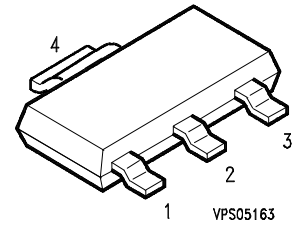


SIPMOS[®] Power Transistor

- P-Channel
- Enhancement mode
- Avalanche rated
- dv/dt rated



Pin 1	Pin 2/4	Pin 3
G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	@ V_{GS}	Package	Ordering Code
BSP 170 P	60 V	-1.9 A	0.3 Ω	$V_{GS} = -10 V$	SOT-223	Q67041-S4018
					-	

Maximum Ratings , at $T_j = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current $T_A = 25^\circ C$ $T_A = 70^\circ C$	I_D	-1.9 -1.5	A
Pulsed drain current $T_A = 25^\circ C$	I_{Dpulse}	-7.6	
Avalanche energy, single pulse $I_D = -1.9 A, V_{DD} = -25 V, R_{GS} = 25 \Omega$	E_{AS}	70	mJ
Avalanche current, periodic limited by T_{jmax}	I_{AR}	-1.9	A
Avalanche energy, periodic limited by $T_{j(max)}$	E_{AR}	0.18	mJ
Reverse diode dv/dt $I_S = -1.9 A, V_{DD} \leq V_{(BR)DSS}, di/dt = 200 A/\mu s,$ $T_{jmax} = 150^\circ C$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_A = 25^\circ C$	P_{tot}	1.8	W
Operating temperature	T_j	-55 ... +150	$^\circ C$
Storage temperature	T_{stg}	-55...+150	
IEC climatic category; DIN IEC 68-1		55/150/56	

Electrical Characteristics

Parameter at $T_j = 25\text{ °C}$, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	

Thermal Characteristics

Thermal resistance, junction -soldering point (Pin 4)	R_{thJS}	-	-	tbd	K/W
SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ¹⁾	R_{thJA}	-	tbd	-	
		-	-	70	

Static Characteristics

Drain- source breakdown voltage $V_{GS} = 0\text{ V}$, $I_D = -0.25\text{ mA}$	$V_{(BR)DSS}$	60	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = -460\text{ }\mu\text{A}$	$V_{GS(th)}$	-2.1	-3	-4	
Zero gate voltage drain current $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25\text{ °C}$ $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 125\text{ °C}$	I_{DSS}	-	-0.1	-1	μA
		-	-	-100	
Gate-source leakage current $V_{GS} = -20\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	-	-10	-100	nA
Drain-Source on-state resistance $V_{GS} = -10\text{ V}$, $I_D = -1.9\text{ A}$	$R_{DS(on)}$	-	0.175	0.3	Ω

¹ Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics

Parameter at $T_j = 25\text{ °C}$, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = -1.9\text{ A}$	g_{fs}	1	2.5	-	S
Input capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{iss}	-	335	420	pF
Output capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{oss}	-	105	135	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{rss}	-	65	85	
Turn-on delay time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -1.9\text{ A}$, $R_G = 6\ \Omega$	$t_{d(on)}$	-	14	21	ns
Rise time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -1.9\text{ A}$, $R_G = 6\ \Omega$	t_r	-	30	45	
Turn-off delay time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -1.9\text{ A}$, $R_G = 6\ \Omega$	$t_{d(off)}$	-	125	190	
Fall time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -1.9\text{ A}$, $R_G = 6\ \Omega$	t_f	-	65	100	

Electrical Characteristics

Parameter at $T_i = 25\text{ °C}$, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	

