IR Sensor Module for Reflective Sensor, Light Barrier, and Fast Proximity Applications





20953

DESCRIPTION

The TSSP770.. series are compact infrared detector modules for presence and fast proximity sensing applications. They provide an active low output in response to infrared bursts at 940 nm. The frequency of the burst should correspond to the carrier frequency shown in the parts table.

This component has not been qualified according to automotive specifications.

FEATURES

- Presence sensor: up to 2 m distance, find more info at: www.vishay.com/doc?49009
- Light barrier: up to 12 m distance, TSAL6200 with I_F = 50 mA, find more info at: www.vishay.com/doc?49650
- Fast proximity: up to 2 m range at 5 ms response time, find more info at: www.vishay.com/doc?82741
- Supply voltage: 2.0 V to 5.5 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

APPLICATIONS

- Reflective sensors for hand dryers, towel or soap dispensers, water faucets, toilet flush
- Vending machine fall detection
- Security and pet gates
- Person or object vicinity switch
- Fast proximity sensors for toys, robotics, drones, and other consumer and industrial uses

LINKS TO ADDITIONAL RESOURCES

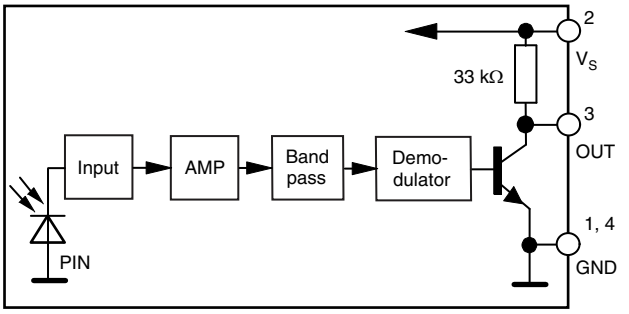
Product Page

Marking

DESIGN SUPPORT TOOLS

- 3D models
- Window size calculator

BLOCK DIAGRAM



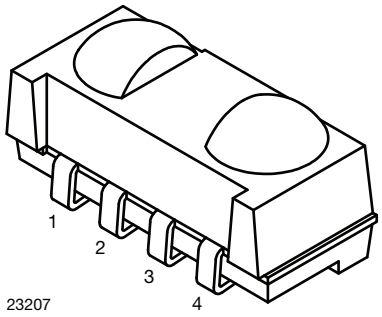
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MECHANICAL DATA

Pinning:

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



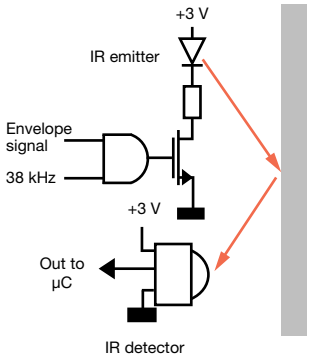
ORDERING CODE

Taping:

TSSP770..TT - top view taped, 2200 pcs/reel

TSSP770..TR - side view taped, 2300 pcs/reel

PRESENCE SENSING



PARTS TABLE		
Carrier frequency	38 kHz	TSSP77038
	56 kHz	TSSP77056
Package		Heimdall
Pinning		1, 4 = GND, 2 = V_S, 3 = OUT
Dimensions (mm)		6.8 W x 3.0 H x 3.2 D
Mounting		SMD
Application		Presence sensors, fast proximity sensors
Special options		• Extended temperature range: www.vishay.com/doc?82738 • Narrow optical filter: www.vishay.com/doc?81590 • Wide optical flter: www.vishay.com/doc?82726

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

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ELECTRICAL AND OPTICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Supply voltage		V_S	2.0	-	5.5	V
Supply current	V_S = 3.3 V, E_v = 0	I_{SD}	0.25	0.35	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.45	-	mA
Transmission distance	E_v = 0, IR diode TSAL6200, I_F = 50 mA, test signal see Fig. 1	d	-	8	-	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: $t_{pi} - 4/f_o < t_{po} < t_{pi} + 4/f_o$, test signal see Fig. 1	$E_{e\ min.}$	-	0.7	1.2	mW/m²
Maximum irradiance	Pulse width tolerance: $t_{pi} - 4/f_o < t_{po} < t_{pi} + 4/f_o$, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 50	-	°

