



# PMCB60XNE

30 V, N-channel Trench MOSFET

21 February 2022

Product data sheet

## 1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a leadless ultra small DSN1006-3 (SOT8026) Surface-Mounted Device (SMD) package using Trench MOSFET technology.

## 2. Features and benefits

- Low threshold voltage
- Very fast switching
- Ultra small package: 1.0 × 0.6 × 0.2 mm
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection > 2 kV HBM (class H2)

## 3. Applications

- Battery switch
- High-speed line driver
- Low-side load switch
- Switching circuits

## 4. Quick reference data

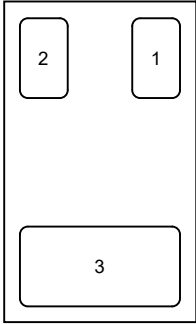
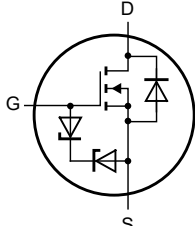
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$	-	-	30	V
$V_{GS}$	gate-source voltage		-12	-	12	V
$I_D$	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ °C}; t \leq 5\text{ s}$	[1]	-	4.3	A
<b>Static characteristics</b>						
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 3.5\text{ A}; T_j = 25\text{ °C}$	-	40	55	mΩ

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 6 cm<sup>2</sup>.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 <p>Transparent top view DSN1006 (SOT8026)</p>	 <p>017aaa255</p>
2	S	source		
3	D	drain		

## 6. Ordering information

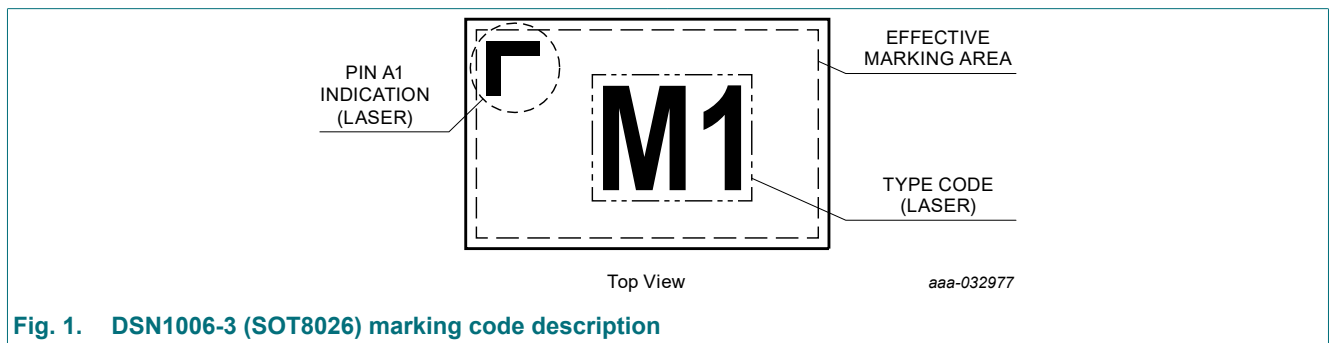
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMCB60XNE	DSN1006	chip-scale package; 3 terminals; body 1.0 x 0.6 x 0.2 mm	SOT8026

