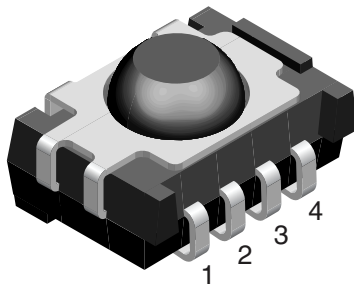


IR Receiver Modules for Remote Control Systems



16797

LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The TSOP36... series are miniaturized SMD IR receiver modules for infrared remote control systems. A PIN diode and a preamplifier are assembled on a leadframe, the epoxy package contains an IR filter.

The demodulated output signal can be directly connected to a microprocessor for decoding.

The TSOP364.. series devices are optimized to suppress almost all spurious pulses from energy saving lamps like CFLs. The AGC4 used in the TSOP364.. may suppress some data signals. The TSOP362.. series are provided primarily for compatibility with old AGC2 designs. New designs should prefer the TSOP364.. series containing the newer AGC4.

These components have not been qualified according to automotive specifications.

FEATURES

- Very low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage range: 2.5 V to 5.5 V
- Improved immunity against modulated light sources
- Insensitive to supply voltage ripple and noise
- Capable of side or top view
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

MECHANICAL DATA

Pinning:

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

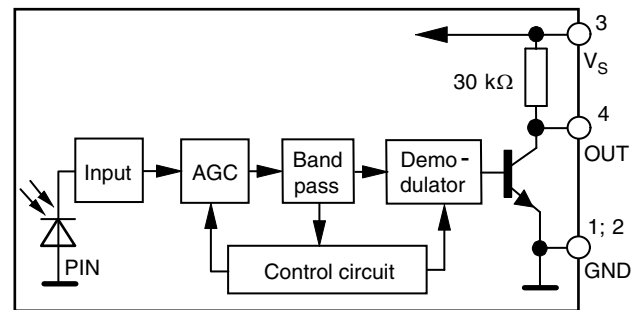
ORDERING CODE

Taping:

TSOP36...TT - top view taped, 1190 pcs/reel

TSOP36...TR - side view taped, 1120 pcs/reel

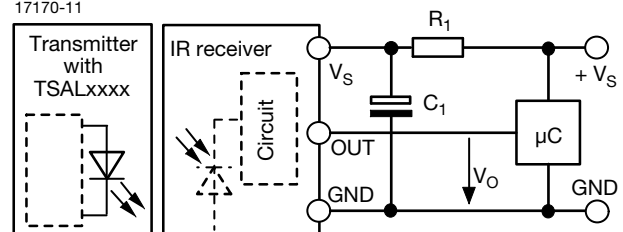
BLOCK DIAGRAM



16839

APPLICATION CIRCUIT

17170-11



R_1 and C_1 recommended to reduce supply ripple for $V_S < 2.8$ V



| PARTS TABLE | | | |
|----------------------|--------|--|--|
| AGC | | LEGACY, FOR LONG BURST REMOTE CONTROLS (AGC2) | RECOMMENDED FOR LONG BURST CODES (AGC4) |
| Carrier frequency | 30 kHz | TSOP36230 | TSOP36430 |
| | 33 kHz | TSOP36233 | TSOP36433 |
| | 36 kHz | TSOP36236 | TSOP36436 ⁽¹⁾⁽²⁾⁽³⁾ |
| | 38 kHz | TSOP36238 | TSOP36438 ⁽⁴⁾⁽⁵⁾ |
| | 40 kHz | TSOP36240 | TSOP36440 |
| | 56 kHz | TSOP36256 | TSOP36456 ⁽⁶⁾⁽⁷⁾ |
| 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 | | Remote control | |
| Best choice for | | ⁽¹⁾ RC-5 ⁽²⁾ RC-6 ⁽³⁾ Panasonic ⁽⁴⁾ NEC ⁽⁵⁾ Sharp ⁽⁶⁾ r-step ⁽⁷⁾ Thomson RCA | |
| Special options | | <ul style="list-style-type: none"> Narrow optical filter: www.vishay.com/doc?81590 Wide optical filter: www.vishay.com/doc?82726 | |

