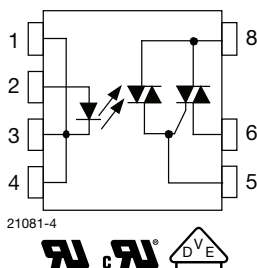


## Optocoupler, Power Phototriac



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/μs
- 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

| 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 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.

### APPLICATIONS

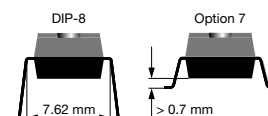
- Home appliances (air conditioners, microwave ovens, washing machines, personal hygiene systems, refrigerators, fan heaters, inductive heating cooker, water heaters, etc.)
- Industrial equipments

### AGENCY APPROVALS

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

### ORDERING INFORMATION

|             |   |   |   |   |   |   |   |                |   |   |   |
|-------------|---|---|---|---|---|---|---|----------------|---|---|---|
| V           | O | 2 | 2 | 2 | 3 | A | - | X              | 0 | 0 | # |
| PART NUMBER |   |   |   |   |   |   |   | PACKAGE OPTION |   |   |   |



| AGENCY CERTIFIED / PACKAGE     | TRIGGER, CURRENT $I_{FT}$ (mA) |
|--------------------------------|--------------------------------|
| <b>UL, cUL</b>                 | <b>10</b>                      |
| DIP-8                          | VO2223A                        |
| DIP-8, option 7                | VO2223A-X007T                  |
| <b>UL, cUL, VDE (option 1)</b> | <b>10</b>                      |
| 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
- (1) Refer to wave profile for soldering conditions for through hole devices
- (2) Total power dissipation value is based on 2S2P PCB

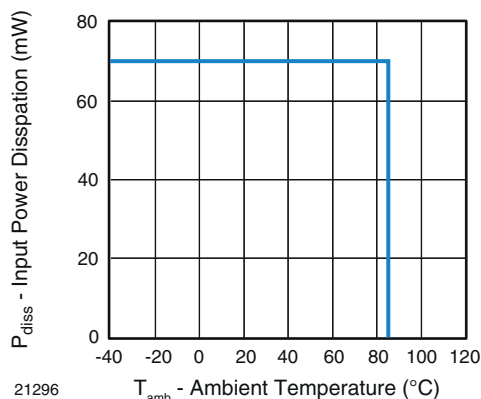
**ABSOLUTE MAXIMUM RATING CURVES**


Fig. 1 - Power Dissipation vs. Temperature

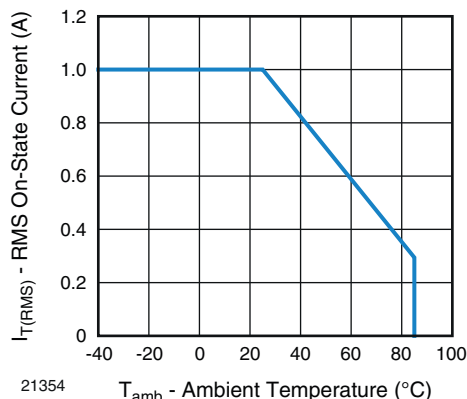


Fig. 2 - Allowable Load Current vs. Ambient Temperature

**Note**

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

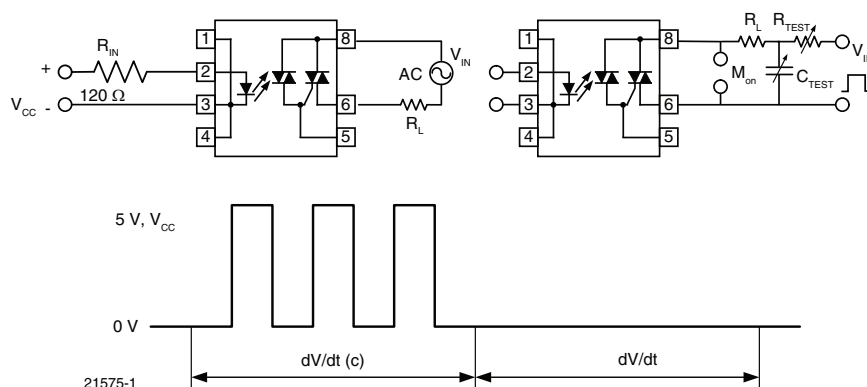


Fig. 3 - dV/dt Test Circuit

| <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,<br>$V_{pd} = V_{IORM} \times 1.6$  | $V_{pd}$   | -        | -            | 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

