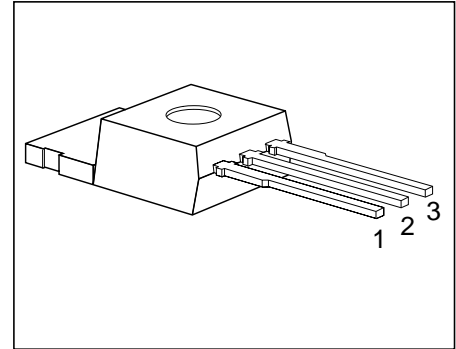


Features

- N channel
- Enhancement mode
- Temperature sensor with thyristor characteristic
- The drain pin is electrically shorted to the tab



Pin	1	2	3
	G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	Package	Ordering Code
BTS 120	100 V	19 A	0.1 Ω	TO-220AB	C67078-A5009-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	100	V
Drain-gate voltage, $R_{GS} = 20 \text{ k}\Omega$	V_{DGR}	100	
Gate-source voltage	V_{GS}	± 20	
Continuous drain current, $T_C = 25 \text{ }^\circ\text{C}$	I_D	19	A
ISO drain current $T_C = 85 \text{ }^\circ\text{C}$, $V_{GS} = 10 \text{ V}$, $V_{DS} = 0.5 \text{ V}$	I_{D-ISO}	3.5	
Pulsed drain current, $T_C = 25 \text{ }^\circ\text{C}$	$I_{D \text{ puls}}$	76	
Short circuit current, $T_j = -55 \dots +150 \text{ }^\circ\text{C}$	I_{SC}	55	
Short circuit dissipation, $T_j = -55 \dots +150 \text{ }^\circ\text{C}$	P_{SCmax}	800	W
Power dissipation	P_{tot}	75	
Operating and storage temperature range	T_j, T_{stg}	$-55 \dots +150$	$^\circ\text{C}$
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	
Thermal resistance			K/W
Chip-case	$R_{th \text{ JC}}$	≤ 1.67	
Chip-ambient	$R_{th \text{ JA}}$	≤ 75	

Electrical Characteristics

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Static Characteristics

Drain-source breakdown voltage $V_{GS} = 0, I_D = 0.25\text{ mA}$	$V_{(BR)DSS}$	100	–	–	V
Gate threshold voltage $V_{GS} = V_{DS}, I_D = 1\text{ mA}$	$V_{GS(th)}$	2.5	3.0	3.5	
Zero gate voltage drain current $V_{GS} = 0\text{ V}, V_{DS} = 100\text{ V}$ $T_j = 25\text{ °C}$ $T_j = 125\text{ °C}$	I_{DSS}	– –	1 100	10 300	μA
Gate-source leakage current $V_{GS} = 20\text{ V}, V_{DS} = 0$ $T_j = 25\text{ °C}$ $T_j = 150\text{ °C}$	I_{GSS}	– –	10 2	100 4	nA μA
Drain-source on-state resistance $V_{GS} = 10\text{ V}, I_D = 12\text{ A}$	$R_{DS(on)}$	–	0.09	0.1	Ω

Dynamic Characteristics

Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}, I_D = 12\text{ A}$	g_{fs}	7	13	18	S
Input capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	C_{iss}	–	1500	2000	μF
Output capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	C_{oss}	–	450	700	
Reverse transfer capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	C_{rss}	–	150	240	
Turn-on time t_{on} , ($t_{on} = t_{d(on)} + t_r$) $V_{CC} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 3\text{ A}, R_{GS} = 50\text{ }\Omega$	$t_{d(on)}$	–	30	45	ns
	t_r	–	50	75	
Turn-off time t_{off} , ($t_{off} = t_{d(off)} + t_f$) $V_{CC} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 3\text{ A}, R_{GS} = 50\text{ }\Omega$	$t_{d(off)}$	–	170	220	
	t_f	–	80	110	

Electrical Characteristics (cont'd)

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Reverse Diode

Continuous source current	I_S	–	–	19	A
Pulsed source current	I_{SM}	–	–	75	
Diode forward on-voltage $I_F = 38\text{ A}$, $V_{GS} = 0$	V_{SD}	–	1.4	1.7	V
Reverse recovery time $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	t_{rr}	–	200	–	ns
Reverse recovery charge $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	Q_{rr}	–	0.25	–	μC

