

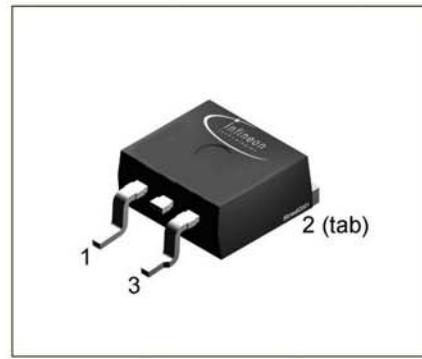
## BUZ31 H3045 A

### SiPMOS® Power Transistor

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



Halogen-Free



Pin 1	Pin 2	Pin 3
G	D	S

Type	$V_{DS}$	$I_D$	$R_{DS(on)}$	Package	Pb-free
BUZ31 H3045A	200 V	14.5 A	0.2 $\Omega$	PG-T0263-3	Yes

### Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current $T_C = 30^\circ\text{C}$	$I_D$	14.5	A
Pulsed drain current $T_C = 25^\circ\text{C}$	$I_{Dpuls}$	58	
Avalanche current, limited by $T_{jmax}$	$I_{AR}$	14.5	
Avalanche energy, periodic limited by $T_{jmax}$	$E_{AR}$	9	mJ
Avalanche energy, single pulse $I_D = 14.5 \text{ A}, V_{DD} = 50 \text{ V}, R_{GS} = 25 \Omega$ $L = 1.42 \text{ mH}, T_j = 25^\circ\text{C}$	$E_{AS}$	200	
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_C = 25^\circ\text{C}$	$P_{tot}$	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 $V_{GS} = 0 \text{ V}$ , $I_D = 0.25 \text{ mA}$ , $T_j = 25^\circ\text{C}$	$V_{(\text{BR})\text{DSS}}$	200	-	-	V
Gate threshold voltage $V_{GS} = V_{DS}$ , $I_D = 1 \text{ mA}$	$V_{GS(\text{th})}$	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	1	$\mu\text{A}$
-		-	10	100	
Gate-source leakage current $V_{GS} = 20 \text{ V}$ , $V_{DS} = 0 \text{ V}$	$I_{GSS}$	-	10	100	nA
Drain-Source on-resistance $V_{GS} = 10 \text{ V}$ , $I_D = 9 \text{ A}$	$R_{DS(\text{on})}$	-	0.16	0.2	$\Omega$

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

#### Dynamic Characteristics

Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 9 \text{ A}$	$g_{fs}$	5	10	-	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 $V_{DD} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$ $R_{GS} = 50 \Omega$	$t_{d(on)}$	-	12	20	ns
Rise time $V_{DD} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$ $R_{GS} = 50 \Omega$	$t_r$	-	50	75	
Turn-off delay time $V_{DD} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$ $R_{GS} = 50 \Omega$	$t_{d(off)}$	-	150	200	
Fall time $V_{DD} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$ $R_{GS} = 50 \Omega$	$t_f$	-	60	80	

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

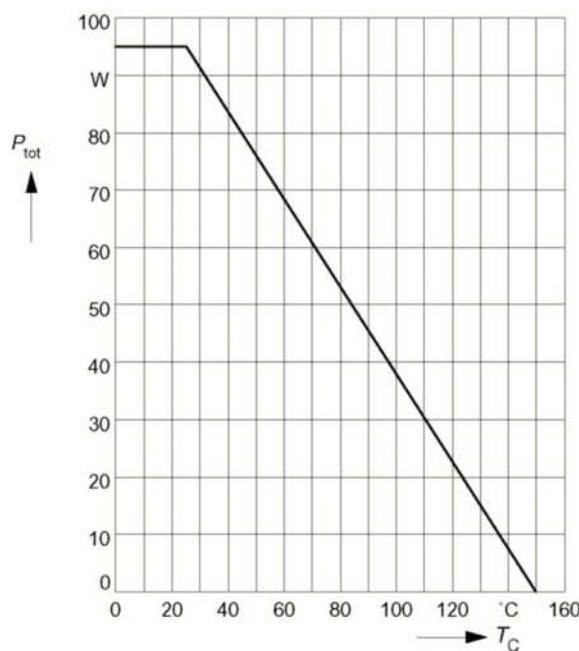
Parameter	Symbol	Values			Unit
		min.	typ.	max.	