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMCB60XNE	M2



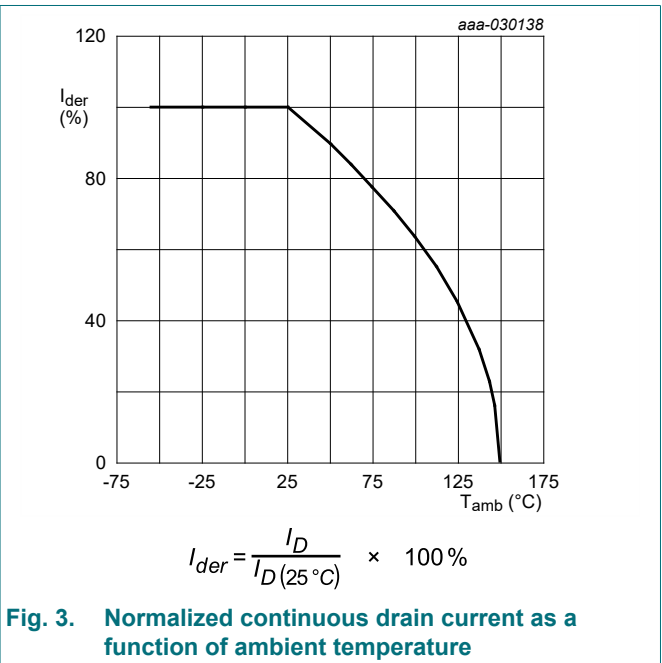
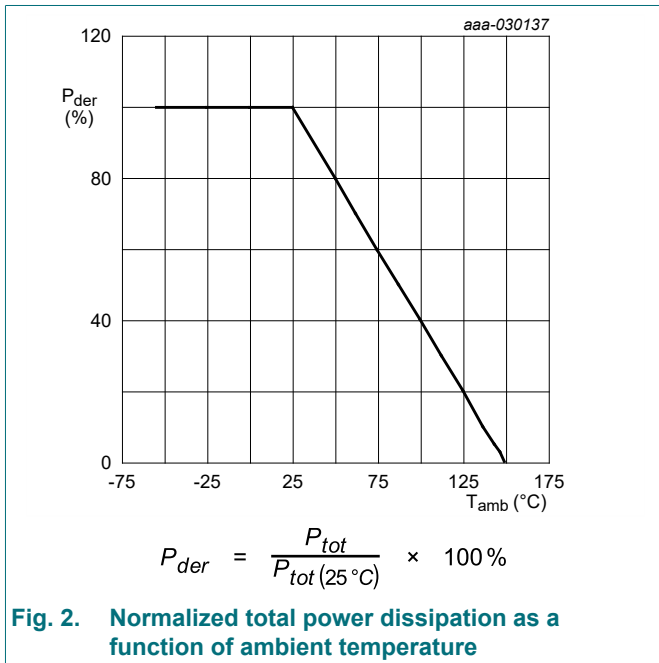
## 8. Limiting values

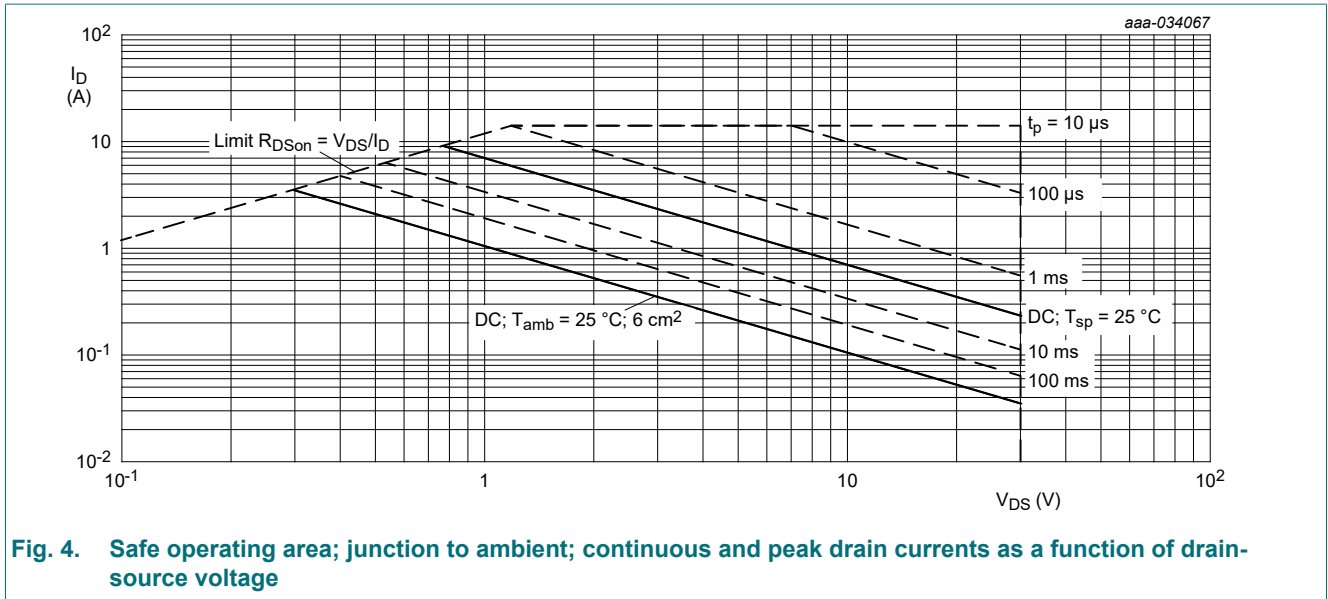
**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
V <sub>DS</sub>	drain-source voltage	T <sub>j</sub> = 25 °C		-	30	V
V <sub>GS</sub>	gate-source voltage			-12	12	V
I <sub>D</sub>	drain current	V <sub>GS</sub> = 4.5 V; T <sub>amb</sub> = 25 °C; t ≤ 5 s	[1]	-	4.3	A
		V <sub>GS</sub> = 4.5 V; T <sub>amb</sub> = 25 °C	[1]	-	3.5	A
		V <sub>GS</sub> = 4.5 V; T <sub>amb</sub> = 100 °C	[1]	-	2.2	A
I <sub>DM</sub>	peak drain current	T <sub>amb</sub> = 25 °C; single pulse; t <sub>p</sub> ≤ 10 μs		-	14	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = 25 °C	[2]	-	480	mW
			[3]	-	900	mW
			[1]	-	1	W
		T <sub>sp</sub> = 25 °C		-	7	W
T <sub>j</sub>	junction temperature			-55	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C
<b>Source-drain diode</b>						
I <sub>S</sub>	source current	T <sub>amb</sub> = 25 °C	[1]	-	1	A

