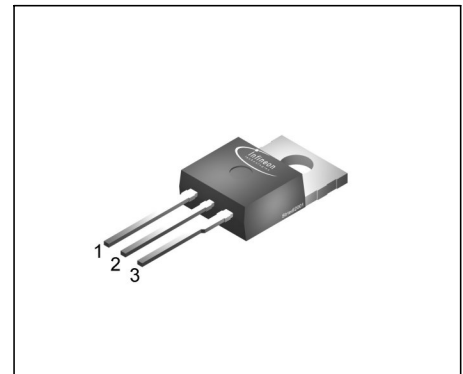


**SIPMOS® Power Transistor**

- N channel
- Enhancement mode
- Avalanche-rated
- Normal Level
- . Pb-free lead plating; RoHS compliant
- . Halogen-free according to IEC61249-2-21



Pin 1	Pin 2	Pin 3
G	D	S



Type	V <sub>DS</sub>	I <sub>D</sub>	R <sub>DS(on)</sub>	Package	Pb-free
BUZ 31 H	200 V	14.5 A	0.2 Ω	PG-TO-220-3	Yes

**Maximum Ratings**

Parameter	Symbol	Values	Unit
Continuous drain current $T_C = 30\text{ °C}$	$I_D$	14.5	A
Pulsed drain current $T_C = 25\text{ °C}$	$I_{Dpuls}$	58	
Avalanche current, limited by $T_{jmax}$	$I_{AR}$	13.5	
Avalanche energy, periodic limited by $T_{jmax}$	$E_{AR}$	9	mJ
Avalanche energy, single pulse $I_D = 14.5\text{ A}$ , $V_{DD} = 50\text{ V}$ , $R_{GS} = 25\text{ Ω}$ $L = 1.42\text{ mH}$ , $T_j = 25\text{ °C}$	$E_{AS}$	200	
Gate source voltage	$V_{GS}$	± 20	V
ESD-Sensitivity HBM as per MIL-STD 883		Class 1	
Power dissipation $T_C = 25\text{ °C}$	$P_{tot}$	95	W
Operating temperature	$T_j$	-55 ... + 150	°C
Storage temperature	$T_{stg}$	-55 ... + 150	
Thermal resistance, chip case	$R_{thJC}$	≤ 1.32	K/W
Thermal resistance, chip to ambient	$R_{thJA}$	75	
DIN humidity category, DIN 40 040		E	
IEC climatic category, DIN IEC 68-1		55 / 150 / 56	

**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 $V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$ , $T_j = 25^\circ\text{C}$	$V_{(BR)DSS}$	200	-	-	V
Gate threshold voltage $V_{GS} = V_{DS}$ , $I_D = 1\text{ mA}$	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current $V_{DS} = 200\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$ $V_{DS} = 200\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125^\circ\text{C}$	$I_{DSS}$	-	0.1 10	1 100	$\mu\text{A}$
Gate-source leakage current $V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	-	10	100	nA
Drain-Source on-resistance $V_{GS} = 5\text{ V}$ , $I_D = 9\text{ A}$	$R_{DS(on)}$	-	0.16	0.2	$\Omega$

