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Team Nexperia

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 °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
Static characteristics							
R _{DSon}	drain-source on-state resistance	V _{GS} = 4.5 V; I _D = 200 mA; T _j = 25 °C		-	0.38	0.46	Ω

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

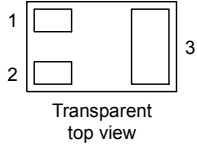
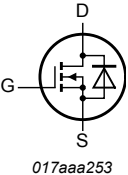


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2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 Transparent top view DFN1006B-3 (SOT883B)	 017aaa253
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

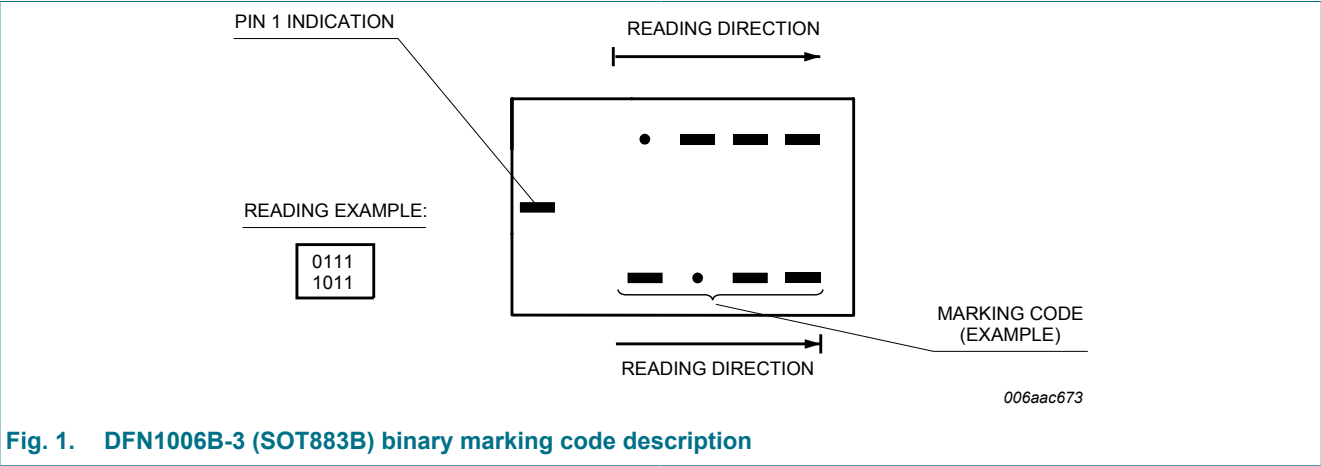


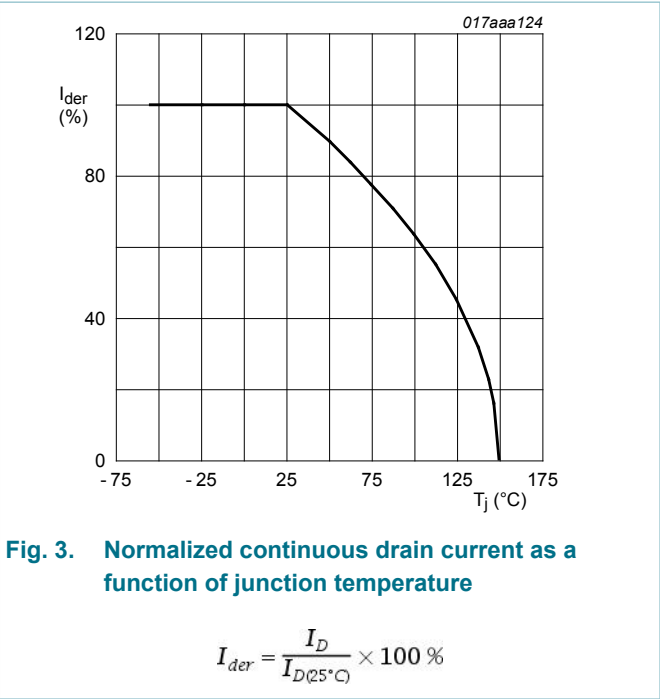
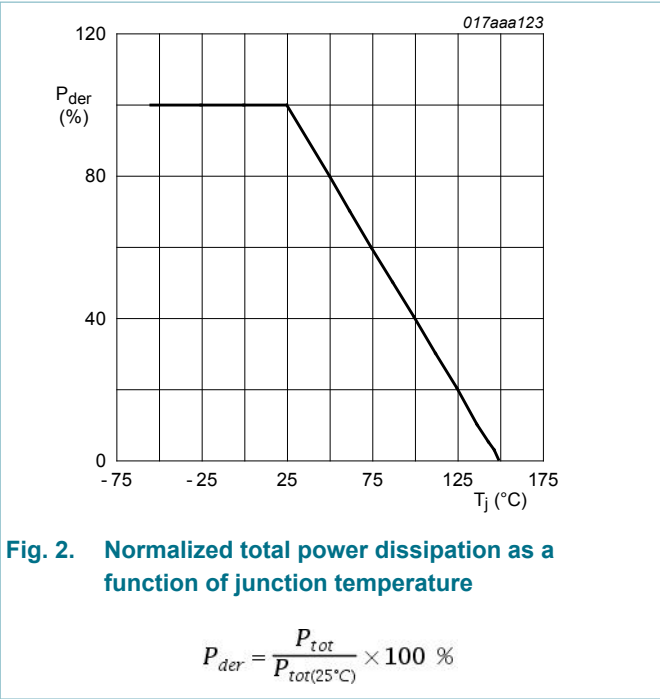
Fig. 1. DFN1006B-3 (SOT883B) binary marking code description

