

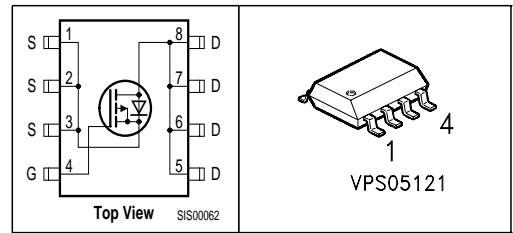
OptiMOS[®]-P Small-Signal-Transistor

Feature

- P-Channel
- Enhancement mode
- Super Logic Level (2.5 V rated)
- 150°C operating temperature
- Avalanche rated
- dv/dt rated

Product Summary

| | | |
|--------------|-----|----|
| V_{DS} | -20 | V |
| $R_{DS(on)}$ | 21 | mΩ |
| I_D | -9 | A |



| Type | Package | Ordering Code |
|----------|---------|---------------|
| BSO203SP | SO 8 | Q67042-S4009 |

Maximum Ratings, at $T_j = 25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Value | Unit |
|--|-----------------------|-------------|-------------------|
| Continuous drain current $T_A=25\text{ °C}$ $T_A=70\text{ °C}$ | I_D | -9 -7.2 | A |
| Pulsed drain current $T_A=25\text{ °C}$ | $I_{D\text{ puls}}$ | -36 | |
| Avalanche energy, single pulse $I_D=-9\text{ A}$, $V_{DD}=-10\text{ V}$, $R_{GS}=25\text{ }\Omega$ | E_{AS} | 97 | mJ |
| Reverse diode dv/dt $I_S=-9\text{ A}$, $V_{DS}=-16\text{ V}$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j\text{ max}}=150\text{ °C}$ | dv/dt | -6 | kV/ μs |
| Gate source voltage | V_{GS} | ± 12 | V |
| Power dissipation $T_A=25\text{ °C}$ | P_{tot} | 2.35 | W |
| Operating and storage temperature | T_j, T_{stg} | -55... +150 | °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 | R_{thJS} | - | - | 35 | K/W |
| SMD version, device on PCB: | R_{thJA} | - | - | 110 | |
| @ min. footprint, $t < 10s$ @ 6 cm ² cooling area ¹⁾ | | - | - | 53 | |

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

| Parameter | Symbol | Values | | | Unit |
|--|---------------|--------|-------------|------------|-----------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| Drain-source breakdown voltage $V_{GS}=0, I_D=-250\mu A$ | $V_{(BR)DSS}$ | -20 | - | - | V |
| Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=-100\mu A$ | $V_{GS(th)}$ | -0.6 | 0.9 | -1.2 | |
| Zero gate voltage drain current $V_{DS}=-20V, V_{GS}=0, T_j=25^\circ C$ $V_{DS}=-20V, V_{GS}=0, T_j=150^\circ C$ | I_{DSS} | - | -0.1 -10 | -1 -100 | μA |
| Gate-source leakage current $V_{GS}=-12V, V_{DS}=0$ | I_{GSS} | - | -10 | -100 | |
| Drain-source on-state resistance $V_{GS}=-2.5V, I_D=-7.1A$ | $R_{DS(on)}$ | - | 22.3 | 34 | $m\Omega$ |
| Drain-source on-state resistance $V_{GS}=-4.5V, I_D=-9A$ | $R_{DS(on)}$ | - | 12.9 | 21 | |

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; $t \leq 10$ sec.

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

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

Dynamic Characteristics

| | | | | | | |
|------------------------------|--------------|---|----|------|-----|----|
| Transconductance | g_{fs} | $ V_{DS} \geq 2 * I_D * R_{DS(on)max}$ $I_D = -7.2\text{A}$ | 16 | 33 | - | S |
| Input capacitance | C_{iss} | $V_{GS} = 0, V_{DS} = -15\text{V},$ $f = 1\text{MHz}$ | - | 2265 | - | pF |
| Output capacitance | C_{oss} | | - | 890 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 728 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = -10\text{V}, V_{GS} = -4.5\text{V},$ $I_D = -1\text{A}, R_G = 6\Omega$ | - | 15.6 | 23 | ns |
| Rise time | t_r | | - | 27 | 40 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 58 | 77 | |
| Fall time | t_f | | - | 69 | 104 | |

