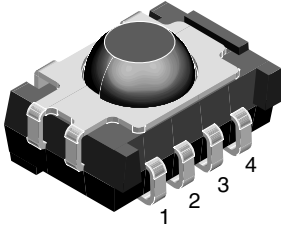


## IR Receiver Module for Light Barrier Systems



16797

### MECHANICAL DATA

#### Pinning:

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

### FEATURES

- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for 38 kHz IR signals
- Shielding against EMI
- Supply voltage: 2.7 V to 5.5 V
- Visible light is suppressed by IR filter
- Insensitive to supply voltage ripple and noise
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

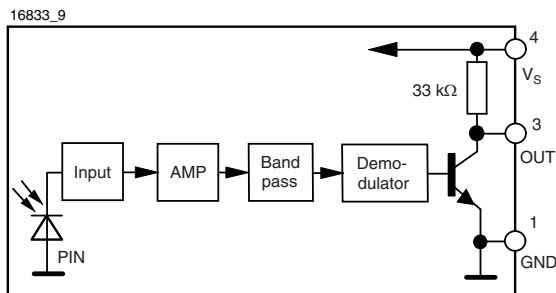
### DESCRIPTION

The TSOP5038 is a compact SMD IR receiver for sensor applications. It has a high gain for IR signals at 38 kHz. The detection level does not change when ambient light or strong IR signals are applied. It can receive continuous 38 kHz signals or 38 kHz bursts.

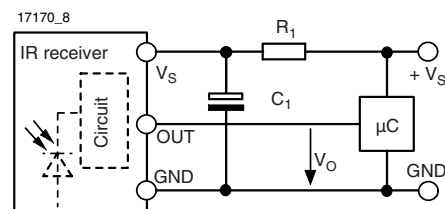
### PARTS TABLE

CARRIER FREQUENCY	SENSOR APPLICATIONS
38 kHz	TSOP5038

### BLOCK DIAGRAM



### APPLICATION CIRCUIT



The external components  $R_1$  and  $C_1$  are optional to improve the robustness against electrical overstress (typical values are  $R_1 = 100 \Omega$ ,  $C_1 = 0.1 \mu\text{F}$ ). The output voltage  $V_O$  should not be pulled down to a level below 1 V by the external circuit. The capacitive load at the output should be less than 2 nF.

ABSOLUTE MAXIMUM RATINGS (1)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage (pin 4)		$V_S$	- 0.3 to + 6.0	V
Supply current (pin 4)		$I_S$	5	mA
Output voltage (pin 3)		$V_O$	- 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 (pin 3)		$I_O$	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	$T_{amb} \leq 85 \text{ °C}$	$P_{tot}$	10	mW

**Note**

(1) 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 (1)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current (pin 4)	$E_v = 0, V_S = 5 \text{ V}$	$I_{SD}$	0.65	0.85	1.05	mA
	$E_v = 40 \text{ klx, sunlight}$	$I_{SH}$		0.95		mA
Supply voltage		$V_S$	2.7		5.5	V
Transmission distance	$E_v = 0$ , test signal see fig. 1, IR diode TSAL6200, $I_F = 400 \text{ mA}$	$d$		30		m
Output voltage low (pin 3)	$I_{OSL} = 0.5 \text{ mA}, E_e = 2 \text{ mW/m}^2$ , test signal see fig. 1	$V_{OSL}$			100	mV
Minimum irradiance	Pulse width tolerance: $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ , test signal see fig. 1	$E_e \text{ min.}$		0.5	1	$\text{mW/m}^2$
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ , test signal see fig. 1	$E_e \text{ max.}$	30			$\text{W/m}^2$
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		$\pm 50$		deg

