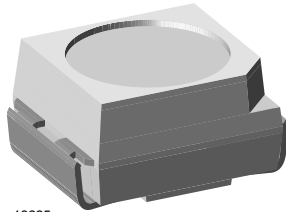


Low Current SMD LED PLCC-2



19225

DESCRIPTION

These new devices have been designed to meet the increasing demand for AlInGaP based low current SMD LEDs.

The package of the VLM.30.. is the PLCC-2 package.

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: low current
- Angle of half intensity: $\pm 60^\circ$

FEATURES

- SMD LED with exceptional brightness
- Compatible with automatic placement equipment
- EIA and ICE standard package
- Compatible with IR reflow, vapor phase and wave solder 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
- Very low power consumption
- Luminous intensity ratio in one packaging unit $I_{Vmax}/I_{Vmin} \leq 1.6$
- ESD withstand voltage: up to 2 kV according to JESD22-A114-B
- Preconditioning according to JEDEC® level 2a
- 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

- 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 for battery driven 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. | | |
| VLMS3000-GS08 | Super red | 2.8 | 10 | - | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS3000-GS18 | Super red | 2.8 | 10 | - | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30J1K2-GS08 | Super red | 4.5 | 8.5 | 11.2 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30J1K2-GS18 | Super red | 4.5 | 8.5 | 11.2 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30K1L2-GS08 | Super red | 7.1 | 10.5 | 18 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30K1L2-GS18 | Super red | 7.1 | 10.5 | 18 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30J1L2-GS08 | Super red | 4.5 | 10 | 18 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30J1L2-GS18 | Super red | 4.5 | 10 | 18 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30J2K2-GS08 | Super red | 5.6 | 8.5 | 11.2 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30J2K2-GS18 | Super red | 5.6 | 8.5 | 11.2 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMS30K2L2-GS08 | Super red | 9 | 12 | 18 | 2 | 624 | 630 | 636 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMO3000-GS08 | Orange | 5.6 | 16 | - | 2 | 600 | 605 | 609 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMO3000-GS18 | Orange | 5.6 | 16 | - | 2 | 600 | 605 | 609 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |



| 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. | | |
| VLMO30K1L2-GS08 | Orange | 7.1 | 15 | 18 | 2 | 600 | 605 | 609 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMO30K1L2-GS18 | Orange | 7.1 | 15 | 18 | 2 | 600 | 605 | 609 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMO30L1M2-GS08 | Orange | 11.2 | 16.5 | 28 | 2 | 600 | 605 | 609 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMO30L1M2-GS18 | Orange | 11.2 | 16.5 | 28 | 2 | 600 | 605 | 609 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMO30K1M2-GS08 | Orange | 7.1 | 16 | 28 | 2 | 600 | 605 | 609 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMO30K1M2-GS18 | Orange | 7.1 | 16 | 28 | 2 | 600 | 605 | 609 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY3000-GS08 | Yellow | 4.5 | 11.6 | - | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY3000-GS18 | Yellow | 4.5 | 11.6 | - | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY3001-GS08 | Yellow | 7.1 | 11.8 | 18 | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY3001-GS18 | Yellow | 7.1 | 11.8 | 18 | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY30J2L1-GS08 | Yellow | 5.6 | 10.6 | 14 | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY30J2L1-GS18 | Yellow | 5.6 | 10.6 | 14 | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY30K2M1-GS08 | Yellow | 9 | 12.3 | 22.4 | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY30K2M1-GS18 | Yellow | 9 | 12.3 | 22.4 | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY30J2M1-GS08 | Yellow | 5.6 | 11.6 | 22.4 | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |
| VLMY30J2M1-GS18 | Yellow | 5.6 | 11.6 | 22.4 | 2 | 581 | 587 | 594 | 2 | - | 1.8 | 2.2 | 2 | AllnGaP |

| ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|---|--|-------------------|-------------|------|
| VLM30.. | | | | |
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Reverse voltage ⁽¹⁾ | | V _R | 6 | V |
| DC forward current | | I _F | 15 | mA |
| Surge forward current | t _p ≤ 10 μs | I _{FSM} | 0.1 | A |
| Power dissipation | | P _V | 40 | mW |
| Junction temperature | | T _j | 125 | °C |
| Operating temperature range | | T _{amb} | -40 to +100 | °C |
| Storage temperature range | | T _{stg} | -40 to +100 | °C |
| Thermal resistance junction / ambient | Mounted on PC board (pad size > 16 mm ²) | R _{thJA} | 400 | K/W |

Note

⁽¹⁾ Driving the LED in reverse direction is suitable for short term application

| OPTICAL AND ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified) | | | | | | | |
|---|------------------------|------------|----------------|------|------|------|------|
| VLMO30.., RED | | | | | | | |
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Luminous intensity ⁽¹⁾ | I _F = 2 mA | VLMS3000 | I _v | 2.8 | 10 | - | mcd |
| | I _F = 2 mA | VLMS30J1K2 | I _v | 4.5 | 8.5 | 11.2 | mcd |
| | I _F = 2 mA | VLMS30K1L2 | I _v | 7.1 | 10.5 | 18 | mcd |
| | I _F = 2 mA | VLMS30J1L2 | I _v | 4.5 | 10 | 18 | mcd |
| | I _F = 2 mA | VLMS30J2K2 | I _v | 5.6 | 8.5 | 11.2 | mcd |
| | I _F = 2 mA | VLMS30K2L2 | I _v | 9 | 12 | 18 | mcd |
| Dominant wavelength | I _F = 2 mA | | λ _d | 624 | 630 | 636 | nm |
| Peak wavelength | I _F = 2 mA | | λ _p | - | 635 | - | nm |
| Angle of half intensity | I _F = 2 mA | | φ | - | ± 60 | - | deg |
| Forward voltage | I _F = 2 mA | | V _F | - | 1.8 | 2.2 | V |
| Reverse voltage | I _R = 10 μA | | V _R | 6 | 15 | - | V |

Note

⁽¹⁾ In one packing unit I_{vmax}/I_{vmin} ≤ 1.6

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)
VLMY30.., ORANGE

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-----------------------------------|-------------------------------|------------|-------------|------|----------|------|------|
| Luminous intensity ⁽¹⁾ | $I_F = 2\text{ mA}$ | VLMO3000 | I_V | 5.6 | 16 | - | mcd |
| | $I_F = 2\text{ mA}$ | VLMO30K1L2 | I_V | 7.1 | 15 | 18 | mcd |
| | $I_F = 2\text{ mA}$ | VLMO30L1M2 | I_V | 11.2 | 16.5 | 28 | mcd |
| | $I_F = 2\text{ mA}$ | VLMO30K1M2 | I_V | 7.1 | 16 | 28 | mcd |
| Dominant wavelength | $I_F = 2\text{ mA}$ | | λ_d | 600 | 605 | 609 | nm |
| Peak wavelength | $I_F = 2\text{ mA}$ | | λ_p | - | 610 | - | nm |
| Angle of half intensity | $I_F = 2\text{ mA}$ | | ϕ | - | ± 60 | - | deg |
| Forward voltage | $I_F = 2\text{ mA}$ | | V_F | - | 1.8 | 2.2 | V |
| Reverse voltage | $I_R = 10\text{ }\mu\text{A}$ | | V_R | 6 | 15 | - | V |

