![Infineon technologies logo]

# SIPMOS® Small-Signal Transistor

- $V_{DS}$ 240 V
- $I_D$ 0.2 A
- $R_{DS(on)}$ 20 Ω
- N channel
- Depletion mode
- High dynamic resistance
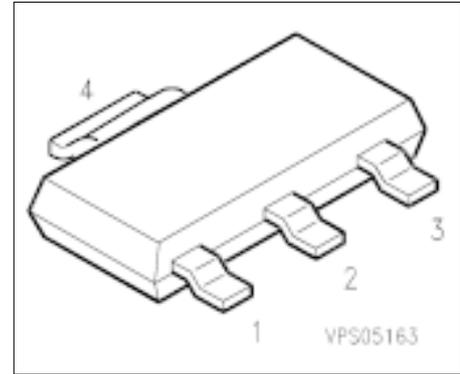


| Type | Ordering Code | Tape and Reel Information | Pin Configuration | | | | Marking | Package |
|------|---------------|--------------------------|------|---|---|---|---------|---------|
| | | | 1 | 2 | 3 | 4 | | |
| BSP 129 | Q67000-S073 | E6327: 1000 pcs/reel | G | D | S | D | BSP 129 | SOT-223 |

## Maximum Ratings

| Parameter | Symbol | Values | Unit |
|-----------|--------|--------|------|
| Drain-source voltage | $V_{DS}$ | 240 | V |
| Drain-gate voltage, $R_{GS} = 20\ \text{k}\Omega$ | $V_{DGR}$ | 240 | |
| Gate-source voltage | $V_{GS}$ | ± 20 | |
| ESD Sensitivity (HBM) as per MIL-STD 883 | – | Class 1 | |
| Continuous drain current, $T_A = 34\ °C$ | $I_D$ | 0.2 | A |
| Pulsed drain current, $T_A = 25\ °C$ | $I_{D\,puls}$ | 0.6 | |
| Max. power dissipation, $T_A = 25\ °C$ | $P_{tot}$ | 1.7 | W |
| Operating and storage temperature range | $T_j,\ T_{stg}$ | – 55 … + 150 | °C |

| Parameter | | Symbol | Values | Unit |
|-----------|---|--------|--------|------|
| Thermal resistance [1] | chip-ambient | $R_{thJA}$ | 72 | K/W |
| | chip-soldering point | $R_{thJS}$ | 12 | |
| DIN humidity category, DIN 40 040 | | – | E | – |
| IEC climatic category, DIN IEC 68-1 | | – | 55/150/56 | |

[1] Transistor on epoxy pcb 40 mm × 40 mm × 1.5 mm with 6 cm$^2$ copper area for drain connection.

## Electrical Characteristics

at $T_j = 25\ ^\circ\text{C}$, unless otherwise specified.

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

### Static Characteristics

| Parameter | Symbol | min. | typ. | max. | Unit |
|---|---|---|---|---|---|
| Drain-source breakdown voltage $V_{GS} = -3$ V, $I_D = 0.25$ mA | $V_{(BR)DSS}$ | 240 | – | – | V |
| Gate threshold voltage $V_{DS} = 3$ V, $I_D = 1$ mA | $V_{GS(th)}$ | – 1.8 | – 1.2 | – 0.7 | |
| Drain-source cutoff current $V_{DS} = 240$ V, $V_{GS} = -3$ V $T_j = 25\ ^\circ\text{C}$ $T_j = 125\ ^\circ\text{C}$ | $I_{DSS}$ | – – | – – | 100 200 | nA µA |
| Gate-source leakage current $V_{GS} = 20$ V, $V_{DS} = 0$ | $I_{GSS}$ | – | 10 | 100 | nA |
| Drain-source on-resistance $V_{GS} = 0$ V, $I_D = 0.014$ A | $R_{DS(on)}$ | – | 7.0 | 20 | Ω |

