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: $I_{F(\text{AV})} \leq 0.2 \, \text{A}$
- Reverse voltage: $V_R \leq 60 \, \text{V}$
- Low forward voltage
- Small and flat lead SMD plastic package
- 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 (SMPS)
- Reverse polarity protection
- Ultra high-speed switching
- Low power consumption 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>$I_{F(\text{AV})}$</td>
<td>average forward current</td>
<td>square-wave pulse; $\delta = 0.5; f = 20 , \text{kHz}; T_{\text{amb}} \leq 130 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>0.2</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>square-wave pulse; $\delta = 0.5; f = 20 , \text{kHz}; T_{SS} \leq 145 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>0.2</td>
<td>A</td>
</tr>
<tr>
<td>$V_R$</td>
<td>reverse voltage</td>
<td>$T_j = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 200 , \text{mA}; T_j = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>540</td>
<td>600</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 60 , \text{V}; T_j = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>20</td>
<td>100</td>
<td>$\mu\text{A}$</td>
</tr>
</tbody>
</table>

[1] Device mounted on a ceramic PCB, $\text{Al}_2\text{O}_3$, standard footprint.
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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<tbody>
<tr>
<td>1</td>
<td>K</td>
<td>cathode</td>
<td>K</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>anode</td>
<td>1 2</td>
<td>K A</td>
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</table>

6. Ordering information

Table 3. Ordering information

<table>
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<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Version</th>
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<tr>
<td>PMEG6002EJ-Q</td>
<td>SC-90</td>
<td>plastic, surface-mounted package; 2 leads; 1.7 mm x 1.25 mm x 0.7 mm body</td>
<td>SOD323F</td>
</tr>
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7. Marking

Table 4. Marking codes

<table>
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<th>Type number</th>
<th>Marking code</th>
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<tbody>
<tr>
<td>PMEG6002EJ-Q</td>
<td>1P</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 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>$T_J = 25 \degree C$</td>
<td>-</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>square-wave pulse; $\delta = 0.5$; $f = 20 \text{ kHz}$; $T_{amb} \leq 130 \degree C$</td>
<td>[1]</td>
<td>-</td>
<td>0.2 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>square-wave pulse; $\delta = 0.5$; $f = 20 \text{ kHz}$; $T_{sp} \leq 145 \degree C$</td>
<td></td>
<td>-</td>
<td>0.2 A</td>
</tr>
<tr>
<td>$I_{FRM}$</td>
<td>repetitive peak forward current</td>
<td>$t_p \leq 1 \text{ ms}$; $\delta \leq 0.25$</td>
<td>-</td>
<td>2.6</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>square-wave pulse; $t_p = 8 \text{ ms}$</td>
<td>[2]</td>
<td>-</td>
<td>2.75 A</td>
</tr>
<tr>
<td>$P_{tot}$</td>
<td>total power dissipation</td>
<td>$T_{amb} \leq 25 \degree C$</td>
<td>[3] [4]</td>
<td>-</td>
<td>385 mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3] [5]</td>
<td>-</td>
<td>695 mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3] [1]</td>
<td>-</td>
<td>1.045 W</td>
</tr>
<tr>
<td>$T_J$</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>\degree C</td>
</tr>
<tr>
<td>$T_{amb}$</td>
<td>ambient temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>\degree C</td>
</tr>
<tr>
<td>$T_{stg}$</td>
<td>storage temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>\degree C</td>
</tr>
</tbody>
</table>

[1] Device mounted on a ceramic PCB, $\text{Al}_2\text{O}_3$, standard footprint.
[2] $T_J = 25 \degree C$ prior to surge.
[3] Reflow soldering is the only recommended soldering method.
9. Thermal characteristics

Table 6. Thermal characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</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>[1]</td>
<td>[2]</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[4]</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( R_{th(j-sp)} )</td>
<td>thermal resistance from junction to solder point</td>
<td></td>
<td>[6]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25</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.

[2] Reflow soldering is the only recommended soldering method.


[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm\(^2\).


