

SIPMOS® Small-Signal-Transistor

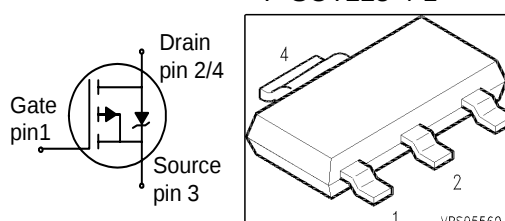
Feature

- P-Channel
- Enhancement mode
- Logic Level
- dv/dt rated

Product Summary

V_{DS}	-100	V
$R_{DS(on)}$	1.8	Ω
I_D	-0.68	A

P-SOT223-4-1



Type	Package	Ordering Code	Tape and Reel Information	Marking
BSP 316 P	P-SOT223-4-1	Q67042-S4165	-	BSP316P

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

Parameter	Symbol	Value	Unit
Continuous drain current $T_A=25\text{ }^{\circ}\text{C}$ $T_A=70\text{ }^{\circ}\text{C}$	I_D	-0.68 -0.54	A
Pulsed drain current $T_A=25\text{ }^{\circ}\text{C}$	$I_{D\text{ puls}}$	-2.72	
Reverse diode dv/dt $I_S=-0.68\text{ A}$, $V_{DS}=-48\text{ V}$, $di/dt=-200\text{ A}/\mu\text{s}$, $T_{j\text{ max}}=150\text{ }^{\circ}\text{C}$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_A=25\text{ }^{\circ}\text{C}$	P_{tot}	1.8	W
Operating and storage temperature	T_j, T_{stg}	-55... +150	$^{\circ}\text{C}$
IEC climatic category; DIN IEC 68-1		55/150/56	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - soldering point (Pin 4)	R_{thJS}	-	15	25	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	80	115	
@ 6 cm ² cooling area ¹⁾		-	48	70	

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 $V_{GS}=0, I_D=-250\mu A$	$V_{(BR)DSS}$	-100	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=-170\mu A$	$V_{GS(th)}$	-1	-1.5	-2	
Zero gate voltage drain current $V_{DS}=-100V, V_{GS}=0, T_j=25^{\circ}C$ $V_{DS}=-100V, V_{GS}=0, T_j=150^{\circ}C$	I_{DSS}	- -	-0.1 -10	-0.2 -100	μA
Gate-source leakage current $V_{GS}=-20V, V_{DS}=0$	I_{GSS}	-	-10	-100	
Drain-source on-state resistance $V_{GS}=-4.5V, I_D=-0.61A$	$R_{DS(on)}$	-	1.5	2.3	Ω
Drain-source on-state resistance $V_{GS}=-10V, I_D=-0.68A$	$R_{DS(on)}$	-	1.4	1.8	

¹⁾Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic Characteristics

Transconductance	g_{fs}	$ V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ $I_D = -0.54\text{A}$	0.5	1	-	S
Input capacitance	C_{iss}	$V_{GS} = 0, V_{DS} = -25\text{V},$ $f = 1\text{MHz}$	-	117	146	pF
Output capacitance	C_{oss}		-	27.7	34.5	
Reverse transfer capacitance	C_{rss}		-	12	15	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -50\text{V}, V_{GS} = -10\text{V},$ $I_D = -0.68\text{A}, R_G = 6\Omega$	-	4.7	7	ns
Rise time	t_r		-	7.5	11.2	
Turn-off delay time	$t_{d(off)}$		-	67.4	101	
Fall time	t_f		-	25.9	38.9	

