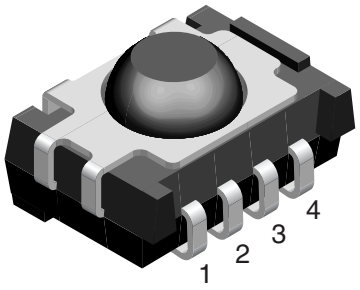
# Silicon PIN Photodiode




16797

## FEATURES

- Package type: surface-mount
- Package form: top view and side view
- Dimensions (L x W x H in mm): 7.5 x 5.3 x 4.0
- Radiant sensitive area (in $mm^2$): 2.2
- High radiant sensitivity
- Daylight blocking filter matched with 870 nm to 950 nm emitters
- Fast response times
- Angle of half sensitivity: $\varphi = \pm 45°$
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

## LINKS TO ADDITIONAL RESOURCES

3D Models

## DESCRIPTION

VEMD8130 is a high speed and high sensitive PIN photodiode. It is a miniature surface-mount device (SMD) including the chip with a 2.2 $mm^2$ sensitive area and a daylight blocking filter matched with IR emitters operating at wavelength between 870 nm and 950 nm.

## MECHANICAL DATA

1 = connection for shielding, 2 = cathode, 3 = anode, 4 = n.c.

## ORDERING CODE

**Taping:**
VEMD81...TT - top view taped
VEMD81...TR - side view taped

| PRODUCT SUMMARY | | | |
|---|---|---|---|
| **COMPONENT** | **$I_{ra}$ (µA)** | **$\varphi$ (°)** | **$\lambda_{0.5}$ (nm)** |
| VEMD8130 | 25 | ± 45 | 800 to 1050 |

**Note**
- Test conditions see table “Basic Characteristics”

| ORDERING INFORMATION | | | |
|---|---|---|---|
| **ORDERING CODE** | **PACKAGING** | **REMARKS** | **PACKAGE FORM** |
| VEMD8130 | Tape and reel | MOQ: 1190 pcs, 1190 pcs/reel | Top view |
| | | MOQ: 1120 pcs, 1120 pcs/reel | Side view |

**Note**
- MOQ: minimum order quantity

| ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| Reverse voltage | | $V_R$ | 60 | V |
| Power dissipation | $T_{amb} \leq 25$ °C | $P_V$ | 215 | mW |
| Junction temperature | | $T_j$ | 100 | °C |
| Operating temperature range | | $T_{amb}$ | -25 to +85 | °C |
| Storage temperature range | | $T_{stg}$ | -25 to +85 | °C |
| Soldering temperature | According to reflow solder profile Fig. 7 | $T_{sd}$ | 260 | °C |

| **BASIC CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Forward voltage | $I_F$ = 50 mA | $V_F$ | - | 1 | 1.3 | V |
| Breakdown voltage | $I_R$ = 100 µA, E = 0 | $V_{(BR)}$ | 60 | - | - | V |
| Reverse dark current | $V_R$ = 10 V, E = 0 | $I_{ro}$ | - | 2 | 30 | nA |
| Diode capacitance | $V_R$ = 0 V, f = 1 MHz, E = 0 | $C_D$ | - | 18 | - | pF |
| | $V_R$ = 3 V, f = 1 MHz, E = 0 | $C_D$ | - | 7 | 40 | pF |
| Reverse light current | $E_e$ = 1 mW/cm², λ = 950 nm, $V_R$ = 5 V | $I_{ra}$ | 20 | 25 | - | µA |
| Angle of half sensitivity | | φ | - | ± 45 | - | ° |
| Wavelength of peak sensitivity | | $\lambda_p$ | - | 940 | - | nm |
| Range of spectral bandwidth | | $\lambda_{0.5}$ | - | 800 to 1050 | - | nm |
| Rise time | $V_R$ = 5 V, $R_L$ = 1 kΩ, λ = 870 nm | $t_r$ | - | 625 | - | ns |
| Fall time | $V_R$ = 5 V, $R_L$ = 1 kΩ, λ = 870 nm | $t_f$ | - | 670 | - | ns |

