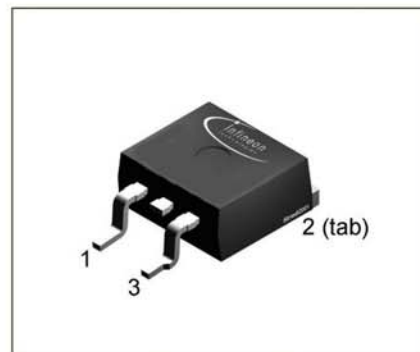


## BUZ 31 SMD

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

- N channel
- Enhancement mode
- Avalanche-rated



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

| Type       | $V_{DS}$ | $I_D$  | $R_{DS(on)}$ | Package            | Ordering Code |
|------------|----------|--------|--------------|--------------------|---------------|
| BUZ 31 SMD | 200 V    | 14.5 A | 0.2 $\Omega$ | D <sup>2</sup> PAK | Q67042-S4131  |

### Maximum Ratings

| Parameter                                                                                                                                                                   | Symbol      | Values        | Unit               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|--------------------|
| Continuous drain current<br>$T_C = 30\text{ }^{\circ}\text{C}$                                                                                                              | $I_D$       | 14.5          | A                  |
| Pulsed drain current<br>$T_C = 25\text{ }^{\circ}\text{C}$                                                                                                                  | $I_{Dpuls}$ | 58            |                    |
| Avalanche current, limited by $T_{jmax}$                                                                                                                                    | $I_{AR}$    | 14.5          |                    |
| Avalanche energy, periodic limited by $T_{jmax}$                                                                                                                            | $E_{AR}$    | 9             | mJ                 |
| Avalanche energy, single pulse<br>$I_D = 14.5\text{ A}$ , $V_{DD} = 50\text{ V}$ , $R_{GS} = 25\text{ }\Omega$<br>$L = 1.42\text{ mH}$ , $T_j = 25\text{ }^{\circ}\text{C}$ | $E_{AS}$    | 200           |                    |
| Gate source voltage                                                                                                                                                         | $V_{GS}$    | $\pm 20$      | V                  |
| Power dissipation<br>$T_C = 25\text{ }^{\circ}\text{C}$                                                                                                                     | $P_{tot}$   | 95            | W                  |
| Operating temperature                                                                                                                                                       | $T_j$       | -55 ... + 150 | $^{\circ}\text{C}$ |
| Storage temperature                                                                                                                                                         | $T_{stg}$   | -55 ... + 150 |                    |
| Thermal resistance, chip case                                                                                                                                               | $R_{thJC}$  | $\leq 1.32$   | 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>$V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$ , $T_j = 25^\circ\text{C}$                                                                                 | $V_{(BR)DSS}$ | 200    | -         | -        | 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>$V_{DS} = 200\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$<br>$V_{DS} = 200\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125^\circ\text{C}$ | $I_{DSS}$     | -<br>- | 0.1<br>10 | 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      | nA            |
| Drain-Source on-resistance<br>$V_{GS} = 10\text{ V}$ , $I_D = 9\text{ A}$                                                                                                                    | $R_{DS(on)}$  | -      | 0.16      | 0.2      | $\Omega$      |

