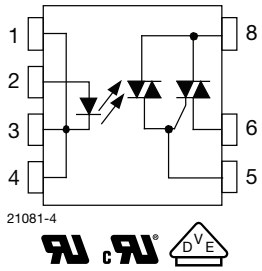
Optocoupler, Power Phototriac

23171



PIN	FUNCTION
1	LED cathode
2	LED anode
3	LED cathode
4	LED cathode
5	Triac gate
6	Triac T1
8	Triac T2

DESCRIPTION

The VO2223 is an optically couple phototriac driving a power triac in a DIP-8 package. It provides a 5300 V of input to output isolation.

FEATURES

- Maximum trigger current (I_{FT}): 10 mA
- Isolation test voltage 5300 V_{RMS}
- Peak off-state voltage 600 V
- Load current 0.9 A_{RMS}
- dV/dt of 210 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

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

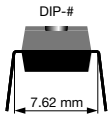
The safety application model number covering all products in this data sheet is VO2223. This model number should be used when consulting safety agency documents.

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

ORDERING INFORMATION

V	O	2	2	2	3	-	X	0	0	#

PART NUMBER — PACKAGE OPTION



AGENCY CERTIFIED / PACKAGE	TRIGGER, CURRENT I_{FT} (mA)
UL, cUL	**10**
DIP-8	VO2223
UL, cUL, VDE (option 1)	**10**
DIP-8	VO2223-X001

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
LED continuous forward current		I_F	50	mA
LED reverse voltage		V_R	6	V
OUTPUT				
Repetitive peak off-state voltage	Sine wave, 50 Hz to 60 Hz, gate open	V_{DRM}	600	V
On-state RMS current		$I_{T(RMS)}$	0.9	A
Peak non-repetitive surge current (60 Hz, 1 cycle)		I_{TSM}	9	A
COUPLER				
Total power dissipation (2)		P_{diss}	1.2	W
Ambient temperature range		T_{amb}	-40 to +85	°C
Storage temperature range		T_{stg}	-40 to +125	°C
Soldering temperature (1)	t ≤ 10 s max.	T_{sld}	260	°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

(1) Refer to wave profile for soldering conditions for through hole devices

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

ABSOLUTE MAXIMUM RATING CURVES

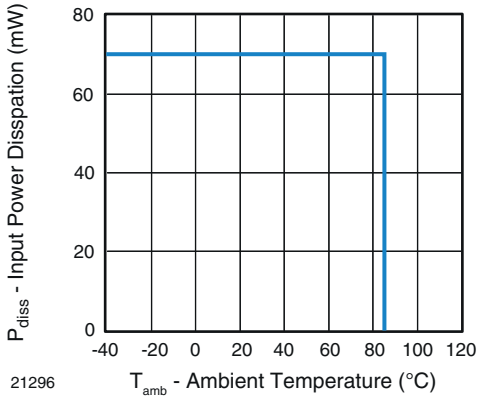


Fig. 1 - Power Dissipation vs. Temperature

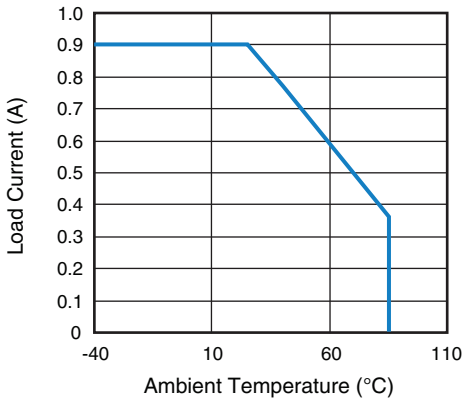


Fig. 2 - Allowable Load Current vs. Ambient Temperature

Note

- The allowable load current was calculated out under a given operating conditions and only for reference:
  LED power: Q_E = 0.015 W, θ_{BA} (4-layer) = 35 °C/W