Dynamic Characteristics

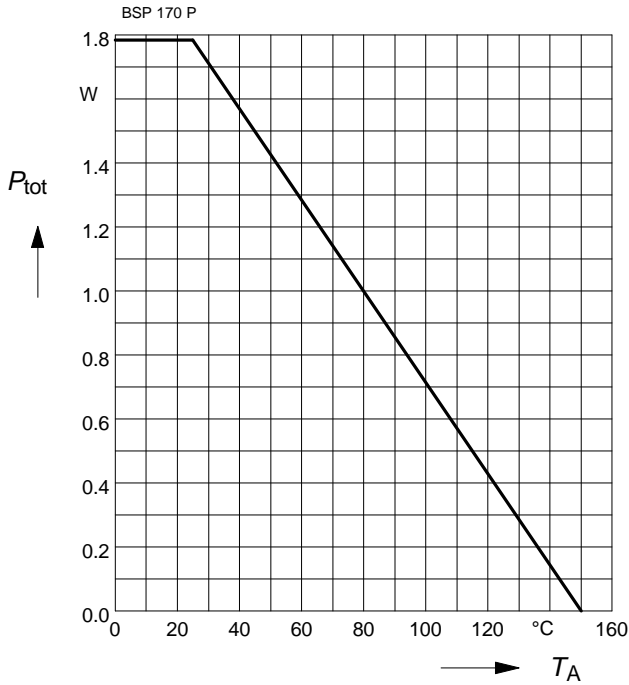
Gate charge at threshold $V_{DD} = -48\text{ V}$, $I_D \geq -0,1\text{ A}$, $V_{GS} = 0\text{ to } -1\text{ V}$	$Q_{G(th)}$	-	0.36	0.54	nC
Gate charge at $V_{GS}=7\text{ V}$ $V_{DD} = -24\text{ V}$, $I_D = -1.9\text{ A}$, $V_{GS} = 0\text{ to } -7\text{ V}$	$Q_{g(7)}$	-	7.8	11.7	nC
Gate charge total $V_{DD} = -48\text{ V}$, $I_D = -1.9\text{ A}$, $V_{GS} = 0\text{ to } -10\text{ V}$	Q_g	-	10	15	
Gate plateau voltage $V_{DD} = -48\text{ V}$, $I_D = -1.9\text{ A}$	$V_{(plateau)}$	-	3.85	-	V

Reverse Diode

Inverse diode continuous forward current $T_A = 25\text{ °C}$	I_S	-	-	-1.9	A
Inverse diode direct current,pulsed $T_A = 25\text{ °C}$	I_{SM}	-	-	-7.6	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$, $I_F = -3.8\text{ A}$	V_{SD}	-	-0.85	-1.2	V
Reverse recovery time $V_R = -30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	60	90	ns
Reverse recovery charge $V_R = -30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	100	150	nC

