



# PSMN1R0-100CSF

NextPower 100 V, 1.04 mOhm, N-channel MOSFET in  
CCPAK1212i package

7 February 2024

Objective data sheet

## 1. General description

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

## 2. Features and benefits

- Low  $Q_{rr}$  for higher efficiency and lower spiking
- 400 Amps  $I_{D(max)}$  continuous current rating
- Low  $Q_G \times R_{DS(on)}$  FOM for high efficiency switching applications
- Strong avalanche energy rating ( $E_{as}$ )
- Avalanche rated and 100% tested
- Ha-free and RoHS compliant CCPAK1212i package
- Inverted package, suitable for top-side cooling

## 3. Applications

- Battery protection
- High power full and half-bridge configurations
- BLDC motor control
- OR-ing

## 4. Quick reference data

Table 1. Quick reference data

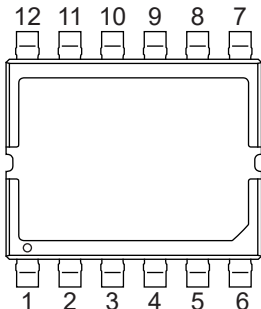
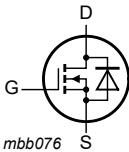
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$		-	-	100	V
$I_D$	drain current	$V_{GS} = 10\text{ V}$ ; $T_{mb} = 25\text{ °C}$	[1]	-	-	400	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$ ; Fig. 1		-	-	1.071	kW
<b>Static characteristics</b>							
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$ ; $I_D = 25\text{ A}$ ; $T_j = 25\text{ °C}$		-	0.83	1.04	mΩ
<b>Dynamic characteristics</b>							
$Q_{GD}$	gate-drain charge	$I_D = 25\text{ A}$ ; $V_{DS} = 50\text{ V}$ ; $V_{GS} = 10\text{ V}$ ; $T_j = 25\text{ °C}$ ; Fig. 2		-	62	-	nC
<b>Source-drain diode</b>							
$Q_r$	recovered charge	$I_S = 25\text{ A}$ ; $dI_S/dt = -100\text{ A/μs}$ ; $V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $T_j = 25\text{ °C}$ ; Fig. 3	[2]	-	110	-	nC

[1] Max current will be demonstrated through application tests. Practically the current will be limited by PCB, thermal design and operating temperature.

[2] includes capacitive recovery

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 <p>12 11 10 9 8 7</p> <p>1 2 3 4 5 6</p> <p>sot8005a_sv</p> <p>CCPAK1212i (SOT8005A)</p>	 <p>mbb076</p>
2	S	source		
3	S	source		
4	S	source		
5	S	source		
6	G	gate		
7	D	drain		
8	D	drain		
9	D	drain		
10	D	drain		
11	D	drain		
12	D	drain		
mb	D	mounting base; connected to drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PSMN1R0-100CSF	CCPAK1212i	Plastic, surface mounted copper clip package (CCPAK1212i); 12 terminals; 2.0 mm pitch, 12 mm × 12 mm × 2.5 mm body	SOT8005A