**Note**

(1)  $T_{amb} = 25 \text{ °C}$ , unless otherwise specified

### TYPICAL CHARACTERISTICS

$T_{amb} = 25 \text{ °C}$ , unless otherwise specified

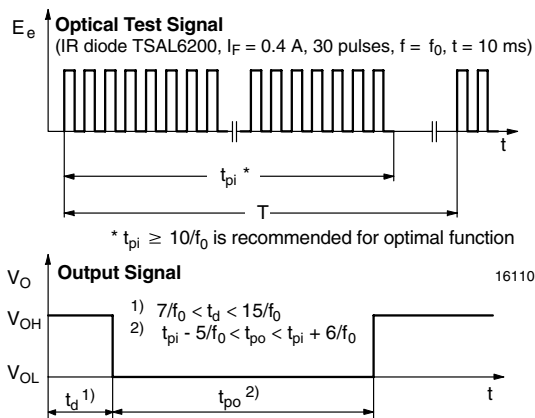


Fig. 1 - Output Active Low

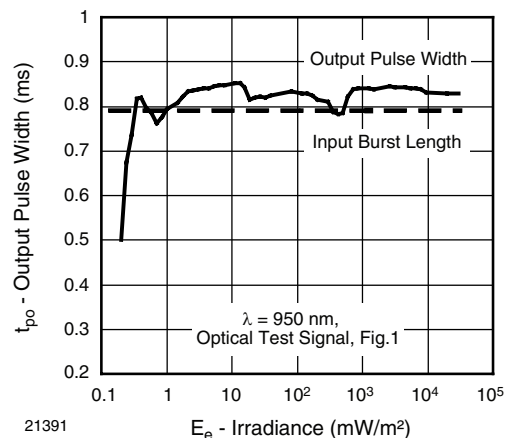


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

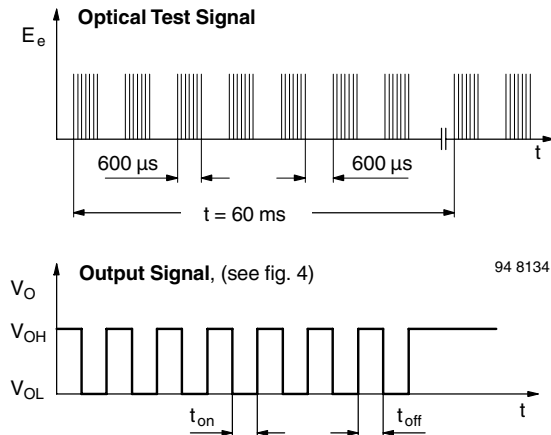
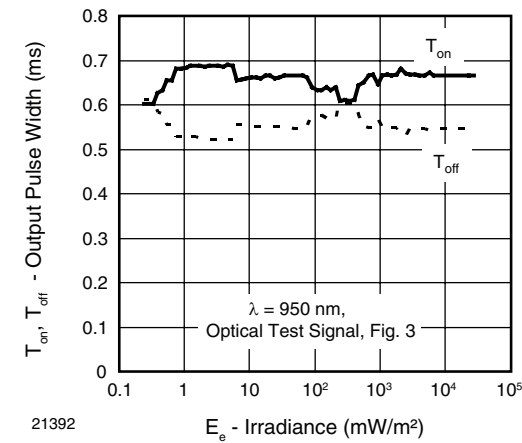
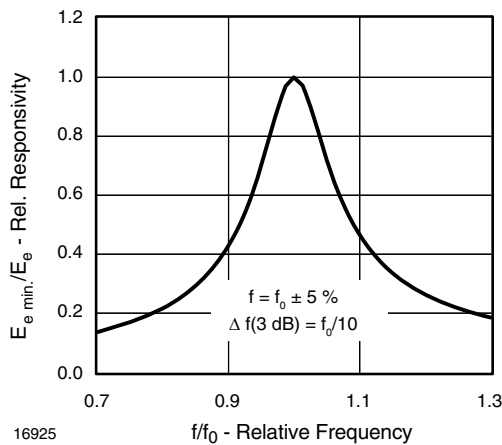