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

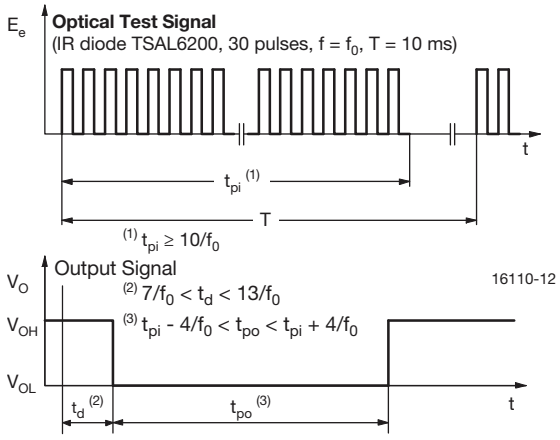


Fig. 1 - Output Active Low

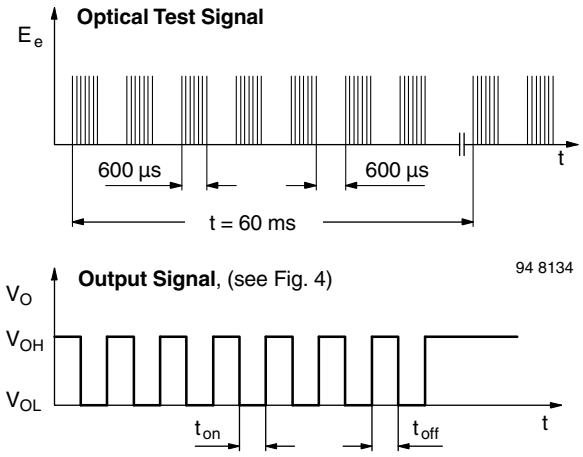


Fig. 3 - Output Function

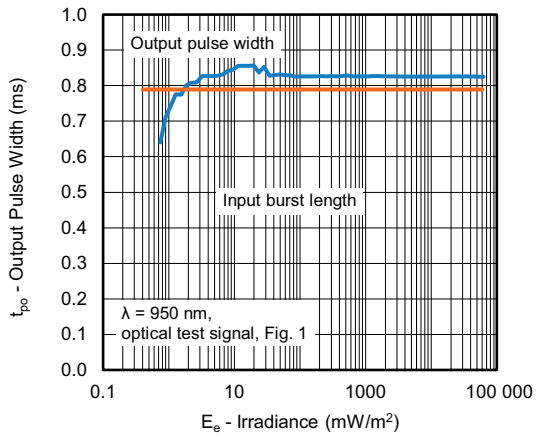


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

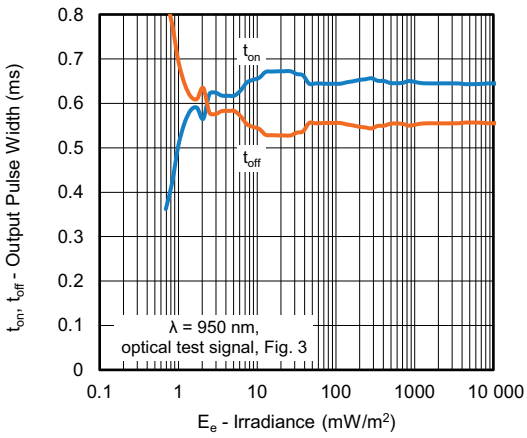


Fig. 4 - Output Pulse Diagram

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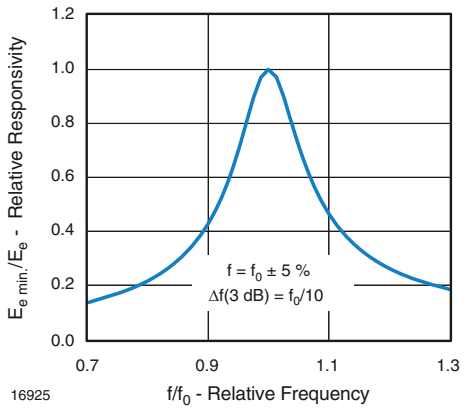


