



PSMN4R3-30BL

N-channel 30 V 4.1 mΩ logic level MOSFET in D2PAK

Rev. 1 — 22 March 2012

Product data sheet

1. Product profile

1.1 General description

Logic level N-channel MOSFET in D2PAK package qualified to 175 °C. This product is designed and qualified for use in a wide range of industrial, communications and domestic equipment.

1.2 Features and benefits

- High efficiency due to low switching and conduction losses
- Suitable for logic level gate drive sources

1.3 Applications

- DC-to-DC converters
- Motor control
- Load switching
- Server power supplies

1.4 Quick reference data

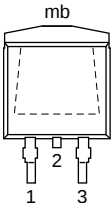
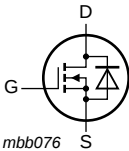
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{DS}	drain-source voltage	T _j ≥ 25 °C; T _j ≤ 175 °C	-	-	30	V
I _D	drain current	T _{mb} = 25 °C; V _{GS} = 10 V; see Figure 1 ^[1]	-	-	100	A
P _{tot}	total power dissipation	T _{mb} = 25 °C; see Figure 2	-	-	103	W
T _j	junction temperature		-55	-	175	°C
Static characteristics						
R _{DSon}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 15 A; T _j = 100 °C; see Figure 12 ; see Figure 13	-	4.9	5.8	mΩ
		V _{GS} = 10 V; I _D = 15 A; T _j = 25 °C; see Figure 13	-	3.5	4.1	mΩ
Dynamic characteristics						
Q _{GD}	gate-drain charge	V _{GS} = 4.5 V; I _D = 15 A; V _{DS} = 15 V; see Figure 14 ; see Figure 15	-	5	-	nC
Q _{G(tot)}	total gate charge		-	19	-	nC
Avalanche ruggedness						
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	V _{GS} = 10 V; T _{j(init)} = 25 °C; I _D = 100 A; V _{sup} ≤ 30 V; R _{GS} = 50 Ω; unclamped	-	-	74	mJ

[1] Continuous current is limited by package.

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	D	drain ^[1]		
3	S	source		
mb	D	mounting base; connected to drain		

SOT404 (D2PAK)

[1] It is not possible to make connection to pin 2

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PSMN4R3-30BL	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

4. Marking

Table 4. Marking codes

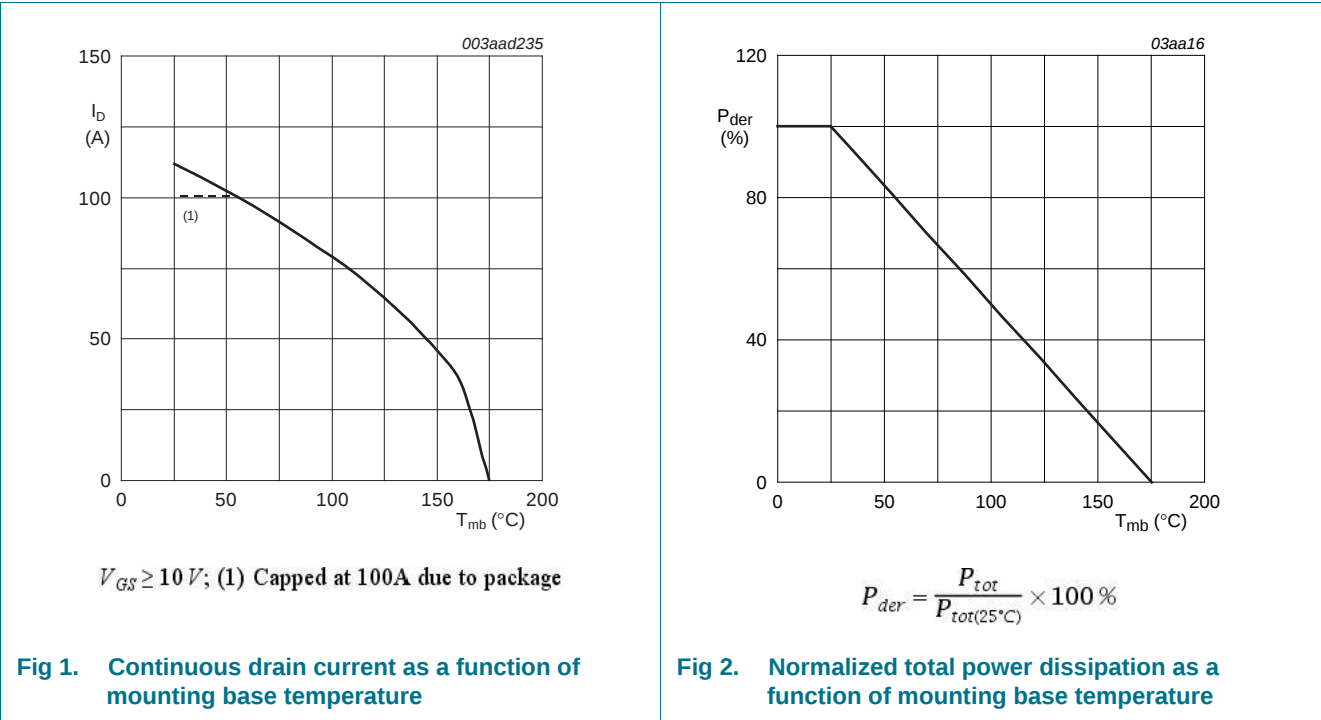
Type number	Marking code
PSMN4R3-30BL	PSMN4R3-30BL

