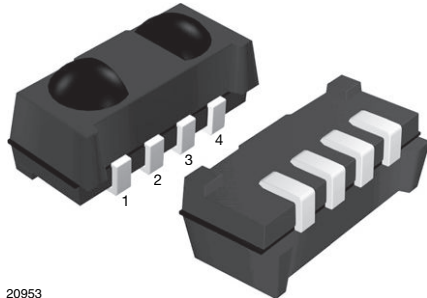




## IR Receiver Modules for Remote Control Systems



20953

### MECHANICAL DATA

#### Pinning:

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

Please see the document "Product Transition Schedule" at [www.vishay.com/ir-receiver-modules/](http://www.vishay.com/ir-receiver-modules/) for up-to-date info, when this product will be released.

### FEATURES

- Very low supply current
- Photo detector and preamplifier in one package
- Compatible also with short burst dataformats
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Capable of side or top view
- Two lenses for high sensitivity and wide receiving angle
- Insensitive to supply voltage ripple and noise
- Narrow optical filter to reduce interference from plasma TV emissions
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### DESCRIPTION

The TSOP753.., TSOP755.. series are a two lens miniaturized receiver module for infrared remote control systems. One PIN diode per lens and a preamplifier are assembled on a leadframe, the epoxy lens cap is designed as an IR filter.

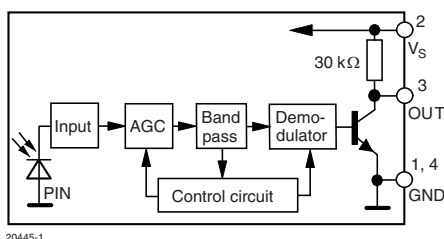
The demodulated output signal can be directly decoded by a microprocessor. The TSOP753.. is compatible with all common IR remote control data formats. It is optimized to suppress almost all spurious pulses from energy saving fluorescent lamps. The TSOP755.. has an excellent noise suppression. It is immune to dimmed LCD backlighting and any fluorescent lamps. AGC3 and AGC5 may also suppress some data signals in case of continuous transmission.

This component has not been qualified according to automotive specifications.

### PARTS TABLE

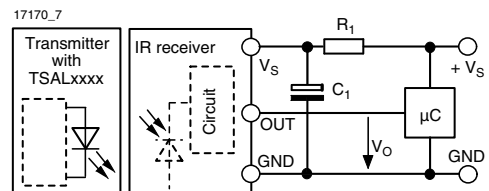
CARRIER FREQUENCY	NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)	VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)
30 kHz	TSOP75330	TSOP75530
33 kHz	TSOP75333	TSOP75533
36 kHz	TSOP75336	TSOP75536
38 kHz	TSOP75338	TSOP75538
40 kHz	TSOP75340	TSOP75540
56 kHz	TSOP75356	TSOP75556

### BLOCK DIAGRAM



20445-1

### APPLICATION CIRCUIT



The external components  $R_1$  and  $C_1$  are optional to improve the robustness against electrical overstress (typical values are  $R_1 = 100 \Omega$ ,  $C_1 = 0.1 \mu F$ ). The output voltage  $V_O$  should not be pulled down to a level below 1 V by the external circuit. The capacitive load at the output should be less than 2 nF.

**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	°C
Storage temperature range		$T_{stg}$	- 25 to + 85	°C
Operating temperature range		$T_{amb}$	- 25 to + 85	°C
Power consumption	$T_{amb} \leq 85\text{ °C}$	$P_{tot}$	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** ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage		$V_S$	2.5		5.5	V
Supply current	$E_v = 0$ , $V_S = 3.3\text{ V}$	$I_{SD}$	0.27	0.35	0.45	mA
	$E_v = 40\text{ klx}$ , sunlight	$I_{SH}$		0.45		mA
Transmission distance	$E_v = 0$ , test signal see fig. 1, IR diode TSAL6200, $I_F = 200\text{ mA}$	$d$		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: $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ , test signal see fig. 1	$E_e\text{ min.}$		0.12	0.25	mW/m <sup>2</sup>
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ , test signal see fig. 1	$E_e\text{ max.}$	30			W/m <sup>2</sup>
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		$\pm 50$		deg

