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Kind regards,

Team Nexperia



PMF77XN

30 V, single N-channel Trench MOSFET

Rev. 1 — 27 March 2012

Product data sheet

1. Product profile

1.1 General description

N-channel enhancement mode Field-Effect Transistor (FET) in a SOT323 (SC-70) small 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	$T_j = 25\text{ }^{\circ}\text{C}$	-	-	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]	-	1.63	A
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}$; $I_D = 1.5\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$	-	77	97	m Ω

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

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	SOT323 (SC-70)	017aaa253
2	S	source		
3	D	drain		



3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
PMF77XN	SC-70	plastic surface-mounted package; 3 leads	SOT323

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PMF77XN	V9%

[1] % = placeholder for manufacturing site code

5. Limiting values

Table 5. Limiting values

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

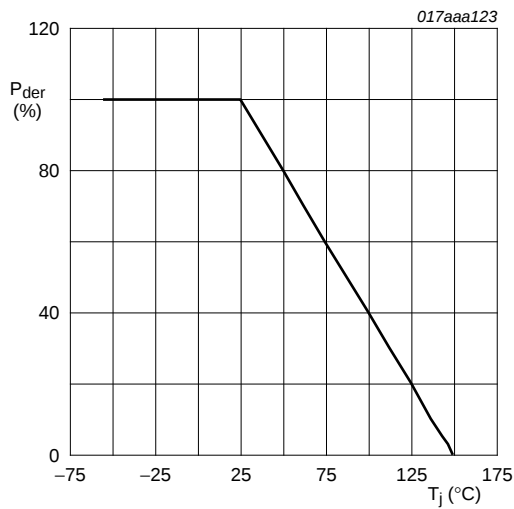
Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ }^{\circ}\text{C}$	-	30	V
V_{GS}	gate-source voltage		-12	12	V
I_D	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}; t \leq 5\text{ s}$ ^[1]	-	1.63	A
		$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$ ^[1]	-	1.5	A
		$V_{GS} = 4.5\text{ V}; T_{amb} = 100\text{ }^{\circ}\text{C}$ ^[1]	-	1	A
I_{DM}	peak drain current	$T_{amb} = 25\text{ }^{\circ}\text{C}$; single pulse; $t_p \leq 10\text{ }\mu\text{s}$	-	6	A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ }^{\circ}\text{C}$ ^[2]	-	270	mW
		^[1]	-	350	mW
		$T_{sp} = 25\text{ }^{\circ}\text{C}$	-	1920	mW
T_j	junction temperature		-55	150	$^{\circ}\text{C}$
T_{amb}	ambient temperature		-55	150	$^{\circ}\text{C}$
T_{stg}	storage temperature		-65	150	$^{\circ}\text{C}$

Source-drain diode

I_S	source current	$T_{amb} = 25\text{ }^{\circ}\text{C}$ ^[1]	-	0.7	A
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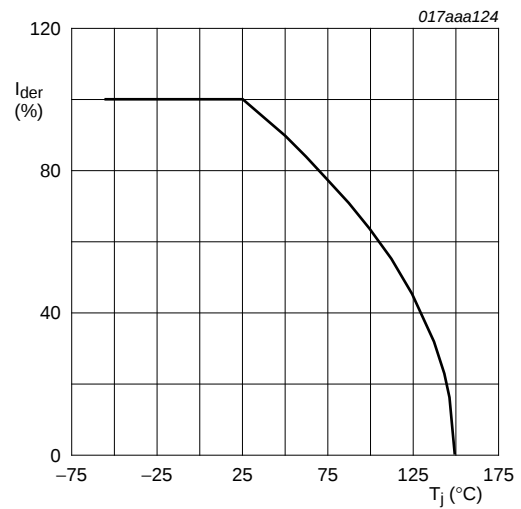
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².

