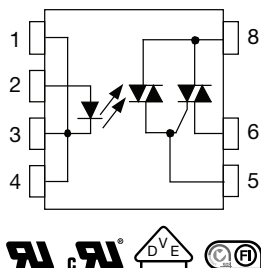


# Optocoupler, Power Phototriac



## FEATURES

- Fully integrated power TRIAC
- Peak off-state voltage 600 V
- Load current 1 A<sub>RMS</sub>
- dV/dt of 600 V/μs
- DIP-8 package
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## 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](#)

## LINKS TO ADDITIONAL RESOURCES



## 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<sub>AC</sub> and is sufficient for as much as 380 V<sub>AC</sub>.

## ORDERING INFORMATION

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

| AGENCY CERTIFIED / PACKAGE     | TRIGGER, CURRENT I <sub>FT</sub> (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>                                                                                          |                                      |              |             |                    |
| Output power dissipation                                                                               |                                      | $P_{diss}$   | 1130        | mW                 |
| 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>                                                                 |                                      | $P_{diss}$   | 1200        | mW                 |
| 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.

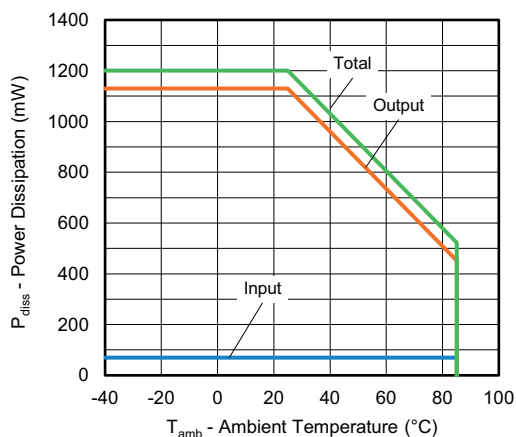
**ABSOLUTE MAXIMUM RATING CURVES**


Fig. 1 - Power Dissipation vs. Ambient Temperature

| <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                                                                                    | $V_T = 6\text{ V}$                                                | $I_{FT}$      | -    | 3.5  | 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                                                                                          | $R_L = 100\text{ }\Omega$                                         | $I_H$         | -    | -    | 25   | mA                     |
| Critical rate of rise of off-state voltage                                                               | $V_{IN} = 400\text{ V}_{RMS}$ (Fig. 3)                            | $dV/dt_{cr}$  | -    | 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.

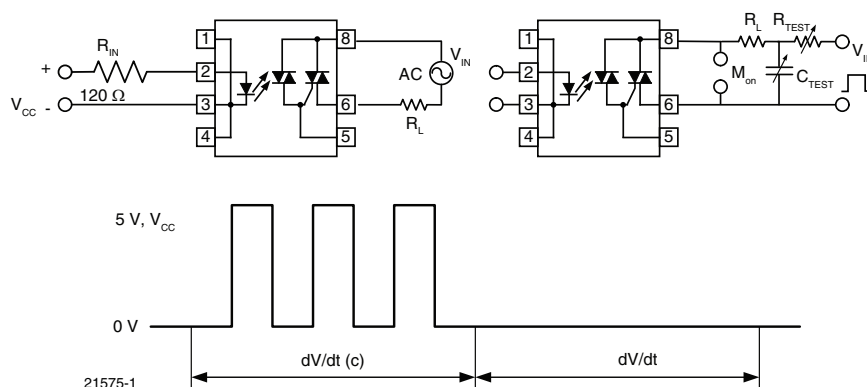


Fig. 2 - dV/dt Test Circuit

| <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                     |                                                                   | $T_{SI}$   | 175            | $^{\circ}\text{C}$ |
| 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

