

## High Power Infrared Emitting Diode, 950 nm, GaAlAs/GaAs

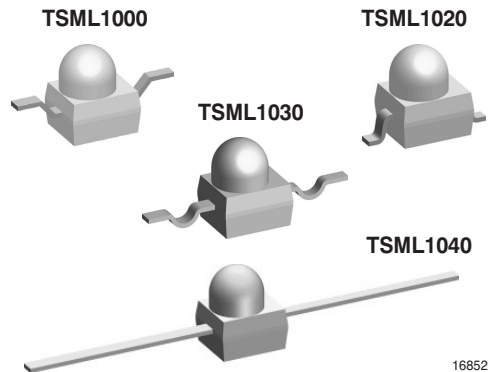
### Description

TSML1000 series are high efficiency infrared emitting diodes in GaAlAs on GaAs technology molded in clear SMD package.

This technology represents best performance for radiant power under pulse conditions, forward voltage and reliability.

### Features

- Outstanding high radiant power
- Low forward voltage
- Suitable for high pulse current operation
- Angle of half intensity  $\varphi = \pm 12^\circ$
- Peak wavelength  $\lambda_p = 950 \text{ nm}$
- High reliability
- Matched Phototransistor series: TEMT1000
- Versatile terminal configurations
- Lead-free component



- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

### Applications

For remote control  
 Photointerrupters  
 Punched tape readers  
 Encoder

### Absolute Maximum Ratings

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

Parameter	Test condition	Symbol	Value	Unit
Reverse Voltage		$V_R$	5	V
Forward current		$I_F$	100	mA
Peak Forward Current	$t_p/T = 0.5$ , $t_p = 100 \mu\text{s}$	$I_{FM}$	200	mA
Surge Forward Current	$t_p = 100 \mu\text{s}$	$I_{FSM}$	1.0	A
Power Dissipation		$P_V$	190	mW
Junction Temperature		$T_j$	100	$^\circ\text{C}$
Operating Temperature Range		$T_{amb}$	- 40 to + 85	$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	- 40 to + 100	$^\circ\text{C}$
Soldering Temperature	$t \leq 5 \text{ sec}$	$T_{sd}$	<260	$^\circ\text{C}$
Thermal Resistance Junction/ Ambient		$R_{thJA}$	400	$^\circ\text{C}$

### Basic Characteristics

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

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Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward Voltage	$I_F = 20 \text{ mA}$ , $t_p = 20 \text{ ms}$	$V_F$		1.2	1.5	V
	$I_F = 1 \text{ A}$ , $t_p = 100 \mu\text{s}$	$V_F$		2.6		V
Temp. Coefficient of $V_F$	$I_F = 1 \text{ mA}$	$TK_{VF}$		- 1.85		mV/K

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Reverse Current	$V_R = 5\text{ V}$	$I_R$			10	$\mu\text{A}$
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$	$C_j$		25		pF
Radiant Intensity	$I_F = 20\text{ mA}$ , $t_p = 20\text{ ms}$	$I_e$	3	7	15	mW/sr
Radiant Power	$I_F = 100\text{ mA}$ , $t_p = 20\text{ ms}$	$\phi_e$		35		mW
Temp. Coefficient of $\phi_e$	$I_F = 20\text{ mA}$	$\text{TK}\phi_e$		- 0.6		%/K
Angle of Half Intensity		$\varphi$		$\pm 12$		deg
Peak Wavelength	$I_F = 100\text{ mA}$	$\lambda_p$		950		nm
Spectral Bandwidth	$I_F = 100\text{ mA}$	$\Delta\lambda$		50		nm
Temp. Coefficient of $\lambda_p$	$I_F = 100\text{ mA}$	$\text{TK}\lambda_p$		0.2		nm/K
Rise Time	$I_F = 100\text{ mA}$	$t_r$		800		ns
Fall Time	$I_F = 100\text{ mA}$	$t_f$		800		ns
Virtual Source Diameter		$\varnothing$		1.2		mm

