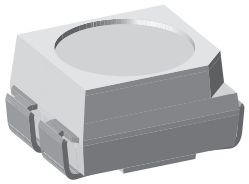
# Bicolor SMD LED



19211

## FEATURES

- SMD LED with exceptional brightness
- Multicolored
- Luminous intensity categorized
- EIA and ICE standard package
- Compatible with automatic placement equipment
- 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
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B
- AEC-Q101 qualified

AUTOMOTIVE GRADE

Pb-free

e3

RoHS COMPLIANT

GREEN (5-2008)**

## DESCRIPTION

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

The package of the VLMKG3400 is the PLCC-4.

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.

## APPLICATIONS

- Automotive: dashboards, switches and optical indicators
- Telecommunication: indicator and backlighting in telephone and fax
- Indicator and backlight in office equipment
- Flat backlight for LCDs, switches and symbols
- General use

## PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD PLCC-4
- Product series: bicolor
- Angle of half intensity: ± 60°

**PARTS TABLE**

| PART | COLOR, LUMINOUS INTENSITY | TECHNOLOGY |
|---|---|---|
| VLMKG3400-GS08 | Super red, $I_V$ = (56 to 140) mcd<br>Green, $I_V$ = (35.5 to 90) mcd | AlInGaP on GaAs |
| VLMKG3400-GS18 | Super red, $I_V$ = (56 to 140) mcd<br>Green, $I_V$ = (35.5 to 90) mcd | AlInGaP on GaAs |

** Please see document “Vishay Material Category Policy”: www.vishay.com/doc?99902

| ABSOLUTE MAXIMUM RATINGS [1] VLMKG3400 | | | | | |
|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | | **SYMBOL** | **VALUE** | **UNIT** |
| Reverse voltage per diode [2] | $I_R$ = 10 µA | | $V_R$ | 5 | V |
| DC forward current per diode | $T_{amb} \leq 80$ °C | 1 chip on | $I_F$ | 30 | mA |
| Surge forward current per diode | | | $I_{FSM}$ | 0.1 | A |
| Power dissipation per diode | | | $P_V$ | 80 | 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$^2$) | 1 chip on<br>2 chips on | $R_{thJA}$ | 560<br>780 | K/W |

Notes:
1) $T_{amb}$ = 25 °C, unless otherwise specified
2) Driving the LED in reverse direction is suitable for short term application

| OPTICAL AND ELECTRICAL CHARACTERISTICS [1] VLMKG3400, SUPER RED | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Luminous intensity | $I_F$ = 20 mA | VLMKG3400 | $I_V$ | 56 | | 140 | mcd |
| Dominant wavelength | $I_F$ = 20 mA | | $\lambda_d$ | 627 | 633 | 639 | nm |
| Peak wavelength | $I_F$ = 20 mA | | $\lambda_p$ | | 643 | | nm |
| Angle of half intensity | $I_F$ = 20 mA | | $\varphi$ | | ± 60 | | deg |
| Forward voltage | $I_F$ = 20 mA | | $V_F$ | | 1.9 | 2.6 | V |
| Reverse current | $V_R$ = 5 V, | | $I_R$ | | | 10 | µA |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | | $C_j$ | | 15 | | pF |

Note:
1) $T_{amb}$ = 25 °C, unless otherwise specified

| OPTICAL AND ELECTRICAL CHARACTERISTICS [1] VLMKG3400, GREEN | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Luminous intensity | $I_F$ = 20 mA | VLMKG3400 | $I_V$ | 35.5 | | 90 | mcd |
| Dominant wavelength | $I_F$ = 20 mA | | $\lambda_d$ | 564 | 570 | 575 | nm |
| Peak wavelength | $I_F$ = 20 mA | | $\lambda_p$ | | 572 | | nm |
| Angle of half intensity | $I_F$ = 20 mA | | $\varphi$ | | ± 60 | | deg |
| Forward voltage | $I_F$ = 20 mA | | $V_F$ | | 2.0 | 2.6 | V |
| Reverse current | $V_R$ = 5 V | | $I_R$ | | | 10 | µA |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | | $C_j$ | | 15 | | pF |

