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_{DSon} = 1.02 Ω

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 °C		-	-	-20	V
V_{GS}	gate-source voltage			-8	-	8	V
I_D	drain current	V_{GS} = -4.5 V; T_{amb} = 25 °C	[1]	-	-	-500	mA
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = -4.5 V; I_D = -500 mA; T_j = 25 °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 cm^2.

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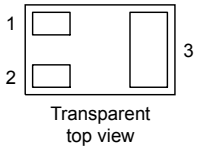
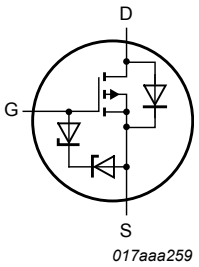
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 Transparent top view **DFN1006B-3 (SOT883B)**	 *017aaa259*
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

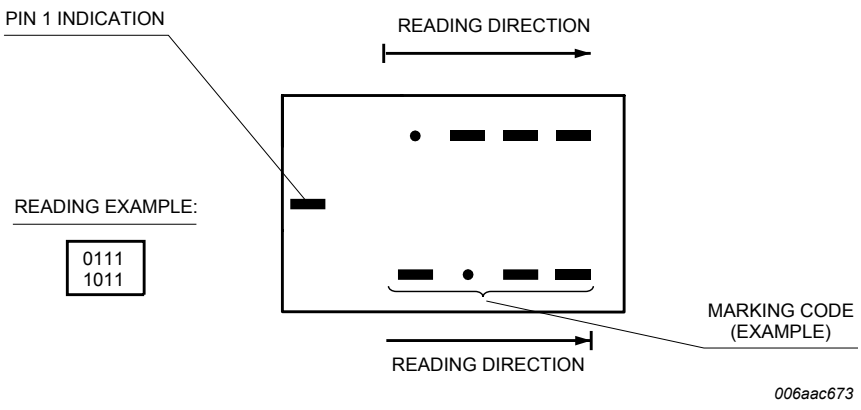


Fig. 1. DFN1006B-3 (SOT883B) binary marking code description

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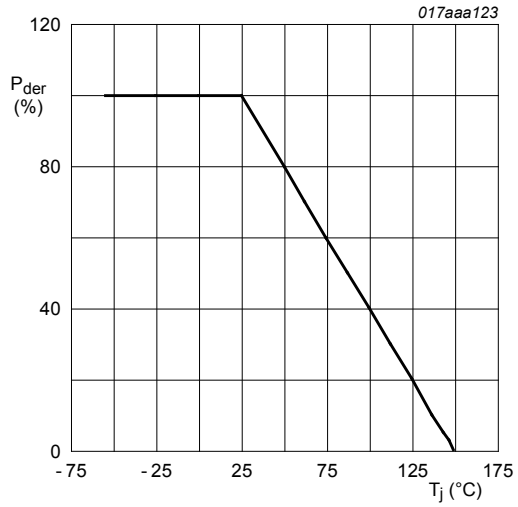
8. Limiting values

Table 5. Limiting values

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

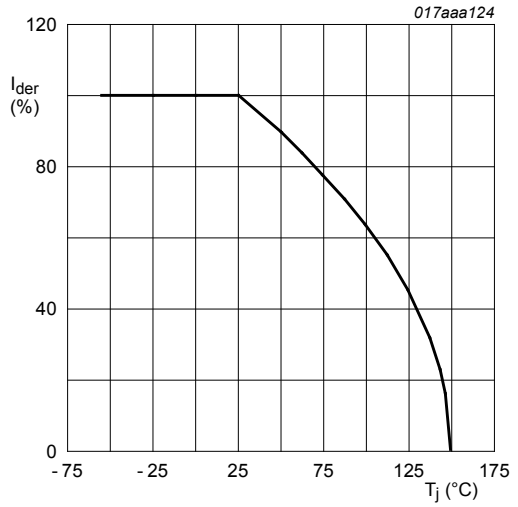
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DS}	drain-source voltage	T_j = 25 °C		-	-20	V
V_{GS}	gate-source voltage			-8	8	V
I_D	drain current	V_{GS} = -4.5 V; T_{amb} = 25 °C	[1]	-	-500	mA
		V_{GS} = -4.5 V; T_{amb} = 100 °C	[1]	-	-300	mA
I_{DM}	peak drain current	T_{amb} = 25 °C; single pulse; $t_p \leq$ 10 µs		-	-2	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]	-	-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.



