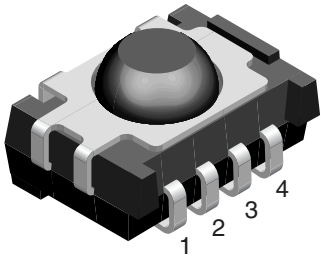
# IR Receiver Modules for Remote Control Systems

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## FEATURES

- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Taping available for top view and side view assembly
- 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

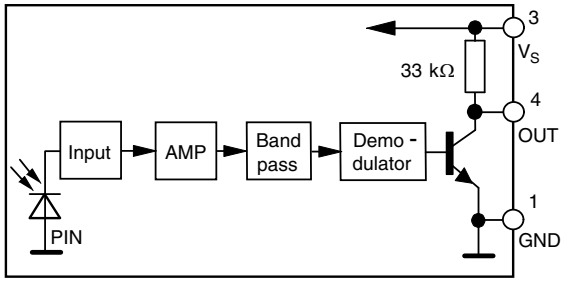
## DESCRIPTION

The TSSP6038 is a compact IR receiver for sensor applications. It has a high gain for IR signals at 38 kHz. The detection level does not change when ambient light or strong IR signals are applied. It can receive continuous 38 kHz signals or 38 kHz bursts.

This component has not been qualified according to automotive specifications.

| PARTS TABLE | | |
|---|---|---|
| **Carrier frequency** | 38 kHz | TSSP6038 |
| **Package** | Pinning | 1 = GND, 2 = N.C., 3 = $V_S$, 4 = OUT |
| | Dimensions (mm) | 4.0 H x 5.3 W x 7.5 L |
| **Mounting** | | SMD |
| **Application** | | Presence sensors |

## BLOCK DIAGRAM

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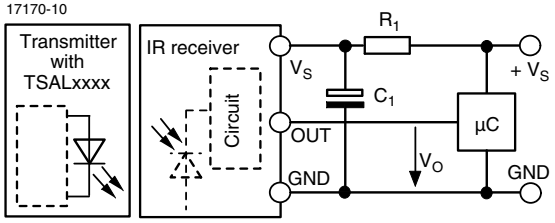
## APPLICATION CIRCUIT




The external components $R_1$ and $C_1$ are optional to improve the robustness against electrical overstress (typical values are $R_1$ = 100 Ω, $C_1$ = 0.1 µF).

| 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 | $T_{amb}$ ≤ 85 °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 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Supply current (pin 3) | $E_v$ = 0, $V_S$ = 5 V | $I_{SD}$ | 0.55 | 0.7 | 0.9 | mA |
| | $E_v$ = 40 klx, sunlight | $I_{SH}$ | | 0.8 | | mA |
| Supply voltage | | $V_S$ | 2.5 | | 5.5 | V |
| Transmission distance | $E_v$ = 0, test signal see fig. 1, IR diode TSAL6200, $I_F$ = 400 mA | d | | 25 | | m |
| Output voltage low (pin 1) | $I_{OSL}$ = 0.5 mA, $E_e$ = 2 mW/m², test signal see fig. 1 | $V_{OSL}$ | | | 100 | mV |
| Minimum irradiance | Pulse width tolerance: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see fig. 1 | $E_{e\ min.}$ | | 0.7 | 1.2 | mW/m² |
| Maximum irradiance | $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see fig. 1 | $E_{e\ max.}$ | 50 | | | W/m² |
| Directivity | Angle of half transmission distance | $\varphi_{1/2}$ | | ± 50 | | deg |

