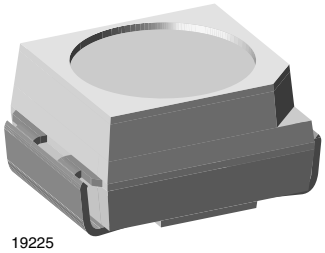
# Low Current SMD LED PLCC-2



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## DESCRIPTION

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

The package of the VLMC310. is the PLCC-2 (equivalent to a size B tantalum capacitor).

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: ± 60°

## 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
- Low power consumption
- Luminous intensity ratio in one packaging unit $I_{Vmax.}/I_{Vmin.} \leq 1.6$
- Preconditioning according to JEDEC® level 2a
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see 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 for battery driven equipment
- Small indicator for outdoor applications
- 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. | | |
| VLMC3100-GS08 | Green | 0.71 | 1.6 | - | 2 | 562 | 572 | 575 | 2 | - | 1.9 | 2.4 | 2 | GaP on GaP |
| VLMC3100-GS18 | Green | 0.71 | 1.6 | - | 2 | 562 | 572 | 575 | 2 | - | 1.9 | 2.4 | 2 | GaP on GaP |
| VLMC3101-GS08 | Green | 1.12 | 1.6 | - | 2 | 562 | 572 | 575 | 2 | - | 1.9 | 2.4 | 2 | GaP on GaP |
| VLMC3101-GS18 | Green | 1.12 | 1.6 | - | 2 | 562 | 572 | 575 | 2 | - | 1.9 | 2.4 | 2 | GaP on GaP |

## ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C, unless otherwise specified)
## VLMC310.

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| Reverse voltage (1) | | $V_R$ | 6 | V |
| DC forward current | | $I_F$ | 7 | mA |
| Surge forward current | $t_p \leq 10$ µs | $I_{FSM}$ | 0.5 | A |
| Power dissipation | | $P_V$ | 20 | mW |
| Junction temperature | | $T_j$ | 100 | °C |
| Operating temperature range | | $T_{amb}$ | -40 to +100 | °C |
| Storage temperature range | | $T_{stg}$ | -40 to +100 | °C |
| Soldering temperature | t ≤ 5 s | $T_{sd}$ | 260 | °C |
| Thermal resistance junction / ambient | Mounted on PC board (pad size > 16 mm²) | $R_{thJA}$ | 500 | K/W |

**Note**

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

## OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)
## VLMC310., GREEN

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 2 mA | VLMC3100 | $I_V$ | 0.71 | 1.6 | - | mcd |
| | | VLMC3101 | $I_V$ | 1.12 | 1.6 | - | mcd |
| Dominant wavelength | $I_F$ = 2 mA | | $\lambda_d$ | 562 | 572 | 575 | nm |
| Peak wavelength | $I_F$ = 2 mA | | $\lambda_p$ | - | 565 | - | nm |
| Angle of half intensity | $I_F$ = 2 mA | | φ | - | ± 60 | - | ° |
| Forward voltage | $I_F$ = 2 mA | | $V_F$ | - | 1.9 | 2.4 | V |
| Reverse voltage | $I_R$ = 10 µA | | $V_R$ | 6 | 15 | - | V |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz | | $C_j$ | - | 50 | - | pF |

**Note**

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

## LUMINOUS INTENSITY CLASSIFICATION

| GROUP | LIGHT INTENSITY (mcd) | | |
|---|---|---|---|
| | OPTIONAL | MIN. | MAX. |
| E | 1 | 0.71 | 0.9 |
| | 2 | 0.9 | 1.12 |
| F | 1 | 1.12 | 1.4 |
| | 2 | 1.4 | 1.8 |
| G | 1 | 1.8 | 2.24 |
| | 2 | 2.24 | 2.8 |
| H | 1 | 2.8 | 3.55 |
| | 2 | 3.55 | 4.5 |

**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 on any one reel.
  In order to ensure availability, single wavelength groups will not be orderable.

