1. General description

Planar 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.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 0.5$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage $V_F \leq 590$ mV
- Low reverse current
- Solderable side pads
- Package height typ. 0.37 mm
- Ultra small and leadless SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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

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>$\delta = 0.5; f = 20$ kHz; square wave; $T_{amb} \leq 115$ °C</td>
<td>[1]</td>
<td>-</td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\delta = 0.5; f = 20$ kHz; square wave; $T_{sp} \leq 140$ °C</td>
<td></td>
<td>-</td>
<td>0.5</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>40</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>530</td>
<td>590</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>0.4</td>
<td>2</td>
<td>µA</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>$I_F = 0.5$ A; $I_R = 0.5$ A; $I_{R(meas)} = 0.1$ A; $T_J = 25$ °C</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>ns</td>
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5. 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>
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</thead>
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<tr>
<td>1</td>
<td>K</td>
<td>cathode[1]</td>
<td></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.

6. 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>PMEG4005EPK-Q</td>
<td>DFN1608D-2</td>
<td>plastic, leadless ultra small plastic package with side-wettable flanks (SWF); 2 terminals; 0.94 mm pitch; 1.6 mm x 0.8 mm x 0.37 mm body</td>
<td>SOD1608</td>
<td></td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMEG4005EPK-Q</td>
<td>0010 0000</td>
</tr>
</tbody>
</table>

Fig. 1. SOD1608 binary marking code description
8. 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&lt;sub&gt;R&lt;/sub&gt;</td>
<td>reverse voltage</td>
<td>T&lt;sub&gt;j&lt;/sub&gt; = 25 °C</td>
<td>-</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;F&lt;/sub&gt;</td>
<td>forward current</td>
<td>T&lt;sub&gt;sp&lt;/sub&gt; ≤ 135 °C</td>
<td>-</td>
<td>0.7</td>
<td>A</td>
</tr>
<tr>
<td>I&lt;sub&gt;F(AV)&lt;/sub&gt;</td>
<td>average forward current</td>
<td>δ = 0.5; f = 20 kHz; square wave; T&lt;sub&gt;amb&lt;/sub&gt; ≤ 115 °C</td>
<td>[1]</td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>δ = 0.5; f = 20 kHz; square wave; T&lt;sub&gt;sp&lt;/sub&gt; ≤ 140 °C</td>
<td>-</td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td>I&lt;sub&gt;FRM&lt;/sub&gt;</td>
<td>repetitive peak forward current</td>
<td>t&lt;sub&gt;p&lt;/sub&gt; ≤ 1 ms; δ ≤ 0.25</td>
<td>-</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>I&lt;sub&gt;FSM&lt;/sub&gt;</td>
<td>non-repetitive peak forward current</td>
<td>t&lt;sub&gt;p&lt;/sub&gt; = 8 ms; square wave; T&lt;sub&gt;j(init)&lt;/sub&gt; = 25 °C</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>P&lt;sub&gt;tot&lt;/sub&gt;</td>
<td>total power dissipation</td>
<td>T&lt;sub&gt;amb&lt;/sub&gt; ≤ 25 °C</td>
<td>[1] [2] [3]</td>
<td>-</td>
<td>390</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[4] [3]</td>
<td>-</td>
<td>830</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1] [3]</td>
<td>-</td>
<td>1470</td>
</tr>
<tr>
<td>T&lt;sub&gt;j&lt;/sub&gt;</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>T&lt;sub&gt;amb&lt;/sub&gt;</td>
<td>ambient temperature</td>
<td></td>
<td>-55</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>T&lt;sub&gt;stg&lt;/sub&gt;</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>°C</td>
</tr>
</tbody>
</table>

[3] Reflow soldering is the only recommended soldering method.
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

