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Kind regards,

Team Nexperia

PMF3800SN

N-channel TrenchMOS standard level FET

Rev. 03 — 11 November 2009 **Product data sheet**

1. Product profile

1.1 General description

Standard level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using TrenchMOS technology. This product is designed and qualified for use in computing, communications, consumer and industrial applications only.

1.2 Features and benefits

- Electrostatically robust due to integrated protection diodes
- Saves PCB space due to small footprint
- Suitable for high frequency applications due to fast switching characteristics
- Suitable for logic level gate drive sources

1.3 Applications

- High-speed line drivers
- Relay drivers

1.4 Quick reference data

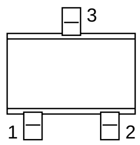
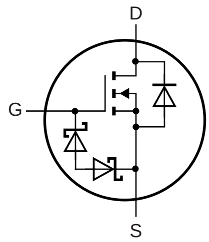
Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C	-	-	60	V
I_D	drain current	$T_{sp} = 25$ °C; $V_{GS} = 10$ V; see Figure 1 and 3	-	-	260	mA
P_{tot}	total power dissipation	$T_{sp} = 25$ °C; see Figure 2	-	-	0.56	W
Dynamic characteristics						
Q_{GD}	gate-drain charge	$V_{GS} = 10$ V; $I_D = 0.5$ A; $V_{DS} = 48$ V; $T_j = 25$ °C; see Figure 11	-	0.07	-	nC
$Q_{G(tot)}$	total gate charge		-	0.85	-	nC
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5$ V; $I_D = 200$ mA; $T_j = 25$ °C; see Figure 9 and 10	-	3.8	5.3	Ω
		$V_{GS} = 10$ V; $I_D = 500$ mA; $T_j = 25$ °C; see Figure 9 and 10	-	2.8	4.5	Ω

founded by Philips

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 SOT323 (SC-70)	 03ab60
2	S	source		
3	D	drain		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMF3800SN	SC-70	plastic surface-mounted package; 3 leads	SOT323

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMF3800SN	FK*

[1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

5. Limiting values

Table 5. Limiting values

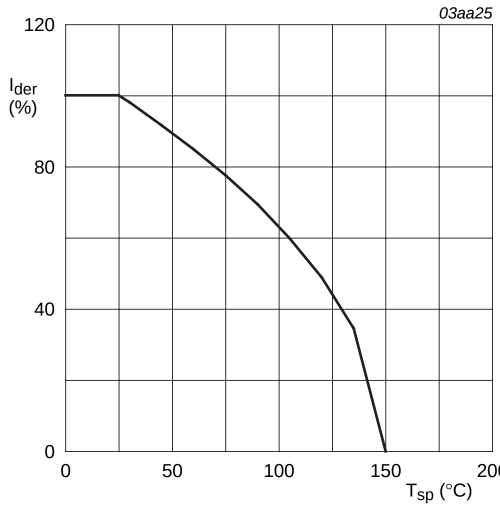
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C	-	60	V
V_{DGR}	drain-gate voltage	$T_j \geq 25$ °C; $T_j \leq 150$ °C; $R_{GS} = 20$ kΩ	-	60	V
V_{GS}	gate-source voltage		-15	15	V
I_D	drain current	$T_{sp} = 100$ °C; $V_{GS} = 10$ V; see Figure 1	-	165	mA
		$T_{sp} = 25$ °C; $V_{GS} = 10$ V; see Figure 1 and 3	-	260	mA
I_{DM}	peak drain current	$T_{sp} = 25$ °C; $t_p \leq 10$ µs; pulsed; see Figure 3	-	560	mA
P_{tot}	total power dissipation	$T_{sp} = 25$ °C; see Figure 2	-	0.56	W
T_{stg}	storage temperature		-55	150	°C
T_j	junction temperature		-55	150	°C

