

PMZB350UPE

20 V, single P-channel Trench MOSFET

1 August 2012

Product data sheet

1. Product profile

1.1 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.

1.2 Features and benefits

- Low threshold voltage
- Very fast switching
- Trench MOSFET technology
- 1.8 kV ESD protected

1.3 Applications

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

1.4 Quick reference data

Table 1. Quick reference data

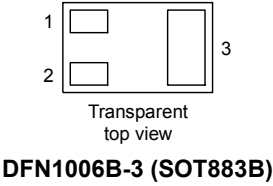
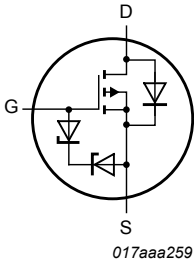
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j = 25\text{ }^\circ\text{C}$	-	-	-20	V
V_{GS}	gate-source voltage		-8	-	8	V
I_D	drain current	$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}; t \leq 5\text{ s}$	[1]	-	-1.4	A
Static characteristics						
R_{DSon}	drain-source on-state resistance	$V_{GS} = -4.5\text{ V}; I_D = -0.3\text{ A}; T_j = 25\text{ }^\circ\text{C}$	-	330	450	m Ω

[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	 <p>Transparent top view DFN1006B-3 (SOT883B)</p>	 <p>017aaa259</p>
2	S	source		
3	D	drain		

3. Ordering information

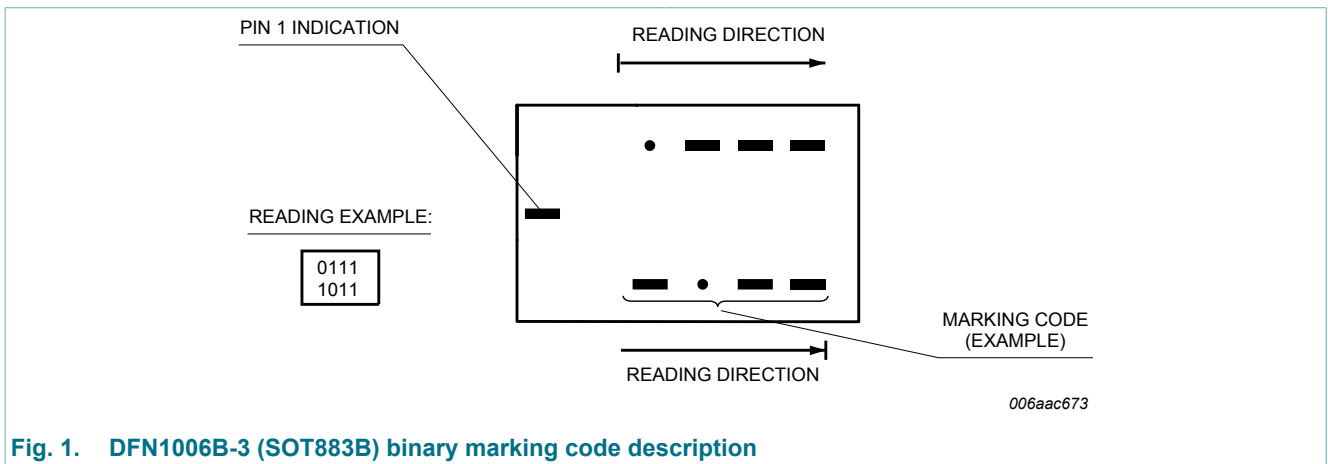
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMZB350UPE	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
PMZB350UPE	0100 1100



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	$T_j = 25\text{ °C}$		-	-20	V
V_{GS}	gate-source voltage			-8	8	V
I_D	drain current	$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}; t \leq 5\text{ s}$	[1]	-	-1.4	A
		$V_{GS} = -4.5\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	-1	A
		$V_{GS} = -4.5\text{ V}; T_{amb} = 100\text{ °C}$	[1]	-	-0.7	A
I_{DM}	peak drain current	$T_{amb} = 25\text{ °C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$		-	-2.8	A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$	[2]	-	360	mW
			[1]	-	715	mW
		$T_{sp} = 25\text{ °C}$		-	3125	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	$T_{amb} = 25\text{ °C}$	[1]	-	-0.8	A
ESD maximum rating						
V_{ESD}	electrostatic discharge voltage	HBM	[3]	-	1800	V

- [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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [3] Measured between all pins.



