

PMZB380XN

30 V, single N-channel Trench MOSFET

1 August 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 of 0.37mm 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	$T_j = 25\text{ }^\circ\text{C}$	-	-	30	V
V_{GS}	gate-source voltage		-12	-	12	V
I_D	drain current	$V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$	[1]	-	930	mA
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = 4.5\text{ V}; I_D = 200\text{ mA}; T_j = 25\text{ }^\circ\text{C}$	-	0.38	0.46	Ω

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

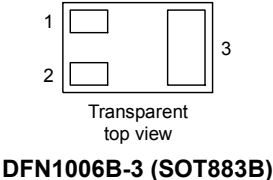
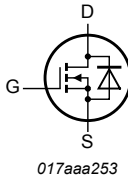


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2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	S	source		
3	D	drain		

3. Ordering information

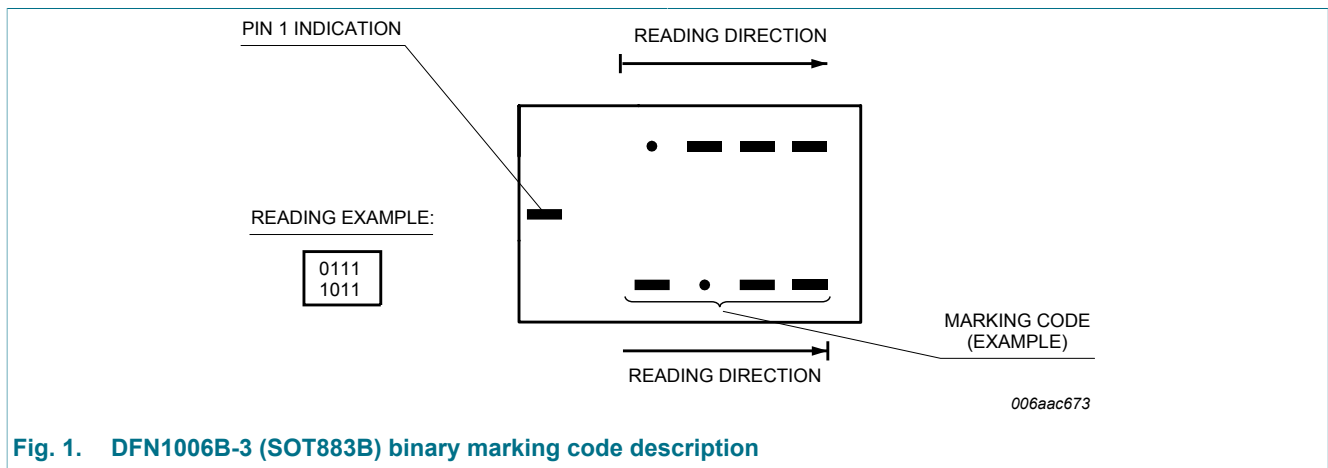
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMZB380XN	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
PMZB380XN	0000 1001



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 °C		-	30	V
V _{GS}	gate-source voltage			-12	12	V
I _D	drain current	V _{GS} = 4.5 V; T _{amb} = 25 °C	[1]	-	930	mA
		V _{GS} = 4.5 V; T _{amb} = 100 °C	[1]	-	590	mA
I _{DM}	peak drain current	T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs		-	3.7	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]	-	670	mA

