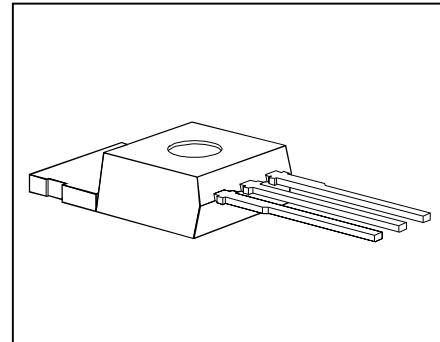


Smart Highside Power Switch

Features

- P 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 100	- 50 V	- 8 A	0.3 Ω	TO-220AB	C67078-A5007-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	- 50	V
Drain-gate voltage, $R_{GS} = 20 \text{ k}\Omega$	V_{DGR}	- 50	
Gate-source voltage	V_{GS}	± 20	
Continuous drain current, $T_C = 30^\circ\text{C}$	I_D	- 8.0	A
ISO drain current $T_C = 85^\circ\text{C}$, $V_{GS} = 10 \text{ V}$, $V_{DS} = 0.5 \text{ V}$	I_{D-ISO}	- 1.5	
Pulsed drain current, $T_C = 25^\circ\text{C}$	$I_{D \text{ puls}}$	- 32	
Short circuit current, $T_j = - 55 \dots + 150^\circ\text{C}$	I_{SC}	- 25	
Short circuit dissipation, $T_j = - 55 \dots + 150^\circ\text{C}$	P_{SCmax}	500	W
Power dissipation	P_{tot}	40	
Operating and storage temperature range	T_j , T_{stg}	- 55 ... + 150	
DIN humidity category, DIN 40 040	-	E	-
IEC climatic category, DIN IEC 68-1	-	55/150/56	
Thermal resistance Chip-case Chip-ambient	$R_{th \text{ JC}}$ $R_{th \text{ JA}}$	≤ 3.1 ≤ 75	K/W

Electrical Characteristics

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Static Characteristics

Drain-source breakdown voltage $V_{GS} = 0, I_D = -0.25 \text{ mA}$	$V_{(BR)DSS}$	- 50	-	-	V
Gate threshold voltage $V_{GS} = V_{DS}, I_D = -1 \text{ mA}$	$V_{GS(\text{th})}$	- 2.5	- 3.0	- 3.5	
Zero gate voltage drain current $V_{GS} = 0 \text{ V}, V_{DS} = -50 \text{ V}$ $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	I_{DSS}	-	- 1 - 100	- 10 - 300	μA
Gate-source leakage current $V_{GS} = -20 \text{ V}, V_{DS} = 0$ $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	I_{GSS}	-	- 10 - 2	- 100 - 4	nA μA
Drain-source on-state resistance $V_{GS} = -10 \text{ V}, I_D = -5 \text{ A}$	$R_{DS(\text{on})}$	-	0.25	0.3	Ω

Dynamic Characteristics

Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(\text{on})\text{max}}, I_D = -5 \text{ A}$	g_{fs}	1.5	2.3	4.0	S
Input capacitance $V_{GS} = 0, V_{DS} = -25 \text{ V}, f = 1 \text{ MHz}$	C_{iss}	-	900	1200	pF
Output capacitance $V_{GS} = 0, V_{DS} = -25 \text{ V}, f = 1 \text{ MHz}$	C_{oss}	-	350	550	
Reverse transfer capacitance $V_{GS} = 0, V_{DS} = -25 \text{ V}, f = 1 \text{ MHz}$	C_{rss}	-	130	230	
Turn-on time t_{on} , ($t_{on} = t_{d(on)} + t_r$) $V_{CC} = -30 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -2.9 \text{ A}, R_{GS} = 50 \Omega$	$t_{d(on)}$ t_r	- -	20 60	30 95	ns
Turn-off time t_{off} , ($t_{off} = t_{d(off)} + t_f$) $V_{CC} = -30 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -2.9 \text{ A}, R_{GS} = 50 \Omega$	$t_{d(off)}$ t_f	- -	70 55	90 75	

Electrical Characteristics (cont'd)
at $T_j = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Reverse Diode

