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Kind regards,

Team Nexperia

# PMZB300XN

20 V, single N-channel Trench MOSFET

1 August 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

- Fast switching
- Trench MOSFET technology
- Low threshold voltage
- Ultra thin package profile of 0.37mm height

### 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             | $T_J = 25\text{ }^{\circ}\text{C}$                                             |     | -   | -   | 20   | V        |
| $V_{GS}$                      | gate-source voltage              |                                                                                |     | -12 | -   | 12   | V        |
| $I_D$                         | drain current                    | $V_{GS} = 4.5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$                  | [1] | -   | -   | 1    | A        |
| <b>Static characteristics</b> |                                  |                                                                                |     |     |     |      |          |
| $R_{DS(on)}$                  | drain-source on-state resistance | $V_{GS} = 4.5\text{ V}; I_D = 200\text{ mA}; T_J = 25\text{ }^{\circ}\text{C}$ |     | -   | 0.3 | 0.38 | $\Omega$ |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm<sup>2</sup>.

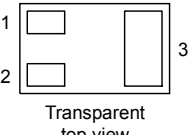
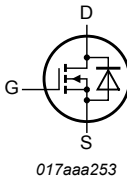


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2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline                                                                                                                | Graphic symbol                                                                                   |
|-----|--------|-------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1   | G      | gate        | <br>Transparent top view<br>DFN1006B-3 (SOT883B) | <br>017aaa253 |
| 2   | S      | source      |                                                                                                                                   |                                                                                                  |
| 3   | D      | drain       |                                                                                                                                   |                                                                                                  |

3. Ordering information

Table 3. Ordering information

| Type number | Package    |                                                                                |         |
|-------------|------------|--------------------------------------------------------------------------------|---------|
|             | Name       | Description                                                                    | Version |
| PMZB300XN   | 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 |
|-------------|--------------|
| PMZB300XN   | 0000 0111    |

