PMV48XP

20 V, 3.5 A P-channel Trench MOSFET

Rev. 1 — 21 December 2010 | 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

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

1.3 Applications

- High-side loadswitch
- High-speed line driver
- Relay 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_{amb} = 25 °C		-	-	-20	V
V_{GS}	gate-source voltage			-12	-	12	V
I_D	drain current	V_{GS} = -4.5 V; T_{amb} = 25 °C	[1]	-	-	-3.5	A
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = -4.5 V; I_D = -2.4 A; pulsed; t_p ≤ 300 µs; δ ≤ 0.01; T_j = 25 °C		-	48	55	mΩ

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

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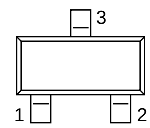
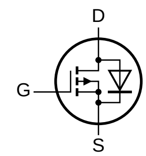
2. Pinning information

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
PMV48XP	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMV48XP	KN%

[1] % = placeholder for manufacturing site code

5. Limiting values

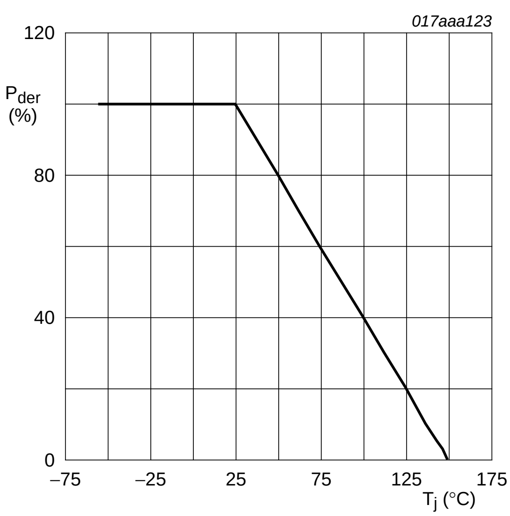
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	T_{amb} = 25 °C		-	-20	V
V_{GS}	gate-source voltage			-12	12	V
I_D	drain current	V_{GS} = -4.5 V; T_{amb} = 25 °C	[1]	-	-3.5	A
		V_{GS} = -4.5 V; T_{amb} = 100 °C	[1]	-	-2.2	A
I_{DM}	peak drain current	T_{amb} = 25 °C; single pulse; t_p ≤ 10 µs		-	-14	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			-	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

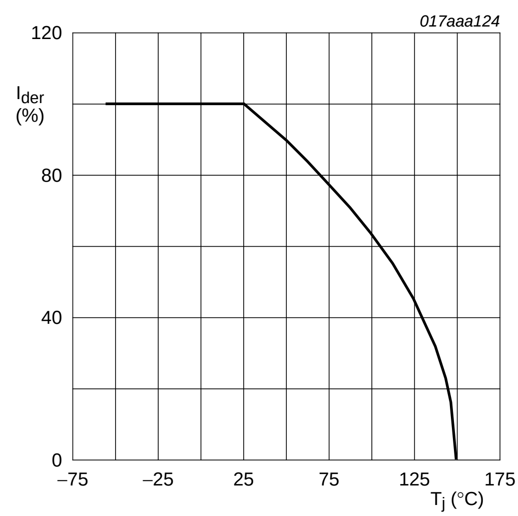
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm^2.

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



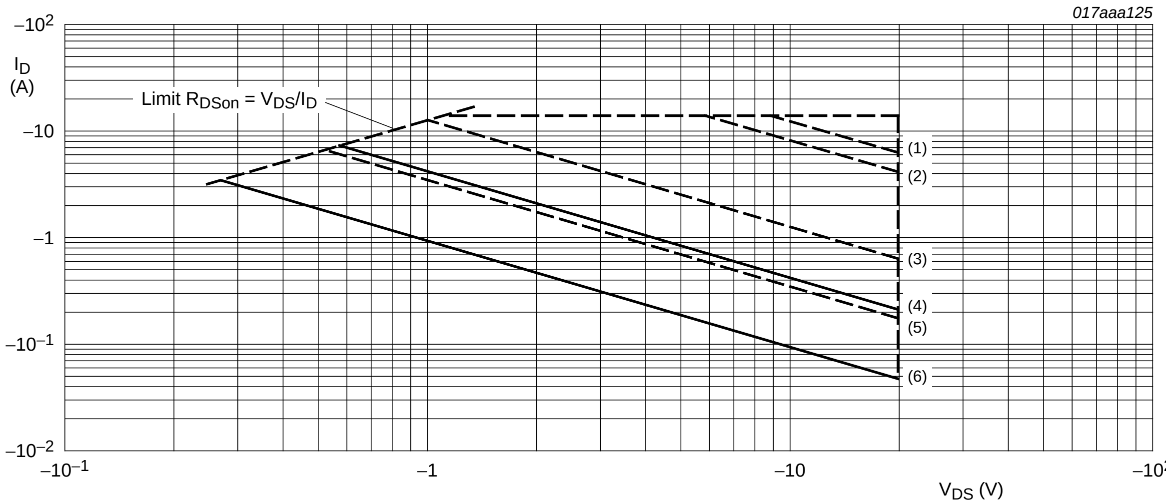
$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\ \%$$