Continuous source current	I_S	—	—	— 8.0	A
Pulsed source current	I_{SM}	—	—	— 32	
Diode forward on-voltage $I_F = -16 \text{ A}, V_{GS} = 0$	V_{SD}	—	— 1.0	— 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}	—	90	—	ns
Reverse recovery charge $I_F = I_S, di_F/dt = -100 \text{ A}/\mu\text{s}, V_R = -30 \text{ V}$	Q_{rr}	—	0.23	—	μC

Temperature Sensor

Forward voltage $I_{TS(on)} = -10 \text{ mA}, T_j = -55 \dots + 150^\circ\text{C}$ Sensor override, $t_p \leq 100 \mu\text{s}$ $T_j = -55 \dots + 160^\circ\text{C}$	$V_{TS(on)}$	—	— 1.4	— 1.5	V
—	—	—	— 10	— 10	
Forward current $T_j = -55 \dots + 150^\circ\text{C}$ Sensor override, $t_p \leq 100 \mu\text{s}$ $T_j = -55 \dots + 160^\circ\text{C}$	$I_{TS(on)}$	—	—	— 10	mA
—	—	—	— 600	— 600	
Holding current, $V_{TS(off)} = -5 \text{ V}, T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	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	—	—	$^\circ\text{C}$
Turn-off time $V_{TS} = -5 \text{ V}, I_{TS(on)} = -2 \text{ mA}$	t_{off}	0.5	—	2.5	μs

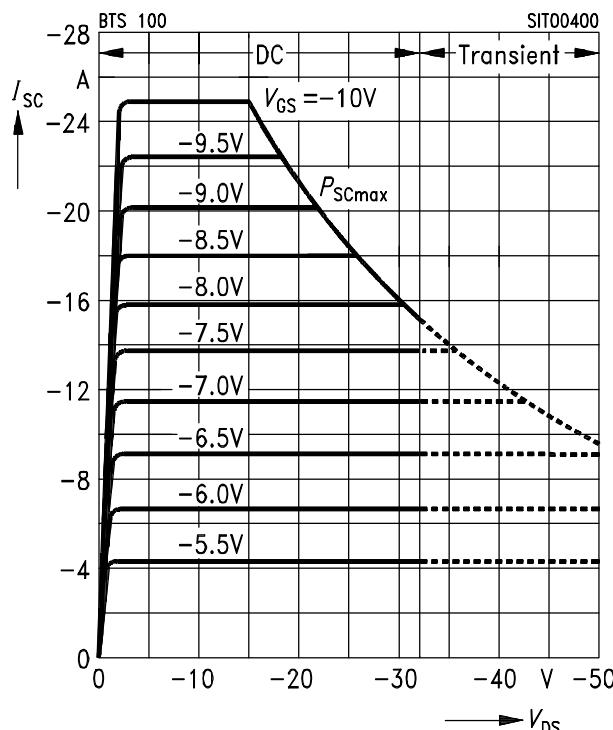
Examples for short-circuit protection

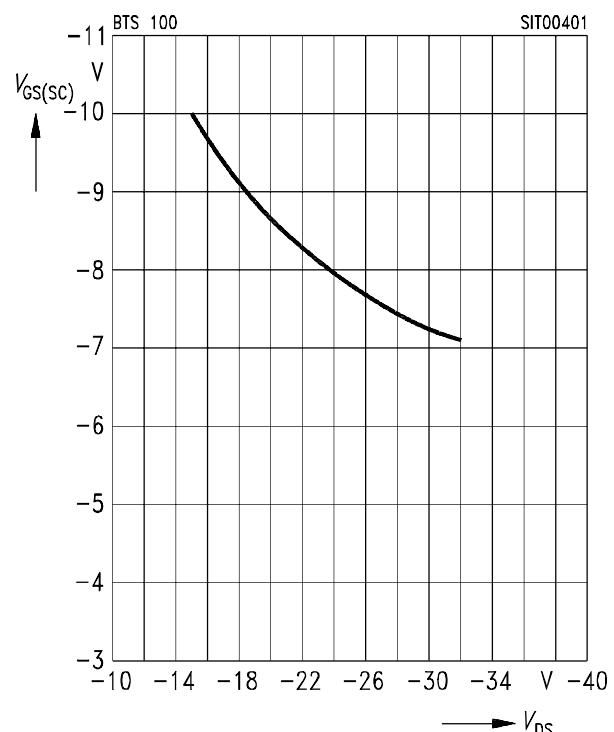
at $T_j = -55 \dots +150^\circ\text{C}$, unless otherwise specified.

