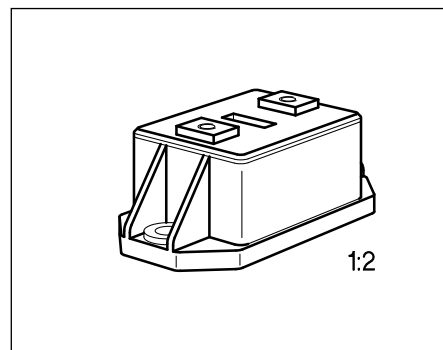


## SIMOPAC® Module

## BSM 181 BSM 181 R

$V_{DS} = 100 \text{ V}$   
 $I_D = 200 \text{ A}$   
 $R_{DS(on)} = 8.5 \text{ m}\Omega$

- 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 181	C67076-A1001-A2
BSM 181 R	C67076-A1016-A2

### Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	$V_{DS}$	800	V
Drain-gate voltage, $R_{GS} = 20 \text{ k}\Omega$	$V_{DGR}$	800	
Gate-source voltage	$V_{GS}$	$\pm 20$	
Continuous drain current, $T_C = 25 \text{ }^\circ\text{C}$	$I_D$	36	A
Pulsed drain current, $T_C = 25 \text{ }^\circ\text{C}$	$I_{D \text{ puls}}$	144	
Operating and storage temperature range	$T_j, T_{stg}$	$-55 \dots +150$	$^\circ\text{C}$
Power dissipation, $T_C = 25 \text{ }^\circ\text{C}$	$P_{tot}$	700	W
Thermal resistance Chip-case	$R_{th \text{ JC}}$	$\leq 0.18$	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	

<sup>1)</sup> See chapter Package Outline and Circuit Diagrams.

<sup>2)</sup> 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 $V_{GS} = 0, I_D = 0.25\text{ mA}$	$V_{(BR)DSS}$	800	—	—	V
Gate threshold voltage $V_{DS} = V_{GS}, I_D = 1\text{ mA}$	$V_{GS(th)}$	2.1	3.0	4.0	
Zero gate voltage drain current $V_{DS} = 800\text{ V}, V_{GS} = 0$ $T_j = 25\text{ °C}$ $T_j = 125\text{ °C}$	$I_{DSS}$	— —	50 300	250 1000	μA
Gate-source leakage current $V_{GS} = 20\text{ V}, V_{DS} = 0$	$I_{GSS}$	—	10	100	nA
Drain-source on-state resistance $V_{GS} = 10\text{ V}, I_D = 23\text{ A}$	$R_{DS(on)}$	—	0.18	0.24	Ω

## Dynamic Characteristics

Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}, I_D = 23\text{ A}$	$g_{fs}$	15	25	—	S
Input capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	$C_{iss}$	—	24	32	nF
Output capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	$C_{oss}$	—	1.3	2.0	
Reverse transfer capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	$C_{rss}$	—	0.5	0.8	
Turn-on time $t_{on} (t_{on} = t_{d(on)} + t_r)$ $V_{CC} = 400\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 23\text{ A}, R_{GS} = 3.3\text{ Ω}$	$t_{d(on)}$	—	60	—	ns
	$t_r$	—	30	—	
Turn-off time $t_{off} (t_{off} = t_{d(off)} + t_f)$ $V_{CC} = 400\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 23\text{ A}, R_{GS} = 3.3\text{ Ω}$	$t_{d(off)}$	—	370	—	
	$t_f$	—	70	—	