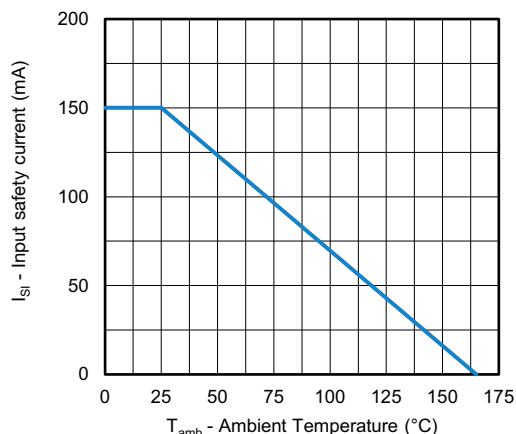


Fig. 3 - Input Safety Current vs. Ambient Temperature

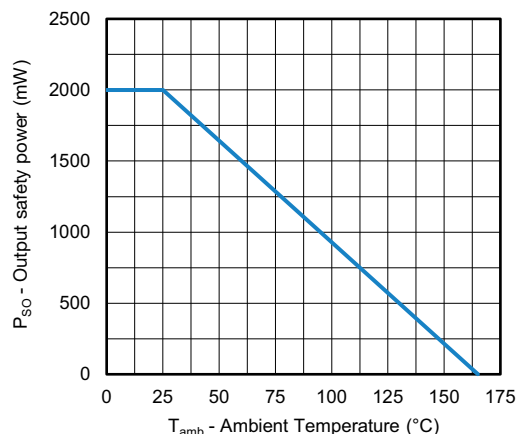


Fig. 4 - Output Safety Power vs. Ambient Temperature

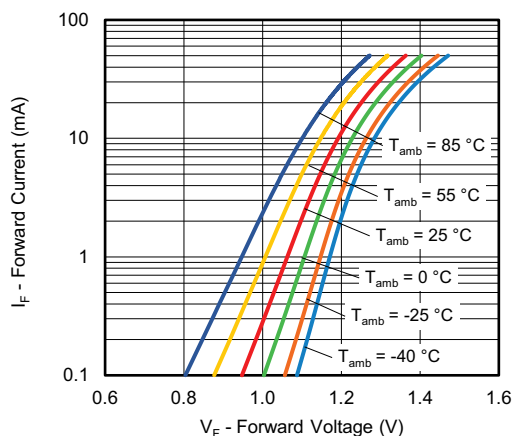
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 5 - Forward Current vs. Forward Voltage