9. 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&lt;sub&gt;th(j-a)&lt;/sub&gt;</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1] [2] [3]</td>
<td>-</td>
<td>-</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1] [4] [3]</td>
<td>-</td>
<td>-</td>
<td>150</td>
</tr>
<tr>
<td>R&lt;sub&gt;th(j-sp)&lt;/sub&gt;</td>
<td>thermal resistance from junction to solder point</td>
<td></td>
<td>[6]</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
</tbody>
</table>

[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P<sub>R</sub> are a significant part of the total power losses.
[3] Reflow soldering is the only recommended soldering method.
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.
**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

**Fig. 4.** Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
10. 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>$I_F = 100 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>380</td>
<td>420</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 500 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>530</td>
<td>590</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 \text{ V}; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>0.4</td>
<td>2</td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40 \text{ V}; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>2</td>
<td>10</td>
<td>$\mu\text{A}$</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>30</td>
<td>35</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>10</td>
<td>15</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>$I_F = 0.5 \text{ A}; I_R = 0.5 \text{ A}; I_{R(\text{meas})} = 0.1 \text{ A}; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{FRM}$</td>
<td>peak forward recovery voltage</td>
<td>$I_F = 0.5 \text{ A}; dI_F/dt = 20 \text{ A/µs}; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>545</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>

Fig. 5. Forward current as a function of forward voltage; typical values

Fig. 6. Reverse current as a function of reverse voltage; typical values
Fig. 7. Diode capacitance as a function of reverse voltage; typical values

$f = 1$ MHz; $T_{amb} = 25$ °C

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

$T_J = 150$ °C
(1) $\delta = 0.1$
(2) $\delta = 0.2$
(3) $\delta = 0.5$
(4) $\delta = 1$

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

$T_J = 125$ °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, standard footprint
$T_J = 150$ °C
(1) $\delta = 1$ (DC)
(2) $\delta = 0.5$; $f = 20$ kHz
(3) $\delta = 0.2$; $f = 20$ kHz
(4) $\delta = 0.1$; $f = 20$ kHz
FR4 PCB, mounting pad for cathode 1 cm²
\( T_j = 150 \, ^\circ C \)
(1) \( \delta = 1 \) (DC)
(2) \( \delta = 0.5; f = 20 \, kHz \)
(3) \( \delta = 0.2; f = 20 \, kHz \)
(4) \( \delta = 0.1; f = 20 \, kHz \)

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

Ceramic PCB, Al₂O₃, standard footprint
\( T_j = 150 \, ^\circ C \)
(1) \( \delta = 1 \) (DC)
(2) \( \delta = 0.5; f = 20 \, kHz \)
(3) \( \delta = 0.2; f = 20 \, kHz \)
(4) \( \delta = 0.1; f = 20 \, kHz \)

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

\( T_j = 150 \, ^\circ C \)
(1) \( \delta = 1 \) (DC)
(2) \( \delta = 0.5; f = 20 \, kHz \)
(3) \( \delta = 0.2; f = 20 \, kHz \)
(4) \( \delta = 0.1; f = 20 \, kHz \)

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

Fig. 14. Reverse recovery definition

Fig. 15. Forward recovery definition

Fig. 16. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

\[ I_{F(\text{AV})} = I_M \times \delta \]  with \( I_M \) defined as peak current,

\[ I_{\text{RMS}} = I_{F(\text{AV})} \]  at DC,

\[ I_{\text{RMS}} = I_M \times \sqrt{\delta} \]  with \( I_{\text{RMS}} \) defined as RMS current.
**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.

12. Package outline

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

Fig. 17. Package outline DFN1608D-2 (SOD1608)

13. Soldering

![Reflow soldering footprint for DFN1608D-2 (SOD1608)](image)

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

<table>
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<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>PMEG4005EPK-Q v.1</td>
<td>20230920</td>
<td>Product data sheet</td>
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15. Legal information

Data sheet status

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<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
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<tr>
<td>Preliminary [short] data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
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<tr>
<td>Product [short] data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
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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 https://www.nexperia.com.

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