

**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	$V_{DS}$	$I_D$	$R_{DS(on)}$	Package	Pb-free
BUZ 31 H3046	200 V	14.5 A	0.2 $\Omega$	PG-TO-262-3	Yes

**Maximum Ratings**

Parameter	Symbol	Values	Unit
Continuous drain current $T_C = 30\text{ }^\circ\text{C}$	$I_D$	14.5	A
Pulsed drain current $T_C = 25\text{ }^\circ\text{C}$	$I_{Dpuls}$	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 $I_D = 14.5\text{ A}$ , $V_{DD} = 50\text{ V}$ , $R_{GS} = 25\text{ }\Omega$ $L = 1.42\text{ mH}$ , $T_j = 25\text{ }^\circ\text{C}$	$E_{AS}$	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.	
<b>Static Characteristics</b>					
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**

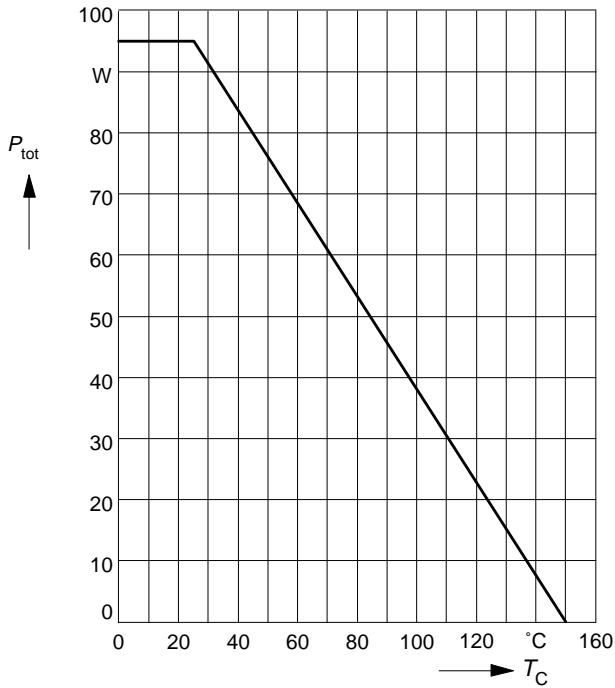
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Dynamic Characteristics</b>					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}, I_D = 7 \text{ A}$	$g_{fs}$	5	12	-	S
Input capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	$C_{iss}$	-	840	1120	pF
Output capacitance $V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$	$C_{oss}$	-	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**

