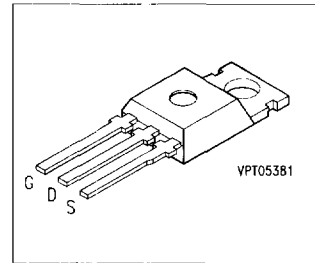


## SIPMOS® Power Transistor

## BUZ 40 B

- N channel
- Enhancement mode
- Avalanche-rated



Type	$V_{DS}$	$I_D$	$R_{DS(on)}$	Package <sup>1)</sup>	Ordering Code
BUZ 40 B	500 V	8.5 A	0.8 $\Omega$	TO-220 AB	C67078-S1305-A4

### Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current, $T_C = 35\text{ °C}$	$I_D$	<b>8.5</b>	A
Pulsed drain current, $T_C = 25\text{ °C}$	$I_{D\text{ puls}}$	<b>34</b>	
Avalanche current, limited by $T_{j\text{ max}}$	$I_{AR}$	<b>10</b>	
Avalanche energy, periodic limited by $T_{j\text{ (max)}}$	$E_{AR}$	<b>13</b>	mJ
Avalanche energy, single pulse $I_D = 10\text{ A}, V_{DD} = 50\text{ V}, R_{GS} = 25\text{ }\Omega$ $L = 10.3\text{ mH}, T_j = 25\text{ °C}$	$E_{AS}$	<b>570</b>	
Gate-source voltage	$V_{GS}$	<b><math>\pm 20</math></b>	V
Power dissipation, $T_C = 25\text{ °C}$	$P_{tot}$	<b>75</b>	W
Operating and storage temperature range	$T_j, T_{stg}$	<b><math>- 55 \dots + 150</math></b>	$^{\circ}\text{C}$
Thermal resistance, chip-case	$R_{th\text{ JC}}$	<b><math>\leq 0.83</math></b>	K/W
DIN humidity category, DIN 40 040		<b>E</b>	–
IEC climatic category, DIN IEC 68-1		<b>55/150/56</b>	

1) See chapter Package Outlines.

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

**Static characteristics**

Drain-source breakdown voltage $V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$	$V_{(BR)DSS}$	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 $V_{DS} = 500\text{ V}$ , $V_{GS} = 0\text{ V}$ $T_j = 25\text{ °C}$ $T_j = 125\text{ °C}$	$I_{DSS}$	–	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 $V_{GS} = 10\text{ V}$ , $I_D = 5.5\text{ A}$	$R_{DS(on)}$	–	0.6	0.8	W

**Dynamic characteristics**

Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$ , $I_D = 5.5\text{ A}$	$g_{fs}$	5.0	8.0	–	S
Input capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{iss}$	–	1500	2300	pF
Output capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{oss}$	–	180	270	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{rss}$	–	65	100	
Turn-on time $t_{on}$ , ( $t_{on} = t_{d(on)} + t_r$ ) $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$ , $R_{GS} = 50\ \Omega$	$t_{d(on)}$	–	20	30	ns
	$t_r$	–	70	110	
Turn-off time $t_{off}$ , ( $t_{off} = t_{d(off)} + t_f$ ) $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$ , $R_{GS} = 50\ \Omega$	$t_{d(off)}$	–	260	340	
	$t_f$	–	80	100	

