



# PSMN1R4-100CSF

NextPower 100 V, 1.35 mOhm, N-channel MOSFET in  
CCPAK1212i package

20 October 2025

Product 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
- 355 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
- CCPAK1212i is JEDEC listed package for open market and 2<sup>nd</sup> source compatibility

## 3. Applications

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

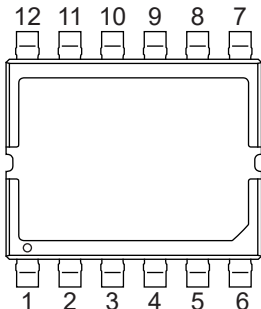
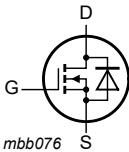
## 4. Quick reference data

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	$V_{GS} = 10\text{ V}$ ; $T_{mb} = 25\text{ °C}$ ; <a href="#">Fig. 2</a>	-	-	355	A
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$ ; <a href="#">Fig. 1</a>	-	-	935	W
<b>Static characteristics</b>						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$ ; $I_D = 25\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 11</a>	-	1.07	1.35	mΩ
<b>Dynamic characteristics</b>						
$Q_{GD}$	gate-drain charge	$I_D = 25\text{ A}$ ; $V_{DS} = 50\text{ V}$ ; $V_{GS} = 10\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 13</a> ; <a href="#">Fig. 14</a>	14	46	106	nC
<b>Source-drain diode</b>						
$Q_r$	recovered charge	$I_S = 25\text{ A}$ ; $dI_S/dt = -100\text{ A/μs}$ ; $V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 17</a>	-	74	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 <p>sot8005a_sv</p> <p><b>CCPAK1212i (SOT8005A)</b></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
PSMN1R4-100CSF	CCPAK1212i	Plastic, surface mounted copper clip package (CCPAK1212i); 12 terminals; 2.0 mm pitch, 12 mm × 12 mm × 2.5 mm body	SOT8005A