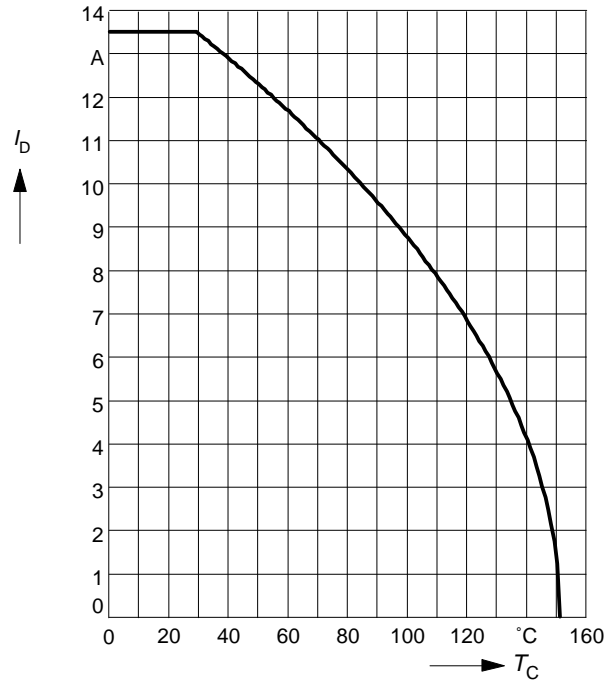
$P_{tot} = f(T_C)$



**Drain current**

$I_D = f(T_C)$

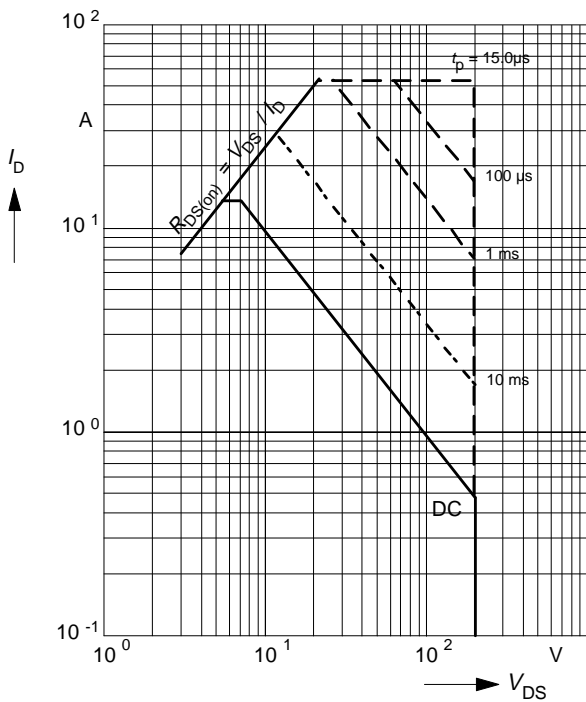
parameter:  $V_{GS} \geq 10\text{ V}$



**Safe operating area**

$I_D = f(V_{DS})$

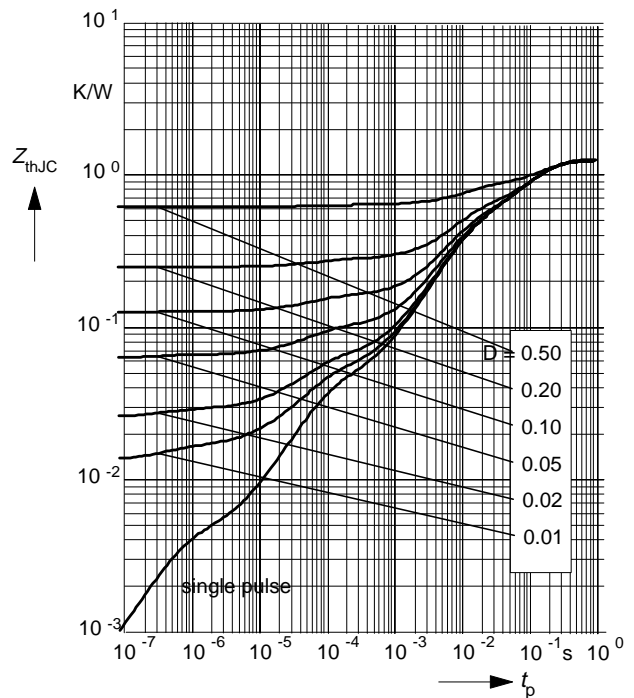
parameter:  $D = 0.01, T_C = 25\text{ °C}$



