



PMV20EN

30 V, N-channel Trench MOSFET

5 July 2018

Product data sheet

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.

2. Features and benefits

- Logic level compatible
- Very fast switching
- Trench MOSFET technology
- Enhanced power dissipation capability of 1200 mW

3. Applications

- Relay driver
- High-speed line driver
- Low-side load switch
- Switching circuits

4. Quick reference data

Table 1. Quick reference data

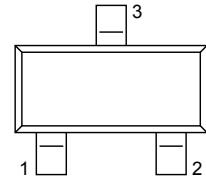
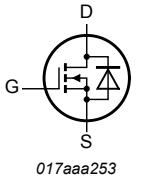
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{DS}	drain-source voltage	T _j = 25 °C	-	-	30	V	
V _{GS}	gate-source voltage		-20	-	20	V	
I _D	drain current	V _{GS} = 10 V; T _{amb} = 25 °C; t ≤ 5 s	[1]	-	-	7.6	A
Static characteristics							
R _{DSon}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 6 A; T _j = 25 °C		-	17	21	mΩ

[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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5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMV20EN	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PMV20EN	%KC

[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 °C		-	30	V
V _{GS}	gate-source voltage			-20	20	V
I _D	drain current	V _{GS} = 10 V; T _{amb} = 25 °C; t ≤ 5 s	[1]	-	7.6	A
		V _{GS} = 10 V; T _{amb} = 25 °C	[1]	-	6	A
		V _{GS} = 10 V; T _{amb} = 100 °C	[1]	-	3.8	A
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 µs		-	24	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	510	mW
			[1]	-	1200	mW
		T _{sp} = 25 °C		-	6940	mW
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]	-	1.1	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.

