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SIPMOS® Power Transistor

BUZ 21

- N channel
- Enhancement mode
- Avalanche-rated
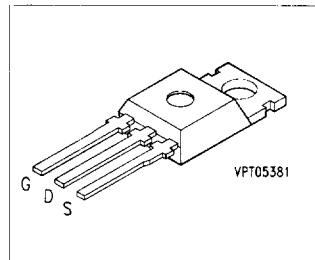
Type	V_{DS}	I_D	$R_{DS\,(on)}$	Package [1]	Ordering Code
BUZ 21	100 V	21 A	0.085 Ω	TO-220 AB	C67078-S1308-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current, $T_C = 25\ °C$	I_D	21	A
Pulsed drain current, $T_C = 25\ °C$	$I_{D\,puls}$	84	
Avalanche current, limited by $T_{j\,max}$	I_{AR}	21	
Avalanche energy, periodic limited by $T_{j\,(max)}$	E_{AR}	11	mJ
Avalanche energy, single pulse $I_D = 21$ A, $V_{DD} = 25$ V, $R_{GS} = 25\ \Omega$ $L = 340\ \mu H$, $T_j = 25\ °C$	E_{AS}	100	
Gate-source voltage	V_{GS}	± 20	V
Power dissipation, $T_C = 25\ °C$	P_{tot}	75	W
Operating and storage temperature range	T_j , T_{stg}	– 55 ... + 150	°C

Thermal resistance, chip-case	$R_{th\,JC}$	≤ 1.67	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 $T_j = 25$ °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static characteristics					
Drain-source breakdown voltage $V_{GS} = 0$ V, $I_D = 0.25$ mA	$V_{(BR) DSS}$	100	–	–	V
Gate threshold voltage $V_{GS} = V_{DS}$, $I_D = 1$ mA	$V_{GS (th)}$	2.1	3.0	4.0	
Zero gate voltage drain current $V_{DS} = 100$ V, $V_{GS} = 0$ V	I_{DSS}				µA
$T_j = \quad 25$ °C		–	0.1	1.0	
$T_j = \; 125$ °C		–	10	100	
Gate-source leakage current $V_{GS} = 20$ V, $V_{DS} = 0$ V	I_{GSS}	–	10	100	nA
Drain-source on-resistance $V_{GS} = 10$ V, $I_D = 13$ A	$R_{DS (on)}$	–	0.065	0.085	Ω
Dynamic characteristics					
Forward transconductance $V_{DS} \geq 2$ x I_D x $R_{DS(on)max}$, $I_D = 13$ A	g_{fs}	8	11	–	S
Input capacitance $V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1$ MHz	C_{iss}	–	1000	1300	pF
Output capacitance $V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1$ MHz	C_{oss}	–	300	530	
Reverse transfer capacitance $V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1$ MHz	C_{rss}	–	150	240	
Turn-on time t_{on} , ($t_{on} = t_{d (on)} + t_r$) $V_{DD} = 30$ V, $V_{GS} = 10$ V, $I_D = 3$ A, $R_{GS} = 50$ Ω	$t_{d (on)}$	–	25	40	ns
	t_r	–	50	75	
Turn-off time t_{off} , ($t_{off} = t_{d (off)} + t_f$) $V_{DD} = 30$ V, $V_{GS} = 10$ V, $I_D = 3$ A, $R_{GS} = 50$ Ω	$t_{d (off)}$	–	160	210	
	t_f	–	80	110	

Electrical Characteristics (cont'd)

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse diode					
Continuous reverse drain current $T_C = 25\ °C$	I_S	–	–	21	A
Pulsed reverse drain current $T_C = 25\ °C$	I_{SM}	–	–	84	
Diode forward on-voltage $I_S = 42\ A$, $V_{GS} = 0\ V$	V_{SD}	–	1.3	1.7	V
Reverse recovery time $V_R = 30\ V$, $I_F = I_S$, $d i_F / d t = 100\ A/\mu s$	t_{rr}	–	150	–	ns
Reverse recovery charge $V_R = 30\ V$, $I_F = I_S$, $d i_F / d t = 100\ A/\mu s$	Q_{rr}	–	0.48	–	μC

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Characteristics at $T_i = 25$ °C, unless otherwise specified.

