1. General description

Planar Low V\textsubscript{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>$I_{F(AV)}$</td>
<td>average forward current</td>
<td>square-wave pulse; $\delta = 0.5; f = 20$ kHz; $T_{sp} \leq 173$ °C</td>
<td>-</td>
<td>-</td>
<td>3</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>$I_F = 3$ A; pulsed; $T_j = 25$ °C</td>
<td>425</td>
<td>490</td>
<td>mV</td>
<td></td>
</tr>
<tr>
<td>$I_R$</td>
<td>reverse current</td>
<td>$V_R = 40$ V; pulsed; $T_j = 25$ °C</td>
<td>30</td>
<td>120</td>
<td>µA</td>
<td></td>
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</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>
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<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>anode</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>anode</td>
</tr>
<tr>
<td>3</td>
<td>K</td>
<td>cathode</td>
</tr>
</tbody>
</table>

Table 1. Pinning information

![Diagram of CFP15B (SOT1289B) package]

nexperia
6. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMEG040V030EPE-Q</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>
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</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
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<th>Marking code</th>
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<tr>
<td>PMEG040V030EPE-Q</td>
<td>040V U03E</td>
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</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 °C</td>
<td>-</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>I_F</td>
<td>forward current</td>
<td>δ = 1; T_sp ≤ 172 °C</td>
<td>-</td>
<td>4.2</td>
<td>A</td>
</tr>
<tr>
<td>I_F(AV)</td>
<td>average forward</td>
<td>square-wave pulse; δ = 0.5; f = 20 kHz; T_sp ≤ 173 °C</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>I_FSMA</td>
<td>non-repetitive peak</td>
<td>half sine-wave pulse; t_p = 8.3 ms; T_j(init) = 25 °C</td>
<td>-</td>
<td>120</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>1.66</td>
<td>W</td>
</tr>
<tr>
<td>T_j</td>
<td>junction temperature</td>
<td></td>
<td>[2]</td>
<td>2.15</td>
<td>W</td>
</tr>
<tr>
<td>T_amb</td>
<td>ambient temperature</td>
<td></td>
<td>-</td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td>T_stg</td>
<td>storage temperature</td>
<td></td>
<td>-55</td>
<td>175</td>
<td>°C</td>
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</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>$R_{th(j-sp)}$</td>
<td>thermal resistance from junction to solder point</td>
<td>[4]</td>
<td>-</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](image1)

FR4 PCB, 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](image2)

FR4 PCB, mounting pad for cathode 1 cm$^2$

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>
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</thead>
<tbody>
<tr>
<td>$V_{(BR)R}$</td>
<td>reverse breakdown voltage</td>
<td>$I_R = 3$ mA; pulsed; $T_j = 25$ °C</td>
<td>[1] 40</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_F$</td>
<td>forward voltage</td>
<td>$I_F = 1$ A; pulsed; $T_j = 25$ °C</td>
<td>[1] -</td>
<td>360</td>
<td>420</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 3$ A; pulsed; $T_j = 25$ °C</td>
<td>[1] -</td>
<td>425</td>
<td>490</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 3$ A; pulsed; $T_j = -40$ °C</td>
<td>[1] -</td>
<td>490</td>
<td>580</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>[1] -</td>
<td>30</td>
<td>120</td>
<td>µA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$V_R = 10$ V; $f = 1$ MHz; $T_j = 25$ °C</td>
<td>-</td>
<td>370</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>125</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{rr}$</td>
<td>reverse recovery time</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>12</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>step recovery</td>
<td>$dI_F/dt = 100$ A/µs; $I_F = 3$ A; $V_R = 30$ 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>340</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

\[
V_R (V) \quad 0 \quad 10 \quad 20 \quad 30 \quad 40
\]

\[
C_d (\text{pF}) \quad 0 \quad 200 \quad 400 \quad 600
\]

\(f = 1 \text{ MHz}; \ T_{\text{amb}} = 25 ^\circ \text{C}\)

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

\[
I_{F(\text{AV})} (\text{A}) \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5
\]

\[
P_{F(\text{AV})} (\text{W}) \quad 0 \quad 0.5 \quad 1.0 \quad 1.5 \quad 2.0
\]

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

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

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

\[
V_R (V) \quad 0 \quad 10 \quad 20 \quad 30 \quad 40
\]

\[
P_{R(\text{AV})} (\text{W}) \quad 0 \quad 0.05 \quad 0.10 \quad 0.15 \quad 0.20
\]

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

- (1) \(\delta = 1\)
- (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

\[
T_{\text{amb}} (\circ \text{C}) \quad 0 \quad 50 \quad 100 \quad 150 \quad 200
\]

\[
I_{F(\text{AV})} (\text{A}) \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5
\]

FR4 PCB, standard footprint

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

**Product data sheet**

24 October 2022
FR4 PCB, mounting pad for cathode 1 cm²
Tj = 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

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

Tj = 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

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

11. Test information

Fig. 11. Reverse recovery definition; step recovery
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

Fig. 15. Package outline CFP15B (SOT1289B)

13. Soldering

Fig. 16. Reflow soldering footprint for CFP15B (SOT1289B)
### 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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<td>20221024</td>
<td>Product data sheet</td>
<td>-</td>
<td>PMEG040V030EPE-Q v.2</td>
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<td>Modifications:</td>
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<td>Characteristics: Typo corrected in conditions of $V_F$ at $T_j = 125 , ^\circ C$</td>
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<td>PMEG040V030EPE-Q v.2</td>
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<td>PMEG040V030EPE-Q v.1</td>
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<td>Preliminary data sheet</td>
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15. Legal information

Data sheet status

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<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<td>Objective [short] data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
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<tr>
<td>Preliminary [short] data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
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<tr>
<td>Product [short] data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
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</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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