



## IR Receiver Modules for Remote Control Systems



22531

### DESCRIPTION

The TSSP570.. is a compact infrared detector module for presence sensing applications. It receives 38 kHz modulated signals and has a peak sensitivity of 940 nm. This component has not been qualified according to automotive specifications.

### FEATURES

- Presence sensor: up to 2 m distance, find more info at: [www.vishay.com/doc?49009](http://www.vishay.com/doc?49009)
- Light barrier: up to 12 m distance, TSAL6200 with  $I_F = 50$  mA, find more info at: [www.vishay.com/doc?49650](http://www.vishay.com/doc?49650)
- Fast proximity: up to 2 m range at 5 ms response time, find more info at: [www.vishay.com/doc?82741](http://www.vishay.com/doc?82741)
- Supply voltage: 2.0 V to 5.5 V
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### LINKS TO ADDITIONAL RESOURCES



Product Page



Marking

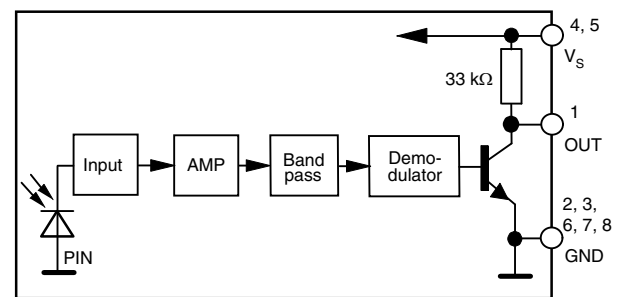
### APPLICATIONS

- Reflective sensors for hand dryers, towel or soap dispensers, water faucets, toilet flush
- Vending machine fall detection
- Security and pet gates
- Person or object vicinity switch
- Fast proximity sensors for toys, robotics, drones, and other consumer and industrial uses

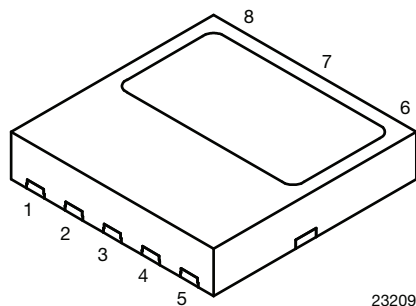
### DESIGN SUPPORT TOOLS

- [3D models](#)
- [Window size calculator](#)

### BLOCK DIAGRAM



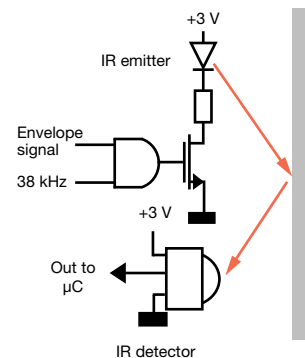
20445-7

**MECHANICAL DATA****Pinning:**1 = OUT, 2, 3, 6, 7, 8 = GND, 4, 5 =  $V_S$ 

23209

**ORDERING CODE****Taping:**

TSSP570..TT1 - top view taped, 1800 pcs/reel

**PRESENCE SENSING****PARTS TABLE**

|                   |                                                                                                                                                      |           |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Carrier frequency | 38 kHz                                                                                                                                               | TSSP57038 |
|                   | 56 kHz                                                                                                                                               | TSSP57056 |
| Package           | Belobog                                                                                                                                              |           |
| Pinning           | 1, 4 = GND, 2 = $V_S$ , 3 = OUT                                                                                                                      |           |
| Dimensions (mm)   | 3.95 W x 3.95 H x 0.8 D                                                                                                                              |           |
| Mounting          | SMD                                                                                                                                                  |           |
| Application       | Presence sensors, fast proximity sensors                                                                                                             |           |
| Special options   | <ul style="list-style-type: none"> <li>Extended temperature range: <a href="http://www.vishay.com/doc?82738">www.vishay.com/doc?82738</a></li> </ul> |           |