7. Marking

Table 4. Marking codes

Type number	Marking code
PSMN1R4-100CSF	XP1F4S10C

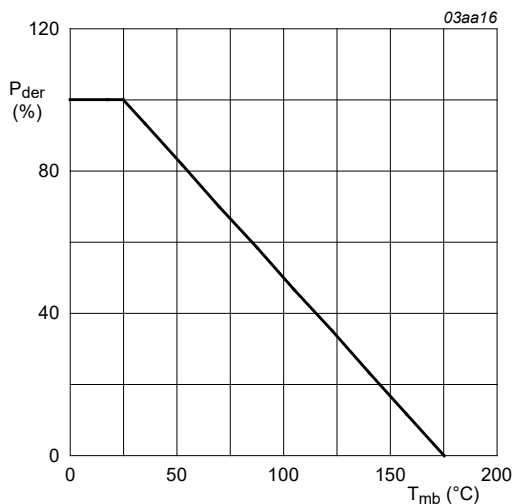
## 8. Limiting values

**Table 5. Limiting values**

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

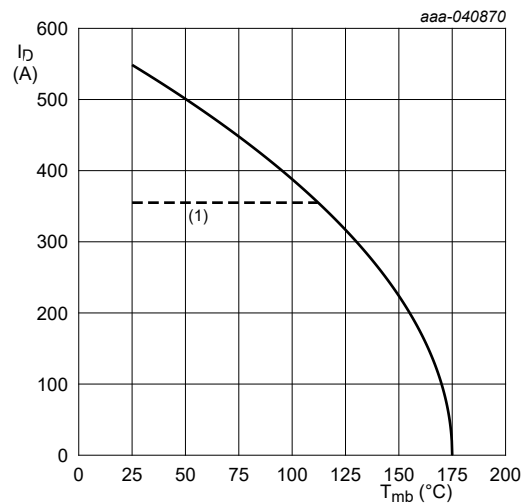
Symbol	Parameter	Conditions		Min	Max	Unit
$V_{DS}$	drain-source voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$		-	100	V
$V_{DGR}$	drain-gate voltage	$25\text{ °C} \leq T_j \leq 175\text{ °C}$ ; $R_{GS} = 20\text{ k}\Omega$		-	100	V
$V_{GS}$	gate-source voltage			-20	20	V
$P_{tot}$	total power dissipation	$T_{mb} = 25\text{ °C}$ ; <a href="#">Fig. 1</a>		-	935	W
$I_D$	drain current	$V_{GS} = 10\text{ V}$ ; $T_{mb} = 25\text{ °C}$ ; <a href="#">Fig. 2</a>		-	355	A
		$V_{GS} = 10\text{ V}$ ; $T_{mb} = 100\text{ °C}$ ; <a href="#">Fig. 2</a>		-	355	A
$I_{DM}$	peak drain current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$ ; $T_{mb} = 25\text{ °C}$ ; <a href="#">Fig. 3</a>		-	2195	A
$T_{stg}$	storage temperature			-55	175	°C
$T_j$	junction temperature			-55	175	°C
$T_{sld(M)}$	peak soldering temperature			-	260	°C
<b>Source-drain diode</b>						
$I_S$	source current	$T_{mb} = 25\text{ °C}$		-	355	A
$I_{SM}$	peak source current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$ ; $T_{mb} = 25\text{ °C}$		-	2195	A
<b>Avalanche ruggedness</b>						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 99\text{ A}$ ; $V_{sup} \leq 100\text{ V}$ ; $R_{GS} = 50\text{ }\Omega$ ; $V_{GS} = 10\text{ V}$ ; $T_{j(init)} = 25\text{ °C}$ ; unclamped; $t_p = 175\text{ }\mu\text{s}$ ; <a href="#">Fig. 4</a>	<a href="#">[1]</a>	-	1130	mJ
$I_{AS}$	non-repetitive avalanche current	$V_{sup} = 100\text{ V}$ ; $V_{GS} = 10\text{ V}$ ; $T_{j(init)} = 25\text{ °C}$ ; $R_{GS} = 50\text{ }\Omega$ ; <a href="#">Fig. 4</a>	<a href="#">[1]</a>	-	99	A

[1] Protected by 100% test



$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ\text{C})}} \times 100\%$$

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



$V_{GS} \geq 10\text{ V}$

(1) 355 A continuous current has been successfully demonstrated during application tests. Practically the current will be limited by PCB, thermal design and operating temperature.