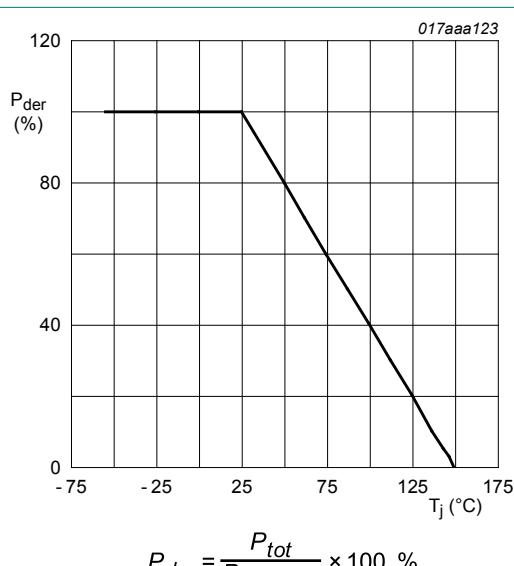


Fig. 1. Normalized total power dissipation as a function of junction temperature

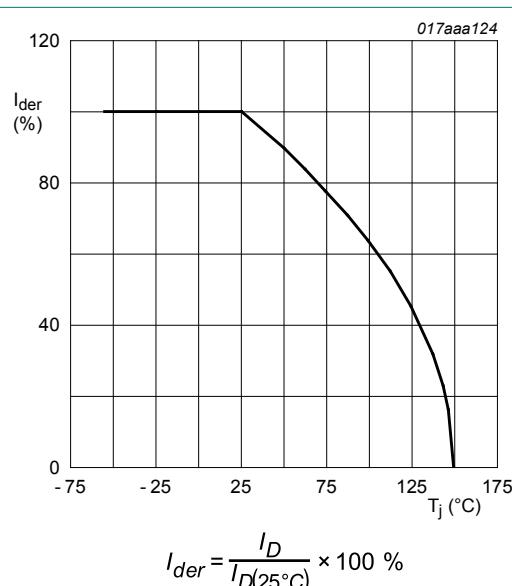
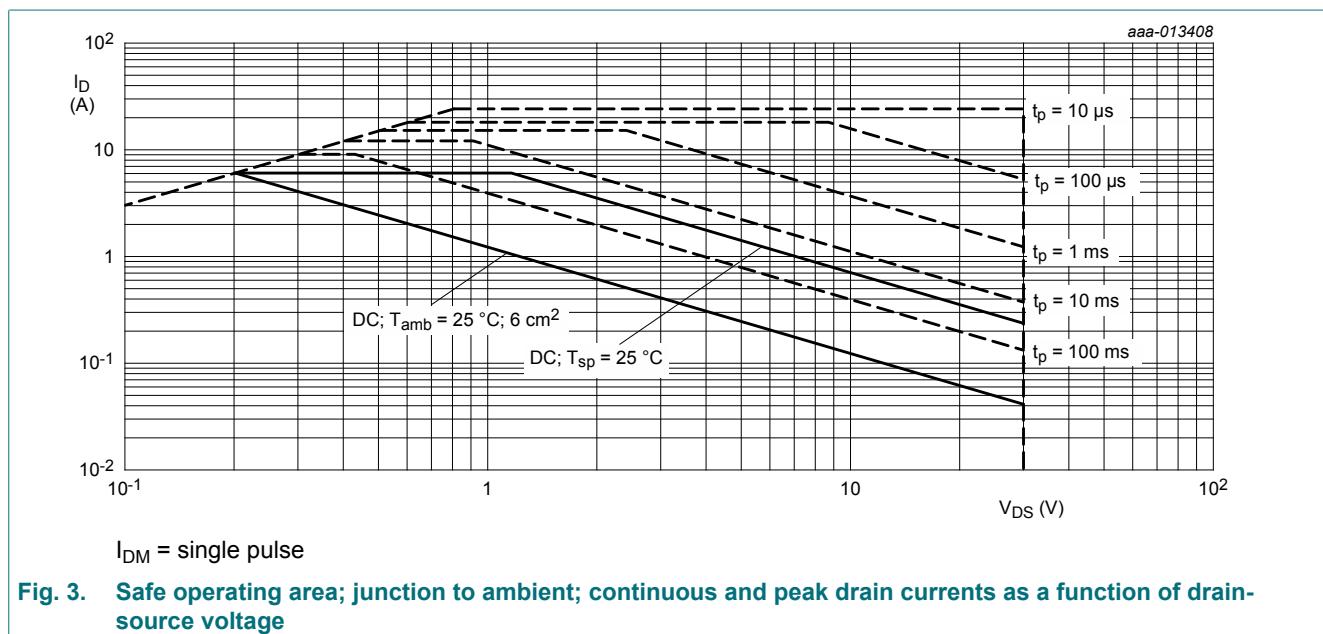


Fig. 2. Normalized continuous drain current as a function of junction temperature



