1. General description

Trench Maximum Efficiency General Application (MEGA) dual Schottky barrier rectifier in common cathode configuration encapsulated in a CFP15B (SOT1289B) power and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Reverse voltage: $V_R \leq 60$ V
- Forward current: $I_F \leq 4$ A (per diode)
- Low forward voltage
- Low leakage current due to Trench MEGA Schottky technology
- Power and flat lead SMD plastic package
- Package height typical 0.95 mm
- High power capability due to clip-bond technology
- AEC-Q101 qualified

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Reverse polarity protection
- Low power consumption applications
- Freewheeling 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>$\delta = 0.5; \delta = 0.5; \delta = 0.5$; square wave; $f = 20$ kHz; $T_{sp} \leq 160 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>4</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>$I_F = 4$ A; $T_J = 25 , ^\circ\text{C}$</td>
<td>[1]</td>
<td>580</td>
<td>660</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10$ V; $T_J = 25 , ^\circ\text{C}$</td>
<td>[1]</td>
<td>0.14</td>
<td>0.9</td>
<td>$\mu$A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 60$ V; $T_J = 25 , ^\circ\text{C}$</td>
<td>[1]</td>
<td>0.3</td>
<td>1.8</td>
<td>$\mu$A</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>A1</td>
<td>anode (diode 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A2</td>
<td>anode (diode 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>CC</td>
<td>common cathode</td>
<td>CFP15B (SOT1289B)</td>
<td></td>
</tr>
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6. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMEG060T080CLPE</td>
<td>CFP15B</td>
<td>plastic, thermal enhanced ultra thin SMD package; 3 leads; 2.13 mm pitch; 5.8 x 4.3 x 0.95 mm body</td>
<td>SOT1289B</td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
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<th>Marking code</th>
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<tr>
<td>PMEG060T080CLPE</td>
<td>060T L08C</td>
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</table>

8. Limiting values

In accordance with the Absolute Maximum Rating System (IEC60134).

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Per diode (unless otherwise specified)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>( V_R ) reverse voltage</td>
<td>( T_j = 25 , ^\circ C )</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>( I_F ) forward current</td>
<td>( \delta = 1; , T_{sp} \leq 156 , ^\circ C )</td>
<td>-</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>( I_{F(AV)} ) average forward current</td>
<td>( \delta = 0.5; , \text{square wave}; , f = 20 , \text{kHz}; , T_{sp} \leq 160 , ^\circ C )</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>( I_{FSM} ) non-repetitive peak forward current</td>
<td>( t_p = 8.3 , \text{ms}; , \text{half sine wave}; , T_{j(init)} = 25 , ^\circ C )</td>
<td>-</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>( I_{FSM} ) non-repetitive peak forward current</td>
<td>( t_p = 8.3 , \text{ms}; , \text{half sine wave}; , \text{per device}; , T_{j(init)} = 25 , ^\circ C )</td>
<td>-</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Per device, one diode loaded</td>
<td>( P_{tot} ) total power dissipation</td>
<td>( T_{amb} \leq 25 , ^\circ C )</td>
<td>[1]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Per device, one diode loaded</td>
<td>( T_j ) junction temperature</td>
<td>( - )</td>
<td>175</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Per device, one diode loaded</td>
<td>( T_{amb} ) ambient temperature</td>
<td>( -55 )</td>
<td>175</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Per device, one diode loaded</td>
<td>( T_{stg} ) storage temperature</td>
<td>( -65 )</td>
<td>175</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>90</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[1] [2]</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[1] [3]</td>
<td>-</td>
<td>-</td>
<td>70</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>7</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[4]</td>
<td>-</td>
<td>-</td>
<td></td>
<td></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.


