



PMZB950UPEL

20 V, P-channel Trench MOSFET

5 December 2016

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

- Low leakage current
- Trench MOSFET technology
- Leadless ultra small and ultra thin SMD plastic package: 1.0 × 0.6 × 0.37 mm
- ElectroStatic Discharge (ESD) protection > 1 kV HBM
- Drain-source on-state resistance $R_{DS(on)} = 1.02 \Omega$

3. Applications

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

4. Quick reference data

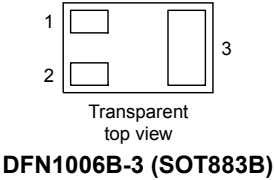
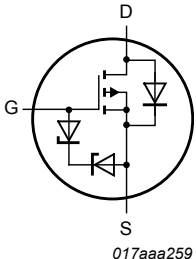
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25 \text{ }^\circ\text{C}$		-	-	-20	V
V_{GS}	gate-source voltage			-8	-	8	V
I_D	drain current	$V_{GS} = -4.5 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	-	-	-500	mA
Static characteristics							
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = -4.5 \text{ V}; I_D = -500 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$		-	1.02	1.4	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
PMZB950UPEL	DFN1006B-3	DFN1006B-3: leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm	SOT883B

7. Marking

Table 4. Marking codes

Type number	Marking code
PMZB950UPEL	0101 1111

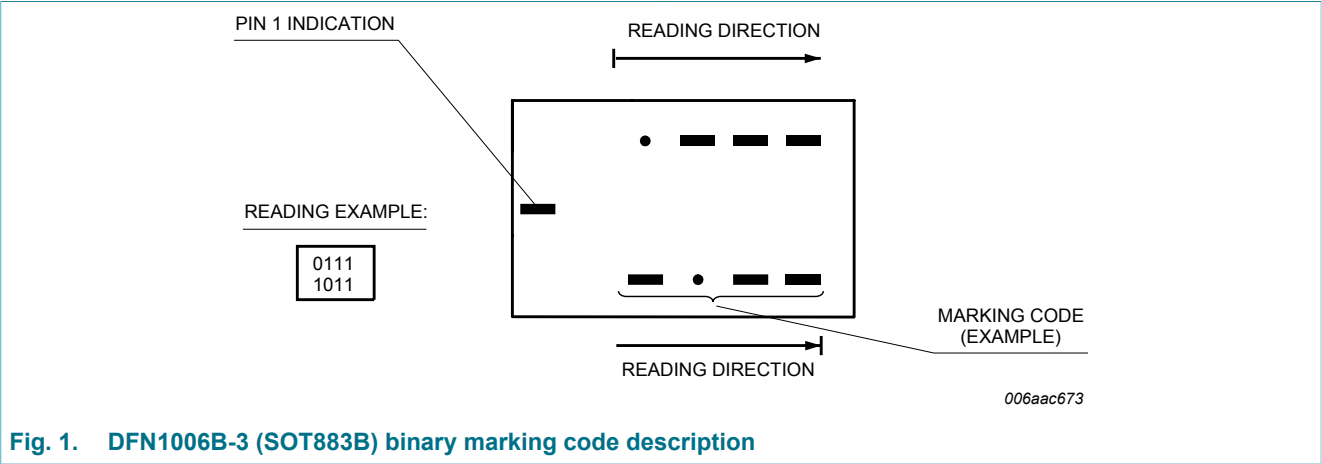