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

Ceramic PCB, Al₂O₃, standard footprint

Fig. 3. 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>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 0.1 \text{ mA}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>130</td>
<td>170</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1 \text{ mA}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>190</td>
<td>230</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 10 \text{ mA}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>260</td>
<td>300</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 100 \text{ mA}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>420</td>
<td>470</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 200 \text{ mA}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>540</td>
<td>600</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10 \text{ V}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>2</td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 50 \text{ V}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>9</td>
<td>30</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 60 \text{ V}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>20</td>
<td>100</td>
<td>µA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>14</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_J = 25 \degree \text{C}$</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</td>
<td>$T_J = 25 \degree \text{C}; \text{When switched from } I_F = 10 \text{ mA to } I_R = 10 \text{ mA}; R_L = 100 \Omega$; measured at $I_R = 1 \text{ mA}$.</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>

![Fig. 4. Forward current as a function of forward voltage; typical values](image1)

![Fig. 5. Reverse current as a function of reverse voltage; typical values](image2)
200 mA low Vf MEGA Schottky barrier rectifier

$$V_{R}(V)$$

$$(0.0)$$

$$0.1$$

$$0.2$$

$$0.3$$

$$V_{R}(V)$$

$$0.0$$

$$0.1$$

$$0.2$$

$$0.3$$

$$P_{F(AV)}(W)$$

$$0.0$$

$$0.05$$

$$0.1$$

$$0.15$$

$$0.2$$

$$0.25$$

$$0.3$$

$$T_{J}(C)$$

$$0.0$$

$$5$$

$$10$$

$$15$$

$$20$$

$$P_{R(AV)}(W)$$

$$0.0$$

$$0.05$$

$$0.1$$

$$0.15$$

$$0.2$$

$$0.25$$

$$0.3$$

$$I_{F(AV)}(A)$$

$$0.0$$

$$0.05$$

$$0.1$$

$$0.15$$

$$0.2$$

$$0.25$$

$$0.3$$

$$T_{amb}(C)$$

$$0.0$$

$$5$$

$$10$$

$$15$$

$$20$$

Fig. 6. Diode capacitance as a function of reverse voltage; typical values

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

Fig. 7. Average forward power dissipation as a function of average forward current; typical values

$$T_{J} = 150 ^{\circ}C$$

(1) $$\delta = 0.1$$

(2) $$\delta = 0.2$$

(3) $$\delta = 0.5$$

(4) $$\delta = 1$$

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

$$T_{J} = 125 ^{\circ}C$$

(1) $$\delta = 1$$

(2) $$\delta = 0.9$$

(3) $$\delta = 0.8$$

(4) $$\delta = 0.5$$

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

FR4 PCB, standard footprint

$$T_{J} = 150 ^{\circ}C$$

(1) $$\delta = 1$$ (DC)

(2) $$\delta = 0.5; f = 20 kHz$$

(3) $$\delta = 0.2; f = 20 kHz$$

(4) $$\delta = 0.1; f = 20 kHz$$
FR4 PCB, mounting pad for cathode 1 cm²
\( T_j = 150 \, ^{\circ}C \)
(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

Ceramic PCB, \( \text{Al}_2\text{O}_3 \), standard footprint
\( T_j = 150 \, ^{\circ}C \)
(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

\( T_j = 150 \, ^{\circ}C \)
(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

The current ratings for the typical waveforms are calculated according to the equations:

\[ I_{F(\text{AV})} = I_M \times \delta \] with \( I_M \) defined as peak current, \( I_{\text{RMS}} = I_{F(\text{AV})} \) at DC, and \( I_{\text{RMS}} = I_M \times \sqrt{\delta} \) with \( I_{\text{RMS}} \) 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
13. Soldering

Fig. 16. Reflow soldering footprint for SC-90 (SOD323F)
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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<td>PMEG6002EJ-Q v.1</td>
<td>20220503</td>
<td>Product data sheet</td>
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15. Legal information

Data sheet status

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<tbody>
<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 https://www.nexperia.com.

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