



PMZB370UNE

30 V, single N-channel Trench MOSFET

Rev. 1 — 8 May 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

- Very fast switching
- Trench MOSFET technology
- Low threshold voltage
- Ultra thin package profile with 0.37 mm height
- ESD protection up to 2 kV

1.3 Applications

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

1.4 Quick reference data

Table 1. Quick reference data

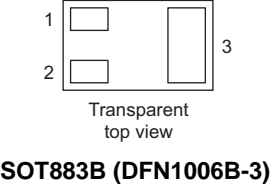
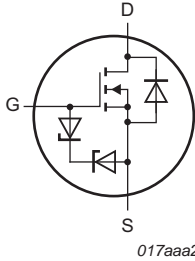
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|----------------------------------|--|---------------------|-----|-----|------|
| V_{DS} | drain-source voltage | $T_j = 25\text{ °C}$ | - | - | 30 | V |
| V_{GS} | gate-source voltage | | -8 | - | 8 | V |
| I_D | drain current | $V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ °C}$ | [1] | - | 900 | mA |
| Static characteristics | | | | | | |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = 4.5\text{ V}; I_D = 500\text{ mA}; T_j = 25\text{ °C}$ | - | 370 | 490 | mΩ |

[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>SOT883B (DFN1006B-3)</p> |  <p>017aaa255</p> |
| 2 | S | source | | |
| 3 | D | drain | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | Version |
|-------------|------------|--|---------|
| | Name | Description | |
| PMZB370UNE | 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 |
|-------------|--------------|
| PMZB370UNE | 0000 1000 |

