WINSOURCE ELECTRONICS

THE DATASHEET OF

PMZ390UN,315

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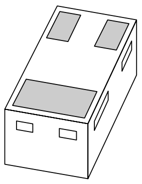

BOTTOM VIEW

PMZ390UN

N-channel TrenchMOS standard level FET

Rev. 01 — 12 July 2007 Product data sheet

1. Product profile

1.1 General description

N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using TrenchMOS technology.

1.2 Features

- Profile 55 % lower than SOT23
- Low on-state resistance
- Leadless package
- Footprint 90 % smaller than SOT23
- Fast switching
- Standard level compatible threshold

1.3 Applications

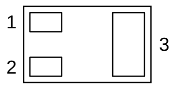
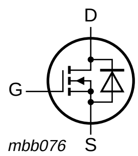
- Driver circuits
- Load switching in portable appliances

1.4 Quick reference data

- $V_{DS} \leq 30$ V
- $R_{DSon} \leq 460$ mΩ
- $I_D \leq 1.78$ A
- $P_{tot} \leq 2.50$ W

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	gate (G)	 SOT883 (SC-101)	
2	source (S)		
3	drain (D)		

founded by Philips

3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
PMZ390UN	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883

4. Limiting values

CAUTION

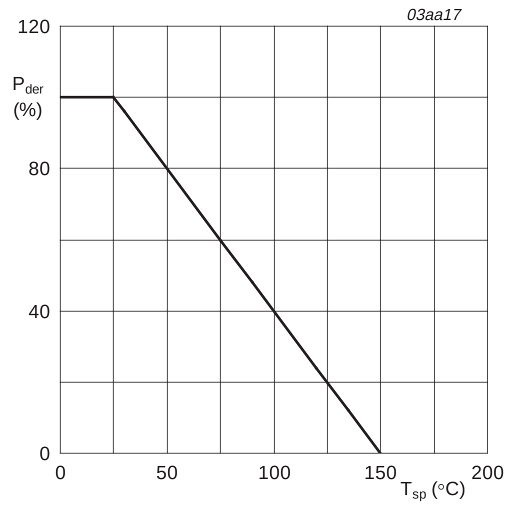
This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

Table 3. Limiting values

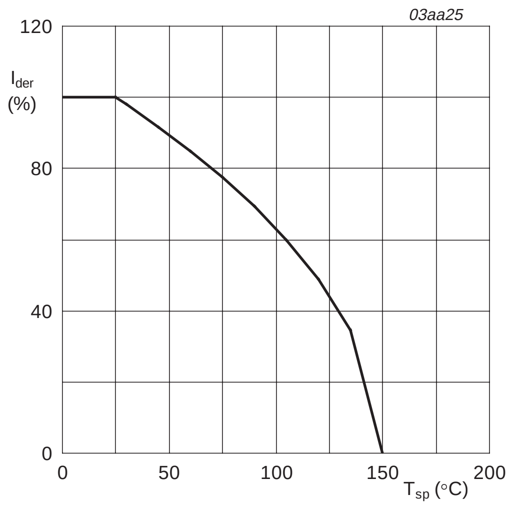
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage	25 °C ≤ T_j ≤ 150 °C	-	30	V
V_{DGR}	drain-gate voltage (DC)	25 °C ≤ T_j ≤ 150 °C; R_{GS} = 20 kΩ	-	30	V
V_{GS}	gate-source voltage		-	±8	V
I_D	drain current	T_{mb} = 25 °C; V_{GS} = 10 V; see Figure 2 and 3	-	1.78	A
		T_{mb} = 100 °C; V_{GS} = 10 V; see Figure 2	-	1.13	A
I_{DM}	peak drain current	T_{mb} = 25 °C; pulsed; t_p ≤ 10 µs; see Figure 3	-	3.56	A
P_{tot}	total power dissipation	T_{mb} = 25 °C; see Figure 1	-	2.50	W
T_{stg}	storage temperature		–55	+150	°C
T_j	junction temperature		–55	+150	°C
Source-drain diode					
I_S	source current	T_{mb} = 25 °C	-	1.78	A
I_{SM}	peak source current	T_{mb} = 25 °C; pulsed; t_p ≤ 10 µs	-	3.56	A
Electrostatic discharge					
V_{esd}	electrostatic discharge voltage	all pins			
		human body model; C = 100 pF; R = 1.5 kΩ	-	60	V
		machine model; C = 200 pF	-	30	V



