



BSS84AKMB

50 V, single P-channel Trench MOSFET

27 October 2020

Product data sheet

1. General description

P-channel enhancement mode Field-Effect Transistor (FET) in a leadless ultra small DFN1006B-3 (SOT883B) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Logic-level compatible
- Very fast switching
- Trench MOSFET technology
- ESD protection up to 1 kV
- Ultra thin package profile with 0.37 mm height

3. Applications

- Relay driver
- High-speed line driver
- High-side load switch
- Switching circuits

4. Quick reference data

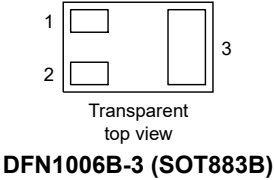
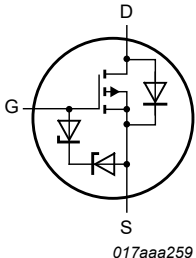
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ °C}$		-	-	-50	V
V_{GS}	gate-source voltage			-20	-	20	V
I_D	drain current	$V_{GS} = -10\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-	-230	mA
Static characteristics							
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -10\text{ V}; I_D = -100\text{ mA}; T_j = 25\text{ °C}$		-	4.5	7.5	Ω

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	S	source		
3	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BSS84AKMB	DFN1006B-3	plastic, leadless ultra small plastic package; 3 solder lands; 0.35 mm pitch; 1.0 mm x 0.6 mm x 0.37 mm body	SOT883B

7. Marking

Table 4. Marking codes

Type number	Marking code
BSS84AKMB	0000 0010

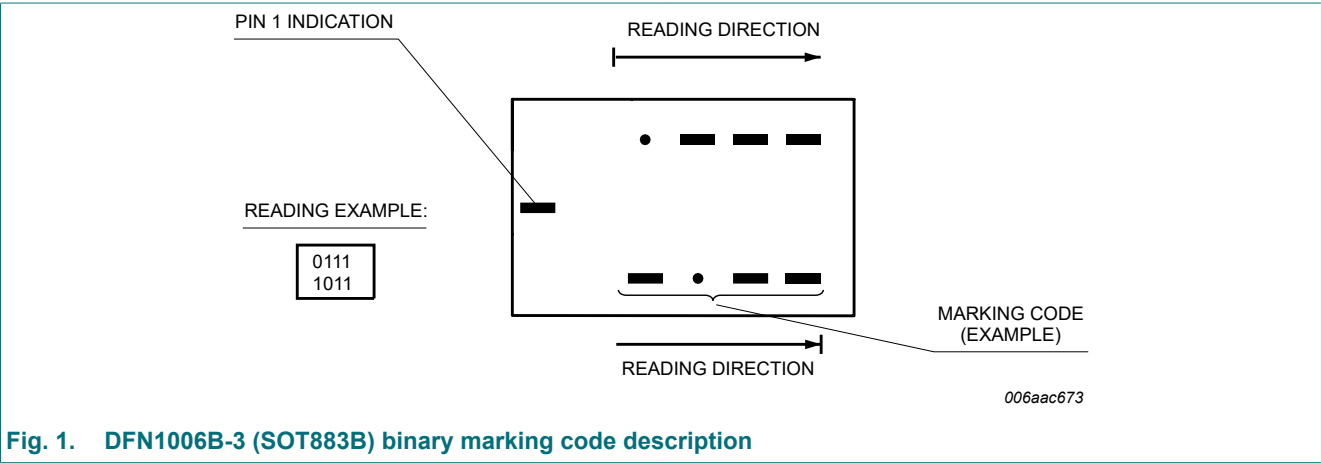


Fig. 1. DFN1006B-3 (SOT883B) binary marking code description

8. Limiting values

Table 5. Limiting values

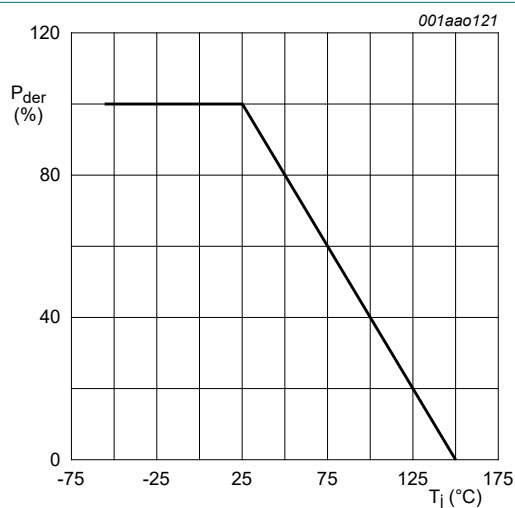
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V _{DS}	drain-source voltage	T _j = 25 °C		-	-50	V
V _{GS}	gate-source voltage			-20	20	V
I _D	drain current	V _{GS} = -10 V; T _{amb} = 25 °C	[1]	-	-230	mA
		V _{GS} = -10 V; T _{amb} = 100 °C	[1]	-	-150	mA
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs		-	-0.9	A
P _{tot}	total power dissipation	T _{amb} = 25 °C	[2]	-	360	mW
			[1]	-	715	mW
		T _{sp} = 25 °C		-	2700	mW
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]	-	-230	mA
ESD maximum rating						
V _{ESD}	electrostatic discharge voltage	HBM	[3]	-	1000	V

