



PMCB60XN

30 V, N-channel Trench MOSFET

8 December 2021

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 × 0.6 × 0.2 mm
- Trench MOSFET technology

3. Applications

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

4. Quick reference data

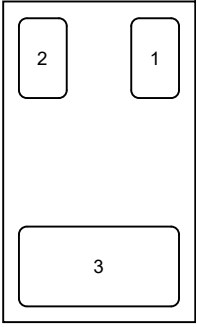
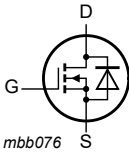
Table 1. Quick reference data

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]	-	4.5	A
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 4\text{ A}; T_j = 25\text{ °C}$	-	40	50	mΩ

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 6 cm².

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>mbb076</p>
2	S	source		
3	D	drain		

6. Ordering information

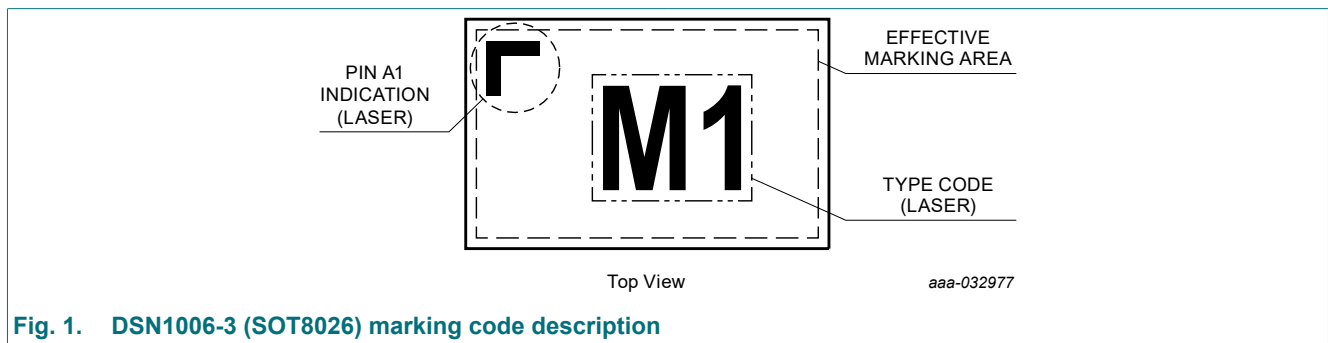
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMCB60XN	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
PMCB60XN	M1



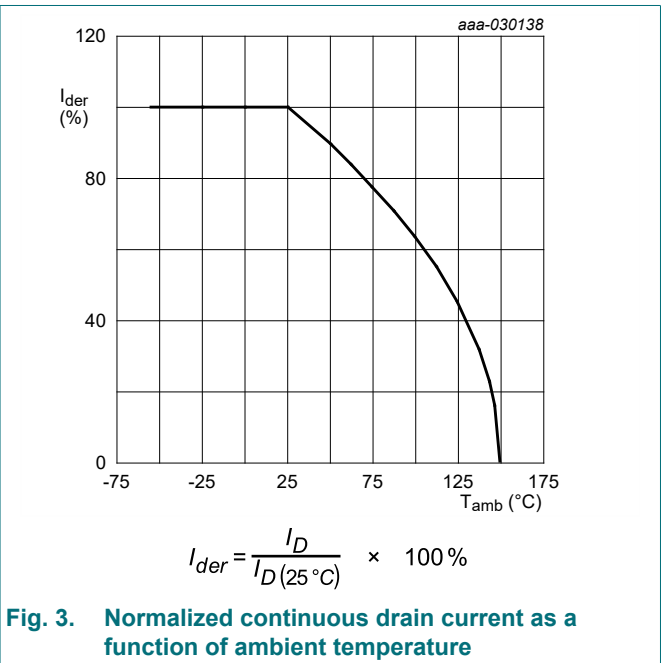
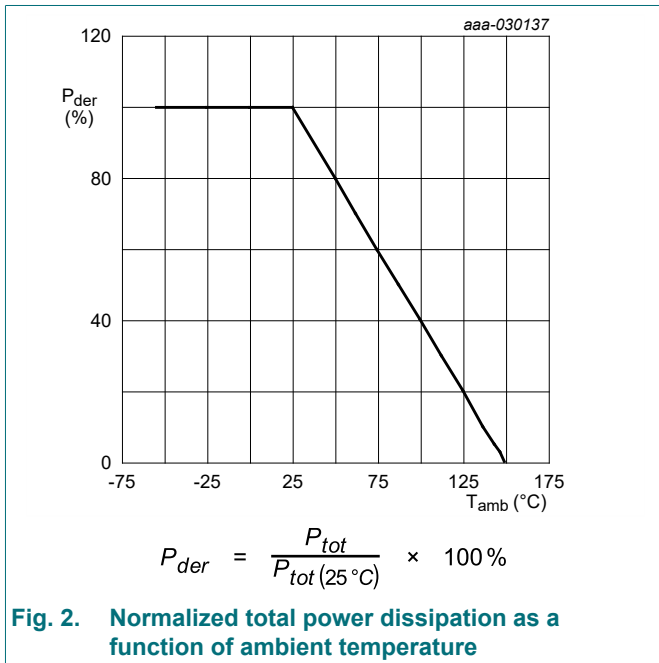
8. Limiting values

