1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a leadless ultra small DFN1006B-3 (SOT883B) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Low leakage current
- Leadless ultra small SMD plastic package: 1.0 × 0.6 × 0.37 mm
- ElectroStatic Discharge (ESD) protection > 1 kV HBM
- Drain-source on-state resistance $R_{DSon} = 470 \, \text{mΩ}$

3. Applications

- Relay driver
- High-speed line driver
- Low-side load switch
- Switching circuits

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>$V_{DS}$</td>
<td>drain-source voltage</td>
<td>$T_j = 25 , ^{\circ}\text{C}$</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>$V_{GS}$</td>
<td>gate-source voltage</td>
<td>$V_{GS} = 4.5 , \text{V}; , T_{amb} = 25 , ^{\circ}\text{C}$</td>
<td>-1</td>
<td>-</td>
<td>8</td>
<td>V</td>
</tr>
<tr>
<td>$I_D$</td>
<td>drain current</td>
<td>$V_{GS} = 4.5 , \text{V}; , I_D = 0.6 , \text{A}; , T_j = 25 , ^{\circ}\text{C}$</td>
<td>-</td>
<td>-</td>
<td>0.6</td>
<td>A</td>
</tr>
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**Static characteristics**

<table>
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<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{DSon}$</td>
<td>drain-source on-state resistance</td>
<td>$V_{GS} = 4.5 , \text{V}; , I_D = 0.6 , \text{A}; , T_j = 25 , ^{\circ}\text{C}$</td>
<td>-</td>
<td>470</td>
<td>620</td>
<td>mΩ</td>
</tr>
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</table>

5. 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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</thead>
<tbody>
<tr>
<td>1</td>
<td>G</td>
<td>gate</td>
<td><img src="image" alt="Simplified outline" /></td>
<td><img src="image" alt="Graphic symbol" /></td>
</tr>
<tr>
<td>2</td>
<td>S</td>
<td>source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>D</td>
<td>drain</td>
<td></td>
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DFN1006B-3 (SOT883B)

6. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package Name</th>
<th>Description</th>
<th>Version</th>
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<tr>
<td>PMZB600UNEL</td>
<td>DFN1006B-3</td>
<td>DFN1006B-3: leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm</td>
<td>SOT883B</td>
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7. Marking

<table>
<thead>
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<th>Type number</th>
<th>Marking code</th>
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<tr>
<td>PMZB600UNEL</td>
<td>0101 1110</td>
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**Fig. 1.** DFN1006B-3 (SOT883B) binary marking code description
8. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

<table>
<thead>
<tr>
<th>Symbol</th>
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<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;DS&lt;/sub&gt;</td>
<td>drain-source voltage</td>
<td>T&lt;sub&gt;j&lt;/sub&gt; = 25 °C</td>
<td>-</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>V&lt;sub&gt;GS&lt;/sub&gt;</td>
<td>gate-source voltage</td>
<td></td>
<td>-8</td>
<td>8</td>
<td>V</td>
</tr>
<tr>
<td>I&lt;sub&gt;D&lt;/sub&gt;</td>
<td>drain current</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt; = 4.5 V; T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>[1]</td>
<td>-</td>
<td>0.6  A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V&lt;sub&gt;GS&lt;/sub&gt; = 4.5 V; T&lt;sub&gt;amb&lt;/sub&gt; = 100 °C</td>
<td></td>
<td>-</td>
<td>0.4  A</td>
</tr>
<tr>
<td>I&lt;sub&gt;DM&lt;/sub&gt;</td>
<td>peak drain current</td>
<td>T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C; single pulse; t&lt;sub&gt;p&lt;/sub&gt; ≤ 10 µs</td>
<td>-</td>
<td>2.5</td>
<td>A</td>
</tr>
<tr>
<td>P&lt;sub&gt;tot&lt;/sub&gt;</td>
<td>total power dissipation</td>
<td>T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>[2]</td>
<td>-</td>
<td>360 mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T&lt;sub&gt;sp&lt;/sub&gt; = 25 °C</td>
<td></td>
<td>-</td>
<td>715 mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>2700 mW</td>
</tr>
<tr>
<td>T&lt;sub&gt;j&lt;/sub&gt;</td>
<td>junction temperature</td>
<td></td>
<td>-55</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>T&lt;sub&gt;amb&lt;/sub&gt;</td>
<td>ambient temperature</td>
<td></td>
<td>-55</td>
<td>150</td>
<td>°C</td>
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<tr>
<td>T&lt;sub&gt;stg&lt;/sub&gt;</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
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<td>°C</td>
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Source-drain diode