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

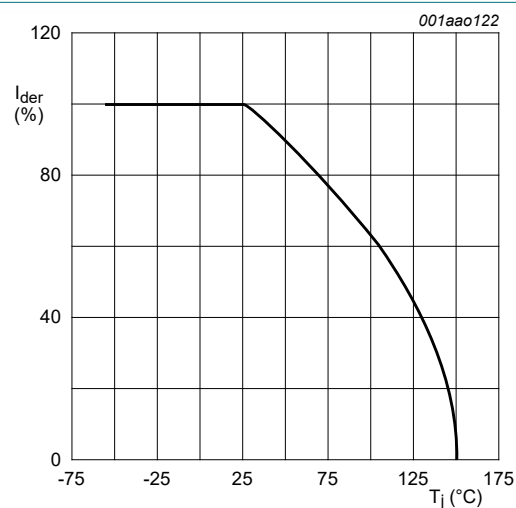
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[3] Measured between all pins.



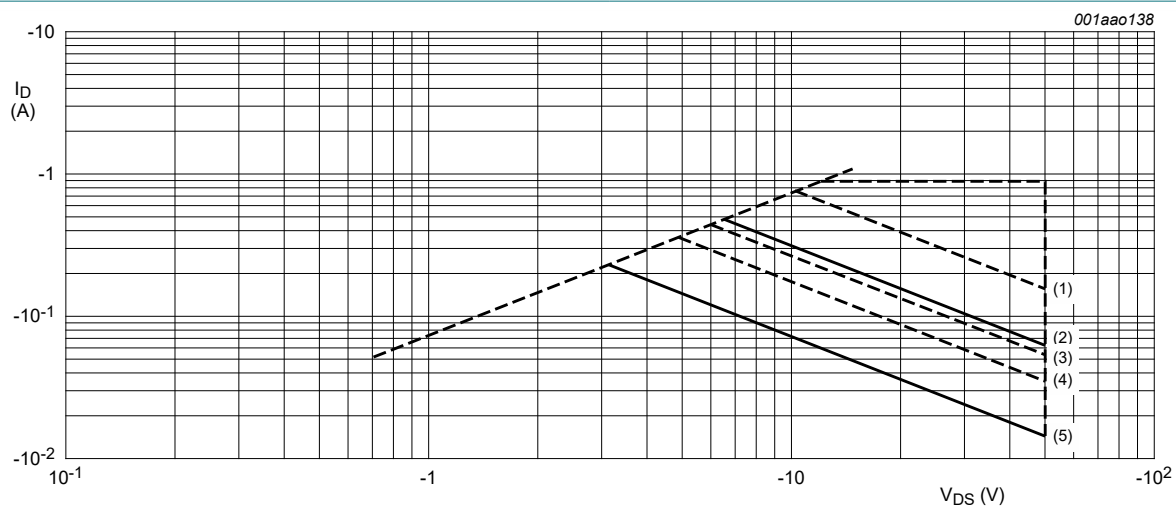
$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ\text{C})}}$$

Fig. 2. Normalized total power dissipation as a function of junction temperature



$$I_{der} = \frac{I_D}{I_{D(25^\circ\text{C})}} \times 100\%$$

Fig. 3. Normalized continuous drain current as a function of junction temperature



I_{DM} is single pulse

(1) $t_p = 1$ ms

(2) DC; $T_{sp} = 25$ °C

(3) $t_p = 10$ ms

(4) $t_p = 100$ ms

(5) DC; $T_{amb} = 25$ °C; drain mounting pad 1 cm²

Fig. 4. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

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]	-	305	350	K/W
			[2]	-	150	175	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	40	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm².