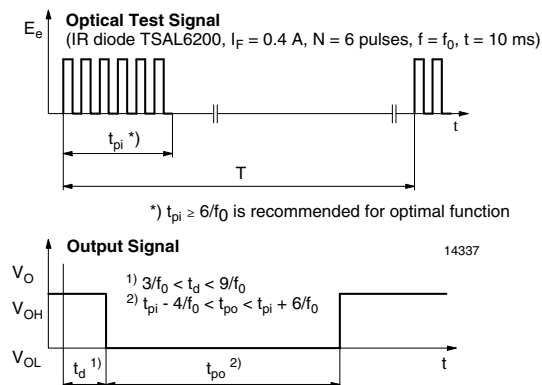
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

Fig. 1 - Output Active Low

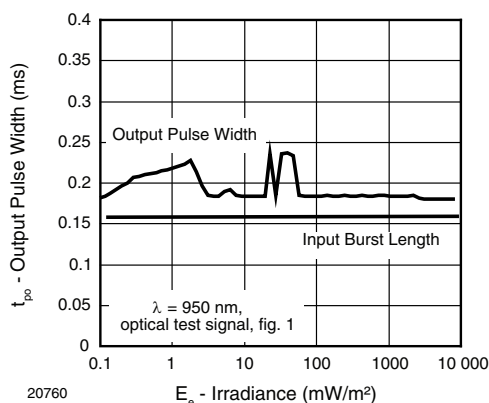


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

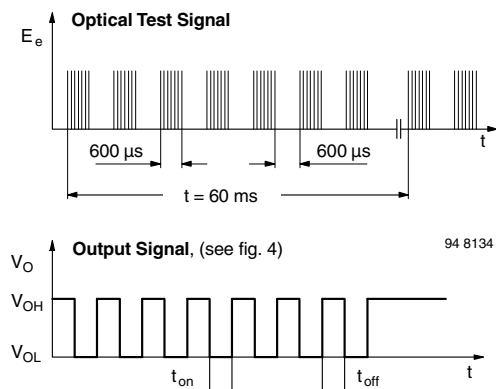


Fig. 3 - Output Function

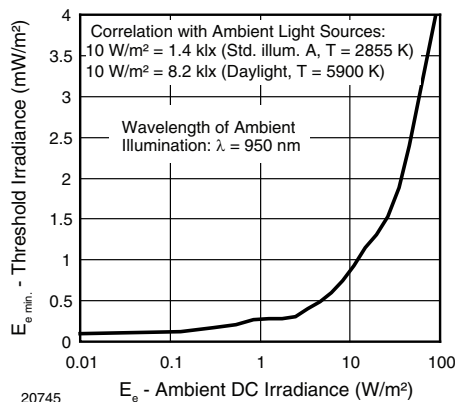


Fig. 6 - Sensitivity in Bright Ambient

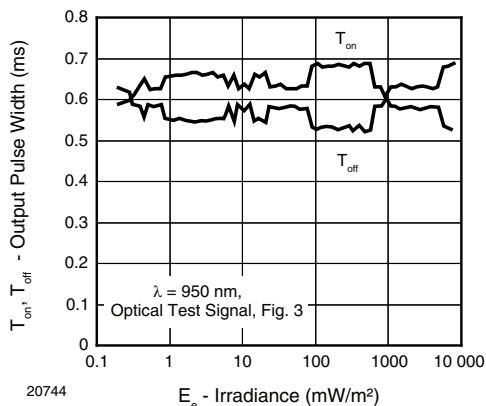


Fig. 4 - Output Pulse Diagram

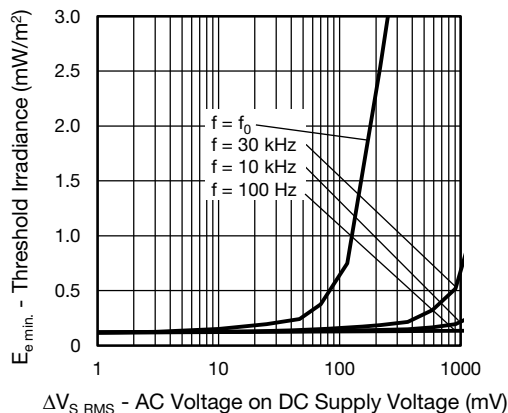


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

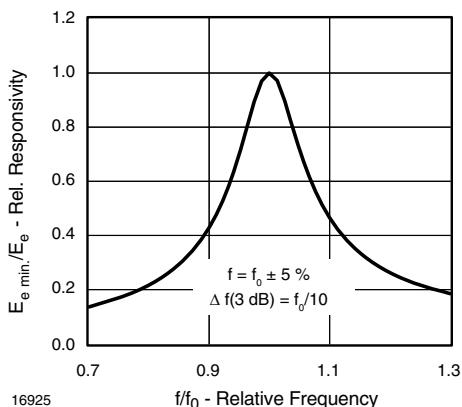


Fig. 5 - Frequency Dependence of Responsivity

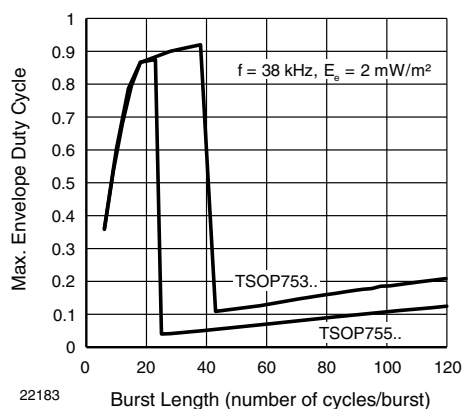


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

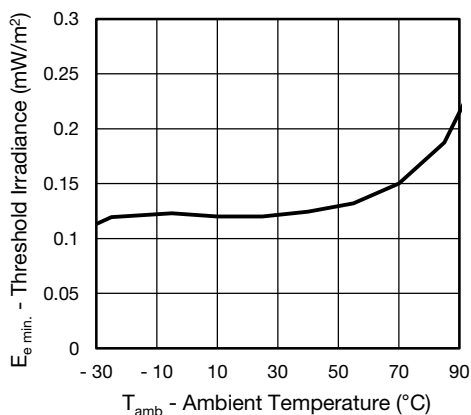


Fig. 9 - Sensitivity vs. Ambient Temperature

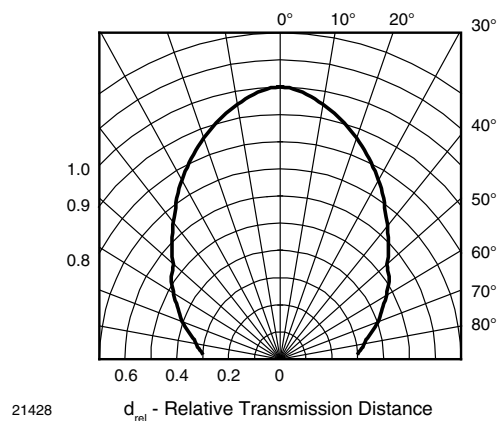


Fig. 12 - Vertical Directivity

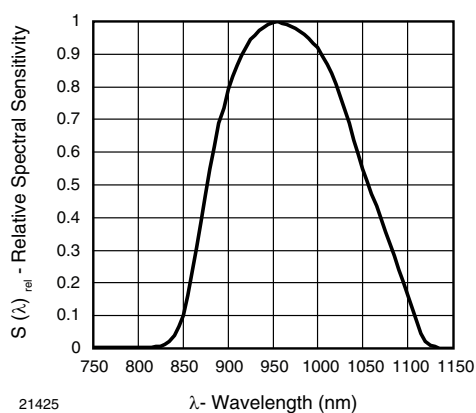


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