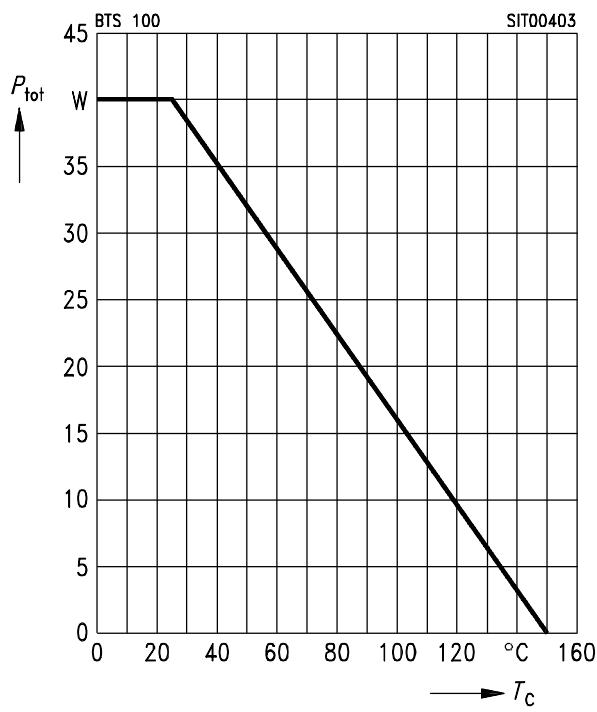
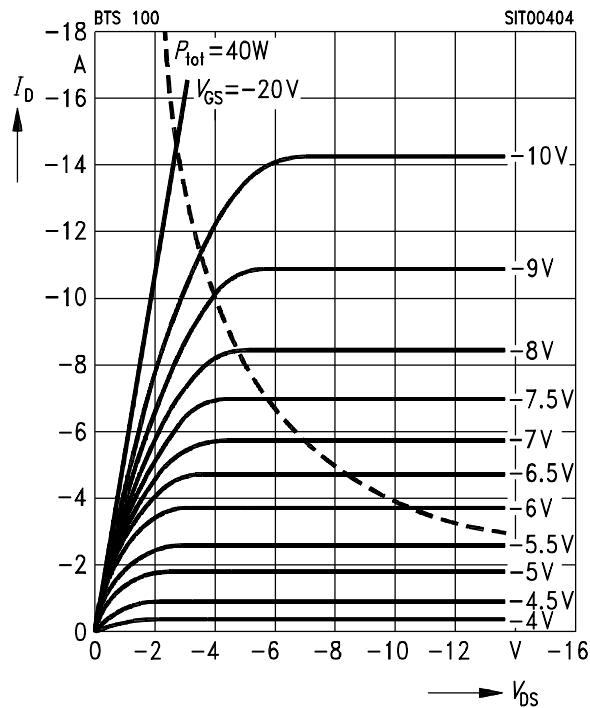
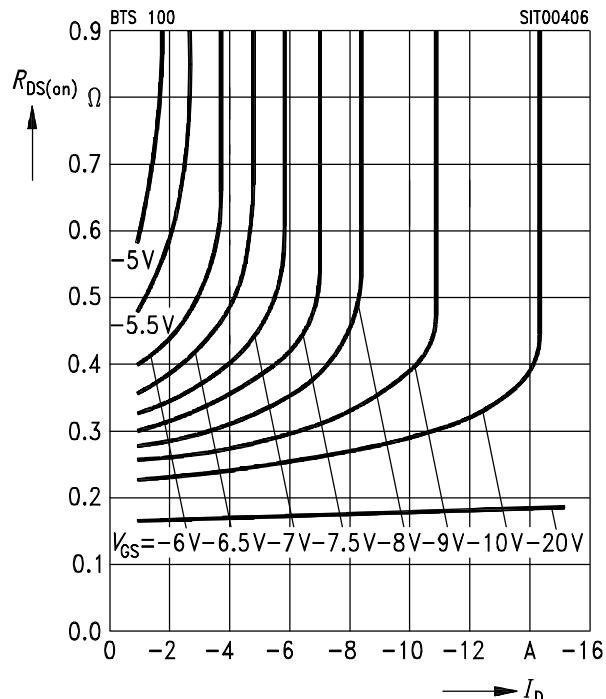
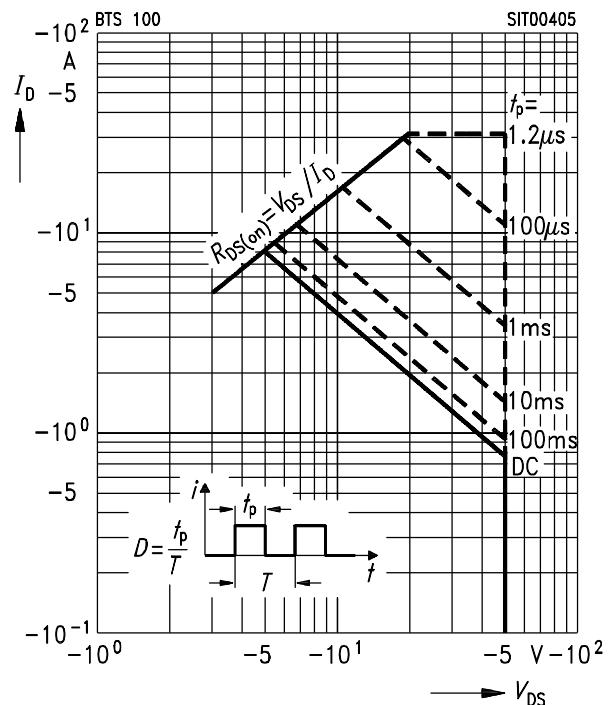
Parameter	Symbol	Example		Unit
		1	2	
Drain-source voltage	V_{DS}	- 15	- 30	-
Gate-source voltage	V_{GS}	- 10	- 8.2	-
Short-circuit current	I_{SC}	≤ -25	≤ -16	-
Short-circuit dissipation	P_{SC}	375	480	-
Response time $T_j = 25^\circ\text{C}$, before short circuit	$t_{SC(\text{off})}$	55	55	ms

