# SIEMENS

## SIPMOS ® Small-Signal Transistor

• P channel

• Enhancement mode

• Logic Level

• $V_{GS(th)}$ = -0.8...-2.0 V
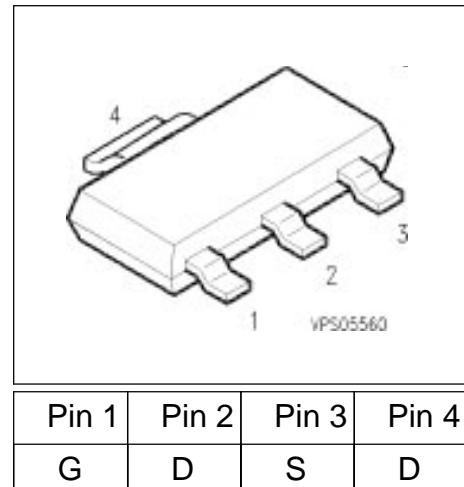


| Pin 1 | Pin 2 | Pin 3 | Pin 4 |
|-------|-------|-------|-------|
| G | D | S | D |

| Type | $V_{DS}$ | $I_D$ | $R_{DS(on)}$ | Package | Marking |
|------|------|------|---------|---------|---------|
| BSP 317 | -200 V | -0.37 A | 6 Ω | SOT-223 | |

| Type | Ordering Code | Tape and Reel Information |
|------|---------------|--------------------------|
| BSP 317 | Q67000-S94 | E6327 |

## Maximum Ratings

| Parameter | Symbol | Values | Unit |
|-----------|--------|--------|------|
| Drain source voltage | $V_{DS}$ | -200 | V |
| Drain-gate voltage $R_{GS}$ = 20 kΩ | $V_{DGR}$ | -200 | |
| Gate source voltage | $V_{GS}$ | ± 20 | |
| Continuous drain current $T_A$ = 25 °C | $I_D$ | -0.37 | A |
| DC drain current, pulsed $T_A$ = 25 °C | $I_{Dpuls}$ | -1.48 | |
| Power dissipation $T_A$ = 25 °C | $P_{tot}$ | 1.8 | W |

## Maximum Ratings

| Parameter | Symbol | Values | Unit |
|---|---|---|---|
| Chip or operating temperature | $T_j$ | -55 ... + 150 | °C |
| Storage temperature | $T_{stg}$ | -55 ... + 150 | |
| Thermal resistance, chip to ambient air | $R_{thJA}$ | $\leq 70$ | K/W |
| Therminal resistance, junction-soldering point [1] | $R_{thJS}$ | $\leq 10$ | |
| DIN humidity category, DIN 40 040 | | E | |
| IEC climatic category, DIN IEC 68-1 | | 55 / 150 / 56 | |

1) Transistor on epoxy pcb 40 mm x 40 mm x 1,5 mm with 6 cm$^2$ copper area for drain connection

## Electrical Characteristics, at $T_j$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |

### Static Characteristics

| Parameter | Symbol | min. | typ. | max. | Unit |
|---|---|---|---|---|---|
| Drain- source breakdown voltage $V_{GS}$ = 0 V, $I_D$ = -0.25 mA, $T_j$ = 25 °C | $V_{(BR)DSS}$ | -200 | - | - | V |
| Gate threshold voltage $V_{GS}$=$V_{DS}$, $I_D$ = -1 mA | $V_{GS(th)}$ | -0.8 | -1.1 | -2 | |
| Zero gate voltage drain current | $I_{DSS}$ | | | | |
| $V_{DS}$ = -200 V, $V_{GS}$ = 0 V, $T_j$ = 25 °C | | - | -0.1 | -1 | µA |
| $V_{DS}$ = -200 V, $V_{GS}$ = 0 V, $T_j$ = 125 °C | | - | -10 | -100 | |
| $V_{DS}$ = -130 V, $V_{GS}$ = 0 V, $T_j$ = 25 °C | | - | - | -100 | nA |
| Gate-source leakage current $V_{GS}$ = -20 V, $V_{DS}$ = 0 V | $I_{GSS}$ | - | -10 | -100 | nA |
| Drain-Source on-state resistance $V_{GS}$ = -10 V, $I_D$ = -0.37 A | $R_{DS(on)}$ | - | 3.4 | 6 | Ω |

