1. General description

Planar Low $V_F$ Schottky barrier rectifier encapsulated in a CFP15B (SOT1289B) power and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Very low forward voltage
- High power capability due to clip-bond technology
- Small and thin SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- High efficiency DC-to-DC conversion
- Low voltage rectification
- Switch mode power supply
- Freewheeling application
- Reverse polarity protection
- OR-ing

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>$\delta = 0.5$; $f = 20$ kHz; square wave; $T_{sp} \leq 172$ °C</td>
<td>-</td>
<td>-</td>
<td>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>45</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 5$ A; pulsed; $T_j = 25$ °C</td>
<td>[1]</td>
<td>440</td>
<td>490</td>
<td>mV</td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 45$ V; pulsed; $T_j = 25$ °C</td>
<td>[1]</td>
<td>80</td>
<td>300</td>
<td>$\mu$A</td>
</tr>
</tbody>
</table>

[1] Very short pulse, in order to maintain a stable junction temperature.

5. 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>

CFP15B (SOT1289B)
6. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMEG045V050EPE-Q</td>
<td>CFP15B</td>
<td>plastic, thermal enhanced ultra thin SMD package; 3 leads; 2.13 mm pitch;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.8 x 4.3 x 0.95 mm body</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Version SOT1289B</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>PMEG045V050EPE-Q</td>
<td>045V050E</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>$\delta = 1; T_{sp} \leq 171 , ^\circ C$</td>
<td>-</td>
<td>7</td>
<td>A</td>
</tr>
<tr>
<td>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>$\delta = 0.5; f = 20 , kHz; square wave; T_{sp} \leq 172 , ^\circ C$</td>
<td>-</td>
<td>5</td>
<td>A</td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>non-repetitive peak forward current</td>
<td>$t_p = 8.3 , ms$; half sine wave; $T_{j(init)} = 25 , ^\circ C$</td>
<td>-</td>
<td>160</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>[2]</td>
<td>90</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[1]</td>
<td>[3]</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>[4]</td>
<td>-</td>
<td>3</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.


---

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 = 5 \text{ mA}; \ T_J = 25 ^\circ C)</td>
<td>[1] 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; pulsed; } T_J = 25 ^\circ C)</td>
<td>-</td>
<td>340</td>
<td>390</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 5 \text{ A; pulsed; } T_J = 25 ^\circ C)</td>
<td>-</td>
<td>440</td>
<td>490</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 5 \text{ A; pulsed; } T_J = -40 ^\circ C)</td>
<td>-</td>
<td>500</td>
<td>580</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_F = 5 \text{ A; pulsed; } T_J = 125 ^\circ C)</td>
<td>-</td>
<td>360</td>
<td>430</td>
<td>mV</td>
</tr>
<tr>
<td>(I_R)</td>
<td>reverse current</td>
<td>(V_R = 45 \text{ V; pulsed; } T_J = 25 ^\circ C)</td>
<td>[1] -</td>
<td>80</td>
<td>300</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 ^\circ C)</td>
<td>-</td>
<td>540</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 C)</td>
<td>-</td>
<td>185</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(meas)} = 0.1 \text{ A; } T_J = 25 ^\circ C)</td>
<td>-</td>
<td>18</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>reverse recovery time ramp recovery</td>
<td>(dI_F/dt = 100 \text{ A/µs; } I_F = 3 \text{ A; } V_R = 30 \text{ V; } T_J = 25 ^\circ C)</td>
<td>-</td>
<td>13</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_F/dt = 20 \text{ A/µs; } T_J = 25 ^\circ C)</td>
<td>-</td>
<td>320</td>
<td>-</td>
<td>mV</td>
</tr>
</tbody>
</table>

[1] Very short pulse, in order to maintain a stable junction temperature.

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 = 100 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 0.8
(5) δ = 1

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

T_J = 100 °C
(1) δ = 1
(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_J = 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
FR4 PCB, mounting pad for cathode 1 cm²

\( T_j = 175 \, ^\circ\text{C} \)
1. \( \delta = 1; \text{DC} \)
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

\( T_j = 175 \, ^\circ\text{C} \)
1. \( \delta = 1; \text{DC} \)
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

11. Test information

Fig. 11. Reverse recovery definition; step recovery
Fig. 12. Reverse recovery definition; ramp recovery

Fig. 13. Forward recovery definition

Fig. 14. 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

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

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. 15. Package outline CFP15B (SOT1289B)

13. Soldering

Fig. 16. 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>PMEG045V050EPE-Q v.1</td>
<td>20220715</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
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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>
<td>[1]</td>
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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>
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</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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Contents

1. General description .......................................................... 1
2. Features and benefits ....................................................... 1
3. Applications ...................................................................... 1
4. Quick reference data ....................................................... 1
5. Pinning information .......................................................... 1
6. Ordering information ....................................................... 2
7. Marking ........................................................................... 2
8. Limiting values ............................................................... 2
9. Thermal characteristics ................................................... 3
10. Characteristics .............................................................. 4
11. Test information ............................................................. 6
12. Package outline ............................................................. 8
13. Soldering ...................................................................... 8
14. Revision history ............................................................ 9
15. Legal information .......................................................... 10

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Date of release: 15 July 2022