1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier encapsulated in a CFP3 (SOD123W) small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low forward voltage
- Low $Q_r$ and low $I_{RM}$
- Low leakage current
- High power capability due to clip-bonding technology
- Small and flat lead SMD power plastic package

3. Applications

- High efficiency DC-to-DC conversion
- LED lighting
- Switch mode power supply
- Freewheeling applications
- Reverse polarity protection
- OR-ing

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>
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</thead>
<tbody>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>$\delta = 0.5; f = 20$ kHz; square wave; $T_{sp} \leq 156$ °C</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_j = 25$ °C</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 2$ A; pulsed; $T_j = 25$ °C</td>
<td>[1]</td>
<td>705</td>
<td>800</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 100$ V; pulsed; $T_j = 25$ °C</td>
<td>[1]</td>
<td>0.15</td>
<td>1.25</td>
<td>$\mu$A</td>
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<td></td>
<td></td>
<td>$V_R = 100$ V; pulsed; $T_j = 125$ °C</td>
<td>[1]</td>
<td>0.28</td>
<td>1.2</td>
<td>mA</td>
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</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>
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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></td>
<td>K  A</td>
</tr>
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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</th>
<th>Name</th>
<th>Description</th>
<th>Version</th>
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<tr>
<td>PMEG100T20ELR</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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7. Marking

Table 4. Marking codes

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<td>PMEG100T20ELR</td>
<td>LB</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>
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<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>100</td>
<td>V</td>
</tr>
<tr>
<td>( I_F )</td>
<td>forward current</td>
<td>( \delta = 1; \ T_{sp} \leq 150 , ^\circ \text{C} )</td>
<td>-</td>
<td>2.8</td>
<td>A</td>
</tr>
<tr>
<td>( I_{F(AV)} )</td>
<td>average forward current</td>
<td>( \delta = 0.5; \ f = 20 , \text{kHz}; \square \text{wave}; \ T_{sp} \leq 156 , ^\circ \text{C} )</td>
<td>-</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>( I_{FSM} )</td>
<td>non-repetitive peak forward current</td>
<td>( t_p = 8.3 , \text{ms}; \half \text{wave}; \ T_{j(init)} = 25 , ^\circ \text{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 \text{C} )</td>
<td>[1]</td>
<td>0.68</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2]</td>
<td>1.15</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>-65</td>
<td>175</td>
<td>°C</td>
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9. Thermal characteristics

Table 6. Thermal characteristics

<table>
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<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>$R_{th(j-sp)}$</td>
<td>thermal resistance from junction to solder point</td>
<td>[4]</td>
<td>-</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.


![Graph 1](aaa-033002)

FR4 PCB, single-sided copper, tin-plated and standard footprint

**Fig. 1.** Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

![Graph 2](aaa-033003)

FR4 PCB, single-sided copper, tin-plated and 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>$V_{(BR)R}$</td>
<td>reverse breakdown voltage</td>
<td>$I_R = 1 \text{ mA}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>100</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 0.1 \text{ A}; \text{ pulsed}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>420</td>
<td>490</td>
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<tr>
<td></td>
<td></td>
<td>$I_F = 0.5 \text{ A}; \text{ pulsed}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>515</td>
<td>580</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1 \text{ A}; \text{ pulsed}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>590</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 2 \text{ A}; \text{ pulsed}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>705</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 2 \text{ A}; \text{ pulsed}; T_j = -40 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>705</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 2 \text{ A}; \text{ pulsed}; T_j = 125 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>590</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 2 \text{ A}; \text{ pulsed}; T_j = 150 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>550</td>
<td>620</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 60 \text{ V}; \text{ pulsed}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>0.06</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 100 \text{ V}; \text{ pulsed}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>0.15</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 100 \text{ V}; \text{ pulsed}; T_j = 125 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>0.28</td>
<td>1.2</td>
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<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 100 \text{ V}; \text{ pulsed}; T_j = 150 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>1.1</td>
<td>5.5</td>
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<tr>
<td></td>
<td></td>
<td>$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>200</td>
<td>-</td>
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<tr>
<td></td>
<td></td>
<td>$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 ^\circ \text{C}$</td>
<td>[1]</td>
<td>-</td>
<td>60</td>
<td>-</td>
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<td>$t_{rr}$</td>
<td>reverse recovery time step recovery</td>
<td>$I_F = 0.5 \text{ A}; I_R = 0.5 \text{ A}; I_{R(\text{meas})} = 0.1 \text{ A}; T_j = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>reverse recovery time ramp recovery</td>
<td>$dI_F/dt = 200 \text{ A/µs}; I_F = 6 \text{ A}; V_R = 26 \text{ V}; T_j = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>12</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$I_{FRM}$</td>
<td>peak reverse recovery current</td>
<td>$dI_F/dt = 200 \text{ A/µs}; I_F = 6 \text{ A}; V_R = 26 \text{ V}; T_j = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>1.3</td>
<td>-</td>
<td>A</td>
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<tr>
<td>$Q_{rr}$</td>
<td>reverse recovery charge</td>
<td></td>
<td>-</td>
<td>8.5</td>
<td>-</td>
<td>nC</td>
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<tr>
<td>$V_{FRM}$</td>
<td>peak forward recovery voltage</td>
<td>$I_F = 0.5 \text{ A}; dI_F/dt = 20 \text{ A/µs}; T_j = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>520</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>