Power Dissipation

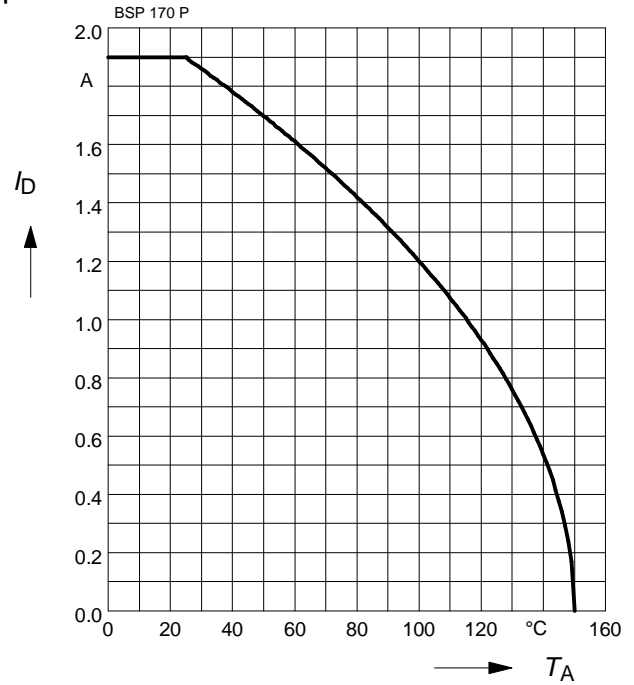
$$P_{\text{tot}} = f(T_A)$$



Drain current

$$I_D = f(T_A)$$

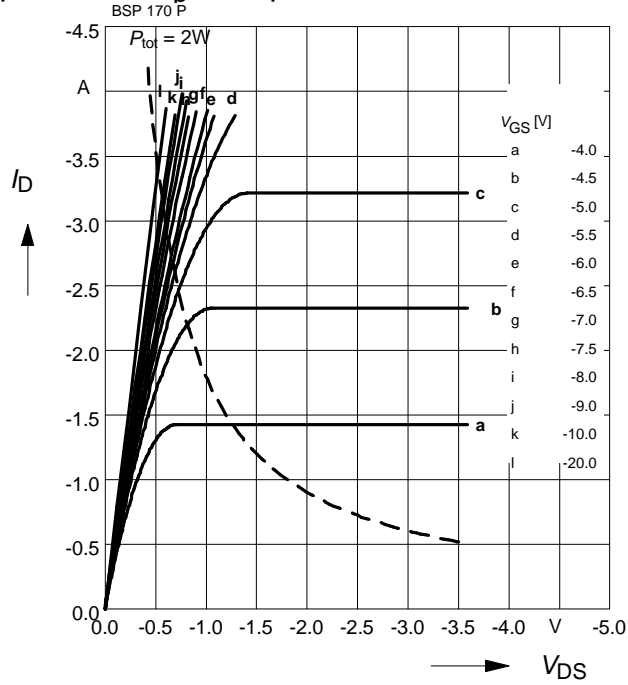
parameter: $V_{GS} \geq -10V$



Typ. output characteristics

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

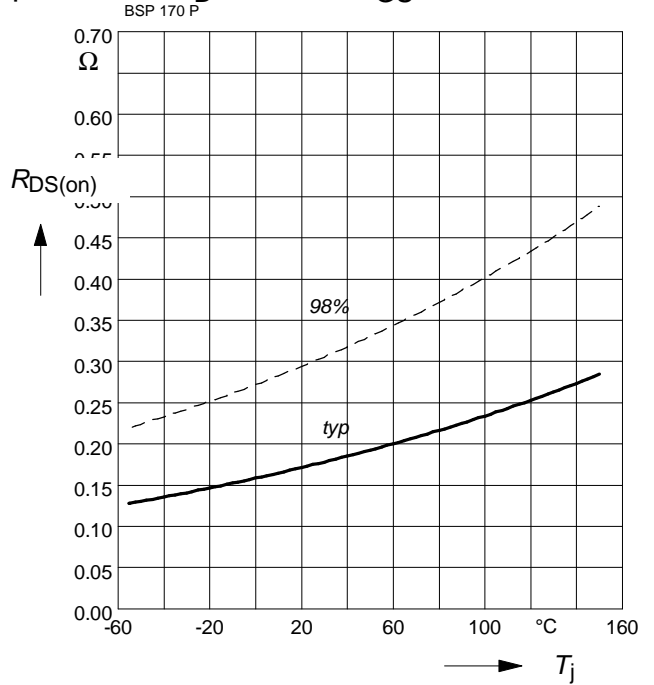
parameter: $t_D = 80 \mu s$



Drain-source on-resistance

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

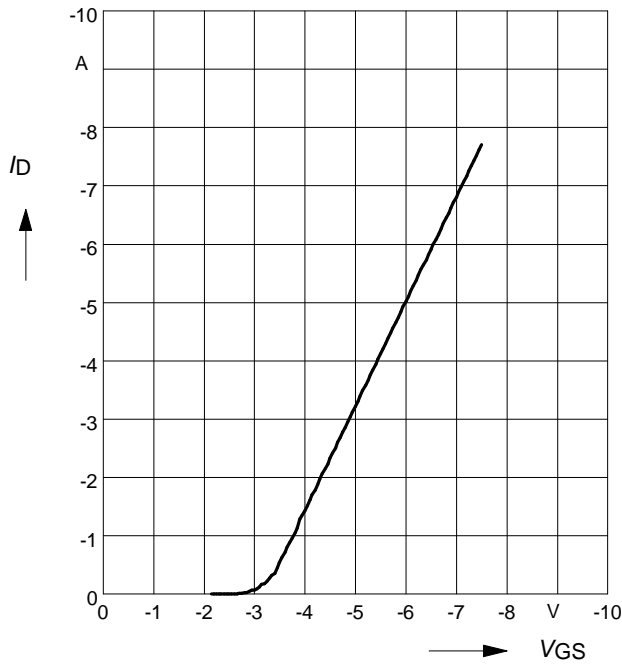
parameter: $I_D = -1.9 A, V_{GS} = -10 V$



Typ. transfer characteristics $I_D = f(V_{GS})$

parameter: $t_p = 80 \mu s$

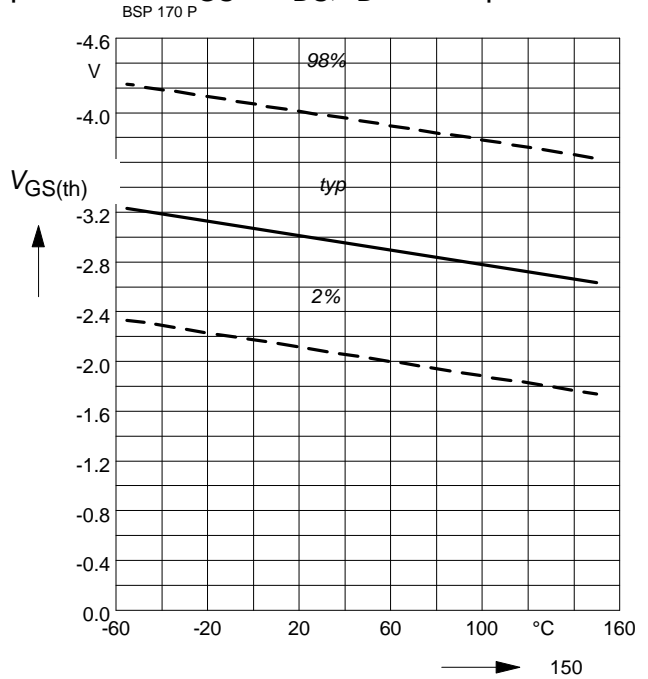
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Gate threshold voltage