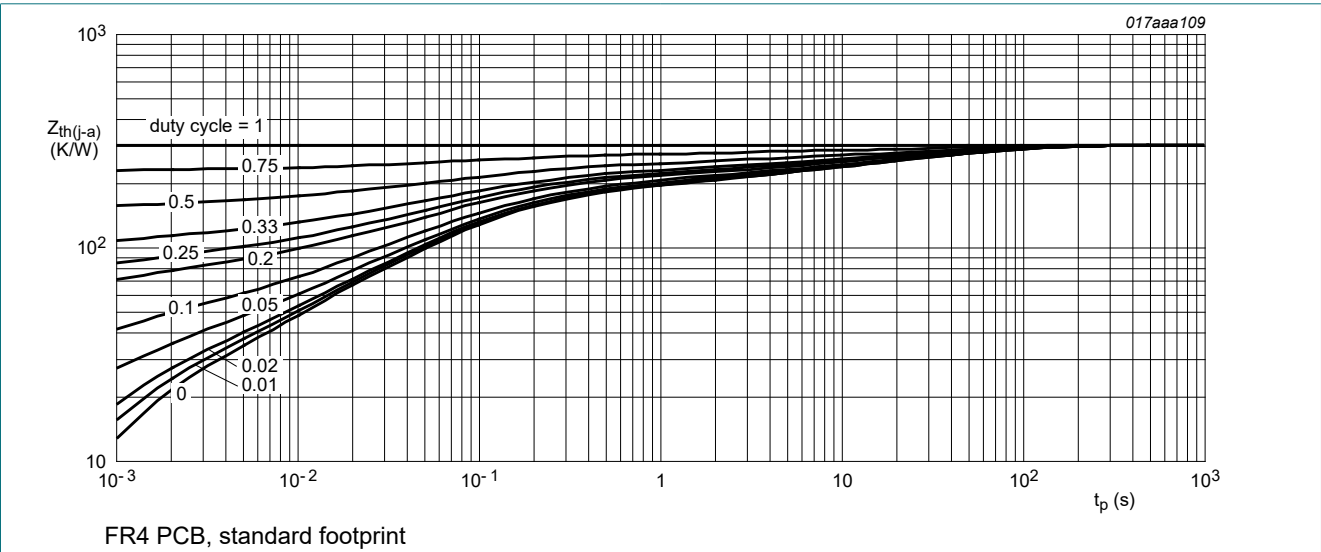


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

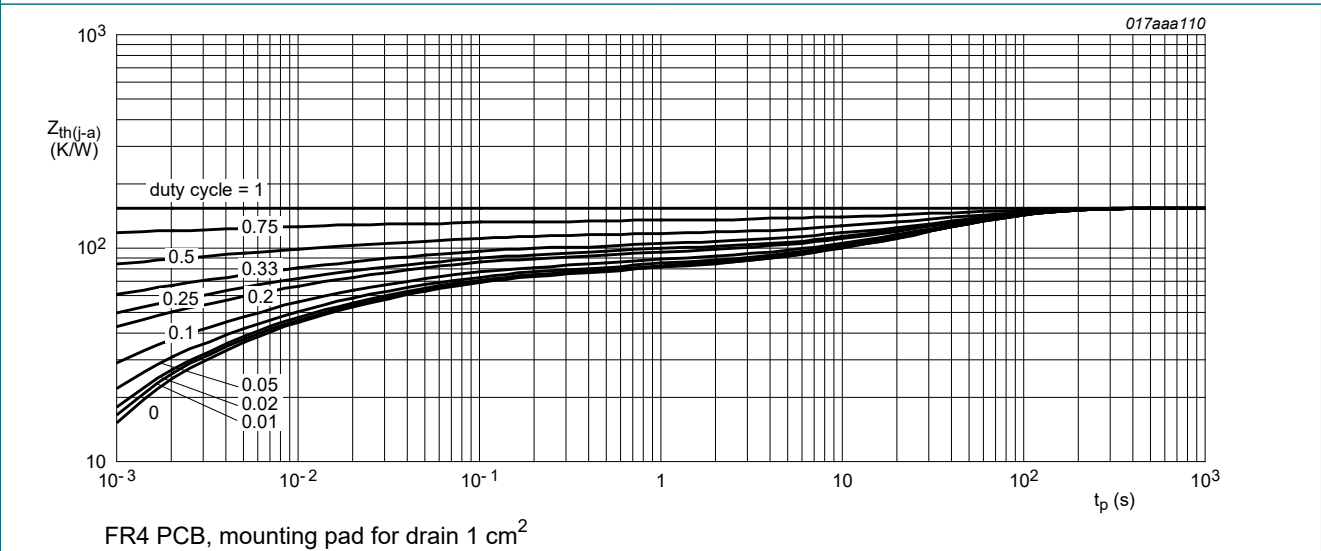


Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250 \mu A$; $V_{GS} = 0 V$; $T_j = 25 ^\circ C$		-50	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = -250 \mu A$; $V_{DS}=V_{GS}$; $T_j = 25 ^\circ C$		-1.1	-1.6	-2.1	V
I_{DSS}	drain leakage current	$V_{DS} = -50 V$; $V_{GS} = 0 V$; $T_j = 25 ^\circ C$		-	-	-1	μA
		$V_{DS} = -50 V$; $V_{GS} = 0 V$; $T_j = 150 ^\circ C$		-	-	-2	μA
I_{GSS}	gate leakage current	$V_{GS} = -20 V$; $V_{DS} = 0 V$; $T_j = 25 ^\circ C$		-	-	-10	μA
		$V_{GS} = 20 V$; $V_{DS} = 0 V$; $T_j = 25 ^\circ C$		-	-	-10	μA
R_{DSon}	drain-source on-state resistance	$V_{GS} = -10 V$; $I_D = -100 mA$; $T_j = 25 ^\circ C$		-	4.5	7.5	Ω
		$V_{GS} = -10 V$; $I_D = -100 mA$; $T_j = 150 ^\circ C$		-	8	13.5	Ω
		$V_{GS} = -5 V$; $I_D = -100 mA$; $T_j = 25 ^\circ C$		-	5.7	8.5	Ω
g_{fs}	forward transconductance	$V_{DS} = -10 V$; $I_D = -100 mA$; $T_j = 25 ^\circ C$		-	150	-	mS
