



# BUK9628-100A

N-channel TrenchMOS logic level FET

Rev. 02 — 26 April 2011

Product data sheet

## 1. Product profile

### 1.1 General description

Logic level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using TrenchMOS technology. This product has been designed and qualified to the appropriate AEC standard for use in automotive critical applications.

### 1.2 Features and benefits

- AEC Q101 compliant
- Low conduction losses due to low on-state resistance

### 1.3 Applications

- Automotive and general purpose power switching

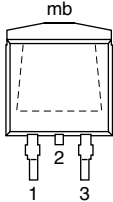
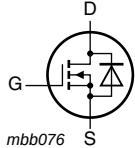
### 1.4 Quick reference data

Table 1. Quick reference data

| Symbol                 | Parameter                                    | Conditions                                                                                                                                   | Min | Typ  | Max | Unit |
|------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|------|
| V <sub>DS</sub>        | drain-source voltage                         | T <sub>j</sub> ≥ 25 °C; T <sub>j</sub> ≤ 175 °C                                                                                              | -   | -    | 100 | V    |
| I <sub>D</sub>         | drain current                                | T <sub>mb</sub> = 25 °C                                                                                                                      | -   | -    | 49  | A    |
| P <sub>tot</sub>       | total power dissipation                      |                                                                                                                                              | -   | -    | 166 | W    |
| Static characteristics |                                              |                                                                                                                                              |     |      |     |      |
| R <sub>DSon</sub>      | drain-source on-state resistance             | V <sub>GS</sub> = 5 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C                                                                         | -   | 18.5 | 28  | mΩ   |
|                        |                                              | V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C                                                                        | -   | 17   | 27  | mΩ   |
| Avalanche ruggedness   |                                              |                                                                                                                                              |     |      |     |      |
| E <sub>DS(AL)S</sub>   | non-repetitive drain-source avalanche energy | I <sub>D</sub> = 30 A; V <sub>sup</sub> ≤ 25 V;<br>R <sub>GS</sub> = 50 Ω; V <sub>GS</sub> = 5 V;<br>T <sub>j(init)</sub> = 25 °C; unclamped | -   | -    | 45  | mJ   |

## 2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                       | Simplified outline                                                                | Graphic symbol                                                                      |
|-----|--------|-----------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | G      | gate                              |  |  |
| 2   | D      | drain                             |                                                                                   |                                                                                     |
| 3   | S      | source                            |                                                                                   |                                                                                     |
| mb  | D      | mounting base; connected to drain |                                                                                   |                                                                                     |

**SOT404 (D2PAK)**

## 3. Ordering information

Table 3. Ordering information

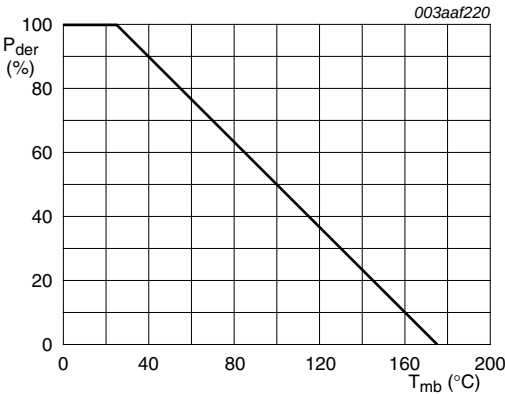
| Type number  | Package |                                                                                  |         |
|--------------|---------|----------------------------------------------------------------------------------|---------|
|              | Name    | Description                                                                      | Version |
| BUK9628-100A | D2PAK   | plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) | SOT404  |

