



**THE DATASHEET OF
BUK7214-75B,118**





BUK7214-75B

N-channel TrenchMOS standard level FET

18 July 2013

Product data sheet

1. General description

Standard 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.

2. Features and benefits

- AEC Q101 compliant
- Low conduction losses due to low on-state resistance
- Suitable for standard level gate drive sources
- Suitable for thermally demanding environments due to 175 °C rating

3. Applications

- 12 V, 24 V and 42 V loads
- Automotive systems
- General purpose power switching
- Motors, lamps and solenoids

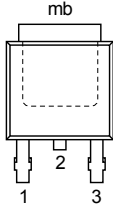
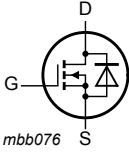
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|--|--|-----|------|-----|------------|
| V_{DS} | drain-source voltage | $T_J \geq 25\text{ °C}$; $T_J \leq 175\text{ °C}$ | - | - | 75 | V |
| I_D | drain current | $V_{GS} = 10\text{ V}$; $T_{mb} = 25\text{ °C}$; Fig. 1 ; Fig. 3 | - | - | 69 | A |
| P_{tot} | total power dissipation | $T_{mb} = 25\text{ °C}$; Fig. 2 | - | - | 158 | W |
| Static characteristics | | | | | | |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = 10\text{ V}$; $I_D = 25\text{ A}$; $T_J = 25\text{ °C}$; Fig. 11 ; Fig. 12 | - | 12.6 | 14 | m Ω |
| Dynamic characteristics | | | | | | |
| Q_{GD} | gate-drain charge | $V_{GS} = 10\text{ V}$; $I_D = 25\text{ A}$; $V_{DS} = 60\text{ V}$; $T_J = 25\text{ °C}$; Fig. 13 | - | 15 | - | nC |
| Avalanche ruggedness | | | | | | |
| $E_{DS(AL)S}$ | non-repetitive drain-source avalanche energy | $I_D = 69\text{ A}$; $V_{sup} \leq 75\text{ V}$; $R_{GS} = 50\text{ }\Omega$; $V_{GS} = 10\text{ V}$; $T_{J(init)} = 25\text{ °C}$; unclamped | - | - | 136 | mJ |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-----------------------------------|---|---|
| 1 | G | gate |  <p style="text-align: center;">DPAK (SOT428)</p> |  |
| 2 | D | drain ^[1] | | |
| 3 | S | source | | |
| mb | D | mounting base; connected to drain | | |

[1] It is not possible to make a connection to pin 2

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BUK7214-75B | DPAK | plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) | SOT428 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BUK7214-75B | BUK7214-75B |

