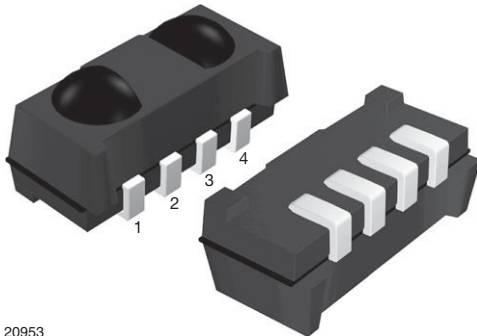


# IR Sensor Module for Reflective Sensor, Light Barrier, and Fast Proximity Applications



20953

## DESIGN SUPPORT TOOLS

[click logo to get started](#)


## MECHANICAL DATA

### Pinning:

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

## ORDERING CODE

### Taping:

TSSP770..TT - top view taped

TSSP770..TR - side view taped

## FEATURES

- Up to 2 m for presence and proximity sensing
- Uses modulated bursts of infrared light
- PIN diode and sensor IC in one package
- Low supply current
- Shielding against EMI
- Visible light is suppressed by IR filter
- Insensitive to supply voltage ripple and noise
- Supply voltage: 2.5 V to 5.5 V
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



## 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.

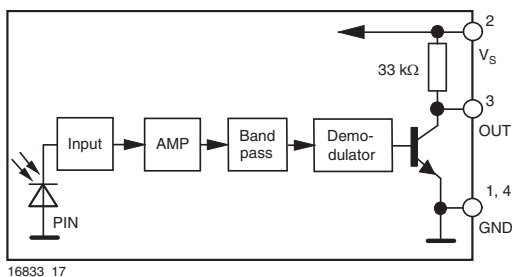
This component has not been qualified according to automotive specifications.

## 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 activation
- Fast proximity sensors for toys, robotics, drones, and other consumer and industrial uses

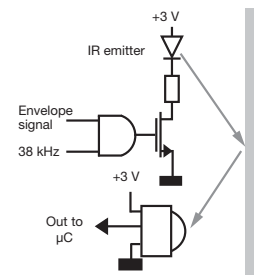
PARTS TABLE		
Carrier frequency	38 kHz	TSSP77038
	56 kHz	TSSP77056
Package	Heimdall	
Pinning	1, 4 = GND, 2 = $V_S$ , 3 = OUT	
Dimensions (mm)	6.8 W x 3.0 H x 3.2 D	
Mounting	SMD	
Application	Presence sensors, fast proximity sensors	

## BLOCK DIAGRAM



16833\_17

## PRESENCE SENSING





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	$T_{amb} \leq 85\text{ °C}$	$P_{tot}$	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 ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage		$V_S$	2.5	-	5.5	V
Supply current	$V_S = 5\text{ V}$ , $E_v = 0$	$I_{SD}$	0.55	0.7	0.9	mA
	$E_v = 40\text{ klx}$ , sunlight	$I_{SH}$	-	0.8	-	mA
Transmission distance	$E_v = 0$ , IR diode TSAL6200, $I_F = 50\text{ mA}$ , test signal see Fig. 1	$d$	-	18	-	m
Output voltage low	$I_{OSL} = 0.5\text{ mA}$ , $E_e = 0.7\text{ mW/m}^2$ , 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	$E_e\text{ min.}$	-	0.7	1.2	mW/m <sup>2</sup>
Maximum irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$ , test signal see Fig. 1	$E_e\text{ max.}$	50	-	-	W/m <sup>2</sup>
Directivity	Angle of half transmission distance	$\Phi_{1/2}$	-	$\pm 50$	-	deg

