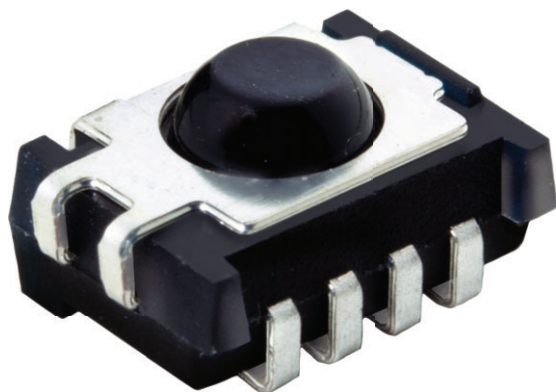




IR Receiver Modules for Remote Control Systems



DESCRIPTION

This IR receiver series is optimized for long burst remote control systems in different environments. The customer can choose 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



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

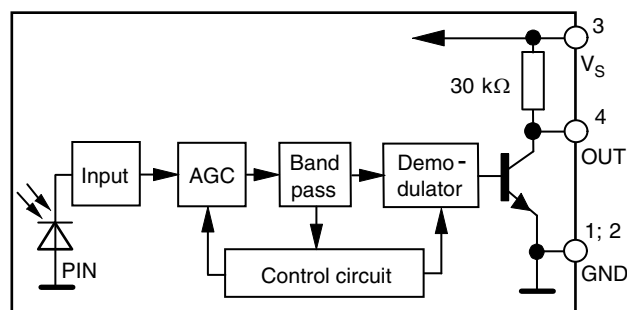
LINKS TO ADDITIONAL RESOURCES



DESIGN SUPPORT TOOLS

- [3D models](#)
- [Window size calculator](#)

BLOCK DIAGRAM



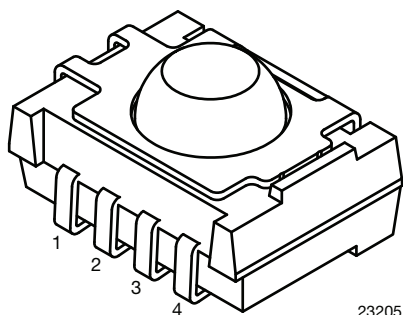
16839



MECHANICAL DATA

Pinning:

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



ORDERING CODE

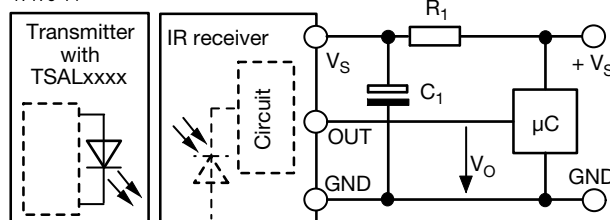
Taping:

TSOP36...TT - top view taped, 1190 pcs/reel

TSOP36...TR - side view taped, 1120 pcs/reel

APPLICATION CIRCUIT

17170-14



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	30 kHz	TSOP36230	TSOP36430
	33 kHz	TSOP36233	TSOP36433
	36 kHz	TSOP36236	TSOP36436 ⁽¹⁾⁽²⁾⁽³⁾
	38 kHz	TSOP36238	TSOP36438 ⁽⁴⁾⁽⁵⁾⁽⁶⁾
	40 kHz	TSOP36240	TSOP36440
	56 kHz	TSOP36256	TSOP36456 ⁽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⁾ Mitsubishi ⁽⁷⁾ Thomson RCA	
Special options		<ul style="list-style-type: none"> Narrow optical filter: www.vishay.com/doc?81590 Wide optical filter: www.vishay.com/doc?82726 	

ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage (pin 3)		V_S	-0.3 to +6	V
Supply current (pin 3)		I_S	3	mA
Output voltage (pin 4)		V_O	-0.3 to ($V_S + 0.3$)	V
Output current (pin 4)		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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current	$E_v = 0$, $V_s = 3.3\text{ V}$	I_{SD}	0.25	0.35	0.45	mA
	$E_v = 40\text{ klx}$, sunlight	I_{SH}	-	0.45	-	mA
Supply voltage		V_s	2.0	-	5.5	V
Transmission distance	$E_v = 0$, test signal see Fig. 1, IR diode TSAL6200, $I_F = 50\text{ mA}$	d	-	30	-	m
Output voltage low	$I_{OSL} = 0.5\text{ mA}$, $E_e = 0.7\text{ mW/m}^2$, test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Test signal: RC5 code	$E_e\text{ min.}$	-	0.08	0.15	mW/m^2
	Test signal: NEC code	$E_e\text{ min.}$	-	0.12	0.25	mW/m^2
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 5/f_0$, test signal see Fig. 1	$E_e\text{ max.}$	30	-	-	W/m^2
Directivity	Angle of half transmission distance	$\phi_{1/2}$	-	± 50	-	$^{\circ}$

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

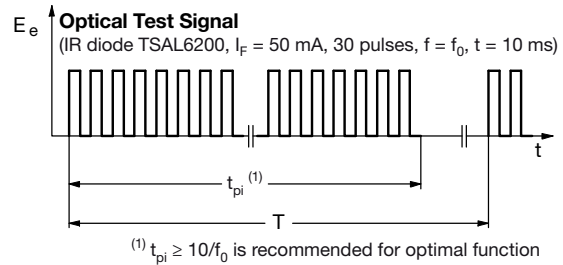


Fig. 1 - Output Active Low

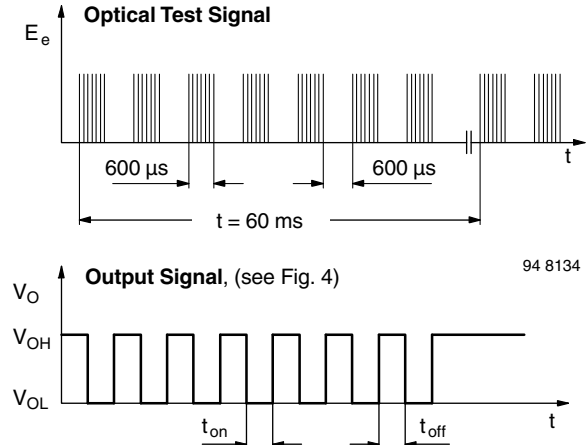


Fig. 3 - Output Function

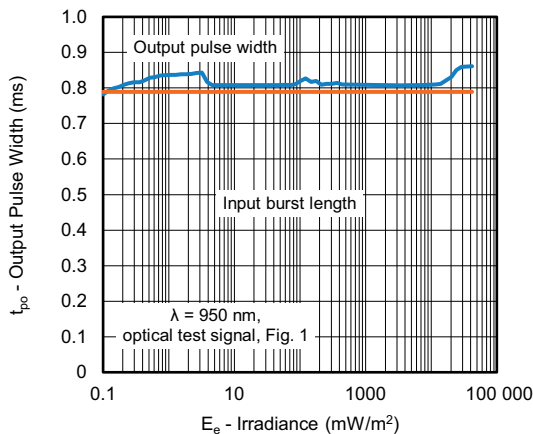


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

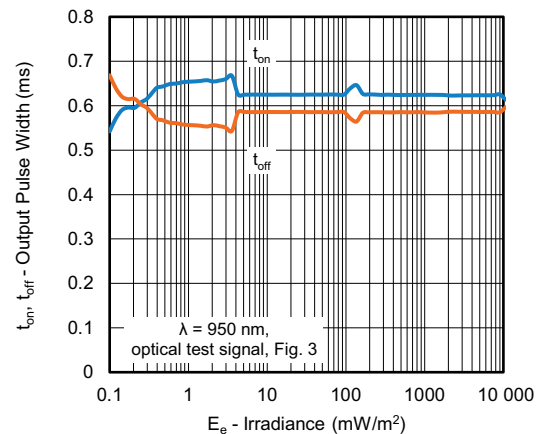


Fig. 4 - Output Pulse Diagram

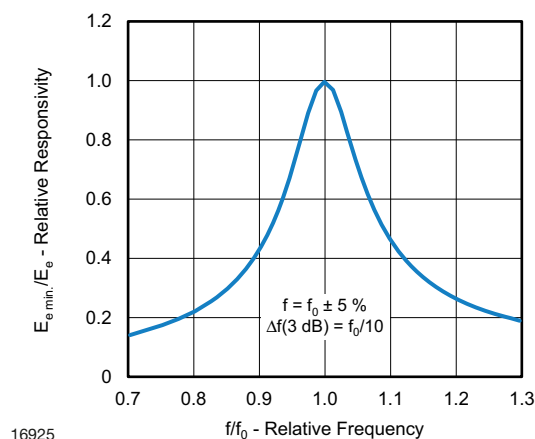


Fig. 5 - Frequency Dependence of Responsivity

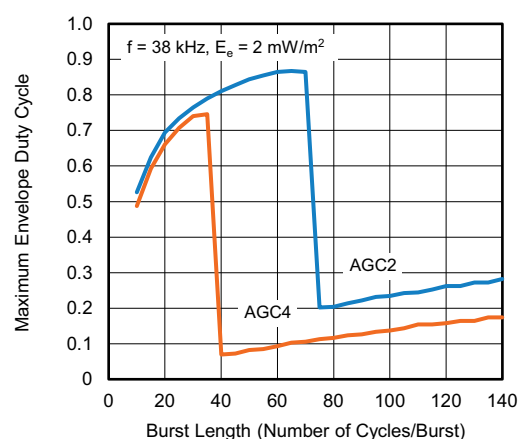


Fig. 8 - Maximum Envelope Duty Cycle vs. Burst Length

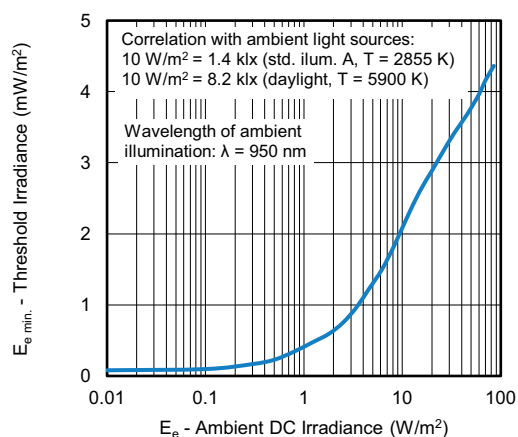


Fig. 6 - Sensitivity in Bright Ambient

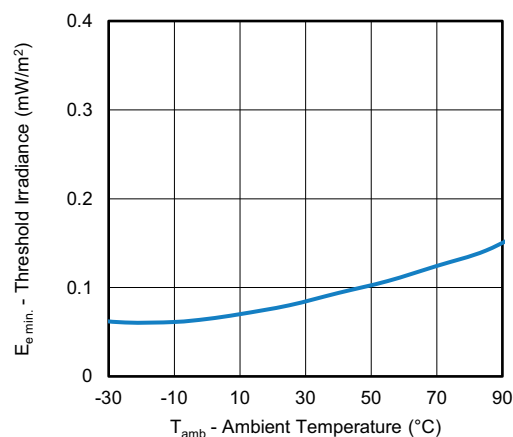


Fig. 9 - Sensitivity vs. Ambient Temperature

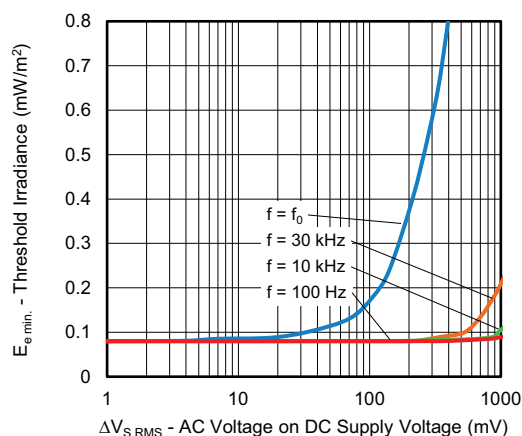


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

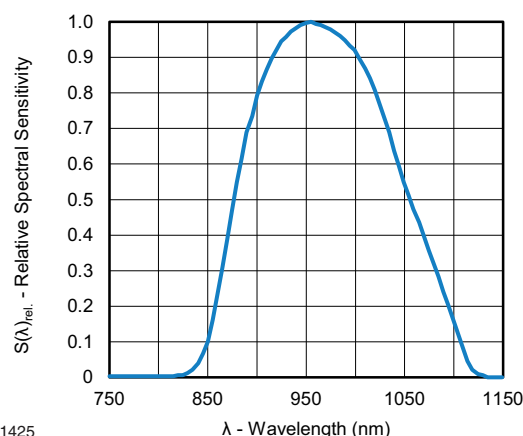


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

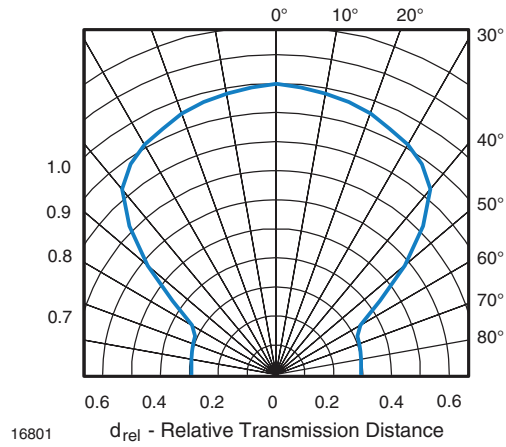


Fig. 11 - Horizontal Directivity