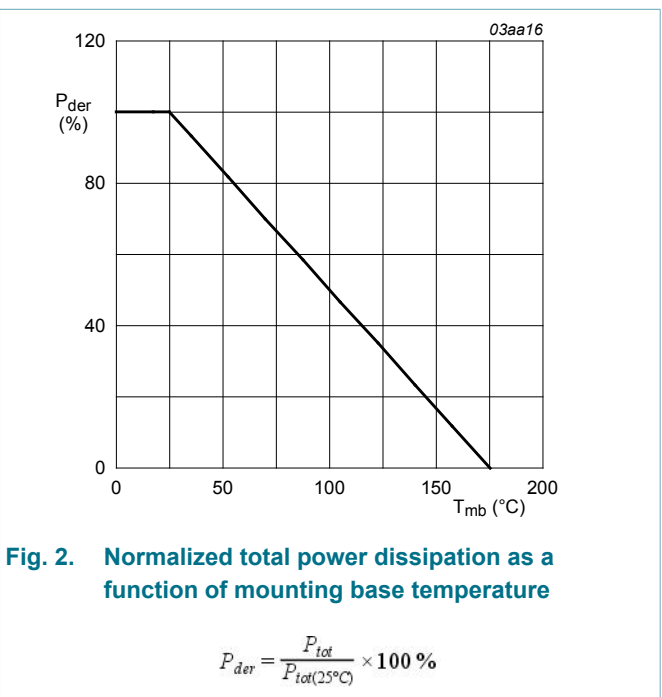
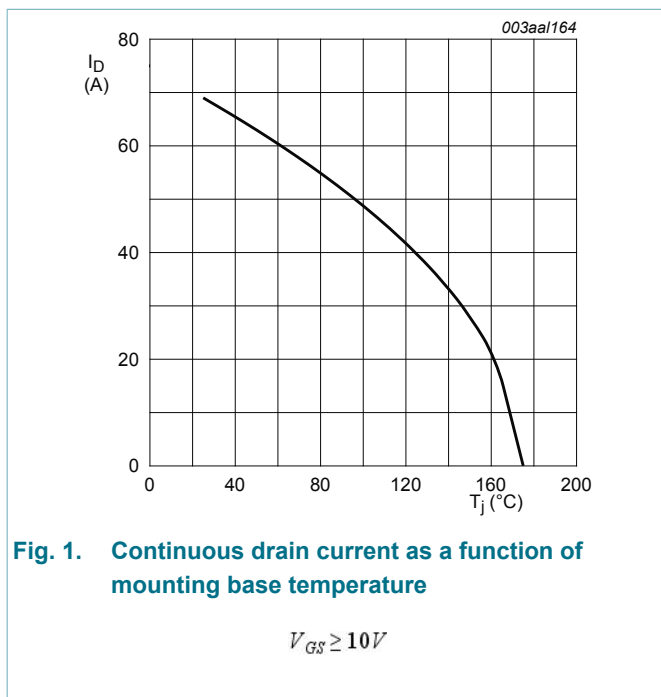
8. Limiting values

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 | $T_j \geq 25\text{ °C}$; $T_j \leq 175\text{ °C}$ | - | 75 | V |
| V_{DGR} | drain-gate voltage | $R_{GS} = 20\text{ k}\Omega$ | - | 75 | V |
| V_{GS} | gate-source voltage | | -20 | 20 | V |
| I_D | drain current | $T_{mb} = 25\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 1 ; Fig. 3 | - | 69 | A |
| | | $T_{mb} = 100\text{ °C}$; $V_{GS} = 10\text{ V}$; Fig. 1 | - | 49 | A |
| I_{DM} | peak drain current | $T_{mb} = 25\text{ °C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; Fig. 3 | - | 276 | A |
| P_{tot} | total power dissipation | $T_{mb} = 25\text{ °C}$; Fig. 2 | - | 158 | W |

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------------------------|--|--|-----|-----|------|
| T _{stg} | storage temperature | | -55 | 175 | °C |
| T _j | junction temperature | | -55 | 175 | °C |
| Source-drain diode | | | | | |
| I _S | source current | T _{mb} = 25 °C | - | 69 | A |
| I _{SM} | peak source current | pulsed; t _p ≤ 10 μs; T _{mb} = 25 °C | - | 276 | A |
| Avalanche ruggedness | | | | | |
| E _{DS(AL)S} | non-repetitive drain-source avalanche energy | I _D = 69 A; V _{sup} ≤ 75 V; R _{GS} = 50 Ω; V _{GS} = 10 V; T _{j(init)} = 25 °C; unclamped | - | 136 | mJ |



