



PMF250XNE

30V N-channel Trench MOSFET

2 February 2024

Product data sheet

1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Low threshold voltage
- Very fast switching
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection > 2 kV HBM

3. Applications

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

4. Quick reference data

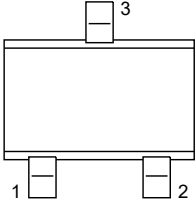
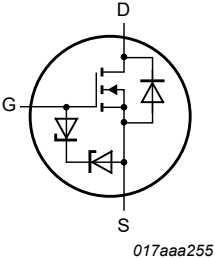
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ }^{\circ}\text{C}$	-	-	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	A
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 0.9\text{ A}; T_j = 25\text{ }^{\circ}\text{C}$	-	212	254	m Ω

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 SC-70 (SOT323)	 017aaa255
2	S	source		
3	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMF250XNE	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	SOT323

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMF250XNE	Z%W

[1] % = placeholder for manufacturing site code

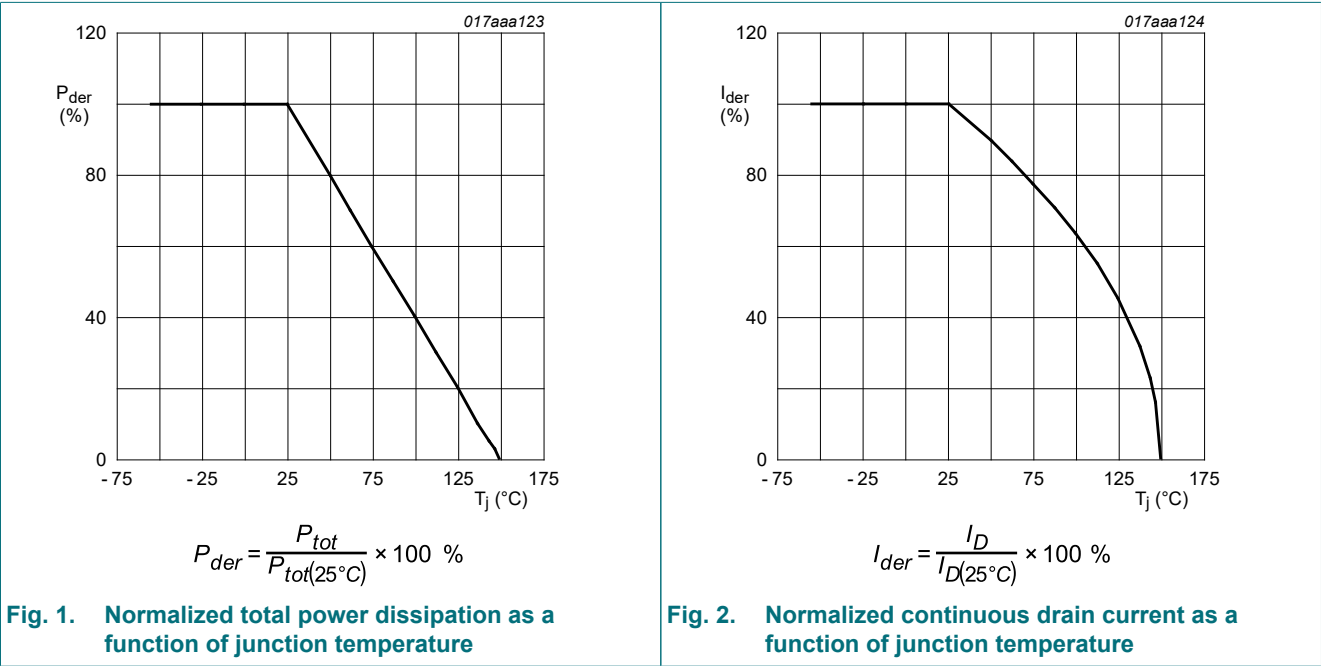
8. Limiting values

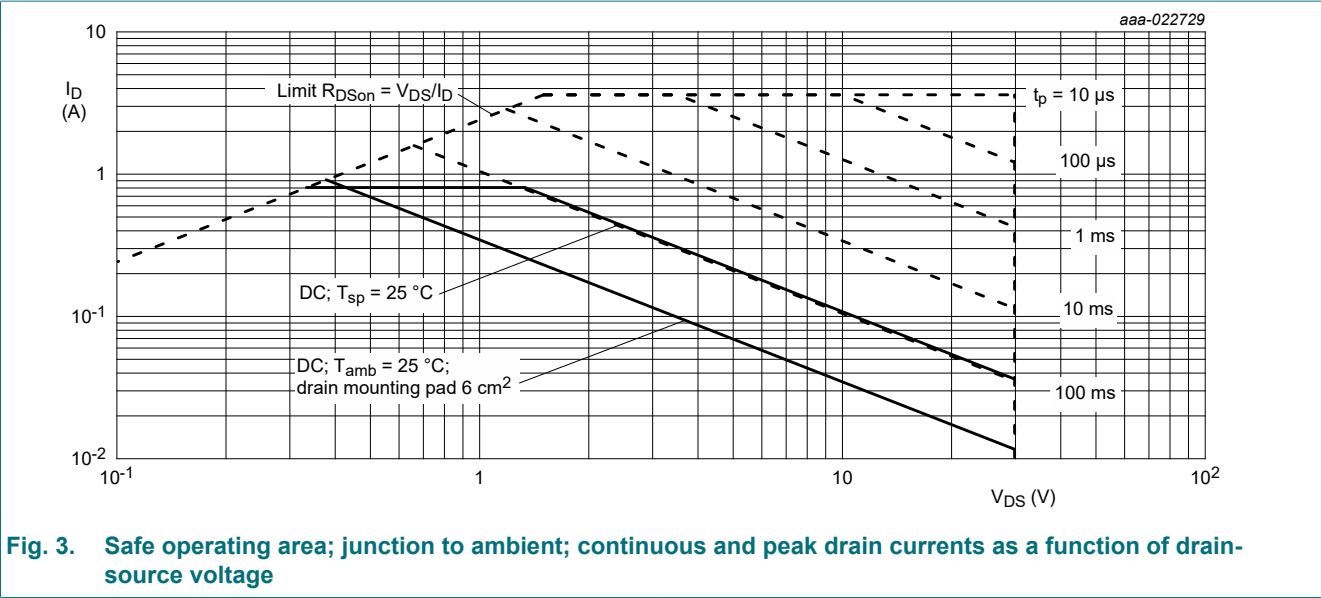
Table 5. Limiting values

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			-12	12	V
I _D	drain current	V _{GS} = 4.5 V; T _{amb} = 25 °C; t ≤ 5 s	[1]	-	1	A
		V _{GS} = 4.5 V; T _{amb} = 25 °C	[1]	-	0.9	A
		V _{GS} = 4.5 V; T _{amb} = 100 °C	[1]	-	0.5	A
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs		-	4	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	275	mW
			[1]	-	342	mW
		T _{sp} = 25 °C		-	1.1	W
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]	-	0.3	A

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





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]	-	397	457	K/W
			[2]	-	318	366	K/W
		$t \leq 5\text{ s}$	[2]	-	256	294	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	102	117	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 and mounting pad for drain 6 cm².

