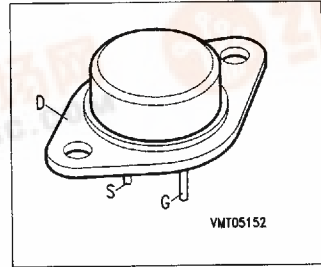


## SIPMOS® Power Transistor

## BUZ 15

- N channel
- Enhancement mode
- Avalanche-rated



Type	$V_{DS}$	$I_D$	$R_{DS(on)}$	Package <sup>1)</sup>	Ordering Code
BUZ 15	50 V	45 A	0.03 $\Omega$	TO-204 AE	C67078-S1001-A2

### Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current, $T_C = 28^\circ\text{C}$	$I_D$	45	A
Pulsed drain current, $T_C = 25^\circ\text{C}$	$I_{D,puls}$	180	
Avalanche current, limited by $T_{j,max}$	$I_{AR}$	45	
Avalanche energy, periodic limited by $T_{j(max)}$	$E_{AR}$	2.5	mJ
Avalanche energy, single pulse $I_D = 42\text{ A}$ , $V_{DD} = 25\text{ V}$ , $R_{GS} = 25\ \Omega$ $L = 20.2\ \mu\text{H}$ , $T_j = 25^\circ\text{C}$	$E_{AS}$	41	
Gate-source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation, $T_C = 25^\circ\text{C}$	$P_{tot}$	125	W
Operating and storage temperature range	$T_j, T_{sig}$	- 55 ... + 150	$^\circ\text{C}$
Thermal resistance, chip-case	$R_{th,JC}$	$\leq 1.0$	K/W
DIN humidity category, DIN 40 040	-	C	-
IEC climatic category, DIN IEC 68-1	-	55/150/56	



### Electrical Characteristics

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

### Static characteristics

Drain-source breakdown voltage $V_{GS} = 0\text{ V}, I_D = 0.25\text{ mA}$	$V_{(BR)DSS}$	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 $V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$ $T_j = 25\text{ °C}$ $T_j = 125\text{ °C}$	$I_{DSS}$	–	0.1 10	1.0 100	$\mu\text{A}$
Gate-source leakage current $V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	$I_{GSS}$	–	10	100	nA
Drain-source on-resistance $V_{GS} = 10\text{ V}, I_D = 29\text{ A}$	$R_{DS(on)}$	–	0.025	0.030	$\Omega$

### Dynamic characteristics

Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}, I_D = 29\text{ A}$	$g_{fs}$	7.0	22.0	–	S
Input capacitance $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	$C_{iss}$	–	1800	2400	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	450	
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.	

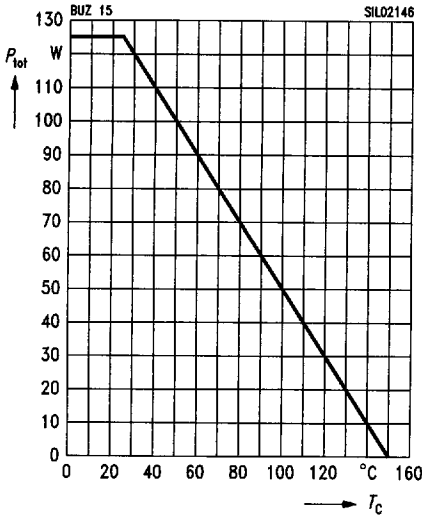
### Reverse diode

Continuous reverse drain current $T_C = 25\text{ }^\circ\text{C}$	$I_S$	–	–	45	A
Pulsed reverse drain current $T_C = 25\text{ }^\circ\text{C}$	$I_{SM}$	–	–	180	
Diode forward on-voltage $I_S = 90\text{ A}$ , $V_{GS} = 0\text{ V}$	$V_{SD}$	–	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	–	$\mu\text{C}$

