



PMZB390UNE

30 V, N-channel Trench MOSFET

12 March 2015

Product data sheet

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.

2. Features and benefits

- Very fast switching
- Low threshold voltage
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection: 2 kV HBM
- Ultra thin package profile of 0.37 mm

3. Applications

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

4. Quick reference data

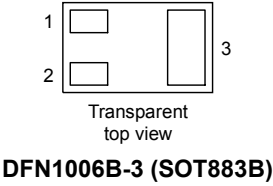
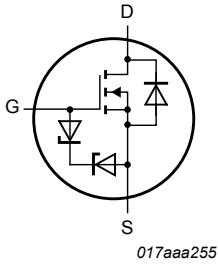
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|----------------------------------|---|-----|-----|-----|------------|
| V_{DS} | drain-source voltage | $T_J = 25\text{ °C}$ | - | - | 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] | - | 0.9 | A |
| Static characteristics | | | | | | |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = 4.5\text{ V}; I_D = 0.9\text{ A}; T_J = 25\text{ °C}$ | - | 390 | 470 | m Ω |

[1] Device mounted on an FR4 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 DFN1006B-3 (SOT883B)</p> |  <p>017aaa255</p> |
| 2 | S | source | | |
| 3 | D | drain | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|------------|--|---------|
| | Name | Description | Version |
| PMZB390UNE | DFN1006B-3 | DFN1006B-3: leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm | SOT883B |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMZB390UNE | 0101 0100 |

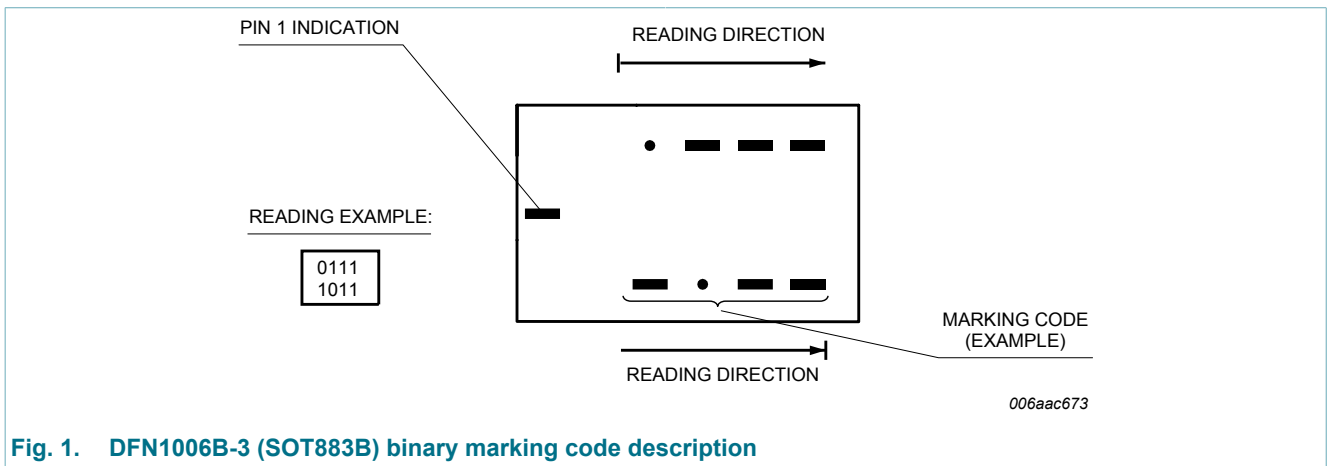


Fig. 1. DFN1006B-3 (SOT883B) binary marking code description

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 | | - | 30 | V |
| V _{GS} | gate-source voltage | | | -8 | 8 | V |
| I _D | drain current | V _{GS} = 4.5 V; T _{amb} = 25 °C | [1] | - | 0.9 | 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] | - | 350 | mW |
| | | | [1] | - | 715 | mW |
| | | T _{sp} = 25 °C | | - | 5430 | 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] | - | 0.7 | A |

[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.

