



PMZB290UN

20 V, single N-channel Trench MOSFET

Rev. 1 — 11 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

- Fast switching
- Trench MOSFET technology
- Low threshold voltage
- Ultra thin package profile with 0.37 mm height

1.3 Applications

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

1.4 Quick reference data

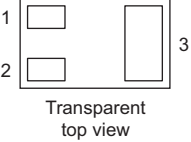
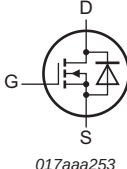
Table 1. Quick reference data

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	$V_{GS} = 4.5\text{ V}$; $T_{amb} = 25\text{ °C}$	[1]	-	1	A
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}$; $I_D = 200\text{ mA}$; $T_j = 25\text{ °C}$	-	290	350	mΩ

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

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		
PMZB290UN	DFN1006B-3	Leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.37 mm		SOT883B

4. Marking

Table 4. Marking codes

Type number	Marking code
PMZB290UN	0000 0101

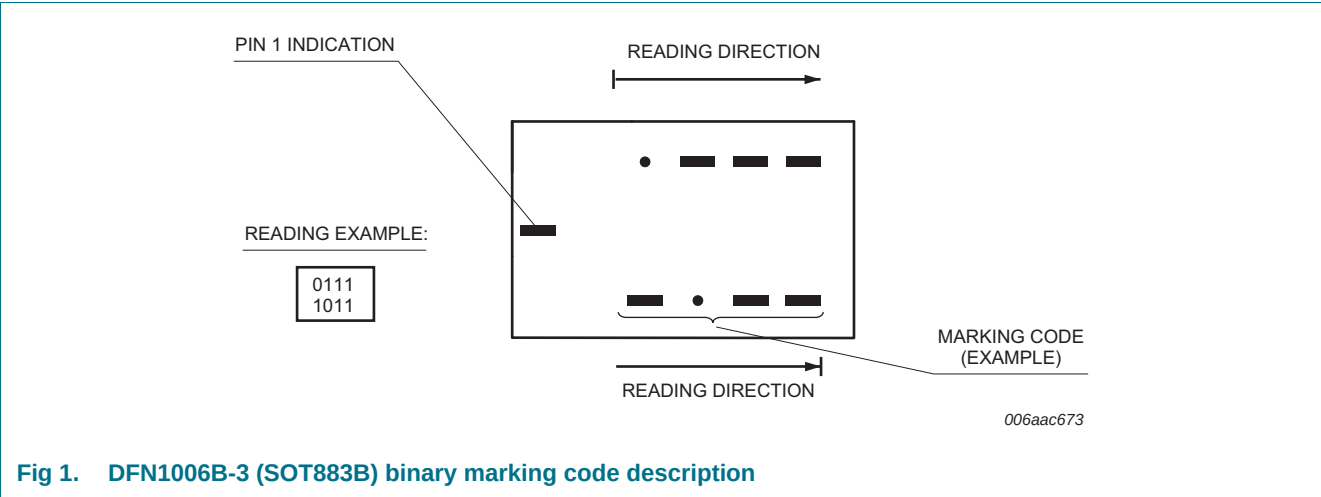


