

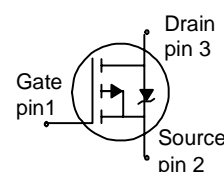
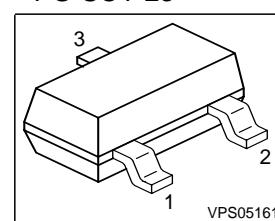
SIPMOS[®] Small-Signal-Transistor
Feature

- P-Channel
- Enhancement mode
- Logic Level
- Avalanche rated
- dv/dt rated
- Pb-free lead plating; RoHS compliant

Product Summary

| | | |
|--------------|-------|----------|
| V_{DS} | -60 | V |
| $R_{DS(on)}$ | 8 | Ω |
| I_D | -0.17 | A |

PG-SOT-23



| Type | Package | Tape and Reel | Marking |
|----------|-----------|-------------------|---------|
| BSS 84 P | PG-SOT-23 | L6327:3000pcs/r. | YBs |
| BSS 84 P | PG-SOT-23 | L6433:10000pcs/r. | YBs |

Maximum Ratings, at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Value | Unit |
|---|---------------------|-------------|-------------------|
| Continuous drain current | I_D | | A |
| $T_A=25\text{ }^\circ\text{C}$ | | -0.17 | |
| $T_A=70\text{ }^\circ\text{C}$ | | -0.14 | |
| Pulsed drain current | $I_{D\text{ puls}}$ | -0.68 | |
| $T_A=25\text{ }^\circ\text{C}$ | | | |
| Avalanche energy, single pulse | E_{AS} | 2.6 | mJ |
| $I_D=-0.17\text{ A}$, $V_{DD}=-25\text{ V}$, $R_{GS}=25\text{ }\Omega$ | | | |
| Avalanche energy, periodic limited by T_{jmax} | E_{AR} | 0.036 | |
| Reverse diode dv/dt | dv/dt | -6 | kV/ μs |
| $I_S=-0.17\text{ A}$, $V_{DS}=-48\text{ V}$, $di/dt=-200\text{ A}/\mu\text{s}$, $T_{jmax}=150\text{ }^\circ\text{C}$ | | | |
| Gate source voltage | V_{GS} | ± 20 | V |
| Power dissipation | P_{tot} | 0.36 | W |
| $T_A=25\text{ }^\circ\text{C}$ | | | |
| Operating and storage temperature | T_j, T_{stg} | -55... +150 | $^\circ\text{C}$ |
| IEC climatic category; DIN IEC 68-1 | | 55/150/56 | |

Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|---|------------|--------|------|------|------|
| | | min. | typ. | max. | |
| Characteristics | | | | | |
| Thermal resistance, junction - soldering point (Pin 3) | R_{thJS} | - | - | 200 | K/W |
| SMD version, device on PCB: @ min. footprint | R_{thJA} | - | - | 350 | |
| @ 6 cm ² cooling area ¹⁾ | | - | - | 300 | |

Electrical Characteristics, at $T_A = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|--|---------------|--------|------|------|----------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| Drain-source breakdown voltage $V_{GS}=0, I_D=-250\mu A$ | $V_{(BR)DSS}$ | -60 | - | - | V |
| Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=-20\mu A$ | $V_{GS(th)}$ | -1 | -1.5 | -2 | |
| Zero gate voltage drain current $V_{DS}=-60V, V_{GS}=0, T_A=25\text{ °C}$ $V_{DS}=-60V, V_{GS}=0, T_A=125\text{ °C}$ | I_{DSS} | - | -0.1 | -1 | μA |
| | | - | -10 | -100 | |
| Gate-source leakage current $V_{GS}=-20V, V_{DS}=0$ | I_{GSS} | - | -10 | -100 | nA |
| Drain-source on-state resistance $V_{GS}=-4.5V, I_D=-0.14A$ | $R_{DS(on)}$ | - | 8 | 12 | Ω |
| Drain-source on-state resistance $V_{GS}=-10V, I_D=-0.17A$ | $R_{DS(on)}$ | - | 5.8 | 8 | |

