1. General description

Planar Schottky barrier rectifier encapsulated in a CFP3-HP (SOD123HP) power flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low forward voltage
- Low leakage current
- High surge current robustness
- High power capability due to clip bond package
- Power flat lead plastic package with exposed heatsink for optimal thermal connection
- 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>$\delta = 0.5; f = 20 \text{ kHz}; \text{ square wave; } T_{sp} \leq 172 \text{ °C}$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_j = 25 \text{ °C}$</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 1 \text{ A; pulsed; } T_j = 25 \text{ °C}$</td>
<td>[1]</td>
<td>-</td>
<td>405</td>
<td>450</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 30 \text{ V; pulsed; } T_j = 25 \text{ °C}$</td>
<td>[1]</td>
<td>-</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 30 \text{ V; pulsed; } T_j = 125 \text{ °C}$</td>
<td>[1]</td>
<td>-</td>
<td>8</td>
<td>25</td>
</tr>
</tbody>
</table>

[1] Very short pulse, in order to maintain a stable junction temperature.
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>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMEG3010EXE-Q</td>
<td>CFP3-HP</td>
<td>Power plastic surface mounted package; 2 terminals; 2.80 mm × 1.80 mm × 0.90 mm body</td>
<td>SOD123HP</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>PMEG3010EXE-Q</td>
<td>AA</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>30</td>
<td>V</td>
</tr>
<tr>
<td>$I_F$</td>
<td>forward current</td>
<td>$\delta = 1$; $T_{sp} \leq 172 , ^\circ C$</td>
<td>-</td>
<td>1.4</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>$\delta = 0.5$; $f = 20 , kHz$; square wave; $T_{sp} \leq 172 , ^\circ C$</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak</td>
<td>$I_p = 8.3 , ms$; half sine wave; $T_{j(init)} = 25 , ^\circ C$</td>
<td>-</td>
<td>50</td>
<td>A</td>
</tr>
<tr>
<td>$P_{tot}$</td>
<td>total power dissipation</td>
<td>$T_{amb} \leq 25 , ^\circ C$</td>
<td>[1]</td>
<td>-0.75</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2]</td>
<td>1.3</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>$T_{amb}$</td>
<td>ambient temperature</td>
<td></td>
<td>-55</td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{stg}$</td>
<td>storage temperature</td>
<td></td>
<td>165</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>200  K/W</td>
</tr>
<tr>
<td>$R_{th(j-sp)}$</td>
<td>thermal resistance from junction to solder point</td>
<td></td>
<td>[4]</td>
<td>-</td>
<td>-</td>
<td>6    K/W</td>
</tr>
</tbody>
</table>

[2] 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
## 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>$V_{(B/R)R}$</td>
<td>reverse breakdown voltage</td>
<td>$I_R = 3 , mA$; pulsed; $T_j = 25 ^\circ C$ [1]</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 0.5 , A$; pulsed; $T_j = 25 ^\circ C$ [1]</td>
<td>-</td>
<td>370</td>
<td>420</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1 , A$; pulsed; $T_j = 25 ^\circ C$ [1]</td>
<td>-</td>
<td>405</td>
<td>450</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1 , A$; pulsed; $T_j = -40 ^\circ C$ [1]</td>
<td>-</td>
<td>470</td>
<td>550</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 30 , V$; pulsed; $T_j = 25 ^\circ C$ [1]</td>
<td>-</td>
<td>15</td>
<td>50</td>
<td>$\mu A$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 30 , V$; pulsed; $T_j = 125 ^\circ C$ [1]</td>
<td>-</td>
<td>305</td>
<td>385</td>
<td>mV</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>145</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>50</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time ;</td>
<td>$I_F = 0.5 , A$; $I_R = 0.5 , A$; $I_{R,(meas)} = 0.1 , A$; $T_j = 25 ^\circ C$</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>step recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>reverse recovery time ;</td>
<td>$dI_F/dt = 200 , A/\mu s$; $I_F = 6 , A$; $V_R = 26 , V$; $T_j = 25 ^\circ C$</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>ramp recovery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{RM}$</td>
<td>peak reverse recovery current</td>
<td></td>
<td>-</td>
<td>0.6</td>
<td>-</td>
<td>A</td>
</tr>
<tr>
<td>$Q_{rr}$</td>
<td>reverse recovery charge</td>
<td></td>
<td>-</td>
<td>2.5</td>
<td>-</td>
<td>nC</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>380</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>

[1] Very short pulse, in order to maintain a stable junction temperature.

### Diagrams

**Fig. 3.** Forward current as a function of forward voltage; typical values

**Fig. 4.** Reverse current as a function of reverse voltage; typical values

---

### Footnotes

(1) pulsed condition: $T_j = 150 ^\circ C$

(2) pulsed condition: $T_j = 125 ^\circ C$

(3) pulsed condition: $T_j = 100 ^\circ C$

(4) pulsed condition: $T_j = 85 ^\circ C$

(5) pulsed condition: $T_j = 25 ^\circ C$

(6) pulsed condition: $T_j = -40 ^\circ C$
Nexperia

PMEG3010EXE-Q

30 V, 1 A Schottky barrier rectifier

Fig. 5. Diode capacitance as a function of reverse voltage; typical values

\[ C_d (\text{pF}) \]

\[ V_R (\text{V}) \]

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

Fig. 6. Average forward power dissipation as a function of average forward current; typical values

\[ P_{F(AV)} (\text{W}) \]

\[ I_{F(AV)} (\text{A}) \]

\[ T_j = 100 ^\circ \text{C} \]

(1) \( \delta = 0.1 \)
(2) \( \delta = 0.2 \)
(3) \( \delta = 0.5 \)
(4) \( \delta = 0.8 \)
(5) \( \delta = 1 \)

Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values

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

\[ V_R (\text{V}) \]

\[ T_j = 100 ^\circ \text{C} \]

(1) \( \delta = 1 \)
(2) \( \delta = 0.9 \)
(3) \( \delta = 0.8 \)
(4) \( \delta = 0.5 \)
(5) \( \delta = 0.2 \)

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

\[ I_{F(AV)} (\text{A}) \]

\[ T_{\text{amb}} (^\circ \text{C}) \]

FR4 PCB, standard footprint

\[ T_j = 175 ^\circ \text{C} \]

(1) \( \delta = 1 \)
(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

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

FR4 PCB, mounting pad for cathode 1 cm²
Tj = 175 °C
(1) δ = 1
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 10. Average forward current as a function of solder point temperature; typical values

Tj = 175 °C
(1) δ = 1
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 11. Reverse recovery definition; step recovery
Fig. 12. Reverse recovery definition; ramp recovery

Fig. 13. Forward recovery definition

Fig. 14. Duty cycle definition

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. 15. Package outline CFP3-HP (SOD123HP)
13. Soldering

Footprint information for reflow soldering of plastic surface-mounted, 2-lead package

Soldering footprint for CFP3-HP (SOD123HP)

recommended stencil thickness: 0.1 mm

occupied area
solder land
solder resist
solder paste

Dimensions in mm
Issue date 23-11-29

Fig. 16. Reflow soldering footprint for CFP3-HP (SOD123HP)
# 14. 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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</thead>
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<td>PMEG3010EXE-Q v.1</td>
<td>20240105</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>
15. Legal information

Data sheet status

<table>
<thead>
<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective [short] data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
</tr>
<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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