Note:
1) $T_{amb}$ = 25 °C, unless otherwise specified

| CROSSING TABLE | |
|---|---|
| **VISHAY** | **OSRAM** |
| VLMKG3400 | LSGT676 |

| LUMINOUS INTENSITY CLASSIFICATION AND GROUP COMBINATIONS, VLMKG3400 | | | | | |
|---|---|---|---|---|---|
| | | SUPER RED | | | |
| | | P2<br>56 to 71 mcd | Q1<br>71 to 90 mcd | Q2<br>90 to 112 mcd | R1<br>112 to 140 mcd |
| GREEN | N2<br>35.5 to 45 mcd | VLMKG3400 | VLMKG3400 | VLMKG3400 | VLMKG3400 |
| | P1<br>45 to 56 mcd | VLMKG3400 | VLMKG3400 | VLMKG3400 | VLMKG3400 |
| | P2<br>56 to 71 mcd | VLMKG3400 | VLMKG3400 | VLMKG3400 | VLMKG3400 |
| | Q1<br>71 to 90 mcd | VLMKG3400 | VLMKG3400 | VLMKG3400 | VLMKG3400 |

Note:
Luminous intensity is tested at a current pulse duration of 25 ms and an accuracy of ± 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 in any one reel. In order to ensure availability, single wavelength groups will not be orderable.

| COLOR CLASSIFICATION | | |
|---|---|---|
| GROUP | DOMINANT WAVELENGTH (nm) | |
| | GREEN | |
| | MIN. | MAX. |
| 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 °C, unless otherwise specified

