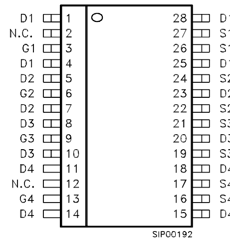
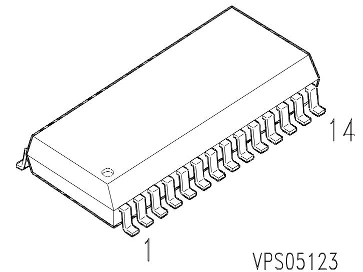
**SIPMOS ® Power Transistor**




- Quad-channel
- Enhancement mode
- Logic level
- Avalanche-rated
- d*v*/d*t* rated

| Type | $V_{DS}$ | $I_D$ | $R_{DS(on)}$ | Package | Ordering Code |
|---|---|---|---|---|---|
| BUZ 104SL-4 | 55 V | 3.2 A | 0.125 Ω | P-DSO-28 | C67078-S. . . .- . . |

**Maximum Ratings**

| Parameter | Symbol | Values | Unit |
|---|---|---|---|
| Continuous drain current *one channel active* | $I_D$ | | A |
| $T_A$ = 25 °C | | 3.2 | |
| Pulsed drain current *one channel active* | $I_{Dpuls}$ | | |
| $T_A$ = 25 °C | | 12.8 | |
| Avalanche energy, single pulse | $E_{AS}$ | | mJ |
| $I_D$ = 3.2 A, $V_{DD}$ = 25 V, $R_{GS}$ = 25 Ω | | | |
| $L$ = 10.15 mH, $T_j$ = 25 °C | | 52 | |
| Reverse diode d*v*/d*t* | d*v*/d*t* | | kV/µs |
| $I_S$ = 3.2 A, $V_{DS}$ = 40 V, d$i_F$/d$t$ = 200 A/µs | | | |
| $T_{jmax}$ = 175 °C | | 6 | |
| Gate source voltage | $V_{GS}$ | ± 14 | V |
| Power dissipation ,*one channel active* | $P_{tot}$ | | W |
| $T_A$ = 25 °C | | 2.4 | |
| Operating temperature | $T_j$ | -55 ... + 175 | °C |
| Storage temperature | $T_{stg}$ | -55 ... + 175 | |
| IEC climatic category, DIN IEC 68-1 | | 55 / 175 / 56 | |

**Thermal Characteristics**

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| Thermal resistance, junction - soldering point [1] | $R_{thJS}$ | - | - | tbd | K/W |
| Thermal resistance, junction - ambient [2] | $R_{thJA}$ | - | - | 62.5 | |

1) Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6 $cm^2$ (one layer,70µm thick) copper area for Drain connection. PCB is vertical without blown air.

2) one channel active

**Electrical Characteristics,** at $T_j$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Static Characteristics** | | | | | |
| Drain- source breakdown voltage<br>$V_{GS}$ = 0 V, $I_D$ = 0.25 mA, $T_j$ = 25 °C | $V_{(BR)DSS}$ | 55 | - | - | V |
| Gate threshold voltage<br>$V_{GS}$=$V_{DS,}$ $I_D$ = 20 µA | $V_{GS(th)}$ | 1.2 | 1.6 | 2 | |
| Zero gate voltage drain current | $I_{DSS}$ | | | | µA |
| $V_{DS}$ = 55 V, $V_{GS}$ = 0 V, $T_j$ = -40 °C | | - | - | 0.1 | |
| $V_{DS}$ = 55 V, $V_{GS}$ = 0 V, $T_j$ = 25 °C | | - | 0.1 | 1 | |
| $V_{DS}$ = 55 V, $V_{GS}$ = 0 V, $T_j$ = 150 °C | | - | - | 100 | |
| Gate-source leakage current<br>$V_{GS}$ = 20 V, $V_{DS}$ = 0 V | $I_{GSS}$ | - | 10 | 100 | nA |
| Drain-Source on-resistance<br>$V_{GS}$ = 5 V, $I_D$ = 3.2 A | $R_{DS(on)}$ | - | 0.095 | 0.125 | Ω |