7. Limiting values

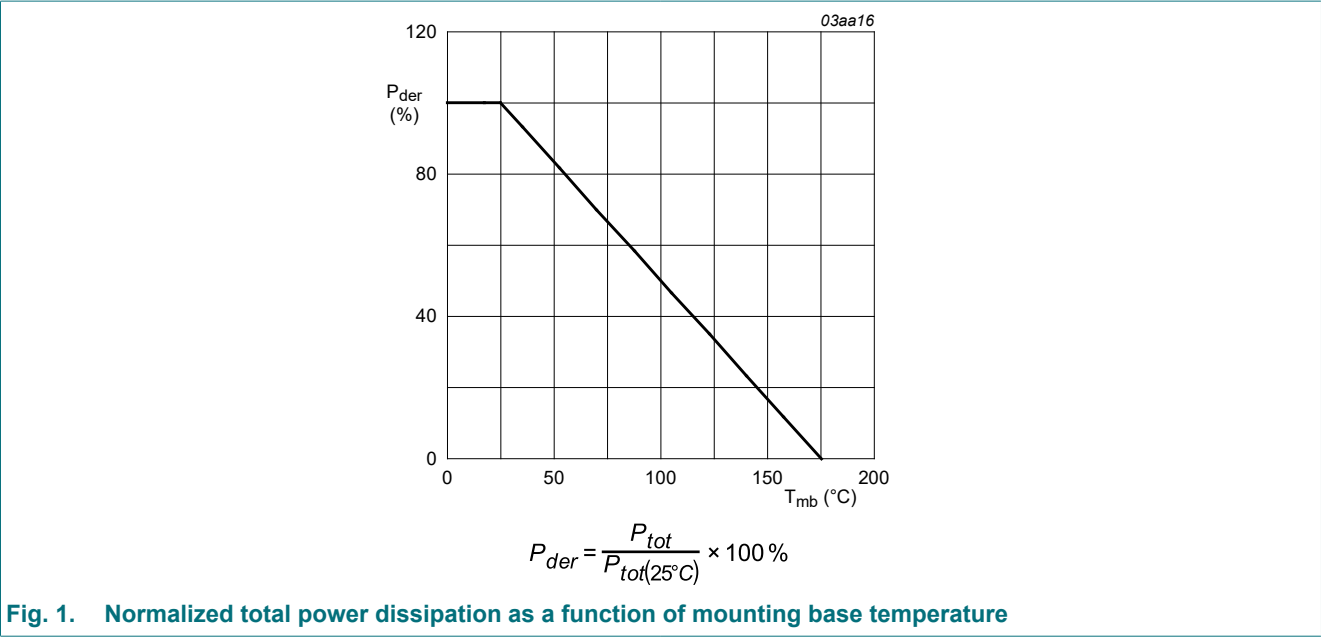
Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).  $T_j = 25\text{ °C}$  unless otherwise stated.

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{DS}$	drain-source voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$		-	100	V
$V_{GS}$	gate-source voltage			-20	20	V
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$ ; Fig. 1		-	1.071	kW
$I_D$	drain current	$V_{GS} = 10\text{ V}$ ; $T_{mb} = 25\text{ °C}$	[1]	-	400	A
		$V_{GS} = 10\text{ V}$ ; $T_{mb} = 100\text{ °C}$		-	282	A
$I_{DM}$	peak drain current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$ ; $T_{mb} = 25\text{ °C}$		-	1600	A
$T_{stg}$	storage temperature			-55	175	°C
$T_j$	junction temperature			-55	175	°C
Source-drain diode						
$I_S$	source current	$T_{mb} = 25\text{ °C}$		-	400	A
$I_{SM}$	peak source current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$ ; $T_{mb} = 25\text{ °C}$		-	1600	A

Symbol	Parameter	Conditions		Min	Max	Unit
Avalanche ruggedness						
E <sub>DS(AL)S</sub>	non-repetitive drain-source avalanche energy	I <sub>D</sub> = 116 A; V <sub>sup</sub> ≤ 100 V; R <sub>GS</sub> = 50 Ω; V <sub>GS</sub> = 10 V; T <sub>j(init)</sub> = 25 °C; unclamped	[2]	-	1561	mJ

- [1] Max current will be demonstrated through application tests. Practically the current will be limited by PCB, thermal design and operating temperature.
- [2] Protected by 100% test



8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-mb)</sub>	thermal resistance from junction to mounting base			-	[tbd]	0.14	K/W