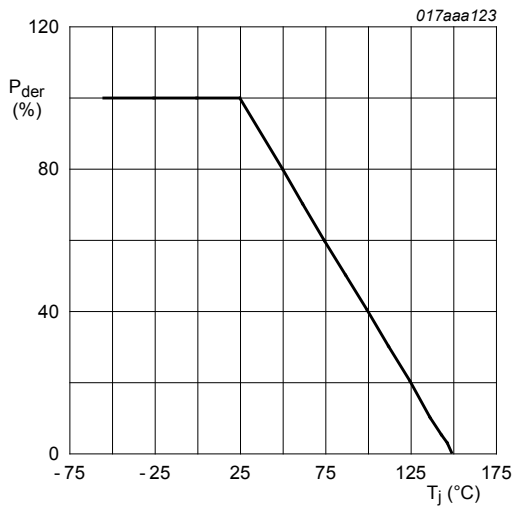


Fig. 2. Normalized total power dissipation as a function of junction temperature

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

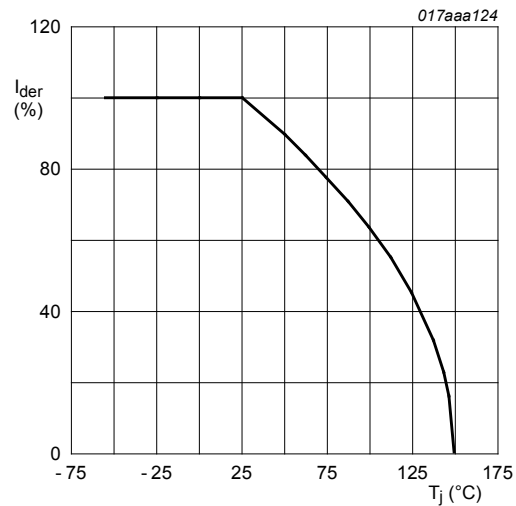
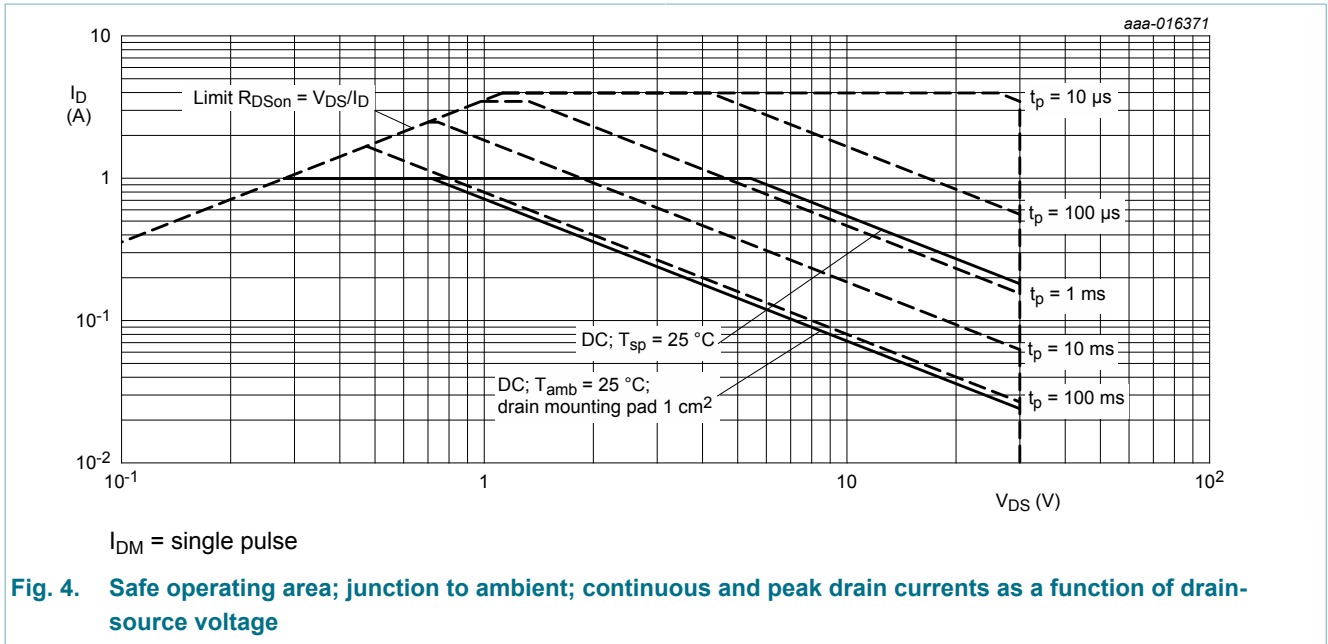