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

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



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

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

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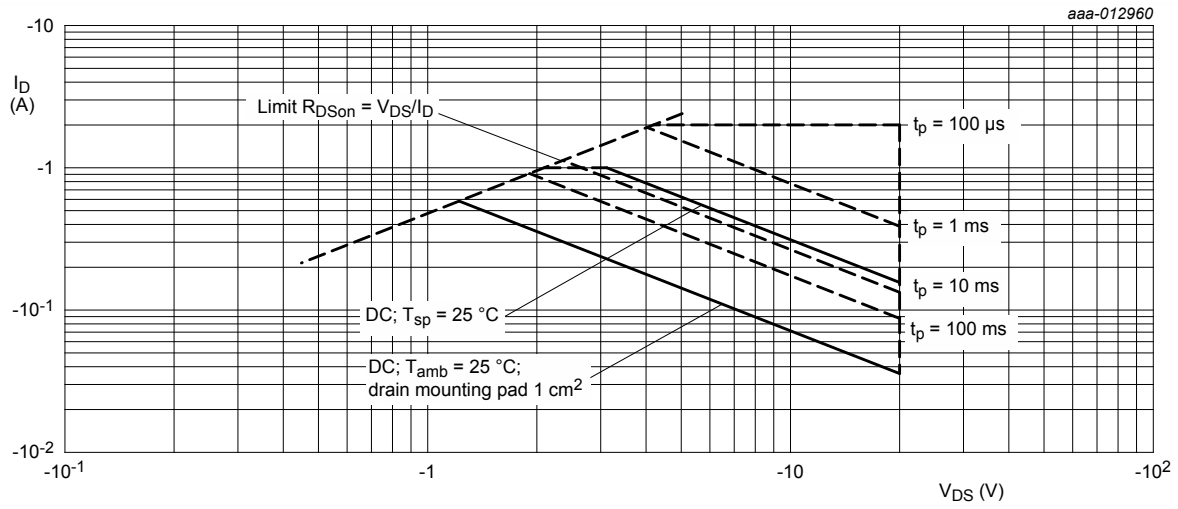

I_{DM} = single pulse

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	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.

