

PMV170UN

20 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 threshold voltage
- 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	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	20	V
V_{GS}	gate-source voltage			-8	-	8	V
I_D	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}; t \leq 5\text{ s}$	[1]	-	-	1.5	A
Static characteristics							
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 1\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$		-	140	165	m Ω

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².

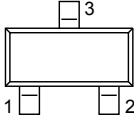
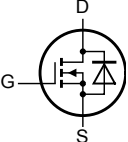


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2. Pinning information

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
PMV170UN	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code
	[1]
PMV170UN	EG%

[1] % = placeholder for manufacturing site code

5. Limiting values

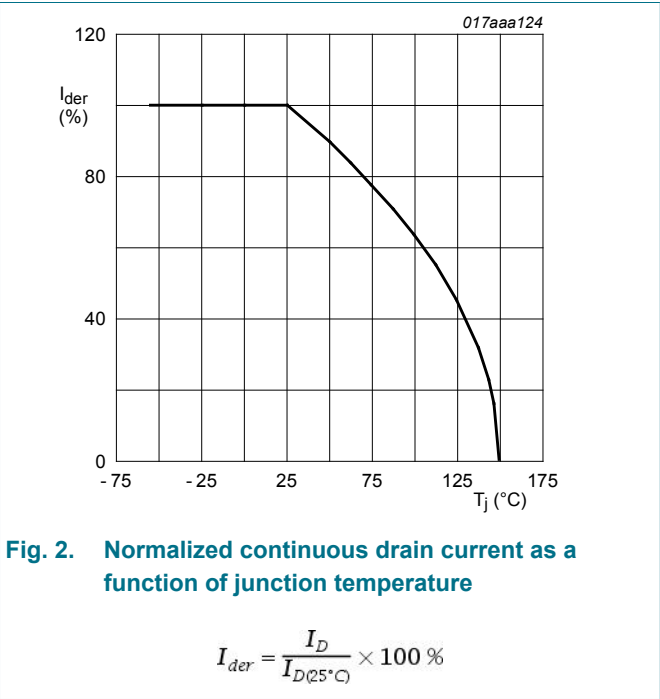
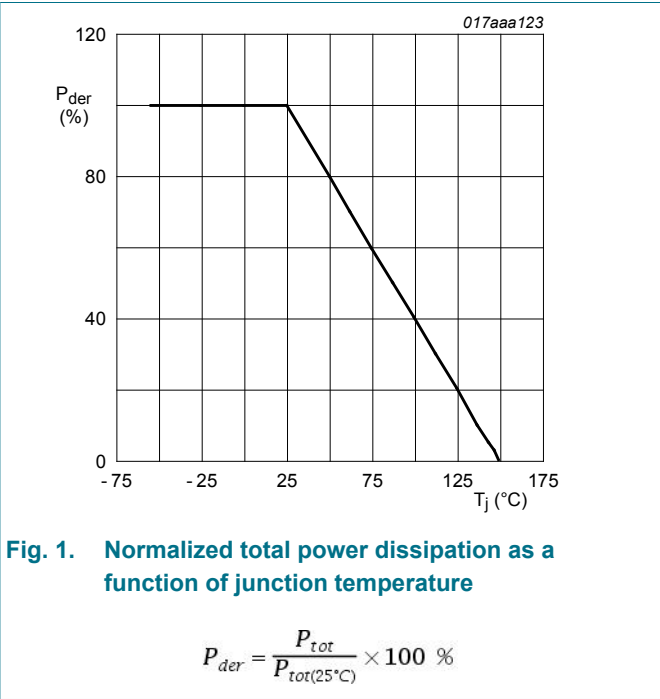
Table 5. Limiting values