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



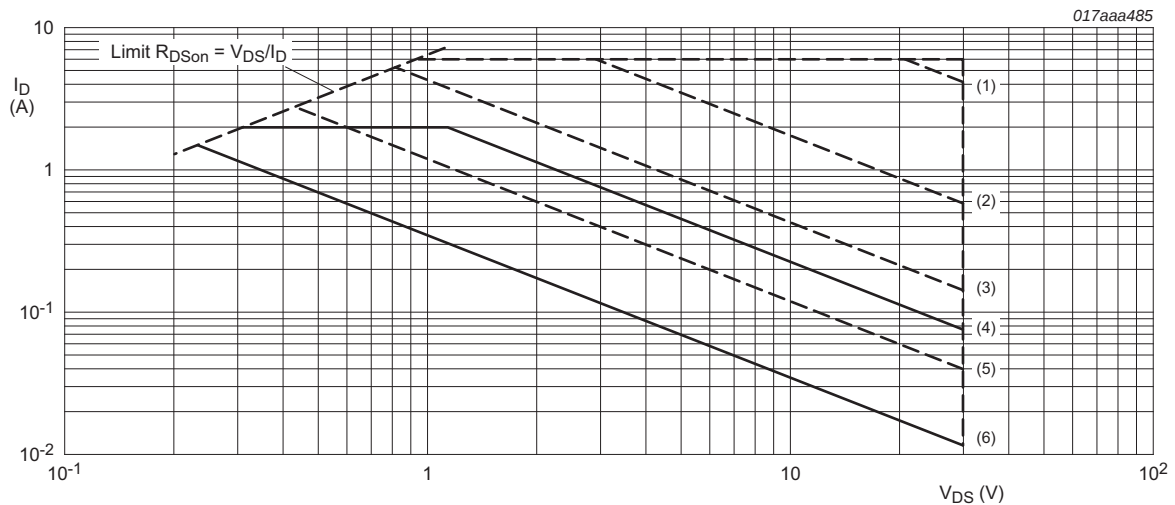
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}\text{C})}} \times 100 \%$$

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



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

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



I_{DM} = single pulse

(1) $t_p = 100 \mu\text{s}$

(2) $t_p = 1 \text{ ms}$

(3) $t_p = 10 \text{ ms}$

(4) DC; $T_{sp} = 25^{\circ}\text{C}$

(5) $t_p = 100 \text{ ms}$

(6) DC; $T_{amb} = 25^{\circ}\text{C}$; drain mounting pad 6 cm^2

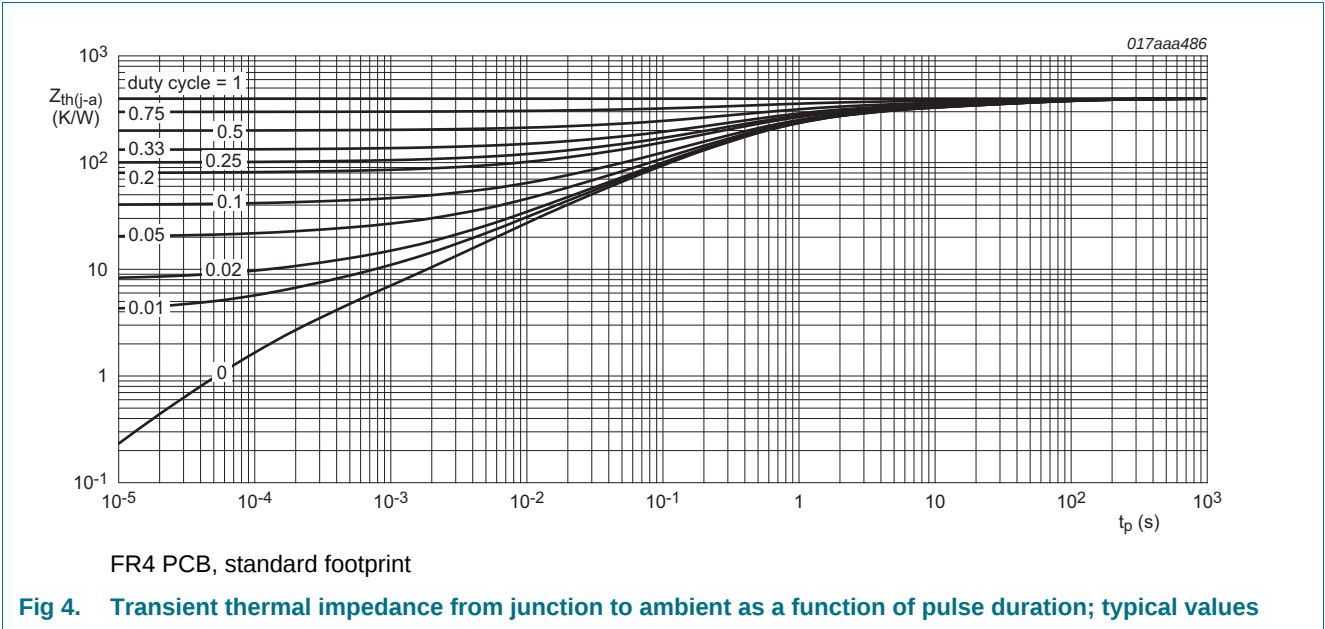
Fig 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