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
LED trigger current	V_T = 6 V	I_{FT}	2.5	-	10	mA
LED reverse current	V_R = 5 V	I_R	-	-	10	µA
LED forward voltage	I_F = 10 mA	V_F	0.9	-	1.3	V
OUTPUT						
Peak on-state voltage	I_F = 10 mA, I_{TM} = max.	V_{TM}	-	-	2.5	V
Peak off-state current	I_F = 10 mA, 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}	-	210	-	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

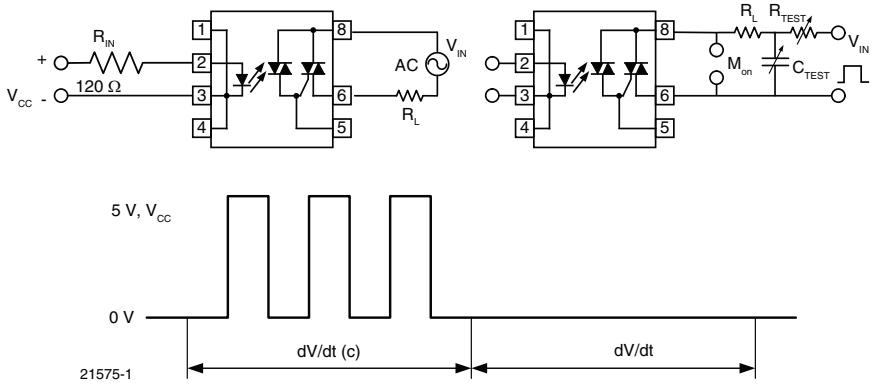


Fig. 3 - dV/dt Test Circuit

SAFETY AND INSULATION RATINGS							
PARAMETER		**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Climatic classification		IEC 68 part 1		-	40 / 85 / 21	-	
Pollution degree		DIN VDE0109		-	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 °C		V_{IO} = 500 V	R_{IS}	-	-	≥ 10^{12}	Ω
Insulation resistance at T_S		V_{IO} = 500 V	R_{IS}	-	-	≥ 10^9	Ω
Insulation resistance at 100 °C		V_{IO} = 500 V	R_{IS}	-	-	≥ 10^{11}	Ω
Partial discharge test voltage		Method b, V_{pd} = V_{IORM} x 1.6	V_{pd}	-	-	1424	V_{peak}
Safety limiting values - maximum values allowed in the event of a failure	Case temperature		T_{SI}	-	-	165	°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		≥ 7	-	-	mm
Minimum external tracking (creepage distance)		Measured from input terminals to output terminals, shortest distance path along body		≥ 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 °C, unless otherwise specified)