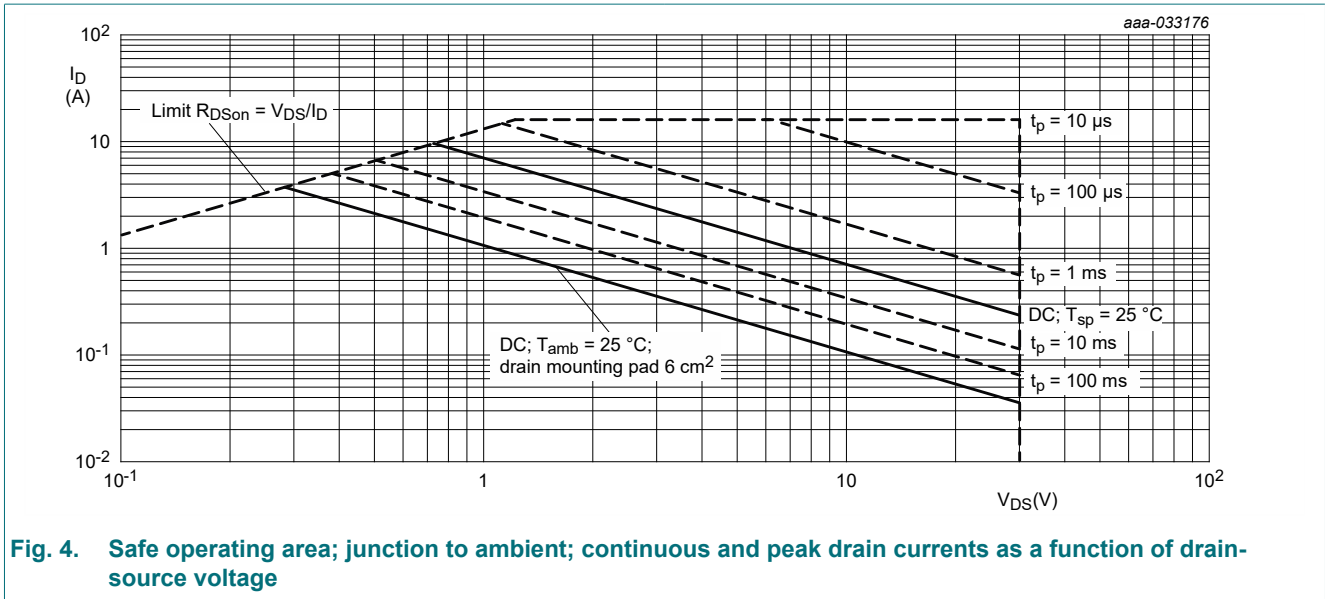
Table 5. Limiting values

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		-	30	V
V _{GS}	gate-source voltage			-12	12	V
I _D	drain current	V _{GS} = 4.5 V; T _{amb} = 25 °C; t ≤ 5 s	[1]	-	4.5	A
		V _{GS} = 4.5 V; T _{amb} = 25 °C	[1]	-	4	A
		V _{GS} = 4.5 V; T _{amb} = 100 °C	[1]	-	2.5	A
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs		-	16	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	480	mW
			[3]	-	900	mW
			[1]	-	1	W
		T _{sp} = 25 °C		-	7	W
T _j	junction temperature			-55	150	°C
T _{amb}	ambient temperature			-55	150	°C
T _{stg}	storage temperature			-65	150	°C
Source-drain diode						
I _S	source current	T _{amb} = 25 °C	[1]	-	1.2	A

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 6 cm².
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 Printed-Circuit Board (PCB), 4 layer copper, tin-plated and standard footprint.





