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Kind regards,

Team Nexperia



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

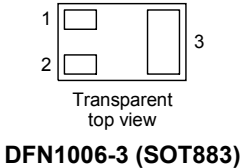
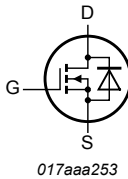
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|----------------------------------|--|-----|-----|-----|------------|
| V_{DS} | drain-source voltage | $T_j = 25\text{ °C}$ | - | - | 20 | V |
| V_{GS} | gate-source voltage | | -8 | - | 8 | V |
| I_D | drain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

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



5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|--|
| 1 | G | gate |  <p>Transparent top view DFN1006-3 (SOT883)</p> |  <p>017aaa253</p> |
| 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 |

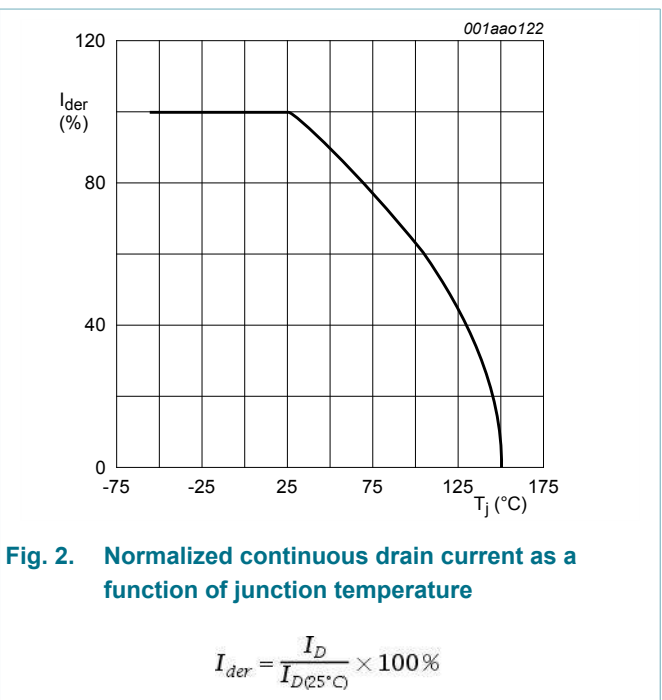
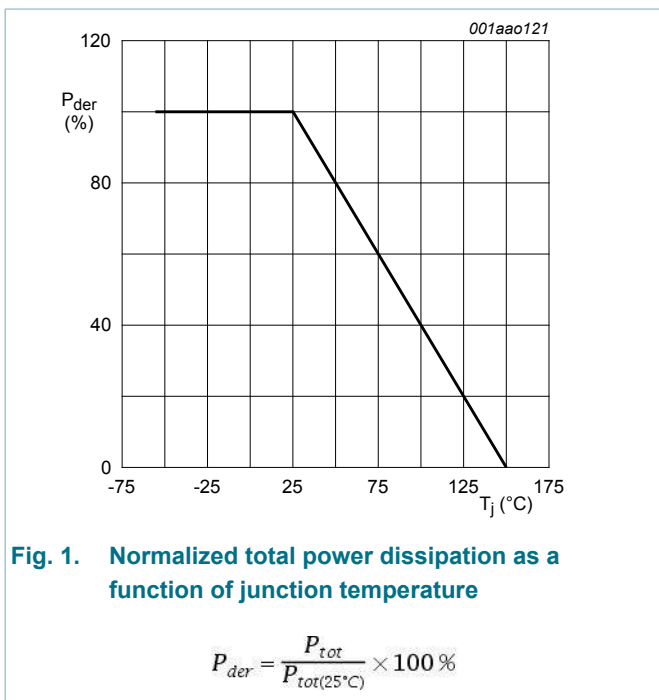
8. Limiting values