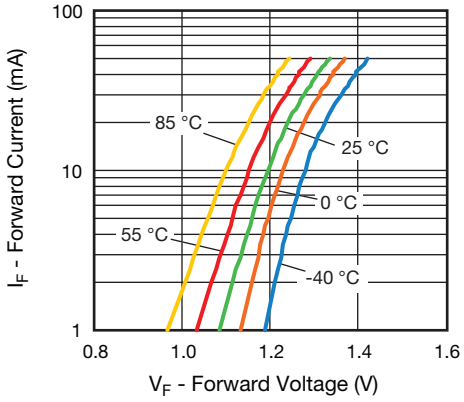


Fig. 4 - Forward Current vs. Forward Voltage

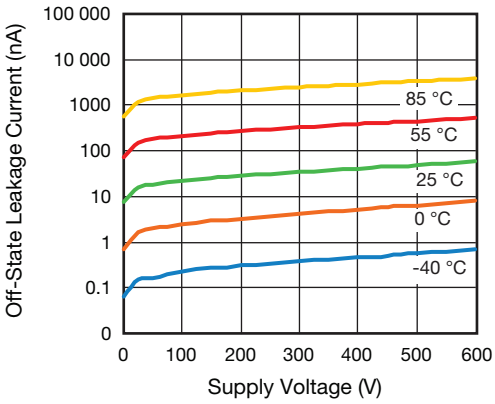


Fig. 7 - Off-State Leakage Current vs. Voltage

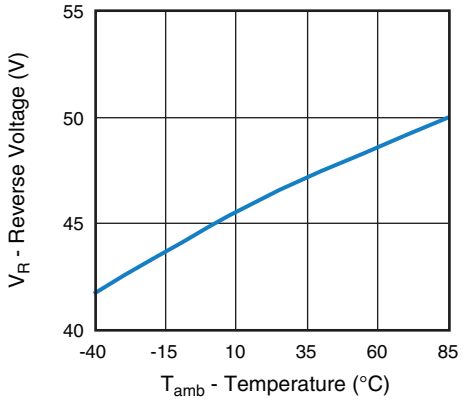


Fig. 5 - Reverse Voltage vs. Temperature

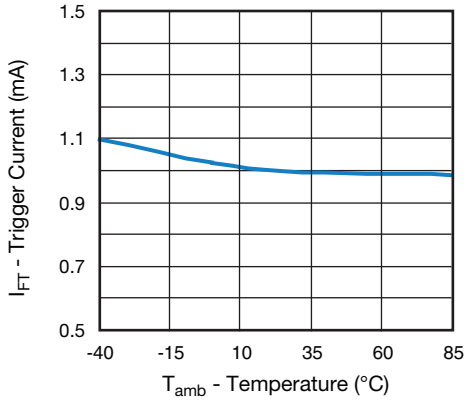


Fig. 8 - Normalized Trigger Input Current vs. Temperature

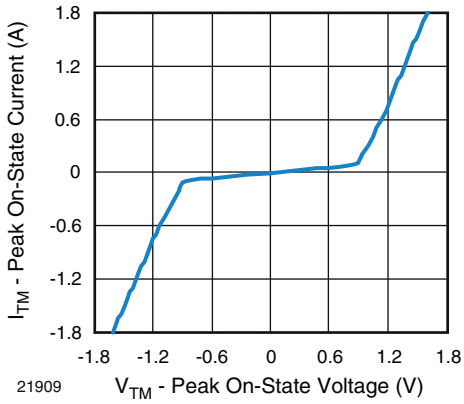


Fig. 6 - On-State Current vs. On-State Voltage

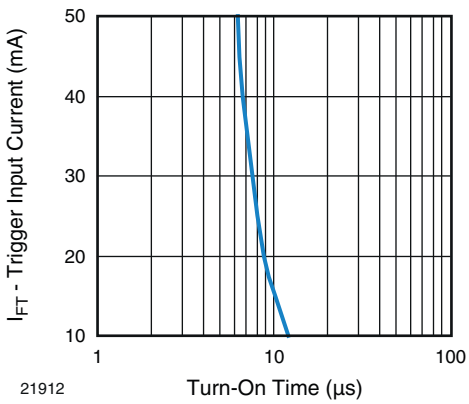