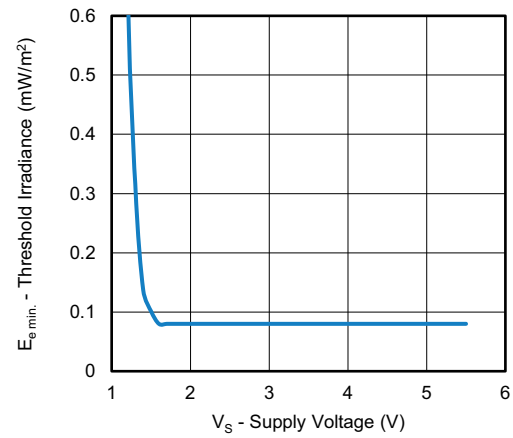


Fig. 12 - Sensitivity vs. Supply Voltage



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)



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

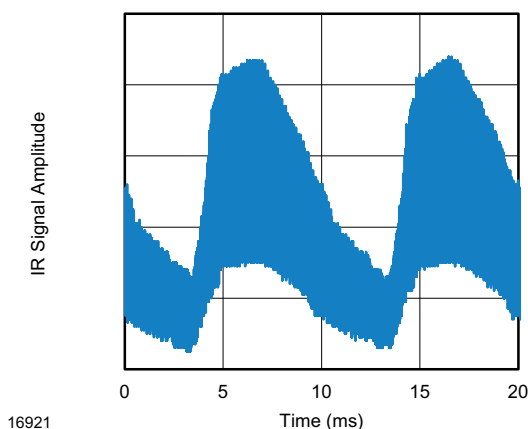


Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

	TSOP362..	TSOP364..
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 > 5 x burst length	35 cycles > 15 x burst length
Maximum number of continuous short bursts/second	1700	1700
NEC code	Yes	Preferred
RC5 / RC6 code	Yes	Preferred
Thomson 56 kHz code	Yes	Preferred
Sharp code	Yes	Preferred
Sony code	Yes	No
Mitsubishi code	Yes	Preferred
Suppression of interference from fluorescent lamps	Fig. 13	Fig. 13 and Fig. 14

Notes

- For data formats with short bursts please see the datasheet for TSOP361.., TSOP363.., TSOP365..
- For Sony 12, 15, and 20 bit IR codes please see the datasheet of TSOP36S40F

Technical drawing of a 4-pin connector, showing dimensions and assembly instructions.