### Typical Characteristics ( $T_{\text{amb}} = 25\text{ }^\circ\text{C}$ unless otherwise specified)

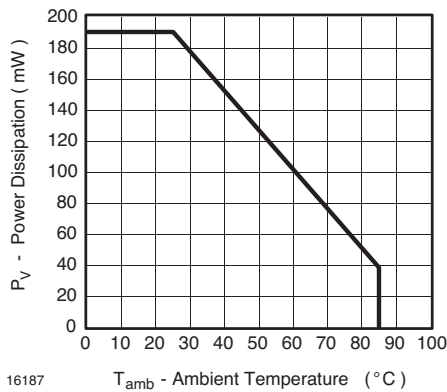


Figure 1. Power Dissipation vs. Ambient Temperature

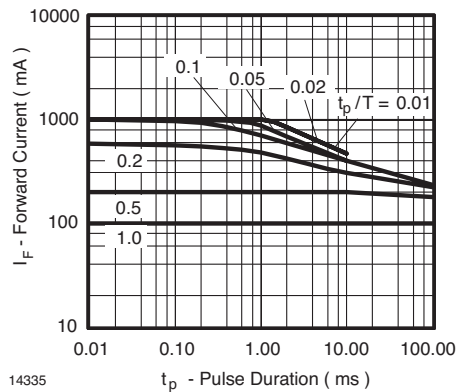


Figure 3. Pulse Forward Current vs. Pulse Duration

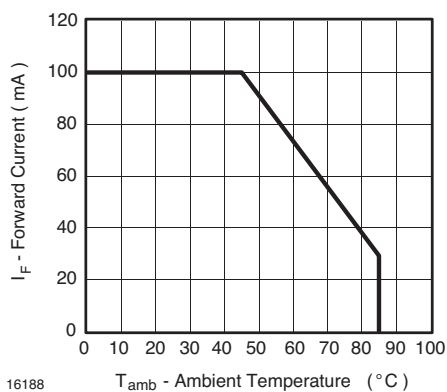


Figure 2. Forward Current vs. Ambient Temperature

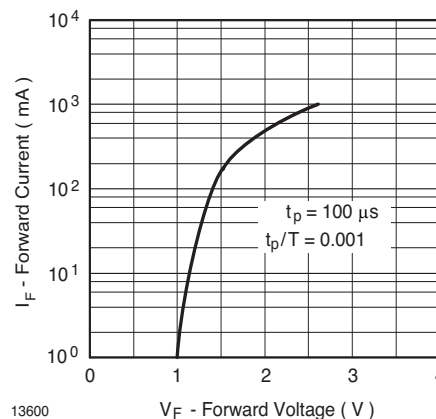


Figure 4. Forward Current vs. Forward Voltage

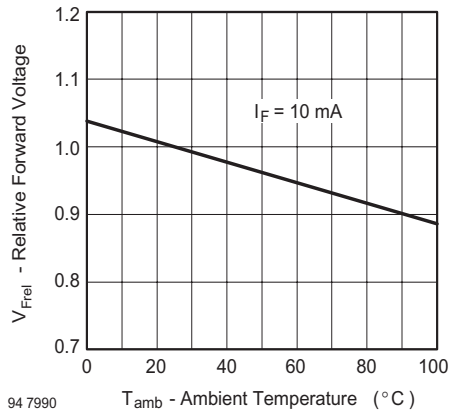


Figure 5. Relative Forward Voltage vs. Ambient Temperature

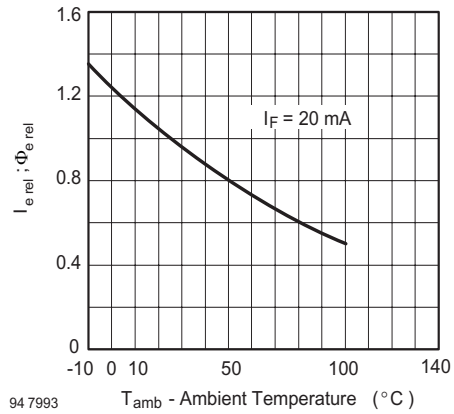


Figure 8. Rel. Radiant Intensity/Power vs. Ambient Temperature

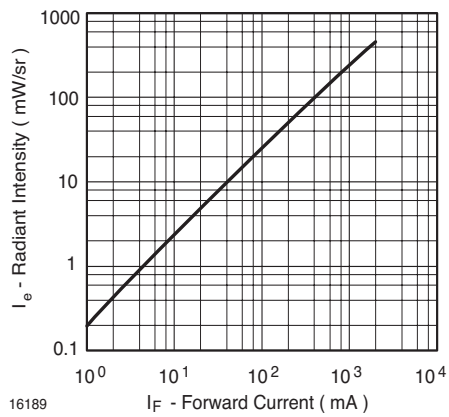


