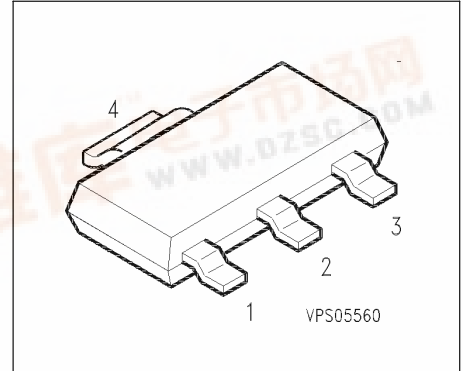




## BSP 295

### SIPMOS® Small-Signal Transistor

- N channel
- Enhancement mode
- Logic Level
- $V_{GS(th)} = 0.8...2.0V$



| Pin 1 | Pin 2 | Pin 3 | Pin 4 |
|-------|-------|-------|-------|
| G     | D     | S     | D     |

| Type    | $V_{DS}$      | $I_D$ | $R_{DS(on)}$              | Package | Marking |
|---------|---------------|-------|---------------------------|---------|---------|
| BSP 295 | 50 V          | 1.8 A | 0.3 $\Omega$              | SOT-223 | BSP 295 |
| Type    | Ordering Code |       | Tape and Reel Information |         |         |
| BSP 295 | Q67000-S066   |       | E6327                     |         |         |

### Maximum Ratings

| Parameter                                            | Symbol      | Values   | Unit |
|------------------------------------------------------|-------------|----------|------|
| Drain source voltage                                 | $V_{DS}$    | 50       | V    |
| Drain-gate voltage<br>$R_{GS} = 20 \text{ k}\Omega$  | $V_{DGR}$   | 50       |      |
| Gate source voltage                                  | $V_{GS}$    | $\pm 20$ |      |
| ESD Sensitivity (HBM) as per MIL-STD 883             |             | Class 1  |      |
| Continuous drain current<br>$T_A = 34^\circ\text{C}$ | $I_D$       | 1.8      | A    |
| DC drain current, pulsed<br>$T_A = 25^\circ\text{C}$ | $I_{Dpuls}$ | 7.2      |      |
| Power dissipation<br>$T_A = 25^\circ\text{C}$        | $P_{tot}$   | 1.8      | W    |

**Maximum Ratings**

| Parameter                                                  | Symbol     | Values        | Unit |
|------------------------------------------------------------|------------|---------------|------|
| Chip or operating temperature                              | $T_j$      | -55 ... + 150 | °C   |
| Storage temperature                                        | $T_{stg}$  | -55 ... + 150 |      |
| Thermal resistance, chip to ambient air                    | $R_{thJA}$ | ≤ 70          | K/W  |
| Thermal resistance, junction-soldering point <sup>1)</sup> | $R_{thJS}$ | ≤ 10          |      |
| DIN humidity category, DIN 40 040                          |            | E             |      |
| IEC climatic category, DIN IEC 68-1                        |            | 55 / 150 / 56 |      |

1) Transistor on epoxy pcb 40 mm x 40 mm x 1,5 mm with 6 cm<sup>2</sup> copper area for drain connection

**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>$V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$ , $T_j = 25^\circ\text{C}$ | $V_{(BR)DSS}$ | 50  | -    | -   | V  |
| Gate threshold voltage<br>$V_{GS}=V_{DS}$ , $I_D = 1\text{ mA}$                                              | $V_{GS(th)}$  | 0.8 | 1.4  | 2   |    |
| Zero gate voltage drain current<br>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$ | $I_{DSS}$     | -   | 0.1  | 1   | μA |
| $V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125^\circ\text{C}$                                   |               | -   | 8    | 50  |    |
| $V_{DS} = 30\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$                                    |               | -   | -    | 100 | nA |
| Gate-source leakage current<br>$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$                                | $I_{GSS}$     | -   | 10   | 100 | nA |
| Drain-Source on-state resistance<br>$V_{GS} = 10\text{ V}$ , $I_D = 1.8\text{ A}$                            | $R_{DS(on)}$  | -   | 0.25 | 0.3 | Ω  |
| $V_{GS} = 4.5\text{ V}$ , $I_D = 1.8\text{ A}$                                                               |               | -   | 0.45 | 0.5 |    |