| ABSOLUTE MAXIMUM RATINGS | | | | |
|-----------------------------|--------------------------|------------------|--------------------------------|------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Supply voltage (pin 3) | | V _S | -0.3 to +6 | V |
| Supply current (pin 3) | | I _S | 3 | mA |
| 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 |
| 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 | E _v = 0, V _S = 3.3 V | I _{SD} | 0.27 | 0.35 | 0.45 | mA |
| | E _v = 40 klx, sunlight | I _{SH} | - | 0.45 | - | 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 | - | 24 | - | m |
| Output voltage low | I _{OSL} = 0.5 mA, E _e = 0.7 mW/m ² , 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.} | - | 0.12 | 0.25 | mW/m ² |
| Maximum irradiance | t _{pi} - 5/f _o < t _{po} < t _{pi} + 6/f _o , test signal see Fig. 1 | E _{e max.} | 30 | - | - | W/m ² |
| Directivity | Angle of half transmission distance | φ _{1/2} | - | ± 50 | - | ° |

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

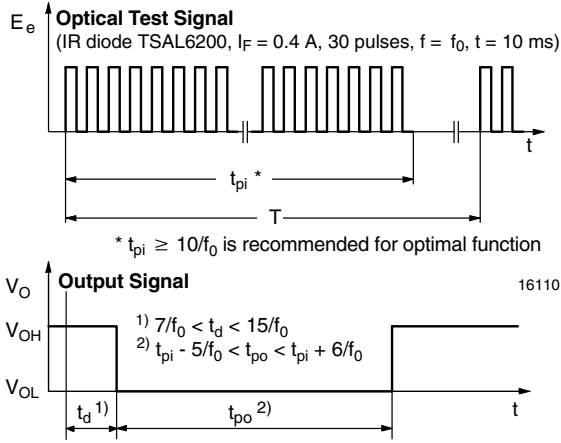


Fig. 1 - Output Active Low

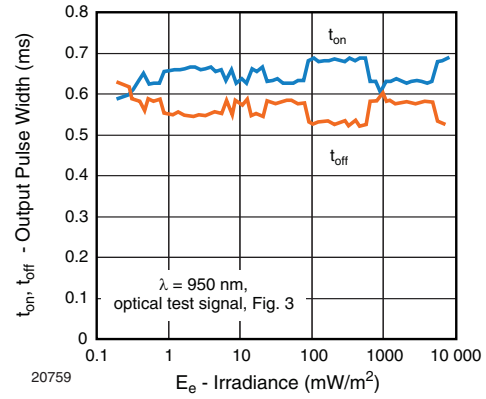


Fig. 4 - Output Pulse Diagram

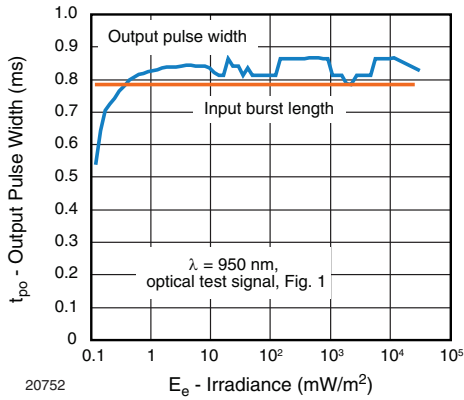


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

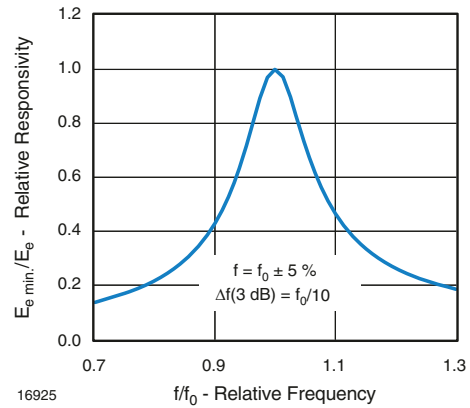


Fig. 5 - Frequency Dependence of Responsivity

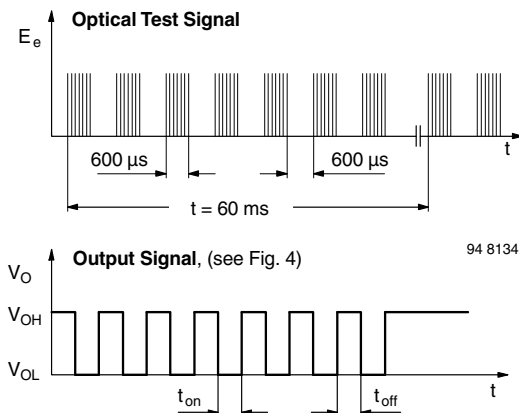


Fig. 3 - Output Function

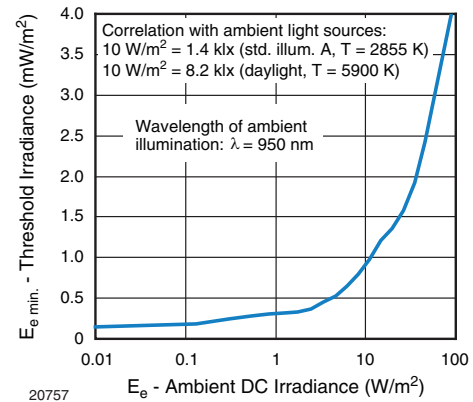


Fig. 6 - Sensitivity in Bright Ambient

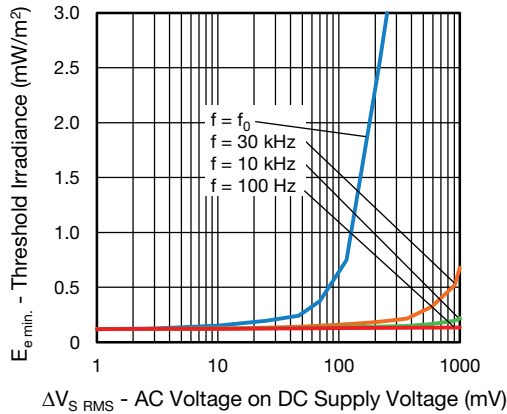


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

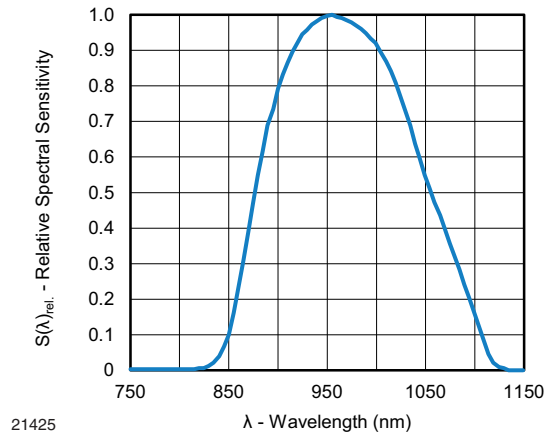


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

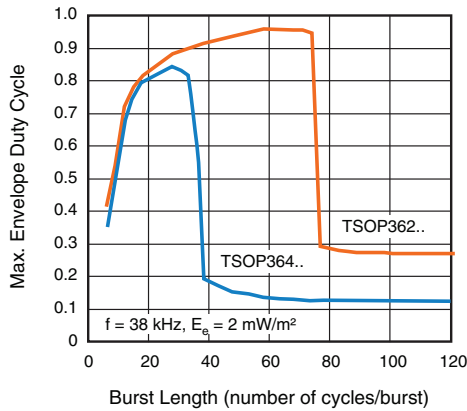


Fig. 8 - Maximum Envelope Duty Cycle vs. Burst Length

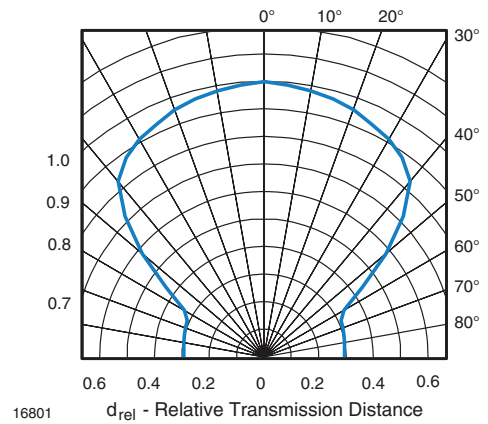


Fig. 11 - Horizontal Directivity

