1. General description

Trench Maximum Efficiency General Application (MEGA) Schottky barrier rectifier encapsulated in a CFP15 (SOT1289) power and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 15$ A
- Reverse voltage: $V_R \leq 45$ V
- Low forward voltage
- Low leakage current due to Trench MEGA Schottky technology
- High power capability due to clip-bonding technology and heat sink
- Small and thin SMD plastic package, typical height 0.78 mm
- 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>$V_R$</td>
<td>reverse voltage</td>
<td>$T_j = 25 , ^\circ$ C</td>
<td></td>
<td></td>
<td>45</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 15$ A; $T_j = 25 , ^\circ$ C; pulsed</td>
<td></td>
<td></td>
<td>510</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10$ V; $T_j = 25 , ^\circ$ C; pulsed</td>
<td></td>
<td></td>
<td>14</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 45$ V; $T_j = 25 , ^\circ$ C; pulsed</td>
<td></td>
<td></td>
<td>30</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>A</td>
<td>anode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>anode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>K</td>
<td>cathode</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>PMEG045T150EIPD</td>
<td>CFP15</td>
<td>plastic, thermal enhanced ultra thin SMD package; 3 terminals; 5.8 x 4.3 x 0.78 mm body</td>
<td>SOT1289</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>PMEG045T150EIPD</td>
<td>045T M15E</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>45</td>
<td>V</td>
</tr>
<tr>
<td>$I_F$</td>
<td>forward current</td>
<td>$T_{sp} \leq 118 ^\circ C; \delta = 1$</td>
<td>-</td>
<td>21</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8 \text{ ms}; T_{j(init)} = 25 ^\circ C; \text{ square wave}$</td>
<td>-</td>
<td>130</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>1.66</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2]</td>
<td>2.15</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>
</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>-</td>
<td>90</td>
<td>KW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2]</td>
<td>-</td>
<td>70</td>
<td>KW</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>3</td>
<td>KW</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.
45 V, 15 A low VF Trench MEGA Schottky barrier rectifier

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>$I_R = 1 \text{ mA}; T_j = 25 \degree C; pulsed} [1]</td>
<td>45</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 1 \text{ A}; T_j = 25 \degree C; pulsed} [1]</td>
<td>-</td>
<td>335</td>
<td>375</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 5 \text{ A}; T_j = 25 \degree C; pulsed} [1]</td>
<td>-</td>
<td>410</td>
<td>460</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 10 \text{ A}; T_j = 25 \degree C; pulsed} [1]</td>
<td>-</td>
<td>465</td>
<td>520</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 15 \text{ A}; T_j = 25 \degree C; pulsed} [1]</td>
<td>-</td>
<td>510</td>
<td>570</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 \text{ V}; T_j = 25 \degree C; pulsed} [1]</td>
<td>-</td>
<td>14</td>
<td>51</td>
<td>\mu A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 30 \text{ V}; T_j = 25 \degree C; pulsed} [1]</td>
<td>-</td>
<td>23</td>
<td>-</td>
<td>\mu A</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 45 \text{ V}; T_j = 25 \degree C; pulsed} [1]</td>
<td>-</td>
<td>30</td>
<td>98</td>
<td>\mu A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \degree C}</td>
<td>-</td>
<td>1.7</td>
<td>-</td>
<td>nF</td>
</tr>
<tr>
<td>$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 \degree C}</td>
<td>-</td>
<td>49</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>reverse recovery time ramp recovery</td>
<td>$dI/dt = 200 \text{ A/\mu s}; T_j = 25 \degree C; I_F = 6 \text{ A}; V_R = 26 \text{ V}</td>
<td>-</td>
<td>21</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>

[1] Very short pulse, in order to maintain a stable junction temperature.
45 V, 15 A low VF Trench MEGA Schottky barrier rectifier

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

- Pulsed condition:
  - (1) $T_J = 175 \, ^\circ C$
  - (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) $T_J = -40 \, ^\circ C$

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

**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

- $T_J = 100 \, ^\circ C$
  - (1) $\delta = 0.1$
  - (2) $\delta = 0.2$
  - (3) $\delta = 0.5$
  - (4) $\delta = 0.8$
  - (5) $\delta = 1$; DC

**Fig. 6.** Average forward power dissipation as a function of average forward current; typical values
45 V, 15 A low VF Trench MEGA Schottky barrier rectifier

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

- **T<sub>j</sub> = 100 °C**
  - (1) δ = 1; DC
  - (2) δ = 0.9
  - (3) δ = 0.8
  - (4) δ = 0.5
  - (5) δ = 0.2

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

- **FR4 PCB, standard footprint**
  - **T<sub>j</sub> = 175 °C**
  - (1) δ = 1; DC
  - (2) δ = 0.5; f = 20 kHz
  - (3) δ = 0.2; f = 20 kHz
  - (4) δ = 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<sup>2**
  - **T<sub>j</sub> = 175 °C**
  - (1) δ = 1; DC
  - (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

- **T<sub>j</sub> = 175 °C**
  - (1) δ = 1; DC
  - (2) δ = 0.5; f = 20 kHz
  - (3) δ = 0.2; f = 20 kHz
  - (4) δ = 0.1; f = 20 kHz
11. Test information

Fig. 11. Reverse recovery definition; step recovery

Fig. 12. Reverse recovery definition; ramp recovery

Fig. 13. 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. 14. Package outline CFP15 (SOT1289)

13. Soldering

Footprint information for reflow soldering of CFP15 package

Fig. 15. Reflow soldering footprint for CFP15 (SOT1289)
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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<tr>
<td>PMEG045T150EIPD v.1</td>
<td>20170927</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
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15. Legal information

Data sheet status

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<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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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>
</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 URL http://www.nexperia.com.

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

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