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

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

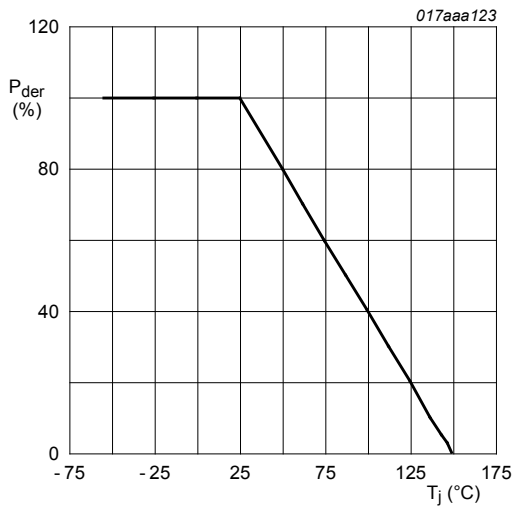


Fig. 2. Normalized total power dissipation as a function of junction temperature

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

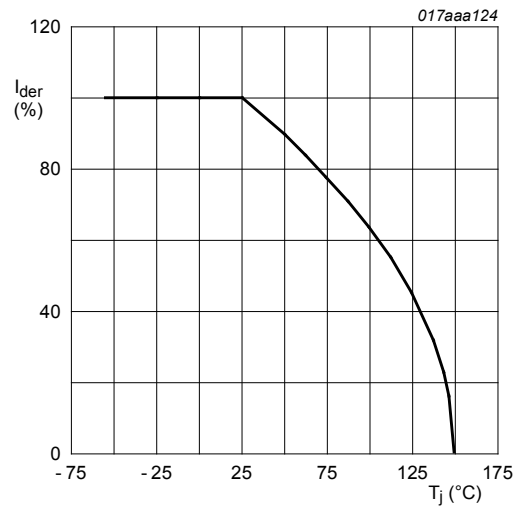
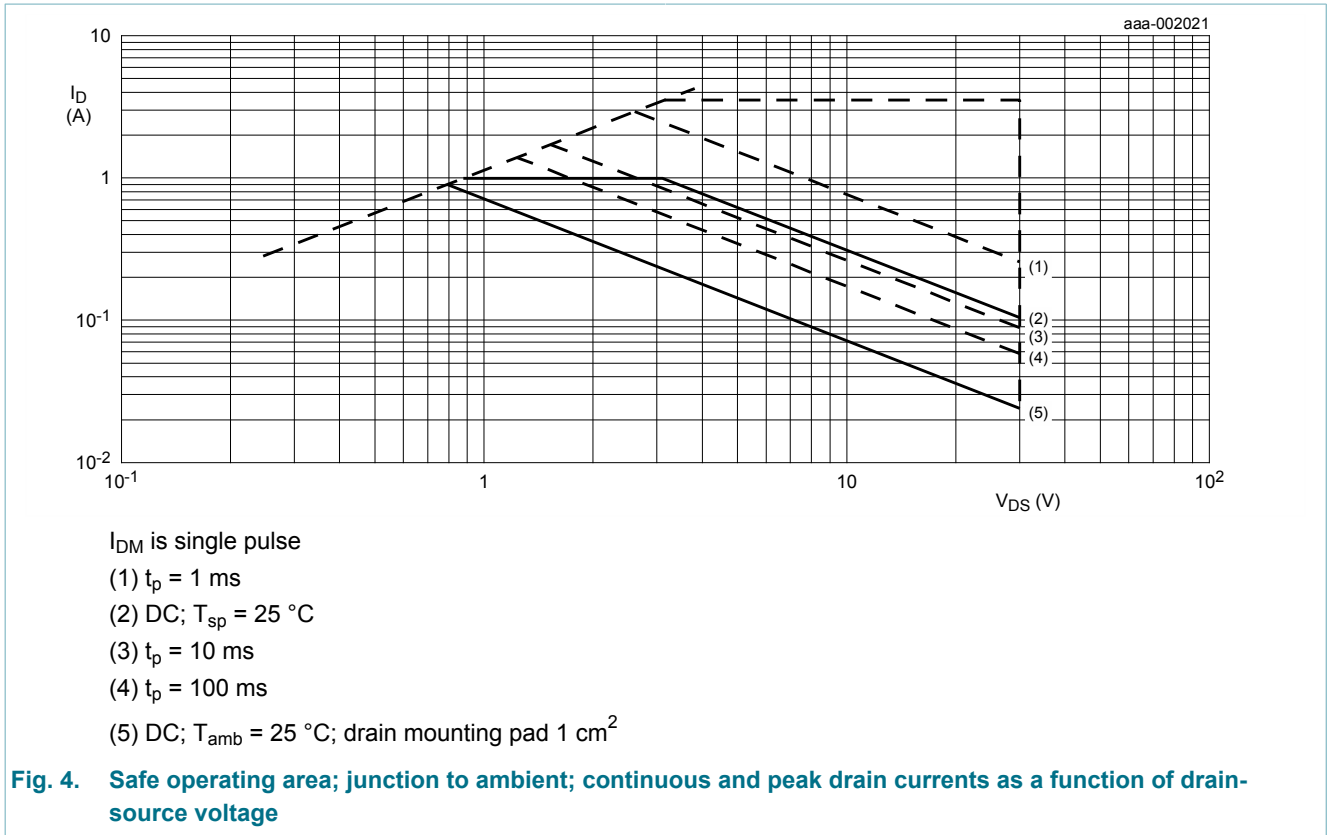