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

### Total power dissipation

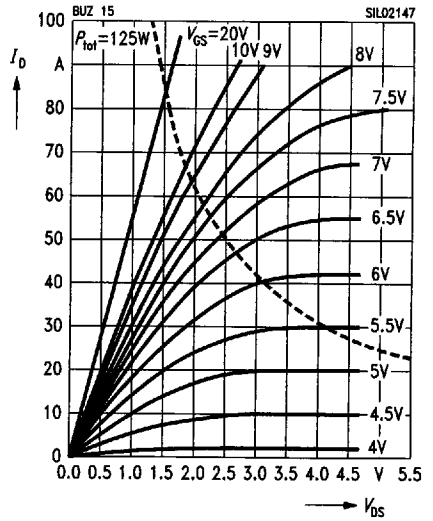
$$P_{\text{tot}} = f(T_C)$$



### Typ. output characteristics

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

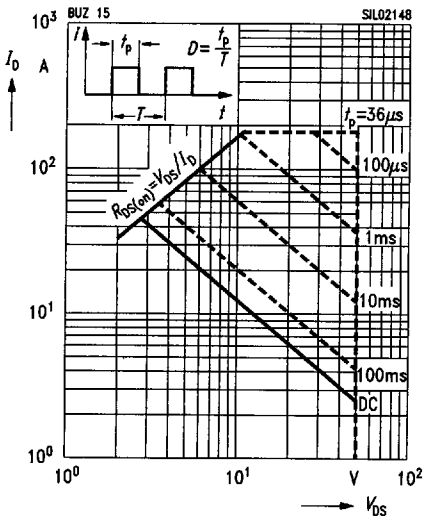
parameter:  $t_p = 80 \mu\text{s}$



### Safe operating area

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

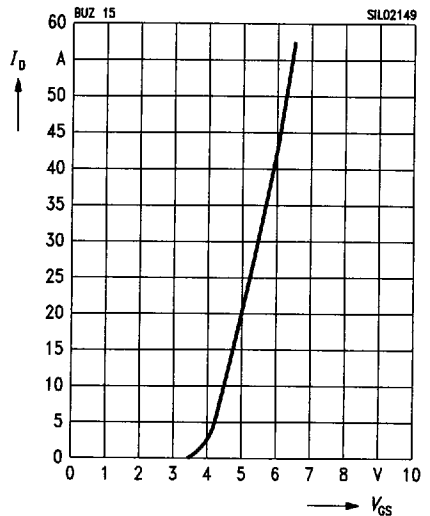
parameter:  $D = 0.01$ ,  $T_C = 25^\circ\text{C}$



### Typ. transfer characteristics

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

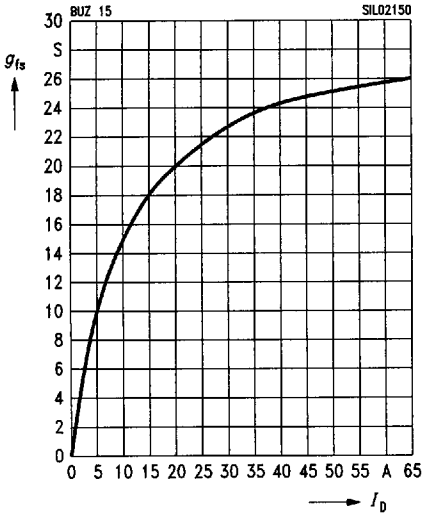
parameter:  $t_p = 80 \mu\text{s}$ ,  $V_{DS} = 25 \text{ V}$



### Typ. forward transconductance

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

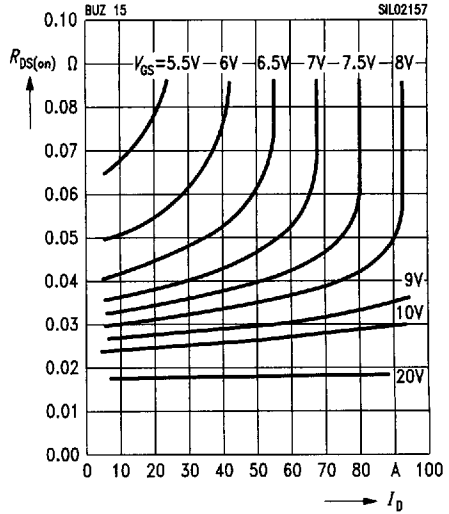
parameter:  $t_p = 80 \mu s$



### Typ. drain-source on-resistance

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

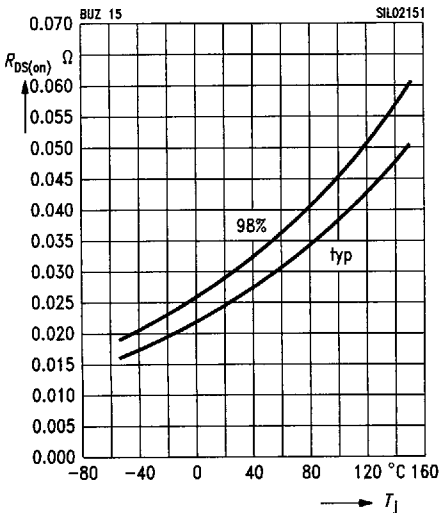
parameter:  $V_{GS}$



### Drain-source on-resistance

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

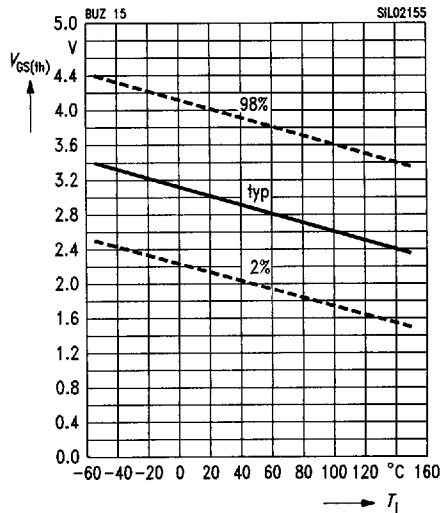
parameter:  $I_D = 29$  A,  $V_{GS} = 10$  V, (spread)