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



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

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



I_{DM} = single pulse

(1) t_p = 100 µs

(2) t_p = 1 ms

(3) t_p = 10 ms

(4) DC; T_{sp} = 25 °C

(5) t_p = 100 ms

(6) DC; T_{amb} = 25 °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

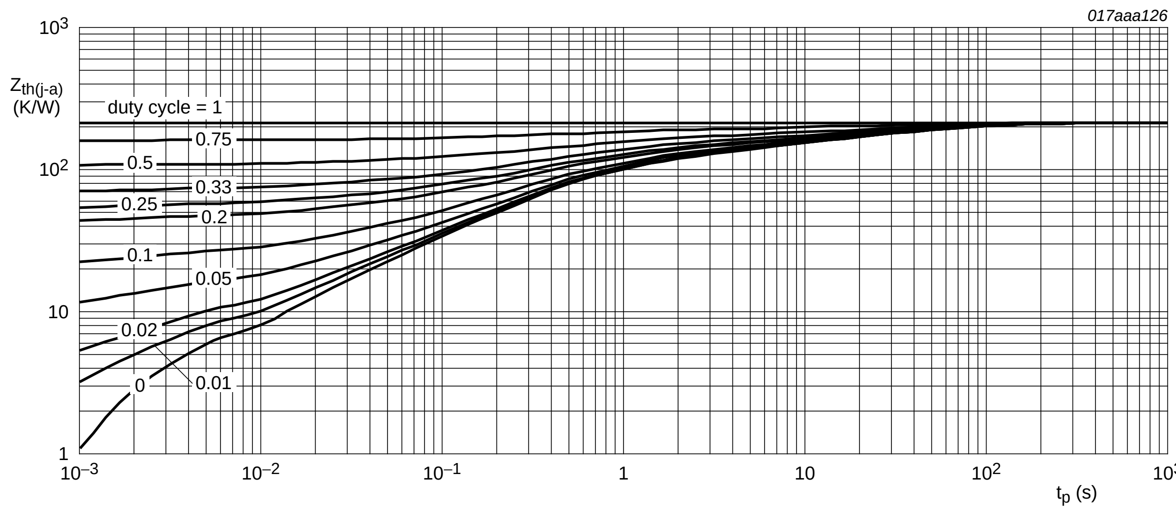
6. Thermal characteristics

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]	-	213	245	K/W
			[2]	-	117	135	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	25	30	K/W

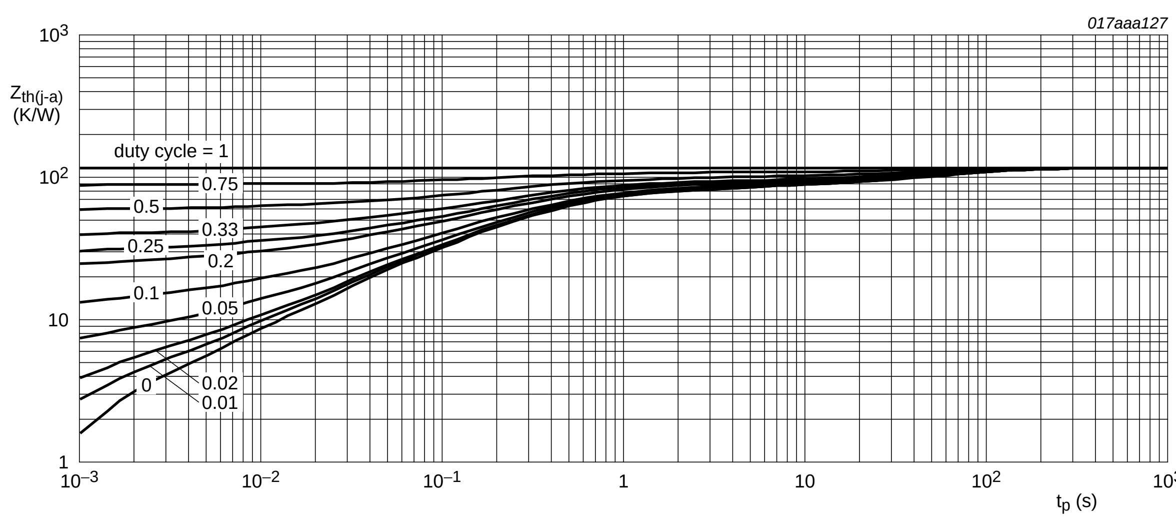
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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



