

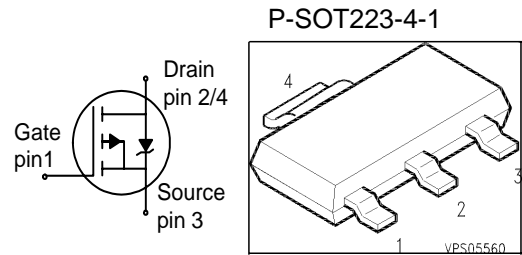
## SIPMOS® Small-Signal-Transistor

### Feature

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

### Product Summary

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



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/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_A=25\text{ }^\circ\text{C}$	$P_{\text{tot}}$	1.8	W
Operating and storage temperature	$T_j, T_{\text{stg}}$	-55... +150	$^\circ\text{C}$
IEC climatic category; DIN IEC 68-1		55/150/56	

**Thermal Characteristics**

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

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Static Characteristics</b>					
Drain-source breakdown voltage $V_{GS}=0, I_D=-250\mu\text{A}$	$V_{(BR)DSS}$	-100	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=-170\mu\text{A}$	$V_{GS(th)}$	-1	-1.5	-2	
Zero gate voltage drain current $V_{DS}=-100\text{V}, V_{GS}=0, T_j=25^\circ\text{C}$ $V_{DS}=-100\text{V}, V_{GS}=0, T_j=150^\circ\text{C}$	$I_{DSS}$	- -	-0.1 -10	-0.2 -100	$\mu\text{A}$
Gate-source leakage current $V_{GS}=-20\text{V}, V_{DS}=0$	$I_{GSS}$	-	-10	-100	
Drain-source on-state resistance $V_{GS}=-4.5\text{V}, I_D=-0.61\text{A}$	$R_{DS(on)}$	-	1.5	2.3	$\Omega$
Drain-source on-state resistance $V_{GS}=-10\text{V}, I_D=-0.68\text{A}$	$R_{DS(on)}$	-	1.4	1.8	

<sup>1)</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  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 *  I_D  * 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**

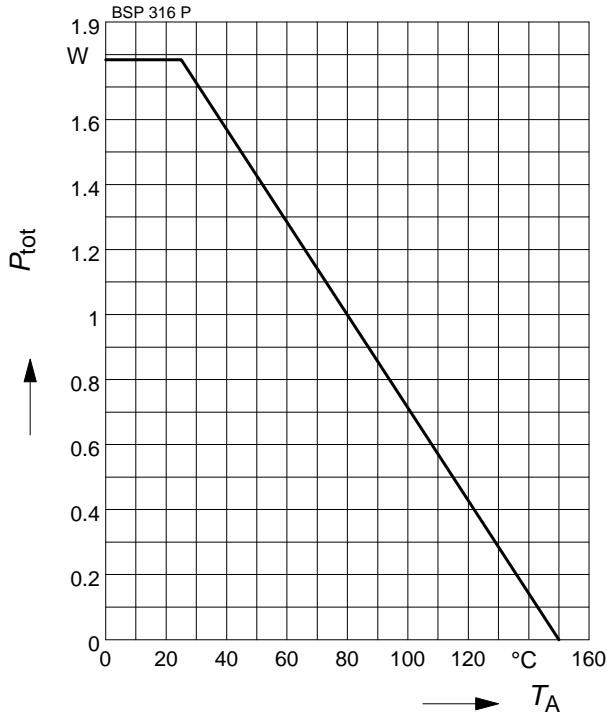
Gate to source charge	$Q_{gs}$	$V_{DD} = -80\text{V}, I_D = -0.68\text{A}$	-	-0.2	-0.3	nC
Gate to drain charge	$Q_{gd}$		-	-1.87	-2.8	
Gate charge total	$Q_g$	$V_{DD} = -80\text{V}, I_D = -0.68\text{A},$ $V_{GS} = 0 \text{ to } -10\text{V}$	-	-5.1	-6.4	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} =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