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 6 cm<sup>2</sup>.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, 4 layer copper, tin-plated and standard footprint.



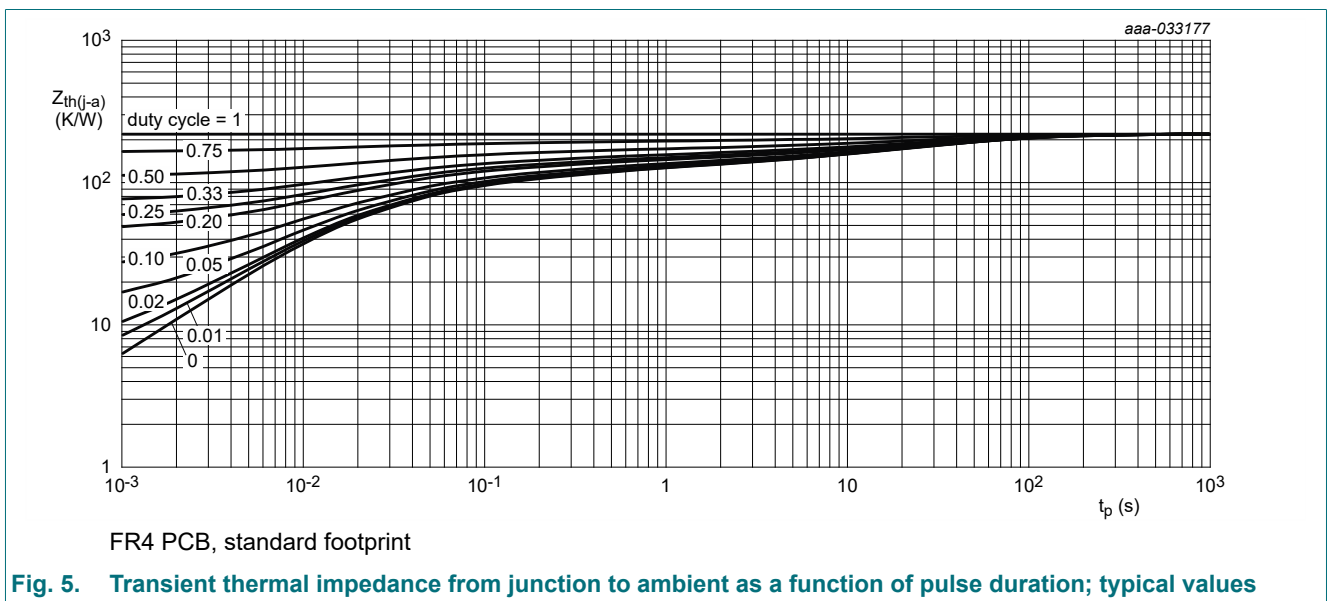


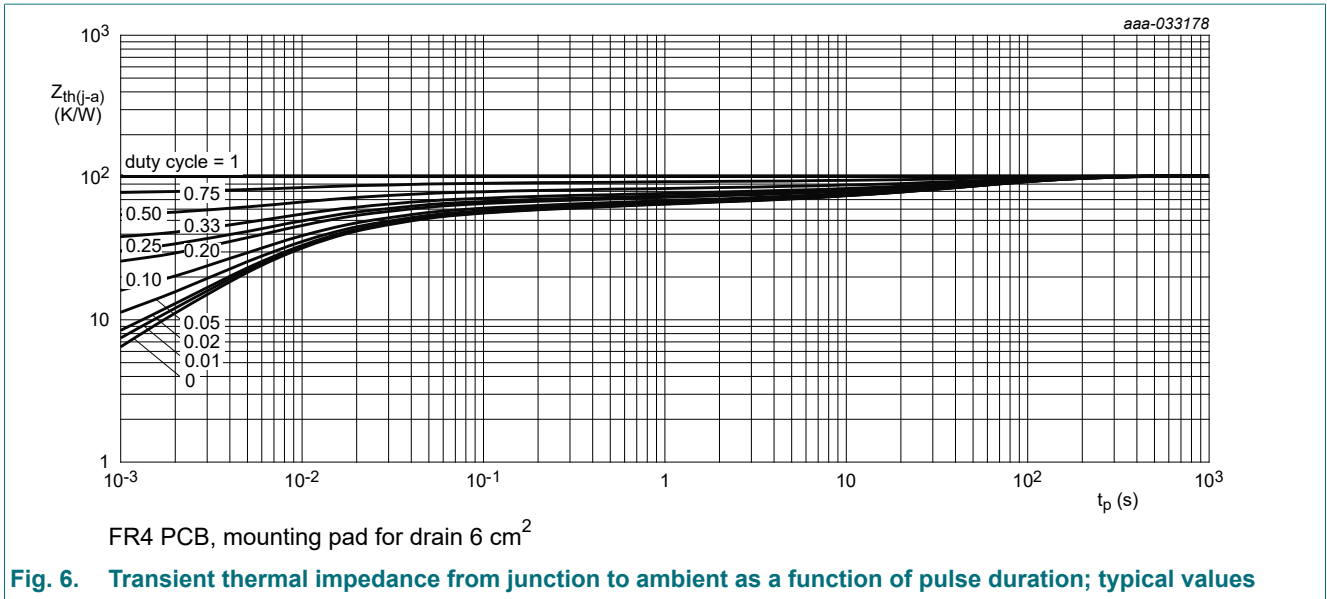
## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	220	258	K/W
			[2]	-	123	142	K/W
			[3]	-	102	120	K/W
		in free air; t ≤ 5 s	[3]	-	70	80	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point			-	13	18	K/W

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, 4 layer copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for drain 6 cm<sup>2</sup>.





## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu\text{A}$ ; $V_{GS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	30	-	-	V
$V_{GSth}$	gate-source threshold voltage	$I_D = 250 \mu\text{A}$ ; $V_{DS} = V_{GS}$ ; $T_j = 25 \text{ }^\circ\text{C}$	0.5	0.8	1.1	V
$I_{DSS}$	drain leakage current	$V_{DS} = 30 \text{ V}$ ; $V_{GS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	-	1	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{GS} = 12 \text{ V}$ ; $V_{DS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_{GS} = -12 \text{ V}$ ; $V_{DS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	-	-10	$\mu\text{A}$
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 4.5 \text{ V}$ ; $I_D = 3.5 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	40	55	$\text{m}\Omega$