**Transient thermal impedance**

$Z_{thJC} = f(t_p)$

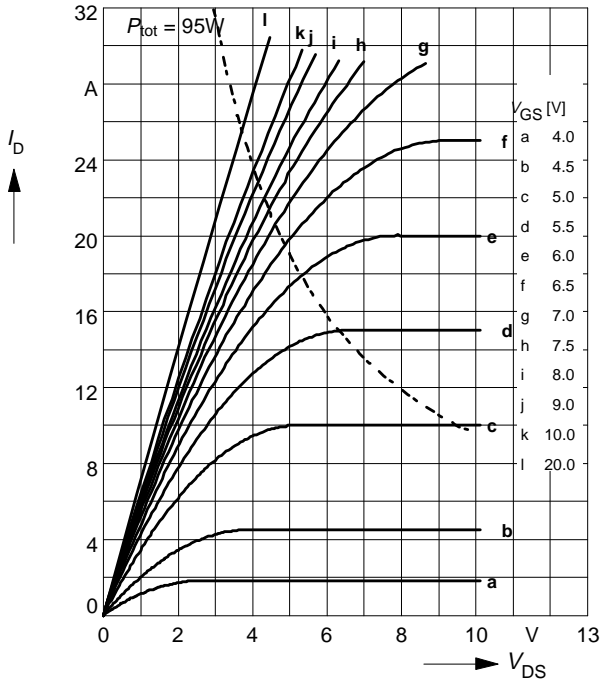
parameter:  $D = t_p / T$



**Typ. output characteristics**

$I_D = f(V_{DS})$

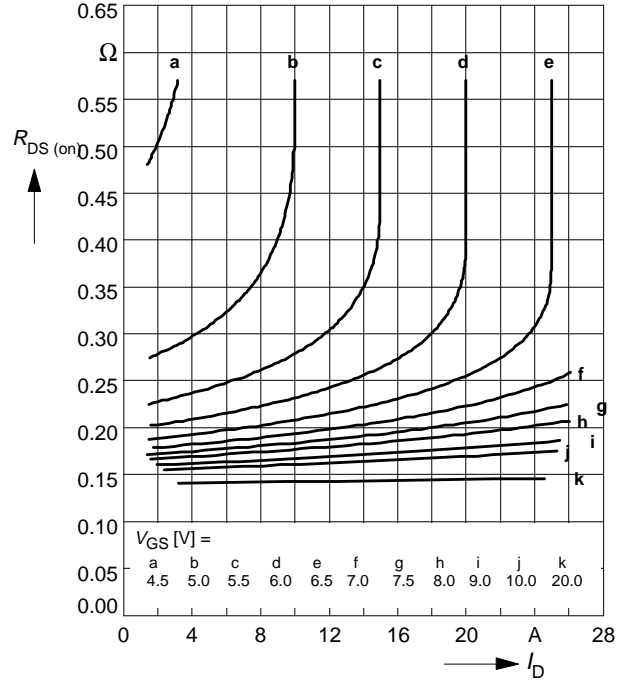
parameter:  $t_p = 80 \mu s$



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

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

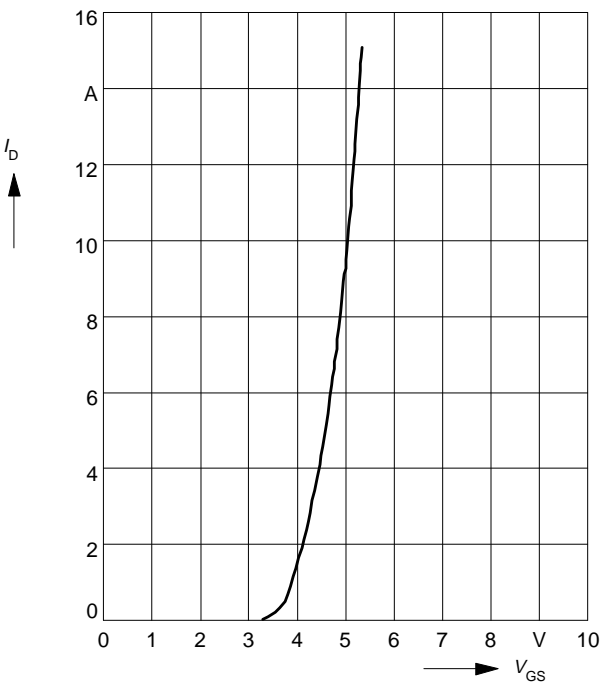
parameter:  $V_{GS}$



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