Gate Charge Characteristics

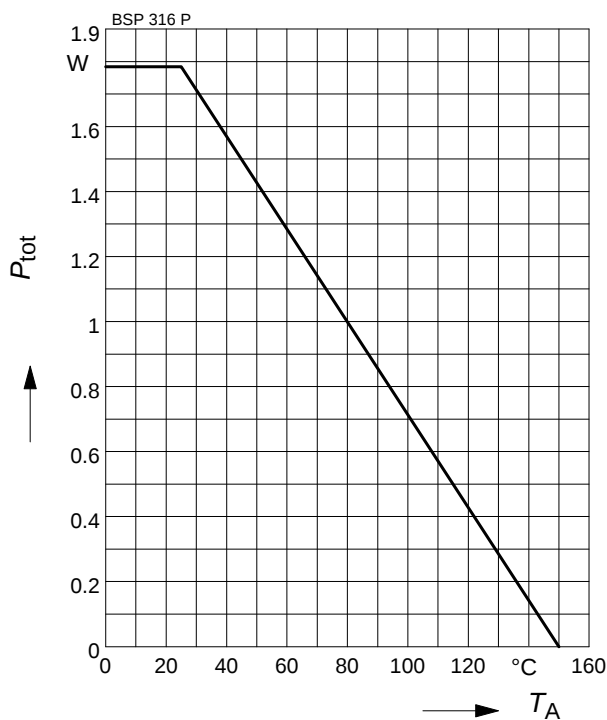
Gate to source charge	Q_{gs}	$V_{DD} = -80\text{V}, I_D = -0.68\text{A}$	-	-0.2	-0.3	nC
Gate to drain charge	Q_{gd}		-	-1.87	-2.8	
Gate charge total	Q_g	$V_{DD} = -80\text{V}, I_D = -0.68\text{A},$ $V_{GS} = 0 \text{ to } -10\text{V}$	-	-5.1	-6.4	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = -80\text{V}, I_D = -0.68\text{A}$	-	-2.7	-	V

Reverse Diode

Inverse diode continuous forward current	I_S	$T_A = 25^{\circ}\text{C}$	-	-	-0.68	A
Inv. diode direct current, pulsed	I_{SM}		-	-	-2.72	
Inverse diode forward voltage	V_{SD}	$V_{GS} = 0, I_F = -0.68\text{A}$	-	-0.85	-1.2	V
Reverse recovery time	t_{rr}	$V_R = -50\text{V}, I_F = I_S,$ $di_F/dt = 100\text{A}/\mu\text{s}$	-	44.2	55.3	ns
Reverse recovery charge	Q_{rr}		-	56.3	70.4	