Fig. 3. Normalized continuous drain current as a function of junction temperature

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



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] | - | 315 | 360 | K/W |
| | | | [2] | - | 150 | 175 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | - | 20 | 23 | 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 .

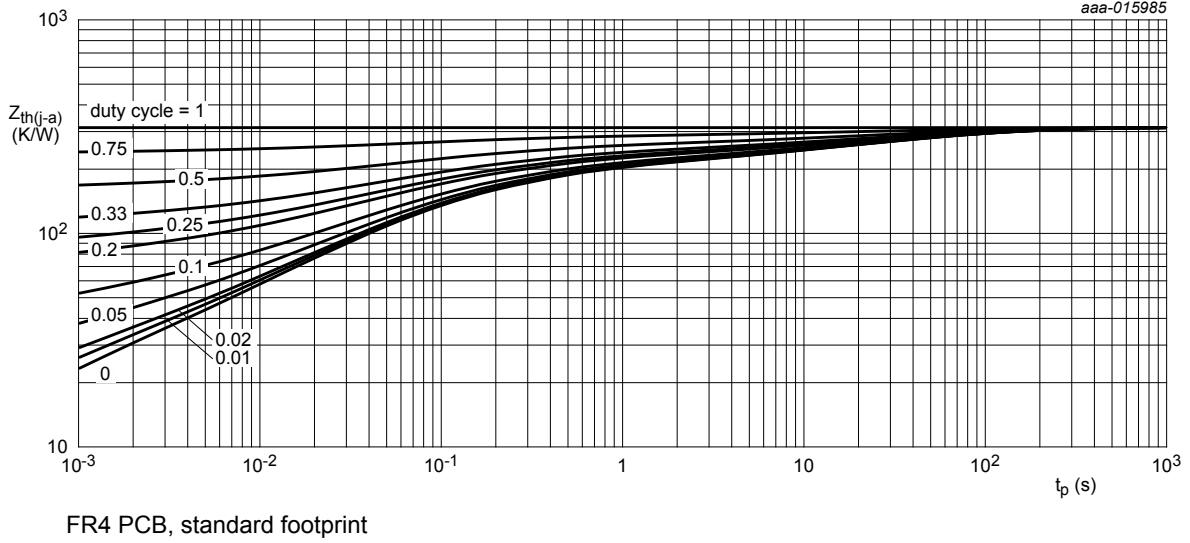


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

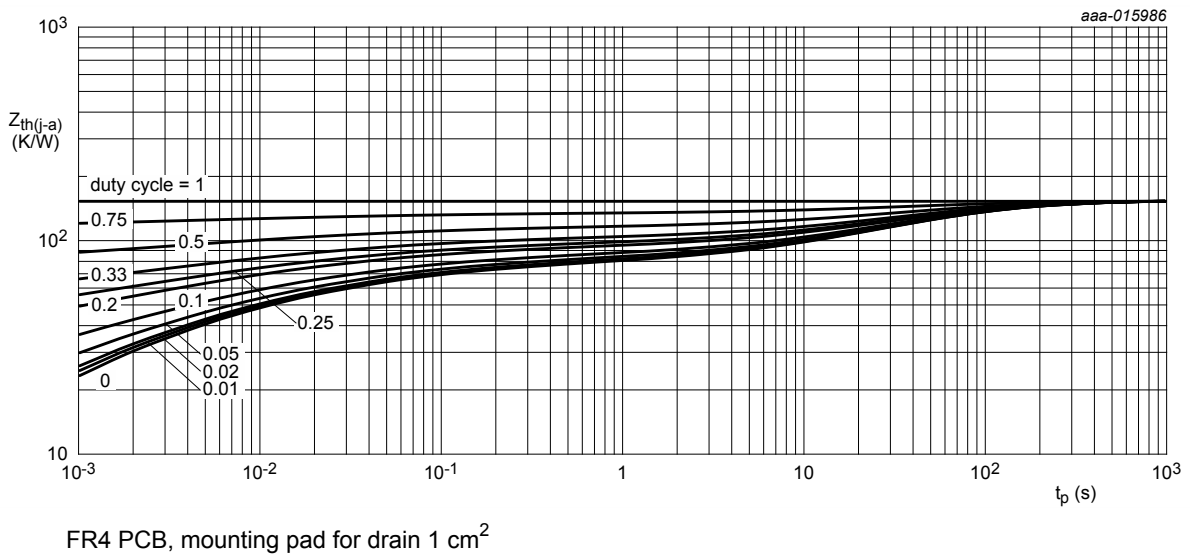


Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. 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 | $I_D = 250 \mu A$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ C$ | 0.45 | 0.7 | 0.95 | V |
| I_{DSS} | drain leakage current | $V_{DS} = 30 V$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 1 | μA |
| I_{GSS} | gate leakage current | $V_{GS} = 8 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 5 | μA |
| | | $V_{GS} = -8 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | -5 | μA |
| | | $V_{GS} = 4.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 1 | μA |
| | | $V_{GS} = -4.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | -1 | μA |
| | | $V_{GS} = 2.5 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 100 | nA |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = 4.5 V$; $I_D = 0.9 A$; $T_j = 25 \text{ }^\circ C$ | - | 390 | 470 | m Ω |