Fig. 1. DFN1006B-3 (SOT883B) binary marking code description

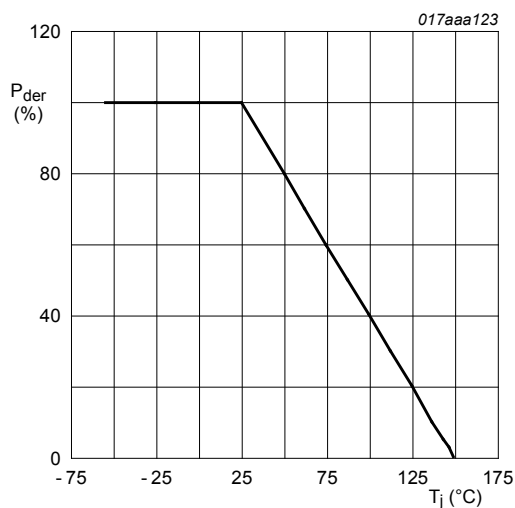
8. Limiting values

Table 5. Limiting values

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

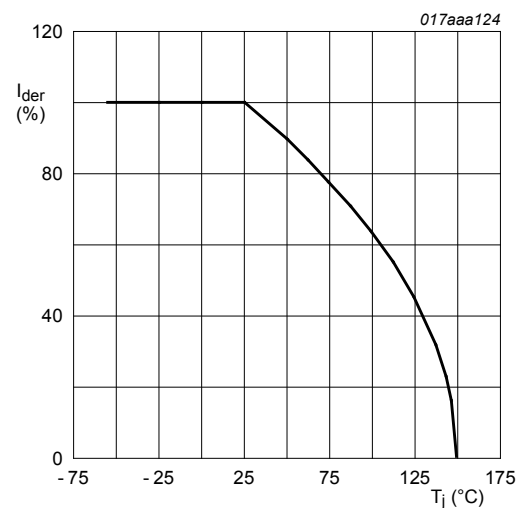
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ }^{\circ}\text{C}$		-	-20	V
V_{GS}	gate-source voltage			-8	8	V
I_D	drain current	$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	-500	mA
		$V_{GS} = -4.5\text{ V}; T_{amb} = 100\text{ }^{\circ}\text{C}$	[1]	-	-300	mA
I_{DM}	peak drain current	$T_{amb} = 25\text{ }^{\circ}\text{C}$; single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	-2	A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ }^{\circ}\text{C}$	[2]	-	360	mW
			[1]	-	715	mW
		$T_{sp} = 25\text{ }^{\circ}\text{C}$		-	2700	mW
T_j	junction temperature			-55	150	$^{\circ}\text{C}$
T_{amb}	ambient temperature			-55	150	$^{\circ}\text{C}$
T_{stg}	storage temperature			-65	150	$^{\circ}\text{C}$
Source-drain diode						
I_S	source current	$T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	-350	mA

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



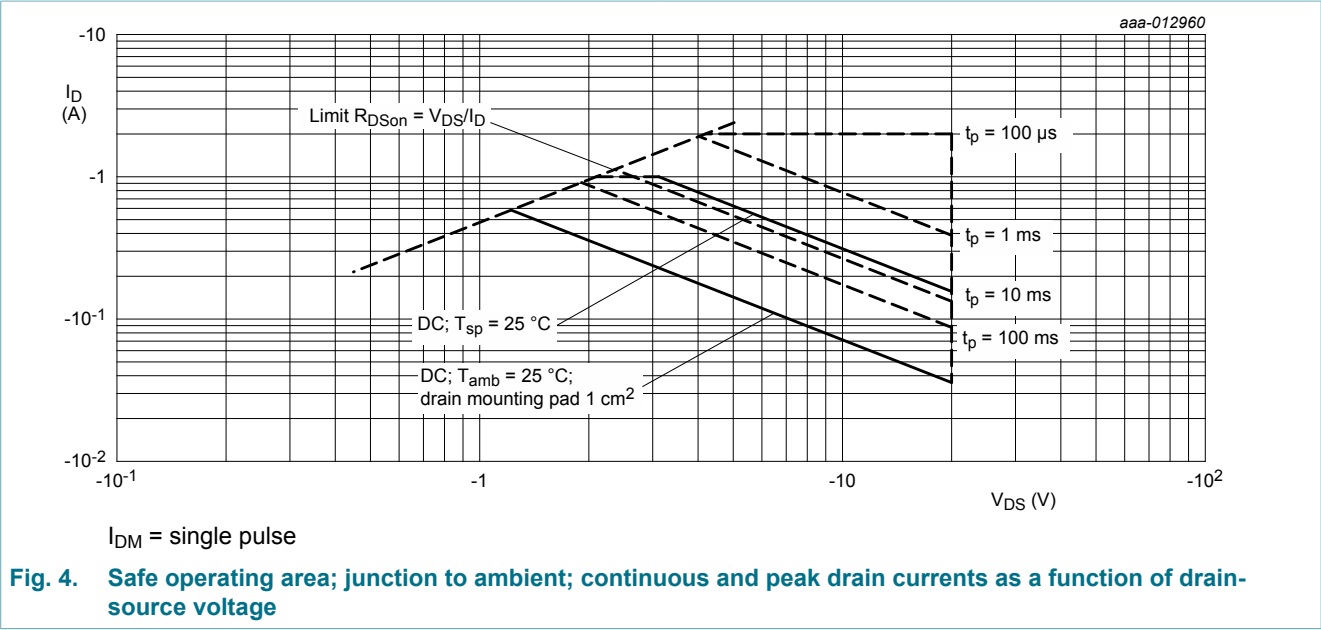
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}\text{C})}} \times 100\%$$

