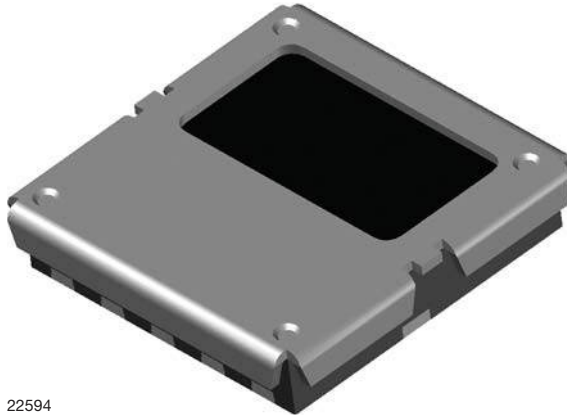




IR Receiver Modules for Remote Control Systems



22594

ORDERING CODE

Taping:

TSOP37...TT1 - top view taped

TSOP37...TT2 - top view taped

FEATURES

- Very low supply current
- Photo detectors and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Insensitive to supply voltage ripple and noise
- External metal shield
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



DESCRIPTION

The TSOP372..H, TSOP374..H series are miniaturized receiver modules for infrared remote control systems. A PIN diode and a preamplifier are assembled on a PCB, the epoxy lens cap is designed as an IR filter.

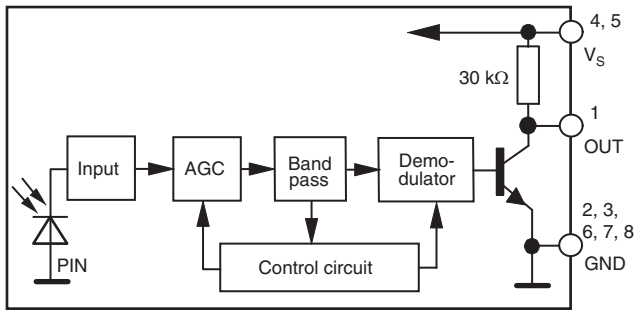
The demodulated output signal can be directly connected to a microprocessor for decoding. The TSOP372..H, TSOP374..H are optimized to suppress almost all spurious pulses from energy saving lamps like CFLs. The AGC4 used in the TSOP374.. may suppress some data signals. The TSOP372..H is a legacy product for all common IR remote control data formats. Between these two receiver types, the TSOP374..H is preferred. Customers should initially try the TSOP374..H in their design.

These components have not been qualified according to automotive specifications.

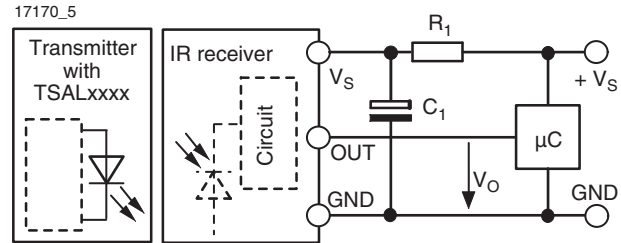
| PARTS TABLE | | | |
|--------------------------|--------|--|---|
| AGC | | LEGACY, FOR LONG BURST REMOTE CONTROLS (AGC2) | RECOMMENDED FOR LONG BURST CODES (AGC4) (1) |
| Carrier frequency | 36 kHz | TSOP37236H | TSOP37436H (2)(3)(4) |
| | 38 kHz | TSOP37238H | TSOP37438H (5)(6)(9) |
| | 40 kHz | TSOP37240H | TSOP37440H |
| | 56 kHz | TSOP37256H | TSOP37456 H(7)(8) |
| Package | | Belobog shield | |
| Pinning | | 1 = OUT, 2, 3, 6, 7, 8 = GND, 4, 5 = V _S | |
| Dimensions (mm) | | 4.3 W x 4.3 H x 1.0 D | |
| Mounting | | SMD | |
| Application | | Remote control | |
| Best remote control code | | (2) RC-5 (3) RC-6 (4) Panasonic (5) NEC (6) Sharp (7) r-step (8) Thomson RCA (9) r-map | |

Note

(1) We advise try AGC4 first if the burst length is unknown.