| | | $V_{GS} = 4.5 V$; $I_D = 0.9 A$; $T_j = 150 \text{ }^\circ C$ | - | 660 | 790 | m Ω |
| | | $V_{GS} = 2.5 V$; $I_D = 0.8 A$; $T_j = 25 \text{ }^\circ C$ | - | 460 | 620 | m Ω |
| | | $V_{GS} = 1.8 V$; $I_D = 0.12 A$; $T_j = 25 \text{ }^\circ C$ | - | 530 | 770 | m Ω |
| | | $V_{GS} = 1.5 V$; $I_D = 0.01 A$; $T_j = 25 \text{ }^\circ C$ | - | 610 | 1020 | m Ω |
| g_{fs} | forward transconductance | $V_{DS} = 10 V$; $I_D = 1 A$; $T_j = 25 \text{ }^\circ C$ | - | 2 | - | S |
| Dynamic characteristics | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $V_{DS} = 15 V$; $I_D = 0.8 A$; $V_{GS} = 4.5 V$; $T_j = 25 \text{ }^\circ C$ | - | 0.8 | 1.3 | nC |
| Q_{GS} | gate-source charge | | - | 0.1 | - | nC |
| Q_{GD} | gate-drain charge | | - | 0.2 | - | nC |
| C_{iss} | input capacitance | $V_{DS} = 15 V$; $f = 1 \text{ MHz}$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | 41 | - | pF |
| C_{oss} | output capacitance | | - | 6 | - | pF |
| C_{rss} | reverse transfer capacitance | | - | 5 | - | pF |
| $t_{d(on)}$ | turn-on delay time | $V_{DS} = 15 V$; $I_D = 0.8 A$; $V_{GS} = 4.5 V$; $R_{G(ext)} = 6 \Omega$; $T_j = 25 \text{ }^\circ C$ | - | 4 | - | ns |
| t_r | rise time | | - | 8 | - | ns |
| $t_{d(off)}$ | turn-off delay time | | - | 12 | - | ns |
| t_f | fall time | | - | 3 | - | ns |
| Source-drain diode | | | | | | |
| V_{SD} | source-drain voltage | $I_S = 0.7 A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | 0.9 | 1.2 | V |

