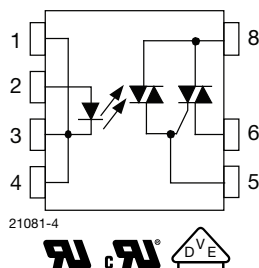


## Optocoupler, Power Phototriac



23171



### FEATURES

- Maximum trigger current ( $I_{FT}$ ): 10 mA
- Isolation test voltage 5300 V<sub>RMS</sub>
- Peak off-state voltage 600 V
- Load current 1 A<sub>RMS</sub>
- dV/dt of 210 V/ $\mu$ s
- DIP-8 package
- Pure tin leads
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### APPLICATIONS

- Home appliances (air conditioners, microwave ovens, washing machines, personal hygiene systems, refrigerators, fan heaters, inductive heating cooker, water heaters, etc.)
- Industrial equipments

### AGENCY APPROVALS

- [UL 1577](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\). available with option 1](#)

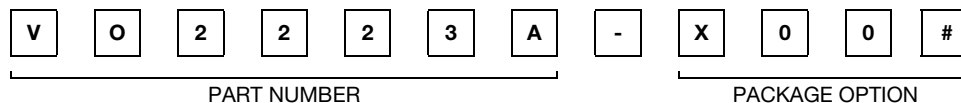
### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

The VO2223A is an optically couple phototriac driving a power triac in a DIP-8 package. It provides a 5300 V of input to output isolation.

### ORDERING INFORMATION



AGENCY CERTIFIED / PACKAGE	TRIGGER, CURRENT $I_{FT}$ (mA)
UL, cUL	10
DIP-8	VO2223A
DIP-8, option 7	VO2223A-X007T
UL, cUL, VDE (option 1)	10
DIP-8	VO2223A-X001

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
LED continuous forward current		$I_F$	50	mA
LED reverse voltage		$V_R$	5	V
<b>OUTPUT</b>				
Repetitive peak off-state voltage	Sine wave, 50 Hz to 60 Hz, gate open	$V_{DRM}$	600	V
On-state RMS current		$I_{T(RMS)}$	1	A
Peak non-repetitive surge current (50 Hz, peak)		$I_{TSM}$	10	A
<b>COUPLER</b>				
Total power dissipation <sup>(2)</sup>		$P_{diss}$	1.2	W
Ambient temperature range		$T_{amb}$	-40 to +85	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-40 to +125	$^{\circ}\text{C}$
Soldering temperature <sup>(1)</sup>	$t \leq 10\text{ s max.}$	$T_{sld}$	260	$^{\circ}\text{C}$
Isolation test voltage	For 1 s	$V_{ISO}$	5300	$V_{RMS}$

**Notes**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

<sup>(1)</sup> Refer to wave profile for soldering conditions for through hole devices