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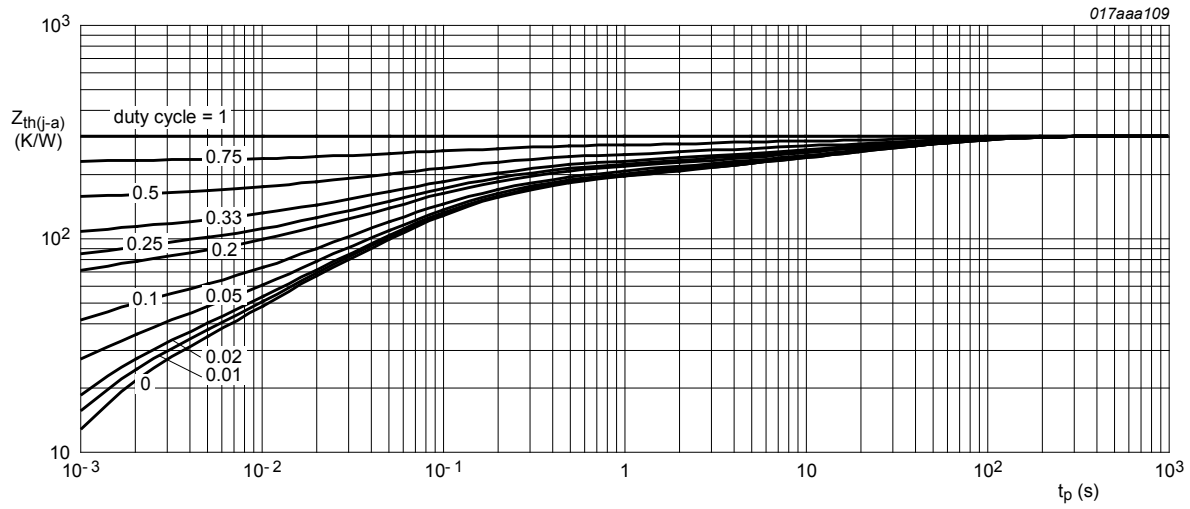
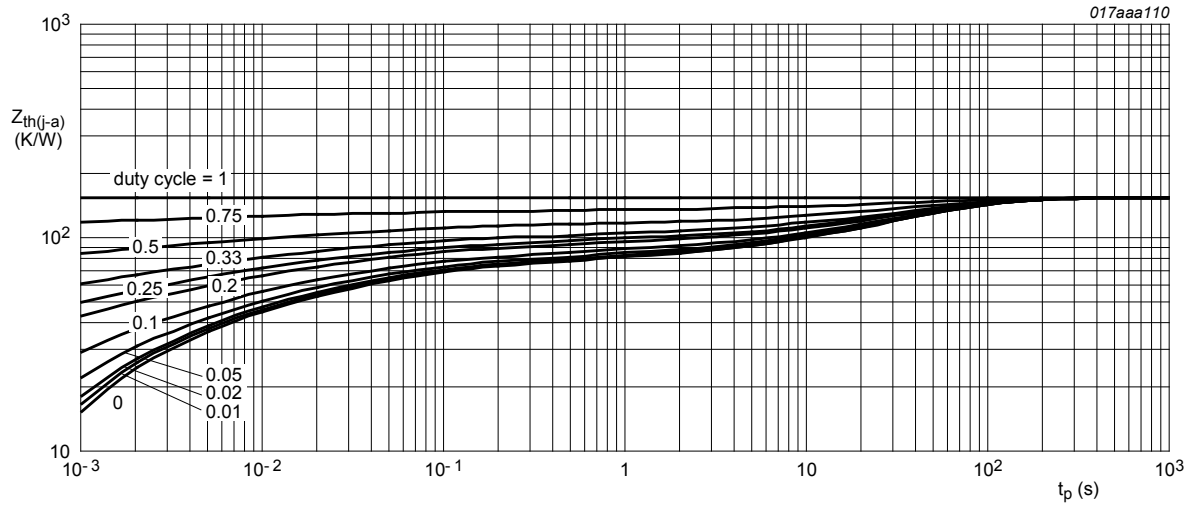


FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for drain 1 cm^2

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

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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	1.4	Ω
		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

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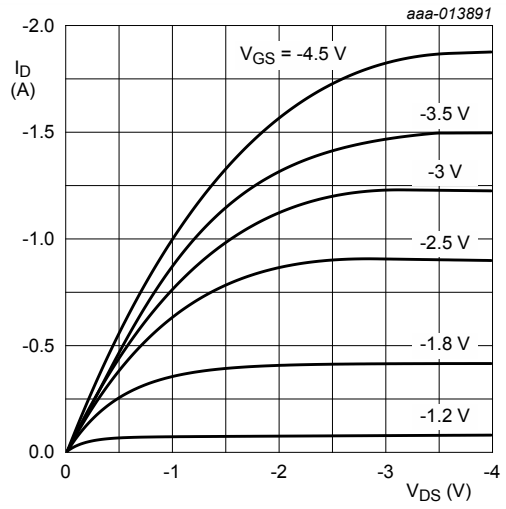
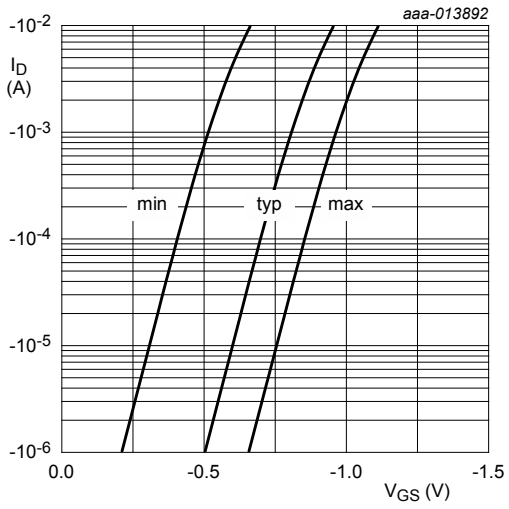


