



# PMV75UP

20 V, P-channel Trench MOSFET

25 April 2014

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

- Trench MOSFET technology
- Low threshold voltage
- Very fast switching
- Enhanced power dissipation capability:  $P_{\text{tot}} = 1000 \text{ mW}$

## 3. Applications

- LED driver
- Power management
- High-side loadswitch
- Switching circuits

## 4. Quick reference data

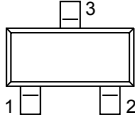
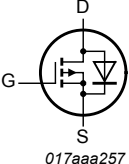
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{\text{DS}}$	drain-source voltage	$T_{\text{J}} = 25 \text{ }^{\circ}\text{C}$		-	-	-20	V
$V_{\text{GS}}$	gate-source voltage			-12	-	12	V
$I_{\text{D}}$	drain current	$V_{\text{GS}} = -4.5 \text{ V}$ ; $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$ ; $t \leq 5 \text{ s}$	[1]	-	-	-3.2	A
<b>Static characteristics</b>							
$R_{\text{DS(on)}}$	drain-source on-state resistance	$V_{\text{GS}} = -4.5 \text{ V}$ ; $I_{\text{D}} = -2.5 \text{ A}$ ; $T_{\text{J}} = 25 \text{ }^{\circ}\text{C}$		-	77	102	m $\Omega$

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

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
PMV75UP	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code
PMV75UP	%CN

[1] % = placeholder for manufacturing site code

## 8. Limiting values

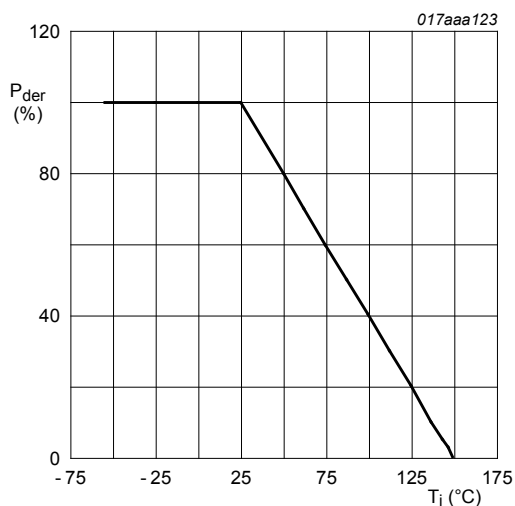
**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
V <sub>DS</sub>	drain-source voltage	T <sub>j</sub> = 25 °C		-	-20	V
V <sub>GS</sub>	gate-source voltage			-12	12	V
I <sub>D</sub>	drain current	V <sub>GS</sub> = -4.5 V; T <sub>amb</sub> = 25 °C; t ≤ 5 s	[1]	-	-3.2	A
		V <sub>GS</sub> = -4.5 V; T <sub>amb</sub> = 25 °C	[1]	-	-2.5	A
		V <sub>GS</sub> = -4.5 V; T <sub>amb</sub> = 100 °C	[1]	-	-1.6	A
I <sub>DM</sub>	peak drain current	T <sub>amb</sub> = 25 °C; single pulse; t <sub>p</sub> ≤ 10 μs		-	-10	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = 25 °C	[2]	-	490	mW
			[1]	-	1000	mW
		T <sub>sp</sub> = 25 °C		-	5000	mW
T <sub>j</sub>	junction temperature			-55	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C
<b>Source-drain diode</b>						
I <sub>S</sub>	source current	T <sub>amb</sub> = 25 °C	[1]	-	-0.9	A

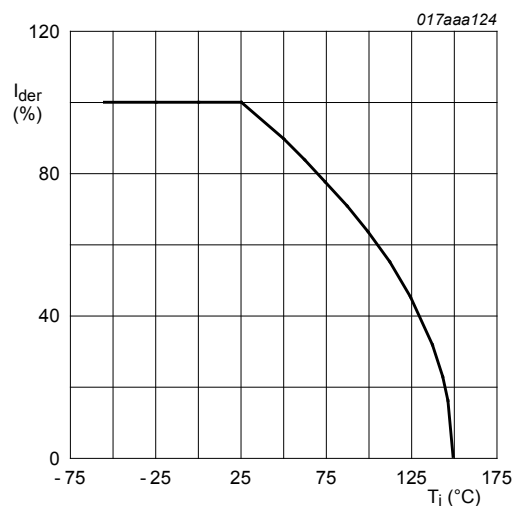
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm<sup>2</sup>.

