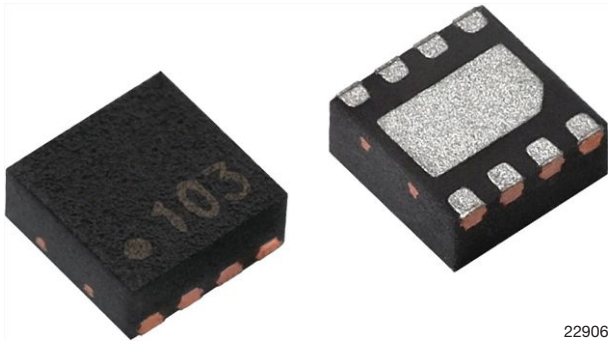




## Preamplifier Circuit for IR Remote Control



22906

### DESIGN SUPPORT TOOLS

[click logo to get started](#)



### FEATURES

- Narrow bandpassfilter for all common carrier frequencies
- High immunity against DC light
- Intelligent AGC to suppress disturbance from fluorescent lamps and CRTs
- Low power consumption
- Wide supply voltage range
- High immunity against ripple on the supply voltage
- Output active low
- IC manufactured in CMOS technology
- Small QFN package with 2 mm width
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

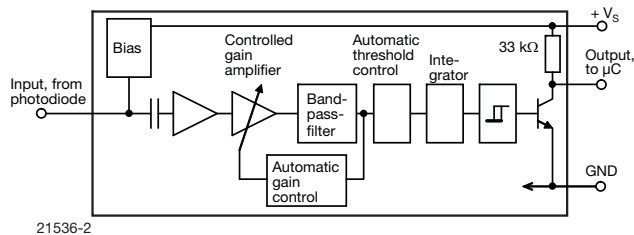
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### DESCRIPTION

The VSOP584.. is designed for use in an IR receiver application together with a photo pin diode. It is a sophisticated receiver concept that is very sensitive to data signals and compatible with the most common data formats for IR remote control. On the other hand it is immune to DC current caused by DC light sources such as tungsten bulbs. The disturbance signal of fluorescent lamps is suppressed; there are no unwanted pulses at the output.

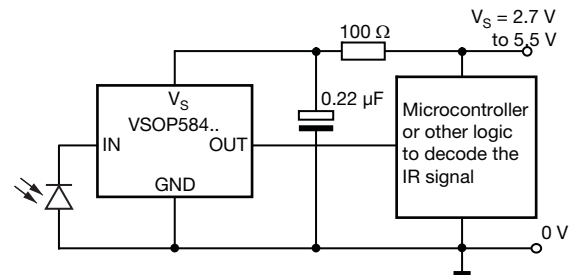
PARTS TABLE		RECOMMENDED FOR LONG BURST CODES (AGC4)
<b>AGC</b>		
<b>Carrier frequency</b>	36 kHz	VSOP58436 (1)(2)(3)
	38 kHz	VSOP58438 (4)(5)(6)
<b>Package</b>		VSOP
<b>Pinning</b>		1, 4, 5 = N.C., 2 = V <sub>S</sub> , 3 = OUT, 6, 8 = GND, 7 = IN
<b>Dimensions (mm)</b>		2.0 W x 2.0 H x 0.76 D
<b>Mounting</b>		SMD
<b>Application</b>		Remote control
<b>Best remote control code</b>		(1) RC-5 (2) RC-6 (3) Panasonic (4) NEC (5) Sharp (6) r-map

### BLOCK DIAGRAM (Simplified)



21536-2

### APPLICATION CIRCUIT



The RC filter is optional to improve the EOS robustness and the immunity to supply voltage ripple. We recommend to keep the distance between the photodiode and the input of the VSOP584.. as short as possible.

21537-5

Vishay recommends using a photodiode with at least 2.3 mm<sup>2</sup> area. The connection between the photodiode and pin 7 should be kept as short as possible and carefully shielded to prevent noise coupling.



ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage	Pin 2	V <sub>S</sub>	-0.3 to +6	V
Supply current	Pin 2	I <sub>S</sub>	5	mA
Output voltage	Pin 3	V <sub>O</sub>	-0.3 to (V <sub>S</sub> + 0.3)	V
Output sink current	Pin 3	I <sub>O</sub>	5	mA
Power dissipation	T <sub>amb</sub> ≤ 85 °C	P <sub>tot</sub>	10	mW
Operating temperature range		T <sub>amb</sub>	-25 to +85	°C
Storage temperature range		T <sub>stg</sub>	-25 to +85	°C
ESD stress, HBM	Pin 2, pin 3, MIL-STD-883C	V <sub>ESD</sub>	2000	V
	Pin 7, MIL-STD-883C	V <sub>ESD</sub>	500	V
ESD stress, MM	Pin 2, pin 3, MIL-STD-883C	V <sub>ESD</sub>	200	V
	Pin 7, MIL-STD-883C	V <sub>ESD</sub>	100	V

**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 CHARACTERISTICS (T <sub>amb</sub> = -30 °C to +85 °C)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage		V <sub>S</sub>	2.7	-	5.5	V
Supply current (pin 2)	I <sub>IN</sub> = 0, V <sub>S</sub> = 5 V	I <sub>S</sub>	0.65	0.85	1.05	mA
Output voltage low (pin 3)	I <sub>OL</sub> = 2 mA	V <sub>OL</sub>	-	-	100	mV
Output voltage high (pin 3)	I <sub>OL</sub> = 0	V <sub>OH</sub>	V <sub>S</sub> - 0.25	-	-	V
Internal pull up resistor (pin 2, pin 3)		R <sub>PU</sub>	-	33	-	kΩ
Max. input DC current	V <sub>IN</sub> > 0	I <sub>IN-DCmax</sub>	400	-	-	μA
Min. signal detection current	I <sub>IN-DC</sub> = 0, f <sub>C</sub> = f <sub>BPF</sub>	I <sub>IN-min</sub>	-	700	1000	pA
	I <sub>IN-DC</sub> = 100 μA, f <sub>C</sub> = f <sub>BPF</sub>	I <sub>IN-min</sub>	-	5	10	nA
Output pulse width	I <sub>IN-DC</sub> = 0, f <sub>C</sub> = f <sub>BPF</sub> , I <sub>IN</sub> = 0.8 nA to 50 μA, testsignal see fig. 1, BER ≤ 2%	t <sub>po</sub>	t <sub>pi</sub> - 6/f <sub>0</sub>	t <sub>pi</sub>	t <sub>pi</sub> + 6/f <sub>0</sub>	μs
Accuracy of bandpass center frequency	T <sub>amb</sub> = + 25 °C	f <sub>BPF</sub>	f <sub>0</sub> - 4 %	f <sub>0</sub>	f <sub>0</sub> + 4 %	kHz
Bandwidth of bandpassfilter	-3 dB, f <sub>0</sub> = 38 kHz	B	-	3.8	-	kHz

