



# PMZB290UNE

20 V, single N-channel Trench MOSFET

Rev. 3 — 23 March 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
- Low threshold voltage
- Trench MOSFET technology
- ESD protection up to 2 kV
- Ultra thin package profile of 0.37mm

### 1.3 Applications

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

### 1.4 Quick reference data

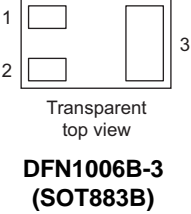
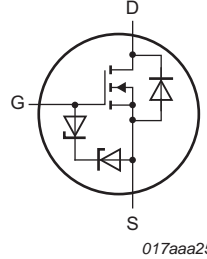
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$T_j = 25\text{ °C}$	-	-	20	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>	-	1	A
<b>Static characteristics</b>						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 500\text{ mA}; T_j = 25\text{ °C}$	-	290	380	m $\Omega$

[1] Device mounted on an FR4 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		
2	S	source		
3	D	drain		

## 3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
PMZB290UNE	DFN1006B-3	Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm	SOT883B

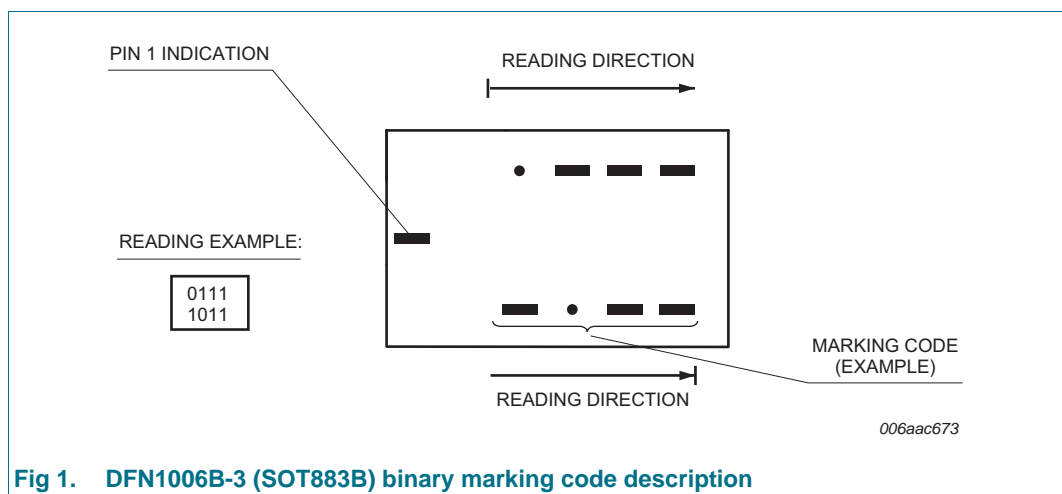
## 4. Marking

Table 4. Marking codes

Type number	Marking code
PMZB290UNE	0000 0110

[1] For DFN1006B-3 (SOT883B) binary marking code description see [Figure 1](#).