BLOCK DIAGRAM


20445-5

APPLICATION CIRCUIT


17170_5

R_1 and C_1 are recommended for protection against EOS. Components should be in the range of $33 \text{ k}\Omega < R_1 < 1 \text{ k}\Omega$, $C_1 > 0.1 \text{ }\mu\text{F}$.

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|-----------------------------|---|------------------|-----------------------|--------------------|
| Supply voltage | | V_S | -0.3 to +6 | V |
| Supply current | | I_S | 3 | mA |
| Output voltage | | V_O | -0.3 to $(V_S + 0.3)$ | V |
| Output current | | I_O | 5 | mA |
| Junction temperature | | T_j | 100 | $^{\circ}\text{C}$ |
| Storage temperature range | | T_{stg} | -25 to +85 | $^{\circ}\text{C}$ |
| Operating temperature range | | T_{amb} | -25 to +85 | $^{\circ}\text{C}$ |
| Power consumption | $T_{\text{amb}} \leq 85 \text{ }^{\circ}\text{C}$ | 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 ($T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$, unless otherwise specified)

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-----------------------|--|--------------------|------|----------|------|-----------------|
| Supply voltage | | V_S | 2.5 | | 5.5 | V |
| Supply current | $V_S = 3.3 \text{ V}$, $E_v = 0$ | I_{SD} | 0.27 | 0.35 | 0.45 | mA |
| | $E_v = 40 \text{ klx}$, sunlight | I_{SH} | | 0.45 | | mA |
| Transmission distance | $E_v = 0$, IR diode TSAL6200, $I_F = 200 \text{ mA}$, test signal see fig. 1 | d | | 45 | | m |
| Output voltage low | $I_{OSL} = 0.5 \text{ mA}$, $E_e = 0.7 \text{ mW/m}^2$, 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 | $E_e \text{ min.}$ | | 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 | $E_e \text{ max.}$ | 30 | | | W/m^2 |
| Directivity | Angle of half transmission distance | $\phi_{1/2}$ | | ± 75 | | deg |