[1] Very short pulse, in order to maintain a stable junction temperature.
**100 V, 2 A low leakage current Trench MEGA Schottky barrier rectifier**

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

Pulsed condition
(1) $T_J = 175 \degree C$
(2) $T_J = 150 \degree C$
(3) $T_J = 125 \degree C$
(4) $T_J = 100 \degree C$
(5) $T_J = 85 \degree C$
(6) $T_J = 25 \degree C$
(7) $T_J = -40 \degree C$

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

Pulsed condition
(1) $T_J = 175 \degree C$
(2) $T_J = 150 \degree C$
(3) $T_J = 125 \degree C$
(4) $T_J = 100 \degree C$
(5) $T_J = 85 \degree C$
(6) $T_J = 25 \degree C$
(7) $T_J = -40 \degree C$

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

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

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

$T_J = 100 \degree C$
(1) $\delta = 0.1$
(2) $\delta = 0.2$
(3) $\delta = 0.5$
(4) $\delta = 0.8$
(5) $\delta = 1; \text{ DC}$
100 V, 2 A low leakage current Trench MEGA Schottky barrier rectifier

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

- $T_j = 100 °C$
- (1) $\delta = 1$; DC
- (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

- FR4 PCB, standard footprint
- $T_j = 175 °C$
- (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$^2$
- $T_j = 175 °C$
- (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 solder point temperature; typical values

- $T_j = 175 °C$
- (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
100 V, 2 A low leakage current Trench MEGA Schottky barrier rectifier

FR4 PCB, standard footprint
$R_{th} = 220 \text{ K/W}$

**Fig. 11.** Derated maximum reverse voltage as a function of junction temperature; typical values

FR4 PCB, mounting pad for cathode 1 cm$^2$
$R_{th} = 130 \text{ K/W}$

**Fig. 12.** Derated maximum reverse voltage as a function of junction temperature; typical values

Soldering point of cathode tab
$R_{th} = 18 \text{ K/W}$

**Fig. 13.** Derated maximum reverse voltage as a function of junction temperature; typical values
11. Test information

Fig. 14. Reverse recovery definition; step recovery

Fig. 15. Reverse recovery definition; ramp recovery

Fig. 16. Forward recovery definition
The current ratings for the typical waveforms are calculated according to the equations: $I_{F(AC)} = I_M \times \delta$ with $I_M$ defined as peak current, $I_{RMS} = I_{F(AC)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with $I_{RMS}$ defined as RMS current.

12. Package outline

![Package outline CFP3 (SOD123W)](image)
13. Soldering

Footprint information for reflow soldering of CFP3 package

![Footprint diagram](sod123w_fr)

Recommended stencil thickness: 0.1 mm

Fig. 19. Reflow soldering footprint for CFP3 (SOD123W)
Fig. 20. Wave soldering footprint for CFP3 (SOD123W)
# 14. Revision history

<table>
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<tr>
<th>Data sheet ID</th>
<th>Release date</th>
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<th>Change notice</th>
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<td>▪ Figure 6 adapted</td>
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Nexperia

15. Legal information

Data sheet status

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<td>[1] Please consult the most recently issued document before initiating or completing a design. [2] The term &quot;short data sheet&quot; is explained in section &quot;Definitions&quot;. [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 <a href="https://www.nexperia.com">https://www.nexperia.com</a>.</td>
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Objective [short] data sheet

Development

This document contains data from the respective specification for product development.

PMEG100T20ELR

100 V, 2 A low leakage current Trench MEGA Schottky barrier rectifier

PMEG100T20ELR

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Product data sheet 12 July 2021 13 / 14

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<thead>
<tr>
<th>Document status</th>
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