



PMCB60XNE

30 V, N-channel Trench MOSFET

21 February 2022

Product data sheet

1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a leadless ultra small DSN1006-3 (SOT8026) Surface-Mounted Device (SMD) package using Trench MOSFET technology.

2. Features and benefits

- Low threshold voltage
- Very fast switching
- Ultra small package: 1.0 × 0.6 × 0.2 mm
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection > 2 kV HBM (class H2)

3. Applications

- Battery switch
- High-speed line driver
- Low-side load switch
- Switching circuits

4. Quick reference data

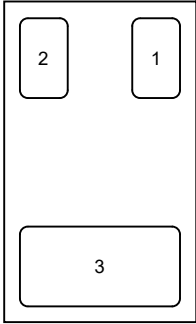
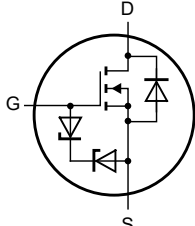
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|----------------------------------|--|-----|-----|-----|------|
| V_{DS} | drain-source voltage | $T_j = 25\text{ °C}$ | - | - | 30 | V |
| V_{GS} | gate-source voltage | | -12 | - | 12 | V |
| I_D | drain current | $V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ °C}; t \leq 5\text{ s}$ | [1] | - | 4.3 | A |
| Static characteristics | | | | | | |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = 4.5\text{ V}; I_D = 3.5\text{ A}; T_j = 25\text{ °C}$ | - | 40 | 55 | mΩ |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 6 cm².

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|--|
| 1 | G | gate |  <p>Transparent top view DSN1006 (SOT8026)</p> |  <p>017aaa255</p> |
| 2 | S | source | | |
| 3 | D | drain | | |

6. Ordering information

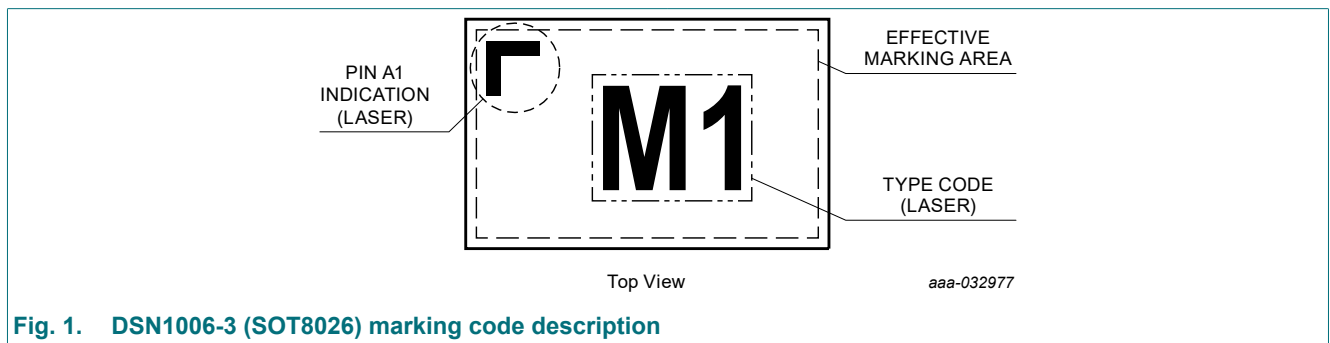
Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PMCB60XNE | DSN1006 | chip-scale package; 3 terminals; body 1.0 x 0.6 x 0.2 mm | SOT8026 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMCB60XNE | M2 |



