



NX3008PBKV

30 V, 220 mA dual P-channel Trench MOSFET

28 December 2022

Product data sheet

1. General description

Dual P-channel enhancement mode Field-Effect Transistor (FET) in an ultra small and flat lead SOT666 Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

2. Features and benefits

- Very fast switching
- Low threshold voltage
- Trench MOSFET technology
- ESD protection up to 2 kV

3. Applications

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

4. Quick reference data

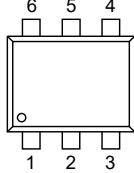
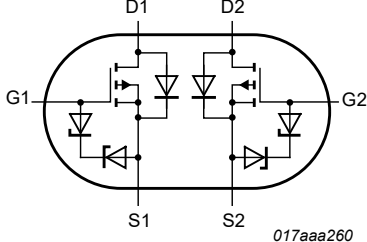
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--|----------------------------------|--|-----|-----|------|----------|
| Per transistor | | | | | | |
| 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] | - | -220 | mA |
| Static characteristics (per transistor) | | | | | | |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = -4.5\text{ V}; I_D = -200\text{ mA}; T_j = 25\text{ °C}$ | - | 2.8 | 4.1 | 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 | S1 | source TR1 |  <p>SOT666</p> |  <p>017aaa260</p> |
| 2 | G1 | gate TR1 | | |
| 3 | D2 | drain TR2 | | |
| 4 | S2 | source TR2 | | |
| 5 | G2 | gate TR2 | | |
| 6 | D1 | drain TR1 | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| NX3008PBKV | SOT666 | plastic, surface-mounted package; 6 leads; 0.5 mm pitch; 1.6 mm x 1.2 mm x 0.55 mm body | SOT666 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| NX3008PBKV | AB |

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---------------------------|---------------------------------|--|-----|-----|------|------|
| Per transistor | | | | | | |
| 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] | - | -220 | mA |
| | | V _{GS} = -4.5 V; T _{amb} = 100 °C | [1] | - | -140 | mA |
| I _{DM} | peak drain current | T _{amb} = 25 °C; single pulse; t _p ≤ 10 μs | | - | -0.9 | A |
| P _{tot} | total power dissipation | T _{amb} = 25 °C | [2] | - | 330 | mW |
| | | | [1] | - | 390 | mW |
| | | T _{sp} = 25 °C | | - | 1090 | mW |
| Per device | | | | | | |
| P _{tot} | total power dissipation | T _{amb} = 25 °C | [2] | - | 500 | 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] | - | -220 | 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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[3] Measured between all pins.