**ABSOLUTE MAXIMUM RATINGS**

| PARAMETER                   | TEST CONDITION                  | SYMBOL    | VALUE                   | UNIT |
|-----------------------------|---------------------------------|-----------|-------------------------|------|
| Supply voltage              |                                 | $V_S$     | -0.3 to +6              | V    |
| Supply current              |                                 | $I_S$     | 5                       | mA   |
| Output voltage              |                                 | $V_O$     | -0.3 to ( $V_S + 0.3$ ) | V    |
| Output current              |                                 | $I_O$     | 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   |
| Power consumption           | $T_{amb} \leq 85^\circ\text{C}$ | $P_{tot}$ | 10                      | mW   |

**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 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                                                                  |                     |      |          |      |                 |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------|------|----------|------|-----------------|
| PARAMETER                                                                                                     | TEST CONDITION                                                                                   | SYMBOL              | MIN. | TYP.     | MAX. | UNIT            |
| Supply current (pin 3)                                                                                        | $E_v = 0$ , $V_S = 3.3\text{ V}$                                                                 | $I_{SD}$            | 0.25 | 0.35     | 0.45 | mA              |
|                                                                                                               | $E_v = 40\text{ klx}$ , sunlight                                                                 | $I_{SH}$            | -    | 0.45     | -    | mA              |
| Supply voltage                                                                                                |                                                                                                  | $V_S$               | 2.0  | -        | 5.5  | V               |
| Transmission distance                                                                                         | $E_v = 0$ , test signal see Fig. 1, IR diode TSAL6200, $I_F = 50\text{ mA}$                      | $d$                 | -    | 8        | -    | m               |
| Output voltage low (pin 1)                                                                                    | $I_{OSL} = 0.5\text{ mA}$ , $E_e = 2\text{ mW/m}^2$ , test signal see Fig. 1                     | $V_{OSL}$           | -    | -        | 100  | mV              |
| Minimum irradiance                                                                                            | Pulse width tolerance:<br>$t_{pi} - 4/f_0 < t_{po} < t_{pi} + 4/f_0$ ,<br>test signal see Fig. 1 | $E_{e\text{ min.}}$ | -    | 0.7      | 1.2  | $\text{mW/m}^2$ |
| Maximum irradiance                                                                                            | Pulse width tolerance:<br>$t_{pi} - 4/f_0 < t_{po} < t_{pi} + 4/f_0$ ,<br>test signal see Fig. 1 | $E_{e\text{ max.}}$ | 30   | -        | -    | $\text{W/m}^2$  |
| Directivity                                                                                                   | Angle of half transmission distance                                                              | $\Phi_{1/2}$        | -    | $\pm 75$ | -    | $^{\circ}$      |

### TYPICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

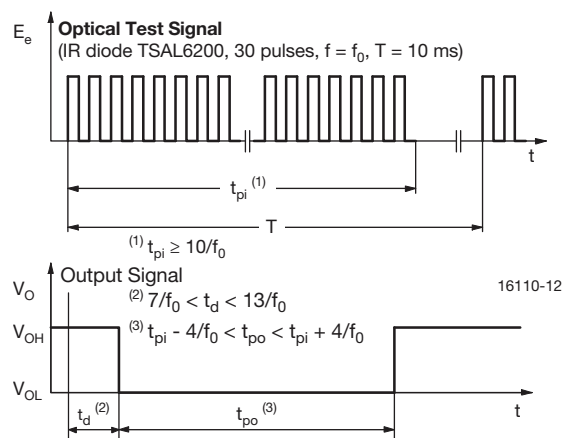


Fig. 1 - Output Active Low

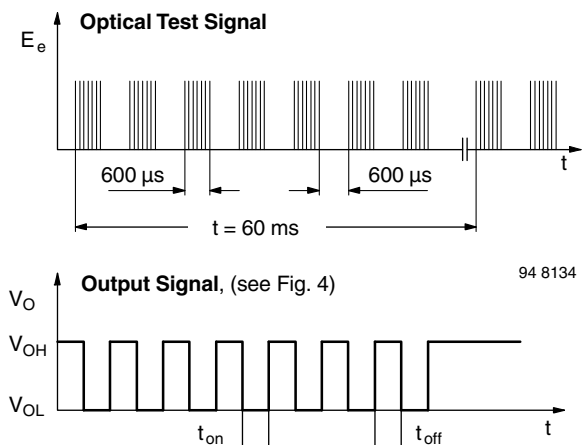


Fig. 3 - Output Function

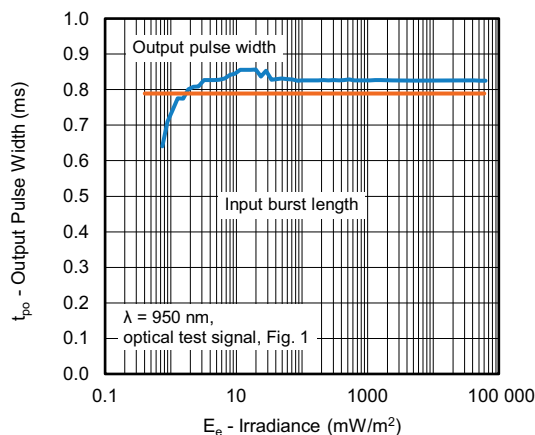


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

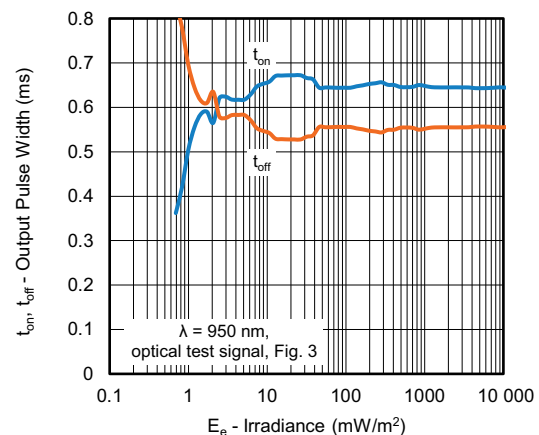


Fig. 4 - Output Pulse Diagram

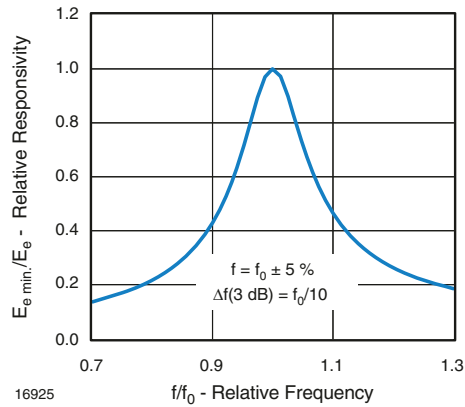


Fig. 5 - Frequency Dependence of Responsivity

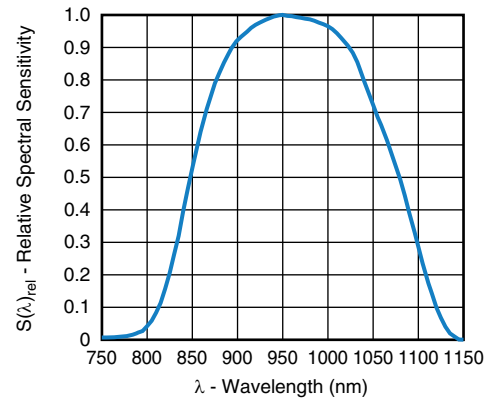


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

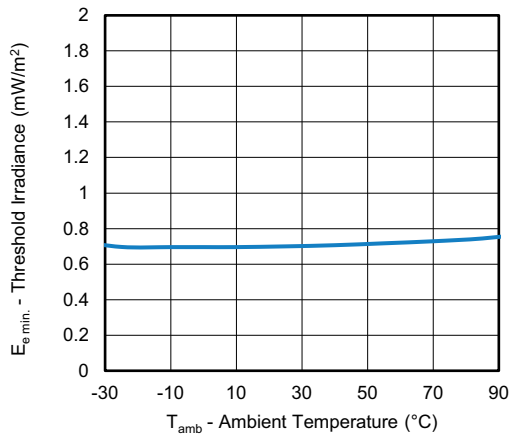


Fig. 6 - Sensitivity vs. Ambient Temperature

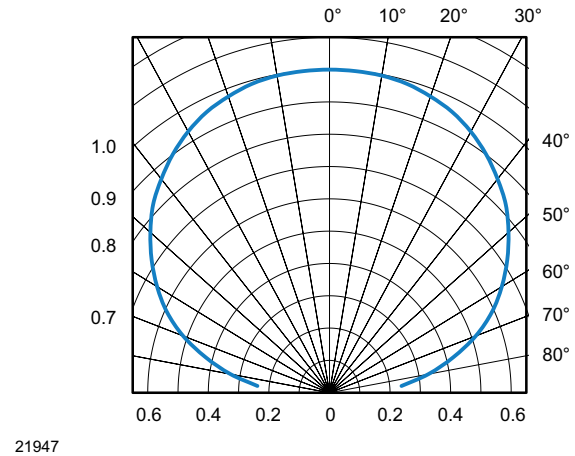


Fig. 9 - Horizontal Directivity

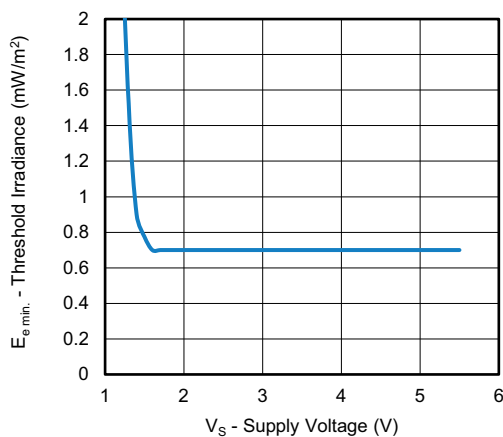
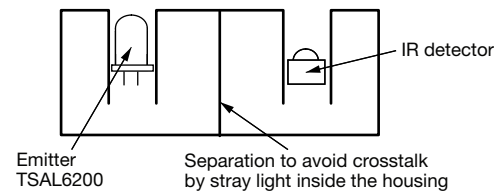


Fig. 7 - Sensitivity vs. Supply Voltage

