

# PMV185XN

30 V, single N-channel Trench MOSFET

3 August 2012

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  $R_{DSon}$
- 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	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	30	V
$V_{GS}$	gate-source voltage			-12	-	12	V
$I_D$	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}; t \leq 5\text{ s}$	[1]	-	-	1.2	A
<b>Static characteristics</b>							
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 1.1\text{ A}; T_J = 25\text{ }^{\circ}\text{C}$		-	185	250	m $\Omega$

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

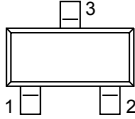
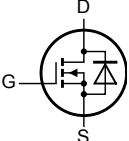


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## 2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 TO-236AB (SOT23)	 017aaa253
2	S	source		
3	D	drain		

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMV185XN	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

## 4. Marking

Table 4. Marking codes

Type number	Marking code [1]
PMV185XN	EH%

[1] % = placeholder for manufacturing site code

## 5. Limiting values

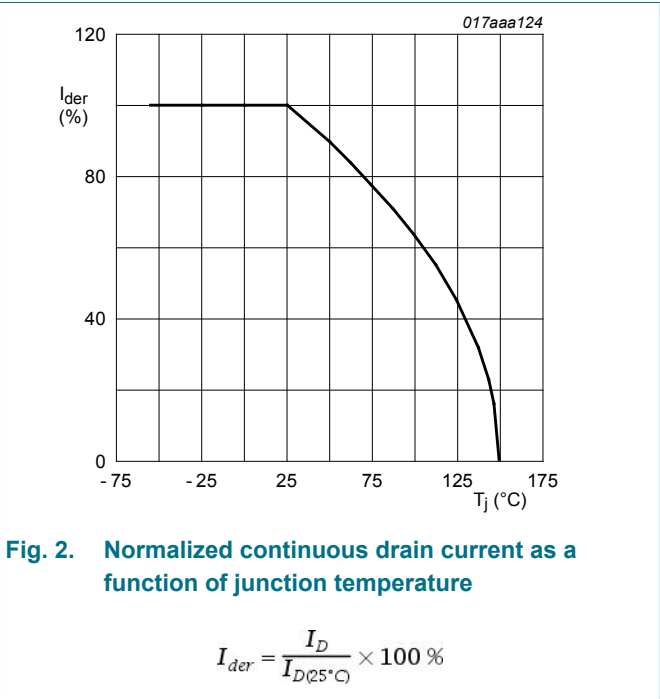
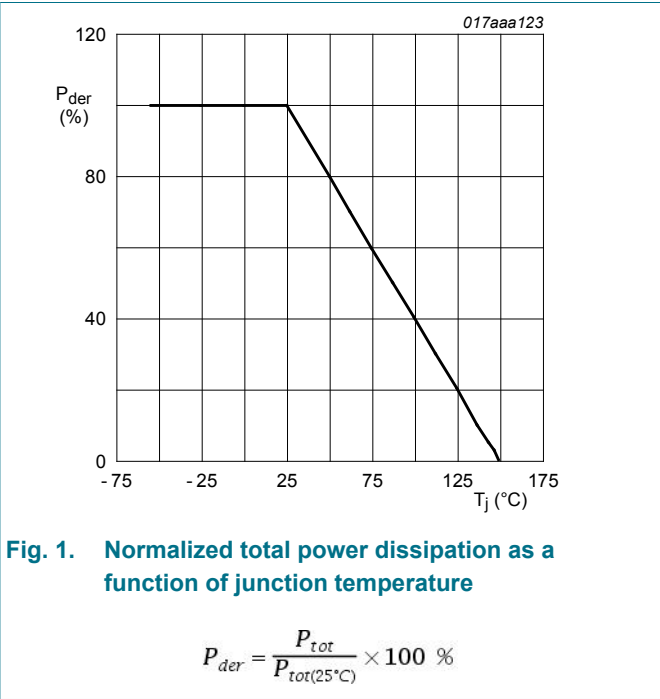
Table 5. Limiting values