¹⁾Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

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

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

Dynamic Characteristics

| | | | | | | |
|------------------------------|--------------|--|-------|------|------|----|
| Transconductance | g_{fs} | $V_{DS} \leq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = -0.14\text{A}$ | 0.065 | 0.13 | - | S |
| Input capacitance | C_{iss} | $V_{GS} = 0$, $V_{DS} = -25\text{V}$, $f = 1\text{MHz}$ | - | 15 | 19 | pF |
| Output capacitance | C_{oss} | | - | 6 | 8 | |
| Reverse transfer capacitance | C_{rss} | | - | 2 | 3 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = -30\text{V}$, $V_{GS} = -4.5\text{V}$, $I_D = -0.14\text{A}$, $R_G = 25\Omega$ | - | 6.7 | 10 | ns |
| Rise time | t_r | | - | 16.2 | 24.3 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 8.6 | 12.9 | |
| Fall time | t_f | | - | 20.5 | 30.8 | |

Gate Charge Characteristics

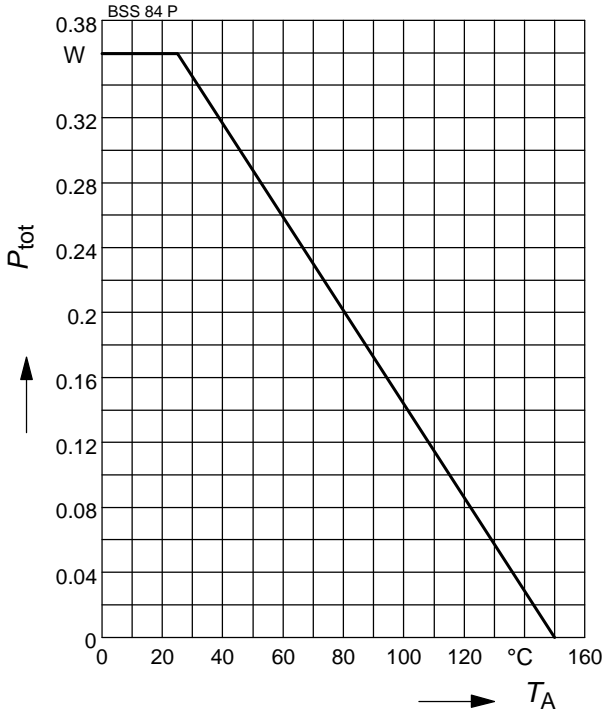
| | | | | | | |
|-----------------------|-----------------|---|---|-------|------|----|
| Gate to source charge | Q_{gs} | $V_{DD} = -48\text{V}$, $I_D = -0.17\text{A}$ | - | 0.25 | 0.37 | nC |
| Gate to drain charge | Q_{gd} | | - | 0.3 | 0.45 | |
| Gate charge total | Q_g | $V_{DD} = -48\text{V}$, $I_D = -0.17\text{A}$, $V_{GS} = 0$ to -10V | - | 1 | 1.5 | |
| Gate plateau voltage | $V_{(plateau)}$ | $V_{DD} = -48\text{V}$, $I_D = -0.17\text{A}$ | - | -3.42 | - | V |

Reverse Diode

| | | | | | | |
|--|----------|--|---|-------|-------|----|
| Inverse diode continuous forward current | I_S | $T_A = 25\text{ }^\circ\text{C}$ | - | - | -0.17 | A |
| Inv. diode direct current, pulsed | I_{SM} | | - | - | -0.68 | |
| Inverse diode forward voltage | V_{SD} | $V_{GS} = 0$, $I_F = -0.17\text{A}$ | - | -0.93 | -1.24 | V |
| Reverse recovery time | t_{rr} | $V_R = -30\text{V}$, $I_F = I_S$, $di_F/dt = 100\text{A}/\mu\text{s}$ | - | 23 | 34 | ns |
| Reverse recovery charge | Q_{rr} | | - | 10 | 15 | |