Fig. 5 - Frequency Dependence of Responsivity

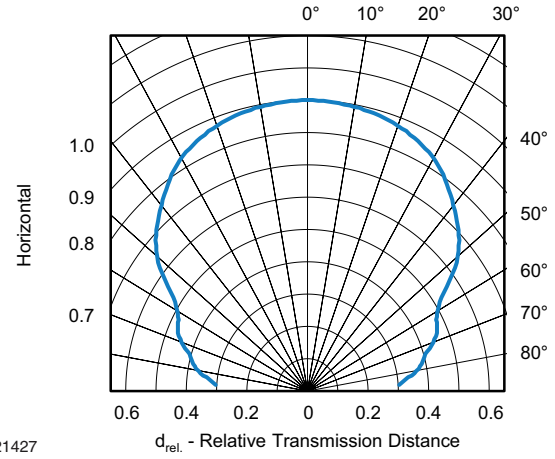


Fig. 8 - Horizontal Directivity

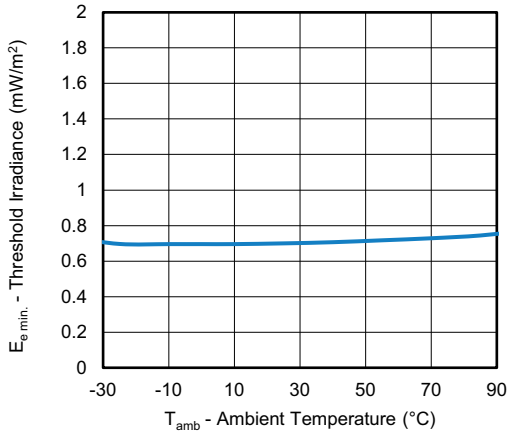


Fig. 6 - Sensitivity vs. Ambient Temperature

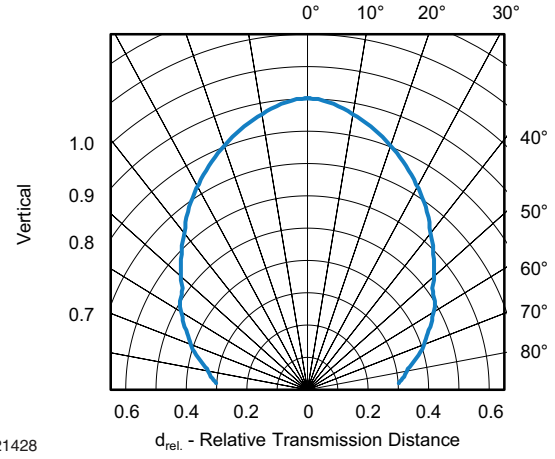


Fig. 9 - Vertical Directivity

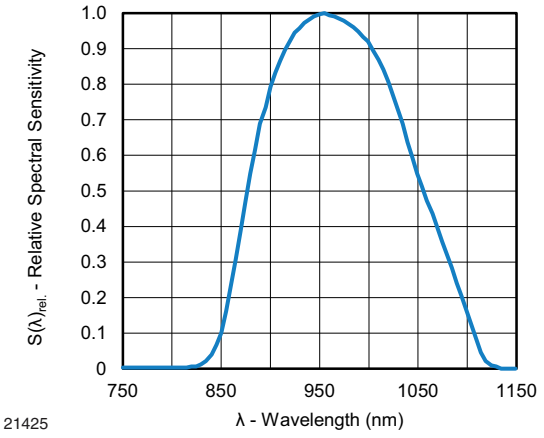


Fig. 7 - Relative Spectral Sensitivity vs. Wavelength

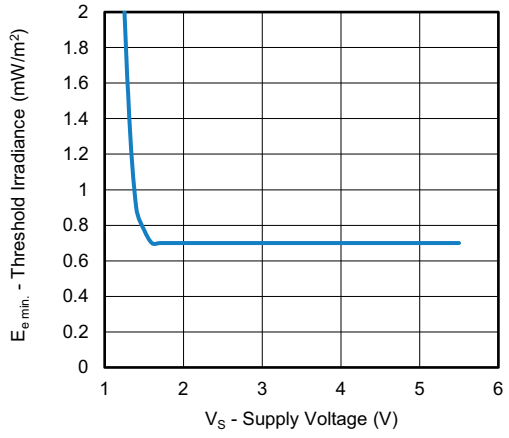
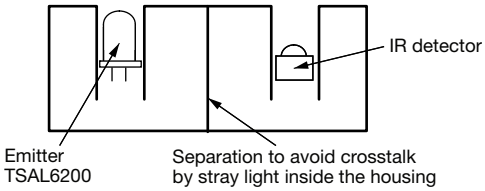


