PSMN2R6-100SSF

NextPower 100 V, 2.6 mΩ, 200 Amp, N-channel MOSFET in LFPAK88 package

9 June 2020 **Objective data sheet**

1. General description

NextPower 100 V, standard level gate drive MOSFET. Qualified to 175 °C and recommended for industrial and consumer applications.

2. Features and benefits

- Low Q_{rr} for higher efficiency and lower spiking
- 200 Amps $I_{D(max)}$ continuous current rating
- Low $Q_G \times R_{DSon}$ FOM for high efficiency switching applications
- Strong avalanche energy rating (E_{as})
- Avalanche rated and 100% tested
- Ha-free and RoHS compliant LFPAK88 package

3. Applications

- Synchronous rectifier in AC-DC and DC-DC
- Primary side switch in DC-DC
- BLDC motor control
- Full-bridge and half-bridge applications
- Battery protection

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	25 °C ≤ T_j ≤ 175 °C		-	-	100	V
I_D	drain current	V_{GS} = 10 V; T_{mb} = 25 °C		-	-	200	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; Fig. 1		-	-	341	W
T_j	junction temperature			-55	-	175	°C
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 25 A; T_j = 25 °C		-	2.08	2.6	mΩ
		V_{GS} = 10 V; I_D = 25 A; T_j = 100 °C		-	3.3	4.2	mΩ
Dynamic characteristics							
Q_{GD}	gate-drain charge	I_D = 25 A; V_{DS} = 50 V; V_{GS} = 10 V		[tbd]	25	[tbd]	nC
$Q_{G(tot)}$	total gate charge			[tbd]	129	[tbd]	nC
Avalanche ruggedness							
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 71 A; V_{sup} ≤ 100 V; R_{GS} = 50 Ω; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; unclamped; Fig. 2	[1]	-	-	629	mJ

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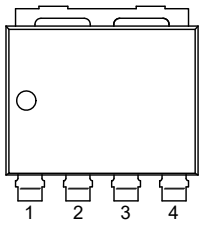
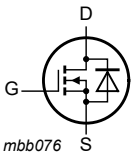
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Source-drain diode							
Q_r	recovered charge	I_S = 25 A; dI_S/dt = -100 A/µs; V_{GS} = 0 V; V_{DS} = 50 V; Fig. 3		-	73	-	nC

[1] Protected by 100% test

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 LFPAK88 (SOT1235)	
2	S	source		
3	S	source		
4	S	source		
mb	D	mounting base; connected to drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PSMN2R6-100SSF	LFPAK88	plastic, single-ended surface-mounted package (LFPAK88); 4 leads; 2 mm pitch; 8 mm x 8 mm x 1.6 mm body	SOT1235

7. Limiting values

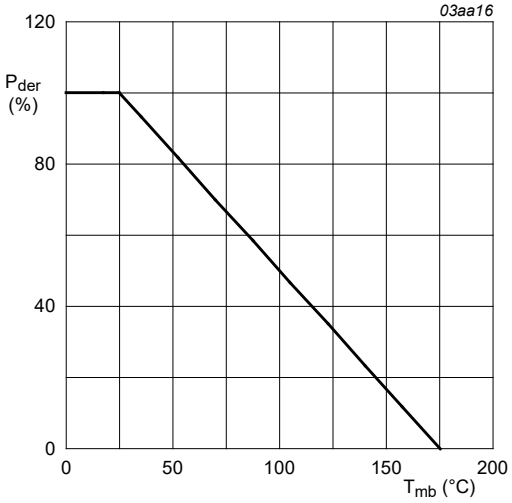
Table 4. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	25 °C ≤ T_j ≤ 175 °C		-	100	V
V_{DGR}	drain-gate voltage	25 °C ≤ T_j ≤ 175 °C; R_{GS} = 20 kΩ		-	100	V
V_{GS}	gate-source voltage			-20	20	V
P_{tot}	total power dissipation	T_{mb} = 25 °C; Fig. 1		-	341	W
I_D	drain current	V_{GS} = 10 V; T_{mb} = 25 °C		-	200	A
		V_{GS} = 10 V; T_{mb} = 100 °C		-	170	A
I_{DM}	peak drain current	pulsed; t_p ≤ 10 µs; T_{mb} = 25 °C		-	800	A
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		-	200	A
I_{SM}	peak source current	pulsed; t_p ≤ 10 µs; T_{mb} = 25 °C		-	800	A