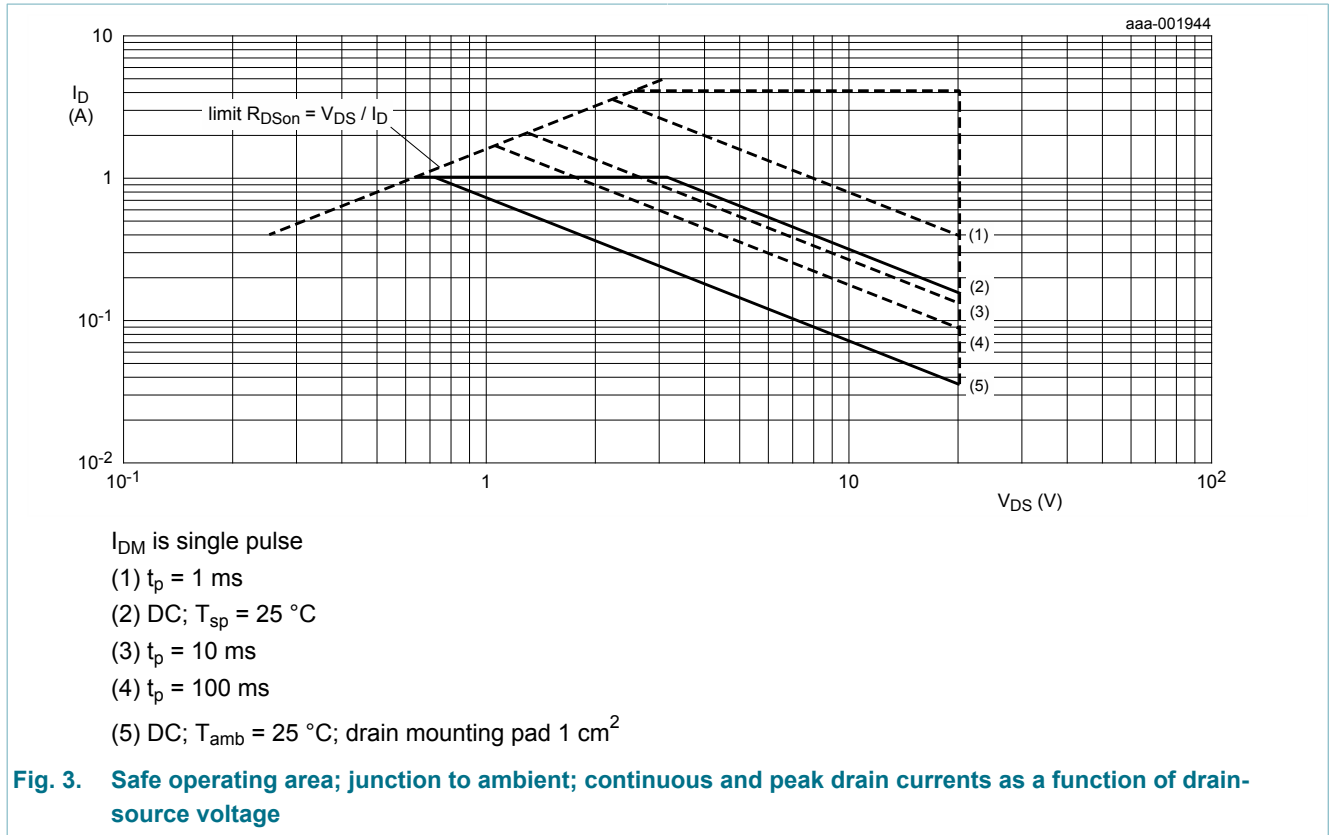
Table 5. Limiting values

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 cm².
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.





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 cm².

