



# PMZB370UNE

30 V, single N-channel Trench MOSFET

Rev. 1 — 8 May 2012

Product data sheet

## 1. Product profile

### 1.1 General description

N-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.

### 1.2 Features and benefits

- Very fast switching
- Trench MOSFET technology
- Low threshold voltage
- Ultra thin package profile with 0.37 mm height
- ESD protection up to 2 kV

### 1.3 Applications

- Relay driver
- High-speed line driver
- Low-side loadswitch
- Switching circuits

### 1.4 Quick reference data

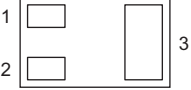
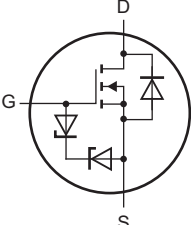
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$	-	-	30	V
$V_{GS}$	gate-source voltage		-8	-	8	V
$I_D$	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ °C}$	<a href="#">[1]</a>	-	900	mA
<b>Static characteristics</b>						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 500\text{ mA}; T_j = 25\text{ °C}$	-	370	490	m $\Omega$

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

## 2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 <p>Transparent top view</p> <p><b>SOT883B (DFN1006B-3)</b></p>	 <p>017aaa255</p>
2	S	source		
3	D	drain		

## 3. Ordering information

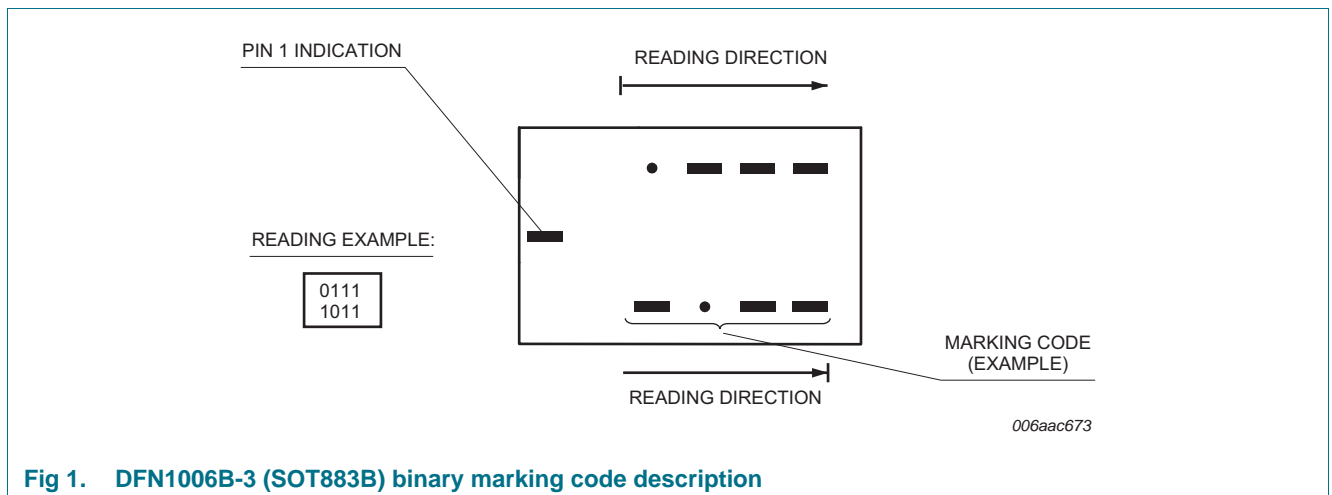
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMZB370UNE	DFN1006B-3	Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm	SOT883B