**Fig. 2. Continuous drain current as a function of mounting base temperature**

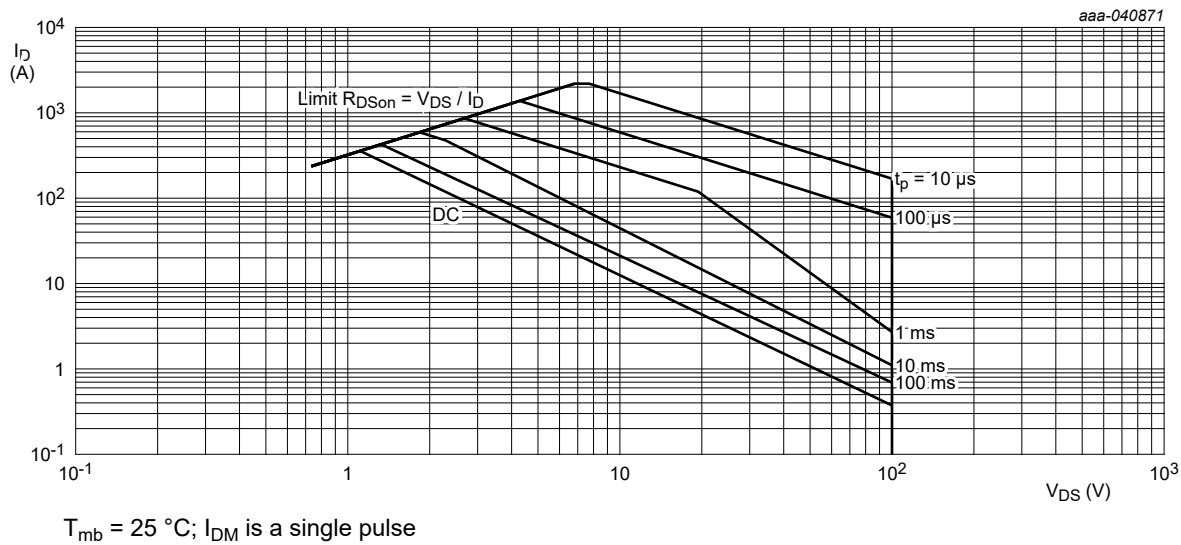


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

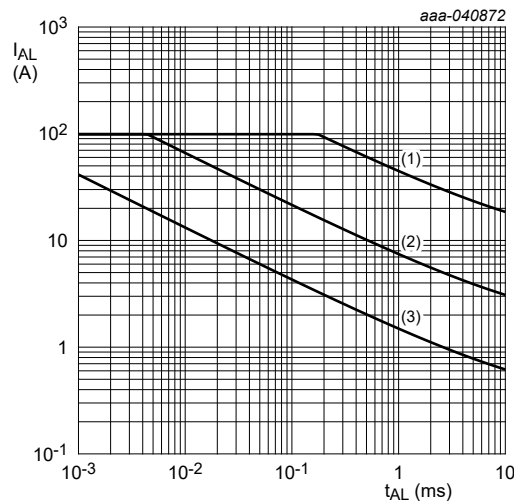


Fig. 4. Avalanche rating; avalanche current as a function of avalanche time

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 5</a>	-	0.123	0.16	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	<a href="#">Fig. 6</a>	-	58	-	K/W
		<a href="#">Fig. 7</a>	-	29	-	K/W

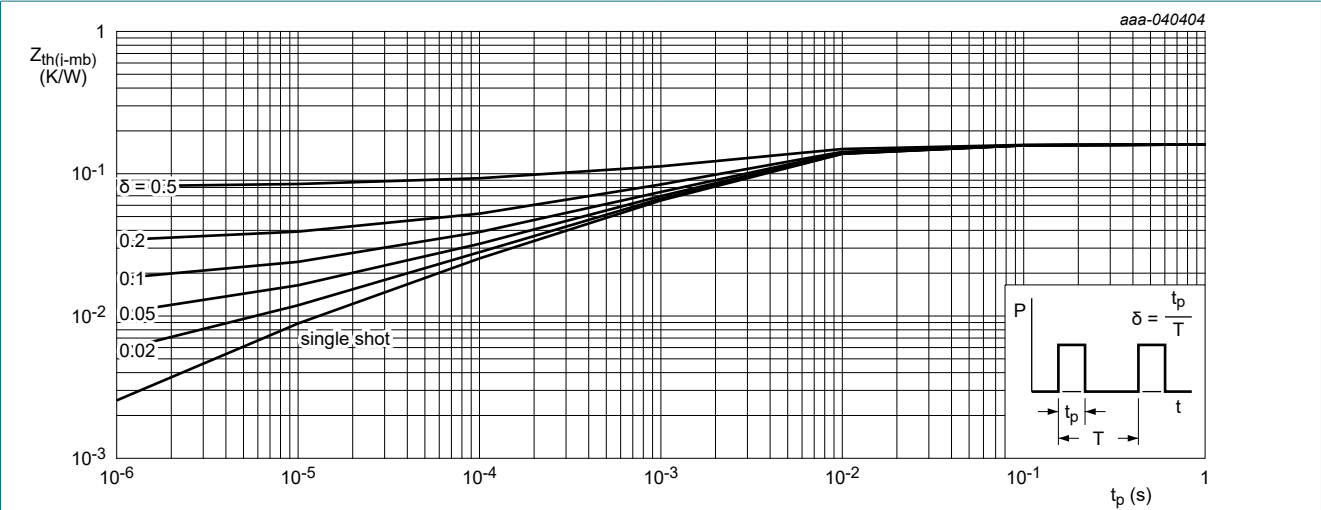


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

70  $\mu\text{m}$  thick copper on FR4 board

aaa-040399

Copper area 25.4 mm square; 70  $\mu\text{m}$  thick on FR4 board

aaa-040400

Fig. 6. PCB layout with minimum footprint for thermal resistance from junction to ambient

