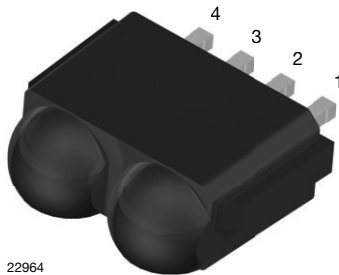


IR Receiver Modules for Remote Control Systems



22964

LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The TSOP59...TR1 series are miniaturized receiver modules for infrared remote control systems. Two PIN diodes and a preamplifier are assembled on a leadframe, the epoxy package contains an IR filter. The demodulated output signal can be directly connected to digital circuitry for decoding.

The TSOP593..TR1 series devices are optimized to suppress almost all spurious pulses from Wi-Fi and energy saving lamps (CFLs). They may also suppress some data signals if continuously transmitted.

The TSOP595..TR1 series contains a very robust AGC5. This series should only be used for critically noisy environments. Please check compatibility with your codes.

These components have not been qualified according to automotive specifications.

FEATURES

- Improved immunity against HF and RF noise
- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Two lenses for high sensitivity
- Insensitive to supply voltage ripple and noise
- Ultra low 2.6 mm profile
- Winged for mounting within PCB cutout
- Compatible with reflow soldering
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



MECHANICAL DATA

Pinning:

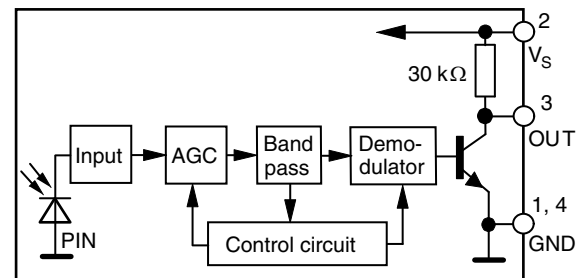
1, 4 = GND, 2 = V_S , 3 = OUT

ORDERING CODE

Taping:

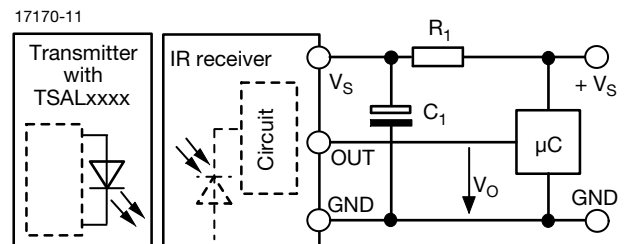
TSOP59...TR1 - top view taped, 2000 pcs/reel

BLOCK DIAGRAM



20445-1

APPLICATION CIRCUIT



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



| PARTS TABLE | | | |
|-------------------|--------|--|---|
| AGC | | NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3) | VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5) |
| Carrier frequency | 30 kHz | TSOP59330TR1 | TSOP59530TR1 |
| | 33 kHz | TSOP59333TR1 | TSOP59533TR1 |
| | 36 kHz | TSOP59336TR1 (1) | TSOP59536TR1 |
| | 38 kHz | TSOP59338TR1 (2)(3)(4)(5) | TSOP59538TR1 |
| | 40 kHz | TSOP59340TR1 | TSOP59540TR1 |
| | 56 kHz | TSOP59356TR1 | TSOP59556TR1 |
| Package | | TVCastSMD | |
| Pinning | | 1, 4 = GND, 2 = V _S , 3 = OUT | |
| Dimensions (mm) | | 6.8 W x 2.6 H x 5.3 D | |
| Mounting | | SMD | |
| Application | | Remote control | |
| Best choice for | | (1) MCIR (2) Mitsubishi (3) RECS-80 Code (4) r-map (5) XMP-1 | |

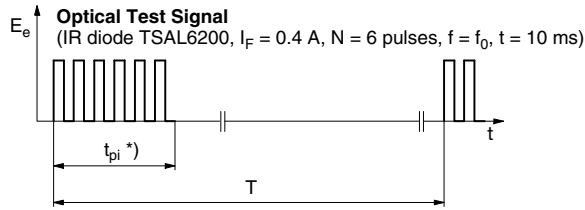
| ABSOLUTE MAXIMUM RATINGS | | | | |
|-----------------------------|--------------------------|---------------------------------|--------------------------------|------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Supply voltage | | V _S | -0.3 to +6 | V |
| Supply current | | I _S | 5 | mA |
| Output voltage | | V _O | -0.3 to 5.5 | V |
| Voltage at output to supply | | V _S - 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

