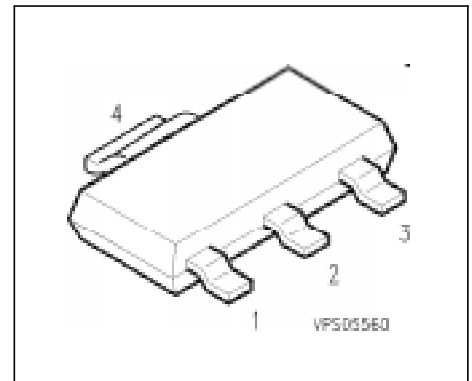


SIPMOS[®] Small-Signal Transistor

- P channel
- Enhancement mode
- Avalanche rated
- $V_{GS(th)} = -2.1 \dots -4.0 \text{ V}$



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

| Type | V_{DS} | I_D | $R_{DS(on)}$ | Package | Marking |
|---------|----------|--------|---------------|---------|---------|
| BSP 170 | -60 V | -1.7 A | 0.35 Ω | SOT-223 | |

| Type | Ordering Code | Tape and Reel Information |
|---------|----------------|---------------------------|
| BSP 170 | Q67000-S . . . | E6327 |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|--|-------------|----------|------|
| Continuous drain current $T_A = 25 \text{ }^\circ\text{C}$ | I_D | -1.7 | A |
| DC drain current, pulsed $T_A = 25 \text{ }^\circ\text{C}$ | I_{Dpuls} | -6.8 | |
| Avalanche energy, single pulse $I_D = -1.7 \text{ A}$, $V_{DD} = -25 \text{ V}$, $R_{GS} = 25 \text{ } \Omega$ $L = 3.23 \text{ mH}$, $T_j = 25 \text{ }^\circ\text{C}$ | E_{AS} | 8 | mJ |
| Gate source voltage | V_{GS} | ± 20 | V |
| Power dissipation $T_A = 25 \text{ }^\circ\text{C}$ | 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 ¹⁾ | R_{thJA} | ≤ 70 | K/W |
| Thermal resistance, junction-soldering point ¹⁾ | R_{thJS} | ≤ 10 | |
| 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 cm² 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

| | | | | | |
|--|---------------|------|-------------|------------|----|
| Drain- source breakdown voltage $V_{GS} = 0 \text{ V}, I_D = -0.25 \text{ mA}, T_j = 25 \text{ }^\circ\text{C}$ | $V_{(BR)DSS}$ | -60 | - | - | V |
| Gate threshold voltage $V_{GS}=V_{DS}, I_D = -1 \text{ mA}$ | $V_{GS(th)}$ | -2.1 | -3 | -4 | |
| Zero gate voltage drain current $V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$ $V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}, T_j = 125 \text{ }^\circ\text{C}$ | I_{DSS} | - | -0.1 -10 | -1 -100 | μA |
| Gate-source leakage current $V_{GS} = -20 \text{ V}, V_{DS} = 0 \text{ V}$ | I_{GSS} | - | -10 | -100 | |
| Drain-Source on-state resistance $V_{GS} = -10 \text{ V}, I_D = -1.7 \text{ A}$ | $R_{DS(on)}$ | - | 0.255 | 0.35 | Ω |