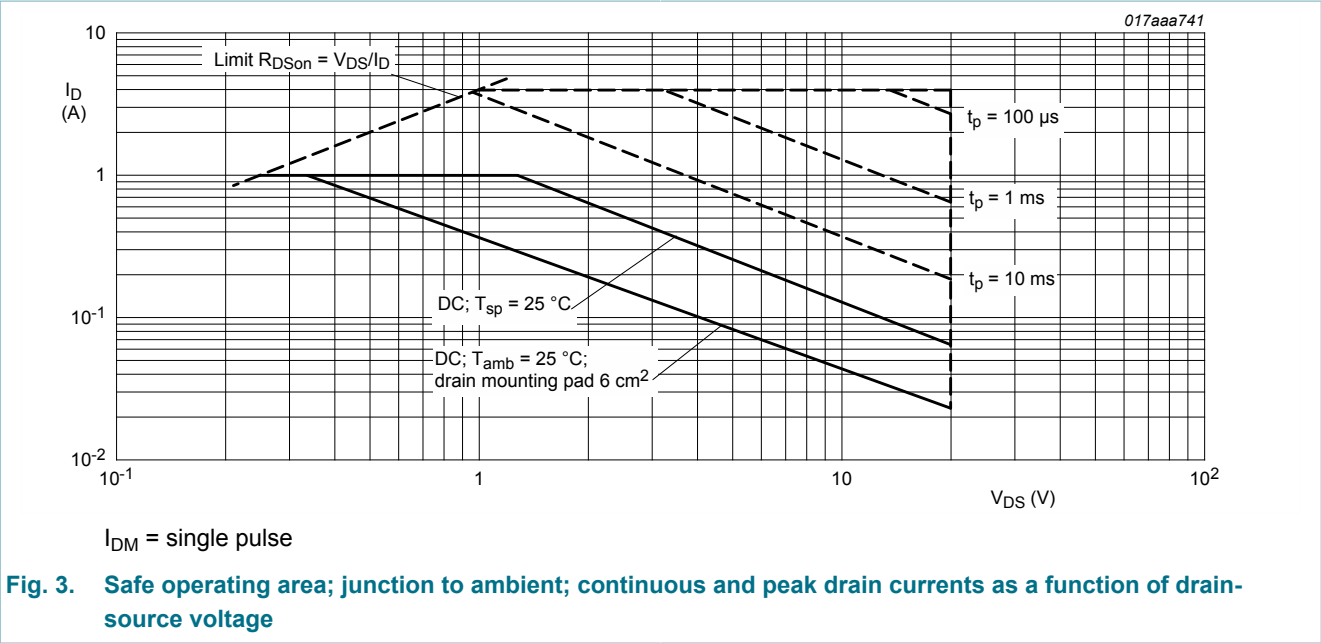
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	20	V
V_{GS}	gate-source voltage			-8	8	V
I_D	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}; t \leq 5\text{ s}$	[1]	-	1.5	A
		$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	1	A
		$V_{GS} = 4.5\text{ V}; T_{amb} = 100\text{ }^{\circ}\text{C}$	[1]	-	0.9	A
I_{DM}	peak drain current	$T_{amb} = 25\text{ }^{\circ}\text{C}; \text{single pulse}; t_p \leq 10\text{ }\mu\text{s}$		-	4	A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ }^{\circ}\text{C}$	[2]	-	325	mW
			[1]	-	455	mW
		$T_{sp} = 25\text{ }^{\circ}\text{C}$		-	1140	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 _{amb} = 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 cm².
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