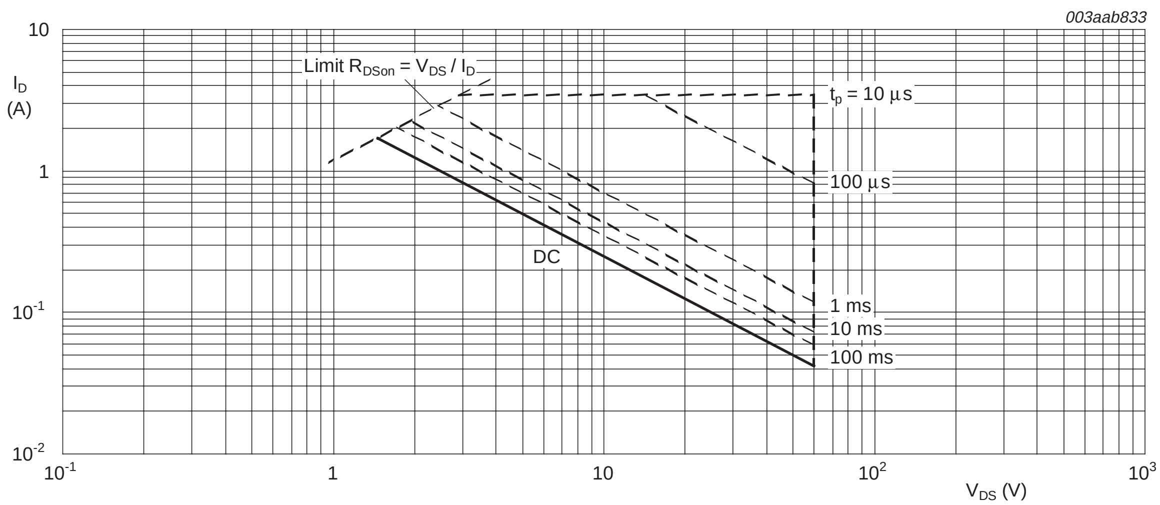
$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\ \%$$

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



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

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



T_{mb} = 25 °C; I_{DM} is single pulse

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

5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	see Figure 4		-	-	50	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	670	-	K/W

[1] Mounted on a printed-circuit board; vertical in still air.