Fig 1. DFN1006B-3 (SOT883B) binary marking code description

5. Limiting values

Table 5. Limiting values

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

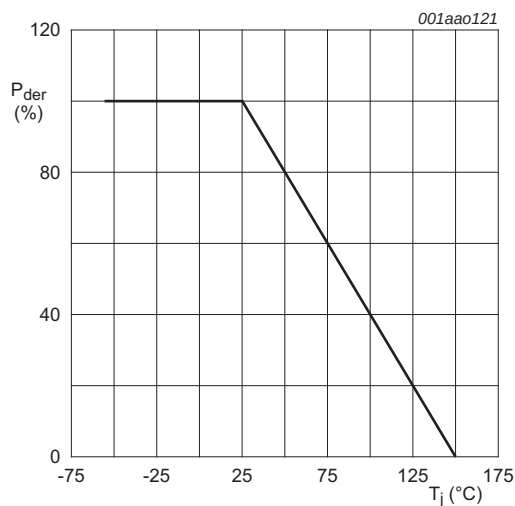
Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ }^{\circ}\text{C}$	-	20	V
V_{GS}	gate-source voltage		-8	8	V
I_D	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	1	A
		$V_{GS} = 4.5\text{ V}; T_{amb} = 100\text{ }^{\circ}\text{C}$	[1]	0.6	A
I_{DM}	peak drain current	$T_{amb} = 25\text{ }^{\circ}\text{C}$; single pulse; $t_p \leq 10\text{ }\mu\text{s}$	-	4	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]	0.67	A
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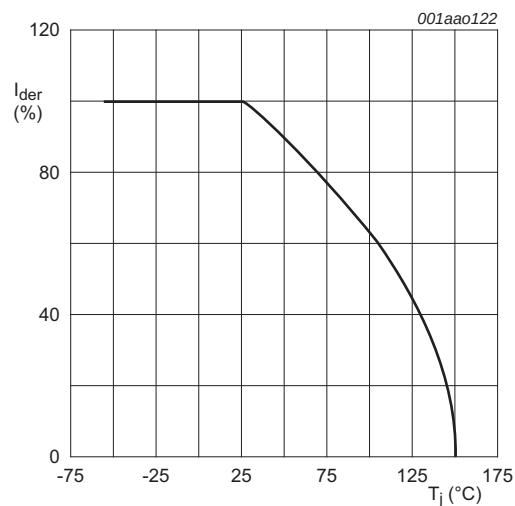
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 1 cm².

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



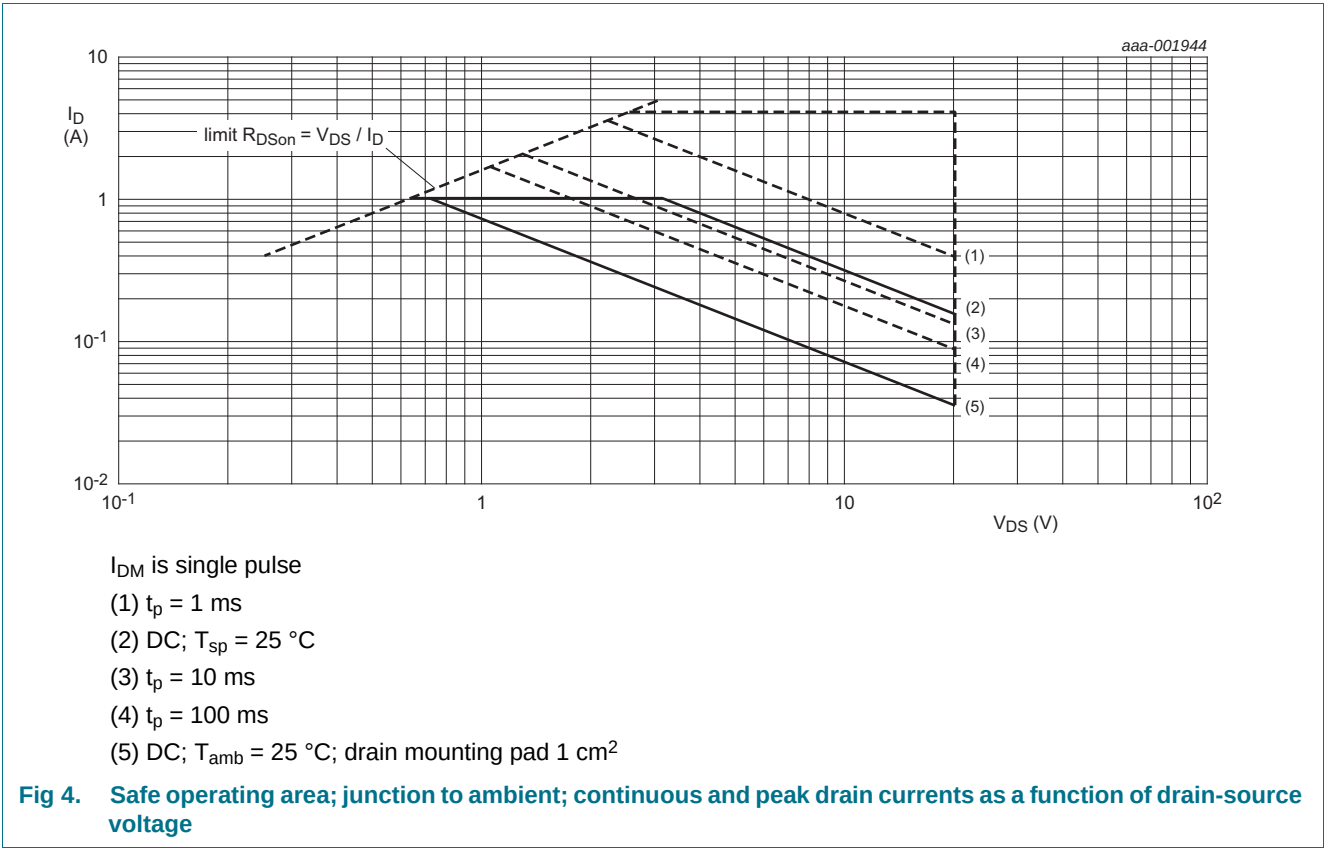
$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}\text{C})}} \times 100\%$$

