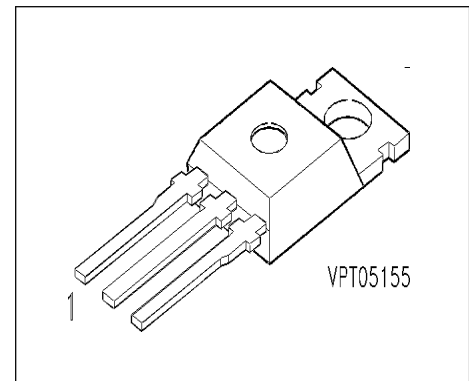


### SIPMOS® Power Transistor

- N channel
- Enhancement mode
- Avalanche-rated
- $dv/dt$  rated
- Ultra low on-resistance
- 175°C operating temperature
- also in TO-220 SMD available



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

| Type    | $V_{DS}$ | $I_D$ | $R_{DS(on)}$   | Package   | Ordering Code   |
|---------|----------|-------|----------------|-----------|-----------------|
| BUZ 100 | 50 V     | 60 A  | 0.018 $\Omega$ | TO-220 AB | C67078-S1348-A2 |

### Maximum Ratings

| Parameter                                                                                                                                                                      | Symbol      | Values        | Unit              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|-------------------|
| Continuous drain current<br>$T_C = 101\text{ }^\circ\text{C}$                                                                                                                  | $I_D$       | 60            | A                 |
| Pulsed drain current<br>$T_C = 25\text{ }^\circ\text{C}$                                                                                                                       | $I_{Dpuls}$ | 240           |                   |
| Avalanche energy, single pulse<br>$I_D = 60\text{ A}$ , $V_{DD} = 25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$<br>$L = 70\text{ }\mu\text{H}$ , $T_j = 25\text{ }^\circ\text{C}$ | $E_{AS}$    | 250           | mJ                |
| Reverse diode $dv/dt$<br>$I_S = 60\text{ A}$ , $V_{DS} = 40\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$T_{jmax} = 175\text{ }^\circ\text{C}$                         | $dv/dt$     | 6             | kV/ $\mu\text{s}$ |
| Gate source voltage                                                                                                                                                            | $V_{GS}$    | $\pm 20$      | V                 |
| Power dissipation<br>$T_C = 25\text{ }^\circ\text{C}$                                                                                                                          | $P_{tot}$   | 250           | W                 |
| Operating temperature                                                                                                                                                          | $T_j$       | -55 ... + 175 | $^\circ\text{C}$  |
| Storage temperature                                                                                                                                                            | $T_{stg}$   | -55 ... + 175 |                   |
| Thermal resistance, chip case                                                                                                                                                  | $R_{thJC}$  | $\leq 0.6$    | K/W               |
| Thermal resistance, chip to ambient                                                                                                                                            | $R_{thJA}$  | $\leq 75$     |                   |
| DIN humidity category, DIN 40 040                                                                                                                                              |             | E             |                   |
| 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>$V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$ , $T_j = -40\text{ }^{\circ}\text{C}$                                                                                                                                                                                | $V_{(BR)DSS}$ | 50          | -              | -               | 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>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25\text{ }^{\circ}\text{C}$<br>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = -40\text{ }^{\circ}\text{C}$<br>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 150\text{ }^{\circ}\text{C}$ | $I_{DSS}$     | -<br>-<br>- | 0.1<br>1<br>10 | 1<br>100<br>100 | $\mu\text{A}$<br>nA<br>$\mu\text{A}$ |
| 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>$V_{GS} = 10\text{ V}$ , $I_D = 60\text{ A}$                                                                                                                                                                                                                             | $R_{DS(on)}$  | -           | 0.013          | 0.018           | $\Omega$                             |