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

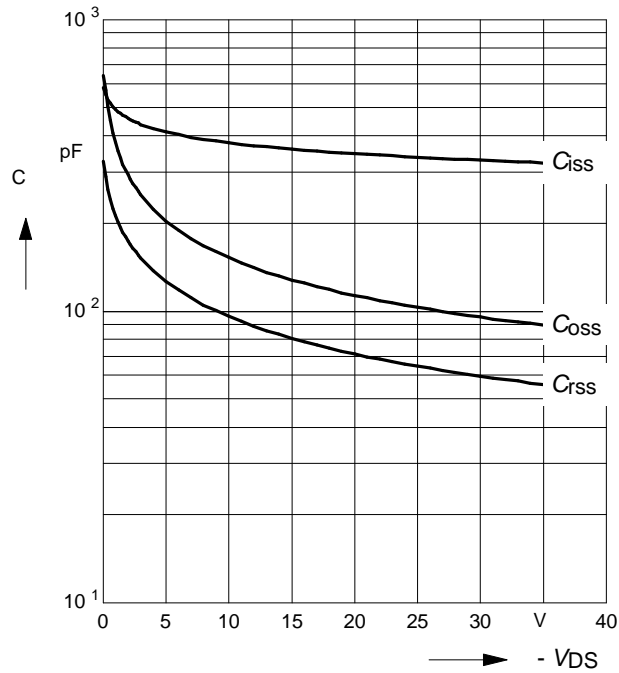
parameter: $V_{GS} = V_{DS}, I_D = -460 \mu A$