FR4 PCB, standard footprint

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



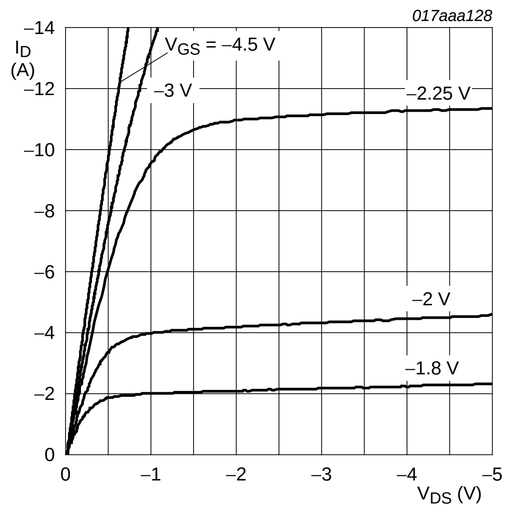
FR4 PCB, mounting pad for drain 6 cm^2

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

7. Characteristics

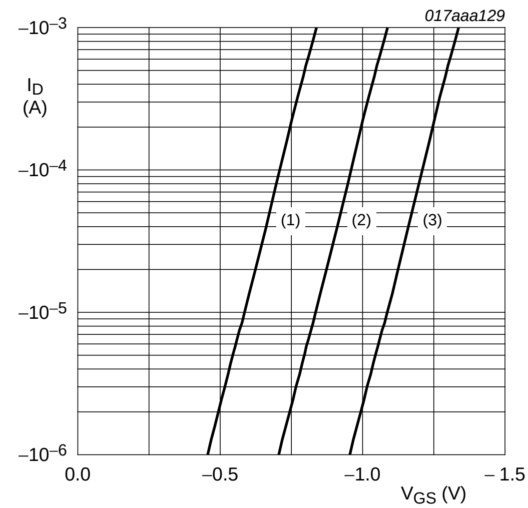
Table 7. Characteristics

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	-0.75	-1	-1.25	V
I_{DSS}	drain leakage current	V_{DS} = -20 V; V_{GS} = 0 V; T_{amb} = 25 °C	-	-	-1	µA
I_{GSS}	gate leakage current	V_{GS} = -12 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; pulsed; t_p ≤ 300 µs; δ ≤ 0.01 ; T_j = 25 °C	-	48	55	mΩ
		V_{GS} = -4.5 V; I_D = -2.4 A; pulsed; t_p ≤ 300 µs; δ ≤ 0.01 ; T_j = 150 °C	-	70	80	mΩ
		V_{GS} = -2.5 V; I_D = -2 A; pulsed; t_p ≤ 300 µs; δ ≤ 0.01 ; T_j = 25 °C	-	71	81	mΩ
g_{fs}	forward transconductance	V_{DS} = -12 V; I_D = -2 A; pulsed; t_p ≤ 300 µs; δ ≤ 0.01 ; T_j = 25 °C	-	12	-	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	-	8.5	11	nC
Q_{GS}	gate-source charge		-	1.8	-	nC
Q_{GD}	gate-drain charge		-	1.8	-	nC
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = -10 V; f = 1 MHz; T_j = 25 °C	-	1000	-	pF
C_{oss}	output capacitance		-	130	-	pF
C_{rss}	reverse transfer capacitance		-	90	-	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = -10 V; V_{GS} = -4.5 V; $R_{G(ext)}$ = 6 Ω; T_j = 25 °C; I_D = -1 A	-	11	-	ns
t_r	rise time		-	13	-	ns
$t_{d(off)}$	turn-off delay time		-	61	-	ns
t_f	fall time		-	23	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	I_S = -2.4 A; V_{GS} = 0 V; T_j = 25 °C; t_p ≤ 300 µs; δ ≤ 0.01	-	-0.82	-1.2	V



