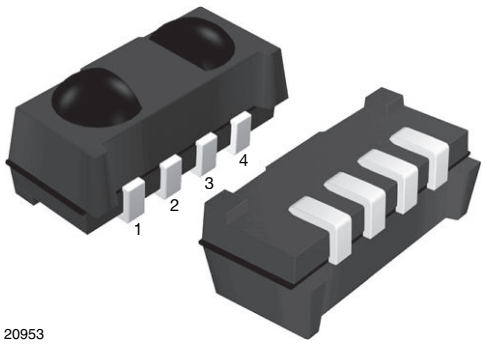
IR Receiver Modules for Data Transmission Systems



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FEATURES

- Low supply current
- Data rates up to 14 000 bps
- Range up to 10 m
- Internal filter for PCM frequency
- Shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

DESCRIPTION

These products are miniaturized receivers for low speed infrared data transmission. Two PIN diodes and a preamplifier are assembled on a lead frame, the epoxy package contains an IR filter.

The demodulated output can be directly connected to a microprocessor for decoding. The TSDP75T85 devices are designed to receive data bursts modulated at 85 kHz, while suppressing noise from CFL lamps and other noise sources.

This component has not been qualified according to automotive specifications.

PARTS TABLE		
AGC		**DATA TRANSMISSION (AGCT)**
Carrier frequency	85 kHz	TSDP75T85
Package	Pinning	1, 4 = GND, 2 = V_S, 3 = OUT
	Dimensions (mm)	3.2 H x 3.0 W x 6.8 L
Mounting		SMD
Application		Data transmission

BLOCK DIAGRAM

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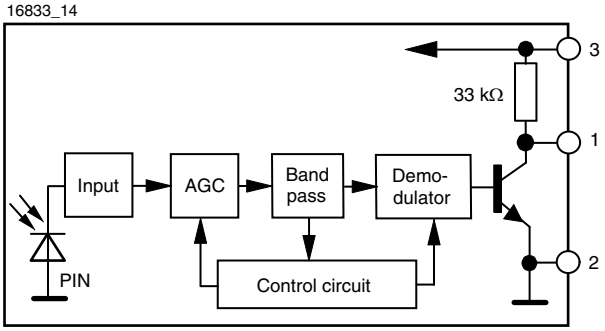
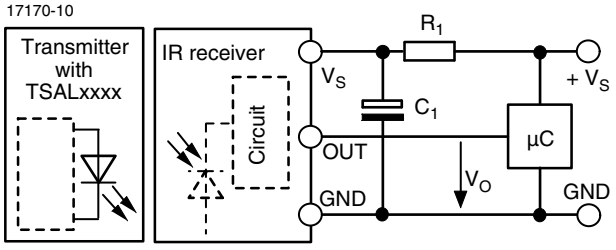


APPLICATION CIRCUIT

17170-10



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	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	$T_{amb} \leq 85$ °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 = 3.3 V	I_{SD}	0.27	0.35	0.45	mA
	E_v = 40 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 mA	d		10		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	BER < 10^{-6} test signal see fig. 13	$E_{e\ min.}$		1	2	mW/m²
Maximum irradiance	BER < 10^{-6} test signal see fig. 13	$E_{e\ max.}$	20			W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		± 50		deg