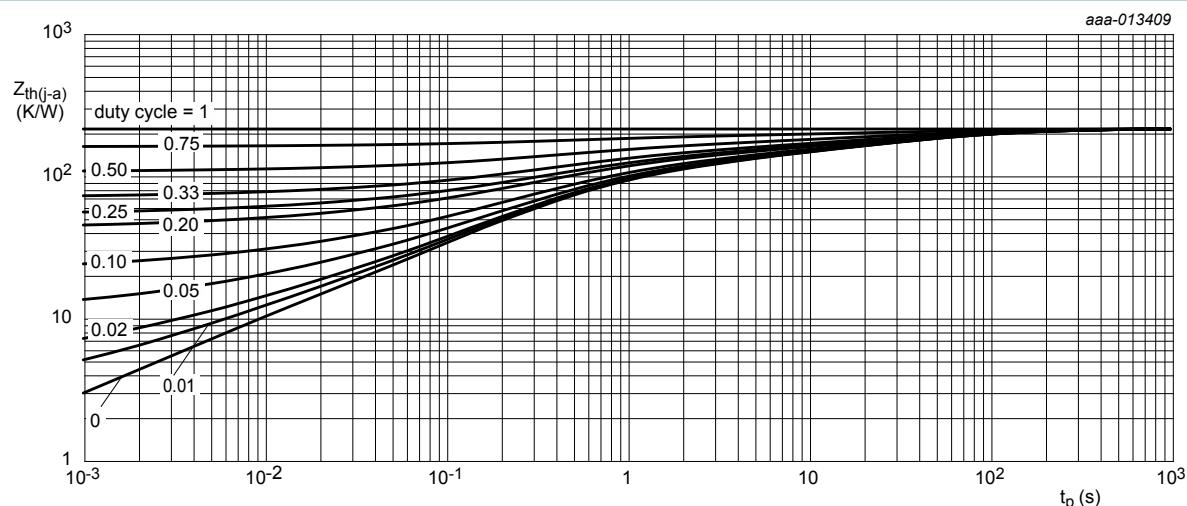
9. Thermal characteristics

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]	-	208	245	K/W
			[2]	-	88	104	K/W
		in free air; $t \leq 5$ s	[2]	-	55	65	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	13	18	K/W

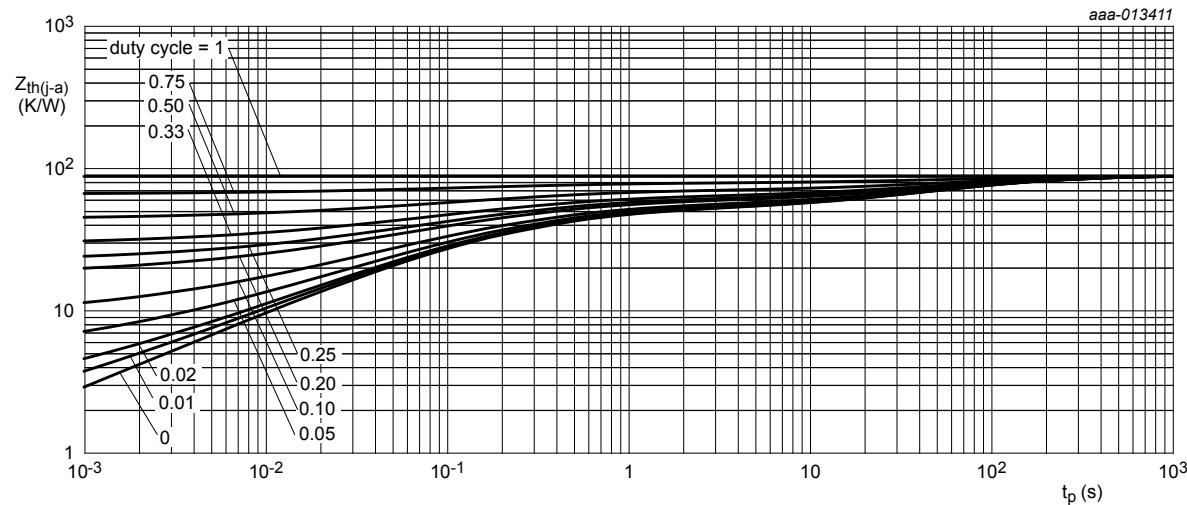
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25^\circ C$		30	-	-	V
V_{GSTh}	gate-source threshold voltage	$I_D = 250 \mu A; V_{DS}=V_{GS}; T_j = 25^\circ C$		1	1.5	2	V
I_{DSS}	drain leakage current	$V_{DS} = 30 V; V_{GS} = 0 V; T_j = 25^\circ C$		-	-	1	μA
I_{GSS}	gate leakage current	$V_{GS} = 20 V; V_{DS} = 0 V; T_j = 25^\circ C$		-	-	100	nA
		$V_{GS} = -20 V; V_{DS} = 0 V; T_j = 25^\circ C$		-	-	-100	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10 V; I_D = 6 A; T_j = 25^\circ C$		-	17	21	$m\Omega$
		$V_{GS} = 10 V; I_D = 6 A; T_j = 150^\circ C$		-	27	34	$m\Omega$