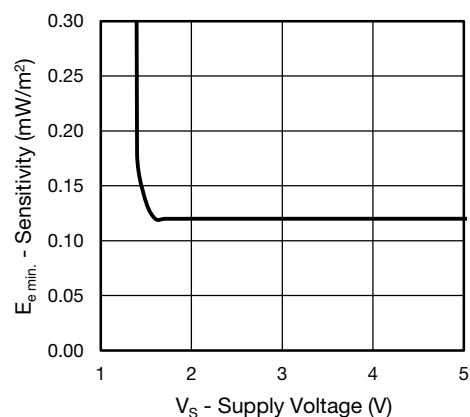


Fig. 13 - Sensitivity vs. Supply Voltage

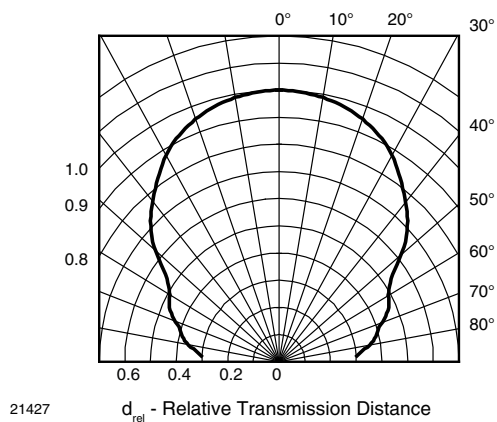


Fig. 11 - Horizontal Directivity



## SUITABLE DATA FORMAT

The TSOP753.., TSOP755.. series are designed to suppress spurious output pulses due to noise or disturbance signals. Data and disturbance signals can be distinguished by the devices according to carrier frequency, burst length and envelope duty cycle. The data signal should be close to the band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the TSOP753.. and TSOP755.. in the presence of a disturbance signal, the sensitivity of the receiver is reduced to insure that no spurious pulses are present at the output. Some examples of disturbance signals which are suppressed are:

- DC light (e.g. from tungsten bulb or sunlight)
- Continuous signals at any frequency
- Strongly or weakly modulated noise from fluorescent lamps with electronic ballasts (see fig. 14 or fig. 15)