Temperature Sensor

Forward voltage $I_{TS(on)} = 10\text{ mA}$, $T_j = -55 \dots +150\text{ °C}$ Sensor override, $t_p \leq 100\text{ }\mu\text{s}$ $T_j = -55 \dots +160\text{ °C}$	$V_{TS(on)}$	–	1.4	1.5	V
		–	–	10	
Forward current $T_j = -55 \dots +150\text{ °C}$ Sensor override, $t_p \leq 100\text{ }\mu\text{s}$ $T_j = -55 \dots +160\text{ °C}$	$I_{TS(on)}$	–	–	10	mA
		–	–	600	
Holding current, $V_{TS(off)} = 5\text{ V}$, $T_j = 25\text{ °C}$ $T_j = 150\text{ °C}$	I_H	0.05 0.05	0.1 0.2	0.5 0.3	
Switching temperature $V_{TS} = 5\text{ V}$	$T_{TS(on)}$	150	–	–	°C
Turn-off time $V_{TS} = 5\text{ V}$, $I_{TS(on)} = 2\text{ mA}$	t_{off}	0.5	–	2.5	μs

Examples for short-circuit protection

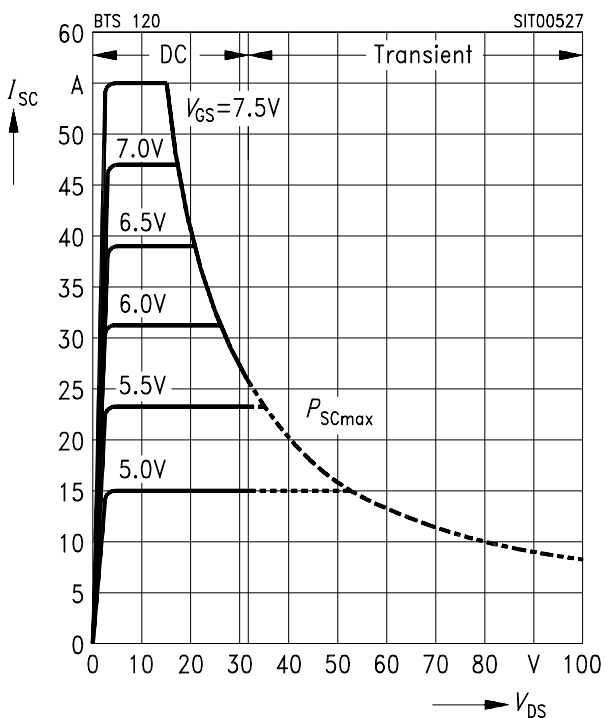
at $T_j = -55 \dots +150 \text{ }^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Examples			Unit
		1	2	–	
Drain-source voltage	V_{DS}	15	30	–	V
Gate-source voltage	V_{GS}	7.3	5.7	–	
Short-circuit current	I_{SC}	53.3	26.7	–	A
Short-circuit dissipation	P_{SC}	800	800	–	W
Response time $T_j = 25 \text{ }^\circ\text{C}$, before short circuit	$t_{SC(off)}$	25	25	–	ms

