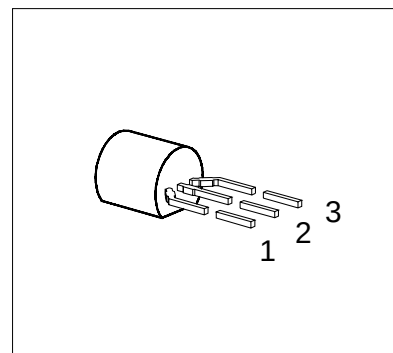


## SIPMOS® Small-Signal Transistor

## BSS 149

- $V_{DS}$  200 V
- $I_D$  0.35 A
- $R_{DS(on)}$  3.5  $\Omega$
- N channel
- Depletion mode
- High dynamic resistance
- Available grouped in  $V_{GS(th)}$



| Type    | Ordering Code | Tape and Reel Information           | Pin Configuration |   |   | Marking | Package |
|---------|---------------|-------------------------------------|-------------------|---|---|---------|---------|
|         |               |                                     | 1                 | 2 | 3 |         |         |
| BSS 149 | Q67000-S252   | E6325: 2000 pcs/carton;<br>Ammopack | G                 | D | S | SS149   | TO-92   |

### Maximum Ratings

| Parameter                                                   | Symbol               | Values           | Unit             |
|-------------------------------------------------------------|----------------------|------------------|------------------|
| Drain-source voltage                                        | $V_{DS}$             | 200              | V                |
| Drain-gate voltage, $R_{GS} = 20 \text{ k}\Omega$           | $V_{DGR}$            | 200              |                  |
| Gate-source voltage                                         | $V_{GS}$             | $\pm 14$         |                  |
| Gate-source peak voltage, aperiodic                         | $V_{gs}$             | $\pm 20$         |                  |
| Continuous drain current, $T_A = 34 \text{ }^\circ\text{C}$ | $I_D$                | 0.35             | A                |
| Pulsed drain current, $T_A = 25 \text{ }^\circ\text{C}$     | $I_{D \text{ puls}}$ | 1.05             |                  |
| Max. power dissipation, $T_A = 25 \text{ }^\circ\text{C}$   | $P_{tot}$            | 1.0              | W                |
| Operating and storage temperature range                     | $T_j, T_{stg}$       | $-55 \dots +150$ | $^\circ\text{C}$ |
| Thermal resistance, chip-ambient<br>(without heat sink)     | $R_{thJA}$           | $\leq 125$       | K/W              |
| DIN humidity category, DIN 40 040                           | —                    | E                | —                |
| IEC climatic category, DIN IEC 68-1                         | —                    | 55/150/56        |                  |

**Electrical Characteristics**

at  $T_j = 25\text{ °C}$ , unless otherwise specified.

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

**Static Characteristics**

|                                                                                                                                  |               |        |        |            |    |
|----------------------------------------------------------------------------------------------------------------------------------|---------------|--------|--------|------------|----|
| Drain-source breakdown voltage<br>$V_{GS} = -3\text{ V}$ , $I_D = 0.25\text{ mA}$                                                | $V_{(BR)DSS}$ | 200    | –      | –          | V  |
| Gate threshold voltage<br>$V_{DS} = 3\text{ V}$ , $I_D = 1\text{ mA}$                                                            | $V_{GS(th)}$  | – 1.8  | – 1.2  | – 0.7      |    |
| Drain-source cutoff current<br>$V_{DS} = 200\text{ V}$ , $V_{GS} = -3\text{ V}$<br>$T_j = 25\text{ °C}$<br>$T_j = 125\text{ °C}$ | $I_{DSS}$     | –<br>– | –<br>– | 0.2<br>200 | μA |
| Gate-source leakage current<br>$V_{GS} = 20\text{ V}$ , $V_{DS} = 0$                                                             | $I_{GSS}$     | –      | 10     | 100        | nA |
| Drain-source on-resistance<br>$V_{GS} = 0\text{ V}$ , $I_D = 0.05\text{ A}$                                                      | $R_{DS(on)}$  | –      | 2.5    | 3.5        | Ω  |