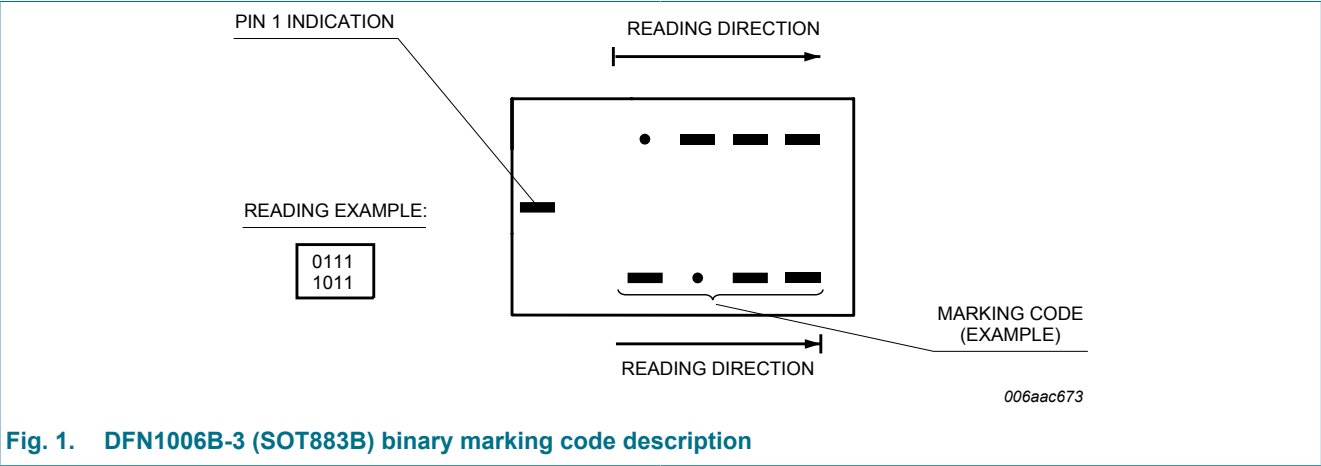


Fig. 1. DFN1006B-3 (SOT883B) binary marking code description

## 5. Limiting values

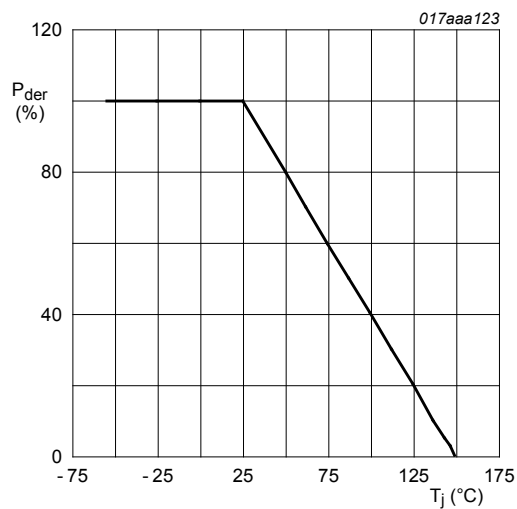
**Table 5. Limiting values**

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

| Symbol                    | Parameter               | Conditions                                                     |     | Min | Max  | Unit |
|---------------------------|-------------------------|----------------------------------------------------------------|-----|-----|------|------|
| V <sub>DS</sub>           | drain-source voltage    | T <sub>j</sub> = 25 °C                                         |     | -   | 20   | V    |
| V <sub>GS</sub>           | gate-source voltage     |                                                                |     | -12 | 12   | V    |
| I <sub>D</sub>            | drain current           | V <sub>GS</sub> = 4.5 V; T <sub>amb</sub> = 25 °C              | [1] | -   | 1    | A    |
|                           |                         | V <sub>GS</sub> = 4.5 V; T <sub>amb</sub> = 100 °C             | [1] | -   | 0.6  | A    |
| I <sub>DM</sub>           | peak drain current      | T <sub>amb</sub> = 25 °C; single pulse; t <sub>p</sub> ≤ 10 μs |     | -   | 4    | A    |
| P <sub>tot</sub>          | total power dissipation | T <sub>amb</sub> = 25 °C                                       | [2] | -   | 360  | mW   |
|                           |                         |                                                                | [1] | -   | 715  | mW   |
|                           |                         | T <sub>sp</sub> = 25 °C                                        |     | -   | 2700 | mW   |
| T <sub>j</sub>            | junction temperature    |                                                                |     | -55 | 150  | °C   |
| T <sub>amb</sub>          | ambient temperature     |                                                                |     | -55 | 150  | °C   |
| T <sub>stg</sub>          | storage temperature     |                                                                |     | -65 | 150  | °C   |
| <b>Source-drain diode</b> |                         |                                                                |     |     |      |      |
| I <sub>S</sub>            | source current          | T <sub>amb</sub> = 25 °C                                       | [1] | -   | 670  | mA   |

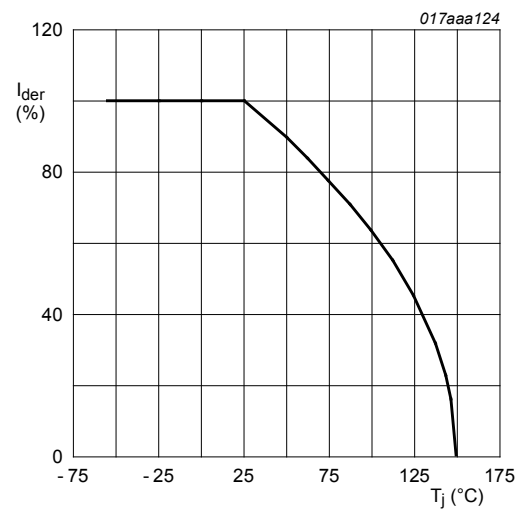
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm<sup>2</sup>.