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

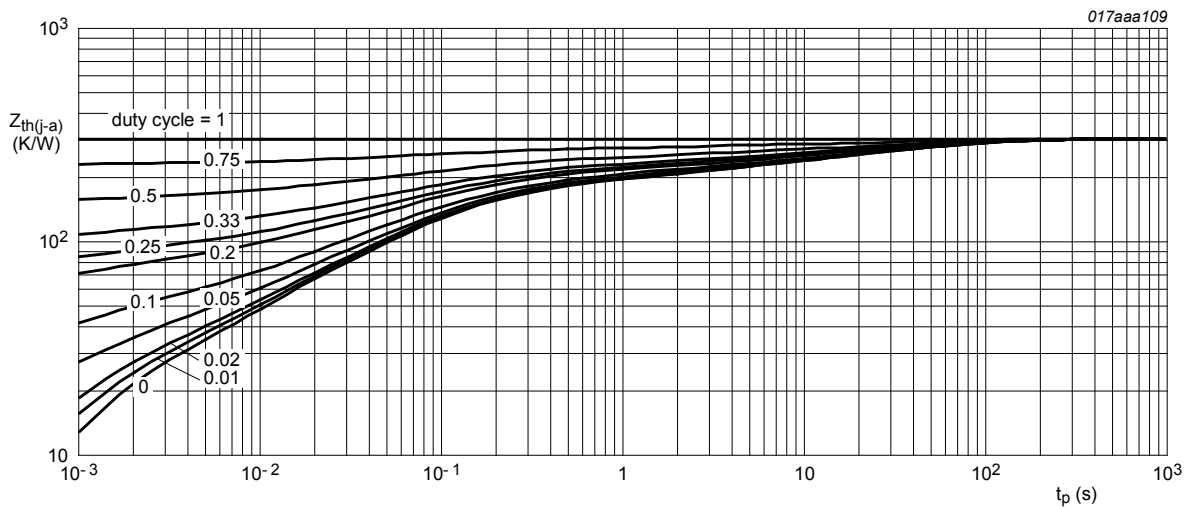


9. Thermal characteristics

Table 6. Thermal characteristics

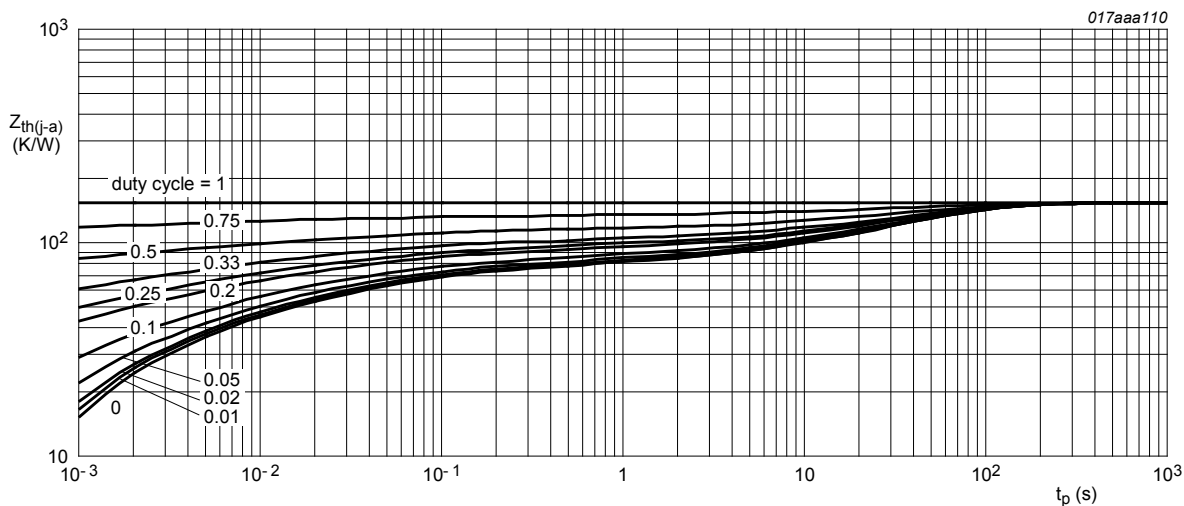
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	305	360	K/W
			[2]	-	150	175	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	40	K/W

[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 cm^2 .



FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for drain 1 cm²

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 μA; V _{GS} = 0 V; T _j = 25 °C		-20	-	-	V
V _{GSth}	gate-source threshold voltage	I _D = -250 μA; V _{DS} =V _{GS} ; T _j = 25 °C		-0.45	-0.7	-0.95	V
I _{DSS}	drain leakage current	V _{DS} = -20 V; V _{GS} = 0 V; T _j = 25 °C		-	-	-1	μA
		V _{DS} = -20 V; V _{GS} = 0 V; T _j = 150 °C		-	-	-10	μA
		V _{DS} = -5 V; V _{GS} = 0 V; T _j = 25 °C		-	-	-25	nA
I _{GSS}	gate leakage current	V _{GS} = 8 V; V _{DS} = 0 V; T _j = 25 °C		-	-	10	μA
		V _{GS} = -8 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-10	μA
		V _{GS} = -4.5 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-1	μA
		V _{GS} = 4.5 V; V _{DS} = 0 V; T _j = 25 °C		-	-	1	μA
		V _{GS} = 1.8 V; V _{DS} = 0 V; T _j = 25 °C		-	-	50	nA
		V _{GS} = -1.8 V; V _{DS} = 0 V; T _j = 25 °C		-	-	-50	nA
		R _{DSon}	drain-source on-state resistance	V _{GS} = -4.5 V; I _D = -500 mA; T _j = 25 °C		-	1.02
V _{GS} = -4.5 V; I _D = -500 mA; T _j = 150 °C				-	1.54	2.1	Ω
V _{GS} = -2.5 V; I _D = -200 mA; T _j = 25 °C				-	1.27	2.2	Ω
V _{GS} = -1.8 V; I _D = -40 mA; T _j = 25 °C				-	1.7	3.3	Ω
V _{GS} = -1.5 V; I _D = -10 mA; T _j = 25 °C				-	2.3	5	Ω
V _{GS} = -1.2 V; I _D = -1 mA; T _j = 25 °C				-	3.5	-	Ω
g _{fs}	forward transconductance	V _{DS} = -10 V; I _D = -500 mA; T _j = 25 °C		-	480	-	mS
Dynamic characteristics							
Q _{G(tot)}	total gate charge	V _{DS} = -10 V; I _D = -450 mA; V _{GS} = -4.5 V; T _j = 25 °C		-	1.19	2.1	nC
Q _{GS}	gate-source charge			-	0.17	-	nC
Q _{GD}	gate-drain charge			-	0.1	-	nC
C _{iss}	input capacitance	V _{DS} = -10 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C		-	43	-	pF
C _{oss}	output capacitance			-	14	-	pF
C _{rss}	reverse transfer capacitance			-	8	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = -10 V; I _D = -0.45 A; R _L = 22 Ω; V _{GS} = -4.5 V; R _{G(ext)} = 6 Ω; T _j = 25 °C		-	2.3	-	ns
t _r	rise time			-	5	-	ns
t _{d(off)}	turn-off delay time			-	13.5	-	ns
t _f	fall time			-	6	-	ns
Source-drain diode							
V _{SD}	source-drain voltage	I _S = -115 mA; V _{GS} = 0 V; T _j = 25 °C		-	-0.7	-1.2	V