Gate Charge Characteristics

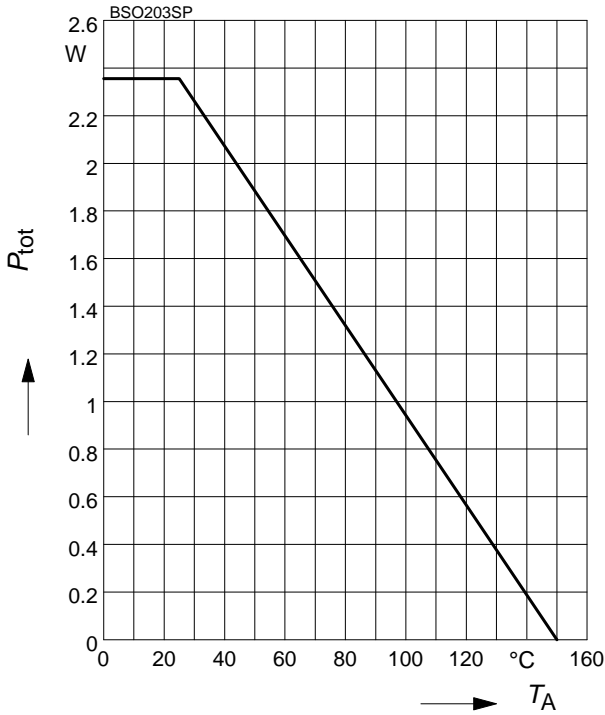
| | | | | | | |
|-----------------------|-----------------|--|---|-------|-------|----|
| Gate to source charge | Q_{gs} | $V_{DD} = -15\text{V}, I_D = -9\text{A}$ | - | -3.8 | -5.7 | nC |
| Gate to drain charge | Q_{gd} | | - | -15.6 | -23.4 | |
| Gate charge total | Q_g | $V_{DD} = -15\text{V}, I_D = -9\text{A},$ $V_{GS} = 0 \text{ to } -4.5\text{V}$ | - | -33.6 | -50.4 | |
| Gate plateau voltage | $V_{(plateau)}$ | $V_{DD} = -15\text{V}, I_D = -9\text{A}$ | - | -1.6 | - | V |

Reverse Diode

| | | | | | | |
|--|----------|--|---|-------|-------|----|
| Inverse diode continuous forward current | I_S | $T_A = 25\text{ }^\circ\text{C}$ | - | - | -3 | A |
| Inverse diode direct current, pulsed | I_{SM} | | - | - | -36 | |
| Inverse diode forward voltage | V_{SD} | $V_{GS} = 0, I_F = I_D $ | - | -0.82 | -1.25 | V |
| Reverse recovery time | t_{rr} | $V_R = -10\text{V}, I_F = I_D ,$ $di_F/dt = 100\text{A}/\mu\text{s}$ | - | 34 | 42 | ns |
| Reverse recovery charge | Q_{rr} | | - | 16.7 | 21 | nC |