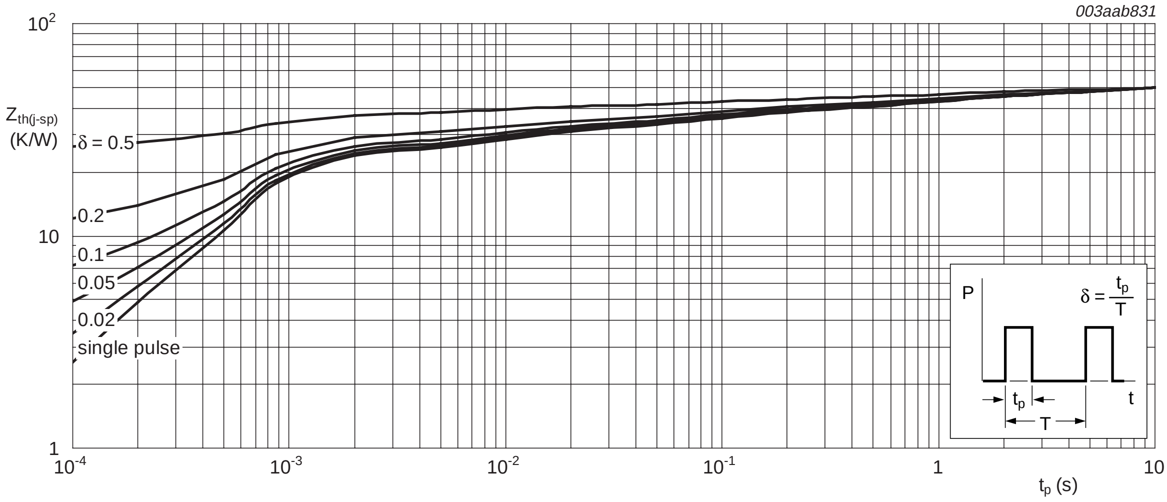


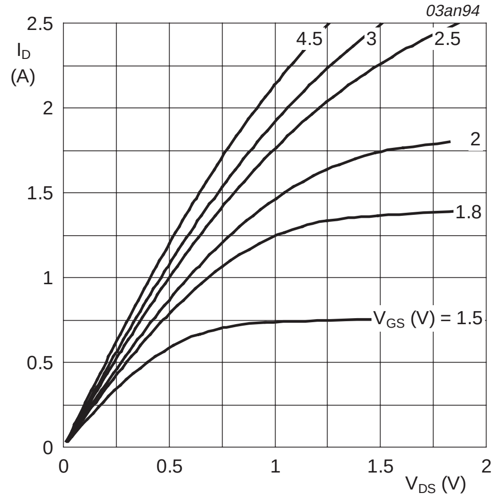
Fig 4. Transient thermal impedance from junction to solder point as a function of pulse duration

6. Characteristics

Table 5. Characteristics

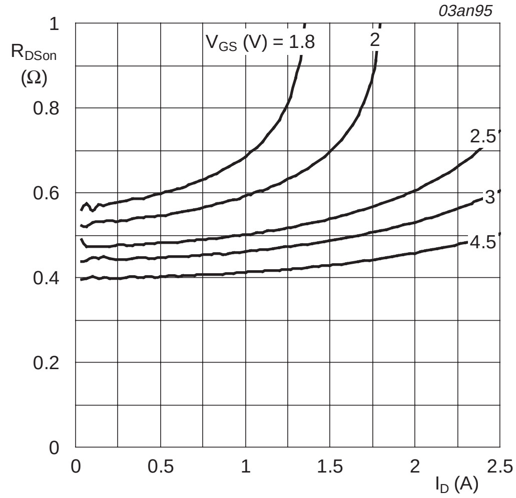
T_j = 25 °C unless otherwise specified.

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	30	-	-	V
		T_j = –55 °C	27	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	I_D = 0.25 mA; V_{DS} = V_{GS}; see Figure 9 and 10				
		T_j = 25 °C	0.45	0.7	0.95	V
		T_j = 150 °C	0.25	-	-	V
		T_j = –55 °C	-	-	1.15	V
I_{DSS}	drain leakage current	V_{DS} = 30 V; V_{GS} = 0 V				
		T_j = 25 °C	-	-	1	µA
		T_j = 150 °C	-	-	100	µA
I_{GSS}	gate leakage current	V_{GS} = ±8 V; V_{DS} = 0 V	-	10	100	nA
R_{DSon}	drain-source on-state resistance	V_{GS} = 4.5 V; I_D = 0.2 A; see Figure 6 and 8				
		T_j = 25 °C	-	390	460	mΩ
		T_j = 150 °C	-	663	782	mΩ
		V_{GS} = 2.5 V; I_D = 0.1 A; see Figure 6 and 8	-	460	560	mΩ
		V_{GS} = 1.8 V; I_D = 0.075 A; see Figure 6 and 8	-	550	730	mΩ
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	I_D = 1 A; V_{DS} = 15 V; V_{GS} = 4.5 V; see Figure 11 and 12	-	0.89	-	nC
Q_{GS}	gate-source charge		-	0.1	-	nC
Q_{GD}	gate-drain charge		-	0.2	-	nC
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz; see Figure 14	-	43	-	pF
C_{oss}	output capacitance		-	7.7	-	pF
C_{rss}	reverse transfer capacitance		-	4.8	-	pF
$t_{d(on)}$	turn-on delay time	V_{DS} = 15 V; R_L = 15 Ω; V_{GS} = 10 V; R_G = 6 Ω	-	4	-	ns
t_r	rise time		-	7.5	-	ns
$t_{d(off)}$	turn-off delay time		-	18	-	ns
t_f	fall time		-	4.5	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	I_S = 0.3 A; V_{GS} = 0 V; see Figure 13	-	0.76	1.2	V



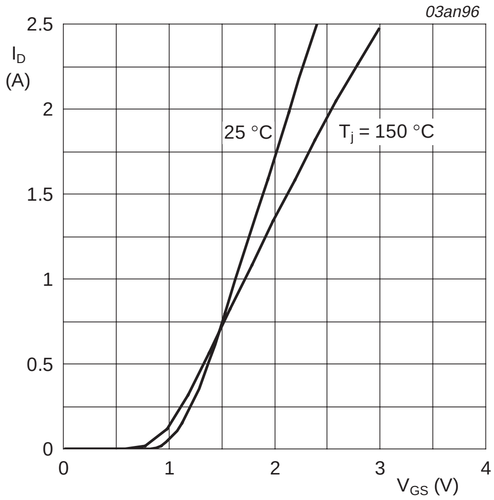
$T_j = 25$ °C

Fig 5. Output characteristics: drain current as a function of drain-source voltage; typical values