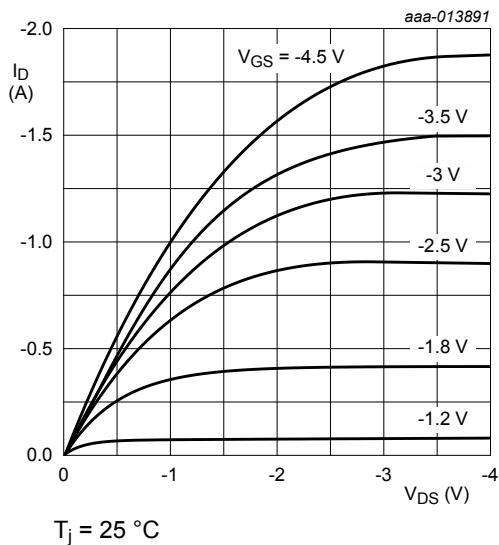


Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values

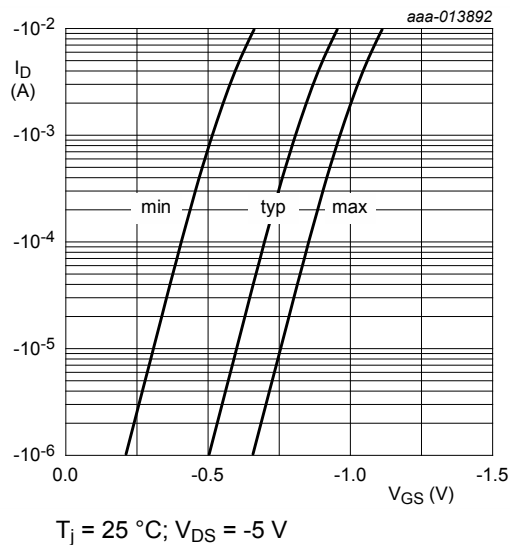


Fig. 8. Sub-threshold drain current as a function of gate-source voltage

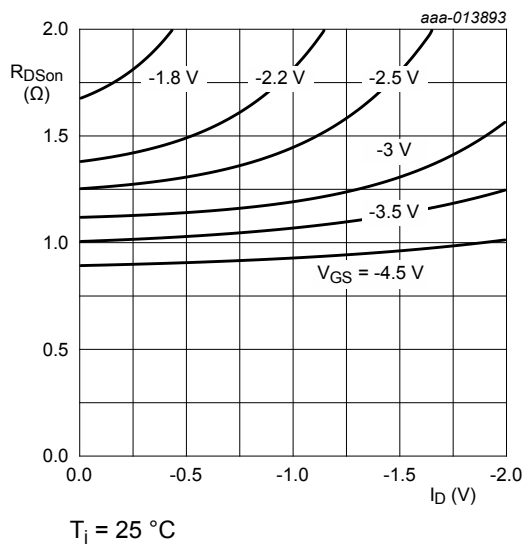


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

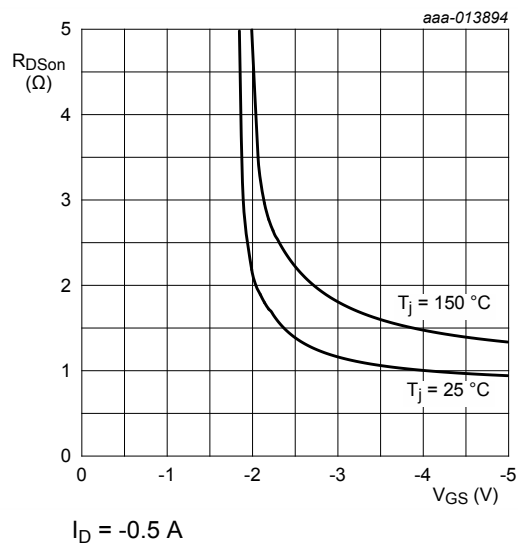


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

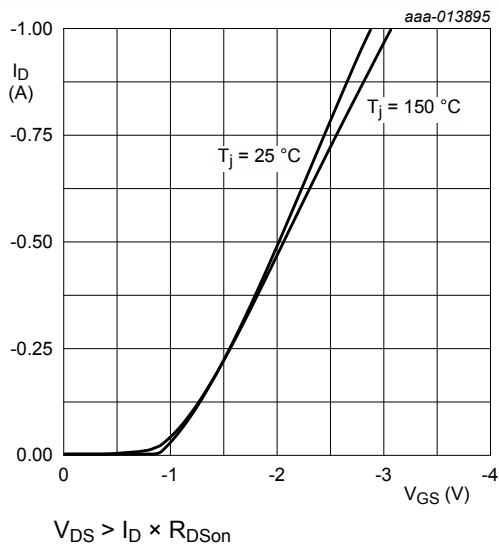


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

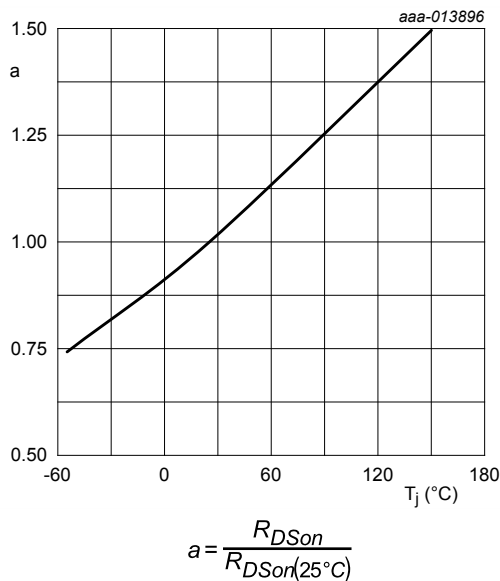


Fig. 12. Normalized drain-source on-state resistance as a function of junction temperature; typical values