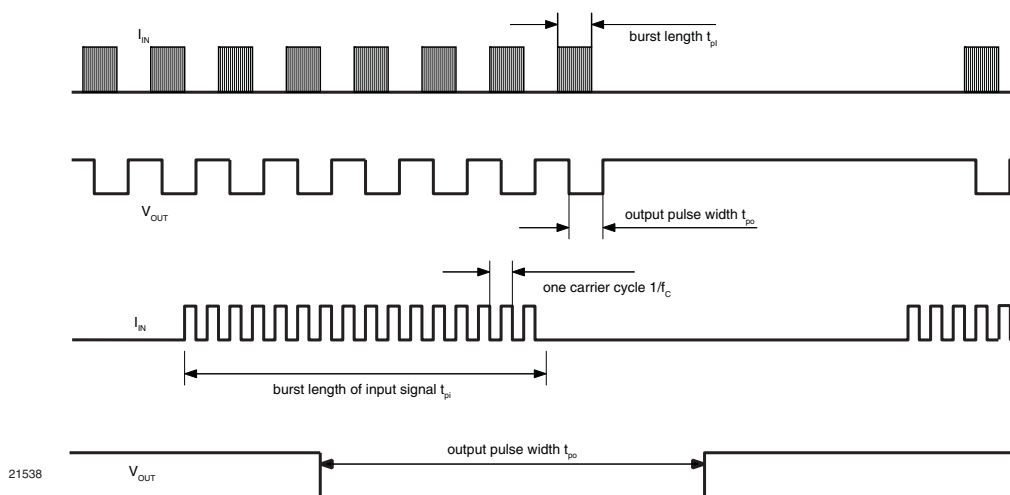


Fig. 1 - Testsignal



**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ ,  $V_S = 3.3\text{ V}$ , unless otherwise specified)

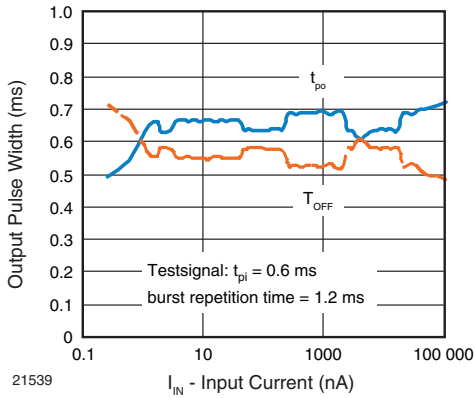


Fig. 2 - Output Pulse Diagram

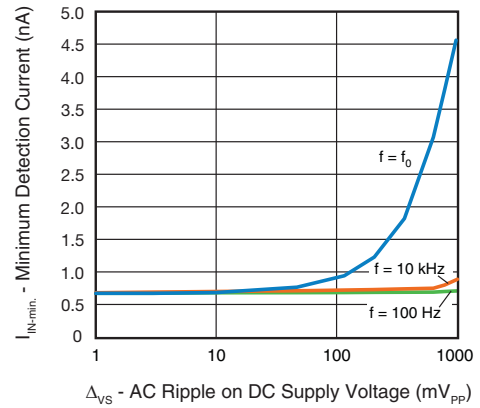


Fig. 5 - Suppression of Ripple on Supply Voltage

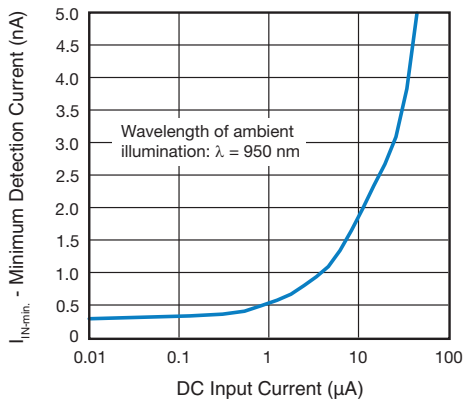


Fig. 3 - Sensitivity vs. DC Input Current

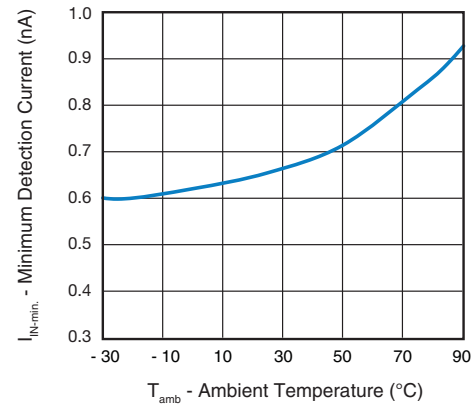


Fig. 6 - Sensitivity vs. Temperature

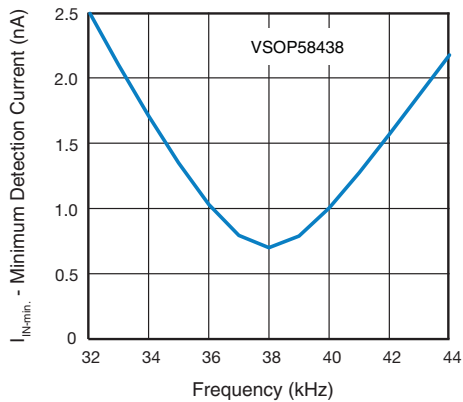


Fig. 4 - Bandpassfilter Characteristic

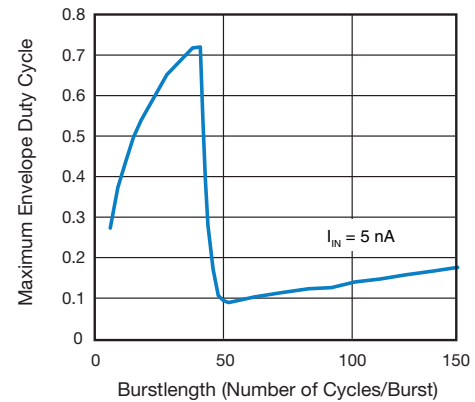
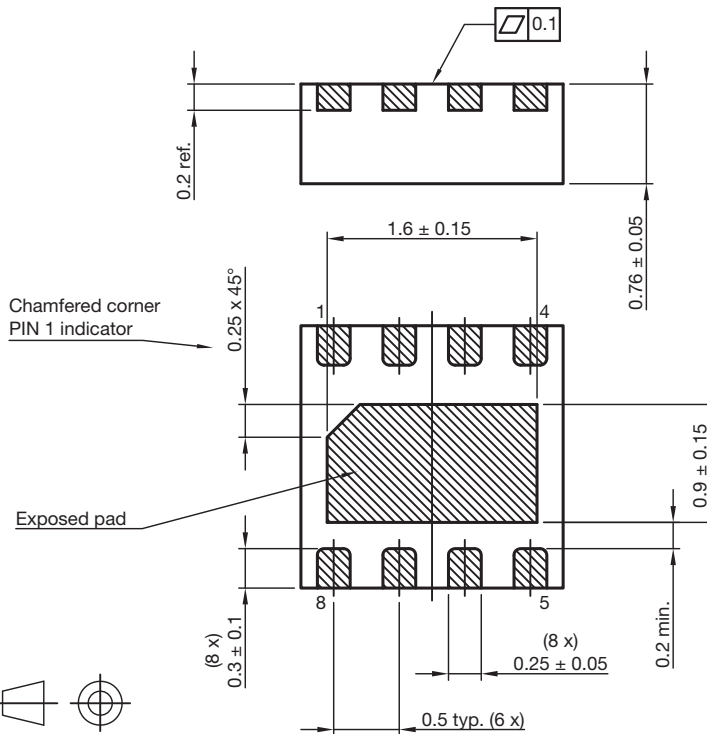
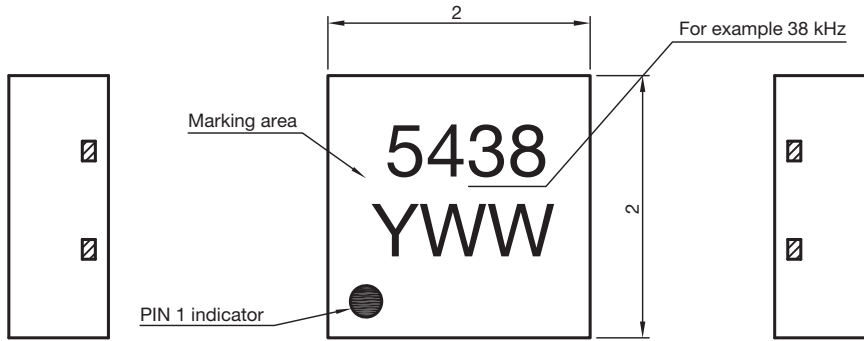


Fig. 7 - Maximum Envelope Duty Cycle

**PACKAGE DIMENSIONS** in millimeters

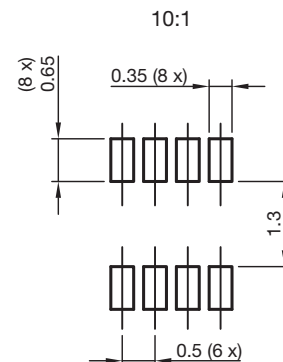


1. Coplanarity (0.1 mm) applies to the exposed pad as well as the exposed terminals.
2. Package dimension does not include mold flash, protrusions, burrs or metal smearing.