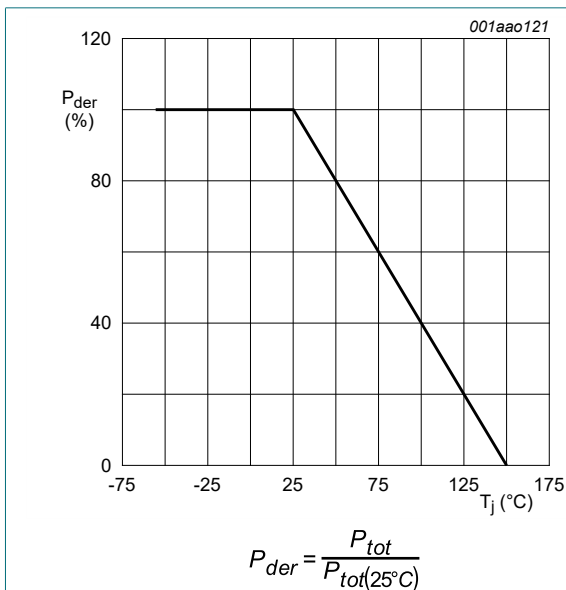


Fig. 1. Normalized total power dissipation as a function of junction temperature

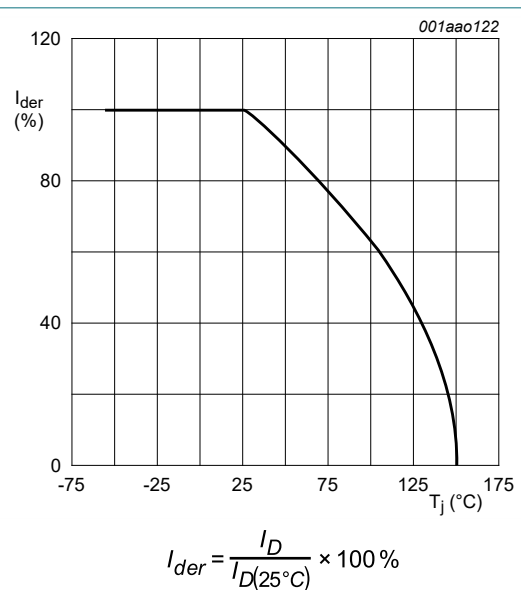
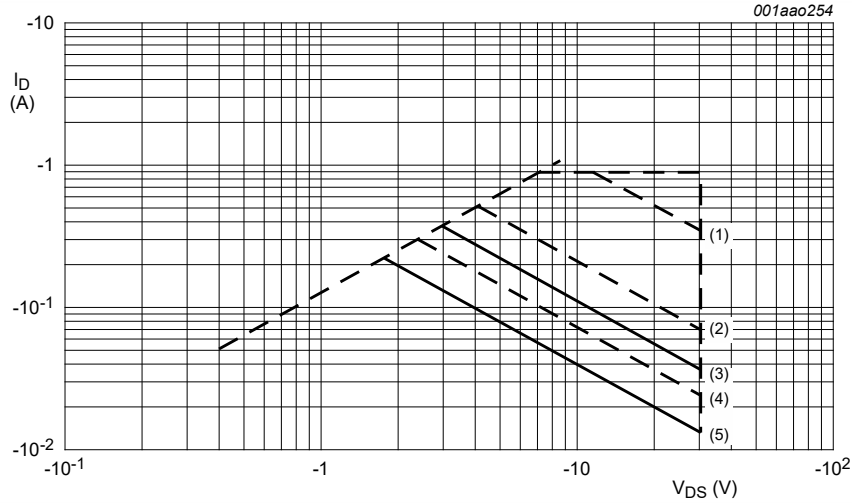


Fig. 2. Normalized continuous drain current as a function of junction temperature



I_{DM} is a single pulse
 (1) $t_p = 1\text{ ms}$
 (2) $t_p = 10\text{ ms}$
 (3) DC; $T_{sp} = 25\text{ }^\circ\text{C}$
 (4) $t_p = 100\text{ ms}$
 (5) DC; $T_{amb} = 25\text{ }^\circ\text{C}$; 1 cm^2 drain mounting pad