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

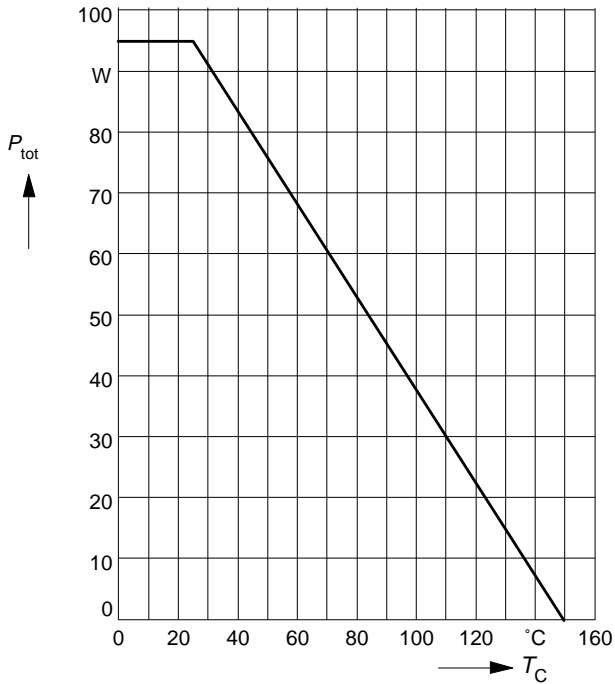
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Dynamic Characteristics</b>					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}, I_D = 7 \text{ A}$	$g_{fs}$	5	12	-	S
Input capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	$C_{iss}$	-	840	1120	pF
Output capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	$C_{oss}$	-	180	270	
Reverse transfer capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	$C_{rss}$	-	95	150	
Turn-on delay time $V_{DD} = 30 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 3 \text{ A}$ $R_{GS} = 50 \Omega$	$t_{d(on)}$	-	12	20	ns
Rise time $V_{DD} = 30 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 3 \text{ A}$ $R_{GS} = 50 \Omega$	$t_r$	-	50	75	
Turn-off delay time $V_{DD} = 30 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 3 \text{ A}$ $R_{GS} = 50 \Omega$	$t_{d(off)}$	-	150	200	
Fall time $V_{DD} = 30 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 3 \text{ A}$ $R_{GS} = 50 \Omega$	$t_f$	-	60	80	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Reverse Diode</b>					
Inverse diode continuous forward current $T_C = 25^\circ\text{C}$	$I_S$	-	-	14.5	A
Inverse diode direct current, pulsed $T_C = 25^\circ\text{C}$	$I_{SM}$	-	-	58	
Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = 29\text{ A}$	$V_{SD}$	-	1.1	1.6	V
Reverse recovery time $V_R = 100\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	$t_{rr}$	-	170	-	ns
Reverse recovery charge $V_R = 100\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	$Q_{rr}$	-	1.1	-	$\mu\text{C}$