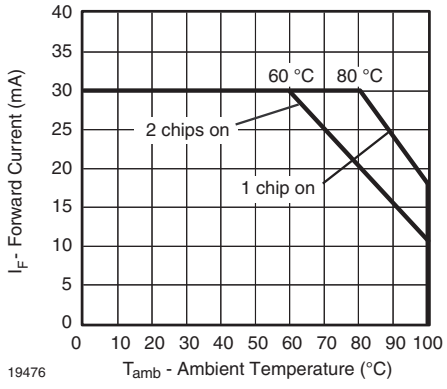



Figure 1. Forward Current vs. Ambient Temperature

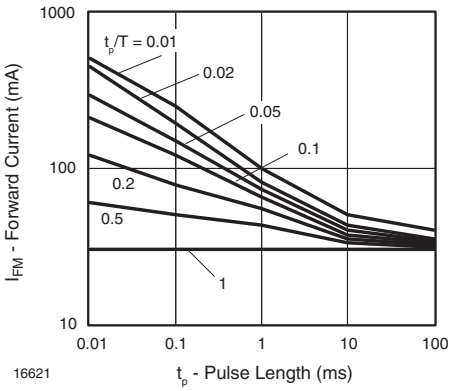



Figure 2. Forward Current vs. Pulse Duration

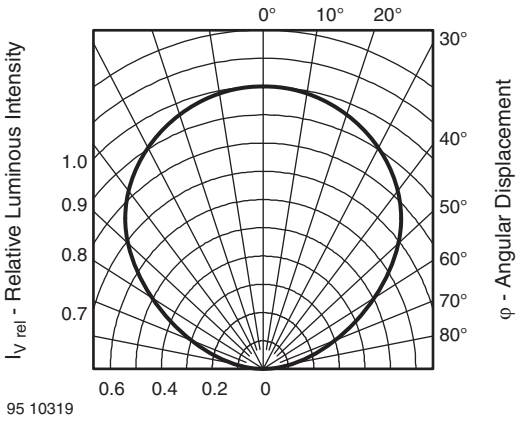



Figure 3. Rel. Luminous Intensity vs. Angular Displacement

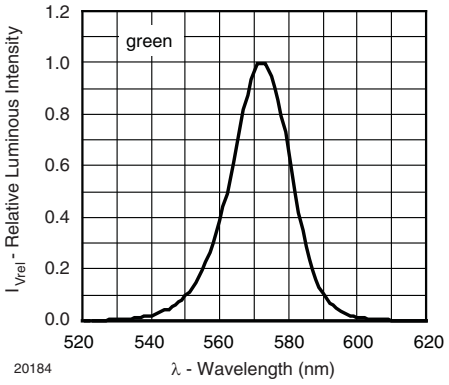



Figure 4. Relative Intensity vs. Wavelength

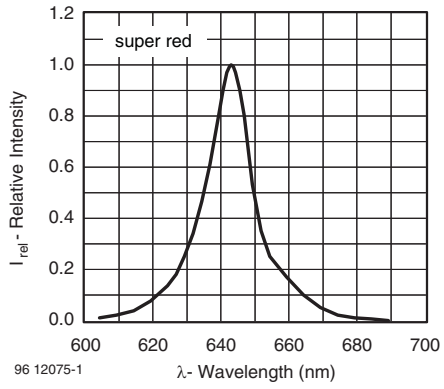



Figure 5. Relative Intensity vs. Wavelength

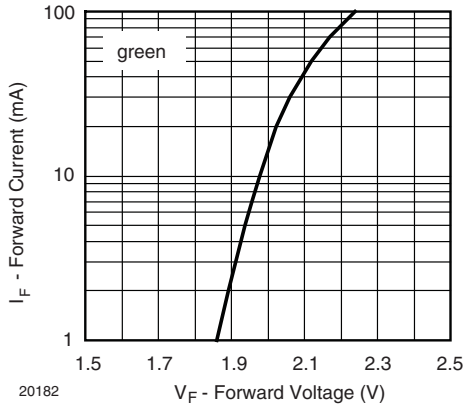



Figure 6. Relative Forward Voltage vs. Ambient Temperature

