Automotive Photovoltaic MOSFET Driver
With Integrated Fast Turn-Off

DESCRIPTION
The VOMDA1271 is an automotive qualified optically
isolated MOSFET driver. The VOMDA1271 obtains all the
required current to drive its internal circuitry from the
infrared emitter on the low voltage, primary side of the
isolation barrier. No power supply is needed to provide VCC.
The VOMDA1271 features a turn-off circuit to achieve a fast
turn off of the MOSFET.

FEATURES
• AEC-Q102 qualified
• Open circuit voltage of 8.5 V typical
  at If = 10 mA
• Short circuit current at 15 μA typical
  at If = 10 mA
• Isolation test voltage 3750 VRMS
• Operating temperature from -40 °C to
  +125 °C
• Material categorization:
  for definitions of compliance please see
  www.vishay.com/doc?99912

APPLICATIONS
• Automotive pre-charge relay
• Powerwall chargers
• Gate driver for High Voltage MOSFETs
• BMS
• Custom solid-state relays

AGENCY APPROVALS
• UL (pending)
• cUL (pending)
• VDE (pending)
• CQC (pending)

LINKS TO ADDITIONAL RESOURCES
**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Tape and Reel</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOMDA1271T</td>
<td>SOP-4</td>
</tr>
</tbody>
</table>

**PACKAGE**

- UL, cUL, VDE, CQC

**Note**

- The product is available only on tape and reel

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**ABSOLUTE MAXIMUM RATINGS** \( (T_{amb} = 25 \, ^\circ\text{C}, \text{unless otherwise specified}) \)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED continuous forward current</td>
<td></td>
<td>( I_F )</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>LED reverse voltage</td>
<td></td>
<td>( V_R )</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Power dissipation</td>
<td></td>
<td>( P_{diss} )</td>
<td>80</td>
<td>mW</td>
</tr>
<tr>
<td>Power derating ( T_{amb} &gt; 80 , ^\circ\text{C} )</td>
<td></td>
<td>( \Delta P_{diss}/\Delta T_{amb} )</td>
<td>-1.3</td>
<td>mW/°C</td>
</tr>
</tbody>
</table>

**MOSFET DRIVER**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power dissipation</td>
<td></td>
<td>( P_{diss} )</td>
<td>2</td>
<td>mW</td>
</tr>
<tr>
<td>Ambient operating temperature range</td>
<td></td>
<td>( T_{amb} )</td>
<td>-40 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td></td>
<td>( T_{stg} )</td>
<td>-40 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Pin soldering temperature</td>
<td></td>
<td>( T_{sld} )</td>
<td>260</td>
<td>°C</td>
</tr>
</tbody>
</table>

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

<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>
</tr>
</thead>
<tbody>
<tr>
<td>LED forward voltage</td>
<td></td>
<td>( V_F )</td>
<td>1.3</td>
<td>1.4</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>Open circuit voltage</td>
<td></td>
<td>( V_{OC} )</td>
<td>-</td>
<td>8.2</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Short circuit current</td>
<td></td>
<td>( I_{SC} )</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>μA</td>
</tr>
</tbody>
</table>

**Note**

- 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.

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

<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>
</tr>
</thead>
<tbody>
<tr>
<td>Turn-on time ( C_L = 200 , \text{pF}, R_L = 10 , \text{MΩ} ), ( I_F = 20 , \text{mA}, P_W = 2 , \text{ms}, ) duty cycle = 50 %</td>
<td></td>
<td>( t_{on} )</td>
<td>-</td>
<td>32</td>
<td>-</td>
<td>μs</td>
</tr>
<tr>
<td>Turn-off time</td>
<td></td>
<td>( t_{off} )</td>
<td>-</td>
<td>80</td>
<td>-</td>
<td>μs</td>
</tr>
</tbody>
</table>

