IR Receiver Modules for Remote Control Systems
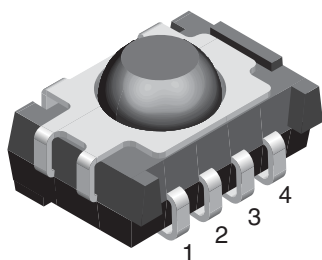
16797

DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

MECHANICAL DATA

Pinning

1 = GND, 2 = N.C., 3 = V_S, 4 = OUT

ORDERING CODE

Taping:

TSOP6...TT - top view taped

TSOP6...TR - side view taped

FEATURES

- Improved immunity against HF and RF noise
- 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 optical noise
- Insensitive to supply voltage ripple and noise
- Taping available for top view and side view assembly
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN **FREE**

GREEN (5-2008)

DESCRIPTION

The TSOP6... series are miniaturized SMD IR receiver modules for infrared remote control systems. A PIN diode and a preamplifier are assembled on a leadframe, the epoxy package contains an IR filter.

The demodulated output signal can be directly connected to a microprocessor for decoding.

The TSOP64.. 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.

The TSOP62.. series devices are provided primarily for compatibility with old AGC2 designs. New designs should prefer the TSOP64.. series containing the newer AGC4.

These components have not been qualified according to automotive specifications.

PARTS TABLE

AGC		LEGACY, FOR LONG BURST REMOTE CONTROLS (AGC2)	RECOMMENDED FOR LONG BURST CODES (AGC4)
Carrier frequency	30 kHz	TSOP6230	TSOP6430
	33 kHz	TSOP6233	TSOP6433
	36 kHz	TSOP6236	TSOP6436 [1][2][3]
	38 kHz	TSOP6238	TSOP6438 [4][5]
	40 kHz	TSOP6240	TSOP6440
	56 kHz	TSOP6256	TSOP6456 [6][7]
Package		Panhead	
Pinning		1 = GND, 2 = N.C., 3 = V_S, 4 = OUT	
Dimensions (mm)		7.5 W x 5.3 H x 4.0 D	
Mounting		SMD	
Application		Remote control	
Best choice for		[1] RC-5 [2] RC-6 [3] Panasonic [4] NEC [5] Sharp [6] r-step [7] Thomson RCA	

BLOCK DIAGRAM
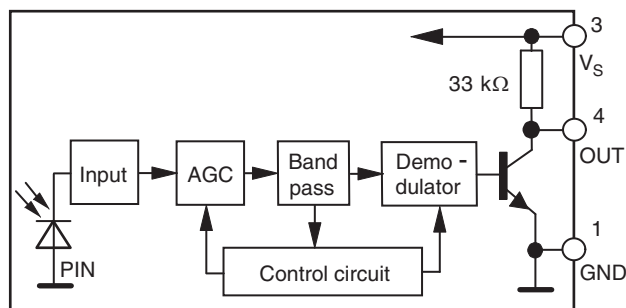
16839-1

APPLICATION CIRCUIT

17170-11
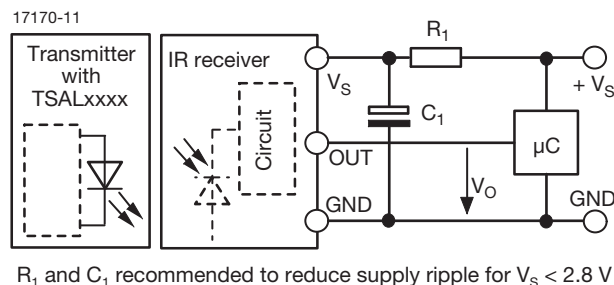
R_1 and C_1 recommended to reduce supply ripple for $V_S < 2.8$ V

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 (V_S + 0.3)	V
Output current		I_O	5	mA
Junction temperature		T_j	100	°C
Storage temperature range		T_{stg}	-25 to +85	°C
Operating temperature range		T_{amb}	-25 to +85	°C
Power consumption	$T_{amb} \leq 85$ °C	P_{tot}	10	mW

Note

- Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect the device reliability

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 = 50 mA, test signal see Fig. 1	d	-	18	-	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)

Optical Test Signal
(IR diode TSAL6200, I_F = 0.4 A, 30 pulses, f = f_0, t = 10 ms)