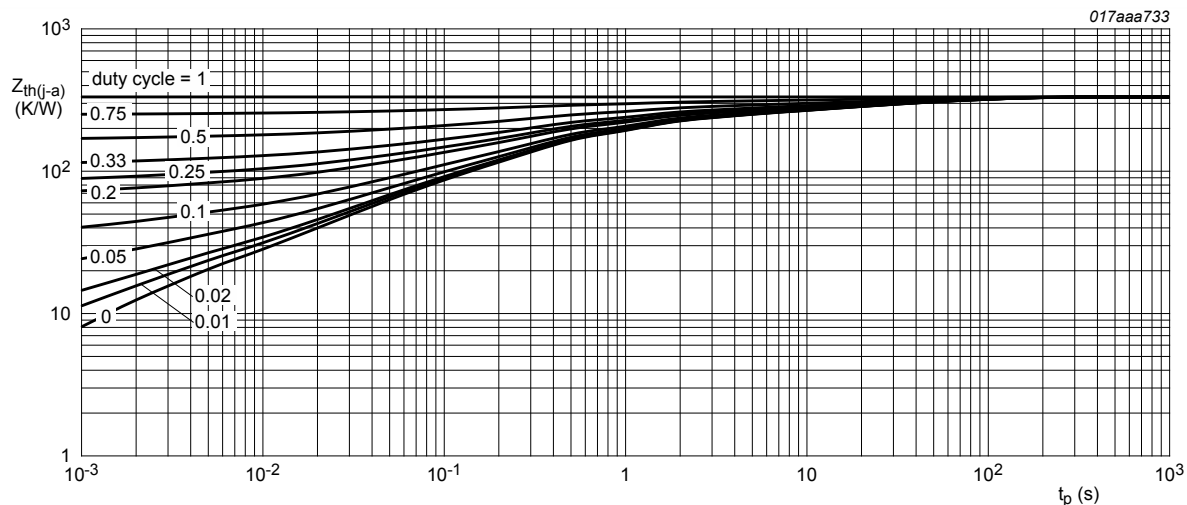


6. Thermal characteristics

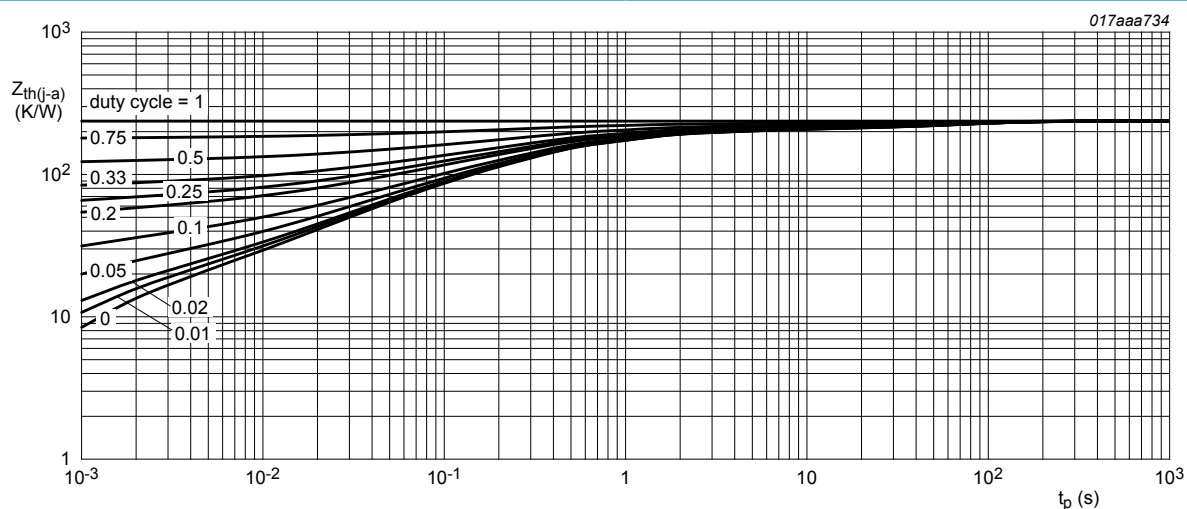
Table 6. Thermal characteristics

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 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