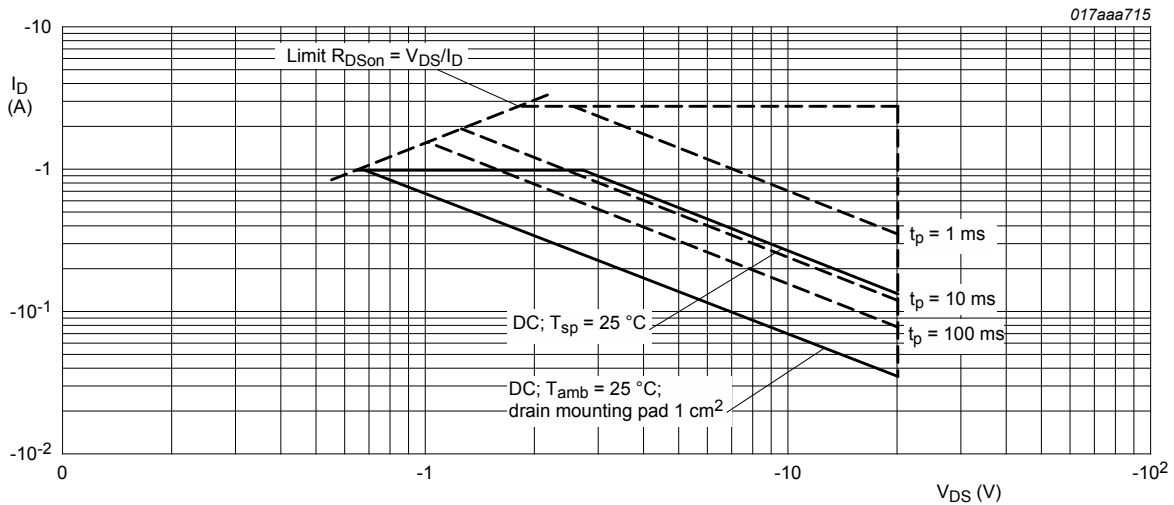
Fig. 2. Normalized total power dissipation as a function of junction temperature

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



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

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



I_{DM} = single pulse

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]	-	304	350	K/W
			[2]	-	150	175	K/W
			[3]	-	90	103	K/W

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	35	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 cm².
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm², t ≤ 5 s.