**Dynamic Characteristics**

|                                                                                                                                                                                      |              |     |     |     |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----|-----|-----|----|
| Forward transconductance<br>$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$ , $I_D = 0.35\text{ A}$                                                                                  | $g_{fs}$     | 0.4 | 0.6 | –   | S  |
| Input capacitance<br>$V_{GS} = 0$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                                                                                      | $C_{iss}$    | –   | 500 | 670 | pF |
| Output capacitance<br>$V_{GS} = 0$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                                                                                     | $C_{oss}$    | –   | 40  | 60  |    |
| Reverse transfer capacitance<br>$V_{GS} = 0$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                                                                           | $C_{rss}$    | –   | 12  | 20  |    |
| Turn-on time $t_{on}$ , ( $t_{on} = t_{d(on)} + t_r$ )<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = -2\text{ V} \dots + 5\text{ V}$ , $R_{GS} = 50\text{ Ω}$ ,<br>$I_D = 0.29\text{ A}$     | $t_{d(on)}$  | –   | 7   | 10  | ns |
|                                                                                                                                                                                      | $t_r$        | –   | 20  | 30  |    |
| Turn-off time $t_{off}$ , ( $t_{off} = t_{d(off)} + t_f$ )<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = -2\text{ V} \dots + 5\text{ V}$ , $R_{GS} = 50\text{ Ω}$ ,<br>$I_D = 0.29\text{ A}$ | $t_{d(off)}$ | –   | 60  | 80  |    |
|                                                                                                                                                                                      | $t_f$        | –   | 50  | 65  |    |

## Electrical Characteristics (cont'd)

at  $T_j = 25\text{ °C}$ , unless otherwise specified.

| Parameter                                                              | Symbol   | Values |      |      | Unit |
|------------------------------------------------------------------------|----------|--------|------|------|------|
|                                                                        |          | min.   | typ. | max. |      |
| Reverse Diode                                                          |          |        |      |      |      |
| Continuous reverse drain current<br>$T_A = 25\text{ }^{\circ}\text{C}$ | $I_S$    | –      | –    | 0.35 | A    |
| Pulsed reverse drain current<br>$T_A = 25\text{ }^{\circ}\text{C}$     | $I_{SM}$ | –      | –    | 1.05 |      |
| Diode forward on-voltage<br>$I_F = 0.7\text{ A}$ , $V_{GS} = 0$        | $V_{SD}$ | –      | 0.8  | 1.2  | V    |

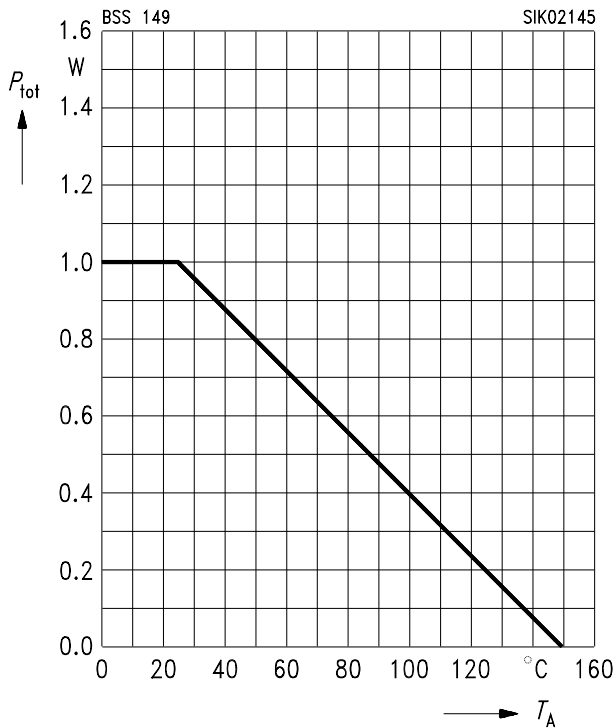
| $V_{GS(th)}$ Grouping                                | Symbol              | Limit Values |        | Unit | Test Condition                                                              |
|------------------------------------------------------|---------------------|--------------|--------|------|-----------------------------------------------------------------------------|
|                                                      |                     | min.         | max.   |      |                                                                             |
| Range of $V_{GS(th)}$                                | $\Delta V_{GS(th)}$ | –            | 0.15   | V    | –                                                                           |
| Threshold voltage selected in groups <sup>1)</sup> : | $V_{GS(th)}$        |              |        |      | $V_{DS1} = 0.2\text{ V}$<br>$V_{DS2} = 3\text{ V}$ ;<br>$I_D = 1\text{ mA}$ |
| P                                                    |                     | – 0.95       | – 0.80 | V    |                                                                             |
| R                                                    |                     | – 1.08       | – 0.93 | V    |                                                                             |
| S                                                    |                     | – 1.21       | – 1.06 | V    |                                                                             |
| T                                                    |                     | – 1.34       | – 1.19 | V    |                                                                             |
| U                                                    |                     | – 1.47       | – 1.32 | V    |                                                                             |
| V                                                    |                     | – 1.60       | – 1.45 | V    |                                                                             |
| W                                                    |                     | – 1.73       | – 1.58 | V    |                                                                             |

1) A specific group cannot be ordered separately.  
Each reel only contains transistors from one group.

