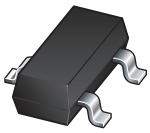


# PMV33UPE

## 20 V, single P-channel Trench MOSFET

Rev. 1 — 12 June 2012 Product data sheet

## 1. Product profile

### 1.1 General description

P-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
- 2 kV ESD protected

### 1.3 Applications

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

### 1.4 Quick reference data

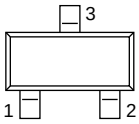
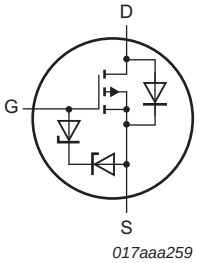
**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{DS}$ | drain-source voltage | $T_j$ = 25 °C | | - | - | -20 | V |
| $V_{GS}$ | gate-source voltage | | | -8 | - | 8 | V |
| $I_D$ | drain current | $V_{GS}$ = -4.5 V; $T_{amb}$ = 25 °C; t ≤ 5 s | [1] | - | - | -5.3 | A |
| **Static characteristics** | | | | | | | |
| $R_{DSon}$ | drain-source on-state resistance | $V_{GS}$ = -4.5 V; $I_D$ = -3 A; $T_j$ = 25 °C | | - | 30 | 36 | mΩ |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 $cm^2$.

## 2. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | G | gate |   SOT23 (TO-236AB) |   017aaa259 |
| 2 | S | source | | |
| 3 | D | drain | | |

## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PMV33UPE | TO-236AB | plastic surface-mounted package; 3 leads | SOT23 |

## 4. Marking

**Table 4. Marking codes**

| Type number | Marking code[1] |
|---|---|
| PMV33UPE | EJ% |

[1] % = placeholder for manufacturing site code

## 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 °C | | - | -20 | V |
| $V_{GS}$ | gate-source voltage | | | -8 | 8 | V |
| $I_D$ | drain current | $V_{GS}$ = -4.5 V; $T_{amb}$ = 25 °C; t ≤ 5 s | [1] | - | -5.3 | A |
| | | $V_{GS}$ = -4.5 V; $T_{amb}$ = 25 °C | [1] | - | -4.4 | A |
| | | $V_{GS}$ = -4.5 V; $T_{amb}$ = 100 °C | [1] | - | -2.8 | A |
| $I_{DM}$ | peak drain current | $T_{amb}$ = 25 °C; single pulse; $t_p$ ≤ 10 µs | | - | -17.6 | A |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = 25 °C | [2] | - | 490 | mW |
| | | | [1] | - | 980 | mW |
| | | $T_{sp}$ = 25 °C | | - | 4150 | 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 °C | [1] | - | -1.2 | A |
| **ESD maximum rating** | | | | | | |
| $V_{ESD}$ | electrostatic discharge voltage | HBM | [3] | - | 2000 | V |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 $cm^2$.

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

[3] Measured between all pins.

## 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] | - | 222 | 255 | K/W |
| | | | [2] | - | 111 | 128 | K/W |
| | | | [3] | - | 74 | 85 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | - | 25 | 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 $cm^2$.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 6 $cm^2$, t ≤ 5 s.

## 7. Characteristics

**Table 7. Characteristics**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D$ = -250 µA; $V_{GS}$ = 0 V; $T_j$ = 25 °C | -20 | - | - | V |
| $V_{GSth}$ | gate-source threshold voltage | $I_D$ = -250 µA; $V_{DS}$ = $V_{GS}$; $T_j$ = 25 °C | -0.45 | -0.7 | -0.95 | V |
| $I_{DSS}$ | drain leakage current | $V_{DS}$ = -20 V; $V_{GS}$ = 0 V; $T_j$ = 25 °C | - | - | -1 | µA |
| | | $V_{DS}$ = -20 V; $V_{GS}$ = 0 V; $T_j$ = 150 °C | - | - | -15 | µA |
| $I_{GSS}$ | gate leakage current | $V_{GS}$ = -8 V; $V_{DS}$ = 0 V; $T_j$ = 25 °C | - | - | -10 | µA |
| | | $V_{GS}$ = 8 V; $V_{DS}$ = 0 V; $T_j$ = 25 °C | - | - | -10 | µA |
| $R_{DSon}$ | drain-source on-state resistance | $V_{GS}$ = -4.5 V; $I_D$ = -3 A; $T_j$ = 25 °C | - | 30 | 36 | mΩ |
| | | $V_{GS}$ = -4.5 V; $I_D$ = -3 A; $T_j$ = 150 °C | - | 43 | 51 | mΩ |
| | | $V_{GS}$ = -2.5 V; $I_D$ = -3 A; $T_j$ = 25 °C | - | 38 | 47 | mΩ |
| | | $V_{GS}$ = -1.8 V; $I_D$ = -3 A; $T_j$ = 25 °C | - | 51 | 65 | mΩ |
| $g_{fs}$ | forward transconductance | $V_{DS}$ = -10 V; $I_D$ = -4.4 A; $T_j$ = 25 °C | - | 16 | - | S |
| **Dynamic characteristics** | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $V_{DS}$ = -10 V; $I_D$ = -4.4 A; $V_{GS}$ = -4.5 V; $T_j$ = 25 °C | - | 14.7 | 22.1 | nC |
| $Q_{GS}$ | gate-source charge | | - | 2.6 | - | nC |
| $Q_{GD}$ | gate-drain charge | | - | 2.5 | - | nC |
| $C_{iss}$ | input capacitance | $V_{DS}$ = -10 V; f = 1 MHz; $V_{GS}$ = 0 V; $T_j$ = 25 °C | - | 1820 | - | pF |
| $C_{oss}$ | output capacitance | | - | 208 | - | pF |
| $C_{rss}$ | reverse transfer capacitance | | - | 146 | - | pF |
| $t_{d(on)}$ | turn-on delay time | $V_{DS}$ = -10 V; $I_D$ = -4.4 A; $V_{GS}$ = -4.5 V; $R_{G(ext)}$ = 6 Ω; $T_j$ = 25 °C | - | 11 | - | ns |
| $t_r$ | rise time | | - | 30 | - | ns |
| $t_{d(off)}$ | turn-off delay time | | - | 83 | - | ns |
| $t_f$ | fall time | | - | 39 | - | ns |
| **Source-drain diode** | | | | | | |
| $V_{SD}$ | source-drain voltage | $I_S$ = -1.2 A; $V_{GS}$ = 0 V; $T_j$ = 25 °C | - | -0.7 | -1.2 | V |