E_e

* $t_{pi} \geq 10/f_0$ is recommended for optimal function

Output Signal   16110

1) $7/f_0 < t_d < 15/f_0$
2) $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$
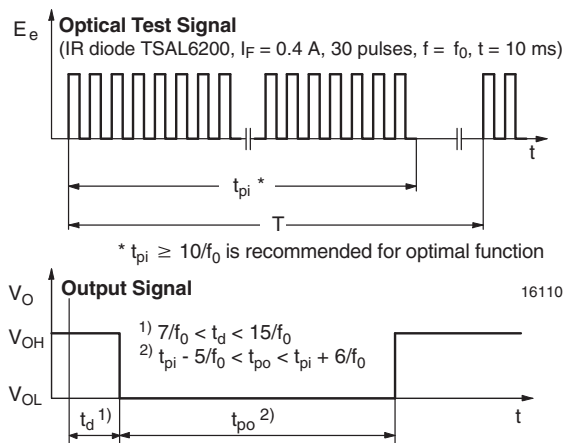
Fig. 1 - Output Active Low

Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

Optical Test Signal

E_e

600 µs   600 µs

t = 60 ms

Output Signal, (see Fig. 4)   94 8134

t_{on} t_{off}

Fig. 3 - Output Function

λ = 950 nm,
optical test signal, fig. 1

Fig. 4 - Output Pulse Diagram

f = $f_0 \pm 5$ %
Δf(3 dB) = $f_0/10$

16925
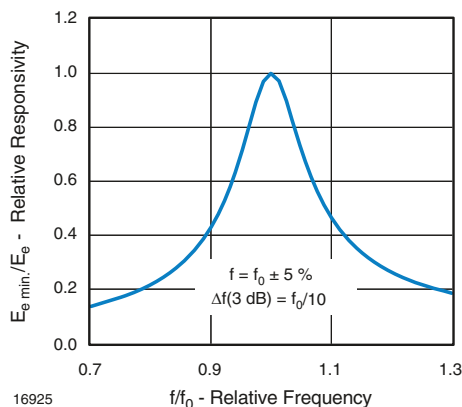
Fig. 5 - Frequency Dependence of Responsivity

Correlation with ambient light sources:
10 W/m² = 1.4 klx (std. illum. A, T = 2855 K)
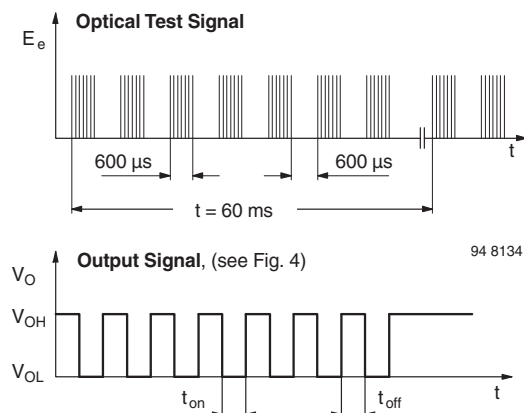10 W/m² = 8.2 klx (daylight, T = 5900 K)

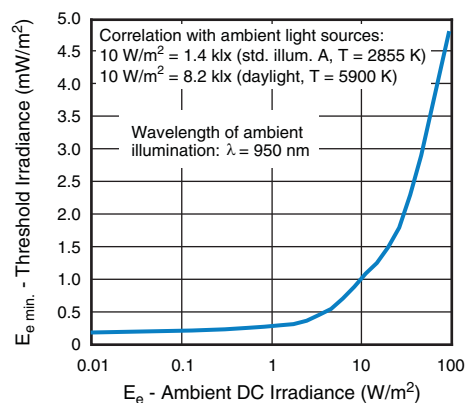Wavelength of ambient
illumination: λ = 950 nm