Short-circuit protection $I_{SC} = f(V_{DS})$

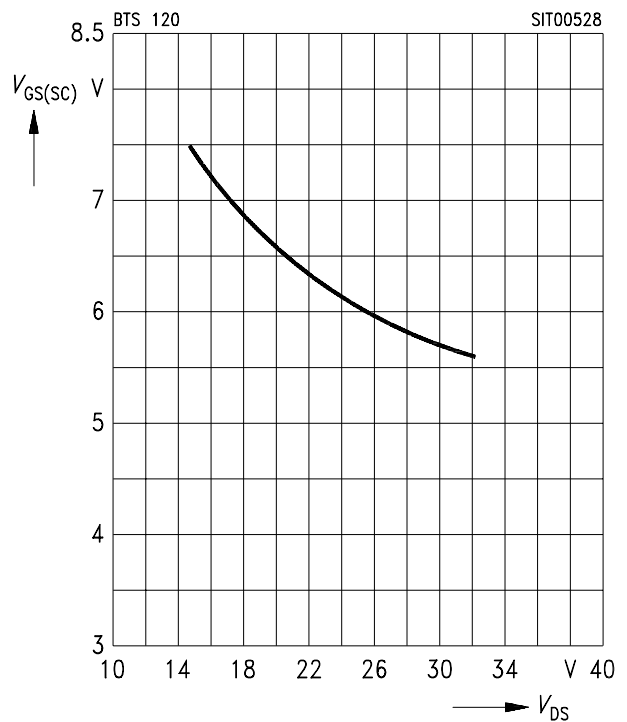
Parameter: V_{GS}

Diagram to determine I_{SC} for $T_j = -55 \dots +150 \text{ }^\circ\text{C}$

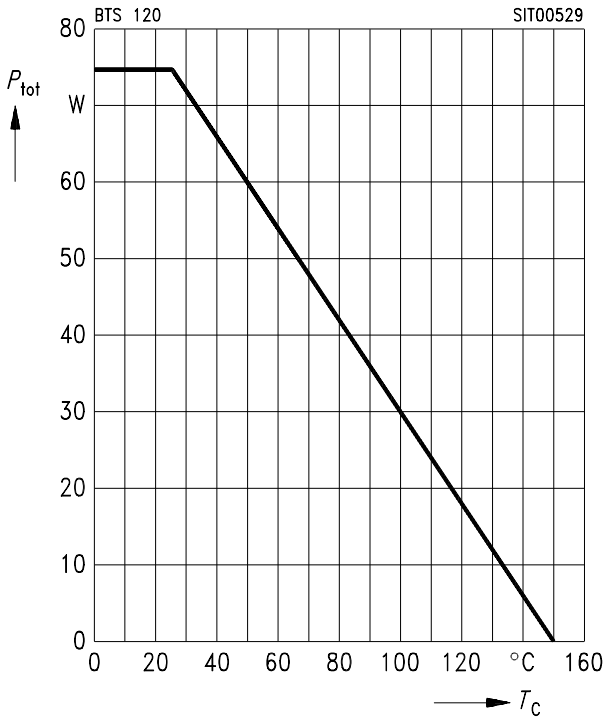


Max. gate voltage $V_{GS(SC)} = f(V_{DS})$

Parameter: $T_j = -55 \dots +150 \text{ }^\circ\text{C}$

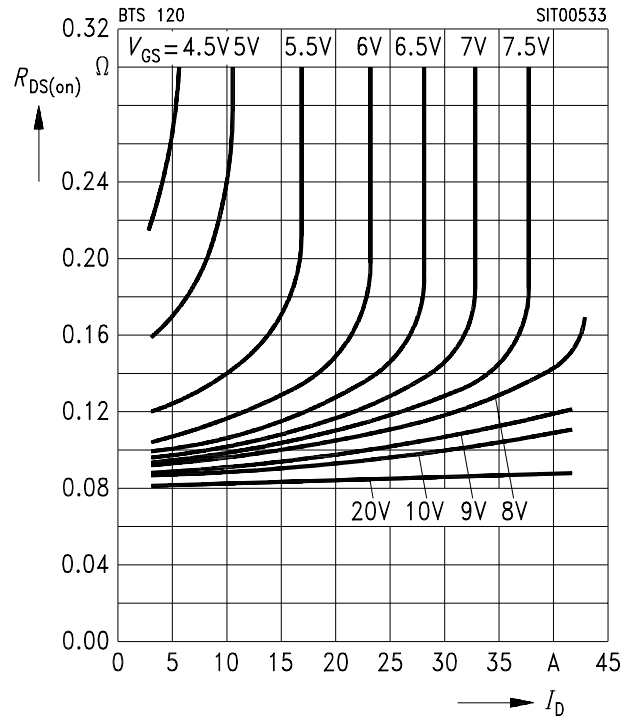


Max. power dissipation $P_{tot} = f(T_c)$



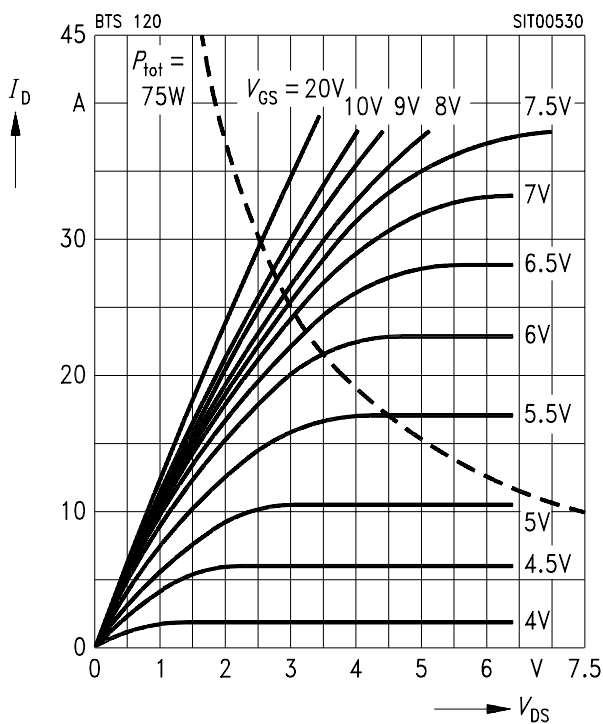
Typ. drain-source on-state resistance $R_{DS(on)} = f(I_D)$

