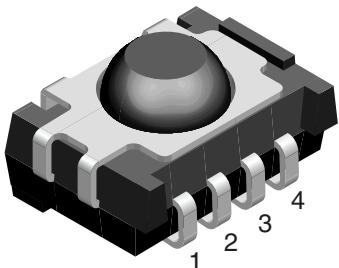


IR Receiver Modules for Remote Control Systems



16797

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
- Taping available for topview and sideview assembly
- 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 = VS, 4 = OUT

ORDERING CODE

Taping:

TSOP36...TT - top view taped

TSOP36...TR - side view taped

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 TSOP362.. and TSOP364.. 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.. is a legacy product for all common IR remote control data formats. Between these two receiver types, the TSOP364.. is preferred. Customers should initially try the TSOP364.. in their design.

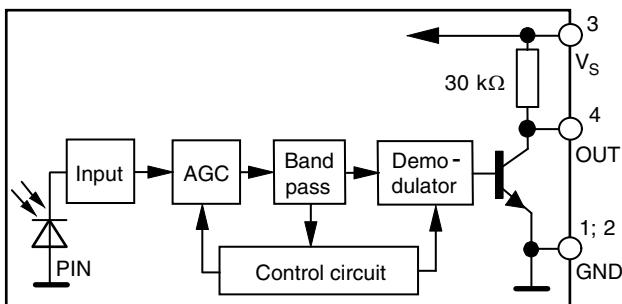
These components have not been qualified according to automotive specifications.

PARTS TABLE

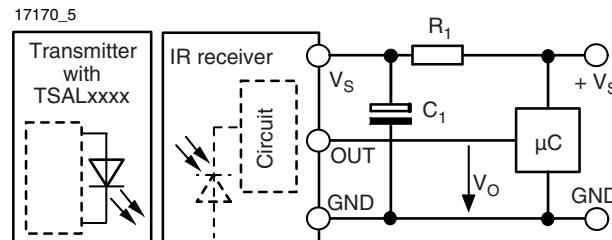
AGC	LEGACY, FOR LONG BURST REMOTE CONTROLS (AGC2)		RECOMMENDED FOR LONG BURST CODES (AGC4) ⁽¹⁾
Carrier frequency	30 kHz	TSOP36230	TSOP36430
	33 kHz	TSOP36233	TSOP36433
	36 kHz	TSOP36236	TSOP36436 ⁽²⁾⁽³⁾⁽⁴⁾
	38 kHz	TSOP36238	TSOP36438 ⁽⁵⁾⁽⁶⁾
	40 kHz	TSOP36240	TSOP36440
	56 kHz	TSOP36256	TSOP36456 ⁽⁷⁾⁽⁸⁾
Package	Panhead		
Pinning	1 = GND, 2 = N.C., 3 = VS, 4 = OUT		
Dimensions (mm)	7.5 W x 5.3 H x 4.0 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		