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



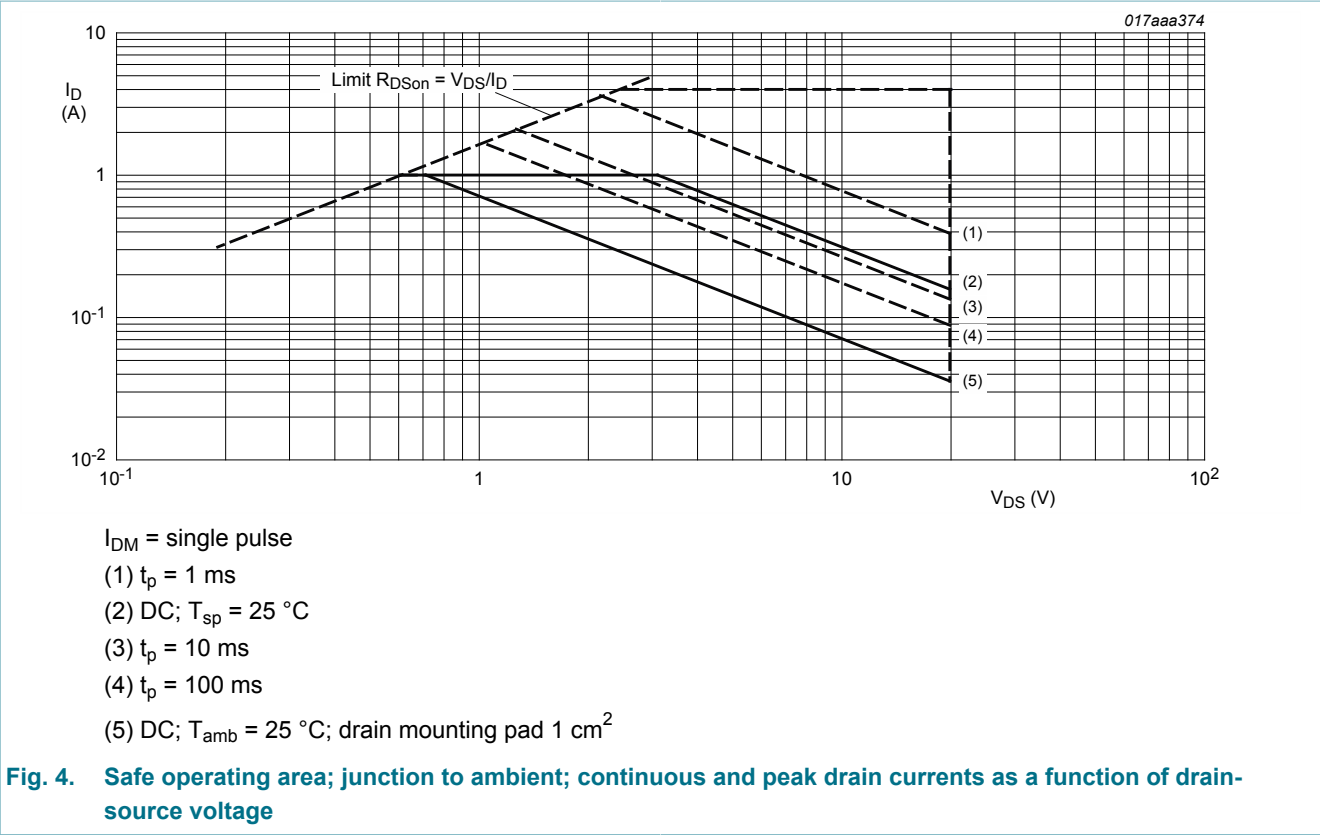
**Fig. 2. Normalized total power dissipation as a function of junction temperature**