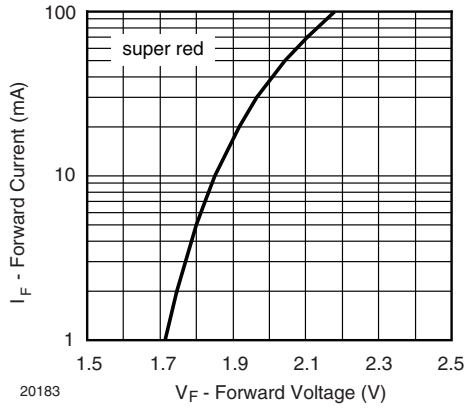



Figure 7. Relative Forward Voltage vs. Ambient Temperature

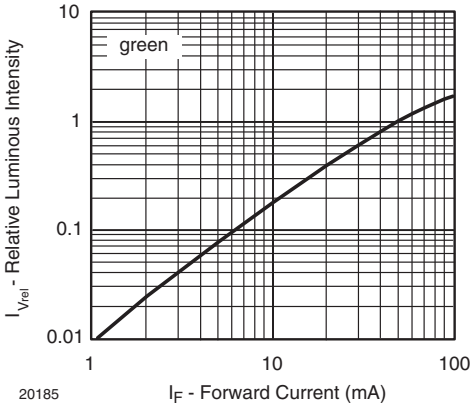



Figure 8. Relative Luminous Intensity vs. Forward Current

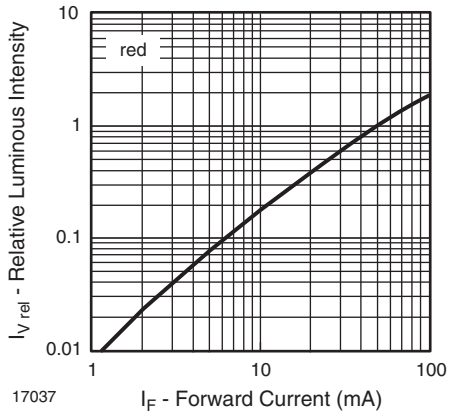



Figure 9. Relative Luminous Intensity vs. Forward Current

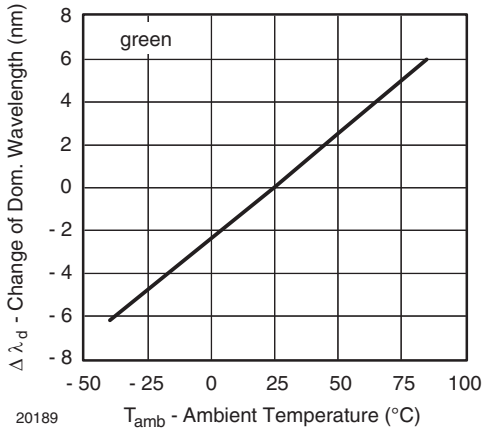



Figure 12. Change of Dominant Wavelength vs. Ambient Temperature

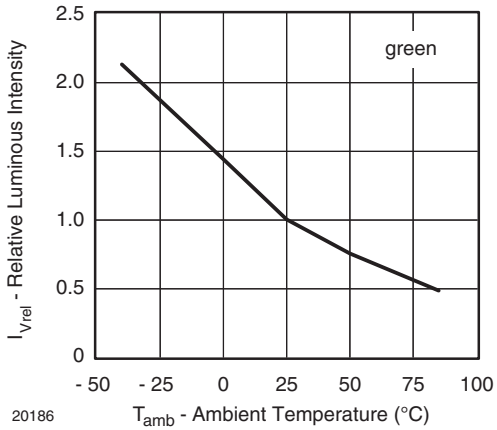



Figure 10. Rel. Luminous Intensity vs. Ambient Temperature

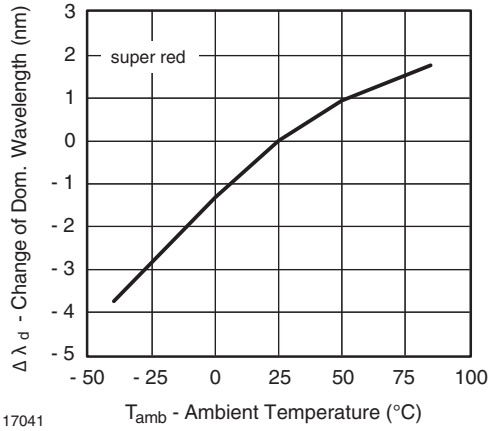