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For technical questions within your region: optocoupleranswers@vishay.com, www.vishay.com/doc?91000
SAFETY AND INSULATION RATINGS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatic classification</td>
<td>According to IEC 68 part 1</td>
<td></td>
<td>40 / 125 / 21</td>
<td></td>
</tr>
<tr>
<td>Pollution degree</td>
<td>According to DIN VDE 0109</td>
<td>CTI</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Comparative tracking index</td>
<td>Insulation group IIIa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum rated withstanding isolation voltage</td>
<td>According to UL1577, t = 1 min</td>
<td>VISO</td>
<td>3750</td>
<td>V_RMS</td>
</tr>
<tr>
<td>Maximum transient isolation voltage</td>
<td>According to DIN EN 60747-5-5</td>
<td>VDTM</td>
<td>6000</td>
<td>V_peak</td>
</tr>
<tr>
<td>Maximum repetitive peak isolation voltage</td>
<td>According to DIN EN 60747-5-5</td>
<td>VDRM</td>
<td>707</td>
<td>V_peak</td>
</tr>
<tr>
<td>Isolation resistance</td>
<td>Tamb = 125 °C, VIO = 500 V</td>
<td>RIO</td>
<td>≥ 10^{12}</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td>Tamb = TS, VIO = 500 V</td>
<td>RIO</td>
<td>≥ 10^{11}</td>
<td>Ω</td>
</tr>
<tr>
<td>Output safety power</td>
<td>PSO</td>
<td>350</td>
<td>mW</td>
<td></td>
</tr>
<tr>
<td>Input safety current</td>
<td>ISI</td>
<td>150</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Input safety temperature</td>
<td>TS</td>
<td>175</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Creepage distance</td>
<td>SOP-4</td>
<td></td>
<td>≥ 5</td>
<td>mm</td>
</tr>
<tr>
<td>Clearance distance</td>
<td></td>
<td></td>
<td>≥ 5</td>
<td>mm</td>
</tr>
<tr>
<td>Input to output test voltage, method B</td>
<td>V_DDM × 1.875 = V_PR, 100 % production test with t_M = 1 s, partial discharge &lt; 5 pC</td>
<td>V_PR</td>
<td>1326</td>
<td>V_peak</td>
</tr>
<tr>
<td>Input to output test voltage, method A</td>
<td>V_DRM × 1.6 = V_PR, 100 % production test with t_M = 10 s, partial discharge &lt; 5 pC</td>
<td>V_PR</td>
<td>1131</td>
<td>V_peak</td>
</tr>
</tbody>
</table>

Note

- As per DIN EN 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.
APPLICATION EXAMPLES

![Bidirectional MOSFET Driver Application](image)

Fig. 2 - Typical MOSFET Driver Applications With Integrated Turn-Off Functionality

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

![Forward Current vs. Forward Voltage](image)

Fig. 3 - Forward Current vs. Forward Voltage

![Open Circuit Voltage vs. Ambient Temperature](image)

Fig. 5 - Open Circuit Voltage vs. Ambient Temperature

![Forward Current vs. Ambient Temperature](image)

Fig. 4 - Forward Current vs. Ambient Temperature

![Output Voltage vs. Forward Current](image)

Fig. 6 - Output Voltage vs. Forward Current
Fig. 7 - Short Circuit Current vs. Forward Current

Fig. 8 - Output Current vs. Output Voltage

Fig. 9 - Short Circuit Current vs. Ambient Temperature

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

Fig. 11 - Turn-On Time vs. Ambient Temperature

Fig. 12 - Turn-Off Time vs. Forward Current
Fig. 13 - Turn-Off Time vs. Ambient Temperature

PACKAGE DIMENSIONS (in millimeters)

Fig. 14 - Package Drawing
PACKAGE MARKING

Fig. 15 - VOMDA1271

Notes
- XXXX = LMC (lot marking code)
- Package configuration (T, M) are not part of the package marking

TAPE AND REEL PACKAGING

Dimensions in millimeters

Note:
- Cumulative tolerance of 10 spocket holes is 0.20 mm

Fig. 16 - Tape and Reel Shipping Medium
(EIA-481, revision A, and IEC 60286), 2000 units per reel

Fig. 17 - Tape and Reel Packing (2000 pieces on reel)
HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: 168 h

Conditions: $T_{\text{amb}} < 30 \, ^\circ\text{C}$, RH $\leq 60 \, %$

Moisture sensitivity level 3, according to J-STD-020

Fig. 18 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020 for SMD Devices
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