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]	-	402	460 K/W
			[2]	-	312	360 K/W
			[3]	-	265	305 K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	55	65	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 cm².
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 6 cm², t ≤ 5 s.



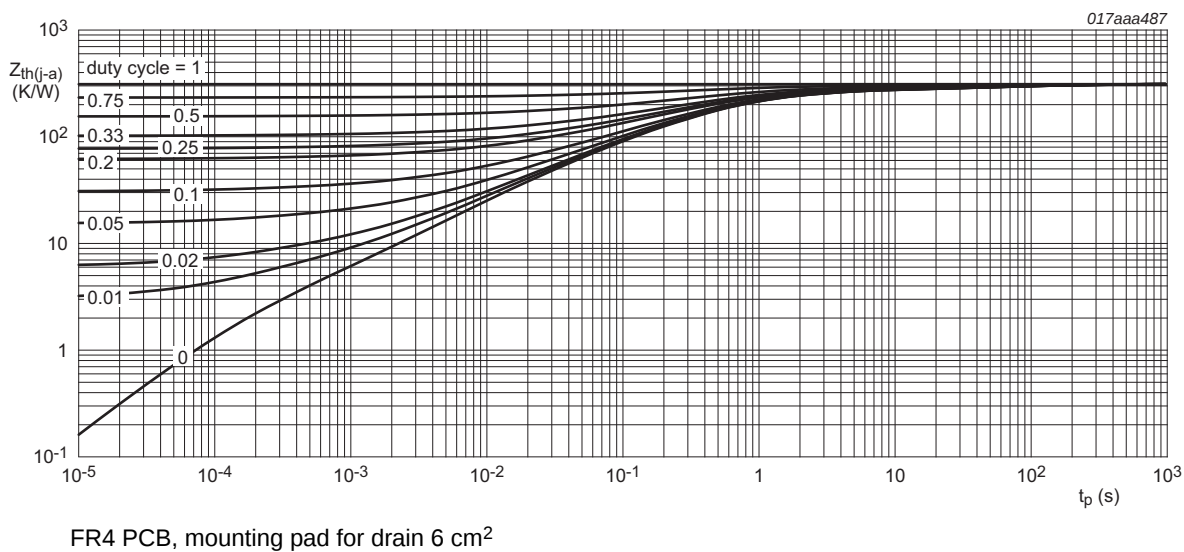


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 250 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	0.5	1	1.5	V
I _{DSS}	drain leakage current	V _{DS} = 30 V; V _{GS} = 0 V; T _j = 25 °C	-	-	1	μA
		V _{DS} = 30 V; V _{GS} = 0 V; T _j = 150 °C	-	-	10	μA
I _{GSS}	gate leakage current	V _{GS} = 12 V; V _{DS} = 0 V; T _j = 25 °C	-	-	100	nA
		V _{GS} = -12 V; V _{DS} = 0 V; T _j = 25 °C	-	-	100	nA
R _{DSon}	drain-source on-state resistance	V _{GS} = 4.5 V; I _D = 1.5 A; T _j = 25 °C	-	77	97	mΩ
		V _{GS} = 4.5 V; I _D = 1.5 A; T _j = 150 °C	-	122	154	mΩ
		V _{GS} = 2.5 V; I _D = 0.8 A; T _j = 25 °C	-	104	142	mΩ
g _{fs}	forward transconductance	V _{DS} = 10 V; I _D = 1.5 A; T _j = 25 °C	-	6.5	-	S
Dynamic characteristics						
Q _{G(tot)}	total gate charge	V _{DS} = 15 V; I _D = 1.5 A; V _{GS} = 4.5 V; T _j = 25 °C	-	1.9	2.9	nC
Q _{GS}	gate-source charge		-	0.35	-	nC
Q _{GD}	gate-drain charge		-	0.43	-	nC
C _{iSS}	input capacitance	V _{DS} = 15 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C	-	170	-	pF
C _{oSS}	output capacitance		-	31	-	pF
C _{rSS}	reverse transfer capacitance		-	17	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = 15 V; I _D = 1.5 A; V _{GS} = 4.5 V; R _{G(ext)} = 6 Ω; T _j = 25 °C	-	8	-	ns
t _r	rise time		-	19	-	ns
t _{d(off)}	turn-off delay time		-	27	-	ns
t _f	fall time		-	11	-	ns
Source-drain diode						
V _{SD}	source-drain voltage	I _S = 0.7 A; V _{GS} = 0 V; T _j = 25 °C	-	0.8	1.2	V