## 4. Marking

Table 4. Marking codes

Type number	Marking code
PMZB370UNE	0000 1000



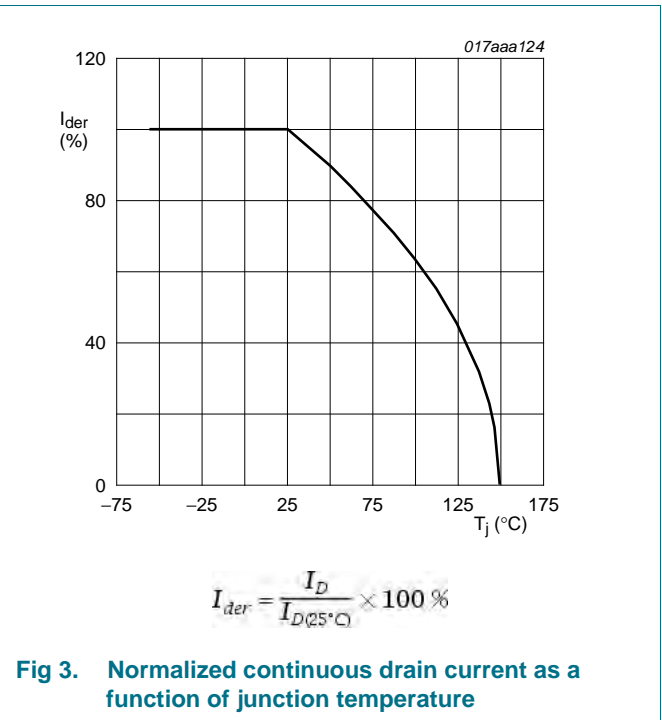
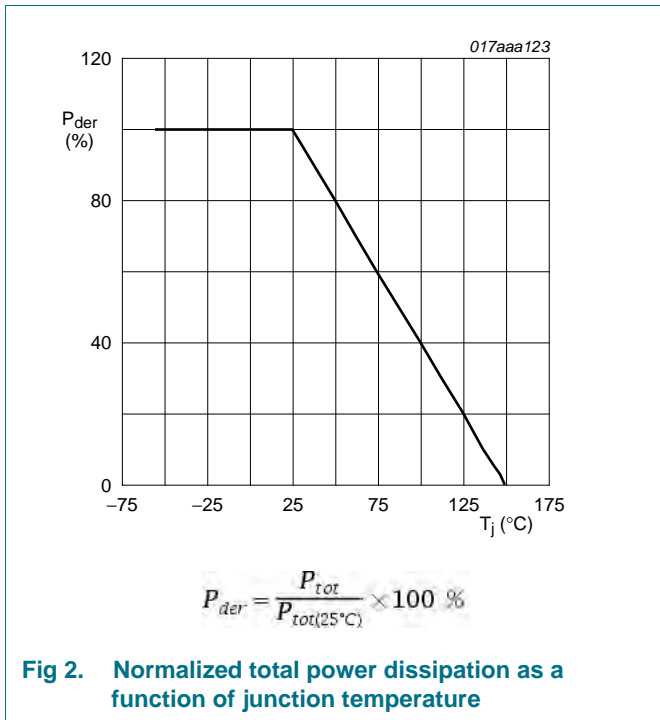
## 5. Limiting values