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

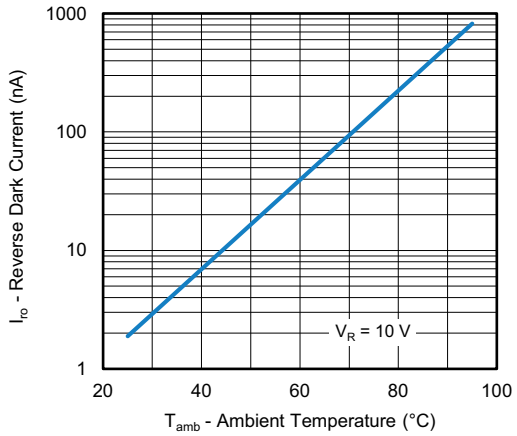



Fig. 1 - Reverse Dark Current vs. Ambient Temperature

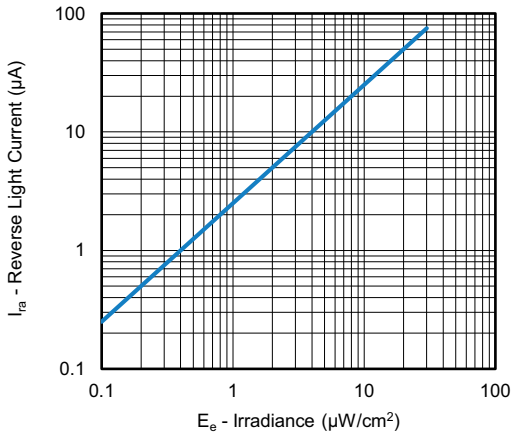



Fig. 3 - Reverse Light Current vs. Irradiance

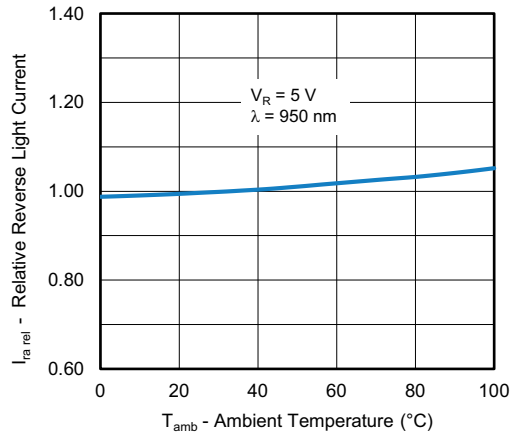



Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

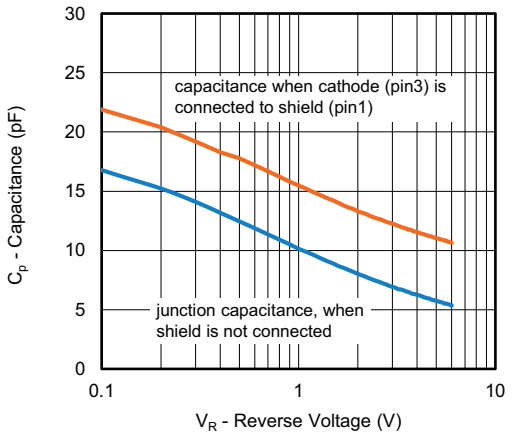



Fig. 4 - Diode Capacitance vs. Reverse Voltage

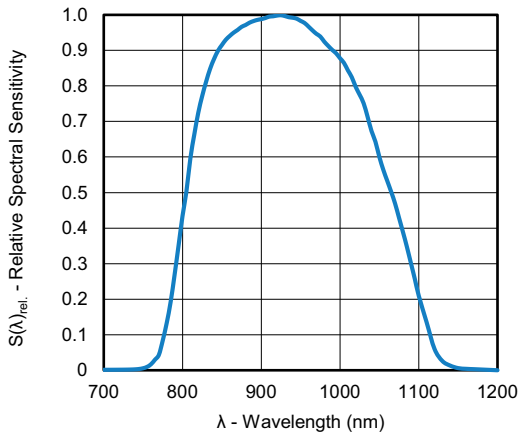



Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

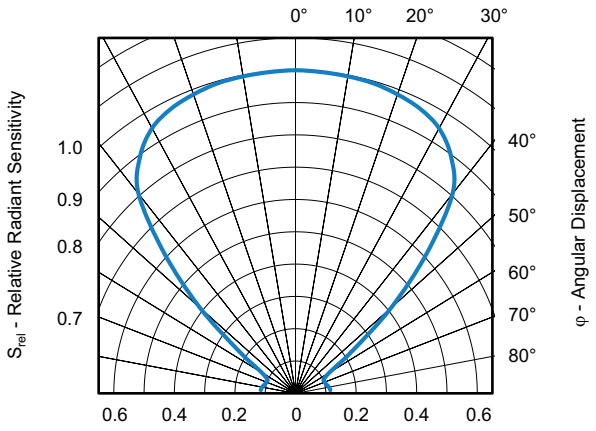
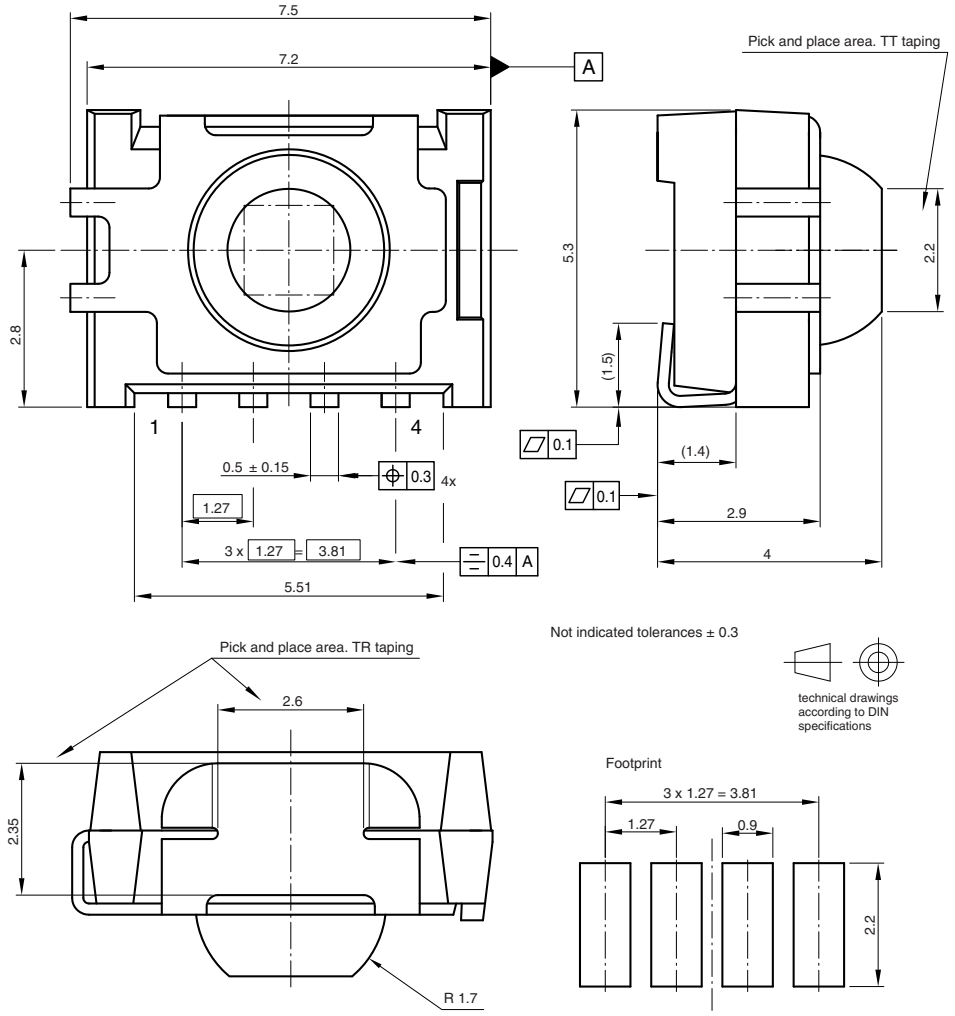



Fig. 6 - Relative Radiant Sensitivity vs. Angular Displacement

## **PACKAGE DIMENSIONS** in millimeters




Drawing-No.: 6.544-5341.01-4
Issue: 8; 02.09.09
16776

## ASSEMBLY INSTRUCTIONS

### Reflow Soldering

- Reflow soldering must be done within 72 h while stored under a max. temperature of 30 °C, 60 % RH after opening the dry pack envelope
- Set the furnace temperatures for pre-heating and heating in accordance with the reflow temperature profile as shown in the diagram. Excercise extreme care to keep the maximum temperature below 260 °C. The temperature shown in the profile means the temperature at the device surface. Since there is a temperature difference between the component and the circuit board, it should be verified that the temperature of the device is accurately being measured
- Handling after reflow should be done only after the work surface has been cooled off

