



PMZ320UPE

30 V, P-channel Trench MOSFET

24 March 2015

Product data sheet

1. General description

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

2. Features and benefits

- Trench MOSFET technology
- Low threshold voltage
- Very fast switching
- ElectroStatic Discharge (ESD) protection > 2 kV HBM
- Leadless ultra small SMD plastic package: 1.0 × 0.6 × 0.48 mm

3. Applications

- Relay driver
- High-speed line driver
- High-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 | | - | - | -30 | 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 _{DS(on)} | drain-source on-state resistance | V _{GS} = -4.5 V; I _D = -1 A; T _J = 25 °C | | - | 430 | 510 | mΩ |

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

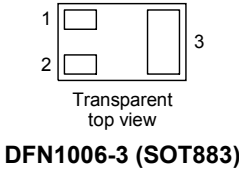
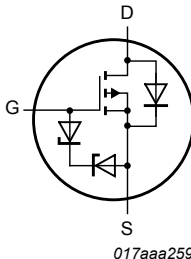


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5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|--|--|
| 1 | G | gate |  <p>Transparent top view</p> <p>DFN1006-3 (SOT883)</p> |  <p>017aaa259</p> |
| 2 | S | source | | |
| 3 | D | drain | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|-----------|---|---------|
| | Name | Description | Version |
| PMZ320UPE | DFN1006-3 | DFN1006-3: leadless ultra small plastic package; 3 solder lands | SOT883 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMZ320UPE | ZW |

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] | - | -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] | - | 350 | mW |
| | | | [1] | - | 760 | mW |
| | | T _{sp} = 25 °C | | - | 6250 | 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 Printed-Circuit Board (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.