Pinning:

1. n.c.
2.  $V_S$
3. Out
4. n.c.
5. n.c.
6. GND
7. IN
8. GND

Proposed hole layout from component side (for reference only)



technical drawings according to DIN specifications

Not indicated tolerances  $\pm 0.1$

Drawing-No.: 6.550-5314.03-4  
Issue: 1; 07.12.15



**ASSEMBLY INSTRUCTIONS**

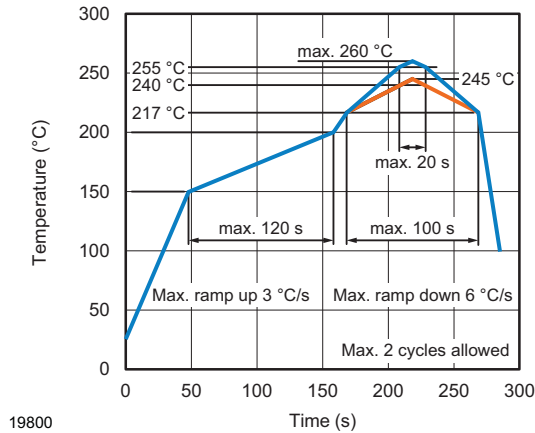
**Reflow Soldering**

- 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**

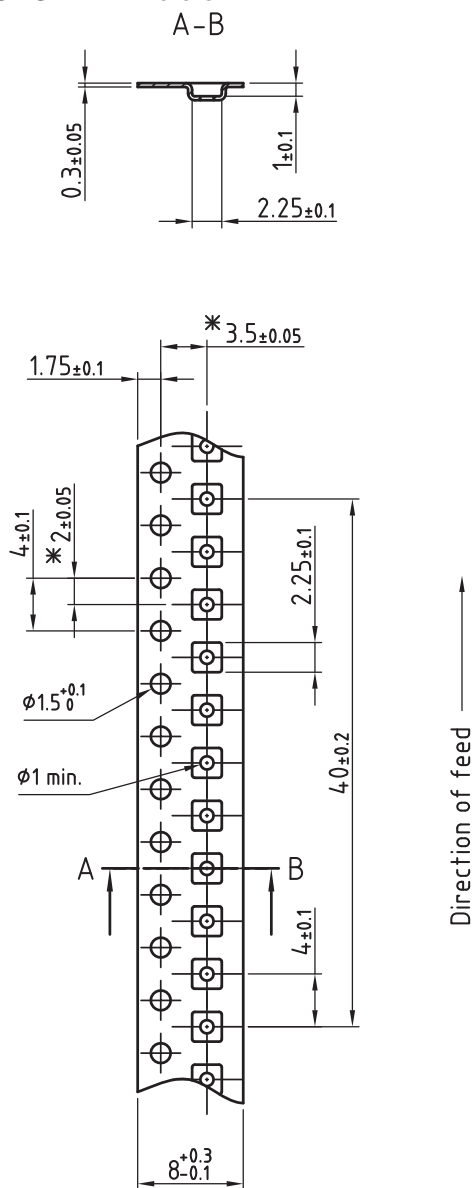
- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off.

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





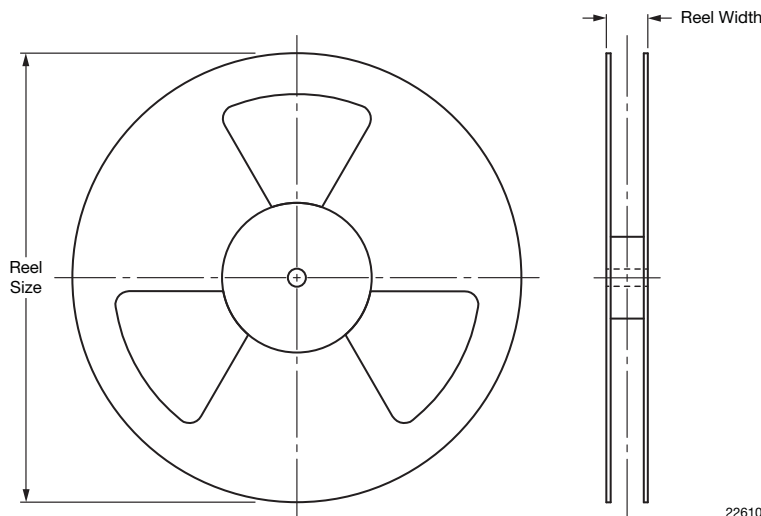
**TAPING VERSION VSOP DIMENSIONS** in millimeters



\* Measured from centerline of sprocket hole to centerline of pocket



**REEL DIMENSIONS** in millimeters



REEL		TRAILER LENGTH (mm)	LEADER LENGTH (mm)	QUANTITY PER REEL
REEL SIZE (inch)	REEL WIDTH (mm)			
7	8.4	160	400	3000

**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 WRITTING	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



**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





## 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

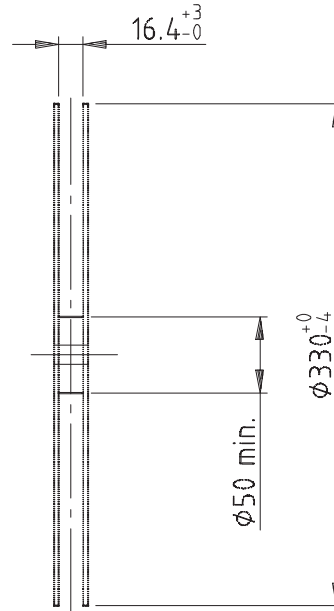
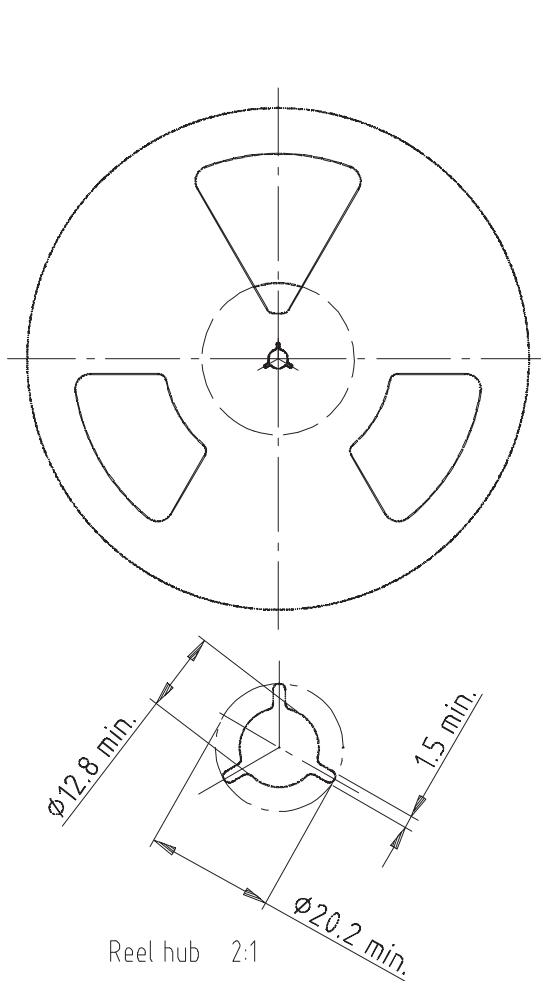
The type designation of the device is extended by TT or TT1 for top view or TR for side view.