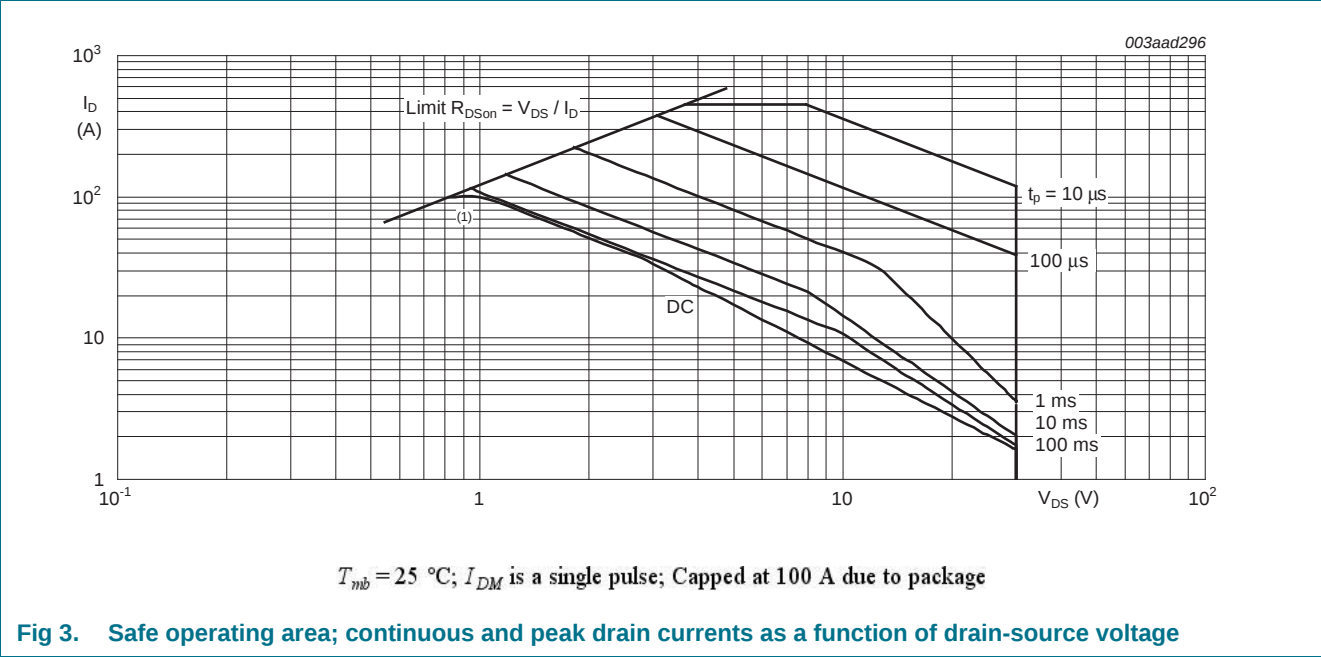
5. Limiting values

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; T _j ≤ 175 °C	-	30	V
V _{DGR}	drain-gate voltage	T _j ≥ 25 °C; T _j ≤ 175 °C; R _{GS} = 20 kΩ	-	30	V
V _{GS}	gate-source voltage		-20	20	V
I _D	drain current	V _{GS} = 10 V; T _{mb} = 100 °C; see Figure 1 [1]	-	80	A
		V _{GS} = 10 V; T _{mb} = 25 °C; see Figure 1 [1]	-	100	A
I _{DM}	peak drain current	pulsed; t _p ≤ 10 μs; T _{mb} = 25 °C; see Figure 3	-	465	A
P _{tot}	total power dissipation	T _{mb} = 25 °C; see Figure 2	-	103	W
T _{stg}	storage temperature		-55	175	°C
T _j	junction temperature		-55	175	°C
T _{sld(M)}	peak soldering temperature		-	260	°C
Source-drain diode					