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



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

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

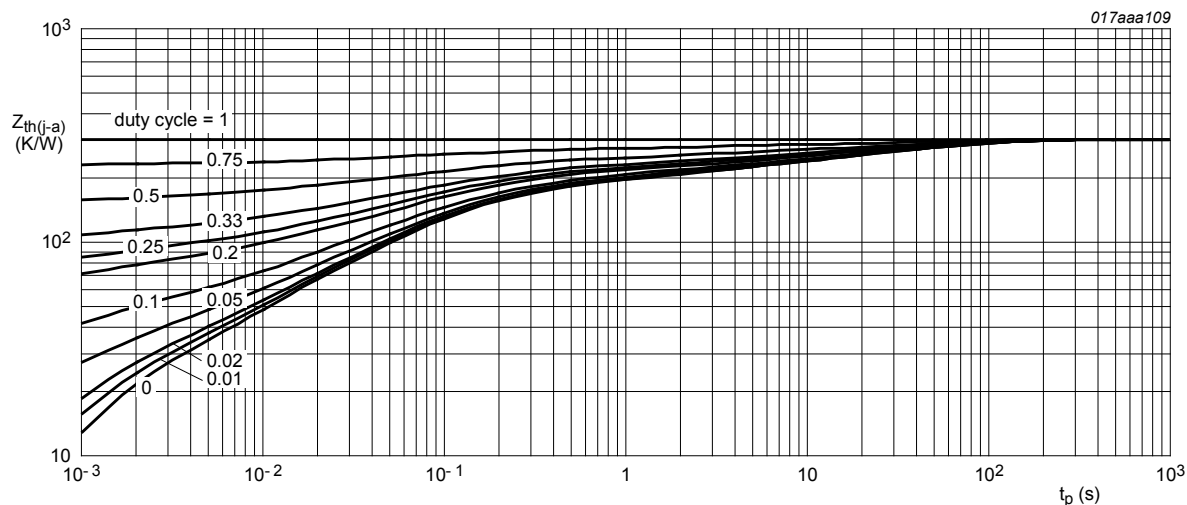


6. Thermal characteristics

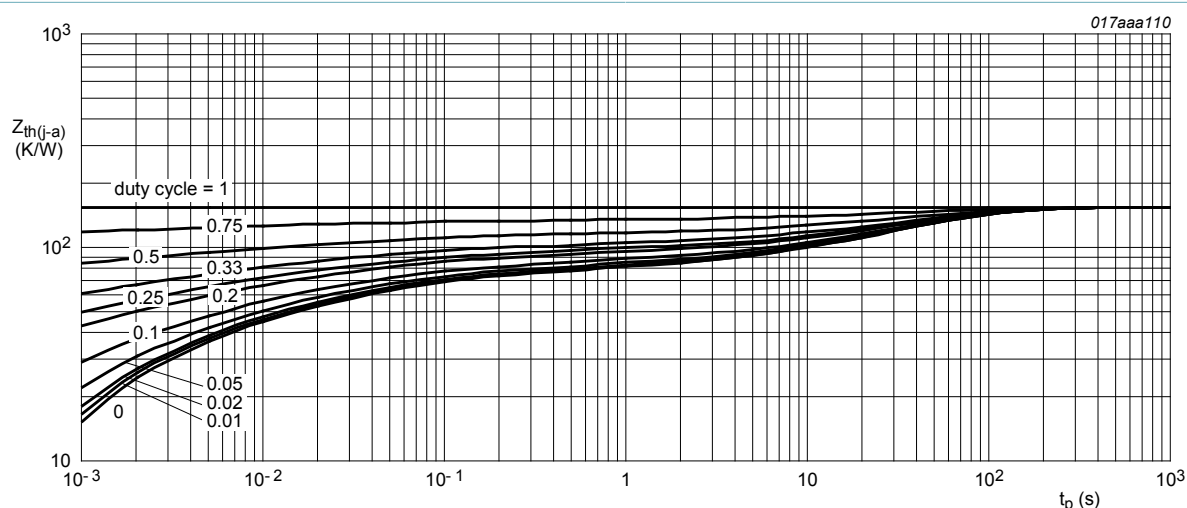
Table 6. Thermal characteristics

| 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  $1\text{ cm}^2$ .