## Characteristics

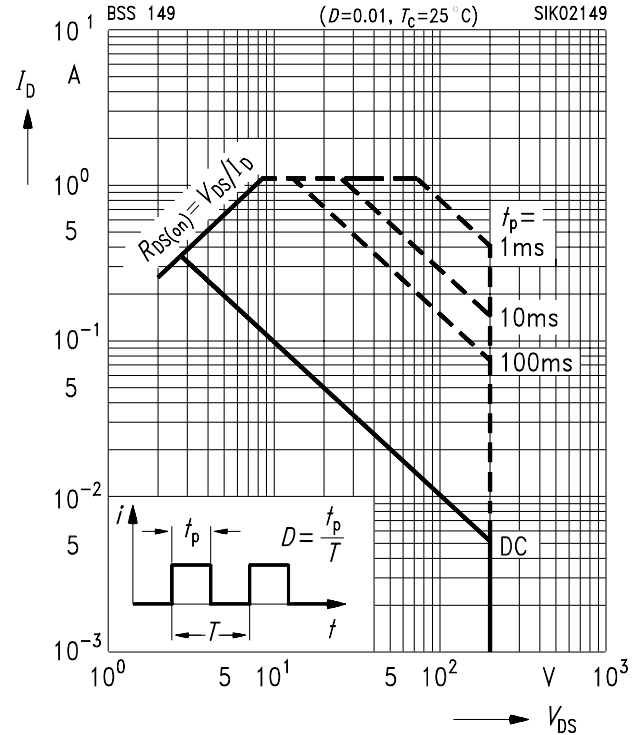
at  $T_j = 25^\circ\text{C}$ , unless otherwise specified.

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



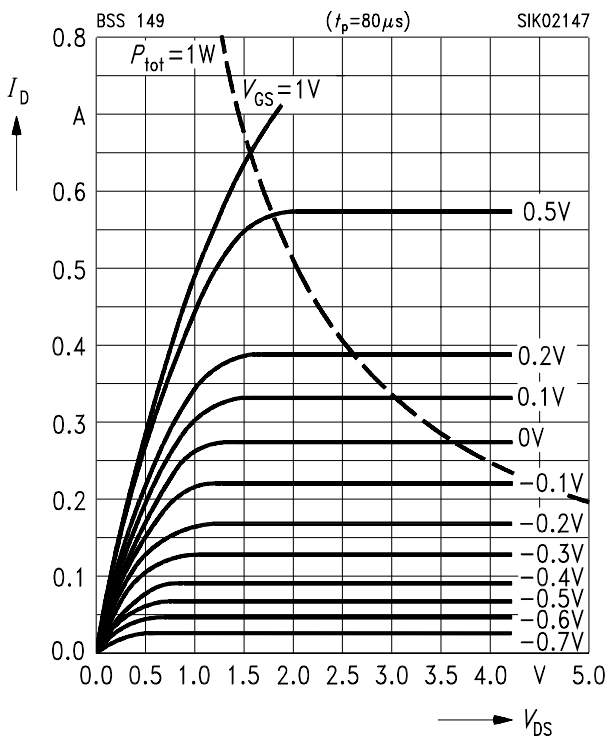
Safe operating area  $I_D = f(V_{\text{DS}})$