Fig. 9 - Trigger Input Current vs. Turn-On Time

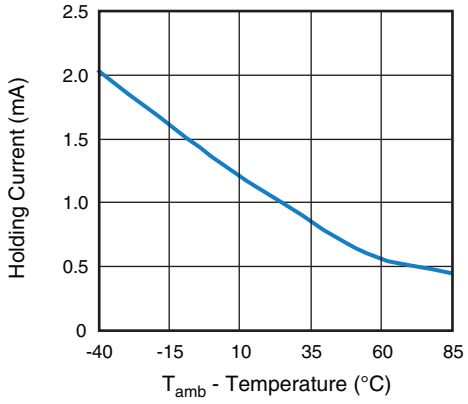


Fig. 10 - Normalized Holding Current vs. Temperature

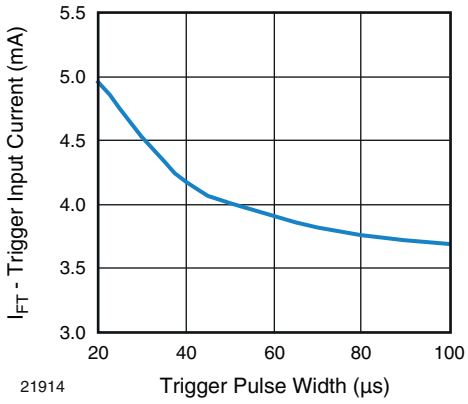


Fig. 11 - Trigger Current vs. Trigger Pulse Width

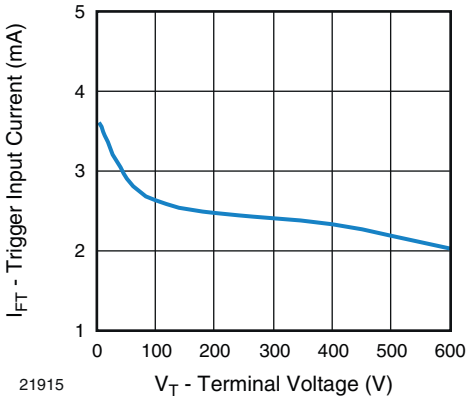
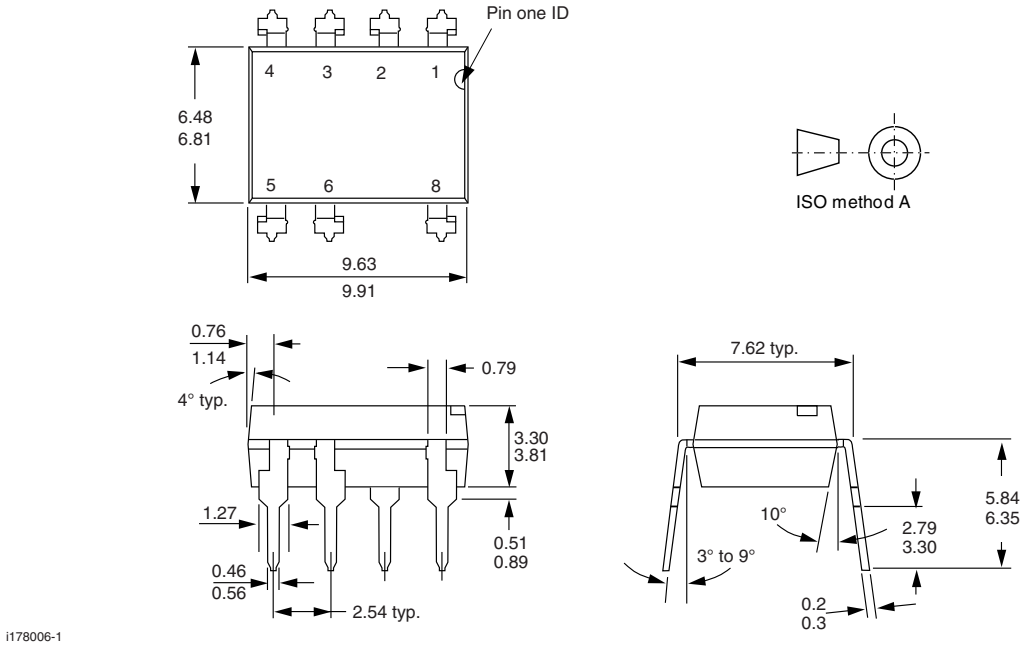


Fig. 12 - Trigger Current vs. V_{LOAD}

PACKAGE DIMENSIONS in millimeters



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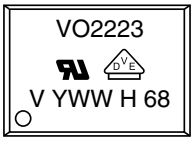
PACKAGE MARKING (Example of VO2223-X001)



