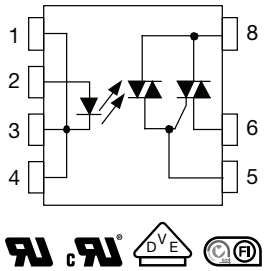
Optocoupler, Power Phototriac





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/µs
- DIP-8 package
- Pure tin leads
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

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

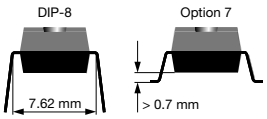
- Air conditioners
- Microwave ovens
- Washing machines
- Refrigerators
- Fan heaters
- Inductive heating cooker
- Water heaters
- Industrial equipments

AGENCY APPROVALS

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

ORDERING INFORMATION

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

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ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Forward current		I_F	50	mA
Reverse voltage		V_R	5	V
Input power dissipation		P_{diss}	70	mW
OUTPUT				
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
COUPLER				
Total power dissipation (1)		P_{diss}	1.2	W
Ambient temperature range		T_{amb}	-40 to +85	°C
Storage temperature range		T_{stg}	-40 to +150	°C
Soldering temperature	t ≤ 10 s max.	T_{sld}	260	°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.

(1) Total power dissipation value is based on 2S2P PCB

ABSOLUTE MAXIMUM RATING CURVES

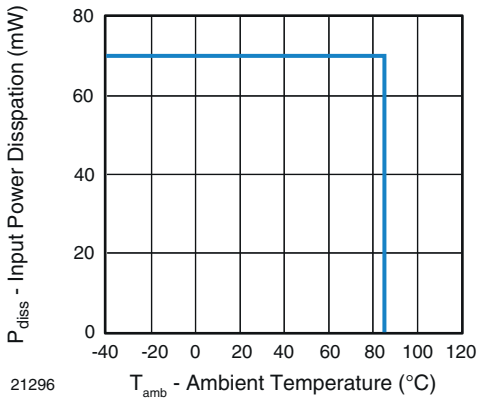


Fig. 1 - Input Power Dissipation vs. Ambient Temperature

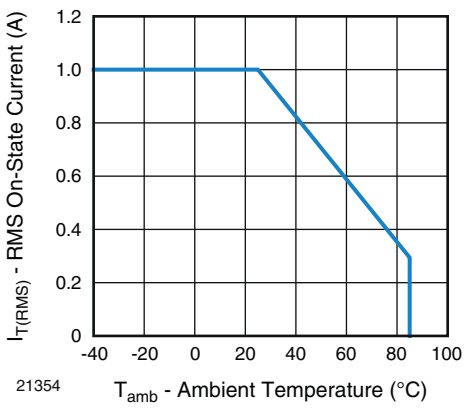


Fig. 2 - RMS On-State Current vs. Ambient Temperature

Note

- The RMS on-state current was calculated out under a given operating conditions and only for reference:
  input power: Q_E = 0.015 W, θ_{BA} (4-layer) = 30 °C/W

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ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Trigger input current	V_T = 6 V	I_{FT}	-	-	10	mA
Input reverse current	V_R = 5 V	I_R	-	-	10	µA
Forward voltage	I_F = 10 mA	V_F	0.9	-	1.5	V
OUTPUT						
Peak on-state voltage	I_{TM} = 1 A	V_{TM}	-	-	1.7	V
Peak off-state current	V_{DRM} = 600 V	I_{DRM}	-	-	100	µA
Holding current	R_L = 100 Ω	I_H	-	-	25	mA
Critical rate of rise of off-state voltage	V_{IN} = 400 V_{RMS} (Fig. 3)	dV/dt_{cr}	-	600	-	V/µs
Critical rate of rise of commutating voltage	V_{IN} = 240 V_{RMS}, I_T = 1 A_{RMS} (Fig. 3)	dV/dt_{crq}	-	0.7	-	V/µs

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.