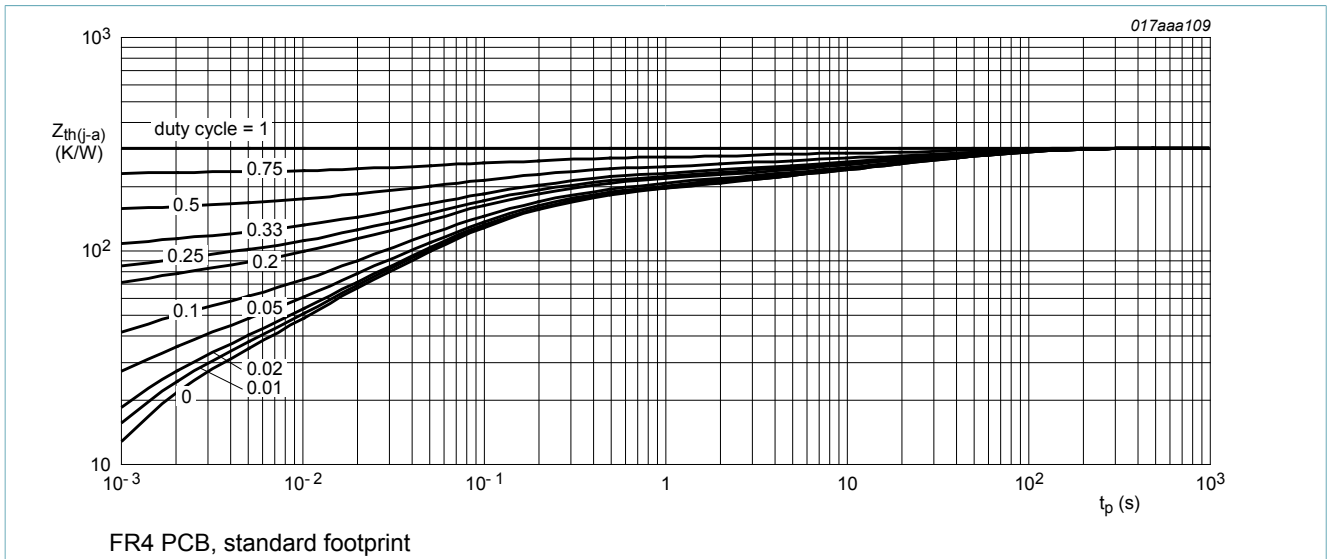


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

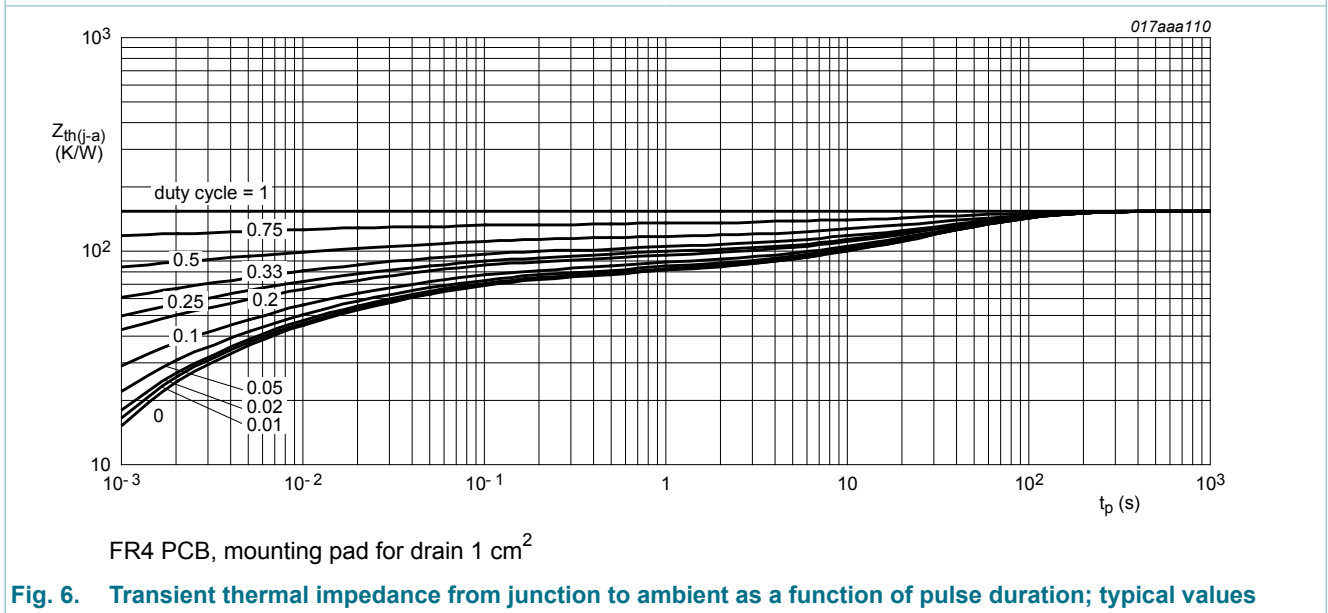


Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = -250 \mu A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-20	-	-	V
V_{GSth}	gate-source threshold voltage	$I_D = -250 \mu A$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ C$	-0.45	-0.7	-0.95	V
I_{DSS}	drain leakage current	$V_{DS} = -20 V$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	-	-1	μA
		$V_{DS} = -20 V$; $V_{GS} = 0 V$; $T_j = 150 \text{ }^\circ C$	-	-	-10	μA
I_{GSS}	gate leakage current	$V_{GS} = -8 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	-	-10	μA
		$V_{GS} = 8 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	-	10	μA
R_{DSon}	drain-source on-state resistance	$V_{GS} = -4.5 V$; $I_D = -0.3 A$; $T_j = 25 \text{ }^\circ C$	-	330	450	m Ω
		$V_{GS} = -4.5 V$; $I_D = -0.3 A$; $T_j = 150 \text{ }^\circ C$	-	478	645	m Ω
		$V_{GS} = -2.5 V$; $I_D = -0.2 A$; $T_j = 25 \text{ }^\circ C$	-	420	645	m Ω
