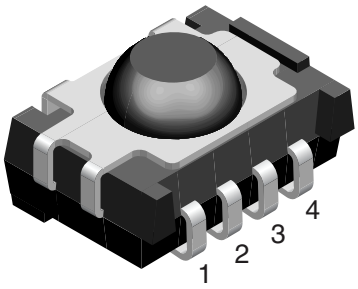
# IR Sensor Module for Remote Control Systems



16797

## LINKS TO ADDITIONAL RESOURCES

Product Page | 3D Models | Calculators | Marking

## DESCRIPTION

The TSMP6000 is a miniaturized sensor for receiving various kinds of modulated IR signals. A PIN diode and preamplifier are assembled on a lead frame, the epoxy package is designed as an IR filter. The modulated output signal, carrier out, can be used for code learning applications.

This component has not been qualified according to automotive specifications.

## FEATURES

- Photo detector and preamplifier in one package
- AC coupled response from 20 kHz to 60 kHz, all data formats
- Improved shielding against electrical field disturbance
- TTL and CMOS compatibility
- Output active low
- Supply voltage 2.5 V to 5.5 V, typically the device works in the range between 2.0 V and 5.5 V
- Carrier out signal for code learning functions
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
e3
RoHS COMPLIANT
HALOGEN FREE
GREEN (5-2008)

## MECHANICAL DATA

**Pinning:**

1 = GND, 2 = N.C., 3 = $V_S$, 4 = OUT

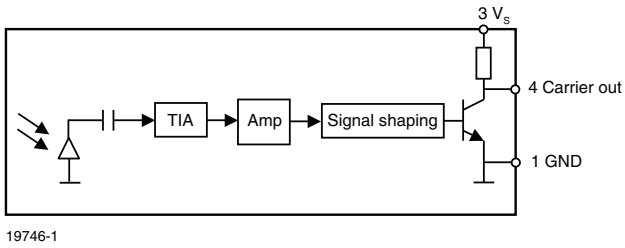
## ORDERING CODE

**Taping:**

TSMP6000TT - top view taped, 1190 pcs/reel

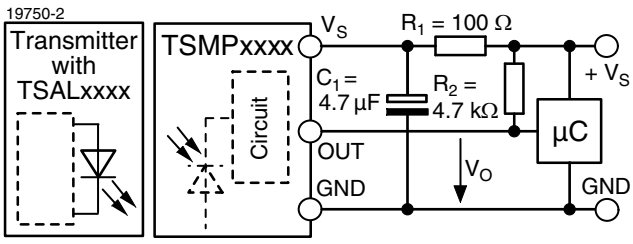
TSMP6000TR - side view taped, 1120 pcs/reel

## BLOCK DIAGRAM



19746-1

## APPLICATION CIRCUIT




$R_1$ + $C_1$ recommended to suppress power supply disturbances.
$R_2$ recommended to get faster slopes and a correct high level of the output pulses.



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| PARTS TABLE | | |
|---|---|---|
| **Carrier frequency** | 20 kHz to 60 kHz | TSMP6000 |
| **Package** | | Panhead |
| **Pinning** | | 1 = GND, 2 = N.C., 3 = $V_S$, 4 = OUT |
| **Dimensions (mm)** | | 7.5 W x 5.3 H x 4.0 D |
| **Mounting** | | SMD |
| **Application** | | Code learning |
| **Special options** | | • Narrow optical filter: www.vishay.com/doc?81590<br>• Wide optical filter: www.vishay.com/doc?82726 |

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

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| Supply voltage (pin 3) | | $V_S$ | -0.3 to +6 | V |
| Output voltage (pin 4) | | $V_O$ | -0.3 to ($V_S$ + 0.3) | V |
| Output current (pin 4) | | $I_O$ | 5 | mA |
| Junction temperature | | $T_j$ | 100 | °C |
| Storage temperature range | | $T_{stg}$ | -25 to +85 | °C |
| Operating temperature range | | $T_{amb}$ | -25 to +85 | °C |

