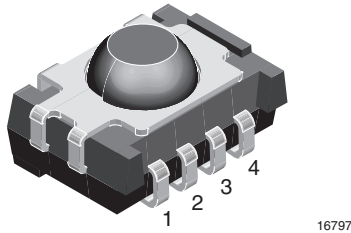


## IR Receiver Modules for Remote Control Systems



16797

### MECHANICAL DATA

#### Pinning

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

### DESCRIPTION

The TSOP361.. series are miniaturized SMD-IR receiver modules for infrared remote control systems. PIN diode and preamplifier are assembled on lead frame, the epoxy package is designed as IR filter.

The demodulated output signal can directly be decoded by a microprocessor. The main benefit is the operation with short burst transmission codes and high data rates at a supply voltage of 3 V.

This component has not been qualified according to automotive specifications.

### FEATURES

- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Continuous data transmission possible
- TTL and CMOS compatibility
- Output active low
- Supply voltage: 2.7 V to 5.5 V
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

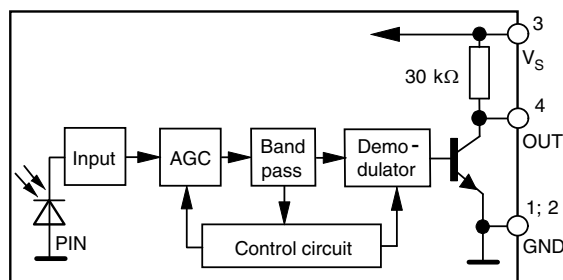
### SPECIAL FEATURES

- Enhanced data rate up to 4000 bit/s
- Operation with short burst possible ( $\geq 6$  cycles/burst)
- Taping available for topview and sideview assembly

### PARTS TABLE

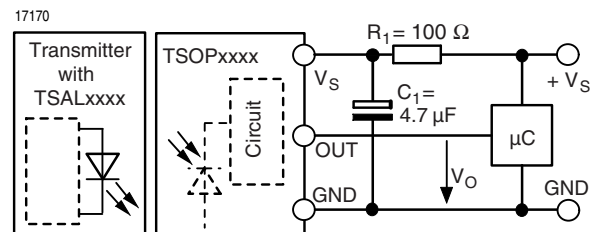
CARRIER FREQUENCY	SHORT BURSTS AND HIGH DATA RATES (AGC1)
30 kHz	TSOP36130
33 kHz	TSOP36133
36 kHz	TSOP36136
36.7 kHz	TSOP36137
38 kHz	TSOP36138
40 kHz	TSOP36140
56 kHz	TSOP36156

### BLOCK DIAGRAM



16839

### APPLICATION CIRCUIT



$R_1$  and  $C_1$  recommended to suppress power supply disturbances. The output voltage should not be hold continuously at a voltage below  $V_O = 2.0$  V by the external circuit.

ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage (pin 3)		V <sub>S</sub>	- 0.3 to + 6	V
Supply current (pin 3)		I <sub>S</sub>	3	mA
Output voltage (pin 4)		V <sub>O</sub>	- 0.3 to (V <sub>S</sub> + 0.3)	V
Output current (pin 4)		I <sub>O</sub>	10	mA
Junction temperature		T <sub>j</sub>	100	°C
Storage temperature range		T <sub>stg</sub>	- 40 to + 100	°C
Operating temperature range		T <sub>amb</sub>	- 25 to + 85	°C
Power consumption	T <sub>amb</sub> ≤ 85 °C	P <sub>tot</sub>	30	mW