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

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

Dynamic Characteristics

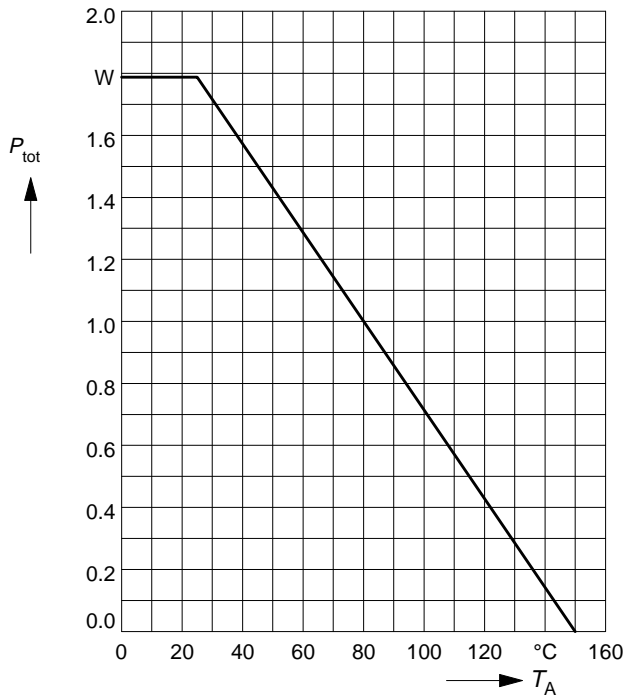
| | | | | | |
|---|--------------|---|------|------|----|
| Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}, I_D = -1.7 \text{ A}$ | g_{fs} | 1 | 1.35 | - | S |
| Input capacitance $V_{GS} = 0 \text{ V}, V_{DS} = -25 \text{ V}, f = 1 \text{ MHz}$ | C_{iss} | - | 800 | 1100 | pF |
| Output capacitance $V_{GS} = 0 \text{ V}, V_{DS} = -25 \text{ V}, f = 1 \text{ MHz}$ | C_{oss} | - | 250 | 375 | |
| Reverse transfer capacitance $V_{GS} = 0 \text{ V}, V_{DS} = -25 \text{ V}, f = 1 \text{ MHz}$ | C_{rss} | - | 95 | 145 | |
| Turn-on delay time $V_{DD} = -30 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -0.3 \text{ A}$ $R_G = 50 \Omega$ | $t_{d(on)}$ | - | 25 | 38 | ns |
| Rise time $V_{DD} = -30 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -0.3 \text{ A}$ $R_G = 50 \Omega$ | t_r | - | 80 | 120 | |
| Turn-off delay time $V_{DD} = -30 \text{ V}, V_{GS} = -10 \text{ V}, I_D = 0.3 \text{ A}$ $R_G = 50 \Omega$ | $t_{d(off)}$ | - | 130 | 175 | |
| Fall time $V_{DD} = -30 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -0.3 \text{ A}$ $R_G = 50 \Omega$ | t_f | - | 150 | 200 | |

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

| Parameter | Symbol | Values | | | Unit |
|---|----------|--------|------|------|---------------|
| | | min. | typ. | max. | |
| Reverse Diode | | | | | |
| Inverse diode continuous forward current $T_A = 25^\circ\text{C}$ | I_S | - | - | -1.7 | A |
| Inverse diode direct current, pulsed $T_A = 25^\circ\text{C}$ | I_{SM} | - | - | -6.8 | |
| Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = -3.4\text{ A}$ | V_{SD} | - | -0.9 | -1.2 | V |
| Reverse recovery time $V_R = 30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$ | t_{rr} | - | 80 | - | ns |
| Reverse recovery charge $V_R = 30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$ | Q_{rr} | - | 0.23 | - | μC |