Top View:

- Overall width: 7.5
- Overall height: 2.8
- Pin pitch: 1.27
- Pin width: 0.5 ± 0.15
- Pin height: 0.3
- Pin spacing: 3 x 1.27 = 3.81
- Overall width including pins: 5.51
- Pin 1 and Pin 4 are indicated.
- Feature A is indicated.

Side View:

- Overall height: 5.3
- Pin height: 1.5
- Pin width: 1.4
- Pin spacing: 2.9
- Overall width: 4
- Feature A is indicated.

Bottom View:

- Overall width: 2.6
- Overall height: 2.35
- Radius: R 1.7
- Feature A is indicated.

Footprint:

- Overall width: 3 x 1.27 = 3.81
- Pin width: 1.27
- Pin spacing: 0.9
- Overall height: 2.2

Assembly Instructions:

- Pick and place area. TT taping
- Pick and place area. TR taping

Technical Specifications:

- Not indicated tolerances ± 0.3
- technical drawings according to DIN specifications

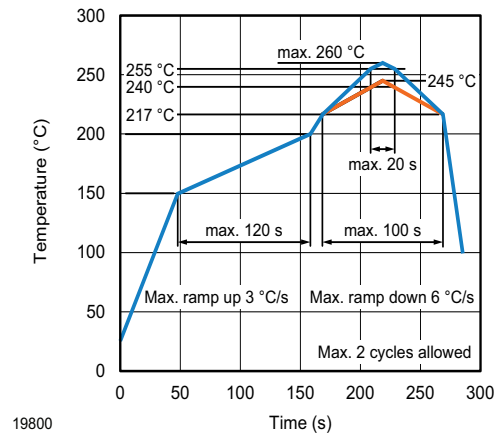
ASSEMBLY INSTRUCTIONS

- 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

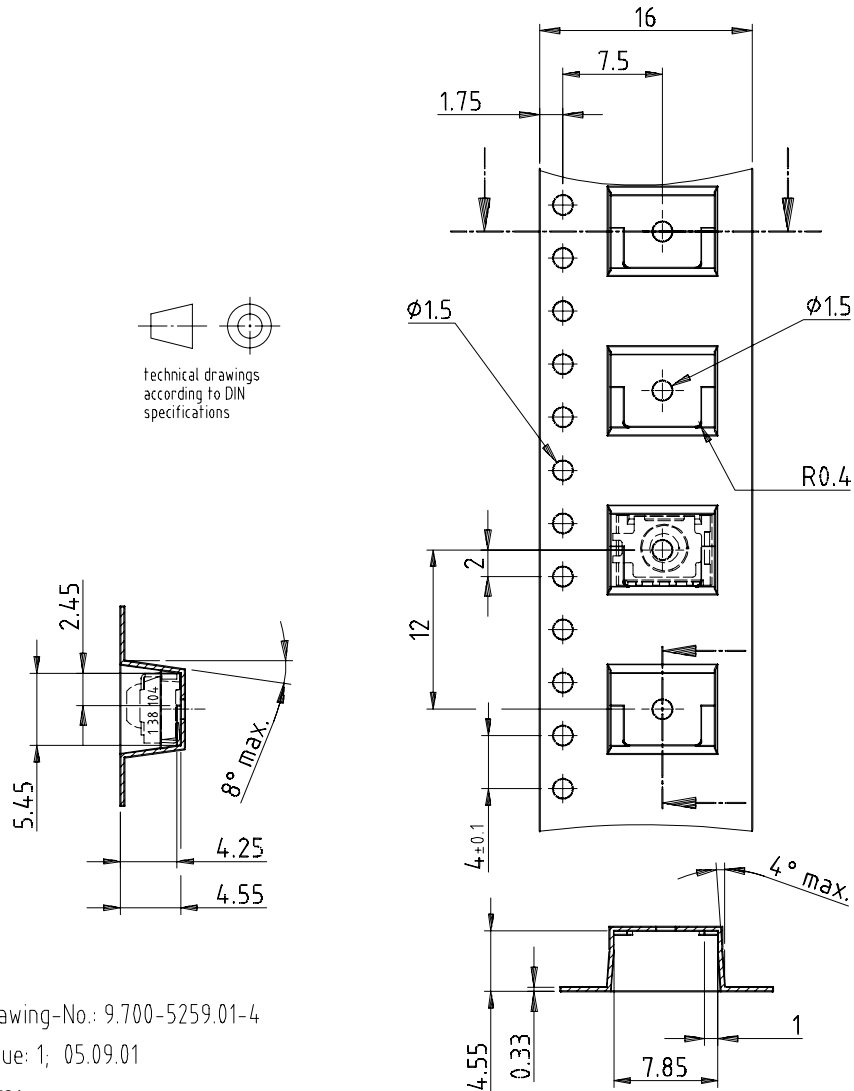
- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off



VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE



TAPING VERSION TSOP..TT DIMENSIONS in millimeters



Drawing-No.: 9.700-5259.01-4

Issue: 1; 05.09.01

16584

technical drawings
according to DIN
specifications

16
7.5
1.75
12
4.85
5.55
4° max.
R0.83
Ø1.5
R0.25
8° max.
2.9
5

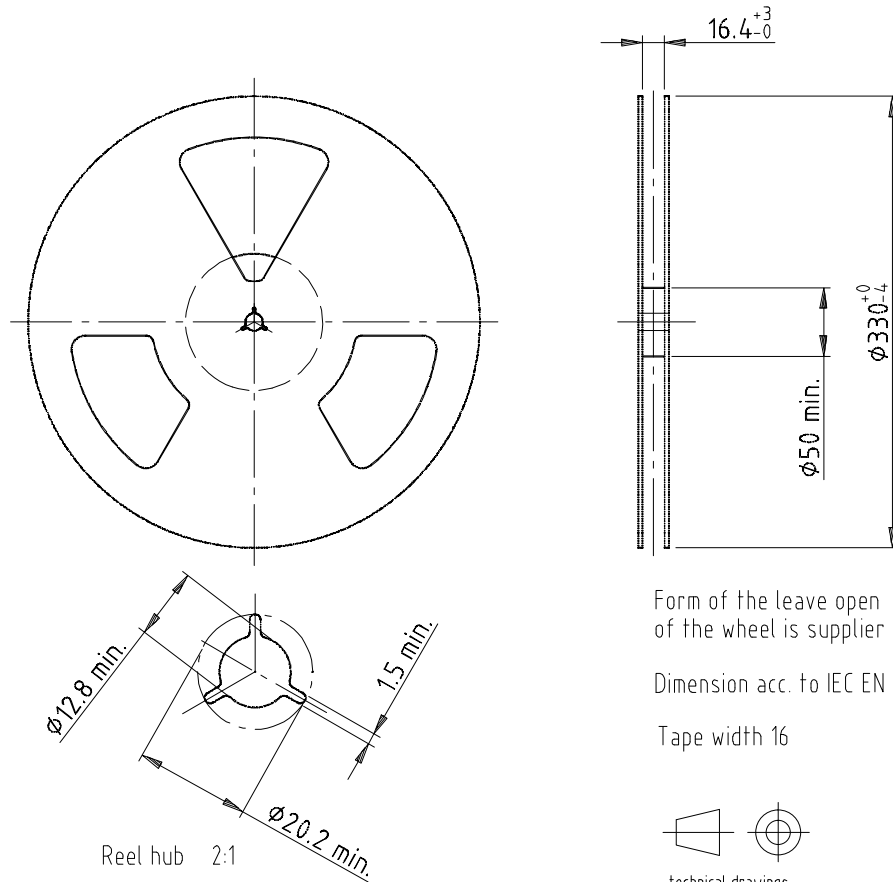
Drawing-No.: 9.700-5260.01-4
Issue: 2; 25.09.01