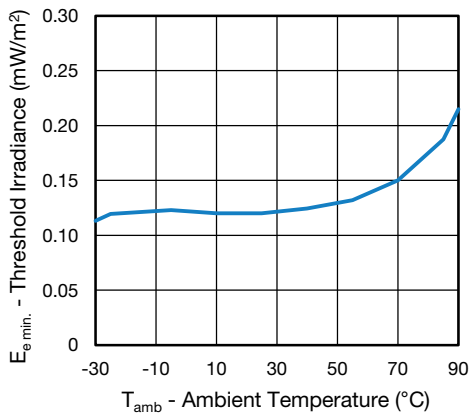


Fig. 9 - Sensitivity vs. Ambient Temperature

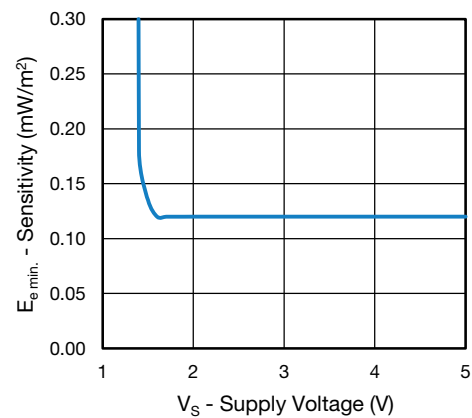


Fig. 12 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

This series is designed to suppress spurious output pulses due to noise or disturbance signals. The devices can distinguish data signals from noise due to differences in frequency, burst length, and envelope duty cycle. The data signal should be close to the device's band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the product in the presence of a disturbance, the sensitivity of the receiver is automatically reduced by the AGC to insure that no spurious pulses are present at the receiver's output.

Some examples which are suppressed are:

- DC light (e.g. from tungsten bulbs sunlight)
- Continuous signals at any frequency
- Strongly or weakly modulated noise from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14)