Total power dissipation

$P_{tot} = f(T_C)$
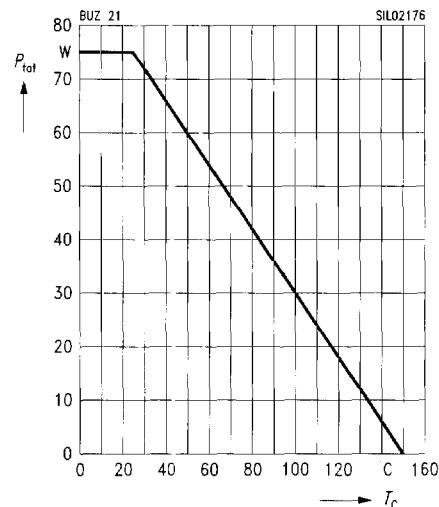
Typ. output characteristics

$I_D = f(V_{DS})$

parameter: $t_p = 80$ μs
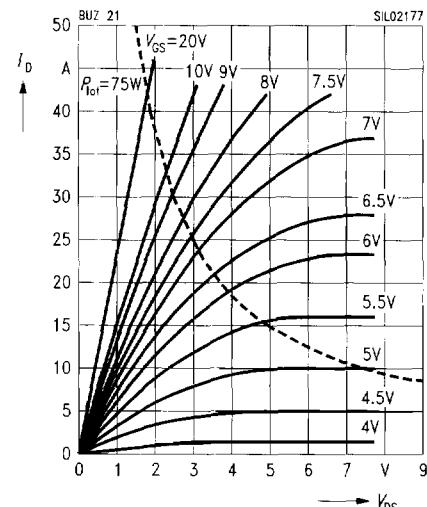
Safe operating area

$I_D = f(V_{DS})$

parameter: $D = 0.01$, $T_C = 25$ °C
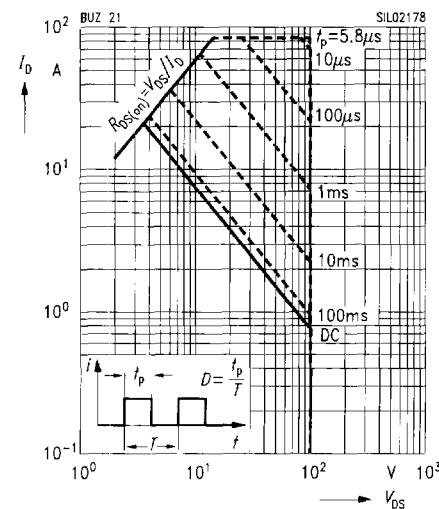
Typ. transfer characteristics

$I_D = f(V_{GS})$

parameter: $t_p = 80$ μs, $V_{DS} = 25$ V
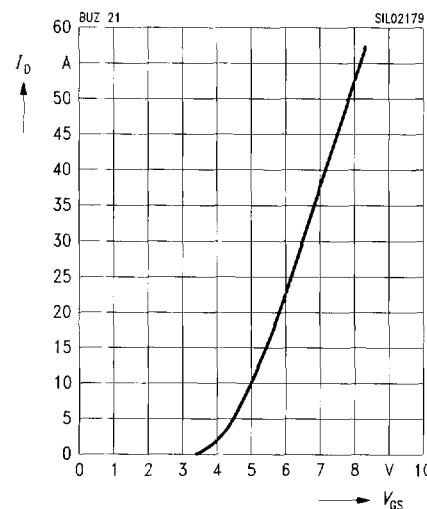
Typ. drain-source on-resistance

