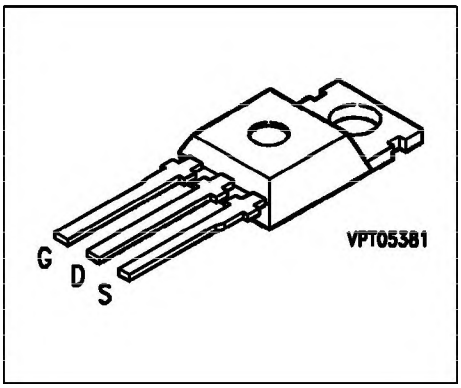
SIEMENS

SIPMOS® Power Transistor

BUZ 102

Preliminary

- N channel
- Enhancement mode
- Avalanche-rated
- d*v*/d*t* rated
- Ultra low on-resistance
- 175 °C operating temperature



Type	V_{DS}	I_D	$R_{DS(on)}$	Package	Ordering Code
BUZ 102	50 V	42 A	0.023 Ω	TO-220 AB	C67078-S1351-A2

Maximum Ratings

Parameter	Symbol	Value	Unit
Continuous drain current, T_C = 111 °C	I_D	42 [1]	A
Pulsed drain currrent, T_C = 25 °C	$I_{D\,puls}$	168	A
Avalanche current, limited by T_{jmax}	I_{AR}	42	A
Avalanche energy, single pulse, I_D = 42 A, V_{DD} = 25 V, R_{GS} = 25 Ω, L = 102 µH, T_j = 25 °C	E_{AS}	180	mJ
Gate-source voltage	V_{GS}	± 20	V
Power dissipation, T_C = 25 °C	P_{tot}	200	W
Operating temperature range	T_j	– 55 ... + 175	°C
Storage temperature range	T_{stg}	– 55 ... + 175	°C
Thermal resistance chip - case	$R_{th\,JC}$	≤ 0.83	K/W
Thermal resistance chip - air	$R_{th\,JA}$	≤ 75	K/W
DIN humidity category, DIN 40 040		E	
IEC climatic category, DIN IEC 68-1		55 / 175 / 56	

[1] current limited by pin wire

Electrical Characteristics
at T_j = 25 °C, unless otherwise specified.

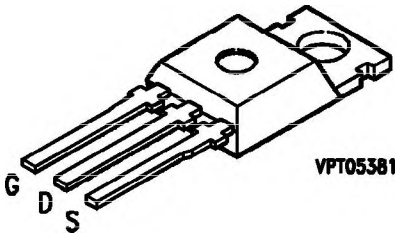
Parameter	Symbol	Value			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage V_{GS} = 0 V, I_D = 0.25 mA, T_j = – 40 °C	$V_{(BR)DSS}$	50	–	–	V
Gate threshold voltage V_{GS} = V_{DS}, I_D = 1 mA	$V_{GS(th)}$	2.1	3.0	4.0	V
Zero gate voltage drain current V_{DS} = 50 V, V_{GS} = 0 V, T_j = – 40 °C	I_{DSS}	–	1	100	nA
Zero gate voltage drain current V_{DS} = 50 V, V_{GS} = 0 V, T_j = 25 °C	I_{DSS}	–	0.1	1.0	µA
Zero gate voltage drain current V_{DS} = 50 V, V_{GS} = 0 V, T_j = 150 °C	I_{DSS}	–	10	100	µA
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 = 42 A	$R_{DS(on)}$	–	0.017	0.023	Ω