Fig. 7. PCB layout for thermal resistance from junction to ambient

## 10. Characteristics

Table 7. 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	3.1	4	V
		I <sub>D</sub> = 1 mA; V <sub>DS</sub> =V <sub>GS</sub> ; T <sub>j</sub> = 175 °C		-	1.61	-	V
		I <sub>D</sub> = 1 mA; V <sub>DS</sub> =V <sub>GS</sub> ; T <sub>j</sub> = -55 °C		-	3.7	-	V
ΔV <sub>GS(th)</sub> /ΔT	gate-source threshold voltage variation with temperature	25 °C ≤ T <sub>j</sub> ≤ 150 °C		-	-9.4	-	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		-	0.05	1.6	μA
		V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 125 °C		-	35	160	μA
I <sub>GSS</sub>	gate leakage current	V <sub>GS</sub> = 20 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	2	100	nA
		V <sub>GS</sub> = -20 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C		-	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; <a href="#">Fig. 11</a>		-	1.07	1.35	mΩ
		V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 100 °C; <a href="#">Fig. 12</a>		-	1.7	2.2	mΩ
		V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 175 °C; <a href="#">Fig. 12</a>		-	2.4	3.1	mΩ
		V <sub>GS</sub> = 7 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 11</a>		-	1.36	2.04	mΩ
R <sub>G</sub>	gate resistance	f = 1 MHz; T <sub>j</sub> = 25 °C		0.51	1.02	2.05	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. 13</a> ; <a href="#">Fig. 14</a>		128	255	383	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		-	228	-	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. 13</a> ; <a href="#">Fig. 14</a>		46	76.5	107	nC
Q <sub>GS(th)</sub>	pre-threshold gate-source charge			-	51	-	nC
Q <sub>GS(th-pl)</sub>	post-threshold gate-source charge			-	25.4	-	nC
Q <sub>GD</sub>	gate-drain charge			14	46	106	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; <a href="#">Fig. 13</a> ; <a href="#">Fig. 14</a>		-	4.4	-	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; <a href="#">Fig. 15</a>		10901	18168	25436	pF
C <sub>oss</sub>	output capacitance			2494	4157	6652	pF
C <sub>rss</sub>	reverse transfer capacitance			9	92	239	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		-	67	-	ns
t <sub>r</sub>	rise time			-	63	-	ns
t <sub>d(off)</sub>	turn-off delay time			-	157	-	ns
t <sub>f</sub>	fall time			-	84	-	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; <a href="#">Fig. 16</a>		-	0.76	1	V

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$t_{rr}$	reverse recovery time	$I_S = 25\text{ A}$ ; $dI_S/dt = -100\text{ A}/\mu\text{s}$ ; $V_{GS} = 0\text{ V}$ ;		-	62	-	ns
$Q_r$	recovered charge	$V_{DS} = 50\text{ V}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 17</a>		-	74	-	nC

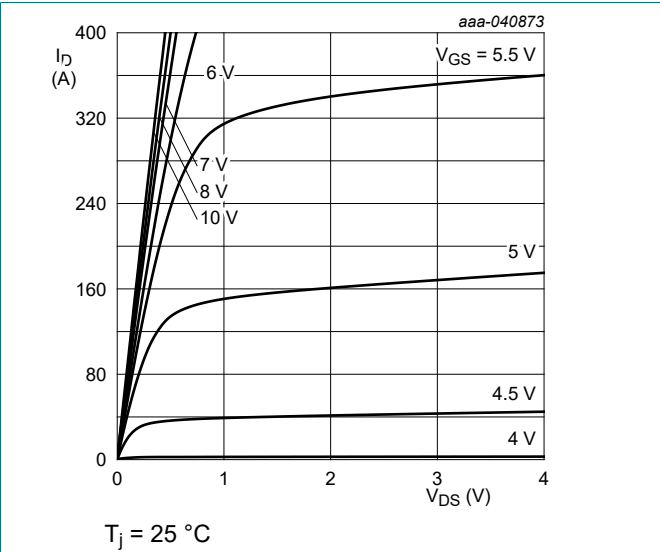


Fig. 8. Output characteristics; drain current as a function of drain-source voltage; typical values