Power dissipation

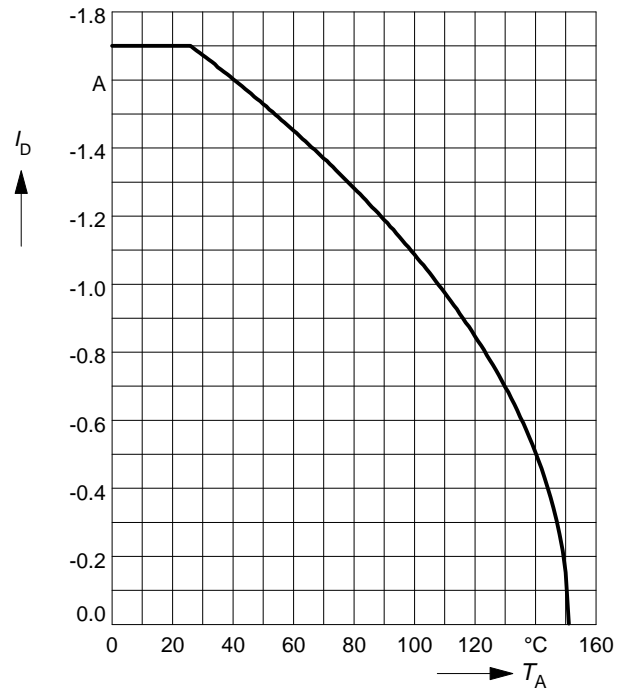
$$P_{\text{tot}} = f(T_A)$$



Drain current

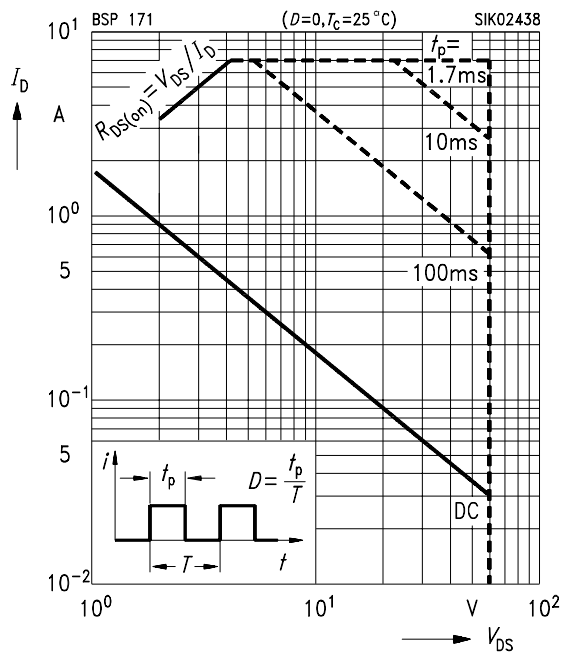
$$I_D = f(T_A)$$

parameter: $V_{GS} \geq -10 \text{ V}$



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

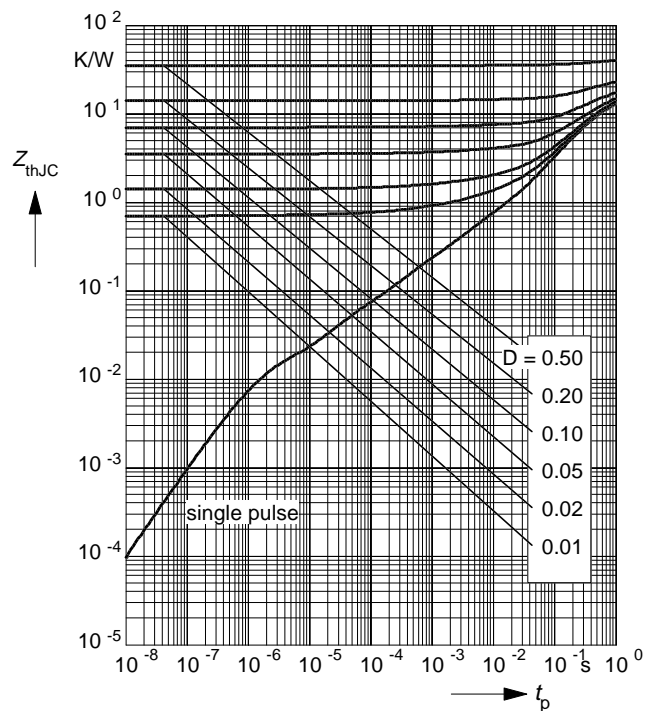
parameter: $D = 0, T_C = 25^\circ\text{C}$