9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	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; $t \leq 5$ s	[3]	-	70	80	K/W
$R_{th(j-sp)}$	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 Printed-Circuit Board (PCB), 4 layer copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 6 cm².

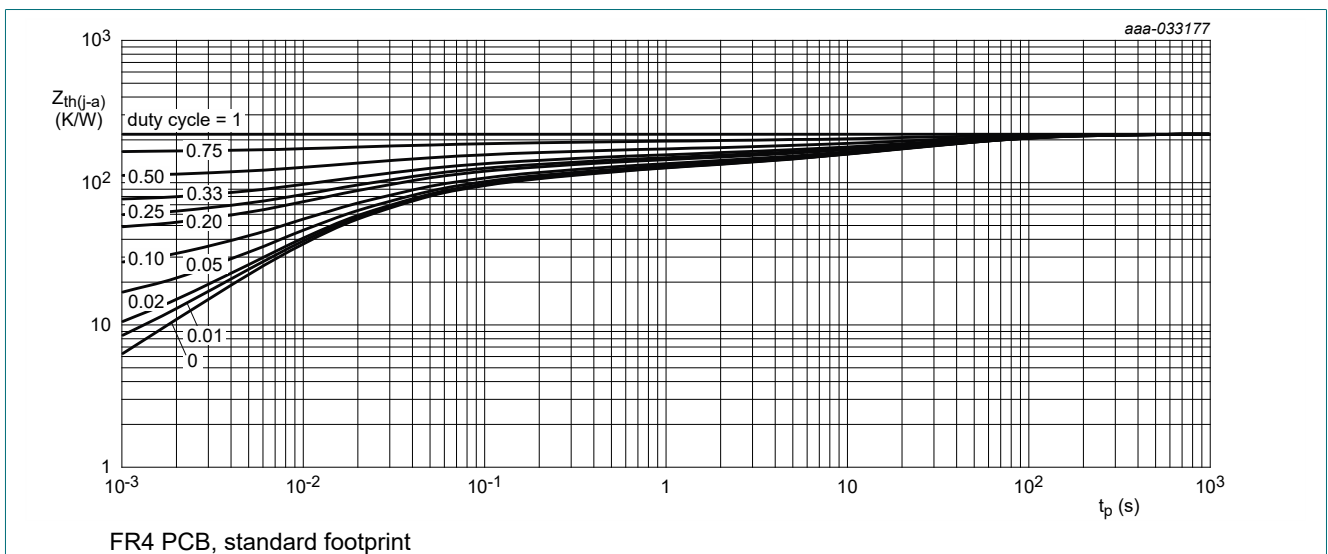


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

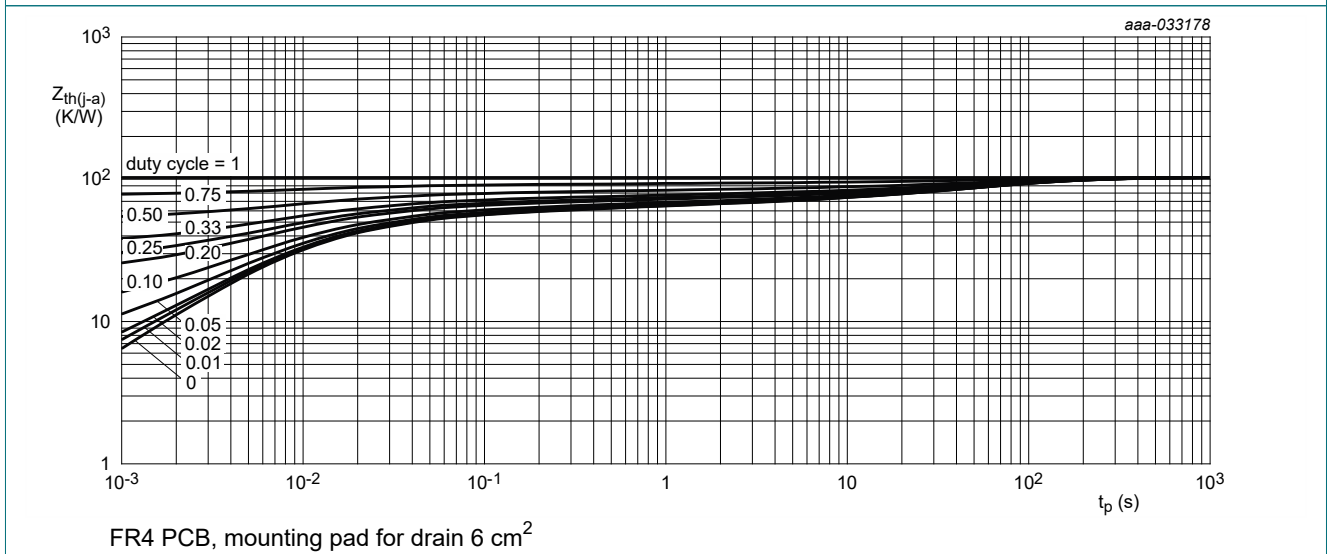


Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	30	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = 250 \mu A$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ C$	0.6	0.8	1.1	V
I_{DSS}	drain leakage current	$V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	-	1	μA
I_{GSS}	gate leakage current	$V_{GS} = 12 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	-	100	nA
		$V_{GS} = -12 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	-	-100	nA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5 V$; $I_D = 4 A$; $T_j = 25 \text{ }^\circ C$	-	40	50	m Ω
		$V_{GS} = 4.5 V$; $I_D = 4 A$; $T_j = 150 \text{ }^\circ C$	-	61	76	m Ω