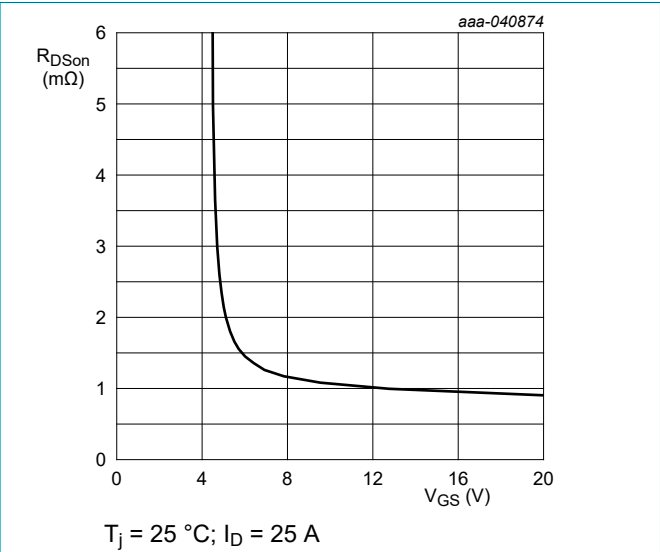


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

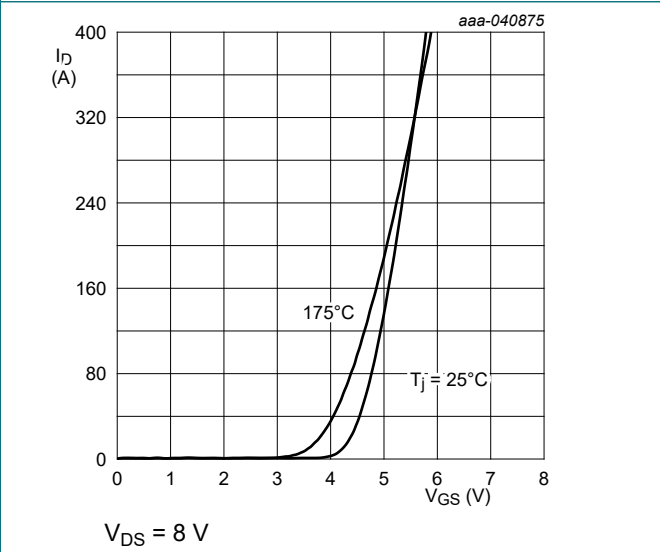


Fig. 10. Transfer characteristics; drain current as a function of gate-source voltage; typical values

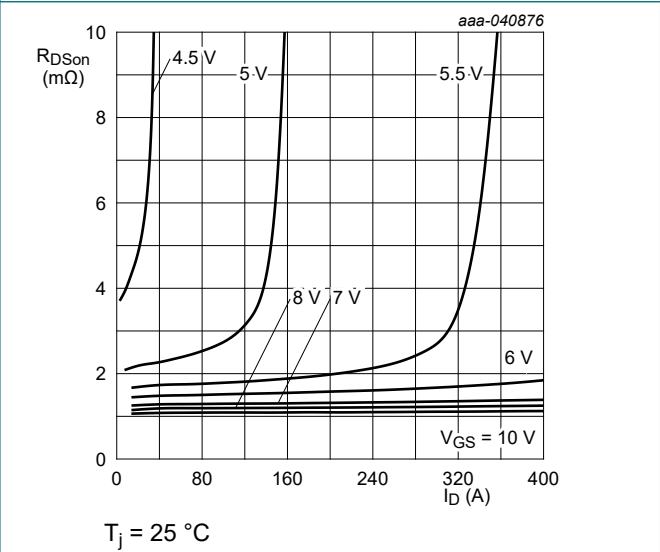


Fig. 11. Drain-source on-state resistance as a function of drain current; typical values