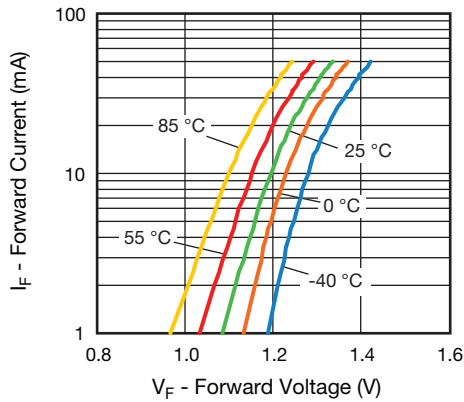
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 4 - Forward Current vs. Forward Voltage

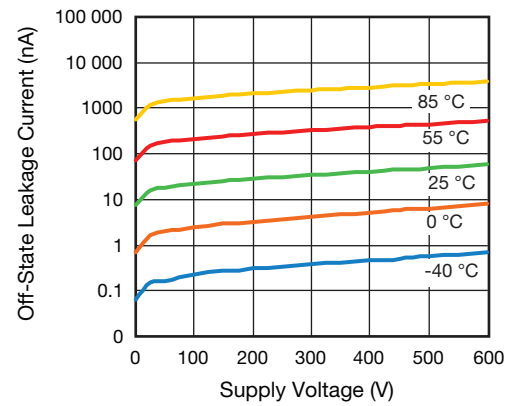


Fig. 7 - Off-State Leakage Current vs. Voltage

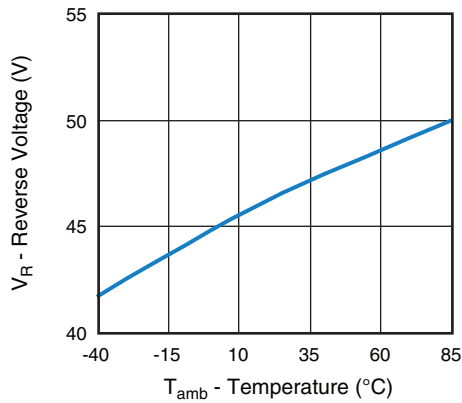


Fig. 5 - Reverse Voltage vs. Temperature

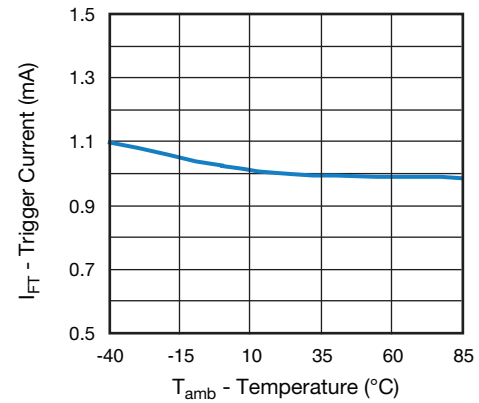


Fig. 8 - Normalized Trigger Input Current vs. Temperature

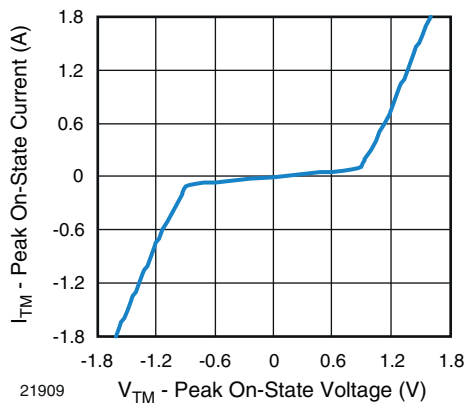


Fig. 6 - On-State Current vs. On-State Voltage

