

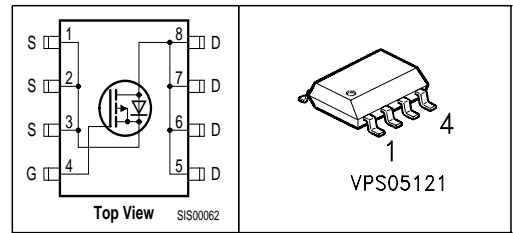
## OptiMOS<sup>®</sup>-P Small-Signal-Transistor

### Feature

- P-Channel
- Enhancement mode
- Logic Level
- 150°C operating temperature
- Avalanche rated
- dv/dt rated
- Ideal for fast switching buck converter

### Product Summary

$V_{DS}$	-30	V
$R_{DS(on)}$	8	mΩ
$I_D$	-14.9	A



Type	Package	Ordering Code
BSO301SP	SO 8	Q67042-S4086

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

Parameter	Symbol	Value	Unit
Continuous drain current $T_A=25\text{ °C}$ $T_A=70\text{ °C}$	$I_D$	-14.9 -11.9	A
Pulsed drain current $T_A=25\text{ °C}$	$I_{D\text{ puls}}$	-59.6	
Avalanche energy, single pulse $I_D=-14.9\text{ A}$ , $V_{DD}=-25\text{ V}$ , $R_{GS}=25\text{ }\Omega$	$E_{AS}$	248	mJ
Reverse diode dv/dt $I_S=-14.9\text{ A}$ , $V_{DS}=-24\text{ V}$ , $di/dt=200\text{ A}/\mu\text{s}$ , $T_{j\text{ max}}=150\text{ °C}$	dv/dt	-6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_A=25\text{ °C}$	$P_{\text{tot}}$	2.5	W
Operating and storage temperature	$T_j$ , $T_{\text{stg}}$	-55... +150	°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	$R_{thJS}$	-	-	35	K/W
SMD version, device on PCB:	$R_{thJA}$	-	-	110	
@ min. footprint, $t < 10s$ @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>		-	-	50	

**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 $V_{GS}=0, I_D=-250\mu A$	$V_{(BR)DSS}$	-30	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=-250\mu A$	$V_{GS(th)}$	-1	-1.5	-2	
Zero gate voltage drain current $V_{DS}=-30V, V_{GS}=0, T_j=25^\circ C$ $V_{DS}=-30V, V_{GS}=0, T_j=150^\circ C$	$I_{DSS}$	-	-0.1 -10	-1 -100	$\mu A$
Gate-source leakage current $V_{GS}=-20V, V_{DS}=0$	$I_{GSS}$	-	-10	-100	
Drain-source on-state resistance $V_{GS}=-4.5V, I_D=-12.1A$	$R_{DS(on)}$	-	9.1	12	m $\Omega$
Drain-source on-state resistance $V_{GS}=-10V, I_D=-14.9A$	$R_{DS(on)}$	-	6.3	8	

<sup>1</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu m$  thick) copper area for drain connection. PCB is vertical without blown air;  $t \leq 10$  sec.

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}$ , $I_D = -11.9\text{A}$	22	44	-	S
Input capacitance	$C_{iss}$	$V_{GS} = 0, V_{DS} = -25\text{V}$ , $f = 1\text{MHz}$	-	4510	-	pF
Output capacitance	$C_{oss}$		-	1140	-	
Reverse transfer capacitance	$C_{rss}$		-	950	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -15\text{V}, V_{GS} = -10\text{V}$ , $I_D = -1\text{A}, R_G = 6\Omega$	-	17	25	ns
Rise time	$t_r$		-	26	38	
Turn-off delay time	$t_{d(off)}$		-	161	240	
Fall time	$t_f$		-	120	180	

