



PMV65XP

20 V, single P-channel Trench MOSFET

12 February 2013

Product data sheet

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.

2. Features and benefits

- Low threshold voltage
- Low on-state resistance
- Trench MOSFET technology

3. Applications

- Low power DC-to-DC converters
- Load switching
- Battery management
- Battery powered portable equipment

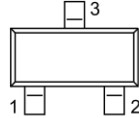
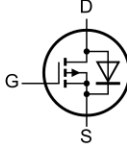
4. Quick reference data

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			-12	-	12	V
I_D	drain current	$V_{GS} = -4.5\text{ V}; T_{sp} = 25\text{ °C}$		-	-	-4.3	A
Static characteristics							
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -4.5\text{ V}; I_D = -2.8\text{ A}; T_j = 25\text{ °C}$		-	58	74	mΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 TO-236AB (SOT23)	 017aaa257
2	S	source		
3	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMV65XP	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code
PMV65XP	%M9

[1] % = placeholder for manufacturing site code

8. 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			-12	12	V
I_D	drain current	$V_{GS} = -4.5\text{ V}; T_{sp} = 25\text{ °C}$		-	-4.3	A
		$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-2.8	A
		$V_{GS} = -4.5\text{ V}; T_{amb} = 100\text{ °C}$	[1]	-	-1.8	A
I_{DM}	peak drain current	$T_{amb} = 25\text{ °C}$; single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	-16	A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$	[2]	-	480	mW
			[1]	-	833	mW
		$T_{sp} = 25\text{ °C}$		-	4165	mW

Symbol	Parameter	Conditions		Min	Max	Unit
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 _{sp} = 25 °C		-	-1.6	A

- [1] Device mounted on an FR4 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.

