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PMZ290UN

20 V, single N-channel Trench MOSFET

6 November 2013 Product data sheet

1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a leadless and ultra small DFN1006-3 (SOT883) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Fast switching
- Trench MOSFET technology
- Low threshold voltage
- Ultra thin package profile with 0.48 mm height

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

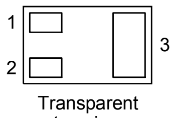
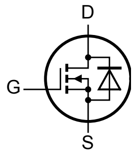
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DS}	drain-source voltage	T_j = 25 °C		-	-	20	V
V_{GS}	gate-source voltage			-8	-	8	V
I_D	drain current	V_{GS} = 4.5 V; T_{amb} = 25 °C	[1]	-	-	1	A
Static characteristics							
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 200 mA; T_j = 25 °C		-	290	350	mΩ

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

Scan or click this QR code to view the latest information for this product

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate	 **DFN1006-3 (SOT883)**	 017aaa253
2	S	source		
3	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMZ290UN	DFN1006-3	DFN1006-3: leadless ultra small plastic package; 3 solder lands	SOT883

7. Marking

Table 4. Marking codes

Type number	Marking code
PMZ290UN	ZG

8. 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		-	20	V
V_{GS}	gate-source voltage			-8	8	V
I_D	drain current	V_{GS} = 4.5 V; T_{amb} = 25 °C	[1]	-	1	A
		V_{GS} = 4.5 V; T_{amb} = 100 °C	[1]	-	0.6	A
I_{DM}	peak drain current	T_{amb} = 25 °C; single pulse; t_p ≤ 10 µs		-	4	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]	-	0.67	A

[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 PCB, single-sided copper, tin-plated and standard footprint.