**Reverse Diode**

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	-	$\mu\text{C}$

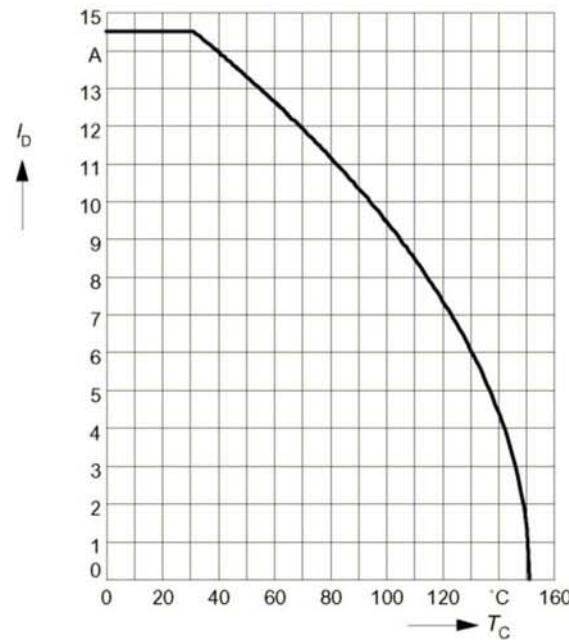
**Power dissipation**

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


**Drain current**

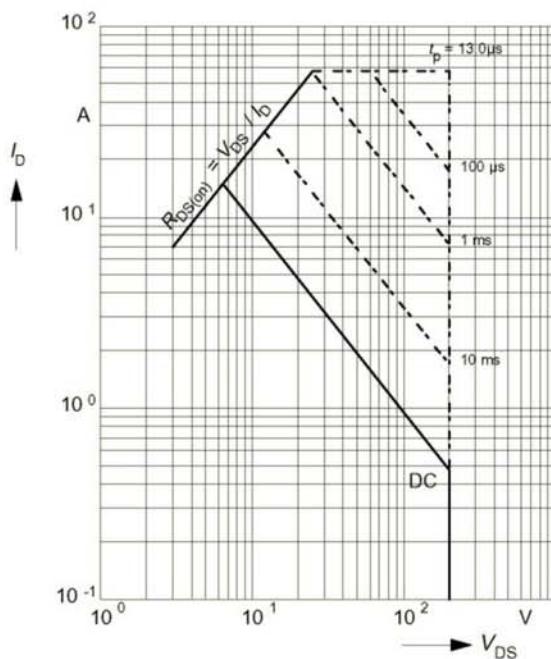
$$I_D = f(T_C)$$

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


**Safe operating area**

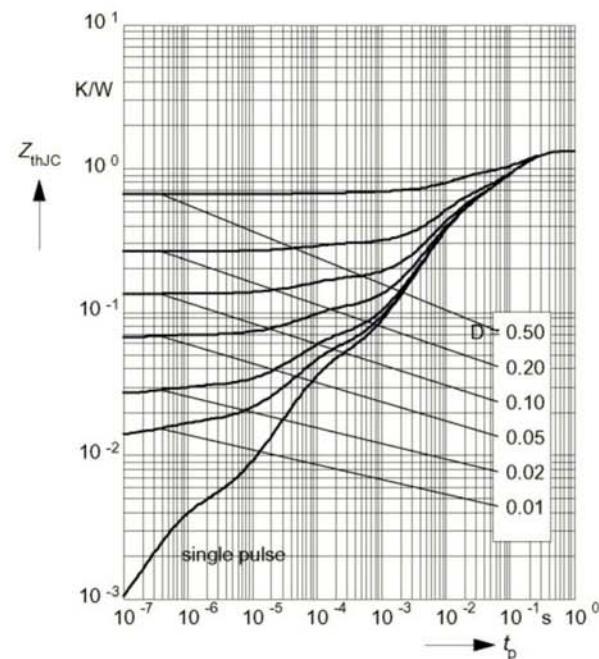
$$I_D = f(V_{DS})$$

parameter:  $D = 0.01$ ,  $T_C = 25$  °C


**Transient thermal impedance**

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

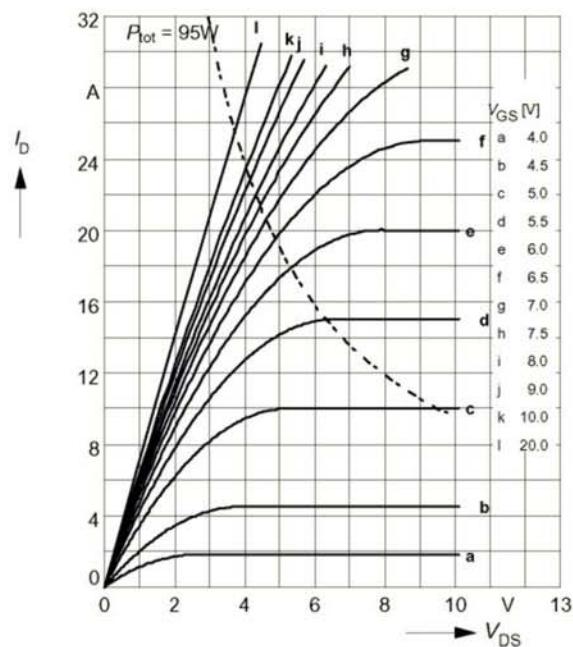
parameter:  $D = t_p / T$