Fig. 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage

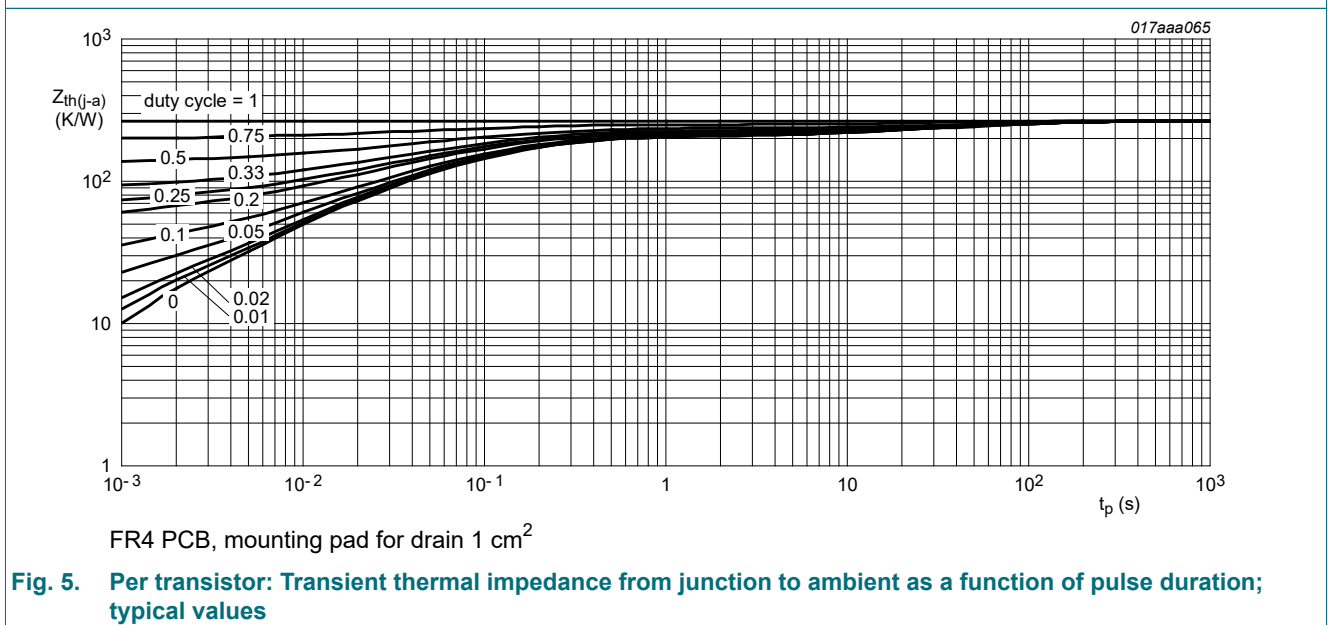
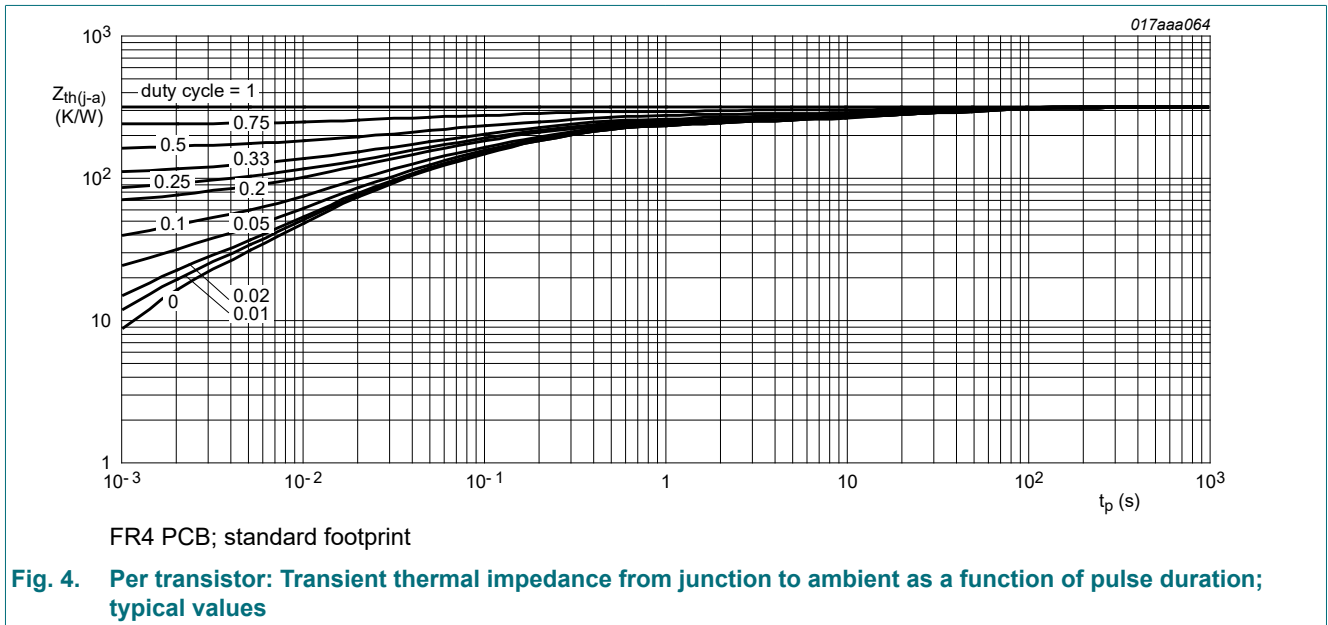
9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-----------------------|--|-------------|-----|-----|-----|-----|------|
| Per transistor | | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | 330 | 380 | K/W |
| | | | [2] | - | 280 | 320 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | - | - | 115 | K/W |
| Per device | | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | - | 250 | K/W |

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

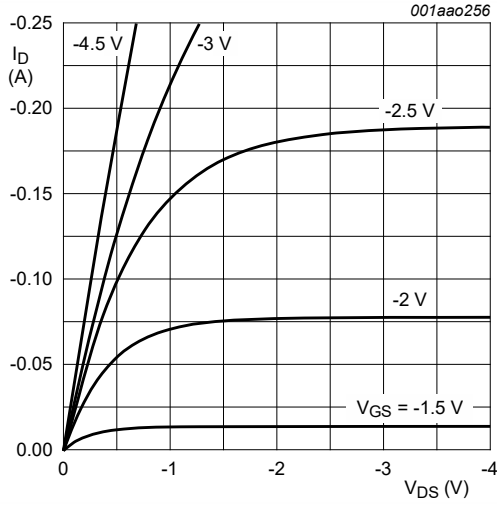
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for drain 1 cm².