**Electrical Characteristics,** at $T_\mathrm{j}$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Dynamic Characteristics** | | | | | |
| Transconductance $V_\mathrm{DS} \geq 2 * I_\mathrm{D} * R_\mathrm{DS(on)max}$, $I_\mathrm{D}$ = -0.37 A | $g_\mathrm{fs}$ | 0.25 | 0.35 | - | S |
| Input capacitance $V_\mathrm{GS}$ = 0 V, $V_\mathrm{DS}$ = 25 V, $f$ = 1 MHz | $C_\mathrm{iss}$ | - | 270 | 360 | pF |
| Output capacitance $V_\mathrm{GS}$ = 0 V, $V_\mathrm{DS}$ = 25 V, $f$ = 1 MHz | $C_\mathrm{oss}$ | - | 50 | 75 | |
| Reverse transfer capacitance $V_\mathrm{GS}$ = 0 V, $V_\mathrm{DS}$ = 25 V, $f$ = 1 MHz | $C_\mathrm{rss}$ | - | 15 | 25 | |
| Turn-on delay time $V_\mathrm{DD}$ = -30 V, $V_\mathrm{GS}$ = -10 V, $I_\mathrm{D}$ = -0.29 A $R_\mathrm{GS}$ = 50 Ω | $t_\mathrm{d(on)}$ | - | 8 | 12 | ns |
| Rise time $V_\mathrm{DD}$ = -30 V, $V_\mathrm{GS}$ = -10 V, $I_\mathrm{D}$ = -0.29 A $R_\mathrm{GS}$ = 50 Ω | $t_\mathrm{r}$ | - | 30 | 45 | |
| Turn-off delay time $V_\mathrm{DD}$ = -30 V, $V_\mathrm{GS}$ = -10 V, $I_\mathrm{D}$ = -0.29 A $R_\mathrm{GS}$ = 50 Ω | $t_\mathrm{d(off)}$ | - | 80 | 110 | |
| Fall time $V_\mathrm{DD}$ = -30 V, $V_\mathrm{GS}$ = -10 V, $I_\mathrm{D}$ = -0.29 A $R_\mathrm{GS}$ = 50 Ω | $t_\mathrm{f}$ | - | 90 | 120 | |

**Electrical Characteristics,** at $T_j = 25°C$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | **min.** | **typ.** | **max.** | |
| **Reverse Diode** | | | | | |
| Inverse diode continuous forward current $T_A = 25 °C$ | $I_S$ | - | - | -0.37 | A |
| Inverse diode direct current, pulsed $T_A = 25 °C$ | $I_{SM}$ | - | - | -1.48 | |
| Inverse diode forward voltage $V_{GS} = 0$ V, $I_F = -0.74$ A, $T_j = 25 °C$ | $V_{SD}$ | - | -0.95 | -1.1 | V |