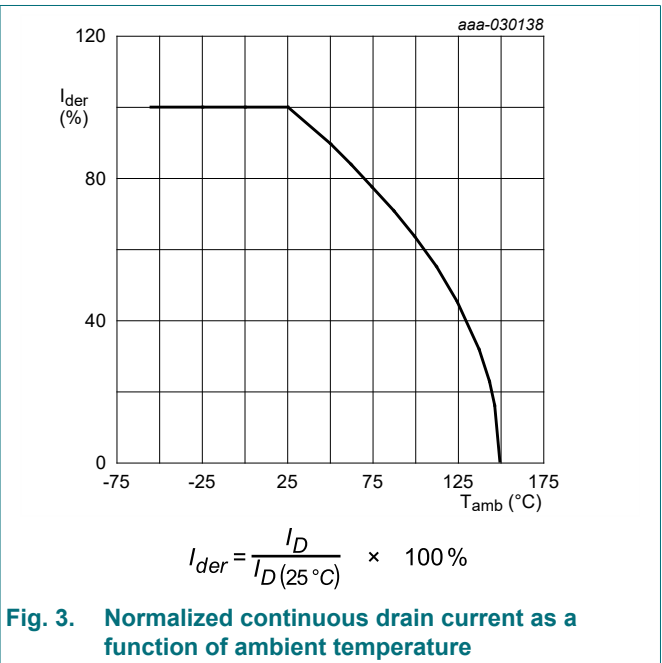
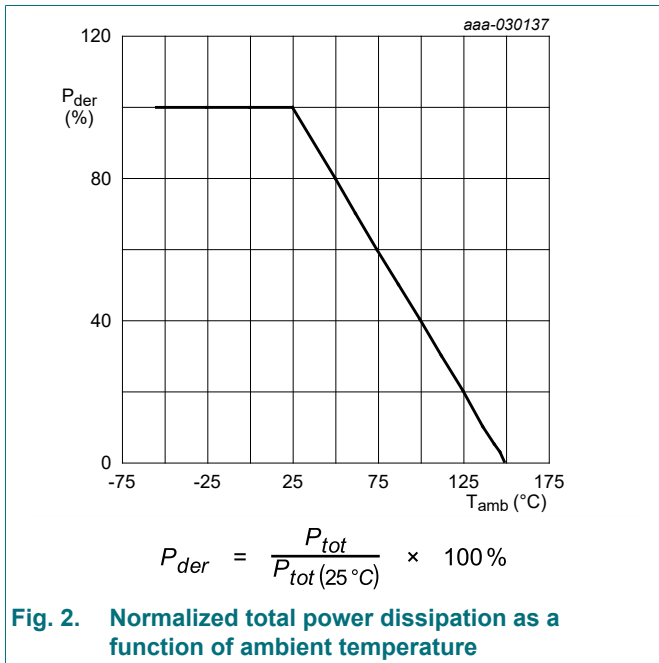
8. Limiting values

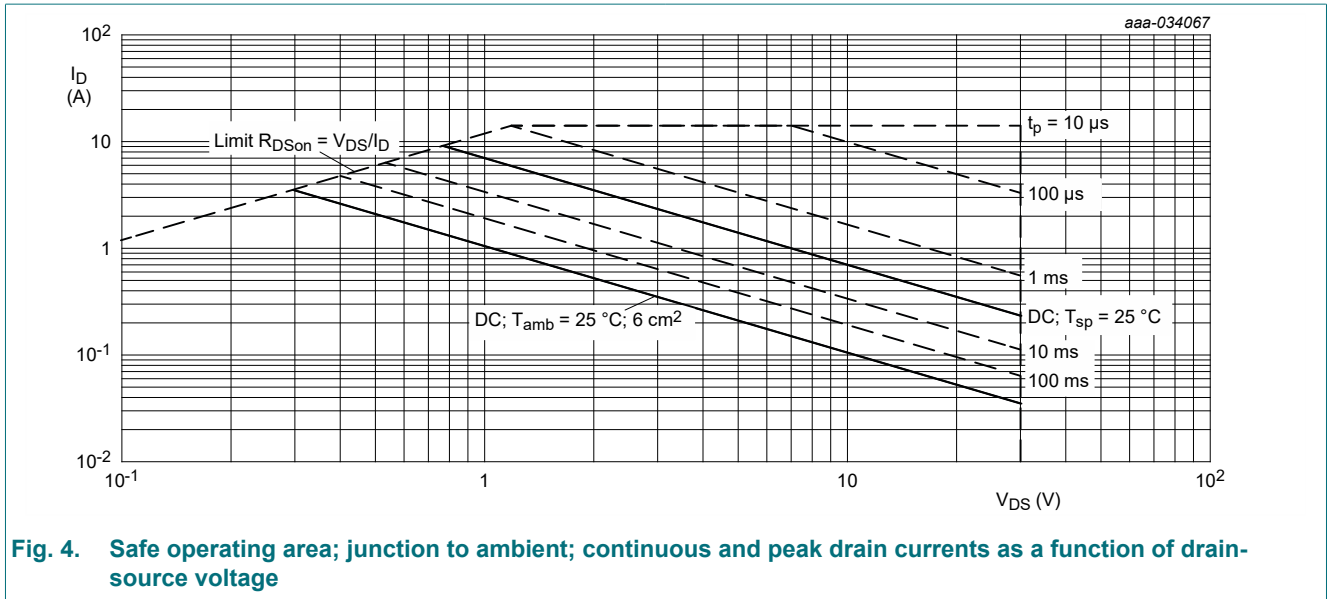
Table 5. Limiting values

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 | | | -12 | 12 | V |
| I _D | drain current | V _{GS} = 4.5 V; T _{amb} = 25 °C; t ≤ 5 s | [1] | - | 4.3 | A |
| | | V _{GS} = 4.5 V; T _{amb} = 25 °C | [1] | - | 3.5 | A |
| | | V _{GS} = 4.5 V; T _{amb} = 100 °C | [1] | - | 2.2 | A |
| I _{DM} | peak drain current | T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs | | - | 14 | A |
| P _{tot} | total power dissipation | T _{amb} = 25 °C | [2] | - | 480 | mW |
| | | | [3] | - | 900 | mW |
| | | | [1] | - | 1 | W |
| | | T _{sp} = 25 °C | | - | 7 | W |
| 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] | - | 1 | A |

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 6 cm².
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, 4 layer copper, tin-plated and standard footprint.