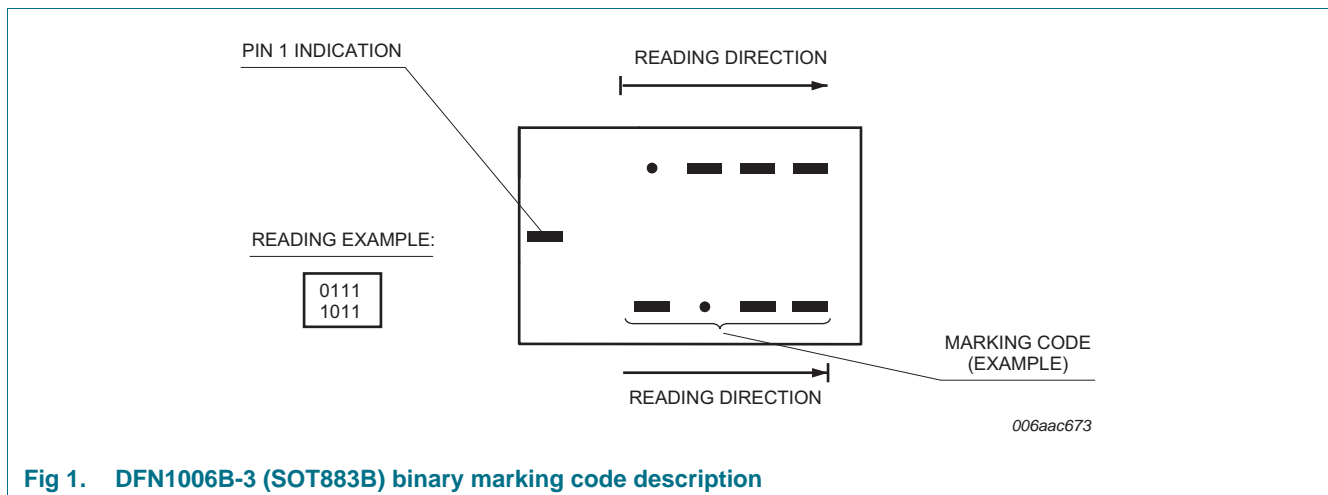


Fig 1. DFN1006B-3 (SOT883B) binary marking code description

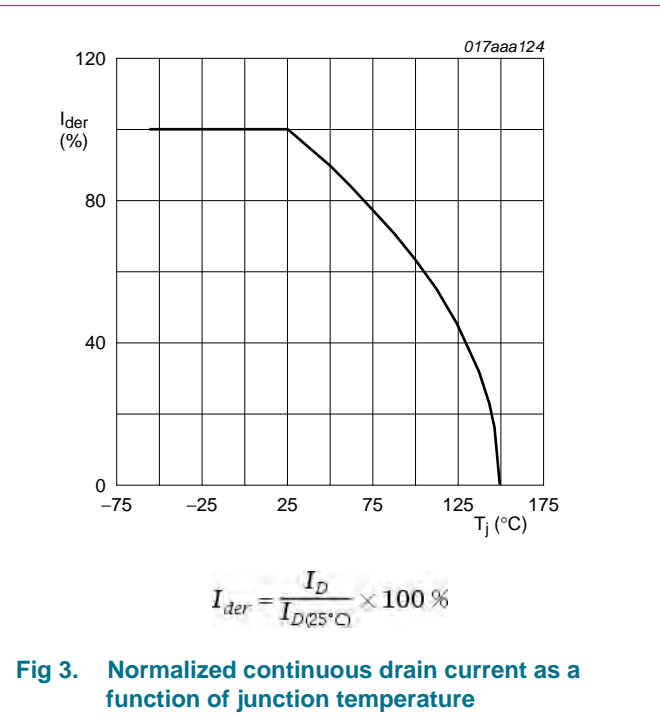
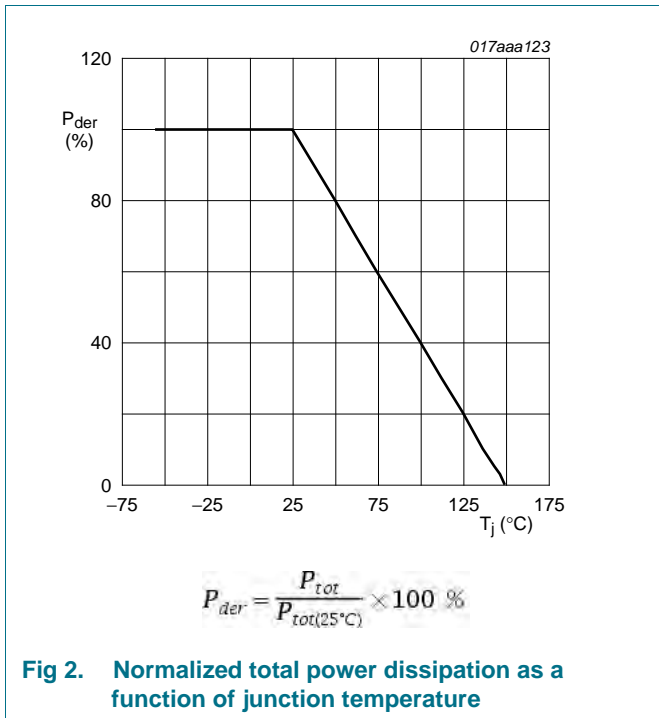
5. Limiting values

