



PMV28UN

20 V, 3.3 A N-channel Trench MOSFET

Rev. 1 — 26 May 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	$T_j = 25\text{ }^{\circ}\text{C}$	-	-	20	V
V_{GS}	gate-source voltage		-8	-	8	V
I_D	drain current	$V_{GS} = 4.5\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	3.3	A
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}$; $I_D = 3.3\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$	-	25	32	m Ω

[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 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		Version
	Name	Description	
PMV28UN	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PMV28UN	KU%

[1] % = placeholder for manufacturing site code

5. Limiting values

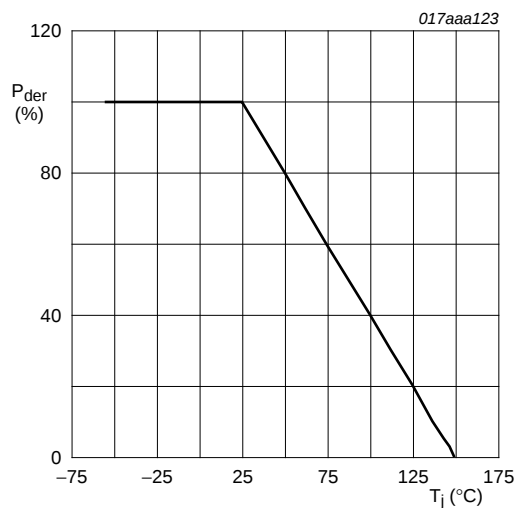
Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$	-	20	V
V_{GS}	gate-source voltage		-8	8	V
I_D	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ °C}$ ^[1]	-	3.3	A
		$V_{GS} = 4.5\text{ V}; T_{amb} = 100\text{ °C}$ ^[1]	-	2.2	A
I_{DM}	peak drain current	$T_{amb} = 25\text{ °C}$; single pulse; $t_p \leq 10\text{ }\mu\text{s}$	-	13	A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$ ^[2]	-	380	mW
		^[1]	-	520	mW
		$T_{sp} = 25\text{ °C}$	-	1800	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]	-	0.6	A

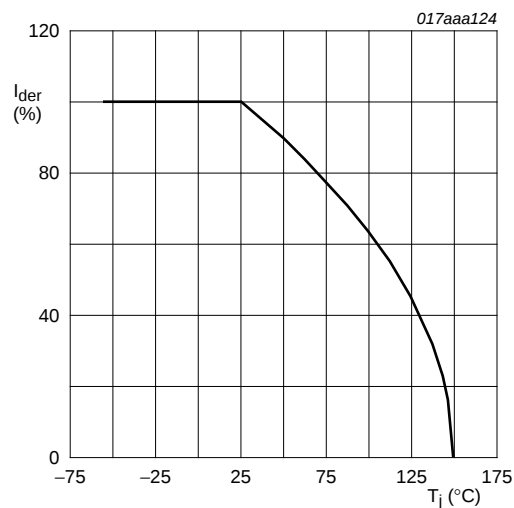
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².

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



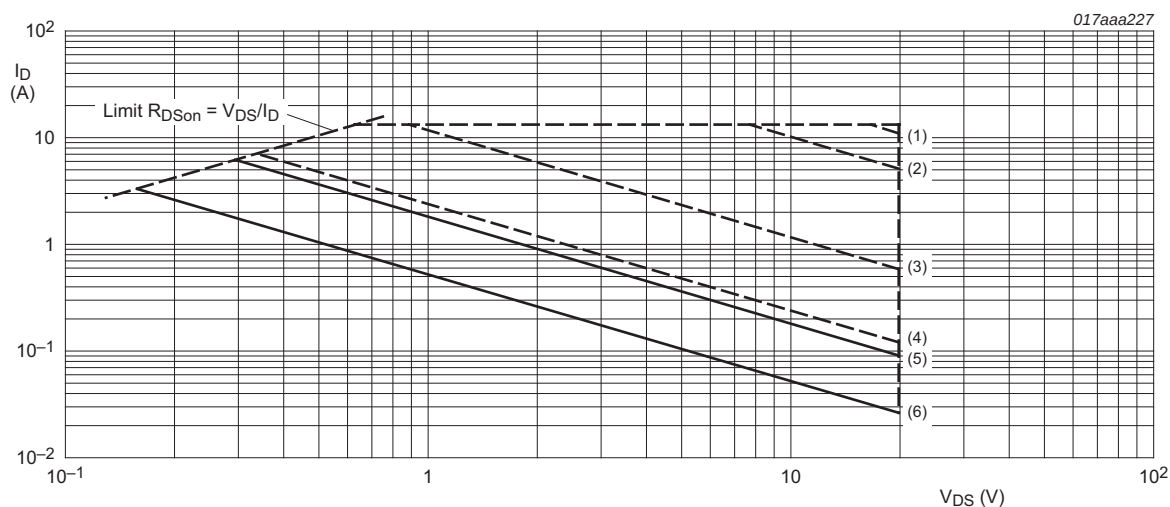
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}\text{C})}} \times 100 \%$$