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



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^2 .

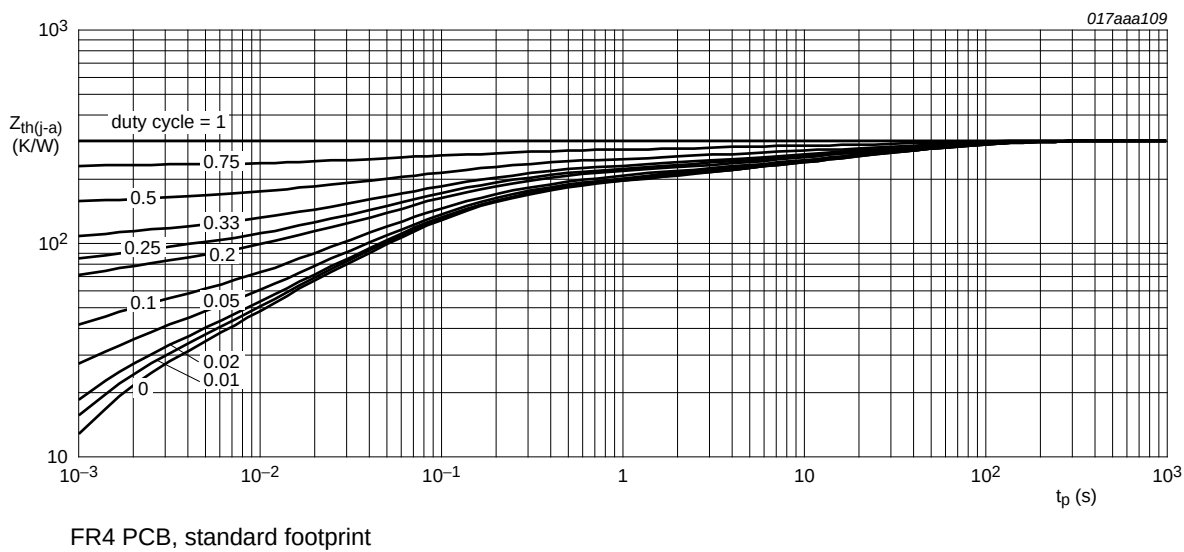


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

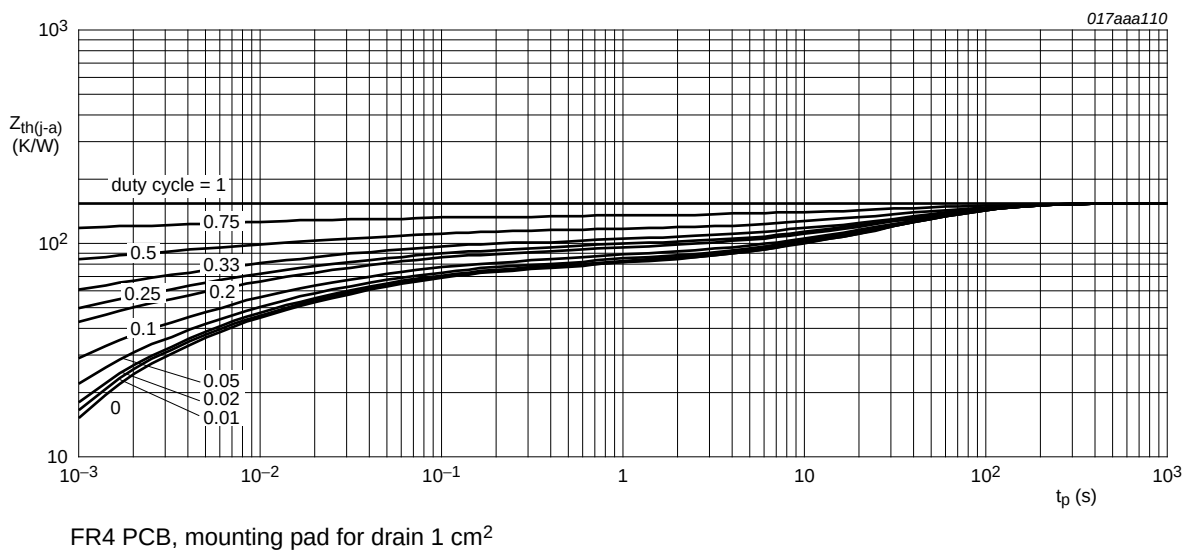
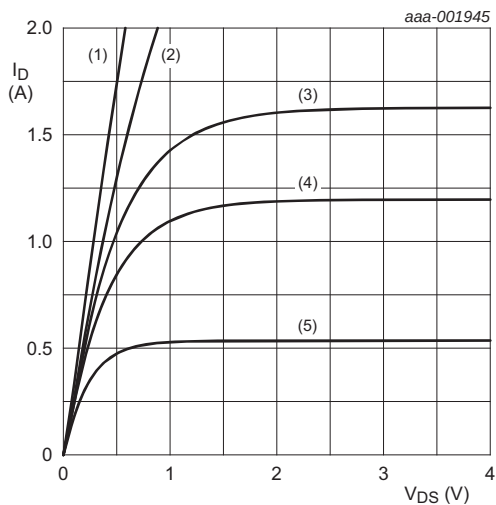


Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

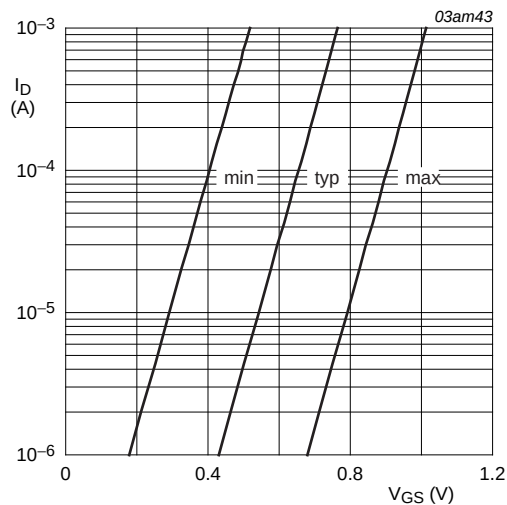
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 10\ \mu A$; $V_{GS} = 0\ V$; $T_j = 25\ ^\circ C$	20	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = 250\ \mu A$; $V_{DS} = V_{GS}$; $T_j = 25\ ^\circ C$	0.45	0.7	0.95	V
I_{DSS}	drain leakage current	$V_{DS} = 20\ V$; $V_{GS} = 0\ V$; $T_j = 25\ ^\circ C$	-	-	1	μA
		$V_{DS} = 20\ V$; $V_{GS} = 0\ V$; $T_j = 150\ ^\circ C$	-	-	100	μA
I_{GSS}	gate leakage current	$V_{GS} = 8\ V$; $V_{DS} = 0\ V$; $T_j = 25\ ^\circ C$	-	-	0.1	μA
		$V_{GS} = -8\ V$; $V_{DS} = 0\ V$; $T_j = 25\ ^\circ C$	-	-	0.1	μA
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5\ V$; $I_D = 200\ mA$; $T_j = 25\ ^\circ C$	-	290	350	m Ω
		$V_{GS} = 4.5\ V$; $I_D = 200\ mA$; $T_j = 150\ ^\circ C$	-	460	560	m Ω
		$V_{GS} = 2.5\ V$; $I_D = 100\ mA$; $T_j = 25\ ^\circ C$	-	360	450	m Ω
		$V_{GS} = 1.8\ V$; $I_D = 75\ mA$; $T_j = 25\ ^\circ C$	-	460	650	m Ω
g_{fs}	forward transconductance	$V_{DS} = 5\ V$; $I_D = 200\ mA$; $T_j = 25\ ^\circ C$	-	2	-	S