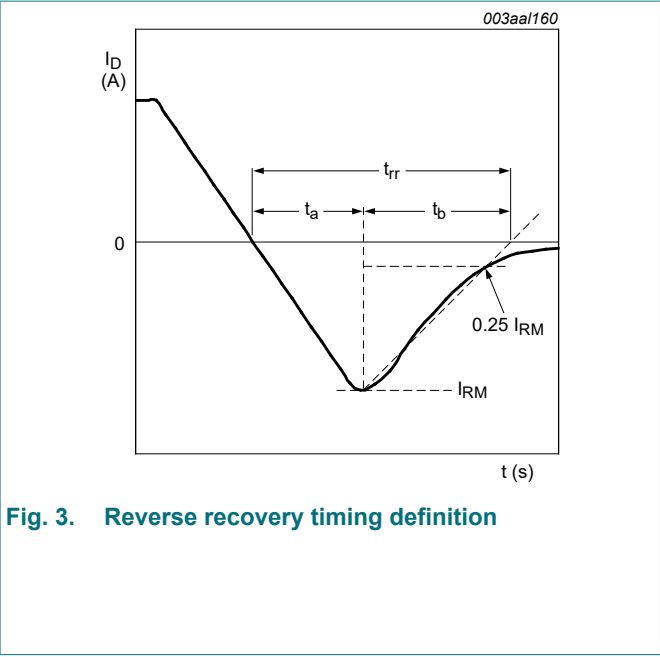
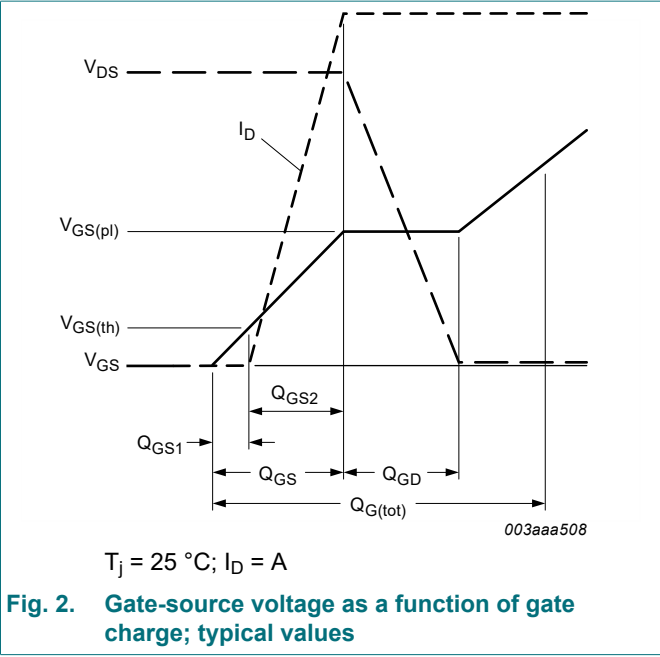
9. Characteristics

