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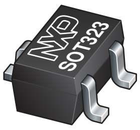


PMF77XN

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

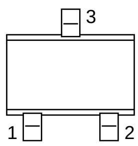
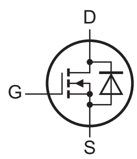
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	T_j = 25 °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]	-	-	1.63	A
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 1.5 A; T_j = 25 °C		-	77	97	mΩ

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

2. Pinning information

Table 2. Pinning information

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

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
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

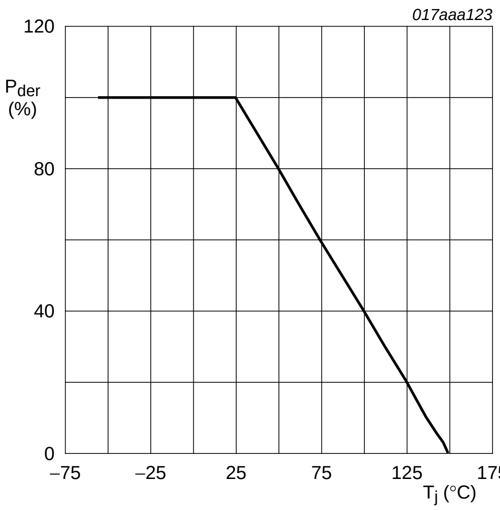
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	T_j = 25 °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]	-	1.63	A
		V_{GS} = 4.5 V; T_{amb} = 25 °C	[1]	-	1.5	A
		V_{GS} = 4.5 V; T_{amb} = 100 °C	[1]	-	1	A
I_{DM}	peak drain current	T_{amb} = 25 °C; single pulse; t_p ≤ 10 µs		-	6	A
P_{tot}	total power dissipation	T_{amb} = 25 °C	[2]	-	270	mW
			[1]	-	350	mW
		T_{sp} = 25 °C		-	1920	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]	-	0.7	A

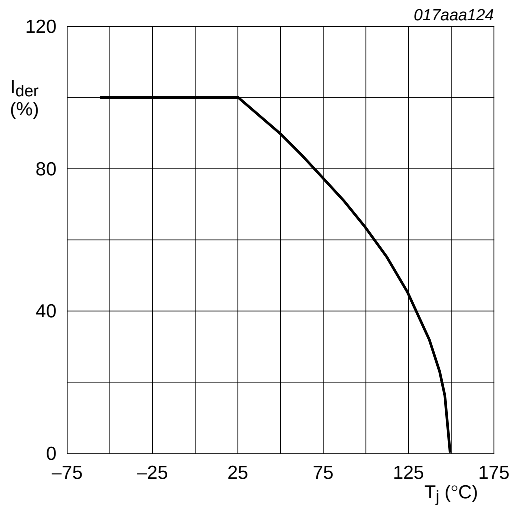
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm^2.

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



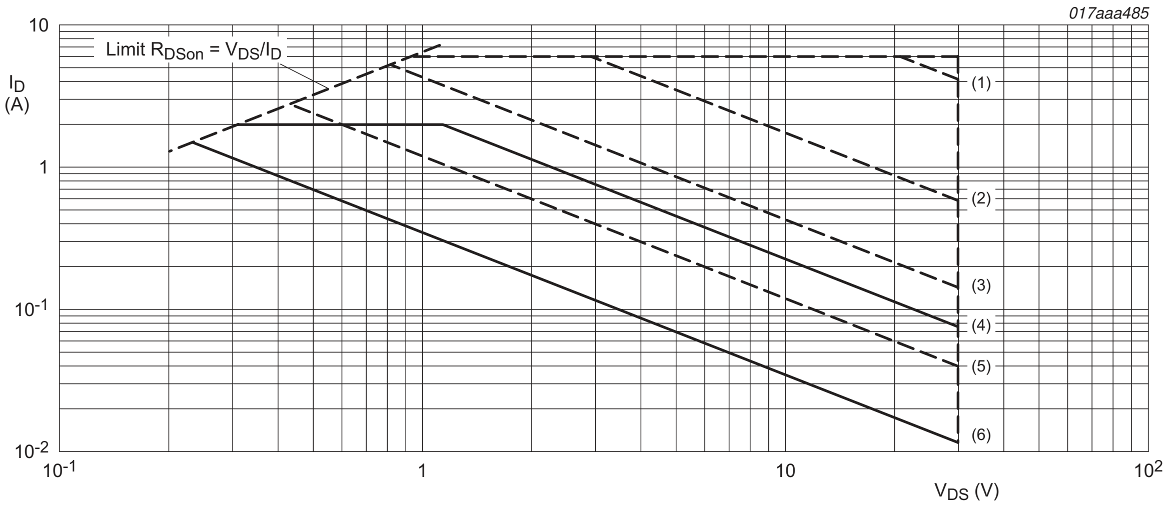
$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ C)}} \times 100\ \%$$