### Electrical Characteristics (cont'd)

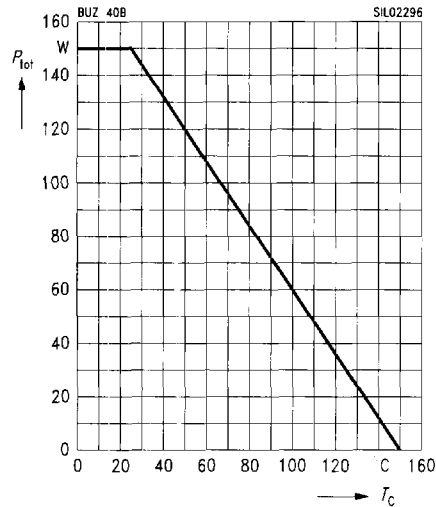
at  $T_j = 25\text{ °C}$ , unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Reverse diode</b>					
Continuous reverse drain current $T_C = 25\text{ °C}$	$I_S$	–	–	8.5	A
Pulsed reverse drain current $T_C = 25\text{ °C}$	$I_{SM}$	–	–	34	
Diode forward on-voltage $I_S = 20\text{ A}$ , $V_{GS} = 0\text{ V}$	$V_{SD}$	–	1.1	1.3	V
Reverse recovery time $V_R = 100\text{ V}$ , $I_F = I_S$ , $di_F / dt = 100\text{ A}/\mu\text{s}$	$t_{rr}$	–	380	–	ns
Reverse recovery charge $V_R = 100\text{ V}$ , $I_F = I_S$ , $di_F / dt = 100\text{ A}/\mu\text{s}$	$Q_{rr}$	–	4	–	$\mu\text{C}$

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

**Total power dissipation**

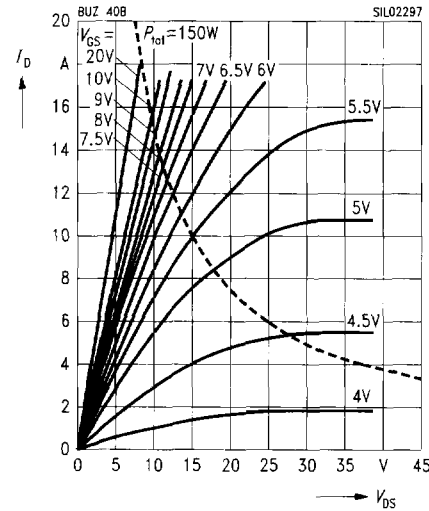
$P_{\text{tot}} = f(T_C)$



**Typ. output characteristics**

$I_D = f(V_{DS})$

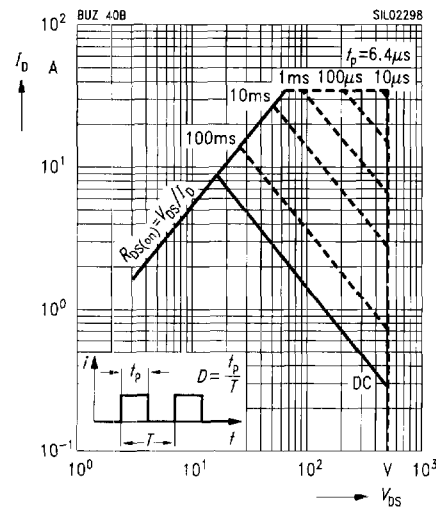
parameter:  $t_p = 80\text{ }\mu\text{s}$



**Safe operating area**

$I_D = f(V_{DS})$

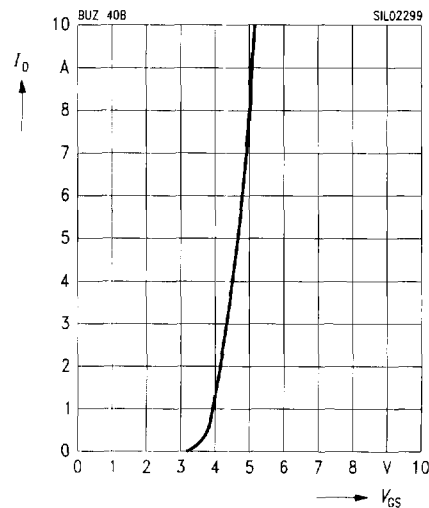
parameter:  $D = 0.01$ ,  $T_C = 25\text{ }^\circ\text{C}$



