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

22911

DESCRIPTION

The TSSP93038DF1PZA device is the latest generation of compact infrared detector module for presence, proximity, or light curtain 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 for presence sensing.

This component has not been qualified according to automotive specifications.

FEATURES

- Constant sensitivity in dark and bright ambient, up to direct sunlight level
- 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?82746
- Supply voltage: 2.0 V to 3.6 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

Product Page | Marking | Packages

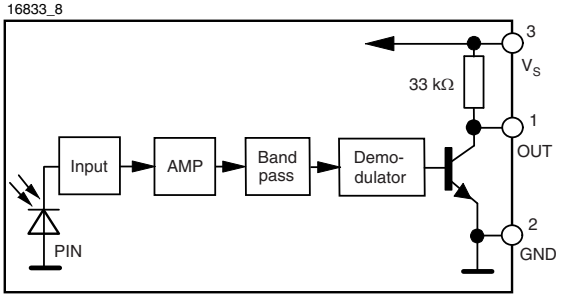
DESIGN SUPPORT TOOLS

- 3D models
- Window size calculator

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

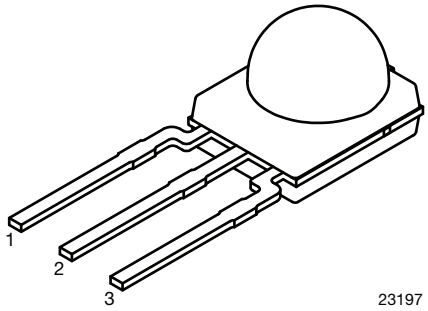
BLOCK DIAGRAM



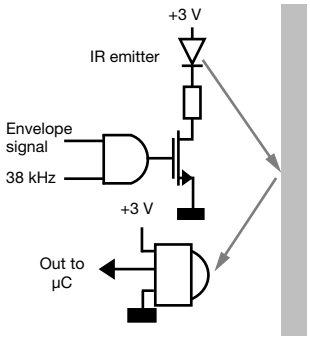
MECHANICAL DATA

Pinning for TSSP93...:

1 = OUT, 2 = GND, 3 = V_S



PRESENCE SENSING



PARTS TABLE		
Carrier frequency	38 kHz	TSSP93038DF1PZA
Package		Minimold
Pinning		1 = OUT, 2 = GND, 3 = V_S
Dimensions (mm)		5.4 W x 6.35 H x 4.9 D
Mounting		Leaded
Application		Presence sensors, fast proximity sensors

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Supply voltage (pin 3)		V_S	-0.3 to +3.6	V
Supply current (pin 3)		I_S	5	mA
Output voltage (pin 1)		V_O	-0.3 to +3.6	V
Voltage at output to supply		V_S - V_O	-0.3 to (V_S + 0.3)	V
Output current (pin 1)		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 (pin 3)	E_v = 0, V_S = 3.3 V	I_{SD}	0.25	0.37	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.8	-	mA
Supply voltage		V_S	2.0	-	3.6	V
Output voltage low (pin 1)	I_{OSL} = 0.5 mA, E_e = 2 mW/m², test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Pulse width tolerance: $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$, test signal see Fig. 1	$E_{e\ min.}$	0.9	1.3	1.8	mW/m²
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	°