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

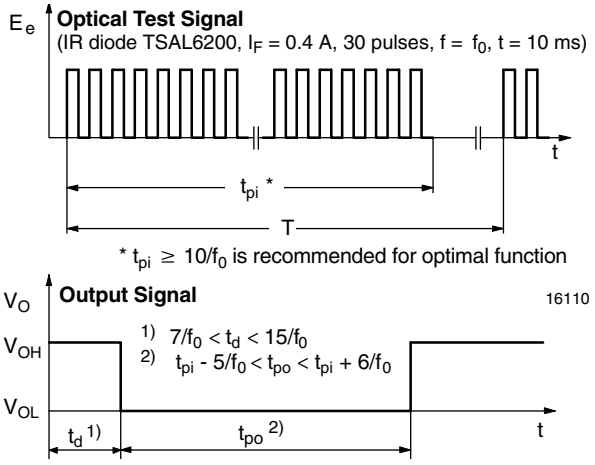



Fig. 1 - Output Active Low

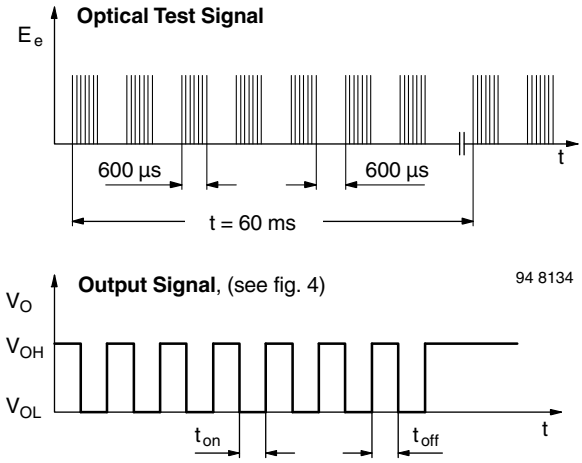



Fig. 3 - Output Function

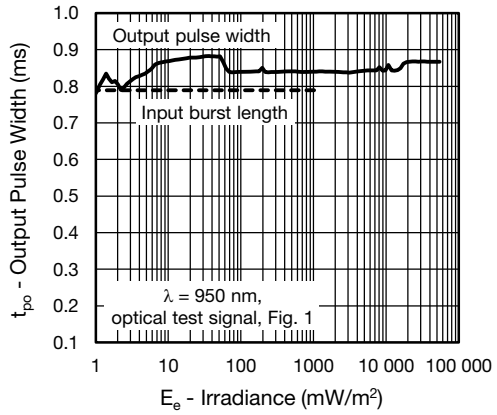



Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

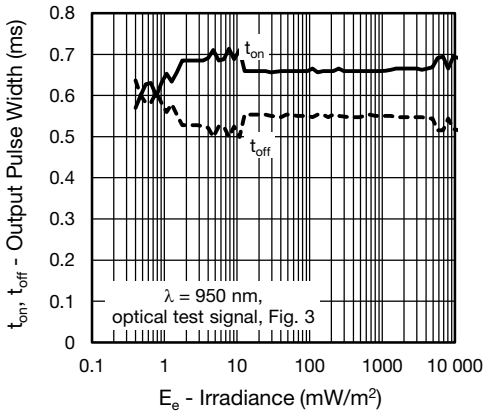



Fig. 4 - Output Pulse Diagram

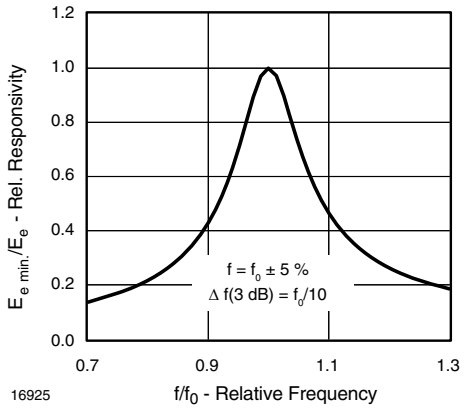