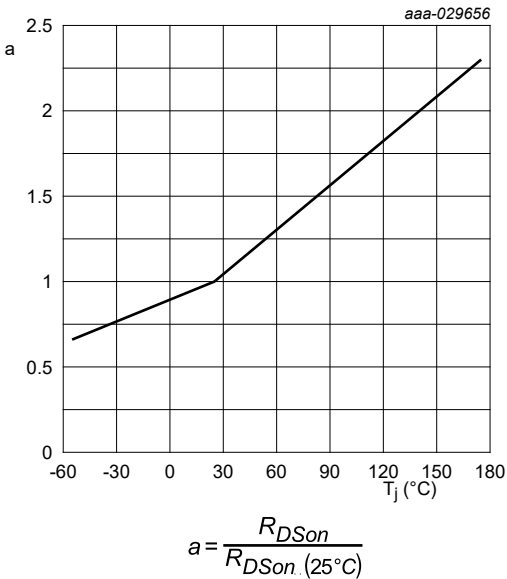


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

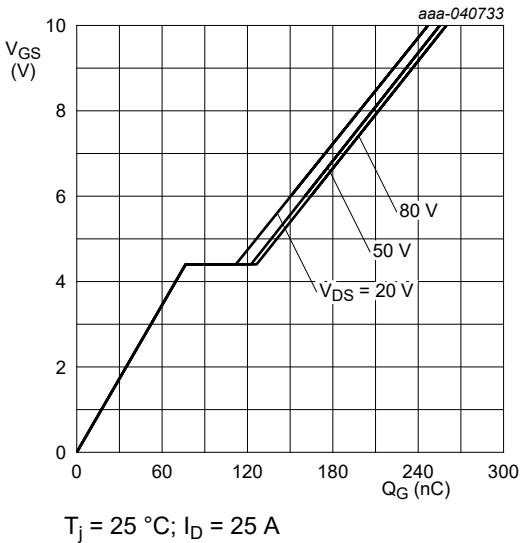


Fig. 13. Gate-source voltage as a function of gate charge; typical values



Fig. 14. Gate charge waveform definitions

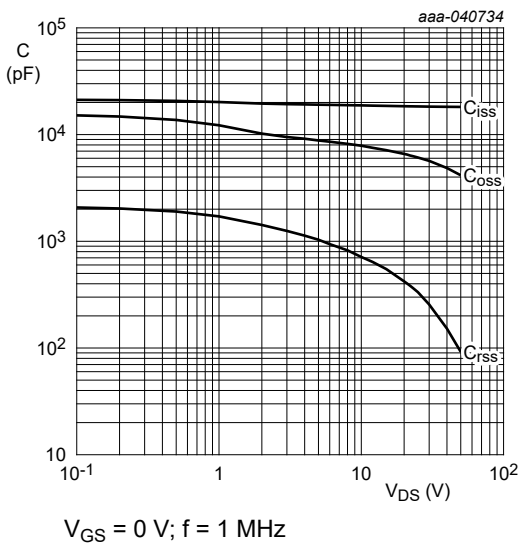


Fig. 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



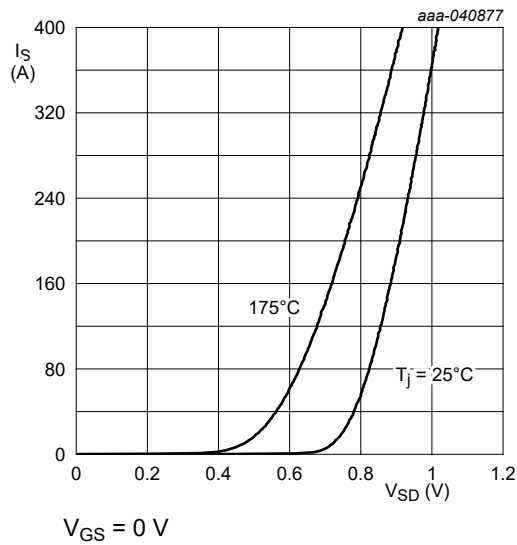


Fig. 16. Source-drain (diode forward) current as a function of source-drain (diode forward) voltage; typical values