1 Power dissipation

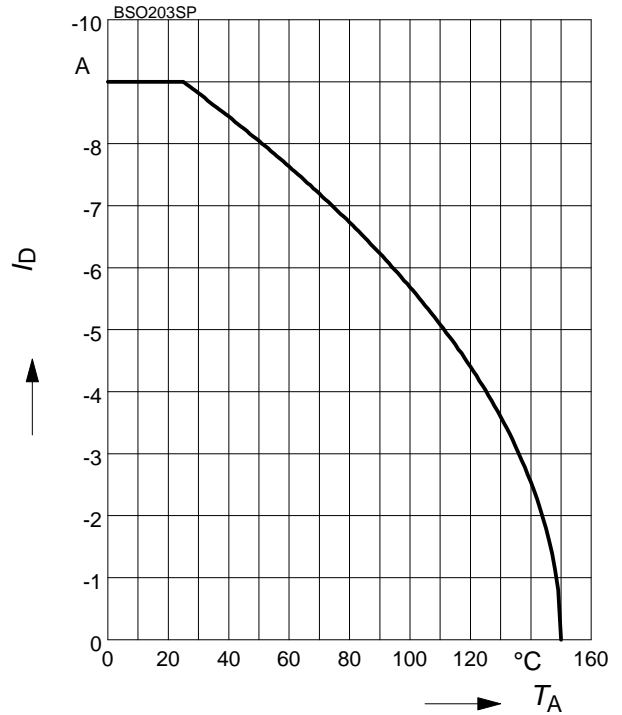
$P_{tot} = f(T_A)$



2 Drain current

$I_D = f(T_A)$

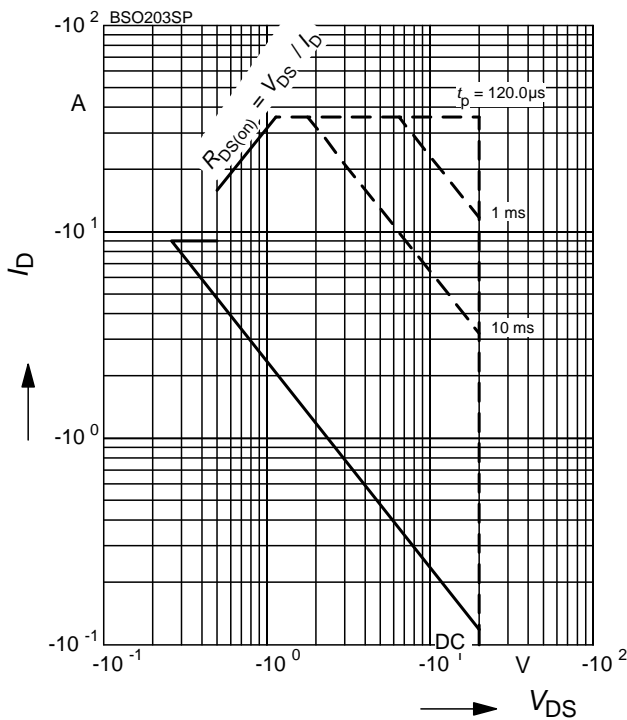
parameter: $|V_{GS}| \geq 4.5 \text{ V}$



