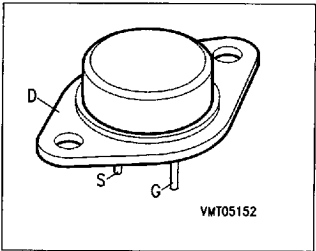


SIPMOS® Power Transistor

BUZ 94

- N channel
- Enhancement mode



| Type   | $V_{DS}$ | $I_D$ | $R_{DS(on)}$ | Package <sup>1)</sup> | Ordering Code   |
|--------|----------|-------|--------------|-----------------------|-----------------|
| BUZ 94 | 600 V    | 7.8 A | 0.9 $\Omega$ | TO-204 AA             | C67078-A1019-A2 |

Maximum Ratings

| Parameter                                                    | Symbol              | Values         | Unit               |
|--------------------------------------------------------------|---------------------|----------------|--------------------|
| Continuous drain current, $T_C = 27\text{ }^{\circ}\text{C}$ | $I_D$               | 7.8            | A                  |
| Pulsed drain current, $T_C = 25\text{ }^{\circ}\text{C}$     | $I_{D\text{ puls}}$ | 31             |                    |
| Drain-source voltage                                         | $V_{DS}$            | 600            | V                  |
| Drain-gate voltage, $R_{GS} = 20\text{ k}\Omega$             | $V_{DGR}$           | 600            |                    |
| Gate-source voltage                                          | $V_{GS}$            | $\pm 20$       |                    |
| Power dissipation, $T_C = 25\text{ }^{\circ}\text{C}$        | $P_{tot}$           | 125            | W                  |
| Operating and storage temperature range                      | $T_J, T_{stg}$      | - 55 ... + 150 | $^{\circ}\text{C}$ |
|                                                              |                     |                |                    |
| Thermal resistance, chip-case                                | $R_{th\text{ JC}}$  | $\leq 1.0$     | K/W                |
| DIN humidity category, DIN 40 040                            |                     | C              | -                  |
| IEC climatic category, DIN IEC 68-1                          |                     | 55/150/56      |                    |

1) See chapter Package Outlines.

Electrical Characteristics

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

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

Static characteristics

|                                                                                                                                                                 |                       |        |           |             |               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------|-----------|-------------|---------------|
| Drain-source breakdown voltage<br>$V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$                                                                                | $V_{(BR)\text{ DSS}}$ | 600    | –         | –           | V             |
| Gate threshold voltage<br>$V_{GS} = V_{DS}$ , $I_D = 1\text{ mA}$                                                                                               | $V_{GS(th)}$          | 2.1    | 3.0       | 4.9         |               |
| Zero gate voltage drain current<br>$V_{DS} = 600\text{ V}$ , $V_{GS} = 0\text{ V}$<br>$T_j = 25\text{ }^{\circ}\text{C}$<br>$T_j = 125\text{ }^{\circ}\text{C}$ | $I_{DSS}$             | –<br>– | 20<br>100 | 250<br>1000 | $\mu\text{A}$ |
| Gate-source leakage current<br>$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$                                                                                   | $I_{GSS}$             | –      | 10        | 100         | nA            |
| Drain-source on-resistance<br>$V_{GS} = 10\text{ V}$ , $I_D = 5.0\text{ A}$                                                                                     | $R_{DS(on)}$          | –      | 0.8       | 0.9         | $\Omega$      |

Dynamic characteristics

|                                                                                                                                                                    |              |     |     |     |             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----|-----|-----|-------------|
| Forward transconductance<br>$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$ , $I_D = 5.0\text{ A}$                                                                 | $g_{fs}$     | 2.7 | 5.0 | –   | S           |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                                                           | $C_{iss}$    | –   | 3.8 | 4.9 | $\text{pF}$ |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                                                          | $C_{oss}$    | –   | 250 | 400 |             |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                                                | $C_{rss}$    | –   | 100 | 170 |             |
| Turn-on time $t_{on}$ , ( $t_{on} = t_{d(on)} + t_r$ )<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 2.8\text{ A}$ , $R_{GS} = 50\text{ }\Omega$     | $t_{d(on)}$  | –   | 50  | 75  | ns          |
|                                                                                                                                                                    | $t_r$        | –   | 80  | 120 |             |
| Turn-off time $t_{off}$ , ( $t_{off} = t_{d(off)} + t_f$ )<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 2.8\text{ A}$ , $R_{GS} = 50\text{ }\Omega$ | $t_{d(off)}$ | –   | 330 | 430 |             |
|                                                                                                                                                                    | $t_f$        | –   | 110 | 140 |             |