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$V_{DS} = 10\ V$; $I_D = 1\ A$; $V_{GS} = 4.5\ V$; $T_j = 25\ ^\circ C$	-	0.89	1.2	nC
Q_{GS}	gate-source charge		-	0.13	-	nC
Q_{GD}	gate-drain charge		-	0.18	-	nC
C_{iss}	input capacitance	$V_{DS} = 20\ V$; $f = 1\ MHz$; $V_{GS} = 0\ V$; $T_j = 25\ ^\circ C$	-	45	68	pF
C_{oss}	output capacitance		-	11	-	pF
C_{rss}	reverse transfer capacitance		-	7	-	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 10\ V$; $R_L = 10\ \Omega$; $V_{GS} = 4.5\ V$; $R_{G(ext)} = 6\ \Omega$; $T_j = 25\ ^\circ C$	-	4.5	9	ns
t_r	rise time		-	10	-	ns
$t_{d(off)}$	turn-off delay time		-	18.5	37	ns
t_f	fall time		-	5	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 300\ mA$; $V_{GS} = 0\ V$; $T_j = 25\ ^\circ C$	-	0.75	1.2	V



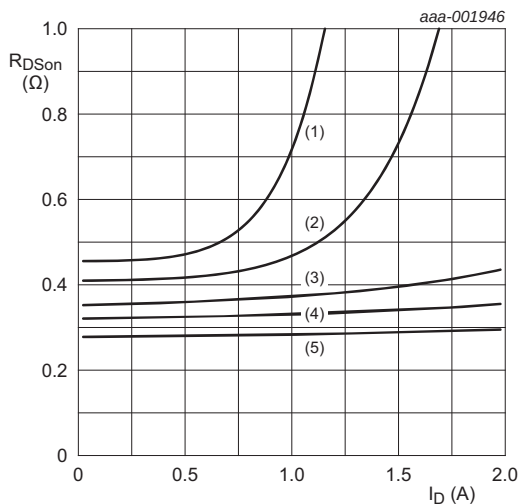
$T_j = 25\text{ }^{\circ}\text{C}$
(1) $V_{GS} = 4.5\text{ V}$
(2) $V_{GS} = 2.5\text{ V}$
(3) $V_{GS} = 2.0\text{ V}$
(4) $V_{GS} = 1.8\text{ V}$
(5) $V_{GS} = 1.5\text{ V}$

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



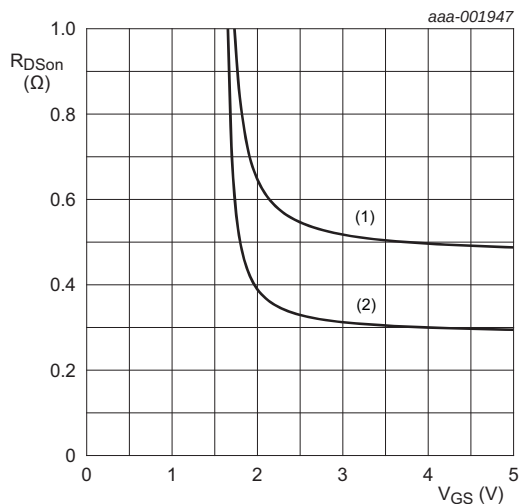
$T_j = 25\text{ }^{\circ}\text{C}; V_{DS} = 5\text{ V}$