### Gate threshold voltage

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

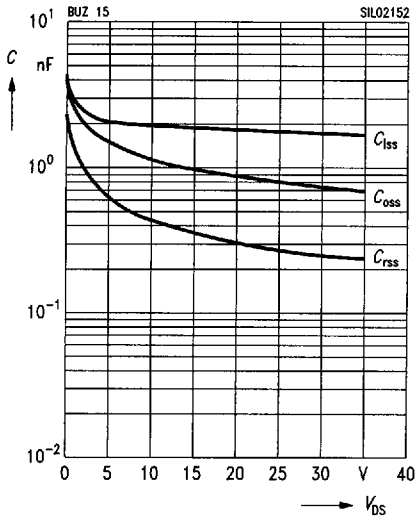
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1$  mA, (spread)



### Typ. capacitances

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

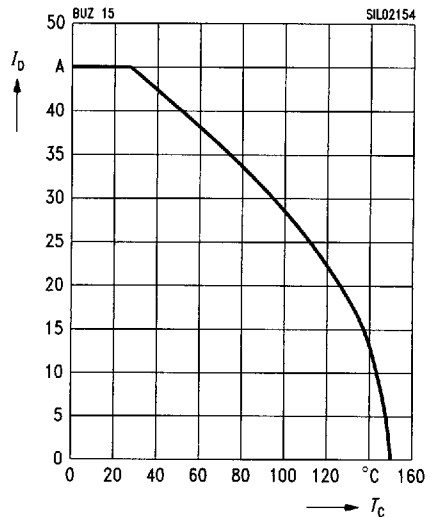
parameter:  $V_{GS} = 0\text{ V}$ ,  $f = 1\text{ MHz}$



### Drain current

$$I_D = f(T_C)$$

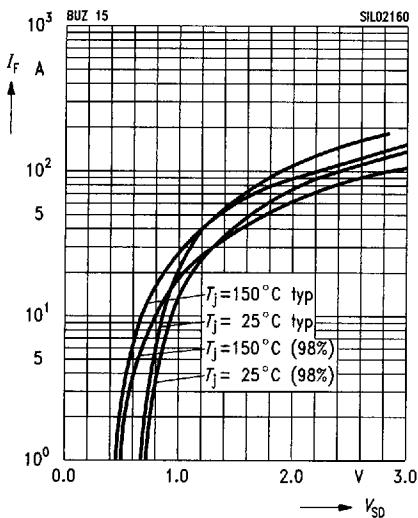
parameter:  $V_{GS} \geq 10\text{ V}$



### Forward characteristics of reverse diode

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

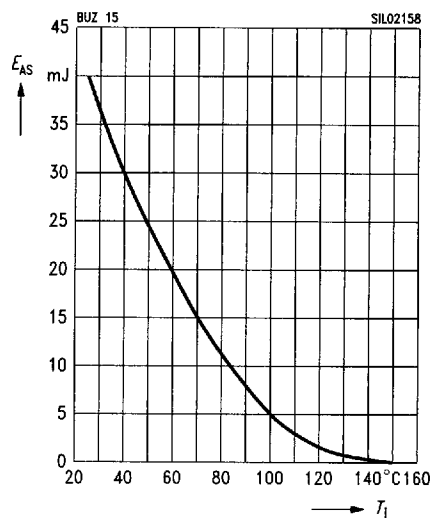
parameter:  $T_j$ ,  $t_p = 80\ \mu\text{s}$ , (spread)



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

parameter:  $I_D = 45\text{ A}$ ,  $V_{DD} = 25\text{ V}$

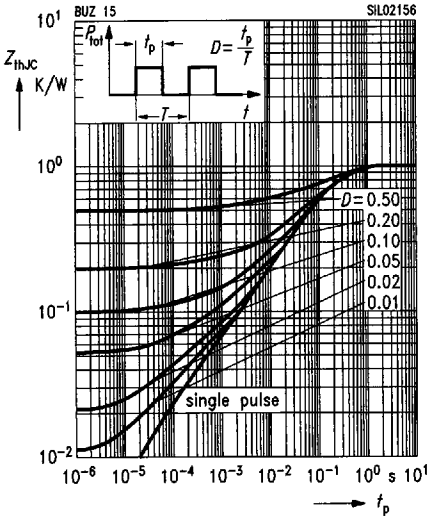
$R_{GS} = 25\ \Omega$ ,  $L = 20.2\ \mu\text{H}$



**Transient thermal impedance**

$Z_{thJC} = f(t_p)$

parameter:  $D = t_p / T$



**Typ. gate charge**

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

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