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

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

#### Dynamic Characteristics

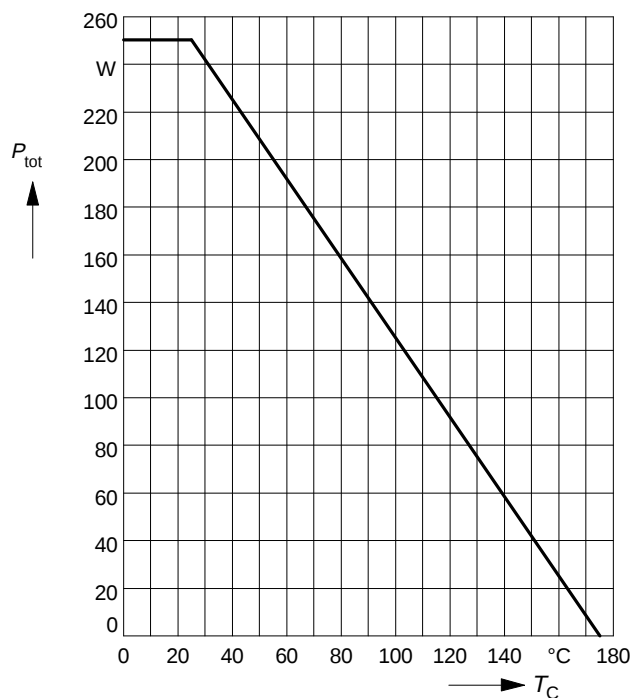
|                                                                                                                      |              |    |      |      |    |
|----------------------------------------------------------------------------------------------------------------------|--------------|----|------|------|----|
| Transconductance<br>$V_{DS} \geq 2 * I_D * R_{DS(on)max}$ , $I_D = 60\text{ A}$                                      | $g_{fs}$     | 25 | 39   | -    | S  |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                             | $C_{iss}$    | -  | 2400 | 3200 | pF |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                            | $C_{oss}$    | -  | 800  | 1200 |    |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                  | $C_{rss}$    | -  | 300  | 450  |    |
| Turn-on delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$  | $t_{d(on)}$  | -  | 40   | 60   | ns |
| Rise time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_r$        | -  | 100  | 150  |    |
| Turn-off delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$ | $t_{d(off)}$ | -  | 250  | 335  |    |
| Fall time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_f$        | -  | 140  | 190  |    |

### 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>$T_C = 25\text{ }^{\circ}\text{C}$                    | $I_S$    | -      | -    | 60   | A             |
| Inverse diode direct current,pulsed<br>$T_C = 25\text{ }^{\circ}\text{C}$                         | $I_{SM}$ | -      | -    | 240  |               |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}$ , $I_F = 120\text{ A}$                     | $V_{SD}$ | -      | 1.4  | 1.8  | V             |
| Reverse recovery time<br>$V_R = 30\text{ V}$ , $I_F=I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | -      | 70   | -    | ns            |
| Reverse recovery charge<br>$V_R = 30\text{ V}$ , $I_F=I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | -      | 0.16 | -    | $\mu\text{C}$ |

