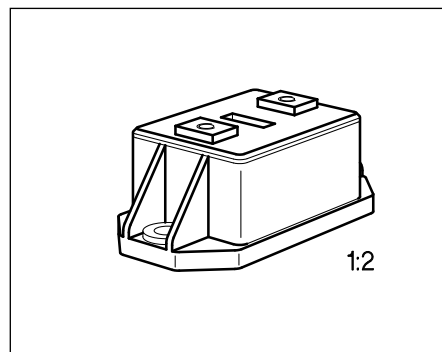


$$V_{DS} = 500 \text{ V}$$

$$I_D = 48 \text{ A}$$

$$R_{DS(on)} = 0.12 \text{ } \Omega$$

- Power module
- Single switch
- N channel
- Enhancement mode
- Package with insulated metal base plate
- Package outline/Circuit diagram: 1<sup>1)</sup>



| Type    | Ordering Code   |
|---------|-----------------|
| BSM 151 | C67076-A1004-A2 |

### Maximum Ratings

| Parameter                                                    | Symbol               | Values             | Unit             |
|--------------------------------------------------------------|----------------------|--------------------|------------------|
| Drain-source voltage                                         | $V_{DS}$             | 500                | V                |
| Drain-gate voltage, $R_{GS} = 20 \text{ k}\Omega$            | $V_{DGR}$            | 500                |                  |
| Gate-source voltage                                          | $V_{GS}$             | $\pm 20$           |                  |
| Continuous drain current, $T_C = 25 \text{ }^\circ\text{C}$  | $I_D$                | 48                 | A                |
| Pulsed drain current, $T_C = 25 \text{ }^\circ\text{C}$      | $I_{D \text{ puls}}$ | 192                |                  |
| Operating and storage temperature range                      | $T_J, T_{stg}$       | $- 55 \dots + 150$ | $^\circ\text{C}$ |
| Power dissipation, $T_C = 25 \text{ }^\circ\text{C}$         | $P_{tot}$            | 625                | W                |
| Thermal resistance<br>Chip-case                              | $R_{th \text{ JC}}$  | $\leq 0.20$        | K/W              |
| Insulation test voltage <sup>2)</sup> , $t = 1 \text{ min.}$ | $V_{is}$             | 2500               | V <sub>ac</sub>  |
| Creepage distance, drain-source                              | —                    | 16                 | mm               |
| Clearance, drain-source                                      | —                    | 11                 |                  |
| DIN humidity category, DIN 40 040                            | —                    | F                  | —                |
| IEC climatic category, DIN IEC 68-1                          | —                    | 55/150/56          |                  |

1) See chapter Package Outline and Circuit Diagrams.

2) Insulation test voltage between drain and base plate referred to standard climate 23/50 in acc. with DIN 50 014, IEC 146, para. 492.1.

**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>$V_{GS} = 0, I_D = 0.25\text{ mA}$                                                    | $V_{(BR)DSS}$ | 500    | —         | —           | V  |
| Gate threshold voltage<br>$V_{DS} = V_{GS}, I_D = 1\text{ mA}$                                                          | $V_{GS(th)}$  | 2.1    | 3.0       | 4.0         |    |
| Zero gate voltage drain current<br>$V_{DS} = 500\text{ V}, V_{GS} = 0$<br>$T_j = 25\text{ °C}$<br>$T_j = 125\text{ °C}$ | $I_{DSS}$     | —<br>— | 50<br>300 | 250<br>1000 | μA |
| Gate-source leakage current<br>$V_{GS} = 20\text{ V}, V_{DS} = 0$                                                       | $I_{GSS}$     | —      | 10        | 100         | nA |
| Drain-source on-state resistance<br>$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$                                           | $R_{DS(on)}$  | —      | 0.1       | 0.12        | Ω  |

