1. General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in an SOD323F (SC-90) very small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 0.5$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage typ. $V_F = 550$ mV
- Low reverse current typ. $I_R = 1.5$ µA
- Very small and flat lead SMD plastic package
- AEC-Q101 qualified

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications
- Automotive applications

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; $T_{SP} \leq 135$ °C; square wave</td>
<td>-</td>
<td>-</td>
<td>0.5</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>$I_F = 500$ mA; $t_p \leq 300$ µs; $\delta \leq 0.02 \ ; T_J = 25$ °C</td>
<td>-</td>
<td>550</td>
<td>640</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 40$ V; pulsed; $T_J = 25$ °C</td>
<td>-</td>
<td>1.5</td>
<td>8</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40$ V; pulsed; $T_J = 125$ °C</td>
<td>-</td>
<td>1</td>
<td>8</td>
<td>mA</td>
</tr>
</tbody>
</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>K</td>
<td>cathode</td>
<td>SOD323F</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>Description</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>PMEG4005CEJ</td>
<td>SOD323F</td>
<td>plastic surface-mounted package; 2 leads</td>
<td>SOD323F</td>
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7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
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</thead>
<tbody>
<tr>
<td>PMEG4005CEJ</td>
<td>2F</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 °C</td>
<td>-</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>I_F</td>
<td>forward current</td>
<td>T_sp ≤ 130 °C; δ = 1</td>
<td>-</td>
<td>0.7</td>
<td>A</td>
</tr>
<tr>
<td>I_(AV)</td>
<td>average forward current</td>
<td>δ = 0.5 ; f = 20 kHz; T_sp ≤ 135 °C; square wave</td>
<td>-</td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td>I_FRM</td>
<td>repetitive peak forward current</td>
<td>t_p ≤ 1 ms; δ ≤ 0.25</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 ms; T_j(init) = 25 °C; square wave</td>
<td>-</td>
<td>8</td>
<td>A</td>
</tr>
<tr>
<td>P_tot</td>
<td>total power dissipation</td>
<td>T_amb ≤ 25 °C</td>
<td>[1]</td>
<td>415</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2]</td>
<td>715</td>
<td>mW</td>
</tr>
<tr>
<td>T_j</td>
<td>junction temperature</td>
<td>-</td>
<td>150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>T_amb</td>
<td>ambient temperature</td>
<td>-65</td>
<td>150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>T_stg</td>
<td>storage temperature</td>
<td>-300</td>
<td>300</td>
<td>K/W</td>
<td></td>
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</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_θ(j-a)</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1][2]</td>
<td>-</td>
<td>-</td>
<td>300 K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1][3]</td>
<td>-</td>
<td>-</td>
<td>175 K/W</td>
</tr>
<tr>
<td>R_θ(j-sp)</td>
<td>thermal resistance from junction to solder point</td>
<td>[4]</td>
<td>-</td>
<td>-</td>
<td>45</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.
FR4 PCB, standard footprint

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

FR4 PCB, mounting pad for cathode 1 cm²

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)})</td>
<td>reverse breakdown voltage</td>
<td>(I_R = 1 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ\text{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 = 10 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>300</td>
<td>380</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 100 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>390</td>
<td>470</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 200 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>435</td>
<td>510</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 300 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>475</td>
<td>560</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 400 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>515</td>
<td>600</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 500 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>550</td>
<td>640</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 500 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = -40 ^\circ\text{C})</td>
<td>-</td>
<td>570</td>
<td>670</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 500 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_J = 125 ^\circ\text{C})</td>
<td>-</td>
<td>520</td>
<td>610</td>
<td>mV</td>
</tr>
<tr>
<td>(I_R)</td>
<td>reverse current</td>
<td>(V_R = 30 \text{ V}; \text{ pulsed}; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>1</td>
<td>5</td>
<td>(\mu\text{A})</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V_R = 40 \text{ V}; \text{ pulsed}; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>1.5</td>
<td>8</td>
<td>(\mu\text{A})</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V_R = 40 \text{ V}; \text{ pulsed}; T_J = 125 ^\circ\text{C})</td>
<td>-</td>
<td>1</td>
<td>8</td>
<td>mA</td>
</tr>
<tr>
<td>(C_d)</td>
<td>diode capacitance</td>
<td>(V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>24</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V_R = 4 \text{ V}; f = 1 \text{ MHz}; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>13.5</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>(t_r)</td>
<td>reverse recovery time</td>
<td>(I_F = 0.5 \text{ A}; I_R = 0.5 \text{ A}; I_{R(meas)} = 0.1 \text{ A}; T_J = 25 ^\circ\text{C})</td>
<td>-</td>
<td>1.8</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>
40 V, 0.5 A low VF MEGA Schottky barrier rectifier

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

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

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

f = 1 MHz; T_{amb} = 25 °C

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

T_{j} = 150 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(2) δ = 1 (DC)
**PMEG4005CEJ**

40 V, 0.5 A low VF MEGA Schottky barrier rectifier

---

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

\[ P_{R(\text{AV})} \text{ (W)} \]

\[ V_R \text{ (V)} \]

- \( T_j = 125 \, \text{°C} \)
  - (1) \( \delta = 1; \) DC
  - (2) \( \delta = 0.9; f = 20 \, \text{kHz} \)
  - (3) \( \delta = 0.8; f = 20 \, \text{kHz} \)
  - (4) \( \delta = 0.5; f = 20 \, \text{kHz} \)

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

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

\[ T_{\text{amb}} \text{ (°C)} \]

FR4 PCB, standard footprint

- \( T_j = 150 \, \text{°C} \)
  - (1) \( \delta = 1; \) DC
  - (2) \( \delta = 0.5; f = 20 \, \text{kHz} \)
  - (3) \( \delta = 0.2; f = 20 \, \text{kHz} \)
  - (4) \( \delta = 0.1; f = 20 \, \text{kHz} \)

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

FR4 PCB, mounting pad for cathode 1 cm\(^2\)

- \( T_j = 150 \, \text{°C} \)
  - (1) \( \delta = 1; \) DC
  - (2) \( \delta = 0.5; f = 20 \, \text{kHz} \)
  - (3) \( \delta = 0.2; f = 20 \, \text{kHz} \)
  - (4) \( \delta = 0.1; f = 20 \, \text{kHz} \)

**Fig. 10. Average forward current as a function of solder point temperature; typical values**

- \( T_j = 150 \, \text{°C} \)
  - (1) \( \delta = 1; \) DC
  - (2) \( \delta = 0.5; f = 20 \, \text{kHz} \)
  - (3) \( \delta = 0.2; f = 20 \, \text{kHz} \)
  - (4) \( \delta = 0.1; f = 20 \, \text{kHz} \)
11. Test information

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, $I_{RMS}^{DC} = I_{F(AV)}$, 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. 13. Package outline SOD323F

13. Soldering

Fig. 14. Reflow soldering footprint for SOD323F
14. Revision history

<table>
<thead>
<tr>
<th>Data sheet ID</th>
<th>Release date</th>
<th>Data sheet status</th>
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<td>PMEG4005CEJ v.1</td>
<td>20160512</td>
<td>Product data sheet</td>
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15. Legal information

Data sheet status

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<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<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 more information, please visit: http://www.nexperia.com
For sales office addresses, please send an email to: salesaddresses@nexperia.com
Date of release: 12 May 2016