Parameter: V_{GS}



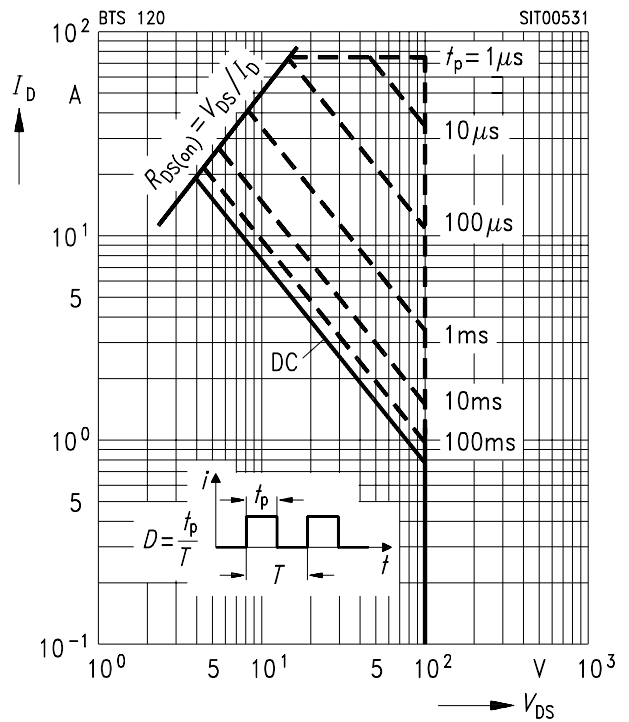
Typical output characteristics $I_D = f(V_{DS})$