**Electrical Characteristics,** at $T_j$ = 25°C, unless otherwise specified

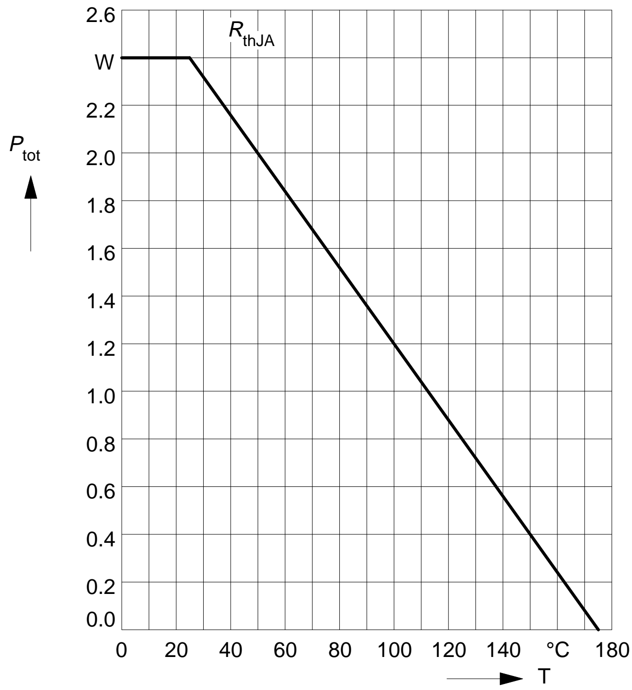
| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Dynamic Characteristics** | | | | | |
| Transconductance<br>$V_{DS} \geq 2 * I_D * R_{DS(on)max}$, $I_D$ = 3.2 A | $g_{fs}$ | 3 | - | - | S |
| Input capacitance<br>$V_{GS}$ = 0 V, $V_{DS}$ = 25 V, $f$ = 1 MHz | $C_{iss}$ | - | 320 | 400 | pF |
| Output capacitance<br>$V_{GS}$ = 0 V, $V_{DS}$ = 25 V, $f$ = 1 MHz | $C_{oss}$ | - | 100 | 125 | |
| Reverse transfer capacitance<br>$V_{GS}$ = 0 V, $V_{DS}$ = 25 V, $f$ = 1 MHz | $C_{rss}$ | - | 55 | 70 | |
| Turn-on delay time<br>$V_{DD}$ = 30 V, $V_{GS}$ = 5 V, $I_D$ = 3.2 A<br>$R_G$ = 16.8 Ω | $t_{d(on)}$ | - | 20 | 30 | ns |
| Rise time<br>$V_{DD}$ = 30 V, $V_{GS}$ = 5 V, $I_D$ = 3.2 A<br>$R_G$ = 16.8 Ω | $t_r$ | - | 30 | 45 | |
| Turn-off delay time<br>$V_{DD}$ = 30 V, $V_{GS}$ = 5 V, $I_D$ = 3.2 A<br>$R_G$ = 16.8 Ω | $t_{d(off)}$ | - | 35 | 53 | |
| Fall time<br>$V_{DD}$ = 30 V, $V_{GS}$ = 5 V, $I_D$ = 3.2 A<br>$R_G$ = 16.8 Ω | $t_f$ | - | 20 | 30 | |
| Gate charge at threshold<br>$V_{DD}$ = 40 V, $I_D \geq$ 0.1 A, $V_{GS}$ =0 to 1 V | $Q_{g(th)}$ | - | 0.55 | 0.85 | nC |
| Gate charge at 5.0 V<br>$V_{DD}$ = 40 V, $I_D$ = 3.2 A, $V_{GS}$ =0 to 5 V | $Q_{g(5)}$ | - | 5.3 | 8 | |
| Gate charge total<br>$V_{DD}$ = 40 V, $I_D$ = 3.2 A, $V_{GS}$ =0 to 10 V | $Q_{g(total)}$ | - | 14 | 21 | |
| Gate plateau voltage<br>$V_{DD}$ = 40 V, $I_D$ = 3.2 A | $V_{(plateau)}$ | - | 3.27 | - | V |