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

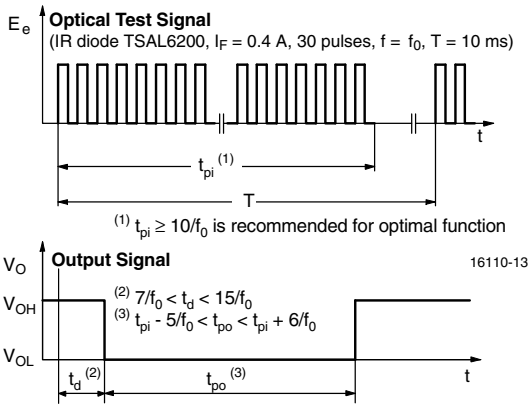


Fig. 1 - Output Delay and Pulse Width

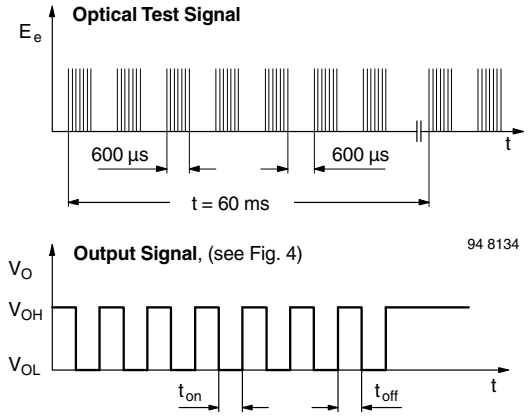


Fig. 3 - Test Signal

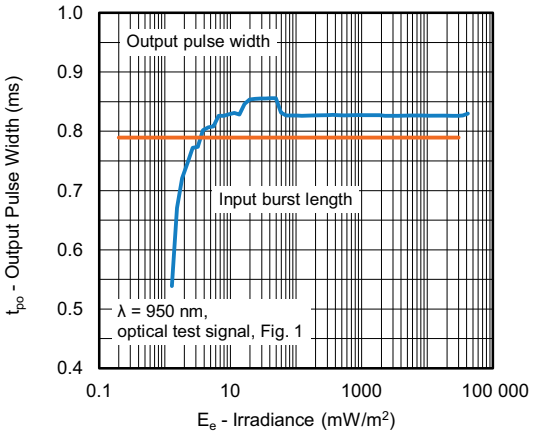


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

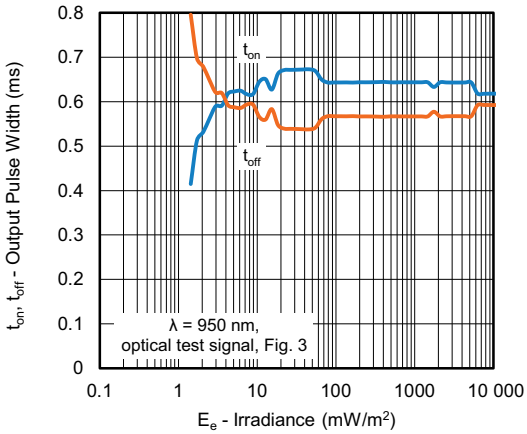


Fig. 4 - Output Pulse Diagram

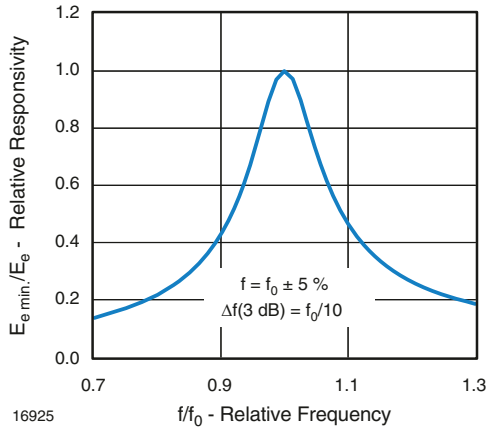


Fig. 5 - Frequency Dependence of Responsivity

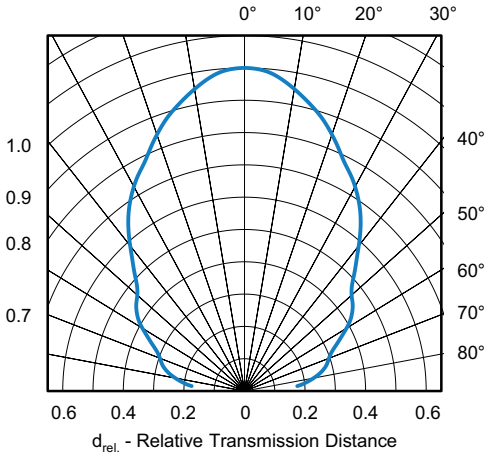


Fig. 8 - Directivity