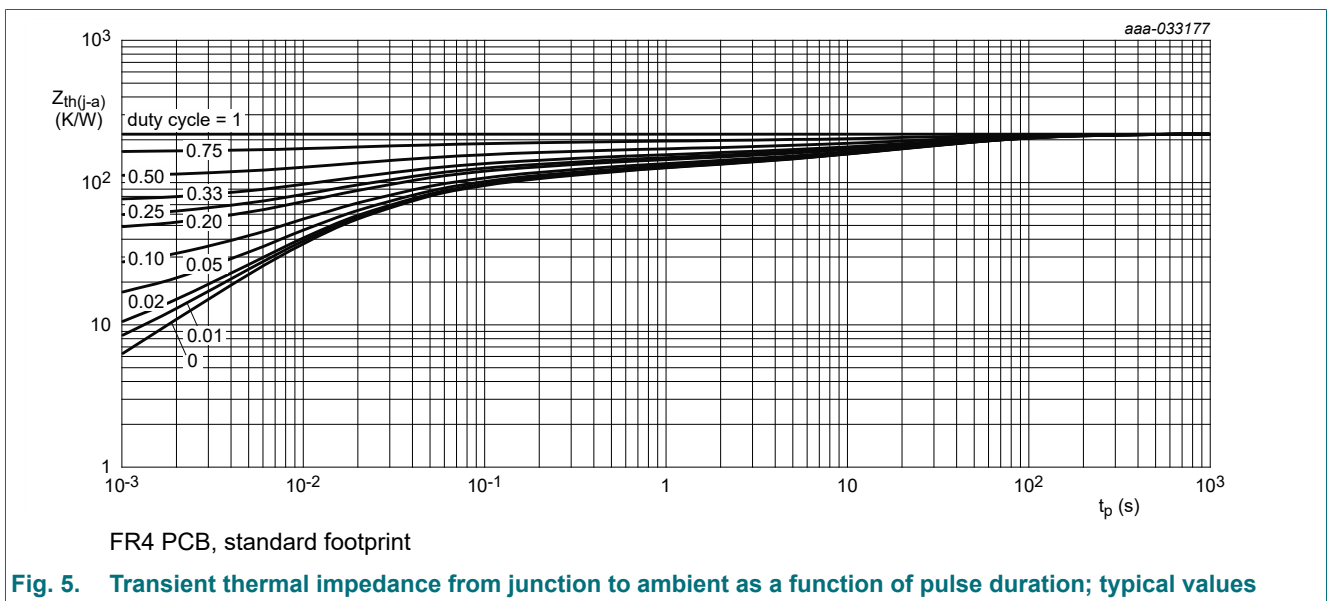


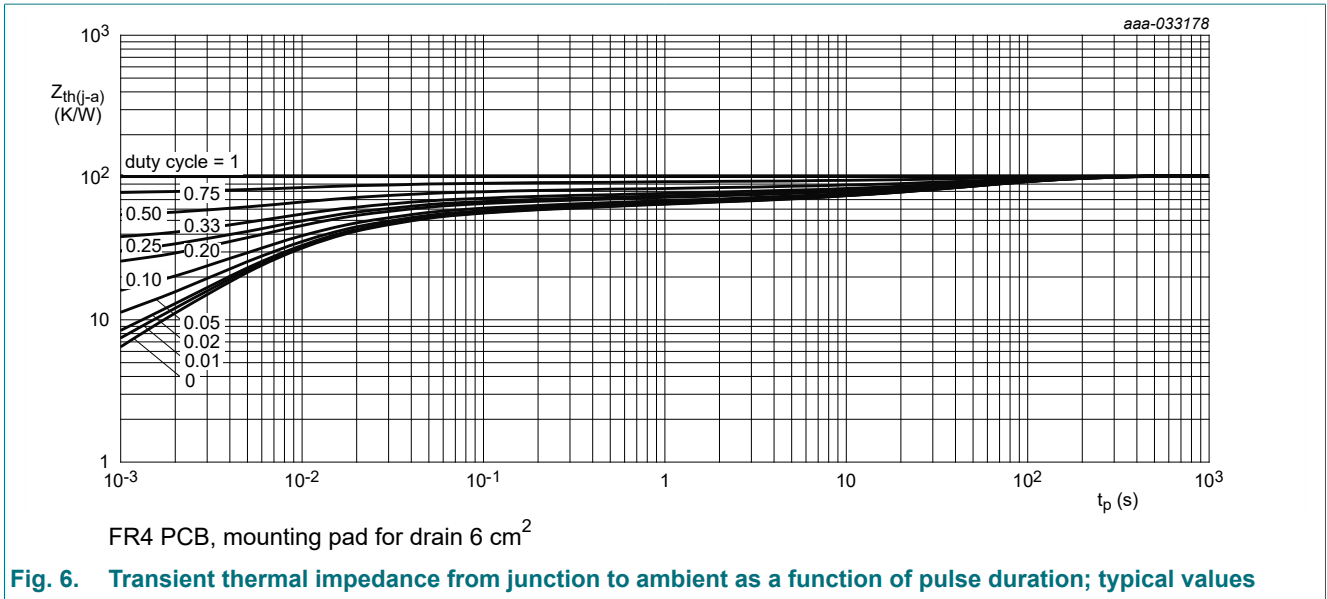
9. Thermal characteristics

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] | - | 220 | 258 | K/W |
| | | | [2] | - | 123 | 142 | K/W |
| | | | [3] | - | 102 | 120 | K/W |
| | | in free air; t ≤ 5 s | [3] | - | 70 | 80 | K/W |
| R _{th(j-sp)} | thermal resistance from junction to solder point | | | - | 13 | 18 | K/W |

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, 4 layer copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for drain 6 cm².





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 | $I_D = 250 \mu A$; $V_{DS} = V_{GS}$; $T_j = 25 \text{ }^\circ C$ | 0.5 | 0.8 | 1.1 | 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 | $V_{GS} = 12 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | 10 | μA |
| | | $V_{GS} = -12 V$; $V_{DS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | - | -10 | μA |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = 4.5 V$; $I_D = 3.5 A$; $T_j = 25 \text{ }^\circ C$ | - | 40 | 55 | m Ω |
| | | $V_{GS} = 4.5 V$; $I_D = 3.5 A$; $T_j = 150 \text{ }^\circ C$ | - | 66 | 91 | m Ω |
| | | $V_{GS} = 2.5 V$; $I_D = 2 A$; $T_j = 25 \text{ }^\circ C$ | - | 48 | 75 | m Ω |
| | | $V_{GS} = 1.8 V$; $I_D = 0.5 A$; $T_j = 25 \text{ }^\circ C$ | - | 70 | 155 | m Ω |