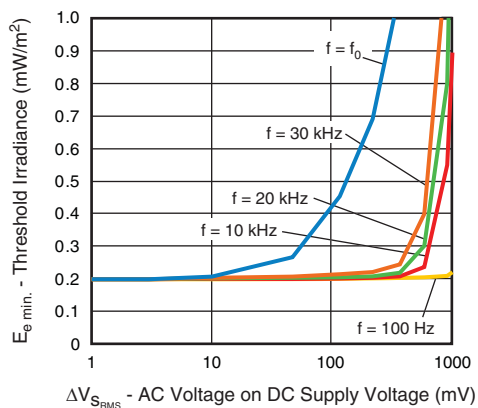Fig. 6 - Sensitivity in Bright Ambient

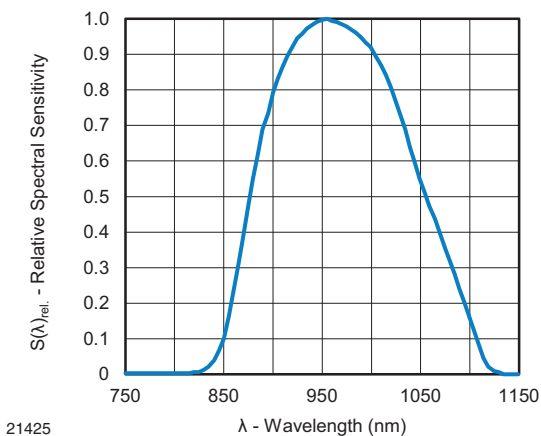Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

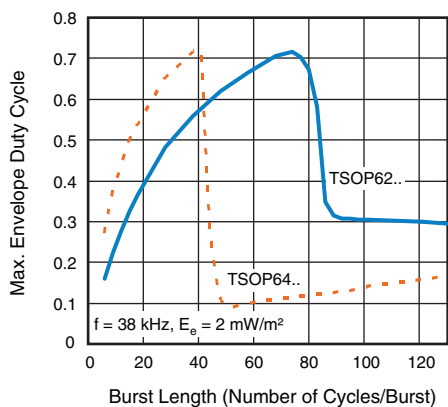Fig. 10 - Relative Spectral Sensitivity vs. Wavelength
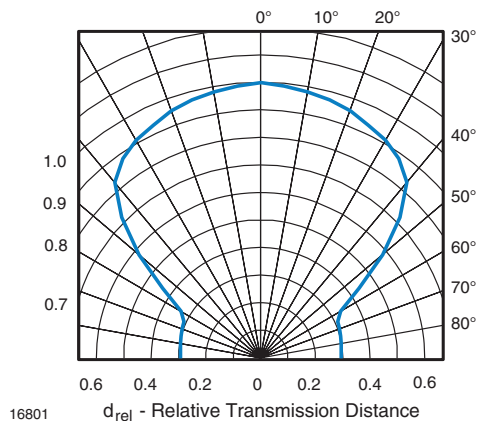

Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length
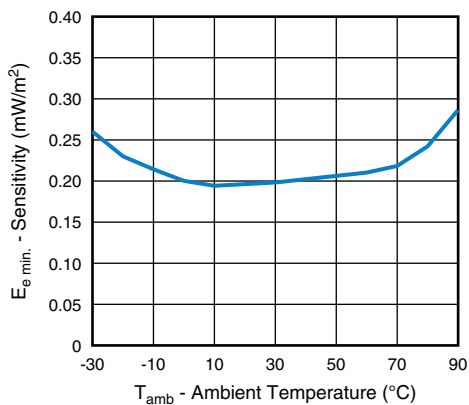

Fig. 11 - Horizontal Directivity
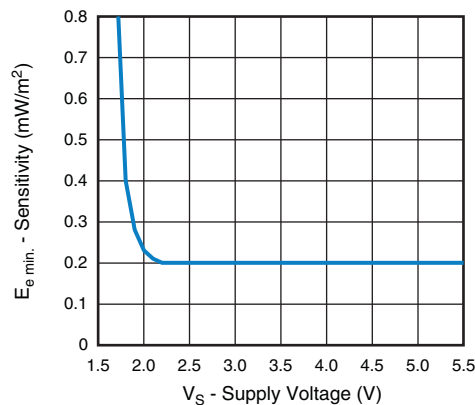

Fig. 9 - Sensitivity vs. Ambient Temperature

Fig. 12 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

This series is designed to suppress spurious output pulses due to noise or disturbance signals. The devices can distinguish data signals from noise due to differences in frequency, burst length, and envelope duty cycle. The data signal should be close to the device's band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the product in the presence of a disturbance, the sensitivity of the receiver is automatically reduced by the AGC to insure that no spurious pulses are present at the receiver's output.

