IR Receiver Modules for Remote Control Systems

22594

DESCRIPTION

This IR receiver series is optimized for long 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

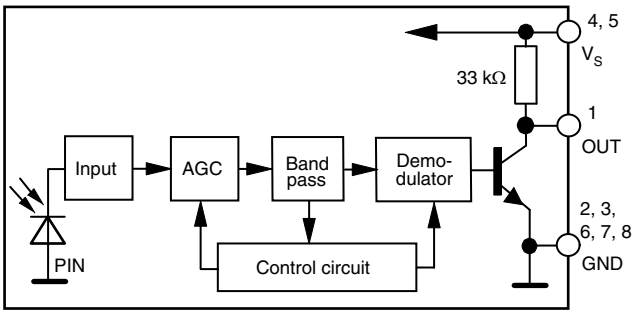
APPLICATIONS

- Infrared remote control systems

DESIGN SUPPORT TOOLS

- 3D models
- Window size calculator

BLOCK DIAGRAM



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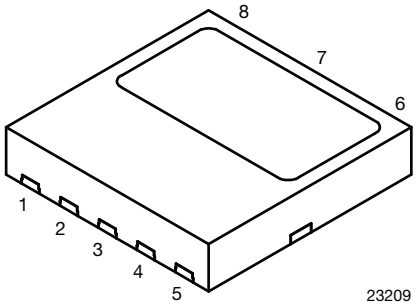
MECHANICAL DATA

Pinning:

1 = OUT, 2, 3, 6, 7, 8 = GND, 4, 5 = V_S

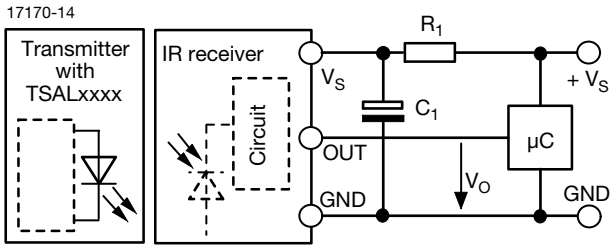


ORDERING CODE

Taping:

TSOP57...HTT1 - top view taped, 1500 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		**LEGACY, FOR LONG BURST REMOTE CONTROLS (AGC2)**	**RECOMMENDED FOR LONG BURST CODES (AGC4)**
Carrier frequency	36 kHz	TSOP57236H	TSOP57436H (1)(2)(3)
	38 kHz	TSOP57238H	TSOP57438H (4)(5)(9)(10)
	40 kHz	TSOP57240H (11)	TSOP57440H
	56 kHz	TSOP57256H (8)	TSOP57456H (6)(7)
Package		Belobog shield	
Pinning		1 = OUT, 2, 3, 6, 7, 8 = GND, 4, 5 = V_S	
Dimensions (mm)		3.95 W x 3.95 H x 0.8 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 (8) Cisco (9) Mitsubishi (10) Sejin 4PPM (11) Sony	
Special options		• Extended temperature range: www.vishay.com/doc?82738	

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

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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 = 5 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	-	15	-	m
Output voltage low	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m^2, test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Test signal: RC5 code	$E_{e\ min.}$	-	0.25	0.5	mW/m^2
	Test signal: NEC code	$E_{e\ min.}$	-	0.3	0.6	mW/m^2
Maximum irradiance	Pulse width tolerance: $t_{pi} - 4/f_o < t_{po} < t_{pi} + 4/f_o$, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m^2
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 75	-	°