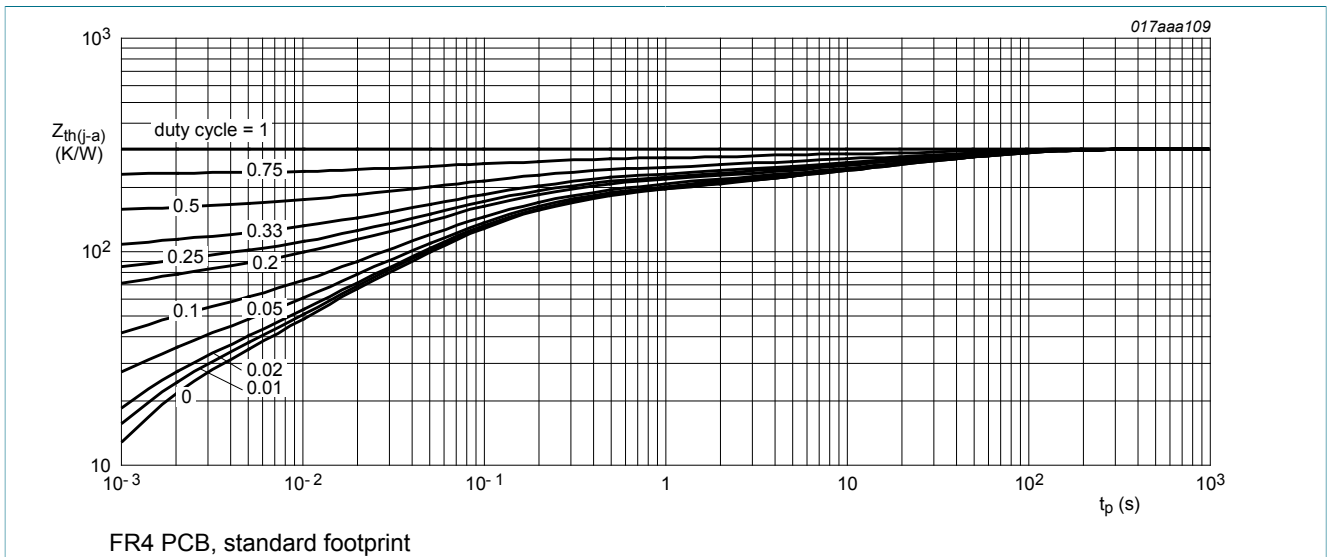


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

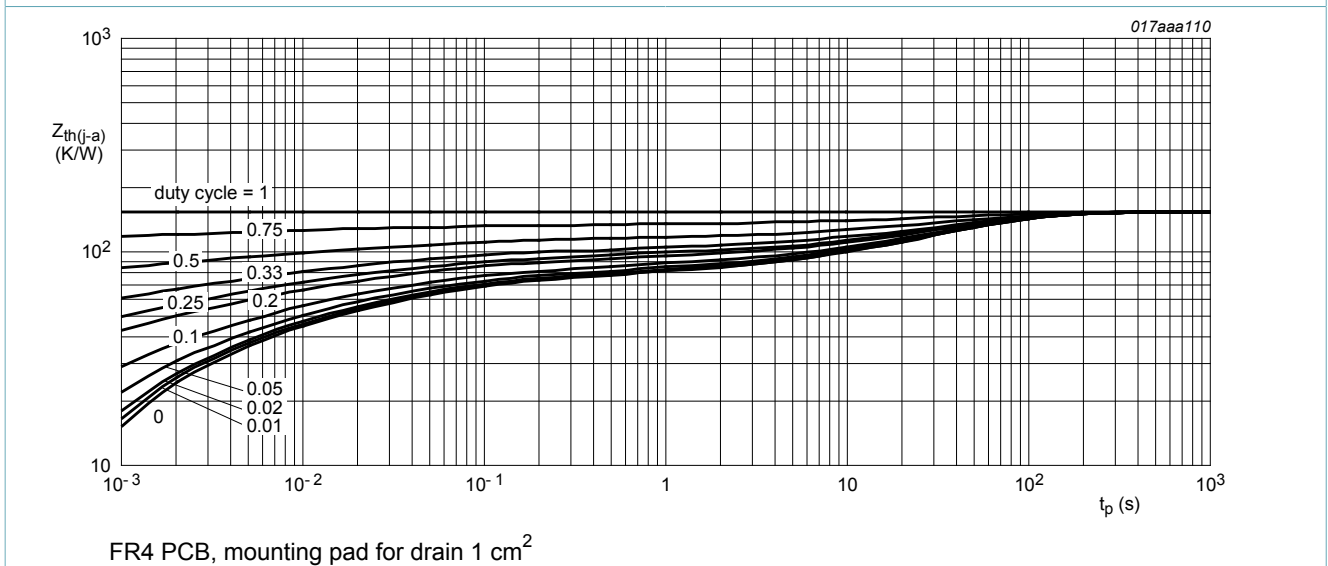
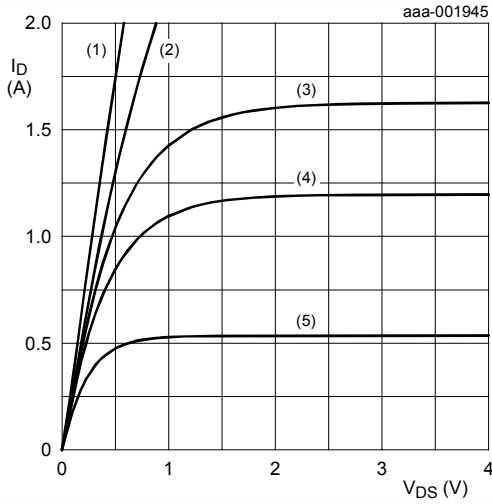