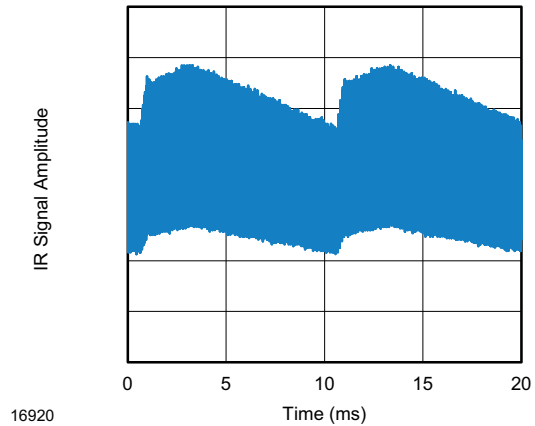


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

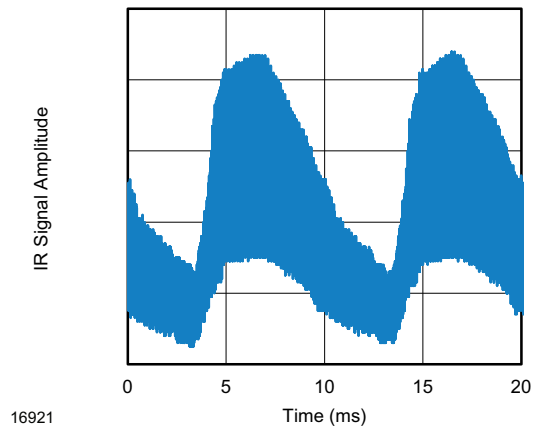


Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

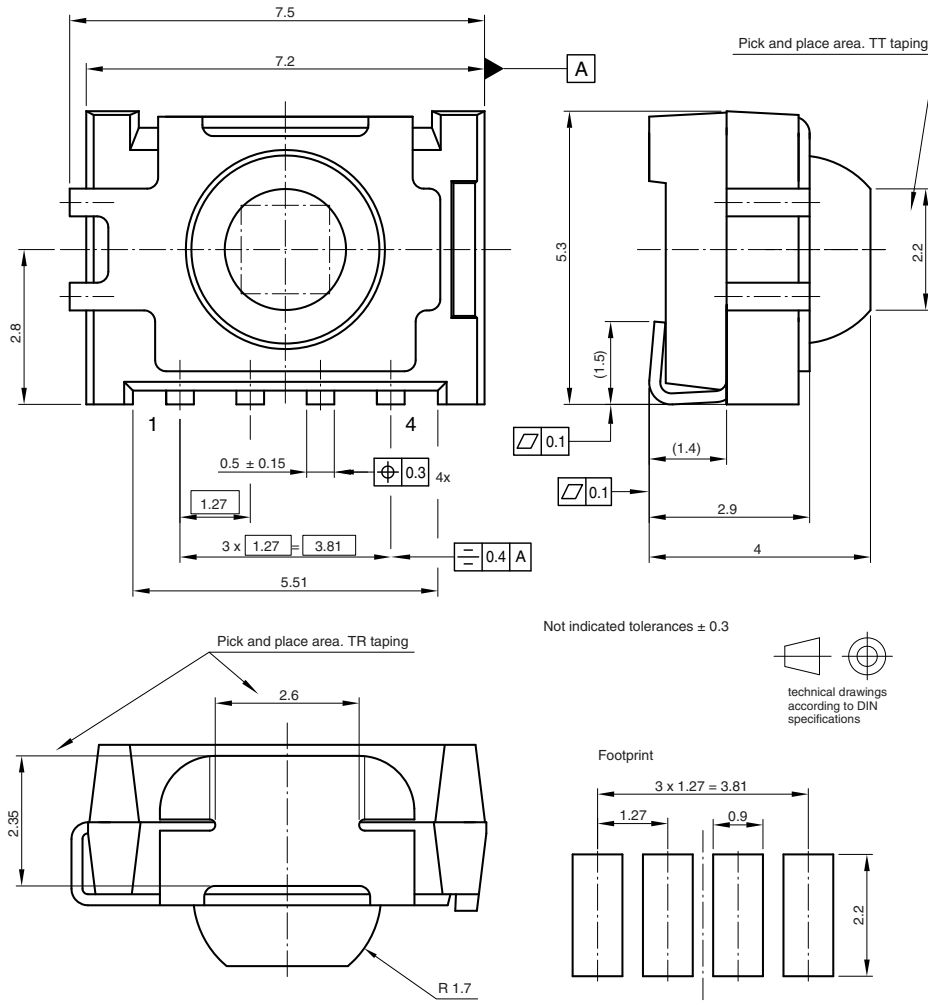
| | TSOP362.. | TSOP364.. |
|--|---|---|
| Minimum burst length | 10 cycles/burst | 10 cycles/burst |
| After each burst of length a minimum gap time is required of | 10 to 70 cycles ≥ 10 cycles | 10 to 35 cycles ≥ 10 cycles |
| For bursts greater than a minimum gap time in the data stream is needed of | 70 cycles > 4 x burst length | 35 cycles > 10 x burst length |
| Maximum number of continuous short bursts/second | 1800 | 1500 |
| NEC code | Yes | Preferred |
| RC5 / RC6 code | Yes | Preferred |
| Thomson 56 kHz code | Yes | Preferred |
| Sharp code | Yes | Preferred |
| Suppression of interference from fluorescent lamps | Mild disturbance patterns are suppressed (example: signal pattern of Fig. 13) | Complex and critical disturbance patterns are suppressed (example: signal pattern of Fig. 14 or highly dimmed LCDs) |

Notes

- For data formats with short bursts please see the datasheet for TSOP361.., TSOP363.., TSOP365..
- For Sony 12, 15, and 20 bit IR codes please see the datasheet of TSOP36S40F