**Note**

- Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect the device reliability

**ELECTRICAL AND OPTICAL CHARACTERISTICS CARRIER OUT**
($T_{amb}$ = 25 °C, unless otherwise specified, $V_S$ = 3 V)

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Supply current (pin 3) | $E_v$ = 0 | $I_{SD}$ | 0.55 | 0.7 | 0.9 | mA |
| Supply voltage | | $V_S$ | 2.5 | - | 5.5 | V |
| Transmission distance | $E_v$ = 0, test signal see Fig. 1, IR diode TSAL6200, $I_F$ = 50 mA | d | - | 1.8 | - | m |
| Output voltage low (pin 4) | $I_{OSL}$ = 0.5 mA, test signal see Fig. 1 | $V_{OSL}$ | - | - | 250 | mV |
| Minimum irradiance | $V_S$ = 3 V, (20 kHz to 60 kHz) | $E_{e\ min.}$ | - | 12 | 25 | mW/m² |
| Maximum irradiance | Test signal see Fig. 1, (20 kHz to 60 kHz) | $E_{e\ max.}$ | 50 | 80 | - | W/m² |
| Directivity | Angle of half transmission distance | $\varphi_{1/2}$ | - | ± 50 | - | deg |
| Output accuracy | $f_C$ = 20 kHz to 60 kHz, $E_e$ = 25 mW/m² to 50 W/m², test signal see Fig. 1, BER ≤ 2% | N carrier pulses | Input burst length -1 cycle | Input burst length | Input burst length +1 cycle | counts |

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

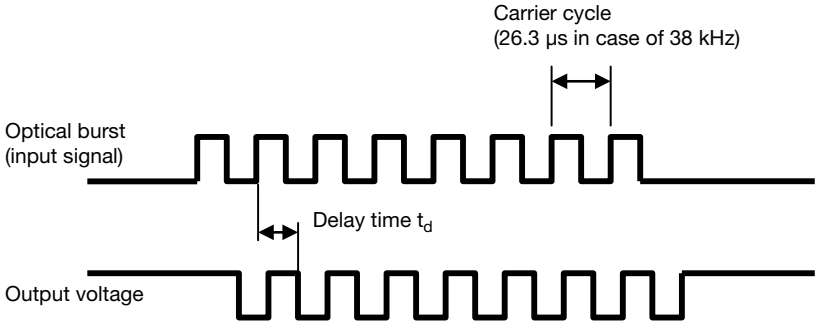



Fig. 1 - Testsignal



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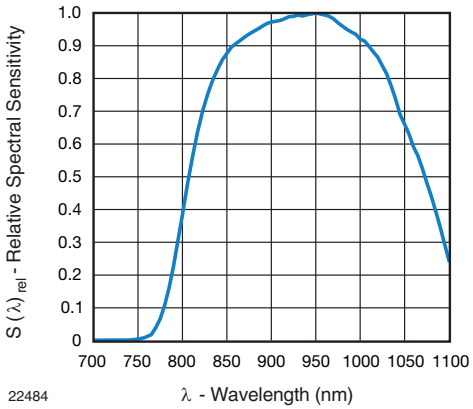