Dynamic characteristics							
$Q_{G(tot)}$	total gate charge	$V_{DS} = -25 V$; $I_D = -200 mA$; $V_{GS} = -5 V$; $T_j = 25 ^\circ C$		-	0.26	0.35	nC
Q_{GS}	gate-source charge			-	0.12	-	nC
Q_{GD}	gate-drain charge	$V_{DS} = -10 V$; $I_D = -200 mA$; $V_{GS} = -5 V$; $T_j = 25 ^\circ C$		-	0.09	-	nC
C_{iss}	input capacitance	$V_{DS} = -25 V$; $f = 1 MHz$; $V_{GS} = 0 V$; $T_j = 25 ^\circ C$		-	24	36	pF
C_{oss}	output capacitance			-	4.5	-	pF
C_{rss}	reverse transfer capacitance			-	1.3	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = -30 V$; $R_L = 250 \Omega$; $V_{GS} = -10 V$; $R_{G(ext)} = 6 \Omega$; $T_j = 25 ^\circ C$		-	13	26	ns
t_r	rise time			-	11	-	ns
$t_{d(off)}$	turn-off delay time			-	48	96	ns
t_f	fall time			-	25	-	ns
Source-drain diode							
V_{SD}	source-drain voltage	$I_S = -115 mA$; $V_{GS} = 0 V$; $T_j = 25 ^\circ C$		-0.48	-0.85	-1.2	V

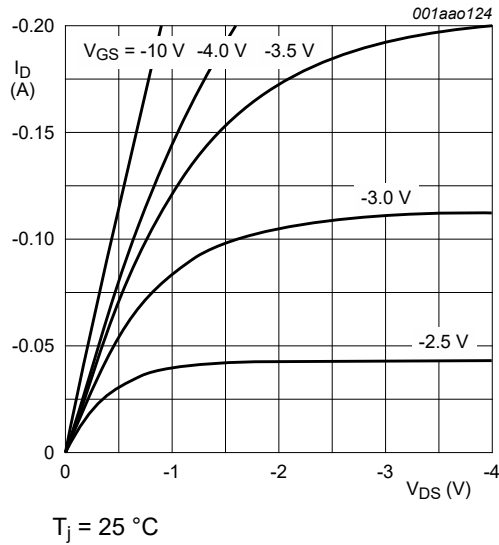


Fig. 7. Output characteristics; drain current as a function of drain-source voltage; typical values