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



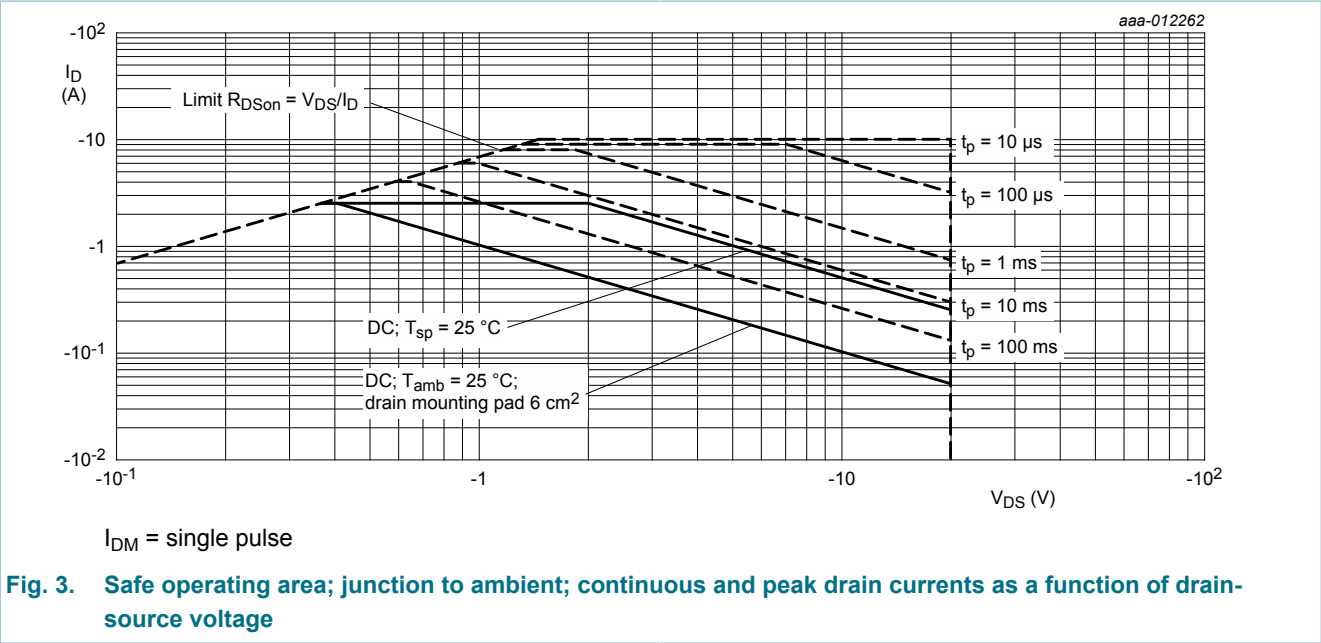
**Fig. 1. Normalized total power dissipation as a function of junction temperature**