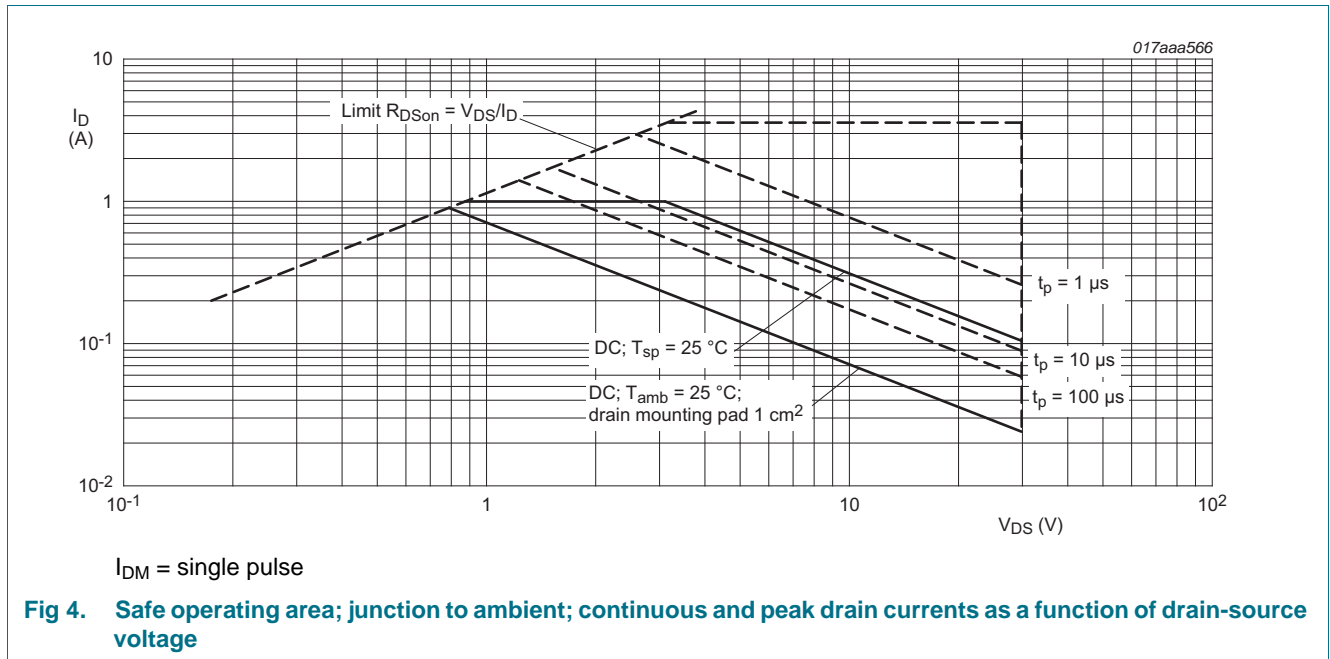
Table 5. Limiting values

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 | | -8 | 8 | V | |
| I _D | drain current | V _{GS} = 4.5 V; T _{amb} = 25 °C | [1] | - | 900 | mA |
| | | V _{GS} = 4.5 V; T _{amb} = 100 °C | [1] | - | 560 | mA |
| I _{DM} | peak drain current | T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs | - | 3.6 | 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] | - | 680 | mA |
| ESD maximum rating | | | | | | |
| V _{ESD} | electrostatic discharge voltage | HBM | [3] | - | 2000 | V |

- [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.
- [3] Measured between all pins.





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 cm².

