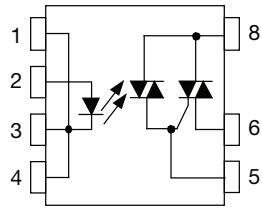


# Optocoupler, Power Phototriac



23171



## FEATURES

- Fully integrated power TRIAC
- Maximum trigger current ( $I_{FT}$ ): 10 mA
- Isolation test voltage 5300  $V_{RMS}$
- Peak off-state voltage 600 V
- Load current 1  $A_{RMS}$
- $dV/dt$  of 600 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

## DESCRIPTION

The VO2223B is an optically coupled phototriac driving an integrated power TRIAC in a DIP-8 package. Featuring galvanic and electrical noise isolation, the VO2223B is able to directly drive medium AC loads with a low voltage input signal. The high blocking voltage of 600 V permits control of off-line voltages up to 230  $V_{AC}$  and is sufficient for as much as 380  $V_{AC}$ .

## APPLICATIONS

- Air conditioners
- Microwave ovens
- Washing machines
- Refrigerators
- Fan heaters
- Inductive heating cooker
- Water heaters
- Industrial equipments

## AGENCY APPROVALS

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

ORDERING INFORMATION													
<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td>V</td><td>O</td><td>2</td><td>2</td><td>2</td><td>3</td><td>B</td><td>-</td><td>X</td><td>0</td><td>0</td><td>#</td> </tr> </table>	V	O	2	2	2	3	B	-	X	0	0	#	
V	O	2	2	2	3	B	-	X	0	0	#		
PART NUMBER	PACKAGE OPTION												
AGENCY CERTIFIED / PACKAGE	TRIGGER, CURRENT $I_{FT}$ (mA)												
UL, cUL, FIMKO	10												
DIP-8	VO2223B												
SMD-8, option 7	VO2223B-X007T												
UL, cUL, FIMKO, VDE (option 1)	10												
DIP-8	VO2223B-X001												
SMD-8, option 7	VO2223B-X017T												

<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Forward current		$I_F$	50	mA
Reverse voltage		$V_R$	5	V
Input power dissipation		$P_{diss}$	70	mW
<b>OUTPUT</b>				
Repetitive peak off-state voltage	Sine wave, 50 Hz to 60 Hz, gate open	$V_{DRM}$	600	V
RMS on-state current		$I_{T(RMS)}$	1	A
Non repetitive surge peak on-state current	50 Hz, peak	$I_{TSM}$	10	A
<b>COUPLER</b>				
Total power dissipation <sup>(1)</sup>		$P_{diss}$	1.2	W
Ambient temperature range		$T_{amb}$	-40 to +85	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-40 to +150	$^{\circ}\text{C}$
Soldering temperature	$t \leq 10\text{ s max.}$	$T_{sld}$	260	$^{\circ}\text{C}$