**Gate Charge Characteristics**

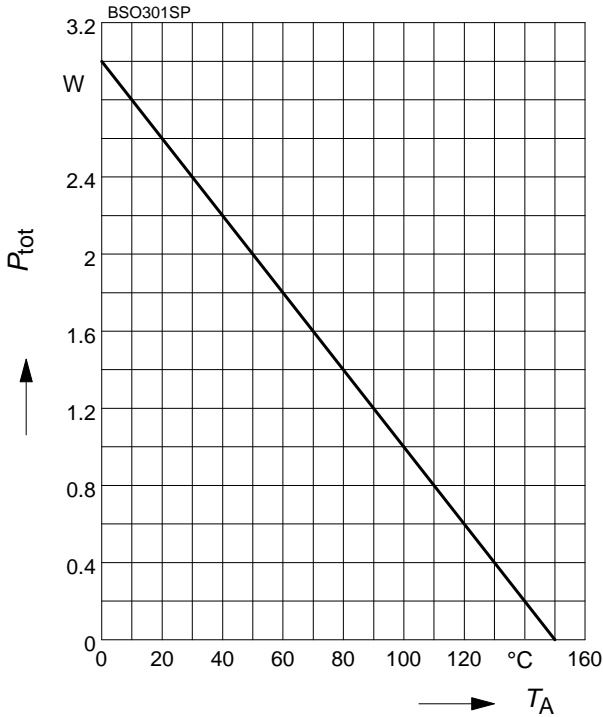
Gate to source charge	$Q_{gs}$	$V_{DD} = -24\text{V}, I_D = -14.9\text{A}$	-	-11	-16	nC
Gate to drain charge	$Q_{gd}$		-	-40	-61	
Gate charge total	$Q_g$	$V_{DD} = -24\text{V}, I_D = -14.9\text{A}$ , $V_{GS} = 0 \text{ to } -10\text{V}$	-	-121	-181	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = -24\text{V}, I_D = -14.9\text{A}$	-	-2.4	-	V

**Reverse Diode**

Inverse diode continuous forward current	$I_S$	$T_A = 25\text{ }^\circ\text{C}$	-	-	-3.3	A
Inv. diode direct current, pulsed	$I_{SM}$		-	-	-59.6	
Inverse diode forward voltage	$V_{SD}$	$V_{GS} = 0,  I_F  =  I_D $	-	-0.75	-1.2	V
Reverse recovery time	$t_{rr}$	$V_R = -15\text{V},  I_F  =  I_D $ , $dI_F/dt = 100\text{A}/\mu\text{s}$	-	36	45	ns
Reverse recovery charge	$Q_{rr}$		-	27	34	

