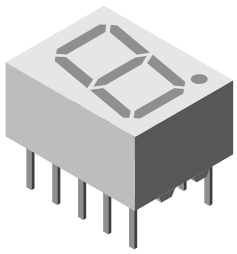
# Standard 7-Segment Display 10 mm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## FEATURES

- Evenly lighted segments
- Grey package surface
- Untinted segments
- Luminous intensity categorized
- Green categorized for color
- Wide viewing angle
- Suitable for DC and high peak current
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e4

RoHS COMPLIANT

## DESCRIPTION

The TDS.31.. series are 10 mm character seven segment LED displays in a very compact package.

The displays are designed for a viewing distance up to 6 m and available in two bright colors. The grey package surface and the evenly lighted untinted segments provide an optimum on-off contrast.

All displays are categorized in luminous intensity groups. That allows users to assemble displays with uniform appearance. Typical applications include instruments, panel meters, point-of-sale terminals and household equipment.

Due to the design of 10 mm displays, a certain amount of cross-talk between segments is unavoidable. This light leakage becomes more noticeable as the brightness of the operated segments increases. However, higher environmental illumination, or a partially transparent cover, may reduce this effect. Therefore, it's important to consider this phenomenon during design-in and to validate suitability for the particular application and all its operation modes.

## APPLICATIONS

- Panel meters
- Test- and measure-equipment
- Point-of-sale terminals
- Control units

## PRODUCT GROUP AND PACKAGE DATA

- Product group: display
- Package: 10 mm
- Product series: standard
- Angle of half intensity: ± 50°

## PARTS TABLE

| PART | COLOR | LUMINOUS INTENSITY (µcd) | | | at $I_F$ (mA) | WAVELENGTH (nm) | | | at $I_F$ (mA) | FORWARD VOLTAGE (V) | | | at $I_F$ (mA) | CIRCUITRY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MIN. | TYP. | MAX. | | MIN. | TYP. | MAX. | | MIN. | TYP. | MAX. | | |
| TDSO3150 | Orange red | 450 | 4500 | - | 10 | 612 | - | 625 | 10 | - | 2 | 3 | 20 | Common anode |
| TDSO3150-KL | Orange red | 1800 | - | 5600 | 10 | 612 | - | 625 | 10 | - | 2 | 3 | 20 | Common anode |
| TDSO3150-L | Orange red | 2800 | - | 5600 | 10 | 612 | - | 625 | 10 | - | 2 | 3 | 20 | Common anode |
| TDSO3155 | Orange red | 1100 | - | 9000 | 10 | 612 | - | 625 | 10 | - | 2 | 3 | 20 | Common anode |
| TDSO3160 | Orange red | 450 | 4500 | - | 10 | 612 | - | 625 | 10 | - | 2 | 3 | 20 | Common cathode |
| TDSO3160-KL | Orange red | 1800 | - | 5600 | 10 | 612 | - | 625 | 10 | - | 2 | 3 | 20 | Common cathode |
| TDSO3160-L | Orange red | 2800 | - | 5600 | 10 | 612 | - | 625 | 10 | - | 2 | 3 | 20 | Common cathode |
| TDSG3150 | Green | 450 | 6800 | - | 10 | 562 | - | 575 | 10 | - | 2.4 | 3 | 20 | Common anode |
| TDSG3150-M | Green | 4500 | - | 9000 | 10 | 562 | - | 575 | 10 | - | 2.4 | 3 | 20 | Common anode |
| TDSG3150-MN | Green | 4500 | - | 14 000 | 10 | 562 | - | 575 | 10 | - | 2.4 | 3 | 20 | Common anode |
| TDSG3160 | Green | 450 | 6800 | - | 10 | 562 | - | 575 | 10 | - | 2.4 | 3 | 20 | Common cathode |
| TDSG3160-M | Green | 4500 | - | 9000 | 10 | 562 | - | 575 | 10 | - | 2.4 | 3 | 20 | Common cathode |