Fig. 5 - Frequency Dependence of Responsivity

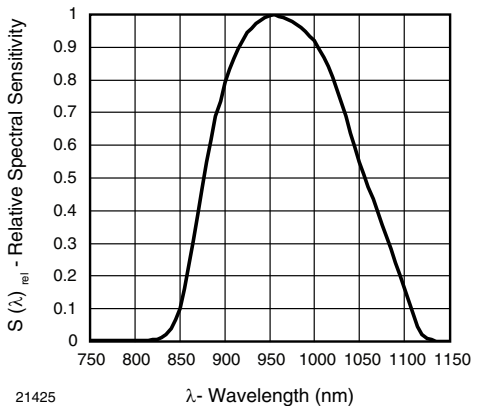



Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

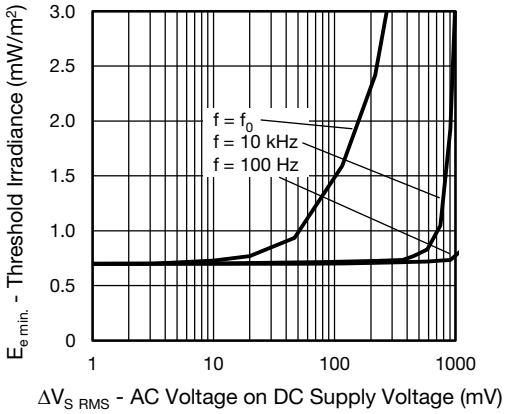



Fig. 6 - Sensitivity in Bright Ambient

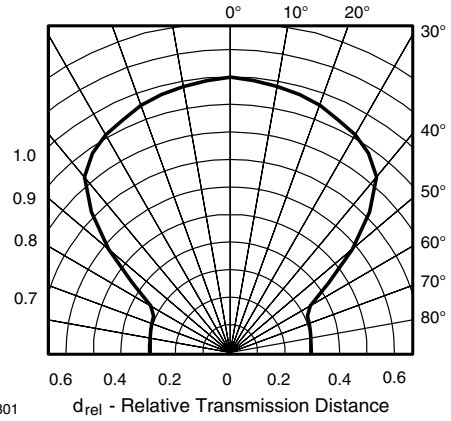



Fig. 9 - Horizontal Directivity

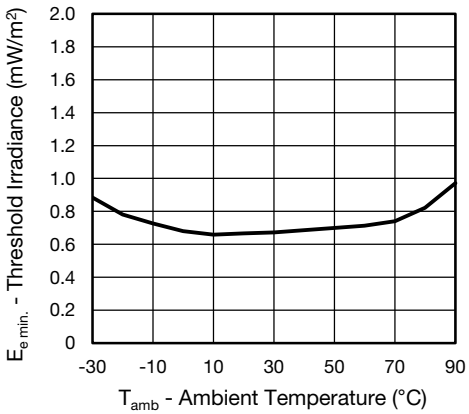



Fig. 7 - Sensitivity vs. Ambient Temperature