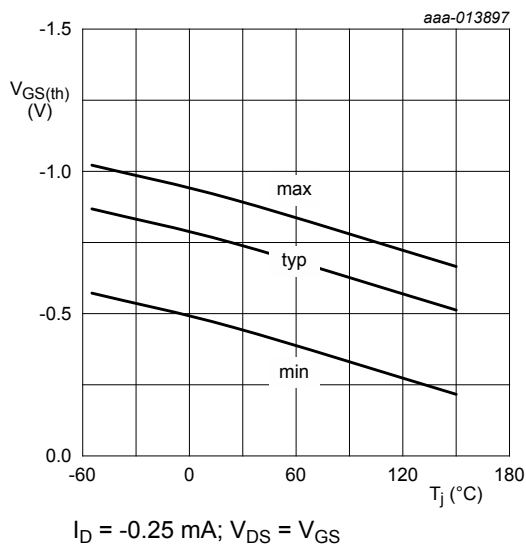


Fig. 13. Gate-source threshold voltage as a function of junction temperature

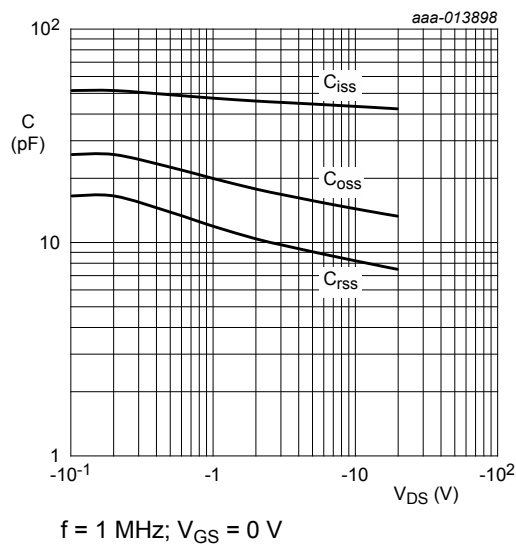


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

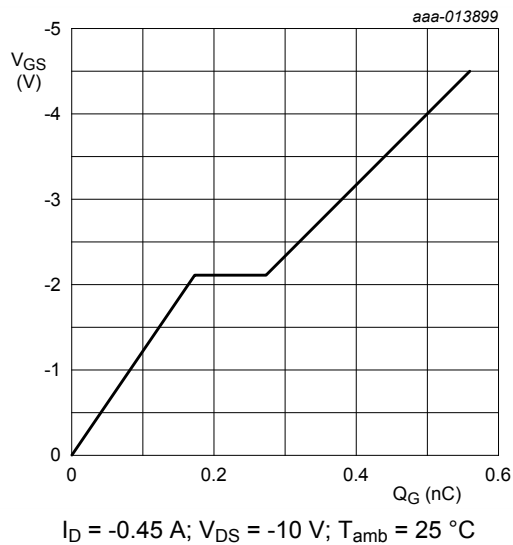


Fig. 15. Gate-source voltage as a function of gate charge; typical values

