1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier encapsulated in a CFP5 (SOD128) small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 3$ A
- Reverse voltage: $V_R \leq 40$ 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
- Suitable for both reflow and wave soldering
- 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
- 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>$\delta = 0.5; f = 20$ kHz; square wave; $T_{sp} \leq 155$ °C</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_J = 25$ °C</td>
<td>-</td>
<td>-</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 3$ A; $T_J = 25$ °C; pulsed</td>
<td>[1]</td>
<td>450</td>
<td>525</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10$ V; $T_J = 25$ °C; pulsed</td>
<td>[1]</td>
<td>5</td>
<td>16</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40$ V; $T_J = 25$ °C; pulsed</td>
<td>[1]</td>
<td>8</td>
<td>28</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>
</tr>
</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>CFP5 (SOD128)</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>
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</thead>
<tbody>
<tr>
<td>PMEG40T30EP-Q</td>
<td>CFP5</td>
<td>plastic, surface mounted package; 2 terminals; 4 mm pitch; 3.8 mm x 2.6 mm x 1 mm body</td>
<td>SOD128</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>PMEG40T30EP-Q</td>
<td>DW</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 Description</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>$T_j = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>40</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>4.2</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F(\text{AV})}$</td>
<td>average forward current</td>
<td>$\delta = 0.5; , f = 20 , \text{kHz}; , \text{square wave}; , T_{sp} \leq 155 , ^\circ\text{C}$</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8 , \text{ms}; , \text{square wave}; , T_{j(\text{init})} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>55</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>0.75</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2]</td>
<td>1.2</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>
</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></td>
<td></td>
<td>200</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></td>
<td></td>
<td>12</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>
<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>$I_R = 1 , mA; , T_j = 25 , ^\circ C$</td>
<td>[1]</td>
<td>40</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 0.1 , A; , T_j = 25 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>300</td>
<td>345  mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1 , A; , T_j = 25 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>380</td>
<td>440  mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 2 , A; , T_j = 25 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>420</td>
<td>490  mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 3 , A; , T_j = 25 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>450</td>
<td>525  mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 3 , A; , T_j = -40 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>505</td>
<td>-     mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 3 , A; , T_j = 125 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>370</td>
<td>-     mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 , V; , T_j = 25 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>5</td>
<td>16   µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 30 , V; , T_j = 25 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>7</td>
<td>-     µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40 , V; , T_j = 25 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>8</td>
<td>28   µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40 , V; , T_j = 125 , ^\circ C; , \text{pulsed}$</td>
<td>[1]</td>
<td>-</td>
<td>5.5</td>
<td>-     mA</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>560</td>
<td>-     pF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10 , V; , f = 1 , MHz; , T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>240</td>
<td>-     pF</td>
<td></td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>$I_F = 0.5 , A; , I_R = 0.5 , A; , I_{R(\text{meas})} = 0.1 , A; , T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>21</td>
<td>-     ns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>step recovery</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>14</td>
<td>-     ns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reverse recovery time</td>
<td>$dI_F/dt = 20 , A/\mu s; , T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>390</td>
<td>-     mV</td>
<td></td>
</tr>
</tbody>
</table>

[1] Very short pulse, in order to maintain a stable junction temperature.
40 V, 3 A low VF Trench MEGA Schottky barrier rectifier

PMEG40T30EP-Q

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

- Pulsed condition:
  1. $T_J = 175 \, ^\circ C$
  2. $T_J = 150 \, ^\circ C$
  3. $T_J = 125 \, ^\circ C$
  4. $T_J = 100 \, ^\circ C$
  5. $T_J = 85 \, ^\circ C$
  6. $T_J = 25 \, ^\circ C$
  7. $T_J = -40 \, ^\circ C$

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

- Pulsed condition:
  1. $T_J = 150 \, ^\circ C$
  2. $T_J = 125 \, ^\circ C$
  3. $T_J = 100 \, ^\circ C$
  4. $T_J = 85 \, ^\circ C$
  5. $T_J = 25 \, ^\circ C$
  6. $T_J = -40 \, ^\circ C$

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

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

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

- $T_J = 100 \, ^\circ C$
  1. $\delta = 0.1$
  2. $\delta = 0.2$
  3. $\delta = 0.5$
  4. $\delta = 0.8$
  5. $\delta = 1$; DC
PMEG40T30EP-Q
40 V, 3 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

- $T_J = 175 \, ^\circ C$
- (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**
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,

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

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**

Fig. 15. Package outline CFP5 (SOD128)
13. Soldering

Fig. 16. Reflow soldering footprint for CFP5 (SOD128)
Fig. 17. Wave soldering footprint for CFP5 (SOD128)
## 14. Revision history

Table 8. 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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<td>20211108</td>
<td>Product data sheet</td>
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<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>
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<tbody>
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<td>[1][2]</td>
<td>[3]</td>
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</tr>
</tbody>
</table>

Objective [short] data sheet Development This document contains data from the objective specification for product development.

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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For sales office addresses, please send an email to: salesaddresses@nexperia.com
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