Parameter: $t_p = 80 \mu s$



Safe operating area $I_D = f(V_{DS})$

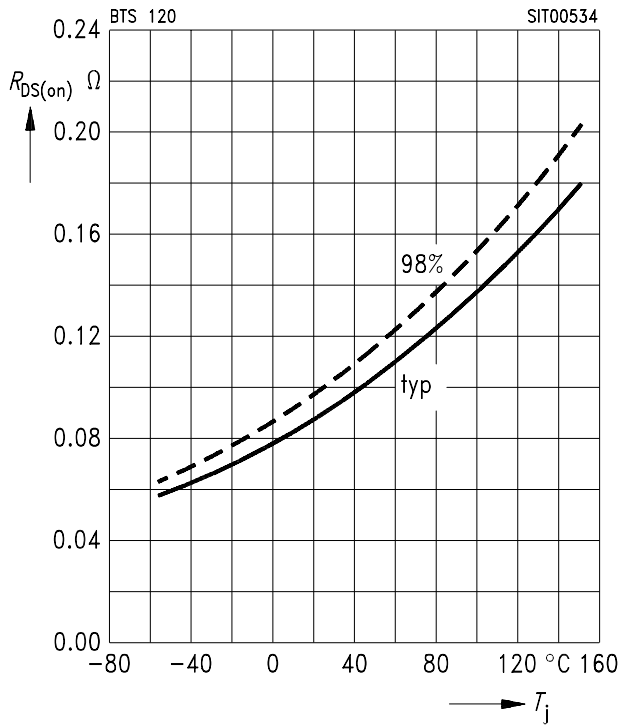
Parameter: $D = 0.01, T_c = 25^\circ C$



Drain-source on-state resistance

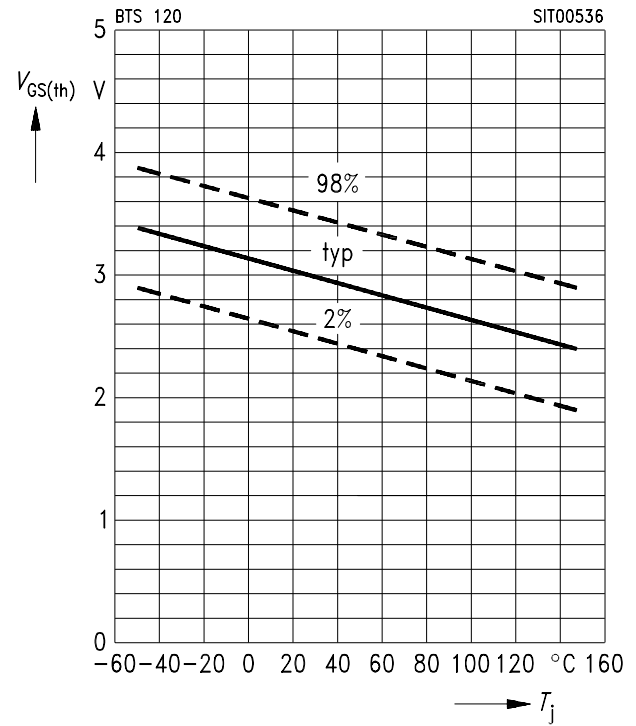
$R_{DS(on)} = f(T_j)$

Parameter: $I_D = 9\text{ A}$, $V_{GS} = 10\text{ V}$



Gate threshold voltage $V_{GS(th)} = f(T_j)$

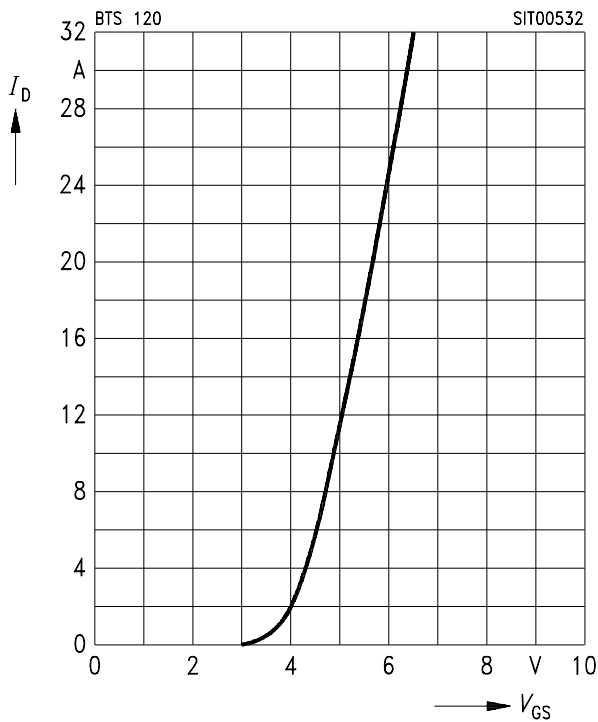
Parameter: $V_{DS} = V_{GS}$, $I_D = 1\text{ mA}$ (spread)



