

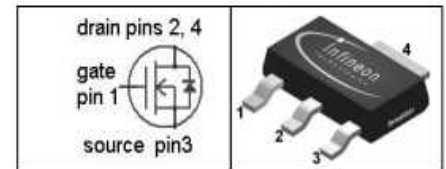
**Features**

- N channel
- Enhancement mode
- Avalanche rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21

**Product Summary**

Drain source voltage	$V_{DS}$	60	V
Drain-Source on-state resistance	$R_{DS(on)}$	0.12	$\Omega$
Continuous drain current	$I_D$	2.9	A

PG-SOT223



Type	Package	Tape and Reel	Packaging
BSP320S	PG-SOT223	H6327: 1000pcs/r	Non dry
BSP320S	PG-SOT223	H6433: 4000pcs/r	Non dry

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

Parameter	Symbol	Value	Unit
Continuous drain current	$I_D$	2.9	A
Pulsed drain current $T_A = 25\text{ }^\circ\text{C}$	$I_{Dpulse}$	11.6	
Avalanche energy, single pulse $I_D = 2.9\text{ A}$ , $V_{DD} = 25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$	$E_{AS}$	60	mJ
Avalanche current, periodic limited by $T_{jmax}$	$I_{AR}$	2.9	A
Avalanche energy, periodic limited by $T_{jmax}$	$E_{AR}$	0.18	mJ
Reverse diode $dv/dt$ $I_S = 2.9\text{ A}$ , $V_{DS} = 20\text{ V}$ , $di/dt = 200\text{ A}/\mu\text{s}$ , $T_{jmax} = 150\text{ }^\circ\text{C}$	$dv/dt$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_A = 25\text{ }^\circ\text{C}$	$P_{tot}$	1.8	W
Operating temperature	$T_j$	-55 ... +150	$^\circ\text{C}$
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)	$R_{thJS}$	-	17	-	K/W
SMD version, device on PCB: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>	$R_{thJA}$	-	110	-	K/W
		-	-	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, $V_{GS} = V_{DS}$ $I_D = 20\text{ }\mu\text{A}$	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current $V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25\text{ °C}$ $V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 150\text{ °C}$	$I_{DSS}$	-	0.1	1	$\mu\text{A}$
		-	-	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 $V_{GS} = 10\text{ V}$ , $I_D = 2.9\text{ A}$	$R_{DS(on)}$	-	0.09	0.12	$\Omega$

<sup>1</sup> Device on 50mm\*50mm\*1.5mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70 $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

**Electrical Characteristics**

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

**Dynamic Characteristics**

Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 2.9\text{ A}$	$g_{fs}$	2.5	5.8	-	S
Input capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{iss}$	-	275	340	pF
Output capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{oss}$	-	90	120	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{rss}$	-	50	65	
Turn-on delay time $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 2.9\text{ A}$ , $R_G = 33\text{ }\Omega$	$t_{d(on)}$	-	11	17	ns
Rise time $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 2.9\text{ A}$ , $R_G = 33\text{ }\Omega$	$t_r$	-	25	40	
Turn-off delay time $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 2.9\text{ A}$ , $R_G = 33\text{ }\Omega$	$t_{d(off)}$	-	25	40	
Fall time $V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 2.9\text{ A}$ , $R_G = 33\text{ }\Omega$	$t_f$	-	35	55	