| g_{fs} | forward transconductance | $V_{DS} = 10 V$; $I_D = 4 A$; $T_j = 25 \text{ }^\circ C$ | - | 6.7 | - | S |
| Dynamic characteristics | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $V_{DS} = 15 V$; $I_D = 4 A$; $V_{GS} = 4.5 V$; $T_j = 25 \text{ }^\circ C$ | - | 5 | 7.5 | nC |
| Q_{GS} | gate-source charge | | - | 0.8 | - | nC |
| Q_{GD} | gate-drain charge | | - | 1.4 | - | nC |
| C_{iss} | input capacitance | $V_{DS} = 15 V$; $f = 1 \text{ MHz}$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | 420 | - | pF |
| C_{oss} | output capacitance | | - | 36 | - | pF |
| C_{rss} | reverse transfer capacitance | | - | 26 | - | pF |
| $t_{d(on)}$ | turn-on delay time | | $V_{DS} = 15 V$; $I_D = 4 A$; $V_{GS} = 4.5 V$; $R_{G(ext)} = 6 \Omega$; $T_j = 25 \text{ }^\circ C$ | - | 20 | - |
| t_r | rise time | - | | 40 | - | ns |
| $t_{d(off)}$ | turn-off delay time | - | | 107 | - | ns |
| t_f | fall time | - | | 74 | - | ns |
| Source-drain diode | | | | | | |
| V_{SD} | source-drain voltage | $I_S = 1 A$; $V_{GS} = 0 V$; $T_j = 25 \text{ }^\circ C$ | - | 0.7 | 1.2 | V |

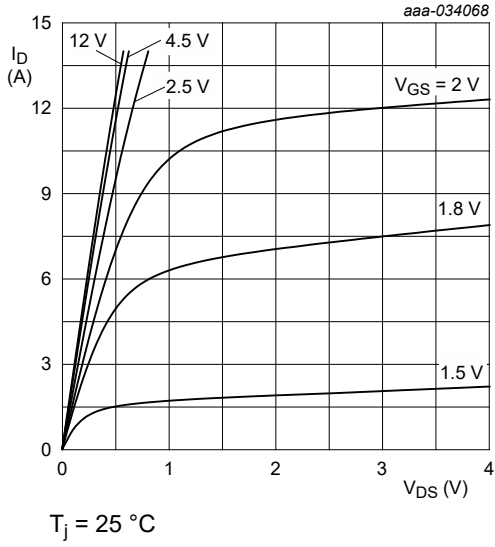


Fig. 7. Output characteristics: drain current as a function of drain-source voltage; typical values