FR4 PCB, standard footprint

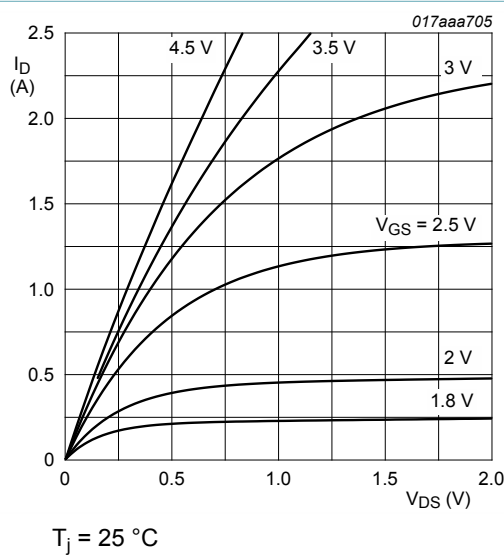
**Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

FR4 PCB, mounting pad for drain 1 cm<sup>2</sup>
**Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

## 7. Characteristics

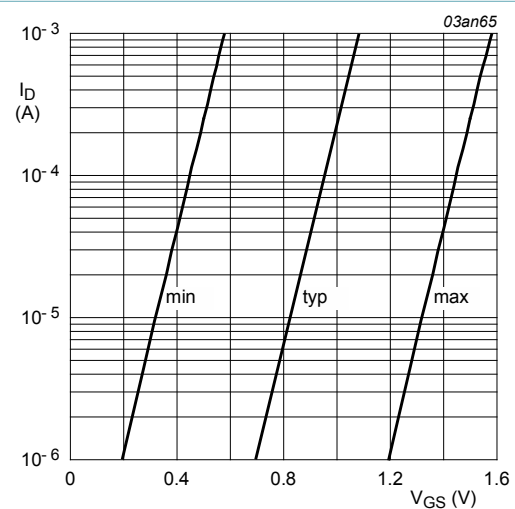
**Table 7. Characteristics**

| Symbol                        | Parameter                      | Conditions                                                 | Min | Typ | Max | Unit    |
|-------------------------------|--------------------------------|------------------------------------------------------------|-----|-----|-----|---------|
| <b>Static characteristics</b> |                                |                                                            |     |     |     |         |
| $V_{(BR)DSS}$                 | drain-source breakdown voltage | $I_D = 10 \mu A$ ; $V_{GS} = 0 V$ ; $T_j = 25^\circ C$     | 20  | -   | -   | V       |
| $V_{GSth}$                    | gate-source threshold voltage  | $I_D = 250 \mu A$ ; $V_{DS} = V_{GS}$ ; $T_j = 25^\circ C$ | 0.5 | 1   | 1.5 | V       |
| $I_{DSS}$                     | drain leakage current          | $V_{DS} = 20 V$ ; $V_{GS} = 0 V$ ; $T_j = 25^\circ C$      | -   | -   | 1   | $\mu A$ |
|                               |                                | $V_{DS} = 20 V$ ; $V_{GS} = 0 V$ ; $T_j = 150^\circ C$     | -   | -   | 100 | $\mu A$ |