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

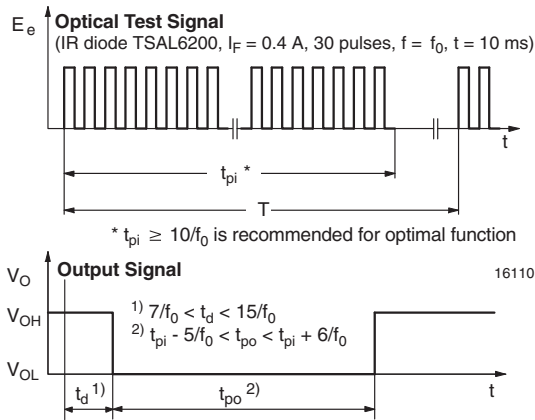


Fig. 1 - Output Active Low

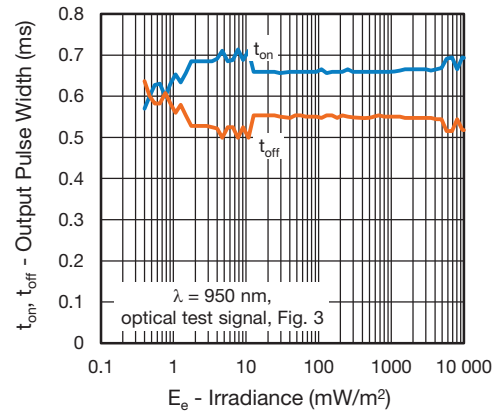


Fig. 4 - Output Pulse Diagram

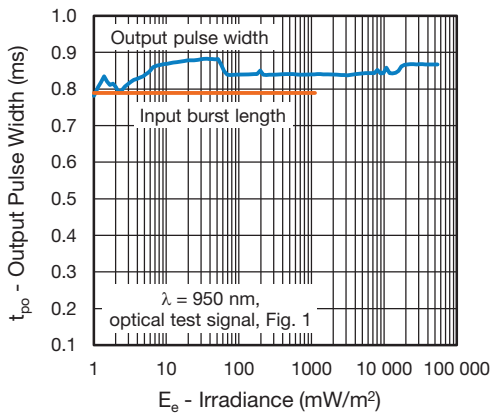


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

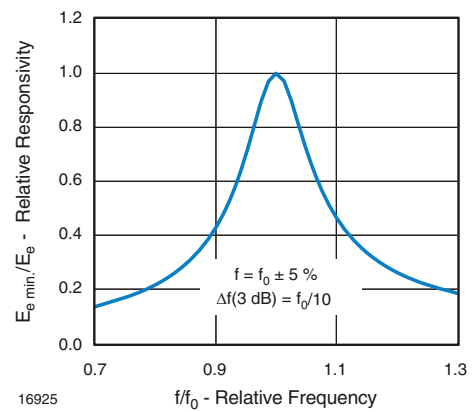


Fig. 5 - Frequency Dependence of Responsivity

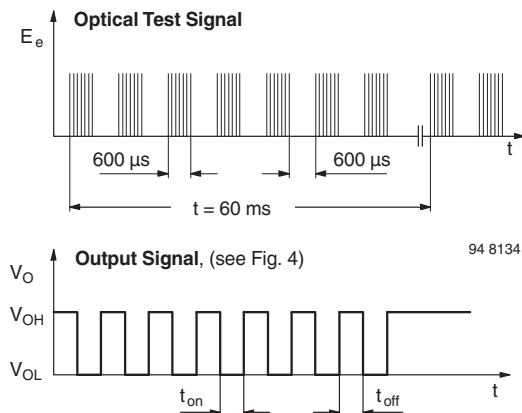


Fig. 3 - Output Function

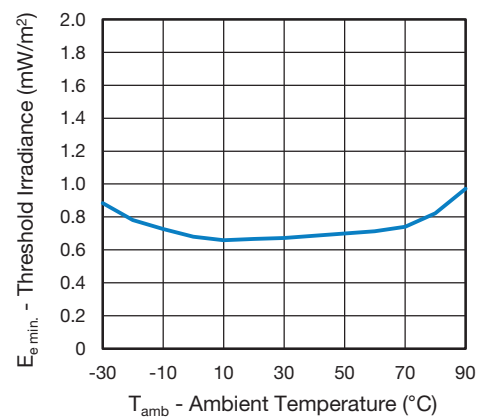
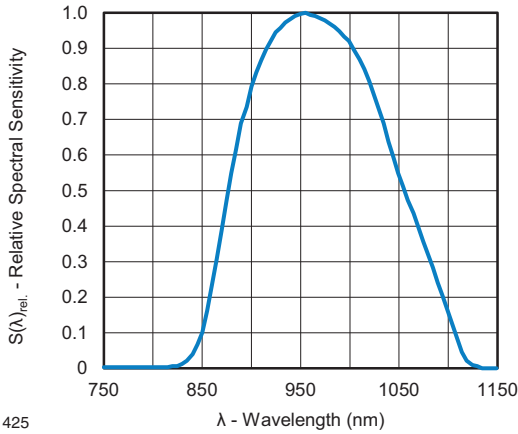
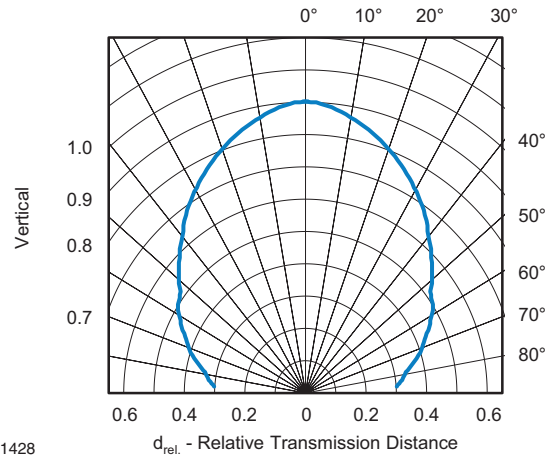


Fig. 6 - Sensitivity vs. Ambient Temperature



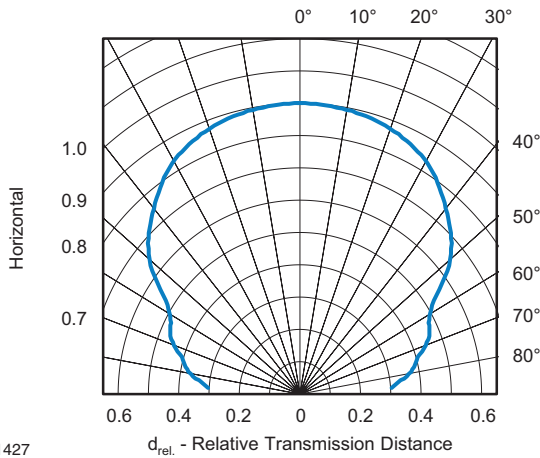
21425

Fig. 7 - Relative Spectral Sensitivity vs. Wavelength



21428

Fig. 9 - Vertical Directivity



21427

Fig. 8 - Horizontal Directivity

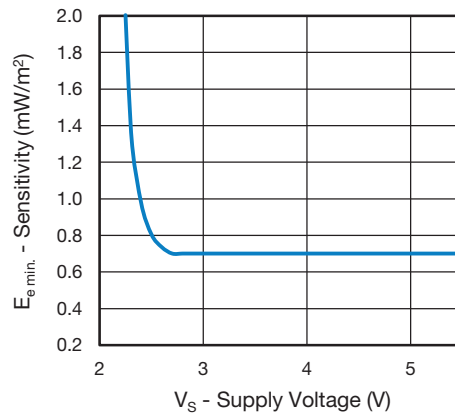
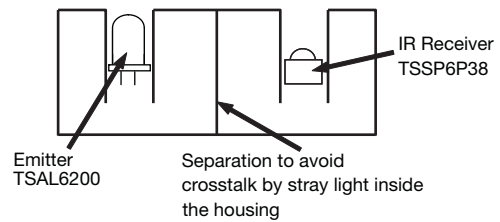


Fig. 10 - Sensitivity vs. Supply Voltage

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](http://www.vishay.com/doc?82741)).