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

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

**Dynamic Characteristics**

|                                                                                                                         |              |     |     |     |    |
|-------------------------------------------------------------------------------------------------------------------------|--------------|-----|-----|-----|----|
| Transconductance<br>$V_{DS} \geq 2 * I_D * R_{DS(on)max}$ , $I_D = 1.7\text{ A}$                                        | $g_{fs}$     | 0.5 | 1.7 | -   | S  |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                | $C_{iss}$    | -   | 320 | 425 | pF |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                               | $C_{oss}$    | -   | 110 | 170 |    |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                     | $C_{rss}$    | -   | 50  | 75  |    |
| Turn-on delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 0.29\text{ A}$<br>$R_{GS} = 50\ \Omega$  | $t_{d(on)}$  | -   | 8   | 12  | ns |
| Rise time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 0.29\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_r$        | -   | 20  | 30  |    |
| Turn-off delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 0.29\text{ A}$<br>$R_{GS} = 50\ \Omega$ | $t_{d(off)}$ | -   | 120 | 160 |    |
| Fall time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 0.29\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_f$        | -   | 85  | 115 |    |

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

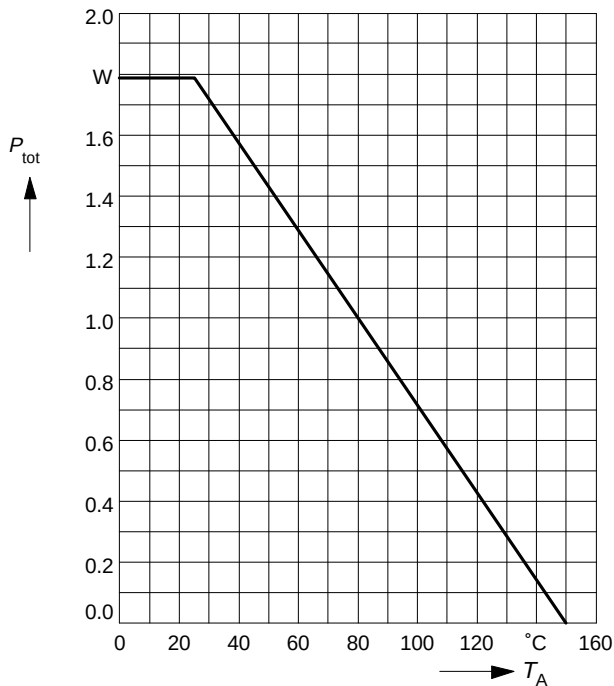
| Parameter | Symbol | Values |      |      | Unit |
|-----------|--------|--------|------|------|------|
|           |        | min.   | typ. | max. |      |

**Reverse Diode**

|                                                                                                          |          |   |     |     |   |
|----------------------------------------------------------------------------------------------------------|----------|---|-----|-----|---|
| Inverse diode continuous forward current<br>$T_A = 25^\circ\text{C}$                                     | $I_S$    | - | -   | 1.8 | A |
| Inverse diode direct current,pulsed<br>$T_A = 25^\circ\text{C}$                                          | $I_{SM}$ | - | -   | 7.2 |   |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}$ , $I_F = 3.6\text{ A}$ , $T_j = 25^\circ\text{C}$ | $V_{SD}$ | - | 1.1 | 1.5 | V |