## Power dissipation

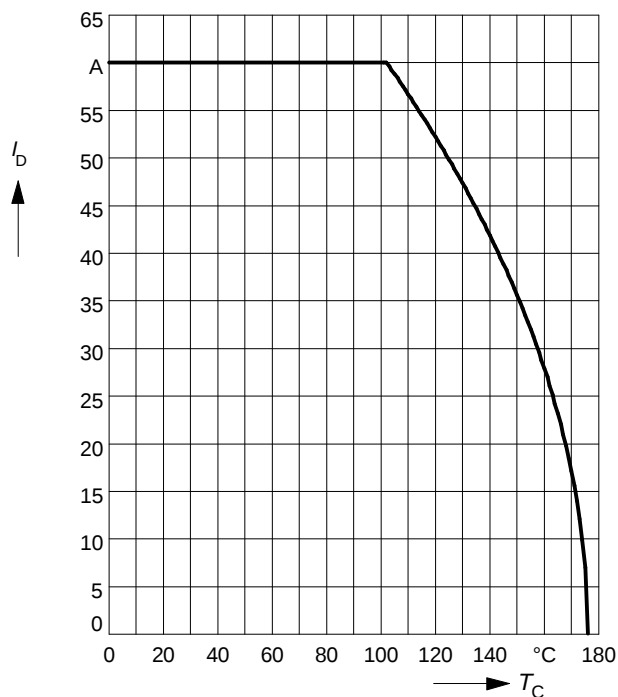
$$P_{\text{tot}} = f(T_C)$$



## Drain current

$$I_D = f(T_C)$$

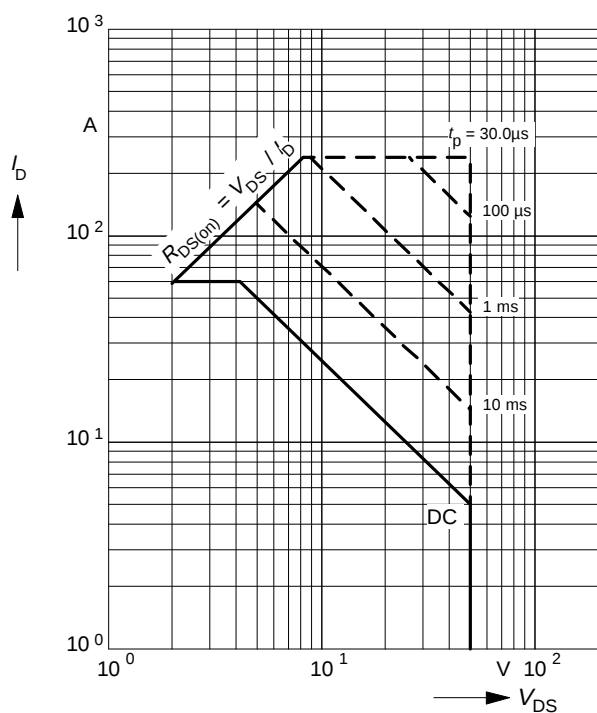
parameter:  $V_{GS} \geq 10$  V



## Safe operating area

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

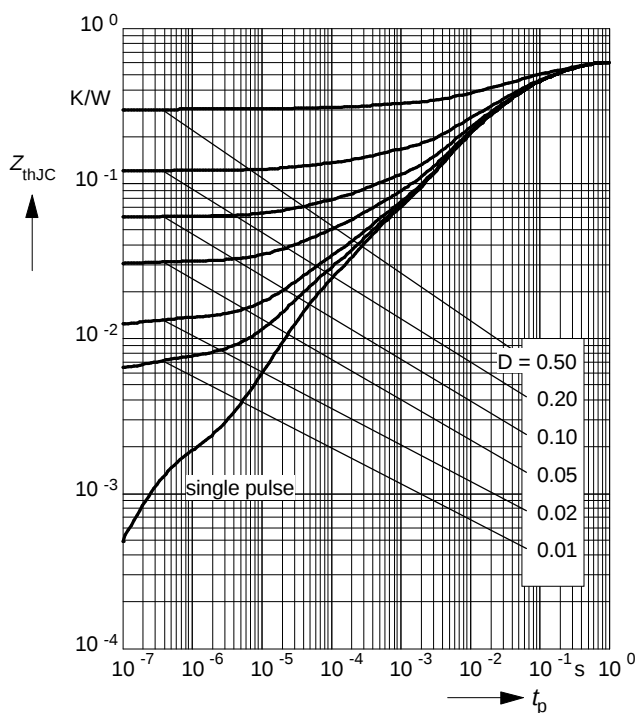
parameter:  $D = 0.01$ ,  $T_C = 25^\circ\text{C}$