I _S	source current	T _{mb} = 25 °C [1]	-	100	A
I _{SM}	peak source current	pulsed; t _p ≤ 10 μs; T _{mb} = 25 °C	-	465	A
Avalanche ruggedness					
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	V _{GS} = 10 V; T _{j(init)} = 25 °C; I _D = 100 A; V _{sup} ≤ 30 V; R _{GS} = 50 Ω; unclamped	-	74	mJ

[1] Continuous current is limited by package.





6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 4	-	1	1.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	Minimum footprint; mounted on a printed circuit board	-	50	-	K/W

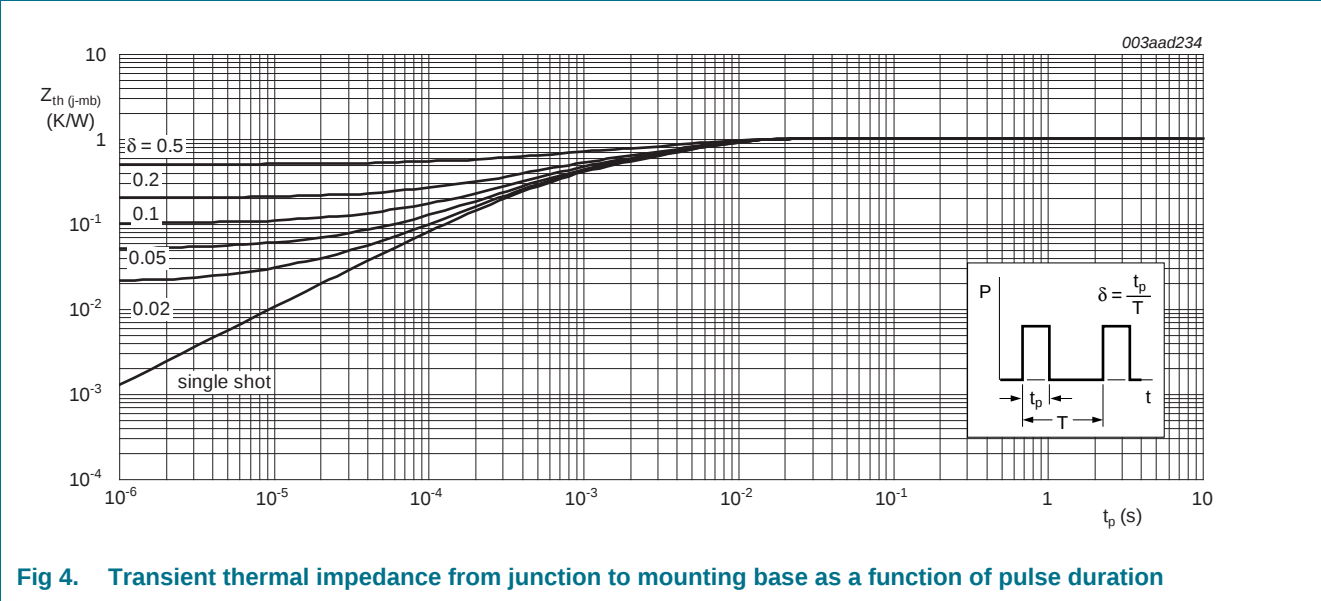


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

7. Characteristics

Table 7. Characteristics

Tested to JEDEC standards where applicable.

