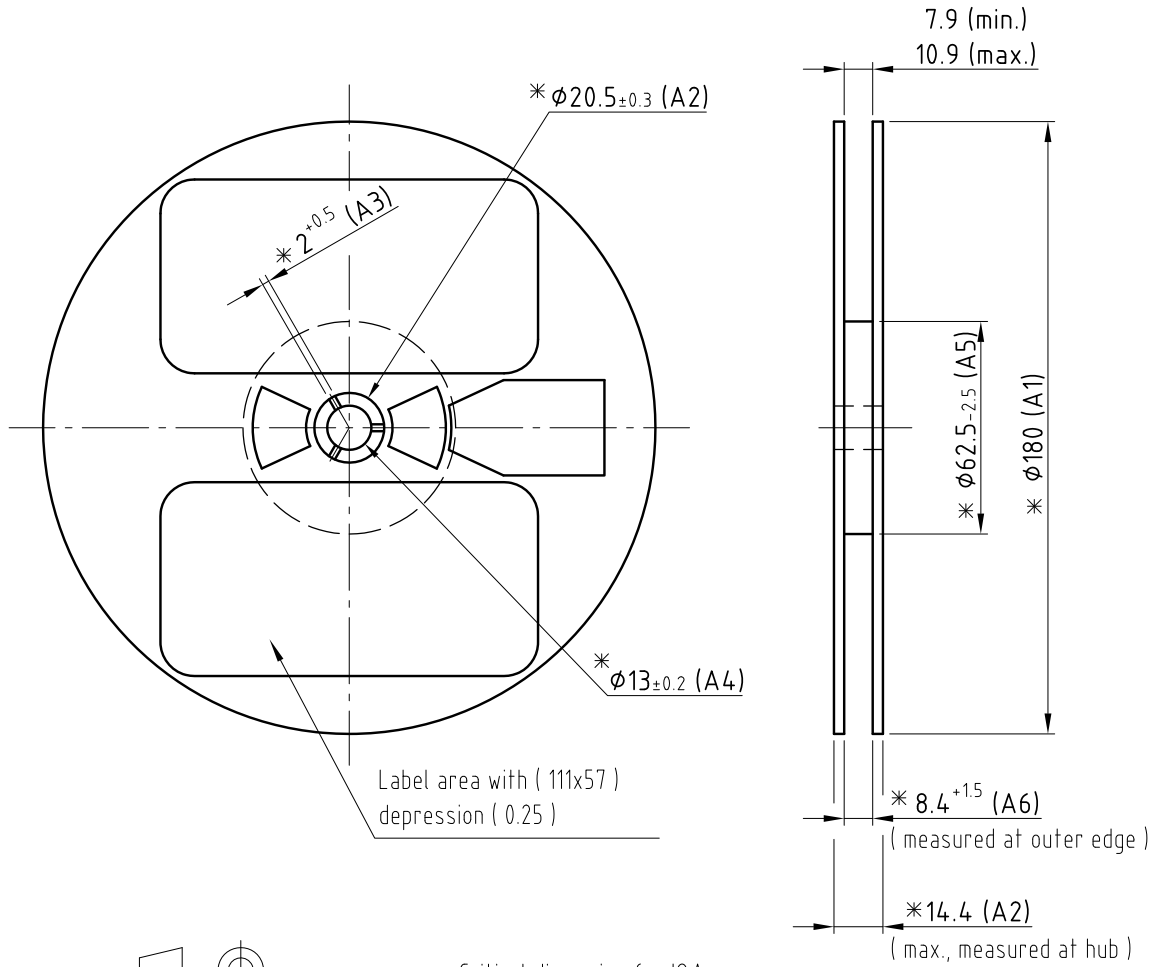


Fig. 20 - Change of Forward Voltage vs. Ambient Temperature



REEL DIMENSIONS in millimeters



technical drawings according to DIN specifications

* Critical dimension for IQA.