		$V_{GS} = -1.8 V$; $I_D = -0.1 A$; $T_j = 25 \text{ }^\circ C$	-	520	940	m Ω
g_{fs}	forward transconductance	$V_{DS} = -10 V$; $I_D = -0.3 A$; $T_j = 25 \text{ }^\circ C$	-	1.4	-	S
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$V_{DS} = -10 V$; $I_D = -0.3 A$; $V_{GS} = -4.5 V$; $T_j = 25 \text{ }^\circ C$	-	1.3	1.9	nC
Q_{GS}	gate-source charge		-	0.2	-	nC
Q_{GD}	gate-drain charge		-	0.25	-	nC
C_{iss}	input capacitance	$V_{DS} = -10 V$; $f = 1 \text{ MHz}$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	127	-	pF
C_{oss}	output capacitance		-	34	-	pF
C_{rss}	reverse transfer capacitance		-	25	-	pF
$t_{d(on)}$	turn-on delay time		$V_{DS} = -10 V$; $I_D = -0.3 A$; $V_{GS} = -4.5 V$; $R_{G(ext)} = 6 \Omega$; $T_j = 25 \text{ }^\circ C$	-	4	-
t_r	rise time	-		5	-	ns
$t_{d(off)}$	turn-off delay time	-		26	-	ns
t_f	fall time	-		9	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = -0.1 A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$	-	-0.7	-1.2	V