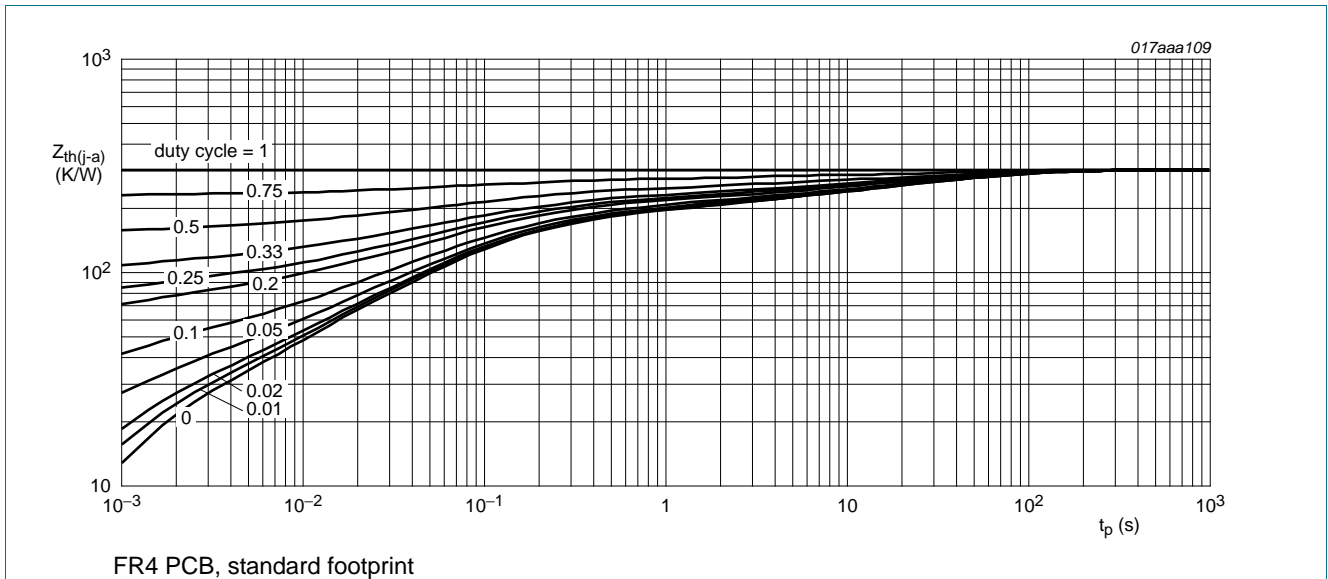


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

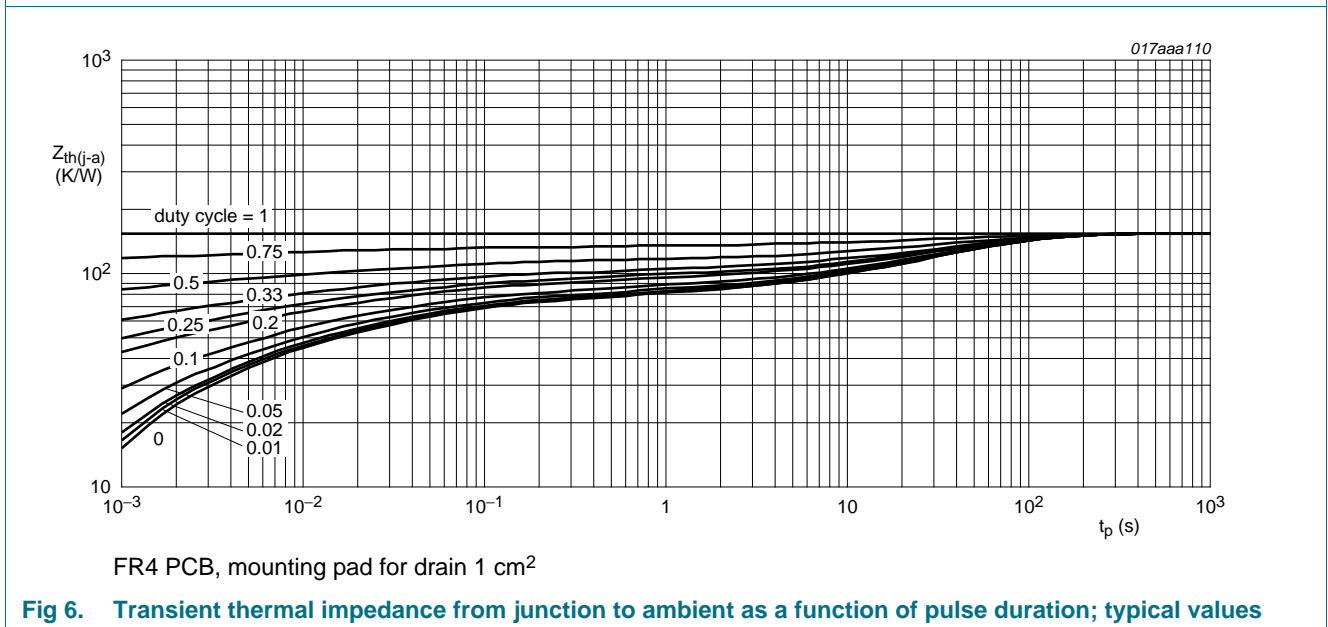
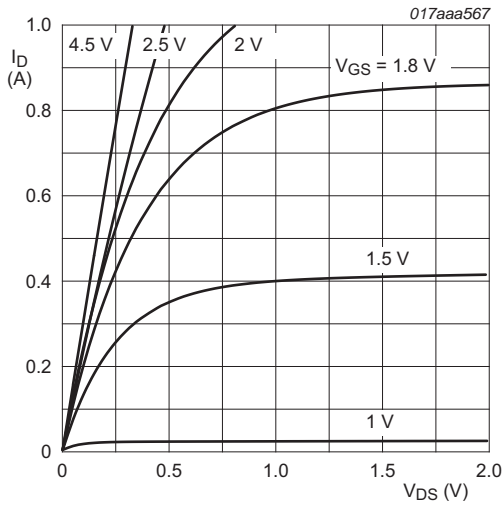


Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

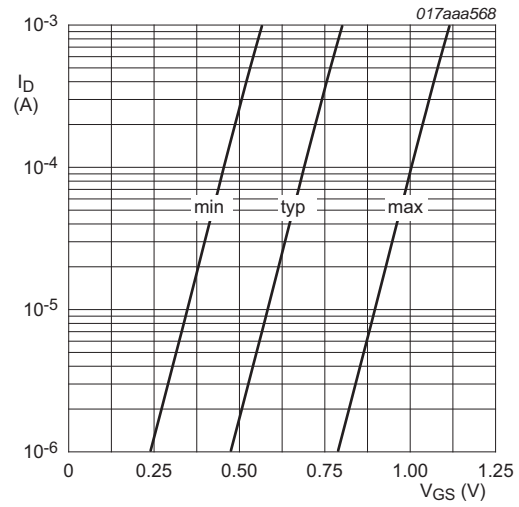
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|----------------------------------|--|------|------|------|------------|
| Static characteristics | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D = 250 \mu A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | 30 | - | - | V |
| V_{GSth} | gate-source threshold voltage | $I_D = 250 \mu A$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ C$ | 0.5 | 0.77 | 1.05 | V |
| I_{DSS} | drain leakage current | $V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 1 | μA |
| | | $V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 150 \text{ }^\circ C$ | - | - | 10 | μA |
| I_{GSS} | gate leakage current | $V_{GS} = 8 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 3 | μA |
| | | $V_{GS} = -8 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 3 | μA |
| | | $V_{GS} = -4.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 0.5 | μA |
| | | $V_{GS} = 4.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 0.5 | μA |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = 4.5 V$; $I_D = 500 \text{ mA}$; $T_j = 25 \text{ }^\circ C$ | - | 370 | 490 | m Ω |
| | | $V_{GS} = 4.5 V$; $I_D = 500 \text{ mA}$; $T_j = 150 \text{ }^\circ C$ | - | 650 | 860 | m Ω |
| | | $V_{GS} = 2.5 V$; $I_D = 400 \text{ mA}$; $T_j = 25 \text{ }^\circ C$ | - | 470 | 750 | m Ω |
| | | $V_{GS} = 1.8 V$; $I_D = 100 \text{ mA}$; $T_j = 25 \text{ }^\circ C$ | - | 630 | 1300 | m Ω |
| g_{fs} | forward transconductance | $V_{DS} = 10 V$; $I_D = 200 \text{ mA}$; $T_j = 25 \text{ }^\circ C$ | - | 1580 | - | mS |
| Dynamic characteristics | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $V_{DS} = 15 V$; $I_D = 500 \text{ mA}$; $V_{GS} = 4.5 V$; $T_j = 25 \text{ }^\circ C$ | - | 0.77 | 1.16 | nC |
| Q_{GS} | gate-source charge | | - | 0.15 | - | nC |
| Q_{GD} | gate-drain charge | | - | 0.16 | - | nC |
| C_{iss} | input capacitance | $V_{DS} = 25 V$; $f = 1 \text{ MHz}$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | 52 | 78 | pF |
| C_{oss} | output capacitance | | - | 9 | - | pF |
| C_{rss} | reverse transfer capacitance | | - | 3 | - | pF |
| $t_{d(on)}$ | turn-on delay time | $V_{DS} = 15 V$; $R_L = 250 \Omega$; $V_{GS} = 4.5 V$; $R_{G(ext)} = 6 \Omega$; $T_j = 25 \text{ }^\circ C$ | - | 11 | 22 | ns |
| t_r | rise time | | - | 9 | - | ns |
| $t_{d(off)}$ | turn-off delay time | | - | 54 | 108 | ns |
| t_f | fall time | | - | 27 | - | ns |
| Source-drain diode | | | | | | |
| V_{SD} | source-drain voltage | $I_S = 300 \text{ mA}$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | 0.48 | 0.76 | 1.2 | V |