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



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

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

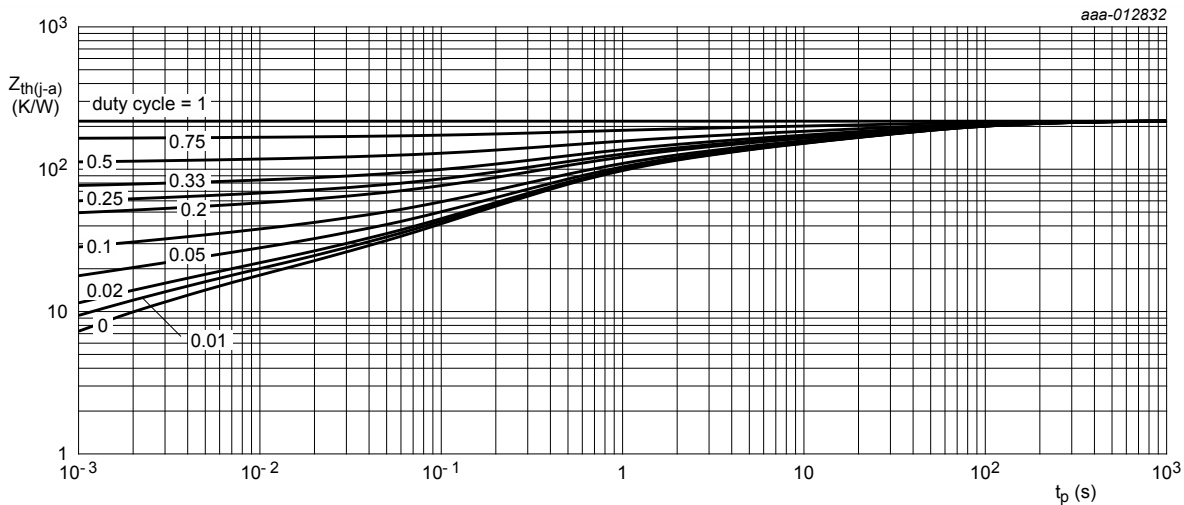


9. Thermal characteristics

Table 6. Thermal characteristics

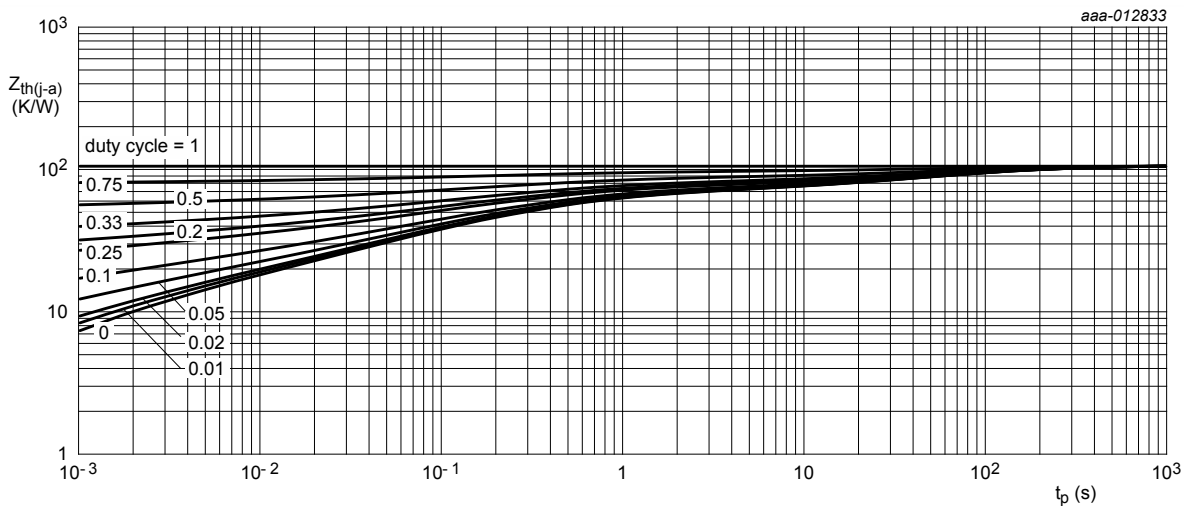
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	217	255	K/W
			[2]	-	105	124	K/W
		in free air; $t \leq 5\text{ s}$	[2]	-	73	86	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	20	25	K/W

[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  $6\text{ cm}^2$ .



