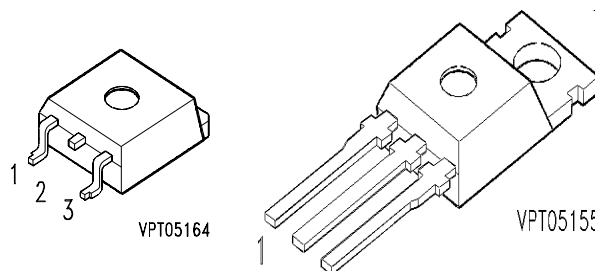


**SIPMOS<sup>®</sup> Power Transistor**

- N channel
- Enhancement mode
- Avalanche-rated
- dv/dt rated
- 175°C operating temperature
- also in SMD available



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

| Type      | $V_{DS}$ | $I_D$ | $R_{DS(on)}$   | Package   | Ordering Code   |
|-----------|----------|-------|----------------|-----------|-----------------|
| BUZ 110 S | 55 V     | 80 A  | 0.012 $\Omega$ | TO-220 AB | Q67040-S4005-A2 |

**Maximum Ratings**

| Parameter                                                                           | Symbol      | Values   | Unit              |
|-------------------------------------------------------------------------------------|-------------|----------|-------------------|
| Continuous drain current                                                            | $I_D$       | 80       | A                 |
| $T_C = 25\text{ }^{\circ}\text{C}$                                                  |             |          |                   |
| $T_C = 100\text{ }^{\circ}\text{C}$                                                 |             | 66       |                   |
| Pulsed drain current                                                                | $I_{Dpuls}$ | 320      |                   |
| $T_C = 25\text{ }^{\circ}\text{C}$                                                  |             |          |                   |
| Avalanche energy, single pulse                                                      | $E_{AS}$    | 460      | mJ                |
| $I_D = 80\text{ A}$ , $V_{DD} = 25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$          |             |          |                   |
| $L = 144\text{ }\mu\text{H}$ , $T_j = 25\text{ }^{\circ}\text{C}$                   |             |          |                   |
| Avalanche current, limited by $T_{jmax}$                                            | $I_{AR}$    | 80       | A                 |
| Avalanche energy, periodic limited by $T_{jmax}$                                    | $E_{AR}$    | 20       | mJ                |
| Reverse diode dv/dt                                                                 | dv/dt       | 6        | kV/ $\mu\text{s}$ |
| $I_S = 80\text{ A}$ , $V_{DS} = 40\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ |             |          |                   |
| $T_{jmax} = 175\text{ }^{\circ}\text{C}$                                            |             |          |                   |
| Gate source voltage                                                                 | $V_{GS}$    | $\pm 20$ | V                 |
| Power dissipation                                                                   | $P_{tot}$   | 200      | W                 |
| $T_C = 25\text{ }^{\circ}\text{C}$                                                  |             |          |                   |

**Maximum Ratings**

| Parameter                              | Symbol     | Values        | Unit |
|----------------------------------------|------------|---------------|------|
| Operating temperature                  | $T_j$      | -55 ... + 175 | °C   |
| Storage temperature                    | $T_{stg}$  | -55 ... + 175 |      |
| Thermal resistance, junction - case    | $R_{thJC}$ | ≤ 0.75        | K/W  |
| Thermal resistance, junction - ambient | $R_{thJA}$ | ≤ 62          |      |
| IEC climatic category, DIN IEC 68-1    |            | 55 / 175 / 56 |      |

**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<br>$V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$ , $T_j = 25^\circ\text{C}$                                                                                                                                                             | $V_{(BR)DSS}$ | 55          | -             | -               | V             |
| Gate threshold voltage<br>$V_{GS}=V_{DS}$ , $I_D = 200\text{ }\mu\text{A}$                                                                                                                                                                                               | $V_{GS(th)}$  | 2.1         | 3             | 4               |               |
| Zero gate voltage drain current<br>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = -40^\circ\text{C}$<br>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$<br>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 150^\circ\text{C}$ | $I_{DSS}$     | -<br>-<br>- | -<br>0.1<br>- | 0.1<br>1<br>100 | $\mu\text{A}$ |
| Gate-source leakage current<br>$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$                                                                                                                                                                                            | $I_{GSS}$     | -           | 10            | 100             |               |
| Drain-Source on-resistance<br>$V_{GS} = 10\text{ V}$ , $I_D = 66\text{ A}$                                                                                                                                                                                               | $R_{DS(on)}$  | -           | 0.009         | 0.012           | $\Omega$      |