1 Power dissipation

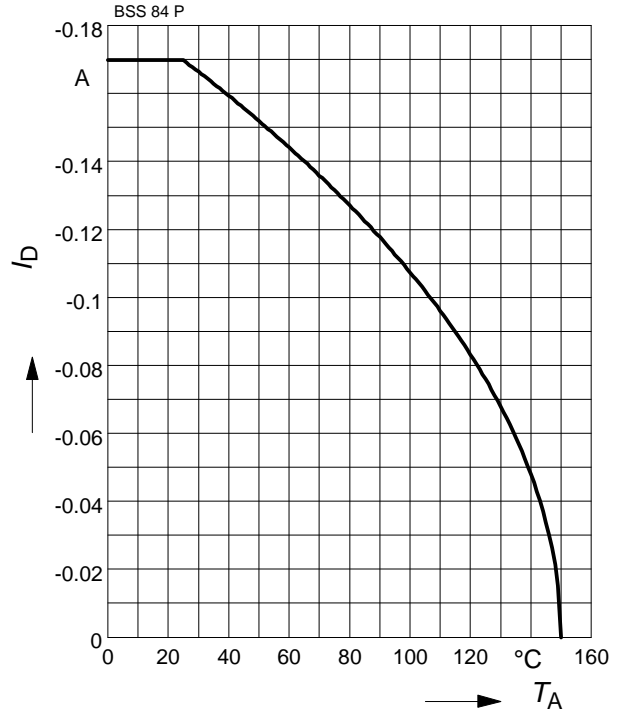
$P_{tot} = f(T_A)$



2 Drain current

$I_D = f(T_A)$

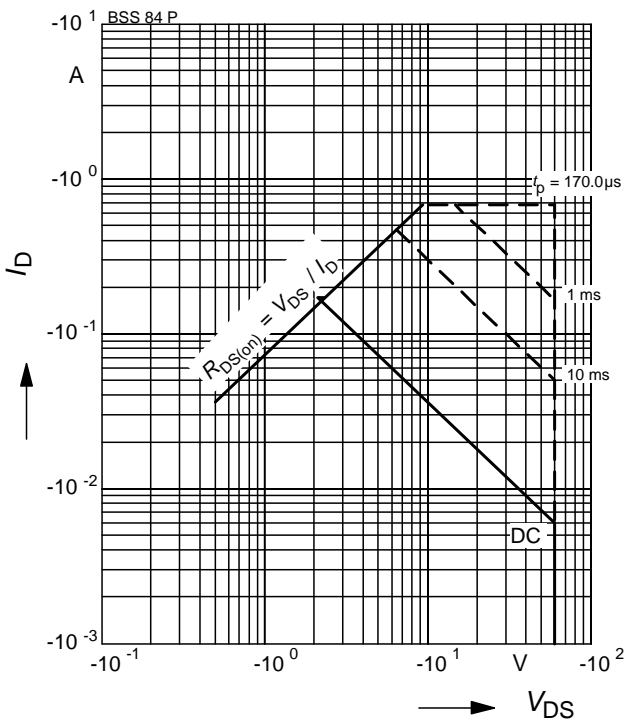
parameter: $V_{GS} \geq 10 \text{ V}$



3 Safe operating area

$I_D = f(V_{DS})$

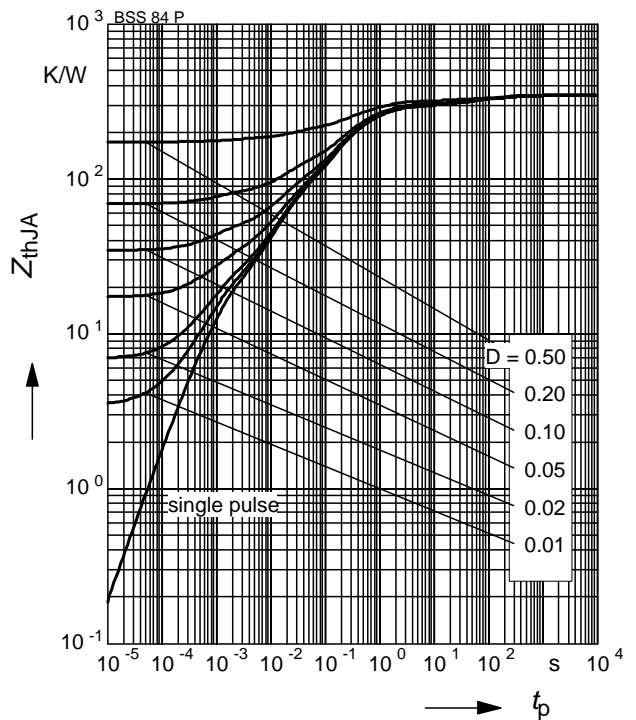
parameter : $D = 0$, $T_A = 25 \text{ °C}$