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



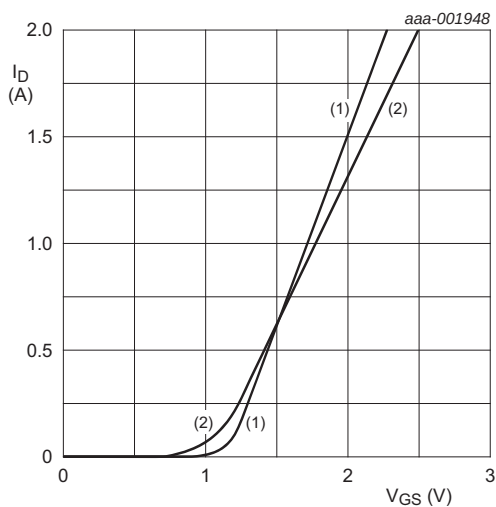
$T_j = 25\text{ }^{\circ}\text{C}$
(1) $V_{GS} = 1.8\text{ V}$
(2) $V_{GS} = 2\text{ V}$
(3) $V_{GS} = 2.5\text{ V}$
(4) $V_{GS} = 3\text{ V}$
(5) $V_{GS} = 4.5\text{ V}$

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



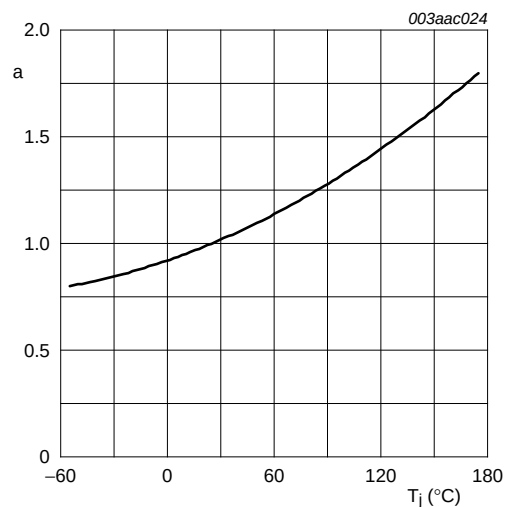
$I_D = 800\text{ mA}$
(1) $T_j = 150\text{ }^{\circ}\text{C}$
(2) $T_j = 25\text{ }^{\circ}\text{C}$

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



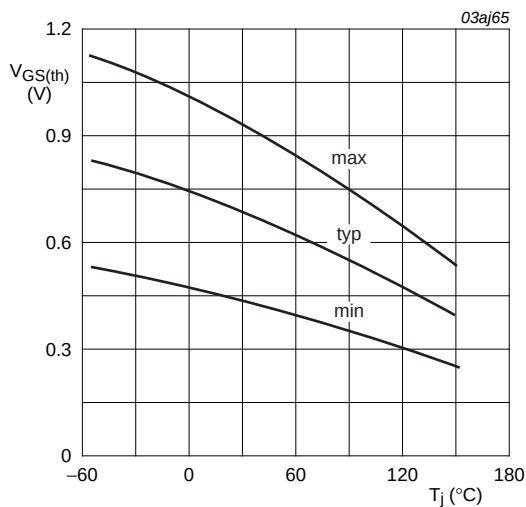
$V_{DS} > I_D \times R_{DSon}$
(1) $T_j = 25\text{ }^{\circ}\text{C}$
(2) $T_j = 150\text{ }^{\circ}\text{C}$

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



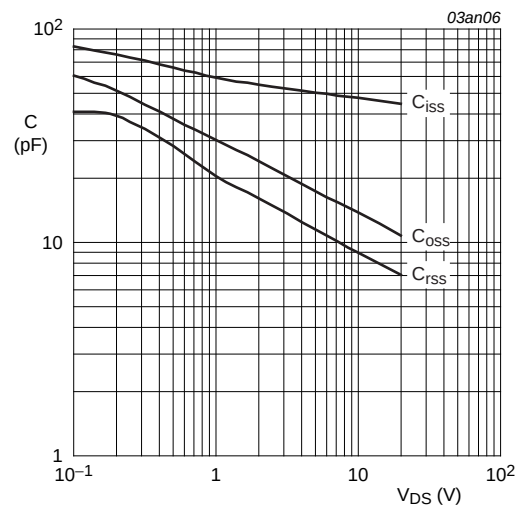
$$a = \frac{R_{DSon}}{R_{DSon}(25^{\circ}\text{C})}$$