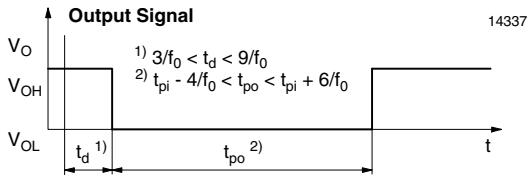
- Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure 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 | 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 = 50 mA | d | - | 18 | - | 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.} | - | 0.2 | 0.4 | 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.} | 50 | - | - | W/m ² |
| Directivity | Angle of half transmission distance | φ _{1/2} | - | ± 45 | - | deg |

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



*) $t_{pi} \geq 6/f_0$ is recommended for optimal function



1) $3/f_0 < t_d < 9/f_0$
2) $t_{pi} - 4/f_0 < t_{po} < t_{pi} + 6/f_0$

Fig. 1 - Output Active Low

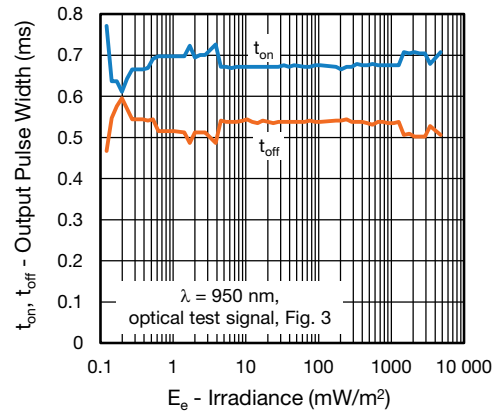


Fig. 4 - Output Pulse Diagram

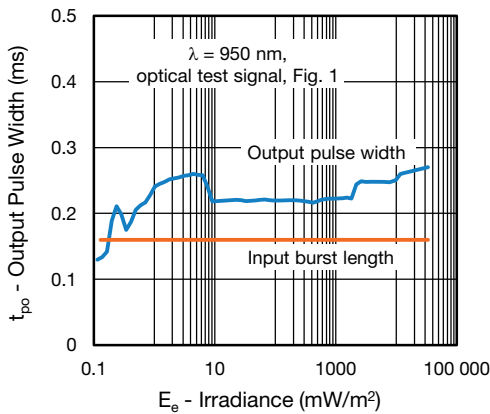


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

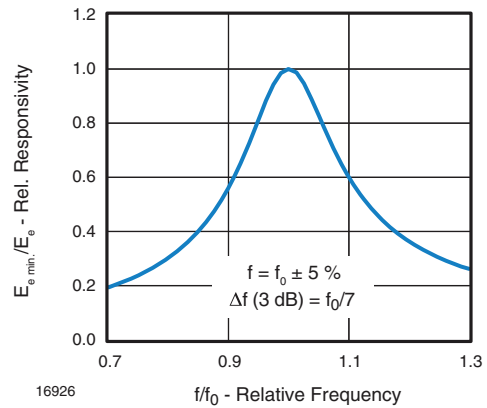


Fig. 5 - Frequency Dependence of Responsivity

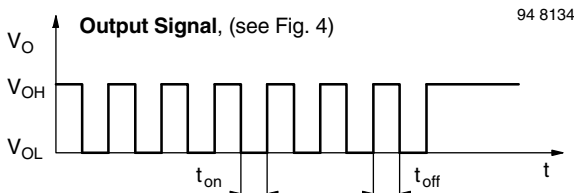
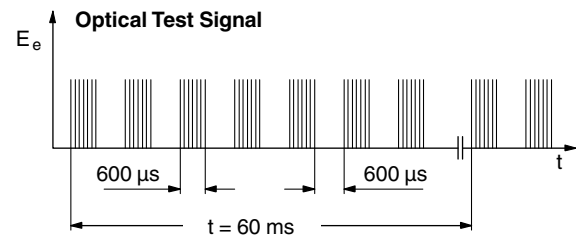