**Electrical Characteristics,** at $T_j$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | **min.** | **typ.** | **max.** | |
| **Reverse Diode** | | | | | |
| Inverse diode continuous forward current<br>$T_A$ = 25 °C | $I_S$ | - | - | 3.2 | A |
| Inverse diode direct current, pulsed<br>$T_A$ = 25 °C | $I_{SM}$ | - | - | 12.8 | |
| Inverse diode forward voltage<br>$V_{GS}$ = 0 V, $I_F$ = 6.4 A | $V_{SD}$ | - | 0.95 | 1.6 | V |
| Reverse recovery time<br>$V_R$ = 30 V, $I_F$=$I_S$, $di_F/dt$ = 100 A/µs | $t_{rr}$ | - | 50 | 75 | ns |
| Reverse recovery charge<br>$V_R$ = 30 V, $I_F$=$I_S$, $di_F/dt$ = 100 A/µs | $Q_{rr}$ | - | 90 | 135 | nC |

**Power dissipation**

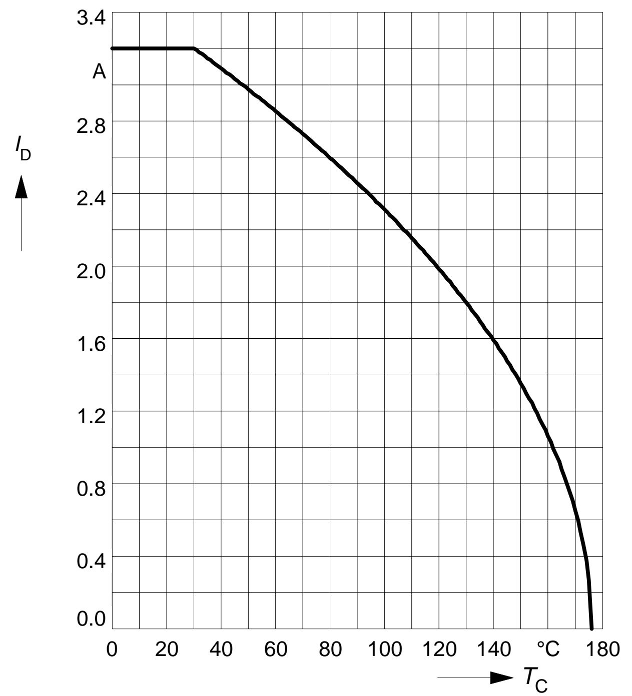
$P_{tot} = f(T)$



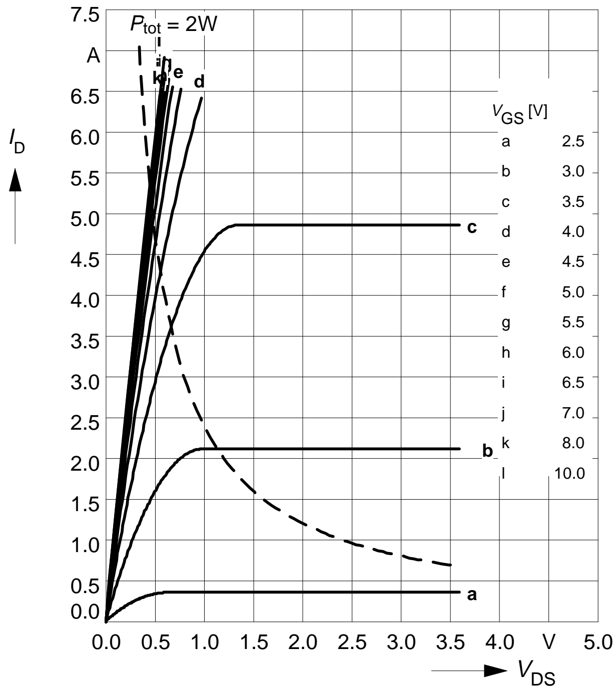

**Drain current**

$I_D = f(T_C)$

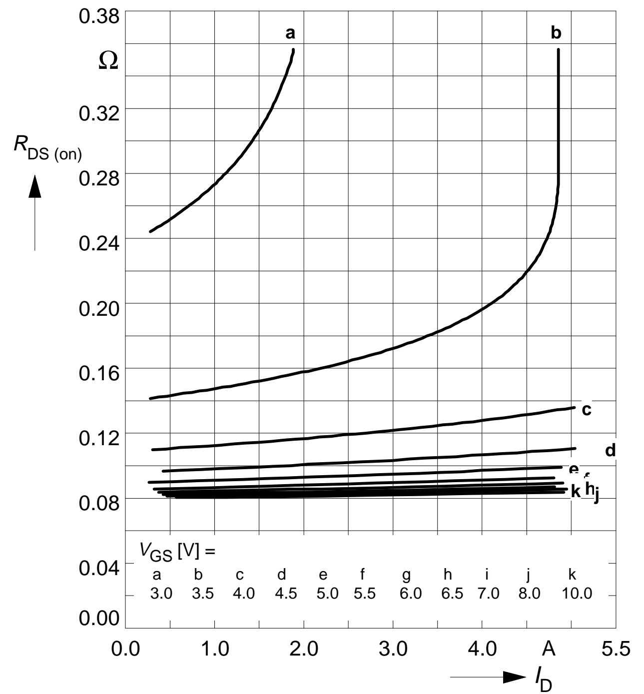
parameter: $V_{GS} \geq 5$ V



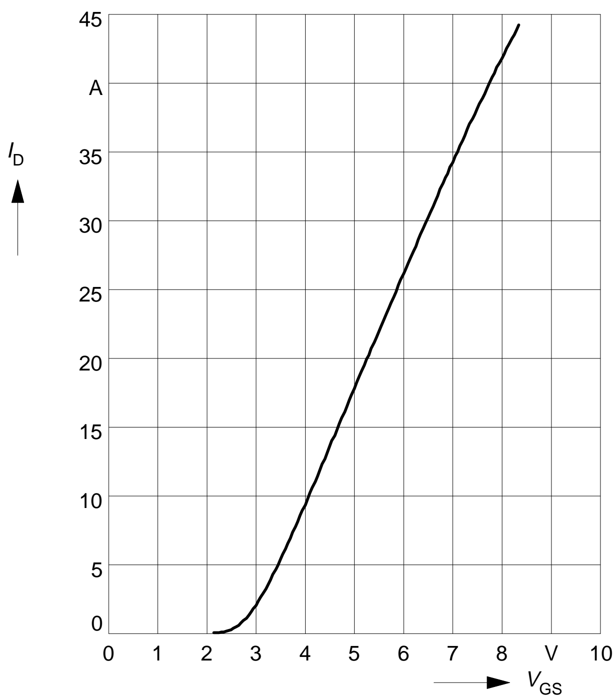
**Typ. output characteristics**
$I_D = f(V_{DS})$
parameter: $t_p$ = 80 µs




**Typ. drain-source on-resistance**
$R_{DS (on)} = f(I_D)$
parameter: $t_p$ = 80 µs, $T_j$ = 25 °C



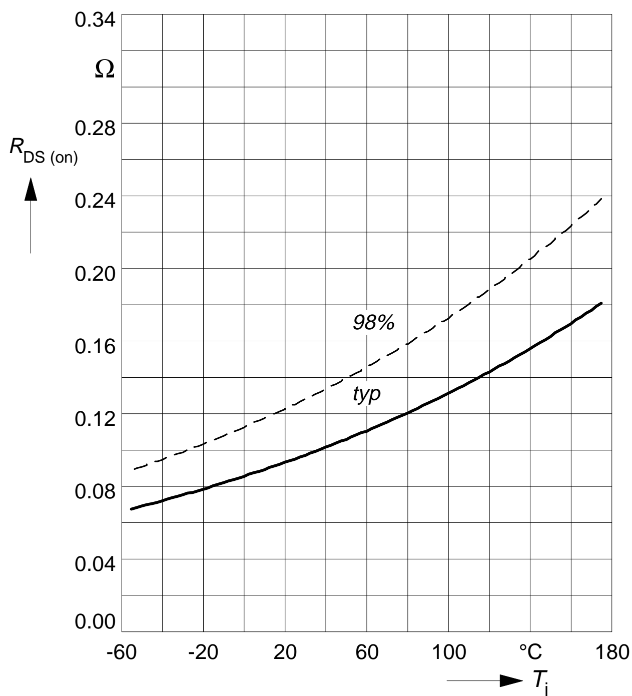

**Typ. transfer characteristics** $I_D = f(V_{GS})$
parameter: $t_p$ = 80 µs
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