Note(1) 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)
VLMY30.., YELLOW

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-----------------------------------|-------------------------------|------------|-------------|------|----------|------|------|
| Luminous intensity ⁽¹⁾ | $I_F = 2\text{ mA}$ | VLMY3000 | I_V | 4.5 | 11.6 | - | mcd |
| | $I_F = 2\text{ mA}$ | VLMY3001 | I_V | 7.1 | 11.8 | 18 | mcd |
| | $I_F = 2\text{ mA}$ | VLMY30J2L1 | I_V | 5.6 | 10.6 | 14 | mcd |
| | $I_F = 2\text{ mA}$ | VLMY30K2M1 | I_V | 9 | 12.3 | 22.4 | mcd |
| | $I_F = 2\text{ mA}$ | VLMY30J2M1 | I_V | 5.6 | 11.6 | 22.4 | mcd |
| Dominant wavelength | $I_F = 2\text{ mA}$ | | λ_d | 581 | 587 | 594 | nm |
| Peak wavelength | $I_F = 2\text{ mA}$ | | λ_p | - | 585 | - | nm |
| Angle of half intensity | $I_F = 2\text{ mA}$ | | ϕ | - | ± 60 | - | deg |
| Forward voltage | $I_F = 2\text{ mA}$ | | V_F | - | 1.8 | 2.2 | V |
| Reverse voltage | $I_R = 10\text{ }\mu\text{A}$ | | V_R | 6 | 15 | - | V |

Note(1) In one packing unit $I_{Vmax}/I_{Vmin.} \leq 1.6$ **LUMINOUS INTENSITY CLASSIFICATION**

| GROUP STANDARD | LIGHT INTENSITY (mcd) | | |
|----------------|-----------------------|------|------|
| | 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 in one 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 in any one reel. In order to ensure availability, single wavelength groups will not be orderable.

| COLOR CLASSIFICATION | | | | |
|----------------------|----------------------|------|--------|------|
| GROUP | YELLOW | | ORANGE | |
| | DOM. WAVELENGTH (nm) | | | |
| | MIN. | MAX. | MIN. | MAX. |
| 1 | 581 | 584 | | |
| 2 | 583 | 586 | 600 | 603 |
| 3 | 585 | 588 | 602 | 605 |
| 4 | 587 | 590 | 604 | 607 |
| 5 | 589 | 592 | 606 | 609 |
| 6 | 591 | 594 | | |

Note

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

| CROSSING TABLE | |
|----------------|-------------|
| VISHAY | OSRAM |
| VLMO30K1L2 | LOT67K-K1L2 |
| VLMO30K1M2 | LOT67K-K1M2 |
| VLMO30L1M2 | LOT67K-L1M2 |
| VLMS30J1K2 | LST67K-J1K2 |
| VLMS30J1L2 | LST67K-J1L2 |
| VLMS30K1L2 | LST67K-K1L2 |
| VLMY30J2L1 | LYT67K-J2L1 |
| VLMY30J2M1 | LYT67K-J2M1 |
| VLMY30K2M1 | LYT67K-K2M1 |

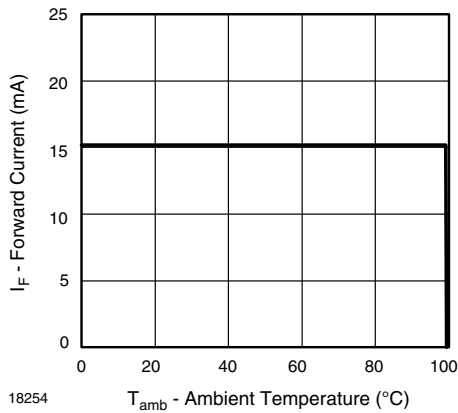
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