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



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

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



I_{DM} = single pulse

(1) t_p = 100 µs

(2) t_p = 1 ms

(3) t_p = 10 ms

(4) DC; T_{sp} = 25 °C

(5) t_p = 100 ms

(6) DC; T_{amb} = 25 °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

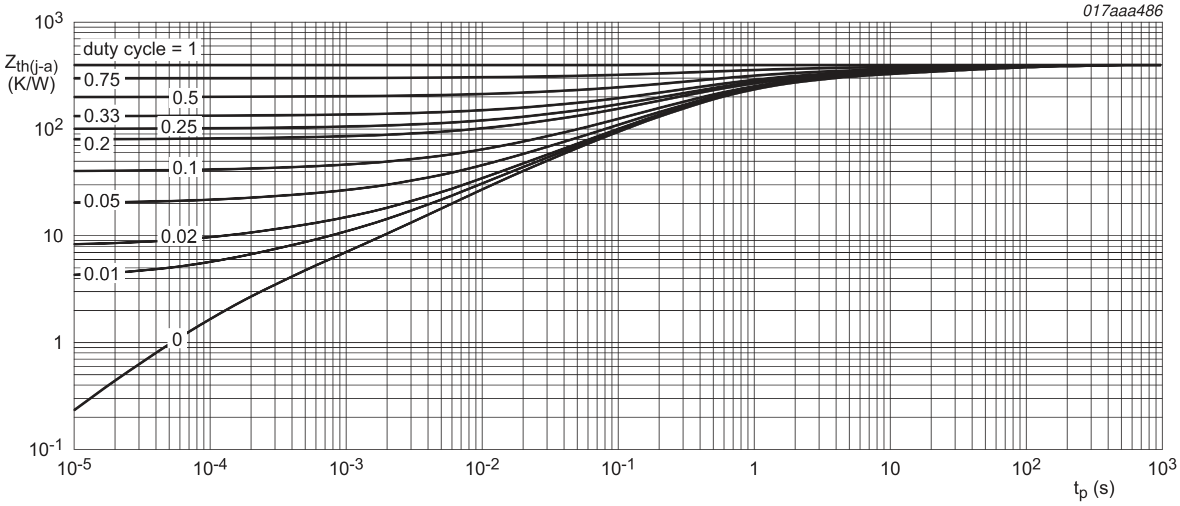
Table 6. Thermal characteristics

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.