		$V_{GS} = 4.5 \text{ V}$ ; $I_D = 3.5 \text{ A}$ ; $T_j = 150 \text{ }^\circ\text{C}$	-	66	91	$\text{m}\Omega$
		$V_{GS} = 2.5 \text{ V}$ ; $I_D = 2 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	48	75	$\text{m}\Omega$
		$V_{GS} = 1.8 \text{ V}$ ; $I_D = 0.5 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	70	155	$\text{m}\Omega$
$g_{fs}$	forward transconductance	$V_{DS} = 10 \text{ V}$ ; $I_D = 4 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	6.7	-	S
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$V_{DS} = 15 \text{ V}$ ; $I_D = 4 \text{ A}$ ; $V_{GS} = 4.5 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	5	7.5	nC
$Q_{GS}$	gate-source charge		-	0.8	-	nC
$Q_{GD}$	gate-drain charge		-	1.4	-	nC
$C_{iss}$	input capacitance	$V_{DS} = 15 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $V_{GS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	420	-	pF
$C_{oss}$	output capacitance		-	36	-	pF
$C_{rss}$	reverse transfer capacitance		-	26	-	pF
$t_{d(on)}$	turn-on delay time		$V_{DS} = 15 \text{ V}$ ; $I_D = 4 \text{ A}$ ; $V_{GS} = 4.5 \text{ V}$ ; $R_{G(ext)} = 6 \Omega$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	20	-
$t_r$	rise time	-		40	-	ns
$t_{d(off)}$	turn-off delay time	-		107	-	ns
$t_f$	fall time	-		74	-	ns
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 1 \text{ A}$ ; $V_{GS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	0.7	1.2	V