Some examples which are suppressed are:

• DC light (e.g. from tungsten bulbs sunlight)

• Continuous signals at any frequency

• Strongly or weakly modulated noise from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14)
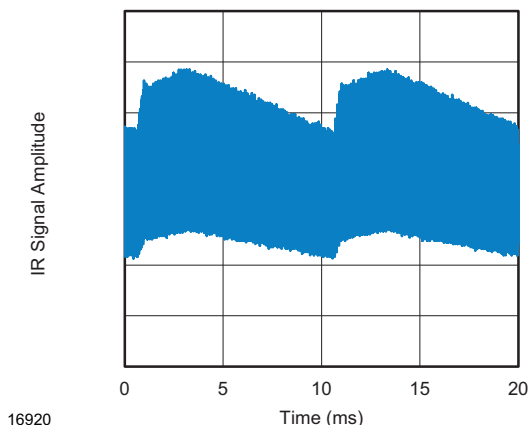
• 2.4 GHz and 5 GHz Wi-Fi

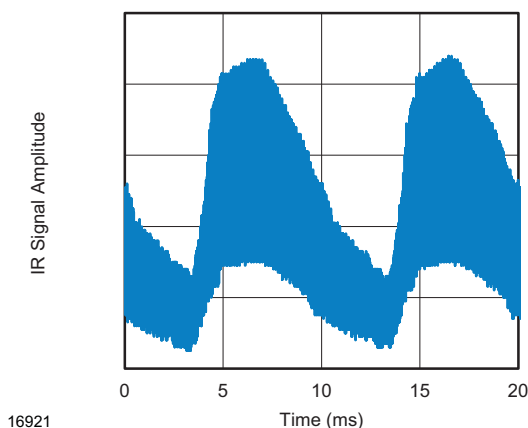Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

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

	TSOP62..	TSOP64..
Minimum burst length	10 cycles/burst	10 cycles/burst
After each burst of length a minimum gap time is required of	10 to 70 cycles ≥ 12 cycles	10 to 35 cycles ≥ 12 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 4 x burst length	35 cycles > 10 x burst length
Maximum number of continuous short bursts/second	800	1300
NEC code	Yes	Preferred
RC5 / RC6 code	Yes	Preferred
Thomson 56 kHz code	Yes	Preferred
Sharp code	Yes	Preferred
Suppression of interference from fluorescent lamps	Mild disturbance patterns are suppressed (example: signal pattern of Fig. 13)	Complex and critical disturbance patterns are suppressed (example: signal pattern of Fig. 14 or highly dimmed LCDs)

Note
• For data formats with short bursts please see the datasheet of TSOP61.., TSOP63.., TSOP65..

PACKAGE DIMENSIONS in millimeters

Drawing-No.: 6.544-5341.01-4
Issue: 8; 02.09.09
16776

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

19800
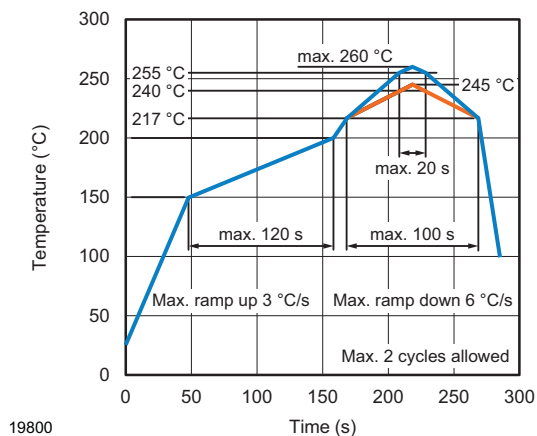
TAPING VERSION TSOP..TT DIMENSIONS in millimeters