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

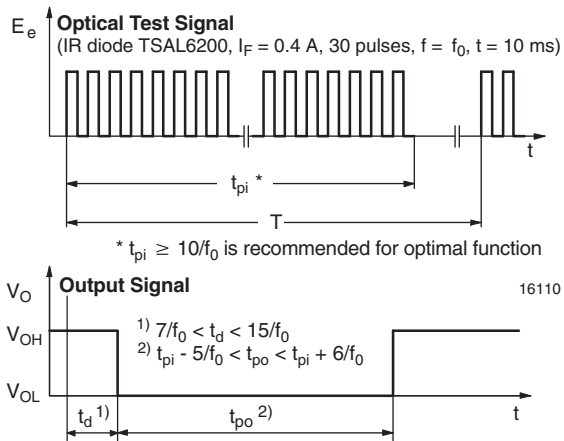


Fig. 1 - Output Function

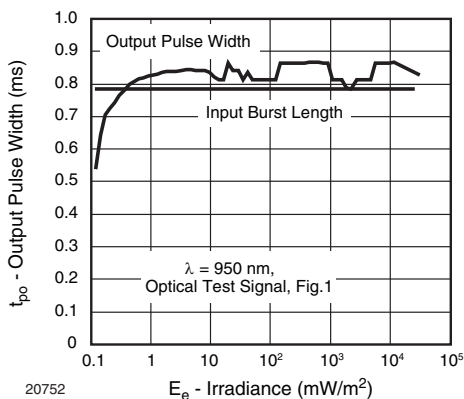


Fig. 2 - Output Pulse Width vs. Irradiance

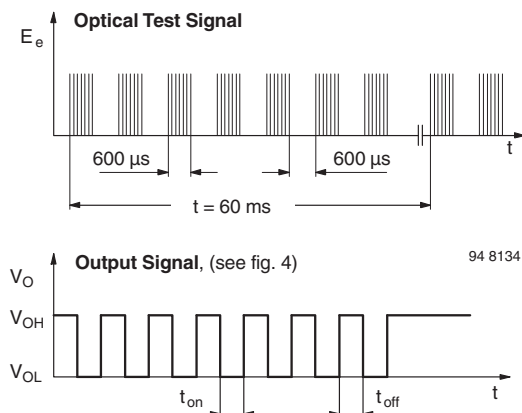


Fig. 3 - Output Function

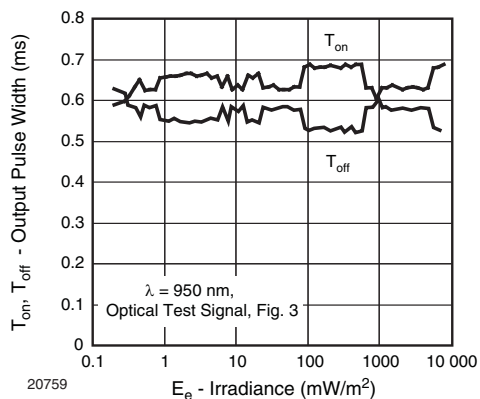


Fig. 4 - Output Pulse Diagram

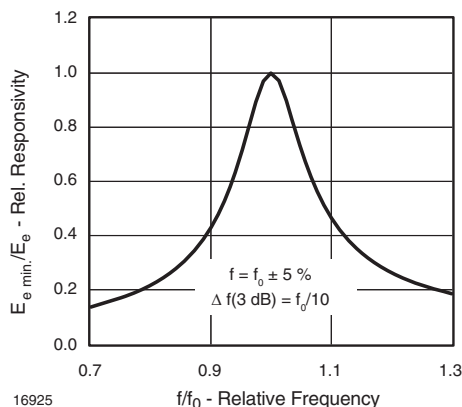


Fig. 5 - Frequency Dependence of Responsivity

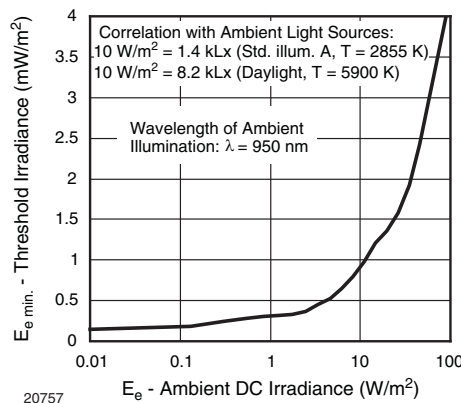


Fig. 6 - Sensitivity in Bright Ambient

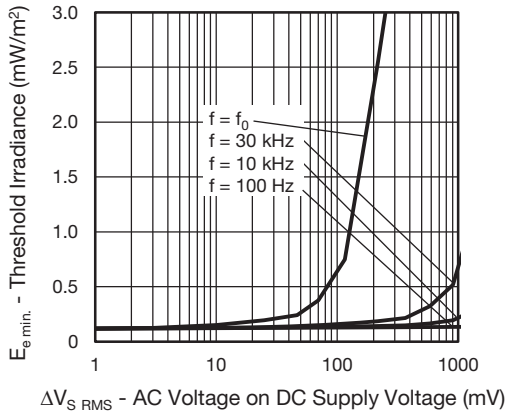


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

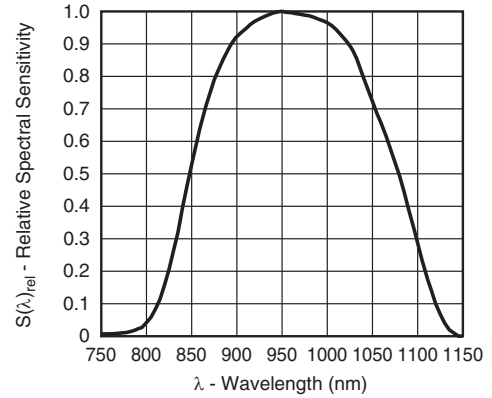


