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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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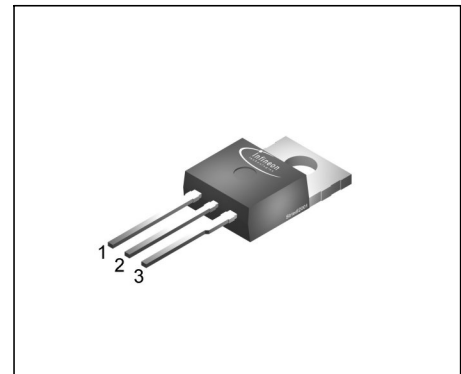
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**SIPMOS® Power Transistor**

- N channel
- Enhancement mode
- Avalanche-rated
- Logic Level
- Pb-free lead plating; RoHS compliant



Pin 1	Pin 2	Pin 3
G	D	S

Type	$V_{DS}$	$I_D$	$R_{DS(on)}$	Package	Pb-free
BUZ 31 L	200 V	13.5 A	0.2 $\Omega$	PG-TO220-3	Yes

**Maximum Ratings**

Parameter	Symbol	Values	Unit
Continuous drain current $T_C = 28\text{ }^\circ\text{C}$	$I_D$	13.5	A
Pulsed drain current $T_C = 25\text{ }^\circ\text{C}$	$I_{Dpuls}$	54	
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 $I_D = 13.5\text{ A}$ , $V_{DD} = 50\text{ V}$ , $R_{GS} = 25\text{ }\Omega$ $L = 1.65\text{ mH}$ , $T_j = 25\text{ }^\circ\text{C}$	$E_{AS}$	200	
Gate source voltage	$V_{GS}$	$\pm 20$	V
ESD-Sensitivity HBM as per MIL-STD 883		Class 1	
Power dissipation $T_C = 25\text{ }^\circ\text{C}$	$P_{tot}$	95	W
Operating temperature	$T_j$	-55 ... + 150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 ... + 150	
Thermal resistance, chip case	$R_{thJC}$	$\leq 1.32$	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 $V_{GS} = V_{DS}$ , $I_D = 1\text{ mA}$	$V_{GS(th)}$	1.2	1.6	2	
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 $V_{GS} = 5\text{ V}$ , $I_D = 7\text{ A}$	$R_{DS(on)}$	-	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 $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{iss}$	-	1200	1600	pF
Output capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{oss}$	-	200	300	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{rss}$	-	100	150	
Turn-on delay time $V_{DD} = 30\text{ V}$ , $V_{GS} = 5\text{ V}$ , $I_D = 3\text{ A}$ $R_{GS} = 50\ \Omega$	$t_{d(on)}$	-	25	40	ns
Rise time $V_{DD} = 30\text{ V}$ , $V_{GS} = 5\text{ V}$ , $I_D = 3\text{ A}$ $R_{GS} = 50\ \Omega$	$t_r$	-	80	120	
Turn-off delay time $V_{DD} = 30\text{ V}$ , $V_{GS} = 5\text{ V}$ , $I_D = 3\text{ A}$ $R_{GS} = 50\ \Omega$	$t_{d(off)}$	-	210	270	
Fall time $V_{DD} = 30\text{ V}$ , $V_{GS} = 5\text{ V}$ , $I_D = 3\text{ A}$ $R_{GS} = 50\ \Omega$	$t_f$	-	65	85	

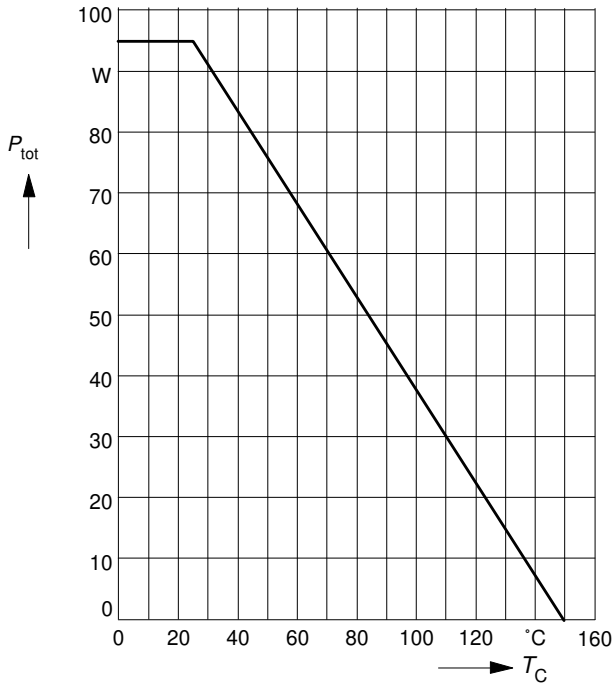
**Electrical Characteristics**, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Reverse Diode</b>					
Inverse diode continuous forward current $T_C = 25^\circ\text{C}$	$I_S$	-	-	13.5	A
Inverse diode direct current, pulsed $T_C = 25^\circ\text{C}$	$I_{SM}$	-	-	54	
Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = 27\text{ A}$	$V_{SD}$	-	1.2	1.6	V
Reverse recovery time $V_R = 100\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	$t_{rr}$	-	180	-	ns
Reverse recovery charge $V_R = 100\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	$Q_{rr}$	-	1.2	-	$\mu\text{C}$