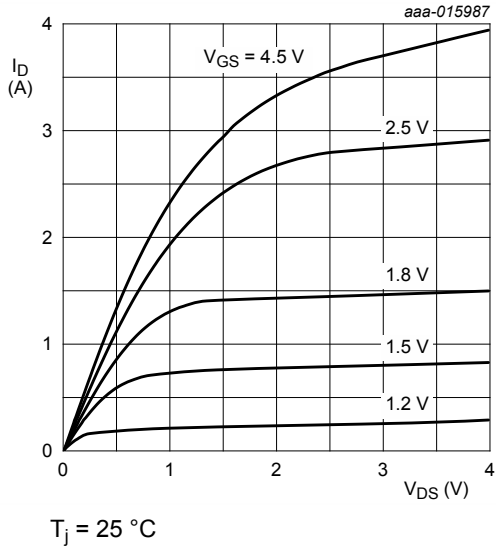


Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values

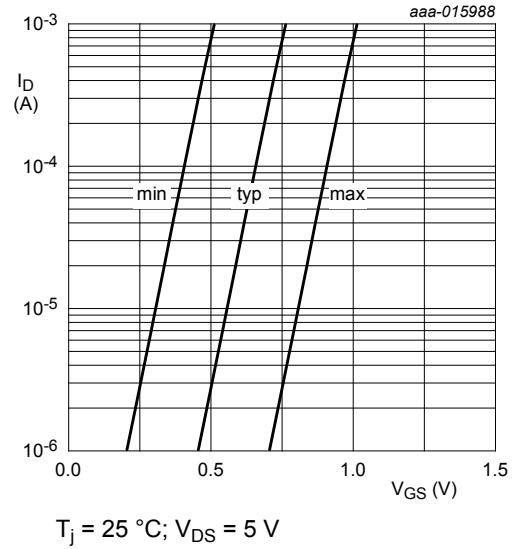


Fig. 8. Sub-threshold drain current as a function of gate-source voltage

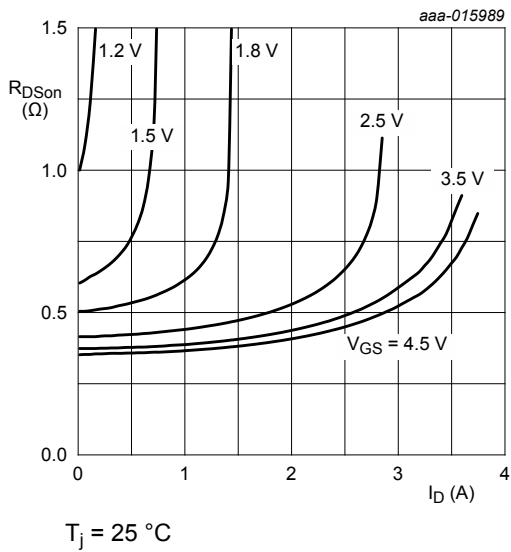


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

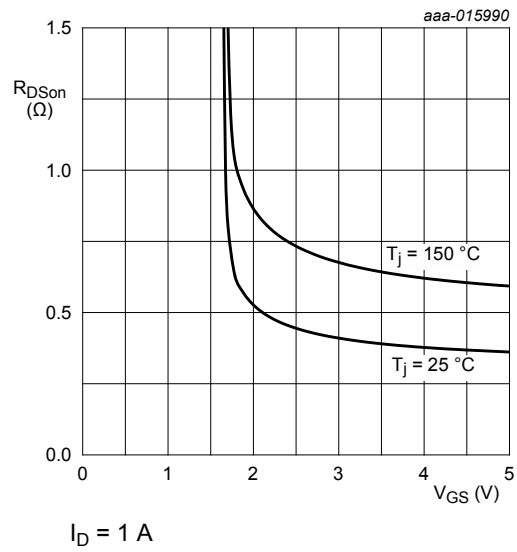


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

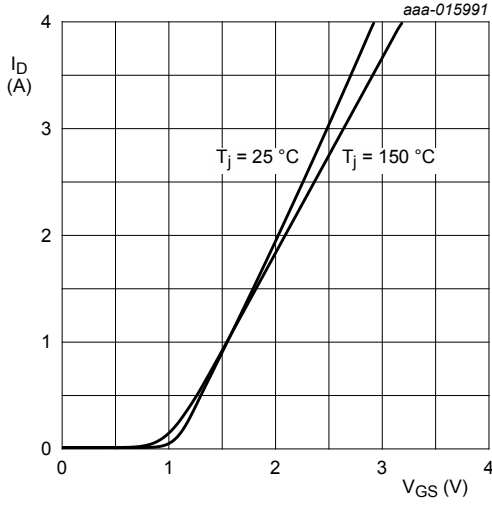


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

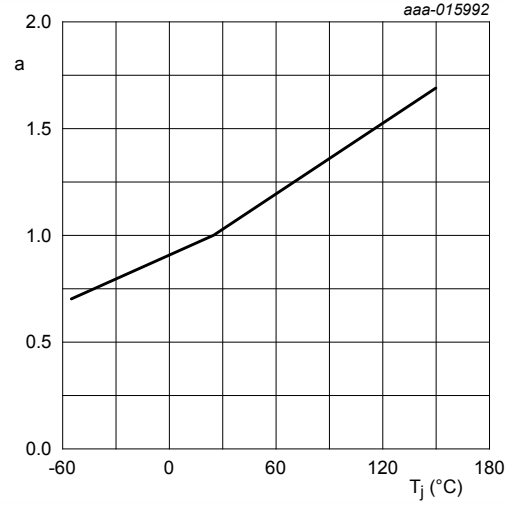