## Transient thermal impedance

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

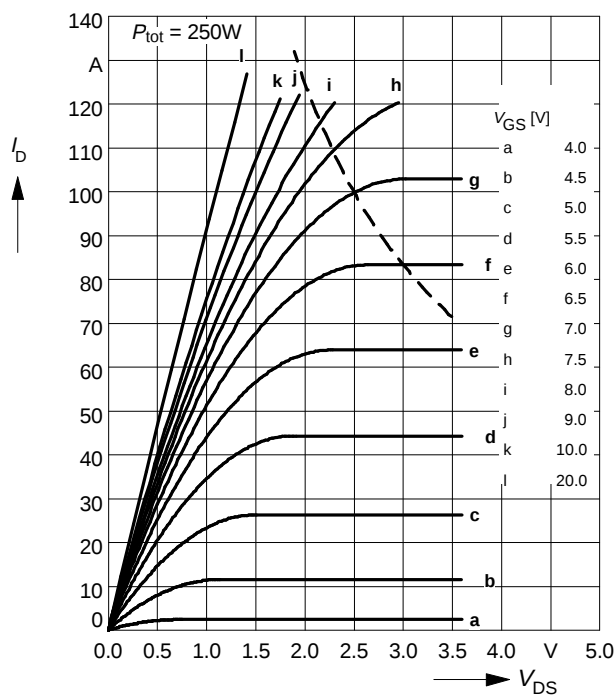
parameter:  $D = t_p / T$



## Typ. output characteristics

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

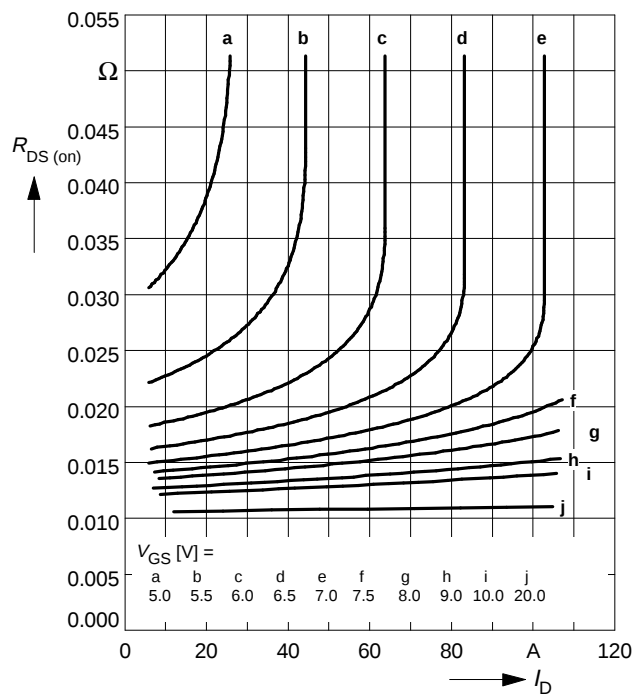
parameter:  $t_p = 80 \mu s$



## Typ. drain-source on-resistance

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

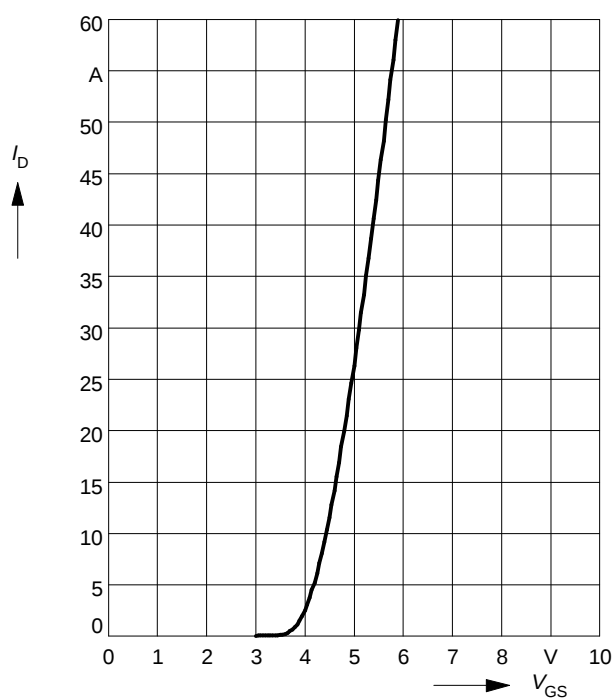
parameter:  $V_{GS}$



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