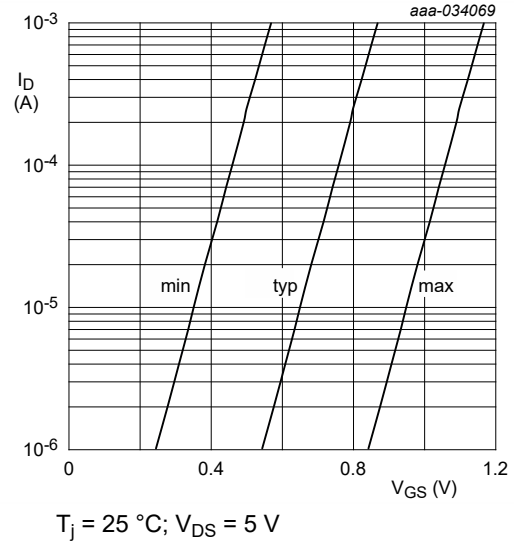


Fig. 8. Subthreshold drain current as a function of gate-source voltage

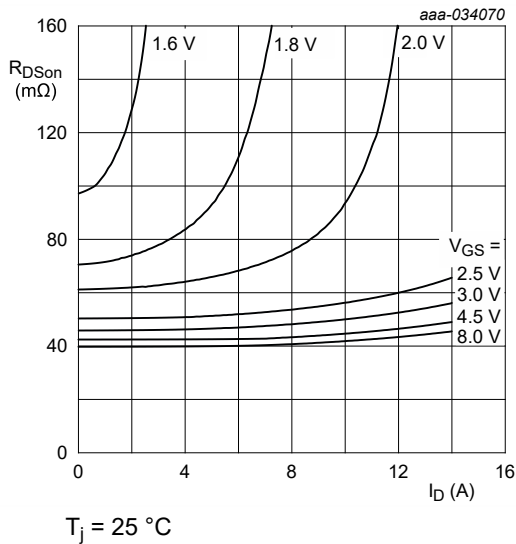


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

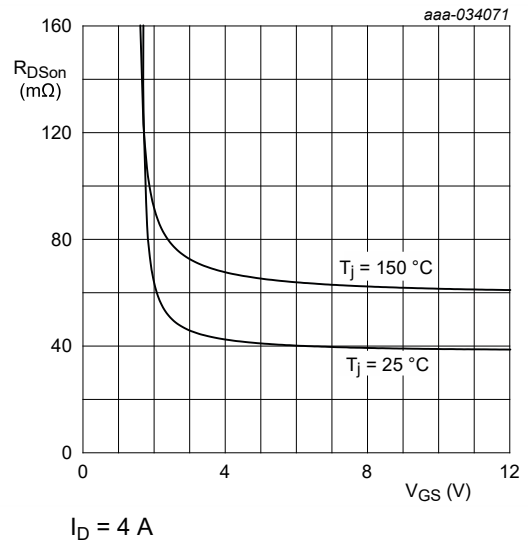


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

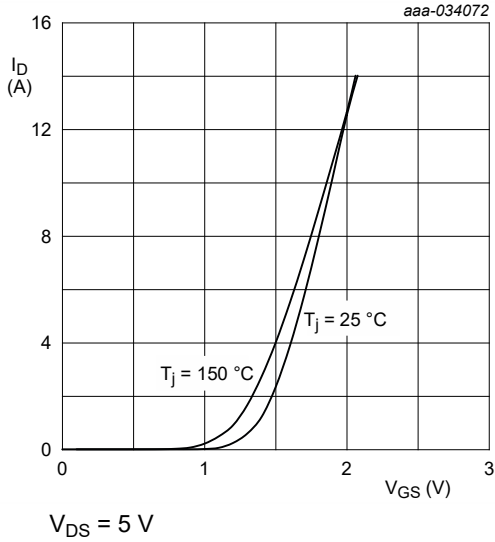


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

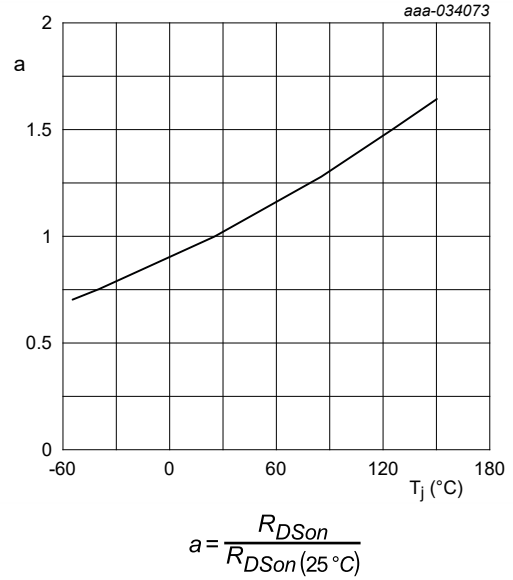


Fig. 12. Normalized drain-source on-state resistance as a function of junction temperature; typical values