4 Transient thermal impedance

$Z_{thJA} = f(t_p)$

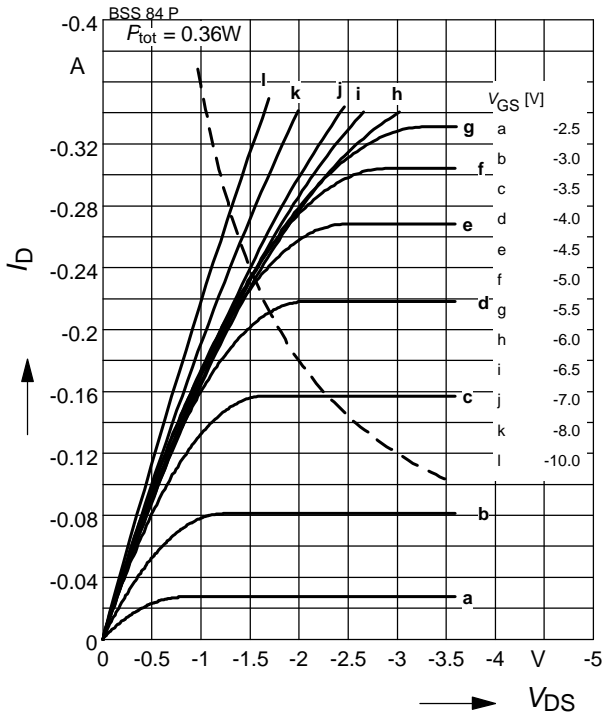
parameter : $D = t_p/T$



5 Typ. output characteristic

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

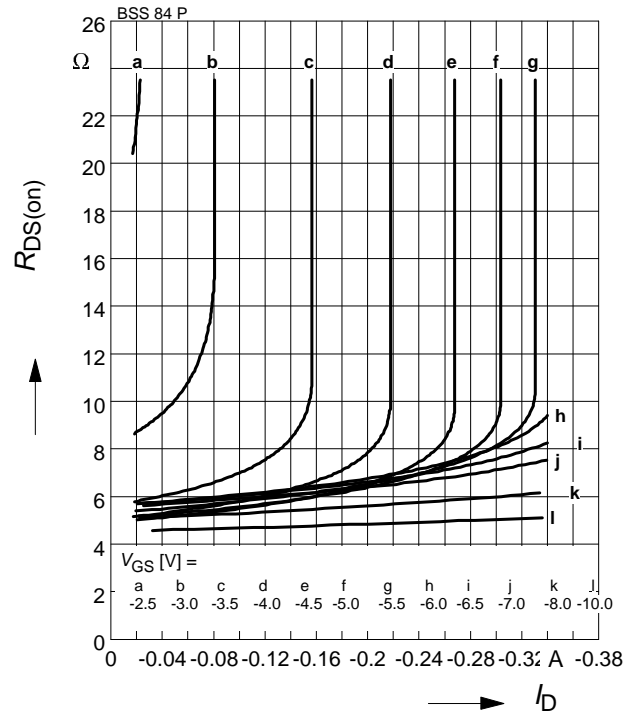
parameter: $T_j = 25\text{ }^\circ\text{C}$



6 Typ. drain-source on resistance

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

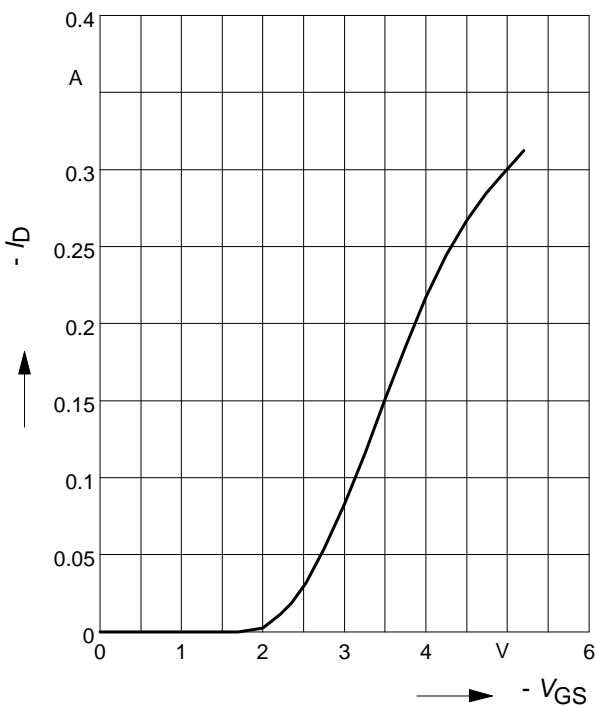
parameter: V_{GS} ; $T_j = 25\text{ }^\circ\text{C}$



