

## IR Receiver Modules for Remote Control Systems



20953

### DESIGN SUPPORT TOOLS

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### MECHANICAL DATA

#### Pinning:

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

### ORDERING CODE

#### Taping:

TSOP77...TT - top view taped

TSOP77...TR - side view taped

### FEATURES

- Improved immunity against HF and RF noise
- Continuous data transmission possible
- 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 ambient light
- Capable of side or top view
- Insensitive to supply voltage ripple and noise
- Two lenses for high sensitivity and wide receiving angle
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### DESCRIPTION

The TSOP773.., TSOP775.. series are a two lens miniaturized receiver module for infrared remote control systems. One PIN diode per lens and a preamplifier are assembled on a leadframe, the epoxy lens cap contains an IR filter.

The TSOP773.. 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.

New designs should prefer the TSOP773.. series containing the newer AGC3. The TSOP775.. series are useful to suppress even extreme levels of optical noise, but may also suppress some data signals. Please check compatibility with your codes.

These components have not been qualified according to automotive specifications.

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 <sup>(1)</sup>	TSOP77536
	38 kHz	TSOP77338 <sup>(2)(3)(4)(5)</sup>	TSOP77538
	40 kHz	TSOP77340	TSOP77540
	56 kHz	TSOP77356	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		<sup>(1)</sup> MCIR <sup>(2)</sup> Mitsubishi <sup>(3)</sup> RECS-80 Code <sup>(4)</sup> r-map <sup>(5)</sup> XMP-1, XMP-2	

## BLOCK DIAGRAM



## APPLICATION CIRCUIT



$R_1$  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 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	$t \leq 10$ 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		$V_S$	2.5	-	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/m <sup>2</sup> , 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	$E_e \text{ min.}$	-	0.2	0.4	mW/m <sup>2</sup>
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ , test signal see Fig. 1	$E_e \text{ max.}$	50	-	-	W/m <sup>2</sup>
Directivity	Angle of half transmission distance	$\phi_{1/2}$	-	$\pm 50$	-	deg