| Symbol                  | Parameter                        | Conditions                                                                                                                |  | Min | Typ  | Max  | Unit |
|-------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------|--|-----|------|------|------|
| I <sub>GSS</sub>        | gate leakage current             | V <sub>GS</sub> = 12 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                     |  | -   | -    | 0.1  | μA   |
|                         |                                  | V <sub>GS</sub> = -12 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                    |  | -   | -    | 0.1  | μA   |
| R <sub>DSon</sub>       | drain-source on-state resistance | V <sub>GS</sub> = 4.5 V; I <sub>D</sub> = 200 mA; T <sub>j</sub> = 25 °C                                                  |  | -   | 0.3  | 0.38 | Ω    |
|                         |                                  | V <sub>GS</sub> = 4.5 V; I <sub>D</sub> = 200 mA; T <sub>j</sub> = 150 °C                                                 |  | -   | 0.54 | 0.68 | Ω    |
|                         |                                  | V <sub>GS</sub> = 2.5 V; I <sub>D</sub> = 100 mA; T <sub>j</sub> = 25 °C                                                  |  | -   | 0.47 | 0.55 | mΩ   |
| g <sub>fs</sub>         | forward transconductance         | V <sub>DS</sub> = 5 V; I <sub>D</sub> = 200 mA; T <sub>j</sub> = 25 °C                                                    |  | -   | 1500 | -    | mS   |
| Dynamic characteristics |                                  |                                                                                                                           |  |     |      |      |      |
| Q <sub>G(tot)</sub>     | total gate charge                | V <sub>DS</sub> = 10 V; I <sub>D</sub> = 1 A; V <sub>GS</sub> = 4.5 V; T <sub>j</sub> = 25 °C                             |  | -   | 0.72 | 0.94 | nC   |
| Q <sub>GS</sub>         | gate-source charge               |                                                                                                                           |  | -   | 0.18 | -    | nC   |
| Q <sub>GD</sub>         | gate-drain charge                |                                                                                                                           |  | -   | 0.18 | -    | nC   |
| C <sub>iss</sub>        | input capacitance                | V <sub>DS</sub> = 20 V; f = 1 MHz; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                          |  | -   | 34   | 51   | pF   |
| C <sub>oss</sub>        | output capacitance               |                                                                                                                           |  | -   | 12   | -    | pF   |
| C <sub>rss</sub>        | reverse transfer capacitance     |                                                                                                                           |  | -   | 8    | -    | pF   |
| t <sub>d(on)</sub>      | turn-on delay time               | V <sub>DS</sub> = 10 V; R <sub>L</sub> = 10 Ω; V <sub>GS</sub> = 4.5 V; R <sub>G(ext)</sub> = 6 Ω; T <sub>j</sub> = 25 °C |  | -   | 5    | 10   | ns   |
| t <sub>r</sub>          | rise time                        |                                                                                                                           |  | -   | 11   | -    | ns   |
| t <sub>d(off)</sub>     | turn-off delay time              |                                                                                                                           |  | -   | 11   | 22   | ns   |
| t <sub>f</sub>          | fall time                        |                                                                                                                           |  | -   | 6    | -    | ns   |
| Source-drain diode      |                                  |                                                                                                                           |  |     |      |      |      |
| V <sub>SD</sub>         | source-drain voltage             | I <sub>S</sub> = 300 mA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                    |  | -   | 0.77 | 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**

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

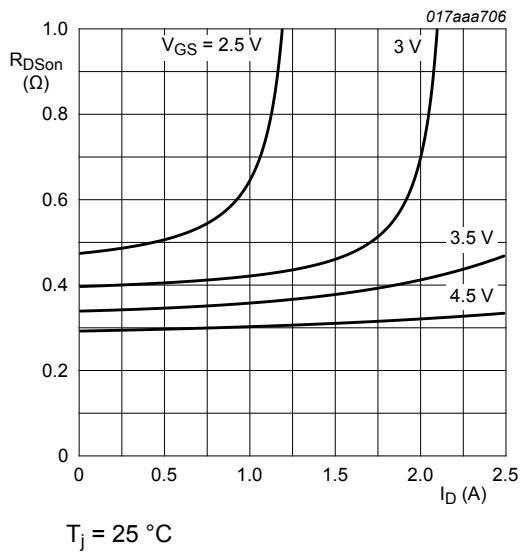


Fig. 9. Drain-source on-state resistance as a function of drain current; typical values

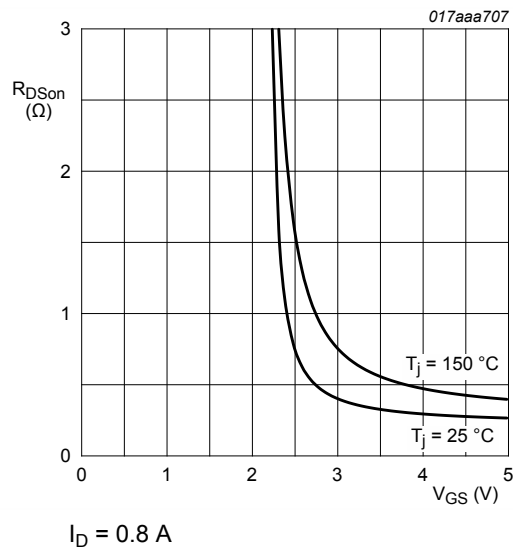


Fig. 10. Drain-source on-state resistance as a function of gate-source voltage; typical values