technical drawings according to DIN specifications
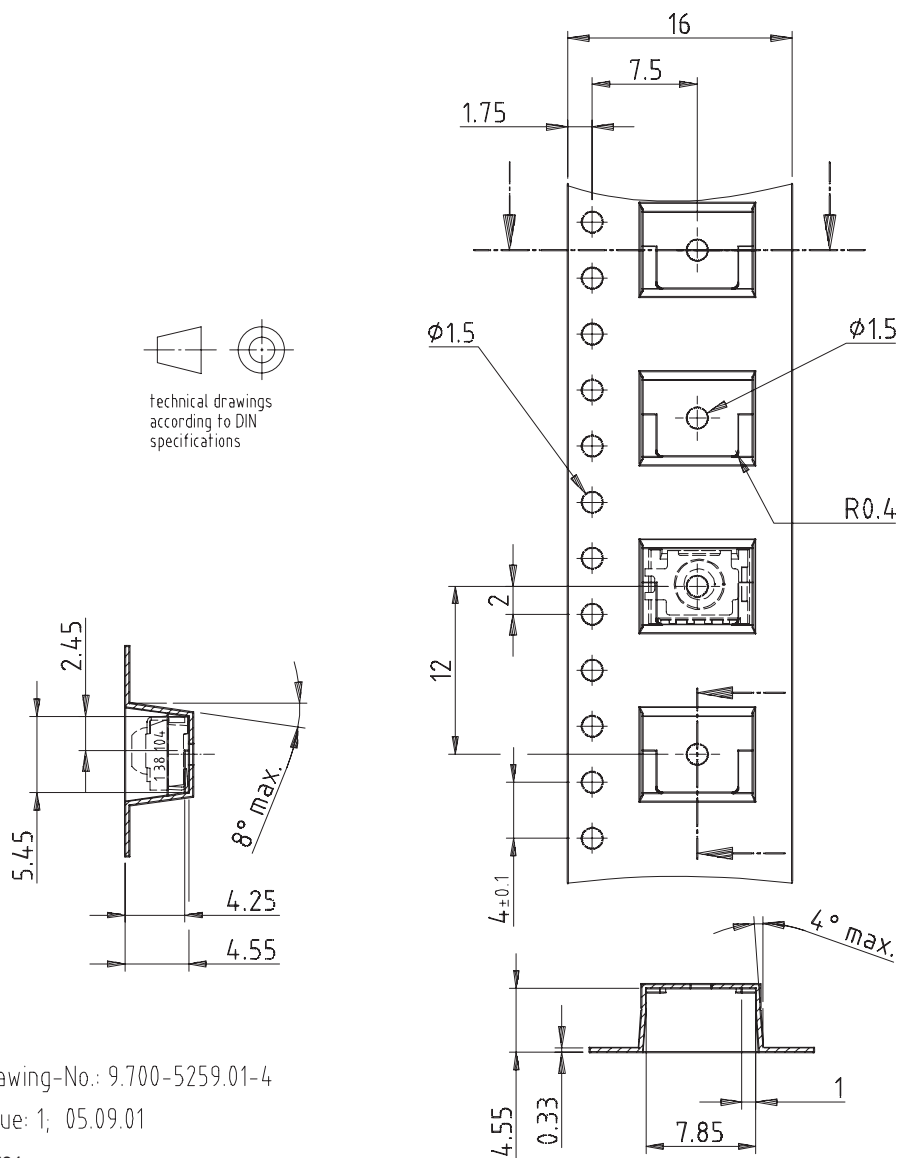
Drawing-No.: 9.700-5259.01-4

Issue: 1; 05.09.01

16584

TAPING VERSION TSOP..TR DIMENSIONS in millimeters

technical drawings
according to DIN
specifications

Drawing-No.: 9.700-5260.01-4

Issue: 2; 25.09..01

16585

REEL DIMENSIONS in millimeters

16.4^{+3}_{-0}

$\phi 330^{+0}_{-4}$

$\phi 50$ min.

$\phi 12.8$ min.

1.5 min.