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A$; $V_{GS} = 0 V$; $T_j = 25 ^\circ C$	20	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = 250 \mu A$; $V_{DS} = V_{GS}$; $T_j = 25 ^\circ C$	0.4	0.7	1	V
I_{DSS}	drain leakage current	$V_{DS} = 20 V$; $V_{GS} = 0 V$; $T_{amb} = 25 ^\circ C$	-	-	1	μA
		$V_{DS} = 20 V$; $V_{GS} = 0 V$; $T_{amb} = 150 ^\circ C$	-	-	20	μA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{GSS}	gate leakage current	$V_{GS} = 8\text{ V}; V_{DS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	-	100	nA
		$V_{GS} = -8\text{ V}; V_{DS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	-	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 1\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	140	165	m Ω
		$V_{GS} = 4.5\text{ V}; I_D = 1\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	208	248	m Ω
		$V_{GS} = 2.5\text{ V}; I_D = 1\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	175	220	m Ω
		$V_{GS} = 1.8\text{ V}; I_D = 0.25\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	237	337	m Ω
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 1\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	3.4	-	S

Dynamic characteristics

$Q_{G(tot)}$	total gate charge	$V_{DS} = 10\text{ V}; I_D = 1\text{ A}; V_{GS} = 4.5\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	1.1	1.65	nC
Q_{GS}	gate-source charge		-	0.15	-	nC
Q_{GD}	gate-drain charge		-	0.3	-	nC
C_{iss}	input capacitance	$V_{DS} = 10\text{ V}; f = 1\text{ MHz}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	83	-	pF
C_{oss}	output capacitance		-	37	-	pF
C_{rss}	reverse transfer capacitance		-	26	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 10\text{ V}; I_D = 1\text{ A}; V_{GS} = 4.5\text{ V}; R_{G(ext)} = 6\text{ }\Omega; T_j = 25\text{ }^{\circ}\text{C}$	-	6	-	ns
t_r	rise time		-	12	-	ns
$t_{d(off)}$	turn-off delay time		-	16	-	ns
t_f	fall time		-	8	-	ns

Source-drain diode

V_{SD}	source-drain voltage	$I_S = 0.7\text{ A}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$	-	0.8	1.2	V
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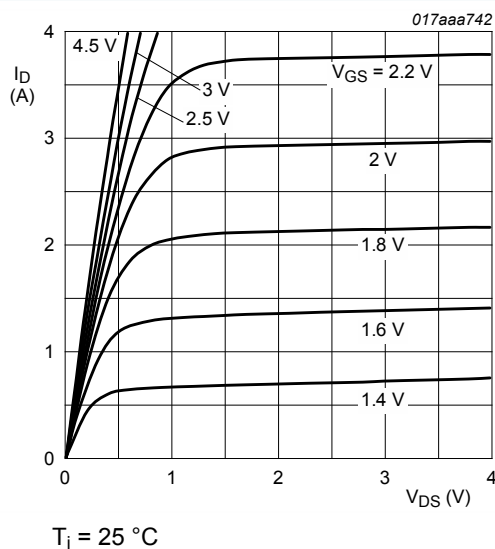