Table 5. Limiting values *…continued*

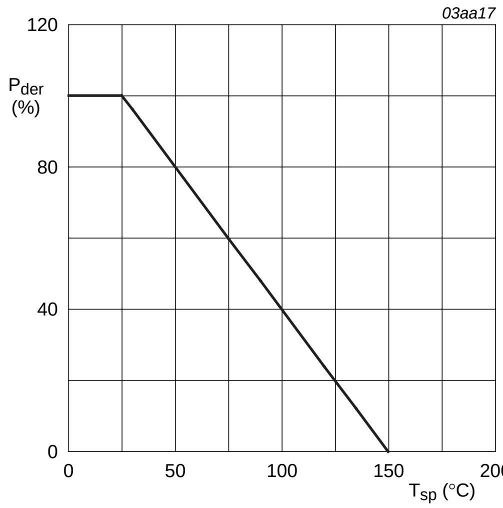
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
Source-drain diode					
I_S	source current	T_{sp} = 25 °C	-	280	mA
I_{SM}	peak source current	T_{sp} = 25 °C; t_p ≤ 10 µs; pulsed	-	560	mA
Electrostatic discharche voltage					
V_{ESD}	electrostatic discharge voltage	HBM; C = 100 pF; R = 1.5 kΩ	-	1	kV



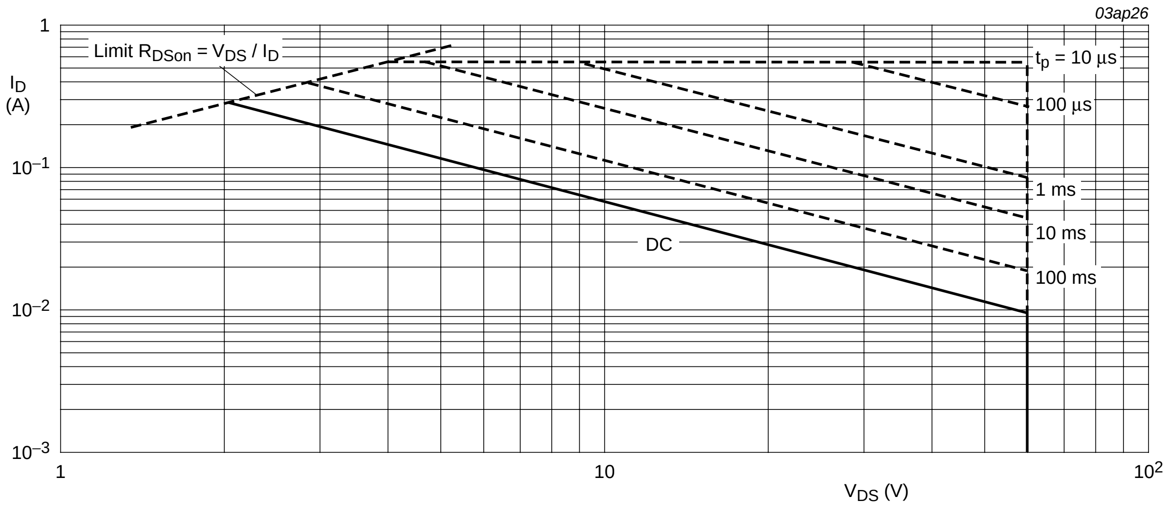
$$I_{der} = \frac{I_D}{I_{D(25°C)}} \times 100\,\%$$

Fig 1. Normalized continuous drain current as a function of solder point temperature



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

Fig 2. Normalized total power dissipation as a function of solder point temperature



$T_{sp} = 25\,°C; I_{DM}$ is single pulse

Fig 3. Safe operating area; 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
$R_{th(j-sp)}$	thermal resistance from junction to solder point	see Figure 4	-	-	220	K/W