<table>
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<tr>
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<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&lt;sub&gt;S&lt;/sub&gt;</td>
<td>source current</td>
<td>T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>[1]</td>
<td>-</td>
<td>0.4  A</td>
</tr>
</tbody>
</table>

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 1 cm<sup>2</sup>.
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>305</td>
<td>360</td>
<td></td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[1]</td>
<td>-</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>150</td>
<td>175</td>
<td></td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[2]</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
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</table>


Fig. 4. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage
Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

Fig. 6. 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>
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<tbody>
<tr>
<td></td>
<td>Static characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{(BR)DSS}$</td>
<td>drain-source breakdown voltage</td>
<td>$I_D = 250 \mu A; V_{GS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{GS(th)}$</td>
<td>gate-source threshold voltage</td>
<td>$I_D = 250 \mu A; V_{DS}=V_{GS}; T_j = 25 \ ^\circ C$</td>
<td>0.45</td>
<td>0.7</td>
<td>0.95</td>
<td>V</td>
</tr>
<tr>
<td>$I_{DSS}$</td>
<td>drain leakage current</td>
<td>$V_{DS} = 20 \ V; V_{GS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{DS} = 20 \ V; V_{GS} = 0 \ V; T_j = 150 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{DS} = 5 \ V; V_{GS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>nA</td>
</tr>
<tr>
<td>$I_{GSS}$</td>
<td>gate leakage current</td>
<td>$V_{GS} = 8 \ V; V_{DS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = -8 \ V; V_{DS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = 4.5 \ V; V_{DS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = -4.5 \ V; V_{DS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = 1.8 \ V; V_{DS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>50</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = -1.8 \ V; V_{DS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>50</td>
<td>nA</td>
</tr>
<tr>
<td>$R_{DS(on)}$</td>
<td>drain-source on-state resistance</td>
<td>$V_{GS} = 4.5 \ V; I_D = 0.6 \ A; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>470</td>
<td>620</td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = 4.5 \ V; I_D = 0.6 \ A; T_j = 150 \ ^\circ C$</td>
<td>-</td>
<td>760</td>
<td>1000</td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = 2.5 \ V; I_D = 0.5 \ A; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>620</td>
<td>850</td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = 1.8 \ V; I_D = 0.1 \ A; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>845</td>
<td>1300</td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{GS} = 1.5 \ V; I_D = 10 \ mA; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>1125</td>
<td>3000</td>
<td>mΩ</td>
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<tr>
<td></td>
<td></td>
<td>$V_{GS} = 1.2 \ V; I_D = 1 \ mA; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>2210</td>
<td></td>
<td>mΩ</td>
</tr>
<tr>
<td>$g_{fs}$</td>
<td>forward transconductance</td>
<td>$V_{DS} = 5 \ V; I_D = 0.6 \ A; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>S</td>
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<tr>
<td>$R_G$</td>
<td>gate resistance</td>
<td>$f = 1 \ MHz$</td>
<td>-</td>
<td>34</td>
<td>-</td>
<td>Ω</td>
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<tr>
<td></td>
<td>Dynamic characteristics</td>
<td></td>
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<td></td>
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<tr>
<td>$Q_{G(total)}$</td>
<td>total gate charge</td>
<td>$V_{GS} = 10 \ V; I_D = 0.6 \ A; V_{GS} = 4.5 \ V; T_j = 25 \ ^\circ C$</td>
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<td>0.4</td>
<td>0.7</td>
<td>nC</td>
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<tr>
<td>$Q_{GS}$</td>
<td>gate-source charge</td>
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<td></td>
<td>0.1</td>
<td>-</td>
<td>nC</td>
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<td>$Q_{GD}$</td>
<td>gate-drain charge</td>
<td></td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>nC</td>
</tr>
<tr>
<td>$C_{iss}$</td>
<td>input capacitance</td>
<td>$V_{DS} = 10 \ V; f = 1 \ MHz; V_{GS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>21.3</td>
<td>-</td>
<td>pF</td>
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<td>$C_{oss}$</td>
<td>output capacitance</td>
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<td>-</td>
<td>5.4</td>
<td>-</td>
<td>pF</td>
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<td>$C_{rss}$</td>
<td>reverse transfer capacitance</td>
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<td>-</td>
<td>4.2</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$t_{d(on)}$</td>
<td>turn-on delay time</td>
<td>$V_{GS} = 10 \ V; I_D = 0.6 \ A; V_{GS} = 4.5 \ V; R_{G(ext)} = 6 \ Ω; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>5.6</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_r$</td>
<td>rise time</td>
<td></td>
<td>-</td>
<td>9.2</td>
<td>-</td>
<td>ns</td>
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<tr>
<td>$t_{d(off)}$</td>
<td>turn-off delay time</td>
<td></td>
<td>-</td>
<td>19</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_f$</td>
<td>fall time</td>
<td></td>
<td>-</td>
<td>51</td>
<td>-</td>
<td>ns</td>
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<tr>
<td>Source-drain diode</td>
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<tr>
<td>$V_{SD}$</td>
<td>source-drain voltage</td>
<td>$I_S = 0.36 \ A; V_{GS} = 0 \ V; T_j = 25 \ ^\circ C$</td>
<td>-</td>
<td>0.8</td>
<td>1.2</td>
<td>V</td>
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</tbody>
</table>
PMZB600UNEL
20 V, N-channel Trench MOSFET