		$V_{GS} = 4.5 V; I_D = 5.4 A; T_j = 25^\circ C$		-	21	26	$m\Omega$
g_{fs}	forward transconductance	$V_{DS} = 10 V; I_D = 2 A; T_j = 25^\circ C$		-	13	-	S
R_G	gate resistance	$f = 1 MHz; T_j = 25^\circ C$		-	1.7	-	Ω
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	$V_{DS} = 15 V; I_D = 5 A; V_{GS} = 10 V; T_j = 25^\circ C$		-	7.2	10.8	nC
Q_{GS}	gate-source charge			-	1	-	nC
Q_{GD}	gate-drain charge			-	0.7	-	nC
C_{iss}	input capacitance	$V_{DS} = 15 V; f = 1 MHz; V_{GS} = 0 V; T_j = 25^\circ C$		-	435	-	pF
C_{oss}	output capacitance			-	90	-	pF
C_{rss}	reverse transfer capacitance			-	35	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 15 V; I_D = 5 A; V_{GS} = 10 V; R_{G(ext)} = 6 \Omega; T_j = 25^\circ C$		-	9	-	ns
t_r	rise time			-	17	-	ns
$t_{d(off)}$	turn-off delay time			-	9	-	ns
t_f	fall time			-	8	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	$I_S = 1.1 A; V_{GS} = 0 V; T_j = 25^\circ C$		-	0.75	1.2	V