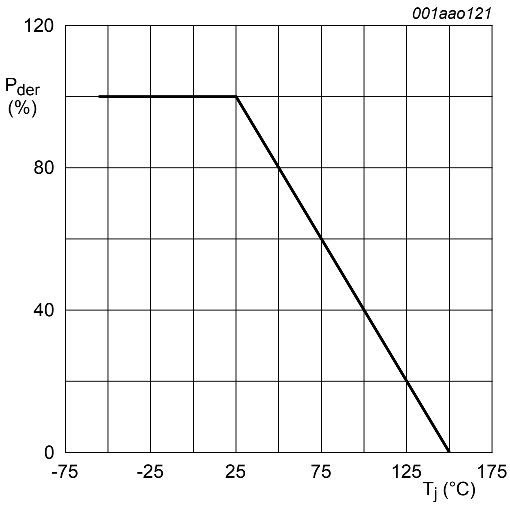


Fig. 1. Normalized total power dissipation as a function of junction temperature

$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\,\%$$

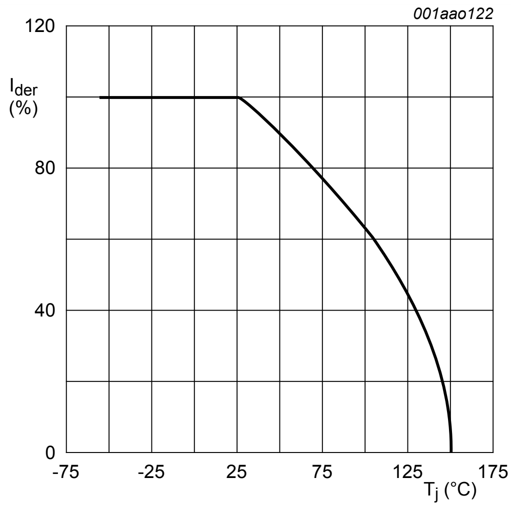
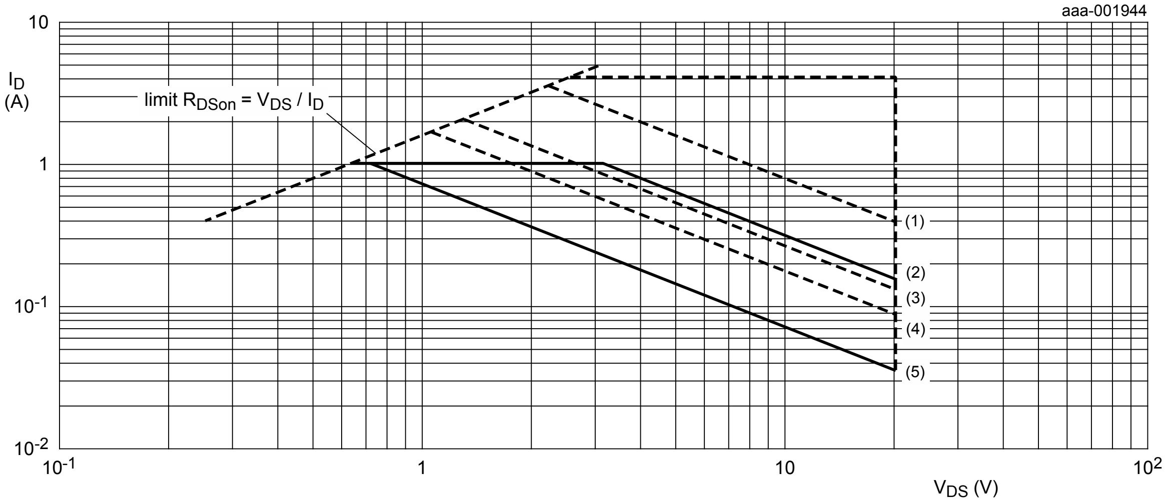


Fig. 2. Normalized continuous drain current as a function of junction temperature