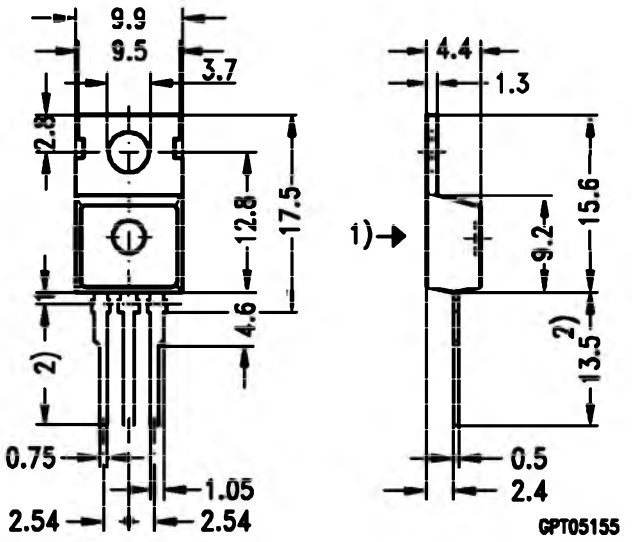
Electrical Characteristics (cont'd)
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Value			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)\,max}$, I_D = 42 A	g_{fs}	10	28	–	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	1620	2160	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	–	550	825	pF
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	–	240	360	pF
Turn-on delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A, R_{GS} = 50 Ω	$t_{d(on)}$	–	25	38	ns
Rise time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A, R_{GS} = 50 Ω	t_r	–	95	140	ns
Turn-off delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A, R_{GS} = 50 Ω	$t_{d(off)}$	–	300	400	ns
Fall time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A, R_{GS} = 50 Ω	t_f	–	160	215	ns
Reverse Diode					
Continuous reverse drain current	I_S	–	–	42	A
Pulsed reverse drain current	I_{SM}	–	–	168	A
Reverse diode forward on-voltage V_{GS} = 0 V, I_F = 84 A	V_{SD}	–	1.2	1.7	V
Reverse recovery time V_R = 30 V, $I_F = I_S$, di_F / dt = 100 A/µs	t_{rr}	–	75	–	ns
Reverse recovery charge V_R = 30 V, $I_F = I_S$, di_F / dt = 100 A/µs	Q_{rr}	–	0.12	–	µC

Package Outline

TO-220 AB





1) punch direction, burr max. 0.04
2) dip tinning
3) max. 14.5 by dip tinning press burr max. 0.05

Weight approx. 2.0 g

Dimensions in mm

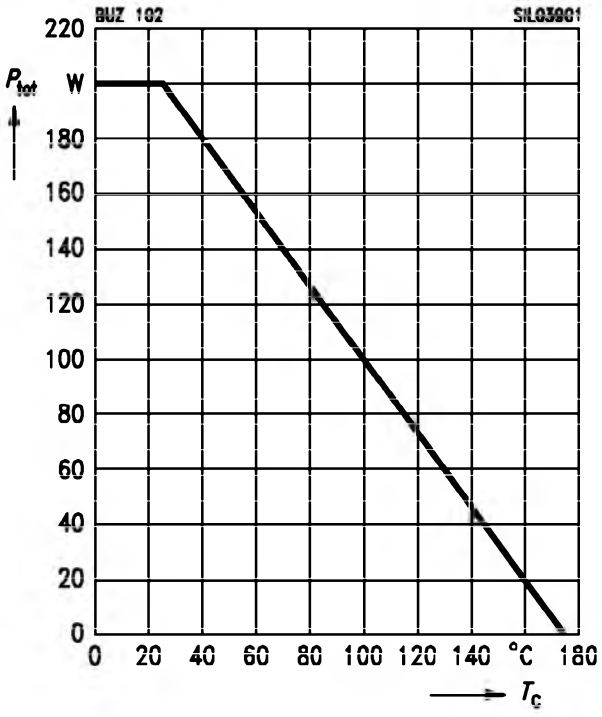
Sorts of Packing

Package outlines for tubes, trays etc. are contained in our Data Book "Package Information".

Characteristics at T_j = 25 °C, unless otherwise specified.