### Manual Soldering

- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off

## VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE

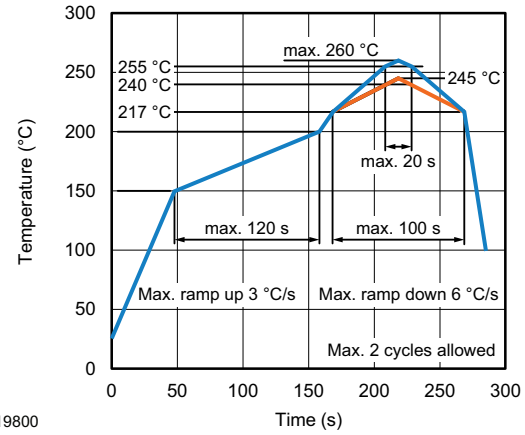
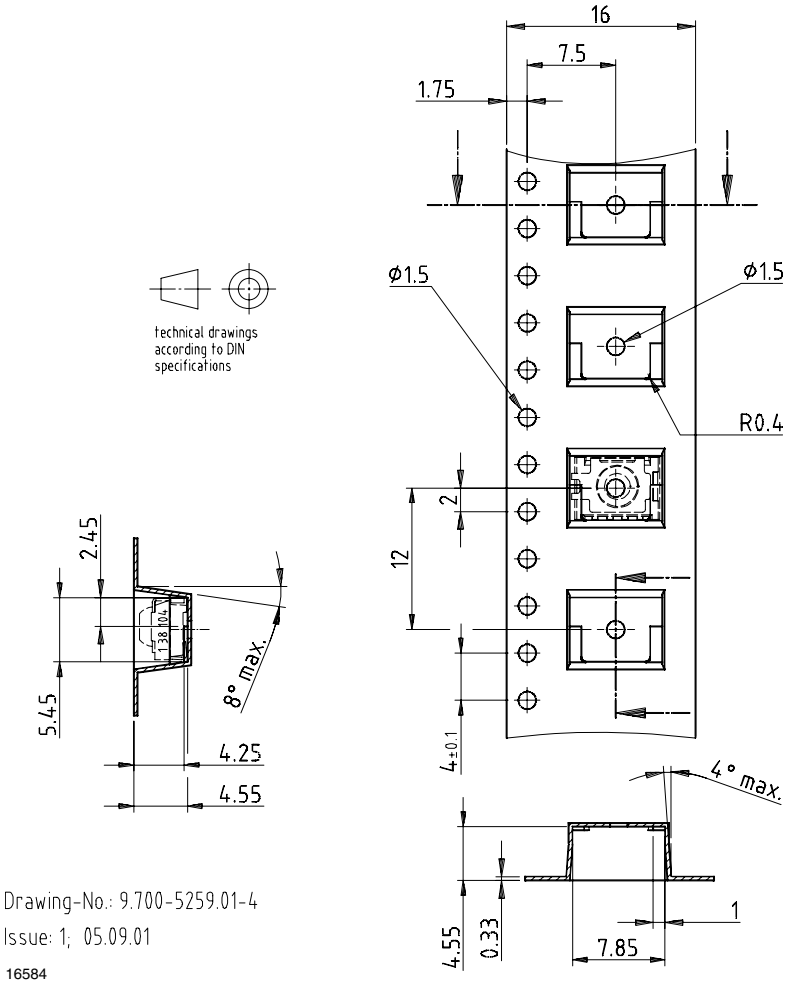
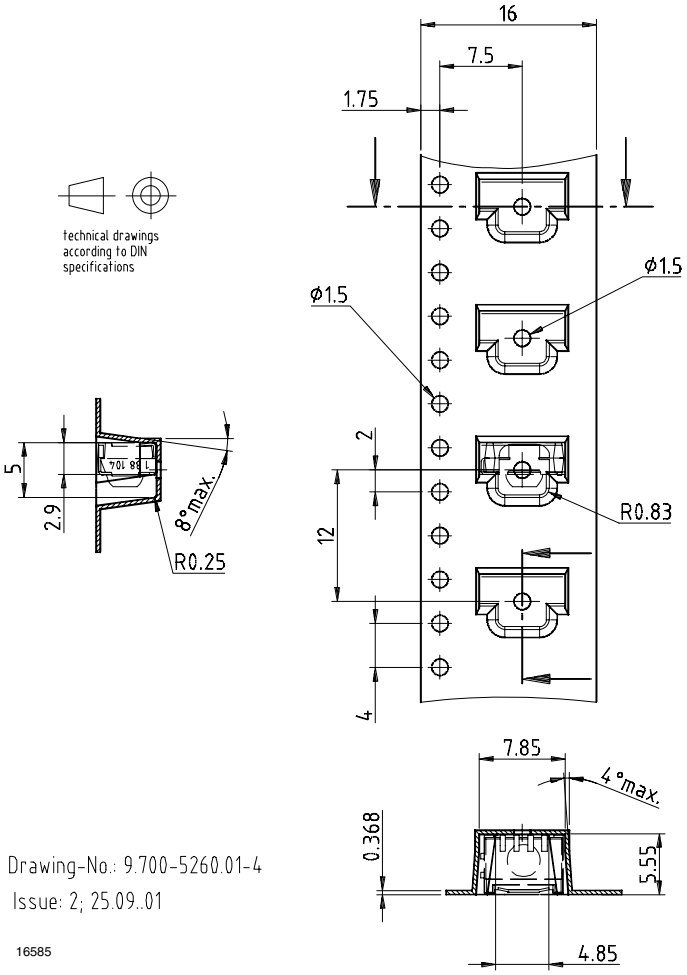