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



Typ. output characteristics  $I_D = f(V_{\text{DS}})$

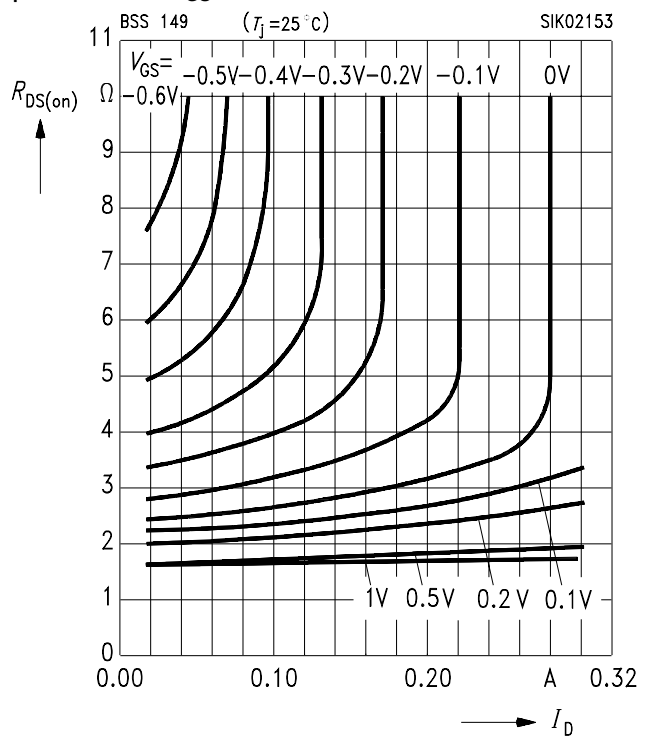
parameter:  $t_p = 80 \mu\text{s}$



Typ. drain-source on-resistance

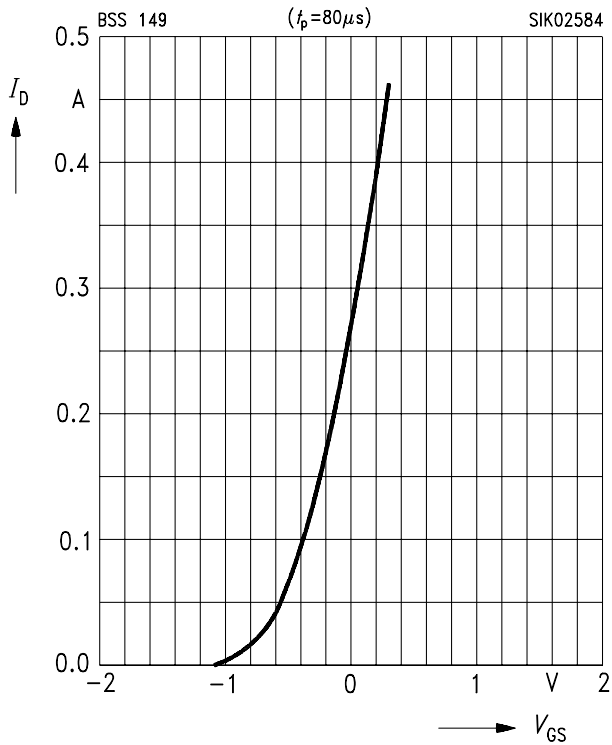
$R_{\text{DS(on)}} = f(I_D)$

parameter:  $V_{\text{GS}}$



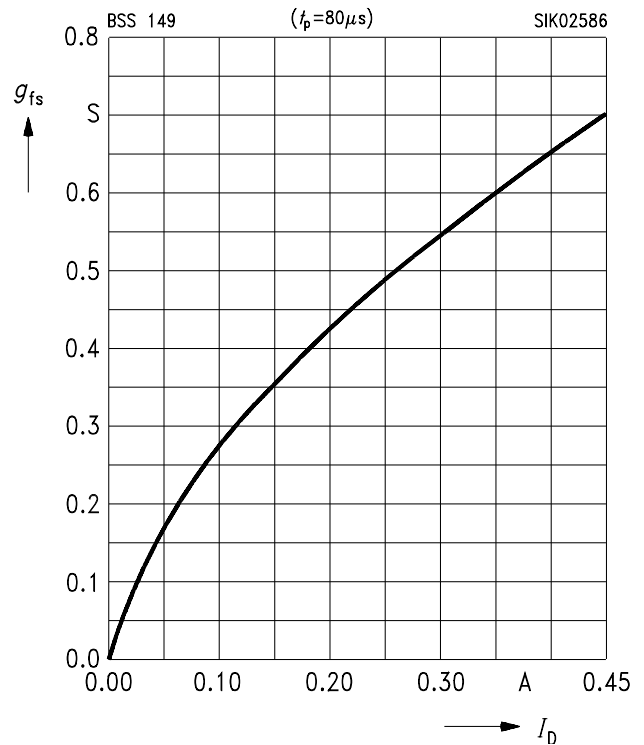
## Typ. transfer characteristics $I_D = f(V_{GS})$

parameter:  $t_p = 80 \mu s$ ,  $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$