PACKING INFORMATION

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

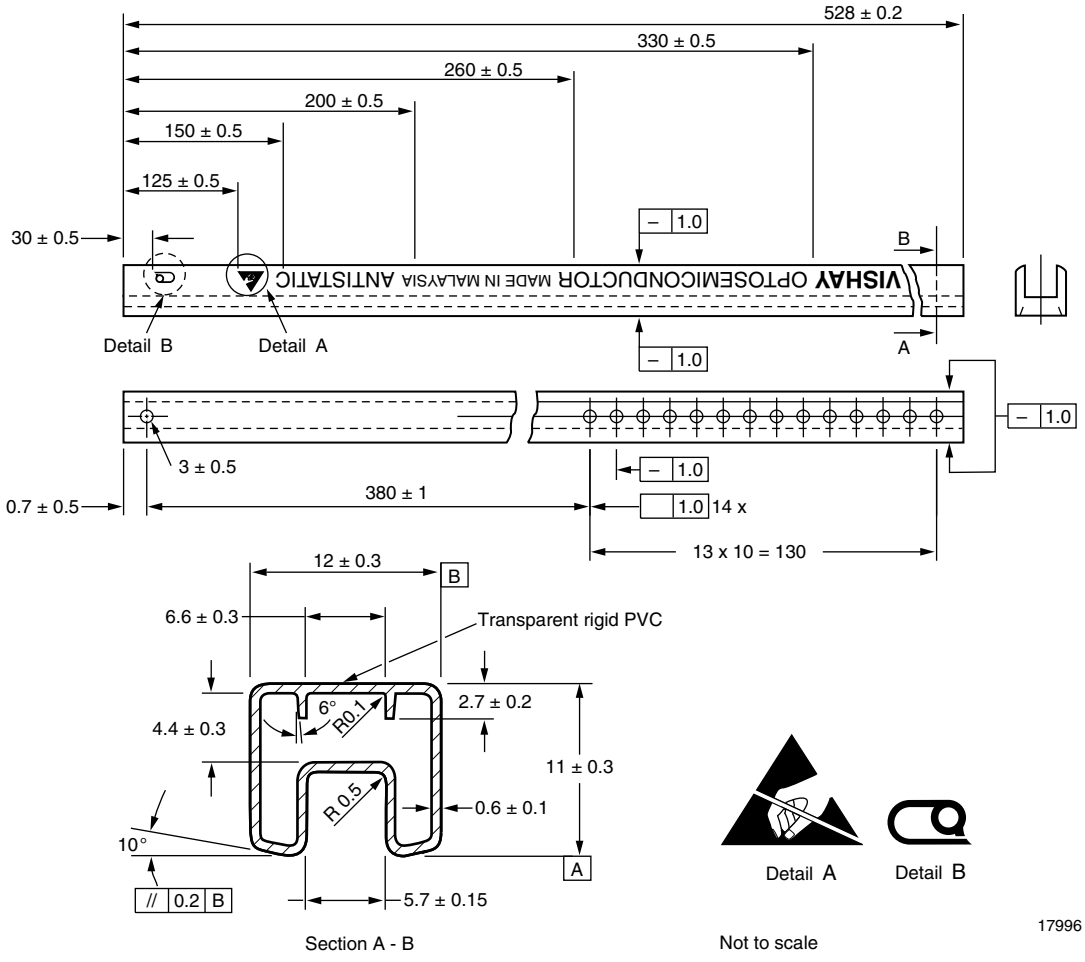


Fig. 13 - Shipping Tube Specifications for DIP Packages

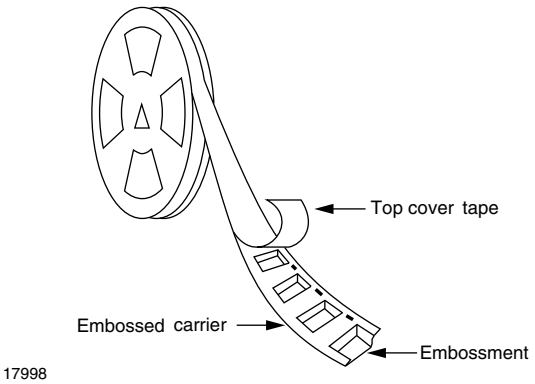


Fig. 14 - Tape and Reel Shipping Medium

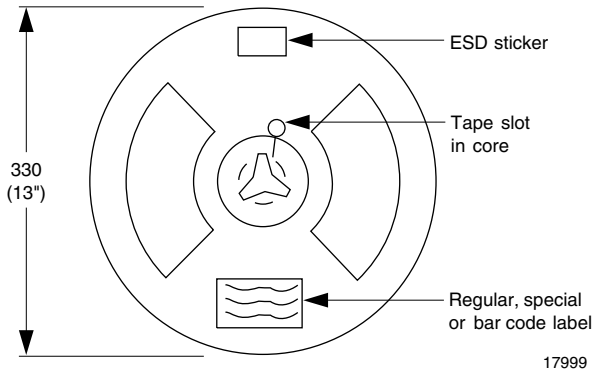


Fig. 15 - Tape and Reel Shipping Medium

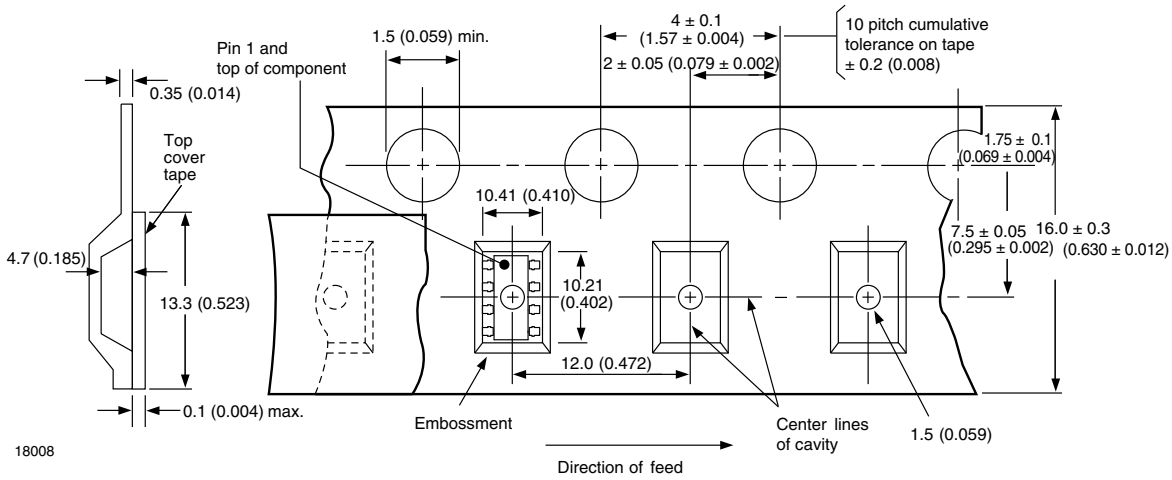