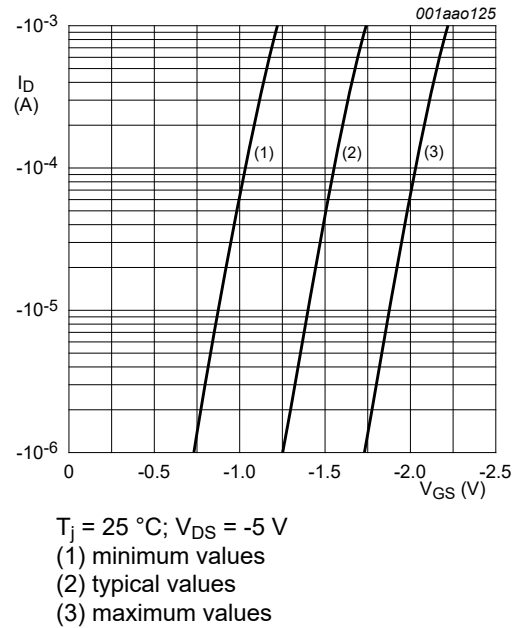


Fig. 8. Sub-threshold drain current as a function of gate-source voltage

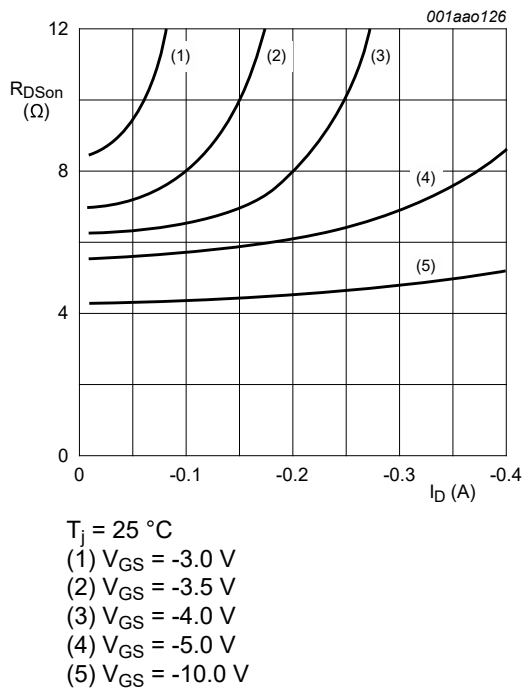


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

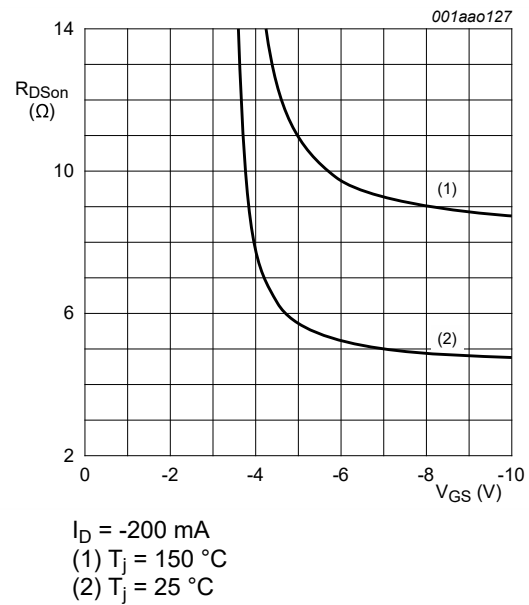


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

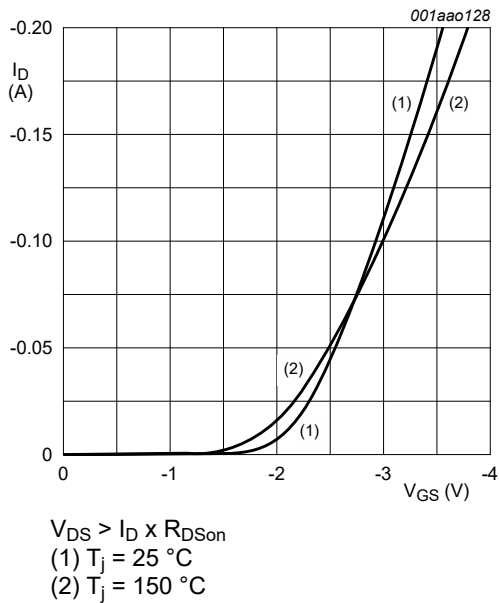


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

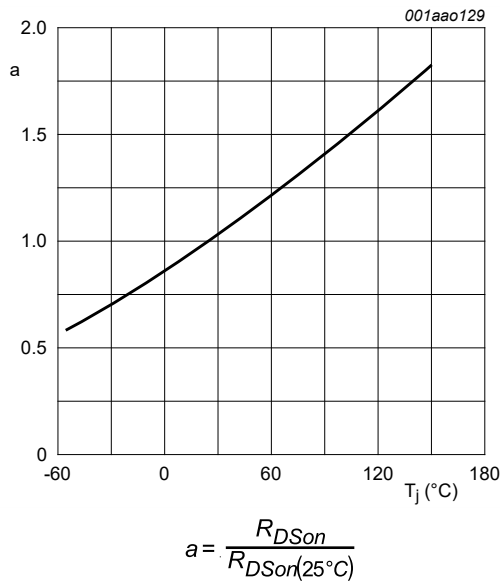


Fig. 12. Normalized drain-source on-state resistance as a function of junction temperature; typical values