## 4. Limiting values

Table 4. Limiting values

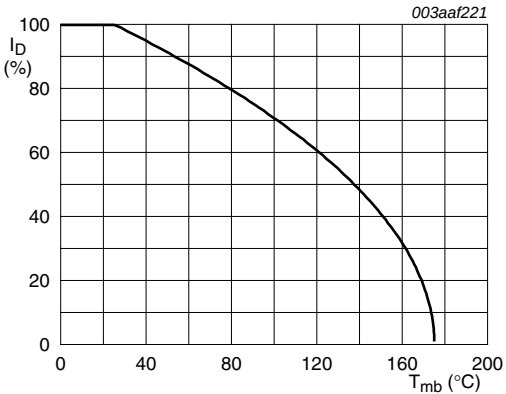
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol                      | Parameter                                    | Conditions                                                                                                                                        | Min | Max | Unit |
|-----------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|
| $V_{DS}$                    | drain-source voltage                         | $T_j \geq 25\text{ °C}$ ; $T_j \leq 175\text{ °C}$                                                                                                | -   | 100 | V    |
| $V_{DGR}$                   | drain-gate voltage                           | $R_{GS} = 20\text{ k}\Omega$                                                                                                                      | -   | 100 | V    |
| $V_{GS}$                    | gate-source voltage                          |                                                                                                                                                   | -10 | 10  | V    |
| $I_D$                       | drain current                                | $T_{mb} = 25\text{ °C}$                                                                                                                           | -   | 49  | A    |
|                             |                                              | $T_{mb} = 100\text{ °C}$                                                                                                                          | -   | 34  | A    |
| $I_{DM}$                    | peak drain current                           | $T_{mb} = 25\text{ °C}$ ; pulsed                                                                                                                  | -   | 195 | A    |
| $P_{tot}$                   | total power dissipation                      | $T_{mb} = 25\text{ °C}$                                                                                                                           | -   | 166 | W    |
| $T_{stg}$                   | storage temperature                          |                                                                                                                                                   | -55 | 175 | °C   |
| $T_j$                       | junction temperature                         |                                                                                                                                                   | -55 | 175 | °C   |
| $V_{GSM}$                   | peak gate-source voltage                     | pulsed; $t_p \leq 50\text{ }\mu\text{s}$                                                                                                          | -15 | 15  | V    |
| <b>Source-drain diode</b>   |                                              |                                                                                                                                                   |     |     |      |
| $I_S$                       | source current                               | $T_{mb} = 25\text{ °C}$                                                                                                                           | -   | 49  | A    |
| $I_{SM}$                    | peak source current                          | pulsed; $T_{mb} = 25\text{ °C}$                                                                                                                   | -   | 195 | A    |
| <b>Avalanche ruggedness</b> |                                              |                                                                                                                                                   |     |     |      |
| $E_{DS(AL)S}$               | non-repetitive drain-source avalanche energy | $I_D = 30\text{ A}$ ; $V_{sup} \leq 25\text{ V}$ ; $R_{GS} = 50\text{ }\Omega$ ; $V_{GS} = 5\text{ V}$ ; $T_{j(init)} = 25\text{ °C}$ ; unclamped | -   | 45  | mJ   |



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

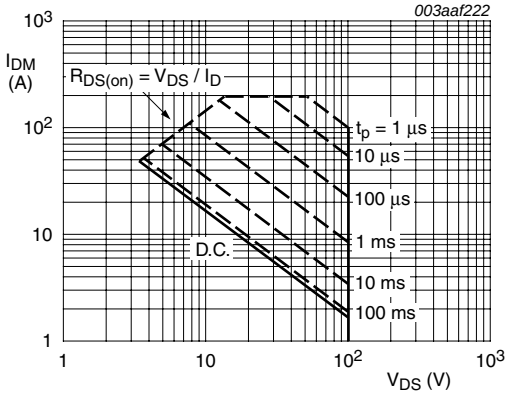
Fig 1. Normalized total power dissipation as a function of mounting base temperature



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

$V_{GS} \geq 5\text{ V}$

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



$T_{mb} = 25\text{ }^{\circ}\text{C}$ ;  $I_{DM}$  is single pulse

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

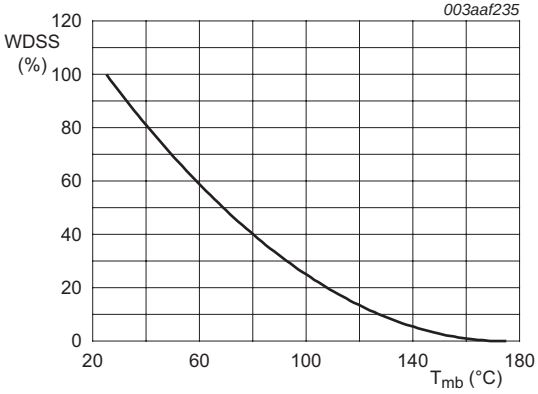
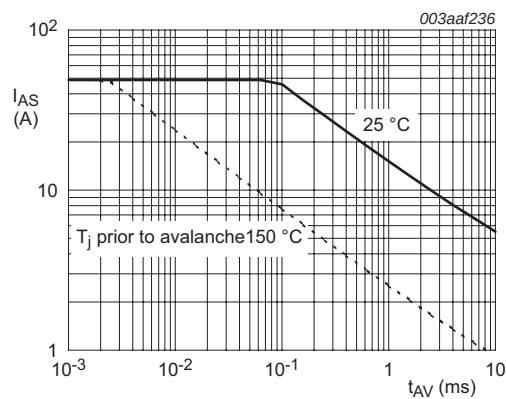