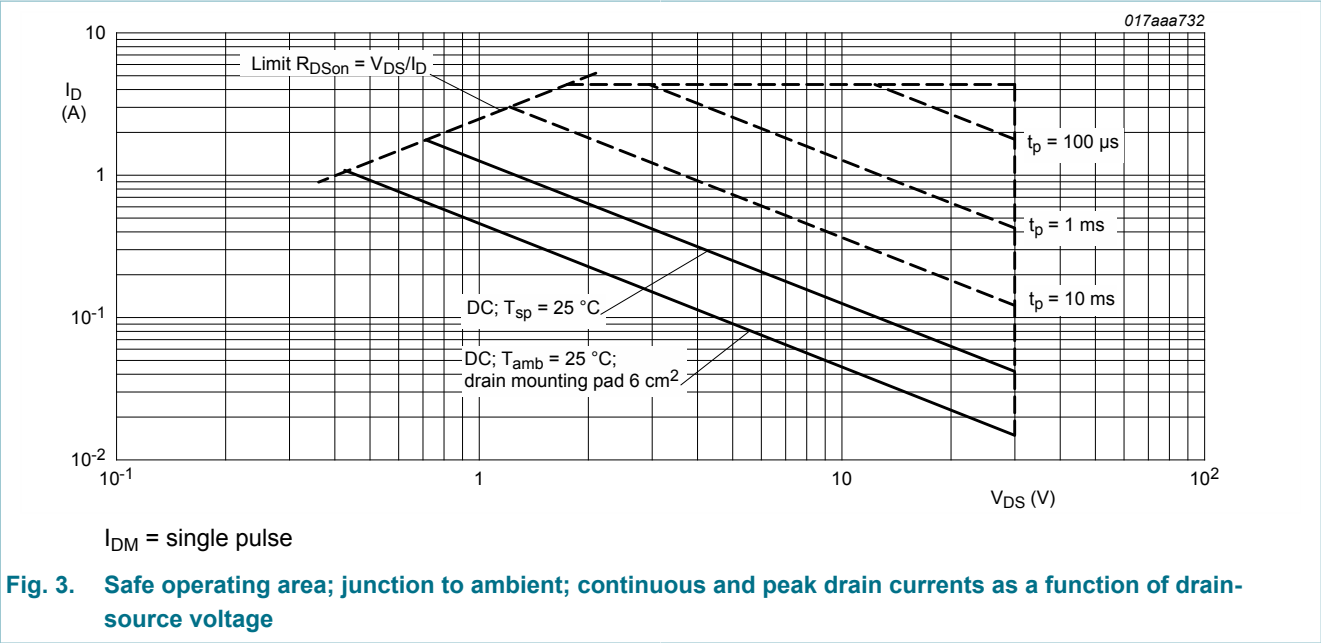
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{DS}$	drain-source voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	30	V
$V_{GS}$	gate-source voltage			-12	12	V
$I_D$	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}; t \leq 5\text{ s}$	[1]	-	1.2	A
		$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	1.1	A
		$V_{GS} = 4.5\text{ V}; T_{amb} = 100\text{ }^{\circ}\text{C}$	[1]	-	0.7	A
$I_{DM}$	peak drain current	$T_{amb} = 25\text{ }^{\circ}\text{C}$ ; single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	4.4	A
$P_{tot}$	total power dissipation	$T_{amb} = 25\text{ }^{\circ}\text{C}$	[2]	-	325	mW
			[1]	-	455	mW
		$T_{sp} = 25\text{ }^{\circ}\text{C}$		-	1275	mW

Symbol	Parameter	Conditions		Min	Max	Unit
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
Source-drain diode						
I <sub>S</sub>	source current	T <sub>amb</sub> = 25 °C	[1]	-	0.7	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



