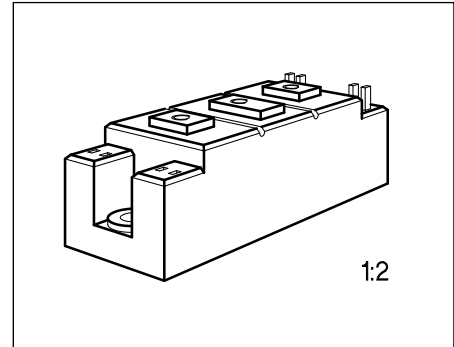


SIMOPAC® Module

BSM 254 F

$V_{DS} = 500 \text{ V}$
 $I_D = 2 \times 35 \text{ A}$
 $R_{DS(on)} = 0.17 \text{ } \Omega$

- Power module
- Half-bridge
- FREDFET
- N channel
- Enhancement mode
- Package with insulated metal base plate
- Package outline/Circuit diagram: 2a¹⁾



| Type | Ordering Code |
|-----------|-----------------|
| BSM 254 F | C67076-A1150-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} | ± 20 | |
| Continuous drain current, $T_C = 25 \text{ }^\circ\text{C}$ | I_D | 35 | A |
| Pulsed drain current, $T_C = 25 \text{ }^\circ\text{C}$ | $I_{D \text{ puls}}$ | 140 | |
| 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} | 400 | W |
| Thermal resistance Chip-case | $R_{th \text{ JC}}$ | ≤ 0.31 | K/W |
| Insulation test voltage ²⁾ , $t = 1 \text{ min.}$ | V_{is} | 2500 | V_{ac} |
| 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 $V_{GS} = 0, I_D = 0.25\text{ mA}$ | $V_{(BR)DSS}$ | 500 | – | – | V |
| Gate threshold voltage $V_{GS} = V_{DS}, I_D = 1\text{ mA}$ | $V_{GS(th)}$ | 2.1 | 3.0 | 4.0 | |
| Zero gate voltage drain current $V_{DS} = 500\text{ V}, V_{GS} = 0$ $T_j = 25\text{ °C}$ $T_j = 125\text{ °C}$ | 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 $V_{GS} = 10\text{ V}, I_D = 22\text{ A}$ | $R_{DS(on)}$ | – | 0.14 | 0.17 | Ω |

Dynamic Characteristics

| | | | | | |
|--|--------------|----|------|-----|----|
| Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max.}, I_D = 22\text{ A}$ | g_{fs} | 13 | 20 | – | S |
| Input capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | C_{iss} | – | 18 | 24 | nF |
| Output capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | C_{oss} | – | 1.3 | 1.9 | |
| Reverse transfer capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$ | C_{rss} | – | 0.48 | 0.7 | |
| Turn-on time t_{on} ($t_{on} = t_{d(on)} + t_r$) $V_{CC} = 250\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 22\text{ A}, R_{GS} = 3.3\text{ }\Omega$ | $t_{d(on)}$ | – | 40 | – | ns |
| | t_r | – | 30 | – | |
| Turn-off time t_{off} ($t_{off} = t_{d(off)} + t_f$) $V_{CC} = 250\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 22\text{ A}, R_{GS} = 3.3\text{ }\Omega$ | $t_{d(off)}$ | – | 70 | – | |
| | t_f | – | 55 | – | |

Electrical Characteristics (cont'd)