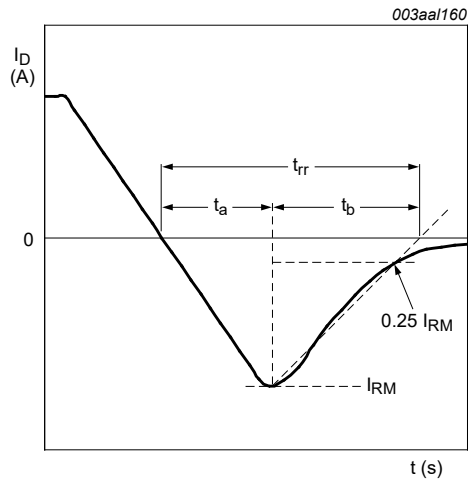
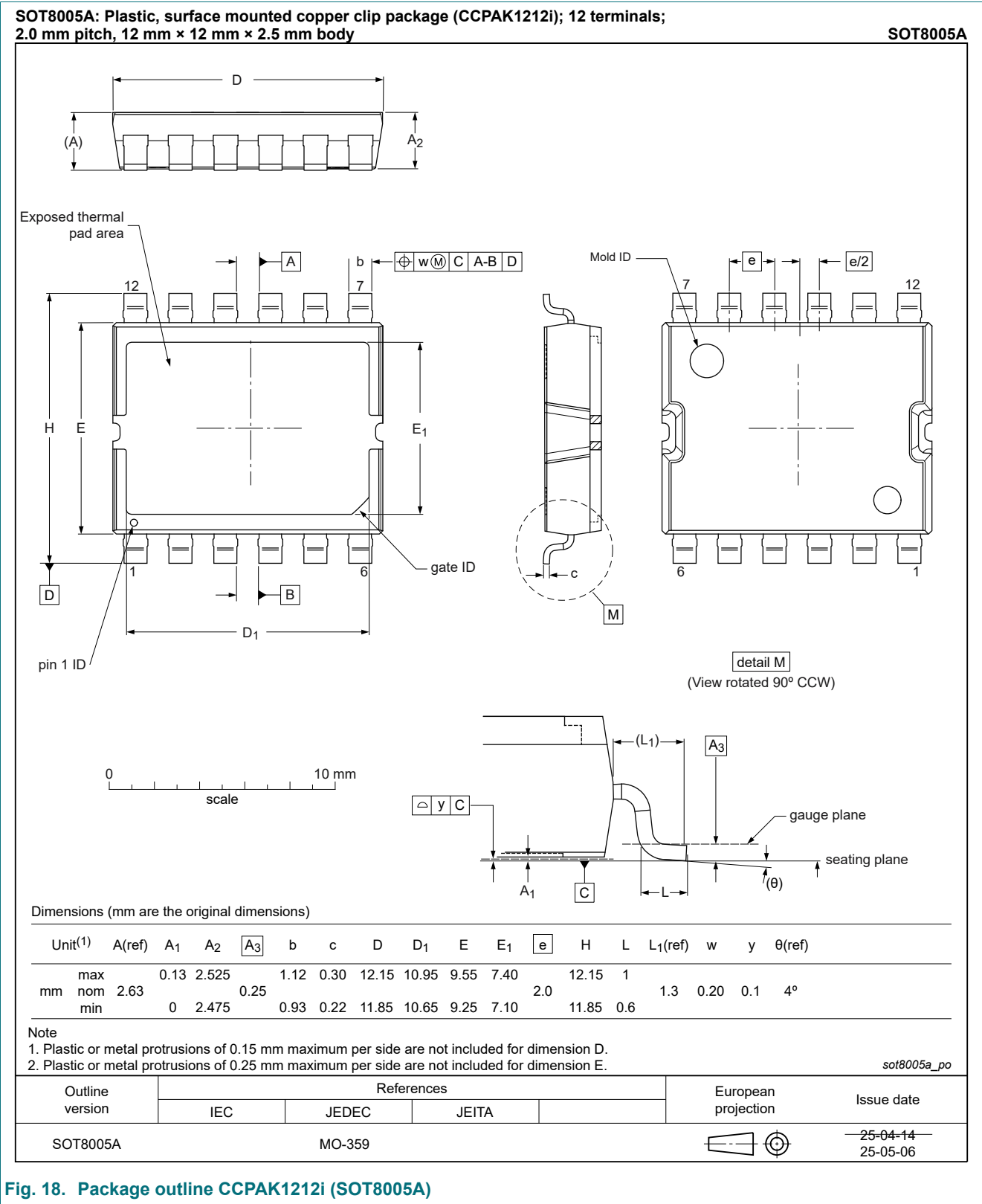