**Power dissipation**

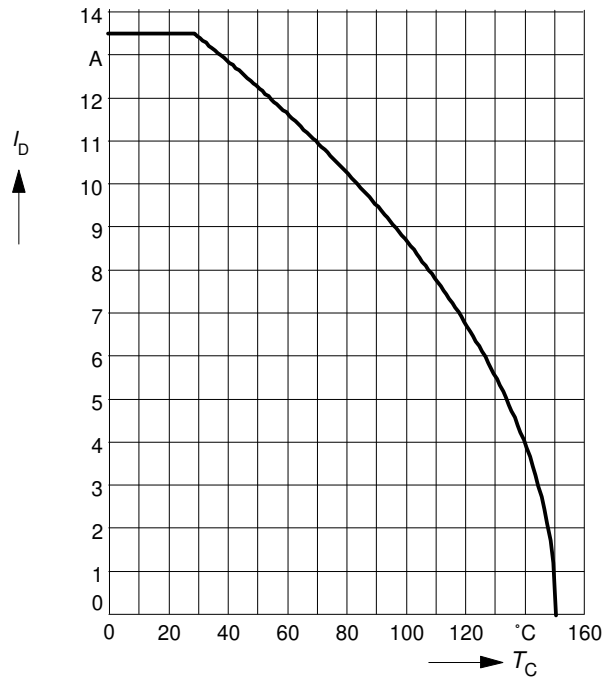
$$P_{\text{tot}} = f(T_C)$$



**Drain current**

$$I_D = f(T_C)$$

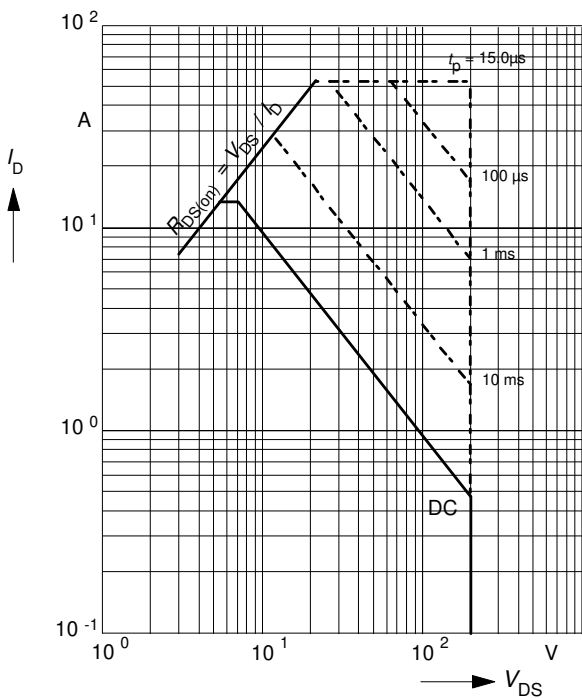
parameter:  $V_{GS} \geq 5 \text{ V}$



**Safe operating area**

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

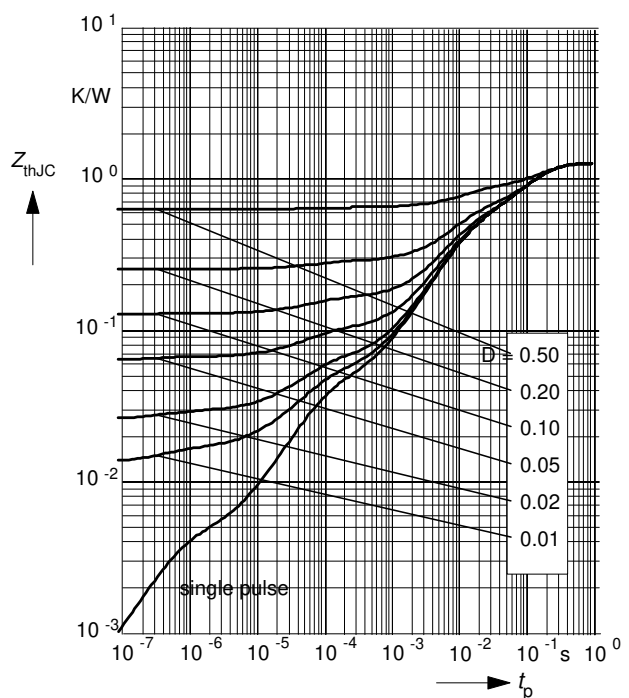