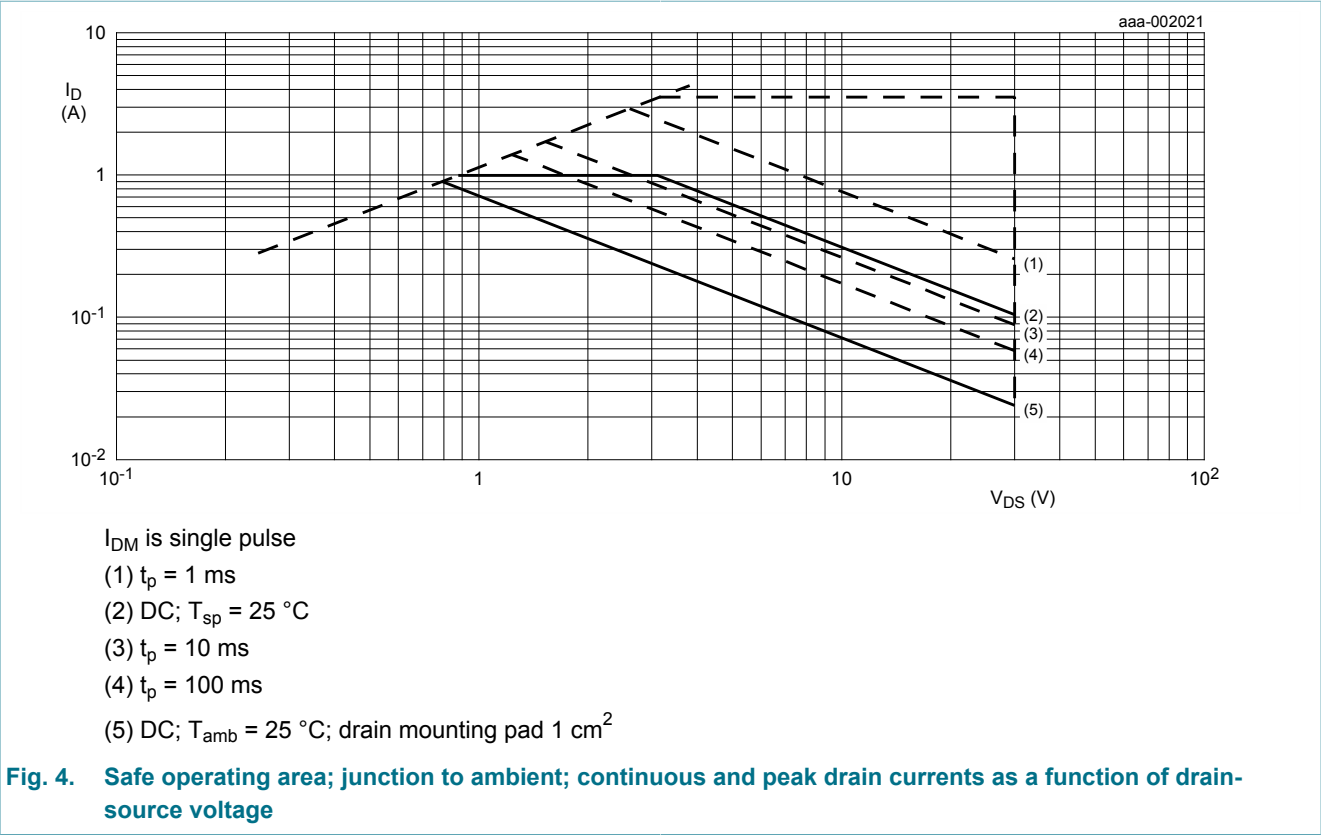
5. Limiting values

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 °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.