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

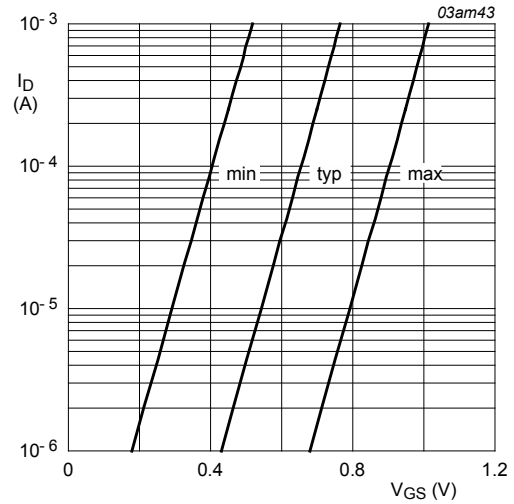
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|----------------------------------|--|------|------|------|------------|
| Static characteristics | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D = 10 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$ | 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 |
| | | $V_{DS} = 20 V; V_{GS} = 0 V; T_j = 150 \text{ }^\circ C$ | - | - | 100 | μA |
| I_{GSS} | gate leakage current | $V_{GS} = 8 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$ | - | - | 0.1 | μA |
| | | $V_{GS} = -8 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$ | - | - | 0.1 | μA |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = 4.5 V; I_D = 200 \text{ mA}; T_j = 25 \text{ }^\circ C$ | - | 290 | 350 | m Ω |
| | | $V_{GS} = 4.5 V; I_D = 200 \text{ mA}; T_j = 150 \text{ }^\circ C$ | - | 460 | 560 | m Ω |
| | | $V_{GS} = 2.5 V; I_D = 100 \text{ mA}; T_j = 25 \text{ }^\circ C$ | - | 360 | 450 | m Ω |
| | | $V_{GS} = 1.8 V; I_D = 75 \text{ mA}; T_j = 25 \text{ }^\circ C$ | - | 460 | 650 | m Ω |
| g_{fs} | forward transconductance | $V_{DS} = 5 V; I_D = 200 \text{ mA}; T_j = 25 \text{ }^\circ C$ | - | 2 | - | S |
| Dynamic characteristics | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $V_{DS} = 10 V; I_D = 1 A; V_{GS} = 4.5 V; T_j = 25 \text{ }^\circ C$ | - | 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 | $V_{DS} = 20 V; f = 1 \text{ MHz}; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$ | - | 45 | 68 | pF |
| C_{oss} | output capacitance | | - | 11 | - | pF |
| C_{rss} | reverse transfer capacitance | | - | 7 | - | pF |
| $t_{d(on)}$ | turn-on delay time | $V_{DS} = 10 V; R_L = 10 \Omega; V_{GS} = 4.5 V; R_{G(ext)} = 6 \Omega; T_j = 25 \text{ }^\circ C$ | - | 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 | $I_S = 300 \text{ mA}; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$ | - | 0.75 | 1.2 | V |