#### Example:

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



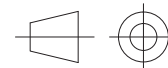
## REEL DIMENSIONS FOR PANHEAD, HEIMDALL, AND TVCASTSMD TR in millimeters



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

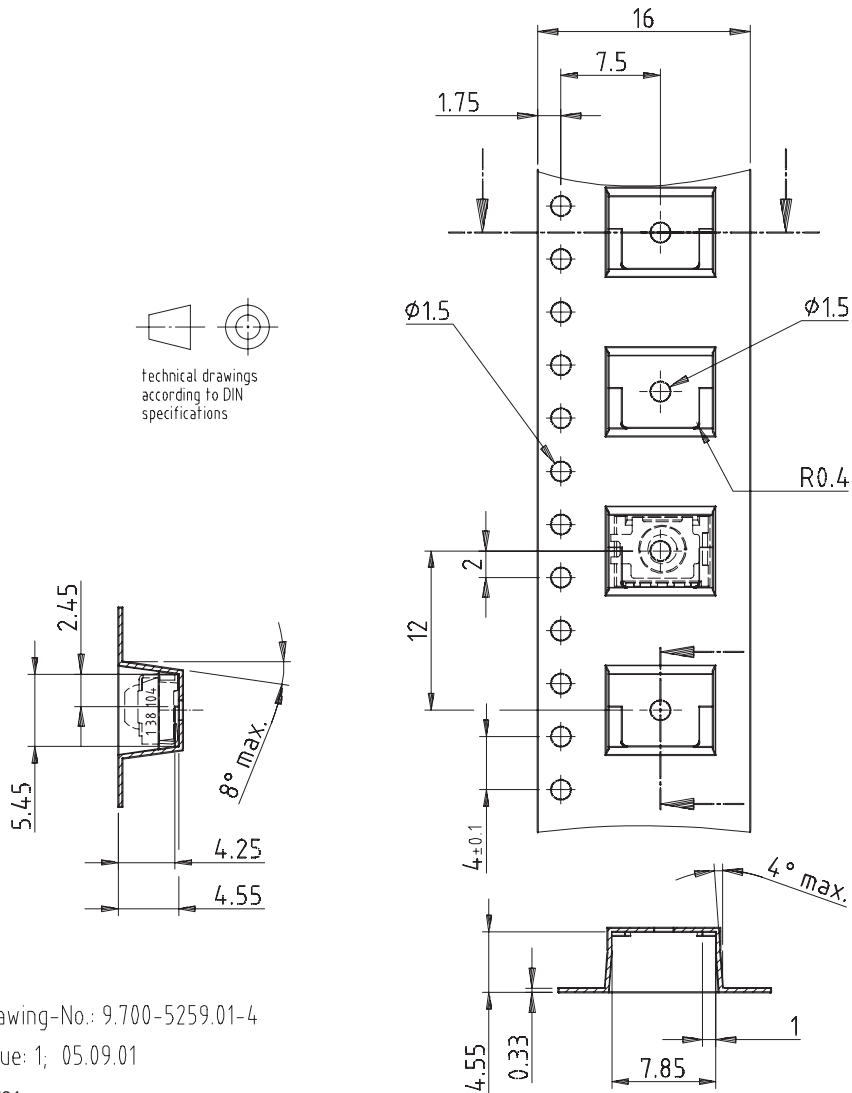
### Note

- 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)