Fig 4. Normalised drain-source non-repetitive avalanche energy as a function of mounting-base temperature



unclamped inductive load

Fig 5. Single-shot avalanche rating; avalanche current as a function of avalanche period

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol         | Parameter                                         | Conditions                    | Min | Typ | Max | Unit |
|----------------|---------------------------------------------------|-------------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base |                               | -   | -   | 0.9 | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient       | minimum footprint ; FR4 board | -   | 50  | -   | K/W  |

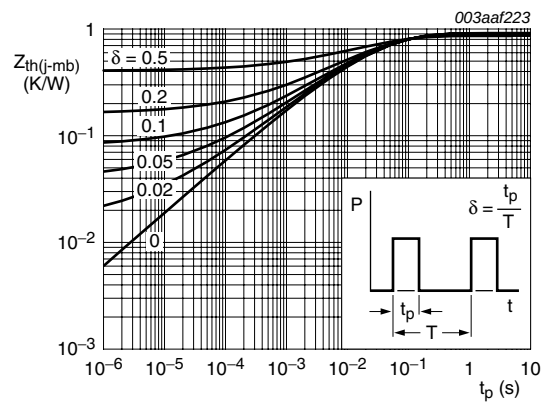


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 6. Characteristics

**Table 6. Characteristics**

| Symbol                  | Parameter                        | Conditions                                                                                                                      | Min | Typ  | Max  | Unit |
|-------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----|------|------|------|
| Static characteristics  |                                  |                                                                                                                                 |     |      |      |      |
| V <sub>(BR)DSS</sub>    | drain-source breakdown voltage   | I <sub>D</sub> = 0.25 mA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                         | 100 | -    | -    | V    |
|                         |                                  | I <sub>D</sub> = 0.25 mA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = -55 °C                                                        | 89  | -    | -    | V    |
| V <sub>GS(th)</sub>     | gate-source threshold voltage    | I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = 25 °C                                               | 1   | 1.5  | 2    | V    |
|                         |                                  | I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = 175 °C                                              | 0.5 | -    | -    | V    |
|                         |                                  | I <sub>D</sub> = 1 mA; V <sub>DS</sub> = V <sub>GS</sub> ; T <sub>j</sub> = -55 °C                                              | -   | -    | 2.3  | V    |
| I <sub>DSS</sub>        | drain leakage current            | V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                          | -   | 0.05 | 10   | µA   |
|                         |                                  | V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 175 °C                                                         | -   | -    | 500  | µA   |
| I <sub>GSS</sub>        | gate leakage current             | V <sub>GS</sub> = 10 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                           | -   | 2    | 100  | nA   |
|                         |                                  | V <sub>GS</sub> = -10 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                          | -   | 2    | 100  | nA   |
| R <sub>DSon</sub>       | drain-source on-state resistance | V <sub>GS</sub> = 5 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C                                                            | -   | 18.5 | 28   | mΩ   |
|                         |                                  | V <sub>GS</sub> = 5 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 175 °C                                                           | -   | -    | 70   | mΩ   |
|                         |                                  | V <sub>GS</sub> = 10 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C                                                           | -   | 17   | 27   | mΩ   |
|                         |                                  | V <sub>GS</sub> = 4.5 V; I <sub>D</sub> = 25 A; T <sub>j</sub> = 25 °C                                                          | -   | 18.8 | 31   | mΩ   |
| Dynamic characteristics |                                  |                                                                                                                                 |     |      |      |      |
| C <sub>iss</sub>        | input capacitance                | V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 25 V; f = 1 MHz; T <sub>j</sub> = 25 °C                                                | -   | 3220 | 4293 | pF   |
| C <sub>oss</sub>        | output capacitance               |                                                                                                                                 | -   | 315  | 378  | pF   |
| C <sub>rss</sub>        | reverse transfer capacitance     |                                                                                                                                 | -   | 187  | 256  | pF   |
| t <sub>d(on)</sub>      | turn-on delay time               | V <sub>DS</sub> = 30 V; R <sub>L</sub> = 1.2 Ω; V <sub>GS</sub> = 5 V; R <sub>G(ext)</sub> = 10 Ω; T <sub>j</sub> = 25 °C       | -   | 11   | 16   | ns   |
| t <sub>r</sub>          | rise time                        |                                                                                                                                 | -   | 58   | 87   | ns   |
| t <sub>d(off)</sub>     | turn-off delay time              |                                                                                                                                 | -   | 250  | 350  | ns   |
| t <sub>f</sub>          | fall time                        |                                                                                                                                 | -   | 106  | 148  | ns   |
| L <sub>D</sub>          | internal drain inductance        | measured from drain lead 6 mm from package to centre of die ; T <sub>j</sub> = 25 °C                                            | -   | 4.5  | -    | nH   |
|                         |                                  | measured from upper edge of drain tab to centre of die ; T <sub>j</sub> = 25 °C                                                 | -   | 2.5  | -    | nH   |
| L <sub>S</sub>          | internal source inductance       | measured from source lead to source bond pad ; T <sub>j</sub> = 25 °C                                                           | -   | 7.5  | -    | nH   |
| Source-drain diode      |                                  |                                                                                                                                 |     |      |      |      |
| V <sub>SD</sub>         | source-drain voltage             | I <sub>S</sub> = 25 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                            | -   | 0.85 | 1.2  | V    |
|                         |                                  | I <sub>S</sub> = 49 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                            | -   | 1.1  | -    | V    |
| t <sub>rr</sub>         | reverse recovery time            | I <sub>S</sub> = 49 A; dI <sub>S</sub> /dt = -100 A/µs; V <sub>GS</sub> = -10 V; V <sub>DS</sub> = 30 V; T <sub>j</sub> = 25 °C | -   | 63   | -    | ns   |
| Q <sub>r</sub>          | recovered charge                 |                                                                                                                                 | -   | 0.22 | -    | µC   |