$R_{DS\,(on)} = f(I_D)$
parameter: V_{GS}
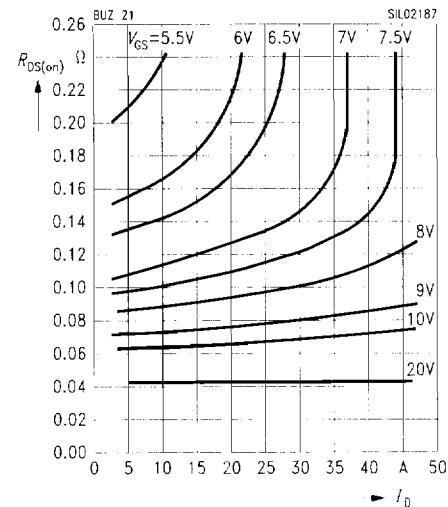
Drain-source on-resistance

$R_{DS\,(on)} = f(T_j)$
parameter: $I_D = 13$ A, $V_{GS} = 10$ V, (spread)
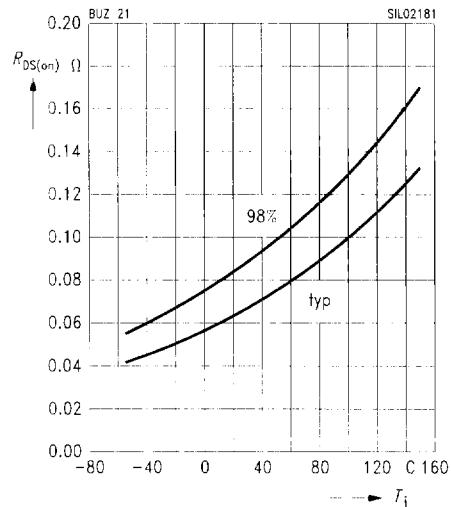
Typ. forward transconductance

$g_{fs} = f(I_D)$
parameter: $t_p = 80$ µs
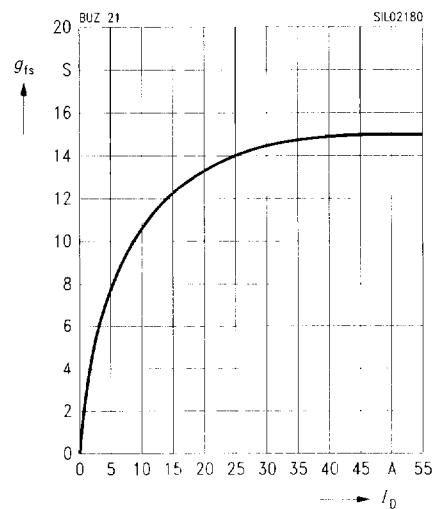

Gate threshold voltage

$V_{GS\,(th)} = f(T_j)$
parameter: $V_{GS} = V_{DS}$, $I_D = 1$ mA, (spread)
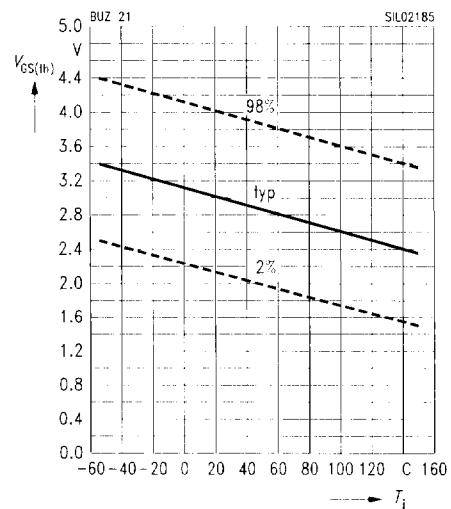
Typ. capacitances
$C = f(V_{DS})$
parameter: $V_{GS} = 0$ V, $f = 1$ MHz
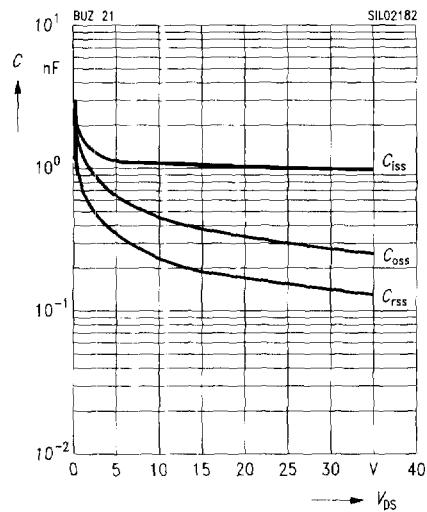
Drain current
$I_D = f(T_C)$
parameter: $V_{GS} \geq 10$ V
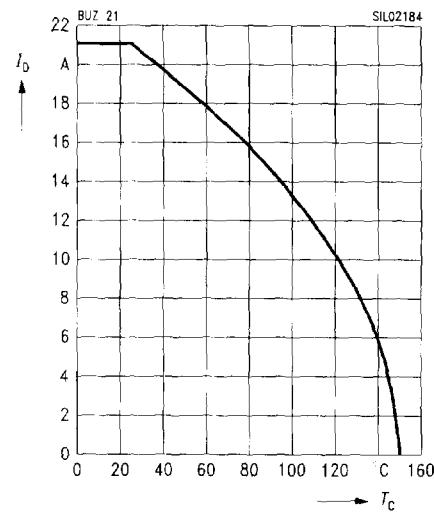
**Forward characteristics of reverse diode**
$I_F = f(V_{SD})$
parameter: T_j, $t_p = 80$ µs, (spread)