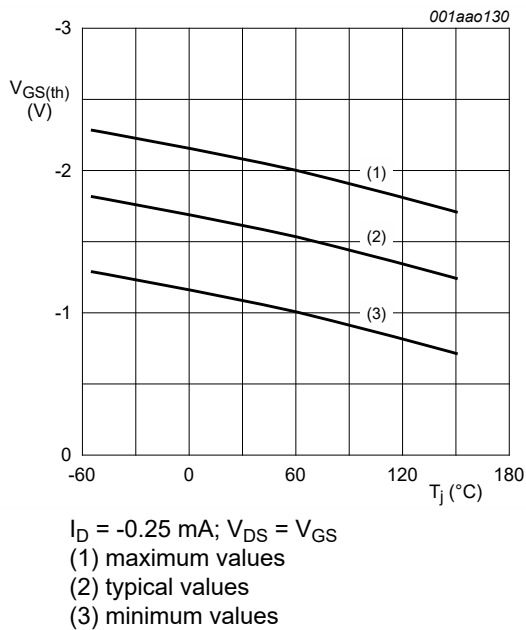


Fig. 13. Gate-source threshold voltage as a function of junction temperature

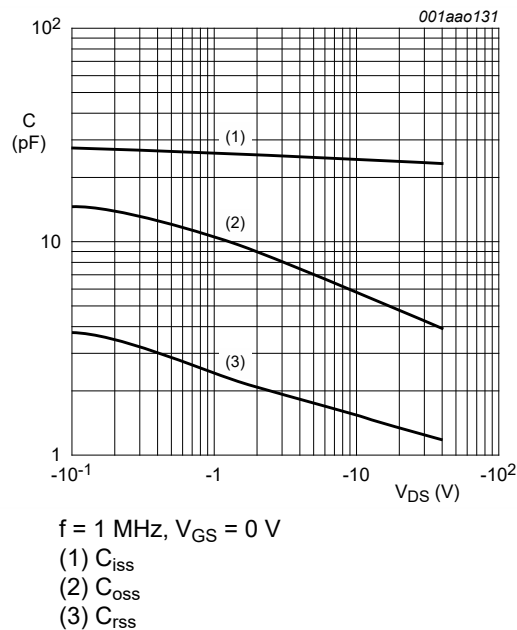


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

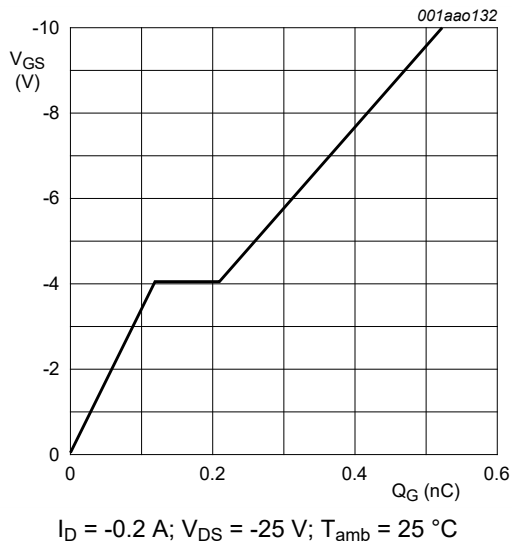


Fig. 15. Gate-source voltage as a function of gate charge; typical values

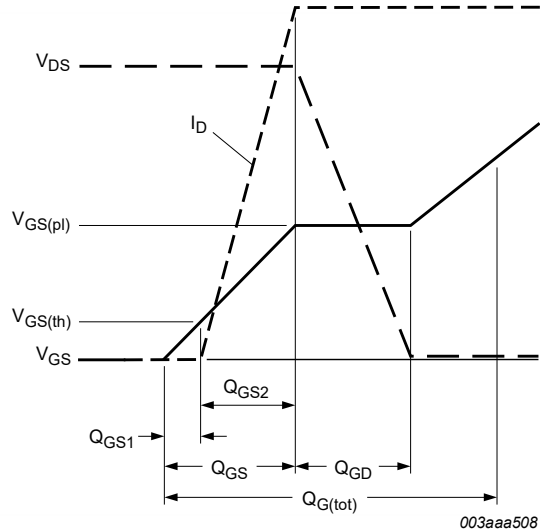


Fig. 16. Gate charge waveform definitions