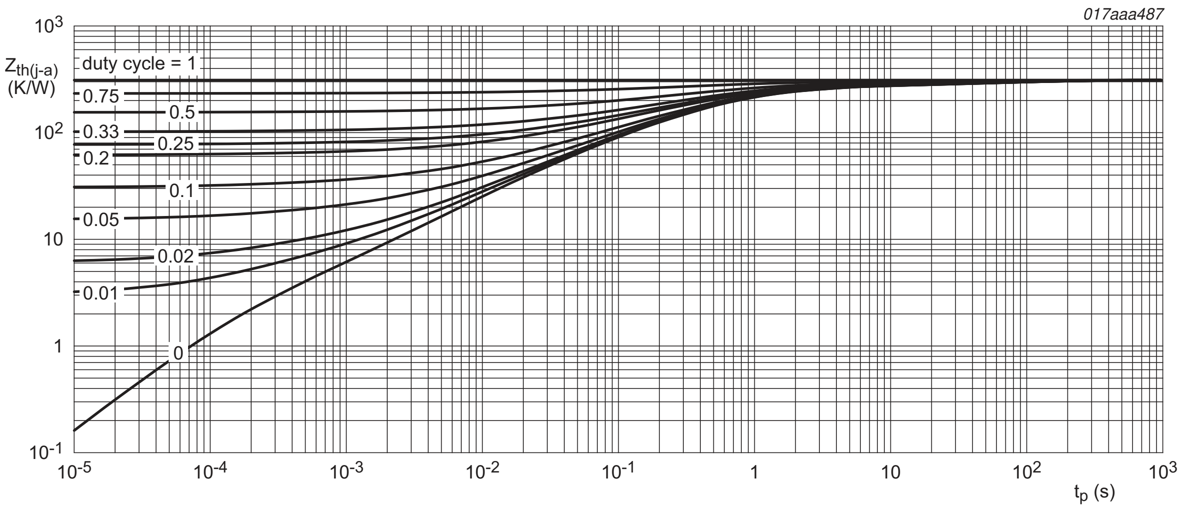
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 6 cm^2.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 6 cm^2, t ≤ 5 s.