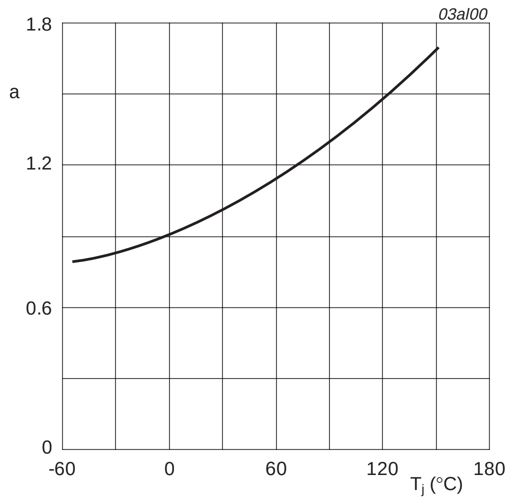
$T_j = 25$ °C

Fig 6. Drain-source on-state resistance as a function of drain current; typical values



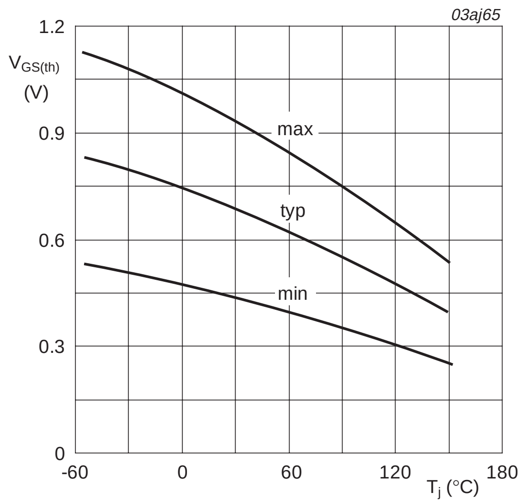
$T_j = 25$ °C and 150 °C; $V_{DS} > I_D \times R_{DSon}$

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



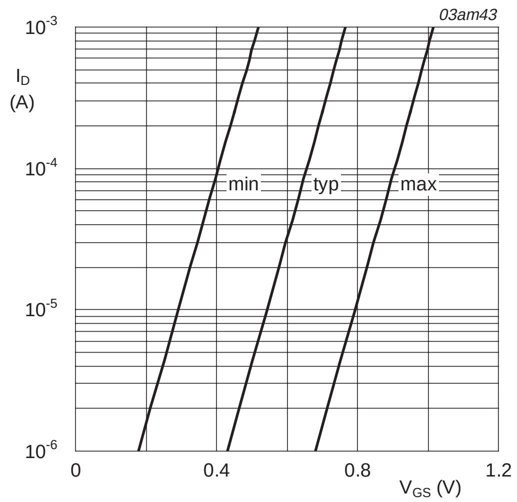
$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

Fig 8. Normalized drain-source on-state resistance factor as a function of junction temperature



