M281
1 Form A
Solid State Relay

DESCRIPTION

The M281 is a bi-directional, single-pole, single-throw, normally open solid-state relay in a miniature 4-pin small outline package. This device offers very low on-resistance—allowing for a high load current rating in a miniature package, ideal in higher power applications where board space is limited.

FEATURES

- Low On-Resistance (0.5 ohms MAX)
- 1A Continuous Load Current
- 60V load voltage rating
- Low input control current (3mA TYP)
- Miniature 4 pin SOP package
- High input-to-output isolation (1.5kV MIN)

APPLICATIONS

- Automated Test Equipment
- Meter reading systems
- Medical equipment
- Battery Monitoring
- Multiplexers

OPTIONS/SUFFIXES*

- -TR  Tape & Reel Option (2,000 pcs / reel)

NOTE: Suffixes listed above are not included in marking on device for part number identification.

SCHEMATIC DIAGRAM

![Schematic Diagram]

ABSOLUTE MAXIMUM RATINGS* 

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNIT</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>°C</td>
<td>-55</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>-40</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Continuous Forward Current</td>
<td>mA</td>
<td></td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Peak Forward Current (1us)</td>
<td>A</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse Input Control Voltage</td>
<td>V</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Power Dissipation</td>
<td>mW</td>
<td>400</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The values indicated are absolute stress ratings. Functional operation of the device is not implied at these or any conditions in excess of those defined in electrical characteristics section of this document. Exposure to Absolute Ratings may cause permanent damage to the device and may adversely affect reliability.

APPROVALS

- UL / C-UL Approved (File # E201932)
### ELECTRICAL CHARACTERISTICS - 25°C

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNIT</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>TEST CONDITIONS</th>
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</thead>
<tbody>
<tr>
<td><strong>INPUT SPECIFICATIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED Forward Voltage</td>
<td>V</td>
<td>1.2</td>
<td>1.5</td>
<td></td>
<td>If = 10mA</td>
</tr>
<tr>
<td>LED Reverse Voltage</td>
<td>V</td>
<td>6</td>
<td>12</td>
<td></td>
<td>Ir = 10μA</td>
</tr>
<tr>
<td>Turn-on Current</td>
<td>mA</td>
<td>1</td>
<td>5</td>
<td></td>
<td>Io = 10mA, t = 20ms</td>
</tr>
<tr>
<td>Turn-On Current</td>
<td>mA</td>
<td>2.1</td>
<td>5</td>
<td></td>
<td>Io = 1A, t = 5ms</td>
</tr>
<tr>
<td>Turn-off Current</td>
<td>mA</td>
<td>0.5</td>
<td>5</td>
<td></td>
<td>Io = 100mA</td>
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<tr>
<td><strong>OUTPUT SPECIFICATIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blocking Voltage</td>
<td>V</td>
<td>60</td>
<td></td>
<td></td>
<td>Io = 1μA</td>
</tr>
<tr>
<td>Continuous Load Currente</td>
<td>mA</td>
<td></td>
<td>1000</td>
<td></td>
<td>If = 5mA</td>
</tr>
<tr>
<td>On-Resistance</td>
<td>Ω</td>
<td>0.5</td>
<td>0.7</td>
<td></td>
<td>Io = 1000mA</td>
</tr>
<tr>
<td>Leakage Current</td>
<td>μA</td>
<td>0.2</td>
<td>1</td>
<td></td>
<td>Vo = 60V</td>
</tr>
<tr>
<td>Output Capacitance</td>
<td>pF</td>
<td>25</td>
<td>50</td>
<td></td>
<td>Vo = 25V, f = 1.0MHz</td>
</tr>
<tr>
<td>Offset Voltage</td>
<td>V</td>
<td>0.2</td>
<td></td>
<td></td>
<td>If = 5mA</td>
</tr>
<tr>
<td><strong>COUPLED SPECIFICATIONS</strong></td>
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<td></td>
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</tr>
<tr>
<td>Isolation Voltage</td>
<td>Vrms</td>
<td>1500</td>
<td></td>
<td></td>
<td>T = 1 minute</td>
</tr>
<tr>
<td>Turn-on Time</td>
<td>ms</td>
<td>1.4</td>
<td>5</td>
<td></td>
<td>If = 5mA, Io = 1000mA</td>
</tr>
<tr>
<td>Turn-off Time</td>
<td>ms</td>
<td>0.2</td>
<td>2</td>
<td></td>
<td>If = 0mA, Io = 100mA, V = 20V</td>
</tr>
<tr>
<td>Isolation Resistance</td>
<td>GΩ</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Coupled Capacitance</td>
<td>pF</td>
<td>3</td>
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<tr>
<td>Contact Transient Ratio</td>
<td>Vrms</td>
<td>2000</td>
<td>7000</td>
<td></td>
<td>dV = 50V</td>
</tr>
</tbody>
</table>
PERFORMANCE DATA

M281

Typical Turn-On Time Distribution
N = 100, Ambient Temperature = 25°C

Device Count

Turn-On Time (ms)

0 10 20 30 40

1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8

M281

Typical Turn-Off Time Distribution
N = 100, Ambient Temperature = 25°C

Device Count

Turn-Off Time (ms)

0 10 20 30 40

0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5

M281

Typical On-Resistance Distribution
N = 100, Ambient Temperature = 25°C

Device Count

On-Resistance (ohms)

0 10 20 30 40

0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65

M281

Typical Leakage Current Distribution
N = 100, Ambient Temperature = 25°C

Device Count

Leakage Current (µA)

0 10 20 30 40 50 60

0 5 10 15 20 25 30 35

M281

Typical Blocking Voltage Distribution
N = 100, Ambient Temperature = 25°C

Device Count

Blocking Voltage (V)

0 10 20 30 40

60 65 70 75 80 85 90 95

M281

Maximum Load Current vs. Temperature

Load Current (mA)

0 200 400 600 800 1000 1200

-40 -20 0 20 40 60 80

Temperature (C)

0 10 20 30 40 50 60 70 80 90
MECHANICAL DIMENSIONS

4 PIN SMALL OUTLINE PACKAGE

END VIEW

TOP VIEW

BACK VIEW
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