



PMV32UP

20 V, 4 A P-channel Trench MOSFET

Rev. 1 — 11 March 2011

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

- 1.8 V drain-source on-state resistance rated
- Very fast switching
- Trench MOSFET technology

1.3 Applications

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

1.4 Quick reference data

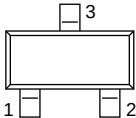
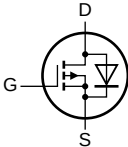
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$	-	-	-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]	-	-4	A
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -4.5\text{ V}; I_D = -2.4\text{ A}; T_j = 25\text{ °C}$	-	32	36	mΩ

[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)	 017aaa094
2	S	source		
3	D	drain		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMV32UP	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PMV32UP	NF%

[1] % = placeholder for manufacturing site code

5. Limiting values

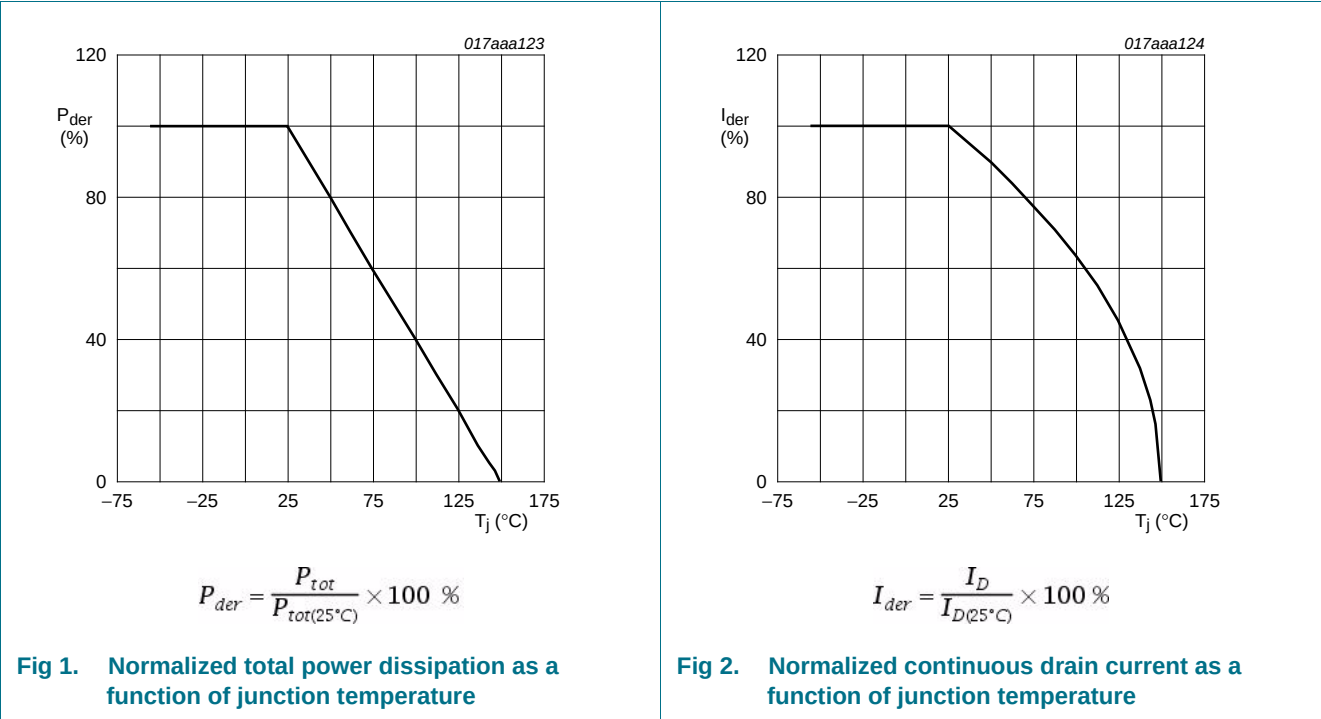
Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