10. Characteristics

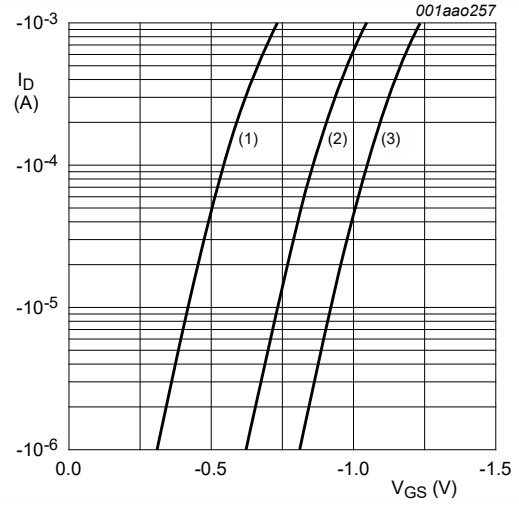
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|----------------------------------|---|---|-------|------|---------------|
| Static characteristics (per transistor) | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D = -250 \mu\text{A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | -30 | - | - | V |
| V_{GSth} | gate-source threshold voltage | $I_D = -250 \mu\text{A}; V_{DS}=V_{GS}; T_j = 25 \text{ }^\circ\text{C}$ | -0.6 | -0.9 | -1.1 | V |
| I_{DSS} | drain leakage current | $V_{DS} = -30 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | - | -1 | μA |
| | | $V_{DS} = -30 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$ | - | - | -10 | μA |
| I_{GSS} | gate leakage current | $V_{GS} = 8 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | -0.2 | -1 | μA |
| | | $V_{GS} = -8 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | -0.2 | -1 | μA |
| | | $V_{GS} = 4.5 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | -10 | - | nA |
| | | $V_{GS} = -4.5 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | -10 | - | nA |
| | | $V_{GS} = 2.5 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | -1 | - | nA |
| | | $V_{GS} = -2.5 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | -1 | - | nA |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = -4.5 \text{ V}; I_D = -200 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$ | - | 2.8 | 4.1 | Ω |
| | | $V_{GS} = -4.5 \text{ V}; I_D = -200 \text{ mA}; T_j = 150 \text{ }^\circ\text{C}$ | - | 5.3 | 7.8 | Ω |
| | | $V_{GS} = -2.5 \text{ V}; I_D = -10 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$ | - | 5.3 | 6.5 | Ω |
| g_{fs} | forward transconductance | $V_{DS} = -10 \text{ V}; I_D = -200 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$ | - | 160 | - | mS |
| Dynamic characteristics (per transistor) | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $V_{DS} = -15 \text{ V}; I_D = -200 \text{ mA}; V_{GS} = -4.5 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 0.55 | 0.72 | nC |
| Q_{GS} | gate-source charge | | - | 0.23 | - | nC |
| Q_{GD} | gate-drain charge | | - | 0.09 | - | nC |
| C_{iss} | input capacitance | $V_{DS} = -15 \text{ V}; f = 1 \text{ MHz}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 31 | 46 | pF |
| C_{oss} | output capacitance | | - | 6.5 | - | pF |
| C_{rss} | reverse transfer capacitance | | - | 2.3 | - | pF |
| $t_{d(on)}$ | turn-on delay time | | $V_{DS} = -20 \text{ V}; R_L = 250 \Omega; V_{GS} = -4.5 \text{ V}; R_{G(ext)} = 6 \Omega; T_j = 25 \text{ }^\circ\text{C}$ | - | 19 | 38 |
| t_r | rise time | - | | 30 | - | ns |
| $t_{d(off)}$ | turn-off delay time | - | | 65 | 130 | ns |
| t_f | fall time | - | | 38 | - | ns |
| Source-drain diode (per transistor) | | | | | | |
| V_{SD} | source-drain voltage | $I_S = -200 \text{ mA}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | -0.47 | -0.88 | -1.2 | V |