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

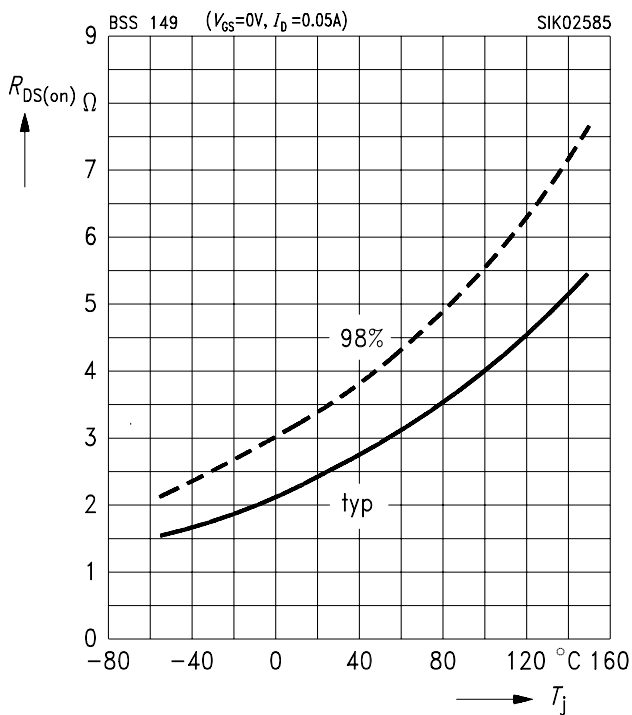
parameter:  $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}$ ,  $t_p = 80 \mu s$



## Drain-source on-resistance

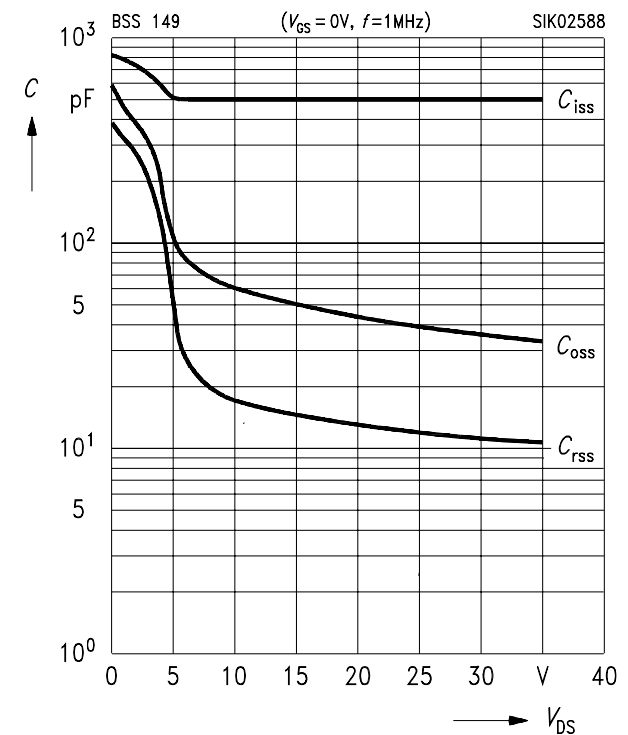
$$R_{DS(on)} = f(T_j)$$

parameter:  $I_D = 0.05 A$ ,  $V_{GS} = 0 V$ , (spread)