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

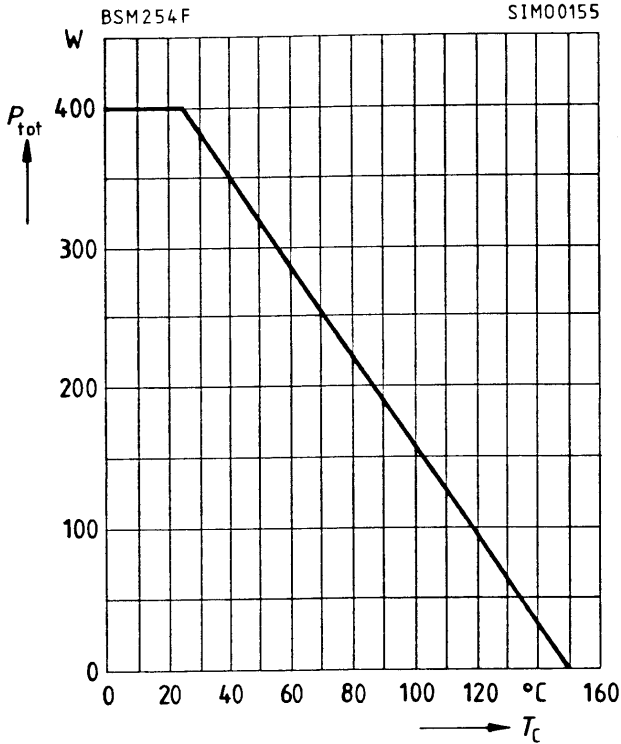
| Parameter | Symbol | Values | | | Unit |
|-----------|--------|--------|------|------|------|
| | | min. | typ. | max. | |

Fast-recovery reverse diode

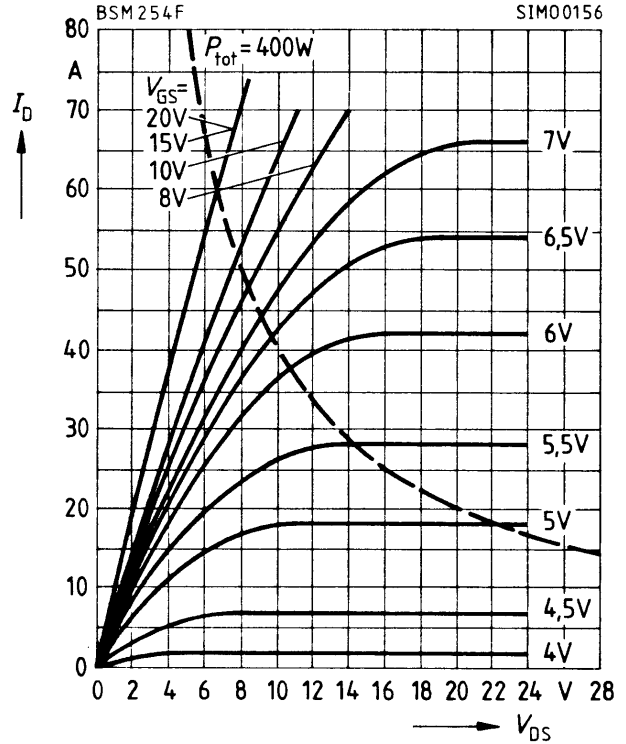
| | | | | | |
|---|-----------|--------|------------|------------|---------------|
| Continuous reverse drain current $T_C = 25\text{ °C}$ | I_S | – | – | 35 | A |
| Pulsed reverse drain current $T_C = 25\text{ °C}$ | I_{SM} | – | – | 140 | |
| Diode forward on-voltage $I_F = 70\text{ A}$, $V_{GS} = 0$ | V_{SD} | – | 1.2 | 1.6 | 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} | – – | 200 350 | 280 500 | 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} | – – | 1.5 8.5 | 2.5 12 | μC |
| Repetitive peak reverse current $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 100\text{ V}$ $T_j = 25\text{ °C}$ $T_j = 150\text{ °C}$ | I_{RRM} | – – | 12 28 | – – | A |