7 Typ. transfer characteristics

$$I_D = f(V_{GS}); |V_{DS}| \geq 2 \times |I_D| \times R_{DS(on)max}$$

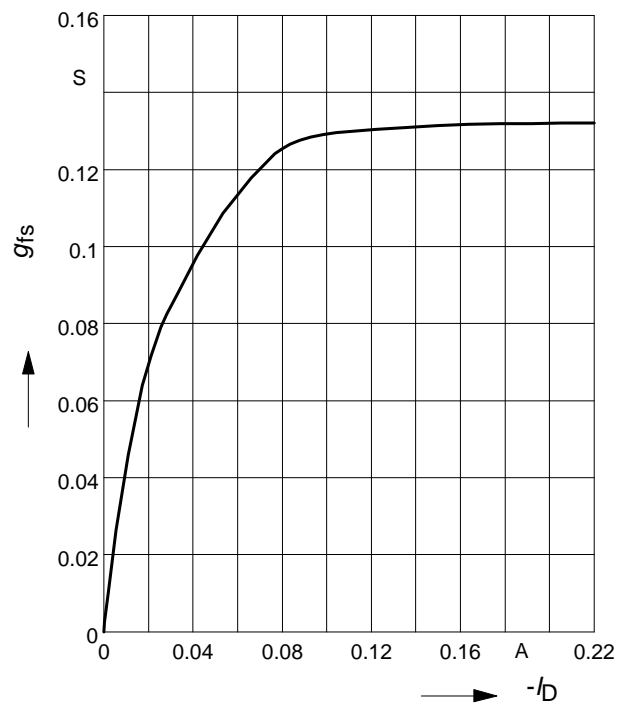
parameter: $T_j = 25\text{ }^\circ\text{C}$



8 Typ. forward transconductance

$$g_{fs} = f(I_D)$$

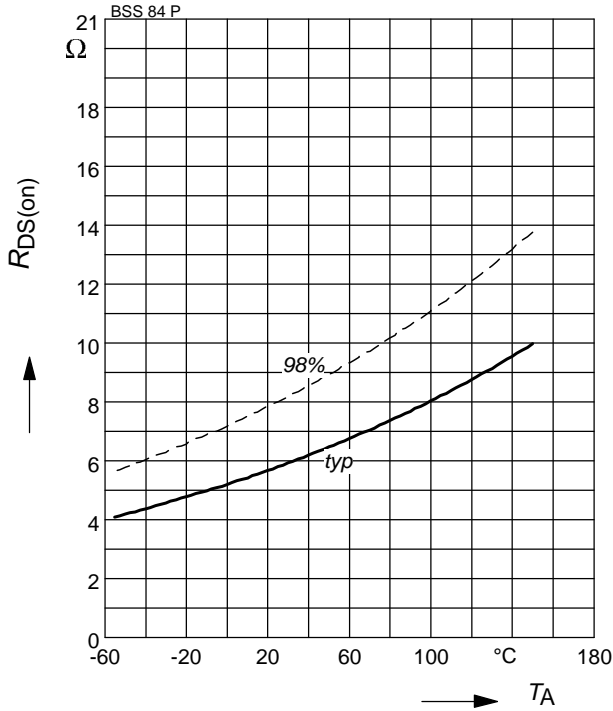
parameter: $T_j = 25\text{ }^\circ\text{C}$



9 Drain-source on-state resistance

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

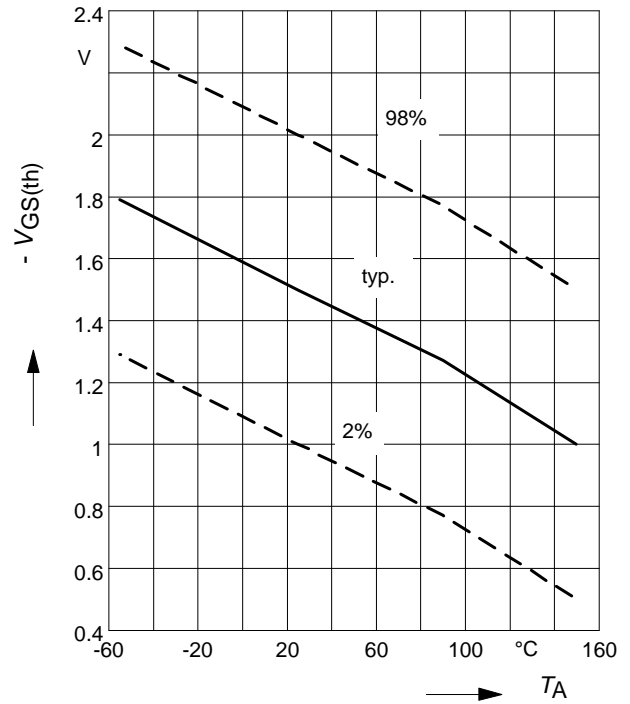
parameter: $I_D = -0.17 \text{ A}$, $V_{GS} = -10 \text{ V}$