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

Parameter: V_{GS}

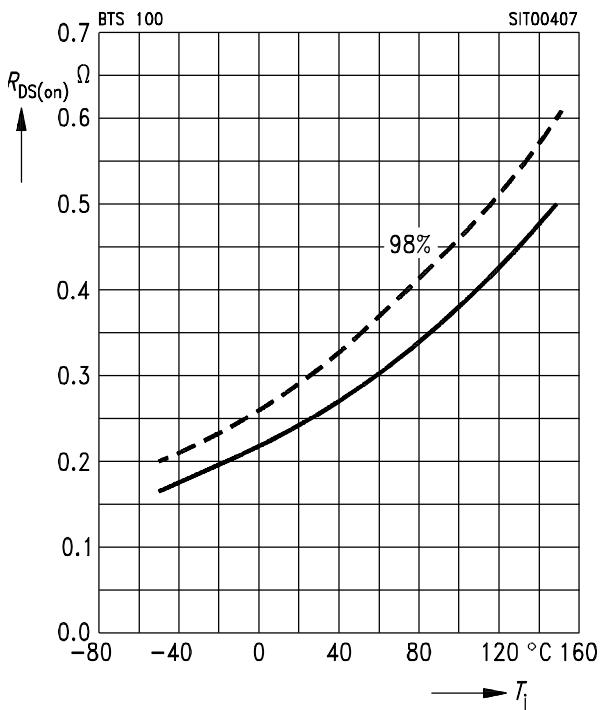
Diagram to determine I_{SC} for $T_j = -55 \dots +150^\circ\text{C}$

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

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


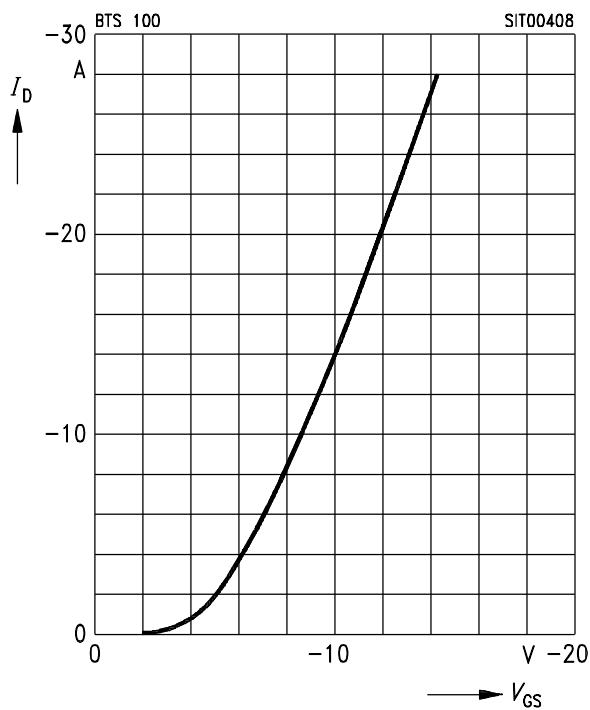
Max. power dissipation $P_{\text{tot}} = f(T_c)$