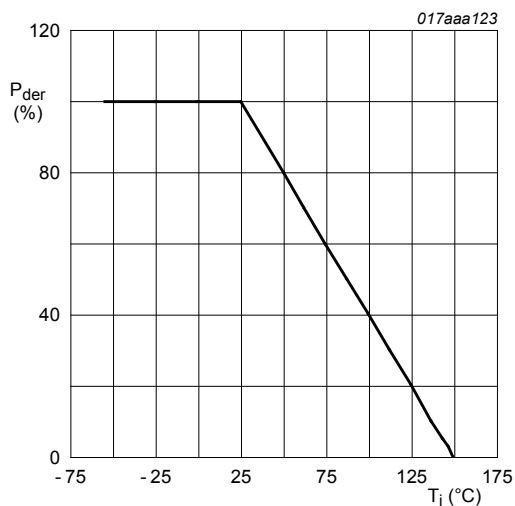


Fig. 1. Normalized total power dissipation as a function of junction temperature

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

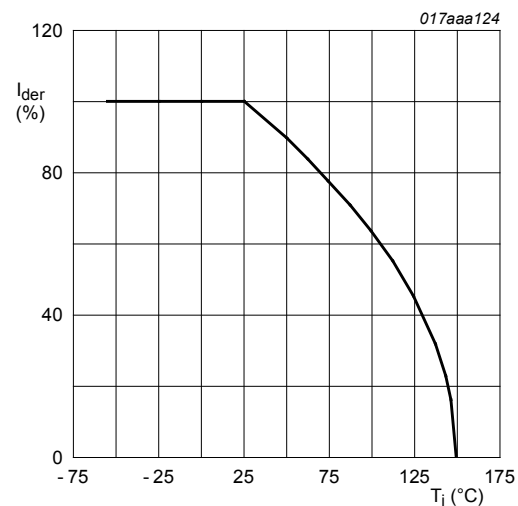
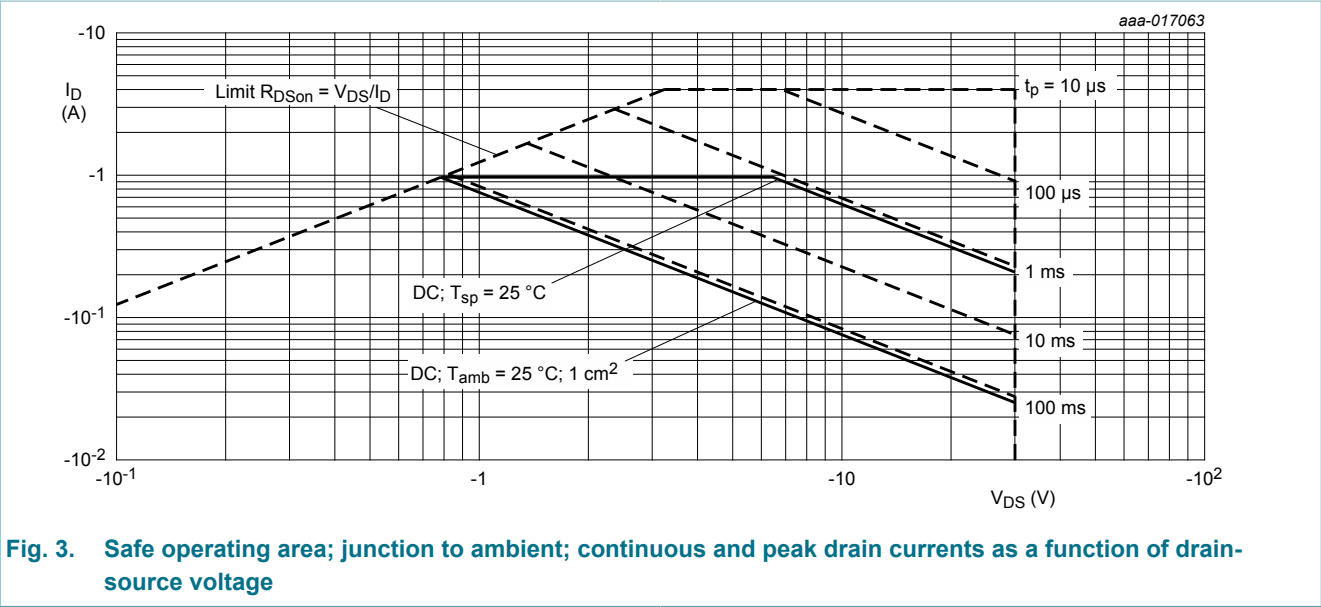


Fig. 2. Normalized continuous drain current as a function of junction temperature

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



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] | - | 145 | 165 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | - | 17 | 20 | 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.