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



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

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



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

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

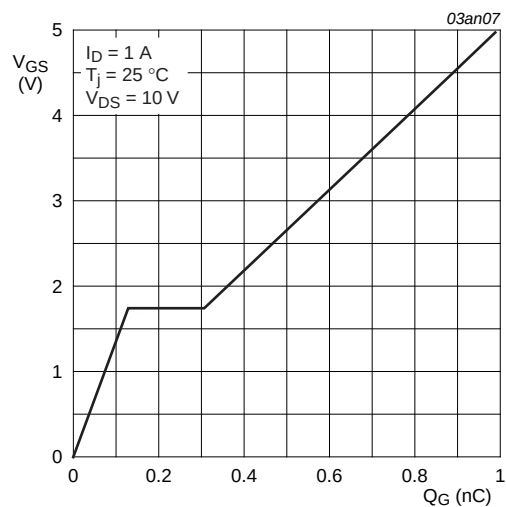


Fig 15. Gate-source voltage as a function of gate charge; typical values

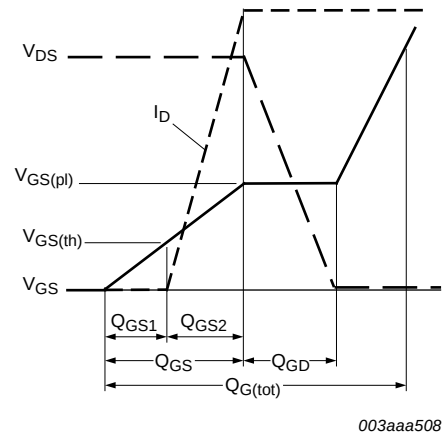
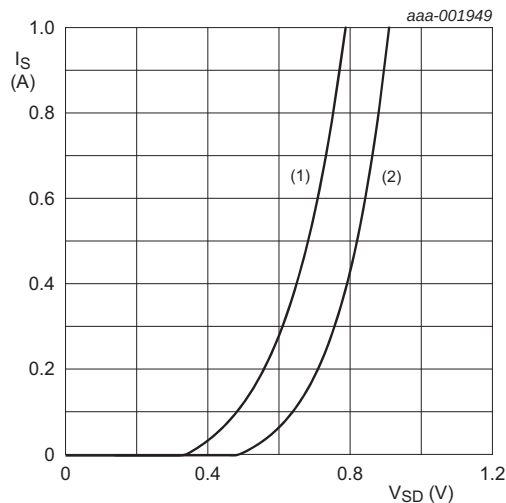