**Dynamic Characteristics**

|                                                                                                                                                         |              |    |     |     |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----|-----|-----|----|
| Forward transconductance<br>$V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}, I_D = 30\text{ A}$                                                         | $g_{fs}$     | 30 | 45  | —   | S  |
| Input capacitance<br>$V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                                               | $C_{iss}$    | —  | 8   | 11  | nF |
| Output capacitance<br>$V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                                              | $C_{oss}$    | —  | 1.2 | 1.7 |    |
| Reverse transfer capacitance<br>$V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                                    | $C_{rss}$    | —  | 0.5 | 0.7 |    |
| Turn-on time $t_{on}$ ( $t_{on} = t_{d(on)} + t_r$ )<br>$V_{CC} = 250\text{ V}, V_{GS} = 10\text{ V}$<br>$I_D = 30\text{ A}, R_{GS} = 3.3\text{ Ω}$     | $t_{d(on)}$  | —  | 36  | —   | ns |
|                                                                                                                                                         | $t_r$        | —  | 25  | —   |    |
| Turn-off time $t_{off}$ ( $t_{off} = t_{d(off)} + t_f$ )<br>$V_{CC} = 250\text{ V}, V_{GS} = 10\text{ V}$<br>$I_D = 30\text{ A}, R_{GS} = 3.3\text{ Ω}$ | $t_{d(off)}$ | —  | 260 | —   |    |
|                                                                                                                                                         | $t_f$        | —  | 50  | —   |    |

**Electrical Characteristics (cont'd)**at  $T_j = 25\text{ °C}$ , unless otherwise specified.

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

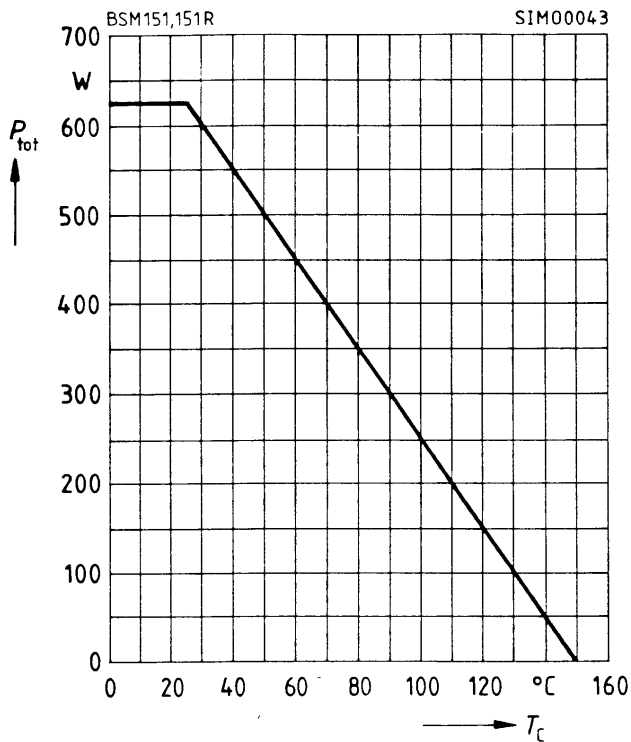
**Reverse diode**

|                                                                |          |   |     |     |   |
|----------------------------------------------------------------|----------|---|-----|-----|---|
| Continuous reverse drain current<br>$T_C = 25\text{ °C}$       | $I_S$    | — | —   | 48  | A |
| Pulsed reverse drain current<br>$T_C = 25\text{ °C}$           | $I_{SM}$ | — | —   | 192 |   |
| Diode forward on-voltage<br>$I_F = 96\text{ A}$ , $V_{GS} = 0$ | $V_{SD}$ | — | 1.1 | 1.4 | V |

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

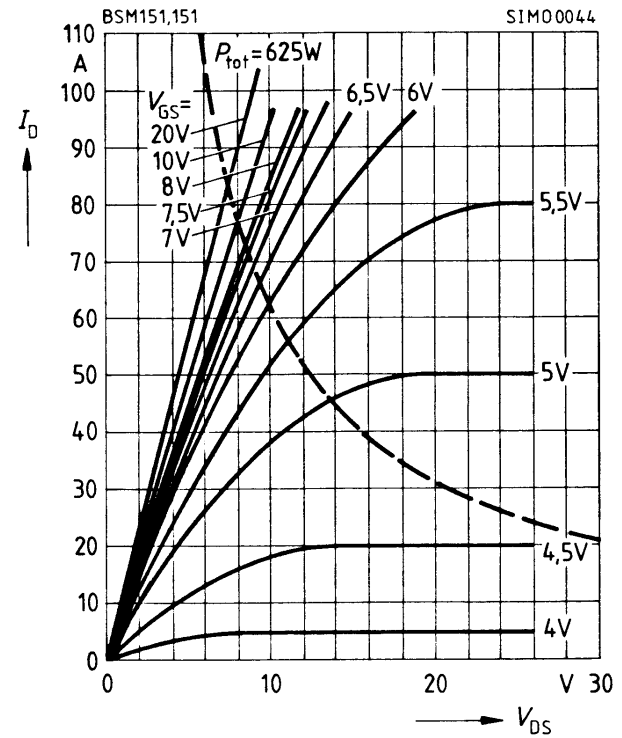
**Power dissipation**  $P_{\text{tot}} = f(T_c)$