Fig. 2 - Relative Spectral Sensitivity vs. Wavelength

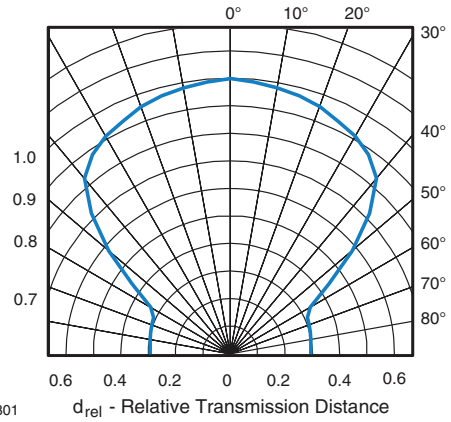
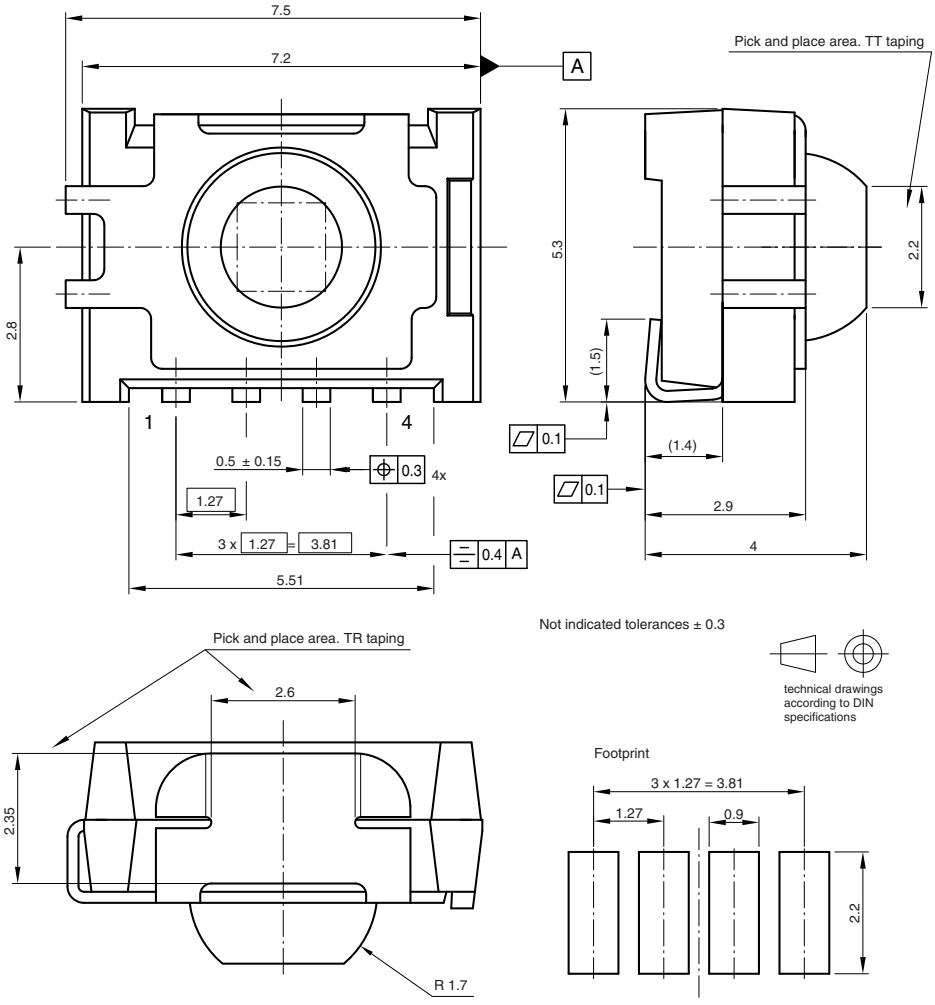



Fig. 3 - Horizontal Directivity

## **PACKAGE DIMENSIONS** in millimeters




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



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## ASSEMBLY INSTRUCTIONS

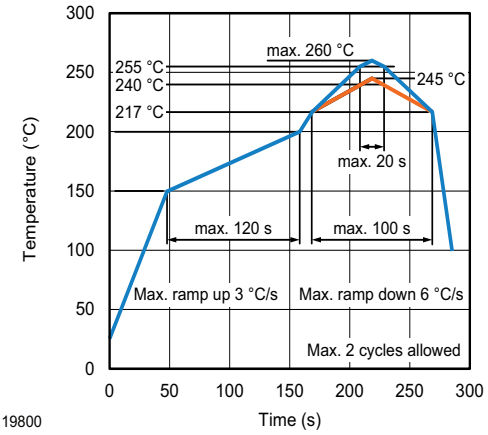
### Reflow Soldering

- 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. Exercise 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