Fig. 3. Normalized continuous drain current as a function of junction temperature

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



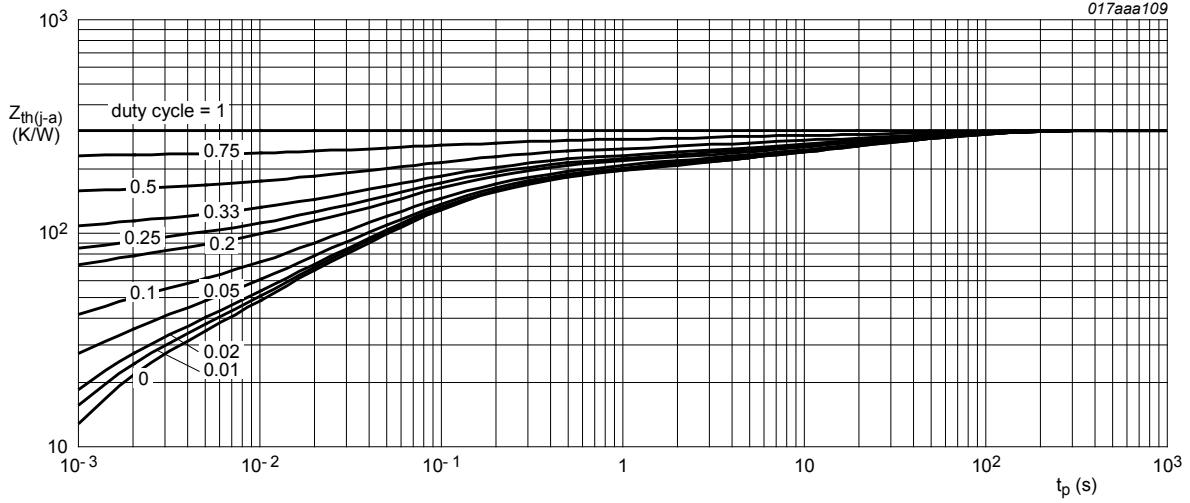
6. Thermal characteristics

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

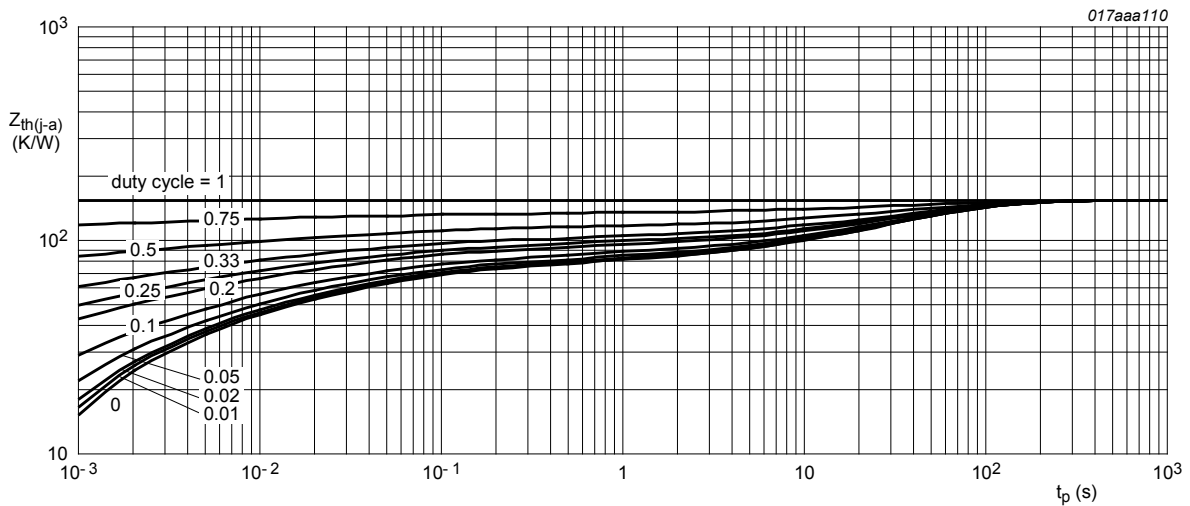
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm^2 .