**Typ. transfer characteristics**

$I_D = f(V_{GS})$

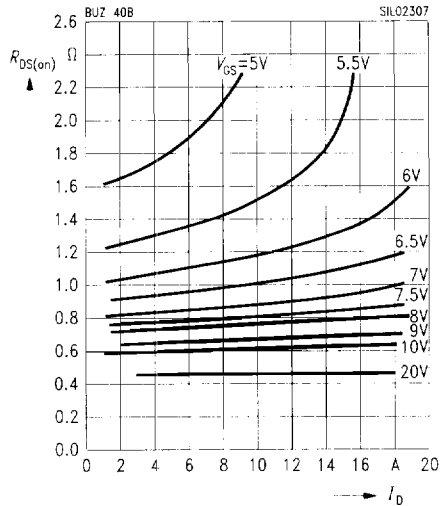
parameter:  $t_p = 80\text{ }\mu\text{s}$ ,  $V_{DS} = 25\text{ V}$



**Typ. drain-source on-resistance**

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

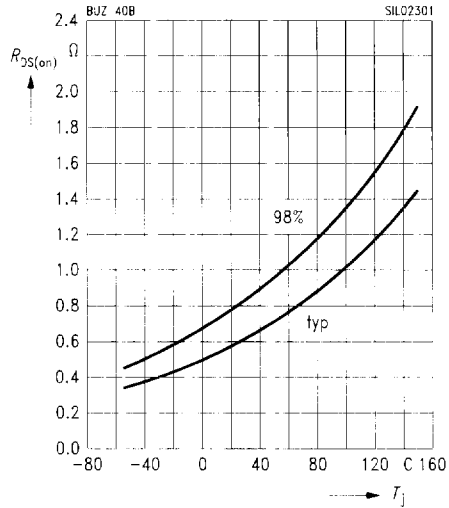
parameter:  $V_{GS}$



**Drain-source on-resistance**

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

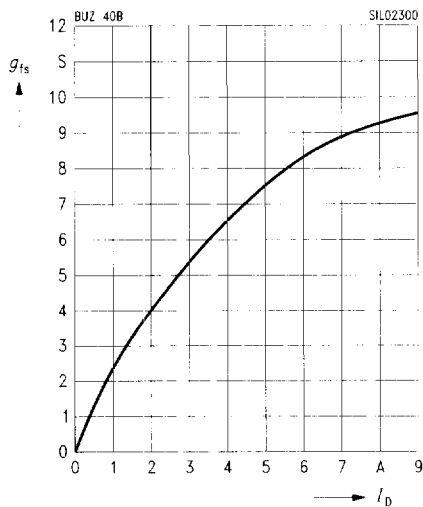
parameter:  $I_D = 5,5 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$ , (spread)



**Typ. forward transconductance**

$g_{fs} = f(I_D)$

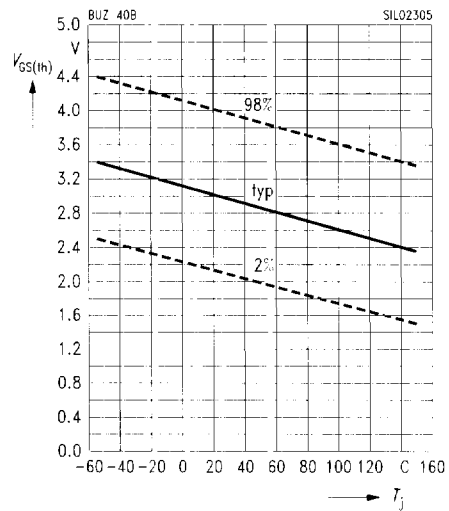
parameter:  $t_p = 80 \mu\text{s}$



**Gate threshold voltage**

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

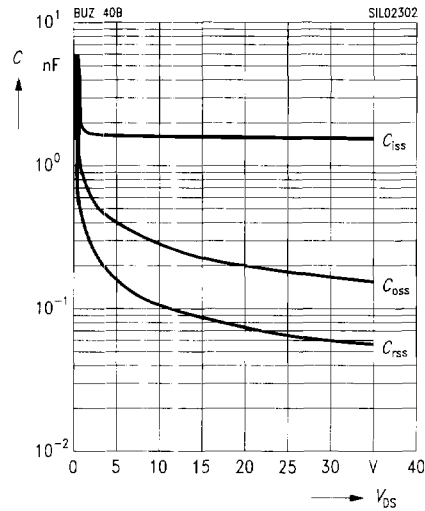
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1 \text{ mA}$ , (spread)