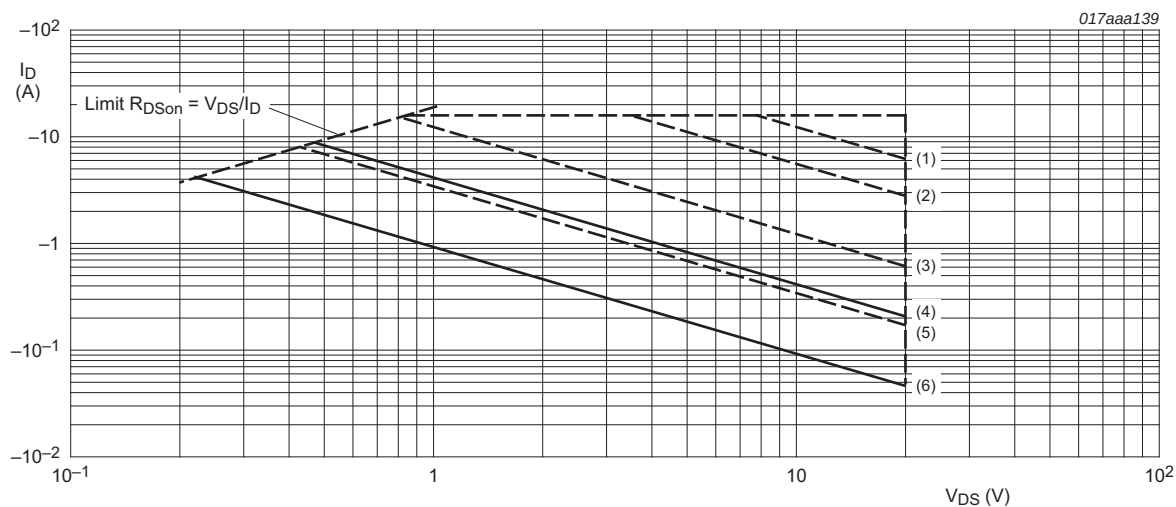
Symbol	Parameter	Conditions	Min	Max	Unit
V _{DS}	drain-source voltage	T _j = 25 °C	-	-20	V
V _{GS}	gate-source voltage		-8	8	V
I _D	drain current	V _{GS} = -4.5 V; T _{amb} = 25 °C	[1]	-4	A
		V _{GS} = -4.5 V; T _{amb} = 100 °C	[1]	-2.5	A
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs	-	-16	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	510	mW
			[1]	930	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	A
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- [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 PCB, single-sided copper, tin-plated and standard footprint.





IDM = single pulse
(1) tp = 100 μs
(2) tp = 1 ms
(3) tp = 10 ms
(4) DC; Tsp = 25 °C
(5) tp = 100 ms
(6) DC; Tamb = 25 °C; drain mounting pad 6 cm²

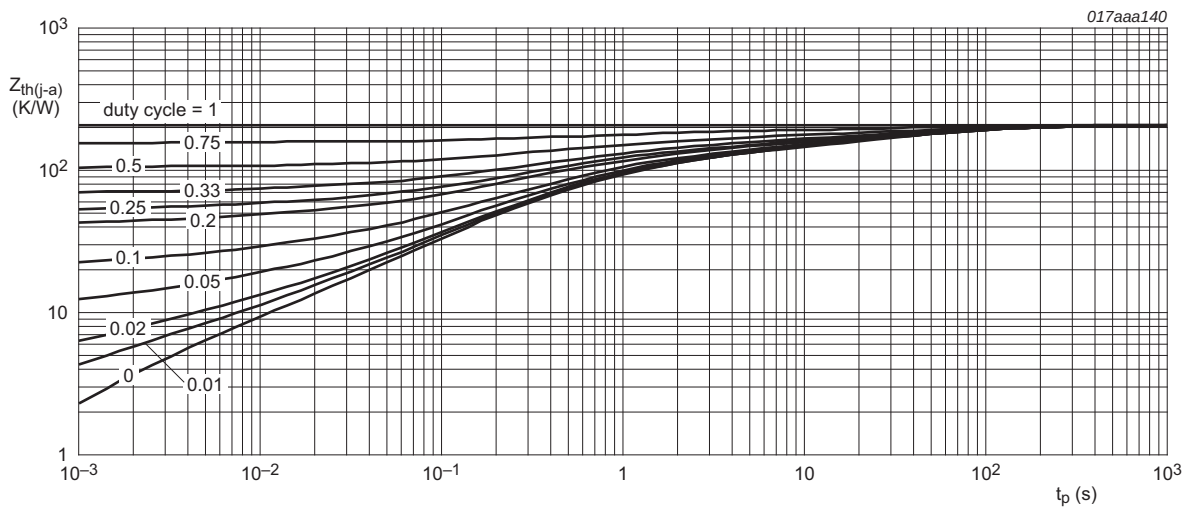
Fig 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