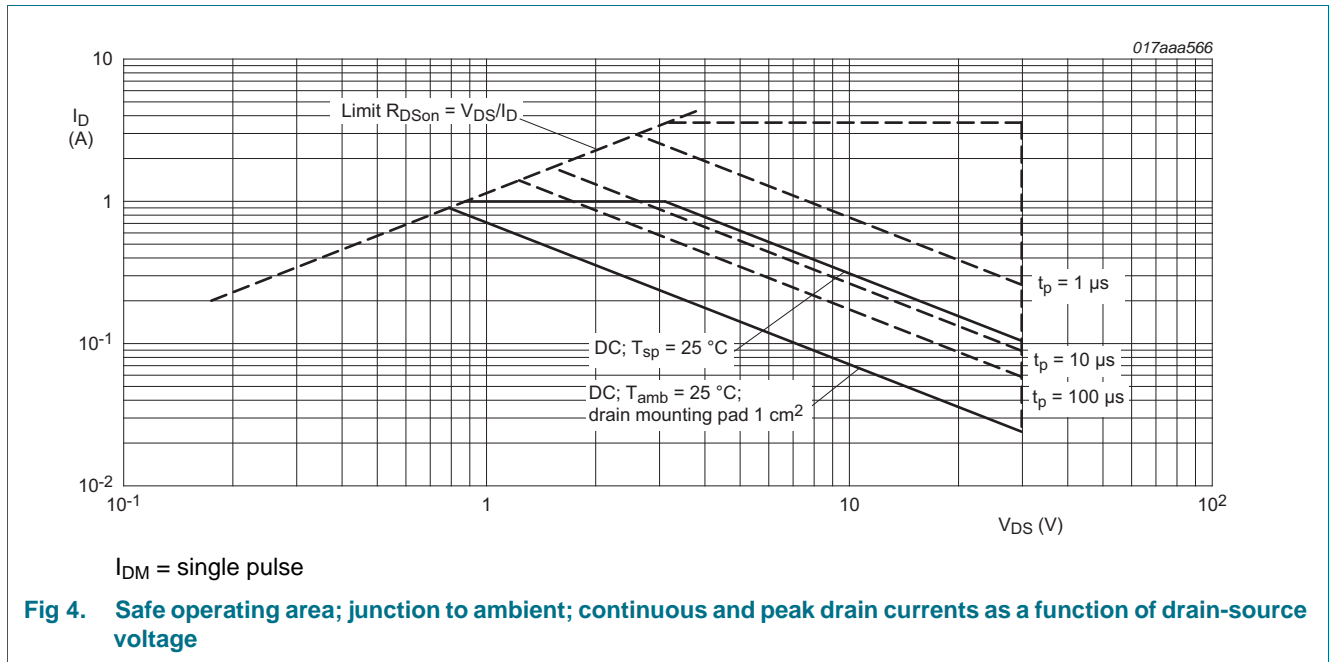
**Table 5. Limiting values**

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		-8	8	V	
I <sub>D</sub>	drain current	V <sub>GS</sub> = 4.5 V; T <sub>amb</sub> = 25 °C	[1]	-	900	mA
		V <sub>GS</sub> = 4.5 V; T <sub>amb</sub> = 100 °C	[1]	-	560	mA
I <sub>DM</sub>	peak drain current	T <sub>amb</sub> = 25 °C; single pulse; t <sub>p</sub> ≤ 10 μs	-	3.6	A	
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = 25 °C	[2]	-	360	mW
			[1]	-	715	mW
		T <sub>sp</sub> = 25 °C		-	2700	mW
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]	-	680	mA
<b>ESD maximum rating</b>						
V <sub>ESD</sub>	electrostatic discharge voltage	HBM	[3]	-	2000	V