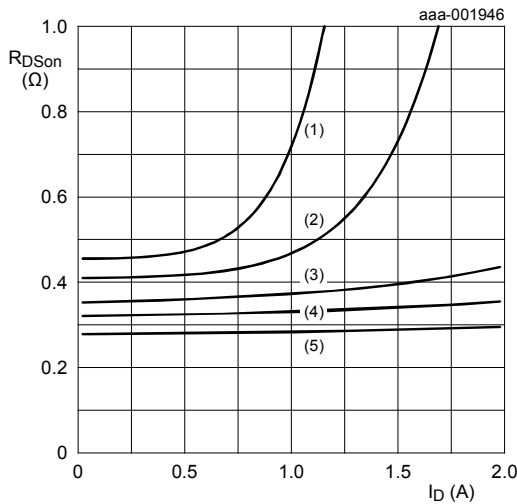
$T_j = 25\text{ }^\circ\text{C}$
 (1) $V_{GS} = 4.5\text{ V}$
 (2) $V_{GS} = 2.5\text{ V}$
 (3) $V_{GS} = 2.0\text{ V}$
 (4) $V_{GS} = 1.8\text{ V}$
 (5) $V_{GS} = 1.5\text{ V}$

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



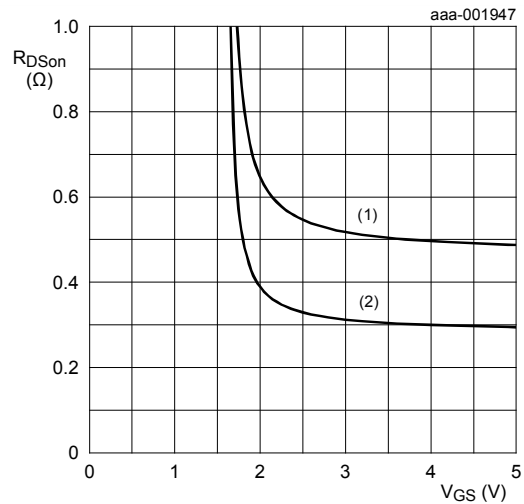
$T_j = 25\text{ }^\circ\text{C}; V_{DS} = 5\text{ V}$

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



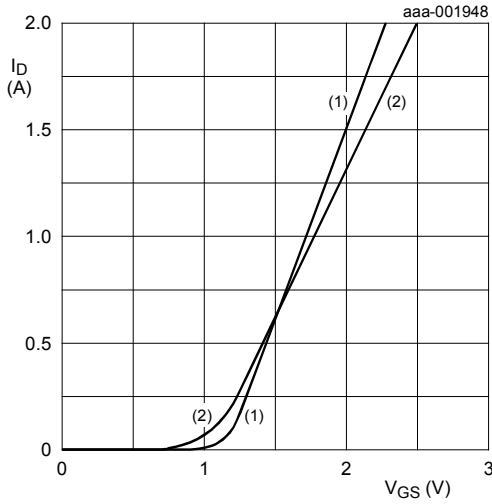
$T_j = 25\text{ }^\circ\text{C}$
 (1) $V_{GS} = 1.8\text{ V}$
 (2) $V_{GS} = 2\text{ V}$
 (3) $V_{GS} = 2.5\text{ V}$
 (4) $V_{GS} = 3\text{ V}$
 (5) $V_{GS} = 4.5\text{ V}$

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



$I_D = 800\text{ mA}$
 (1) $T_j = 150\text{ }^\circ\text{C}$
 (2) $T_j = 25\text{ }^\circ\text{C}$

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



$V_{DS} > I_D \times R_{DS(on)}$
 (1) $T_j = 25\text{ °C}$
 (2) $T_j = 150\text{ °C}$

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

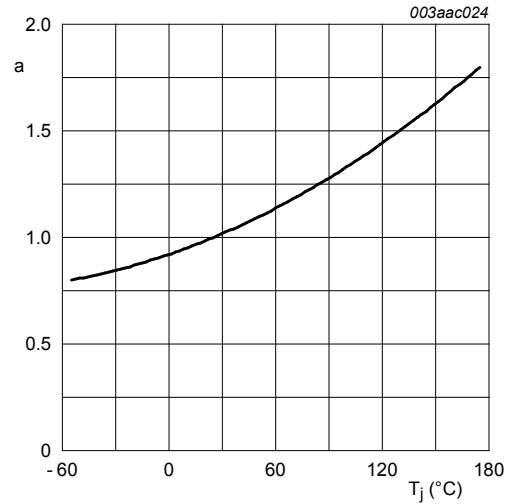
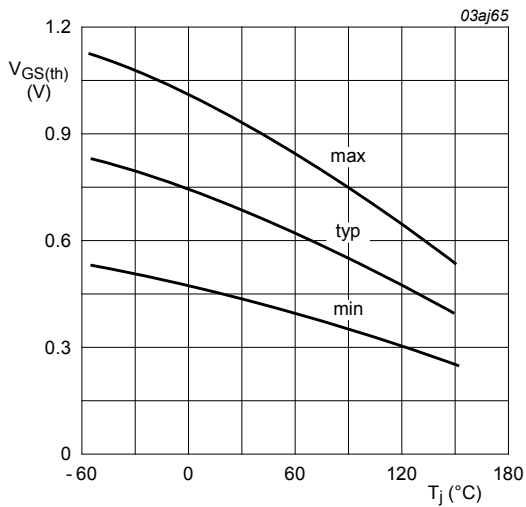