FR4 PCB, standard footprint

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



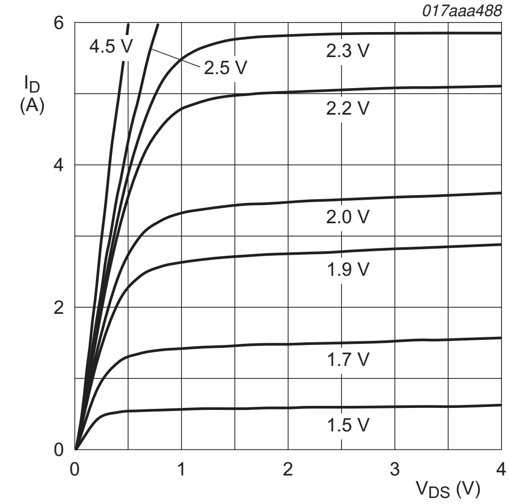
FR4 PCB, mounting pad for drain 6 cm^2

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

7. Characteristics

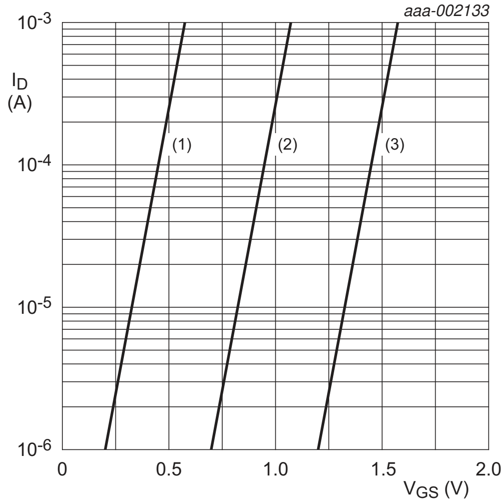
Table 7. Characteristics

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



T_j = 25 °C

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



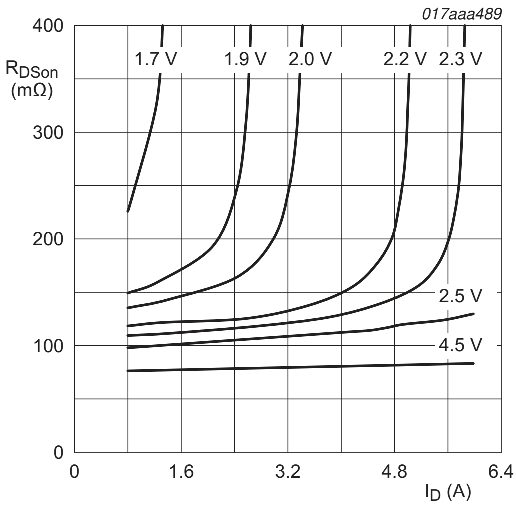
T_j = 25 °C; V_{DS} = 5 V

(1) minimum values

(2) typical values

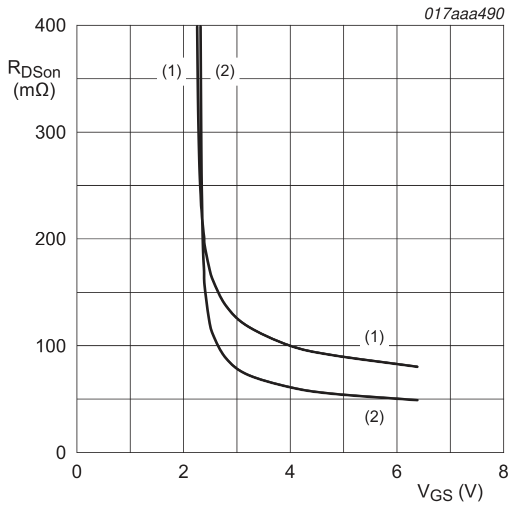
(3) maximum values

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



T_j = 25 °C

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

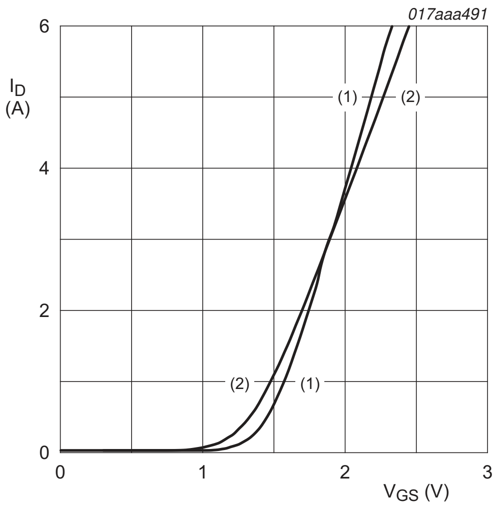


I_D = 1.5 A

(1) T_j = 150 °C