ELECTRICAL AND OPTICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current	E <sub>v</sub> = 0	I <sub>SD</sub>	0.7	1.2	1.5	mA
	E <sub>v</sub> = 40 klx, sunlight	I <sub>SH</sub>		1.3		mA
Supply voltage		V <sub>S</sub>	2.7		5.5	V
Transmission distance	E <sub>v</sub> = 0, test signal see fig. 1, IR diode TSAL6200, I <sub>F</sub> = 400 mA	d		35		m
Output voltage low	I <sub>OSL</sub> = 0.5 mA, E <sub>e</sub> = 0.7 mW/m <sup>2</sup> , test signal see fig. 1	V <sub>OSL</sub>			250	mV
Minimum irradiance (30 to 40 kHz)	V <sub>S</sub> = 3 V, pulse width tolerance: t <sub>pi</sub> - 5/f <sub>0</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>0</sub> , test signal see fig. 3	E <sub>e</sub> min.		0.35	0.5	W/m <sup>2</sup>
Minimum irradiance (56 kHz)	V <sub>S</sub> = 3 V, pulse width tolerance: t <sub>pi</sub> - 5/f <sub>0</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>0</sub> , test signal see fig. 3	E <sub>e</sub> min.		0.4	0.6	W/m <sup>2</sup>
Minimum irradiance (30 to 40 kHz)	V <sub>S</sub> = 5 V, pulse width tolerance: t <sub>pi</sub> - 5/f <sub>0</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>0</sub> , test signal see fig. 3	E <sub>e</sub> min.		0.45	0.6	W/m <sup>2</sup>
Minimum irradiance (56 kHz)	V <sub>S</sub> = 5 V, pulse width tolerance: t <sub>pi</sub> - 5/f <sub>0</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>0</sub> , test signal see fig. 3	E <sub>e</sub> min.		0.5	0.7	W/m <sup>2</sup>
Maximum irradiance	t <sub>pi</sub> - 5/f <sub>0</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>0</sub> , test signal see fig. 3	E <sub>e</sub> max.	30			W/m <sup>2</sup>
Directivity	Angle of half transmission distance	φ <sub>1/2</sub>		± 45		deg

## TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

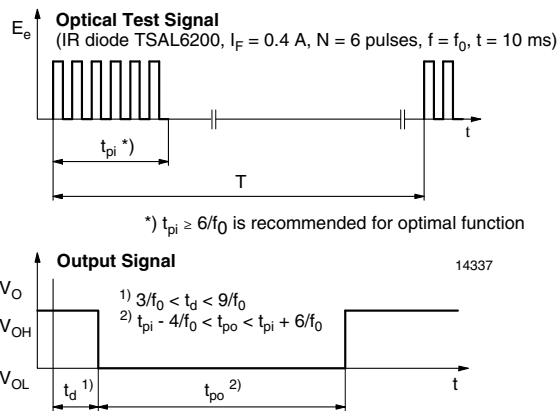


Fig. 1 - Output Function

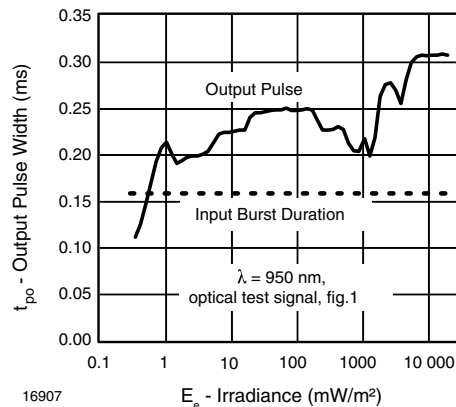
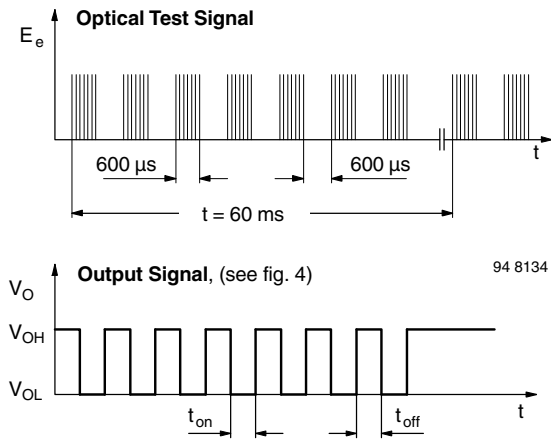
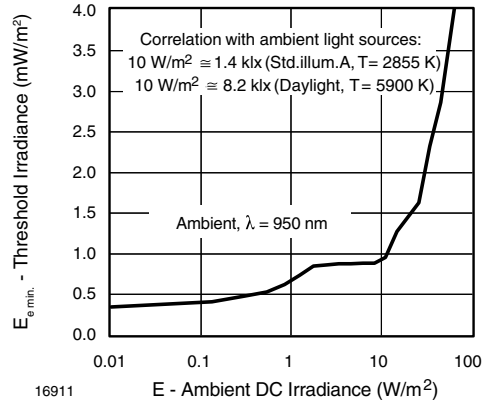
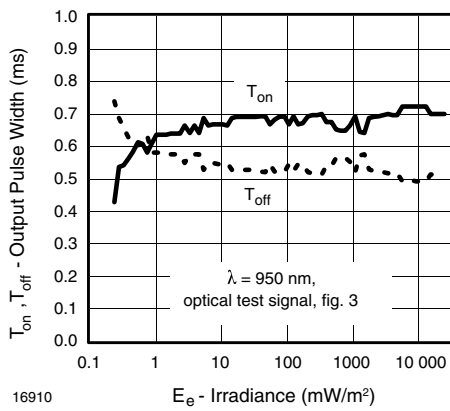
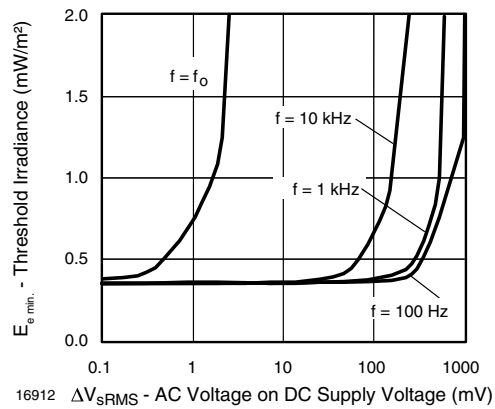
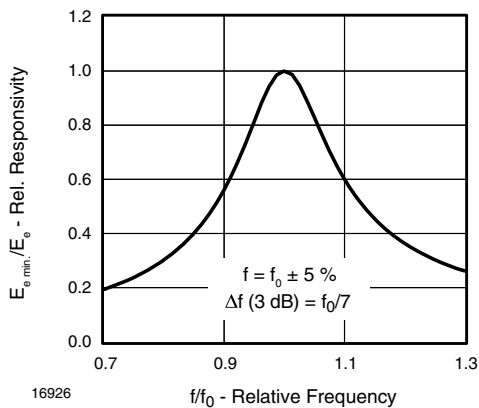
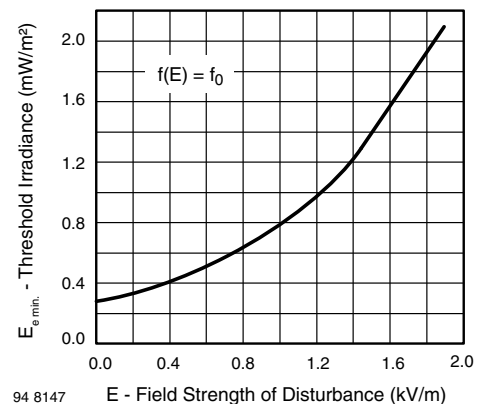