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

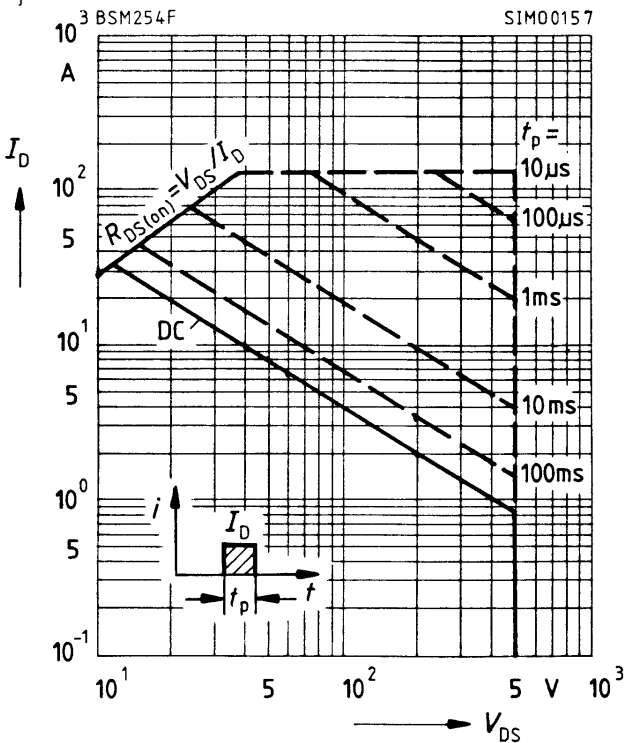
Power dissipation $P_{\text{tot}} = f(T_C)$
parameter: $T_j = 150\text{ }^\circ\text{C}$



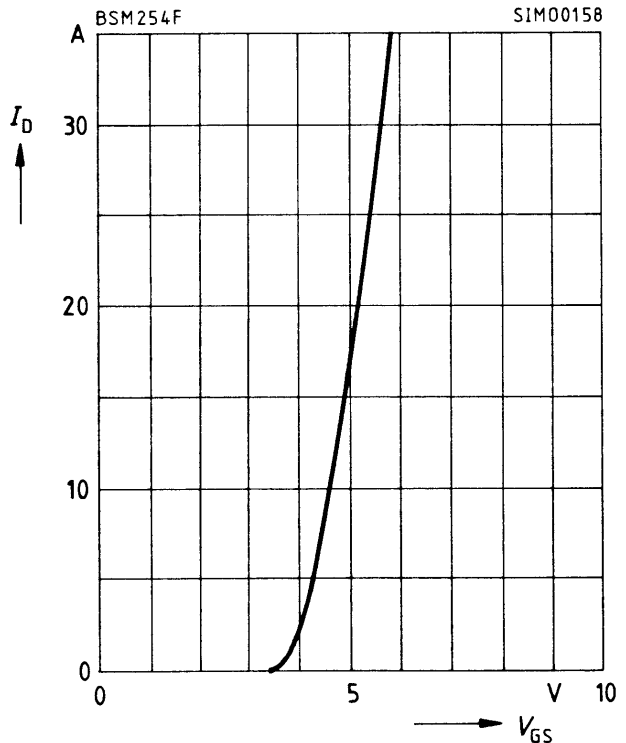
Typ. output characteristics $I_D = f(V_{\text{DS}})$
parameter: $t_p = 80\text{ }\mu\text{s}$



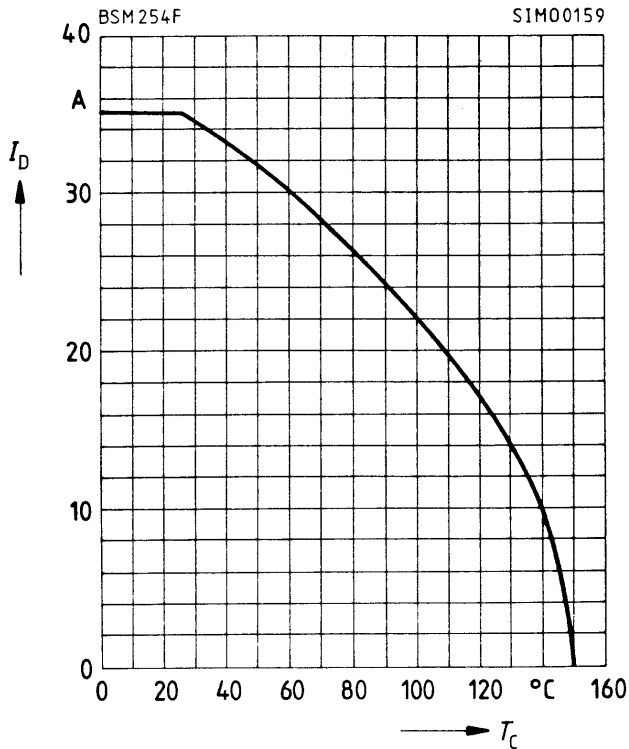
Safe operating area $I_D = f(V_{\text{DS}})$
parameter: single pulse, $T_C = 25\text{ }^\circ\text{C}$
 $T_j \leq 150\text{ }^\circ\text{C}$