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

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 10 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	30	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = 250 \mu A; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ C$	0.5	1	1.5	V
I_{DSS}	drain leakage current	$V_{DS} = 30 V; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$	-	-	1	μA
		$V_{DS} = 30 V; V_{GS} = 0 V; T_j = 150 \text{ }^\circ C$	-	-	100	μA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{GSS}	gate leakage current	V _{GS} = 12 V; V _{DS} = 0 V; T _j = 25 °C	-	-	0.1	μA
		V _{GS} = -12 V; V _{DS} = 0 V; T _j = 25 °C	-	-	0.1	μA
R _{DS(on)}	drain-source on-state resistance	V _{GS} = 4.5 V; I _D = 200 mA; T _j = 25 °C	-	0.38	0.46	Ω
		V _{GS} = 4.5 V; I _D = 200 mA; T _j = 150 °C	-	0.57	0.7	Ω
		V _{GS} = 2.5 V; I _D = 100 mA; T _j = 25 °C	-	0.55	0.68	mΩ
g _{fs}	forward transconductance	V _{DS} = 5 V; I _D = 200 mA; T _j = 25 °C	-	1300	-	mS
Dynamic characteristics						
Q _{G(tot)}	total gate charge	V _{DS} = 15 V; I _D = 1 A; V _{GS} = 4.5 V; T _j = 25 °C	-	0.65	0.87	nC
Q _{GS}	gate-source charge		-	0.14	-	nC
Q _{GD}	gate-drain charge		-	0.18	-	nC
C _{iss}	input capacitance	V _{DS} = 25 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C	-	37	56	pF
C _{oss}	output capacitance		-	8.6	-	pF
C _{rss}	reverse transfer capacitance		-	5.4	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = 15 V; R _L = 15 Ω; V _{GS} = 4.5 V; R _{G(ext)} = 6 Ω; T _j = 25 °C	-	6.5	13	ns
t _r	rise time		-	9.5	-	ns
t _{d(off)}	turn-off delay time		-	14	28	ns
t _f	fall time		-	5.5	-	ns
Source-drain diode						
V _{SD}	source-drain voltage	I _S = 300 mA; V _{GS} = 0 V; T _j = 25 °C	-	0.78	1.2	V