**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> Total power dissipation value is based on 2S2P PCB

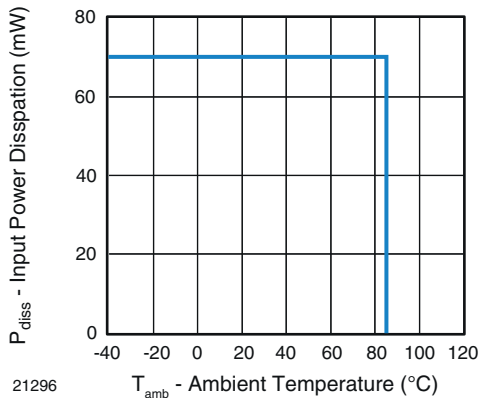
**ABSOLUTE MAXIMUM RATING CURVES**


Fig. 1 - Input Power Dissipation vs. Ambient Temperature

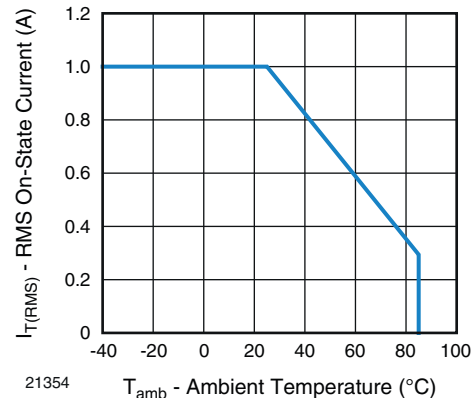


Fig. 2 - RMS On-State Current vs. Ambient Temperature

**Note**

- The RMS on-state current was calculated out under a given operating conditions and only for reference: input 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>						
Trigger input current	$V_T = 6\text{ V}$	$I_{FT}$	-	-	10	mA
Input reverse current	$V_R = 5\text{ V}$	$I_R$	-	-	10	$\mu\text{A}$
Forward voltage	$I_F = 10\text{ mA}$	$V_F$	0.9	-	1.5	V
<b>OUTPUT</b>						
Peak on-state voltage	$I_{TM} = 1\text{ A}$	$V_{TM}$	-	-	1.7	V
Peak off-state current	$V_{DRM} = 600\text{ V}$	$I_{DRM}$	-	-	100	$\mu\text{A}$
Holding current	$R_L = 100\ \Omega$	$I_H$	-	-	25	mA
Critical rate of rise of off-state voltage	$V_{IN} = 400\text{ V}_{RMS}$ (Fig. 3)	$dV/dt_{cr}$	-	600	-	$\text{V}/\mu\text{s}$
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.

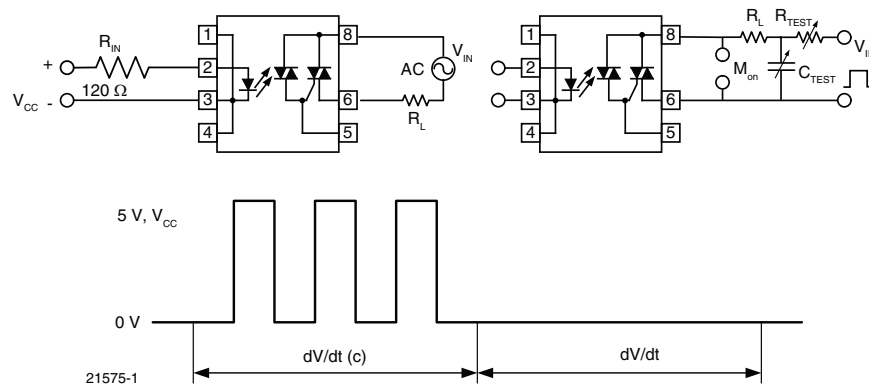


Fig. 3 - dV/dt Test Circuit

<b>SAFETY AND INSULATION RATINGS</b>				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		40 / 85 / 21	
Pollution degree	According to DIN VDE 0109		2	
Comparative tracking index	Insulation group IIIa	CTI	175	
Maximum rated withstanding isolation voltage	According to UL1577, $t = 1\text{ min}$	$V_{ISO}$	5300	$V_{RMS}$
Maximum transient isolation voltage	According to DIN EN 60747-5-5	$V_{IOTM}$	8000	$V_{peak}$
Maximum repetitive peak isolation voltage	According to DIN EN 60747-5-5	$V_{IORM}$	890	$V_{peak}$
Isolation resistance	$T_{amb} = 25\text{ }^{\circ}\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$T_{amb} = 100\text{ }^{\circ}\text{C}$ , $V_{IO} = 500\text{ V}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	2000	mW
Input safety current		$I_{SI}$	150	mA
Input safety temperature		$T_{SI}$	165	$^{\circ}\text{C}$
Creepage distance	DIP-8		$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Creepage distance	SMD-8, option 7		$\geq 8$	mm
Clearance distance			$\geq 8$	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)