		$V_{GS} = 2.5 V$; $I_D = 2 A$; $T_j = 25 \text{ }^\circ C$	-	48	65	m Ω
		$V_{GS} = 1.8 V$; $I_D = 0.5 A$; $T_j = 25 \text{ }^\circ C$	-	65	120	m Ω
g_{fs}	forward transconductance	$V_{DS} = 10 V$; $I_D = 4.8 A$; $T_j = 25 \text{ }^\circ C$	-	8	-	S
R_G	gate resistance	$f = 1 \text{ MHz}$	-	1.6	-	Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$V_{DS} = 15 V$; $I_D = 4.8 A$; $V_{GS} = 4.5 V$; $T_j = 25 \text{ }^\circ C$	-	2	2.7	nC
Q_{GS}	gate-source charge		-	0.4	-	nC
Q_{GD}	gate-drain charge		-	0.5	-	nC
C_{iss}	input capacitance	$V_{DS} = 15 V$; $f = 1 \text{ MHz}$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	241	-	pF
C_{oss}	output capacitance		-	117	-	pF
C_{rss}	reverse transfer capacitance		-	15	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 15 V$; $I_D = 4.8 A$; $V_{GS} = 4.5 V$; $R_{G(ext)} = 6 \text{ } \Omega$; $T_j = 25 \text{ }^\circ C$	-	2	-	ns
t_r	rise time		-	4	-	ns
$t_{d(off)}$	turn-off delay time		-	5	-	ns
t_f	fall time		-	2	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 1.2 A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	0.7	1.2	V