Fig. 3 - Output Function



21392

Fig. 4 - Output Pulse Diagram



16925

Fig. 5 - Frequency Dependence of Responsivity

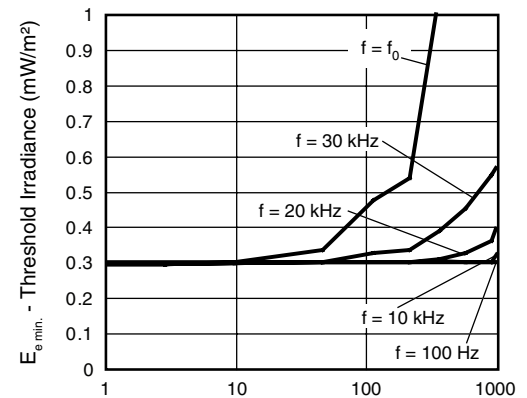
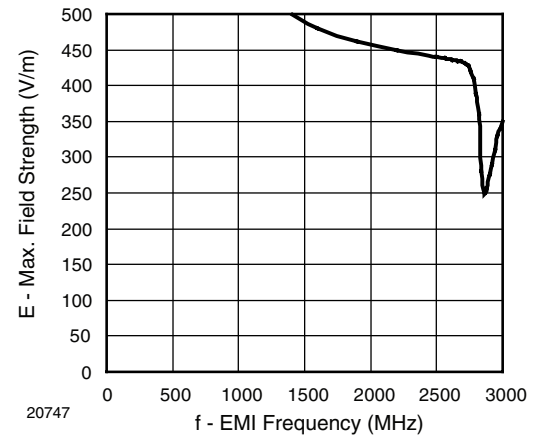
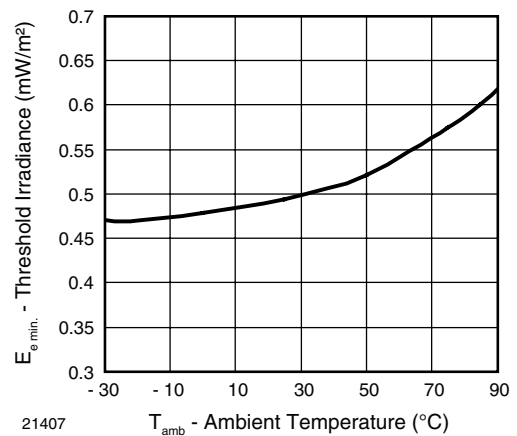

 21394  $\Delta V_{s_{RMS}}$  - AC Voltage on DC Supply Voltage (mV)

Fig. 6 - Sensitivity vs. Supply Voltage Disturbances



20747

Fig. 7 - Sensitivity vs. Electric Field Disturbances



21407

Fig. 8 - Sensitivity vs. Ambient Temperature

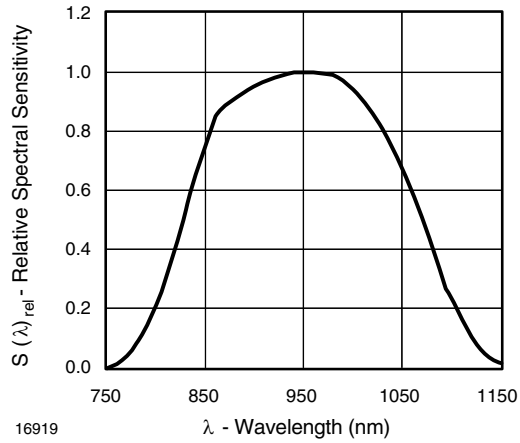


Fig. 9 - Relative Spectral Sensitivity vs. Wavelength

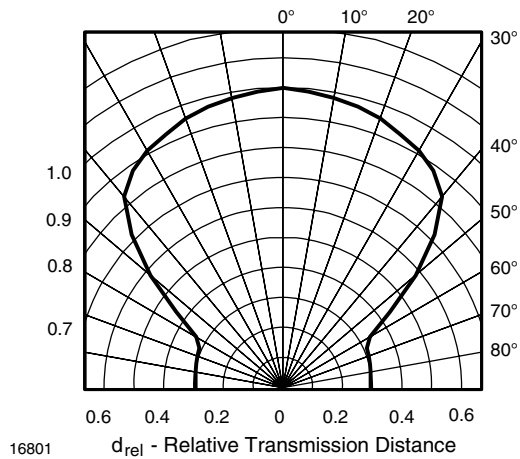


Fig. 10 - Horizontal Directivity

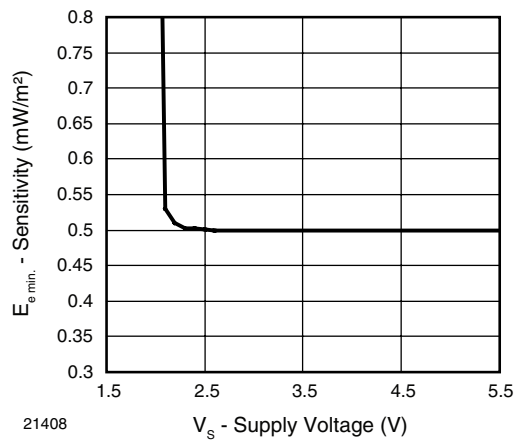
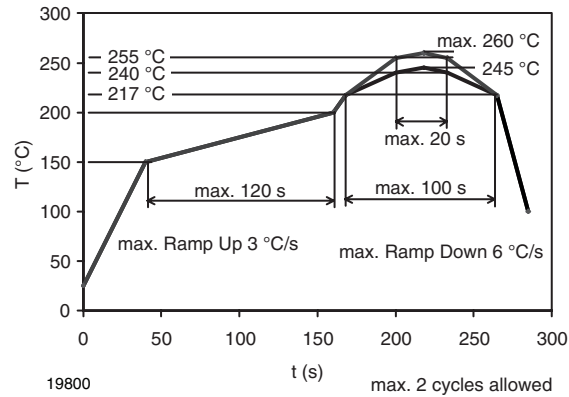