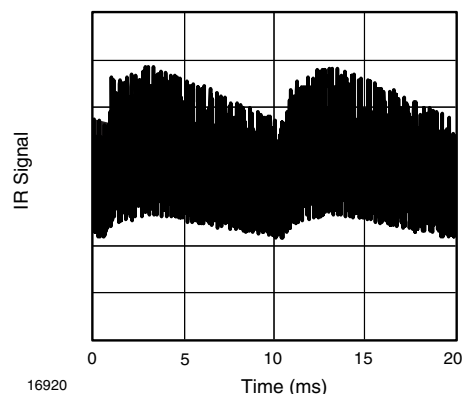


Fig. 14 - IR Signal from Fluorescent Lamp with Low Modulation

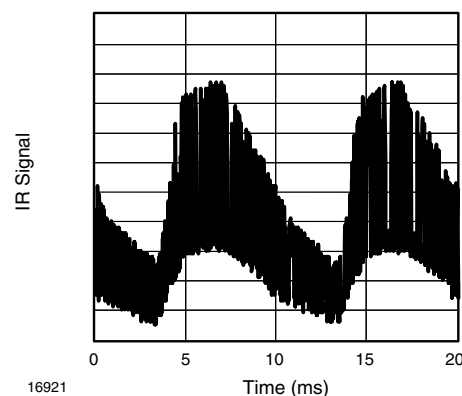


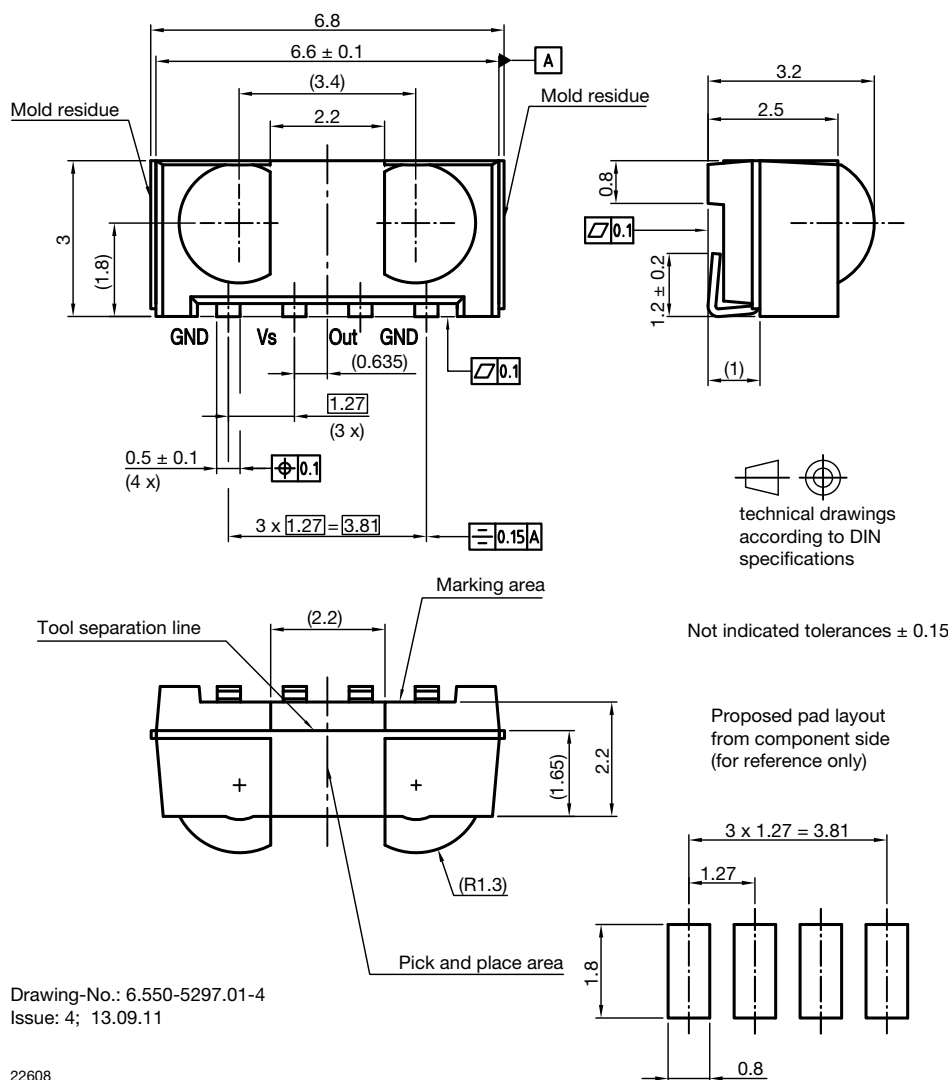
Fig. 15 - IR Signal from Fluorescent Lamp with High Modulation

	TSOP753..	TSOP755..
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 > 4 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	2000	2000
Recommended for NEC code	yes	yes
Recommended for RC5/RC6 code	yes	yes
Recommended for Sony code	no	no
Recommended for XMP format	yes	yes
Recommended for RCMM code	yes	yes
Recommended for RECS-80 code	yes	yes