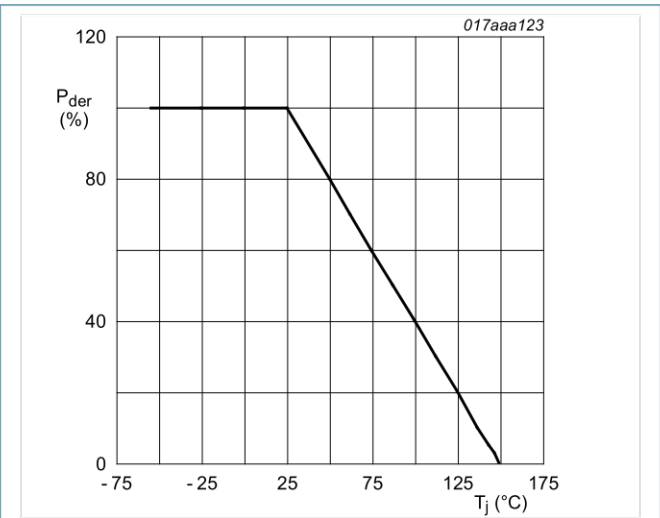


Fig. 1. Normalized total power dissipation as a function of junction temperature

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

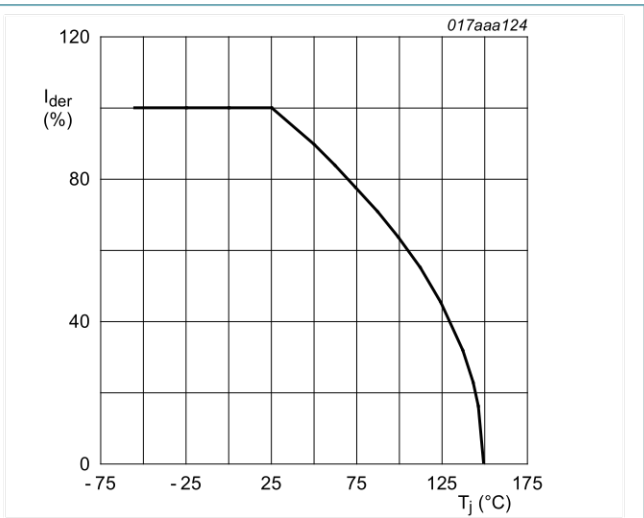
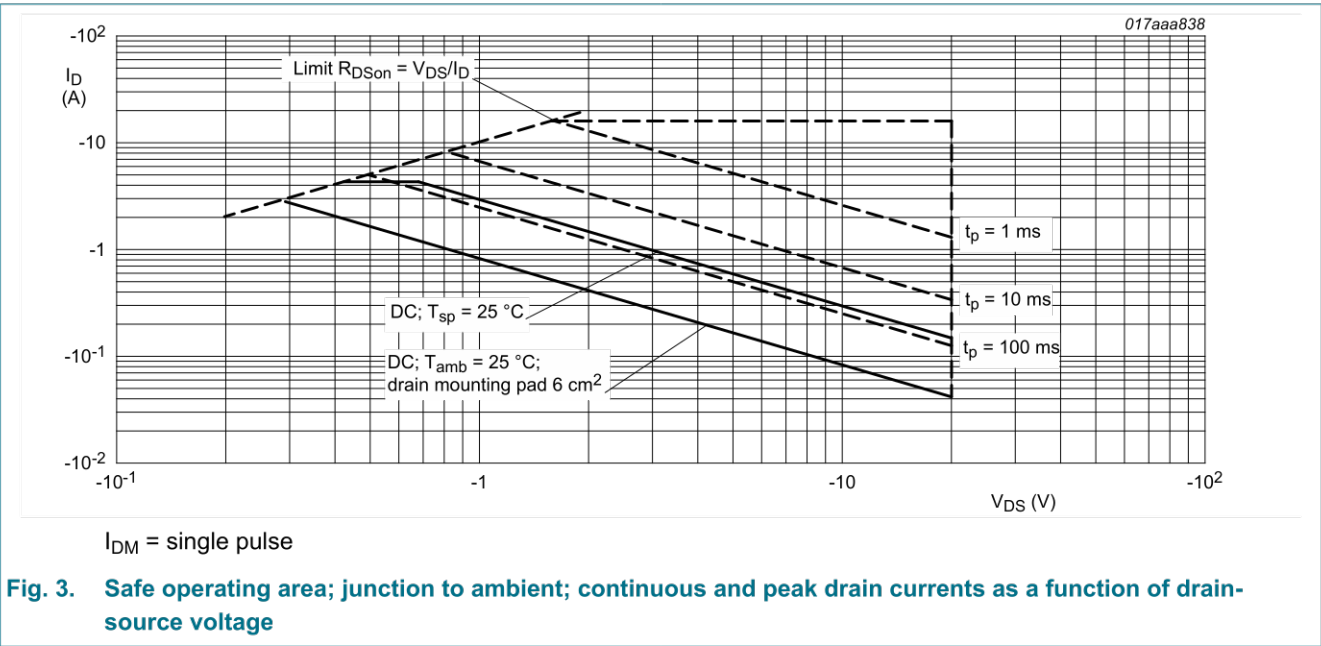


Fig. 2. Normalized continuous drain current as a function of junction temperature