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

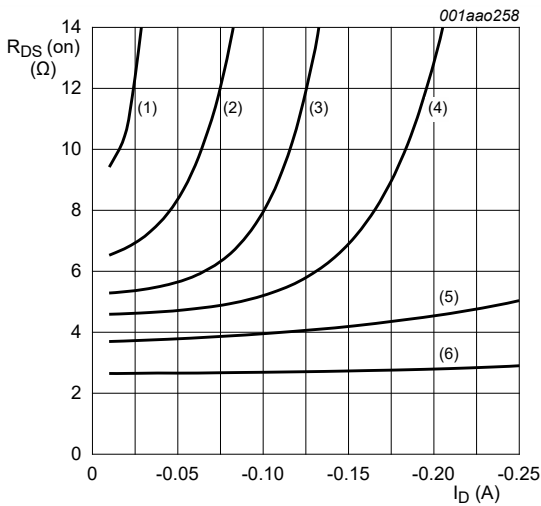
Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values



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

- (1) minimum values
- (2) typical values
- (3) maximum values

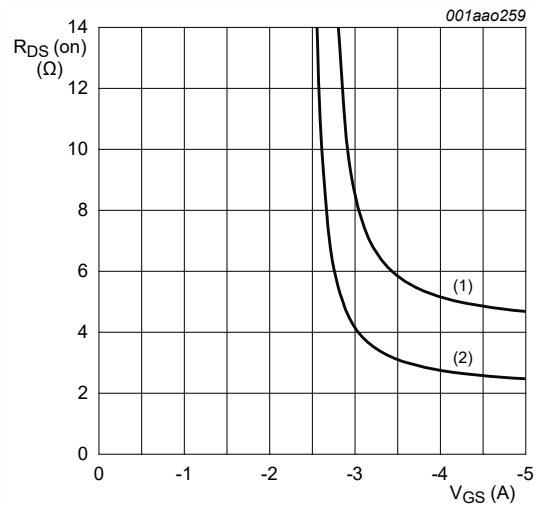
Fig. 7. Sub-threshold drain current as a function of gate-source voltage



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

- (1) $V_{GS} = -1.75\text{ V}$
- (2) $V_{GS} = -2.0\text{ V}$
- (3) $V_{GS} = -2.25\text{ V}$
- (4) $V_{GS} = -2.5\text{ V}$
- (5) $V_{GS} = -3.0\text{ V}$
- (6) $V_{GS} = -4.5\text{ V}$

