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Kind regards,

Team Nexperia
1. Product profile

1.1 General description

N-channel enhancement mode Field-Effect Transistor (FET) in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

1.2 Features and benefits

- Logic-level compatible
- Very fast switching
- Trench MOSFET technology

1.3 Applications

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

1.4 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 °C</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>V_GS</td>
<td>gate-source voltage</td>
<td></td>
<td>-20</td>
<td>-</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>I_D</td>
<td>drain current</td>
<td>V_GS = 10 V; T_amb = 25 °C</td>
<td>-</td>
<td>-</td>
<td>3.1</td>
<td>A</td>
</tr>
</tbody>
</table>

Static characteristics

<table>
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<th>Parameter</th>
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<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_DSon</td>
<td>drain-source on-state resistance</td>
<td>V_GS = 10 V; I_D = 3.1 A; T_j = 25 °C</td>
<td>-</td>
<td>28</td>
<td>36</td>
<td>mΩ</td>
</tr>
</tbody>
</table>

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².

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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<tr>
<td>1</td>
<td>G</td>
<td>gate</td>
<td></td>
<td></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>
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SOT23 (TO-236AB)
3. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Name</th>
<th>Description</th>
<th>Version</th>
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<tr>
<td>PMV37EN</td>
<td>TO-236AB</td>
<td>plastic surface-mounted package; 3 leads</td>
<td>SOT23</td>
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</table>

4. Marking

Table 4. Marking codes

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<th>Type number</th>
<th>Marking code[1]</th>
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<tr>
<td>PMV37EN</td>
<td>KX%</td>
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[1] % = placeholder for manufacturing site code

5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

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<th>Conditions</th>
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<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDS</td>
<td>drain-source voltage</td>
<td>T&lt;sub&gt;j&lt;/sub&gt; = 25 °C</td>
<td>-</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>VGS</td>
<td>gate-source voltage</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt; = 10 V; T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>-20</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>ID</td>
<td>drain current</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt; = 10 V; T&lt;sub&gt;amb&lt;/sub&gt; = 25 °C</td>
<td>1.9</td>
<td>3.1</td>
<td>A</td>
</tr>
<tr>
<td>IDM</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>1.9</td>
<td>3.1</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>-</td>
<td>380</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T&lt;sub&gt;sp&lt;/sub&gt; = 25 °C</td>
<td></td>
<td>520</td>
<td>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>
</tr>
<tr>
<td>T&lt;sub&gt;stg&lt;/sub&gt;</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Source-drain diode

| IS     | source current | T<sub>amb</sub> = 25 °C | [1] | - 0.6 | A    |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².

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PMV37EN

30 V, 3.1 A N-channel Trench MOSFET

Fig 1. Normalized total power dissipation as a function of junction temperature

\[ P_{\text{der}} = \frac{P_{\text{tot}}(T_j)}{P_{\text{tot}(25\,^\circ\text{C})}} \times 100\,\% \]

Fig 2. Normalized continuous drain current as a function of junction temperature

\[ I_{\text{der}} = \frac{I_D}{I_{D(25\,^\circ\text{C})}} \times 100\,\% \]

Fig 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

\[ I_{\text{DM}} = \text{single pulse} \]

1. \( t_p = 100\,\mu\text{s} \)
2. \( t_p = 1\,\text{ms} \)
3. \( t_p = 10\,\text{ms} \)
4. \( t_p = 100\,\text{ms} \)
5. DC; \( T_{\text{sp}} = 25\,^\circ\text{C} \)
6. DC; \( T_{\text{amb}} = 25\,^\circ\text{C} \); drain mounting pad 6 cm²
6. 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</td>
<td>in free air</td>
<td>[1] -</td>
<td>285</td>
<td>330</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{th(j-sp)}$</td>
<td>thermal resistance</td>
<td>from junction to solder point</td>
<td>-</td>
<td>60</td>
<td>70</td>
<td>K/W</td>
</tr>
</tbody>
</table>


Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values
## 7. 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>$V_{(BR)DSS}$</td>
<td>drain-source breakdown voltage</td>
<td>$I_D = 250 , \mu A; V_{GS} = 0 , V; T_j = 25 , ^\circ C$</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{GSth}$</td>
<td>gate-source threshold voltage</td>
<td>$I_D = 250 , \mu A; V_{DS} = V_{GS}; T_j = 25 , ^\circ C$</td>
<td>1</td>
<td>1.5</td>
<td>2.5</td>
<td>V</td>
</tr>
<tr>
<td>$I_{DSS}$</td>
<td>drain leakage current</td>
<td>$V_{DS} = 30 , V; V_{GS} = 0 , V; T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>\mu A</td>
</tr>
<tr>
<td>$I_{GSS}$</td>
<td>gate leakage current</td>
<td>$V_{GS} = 20 , V; V_{DS} = 0 , V; T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>$R_{DSon}$</td>
<td>drain-source on-state resistance</td>
<td>$V_{GS} = 10 , V; I_D = 3.1 , A; T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>28</td>
<td>36</td>
<td>m\Omega</td>
</tr>
<tr>
<td>$g_{fs}$</td>
<td>forward transconductance</td>
<td>$V_{DS} = 5 , V; I_D = 3 , A; T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>S</td>
</tr>
</tbody>
</table>