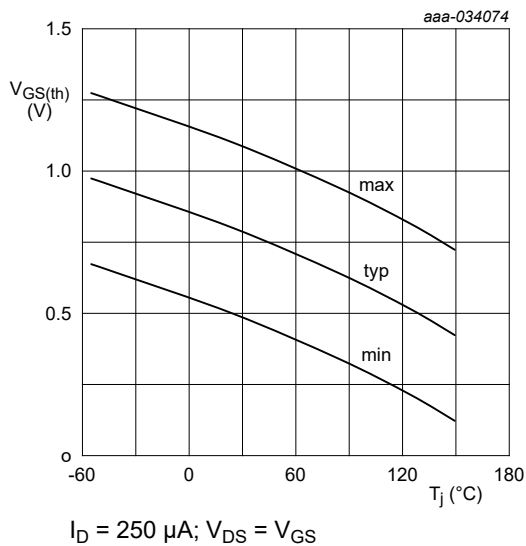


Fig. 13. Gate-source threshold voltage as a function of junction temperature

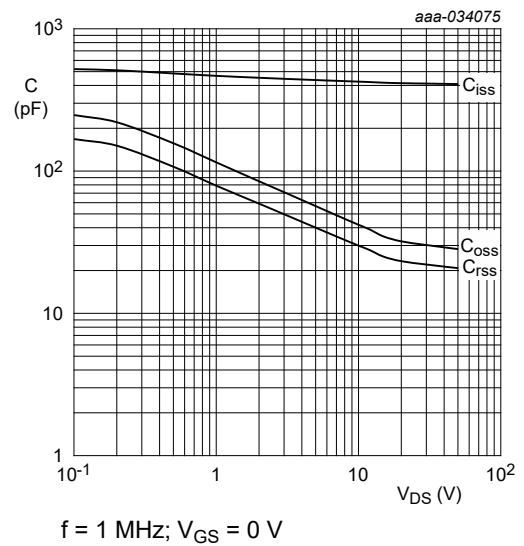
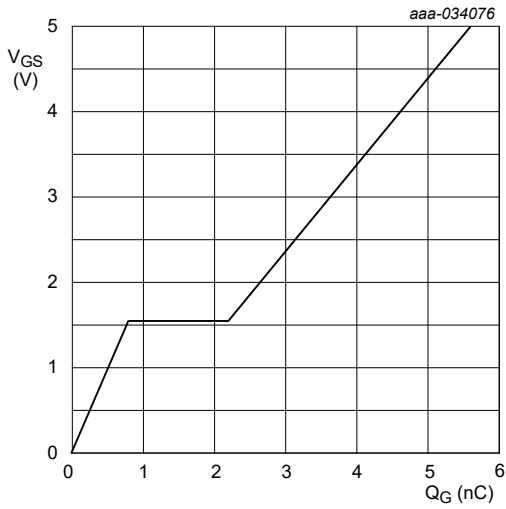


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



$I_D = 4 \text{ A}; V_{DS} = 15 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$

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

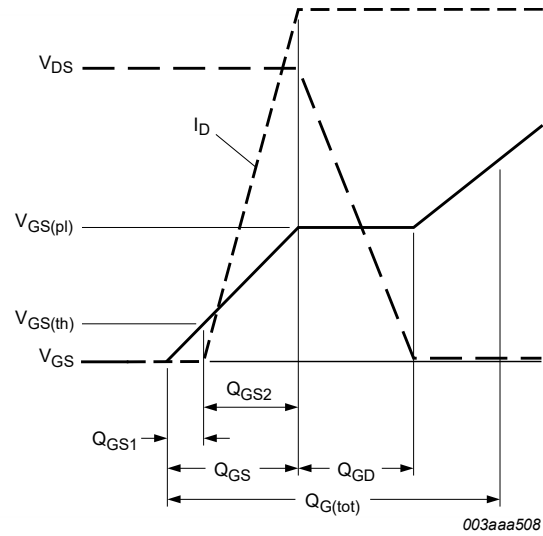
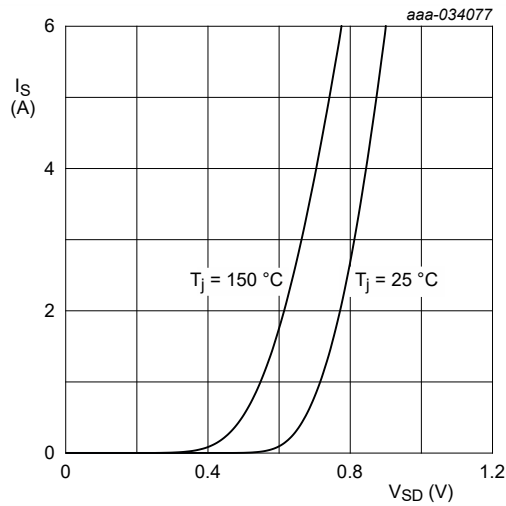