Typ. capacitances

$C = f(V_{DS})$

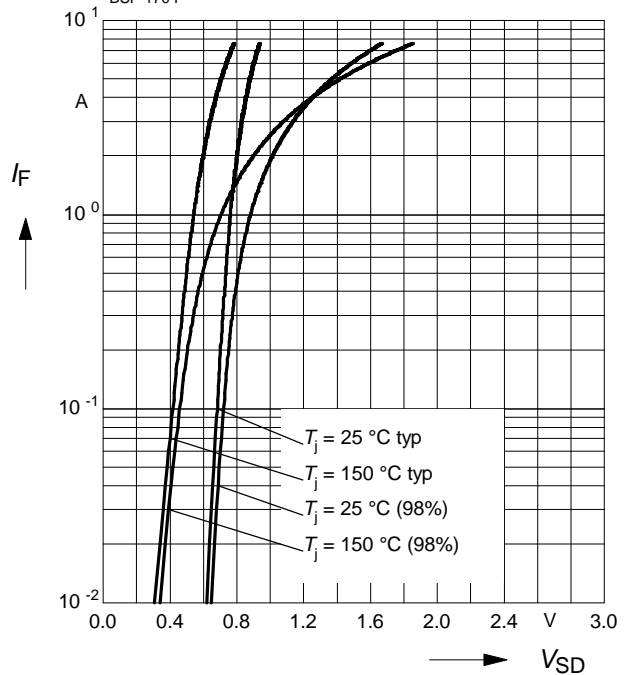
Parameter: $V_{GS} = 0 V, f = 1 MHz$



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

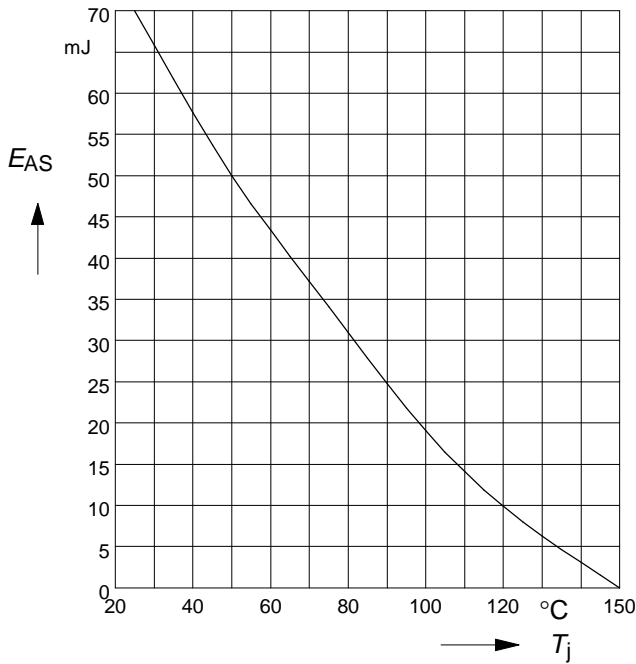
parameter: $T_j, t_p = 80 \mu s$



Avalanche Energy $E_{AS} = f(T_j)$

parameter: $I_D = -1.9 \text{ A}$, $V_{DD} = -25 \text{ V}$

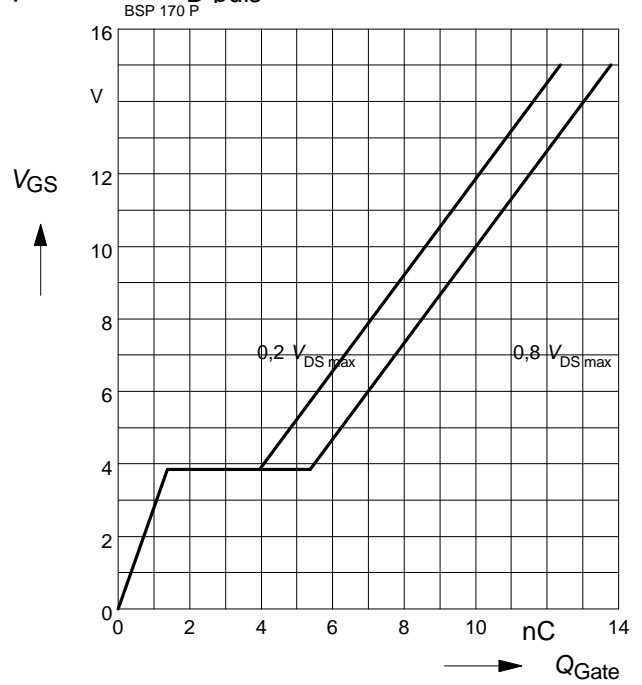
$R_{GS} = 25 \Omega$



Typ. gate charge $V_{GS} = f(Q_{Gate})$

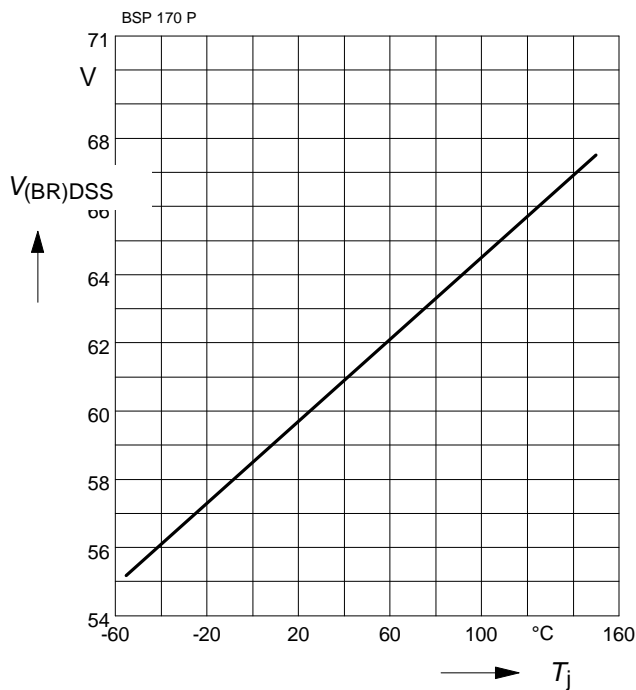
parameter: $I_{D \text{ puls}} = -1.9 \text{ A}$

parameter: $I_{D \text{ puls}} = -1.9 \text{ A}$



Drain-source breakdown voltage $V_{(BR)DSS} = f(T_j)$

$V_{(BR)DSS} = f(T_j)$



Edition 7.97

**Published by Siemens AG,
Bereich Halbleiter Vertrieb,
Werbung, Balanstraße 73,
81541 München**

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