parameter:  $T_j = 150^\circ\text{C}$



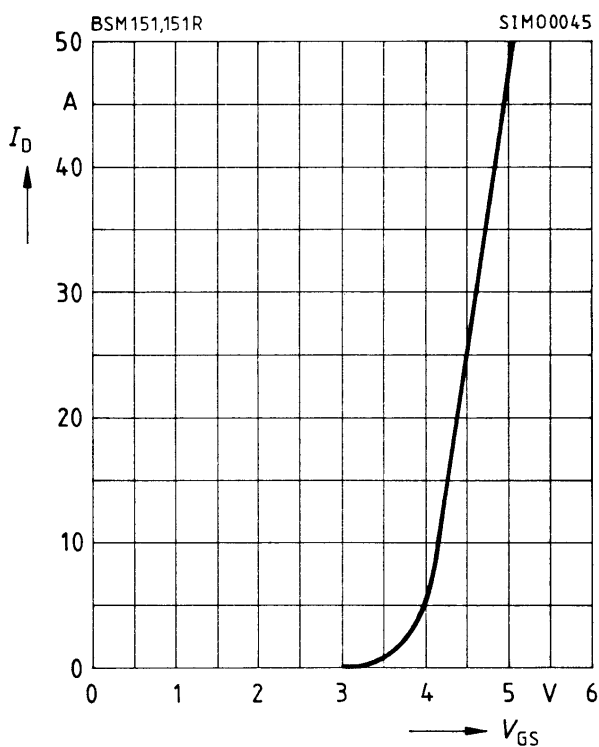
**Typ. output characteristics**  $I_D = f(V_{\text{DS}})$

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



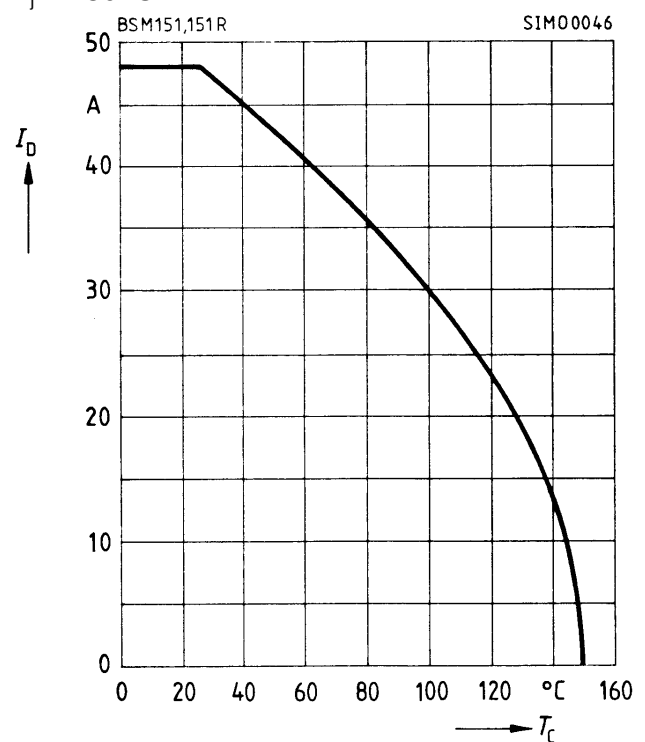
**Typ. transfer characteristic**  $I_D = f(V_{\text{GS}})$