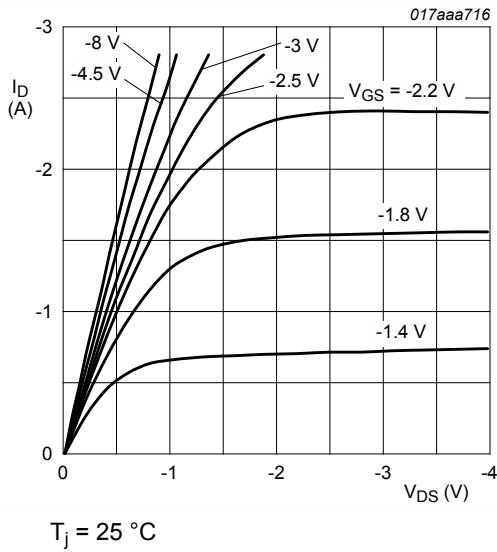


Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values

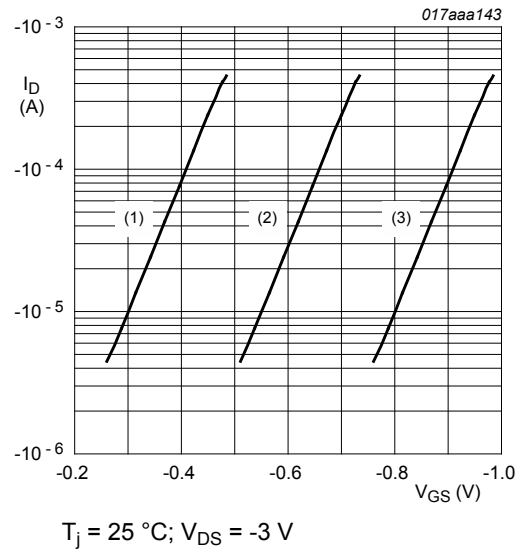


Fig. 8. Sub-threshold drain current as a function of gate-source voltage

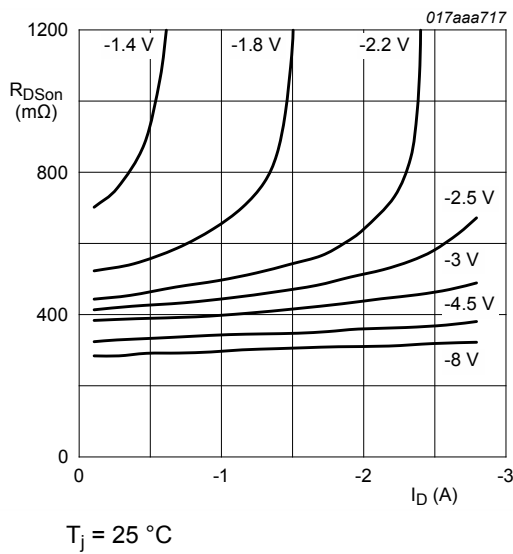


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

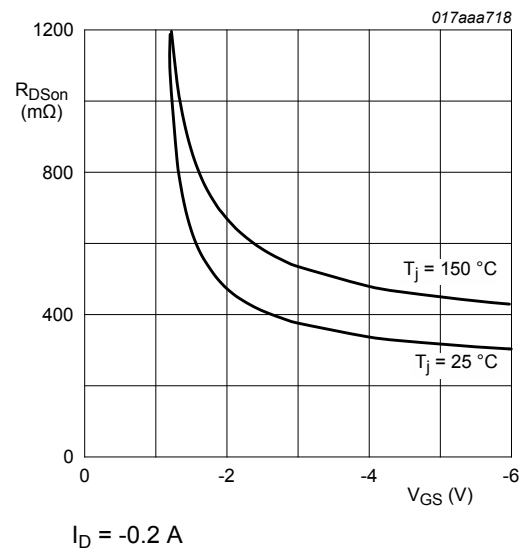
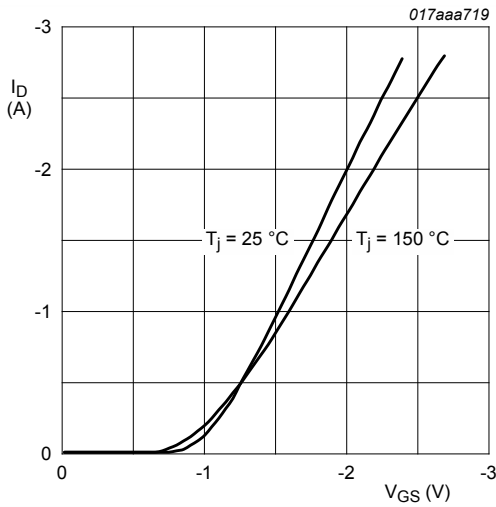