## Electrical Characteristics (cont'd)

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

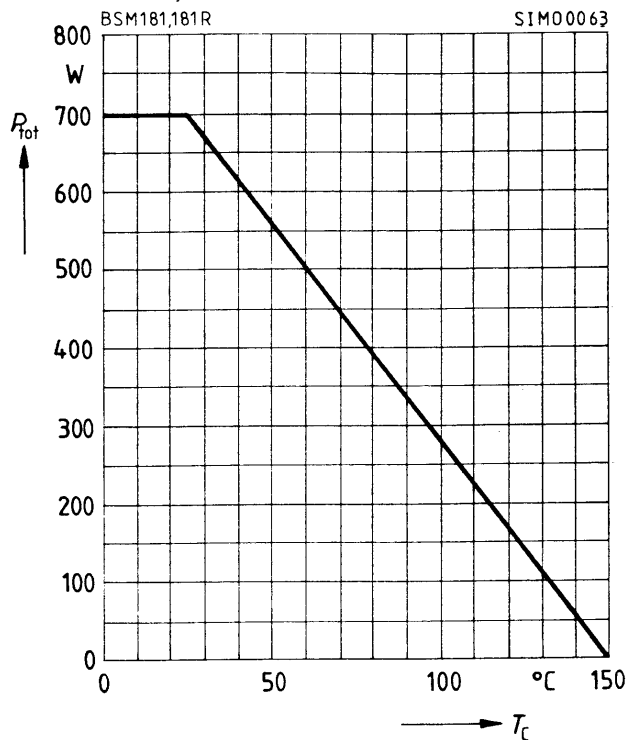
## Reverse diode

Continuous reverse drain current $T_C = 25\text{ °C}$	$I_S$	—	—	36	A
Pulsed reverse drain current $T_C = 25\text{ °C}$	$I_{SM}$	—	—	144	
Diode forward on-voltage $I_F = 72\text{ A}$ , $V_{GS} = 0$	$V_{SD}$	—	1.1	1.4	V
Reverse recovery time $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 100\text{ V}$ $T_j = 25\text{ °C}$ $T_j = 150\text{ °C}$	$t_{rr}$	— —	1200 —	— —	ns
Reverse recovery charge $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 100\text{ V}$ $T_j = 25\text{ °C}$ $T_j = 150\text{ °C}$	$Q_{rr}$	— —	42 50	— —	$\mu\text{C}$

