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: $I_{F(AV)} \leq 2 \text{ A}$
- Reverse voltage: $V_R \leq 100 \text{ V}$
- Low forward voltage: $V_F = 770 \text{ mV}$
- High power capability due to clip-bonding technology
- Extremely low leakage current $I_R = 40 \text{ nA}$
- High temperature $T_J \leq 175 ^\circ \text{C}$
- 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

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>$\delta = 0.5; f = 20 \text{ kHz};$ square wave; $T_{sp} \leq 160 ^\circ \text{C}$</td>
<td>-</td>
<td>-</td>
<td>2</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>100</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 2 \text{ A}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>770</td>
<td>830</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 100 \text{ V}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>40</td>
<td>150</td>
<td>nA</td>
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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></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>PMEG10020ELR-Q</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>
<td></td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
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<tbody>
<tr>
<td>PMEG10020ELR-Q</td>
<td>K8</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 °C</td>
<td>-</td>
<td>100</td>
<td>V</td>
</tr>
<tr>
<td>I_F</td>
<td>forward current</td>
<td>δ = 1; T_sp = 155 °C</td>
<td>-</td>
<td>2.8</td>
<td>A</td>
</tr>
<tr>
<td>I_(F(AV))</td>
<td>average forward current</td>
<td>δ = 0.5; f = 20 kHz; square wave; T_amb ≤ 80 °C</td>
<td>[1]</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>δ = 0.5; f = 20 kHz; square wave; T_sp ≤ 160 °C</td>
<td></td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>I_(FSM)</td>
<td>non-repetitive peak forward current</td>
<td>I_p = 8.3 ms; half sine wave; T_j(init) = 25 °C</td>
<td>-</td>
<td>50</td>
<td>A</td>
</tr>
<tr>
<td>P_tot</td>
<td>total power dissipation</td>
<td>T_amb ≤ 25 °C</td>
<td>[2]</td>
<td>680</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td>1150</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>2140</td>
<td>mW</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>-65</td>
<td>175</td>
<td>°C</td>
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</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>220</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>[3]</td>
<td>130</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>[4]</td>
<td>70</td>
<td>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>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.


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>$V_{(BR)R}$</td>
<td>reverse breakdown voltage</td>
<td>$I_R = 1 \text{ mA}; t_p = 300 \mu\text{s}; \delta = 0.02; T_j = 25 ^\circ\text{C}$</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 0.5 \text{ A}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>640</td>
<td>710</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 \text{ V}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>nA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>70</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>$I_F = 0.5 \text{ A}; I_R = 1 \text{ A}; I_{R(meas)} = 0.25 \text{ A}; T_j = 25 ^\circ\text{C}$</td>
<td>-</td>
<td>3.7</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>
Nexperia

PMEG10020ELR-Q

100 V, 2 A low leakage current Schottky barrier rectifier

<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_{FRM}</td>
<td>peak forward recovery voltage</td>
<td>I_F = 0.5 A; dI_F/dt = 20 A/μs; T_j = 25 °C</td>
<td>-</td>
<td>690</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>

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

- (1) T_j = 175 °C
- (2) T_j = 150 °C
- (3) T_j = 125 °C
- (4) T_j = 85 °C
- (5) T_j = 25 °C
- (6) T_j = −40 °C

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

- (1) T_j = 175 °C
- (2) T_j = 150 °C
- (3) T_j = 125 °C
- (4) T_j = 85 °C
- (5) T_j = 25 °C
- (6) T_j = −40 °C

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

- f = 1 MHz; T_amb = 25 °C

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

- T_j = 175 °C
- (1) δ = 0.1
- (2) δ = 0.2
- (3) δ = 0.5
- (4) δ = 1

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Product data sheet 16 November 2022
**PMEG10020ELR-Q**

100 V, 2 A low leakage current Schottky barrier rectifier

---

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

- \( T_j = 150 ^\circ C \)
- (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. 9.** Average forward current as a function of ambient temperature; typical values

- FR4 PCB, standard footprint
- \( T_j = 175 ^\circ C \)
- (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
- \( T_j = 175 ^\circ C \)
- (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. 11.** Average forward current as a function of ambient temperature; typical values

- Ceramic PCB, Al\(_2\)O\(_3\), standard footprint
- \( T_j = 175 ^\circ C \)
- (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

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

\[ T_j = 175 \, ^\circ C \]

(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. 13. Reverse recovery 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,

\[ I_{RMS} = I_{F(AV)} \text{ at DC}, \]

\[ I_{RMS} = I_M \times \sqrt{\delta} \] 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

Footprint information for reflow soldering of CFP3 package

SOD123W

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

Fig. 18. Wave soldering footprint for CFP3 (SOD123W)
## 14. Revision history

<table>
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<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>20221116</td>
<td>Product data sheet</td>
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<td>PMEG10020ELR-Q v.1</td>
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**Modifications:**
- Limiting values: Measurement conditions for \(I_{FSM}\) changed from square wave to half-sine wave.

<table>
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<td>20210504</td>
<td>Product data sheet</td>
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15. Legal information

Data sheet status

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<td>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>
</tr>
<tr>
<td>Product [short] data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
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[2] The term "short data sheet" is explained in section "Definitions".
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Contents

1. General description......................................................1
2. Features and benefits.................................................. 1
3. Applications......................................................................1
4. Quick reference data....................................................1
5. Pinning information......................................................1
6. Ordering information....................................................2
7. Marking.......................................................................... 2
8. Limiting values............................................................. 2
9. Thermal characteristics................................................ 3
10. Characteristics............................................................. 4
11. Test information.......................................................... 7
12. Package outline.......................................................... 9
13. Soldering...................................................................... 10
14. Revision history..........................................................12
15. Legal information.........................................................13

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