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

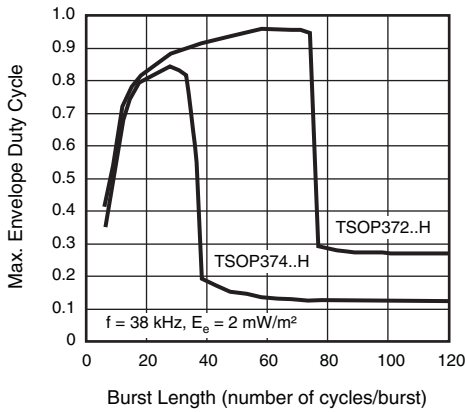


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

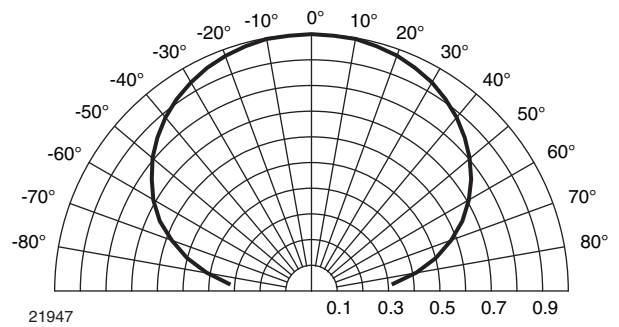


Fig. 11 - Directivity

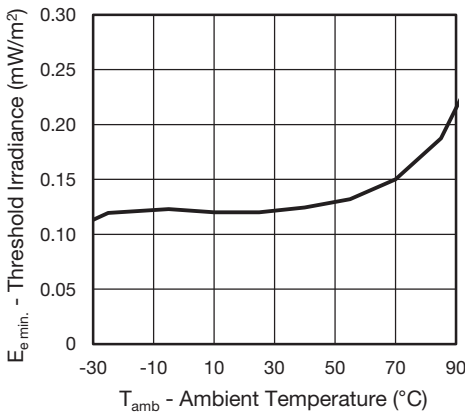


Fig. 9 - Sensitivity vs. Ambient Temperature

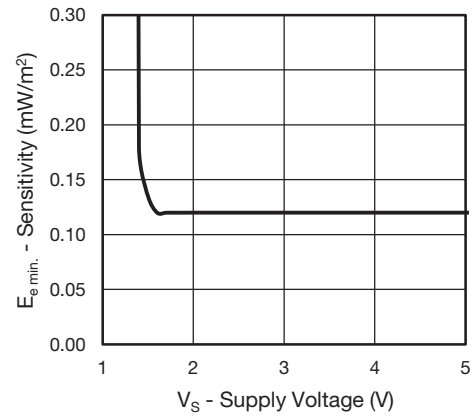


Fig. 12 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

The TSOP372..H, TSOP374..H 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 TSOP372..H, TSOP374..H 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 patterns from fluorescent lamps with electronic ballasts (see figure 13 or figure 14)