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

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

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

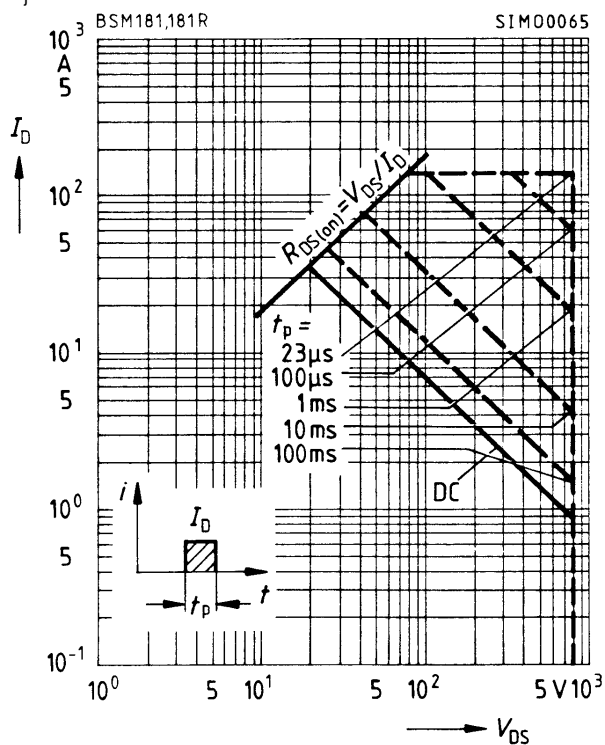


**Typ. output characteristics**  $I_D = f(V_{\text{DS}})$

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

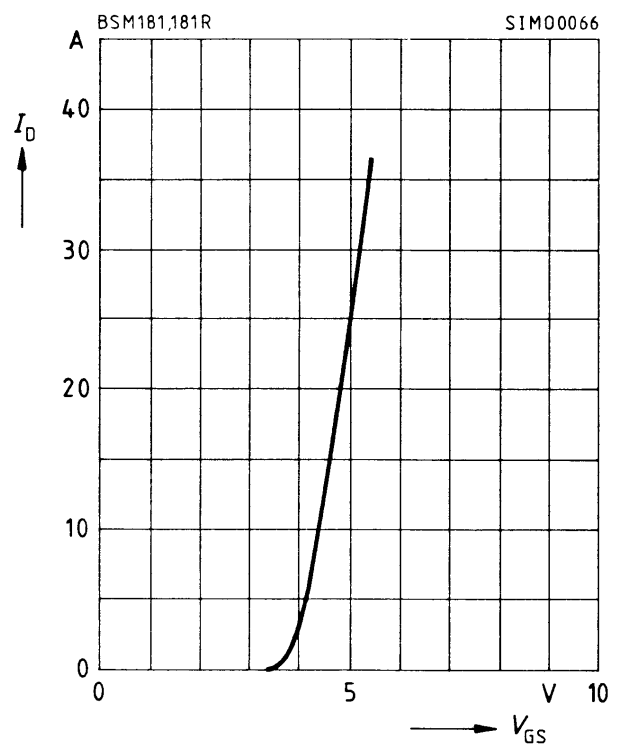
**Safe operating area**  $I_D = f(V_{\text{DS}})$

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



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

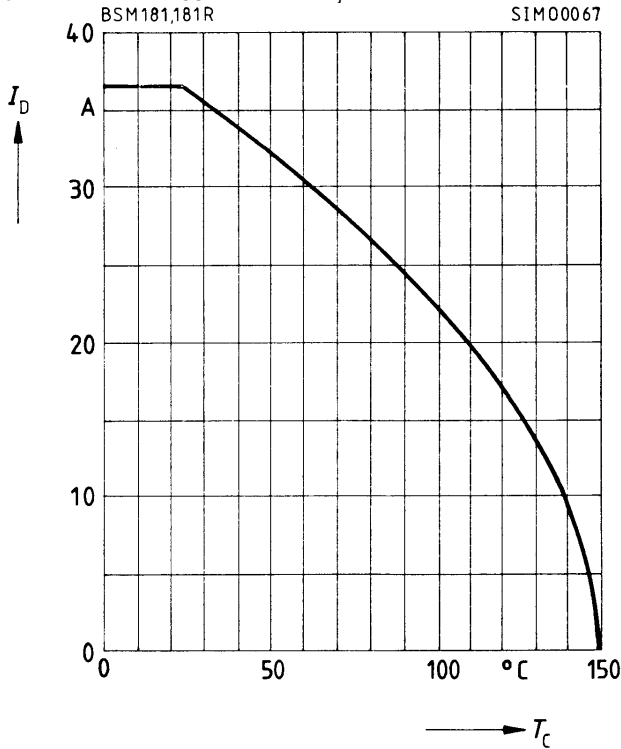
parameter:  $t_p = 80\ \mu\text{s}$ ,  $V_{\text{DS}} = 25\ \text{V}$