6. Thermal characteristics

Table 6. Thermal characteristics

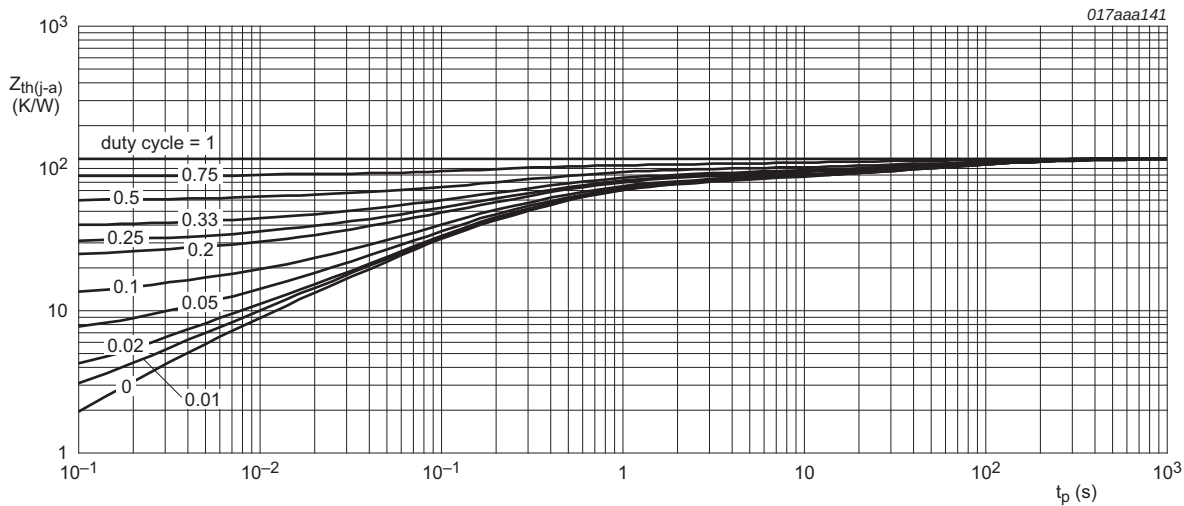
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Rth(j-a)	thermal resistance from junction to ambient	in free air	[1]	-	207	245 K/W
			[2]	-	117	135 K/W
Rth(j-sp)	thermal resistance from junction to solder point		-	25	30	K/W

[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 cm².



FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for drain 6 cm²

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 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	-	-	-10	μA
I _{GSS}	gate leakage current	V _{GS} = -8 V; V _{DS} = 0 V; T _j = 25 °C	-	-	-100	nA
R _{DSon}	drain-source on-state resistance	V _{GS} = -4.5 V; I _D = -2.4 A; T _j = 25 °C	-	32	36	mΩ
		V _{GS} = -4.5 V; I _D = -2.4 A; T _j = 150 °C	-	46	53	mΩ
		V _{GS} = -2.5 V; I _D = -2.0 A; T _j = 25 °C	-	40	46	mΩ
		V _{GS} = -1.8 V; I _D = -1.8 A; T _j = 25 °C	-	55	73	mΩ
g _{fs}	forward transconductance	V _{DS} = -5 V; I _D = -2.4 A; T _j = 25 °C	-	13	-	S
Dynamic characteristics						
Q _{G(tot)}	total gate charge	I _D = -1 A; V _{DS} = -10 V; V _{GS} = -4.5 V; T _j = 25 °C	-	15.5	-	nC
Q _{GS}	gate-source charge		-	2.7	-	nC
Q _{GD}	gate-drain charge		-	2.2	-	nC
C _{iss}	input capacitance	V _{GS} = 0 V; V _{DS} = -10 V; f = 1 MHz; T _j = 25 °C	-	1890	-	pF
C _{oss}	output capacitance		-	175	-	pF
C _{rss}	reverse transfer capacitance		-	112	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = -10 V; V _{GS} = -5 V; R _{G(ext)} = 6 Ω; T _j = 25 °C; I _D = -1 A	-	13	-	ns
t _r	rise time		-	21	-	ns
t _{d(off)}	turn-off delay time		-	95	-	ns
t _f	fall time		-	33	-	ns
Source-drain diode						
V _{SD}	source-drain voltage	I _S = -2.4 A; V _{GS} = 0 V; T _j = 25 °C	-	-0.75	-1	V

