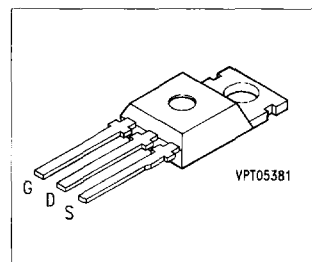


SIPMOS® Power Transistors

- N channel
- Enhancement mode
- Avalanche-rated

BUZ 12 BUZ 12 A



| Type | V_{DS} | I_D | T_C | $R_{DS(on)}$ | Package ¹⁾ | Ordering Code |
|-----------------|----------|-------|-------|----------------|-----------------------|-----------------|
| BUZ 12 | 50 V | 42 A | 65 °C | 0.028 Ω | TO-220 AB | C67078-S1331-A2 |
| BUZ 12 A | 50 V | 42 A | 44 °C | 0.035 Ω | TO-220 AB | C67078-S1331-A3 |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|--|---------------------|----------------|------|
| Continuous drain current | I_D | 42 | A |
| Pulsed drain current, $T_C = 25$ °C | $I_{D\text{ puls}}$ | 168 | |
| Avalanche current, limited by $T_{j\text{ max}}$ | I_{AR} | 42 | |
| Avalanche energy, periodic limited by $T_{j\text{ (max)}}$ | E_{AR} | 2.5 | mJ |
| Avalanche energy, single pulse $I_D = 42$ A, $V_{DD} = 25$ V, $R_{GS} = 25$ Ω $L = 23.2$ μ H, $T_j = 25$ °C | E_{AS} | 41 | |
| Gate-source voltage | V_{GS} | ± 20 | V |
| Power dissipation, $T_C = 25$ °C | P_{tot} | 125 | W |
| Operating and storage temperature range | T_j, T_{stg} | - 55 ... + 150 | °C |
| Thermal resistance, chip-case | R_{thJC} | ≤ 1.0 | K/W |
| DIN humidity category, DIN 40 040 | - | E | - |
| 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 $V_{GS} = 0\text{ V}$, $I_D = 0.25\text{ mA}$ | $V_{(BR)DSS}$ | 50 | – | – | 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 $V_{DS} = 50\text{ V}$, $V_{GS} = 0\text{ V}$ $T_j = 25\text{ }^\circ\text{C}$ $T_j = 125\text{ }^\circ\text{C}$ | I_{DSS} | – | 0.1 10 | 1.0 100 | μA |
| Gate-source leakage current $V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$ | I_{GSS} | – | 10 | 100 | nA |
| Drain-source on-resistance $V_{GS} = 10\text{ V}$, $I_D = 32\text{ A}$ | $R_{DS(on)}$ | – | 0.024 0.030 | 0.028 0.035 | Ω |
| | | | | | BUZ 12 BUZ 12 A |

Dynamic characteristics

| | | | | | |
|--|--------------|------|------|------|----|
| Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, $I_D = 32\text{ A}$ | g_{fs} | 12.0 | 23.0 | – | S |
| Input capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | C_{iss} | – | 1700 | 2300 | pF |
| Output capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | C_{oss} | – | 800 | 1200 | |
| Reverse transfer capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$ | C_{rss} | – | 280 | 420 | |
| Turn-on time t_{on} , ($t_{on} = t_{d(on)} + t_r$) $V_{DD} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 3\text{ A}$, $R_{GS} = 50\text{ }\Omega$ | $t_{d(on)}$ | – | 35 | 50 | ns |
| | t_r | – | 85 | 130 | |
| Turn-off time t_{off} , ($t_{off} = t_{d(off)} + t_f$) $V_{DD} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 3\text{ A}$, $R_{GS} = 50\text{ }\Omega$ | $t_{d(off)}$ | – | 220 | 280 | |
| | t_f | – | 140 | 180 | |

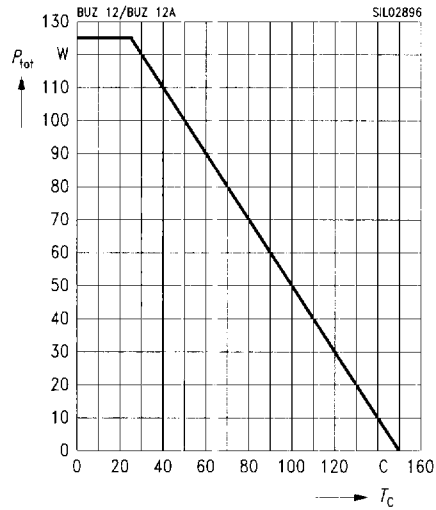
Electrical Characteristics (cont'd)
at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified.

