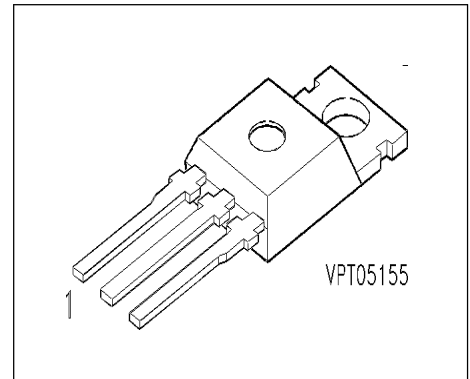


### SIPMOS<sup>®</sup> Power Transistor

- P 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 171 | -50 V    | -8 A  | 0.3 $\Omega$ | TO-220 AB | C67078-S1450-A2 |

### Maximum Ratings

| Parameter                                                                                                                                                                 | Symbol      | Values        | Unit               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|--------------------|
| Continuous drain current<br>$T_C = 30\text{ }^{\circ}\text{C}$                                                                                                            | $I_D$       | -8            | A                  |
| Pulsed drain current<br>$T_C = 25\text{ }^{\circ}\text{C}$                                                                                                                | $I_{Dpuls}$ | -32           |                    |
| Avalanche energy, single pulse<br>$I_D = -8\text{ A}$ , $V_{DD} = -25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$<br>$L = 1.1\text{ mH}$ , $T_j = 25\text{ }^{\circ}\text{C}$ | $E_{AS}$    | 70            | mJ                 |
| Gate source voltage                                                                                                                                                       | $V_{GS}$    | $\pm 20$      | V                  |
| Power dissipation<br>$T_C = 25\text{ }^{\circ}\text{C}$                                                                                                                   | $P_{tot}$   | 40            | W                  |
| Operating temperature                                                                                                                                                     | $T_j$       | -55 ... + 150 | $^{\circ}\text{C}$ |
| Storage temperature                                                                                                                                                       | $T_{stg}$   | -55 ... + 150 |                    |
| Thermal resistance, chip case                                                                                                                                             | $R_{thJC}$  | $\leq 3.1$    | 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 / 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>$V_{GS} = 0\text{ V}$ , $I_D = -0.25\text{ mA}$ , $T_j = 25\text{ }^{\circ}\text{C}$                                                                                          | $V_{(BR)DSS}$ | -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>$V_{DS} = -50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125\text{ }^{\circ}\text{C}$ | $I_{DSS}$     | -<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       |               |
| Drain-Source on-resistance<br>$V_{GS} = -10\text{ V}$ , $I_D = -5\text{ A}$                                                                                                                                      | $R_{DS(on)}$  | -      | 0.25        | 0.3        | $\Omega$      |