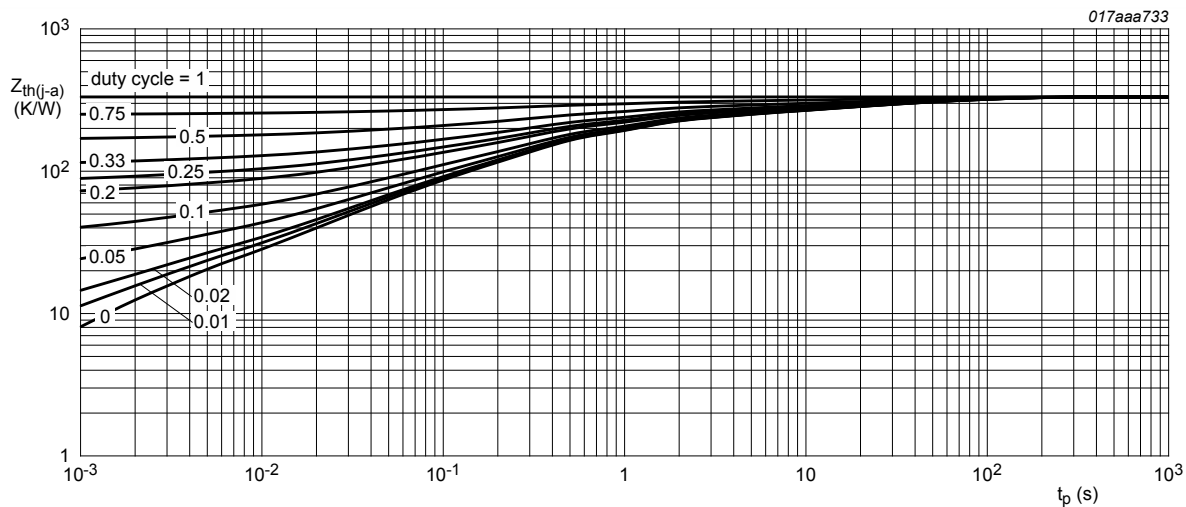


6. Thermal characteristics

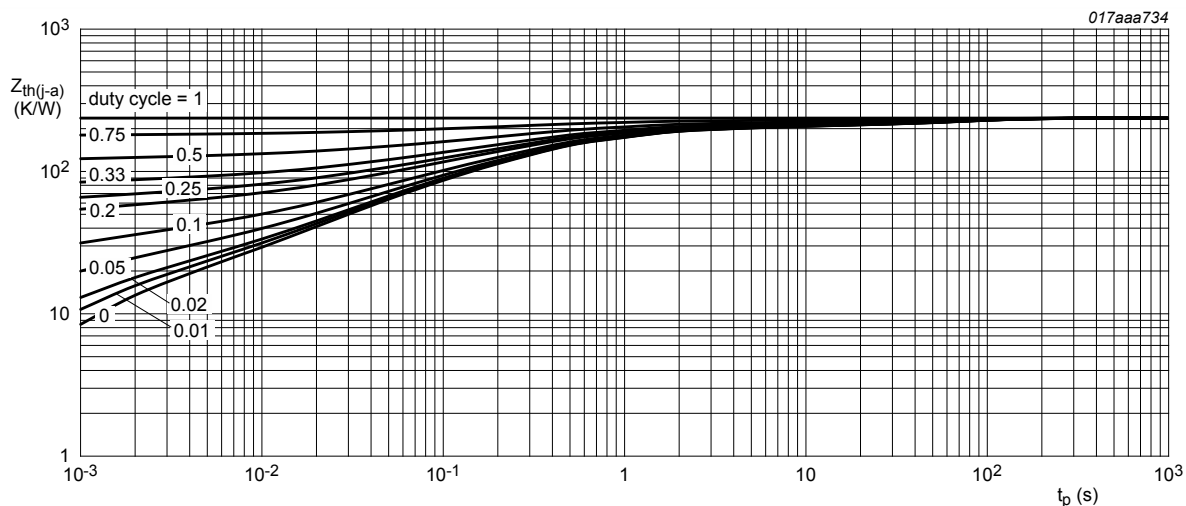
Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	333	385	K/W
			[2]	-	240	275	K/W
		in free air; $t \leq 5\text{ s}$	[2]	-	203	235	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	85	100	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  $6\text{ cm}^2$ .