Note

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

BLOCK DIAGRAM


16839

APPLICATION CIRCUIT


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

ABSOLUTE MAXIMUM RATINGS

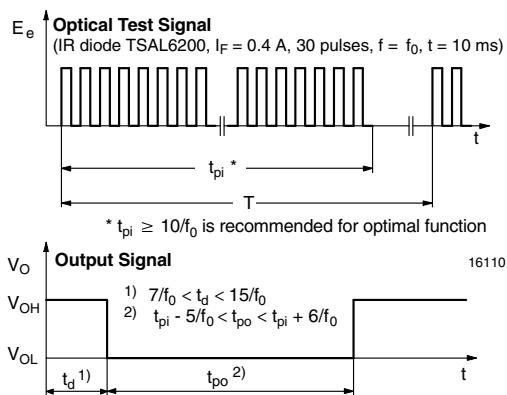
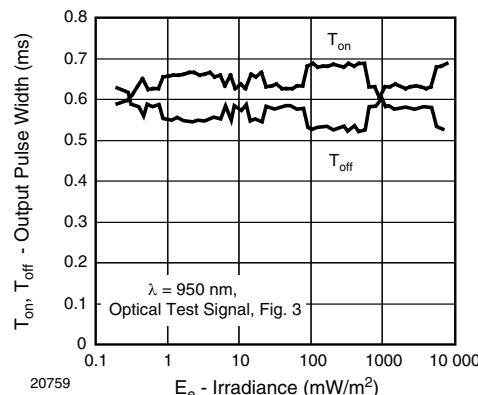
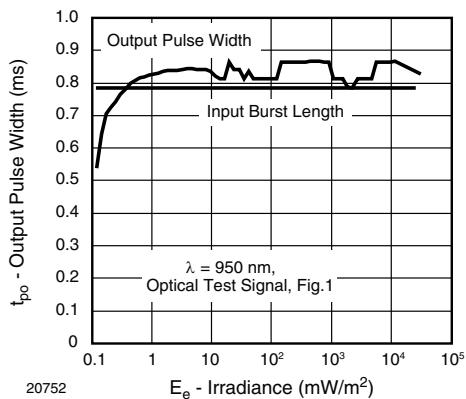
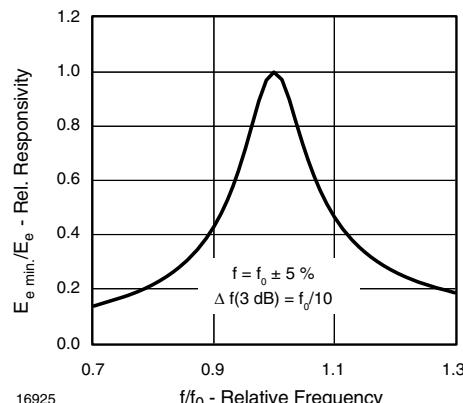
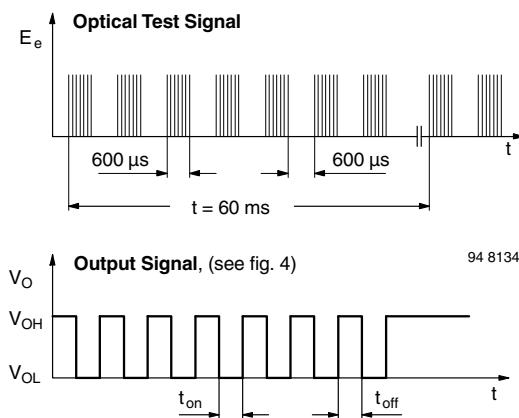
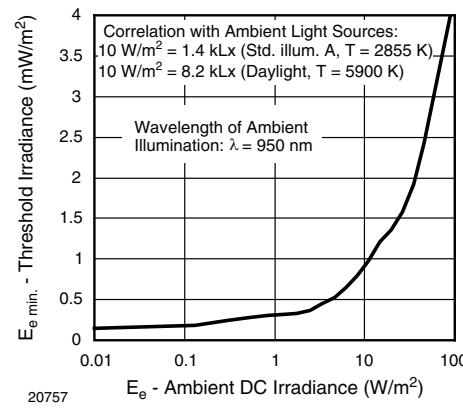
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage (pin 3)		V_S	-0.3 to +6	V
Supply current (pin 3)		I_S	3	mA
Output voltage (pin 4)		V_O	-0.3 to ($V_S + 0.3$)	V
Output current (pin 4)		I_O	5	mA
Junction temperature		T_j	100	°C
Storage temperature range		T_{stg}	-25 to +85	°C
Operating temperature range		T_{amb}	-25 to +85	°C
Power consumption	$T_{amb} \leq 85^\circ\text{C}$	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 ($T_{amb} = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
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
Supply voltage		V_S	2.5		5.5	V
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: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, 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	$\varphi_{1/2}$		± 50		deg