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

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

**Dynamic Characteristics**

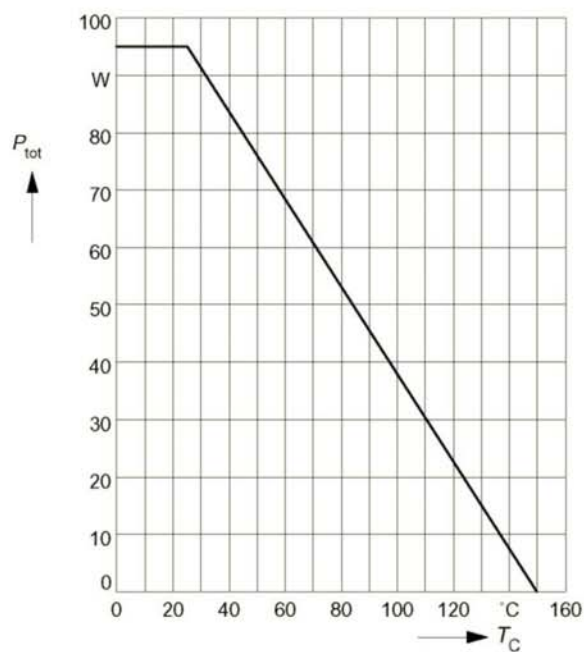
|                                                                                                                      |              |   |     |      |    |
|----------------------------------------------------------------------------------------------------------------------|--------------|---|-----|------|----|
| Transconductance<br>$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 9\text{ A}$                               | $g_{fs}$     | 5 | 10  | -    | S  |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                             | $C_{iss}$    | - | 840 | 1120 | pF |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                            | $C_{oss}$    | - | 180 | 270  |    |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                  | $C_{rss}$    | - | 95  | 150  |    |
| Turn-on delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$  | $t_{d(on)}$  | - | 12  | 20   | 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>$R_{GS} = 50\ \Omega$ | $t_{d(off)}$ | - | 150 | 200  |    |
| Fall time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_f$        | - | 60  | 80   |    |

**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>$T_C = 25\text{ }^{\circ}\text{C}$                       | $I_S$    | -      | -    | 14.5 | A             |
| Inverse diode direct current,pulsed<br>$T_C = 25\text{ }^{\circ}\text{C}$                            | $I_{SM}$ | -      | -    | 58   |               |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}$ , $I_F = 29\text{ A}$                         | $V_{SD}$ | -      | 1.1  | 1.6  | V             |
| Reverse recovery time<br>$V_R = 100\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | -      | 170  | -    | ns            |
| Reverse recovery charge<br>$V_R = 100\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | -      | 1.1  | -    | $\mu\text{C}$ |