3 Safe operating area

$I_D = f(V_{DS})$

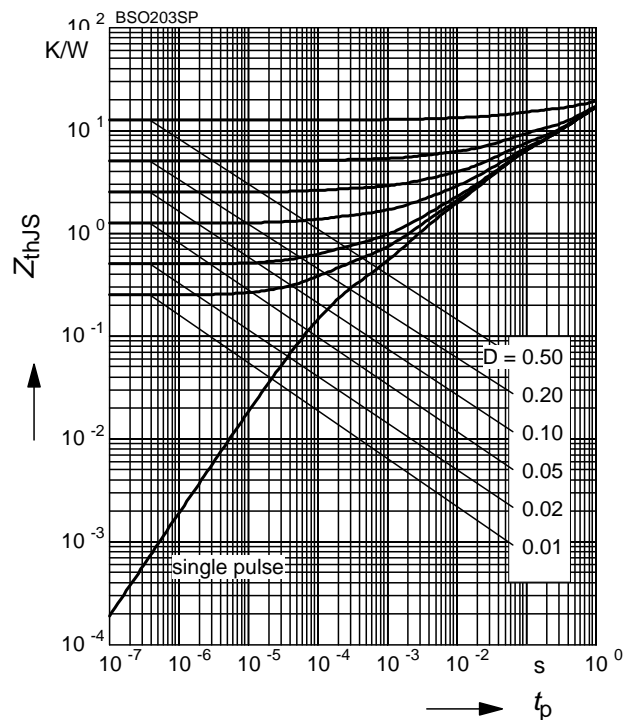
parameter: $D = 0, T_A = 25 \text{ °C}$



4 Transient thermal impedance

$Z_{thJS} = f(t_p)$

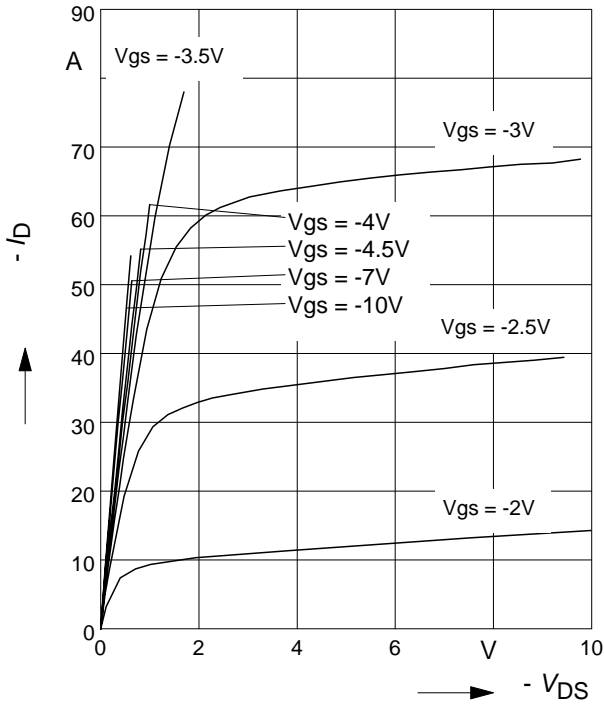
parameter: $D = t_p/T$



5 Typ. output characteristic

$I_D = f(V_{DS}); T_j = 25^\circ\text{C}$

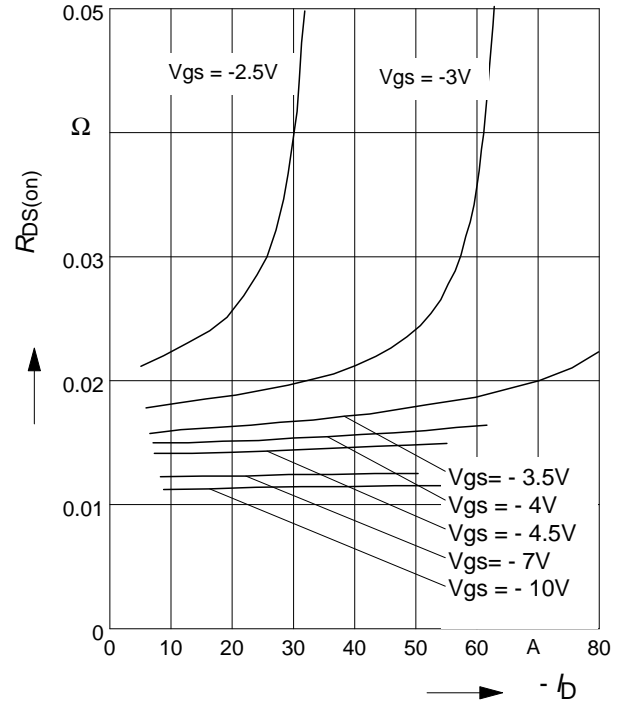
parameter: $t_p = 80 \mu\text{s}$



6 Typ. drain-source on resistance

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

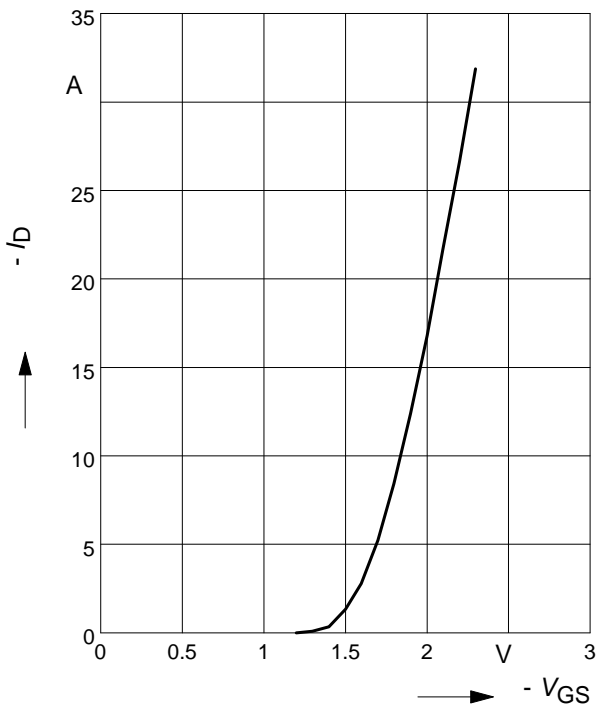