$$I_{der} = \frac{I_D}{I_{D(25°C)}} \times 100\,\%$$



I_{DM} is 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^2

Fig. 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

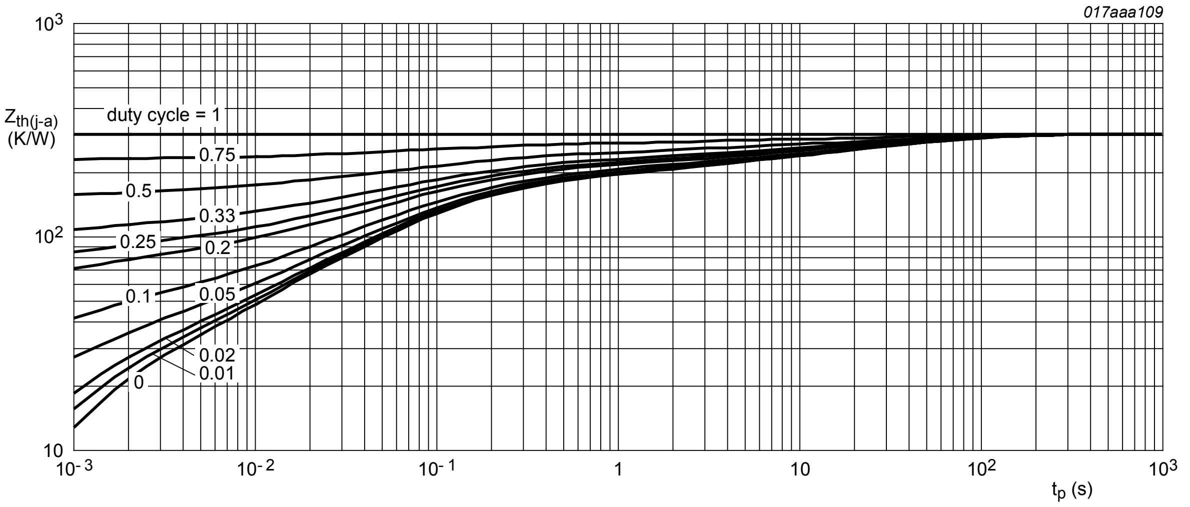
9. Thermal characteristics

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

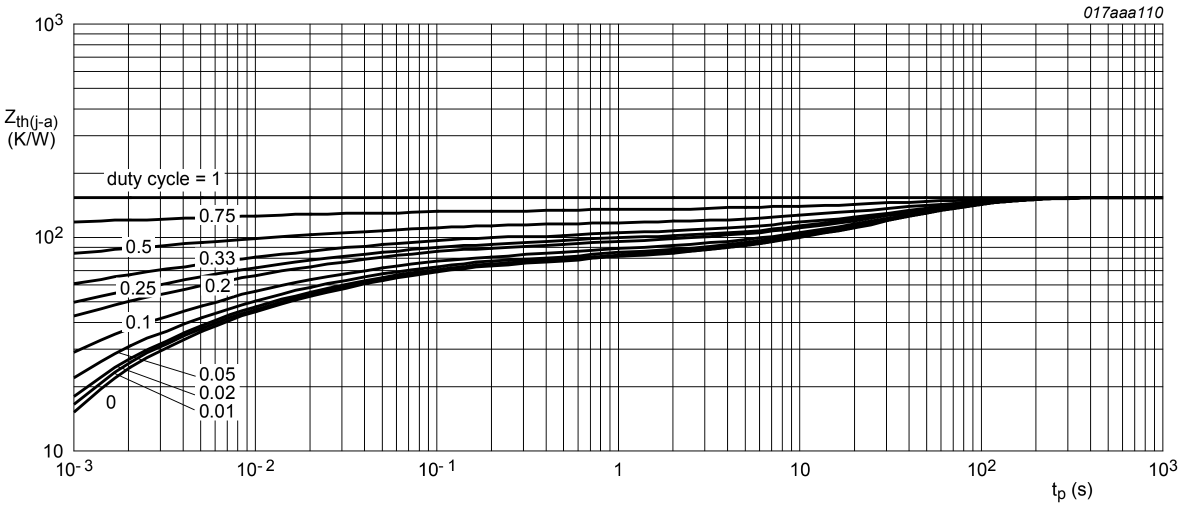
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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



FR4 PCB, standard footprint

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



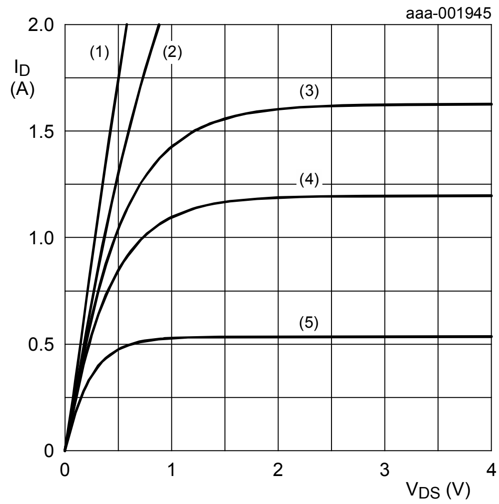
FR4 PCB, mounting pad for drain 1 cm^2

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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
$V_{(BR)DSS}$	drain-source breakdown voltage	I_D = 10 µA; V_{GS} = 0 V; T_j = 25 °C		20	-	-	V
V_{GSth}	gate-source threshold voltage	I_D = 250 µA; V_{DS} = V_{GS}; T_j = 25 °C		0.45	0.7	0.95	V
I_{DSS}	drain leakage current	V_{DS} = 20 V; V_{GS} = 0 V; T_j = 25 °C		-	-	1	µA
		V_{DS} = 20 V; V_{GS} = 0 V; T_j = 150 °C		-	-	100	µA
I_{GSS}	gate leakage current	V_{GS} = 8 V; V_{DS} = 0 V; T_j = 25 °C		-	-	0.1	µA
		V_{GS} = -8 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		-	290	350	mΩ
		V_{GS} = 4.5 V; I_D = 200 mA; T_j = 150 °C		-	460	560	mΩ
		V_{GS} = 2.5 V; I_D = 100 mA; T_j = 25 °C		-	360	450	mΩ
		V_{GS} = 1.8 V; I_D = 75 mA; T_j = 25 °C		-	460	650	mΩ
g_{fs}	forward transconductance	V_{DS} = 5 V; I_D = 200 mA; T_j = 25 °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 °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 °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 Ω; V_{GS} = 4.5 V; $R_{G(ext)}$ = 6 Ω; T_j = 25 °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 °C		-	0.75	1.2	V