Figure 6. Radiant Intensity vs. Forward Current

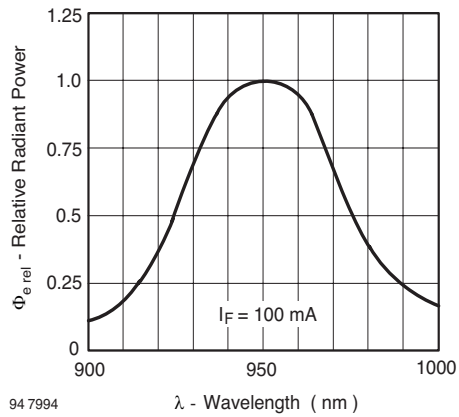


Figure 9. Relative Radiant Power vs. Wavelength

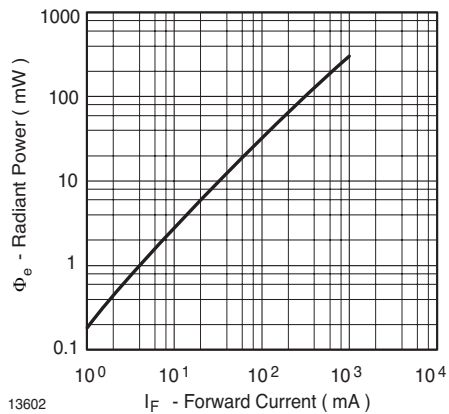


Figure 7. Radiant Power vs. Forward Current

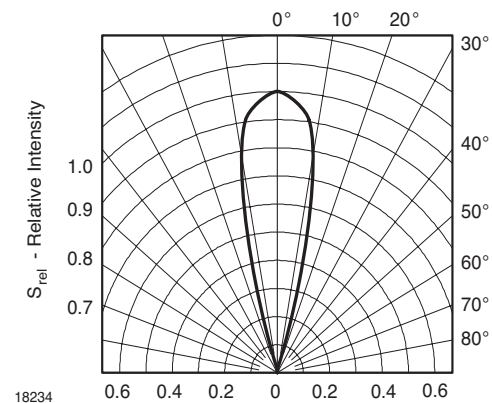


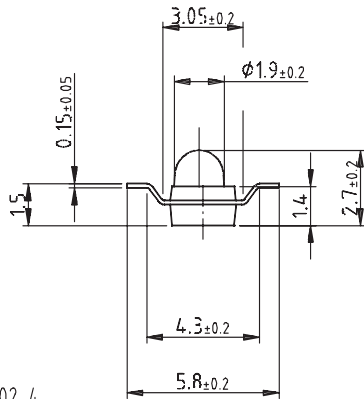
Figure 10. Relative Radiant Intensity vs. Angular Displacement

# TSML1000 / 1020 / 1030 / 1040



Vishay Semiconductors

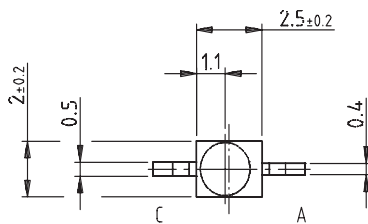
## Package Dimensions in mm TSML1000



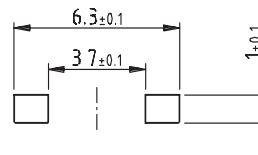
technical drawings  
according to DIN  
specifications

All dimensions in mm

Drawing-No.: 6.544-5326.02-4  
Issue: 3; 02.04.03

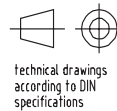
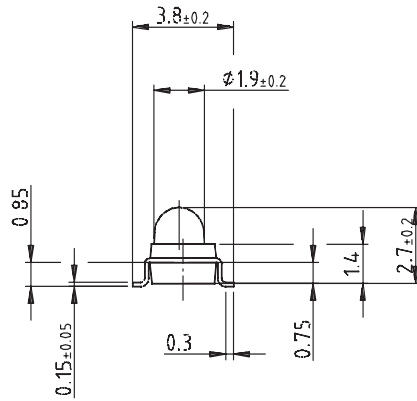