### 1 Power dissipation

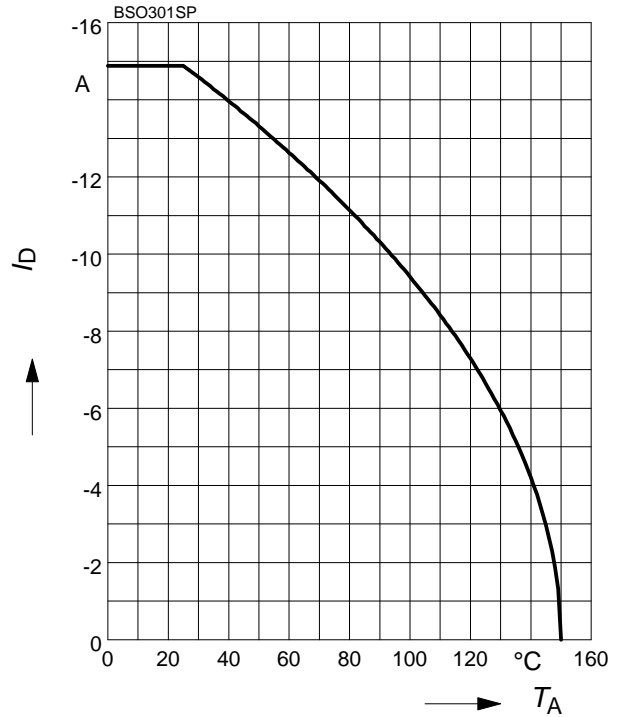
$$P_{tot} = f(T_A)$$



### 2 Drain current

$$I_D = f(T_A)$$

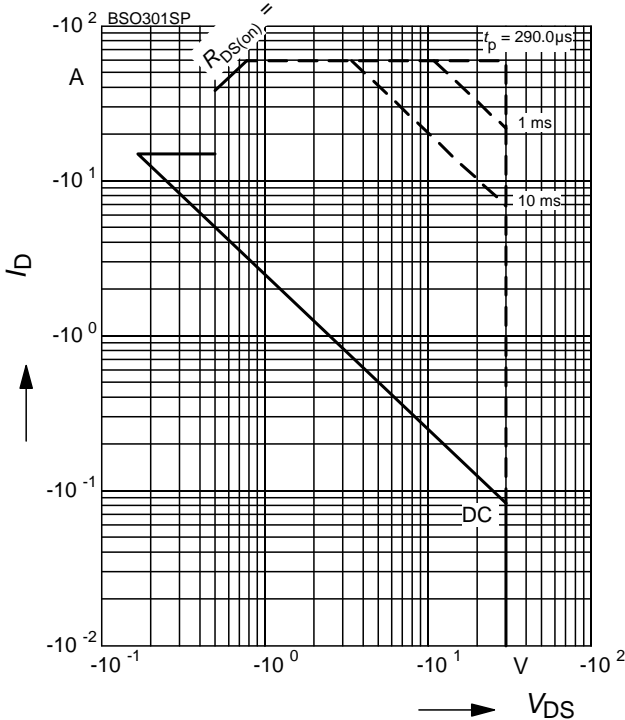
parameter:  $|V_{GS}| \geq 10 \text{ V}$



### 3 Safe operating area

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

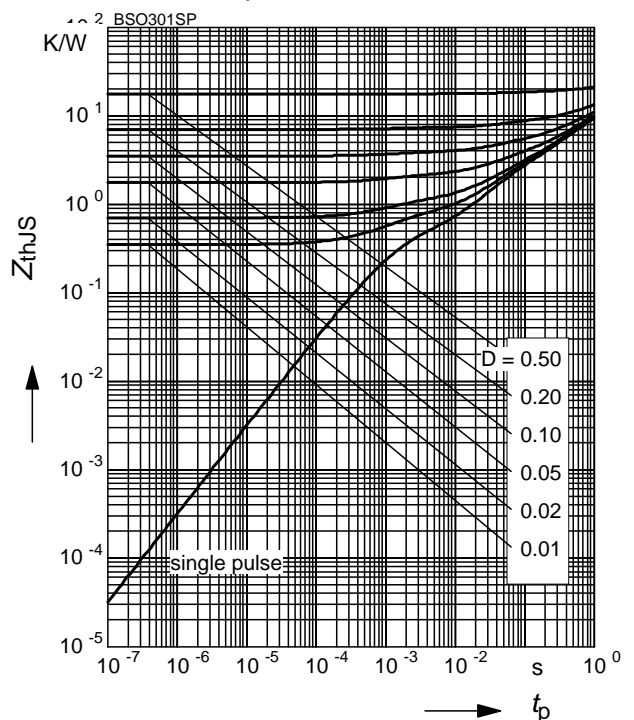
parameter:  $D = 0, T_A = 25 \text{ °C}$



### 4 Transient thermal impedance

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

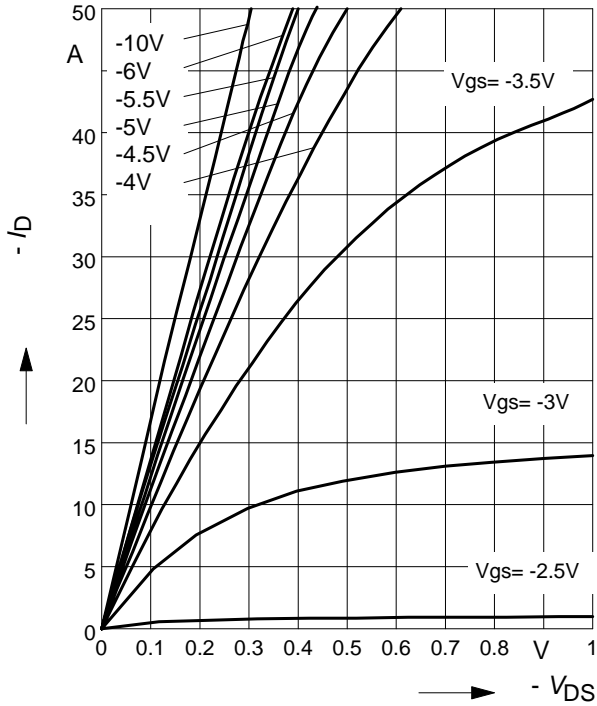
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