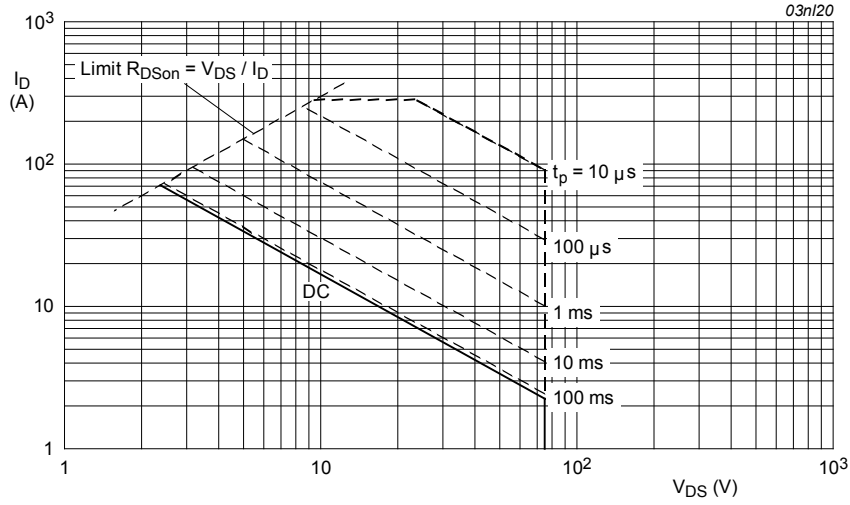


Fig. 3. Safe operating area; continuous and peak drain currents as a function of drain-source voltage

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

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|---|------------|-----|------|------|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | Fig. 4 | - | - | 0.95 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | | - | 71.4 | - | K/W |