## COLOR CLASSIFICATION

| GROUP | GREEN | |
|---|---|---|
| | DOMINANT 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 °C, unless otherwise specified)

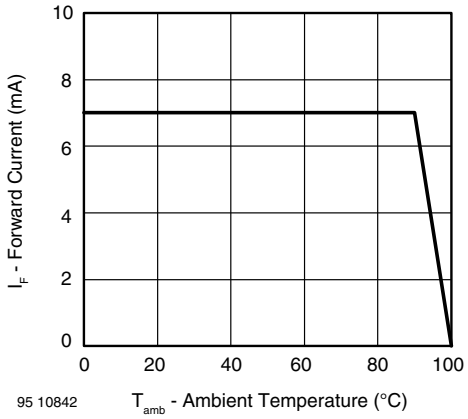



Fig. 1 - Forward Current vs. Ambient Temperature

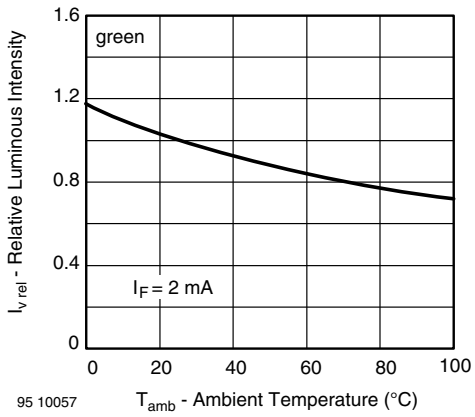



Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature

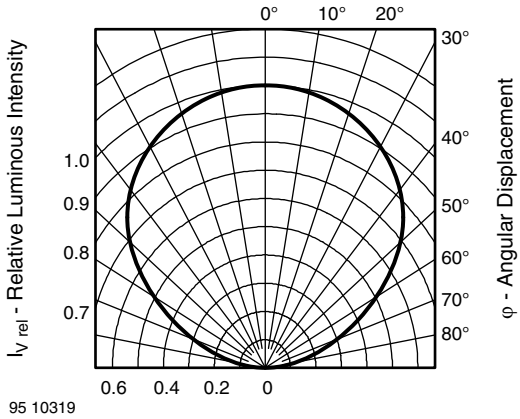



Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

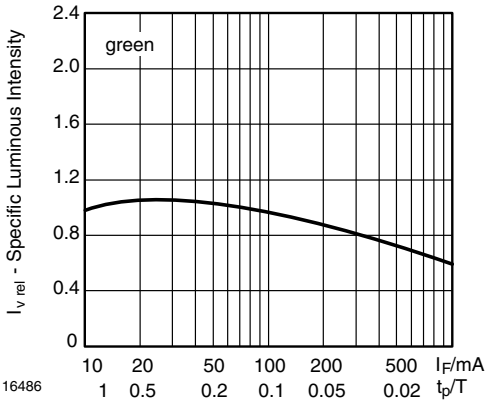



Fig. 5 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

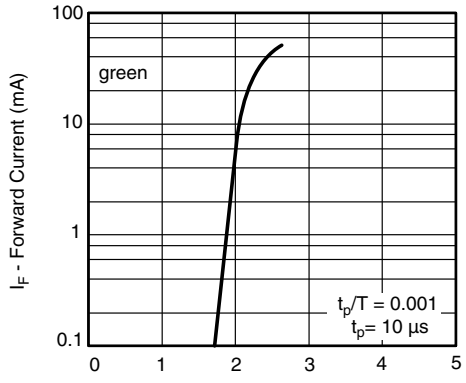