T_j = 25 °C

(1) V_{GS} = 4.5 V

(2) V_{GS} = 2.5 V

(3) V_{GS} = 2.0 V

(4) V_{GS} = 1.8 V

(5) V_{GS} = 1.5 V

Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

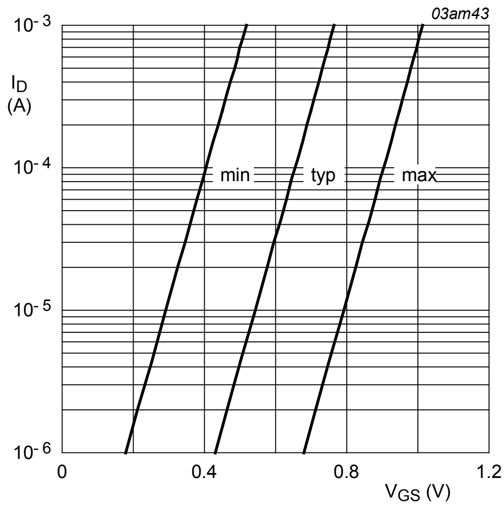
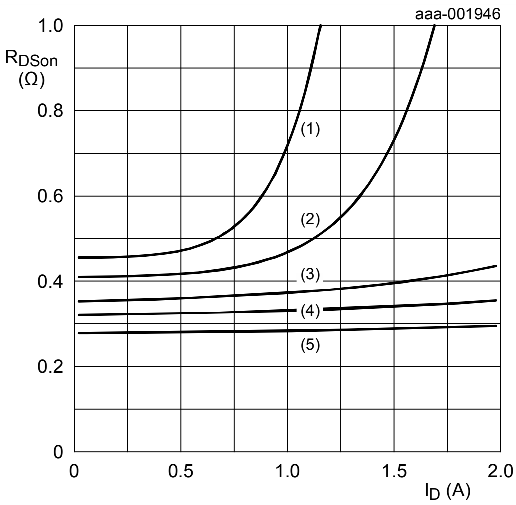