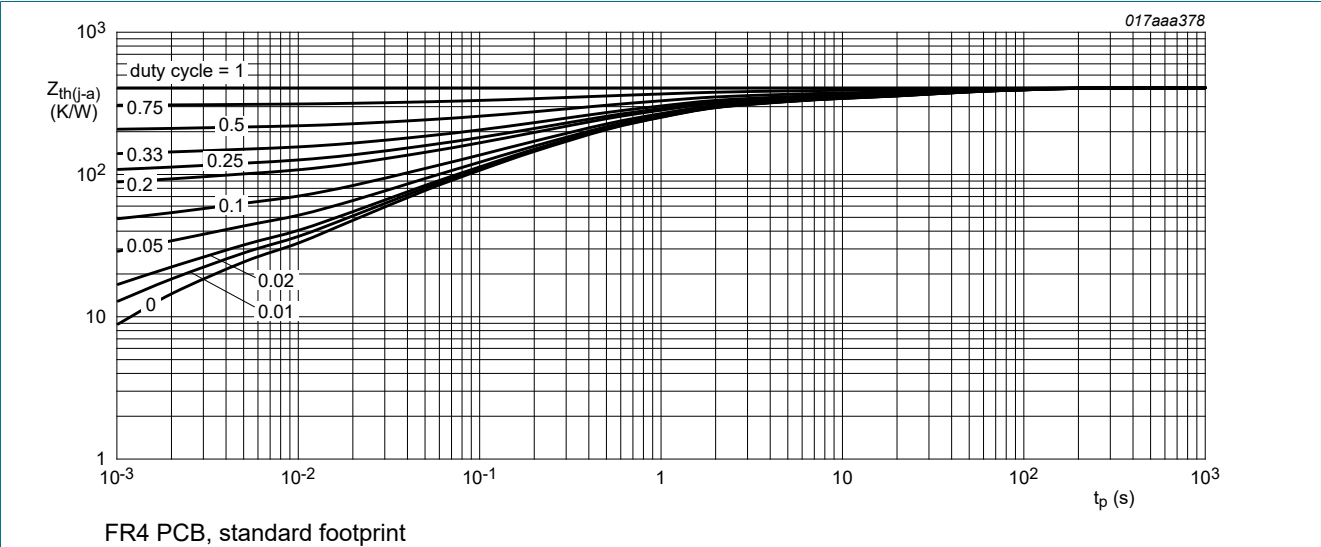


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

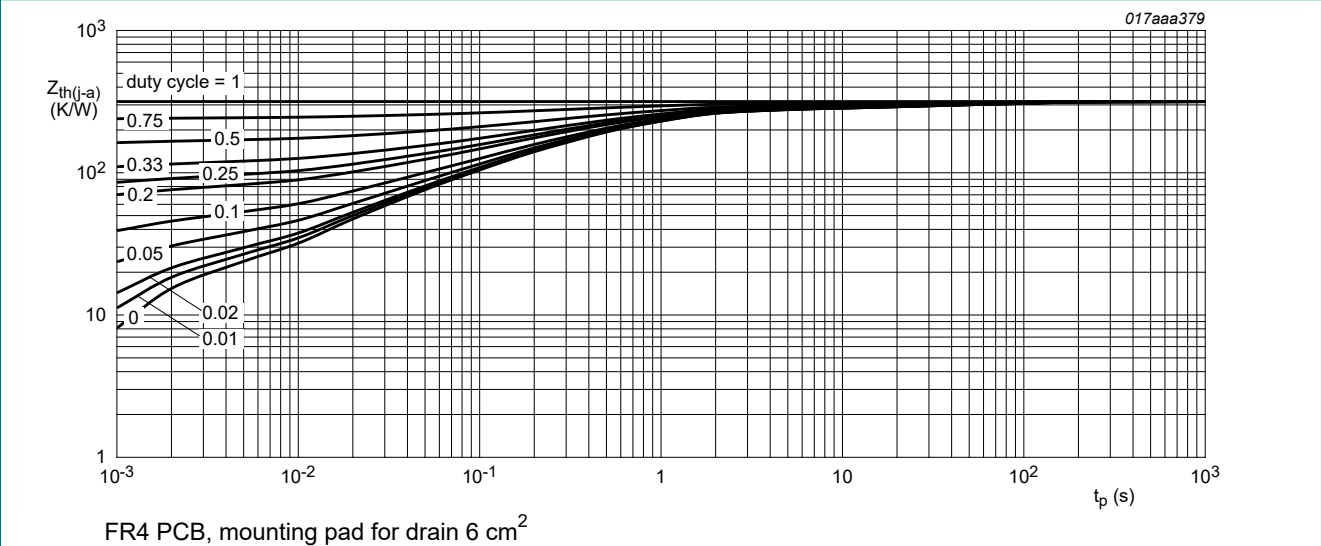


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 250 μA; V _{GS} = 0 V; T _j = 25 °C		30	-	-	V
V _{GSth}	gate-source threshold voltage	I _D = 250 μA; V _{DS} =V _{GS} ; T _j = 25 °C		0.75	1	1.25	V
I _{DSS}	drain leakage current	V _{DS} = 30 V; V _{GS} = 0 V; T _j = 25 °C		-	-	1	μA
I _{GSS}	gate leakage current	V _{GS} = 12 V; V _{DS} = 0 V; T _j = 25 °C		-	-	10	μA
		V _{GS} = -12 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-10	μA
		V _{GS} = 4.5 V; V _{DS} = 0 V; T _j = 25 °C		-	-	5	μA
		V _{GS} = -4.5 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-5	μA
R _{DSon}	drain-source on-state resistance	V _{GS} = 4.5 V; I _D = 0.9 A; T _j = 25 °C		-	212	254	mΩ
		V _{GS} = 4.5 V; I _D = 0.9 A; T _j = 150 °C		-	346	416	mΩ