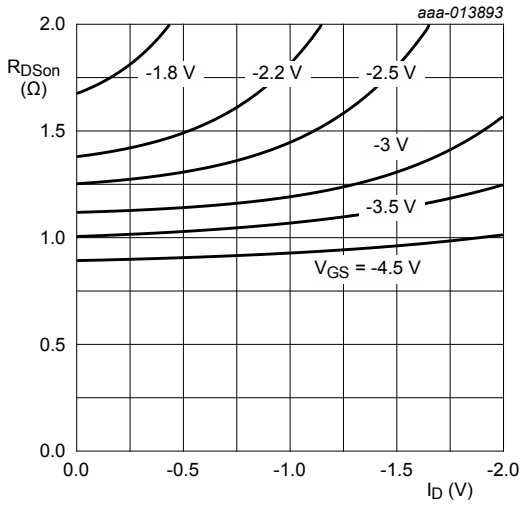
T_j = 25 °C

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



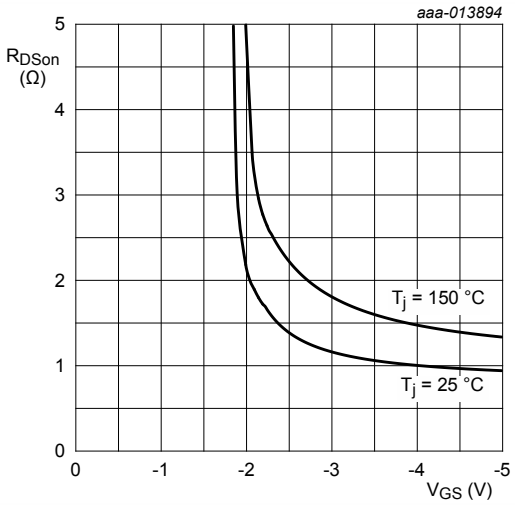
T_j = 25 °C; V_{DS} = -5 V

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



T_j = 25 °C

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



I_D = -0.5 A

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

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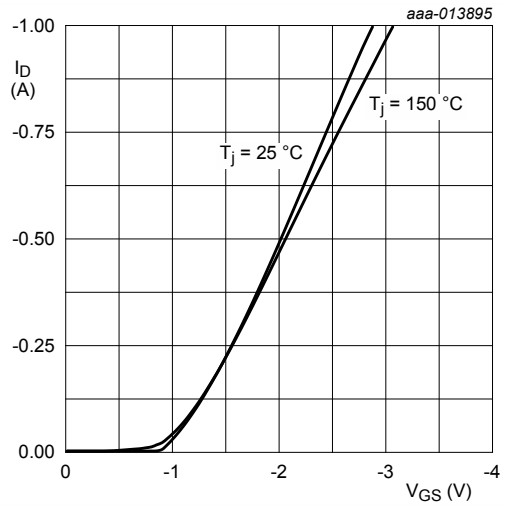
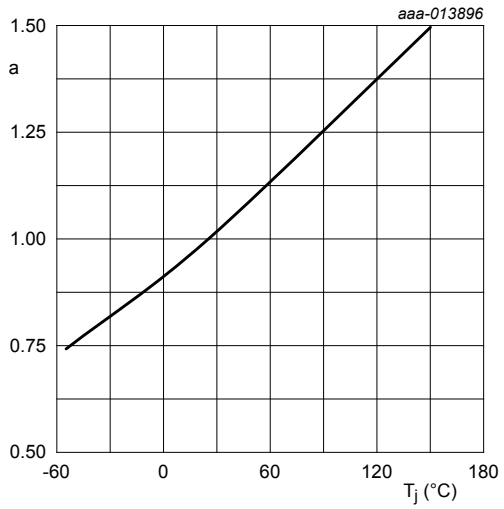


