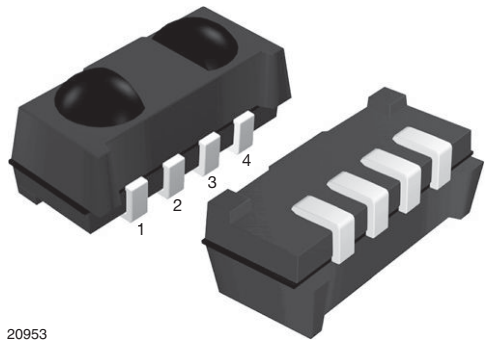
IR Receiver Modules for Remote Control Systems



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FEATURES

- Improved immunity against HF and RF noise
- Continuous data transmission possible
- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Capable of side or top view
- Insensitive to supply voltage ripple and noise
- Two lenses for high sensitivity and wide receiving angle
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

MECHANICAL DATA

Pinning:

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

ORDERING CODE

Taping:

TSOP77...TT - top view taped

TSOP77...TR - side view taped

DESCRIPTION

The TSOP773.., TSOP775.. series are a two lens miniaturized receiver module for infrared remote control systems. One PIN diode per lens and a preamplifier are assembled on a leadframe, the epoxy lens cap contains an IR filter.

The TSOP773.. series devices are optimized to suppress almost all spurious pulses from Wi-Fi and CFL sources. They may suppress some data signals if continuously transmitted.

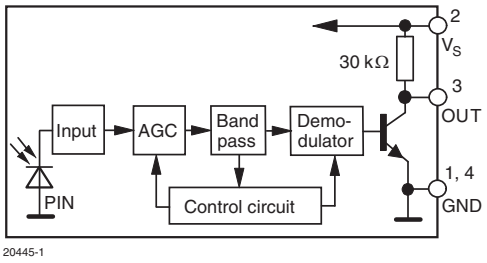
New designs should prefer the TSOP773.. series containing the newer AGC3. The TSOP775.. series are useful to suppress even extreme levels of optical noise, but may also suppress some data signals. Please check compatibility with your codes.

These components have not been qualified according to automotive specifications.

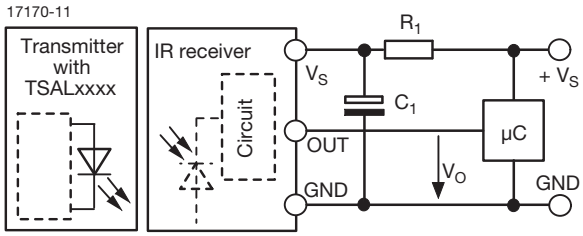
PARTS TABLE

AGC		NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)	VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)
Carrier frequency	30 kHz	TSOP77330	TSOP77530
	33 kHz	TSOP77333	TSOP77533
	36 kHz	TSOP77336 (1)	TSOP77536
	38 kHz	TSOP77338 (2)(3)(4)(5)	TSOP77538
	40 kHz	TSOP77340	TSOP77540
	56 kHz	TSOP77356	TSOP77556
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		Remote control	
Best choice for		(1) MCIR (2) Mitsubishi (3) RECS-80 Code (4) r-map (5) XMP-1, XMP-2	

BLOCK DIAGRAM



APPLICATION CIRCUIT



R_1 and C_1 recommended to reduce supply ripple for V_S < 2.8 V

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 5.5	V
Voltage at output to supply		$V_S - V_O$	-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
Soldering temperature	t ≤ 10 s, 1 mm from case	T_{sd}	260	°C

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 voltage		V_S	2.5	-	5.5	V
Supply current	V_S = 5 V, E_v = 0	I_{SD}	0.55	0.7	0.9	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.8	-	mA
Transmission distance	E_v = 0, IR diode TSAL6200, I_F = 250 mA, test signal see Fig. 1	d	-	40	-	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: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see Fig. 1	$E_{e\,min.}$	-	0.2	0.4	mW/m²
Maximum irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see Fig. 1	$E_{e\,max.}$	50	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 50	-	deg