### Dynamic 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>$Q_{G(tot)}$</td>
<td>total gate charge</td>
<td>$V_{DS} = 15 , V; I_D = 3 , A; V_{GS} = 10 , V; T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>6.5</td>
<td>10</td>
<td>nC</td>
</tr>
<tr>
<td>$Q_{GS}$</td>
<td>gate-source charge</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>nC</td>
<td></td>
</tr>
<tr>
<td>$Q_{GD}$</td>
<td>gate-drain charge</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>nC</td>
<td></td>
</tr>
<tr>
<td>$C_{iss}$</td>
<td>input capacitance</td>
<td>$V_{DS} = 15 , V; f = 1 , MHz; V_{GS} = 0 , V; T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>330</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$C_{oss}$</td>
<td>output capacitance</td>
<td>-</td>
<td>76</td>
<td>-</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>$C_{rss}$</td>
<td>reverse transfer capacitance</td>
<td>-</td>
<td>36</td>
<td>-</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>$\tau_{(on)}$</td>
<td>turn-on delay time</td>
<td>$V_{DS} = 15 , V; V_{GS} = 10 , V; R_{G(\text{ext})} = 6 , \Omega; T_j = 25 , ^\circ C; I_D = 3 , A$</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$\tau_r$</td>
<td>rise time</td>
<td>-</td>
<td>14</td>
<td>-</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>$\tau_{(off)}$</td>
<td>turn-off delay time</td>
<td>-</td>
<td>55</td>
<td>-</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>$\tau_f$</td>
<td>fall time</td>
<td>-</td>
<td>23</td>
<td>-</td>
<td>ns</td>
<td></td>
</tr>
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</table>

### Source-drain diode

<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>$V_{SD}$</td>
<td>source-drain voltage</td>
<td>$I_S = 0.6 , A; V_{GS} = 0 , V; T_j = 25 , ^\circ C$</td>
<td>-</td>
<td>0.75</td>
<td>1.2</td>
<td>V</td>
</tr>
</tbody>
</table>
30 V, 3.1 A N-channel Trench MOSFET

**Fig 6.** Output characteristics: drain current as a function of drain-source voltage; typical values

**Tj = 25 °C**

**Fig 7.** Sub-threshold drain current as a function of gate-source voltage

**Tj = 25 °C; VDS = 5 V**

(1) minimum values
(2) typical values
(3) maximum values

**Fig 8.** Drain-source on-state resistance as a function of drain current; typical values

**Tj = 25 °C**

(1) VGS = 2.8 V
(2) VGS = 3.0 V
(3) VGS = 3.5 V
(4) VGS = 4.5 V
(5) VGS = 5.0 V
(6) VGS = 6.0 V
(7) VGS = 10 V

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

**I_D = 5 A**

(1) Tj = 150 °C
(2) Tj = 25 °C
**PMV37EN**

30 V, 3.1 A N-channel Trench MOSFET

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

\[ V_{DS} > I_D \times R_{DS(on)} \]

(1) \( T_j = 25 \, ^\circ C \)
(2) \( T_j = 150 \, ^\circ C \)

**Fig 11.** Normalized drain-source on-state resistance as a function of junction temperature; typical values

\[ a = \frac{R_{DS(on)}}{R_{DS(on)(25\,^\circ C)}} \]

**Fig 12.** Gate-source threshold voltage as a function of junction temperature

\[ V_{GS(th)} \]

- (1) maximum values
- (2) typical values
- (3) minimum values

**Fig 13.** Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

\[ f = 1 \, MHz; \, V_{GS} = 0 \, V \]

- (1) \( C_{iss} \)
- (2) \( C_{oss} \)
- (3) \( C_{rss} \)
**PMV37EN**

**30 V, 3.1 A N-channel Trench MOSFET**

---

**Fig 14.** Gate-source voltage as a function of gate charge; typical values

I_D = 3 A; V_DS = 15 V; T_amb = 25 °C

**Fig 15.** Gate charge waveform definitions

**Fig 16.** Source current as a function of source-drain voltage; typical values

V_GS = 0 V

(1) T_J = 150 °C
(2) T_J = 25 °C
8. Test information

Fig 17. Duty cycle definition
9. Package outline

Plastic surface-mounted package; 3 leads

**SOT23**

![Package outline diagram](image)

**DIMENSIONS** (mm are the original dimensions)

<table>
<thead>
<tr>
<th>UNIT</th>
<th>A</th>
<th>A₁ max.</th>
<th>b₁</th>
<th>c</th>
<th>D</th>
<th>E</th>
<th>e</th>
<th>e₁</th>
<th>Hₑ</th>
<th>Lₚ</th>
<th>Q</th>
<th>v</th>
<th>w</th>
</tr>
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<tbody>
<tr>
<td>mm</td>
<td>1.1</td>
<td>0.9</td>
<td>0.1</td>
<td>0.48</td>
<td>0.15</td>
<td>3.0</td>
<td>1.4</td>
<td>1.9</td>
<td>2.5</td>
<td>2.1</td>
<td>0.45</td>
<td>0.2</td>
<td>0.1</td>
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**REFERENCES**

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<th>IEC</th>
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<th>JEITA</th>
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**EUROPEAN PROJECTION**

- IEC
- JEDEC
- JEITA

**ISSUE DATE**

- 06-03-16

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**Fig 18. Package outline SOT23 (TO-236AB)**
10. Soldering

Fig 19. Reflow soldering footprint for SOT23 (TO-236AB)

Fig 20. Wave soldering footprint for SOT23 (TO-236AB)
11. Revision history

<table>
<thead>
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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>PMV37EN v.1</td>
<td>20110509</td>
<td>Product data sheet</td>
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12. Legal information

12.1 Data sheet status

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<tr>
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<th>Product status</th>
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<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>
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<td>Production</td>
<td>This document contains the product specification.</td>
</tr>
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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 URL: http://www.nxp.com.

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13. Contact information

For more information, please visit: [http://www.nxp.com](http://www.nxp.com)

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