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

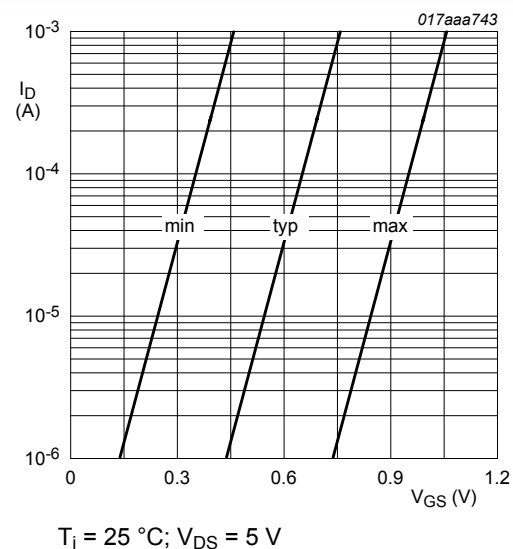


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

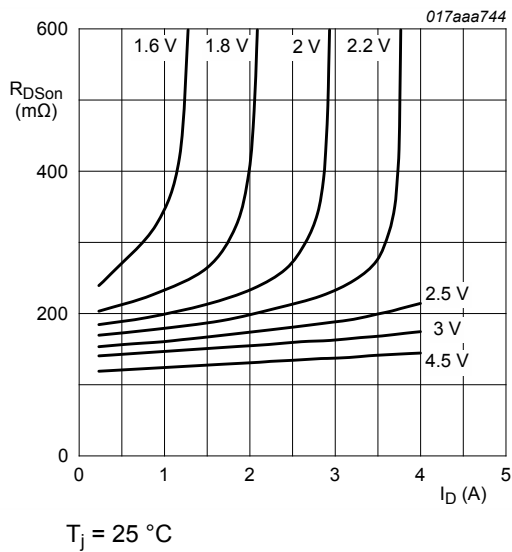


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

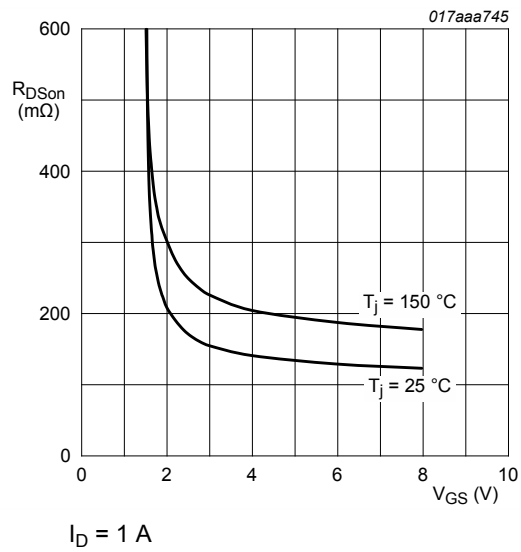


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

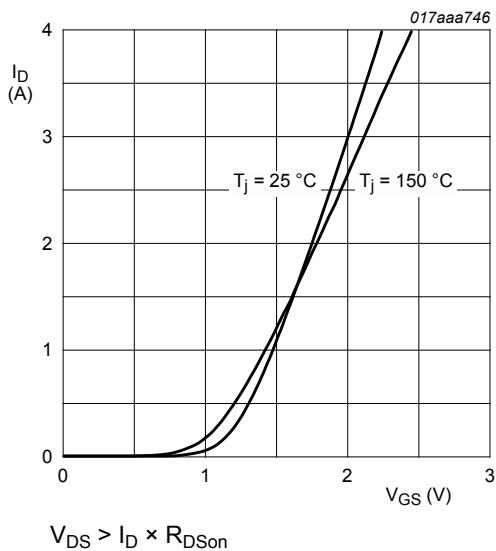


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

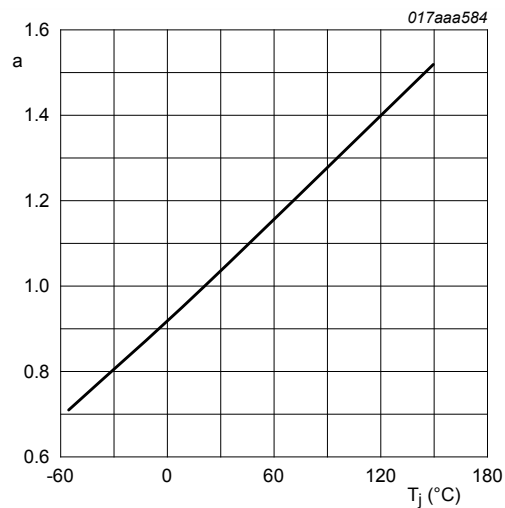


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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