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

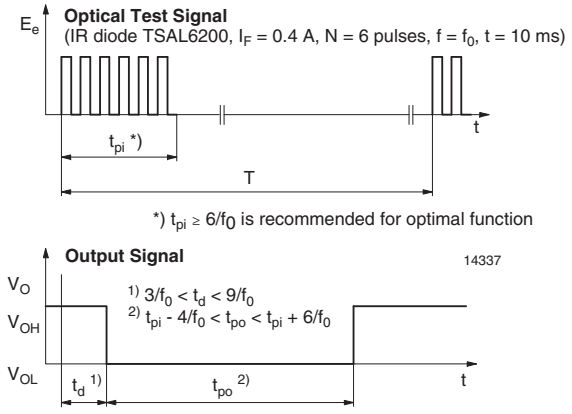


Fig. 1 - Output Active Low

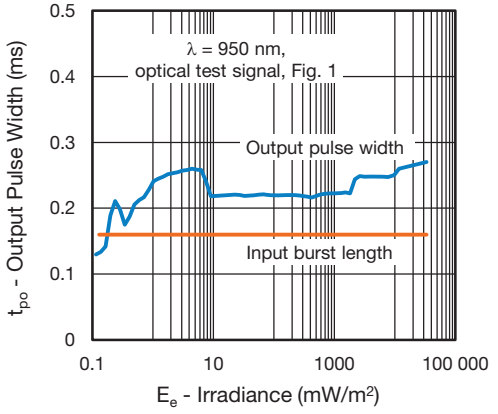


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

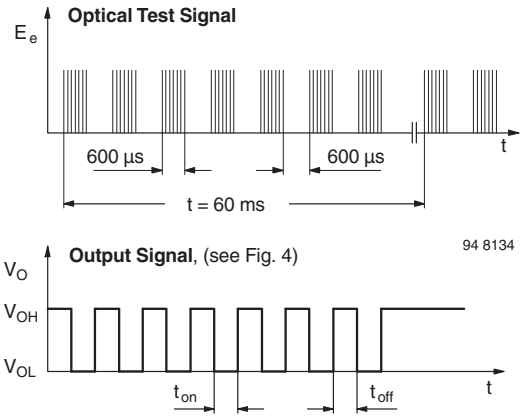


Fig. 3 - Output Function

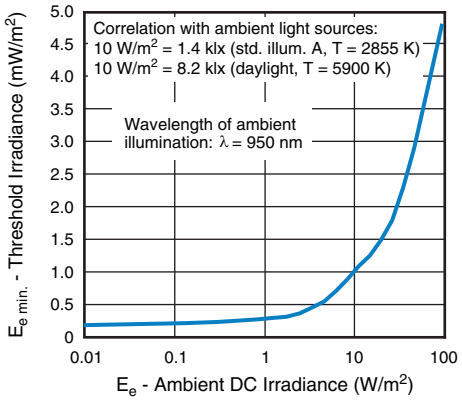


Fig. 6 - Sensitivity in Bright Ambient

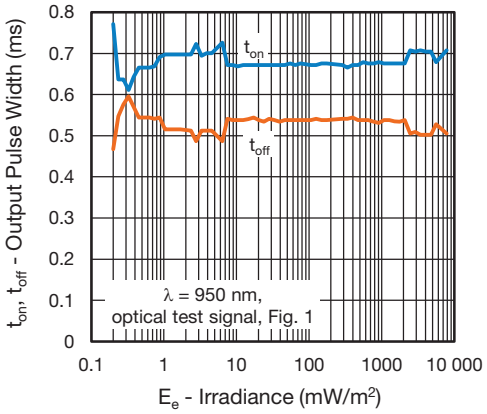


Fig. 4 - Output Pulse Diagram

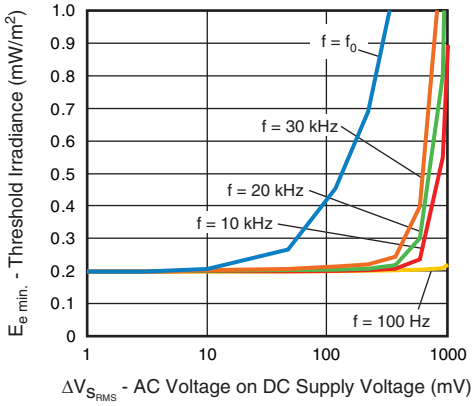


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

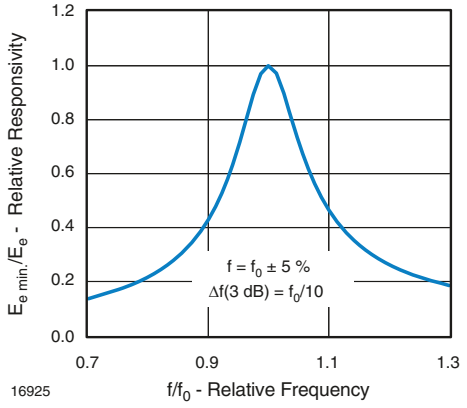


Fig. 5 - Frequency Dependence of Responsivity

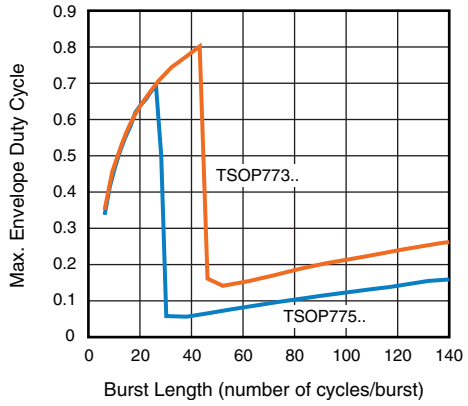


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

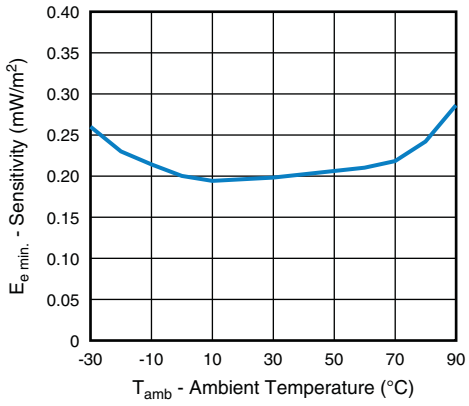


Fig. 9 - Sensitivity vs. Ambient Temperature

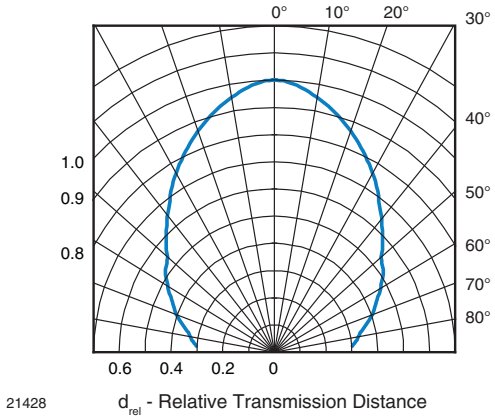


Fig. 12 - Vertical Directivity

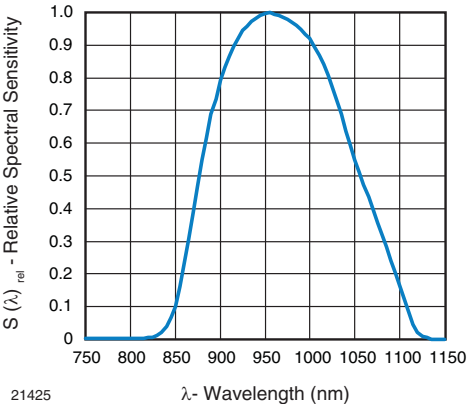


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

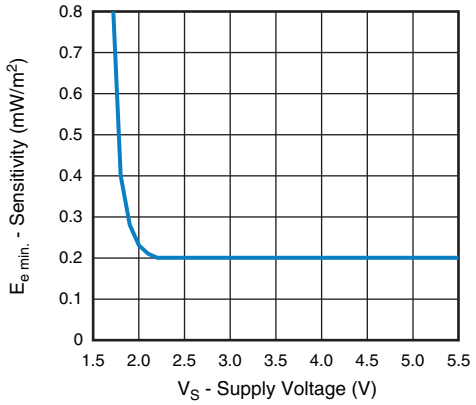


Fig. 1 Sensitivity vs. Supply Voltage

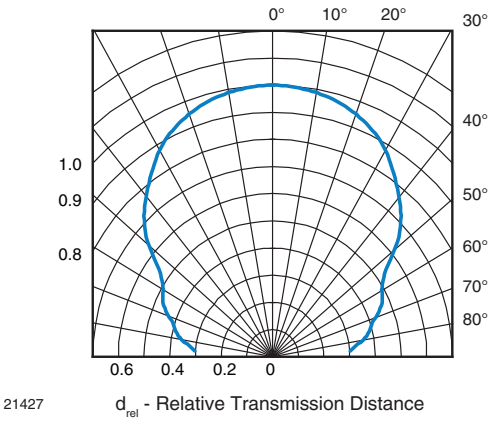


Fig. 11 - Horizontal Directivity

SUITABLE DATA FORMAT

These products are designed to suppress spurious output pulses due to noise or disturbance signals. Data and disturbance signals can be distinguished by the devices according to carrier frequency, burst length and envelope duty cycle. The data signal should be close to the band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the IR receiver in the presence of a disturbance signal, the sensitivity of the receiver is reduced to insure that no spurious pulses are present at the output. Some examples of disturbance signals which are suppressed are:

- DC light (e.g. from tungsten bulb or sunlight)
- Continuous signals at any frequency
- Modulated IR pattern from common fluorescent lamps (example of noise pattern is shown in Fig. 13 or Fig. 14)
- 2.4 GHz and 5 GHz Wi-Fi

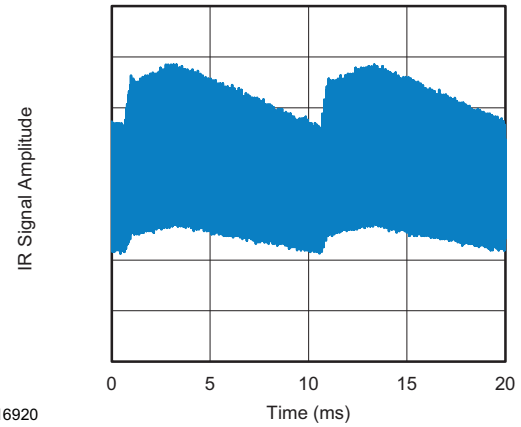


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

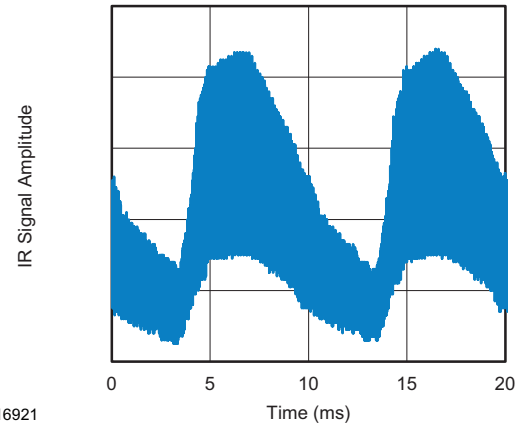


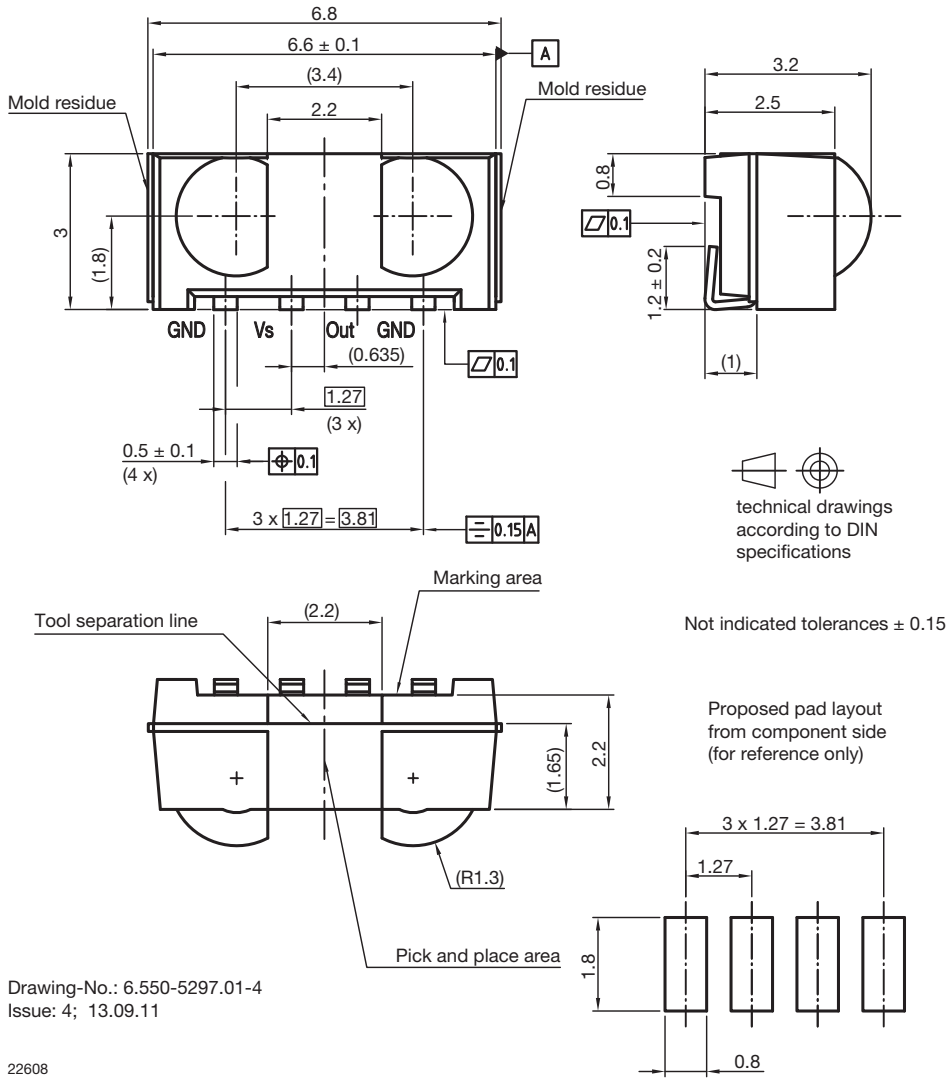
Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

	TSOP773..	TSOP775..
Minimum burst length	6 cycles/burst	6 cycles/burst
After each burst of length a minimum gap time is required of	6 to 35 cycles ≥ 10 cycles	6 to 24 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	35 cycles > 4 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	2000	2000
MCIR code	Preferred	Yes
XMP-1, XMP-2 code	Preferred	Yes
Suppression of interference from fluorescent lamps	Mild and complex disturbance patterns are suppressed (example: signal pattern of Fig. 13 and Fig. 14)	Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs

Note

- For data formats with long bursts please see the datasheet for TSOP772.., TSOP774..