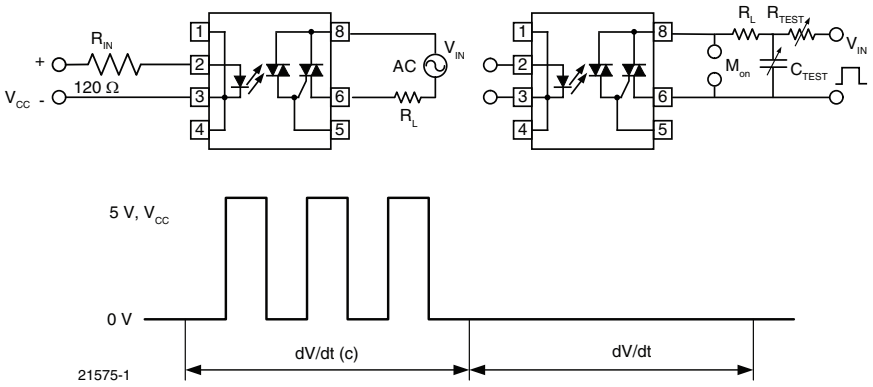


Fig. 3 - dV/dt Test Circuit

SAFETY AND INSULATION RATINGS				
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 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 °C, V_{IO} = 500 V	R_{IO}	≥ 10^{12}	Ω
	T_{amb} = 100 °C, V_{IO} = 500 V	R_{IO}	≥ 10^{11}	Ω
Output safety power		P_{SO}	2000	mW
Input safety current		I_{SI}	150	mA
Input safety temperature		T_{SI}	165	°C
Creepage distance	DIP-8		≥ 7	mm
Clearance distance			≥ 7	mm
Creepage distance	SMD-8, option 7		≥ 8	mm
Clearance distance			≥ 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