**Electrical Characteristics**

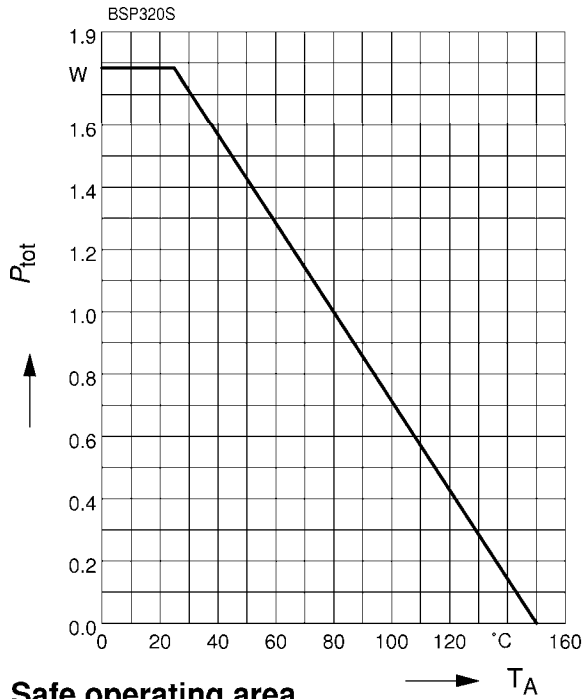
Parameter at $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
<b>Dynamic Characteristics</b>					
Gate charge at threshold $V_{DD} = 40\text{ V}$ , $I_D = 0.1\text{ A}$ , $V_{GS} = 1\text{ V}$	$Q_{G(th)}$	-	0.25	0.3	nC
Gate charge at $V_{GS}=7\text{V}$ $V_{DD} = 40\text{ V}$ , $I_D = 2.9\text{ A}$ , $V_{GS} = 0\text{ to }7\text{ V}$	$Q_{g(7)}$	-	7.4	9.3	nC
Gate charge total $V_{DD} = 40\text{ V}$ , $I_D = 2.9\text{ A}$ , $V_{GS} = 0\text{ to }10\text{ V}$	$Q_g$	-	9.7	12	
Gate plateau voltage $V_{DD} = 40\text{ V}$ , $I_D = 2.9\text{ A}$	$V_{(plateau)}$	-	4.7	-	V

**Reverse Diode**

Inverse diode continuous forward current $T_A = 25\text{ }^\circ\text{C}$	$I_S$	-	-	2.9	A
Inverse diode direct current,pulsed $T_A = 25\text{ }^\circ\text{C}$	$I_{SM}$	-	-	11.6	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$ , $I_F = 5.8\text{ A}$	$V_{SD}$	-	0.95	1.2	V
Reverse recovery time $V_R = 30\text{ V}$ , $I_F=I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	$t_{rr}$	-	45	56	ns
Reverse recovery charge $V_R = 30\text{ V}$ , $I_F=I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	$Q_{rr}$	-	0.08	0.12	$\mu\text{C}$