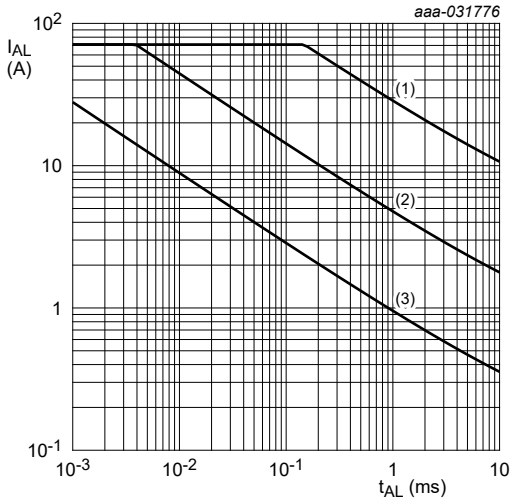
Symbol	Parameter	Conditions		Min	Max	Unit
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	I_D = 71 A; V_{sup} ≤ 100 V; R_{GS} = 50 Ω; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; unclamped; Fig. 2	[1]	-	629	mJ
I_{AS}	non-repetitive avalanche current	V_{sup} ≤ 100 V; V_{GS} = 10 V; $T_{j(init)}$ = 25 °C; R_{GS} = 50 Ω; Fig. 2	[1]	-	71	A

[1] Protected by 100% test



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

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



((1) $T_{j\ (init)}$ = 25 °C; (2) $T_{j\ (init)}$ = 150 °C; (3) Repetitive Avalanche

Fig. 2. Avalanche rating; avalanche current as a function of avalanche time

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base			-	[tbd]	0.44	K/W

9. Characteristics

Table 6. 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		100	-	-	V
		I_D = 250 µA; V_{GS} = 0 V; T_j = -55 °C		90	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 1 mA; V_{DS}=V_{GS}; T_j = 25 °C		2	3	4	V
		I_D = 1 mA; V_{DS}=V_{GS}; T_j = -55 °C		-	3.5	-	V
		I_D = 1 mA; V_{DS}=V_{GS}; T_j = 175 °C		-	1.6	-	V
$\Delta V_{GS(th)}/\Delta T$	gate-source threshold voltage variation with temperature	25 °C ≤ T_j ≤ 150 °C		-	-8.4	-	mV/K

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{DSS}	drain leakage current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C		-	0.1	25	µA
		V_{DS} = 100 V; V_{GS} = 0 V; T_j = 125 °C		-	-	100	µA
I_{GSS}	gate leakage current	V_{GS} = 20 V; V_{DS} = 0 V; T_j = 25 °C		-	2	100	nA
		V_{GS} = -20 V; V_{DS} = 0 V; T_j = 25 °C		-	2	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 10 V; I_D = 25 A; T_j = 25 °C		-	2.08	2.6	mΩ
		V_{GS} = 7 V; I_D = 25 A; T_j = 25 °C		-	2.5	3.6	mΩ
		V_{GS} = 10 V; I_D = 25 A; T_j = 100 °C		-	3.3	4.2	mΩ
		V_{GS} = 10 V; I_D = 25 A; T_j = 175 °C		-	4.7	5.9	mΩ
R_G	gate resistance	f = 1 MHz; T_j = 25 °C		[tbd]	0.8	[tbd]	Ω
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	I_D = 25 A; V_{DS} = 50 V; V_{GS} = 10 V		[tbd]	129	[tbd]	nC
		I_D = 0 A; V_{DS} = 0 V; V_{GS} = 10 V		-	70	-	nC
Q_{GS}	gate-source charge	I_D = 25 A; V_{DS} = 50 V; V_{GS} = 10 V		[tbd]	38	[tbd]	nC
$Q_{GS(th)}$	pre-threshold gate-source charge			-	25	-	nC
$Q_{GS(th-pl)}$	post-threshold gate-source charge			-	13	-	nC
Q_{GD}	gate-drain charge			[tbd]	25	[tbd]	nC
$V_{GS(pl)}$	gate-source plateau voltage	I_D = 25 A; V_{DS} = 50 V		-	4.5	-	V
C_{iss}	input capacitance	V_{DS} = 50 V; V_{GS} = 0 V; f = 1 MHz; T_j = 25 °C		[tbd]	9221	[tbd]	pF
C_{oss}	output capacitance			[tbd]	2168	[tbd]	pF
C_{rss}	reverse transfer capacitance			[tbd]	37	[tbd]	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 50 V; R_L = 2 Ω; V_{GS} = 10 V; $R_{G(ext)}$ = 5 Ω		-	35	-	ns
t_r	rise time			-	30	-	ns
$t_{d(off)}$	turn-off delay time			-	76	-	ns
t_f	fall time			-	40	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	I_S = 25 A; V_{GS} = 0 V; T_j = 25 °C		-	0.8	1.2	V
t_{rr}	reverse recovery time	I_S = 25 A; dI_S/dt = -100 A/µs; V_{GS} = 0 V; V_{DS} = 50 V; Fig. 3		-	71	-	ns
Q_r	recovered charge			-	73	-	nC

