

PSMN027-100BS

N-channel 100V 26.8 m Ω standard level MOSFET in D2PAK. Rev. 2 — 1 March 2012 Product data she

Product data sheet

Product profile 1.

1.1 General description

Standard level N-channel MOSFET in D2PAK package qualified to 175C. 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 standard level gate drive

1.3 Applications

- DC-to-DC converters
- Load switching

- Motor control
- Server power supplies

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V_{DS}	drain-source voltage	T _j ≥ 25 °C; T _j ≤ 175 °C	-	-	100	V
I _D	drain current	T_{mb} = 25 °C; V_{GS} = 10 V; see <u>Figure 1</u>	-	-	37	Α
P _{tot}	total power dissipation	T _{mb} = 25 °C; see <u>Figure 2</u>	-	-	103	W
T _j	junction temperature		-55	-	175	°C
Static chara	acteristics					
R _{DSon}	drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 15 \text{ A}; T_j = 100 °C;$ see Figure 12	-	-	48	mΩ
		$V_{GS} = 10 \text{ V; } I_D = 15 \text{ A; } T_j = 25 \text{ °C;}$ see Figure 13	-	21	26.8	mΩ
Dynamic cl	haracteristics					
Q_{GD}	gate-drain charge	$V_{GS} = 10 \text{ V}; I_D = 30 \text{ A}; V_{DS} = 50 \text{ V};$	-	9	-	nC
Q _{G(tot)}	total gate charge	see Figure 14; see Figure 15	-	30	-	nC
Avalanche	ruggedness					
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; I_D = 37 A; V_{sup} ≤ 100 V; unclamped; R_{GS} = 50 Ω	-	-	59	mJ



2. Pinning information

Table 2. Pinning information

	•			
Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		_
2	D	drain[1]	mb	D D
3	S	source		
mb D	D	mounting base; connected to drain		mbb076 S
			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
PSMN027-100BS	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

4. Limiting values

Table 4. 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	-	100	V
V_{DGR}	drain-gate voltage	$T_j \le 175 \text{ °C}; T_j \ge 25 \text{ °C}; R_{GS} = 20 \text{ k}\Omega$	-	100	V
V_{GS}	gate-source voltage		-20	20	V
I _D	drain current	$V_{GS} = 10 \text{ V}; T_{mb} = 100 \text{ °C}; \text{ see } \frac{\text{Figure 1}}{\text{Model}}$	-	26	Α
		$V_{GS} = 10 \text{ V}; T_{mb} = 25 \text{ °C}; \text{ see } \frac{\text{Figure 1}}{\text{Model}}$	-	37	Α
I _{DM}	peak drain current	pulsed; $t_p \le 10 \mu s$; $T_{mb} = 25 \text{ °C}$; see Figure 3	-	148	Α
P _{tot}	total power dissipation	T _{mb} = 25 °C; see <u>Figure 2</u>	-	103	W
T _{stg}	storage temperature		-55	175	°C
Tj	junction temperature		-55	175	°C
T _{sld(M)}	peak soldering temperature		-	260	°C
Source-dra	ain diode				
I _S	source current	T _{mb} = 25 °C	-	37	Α
I _{SM}	peak source current	pulsed; $t_p \le 10 \ \mu s$; $T_{mb} = 25 \ ^{\circ}C$	-	148	Α
Avalanche	ruggedness				
E _{DS(AL)S}	non-repetitive drain-source avalanche energy	V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; I_D = 37 A; V_{sup} ≤ 100 V; unclamped; R_{GS} = 50 Ω	-	59	mJ

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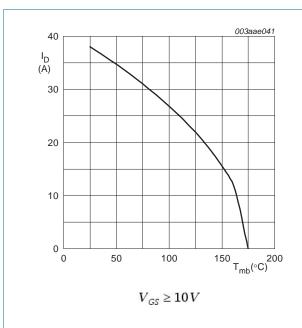


Fig 1. Continuous drain current as a function of mounting base temperature

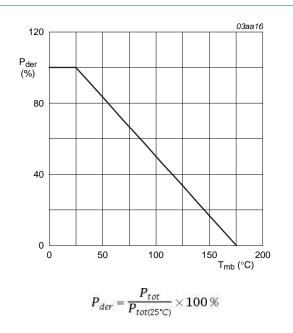
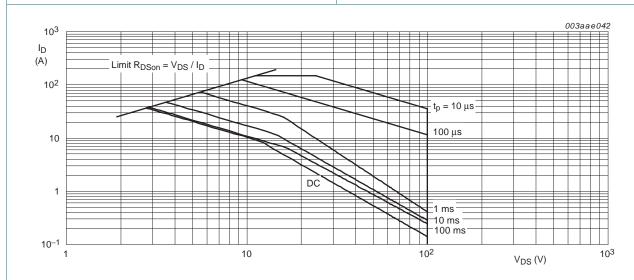