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

$T_j = 25°C; V_{DS} = 5V$



T_j = 25 °C

(1) V_{GS} = 1.8 V

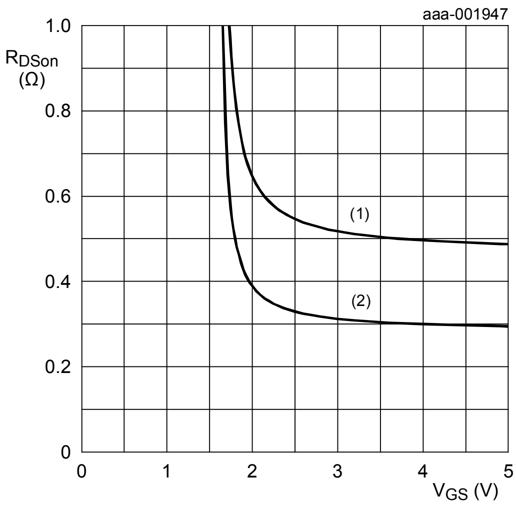
(2) V_{GS} = 2 V

(3) V_{GS} = 2.5 V

(4) V_{GS} = 3 V

(5) V_{GS} = 4.5 V

Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

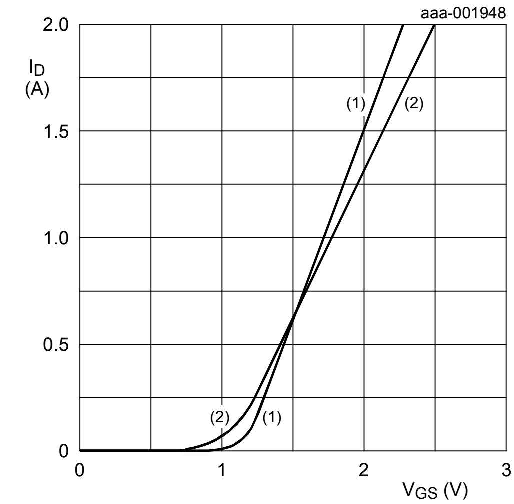


I_D = 800 mA

(1) T_j = 150 °C

(2) T_j = 25 °C

Fig. 9. 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 °C

(2) T_j = 150 °C

Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

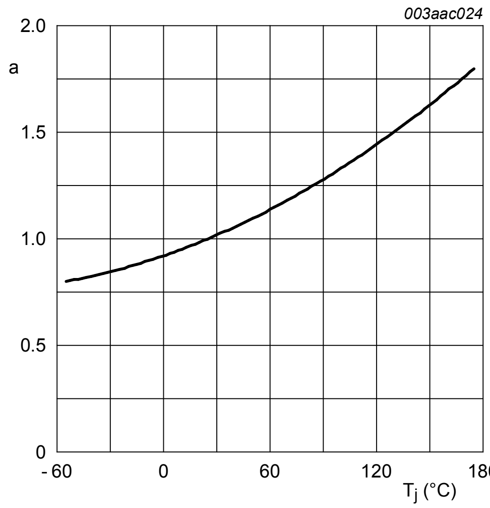
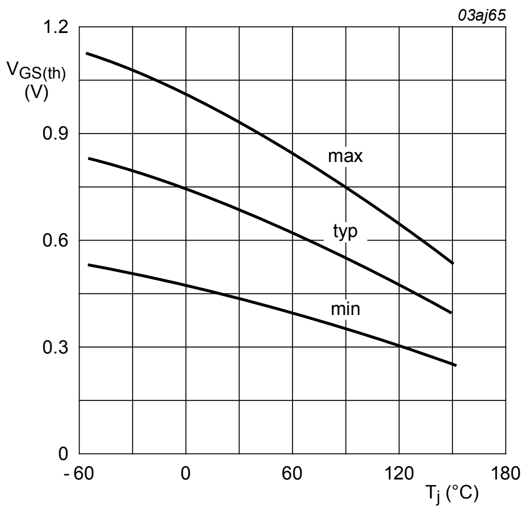


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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