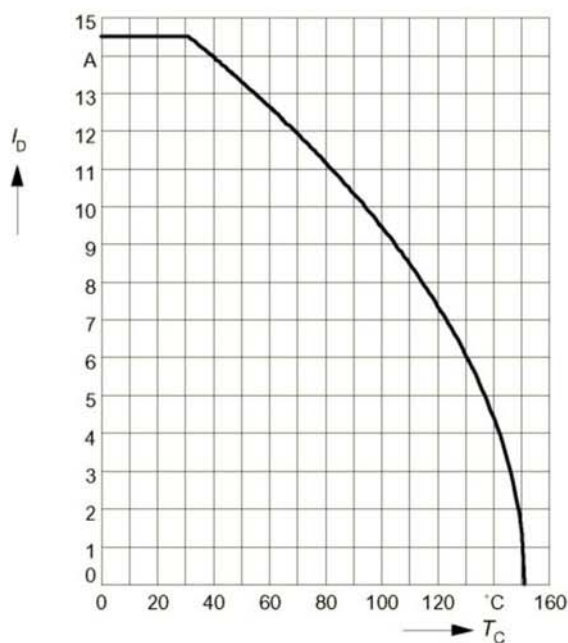
**Power dissipation**

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


**Drain current**

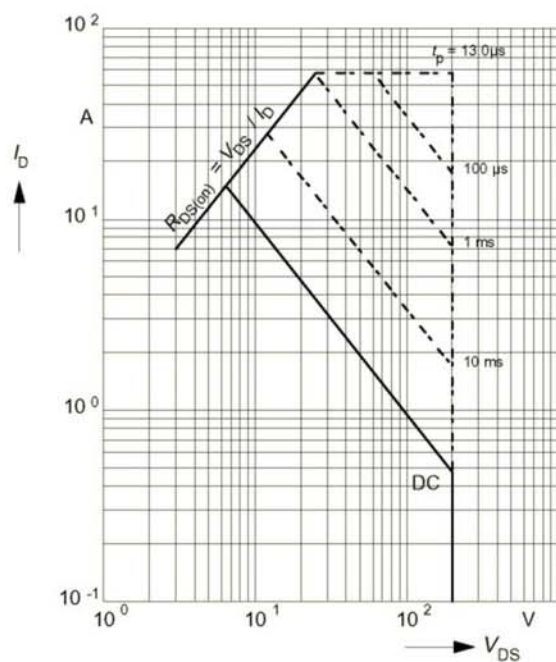
$$I_D = f(T_C)$$

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


**Safe operating area**

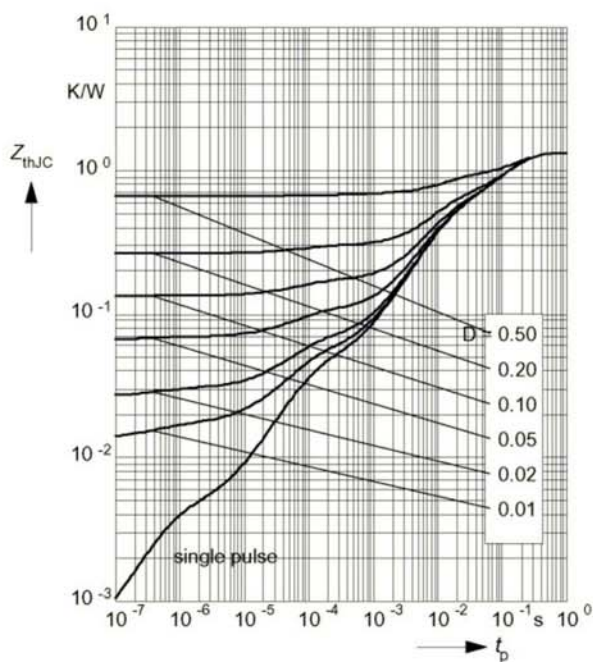
$$I_D = f(V_{DS})$$

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


**Transient thermal impedance**

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

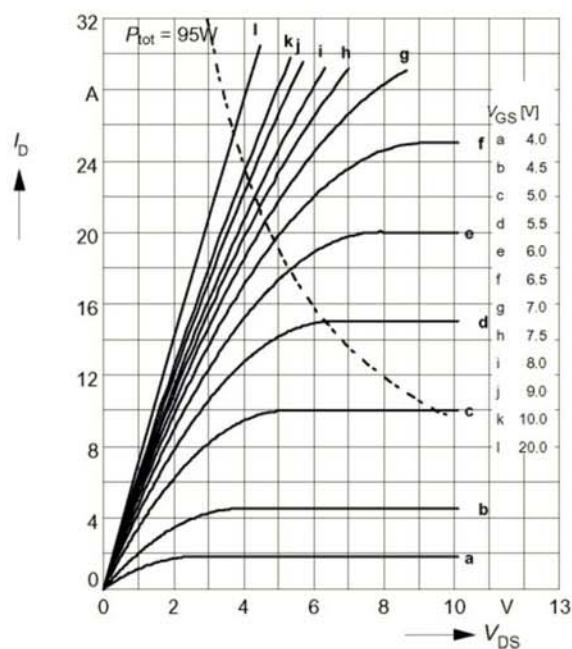
parameter:  $D = t_p / T$