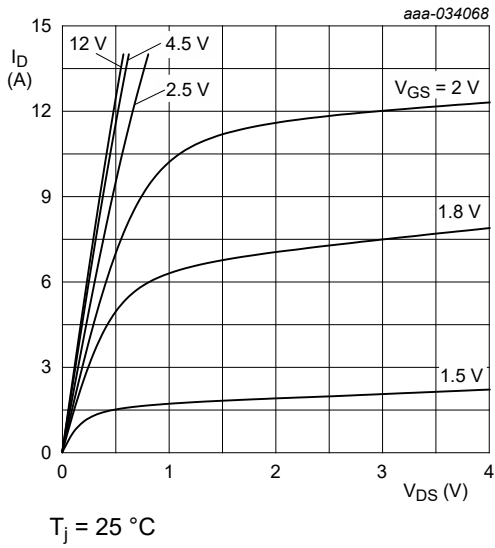


Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values

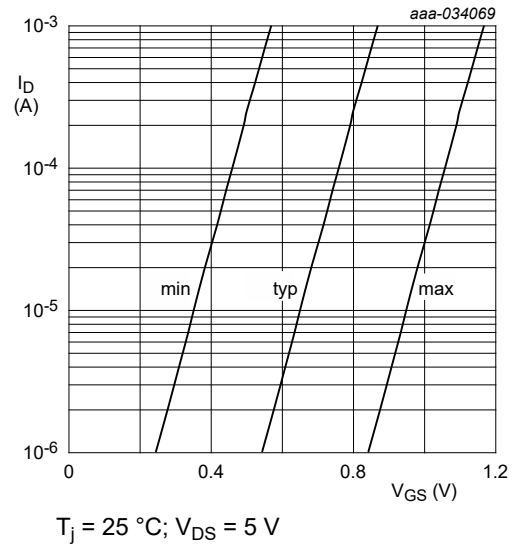


Fig. 8. Subthreshold drain current as a function of gate-source voltage

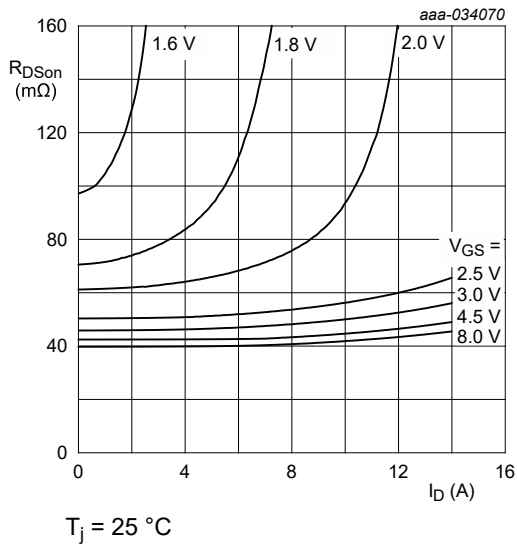


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

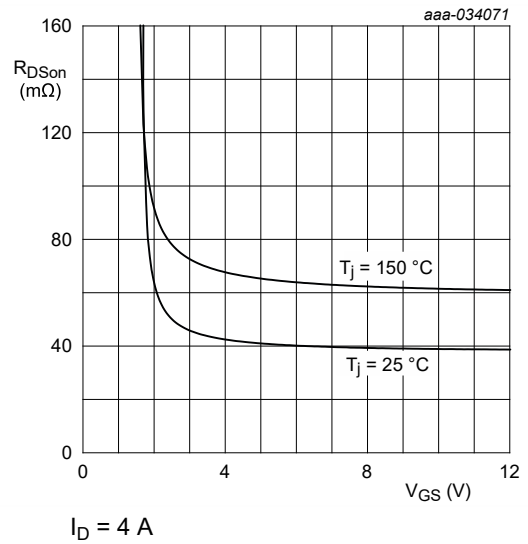


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

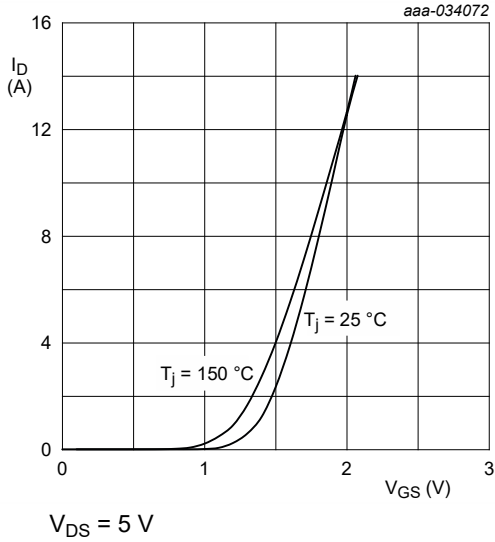


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

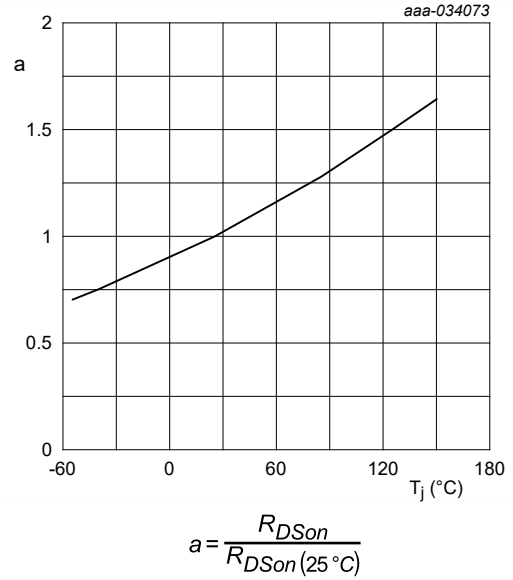


Fig. 12. Normalized drain-source on-state resistance as a function of junction temperature; typical values