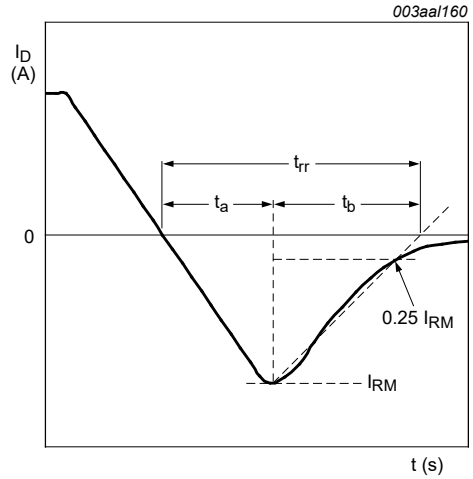
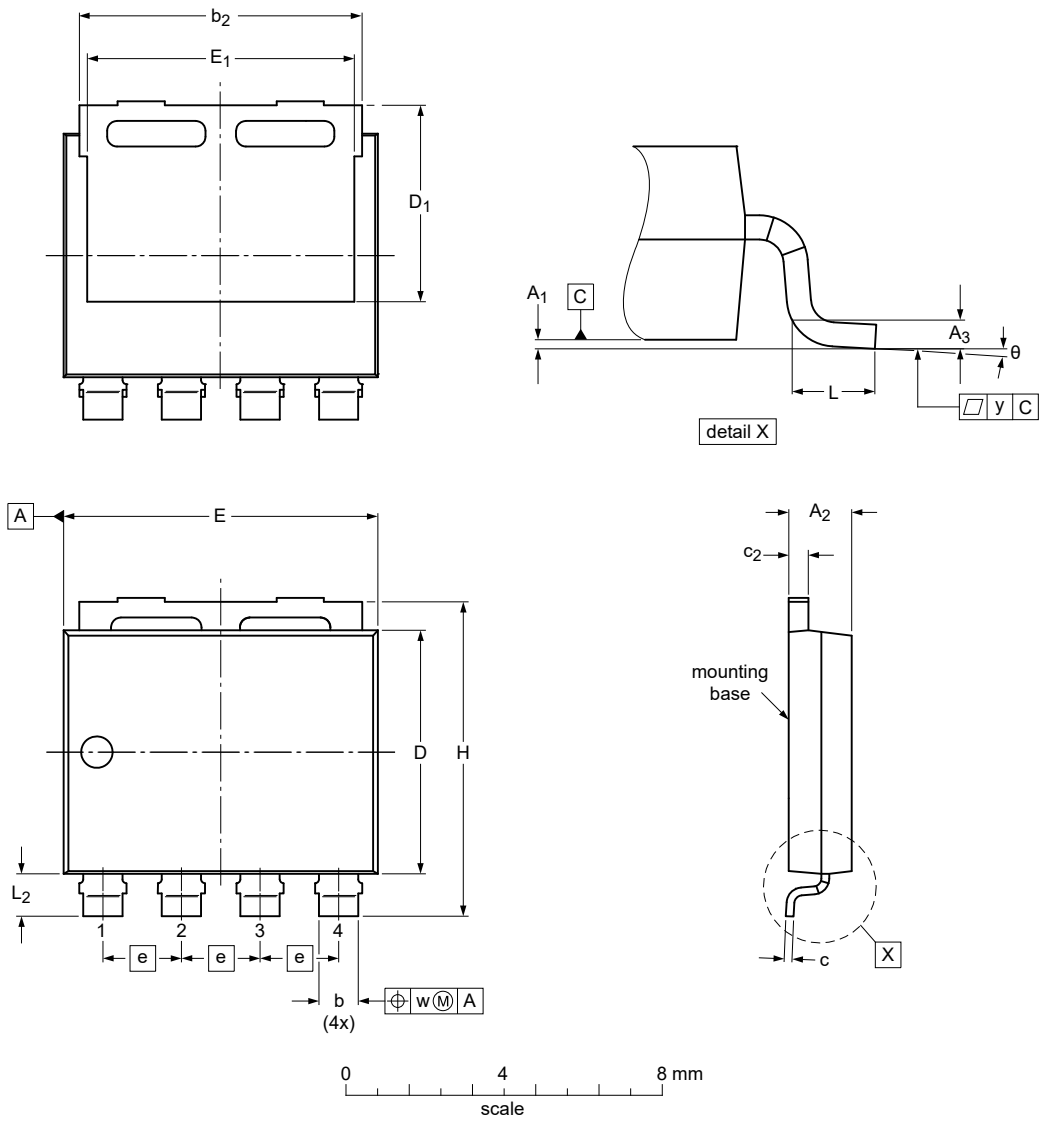


Fig. 3. Reverse recovery timing definition

10. Package outline

Plastic single-ended surface-mounted package (LFPAK88); 4 leads **SOT1235**



Dimensions (mm are the original dimensions)