### 4.1 Binary marking code description



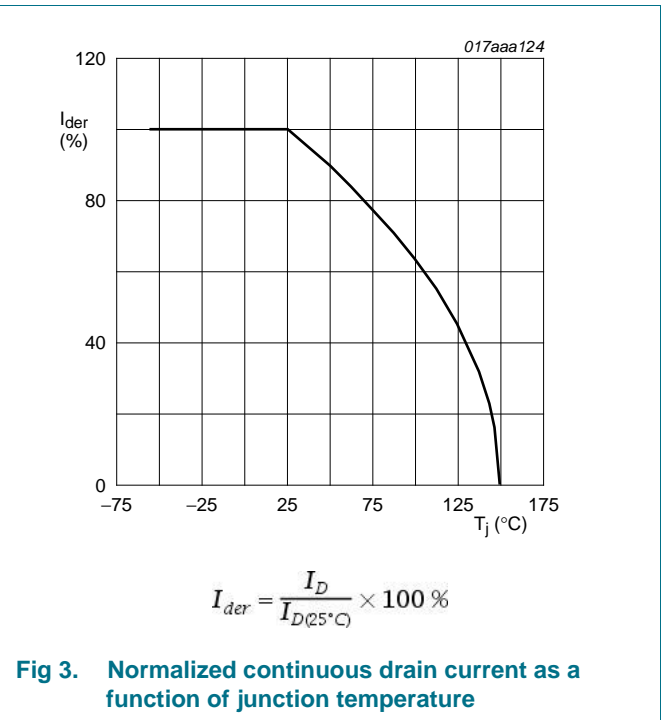
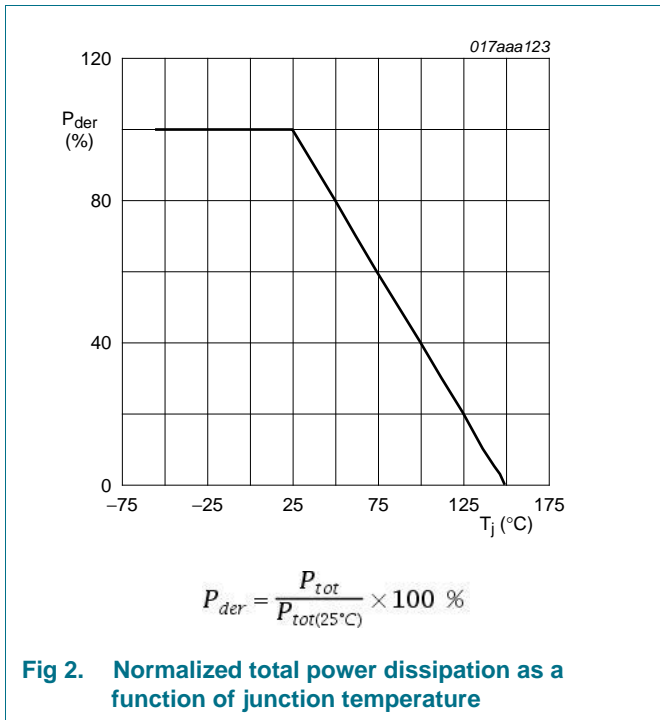
## 5. Limiting values

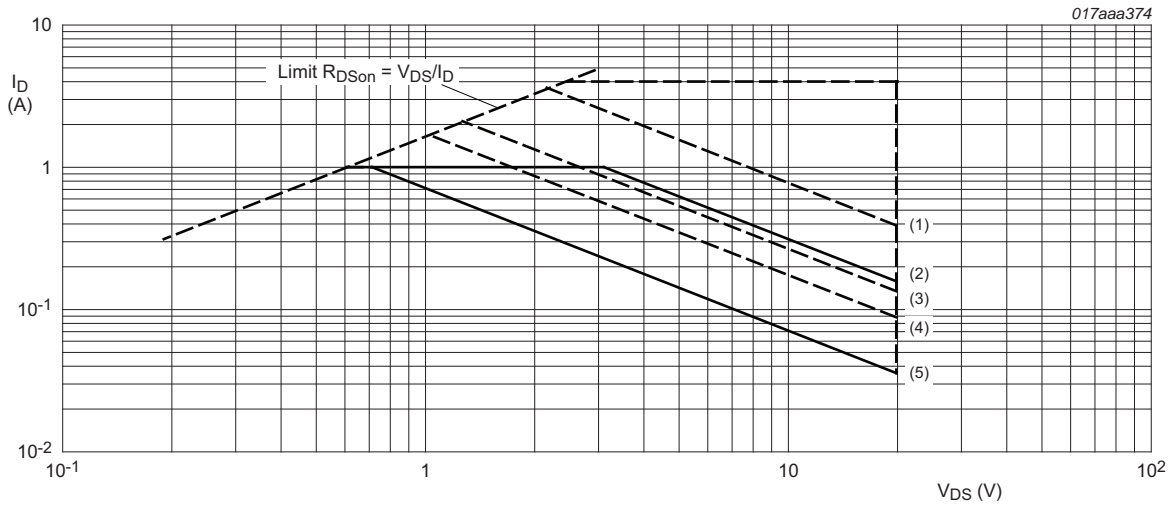
**Table 5. Limiting values**

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	-	20	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]	-	1	A
		V <sub>GS</sub> = 4.5 V; T <sub>amb</sub> = 100 °C	[1]	-	625	mA
I <sub>DM</sub>	peak drain current	T <sub>amb</sub> = 25 °C; single pulse; t <sub>p</sub> ≤ 10 μs	-	4	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 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm<sup>2</sup>.
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [3] Measured between all pins.