1 Power dissipation

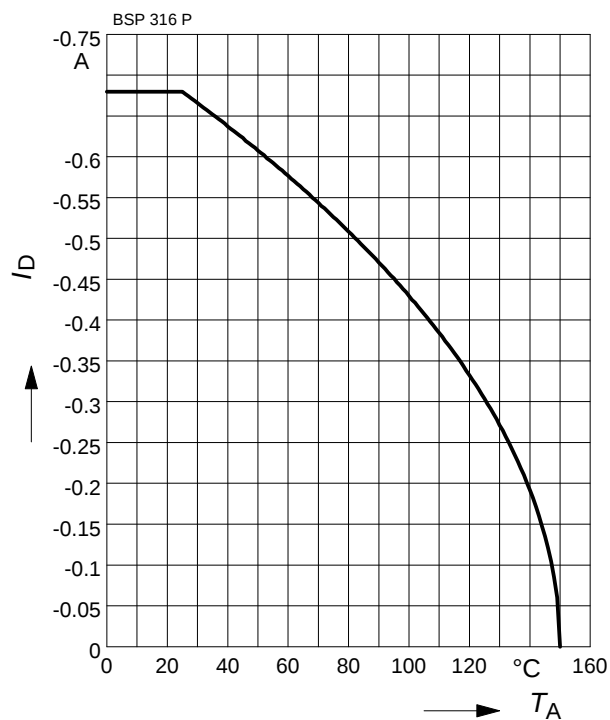
$$P_{\text{tot}} = f(T_A)$$



2 Drain current

$$I_D = f(T_A)$$

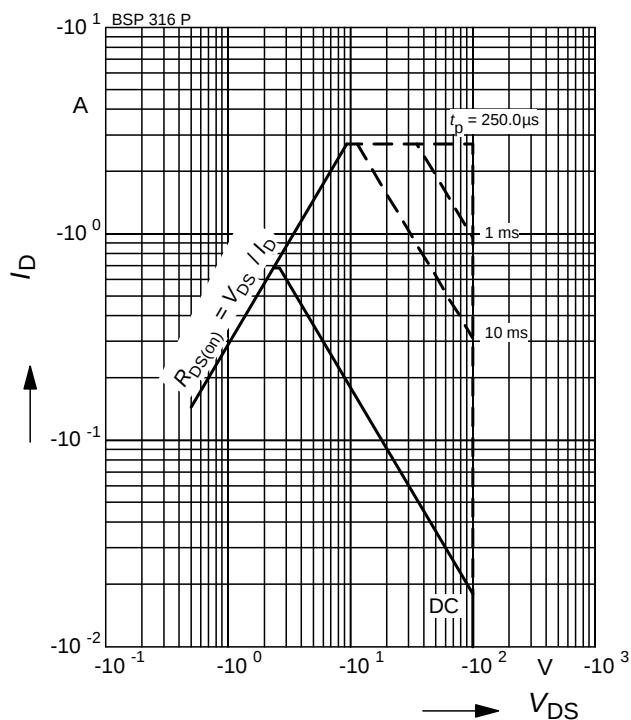
parameter: $|V_{GS}| \geq 10V$



3 Safe operating area

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

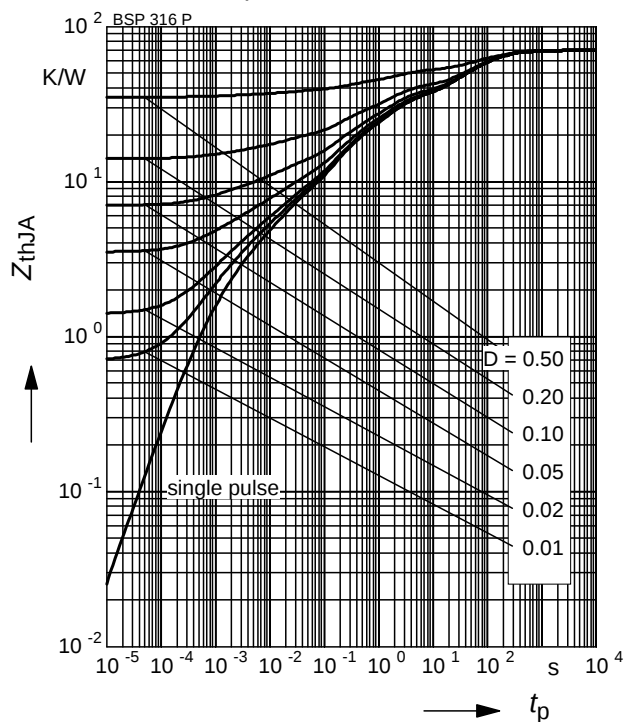
parameter: $D = 0$, $T_A = 25^\circ\text{C}$



4 Transient thermal impedance

$$Z_{\text{thJA}} = f(t_p)$$

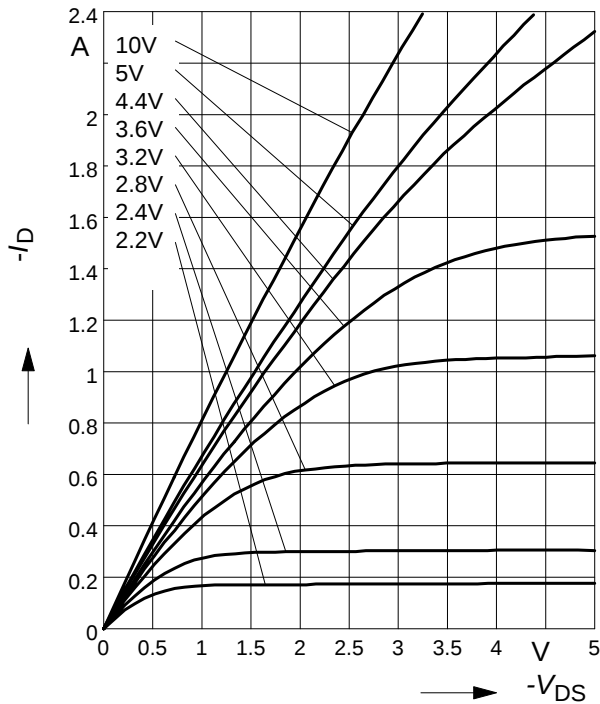
parameter: $D = t_p/T$



5 Typ. output characteristic

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

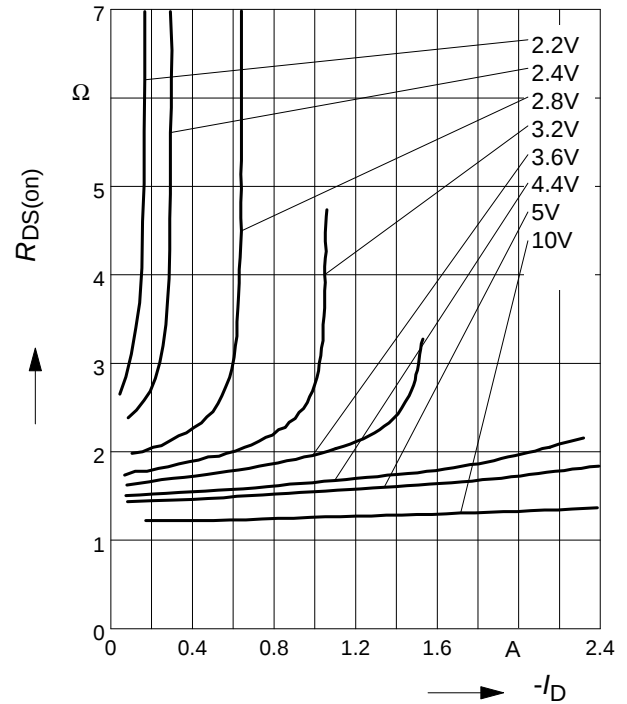
parameter: $T_j = 25^\circ\text{C}$, $-V_{GS}$