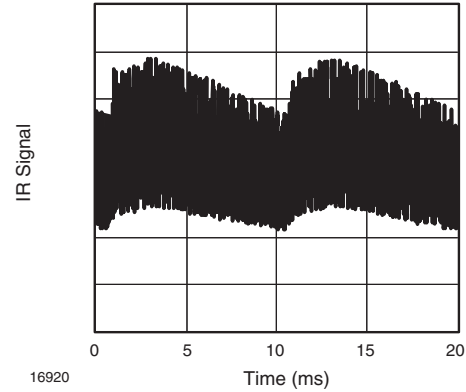


Fig. 13 - IR Signal from Fluorescent Lamp with Low Modulation

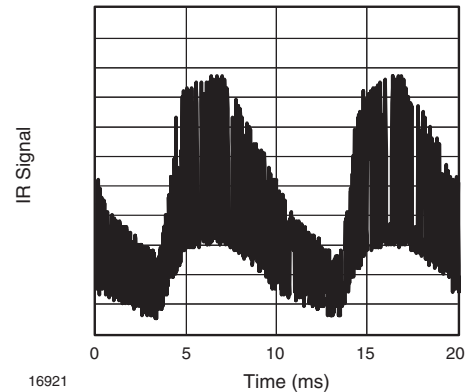


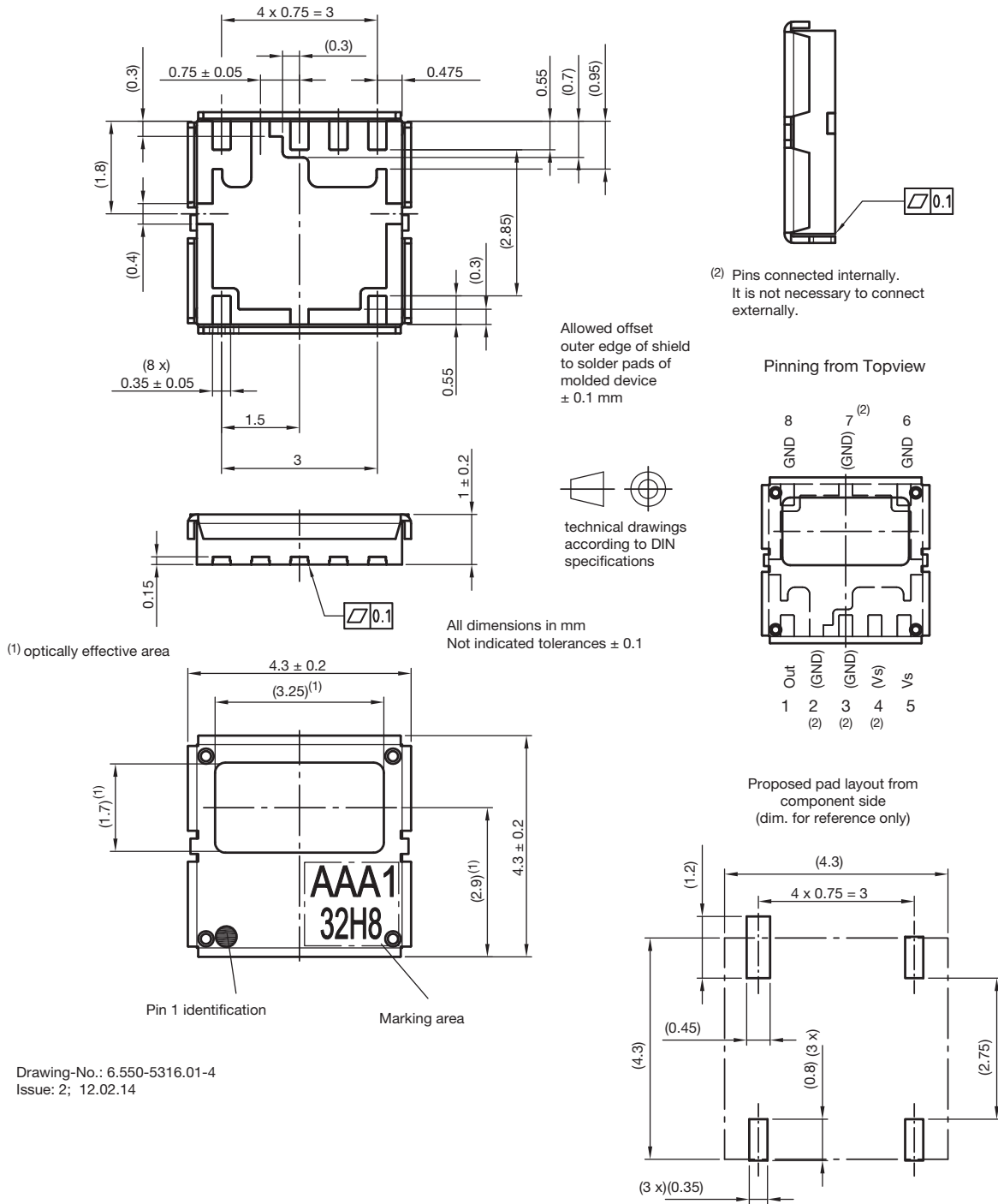
Fig. 14 - IR Signal from Fluorescent Lamp with High Modulation

| | TSOP372..H | TSOP374..H |
|--|---|--|
| 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 | Most common disturbance patterns are suppressed | Even extreme disturbance patterns are suppressed |