T_j = 25 °C

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



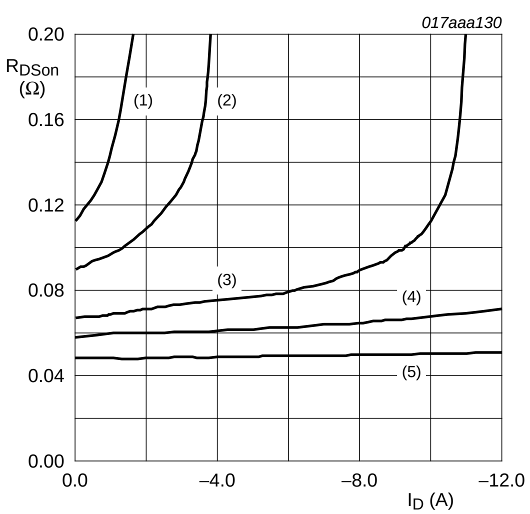
T_j = 25 °C; V_{DS} = -3 V

(1) minimum values

(2) typical values

(3) maximum values

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



T_j = 25 °C

(1) V_{GS} = -1.8 V

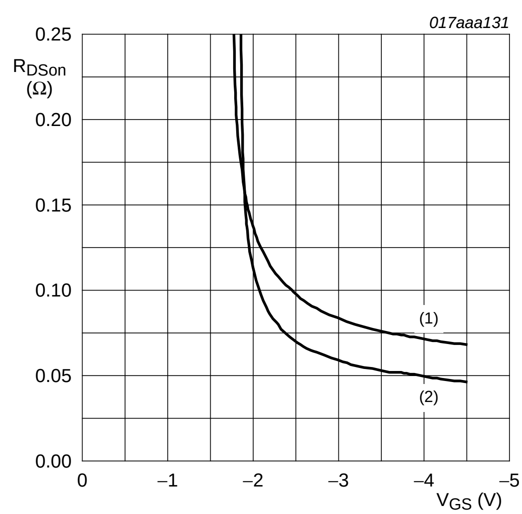
(2) V_{GS} = -2.0 V

(3) V_{GS} = -2.25 V

(4) V_{GS} = -3.0 V

(5) V_{GS} = -4.5 V

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

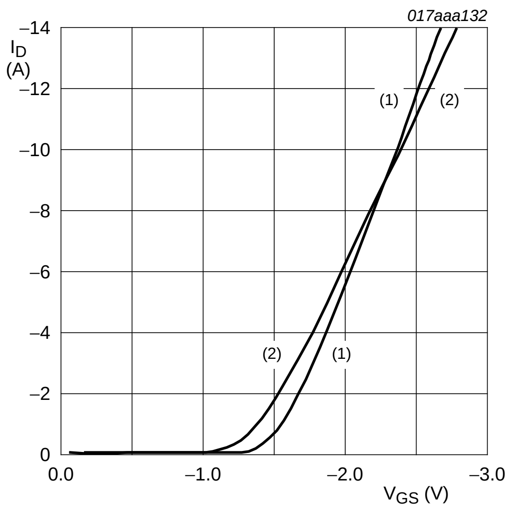


I_D = -2.4 A

(1) T_j = 125 °C

(2) T_j = 25 °C

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

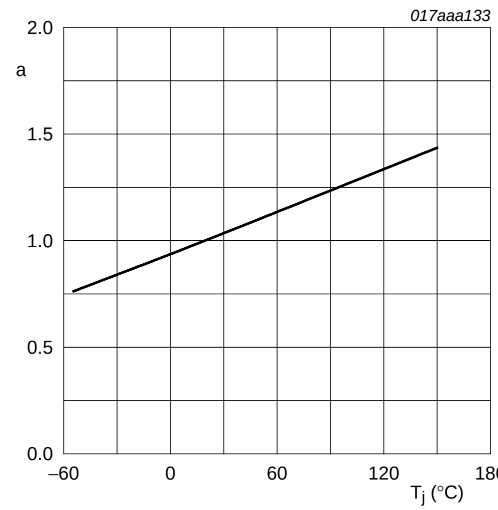


$V_{DS} > I_D \times R_{DSon}$

(1) T_j = 25 °C