**Drain-source on-resistance**

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

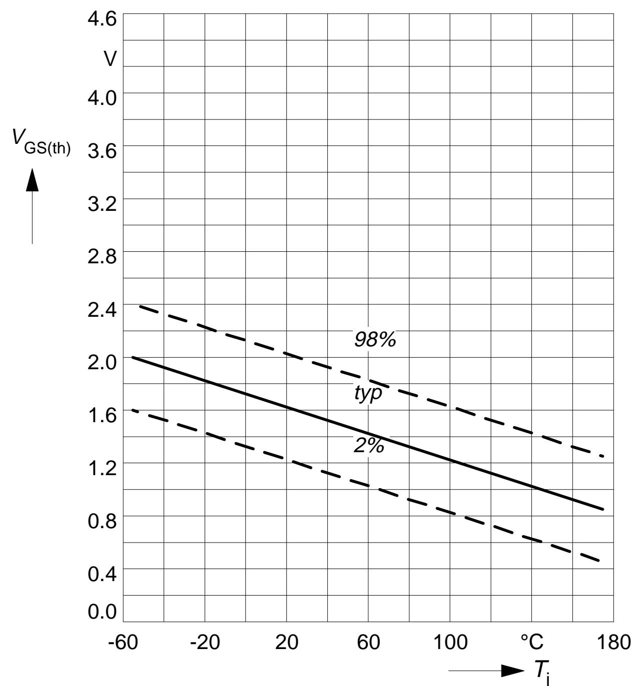
parameter: $I_D$ = 3.2 A, $V_{GS}$ = 5 V




**Gate threshold voltage**

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

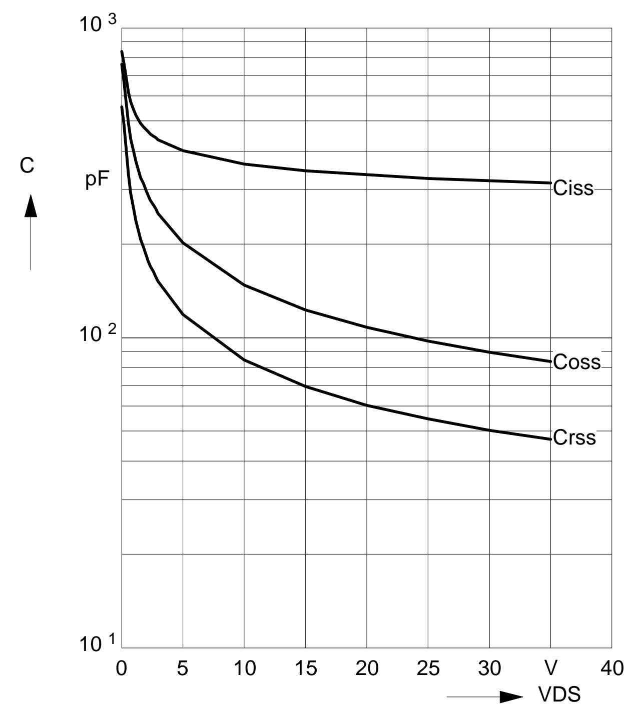
parameter: $V_{GS}$ = $V_{DS}$, $I_D$ = 20 µA