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



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

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



I_{DM} = 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; $T_{sp} = 25^{\circ}\text{C}$

(6) DC; $T_{amb} = 25^{\circ}\text{C}$; drain mounting pad 6 cm^2

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

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]	285	330	K/W
			[2]	208	240	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	60	70	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.

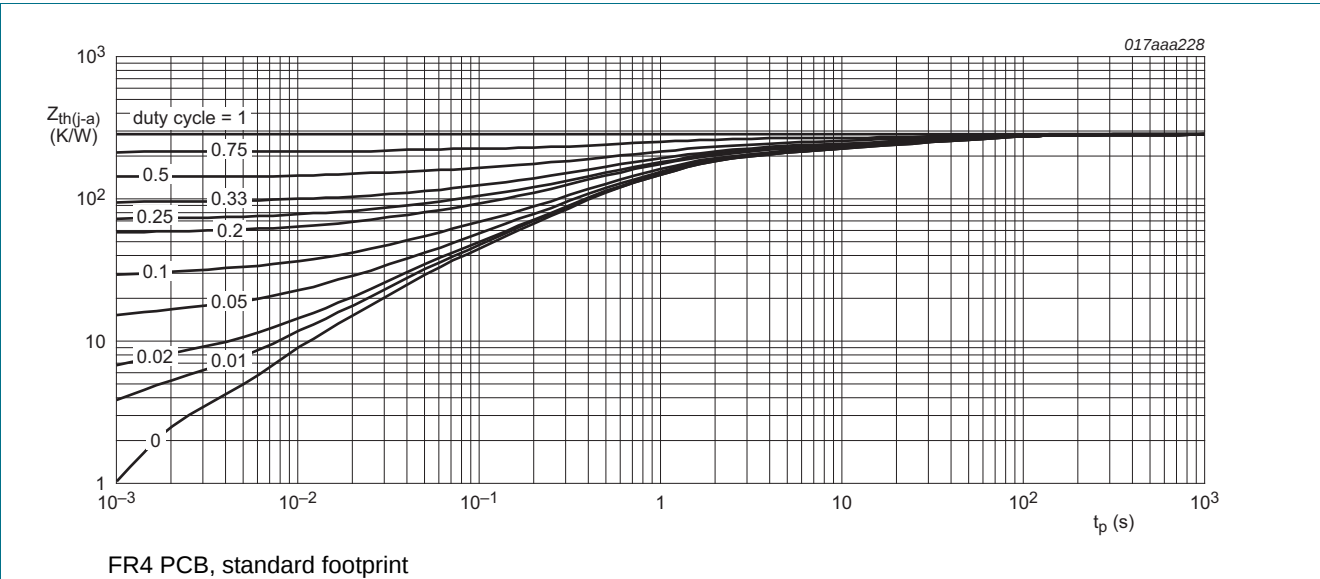


Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

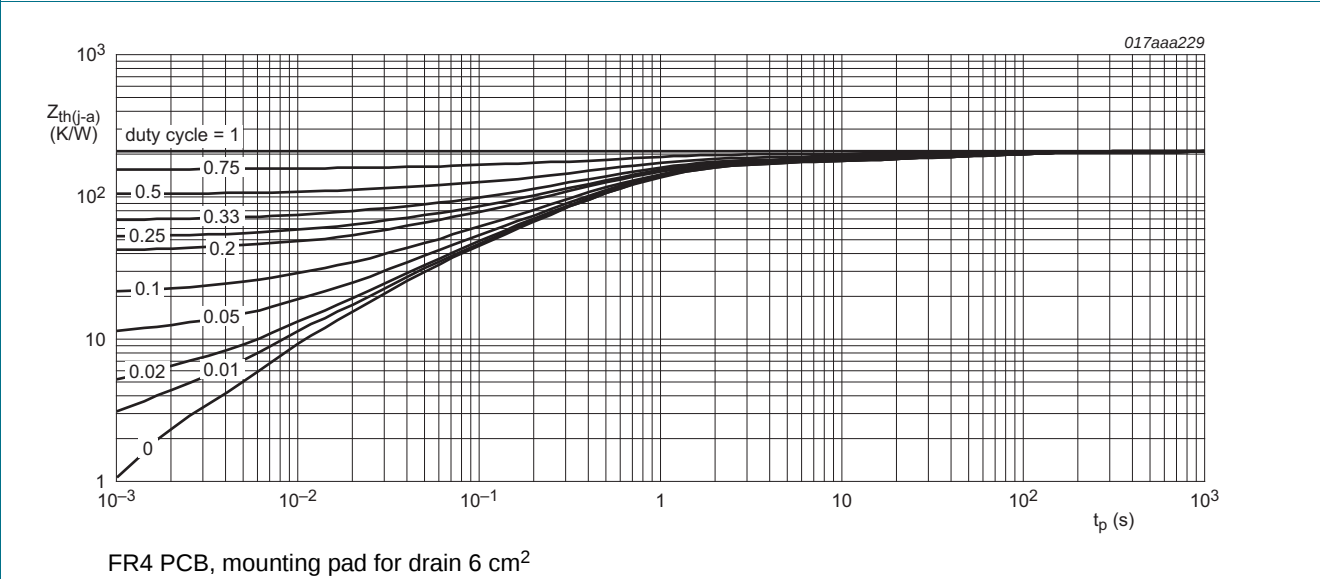


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250\ \mu\text{A}$; $V_{GS} = 0\ \text{V}$; $T_j = 25\ ^\circ\text{C}$	20	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = 250\ \mu\text{A}$; $V_{DS} = V_{GS}$; $T_j = 25\ ^\circ\text{C}$	0.4	0.7	1	V
I_{DSS}	drain leakage current	$V_{DS} = 20\ \text{V}$; $V_{GS} = 0\ \text{V}$; $T_j = 25\ ^\circ\text{C}$	-	-	1	μA
		$V_{DS} = 20\ \text{V}$; $V_{GS} = 0\ \text{V}$; $T_j = 150\ ^\circ\text{C}$	-	-	25	μA
I_{GSS}	gate leakage current	$V_{GS} = 8\ \text{V}$; $V_{DS} = 0\ \text{V}$; $T_j = 25\ ^\circ\text{C}$	-	-	100	nA