Typical output characteristics $I_D = f(V_{DS})$
 Parameter: $t_p = 80 \mu\text{s}$

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

Safe operating area $I_D = f(V_{DS})$
 Parameter: $D = 0.01, T_c = 25^\circ\text{C}$


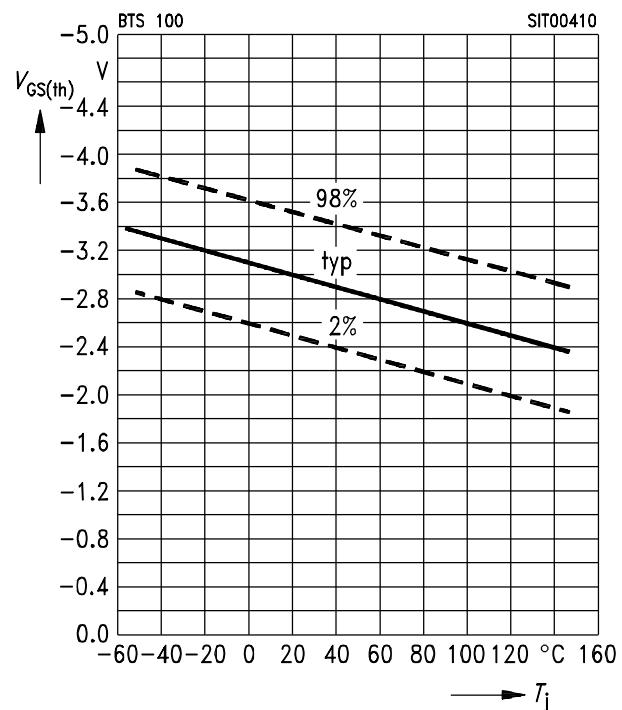
Drain-source on-state resistance

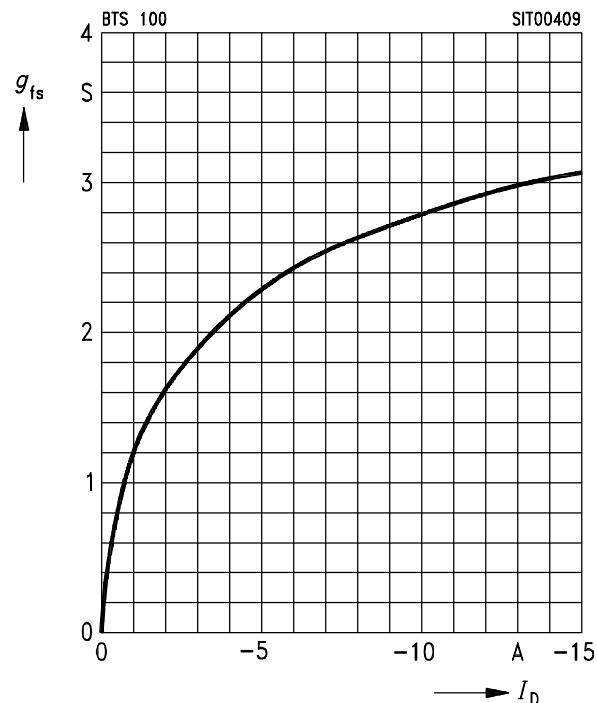
$$R_{DS(on)} = f(T_j)$$