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

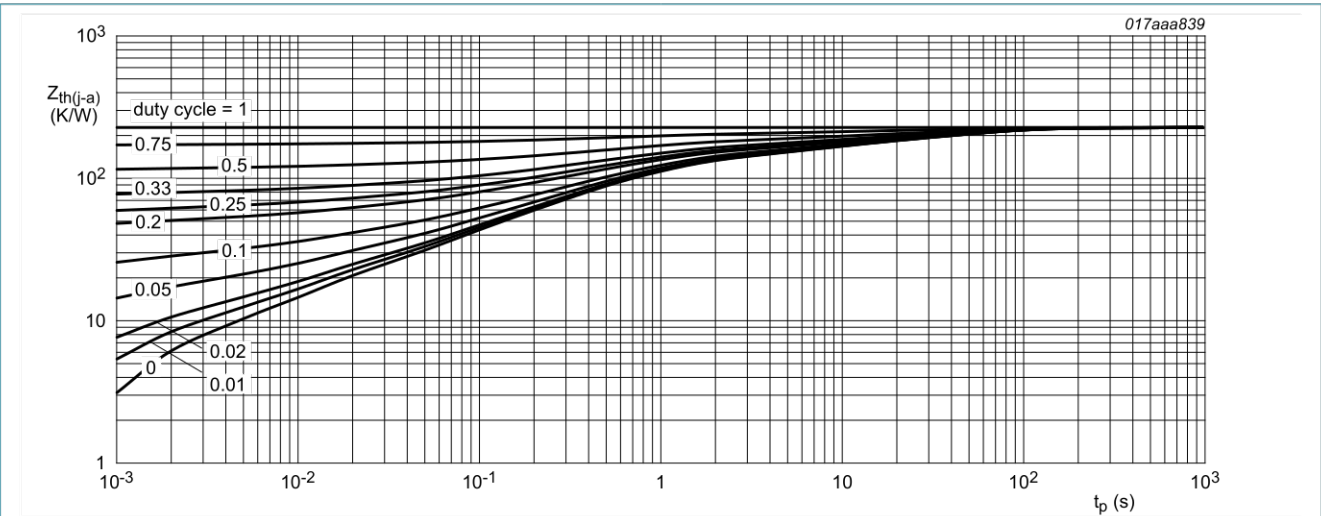


9. Thermal characteristics

Table 6. Thermal characteristics

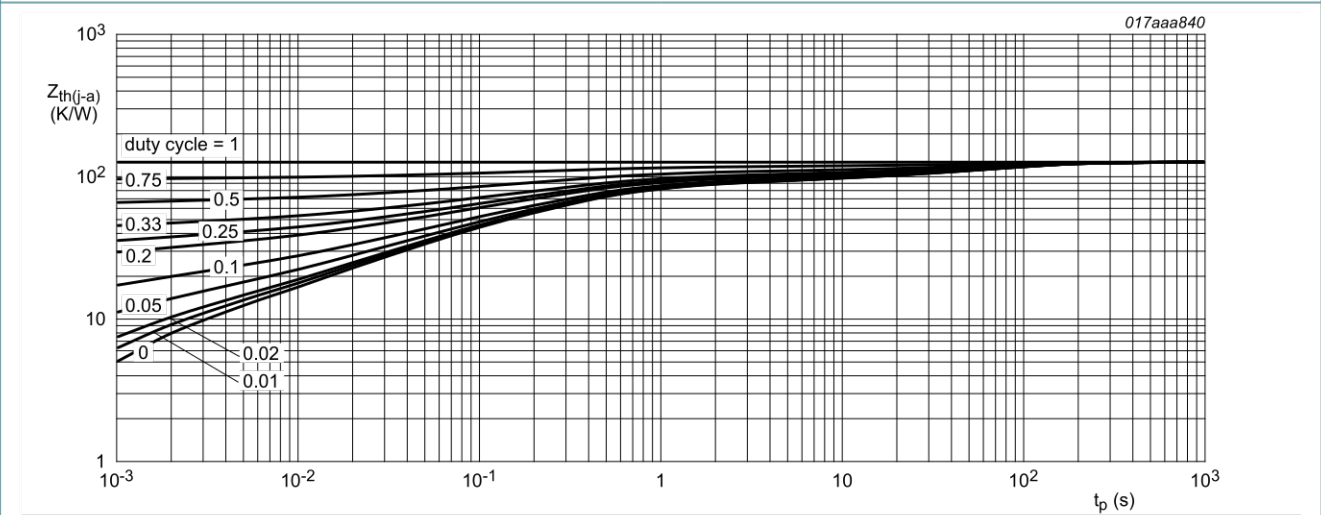
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	230	260	K/W
			[2]	-	125	150	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	25	30	K/W

[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 cm²

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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250\text{ }\mu\text{A}$; $V_{GS} = 0\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$	-20	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = -250\text{ }\mu\text{A}$; $V_{DS} = V_{GS}$; $T_j = 25\text{ }^\circ\text{C}$	-0.47	-0.65	-0.9	V
I_{DSS}	drain leakage current	$V_{DS} = -20\text{ V}$; $V_{GS} = 0\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$	-	-	-1	μA
		$V_{DS} = -20\text{ V}$; $V_{GS} = 0\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$	-	-	-100	μA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{GSS}	gate leakage current	$V_{GS} = -12\text{ V}; V_{DS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	-	-100	nA
		$V_{GS} = 12\text{ V}; V_{DS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	-	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -4.5\text{ V}; I_D = -2.8\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	58	74	m Ω
		$V_{GS} = -4.5\text{ V}; I_D = -2.8\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	82	105	m Ω
		$V_{GS} = -2.5\text{ V}; I_D = -2.3\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	67	92	m Ω
		$V_{GS} = -1.8\text{ V}; I_D = -1\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	87	135	m Ω
g_{fs}	forward transconductance	$V_{DS} = -10\text{ V}; I_D = -2.8\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	15	-	S