<sup>(2)</sup> Total power dissipation value is based on 2S2P PCB

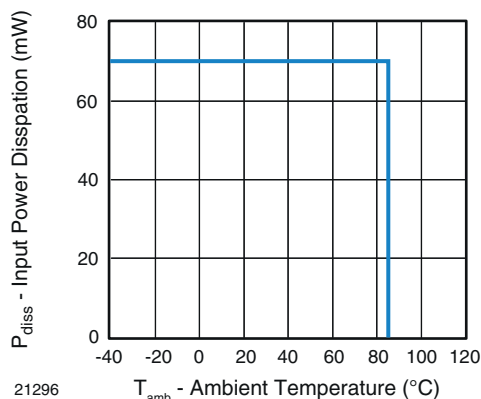
**ABSOLUTE MAXIMUM RATING CURVES**


Fig. 1 - Power Dissipation vs. Temperature

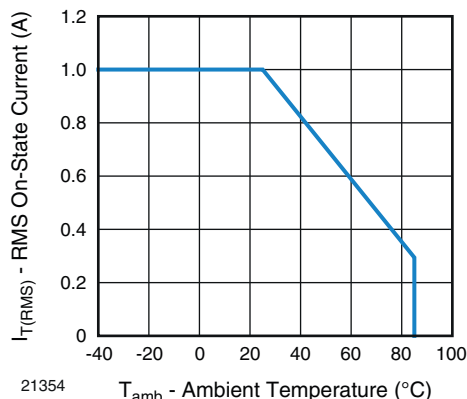


Fig. 2 - Allowable Load Current vs. Ambient Temperature

**Note**

- The allowable load current was calculated out under a given operating conditions and only for reference:  
LED power:  $Q_E = 0.015\text{ W}$ ,  $\theta_{BA}$  (4-layer) =  $30\text{ }^{\circ}\text{C/W}$

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
LED trigger current	$V_T = 6\text{ V}$	$I_{FT}$	2.5	-	10	mA
Input reverse current	$V_R = 5\text{ V}$	$I_R$	-	-	10	$\mu\text{A}$
LED forward voltage	$I_F = 10\text{ mA}$	$V_F$	0.9	-	1.4	V
<b>OUTPUT</b>						
Peak on-state voltage	$I_{TM} = 1\text{ A}$	$V_{TM}$	-	-	1.7	V
Peak off-state current	$V_{DRM} = 600\text{ V}$ , $T_A = 110\text{ }^{\circ}\text{C}$	$I_{DRM}$	-	-	100	$\mu\text{A}$
Holding current	$R_L = 100\text{ }\Omega$	$I_H$	-	-	25	mA
Critical rate of rise of off-state voltage	$V_{IN} = 400\text{ V}_{RMS}$ (Fig. 3)	$dV/dt_{cr}$	-	210	-	$\text{V}/\mu\text{s}$
Critical rate of rise of commutating voltage	$V_{IN} = 240\text{ V}_{RMS}$ , $I_T = 1\text{ A}_{RMS}$ (Fig. 3)	$dV/dt_{crq}$	-	0.7	-	$\text{V}/\mu\text{s}$