Fig. 12. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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

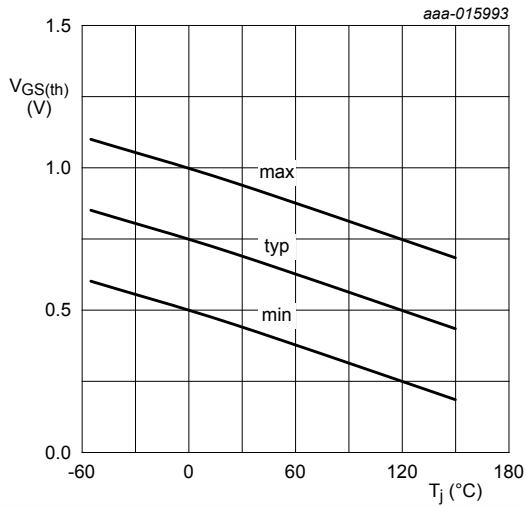


Fig. 13. Gate-source threshold voltage as a function of junction temperature

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

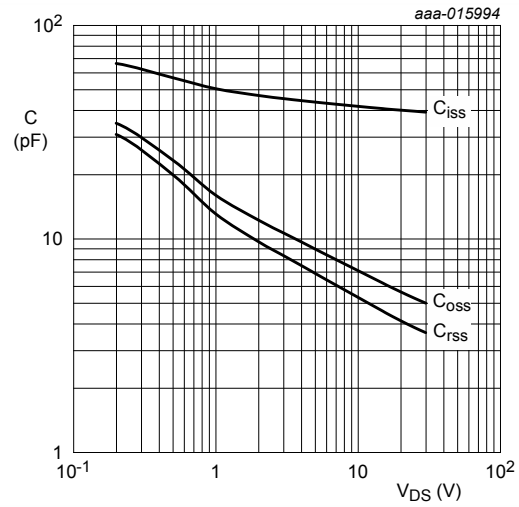
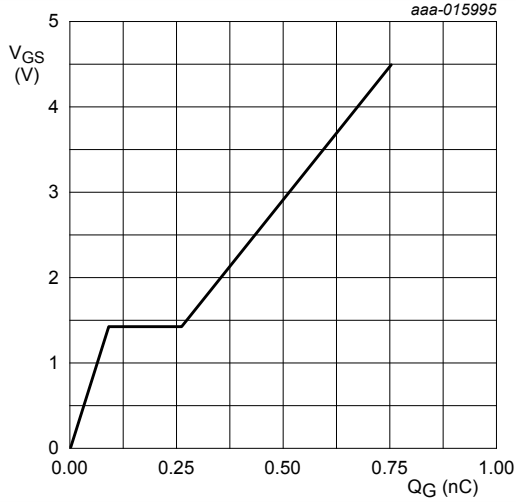


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

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



$I_D = 0.8 \text{ A}$; $V_{DS} = 15 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$