Transient thermal impedance

$$Z_{\text{thJA}} = f(t_p)$$

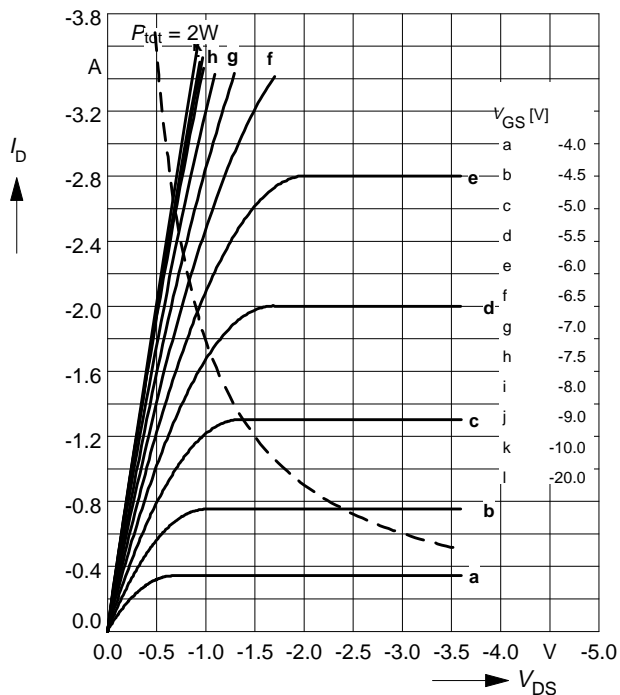
parameter: $D = t_p / T$



Typ. output characteristics

$$I_D = f(V_{DS})$$

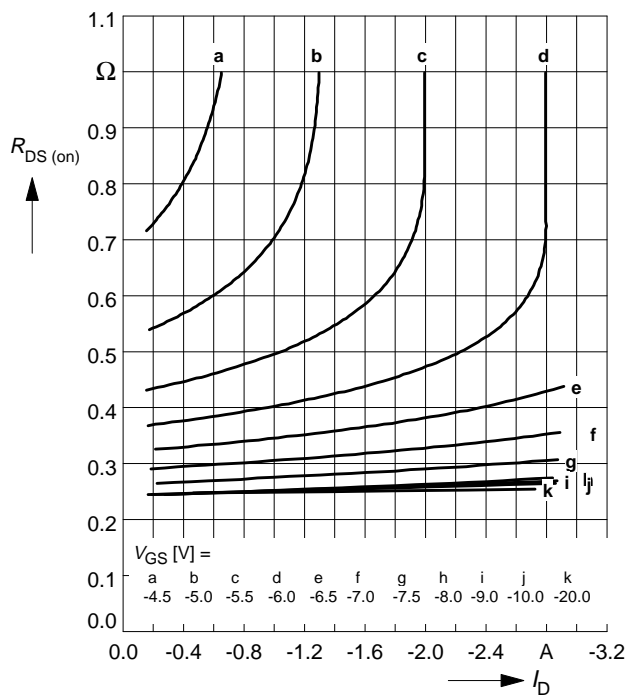
parameter: $t_p = 80 \mu s$, $T_j = 25^\circ C$



Typ. drain-source on-resistance

$$R_{DS(on)} = f(I_D)$$

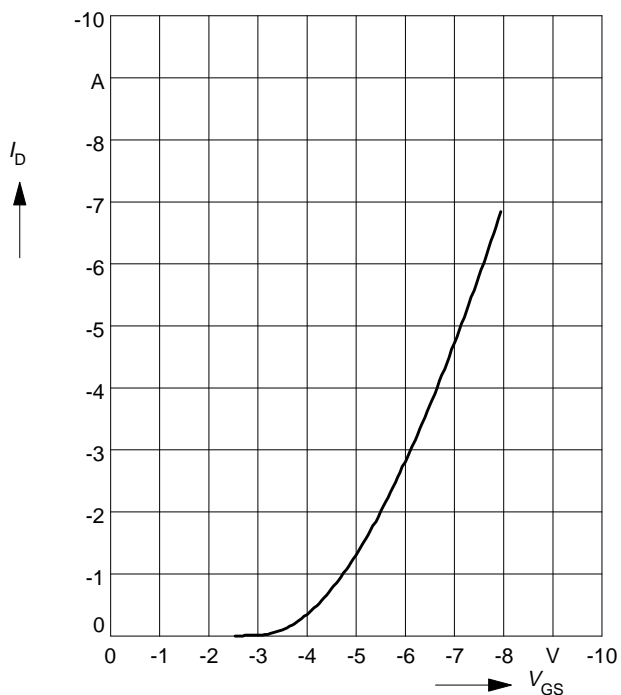
parameter: $t_p = 80 \mu s$, $T_j = 25^\circ C$



Typ. transfer characteristics $I_D = f(V_{GS})$

parameter: $t_p = 80 \mu s$

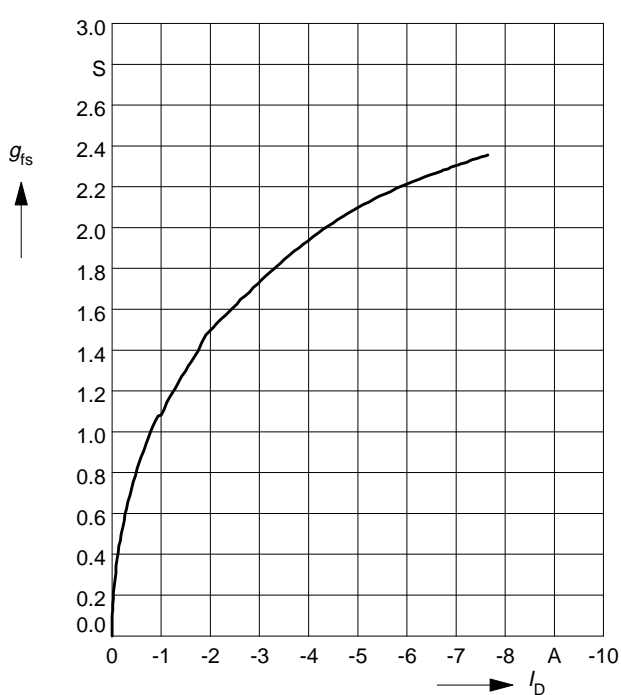
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