Fig. 3 - Forward Current vs. Forward Voltage

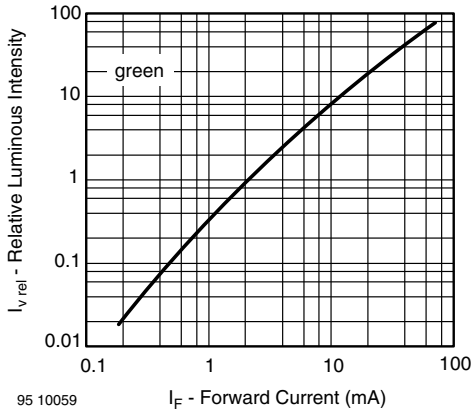



Fig. 6 - Relative Luminous Intensity vs. Forward Current

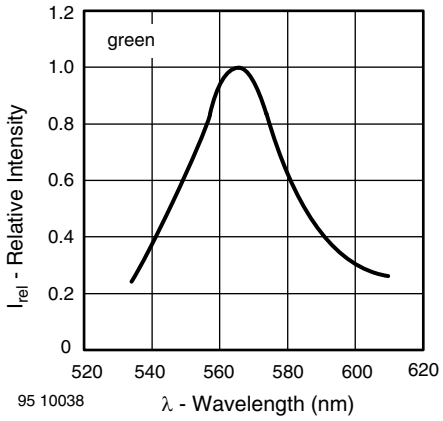
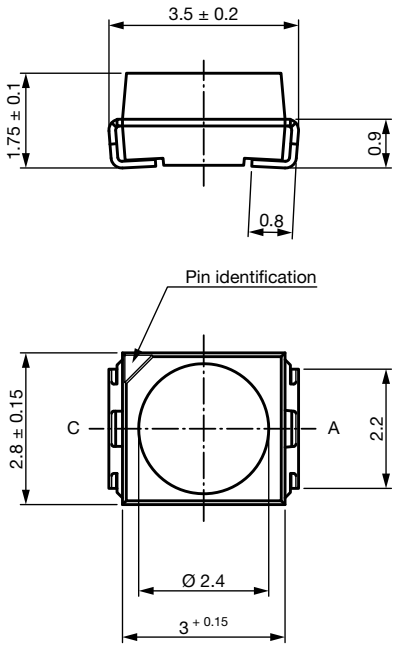
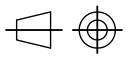



Fig. 7 - Relative Intensity vs. Wavelength

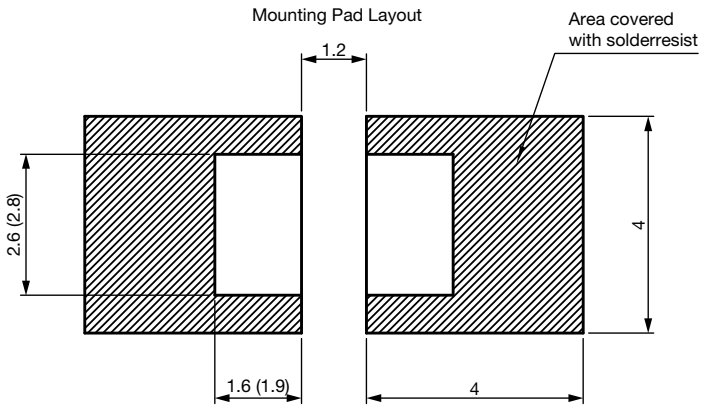
## **PACKAGE DIMENSIONS** in millimeters



technical drawings
according to DIN
specifications

Drawing-No.: 6.541-5067.01-4
Issue: 7; 12.03.14

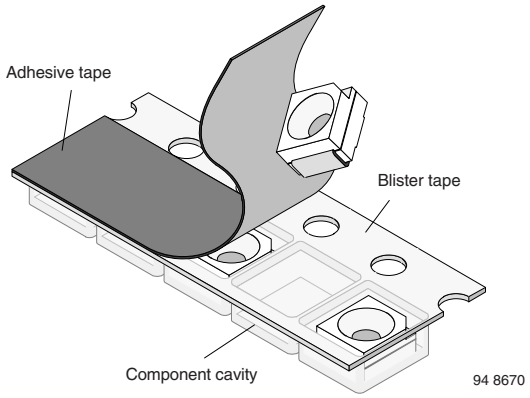



Dimensions: reflow and vapor phase (wave soldering)