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

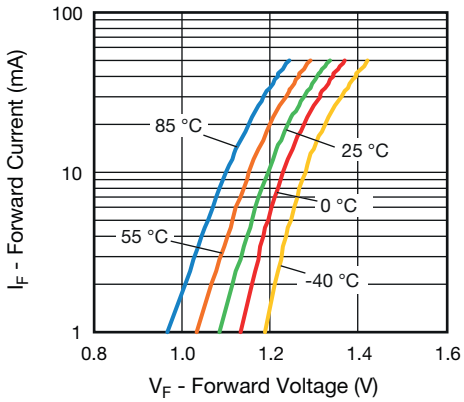


Fig. 4 - Forward Current vs. Forward Voltage

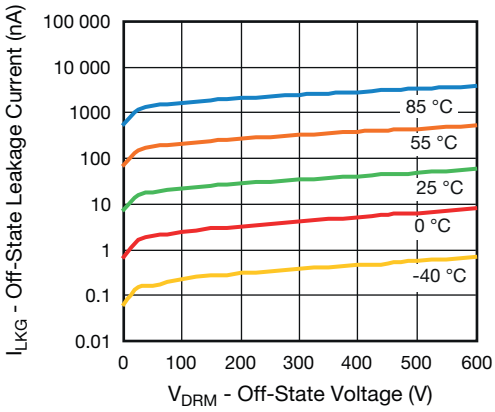


Fig. 7 - Off-State Leakage Current vs. Off-State Voltage

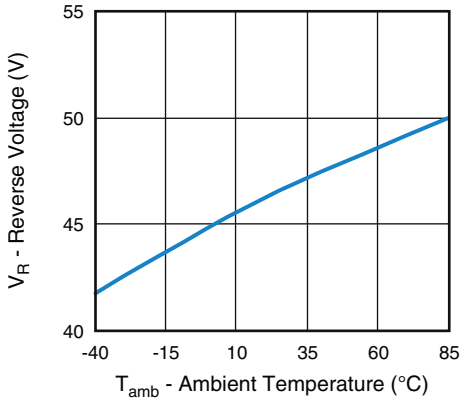


Fig. 5 - Reverse Voltage vs. Ambient Temperature

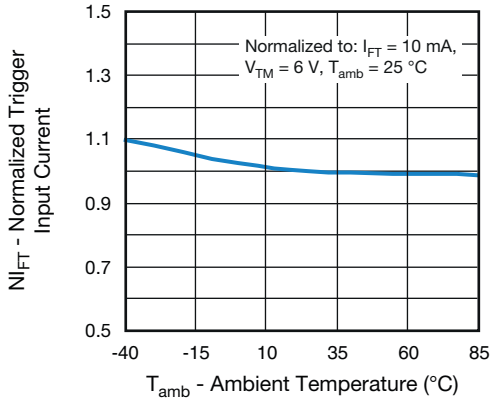


Fig. 8 - Normalized Trigger Input Current vs. Ambient Temperature

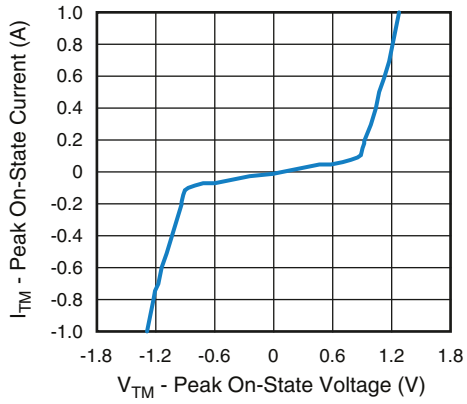


Fig. 6 - On-State Current vs. On-State Voltage

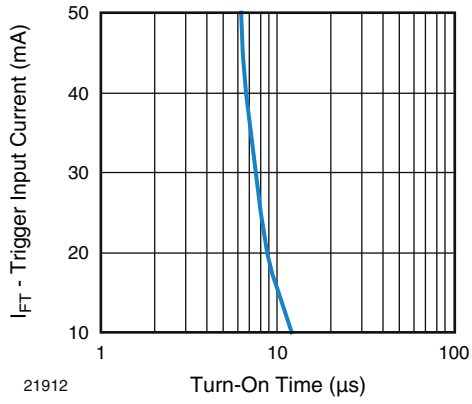


Fig. 9 - Trigger Input Current vs. Turn-On Time

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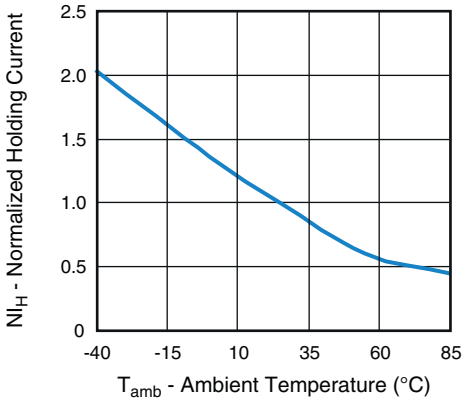