**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
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A$ ; $V_{GS} = 0 V$ ; $T_j = 25 ^\circ C$	30	-	-	V
$V_{GSth}$	gate-source threshold voltage	$I_D = 250 \mu A$ ; $V_{DS} = V_{GS}$ ; $T_j = 25 ^\circ C$	0.5	1	1.5	V
$I_{DSS}$	drain leakage current	$V_{DS} = 30 V$ ; $V_{GS} = 0 V$ ; $T_{amb} = 25 ^\circ C$	-	-	1	$\mu A$
		$V_{DS} = 30 V$ ; $V_{GS} = 0 V$ ; $T_{amb} = 150 ^\circ C$	-	-	10	$\mu A$

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
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> = 1.1 A; T <sub>j</sub> = 25 °C		-	185	250	mΩ
		V <sub>GS</sub> = 4.5 V; I <sub>D</sub> = 1.1 A; T <sub>j</sub> = 150 °C		-	300	400	mΩ
		V <sub>GS</sub> = 2.5 V; I <sub>D</sub> = 0.25 A; T <sub>j</sub> = 25 °C		-	255	365	mΩ
g <sub>fs</sub>	forward transconductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 1.1 A; T <sub>j</sub> = 25 °C		-	2.9	-	S
Dynamic characteristics							
Q <sub>G(tot)</sub>	total gate charge	V <sub>DS</sub> = 15 V; I <sub>D</sub> = 1.1 A; V <sub>GS</sub> = 4.5 V; T <sub>j</sub> = 25 °C		-	0.87	1.3	nC
Q <sub>GS</sub>	gate-source charge			-	0.17	-	nC
Q <sub>GD</sub>	gate-drain charge			-	0.24	-	nC
C <sub>iss</sub>	input capacitance	V <sub>DS</sub> = 15 V; f = 1 MHz; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	76	-	pF
C <sub>oss</sub>	output capacitance			-	30	-	pF
C <sub>rss</sub>	reverse transfer capacitance			-	22	-	pF
t <sub>d(on)</sub>	turn-on delay time	V <sub>DS</sub> = 15 V; I <sub>D</sub> = 1.1 A; V <sub>GS</sub> = 4.5 V; R <sub>G(ext)</sub> = 6 Ω; T <sub>j</sub> = 25 °C		-	7	-	ns
t <sub>r</sub>	rise time			-	11	-	ns
t <sub>d(off)</sub>	turn-off delay time			-	16	-	ns
t <sub>f</sub>	fall time			-	7	-	ns
Source-drain diode							
V <sub>SD</sub>	source-drain voltage	I <sub>S</sub> = 0.7 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	0.8	1.2	V