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values



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

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

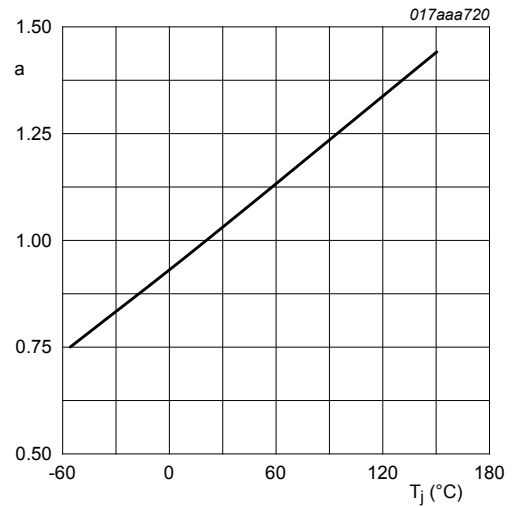
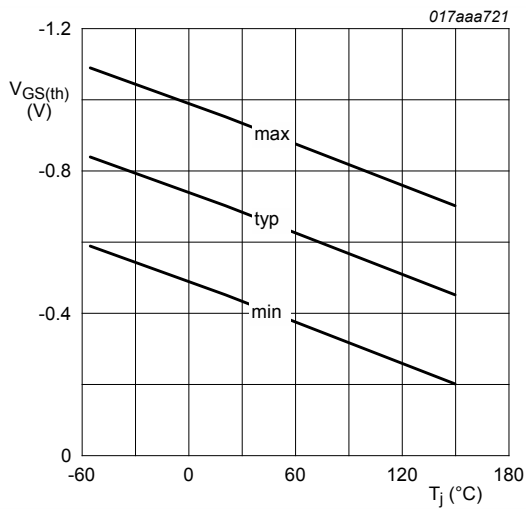


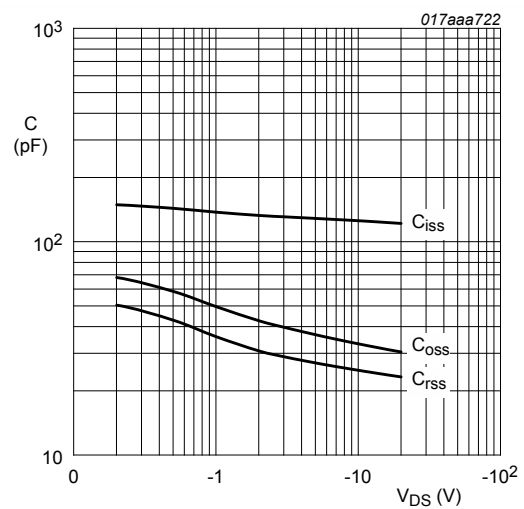
Fig. 12. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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



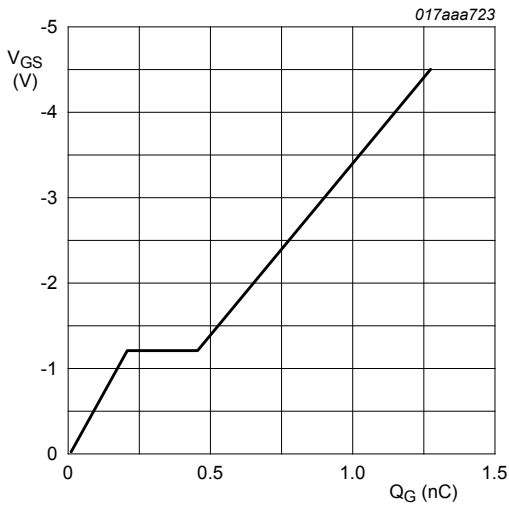
$$I_D = -0.25 \text{ mA}; V_{DS} = V_{GS}$$