**Typ. output characteristics**

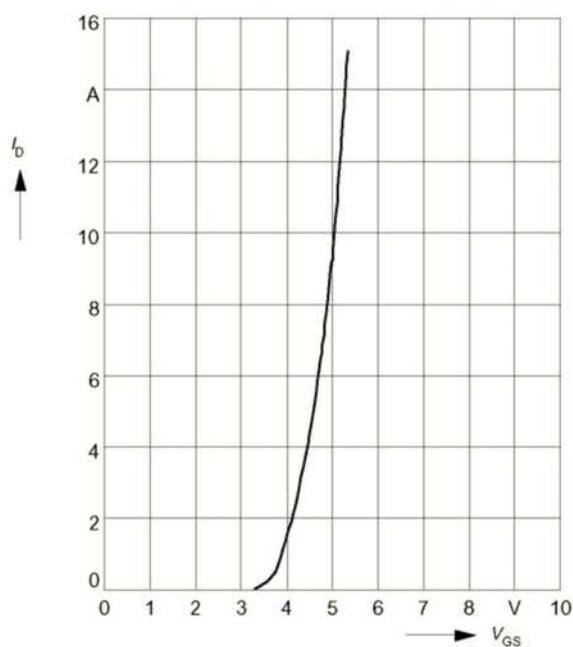
$$I_D = f(V_{DS})$$

parameter:  $t_p = 80 \mu s$


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

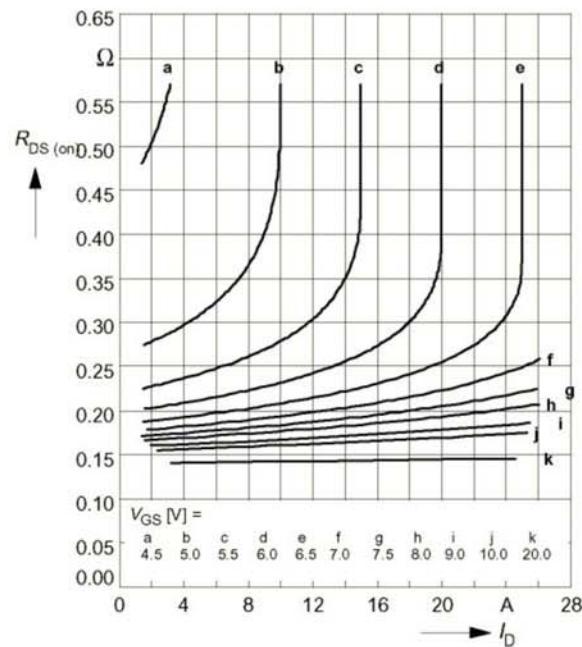
parameter:  $t_p = 80 \mu s$

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


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

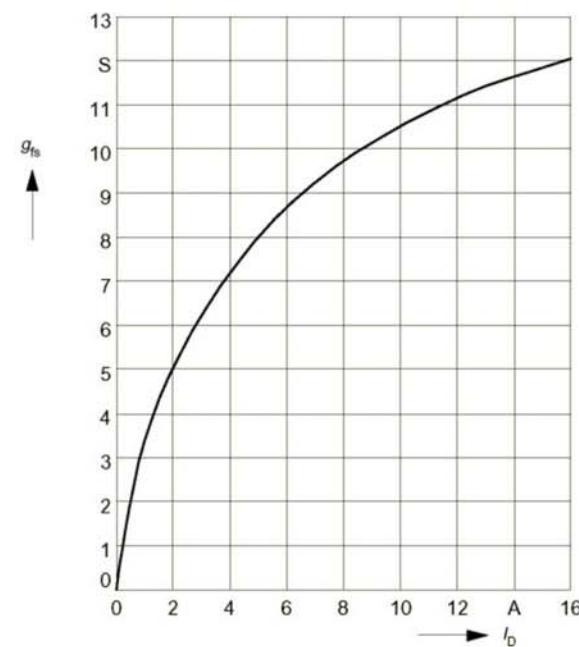
$$R_{DS(on)} = f(I_D)$$

parameter:  $V_{GS}$


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

parameter:  $t_p = 80 \mu s$ ,

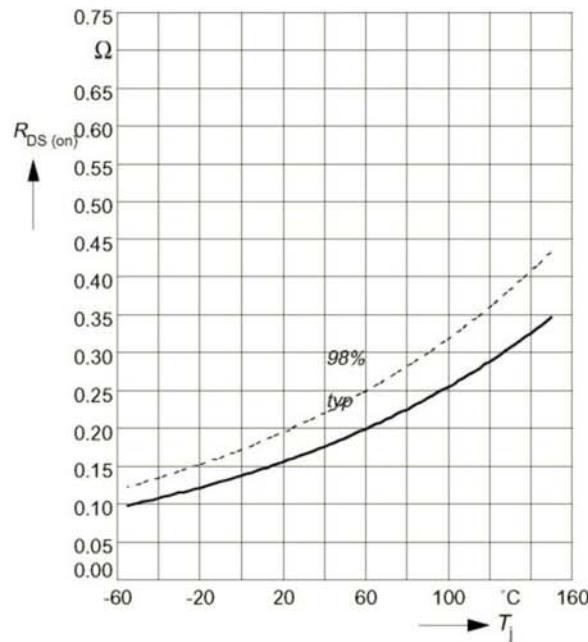
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)} \text{max}$$