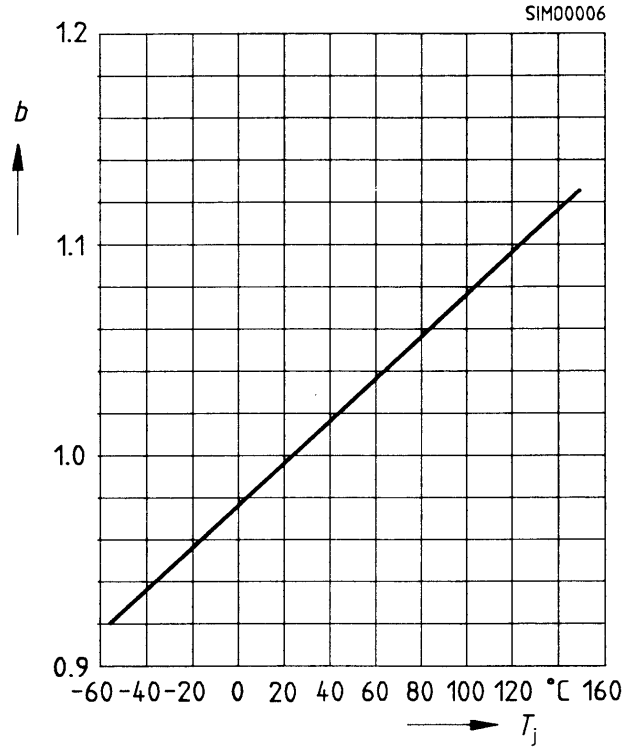
Typ. transfer characteristic $I_D = f(V_{\text{GS}})$
parameter: $t_p = 80\text{ }\mu\text{s}$, $V_{\text{DS}} = 25\text{ V}$



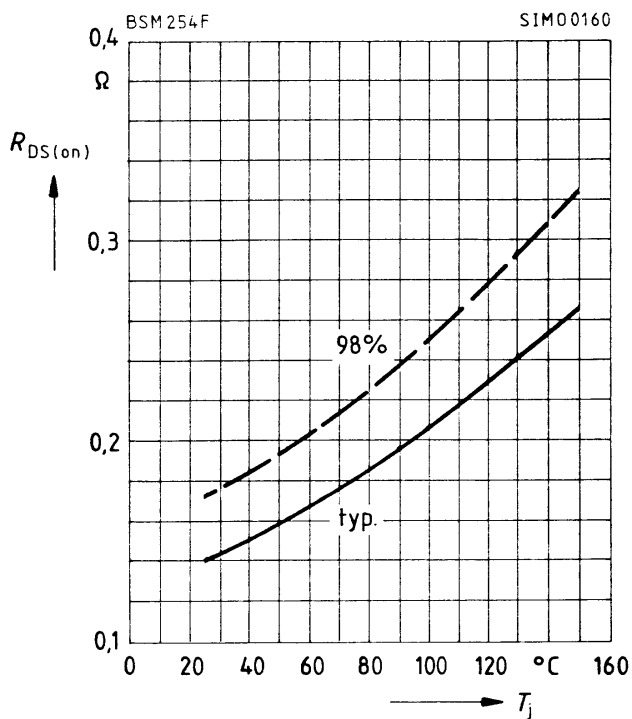
Drain current $I_D = f(T_C)$
 parameter: $V_{GS} \geq 10 \text{ V}$, $T_j = 150 \text{ }^\circ\text{C}$