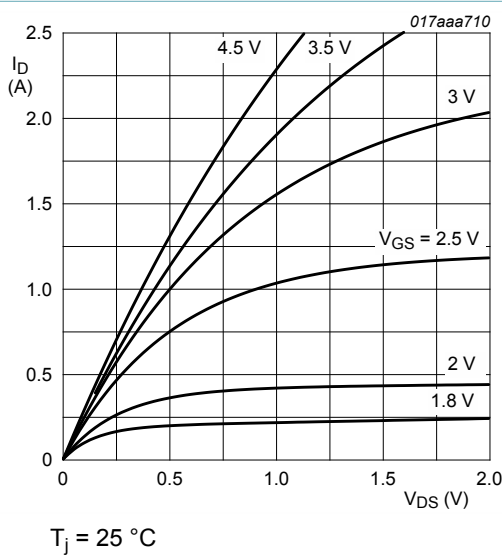


Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values

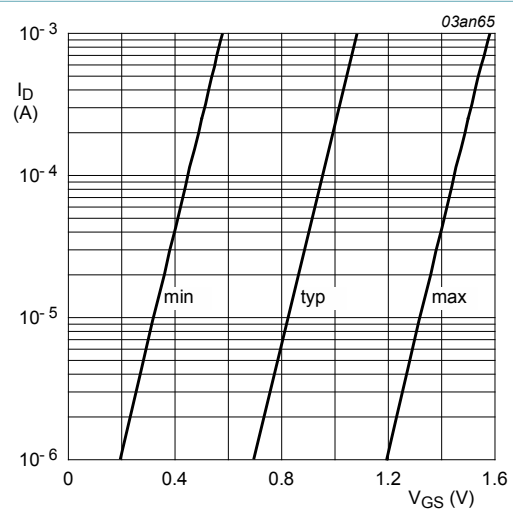


Fig. 8. Subthreshold drain current as a function of gate-source voltage

T_j = 25 °C; V_{DS} = 5 V

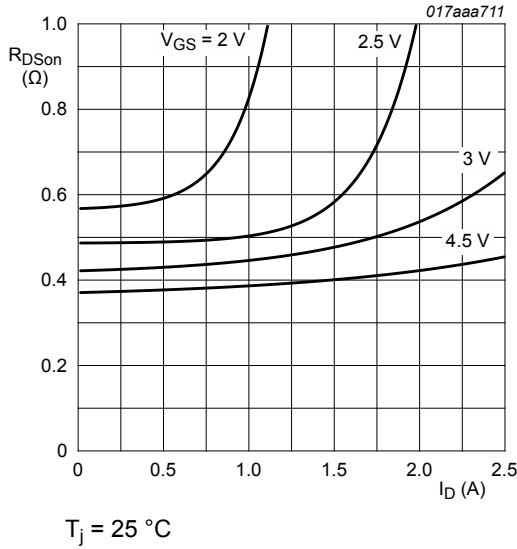


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

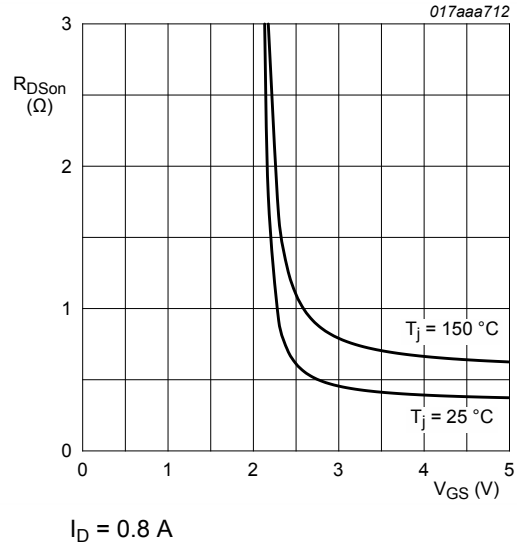


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

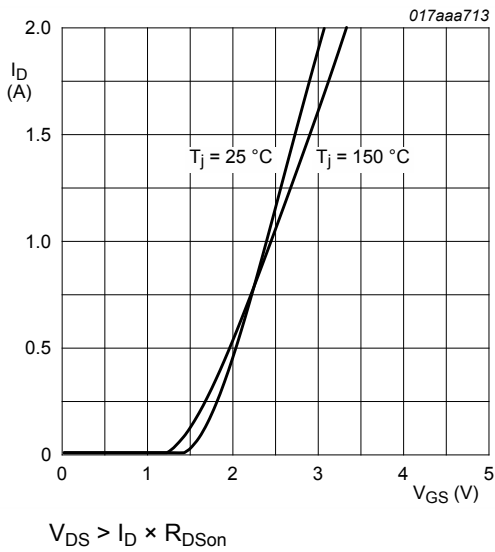


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

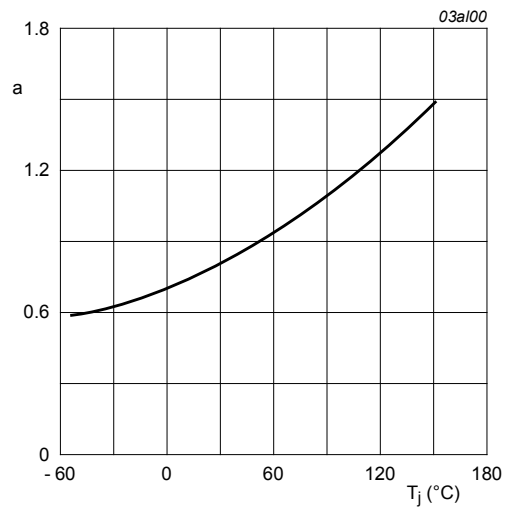
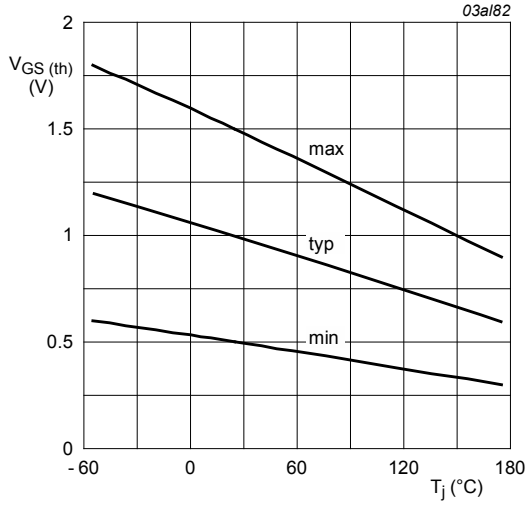