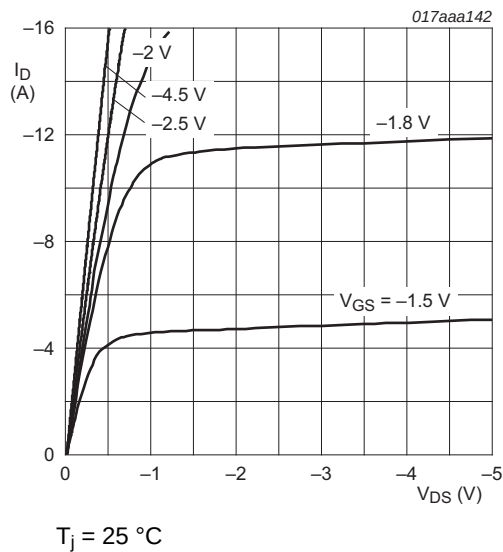


Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values

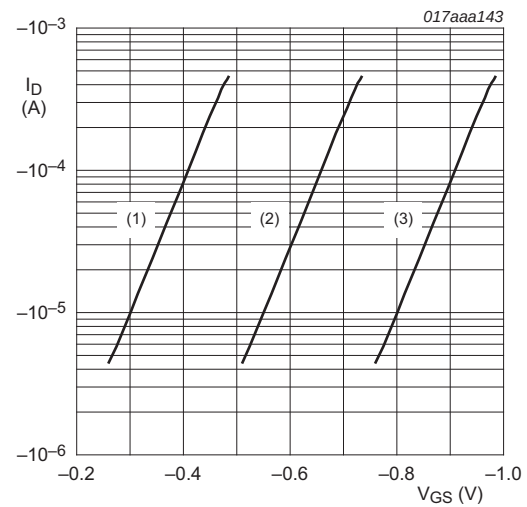


Fig 7. Sub-threshold drain current as a function of gate-source voltage

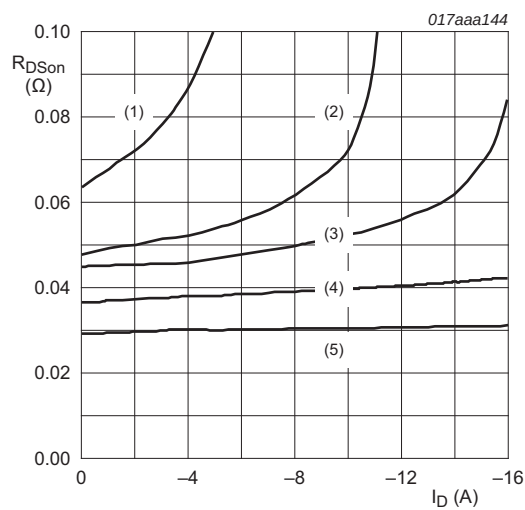


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

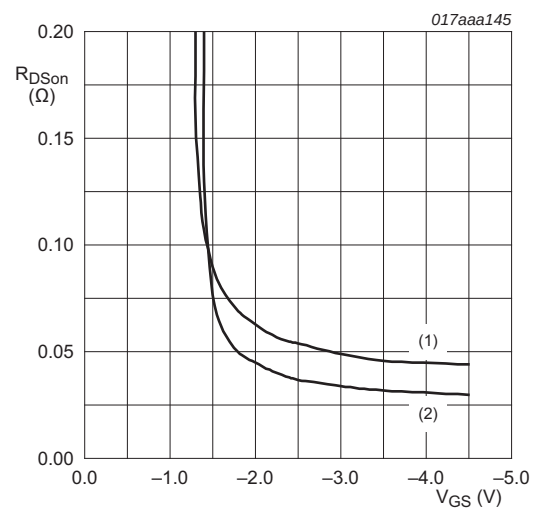
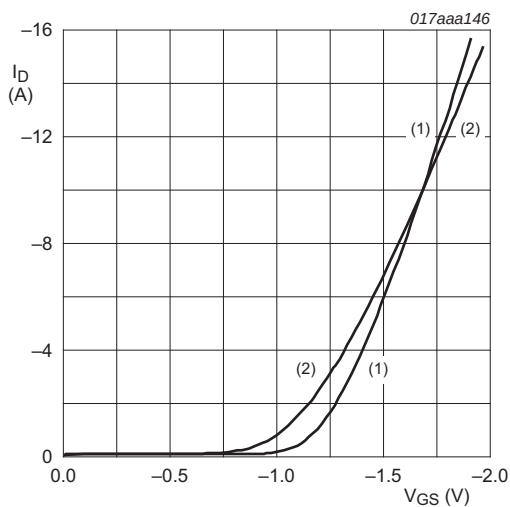