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

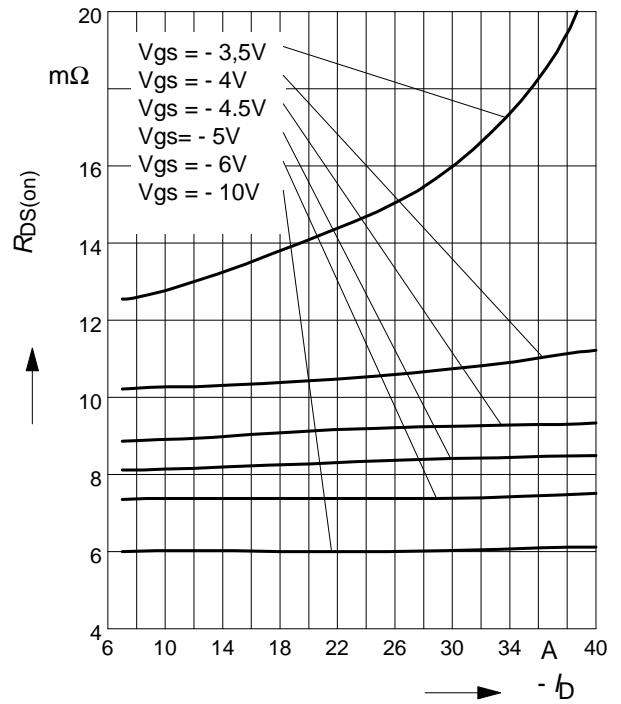
parameter:  $T_j = 25^\circ\text{C}$



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

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

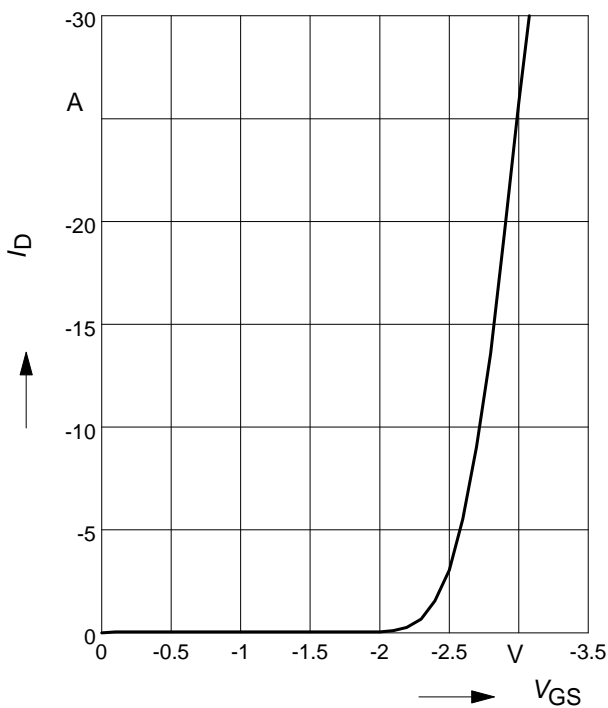
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