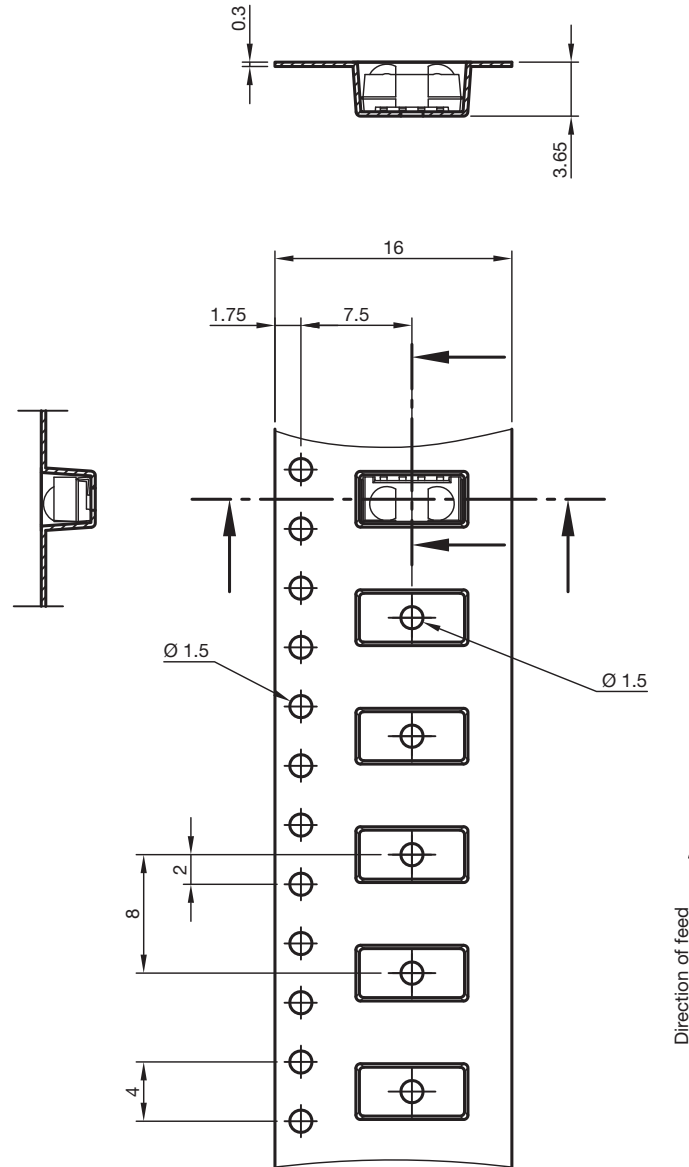
Drawing-No.: 9.700-5259.01-4

Issue: 1; 05.09.01

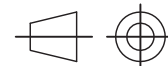
16584

## 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

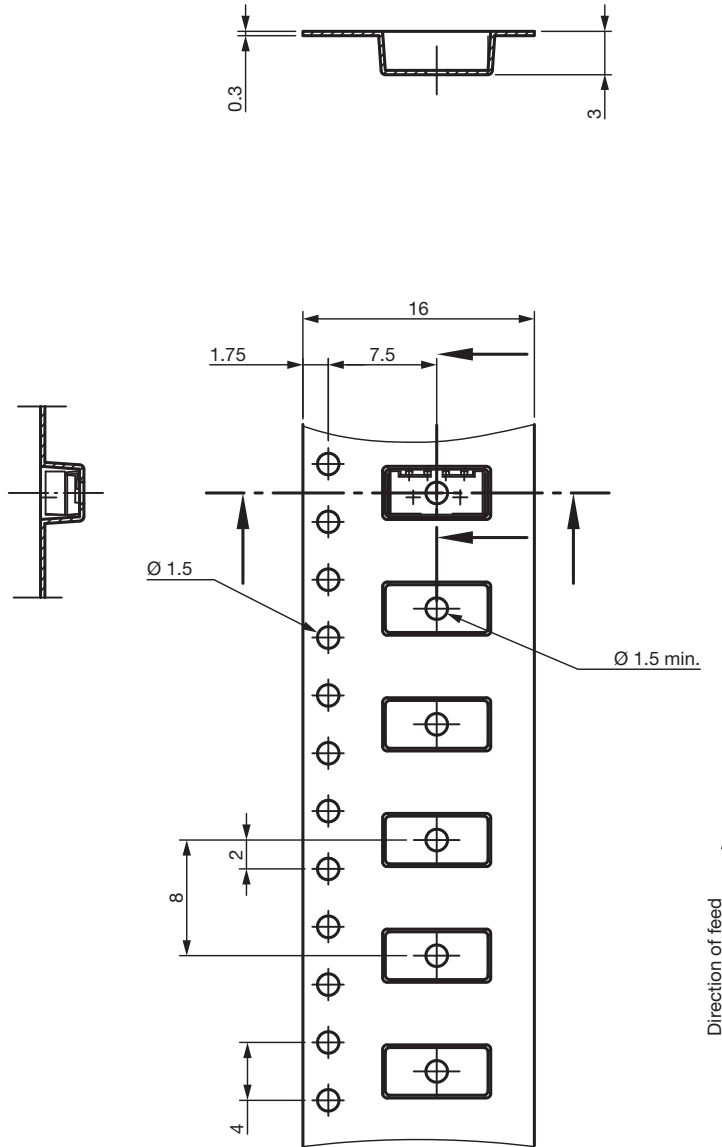


technical drawings  
according to DIN  
specifications

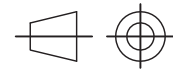


## TAPING VERSION TSOP..TT (TOP VIEW) DIMENSIONS in millimeters

C. Heimdall without lens (TSOP75...WTT, TSOP77...WTT, TSSP77...WTT, TSOP15...WTT, TSOP95...WTT)



Drawing-No.: 9.700-5341.01-4  
Issue: 3; 06.10.15



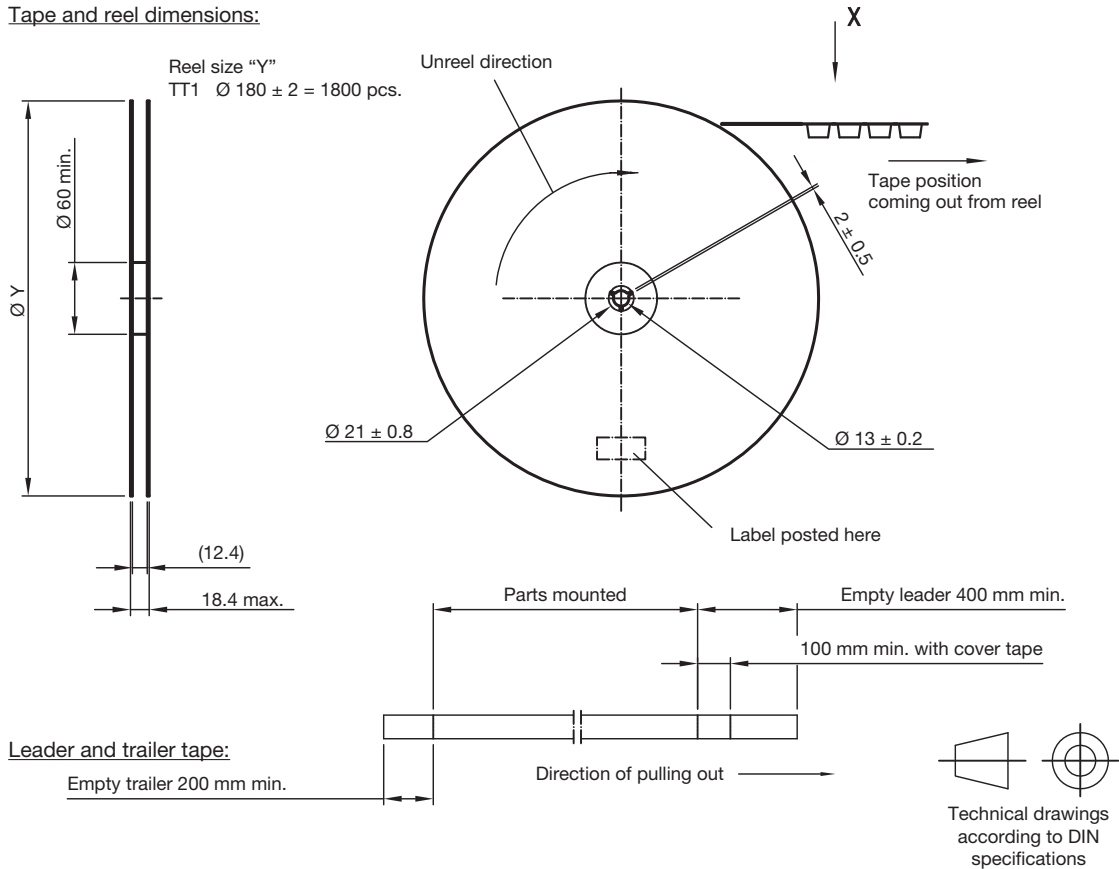
technical drawings  
according to DIN  
specifications



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

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

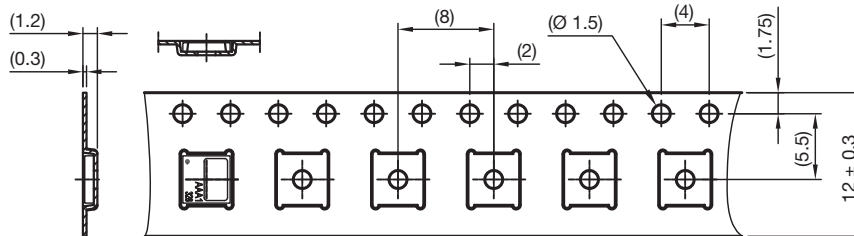
Tape and reel dimensions:



Leader and trailer tape:

Empty trailer 200 mm min.