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

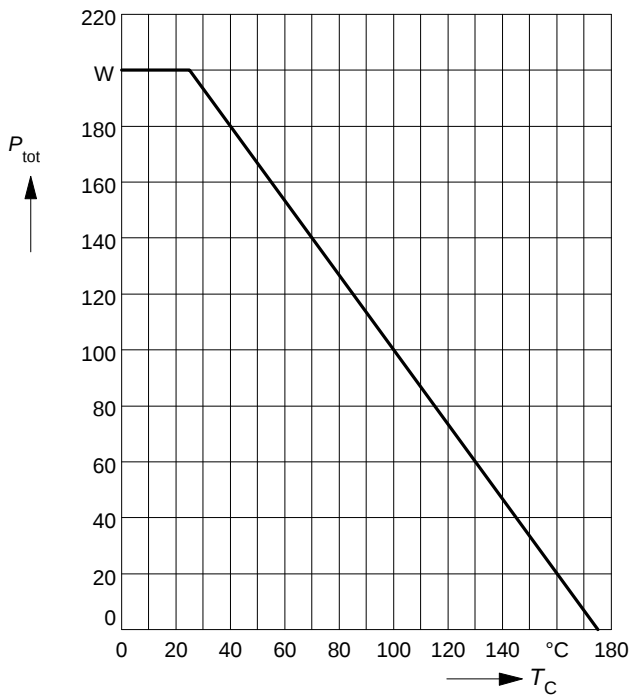
| Parameter                                                                                                             | Symbol          | Values |      |      | Unit |
|-----------------------------------------------------------------------------------------------------------------------|-----------------|--------|------|------|------|
|                                                                                                                       |                 | min.   | typ. | max. |      |
| Dynamic Characteristics                                                                                               |                 |        |      |      |      |
| Transconductance<br>$V_{DS} \geq 2 * I_D * R_{DS(on)max}$ , $I_D = 66 \text{ A}$                                      | $g_{fs}$        | 30     | -    | -    | S    |
| Input capacitance<br>$V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$                           | $C_{iss}$       | -      | 2420 | 3025 | pF   |
| Output capacitance<br>$V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$                          | $C_{oss}$       | -      | 745  | 930  |      |
| Reverse transfer capacitance<br>$V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$                | $C_{rss}$       | -      | 380  | 475  |      |
| Turn-on delay time<br>$V_{DD} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 80 \text{ A}$<br>$R_G = 3.9 \Omega$  | $t_{d(on)}$     | -      | 20   | 30   | ns   |
| Rise time<br>$V_{DD} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 80 \text{ A}$<br>$R_G = 3.9 \Omega$           | $t_r$           | -      | 35   | 55   |      |
| Turn-off delay time<br>$V_{DD} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 80 \text{ A}$<br>$R_G = 3.9 \Omega$ | $t_{d(off)}$    | -      | 45   | 70   |      |
| Fall time<br>$V_{DD} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 80 \text{ A}$<br>$R_G = 3.9 \Omega$           | $t_f$           | -      | 30   | 45   |      |
| Gate charge at threshold<br>$V_{DD} = 40 \text{ V}$ , $I_D \geq 0.1 \text{ A}$ , $V_{GS} = 0 \text{ to } 1 \text{ V}$ | $Q_{g(th)}$     | -      | 3    | 4.5  | nC   |
| Gate charge at 7.0 V<br>$V_{DD} = 40 \text{ V}$ , $I_D = 80 \text{ A}$ , $V_{GS} = 0 \text{ to } 7 \text{ V}$         | $Q_{g(7)}$      | -      | 65   | 100  |      |
| Gate charge total<br>$V_{DD} = 40 \text{ V}$ , $I_D = 80 \text{ A}$ , $V_{GS} = 0 \text{ to } 10 \text{ V}$           | $Q_{g(total)}$  | -      | 85   | 130  |      |
| Gate plateau voltage<br>$V_{DD} = 40 \text{ V}$ , $I_D = 80 \text{ A}$                                                | $V_{(plateau)}$ | -      | 5.8  | -    | V    |