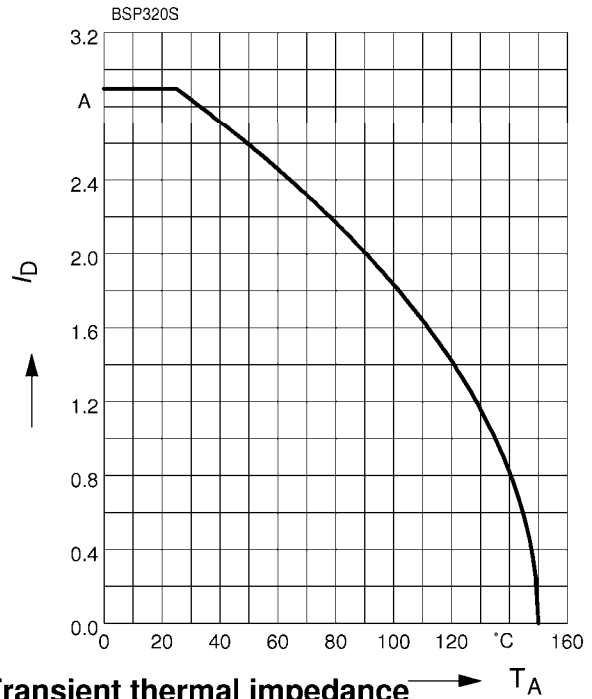
**Power Dissipation**

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



**Drain current**

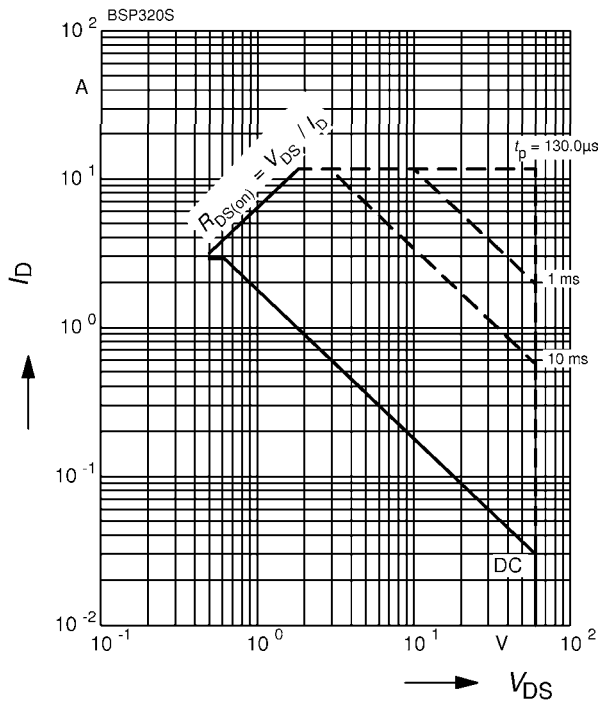
$$I_D = f(T_A)$$



**Safe operating area**

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

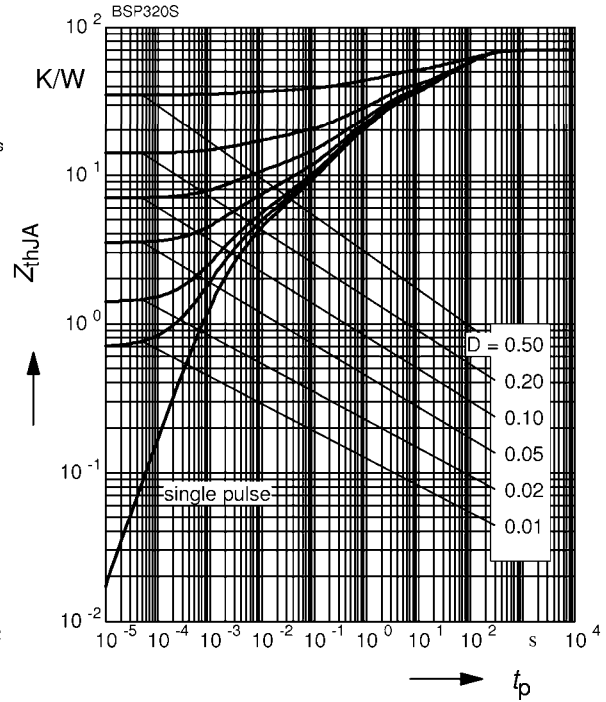
parameter :  $D = 0$  ,  $T_A = 25\text{ °C}$