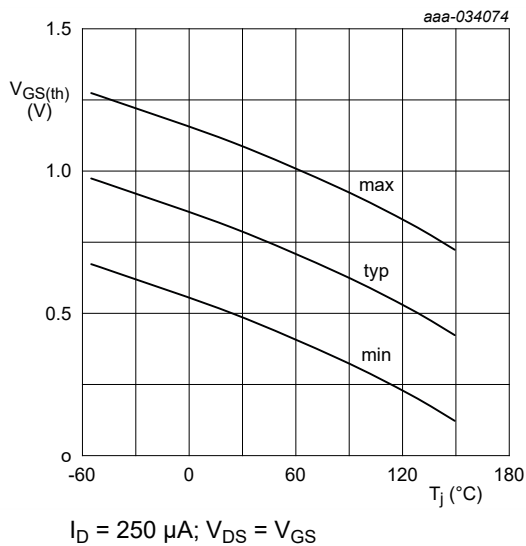


Fig. 13. Gate-source threshold voltage as a function of junction temperature

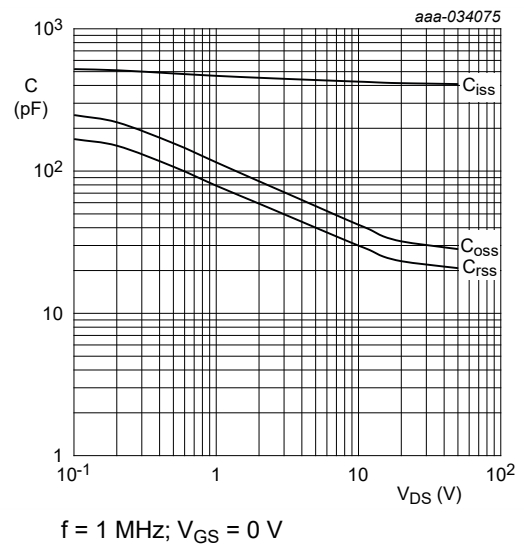
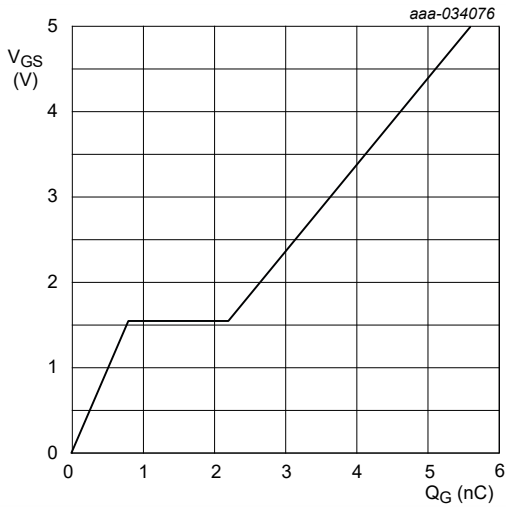


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values





$I_D = 4 \text{ A}; V_{DS} = 15 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$

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

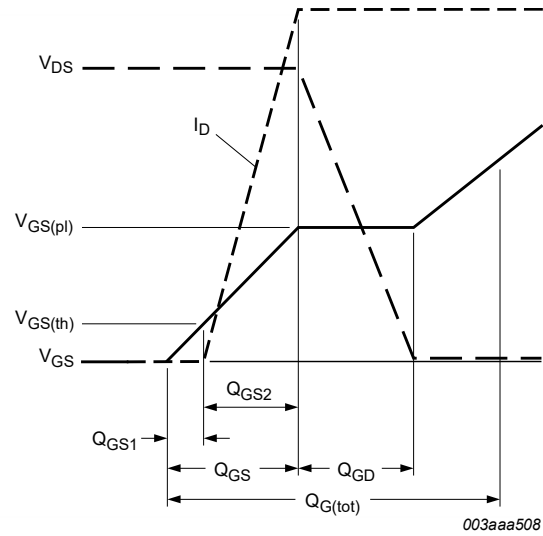
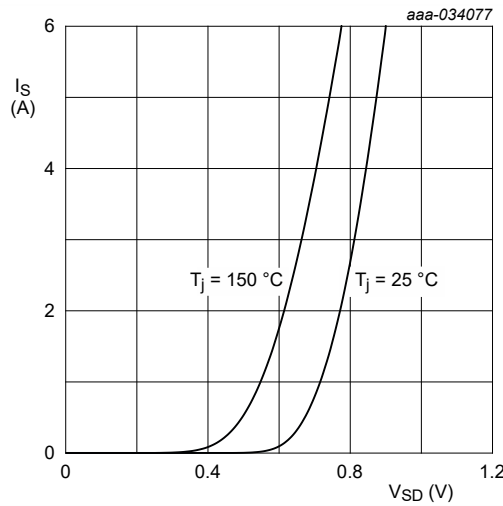