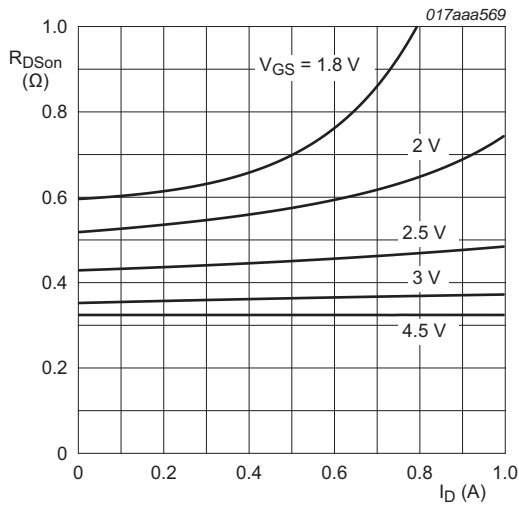
$T_j = 25\text{ }^\circ\text{C}$

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



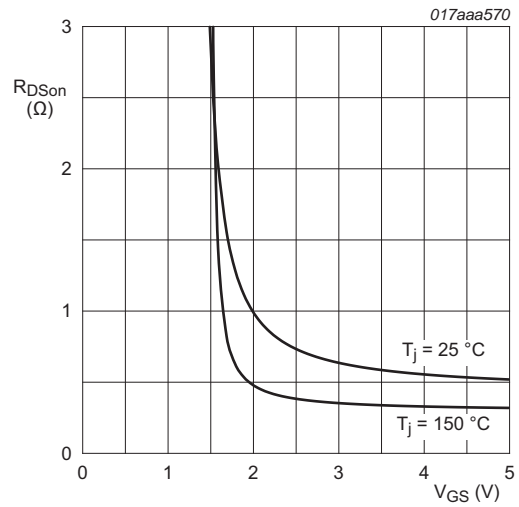
$T_j = 25\text{ }^\circ\text{C}; V_{DS} = 5\text{ V}$

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



$T_j = 25\text{ }^\circ\text{C}$

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



$I_D = 500\text{ mA}$

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

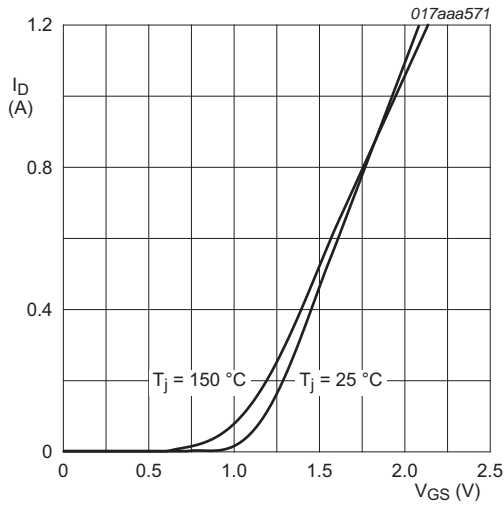
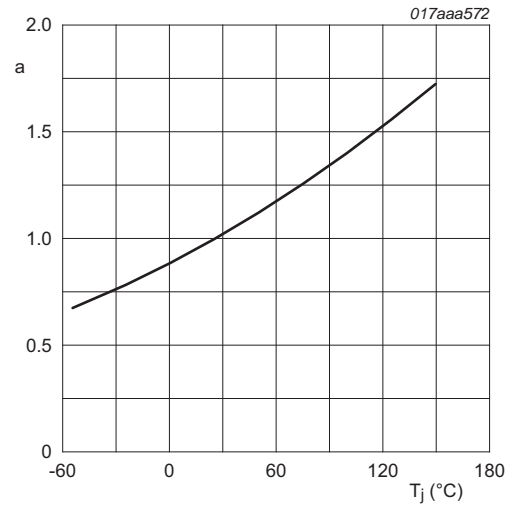
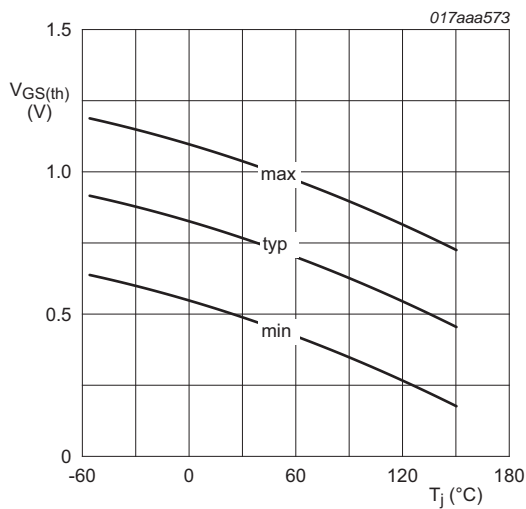