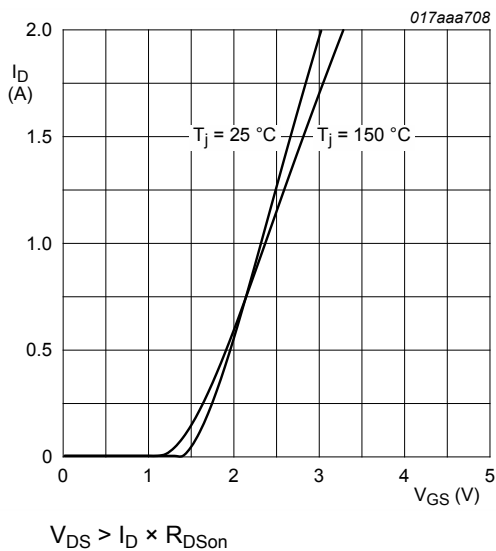


Fig. 11. Transfer characteristics: drain current as a function of gate-source voltage; typical values

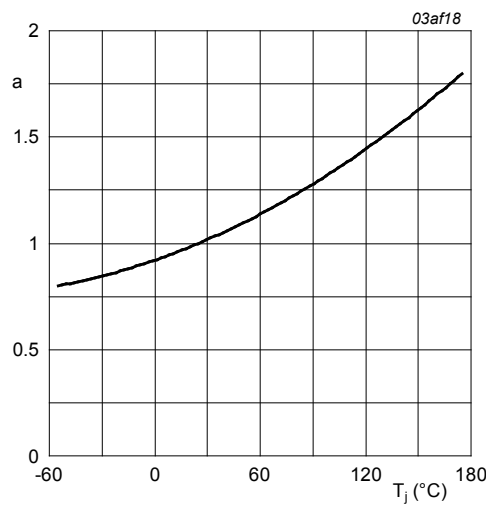


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

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

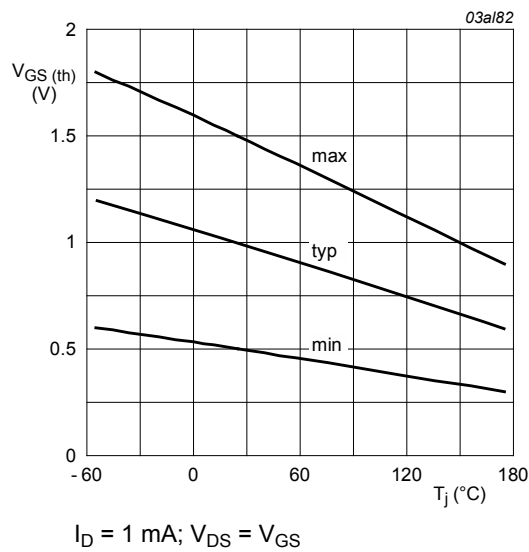


Fig. 13. Gate-source threshold voltage as a function of junction temperature

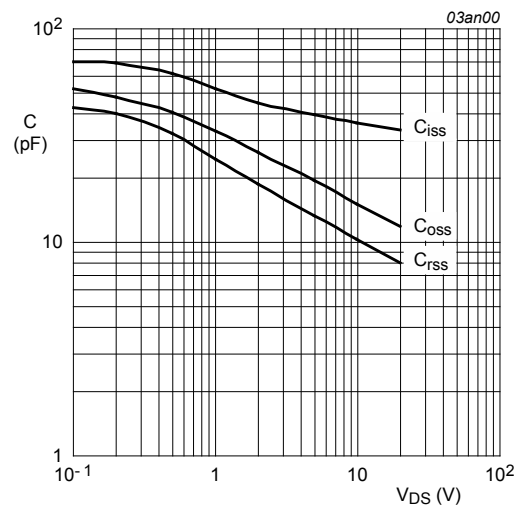


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

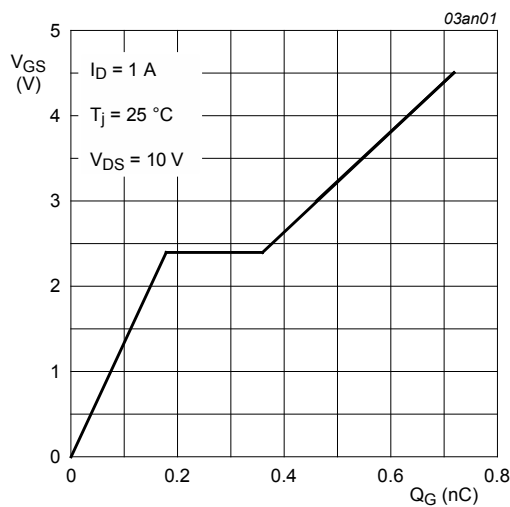


Fig. 15. Gate-source voltage as a function of gate charge; typical values

$I_D = 1\text{ A}; V_{DS} = 10\text{ V}$