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

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

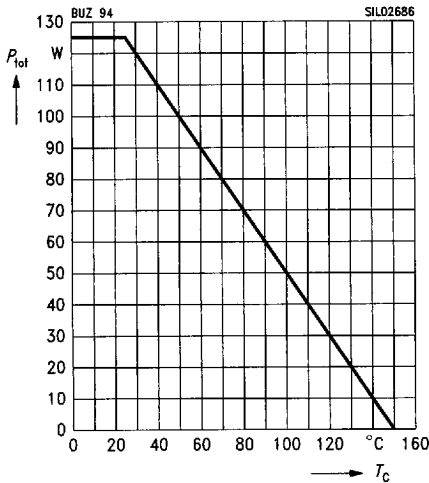
**Reverse diode**

|                                                                                                        |          |   |     |     |               |
|--------------------------------------------------------------------------------------------------------|----------|---|-----|-----|---------------|
| Continuous reverse drain current<br>$T_C = 25\text{ }^{\circ}\text{C}$                                 | $I_S$    | — | —   | 7.5 | A             |
| Pulsed reverse drain current<br>$T_C = 25\text{ }^{\circ}\text{C}$                                     | $I_{SM}$ | — | —   | 30  |               |
| Diode forward on-voltage<br>$I_S = 15\text{ A}$ , $V_{GS} = 0\text{ V}$                                | $V_{SD}$ | — | 1.3 | 1.7 | V             |
| Reverse recovery time<br>$V_R = 100\text{ V}$ , $I_F = I_S$ , $di_F / dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | — | 1.2 | —   | $\mu\text{s}$ |
| Reverse recovery charge<br>$V_R = 100\text{ V}$ , $I_F = I_S$ , $di_F / dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | — | 12  | —   | $\mu\text{C}$ |

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

Total power dissipation

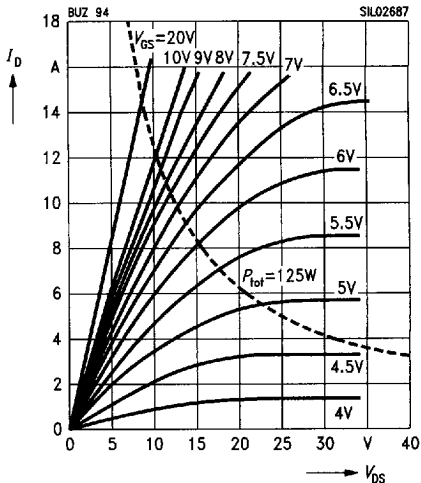
$P_{\text{tot}} = f(T_C)$



Typ. output characteristics

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

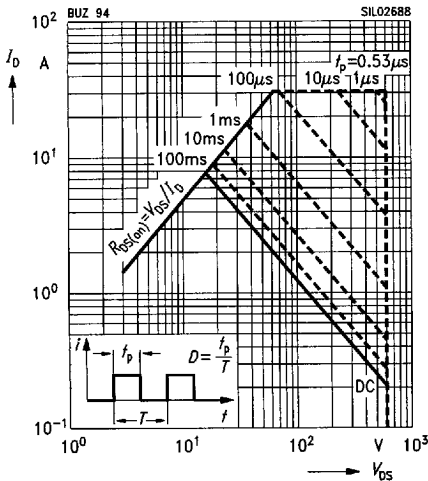
parameter:  $D = 0.01$ ,  $T_C = 25\text{ }^{\circ}\text{C}$