### Power dissipation

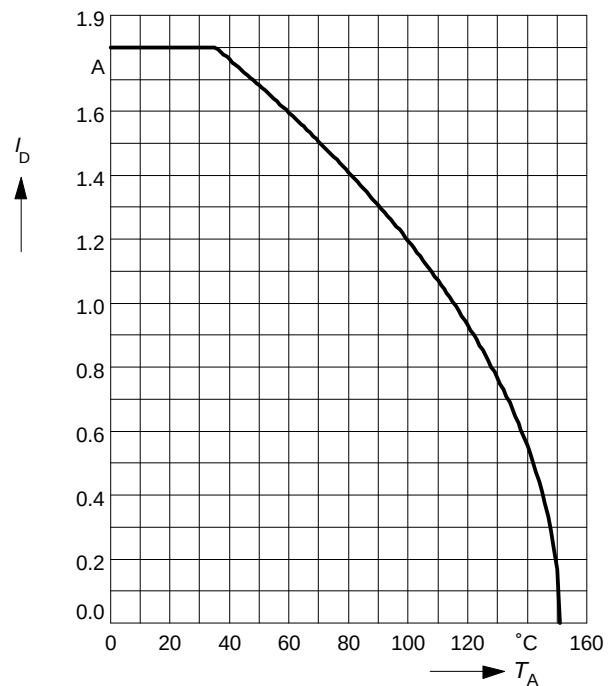
$$P_{\text{tot}} = f(T_A)$$



### Drain current

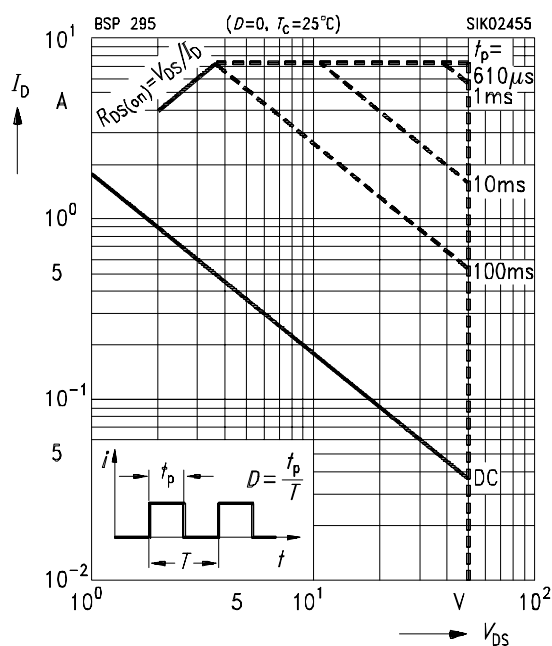
$$I_D = f(T_A)$$

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



### Safe operating area $I_D = f(V_{DS})$

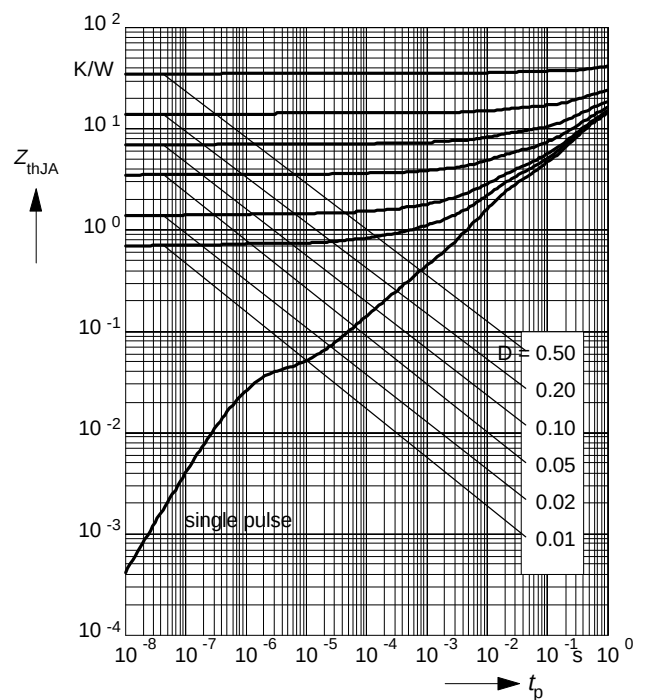
parameter:  $D = 0$ ,  $T_C = 25^\circ\text{C}$