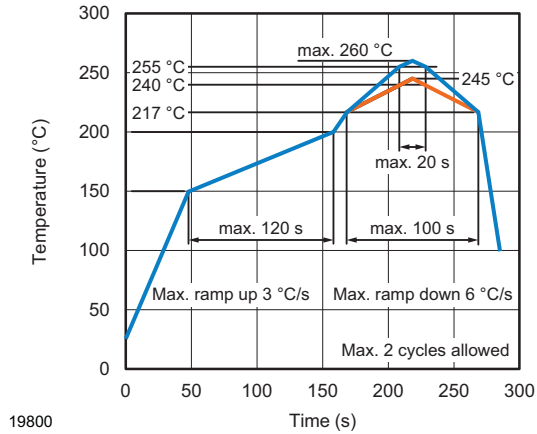
Example for a sensor hardware:



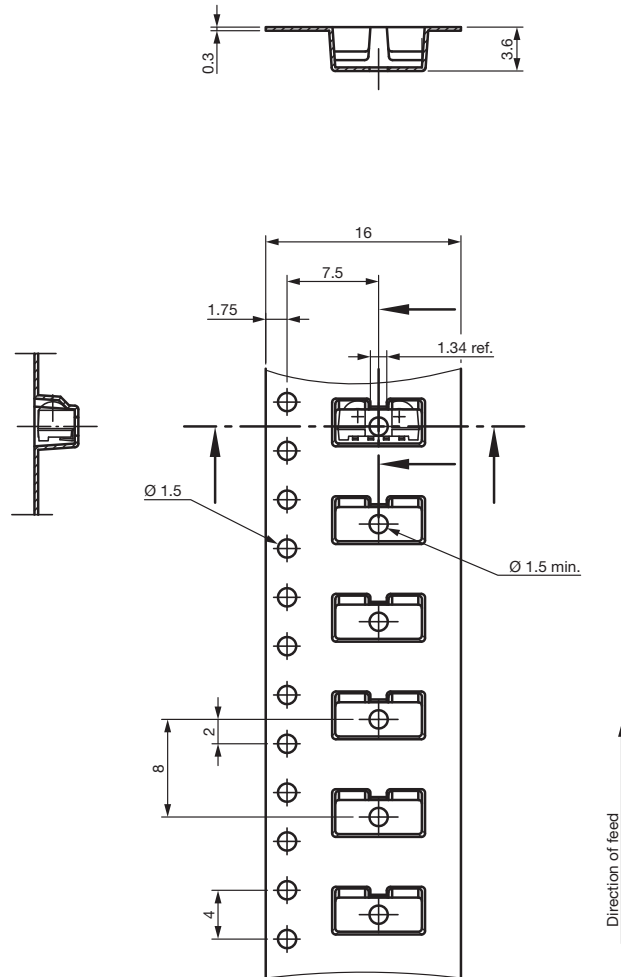
There should be no common window in front of the emitter and detector in order to avoid crosstalk via guided light through the window.



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



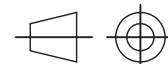
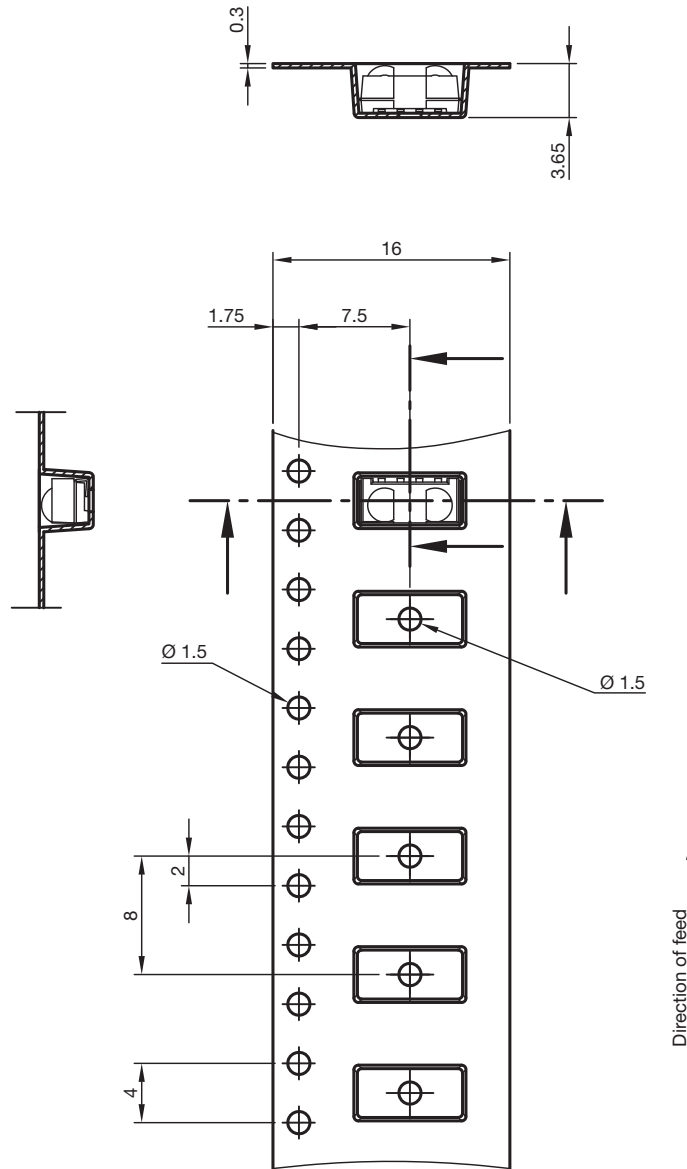
**TAPING VERSION TSSP..TR DIMENSIONS in millimeters**