**Drain-source on-resistance**

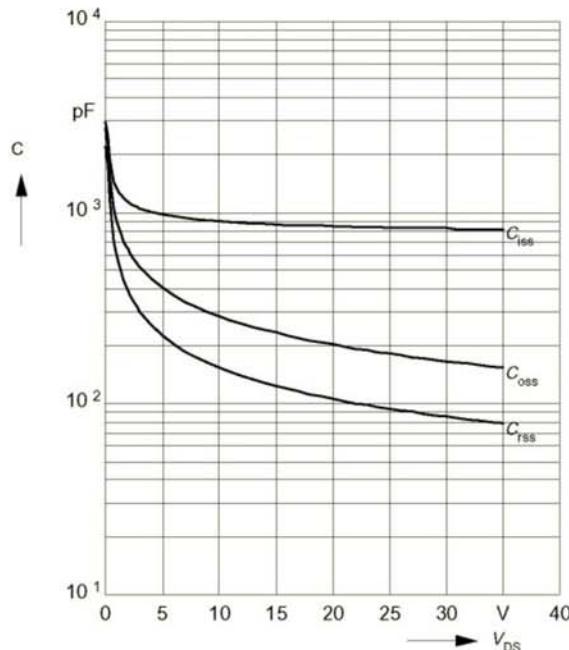
$$R_{DS(on)} = f(T_j)$$

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


**Typ. capacitances**

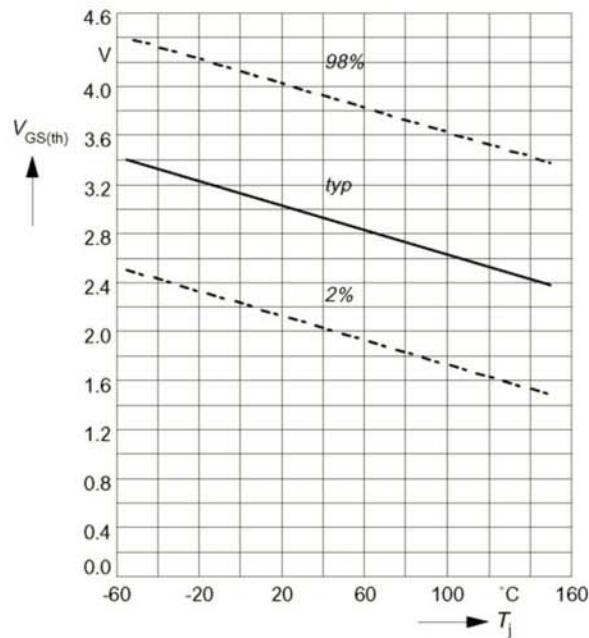
$$C = f(V_{DS})$$

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


**Gate threshold voltage**

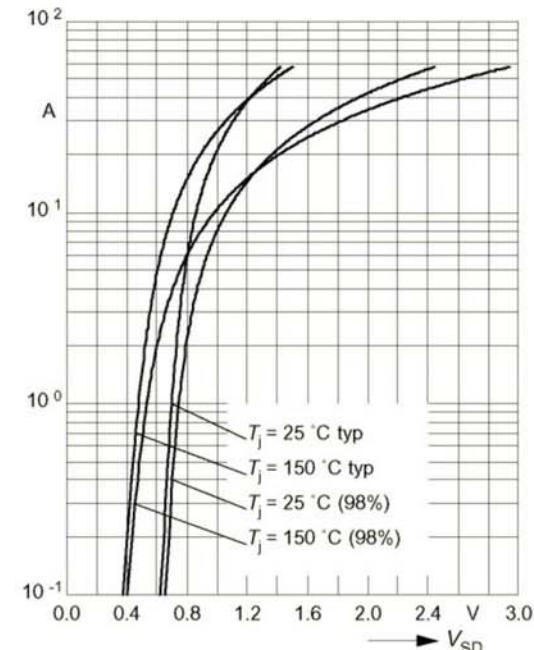