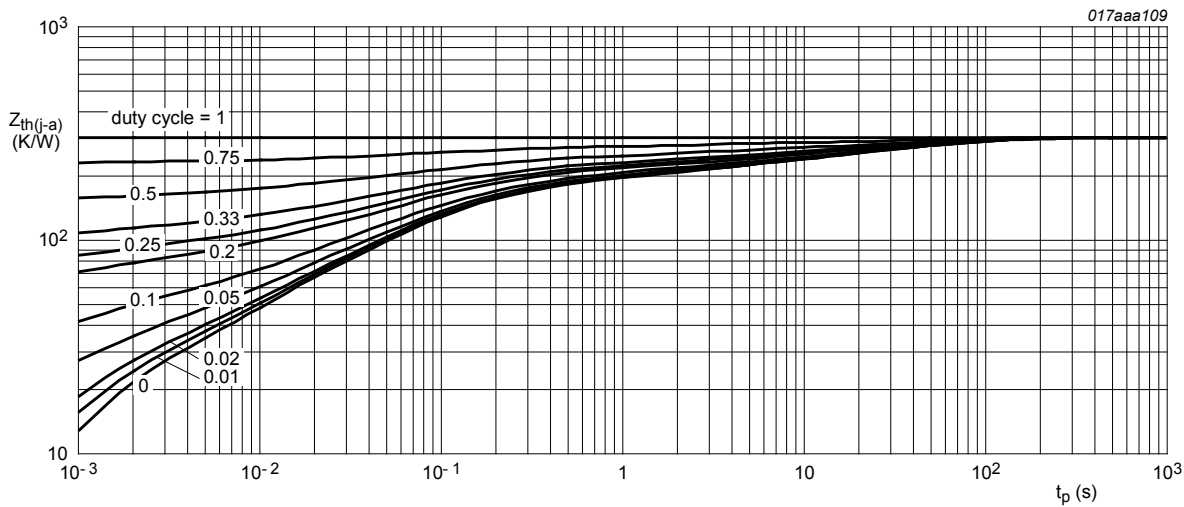
6. Thermal characteristics

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

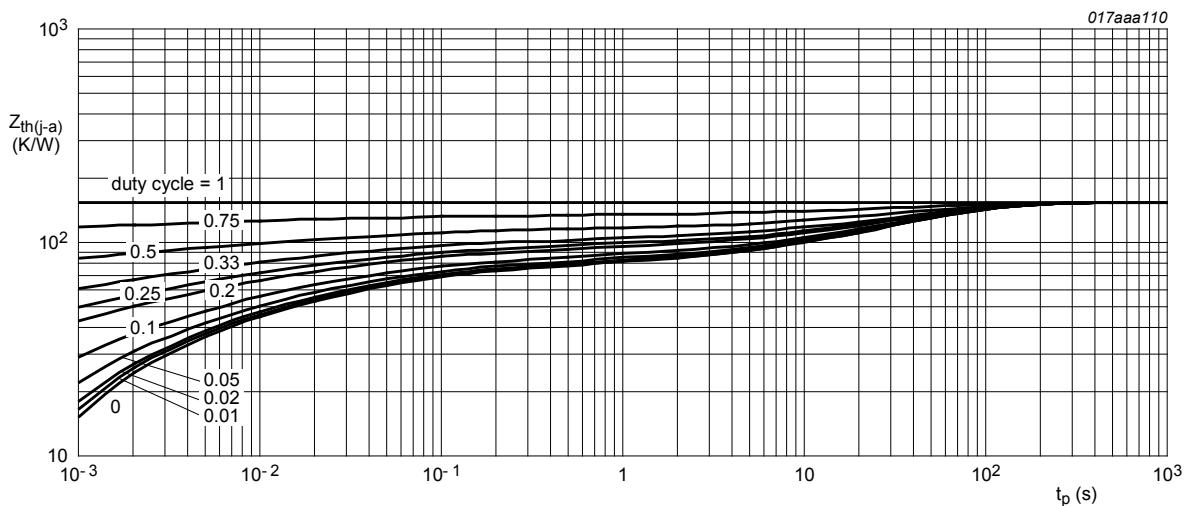
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[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