## Power dissipation

$P_{tot} = f(T_A)$
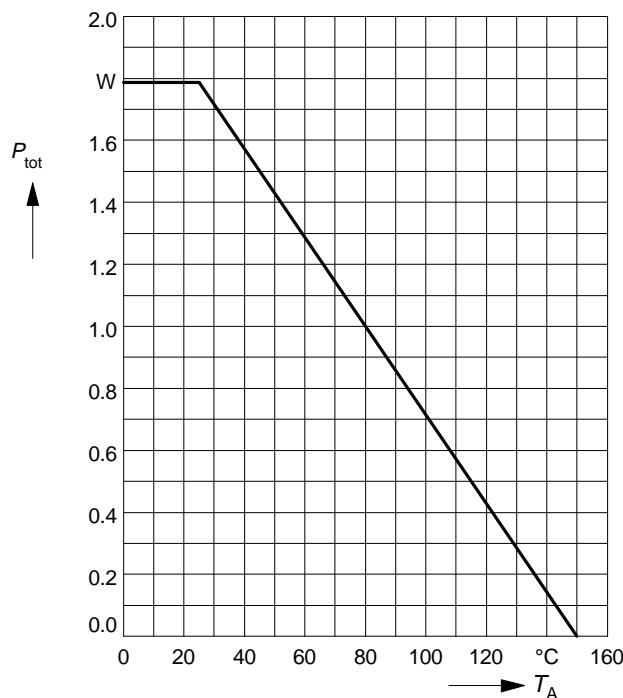


## Drain current

$I_D = f(T_A)$
parameter: $V_{GS} \geq$ -10 V



## Safe operating area $I_D = f(V_{DS})$

parameter : $D = 0$, $T_C = 25°C$



BSP 317 ($D=0, T_C=25°C$)  SIK02470

$R_{DS(on)} = V_{DS}/I_D$

$t_p = 900\mu s$
10ms
100ms
DC
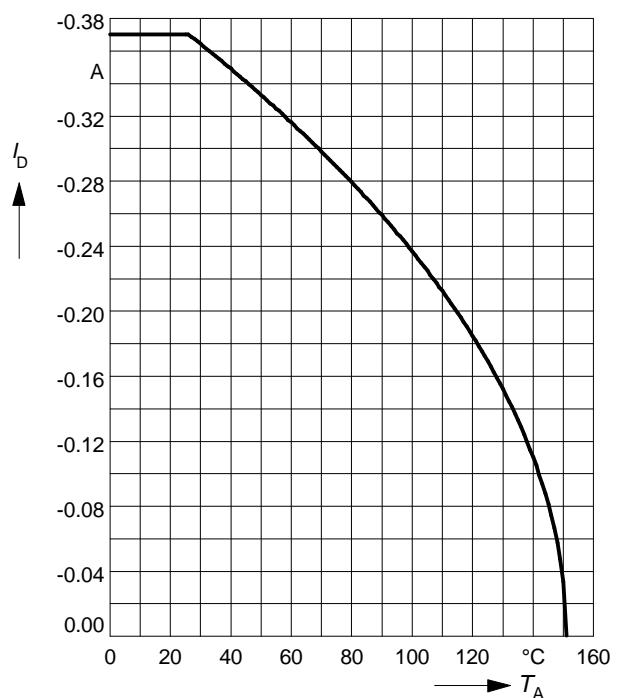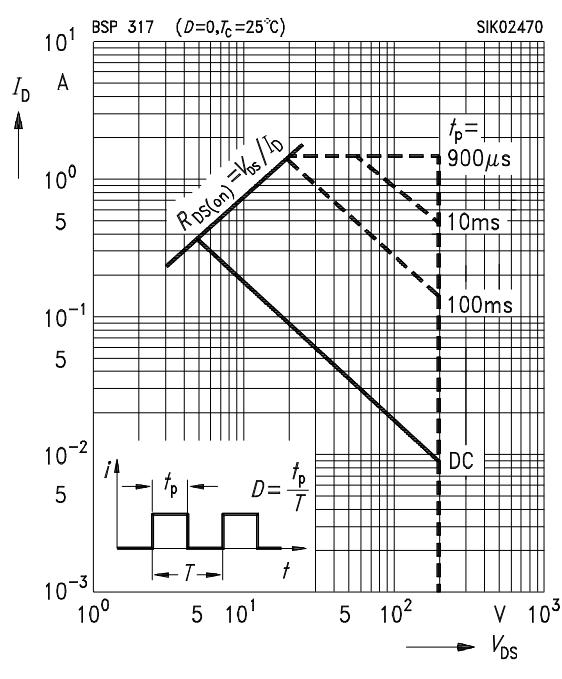
$D = \frac{t_p}{T}$