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





## 6. 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<sup>2</sup>.

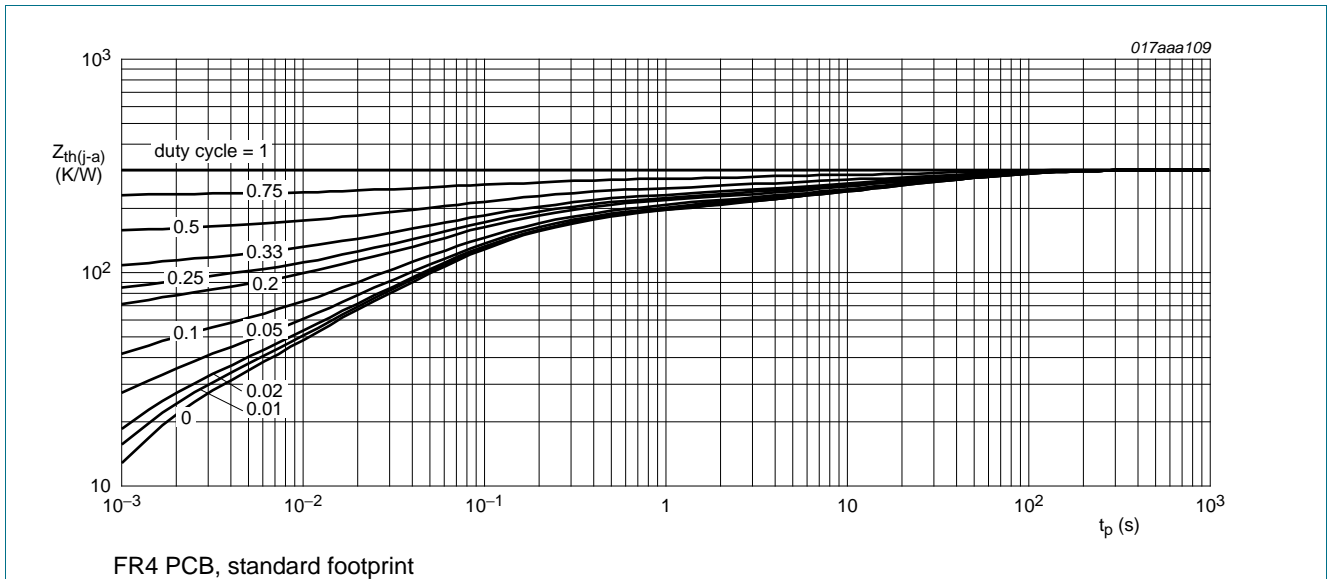


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

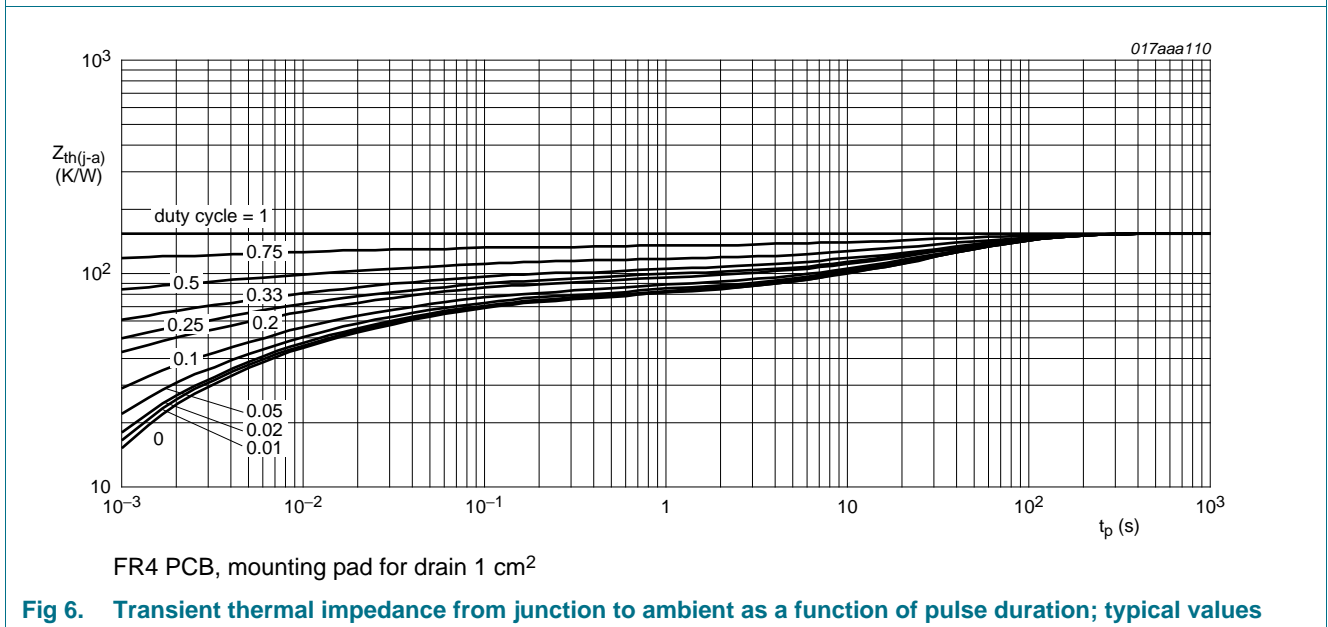
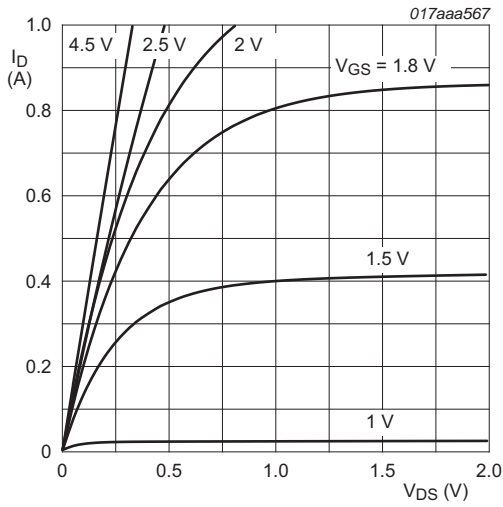


Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 7. Characteristics

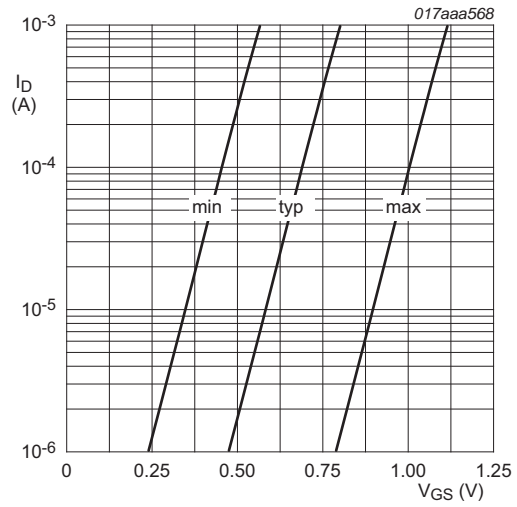
**Table 7. Characteristics**

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	0.77	1.05	V
$I_{DSS}$	drain leakage current	$V_{DS} = 30 \text{ V}$ ; $V_{GS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 30 \text{ V}$ ; $V_{GS} = 0 \text{ V}$ ; $T_j = 150 \text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
$I_{GSS}$	gate leakage current	$V_{GS} = 8 \text{ V}$ ; $V_{DS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	-	3	$\mu\text{A}$
		$V_{GS} = -8 \text{ V}$ ; $V_{DS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	-	3	$\mu\text{A}$
		$V_{GS} = -4.5 \text{ V}$ ; $V_{DS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	-	0.5	$\mu\text{A}$
		$V_{GS} = 4.5 \text{ V}$ ; $V_{DS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	-	0.5	$\mu\text{A}$
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 4.5 \text{ V}$ ; $I_D = 500 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	370	490	m $\Omega$
		$V_{GS} = 4.5 \text{ V}$ ; $I_D = 500 \text{ mA}$ ; $T_j = 150 \text{ }^\circ\text{C}$	-	650	860	m $\Omega$
		$V_{GS} = 2.5 \text{ V}$ ; $I_D = 400 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	470	750	m $\Omega$
		$V_{GS} = 1.8 \text{ V}$ ; $I_D = 100 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	630	1300	m $\Omega$
$g_{fs}$	forward transconductance	$V_{DS} = 10 \text{ V}$ ; $I_D = 200 \text{ mA}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	1580	-	mS
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$V_{DS} = 15 \text{ V}$ ; $I_D = 500 \text{ mA}$ ; $V_{GS} = 4.5 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	0.77	1.16	nC
$Q_{GS}$	gate-source charge		-	0.15	-	nC
$Q_{GD}$	gate-drain charge		-	0.16	-	nC
$C_{iss}$	input capacitance	$V_{DS} = 25 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $V_{GS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	52	78	pF
$C_{oss}$	output capacitance		-	9	-	pF
$C_{rss}$	reverse transfer capacitance		-	3	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 15 \text{ V}$ ; $R_L = 250 \Omega$ ; $V_{GS} = 4.5 \text{ V}$ ; $R_{G(ext)} = 6 \Omega$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	11	22	ns
$t_r$	rise time		-	9	-	ns
$t_{d(off)}$	turn-off delay time		-	54	108	ns
$t_f$	fall time		-	27	-	ns
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 300 \text{ mA}$ ; $V_{GS} = 0 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	0.48	0.76	1.2	V



