IR Receiver Modules for Remote Control Systems





DESCRIPTION

This IR receiver series is optimized for short burst remote control systems in different environments. The customer can chose between different IC settings (AGC variants), to find the optimum solution for his application. The higher the AGC, the better noise is suppressed, but the lower the code compatibility.

The devices contain a PIN diode and a preamplifier assembled on a lead frame. The epoxy package contains an IR filter. The demodulated output signal can be directly connected to a microprocessor for decoding. These components have not been qualified to automotive specifications.

FEATURES

- Individual IC settings to reach maximum performance
- Immunity against noise (lamps, LCD TV, Wi-Fi)
- Low supply current
- Photo detector and preamplifier in one package
- Supply voltage: 2.0 V to 5.5 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

Product Page

Marking

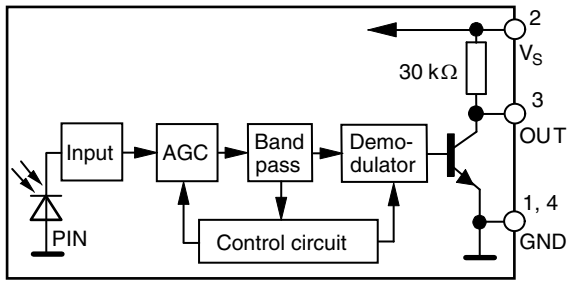
APPLICATIONS

- Infrared remote control systems

DESIGN SUPPORT TOOLS

- 3D models
- Window size calculator

BLOCK DIAGRAM



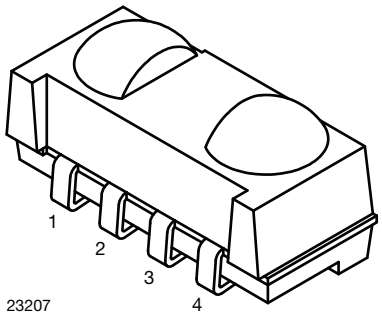
20445-1

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MECHANICAL DATA

Pinning:

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



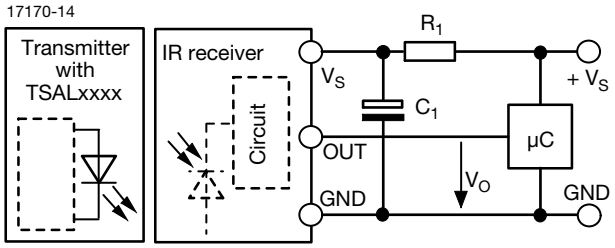
ORDERING CODE

Taping:

TSOP77...TT - top view taped, 2200 pcs/reel

TSOP77...TR - side view taped, 2300 pcs/reel

APPLICATION CIRCUIT



R_1 and C_1 recommended in case there are strong ripple or spikes on the supply line.

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)(2)	TSOP77536
	38 kHz	TSOP77338 (3)(5)	TSOP77538
	40 kHz	TSOP77340	TSOP77540
	56 kHz	TSOP77356 (4)	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) RCMM (3) RECS-80 Code (4) r-map (5) XMP	
Special options		• Extended temperature range: www.vishay.com/doc?82738 • Narrow optical filter: www.vishay.com/doc?81590 • Wide optical flter: www.vishay.com/doc?82726	

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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	2.0	-	5.5	V
Supply current	V_S = 3.3 V, E_v = 0	I_{SD}	0.25	0.35	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.45	-	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	Test signal: RC5 code	$E_{e\ min.}$	-	0.2	0.4	mW/m²
	Test signal: XMP code	$E_{e\ min.}$	-	0.3	0.5	mW/m²
Maximum irradiance	$t_{pi} - 3/f_o < t_{po} < t_{pi} + 3.5/f_o$, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 50	-	°