## Transient thermal impedance

$Z_{th\ JA} = f(t_p)$
parameter: $D = t_p / T$



D = 0.50
0.20
0.10
0.05
0.02
0.01

single pulse
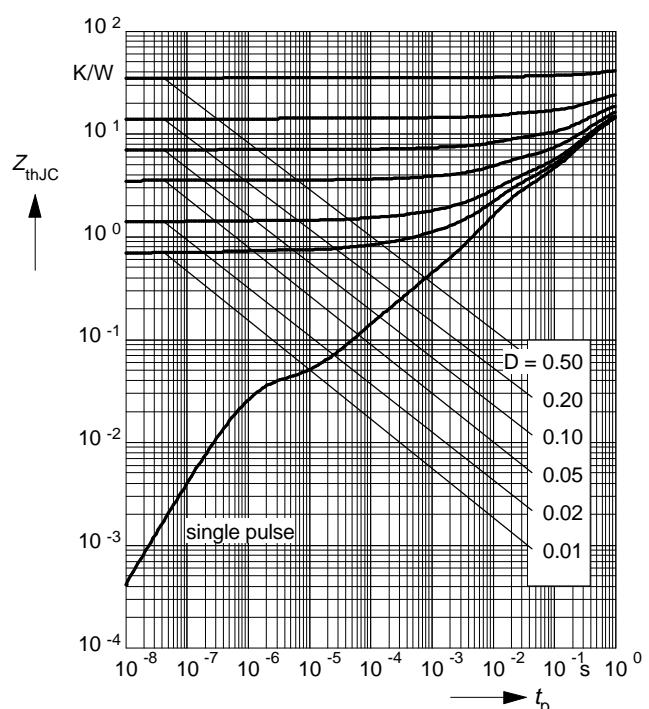
## Typ. output characteristics

$I_D = f(V_{DS})$
parameter: $t_p = 80$ µs
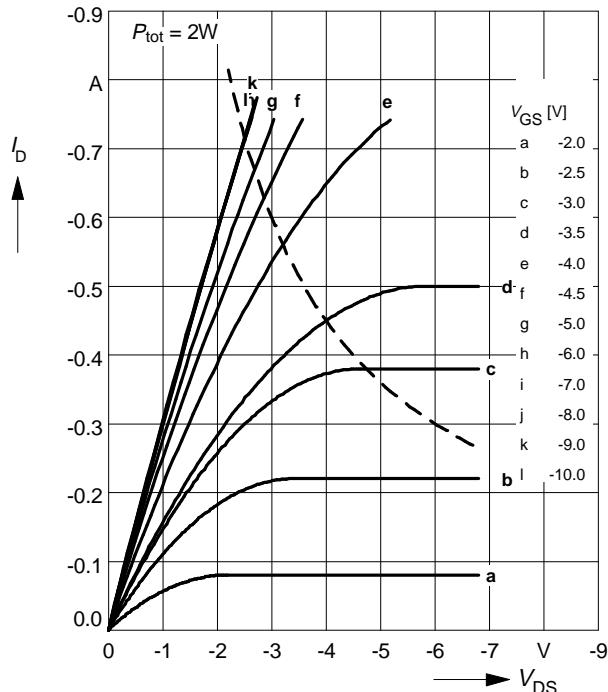


## Typ. drain-source on-resistance

$R_{DS\,(on)} = f(I_D)$
parameter: $t_p = 80$ µs, $T_j = 25$ °C
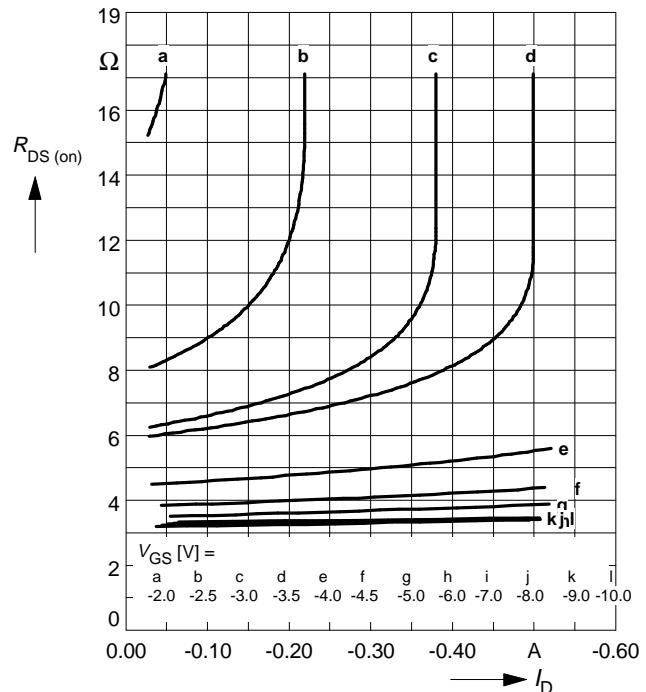


Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: $t_p = 80$ µs
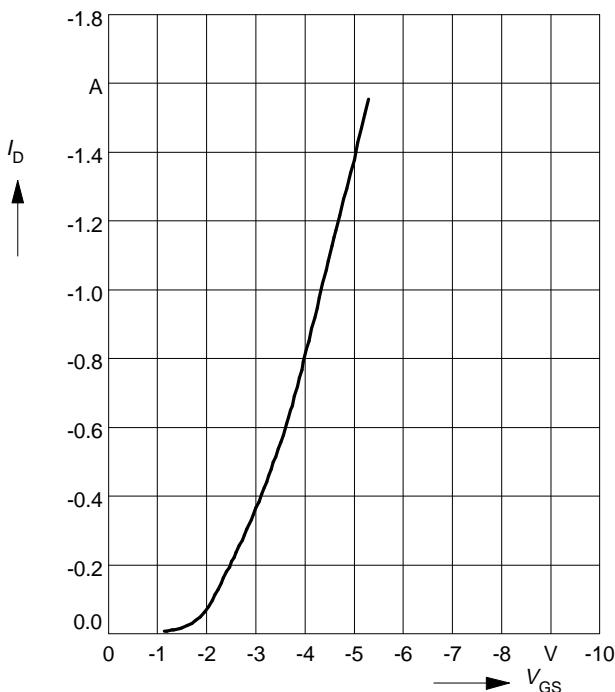


Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $t_p = 80$ µs,
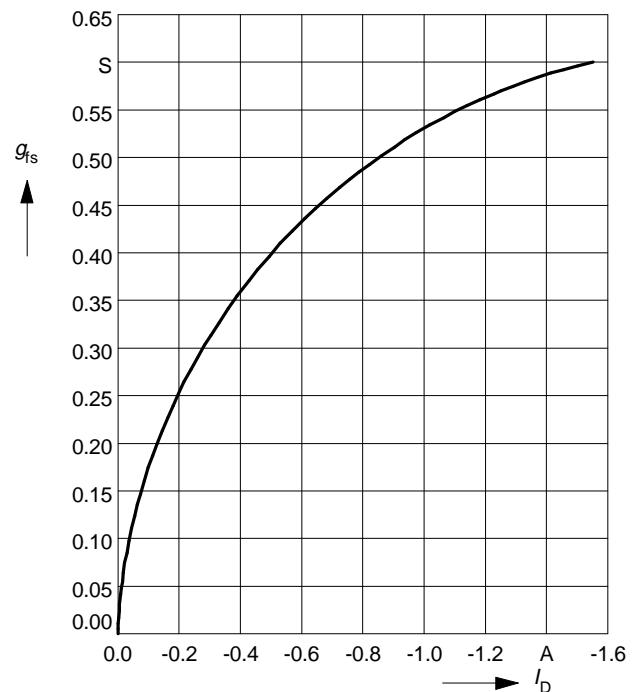
## Drain-source on-resistance

$R_{DS\,(on)} = f(T_j)$
parameter: $I_D = -0.37\,A$, $V_{GS} = -10\,V$
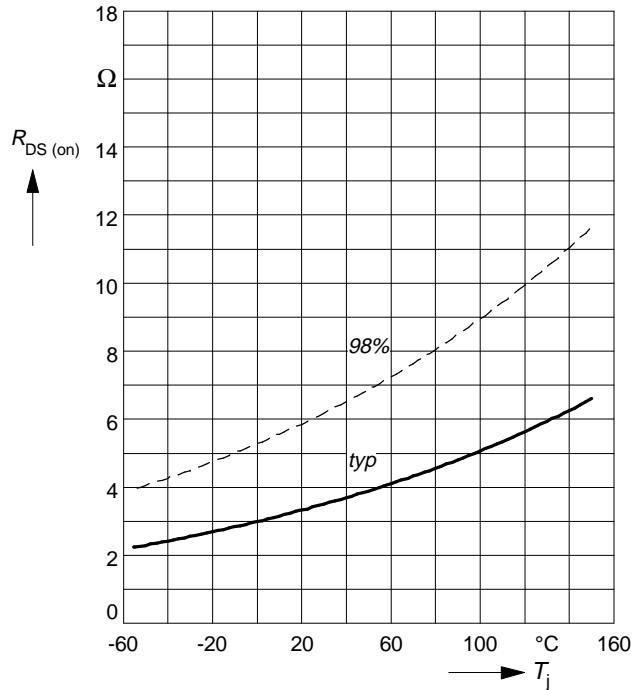
## Gate threshold voltage