 Parameter: $I_D = -5 \text{ A}$, $V_{GS} = -10 \text{ V}$

Typ. transfer characteristic

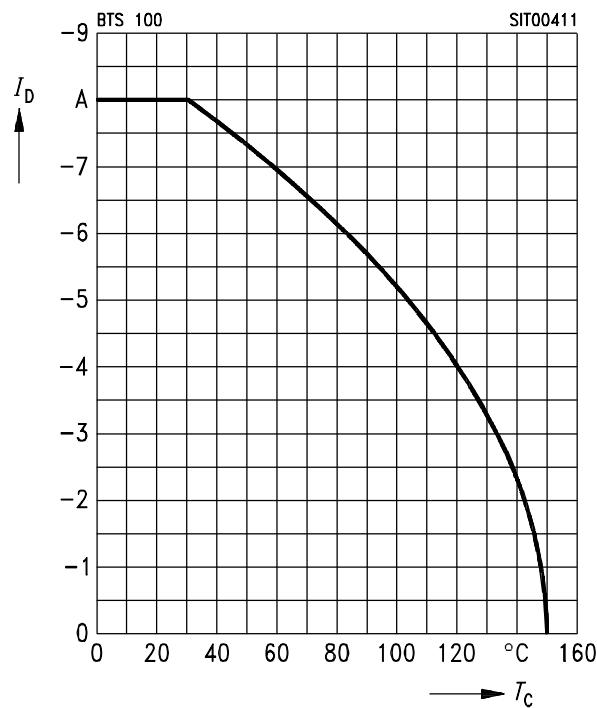
$$I_D = f(V_{GS})$$

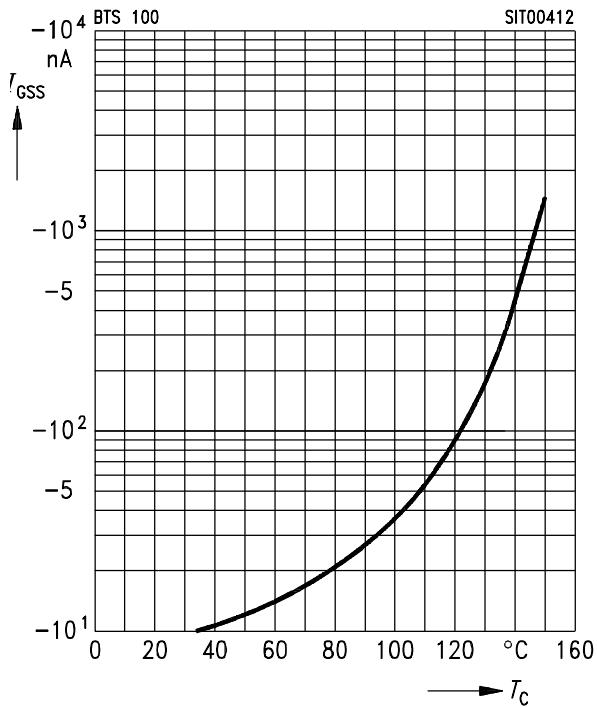
 Parameter: $t_p = 80 \mu\text{s}$, $V_{DS} = -25 \text{ V}$

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

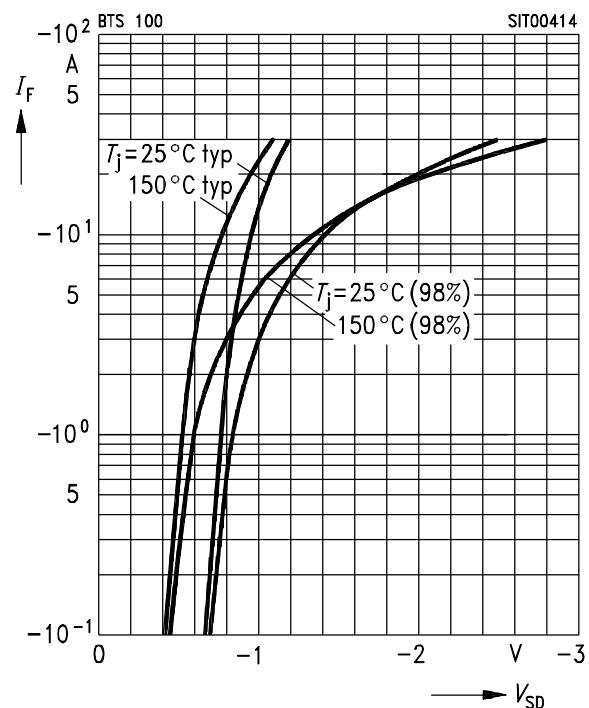
 Parameter: $V_{DS} = V_{GS}$, $I_D = -1 \text{ mA}$