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

Fig. 12. Gate-source threshold voltage as a function of junction temperature

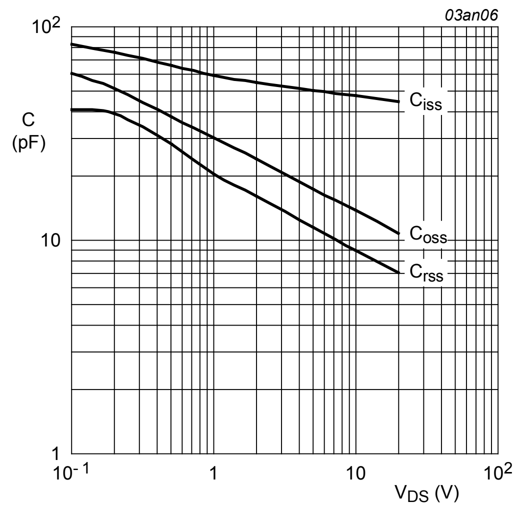


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

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

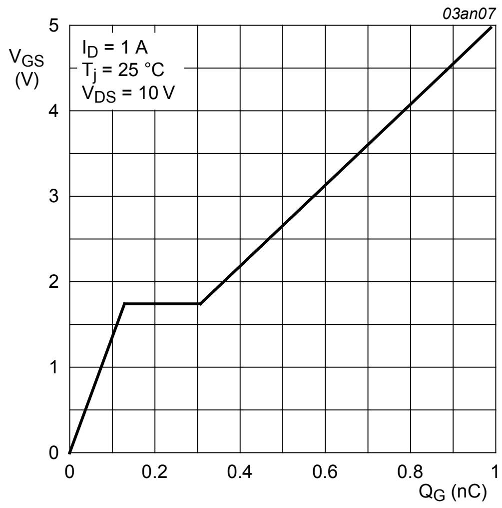


Fig. 14. Gate-source voltage as a function of gate charge; typical values

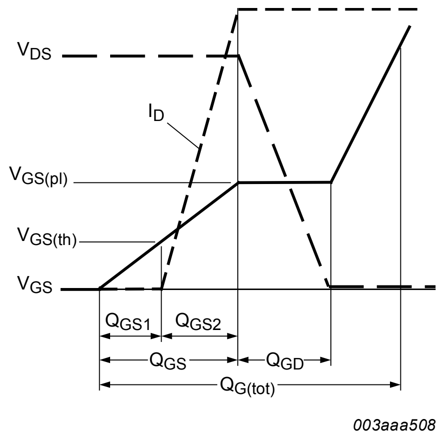
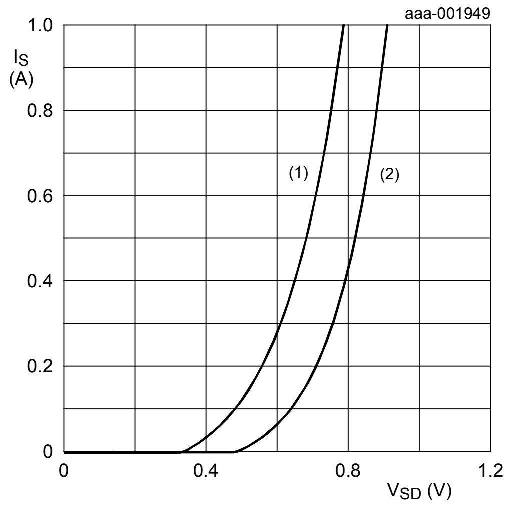


Fig. 15. Gate charge waveform definitions



V_{GS} = 0 V

(1) T_j = 150 °C

(2) T_j = 25 °C

Fig. 16. Source current as a function of source-drain voltage; typical values

11. Test information

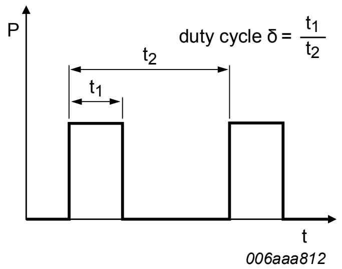
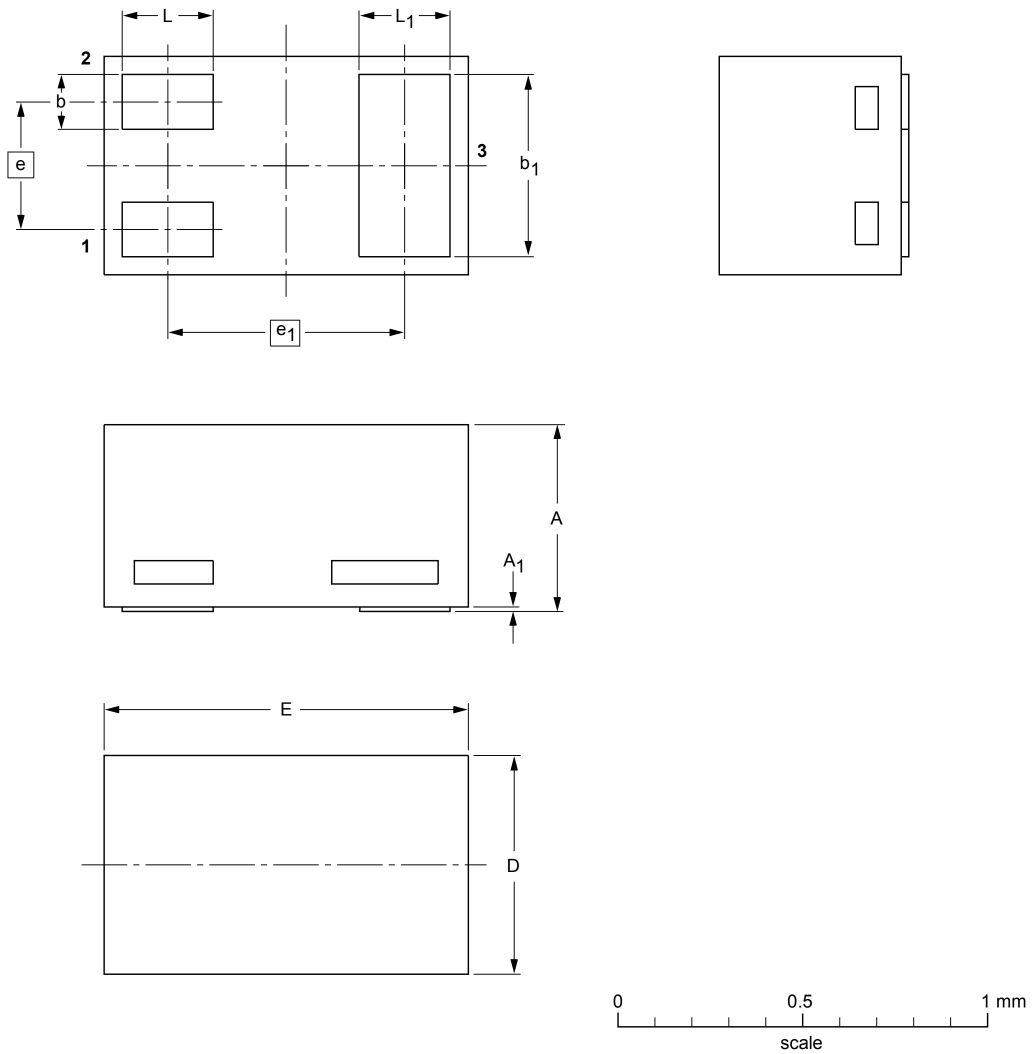