### Typ. capacitances

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

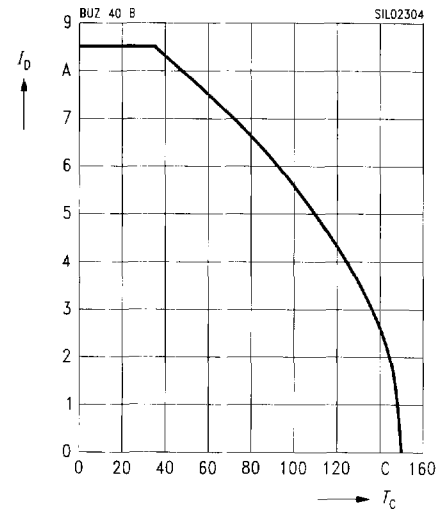
parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$



### Drain current

$$I_D = f(T_C)$$

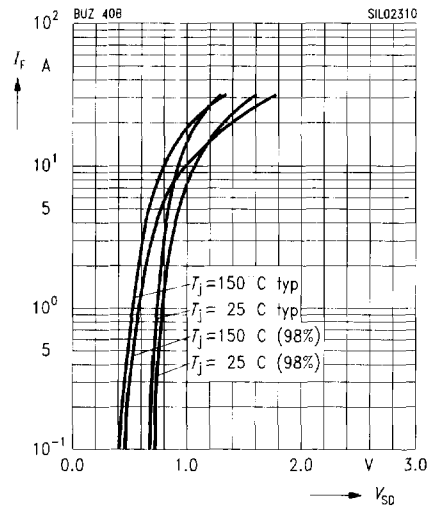
parameter:  $V_{GS} \geq 10 \text{ V}$



### Forward characteristics of reverse diode

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

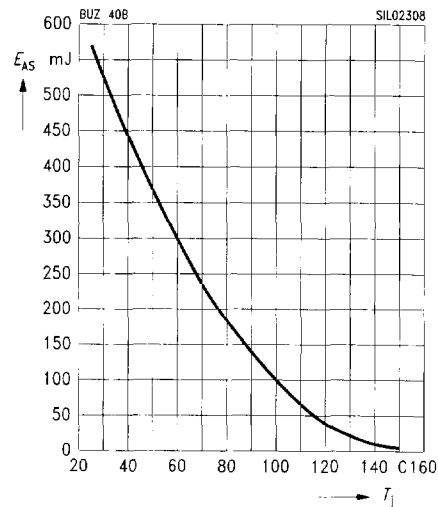
parameter:  $T_j$ ,  $t_p = 80 \text{ } \mu\text{s}$ , (spread)



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

parameter:  $I_D = 10 \text{ A}$ ,  $V_{DD} = 50 \text{ V}$

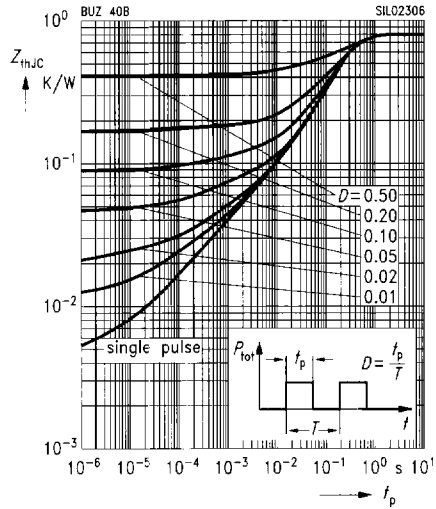
$R_{GS} = 25 \text{ } \Omega$ ,  $L = 10.3 \text{ mH}$



**Transient thermal impedance**

$Z_{thJC} = f(t_p)$

parameter:  $D = t_p / T$



**Typ. gate charge**

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

parameter:  $I_{D,puls} = 12.0$  A