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

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

## Dynamic Characteristics

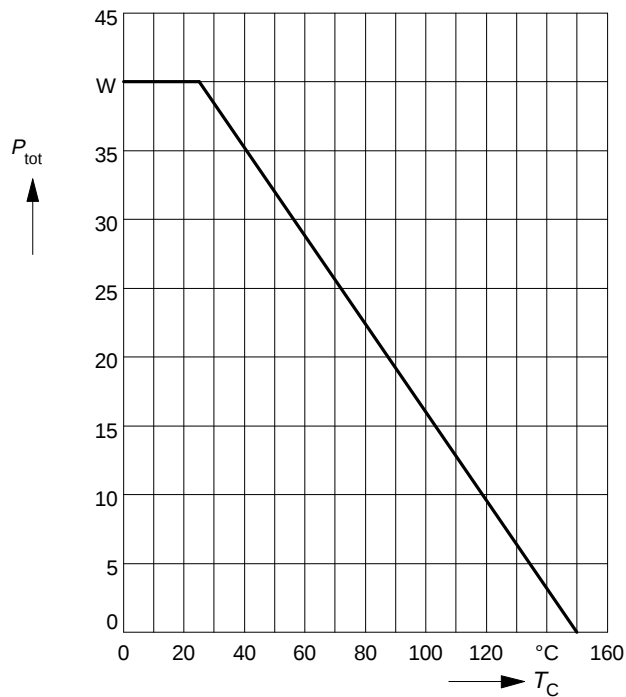
|                                                                                                                           |              |     |     |      |    |
|---------------------------------------------------------------------------------------------------------------------------|--------------|-----|-----|------|----|
| Transconductance<br>$V_{DS} \geq 2 * I_D * R_{DS(on)max}$ , $I_D = -5\text{ A}$                                           | $g_{fs}$     | 1.5 | 2.3 | -    | S  |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$                                 | $C_{iss}$    | -   | 750 | 1000 | pF |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$                                | $C_{oss}$    | -   | 270 | 400  |    |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = -25\text{ V}$ , $f = 1\text{ MHz}$                      | $C_{rss}$    | -   | 120 | 180  |    |
| Turn-on delay time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -10\text{ V}$ , $I_D = -2.9\text{ A}$<br>$R_{GS} = 50\ \Omega$  | $t_{d(on)}$  | -   | 20  | 30   | ns |
| Rise time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -10\text{ V}$ , $I_D = -2.9\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_r$        | -   | 110 | 170  |    |
| Turn-off delay time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -10\text{ V}$ , $I_D = -2.9\text{ A}$<br>$R_{GS} = 50\ \Omega$ | $t_{d(off)}$ | -   | 70  | 90   |    |
| Fall time<br>$V_{DD} = -30\text{ V}$ , $V_{GS} = -10\text{ V}$ , $I_D = -2.9\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_f$        | -   | 100 | 140  |    |

### 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>$T_C = 25\text{ }^{\circ}\text{C}$                       | $I_S$    | -      | -     | -8   | A             |
| Inverse diode direct current,pulsed<br>$T_C = 25\text{ }^{\circ}\text{C}$                            | $I_{SM}$ | -      | -     | -32  |               |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}$ , $I_F = -16\text{ A}$                        | $V_{SD}$ | -      | -1.25 | -1.7 | V             |
| Reverse recovery time<br>$V_R = -30\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | -      | 90    | -    | ns            |
| Reverse recovery charge<br>$V_R = -30\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | -      | 0.23  | -    | $\mu\text{C}$ |