## 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.




### TAPING OF VLM.3..

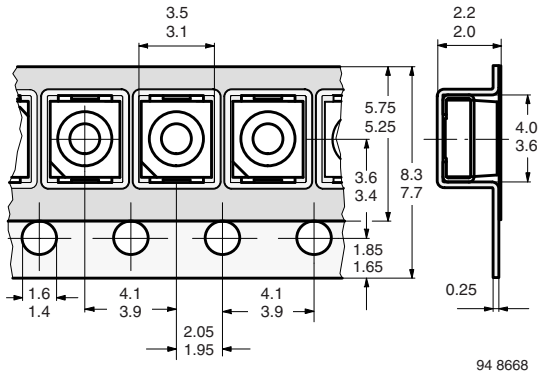



Fig. 8 - Tape Dimensions in mm for PLCC-2

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

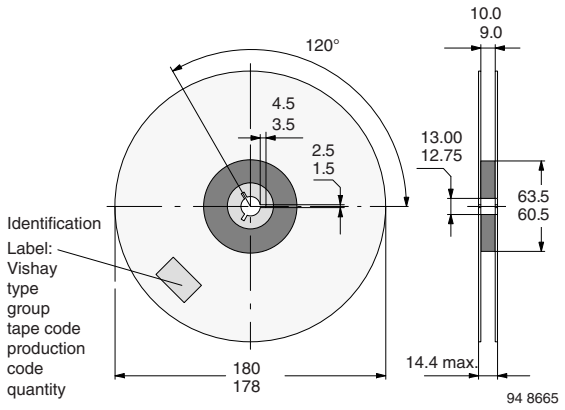



Fig. 9 - Reel Dimensions - GS08

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

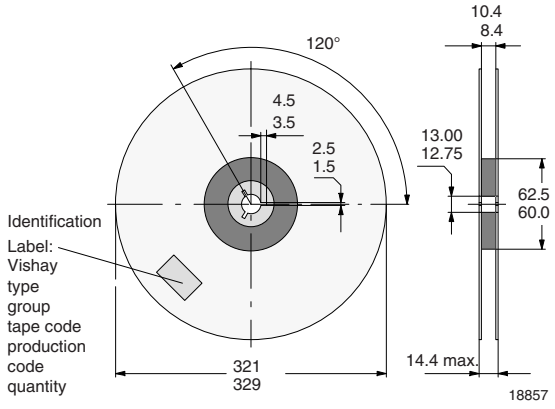



Fig. 10 - Reel Dimensions - GS18

### SOLDERING PROFILE

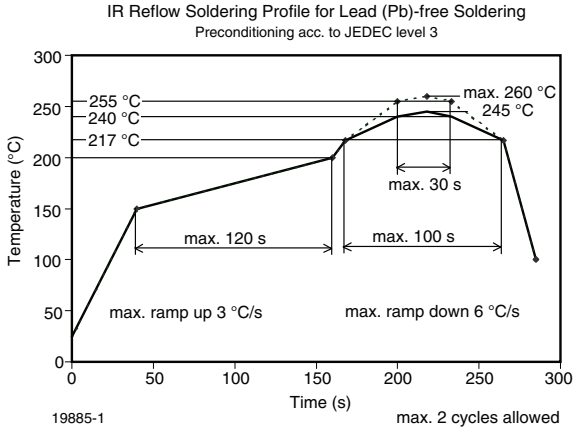



Fig. 11 - Vishay Lead (Pb)-free Reflow Soldering Profile (according to J-STD-020)

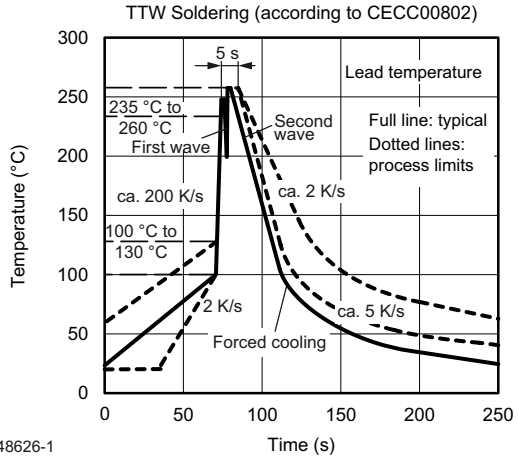
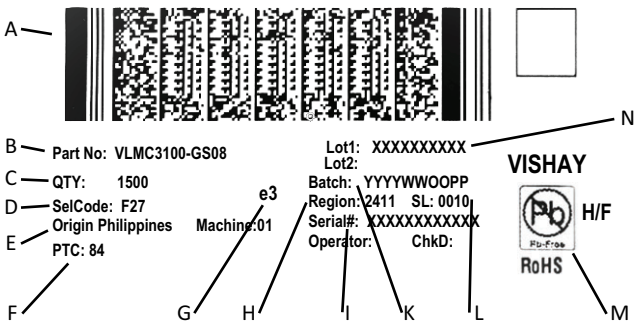