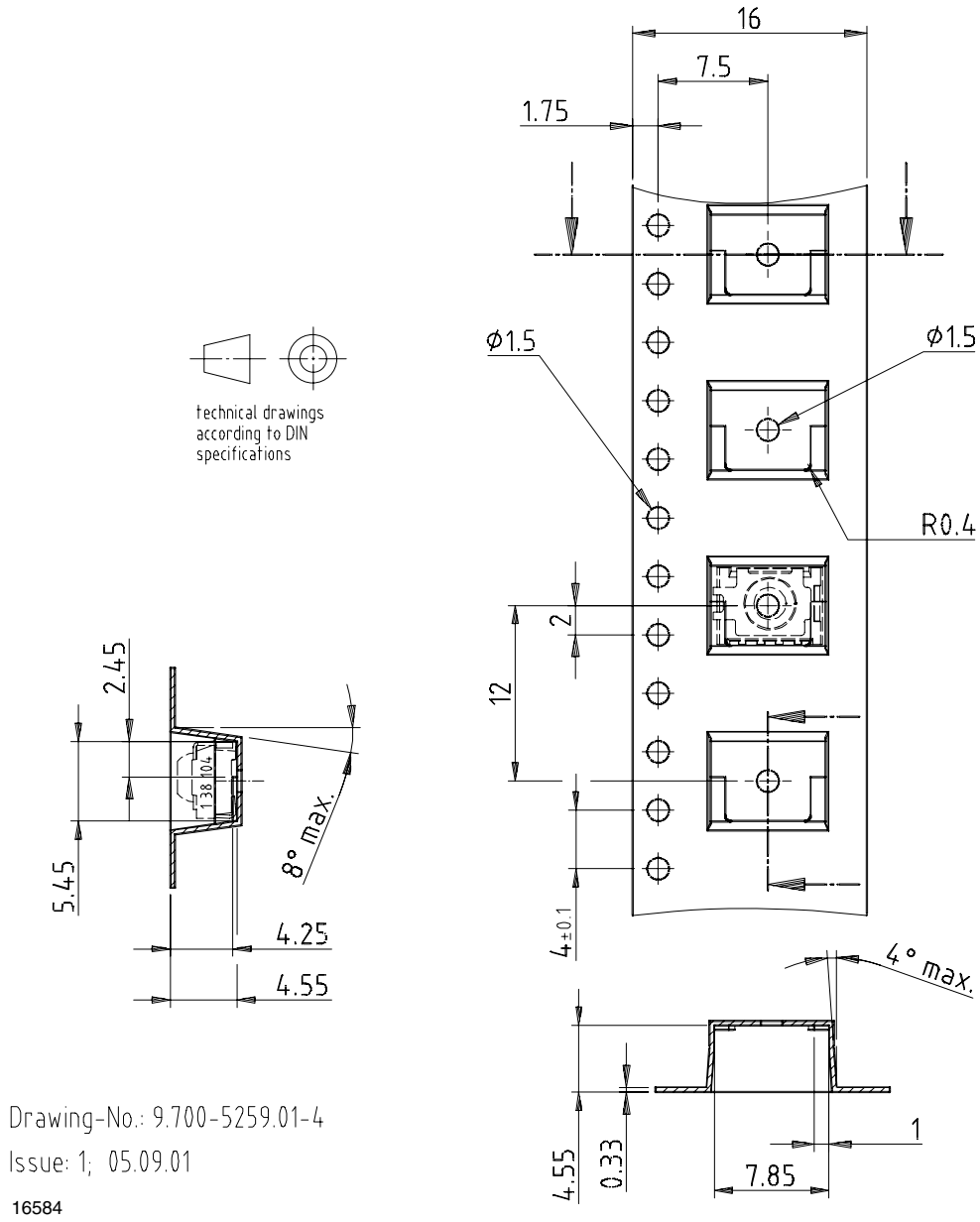



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**TAPING VERSION TSMP..TT DIMENSIONS** in millimeters