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

$$a = \frac{R_{DS(on)}}{R_{DS(on)(25\text{°C})}}$$



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

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

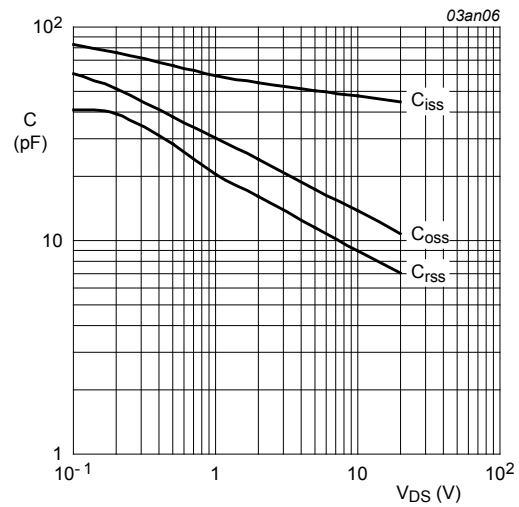


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

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

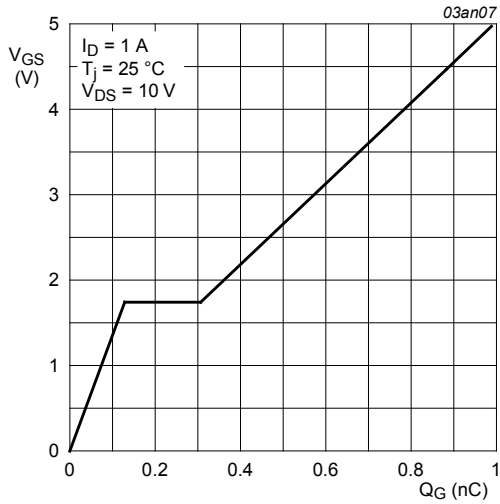


Fig. 14. Gate-source voltage as a function of gate charge; typical values

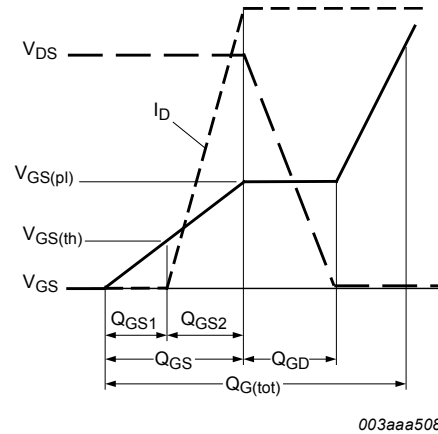
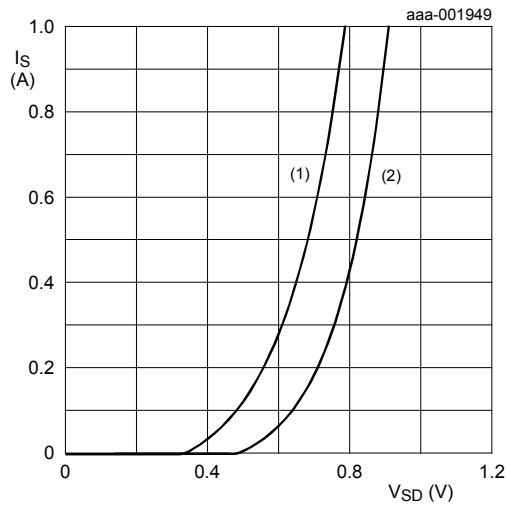