Total power dissipation

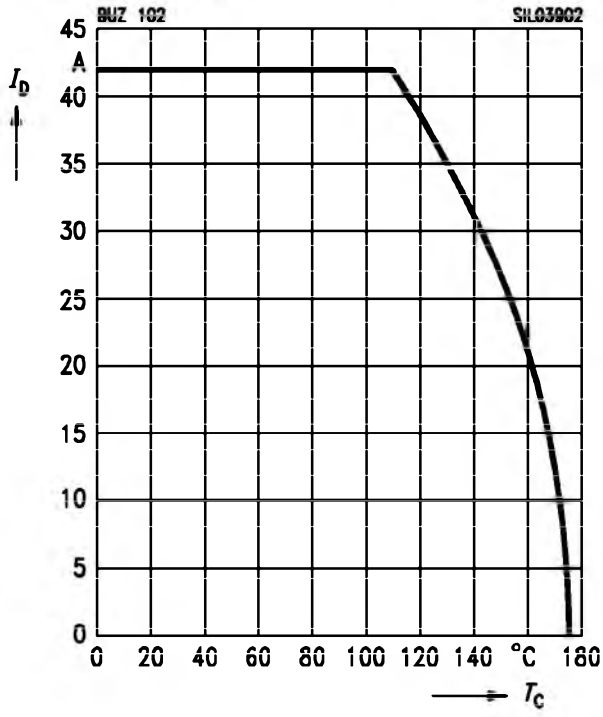
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

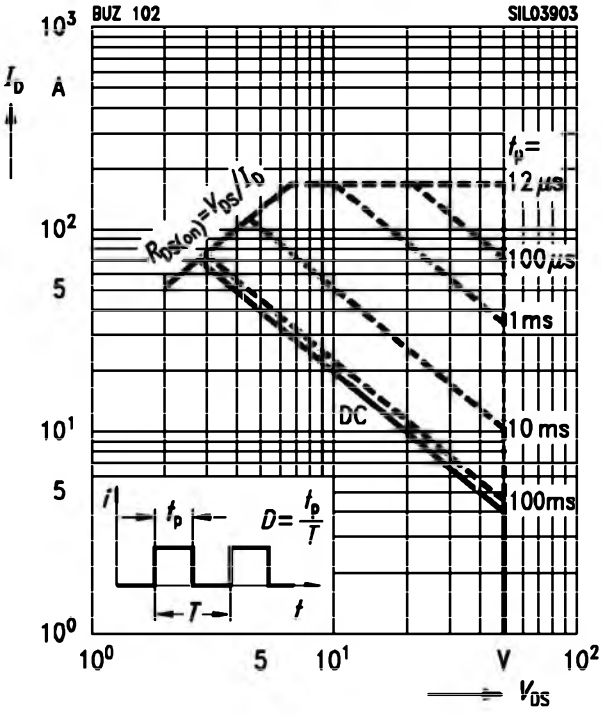
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