$$V_{GS(th)} = f(T_j)$$

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

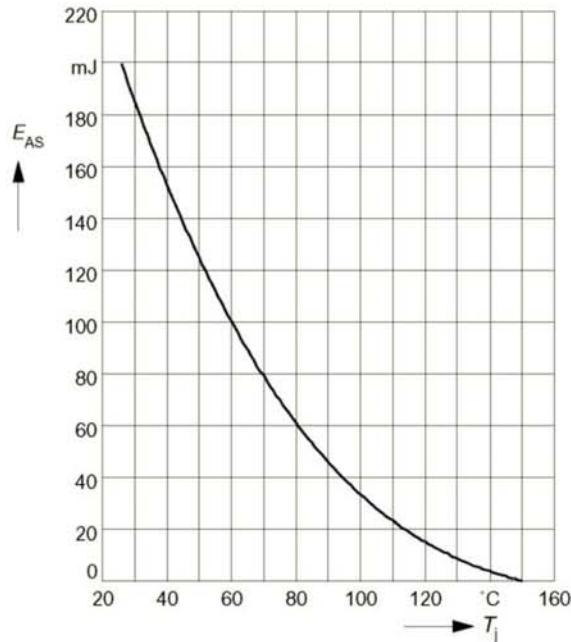

**Forward characteristics of reverse diode**

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

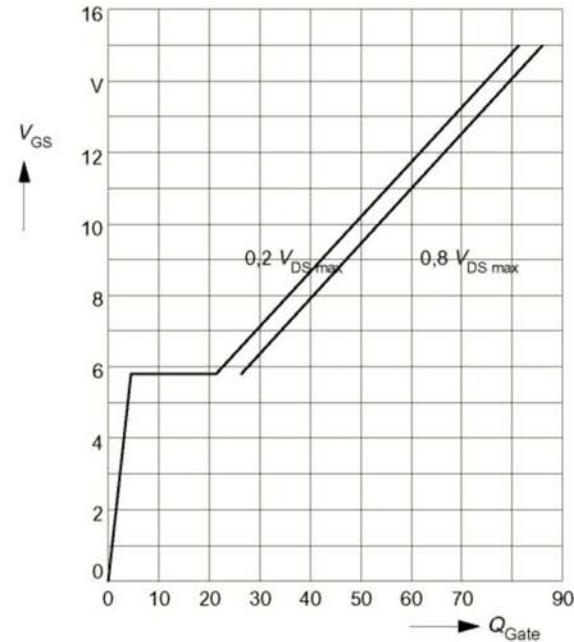
parameter:  $T_j$ ,  $t_p = 80 \text{ } \mu\text{s}$