Fig. 7

## TAPING DIMENSIONS VEMD8130TT in millimeters



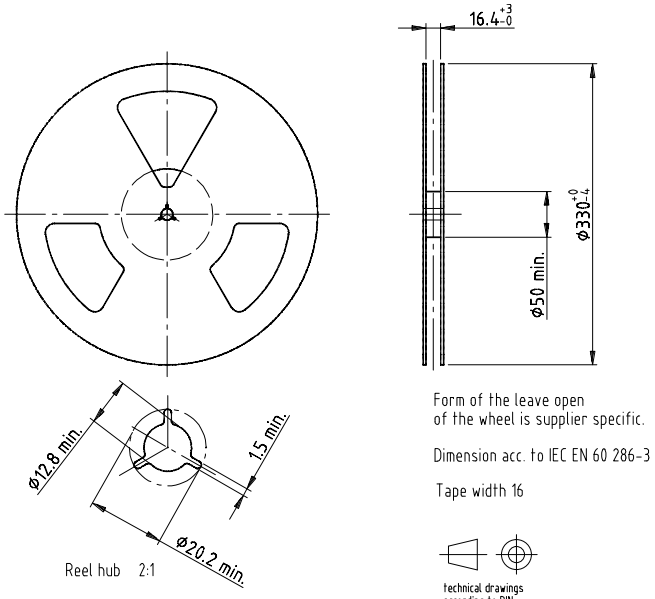
## TAPING DIMENSIONS VEMD8130TR in millimeters




Drawing-No.: 9.700-5260.01-4
Issue: 2; 25.09..01

16585

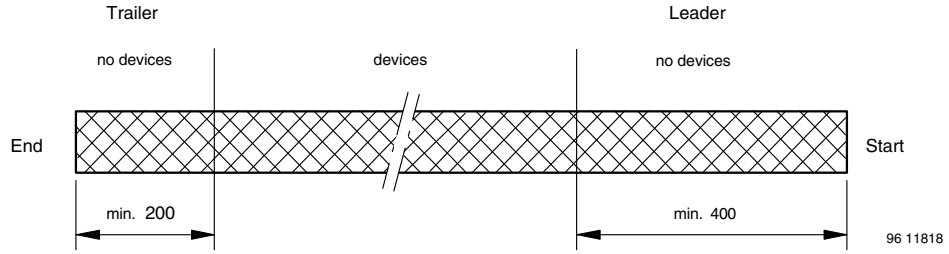
## REEL DIMENSIONS in millimeters




Drawing-No.: 9.800-5052.V2-4
Issue: 1; 07.05.02

16734

## LEADER AND TRAILER DIMENSIONS in millimeters




## COVER TAPE PEEL STRENGTH

According to DIN EN 60286-3

0.1 N to 1.3 N

300 mm/min. ± 10 mm/min.