(2) T_j = 25 °C

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

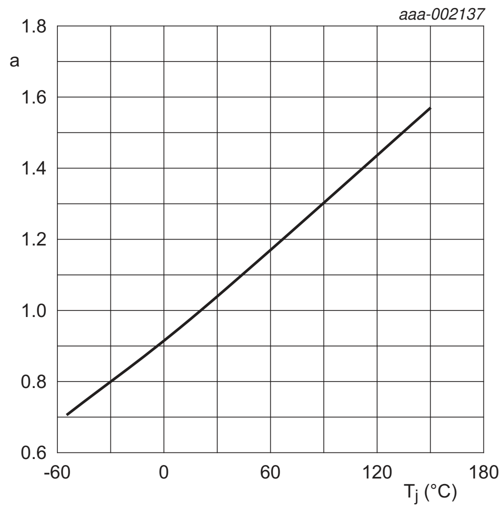


$V_{DS} > I_D \times R_{DSon}$

(1) T_j = 25 °C

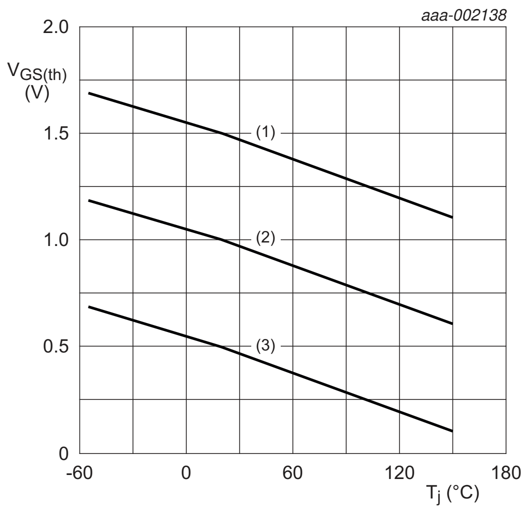
(2) T_j = 150 °C

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



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

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



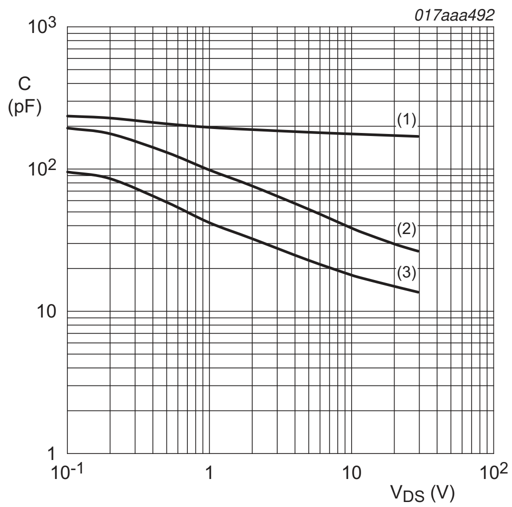
I_D = 1.5 A; $V_{DS} = V_{GS}$

(1) maximum values

(2) typical values

(3) minimum values

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



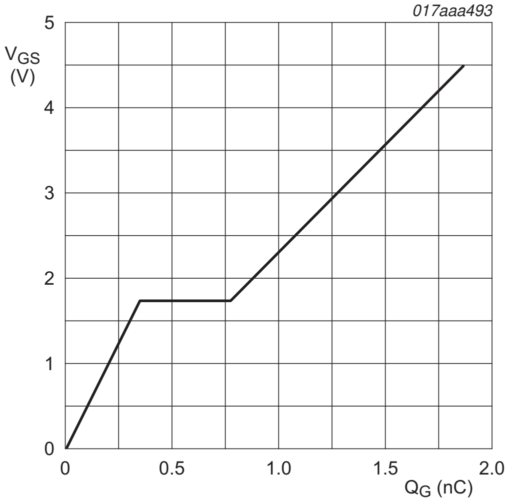
f = 1 MHz; V_{GS} = 0 V

(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

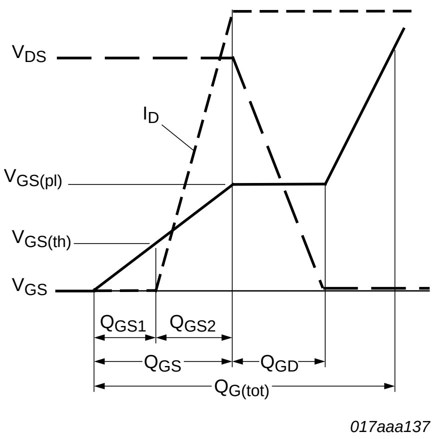
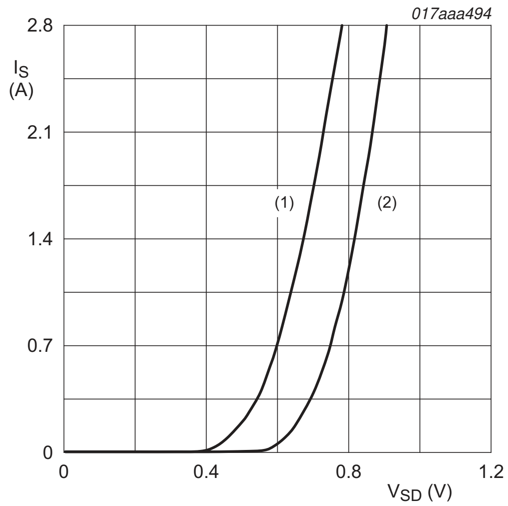