### Transient thermal impedance

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

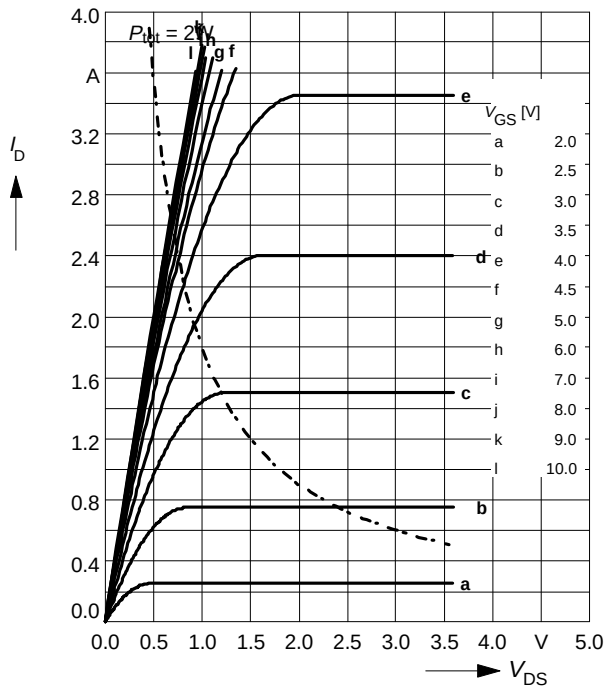
parameter:  $D = t_p / T$



### Typ. output characteristics

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

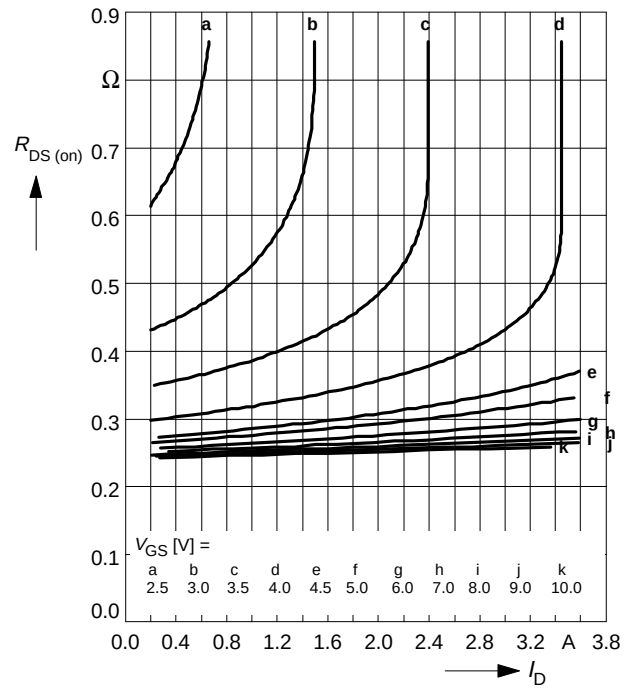
parameter:  $t_p = 80 \mu s$ ,  $T_j = 25^\circ C$