Fig. 16. Gate charge waveform definitions



$V_{GS} = 0 \text{ V}$

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

## 11. Test information

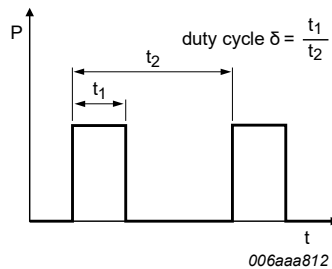


Fig. 18. Duty cycle definition

## 12. Package outline

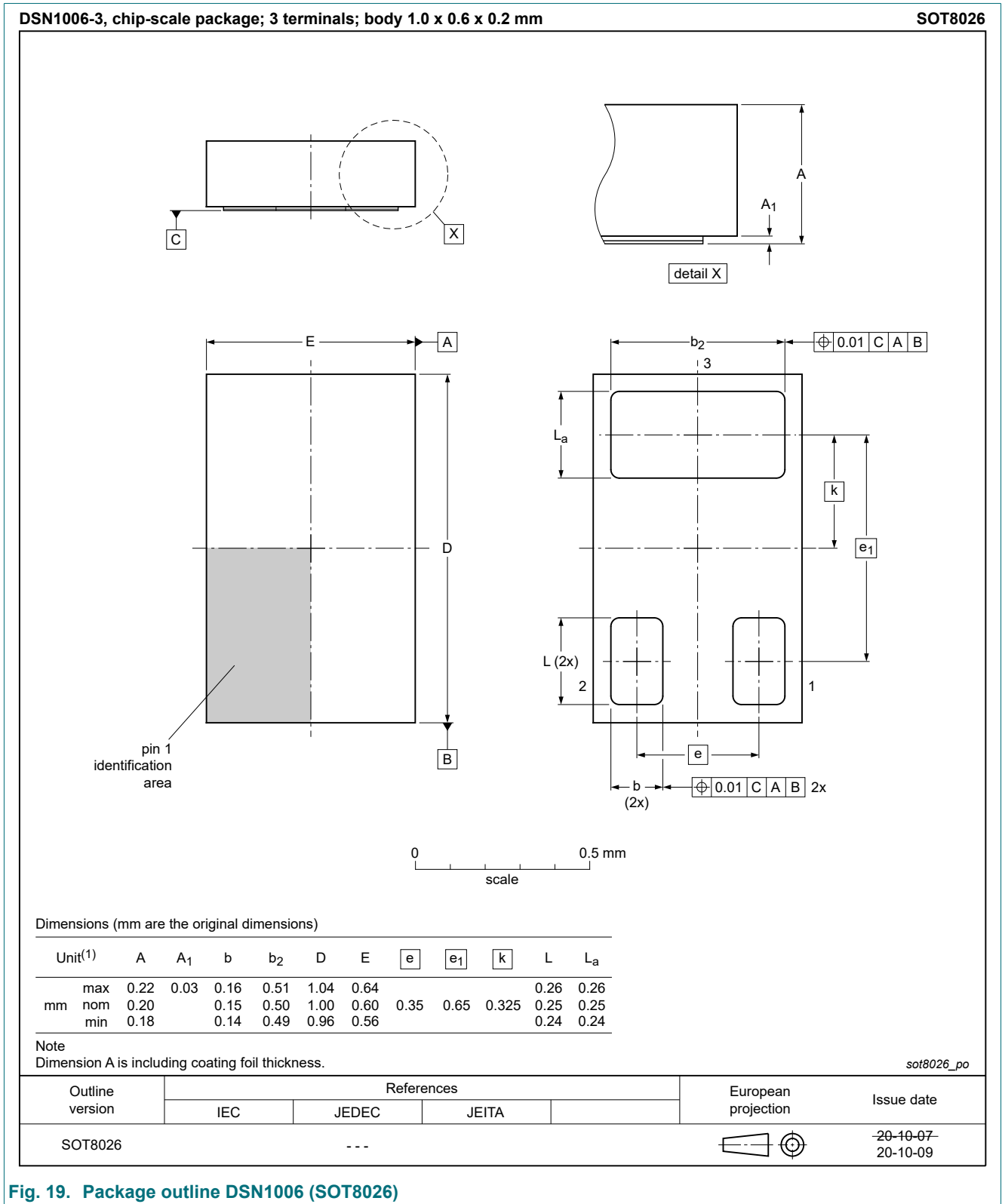


Fig. 19. Package outline DSN1006 (SOT8026)