parameter: V_{GS}



7 Typ. transfer characteristics

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

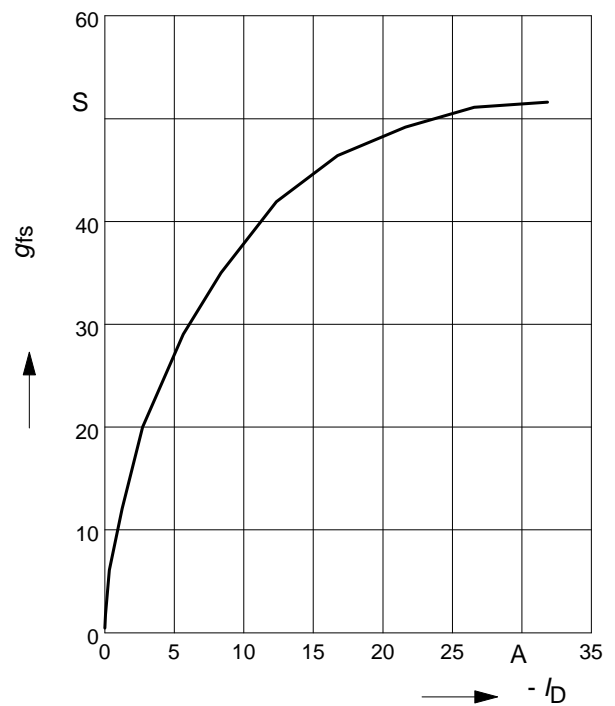
parameter: $t_p = 80 \mu\text{s}$



8 Typ. forward transconductance

$g_{fs} = f(I_D); T_j = 25^\circ\text{C}$

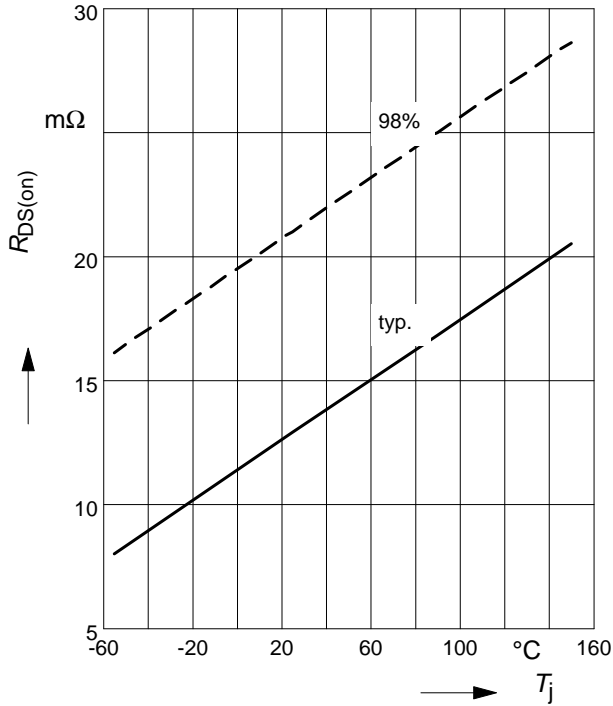
parameter: $t_p = 80 \mu\text{s}$



9 Drain-source on-resistance

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

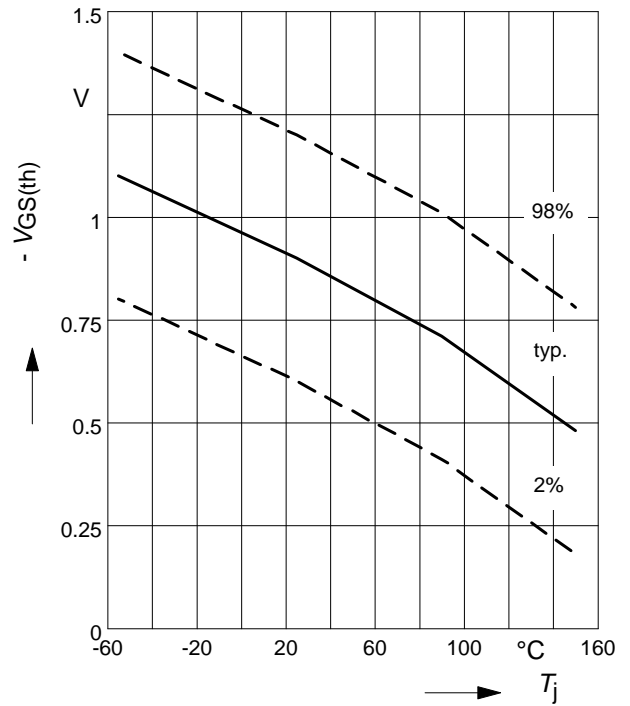
parameter: $I_D = -9\text{ A}$, $V_{GS} = -4.5\text{ V}$