PACKAGE DIMENSIONS in millimeters



ASSEMLY INSTRUCTIONS

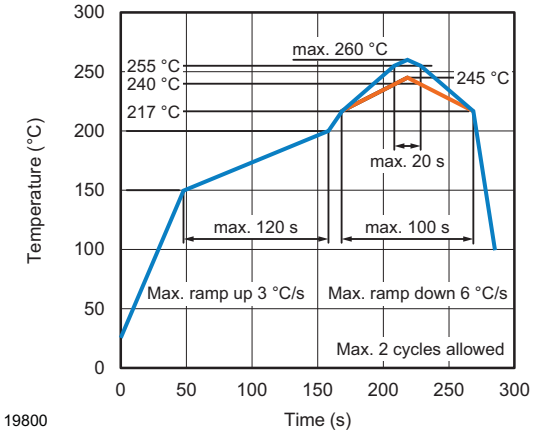
Reflow Soldering

- 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

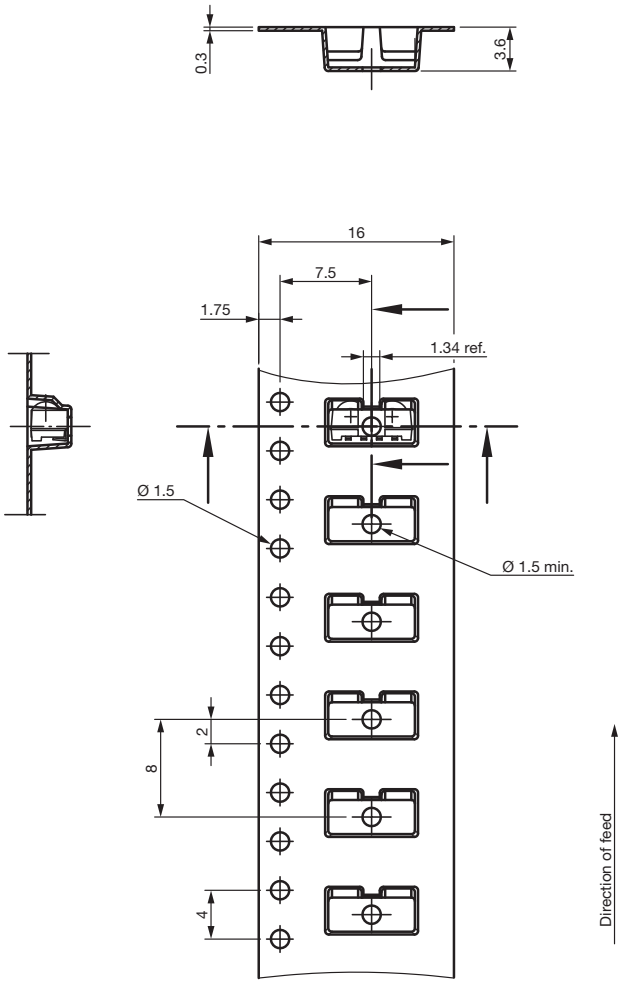
Manual Soldering

- 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



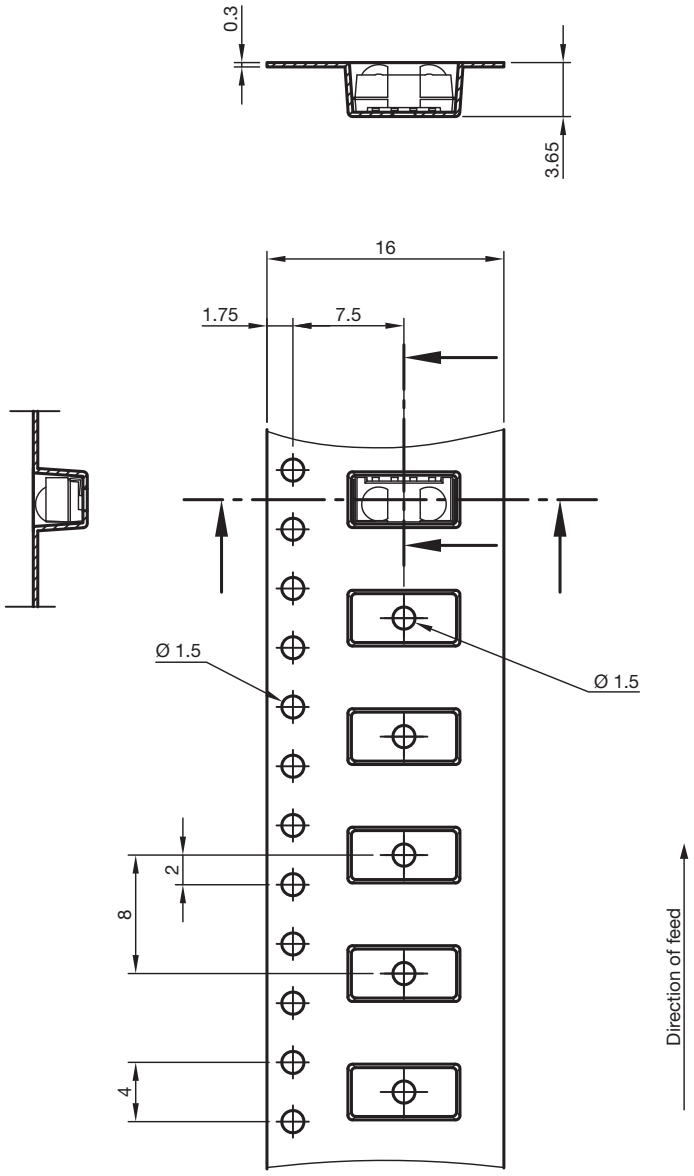
TAPING VERSION TSOP..TR DIMENSIONS in millimeters



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

technical drawings
according to DIN
specifications

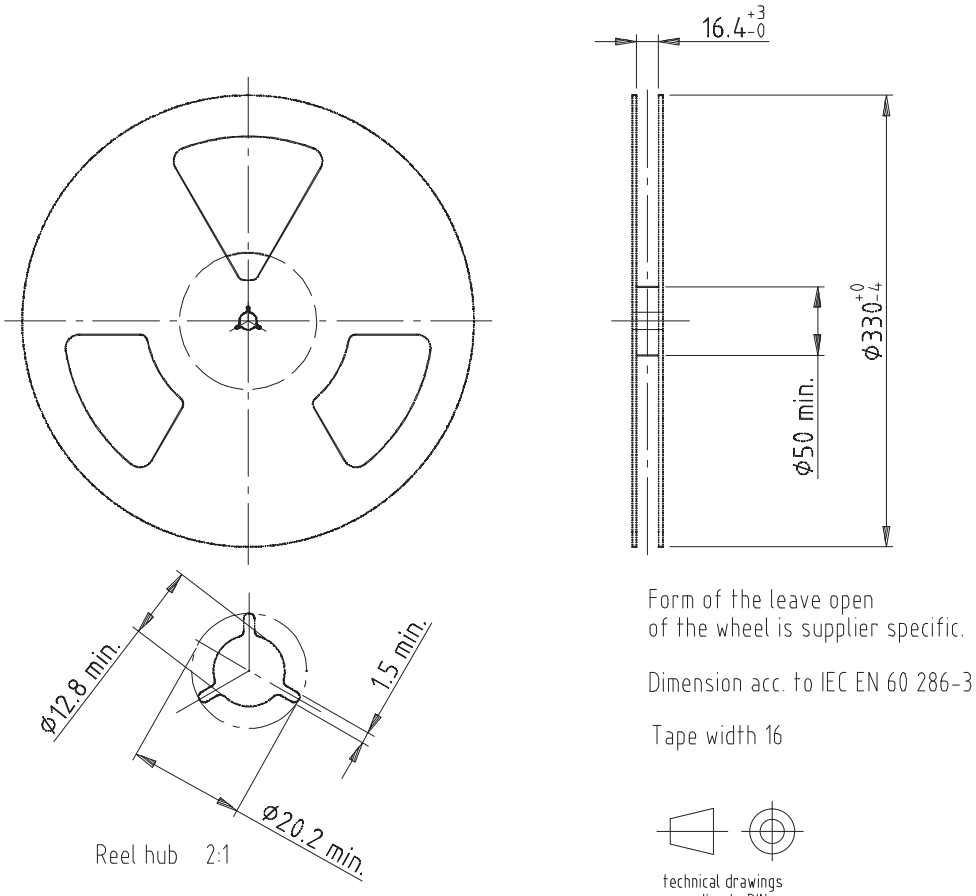
TAPING VERSION TSOP..TT DIMENSIONS in millimeters