**Transient thermal impedance**

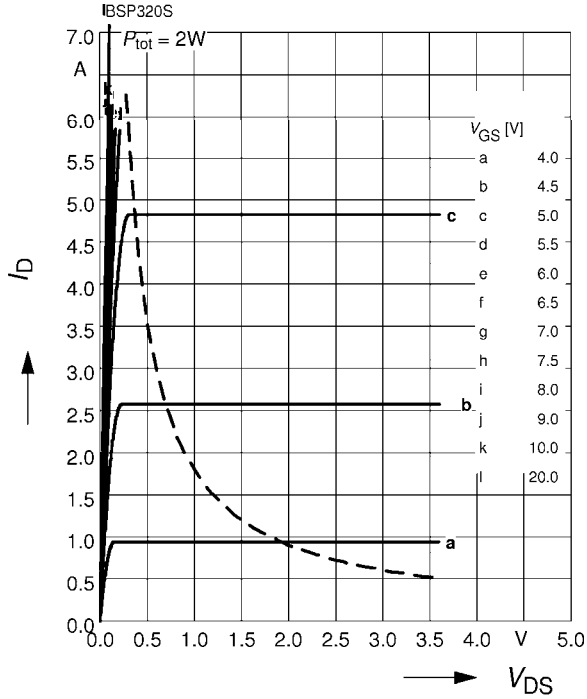
$$Z_{thJA} = f(t_p)$$

parameter :  $D = t_p/T$



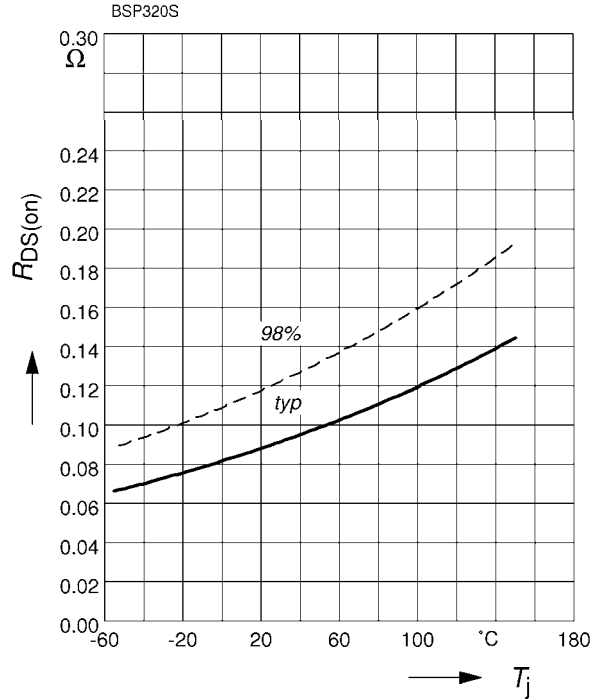
**Typ. output characteristics**

$I_D = f(V_{DS})$   
 parameter:  $t_p = 80 \mu s$



**Drain-source on-resistance**

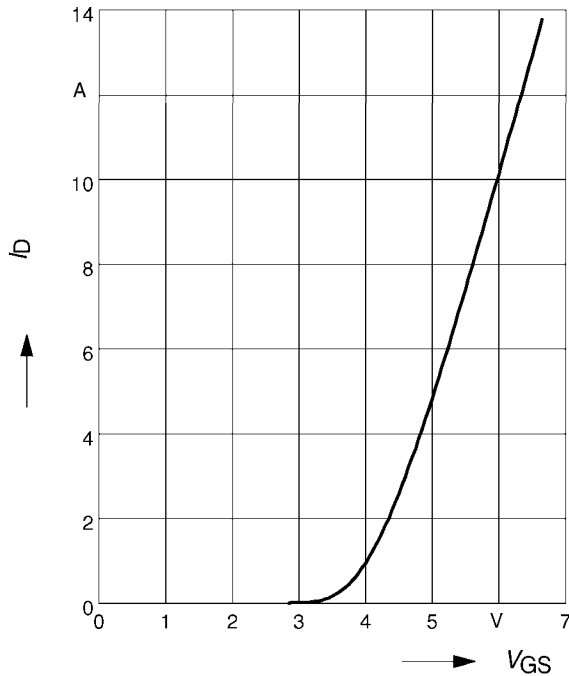
$R_{DS(on)} = f(T_j)$   
 parameter :  $I_D = 2.9 A, V_{GS} = 10 V$



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

parameter:  $t_p = 80 \mu s$

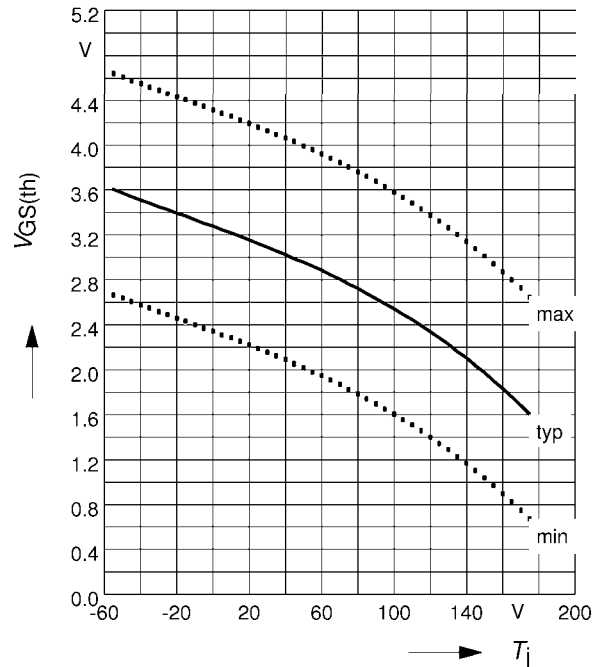
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