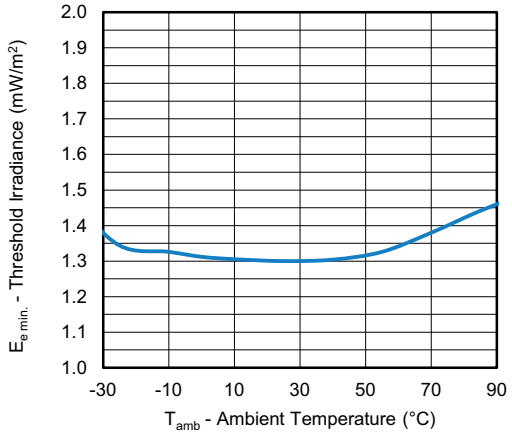


Fig. 6 - Sensitivity vs. Ambient Temperature

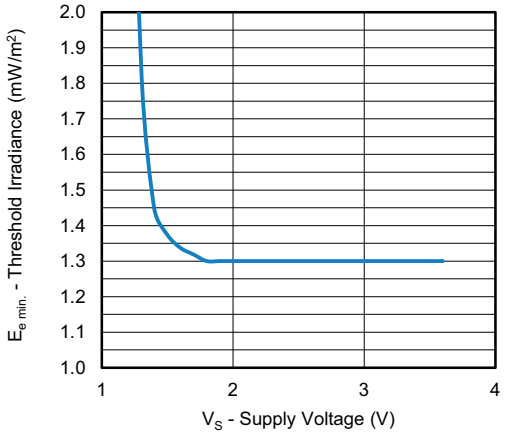


Fig. 9 - Sensitivity vs. Supply Voltage

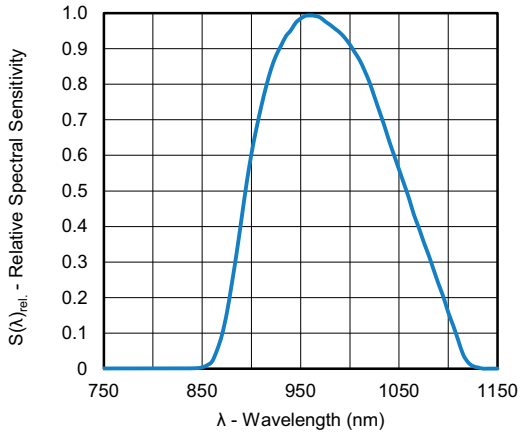
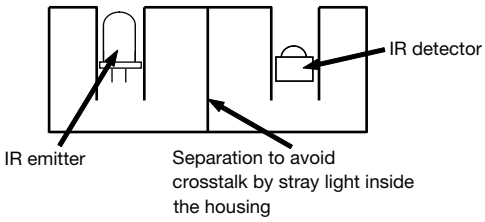


Fig. 7 - Relative Spectral Sensitivity vs. Wavelength

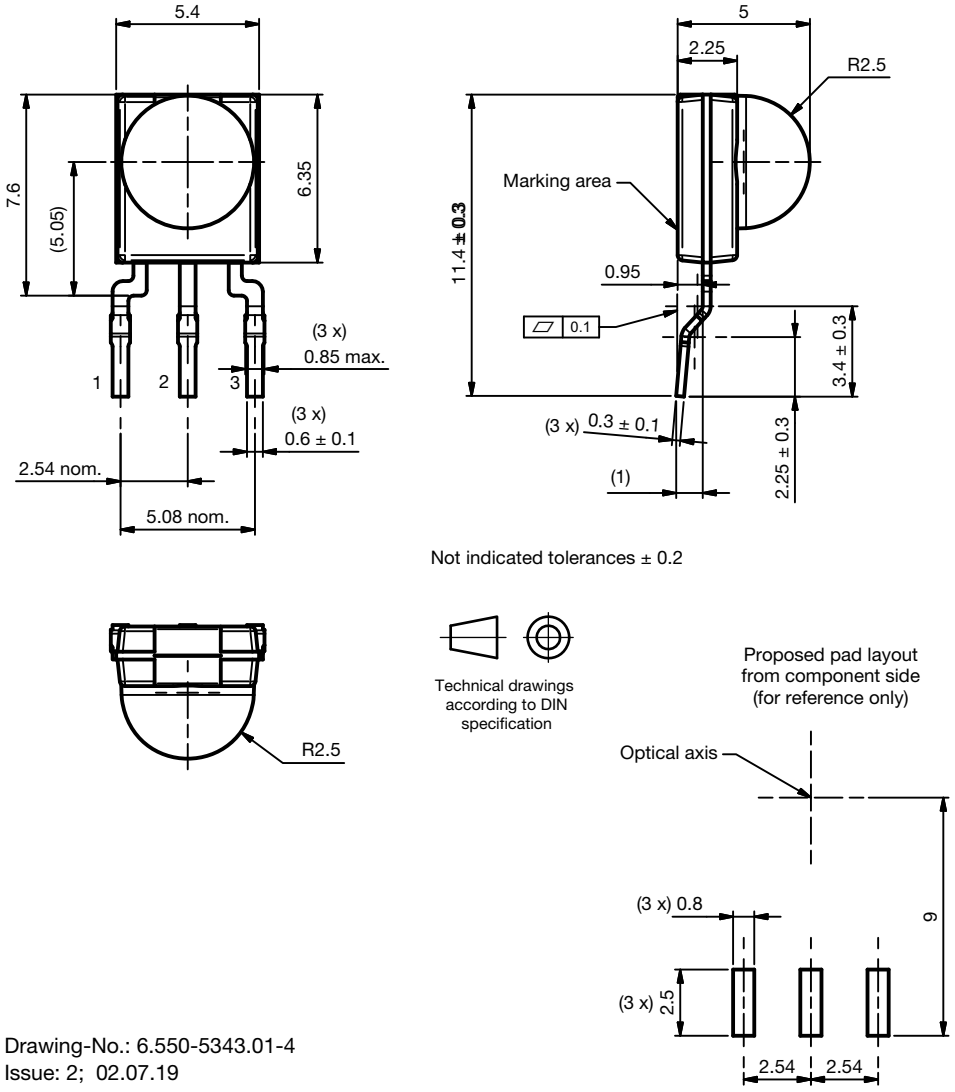
The typical application of these devices is a reflective or beam break sensor with active low “detect” or “no detect” information contained in its output.