Fig 15. Gate charge waveform definitions



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

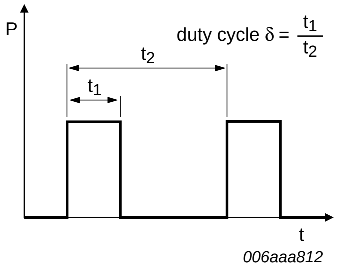


Fig 17. Duty cycle definition

9. Package outline

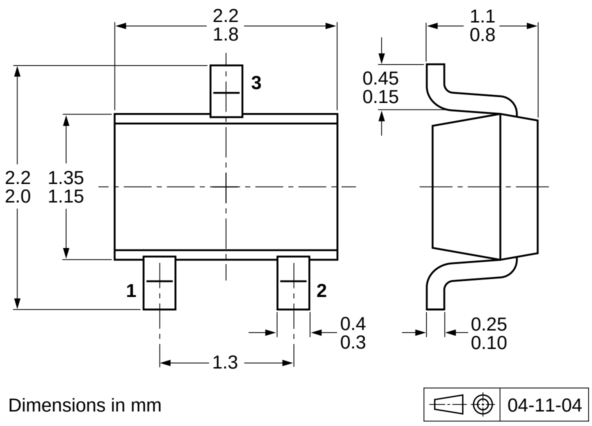


Fig 18. Package outline SOT323 (SC-70)

10. Soldering

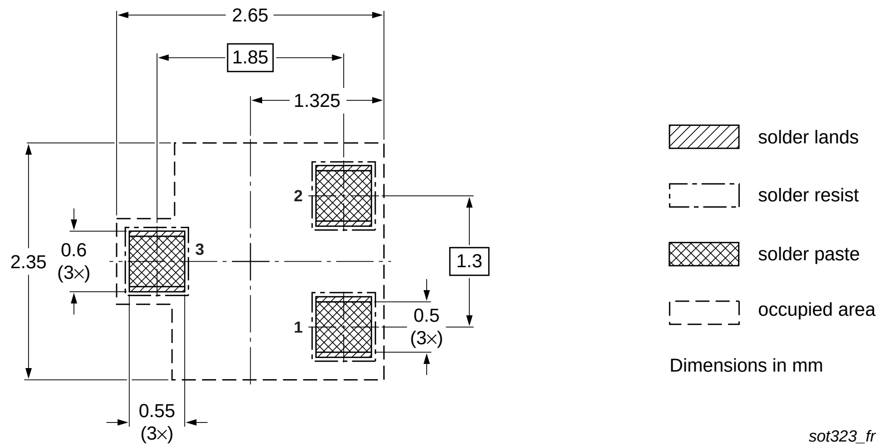


Fig 19. Reflow soldering footprint for SOT323 (SC-70)

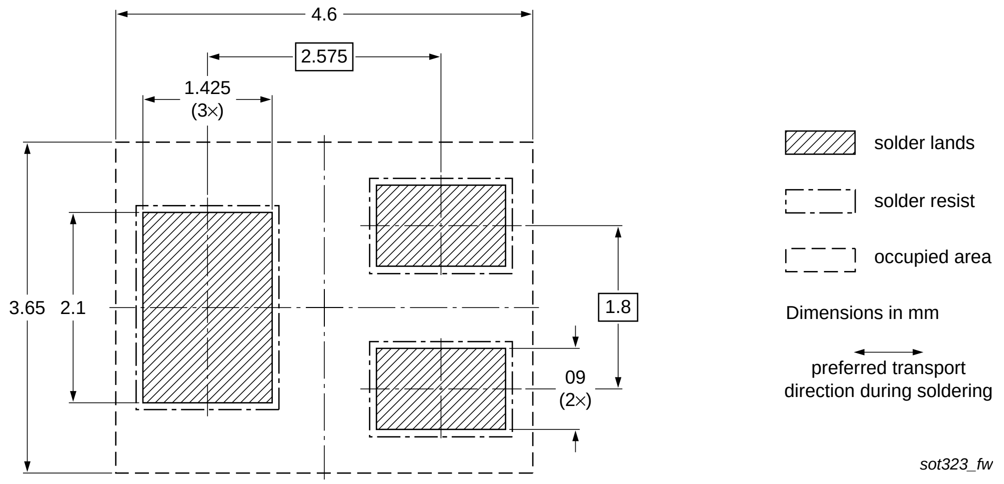


Fig 20. Wave soldering footprint for SOT323 (SC-70)

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.
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