		$V_{GS} = -8\ \text{V}$; $V_{DS} = 0\ \text{V}$; $T_j = 25\ ^\circ\text{C}$	-	-	100	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5\ \text{V}$; $I_D = 3.3\ \text{A}$; $T_j = 25\ ^\circ\text{C}$	-	25	32	m Ω
		$V_{GS} = 4.5\ \text{V}$; $I_D = 3.3\ \text{A}$; $T_j = 150\ ^\circ\text{C}$	-	38	48	m Ω
		$V_{GS} = 2.5\ \text{V}$; $I_D = 3\ \text{A}$; $T_j = 25\ ^\circ\text{C}$	-	30	40	m Ω
		$V_{GS} = 1.8\ \text{V}$; $I_D = 2.4\ \text{A}$; $T_j = 25\ ^\circ\text{C}$	-	39	65	m Ω
g_{fs}	forward transconductance	$V_{DS} = 10\ \text{V}$; $I_D = 3\ \text{A}$; $T_j = 25\ ^\circ\text{C}$	-	15	-	S
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$V_{DS} = 10\ \text{V}$; $I_D = 3\ \text{A}$; $V_{GS} = 4.5\ \text{V}$; $T_j = 25\ ^\circ\text{C}$	-	5.8	9	nC
Q_{GS}	gate-source charge		-	0.8	-	nC
Q_{GD}	gate-drain charge		-	1.7	-	nC
C_{iss}	input capacitance	$V_{DS} = 10\ \text{V}$; $f = 1\ \text{MHz}$; $V_{GS} = 0\ \text{V}$; $T_j = 25\ ^\circ\text{C}$	-	470	-	pF
C_{oss}	output capacitance		-	123	-	pF
C_{rss}	reverse transfer capacitance		-	72	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 10\ \text{V}$; $V_{GS} = 4.5\ \text{V}$; $R_{G(ext)} = 6\ \Omega$; $T_j = 25\ ^\circ\text{C}$; $I_D = 3\ \text{A}$	-	9	-	ns
t_r	rise time		-	25	-	ns
$t_{d(off)}$	turn-off delay time		-	126	-	ns
t_f	fall time		-	60	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 0.6\ \text{A}$; $V_{GS} = 0\ \text{V}$; $T_j = 25\ ^\circ\text{C}$	-	0.7	1.2	V