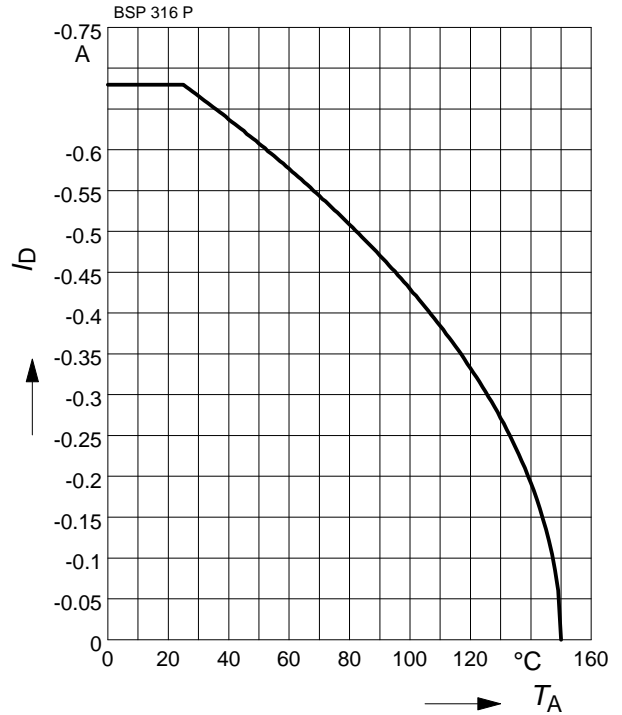
$$P_{\text{tot}} = f(T_A)$$



### 2 Drain current

$$I_D = f(T_A)$$

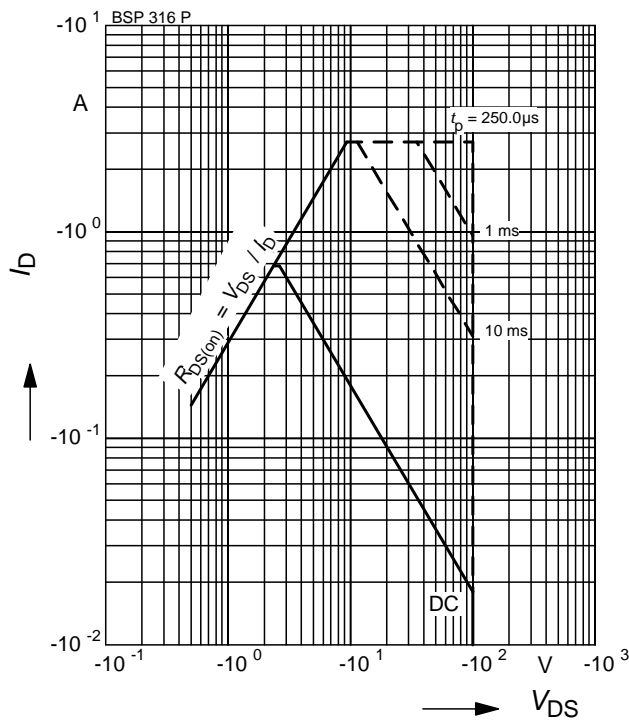
parameter:  $|V_{GS}| \geq 10V$



### 3 Safe operating area

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

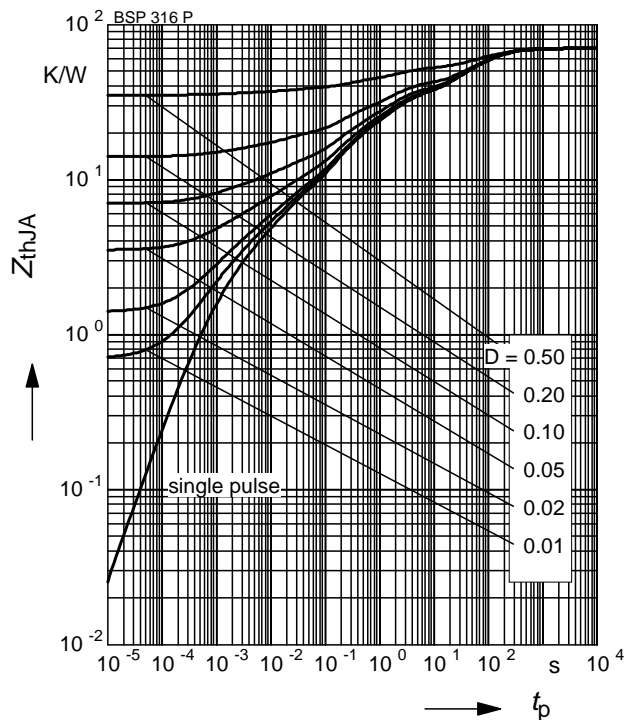
parameter:  $D = 0, T_A = 25^\circ C$