**ABSOLUTE MAXIMUM RATINGS** ($T_{amb}$ = 25 °C, unless otherwise specified)
**TDSO315., TDSO316., TDSG315., TDSG316.**

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| Reverse voltage per segment or DP | | $V_R$ | 6 | V |
| DC forward current per segment or DP | | $I_F$ | 20 | mA |
| DC forward current per segment or DP | $t_p \leq 10$ µs (non repetitive) | $I_{FSM}$ | 0.15 | A |
| Power dissipation | $T_{amb} \leq 45$ °C | $P_V$ | 480 | mW |
| Junction temperature | | $T_j$ | 100 | °C |
| Operating temperature range | | $T_{amb}$ | -40 to +85 | °C |
| Storage temperature range | | $T_{stg}$ | -40 to +85 | °C |
| Soldering temperature | t ≤ 3 s, 2 mm below seating plane | $T_{sd}$ | 260 | °C |
| Thermal resistance LED junction to ambient | | $R_{thJA}$ | 120 | K/W |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)
**TDSO315., ORANGE RED**

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Luminous intensity per segment (digit average) (1) | $I_F$ = 10 mA | TDSO3150 | $I_V$ | 450 | 4500 | - | µcd |
| | | TDSO3150-KL | | 1800 | - | 5600 | |
| | | TDSO3150-L | | 2800 | - | 5600 | |
| | | TDSO3155 | | 1100 | - | 9000 | |
| | | TDSO3160 | | 450 | 4500 | - | |
| | | TDSO3160-KL | | 1800 | - | 5600 | |
| | | TDSO3160-L | | 2800 | - | 5600 | |
| Dominant wavelength | $I_F$ = 10 mA | TDSO3150, TDSO3150-KL, TDSO3150-L, TDSO3155, TDSO3160, TDSO3160-KL, TDSO3160-L | $\lambda_d$ | 612 | - | 625 | nm |
| Peak wavelength | $I_F$ = 10 mA | | $\lambda_p$ | - | 630 | - | nm |
| Angle of half intensity | $I_F$ = 10 mA | | j | - | ± 50 | - | ° |
| Forward voltage per segment or DP | $I_F$ = 20 mA | | $V_F$ | - | 2 | 3 | V |
| Reverse voltage per segment or DP | $I_R$ = 10 µA | | $V_R$ | 6 | 15 | - | V |

**Note**

(1) $I_{Vmin.}$ and $I_V$ groups are mean values of all segments (a to g), matching factor within segments is ≥ 0.5, excluding decimal points and colon

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)
**TDSG315., TDSG316., GREEN**

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Luminous intensity per segment (digit average) (1) | $I_F$ = 10 mA | TDSG3150 | $I_V$ | 450 | 6800 | - | µcd |
| | | TDSG3150-M | | 4500 | - | 9000 | |
| | | TDSG3150-MN | | 4500 | - | 14 000 | |
| | | TDSG3160 | | 450 | 6800 | - | |
| | | TDSG3160-M | | 4500 | - | 9000 | |
| Dominant wavelength | $I_F$ = 10 mA | TDSG3150, TDSG3150-M, TDSG3150-MN, TDSG3160, TDSG3160-M | $\lambda_d$ | 562 | - | 575 | nm |
| Peak wavelength | $I_F$ = 10 mA | | $\lambda_p$ | - | 565 | - | nm |
| Angle of half intensity | $I_F$ = 10 mA | | j | - | ± 50 | - | ° |
| Forward voltage per segment or DP | $I_F$ = 20 mA | | $V_F$ | - | 2.4 | 3 | V |
| Reverse voltage per segment or DP | $I_R$ = 10 µA | | $V_R$ | 6 | 15 | - | V |