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

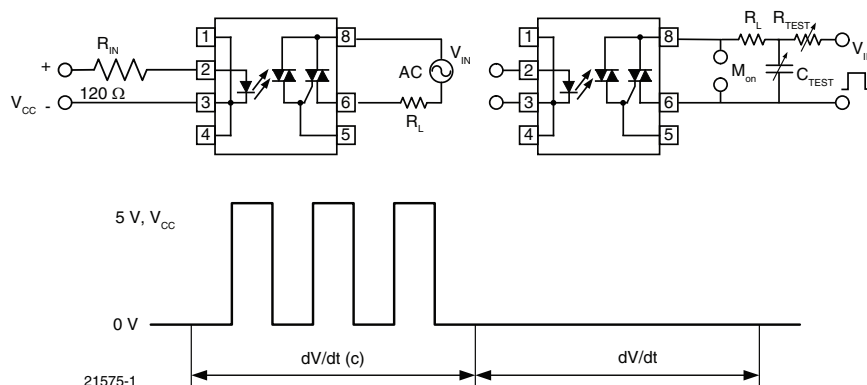


Fig. 3 - dV/dt Test Circuit

<b>SAFETY AND INSULATION RATINGS</b>						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification	IEC 68 part 1		-	40 / 85 / 21	-	
Pollution degree	DIN VDE 0109		-	2	-	
Tracking resistance (comparative tracking index)	Insulation group IIIa	CTI	175	-	-	
Highest allowable overvoltage	Transient overvoltage	$V_{IOTM}$	8000	-	-	$V_{peak}$
Maximum working insulation voltage	Recurring peak voltage	$V_{IORM}$	890	-	-	$V_{peak}$
Insulation resistance at $25\text{ }^{\circ}\text{C}$	$V_{IO} = 500\text{ V}$	$R_{IS}$	-	-	$\geq 10^{12}$	$\Omega$
Insulation resistance at $T_S$	$V_{IO} = 500\text{ V}$	$R_{IS}$	-	-	$\geq 10^9$	$\Omega$
Insulation resistance at $100\text{ }^{\circ}\text{C}$	$V_{IO} = 500\text{ V}$	$R_{IS}$	-	-	$\geq 10^{11}$	$\Omega$
Partial discharge test voltage	Method b, $V_{pd} = V_{IORM} \times 1.6$	$V_{pd}$	-	-	1424	$V_{peak}$
Safety limiting values - maximum values allowed in the event of a failure	Case temperature	$T_{SI}$	-	-	165	$^{\circ}\text{C}$
	Input current	$I_{SI}$	-	-	150	mA
	Output power	$P_{SO}$	-	-	2000	mW
Minimum external air gap (clearance distance)	Measured from input terminals to output terminals, shortest distance through air		$\geq 7$	-	-	mm
Minimum external tracking (creepage distance)	Measured from input terminals to output terminals, shortest distance path along body		$\geq 7$	-	-	mm

**Note**

- This phototriac coupler is suitable for "safe electrical insulation" only within the safety ratings. Compliance with safety ratings shall be ensured by means of protective circuits.

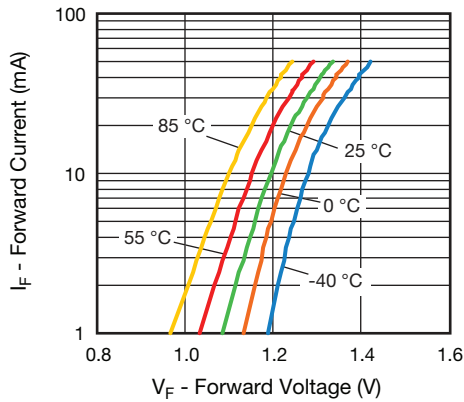
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 4 - Forward Current vs. Forward Voltage