Fig 2. Normalized total power dissipation as a function of mounting base temperature



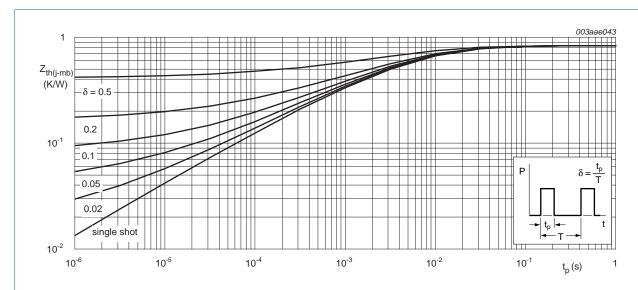
 $T_{mb} = 25 \,^{\circ}C; I_{DM}$ is single pulse

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

Thermal characteristics

Table 5. **Thermal characteristics**

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 4	-	8.0	1.46	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	Minimum footprint; mounted on a printed circuit board	-	60	-	K/W



Transient thermal impedance from junction to mounting base as a function of pulse duration; typical values

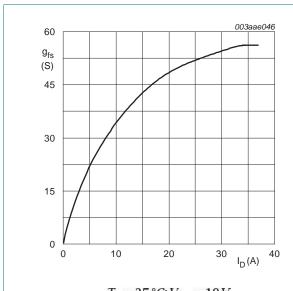
6. Characteristics

Table 6 Characteristics

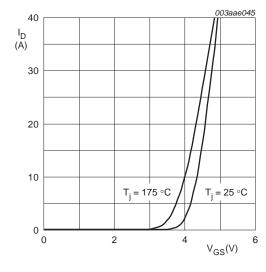
Table 6.	Characteristics					
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Static cha	aracteristics					
V _{(BR)DSS}	drain-source breakdown	$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = -55 \text{ °C}$	90	-	-	V
	voltage	$I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	100	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1$ mA; $V_{DS} = V_{GS}$; $T_j = 175$ °C; see Figure 10	1	-	-	V
		$I_D = 1$ mA; $V_{DS} = V_{GS}$; $T_j = 25$ °C; see <u>Figure 11</u> ; see <u>Figure 10</u>	2	3	4	V
		$I_D = 1$ mA; $V_{DS} = V_{GS}$; $T_j = -55$ °C; see <u>Figure 10</u>	-	-	4.8	V
I _{DSS}	drain leakage current	$V_{DS} = 100 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 125 \text{ °C}$	-	-	50	μΑ
		$V_{DS} = 100 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	0.08	2	μΑ
I_{GSS}	gate leakage current	$V_{GS} = 20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	10	100	nΑ
		$V_{GS} = -20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ °C}$	-	10	100	nΑ
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 15 \text{ A}; T_j = 100 \text{ °C};$ see <u>Figure 12</u>	-	-	48	mΩ
		$V_{GS} = 10 \text{ V}; I_D = 15 \text{ A}; T_j = 175 ^{\circ}\text{C};$ see Figure 12	-	59	75	mΩ
		$V_{GS} = 10 \text{ V}; I_D = 15 \text{ A}; T_j = 25 ^{\circ}\text{C};$ see <u>Figure 13</u>	-	21	26.8	mΩ
R_G	internal gate resistance (AC)	f = 1 MHz	-	0.92	-	Ω
Dynamic	characteristics					
$Q_{G(tot)}$	total gate charge	$I_D = 30 \text{ A}$; $V_{DS} = 50 \text{ V}$; $V_{GS} = 10 \text{ V}$; see Figure 14; see Figure 15	-	30	-	nC
		$I_D = 0 A$; $V_{DS} = 0 V$; $V_{GS} = 10 V$	-	24	-	nC
Q_{GS}	gate-source charge	$I_D = 30 \text{ A}$; $V_{DS} = 50 \text{ V}$; $V_{GS} = 10 \text{ V}$; see Figure 14; see Figure 15	-	8	-	nC
Q _{GS(th)}	pre-threshold gate-source charge	$I_D = 30 \text{ A}; V_{DS} = 50 \text{ V}; V_{GS} = 10 \text{ V};$ see <u>Figure 14</u>	-	4.8	-	nC
Q _{GS(th-pl)}	post-threshold gate-source charge		-	3.4	-	nC
Q_{GD}	gate-drain charge	$I_D = 30 \text{ A}$; $V_{DS} = 50 \text{ V}$; $V_{GS} = 10 \text{ V}$; see Figure 14; see Figure 15	-	9	-	nC
$V_{GS(pl)}$	gate-source plateau voltage	V _{DS} = 50 V; see <u>Figure 14</u> ; see <u>Figure 15</u>	-	4.9	-	V
C _{iss}	input capacitance	$V_{DS} = 50 \text{ V}; V_{GS} = 0 \text{ V}; f = 1 \text{ MHz};$	-	1624	-	pF
Coss	output capacitance	T _j = 25 °C; see <u>Figure 16</u>	-	115	-	pF
C _{rss}	reverse transfer capacitance		-	74	-	pF
d(on)	turn-on delay time	$V_{DS} = 50 \text{ V}; R_L = 1.7 \Omega; V_{GS} = 10 \text{ V};$	-	14.4	-	ns
t _r	rise time	$R_{G(ext)} = 4.7 \Omega; T_j = 25 \text{ °C}$	-	11.4	-	ns
d(off)	turn-off delay time		-	29.6	-	ns
t _f	fall time		-	8.9	-	ns