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

technical drawings according to DIN specifications

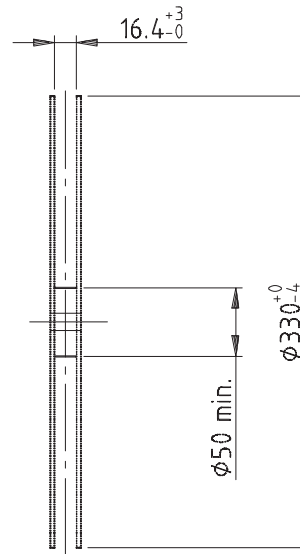
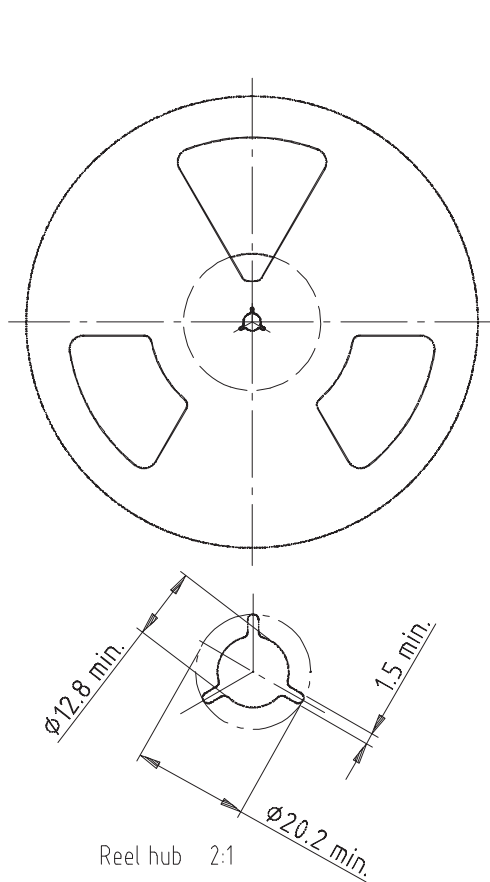
**TAPING VERSION TSSP..TT DIMENSIONS** in millimeters



technical drawings  
according to DIN  
specifications

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

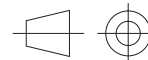
**REEL DIMENSIONS** in millimeters



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

Dimension acc. to IEC EN 60 286-3

Tape width 16



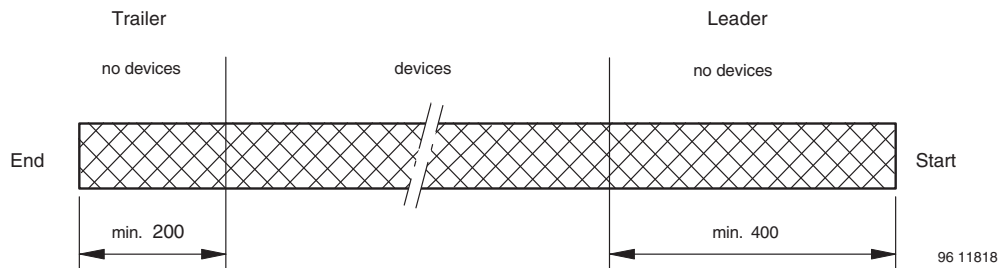
technical drawings according to DIN specifications

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

Issue: 1; 07.05.02

16734

**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

**LABEL**

**Standard bar code labels for finished goods**

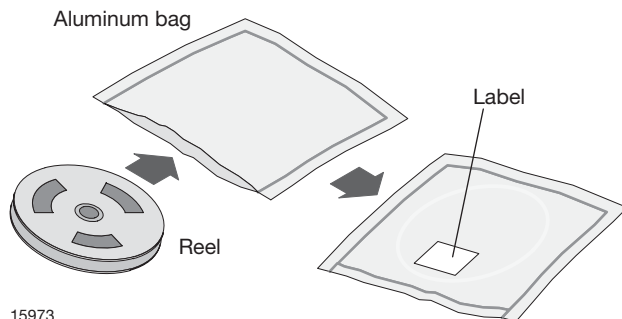
The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain Vishay Semiconductor GmbH specific data.



<b>VISHAY SEMICONDUCTORS GmbH STANDARD BAR CODE PRODUCT LABEL (finished goods)</b>		
<b>PLAIN WRITING</b>	<b>ABBREVIATION</b>	<b>LENGTH</b>
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
<b>LONG BAR CODE TOP</b>	<b>TYPE</b>	<b>LENGTH</b>
Item-number	N	8
Plant-code	N	2
Sequence-number	X	3
Quantity	N	8
Total length	-	21
<b>SHORT BAR CODE BOTTOM</b>	<b>TYPE</b>	<b>LENGTH</b>
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.

### RECOMMENDED METHOD OF STORAGE

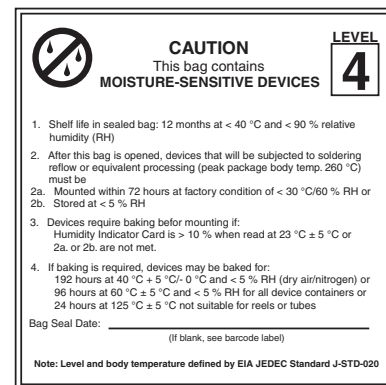
Dry box storage is recommended as soon as the aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- 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.



EIA JEDEC standard J-STD-020 level 4 label is included on all dry bags

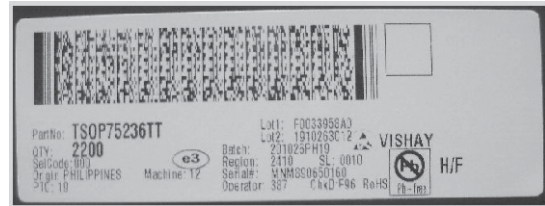


**ESD PRECAUTION**

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.



22178



## Tape and Reel Standards for Surface-Mount IR Receiver Modules

Vishay Semiconductor surface-mount IR receivers are packaged on tape and reel. The following specification is based on IEC publication 286, which takes the industrial requirements for automatic insertion into account.

Absolute maximum ratings, mechanical dimensions, optical and electrical characteristics for taped devices are identical to the basic catalog types and can be found in the specifications for untaped devices.