		V _{GS} = 2.5 V; I _D = 0.8 A; T _j = 25 °C		-	269	321	mΩ
g _{fs}	forward transconductance	V _{DS} = 10 V; I _D = 0.9 A; T _j = 25 °C		-	3.5	-	S
Dynamic characteristics							
Q _{G(tot)}	total gate charge	V _{DS} = 15 V; I _D = 0.9 A; V _{GS} = 4.5 V; T _j = 25 °C		-	1.05	1.65	nC
Q _{GS}	gate-source charge			-	0.15	-	nC
Q _{GD}	gate-drain charge			-	0.27	-	nC
C _{iss}	input capacitance	V _{DS} = 15 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C		-	81	-	pF
C _{oss}	output capacitance			-	13	-	pF
C _{rss}	reverse transfer capacitance			-	8.5	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = 15 V; I _D = 0.9 A; V _{GS} = 4.5 V; R _{G(ext)} = 6 Ω; T _j = 25 °C		-	7	-	ns
t _r	rise time			-	14	-	ns
t _{d(off)}	turn-off delay time			-	17	-	ns
t _f	fall time			-	6	-	ns
Source-drain diode							
V _{SD}	source-drain voltage	I _S = 0.3 A; V _{GS} = 0 V; T _j = 25 °C		-	0.7	1.2	V