$V_{GS\,(th)} = f(T_j)$
parameter: $V_{GS} = V_{DS}$, $I_D = -1\,mA$
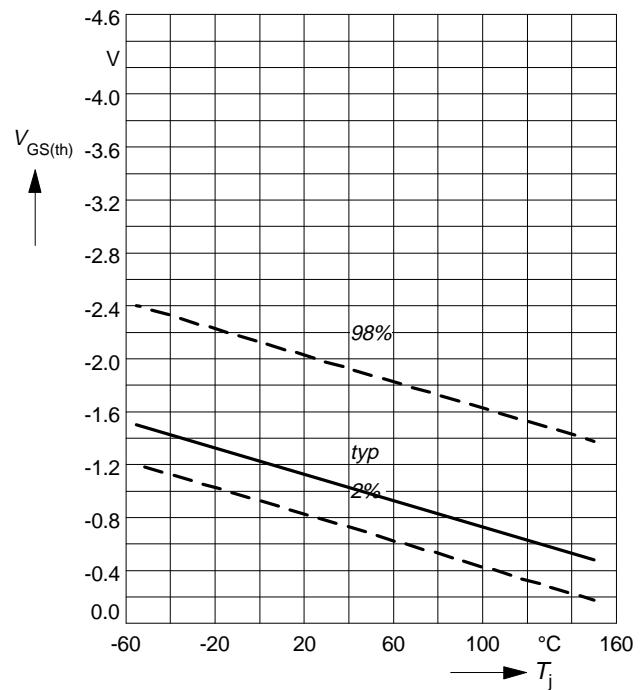
## Typ. capacitances

$C = f(V_{DS})$
parameter: $V_{GS}=0V$, $f = 1\,MHz$
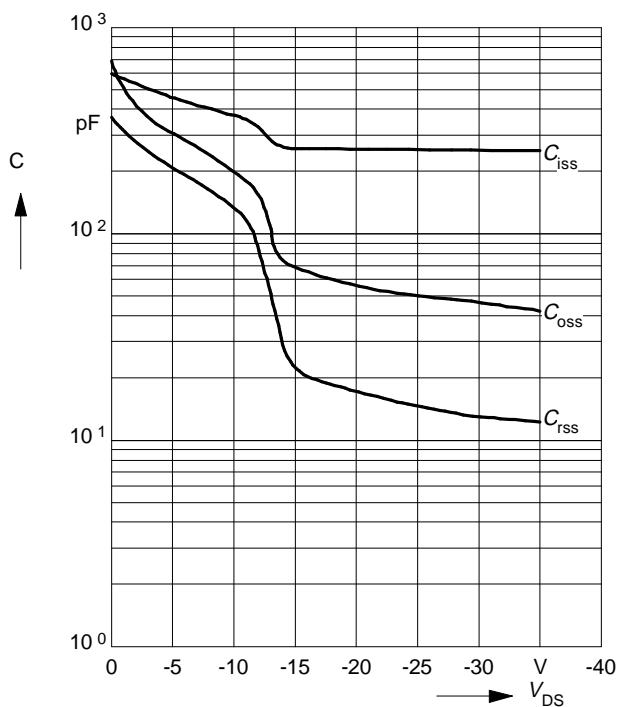
## Forward characteristics of reverse diode