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

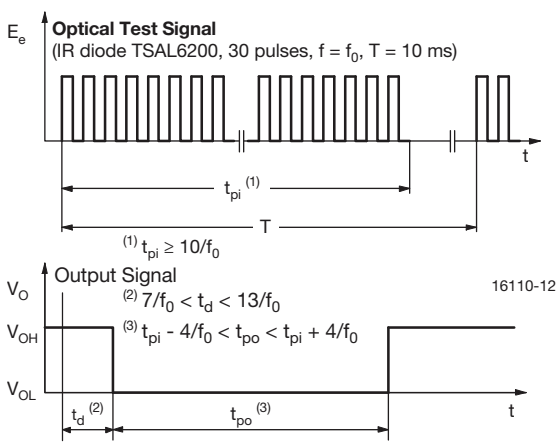

Fig. 1 - Output Active Low

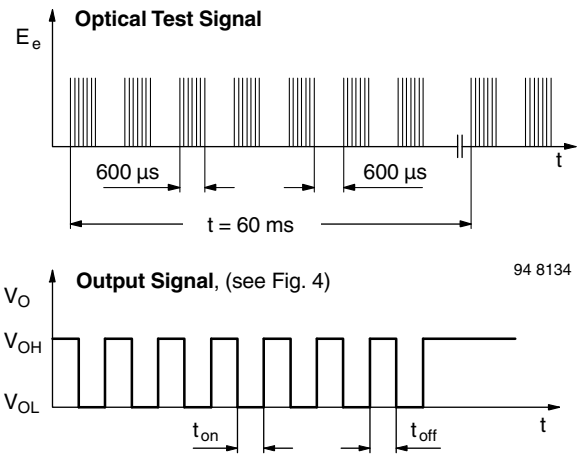

Fig. 3 - Output Function

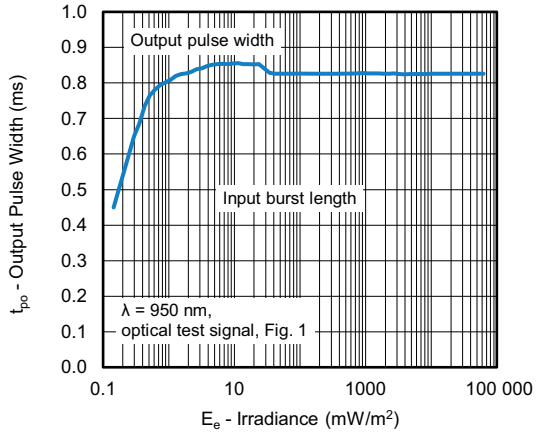

Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

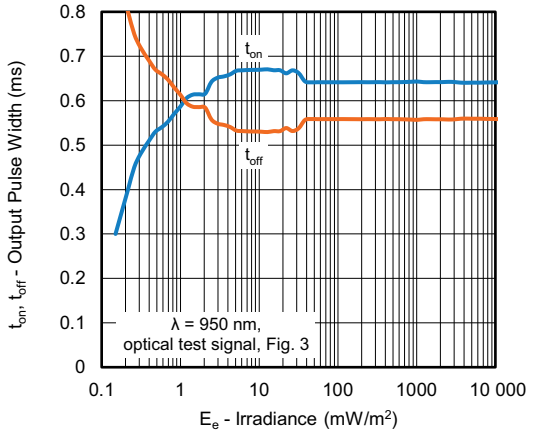

Fig. 4 - Output Pulse Diagram

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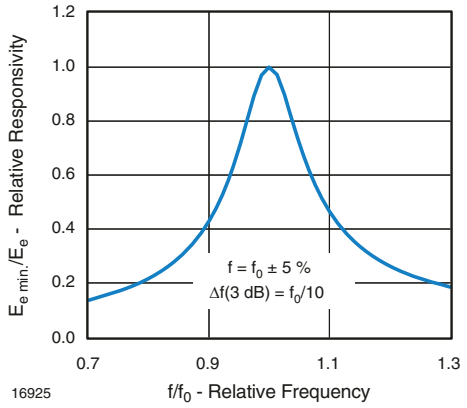