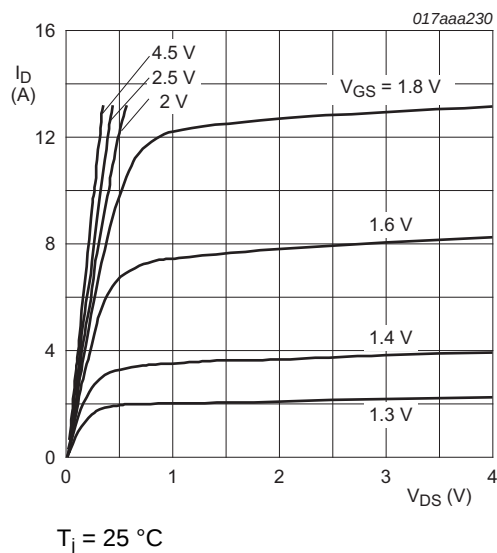


Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values

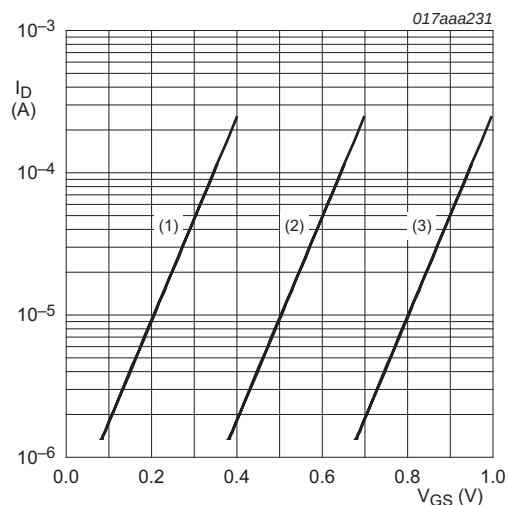


Fig 7. Sub-threshold drain current as a function of gate-source voltage

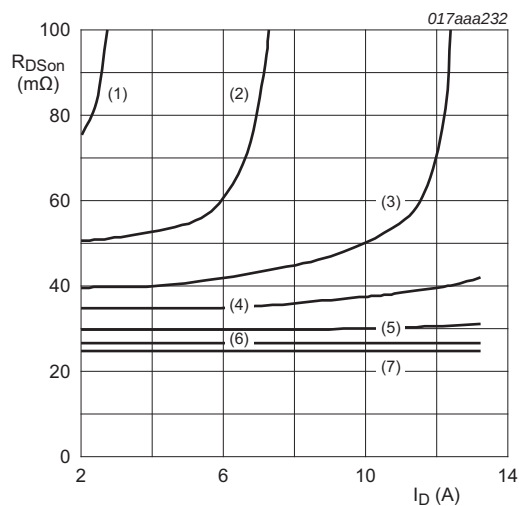


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

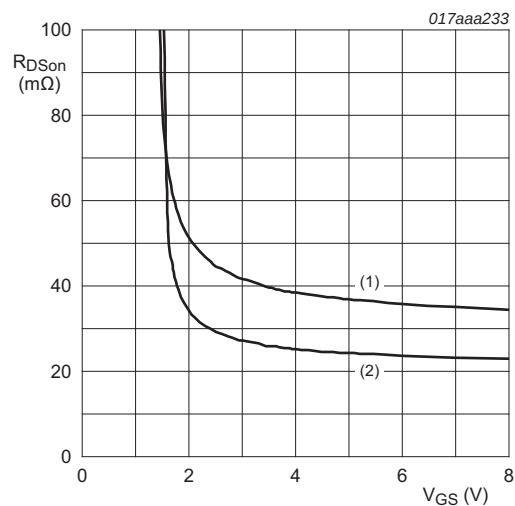
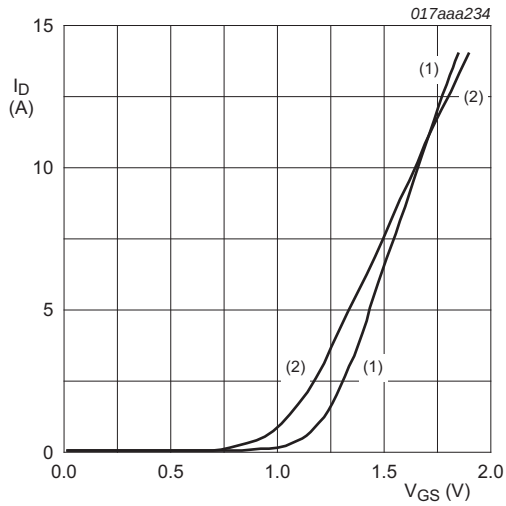


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