Fig. 10 - Sensitivity vs. Supply Voltage

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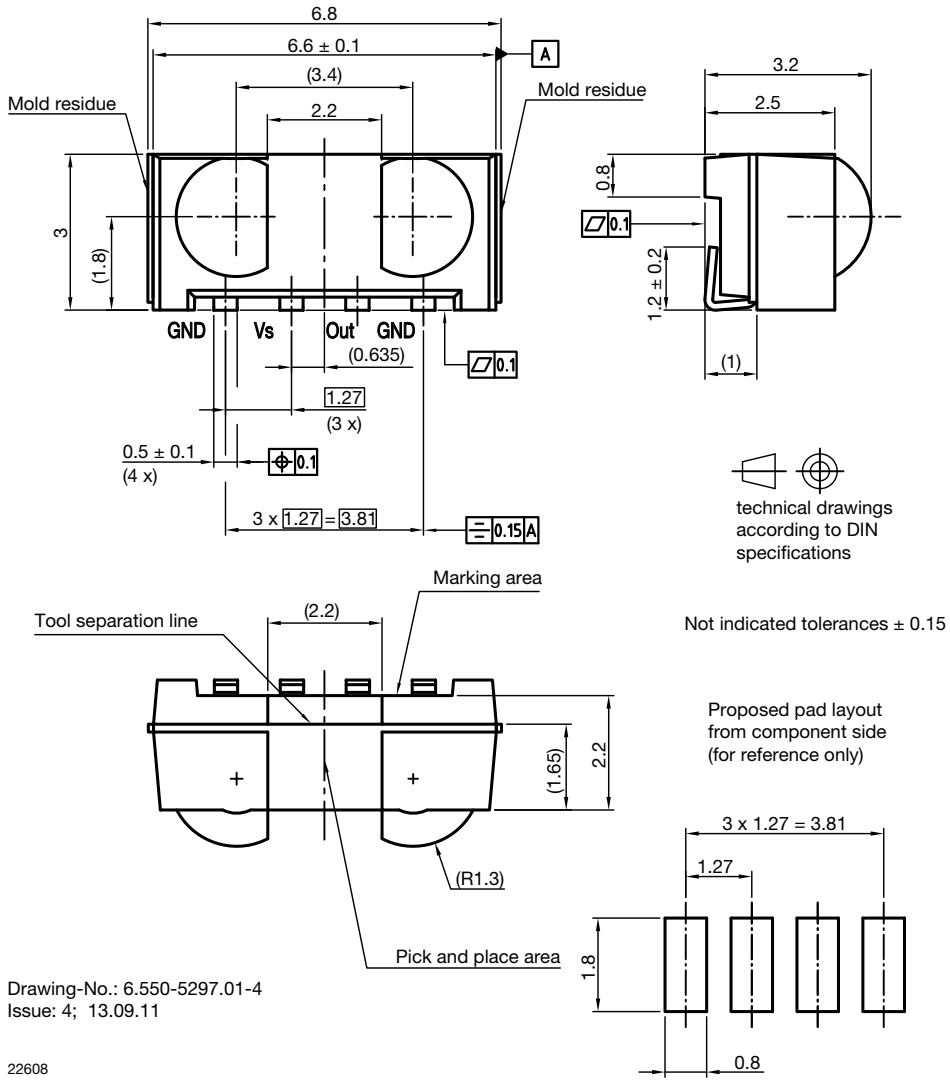
The typical application of these devices is a reflective or beam break sensor with active low “detect” or “no detect” information contained in its output. The TSSP77056 is also suitable for fast (~ 5 ms) proximity sensor applications for ranges between 10 cm and 2 m. Please see application note “Vishay’s TSSP4056 Sensor for Fast Proximity Sensing” (www.vishay.com/doc?82741).

Example for a sensor hardware:



There should be no common window in front of the emitter and detector in order to avoid crosstalk via guided light through the window.