### Dynamic Characteristics

| Parameter | Symbol | min. | typ. | max. | Unit |
|---|---|---|---|---|---|
| Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, $I_D = 0.25$ A | $g_{fs}$ | 0.14 | 0.2 | – | S |
| Input capacitance $V_{GS} = 0$, $V_{DS} = 25$ V, $f = 1$ MHz | $C_{iss}$ | – | 110 | 150 | pF |
| Output capacitance $V_{GS} = 0$, $V_{DS} = 25$ V, $f = 1$ MHz | $C_{oss}$ | – | 20 | 30 | |
| Reverse transfer capacitance $V_{GS} = 0$, $V_{DS} = 25$ V, $f = 1$ MHz | $C_{rss}$ | – | 7 | 10 | |
| Turn-on time $t_{on}$, ($t_{on} = t_{d(on)} + t_r$) | $t_{d(on)}$ | – | 4 | 6 | ns |
| $V_{DD} = 30$ V, $V_{GS} = -2$ V ... $+5$ V, $R_{GS} = 50\ \Omega$, $I_D = 0.25$ A | $t_r$ | – | 10 | 15 | |
| Turn-off time $t_{off}$, ($t_{off} = t_{d(off)} + t_f$) | $t_{d(off)}$ | – | 15 | 20 | |
| $V_{DD} = 30$ V, $V_{GS} = -2$ V ... $+5$ V, $R_{GS} = 50\ \Omega$, $I_D = 0.25$ A | $t_f$ | – | 25 | 35 | |

## Package Outline

**Electrical Characteristics** (cont'd)

at $T_j$ = 25 ˚C, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|-----------|--------|--------|--------|--------|------|
| | | min. | typ. | max. | |
| **Reverse Diode** | | | | | |
| Continuous reverse drain current $T_A$ = 25 ˚C | $I_S$ | – | – | 0.15 | A |
| Pulsed reverse drain current $T_A$ = 25 ˚C | $I_{SM}$ | – | – | 0.45 | |
| Diode forward on-voltage $I_F$ = 0.3 A, $V_{GS}$ = 0 | $V_{SD}$ | – | 0.7 | 1.4 | V |