parameter:  $D = 0.01, T_C = 25^\circ\text{C}$



**Transient thermal impedance**

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

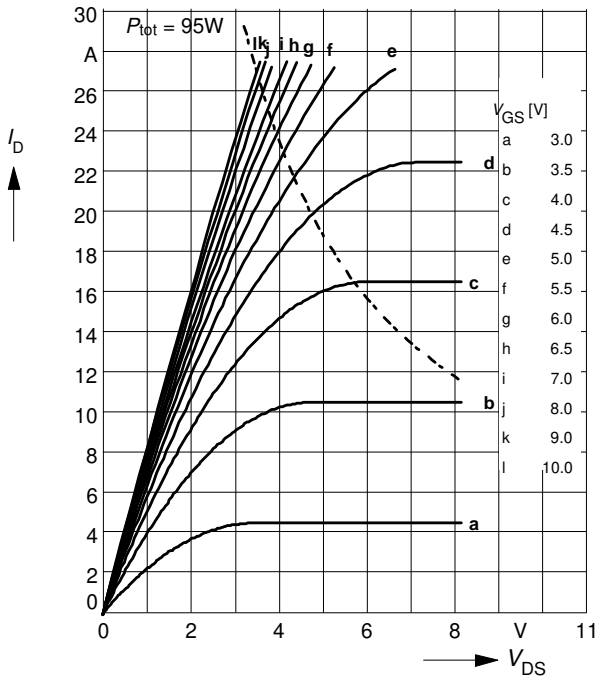
parameter:  $D = t_p / T$



**Typ. output characteristics**

$I_D = f(V_{DS})$

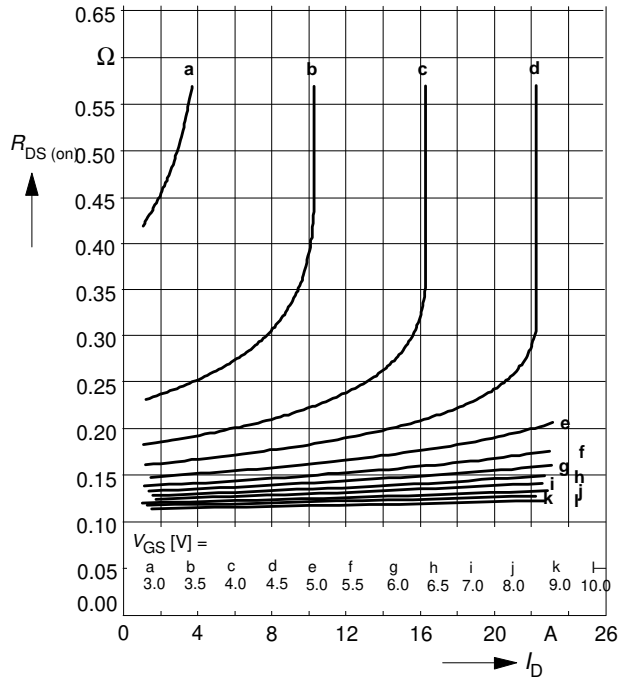
parameter:  $t_p = 80 \mu s$ ,  $T_j = 25 \text{ }^\circ\text{C}$