X 2:1



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

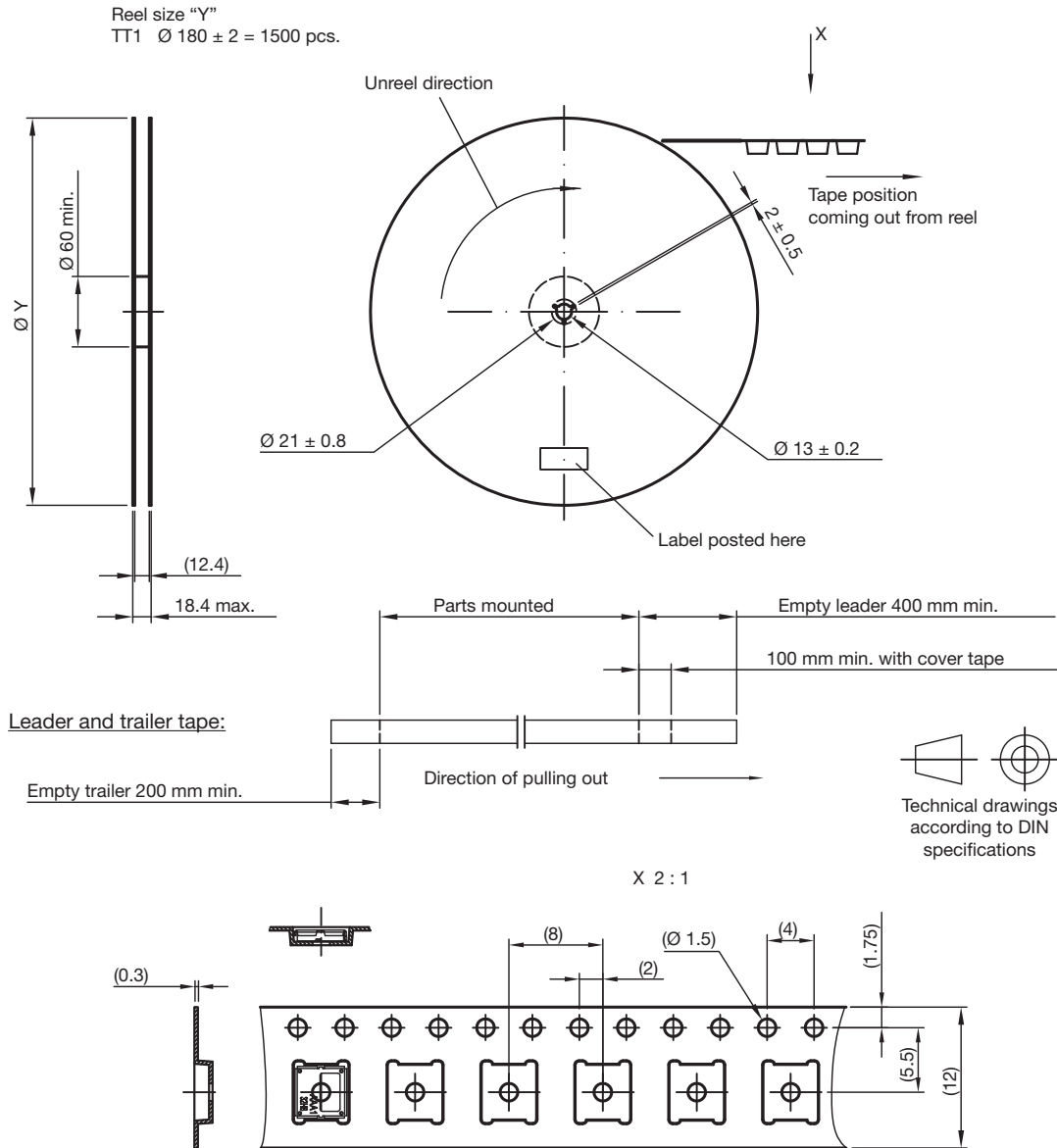
Not indicated tolerances  $\pm 0.1$



### 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:



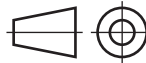
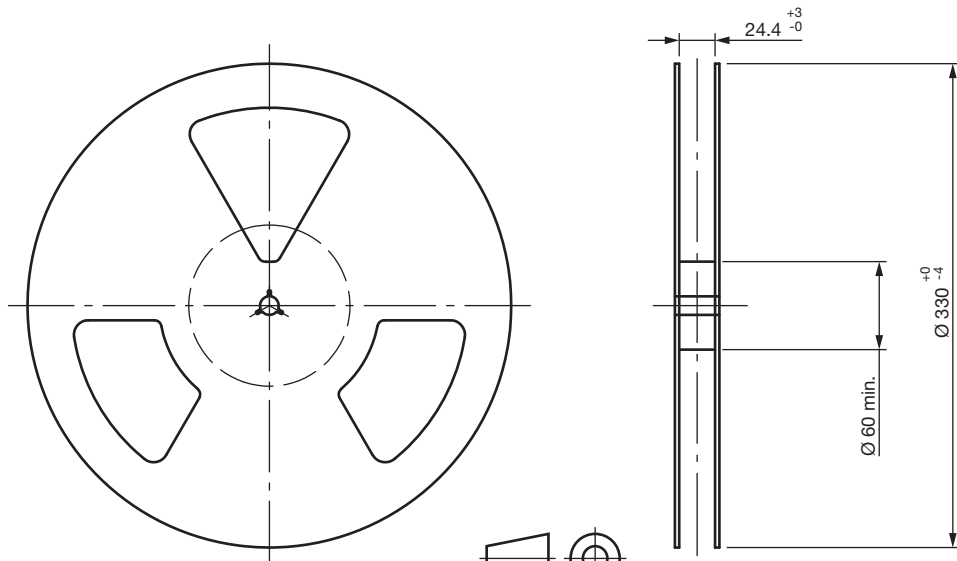
Drawing-No.: 9.700-5380.01-4  
Issue: 3; 07.03.18

Not indicated tolerances  $\pm 0.1$



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

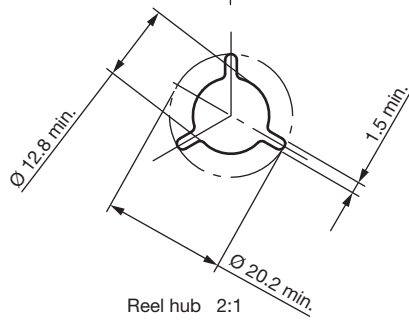
F. Minimold DF1P (TSOP33...DF1P, TSOP53...DF1P, TSOP13...DF1P, TSOP93...DF1P)



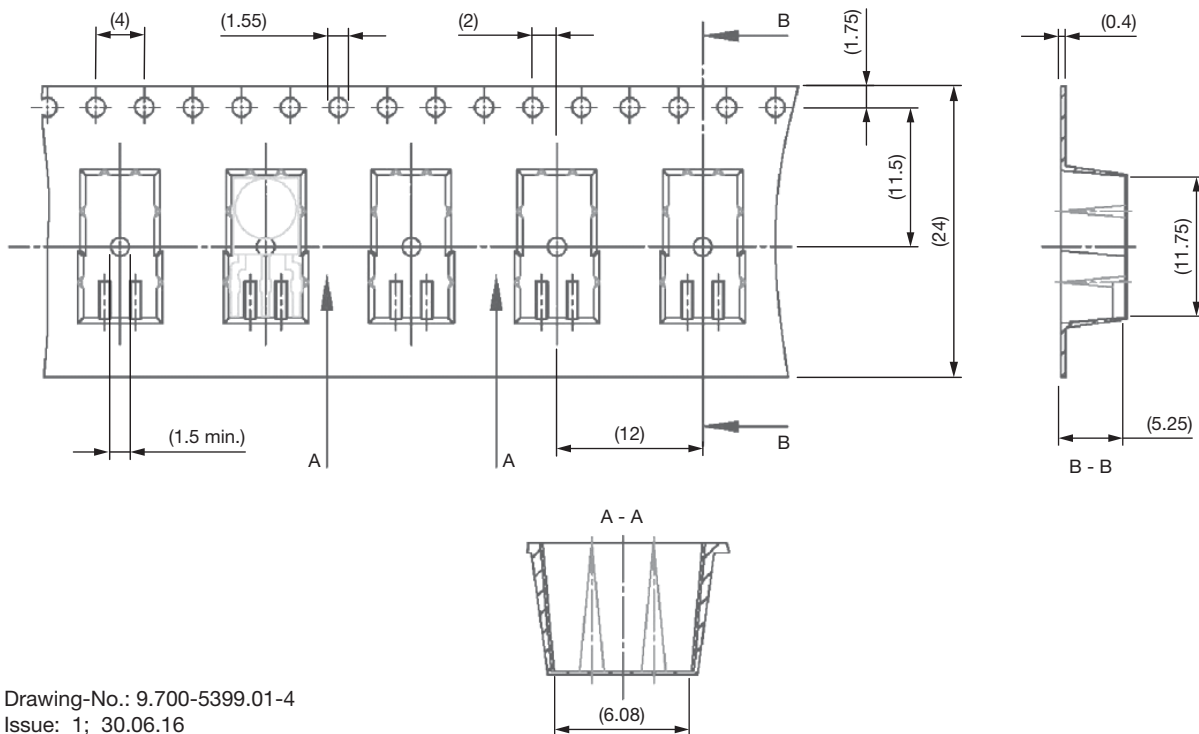
Technical drawing according to DIN specifications