Suppression of interference from fluorescent lamps	Most common disturbance signals are suppressed	Most common disturbance signals are suppressed

### Note

- For data formats with long bursts please see the datasheet for TSOP752.., TSOP754.. .

### PACKAGE DIMENSIONS in millimeters



## ASSEMBLY INSTRUCTIONS

## Reflow Soldering

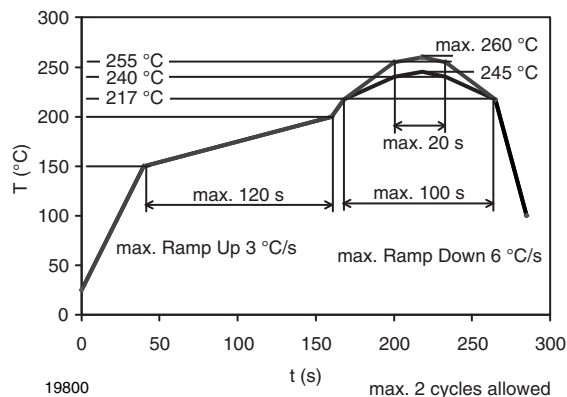
- Reflow soldering must be done within 72 h while stored under a max. temperature of 30 °C, 60 % RH after opening the dry pack envelope
- Set the furnace temperatures for pre-heating and heating in accordance with the reflow temperature profile as shown in the diagram. Exercise extreme care to keep the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

