1. General description

Planar 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: $I_{F(AV)} \leq 1 \text{ A}$
- Reverse voltage: $V_R \leq 60 \text{ V}$
- Low forward voltage
- High power capability due to clip-bond technology
- Small and flat lead SMD plastic package

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- 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>$\delta = 0.5; f = 20 \text{ kHz}; \text{square wave}; T_{amb} \leq 110 \degree \text{C}$</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\delta = 0.5; f = 20 \text{ kHz}; \text{square wave}; T_{sp} \leq 140 \degree \text{C}$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>-</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 1 \text{ A}; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>460</td>
<td>530</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 60 \text{ V}; T_j = 25 \degree \text{C}$</td>
<td>-</td>
<td>30</td>
<td>60</td>
<td>$\mu\text{A}$</td>
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</tbody>
</table>

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

5. 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>CFP3 (SOD123W)</td>
<td>sym001f</td>
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</table>

[1] The marking bar indicates the cathode.
6. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package Name</th>
<th>Description</th>
<th>Version</th>
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</thead>
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<tr>
<td>PMEG6010ER</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>
</tr>
</tbody>
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7. Marking

Table 4. Marking codes

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<th>Marking code</th>
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<td>PMEG6010ER</td>
<td>BB</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>
<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>$T_j = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>$I_{F(\text{AV})}$</td>
<td>average forward current</td>
<td>$\delta = 0.5; f = 20 , \text{kHz}; \text{square wave}; T_{\text{amb}} \leq 110 , ^\circ\text{C}$</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\delta = 0.5; f = 20 , \text{kHz}; \text{square wave}; T_{\text{sp}} \leq 140 , ^\circ\text{C}$</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8 , \text{ms}; \text{half sine wave}; T_{j(\text{init})} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>50</td>
<td>A</td>
</tr>
<tr>
<td>$P_{\text{tot}}$</td>
<td>total power dissipation</td>
<td>$T_{\text{amb}} \leq 25 , ^\circ\text{C}$</td>
<td>[2]</td>
<td>0.57</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td>0.95</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>1.8</td>
<td>W</td>
</tr>
<tr>
<td>$T_j$</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>^\circ\text{C}</td>
</tr>
<tr>
<td>$T_{\text{amb}}$</td>
<td>ambient temperature</td>
<td></td>
<td>-55</td>
<td>150</td>
<td>^\circ\text{C}</td>
</tr>
<tr>
<td>$T_{\text{stg}}$</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>^\circ\text{C}</td>
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</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>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>220</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{\text{th(j-a)}}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in air</td>
<td>[1]</td>
<td>[3]</td>
<td>-</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>130</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18</td>
<td>K/W</td>
</tr>
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</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 cm$^2$

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 °C</td>
<td>-</td>
<td>320</td>
<td>370</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_F = 0.7 A; T_j = 25 °C</td>
<td>-</td>
<td>430</td>
<td>490</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_F = 1 A; T_j = 25 °C</td>
<td>-</td>
<td>460</td>
<td>530</td>
<td>mV</td>
</tr>
<tr>
<td>I_R</td>
<td>reverse current</td>
<td>V_R = 5 V; T_j = 25 °C</td>
<td>-</td>
<td>1.2</td>
<td>-</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_R = 10 V; T_j = 25 °C</td>
<td>-</td>
<td>1.7</td>
<td>-</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_R = 60 V; T_j = 25 °C</td>
<td>-</td>
<td>30</td>
<td>60</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 °C</td>
<td>-</td>
<td>120</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_R = 10 V; f = 1 MHz; T_j = 25 °C</td>
<td>-</td>
<td>40</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>
60 V, 1 A low VF Schottky barrier rectifier

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

(1) $T_J = 150 \degree C$
(2) $T_J = 125 \degree C$
(3) $T_J = 85 \degree C$
(4) $T_J = 25 \degree C$
(5) $T_J = -40 \degree C$

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

(1) $T_J = 125 \degree C$
(2) $T_J = 85 \degree C$
(3) $T_J = 25 \degree C$
(4) $T_J = -40 \degree C$

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

$f = 1 \text{ MHz}; T_{\text{amb}} = 25 \degree C$

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

$T_J = 150 \degree C$
(1) $\delta = 0.1$
(2) $\delta = 0.2$
(3) $\delta = 0.5$
(4) $\delta = 1$
60 V, 1 A low VF Schottky barrier rectifier

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

\[ P_{R(AV)}(W) \]

\[ V_R(V) \]

- \( T_J = 125 \, ^\circ C \)
  - (1) \( \delta = 1 \)
  - (2) \( \delta = 0.9 \)
  - (3) \( \delta = 0.8 \)
  - (4) \( \delta = 0.5 \)

FR4 PCB, 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. 9. Average forward current as a function of ambient temperature; typical values

- FR4 PCB, mounting pad for cathode 1 cm\(^2\)
  - \( T_J = 150 \, ^\circ C \)
    - (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

- Ceramic PCB, \( Al_2O_3, \) 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. 10. Average forward current as a function of ambient 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
- $I_{RMS} = I_M \times \sqrt{\delta}$ with $I_{RMS}$ defined as RMS current

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

Fig. 13. Duty cycle definition

$T_j = 150 ^\circ \text{C}$

(1) $\delta = 1$; DC
(2) $\delta = 0.5$; $f = 20 \text{ kHz}$
(3) $\delta = 0.2$; $f = 20 \text{ kHz}$
(4) $\delta = 0.1$; $f = 20 \text{ kHz}$
12. Package outline

Fig. 14. Package outline CFP3 (SOD123W)
13. Soldering

Footprint information for reflow soldering of CFP3 package

![Footprint Diagram](sod123w_fr)

- Occupied area
- Solder land
- Solder resist
- Sold paste

Dimensions in mm:
- 2.1
- 1.8
- 2.9
- 2.8
- 4.4
- 1.1
- 1.2
- 1.4
- 1.6
- 2.1
- 1.2
- 1.4
- 2.8
- 3.9
- 2.8

Recommended stencil thickness: 0.1 mm

Fig. 15. Reflow soldering footprint for CFP3 (SOD123W)
Fig. 16. Wave soldering footprint for CFP3 (SOD123W)
14. Revision history

Table 8. Revision history

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<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
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<td>for $I_{FSM}$ changed</td>
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<td></td>
<td>from square wave to</td>
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Data sheet status

<table>
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<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<td>Development</td>
<td>This document contains data from the respective 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>
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[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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