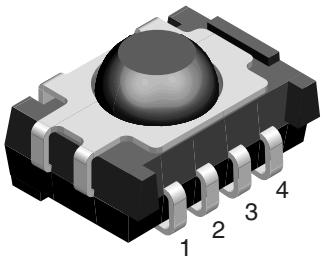
IR Receiver Modules for Remote Control Systems



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FEATURES

- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Taping available for top view and side view assembly
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

MECHANICAL DATA

Pinning

1 = GND, 2 = N.C., 3 = V_S, 4 = OUT

DESCRIPTION

The TSOP61.., TSOP63.. series are miniaturized SMD-IR receivers for infrared remote control systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

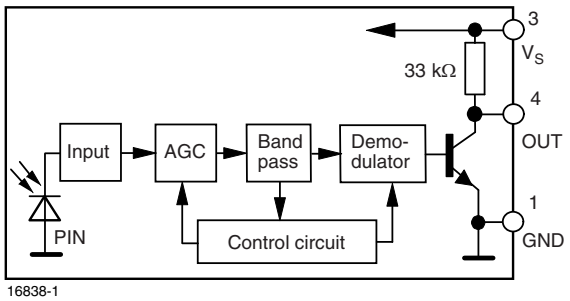
The demodulated output signal can directly be decoded by a microprocessor. The main benefit of the TSOP61.. is a legacy product, compatibile to all IR remote control data formats. The TSOP63.. is optimized to better suppress spurious pulses from fluorescent lamps and LCD TVs. The TSOP65.. has an excellent noise suppression, it is immune against any dimmed LCD backlighting or plasma TVs. 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

AGC		LEGACY, FOR SHORT BURST REMOTE CONTROLS (AGC1)	NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)	VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)
Carrier frequency	30 kHz	TSOP6130	TSOP6330	TSOP6530
	33 kHz	TSOP6133	TSOP6333	TSOP6533
	36 kHz	TSOP6136	TSOP6336 (1)(2)	TSOP6536 (1)(2)
	38 kHz	TSOP6138	TSOP6338 (3)(4)(5)(6)	TSOP6538 (3)(4)(5)
	40 kHz	TSOP6140	TSOP6340	TSOP6540
	56 kHz	TSOP6156	TSOP6356	TSOP6556
Package	Pinning	1 = GND, 2 = N.C., 3 = V_S, 4 = OUT		
	Dimensions (mm)	4.0 H x 5.3 W x 7.5 L		
Mounting		SMD		
Application		Remote control		
Best remote control code		(1) MCIR (2) RCMM (3) Mitsubishi (4) RECS-80 Code (5) r-map (6) XMP-1, XMP-2		

BLOCK DIAGRAM



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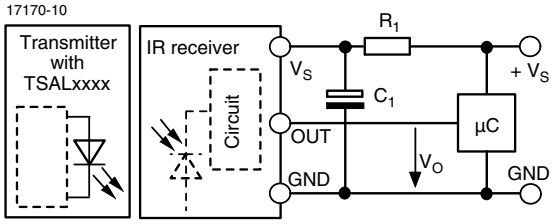
APPLICATION CIRCUIT



The external components R_1 and C_1 are optional to improve the robustness against electrical overstress (typical values are R_1 = 100 Ω, C_1 = 0.1 µF).

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 (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	$T_{amb} \leq 85$ °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 voltage		V_S	2.5		5.5	V
Supply current	V_S = 5 V, E_v = 0	I_{SD}	0.55	0.7	0.9	mA
	E_v = 40 klx, sunlight	I_{SH}		0.8		mA
Transmission distance	E_v = 0, IR diode TSAL6200, I_F = 250 mA, test signal see fig. 1	d		40		m
Output voltage low	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m², 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/m²
Maximum irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see fig. 1	$E_{e\ max.}$	50			W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		± 50		deg