parameter:  $t_p = 80 \mu\text{s}$ ,  $V_{\text{DS}} = 25\text{V}$



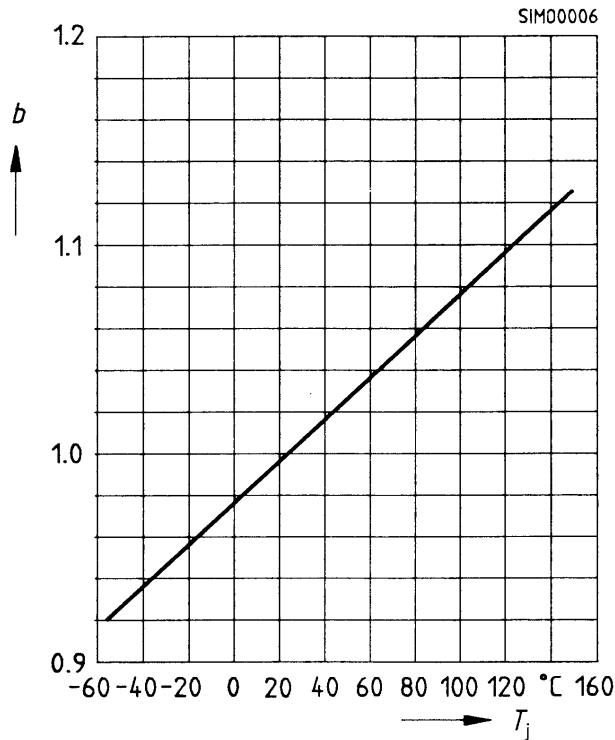
**Drain current**  $I_D = f(T_c)$

parameter:  $V_{\text{GS}} \geq 10\text{V}$ ,  $T_j = 150^\circ\text{C}$



## Drain-source breakdown voltage

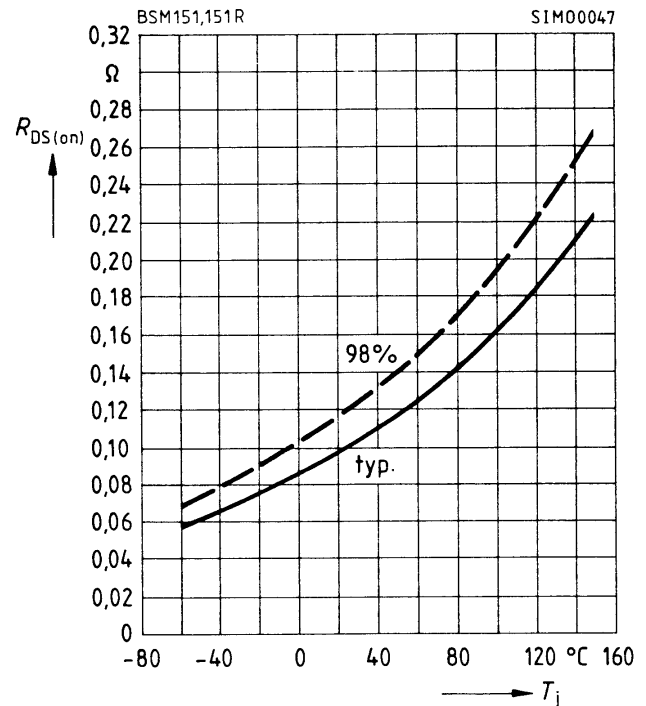
$$V_{(BR)DSS}(T_j) = b \times V_{(BR)DSS}(25^\circ\text{C})$$



## Drain source on-resistance

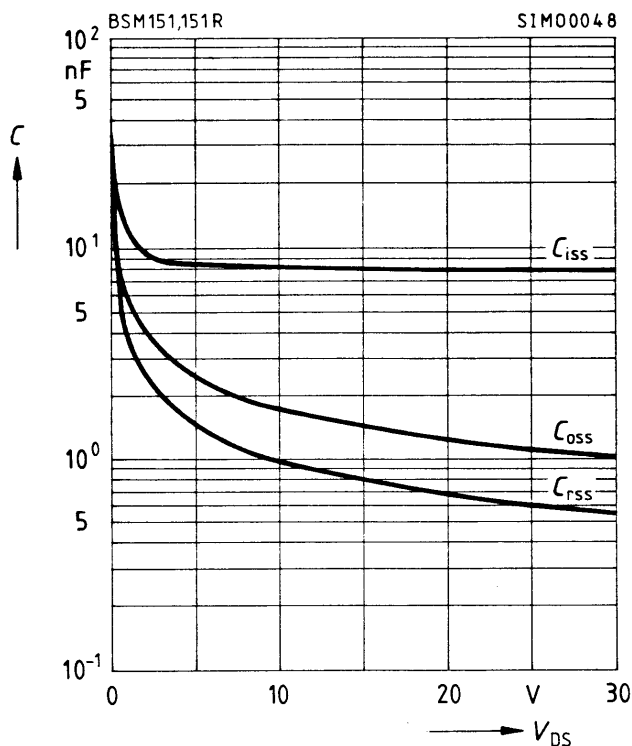
$$R_{DS(on)} = f(T_j)$$

parameter:  $I_D = 30\text{ A}$ ;  $V_{GS} = 10\text{ V}$ , (spread)