10 Typ. gate threshold voltage

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

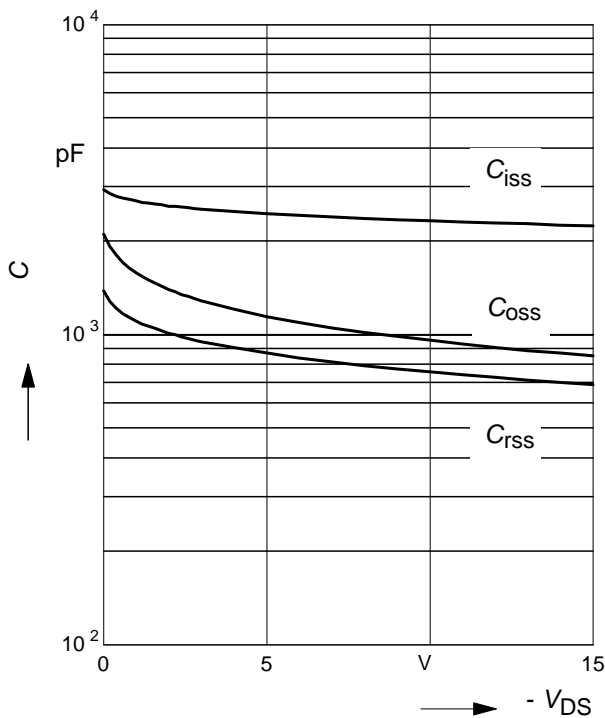
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