Dynamic characteristics

$Q_{G(tot)}$	total gate charge	$V_{DS} = -6\text{ V}; I_D = -2.8\text{ A}; V_{GS} = -4.5\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	7.7	-	nC
Q_{GS}	gate-source charge		-	1	-	nC
Q_{GD}	gate-drain charge		-	1.65	-	nC
C_{iss}	input capacitance	$V_{DS} = -20\text{ V}; f = 1\text{ MHz}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	744	-	pF
C_{oss}	output capacitance		-	65	-	pF
C_{rss}	reverse transfer capacitance		-	53	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = -6\text{ V}; V_{GS} = -4.5\text{ V}; R_{G(ext)} = 6\text{ }\Omega; T_j = 25\text{ }^{\circ}\text{C}; I_D = -1\text{ A}$	-	7	-	ns
t_r	rise time		-	18	-	ns
$t_{d(off)}$	turn-off delay time		-	135	-	ns
t_f	fall time		-	68	-	ns

Source-drain diode

V_{SD}	source-drain voltage	$I_S = -0.9\text{ A}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	-0.8	-1.2	V
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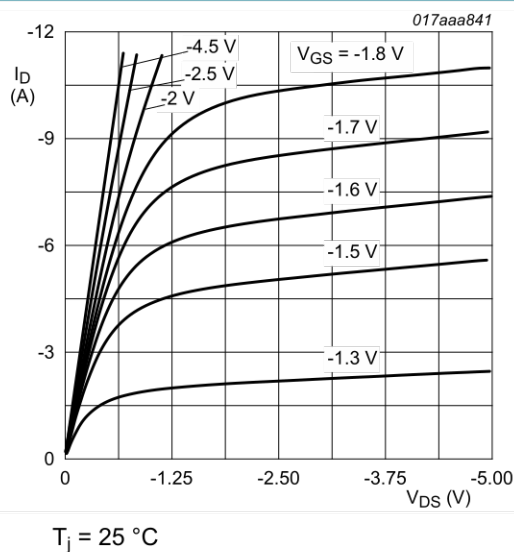