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

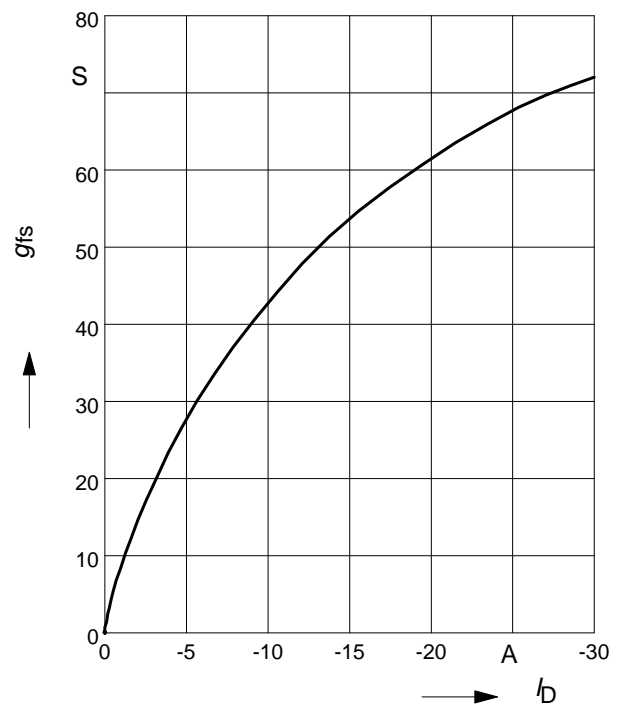
parameter:  $T_j = 25^\circ\text{C}$



**8 Typ. forward transconductance**

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

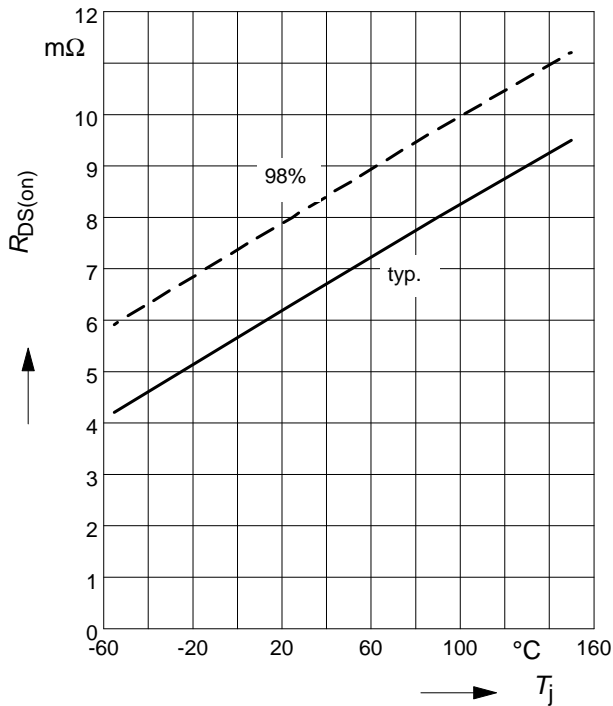
parameter:  $T_j = 25^\circ\text{C}$



**9 Drain-source on-resistance**

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

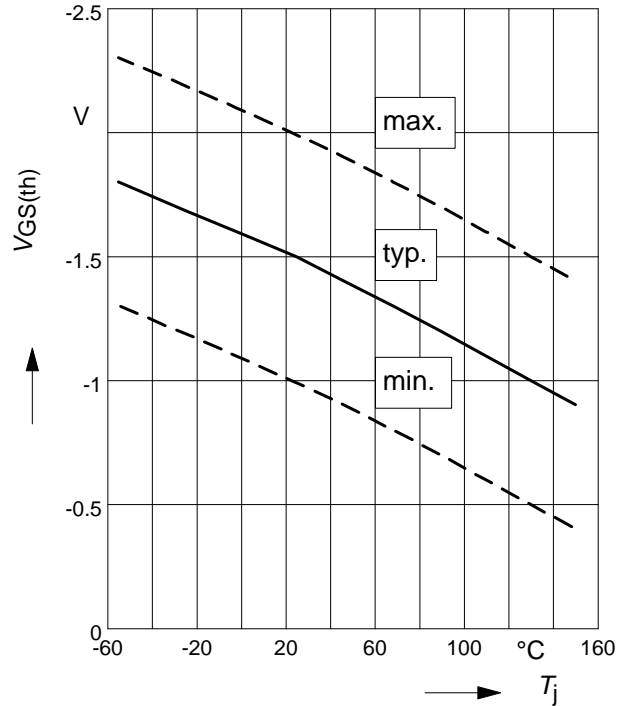
parameter:  $I_D = -14.9 \text{ A}$ ,  $V_{GS} = -10 \text{ V}$