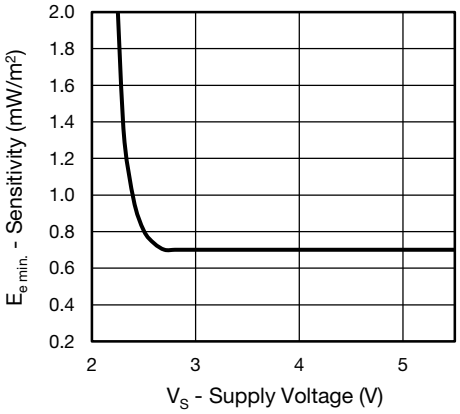
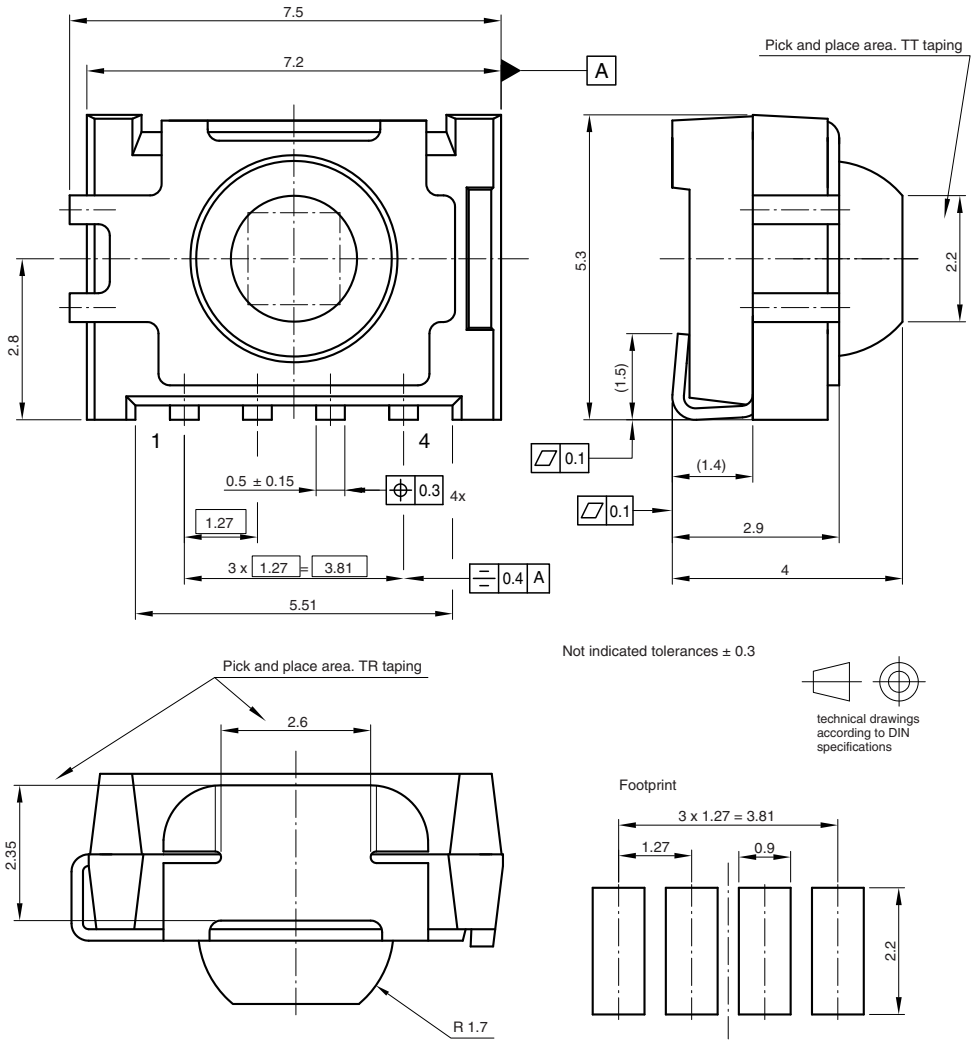



Fig. 10 - Sensitivity vs. Supply Voltage

**PACKAGE DIMENSIONS** in millimeters

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## ASSEMBLY INSTRUCTIONS

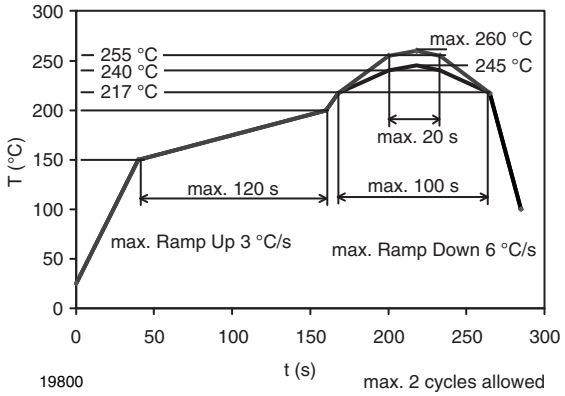
### Reflow Soldering

- 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. 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