Fig. 5 - Frequency Dependance of Responsivity

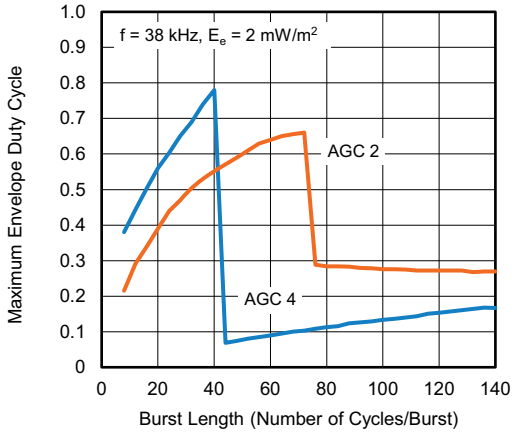

Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

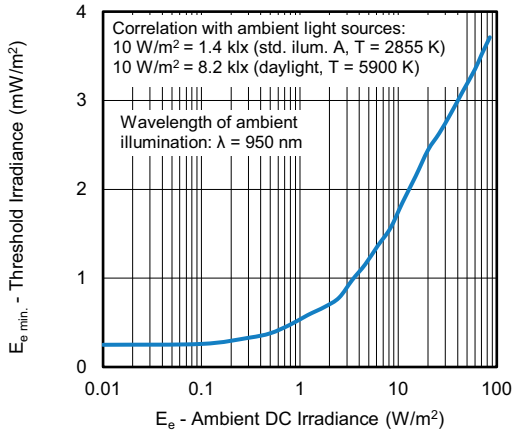

Fig. 6 - Sensitivity in Bright Ambient

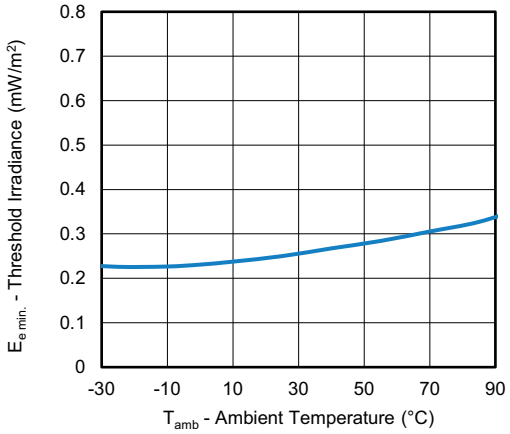

Fig. 9 - Sensitivity vs. Ambient Temperature

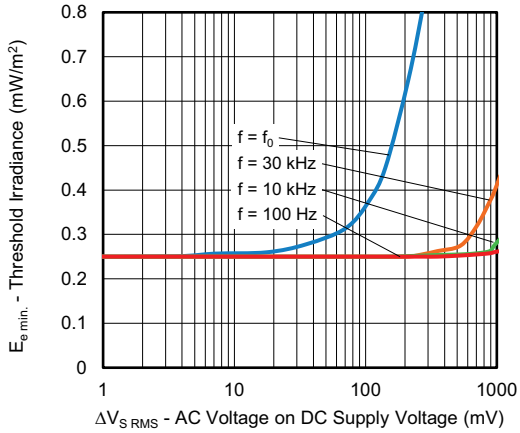

Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

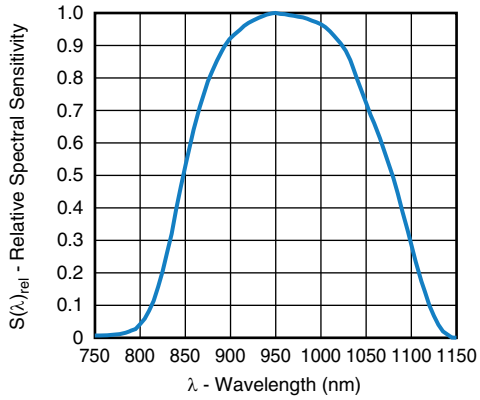

Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

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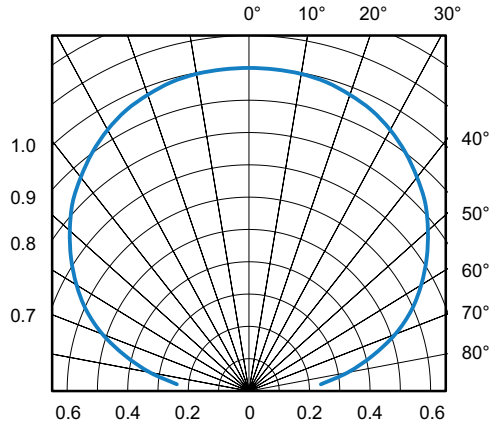

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Fig. 11 - Horizontal Directivity