16585

16585



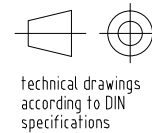
REEL DIMENSIONS in millimeters



Form of the leave open of the wheel is supplier specific.

Dimension acc. to IEC EN 60 286-3

Tape width 16

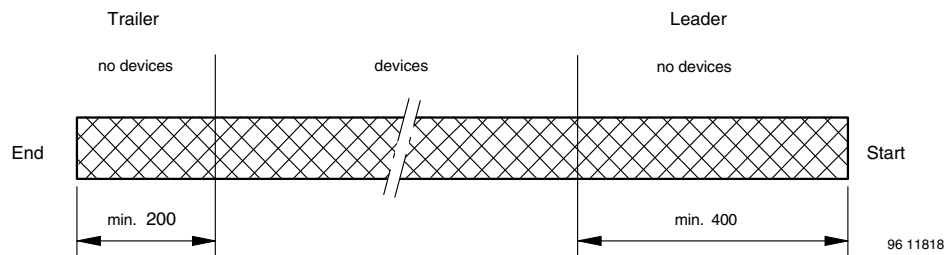


Drawing-No.: 9.800-5052.V2-4

Issue: 1; 07.05.02

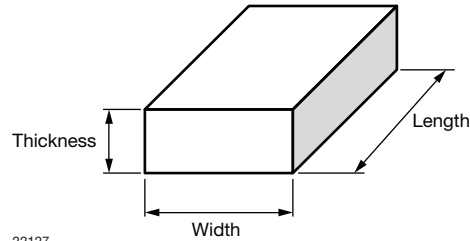
16734

LEADER AND TRAILER DIMENSIONS in millimeters



**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

COVER TAPE PEEL 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.

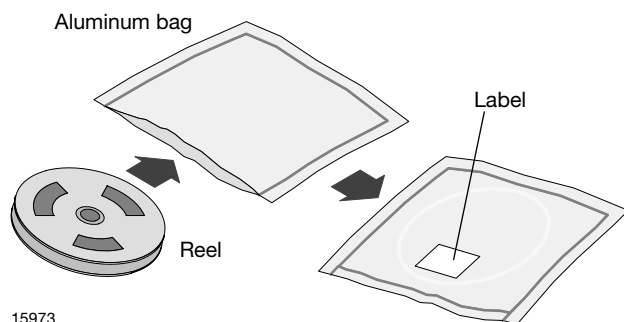
VISHAY SEMICONDUCTOR GmbH STANDARD BAR CODE PRODUCT LABEL (finished goods)

PLAIN 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



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 $\leq 60\%$ RH max.

After more than 72 h under these conditions moisture content will be too high for reflow soldering.

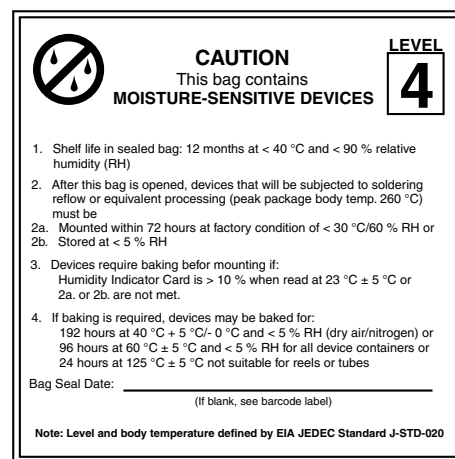
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

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.



22645



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