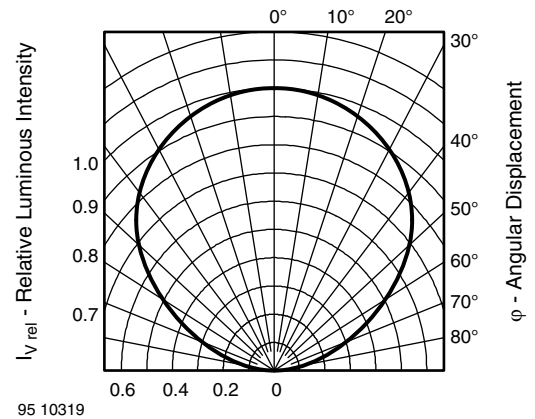


Fig. 3 - Relative Luminous Intensity vs. Angular Displacement

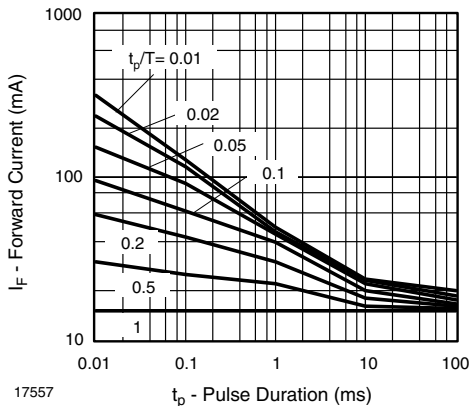


Fig. 2 - Forward Current vs. Pulse Length

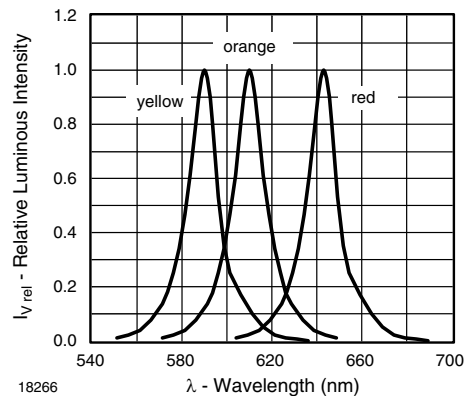


Fig. 4 - Relative Intensity vs. Wavelength

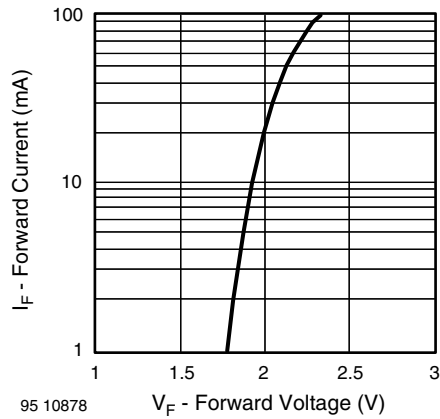


Fig. 5 - Forward Current vs. Forward Voltage

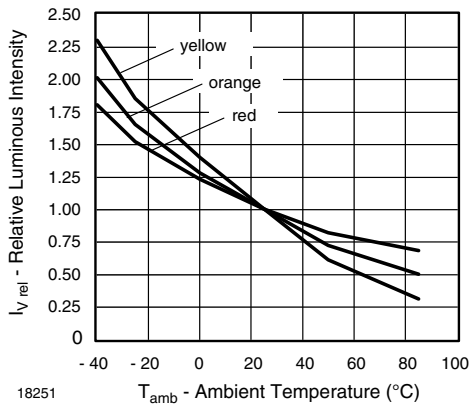


Fig. 6 - Relative Luminous Intensity vs. Ambient Temperature

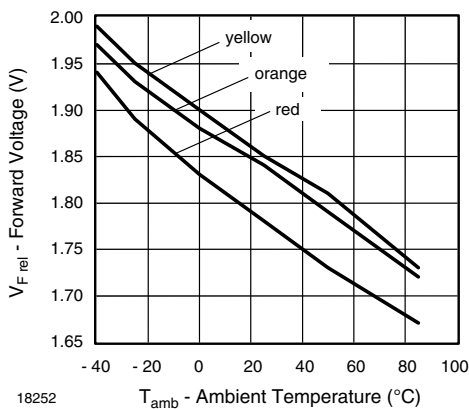
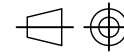
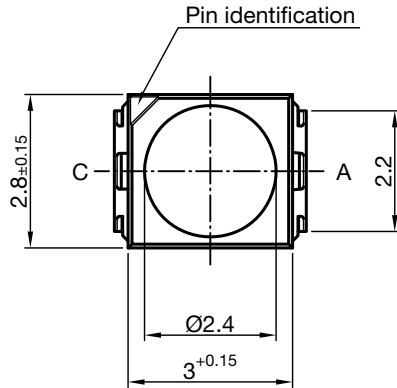
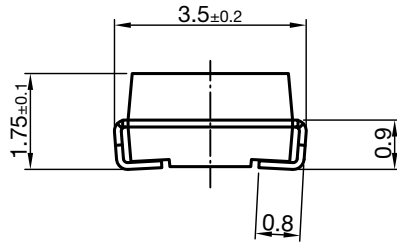