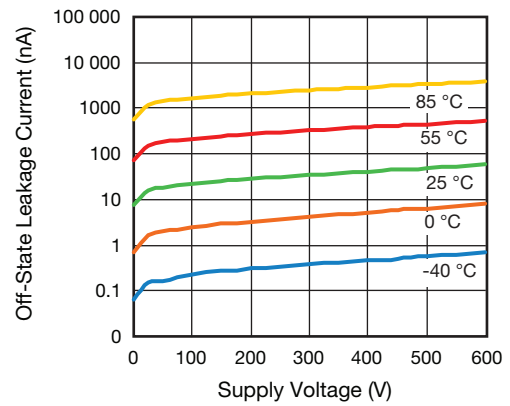


Fig. 7 - Off-State Leakage Current vs. Voltage

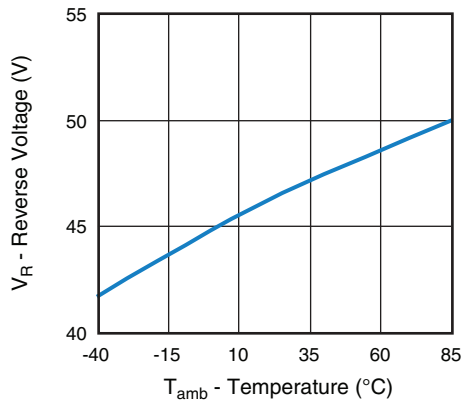


Fig. 5 - Reverse Voltage vs. Temperature

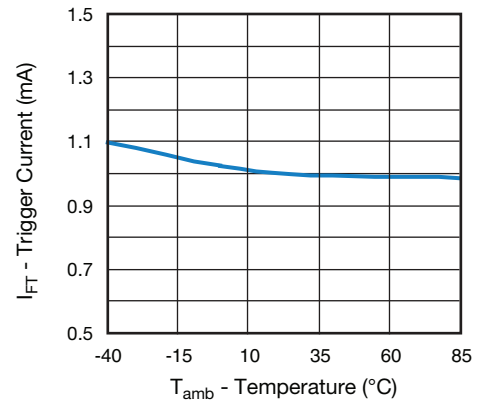


Fig. 8 - Normalized Trigger Input Current vs. Temperature

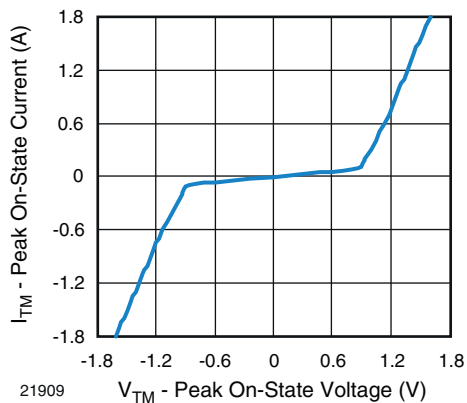


Fig. 6 - On-State Current vs. On-State Voltage

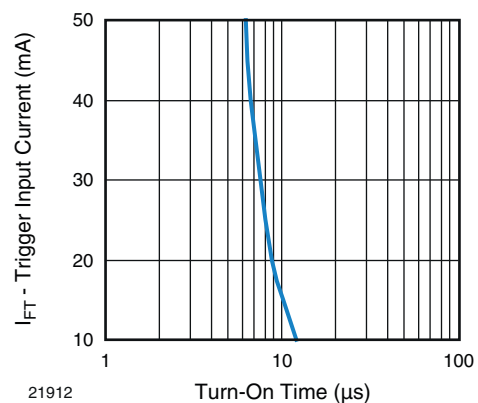


Fig. 9 - Trigger Input Current vs. Turn-on Time

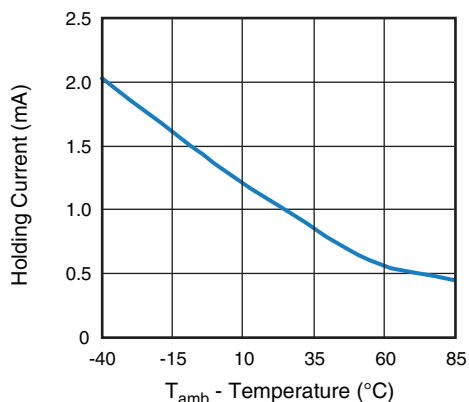
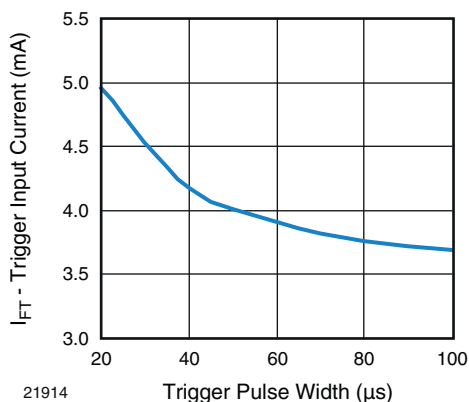
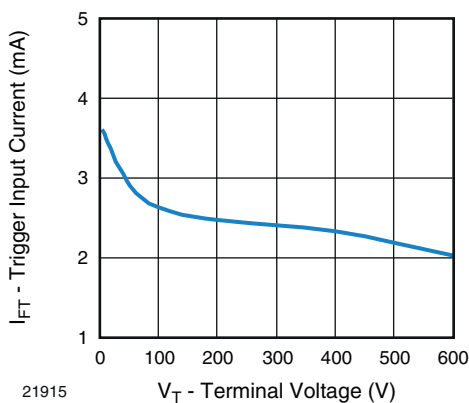