Fig. 3 - Output Function

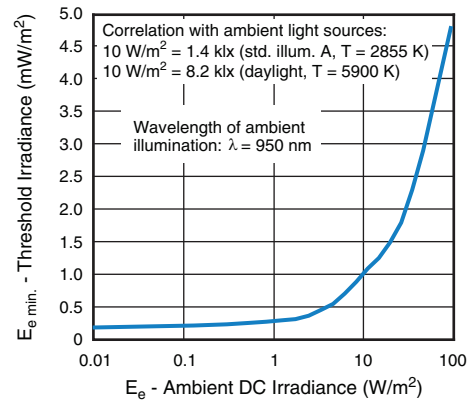


Fig. 6 - Sensitivity in Bright Ambient

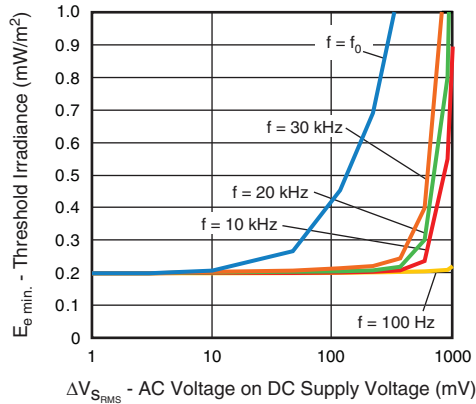


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

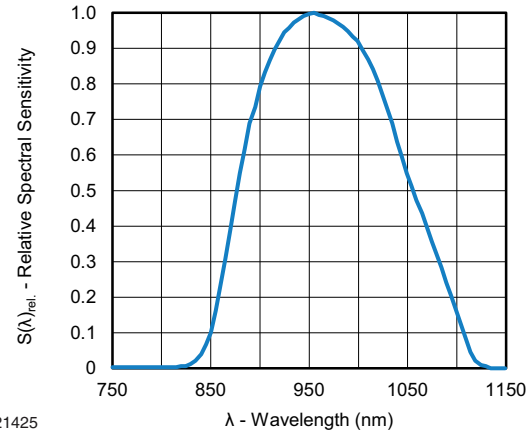


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

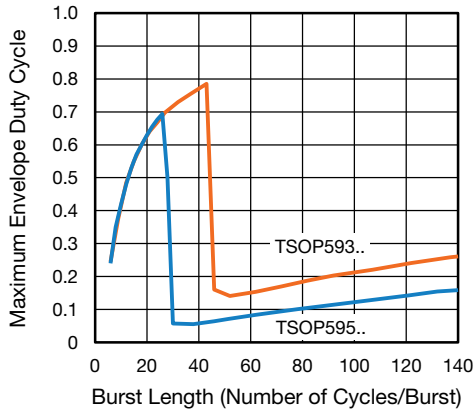


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

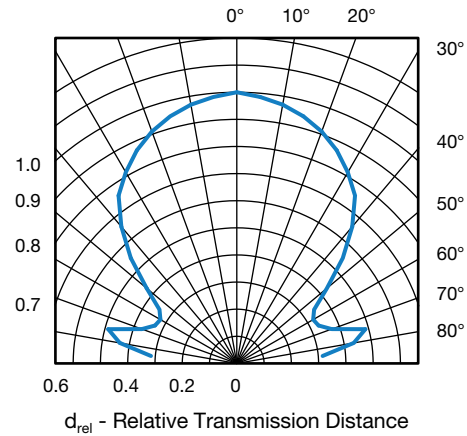


Fig. 11 - Horizontal Directivity

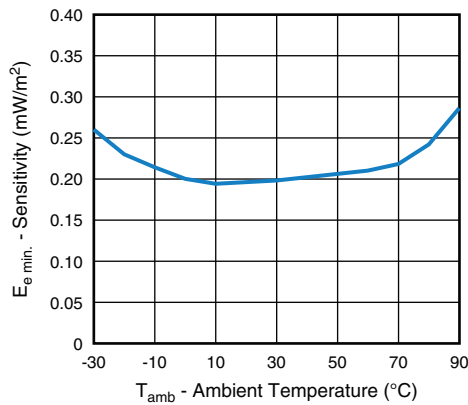


Fig. 9 - Sensitivity vs. Ambient Temperature

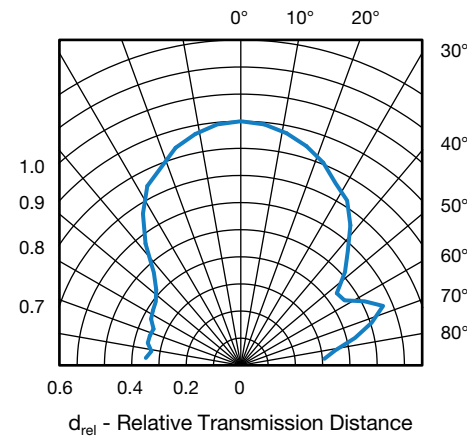


Fig. 12 - Vertical Directivity

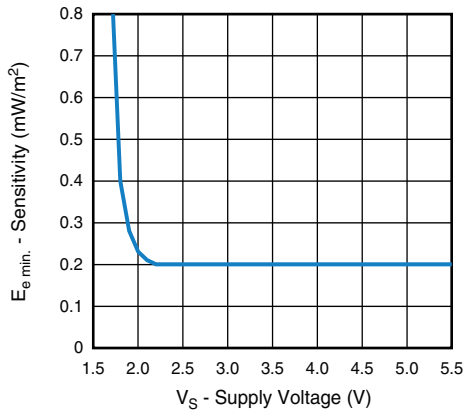


Fig. 13 - Sensitivity vs. Supply Voltage

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 pattern from fluorescent lamps with electronic ballasts (see Fig. 14 or Fig. 15)

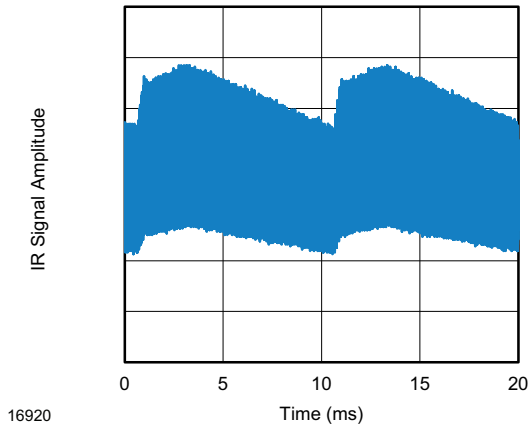