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



$I_D = -200\text{ mA}$

- (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

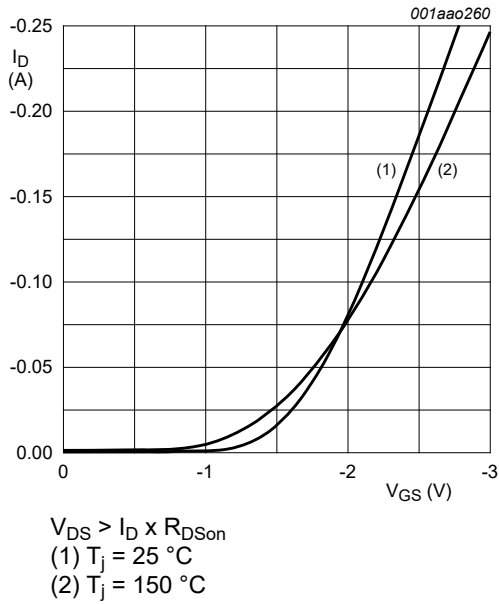


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

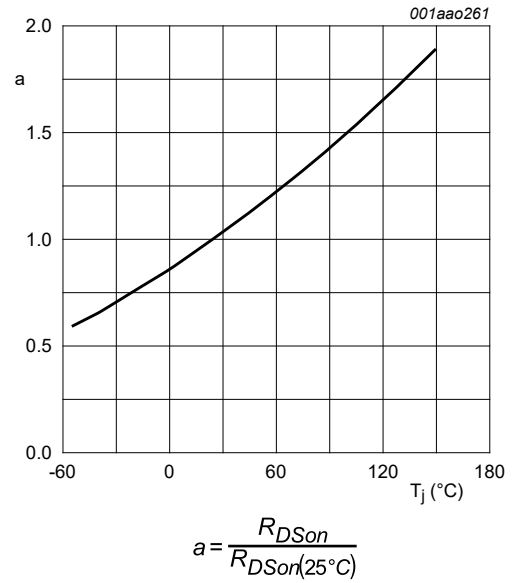


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

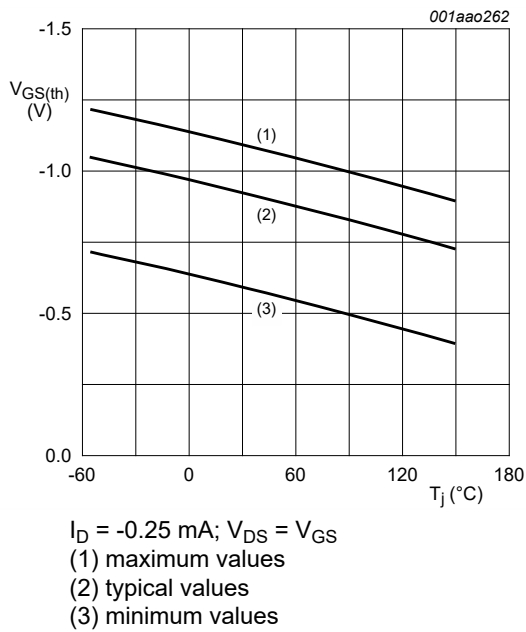


Fig. 12. Gate-source threshold voltage as a function of junction temperature

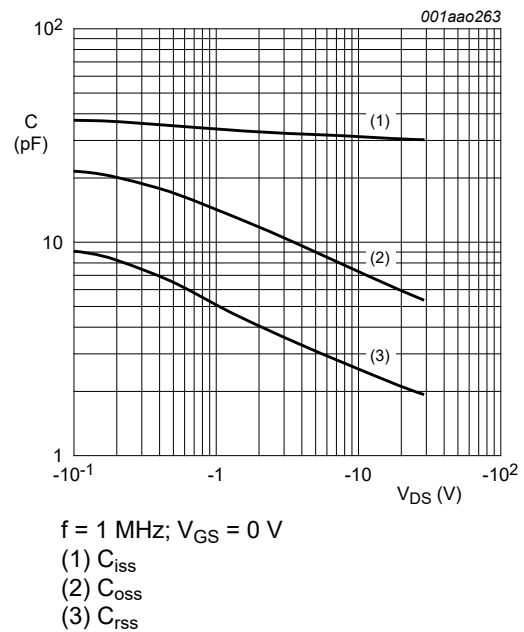


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

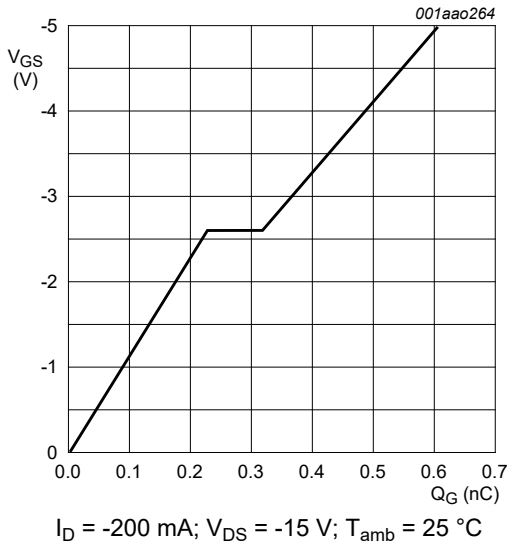


Fig. 14. Gate-source voltage as a function of gate charge; typical values

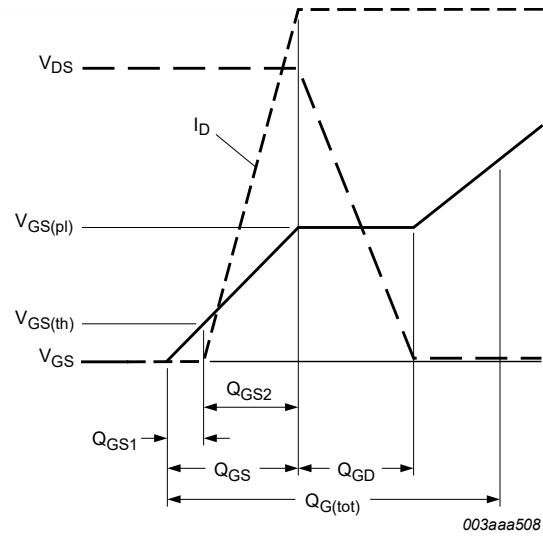
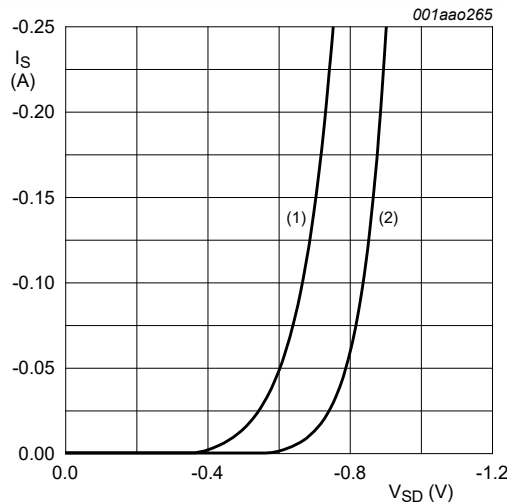