| Parameter | Symbol | Values | | | Unit |
|---|----------|--------|------|------|---------------|
| | | min. | typ. | max. | |
| Reverse diode | | | | | |
| Continuous reverse drain current $T_C = 25\text{ }^\circ\text{C}$ | I_S | – | | 42 | A |
| Pulsed reverse drain current $T_C = 25\text{ }^\circ\text{C}$ | I_{SM} | – | | 168 | |
| Diode forward on-voltage $I_S = 84\text{ A}$, $V_{GS} = 0\text{ V}$ | V_{SD} | – | 1.8 | 2.2 | V |
| Reverse recovery time $V_R = 30\text{ V}$, $I_F = I_S$, $di_F / dt = 100\text{ A}/\mu\text{s}$ | t_{rr} | – | 80 | – | ns |
| Reverse recovery charge $V_R = 30\text{ V}$, $I_F = I_S$, $di_F / dt = 100\text{ A}/\mu\text{s}$ | Q_{rr} | – | 0.14 | – | μC |

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

Total power dissipation

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

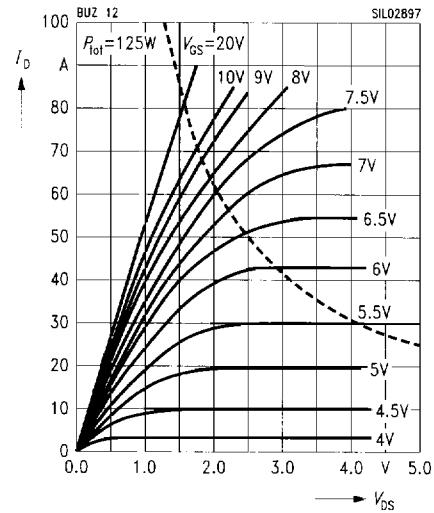


Typ. output characteristics

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

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

BUZ 12

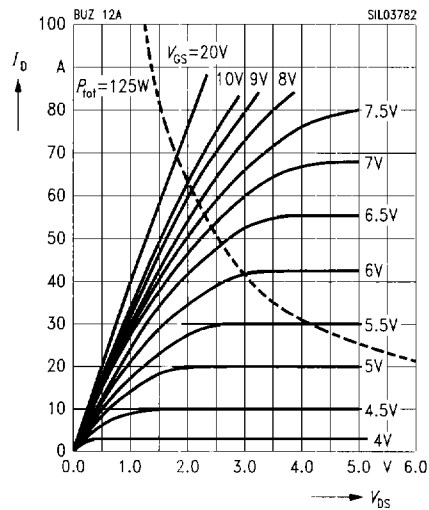


Typ. output characteristics

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