10 Typ. gate threshold voltage

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

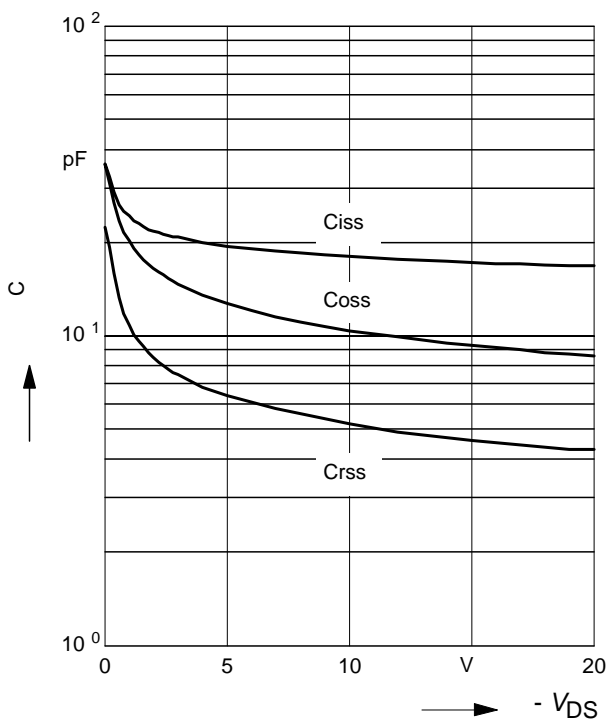
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

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

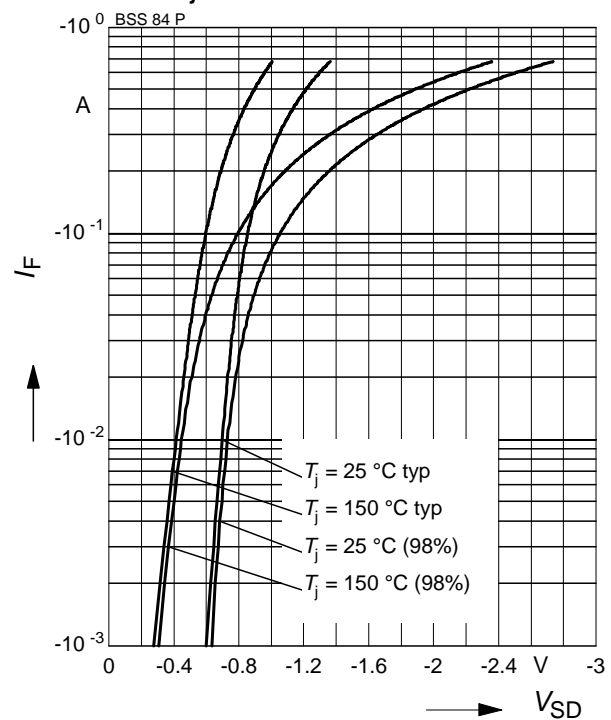
parameter: $V_{GS} = 0$, $f = 1 \text{ MHz}$