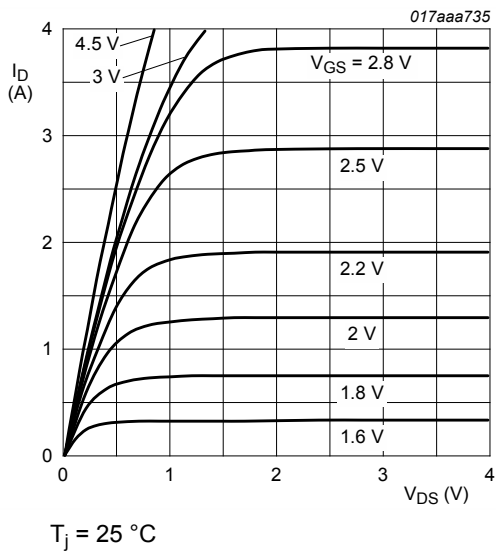


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

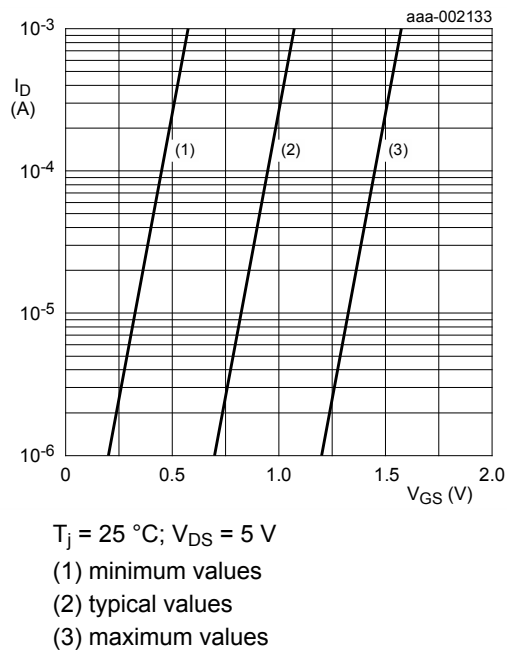


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

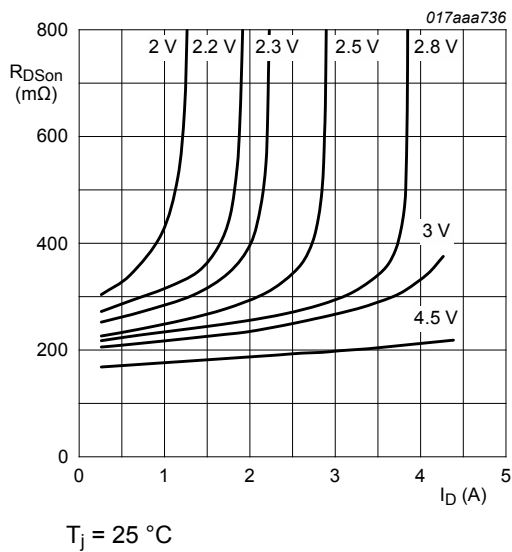


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

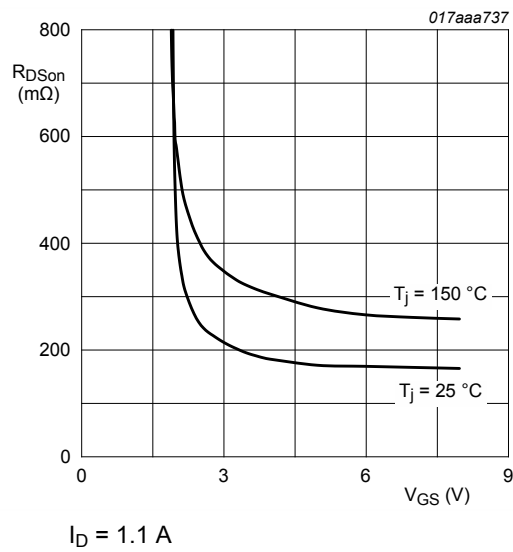


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

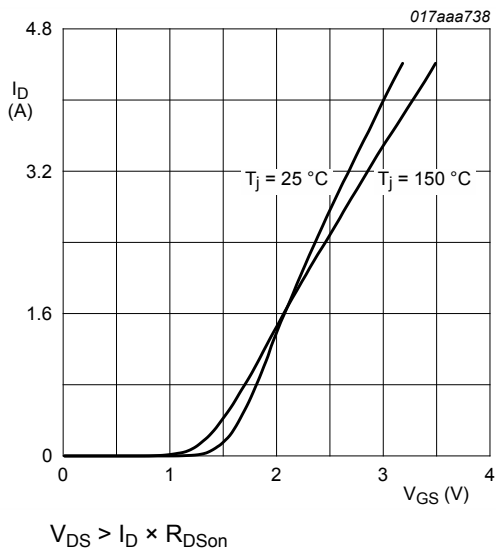


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

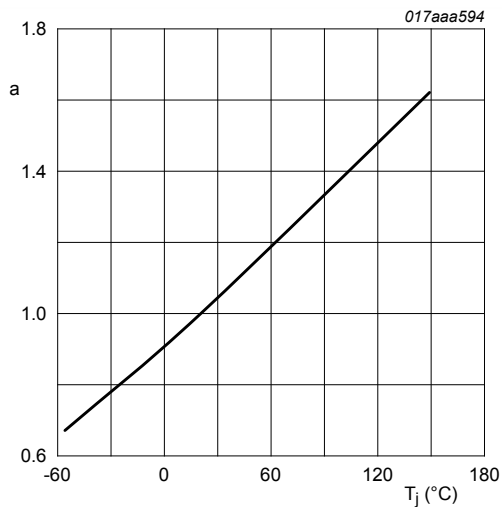


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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