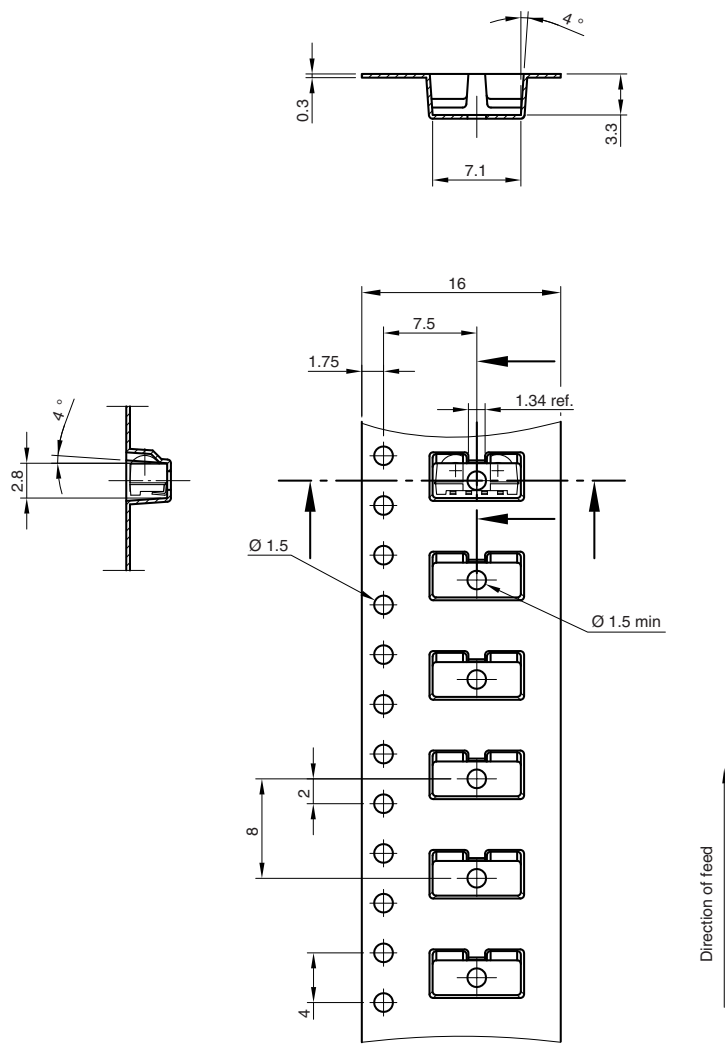
- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off



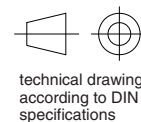
**VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE**



**TAPING VERSION TSOP..TR DIMENSIONS** in millimeters



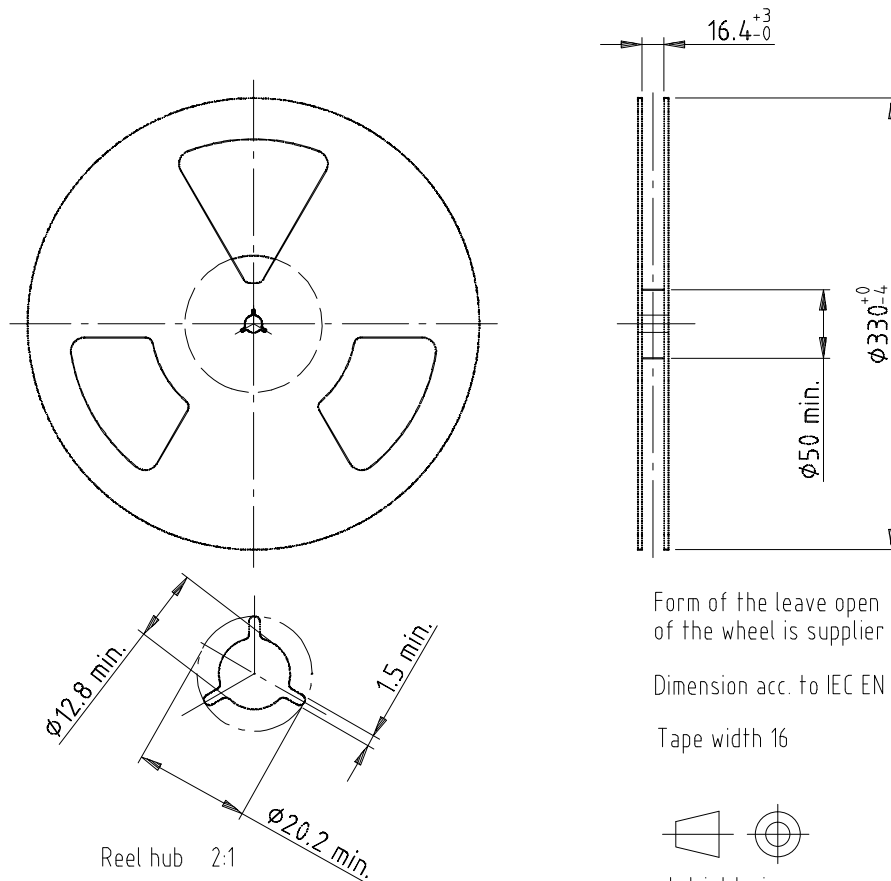
Drawing-No.: 9.700-5337.01-4  
Issue: 1; 16.10.08  
21577