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

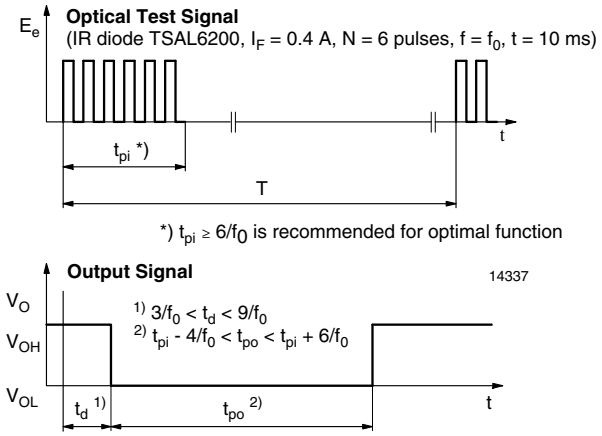


Fig. 1 - Output Active Low

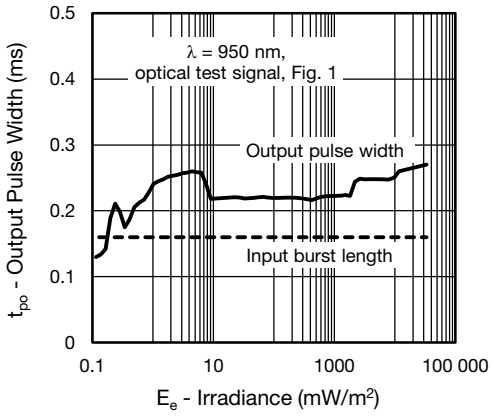


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

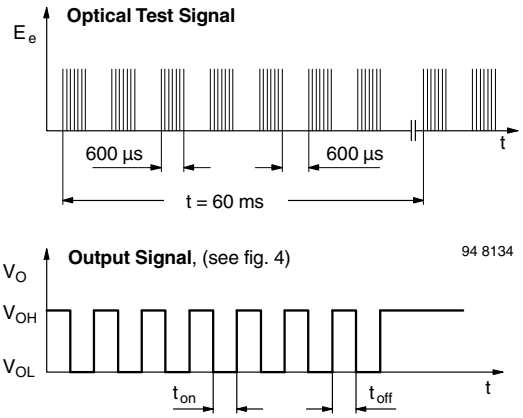


Fig. 3 - Output Function

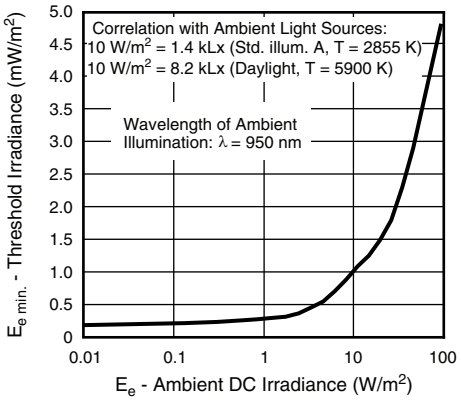


Fig. 6 - Sensitivity in Bright Ambient

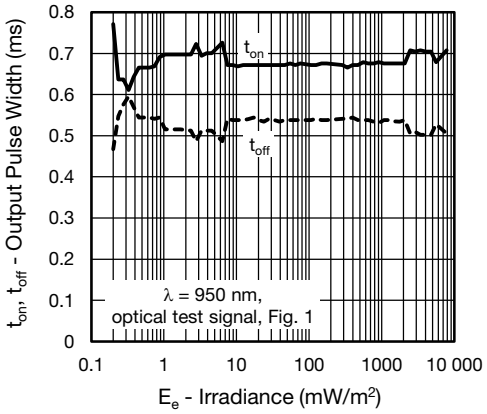


Fig. 4 - Output Pulse Diagram

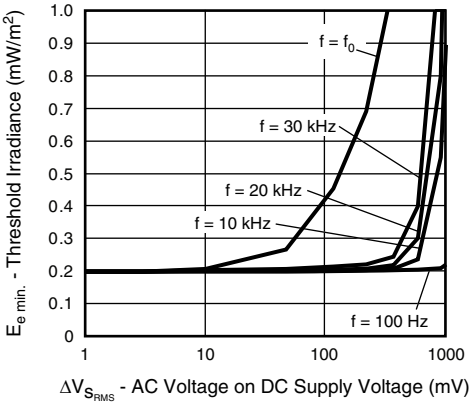


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

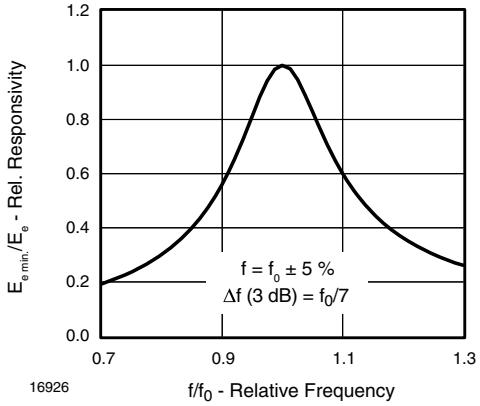