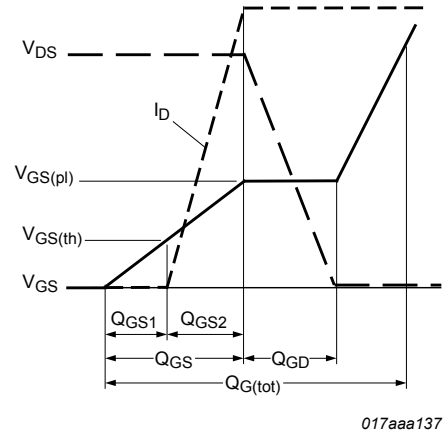
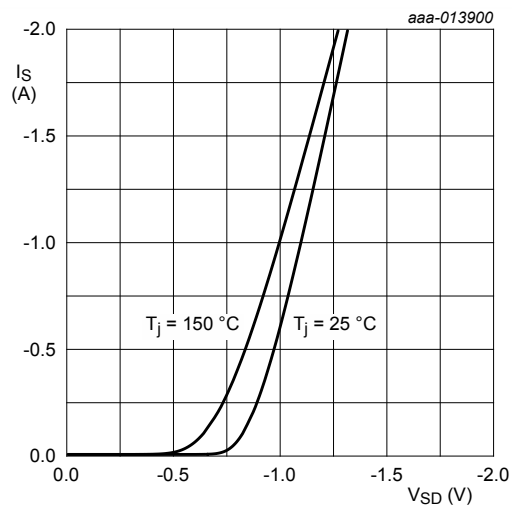


Fig. 16. MOSFET transistor: Gate charge waveform definitions



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

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

11. Package outline

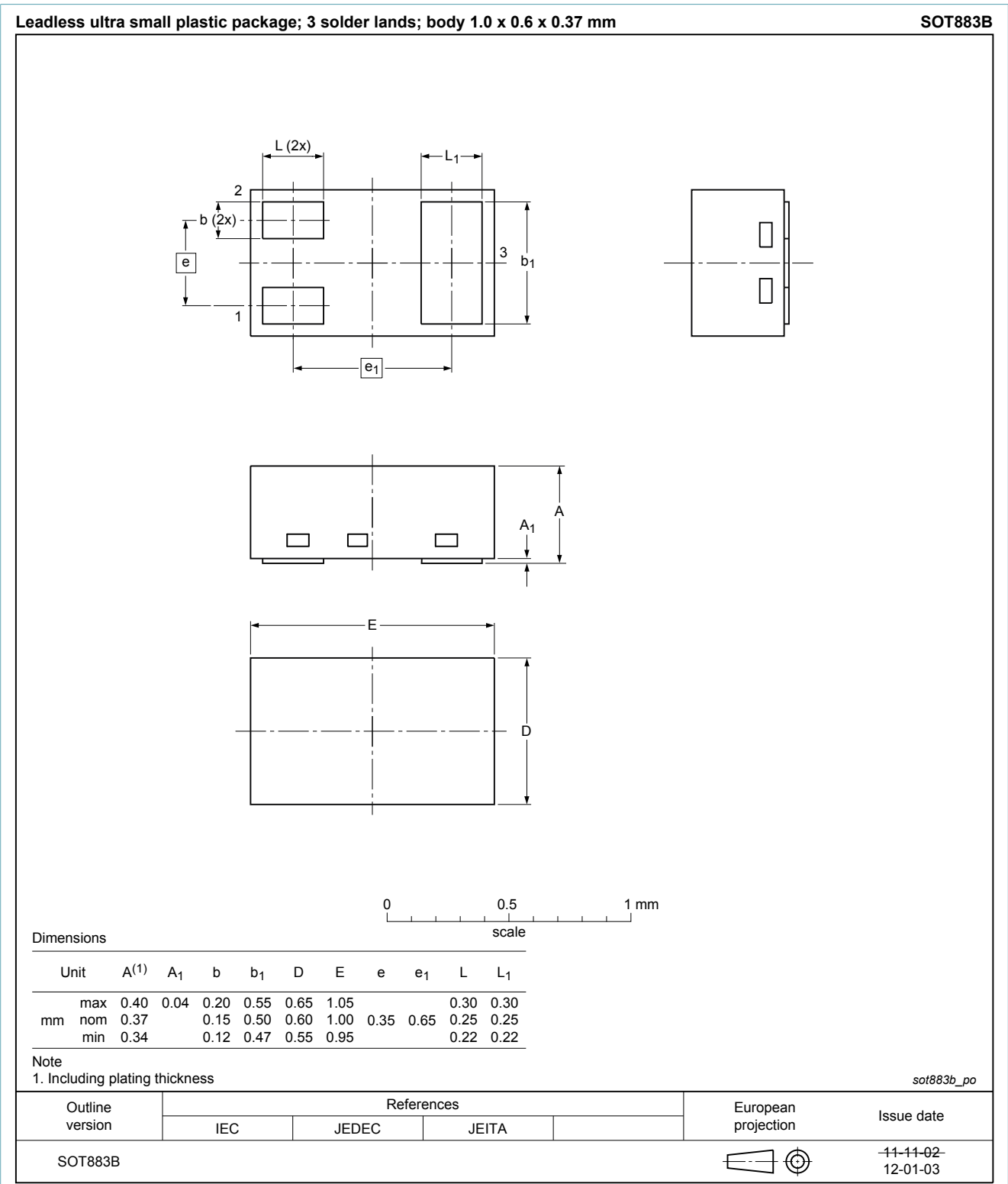


Fig. 18. Package outline DFN1006B-3 (SOT883B)