Fig. 15. Gate charge waveform definitions



$V_{GS} = 0$ V
(1) $T_j = 150$ °C
(2) $T_j = 25$ °C

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

11. Test information

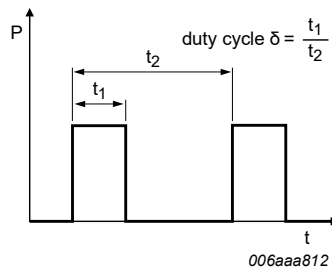


Fig. 17. Duty cycle definition

12. Package outline

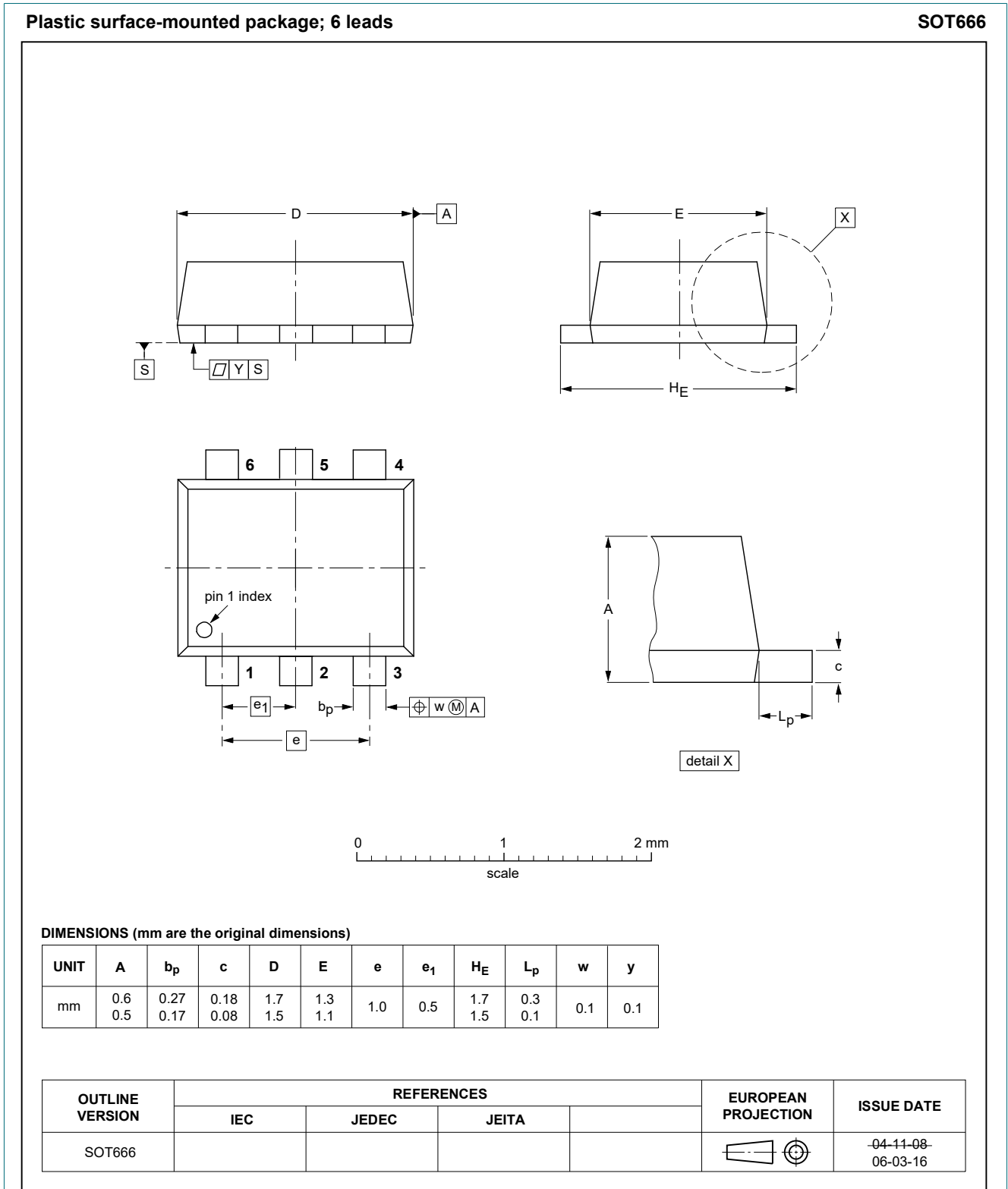


Fig. 18. Package outline SOT666

13. Soldering

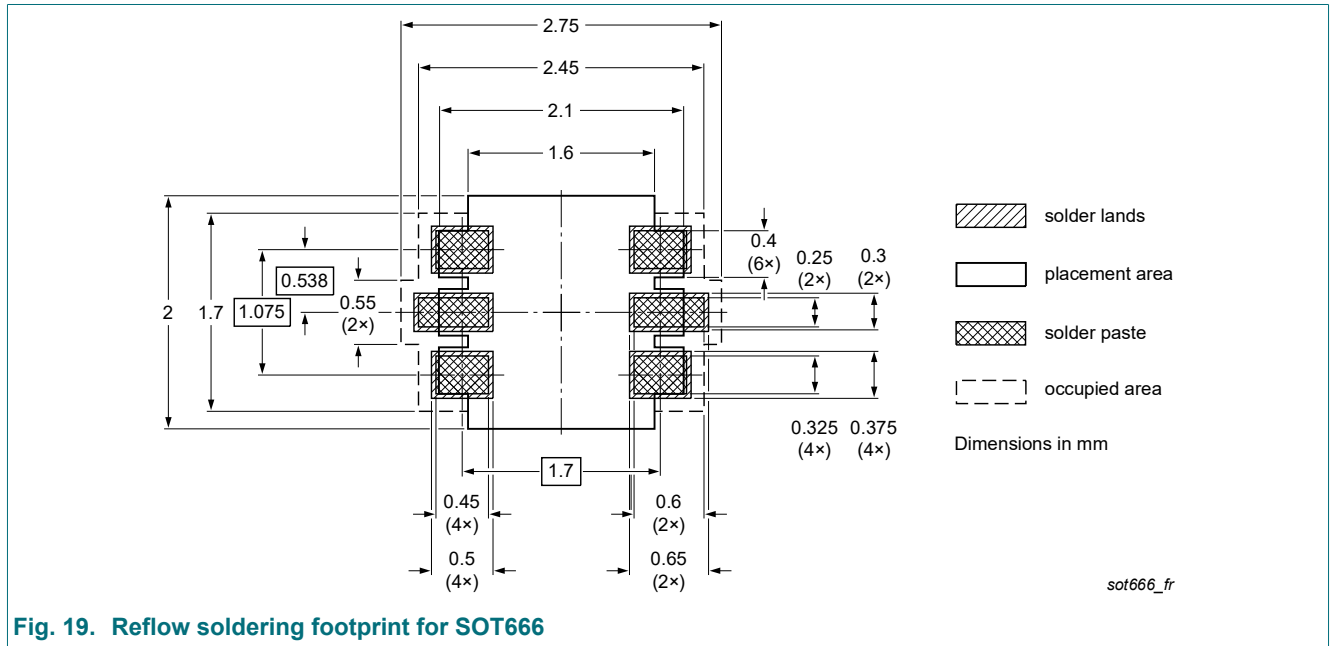


Fig. 19. Reflow soldering footprint for SOT666

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|--------------------|---------------|----------------|
| NX3008PBKV v.2 | 20221228 | Product data sheet | - | NX3008PBKV v.1 |
| Modifications: | <ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia• Legal texts have been adapted to the new company name where appropriate• Product changed to non-automotive qualification | | | |
| NX3008PBKV v.1 | 20110729 | 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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Contents

| | |
|---------------------------------|----|
| 1. General description..... | 1 |
| 2. Features and benefits..... | 1 |
| 3. Applications..... | 1 |
| 4. Quick reference data..... | 1 |
| 5. Pinning information..... | 2 |
| 6. Ordering information..... | 2 |
| 7. Marking..... | 2 |
| 8. Limiting values..... | 3 |
| 9. Thermal characteristics..... | 5 |
| 10. Characteristics..... | 6 |
| 11. Test information..... | 9 |
| 12. Package outline..... | 10 |
| 13. Soldering..... | 11 |
| 14. Revision history..... | 12 |
| 15. Legal information..... | 13 |

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