## Power dissipation

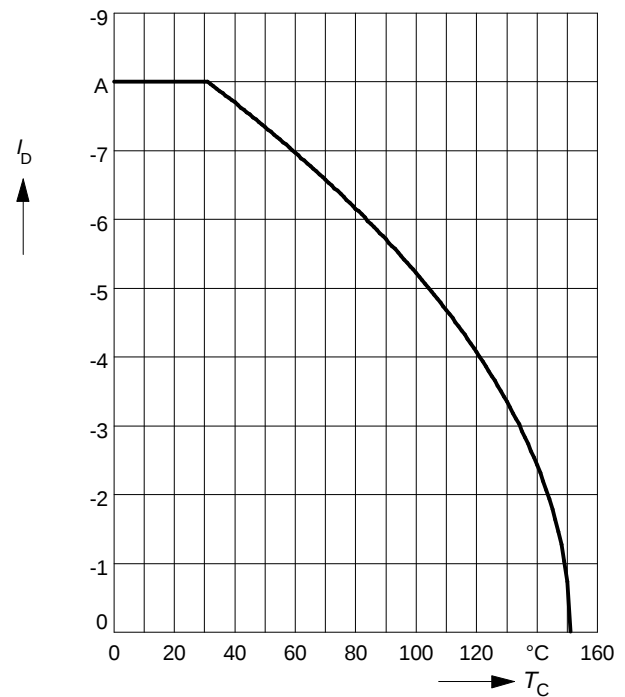
$$P_{\text{tot}} = f(T_C)$$



## Drain current

$$I_D = f(T_C)$$

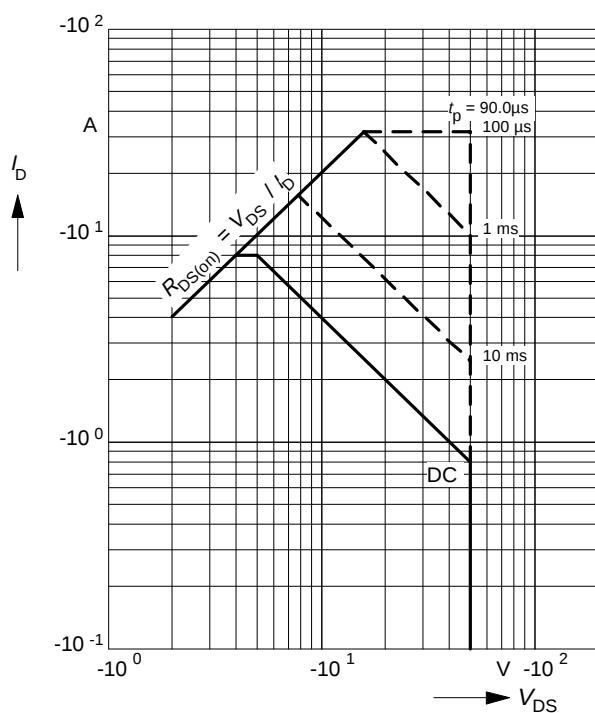
parameter:  $V_{GS} \geq -10$  V



## Safe operating area

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

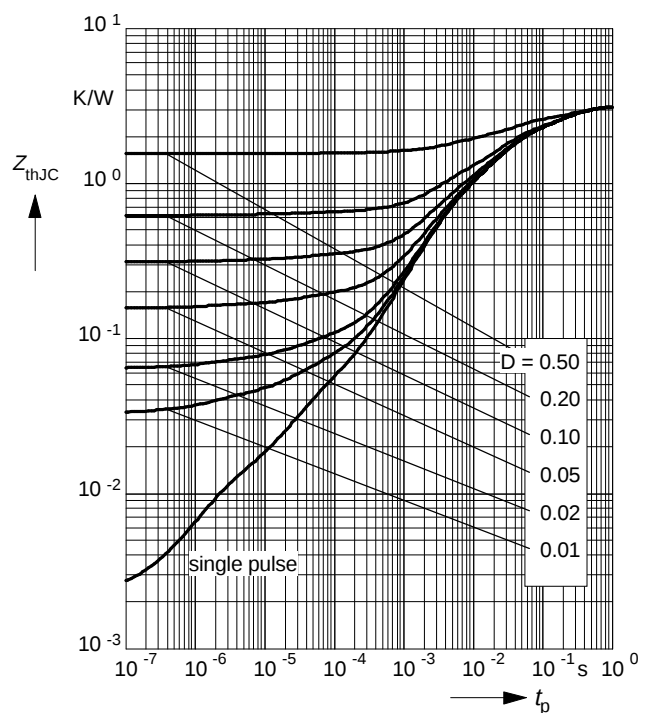
parameter:  $D = 0.01$ ,  $T_C = 25^\circ\text{C}$