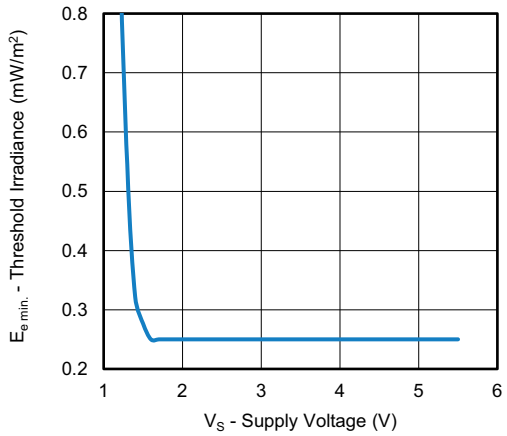

Fig. 12 - Sensitivity vs. Supply Voltage

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SUITABLE DATA FORMAT

The TSOP572.., TSOP574.. 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 TSOP572.., TSOP574.. 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 patterns from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14)
- 2.4 GHz and 5 GHz Wi-Fi

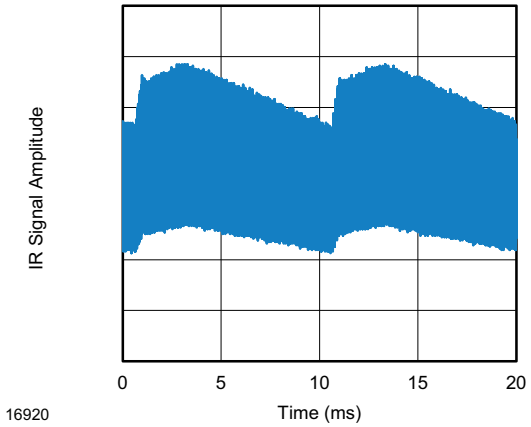

Fig. 13 - IR Signal from Fluorescent Lamp With Low Modulation

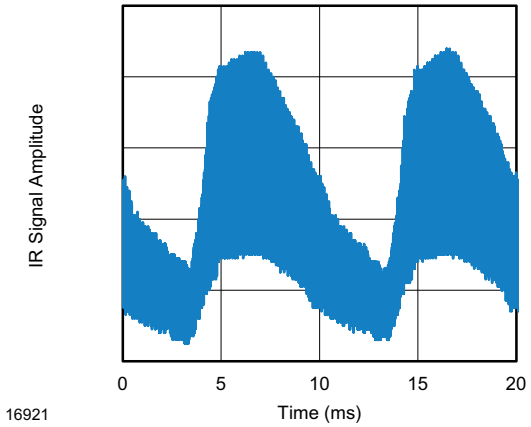

Fig. 14 - IR Signal from Fluorescent Lamp With High Modulation

AGC CHARACTERISTICS		
	TSOP572..	**TSOP574..**
Minimum burst length	10 cycles/burst	10 cycles/burst
After each burst of length a minimum gap time is required of	10 to 72 cycles ≥ 10 cycles	10 to 40 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	72 cycles > 3 x burst length	40 cycles > 10 x burst length
Maximum number of continuous short bursts/second	950	1500
NEC code	Yes	Preferred
RC5 / RC6 code	Yes	Preferred
RCA 56 kHz code	Yes	Preferred
r-step code	Yes	Preferred
Sony code	Preferred	No
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 for TSOP573..