12. Soldering

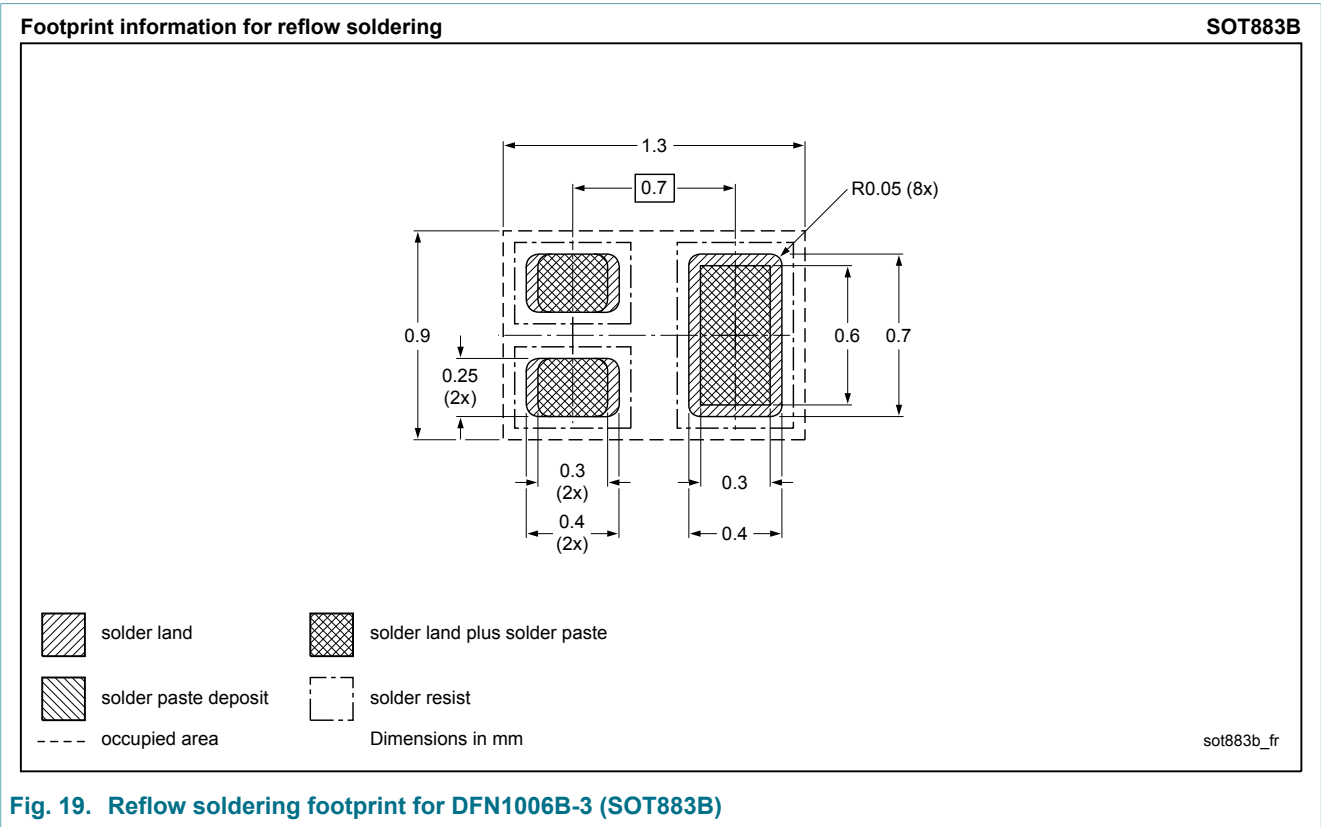


Fig. 19. Reflow soldering footprint for DFN1006B-3 (SOT883B)

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMZB950UPEL v.1	20161205	Product data sheet	-	-

14. 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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