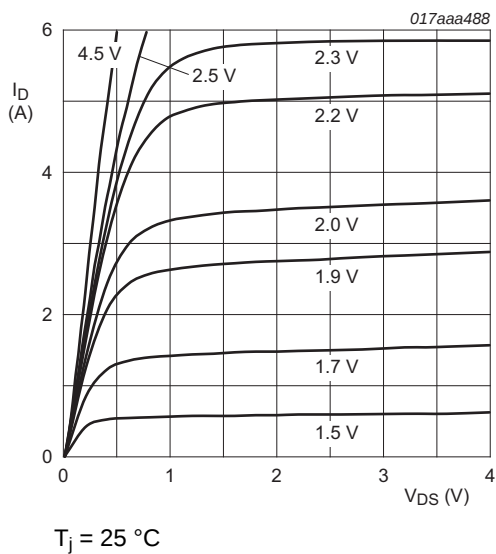


Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values

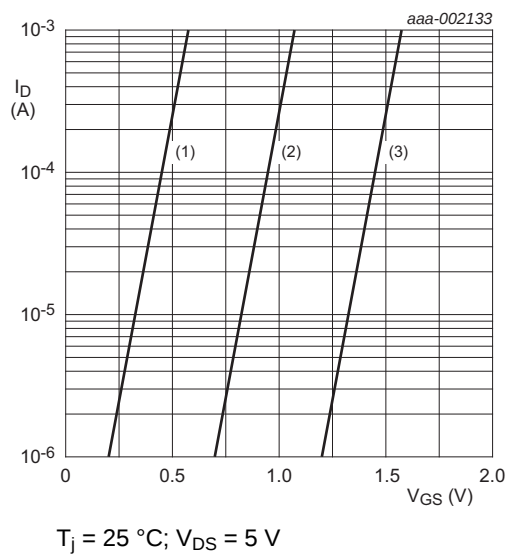


Fig 7. Sub-threshold drain current as a function of gate-source voltage

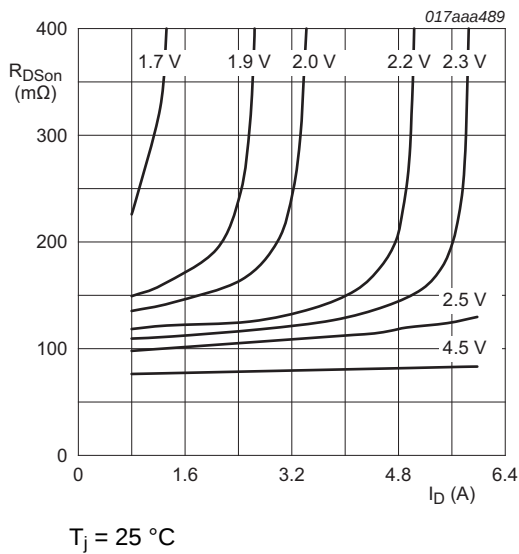


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