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

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



$I_D = 1 \text{ mA}; V_{DS} = V_{GS}$

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

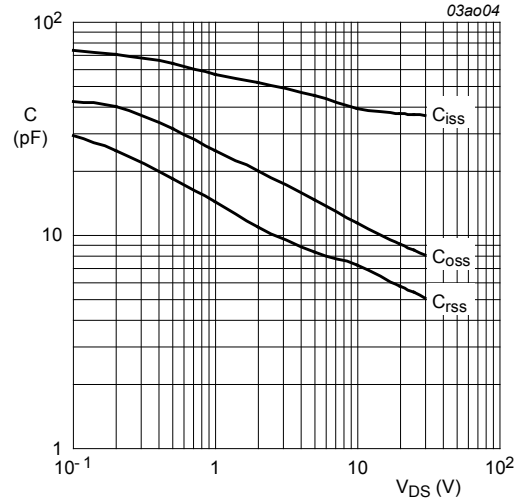


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

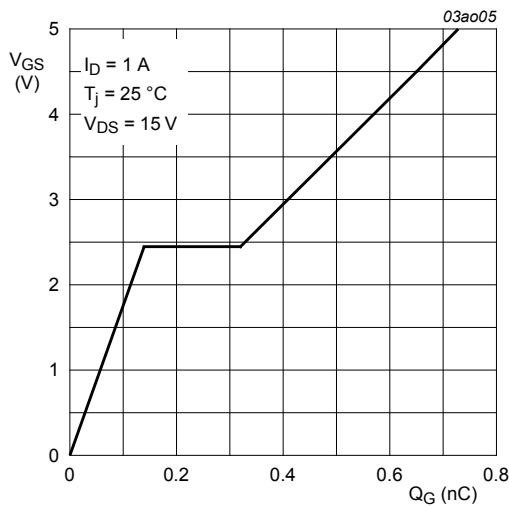


Fig. 15. Gate-source voltage as a function of gate charge; typical values

$I_D = 1 \text{ A}; V_{DS} = 15 \text{ V}$

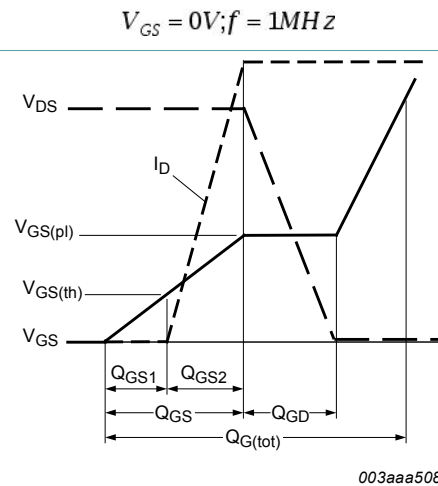
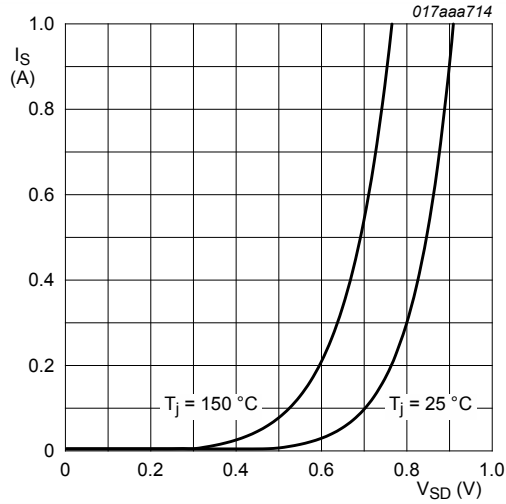


Fig. 16. MOSFET transistor: Gate charge waveform definitions



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

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

8. Test information

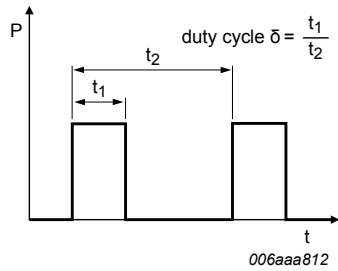


Fig. 18. Duty cycle definition

9. Package outline

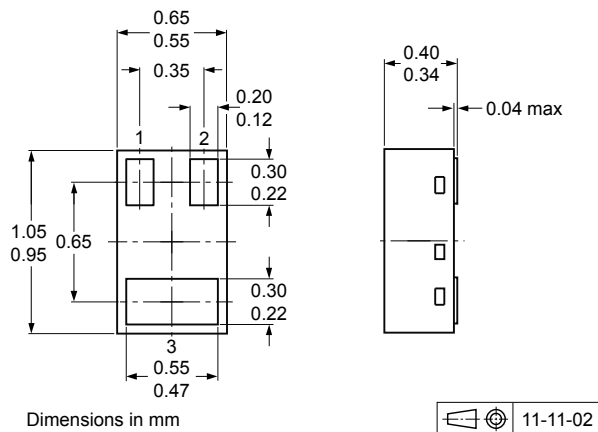


Fig. 19. DFN1006B-3 (SOT883B)

