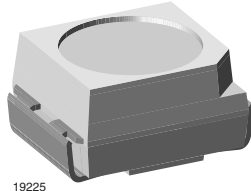


## Standard SMD LED PLCC-2



19225

### DESCRIPTION

This device has been designed to meet the increasing demand for white SMD LED.

The package of the VLMW31.. is the PLCC-2.

It consists of a lead frame which is embedded in a white thermoplast. The reflector inside this package is filled with a mixture of epoxy and TAG phosphor.

The TAG phosphor converts the blue emission partially to yellow, which mixes with the remaining blue to give white.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: SMD PLCC-2
- Product series: standard
- Angle of half intensity:  $\pm 60^\circ$

### FEATURES

- High efficient InGaN technology
- Chromaticity Coordinate categorized according to CIE1931 per packing unit
- Typical color temperature 5500 K
- EIA and ICE standard package
- Compatible with IR-reflow, vapor phase and wave solder processes acc. to CECC 00802 and J-STD-020C
- Available in 8 mm tape reel
- Lead (Pb)-free device
- Preconditioning: according to JEDEC level 2a
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC
- ESD-withstand voltage: up to 1 kV according to JESD22-A114-B
- Automotive qualified AEC-Q101



### APPLICATIONS

- Automotive: backlighting in dashboards and switches
- Telecommunication: indicator and backlighting in telephone and fax
- Backlighting for audio and video equipment
- Backlighting in office equipment
- Indoor and outdoor message boards
- Flat backlight for LCDs, switches and symbols
- Illumination purposes, alternative to incandescent lamps
- General use

### PARTS TABLE

| PART               | COLOR, LUMINOUS INTENSITY               | TECHNOLOGY       |
|--------------------|---|------------------|
| VLMW3100-5K8L-08   | White, $I_V > 56$ mcd                   | InGaN/TAG on SiC |
| VLMW3100-5K8L-18   | White, $I_V > 56$ mcd                   | InGaN/TAG on SiC |
| VLMW3102-5K8L-08   | White, $I_V > 112$ mcd                  | InGaN/TAG on SiC |
| VLMW3102-5K8L-18   | White, $I_V > 112$ mcd                  | InGaN/TAG on SiC |
| VLMW31Q2R2-5K8L-08 | White, $I_V = (90 \text{ to } 180)$ mcd | InGaN/TAG on SiC |
| VLMW31Q2R2-5K8L-18 | White, $I_V = (90 \text{ to } 180)$ mcd | InGaN/TAG on SiC |
| VLMW31P1S1-5K8L-08 | White, $I_V = (45 \text{ to } 224)$ mcd | InGaN/TAG on SiC |
| VLMW31P1S1-5K8L-18 | White, $I_V = (45 \text{ to } 224)$ mcd | InGaN/TAG on SiC |



| ABSOLUTE MAXIMUM RATINGS <sup>1)</sup> VLMW31.. |   |            |               |                  |
|---|---|------------|---------------|------------------|
| PARAMETER                                       | TEST CONDITION  | SYMBOL     | VALUE         | UNIT             |
| Reverse voltage <sup>2)</sup>                   |   | $V_R$      | 5             | V                |
| DC Forward current                              | $T_{amb} \leq 80\text{ }^\circ\text{C}$                 | $I_F$      | 20            | mA               |
| Surge forward current                           | $t_p \leq 10\text{ }\mu\text{s}$                        | $I_{FSM}$  | 0.1           | A                |
| Power dissipation                               |   | $P_V$      | 84            | mW               |
| Junction temperature                            |   | $T_j$      | 110           | $^\circ\text{C}$ |
| Storage temperature range                       |   | $T_{stg}$  | - 40 to + 100 | $^\circ\text{C}$ |
| Operating temperature range                     |   | $T_{amb}$  | - 40 to + 100 | $^\circ\text{C}$ |
| Thermal resistance junction/ambient             | mounted on PC board<br>(pad size > 16 mm <sup>2</sup> ) | $R_{thJA}$ | 350           | K/W              |

Note:

- 1)  $T_{amb} = 25\text{ }^\circ\text{C}$ , unless otherwise specified
- 2) Driving the LED in reverse direction is suitable for short term application

| OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> VLMW31.., WHITE |                               |            |           |     |          |     |      |
|--|-------------------------------|------------|-----------|-----|----------|-----|------|
| PARAMETER  | TEST CONDITION                | PART       | SYMBOL    | MIN | TYP.     | MAX | UNIT |
| Luminous intensity   | $I_F = 10\text{ mA}$          | VLMW3100   | $I_V$     | 56  |          |     | mcd  |
|  |                               | VLMW3102   | $I_V$     | 112 |          |     | mcd  |
|  |                               | VLMW31Q2R2 | $I_V$     | 90  |          | 180 | mcd  |
|  |                               | VLMW31P1S1 | $I_V$     | 45  |          | 224 | mcd  |
| Chromaticity coordinate x acc. to CIE 1931                           | $I_F = 10\text{ mA}$          | VLMW3100   | x         |     | 0.33     |     |      |
| Chromaticity coordinate y acc. to CIE 1931                           | $I_F = 10\text{ mA}$          | VLMW3100   | y         |     | 0.33     |     |      |
| Angle of half intensity  | $I_F = 10\text{ mA}$          |            | $\varphi$ |     | $\pm 60$ |     | deg  |
| Forward voltage  | $I_F = 20\text{ mA}$          |            | $V_F$     |     | 3.5      | 4.2 | V    |
| Reverse voltage  | $I_R = 10\text{ }\mu\text{A}$ |            | $V_R$     | 5   |          |     | V    |
| Temperature coefficient of $V_F$                                     | $I_F = 10\text{ mA}$          |            | $TC_{VF}$ |     | - 4      |     | mV/K |
| Temperature coefficient of $I_V$                                     | $I_F = 10\text{ mA}$          |            | $TC_{IV}$ |     | - 0.5    |     | %/K  |

Note:

- 1)  $T_{amb} = 25\text{ }^\circ\text{C}$ , unless otherwise specified

| LUMINOUS INTENSITY CLASSIFICATION |                          |          |     |     |
|-----------------------------------|--------------------------|----------|-----|-----|
| GROUP                             | LUMINOUS INTENSITY (MCD) |          |     |     |
|                                   | STANDARD                 | OPTIONAL | MIN | MAX |
| P                                 | 1                        | 45       | 56  |     |
|                                   | 2                        | 56       | 71  |     |
| Q                                 | 1                        | 71       | 90  |     |
|                                   | 2                        | 90       | 112 |     |
| R                                 | 1                        | 112      | 140 |     |
|                                   | 2                        | 140      | 180 |     |
| S                                 | 1                        | 180      | 224 |     |

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.

| CROSSING TABLE |            |
|----------------|------------|
| VISHAY         | OSRAM      |
| VLMW31Q2R2     | LWT673Q2R2 |
| VLMW31P1S1     | LWT673P1S1 |

| CHROMATICITY COORDINATED GROUPS FOR WHITE SMD LED |       |       |    |
|---|-------|-------|----|
|   | X     | Y     |    |
| 5L  | 0.291 | 0.268 | 7L |
|   | 0.285 | 0.279 |    |
|   | 0.307 | 0.312 |    |
|   | 0.310 | 0.297 |    |
| 5K  | 0.296 | 0.259 | 7K |
|   | 0.291 | 0.268 |    |
|   | 0.310 | 0.297 |    |
|   | 0.313 | 0.284 |    |
| 6L  | 0.310 | 0.297 | 8L |
|   | 0.307 | 0.312 |    |
|   | 0.330 | 0.347 |    |
|   | 0.330 | 0.330 |    |
| 6K  | 0.313 | 0.284 | 8K |
|   | 0.310 | 0.297 |    |
|   | 0.330 | 0.330 |    |
|   | 0.330 | 0.310 |    |

Note:

Chromaticity coordinate groups are tested at a current pulse duration of 25 ms and a tolerance of  $\pm 0.01$ .