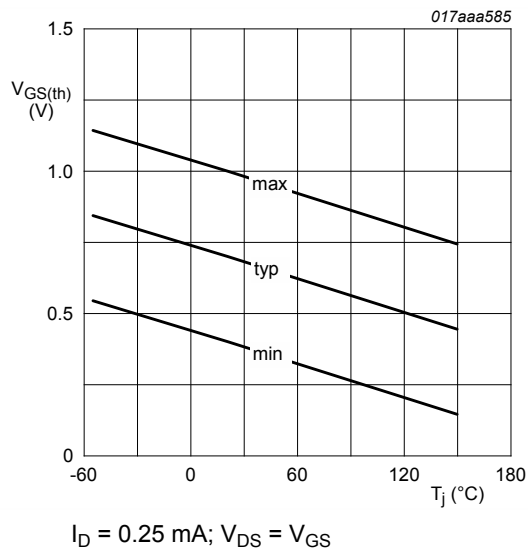


Fig. 12. Gate-source threshold voltage as a function of junction temperature

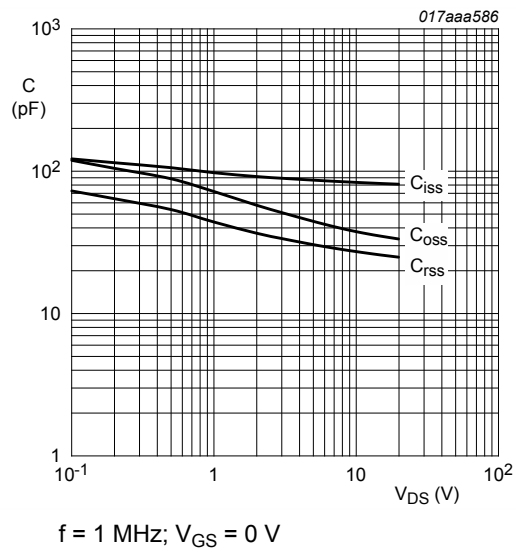


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

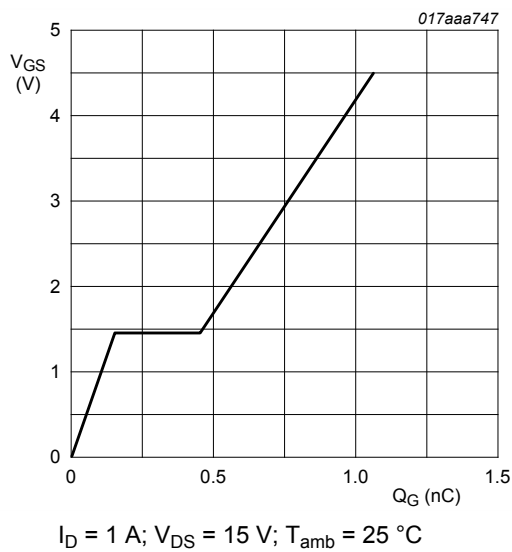


Fig. 14. Gate-source voltage as a function of gate charge; typical values

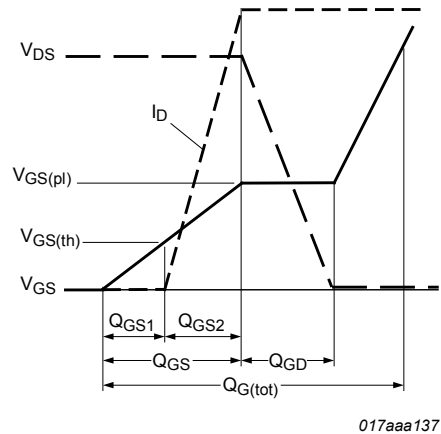
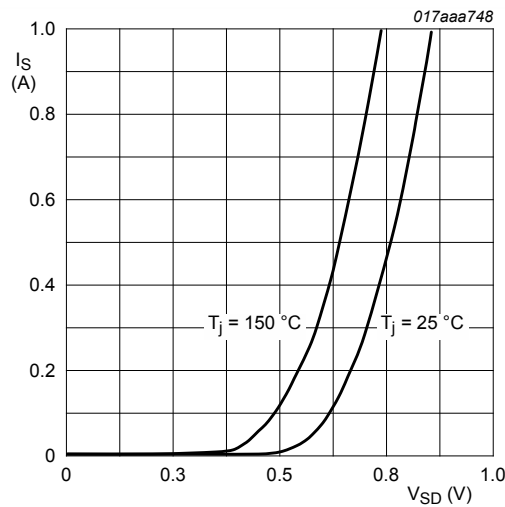