Fig. 15. Gate charge waveform definitions



$V_{GS} = 0\text{ V}$
 (1) $T_j = 150\text{ }^\circ\text{C}$
 (2) $T_j = 25\text{ }^\circ\text{C}$

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

11. Test information

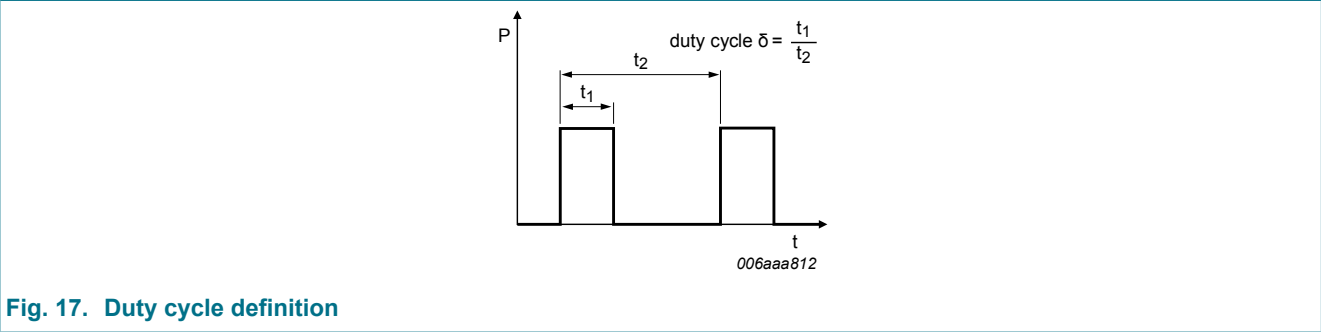


Fig. 17. Duty cycle definition

12. Package outline