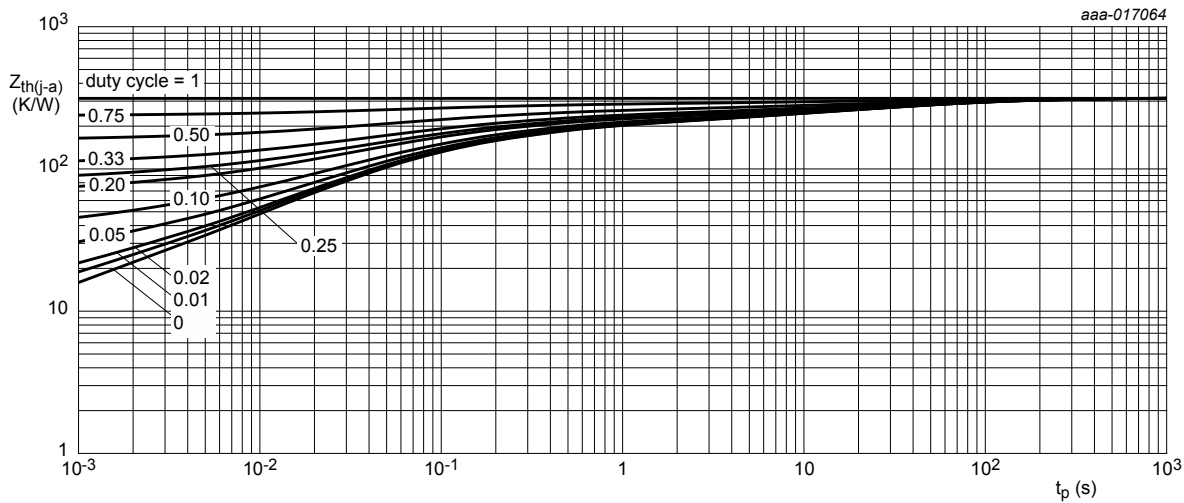


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

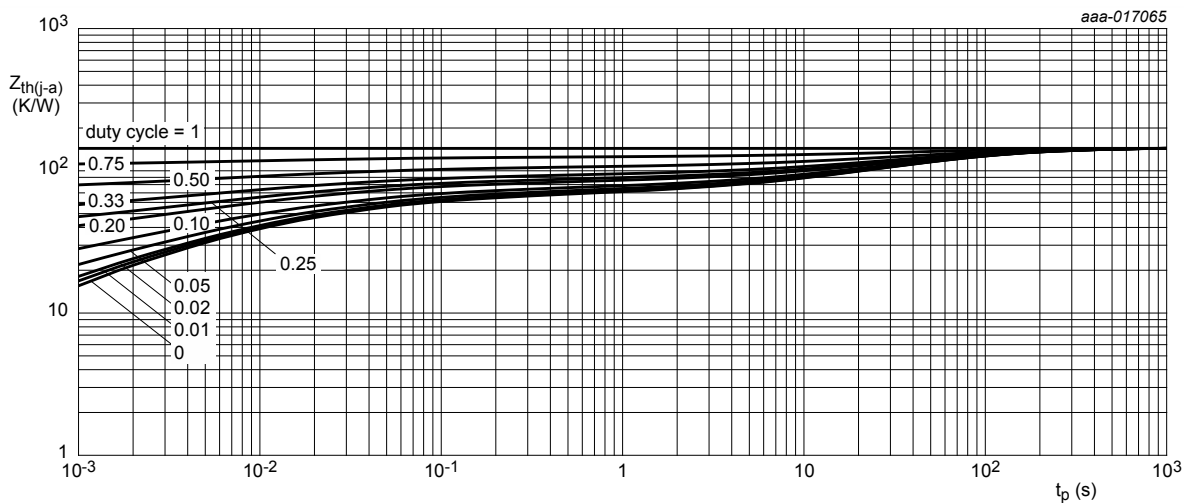


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-------------------------|----------------------------------|---|--|-------|------|-------|------|
| Static characteristics | | | | | | | |
| V _{(BR)DSS} | drain-source breakdown voltage | I _D = -250 μA; V _{GS} = 0 V; T _j = 25 °C | | -30 | - | - | 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} = -30 V; V _{GS} = 0 V; T _j = 25 °C | | - | - | -1 | μA |
| I _{GSS} | gate leakage current | V _{GS} = 8 V; V _{DS} = 0 V; T _j = 25 °C | | - | - | 5 | μA |
| | | V _{GS} = -8 V; V _{DS} = 0 V; T _j = 25 °C | | - | - | -5 | μA |
| | | V _{GS} = 4.5 V; V _{DS} = 0 V; T _j = 25 °C | | - | - | 1 | μA |
| | | V _{GS} = -4.5 V; V _{DS} = 0 V; T _j = 25 °C | | - | - | -1 | μA |
| | | V _{GS} = 2.5 V; V _{DS} = 0 V; T _j = 25 °C | | - | - | 100 | nA |
| | | V _{GS} = -2.5 V; V _{DS} = 0 V; T _j = 25 °C | | - | - | -100 | nA |
| R _{DSon} | drain-source on-state resistance | V _{GS} = -4.5 V; I _D = -1 A; T _j = 25 °C | | - | 430 | 510 | mΩ |
| | | V _{GS} = -4.5 V; I _D = -1 A; T _j = 150 °C | | - | 680 | 810 | mΩ |