$I_{DM}$  = 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  $1$  cm<sup>2</sup>

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

## 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>.

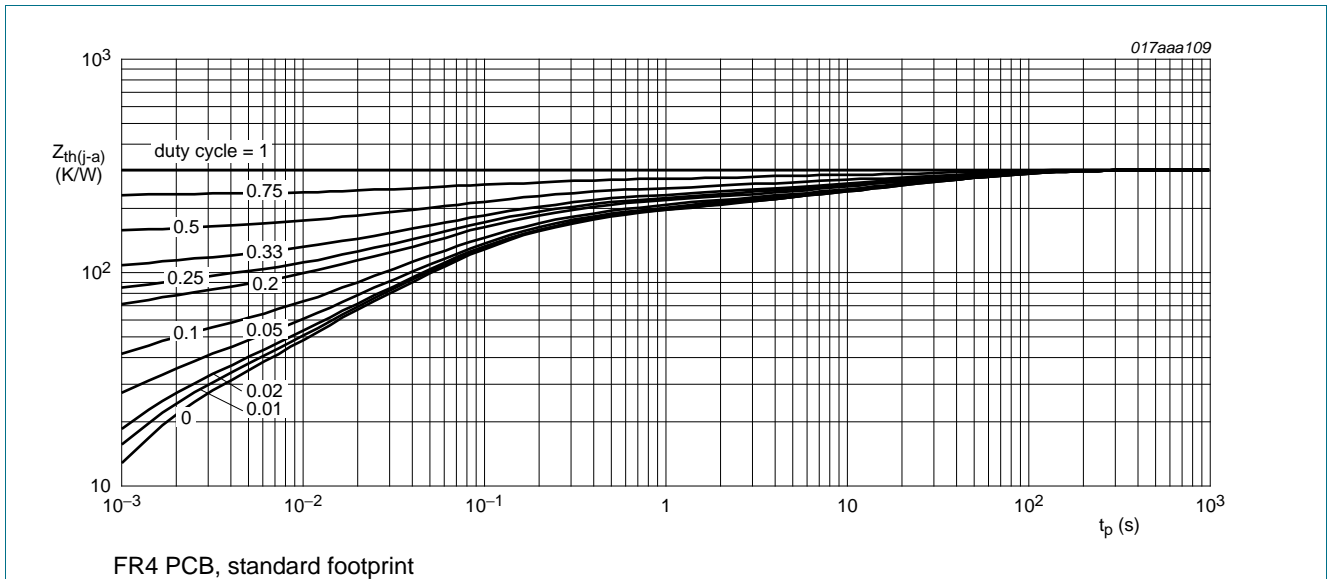


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

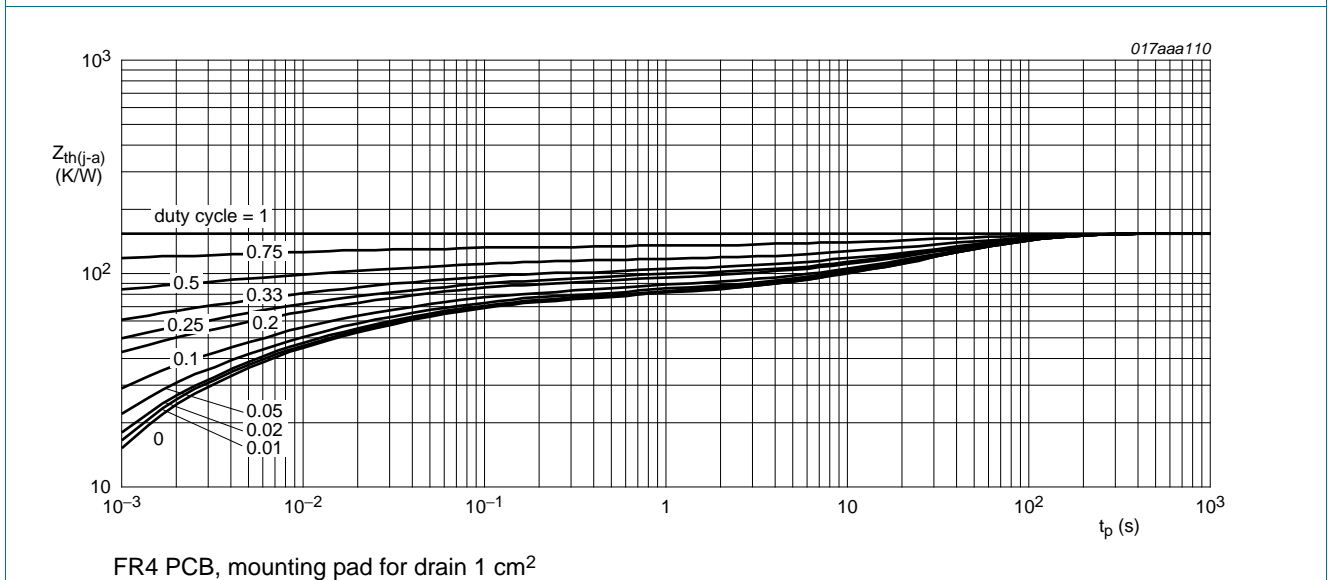
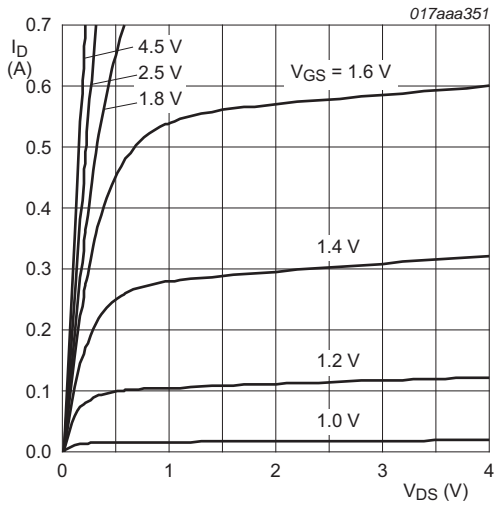


Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 7. Characteristics

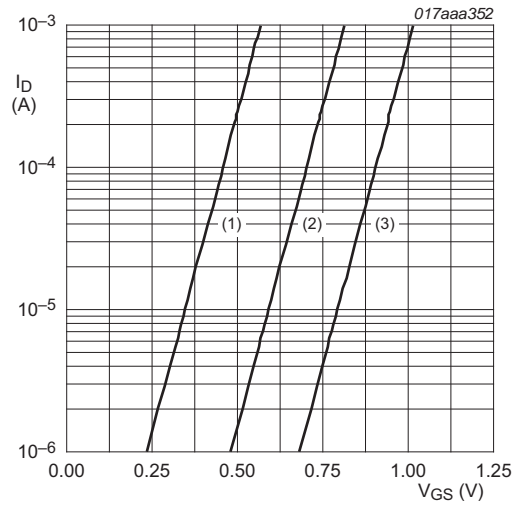
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A$ ; $V_{GS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	20	-	-	V
$V_{GSth}$	gate-source threshold voltage	$I_D = 250 \mu A$ ; $V_{DS} = V_{GS}$ ; $T_j = 25 \text{ }^\circ C$	0.5	0.75	0.95	V
$I_{DSS}$	drain leakage current	$V_{DS} = 20 V$ ; $V_{GS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	1	$\mu A$
		$V_{DS} = 20 V$ ; $V_{GS} = 0 V$ ; $T_j = 150 \text{ }^\circ C$	-	-	10	$\mu A$
$I_{GSS}$	gate leakage current	$V_{GS} = 8 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	2	$\mu A$
		$V_{GS} = -8 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	2	$\mu A$
		$V_{GS} = 4.5 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	500	nA
		$V_{GS} = -4.5 V$ ; $V_{DS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	-	500	nA
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 4.5 V$ ; $I_D = 500 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	290	380	m $\Omega$