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

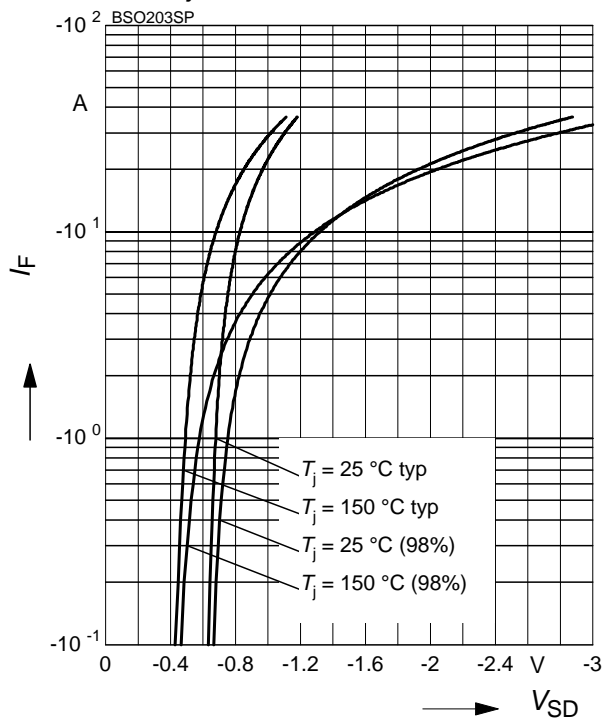
parameter: $V_{GS}=0$, $f=1\text{ MHz}$



12 Forward character. of reverse diode

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

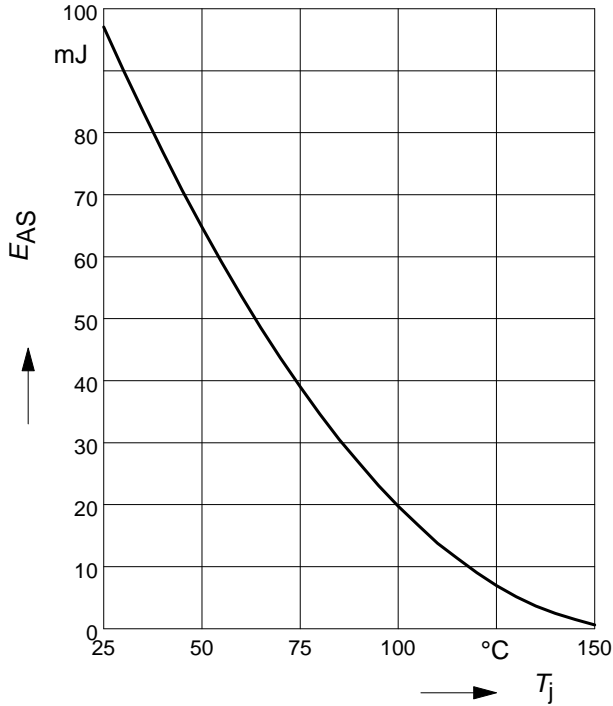
parameter: T_j , $t_p = 80\ \mu\text{s}$



13 Typ. avalanche energy

$E_{AS} = f(T_j)$, par.: $I_D = -9\text{ A}$

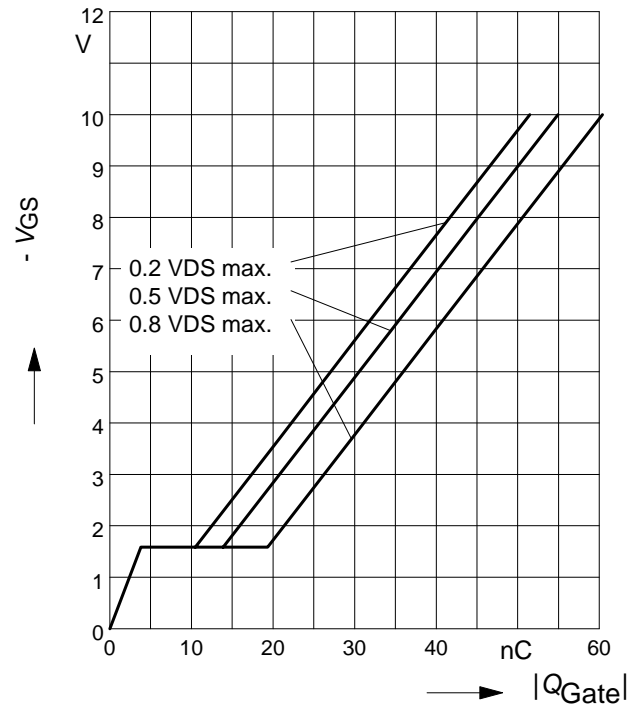
$V_{DD} = -10\text{ V}$, $R_{GS} = 25\ \Omega$



14 Typ. gate charge

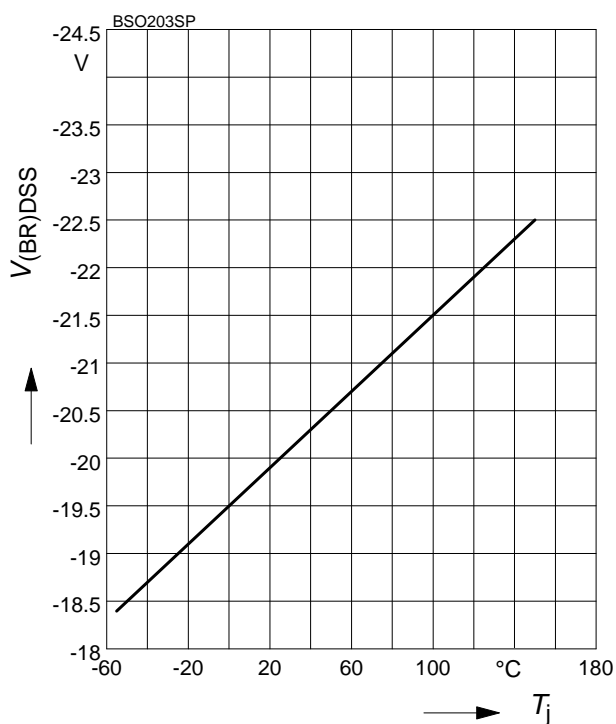
$|V_{GS}| = f(Q_{Gate})$

parameter: $I_D = -9\text{ A}$ pulsed



15 Drain-source breakdown voltage

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



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