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

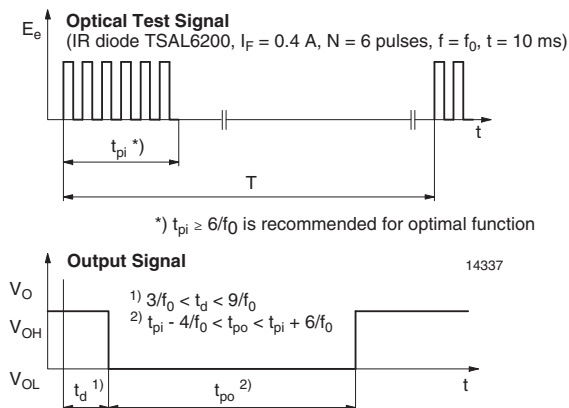


Fig. 1 - Output Active Low

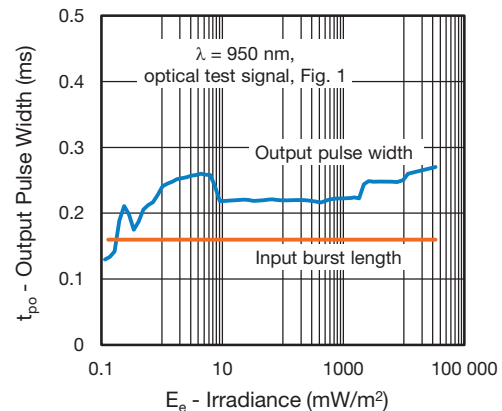


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient



Fig. 3 - Output Function

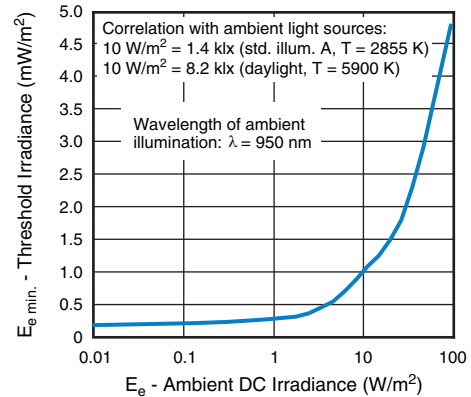


Fig. 6 - Sensitivity in Bright Ambient

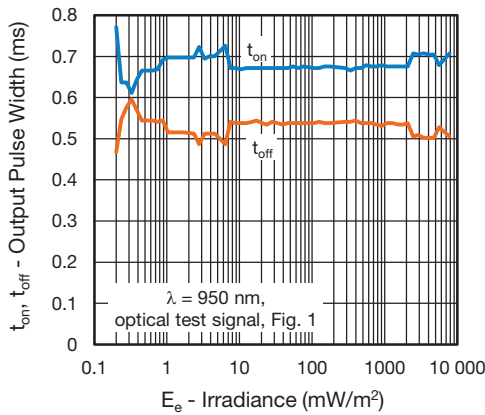


Fig. 4 - Output Pulse Diagram

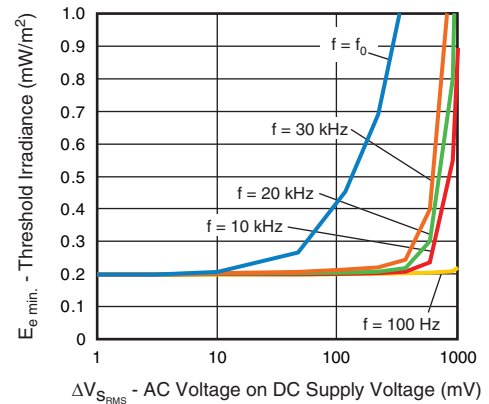


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

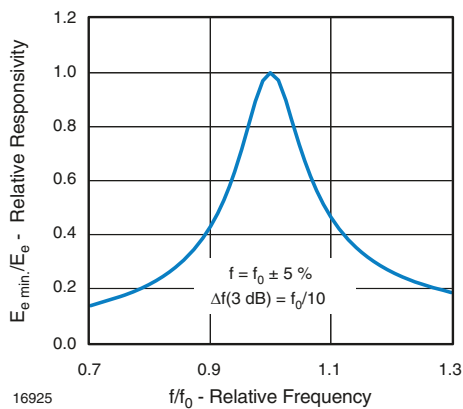


Fig. 5 - Frequency Dependence of Responsivity

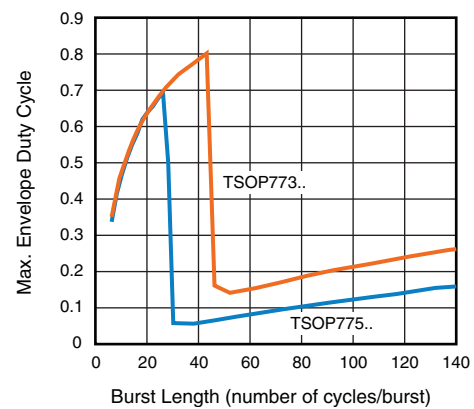


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

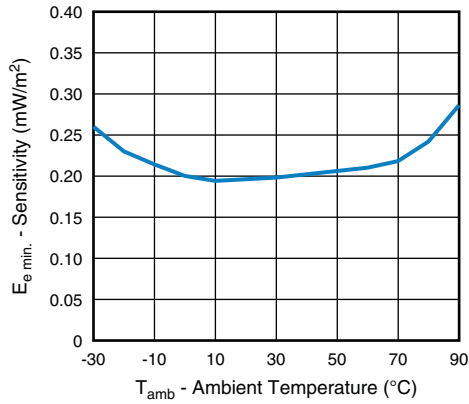


Fig. 9 - Sensitivity vs. Ambient Temperature



Fig. 12 - Vertical Directivity

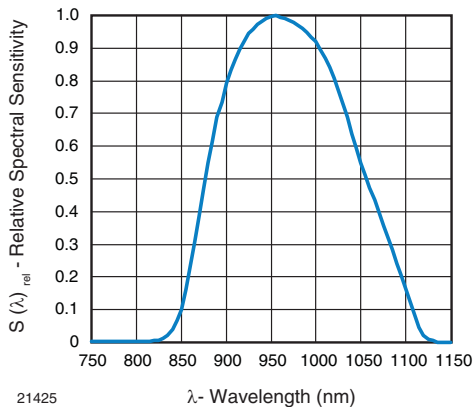


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

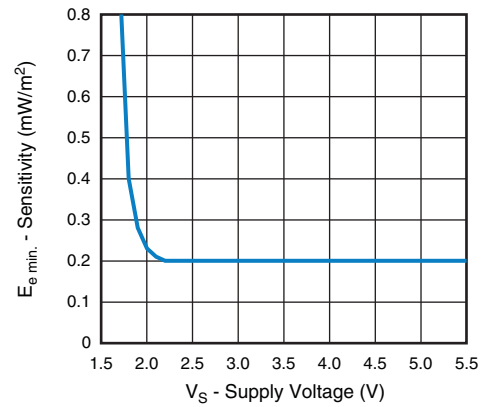