Fig. 5 - Frequency Dependence of Responsivity

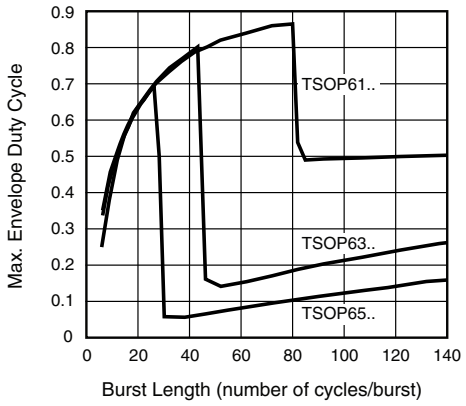


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

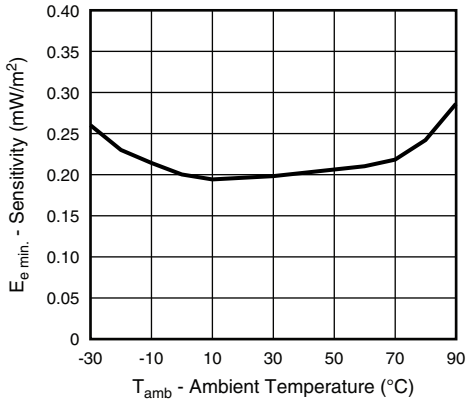


Fig. 9 - Sensitivity vs. Ambient Temperature

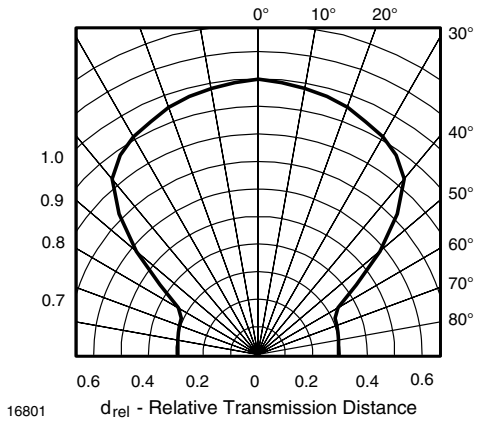


Fig. 11 - Horizontal Directivity

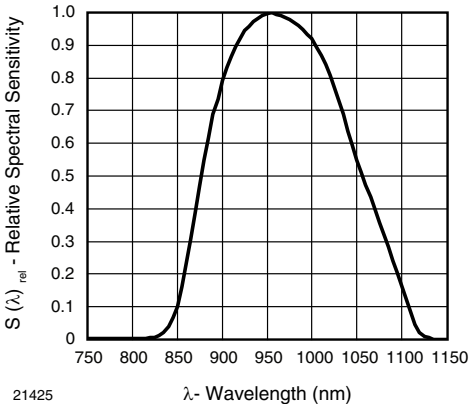


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

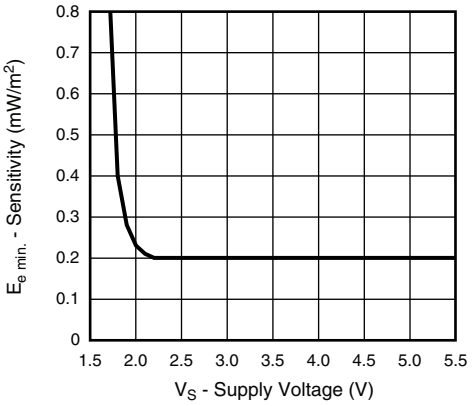


Fig. 12 - Sensitivity vs. Supply Voltage

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 patterns from fluorescent lamps with electronic ballasts (see figure 13 or figure 14)