![Graph 1](aaa-030006)

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

![Graph 2](aaa-030007)

**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>$I_R = 1$ mA; $T_j = 25$ °C</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 0.5$ A; $T_j = 25$ °C</td>
<td>-</td>
<td>440</td>
<td>510</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 1$ A; $T_j = 25$ °C</td>
<td>-</td>
<td>470</td>
<td>540</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 4$ A; $T_j = 25$ °C</td>
<td>-</td>
<td>580</td>
<td>660</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 4$ A; $T_j = -40$ °C</td>
<td>-</td>
<td>630</td>
<td>720</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 4$ A; $T_j = 125$ °C</td>
<td>-</td>
<td>520</td>
<td>610</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 10$ V; $T_j = 25$ °C</td>
<td>-</td>
<td>0.14</td>
<td>0.9</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 40$ V; $T_j = 25$ °C</td>
<td>-</td>
<td>0.18</td>
<td>1.2</td>
<td>µA</td>
</tr>
<tr>
<td></td>
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<td>$V_R = 60$ V; $T_j = 25$ °C</td>
<td>-</td>
<td>0.3</td>
<td>1.8</td>
<td>µA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 1$ V; $f = 1$ MHz; $T_j = 25$ °C</td>
<td>-</td>
<td>560</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 10$ V; $f = 1$ MHz; $T_j = 25$ °C</td>
<td>-</td>
<td>180</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time step recovery</td>
<td>$I_F = 0.5$ A; $I_R = 0.5$ A; $I_{R(meas)} = 0.1$ A; $T_j = 25$ °C</td>
<td>-</td>
<td>17</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>reverse recovery time ramp recovery</td>
<td>$dI_F/dt = 200$ A/µs; $I_F = 6$ A; $V_F = 26$ V; $T_j = 25$ °C</td>
<td>-</td>
<td>11</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$V_{FRM}$</td>
<td>peak forward recovery voltage</td>
<td>$I_F = 0.5$ A; $dI_F/dt = 20$ A/µs; $T_j = 25$ °C</td>
<td>-</td>
<td>460</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>

[1] Very short pulse, in order to maintain a stable junction temperature.
60 V, 2 x 4 A dual common cathode low leakage current Trench MEGA Schottky barrier rectifier

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

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

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

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

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

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

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

- $T_j = 100 \, ^\circ\mathrm{C}$
  1. $\delta = 0.1$
  2. $\delta = 0.2$
  3. $\delta = 0.5$
  4. $\delta = 0.8$
  5. $\delta = 1$; DC
Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values

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

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

\( T_j = 100^\circ \text{C} \)
(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

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

\[ T_{\text{amb}} (\text{°C}) \]

FR4 PCB, standard footprint
\( T_j = 175^\circ \text{C} \)
(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

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

\[ T_{\text{amb}} (\text{°C}) \]

FR4 PCB, mounting pad for cathode 1 cm\(^2\)
\( T_j = 175^\circ \text{C} \)
(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

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

\[ T_{sp} (\text{°C}) \]

\( T_j = 175^\circ \text{C} \)
(1) \( \delta = 1; \) DC
(2) \( \delta = 0.5; f = 20 \text{ kHz} \)
(3) \( \delta = 0.2; f = 20 \text{ kHz} \)
(4) \( \delta = 0.1; f = 20 \text{ kHz} \)
60 V, 2 x 4 A dual common cathode low leakage current Trench MEGA Schottky barrier rectifier

Fig. 11. Derated maximum reverse voltage as a function of junction temperature; typical values

FR4 PCB, standard footprint
$R_{th} = 90 \text{ K/W}$

Fig. 12. Derated maximum reverse voltage as a function of junction temperature; typical values

FR4 PCB, mounting pad for cathode 1 cm$^2$
$R_{th} = 70 \text{ K/W}$

Fig. 13. Derated maximum reverse voltage as a function of junction temperature; typical values

Soldering point of cathode tab
$R_{th} = 7 \text{ K/W}$
11. Test information

Fig. 14. Reverse recovery definition; step recovery

Fig. 15. Reverse recovery definition; ramp recovery

Fig. 16. Forward recovery 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

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

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**

![Package outline CFP15B (SOT1289B)](image-url)
13. Soldering

Footprint information for reflow soldering of CFP15B package

Figure 19. Reflow soldering footprint for CFP15B (SOT1289B)
## 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>20200427</td>
<td>Product data sheet</td>
<td>-</td>
<td>PMEG060T080CLPE v.1</td>
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<td>Modifications:</td>
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<td>• Product status changed</td>
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<tr>
<td>PMEG060T080CLPE v.1</td>
<td>20200304</td>
<td>Objective data sheet</td>
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</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>
<tr>
<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.

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