**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<br>$T_C = 25\text{ }^{\circ}\text{C}$              | $I_S$    | -      | -    | 80   | A             |
| Inverse diode direct current,pulsed<br>$T_C = 25\text{ }^{\circ}\text{C}$                   | $I_{SM}$ | -      | -    | 320  |               |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}, I_F = 160\text{ A}$                  | $V_{SD}$ | -      | 1.28 | 2    | V             |
| Reverse recovery time<br>$V_R = 30\text{ V}, I_F=I_S, di_F/dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | -      | 80   | 120  | ns            |
| Reverse recovery charge<br>$V_R = 30\text{ V}, I_F=I_S, di_F/dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | -      | 17   | 25   | $\mu\text{C}$ |

## Power dissipation

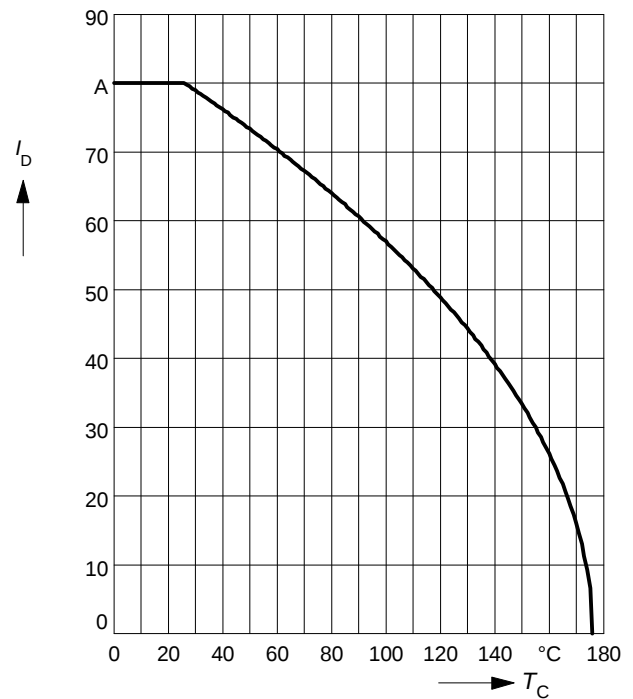
$$P_{\text{tot}} = f(T_C)$$



## Drain current

$$I_D = f(T_C)$$

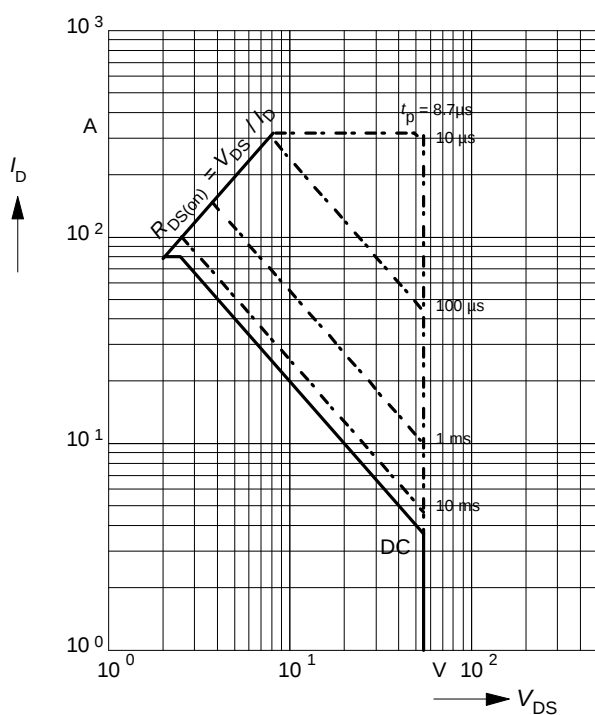
parameter:  $V_{GS} \geq 10 \text{ V}$



## Safe operating area

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

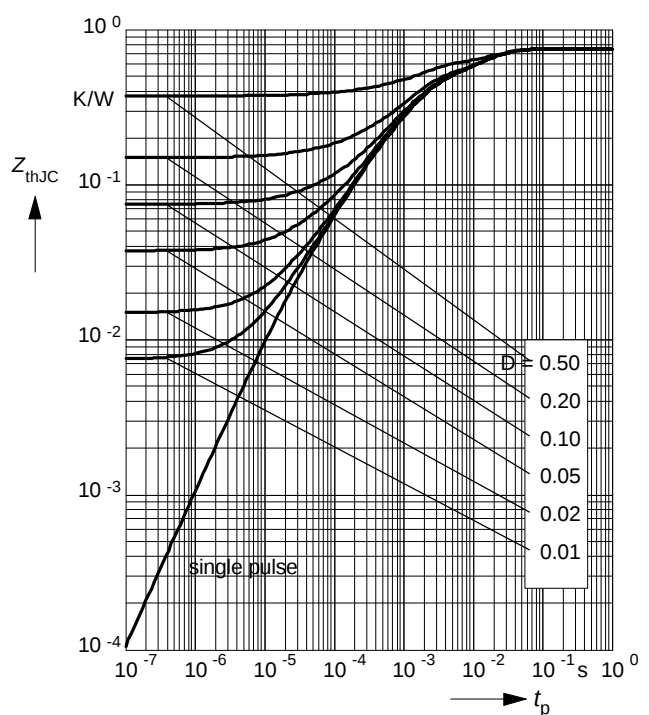
parameter:  $D = 0$ ,  $T_C = 25^\circ\text{C}$



