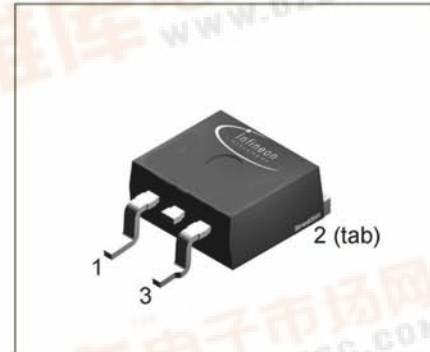




# SIPMOS<sup>®</sup> Power Transistor

- N channel
- Enhancement mode
- Avalanche-rated

## BUZ 21 SMD



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

| Type       | V <sub>DS</sub> | I <sub>D</sub> | R <sub>DS(on)</sub> | Package            | Ordering Code |
|------------|-----------------|----------------|---------------------|--------------------|---------------|
| BUZ 21 SMD | 100 V           | 21 A           | 0.085 Ω             | D <sup>2</sup> PAK | Q67042-S4132  |

### Maximum Ratings

| Parameter                                                                                                                                                                         | Symbol      | Values        | Unit               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|--------------------|
| Continuous drain current<br>$T_C = 25\text{ }^{\circ}\text{C}$                                                                                                                    | $I_D$       | 21            | A                  |
| Pulsed drain current<br>$T_C = 25\text{ }^{\circ}\text{C}$                                                                                                                        | $I_{Dpuls}$ | 84            |                    |
| Avalanche current, limited by $T_{jmax}$                                                                                                                                          | $I_{AR}$    | 21            |                    |
| Avalanche energy, periodic limited by $T_{jmax}$                                                                                                                                  | $E_{AR}$    | 11            | mJ                 |
| Avalanche energy, single pulse<br>$I_D = 21\text{ A}$ , $V_{DD} = 25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$<br>$L = 340\text{ }\mu\text{H}$ , $T_j = 25\text{ }^{\circ}\text{C}$ | $E_{AS}$    | 100           |                    |
| Gate source voltage                                                                                                                                                               | $V_{GS}$    | $\pm 20$      | V                  |
| Power dissipation<br>$T_C = 25\text{ }^{\circ}\text{C}$                                                                                                                           | $P_{tot}$   | 75            | W                  |
| Operating temperature                                                                                                                                                             | $T_j$       | -55 ... + 150 | $^{\circ}\text{C}$ |
| Storage temperature                                                                                                                                                               | $T_{stg}$   | -55 ... + 150 |                    |
| Thermal resistance, chip case                                                                                                                                                     | $R_{thJC}$  | $\leq 1.67$   | K/W                |
| Thermal resistance, chip to ambient                                                                                                                                               | $R_{thJA}$  | 75            |                    |
| DIN humidity category, DIN 40 040                                                                                                                                                 |             | E             |                    |
| IEC climatic category, DIN IEC 68-1                                                                                                                                               |             | 55 / 150 / 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>$V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$ , $T_j = 25^\circ\text{C}$  | $V_{(BR)DSS}$ | 100 | -     | -     | V             |
| Gate threshold voltage<br>$V_{GS}=V_{DS}$ , $I_D = 1\text{ mA}$                                               | $V_{GS(th)}$  | 2.1 | 3     | 4     |               |
| Zero gate voltage drain current<br>$V_{DS} = 100\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$ | $I_{DSS}$     | -   | 0.1   | 1     | $\mu\text{A}$ |
| $V_{DS} = 100\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125^\circ\text{C}$                                   |               | -   | 10    | 100   |               |
| Gate-source leakage current<br>$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$                                 | $I_{GSS}$     | -   | 10    | 100   | nA            |
| Drain-Source on-resistance<br>$V_{GS} = 10\text{ V}$ , $I_D = 13\text{ A}$                                    | $R_{DS(on)}$  | -   | 0.065 | 0.085 | $\Omega$      |