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

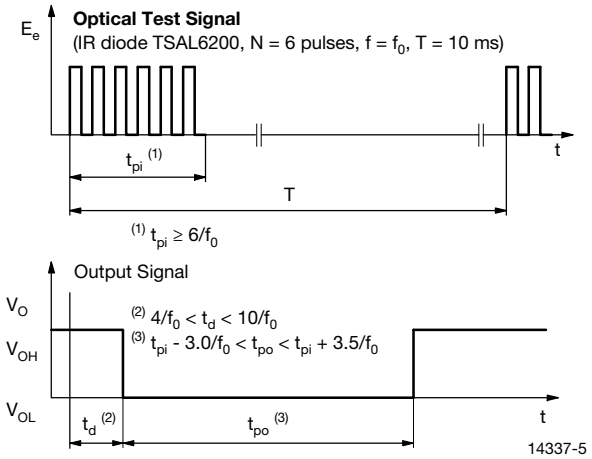


Fig. 1 - Output Active Low

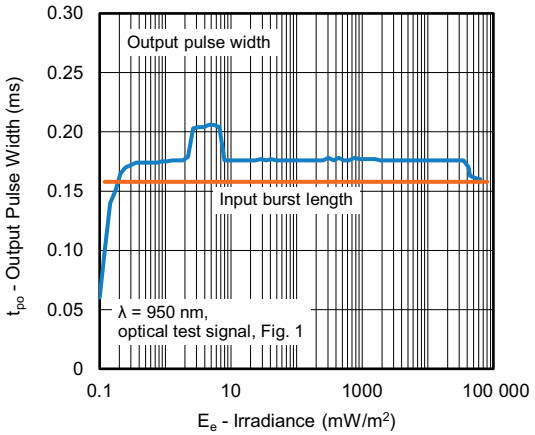


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

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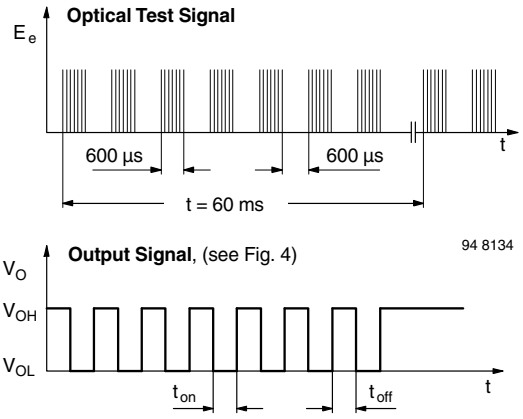