| | | V _{GS} = -2.5 V; I _D = -0.8 A; T _j = 25 °C | | - | 570 | 770 | mΩ |
| | | V _{GS} = -1.8 V; I _D = -0.25 A; T _j = 25 °C | | - | 750 | 1140 | mΩ |
| | | V _{GS} = -1.5 V; I _D = -0.01 A; T _j = 25 °C | | - | 950 | 1610 | mΩ |
| g _{fs} | forward transconductance | V _{DS} = -10 V; I _D = -1 A; T _j = 25 °C | | - | 2.1 | - | S |
| Dynamic characteristics | | | | | | | |
| Q _{G(tot)} | total gate charge | V _{DS} = -15 V; I _D = -1 A; V _{GS} = -4.5 V; T _j = 25 °C | | - | 1.4 | - | nC |
| Q _{GS} | gate-source charge | | | - | 0.2 | - | nC |
| Q _{GD} | gate-drain charge | | | - | 0.3 | - | nC |
| C _{iss} | input capacitance | V _{DS} = -15 V; f = 1 MHz; V _{GS} = 0 V; T _j = 25 °C | | - | 122 | - | pF |
| C _{oss} | output capacitance | | | - | 11 | - | pF |
| C _{rss} | reverse transfer capacitance | | | - | 9 | - | pF |
| t _{d(on)} | turn-on delay time | V _{DS} = -15 V; I _D = -1 A; V _{GS} = -4.5 V; R _{G(ext)} = 6 Ω; T _j = 25 °C | | - | 3 | - | ns |
| t _r | rise time | | | - | 6 | - | ns |
| t _{d(off)} | turn-off delay time | | | - | 22 | - | ns |
| t _f | fall time | | | - | 5 | - | ns |
| Source-drain diode | | | | | | | |
| V _{SD} | source-drain voltage | I _S = -0.7 A; V _{GS} = 0 V; T _j = 25 °C | | - | -1 | -1.2 | V |