Fig. 10 - Normalized Holding Current vs. Ambient Temperature

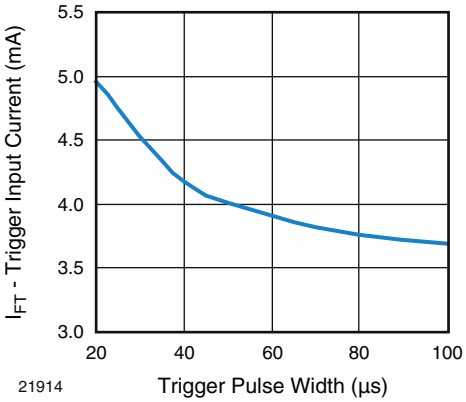


Fig. 11 - Trigger Input Current vs. Trigger Pulse Width

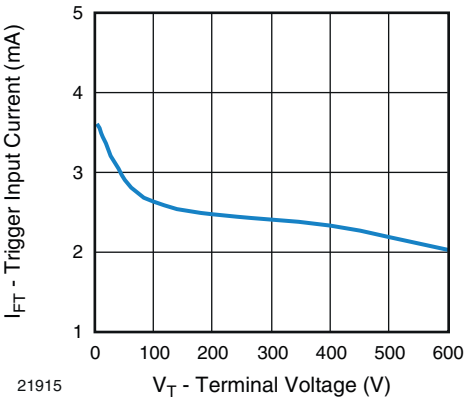
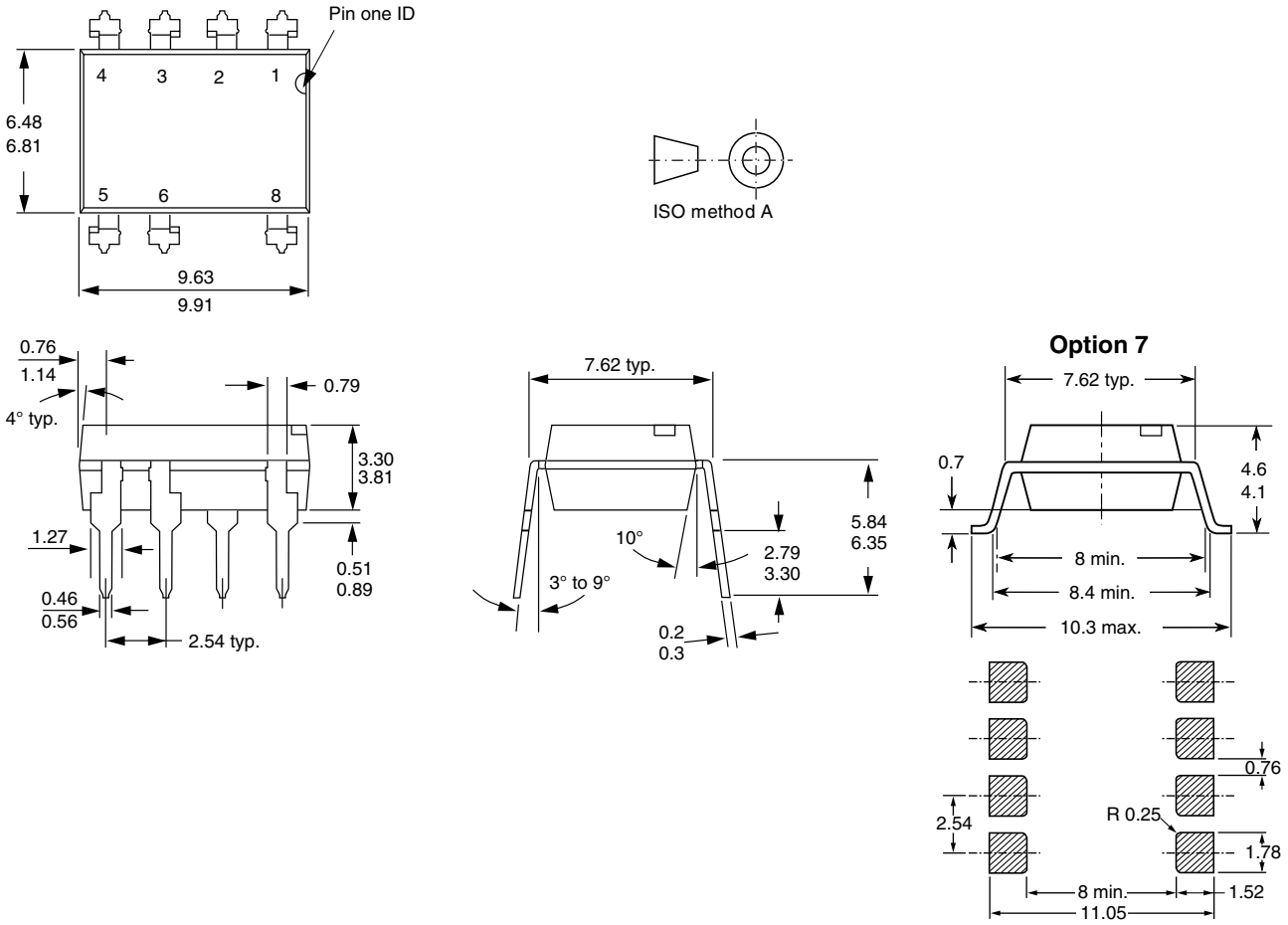


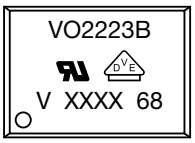
Fig. 12 - Trigger Input Current vs. Terminal Voltage

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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