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

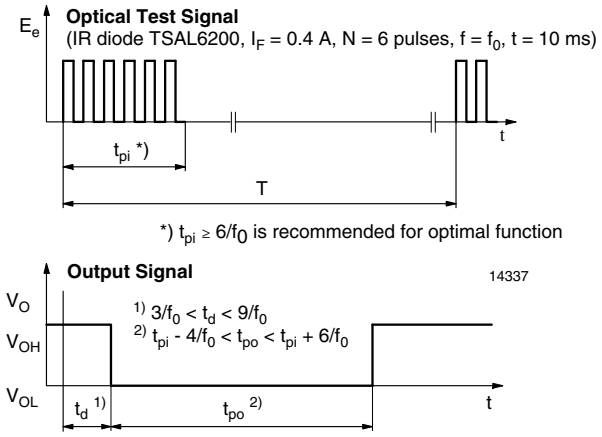


Fig. 1 - Output Active Low

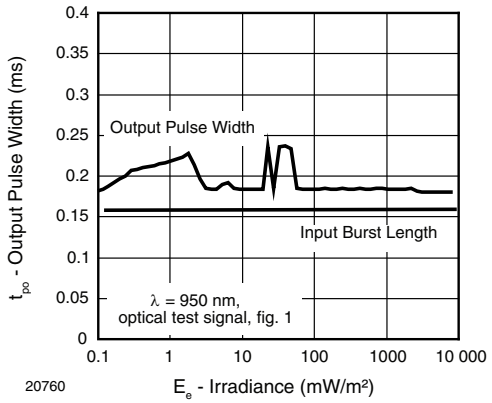


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

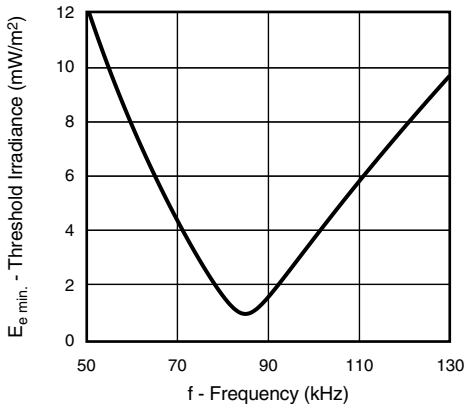


Fig. 3 - Frequency Dependence of Responsivity

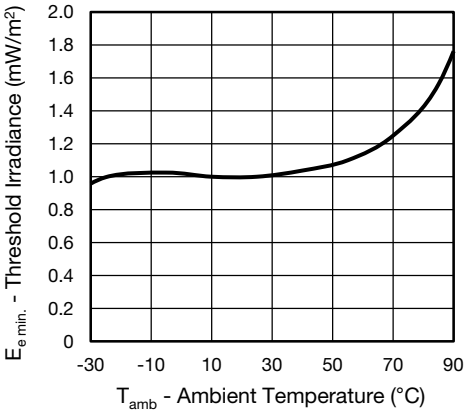


Fig. 6 - Sensitivity vs. Ambient Temperature

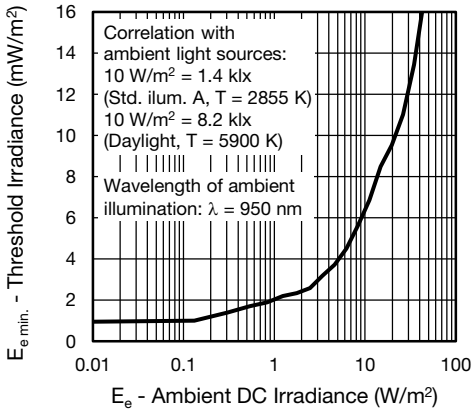


Fig. 4 - Sensitivity in Bright Ambient

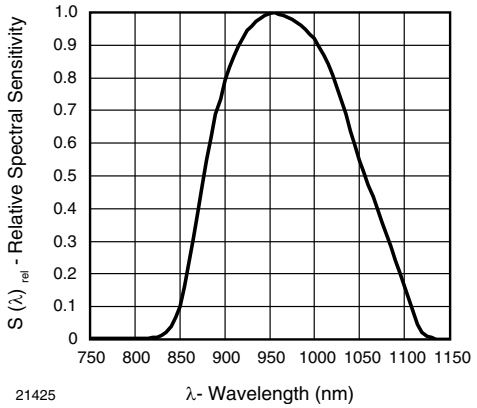


Fig. 7 - Relative Spectral Sensitivity vs. Wavelength

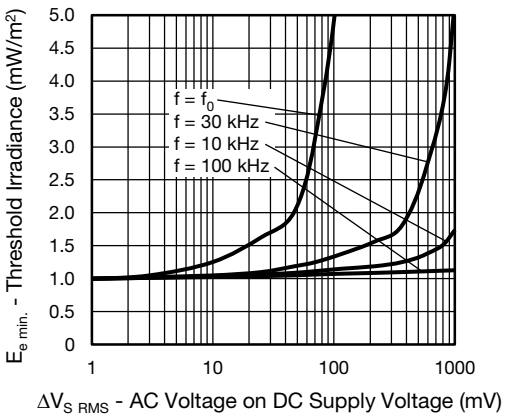


Fig. 5 - Sensitivity vs. Supply Voltage Disturbances

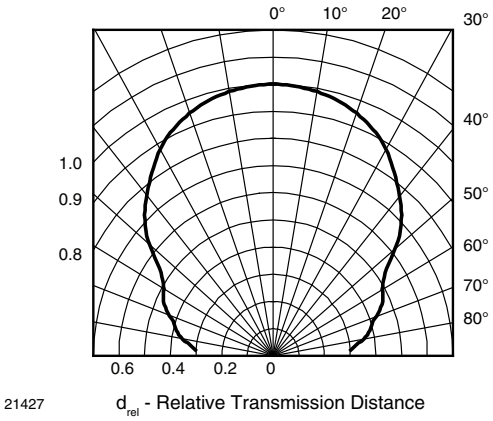


Fig. 8 - Horizontal Directivity

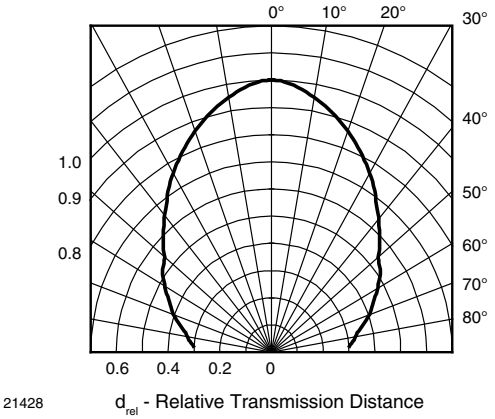


Fig. 9 - Vertical Directivity

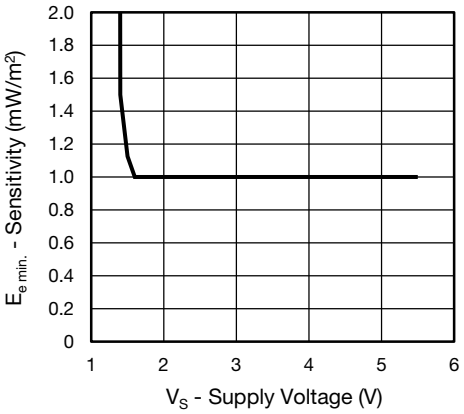


Fig. 10 - Sensitivity vs. Supply Voltage

SUITABLE BURST FORMAT

These receivers are designed to suppress spurious output pulses due to noise or optical disturbances. Modulated data is discriminated from noise via differences in carrier frequency, burst length and envelope duty cycle. For optimum sensitivity, the data's modulation frequency should be as close as possible to the band-pass center frequency of 85 kHz and fulfill the conditions in the table below.

When a data signal is applied to the IR receiver in the presence of noise, the sensitivity of the receiver is reduced by the AGC to suppress spurious pulses from occurring at the output. Some examples of optical noise which is suppressed:

- DC light (e.g. tungsten bulbs or sunlight)
- Unvarying waveforms at any frequency
- Burst-like IR signals from common fluorescent lamps as shown in fig. 11. Highly modulated noise as in fig. 12 is not completely suppressed

Minimum burst length	6 cycles/burst
After each burst of length: A minimum gap time is required of:	6 to 70 cycles≥ 6 cycles
For bursts greater than: A minimum gap time in the data stream is needed of:	70 cycles > 1.2 x burst length
Maximum number of continuous short bursts/second:	7000