Notes

- For data formats with short bursts (less than 10 carrier cycles) please see the datasheet for TSOP373..H, TSOP375..H
- Best choice of AGC for some popular IR-codes:
 TSOP37436: RC-5, RC-6, Panasonic;
 TSOP37438: NEC, Sharp, r-step;
 TSOP37456: r-step, Thomson RCA
- For Sony 12, 15, and 20 bit IR-codes please see the datasheet of TSOP37S40H

PACKAGE DIMENSIONS in millimeters





ASSEMBLY INSTRUCTIONS

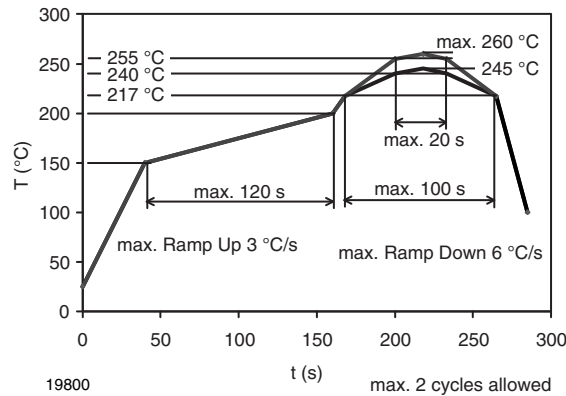
Reflow Soldering

- 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



| ORDERING INFORMATION | | | |
|----------------------|---------------|-----------------------|-----------------------------|
| ORDERING CODE | PACKAGING | VOLUME ⁽¹⁾ | REMARKS |
| TSOP37..HTT1 | Tape and reel | MOQ: 1500 pcs | 3.95 mm x 3.95 mm x 0.75 mm |
| TSOP37..HTT2 | | MOQ: 5000 pcs | |