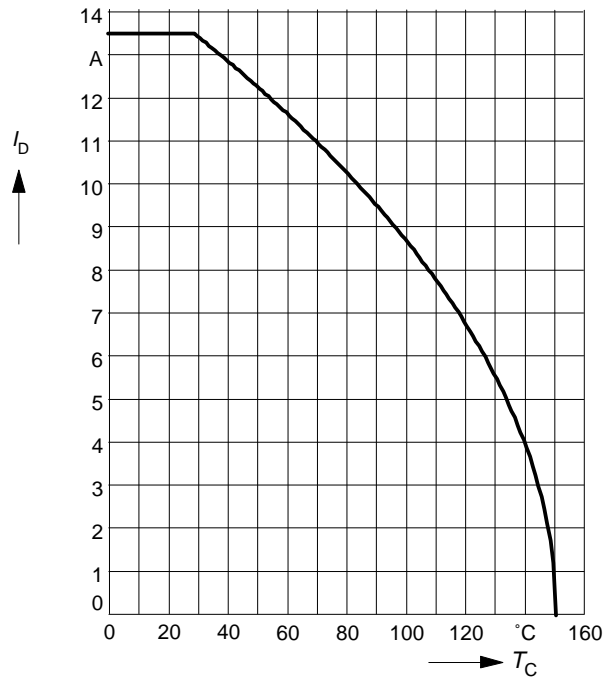
**Power dissipation**

$P_{tot} = f(T_C)$



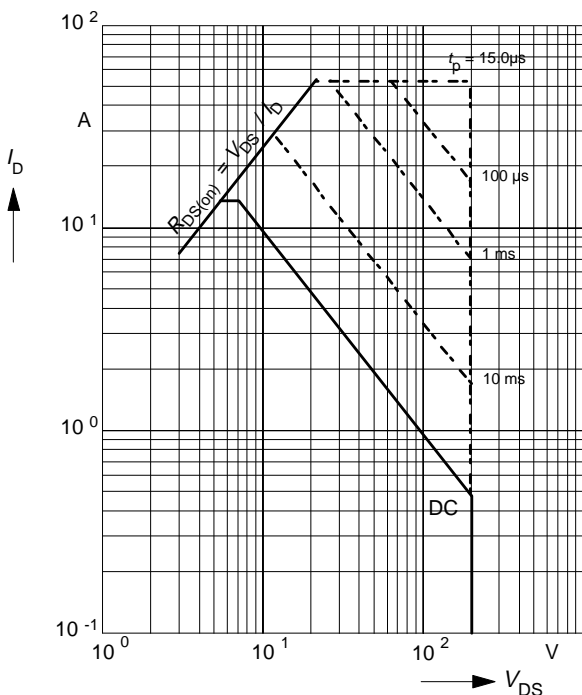
**Drain current**

$I_D = f(T_C)$   
parameter:  $V_{GS} \geq 10\text{ V}$



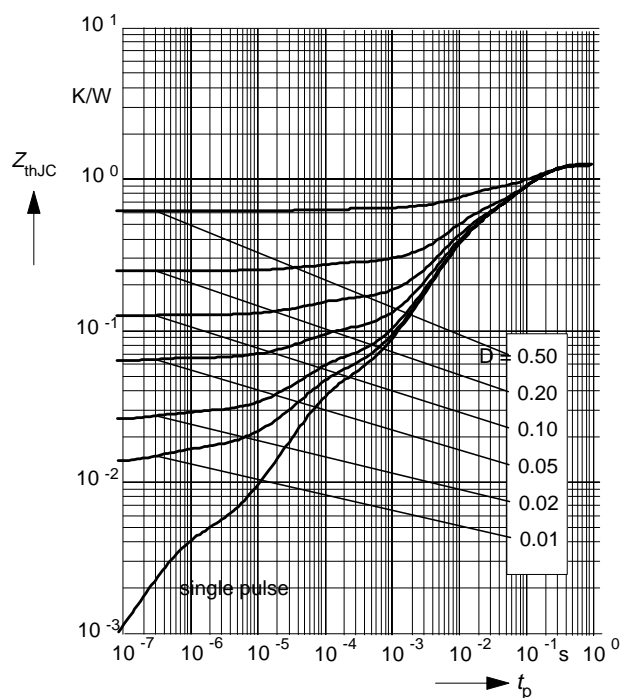
**Safe operating area**

$I_D = f(V_{DS})$   
parameter:  $D = 0.01, T_C = 25^\circ\text{C}$



**Transient thermal impedance**

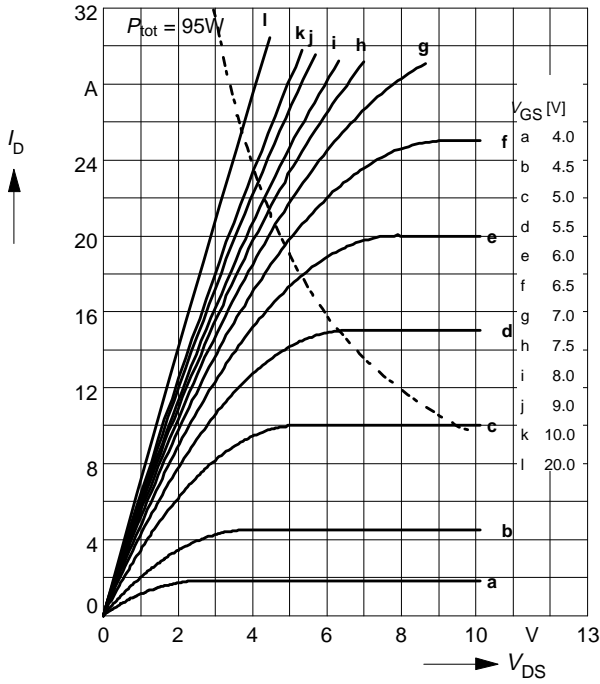
$Z_{thJC} = f(t_p)$   
parameter:  $D = t_p / T$