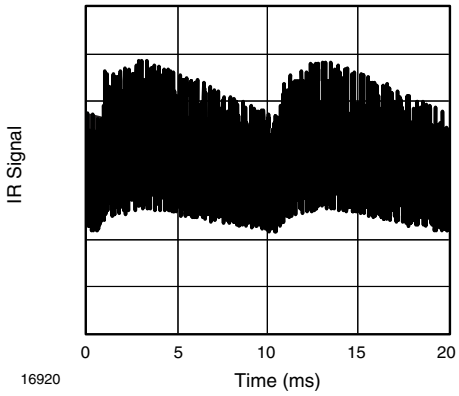


Fig. 13 - IR Disturbance from Fluorescent Lamp with Low Modulation

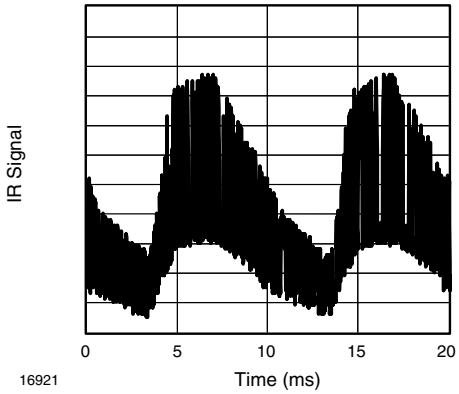


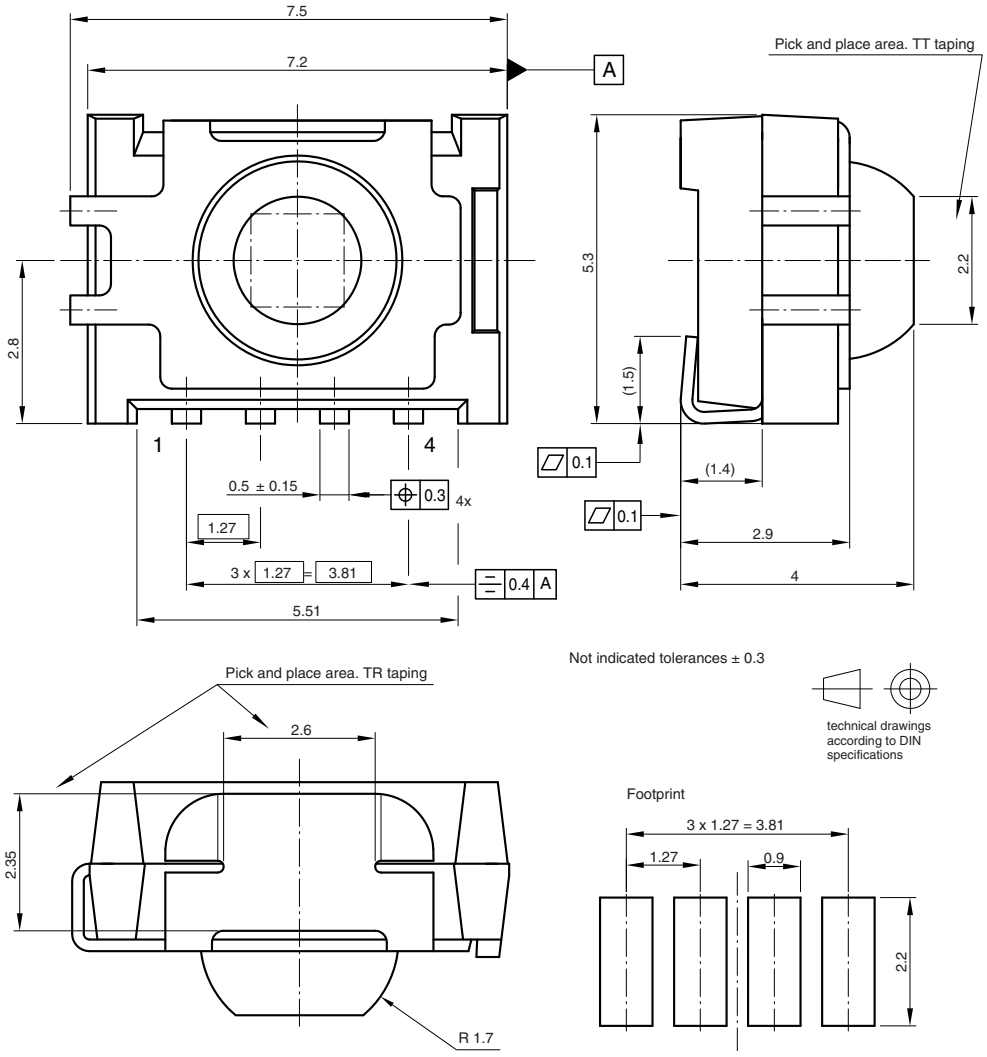
Fig. 14 - IR Disturbance from Fluorescent Lamp with High Modulation