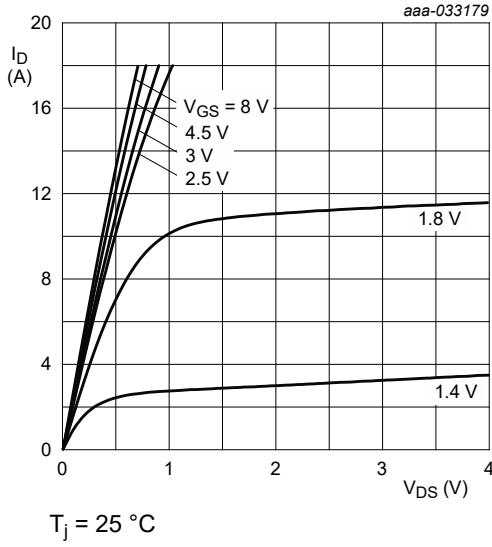


Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values

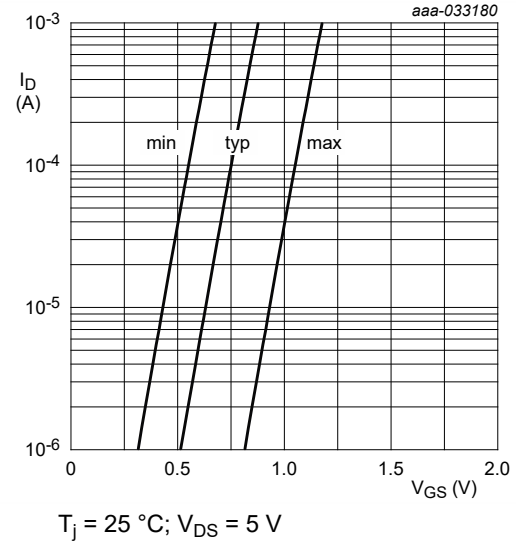


Fig. 8. Subthreshold drain current as a function of gate-source voltage

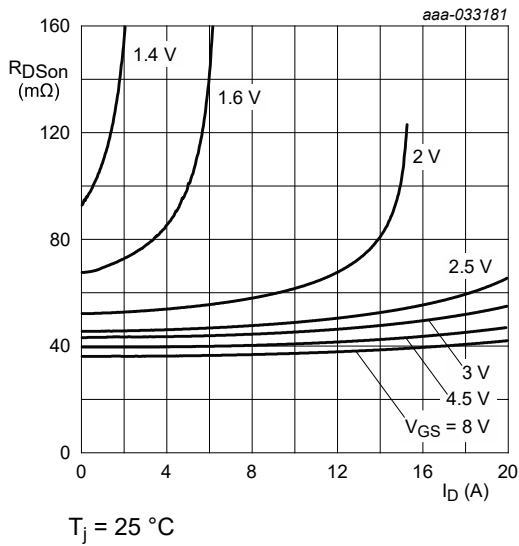


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

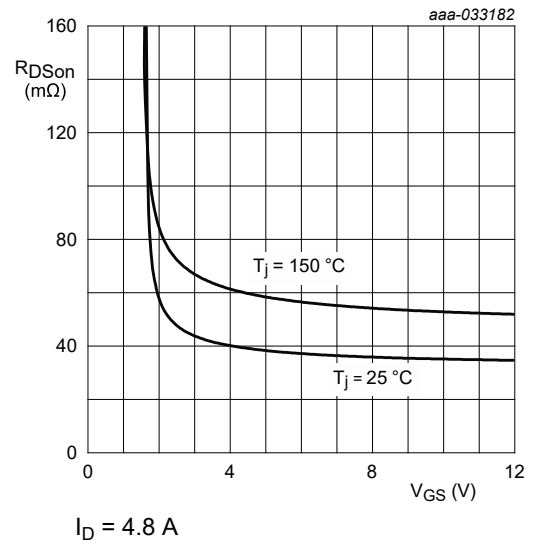


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

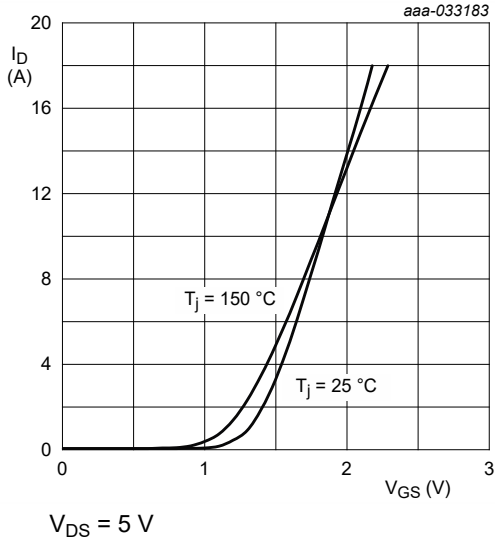
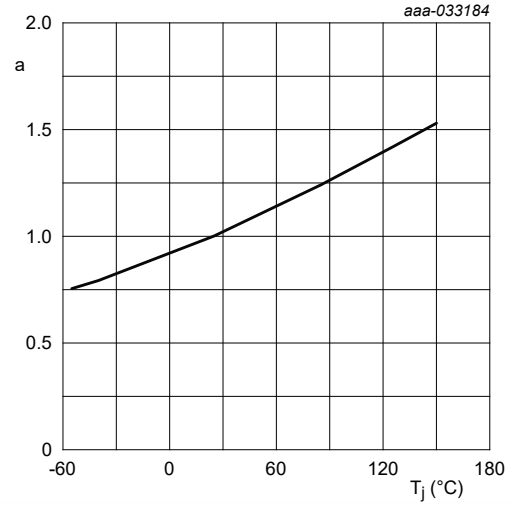