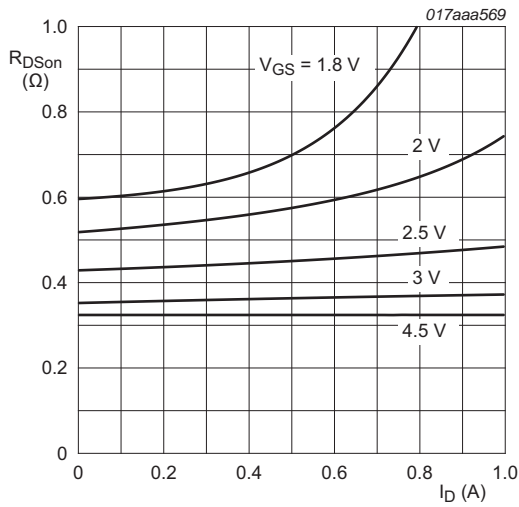
$T_j = 25\text{ }^\circ\text{C}$

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



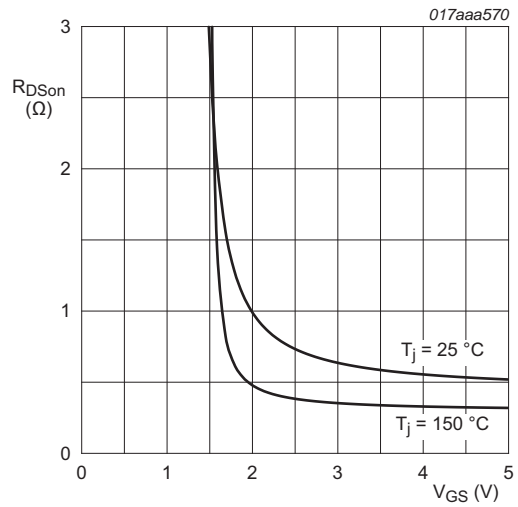
$T_j = 25\text{ }^\circ\text{C}; V_{DS} = 5\text{ V}$

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



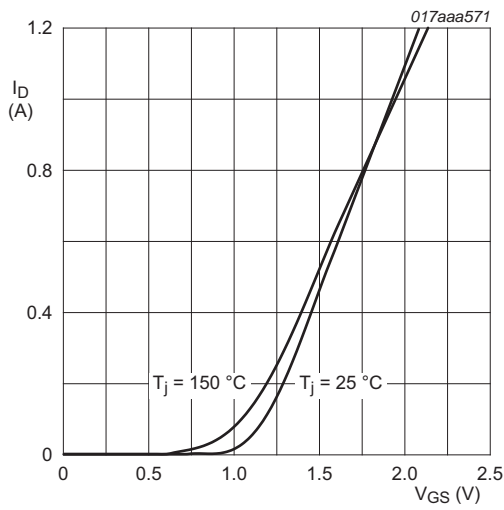
$T_j = 25\text{ }^\circ\text{C}$

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



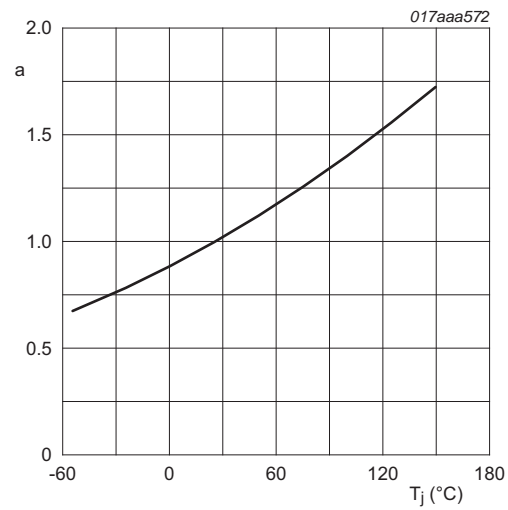
$I_D = 500\text{ mA}$

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



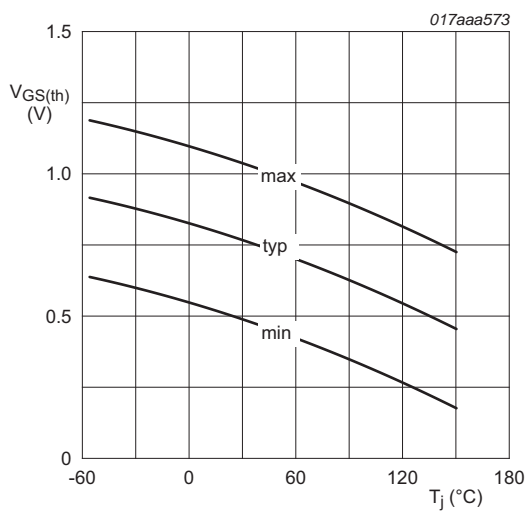
$$V_{DS} > I_D \times R_{DS(on)}$$

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



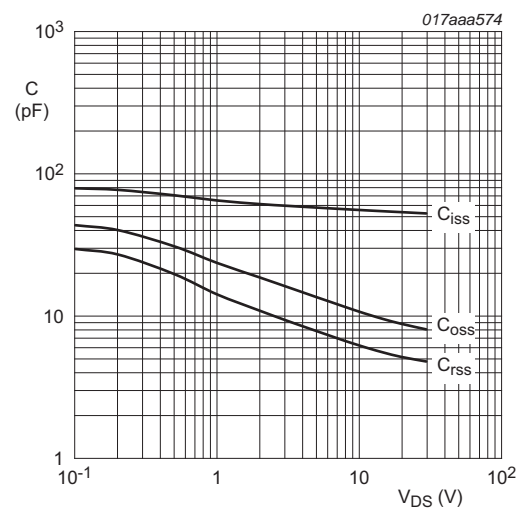
$$a = \frac{R_{DS(on)}}{R_{DS(on)(25^\circ C)}}$$