		$V_{GS} = 4.5 V$ ; $I_D = 500 \text{ mA}$ ; $T_j = 150 \text{ }^\circ C$	-	460	610	m $\Omega$
		$V_{GS} = 2.5 V$ ; $I_D = 400 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	420	620	m $\Omega$
		$V_{GS} = 1.8 V$ ; $I_D = 100 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	600	1100	m $\Omega$
$g_{fs}$	forward transconductance	$V_{DS} = 10 V$ ; $I_D = 200 \text{ mA}$ ; $T_j = 25 \text{ }^\circ C$	-	1.6	-	S
<b>Dynamic characteristics</b>						
$Q_{G(tot)}$	total gate charge	$V_{DS} = 10 V$ ; $I_D = 500 \text{ mA}$ ; $V_{GS} = 4.5 V$ ; $T_j = 25 \text{ }^\circ C$	-	0.45	0.68	nC
$Q_{GS}$	gate-source charge		-	0.15	-	nC
$Q_{GD}$	gate-drain charge		-	0.15	-	nC
$C_{iss}$	input capacitance	$V_{DS} = 10 V$ ; $f = 1 \text{ MHz}$ ; $V_{GS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	-	55	83	pF
$C_{oss}$	output capacitance		-	15	-	pF
$C_{rss}$	reverse transfer capacitance		-	7	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 10 V$ ; $R_L = 250 \text{ } \Omega$ ; $V_{GS} = 4.5 V$ ; $R_{G(ext)} = 6 \text{ } \Omega$ ; $T_j = 25 \text{ }^\circ C$	-	6	12	ns
$t_r$	rise time		-	4	-	ns
$t_{d(off)}$	turn-off delay time		-	86	172	ns
$t_f$	fall time		-	31	-	ns
<b>Source-drain diode</b>						
$V_{SD}$	source-drain voltage	$I_S = 300 \text{ mA}$ ; $V_{GS} = 0 V$ ; $T_j = 25 \text{ }^\circ C$	0.48	0.77	1.2	V