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

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

**Dynamic Characteristics**

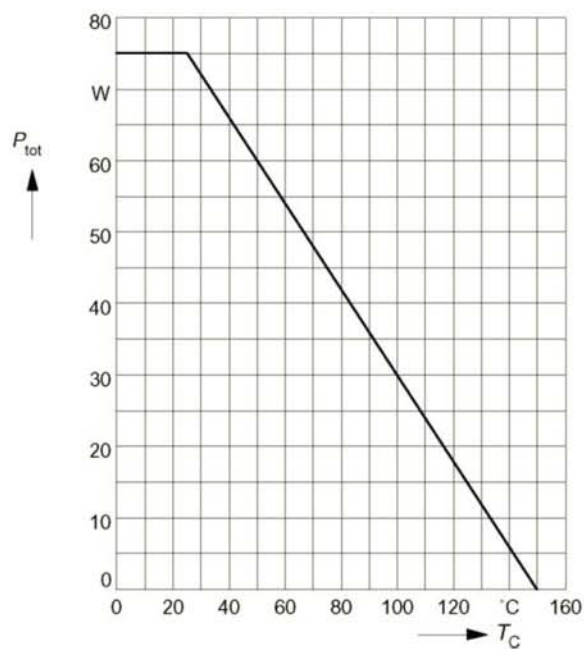
|                                                                                                                      |              |   |      |      |    |
|----------------------------------------------------------------------------------------------------------------------|--------------|---|------|------|----|
| Transconductance<br>$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 13\text{ A}$                              | $g_{fs}$     | 8 | 11   | -    | S  |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                             | $C_{iss}$    | - | 1000 | 1300 | pF |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                            | $C_{oss}$    | - | 300  | 530  |    |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                  | $C_{rss}$    | - | 150  | 240  |    |
| Turn-on delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$  | $t_{d(on)}$  | - | 25   | 40   | ns |
| Rise time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_r$        | - | 50   | 75   |    |
| Turn-off delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$ | $t_{d(off)}$ | - | 160  | 210  |    |
| Fall time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_f$        | - | 80   | 110  |    |

**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>$T_C = 25\text{ }^{\circ}\text{C}$                      | $I_S$    | -      | -    | 21   | A             |
| Inverse diode direct current,pulsed<br>$T_C = 25\text{ }^{\circ}\text{C}$                           | $I_{SM}$ | -      | -    | 84   |               |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}$ , $I_F = 42\text{ A}$                        | $V_{SD}$ | -      | 1.3  | 1.7  | V             |
| Reverse recovery time<br>$V_R = 30\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | -      | 150  | -    | ns            |
| Reverse recovery charge<br>$V_R = 30\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | -      | 0.48 | -    | $\mu\text{C}$ |