**10 Typ. gate threshold voltage**

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

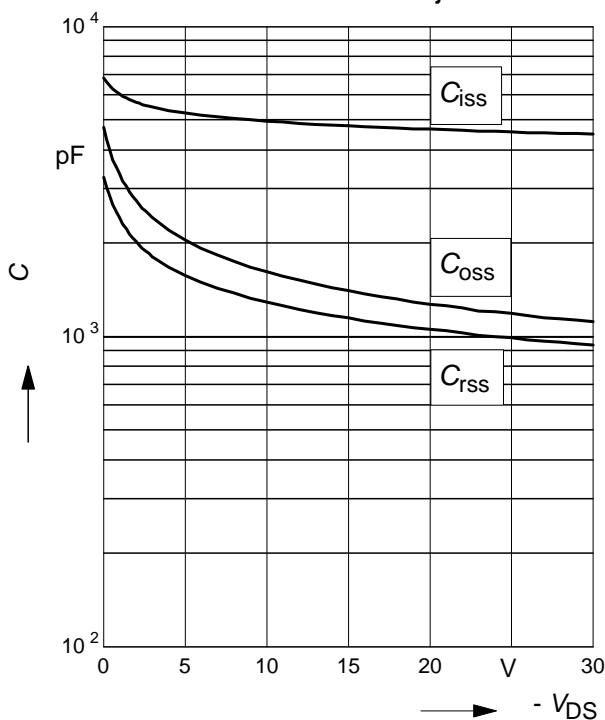
parameter:  $V_{GS} = V_{DS}$



**11 Typ. capacitances**

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

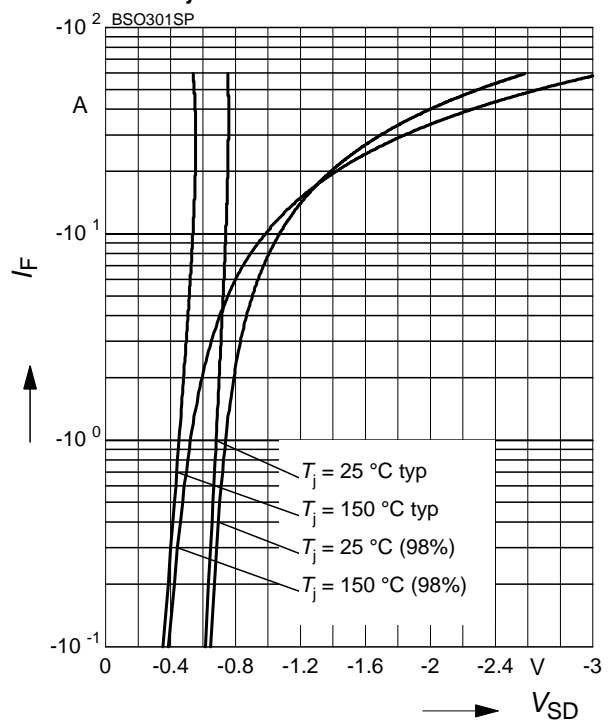
parameter:  $V_{GS}=0$ ,  $f=1 \text{ MHz}$ ,  $T_j = 25 \text{ °C}$