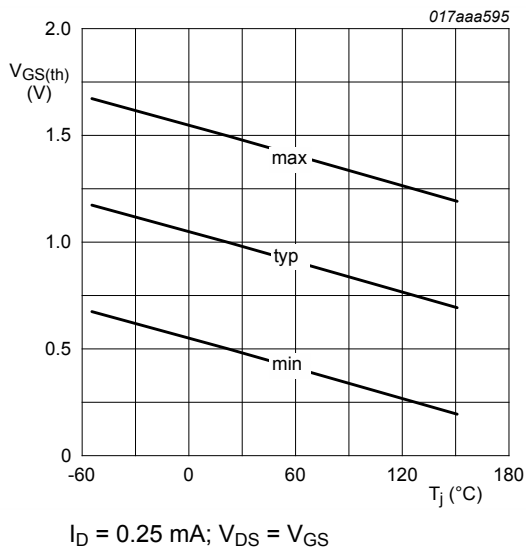


Fig. 12. Gate-source threshold voltage as a function of junction temperature

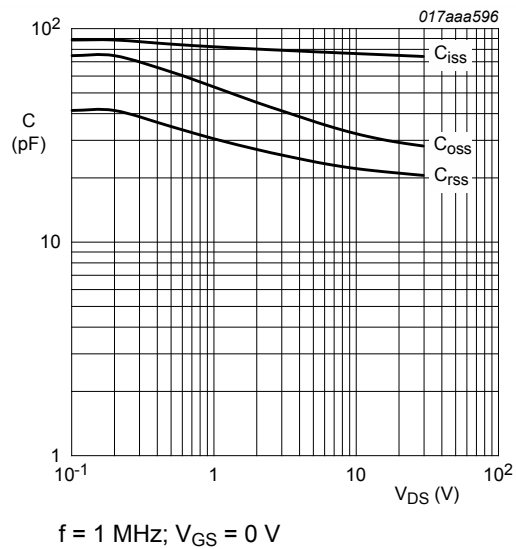


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



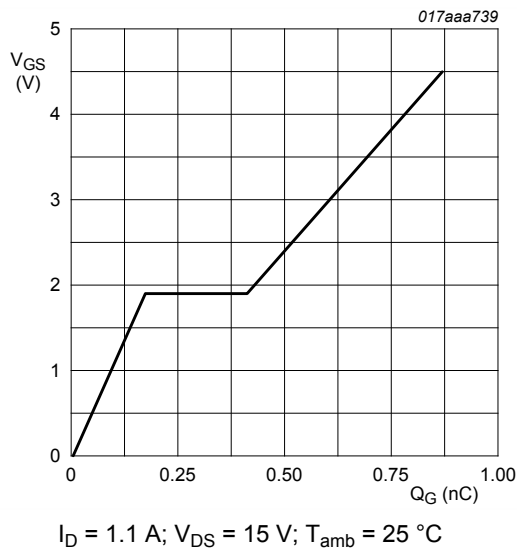


Fig. 14. Gate-source voltage as a function of gate charge; typical values