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
		$I_D = 250\ \mu A$; $V_{GS} = 0\ V$; $T_J = -55\ ^\circ C$	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1\ mA$; $V_{DS} = V_{GS}$; $T_J = 25\ ^\circ C$; see Figure 10 ; see Figure 11	1.3	1.7	2.15	V
		$I_D = 1\ mA$; $V_{DS} = V_{GS}$; $T_J = 175\ ^\circ C$; see Figure 11	0.5	-	-	V
		$I_D = 1\ mA$; $V_{DS} = V_{GS}$; $T_J = -55\ ^\circ C$; see Figure 11	-	-	2.45	V
I_{DSS}	drain leakage current	$V_{DS} = 30\ V$; $V_{GS} = 0\ V$; $T_J = 25\ ^\circ C$	-	0.02	1	μA
		$V_{DS} = 30\ V$; $V_{GS} = 0\ V$; $T_J = 125\ ^\circ C$	-	-	40	μA
I_{GSS}	gate leakage current	$V_{GS} = 16\ V$; $V_{DS} = 0\ V$; $T_J = 25\ ^\circ C$	-	10	100	nA
		$V_{GS} = -16\ V$; $V_{DS} = 0\ V$; $T_J = 25\ ^\circ C$	-	10	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\ V$; $I_D = 15\ A$; $T_J = 175\ ^\circ C$; see Figure 12 ; see Figure 13	-	6.65	7.8	mΩ
		$V_{GS} = 4.5\ V$; $I_D = 15\ A$; $T_J = 25\ ^\circ C$; see Figure 13	-	4.46	5.2	mΩ
		$V_{GS} = 10\ V$; $I_D = 15\ A$; $T_J = 100\ ^\circ C$; see Figure 12 ; see Figure 13	-	4.9	5.8	mΩ
		$V_{GS} = 10\ V$; $I_D = 15\ A$; $T_J = 25\ ^\circ C$; see Figure 13	-	3.5	4.1	mΩ
R_G	gate resistance	$f = 1\ MHz$	-	1	-	Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$I_D = 15\ A$; $V_{DS} = 15\ V$; $V_{GS} = 4.5\ V$; see Figure 14 ; see Figure 15	-	19	-	nC
		$I_D = 15\ A$; $V_{DS} = 15\ V$; $V_{GS} = 10\ V$; see Figure 14 ; see Figure 15	-	41.5	-	nC
		$I_D = 0\ A$; $V_{DS} = 0\ V$; $V_{GS} = 10\ V$	-	30	-	nC
Q_{GS}	gate-source charge	$I_D = 15\ A$; $V_{DS} = 15\ V$; $V_{GS} = 4.5\ V$; see Figure 14 ; see Figure 15	-	8	-	nC
$Q_{GS(th)}$	pre-threshold gate-source charge		-	4	-	nC
$Q_{GS(th-pl)}$	post-threshold gate-source charge		-	4	-	nC
Q_{GD}	gate-drain charge		-	5	-	nC
$V_{GS(pl)}$	gate-source plateau voltage	$I_D = 15\ A$; $V_{DS} = 15\ V$; see Figure 14 ; see Figure 15	-	2.7	-	V
C_{iss}	input capacitance	$V_{DS} = 15\ V$; $V_{GS} = 0\ V$; $f = 1\ MHz$; $T_J = 25\ ^\circ C$; see Figure 16	-	2400	-	pF
C_{oss}	output capacitance		-	500	-	pF
C_{rss}	reverse transfer capacitance		-	240	-	pF