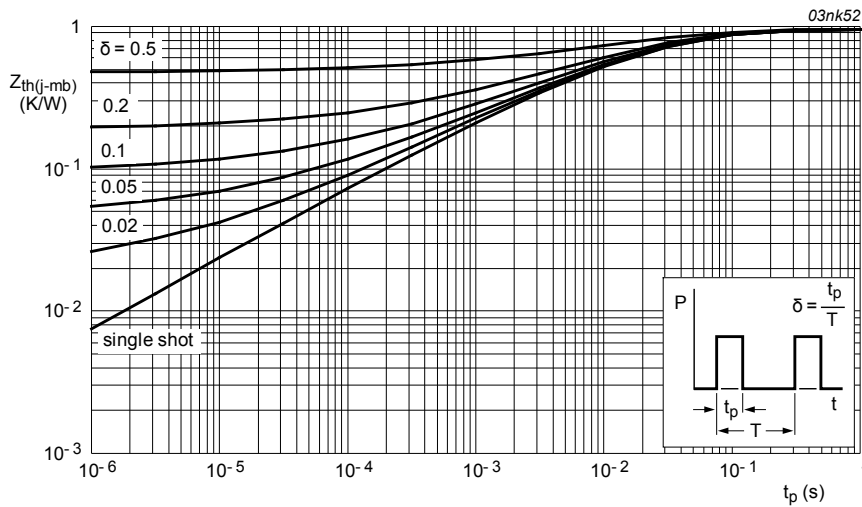


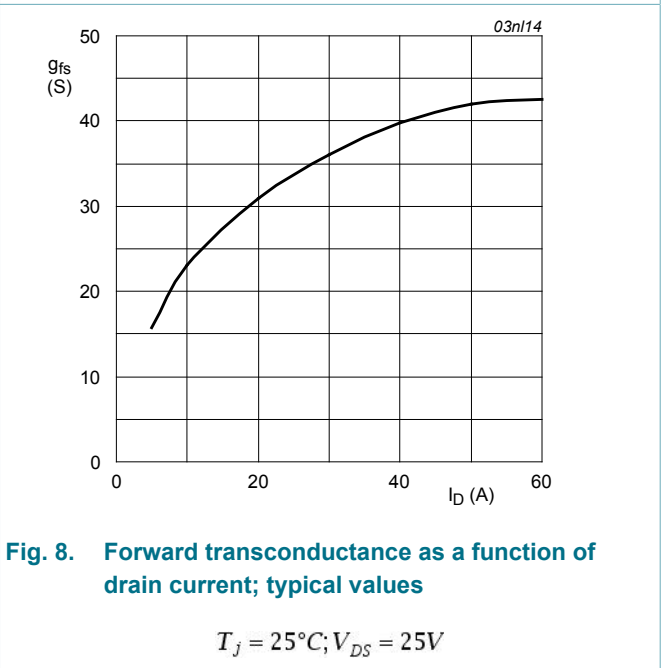
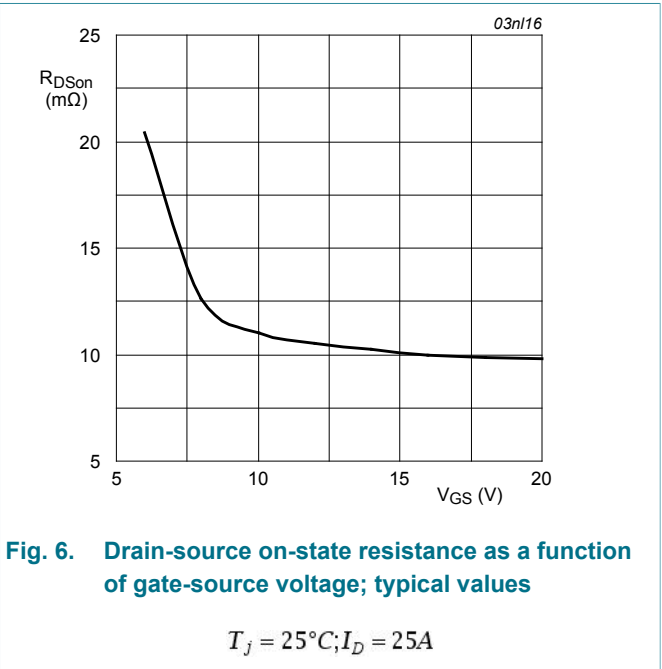
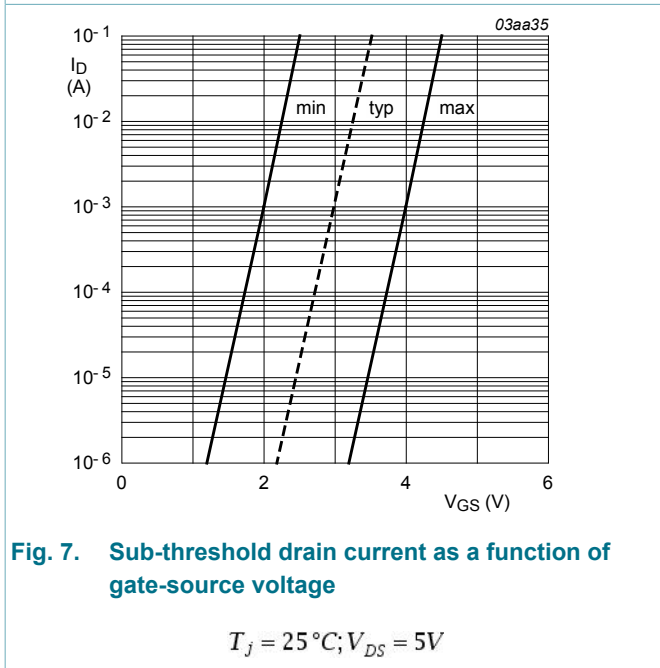
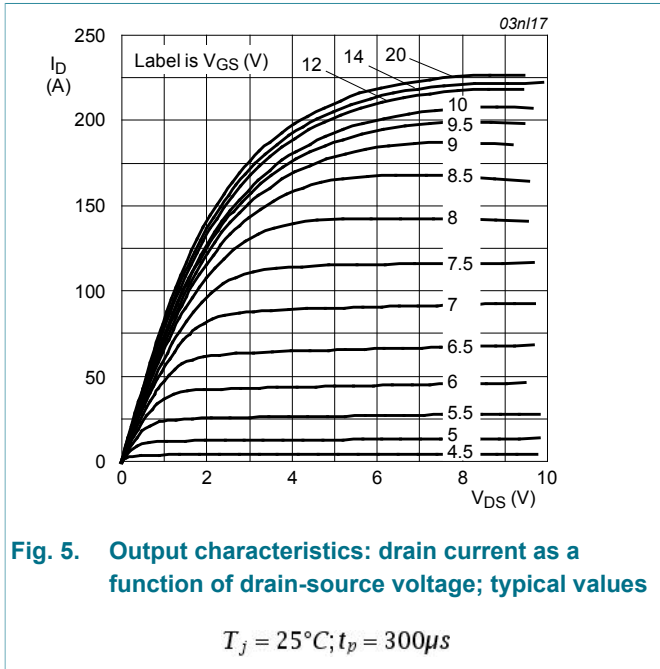
Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|----------------------------------|--|-----|------|------|---------------|
| Static characteristics | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_J = 25 \text{ }^\circ\text{C}$ | 75 | - | - | V |
| | | $I_D = 0.25 \text{ mA}; V_{GS} = 0 \text{ V}; T_J = -55 \text{ }^\circ\text{C}$ | 70 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = 175 \text{ }^\circ\text{C};$ Fig. 10 | 0.9 | - | - | V |
| | | $I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = 25 \text{ }^\circ\text{C};$ Fig. 10 | 2 | 3 | 4 | V |
| | | $I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = -55 \text{ }^\circ\text{C};$ Fig. 10 | - | - | 4.4 | V |
| I_{DSS} | drain leakage current | $V_{DS} = 75 \text{ V}; V_{GS} = 0 \text{ V}; T_J = 175 \text{ }^\circ\text{C}$ | - | - | 500 | μA |
| | | $V_{DS} = 75 \text{ V}; V_{GS} = 0 \text{ V}; T_J = 25 \text{ }^\circ\text{C}$ | - | 0.02 | 1 | μA |
| I_{GSS} | gate leakage current | $V_{GS} = 20 \text{ V}; V_{DS} = 0 \text{ V}; T_J = 25 \text{ }^\circ\text{C}$ | - | 2 | 100 | nA |
| | | $V_{GS} = -20 \text{ V}; V_{DS} = 0 \text{ V}; T_J = 25 \text{ }^\circ\text{C}$ | - | 2 | 100 | nA |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = 10 \text{ V}; I_D = 25 \text{ A}; T_J = 175 \text{ }^\circ\text{C};$ Fig. 11; Fig. 12 | - | - | 33 | m Ω |
| | | $V_{GS} = 10 \text{ V}; I_D = 25 \text{ A}; T_J = 25 \text{ }^\circ\text{C};$ Fig. 11; Fig. 12 | - | 12.6 | 14 | m Ω |