Fig. 17. Duty cycle definition

12. Package outline

Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm **SOT883**



DIMENSIONS (mm are the original dimensions)

UNIT	A(1)	A1 max.	b	b1	D	E	e	e1	L	L1
mm	0.50 0.46	0.03	0.20 0.12	0.55 0.47	0.62 0.55	1.02 0.95	0.35	0.65	0.30 0.22	0.30 0.22

Note

1. Including plating thickness

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT883			SC-101			~~03-02-05~~ 03-04-03

Fig. 18. Package outline DFN1006-3 (SOT883)

13. Soldering

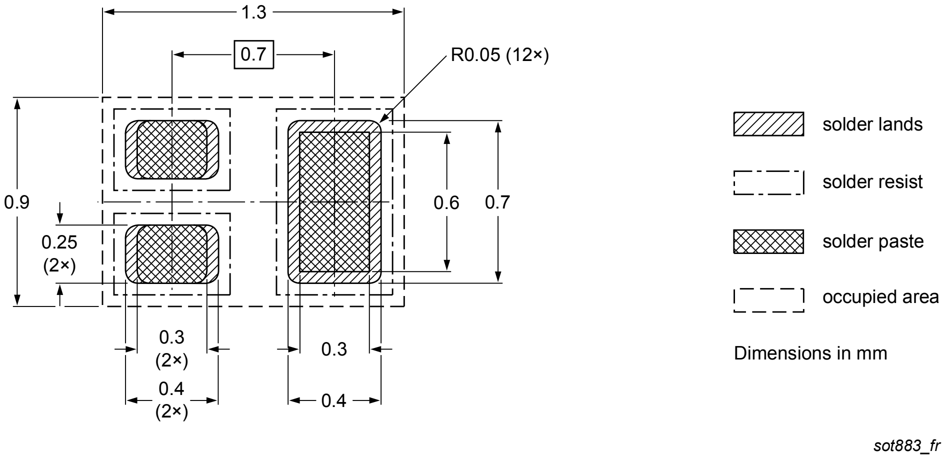


Fig. 19. Reflow soldering footprint for DFN1006-3 (SOT883)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMZ290UN v.1	20131106	Product data sheet	-	-

15. Legal information

15.1 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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Date of release: 6 November 2013