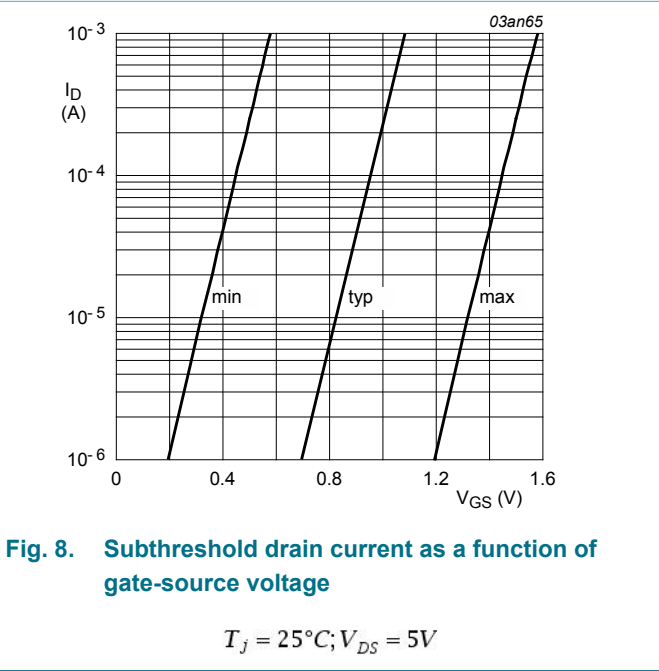
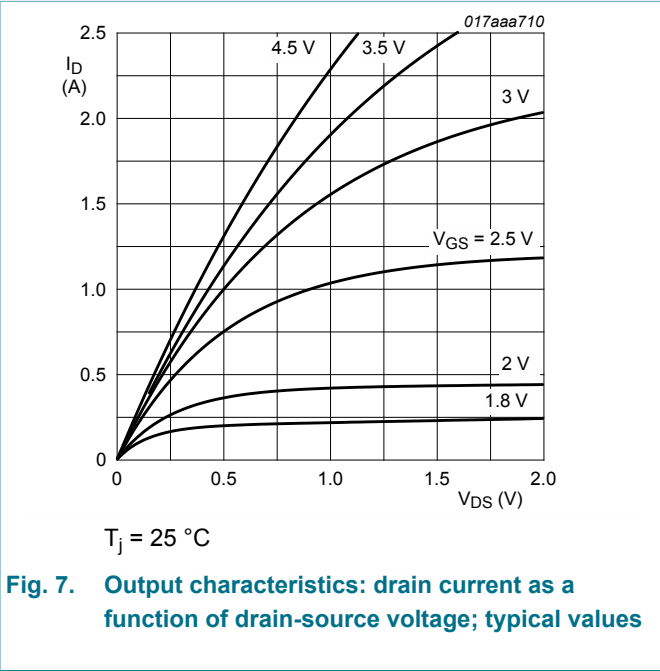
Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 7. Characteristics

