1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOD128 small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

• Average forward current: $I_{F(AV)} \leq 5 \, \text{A}$
• Reverse voltage: $V_R \leq 40 \, \text{V}$
• Low forward voltage
• High power capability due to clip-bonding technology
• Small and flat lead SMD plastic package
• High temperature $T_j \leq 175 \, ^\circ\text{C}$
• Suitable for both reflow and wave soldering
• 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
• Reverse polarity protection
• Low power consumption applications
• High temperature applications

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>$\delta = 0.5; f = 20 , \text{kHz}; \text{square wave}; T_{sp} \leq 155 , ^\circ\text{C}$</td>
<td></td>
<td></td>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_j = 25 , ^\circ\text{C}$</td>
<td></td>
<td></td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 5 , \text{A}; T_j = 25 , ^\circ\text{C}$</td>
<td></td>
<td>430</td>
<td>490</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 40 , \text{V}; T_j = 25 , ^\circ\text{C}$</td>
<td></td>
<td>60</td>
<td>300</td>
<td>$\mu\text{A}$</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>PMEG4050ETP-Q</td>
<td>CFP5</td>
<td>plastic, surface mounted package; 2 terminals; 4 mm pitch; 3.8 mm x 2.6 mm x 1 mm body</td>
<td>SOD128</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>PMEG4050ETP-Q</td>
<td>C4</td>
</tr>
</tbody>
</table>
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>$T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>40 V</td>
<td></td>
</tr>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>$\delta = 0.5; f = 20 , kHz; \text{square wave}; , T_{\text{amb}} \leq 15 , ^\circ C$</td>
<td>[1] -</td>
<td>5 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\delta = 0.5; f = 20 , kHz; \text{square wave}; , T_{\text{sp}} \leq 155 , ^\circ C$</td>
<td>-</td>
<td>5 A</td>
<td></td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8 , ms; \text{square wave}; , T_{j(\text{init})} = 25 , ^\circ C$</td>
<td>-</td>
<td>70 A</td>
<td></td>
</tr>
<tr>
<td>$P_{\text{tot}}$</td>
<td>total power dissipation</td>
<td>$T_{\text{amb}} \leq 25 , ^\circ C$</td>
<td>[2] -</td>
<td>750 mW</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3] -</td>
<td>1.25 W</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1] -</td>
<td>2.5 W</td>
<td></td>
</tr>
<tr>
<td>$T_j$</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>175 °C</td>
<td></td>
</tr>
<tr>
<td>$T_{\text{amb}}$</td>
<td>ambient temperature</td>
<td></td>
<td>-55</td>
<td>175 °C</td>
<td></td>
</tr>
<tr>
<td>$T_{\text{stg}}$</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>175 °C</td>
<td></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>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1] [2]</td>
<td>-</td>
<td>-</td>
<td>200 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1] [3]</td>
<td>-</td>
<td>-</td>
<td>120 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1] [4]</td>
<td>-</td>
<td>-</td>
<td>60 K/W</td>
</tr>
<tr>
<td>$R_{th(j-sp)}$</td>
<td>thermal resistance from junction to solder point</td>
<td></td>
<td>[5] -</td>
<td>-</td>
<td>12</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.
Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

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
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>$I_F = 0.1 , A; , T_j = 25 , ^\circ \text{C}$</td>
<td>-</td>
<td>270</td>
<td>310</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1 , A; , T_j = 25 , ^\circ \text{C}$</td>
<td>-</td>
<td>340</td>
<td>390</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 5 , A; , T_j = 25 , ^\circ \text{C}$</td>
<td>-</td>
<td>430</td>
<td>490</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 5 , A; , T_j = 125 , ^\circ \text{C}$</td>
<td>-</td>
<td>340</td>
<td>390</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 , V; , T_j = 25 , ^\circ \text{C}$</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40 , V; , T_j = 25 , ^\circ \text{C}$</td>
<td>-</td>
<td>60</td>
<td>300</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10 , V; , T_j = 125 , ^\circ \text{C}$</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40 , V; , T_j = 125 , ^\circ \text{C}$</td>
<td>-</td>
<td>42</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1 , V; , f = 1 , \text{MHz}; , T_j = 25 , ^\circ \text{C}$</td>
<td>-</td>
<td>600</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10 , V; , f = 1 , \text{MHz}; , T_j = 25 , ^\circ \text{C}$</td>
<td>-</td>
<td>220</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>

(1) $T_j = 175 \, ^\circ \text{C}$
(2) $T_j = 150 \, ^\circ \text{C}$
(3) $T_j = 125 \, ^\circ \text{C}$
(4) $T_j = 85 \, ^\circ \text{C}$
(5) $T_j = 25 \, ^\circ \text{C}$
(6) $T_j = -40 \, ^\circ \text{C}$

Fig. 4. Forward current as a function of forward voltage; typical values

Fig. 5. Reverse current as a function of reverse voltage; typical values
40 V, 5 A low VF MEGA Schottky barrier rectifier

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

Fig. 7. Average forward power dissipation as a function of average forward current; typical values

Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values

Fig. 9. Average forward current as a function of ambient temperature; typical values
FR4 PCB, mounting pad for cathode 1 cm²
$T_j = 175 \, ^\circ C$

1. $\delta = 1.0$
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

Ceramic PCB, Al₂O₃, standard footprint
$T_j = 175 \, ^\circ C$

1. $\delta = 1.0 \,(DC)$
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

$T_j = 175 \, ^\circ C$

1. $\delta = 1.0$
2. $\delta = 0.9$
3. $\delta = 0.8$
4. $\delta = 0.5$

Fig. 12. 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: 

\[ I_{F(AV)} = I_M \times \delta \]

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.

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. 14. Package outline CFP5 (SOD128)

13. Soldering

Fig. 15. Reflow soldering footprint for CFP5 (SOD128)
Fig. 16. Wave soldering footprint for CFP5 (SOD128)
### 14. Revision history

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<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<tr>
<td>PMEG4050ETP-Q v.1</td>
<td>20210719</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>
15. Legal information

Data sheet status

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<thead>
<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<tbody>
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<td>[3]</td>
<td></td>
</tr>
</tbody>
</table>

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Preliminary [short] data sheet Qualification This document contains data from the preliminary specification.

Product [short] data sheet Production This document contains the product specification.

[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".
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