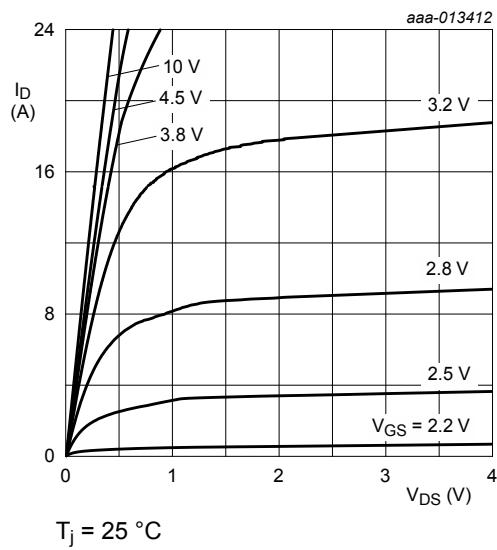


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

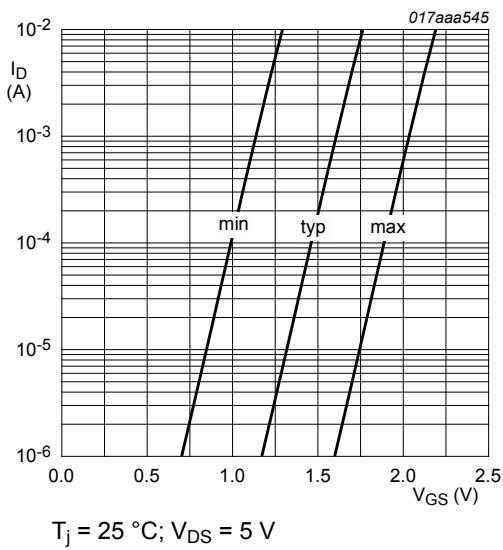


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

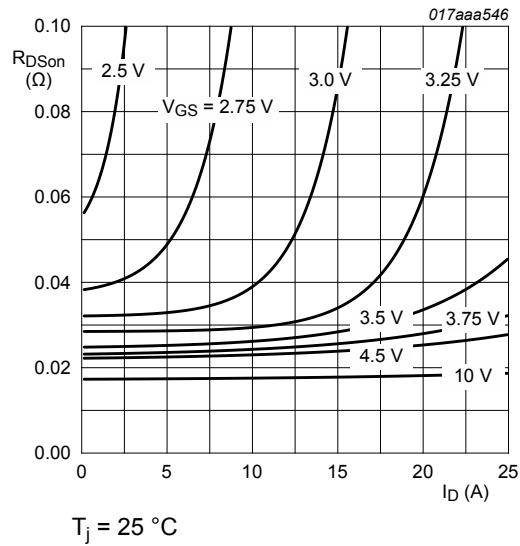


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

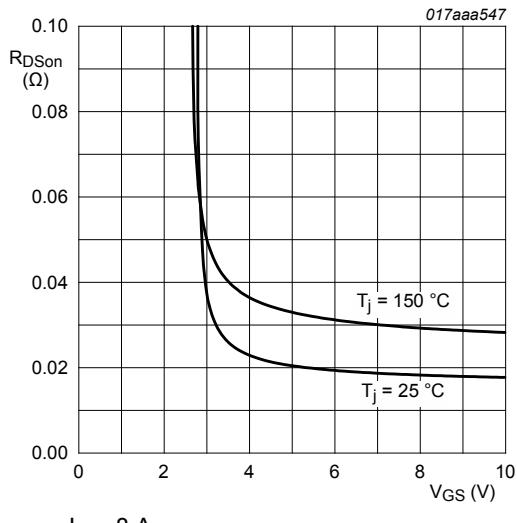


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

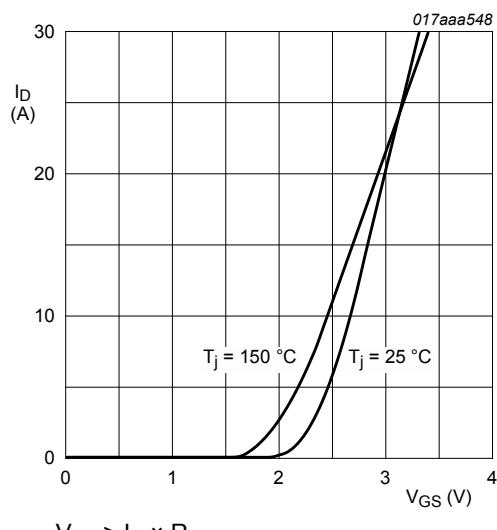


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

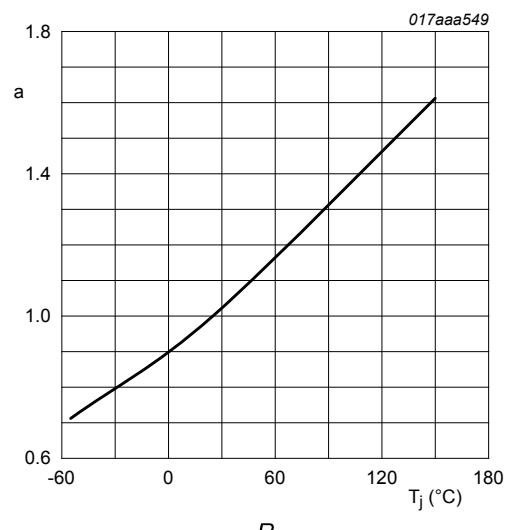