**TYPICAL CHARACTERISTICS**

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

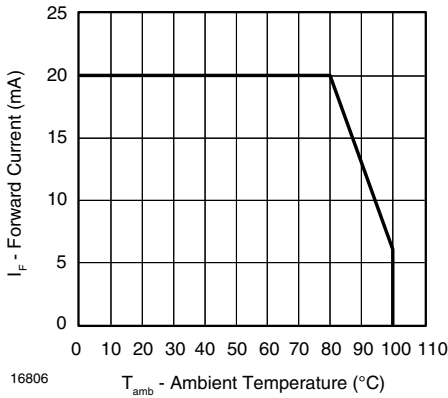


Figure 1. Forward Current vs. Ambient Temperature for AlInGaP

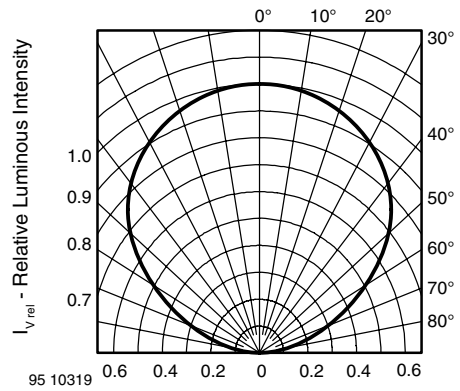


Figure 2. Rel. Luminous Intensity vs. Angular Displacement

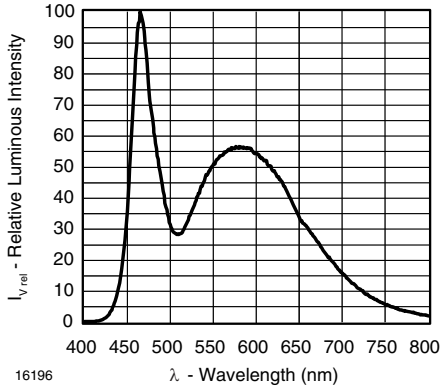


Figure 3. Relative Intensity vs. Wavelength

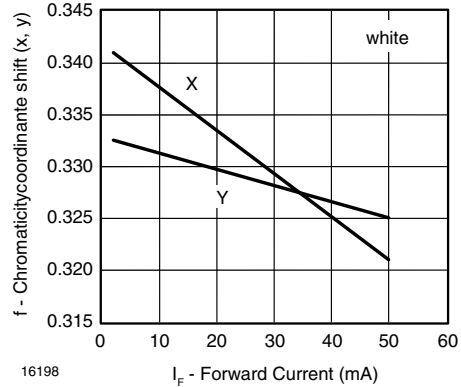


Figure 6. Chromaticity Coordinate Shift vs. Forward Current

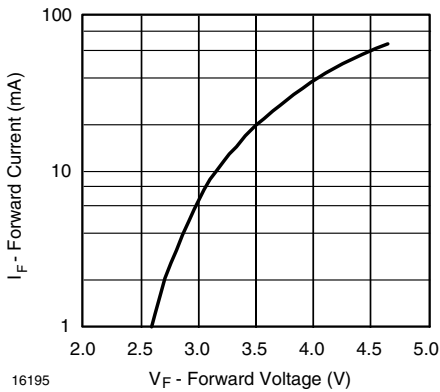