The typical application of this device is a reflective or beam break sensor with active low “detect” or “no detect” information contained in its output. The TSSP570.. is also suitable for fast (~ 15 ms) proximity sensor applications for ranges between 10 cm and 2 m, if a burst pattern with variable intensity is used.

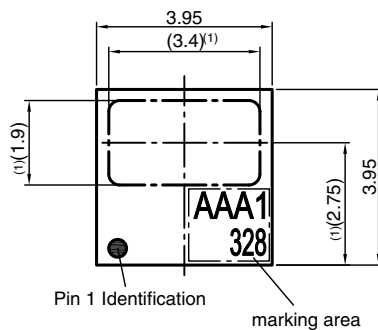
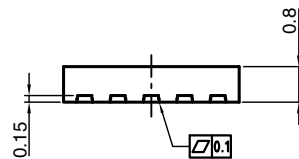
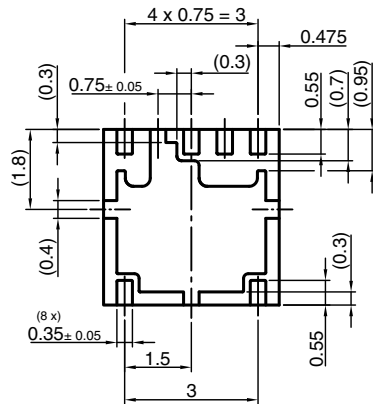
Example for a sensor hardware:



There should be no common window in front of the emitter and detector in order to avoid crosstalk via guided light through the window.

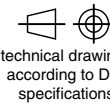


**PACKAGE DIMENSIONS** in millimeters

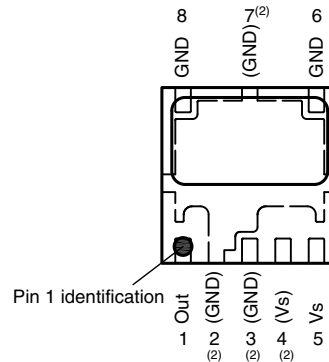


Drawing-No.: 6.550-5315.01-4  
Issue: 2; 12.02.14

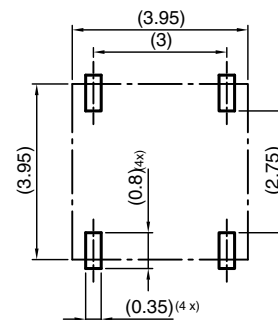
Not indicated tolerances  $\pm 0.1$



Pinning from topview



Proposed pad layout from component side (dim. for reference only)