**Typ. output characteristics**

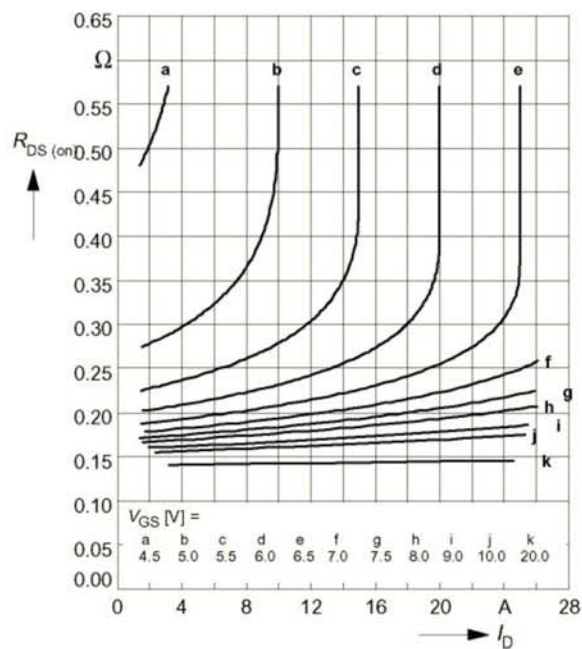
$$I_D = f(V_{DS})$$

parameter:  $t_p = 80 \mu s$


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

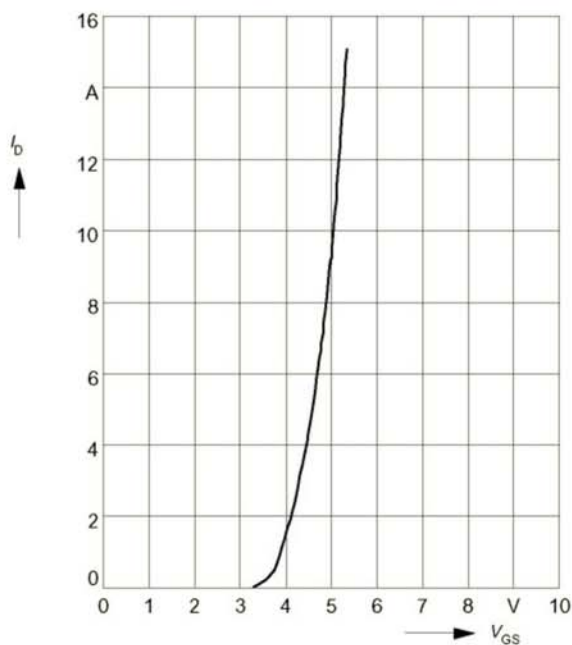
$$R_{DS(on)} = f(I_D)$$

parameter:  $V_{GS}$


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

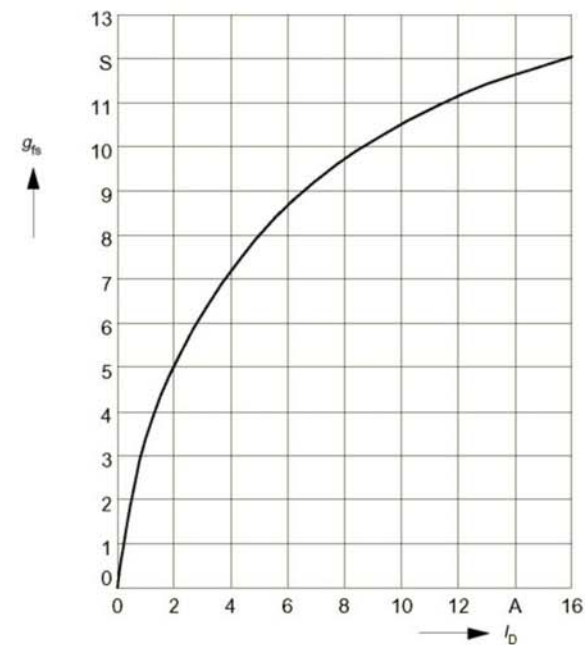
parameter:  $t_p = 80 \mu s$

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


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

parameter:  $t_p = 80 \mu s$ ,