**Typ. output characteristics**

$I_D = f(V_{DS})$

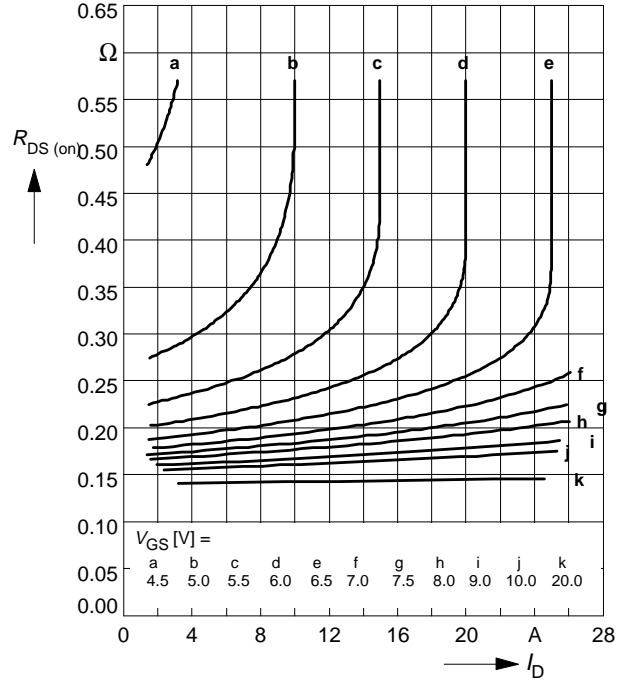
parameter:  $t_p = 80 \mu s$



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

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

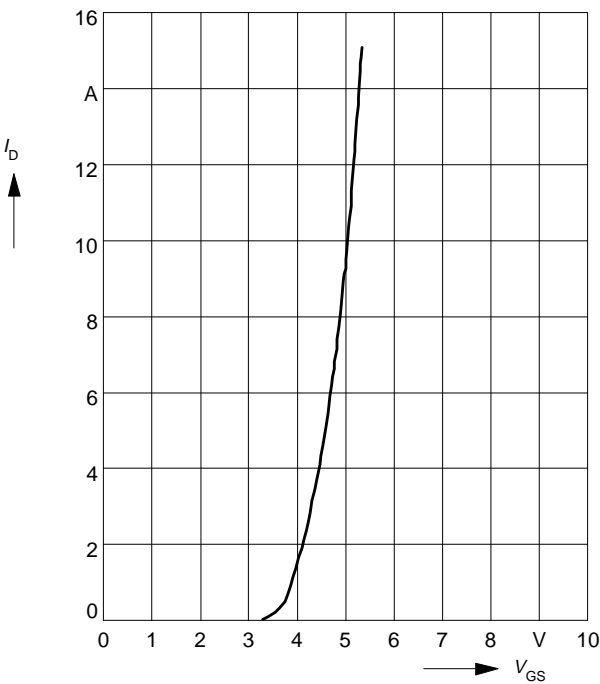
parameter:  $V_{GS}$



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

parameter:  $t_p = 80 \mu s$

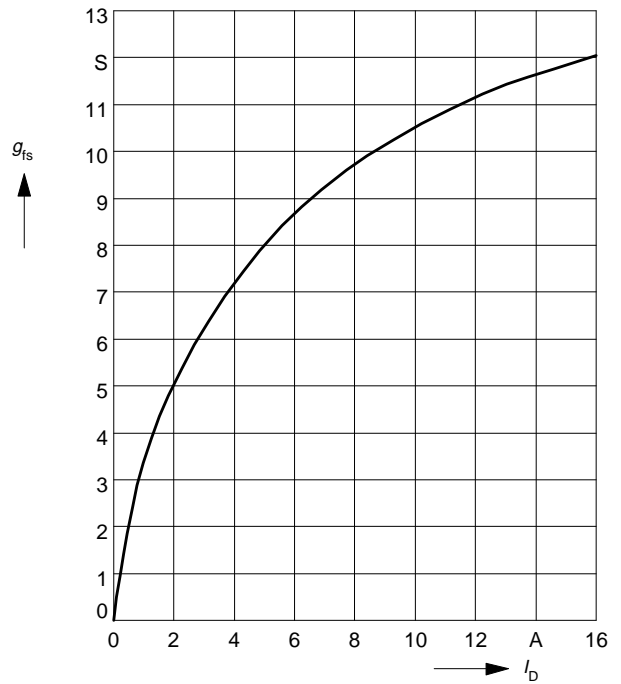