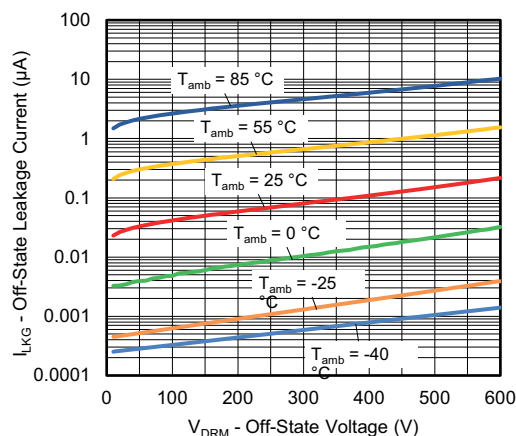


Fig. 7 - Off-State Leakage Current vs. Off-State Voltage

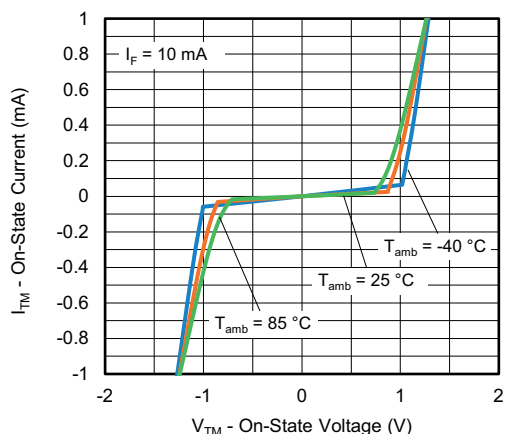


Fig. 6 - On-State Current vs. On-State Voltage

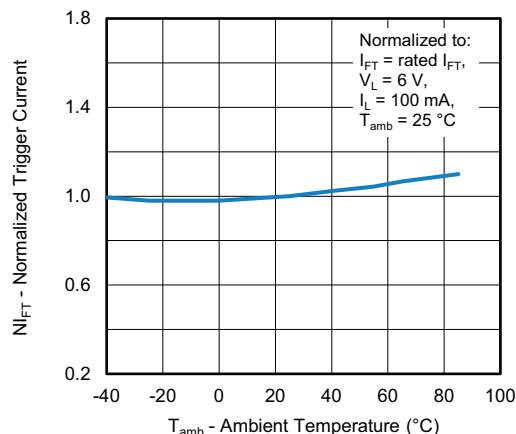


Fig. 8 - Normalized Trigger Input Current vs. Ambient Temperature

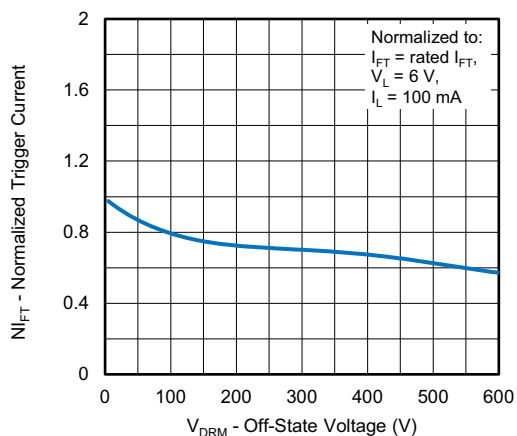