Safe operating area

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

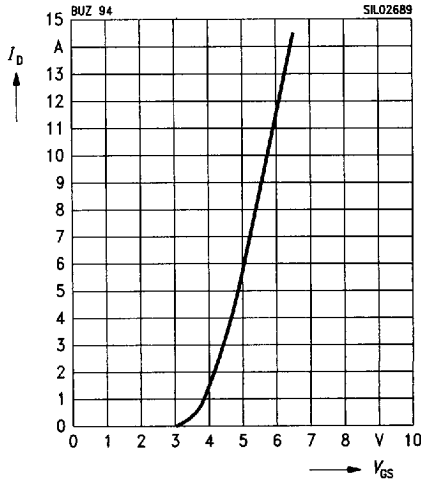
parameter:  $D = 0.01$ ,  $T_C = 25\text{ }^{\circ}\text{C}$



Typ. transfer characteristics

$I_D = f(V_{\text{GS}})$

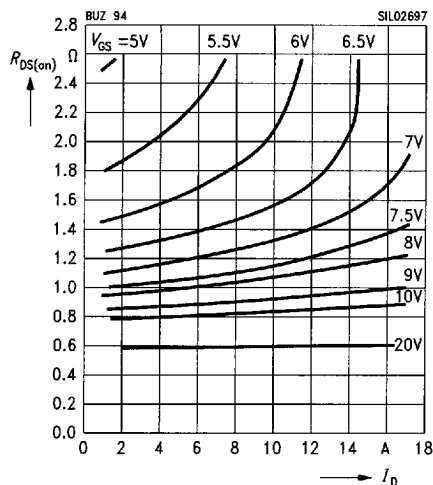
parameter:  $t_p = 80\text{ }\mu\text{s}$ ,  $V_{\text{DS}} = 25\text{ V}$



## Typ. drain-source on-resistance

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

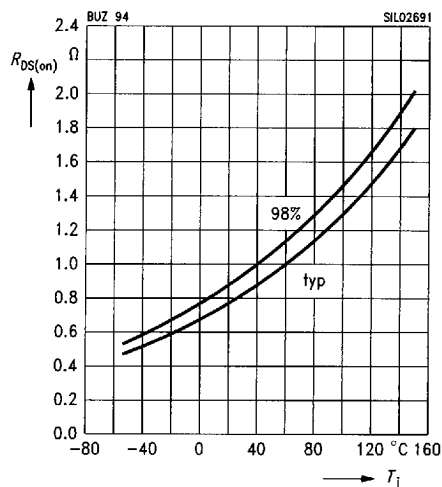
parameter:  $V_{GS}$



## Drain-source on-resistance

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

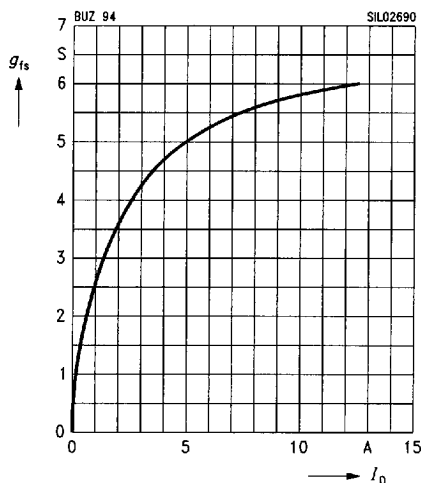
parameter:  $I_D = 5.0$  A,  $V_{GS} = 10$  V, (spread)