PACKAGE DIMENSIONS in millimeters



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

ASSEMBLY INSTRUCTIONS

Reflow Soldering

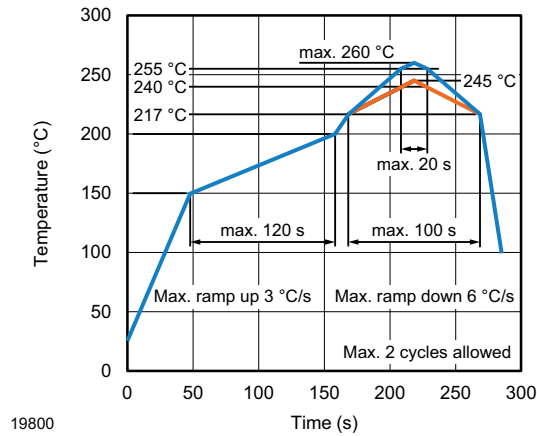
- Reflow soldering must be done within 72 h while stored under a max. temperature of 30 °C, 60 % RH after opening the dry pack envelope
- Set the furnace temperatures for pre-heating and heating in accordance with the reflow temperature profile as shown in the diagram. Exercise extreme care to keep the 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

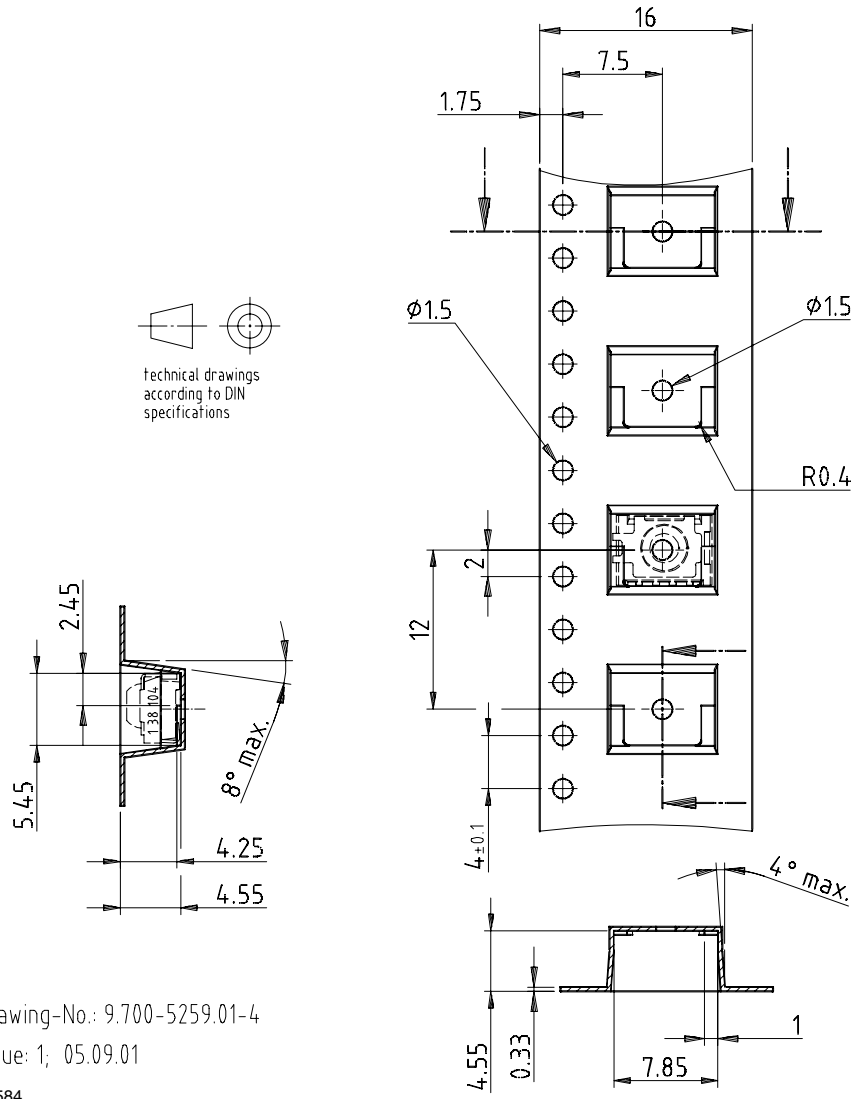
- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off



VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE



TAPING VERSION TSOP..TT DIMENSIONS in millimeters



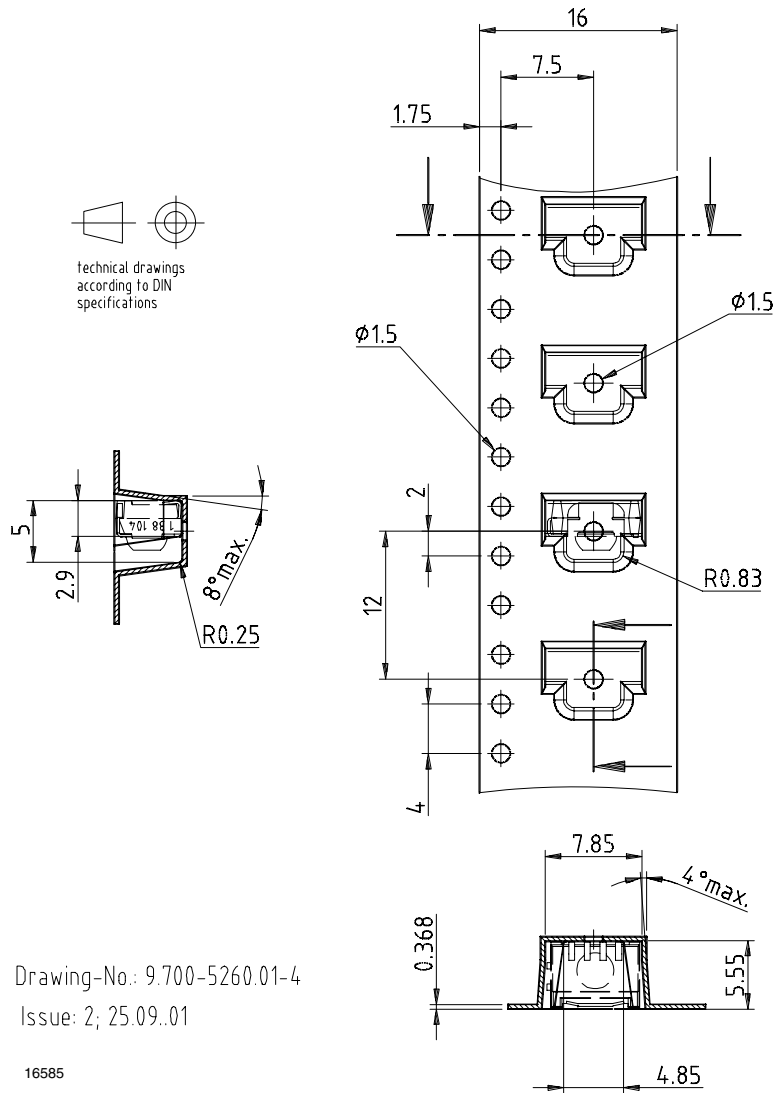
Drawing-No.: 9.700-5259.01-4

Issue: 1; 05.09.01

16584

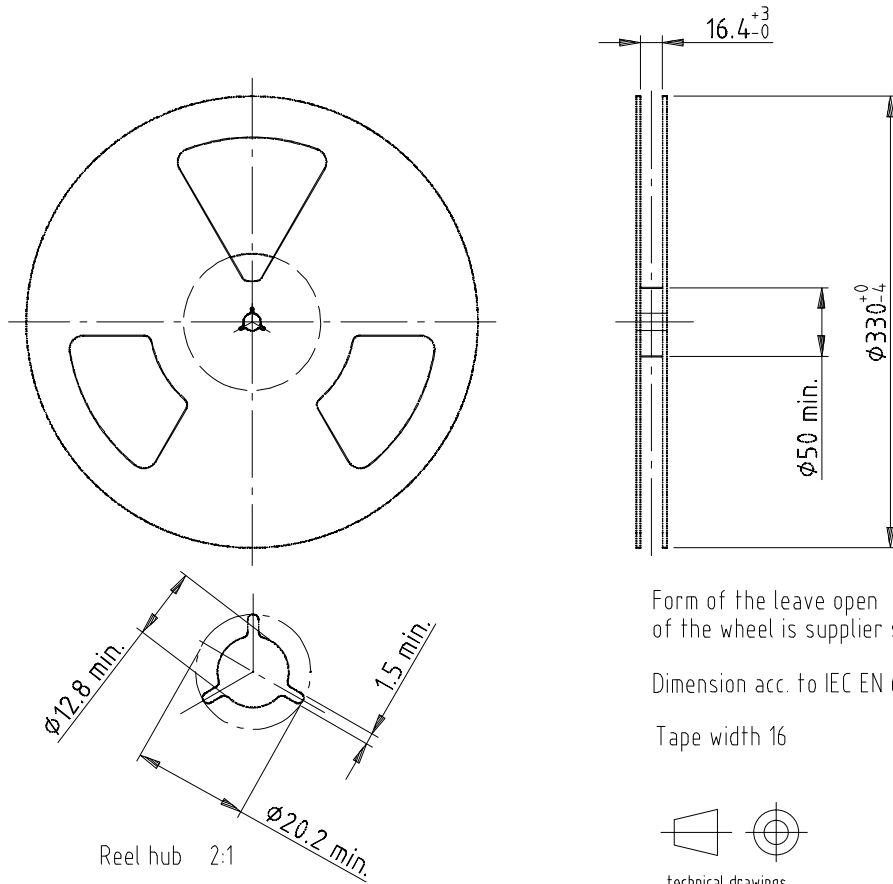


TAPING VERSION TSOP..TR DIMENSIONS in millimeters





REEL DIMENSIONS in millimeters

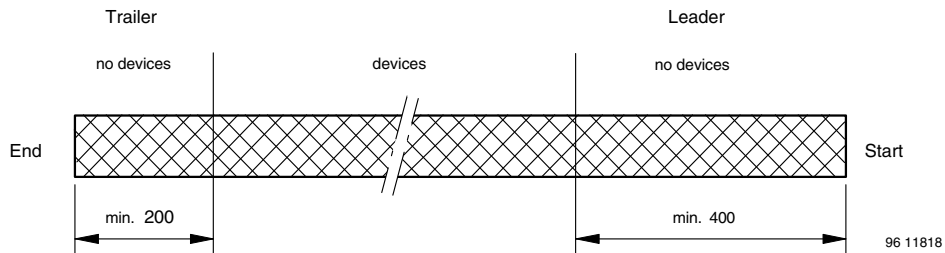


Drawing-No.: 9.800-5052.V2-4

Issue: 1; 07.05.02

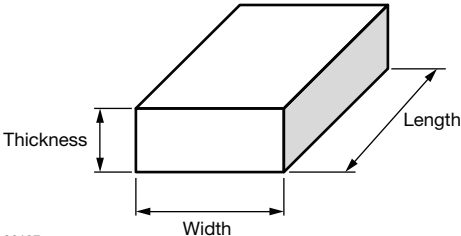
16734

LEADER AND TRAILER DIMENSIONS in millimeters



OUTER PACKAGING

The sealed reel is packed into a pizza box.

| CARTON BOX DIMENSIONS in millimeters | | | |
|--|------------------|--------------|---------------|
|  <small>22127</small> | | | |
| | 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 |



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.

ESD PRECAUTION

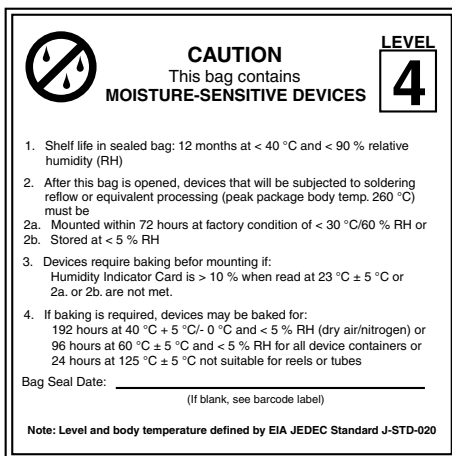
Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electrostatic sensitive devices warning labels are on the packaging.

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



22522

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



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