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient


**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 - Sensitivity vs. Electric Field Disturbances**

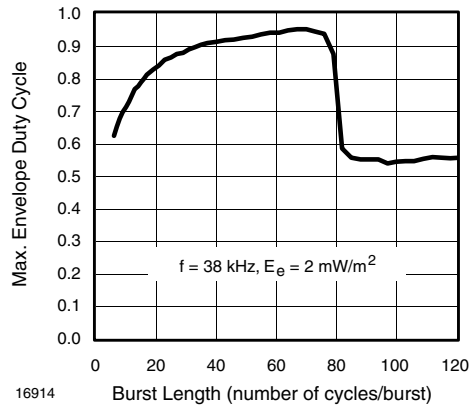


Fig. 9 - Maximum Envelope Duty Cycle vs. Burst Length

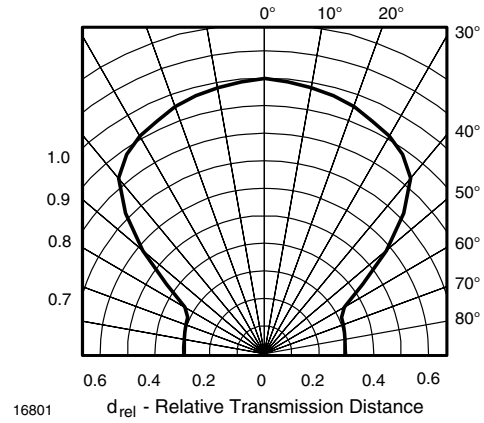


Fig. 12 - Directivity

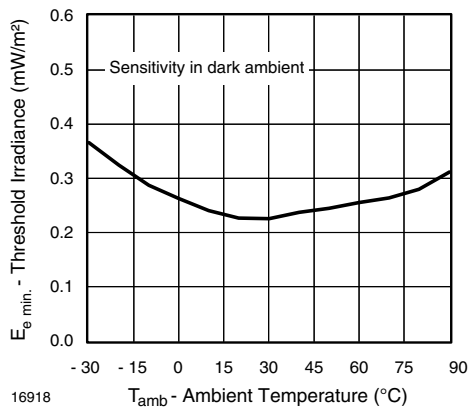


Fig. 10 - Sensitivity vs. Ambient Temperature

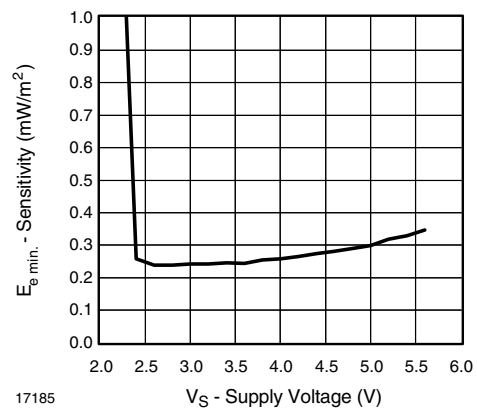


Fig. 13 - Sensitivity vs. Supply Voltage

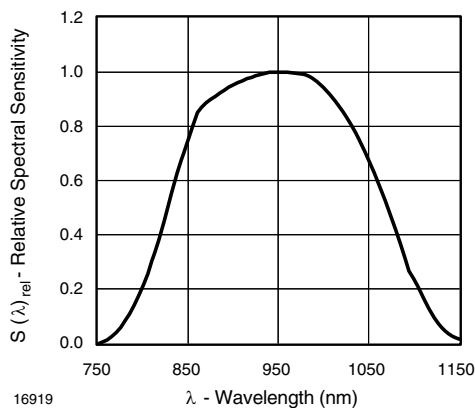


Fig. 11 - Relative Spectral Sensitivity vs. Wavelength

**SUITABLE DATA FORMAT**

The circuit of the TSOP361.. is designed so that unexpected output pulses due to noise or disturbance signals are avoided. A bandpass filter, an integrator stage and an automatic gain control are used to suppress such disturbances.

The distinguishing mark between data signal and disturbance signal are carrier frequency, burst length and duty cycle.