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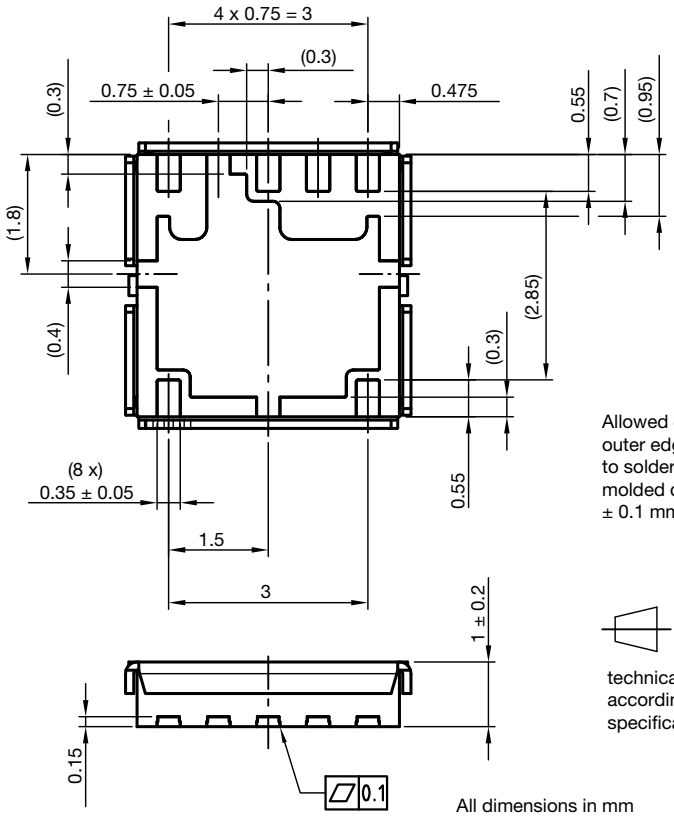
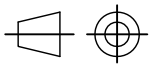
PACKAGE DIMENSIONS in millimeters

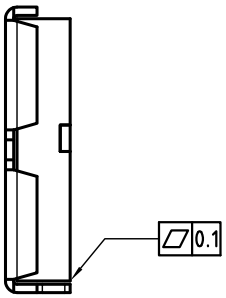


Allowed offset outer edge of shield to solder pads of molded device ± 0.1 mm



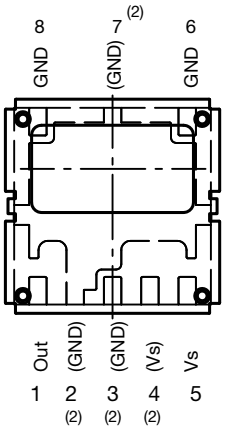
technical drawings according to DIN specifications

All dimensions in mm
Not indicated tolerances ± 0.1

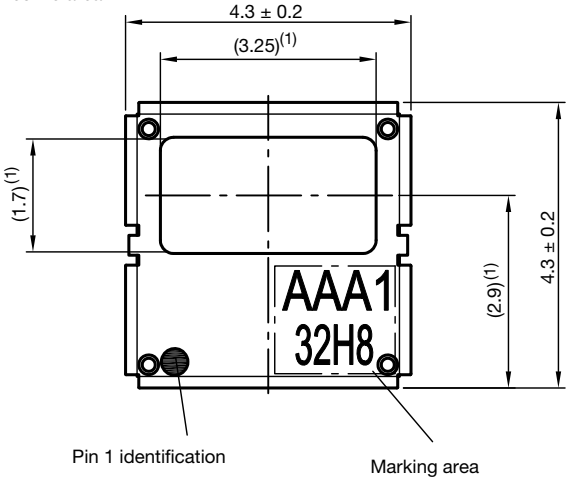


(2) Pins connected internally. It is not necessary to connect externally.

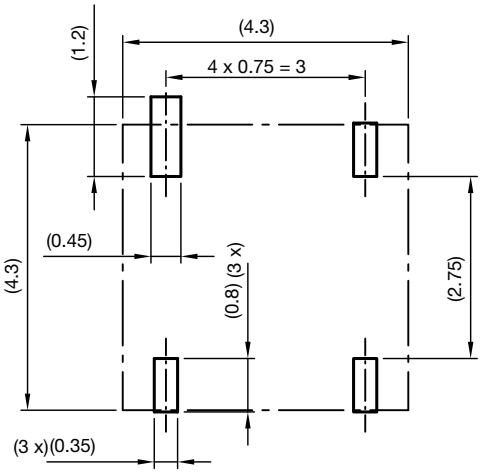
Pinning from Topview



(1) optically effective area



Proposed pad layout from component side (dim. for reference only)