Technical drawing of a 10-hole punch plate. The main view shows a rectangular plate with 10 circular holes arranged in two vertical columns of five. The overall width is 16. The distance from the left edge to the center of the first column is 1.75, and the distance between the centers of the two columns is 7.5. The distance from the bottom edge to the center of the first row is 4, and the distance between the centers of the rows is 2. The diameter of the holes is  $\varnothing 1.5$ . A detail view on the left shows a cross-section of the plate with a thickness of 3.3 and a chamfer angle of  $4^\circ$ . A detail view on the right shows a cross-section of the plate with a thickness of 3.35, a width of 7.1, and a chamfer angle of  $4^\circ$ .

technical drawings  
according to DIN  
specifications



**REEL DIMENSIONS** in millimeters

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

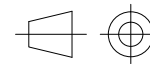
Issue: 1; 07.05.02

16734

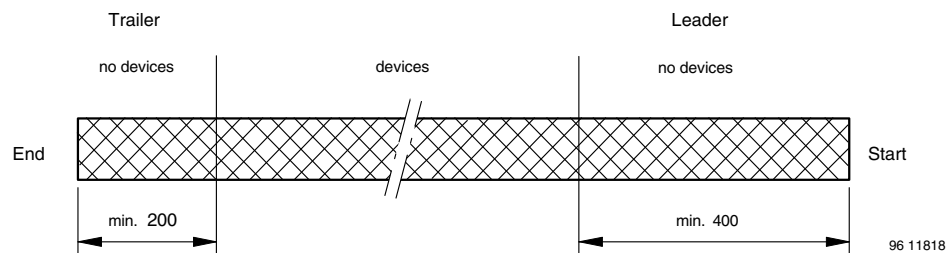
Form of the leave open of the wheel is supplier specific.

Dimension acc. to IEC EN 60 286-3

Tape width 16



technical drawings according to DIN specifications

**LEADER AND TRAILER DIMENSIONS** in millimeters

96 11818

**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**

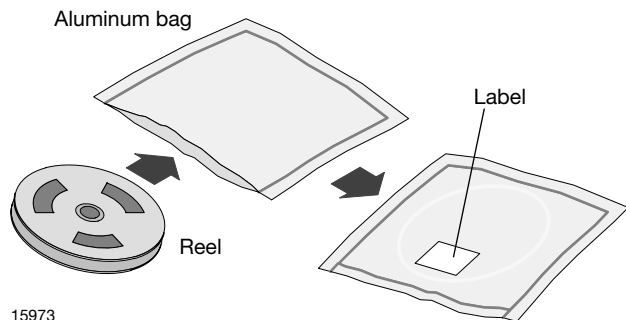
The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain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

**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:

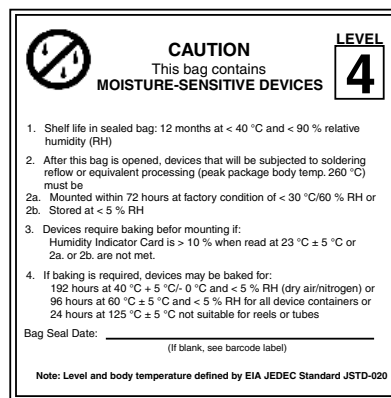
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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



EIA JEDEC standard JSTD-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.

**BAR CODE PRODUCT LABEL (example)**

22178



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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.**