	TSOP61..	TSOP63..	TSOP65..
Minimum burst length	6 cycles/burst	6 cycles/burst	6 cycles/burst
After each burst of length a minimum gap time is required of	6 to 70 cycles ≥ 10 cycles	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	70 cycles > 1.1 x burst length	35 cycles > 6 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	2000	2000	2000
Recommended for NEC code	yes	yes	yes
Recommended for RC5/RC6 code	yes	yes	yes
Recommended for RECS-80 code	yes	yes	yes
Recommended for RCMM code	yes	yes	yes
Recommended for r-step code	yes	yes	yes
Recommended for XMP code	yes	yes	yes
Suppression of interference from fluorescent lamps	Common disturbance patterns are supressed (example: signal pattern of fig. 13)	Internference patterns from lamps with high modulation are suppressed (examples: signal pattern of fig. 13 and fig. 14)	Even critical disturbance patterns like dimmed LCD backlighting are suppressed

Notes

- For data formats with long bursts (10 carrier cycles or longer) we recommend the TSOP62.., TSOP64.. because of the better noise suppression.
- Example of compatible products for IR-codes:
  - TSOP6336, TSOP6536: MCIR, RCMM
  - TSOP6338: Mitsubishi, RECS-80 Code, r-map, XMP-1, XMP-2
  - TSOP6538: Mitsubishi, RECS-80 Code, r-map
- For SIRCS 15 and 20 bit, Sony 12 bit IR-codes, please see the datasheet for TSOP4S40, TSOP2S40

PACKAGE DIMENSIONS in millimeters



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

ASSEMBLY INSTRUCTIONS

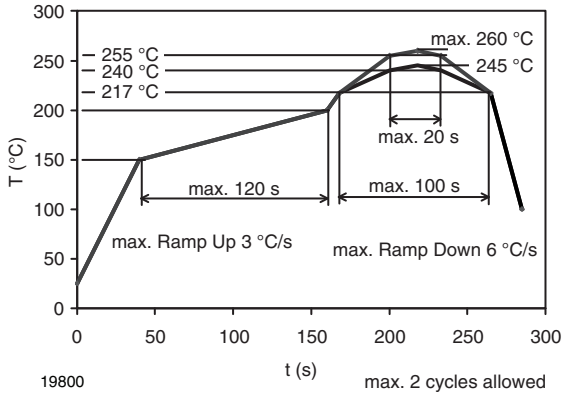
Reflow Soldering

- 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. Excercise 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