PACKAGE DIMENSIONS in millimeters



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ASSEMBLY INSTRUCTIONS

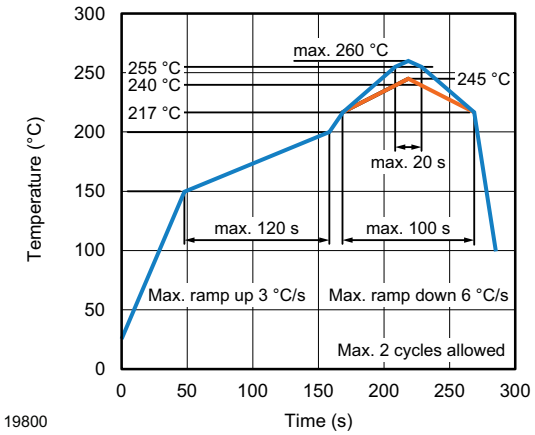
Reflow Soldering

- 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

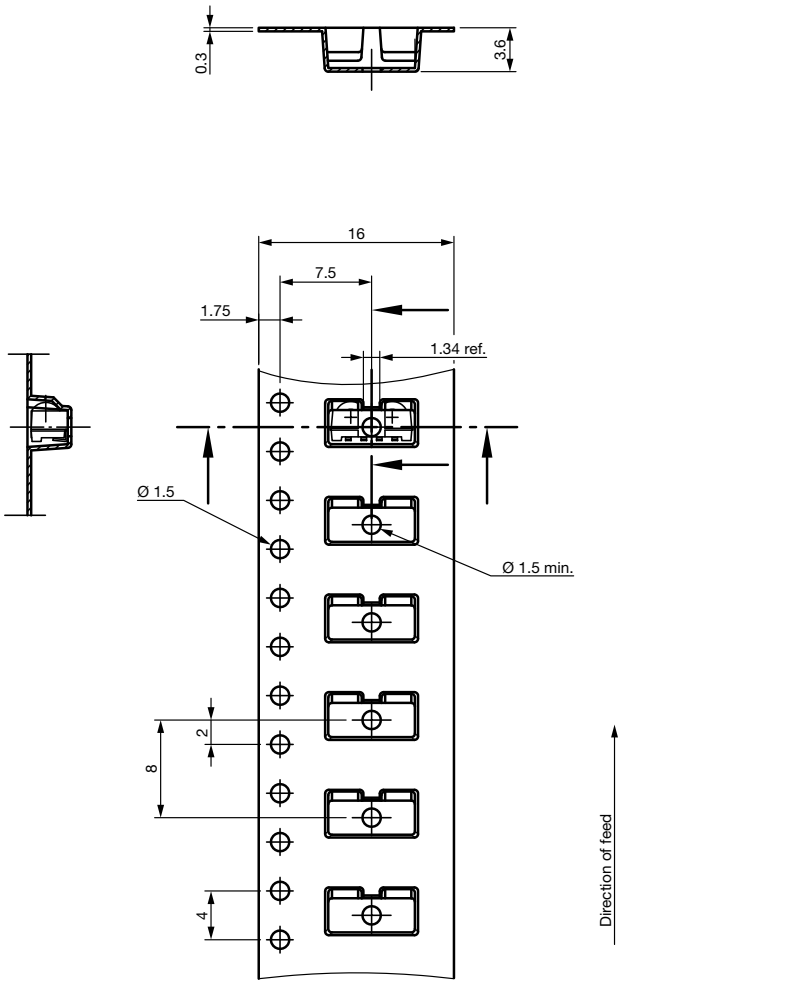
- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off

VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE



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TAPING VERSION TSSP..TR DIMENSIONS in millimeters