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

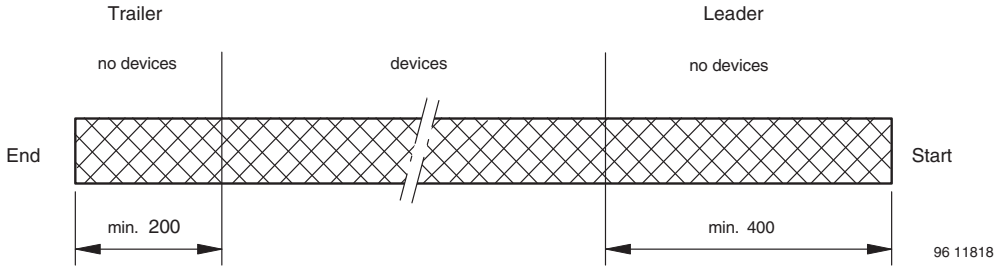
technical drawings
according to DIN
specifications

REEL DIMENSIONS in millimeters



Drawing-No.: 9.800-5052.V2-4
Issue: 1; 07.05.02
16734

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

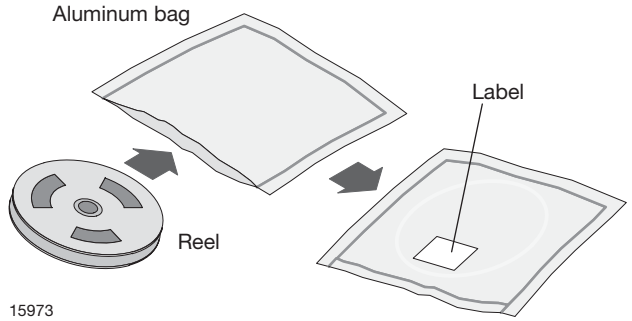
Standard bar code labels for finished goods

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.



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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:

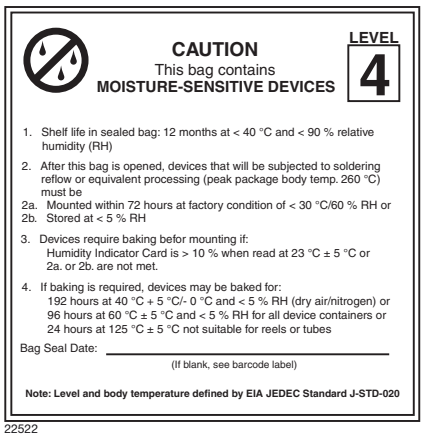
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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

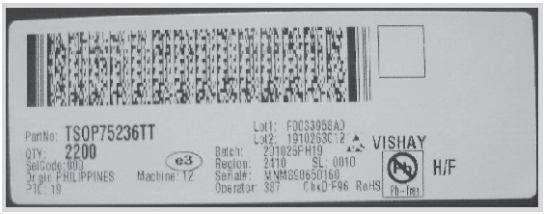
EIA JEDEC standard J-STD-020 level 4 is included on all dry bags

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.



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)

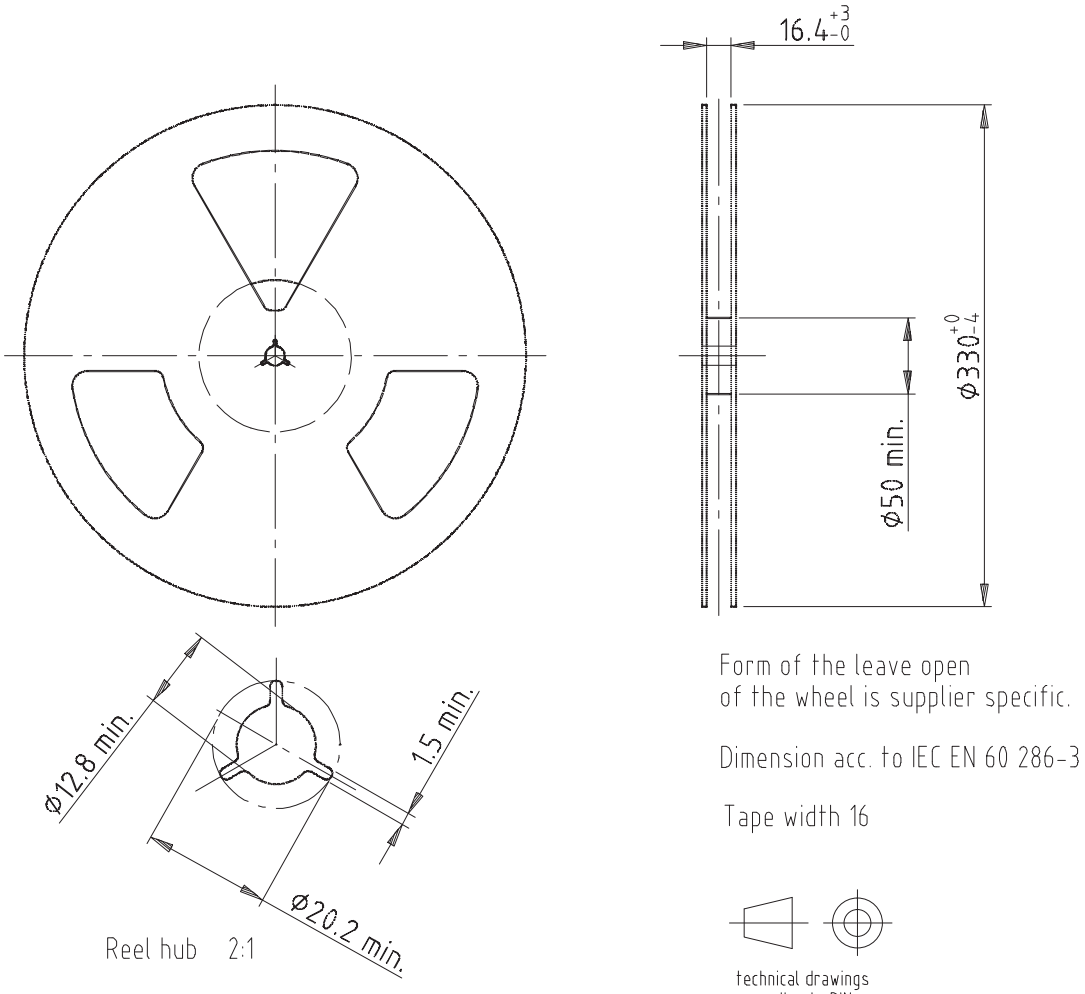
TSOP75338WTT (reel packing)

TSOP57438TT1 (reel packing)

TSOP57238HTT1 (reel packing)

TSOP39438TR1 (reel packing)