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

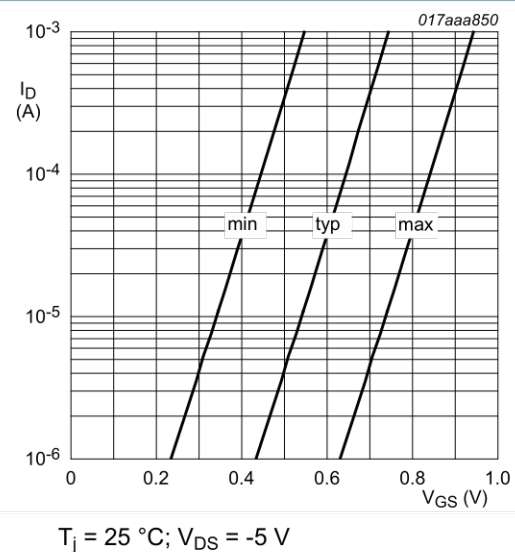


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

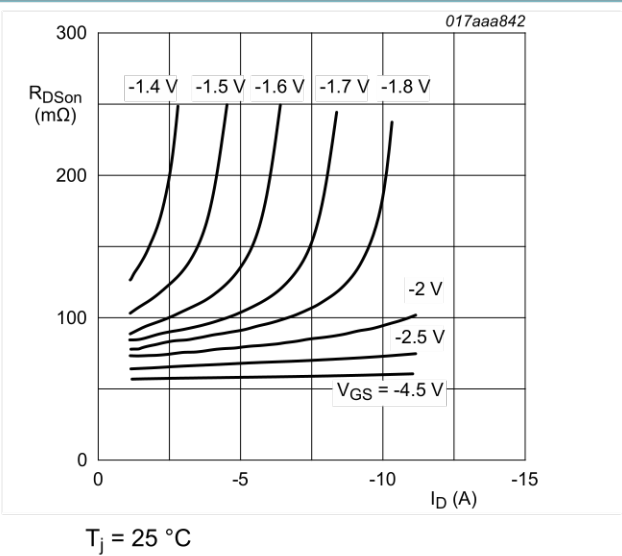


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