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



$I_D = -0.3$ A; $V_{DS} = -10$ V; $T_{amb} = 25$ °C

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

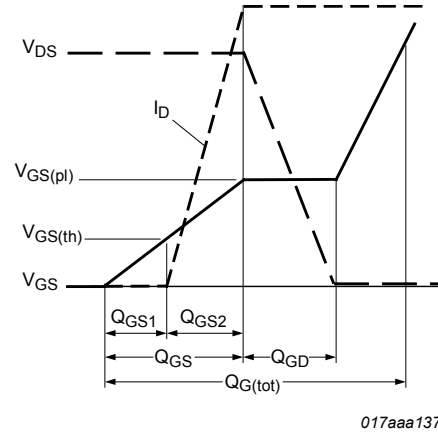
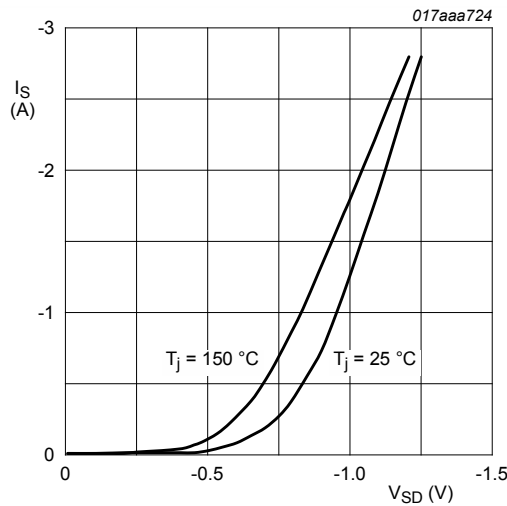


Fig. 16. Gate charge waveform definitions



$V_{GS} = 0$ V

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

8. Test information

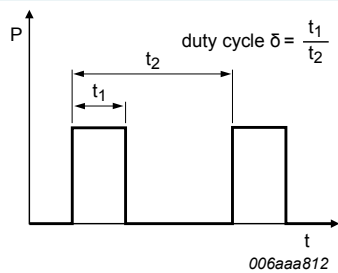


Fig. 18. Duty cycle definition

9. Package outline

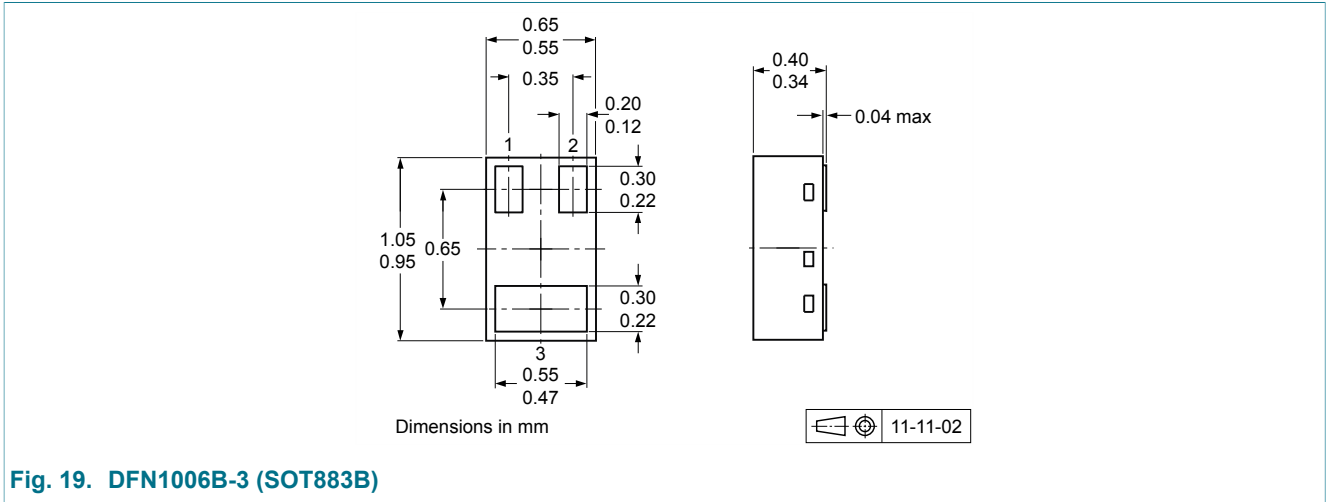


Fig. 19. DFN1006B-3 (SOT883B)