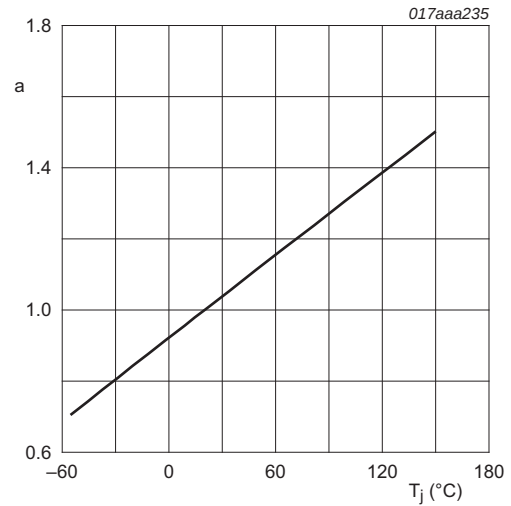


$$V_{DS} > I_D \times R_{DS(on)}$$

(1) $T_j = 25\text{ }^{\circ}\text{C}$

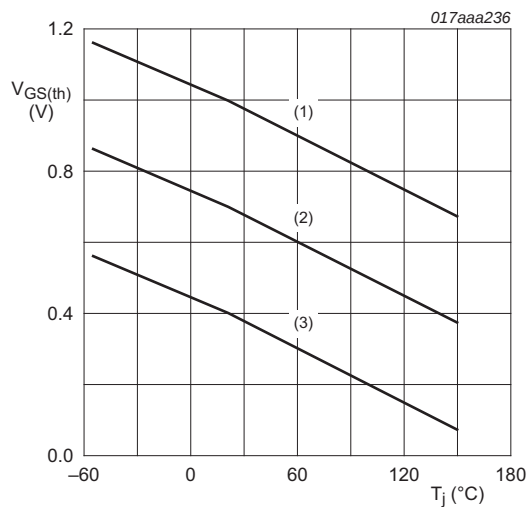
(2) $T_j = 150\text{ }^{\circ}\text{C}$

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



$$a = \frac{R_{DS(on)}}{R_{DS(on)(25^{\circ}\text{C})}}$$

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



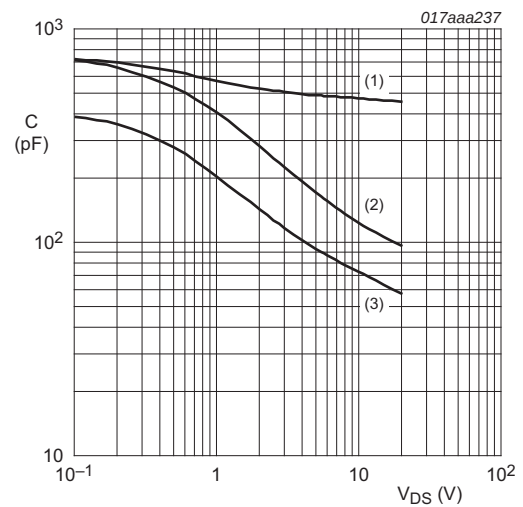
$$I_D = 0.25\text{ mA}; V_{DS} = V_{GS}$$