12 Forward character. of reverse diode

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

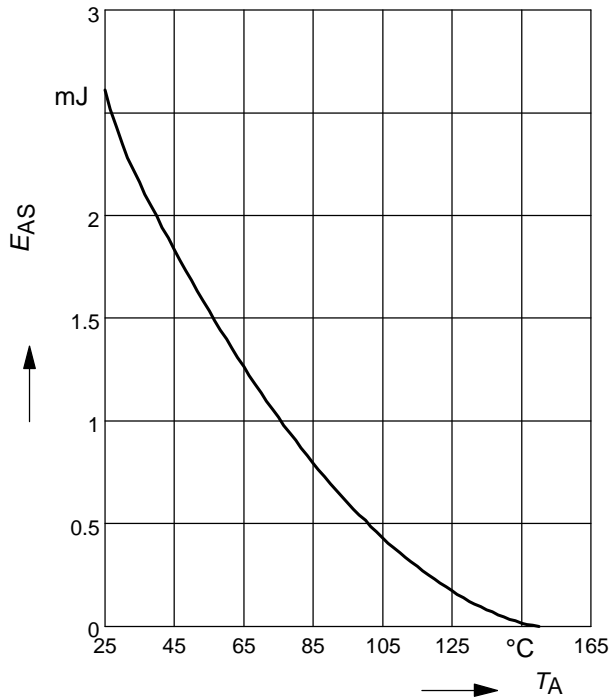
parameter: T_j , $t_p = 80 \mu\text{s}$



13 Typ. avalanche energy

$E_{AS} = f(T_A)$, parameter:

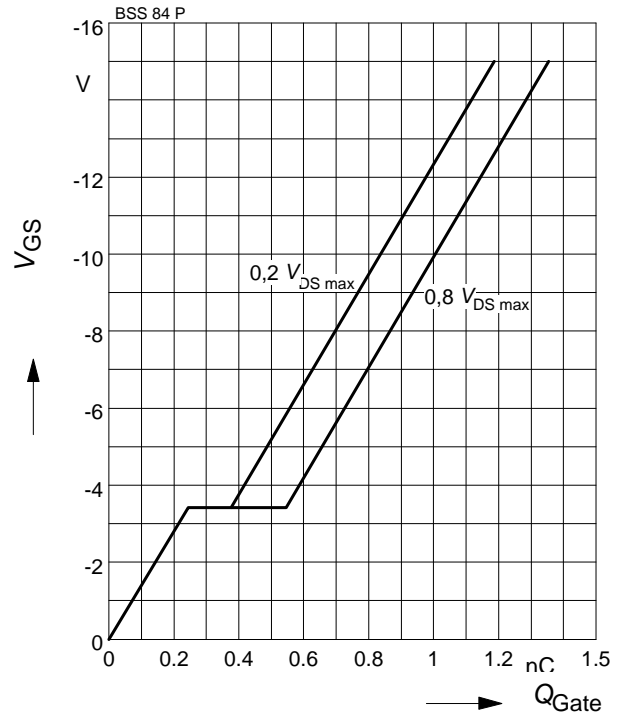
$I_D = -0.17\text{ A}$, $V_{DD} = -25\text{ V}$, $R_{GS} = 25\ \Omega$



14 Typ. gate charge

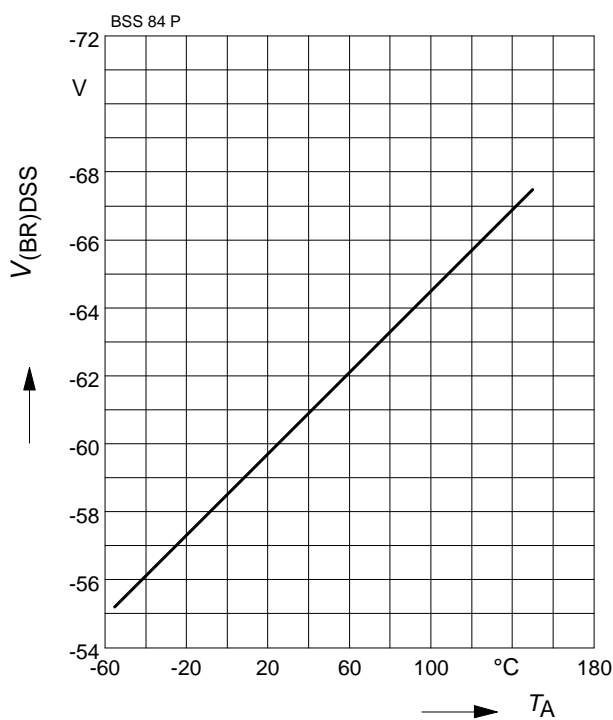
$V_{GS} = f(Q_{Gate})$

parameter: $I_D = -0.17\text{ A}$ pulsed; $T_j = 25\text{ °C}$



15 Drain-source breakdown voltage

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



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