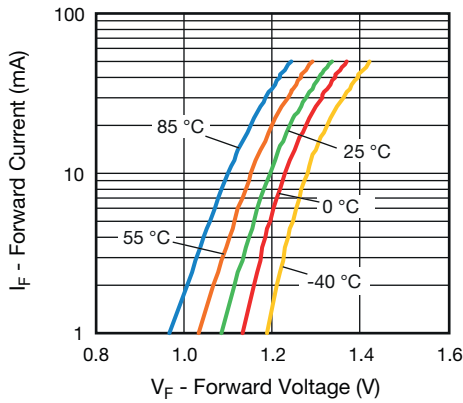


Fig. 4 - Forward Current vs. Forward Voltage

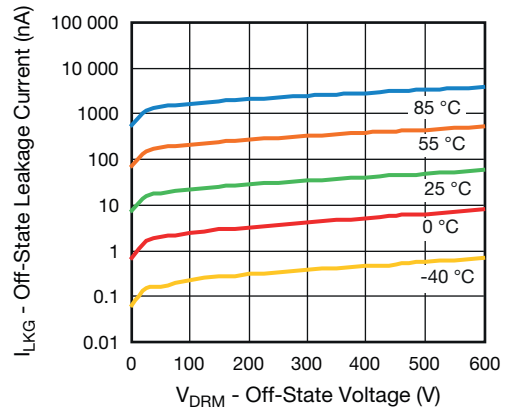


Fig. 7 - Off-State Leakage Current vs. Off-State Voltage

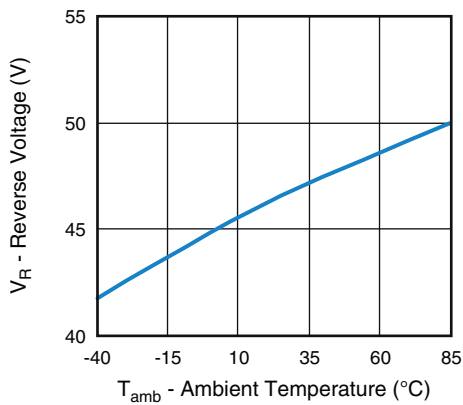


Fig. 5 - Reverse Voltage vs. Ambient Temperature

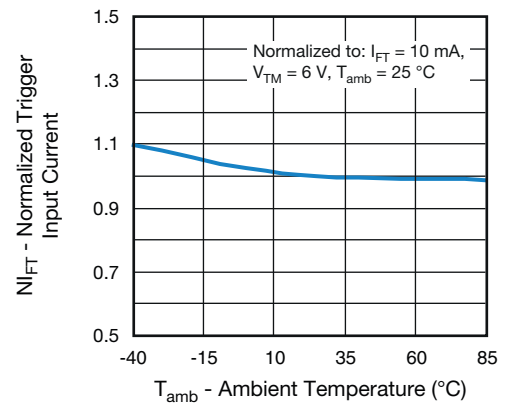


Fig. 8 - Normalized Trigger Input Current vs. Ambient Temperature

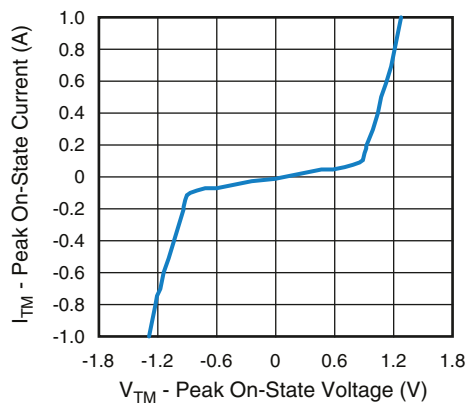


Fig. 6 - On-State Current vs. On-State Voltage

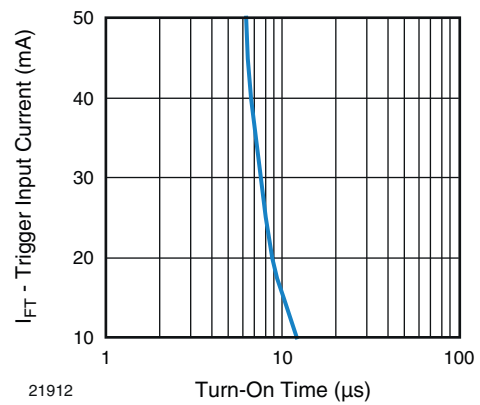


Fig. 9 - Trigger Input Current vs. Turn-On Time

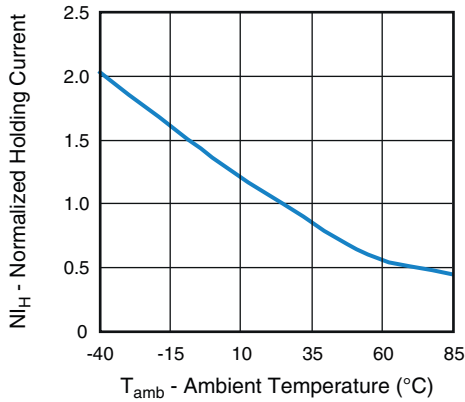


Fig. 10 - Normalized Holding Current vs. Ambient Temperature

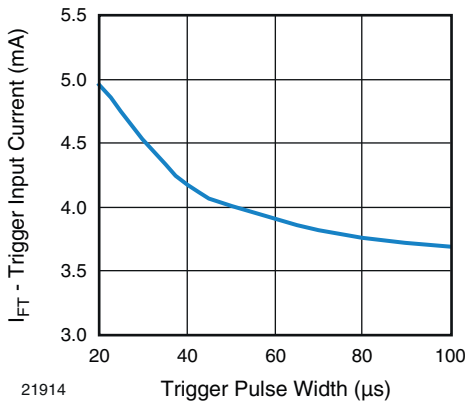