### 4 Transient thermal impedance

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

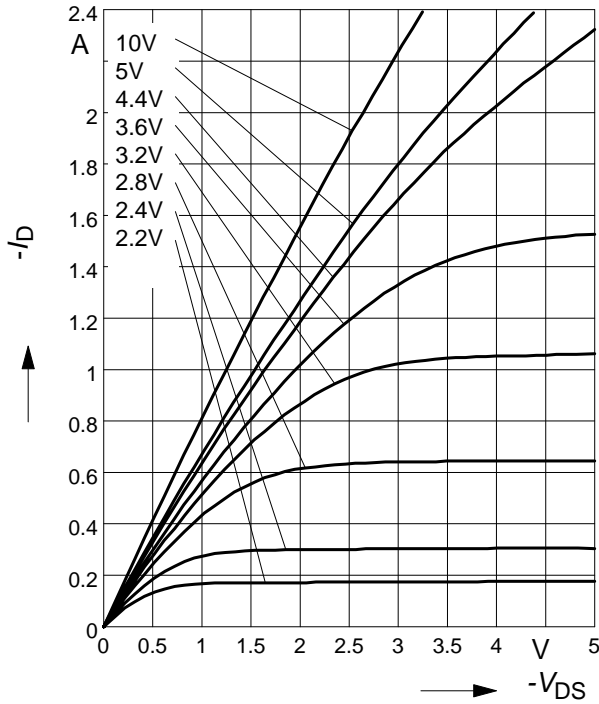
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

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

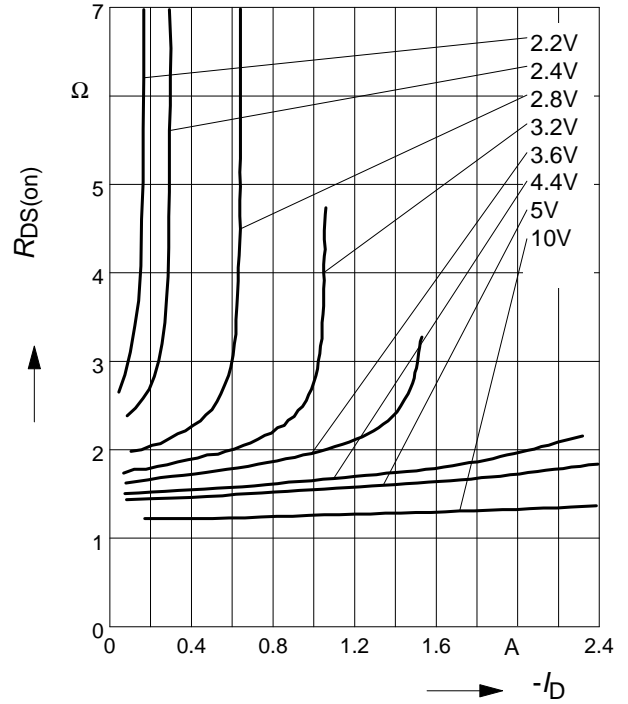
parameter:  $T_j = 25^\circ\text{C}$ ,  $-V_{GS}$