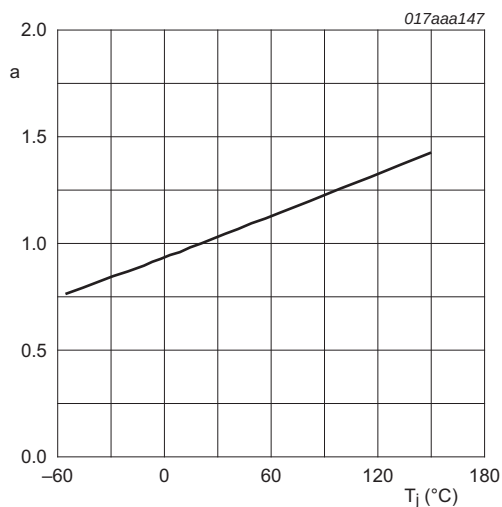


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values



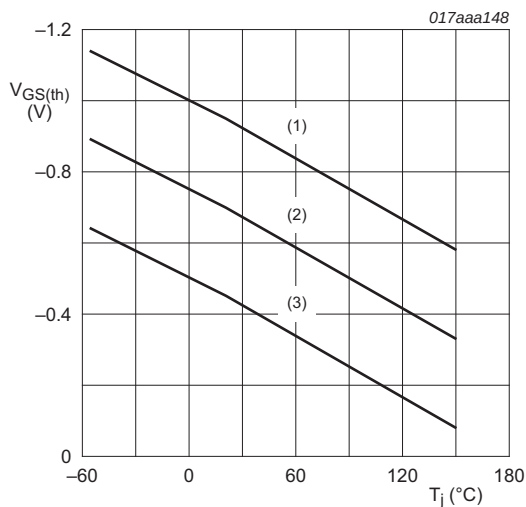
$V_{DS} > I_D \times R_{DSon}$
(1) $T_j = 25\text{ }^{\circ}\text{C}$
(2) $T_j = 150\text{ }^{\circ}\text{C}$

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



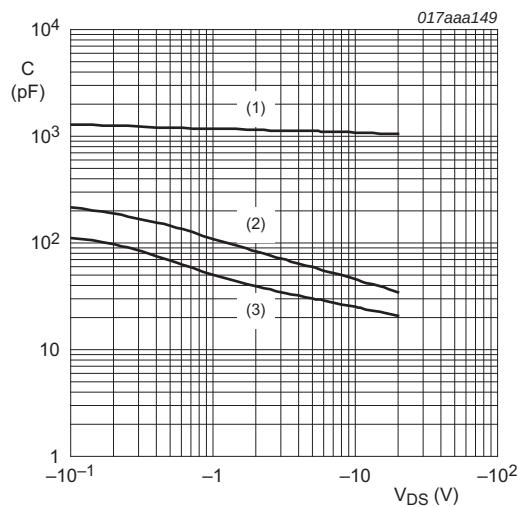
$$a = \frac{R_{DSon}}{R_{DSon(25^{\circ}\text{C})}}$$