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

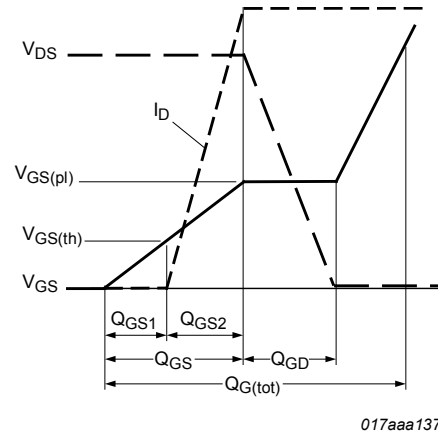
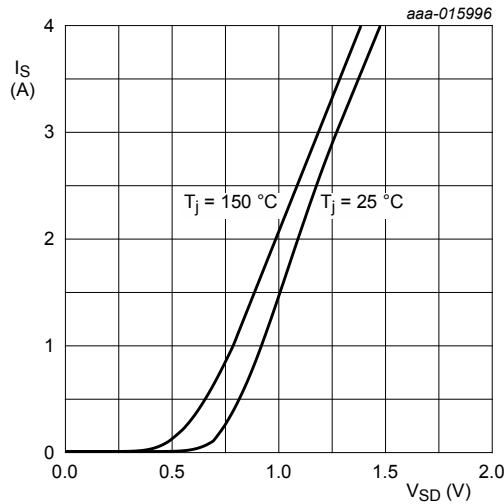


Fig. 16. MOSFET transistor: Gate charge waveform definitions



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

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

11. Test information

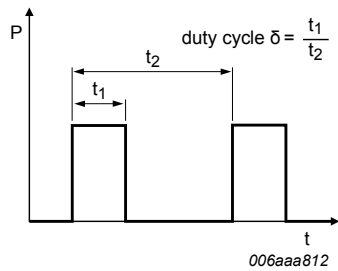


Fig. 18. Duty cycle definition

12. Package outline

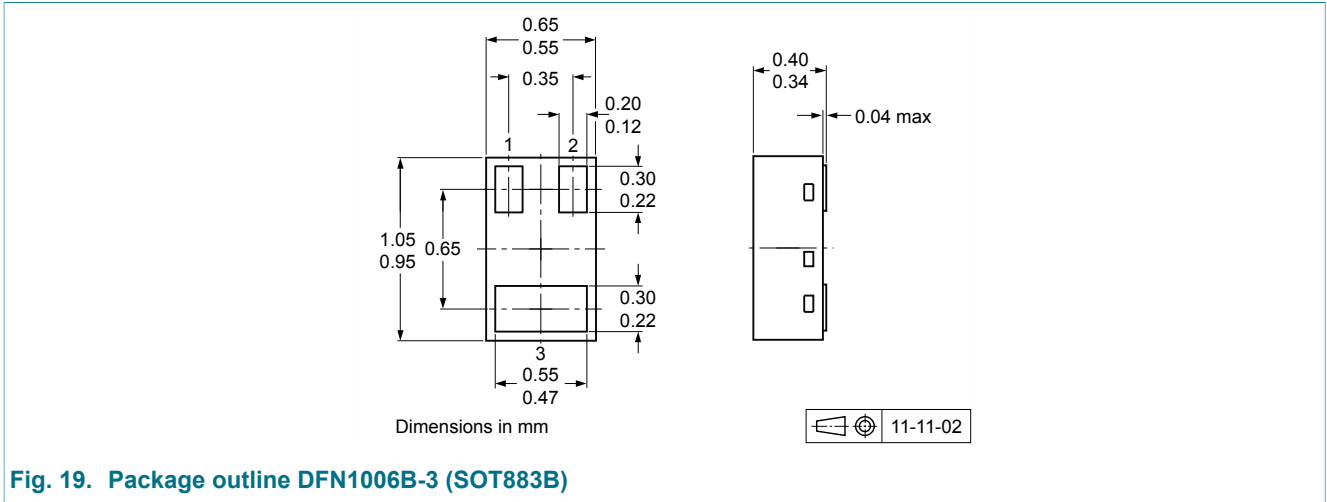


Fig. 19. Package outline DFN1006B-3 (SOT883B)