**Note**

(1) $I_{Vmin.}$ and $I_V$ groups are mean values of all segments (a to g), matching factor within segments is ≥ 0.5, excluding decimal points and colon

| LUMINOUS INTENSITY CLASSIFICATION | | |
|---|---|---|
| GROUP | LIGHT INTENSITY (µcd) | |
| STANDARD | MIN. | MAX. |
| E | 180 | 360 |
| F | 280 | 560 |
| G | 450 | 900 |
| H | 700 | 1400 |
| I | 1100 | 2200 |
| K | 1800 | 3600 |
| L | 2800 | 5600 |
| M | 4500 | 9000 |
| N | 7000 | 14 000 |

**Note**

- The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped in one tube (there will be no mixing of two groups in one tube).
  In order to ensure availability, single brightness groups will not be orderable

| COLOR CLASSIFICATION | | | | |
|---|---|---|---|---|
| GROUP | ORANGE RED | | GREEN | |
| | MIN. | MAX. | MIN. | MAX. |
| 1 | 612 | 617 | | |
| 2 | 616 | 621 | | |
| 3 | 620 | 625 | 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 and an accuracy of ± 1 nm

**TYPICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)

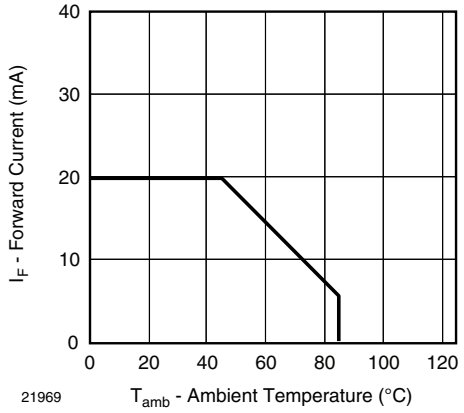



Fig. 1 - Forward Current vs. Ambient Temperature

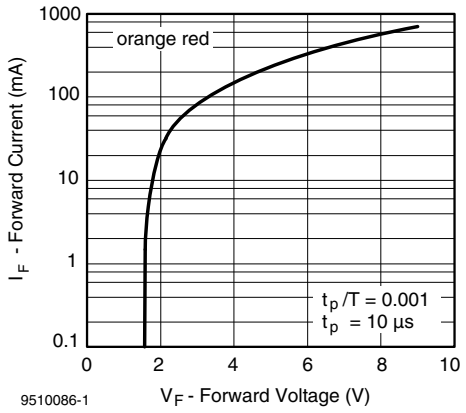



Fig. 4 - Forward Current vs. Forward Voltage

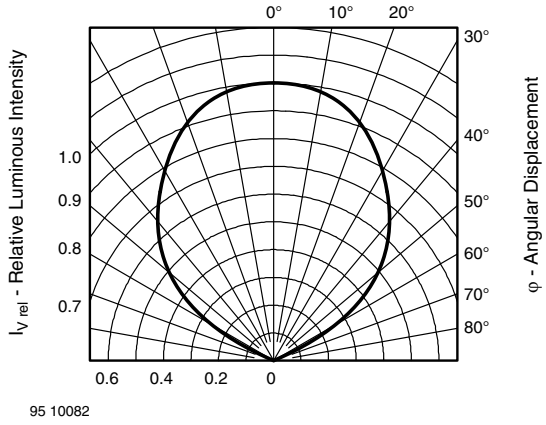



Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

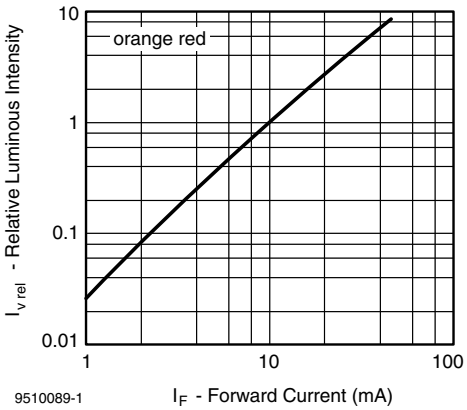



Fig. 5 - Relative Luminous Intensity vs. Forward Current

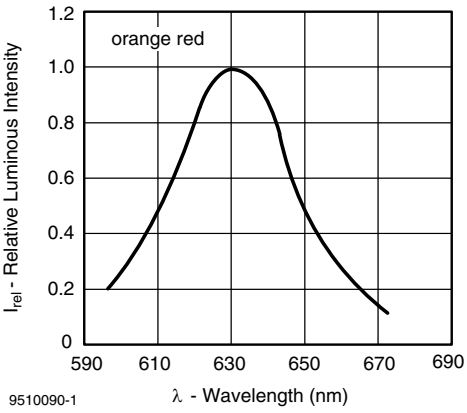



Fig. 3 - Relative Intensity vs. Wavelength

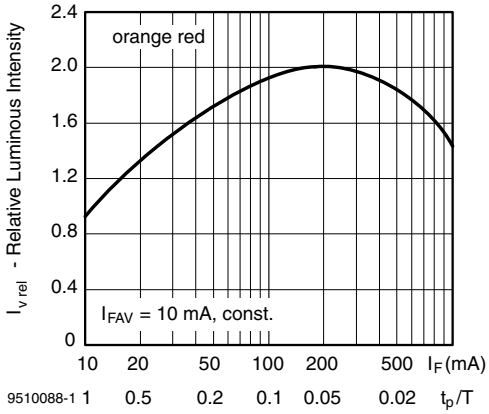