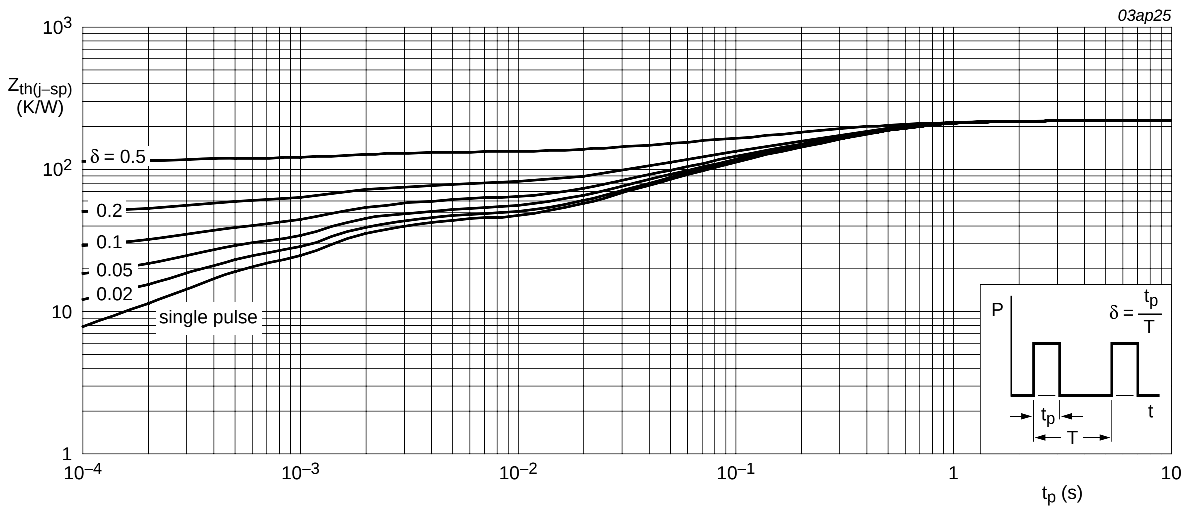
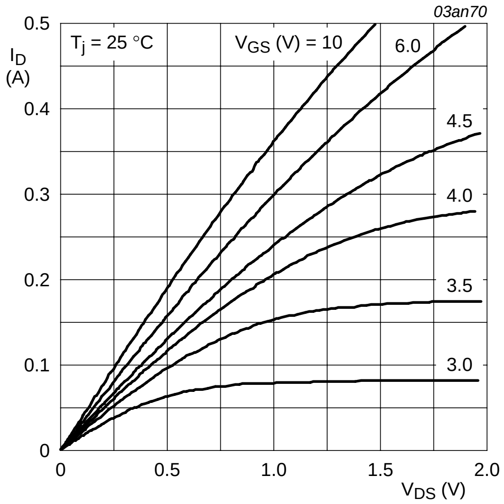


Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration

7. Characteristics

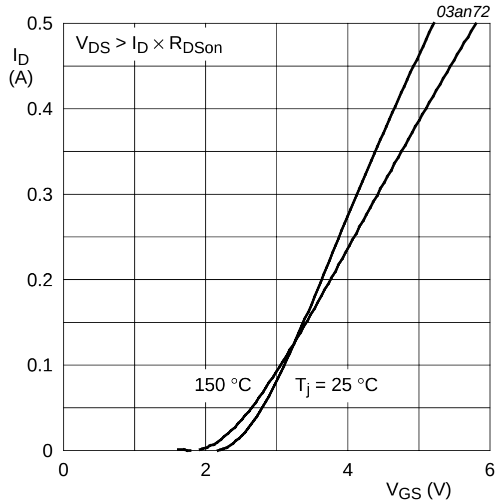
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 10 µA; V_{GS} = 0 V; T_j = -55 °C	55	-	-	V
		I_D = 10 µA; V_{GS} = 0 V; T_j = 25 °C	60	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS} = V_{GS}; T_j = 150 °C; see Figure 7 and 8	0.6	-	-	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = -55 °C; see Figure 7 and 8	-	-	3.5	V
		I_D = 1 mA; V_{DS} = V_{GS}; T_j = 25 °C; see Figure 7 and 8	1	2	3.3	V
I_{DSS}	drain leakage current	V_{DS} = 48 V; V_{GS} = 0 V; T_j = 25 °C	-	-	1	µA
		V_{DS} = 48 V; V_{GS} = 0 V; T_j = 150 °C	-	-	10	µA
I_{GSS}	gate leakage current	V_{GS} = -10 V; V_{DS} = 0 V; T_j = 25 °C	-	50	500	nA
		V_{GS} = 10 V; V_{DS} = 0 V; T_j = 25 °C	-	50	500	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 500 mA; T_j = 150 °C; see Figure 9 and 10	-	5.2	8.4	Ω
		V_{GS} = 4.5 V; I_D = 200 mA; T_j = 25 °C; see Figure 9 and 10	-	3.8	5.3	Ω
		V_{GS} = 10 V; I_D = 500 mA; T_j = 25 °C; see Figure 9 and 10	-	2.8	4.5	Ω