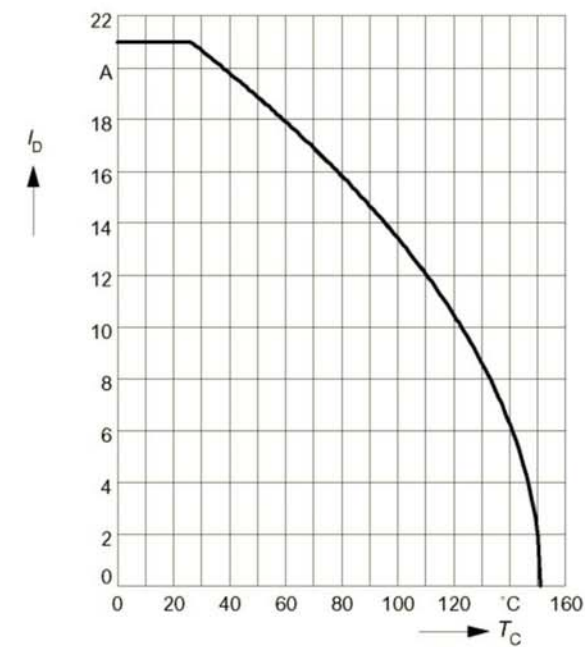
**Power dissipation**

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


**Drain current**

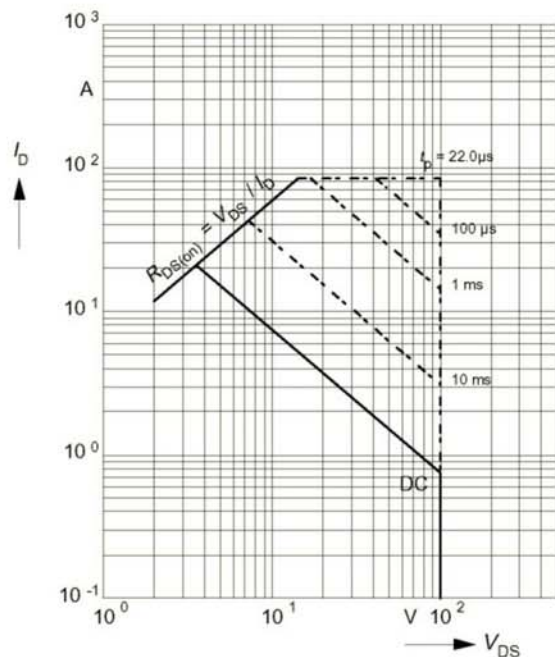
$$I_D = f(T_C)$$

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


**Safe operating area**

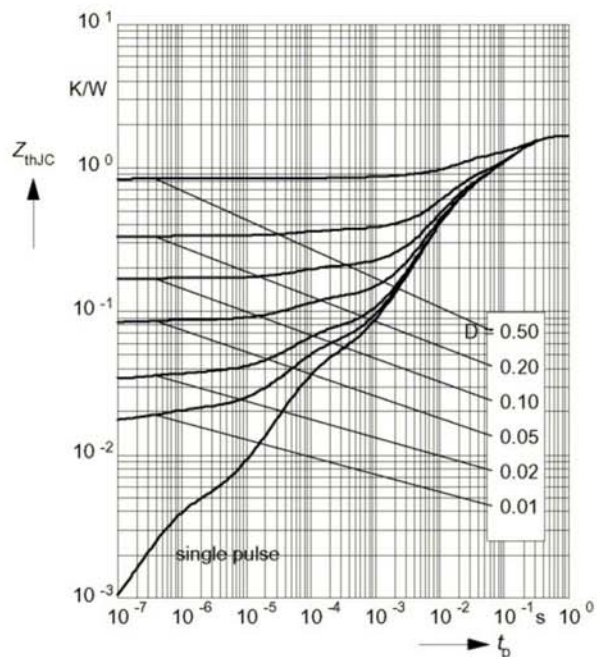
$$I_D = f(V_{DS})$$

parameter:  $D = 0.01$ ,  $T_C = 25^\circ\text{C}$


**Transient thermal impedance**

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

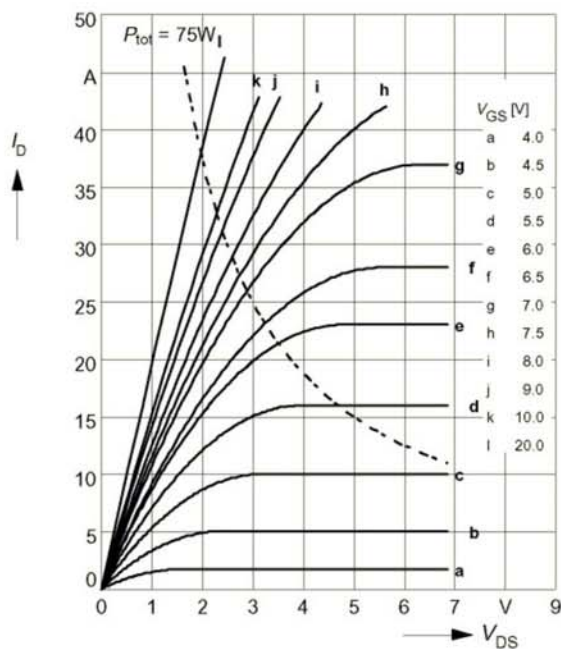
parameter:  $D = t_p / T$