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

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

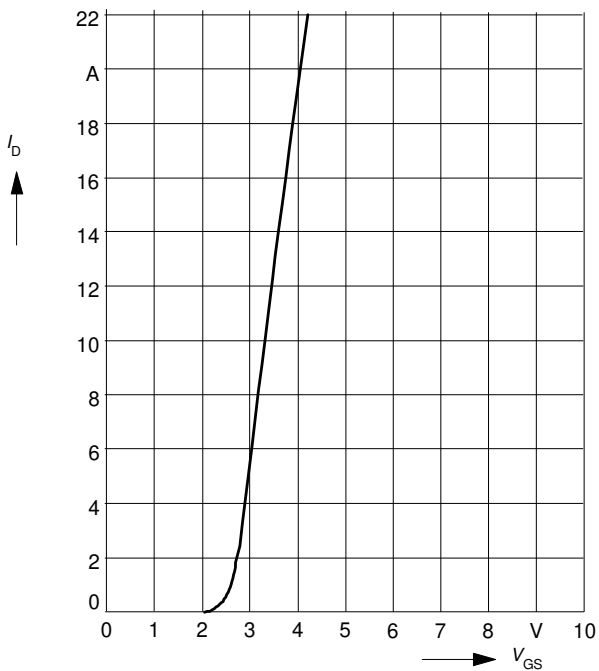
parameter:  $t_p = 80 \mu s$ ,  $T_j = 25 \text{ }^\circ\text{C}$



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

parameter:  $t_p = 80 \mu s$

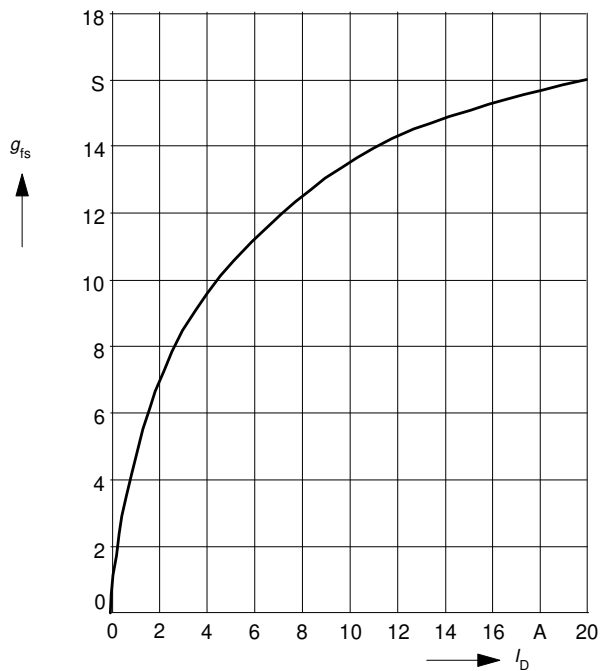
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



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

parameter:  $t_p = 80 \mu s$ ,

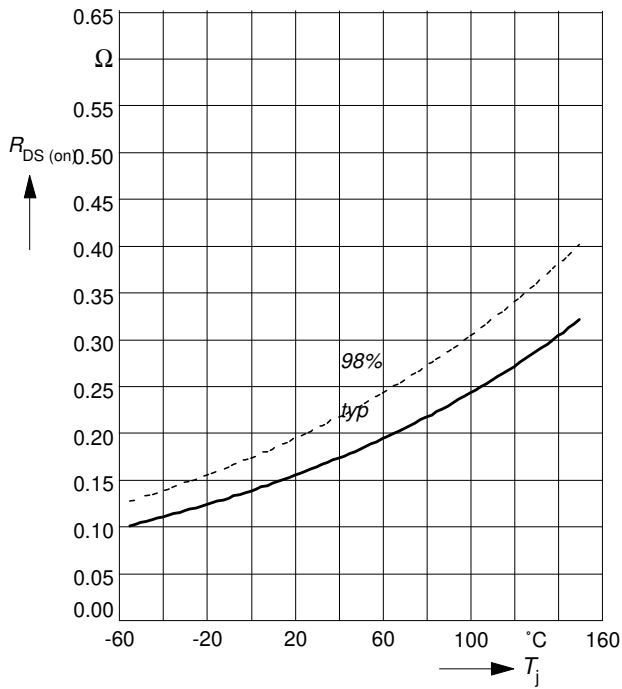
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