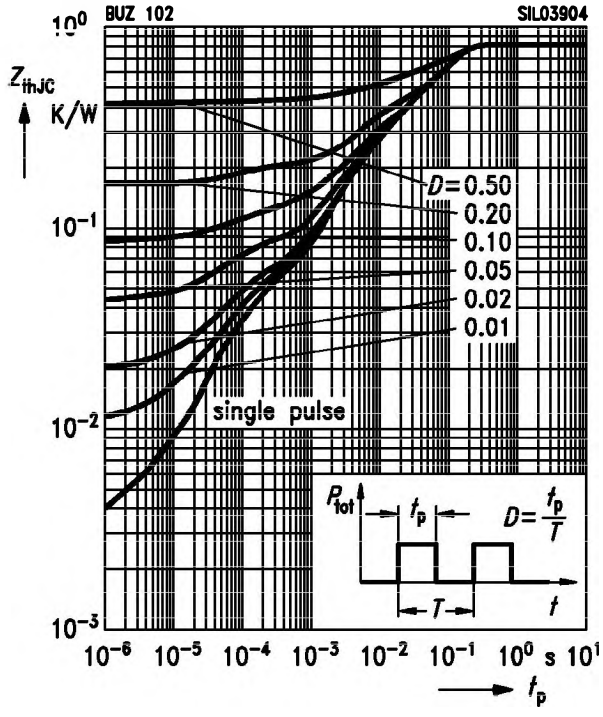
parameter: D = 0.01, T_C = 25 °C



Transient thermal impedance

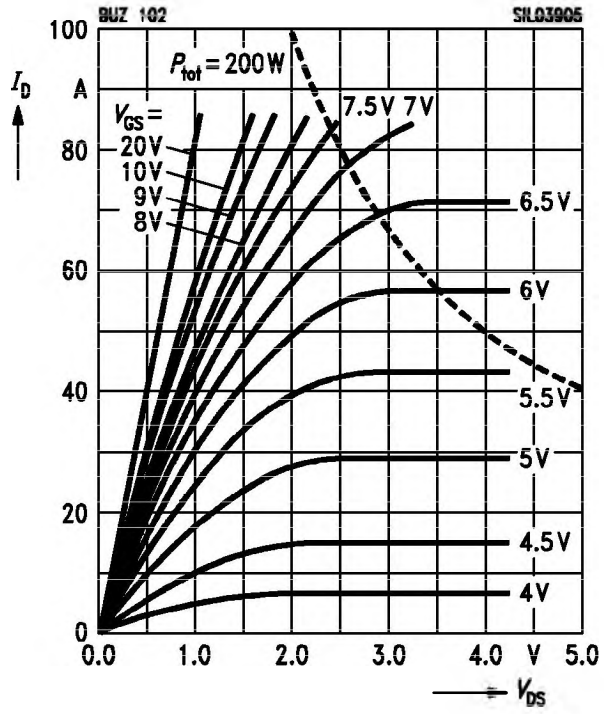
$Z_{th\,JC} = f(t_p)$

parameter: $D = t_p / T$

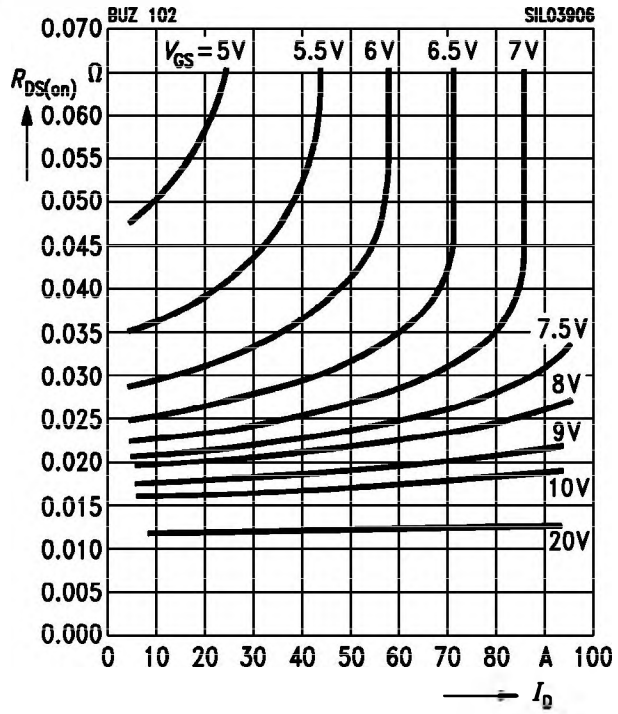


Characteristics at T_j = 25 °C, unless otherwise specified.

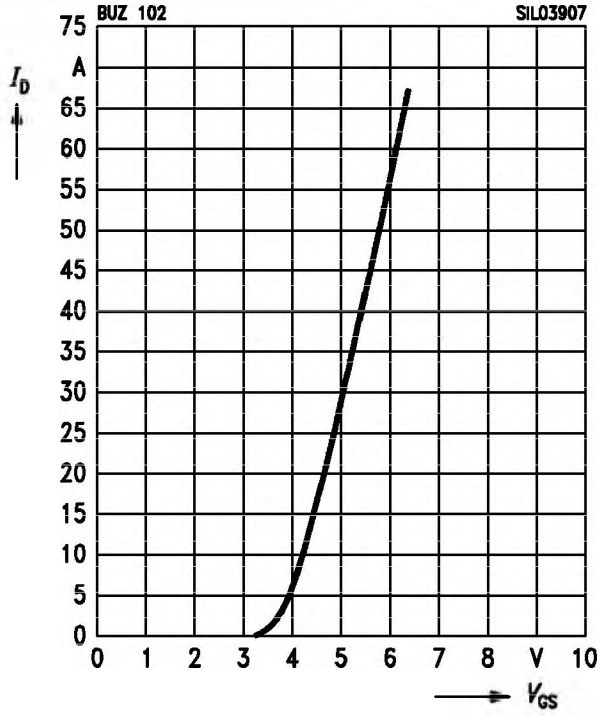
Typ. output characteristics
$I_D = f(V_{DS})$
parameter: t_p = 80 µs