Fig. 1 Sensitivity vs. Supply Voltage

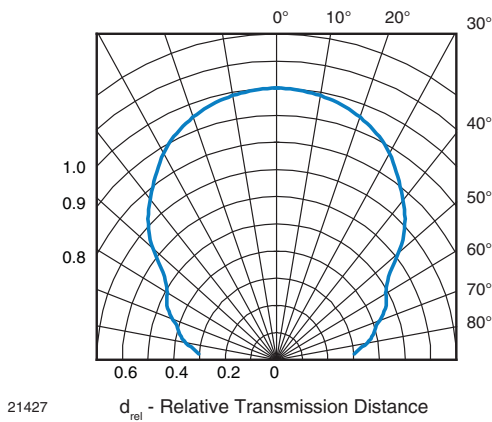


Fig. 11 - Horizontal Directivity

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

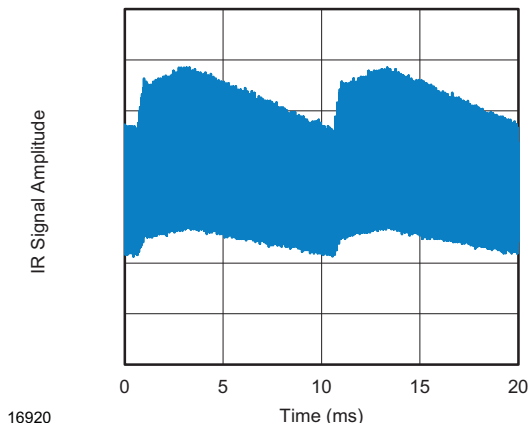


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

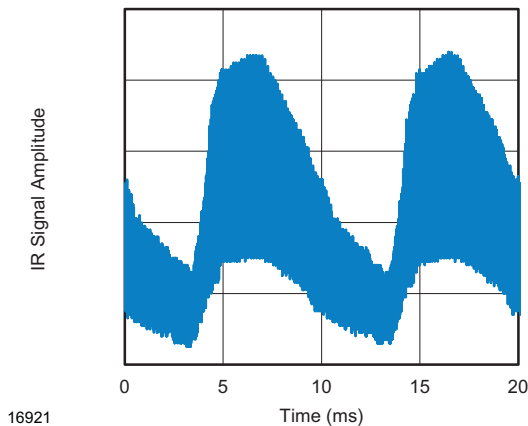


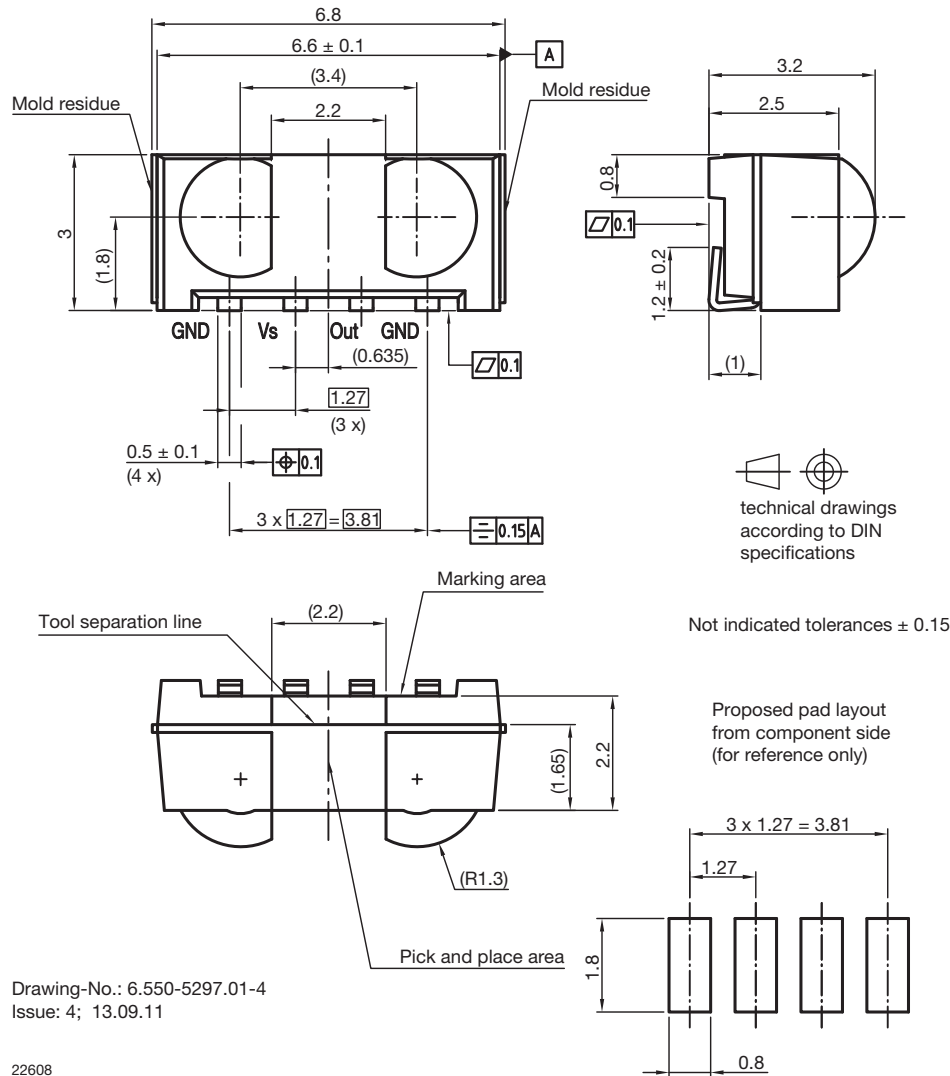
Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

	<b>TSOP773..</b>	<b>TSOP775..</b>
Minimum burst length	6 cycles/burst	6 cycles/burst
After each burst of length a minimum gap time is required of	6 to 35 cycles ≥ 10 cycles	6 to 24 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	35 cycles > 4 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	2000	2000
MCIR code	Preferred	Yes
XMP-1, XMP-2 code	Preferred	Yes
Suppression of interference from fluorescent lamps	Mild and complex disturbance patterns are suppressed (example: signal pattern of Fig. 13 and Fig. 14)	Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs

**Note**

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

**PACKAGE DIMENSIONS** in millimeters



**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



## TAPING VERSION TSOP..TR DIMENSIONS in millimeters



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







**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



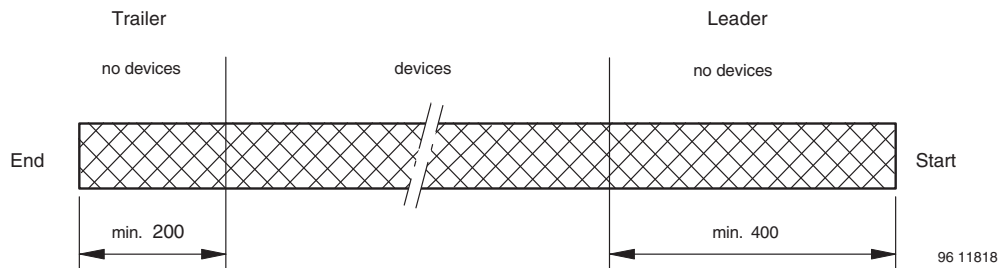
technical drawings according to DIN specifications

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

$300 \pm 10$  mm/min.

$165^\circ$  to  $180^\circ$  peel angle

**LABEL**

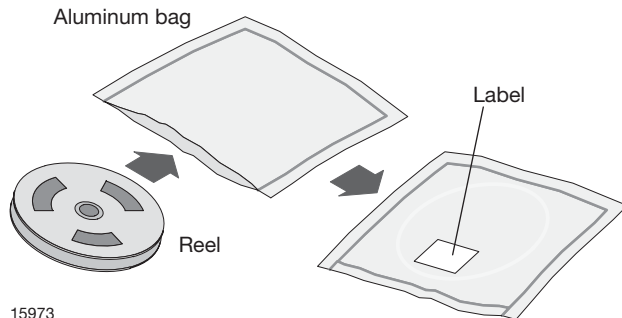
**Standard bar code labels for finished goods**

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 WRITING</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.

### 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.



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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