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<sup>2</sup>

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 <sub>(BR)DSS</sub>	drain-source breakdown voltage	I <sub>D</sub> = -250 μA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C		-20	-	-	V
V <sub>GSth</sub>	gate-source threshold voltage	I <sub>D</sub> = -250 μA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = 25 °C		-0.47	-0.68	-0.9	V
I <sub>DSS</sub>	drain leakage current	V <sub>DS</sub> = -20 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	-	-1	μA
I <sub>GSS</sub>	gate leakage current	V <sub>GS</sub> = 12 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	-	100	nA
		V <sub>GS</sub> = -12 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	-	-100	nA
R <sub>DSon</sub>	drain-source on-state resistance	V <sub>GS</sub> = -4.5 V; I <sub>D</sub> = -2.5 A; T <sub>j</sub> = 25 °C		-	77	102	mΩ
		V <sub>GS</sub> = -4.5 V; I <sub>D</sub> = -2.4 A; T <sub>j</sub> = 150 °C		-	110	146	mΩ
		V <sub>GS</sub> = -2.5 V; I <sub>D</sub> = -2.2 A; T <sub>j</sub> = 25 °C		-	95	125	mΩ
		V <sub>GS</sub> = -1.8 V; I <sub>D</sub> = -1 A; T <sub>j</sub> = 25 °C		-	120	156	mΩ
g <sub>fs</sub>	forward transconductance	V <sub>DS</sub> = -10 V; I <sub>D</sub> = -2 A; T <sub>j</sub> = 25 °C		-	15	-	S
R <sub>G</sub>	internal gate resistance (AC)	f = 1 MHz		-	41	-	Ω
Dynamic characteristics							
Q <sub>G(tot)</sub>	total gate charge	V <sub>DS</sub> = -10 V; I <sub>D</sub> = -2.5 A; V <sub>GS</sub> = -4.5 V; T <sub>j</sub> = 25 °C		-	5	7.5	nC
Q <sub>GS</sub>	gate-source charge			-	0.7	-	nC
Q <sub>GD</sub>	gate-drain charge			-	0.9	-	nC
C <sub>iss</sub>	input capacitance	V <sub>DS</sub> = -10 V; f = 1 MHz; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	550	-	pF
C <sub>oss</sub>	output capacitance			-	63	-	pF
C <sub>rss</sub>	reverse transfer capacitance			-	53	-	pF
t <sub>d(on)</sub>	turn-on delay time	V <sub>DS</sub> = -10 V; I <sub>D</sub> = -2.5 A; V <sub>GS</sub> = -4.5 V; R <sub>G(ext)</sub> = 6 Ω; T <sub>j</sub> = 25 °C		-	6	-	ns
t <sub>r</sub>	rise time			-	14	-	ns
t <sub>d(off)</sub>	turn-off delay time			-	120	-	ns
t <sub>f</sub>	fall time			-	50	-	ns
Source-drain diode							
V <sub>SD</sub>	source-drain voltage	I <sub>S</sub> = -0.9 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	-0.8	-1.2	V