### 13. Soldering

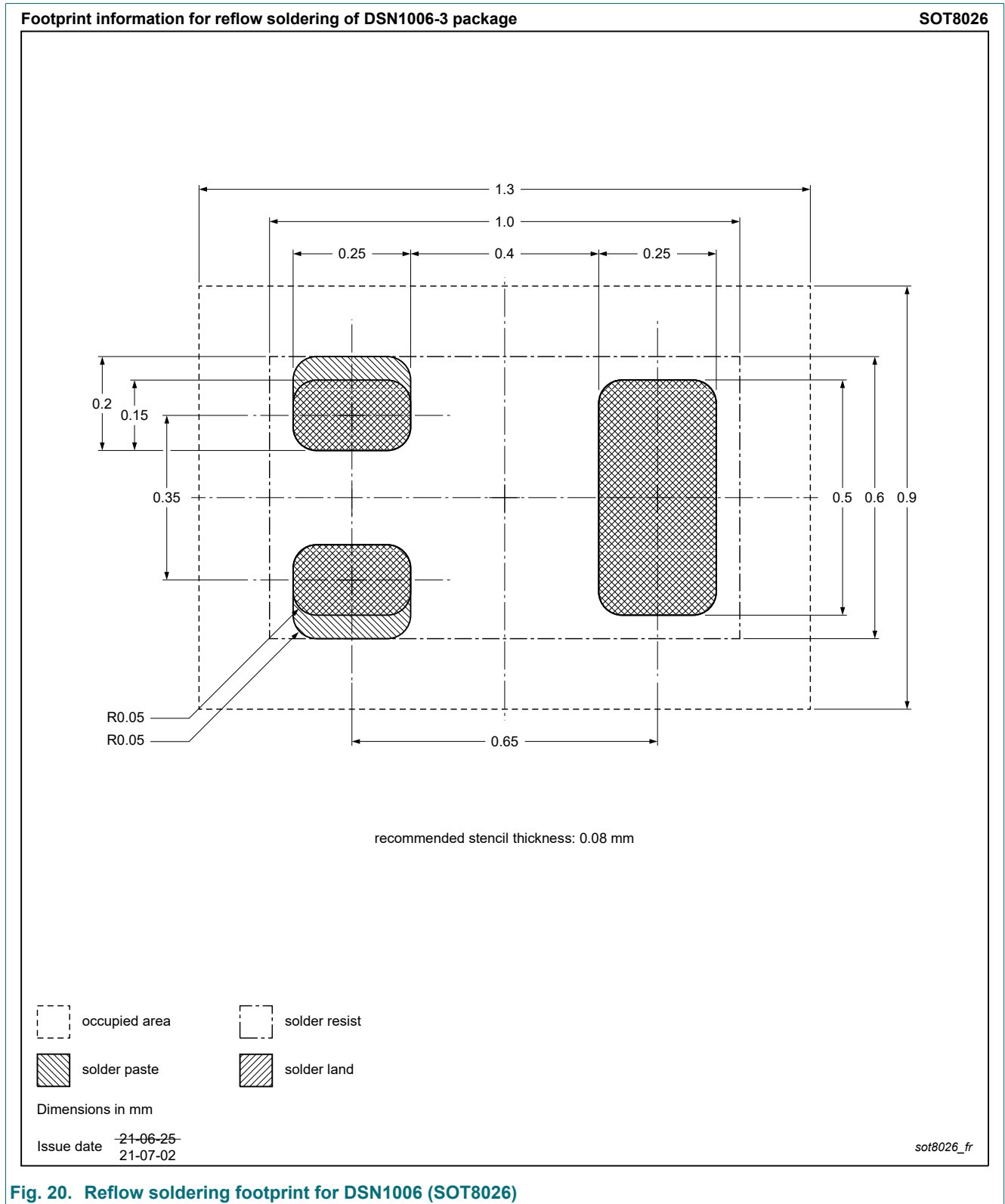


Fig. 20. Reflow soldering footprint for DSN1006 (SOT8026)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMCB60XNE v.1	20220221	Product data sheet	-	-

## 15. Legal information

### 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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