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



**Typ. forward transconductance**  $g_{fs} = f(I_D)$

parameter:  $t_p = 80 \mu s$ ,

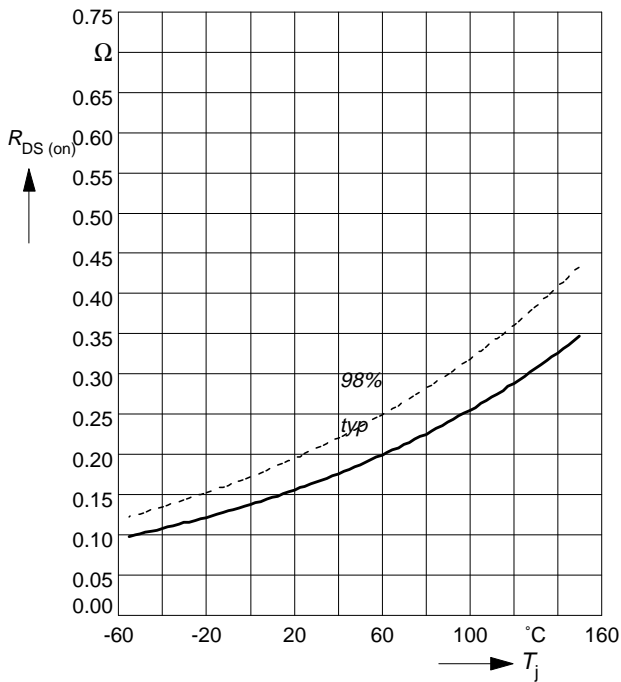
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



**Drain-source on-resistance**

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

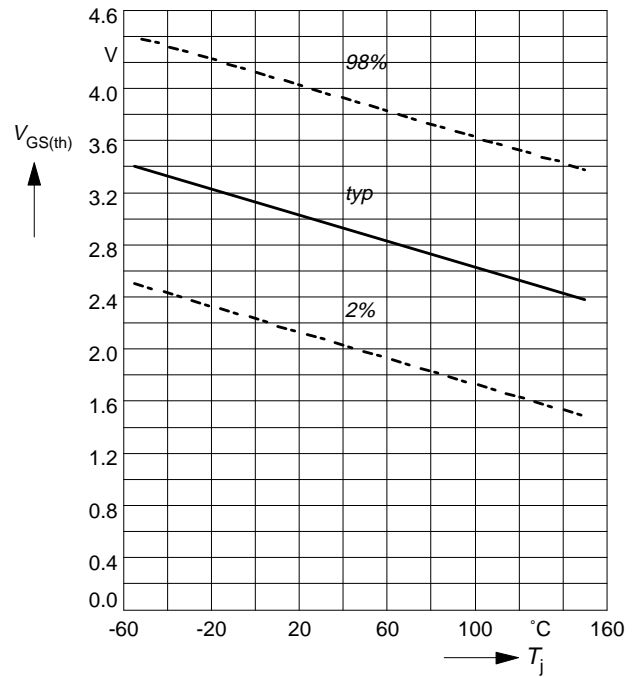
parameter:  $I_D = 9\text{ A}$ ,  $V_{GS} = 10\text{ V}$