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



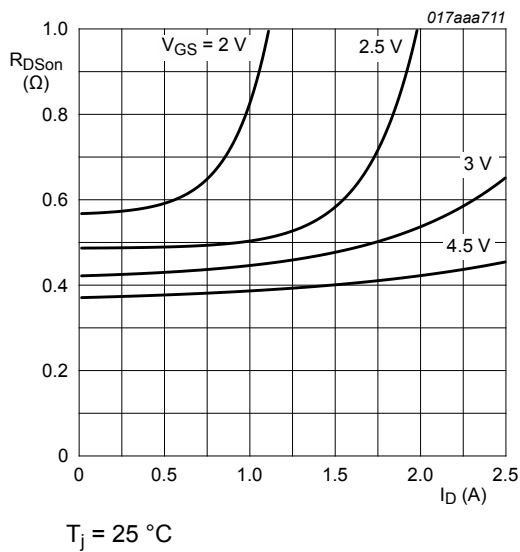


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

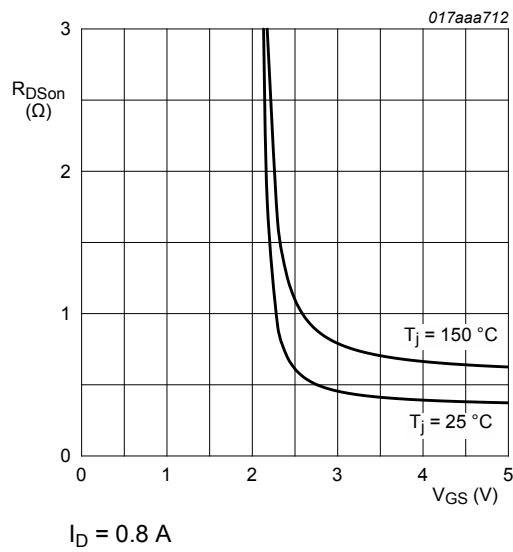


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

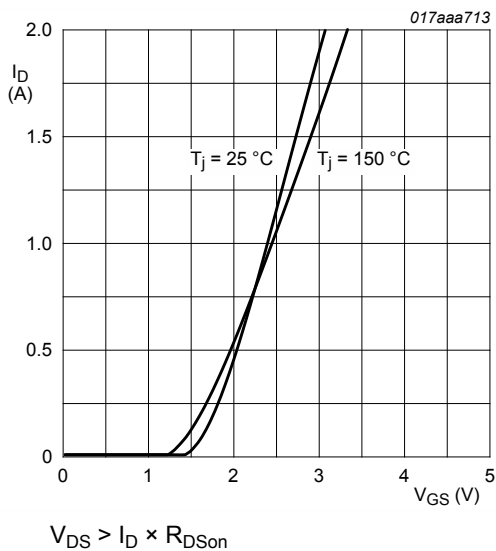


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

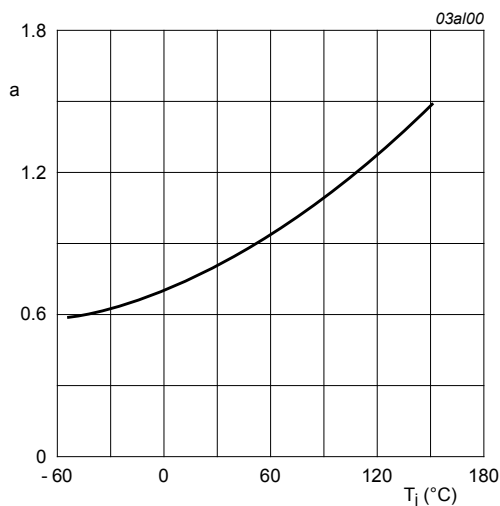


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

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

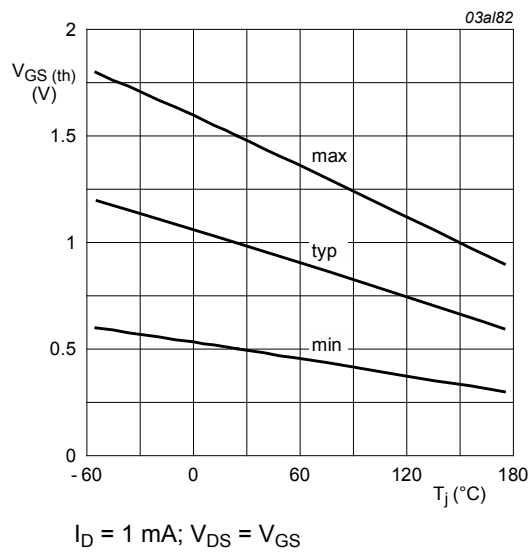


Fig. 13. Gate-source threshold voltage as a function of junction temperature

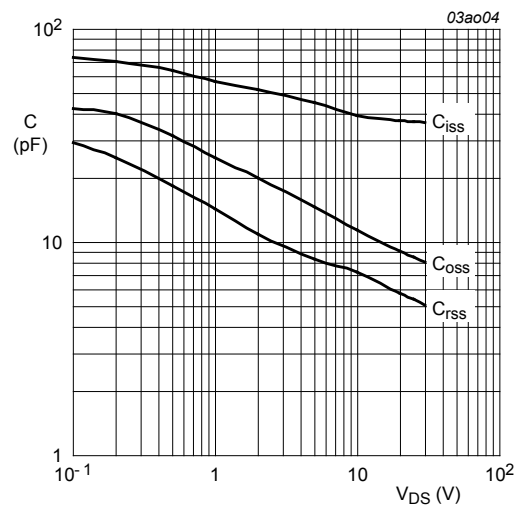


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