Fig. 9 - Normalized Trigger Current vs. Off-State Voltage

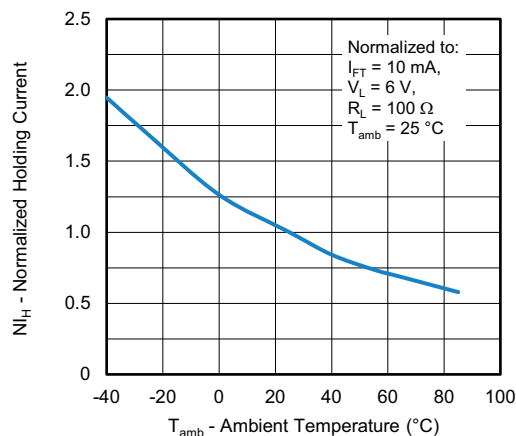


Fig. 11 - Normalized Holding Current vs. Ambient Temperature

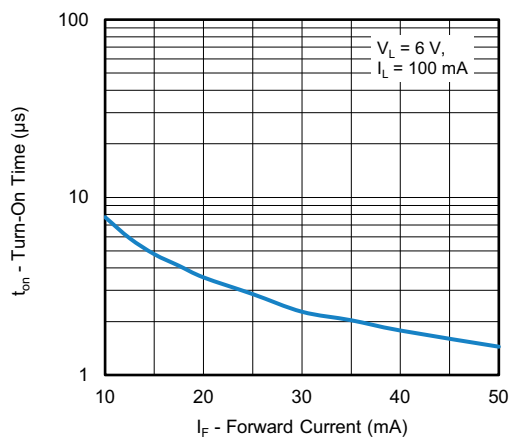


Fig. 10 - Turn-On Time vs. Forward Current

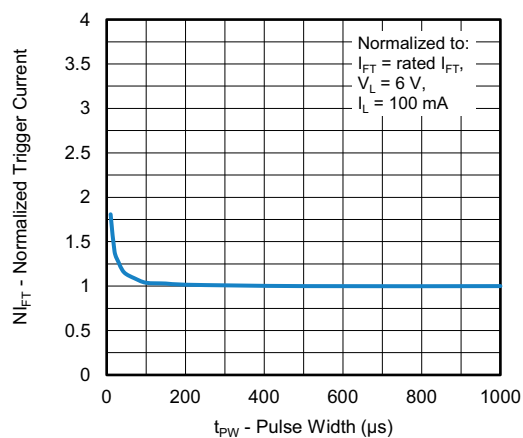
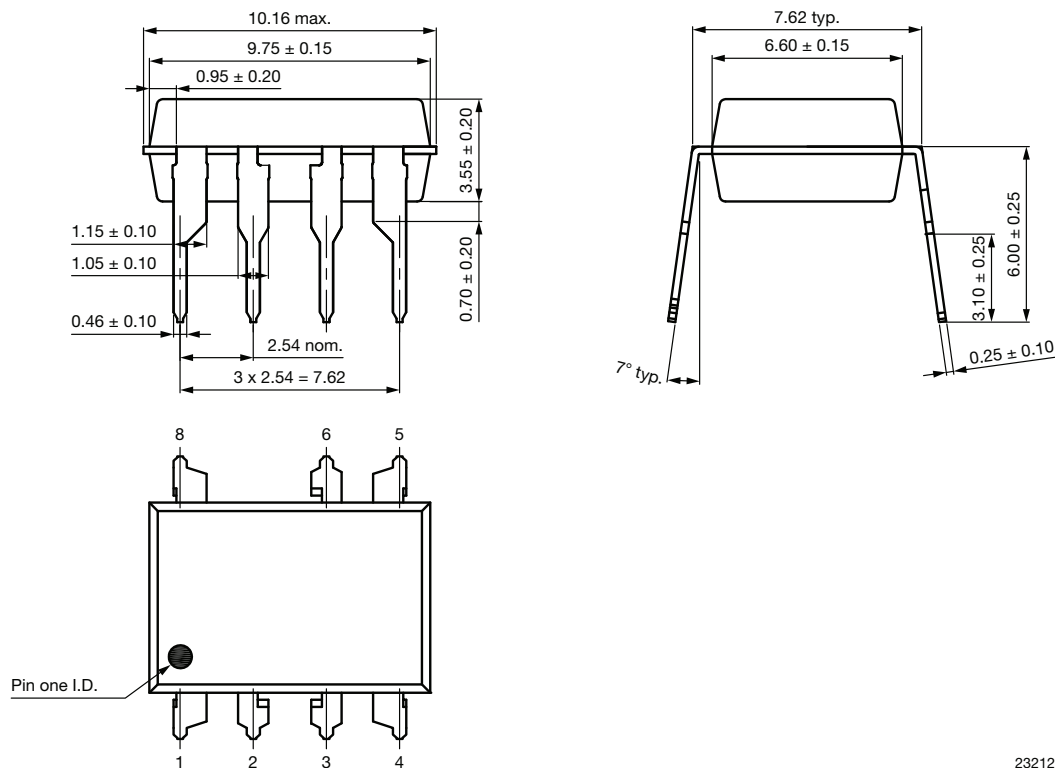