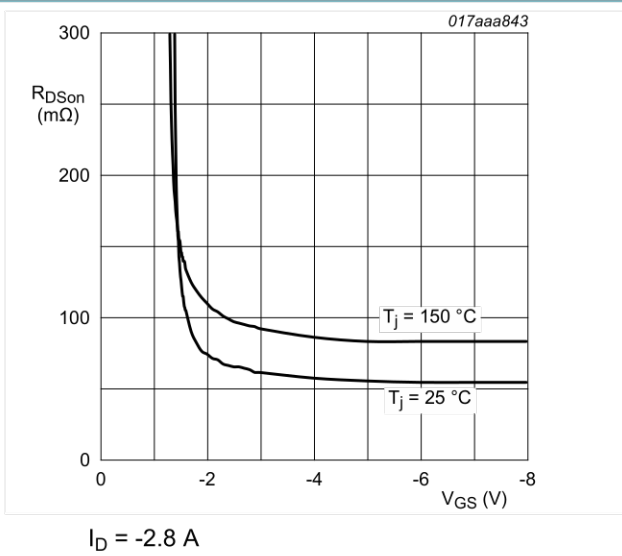


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

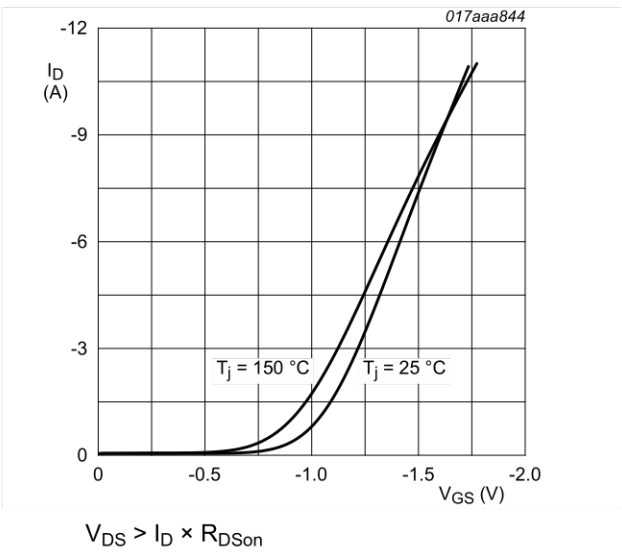


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

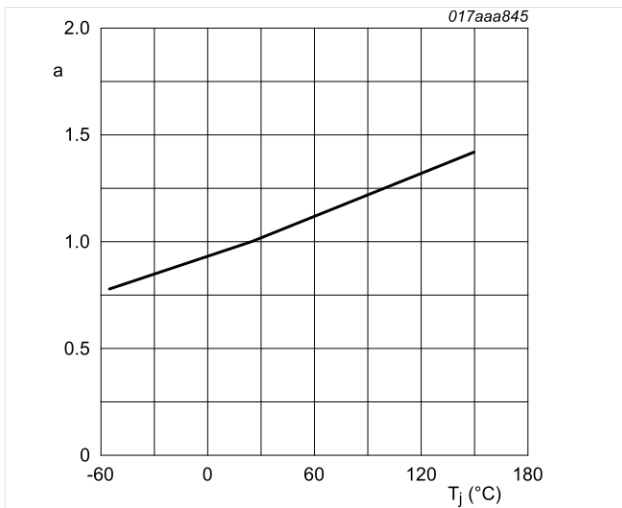
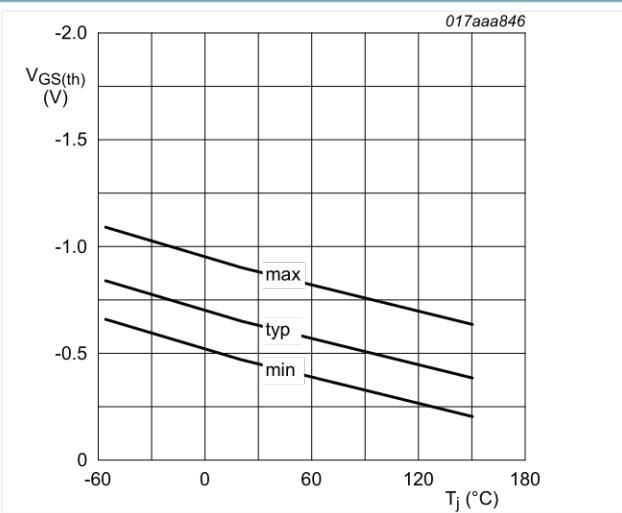