Fig. 10 - Normalized Holding Current vs. Temperature



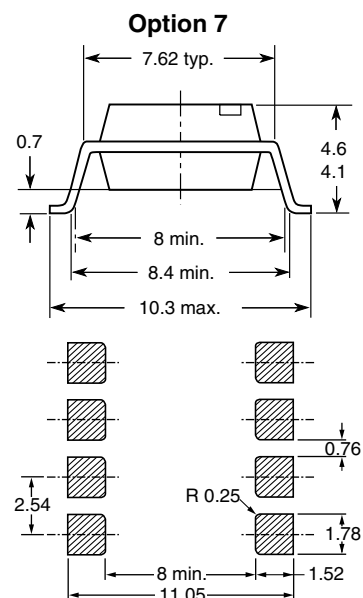
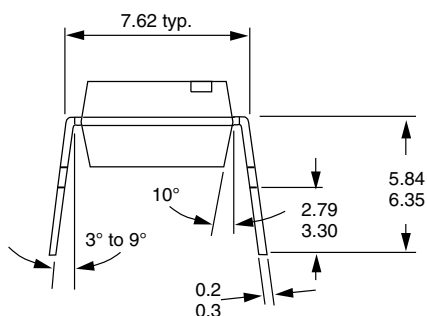
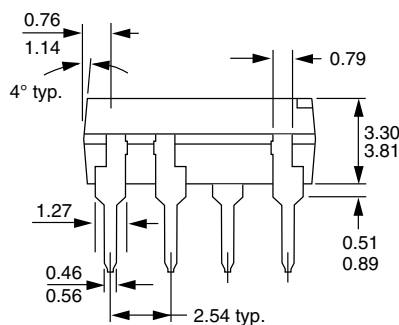
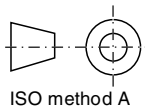
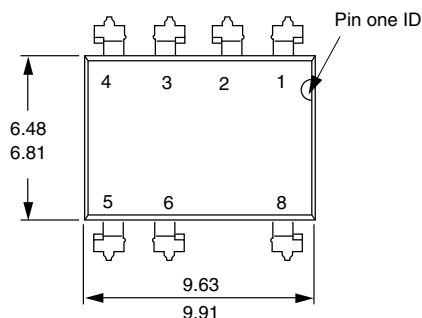
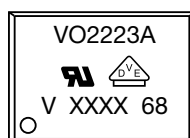
21914

Fig. 11 - Trigger Current vs. Trigger Pulse Width



21915

Fig. 12 - Trigger Current vs. V<sub>LOAD</sub>

**PACKAGE DIMENSIONS** in millimeters

**PACKAGE MARKING** (Example of VO2223A-X001)

**Note**

- XXXX = LMC (lot marking code)