Figure 13. Change of Dominant Wavelength vs. Ambient Temperature

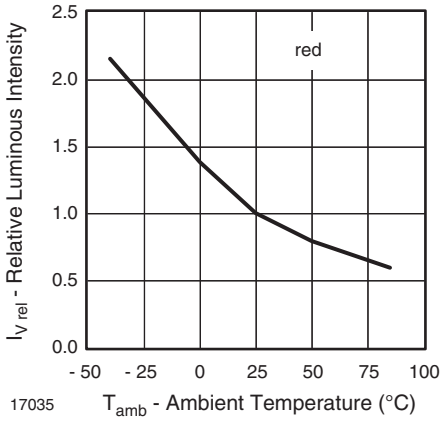



Figure 11. Rel. Luminous Intensity vs. Ambient Temperature

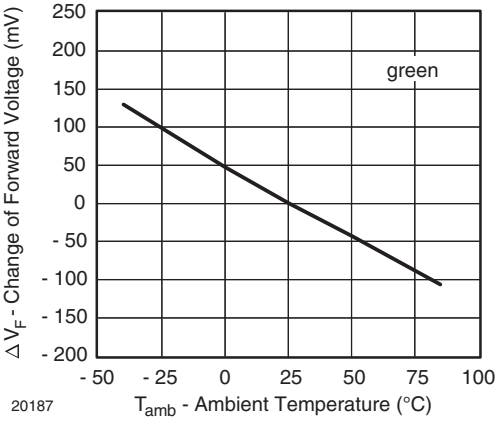



Figure 14. Change of Forward Voltage vs. Ambient Temperature

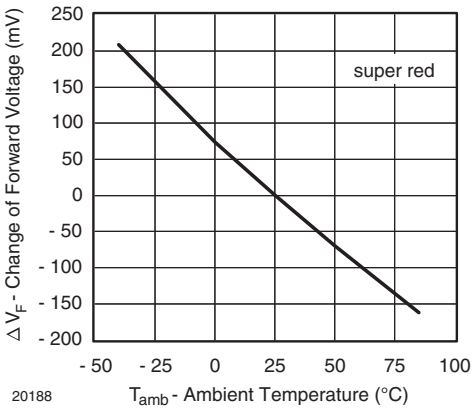
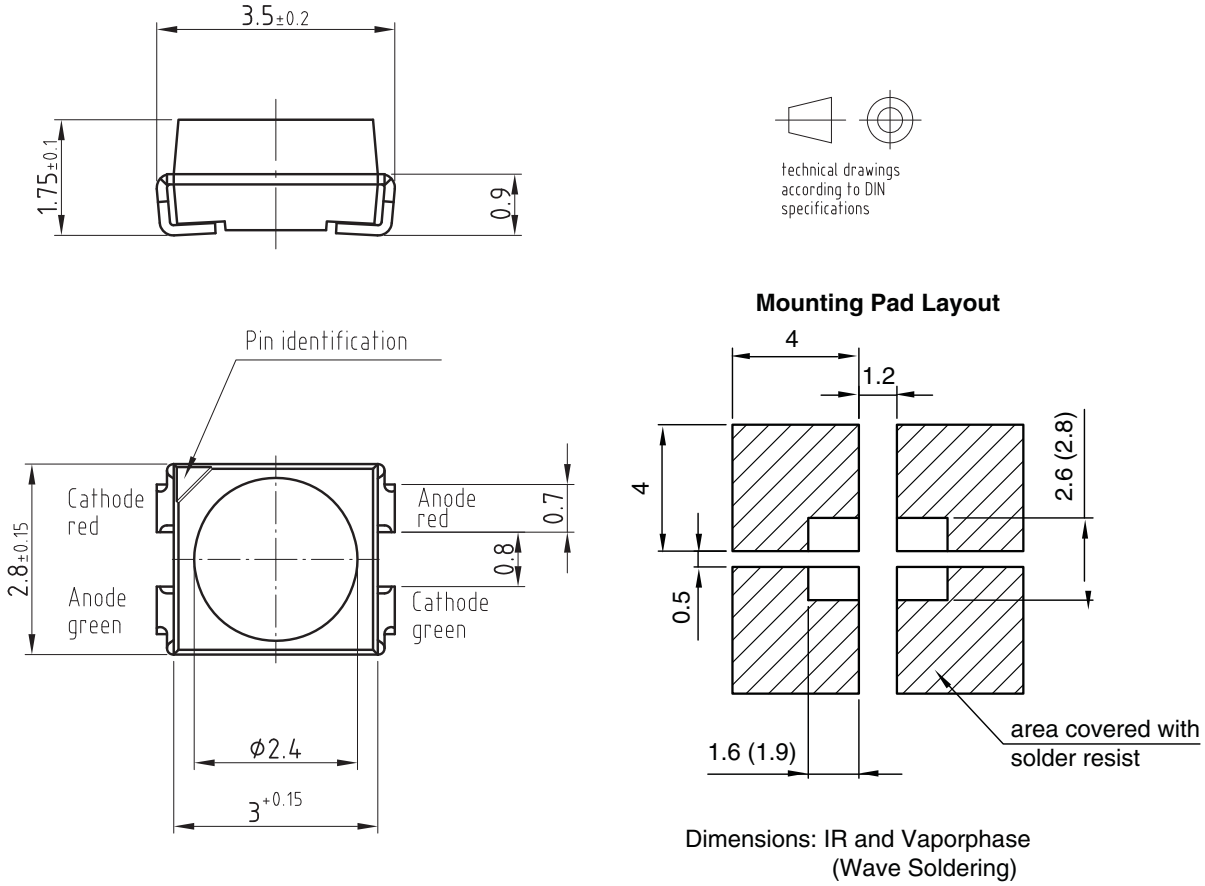



Figure 15. Change of Forward Voltage vs. Ambient Temperature

## **PACKAGE DIMENSIONS** in millimeters



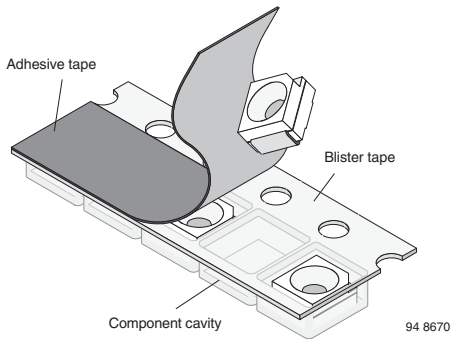

Dimensions: IR and Vaporphase
(Wave Soldering)