Fig. 6 - Relative Luminous Intensity vs. Forward Current / Duty Cycle

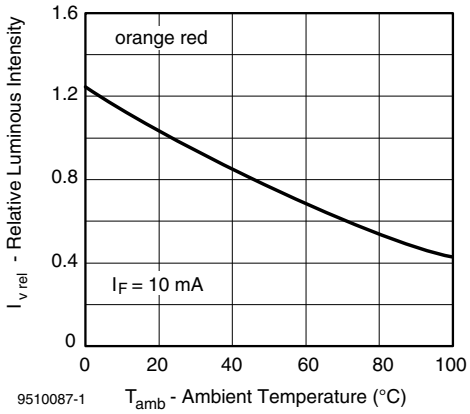



Fig. 7 - Relative Luminous Intensity vs. Ambient Temperature

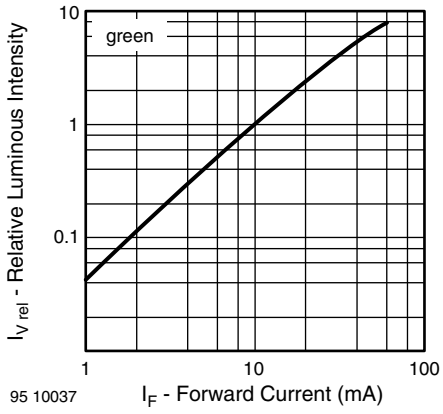



Fig. 10 - Relative Luminous Intensity vs. Forward Current

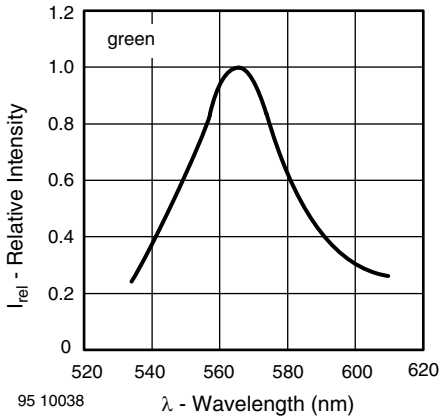



Fig. 8 - Relative Intensity vs. Wavelength

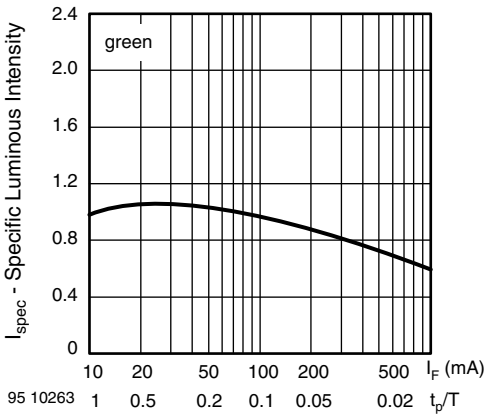



Fig. 11 - Specific Luminous Intensity vs. Forward Current

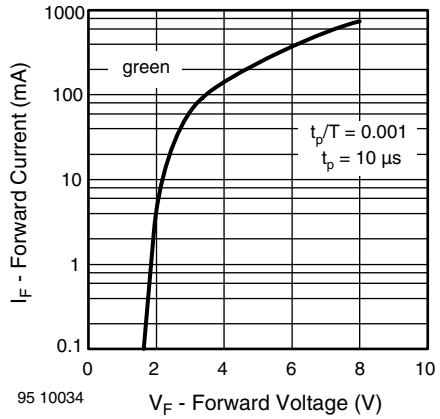



Fig. 9 - Forward Current vs. Forward Voltage

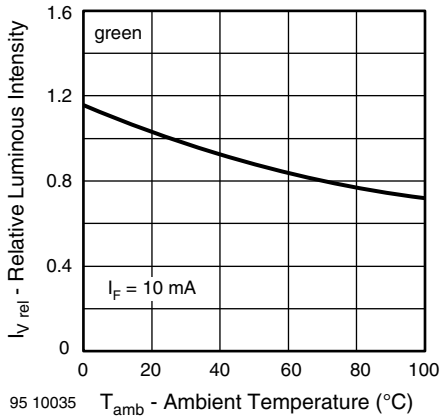



Fig. 12 - Relative Luminous Intensity vs. Ambient Temperature

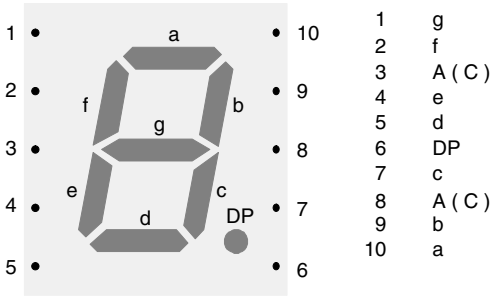
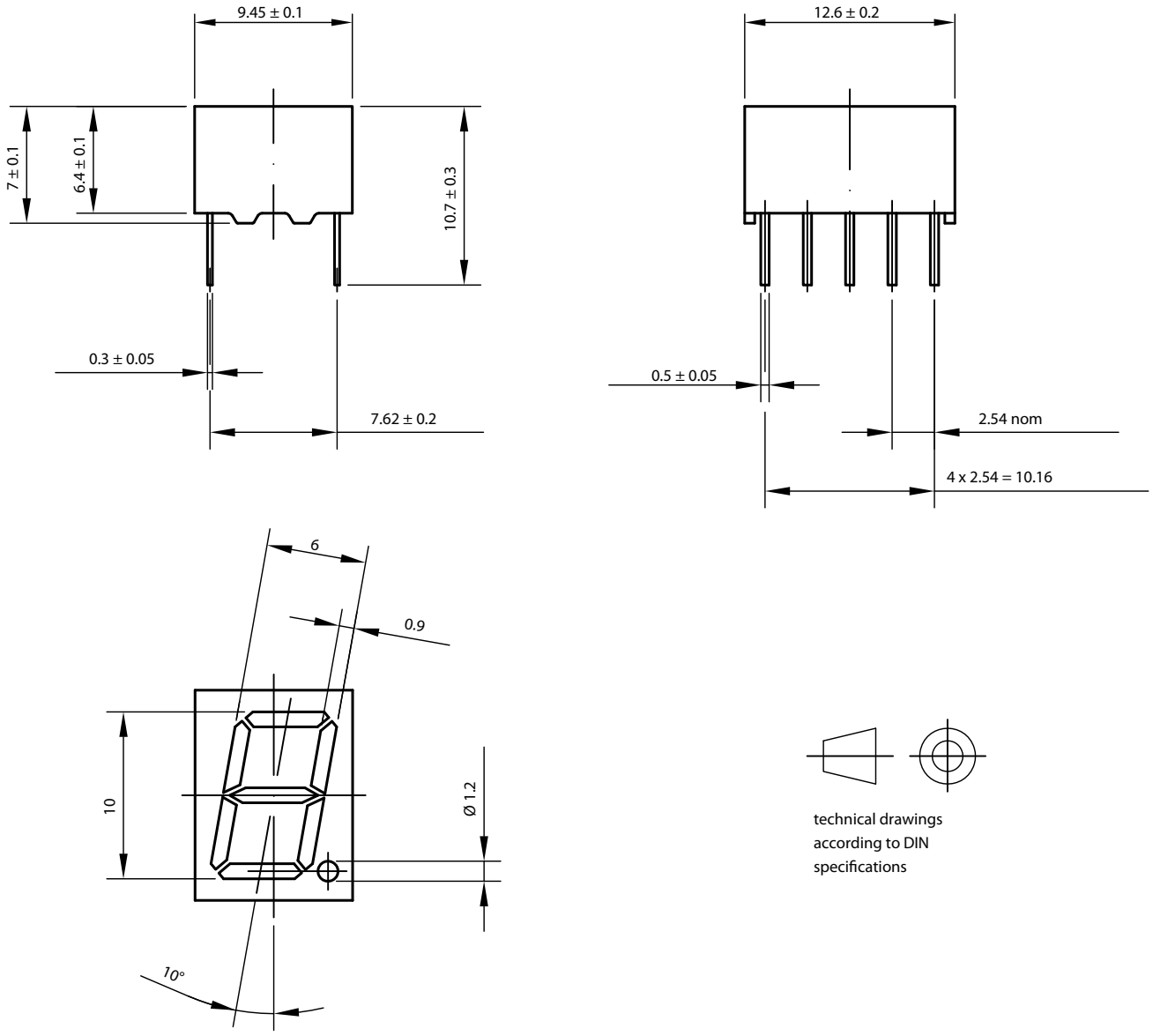