The data signal should fulfill the following conditions:

- Carrier frequency should be close to center frequency of the bandpass (e.g. 38 kHz)
- Burst length should be 6 cycles/burst or longer
- After each burst which is between 6 cycles and 70 cycles a gap time of at least 10 cycles is necessary
- For each burst which is longer than 1.8 ms a corresponding gap time is necessary at some time in the data stream. This gap time should be as long as the burst or longer
- Up to 2200 short bursts per second can be received continuously

Some examples for suitable data format are: NEC code, Toshiba Micom Format, Sharp code, RC5 code, RC6 code, RCMM code, R-2000 code, RECS-80 code.

When a disturbance signal is applied to the TSOP361.. it can still receive the data signal. However the sensitivity is reduced to that level that no unexpected pulses will occur.

Some examples for such disturbance signals which are suppressed by the TSOP361.. are:

- DC light (e.g. from tungsten bulb or sunlight)
- Continuous signal at 38 kHz or at any other frequency
- Signals from fluorescent lamps with electronic ballast (see figure 14)

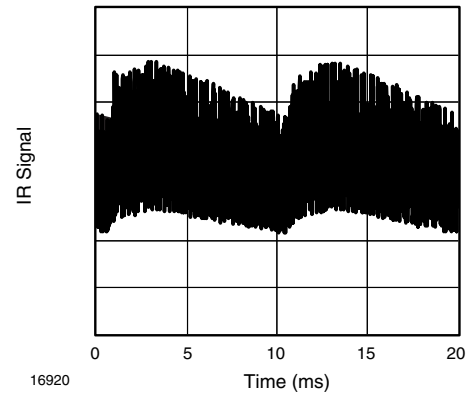
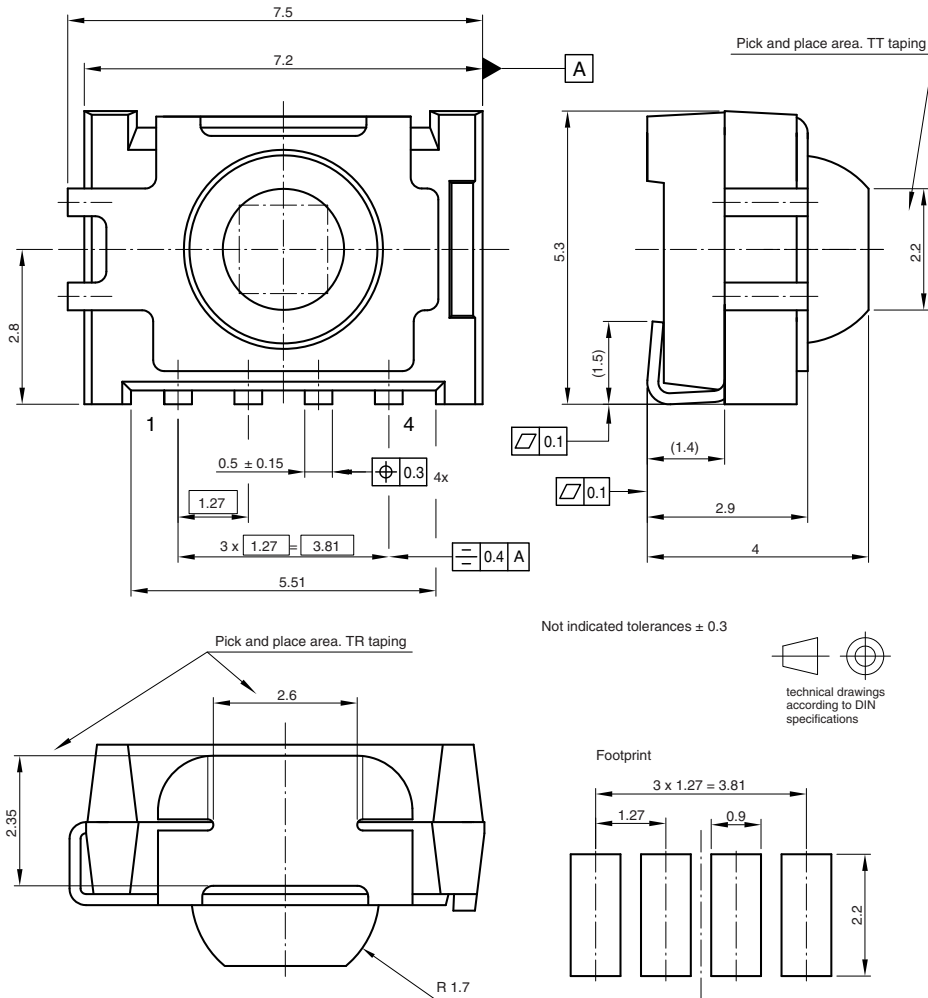