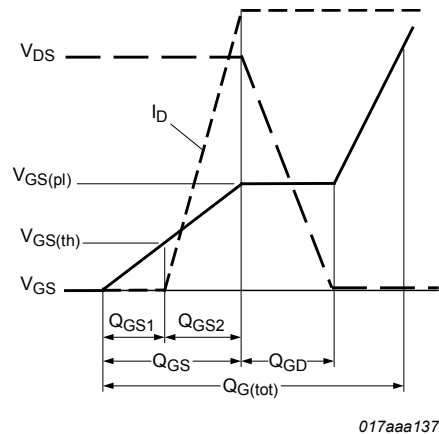


Fig. 15. Gate charge waveform definitions

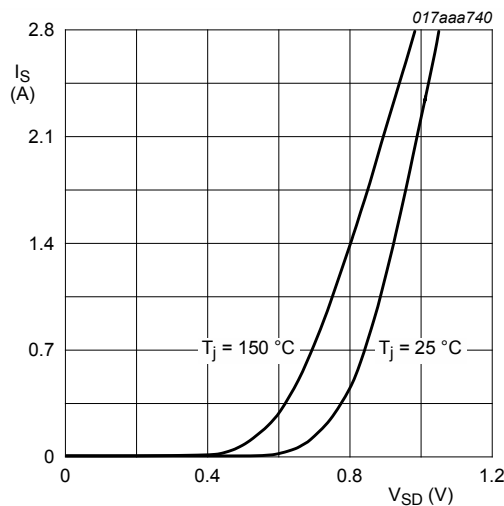


Fig. 16. Source current as a function of source-drain voltage; typical values

8. Test information

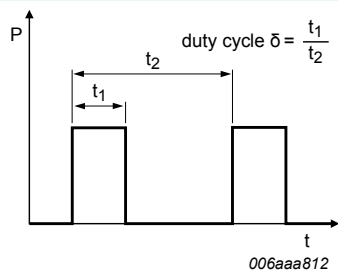
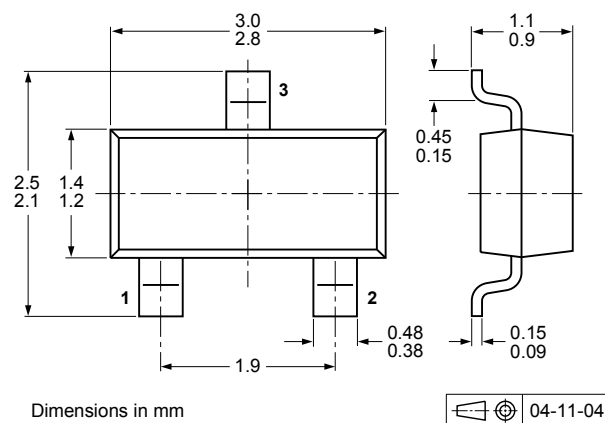