$V_{(BR)GSS}$	gate-source breakdown voltage	V_{DS} = 0 V; T_j = 25 °C; I_G = -1 mA	16	22	-	V
		T_j = 25 °C; I_G = 1 mA; V_{DS} = 0 V	16	22	-	V
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	I_D = 0.5 A; V_{DS} = 48 V; V_{GS} = 10 V; T_j = 25 °C; see Figure 11	-	0.85	-	nC
Q_{GS}	gate-source charge		-	0.55	-	nC
Q_{GD}	gate-drain charge		-	0.07	-	nC
C_{iss}	input capacitance	V_{DS} = 10 V; V_{GS} = 0 V; f = 1 MHz; T_j = 25 °C; see Figure 12	-	13	40	pF
C_{oss}	output capacitance		-	8	30	pF
C_{rss}	reverse transfer capacitance		-	4	10	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 50 V; R_L = 250 Ω; V_{GS} = 10 V; $R_{G(ext)}$ = 50 Ω	-	-	-	ns
t_r	rise time		-	-	-	ns
$t_{d(off)}$	turn-off delay time		-	-	-	ns
t_f	fall time		-	-	-	ns
t_{off}	turn-off time	V_{DS} = 50 V; V_{GS} = 10 V; $R_{G(ext)}$ = 50 Ω; R_{GS} = 50 Ω; T_j = 25 °C; R_L = 250 Ω	-	9	-	ns
t_{on}	turn-on time		-	3	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	I_S = 300 mA; V_{GS} = 0 V; T_j = 25 °C; see Figure 13	-	0.93	1.5	V
t_{rr}	reverse recovery time	I_S = 300 mA; dI_S/dt = -100 A/µs; V_{GS} = 0 V; V_{DS} = 25 V; T_j = 25 °C	-	30	-	ns
Q_r	recovered charge		-	30	-	nC