Fig. 3 - Output Function

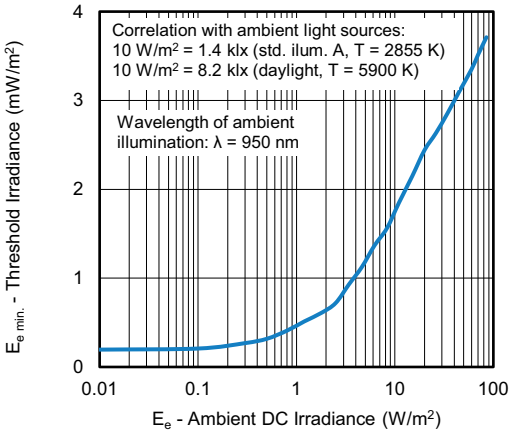


Fig. 6 - Sensitivity in Bright Ambient

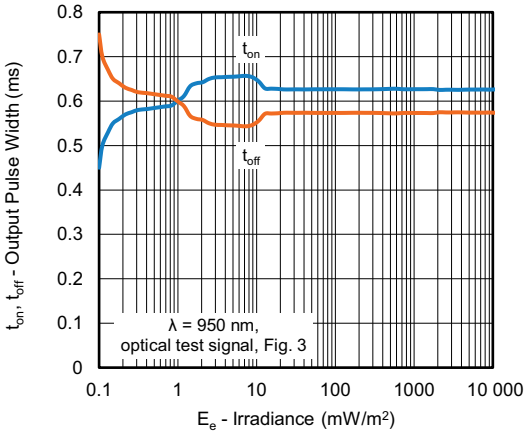


Fig. 4 - Output Pulse Diagram

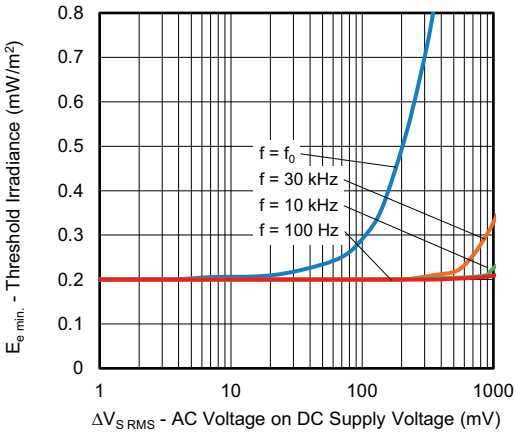


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

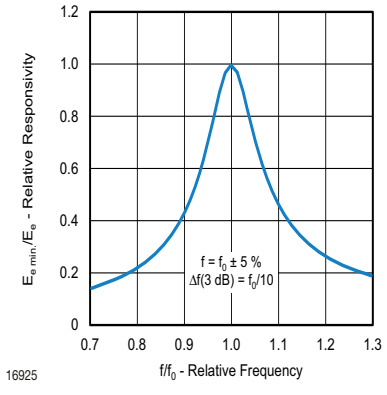


Fig. 5 - Frequency Dependence of Responsivity

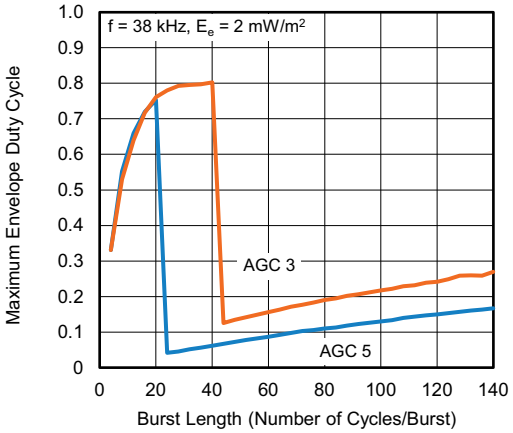


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

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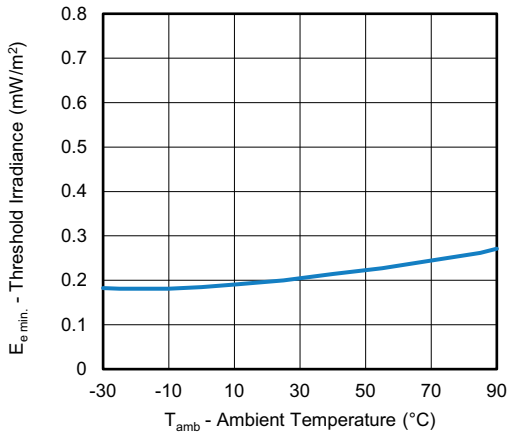
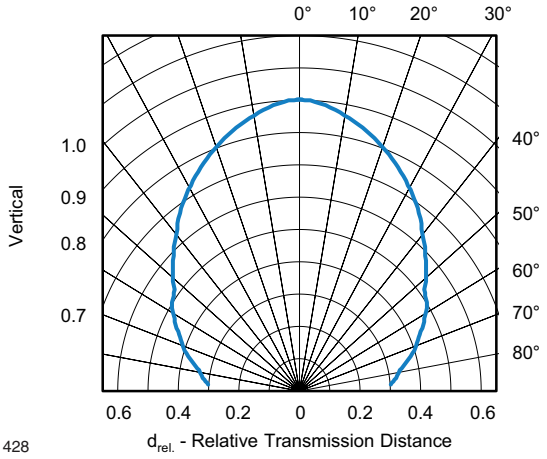
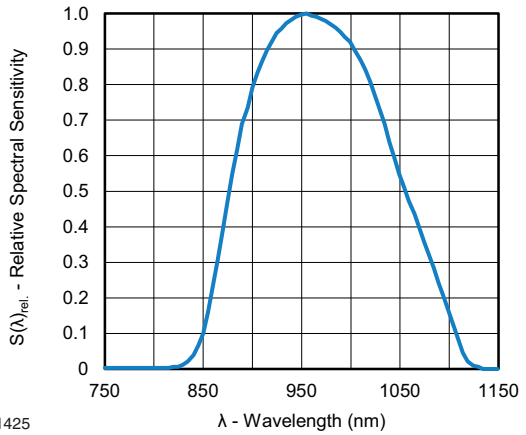