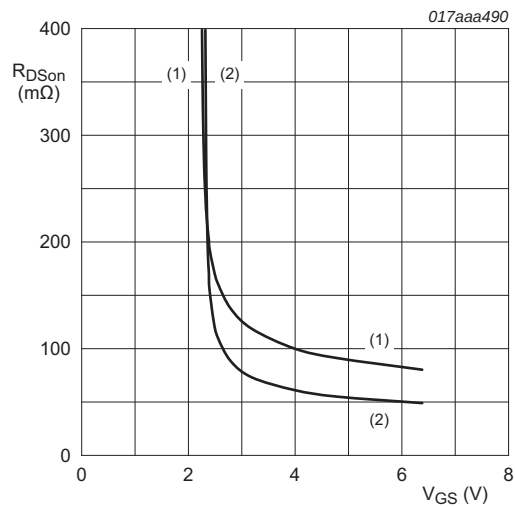
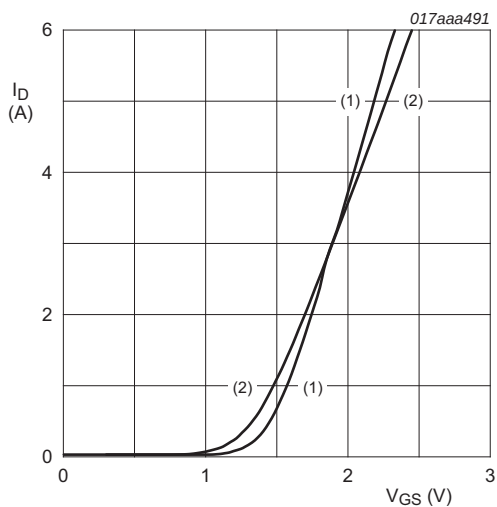
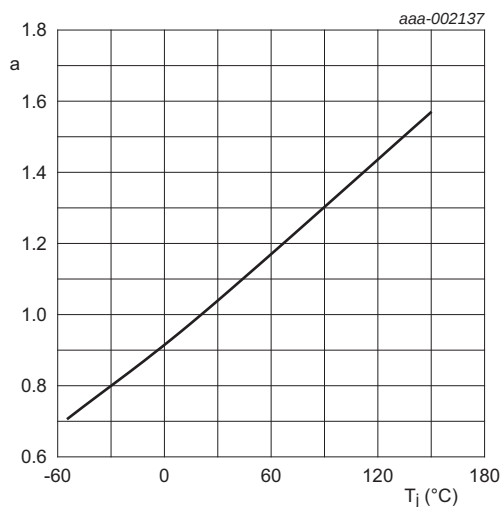


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values



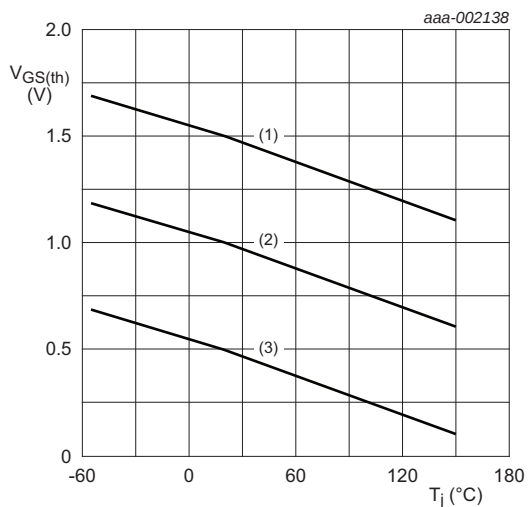
$V_{DS} > I_D \times R_{DSon}$
(1) $T_j = 25\text{ °C}$
(2) $T_j = 150\text{ °C}$