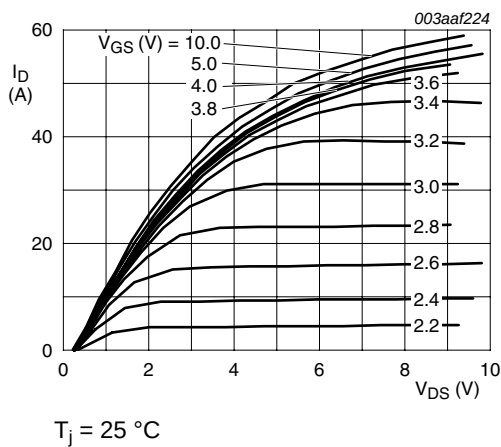


Fig 7. Output characteristics: drain current as a function of drain-source voltage; typical values

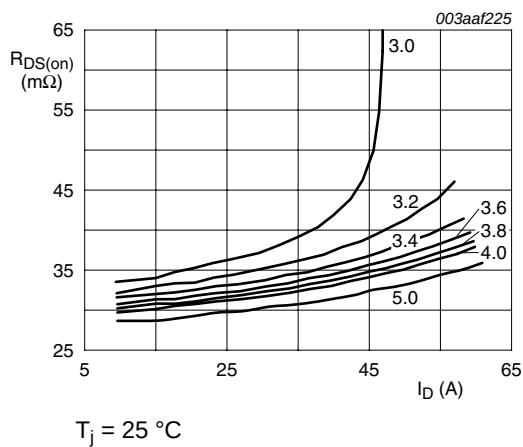


Fig 8. Drain-source on-state resistance as a function of drain current; typical values