Fig. 15. Gate charge waveform definitions



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

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

8. Test information

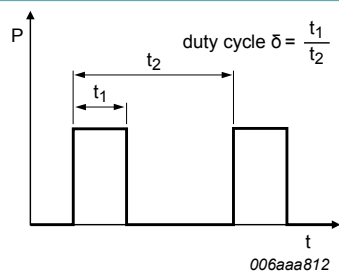


Fig. 17. Duty cycle definition

9. Package outline

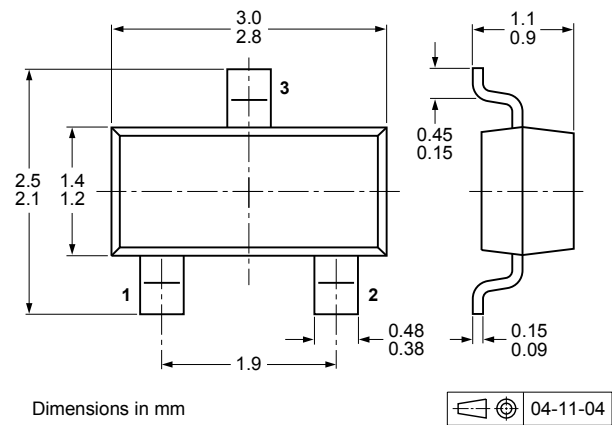


Fig. 18. TO-236AB (SOT23)