Fig. 14 - IR Disturbance from Fluorescent Lamp With Low Modulation

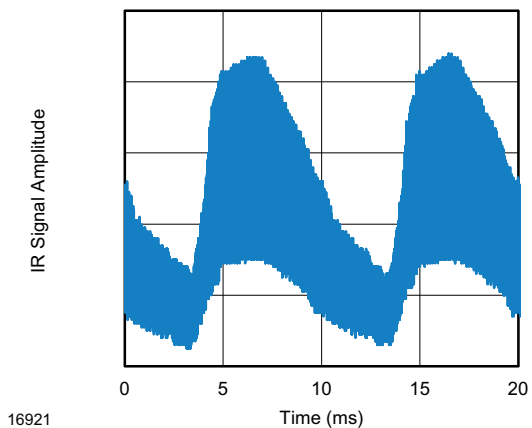


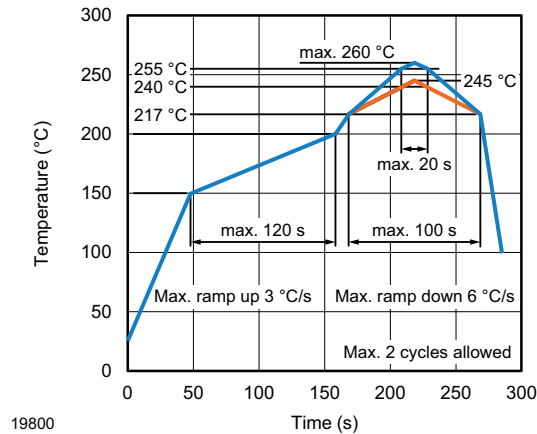
Fig. 15 - IR Disturbance from Fluorescent Lamp With High Modulation

| | TSOP593..TR1 | TSOP595..TR1 |
|--|--|---|
| Minimum burst length | 6 cycles/burst | 6 cycles/burst |
| After each burst of length a minimum gap time is required of | 6 to 35 cycles ≥ 10 cycles | 6 to 24 cycles ≥ 10 cycles |
| For bursts greater than a minimum gap time in the data stream is needed of | 35 cycles > 6 x burst length | 24 cycles > 25 ms |
| Maximum number of continuous short bursts/second | 2000 | 2000 |
| MCIR code | Preferred | Yes |
| XMP-1, XMP-2 code | Preferred | Yes |
| Suppression of interference from fluorescent lamps | Mild and complex disturbance patterns are suppressed (example: signal patterns of Fig. 14 and Fig. 15) | Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs |

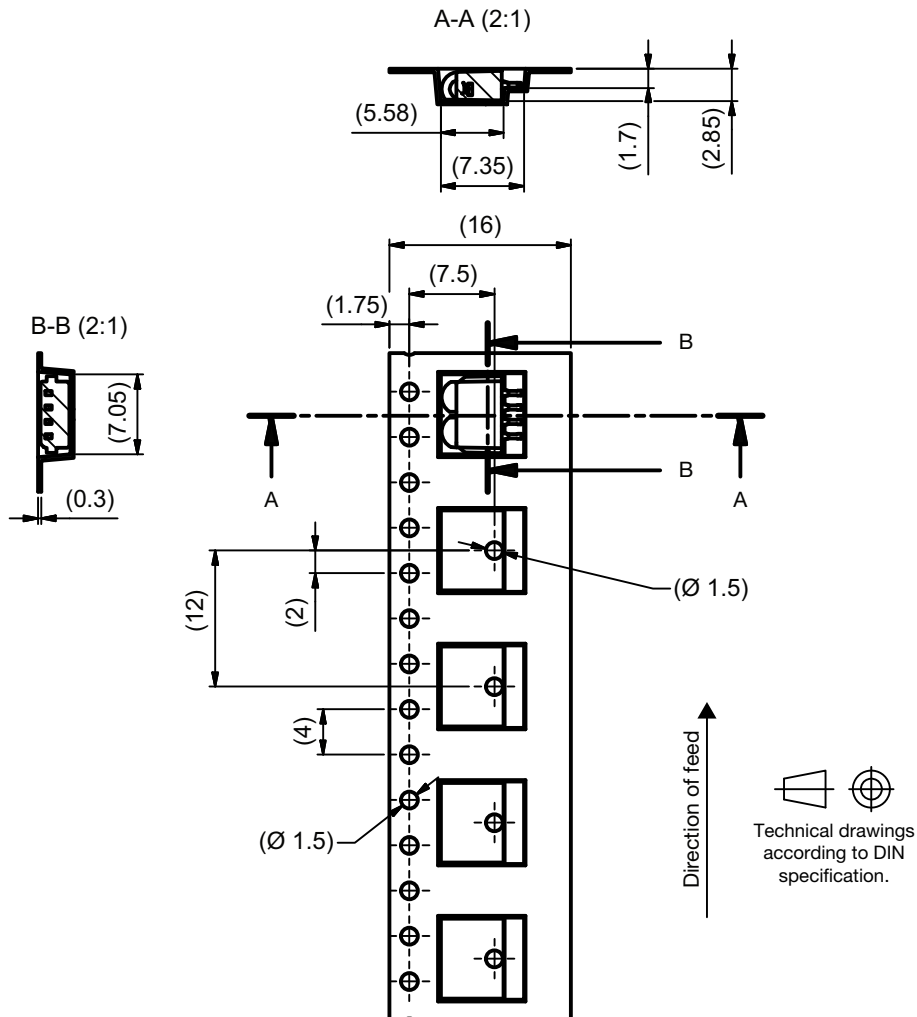
Note

- For data formats with long bursts please see the datasheet for TSOP592..TR1, TSOP594..TR1

VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE



TAPING VERSION TSOP..TR DIMENSIONS in millimeters

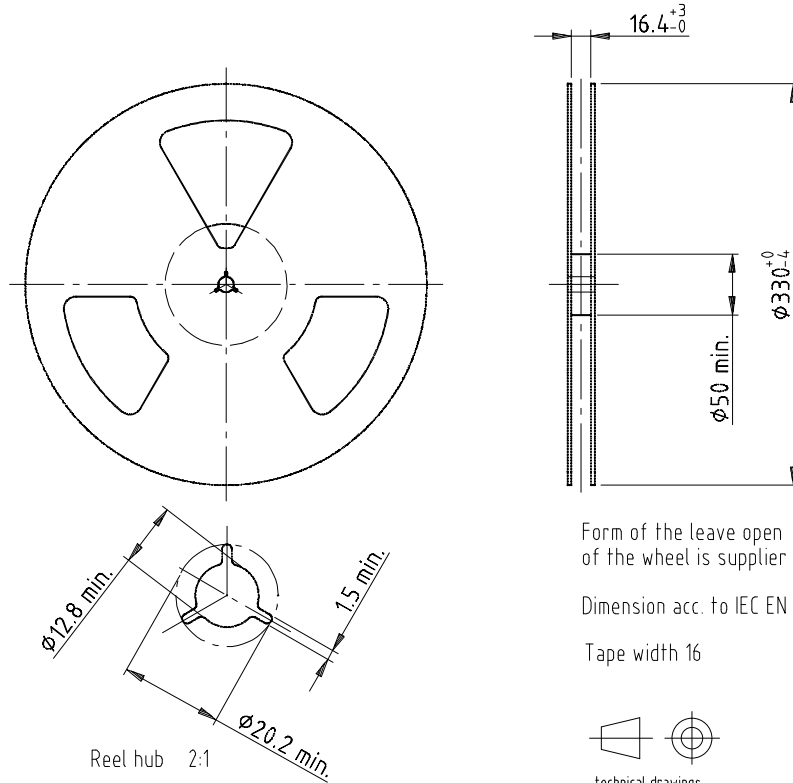


Drawing-No.: MM-200-229.01-4_Z
Issue A: 24.04.17



REEL DIMENSIONS in millimeters

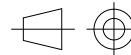
Packing quantity - 2000 pieces per reel



Form of the leave open of the wheel is supplier specific.

Dimension acc. to IEC EN 60 286-3

Tape width 16



Technical drawings according to DIN specifications

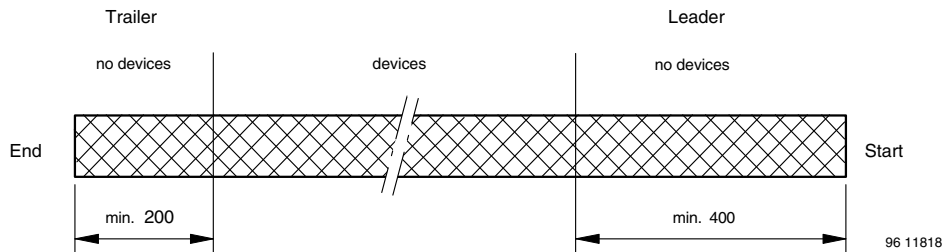
Reel hub 2:1

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 (Belobog, Panhead, Heimdall, TVCast SMD, and Minimold DF1P) (taping in reels) | 50 | 340 | 340 |

COVER TAPE PEEL STRENGTH

According to DIN EN 60286-3
 0.1 N to 1.3 N
 300 ± 10 mm/min.
 165° to 180° peel angle

LABEL

Standard bar code labels for finished goods

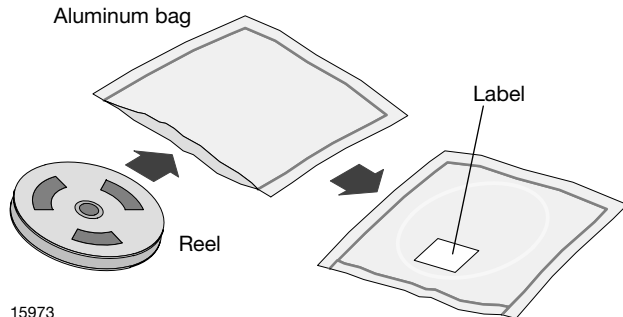
The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain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



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.

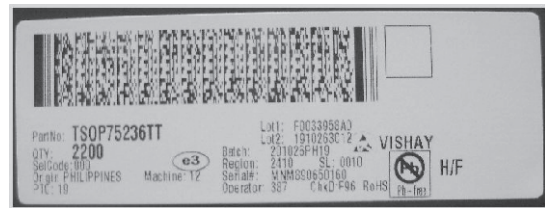
An EIA JEDEC® standard J-STD-020 level 4 label is included on all dry bags.

ESD PRECAUTION

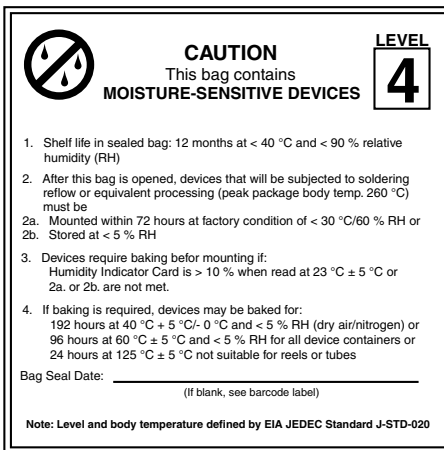
Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electrostatic sensitive devices warning labels are on the packaging.

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.



22178



22522

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



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