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values



$$a = \frac{R_{DSon}}{R_{DSon}(25\text{ }^\circ\text{C})}$$

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

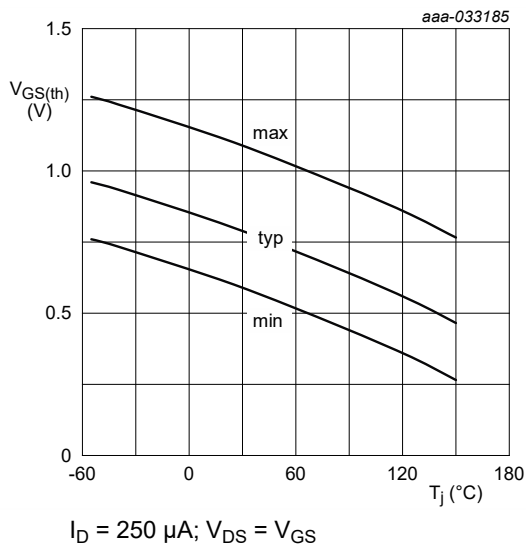


Fig. 13. Gate-source threshold voltage as a function of junction temperature

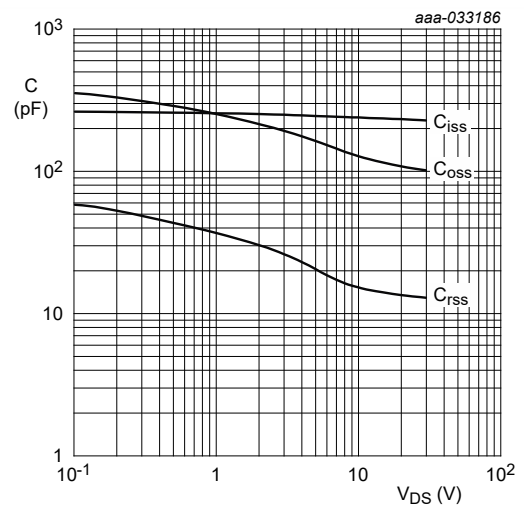
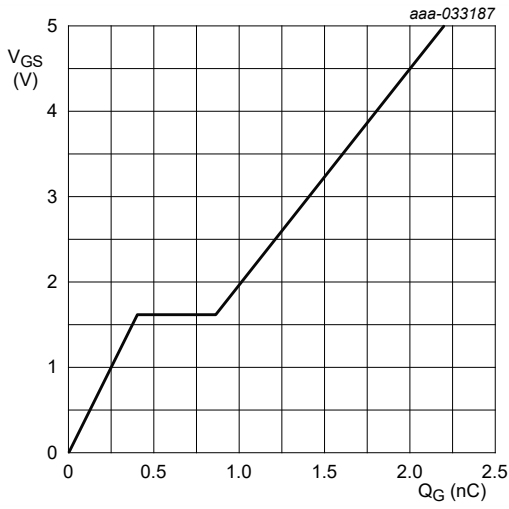


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



$I_D = 4.8 \text{ A}; V_{DS} = 15 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$

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

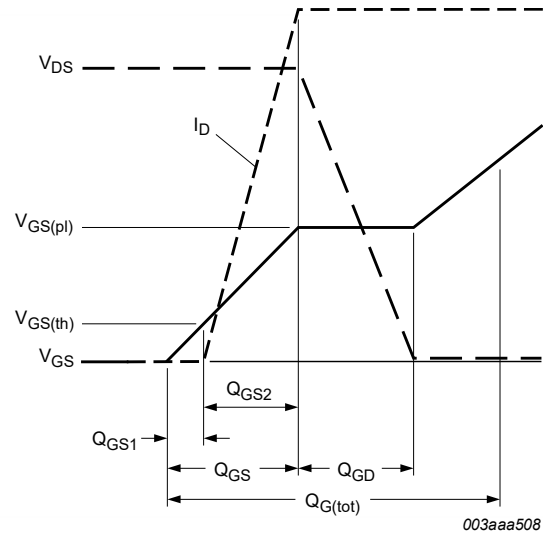
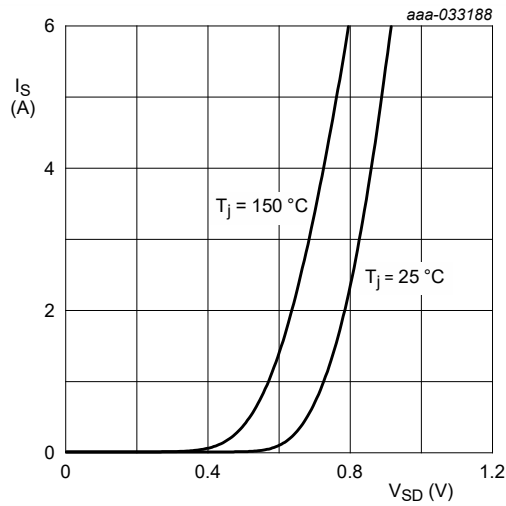