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

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

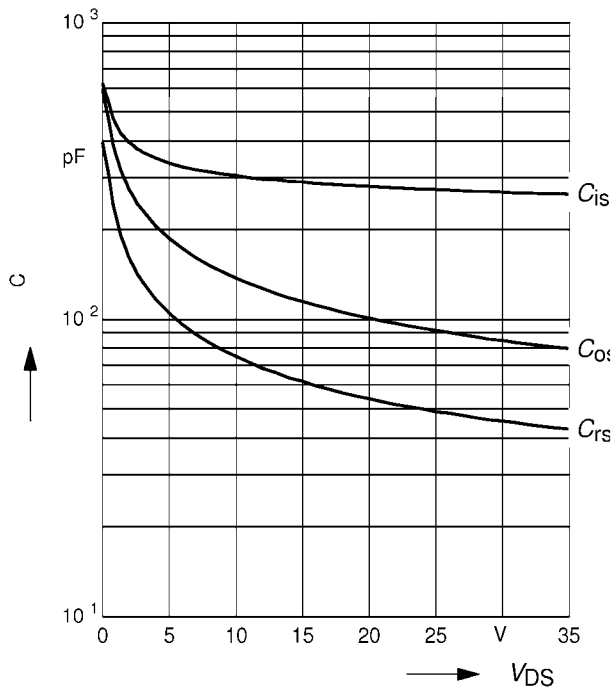
parameter:  $V_{GS} = V_{DS}, I_D = 20 \mu A$