**12 Forward character. of reverse diode**

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

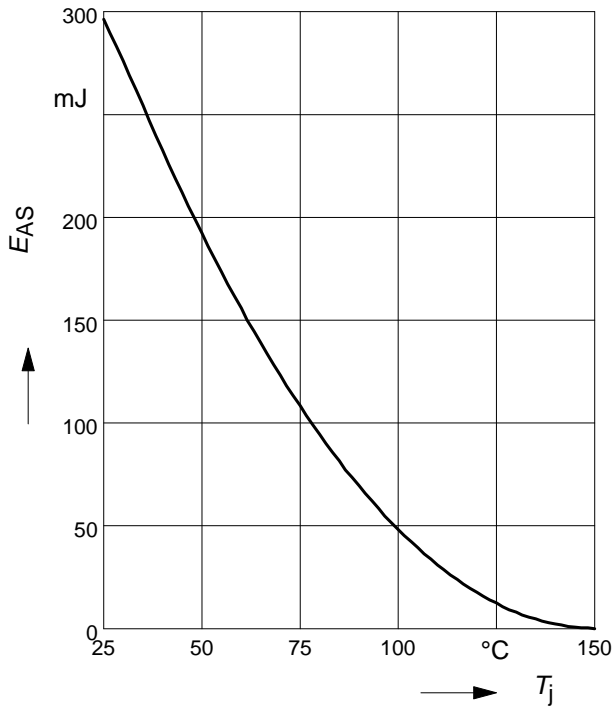
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



**13 Typ. avalanche energy**

$E_{AS} = f(T_j)$ ; par.:  $I_D = -14.9$  A

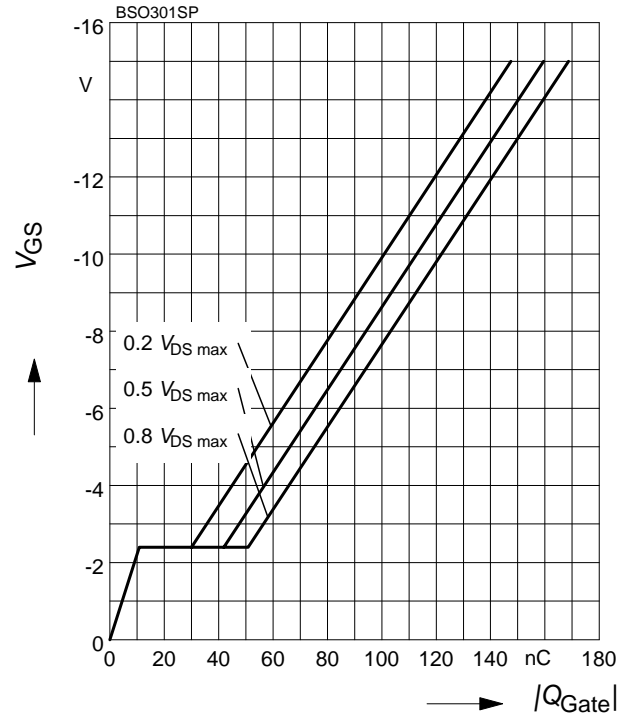
$V_{DD} = -25$  V,  $R_{GS} = 25$   $\Omega$



**14 Typ. gate charge**

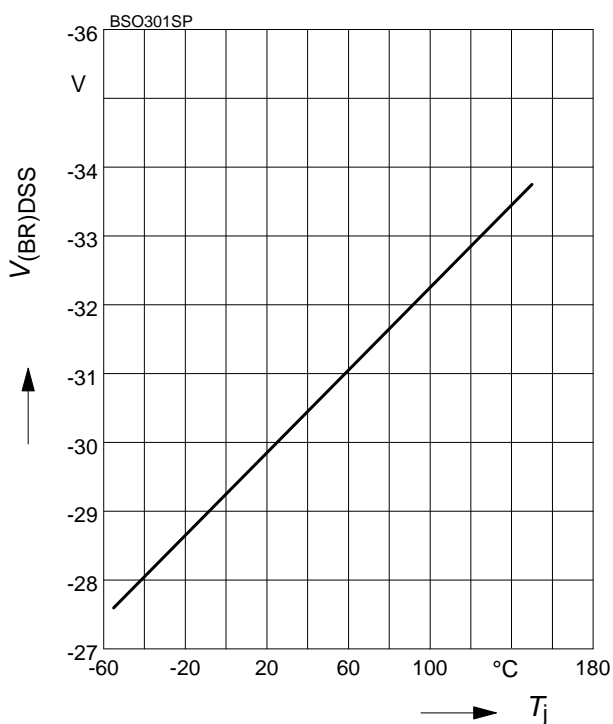
$V_{GS} = f(Q_{Gate})$

parameter:  $I_D = -14.9$  A pulsed



**15 Drain-source breakdown voltage**

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



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