**Drain-source on-resistance**

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

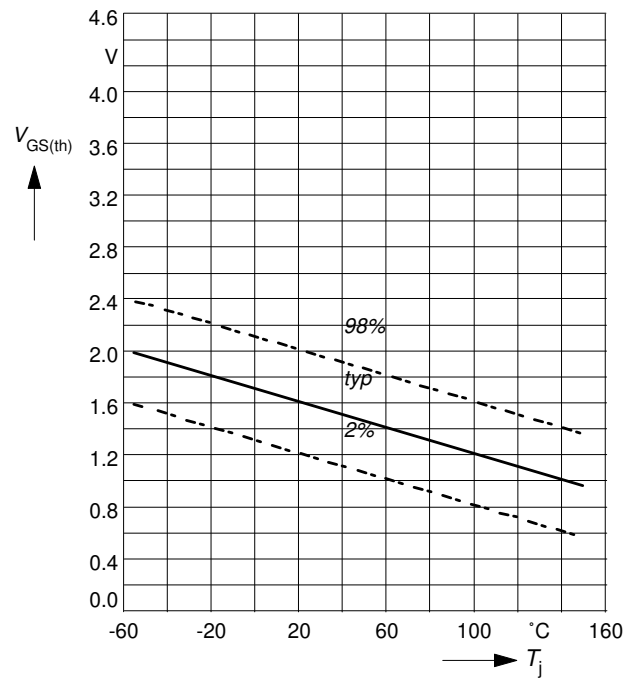
parameter:  $I_D = 7\text{ A}$ ,  $V_{GS} = 5\text{ V}$



**Gate threshold voltage**

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

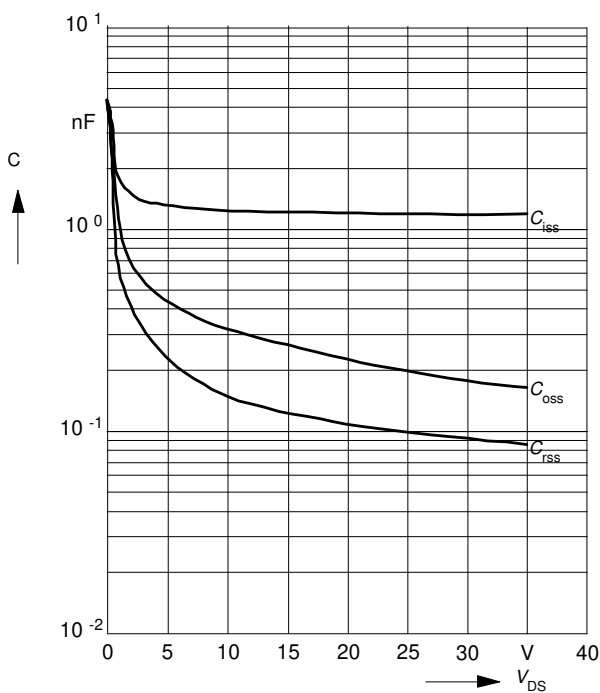
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1\text{ mA}$



**Typ. capacitances**

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

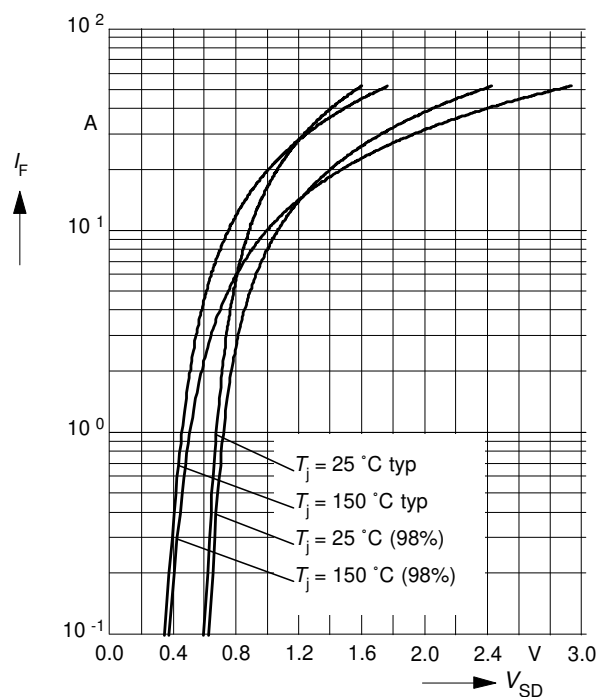
parameter:  $V_{GS} = 0\text{ V}$ ,  $f = 1\text{ MHz}$