Fig. 16. Gate charge waveform definitions



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

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

11. Test information

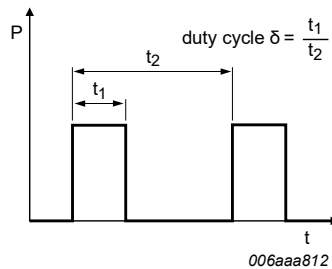


Fig. 18. Duty cycle definition

12. Package outline

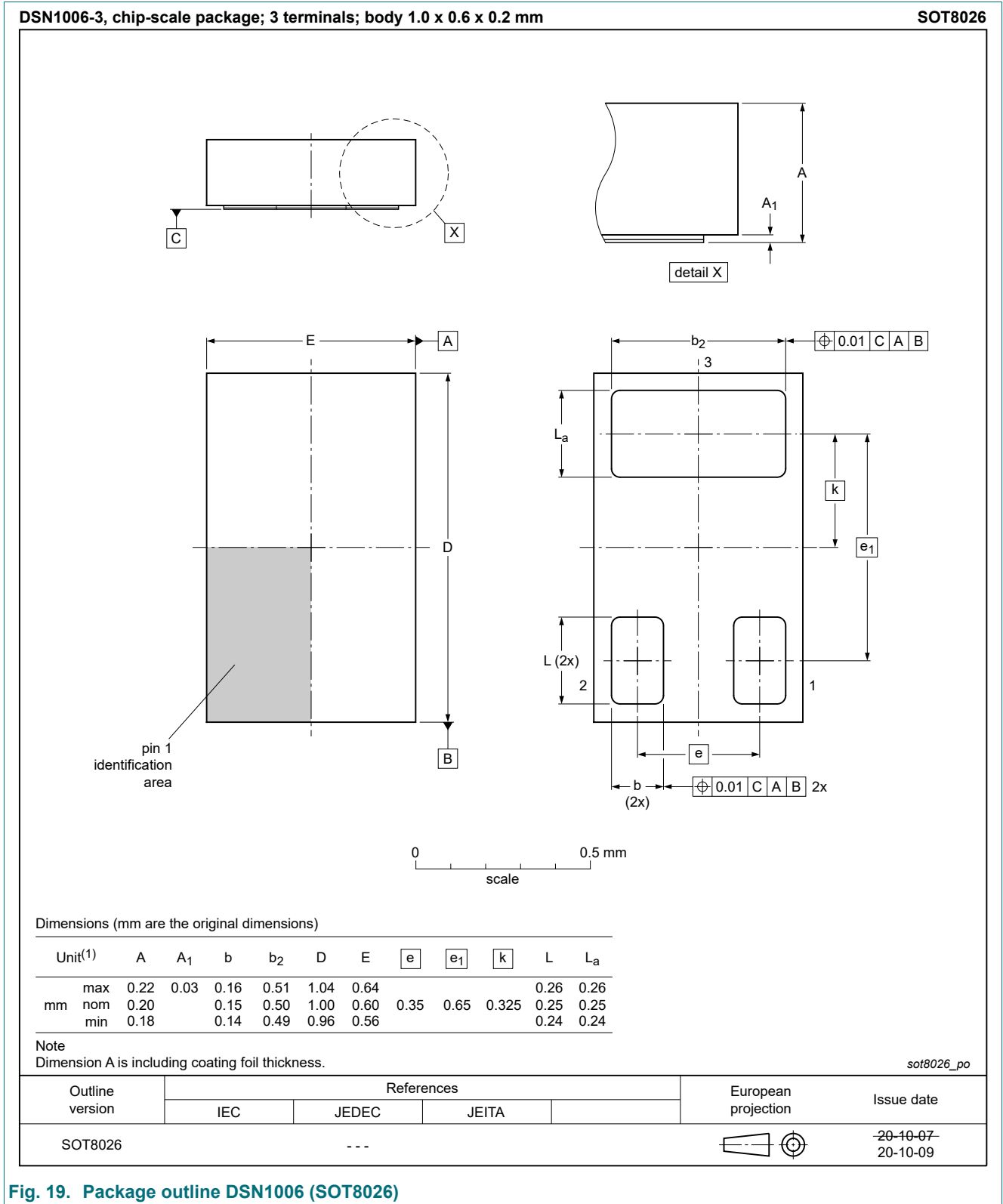


Fig. 19. Package outline DSN1006 (SOT8026)