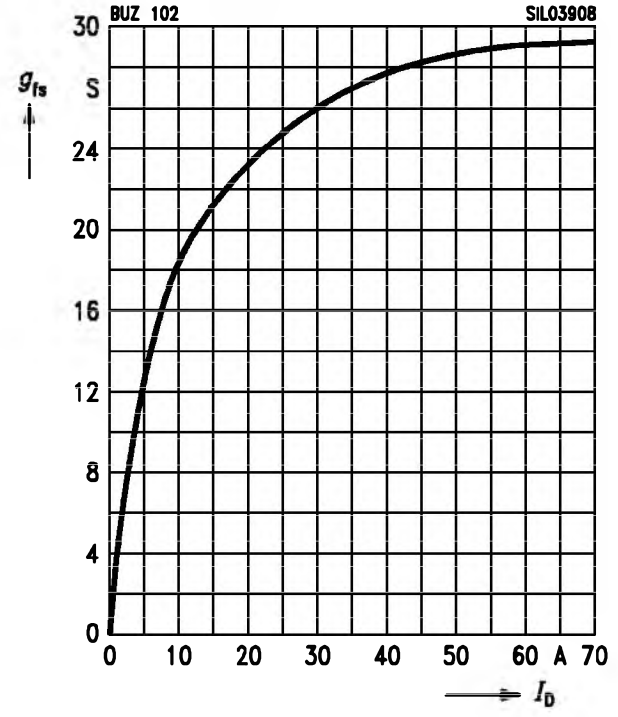
Typ. drain-source on-resistance
$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: t_p = 80 µs,
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: t_p = 80 µs,
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

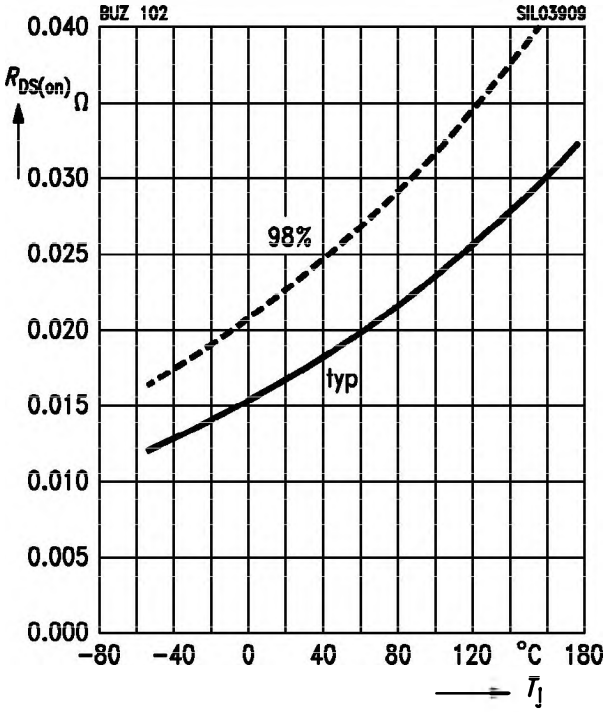


Characteristics at T_j = 25 °C, unless otherwise specified.