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



$$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$$

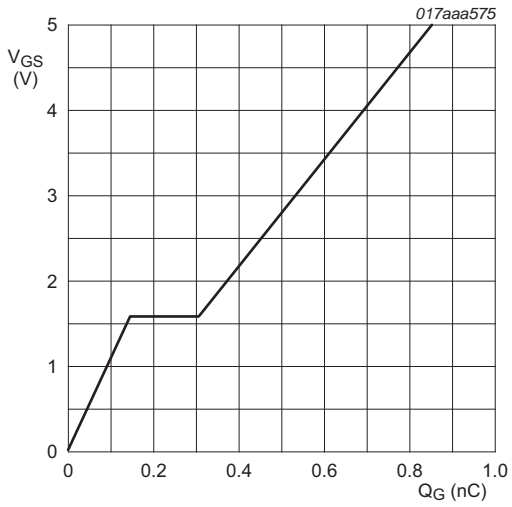
Fig 13. Gate-source threshold voltage as a function of junction temperature



$$f = 1 \text{ MHz}; V_{GS} = 0 \text{ V}$$

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





$I_D = 0.5 \text{ A}; V_{DS} = 15 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$

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

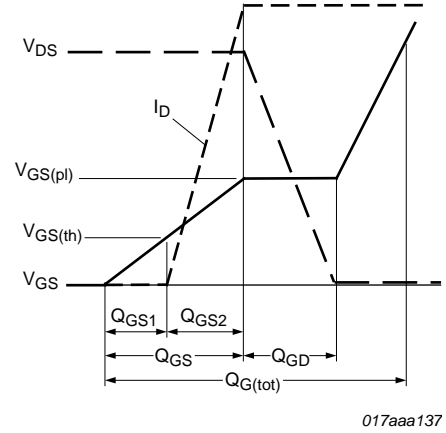
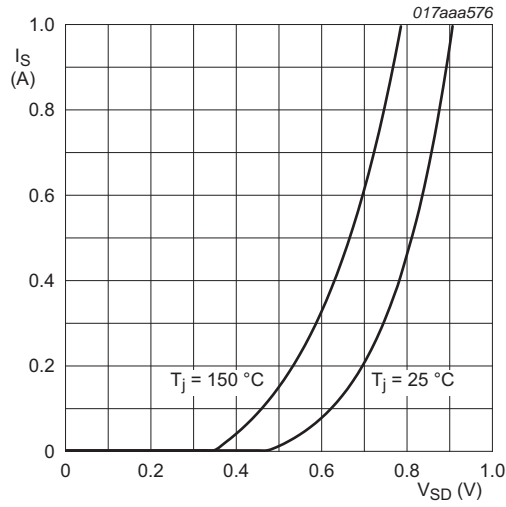


Fig 16. Gate charge waveform definitions



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

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

### 8. Test information

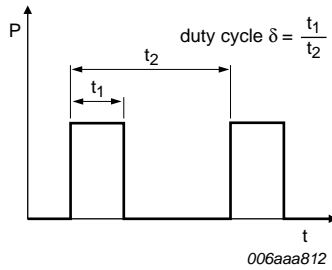


Fig 18. Duty cycle definition

### 9. Package outline

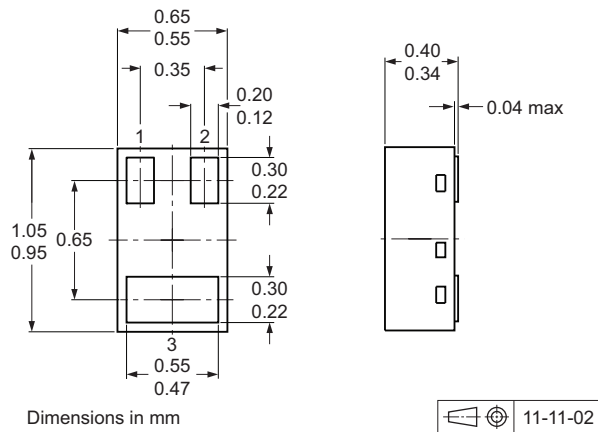


Fig 19. Package outline SOT883B (DFN1006B-3)