parameter:  $t_p = 80 \mu s$

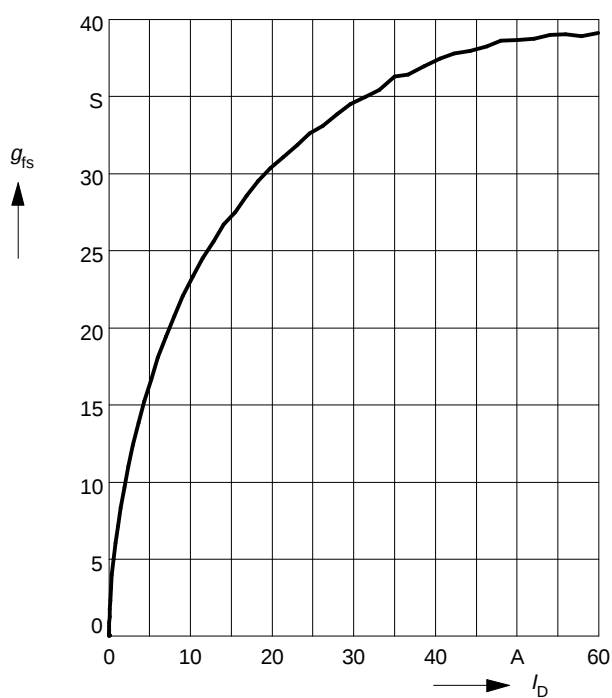
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



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

parameter:  $t_p = 80 \mu s$ ,

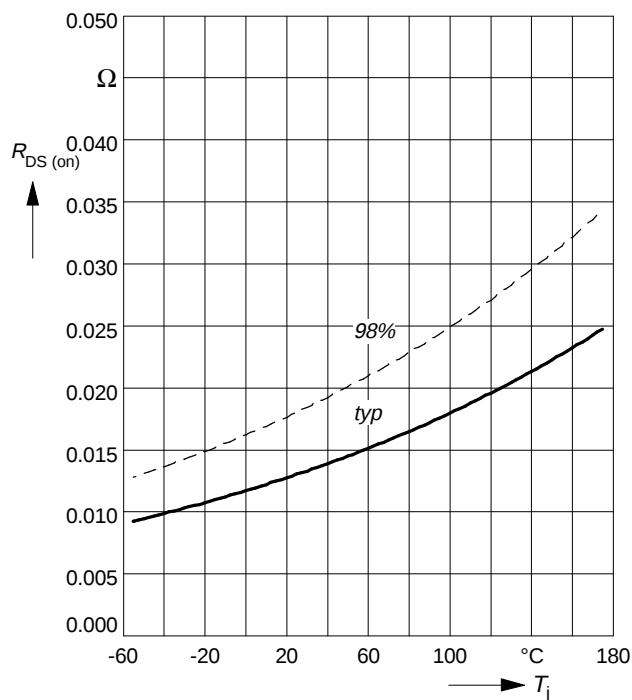
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



## Drain-source on-resistance

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

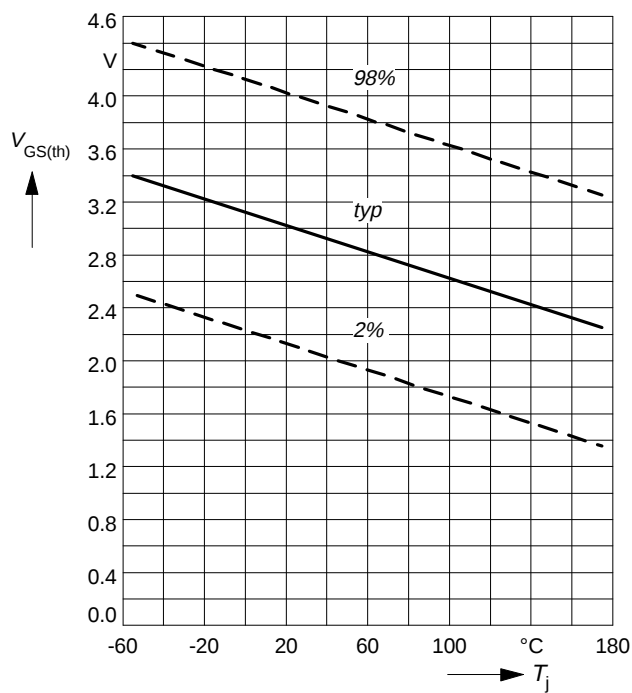
parameter:  $I_D = 60 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