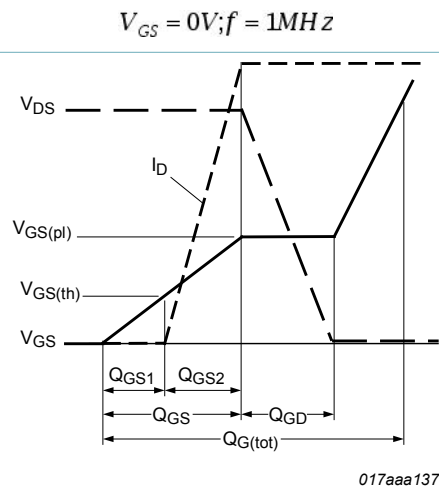
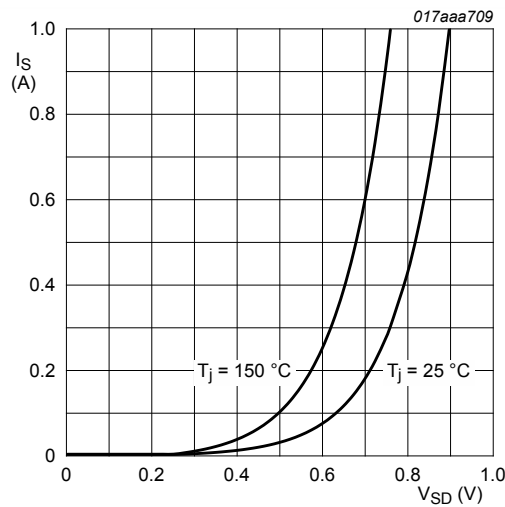


Fig. 16. Gate charge waveform definitions



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

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

8. Test information

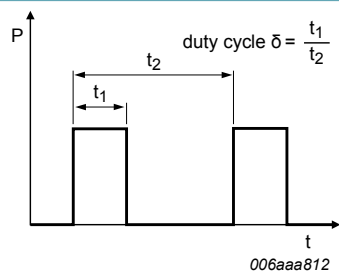


Fig. 18. Duty cycle definition

9. Package outline

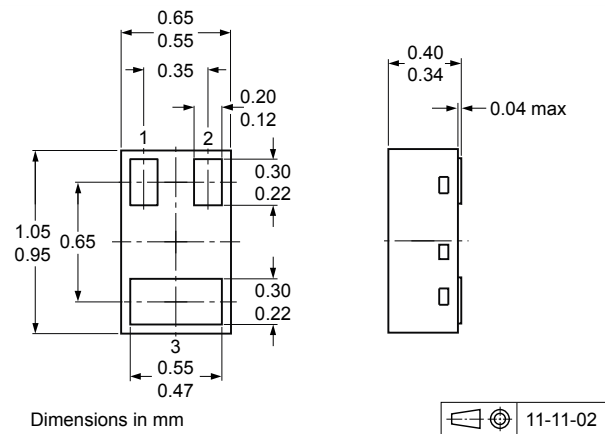


Fig. 19. DFN1006B-3 (SOT883B)



## 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.                                     |

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## 13. Contents

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