**Typ. output characteristics**

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

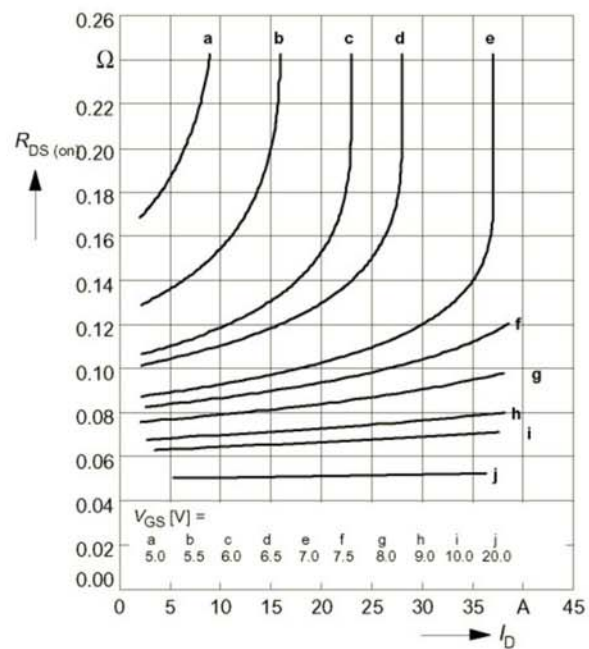
parameter:  $t_p = 80 \mu s$



**Typ. drain-source on-resistance**

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

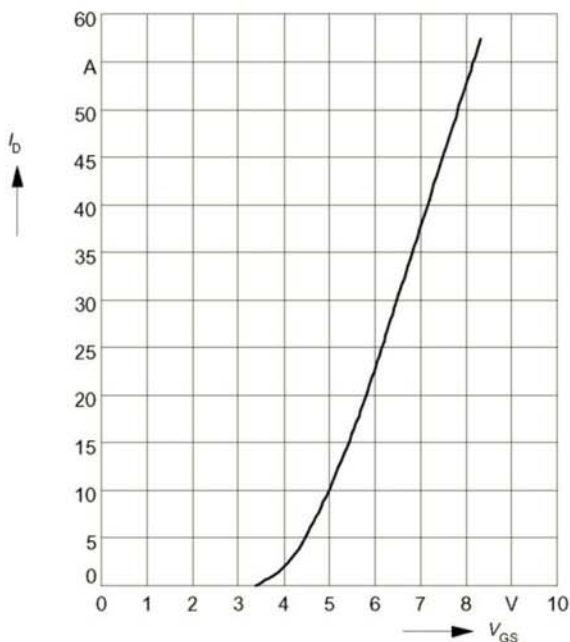
parameter:  $t_p = 80 \mu s$ ,  $T_j = 25^\circ C$



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

parameter:  $t_p = 80 \mu s$

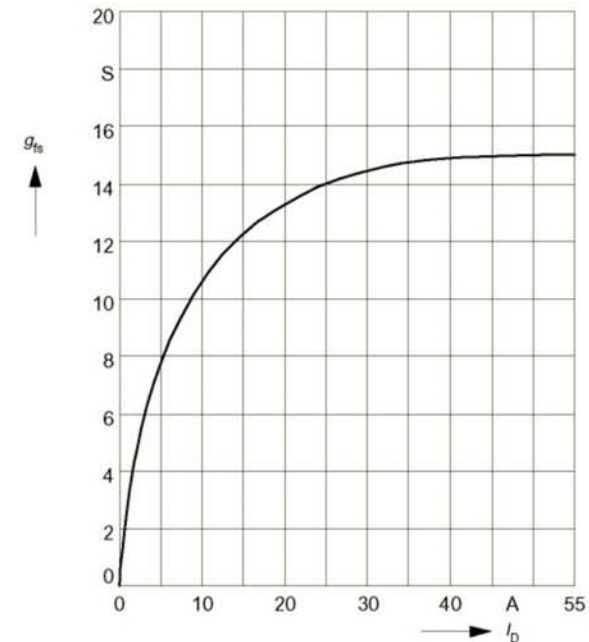
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



