1. **Product profile**

1.1 **General description**

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a leadless ultra small SOD1608 (DFN1608D-2) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

1.2 **Features and benefits**

- Average forward current: $I_{F(AV)} \leq 0.5$ A
- Reverse voltage: $V_R \leq 20$ V
- Low forward voltage $V_F \leq 410$ mV
- Low reverse current
- AEC-Q101 qualified
- Solderable side pads
- Package height typ. 0.37 mm
- Ultra small and leadless SMD plastic package

1.3 **Applications**

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- LED backlight for mobile application
- Low power consumption applications
- Ultra high-speed switching
- Reverse polarity protection

1.4 **Quick reference data**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>square wave; $\delta = 0.5; f = 20$ kHz; $T_{amb} \leq 130$ °C</td>
<td>[1]</td>
<td>-</td>
<td>-</td>
<td>0.5 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>square wave; $\delta = 0.5; f = 20$ kHz; $T_{sp} \leq 140$ °C</td>
<td>-</td>
<td>-</td>
<td>0.5 A</td>
<td></td>
</tr>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_J = 25$ °C</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 500$ mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02; T_J = 25$ °C</td>
<td>-</td>
<td>360</td>
<td>410</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10$ V; $T_J = 25$ °C</td>
<td>-</td>
<td>30</td>
<td>130</td>
<td>µA</td>
</tr>
<tr>
<td>$t_{fr}$</td>
<td>reverse recovery time</td>
<td>$I_{R} = 0.5$ A; $I_F = 0.5$ A; $I_{R(meas)} = 0.1$ A; $T_J = 25$ °C</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
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2. Pinning information

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>K</td>
<td>cathode[1]</td>
<td><img src="sym001" alt="Simplified outline" /></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>anode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[1] The marking bar indicates the cathode.

3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMEG2005EPK</td>
<td>DFN1608D-2</td>
<td>Leadless ultra small plastic package; 2 terminals</td>
<td>SOD1608</td>
<td></td>
</tr>
</tbody>
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4. Marking

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMEG2005EPK</td>
<td>1000 0000</td>
</tr>
</tbody>
</table>

![SOD1608 binary marking code description](006aad909)
5. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>$I_F$</td>
<td>forward current</td>
<td>$T_{sp} \leq 135 , ^\circ C$</td>
<td>-</td>
<td>0.7</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>square wave; $\delta = 0.5$; $f = 20 , \text{kHz}$; $T_{amb} \leq 130 , ^\circ C$</td>
<td>-</td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>square wave; $\delta = 0.5$; $f = 20 , \text{kHz}$; $T_{sp} \leq 140 , ^\circ C$</td>
<td>-</td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FRM}$</td>
<td>repetitive peak forward current</td>
<td>$t_p \leq 1 , \text{ms}$; $\delta \leq 0.5$</td>
<td>-</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>square wave; $t_p = 8 , \text{ms}$; $T_{j(init)} = 25 , ^\circ C$</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>$P_{tot}$</td>
<td>total power dissipation</td>
<td>$T_{amb} \leq 25 , ^\circ C$</td>
<td>[2]</td>
<td>390</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td>830</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>1470</td>
<td>mW</td>
</tr>
</tbody>
</table>

Table 6. Thermal characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1][2]</td>
<td>-</td>
<td>-</td>
<td>320 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1][3]</td>
<td>-</td>
<td>-</td>
<td>150 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1][4]</td>
<td>-</td>
<td>-</td>
<td>85  K/W</td>
</tr>
<tr>
<td>$R_{th(j-sp)}$</td>
<td>thermal resistance from junction to solder point</td>
<td></td>
<td>[3]</td>
<td>-</td>
<td>-</td>
<td>20  K/W</td>
</tr>
</tbody>
</table>


6. Thermal characteristics

[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses $P_R$ are a significant part of the total power losses.
Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
7. Characteristics

Table 7. Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 100 \text{ mA};$ pulsed; $t_p \leq 300 \mu\text{s};$ $\delta \leq 0.02; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>270</td>
<td>300</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 500 \text{ mA};$ pulsed; $t_p \leq 300 \mu\text{s};$ $\delta \leq 0.02; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>360</td>
<td>410</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 \text{ V}; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>30</td>
<td>130</td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 20 \text{ V}; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>70</td>
<td>300</td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>35</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>13</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery</td>
<td>$I_F = 0.5 \text{ A}; I_R = 0.5 \text{ A}; I_R(\text{meas}) = 0.1 \text{ A};$</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{FRM}$</td>
<td>peak forward recovery voltage</td>
<td>$I_F = 0.5 \text{ A}; dI_F/dt = 20 \text{ mA/µs}; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>380</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>
Fig 5. Forward current as a function of forward voltage; typical values