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



Drawing-No.: 6.550-5343.01-4
Issue: 2; 02.07.19

ASSEMBLY INSTRUCTIONS

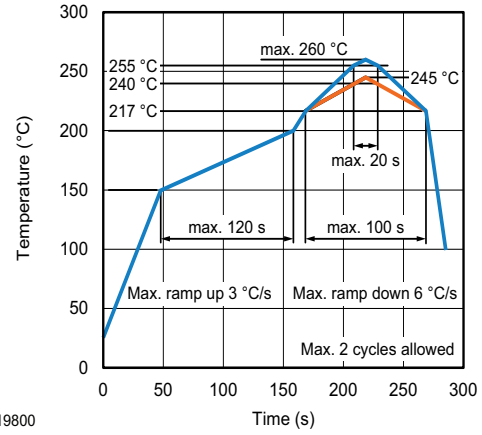
Reflow Soldering

- 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

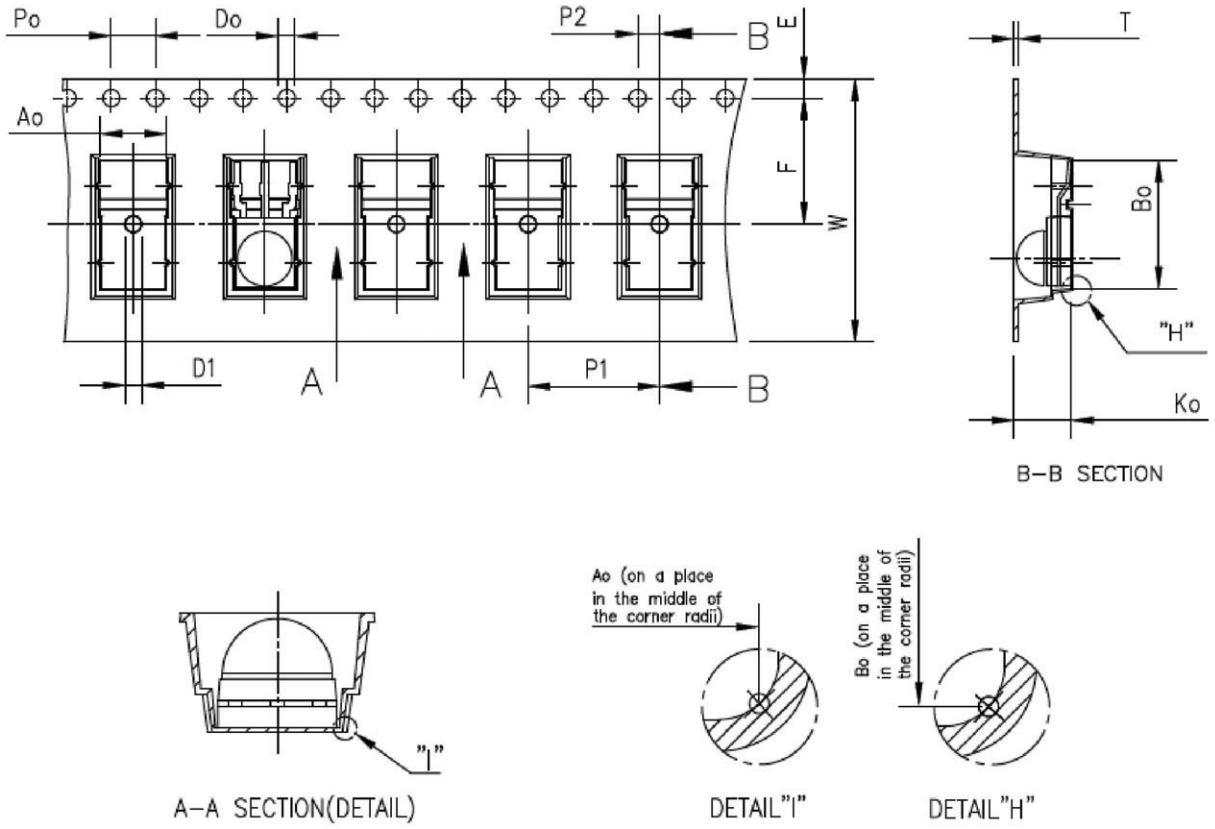
Manual Soldering

- 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