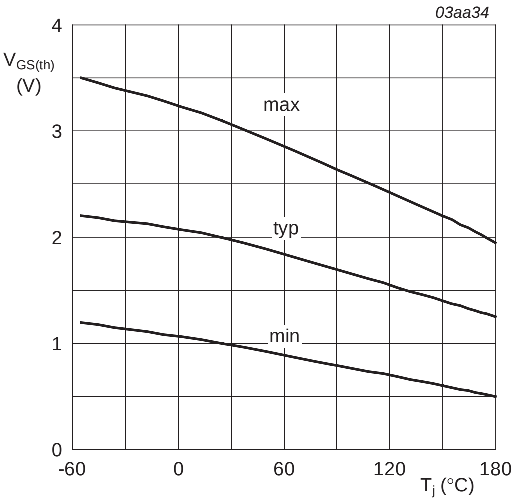
$T_j = 25\,°C$

Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values



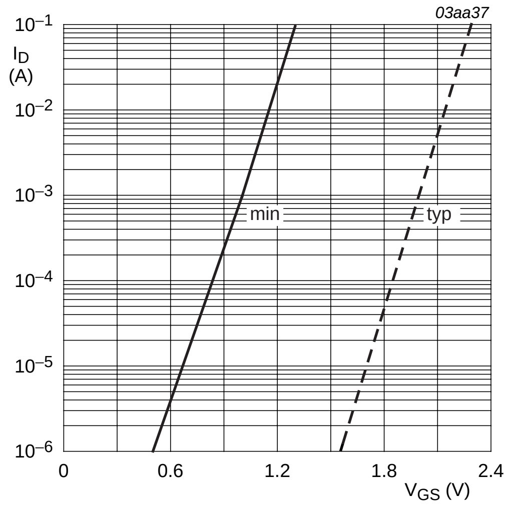
$V_{DS} > I_D \times R_{DSon}$

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



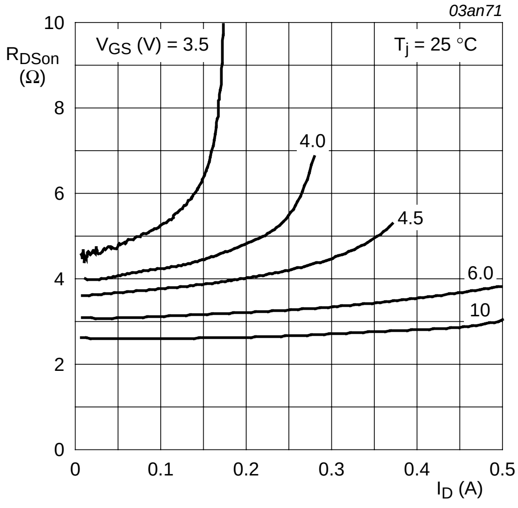
$I_D = 1\,mA; V_{DS} = V_{GS}$

Fig 7. Gate-source threshold voltage as a function of junction temperature



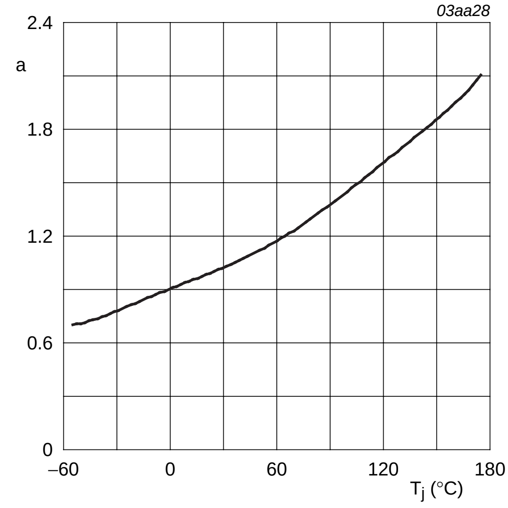
$T_j = 25\,°C; V_{DS} = 5\,V$

Fig 8. Sub-threshold drain current as a function of gate-source voltage



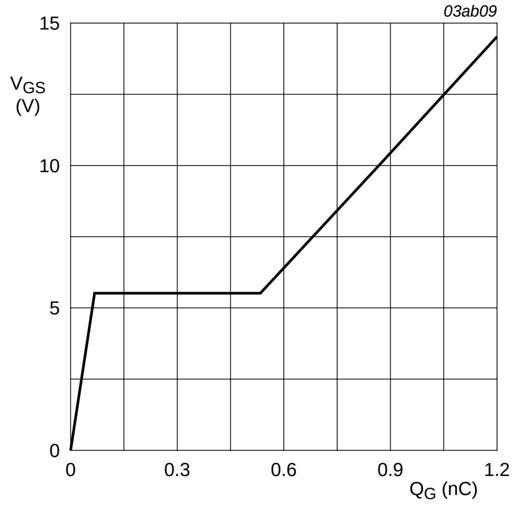
$T_j = 25\,°C$

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



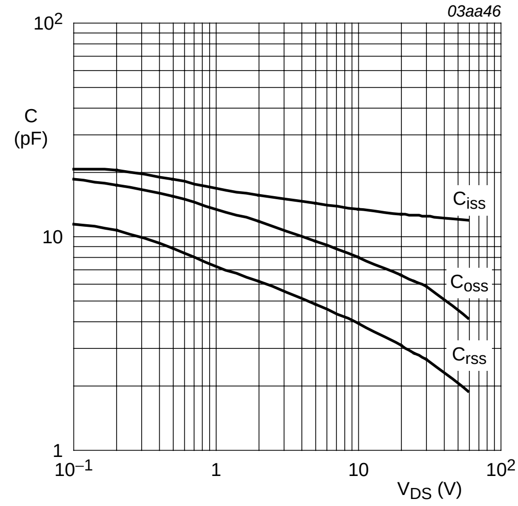
$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

Fig 10. Normalized drain-source on-state resistance factor as a function of junction temperature