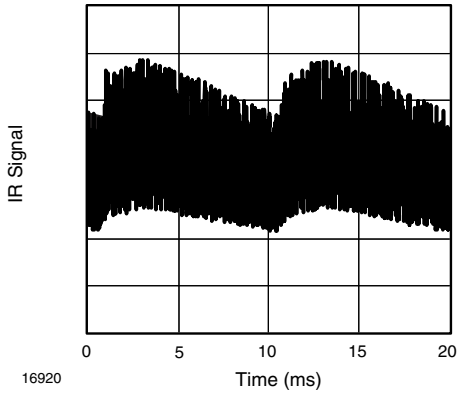


Fig. 11 - IR Noise from Fluorescent Lamp with Low Modulation

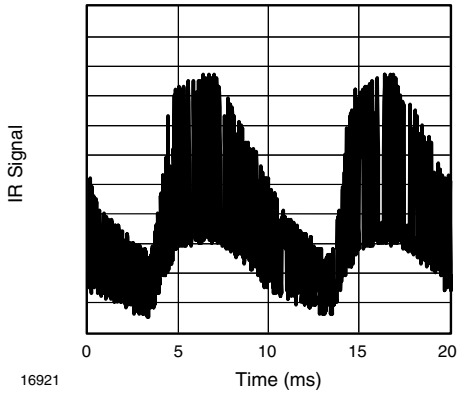


Fig. 12 - IR Noise from Fluorescent Lamp with High Modulation