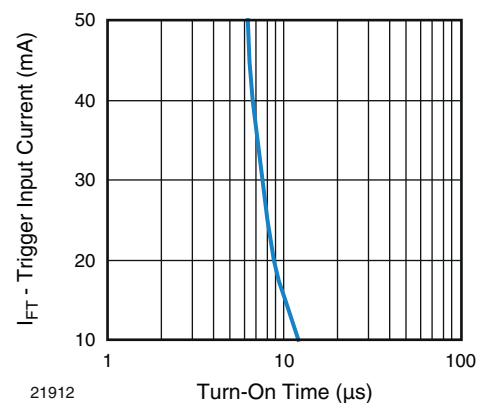


Fig. 9 - Trigger Input Current vs. Turn-on Time

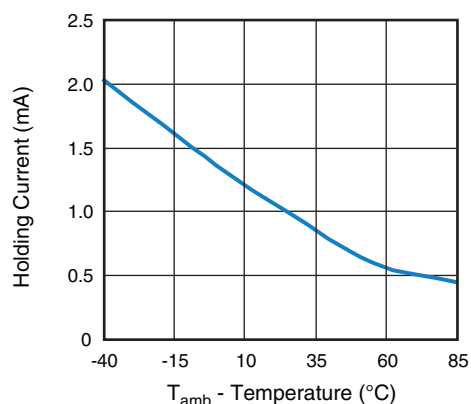


Fig. 10 - Normalized Holding Current vs. Temperature

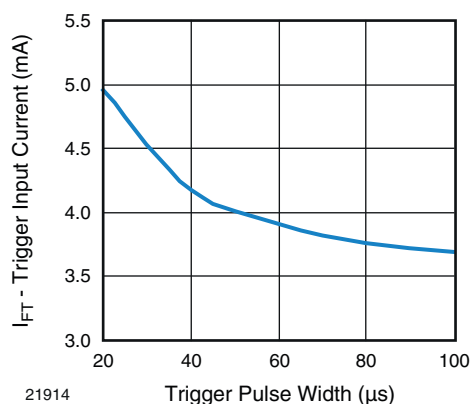


Fig. 11 - Trigger Current vs. Trigger Pulse Width

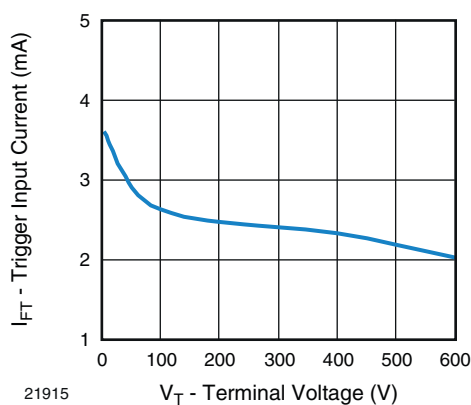
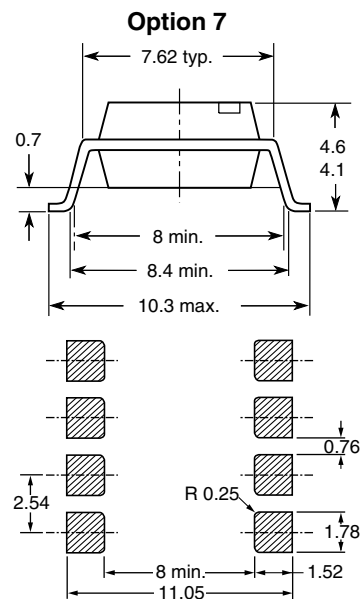
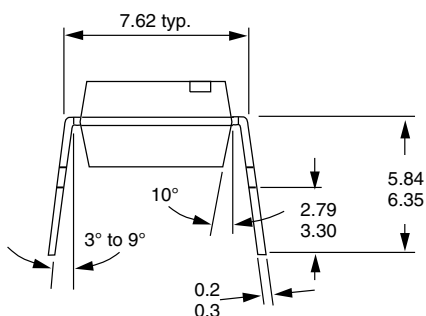
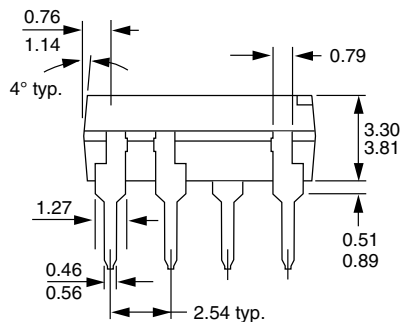
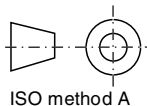
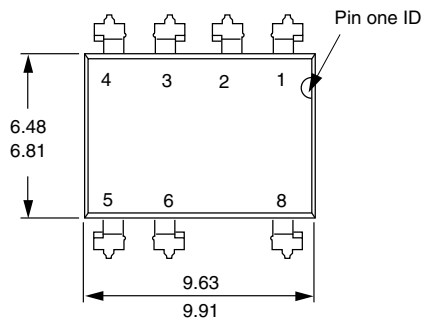