Figure 4. Forward Current vs. Forward Voltage

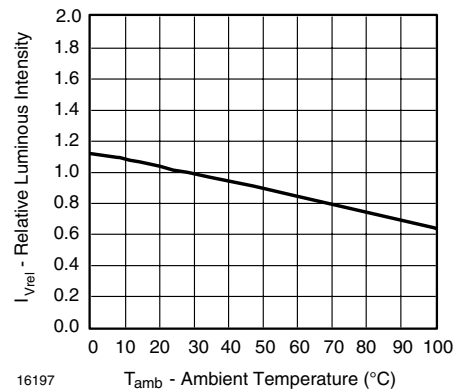


Figure 7. Rel. Luminous Intensity vs. Ambient Temperature

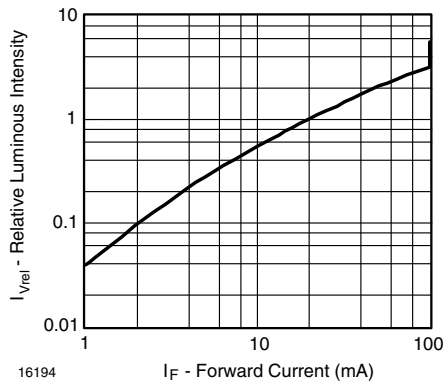


Figure 5. Relative Luminous Intensity vs. Forward Current

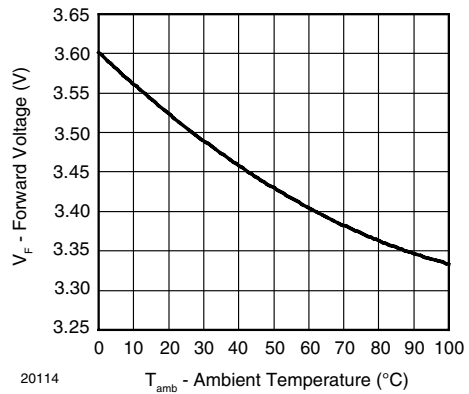


Figure 8. Forward Voltage vs. Ambient Temperature

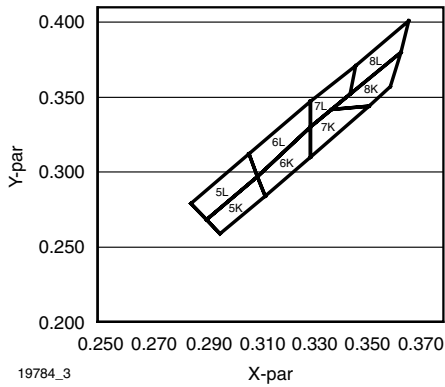
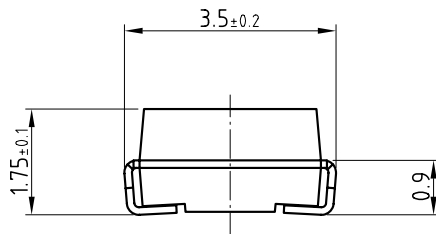
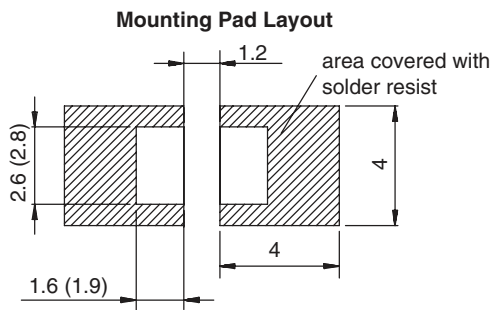
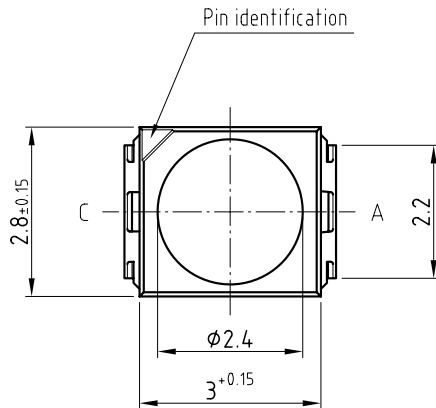