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

**Total power dissipation** $P_{tot} = f(T_A)$
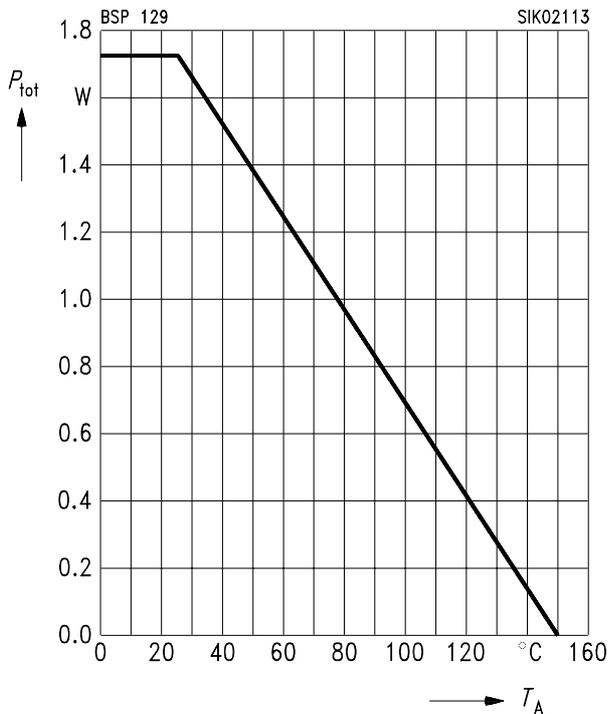


**Safe operating area** $I_D = f(V_{DS})$
parameter: $D = 0.01$, $T_C = 25$ ˚C
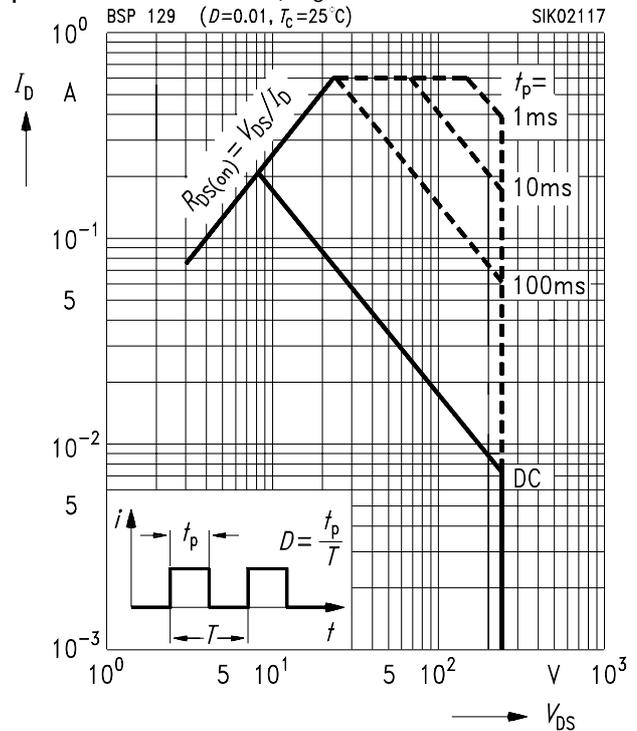


**Typ. output characteristics** $I_D = f(V_{DS})$
parameter: $t_p = 80$ µs
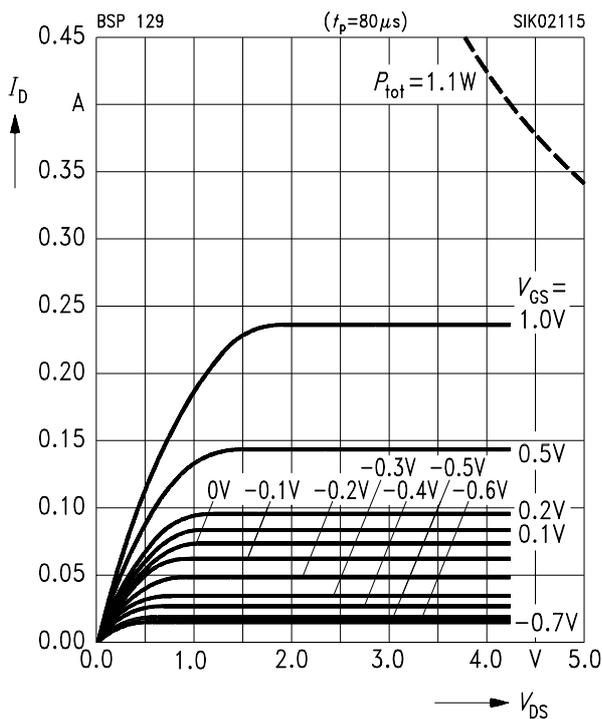


**Typ. drain-source on-resistance**
$R_{DS(on)} = f(I_D)$
parameter: $V_{GS}$
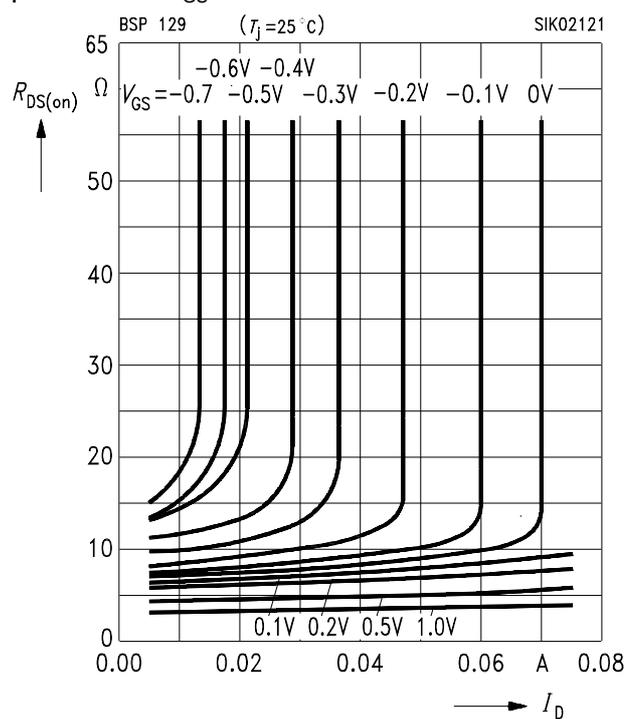
**Typ. transfer characteristics** $I_D = f(V_{GS})$
parameter: $t_p = 80$ µs, $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$
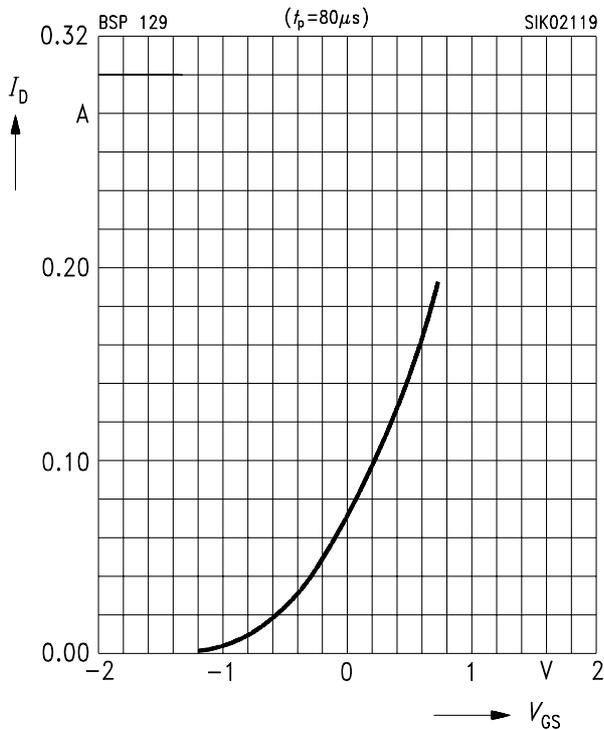