Fig. 9 - Sensitivity vs. Ambient Temperature



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Fig. 12 - Vertical Directivity



21425

Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

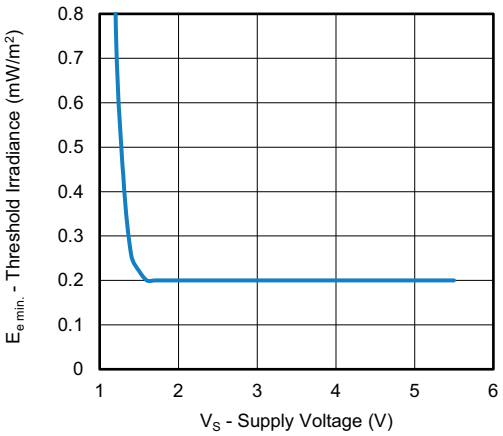
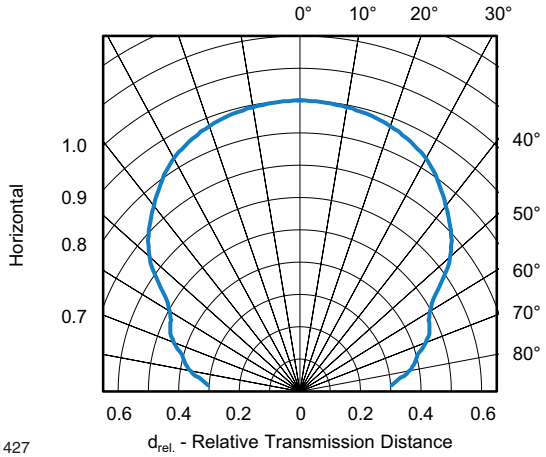


Fig. 13 - Sensitivity vs. Supply Voltage



21427

Fig. 11 - Horizontal Directivity

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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. 14 or Fig. 15)
- 2.4 GHz and 5 GHz Wi-Fi