## Continuous drain current

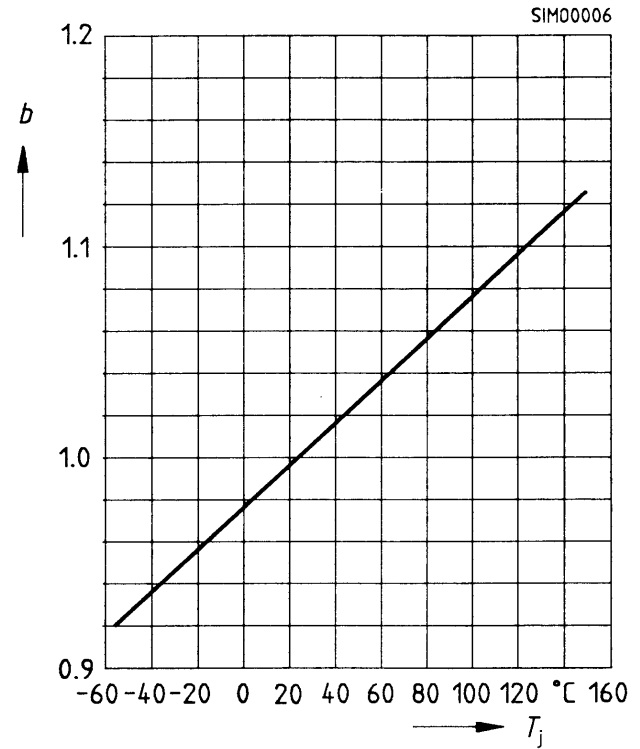
$$I_D = f(T_C)$$

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



## Drain-source breakdown voltage

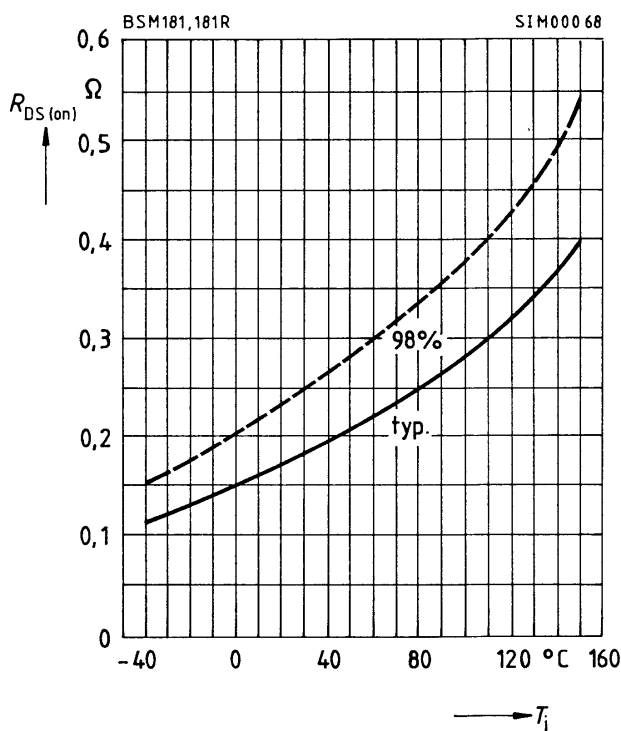
$$V_{(BR)DSS}(T_j) = b \times V_{(BR)DSS}(25^\circ\text{C})$$



## Drain source on-state resistance

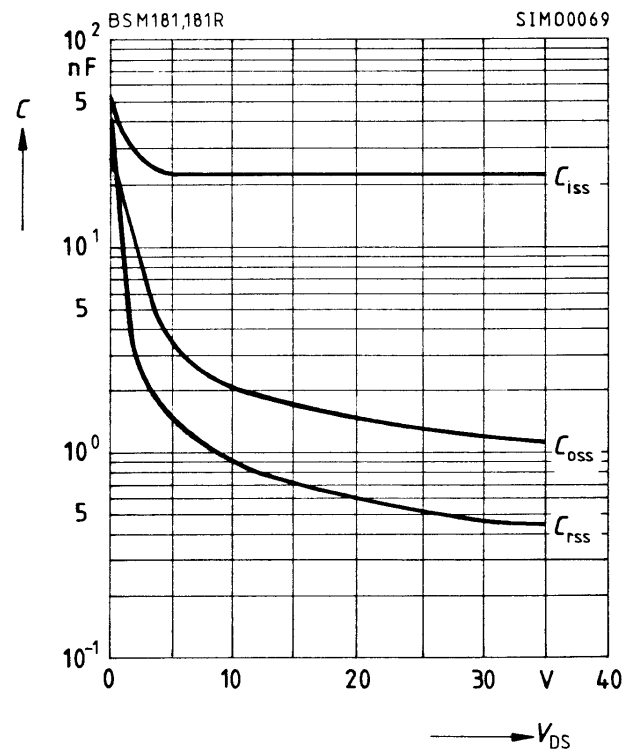
$$R_{DS(on)} = f(T_j)$$

parameter:  $I_D = 36 \text{ A}$ ;  $V_{GS} = 10 \text{ V}$ , (spread)