Solder pad proposal



16159

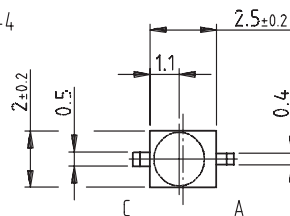
## Package Dimensions in mm TSML1020



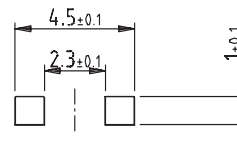
technical drawings  
according to DIN  
specifications

All dimensions in mm

Drawing-No.: 6.544-5325.02-4  
Issue: 3; 02.04.03

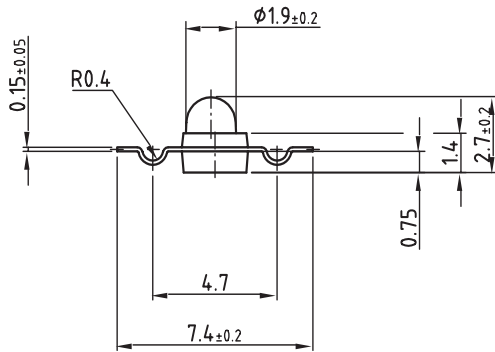


Solder pad proposal



16160

**Package Dimensions in mm**  
**TSML1030**

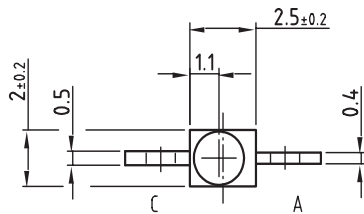


Drawing-No.: 6.544-5329.01-4  
Issue: 4; 08.05.03

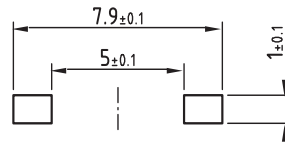


Technical drawings according to DIN specifications

All dimensions in mm

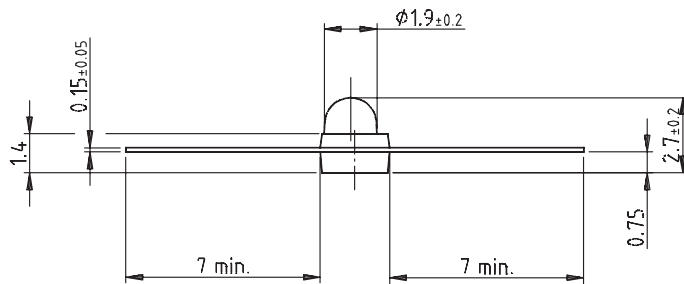


Solder pad proposal

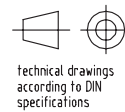


16228

**Package Dimensions in mm**  
**TSML1040**

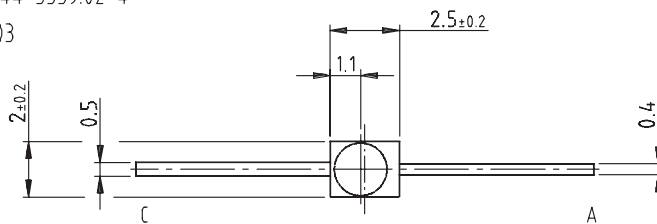


Drawing-No.: 6.544-5339.02-4  
Issue: 3; 02.04.03



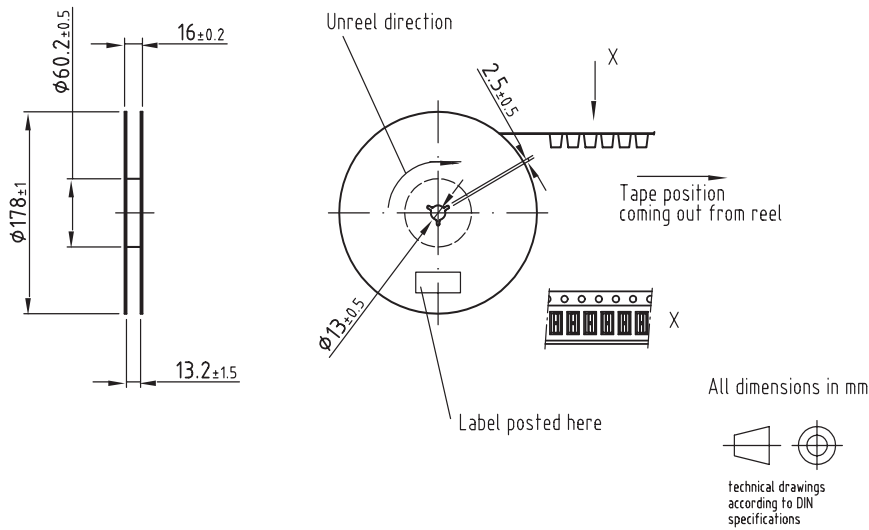
Technical drawings according to DIN specifications