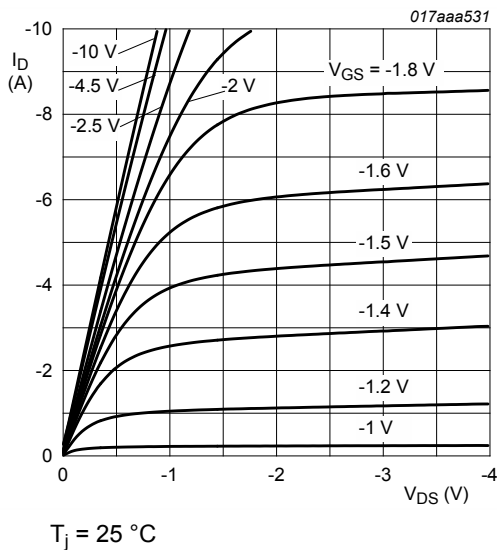


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

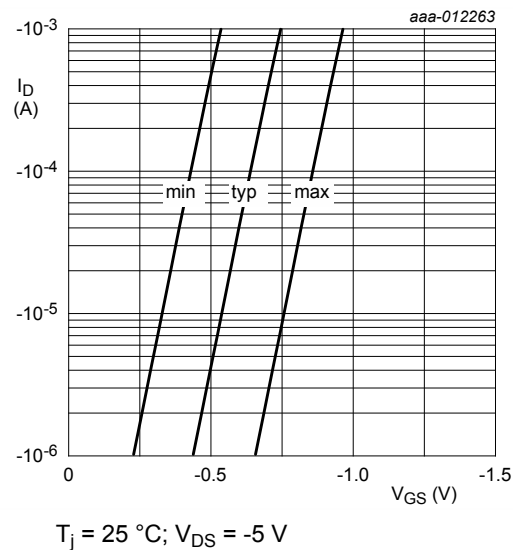


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

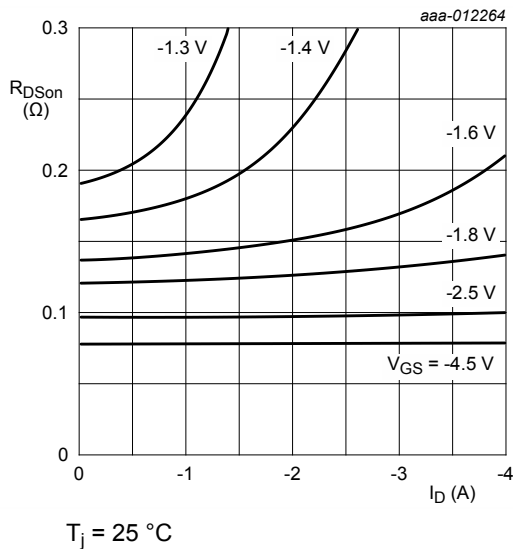


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

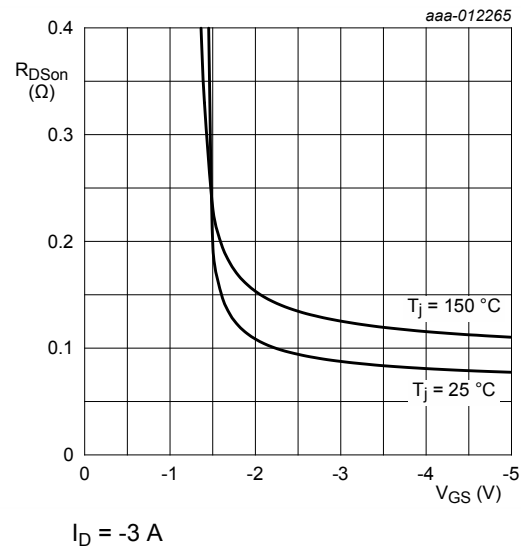


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

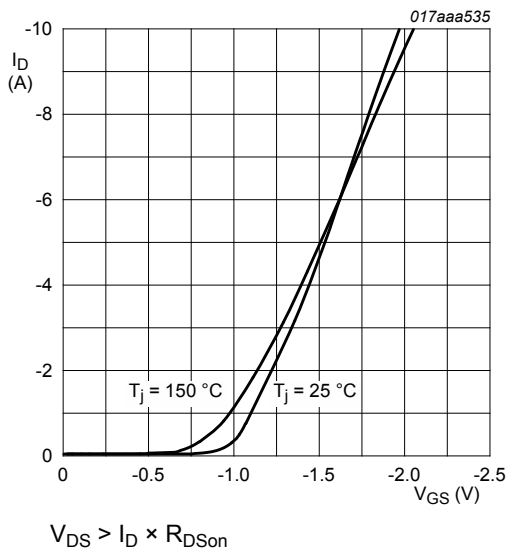


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

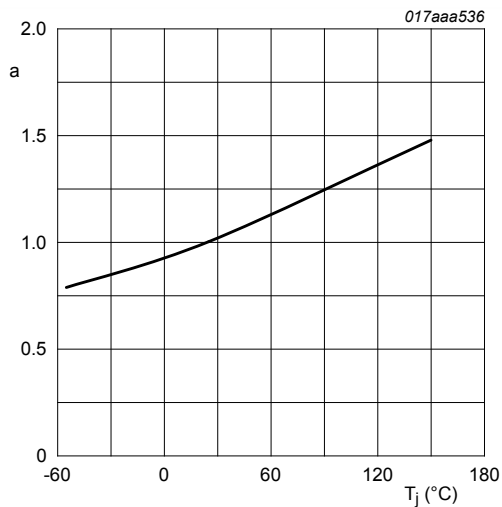


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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