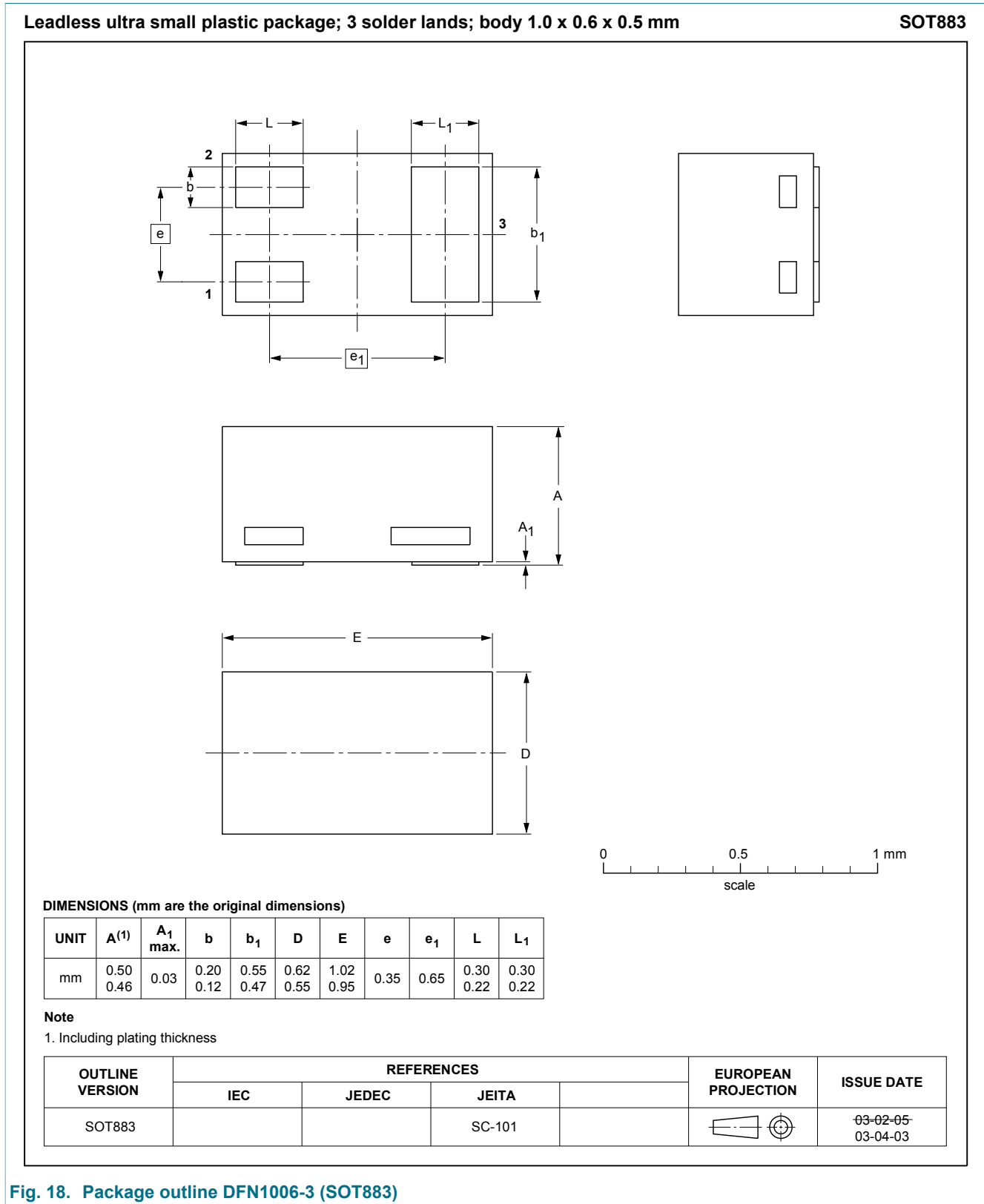


Fig. 18. Package outline DFN1006-3 (SOT883)

13. Soldering

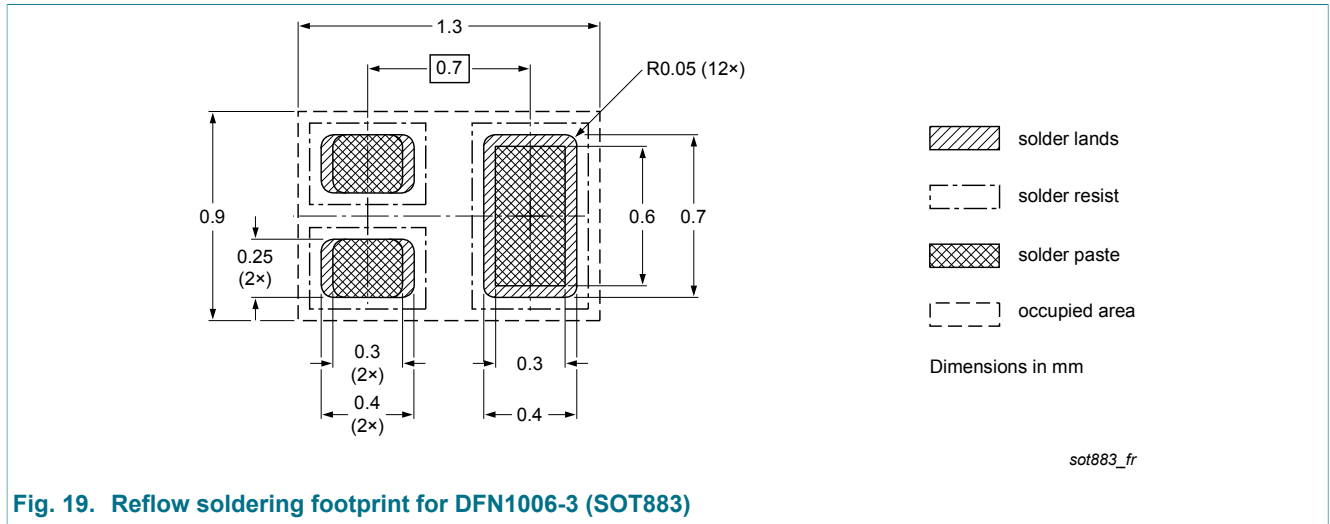


Fig. 19. Reflow soldering footprint for DFN1006-3 (SOT883)

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. |
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