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

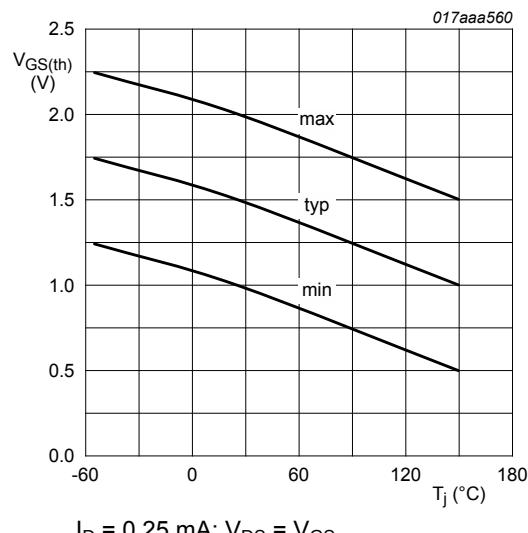


Fig. 12. Gate-source threshold voltage as a function of junction temperature

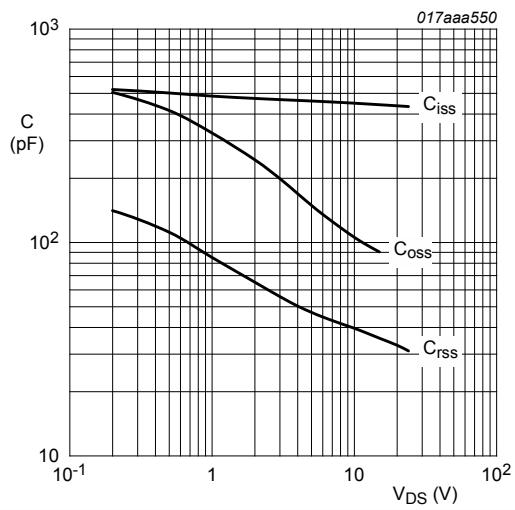
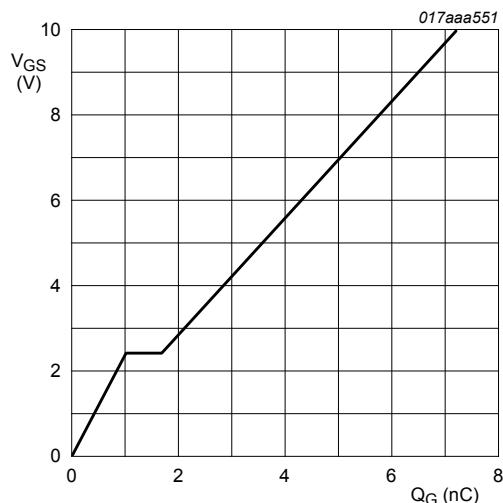


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



I_D = 5 A; V_{DS} = 15 V; T_{amb} = 25 °C

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

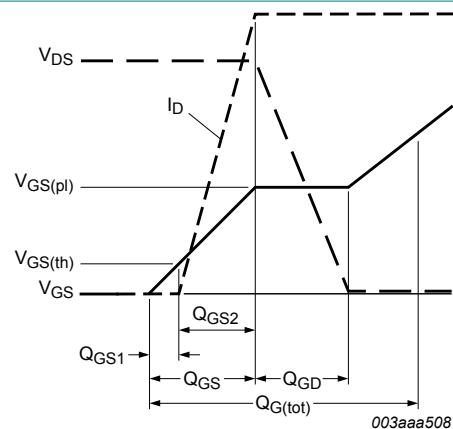
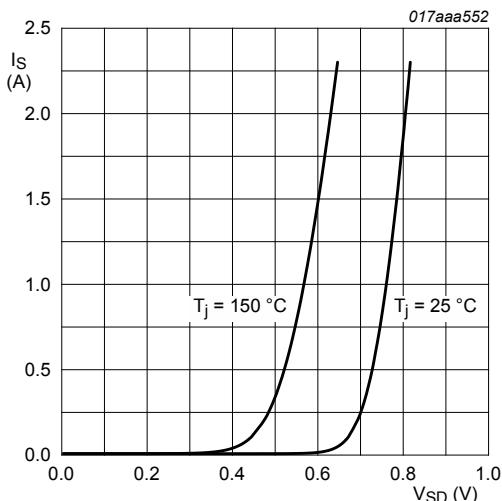