## Transient thermal impedance

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

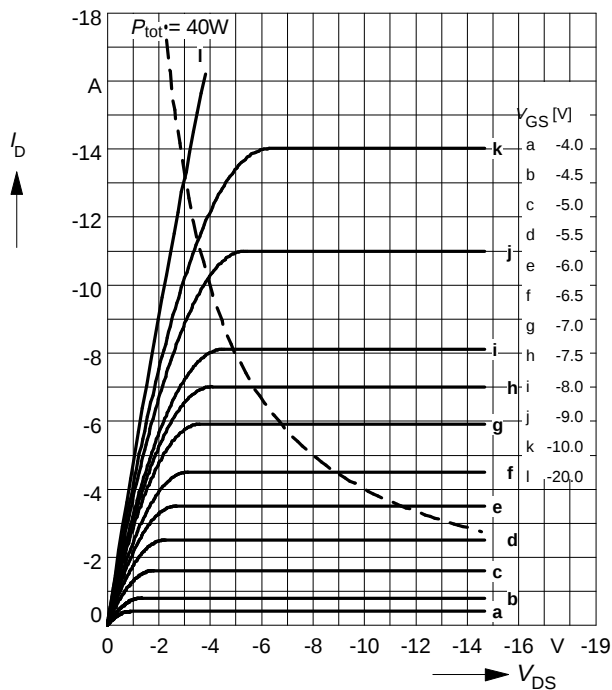
parameter:  $D = t_p / T$



## Typ. output characteristics

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

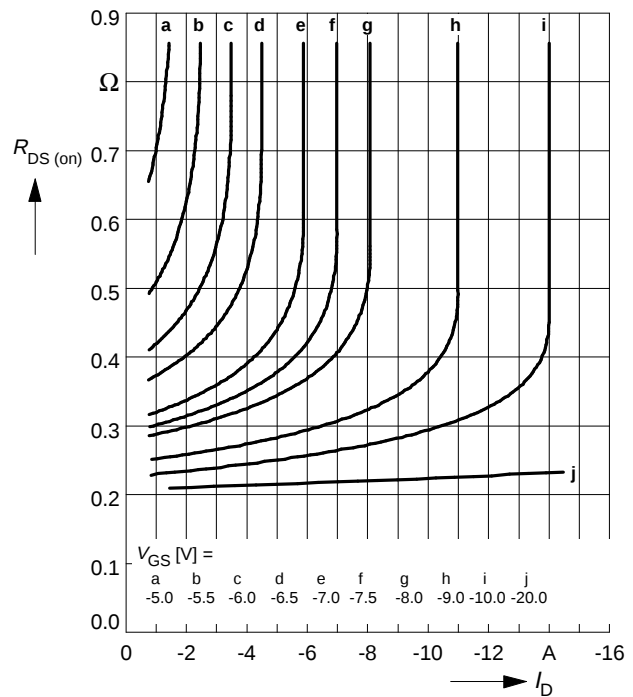
parameter:  $t_p = 80 \mu s$



## Typ. drain-source on-resistance

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

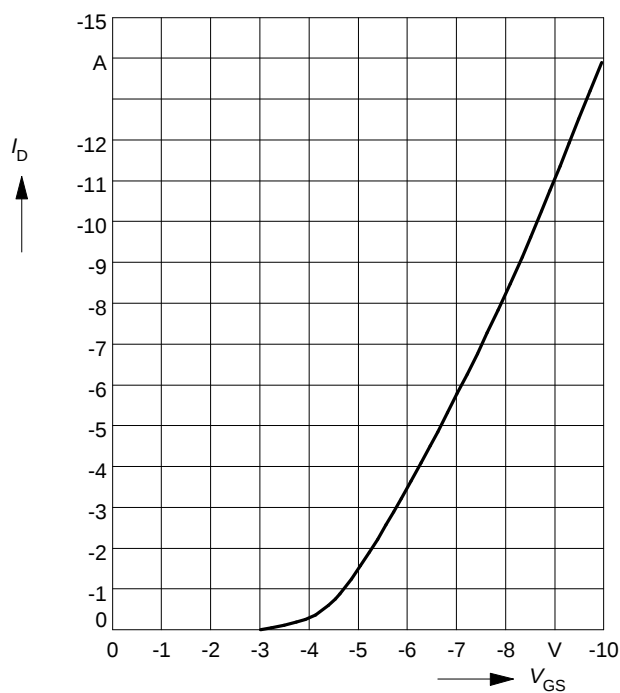
parameter:  $V_{GS}$



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