(1) $T_j = 150 \, ^\circ C$
(2) $T_j = 125 \, ^\circ C$
(3) $T_j = 85 \, ^\circ C$
(4) $T_j = 25 \, ^\circ C$
(5) $T_j = -40 \, ^\circ C$

Fig 6. Reverse current as a function of reverse voltage; typical values

(1) $T_j = 125 \, ^\circ C$
(2) $T_j = 85 \, ^\circ C$
(3) $T_j = 25 \, ^\circ C$
(4) $T_j = -40 \, ^\circ C$

Fig 7. Diode capacitance as a function of reverse voltage; typical values

$f = 1 \, MHz; \; T_{amb} = 25 \, ^\circ C$

Fig 8. Average forward power dissipation as a function of average forward current; typical values

$T_j = 150 \, ^\circ C$
(1) $\delta = 0.1$
(2) $\delta = 0.2$
(3) $\delta = 0.5$
(4) $\delta = 1$
20 V, 0.5 A low VF MEGA Schottky barrier rectifier

Fig 9. Average reverse power dissipation as a function of reverse voltage; typical values

FR4 PCB, standard footprint

\[ T_j = 125 \, ^\circ\text{C} \]

(1) $\delta = 1$
(2) $\delta = 0.9$
(3) $\delta = 0.8$
(4) $\delta = 0.5$

Fig 10. Average forward current as a function of ambient temperature; typical values

FR4 PCB, mounting pad for cathode 1 cm²

\[ T_j = 150 \, ^\circ\text{C} \]

(1) $\delta = 1$ (DC)
(2) $\delta = 0.5; f = 20 \, \text{kHz}$
(3) $\delta = 0.2; f = 20 \, \text{kHz}$
(4) $\delta = 0.1; f = 20 \, \text{kHz}$

Fig 11. Average forward current as a function of ambient temperature; typical values

Ceramic PCB, Al₂O₃, standard footprint

\[ T_j = 150 \, ^\circ\text{C} \]

(1) $\delta = 1$ (DC)
(2) $\delta = 0.5; f = 20 \, \text{kHz}$
(3) $\delta = 0.2; f = 20 \, \text{kHz}$
(4) $\delta = 0.1; f = 20 \, \text{kHz}$

Fig 12. Average forward current as a function of ambient temperature; typical values
8. Test information

Fig 13. Average forward current as a function of solder point temperature; typical values

\[ T_j = 150 \, ^\circ\text{C} \]

(1) \( \delta = 1 \) (DC)
(2) \( \delta = 0.5; f = 20 \, \text{kHz} \)
(3) \( \delta = 0.2; f = 20 \, \text{kHz} \)
(4) \( \delta = 0.1; f = 20 \, \text{kHz} \)

Fig 14. Reverse recovery definition

\[ \text{trr} \]
\[ \text{IR(meas)} \]
\[ \text{IF} \]
\[ \text{I}_{\text{t}} \]
The current ratings for the typical waveforms are calculated according to the equations:

\[ I_{F(AV)} = I_M \times \delta \] with \( I_M \) defined as peak current, \( I_{RMS} = I_{F(AV)} \) at DC, and \( I_{RMS} = I_M \times \sqrt{\delta} \) with \( I_{RMS} \) defined as RMS current.

### 8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.
9. Package outline

![Package outline SOD1608 (DFN1608D-2)](image)

Fig 17. Package outline SOD1608 (DFN1608D-2)

10. Soldering

![Footprint information for reflow soldering of SOD1608 package](image)

Fig 18. Reflow soldering footprint for SOD1608 (DFN1608D-2)
11. Revision history

<table>
<thead>
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<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>20120314</td>
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<td>PMEG2005EPK v.1</td>
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Modifications:
- 5 "Limiting values": I_F corrected
- 7 "Characteristics": t_F and V_FRM added
- Fig 14. and 15: added

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<td>20120112</td>
<td>Product data sheet</td>
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12. Legal information

12.1 Data sheet status

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<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<tr>
<td>Preliminary [short] data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
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<tr>
<td>[50x98] Preliminary [short] data sheet</td>
<td>Qualification</td>
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</tbody>
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[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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NXP Semiconductors

20 V, 0.5 A low VF MEGA Schottky barrier rectifier

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For sales office addresses, please send an email to: salesaddresses@nxp.com
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