13. Soldering

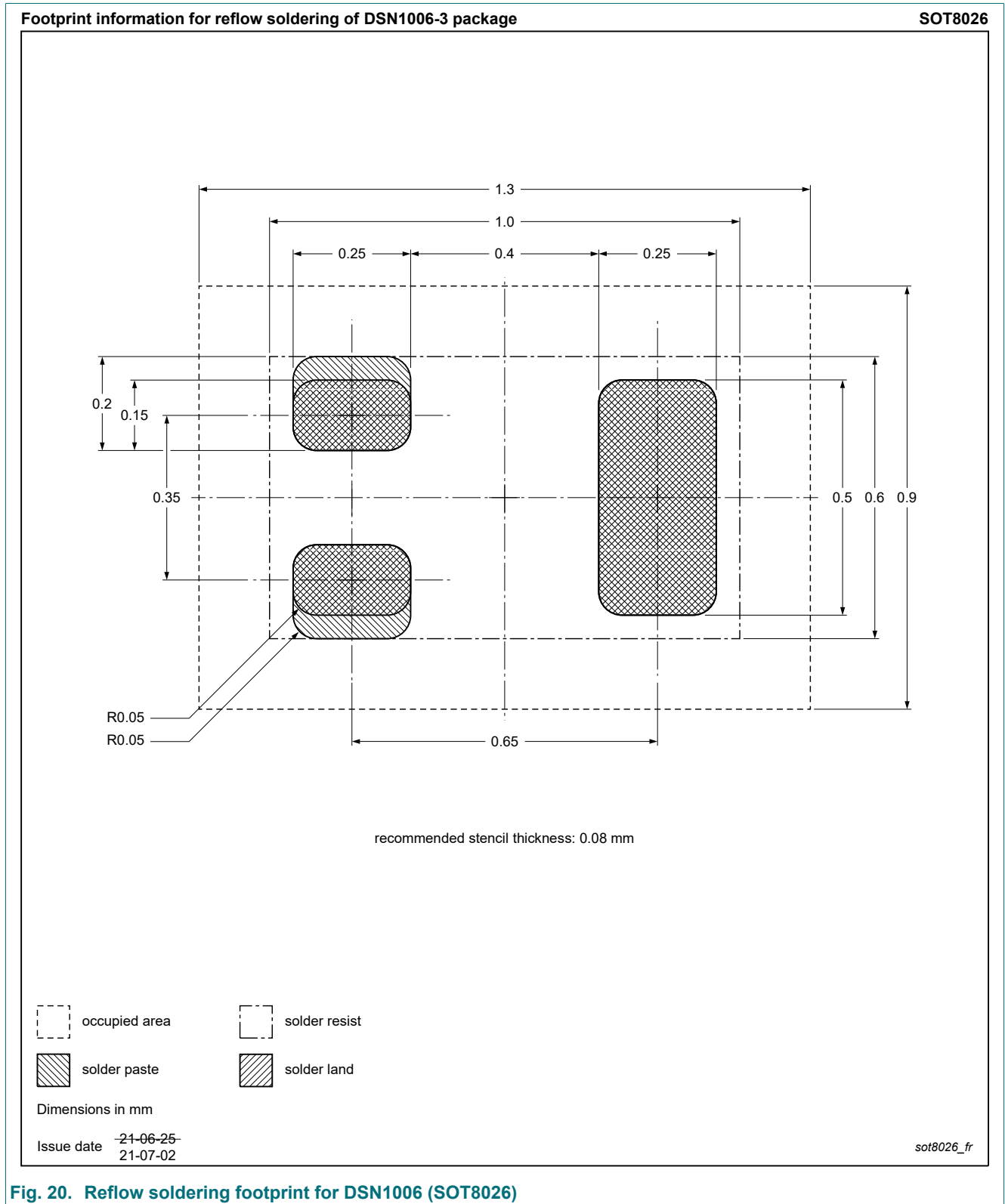


Fig. 20. Reflow soldering footprint for DSN1006 (SOT8026)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMCB60XN v.2	20211208	Product data sheet	-	PMCB60XN v.1
Modifications:	• Update of parameters I_D , P_{tot} , $R_{th(j-a)}$			
PMCB60XN v.1	20210720	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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