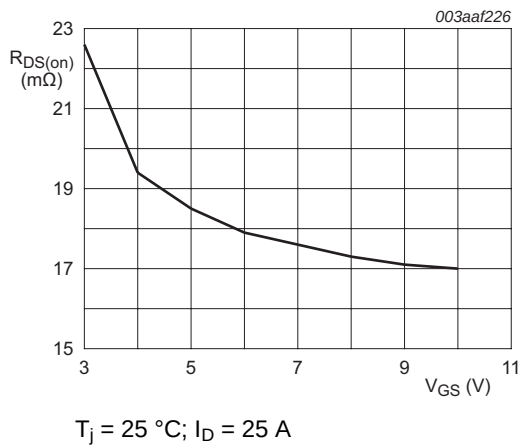


Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

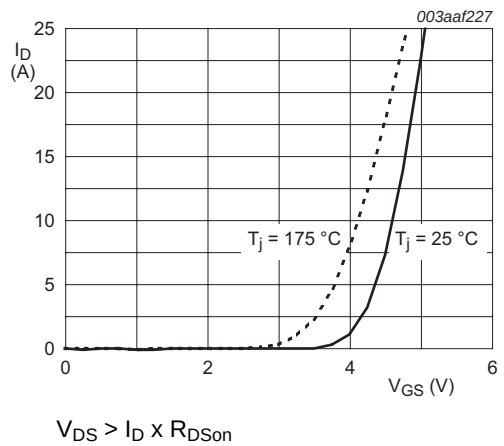


Fig 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

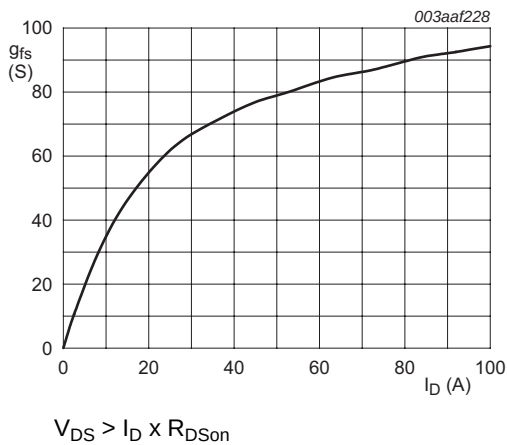


Fig 11. Forward transconductance as a function of drain current; typical values

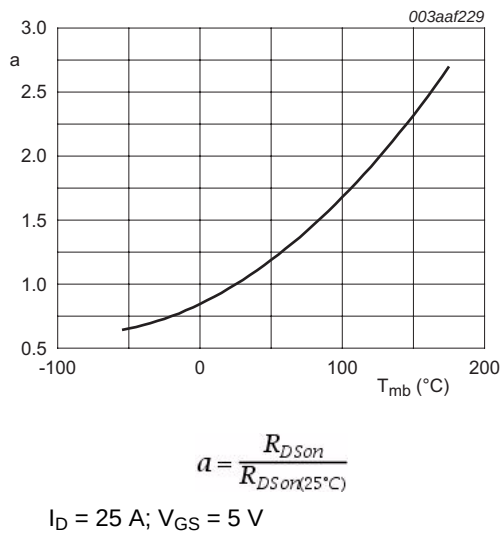


Fig 12. Normalized drain-source on-state resistance factor as a function of junction temperature