13. Soldering

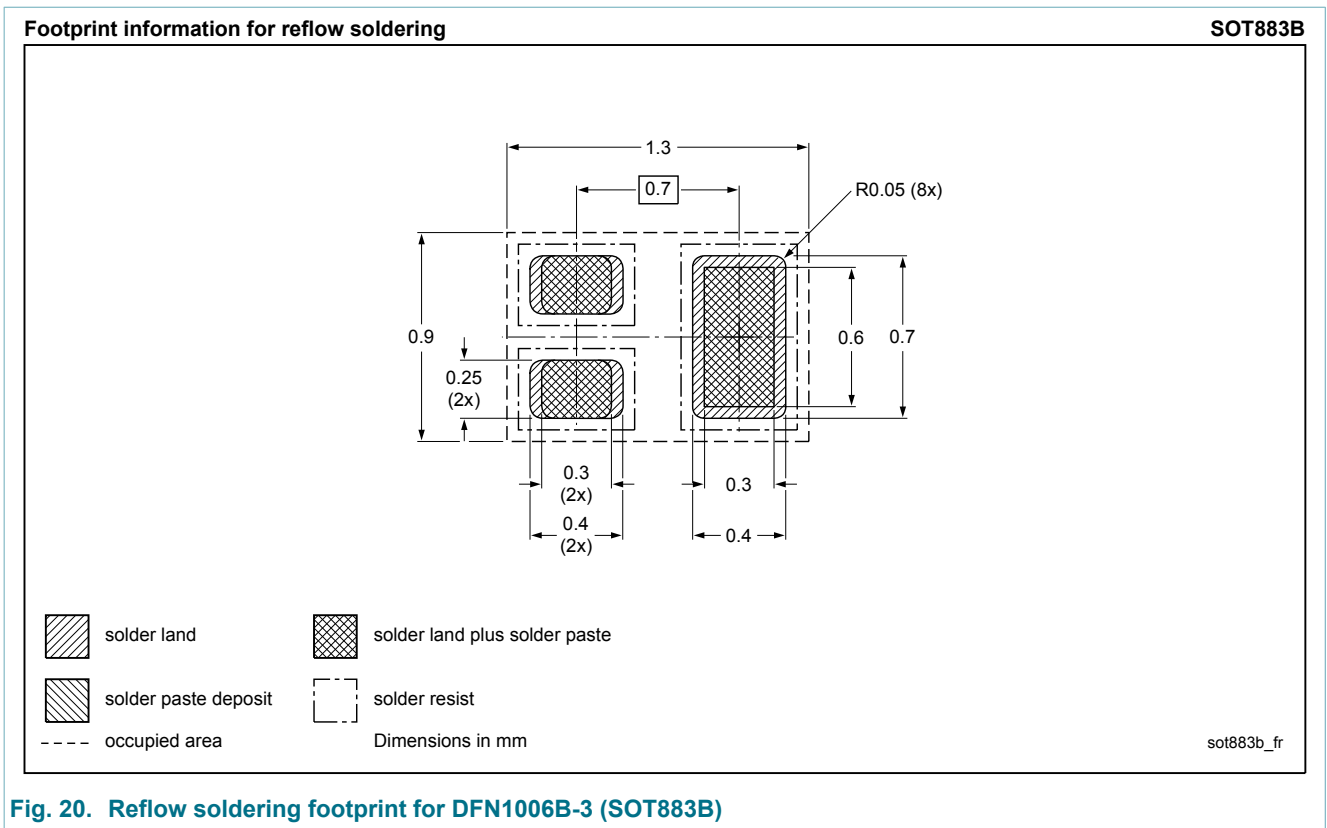


Fig. 20. Reflow soldering footprint for DFN1006B-3 (SOT883B)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PMZB390UNE v.1 | 20150312 | Product data sheet | - | - |

15. Legal information

15.1 Data sheet status

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|--------------------------------|--------------------|---|
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| Product [short] data sheet | Production | This document contains the product specification. |

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