Table 6. Characteristics ... continued

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Source-dra	in diode					
V _{SD}	source-drain voltage	I_S = 15 A; V_{GS} = 0 V; T_j = 25 °C; see <u>Figure 17</u>	-	0.8	1.2	V
t _{rr}	reverse recovery time	$I_S = 10 \text{ A}$; $dI_S/dt = 100 \text{ A/}\mu\text{s}$; $V_{GS} = 0 \text{ V}$;	-	47	-	ns
Q _r	recovered charge	$V_{DS} = 50 \text{ V}$	-	91	-	nC



 $T_j = 25 \,^{\circ}C; V_{DS} = 10 \, V$



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

Fig 6. Transfer characteristics: drain current as a

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

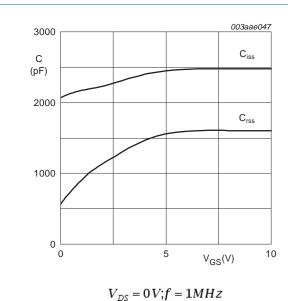
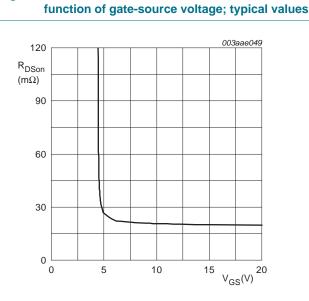


Fig 7. Input and reverse transfer capacitances as a function of gate-source voltage; typical values



 $T_j=25\,^{\circ}C; I_D=10A$

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

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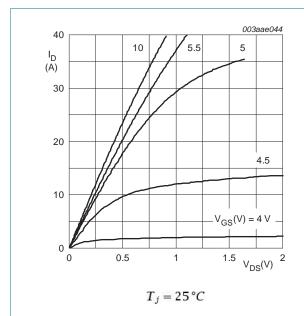


Fig 9. Output characteristics: drain current as a function of drain-source voltage; typical values

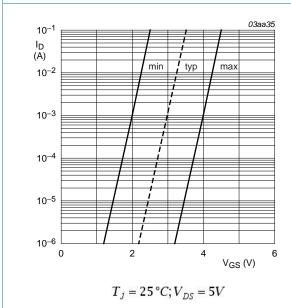


Fig 11. Sub-threshold drain current as a function of gate-source voltage

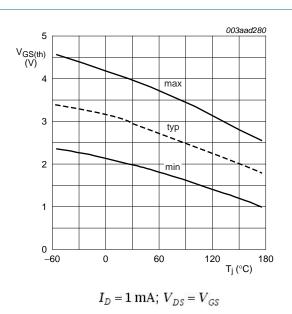


Fig 10. Gate-source threshold voltage as a function of junction temperature

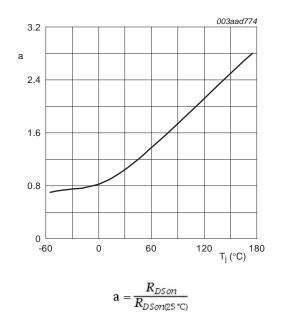


Fig 12. Normalized drain-source on-state resistance factor as a function of junction temperature