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

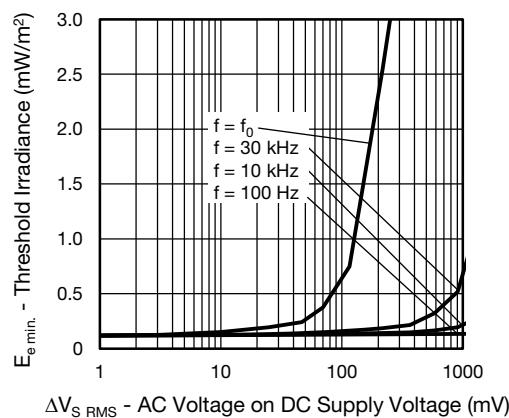


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

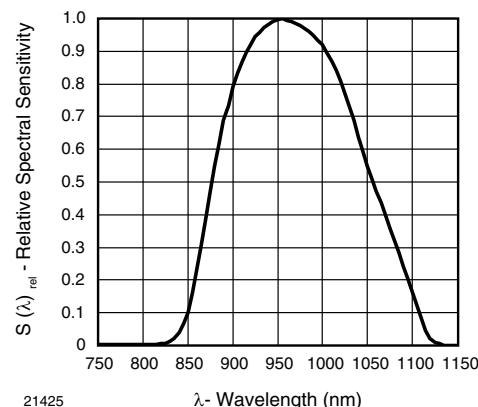


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

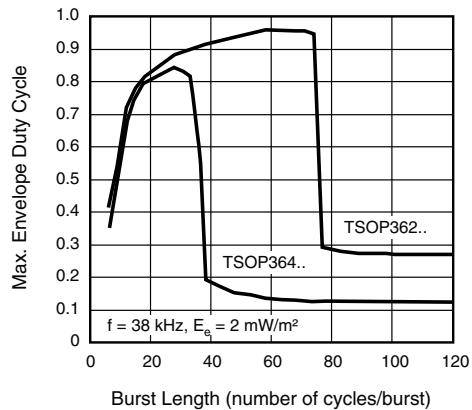


Fig. 8 - Maximum Envelope Duty Cycle vs. Burst Length

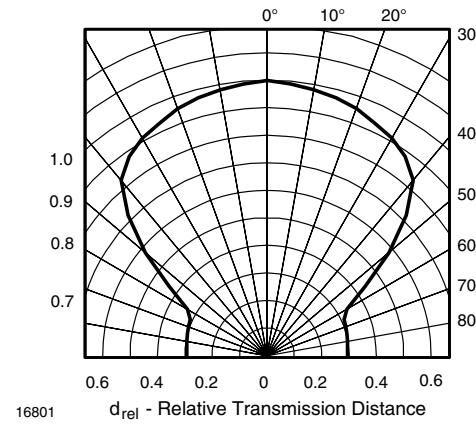


Fig. 11 - Horizontal Directivity

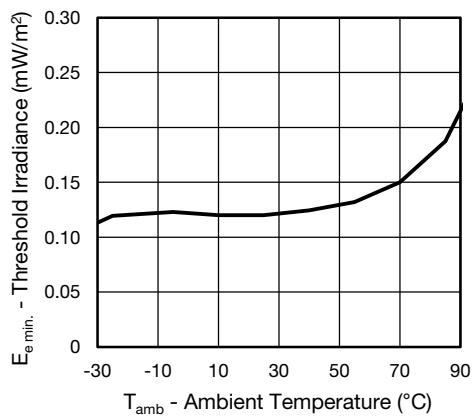


Fig. 9 - Sensitivity vs. Ambient Temperature

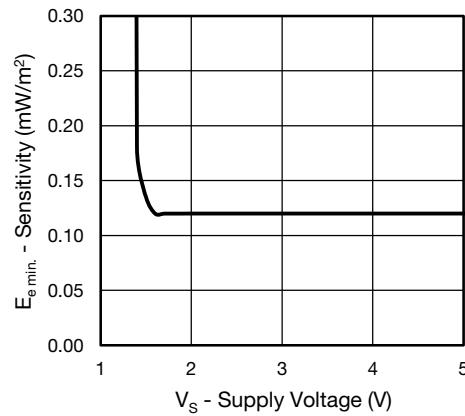


Fig. 12 - Sensitivity vs. Supply Voltage

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 figure 13 or figure 14)