Typ. forward transconductance $g_{fs} = f(I_D)$

parameter: $t_p = 80 \mu s$,

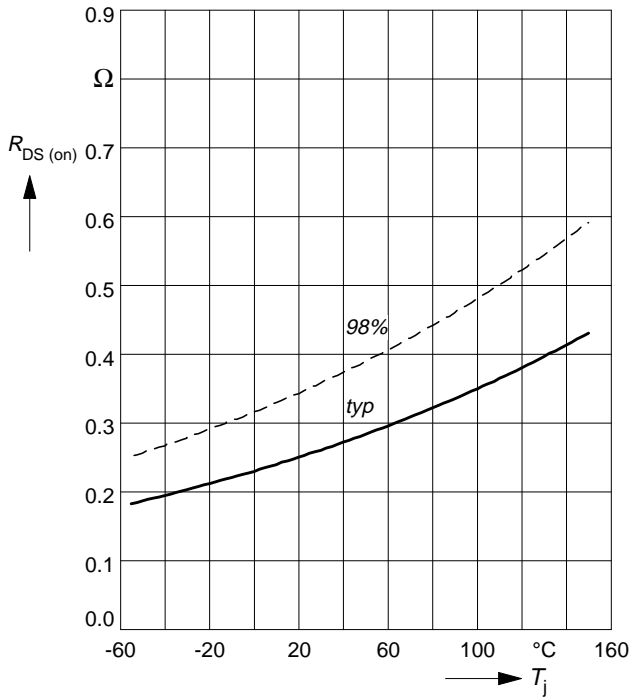
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



Drain-source on-resistance

$$R_{DS(on)} = f(T_j)$$

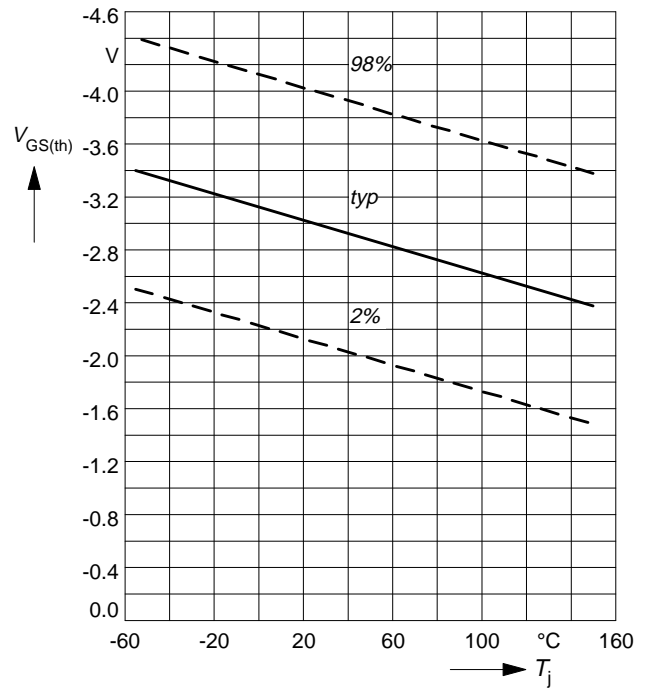
parameter: $I_D = -1.7 \text{ A}$, $V_{GS} = -10 \text{ V}$