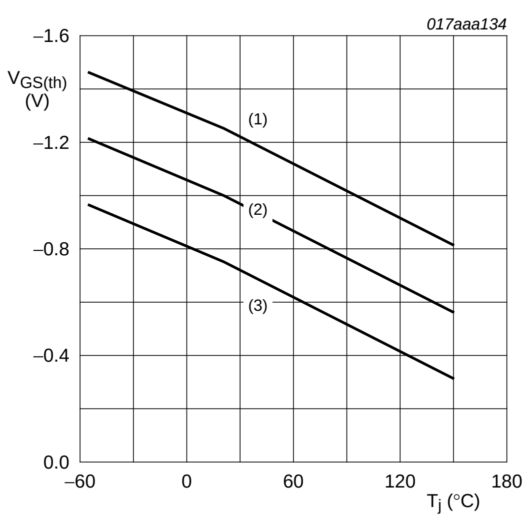
(2) T_j = 150 °C

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



$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

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



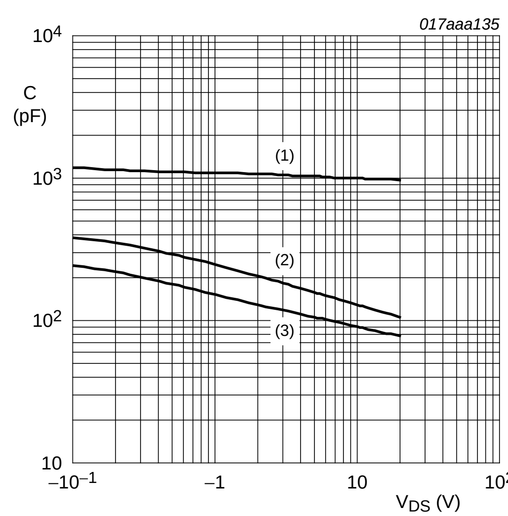
I_D = -0.25 mA; $V_{DS} = V_{GS}$

(1) maximum values

(2) typical values

(3) minimum values

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



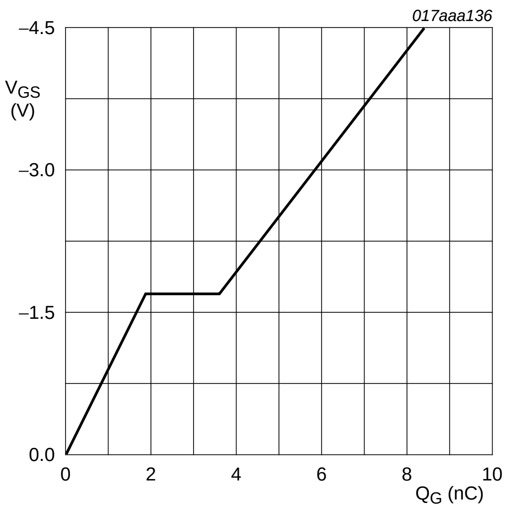
f = 1 MHz; V_{GS} = 0 V

(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 A; V_{DS} = -10 V; T_{amb} = 25 °C

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

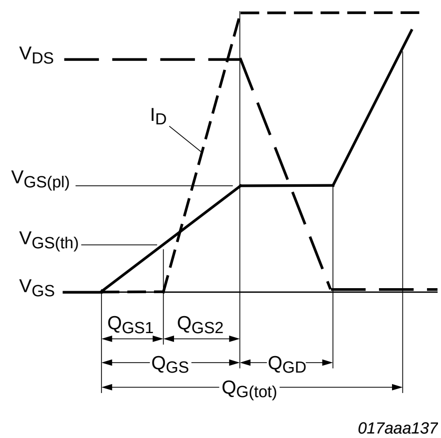
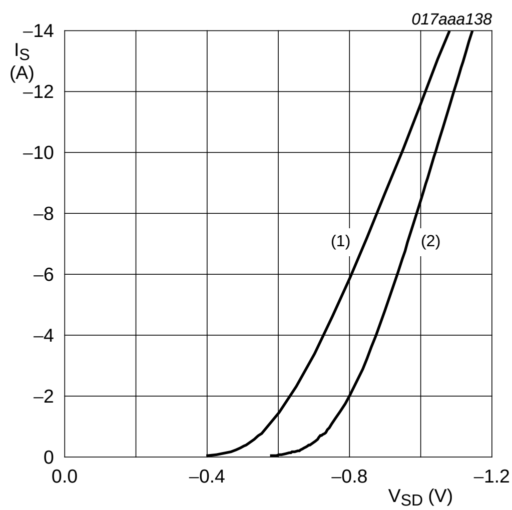


