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: $I_{F(AV)} \leq 3\, \text{A}$
- Reverse voltage: $V_R \leq 40\, \text{V}$
- Low forward voltage
- High power capability due to clip-bond technology
- Small and flat lead 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 (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>$\delta = 0.5; f = 20, \text{kHz}; \text{square wave}; T_{\text{amb}} \leq 65 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\delta = 0.5; f = 20, \text{kHz}; \text{square wave}; T_{\text{sp}} \leq 165 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>3</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>$I_T = 3, \text{A}; T_j = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>460</td>
<td>540</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>25</td>
<td>100</td>
<td>$\mu$A</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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<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>PMEG4030ETR-Q</td>
<td>CFP3</td>
<td>plastic, surface</td>
<td>mounted package: 2 terminals; 2.6 mm x 1.7 mm x 1 mm body</td>
<td>SOD123W</td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
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<tr>
<td>PMEG4030ETR-Q</td>
<td>LL</td>
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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</td>
<td>V</td>
</tr>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>$\delta = 0.5; f = 20 , kHz; square wave; $T_{\text{amb}} \leq 65 , ^\circ C$</td>
<td>[1]</td>
<td>-</td>
<td>3 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\delta = 0.5; f = 20 , kHz; square wave; $T_{\text{sp}} \leq 165 , ^\circ C$</td>
<td></td>
<td>-</td>
<td>3 A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8.3 , \text{ms};$ half sine wave; $T_j(\text{init}) = 25 , ^\circ C$</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>-</td>
<td>0.68 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td>1.15 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>2.14 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>-55</td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{\text{stg}}$</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>175</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>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1]</td>
<td>[2]</td>
<td>-</td>
<td>220 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>[3]</td>
<td>-</td>
<td>130 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>[4]</td>
<td>-</td>
<td>70 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>-</td>
<td>18 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
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>$I_F = 0.1 \ A; T_J = 25 \ ^\circ C$</td>
<td>-</td>
<td>295</td>
<td>330</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1 \ A; T_J = 25 \ ^\circ C$</td>
<td>-</td>
<td>380</td>
<td>440</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 3 \ A; T_J = 25 \ ^\circ C$</td>
<td>-</td>
<td>460</td>
<td>540</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>5</td>
<td>-</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40 \ V; T_J = 25 \ ^\circ C$</td>
<td>-</td>
<td>25</td>
<td>100</td>
<td>µA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1 \ V; f = 1 \ MHz; T_J = 25 \ ^\circ C$</td>
<td>-</td>
<td>250</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>95</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>
Fig. 4. Forward current as a function of forward voltage; typical values

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

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

(1) $T_j = 125 ^\circ C$
(2) $T_j = 85 ^\circ C$
(3) $T_j = 25 ^\circ C$
(4) $T_j = -40 ^\circ C$

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

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

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

$T_j = 150 ^\circ C$
(1) $\delta = 0.1$
(2) $\delta = 0.2$
(3) $\delta = 0.5$
(4) $\delta = 1$
**High temperature 40 V, 3 A low VF Schottky barrier rectifier**

**Fig. 8.** 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. 9.** Average forward current as a function of ambient temperature; typical values

- **FR4 PCB, standard footprint**
  - $T_j = 175 \, ^\circ\text{C}$
  - (1) $\delta = 1$; DC
  - (2) $\delta = 0.5$; $f = 20 \, \text{kHz}$
  - (3) $\delta = 0.2$; $f = 20 \, \text{kHz}$
  - (4) $\delta = 0.1$; $f = 20 \, \text{kHz}$

- **Ceramic PCB, $\text{Al}_2\text{O}_3$, standard footprint**
  - $T_j = 175 \, ^\circ\text{C}$
  - (1) $\delta = 1$; DC
  - (2) $\delta = 0.5$; $f = 20 \, \text{kHz}$
  - (3) $\delta = 0.2$; $f = 20 \, \text{kHz}$
  - (4) $\delta = 0.1$; $f = 20 \, \text{kHz}$

**Fig. 10.** Average forward current as a function of ambient temperature; typical values

- **FR4 PCB, mounting pad for cathode 1 cm$^2$**
  - $T_j = 175 \, ^\circ\text{C}$
  - (1) $\delta = 1$; DC
  - (2) $\delta = 0.5$; $f = 20 \, \text{kHz}$
  - (3) $\delta = 0.2$; $f = 20 \, \text{kHz}$
  - (4) $\delta = 0.1$; $f = 20 \, \text{kHz}$
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.
12. Package outline

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

Footprint information for reflow soldering of CFP3 package

```
occupied area

solder land

solder resist

solder paste

Dimensions in mm

recommended stencil thickness: 0.1 mm

Issue date 17-06-09 20-02-28
```

Fig. 15. Reflow soldering footprint for CFP3 (SOD123W)
Wave soldering footprint information

Solder lands

occupied area

solder resist

dummy track (solder resist and Cu free)

Dimensions in mm

Issue date

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

Table 8. Revision history

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<td>Product data sheet</td>
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<td>PMEG4030ETR-Q v.3</td>
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Data sheet status

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<th>Product status</th>
<th>Definition</th>
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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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