Fig. 11 - Trigger Input Current vs. Trigger Pulse Width

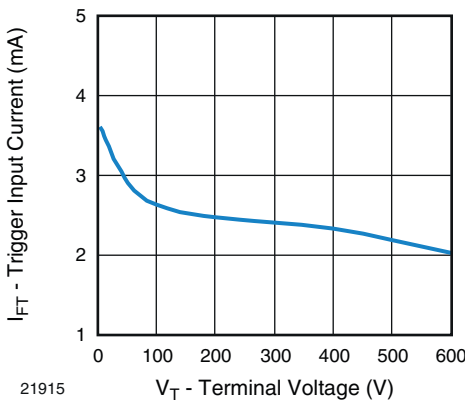
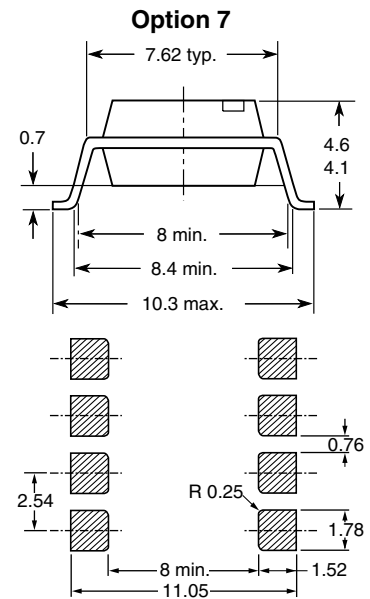
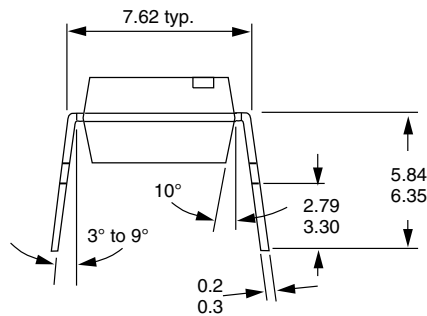
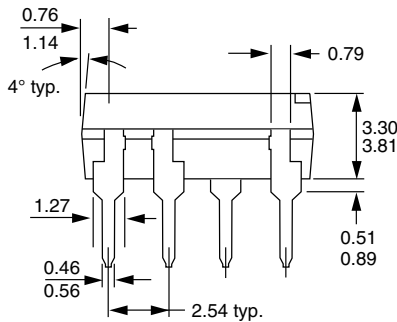
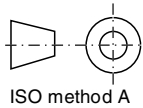
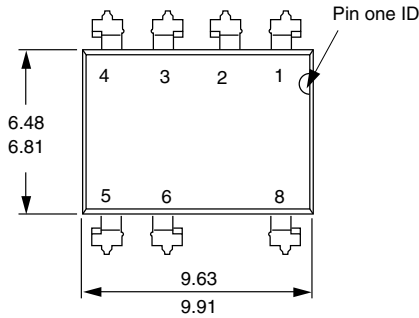
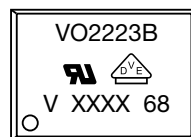


Fig. 12 - Trigger Input Current vs. Terminal Voltage

**PACKAGE DIMENSIONS** (in millimeters)



**PACKAGE MARKING** (Example of VO2223B-X001)



**Notes**

- XXXX = LMC (lot marking code)
- The VDE logo is only marked on option 1 parts. Option information is not marked on the part
- Tape and reel suffix (T) is not part of the package marking