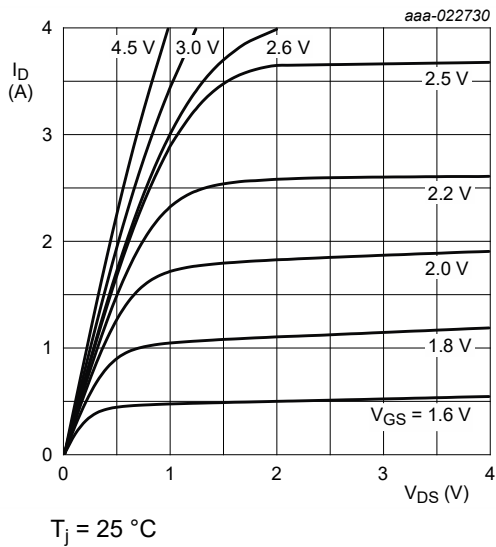


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

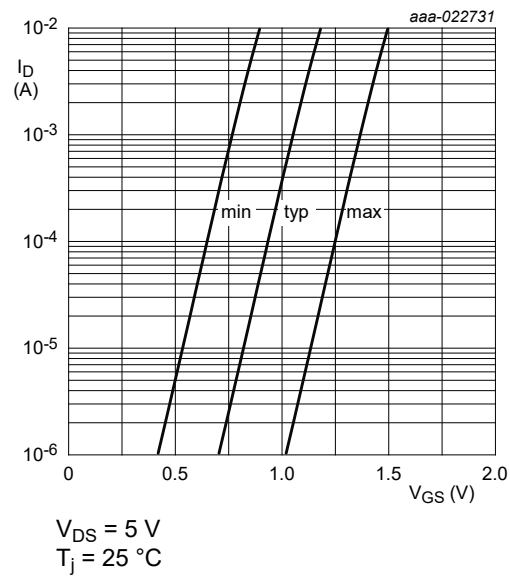


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

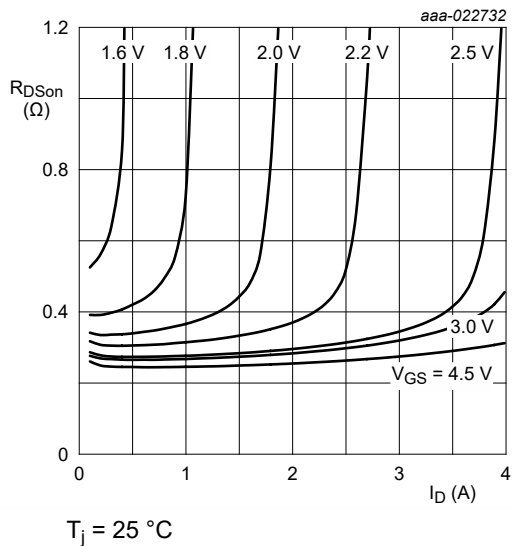


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

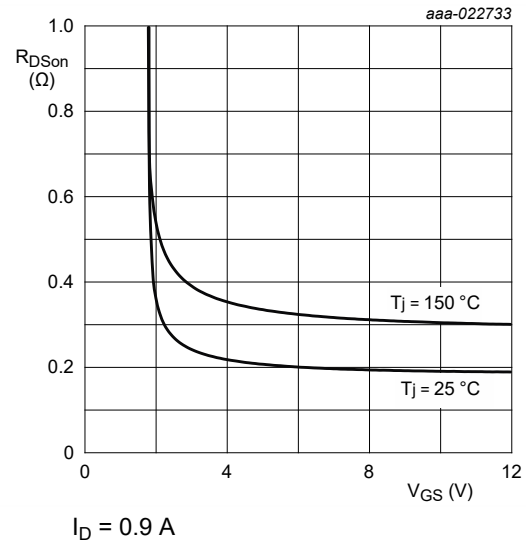


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

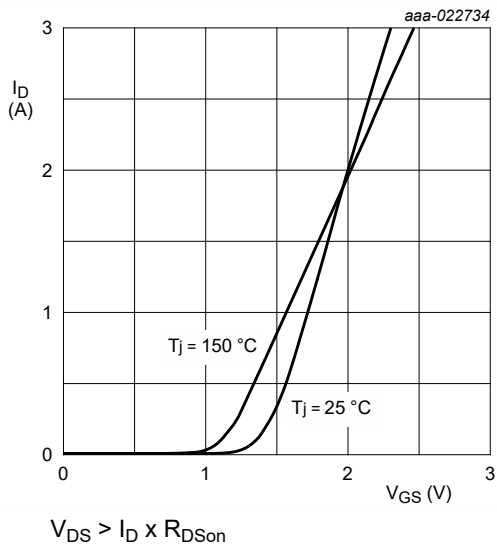


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

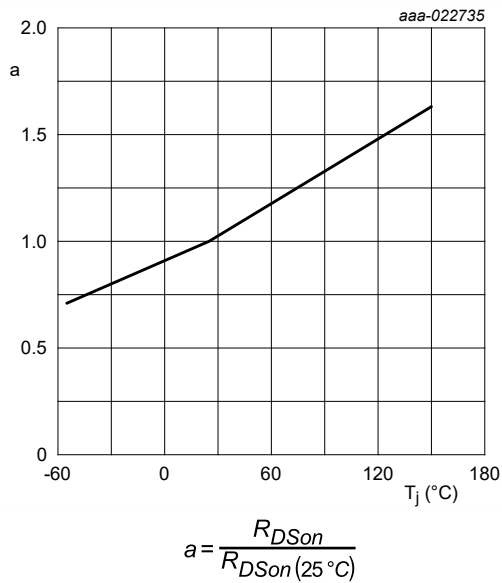


Fig. 11. Normalized drain-source on-state resistance as a function of ambient temperature; typical values