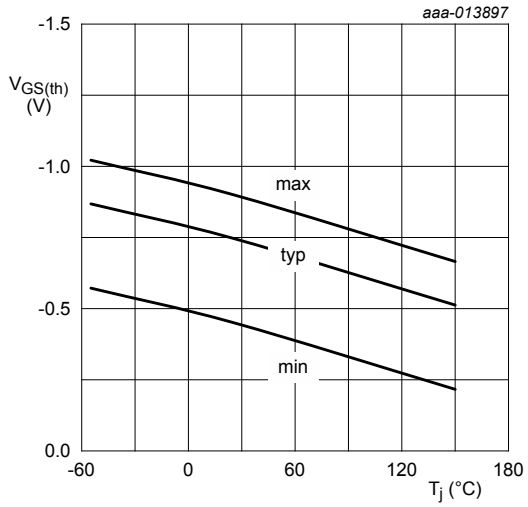
$V_{DS} > I_D \times R_{DSon}$

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



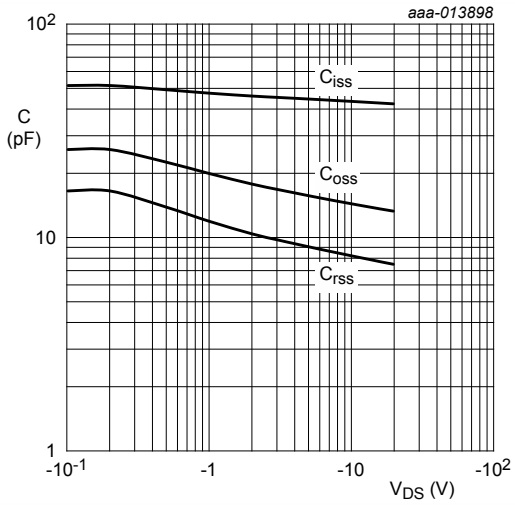
$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

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



I_D = -0.25 mA; $V_{DS} = V_{GS}$

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



f = 1 MHz; V_{GS} = 0 V

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

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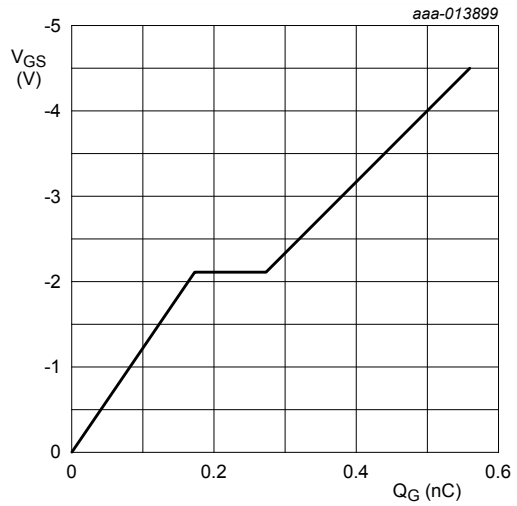