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

parameter:  $t_p = 80 \mu s$ ,

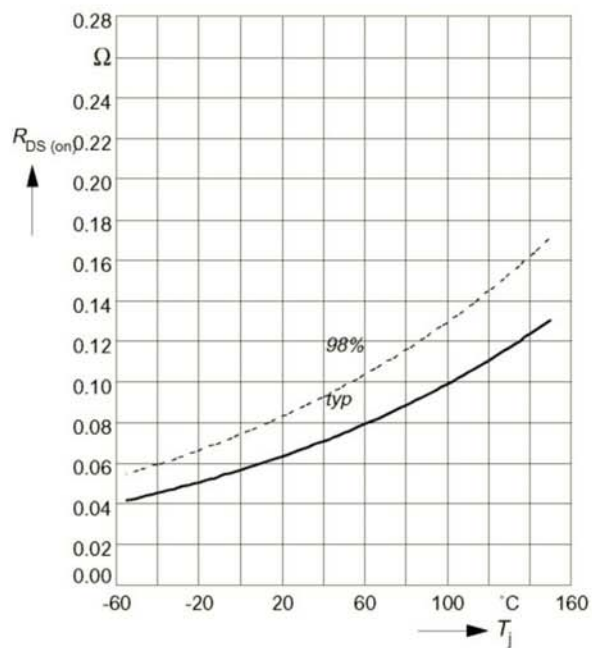
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



### Drain-source on-resistance

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

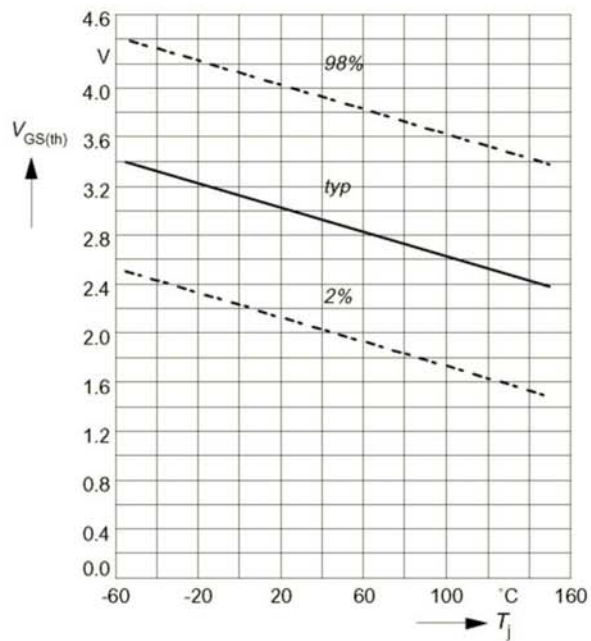
parameter:  $I_D = 13 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



### Gate threshold voltage

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

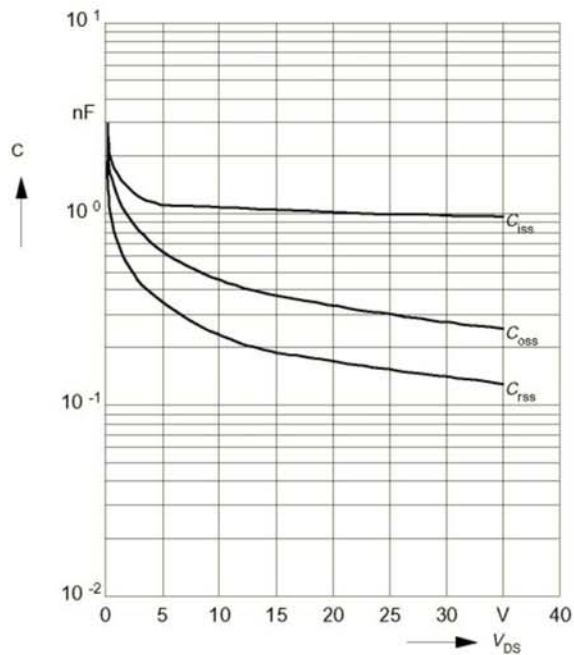
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1 \text{ mA}$