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

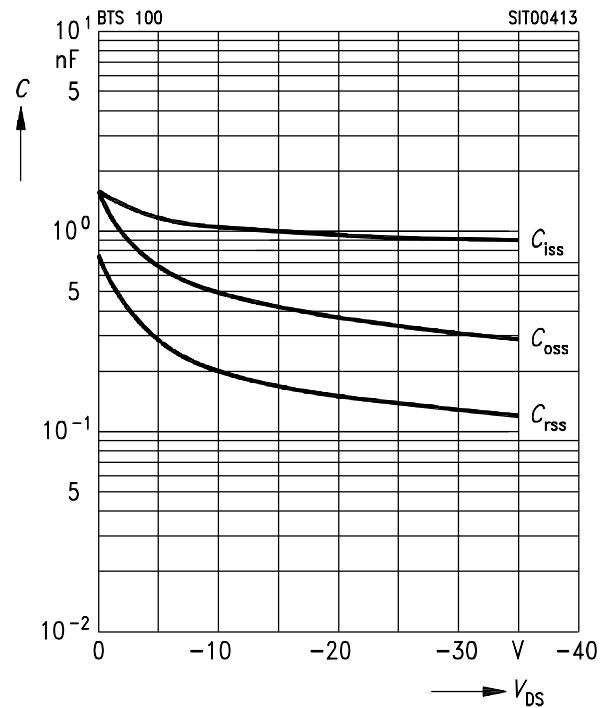
 Parameter: $t_p = 80 \mu\text{s}$, $V_{DS} = -25 \text{ V}$


Continuous drain current $I_D = f(T_C)$

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

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

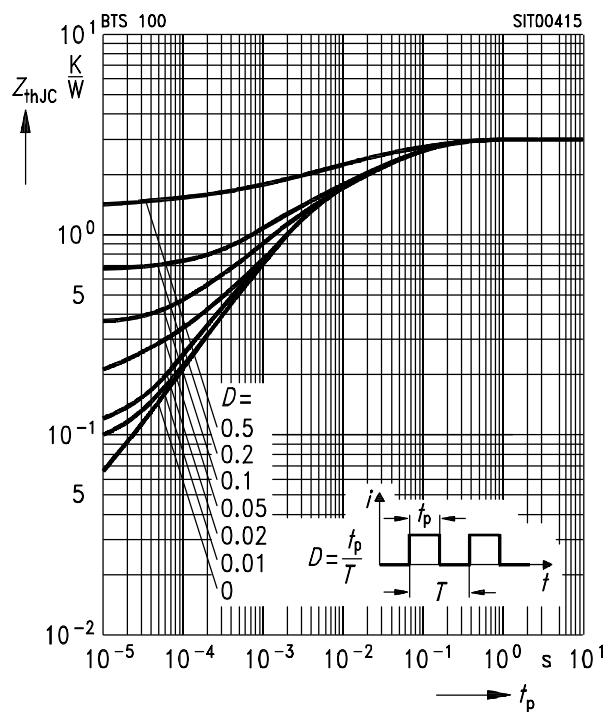
 Parameter: $V_{GS} = -20 \text{ V}, V_{DS} = 0$

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

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

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

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


Transient thermal impedance $Z_{\text{thJC}} = f(t_p)$

Parameter: $D = t_p/T$

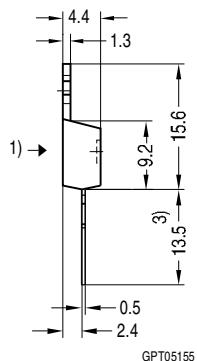
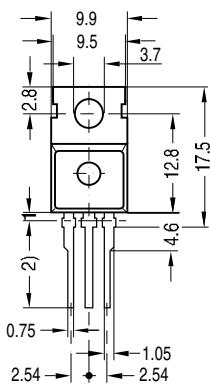


TO 220 AB

Standard

Ordering Code

C67078-A5007-A2



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

TO 220 AB

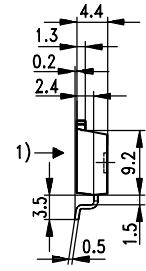
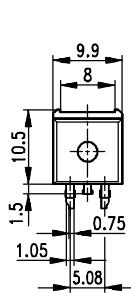
SMD Version E3045

SMD T&R E3045A

Ordering Code

C67078-A5007-A7

C67078-A5007-A12



1) shear and punch direction no burrs this surface

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