| Dynamic characteristics | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $I_D = 25 \text{ A}; V_{DS} = 60 \text{ V}; V_{GS} = 10 \text{ V};$ $T_J = 25 \text{ }^\circ\text{C};$ Fig. 13 | - | 41 | - | nC |
| Q_{GS} | gate-source charge | | - | 9 | - | nC |
| Q_{GD} | gate-drain charge | | - | 15 | - | nC |
| C_{iss} | input capacitance | $V_{GS} = 0 \text{ V}; V_{DS} = 25 \text{ V}; f = 1 \text{ MHz};$ $T_J = 25 \text{ }^\circ\text{C};$ Fig. 14 | - | 1959 | 2612 | pF |
| C_{oss} | output capacitance | | - | 326 | 391 | pF |
| C_{rss} | reverse transfer capacitance | | - | 159 | 218 | pF |
| $t_{d(on)}$ | turn-on delay time | $V_{DS} = 25 \text{ V}; R_L = 1.2 \text{ }^\circ\Omega; V_{GS} = 10 \text{ V};$ $R_{G(ext)} = 10 \text{ }^\circ\Omega; T_J = 25 \text{ }^\circ\text{C}$ | - | 18 | - | ns |
| t_r | rise time | | - | 114 | - | ns |
| $t_{d(off)}$ | turn-off delay time | | - | 52 | - | ns |
| t_f | fall time | | - | 45 | - | ns |
| L_D | internal drain inductance | measured from drain to centre of die ; $T_J = 25 \text{ }^\circ\text{C}$ | - | 2.5 | - | nH |
| L_S | internal source inductance | measured from source lead to source bond pad ; $T_J = 25 \text{ }^\circ\text{C}$ | - | 7.5 | - | nH |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------------|-----------------------|--|-----|------|-----|------|
| Source-drain diode | | | | | | |
| V_{SD} | source-drain voltage | $I_S = 25\text{ A}$; $V_{GS} = 0\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 15 | - | 0.85 | 1.2 | V |
| t_{rr} | reverse recovery time | $I_S = 20\text{ A}$; $di_S/dt = -100\text{ A}/\mu\text{s}$; | - | 74 | - | ns |
| Q_r | recovered charge | $V_{GS} = -10\text{ V}$; $V_{DS} = 30\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$ | - | 94 | - | nC |