10. Soldering

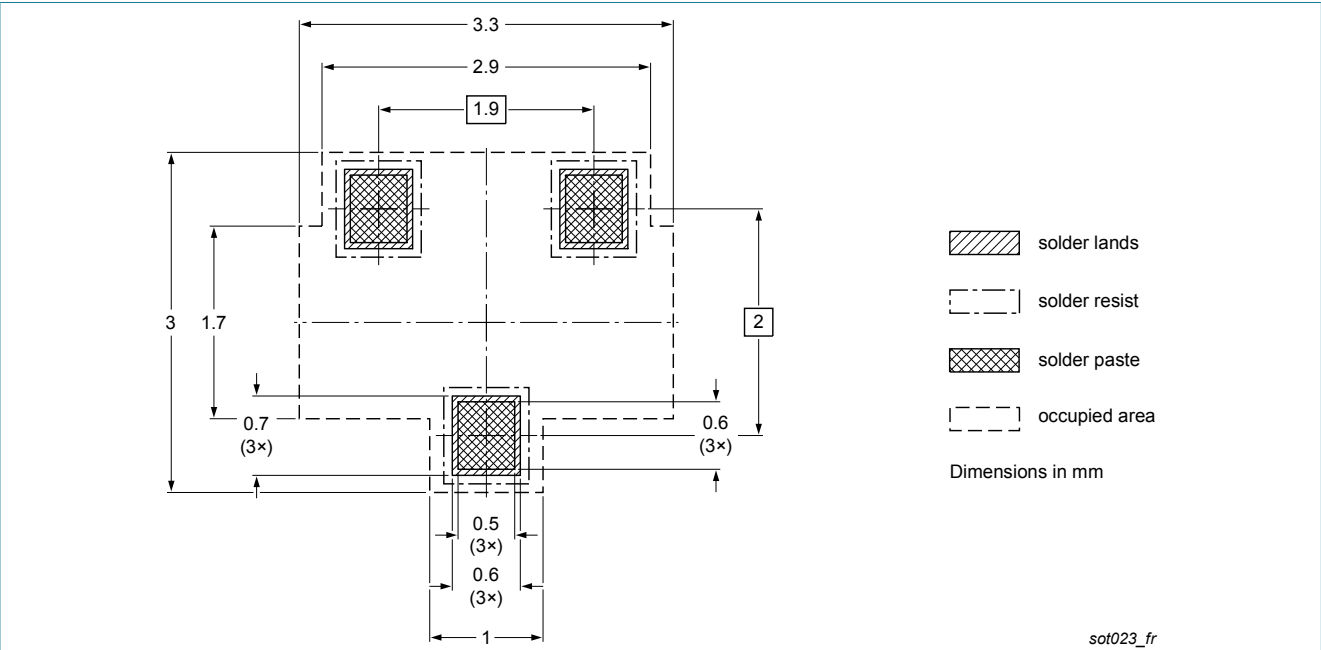


Fig. 19. Reflow soldering footprint for SOT23 (TO-236AB)

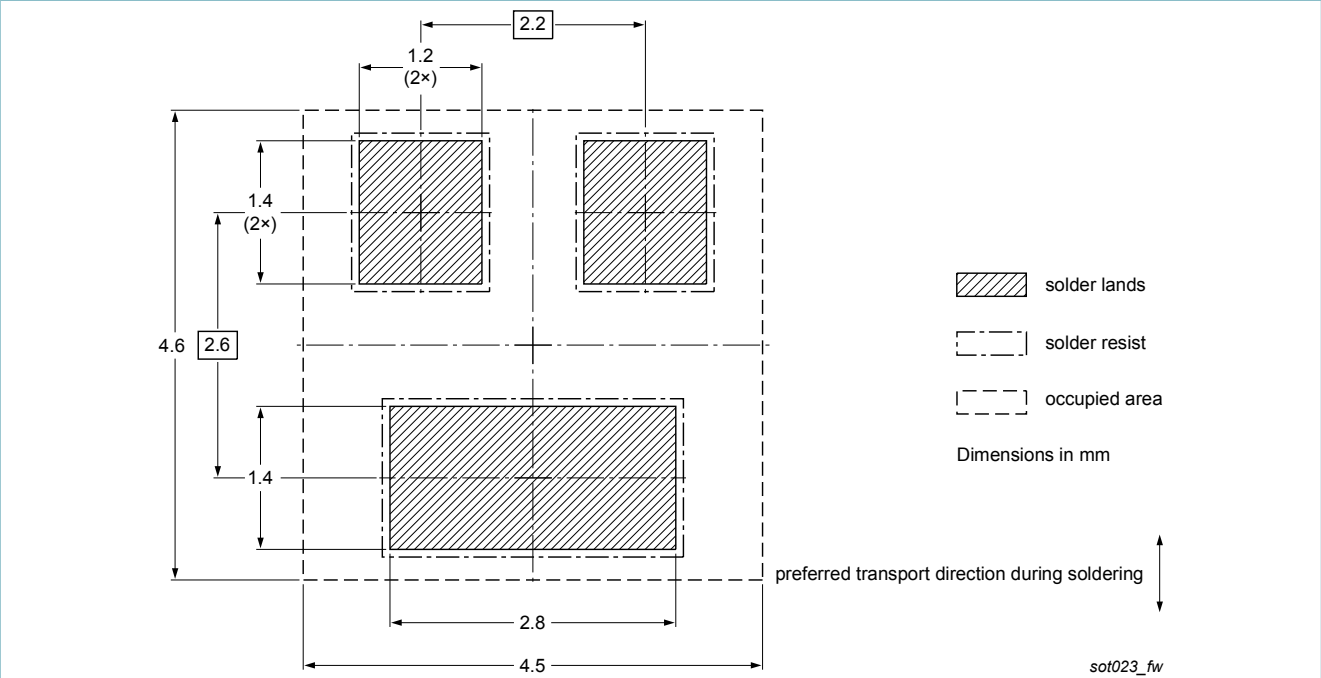


Fig. 20. Wave soldering footprint for SOT23 (TO-236AB)

11. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMV170UN 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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