**Typ. capacitances**

$C = f(V_{DS})$

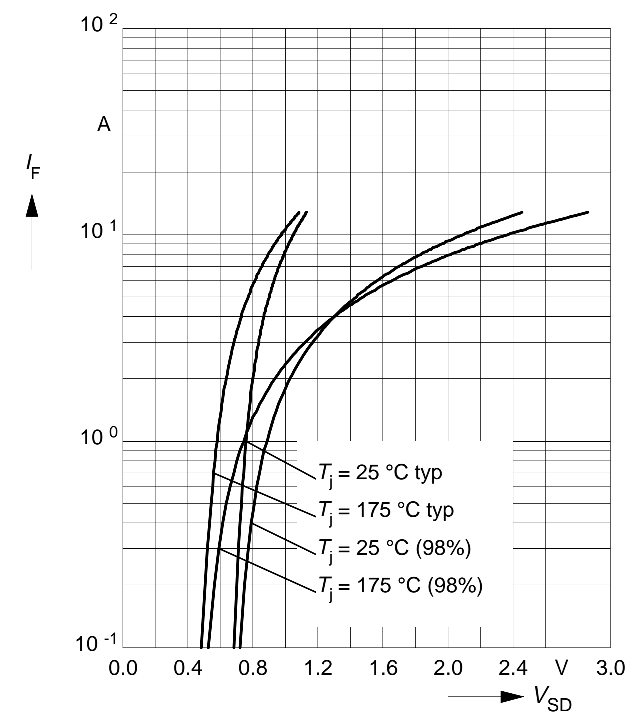
parameter: $V_{GS}$ = 0V, $f$ = 1MHz



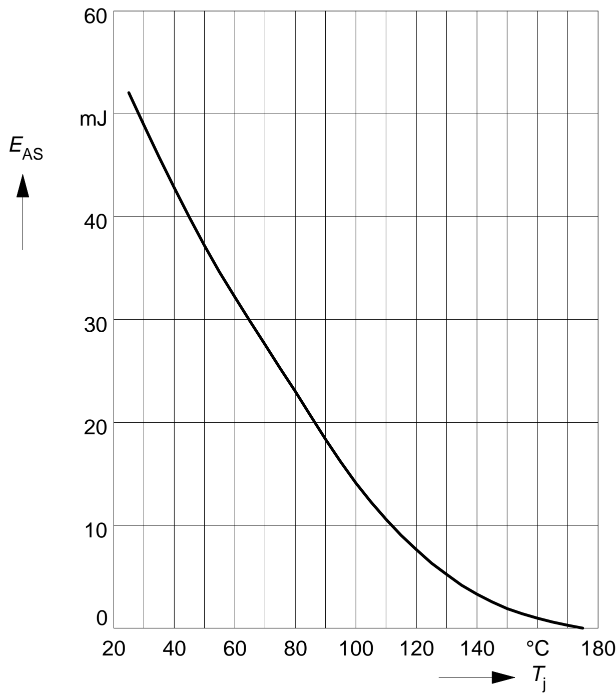

**Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

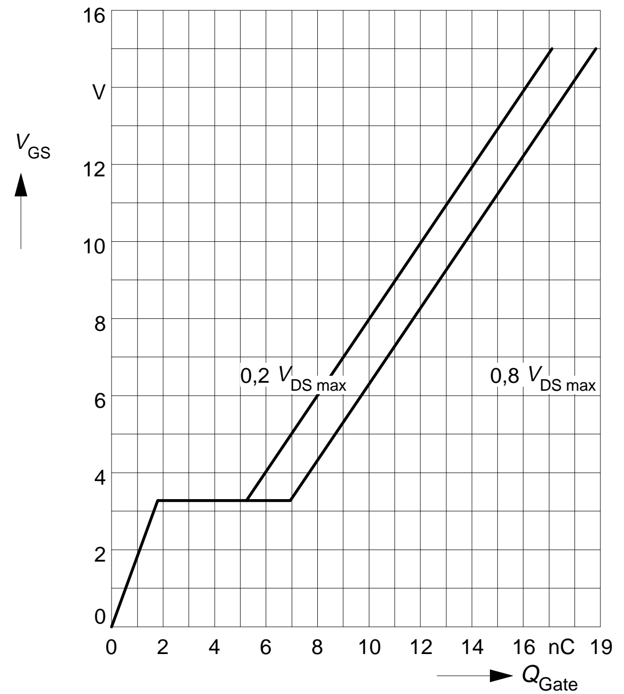
parameter: $T_j$, $t_p$ = 80 µs



**Avalanche energy** $E_{AS} = f(T_j)$
parameter: $I_D$=3.2A, $V_{DD}$ =25 V
$R_{GS}$ =25 Ω , L = 10.15mH




**Typ. gate charge**
$V_{GS} = f(Q_{Gate})$
parameter: $I_{D\ puls}$ = 3 A




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