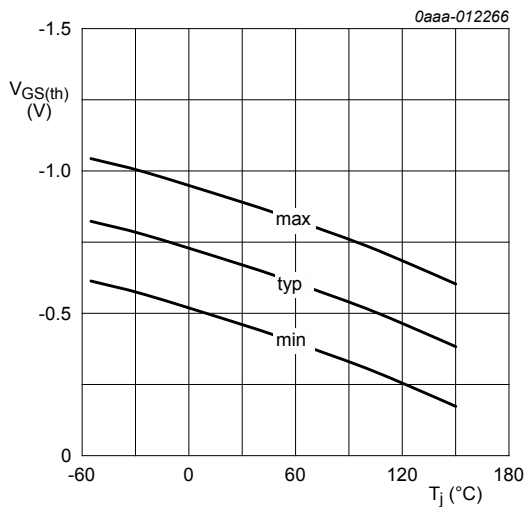


Fig. 12. Gate-source threshold voltage as a function of junction temperature

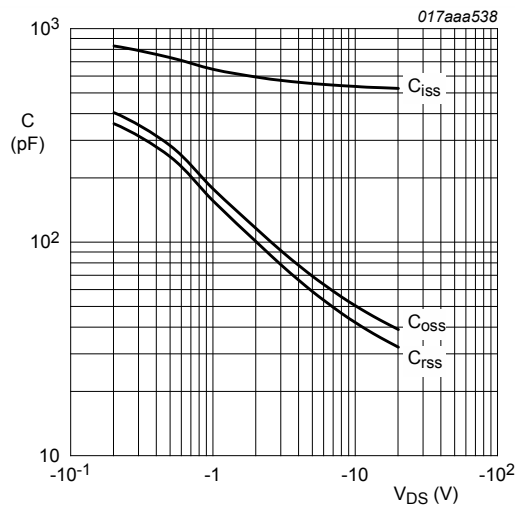


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

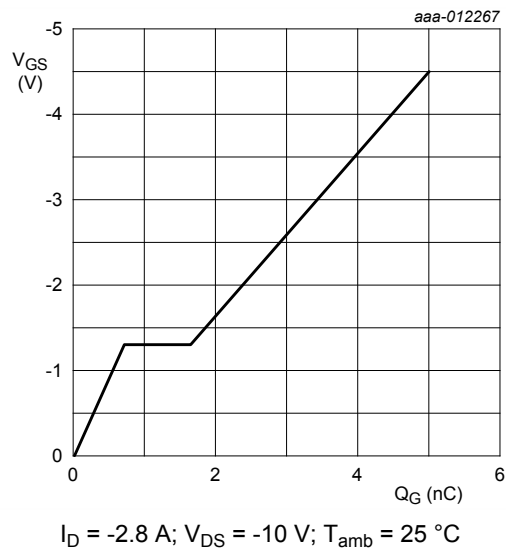