Drain-source on-resistance

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

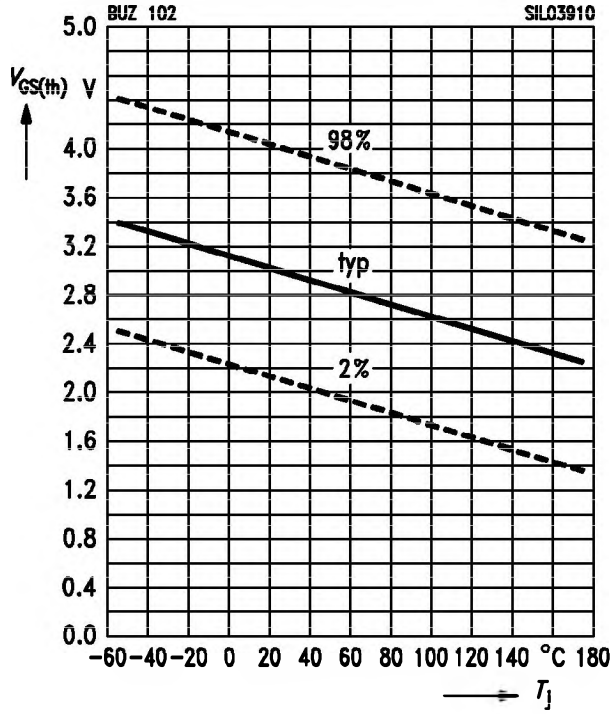
parameter: I_D = 42 A, V_{GS} = 10 V, (spread)



Gate threshold voltage

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

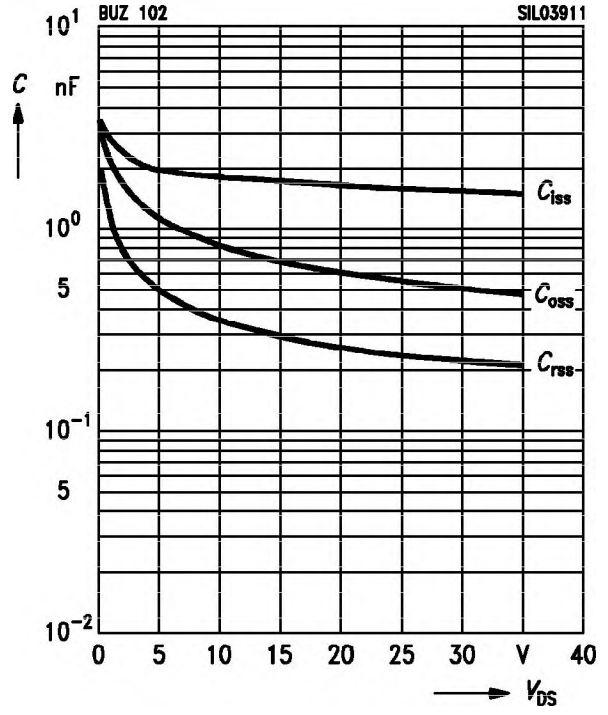
parameter: $V_{GS} = V_{DS}$, I_D = 1 mA, (spread)