(1) maximum values

(2) typical values

(3) minimum values

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



$$f = 1\text{ MHz}; V_{GS} = 0\text{ V}$$

(1) C_{iss}

(2) C_{oss}

(3) C_{rss}

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

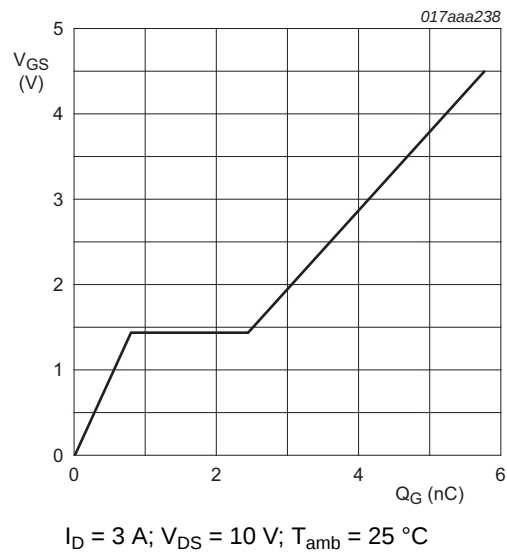


Fig 14. Gate-source voltage as a function of gate charge; typical values

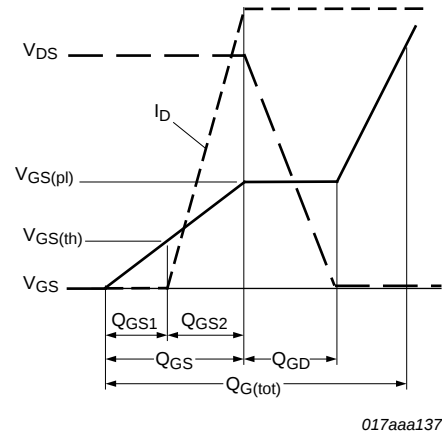
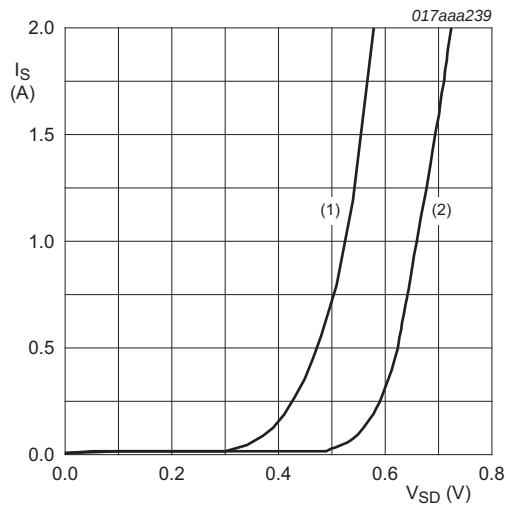


Fig 15. Gate charge waveform definitions



$V_{GS} = 0\text{ V}$
(1) $T_j = 150\text{ }^\circ\text{C}$
(2) $T_j = 25\text{ }^\circ\text{C}$