Fig. 16. Gate charge waveform definitions



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

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

11. Test information

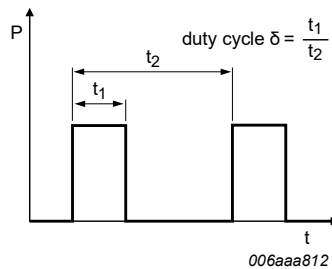


Fig. 18. Duty cycle definition

12. Package outline

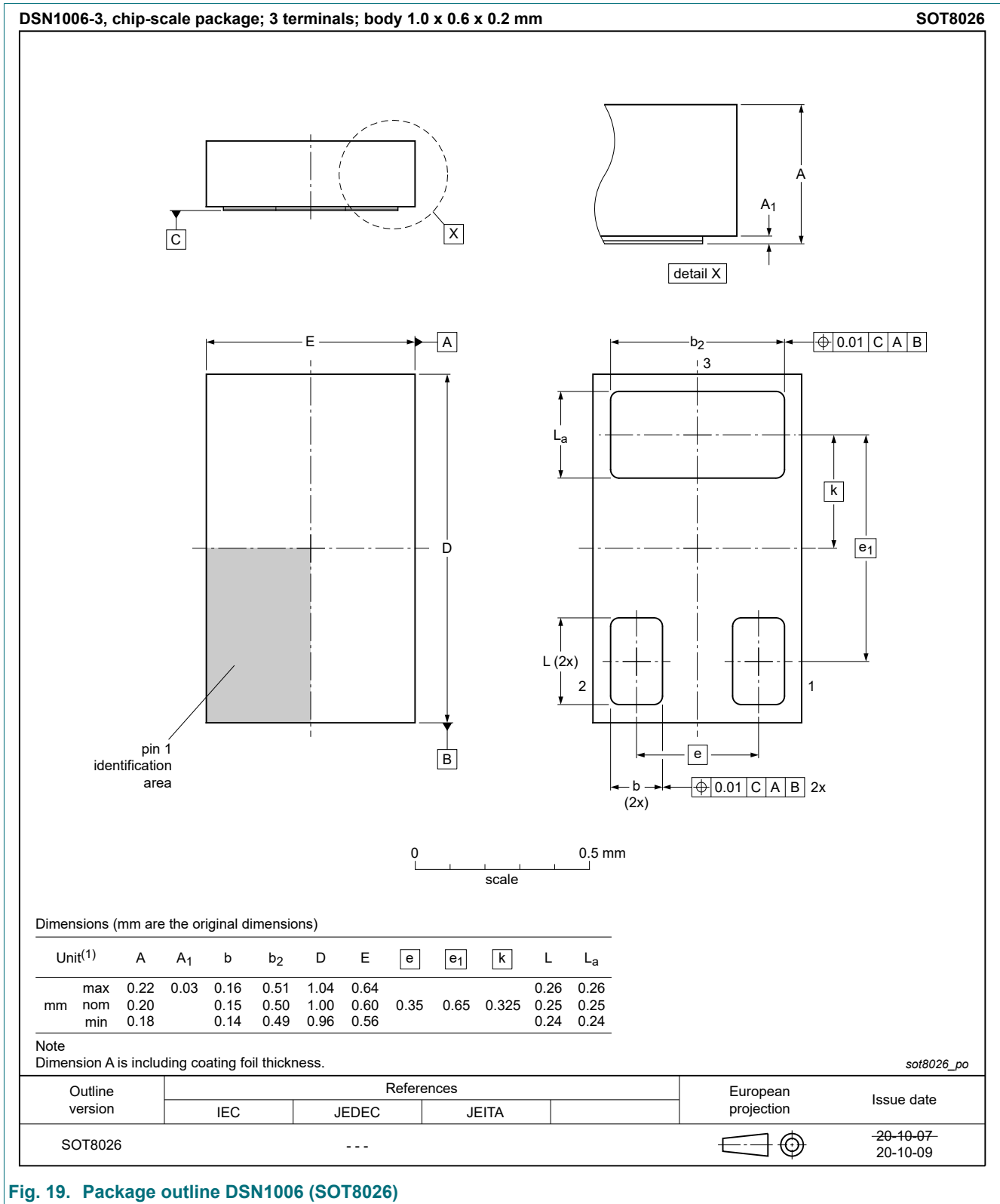


Fig. 19. Package outline DSN1006 (SOT8026)