## Typ. forward transconductance

$$g_{fs} = f(I_D)$$

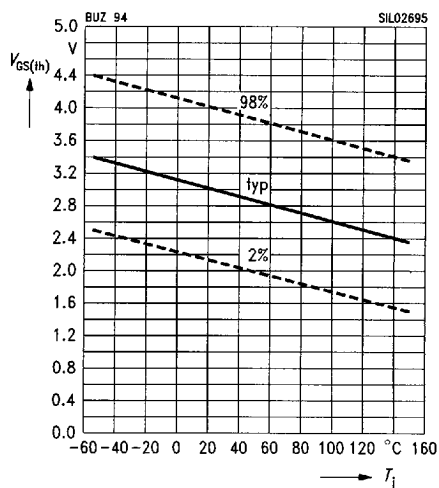
parameter:  $t_p = 80$   $\mu\text{s}$



## Gate threshold voltage

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

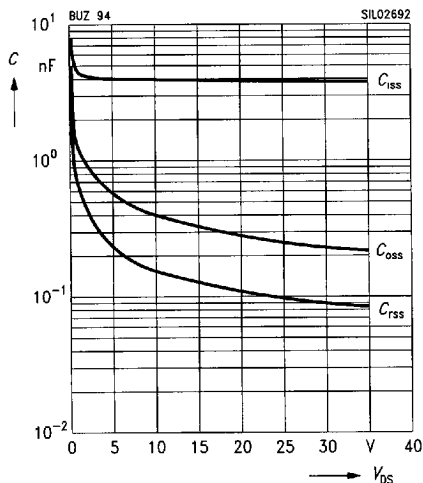
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1$  mA, (spread)



## Typ. capacitances

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

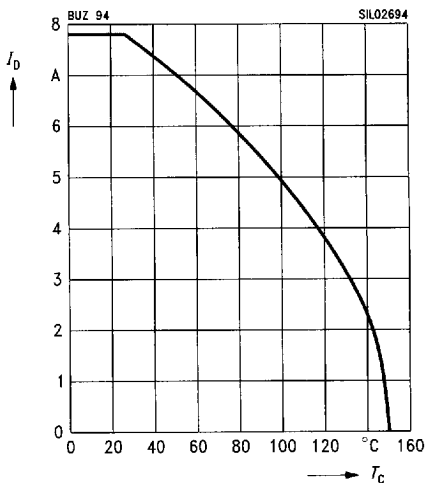
parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$



## Drain current

$$I_D = f(T_C)$$

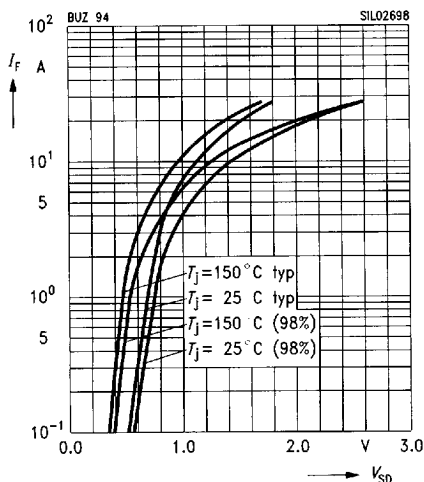
parameter:  $V_{GS} \geq 10 \text{ V}$



## Forward characteristics of reverse diode

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

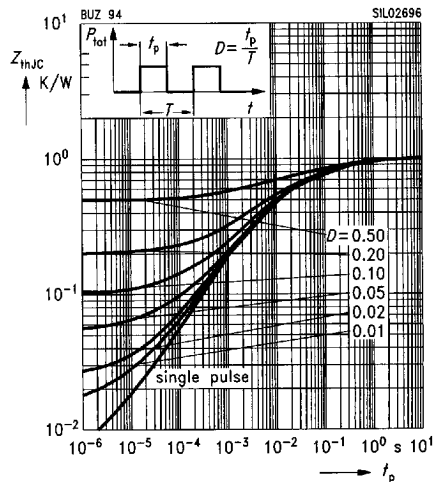
parameter:  $T_j = 80 \text{ }^{\circ}\text{C}$ ,  $t_p = 80 \text{ } \mu\text{s}$ , (spread)



## Transient thermal impedance

$$Z_{thJC} = f(t_p)$$

parameter:  $D = t_p / T$



Typ. gate charge

$V_{GS} = f(Q_{Gate})$

parameter:  $I_{D\,puls} = 11.7\,A$