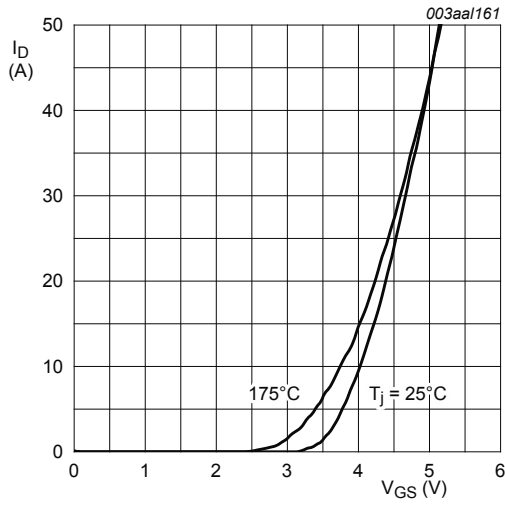


Fig. 9. Transfer characteristics; drain current as a function of gate-source voltage; typical values

$$V_{DS} = 12V$$

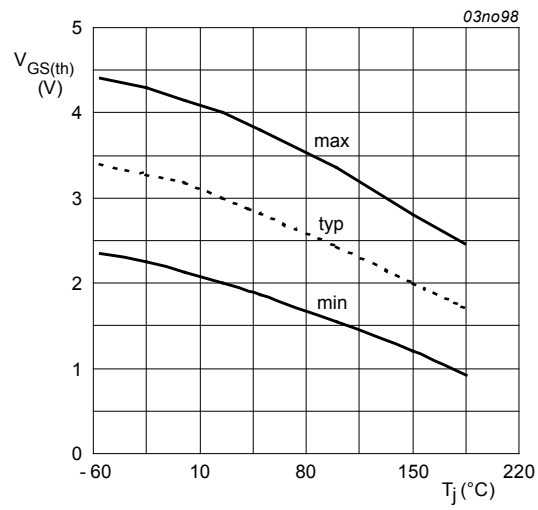


Fig. 10. Gate-source threshold voltage as a function of junction temperature

$$I_D = 1mA; V_{DS} = V_{GS}$$

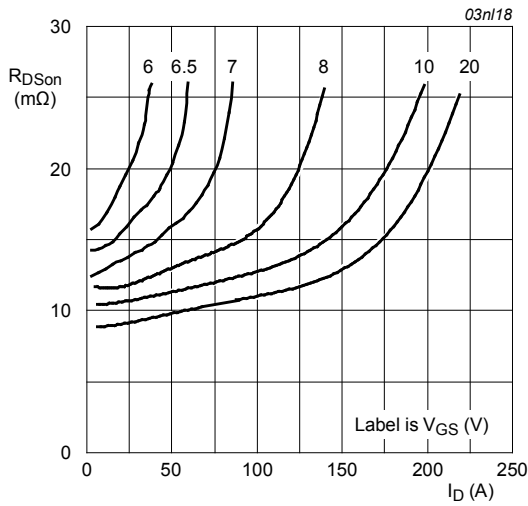


Fig. 11. Drain-source on-state resistance as a function of drain current; typical values