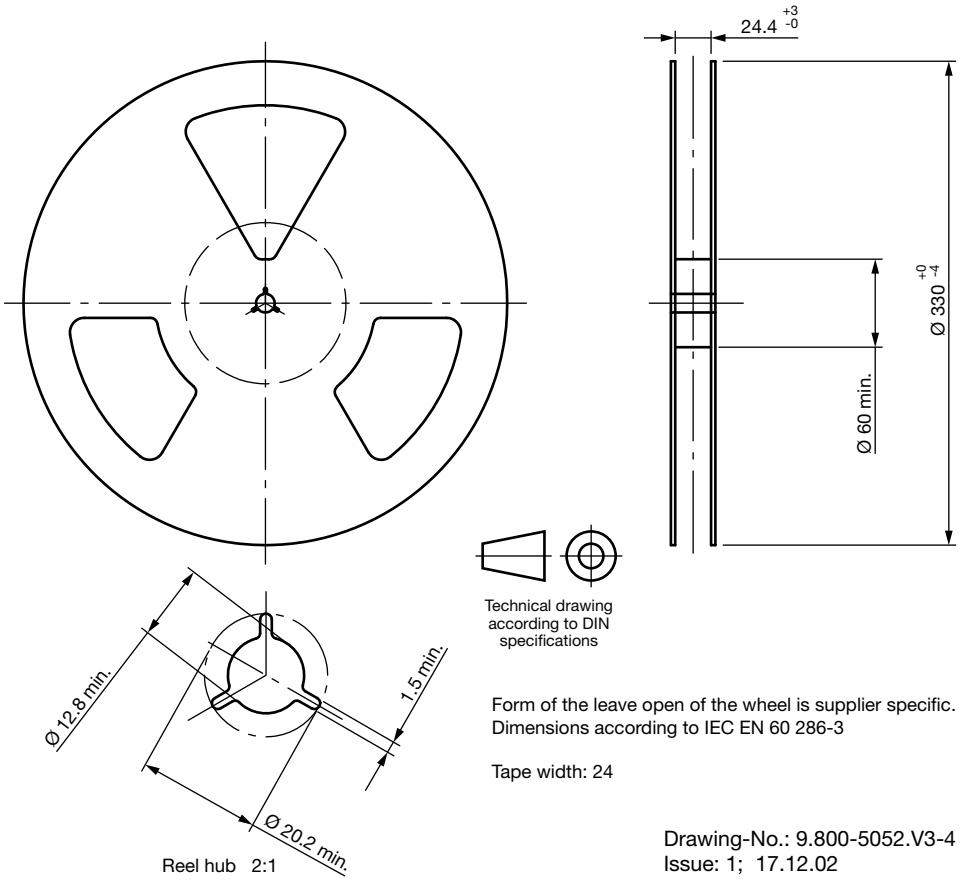
PACKAGING DIMENSIONS in millimeters



Drawing-No.: 9.700-5399.01-4
Issue: 2; 29.06.18

Item	A_0	B_0	K_0	P_0	P_1	P_2	T
Dimensions	6.08 ± 0.10	11.75 ± 0.10	5.25 ± 0.10	4.0 ± 0.10	12.0 ± 0.10	2.0 ± 0.10	0.40 ± 0.05
Item	E	F	D_0	D_1	W	$10P_0$	
Dimensions	1.75 ± 0.10	11.50 ± 0.10	1.55 ± 0.05	1.5 min.	24.0 +0.30 / -0.10	40.0 ± 0.20	