### Typ. capacitances

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

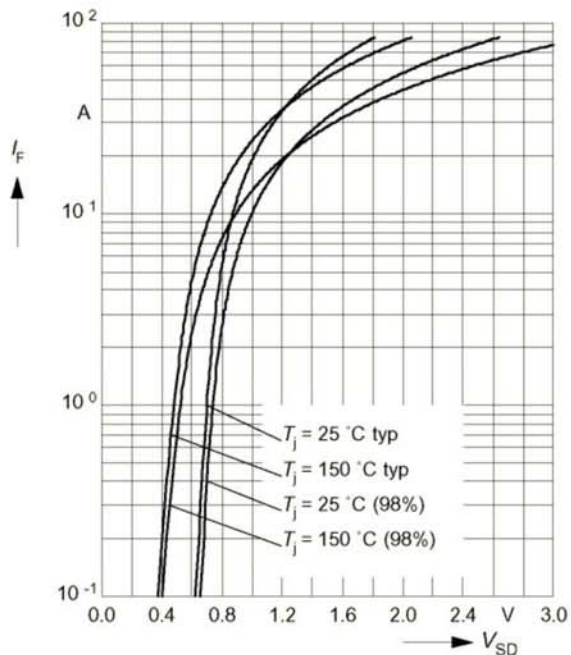
parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$



### Forward characteristics of reverse diode

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

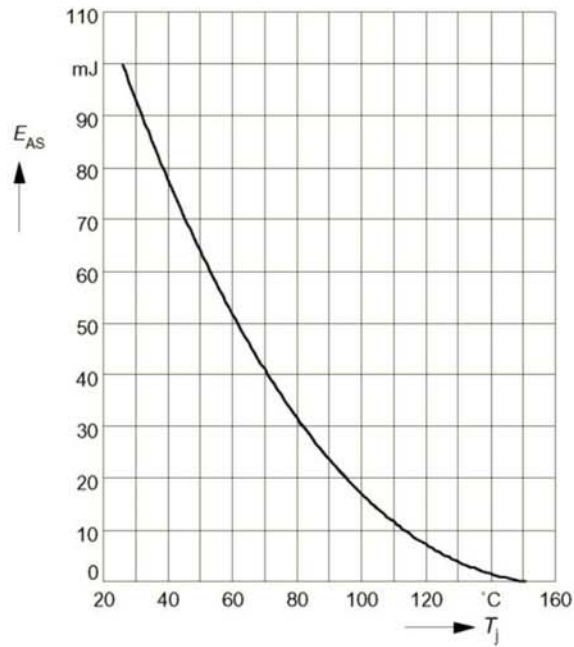
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



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

parameter:  $I_D = 21\text{ A}$ ,  $V_{DD} = 25\text{ V}$

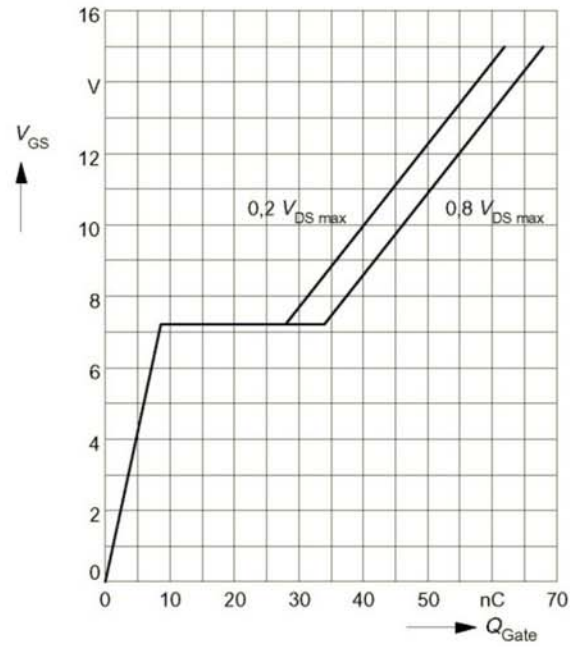
$R_{GS} = 25\ \Omega$ ,  $L = 340\ \mu\text{H}$



**Typ. gate charge**

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

parameter:  $I_{D\text{ puls}} = 36\text{ A}$



**Drain-source breakdown voltage**

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