### PACKAGING

The tapes of components are available on reels. Each reel is marked with labels which contain the following information:

- Vishay
- Type
- Group
- Tape code, normally part of type name
- Production code
- Quantity

### MISSING COMPONENTS

Up to 3 consecutive components may be missing if the gap is followed by at least 6 components. A maximum of 0.5 % of the components per reel quantity may be missing. At least 5 empty positions are present at the start and the end of the tape to enable tape insertion.

**Tensile strength** of the tape: > 15 N

### NUMBER OF COMPONENTS

- A. Panhead: quantity per reel:
  - TT, top view package, 1190 pcs
  - TR, side view package, 1120 pcs
- B. Heimdall: quantity per reel:
  - TT, top view package, 2200 pcs
  - TR, side view package, 2300 pcs
- C. Heimdall without lens: quantity per reel:
  - WTT, top view package, 2200 pcs
  - WTR, side view package, 2300 pcs
- D. Belobog: quantity per reel:
  - TT1, top view package, 1800 pcs
- E. Belobog with shield: quantity per reel:
  - TT1, top view package, 1500 pcs
- F. Minimold DF1P: quantity per reel:
  - DF1P, 1100 pcs
- G. TVCastSMD TR1: quantity per reel:
  - TR1, side view package, 2000 pcs

### ORDER DESIGNATION

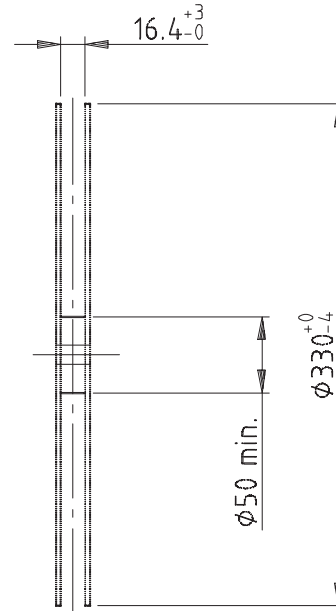
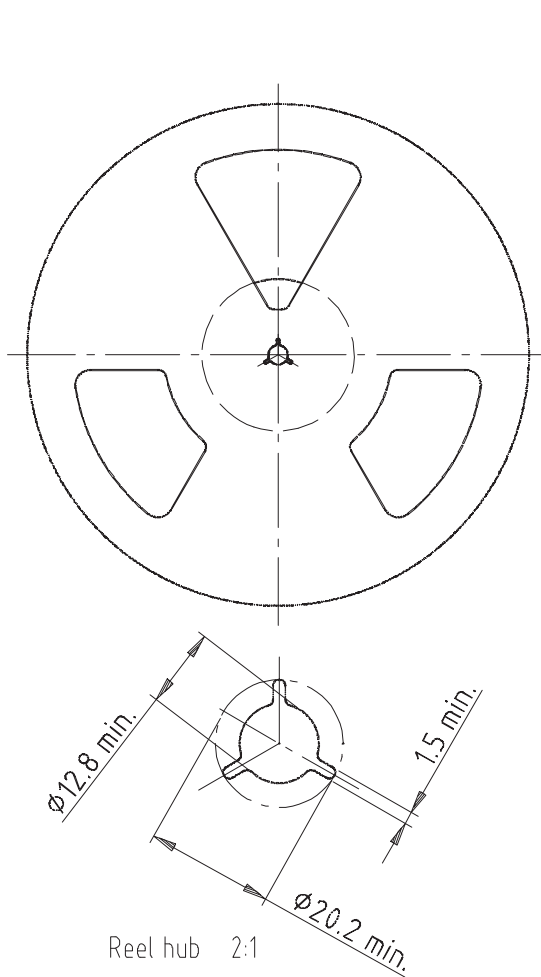
The type designation of the device is extended by TT or TT1 for top view or TR for side view.

#### Example:

- TSOP6238TR (reel packing)
- TSOP75238TR (reel packing)
- TSOP75338WTT (reel packing)
- TSOP57438TT1 (reel packing)
- TSOP57238HTT1 (reel packing)
- TSOP39438TR1 (reel packing)