## Gate threshold voltage

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

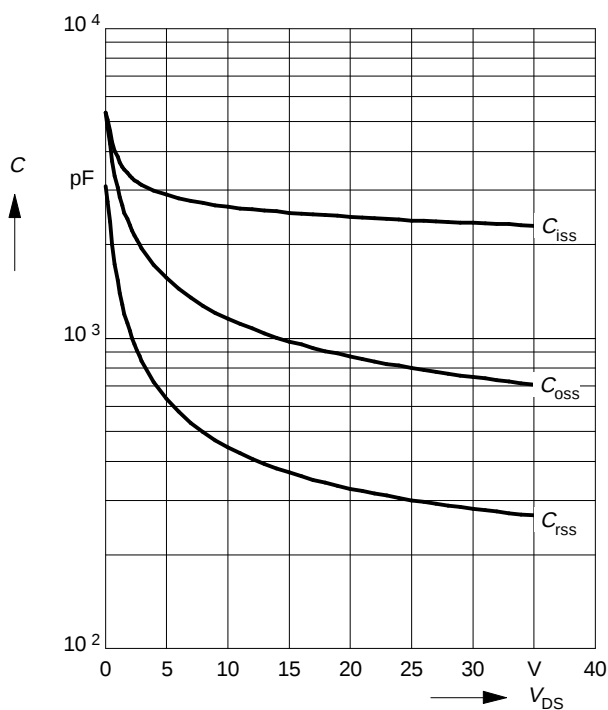
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1 \text{ mA}$



## Typ. capacitances

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

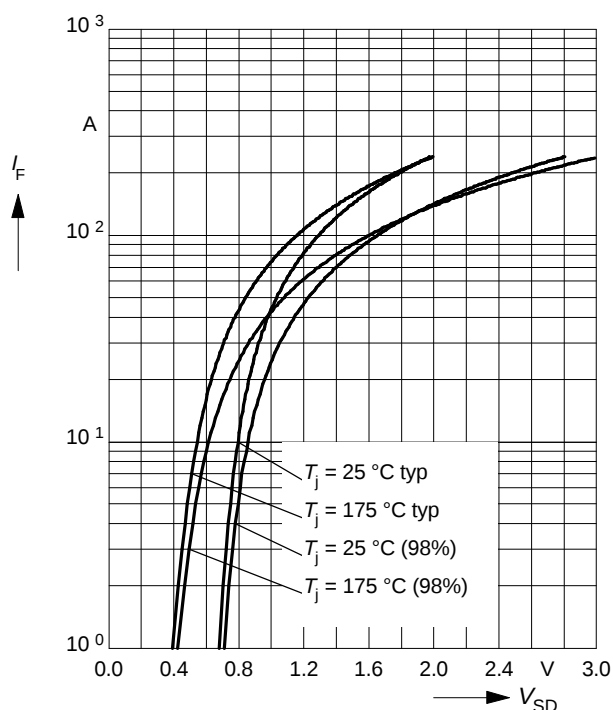
parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$



## Forward characteristics of reverse diode

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

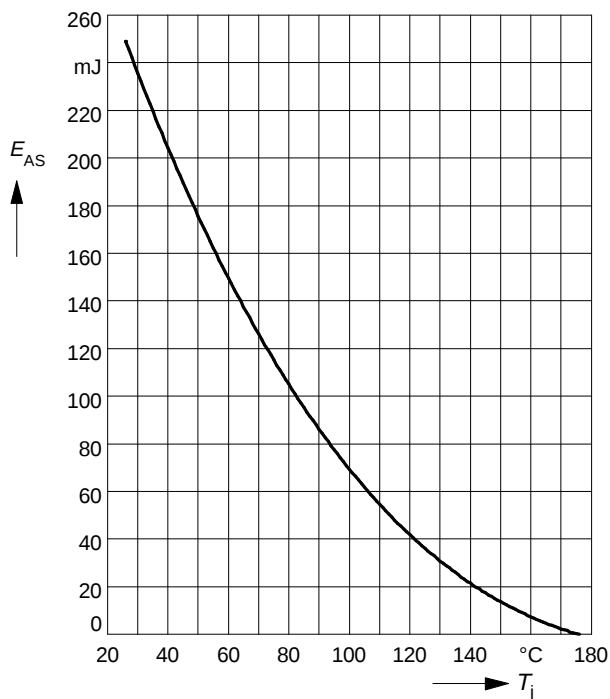
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