$$T_j = 25^\circ C; t_p = 300\mu s$$

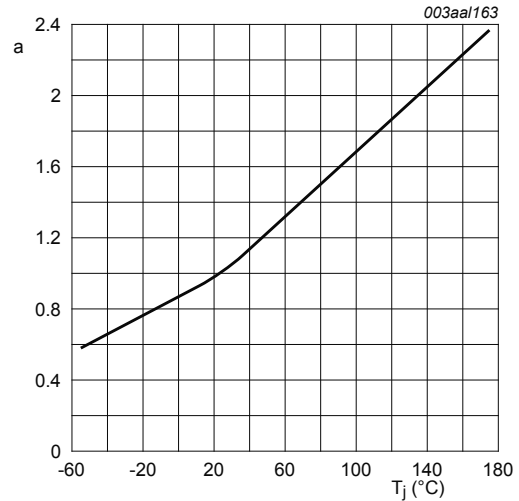


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

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

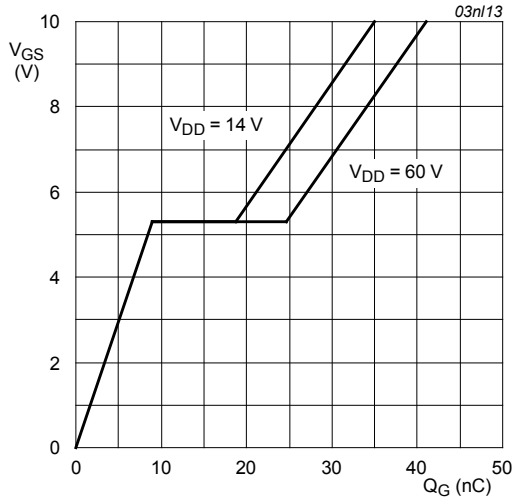


Fig. 13. Gate-source voltage as a function of gate charge; typical values

$$T_j = 25^\circ\text{C}; I_D = 25\text{A}$$

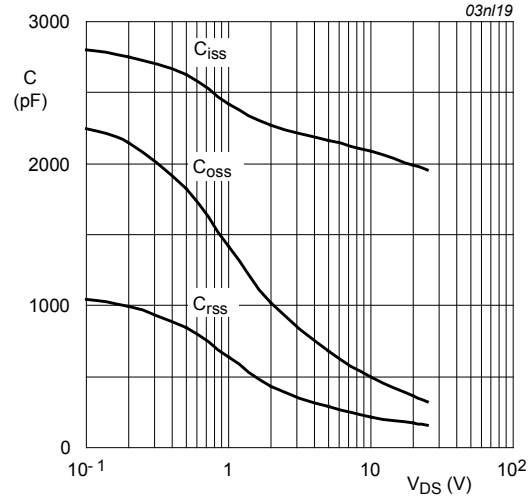


Fig. 14. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values

$$V_{GS} = 0\text{V}; f = 1\text{MHz}$$

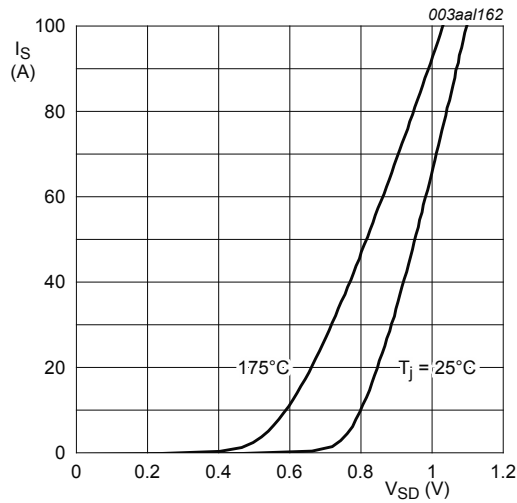
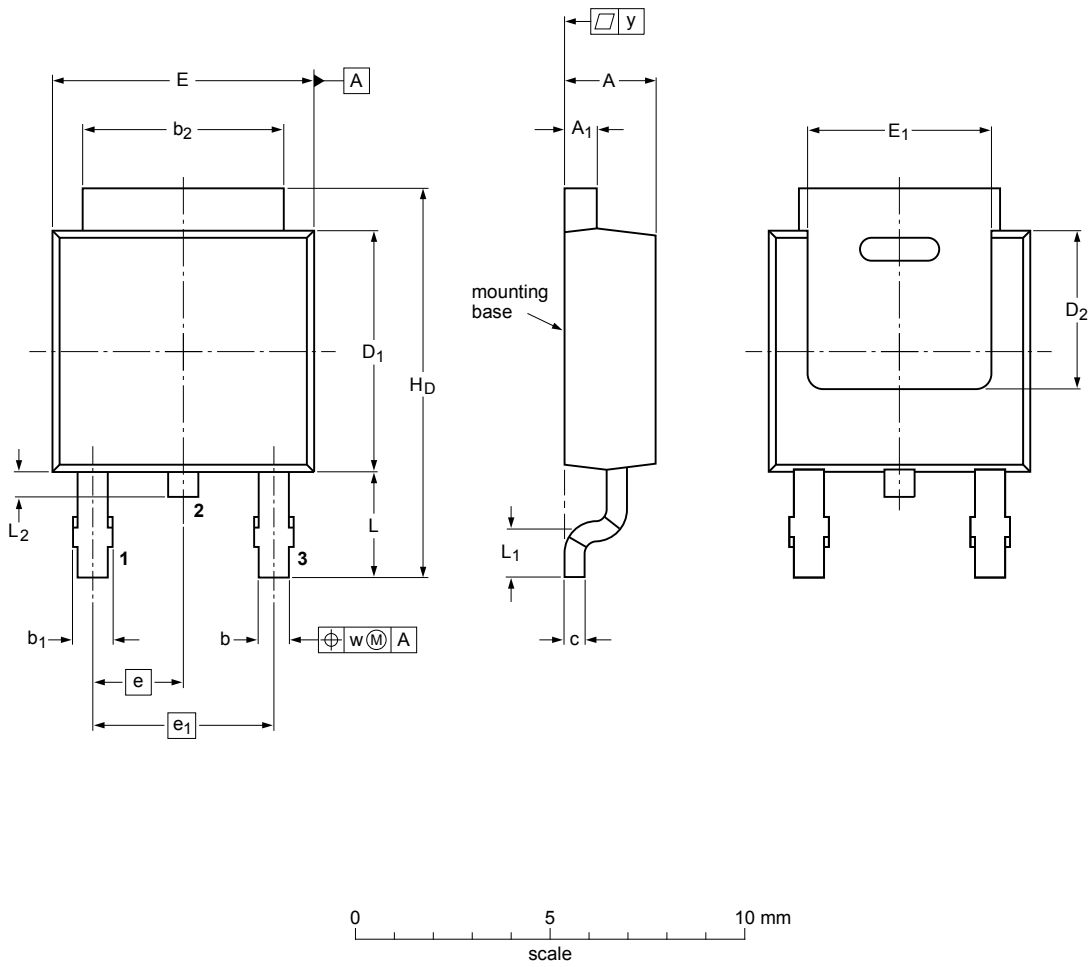


Fig. 15. Source current as a function of source-drain voltage; typical values

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

11. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) SOT428



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ | b | b ₁ | b ₂ | c | D ₁ | D ₂ min | E | E ₁ min | e | e ₁ | H _D | L | L ₁ min | L ₂ | w | y max |
|------|--------------|----------------|--------------|----------------|----------------|--------------|----------------|-----------------------|--------------|-----------------------|-------|----------------|----------------|--------------|-----------------------|----------------|-----|----------|
| mm | 2.38 2.22 | 0.93 0.46 | 0.89 0.71 | 1.1 0.9 | 5.46 5.00 | 0.56 0.20 | 6.22 5.98 | 4.0 | 6.73 6.47 | 4.45 | 2.285 | 4.57 | 10.4 9.6 | 2.95 2.55 | 0.5 | 0.9 0.5 | 0.2 | 0.2 |

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT428 | | TO-252 | SC-63 | | 06-02-14 06-03-16 |

Fig. 16. Package outline DPAK (SOT428)

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. |
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