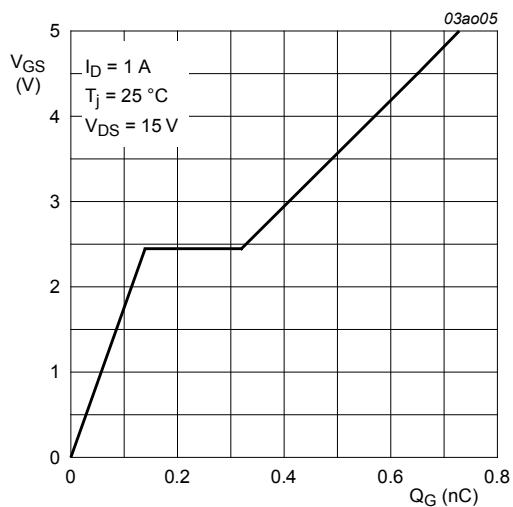


Fig. 15. Gate-source voltage as a function of gate charge; typical values

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

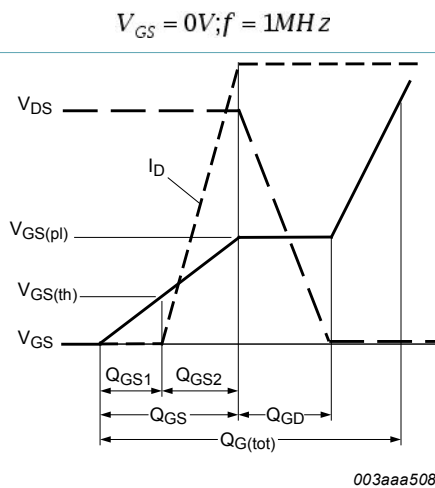
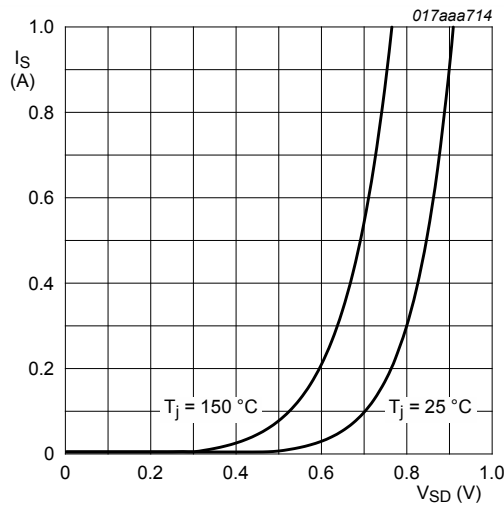


Fig. 16. MOSFET transistor: Gate charge waveform definitions



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

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

8. Test information

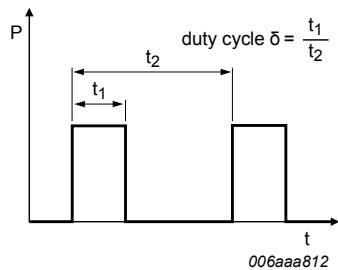


Fig. 18. Duty cycle definition

9. Package outline

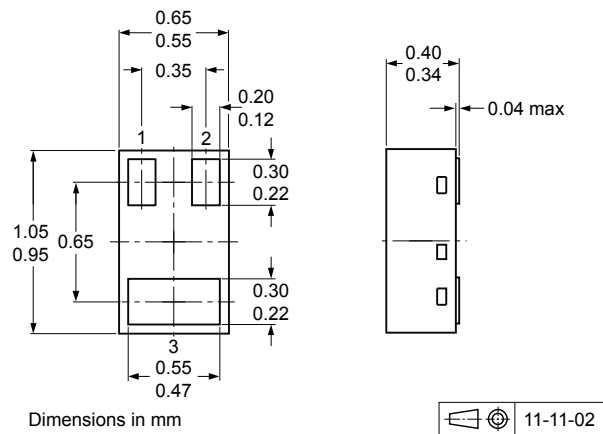


Fig. 19. DFN1006B-3 (SOT883B)

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.
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