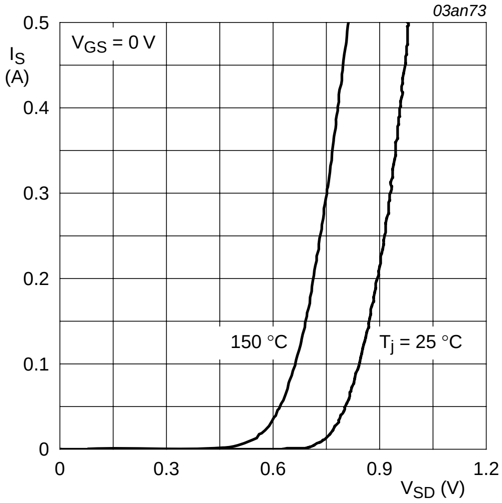
$I_D = 0.5A; V_{DS} = 48\,V$

Fig 11. Gate-source voltage as a function of gate charge; typical values



$V_{GS} = 0\,V; f = 1\,MHz$

Fig 12. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

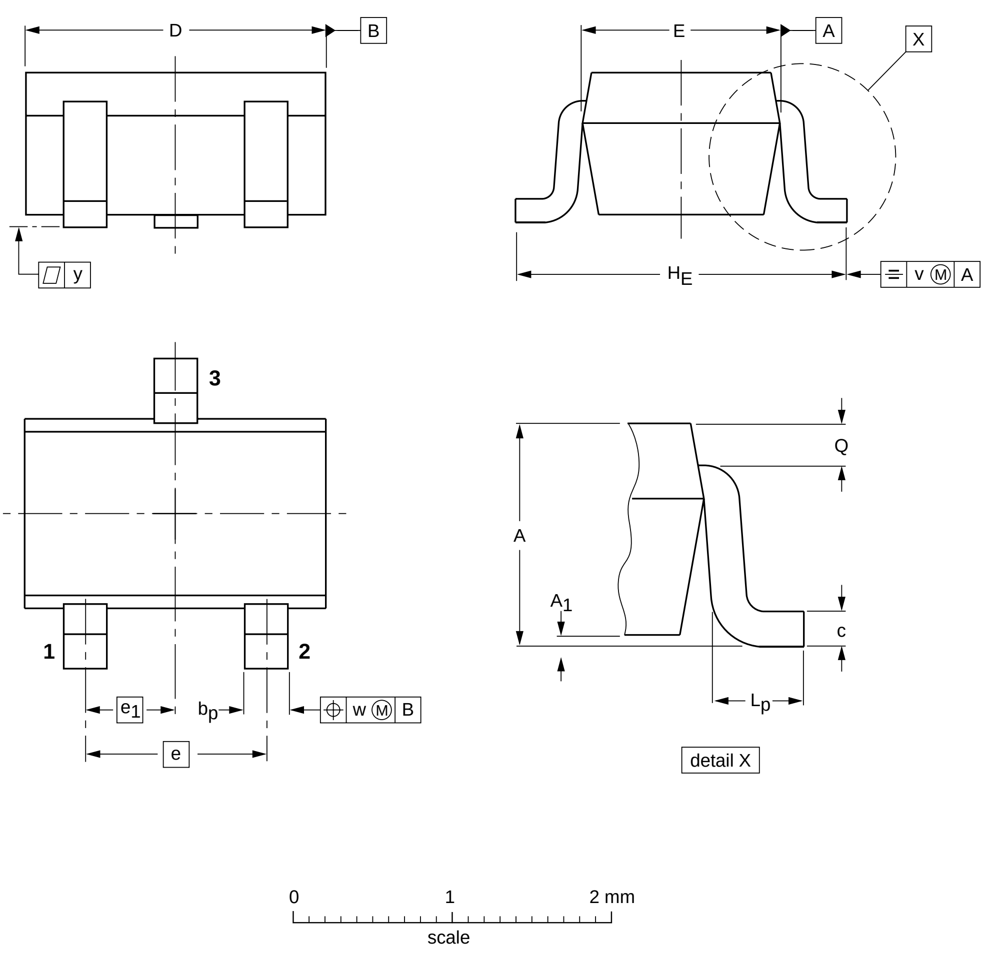


$$V_{GS} = 0\,V$$

Fig 13. Source current as a function of source-drain voltage; typical values

8. Package outline

Plastic surface-mounted package; 3 leads **SOT323**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.8	0.1	0.4 0.3	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT323			SC-70			~~04-11-04~~ 06-03-16

Fig 14. Package outline SOT323 (SC-70)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMF3800SN_3	20091111	Product data sheet	-	PMF3800SN_2
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Maximum value added for $V_{GS(th)}$ @ T_j = 25 °C in Characteristics table.			
PMF3800SN_2 (9397 750 15218)	20050701	Product data sheet	-	PMF3800SN_1
PMF3800SN_1 (9397 750 14255)	20050208	Product data sheet	-	-

10. Legal information

10.1 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.

[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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