parameter:  $t_p = 80 \mu s$

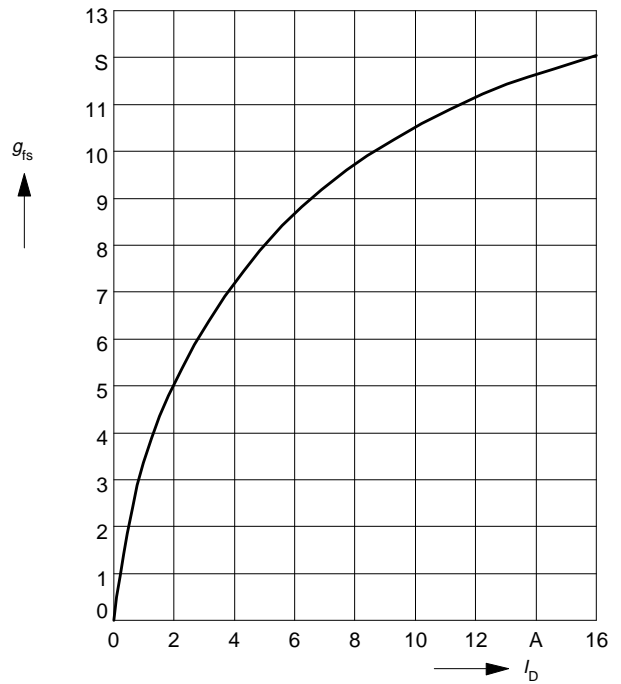
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



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

parameter:  $t_p = 80 \mu s$ ,

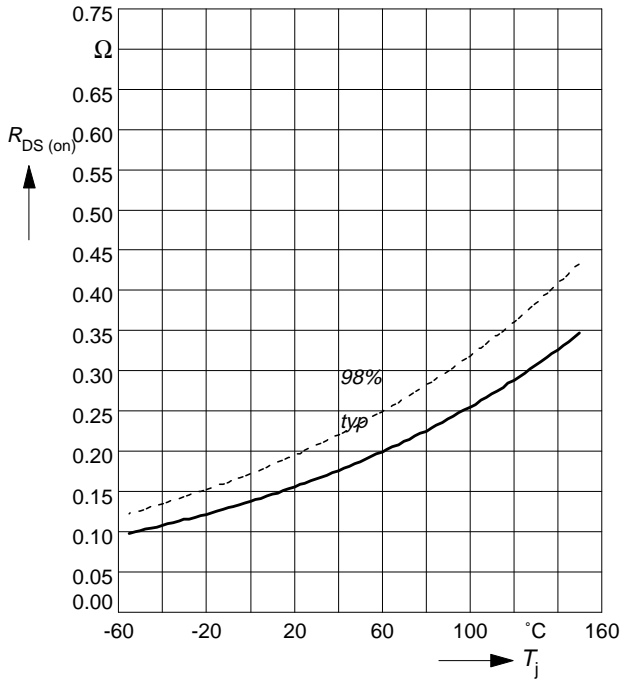
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



**Drain-source on-resistance**

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

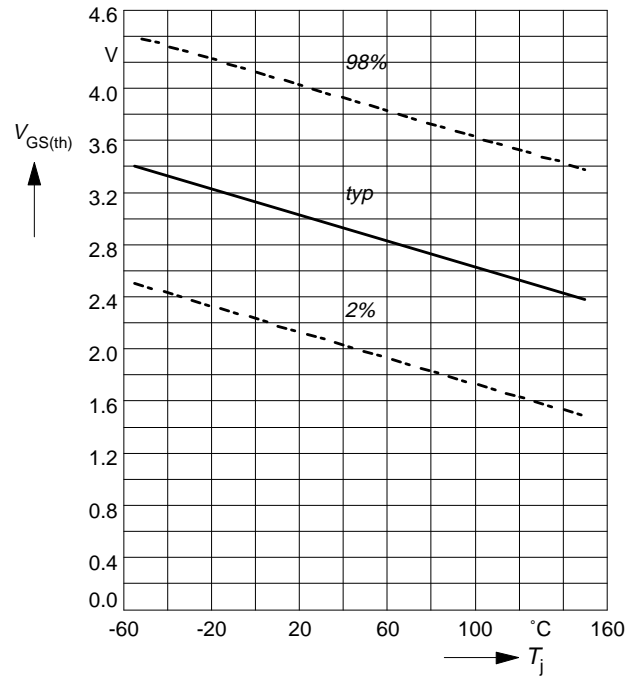
parameter:  $I_D = 9\text{ A}$ ,  $V_{GS} = 10\text{ V}$