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

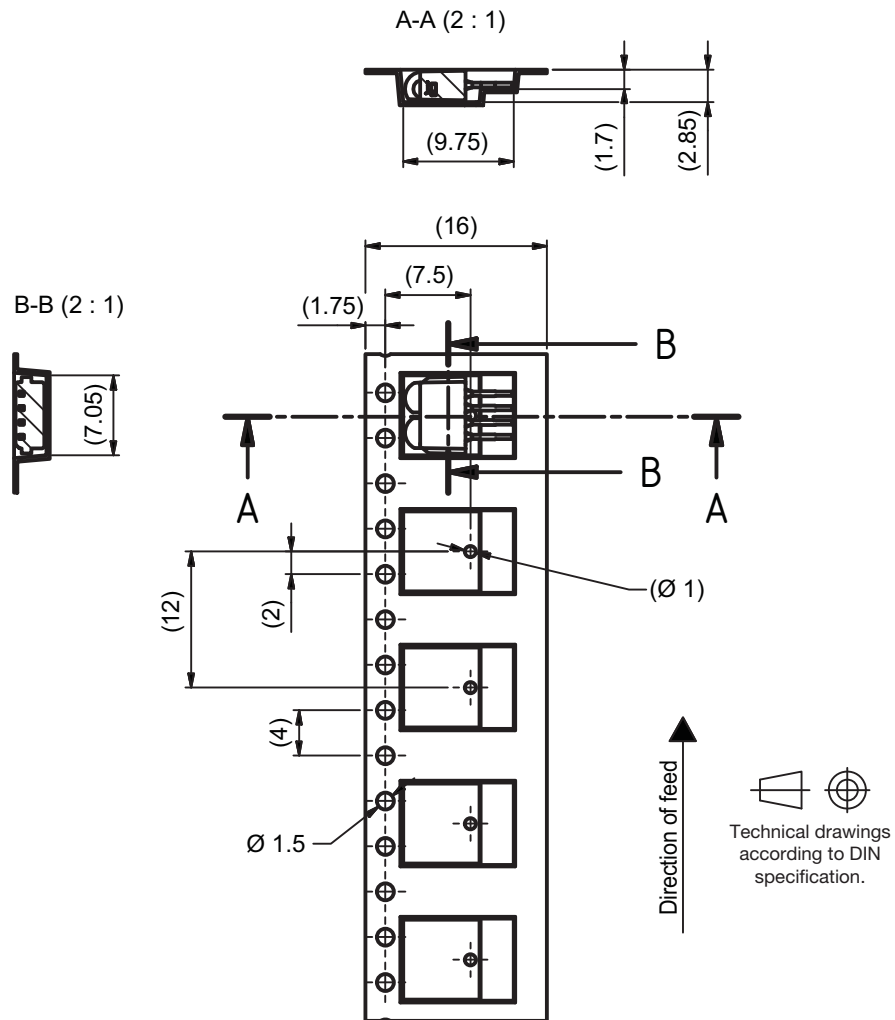


Drawing-No.: 9.700-5399.01-4  
Issue: 1; 30.06.16



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

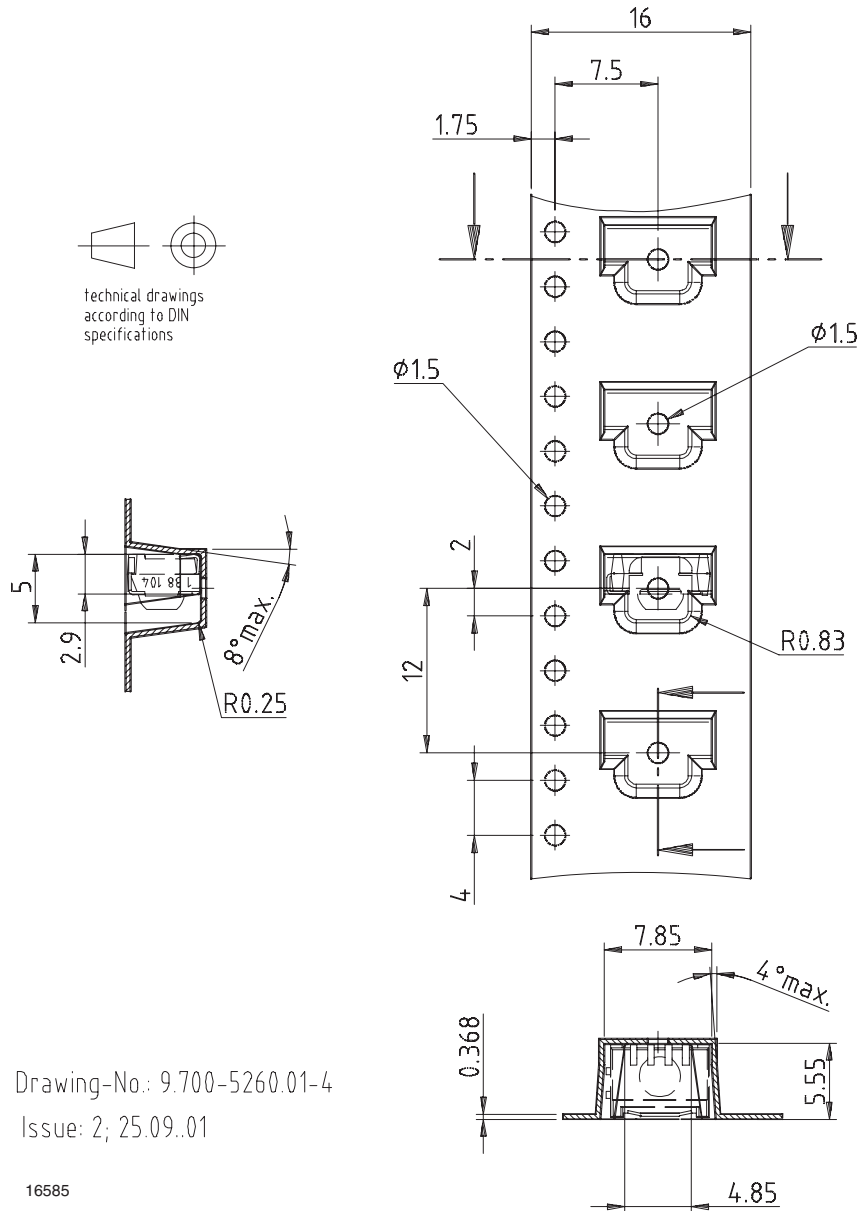
G. TVCastSMD TR1 (TSOP59...TR1, TSOP39...TR1, TSOP19...TR1, TSOP99...TR1)