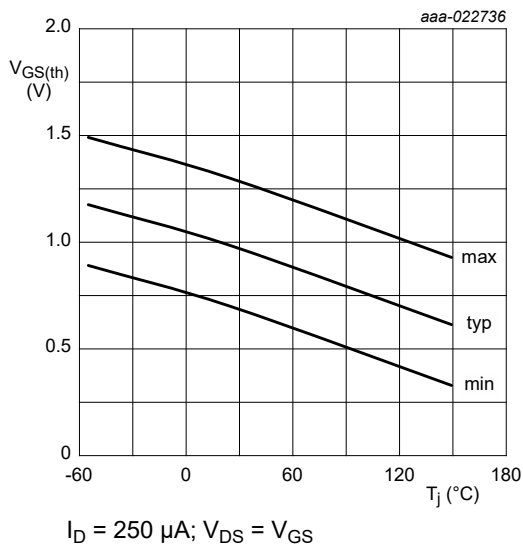


Fig. 12. Gate-source threshold voltage as a function of ambient temperature

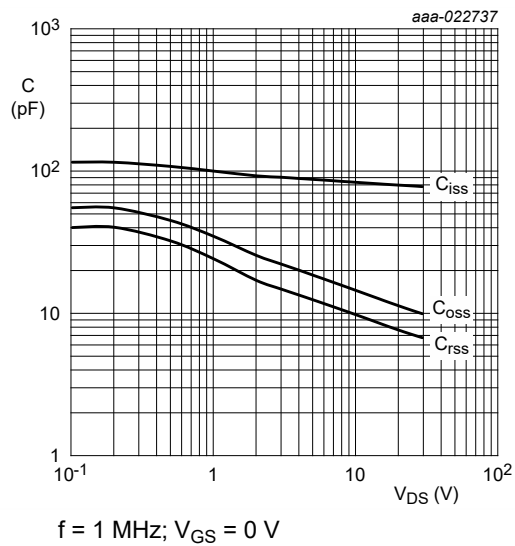


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

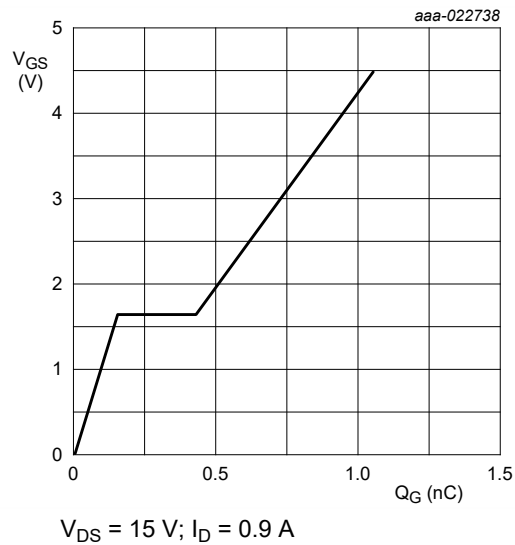


Fig. 14. Gate-source voltage as a function of gate charge; typical values

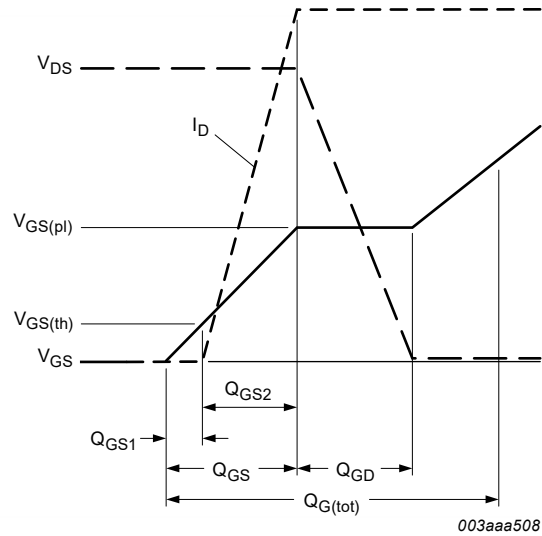


Fig. 15. Gate charge waveform definitions

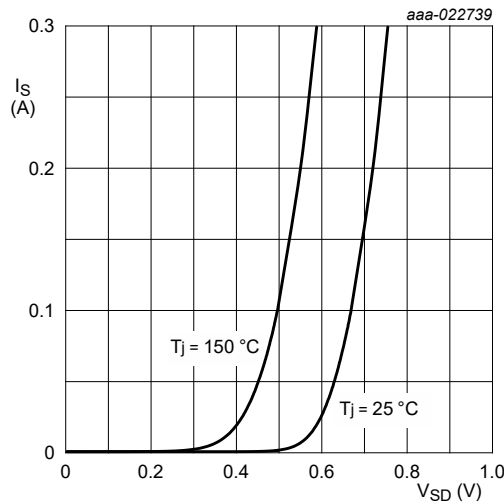