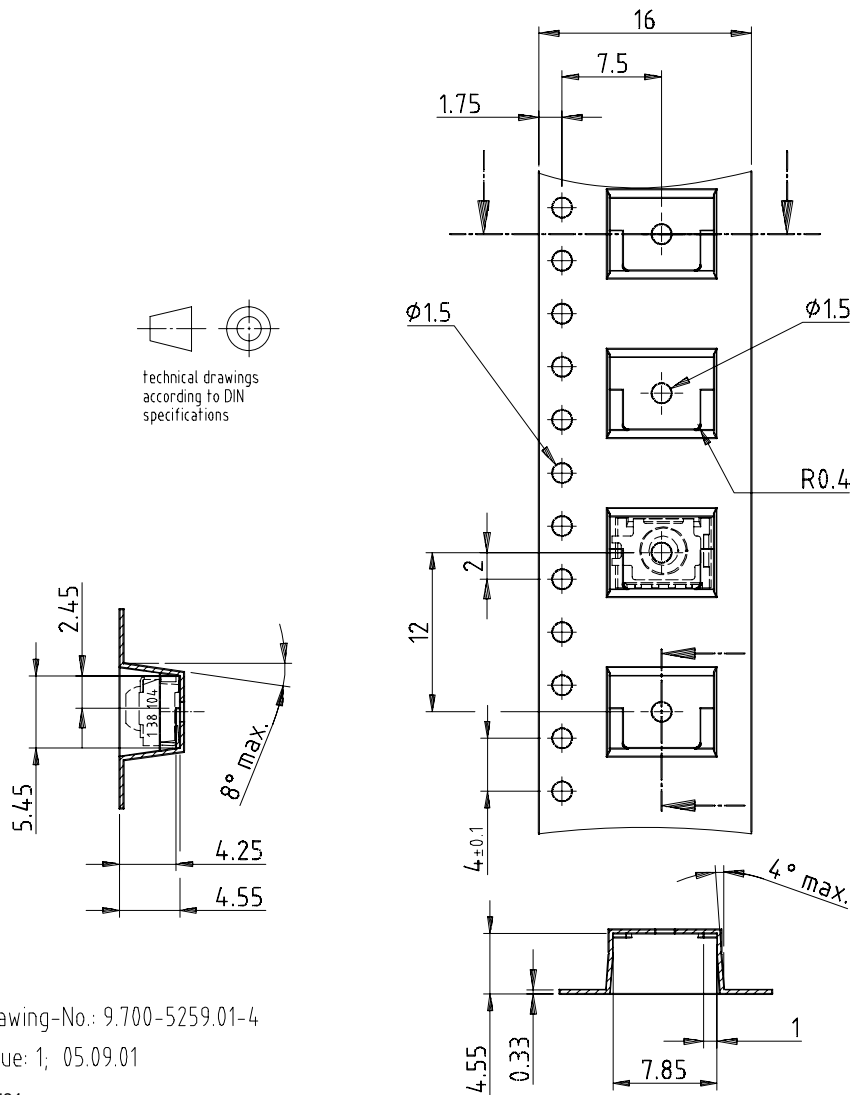
Fig. 11 - Sensitivity vs. Supply Voltage



## VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE

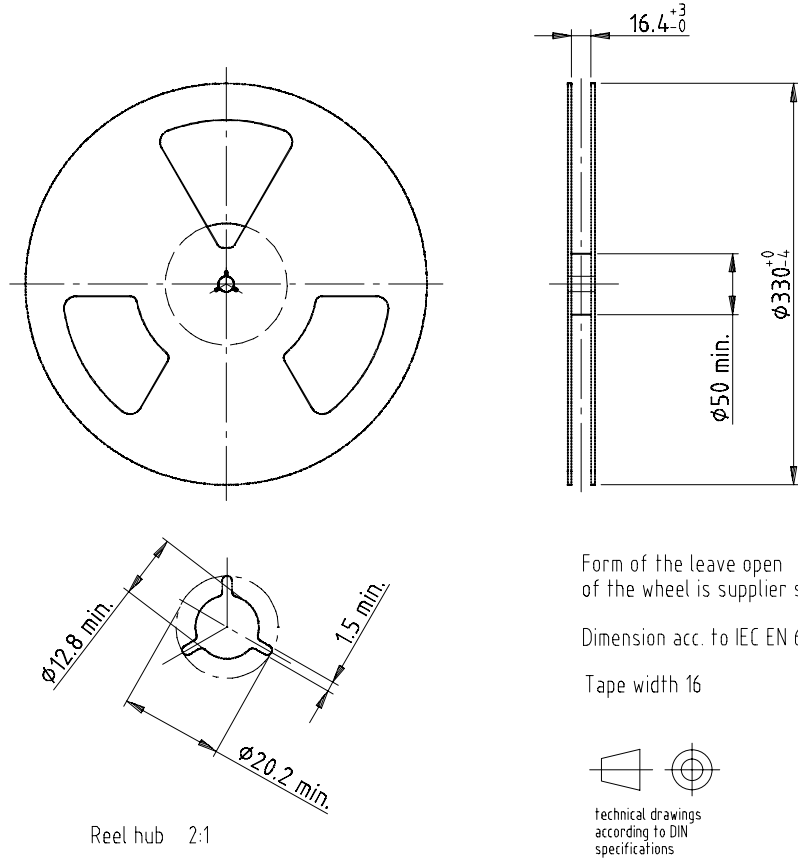


## TAPING VERSION TSOP..TT Dimensions in millimeters



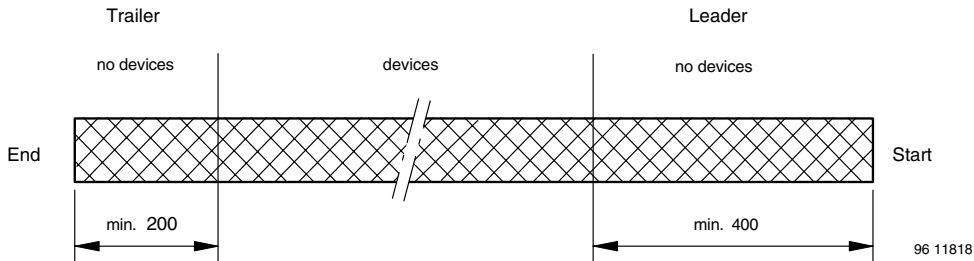


**REEL DIMENSIONS** in millimeters



Drawing refers to following types: Reel for blister carrier tape Version B  
 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**

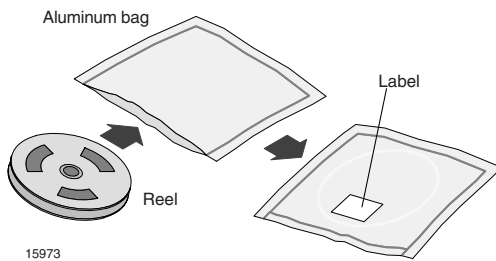
The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain Vishay Semiconductor GmbH specific data.



<b>VISHAY SEMICONDUCTOR GMBH STANDARD BAR CODE PRODUCT LABEL (Finished Goods)</b>		
<b>PLAIN WRITTING</b>	<b>ABBREVIATION</b>	<b>LENGTH</b>
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
<b>LONG BAR CODE TOP</b>	<b>TYPE</b>	<b>LENGTH</b>
Item-number	N	8
Plant-code	N	2
Sequence-number	X	3
Quantity	N	8
Total length	-	21
<b>SHORT BAR CODE BOTTOM</b>	<b>TYPE</b>	<b>LENGTH</b>
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.



### FINAL PACKING

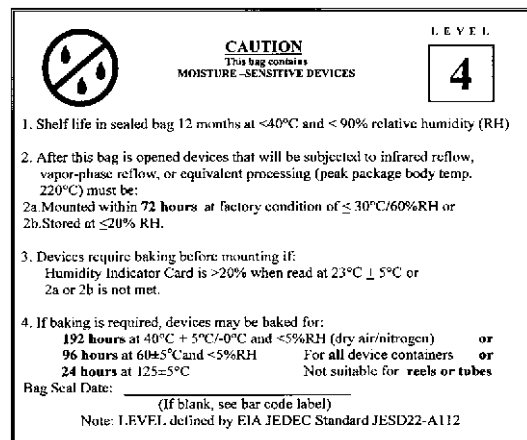
The sealed reel is packed into a cardboard box. A secondary cardboard box is used for shipping purposes.

### 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 JESD22-A112 level 4 label is included on all dry bags.



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Example of JESD22-A112 level 4 label

## 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. Electro-static 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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## Disclaimer

All product specifications and data are subject to change without notice.

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