Table 7. Characteristics ...continued
Tested to JEDEC standards where applicable.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t _{d(on)}	turn-on delay time	V _{DS} = 15 V; R _L = 0.5 Ω; V _{GS} = 10 V; R _{G(ext)} = 5.6 Ω	-	28	-	ns
t _r	rise time		-	58	-	ns
t _{d(off)}	turn-off delay time		-	44	-	ns
t _f	fall time		-	21	-	ns
Source-drain diode						
V _{SD}	source-drain voltage	I _S = 15 A; V _{GS} = 0 V; T _j = 25 °C; see Figure 17	-	0.81	1.2	V
t _{rr}	reverse recovery time	I _S = 15 A; dI _S /dt = -100 A/μs;	-	35	-	ns
Q _r	recovered charge	V _{GS} = 0 V; V _{DS} = 15 V	-	30	-	nC

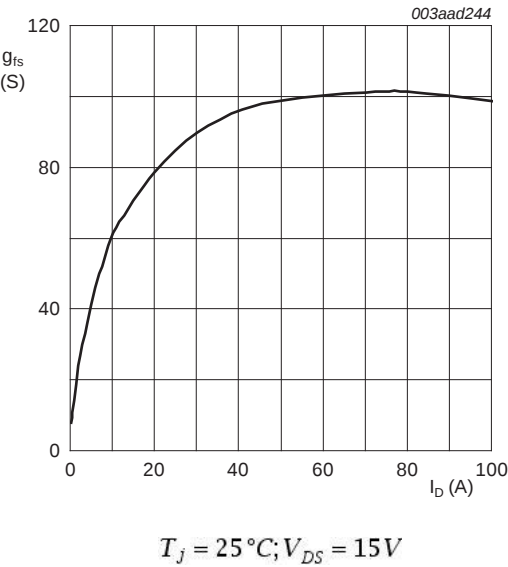


Fig 5. Forward transconductance as a function of drain current; typical values

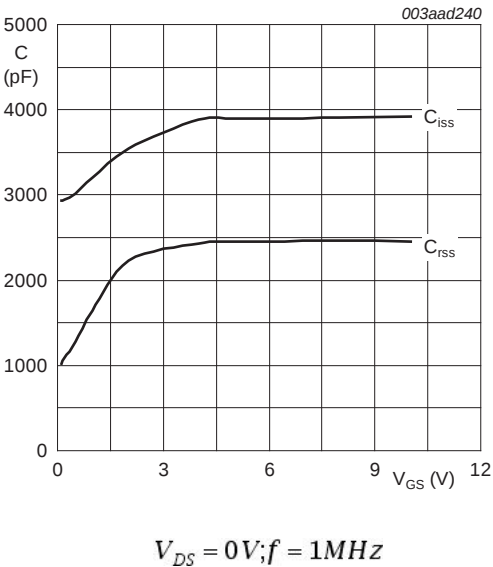
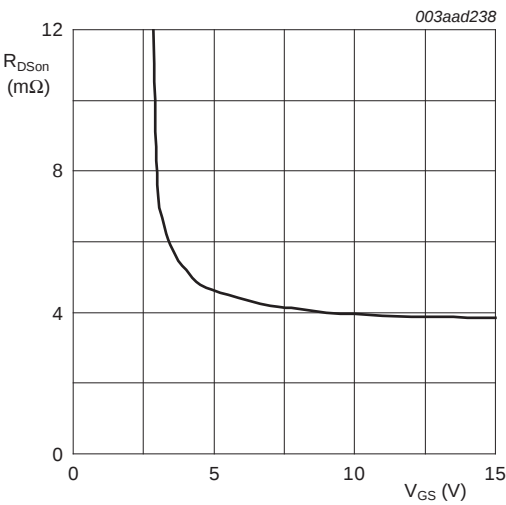
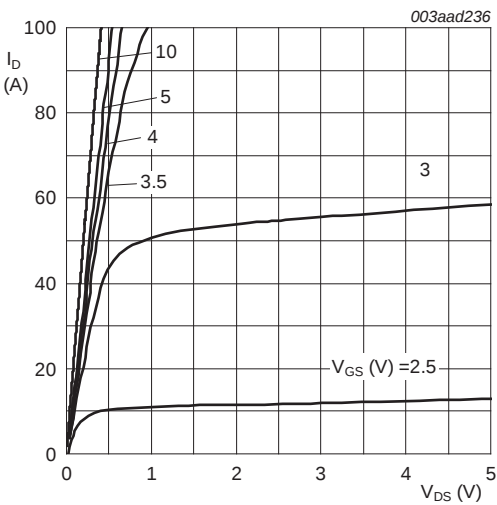