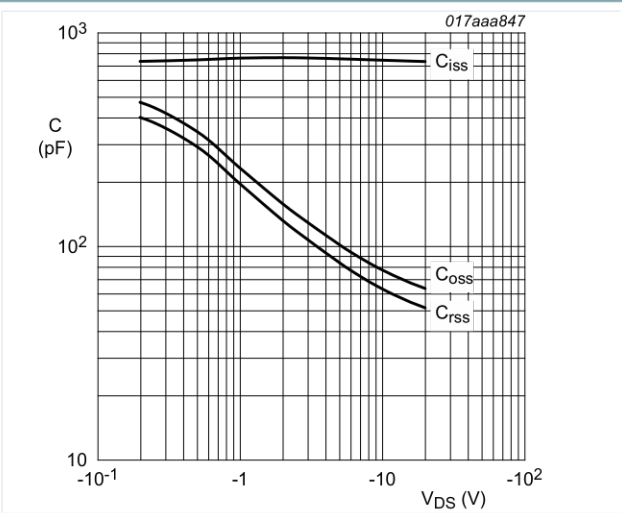
Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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



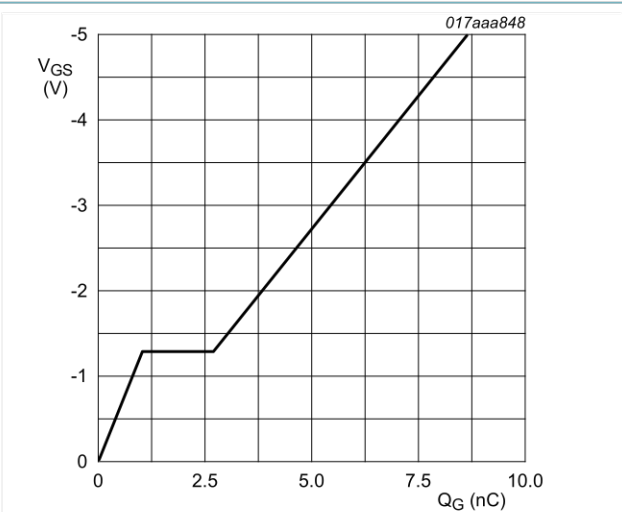
$I_D = -0.25$ mA; $V_{DS} = V_{GS}$

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



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

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



$I_D = -2.8$ A; $V_{DS} = -6$ V; $T_{amb} = 25$ °C

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

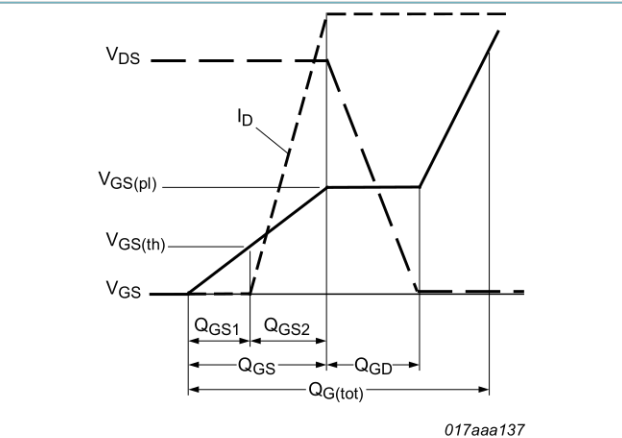
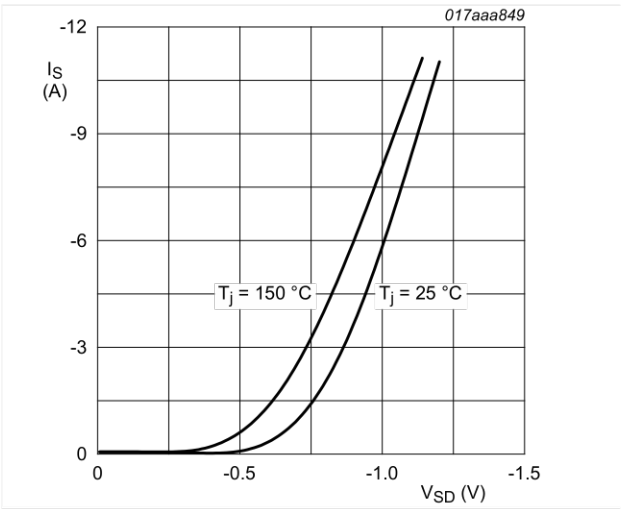


Fig. 15. Gate charge waveform definitions



$V_{GS} = 0\text{ V}$
(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

11. Test information

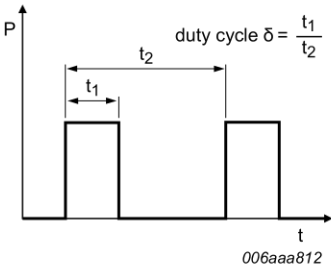


Fig. 17. Duty cycle definition

12. Package outline

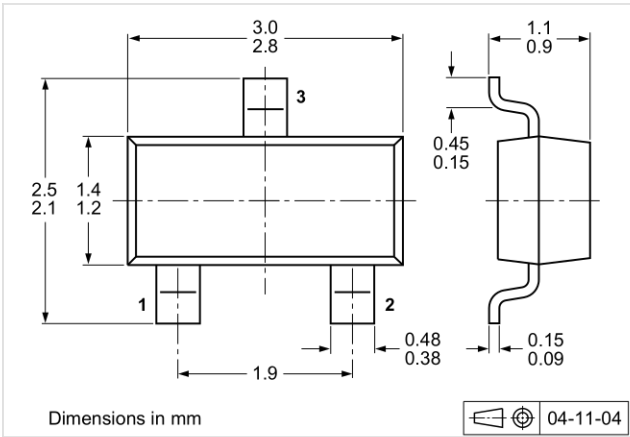


Fig. 18. Package outline TO-236AB (SOT23)