**Gate threshold voltage**

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

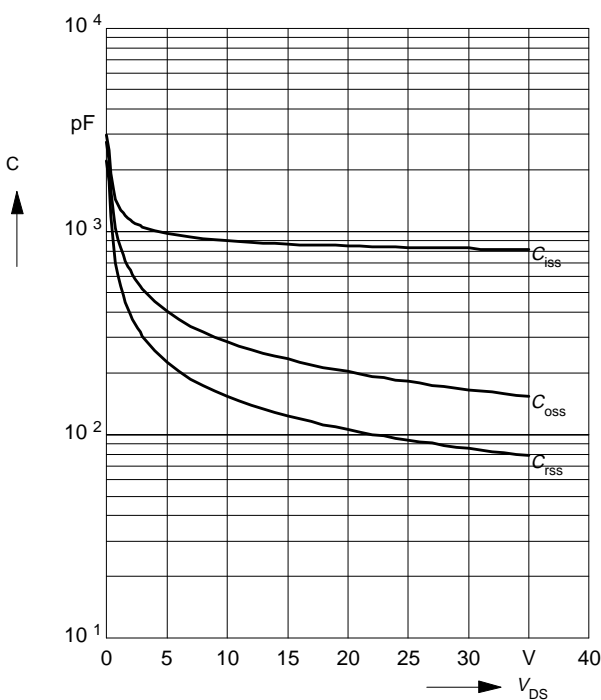
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1\text{ mA}$



**Typ. capacitances**

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

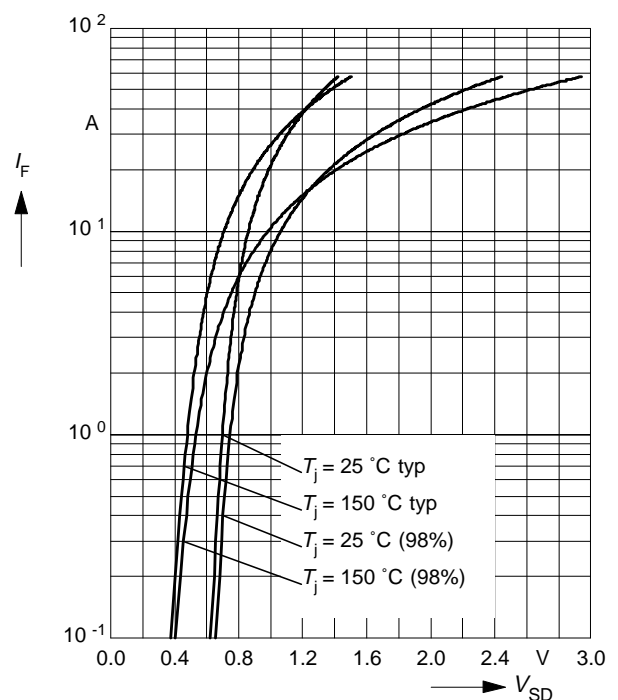
parameter:  $V_{GS} = 0\text{ V}$ ,  $f = 1\text{ MHz}$



**Forward characteristics of reverse diode**

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

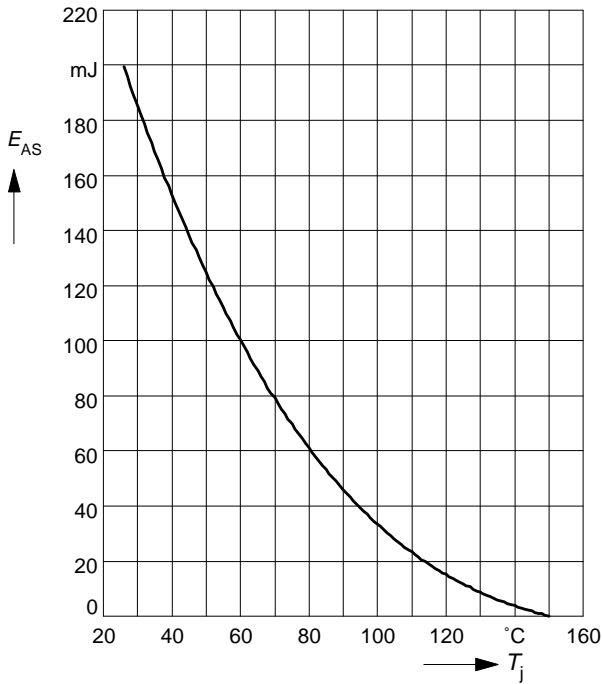
parameter:  $T_j$ ,  $t_p = 80\text{ }\mu\text{s}$