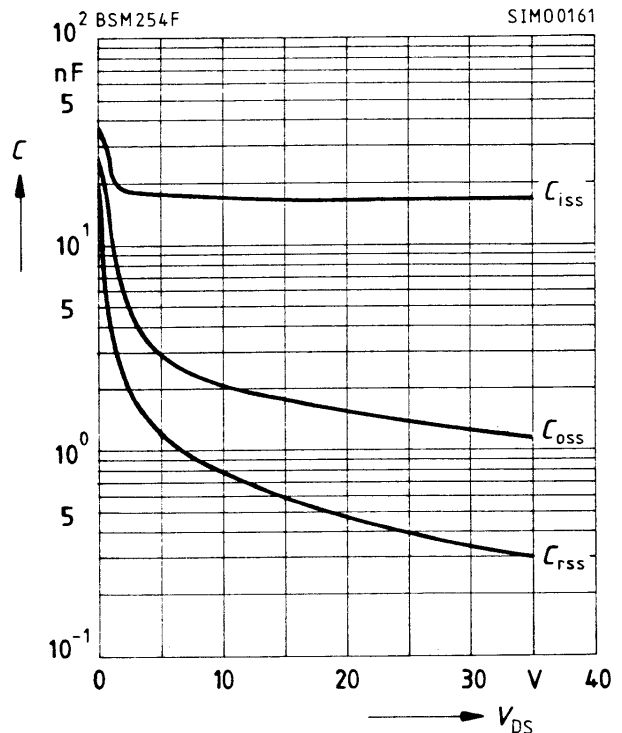
Drain-source breakdown voltage
 $V_{(BR)DSS}(T_j) = b \times V_{(BR)DSS}(25 \text{ }^\circ\text{C})$



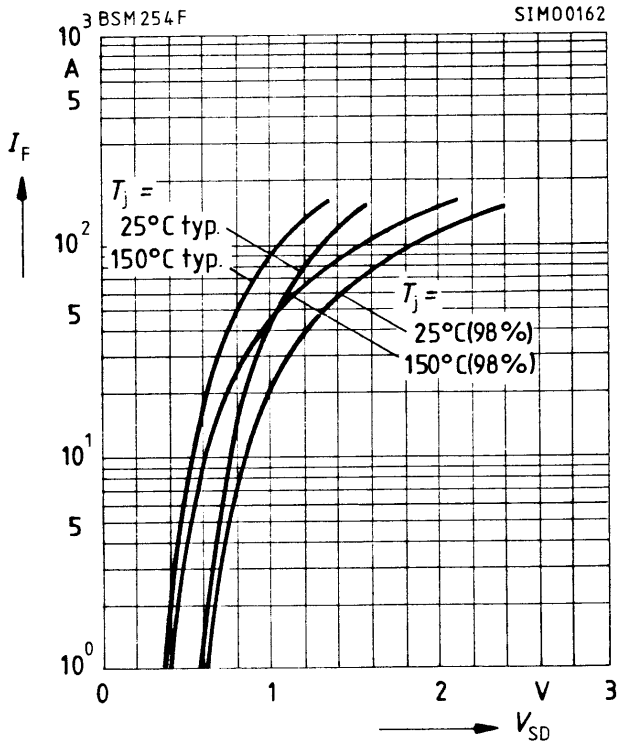
Drain source on-state resistance
 $R_{DS(on)} = f(T_j)$
 parameter: $I_D = 22 \text{ A}$; $V_{GS} = 10 \text{ V}$, (spread)