13. Soldering

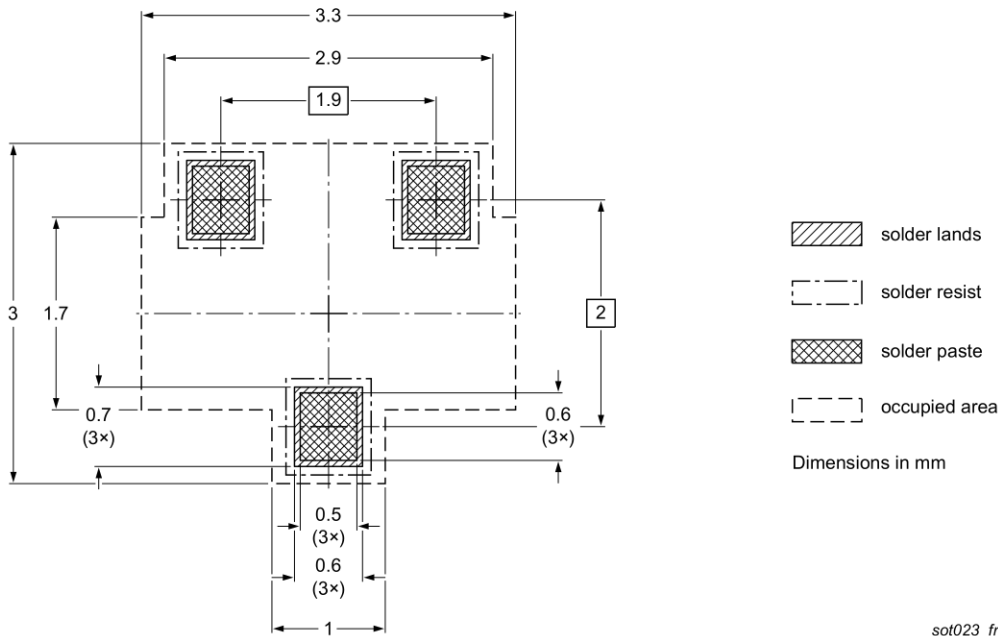
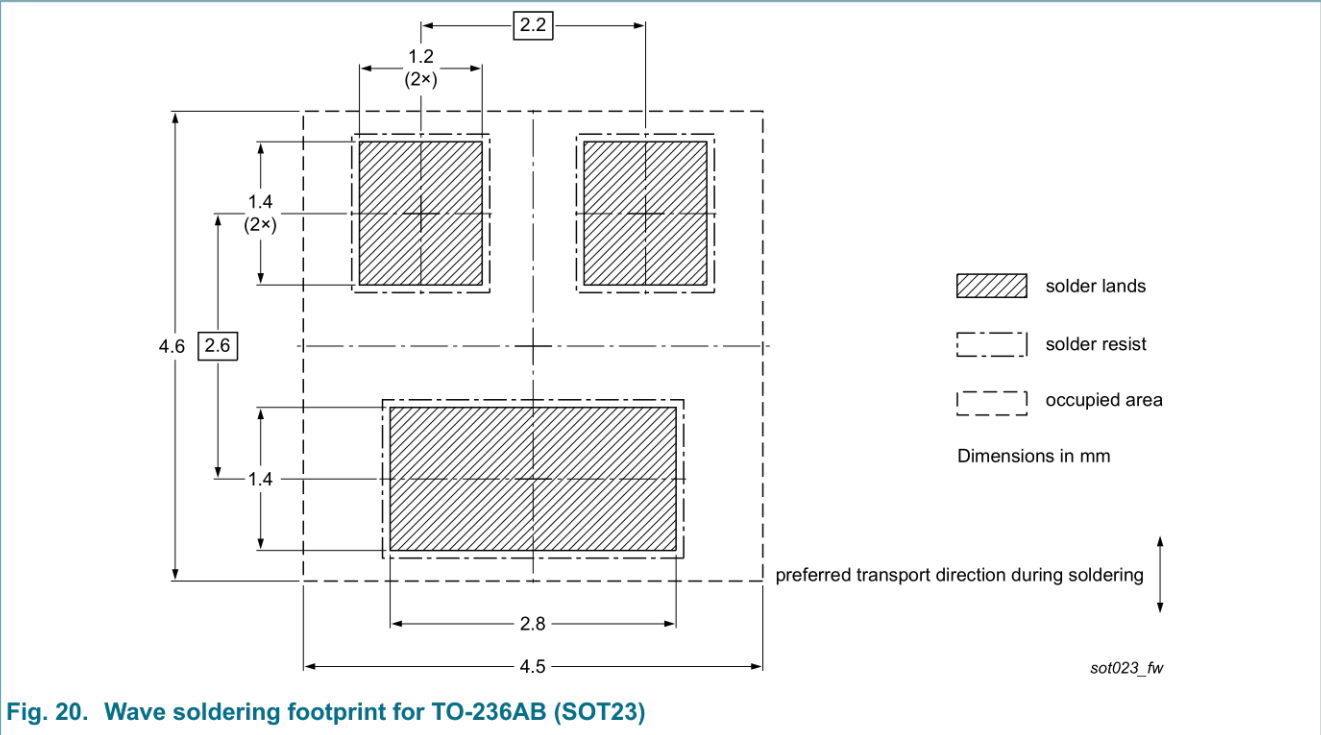


Fig. 19. Reflow soldering footprint for TO-236AB (SOT23)



14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMV65XP v.2	20130212	Product data sheet	-	PMV65XP v.1
Modifications:	• Pinning information corrected			
PMV65XP v.1	20120921	Product data sheet	-	-

15. Legal information

15.1 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.
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