**6 Typ. drain-source on resistance**

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

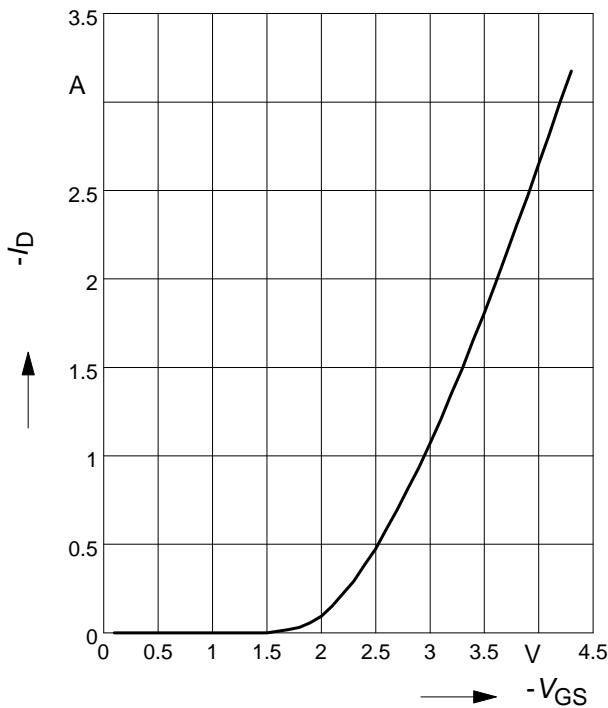
parameter:  $T_j = 25^\circ\text{C}$ ,  $-V_{GS}$