Fig. 12 - Normalized Trigger Current vs. Pulse Width



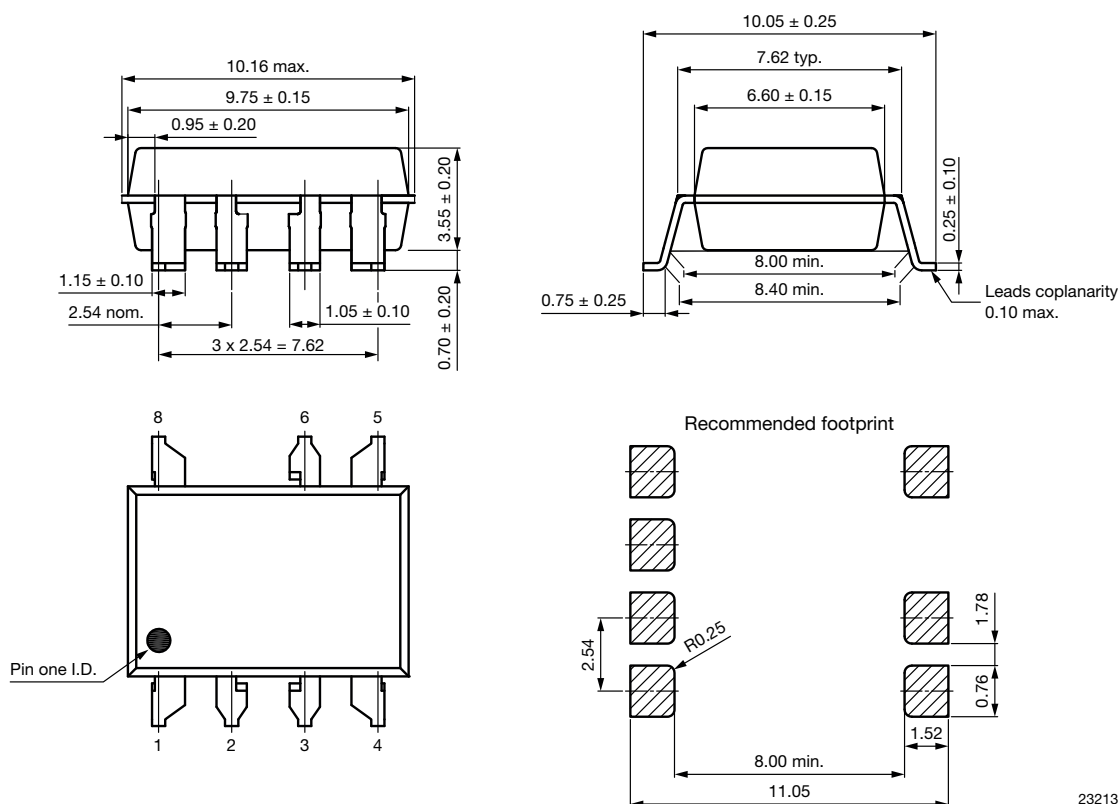
**PACKAGE DIMENSIONS** in millimeters

**DIP-8**



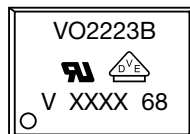
23212

**SMD-8, Option 7**



23213

### 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      |

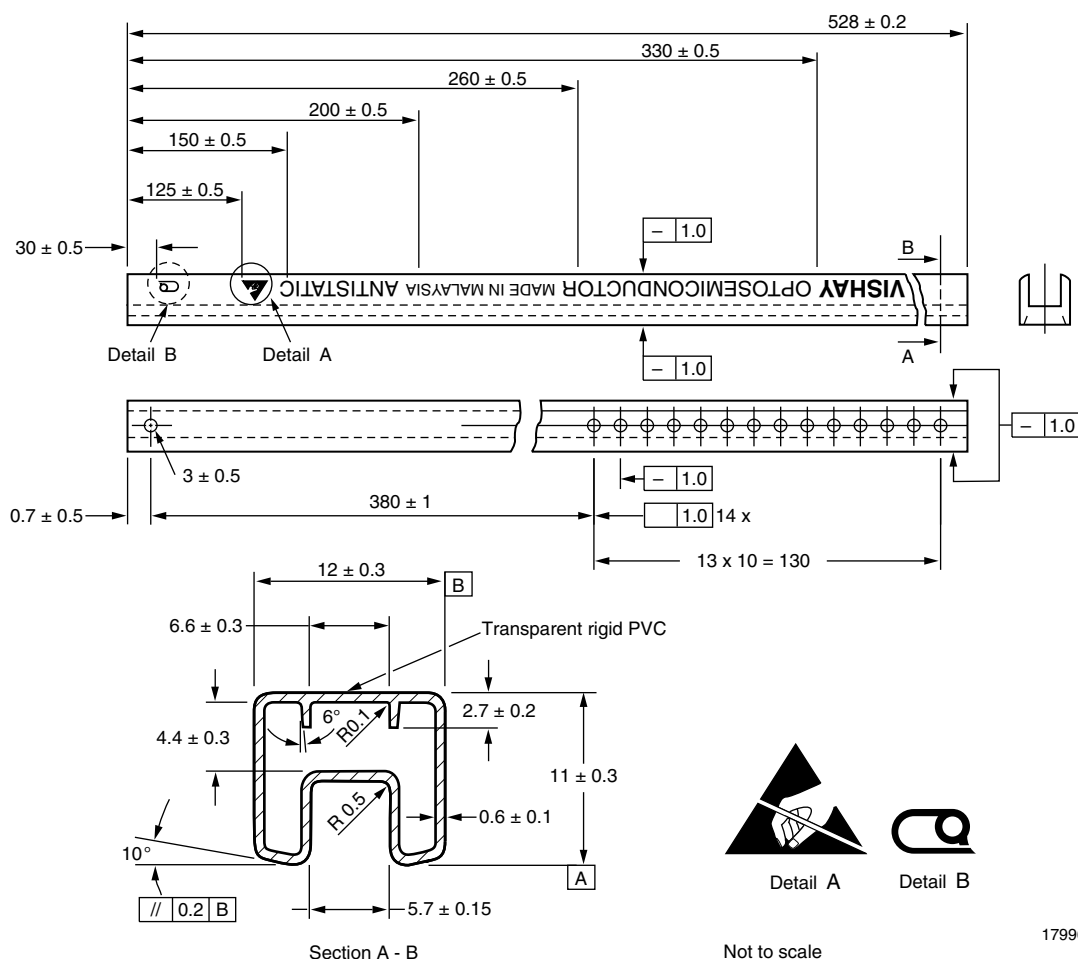
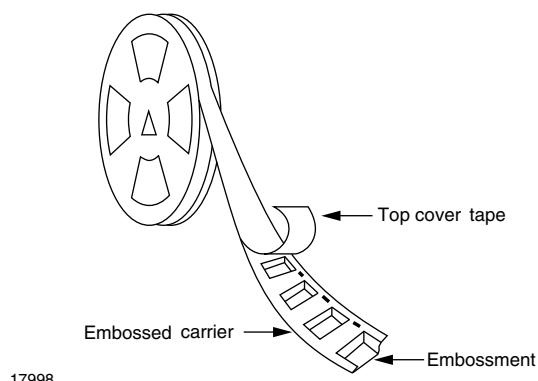
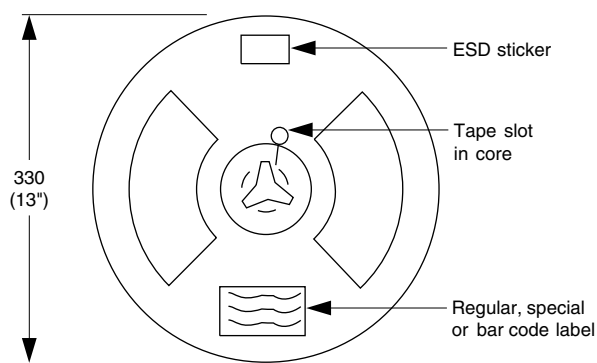