Unit		A_1	A_2	A_3	b	b_2	c	c_2	$D^{(1)}$	$D_1{}^{(1)}$	$E^{(1)}$	$E_1{}^{(1)}$	e	$H^{(1)}$	L	L_2	w	y	θ
mm	max	0.15	1.7		1.1	7.3	0.24	0.55	6.3	5.1	8.1	6.9		8.1	0.8	1.3			8°
	nom			0.25									2.0				0.25	0.10	
	min	0.00	1.5		0.9	7.1	0.18	0.45	6.1	4.9	7.9	6.7		7.8	0.6	0.9			0°

Note
1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

sot1235_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1235						~~17-08-02~~ 17-08-07

Fig. 4. Package outline LFPAK88 (SOT1235)

11. Soldering

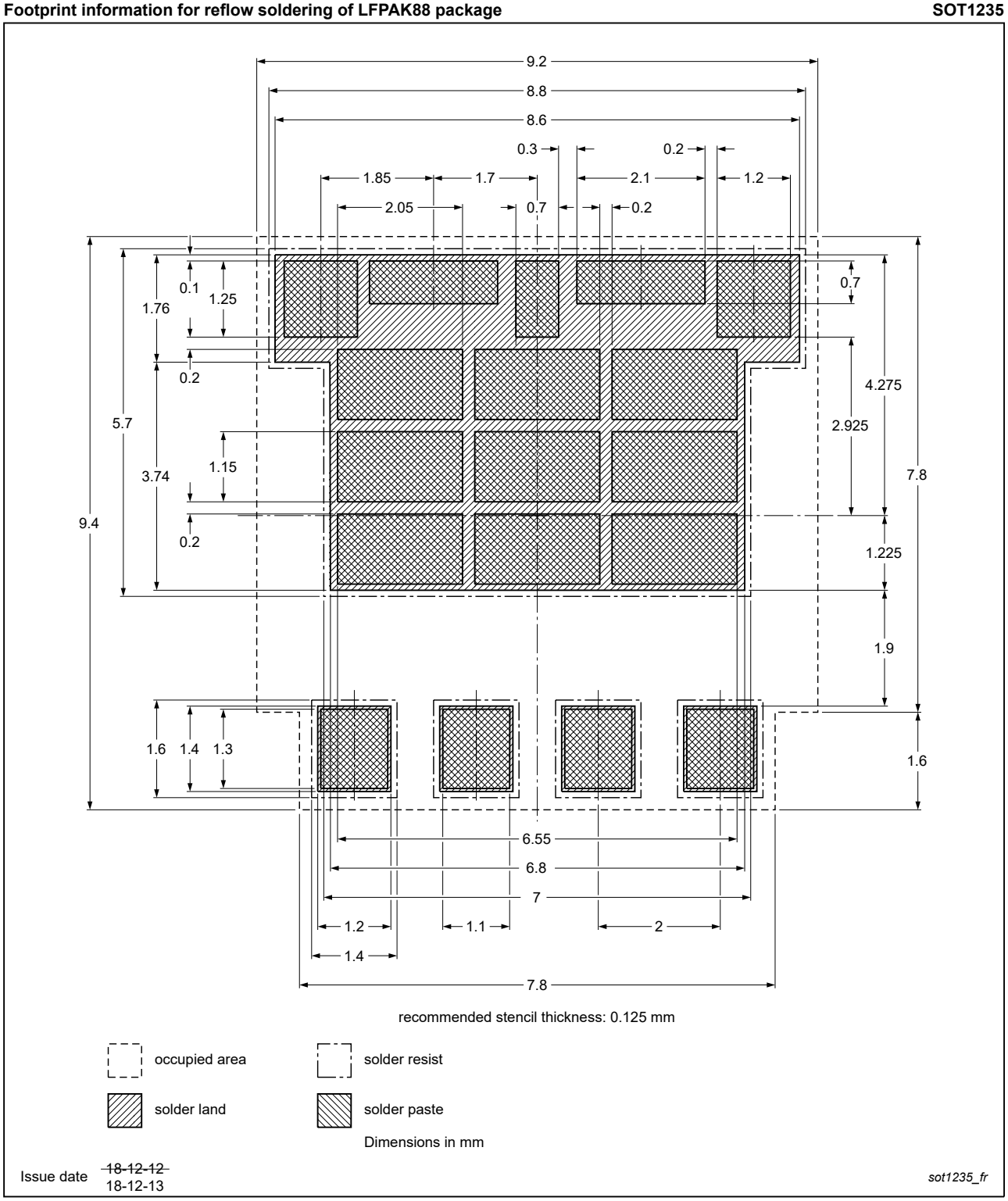


Fig. 5. Reflow soldering footprint for LFPAK88 (SOT1235)

12. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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