**Gate threshold voltage**

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

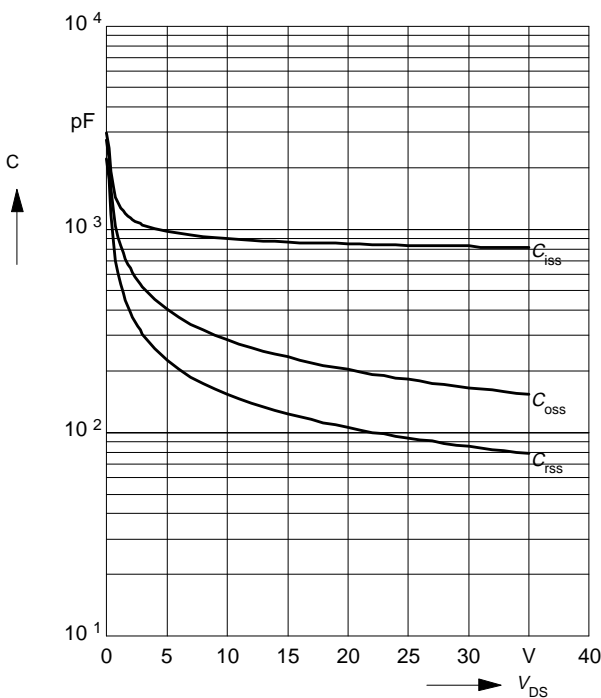
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1\text{ mA}$



**Typ. capacitances**

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

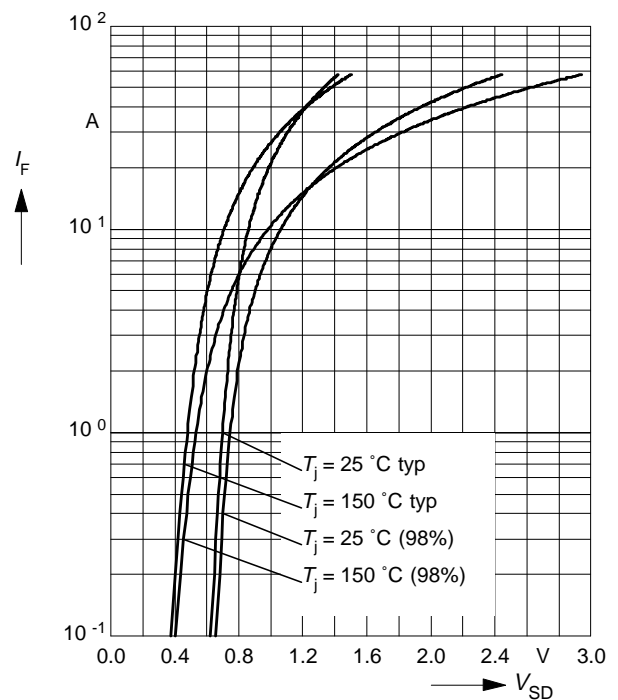
parameter:  $V_{GS} = 0\text{ V}$ ,  $f = 1\text{ MHz}$



