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: $I_{F(AV)} \leq 1$ A
- Reverse voltage: $V_R \leq 20$ V
- Low forward voltage $V_F \leq 415$ 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; $T_{amb} \leq 110$ °C</td>
<td>[1]</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>square wave; $\delta = 0.5$; $f = 20$ kHz; $T_{sp} \leq 135$ °C</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>A</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>$I_F = 1$ A; pulsed; $t_p \leq 300$ $\mu$s; $\delta \leq 0.02$; $T_j = 25$ °C</td>
<td>-</td>
<td>370</td>
<td>415</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>50</td>
<td>250</td>
<td>$\mu$A</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>4</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), $\text{Al}_2\text{O}_3$, standard footprint.
2. Pinning information

Table 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="image" alt="Simplified outline" /></td>
<td><img src="image" alt="Graphic symbol" /></td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>anode</td>
<td><img src="image" alt="Simplified outline" /></td>
<td><img src="image" alt="Graphic symbol" /></td>
</tr>
</tbody>
</table>

[1] The marking bar indicates the cathode.

3. Ordering information

Table 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>PMEG2010EPK</td>
<td>DFN1608D-2</td>
<td>Leadless ultra small plastic package; 2 terminals</td>
<td>SOD1608</td>
<td></td>
</tr>
</tbody>
</table>

4. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMEG2010EPK</td>
<td>0100 0000</td>
</tr>
</tbody>
</table>

![Fig 1. SOD1608 binary marking code description](image)
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 °C</td>
<td>-</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>I_f</td>
<td>forward current</td>
<td>T_sp ≤ 130 °C</td>
<td>-</td>
<td>1.4</td>
<td>A</td>
</tr>
<tr>
<td>I_f(AV)</td>
<td>average forward current</td>
<td>square wave; δ = 0.5; f = 20 kHz; T_amb ≤ 110 °C</td>
<td>[1]</td>
<td>-</td>
<td>1 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>square wave; δ = 0.5; f = 20 kHz; T_sp ≤ 135 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_FRM</td>
<td>repetitive peak forward current</td>
<td>t_p ≤ 1 ms; δ ≤ 0.25</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>I_FSM</td>
<td>non-repetitive peak forward current</td>
<td>square wave; t_p = 8 ms; T_(j(init)) = 25 °C</td>
<td>-</td>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>P_tot</td>
<td>total power dissipation</td>
<td>T_amb ≤ 25 °C</td>
<td>[2]</td>
<td>-</td>
<td>410 mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td>-</td>
<td>860 mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>-</td>
<td>1565 mW</td>
</tr>
</tbody>
</table>

<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</td>
<td>in free air</td>
<td>[1][2]</td>
<td>-</td>
<td>-</td>
<td>305 K/W</td>
</tr>
<tr>
<td></td>
<td>from junction to ambient</td>
<td></td>
<td>[1][3]</td>
<td>-</td>
<td>-</td>
<td>145 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1][4]</td>
<td>-</td>
<td>-</td>
<td>80 K/W</td>
</tr>
<tr>
<td>R_th(j-sp)</td>
<td>thermal resistance</td>
<td>from junction to solder point</td>
<td>[5]</td>
<td>-</td>
<td>-</td>
<td>20 K/W</td>
</tr>
</tbody>
</table>


6. Thermal characteristics

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</td>
<td>in free air</td>
<td>[1][2]</td>
<td>-</td>
<td>-</td>
<td>305 K/W</td>
</tr>
<tr>
<td></td>
<td>from junction to ambient</td>
<td></td>
<td>[1][3]</td>
<td>-</td>
<td>-</td>
<td>145 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1][4]</td>
<td>-</td>
<td>-</td>
<td>80 K/W</td>
</tr>
<tr>
<td>R_th(j-sp)</td>
<td>thermal resistance</td>
<td>from junction to solder point</td>
<td>[5]</td>
<td>-</td>
<td>-</td>
<td>20 K/W</td>
</tr>
</tbody>
</table>

[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

FR4 PCB, standard footprint

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

FR4 PCB, mounting pad for cathode 1 cm²

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>$I_F = 100 , mA; \text{pulsed}; \ t_p \leq 300 , \mu s$; $\delta \leq 0.02; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>240</td>
<td>280</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 500 , mA; \text{pulsed}; \ t_p \leq 300 , \mu s$; $\delta \leq 0.02; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>310</td>
<td>350</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 700 , mA; \text{pulsed}; \ t_p \leq 300 , \mu s$; $\delta \leq 0.02; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>330</td>
<td>390</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1 , A; \text{pulsed}; \ t_p \leq 300 , \mu s$; $\delta \leq 0.02; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>370</td>
<td>415</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 , V; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>50</td>
<td>250</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 20 , V; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>150</td>
<td>600</td>
<td>µA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1 , V; \ f = 1 , MHz; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>150</td>
<td>600</td>
<td>µA</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>$I_F = 0.5 , A; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>4</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>$V_{FRM}$</td>
<td>peak forward recovery voltage</td>
<td>$I_F = 0.5 , A; \ dI_F/dt = 20 , A/\mu s; \ T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>335</td>
<td></td>
<td>mV</td>
</tr>
</tbody>
</table>
**Forward current as a function of forward voltage; typical values**

- $T_j = 150 \, ^\circ C$
- $T_j = 125 \, ^\circ C$
- $T_j = 85 \, ^\circ C$
- $T_j = 25 \, ^\circ C$
- $T_j = -40 \, ^\circ C$

**Reverse current as a function of reverse voltage; typical values**

- $T_j = 125 \, ^\circ C$
- $T_j = 85 \, ^\circ C$
- $T_j = 25 \, ^\circ C$
- $T_j = -40 \, ^\circ C$

**Diode capacitance as a function of reverse voltage; typical values**

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

**Average forward power dissipation as a function of average forward current; typical values**

- $T_j = 150 \, ^\circ C$
- $\delta = 0.1$
- $\delta = 0.2$
- $\delta = 0.5$
- $\delta = 1$
20 V, 1 A low VF MEGA Schottky barrier rectifier

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

- **T<sub>j</sub> = 125 °C**
  - (1) δ = 1
  - (2) δ = 0.9
  - (3) δ = 0.8
  - (4) δ = 0.5

**FR4 PCB, standard footprint**

- **T<sub>j</sub> = 150 °C**
  - (1) δ = 1 (DC)
  - (2) δ = 0.5; f = 20 kHz
  - (3) δ = 0.2; f = 20 kHz
  - (4) δ = 0.1; f = 20 kHz

**Ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint**

- **T<sub>j</sub> = 150 °C**
  - (1) δ = 1 (DC)
  - (2) δ = 0.5; f = 20 kHz
  - (3) δ = 0.2; f = 20 kHz
  - (4) δ = 0.1; f = 20 kHz

**Fig 10.** 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

Fig 14. Reverse recovery definition
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)](sod1608.pkg)

10. Soldering

![Reflow soldering footprint for SOD1608 (DFN1608D-2)](sod1608.fr)
## 11. Revision history

Table 8. Revision history

<table>
<thead>
<tr>
<th>Document ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>5 &quot;Limiting values&quot;: $I_F$ corrected</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7 &quot;Characteristics&quot;: $t_{br}$ and $V_{FRM}$ added</td>
<td></td>
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<td>14. and 15</td>
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<td>20120120</td>
<td>Product data sheet</td>
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12. Legal information

12.1 Data sheet information

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective [short] data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
</tr>
<tr>
<td>Preliminary [short] data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product [short] data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
</tr>
</tbody>
</table>

[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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