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

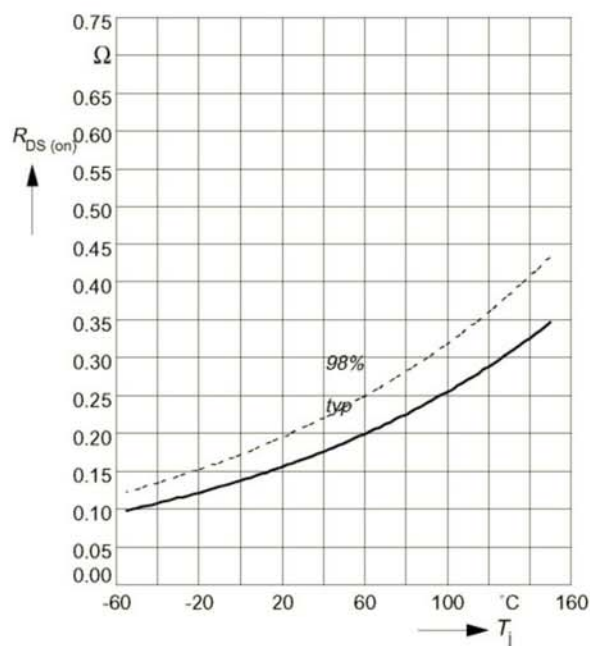




**Drain-source on-resistance**

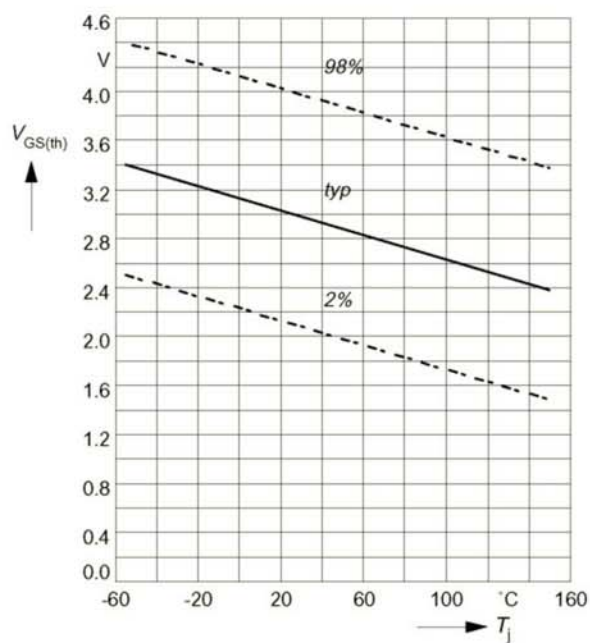
$$R_{DS(on)} = f(T_j)$$

parameter:  $I_D = 9\text{ A}$ ,  $V_{GS} = 10\text{ V}$


**Gate threshold voltage**

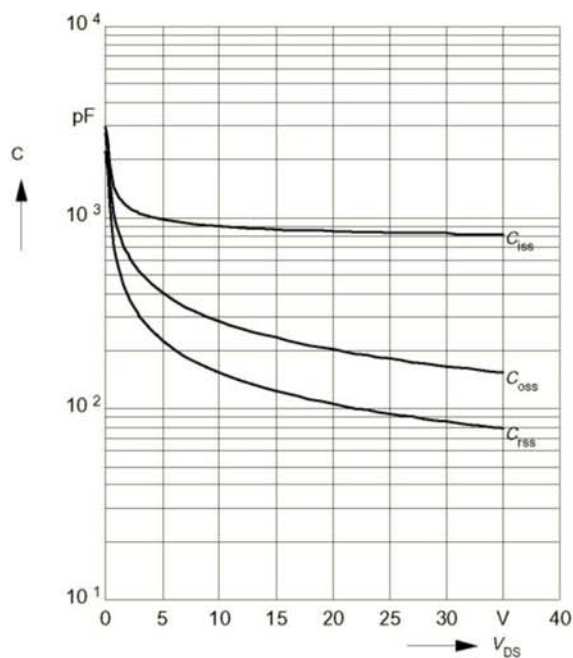
$$V_{GS(th)} = f(T_j)$$

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


**Typ. capacitances**

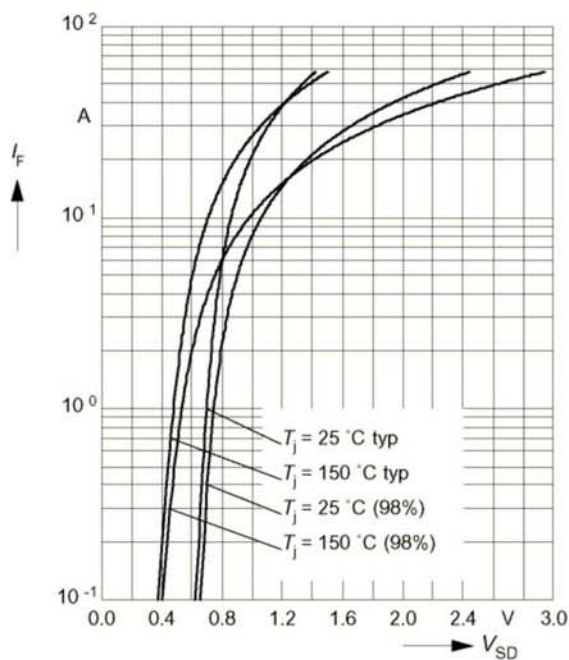
$$C = f(V_{DS})$$

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