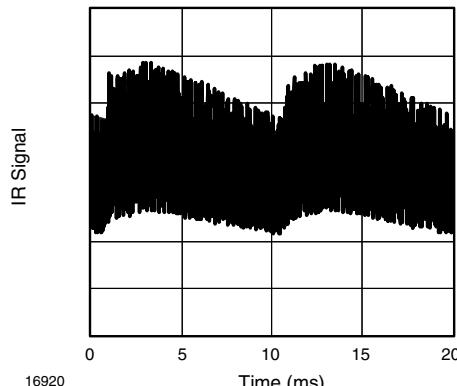


Fig. 13 - IR Disturbance from Fluorescent Lamp with Low Modulation

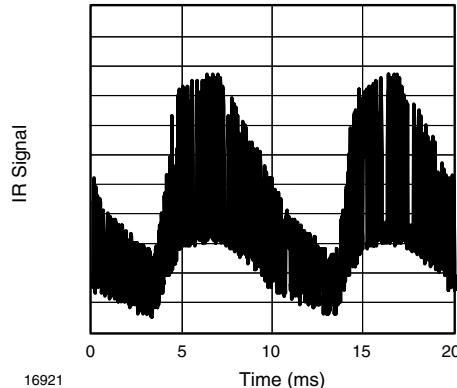
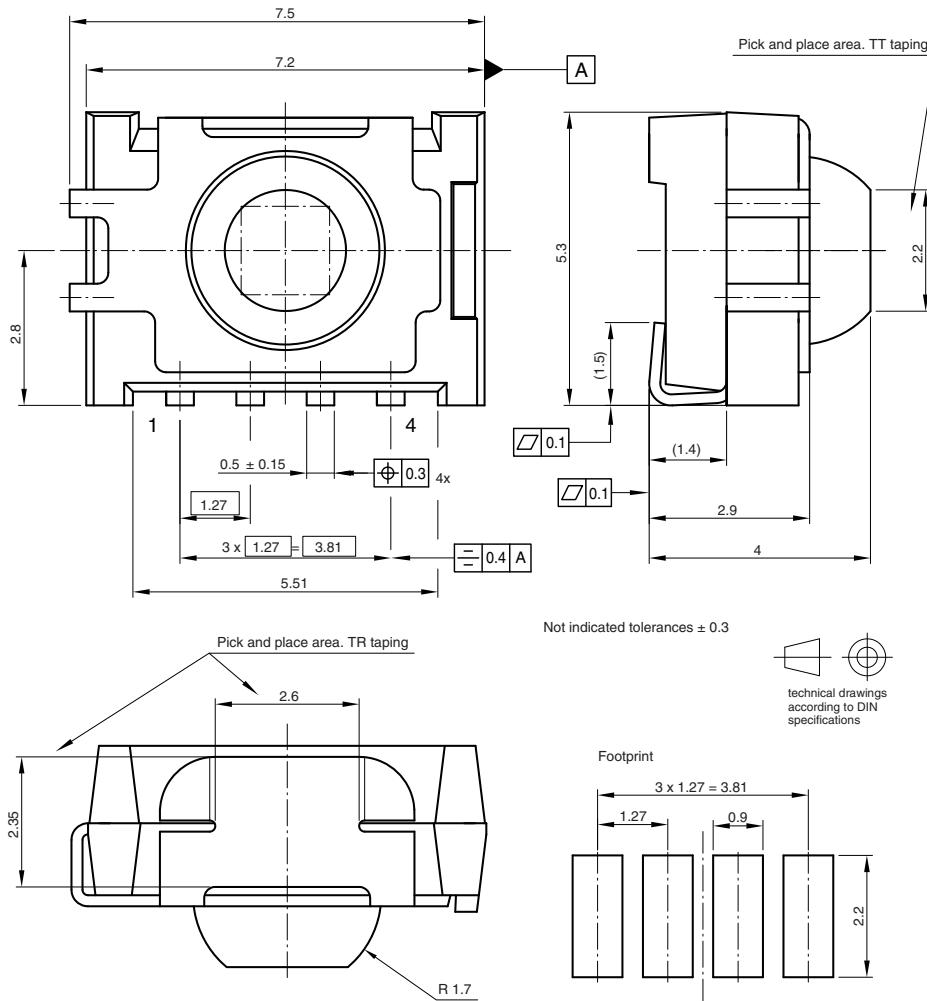