Fig. 15. Gate charge waveform definitions



V_{GS} = 0 V

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

11. Test information

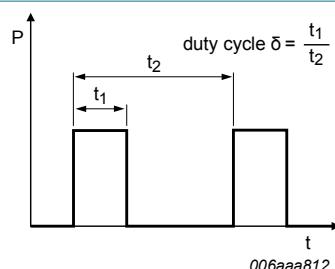
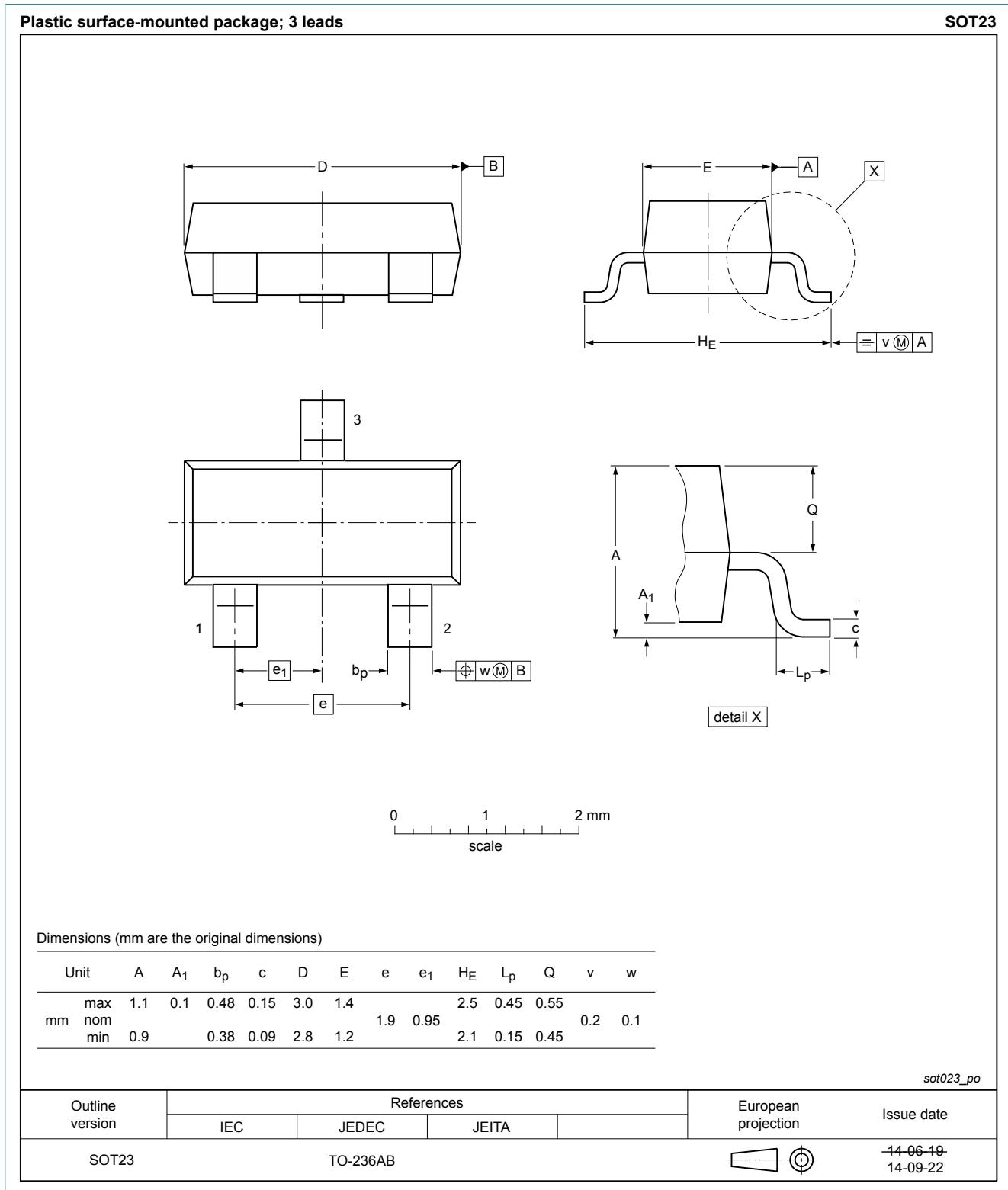