Fig. 17. Reverse recovery timing definition

11. Package outline



12. Soldering

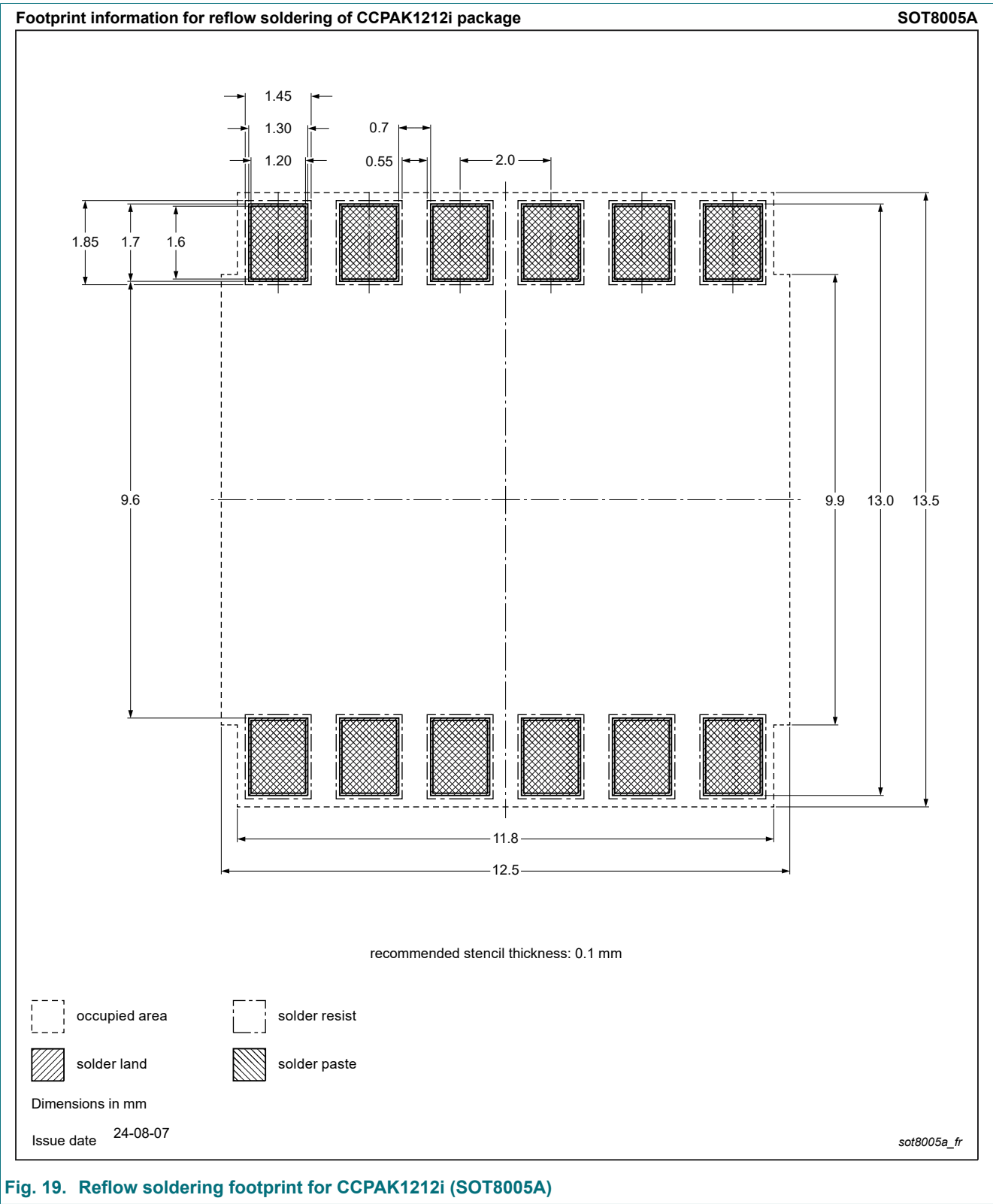


Fig. 19. Reflow soldering footprint for CCPAK1212i (SOT8005A)

### 13. 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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Date of release: 20 October 2025