parameter:  $t_p = 80 \mu s$

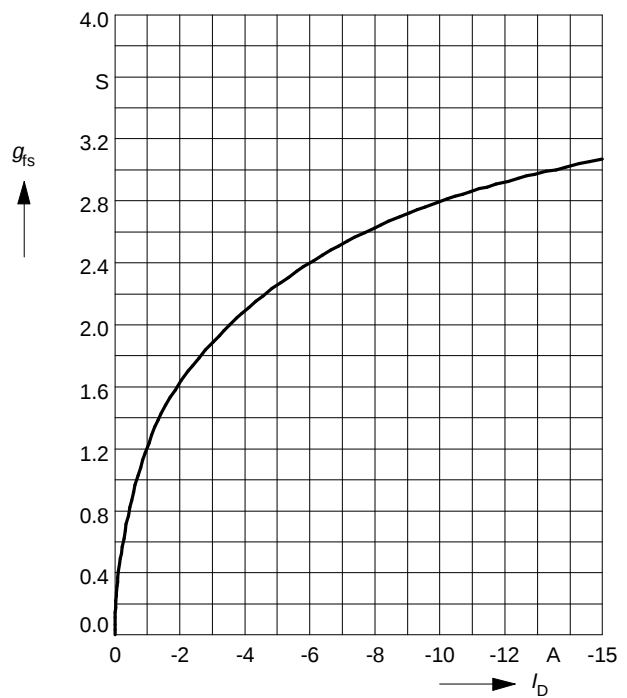
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



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

parameter:  $t_p = 80 \mu s$ ,

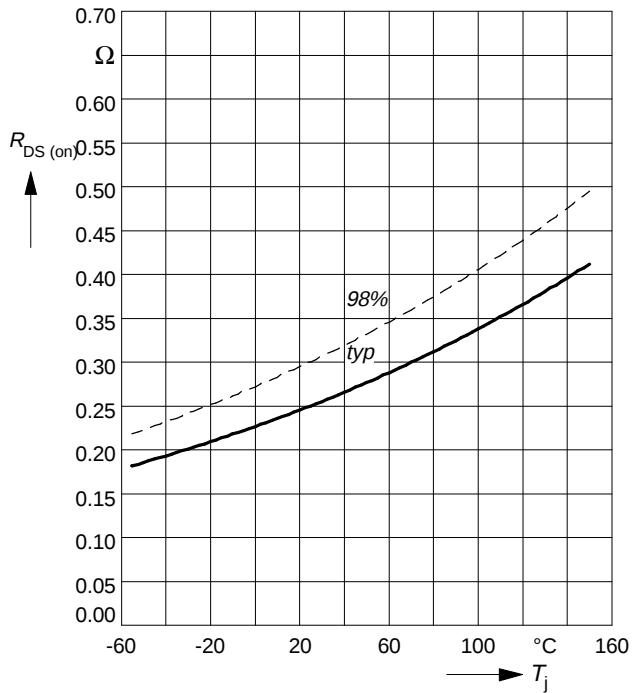
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



## Drain-source on-resistance

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

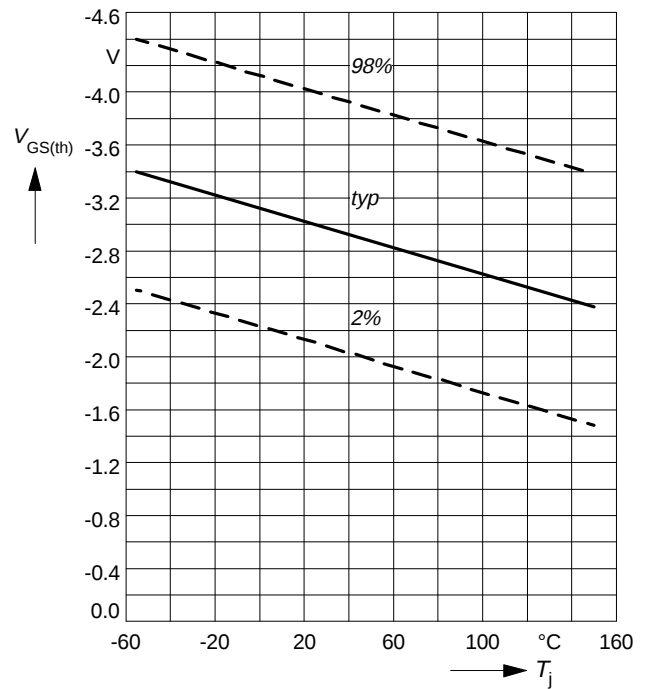
parameter:  $I_D = -5 \text{ A}$ ,  $V_{GS} = -10 \text{ V}$