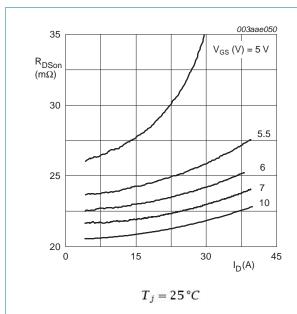


Fig 13. Drain-source on-state resistance as a function of drain current; typical values

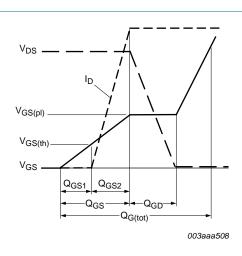


Fig 14. Gate charge waveform definitions

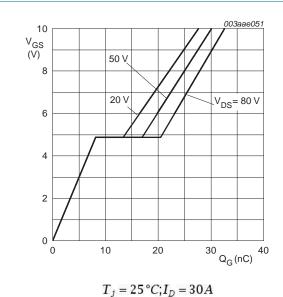


Fig 15. Gate-source voltage as a function of gate charge; typical values

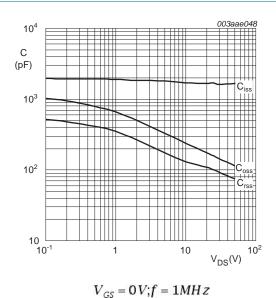
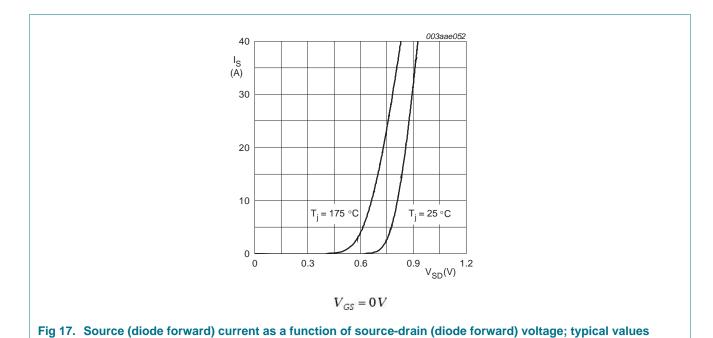


Fig 16. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



7. Package outline

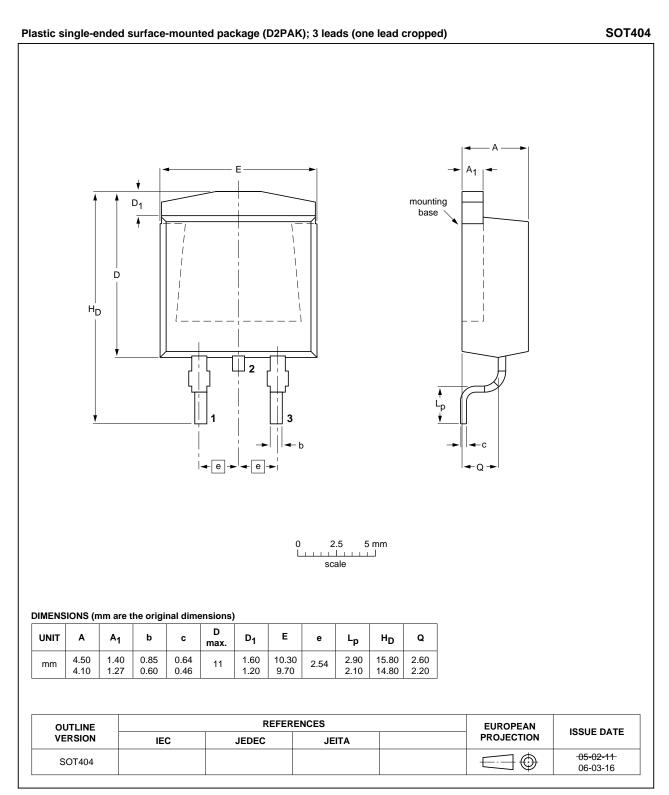


Fig 18. Package outline SOT404 (D2PAK)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PSMN027-100BS v.2	20120301	Product data sheet	-	PSMN027-100BS v.1
Modifications:	Status changed from the various changes to the various changes to the various changes to the various changes to the various changes.	om objective to product. o content.		
PSMN027-100BS v.1	20111020	Objective data sheet	-	-

9. Legal information

9.1 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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