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

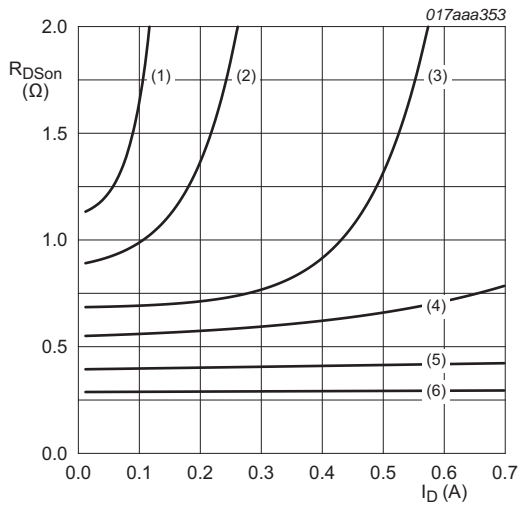
**Fig 7. Output characteristics: drain current as a function of drain-source voltage; typical values**



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

- (1) minimum values
- (2) typical values
- (3) maximum values

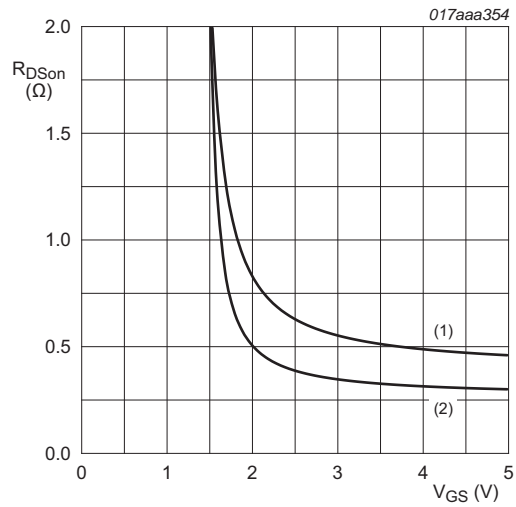
**Fig 8. Sub-threshold drain current as a function of gate-source voltage**



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

- (1)  $V_{GS} = 1.3\text{ V}$
- (2)  $V_{GS} = 1.4\text{ V}$
- (3)  $V_{GS} = 1.6\text{ V}$
- (4)  $V_{GS} = 1.8\text{ V}$
- (5)  $V_{GS} = 2.5\text{ V}$
- (6)  $V_{GS} = 4.5\text{ V}$