Fig. 17. Duty cycle definition

12. Package outline



13. Soldering

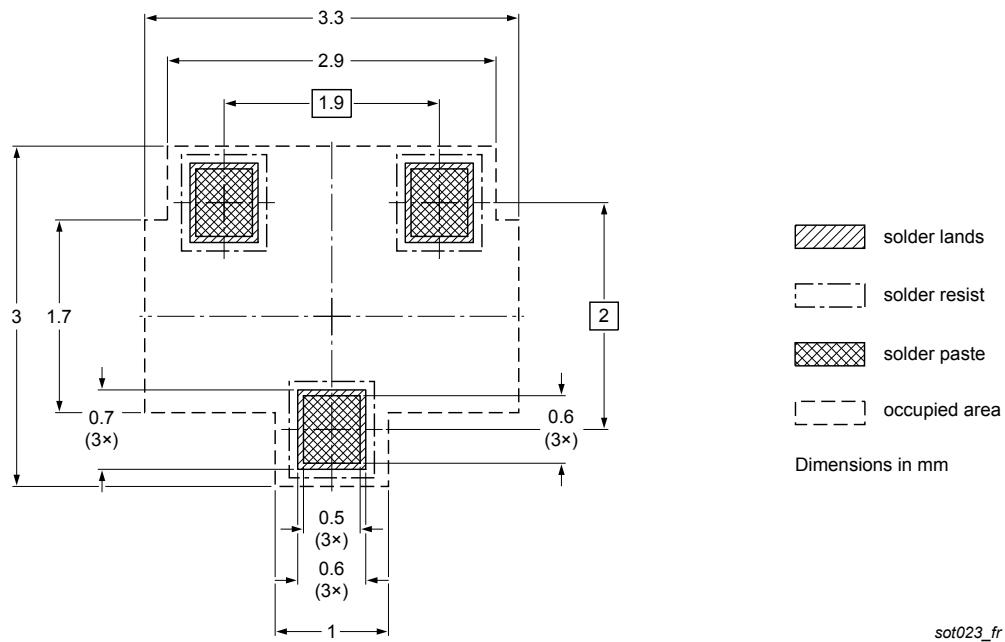


Fig. 19. Reflow soldering footprint for TO-236AB (SOT23)

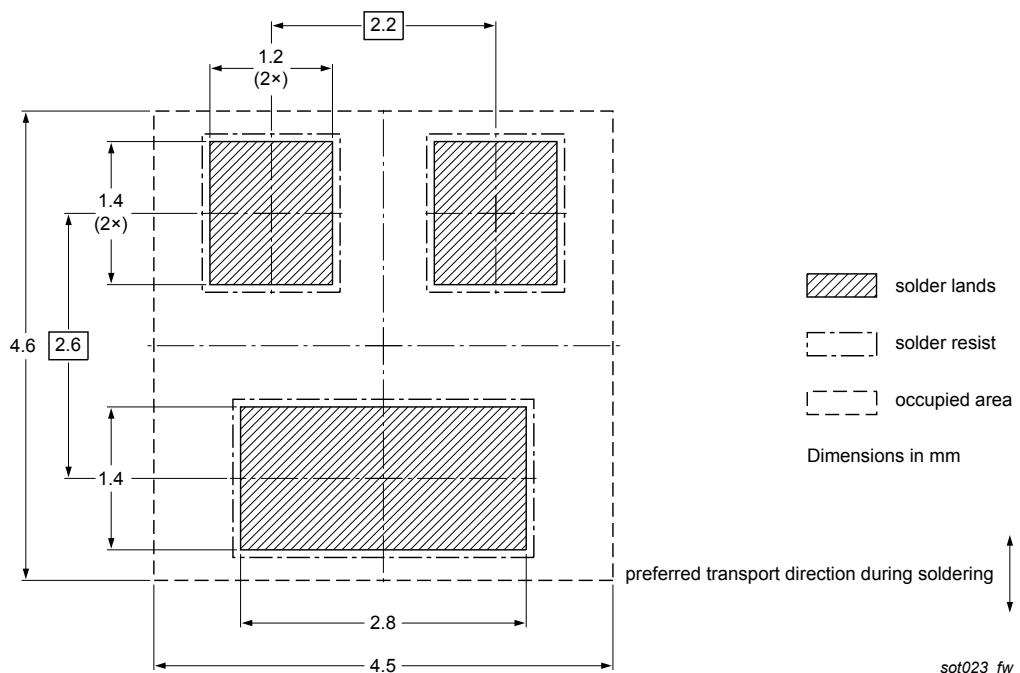


Fig. 20. Wave soldering footprint for TO-236AB (SOT23)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMV20EN v.2	20180705	Product data sheet	-	PMV20EN v.1
Modifications:	<ul style="list-style-type: none">Adaption of the typical value of g_{fs} according to new wafer fab			
PMV20EN v.1	20140605	Product data sheet	-	-

15. Legal information

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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