Fig. 14 - IR Disturbance from Fluorescent Lamp with High Modulation

	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	Most common disturbance patterns are suppressed	Even extreme disturbance patterns are suppressed

Notes

- For data formats with short bursts please see the datasheet for TSOP361.., TSOP363.., TSOP365..
- Best choice of AGC for some popular IR-codes:
 - TSOP36436: RC-5, RC-6, Panasonic
 - TSOP36438: NEC, Sharp, r-map
 - TSOP36456: r-step, Thomson RCA
- For Sony 12, 15, and 20 bit IR-codes please see the datasheet of TSOP34S40F, TSOP32S40F

PACKAGE DIMENSIONS in millimeters


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

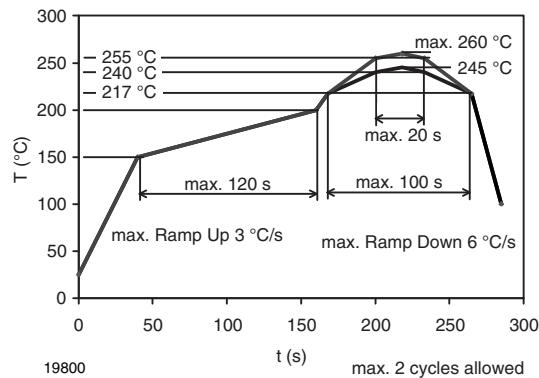
ASSEMBLY INSTRUCTIONS
Reflow Soldering

- 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

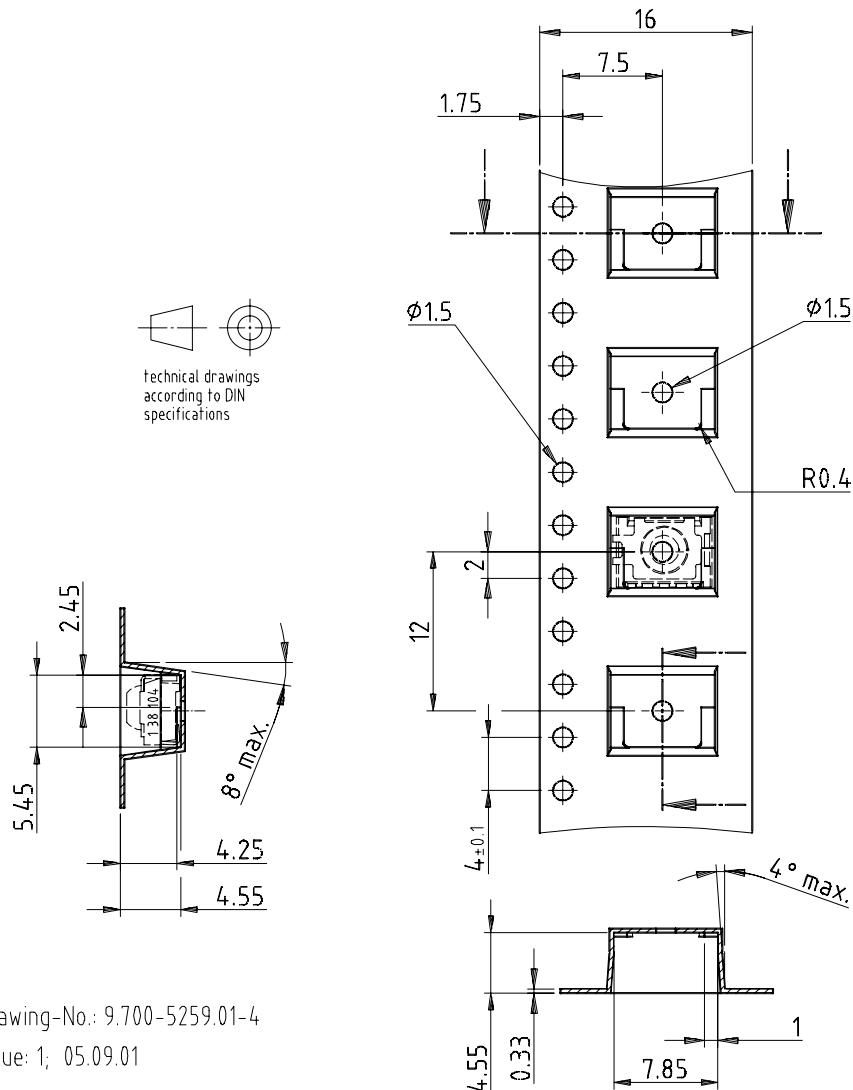
Manual Soldering

- 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



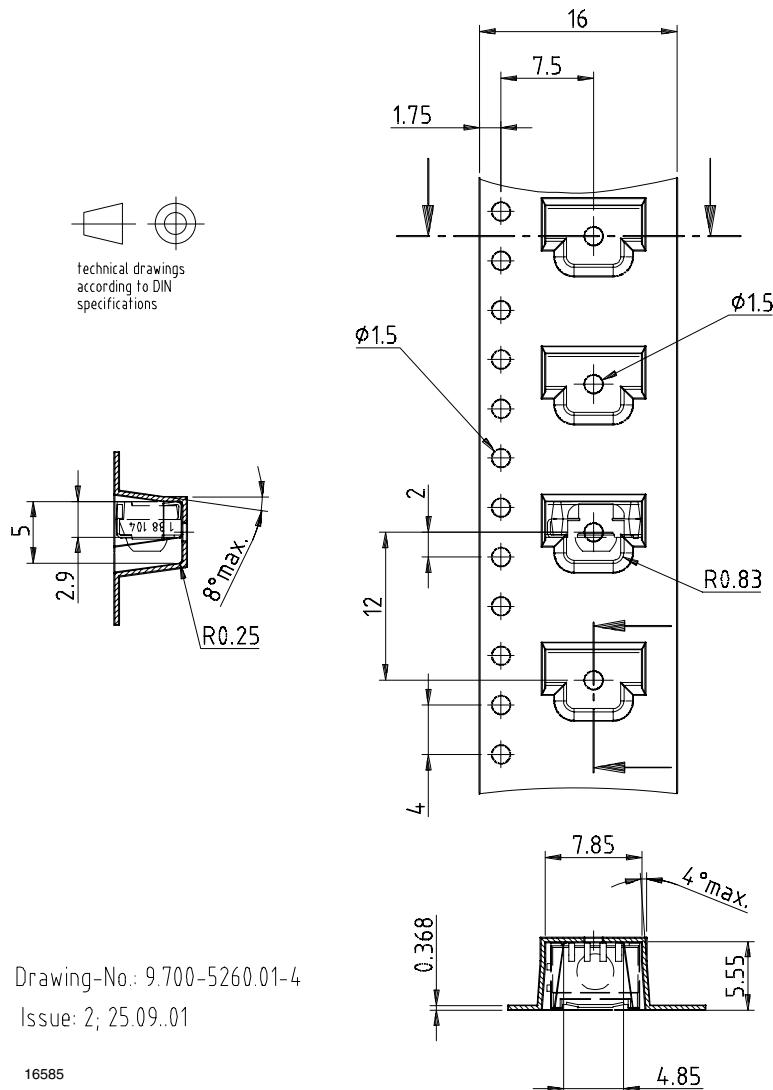
TAPING VERSION TSOP..TT DIMENSIONS in millimeters