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



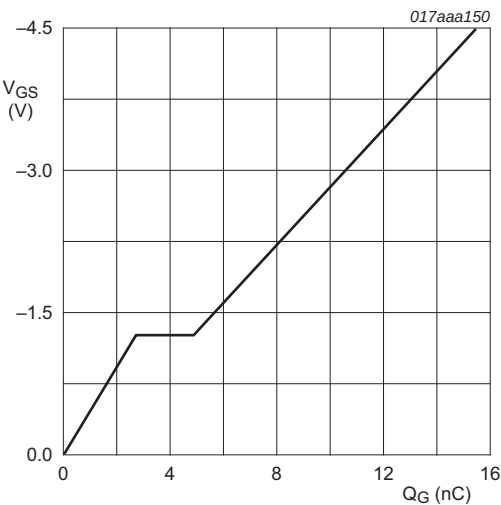
$I_D = -0.25\text{ mA}$; $V_{DS} = V_{GS}$
(1) maximum values
(2) typical values
(3) minimum values

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



$I_D = -2.4\text{ A}$; $V_{DS} = -10\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$

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

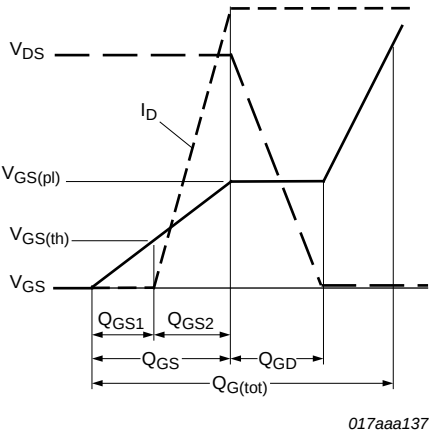
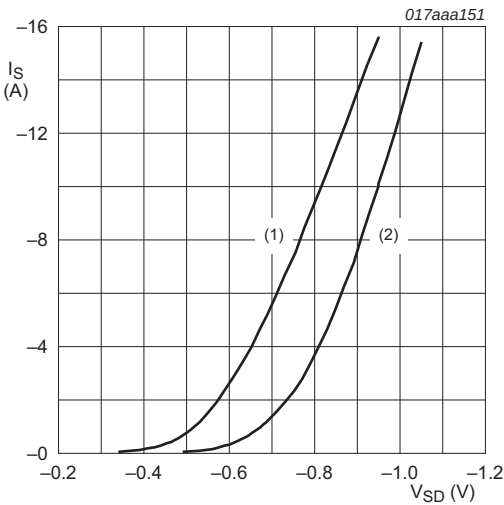


Fig 15. Gate charge waveform definitions



$V_{GS} = 0\text{ V}$
(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. Package outline