Fig. 14 - IR Signal from Fluorescent Lamp with Low Modulation

## PACKAGE DIMENSIONS in millimeters



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

## ASSEMBLY INSTRUCTIONS

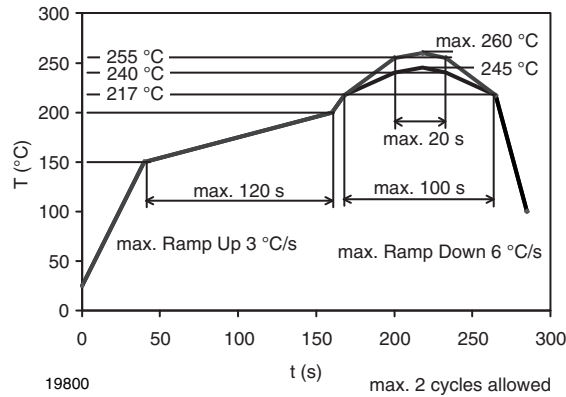
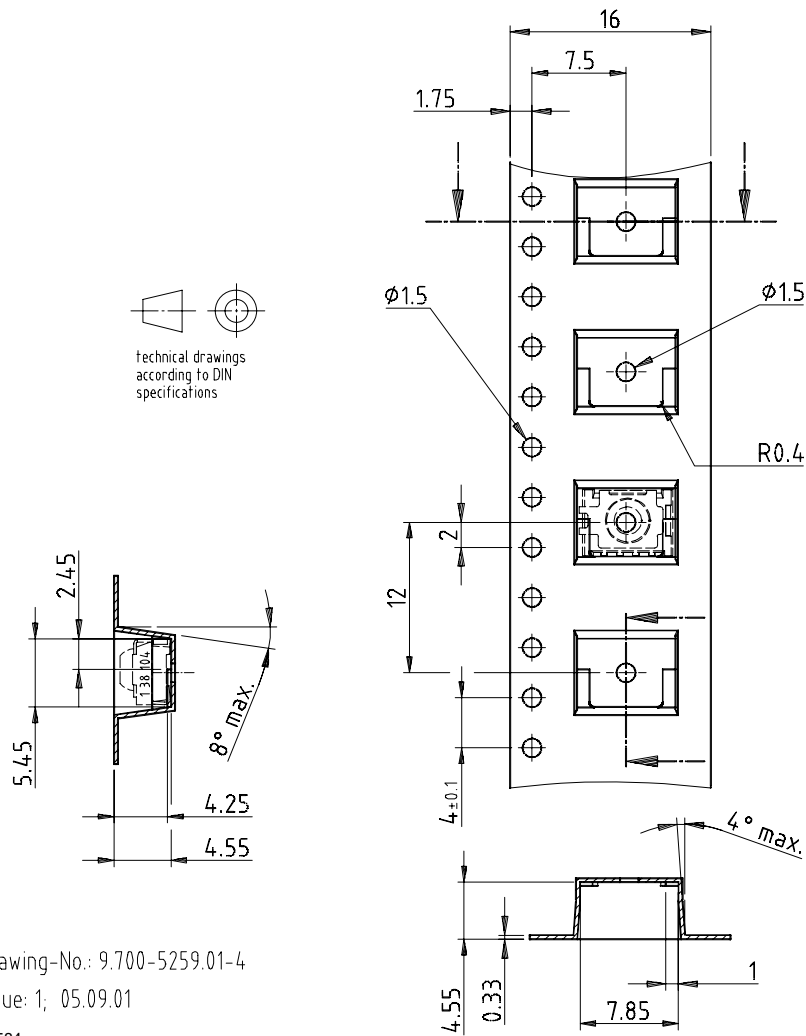
### Reflow Soldering