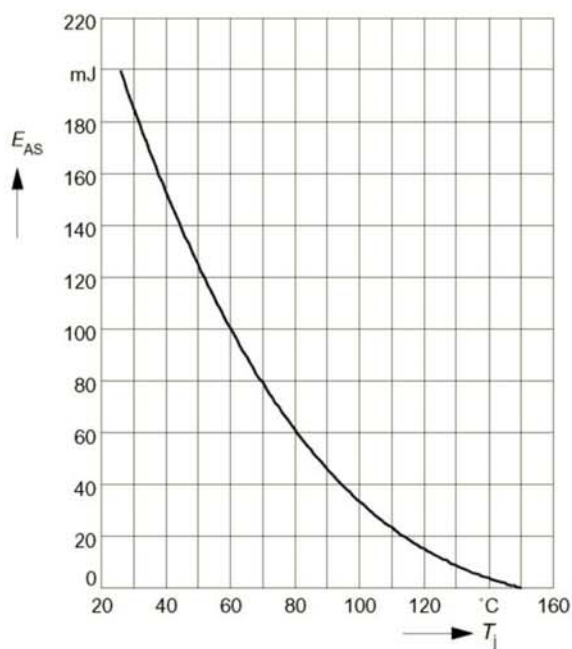

**Forward characteristics of reverse diode**

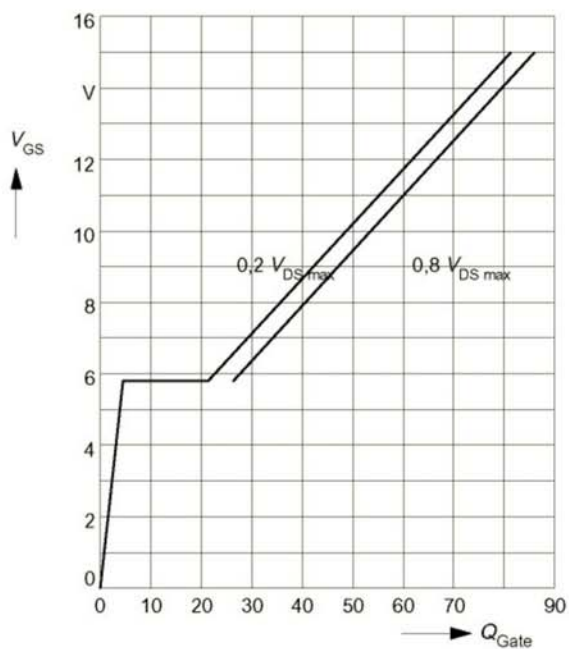
$$I_F = f(V_{SD})$$

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



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

 parameter:  $I_D = 14.5 \text{ A}$ ,  $V_{DD} = 50 \text{ V}$ 
 $R_{GS} = 25 \Omega$ ,  $L = 1.42 \text{ mH}$ 

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

 parameter:  $I_{D \text{ puls}} = 20 \text{ A}$ 

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