Fig. 14. Gate-source voltage as a function of gate charge; typical values

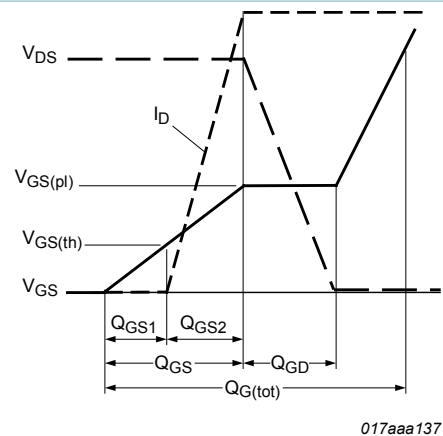


Fig. 15. Gate charge waveform definitions

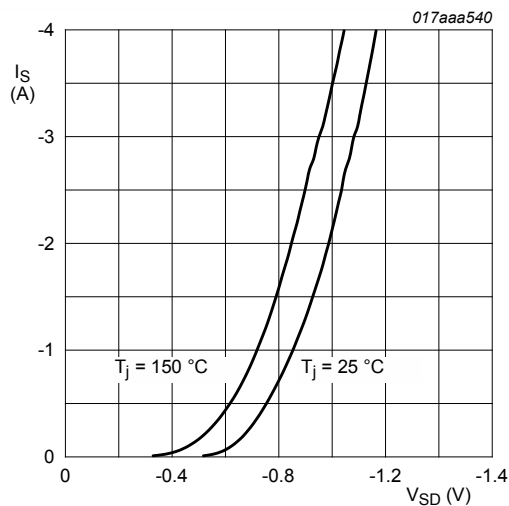
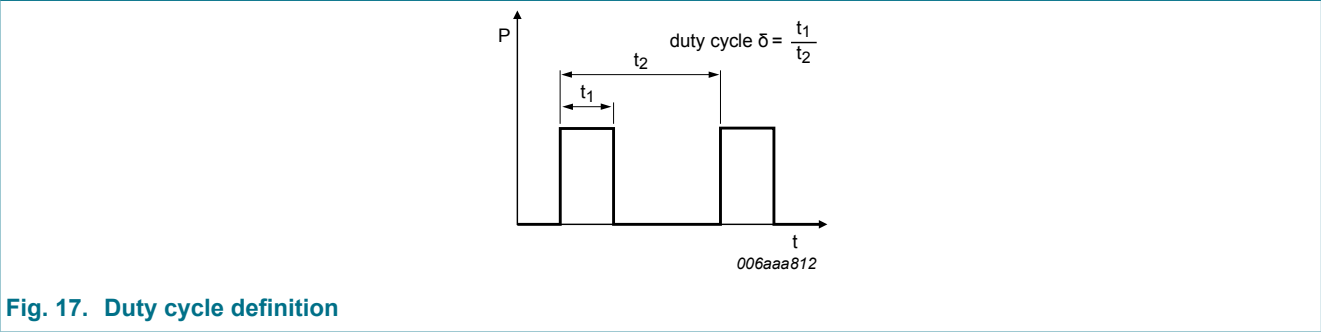
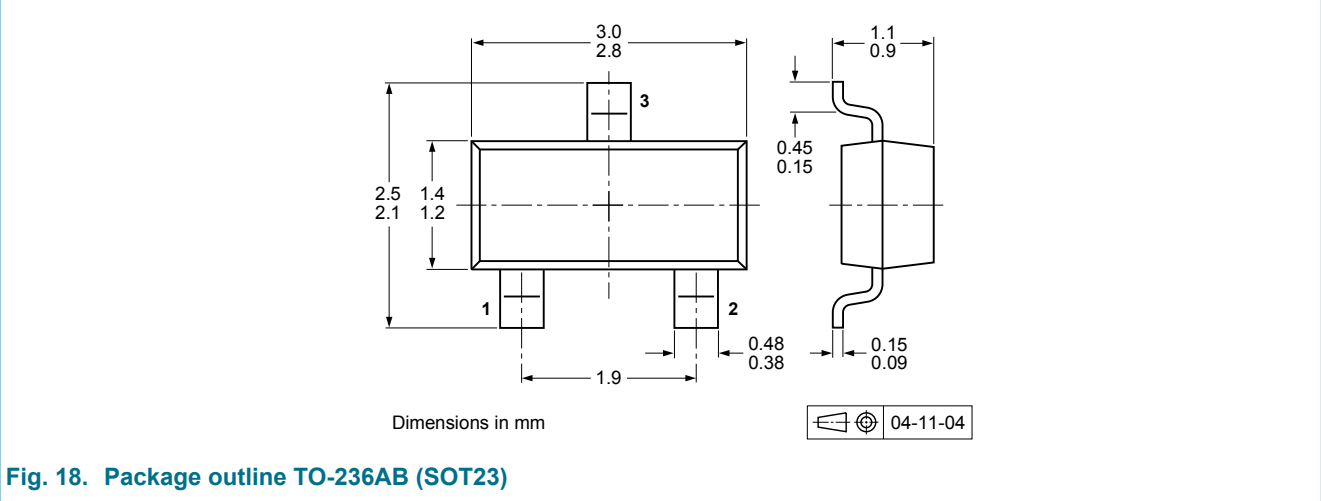