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

8. Test information

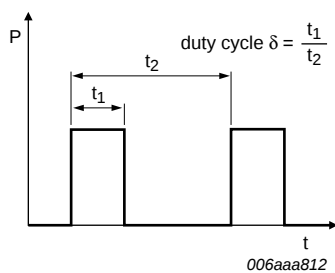


Fig 17. Duty cycle definition

9. Package outline

Plastic surface-mounted package; 3 leads

SOT23

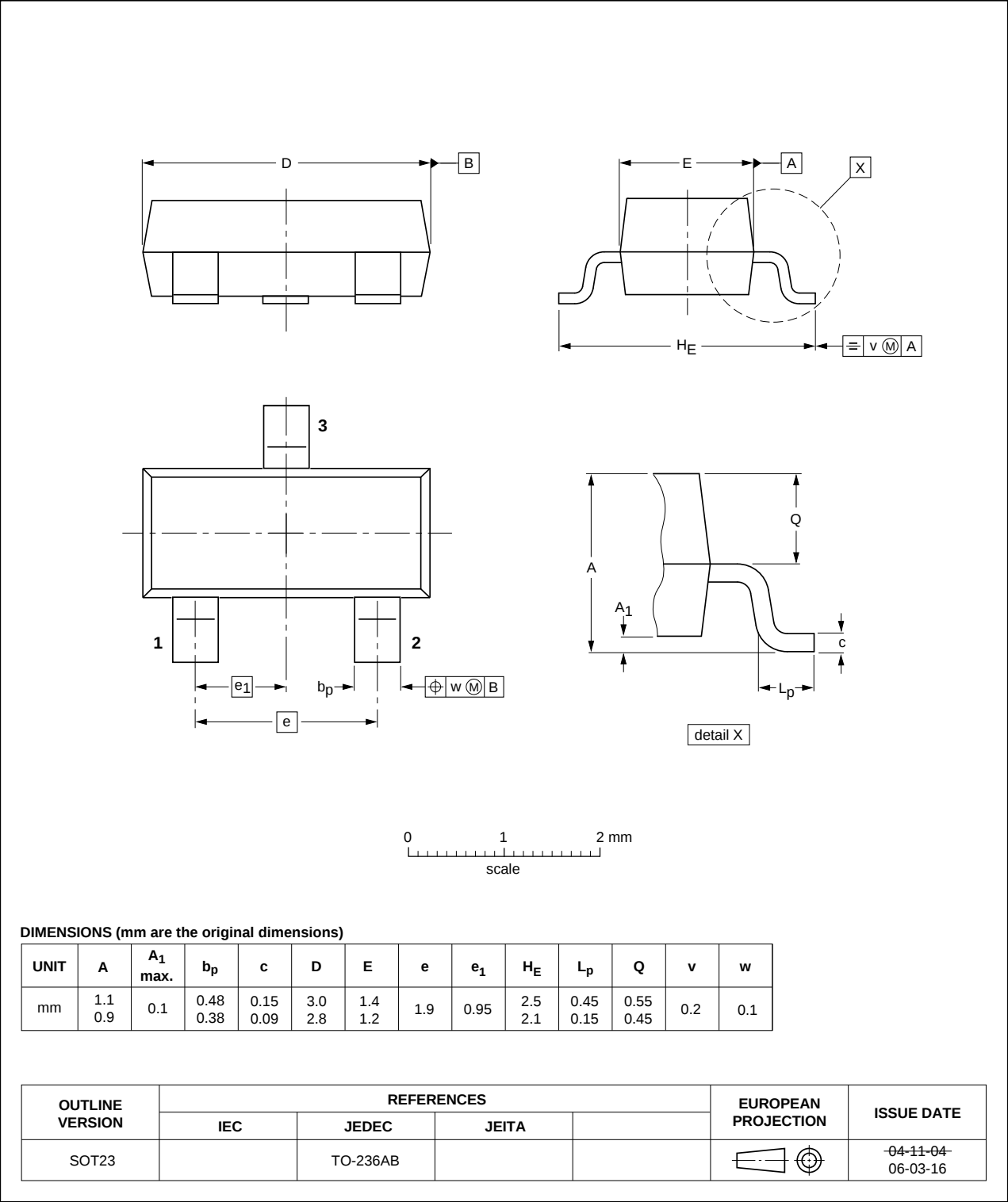


Fig 18. Package outline SOT23 (TO-236AB)