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

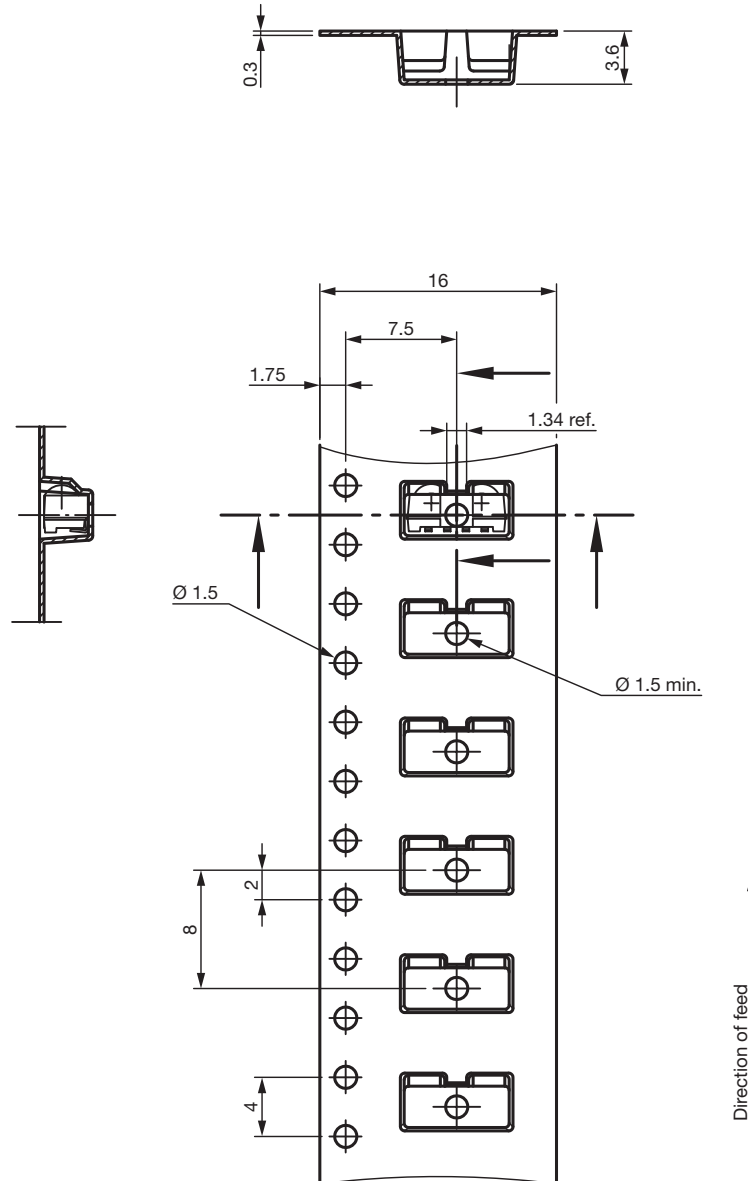
Issue: 2; 25.09..01

16585

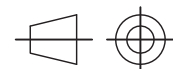


## TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

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

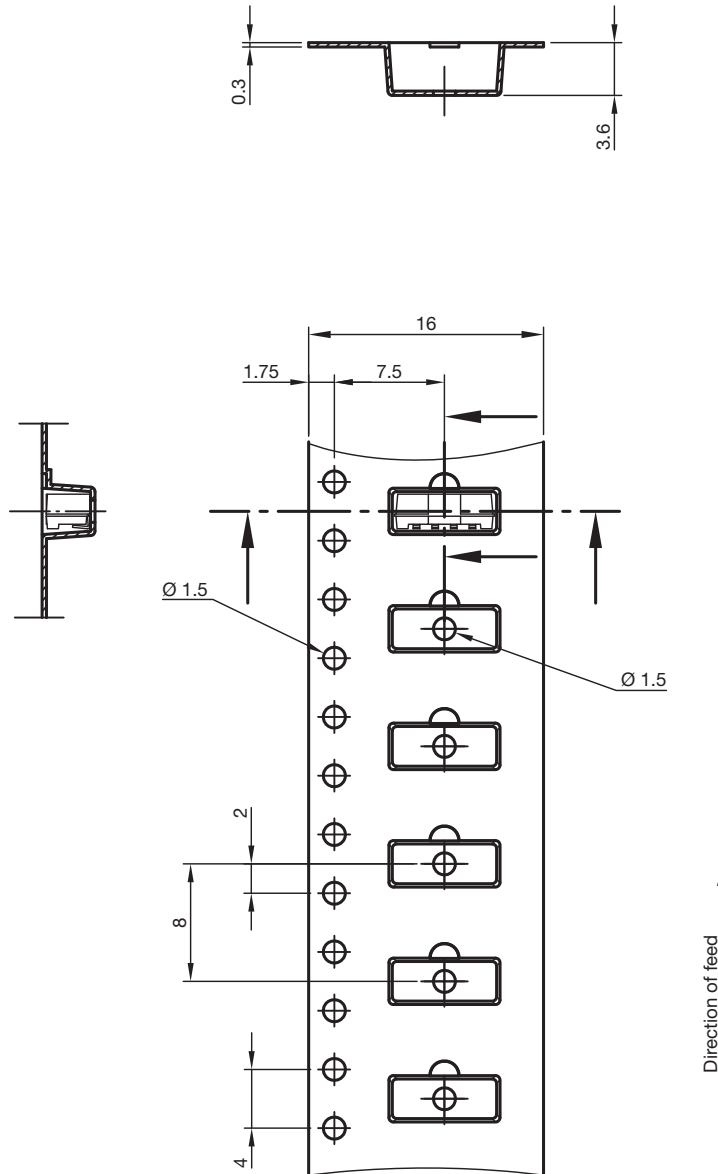


technical drawings  
according to DIN  
specifications

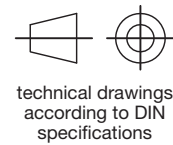


## TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

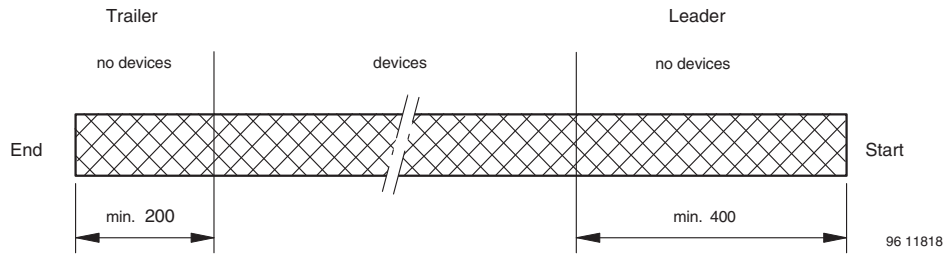
C. Heimdall without lens (TSOP75...WTR, TSOP77...WTR, TSSP...WTR, TSOP15...WTR, TSOP95...WTR)



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



### 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

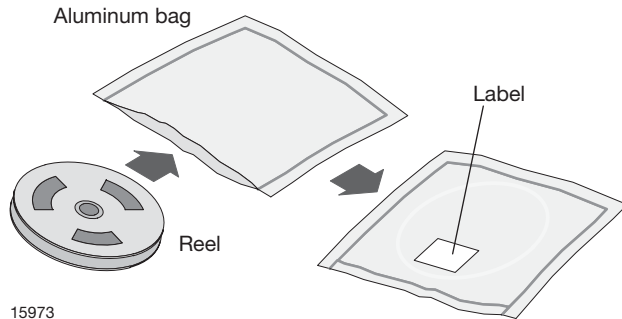
#### Standard bar code labels for finished goods

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.



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## 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.

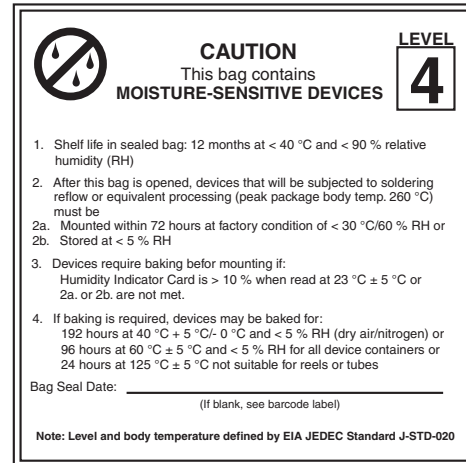
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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

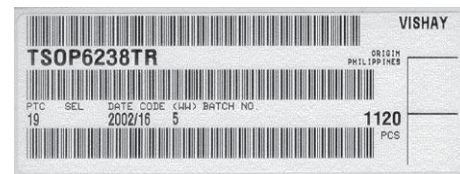
EIA JEDEC standard JSTD-020 level 4 label is included on all dry bags

## 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.



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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

22127



## Disclaimer

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