Table 6. Characteristics

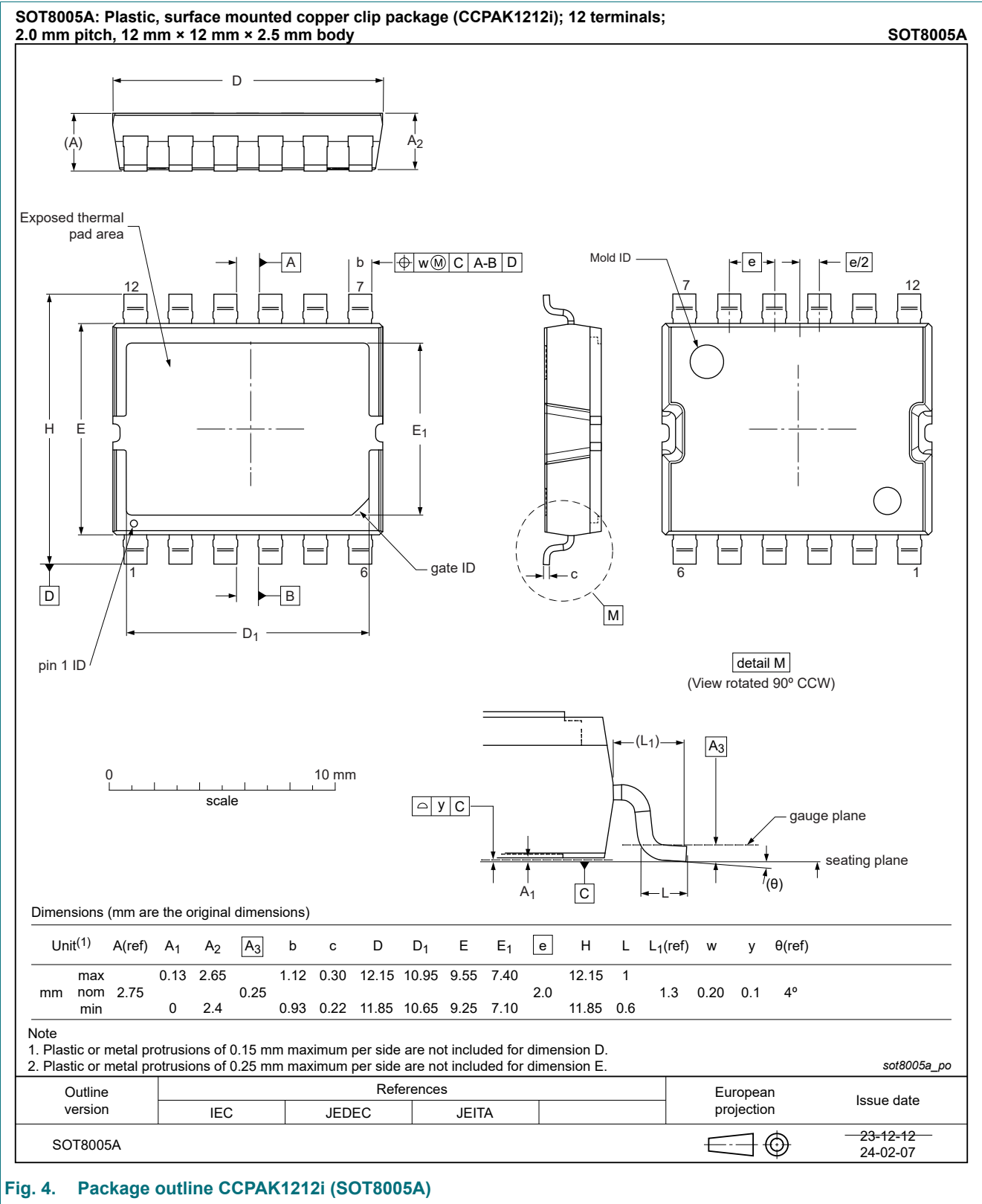
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V <sub>(BR)DSS</sub>	drain-source breakdown voltage	I <sub>D</sub> = 250 μA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C		100	-	-	V
		I <sub>D</sub> = 250 μA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = -55 °C		90	-	-	V
V <sub>GS(th)</sub>	gate-source threshold voltage	I <sub>D</sub> = 1 mA; V <sub>DS</sub> =V <sub>GS</sub> ; T <sub>j</sub> = 25 °C		2	3	4	V
		I <sub>D</sub> = 1 mA; V <sub>DS</sub> =V <sub>GS</sub> ; T <sub>j</sub> = 175 °C		-	1.6	-	V
		I <sub>D</sub> = 1 mA; V <sub>DS</sub> =V <sub>GS</sub> ; T <sub>j</sub> = -55 °C		-	3.5	-	V
ΔV <sub>GS(th)</sub> /ΔT	gate-source threshold voltage variation with temperature	25 °C ≤ T <sub>j</sub> ≤ 150 °C		-	[tbd]	-	mV/K
I <sub>DSS</sub>	drain leakage current	V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	[tbd]	5	μA
		V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 125 °C		-	[tbd]	[tbd]	μA