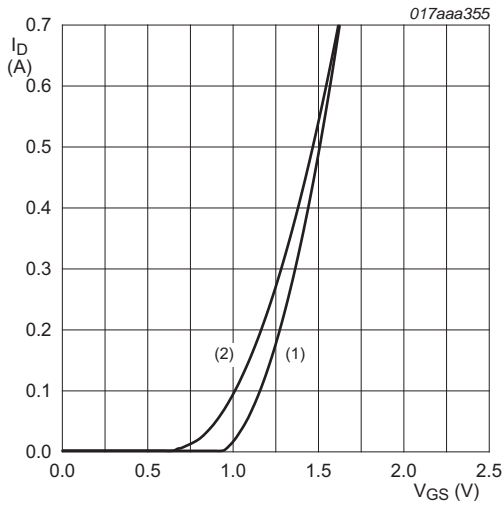
**Fig 9. Drain-source on-state resistance as a function of drain current; typical values**



$I_D = 400\text{ mA}$

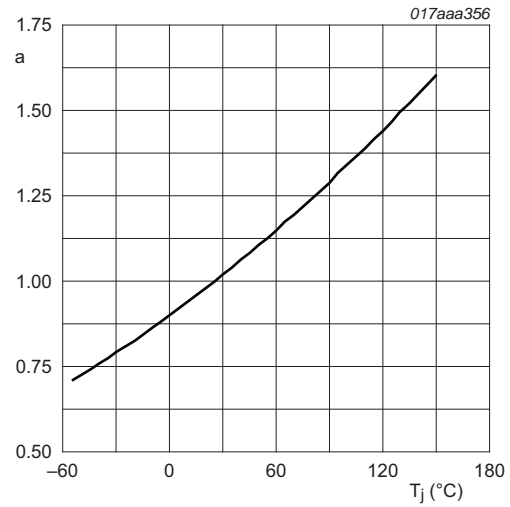
- (1)  $T_j = 150\text{ }^\circ\text{C}$
- (2)  $T_j = 25\text{ }^\circ\text{C}$

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



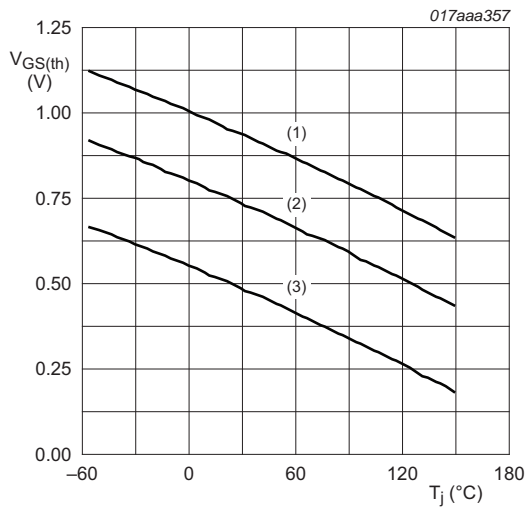
$V_{DS} > I_D \times R_{DS(on)}$   
 (1)  $T_j = 25\text{ °C}$   
 (2)  $T_j = 150\text{ °C}$

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



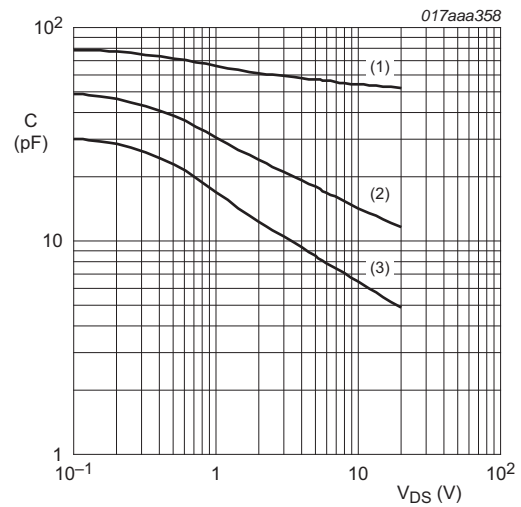
$$a = \frac{R_{DS(on)}}{R_{DS(on)(25\text{ °C})}}$$