SUITABLE CODING FORMAT

Coding formats must adhere to the constraints given in the Suitable Burst Format section.

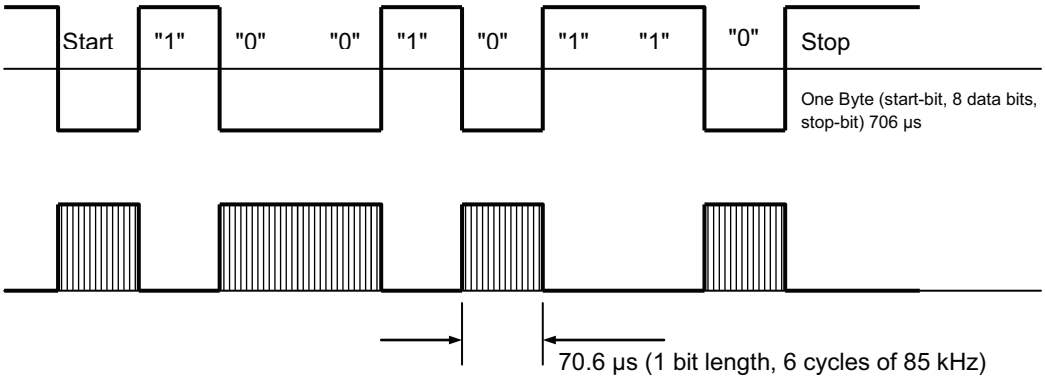
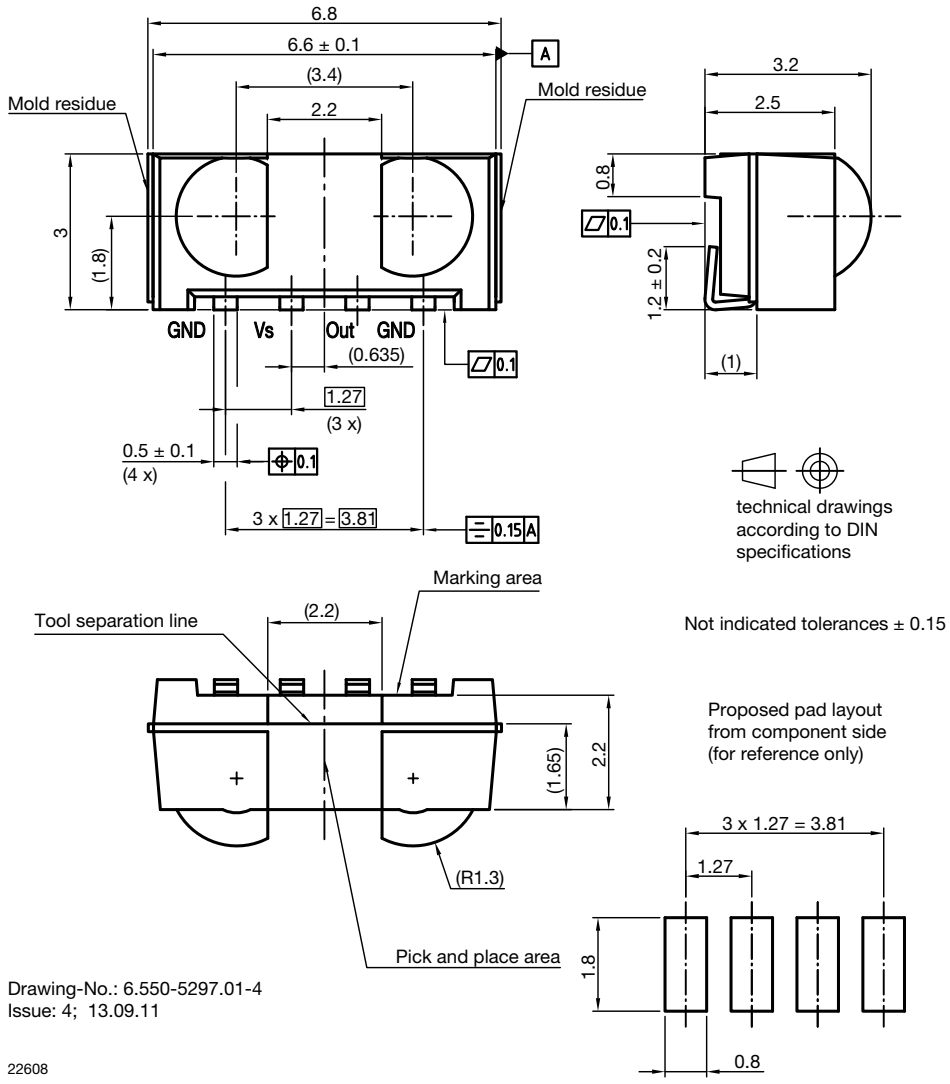