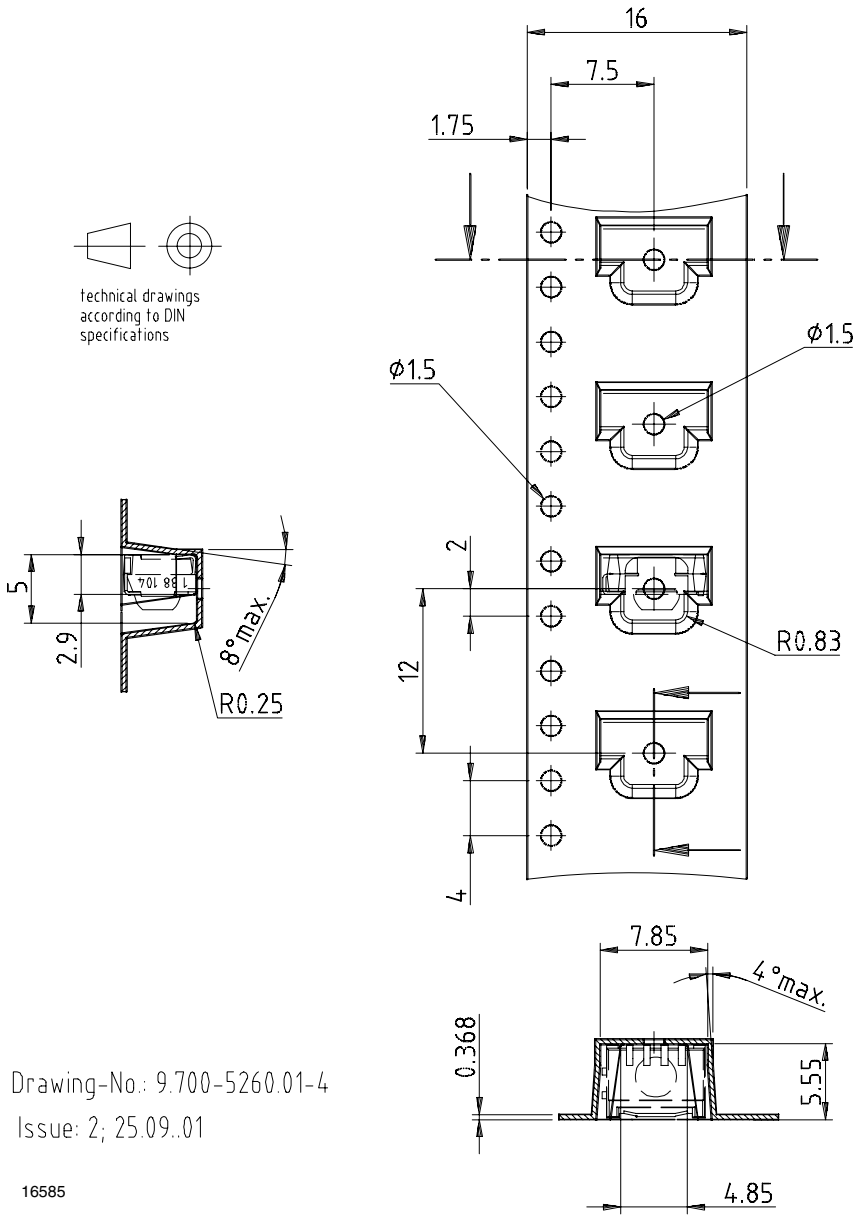



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16584



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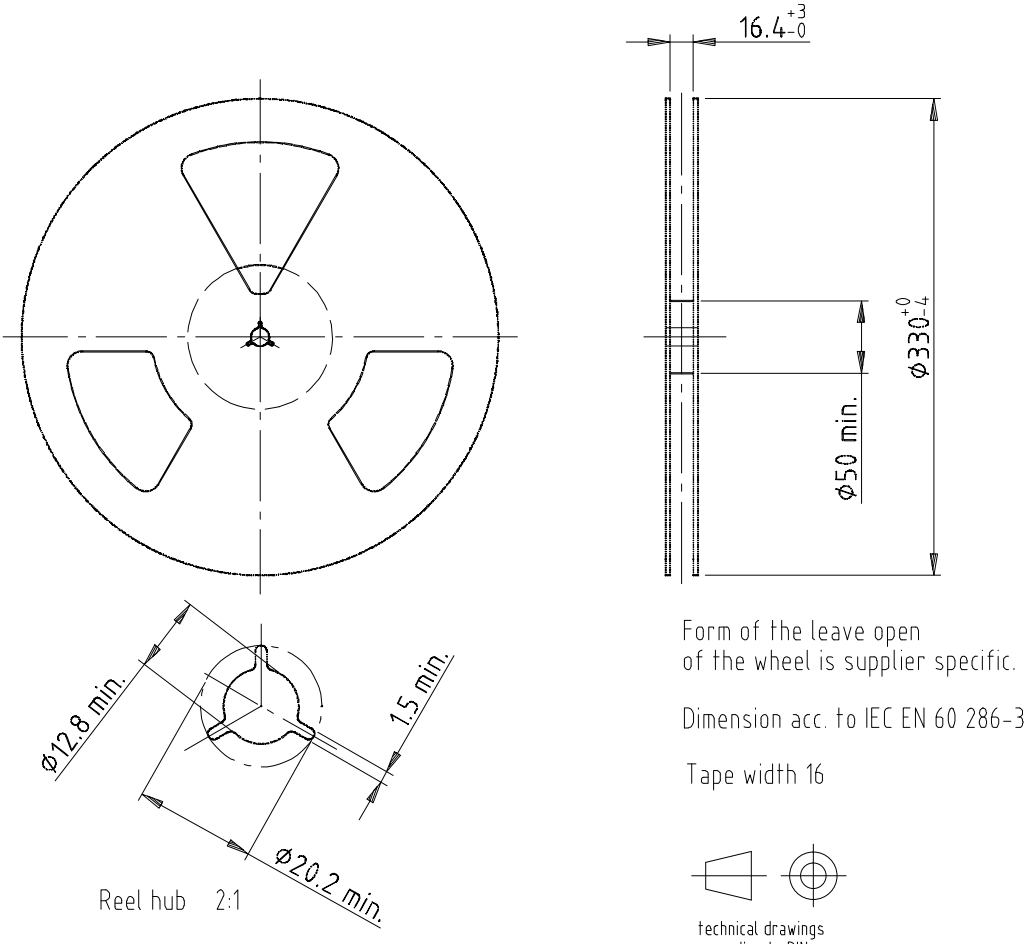
**TAPING VERSION TSMP..TR DIMENSIONS** in millimeters






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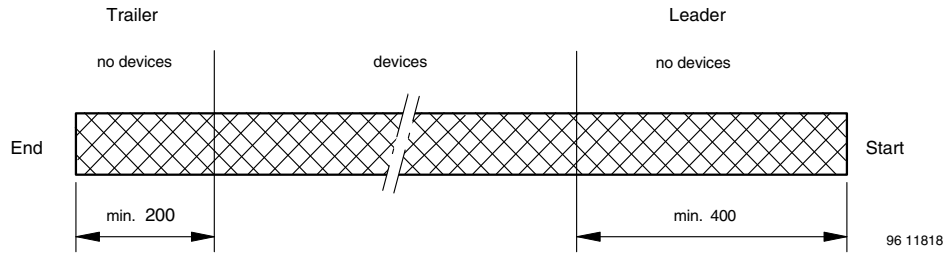
## REEL DIMENSIONS in millimeters