Gate threshold voltage

$$V_{GS(th)} = f(T_j)$$

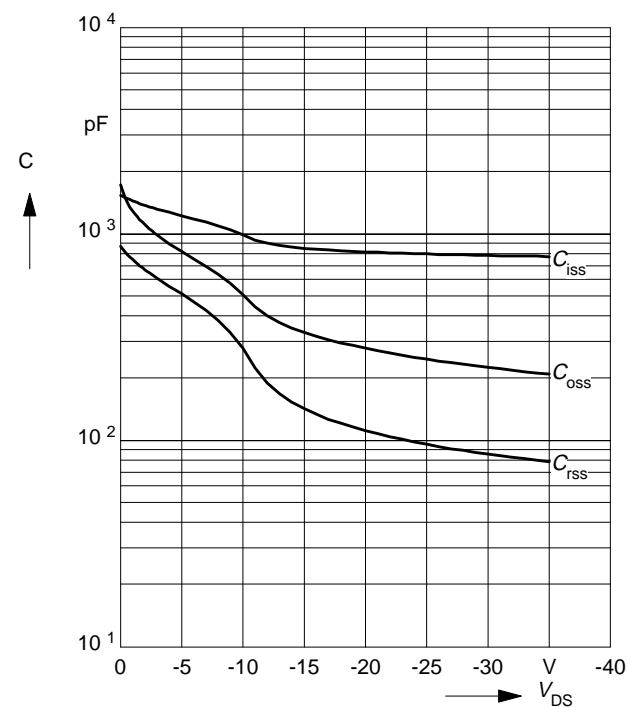
parameter: $V_{GS} = V_{DS}$, $I_D = -1 \text{ mA}$



Typ. capacitances

$$C = f(V_{DS})$$

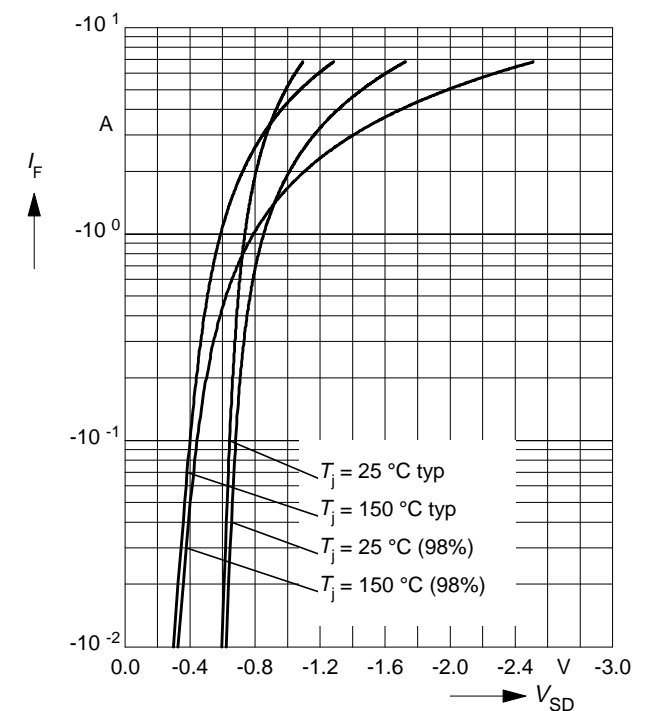
parameter: $V_{GS}=0\text{V}$, $f = 1 \text{ MHz}$



Forward characteristics of reverse diode

$$I_F = f(V_{SD})$$

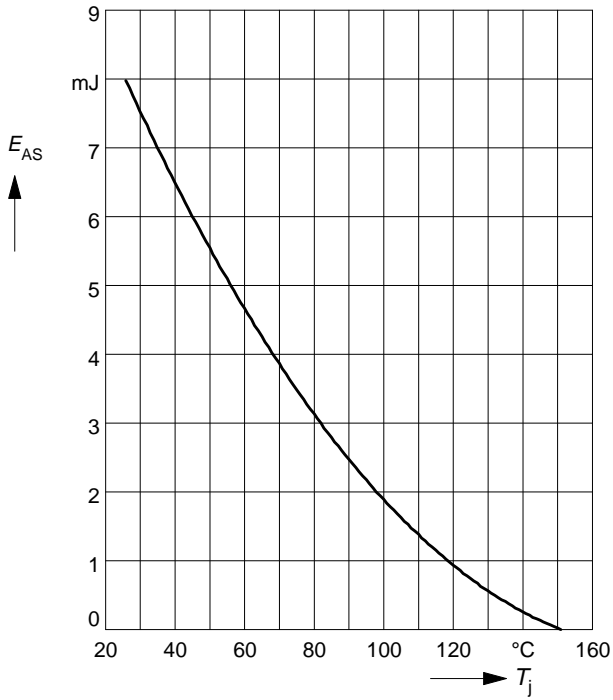
parameter: $T_j, t_p = 80 \mu\text{s}$



Avalanche energy $E_{AS} = f(T_j)$

parameter: $I_D = -1.7$ A, $V_{DD} = -25$ V

$R_{GS} = 25 \Omega$, $L = 3.23$ mH



Drain-source breakdown voltage $V_{(BR)DSS} = f(T_j)$

$V_{(BR)DSS} = f(T_j)$