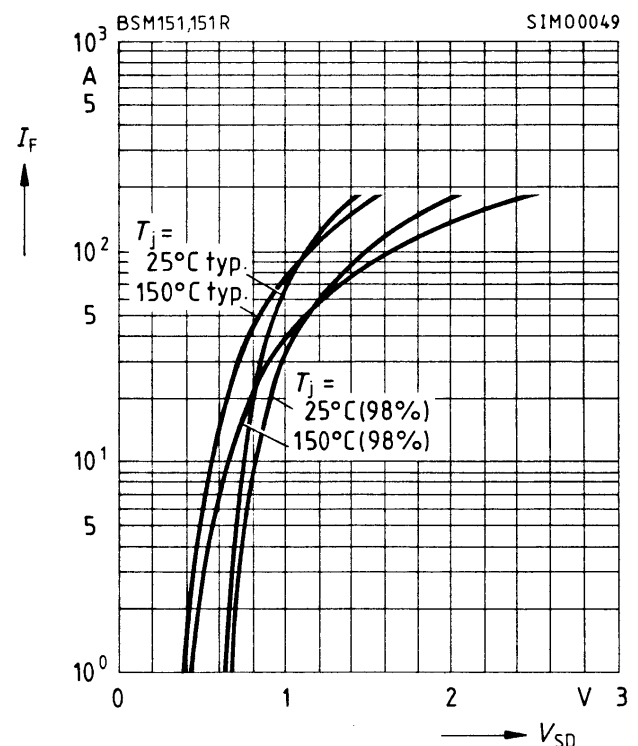
## Typ. capacitances $C = f(V_{DS})$

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



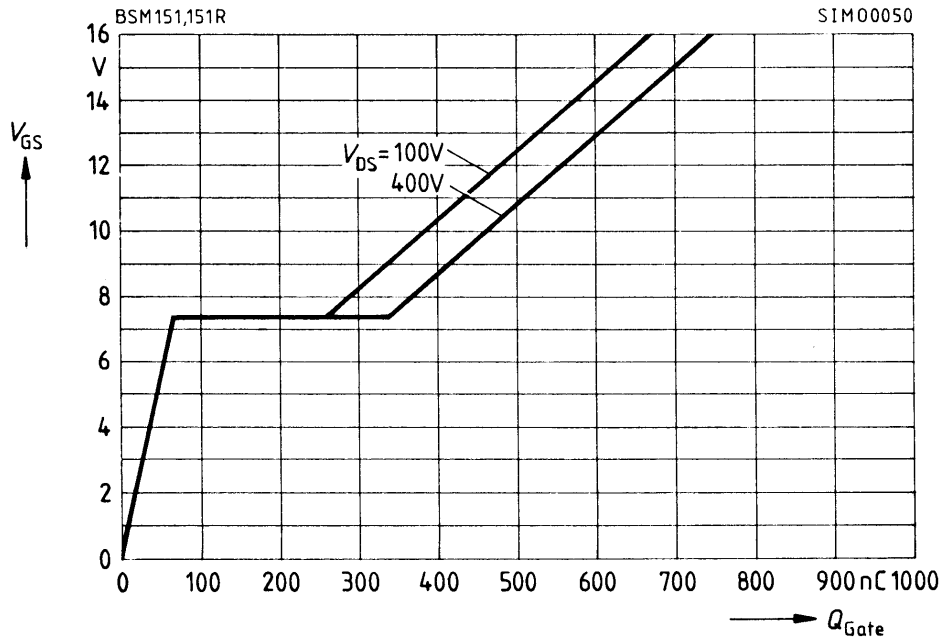
## Forward characteristics of reverse diode

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



**Typ. gate charge**  $V_{GS} = f(Q_{Gate})$

parameter:  $I_{Dpuls} = 63 \text{ A}$



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

parameter: single pulse,  $T_C = 25^\circ \text{C}$ ,  $T_j \leq 150^\circ \text{C}$