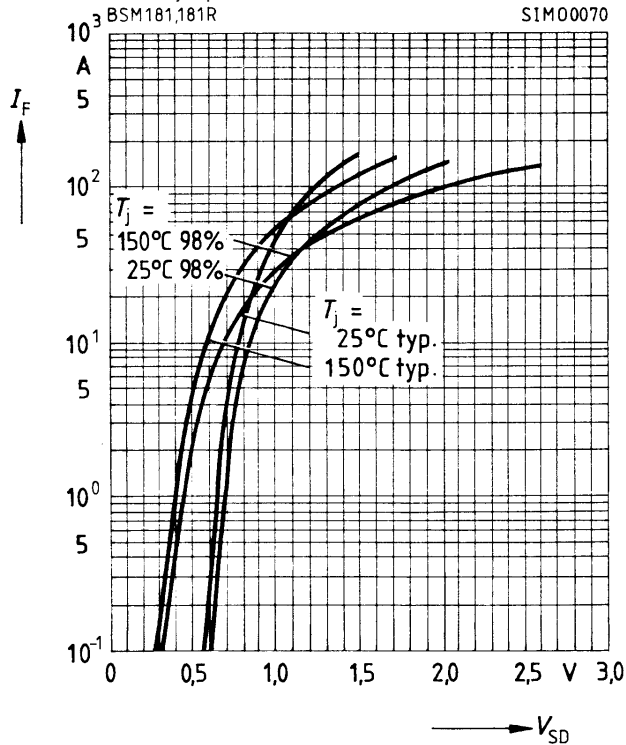
## Typical capacitances $C = f(V_{DS})$

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



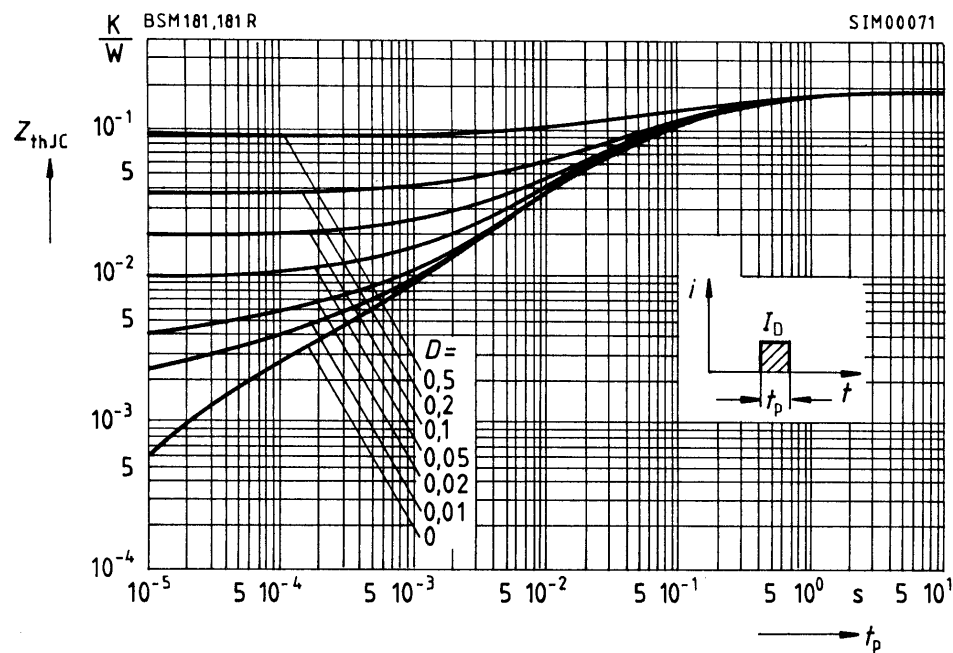
## Forward characteristics of reverse diode $I_F = f(V_{SD})$

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



## Transient thermal impedance $Z_{thJC} = f(t_p)$

parameter:  $D = t_p/T$



Typ. gate charge  $V_{GS} = f(Q_{Gate})$   
parameter:  $I_{Dpuls} = 52.5\text{ A}$