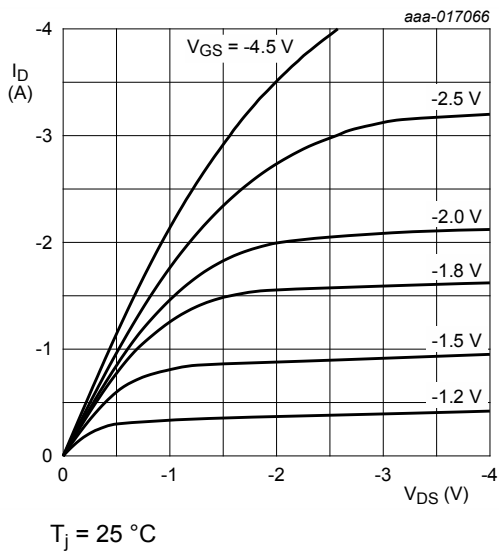


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

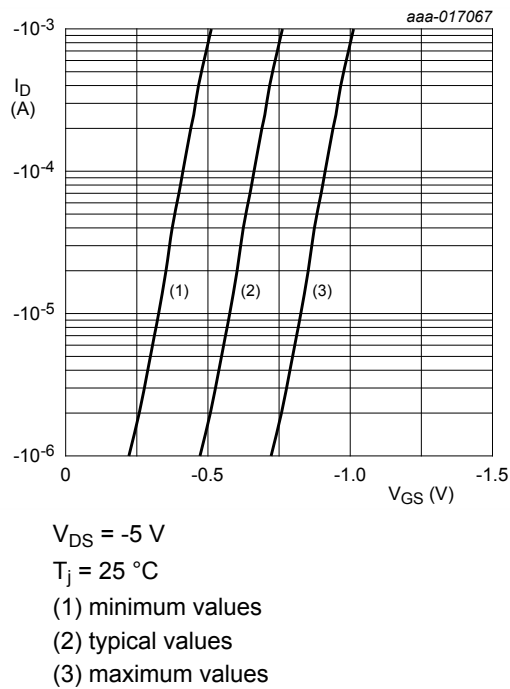


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

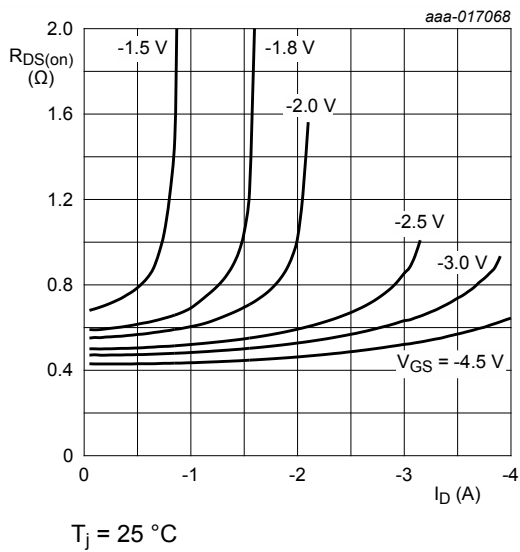


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

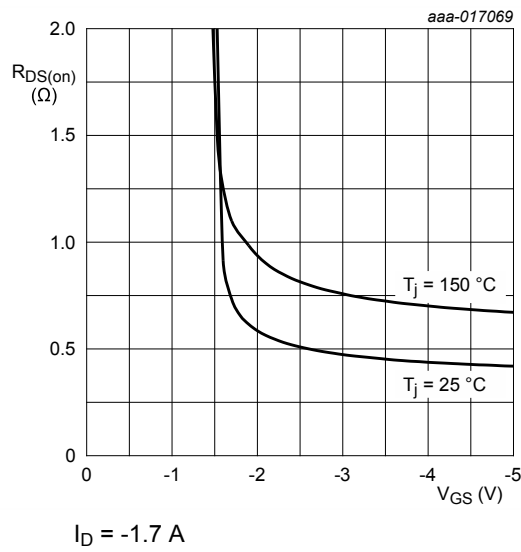


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

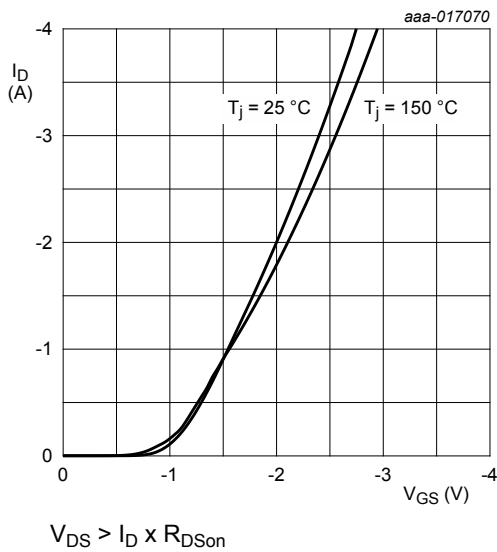


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

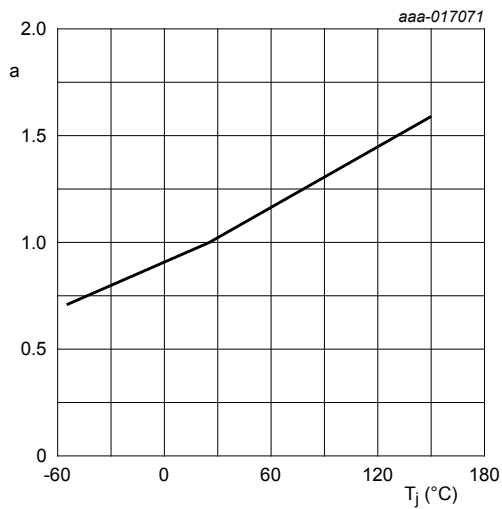
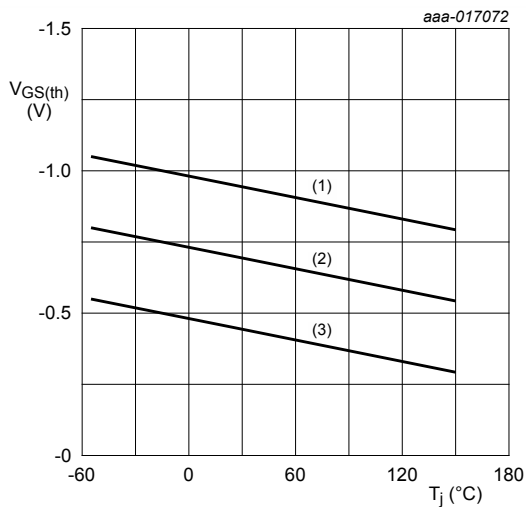