**PACKING INFORMATION**

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

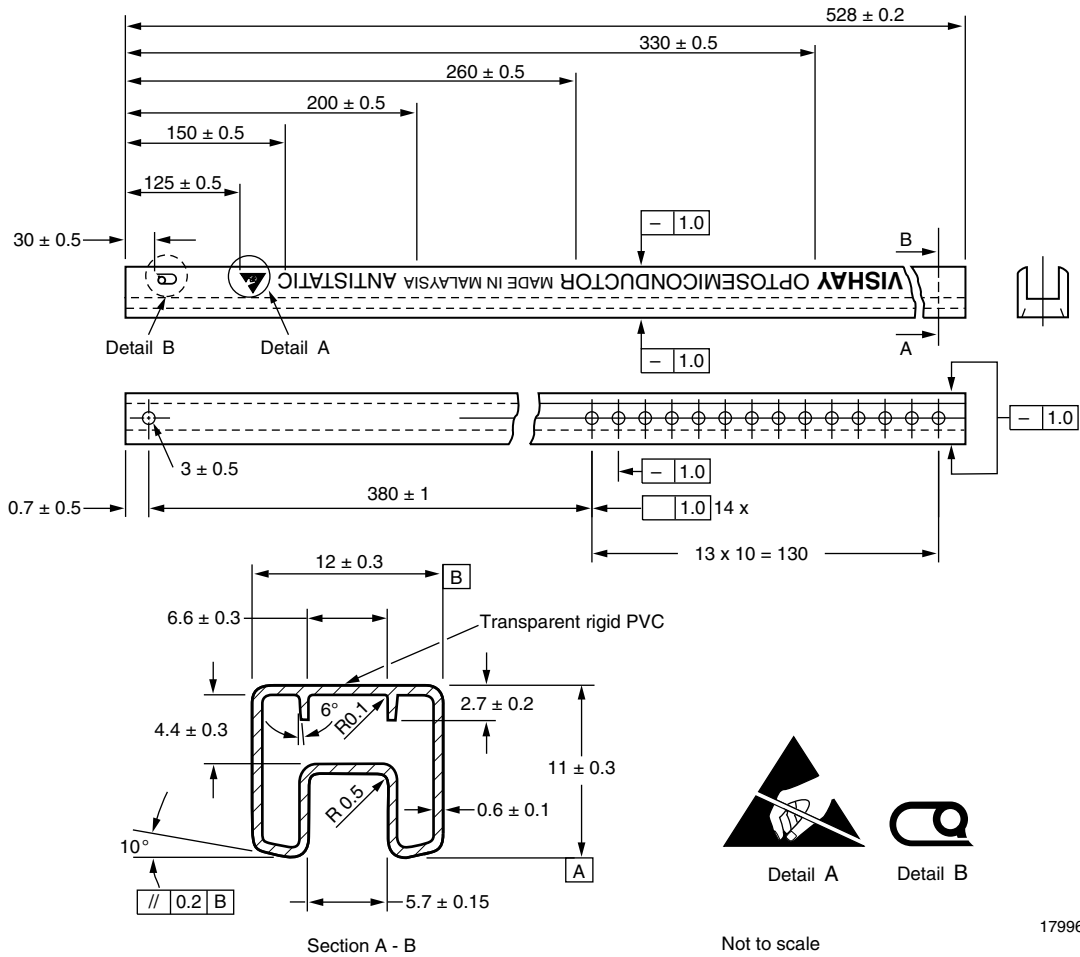
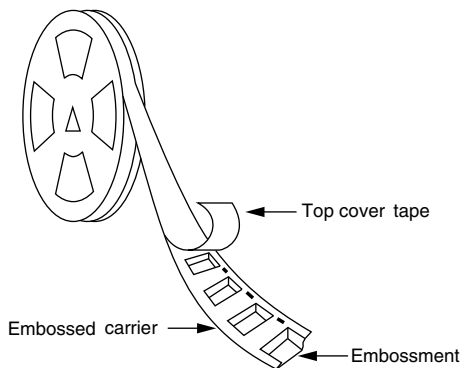
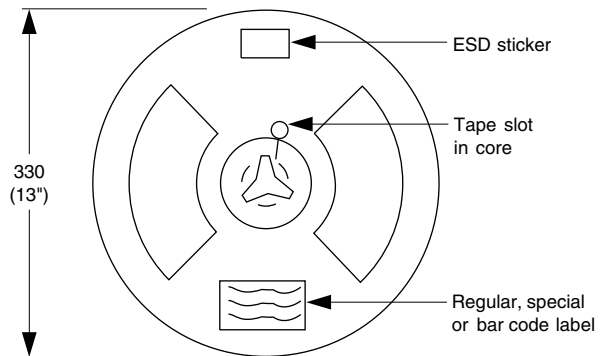