Figure 9. Coordinates of Colorgroups

**PACKAGE DIMENSIONS** in millimeters



technical drawings according to DIN specifications

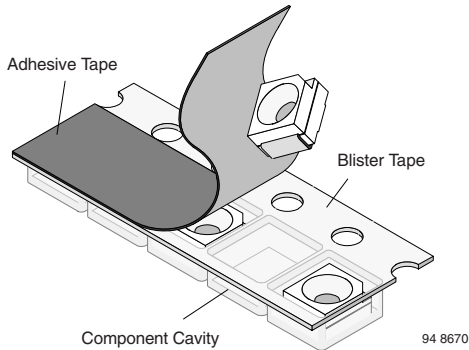


Drawing-No.: 6.541-5067.01-4  
Issue: 4; 30.07.07  
20541

**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...**

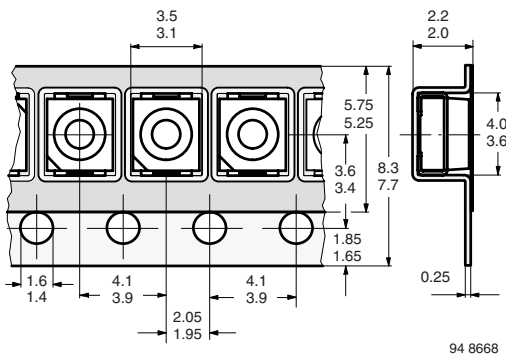


Figure 10. Tape Dimensions in mm for PLCC-2

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

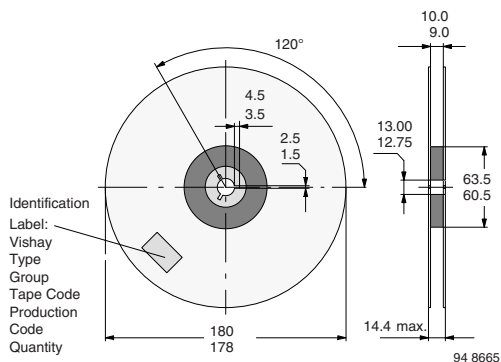


Figure 11. Reel Dimensions - GS08

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

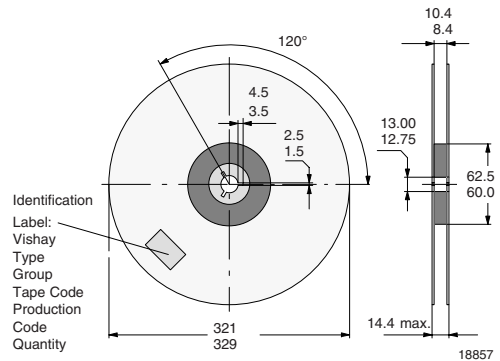


Figure 12. Reel Dimensions - GS18

**SOLDERING PROFILE**

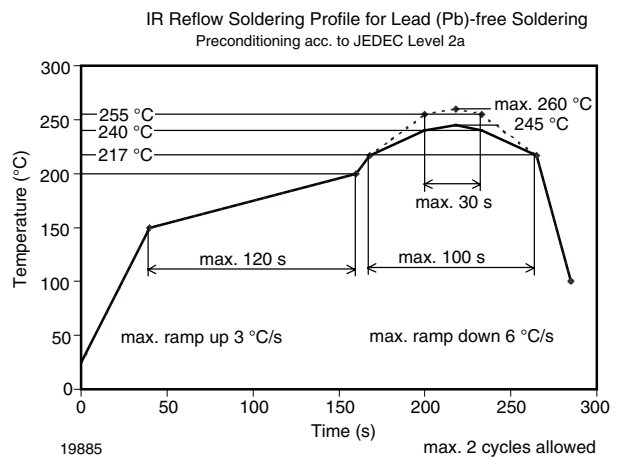


Figure 13. Vishay Lead (Pb)-free Reflow Soldering Profile (acc. to J-STD-020C)

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

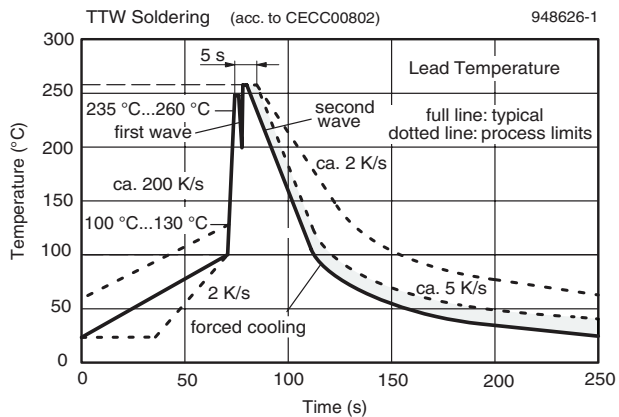
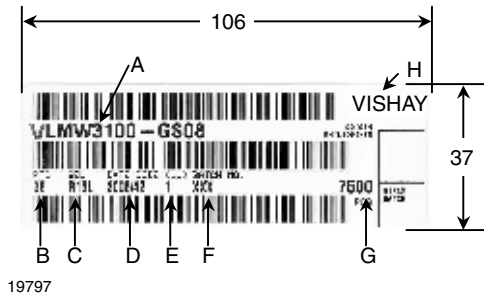


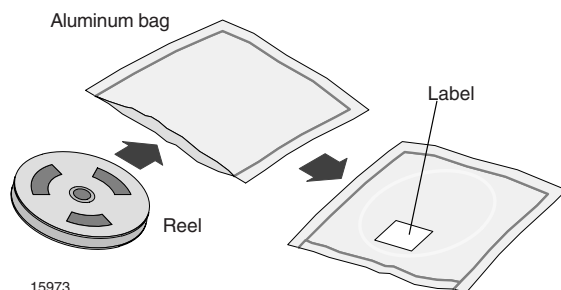
Figure 14. Double Wave Soldering of Opto Devices (all Packages)

**BAR CODE PRODUCT LABEL  
EXAMPLE:**


- 19797
- A) Type of component
  - B) Manufacturing plant
  - C) SEL - selection code (bin):  
e.g.: R1 = code for luminous intensity group  
5L = code for chrom. coordinate group
  - D) Date code year/week
  - E) Day code (e.g. 1: Monday)
  - F) Batch no.
  - G) Total quantity
  - H) Company code

**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.

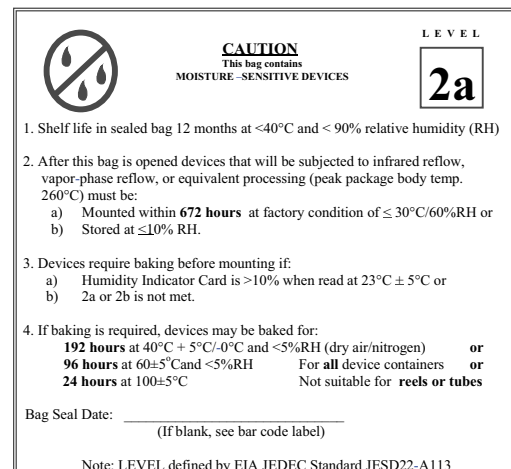
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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.



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.

**OZONE DEPLETING SUBSTANCES POLICY STATEMENT**

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany





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