## Transient thermal impedance

$$Z_{\text{th JC}} = f(t_p)$$

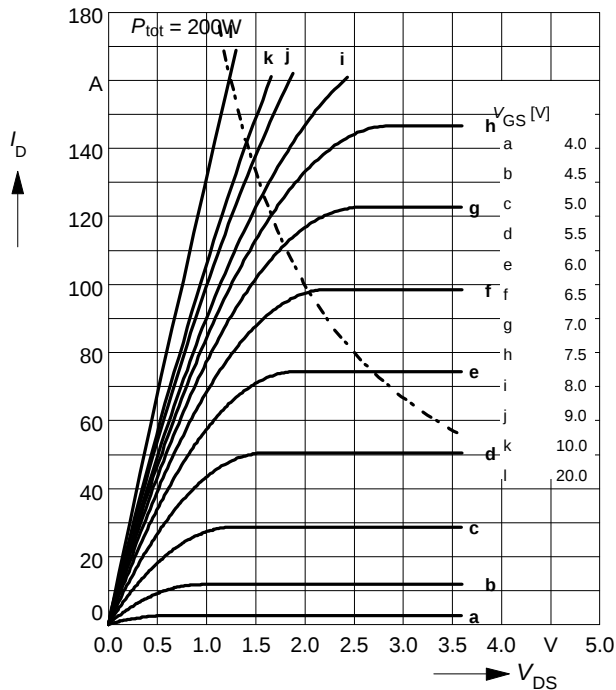
parameter:  $D = t_p / T$



## Typ. output characteristics

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

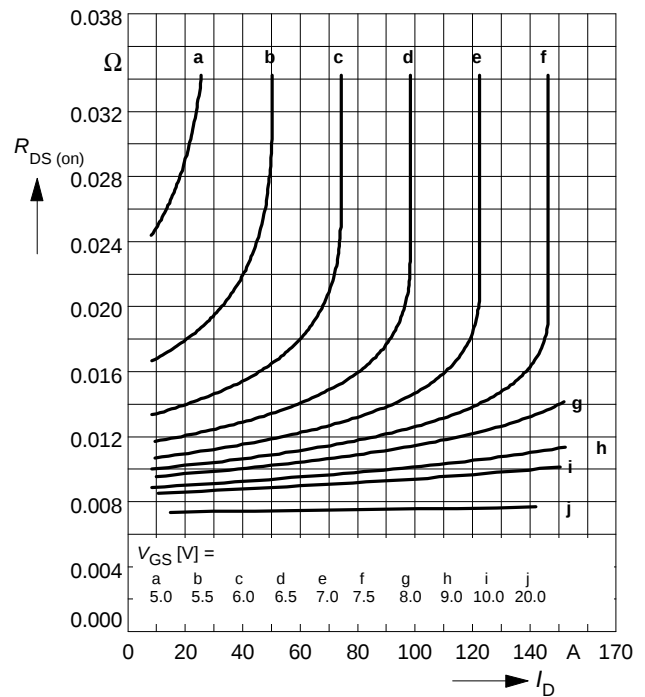
parameter:  $t_p = 80 \mu s$