Plastic surface-mounted package; 3 leads

SOT23

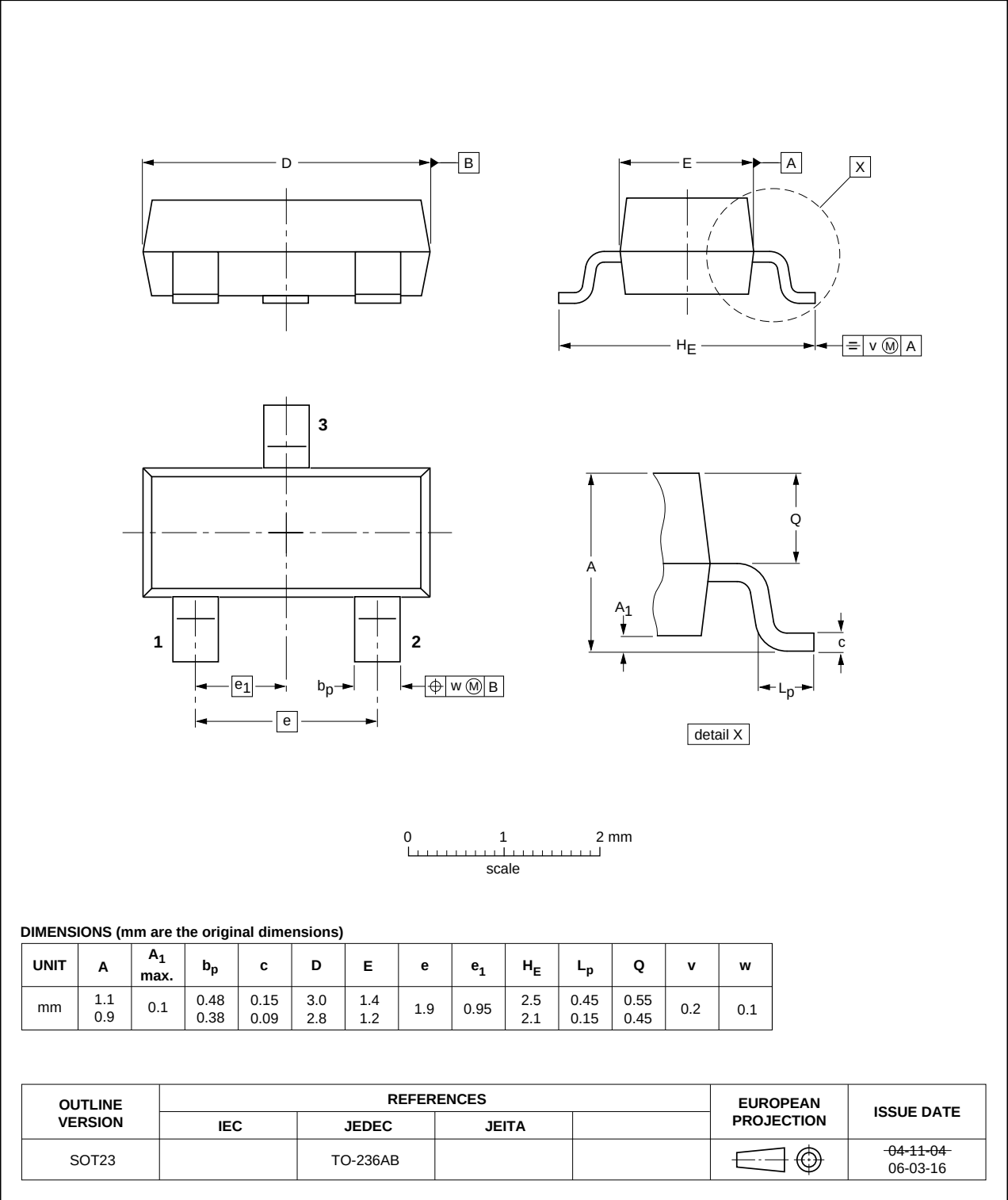


Fig 17. Package outline SOT23 (TO-236AB)