10. Soldering

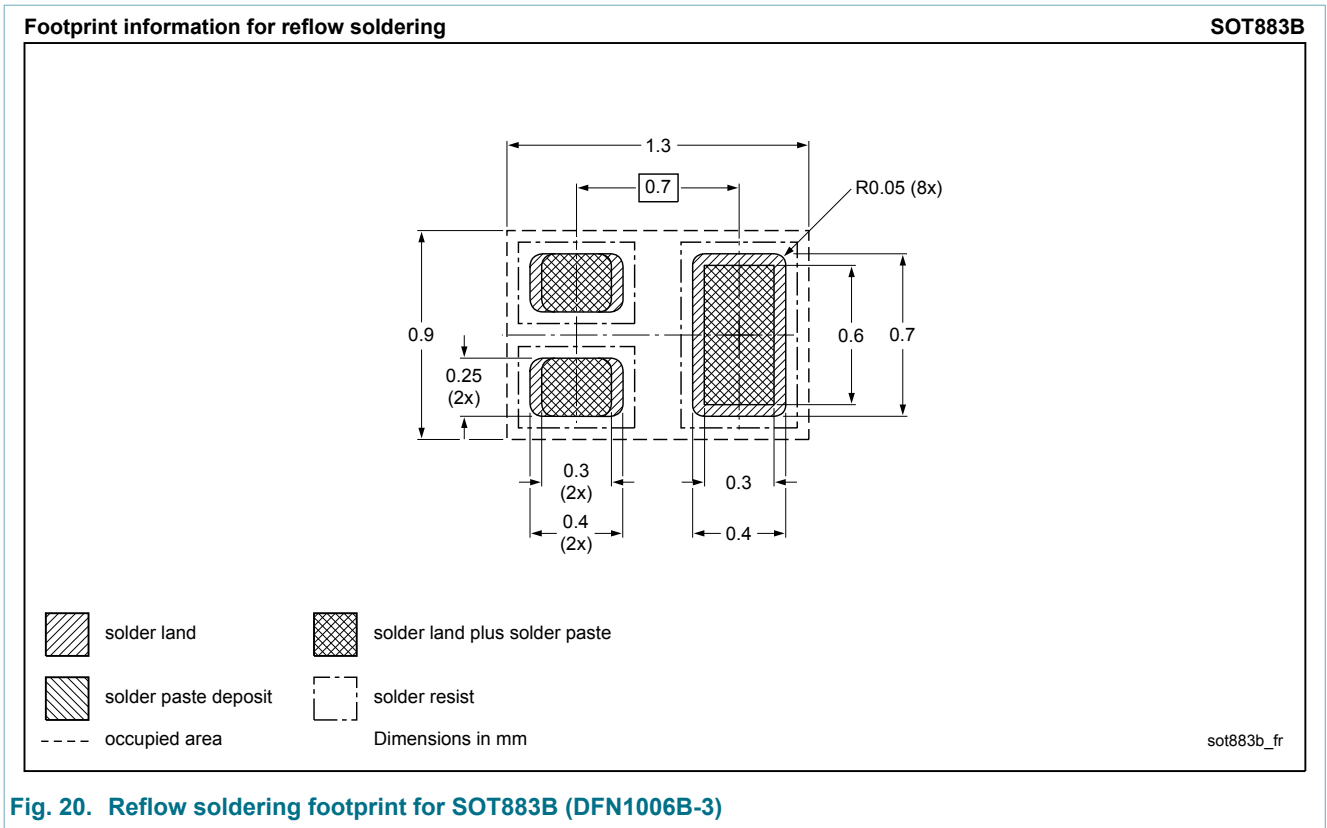


Fig. 20. Reflow soldering footprint for SOT883B (DFN1006B-3)

11. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMZB350UPE 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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13. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Marking	2
5	Limiting values	3
6	Thermal characteristics	4
7	Characteristics	6
8	Test information	9
9	Package outline	10
10	Soldering	10
11	Revision history	11
12	Legal information	12
12.1	Data sheet status	12
12.2	Definitions	12
12.3	Disclaimers	12
12.4	Trademarks	13

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