Fig. 12 - Double Wave Soldering of Opto Devices (all packages)

| PACKING | | |
|---|---|---|
| TAPING VARIANT | MOQ | REELS/BOX |
| GS08 | 7500 | 5 |
| GS18 | 8000 | 1 |

## BAR CODE PRODUCT LABEL (example)




A. 2D barcode

B. Part No: Vishay part number

C. QTY: quantity

D. SelCode: selection bin code:
F2 (LOP group), 7 (LD group)

E. Country of origin

F. PTC: production plant code

G. Termination finish

H. Region code

I. Serial#: serial number

K. Batch number: year, week, country code, plant code

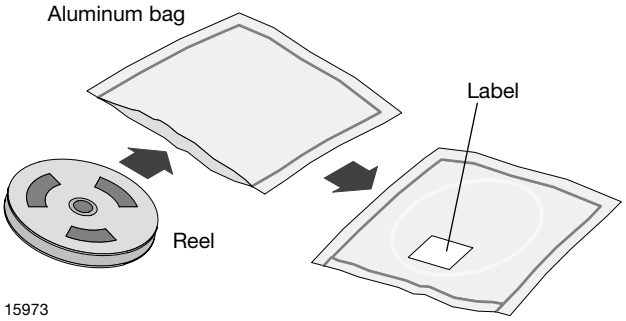
L. SL: sales location

M. Environmental symbols: RoHS, lead (Pb)-free, halogen-free

N. Lot numbers

## 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:

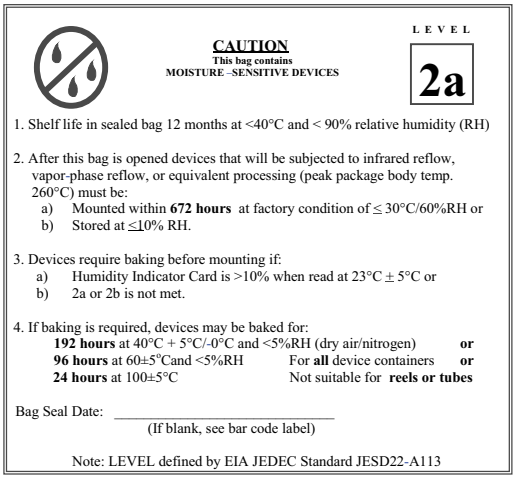
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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.



**CAUTION**
This bag contains
MOISTURE –SENSITIVE DEVICES

LEVEL
**2a**

1. Shelf life in sealed bag 12 months at <40°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°C) must be:
   a) Mounted within **672 hours** at factory condition of ≤ 30°C/60%RH or
   b) Stored at ≤10% RH.

3. Devices require baking before mounting if:
   a) Humidity Indicator Card is >10% when read at 23°C ± 5°C or
   b) 2a or 2b is not met.

4. If baking is required, devices may be baked for:
   **192 hours** at 40°C + 5°C/-0°C and <5%RH (dry air/nitrogen) **or**
   **96 hours** at 60±5°Cand <5%RH For **all** device containers **or**
   **24 hours** at 100±5°C Not suitable for **reels or tubes**

Bag Seal Date: _____
(If blank, see bar code label)

Note: LEVEL defined by EIA JEDEC Standard JESD22-A113

19786

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. Electrostatic 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.

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