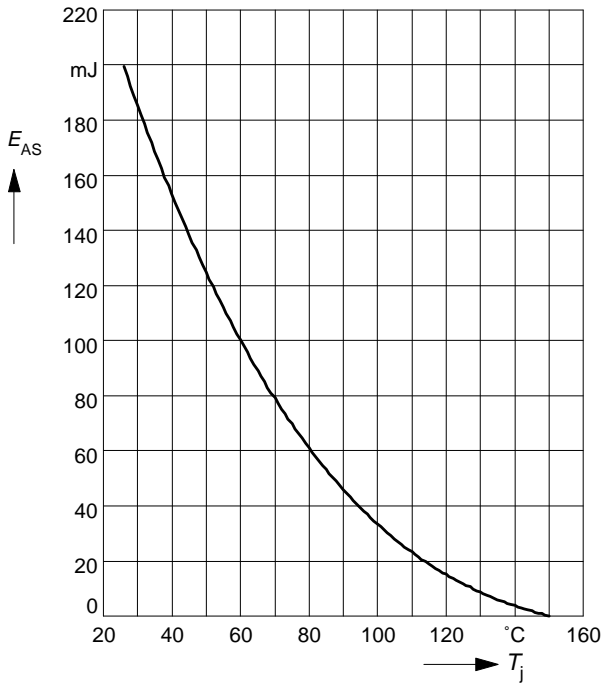
**Forward characteristics of reverse diode**

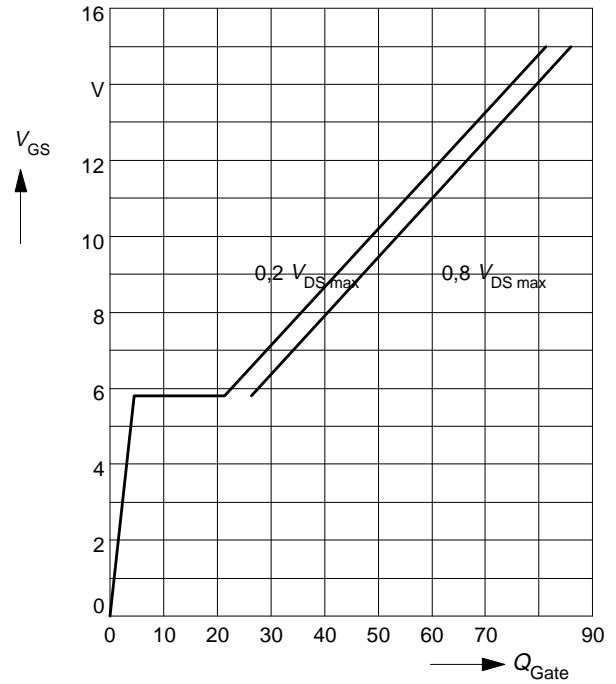
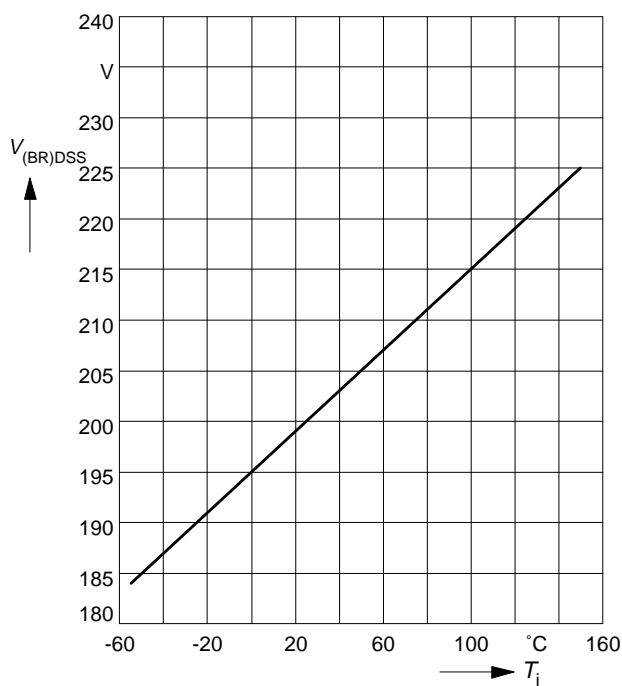
$$I_F = f(V_{SD})$$