Fig. 13

PACKAGE DIMENSIONS in millimeters



ASSEMBLY INSTRUCTIONS

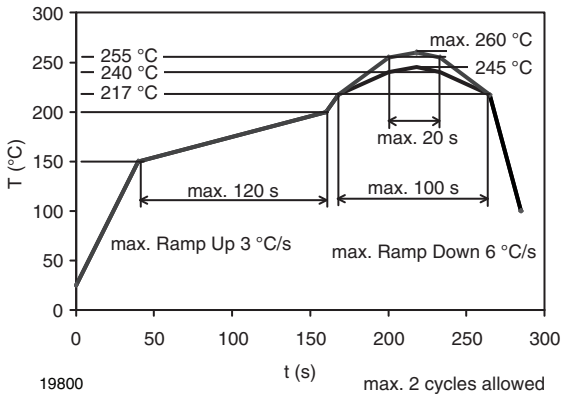
Reflow Soldering

- 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. 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

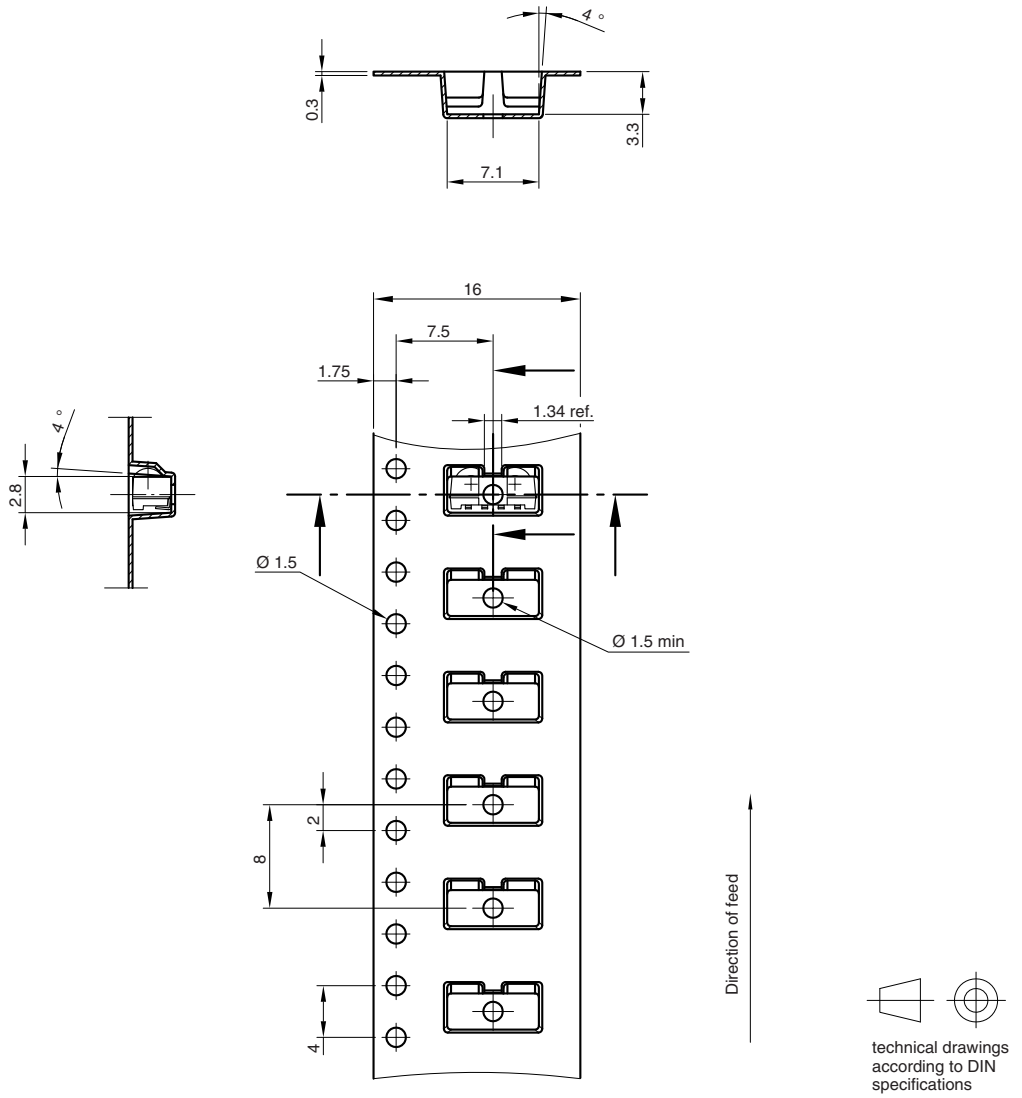
Manual Soldering

- 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

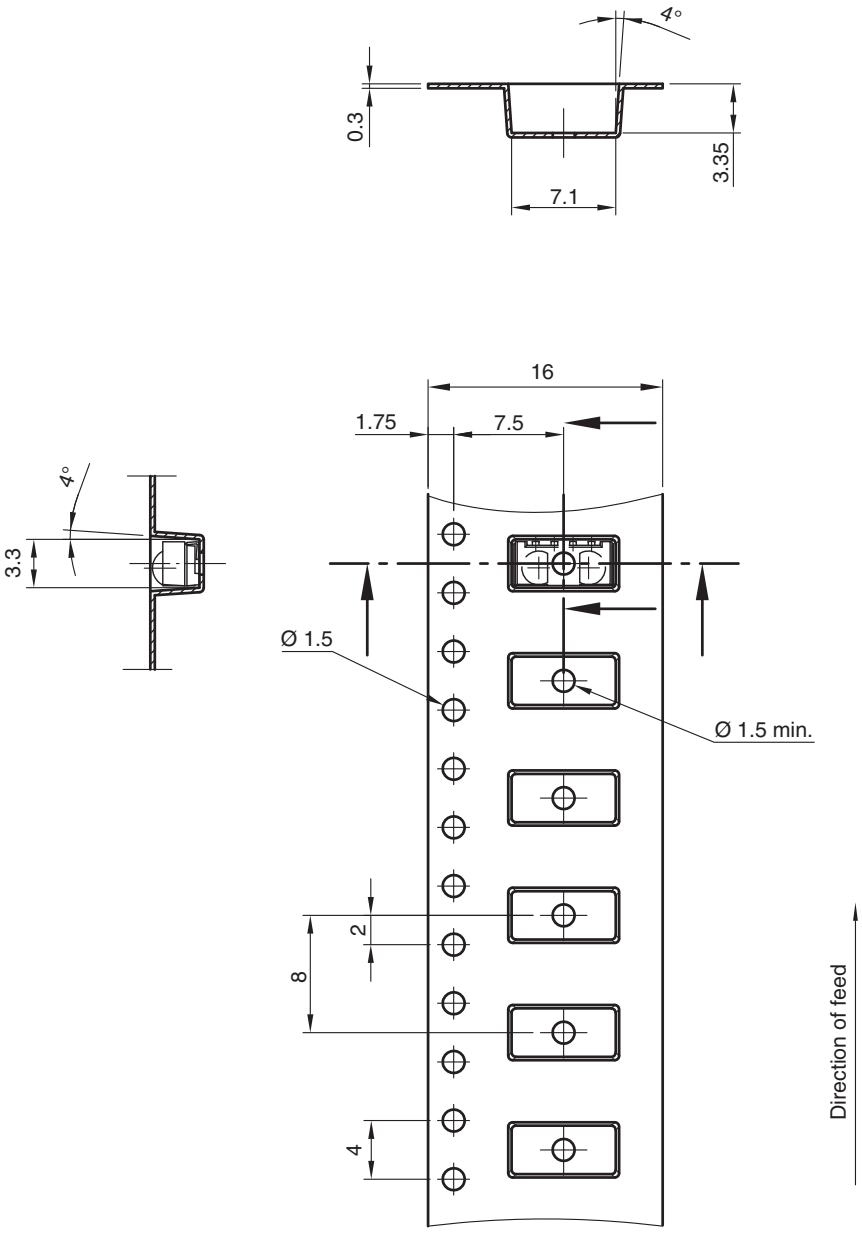


TAPING VERSION TSDP.....TR DIMENSIONS in millimeters



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