Fig 6. Input and reverse transfer capacitances as a function of gate-source voltage; typical values



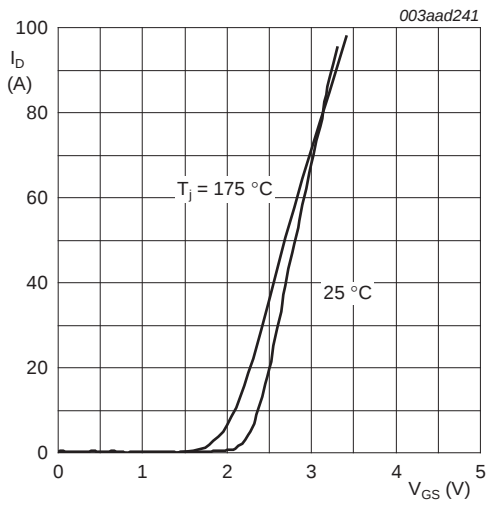
$T_j = 25\text{ }^{\circ}\text{C}; I_D = 15\text{ A}$

Fig 7. Drain-source on-state resistance as a function of gate-source voltage; typical values



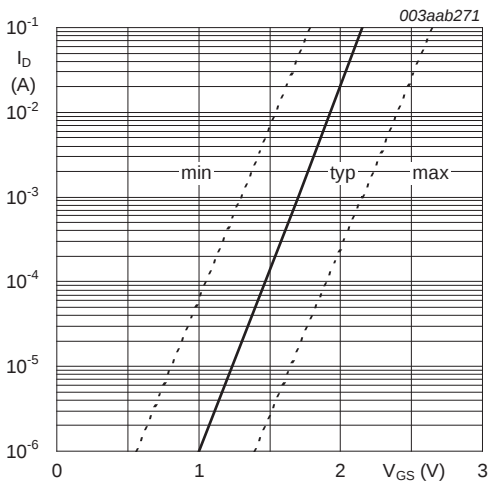
$T_j = 25\text{ }^{\circ}\text{C}$

Fig 8. Output characteristics: drain current as a function of drain-source voltage; typical values



$V_{DS} > I_D \times R_{DS(on)}$

Fig 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values



$T_j = 25\text{ }^{\circ}\text{C}; V_{DS} = 5\text{ V}$

Fig 10. Sub-threshold drain current as a function of gate-source voltage

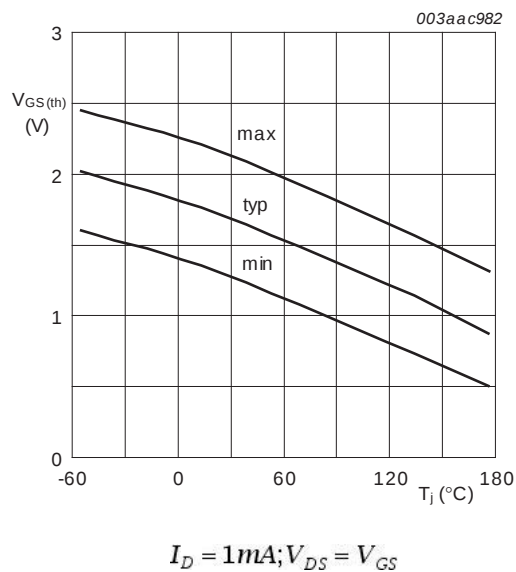


Fig 11. Gate-source threshold voltage as a function of junction temperature

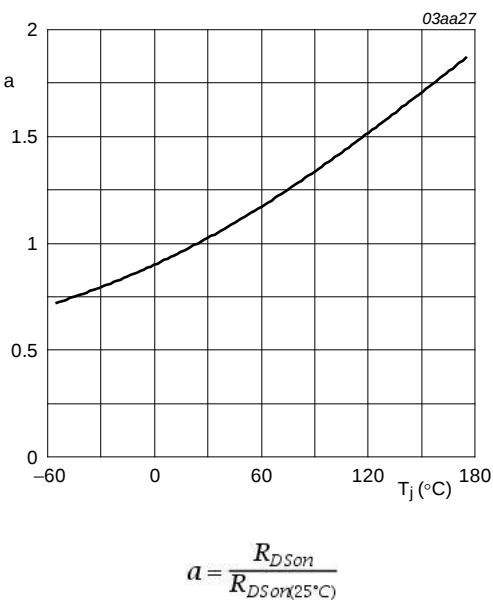


Fig 12. Normalized drain-source on-state resistance factor as a function of junction temperature