Fig. 7 - Forward Voltage vs. Ambient Temperature



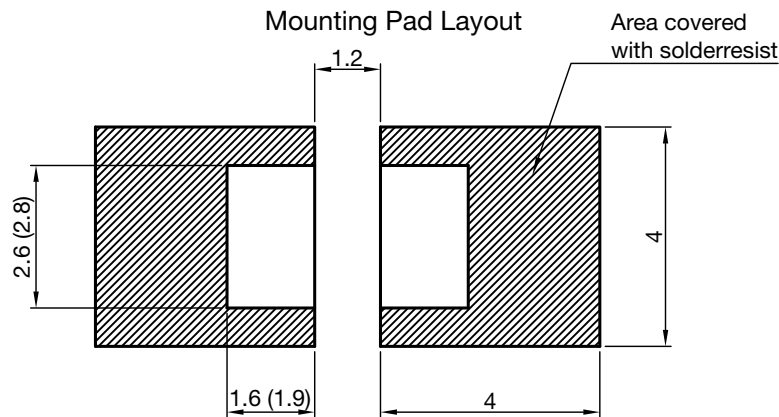
PACKAGE DIMENSIONS in millimeters



Technical drawings according to DIN specifications

Dimensions in mm

Drawing-No.: 6.541-5067.01-4
Issue: 6; 23.09.13

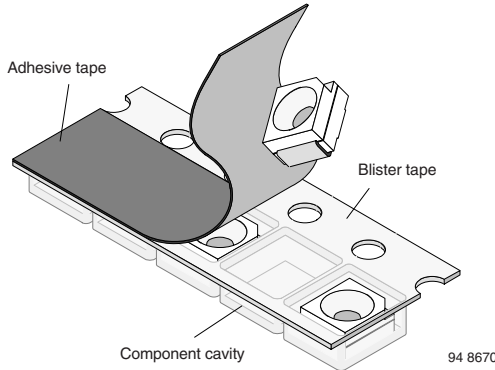


Dimensions: Reflow and vapor phase (wave soldering)

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.



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

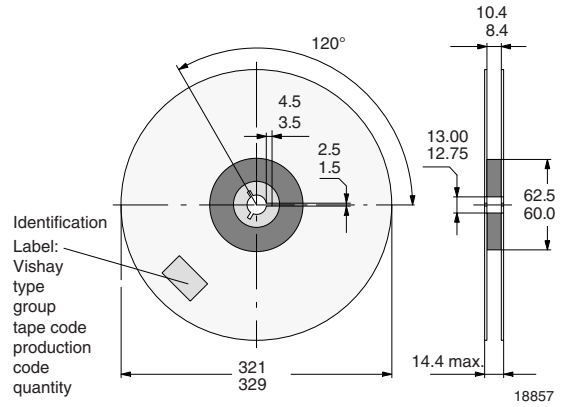


Fig. 10 - Reel Dimensions - GS18

TAPING OF VLM.3...