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PACKING INFORMATION

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

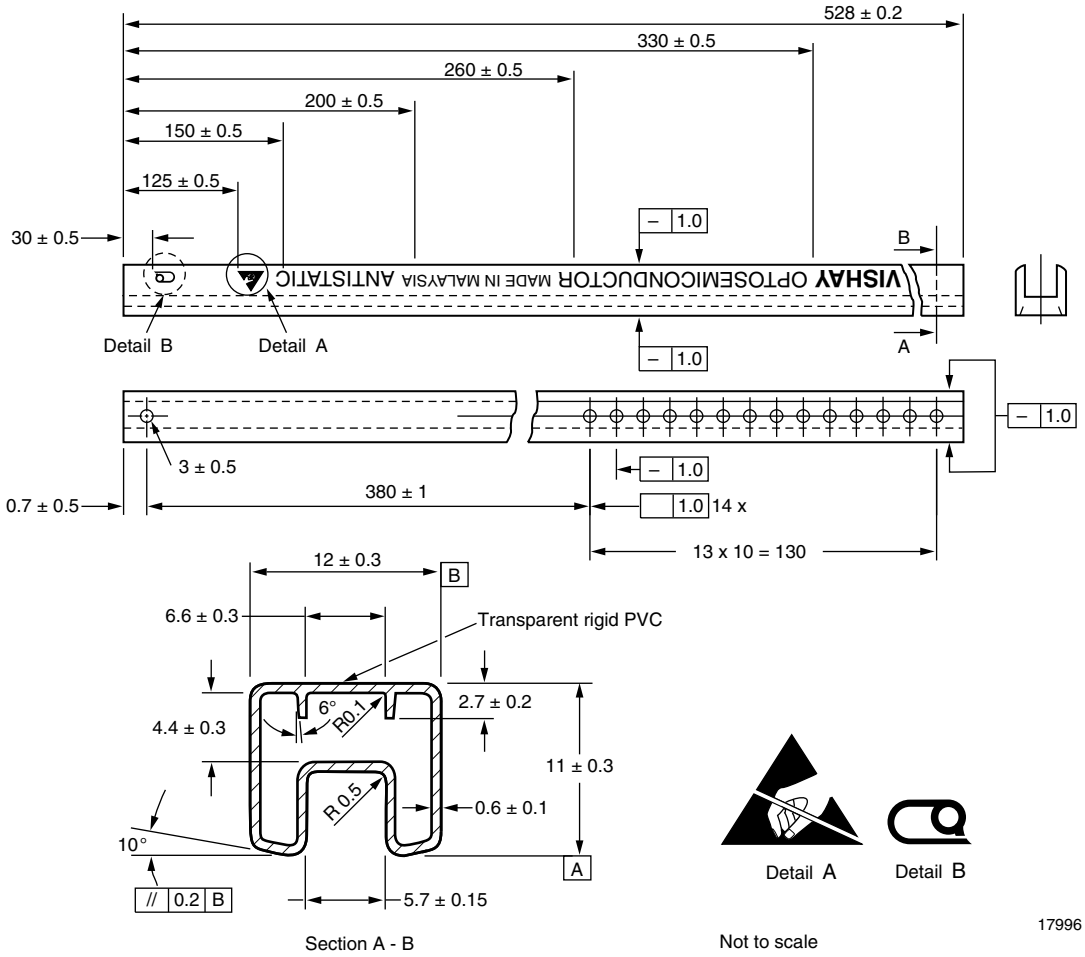


Fig. 13 - Shipping Tube Specifications for DIP Packages

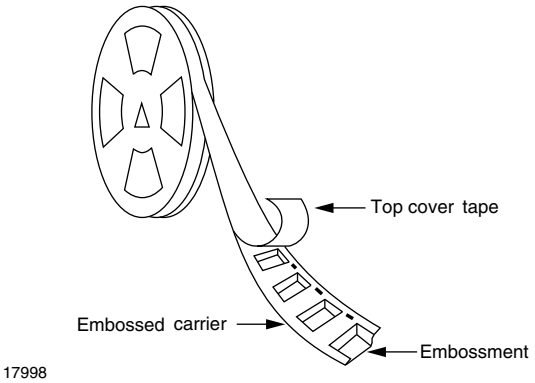


Fig. 14 - Tape and Reel Shipping Medium

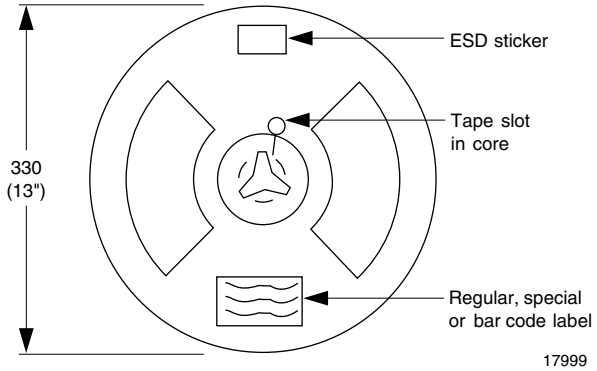


Fig. 15 - Tape and Reel Shipping Medium

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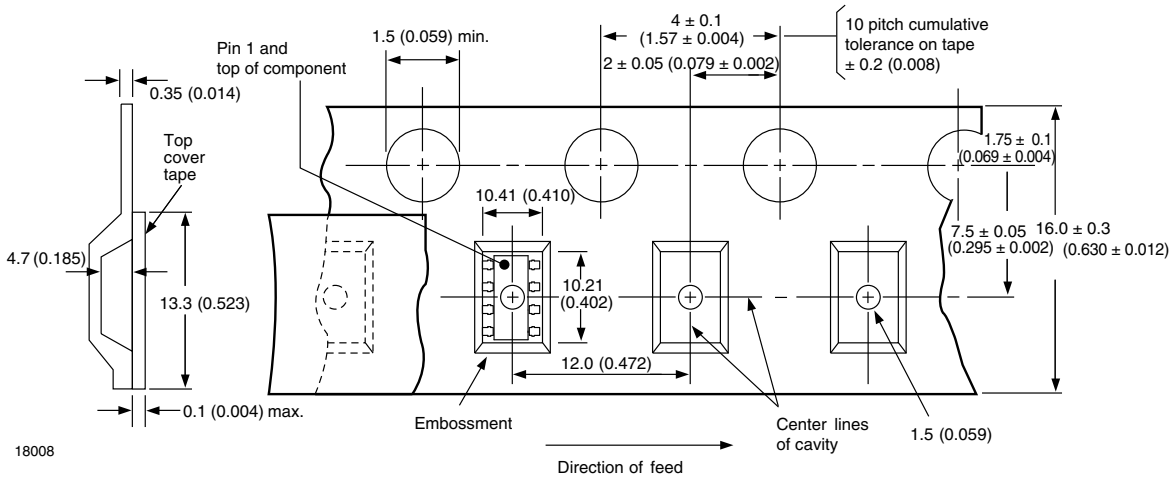