**Notes**

- (1) Optically effective area
- (2) Pins connected internally. It is not necessary to connect externally



## ASSEMBLY INSTRUCTIONS

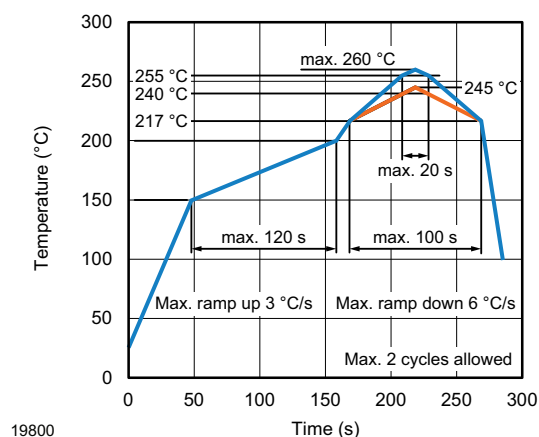
### Reflow Soldering

- Reflow soldering must be done within 168 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

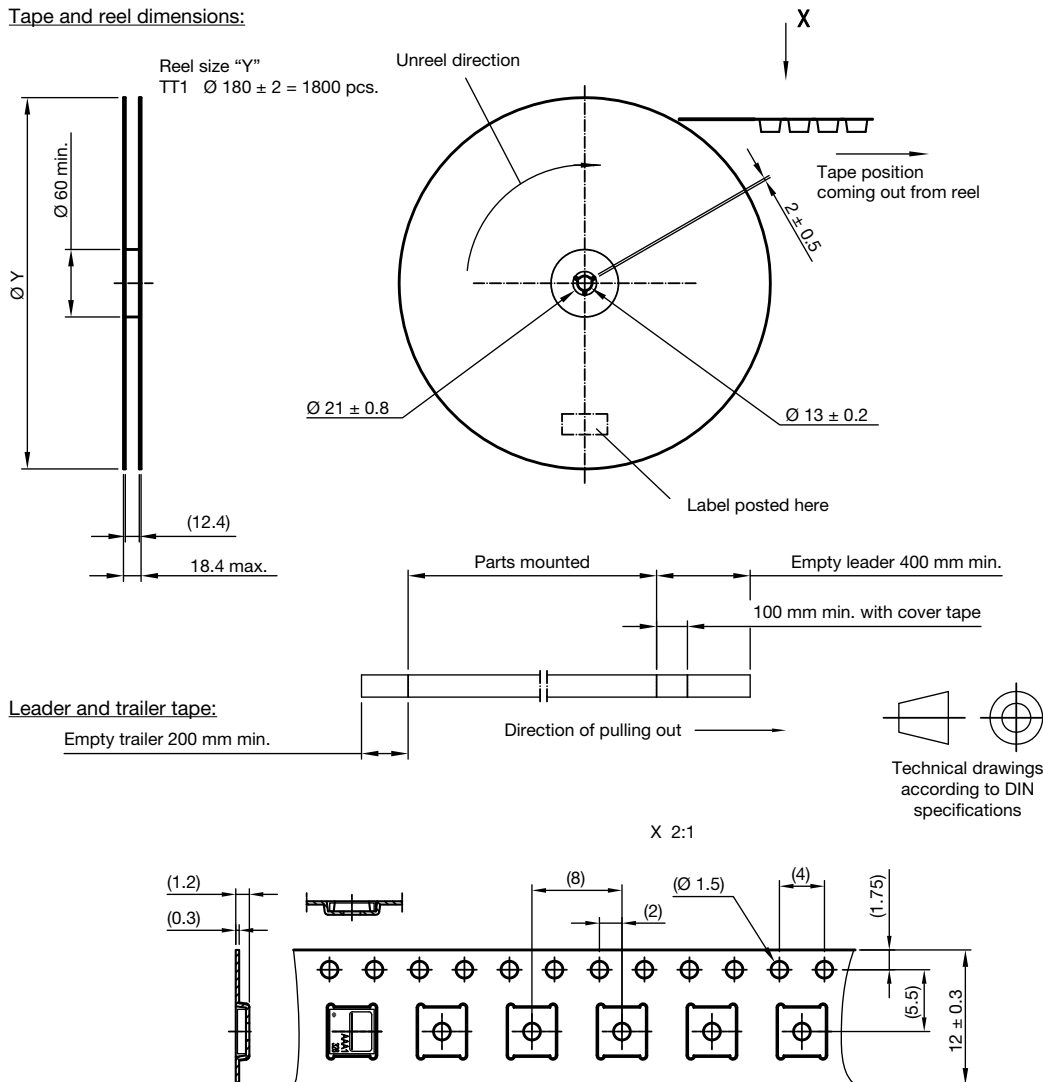
## VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE





**TAPING VERSION TSSP57038 DIMENSIONS** in millimeters

Tape and reel dimensions:



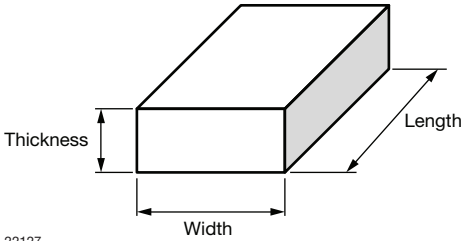
Drawing-No.: 9.700-5347.01-4  
Issue: 2; 07.03.18

Not indicated tolerances  $\pm 0.1$



## OUTER PACKAGING

The sealed reel is packed into a pizza box.

| CARTON BOX DIMENSIONS in millimeters                                               |           |       |        |
|------------------------------------------------------------------------------------|-----------|-------|--------|
|  |           |       |        |
|                                                                                    | THICKNESS | WIDTH | LENGTH |
| Pizza box (Panhead, Heimdall, and Belobog) (taping in reels)                       | 50        | 340   | 340    |

## LABEL

### Standard bar code labels for finished goods

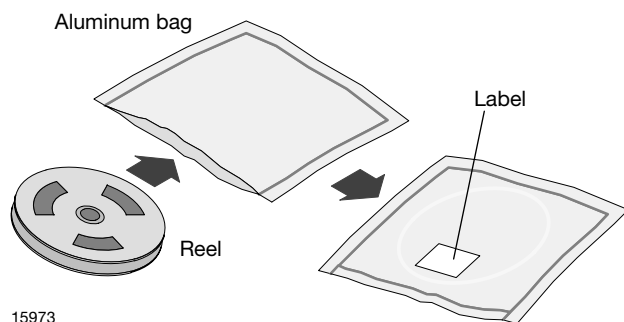
The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain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



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 168 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 3 label is included on all dry bags.

| Caution                                                                                                           |  | LEVEL<br>3 |
|-------------------------------------------------------------------------------------------------------------------|--|------------|
| This bag contains<br>MOISTURE-SENSITIVE DEVICES                                                                   |  |            |
| 1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)                        |  |            |
| 2. Peak package body temperature: 260 °C<br><small>If blank, see adjacent bar code label</small>                  |  |            |
| 3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be |  |            |
| a) Mounted within: 168 hours of factory conditions<br><small>If blank, see adjacent bar code label</small>        |  |            |
| b) Stored per J-STD-033                                                                                           |  |            |
| 4. Devices require bake, before mounting, if:                                                                     |  |            |
| a) Humidity Indicator Card reads > 10% for level 2a - 5a devices or >60% for level 2 devices when read at 23±5°C  |  |            |
| b) 3a or 3b are not met                                                                                           |  |            |
| 5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure                                         |  |            |
| Bag Seal Date: _____<br><small>If blank, see adjacent bar code label</small>                                      |  |            |
| <small>Note: Level and body temperature defined by IPC/JEDEC J-STD-020</small>                                    |  |            |

22650

EIA JEDEC standard J-STD-020 level 3 label is included on all dry bags

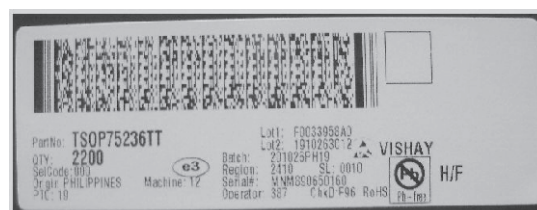
## ESD PRECAUTION

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.

## BAR CODE PRODUCT LABEL (example)



22178



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