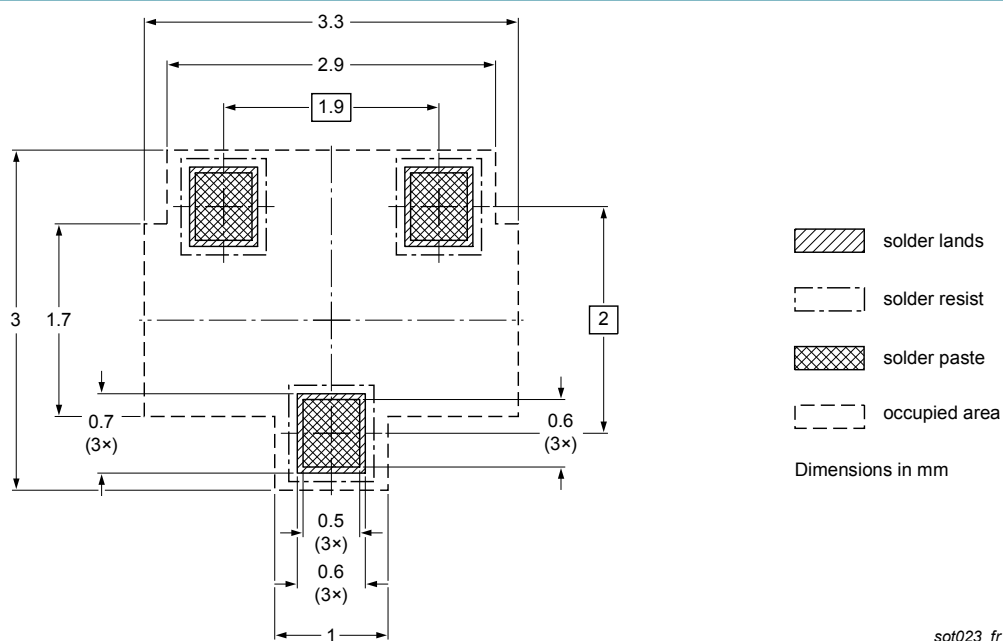
Fig. 17. Duty cycle definition

## 9. Package outline

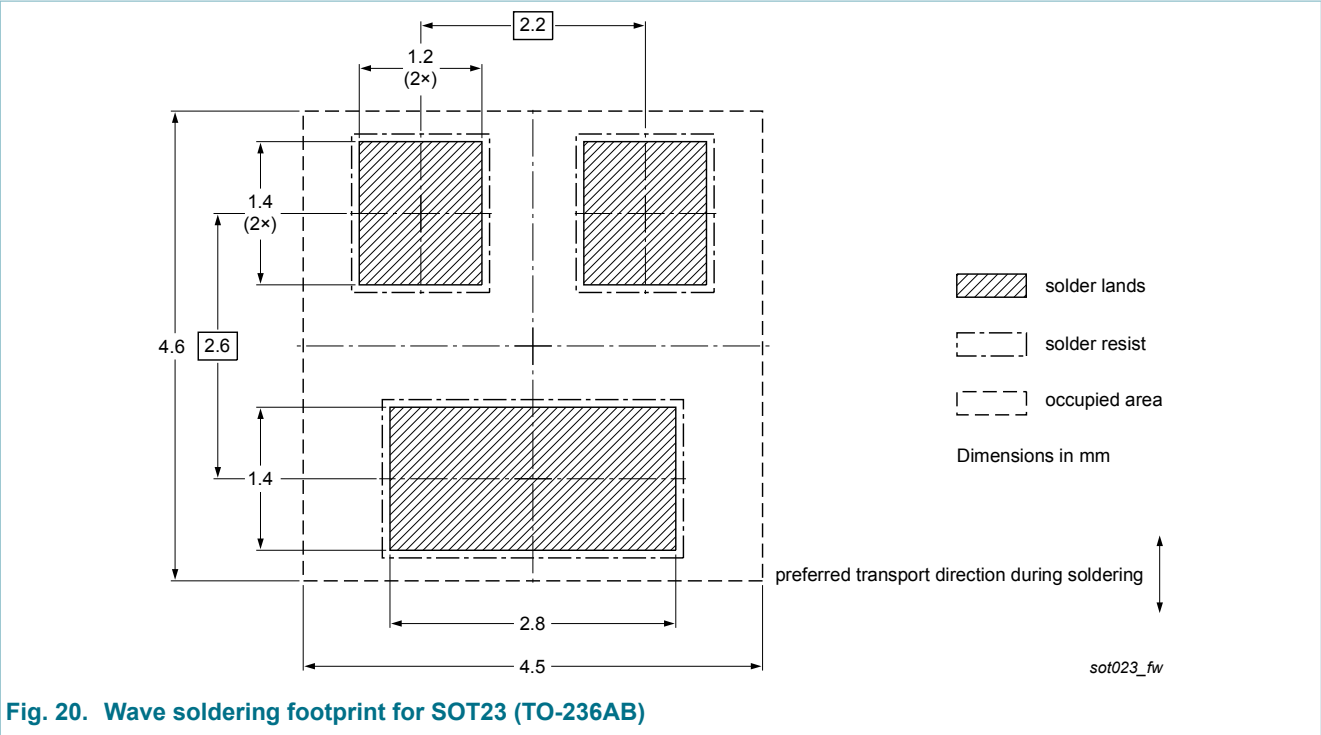


**Fig. 18. TO-236AB (SOT23)**

## 10. Soldering



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



## 11. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMV185XN v.1	20120803	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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