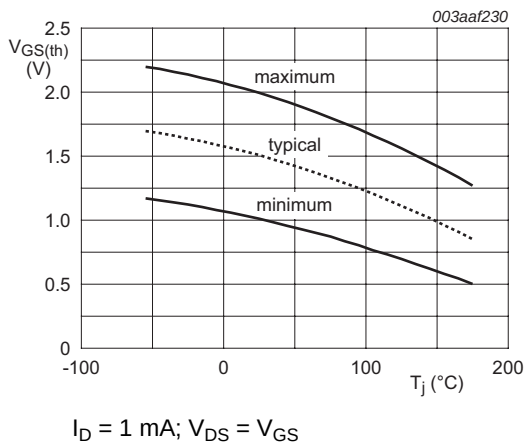


Fig 13. Gate-source threshold voltage as a function of junction temperature

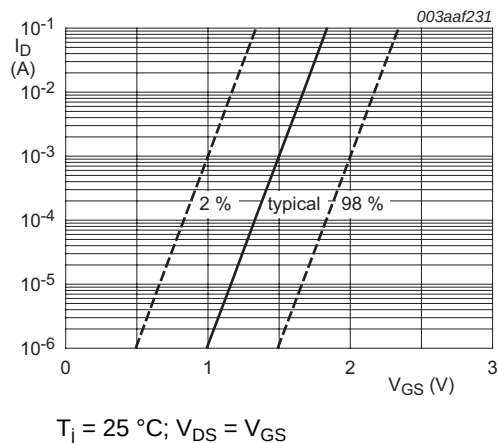


Fig 14. Sub-threshold drain current as a function of gate-source voltage

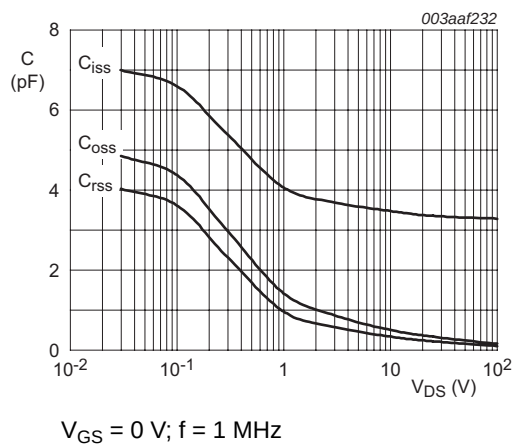


Fig 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

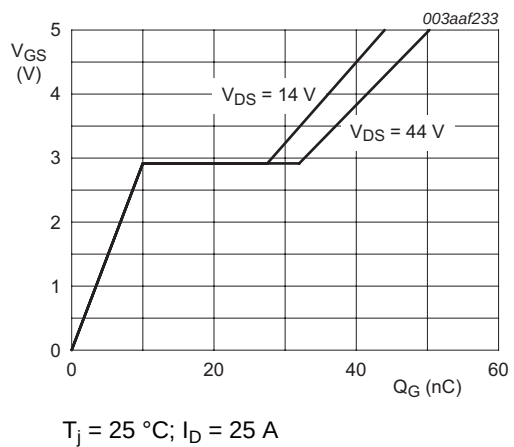


Fig 16. Gate-source voltage as a function of gate charge; typical values

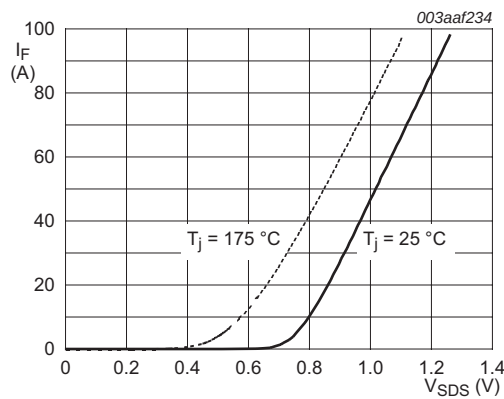


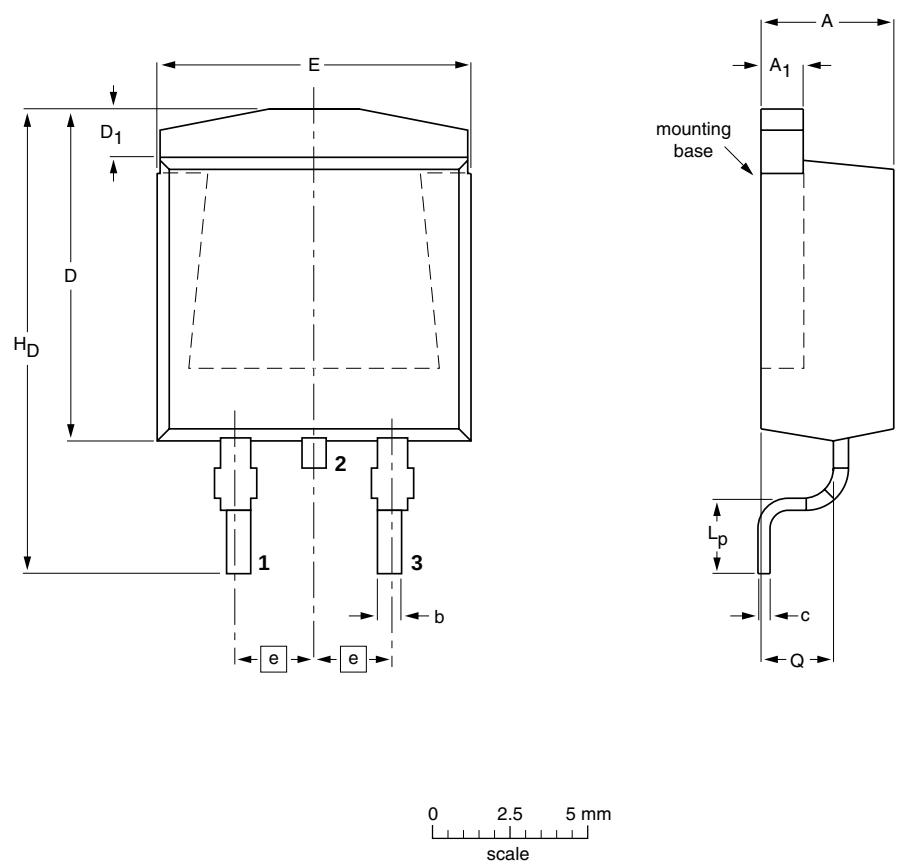
Fig 17. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values



7. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

SOT404



DIMENSIONS (mm are the original dimensions)

| UNIT | A            | A <sub>1</sub> | b            | c            | D <sub>max.</sub> | D <sub>1</sub> | E             | e    | L <sub>p</sub> | H <sub>D</sub> | Q            |
|------|--------------|----------------|--------------|--------------|-------------------|----------------|---------------|------|----------------|----------------|--------------|
| mm   | 4.50<br>4.10 | 1.40<br>1.27   | 0.85<br>0.60 | 0.64<br>0.46 | 11                | 1.60<br>1.20   | 10.30<br>9.70 | 2.54 | 2.90<br>2.10   | 15.80<br>14.80 | 2.60<br>2.20 |

| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|-------|-------|--|------------------------|----------------------|
|                    | IEC        | JEDEC | JEITA |  |                        |                      |
| SOT404             |            |       |       |  |                        | 05-02-11<br>06-03-16 |

Fig 18. Package outline SOT404 (D2PAK)

## 8. Revision history

Table 7. Revision history

| Document ID           | Release date                                                                                                                                                                                                                                                                                                                                 | Data sheet status     | Change notice | Supersedes            |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|-----------------------|
| BUK9628-100A v.2      | 20110426                                                                                                                                                                                                                                                                                                                                     | Product data sheet    | -             | BUK9528_9628-100A v.1 |
| Modifications:        | <ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Type number BUK9628-100A separated from data sheet BUK9528_9628-100A v.1.</li></ul> |                       |               |                       |
| BUK9528_9628-100A v.1 | 20000301                                                                                                                                                                                                                                                                                                                                     | Product specification | -             | -                     |

## 9. Legal information

### 9.1 Data sheet status

| Document status <sup>[1] [2]</sup> | Product status <sup>[3]</sup> | 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.                                     |

[1] Please consult the most recently issued document before initiating or completing a design.

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

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## 11. Contents

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|           |                                          |           |
|-----------|------------------------------------------|-----------|
| <b>1</b>  | <b>Product profile</b> . . . . .         | <b>1</b>  |
| 1.1       | General description . . . . .            | 1         |
| 1.2       | Features and benefits . . . . .          | 1         |
| 1.3       | Applications . . . . .                   | 1         |
| 1.4       | Quick reference data . . . . .           | 1         |
| <b>2</b>  | <b>Pinning information</b> . . . . .     | <b>2</b>  |
| <b>3</b>  | <b>Ordering information</b> . . . . .    | <b>2</b>  |
| <b>4</b>  | <b>Limiting values</b> . . . . .         | <b>2</b>  |
| <b>5</b>  | <b>Thermal characteristics</b> . . . . . | <b>4</b>  |
| <b>6</b>  | <b>Characteristics</b> . . . . .         | <b>5</b>  |
| <b>7</b>  | <b>Package outline</b> . . . . .         | <b>9</b>  |
| <b>8</b>  | <b>Revision history</b> . . . . .        | <b>10</b> |
| <b>9</b>  | <b>Legal information</b> . . . . .       | <b>11</b> |
| 9.1       | Data sheet status . . . . .              | 11        |
| 9.2       | Definitions . . . . .                    | 11        |
| 9.3       | Disclaimers . . . . .                    | 11        |
| 9.4       | Trademarks . . . . .                     | 12        |
| <b>10</b> | <b>Contact information</b> . . . . .     | <b>12</b> |

## Данный компонент на территории Российской Федерации

**Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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