Fig 15. Gate charge waveform definitions



V_{GS} = 0 V

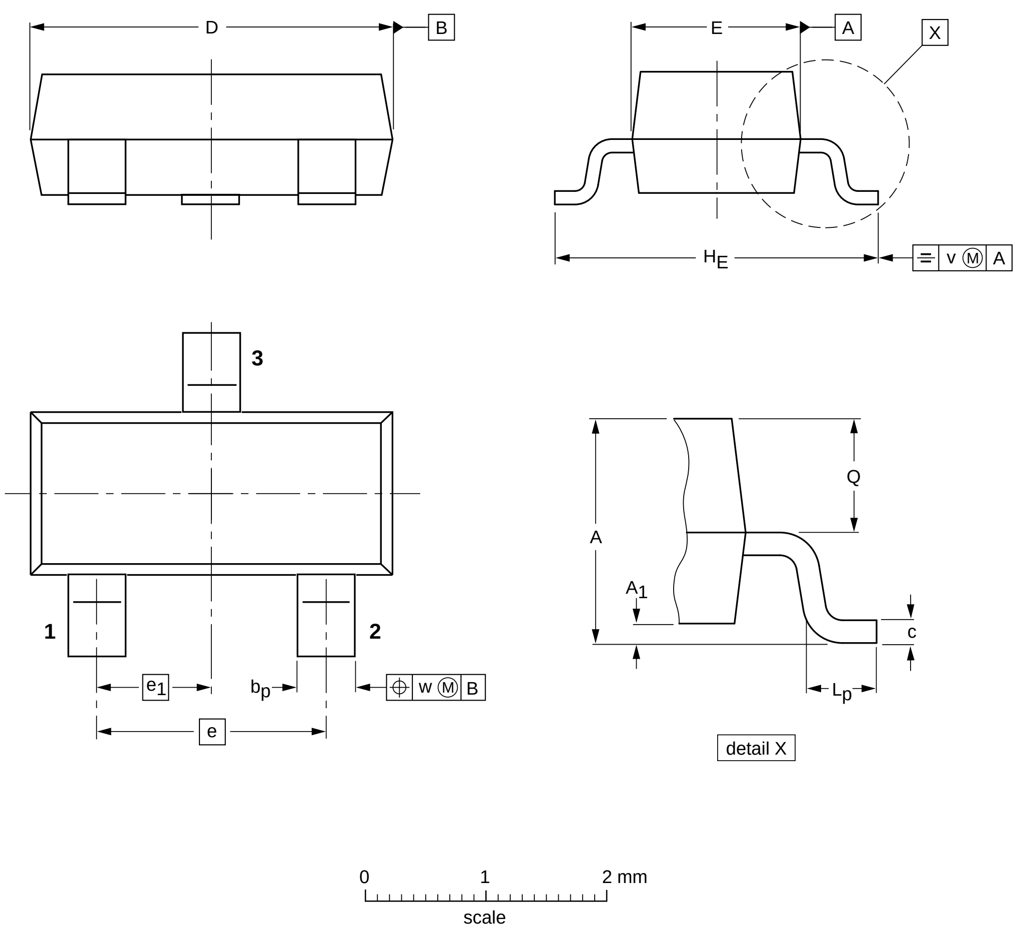
(1) T_j = 150 °C

(2) T_j = 25 °C

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

8. Package outline

Plastic surface-mounted package; 3 leads **SOT23**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT23		TO-236AB				~~04-11-04~~ 06-03-16