10. Soldering

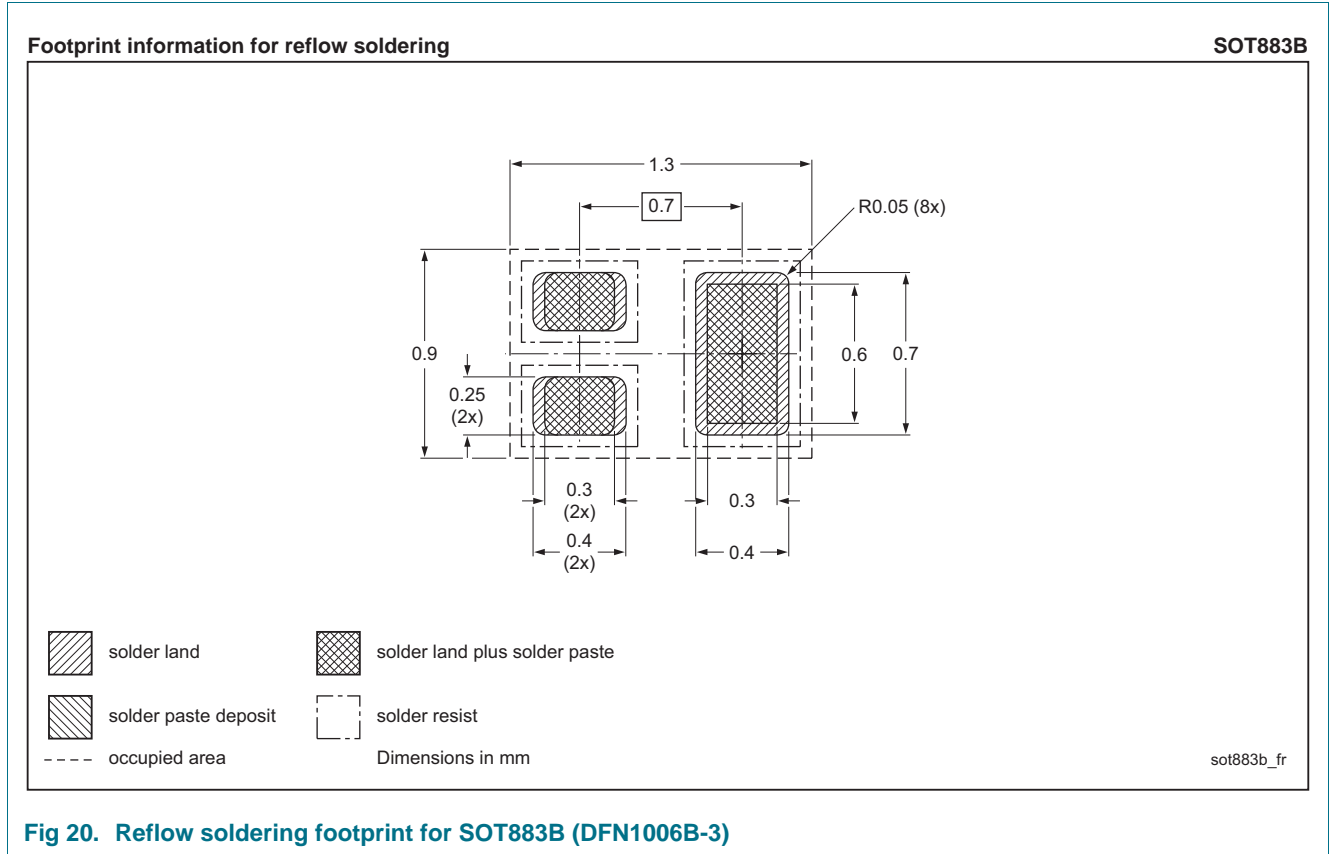


Fig 20. Reflow soldering footprint for SOT883B (DFN1006B-3)

## 11. Revision history

**Table 8.** Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMZB370UNE v.1	20120508	Product data sheet	-	-

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1]</sup> <sup>[2]</sup>	Product status <sup>[3]</sup>	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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