$T_j = 150$ °C typ
$T_j = 25$ °C typ
$T_j = 150$ °C (98%)
$T_j = 25$ °C (98%)
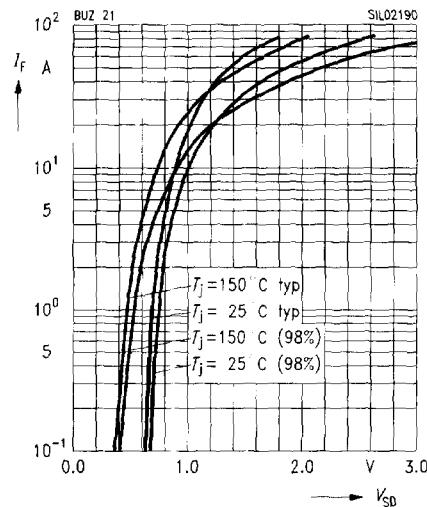
Avalanche energy $E_{AS} = f(T_j)$
parameter: $I_D = 21$ A, $V_{DD} = 25$ V
$R_{GS} = 25$ Ω, $L = 340$ µH
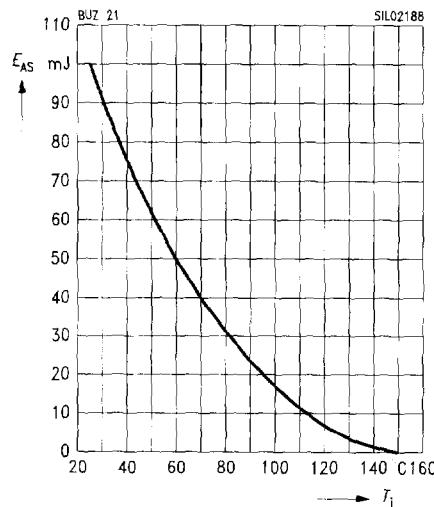
Transient thermal impedance

$Z_{th\,JC} = f(t_p)$

parameter: $D = t_p / T$
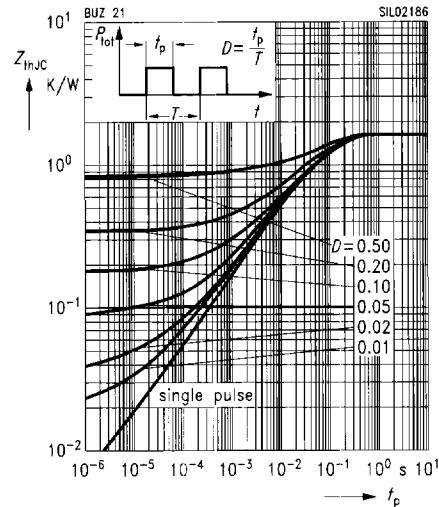
Typ. gate charge

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

parameter: $I_{D\,puls} = 36.0$ A