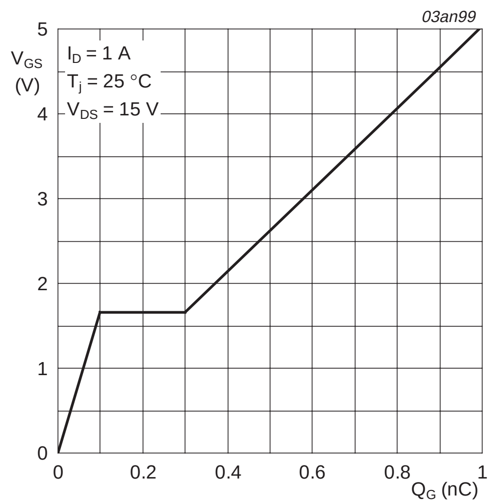
I_D = 1 mA; V_{DS} = V_{GS}

Fig 9. Gate-source threshold voltage as a function of junction temperature



T_j = 25 °C; V_{DS} = 5 V

Fig 10. Sub-threshold drain current as a function of gate-source voltage



I_D = 1 A; V_{DS} = 15 V

Fig 11. Gate-source voltage as a function of gate charge; typical values

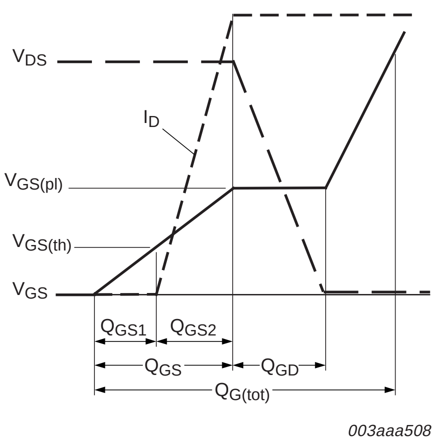
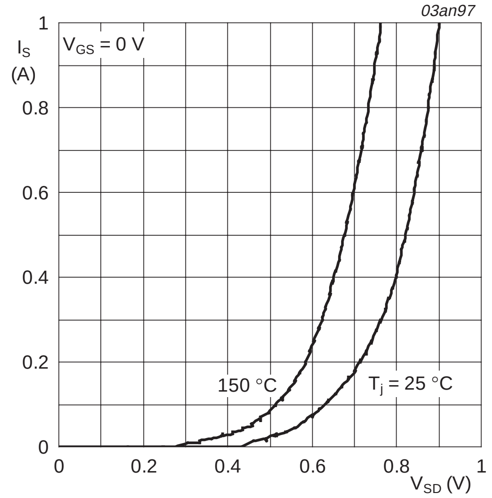
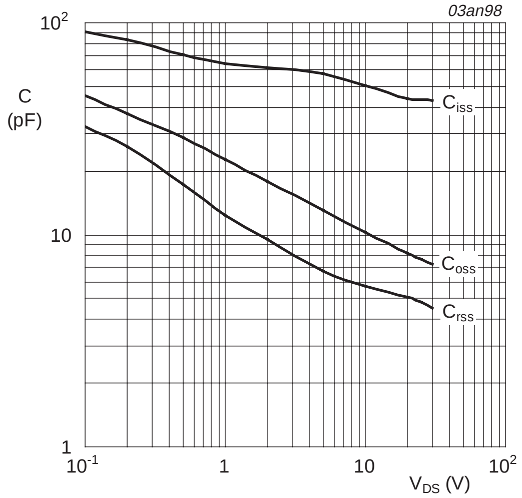