10. Soldering

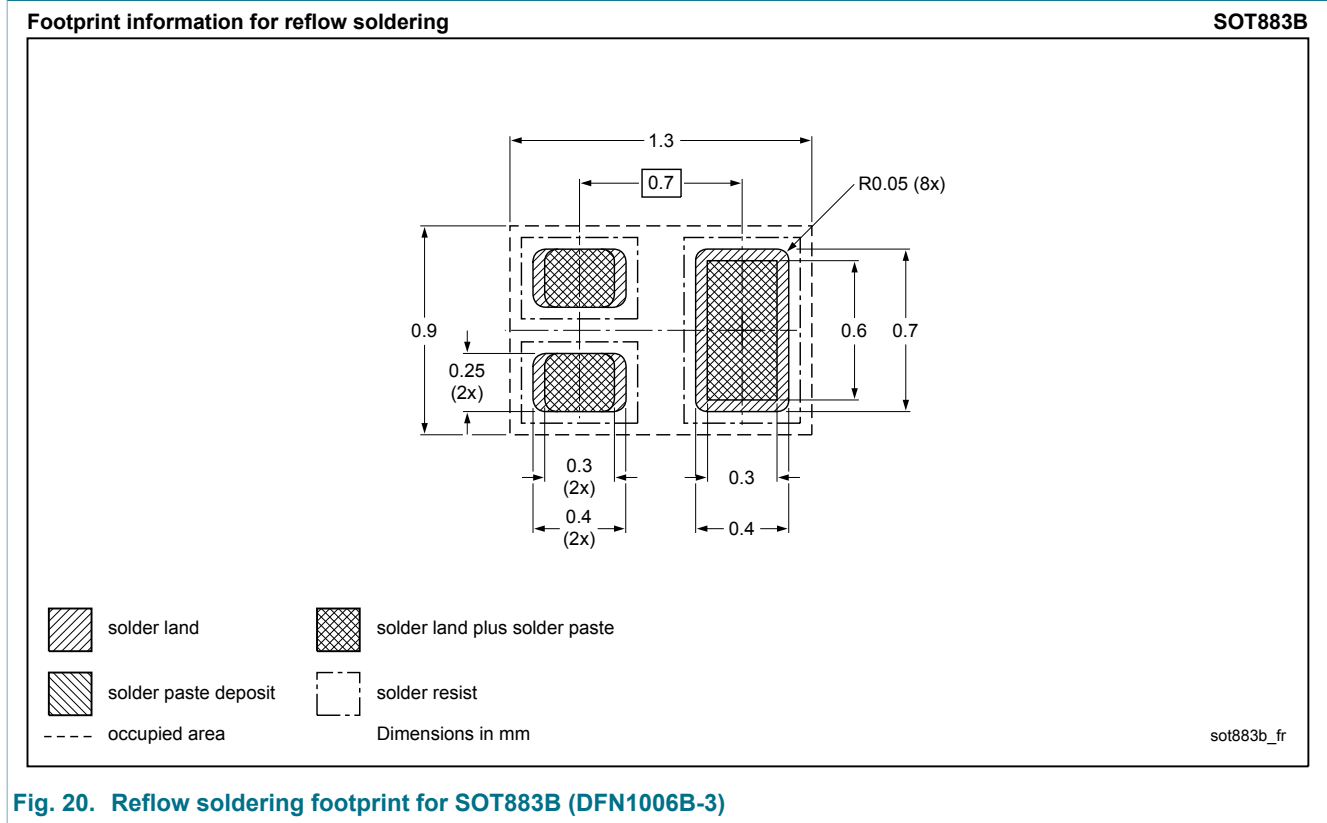


Fig. 20. Reflow soldering footprint for SOT883B (DFN1006B-3)

11. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMZB380XN v.1	20120801	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.
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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