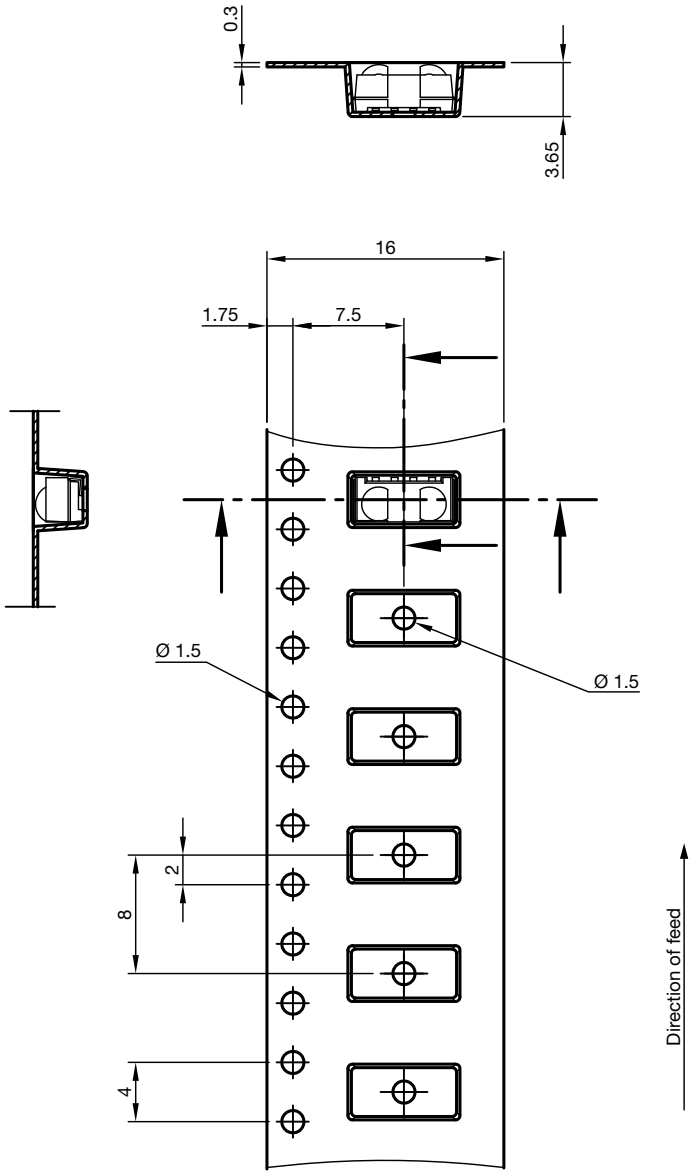


technical drawings
according to DIN
specifications

Drawing-No.: 9.700-5337.01-4
Issue: 2; 06.10.15

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TAPING VERSION TSSP..TT DIMENSIONS in millimeters