## Gate threshold voltage

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

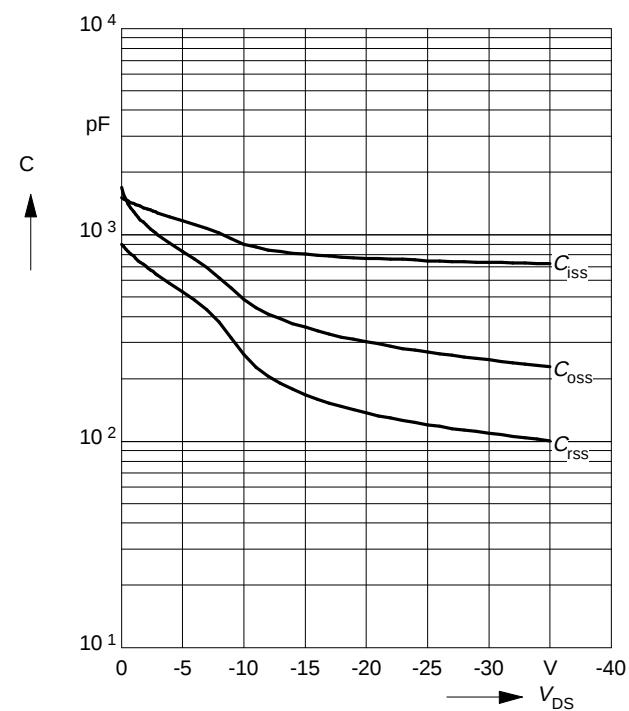
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1 \text{ mA}$



## Typ. capacitances

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

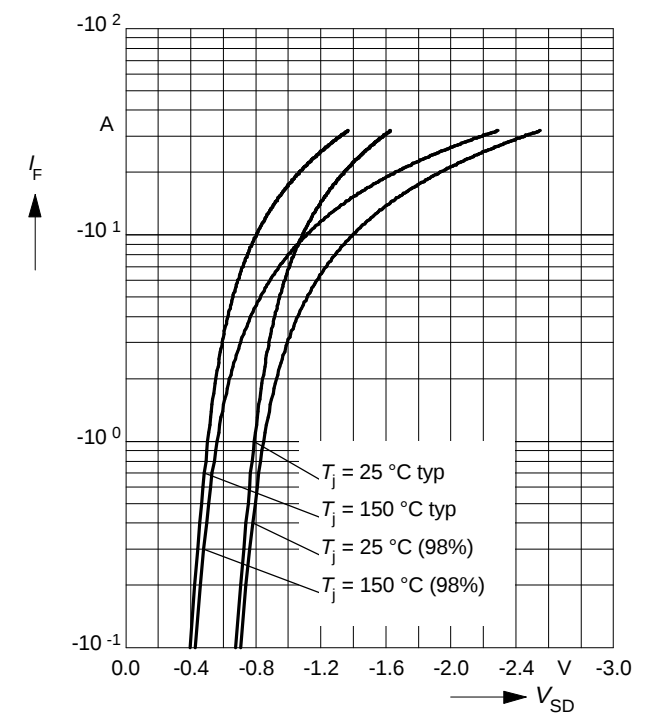
parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$