- 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

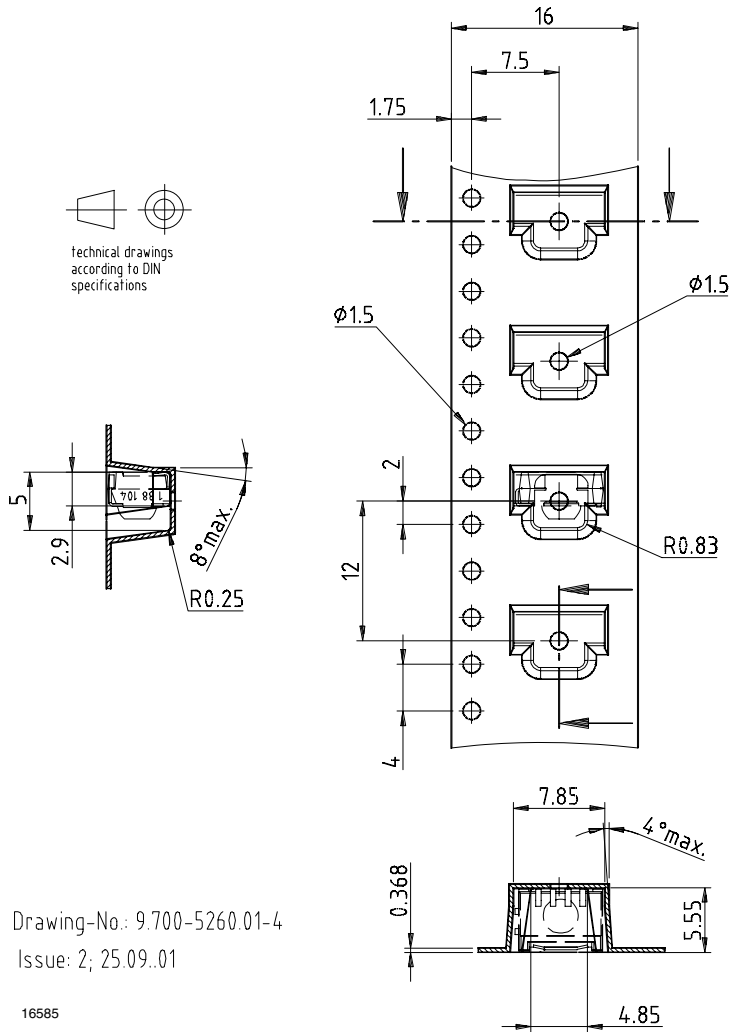
- Handling after reflow should be done only after the work surface has been cooled off