### Typ. drain-source on-resistance

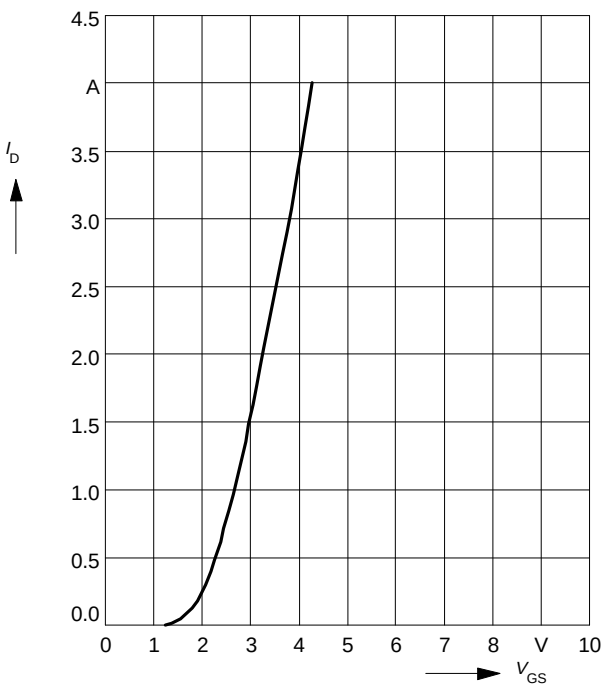
$$R_{DS(on)} = f(I_D)$$

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



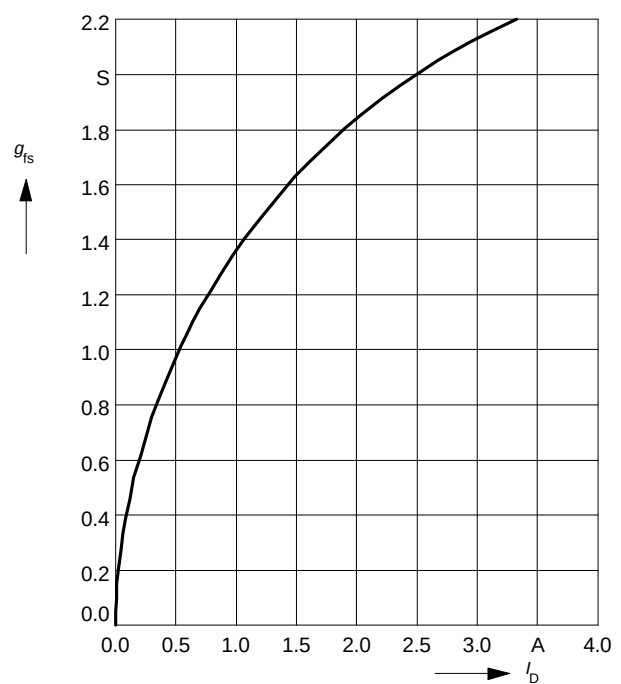
### Typ. transfer characteristics $I_D = f(V_{GS})$

parameter:  $t_p = 80 \mu s$



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

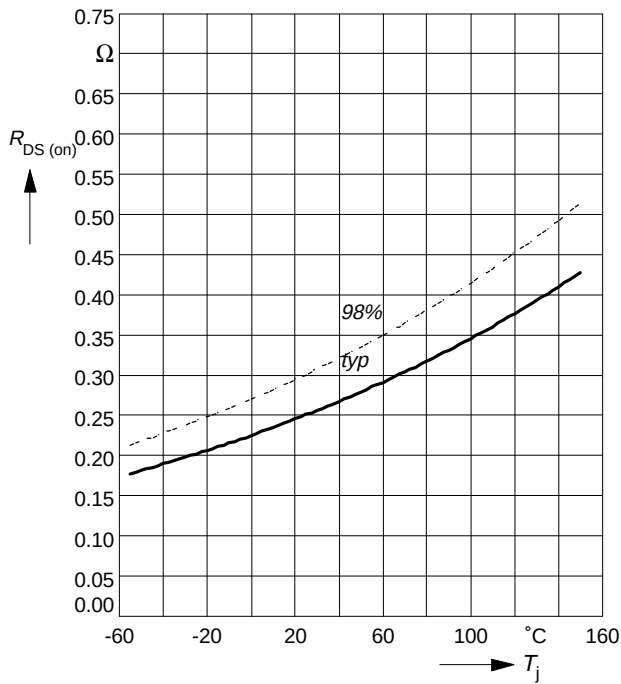
parameter:  $t_p = 80 \mu s$ ,



### Drain-source on-resistance

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

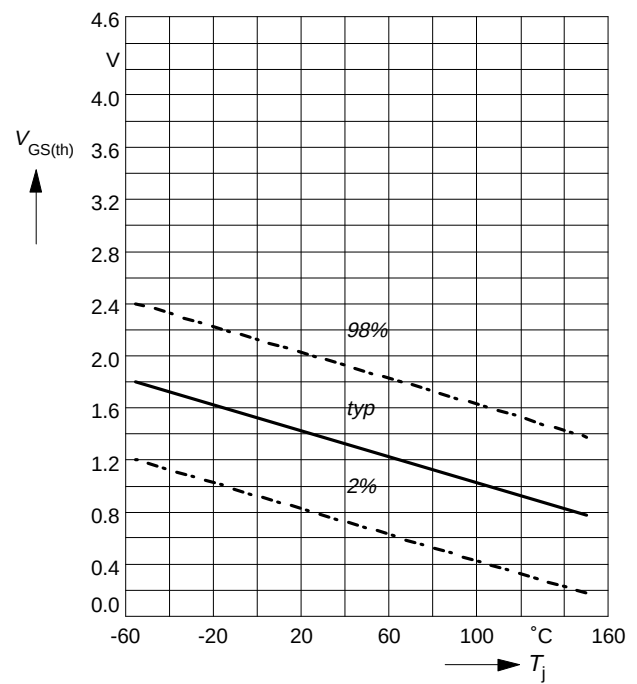
parameter:  $I_D = 1.8 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$