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

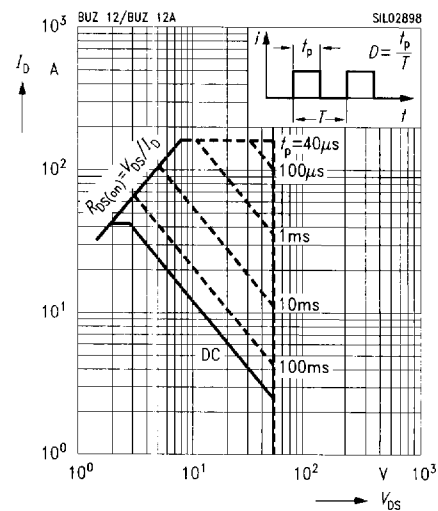
BUZ 12 A



Safe operating area

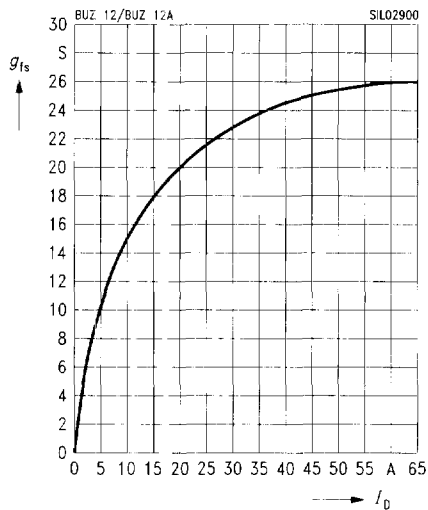
$$I_D = f(V_{\text{DS}})$$

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



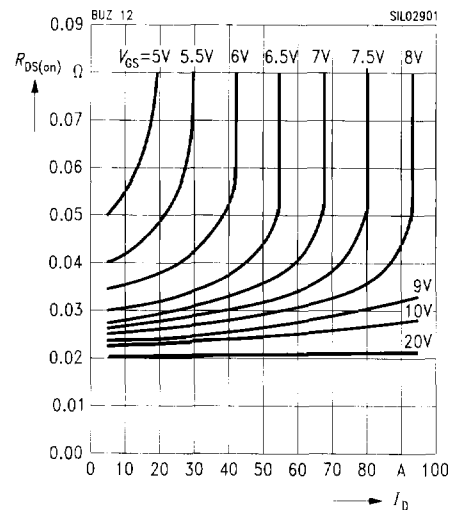
Typ. forward transconductance

$g_{fs} = f(I_D)$
parameter: $t_p = 80 \mu s$



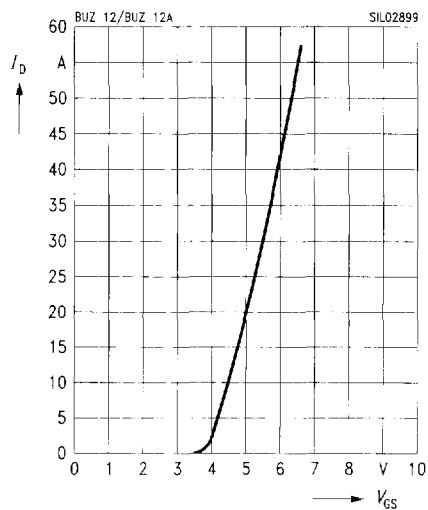
Typ. drain-source on-resistance

$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



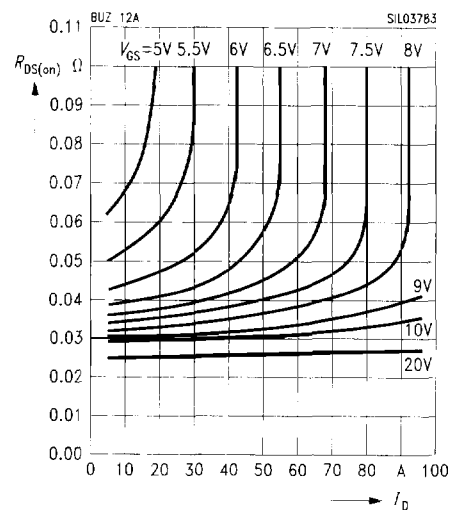
Typ. transfer characteristics

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



Typ. drain-source on-resistance

$R_{DS(on)} = f(I_D)$
parameter: V_{GS}

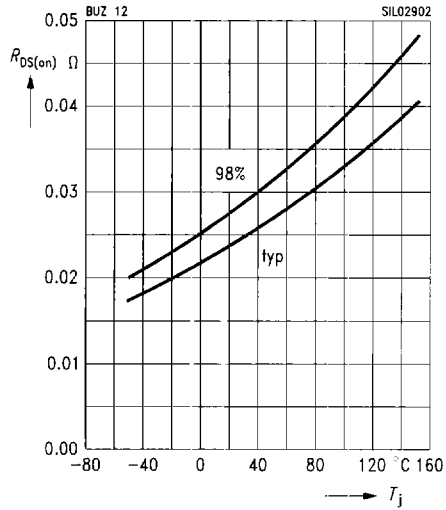


Drain-source on-resistance

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

BUZ 12

parameter: $I_D = 32\text{ A}$, $V_{GS} = 10\text{ V}$, (spread)

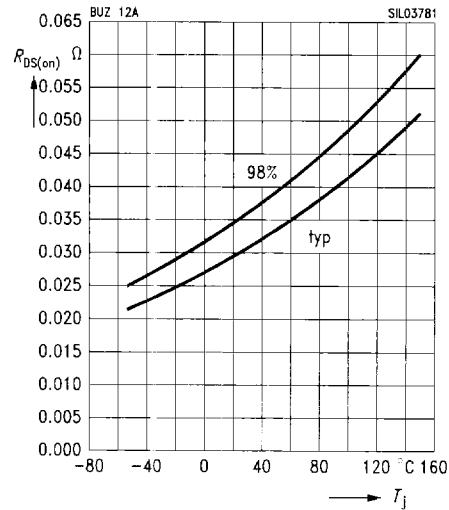


Drain-source on-resistance

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

BUZ 12 A

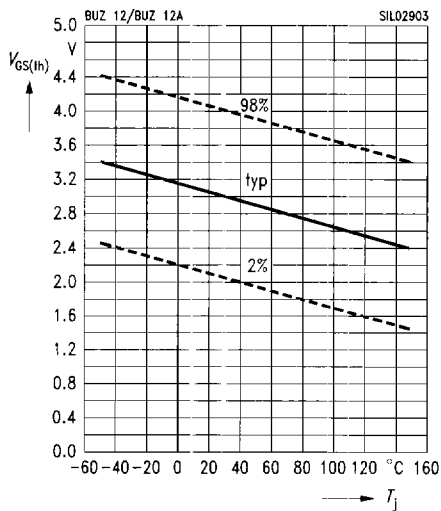
parameter: $I_D = 32\text{ A}$, $V_{GS} = 10\text{ V}$, (spread)