6 Typ. drain-source on resistance

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

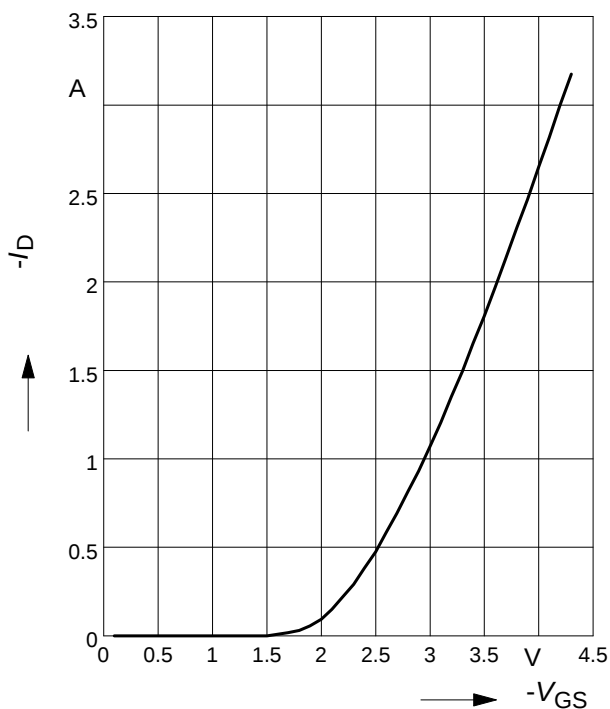
parameter: $T_j = 25^\circ\text{C}$, $-V_{GS}$



