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

- Average forward current: $I_{F(AV)} \leq 1 \text{ A}$
- Reverse voltage: $V_R \leq 40 \text{ V}$
- Low forward voltage
- Low leakage current due to Trench MEGA Schottky technology
- High power capability due to clip-bonding technology
- Small and flat lead SMD plastic package
- Capable for reflow and wave soldering
- AEC-Q101 qualified

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Freewheeling application
- Reverse polarity protection
- Low power consumption application

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>$\delta = 0.5 \ ; f = 20 \text{ kHz} ; T_{sp} \leq 170 \text{ °C} ;$ square wave</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>40</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 1 \text{ A} ; T_J = 25 \text{ °C} ;$ pulsed [1]</td>
<td>-</td>
<td>400</td>
<td>460</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 \text{ V} ; T_J = 25 \text{ °C} ;$ pulsed [1]</td>
<td>-</td>
<td>3</td>
<td>11.5</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40 \text{ V} ; T_J = 25 \text{ °C} ;$ pulsed [1]</td>
<td>-</td>
<td>6</td>
<td>22</td>
<td>µA</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>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>K</td>
<td>cathode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>anode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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>PMEG40T10ER</td>
<td>CFP3</td>
<td>plastic,</td>
<td>surface mounted package; 2 terminals; 2.6 mm x 1.7 mm</td>
<td>SOD123W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mm x 1 mm</td>
<td>body</td>
<td></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>PMEG40T10ER</td>
<td>L2</td>
</tr>
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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)</td>
<td>forward current</td>
<td>(\delta = 1 , \delta = 166 , ^\circ) C</td>
<td>-</td>
<td>1.4</td>
<td>A</td>
</tr>
<tr>
<td>(I_{F(\text{AV})})</td>
<td>average forward current</td>
<td>(\delta = 0.5 , f = 20 , \text{kHz}; , T_{sp} \leq 170 , ^\circ) C; square wave</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>(I_{\text{FSM}})</td>
<td>non-repetitive peak forward current</td>
<td>(t_p = 8 , \text{ms}; , \text{square wave}; , T_{j(\text{init})} = 25 , ^\circ) C</td>
<td>-</td>
<td>20</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>[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_{\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_{\text{th(j-a)}})</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1]</td>
<td>-</td>
<td>-</td>
<td>220 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2]</td>
<td>-</td>
<td>-</td>
<td>130 K/W</td>
</tr>
<tr>
<td>(R_{\text{th(j-sp)}})</td>
<td>thermal resistance from junction to solder point</td>
<td></td>
<td>[4]</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

FR4 PCB, standard footprint

Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

FR4 PCB, mounting pad for cathode 1 cm²
## 10. 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>$V_{\text{BR,}R}$</td>
<td>reverse breakdown voltage</td>
<td>$I_R = 1$ mA; pulsed; $T_J = 25$ °C</td>
<td>40</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 0.1$ A; $T_J = 25$ °C; pulsed</td>
<td>[1]</td>
<td>-</td>
<td>310</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 0.5$ A; $T_J = 25$ °C; pulsed</td>
<td>[1]</td>
<td>-</td>
<td>365</td>
<td>420</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1$ A; $T_J = 25$ °C; pulsed</td>
<td>[1]</td>
<td>-</td>
<td>400</td>
<td>460</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1$ A; $T_J = -40$ °C; pulsed</td>
<td>[1]</td>
<td>-</td>
<td>505</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1$ A; $T_J = 125$ °C; pulsed</td>
<td>[1]</td>
<td>-</td>
<td>365</td>
<td>-</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10$ V; $T_J = 25$ °C; pulsed</td>
<td>3</td>
<td>11.5</td>
<td>-</td>
<td>μA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 30$ V; $T_J = 25$ °C; pulsed</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>μA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40$ V; $T_J = 25$ °C; pulsed</td>
<td>6</td>
<td>22</td>
<td>-</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>350</td>
<td>-</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>145</td>
<td>-</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time step recovery</td>
<td>$I_F = 0.5$ A; $I_R = 0.5$ A; $I_R(\text{meas}) = 0.1$ A; $T_J = 25$ °C</td>
<td>-</td>
<td>11.5</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>reverse recovery time ramp recovery</td>
<td>$dI_F/dt = 200$ A/μs; $I_F = 6$ A; $V_R = 26$ V; $T_J = 25$ °C</td>
<td>-</td>
<td>11</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{\text{FRM}}$</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>430</td>
<td>-</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>

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

**PMEG40T10ER**

40 V, 1 A low VF Trench MEGA Schottky barrier rectifier

---

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

- Pulsed condition
  - (1) $T_J = 175 \, ^\circ\text{C}$
  - (2) $T_J = 150 \, ^\circ\text{C}$
  - (3) $T_J = 125 \, ^\circ\text{C}$
  - (4) $T_J = 100 \, ^\circ\text{C}$
  - (5) $T_J = 85 \, ^\circ\text{C}$
  - (6) $T_J = 25 \, ^\circ\text{C}$
  - (7) $T_J = -40 \, ^\circ\text{C}$

---

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

- Pulsed condition
  - (1) $T_J = 150 \, ^\circ\text{C}$
  - (2) $T_J = 125 \, ^\circ\text{C}$
  - (3) $T_J = 100 \, ^\circ\text{C}$
  - (4) $T_J = 85 \, ^\circ\text{C}$
  - (5) $T_J = 25 \, ^\circ\text{C}$
  - (6) $T_J = -40 \, ^\circ\text{C}$

---

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

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

---

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

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

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

- $T_j = 100 \, ^\circ C$
- (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
- $T_j = 175 \, ^\circ C$
- (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$^2$
- $T_j = 175 \, ^\circ C$
- (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. 10.** 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) $\delta = 0.1; \, f = 20 \, kHz$
11. Test information

Fig. 11. Reverse recovery definition; step recovery

Fig. 12. Reverse recovery definition; ramp recovery

Fig. 13. Forward 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,

\[ I_{RMS} = I_{F(AV)} \text{ at DC, and } I_{RMS} = I_M \times \sqrt{\delta} \]

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**

![Package outline](image)
13. Soldering

Fig. 16. Reflow soldering footprint for CFP3 (SOD123W)
Fig. 17. Wave soldering footprint for CFP3 (SOD123W)
14. Revision history

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<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>20180306</td>
<td>Product data sheet</td>
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<td>PMEG40T10ER v.1</td>
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<td>• Graphic symbol changed</td>
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<tr>
<td>PMEG40T10ER v.1</td>
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Data sheet status

<table>
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<th>Product status</th>
<th>Definition</th>
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<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>
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<tr>
<td>Product [short] data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
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</table>

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[2] The term "short data sheet" is explained in section "Definitions".
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