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: \( I_{F(\text{AV})} \leq 0.5 \text{ A} \)
- Reverse voltage: \( V_R \leq 20 \text{ V} \)
- Low forward voltage \( V_F \leq 410 \text{ mV} \)
- 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(\text{AV})} )</td>
<td>average forward current</td>
<td>( \delta = 0.5; f = 20 \text{ kHz}; \text{square wave}; T_{\text{amb}} \leq 130 \text{ °C} )</td>
<td>( 0.5 )</td>
<td>-</td>
<td>-</td>
<td>A</td>
</tr>
<tr>
<td>( \delta = 0.5; f = 20 \text{ kHz}; \text{square wave}; T_{\text{sp}} \leq 140 \text{ °C} )</td>
<td>-</td>
<td>-</td>
<td>0.5</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_R )</td>
<td>reverse voltage</td>
<td>( T_J = 25 \text{ °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 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ µs}; \delta \leq 0.02; T_J = 25 \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 \text{ °C} )</td>
<td>-</td>
<td>30</td>
<td>130</td>
<td>µA</td>
</tr>
<tr>
<td>( I_{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 \text{ °C} )</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>

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>
</tr>
</thead>
<tbody>
<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>PMEG2005EPK-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>PMEG2005EPK-Q</td>
<td>1000 0000</td>
</tr>
</tbody>
</table>

![SOD1608 binary marking code description](image)
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>$V_R$</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>$T_{sp} \leq 135 °C$</td>
<td>-</td>
<td>0.7</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F(\text{AV})}$</td>
<td>average forward current</td>
<td>$\delta = 0.5$; $f = 20 \text{ kHz}$; square wave; $T_{\text{amb}} \leq 130 °C$</td>
<td>[1]</td>
<td>-</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\delta = 0.5$; $f = 20 \text{ kHz}$; square wave; $T_{sp} \leq 140 °C$</td>
<td></td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F\text{RM}}$</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>$I_{F\text{SM}}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8 \text{ ms}$; square wave; $T_{\text{sp(init)}} = 25 °C$</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>$P_{\text{tot}}$</td>
<td>total power dissipation</td>
<td>$T_{\text{amb}} \leq 25 °C$</td>
<td>[2]</td>
<td>-</td>
<td>390  mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td>-</td>
<td>830  mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>-</td>
<td>1470 mW</td>
</tr>
<tr>
<td>$T_j$</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{\text{amb}}$</td>
<td>ambient temperature</td>
<td></td>
<td>-55</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{\text{stg}}$</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>°C</td>
</tr>
</tbody>
</table>


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>$R_{\text{th(j-a)}}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1]</td>
<td>[2]</td>
<td></td>
<td>320  K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{\text{th(j-sp)}}$</td>
<td>thermal resistance from junction to solder point</td>
<td></td>
<td>[5]</td>
<td></td>
<td>20</td>
<td>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.
FR4 PCB, standard footprint

**Fig. 2.** Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

FR4 PCB, mounting pad for cathode 1 cm$^2$

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

Ceramic PCB, Al$_2$O$_3$, standard footprint

**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>$I_F = 100\ mA$; pulsed; $t_p \leq 300\ \mu s$; $\delta \leq 0.02$; $T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>270</td>
<td>300</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 500\ mA$; pulsed; $t_p \leq 300\ \mu s$; $\delta \leq 0.02$; $T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>360</td>
<td>410</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10\ V$; $T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>30</td>
<td>130</td>
<td>$\mu A$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 20\ V$; $T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>70</td>
<td>300</td>
<td>$\mu A$</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1\ V$; $f = 1\ \text{MHz}$; $T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>35</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10\ V$; $f = 1\ \text{MHz}$; $T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>13</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>$I_F = 0.5\ A$; $I_R = 0.5\ A$; $I_{R\text{meas}} = 0.1\ A$; $T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{FRM}$</td>
<td>peak forward recovery voltage</td>
<td>$I_F = 0.5\ A$; $dI_F/dt = 20\ mA/\mu s$; $T_j = 25\ ^\circ C$</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

Fig. 6. Reverse current as a function of reverse voltage; typical values
20 V, 0.5 A low VF Schottky barrier rectifier

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

\[ f = 1 \text{ MHz}; T_{\text{amb}} = 25 ^\circ \text{C} \]

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

\[ T_J = 150 ^\circ \text{C} \]

(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

\[ T_J = 125 ^\circ \text{C} \]

(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, 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) \( \delta = 0.1; f = 20 \text{ kHz} \)
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

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

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

with \( I_M \) defined as peak 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

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

13. Soldering

Footprint information for reflow soldering of DFN1608D-2 package

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

Table 8. Revision history

<table>
<thead>
<tr>
<th>Data sheet ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>PMEG2005EPK-Q v.1</td>
<td>20230920</td>
<td>Product data sheet</td>
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<td>-</td>
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15. Legal information

Data sheet status

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<tr>
<td>Objective [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>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 https://www.nexperia.com.

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