Fig 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values



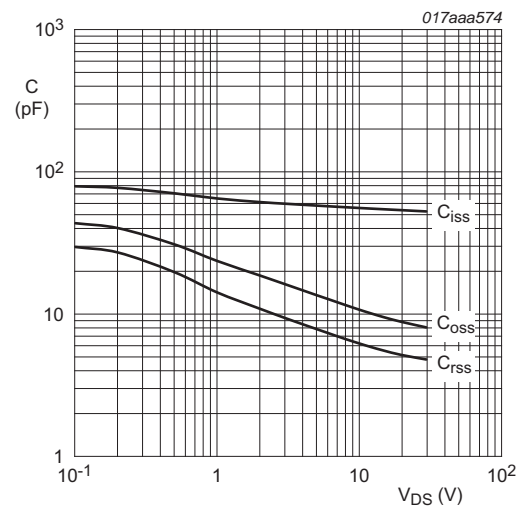
$$a = \frac{R_{DSon}}{R_{DSon(25^{\circ}C)}}$$

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



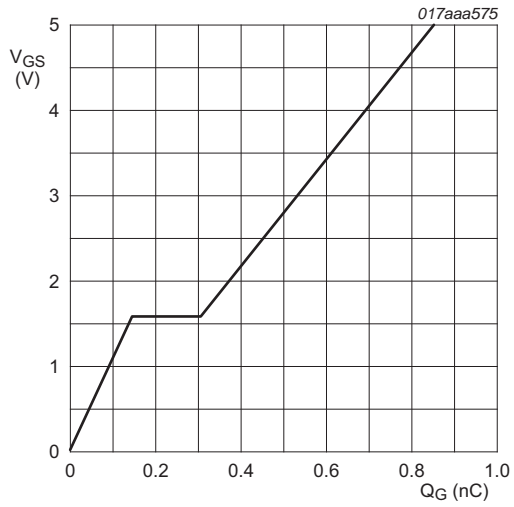
$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$

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



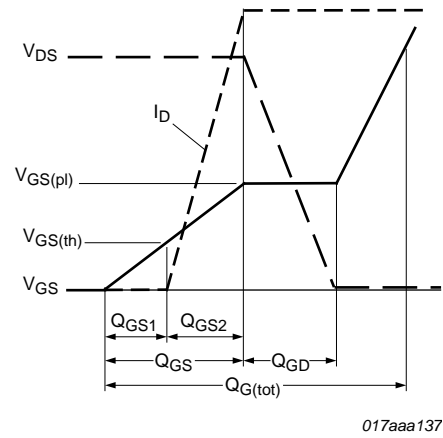
$f = 1 \text{ MHz}; V_{GS} = 0 \text{ V}$

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



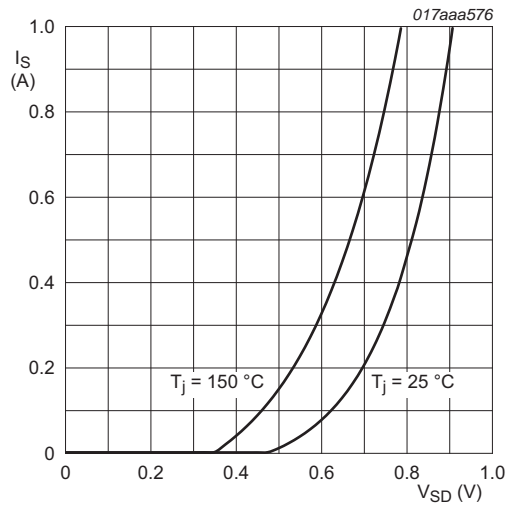
$I_D = 0.5 \text{ A}; V_{DS} = 15 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$