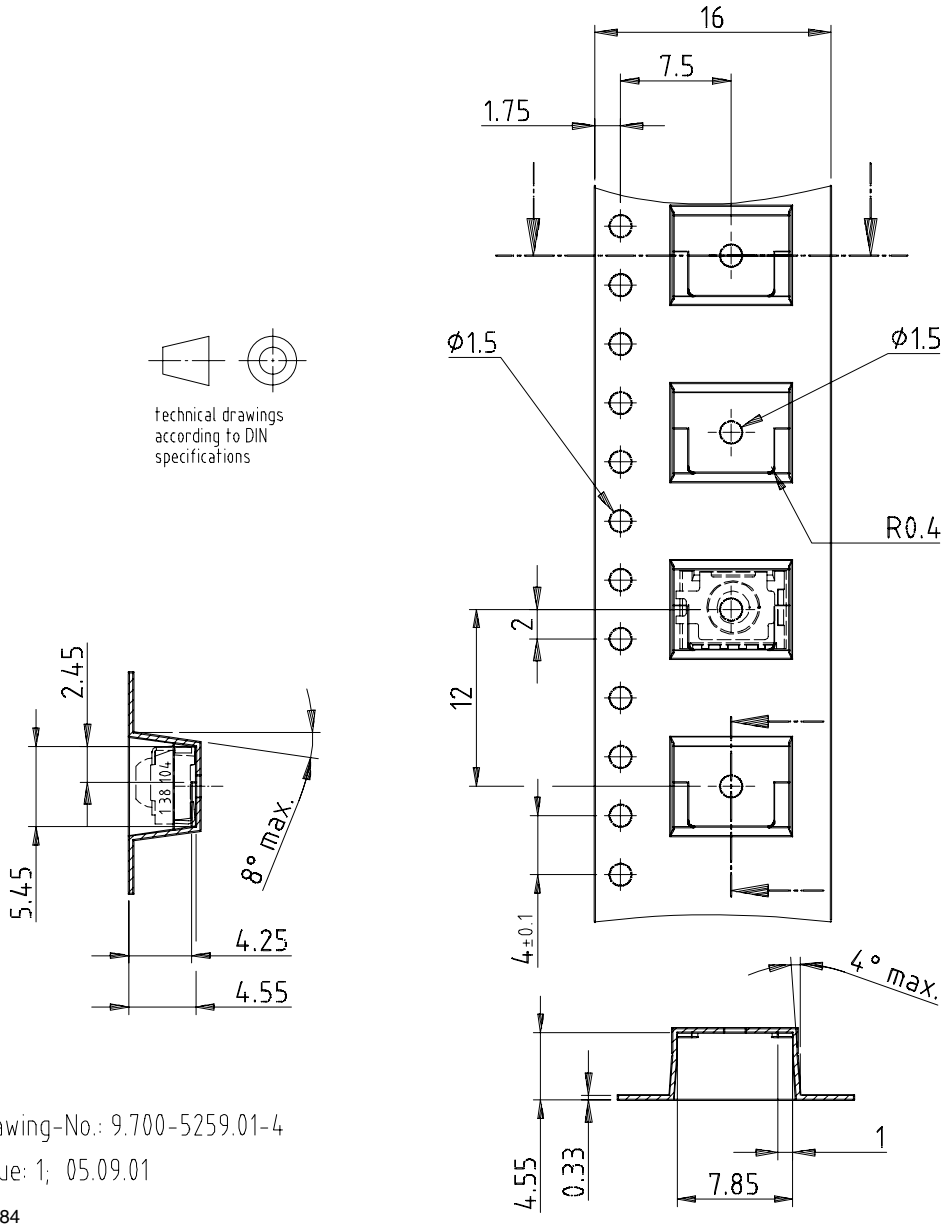
### Manual Soldering

- 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