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



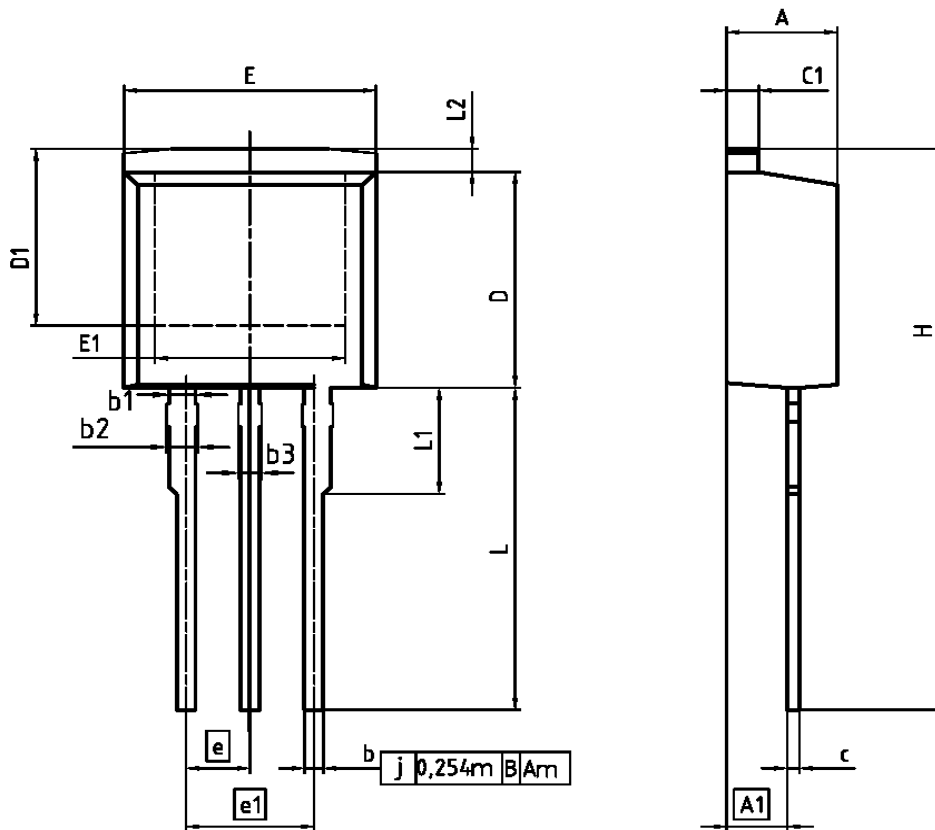
**Avalanche energy  $E_{AS} = f(T_j)$** 

 parameter:  $I_D = 14.5 \text{ A}$ ,  $V_{DD} = 50 \text{ V}$ 
 $R_{GS} = 25 \Omega$ ,  $L = 1.42 \text{ mH}$ 

**Typ. gate charge  $V_{GS} = f(Q_{Gate})$** 
 $V_{GS} = f(Q_{Gate})$ 

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

**Drain-source breakdown voltage  $V_{(BR)DSS} = f(T_j)$** 
 $V_{(BR)DSS} = f(T_j)$ 




PG-TO-262-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.300	4.572	0.169	0.180
A1	2.150	2.718	0.085	0.107
b	0.650	0.864	0.026	0.034
b1	0.950	1.093	0.037	0.043
b2	0.950	1.400	0.037	0.055
b3	0.650	1.118	0.026	0.044
c	0.330	0.600	0.013	0.024
c1	1.170	1.400	0.046	0.055
D	8.509	8.450	0.335	0.372
D1	6.900	-	0.272	-
E	9.700	10.363	0.382	0.408
E1	6.500	8.600	0.256	0.339
e	2.540		0.100	
e1	5.080		0.200	
N	3		3	
L	13.000	14.000	0.512	0.551
L1	-	4.800	-	0.189
L2	-	1.727	-	0.068

REFERENCE  
JEDEC TO262

SCALE

0 2.5 5mm

EUROPEAN PROJECTION

ISSUE DATE  
05-05-2006

FILE  
TO262\_1

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