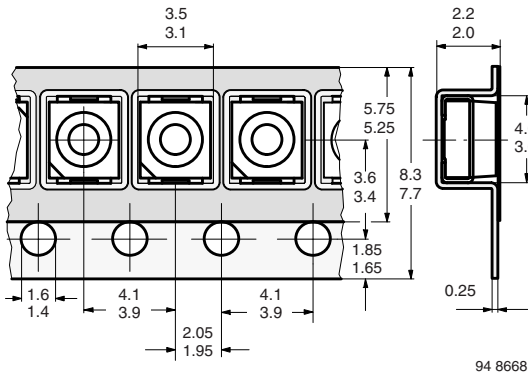


Fig. 8 - Tape Dimensions in mm for PLCC-2

SOLDERING PROFILE

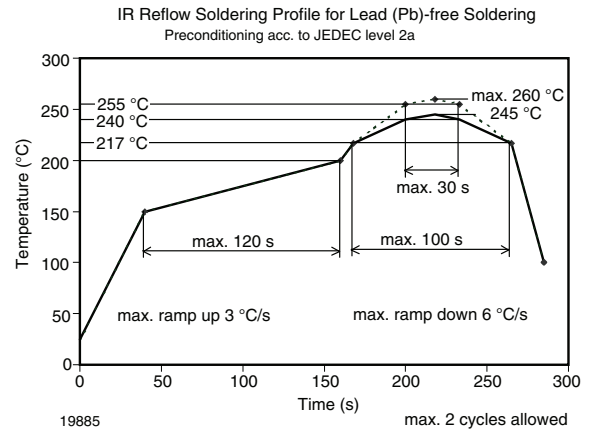


Fig. 11 - Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

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

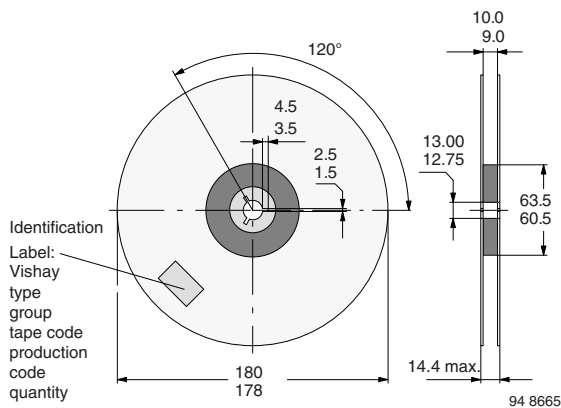


Fig. 9 - Reel Dimensions - GS08

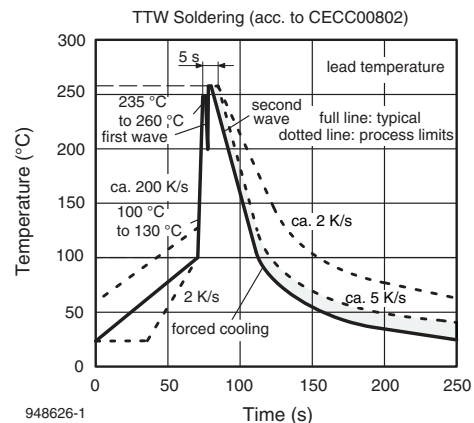
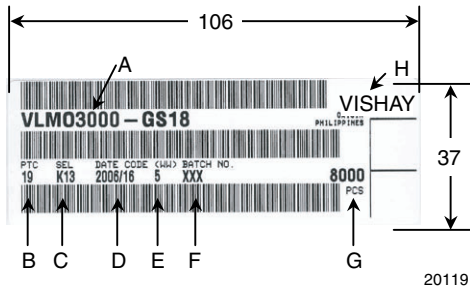


Fig. 12 - Double Wave Soldering of Opto Devices (all Packages)



BAR CODE PRODUCT LABEL (example)



- A) Type of component
- B) Manufacturing plant
- C) SEL - selection code (bin):
e.g.: K1 = code for luminous intensity group
3 = code for color group
- D) Date code year / week
- E) Day code (e.g. 5: Friday)
- F) Batch no.
- G) Total quantity
- H) Company code



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