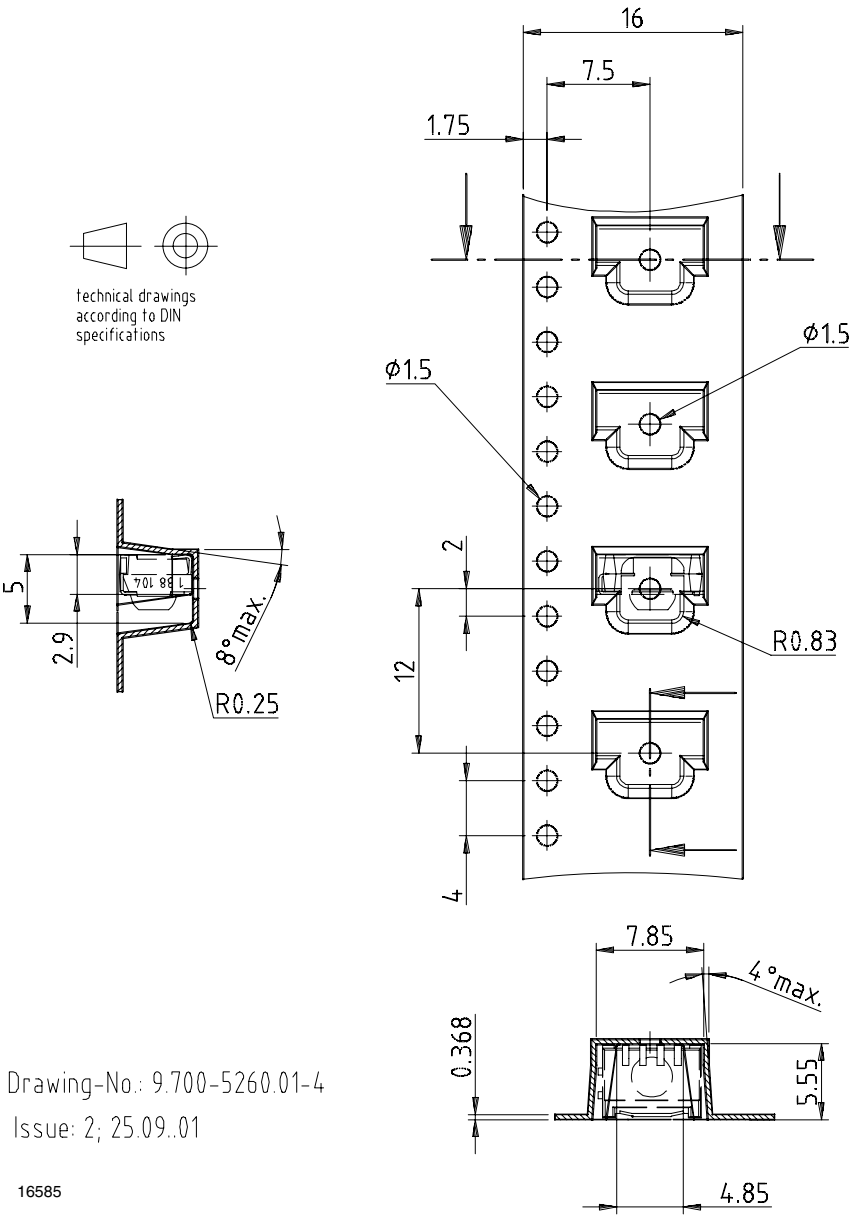
## VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE