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



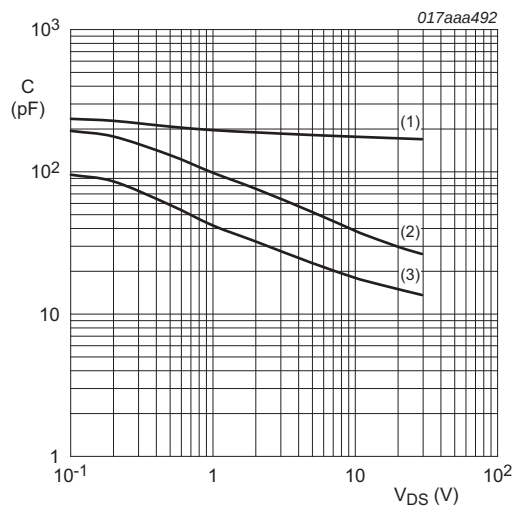
$$a = \frac{R_{DSon}}{R_{DSon(25^{\circ}C)}}$$

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



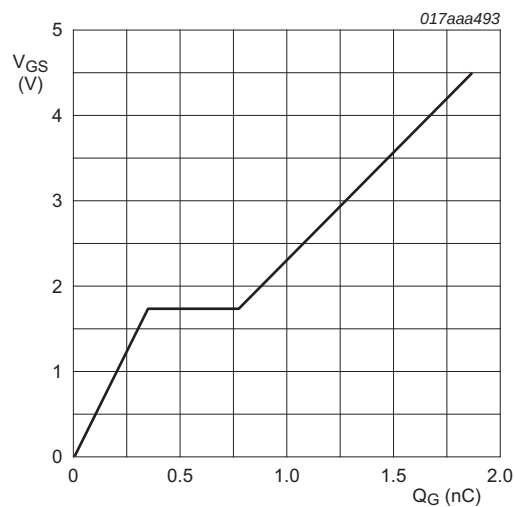
$I_D = 1.5\text{ A}; V_{DS} = V_{GS}$
(1) maximum values
(2) typical values
(3) minimum values

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



$f = 1\text{ MHz}; V_{GS} = 0\text{ V}$
(1) C_{iss}
(2) C_{oss}
(3) C_{rss}

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



$I_D = 1.5$ A; $V_{DS} = 10$ V; $T_{amb} = 25$ °C

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

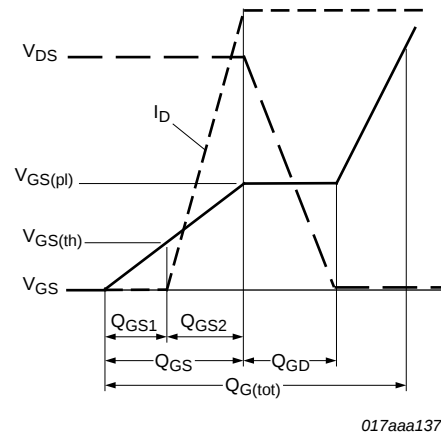
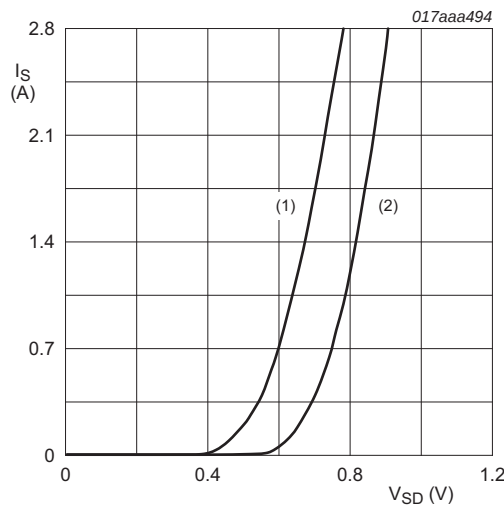