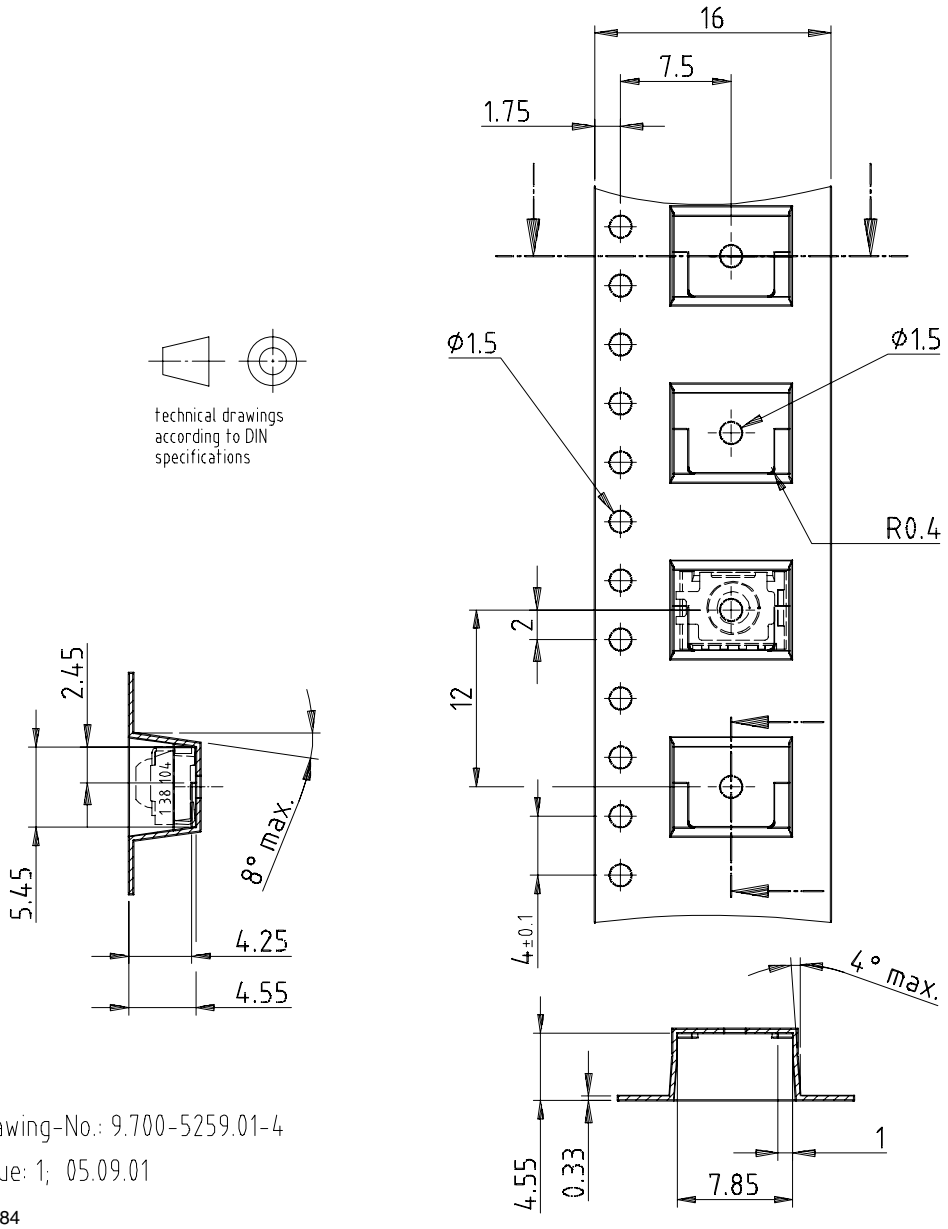
Manual Soldering

- 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

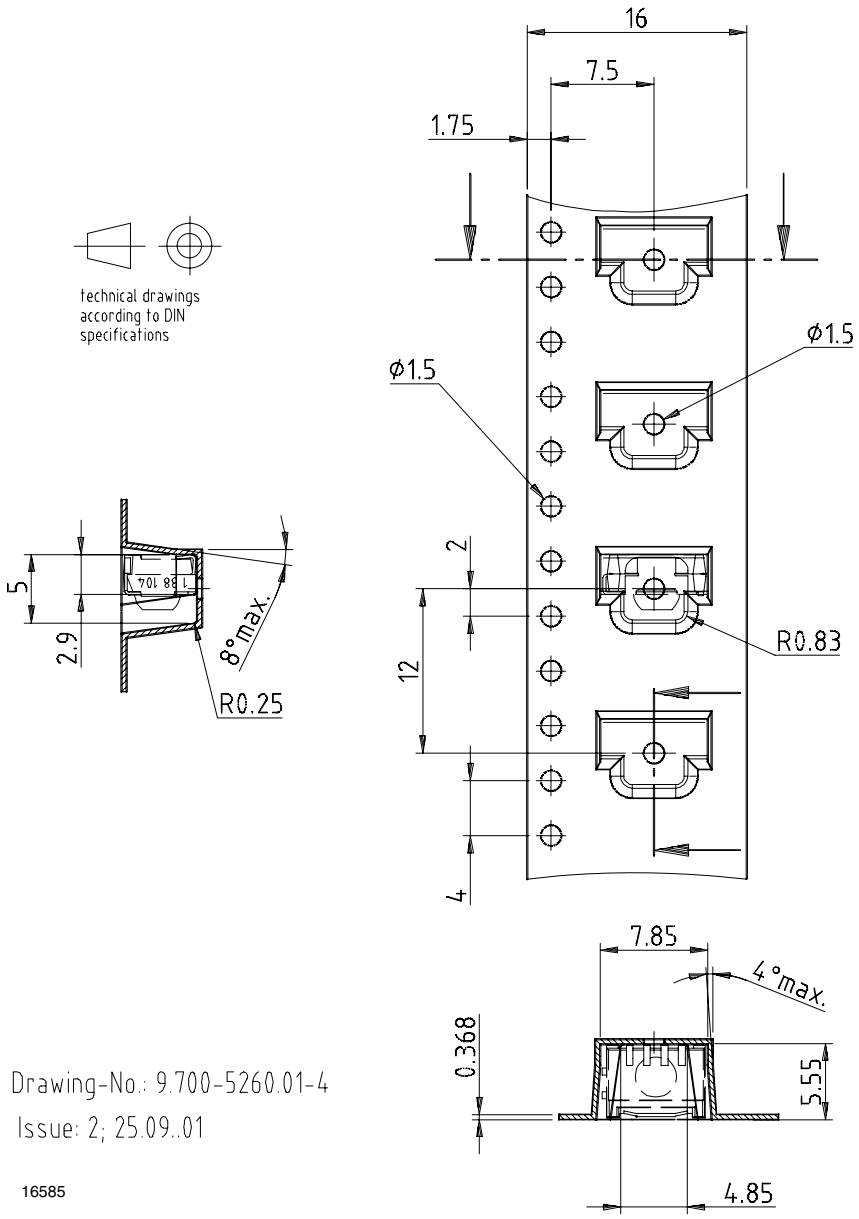
VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE



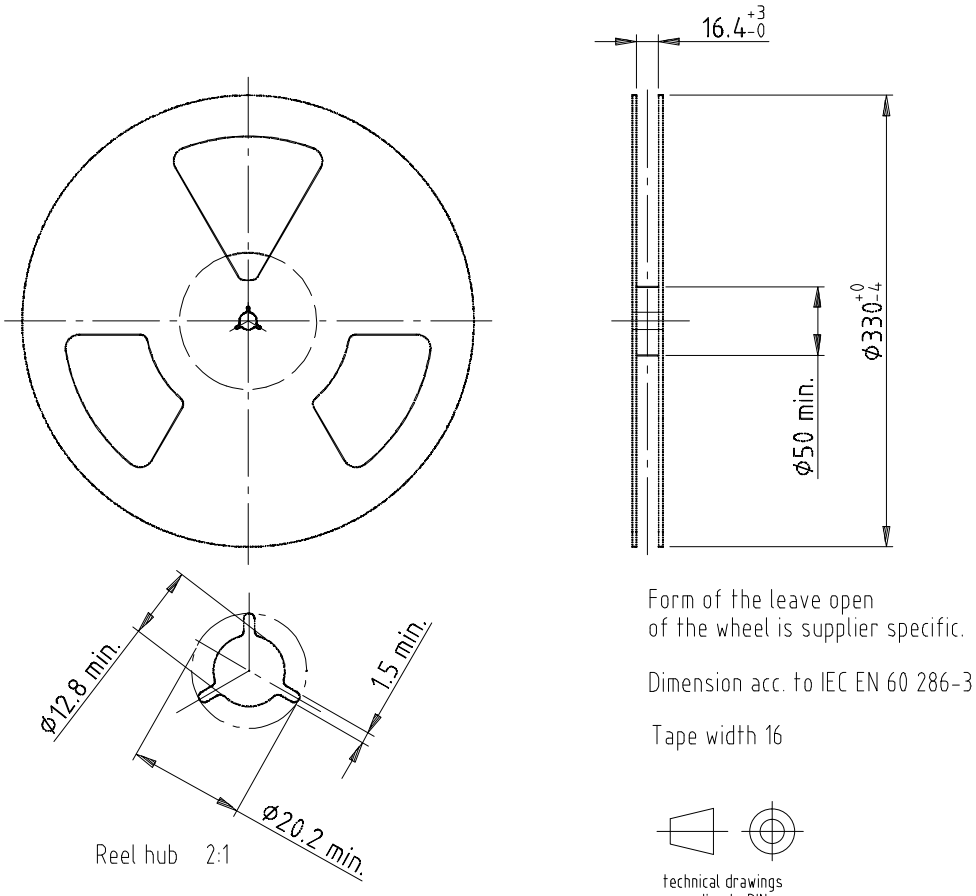
TAPING VERSION TSOP..TT DIMENSIONS in millimeters