7 Typ. transfer characteristics

$$I_D = f(V_{GS}); |V_{DS}| \geq 2 \times |I_D| \times R_{DS(on)max}$$

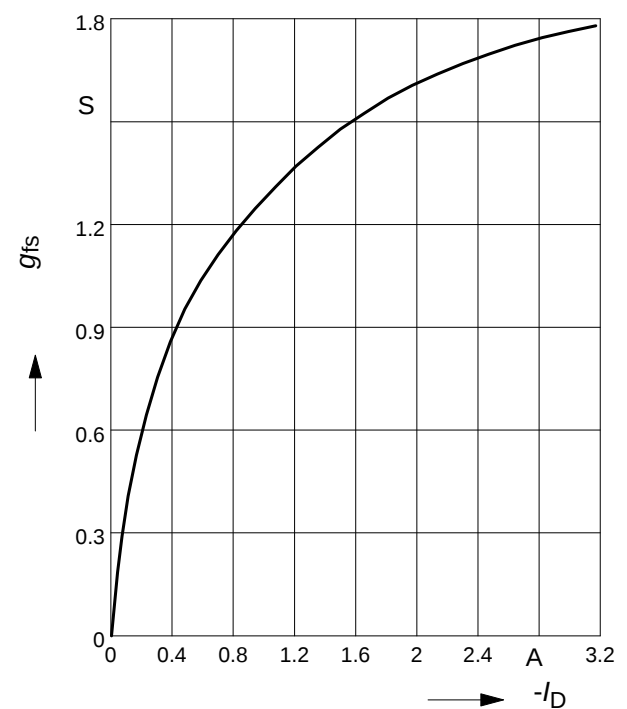
parameter: $T_j = 25^\circ\text{C}$



8 Typ. forward transconductance

$$g_{fs} = f(I_D)$$

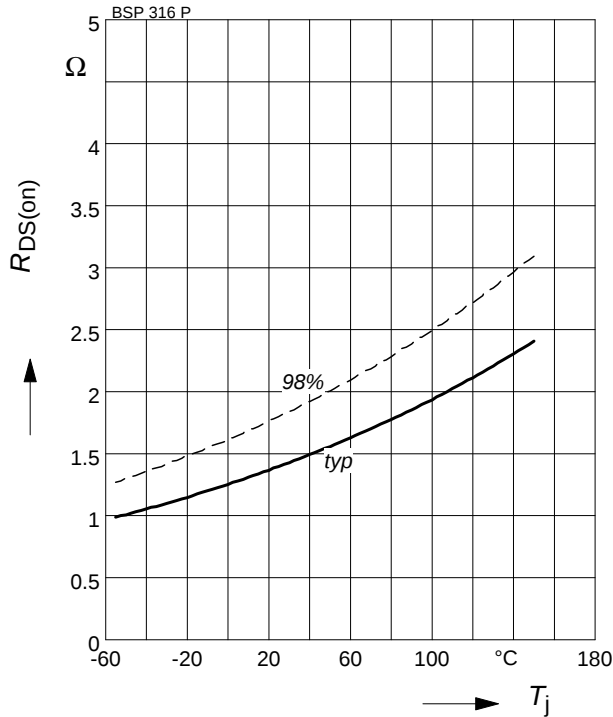
parameter: $T_j = 25^\circ\text{C}$



9 Drain-source on-state resistance

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

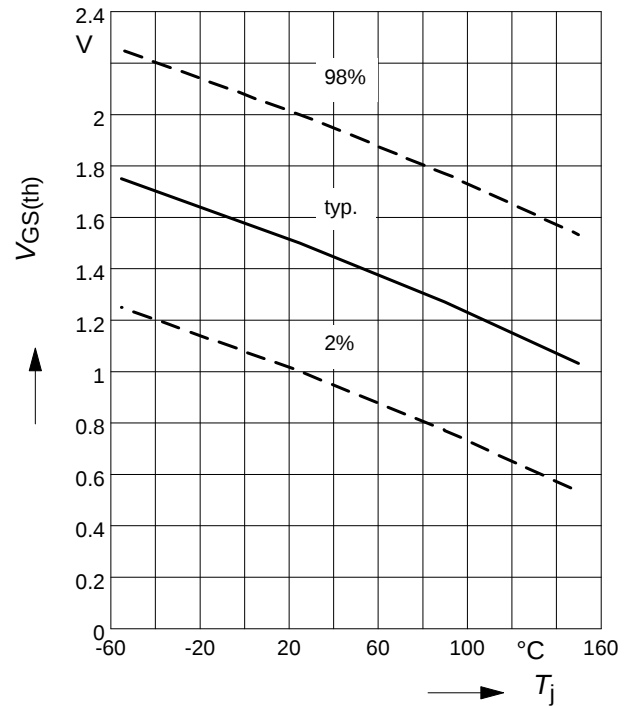
parameter: $I_D = -0.68$ A, $V_{GS} = -10$ V



10 Typ. gate threshold voltage

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

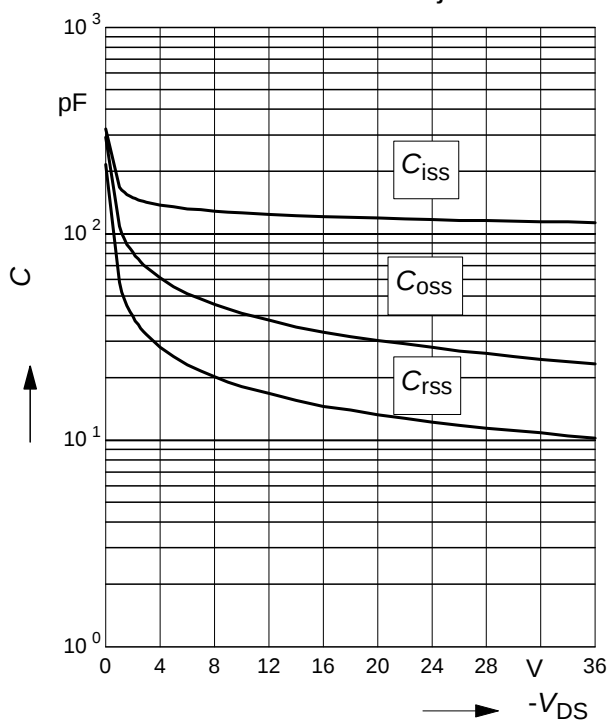
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