## Typ. drain-source on-resistance

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

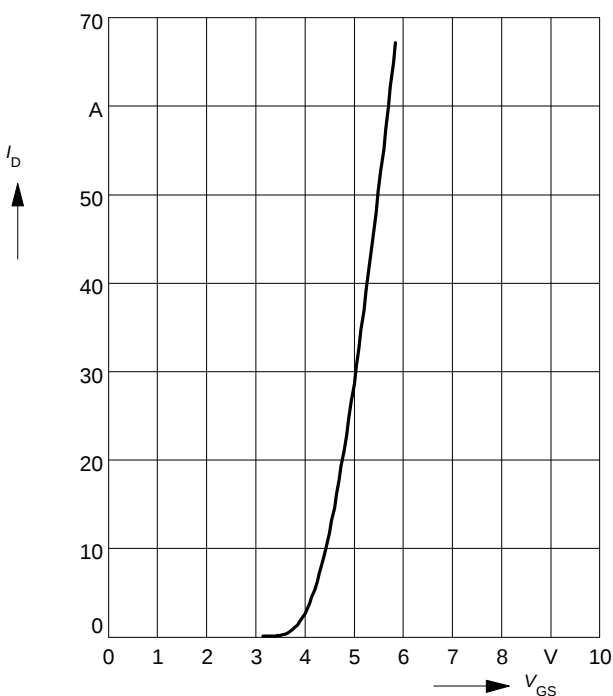
parameter:  $t_p = 80 \mu s$ ,  $T_j = 25^\circ C$



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

parameter:  $t_p = 80 \mu s$

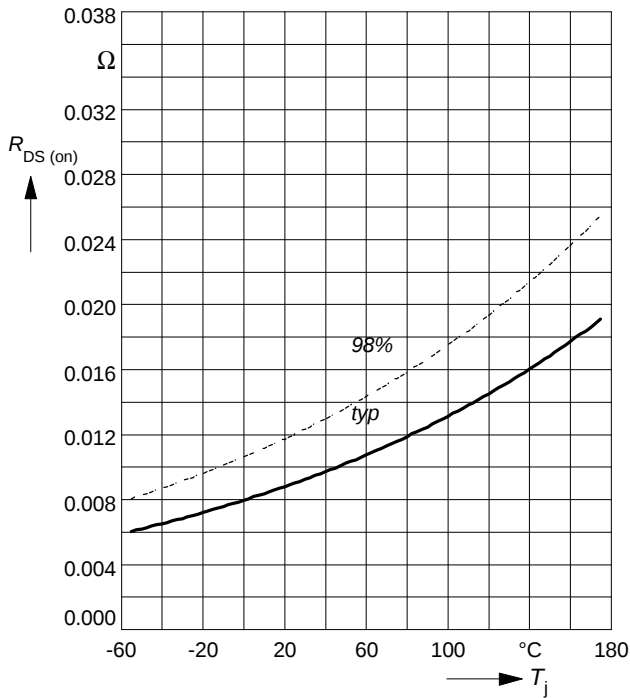
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



