1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOD123W small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 1$ A
- Reverse voltage: $V_R \leq 100$ V
- Low forward voltage: $V_F = 710$ mV
- High power capability due to clip-bonding technology
- Extremely low leakage current $I_R = 40$ nA
- High temperature $T_j \leq 175$ °C
- AEC-Q101 qualified
- Capable for reflow and wave soldering

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Reverse polarity protection
- Low power consumption 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>$\delta = 0.5; f = 20$ kHz; $T_{sp} \leq 170$ °C; square wave</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>100</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 1$ A; $t_p \leq 300$ µs; $\delta \leq 0.02$; $T_j = 25$ °C</td>
<td>-</td>
<td>710</td>
<td>770</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 100$ V; $t_p \leq 300$ µs; $\delta \leq 0.02$; $T_j = 25$ °C</td>
<td>-</td>
<td>40</td>
<td>150</td>
<td>nA</td>
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5. Pinning information

Table 2. Pinning information

<table>
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<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
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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>CFP3 (SOD123W)</td>
<td>K A</td>
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</table>

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

<table>
<thead>
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<th>Type number</th>
<th>Package Name</th>
<th>Description</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>PMEG10010ELR</td>
<td>CFP3</td>
<td>plastic, surface mounted package; 2 terminals; 2.6 mm x 1.7 mm x 1 mm body</td>
<td>SOD123W</td>
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</table>

7. Marking

Table 4. Marking codes

<table>
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<th>Marking code</th>
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<td>PMEG10010ELR</td>
<td>K7</td>
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8. Limiting values

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

<table>
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<th>Symbol</th>
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<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_j = 25 , ^\circ C$</td>
<td></td>
<td>100</td>
<td>V</td>
</tr>
<tr>
<td>$I_F$</td>
<td>forward current</td>
<td>$\delta = 1; T_{sp} = 165 , ^\circ C$</td>
<td></td>
<td>1.4</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F(\text{AV})}$</td>
<td>average forward current</td>
<td>$\delta = 0.5; f = 20 , \text{kHz}; T_{\text{amb}} \leq 135 , ^\circ C; \text{square wave}$</td>
<td>[1]</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\delta = 0.5; f = 20 , \text{kHz}; T_{sp} \leq 170 , ^\circ C; \text{square wave}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8 , \text{ms}; \text{square wave}; T_{j(init)} = 25 , ^\circ C$</td>
<td></td>
<td>50</td>
<td>A</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>680</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td>1.15</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>2.14</td>
<td>W</td>
</tr>
<tr>
<td>$T_j$</td>
<td>junction temperature</td>
<td></td>
<td></td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{\text{amb}}$</td>
<td>ambient temperature</td>
<td></td>
<td></td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>$T_{\text{stg}}$</td>
<td>storage temperature</td>
<td></td>
<td>-55</td>
<td>175</td>
<td>°C</td>
</tr>
</tbody>
</table>

[1] Device mounted on a ceramic PCB, $\text{Al}_2\text{O}_3$, standard footprint.

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></td>
<td></td>
<td>220</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>[1]</td>
<td>[2]</td>
<td>130</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>[3]</td>
<td>70</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[4]</td>
<td></td>
<td>18</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. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

FR4 PCB, mounting pad for cathode 1 cm²

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>$V_{(BR)R}$</td>
<td>reverse breakdown voltage</td>
<td>$I_R = 1\ mA; t_p = 300\ \mu s; \delta = 0.02; T_j = 25\ ^\circ C$</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 0.1\ A; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>505</td>
<td>565</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 0.5\ A; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>640</td>
<td>710</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 0.7\ A; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>675</td>
<td>740</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1\ A; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>710</td>
<td>770</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1\ A; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 125\ ^\circ C$</td>
<td>-</td>
<td>575</td>
<td>680</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10\ V; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 60\ V; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>12</td>
<td>-</td>
<td>nA</td>
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<tr>
<td></td>
<td></td>
<td>$V_R = 100\ V; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>40</td>
<td>150</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 100\ V; t_p \leq 300\ \mu s; \delta \leq 0.02; T_j = 125\ ^\circ C$</td>
<td>-</td>
<td>70</td>
<td>500</td>
<td>\mu A</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>70</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 4\ V; f = 1\ MHz; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>42</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10\ V; f = 1\ MHz; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>28</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>$I_F = 0.5\ A; I_R = 1\ A; I_{R\text{(meas)}} = 0.25\ A; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>3.7</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{FRM}$</td>
<td>peak forward recovery voltage</td>
<td>$I_F = 0.5\ A; dI_F/dt = 20\ A/\mu s; T_j = 25\ ^\circ C$</td>
<td>-</td>
<td>690</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>
100 V, 1 A low leakage current Schottky barrier rectifier

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

Fig. 5. Reverse current as a function of reverse voltage; typical values

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

f = 1 MHz; $T_{\text{amb}} = 25 ^\circ \text{C}$
100 V, 1 A low leakage current Schottky barrier rectifier

---

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

- **Graph:**
  - Vertical axis: $P_{R(AV)}$ (mW)
  - Horizontal axis: $V_R$ (V)
  - Data points:
    - (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

- **Equation:** $T_j = 150 \, ^\circ C$

---

**FR4 PCB, standard footprint**

- **Graph:**
  - Vertical axis: $I_{F(AV)}$ (A)
  - Horizontal axis: $T_{amb}$ (°C)
  - Data points:
    - (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. 9.** Average forward current as a function of ambient temperature; typical values

- **Graph:**
  - Vertical axis: $I_{F(AV)}$ (A)
  - Horizontal axis: $T_{amb}$ (°C)
  - Data points:
    - (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 cm$^2$**

- **Graph:**
  - Vertical axis: $I_{F(AV)}$ (A)
  - Horizontal axis: $T_{amb}$ (°C)
  - Data points:
    - (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

---

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

- **Graph:**
  - Vertical axis: $I_{F(AV)}$ (A)
  - Horizontal axis: $T_{amb}$ (°C)
  - Data points:
    - (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. 10.** Average forward current as a function of ambient temperature; typical values

- **Graph:**
  - Vertical axis: $I_{F(AV)}$ (A)
  - Horizontal axis: $T_{amb}$ (°C)
  - Data points:
    - (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

- **Graph:**
  - Vertical axis: $I_{F(AV)}$ (A)
  - Horizontal axis: $T_{amb}$ (°C)
  - Data points:
    - (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 solder point temperature; typical values

11. Test information

Fig. 13. Reverse recovery 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, \( I_{RMS} = I_{F(\text{AV})} \) 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. 16. Package outline CFP3 (SOD123W)

13. Soldering

Fig. 17. Reflow soldering footprint for CFP3 (SOD123W)
Wave soldering footprint information

Fig. 18. Wave soldering footprint for CFP3 (SOD123W)
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>20180326</td>
<td>Product data sheet</td>
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<td>PMEG10010ELR v.3</td>
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<td>Modifications:</td>
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<tr>
<td>• Features and benefits: Capable for reflow and wave soldering added</td>
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<td>• Soldering: Wave soldering footprint added</td>
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15. Legal information

Data sheet status

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<th>Product status</th>
<th>Definition</th>
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<td>[1][2] 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>
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<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.

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16. Contents

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