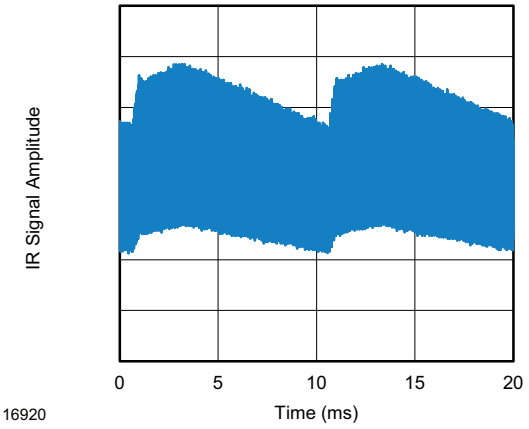


Fig. 14 - IR Disturbance from Fluorescent Lamp With Low Modulation

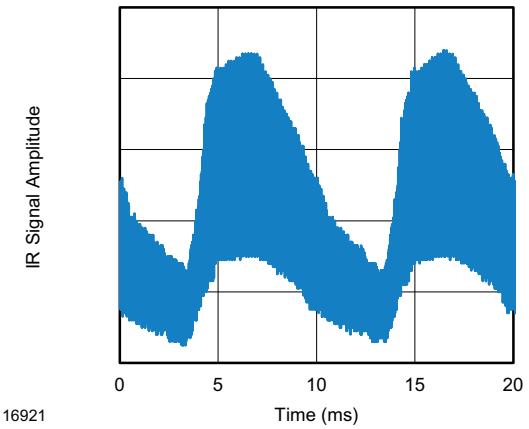


Fig. 15 - IR Disturbance from Fluorescent Lamp With High Modulation

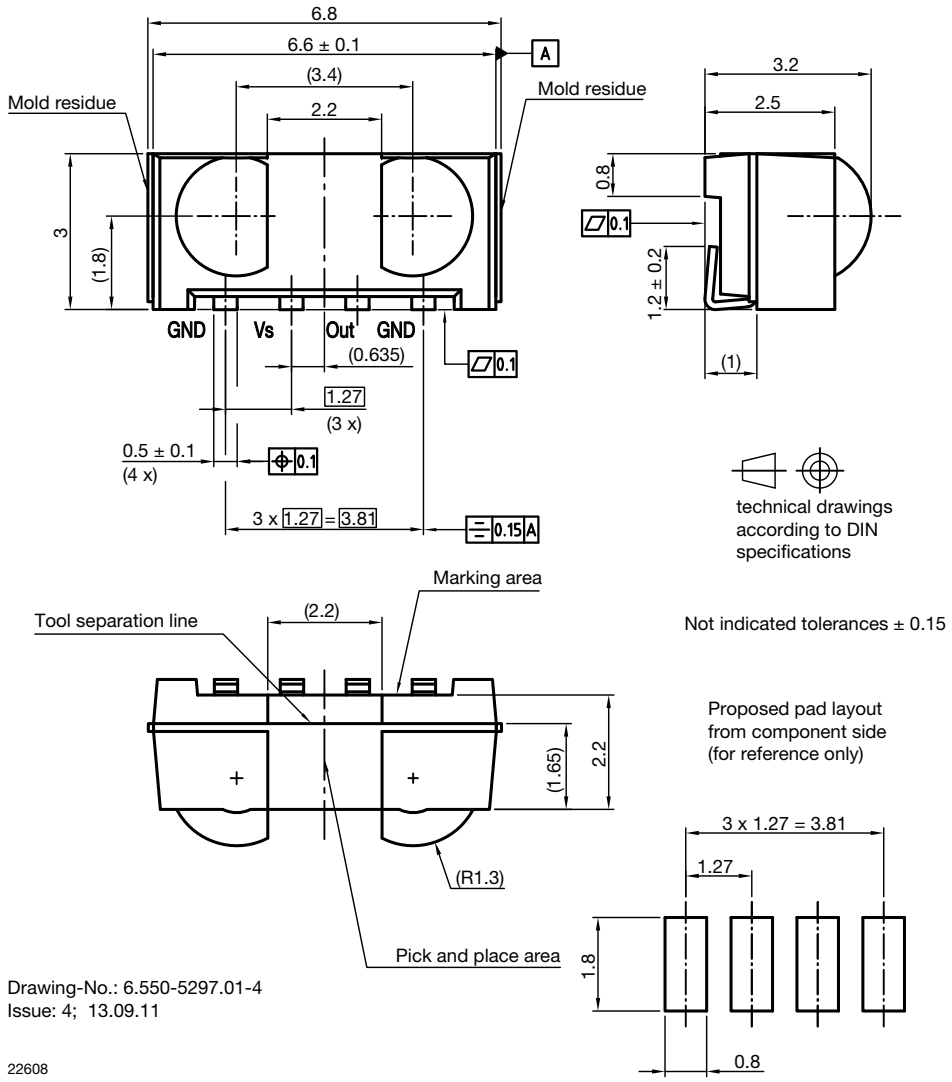
	TSOP773..	TSOP775..
Minimum burst length	6 cycles/burst	6 cycles/burst
After each burst of length a minimum gap time is required of	6 to 40 cycles ≥ 7 cycles	6 to 20 cycles ≥ 7 cycles
For bursts greater than a minimum gap time in the data stream is needed of	40 cycles > 6 x burst length	20 cycles > 10 x burst length
Maximum number of continuous short bursts/second	2500	2500
RCMM code	Preferred	Yes
XMP code	Preferred	Yes
r-map code	Preferred	Yes
Suppression of interference from fluorescent lamps	Mild and complex disturbance patterns are suppressed (example: signal pattern of Fig. 14 and Fig. 15)	Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs

Note

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

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PACKAGE DIMENSIONS in millimeters