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

parameter:  $I_D = 14.5 \text{ A}$ ,  $V_{DD} = 50 \text{ V}$

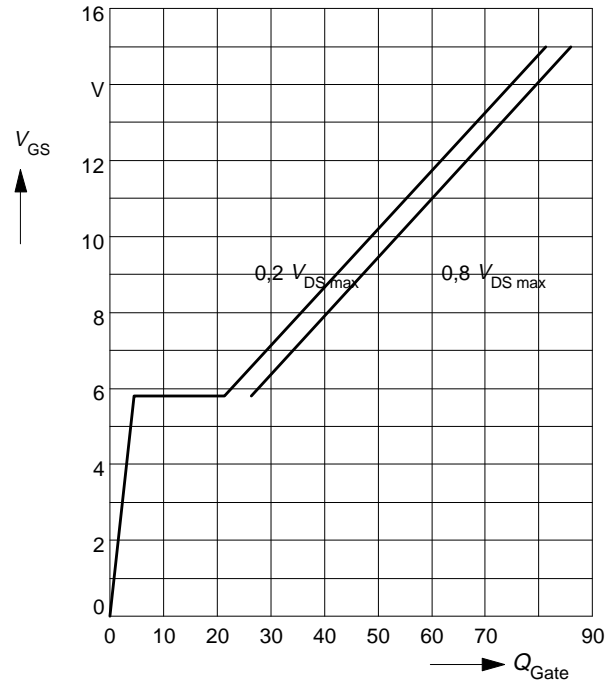
$R_{GS} = 25 \Omega$ ,  $L = 1.42 \text{ mH}$