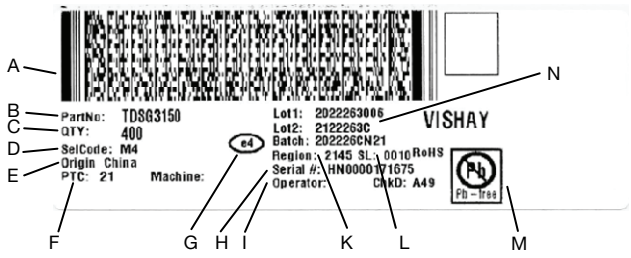

Fig. 13 - TDS.31..

## PACKAGE DIMENSIONS FOR TDS.31.. in millimeters



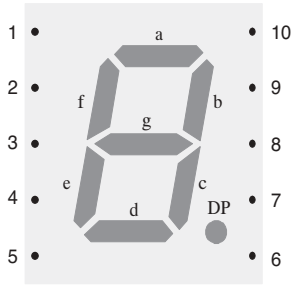

Drawing-No.: 6.544-5093.01-4
Issue: 2; 23.03.2012

**LABEL OF FAN FOLD BOX** (example)




A. 2D barcode
B. Part No: Vishay part number
C. QTY: quantity
D. SelCode: selection bin code
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: storage location
M. Environmental symbols: RoHS, lead (Pb)-free, halogen-free
N. Lot numbers

# Pin Connections 10 mm




| | |
|---|---|
| 1 | g |
| 2 | f |
| 3 | A ( C ) |
| 4 | e |
| 5 | d |
| 6 | DP |
| 7 | c |
| 8 | A ( C ) |
| 9 | b |
| 10 | a |

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2. Regularly and continuously improve the performance of our products, processes, distribution and operatingsystems 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.




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