$\phi 20.2$ min.
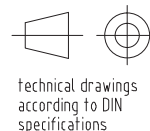
Reel hub   2:1
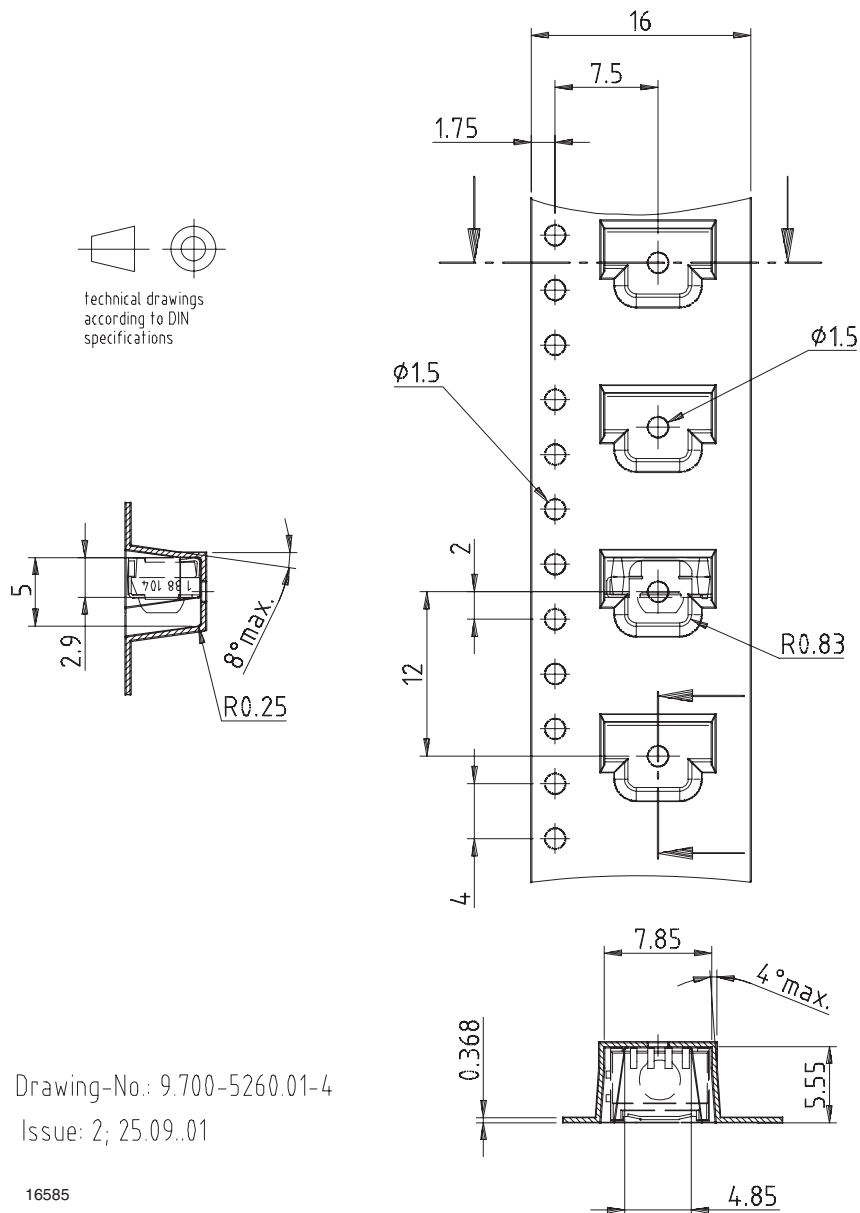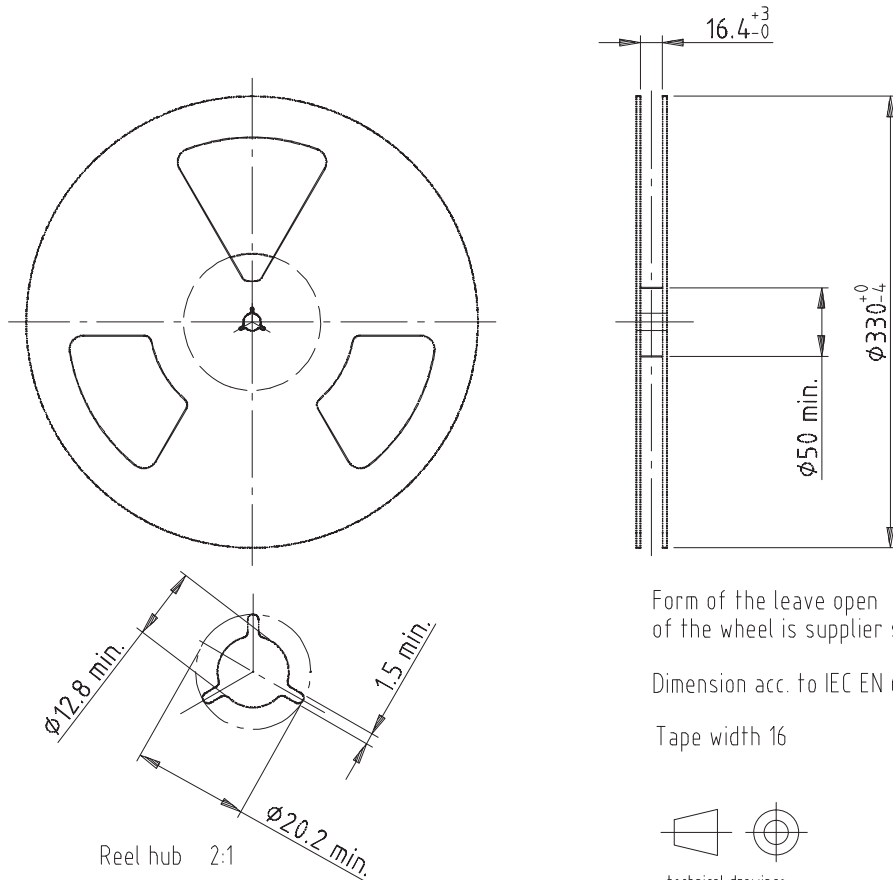
Form of the leave open
of the wheel is supplier specific.