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

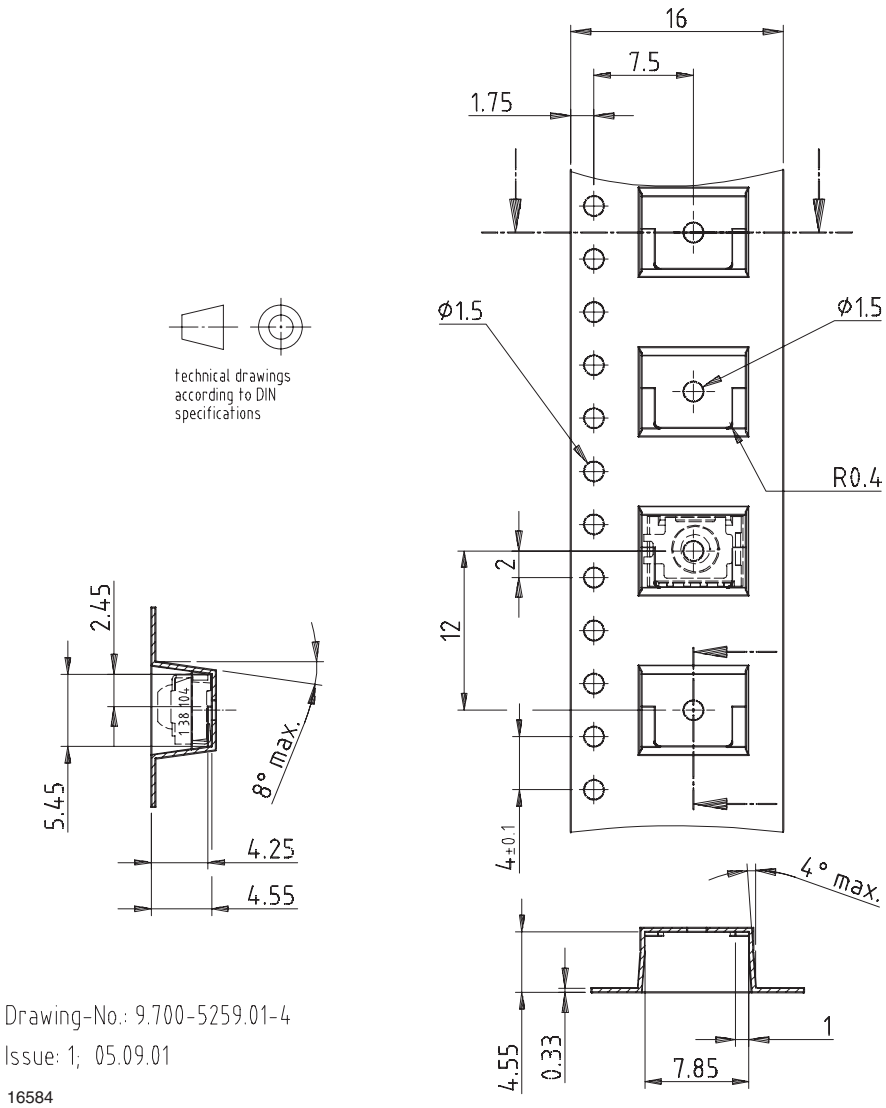


Note

- The body structure of the reel can vary

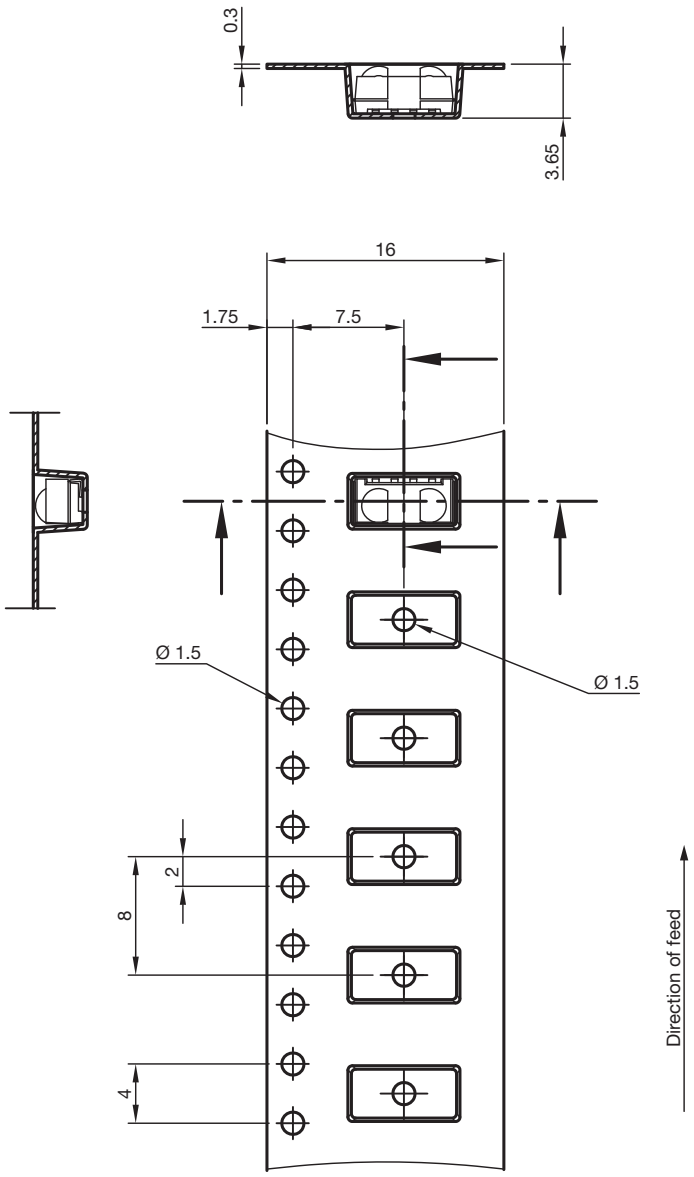
TAPING VERSION TSOP..TT (TOP VIEW) DIMENSIONS in millimeters

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



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

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

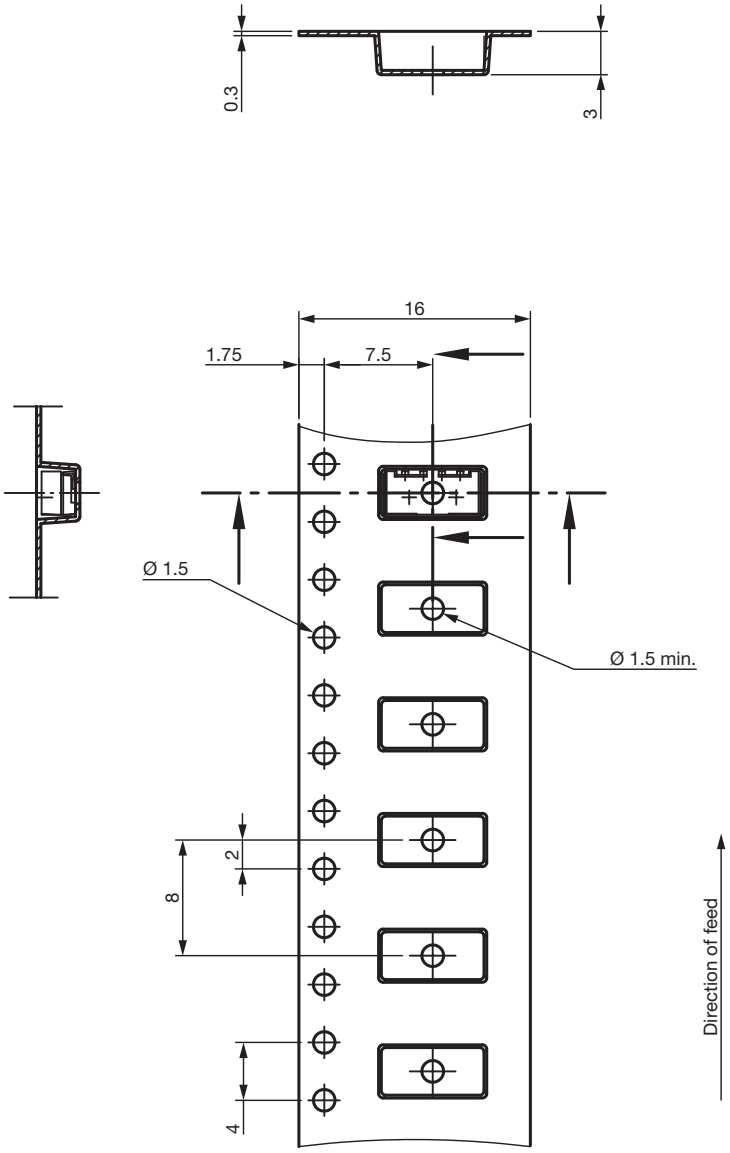


Drawing-No.: 9.700-5338.01-4
Issue: 4; 12.06.13

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)