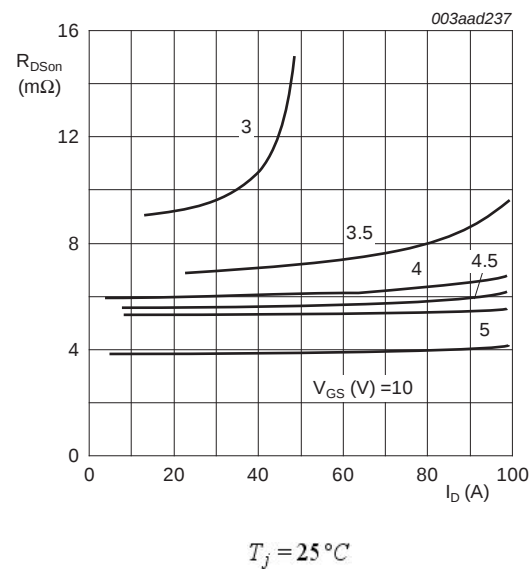


Fig 13. Drain-source on-state resistance as a function of drain current; typical values

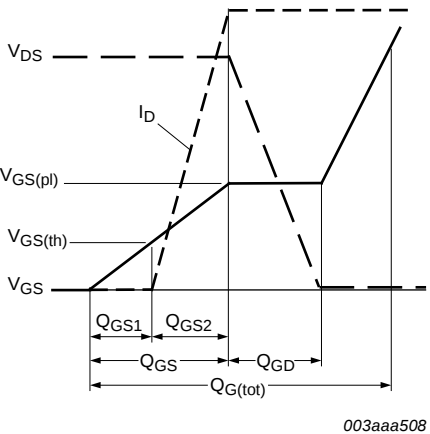


Fig 14. Gate charge waveform definitions

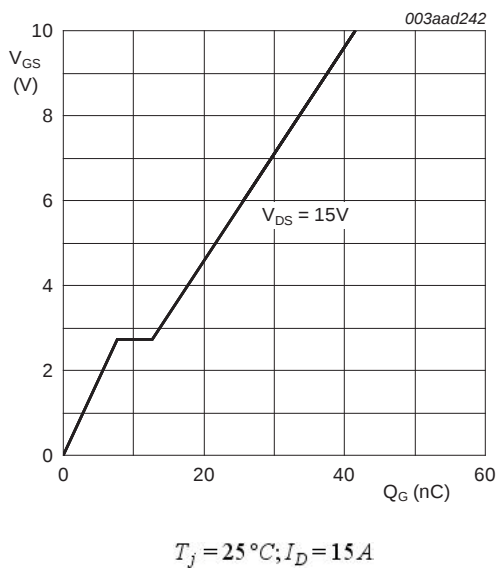


Fig 15. Gate-source voltage as a function of gate charge; typical values

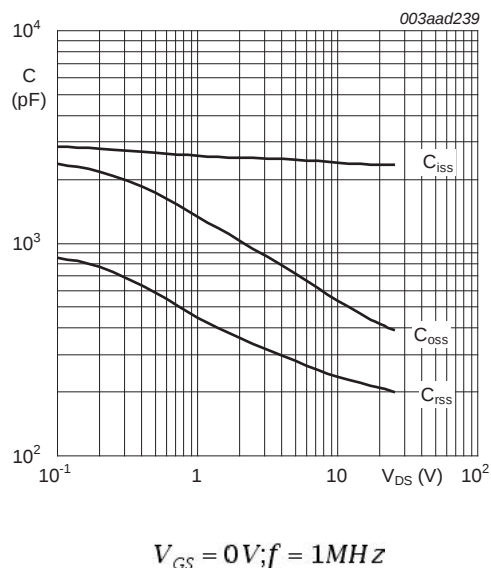


Fig 16. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

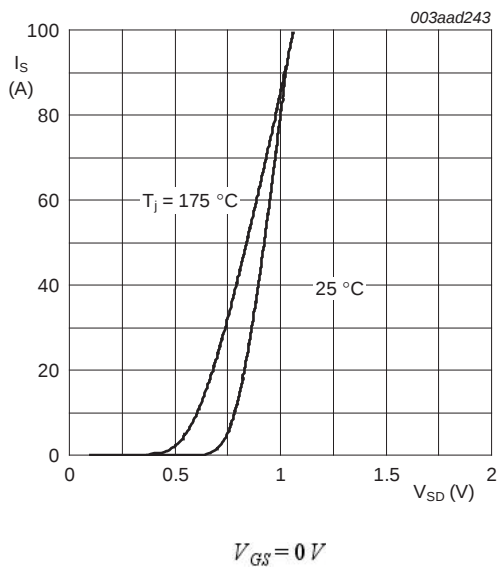
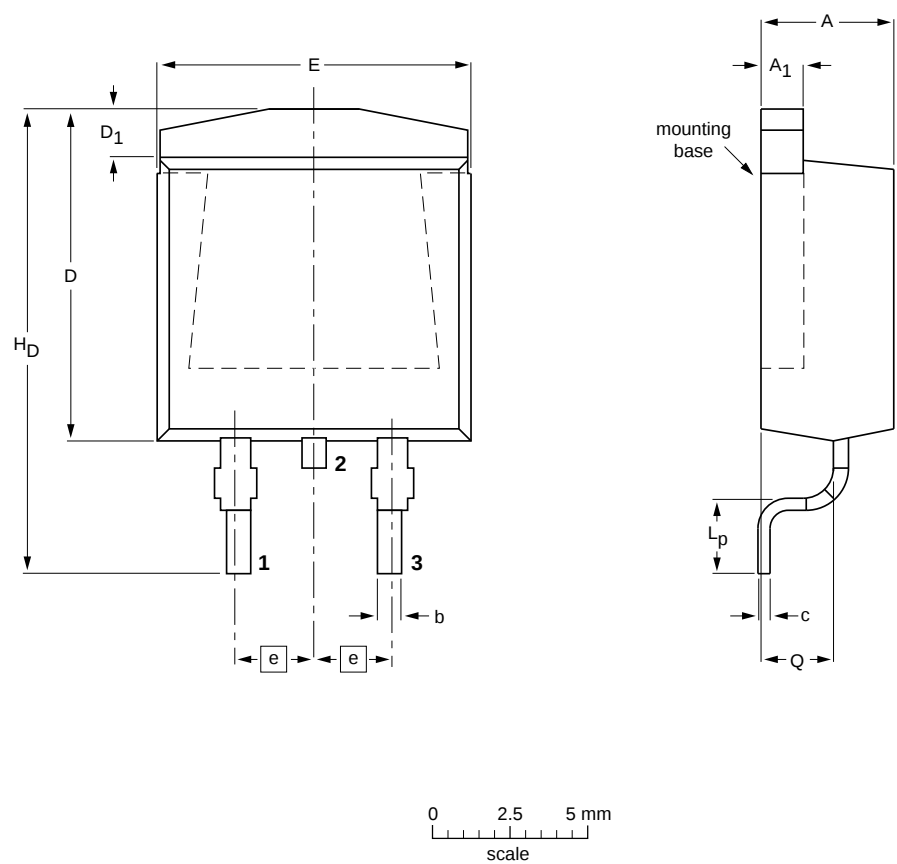


Fig 17. Source current as a function of source-drain voltage; typical values

8. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

SOT404



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁	b	c	D _{max.}	D ₁	E	e	L _p	H _D	Q
mm	4.50 4.10	1.40 1.27	0.85 0.60	0.64 0.46	11	1.60 1.20	10.30 9.70	2.54	2.90 2.10	15.80 14.80	2.60 2.20

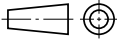
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT404						05-02-11 06-03-16

Fig 18. Package outline SOT404 (D2PAK)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PSMN4R3-30BL v.1	20120322	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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