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

16734

## LEADER AND TRAILER DIMENSIONS in millimeters



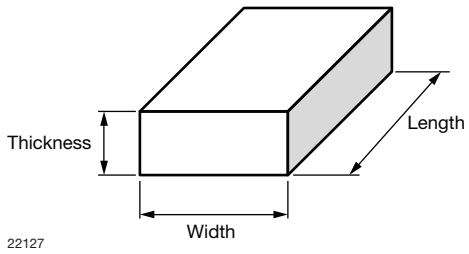



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## OUTER PACKAGING

The sealed reel is packed into a pizza box.

**CARTON BOX DIMENSIONS** in millimeters




| | THICKNESS | WIDTH | LENGTH |
|---|---|---|---|
| Pizza box (SMD and Heimdall) (taping in reels) | 50 | 340 | 340 |

## 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)

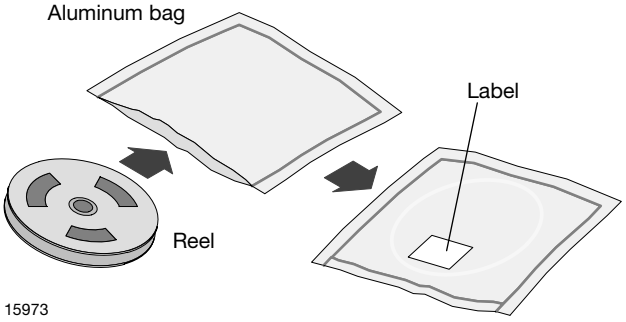
| PLAIN WRITTING | ABBREVIATION | LENGTH |
|---|---|---|
| Item-description | - | 18 |
| Item-number | INO | 8 |
| Selection-code | SEL | 3 |
| LOT-/serial-number | BATCH | 10 |
| Data-code | COD | 3 (YWW) |
| Plant-code | PTC | 2 |
| Quantity | QTY | 8 |
| Accepted by | ACC | - |
| Packed by | PCK | - |
| 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 |



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## DRY PACKING

The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.




15973

## FINAL PACKING

The sealed reel is packed into a cardboard box.

## 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:

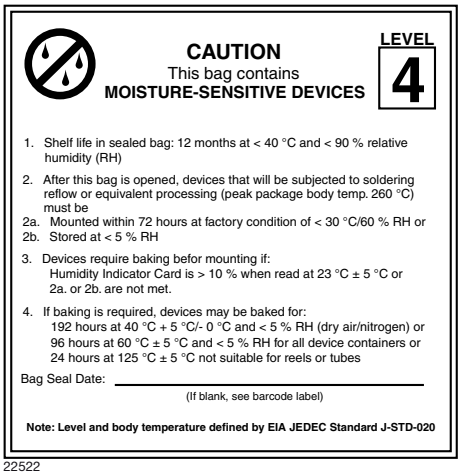
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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 J-STD-020 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 soldering reflow or equivalent processing (peak package body temp. 260 °C) must be
2a. Mounted within 72 hours at factory condition of < 30 °C/60 % RH or
2b. Stored at < 5 % RH
3. Devices require baking befor mounting if:
Humidity Indicator Card is > 10 % when read at 23 °C ± 5 °C or
2a. or 2b. are 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 °C ± 5 °C and < 5 % RH for all device containers or
24 hours at 125 °C ± 5 °C not suitable for reels or tubes

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

**Note: Level and body temperature defined by EIA JEDEC Standard J-STD-020**

22522

EIA JEDEC standard J-STD-020 level 4 label is included on all dry bags

## 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.




22645



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