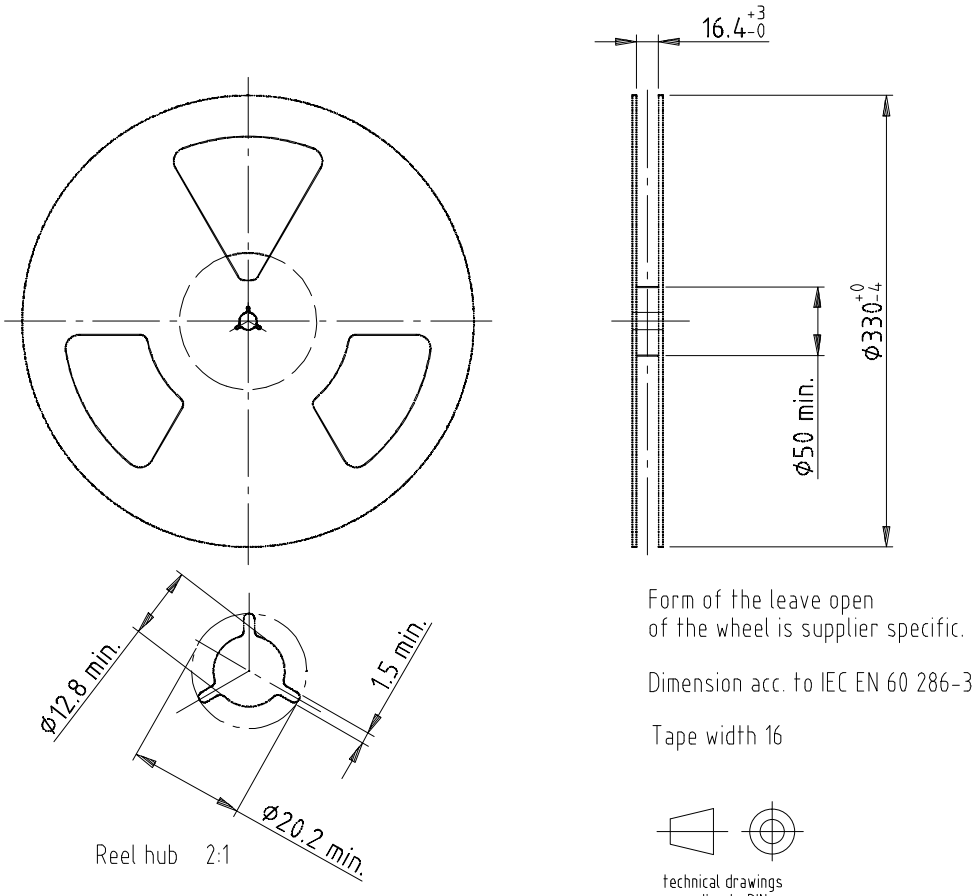
TAPING VERSION TSDP.....TT DIMENSIONS in millimeters



technical drawings
according to DIN
specifications

Drawing-No.: 9.700-5338.01-4
Issue: 3; 09.06.09
21578

REEL DIMENSIONS in millimeters



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Issue: 1; 07.05.02

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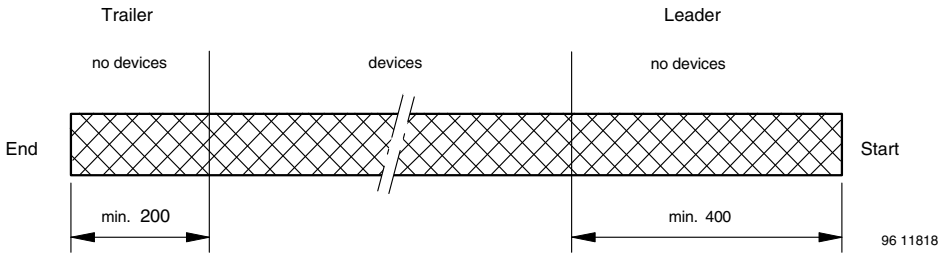
LEADER AND TRAILER DIMENSIONS in millimeters



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