Fig. 16 - Tape and Packing (1000 pieces on reel)

SOLDER PROFILES

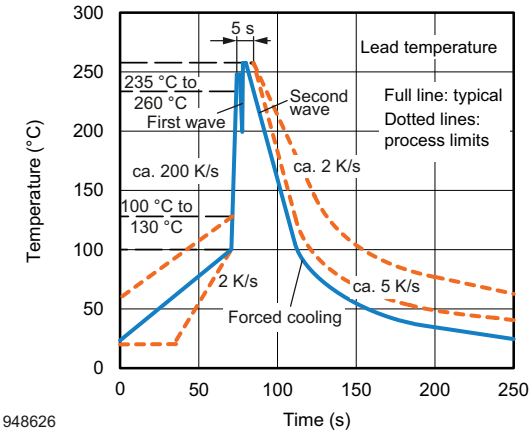


Fig. 17 - Recommended Wave Soldering Double Wave Profile for DIP Devices

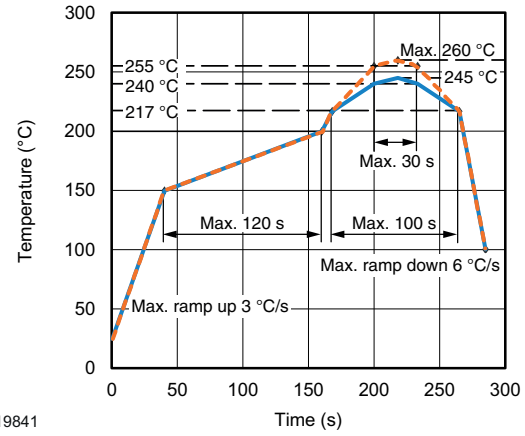


Fig. 18 - Recommended Lead (Pb)-free Reflow Solder Profile for SMD Devices

HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

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

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

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