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

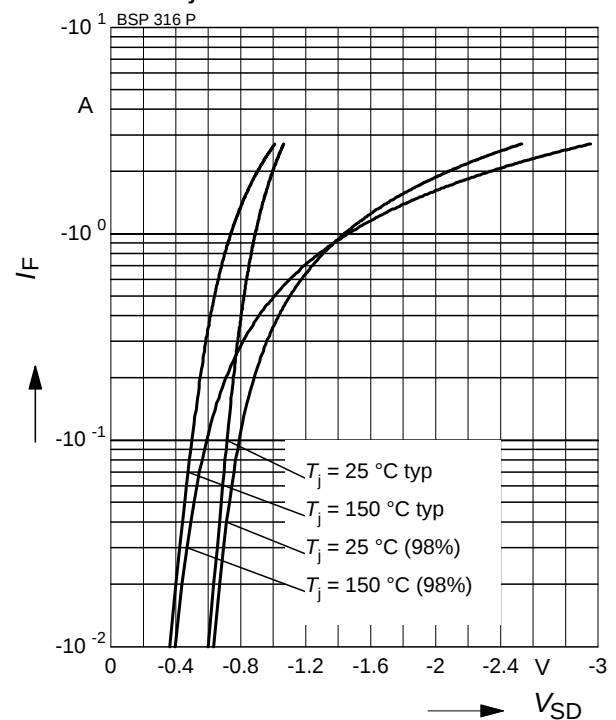
parameter: $V_{GS}=0$, $f=1$ MHz, $T_j = 25$ $^{\circ}\text{C}$



12 Forward character. of reverse diode

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

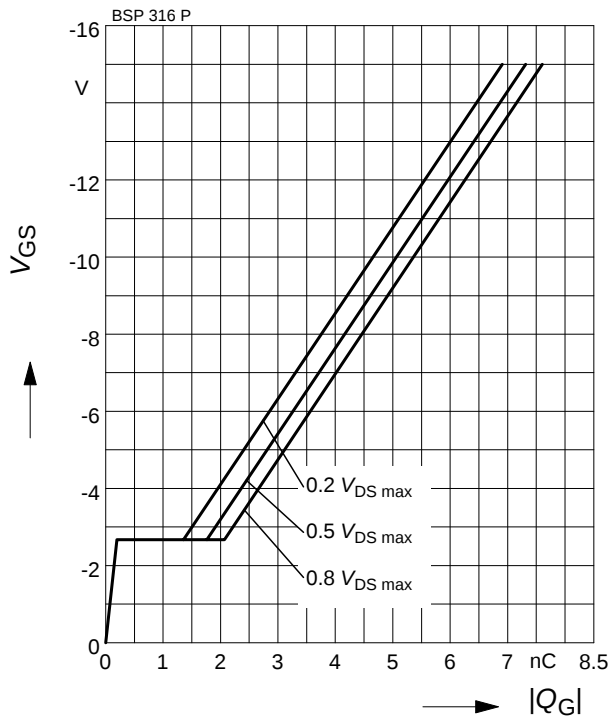
parameter: T_j



13 Typ. gate charge

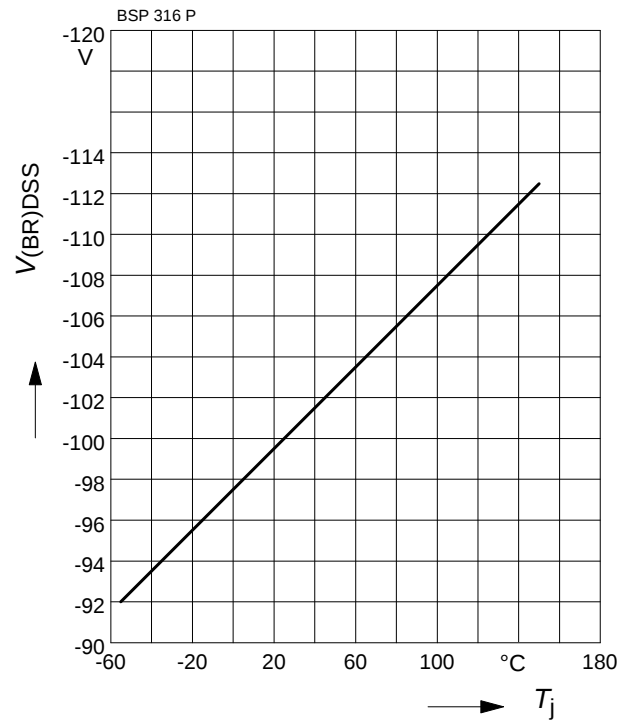
$$V_{GS} = f(Q_{Gate})$$

parameter: $I_D = -0.68$ A pulsed, $T_j = 25$ °C



14 Drain-source breakdown voltage

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



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