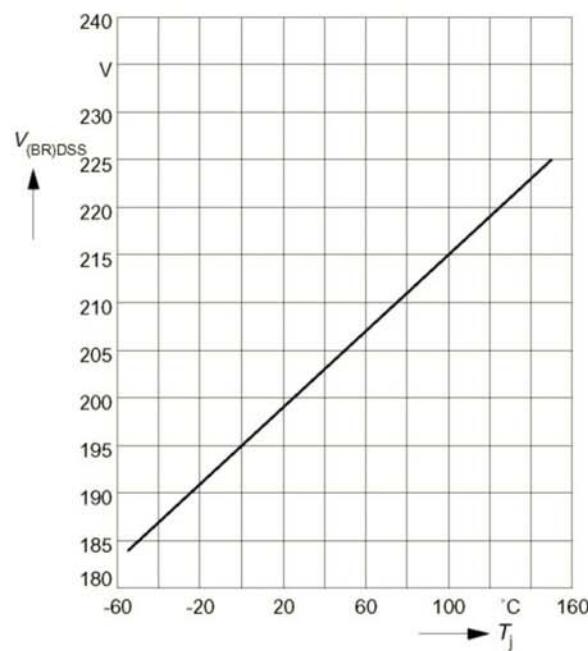
**Avalanche energy**  $E_{AS} = f(T_j)$   
 parameter:  $I_D = 14.5 \text{ A}$ ,  $V_{DD} = 50 \text{ V}$   
 $R_{GS} = 25 \Omega$ ,  $L = 1.42 \text{ mH}$

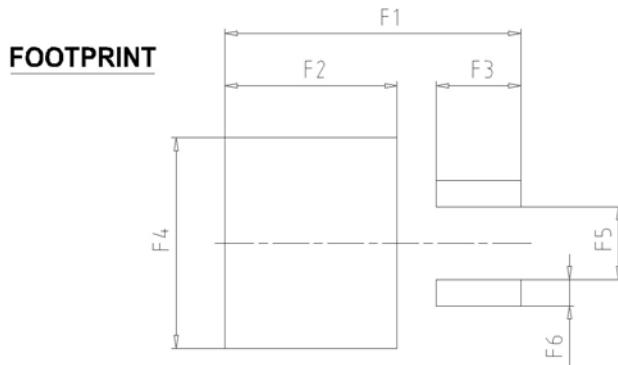
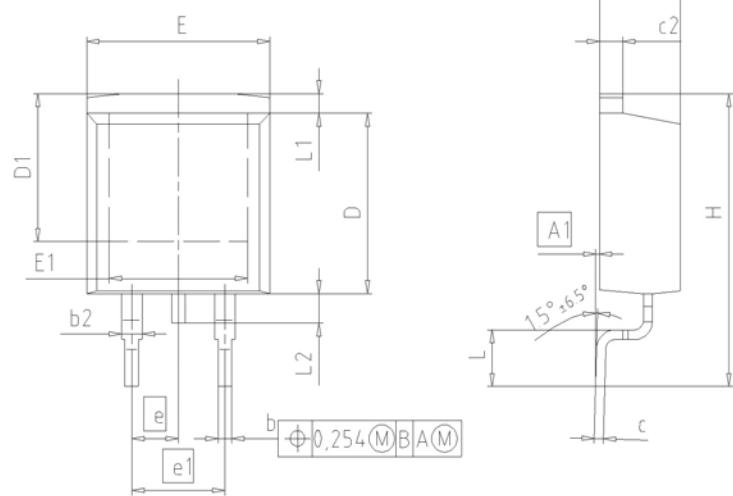


**Typ. gate charge**  
 $V_{GS} = f(Q_{Gate})$   
 parameter:  $I_D \text{ puls} = 20 \text{ A}$



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



**Package Drawing: TO263-3**


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	0.00	0.25	0.000	0.010
b	0.65	0.85	0.026	0.033
b2	0.95	1.15	0.037	0.045
c	0.33	0.65	0.013	0.026
c2	1.17	1.40	0.046	0.055
D	8.51	9.45	0.335	0.372
D1	7.10	7.90	0.280	0.311
E	9.80	10.31	0.386	0.406
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	2		2	
H	14.61	15.88	0.575	0.625
L	2.29	3.00	0.090	0.118
L1	0.70	1.60	0.028	0.063
L2	1.00	1.78	0.039	0.070
F1	16.05	16.25	0.632	0.640
F2	9.30	9.50	0.366	0.374
F3	4.50	4.70	0.177	0.185
F4	10.70	10.90	0.421	0.429
F5	3.65	3.85	0.144	0.152
F6	1.25	1.45	0.049	0.057

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