**Fig. 7.** Output characteristics: drain current as a function of drain-source voltage; typical values

**Fig. 8.** Sub-threshold drain current as a function of gate-source voltage

**Fig. 9.** Drain-source on-state resistance as a function of drain current; typical values

**Fig. 10.** Drain-source on-state resistance as a function of gate-source voltage; typical values
Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

$V_{DS} > I_D \times R_{DSon}$

Fig. 12. Normalized drain-source on-state resistance as a function of junction temperature; typical values

$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

Fig. 13. Gate-source threshold voltage as a function of junction temperature

$I_D = 0.25 \, mA; \, V_{DS} = V_{GS}$

Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

$f = 1 \, MHz; \, V_{GS} = 0 \, V$
Fig. 15. Gate-source voltage as a function of gate charge; typical values

\( V_{GS} \) (V) vs. \( Q_G \) (nC)

\( I_D = 0.6 \text{ A; } V_{DS} = 10 \text{ V; } T_{amb} = 25 \text{ °C} \)

Fig. 16. MOSFET transistor: Gate charge waveform definitions

Fig. 17. Source current as a function of source-drain voltage; typical values

\( V_{GS} = 0 \text{ V} \)

\( T_J = -50 \text{ °C; } T_J = 25 \text{ °C} \)
11. Package outline

Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Unit</th>
<th>A(1)</th>
<th>A₁</th>
<th>b</th>
<th>b₁</th>
<th>D</th>
<th>E</th>
<th>e₁</th>
<th>L</th>
<th>L₁</th>
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<tr>
<td>max</td>
<td>mm</td>
<td>0.40</td>
<td>0.04</td>
<td>0.20</td>
<td>0.55</td>
<td>0.65</td>
<td>1.05</td>
<td>0.30</td>
<td>0.30</td>
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</tr>
<tr>
<td>nom</td>
<td>mm</td>
<td>0.37</td>
<td>0.15</td>
<td>0.50</td>
<td>0.60</td>
<td>1.00</td>
<td>0.35</td>
<td>0.65</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>min</td>
<td>mm</td>
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<td>0.12</td>
<td>0.47</td>
<td>0.55</td>
<td>0.95</td>
<td>0.22</td>
<td>0.22</td>
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Note
1. Including plating thickness

Fig. 18. Package outline DFN1006B-3 (SOT883B)
12. Soldering

Footprint information for reflow soldering

Fig. 19. Reflow soldering footprint for DFN1006B-3 (SOT883B)
13. Revision history

Table 8. Revision history

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<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>20161205</td>
<td>Product data sheet</td>
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14. Legal information

Data sheet status

<table>
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<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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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>
</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 URL http://www.nexperia.com.

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