



PMV20XN

30 V, 4.8 A N-channel Trench MOSFET

Rev. 1 — 5 April 2011

Product data sheet

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

- Low threshold voltage
- Very fast switching
- Trench MOSFET technology

1.3 Applications

- Relay driver
- High-speed line driver
- Low-side loadswitch
- Switching circuits

1.4 Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|----------------------------------|---|-----|-----|-----|------|
| V_{DS} | drain-source voltage | $T_j = 25\text{ °C}$ | - | - | 30 | V |
| V_{GS} | gate-source voltage | | -12 | - | 12 | V |
| I_D | drain current | $V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ °C}$ | [1] | - | 4.8 | A |
| Static characteristics | | | | | | |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = 4.5\text{ V}; I_D = 4.8\text{ A}; T_j = 25\text{ °C}$ | - | 19 | 25 | mΩ |

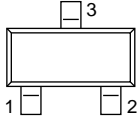
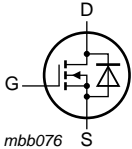
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².

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2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|---|
| 1 | G | gate |  SOT23 (TO-236AB) |  mbb076 |
| 2 | S | source | | |
| 3 | D | drain | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|----------|--|---------|
| | Name | Description | Version |
| PMV20XN | TO-236AB | plastic surface-mounted package; 3 leads | SOT23 |

4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| PMV20XN | KW% |

[1] % = placeholder for manufacturing site code

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5. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|-----------|-------------------------|--|-----|-----|------|----|
| V_{DS} | drain-source voltage | $T_j = 25\text{ °C}$ | - | 30 | V | |
| V_{GS} | gate-source voltage | | -12 | 12 | V | |
| I_D | drain current | $V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ °C}$ | [1] | - | 4.8 | A |
| | | $V_{GS} = 4.5\text{ V}; T_{amb} = 100\text{ °C}$ | [1] | - | 3 | A |
| I_{DM} | peak drain current | $T_{amb} = 25\text{ °C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$ | - | 20 | A | |
| P_{tot} | total power dissipation | $T_{amb} = 25\text{ °C}$ | [2] | - | 510 | mW |
| | | | [1] | - | 930 | mW |
| | | $T_{sp} = 25\text{ °C}$ | | - | 4170 | mW |
| T_j | junction temperature | | -55 | 150 | °C | |
| T_{amb} | ambient temperature | | -55 | 150 | °C | |
| T_{stg} | storage temperature | | -65 | 150 | °C | |

Source-drain diode

| | | | | | | |
|-------|----------------|--------------------------|-----|---|---|---|
| I_S | source current | $T_{amb} = 25\text{ °C}$ | [1] | - | 1 | A |
|-------|----------------|--------------------------|-----|---|---|---|

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

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|----------------|--|-------------|-----|-----|-----|------|-----|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | 207 | 245 | K/W |
| | | | [2] | - | 116 | 135 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | - | 20 | 30 | K/W | |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 6 cm².

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7. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|----------------------------------|---|-----|------|-----|------------|
| Static characteristics | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D = 250 \mu A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | 30 | - | - | V |
| V_{GSth} | gate-source threshold voltage | $I_D = 250 \mu A$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ C$ | 0.5 | 1 | 1.5 | V |
| I_{DSS} | drain leakage current | $V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 1 | μA |
| | | $V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 150 \text{ }^\circ C$ | - | - | 20 | μA |
| I_{GSS} | gate leakage current | $V_{GS} = 12 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 100 | nA |
| | | $V_{GS} = -12 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 100 | nA |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = 4.5 V$; $I_D = 4.8 A$; $T_j = 25 \text{ }^\circ C$ | - | 19 | 25 | m Ω |
| | | $V_{GS} = 4.5 V$; $I_D = 4.8 A$; $T_j = 150 \text{ }^\circ C$ | - | 31 | 40 | m Ω |
| | | $V_{GS} = 2.5 V$; $I_D = 4 A$; $T_j = 25 \text{ }^\circ C$ | - | 26 | 35 | m Ω |
| g_{fs} | forward transconductance | $V_{DS} = 5 V$; $I_D = 3 A$; $T_j = 25 \text{ }^\circ C$ | - | 8 | - | S |
| Dynamic characteristics | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $I_D = 3 A$; $V_{DS} = 15 V$; $V_{GS} = 4.5 V$; $T_j = 25 \text{ }^\circ C$ | - | 6.4 | 10 | nC |
| Q_{GS} | gate-source charge | | - | 1.8 | - | nC |
| Q_{GD} | gate-drain charge | | - | 1.1 | - | nC |
| C_{iss} | input capacitance | $V_{GS} = 0 V$; $V_{DS} = 15 V$; $f = 1 \text{ MHz}$; $T_j = 25 \text{ }^\circ C$ | - | 585 | - | pF |
| C_{oss} | output capacitance | | - | 110 | - | pF |
| C_{rss} | reverse transfer capacitance | | - | 55 | - | pF |
| $t_{d(on)}$ | turn-on delay time | $V_{DS} = 15 V$; $V_{GS} = 5.4 V$; $R_{G(ext)} = 6 \Omega$; $T_j = 25 \text{ }^\circ C$; $I_D = 4.8 A$ | - | 12 | - | ns |
| t_r | rise time | | - | 27 | - | ns |
| $t_{d(off)}$ | turn-off delay time | | - | 128 | - | ns |
| t_f | fall time | | - | 68 | - | ns |
| Source-drain diode | | | | | | |
| V_{SD} | source-drain voltage | $I_S = 1 A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | 0.75 | 1.2 | V |