Fig 16. Gate charge waveform definitions



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

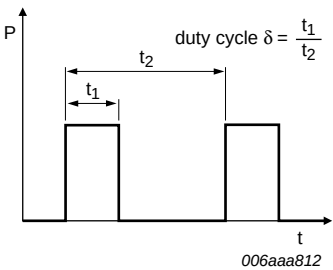


Fig 18. Duty cycle definition

9. Package outline

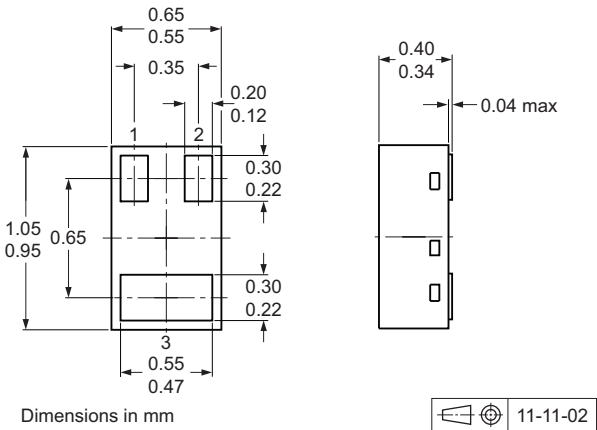
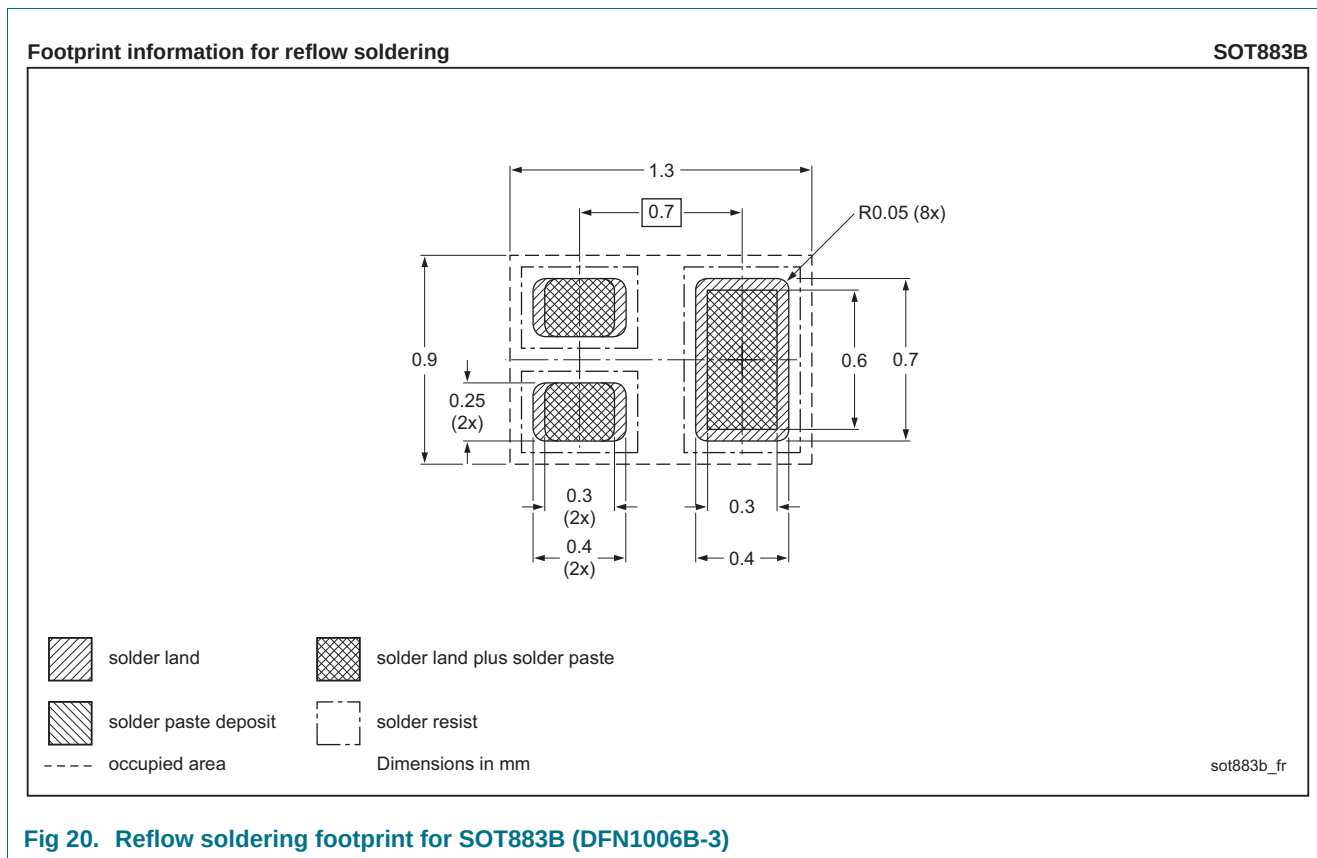


Fig 19. Package outline SOT883B (DFN1006B-3)

10. Soldering



11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMZB290UN v.1	20120511	Product data sheet	-	-

12. Legal information

12.1 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.
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