All dimensions in mm

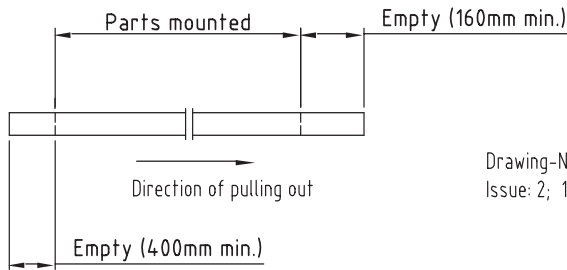


16760

## Reel Dimensions



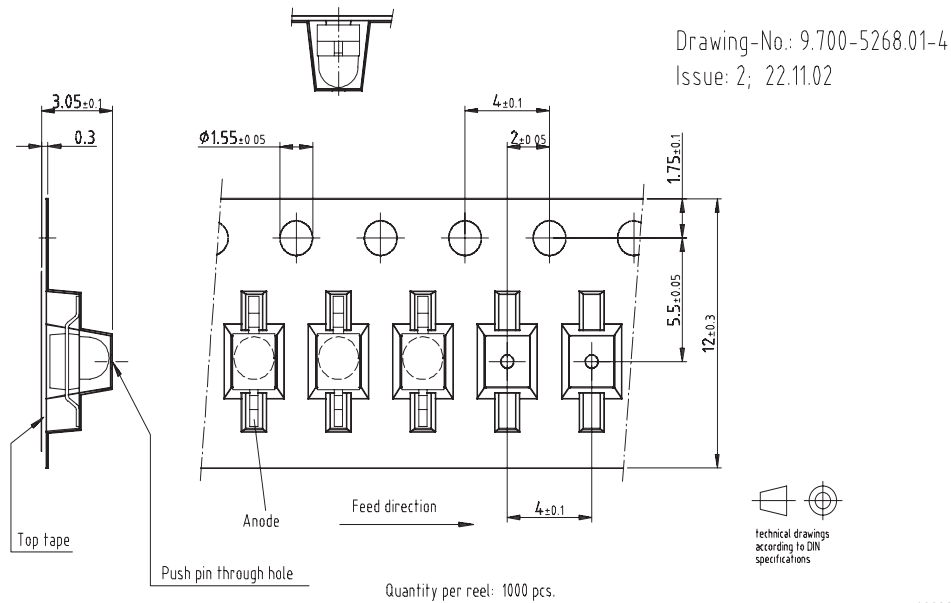
### Leader and trailer tape:



Drawing-No.: 9.800-5080.01-4  
Issue: 2; 18.11.02

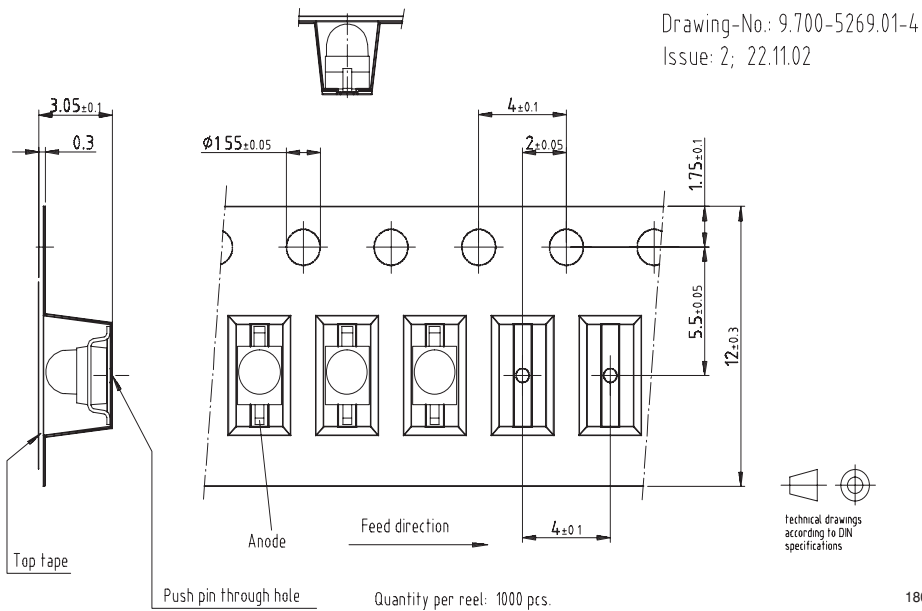
18033

## Taping TSML1000



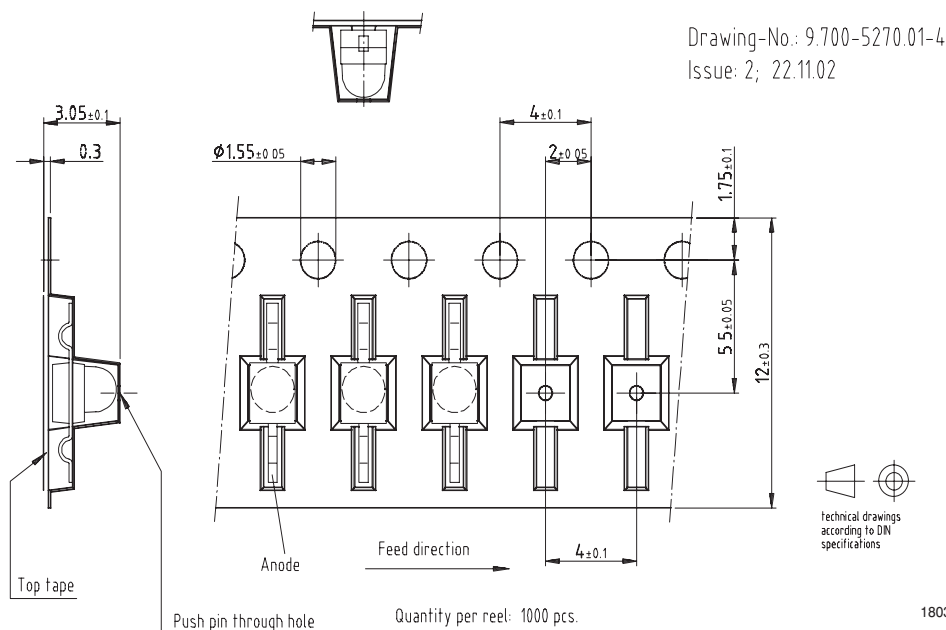
18030

## Taping TSML1020



18031

## Taping TSML1030



### Precautions For Use

#### 1. Over-current-proof

Customer must apply resistors for protection, otherwise slight voltage shift will cause big current change (Burn out will happen).

#### 2. Storage

2.1 Storage temperature and rel. humidity conditions are: 5 °C to 35 °C, R.H. 60 %

2.2 Floor life must not exceed 168 h, acc. to JEDEC level 3, J-STD-020.

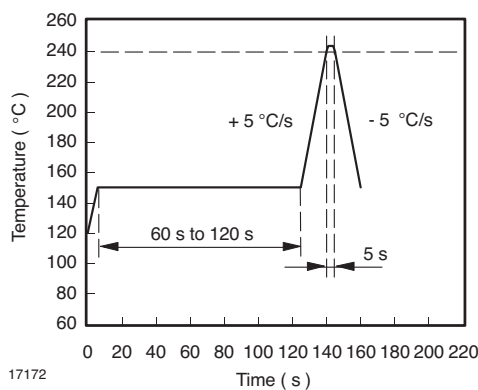
Once the package is opened, the products should be used within a week. Otherwise, they should be kept in a damp proof box with desiccant.

Considering tape life, we suggest to use products within one year from production date.

2.3 If opened more than one week in an atmosphere 5 °C to 35 °C, R.H. 60 %, devices should be treated at 60°C ± 5°C for 15 hrs.

2.4 If humidity indicator in the package shows pink color (normal blue), then devices should be treated with the same conditions as 2.3

### Reflow Solder Profile







## Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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