**7 Typ. transfer characteristics**

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

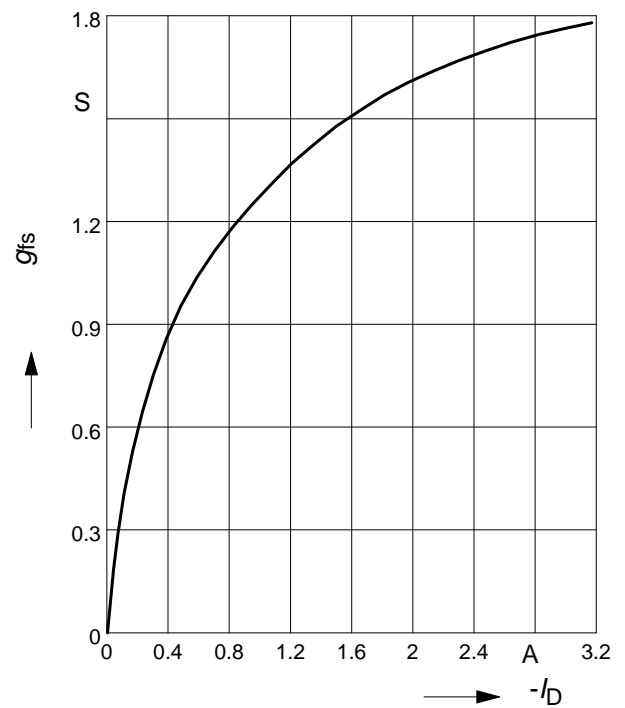
parameter:  $T_j = 25^\circ\text{C}$



**8 Typ. forward transconductance**

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

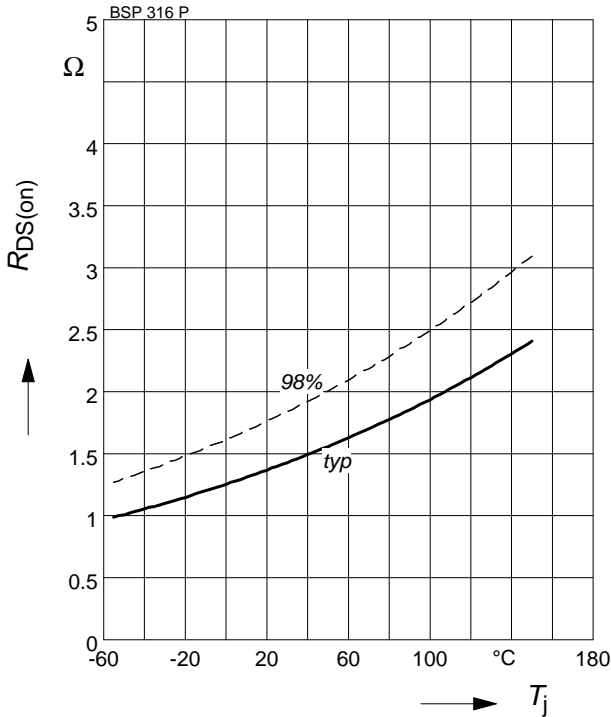
parameter:  $T_j = 25^\circ\text{C}$



**9 Drain-source on-state resistance**

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

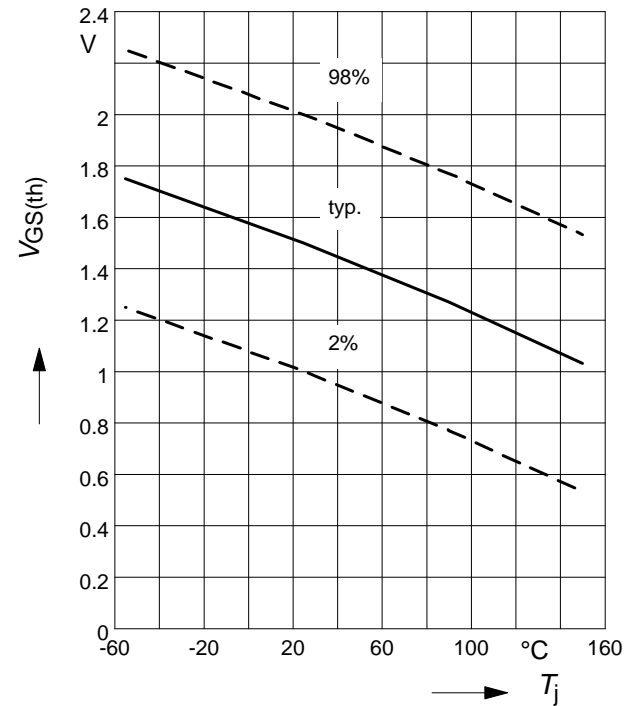
parameter :  $I_D = -0.68 \text{ A}$ ,  $V_{GS} = -10 \text{ V}$