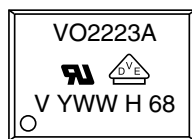
Fig. 12 - Trigger Current vs. V<sub>LOAD</sub>



**PACKAGE DIMENSIONS** in millimeters

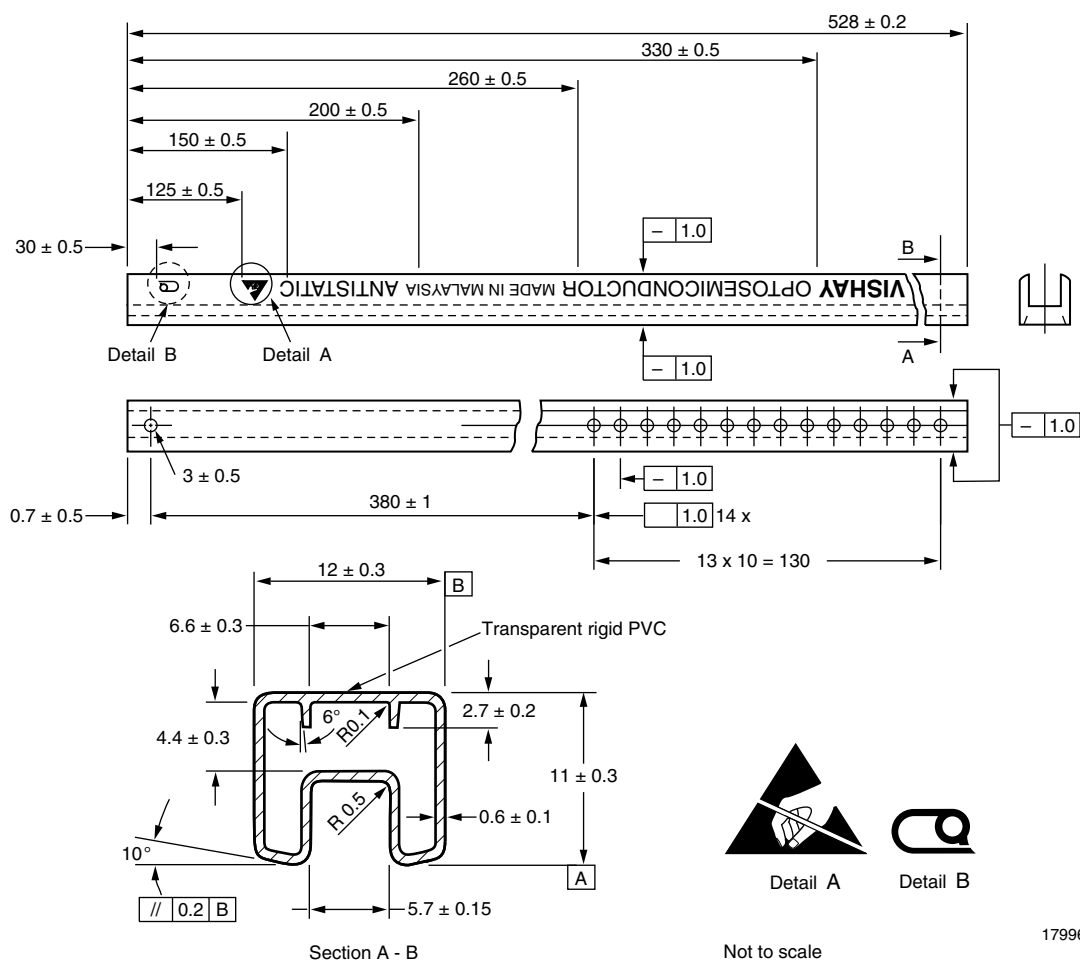


**PACKAGE MARKING** (Example of VO2223A-X001)



**PACKING INFORMATION**

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

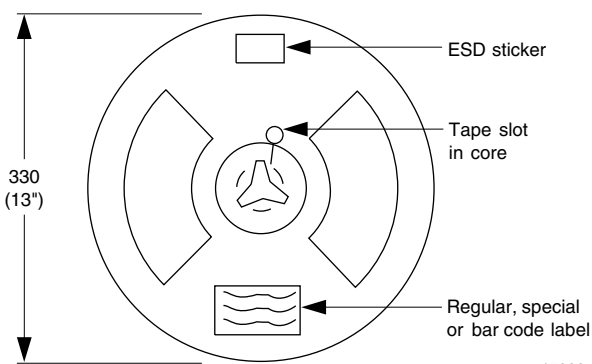