165° to 180° peel angle

## LABEL

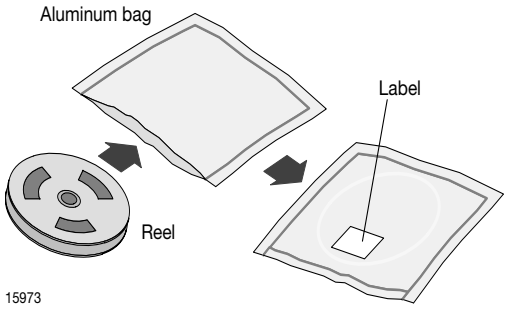
**Standard bar code labels for finished goods**

The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain Vishay Semiconductor GmbH specific data.

| **VISHAY SEMICONDUCTOR GMBH STANDARD BAR CODE PRODUCT LABEL** (finished goods) | | |
|---|---|---|
| **PLAIN WRITING** | **ABBREVIATION** | **LENGTH** |
| Item-description | - | 18 |
| Item-number | INO | 8 |
| Selection-code | SEL | 3 |
| LOT-/serial-number | BATCH | 10 |
| Data-code | COD | 3 (YWW) |
| Plant-code | PTC | 2 |
| Quantity | QTY | 8 |
| Accepted by | ACC | - |
| Packed by | PCK | - |
| Mixed code indicator | MIXED CODE | - |
| Origin | xxxxxxx+ | Company logo |
| **LONG BAR CODE TOP** | **TYPE** | **LENGTH** |
| Item-number | N | 8 |
| Plant-code | N | 2 |
| Sequence-number | X | 3 |
| Quantity | N | 8 |
| Total length | - | 21 |
| **SHORT BAR CODE BOTTOM** | **TYPE** | **LENGTH** |
| Selection-code | X | 3 |
| Data-code | N | 3 |
| Batch-number | X | 10 |
| Filter | - | 1 |
| Total length | - | 17 |

## 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:

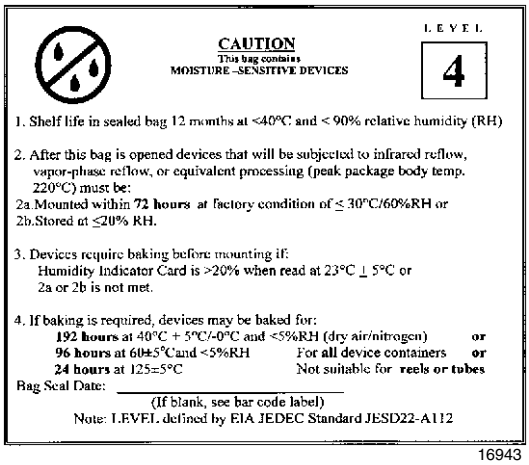
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

After more than 72 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 125 °C + 5 °C not suitable for reel or tubes.

An EIA JEDEC® standard JESD22-A112 level 4 label is included on all dry bags.


CAUTION
This bag contains
MOISTURE-SENSITIVE DEVICES

LEVEL
4

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. 220°C) must be:
2a. Mounted within **72 hours** at factory condition of ≤ 30°C/60%RH or
2b. Stored at <20% RH.

3. Devices require baking before mounting if:
Humidity Indicator Card is >20% when read at 23°C ± 5°C or
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°C and <5%RH For **all** device containers **or**
**24 hours** at 125±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-A112

16943

Example of JESD22-A112 level 4 label

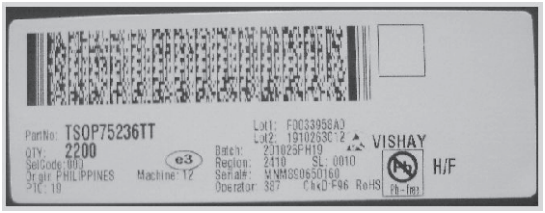
## ESD PRECAUTION

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 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.

## BAR CODE PRODUCT LABEL (example)




22178

# Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.