Gate threshold voltage

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

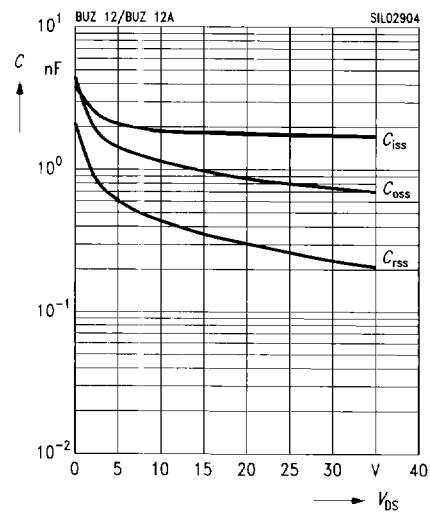
parameter: $V_{GS} = V_{DS}$, $I_D = 1\text{ mA}$, (spread)



Typ. capacitances

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

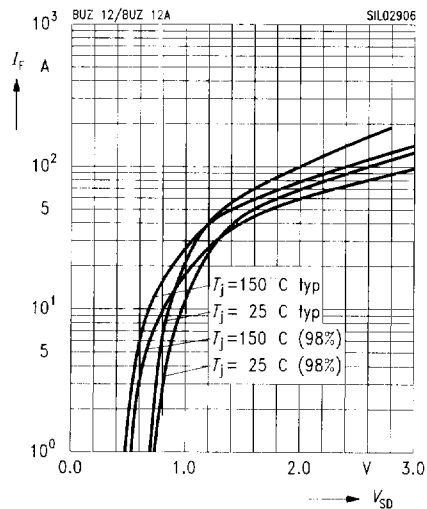
parameter: $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$



Forward characteristics of reverse diode

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

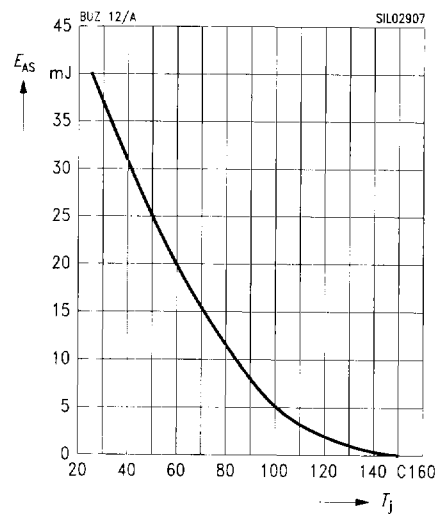
parameter: $T_j, t_p = 80 \mu\text{s}$, (spread)



Avalanche energy $E_{AS} = f(T_j)$

parameter: $I_D = 42 \text{ A}$, $V_{DD} = 25 \text{ V}$

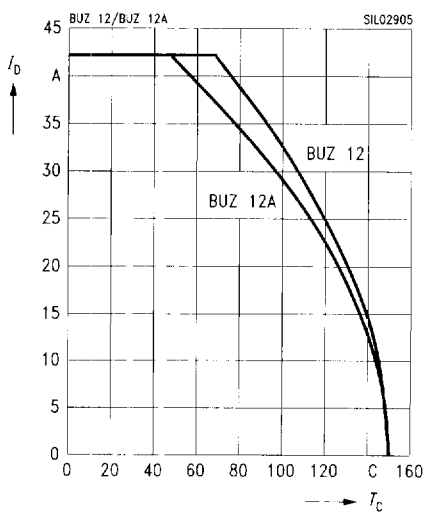
$R_{GS} = 25 \Omega$, $L = 23.2 \mu\text{H}$



Drain current

$$I_D = f(T_C)$$

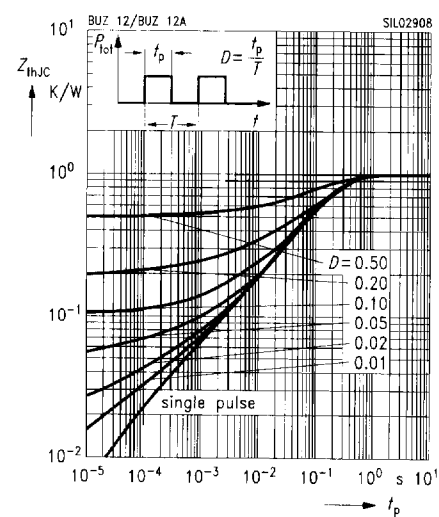
parameter: $V_{GS} \geq 10 \text{ V}$



Transient thermal impedance

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

parameter: $D = t_p / T$



Typ. gate charge

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

parameter: $I_{D\ puls} = 63.0\ A$