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



$I_D = 0.25\text{ mA}; V_{DS} = V_{GS}$   
 (1) maximum values  
 (2) typical values  
 (3) minimum values

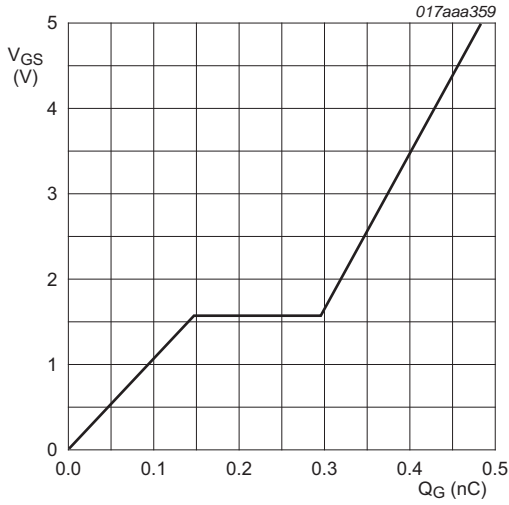
Fig 13. Gate-source threshold voltage as a function of junction temperature



$f = 1\text{ MHz}; V_{GS} = 0\text{ V}$   
 (1)  $C_{iss}$   
 (2)  $C_{oss}$   
 (3)  $C_{rss}$

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





$I_D = 0.5 \text{ A}; V_{DS} = 10 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$

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

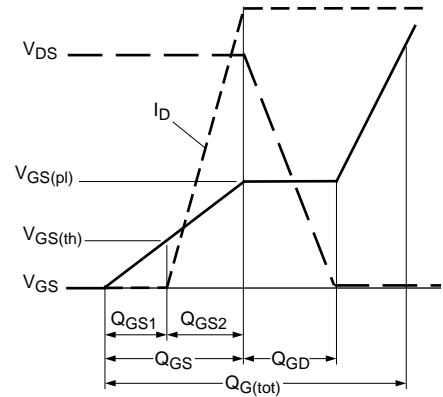
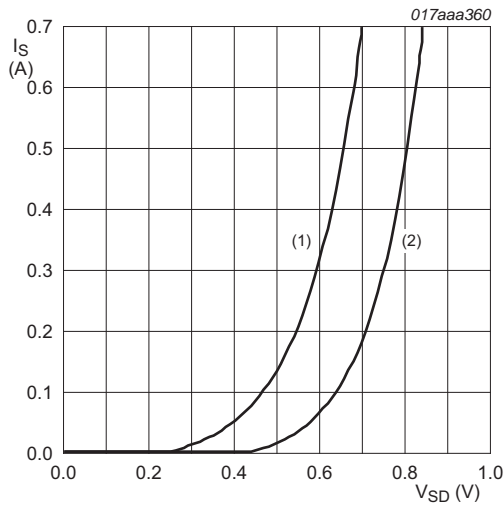


Fig 16. Gate charge waveform definitions



$V_{GS} = 0 \text{ V}$   
 (1)  $T_j = 150 \text{ }^\circ\text{C}$   
 (2)  $T_j = 25 \text{ }^\circ\text{C}$

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

### 8. Test information



Fig 18. Duty cycle definition

### 9. Package outline

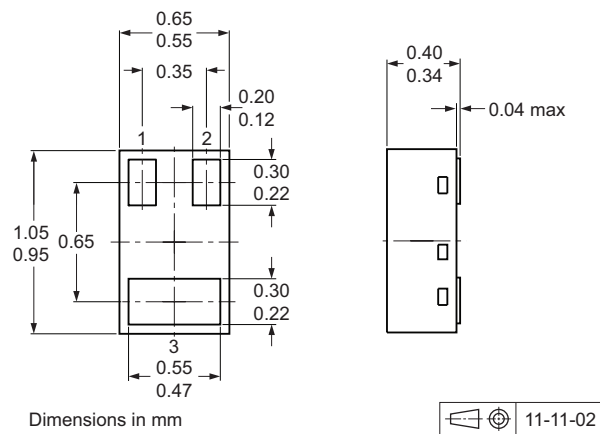


Fig 19. Package outline DFN1006B-3 (SOT883B)