Drawing-No.: 6.550-5316.01-4
Issue: 2; 12.02.14

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ASSEMBLY INSTRUCTIONS

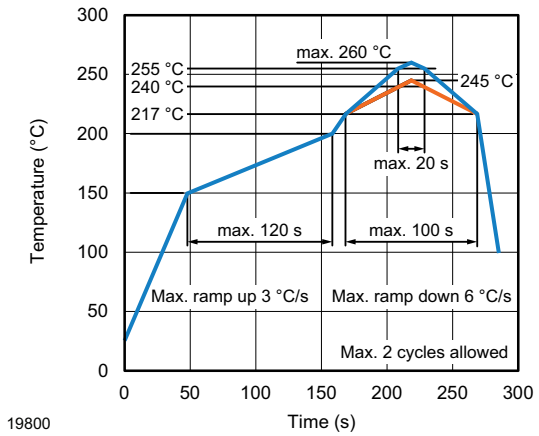
Reflow Soldering

- Reflow soldering must be done within 168 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



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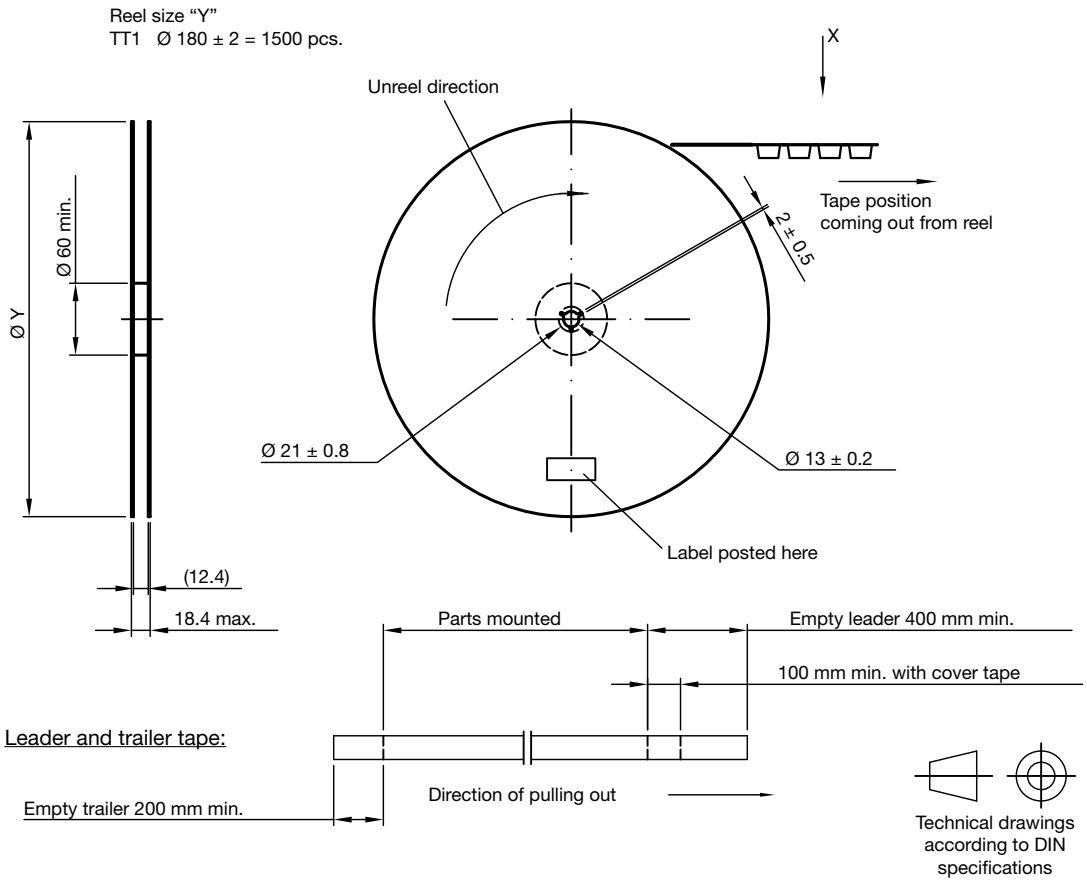
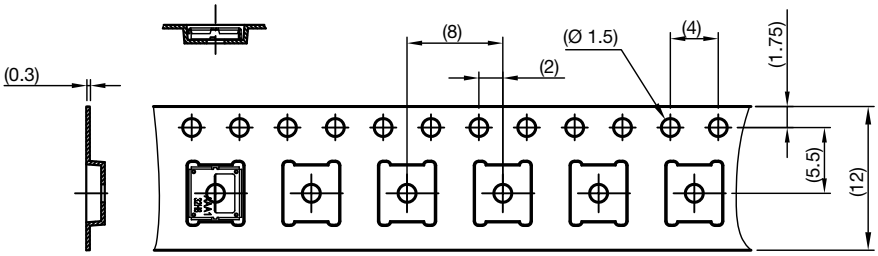
TAPING VERSION TSOP57... DIMENSIONS in millimeters