### Manual Soldering

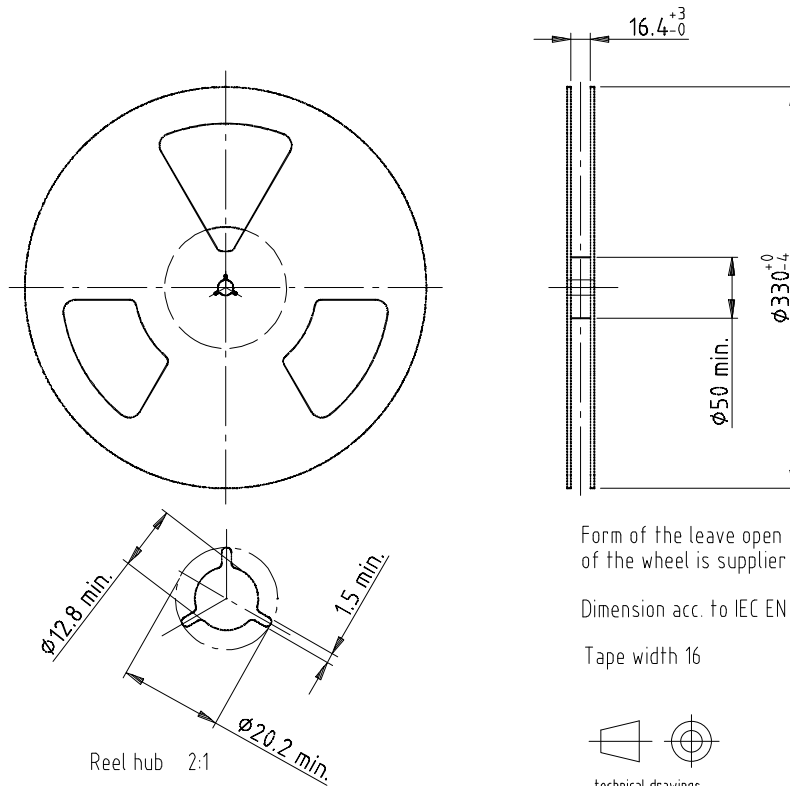
- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off

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

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


## TAPING VERSION TSOP..TR DIMENSIONS in millimeters





**REEL DIMENSIONS** in millimeters


Reel hub 2:1

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

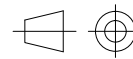
Issue: 1; 07.05.02

16734

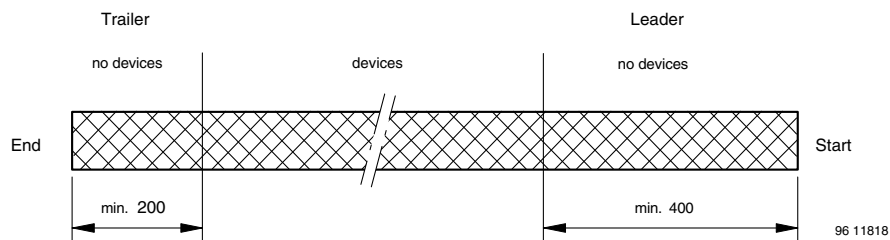
Form of the leave open of the wheel is supplier specific.

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 to 1.3 N

300 ± 10 mm/min.

165° to 180° peel angle

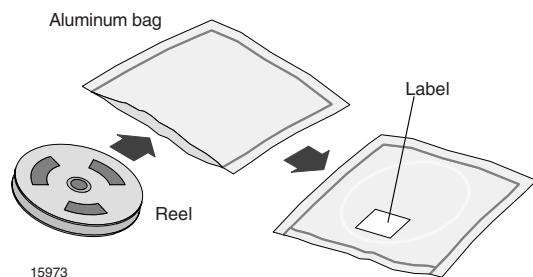
**LABEL**
**Standard bar code labels for finished goods**

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.

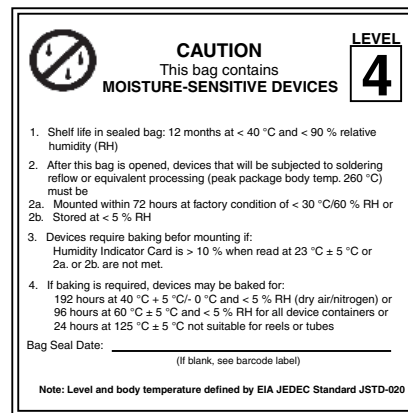
After more than 72 h under these conditions moisture content will be too high for reflow soldering.

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.



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