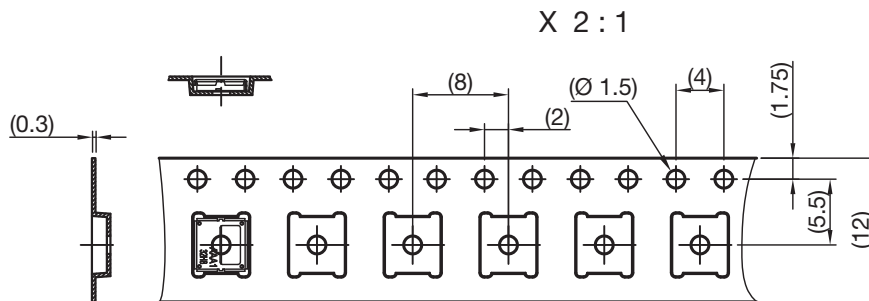
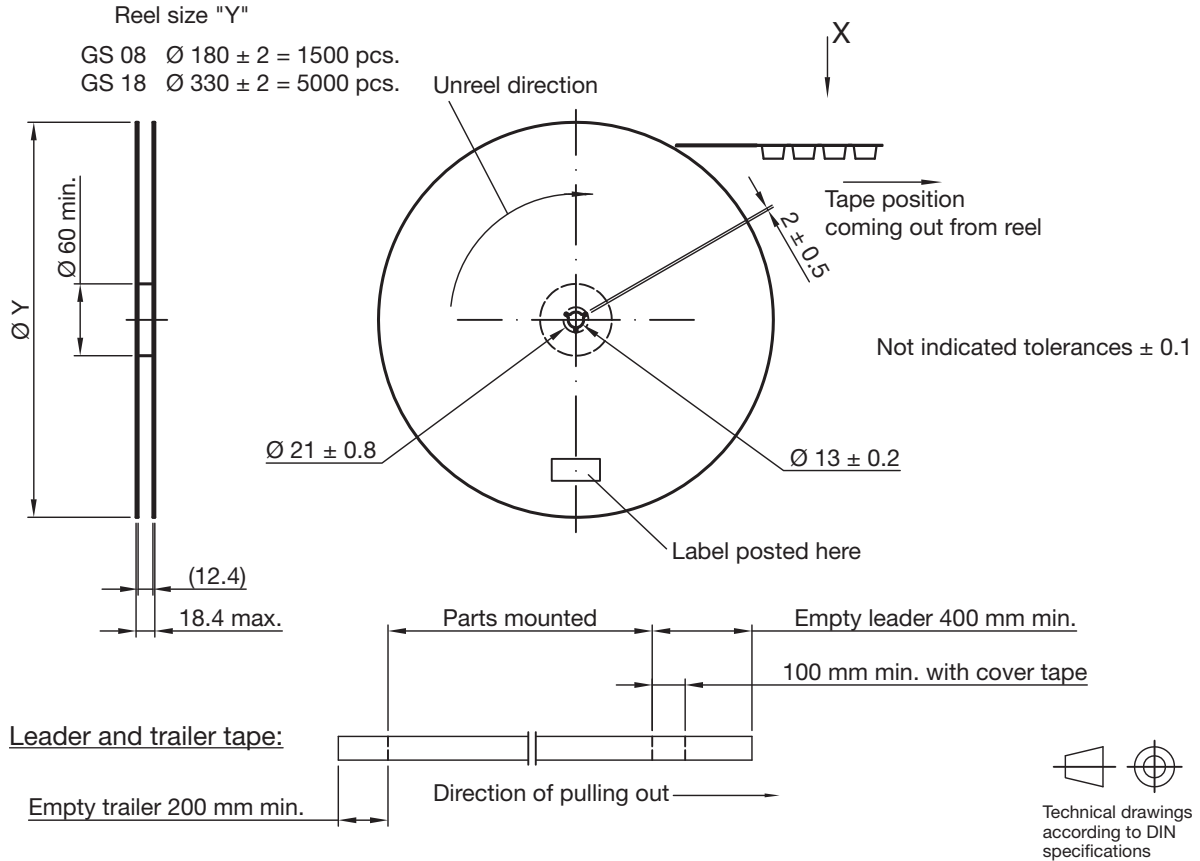
Note

⁽¹⁾ MOQ: minimum order quantity



TAPING VERSION TSOP37..H DIMENSIONS in millimeters

Tape and Reel dimensions:



Reel dimensions and tape

Drawing-No.: 9.700-5380.01-4
Issue: 1; 28.10.13



LABEL

Standard bar code labels for finished goods

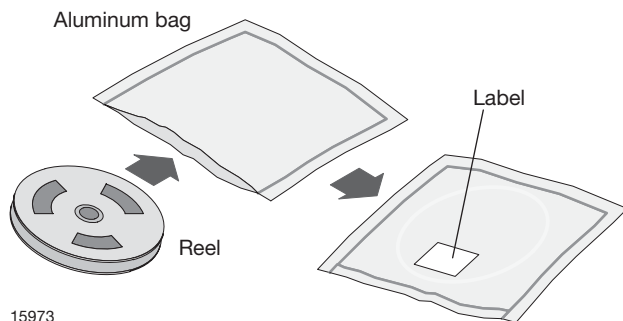
The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled

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 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.

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



Caution
This bag contains
MOISTURE-SENSITIVE DEVICES

LEVEL
3

If blank, see adjacent bar code label

1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)
2. Peak package body temperature: 260 °C
If blank, see adjacent bar code label
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
If blank, see adjacent bar code label
≤30°C/60% RH, or
 - 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: _____
If blank, see adjacent bar code label

Note: Level and body temperature defined by IPC/JEDEC J-STD-020

22650

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



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Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

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.