Drawing-No.: 6.541-5057.02-4
Issue: 2; 30.05.07
20190

## 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...

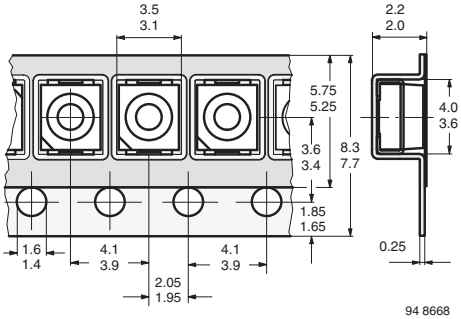



Figure 16. Tape Dimensions in mm for PLCC-2

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

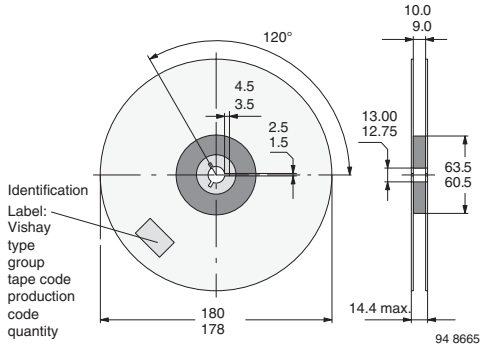



Figure 17. Reel Dimensions - GS08

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

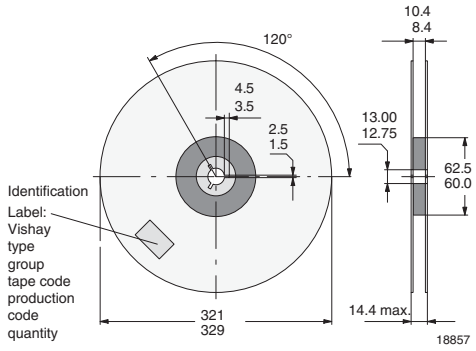



Figure 18. Reel Dimensions - GS18

## SOLDERING PROFILE

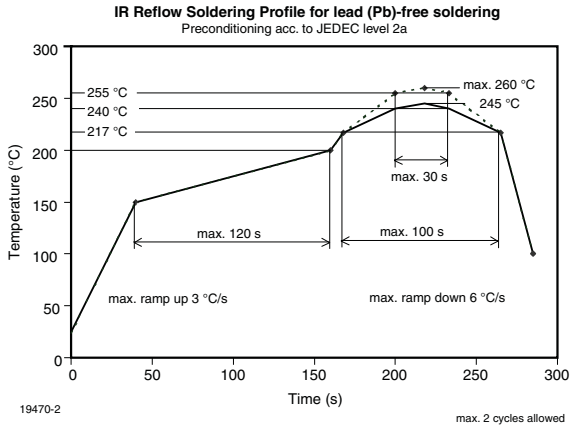



Figure 19. Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020)

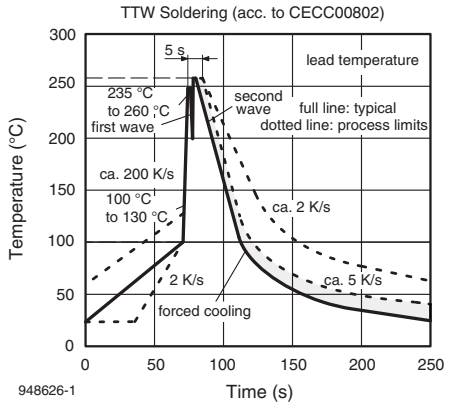
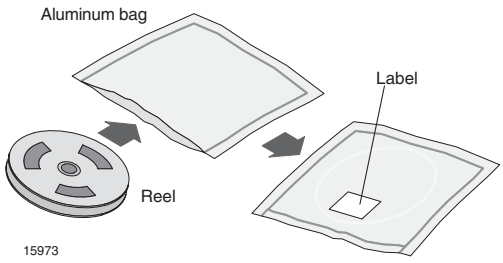



Figure 20. Double Wave Soldering of Opto Devices (all Packages)

## 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.

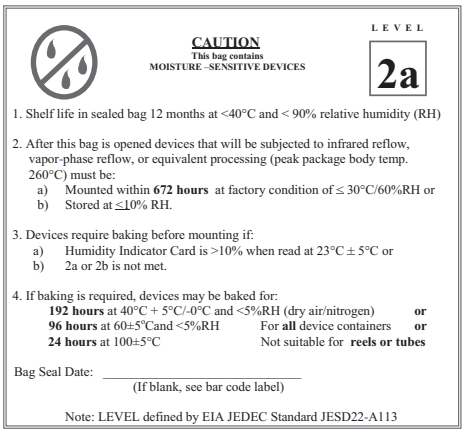
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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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**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.**

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