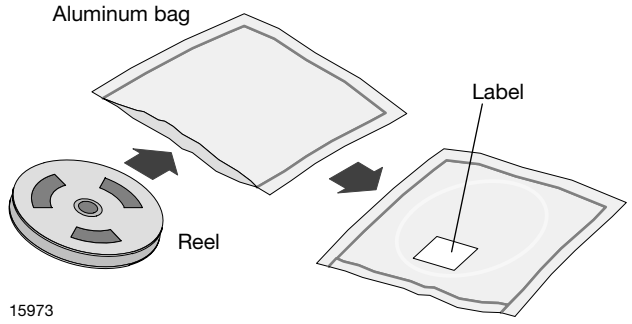
Standard bar code labels for finished goods

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.



15973

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:

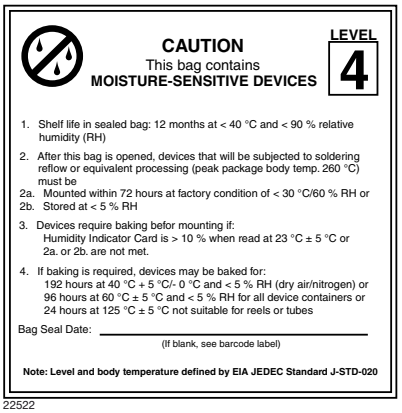
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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



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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.

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