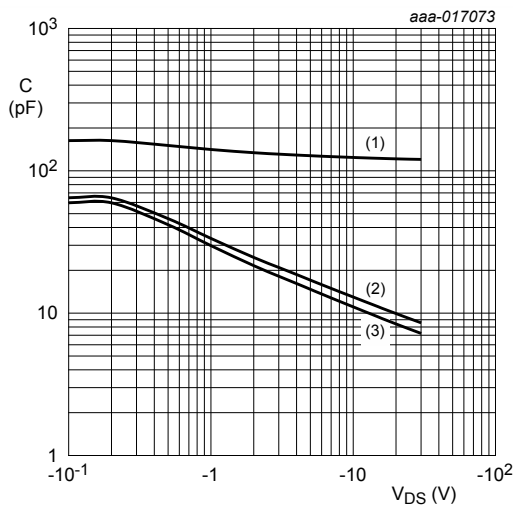
Fig. 11. Normalized drain-source on-state resistance as a function of ambient temperature; typical values

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



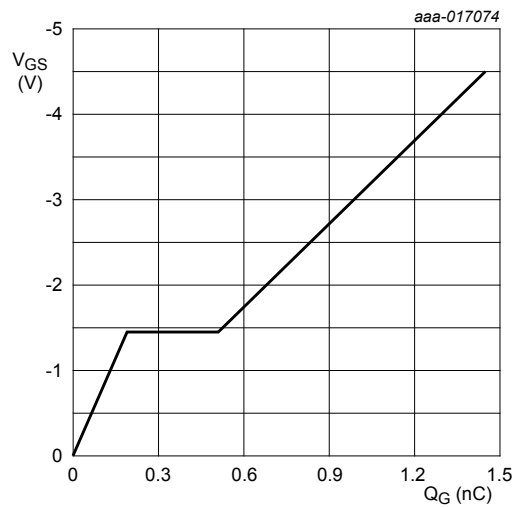
$I_D = -250\text{ }\mu\text{A}$; $V_{DS} = V_{GS}$
(1) maximum values
(2) typical values
(3) maximum values

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



$f = 1\text{ MHz}$; $V_{GS} = 0\text{ V}$
(1) C_{iss}
(2) C_{oss}
(3) C_{rss}

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



$V_{DS} = -15\text{ V}; I_D = -1\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$