## REEL DIMENSIONS FOR PANHEAD, HEIMDALL, AND TVCASTSMD TR in millimeters



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

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

Issue: 1; 07.05.02

16734

### Note

- The body structure of the reel can vary



## TAPING VERSION TSOP..TT (TOP VIEW) DIMENSIONS in millimeters

A. Panhead (TSOP36...TT, TSSP...TT, TSOP6...TT, TSOP16...TT, TSOP96...TT)



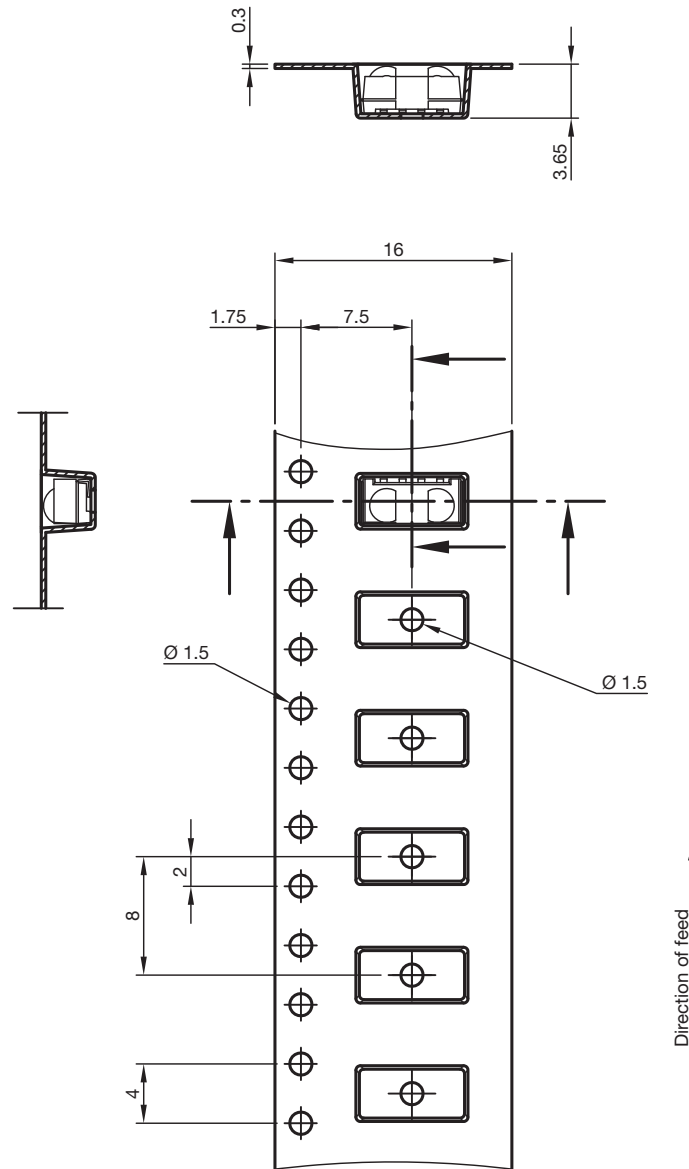
Drawing-No.: 9.700-5259.01-4

Issue: 1; 05.09.01

16584

## TAPING VERSION TSOP..TT (TOP VIEW) DIMENSIONS in millimeters

B. Heimdall (TSOP75...TT, TSOP77...TT, TSSP77...TT, TSOP15...TT, TSOP95...TT)



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



technical drawings  
according to DIN  
specifications

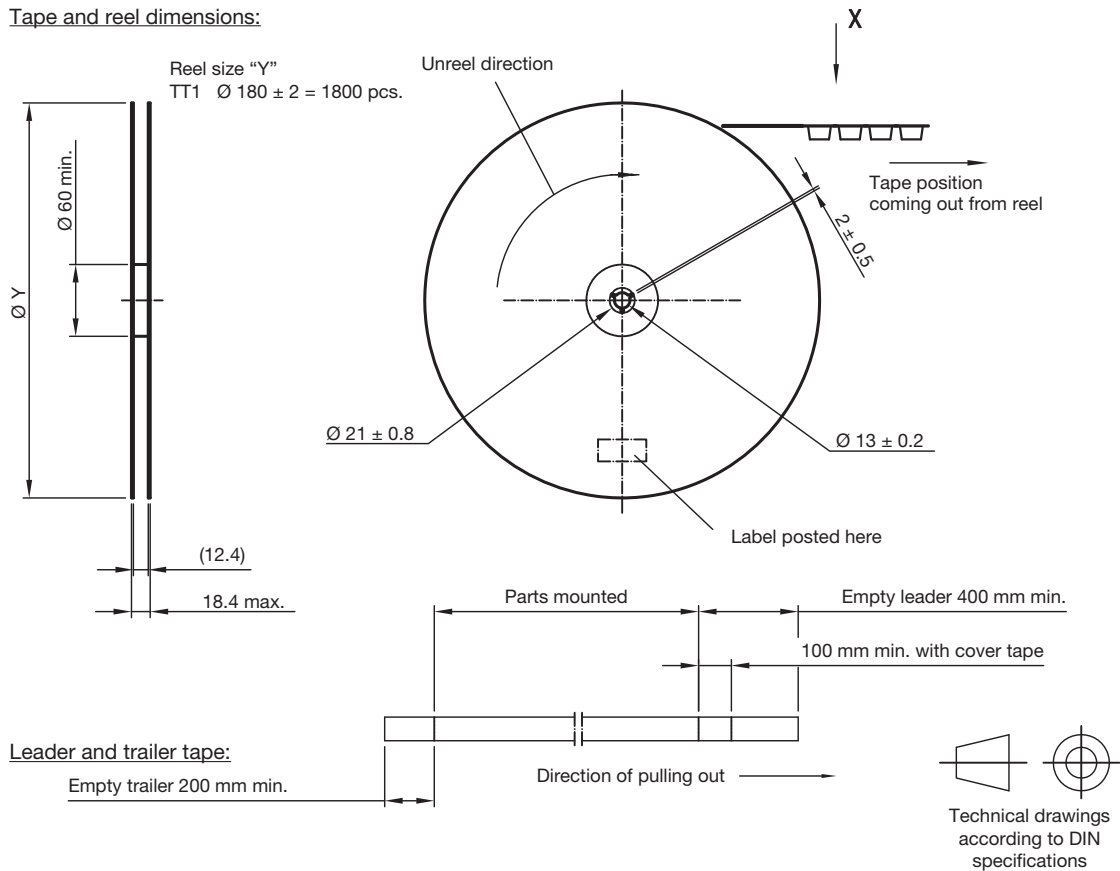




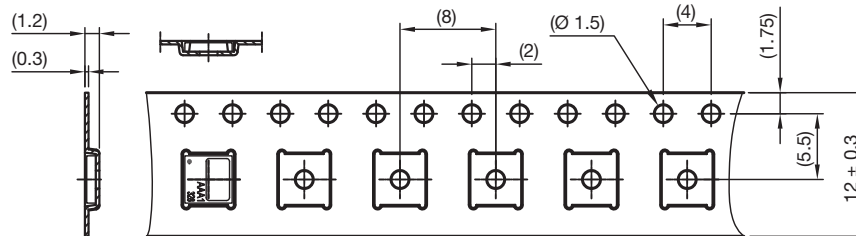
### TAPING VERSION TSOP..TT1 (TOP VIEW) DIMENSIONS in millimeters

D. Belobog (TSOP37...TT1, TSOP57...TT1, TSOP17...TT1, TSOP97...TT1)

Tape and reel dimensions:



X 2:1



Drawing-No.: 9.700-5347.01-4  
Issue: 2; 07.03.18

Not indicated tolerances  $\pm 0.1$





### TAPING VERSION TSOP..TT1 (TOP VIEW) DIMENSIONS in millimeters

E. Belobog with shield (TSOP37...HTT1, TSOP57...HTT1, TSOP17...HTT1, TSOP97...HTT1)

Tape and reel dimensions:



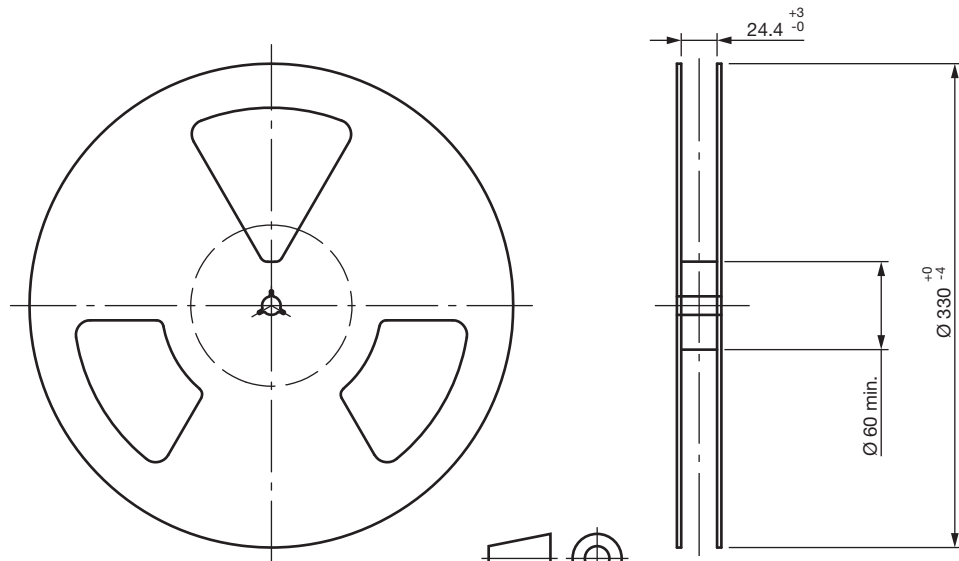
Drawing-No.: 9.700-5380.01-4  
Issue: 3; 07.03.18

Not indicated tolerances  $\pm 0.1$



### TAPING VERSION TSOP..DF1P (SIDE VIEW) DIMENSIONS in millimeters

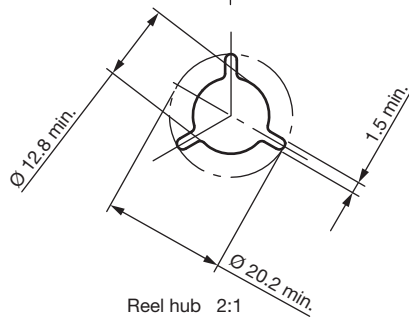
F. Minimold DF1P (TSOP33...DF1P, TSOP53...DF1P, TSOP13...DF1P, TSOP93...DF1P)



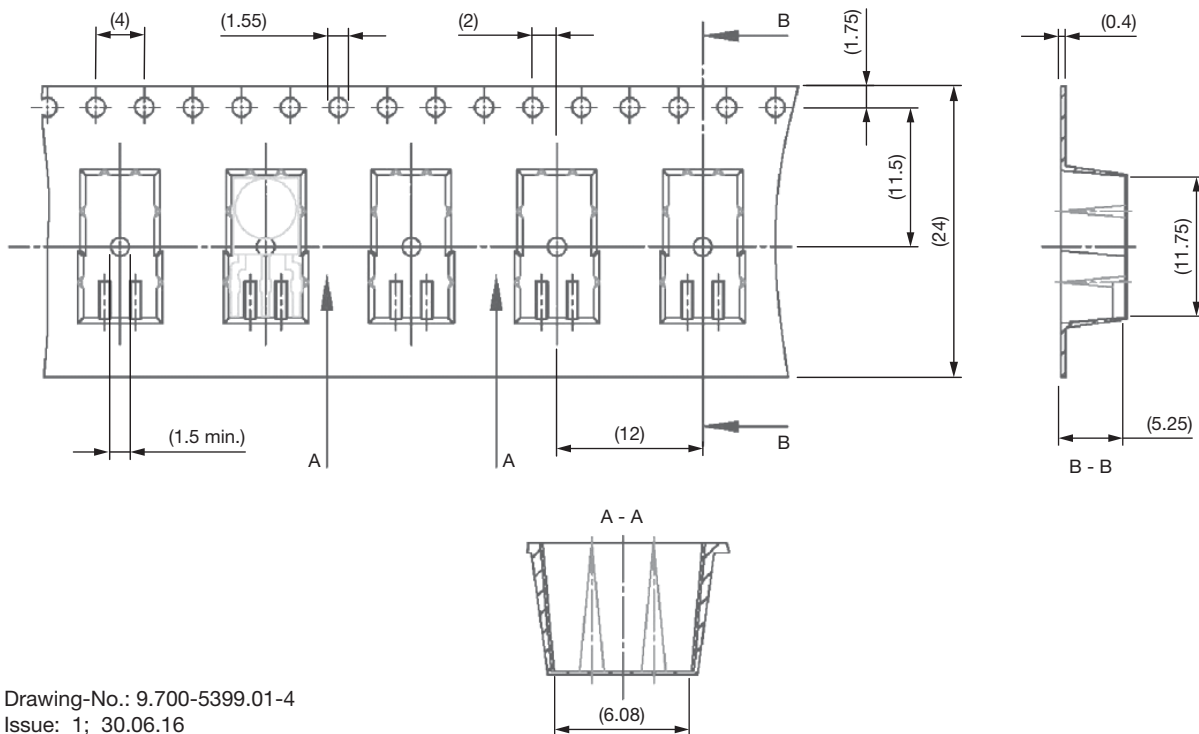
Technical drawing according to DIN specifications