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



017aaa137

Fig 16. 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

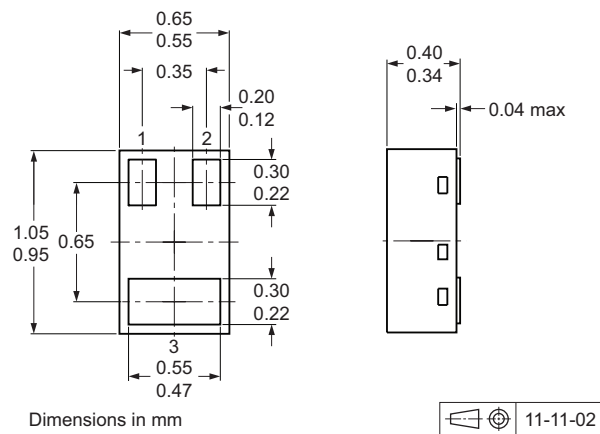
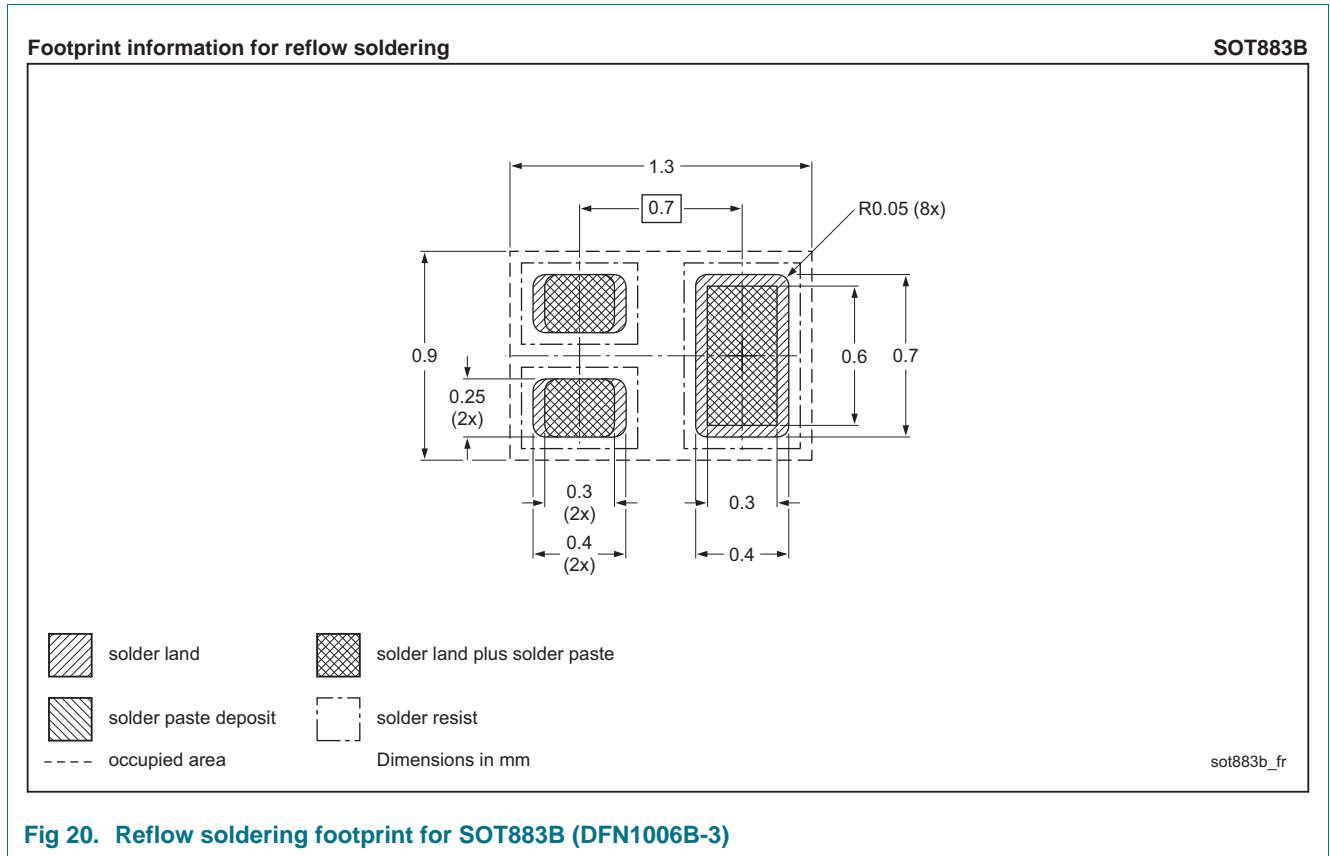


Fig 19. Package outline SOT883B (DFN1006B-3)

10. Soldering



11. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PMZB370UNE v.1 | 20120508 | 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. |

[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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