1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a CFP15 (SOT1289) power and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: \( I_{F(AV)} \leq 10 \, A \)
- Reverse voltage: \( V_R \leq 45 \, V \)
- Extremely low forward voltage
- High power capability due to clip-bonding technology and heat sink
- Small and thin SMD power 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>( I_{F(AV)} )</td>
<td>average forward current</td>
<td>( \delta = 0.5; f = 20 , kHz; T_{sp} \leq 160 , ^\circ C; ) square wave</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>A</td>
</tr>
<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 = 10 , A; t_p \leq 300 , \mu s; \delta \leq 0.02; T_J = 25 , ^\circ C; ) pulsed</td>
<td>420</td>
<td>490</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>( I_R )</td>
<td>reverse current</td>
<td>( V_R = 10 , V; t_p \leq 3 , ms; \delta \leq 0.3; T_J = 25 , ^\circ C; ) pulsed</td>
<td>20</td>
<td>50</td>
<td></td>
<td>\mu A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( V_R = 45 , V; t_p \leq 3 , ms; \delta \leq 0.3; T_J = 25 , ^\circ C; ) pulsed</td>
<td>250</td>
<td>600</td>
<td></td>
<td>\mu A</td>
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</table>
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>Description</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>PMEG045V100EPD</td>
<td>CFP15</td>
<td>plastic, thermal enhanced ultra thin SMD package; 3 leads; body: 5.8 x 4.3 x 0.78 mm</td>
<td>SOT1289</td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
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<tr>
<td>PMEG045V100EPD</td>
<td>045V 100E</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>
<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>$T_{sp} = 155 , ^\circ C$; $\delta = 1$</td>
<td>-</td>
<td>14</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>$\delta = 0.5$; $f = 20 , \text{kHz}$; $T_{sp} \leq 160 , ^\circ C$; square wave [1]</td>
<td>-</td>
<td>10</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8 , \text{ms}$; $T_{j(init)} = 25 , ^\circ C$; square wave [2]</td>
<td>-</td>
<td>210</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></td>
<td></td>
<td></td>
<td>[3]</td>
<td>3.75</td>
<td>W</td>
</tr>
<tr>
<td>$T_j$</td>
<td>junction temperature</td>
<td>-</td>
<td>-</td>
<td>175</td>
<td>^\circ C</td>
</tr>
<tr>
<td>$T_{amb}$</td>
<td>ambient temperature</td>
<td>-</td>
<td>-</td>
<td>175</td>
<td>^\circ 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>$T_{stg}$</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td></td>
<td>175</td>
<td>°C</td>
</tr>
</tbody>
</table>


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.

Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

Device mounted on a ceramic PCB, $\text{Al}_2\text{O}_3$, standard footprint.


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

FR4 PCB, mounting pad for cathode 1 cm²

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

Ceramic PCB, Al₂O₃, standard footprint
## 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>$I_R = 5 \text{ mA}; T_j = 25 \degree C; t_p \leq 1.2 \text{ ms}; \delta \leq 0.12; \text{ pulsed}$</td>
<td>45</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 1 \text{ A}; t_p \leq 300 \mu s; \delta \leq 0.02; T_j = 25 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>320</td>
<td>360</td>
<td>mV</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 2 \text{ A}; t_p \leq 300 \mu s; \delta \leq 0.02; T_j = 25 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>340</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 5 \text{ A}; t_p \leq 300 \mu s; \delta \leq 0.02; T_j = 25 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>380</td>
<td>430</td>
<td>mV</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 10 \text{ A}; t_p \leq 300 \mu s; \delta \leq 0.02; T_j = 25 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>420</td>
<td>490</td>
<td>mV</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 10 \text{ A}; t_p \leq 300 \mu s; \delta \leq 0.02; T_j = 125 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>330</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 5 \text{ V}; t_p \leq 3 \text{ ms}; \delta \leq 0.3; T_j = 25 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>15</td>
<td>-</td>
<td>µA</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 \text{ V}; t_p \leq 3 \text{ ms}; \delta \leq 0.3; T_j = 25 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>20</td>
<td>50</td>
<td>µA</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 30 \text{ V}; t_p \leq 3 \text{ ms}; \delta \leq 0.3; T_j = 25 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>60</td>
<td>-</td>
<td>µA</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 45 \text{ V}; t_p \leq 3 \text{ ms}; \delta \leq 0.3; T_j = 25 \degree C; \text{ pulsed}$</td>
<td>-</td>
<td>250</td>
<td>600</td>
<td>µA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \degree C$</td>
<td>-</td>
<td>1190</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \degree C$</td>
<td>-</td>
<td>400</td>
<td>-</td>
<td>pF</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>37</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time ramp recovery</td>
<td>$dI/dt = 200 \text{ A/µs}; T_j = 25 \degree C; I_F = 6 \text{ A}; V_R = 26 \text{ V}$</td>
<td>-</td>
<td>17</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{FRM}$</td>
<td>peak forward recovery voltage</td>
<td>$I_F = 0.5 \text{ A}; dI/dt = 20 \text{ A/µs}; T_j = 25 \degree C$</td>
<td>-</td>
<td>308</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>
Fig. 4. 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. 5. 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. 6. Diode capacitance as a function of reverse voltage; typical values

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

Fig. 7. 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. \( \delta = 1 \)
**PMEG045V100EPD**

45 V, 10 A low VF MEGA Schottky barrier rectifier

---

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

\[ P_{D(R)V} \] (W)

\[ T_j = 100 \, ^\circ C \]

(1) \( \delta = 1 \)
(2) \( \delta = 0.9 \)
(3) \( \delta = 0.8 \)
(4) \( \delta = 0.5 \)
(5) \( \delta = 0.2 \)

**Fig. 9.** Average forward current as a function of ambient temperature; typical values

\[ I_{F(AV)} \] (A)

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

FR4 PCB, mounting pad for cathode 1 cm²

\( T_j = 175 \, ^\circ C \)

(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. 11.** Average forward current as a function of ambient temperature; typical values

Ceramic PCB, Al₂O₃, 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
$T_j = 175 \, ^\circ C$

(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. 12. Average forward current as a function of solder point temperature; typical values
11. Test information

Fig. 13. Reverse recovery definition; step recovery

Fig. 14. Reverse recovery definition; ramp recovery

Fig. 15. Forward recovery definition
11.1 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 CFP15 (SOT1289)](image)

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.
13. Soldering

Footprint information for reflow soldering of CFP15 package

Fig. 18. Reflow soldering footprint for CFP15 (SOT1289)
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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<tbody>
<tr>
<td>PMEG045V100EPD v.2</td>
<td>20141204</td>
<td>Product data sheet</td>
<td>-</td>
<td>PMEG045V100EPD v.1</td>
</tr>
<tr>
<td>Modifications:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Product status changed</td>
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<td></td>
</tr>
<tr>
<td>PMEG045V100EPD v.1</td>
<td>20140704</td>
<td>Preliminary data sheet</td>
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</table>
15. Legal information

15.1 Data sheet status

<table>
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<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<tr>
<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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