**Typ. forward transconductance** $g_{fs} = f(I_D)$
parameter: $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$, $t_p = 80$ µs
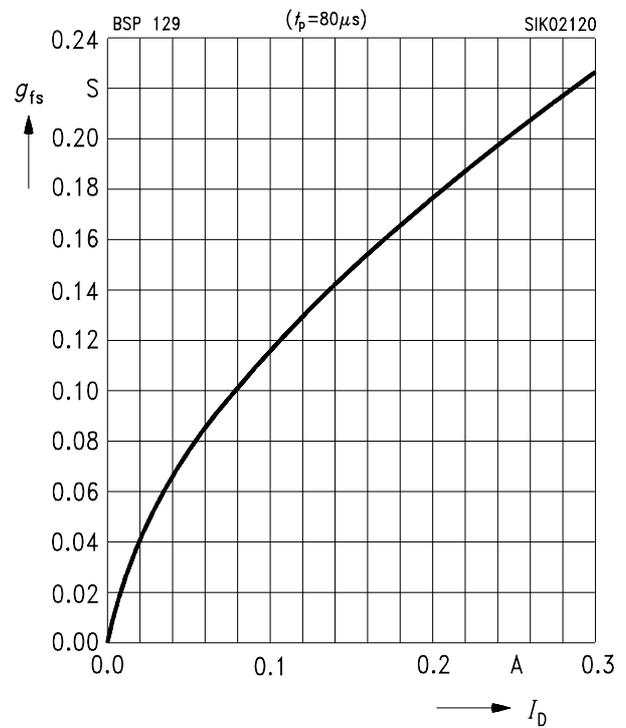


**Drain-source on-resistance**
$R_{DS(on)} = f(T_j)$
parameter: $I_D = 0.014$ A, $V_{GS} = 0$ V, (spread)
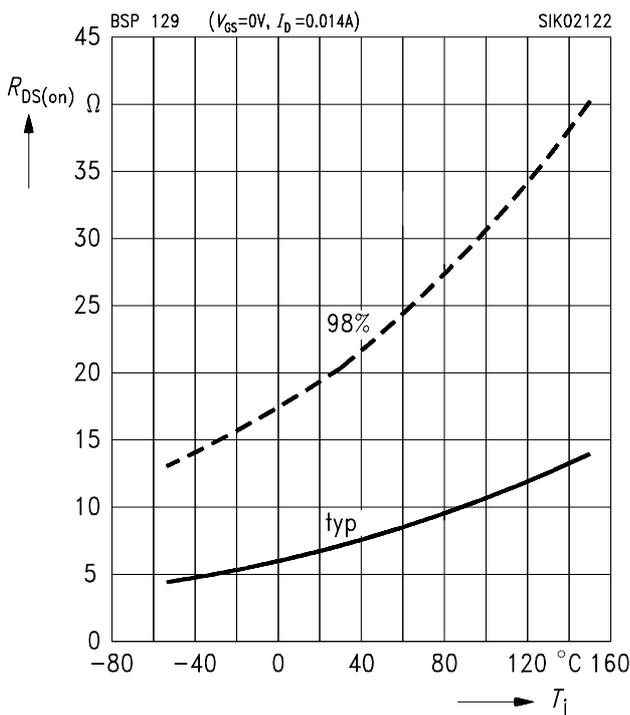