## PACKING INFORMATION

DEVICE PER TUBE			
TYPE	UNITS/TUBE	TUBES/BOX	UNITS/BOX
DIP-8	50	40	2000

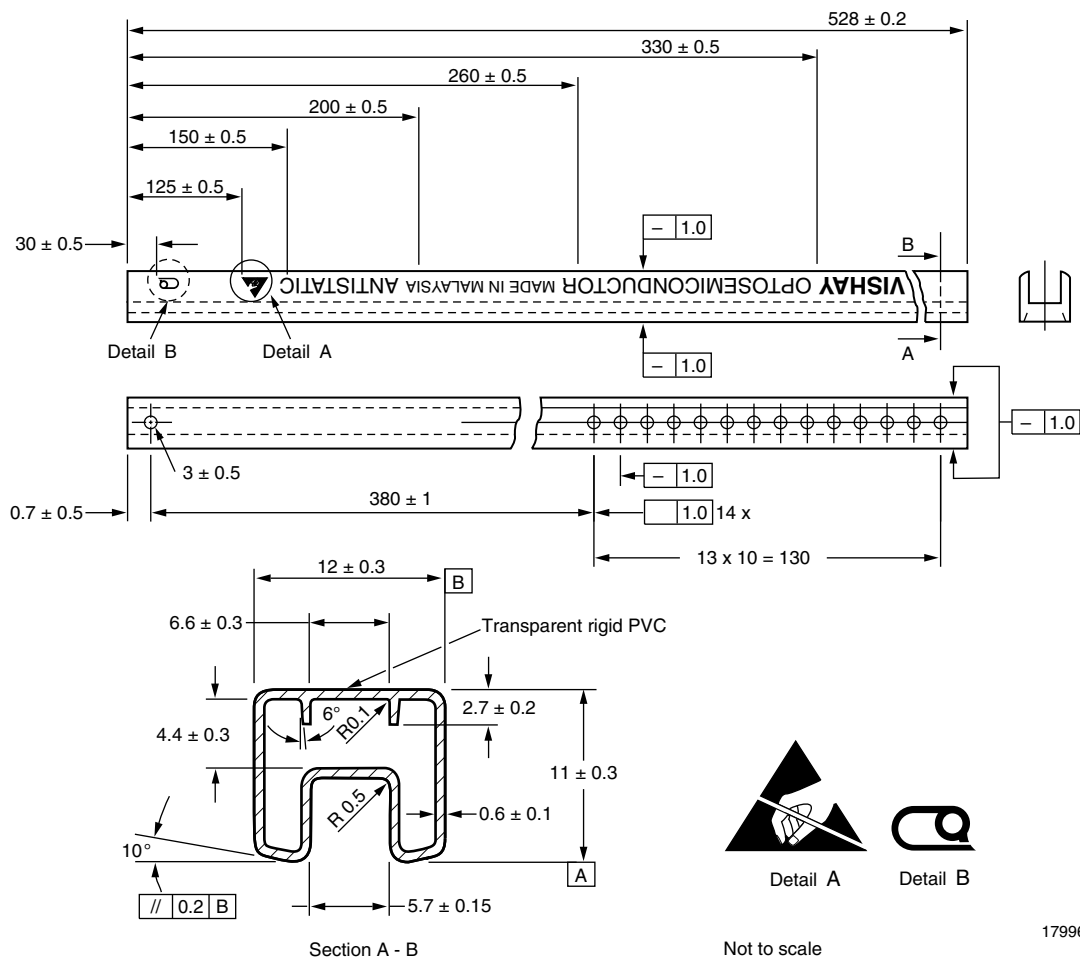


Fig. 13 - Shipping Tube Specifications for DIP Packages

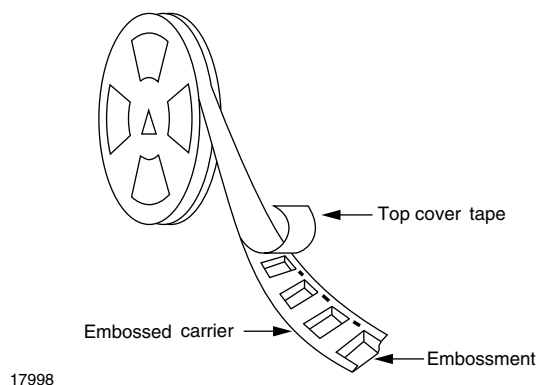


Fig. 14 - Tape and Reel Shipping Medium

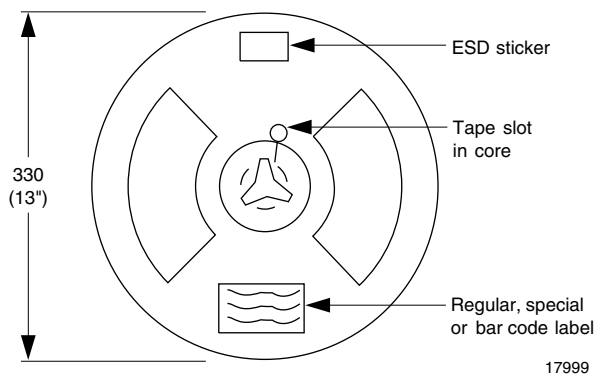


Fig. 15 - Tape and Reel Shipping Medium

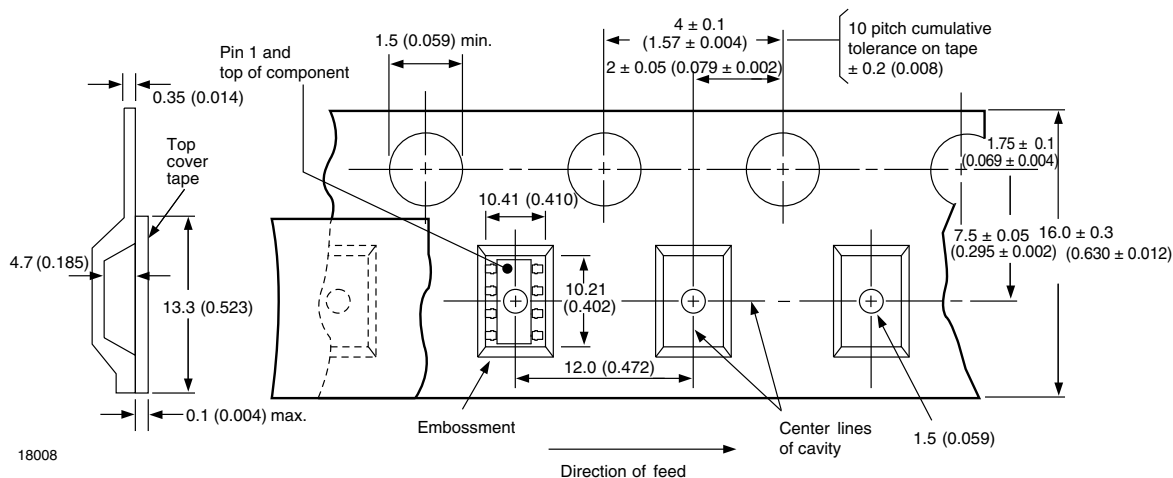
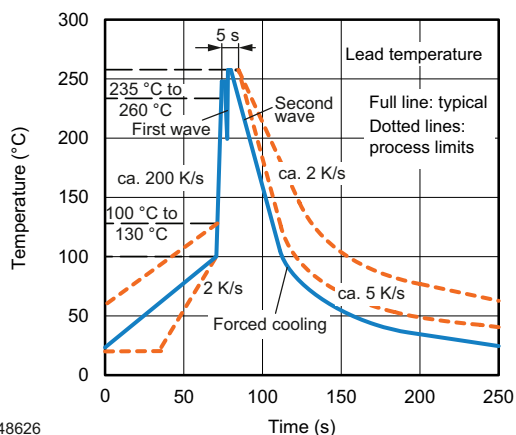


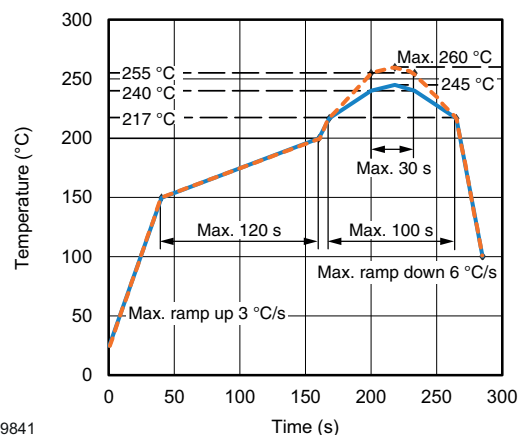
Fig. 16 - Tape and Packing (1000 pieces on reel)

## SOLDER PROFILES



948626

Fig. 17 - Recommended Wave Soldering Double Wave Profile for DIP Devices



19841

Fig. 18 - Recommended Lead (Pb)-free Reflow Solder Profile for SMD Devices

## HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions:  $T_{amb} < 30\text{ °C}$ , RH < 85 %

Moisture sensitivity level 1, according to J-STD-020





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.