**Typ. gate charge**

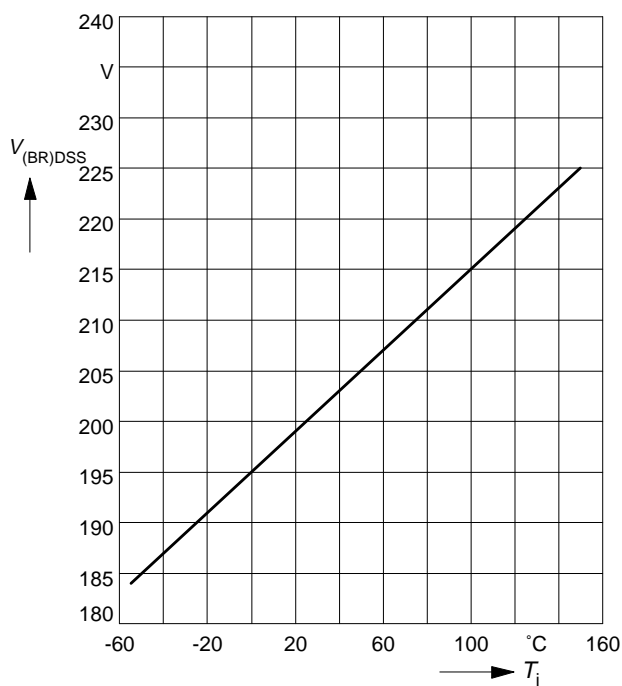
$V_{GS} = f(Q_{Gate})$

parameter:  $I_{D \text{ puls}} = 20 \text{ A}$



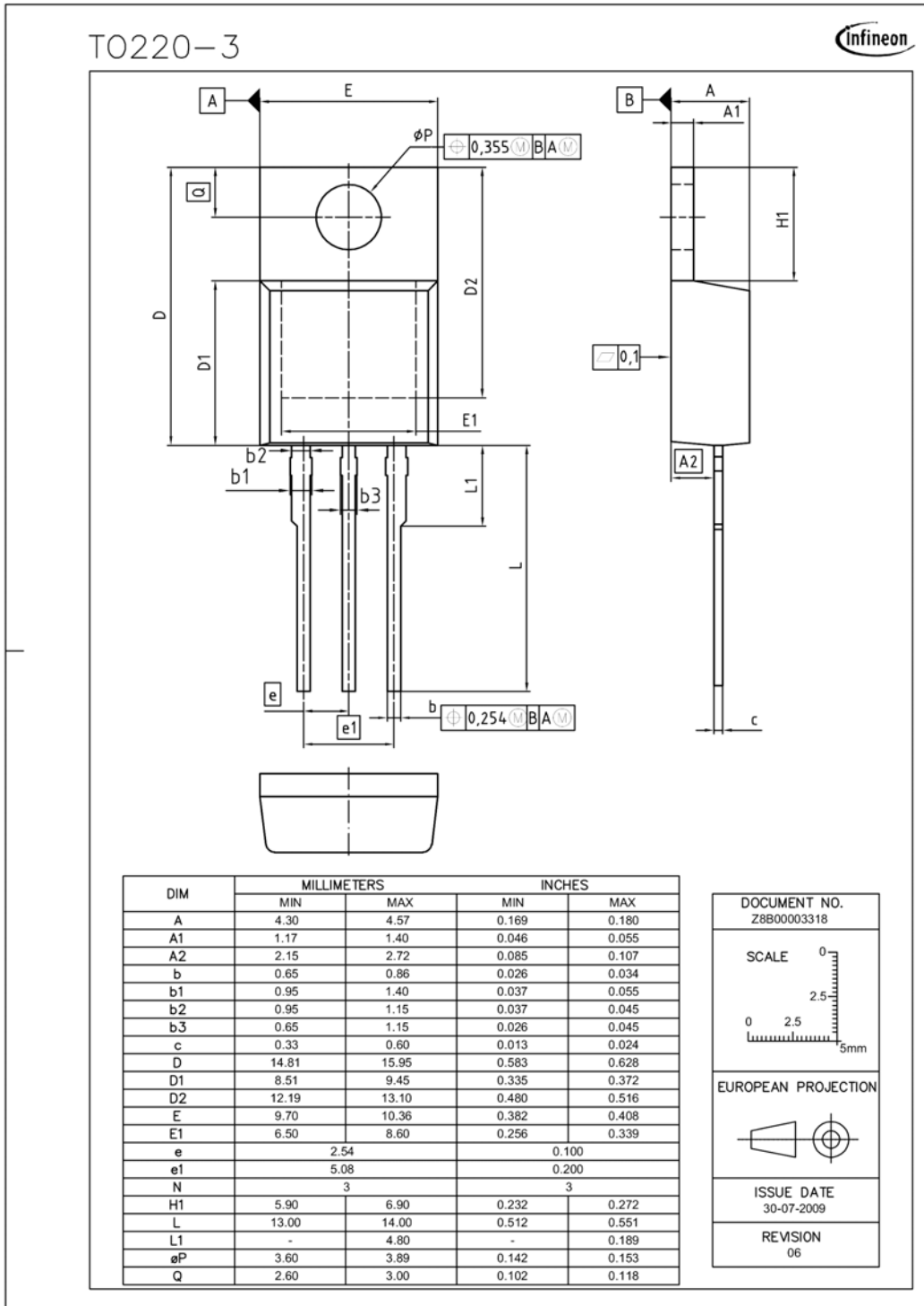
**Drain-source breakdown voltage**

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





# Package Drawing: PG-TO220-3



**Published by**  
**Infineon Technologies AG**  
**81726 Munich, Germany**  
**© 2009 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.