REEL DIMENSIONS in millimeters

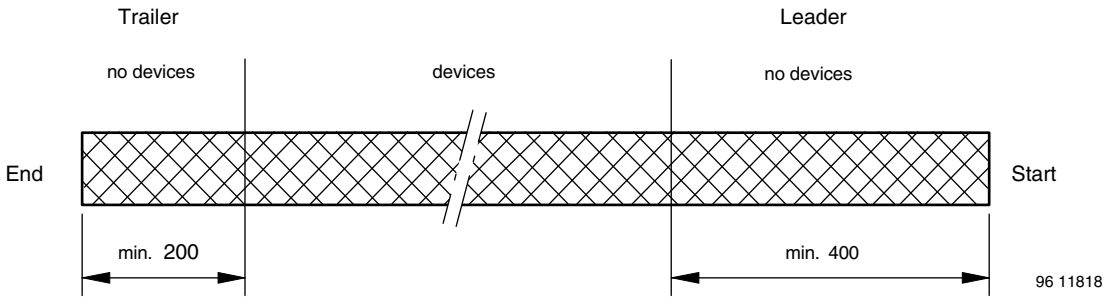


Form of the leave open of the wheel is supplier specific.
Dimensions according to IEC EN 60 286-3

Tape width: 24

Drawing-No.: 9.800-5052.V3-4
Issue: 1; 17.12.02

LEADER AND TRAILER DIMENSIONS in millimeters



COVER TAPE PEEL STRENGTH

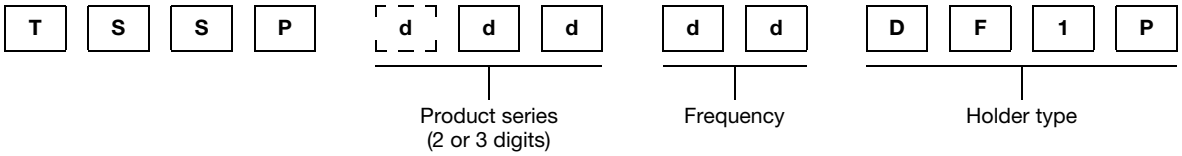
According to DIN EN 60286-3

0.1 N to 1.3 N

300 mm/min. ± 10 mm/min.

165° to 180° peel angle

ORDERING INFORMATION



Note

- d = “digit”, please consult the list of available series on the previous page to create a valid part number

Example: TSSP93038DF1P

PACKAGING QUANTITY

- 1100 pieces per reel
- 1 reel per box

LABEL

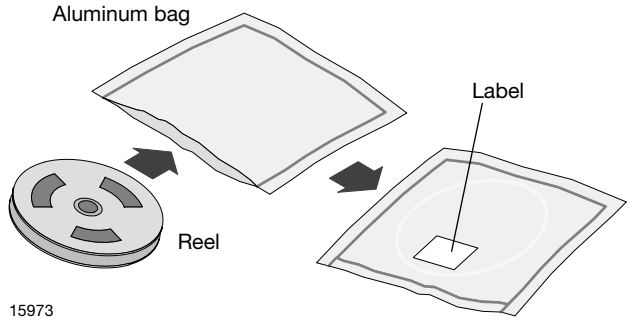
Standard bar code labels for finished goods

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:

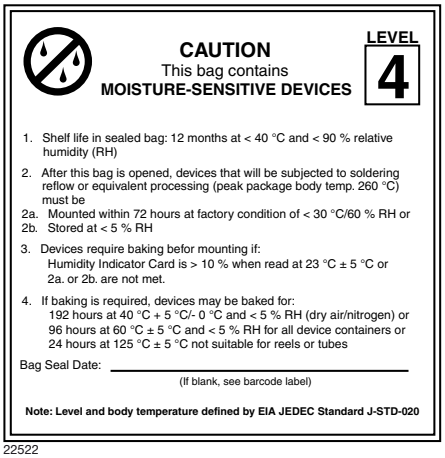
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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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