Typ. capacitances

$C = f(V_{DS})$

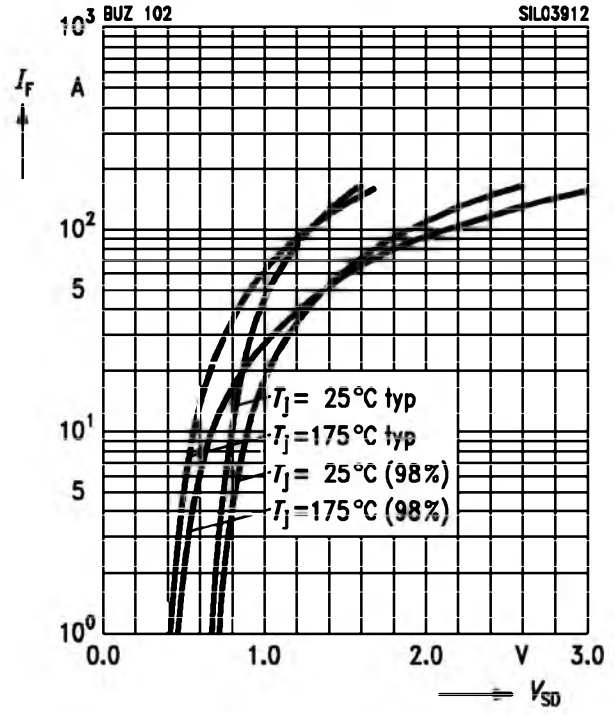
parameter: V_{GS} = 0 V, f = 1 MHz



Forward characteristics of reverse diode

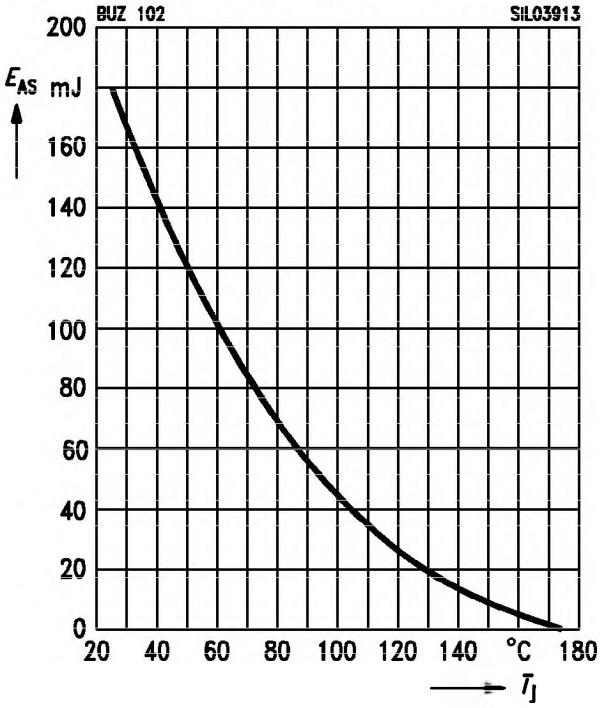
$I_F = f(V_{SD})$

parameter: T_j, t_p = 80 µs, (spread)

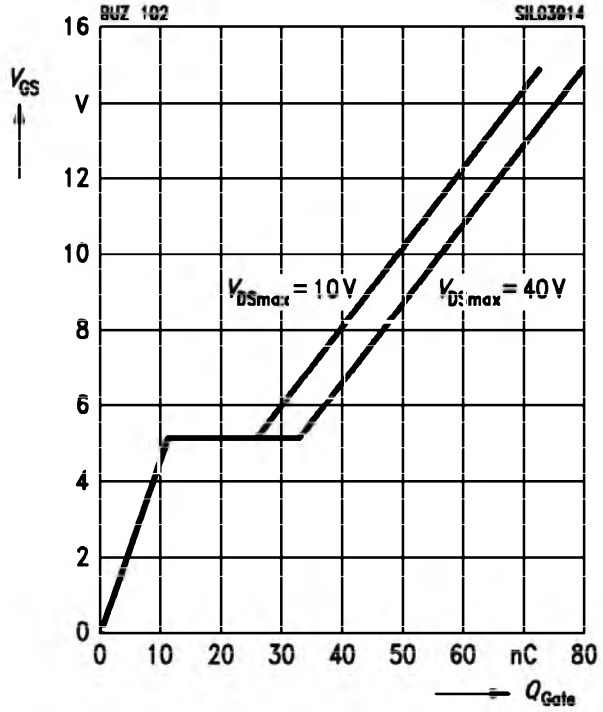


Characteristics at T_j = 25 °C, unless otherwise specified.

Maximum avalanche energy $E_{AS} = f(T_j)$
parameter: I_D = 42 A, V_{DD} = 25 V,
R_{GS} = 250 Ω, L = 102 µH



Typ. gate charge
$V_{GS} = f(Q_{Gate})$
parameter: $I_{D\ puls}$ = 63 A



Drain-source breakdown voltage
$V_{(BR)DSS}$ (T_j) = b x $V_{(BR)DSS}$ (25 °C)