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



Drawing-No.: 9.700-5399.01-4  
Issue: 1; 30.06.16



## TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

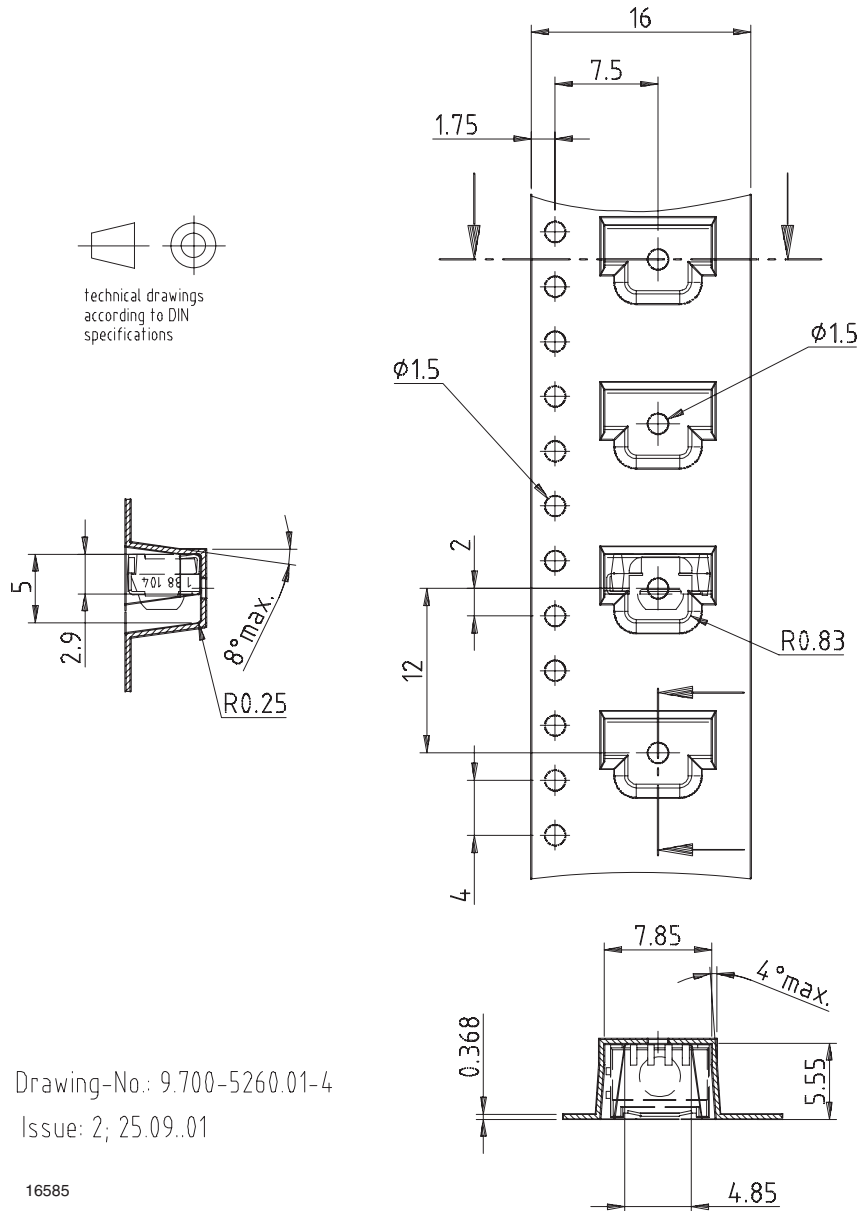
G. TVCastSMD TR1 (TSOP59...TR1, TSOP39...TR1, TSOP19...TR1, TSOP99...TR1)



Drawing-No.: GO-100220.10\_Z  
Issue B: 08.02.17

## TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

A. Panhead (TSOP36...TR, TSSP6...TR, TSOP6...TR, TSOP16...TR, TSOP96...TR)



Drawing-No.: 9.700-5260.01-4

Issue: 2; 25.09..01

16585

## TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

B. Heimdall (TSSP7...., TSOP75...TR, TSOP77...TR, TSSP7....TR, TSOP15...TR, TSOP95...TR)



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



technical drawings  
according to DIN  
specifications

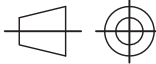


## TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

C. Heimdall without lens (TSOP75...WTR, TSOP77...WTR, TSSP...WTR, TSOP15...WTR, TSOP95...WTR)



Drawing-No.: 9.700-5342.01-4  
Issue: 2; 12.06.13

  
technical drawings  
according to DIN  
specifications

### LEADER AND TRAILER DIMENSIONS in millimeters



### COVER TAPE REEL STRENGTH

According to DIN EN 60286-3

0.1 N to 1.3 N

300 mm/min.  $\pm$  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 TOP	TYPE	LENGTH
Selection-code	X	3
Data-code	N	3
Batch-number	X	10
Filter	-	1
Total length	-	17

## DRY PACKAGING

The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.



15973

## 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.

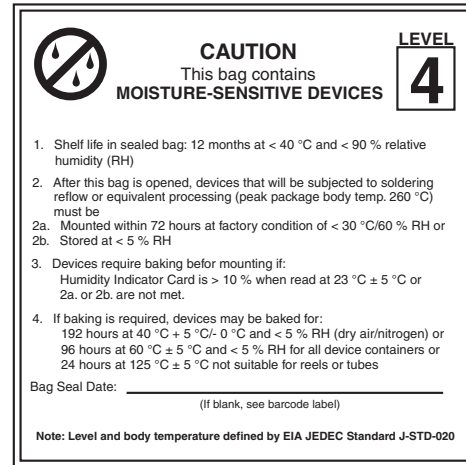
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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.



22522

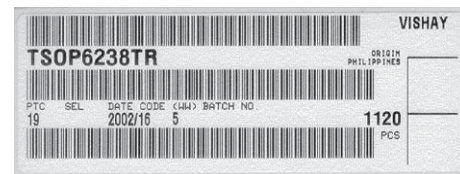
EIA JEDEC standard JSTD-020 level 4 label is included on all dry bags

## 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. 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.



16962

## 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

22127





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