Dimension acc. to IEC EN 60 286-3

Tape width 16

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

16734

technical drawings
according to DIN
specifications

LEADER AND TRAILER DIMENSIONS in millimeters

Trailer

Leader

no devices

devices

no devices

End

Start

min. 200

min. 400

96 11818
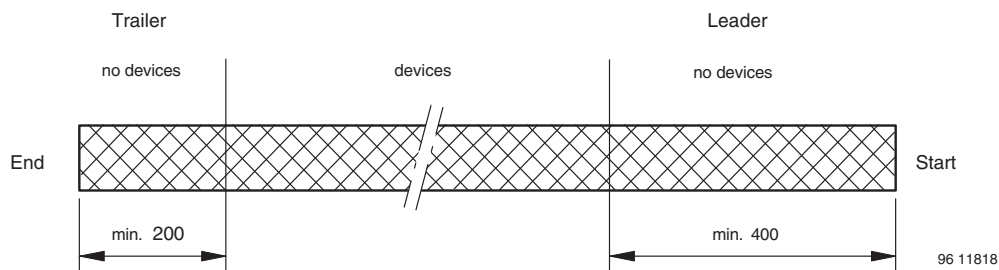
COVER TAPE PEEL STRENGTH

According to DIN EN 60286-3

0.1 N to 1.3 N

300 mm/min. ± 10 mm/min.

165° to 180° peel angle

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
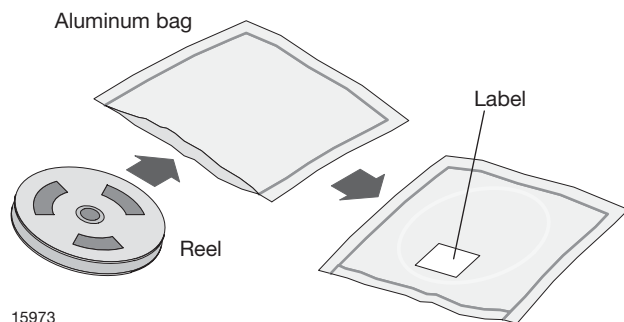
FINAL PACKING

The sealed reel is packed into a cardboard box.

RECOMMENDED METHOD OF STORAGE

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

• Storage temperature 10 °C to 30 °C

• Storage humidity ≤ 60 % RH max.

After more than 72 h under these conditions moisture content will be too high for reflow soldering.
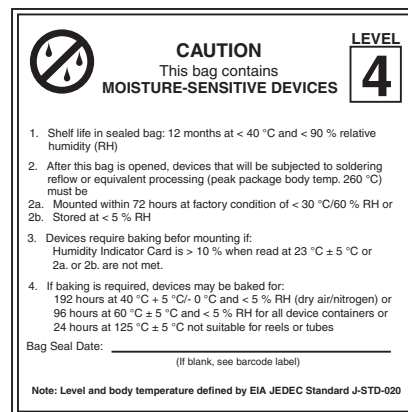
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

192 h at 40 °C + 5 °C / - 0 °C and < 5 % RH (dry air / nitrogen) or

96 h at 60 °C + 5 °C and < 5 % RH for all device containers or

24 h at 125 °C + 5 °C not suitable for reel or tubes.

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

22522

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

ESD PRECAUTION

Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electrostatic sensitive devices warning labels are on the packaging.

VISHAY SEMICONDUCTORS STANDARD BAR CODE LABELS

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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