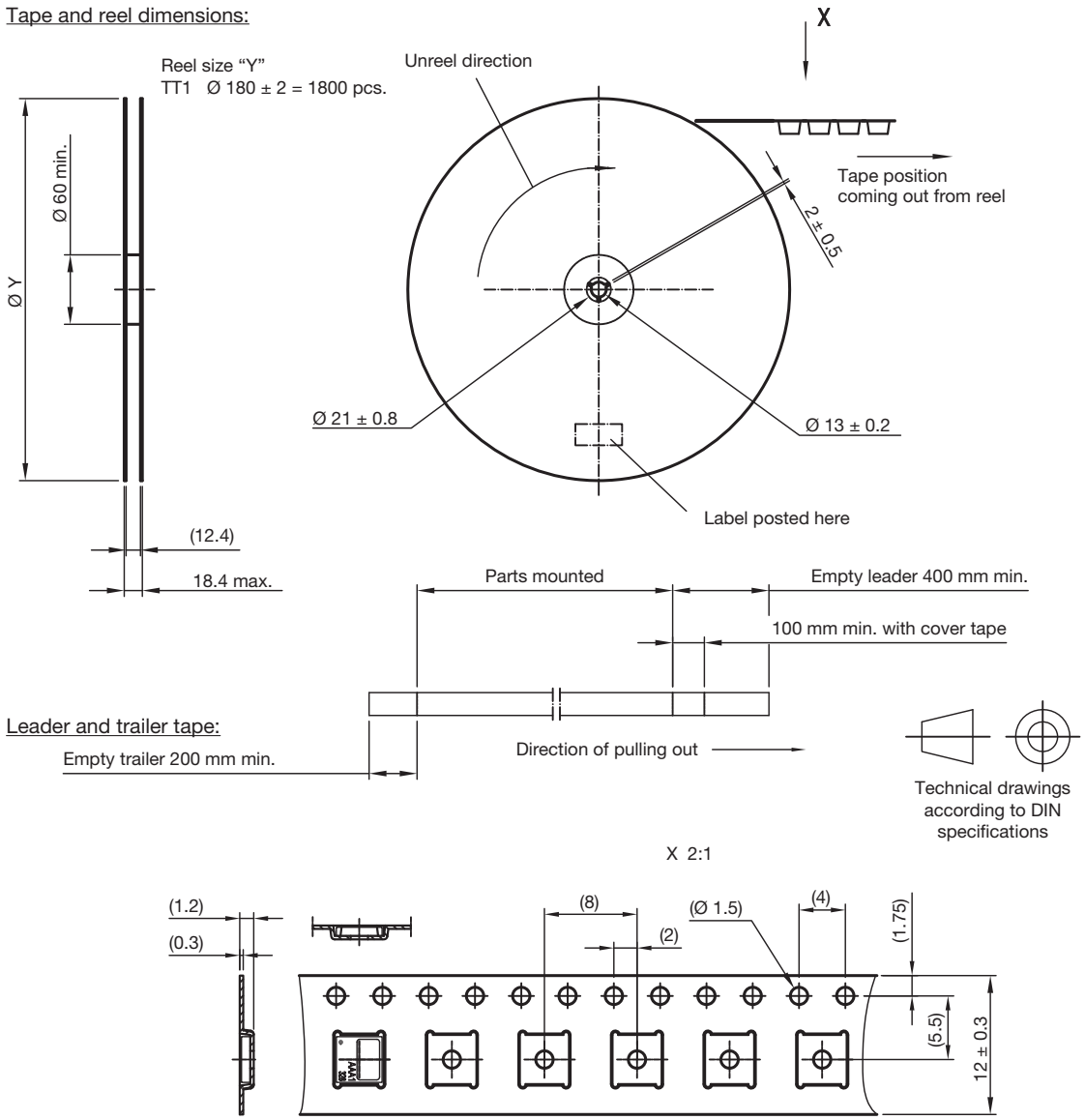


Drawing-No.: 9.700-5341.01-4
Issue: 3; 06.10.15

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)



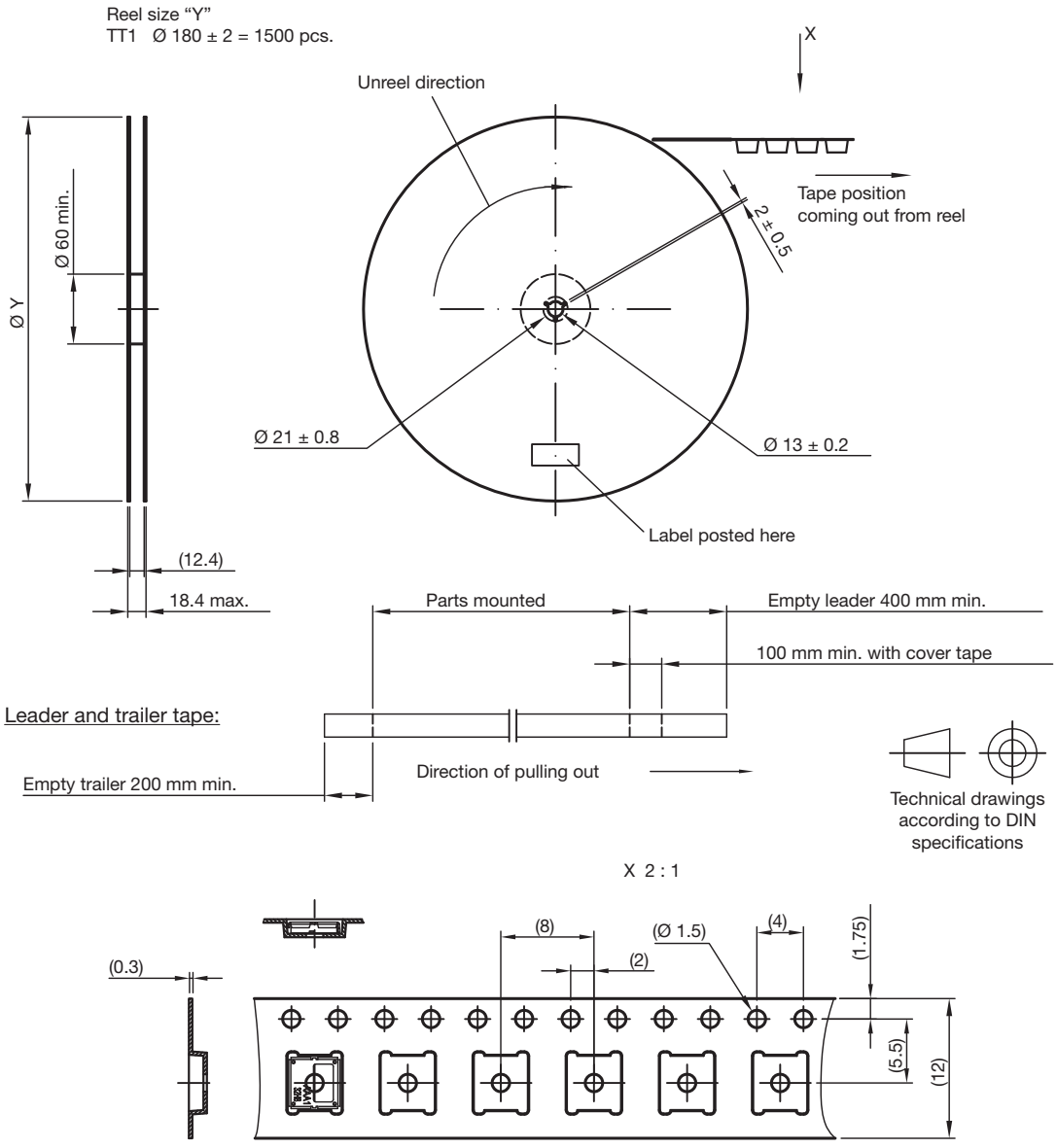
Drawing-No.: 9.700-5347.01-4
Issue: 2; 07.03.18

Not indicated tolerances ± 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:

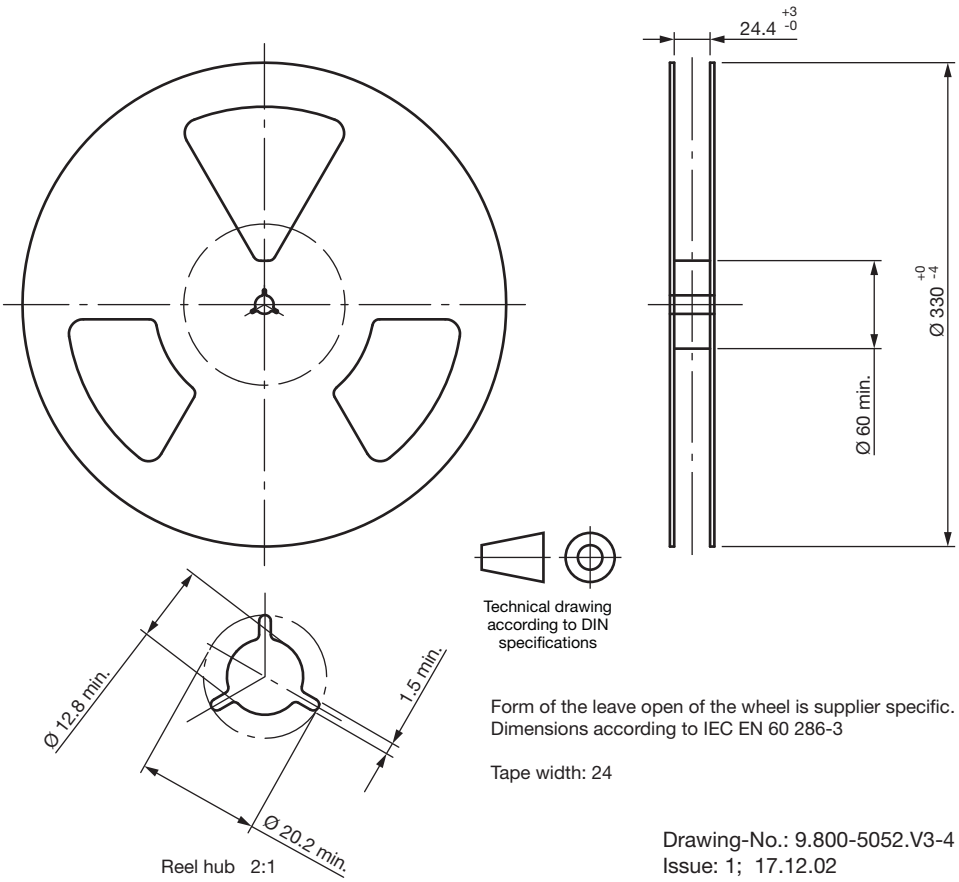


Drawing-No.: 9.700-5380.01-4
Issue: 3; 07.03.18

Not indicated tolerances ± 0.1

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

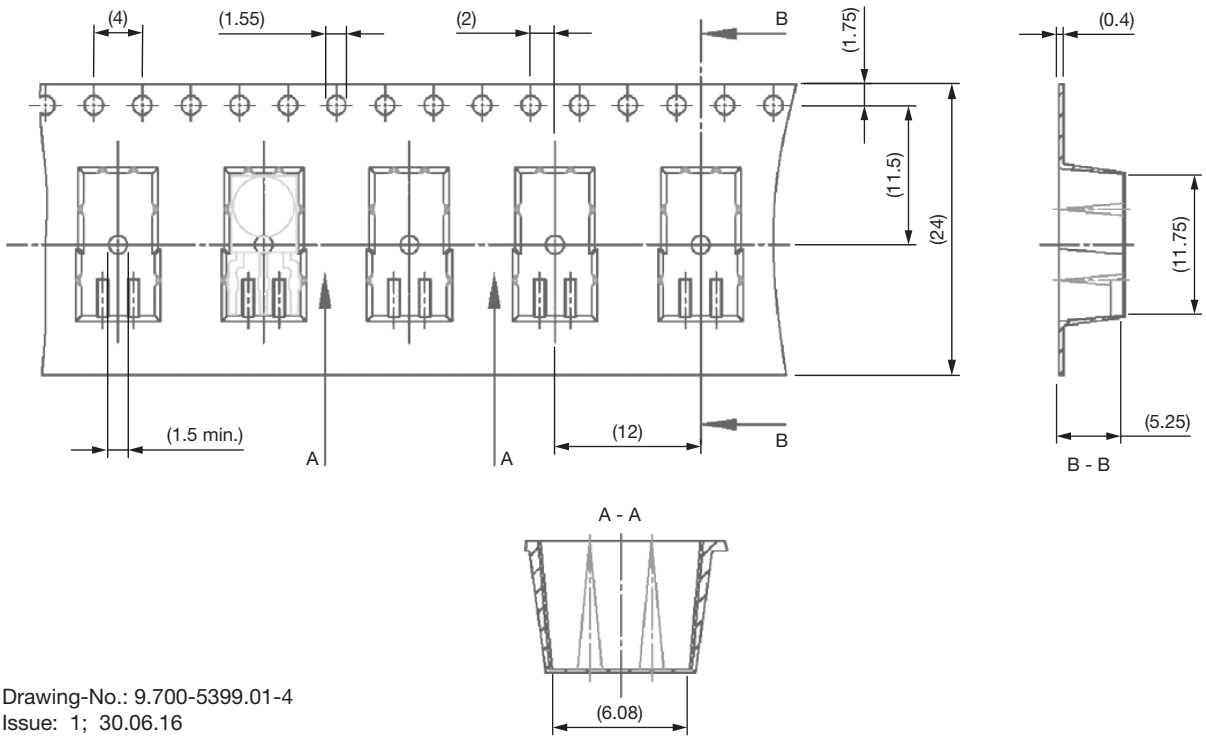
F. Minimold DF1P (TSOP33...DF1P, TSOP53...DF1P, TSOP13...DF1P, TSOP93...DF1P)



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

Tape width: 24

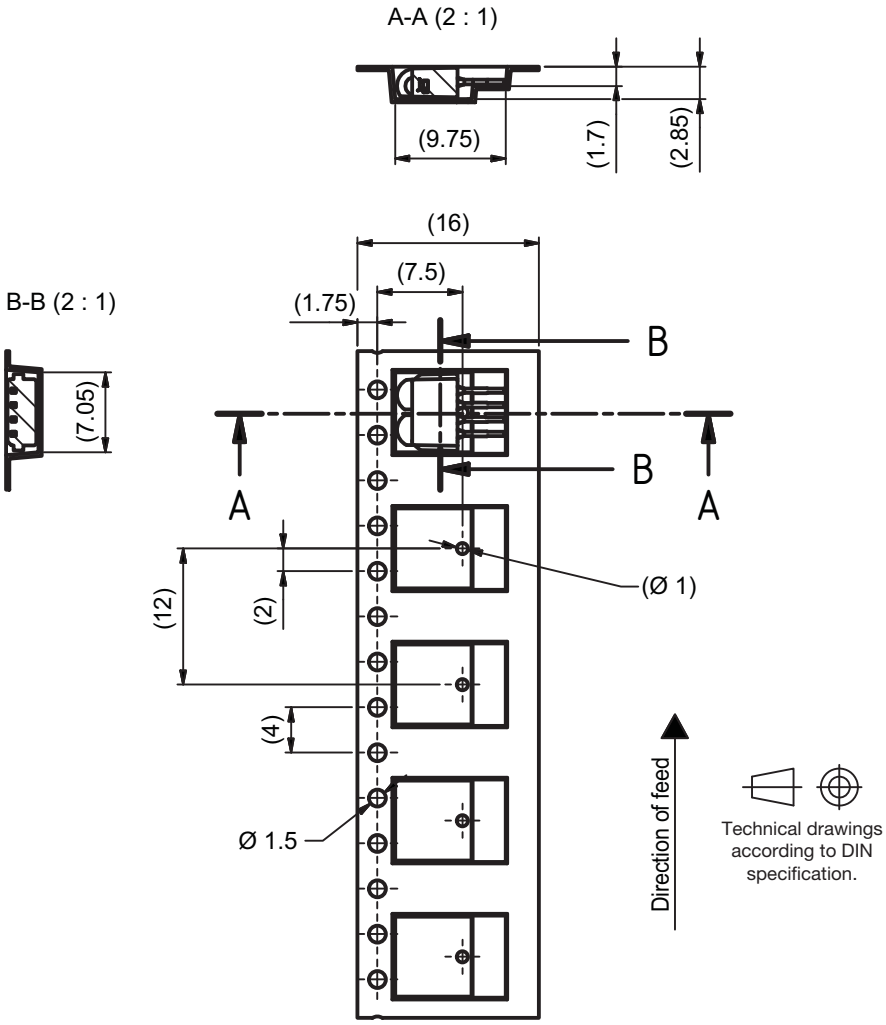
Drawing-No.: 9.800-5052.V3-4
Issue: 1; 17.12.02



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

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

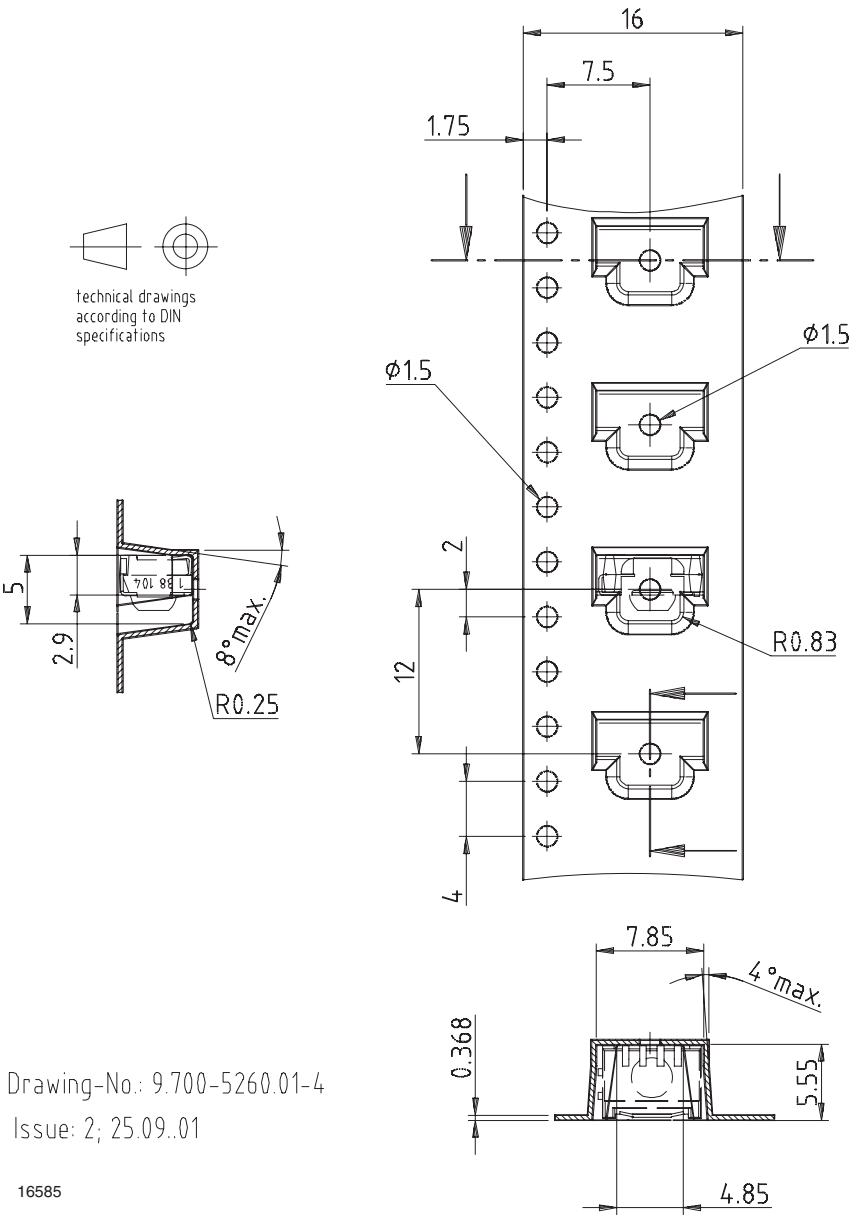
G. TVCastSMD TR1 (TSOP59...TR1, TSOP39...TR1, TSOP19...TR1, TSOP99...TR1)