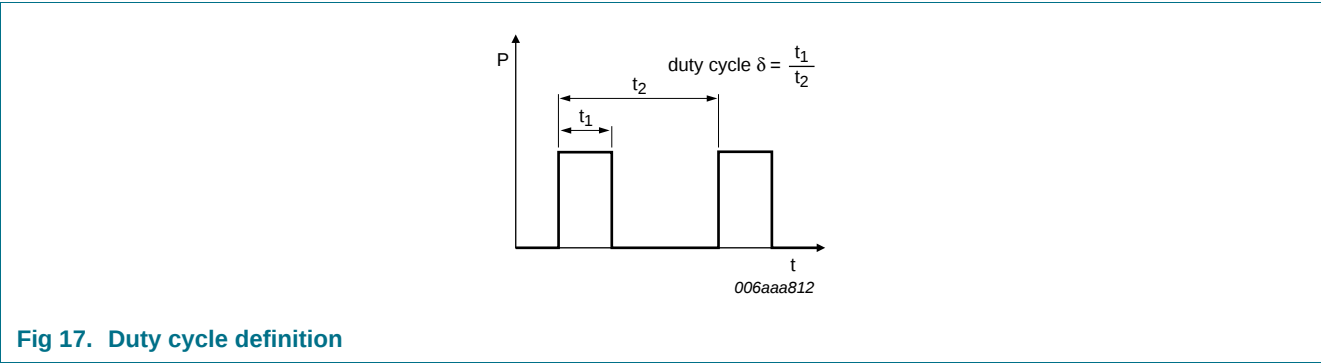
Fig 15. Gate charge waveform definitions



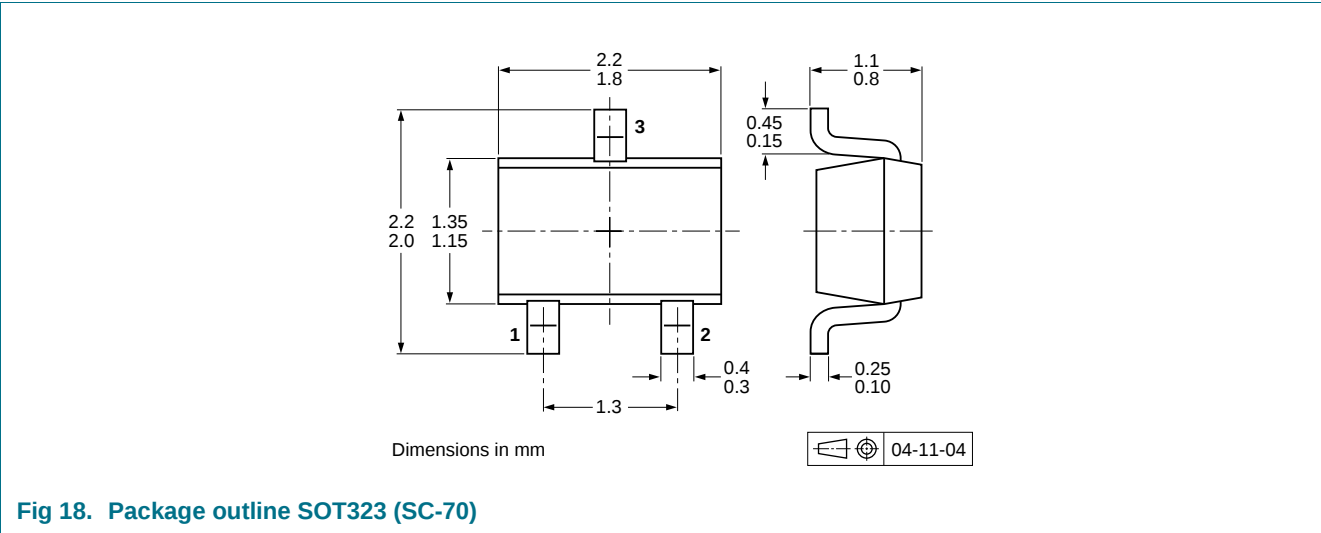
$V_{GS} = 0$ V
(1) $T_j = 150$ °C
(2) $T_j = 25$ °C