GS08 = 2000 pcs

Not indicated tolerances ± 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

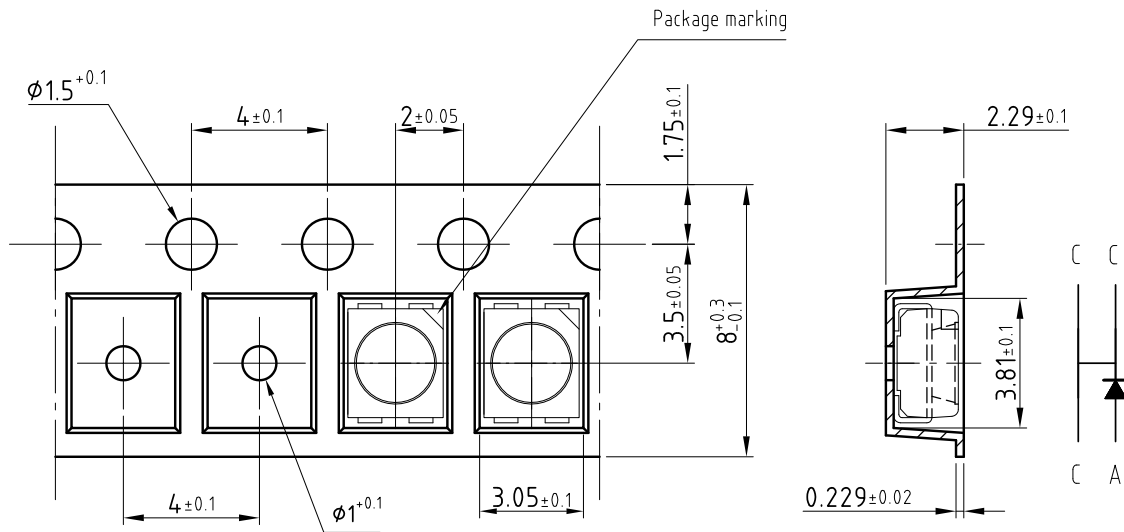
20983



TAPING DIMENSIONS in millimeters

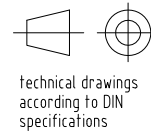
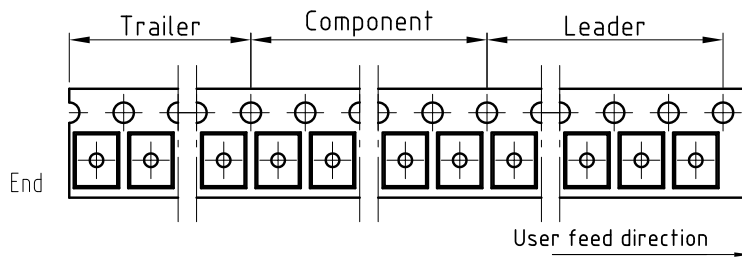
Taping and orientation

Reels come in quantity of 2000 units.