## Forward characteristics of reverse diode

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

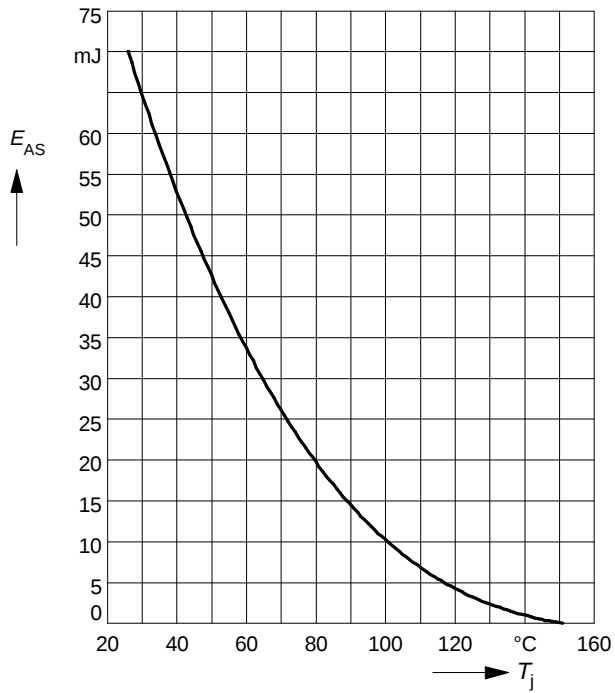
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



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

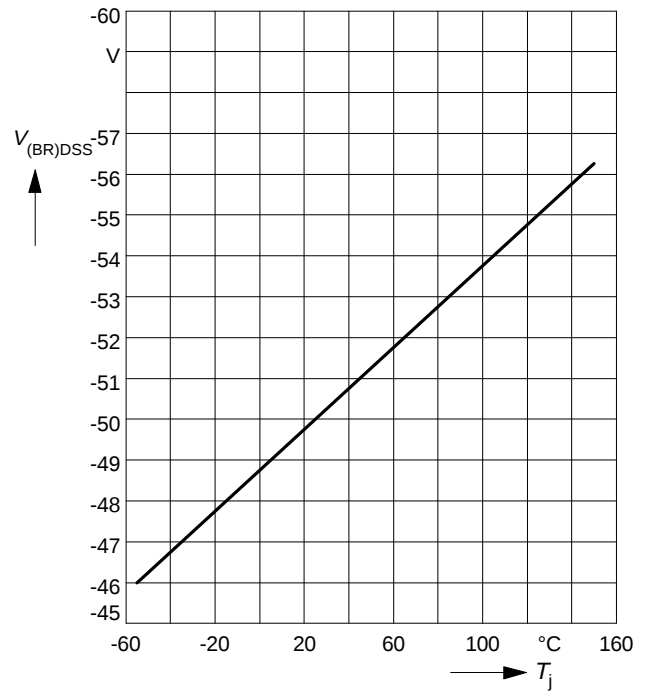
parameter:  $I_D = -8 \text{ A}$ ,  $V_{DD} = -25 \text{ V}$

$R_{GS} = 25 \text{ } \Omega$ ,  $L = 1.1 \text{ mH}$



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

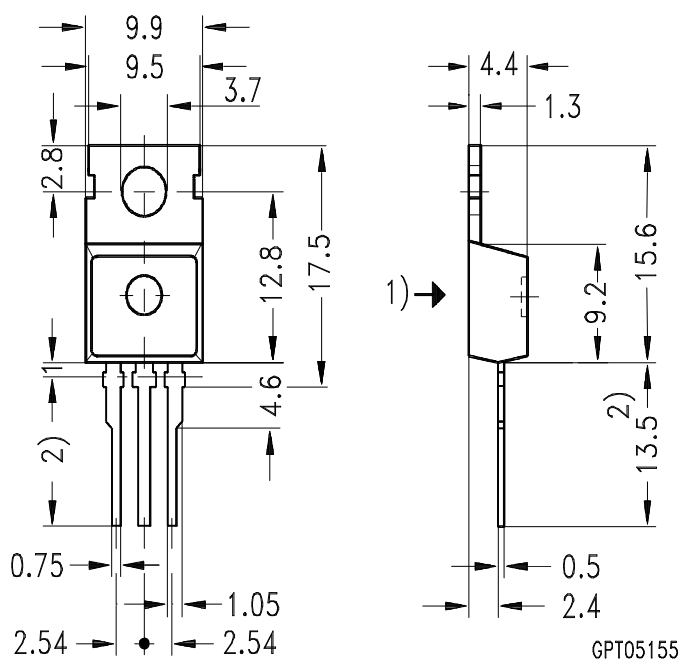
$V_{(BR)DSS} = f(T_j)$



## 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