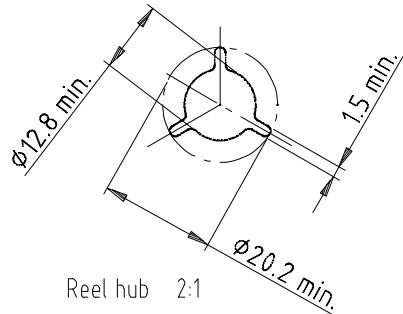
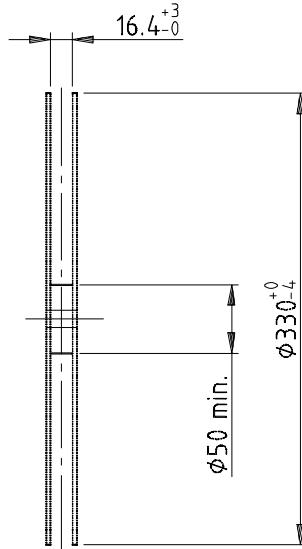
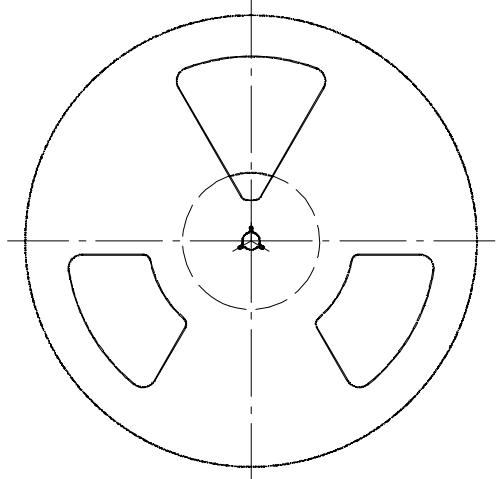


Drawing-No.: 9.700-5259.01-4

Issue: 1: 05.09.01

16584

TAPING VERSION TSOP..TR DIMENSIONS in millimeters


REEL DIMENSIONS in millimeters


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

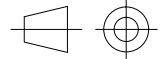
Issue: 1; 07.05.02

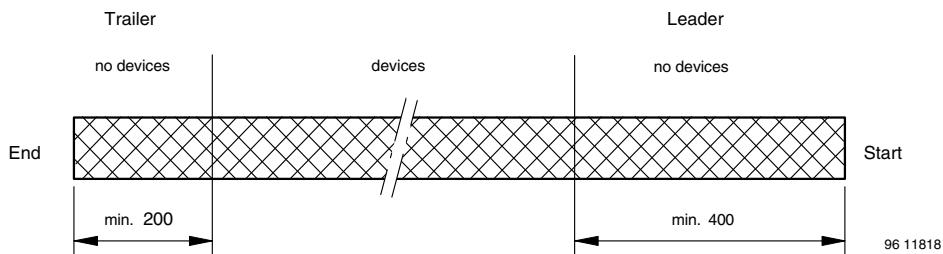
16734

 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

COVER TAPE PEEL STRENGTH

According to DIN EN 60286-3

0.1 N to 1.3 N

 300 mm/min. \pm 10 mm/min.

165° to 180° peel angle

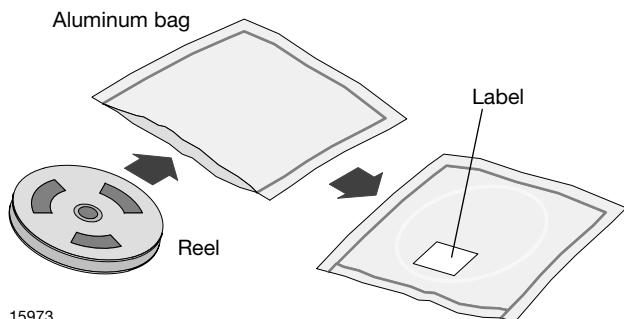
LABEL
Standard bar code labels for finished goods

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	xxxxxxxx+	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

After more than 72 h under these conditions moisture content will be too high for reflow soldering.

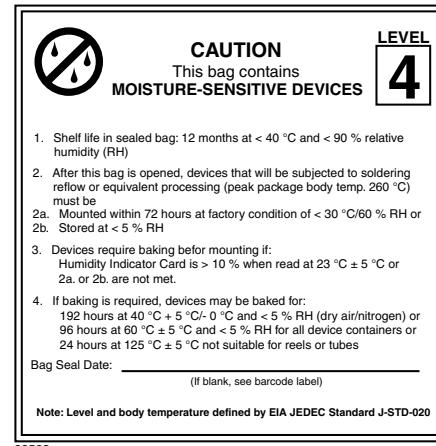
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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.



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

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.

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

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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.