Fig. 16 - Tape and Packing (1000 pieces on reel)

SOLDER PROFILES

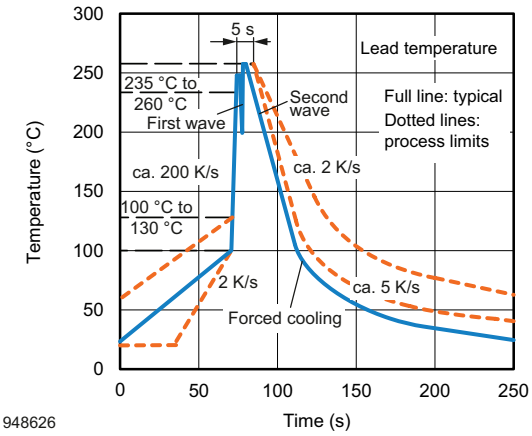


Fig. 17 - Recommended Wave Soldering Double Wave Profile for DIP Devices

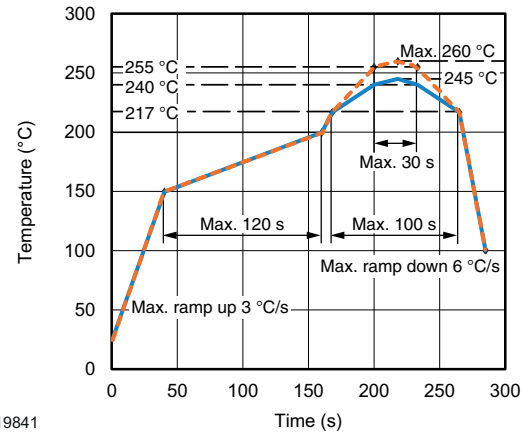


Fig. 18 - Recommended Lead (Pb)-free Reflow Solder Profile for SMD Devices

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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