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

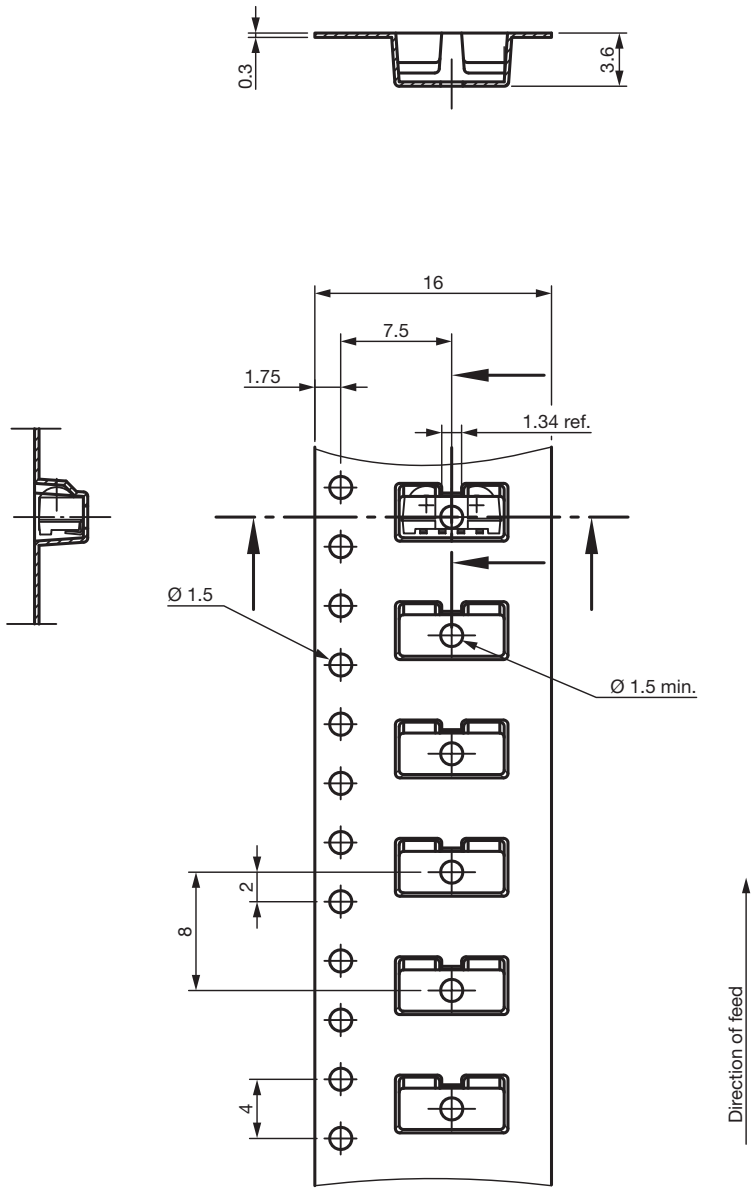
TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

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



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

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

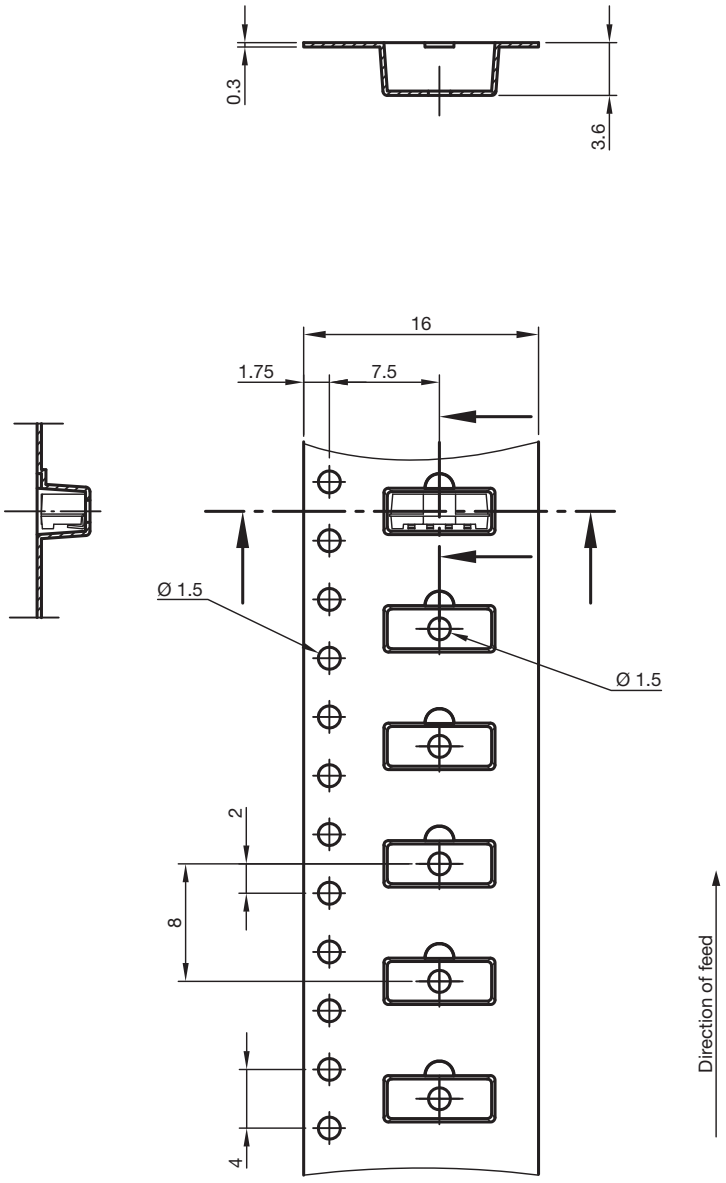


Drawing-No.: 9.700-5337.01-4
Issue: 2; 06.10.15

technical drawings
according to DIN
specifications

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

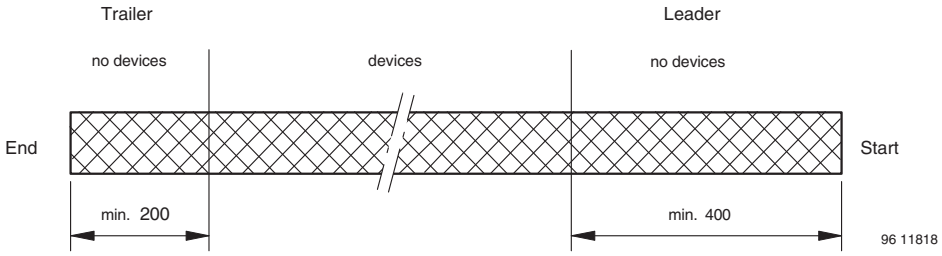
C. Heimdall without lens (TSOP75...WTR, TSOP77...WTR, TSSP...WTR, TSOP15...WTR, TSOP95...WTR)



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. ± 10 mm/min.

165° to 180° peel angle

LABEL

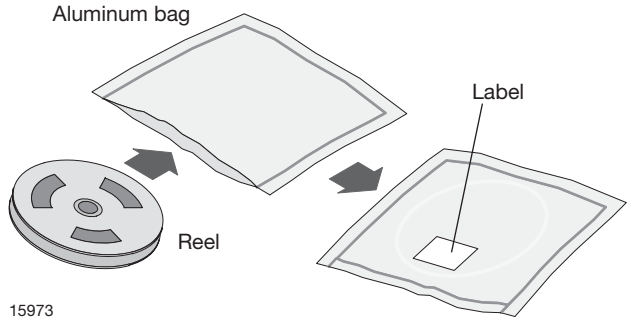
Standard bar code labels for finished goods

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.



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:

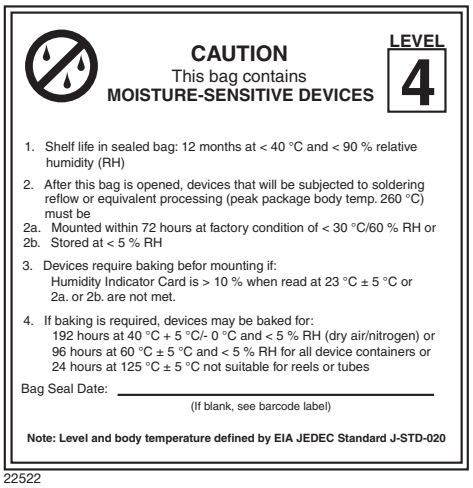
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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.



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.

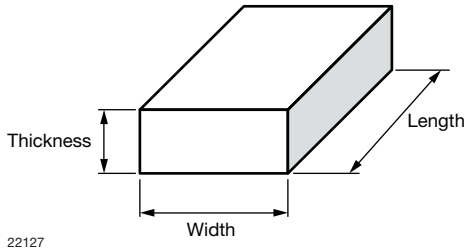
VISHAY SEMICONDUCTORS STANDARD BAR CODE LABELS

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.

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

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http://moschip.ru/get-element

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