ASSEMLY INSTRUCTIONS

Reflow Soldering

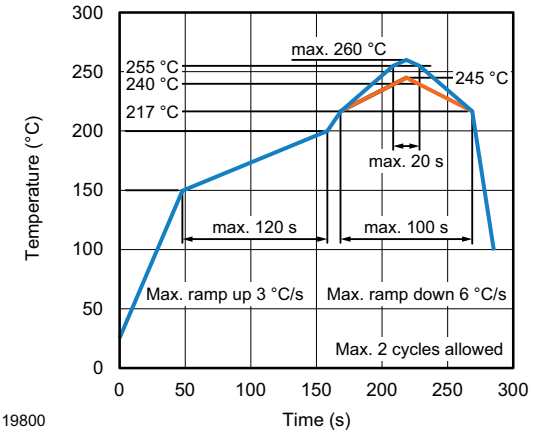
- Reflow soldering must be done within 72 h while stored under a max. temperature of 30 °C, 60 % RH after opening the dry pack envelope
- Set the furnace temperatures for pre-heating and heating in accordance with the reflow temperature profile as shown in the diagram. Exercise extreme care to keep the 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

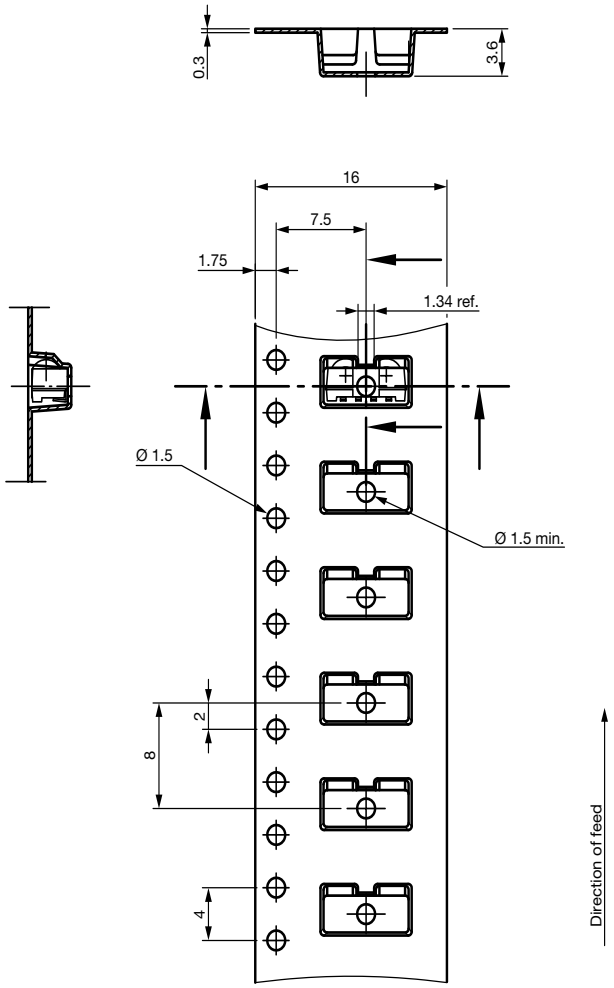
- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off

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VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE



TAPING VERSION TSOP..TR DIMENSIONS in millimeters

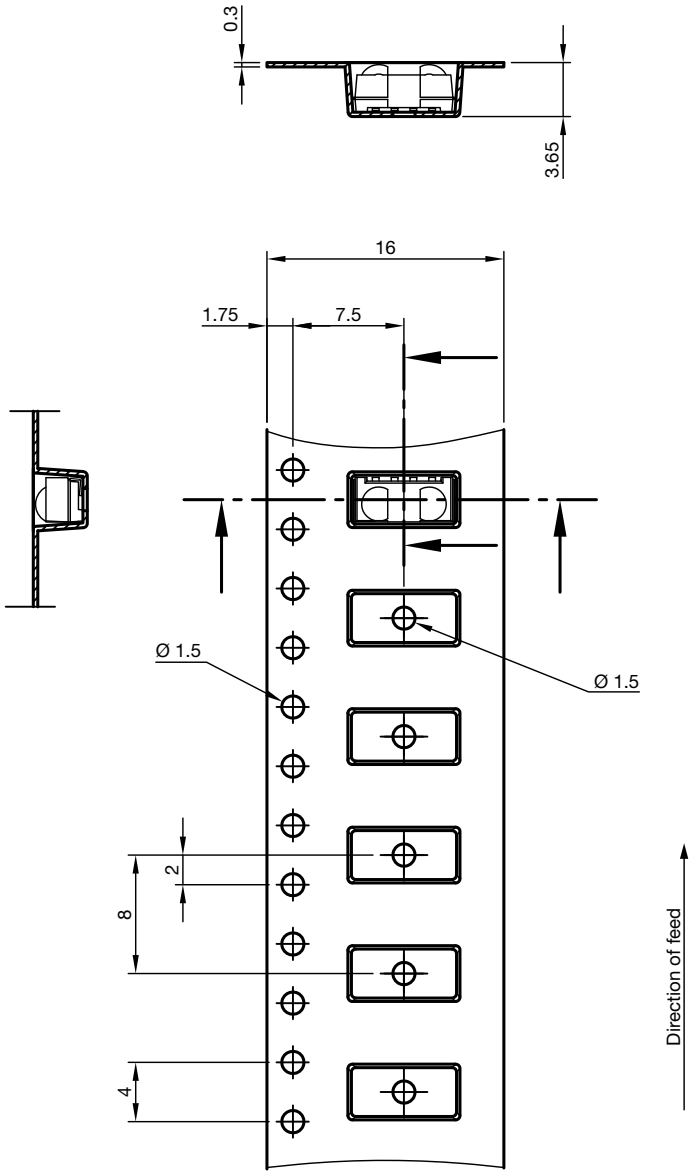


Drawing-No.: 9.700-5337.01-4
Issue: 2; 06.10.15

technical drawings
according to DIN
specifications

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TAPING VERSION TSOP..TT DIMENSIONS in millimeters