Typ. transfer characteristic

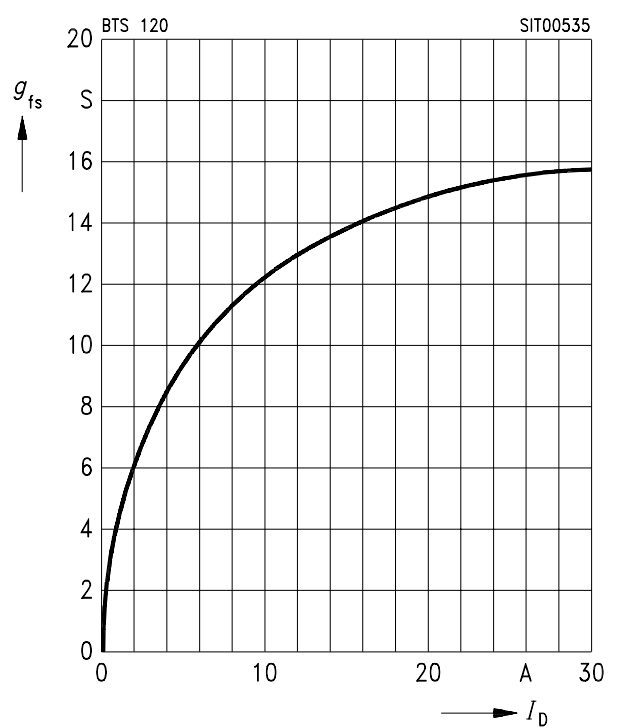
$I_D = f(V_{GS})$

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



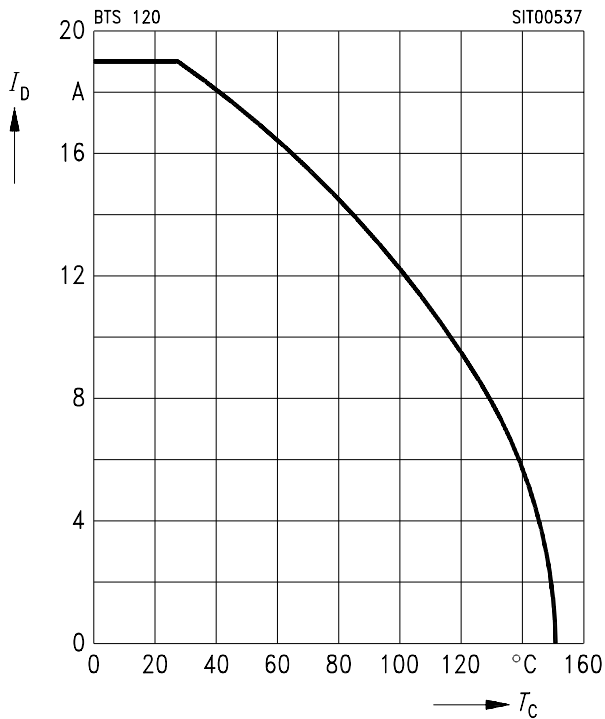
Typ. transconductance $g_{fs} = f(I_D)$

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



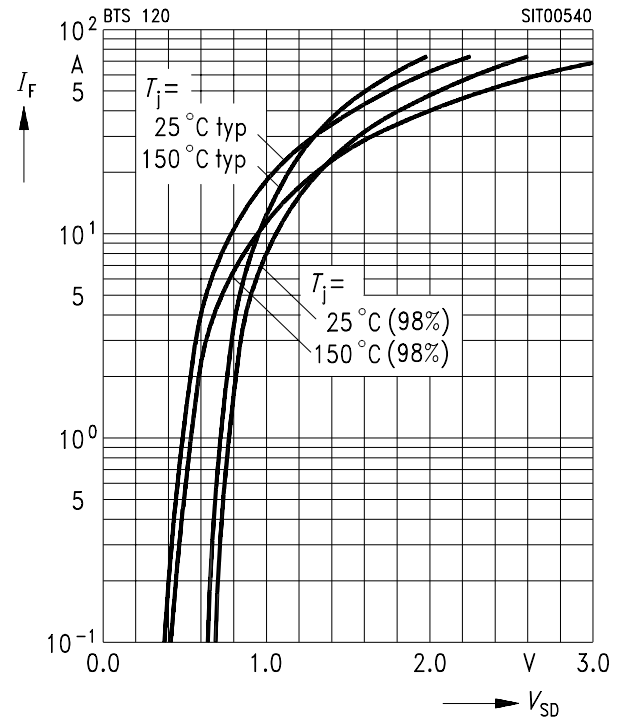
Continuous drain current $I_D = f(T_C)$

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



Forward characteristics of reverse diode $I_F = f(V_{SD})$

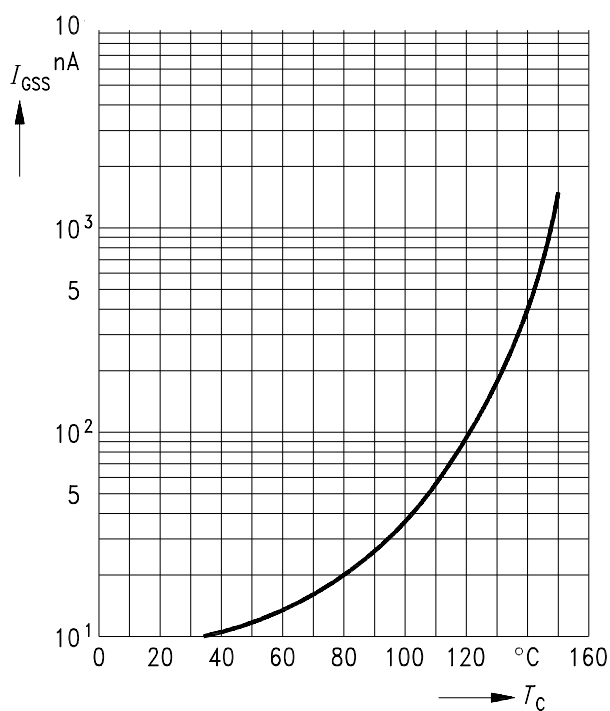
Parameter: $T_j, t_p = 80 \mu\text{s}$ (spread)