TAPING VERSION TSOP..TR DIMENSIONS in millimeters



REEL DIMENSIONS in millimeters



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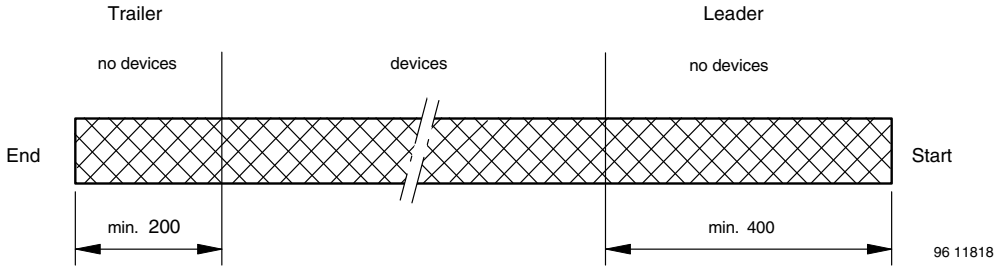
Issue: 1; 07.05.02
16734

LEADER AND TRAILER DIMENSIONS in millimeters



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

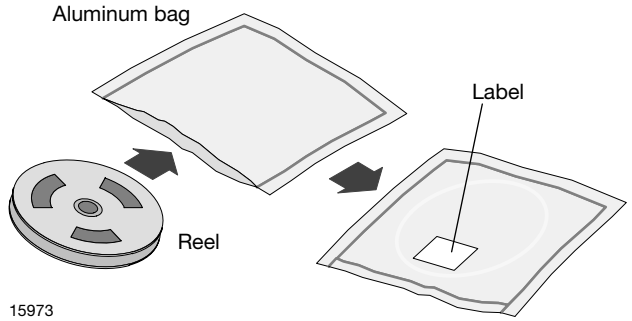
Standard bar code labels for finished goods

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.



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FINAL PACKING

The sealed reel is packed into a cardboard box. A secondary cardboard box is used for shipping purposes.

RECOMMENDED METHOF 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:

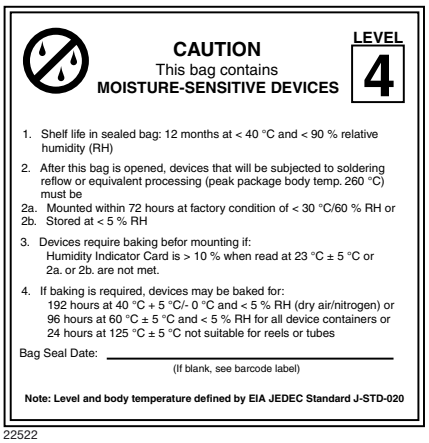
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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.



22522

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. 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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