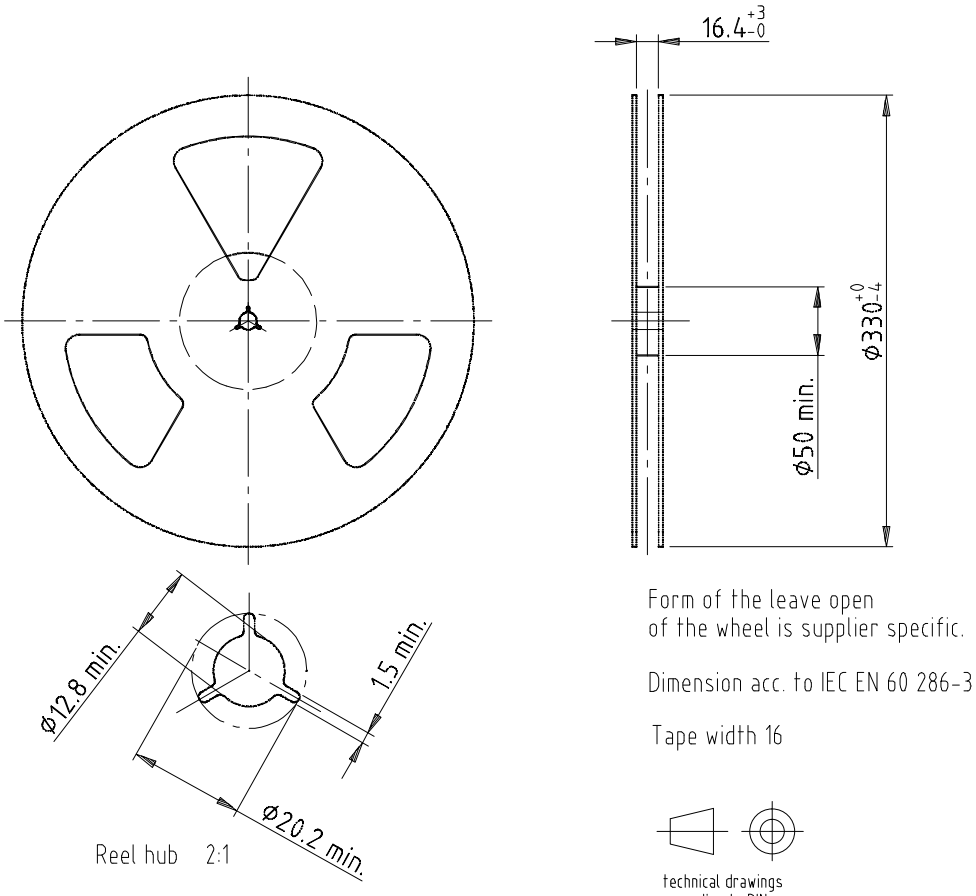


technical drawings
according to DIN
specifications

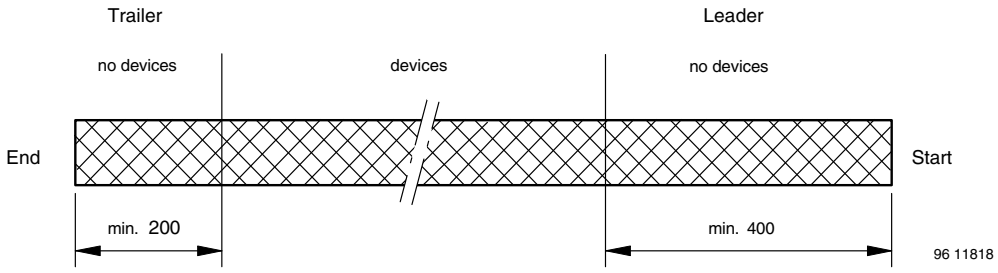
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Issue: 4; 12.06.13

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REEL DIMENSIONS in millimeters



LEADER AND TRAILER DIMENSIONS in millimeters



COVER TAPE PEEL STRENGTH

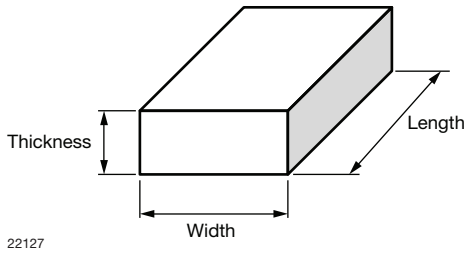
According to DIN EN 60286-3
0.1 N to 1.3 N
300 ± 10 mm/min.
165° to 180° peel angle

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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

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.

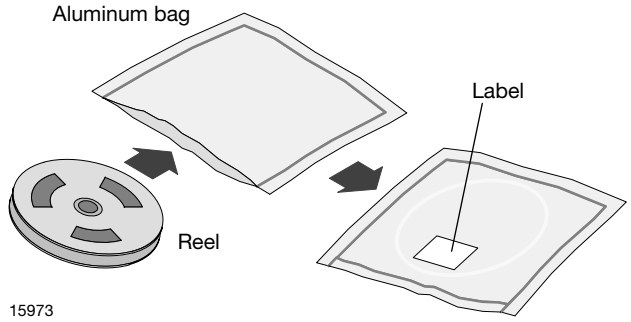
VISHAY SEMICONDUCTOR GmbH STANDARD BAR CODE PRODUCT LABEL (finished goods)

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

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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:

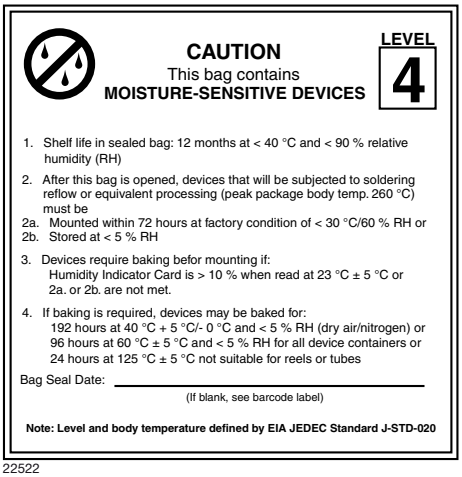
- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

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 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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