Optocoupler, Power Phototriac

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 (IFT): 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

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

<table>
<thead>
<tr>
<th>PIN</th>
<th>FUNCTION</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>LED cathode</td>
</tr>
<tr>
<td>2</td>
<td>LED anode</td>
</tr>
<tr>
<td>3</td>
<td>LED cathode</td>
</tr>
<tr>
<td>4</td>
<td>LED cathode</td>
</tr>
<tr>
<td>5</td>
<td>Triac gate</td>
</tr>
<tr>
<td>6</td>
<td>Triac T1</td>
</tr>
<tr>
<td>8</td>
<td>Triac T2</td>
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PART NUMBER

<table>
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<tr>
<th>AGENCY CERTIFIED / PACKAGE</th>
<th>TRIGGER, CURRENT I_{FT} (mA)</th>
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<tr>
<td>UL, cUL</td>
<td>10</td>
</tr>
<tr>
<td>DIP-8</td>
<td>VO2223</td>
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<tr>
<td>UL, cUL, VDE (option 1)</td>
<td>10</td>
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<tr>
<td>DIP-8</td>
<td>VO2223-X001</td>
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</tbody>
</table>
ABSOLUTE MAXIMUM RATING CURVES

**Fig. 1 - Power Dissipation vs. Temperature**

**Fig. 2 - Allowable Load Current vs. Ambient Temperature**

**Notes**

- The allowable load current was calculated out under a given operating conditions and only for reference.
- LED power: \( Q_E = 0.015 \text{ W}, \theta_{BA} (4\text{-layer}) = 35 \text{ °C/W} \)
**ELECTRICAL CHARACTERISTICS** (T_{amb} = 25 °C, unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
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</thead>
<tbody>
<tr>
<td>INPUT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED trigger current</td>
<td>V_T = 6 V</td>
<td>I_{TT}</td>
<td>2.5</td>
<td>-</td>
<td>10</td>
<td>mA</td>
</tr>
<tr>
<td>LED reverse current</td>
<td>V_R = 5 V</td>
<td>I_R</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>μA</td>
</tr>
<tr>
<td>LED forward voltage</td>
<td>I_F = 10 mA</td>
<td>V_F</td>
<td>0.9</td>
<td>-</td>
<td>1.3</td>
<td>V</td>
</tr>
<tr>
<td>OUTPUT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak on-state voltage</td>
<td>I_F = 10 mA, I_TM = max.</td>
<td>V_TM</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
<td>V</td>
</tr>
<tr>
<td>Peak off-state current</td>
<td>I_F = 10 mA, V_DRM = 600 V</td>
<td>I_DRM</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>μA</td>
</tr>
<tr>
<td>Holding current</td>
<td>R_L = 100 Ω</td>
<td>I_H</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>mA</td>
</tr>
<tr>
<td>Critical rate of rise of off-state voltage</td>
<td>V_IN = 400 V_{RMS} (Fig. 3)</td>
<td>dV/dt_{cr}</td>
<td>-</td>
<td>210</td>
<td>-</td>
<td>V/μs</td>
</tr>
<tr>
<td>Critical rate of rise of commutating voltage</td>
<td>V_IN = 240 V_{RMS}, I_T = 1 A_{RMS} (Fig. 3)</td>
<td>dV/dt_{crq}</td>
<td>-</td>
<td>0.7</td>
<td>-</td>
<td>V/μs</td>
</tr>
</tbody>
</table>

**SAFETY AND INSULATION RATINGS**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatic classification</td>
<td>IEC 68 part 1</td>
<td>-</td>
<td>40 / 85 / 21</td>
<td>-</td>
<td>-</td>
<td>Unit</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>DIN VDE0109</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>Unit</td>
</tr>
<tr>
<td>Tracking resistance (comparative tracking index)</td>
<td>Insulation group IIIa</td>
<td>CTI</td>
<td>175</td>
<td>-</td>
<td>-</td>
<td>Unit</td>
</tr>
<tr>
<td>Highest allowable overvoltage</td>
<td>Transient overvoltage</td>
<td>V_{OTM}</td>
<td>8000</td>
<td>-</td>
<td>-</td>
<td>V_{peak}</td>
</tr>
<tr>
<td>Maximum working insulation voltage</td>
<td>Recurring peak voltage</td>
<td>V_{GRM}</td>
<td>890</td>
<td>-</td>
<td>-</td>
<td>V_{peak}</td>
</tr>
<tr>
<td>Insulation resistance at 25 °C</td>
<td>V_{IO} = 500 V</td>
<td>R_{IS}</td>
<td>-</td>
<td>-</td>
<td>≥ 10^{12}</td>
<td>Ω</td>
</tr>
<tr>
<td>Insulation resistance at T_S</td>
<td>V_{IO} = 500 V</td>
<td>R_{IS}</td>
<td>-</td>
<td>-</td>
<td>≥ 10^9</td>
<td>Ω</td>
</tr>
<tr>
<td>Insulation resistance at 100 °C</td>
<td>V_{IO} = 500 V</td>
<td>R_{IS}</td>
<td>-</td>
<td>-</td>
<td>≥ 10^{11}</td>
<td>Ω</td>
</tr>
<tr>
<td>Partial discharge test voltage</td>
<td>Method b, V_{pd} = V_{GRM} x 1.6</td>
<td>V_{pd}</td>
<td>-</td>
<td>-</td>
<td>1424</td>
<td>V_{peak}</td>
</tr>
<tr>
<td>Safety limiting values - maximum values allowed in the event of a failure</td>
<td>Case temperature</td>
<td>T_SI</td>
<td>-</td>
<td>-</td>
<td>165</td>
<td>°C</td>
</tr>
<tr>
<td>Input current</td>
<td>I_{SI}</td>
<td>-</td>
<td>150</td>
<td>mA</td>
<td>-</td>
<td>mW</td>
</tr>
<tr>
<td>Output power</td>
<td>P_{SO}</td>
<td>-</td>
<td>2000</td>
<td>mW</td>
<td>-</td>
<td>mm</td>
</tr>
<tr>
<td>Minimum external air gap (clearance distance)</td>
<td>Measured from input terminals to output terminals, shortest distance through air</td>
<td>-</td>
<td>≥ 7</td>
<td>-</td>
<td>-</td>
<td>mm</td>
</tr>
<tr>
<td>Minimum external tracking (creepage distance)</td>
<td>Measured from input terminals to output terminals, shortest distance path along body</td>
<td>-</td>
<td>≥ 7</td>
<td>-</td>
<td>-</td>
<td>mm</td>
</tr>
</tbody>
</table>

**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.

- 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. 5 - Reverse Voltage vs. Temperature

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

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

Fig. 8 - Normalized Trigger Input Current vs. Temperature

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

Pin one ID

ISO method A

PACKAGE MARKING (Example of VO2223-X001)

VO2223
V YWW H 68
PACKING INFORMATION

### DEVICE PER TUBE

<table>
<thead>
<tr>
<th>TYPE</th>
<th>UNITS/TUBE</th>
<th>TUBES/BOX</th>
<th>UNITS/BOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIP-8</td>
<td>50</td>
<td>40</td>
<td>2000</td>
</tr>
</tbody>
</table>

**Fig. 13 - Shipping Tube Specifications for DIP Packages**

**Fig. 14 - Tape and Reel Shipping Medium**

**Fig. 15 - Tape and Reel Shipping Medium**

For technical questions, contact: optocoupleranswers@vishay.com

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SOLDER PROFILES

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

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: $T_{\text{amb}} < 30 \, ^\circ \text{C}$, RH < 85 %
Moisture sensitivity level 1, according to J-STD-020
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