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

$C = f(V_{DS})$

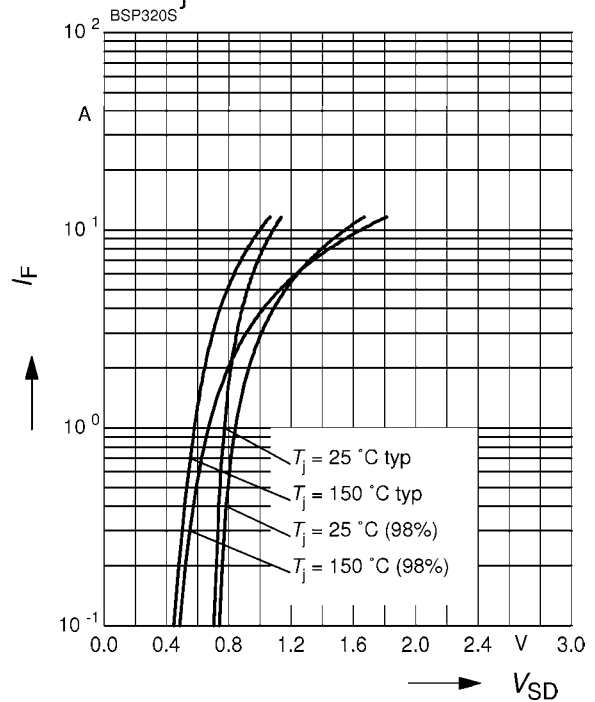
Parameter:  $V_{GS} = 0 V, f = 1 MHz$



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

$I_F = f(V_{SD})$

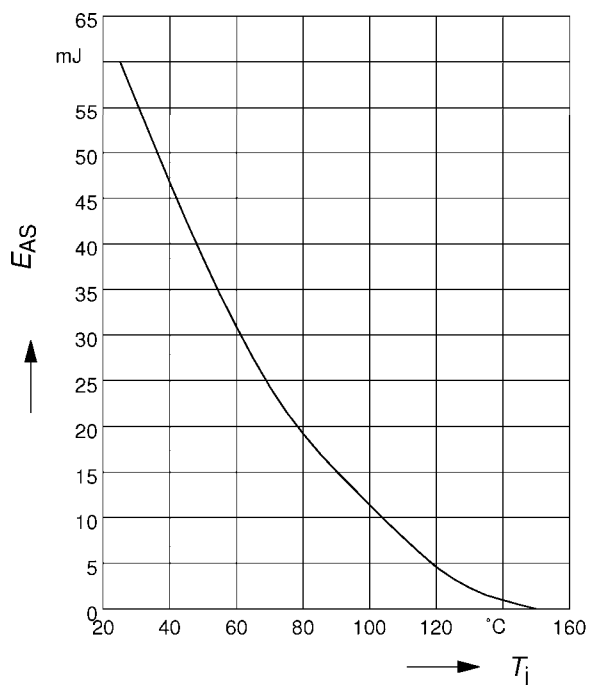
parameter:  $T_j, t_p = 80 \mu s$



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

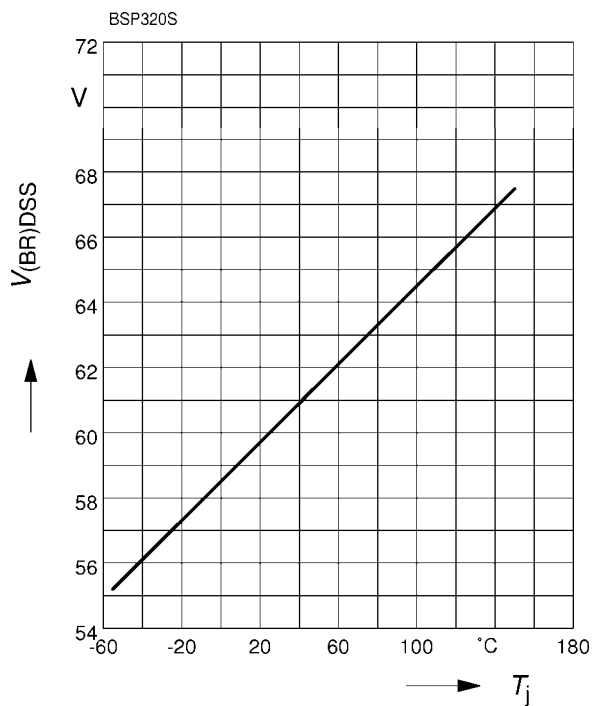
parameter:  $I_D = 2.9\text{ A}$ ,  $V_{DD} = 25\text{ V}$

$R_{GS} = 25\ \Omega$



**Drain-source breakdown voltage**

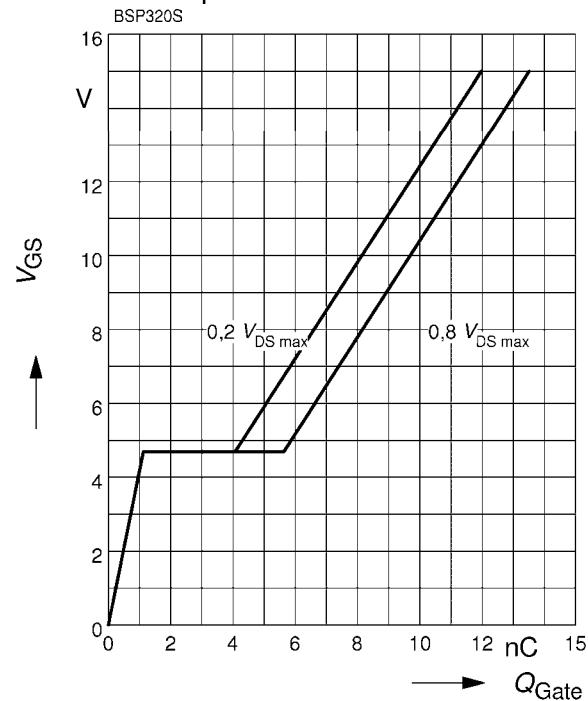
$V_{(BR)DSS} = f(T_j)$



**Typ. gate charge**

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

parameter:  $I_{D\text{ puls}} = 2.9\text{ A}$





**Published by**  
**Infineon Technologies AG**  
**81726 Munich, Germany**  
**© 2008 Infineon Technologies AG**  
**All Rights Reserved.**

**Legal Disclaimer**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

**Information**

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

**Warnings**

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office. Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.