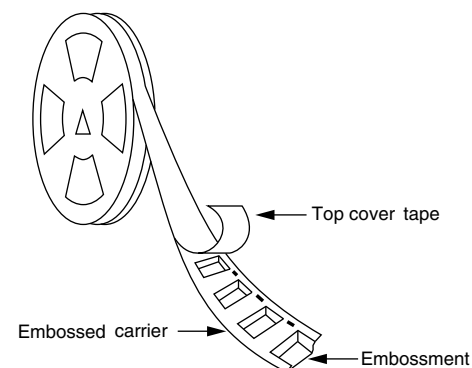


17996

Not to scale

17996

17998



17999

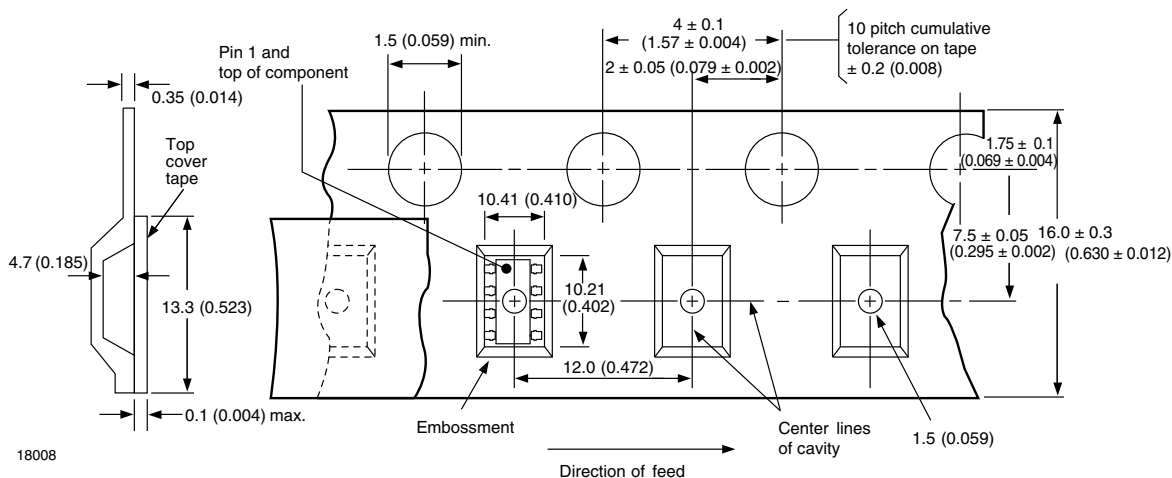
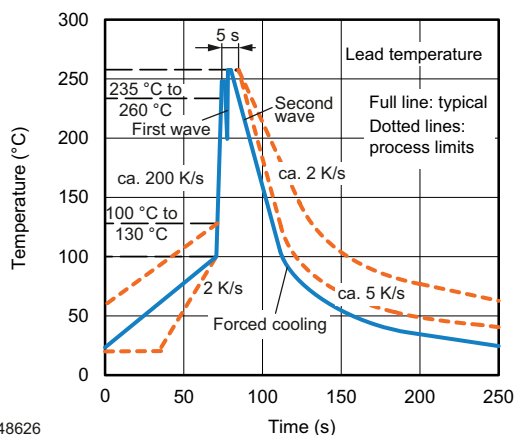


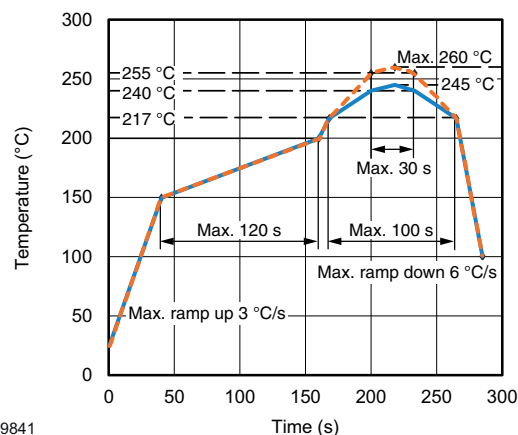
Fig. 16 - Tape and Packing (1000 pieces on reel)

## 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





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