I_D = -0.45 A; V_{DS} = -10 V; T_{amb} = 25 °C

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

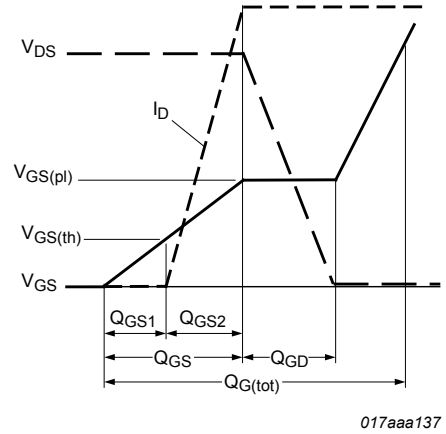
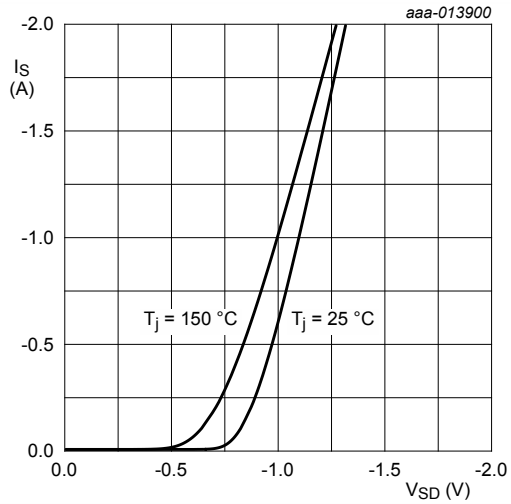


Fig. 16. MOSFET transistor: Gate charge waveform definitions



V_{GS} = 0 V

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

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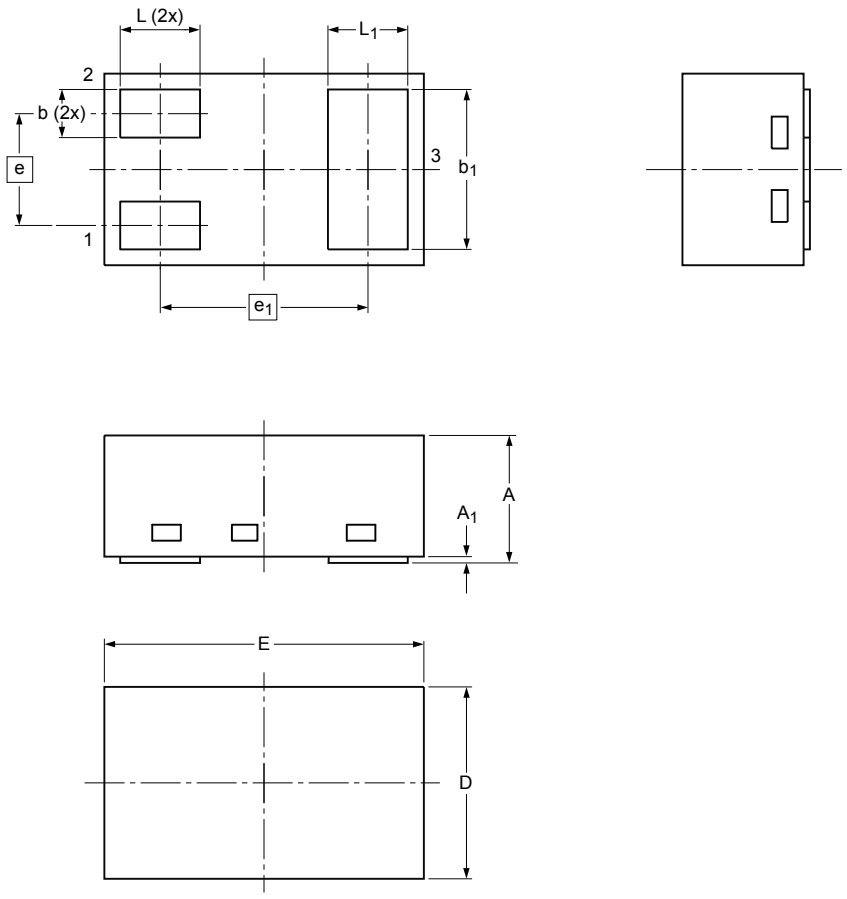
11. Package outline

Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm **SOT883B**



0 0.5 1 mm

scale

Dimensions

Unit		$A^{(1)}$	A_1	b	b_1	D	E	e	e_1	L	L_1
	max	0.40	0.04	0.20	0.55	0.65	1.05			0.30	0.30
mm	nom	0.37		0.15	0.50	0.60	1.00	0.35	0.65	0.25	0.25
	min	0.34		0.12	0.47	0.55	0.95			0.22	0.22

Note

1. Including plating thickness

sot883b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT883B						~~11-11-02~~ 12-01-03

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

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12. Soldering

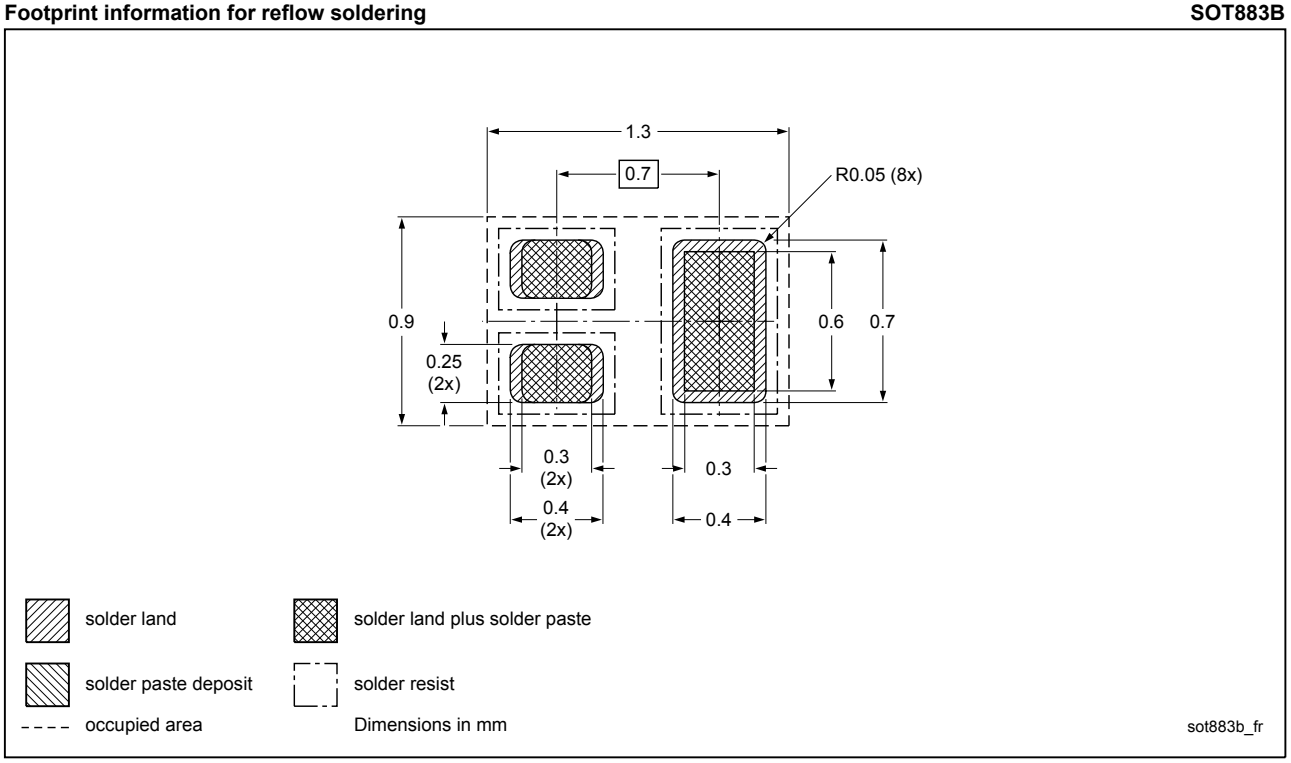

Fig. 19. Reflow soldering footprint for DFN1006B-3 (SOT883B)

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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	-	-

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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.

[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".
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Date of release: 05 December 2016