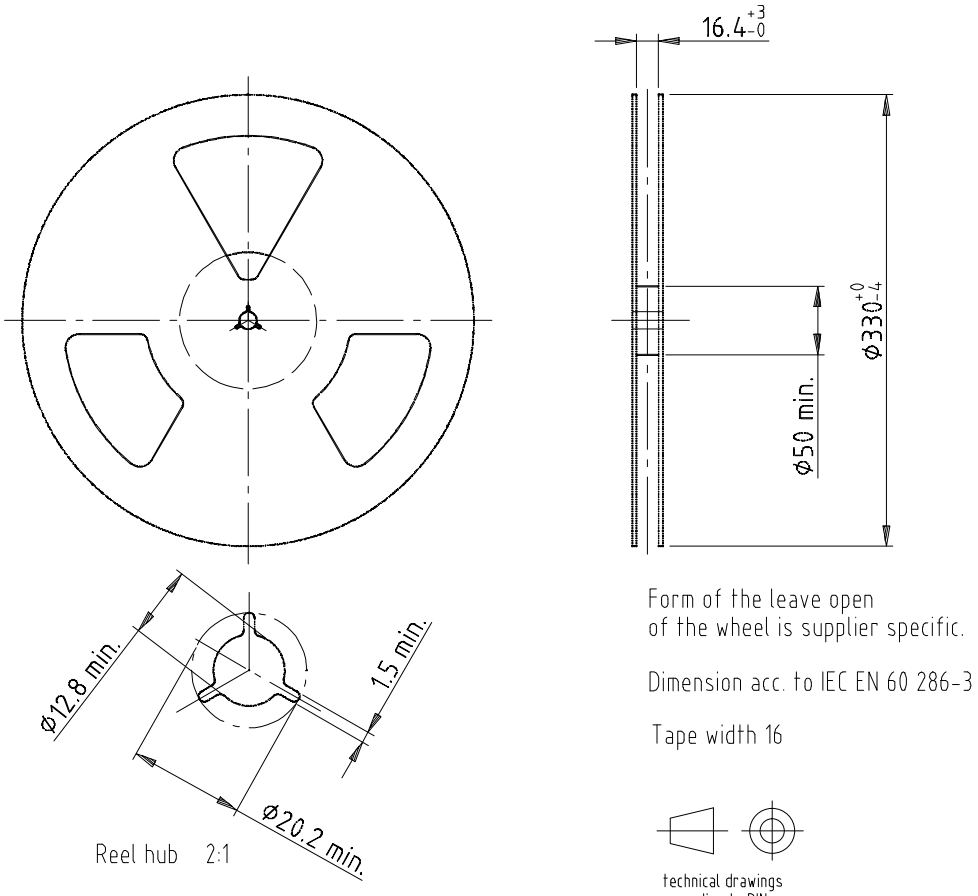

## TAPING VERSION TSSP6038TT DIMENSIONS in millimeters



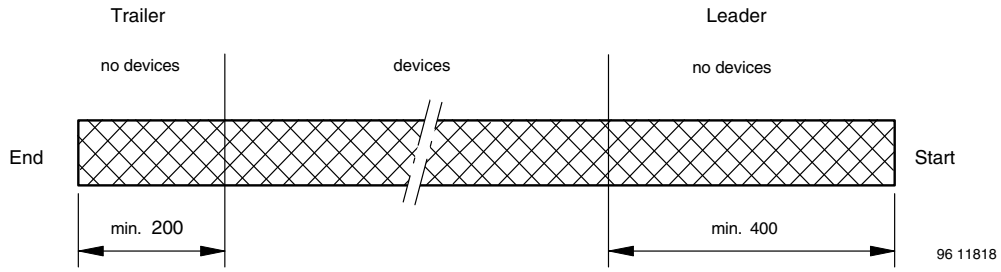
**TAPING VERSION TSSP6038TR DIMENSIONS** in millimeters



## REEL DIMENSIONS in millimeters




## 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

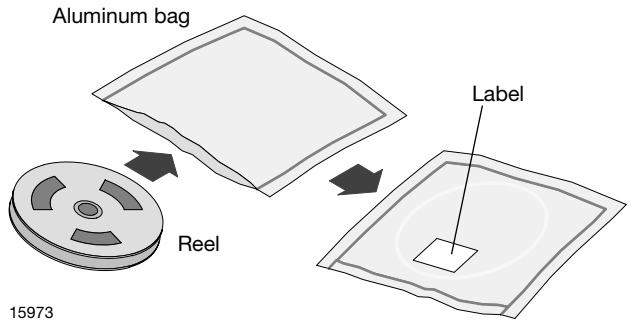
**Standard bar code labels for finished goods**

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.

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## 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:

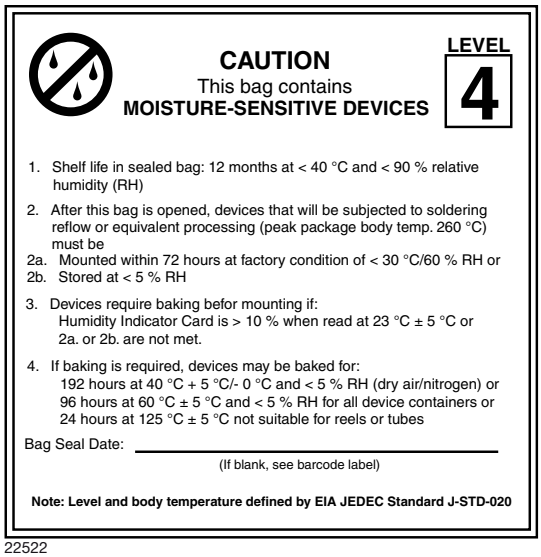
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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 J-STD-020 level 4 label is included on all dry bags.

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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. 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.


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**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**