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

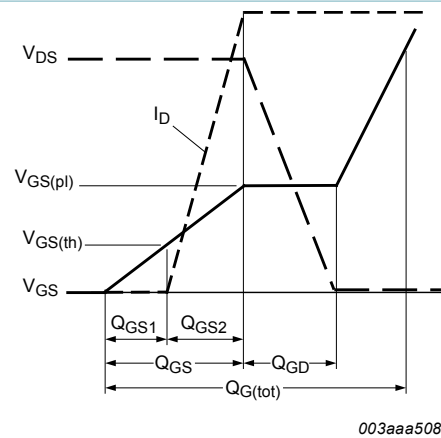
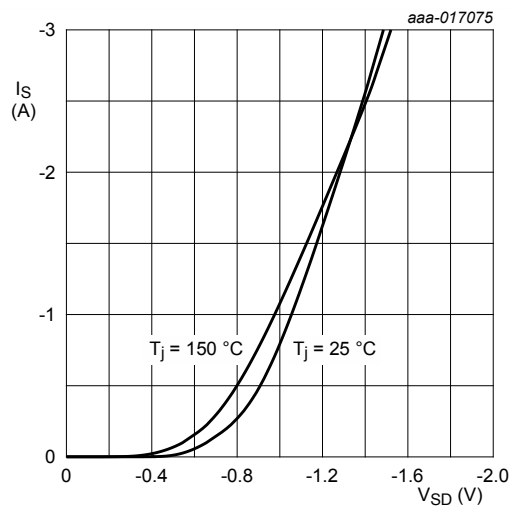