10. Soldering

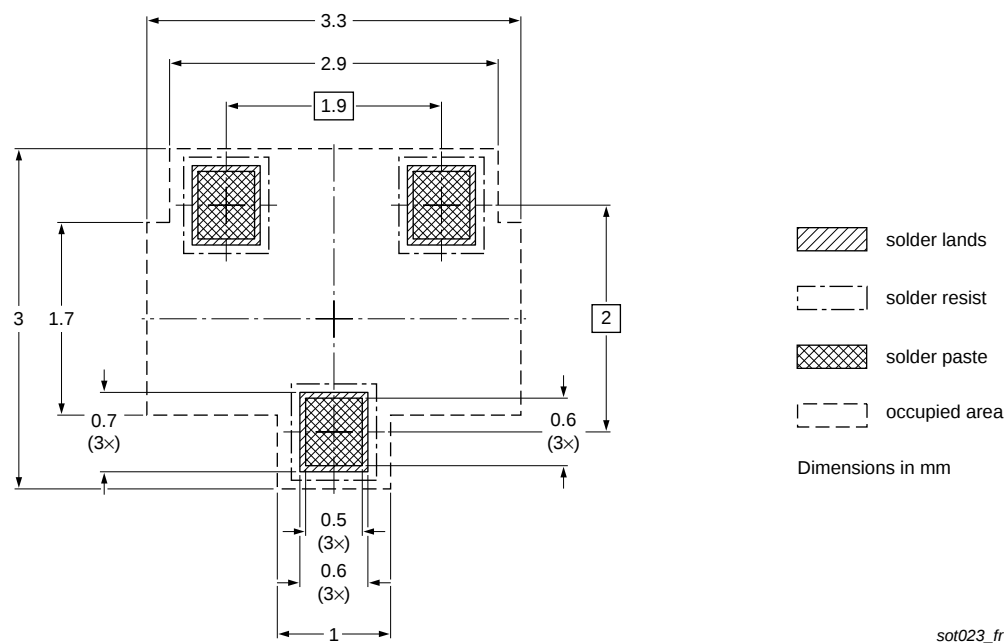


Fig 19. Reflow soldering footprint for SOT23 (TO-236AB)

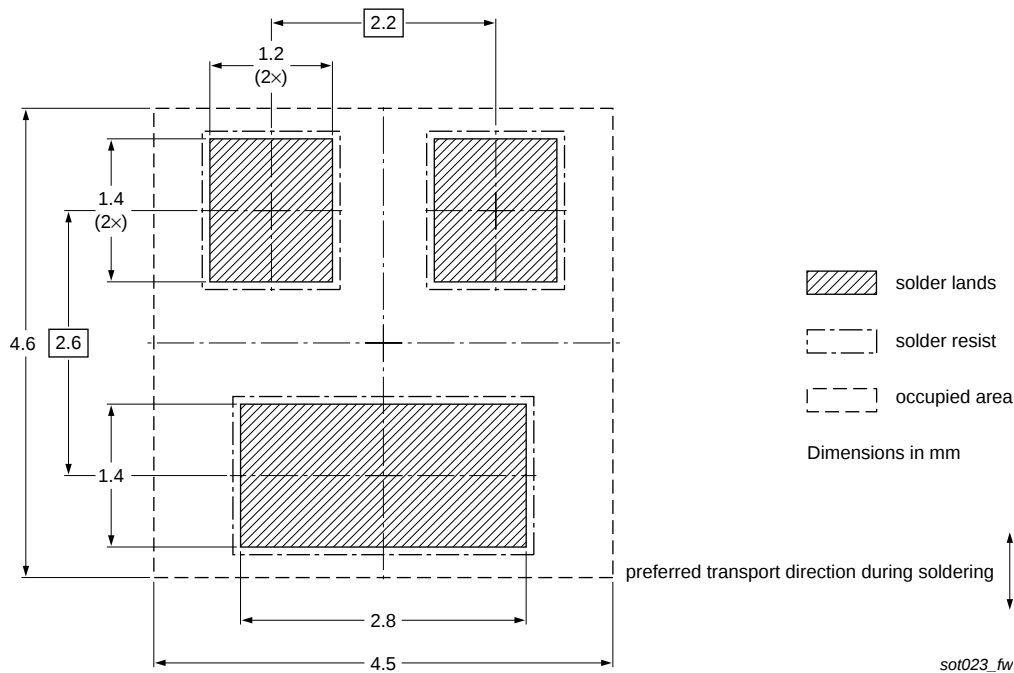


Fig 20. Wave soldering footprint for SOT23 (TO-236AB)

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMV28UN v.1	20110526	Product data sheet	-	-

12. Legal information

12.1 Data sheet status

Document status [1] [2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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[2] The term 'short data sheet' is explained in section "Definitions".

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