200mm min. for $\phi 180$ reel

480mm min. for $\phi 180$ reel



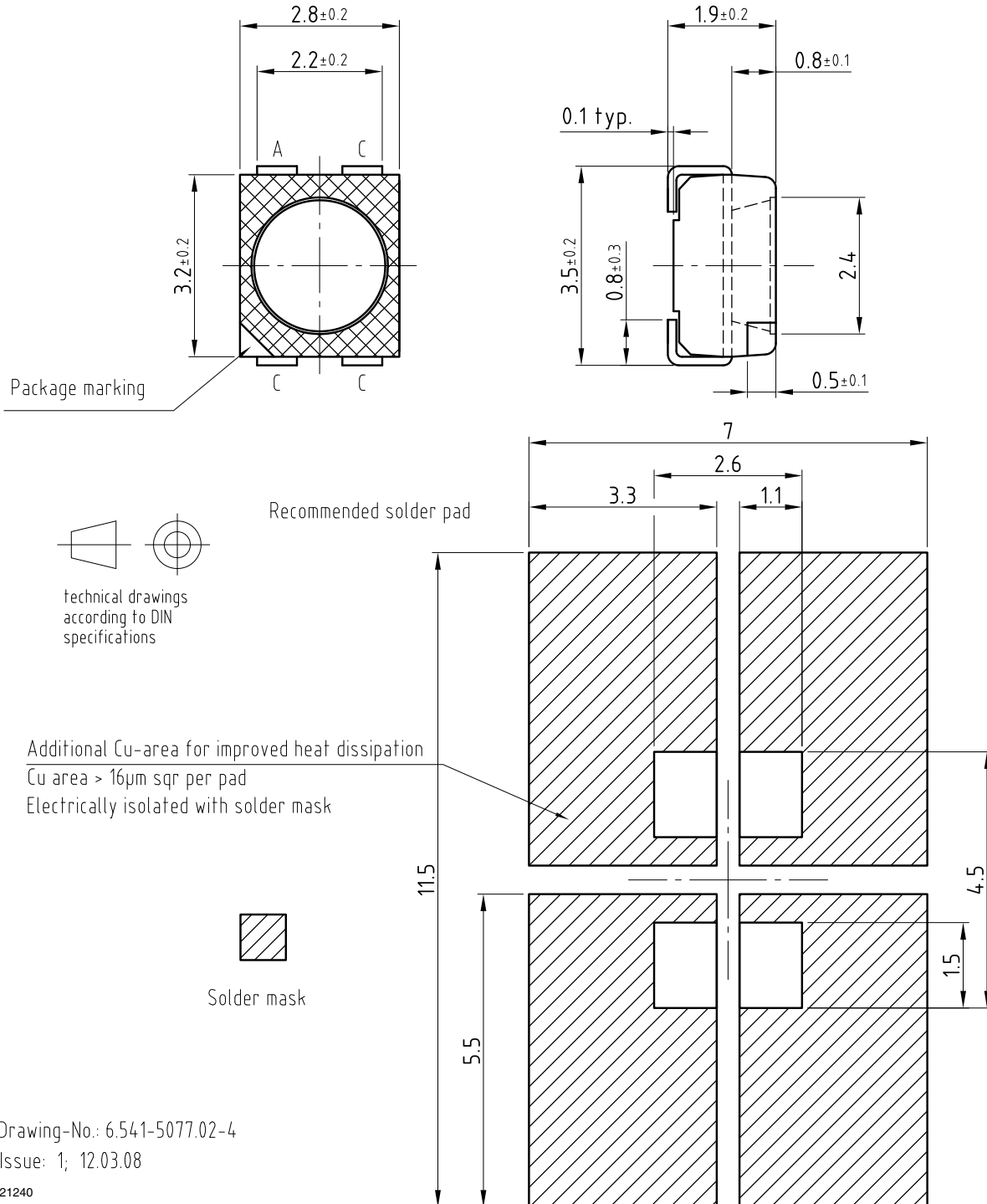
Drawing-No: 9.700-5334.02-4

Issue: 2; 07.04.08

21241



PACKAGE/SOLDERING PADS DIMENSIONS in millimeters



Drawing-No.: 6.541-5077.02-4

Issue: 1; 12.03.08

21240

SOLDERING PROFILE

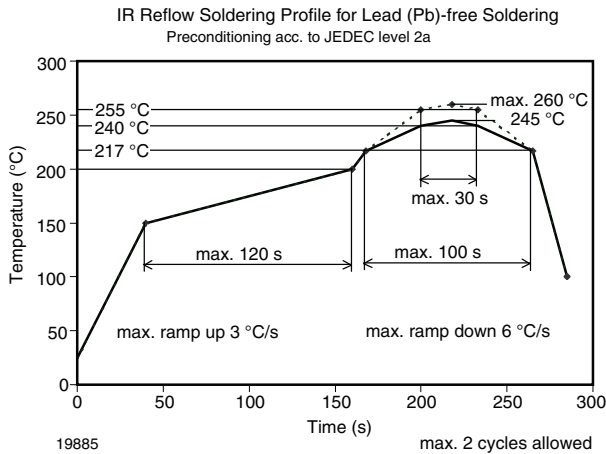


Fig. 21 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

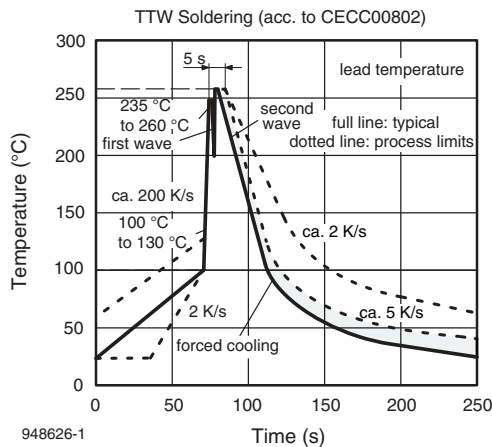
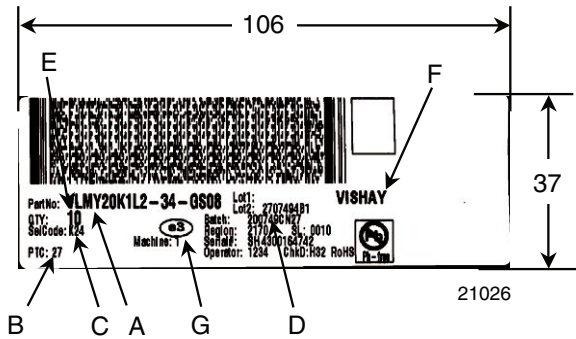


Fig. 22 - Double Wave Soldering of Opto Devices (all Packages)

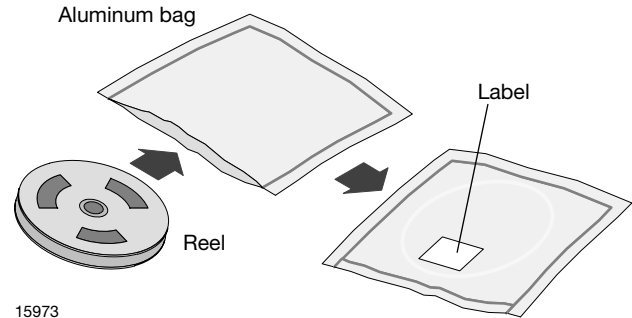
BAR CODE PRODUCT LABEL (example)



- 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 ≤ 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.

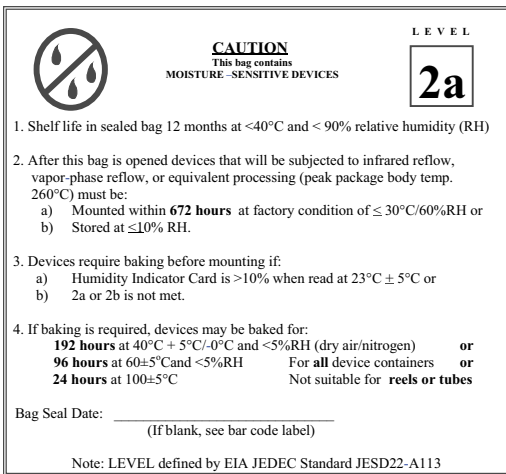
An EIA JEDEC standard JESD22-A112 level 2a label is included on all dry bags.

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 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.



Example of JESD22-A112 level 2a label



Disclaimer

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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.

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Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

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.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.