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

9. Soldering

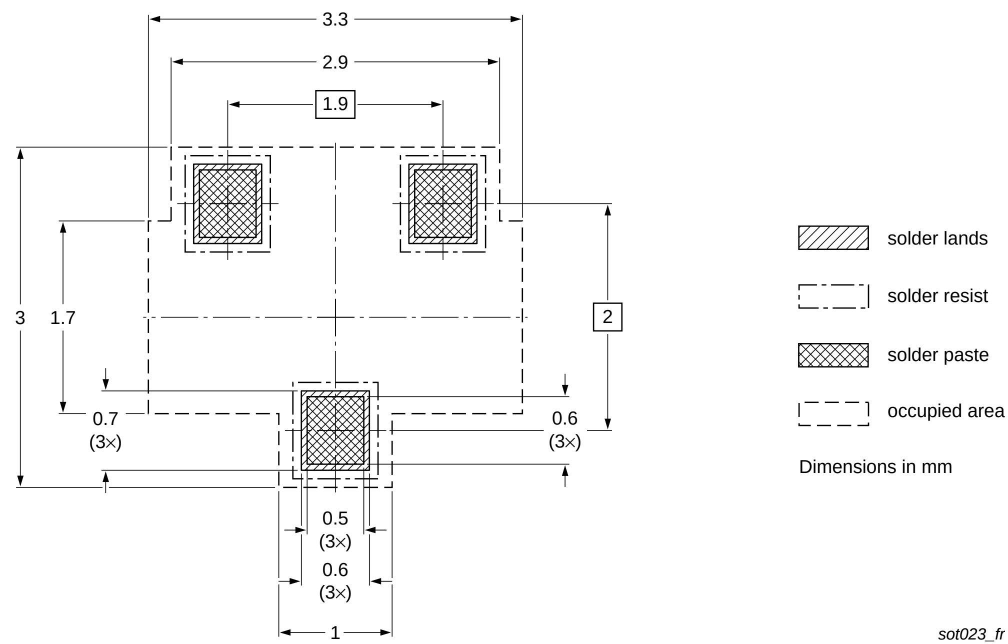


Fig 18. Reflow soldering footprint for SOT23 (TO-236AB)

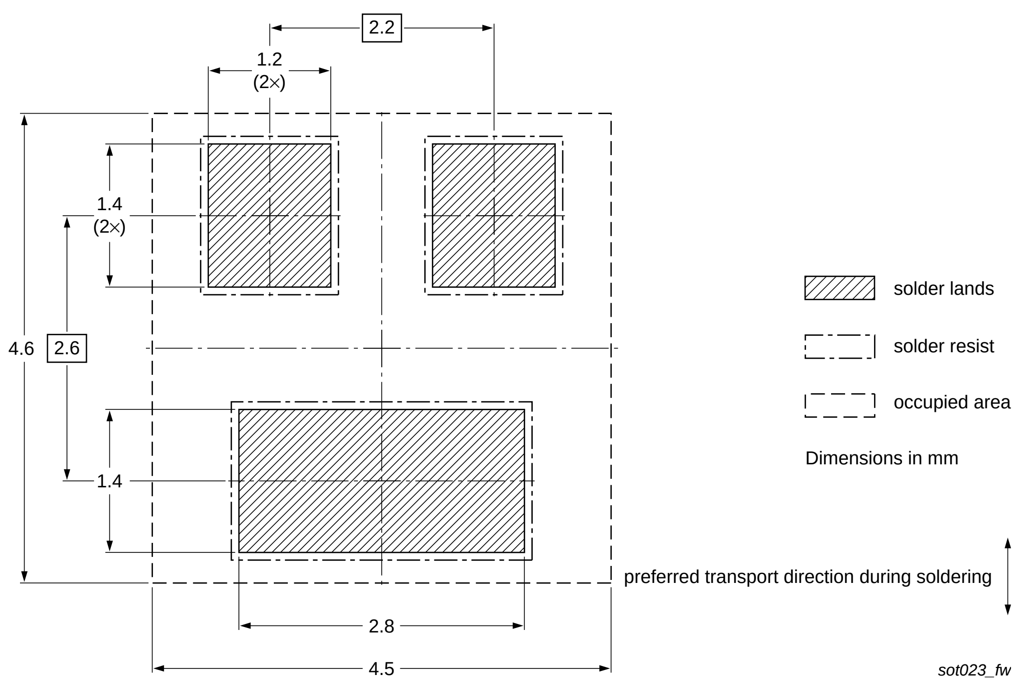


Fig 19. Wave soldering footprint for SOT23 (TO-236AB)

10. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMV48XP v.1	20101221	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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13. Contents