## Drain-source on-resistance

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

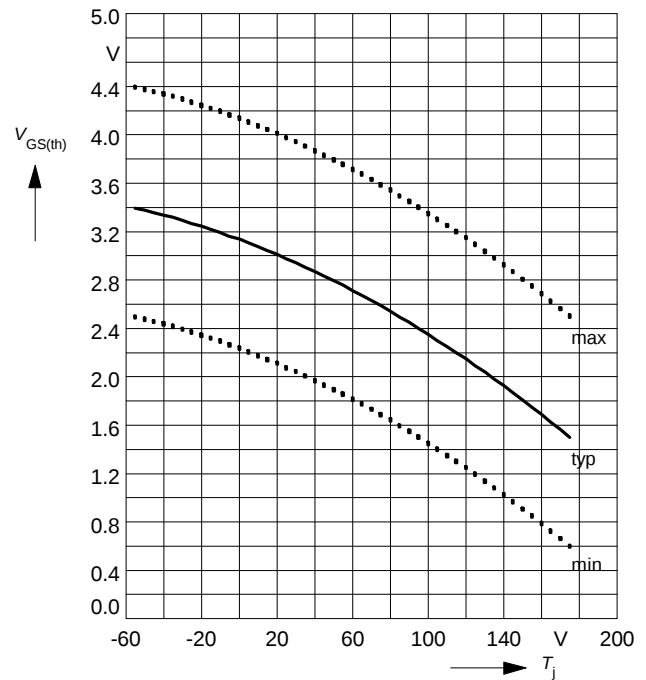
parameter:  $I_D = 66 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



## Gate threshold voltage

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

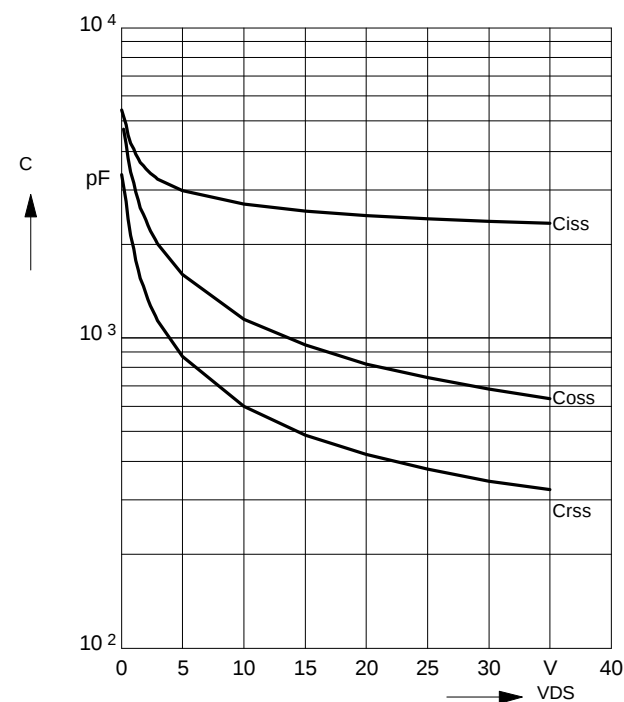
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 200 \mu\text{A}$



## Typ. capacitances

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

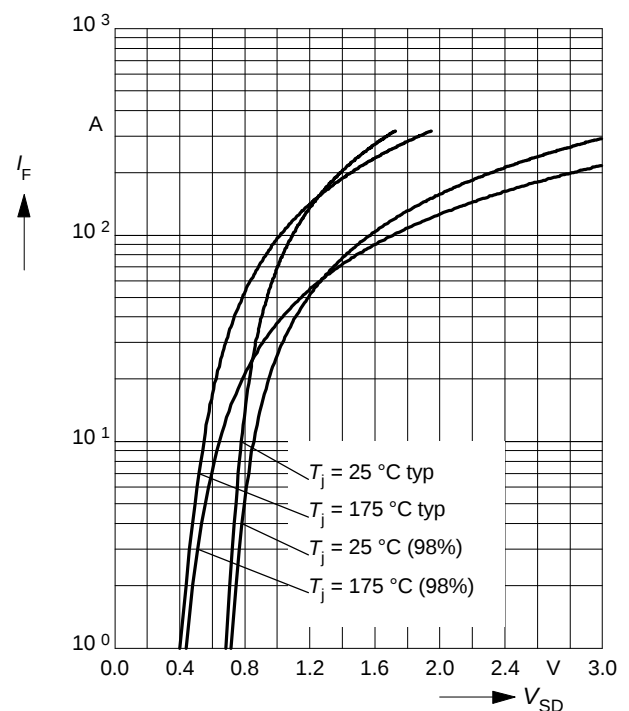
parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$