13. Soldering

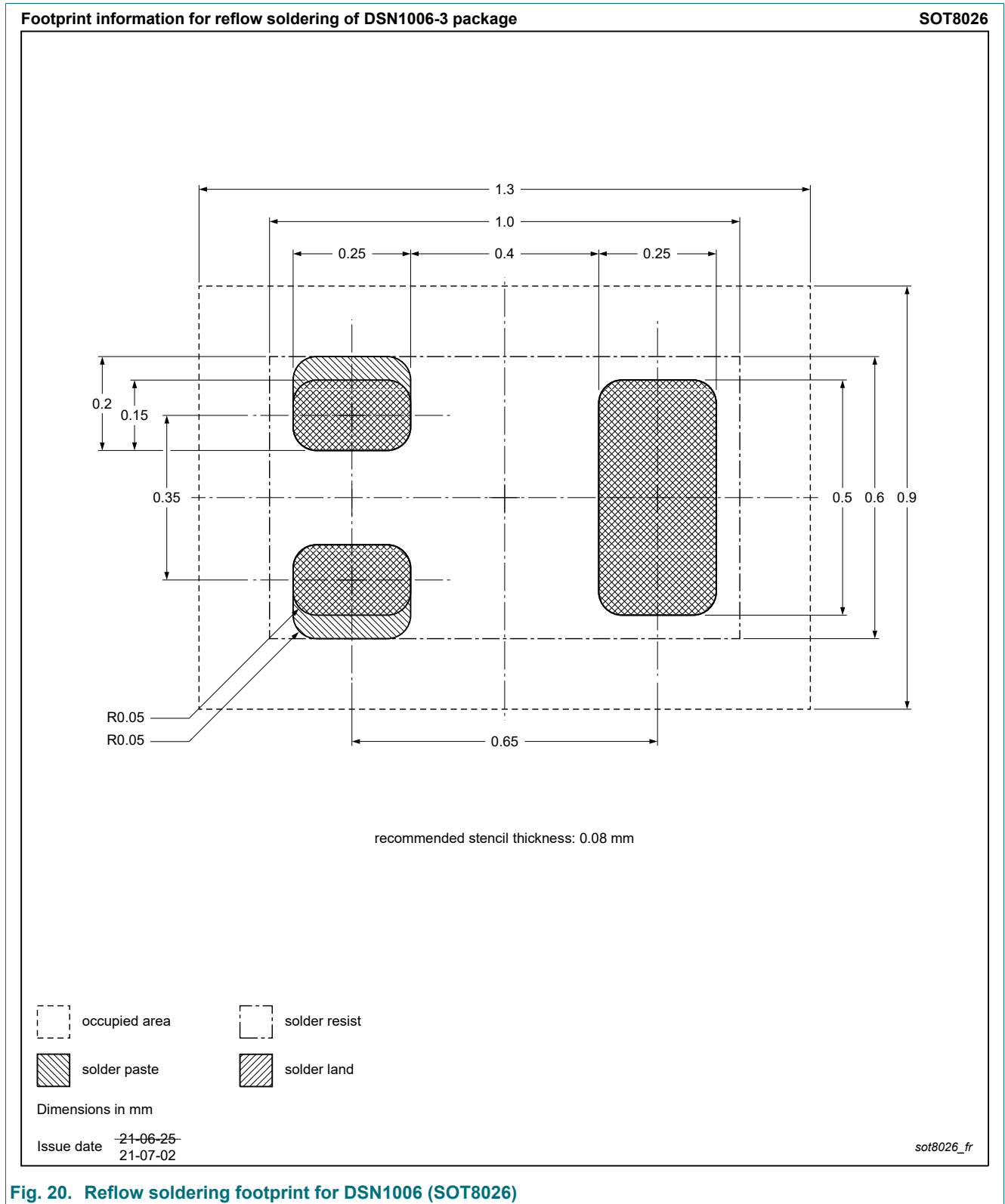


Fig. 20. Reflow soldering footprint for DSN1006 (SOT8026)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| PMCB60XNE v.1 | 20220221 | Product data sheet | - | - |

15. Legal information

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. |

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