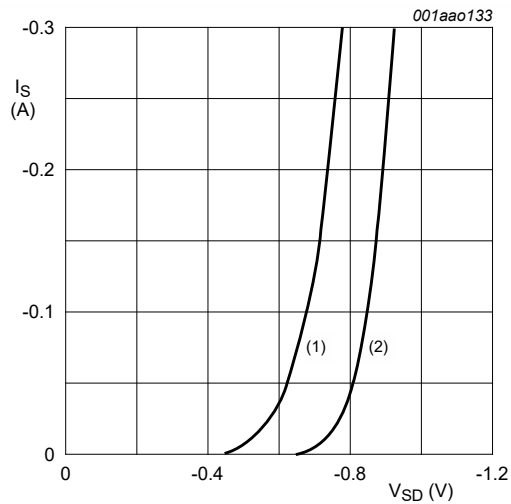


Fig. 17. Source current as a function of source-drain voltage; typical values

11. Test information

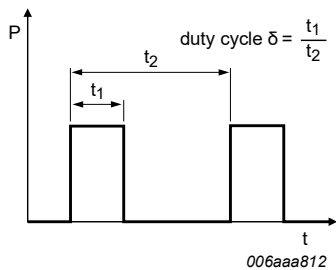


Fig. 18. Duty cycle definition

12. Package outline

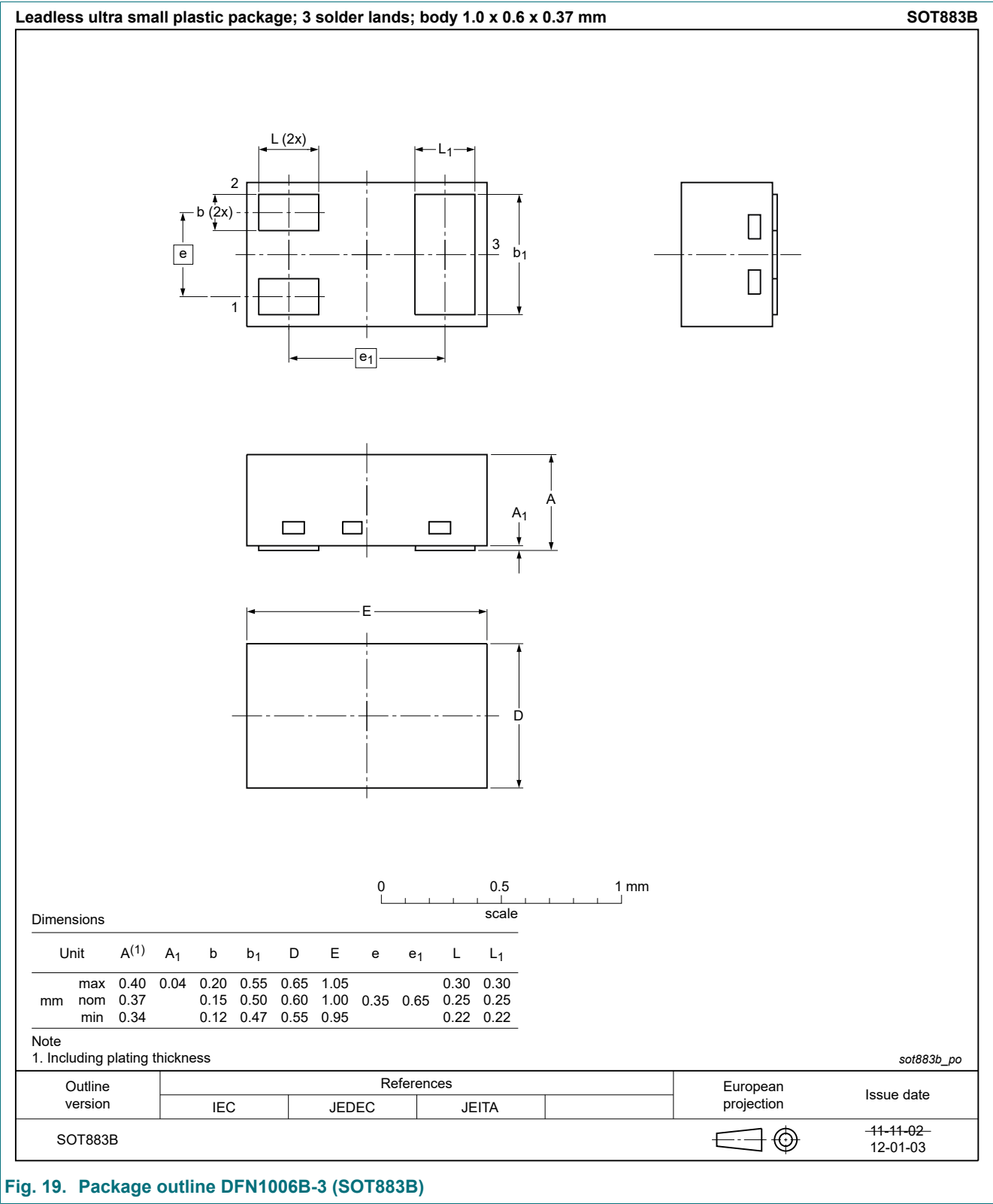
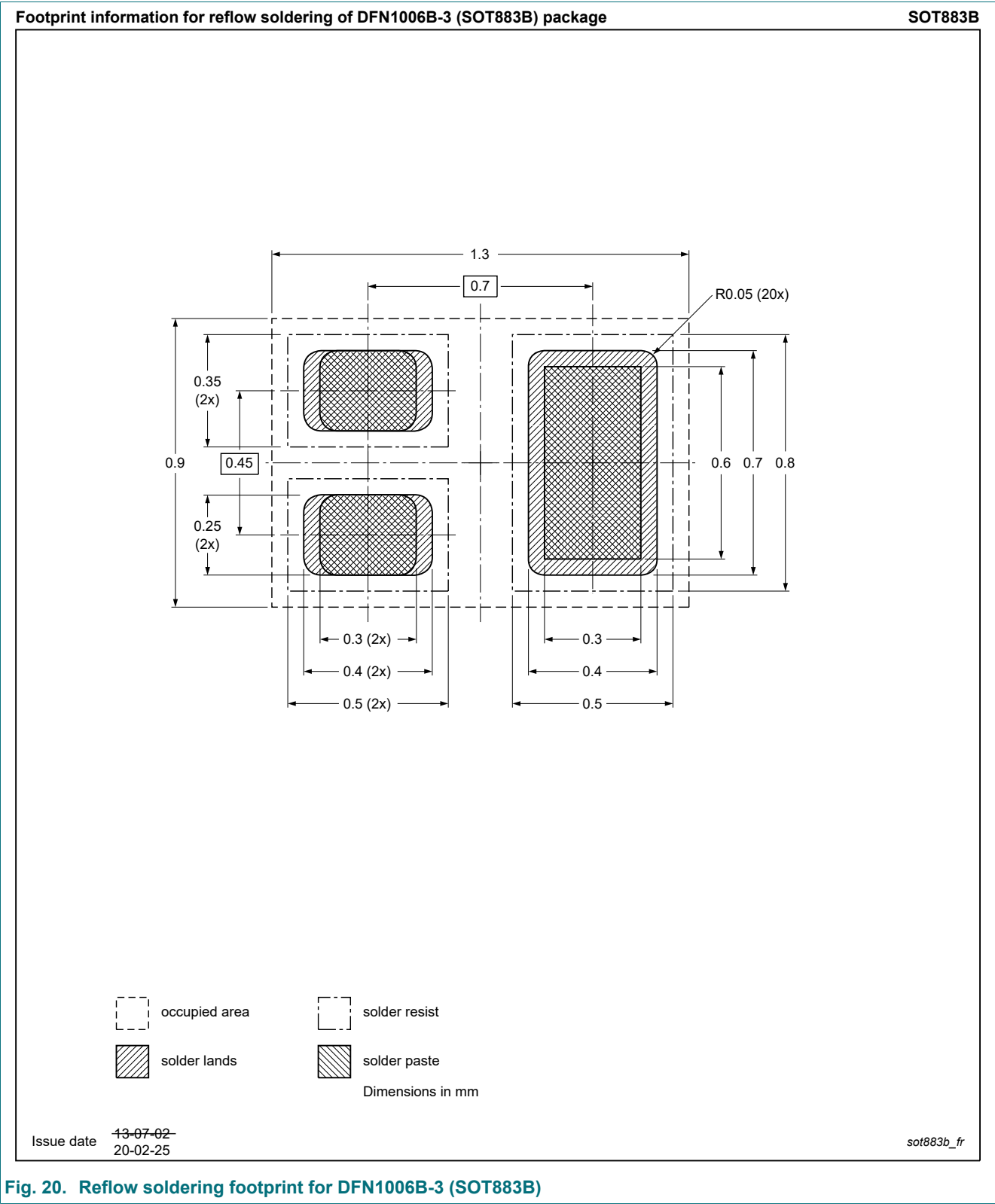


Fig. 19. Package outline DFN1006B-3 (SOT883B)

13. Soldering



14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BSS84AKMB v.2	20201027	Product data sheet	-	BSS84AKMB v.1
Modifications:	- The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. - Legal texts have been adapted to the new company name where appropriate.			
BSS84AKMB v.1	20120606	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.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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