Fig. 13 - Shipping Tube Specifications for DIP Packages



17998

Fig. 14 - Tape and Reel Shipping Medium



17999

Fig. 15 - Tape and Reel Shipping Medium

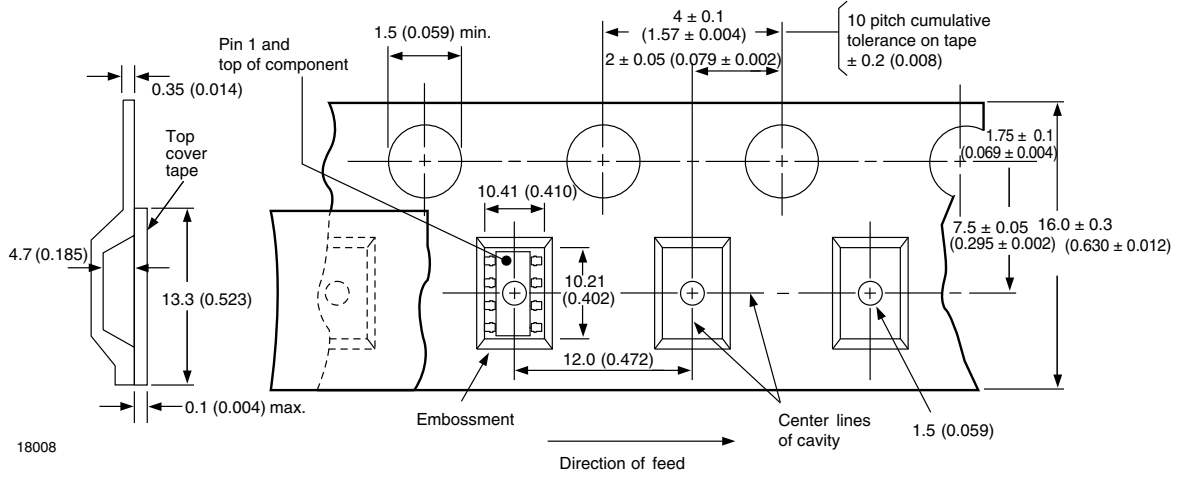
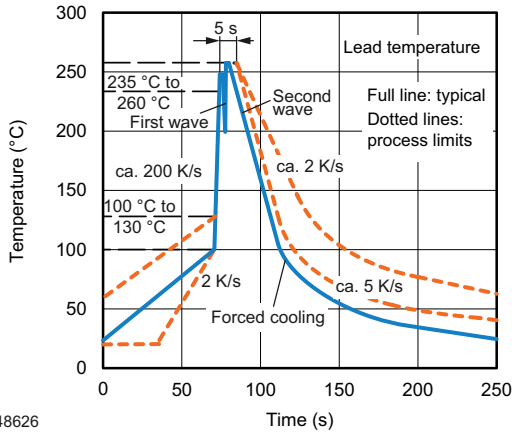


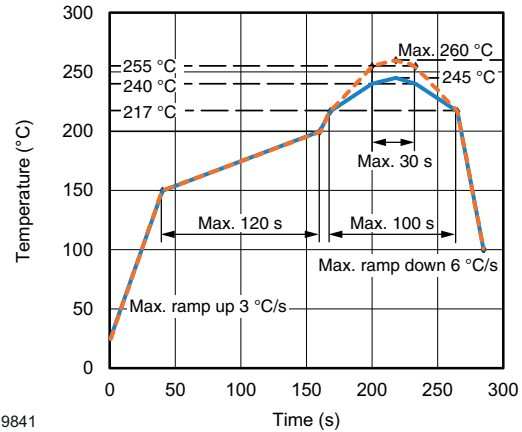
Fig. 16 - Tape and Packing (1000 pieces on reel)

**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:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ , RH < 85 %

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





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