Fig. 13 - Shipping Tube Specifications for DIP Packages



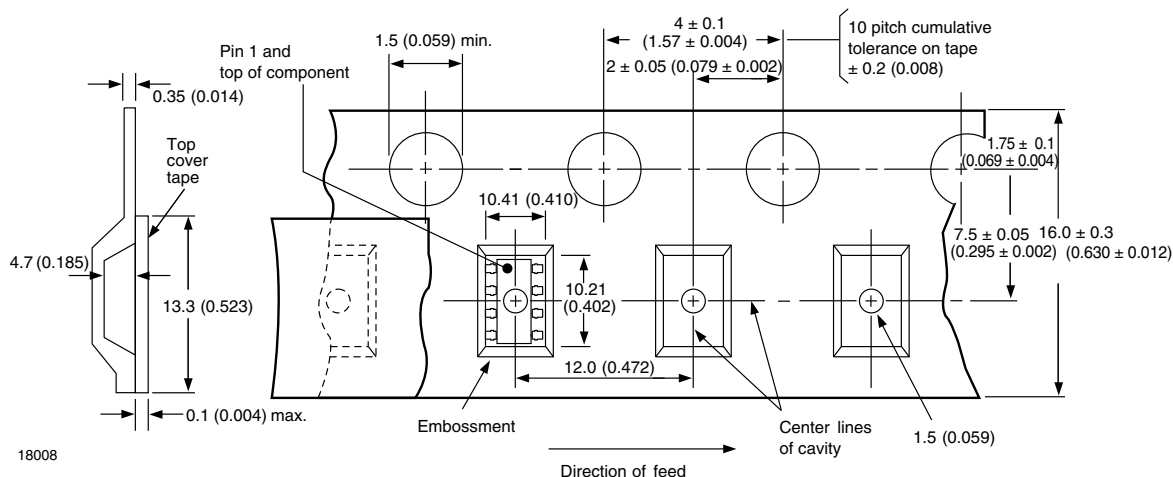
17998

Fig. 14 - Tape and Reel Shipping Medium



17999

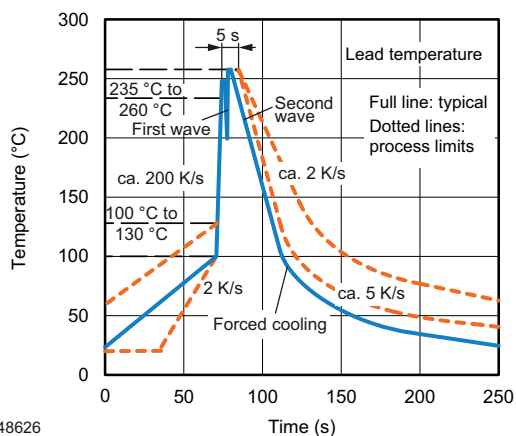
Fig. 15 - Tape and Reel Shipping Medium



18008

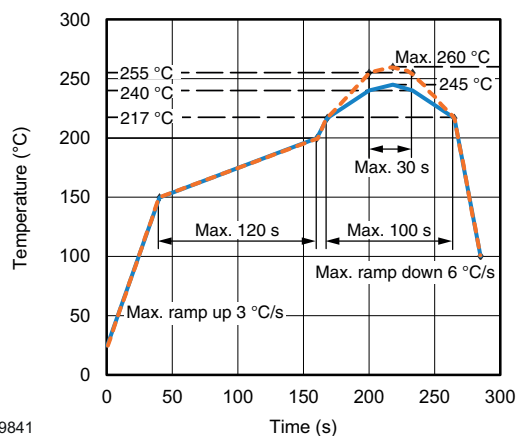
Fig. 16 - Tape and Packing (1000 pieces on reel)

## 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



## 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.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. 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.