Typ. gate-source leakage current $I_{GSS} = f(T_C)$

Parameter: $V_{GS} = 20 \text{ V}, V_{DS} = 0$

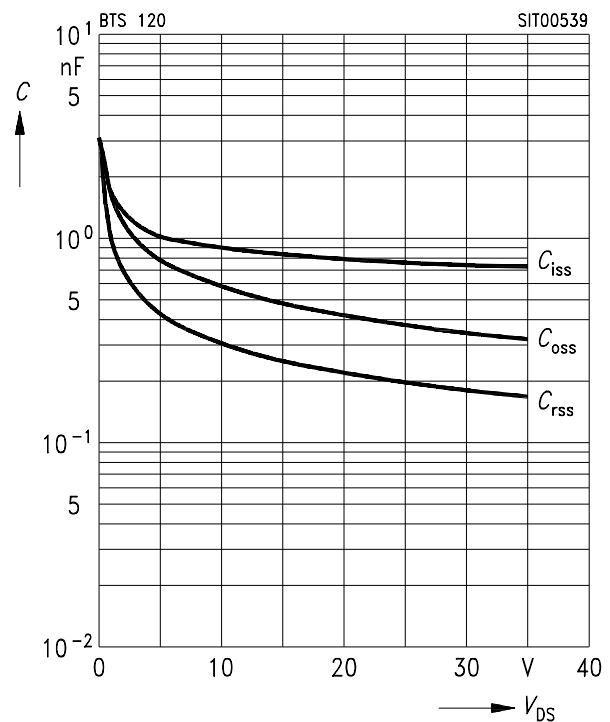
Parameter: $V_{GS} = 20 \text{ V}, V_{DS} = 0$



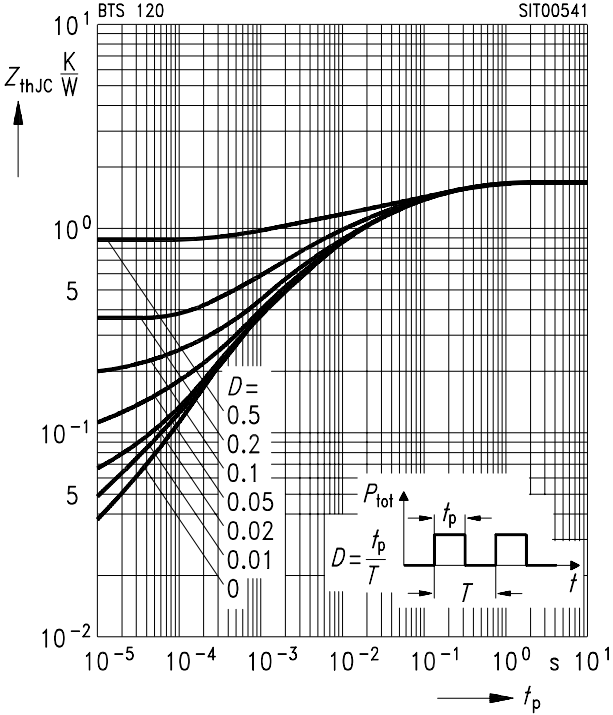
Typ. capacitances $C = f(V_{DS})$

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

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

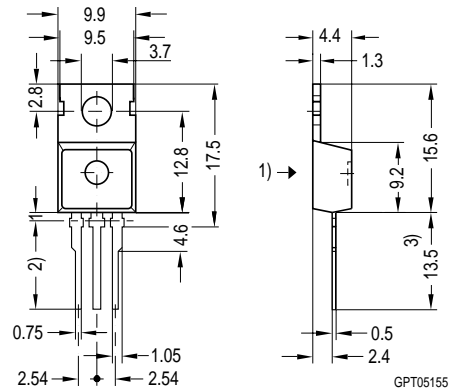


Transient thermal impedance $Z_{thJC} = f(t_p)$
Parameter: $D = t_p/T$



TO 220 AB
Standard

Ordering Code
C67078-A5009-A2



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



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.