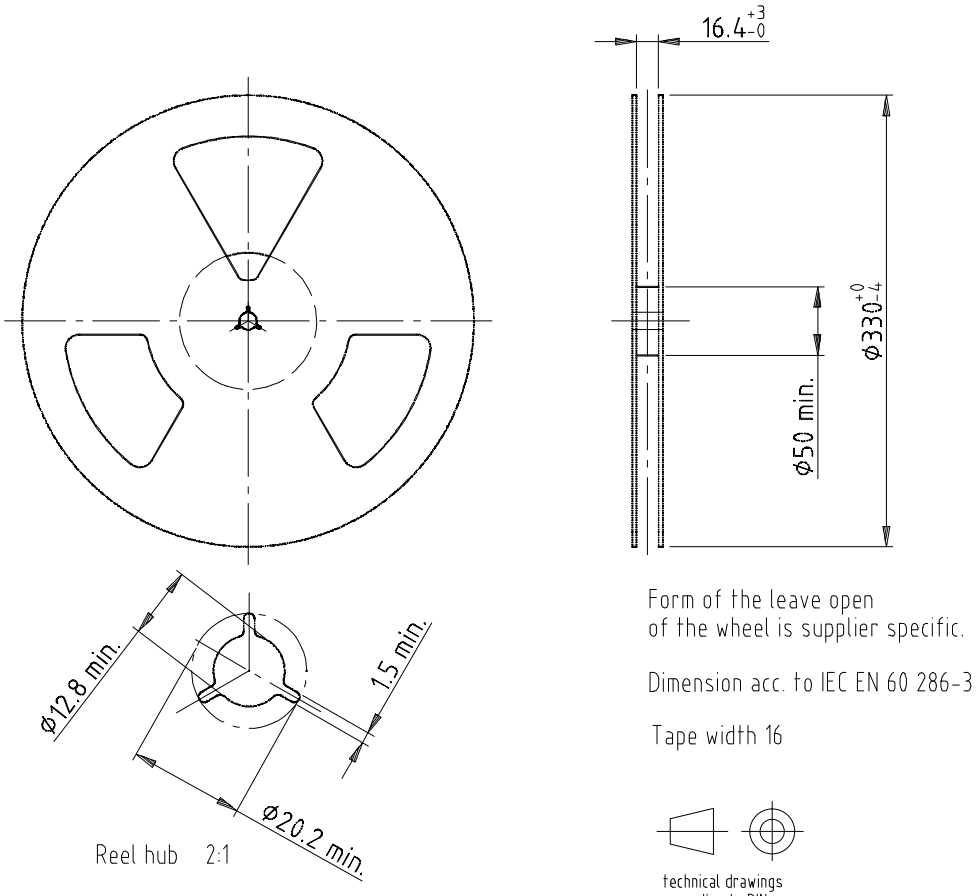


Drawing-No.: 9.700-5338.01-4
Issue: 4; 12.06.13

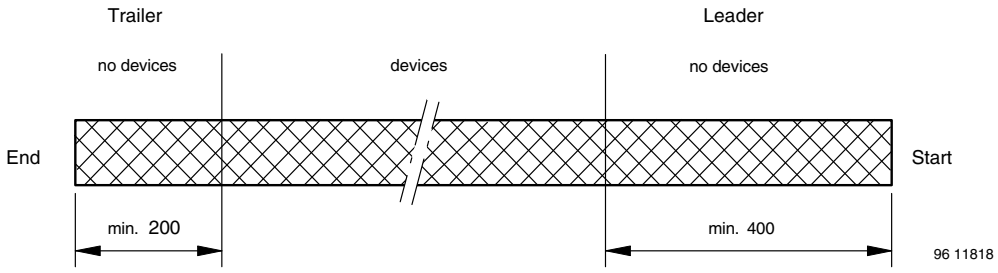
technical drawings
according to DIN
specifications

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REEL DIMENSIONS in millimeters



LEADER AND TRAILER DIMENSIONS in millimeters



COVER TAPE REEL STRENGTH

According to DIN EN 60286-3

0.1 N to 1.3 N

300 ± 10 mm/min.

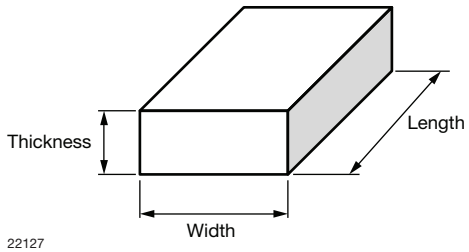
165° to 180° peel angle

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OUTER PACKAGING

The sealed reel is packed into a pizza box.

CARTON BOX DIMENSIONS in millimeters



	THICKNESS	WIDTH	LENGTH
Pizza box (SMD and heimdall) (taping in reels)	50	340	340

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.

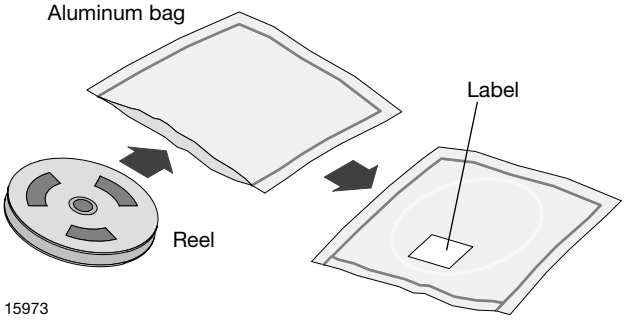
VISHAY SEMICONDUCTORS GmbH STANDARD BAR CODE PRODUCT LABEL (finished goods)

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

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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.

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.

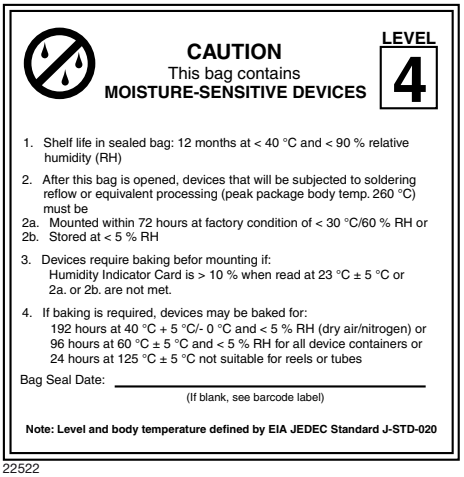
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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.



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. Electrostatic sensitive devices warning labels are on the packaging.

VISHAY SEMICONDUCTORS STANDARD BAR CODE LABELS (example)

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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