Fig. 16. Source current as a function of source-drain voltage; typical values

11. Test information



12. Package outline



13. Soldering

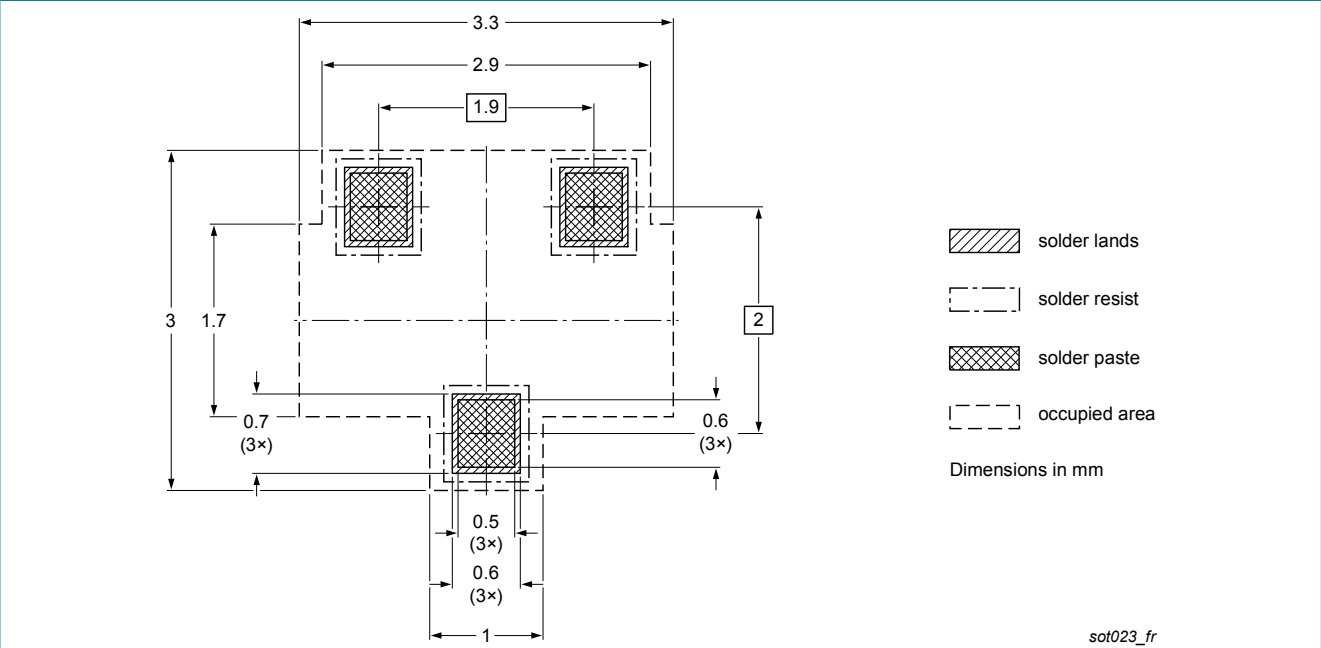


Fig. 19. Reflow soldering footprint for TO-236AB (SOT23)

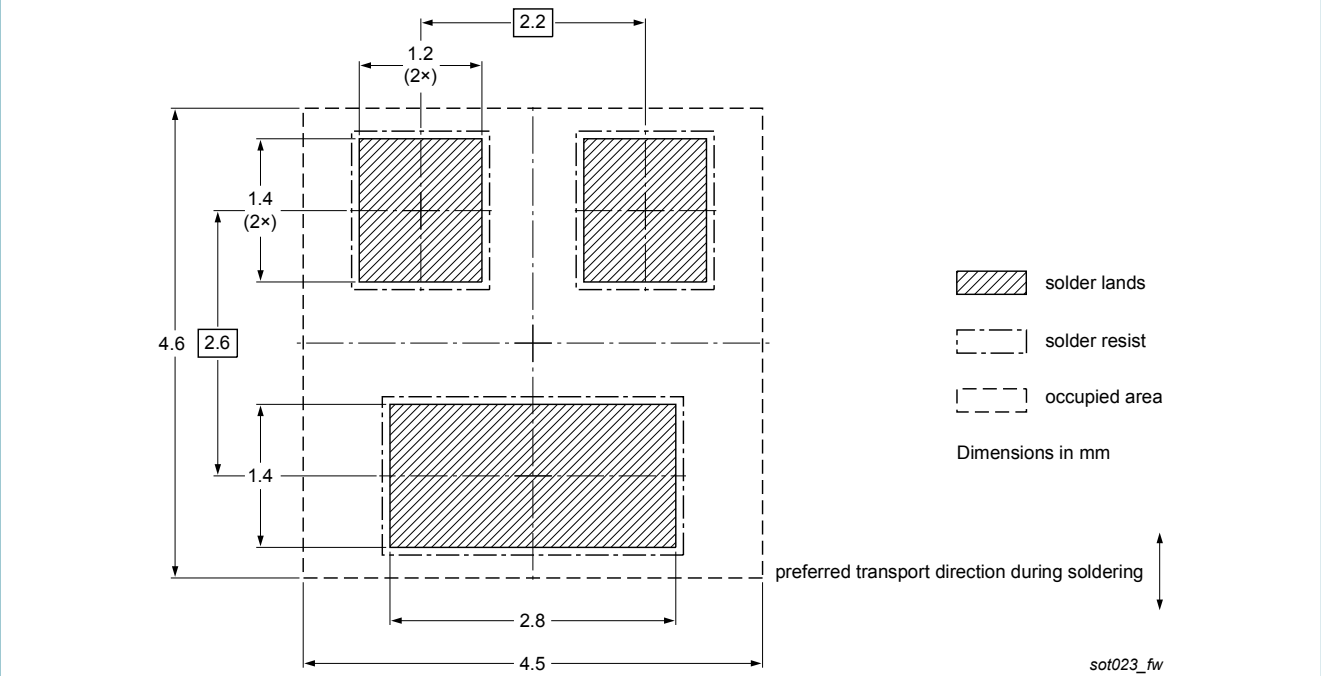


Fig. 20. Wave soldering footprint for TO-236AB (SOT23)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMV75UP v.1	20140425	Product data sheet	-	-

## 15. Legal information

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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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