10. Soldering

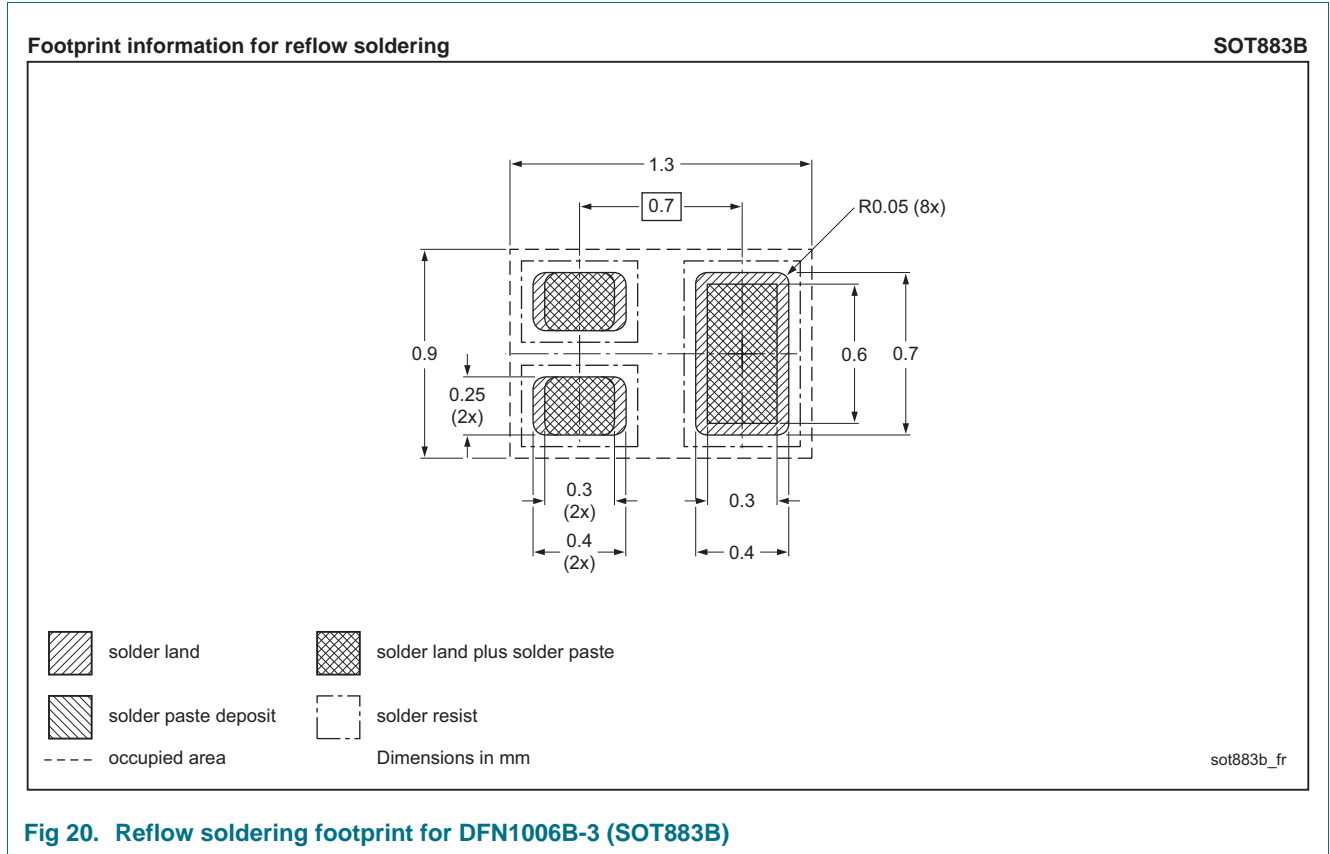


Fig 20. Reflow soldering footprint for DFN1006B-3 (SOT883B)

## 11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMZB290UNE v.3	20120323	Product data sheet	-	PMZB290UNE v.2
Modifications:	• <a href="#">1.2 "Features and benefits"</a> corrected.			
PMZB290UNE v.2	20120207	Product data sheet	-	PMZB290UNE v.1
PMZB290UNE v.1	20120201	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.

[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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Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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