$I_F = f(V_{SD})$
parameter: $T_j$, $t_p = 80\,\mu s$
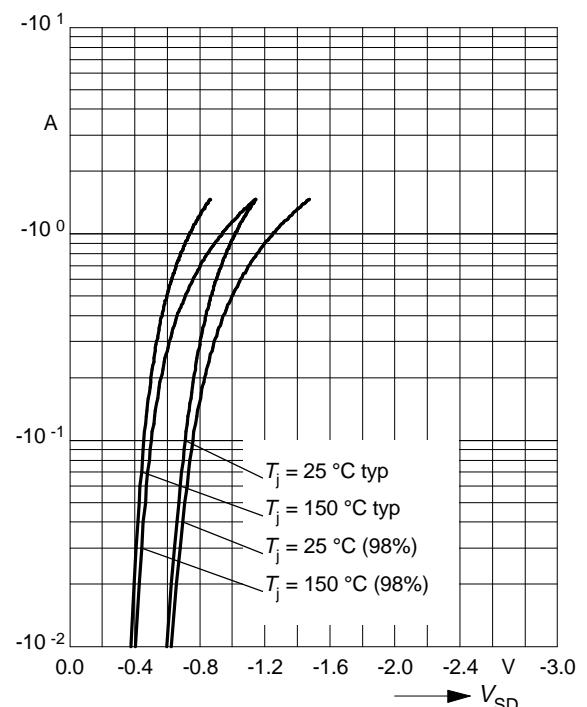
**Drain-source breakdown voltage**

$V_{(BR)DSS} = f(T_j)$
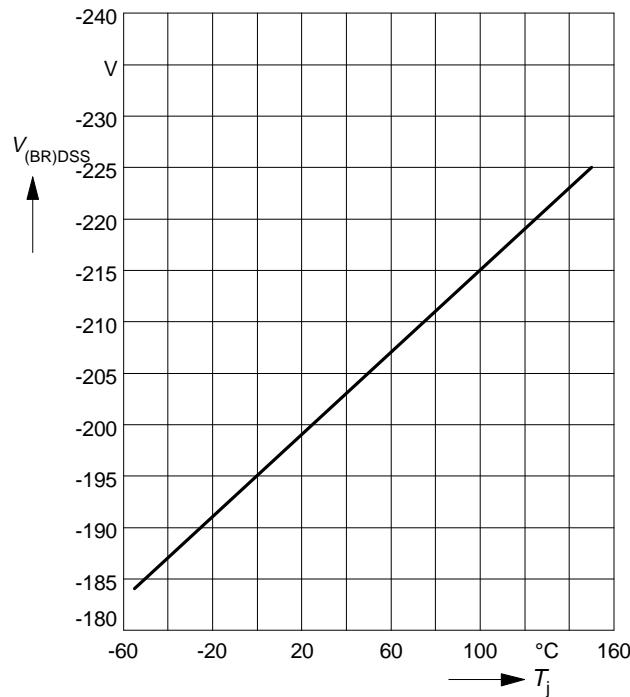
**Safe operating area** $I_D = f(V_{DS})$

parameter : $D = 0.01$, $T_C = 25°C$
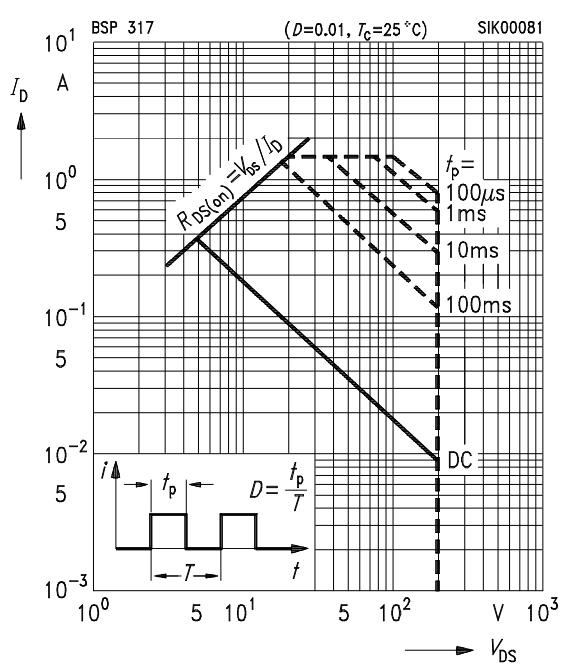
**Package outlines**

SOT-223

Dimensions in mm



GPS05560