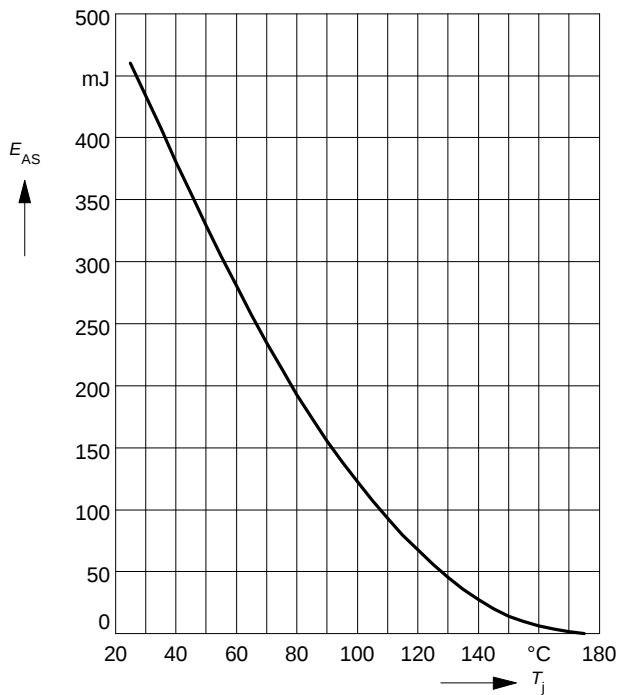
## Forward characteristics of reverse diode

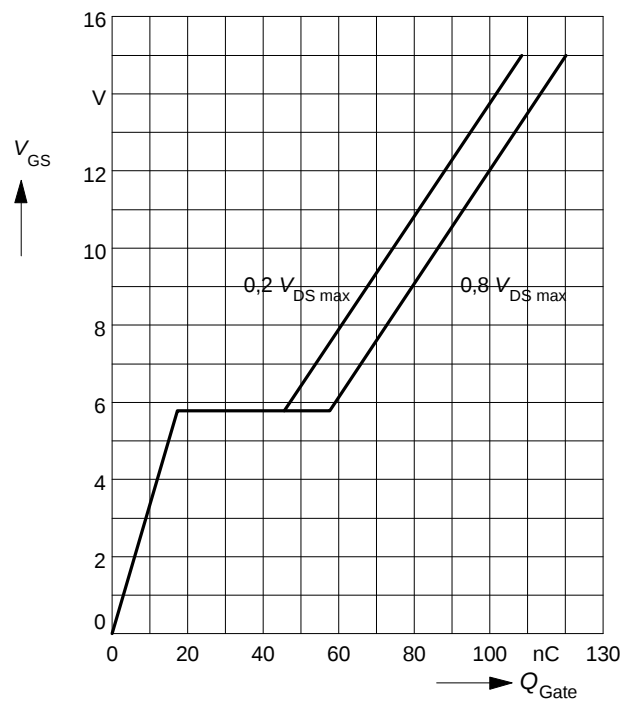
$$I_F = f(V_{SD})$$

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



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

 parameter:  $I_D = 80 \text{ A}$ ,  $V_{DD} = 25 \text{ V}$ 
 $R_{GS} = 3.8 \Omega$ ,  $L = 144 \mu\text{H}$ 

**Typ. gate charge**
 $V_{GS} = f(Q_{Gate})$ 

 parameter:  $I_{D \text{ puls}} = 80 \text{ A}$ 

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