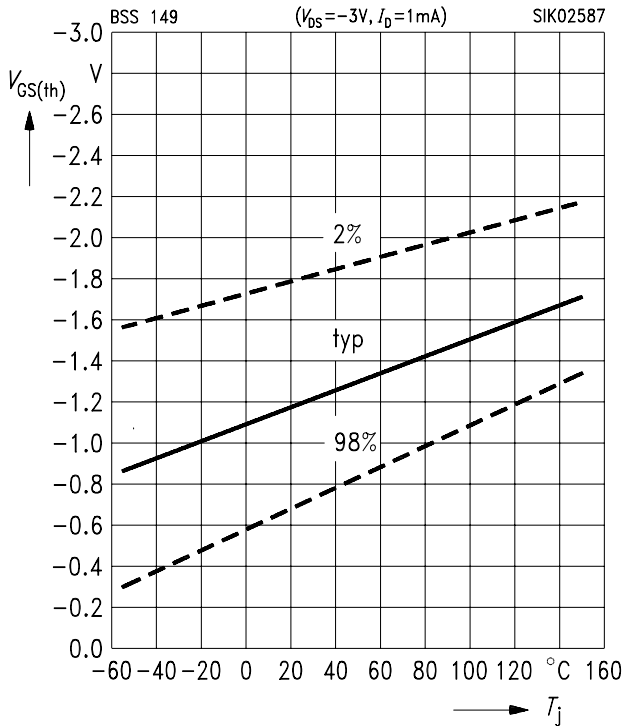
## Typ. capacitances $C = f(V_{DS})$

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



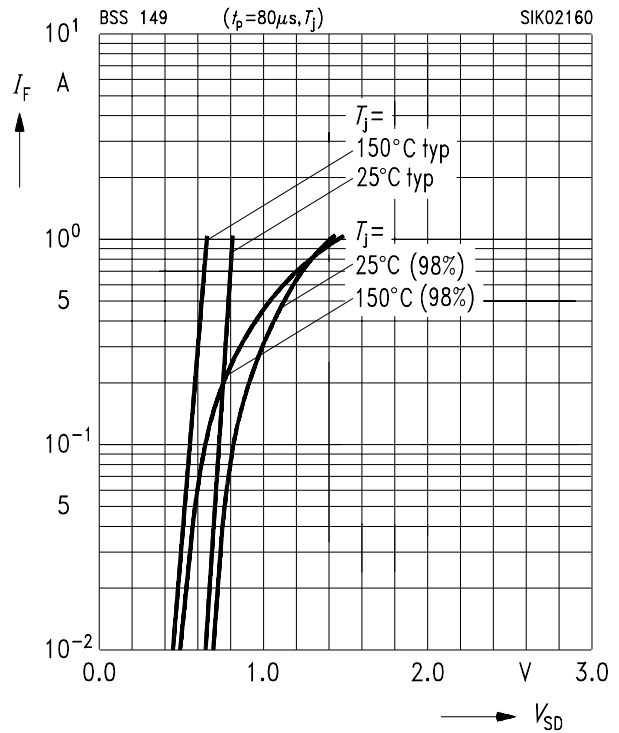
## Gate threshold voltage $V_{GS(th)} = f(T_j)$

parameter:  $V_{DS} = 3 \text{ V}$ ,  $I_D = 1 \text{ mA}$ , (spread)



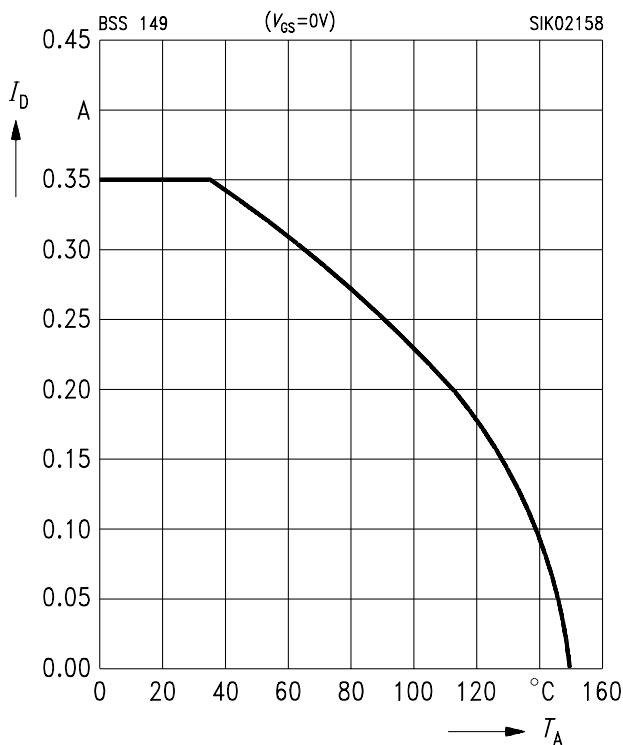
## Forward characteristics of reverse diode $I_F = f(V_{SD})$

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



## Drain current $I_D = f(T_A)$

parameter:  $V_{GS} \geq 3 \text{ V}$



## Drain-source breakdown voltage

$V_{(BR)DSS} = b \times V_{(BR)DSS}(25^\circ\text{C})$