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

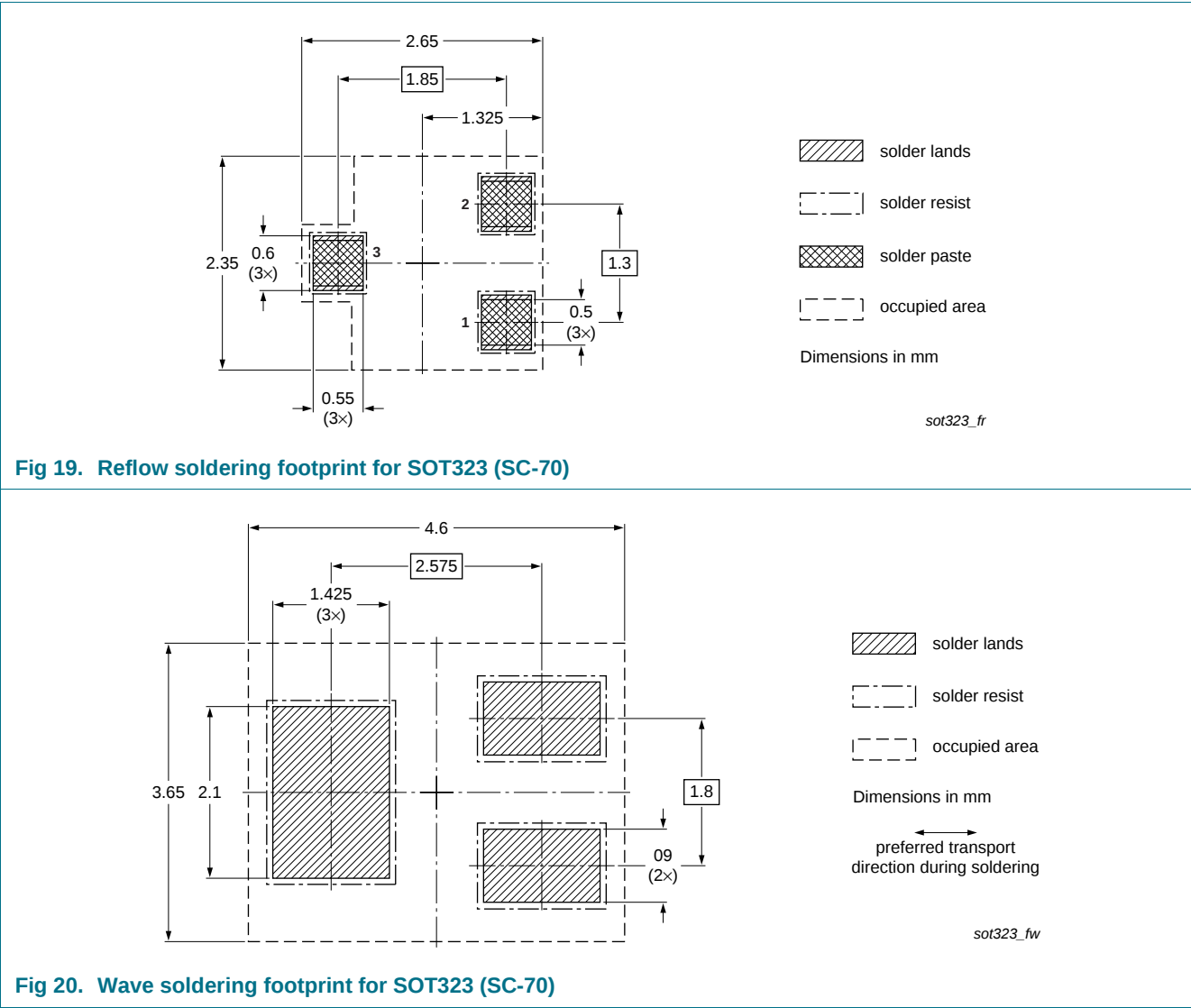
8. Test information



9. Package outline



10. Soldering



11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMF77XN v.1	20120327	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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