**10 Typ. gate threshold voltage**

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

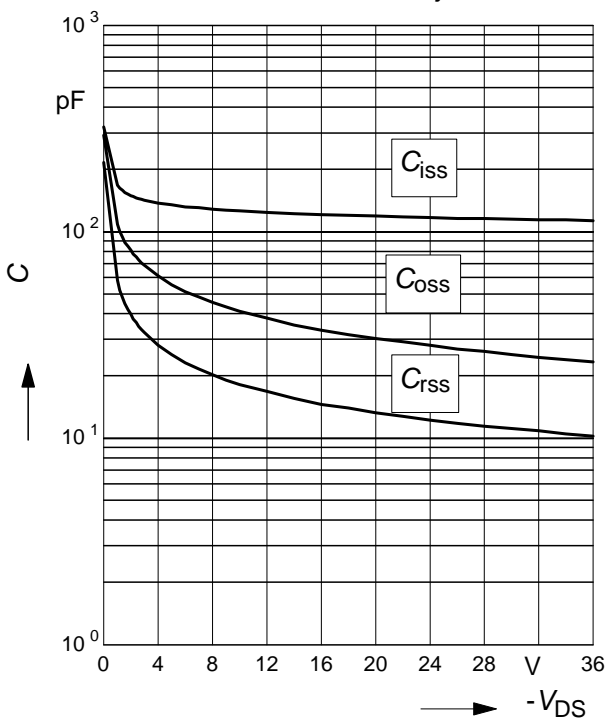
parameter:  $V_{GS} = V_{DS}$



**11 Typ. capacitances**

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

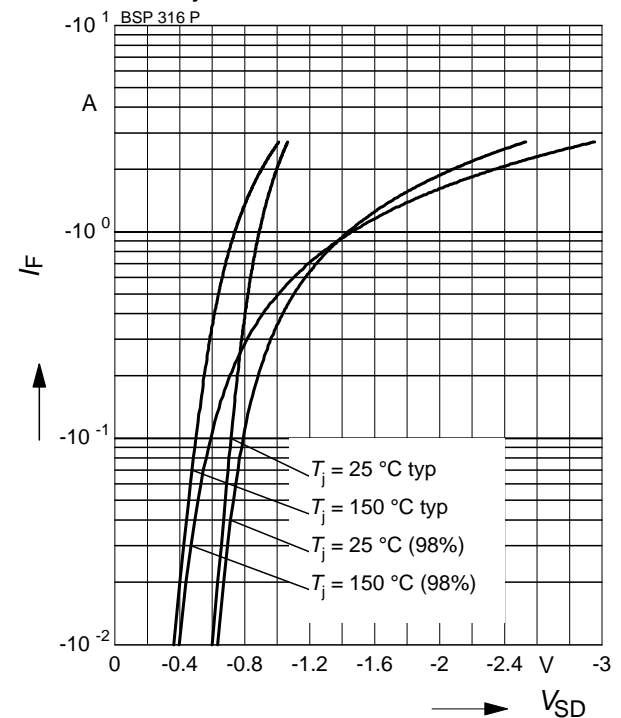
parameter:  $V_{GS}=0$ ,  $f=1 \text{ MHz}$ ,  $T_j = 25 \text{ }^\circ\text{C}$



**12 Forward character. of reverse diode**

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

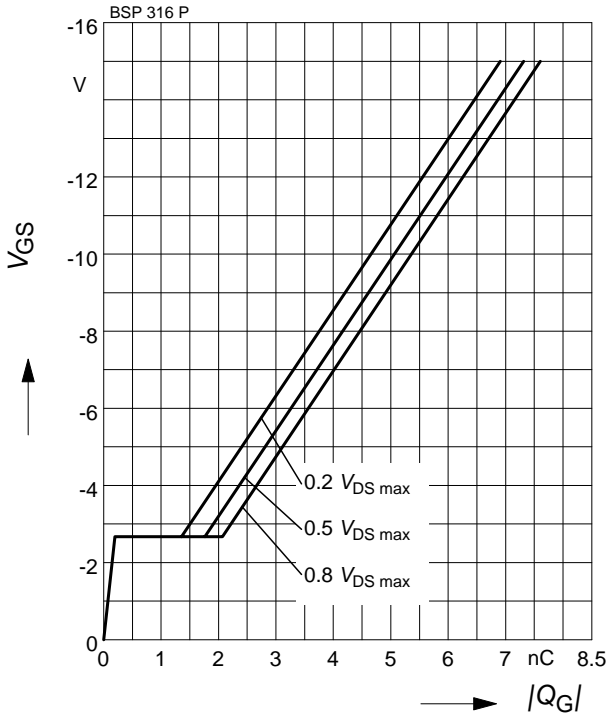
parameter:  $T_j$



**13 Typ. gate charge**

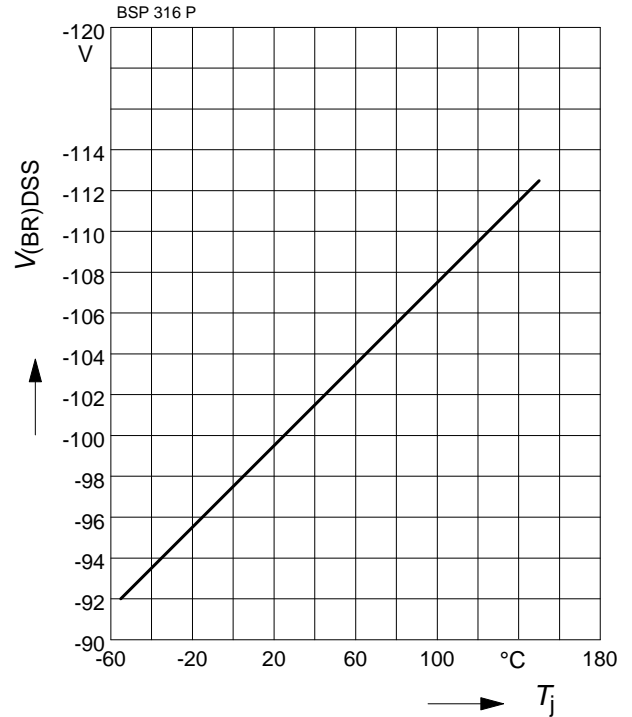
$$V_{GS} = f(Q_{Gate})$$

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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