**Forward characteristics of reverse diode**

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

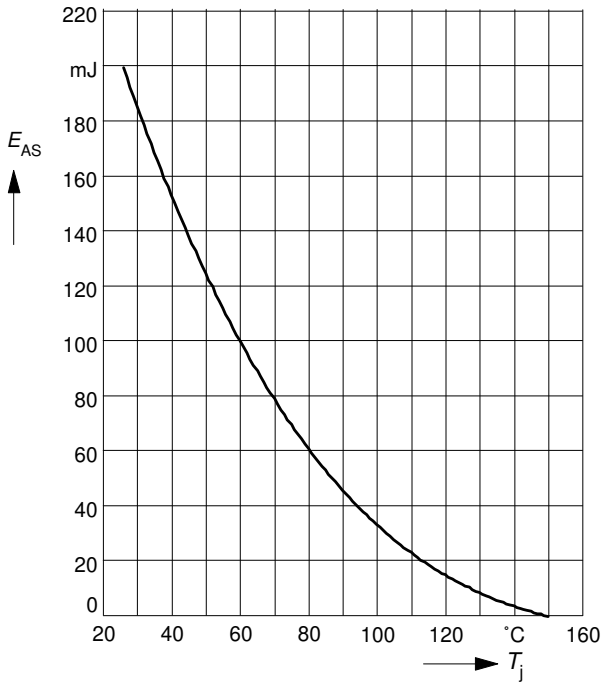
parameter:  $T_j$ ,  $t_p = 80\text{ }\mu\text{s}$





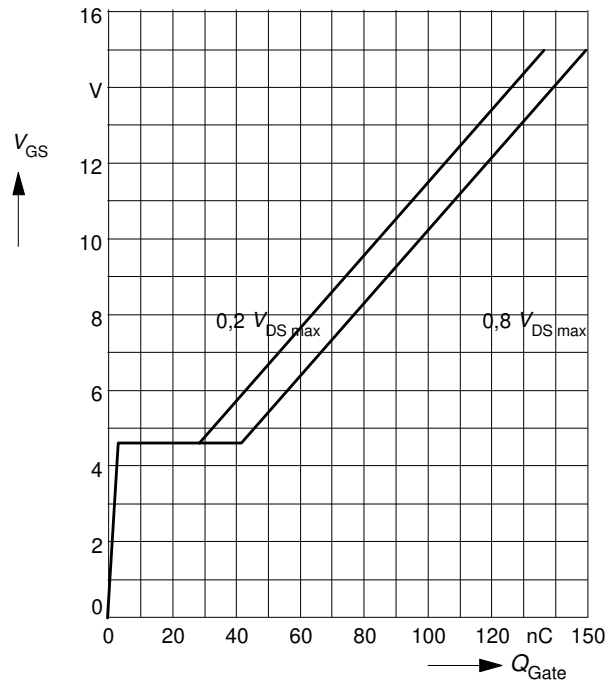
**Avalanche energy**  $E_{AS} = f(T_j)$

parameter:  $I_D = 13.5 \text{ A}$ ,  $V_{DD} = 50 \text{ V}$   
 $R_{GS} = 25 \Omega$ ,  $L = 1.65 \text{ mH}$



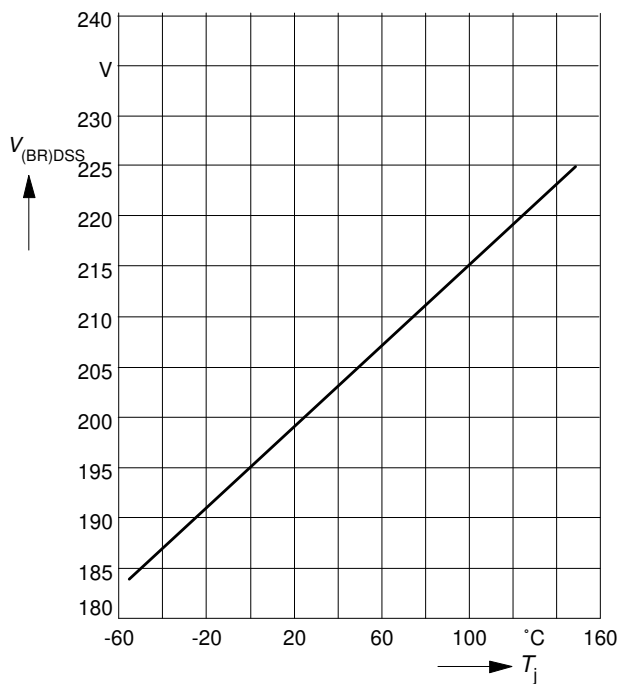
**Typ. gate charge**

$V_{GS} = f(Q_{Gate})$   
parameter:  $I_{D \text{ puls}} = 21 \text{ A}$



**Drain-source breakdown voltage**

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





**Published by**  
**Infineon Technologies AG**  
**81726 Munich, Germany**  
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