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I <sub>GSS</sub>	gate leakage current	V <sub>DS</sub> = 0 V; T <sub>J</sub> = 25 °C		-	2	100	nA
				-	2	100	nA
R <sub>DSon</sub>	drain-source on-state resistance	V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>J</sub> = 25 °C		-	0.83	1.04	mΩ
		V <sub>GS</sub> = 7 V; I <sub>D</sub> = 25 A; T <sub>J</sub> = 25 °C		-	0.94	1.18	mΩ
		V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>J</sub> = 100 °C		-	[tbd]	[tbd]	mΩ
		V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>J</sub> = 175 °C		-	[tbd]	[tbd]	mΩ
R <sub>G</sub>	gate resistance	f = 1 MHz; T <sub>J</sub> = 25 °C		[tbd]	[tbd]	[tbd]	Ω
Dynamic characteristics							
Q <sub>G(tot)</sub>	total gate charge	I <sub>D</sub> = 25 A; V <sub>DS</sub> = 50 V; V <sub>GS</sub> = 10 V; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>		[tbd]	323	[tbd]	nC
		I <sub>D</sub> = 0 A; V <sub>DS</sub> = 0 V; V <sub>GS</sub> = 10 V; T <sub>J</sub> = 25 °C		-	167	-	nC
Q <sub>GS</sub>	gate-source charge	I <sub>D</sub> = 25 A; V <sub>DS</sub> = 50 V; V <sub>GS</sub> = 10 V; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>		[tbd]	94	[tbd]	nC
Q <sub>GS(th)</sub>	pre-threshold gate-source charge	I <sub>D</sub> = 25 A; V <sub>DS</sub> = 50 V; V <sub>GS</sub> = 10 V; T <sub>J</sub> = 25 °C		-	63	-	nC
Q <sub>GS(th-pl)</sub>	post-threshold gate-source charge			-	31	-	nC
Q <sub>GD</sub>	gate-drain charge	I <sub>D</sub> = 25 A; V <sub>DS</sub> = 50 V; V <sub>GS</sub> = 10 V; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>		-	62	-	nC
V <sub>GS(pl)</sub>	gate-source plateau voltage	I <sub>D</sub> = 25 A; V <sub>DS</sub> = 50 V; T <sub>J</sub> = 25 °C		-	[tbd]	-	V
C <sub>iss</sub>	input capacitance	V <sub>DS</sub> = 50 V; V <sub>GS</sub> = 0 V; f = 1 MHz; T <sub>J</sub> = 25 °C		[tbd]	23154	[tbd]	pF
C <sub>oss</sub>	output capacitance			[tbd]	5201	[tbd]	pF
C <sub>rss</sub>	reverse transfer capacitance			[tbd]	82	[tbd]	pF
t <sub>d(on)</sub>	turn-on delay time	V <sub>DS</sub> = 50 V; R <sub>L</sub> = 2 Ω; V <sub>GS</sub> = 10 V; R <sub>G(ext)</sub> = 5 Ω; T <sub>J</sub> = 25 °C		-	84	-	ns
t <sub>r</sub>	rise time			-	72	-	ns
t <sub>d(off)</sub>	turn-off delay time			-	191	-	ns
t <sub>f</sub>	fall time			-	94	-	ns
Source-drain diode							
V <sub>SD</sub>	source-drain voltage	I <sub>S</sub> = 25 A; V <sub>GS</sub> = 0 V; T <sub>J</sub> = 25 °C		-	[tbd]	1	V
t <sub>rr</sub>	reverse recovery time	I <sub>S</sub> = 25 A; dI <sub>S</sub> /dt = -100 A/μs; V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 50 V; T <sub>J</sub> = 25 °C; <a href="#">Fig. 3</a>		-	108	-	ns
Q <sub>r</sub>	recovered charge		[1]	-	110	-	nC

[1] includes capacitive recovery



10. Package outline



## 11. Legal information

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Document status [1][2]	Product status [3]	Definition
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