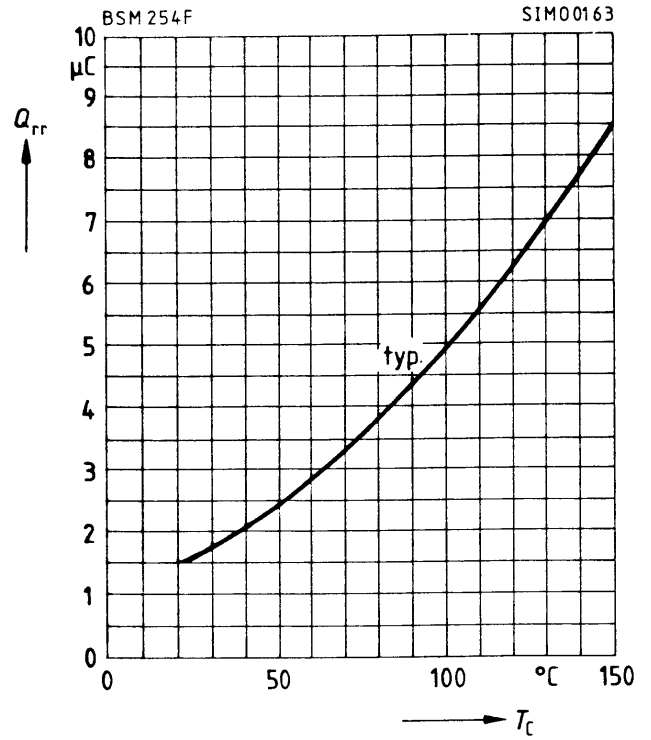
Typ. capacitances $C = f(V_{DS})$
 parameter: $V_{GS} = 0$, $f = 1 \text{ MHz}$ (spread)



Forward characteristics of fast-recovery reverse diode $I_F = f(V_{SD})$
 parameter: $T_j, t_p = 80 \mu s$ (spread)

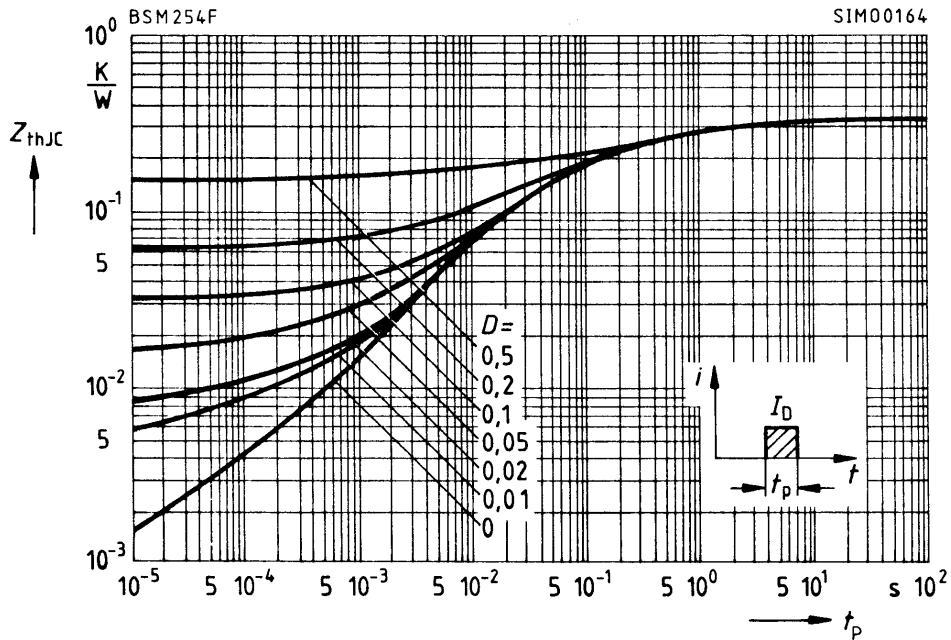


Typ. reverse recovery charge $Q_{rr} = f(T_j)$
 parameter: $di/dt = 100 \text{ A}/\mu\text{s}$, $I_F = 35 \text{ A}$
 $V_R = 100 \text{ V}$



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

parameter: $D = t_p/T$



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

parameter: $I_{Dpuls} = 52.5$ A