Fig 12. Gate charge waveform definitions



T_j = 25 °C and 150 °C; V_{GS} = 0 V

Fig 13. Source current as a function of source-drain voltage; typical values

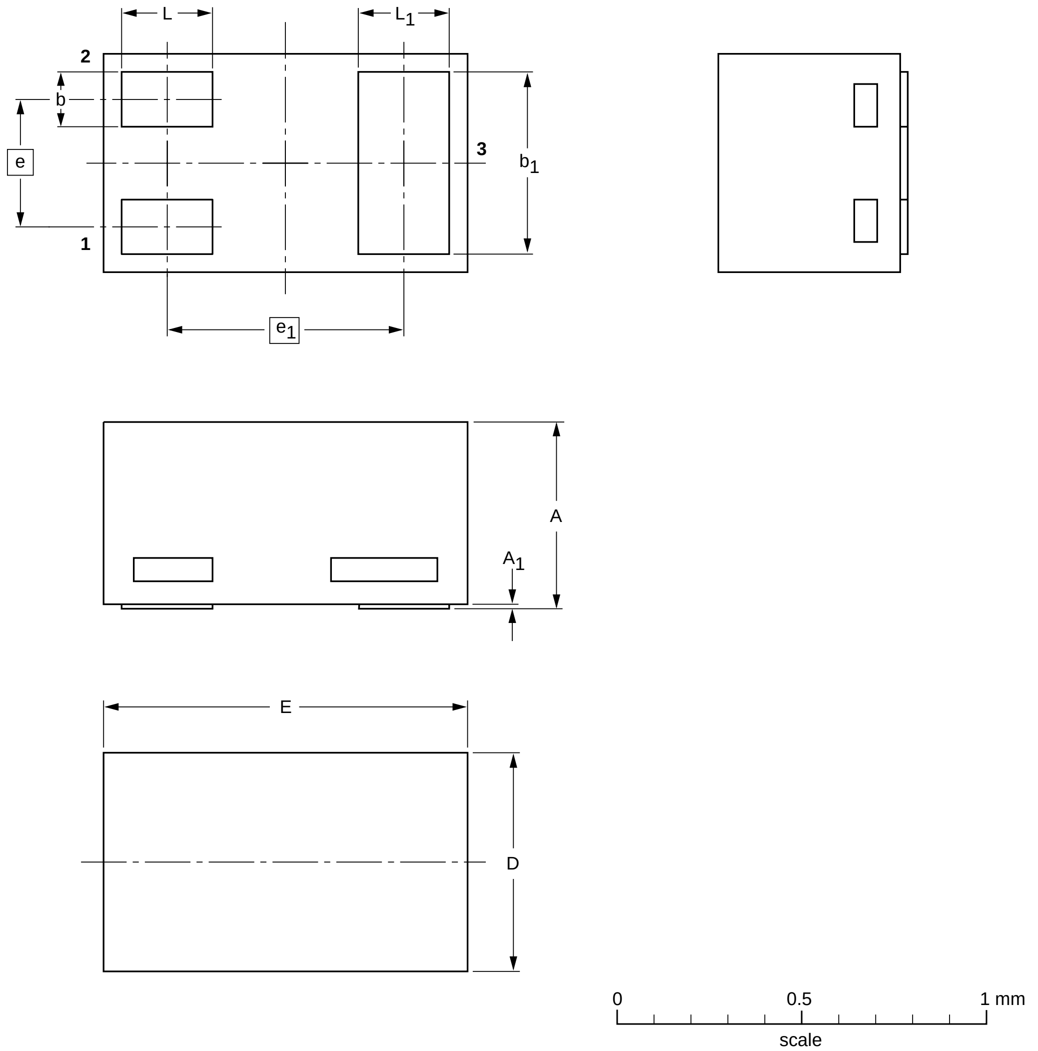


V_{GS} = 0 V; f = 1 MHz

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

7. 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)	A_1 max.	b	b_1	D	E	e	e_1	L	L_1
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

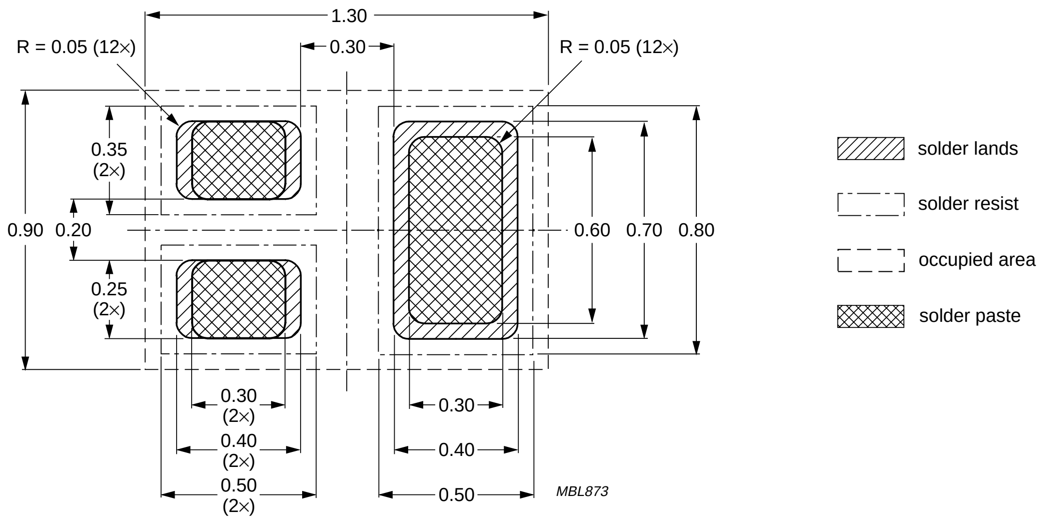
Note

1. Including plating thickness

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

Fig 15. Package outline SO883 (SC-101)

8. Soldering



Dimensions in mm

Fig 16. Reflow soldering footprint for SOT883

9. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMZ390UN _1	20070712	Product data sheet	-	-

10. Legal information

10.1 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.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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