Fig. 15. Gate charge waveform definitions



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

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

11. Test information

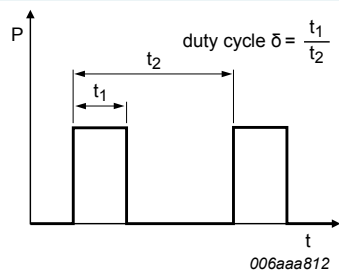


Fig. 17. Duty cycle definition

12. Package outline

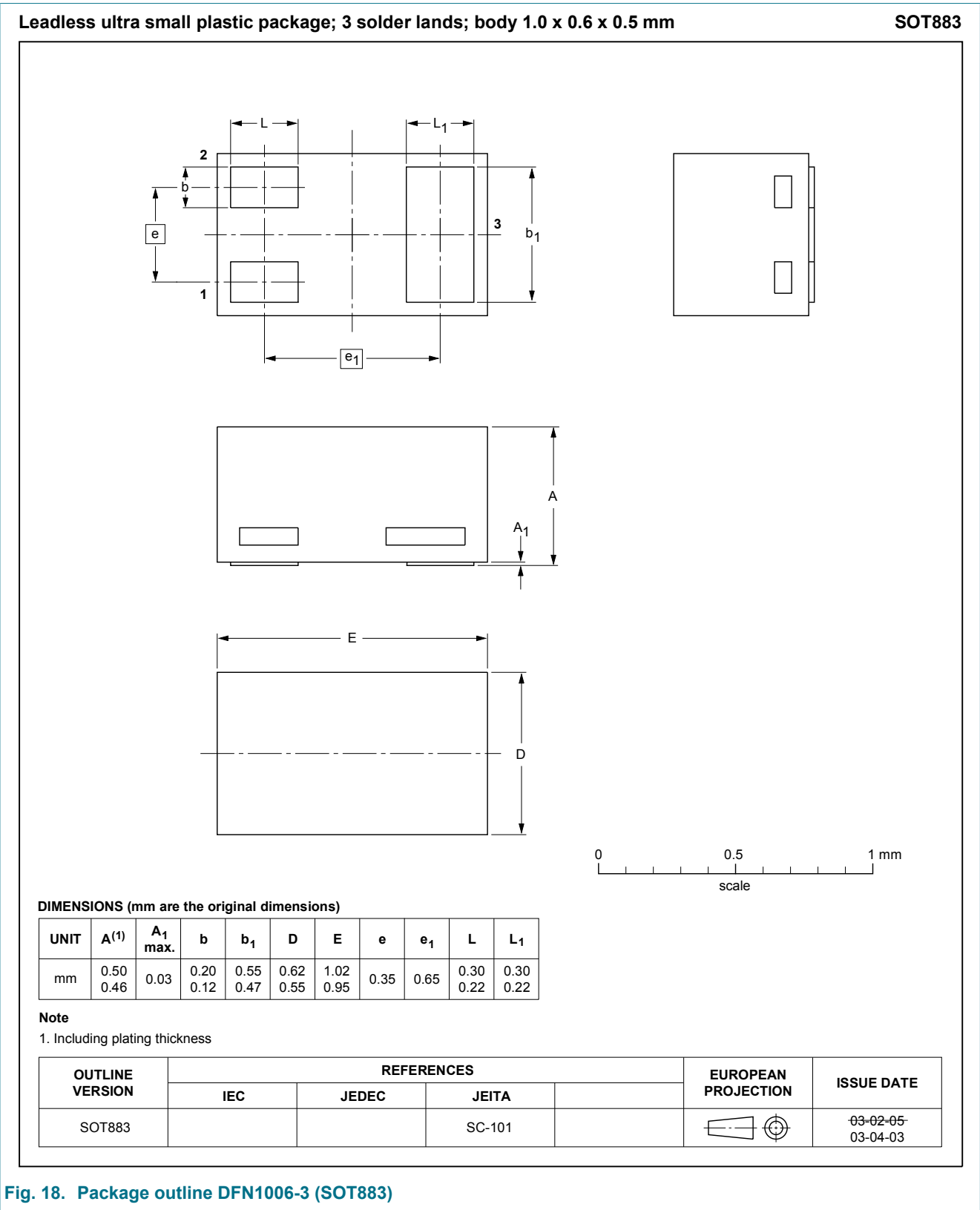


Fig. 18. Package outline DFN1006-3 (SOT883)

13. Soldering

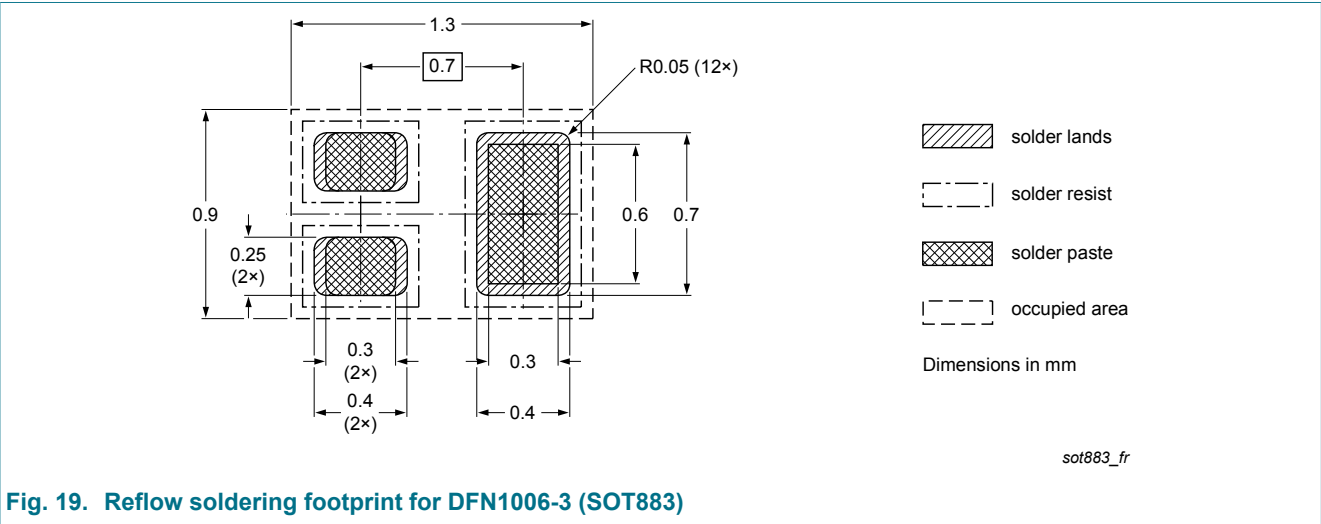


Fig. 19. Reflow soldering footprint for DFN1006-3 (SOT883)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| PMZ320UPE v.1 | 20150324 | Product data sheet | - | - |

15. Legal information

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|--------------------------------|--------------------|---|
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Date of release: 24 March 2015