### Gate threshold voltage

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

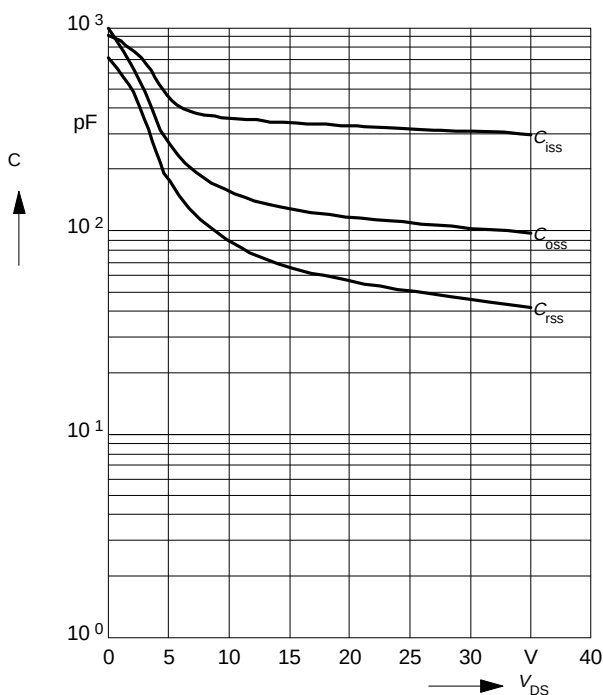
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1 \text{ mA}$



### Typ. capacitances

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

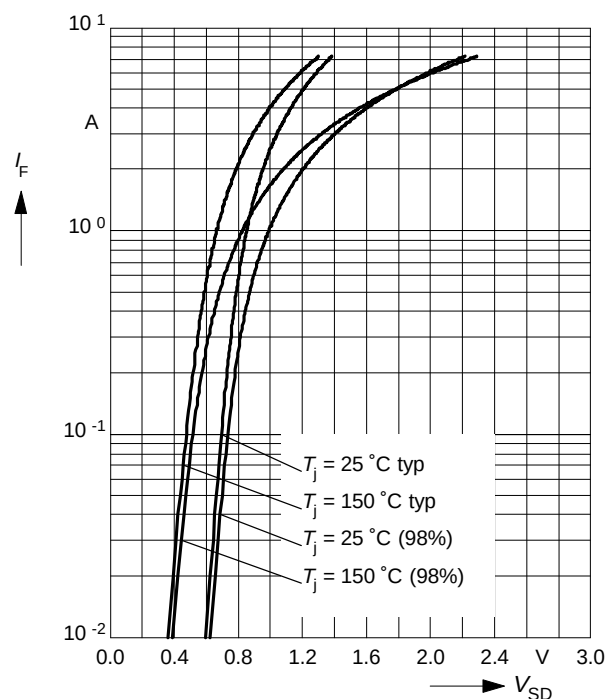
parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$



### Forward characteristics of reverse diode

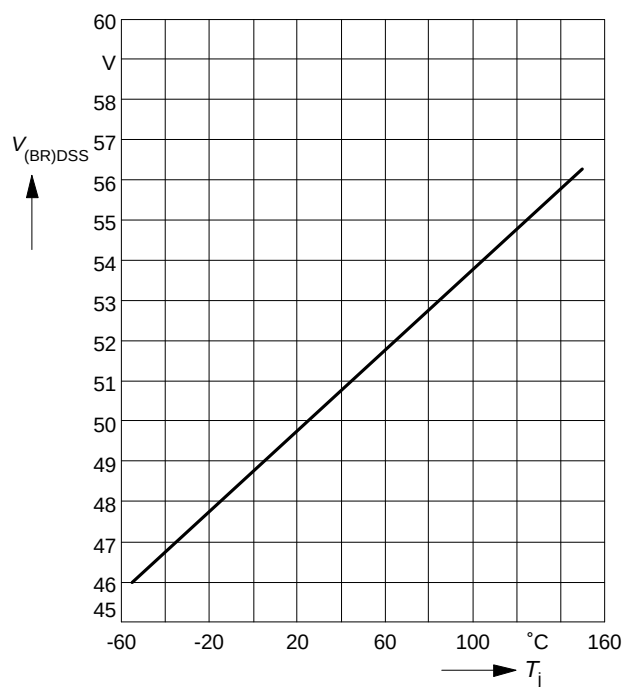
$$I_F = f(V_{SD})$$

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



### Drain-source breakdown voltage

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



### Safe operating area $I_D = f(V_{DS})$

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