9. Soldering

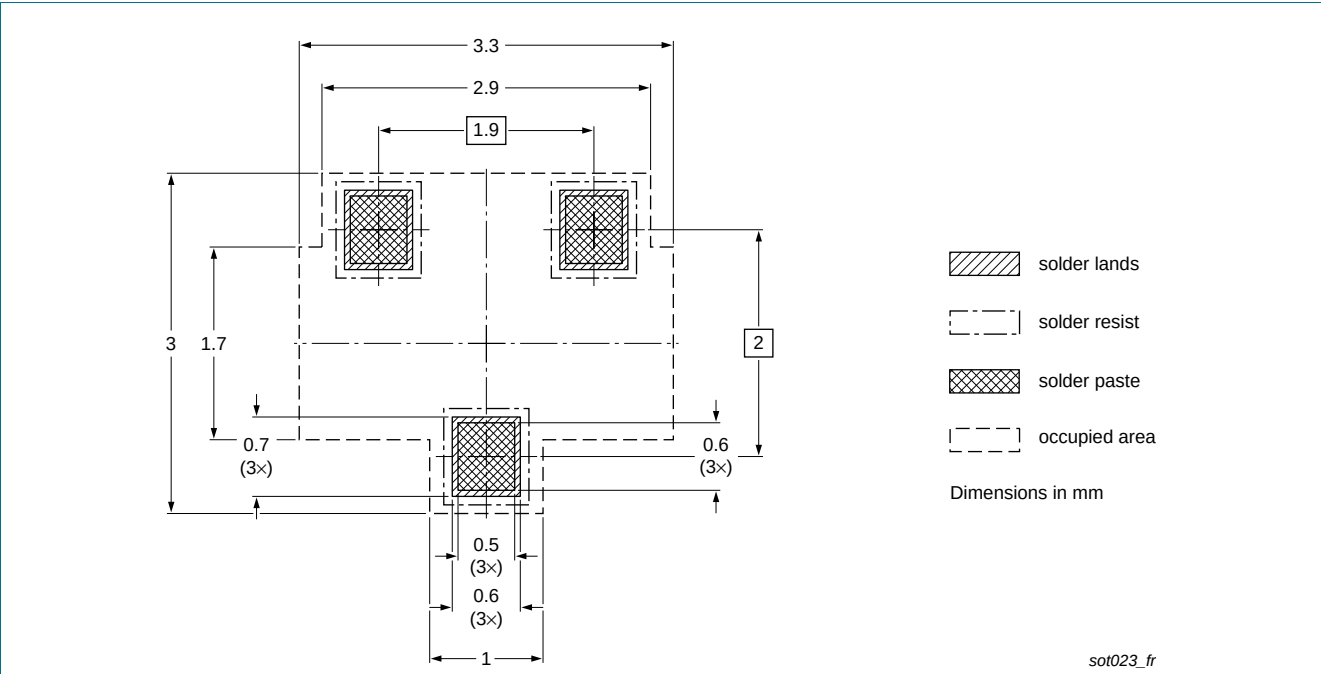


Fig 18. Reflow soldering footprint for SOT23 (TO-236AB)

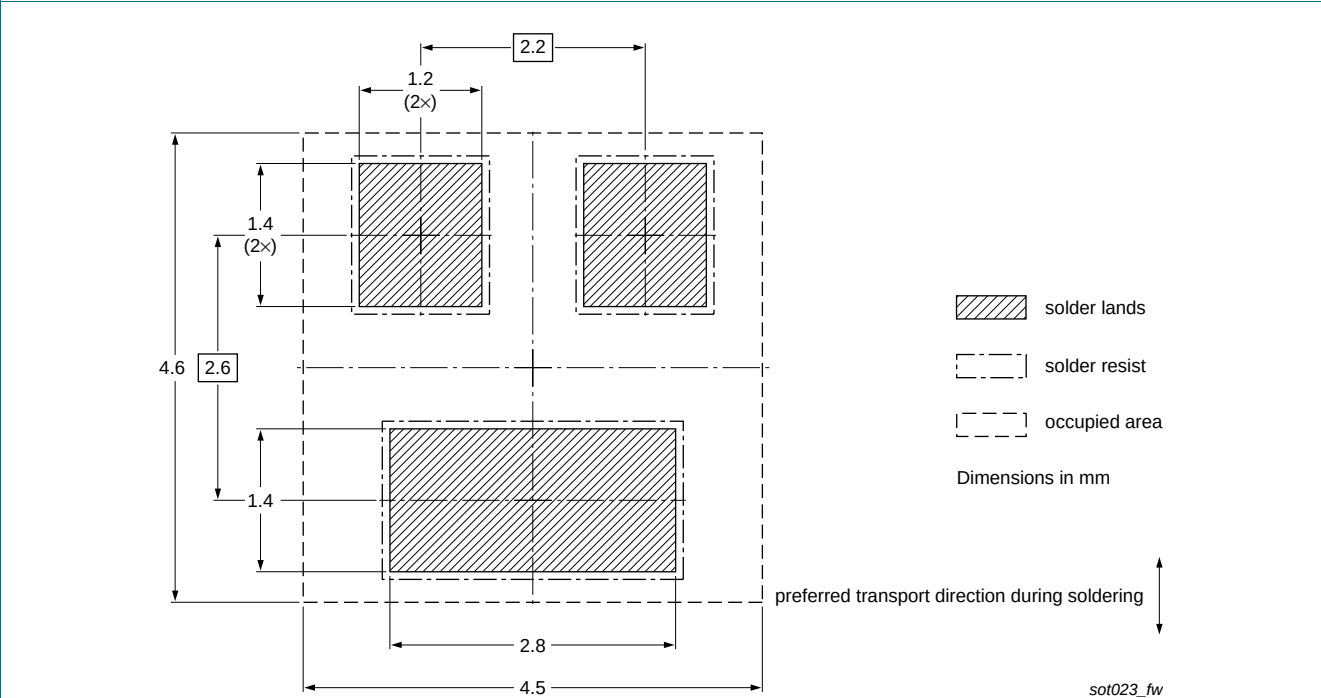


Fig 19. Wave soldering footprint for SOT23 (TO-236AB)

10. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMV32UP v.1	20110311	Product data sheet	-	-

11. Legal information

11.1 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.

[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".

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