**Typ. capacitances** $C = f(V_{DS})$
parameter: $V_{GS} = 0$, $f = 1$ MHz
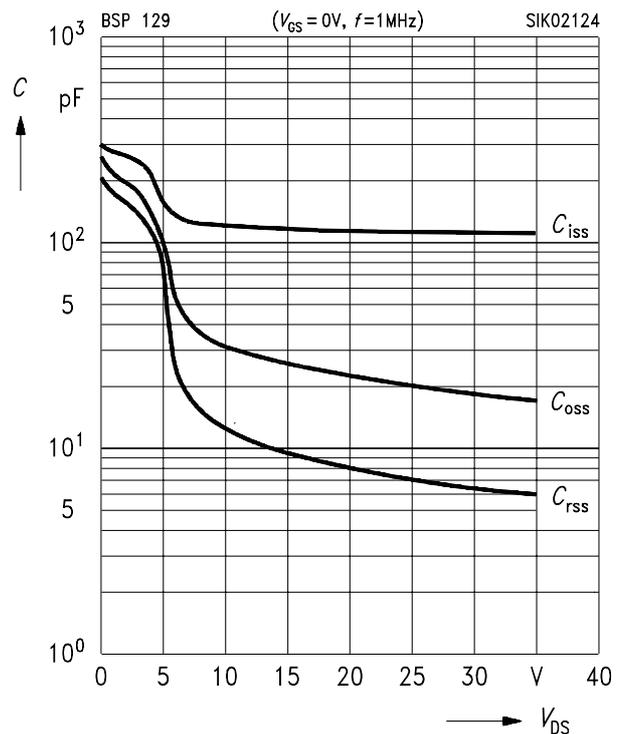
## Gate threshold voltage $V_{GS(th)} = f(T_j)$
parameter: $V_{DS}$ = 3 V, $I_D$ = 1 mA, (spread)
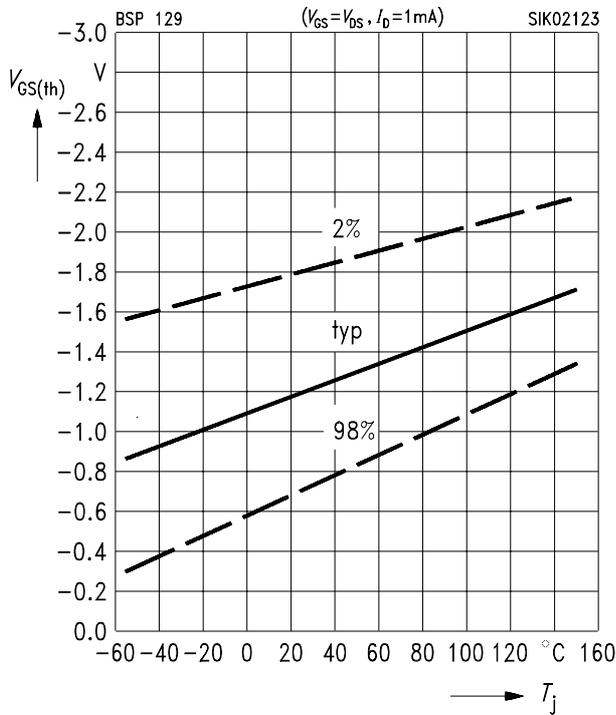


## Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: $t_p$ = 80 µs, $T_j$, (spread)
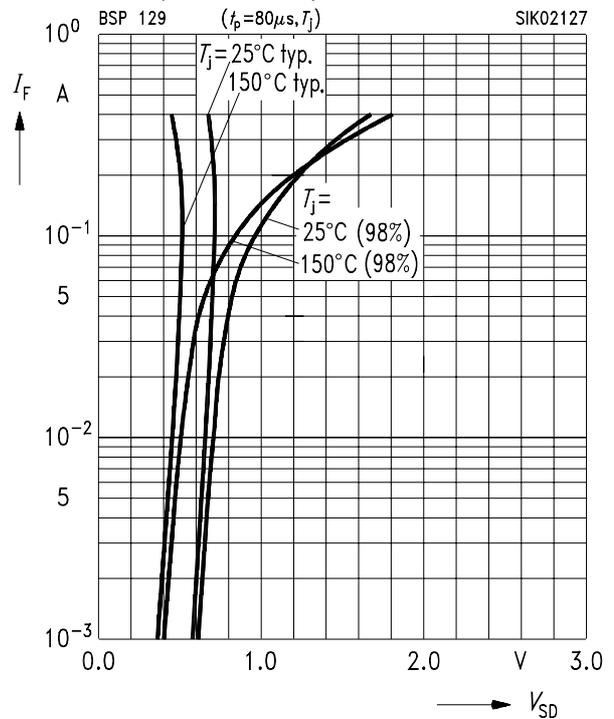


## Drain current $I_D = f(T_A)$
parameter: $V_{GS} \geq 3$ V
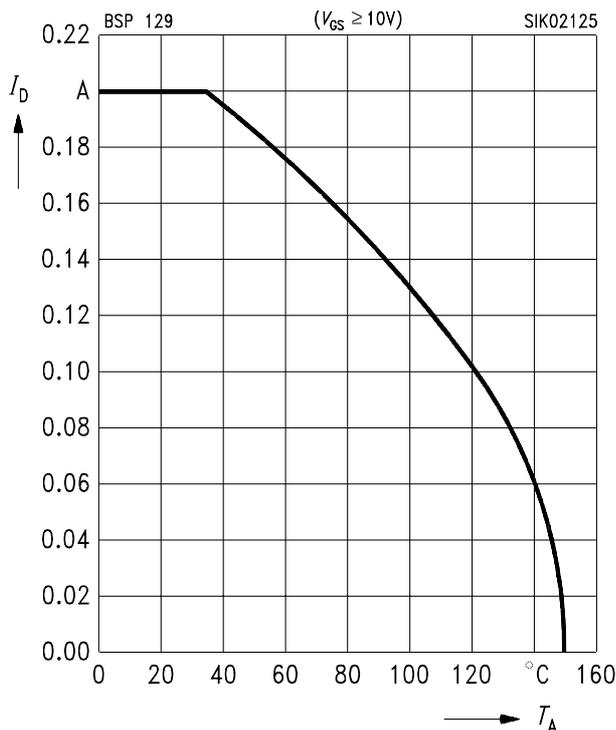


## Safe operating area $I_D = f(V_{DS})$
parameter: $D$ = 0, $T_C$ = 25 °C
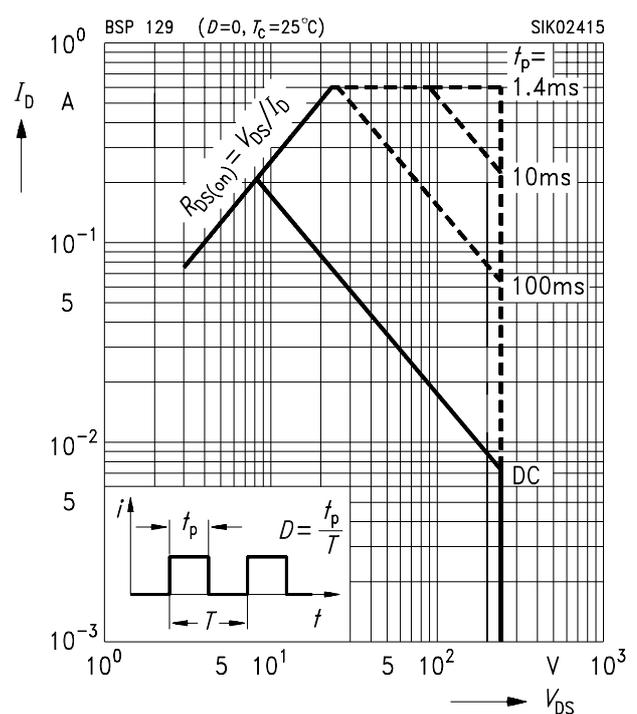
**Drain-source breakdown voltage**

$V_{(BR)\,DSS} = b \times V_{(BR)DSS}$ (25 ˚C)