Fig. 16. Source current as a function of source-drain voltage; typical values

11. Test information

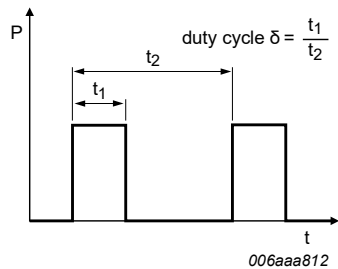


Fig. 17. Duty cycle definition

12. Package outline

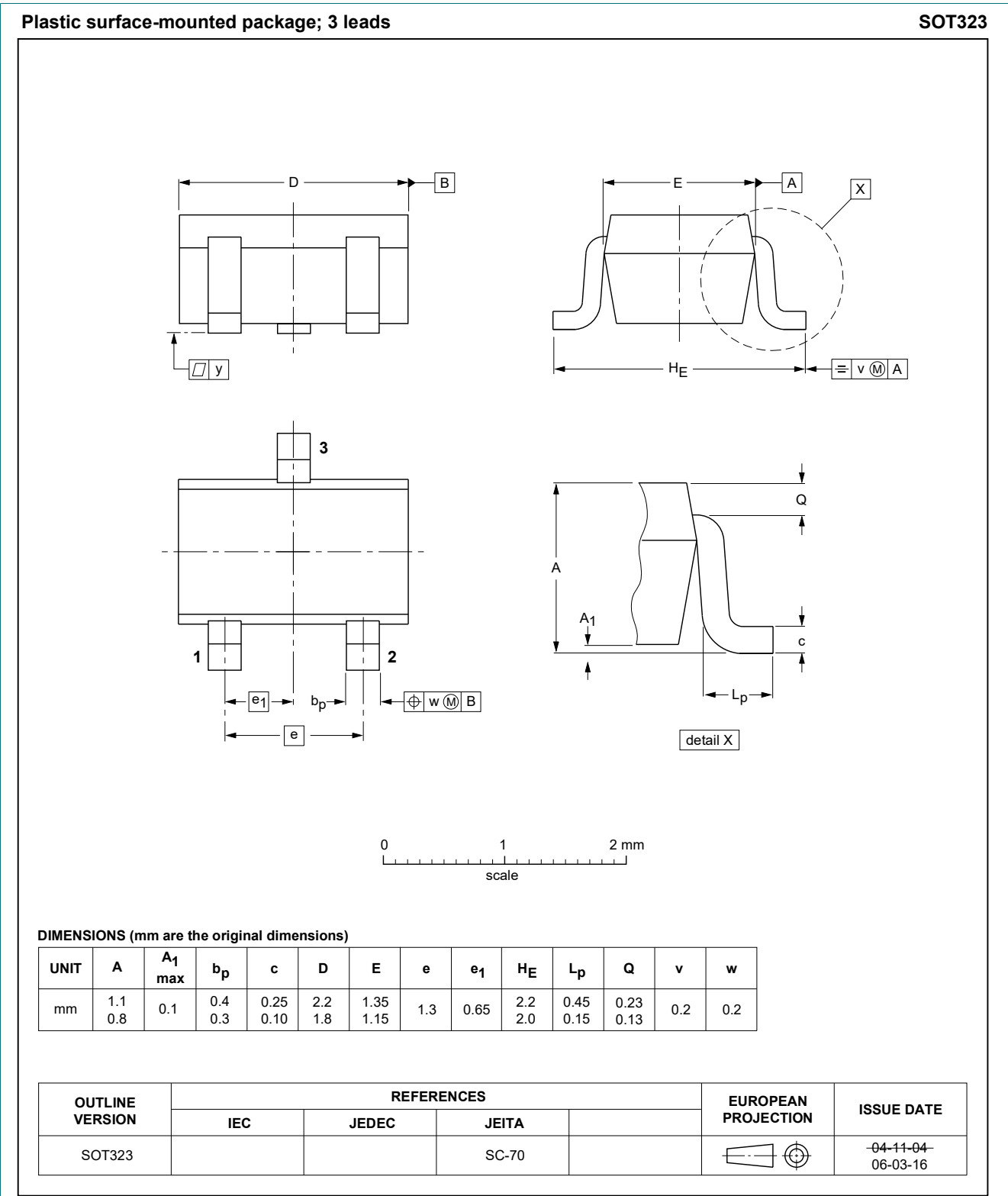
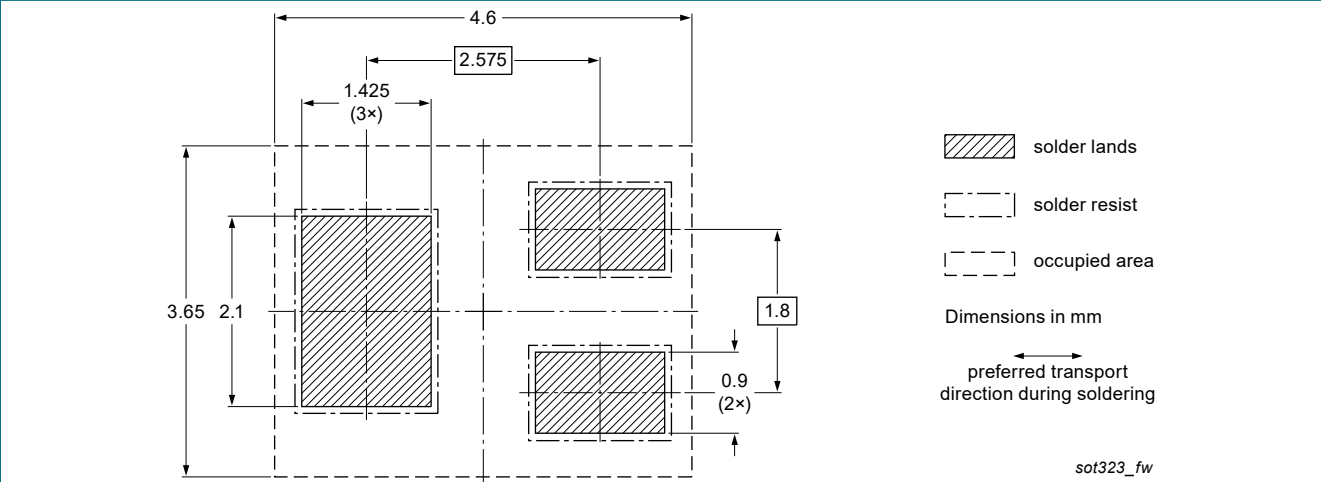
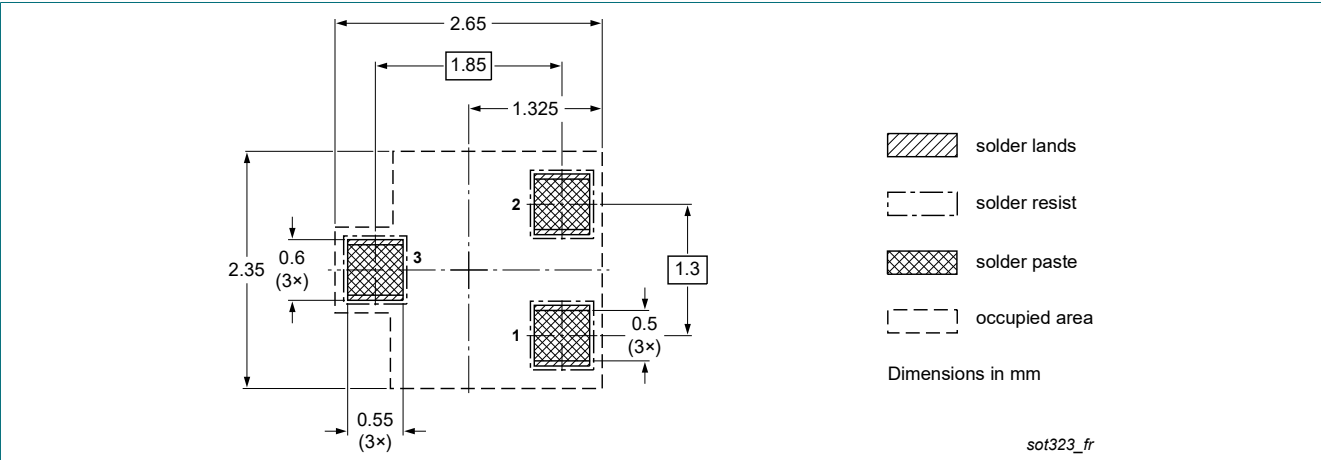


Fig. 18. Package outline SC-70 (SOT323)

13. Soldering



14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMF250XNE v.2	20240202	Product data sheet	-	PMF250XNE v.1
Modifications:	• Chapter "Characteristics": X-axis title of Fig. 8 changed			
PMF250XNE v.1	20160428	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 3

9. Thermal characteristics..... 5

10. Characteristics.....6

11. Test information..... 9

12. Package outline..... 10

13. Soldering..... 11

14. Revision history.....12

15. Legal information.....13

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Date of release: 2 February 2024

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