Tape and reel dimensions:





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

Not indicated tolerances ± 0.1

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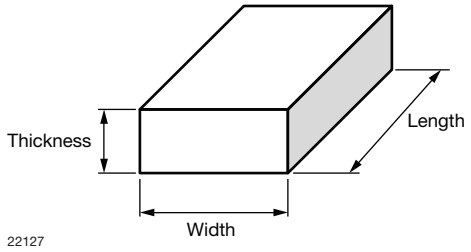
OUTER PACKAGING

The sealed reel is packed into a pizza box.

CARTON BOX DIMENSIONS in millimeters



	THICKNESS	WIDTH	LENGTH
Pizza box (Panhead, Heimdall, and Belobog) (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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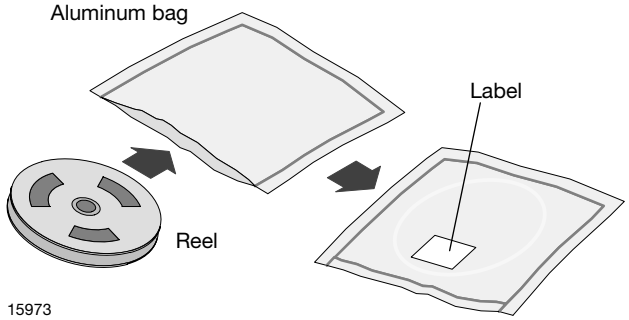
DRY PACKING

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



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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.

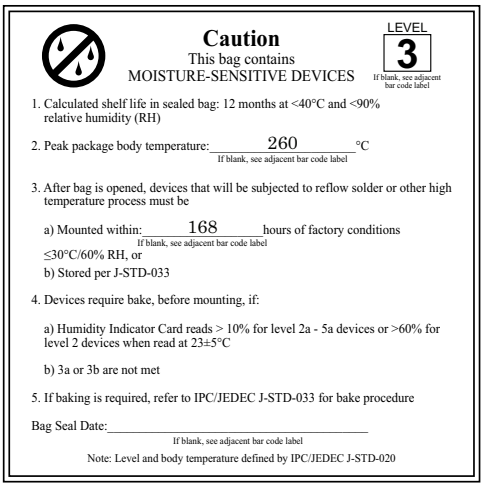
After more than 168 h under these conditions moisture content will be too high for reflow soldering.

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 3 label is included on all dry bags.



Caution
This bag contains
MOISTURE-SENSITIVE DEVICES

LEVEL 3
If blank, see adjacent bar code label

1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)
2. Peak package body temperature: 260 °C
   If blank, see adjacent bar code label
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be
   a) Mounted within: 168 hours of factory conditions
   If blank, see adjacent bar code label
   ≤30°C/60% RH, or
   b) Stored per J-STD-033
4. Devices require bake, before mounting, if:
   a) Humidity Indicator Card reads > 10% for level 2a - 5a devices or >60% for level 2 devices when read at 23±5°C
   b) 3a or 3b are not met
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure

Bag Seal Date: _____
If blank, see adjacent bar code label

Note: Level and body temperature defined by IPC/JEDEC J-STD-020

22650

EIA JEDEC standard J-STD-020 level 3 label is included on all dry bags

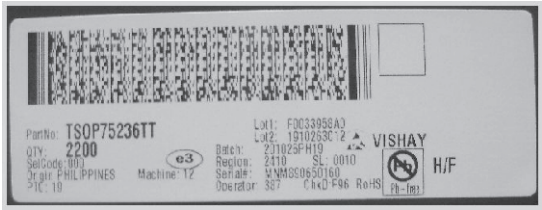
ESD PRECAUTION

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.

BAR CODE PRODUCT LABEL (example)



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