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

parameter:  $I_D = 60 \text{ A}$ ,  $V_{DD} = 25 \text{ V}$

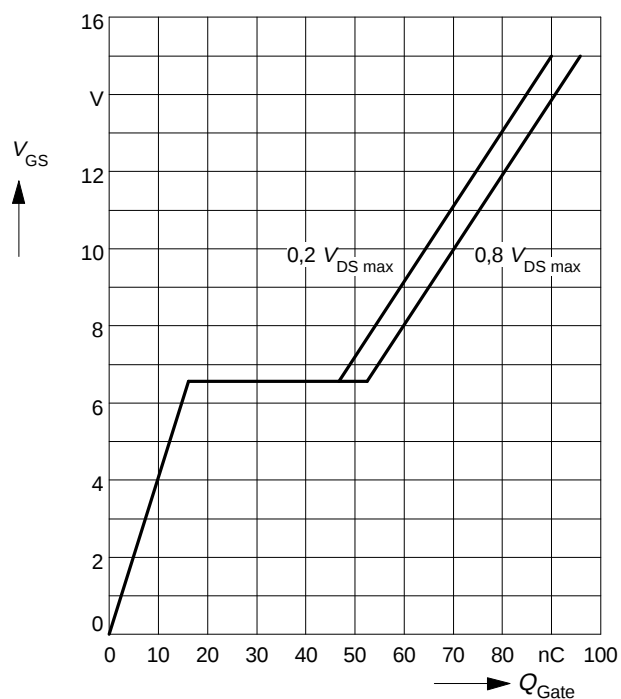
$R_{GS} = 25 \Omega$ ,  $L = 70 \mu\text{H}$



## Typ. gate charge

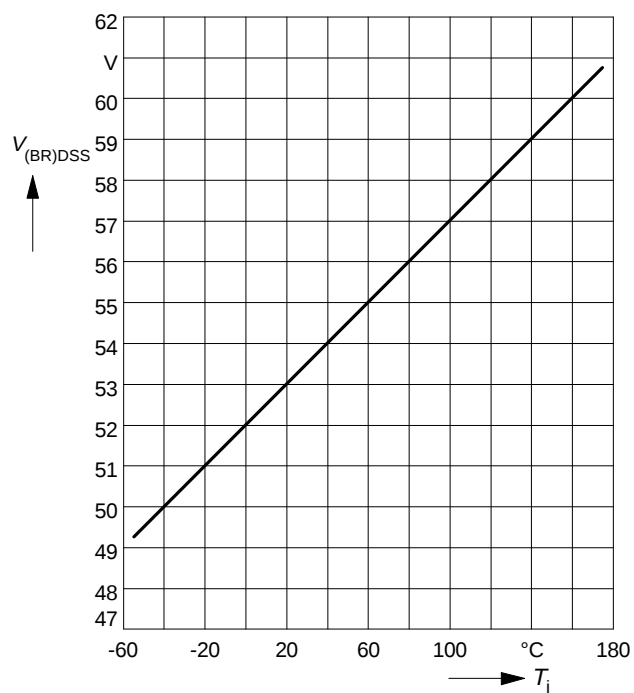
$V_{GS} = f(Q_{Gate})$

parameter:  $I_{D \text{ puls}} = 90 \text{ A}$



## Drain-source breakdown voltage

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



## Package Outlines

TO-220 AB

Dimension in mm



- 1) punch direction, burr max. 0.04
- 2) dip tinning
- 3) max. 14.5 by dip tinning press burr max. 0.05

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