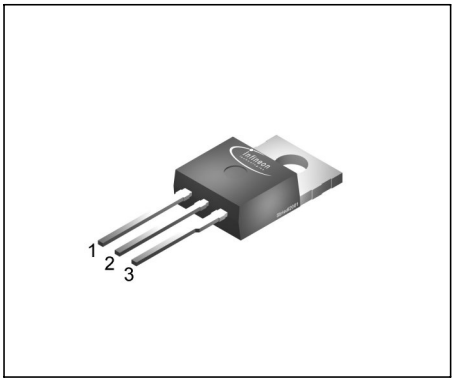
SIPMOS ® Power Transistor

BUZ 31L H



- N channel
- Enhancement mode
- Avalanche-rated
- Logic 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 L H	200 V	13.5 A	0.2 Ω	PG-TO220-3	Yes

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current T_C = 28 °C	I_D	13.5	A
Pulsed drain current T_C = 25 °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 A, V_{DD} = 50 V, R_{GS} = 25 Ω L = 1.65 mH, T_j = 25 °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 °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˚C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain- source breakdown voltage V_{GS} = 0 V, I_D = 0.25 mA, T_j = 25 ˚C	$V_{(BR)DSS}$	200	-	-	V
Gate threshold voltage V_{GS}=V_{DS}, I_D = 1 mA	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current V_{DS} = 200 V, V_{GS} = 0 V, T_j = 25 ˚C V_{DS} = 200 V, V_{GS} = 0 V, T_j = 125 ˚C	I_{DSS}	- -	0.1 10	1 100	µA
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0 V	I_{GSS}	-	10	100	nA
Drain-Source on-resistance V_{GS} = 5 V, I_D = 7 A	$R_{DS(on)}$	-	0.16	0.2	Ω

Electrical Characteristics, at T_j = 25°C, unless otherwise specified

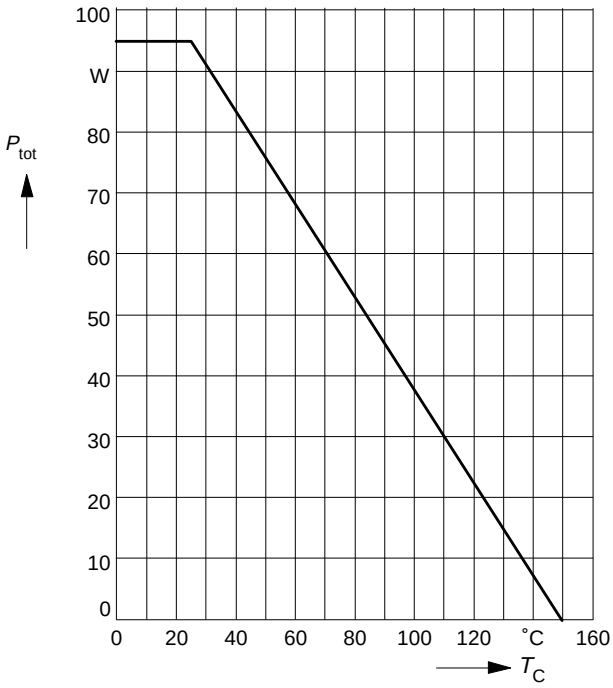
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}$, I_D = 7 A	g_{fs}	5	12	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	1200	1600	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	-	200	300	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	-	100	150	
Turn-on delay time V_{DD} = 30 V, V_{GS} = 5 V, I_D = 3 A R_{GS} = 50 Ω	$t_{d(on)}$	-	25	40	ns
Rise time V_{DD} = 30 V, V_{GS} = 5 V, I_D = 3 A R_{GS} = 50 Ω	t_r	-	80	120	
Turn-off delay time V_{DD} = 30 V, V_{GS} = 5 V, I_D = 3 A R_{GS} = 50 Ω	$t_{d(off)}$	-	210	270	
Fall time V_{DD} = 30 V, V_{GS} = 5 V, I_D = 3 A R_{GS} = 50 Ω	t_f	-	65	85	

Electrical Characteristics, at T_j = 25°C, unless otherwise specified

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

Power dissipation

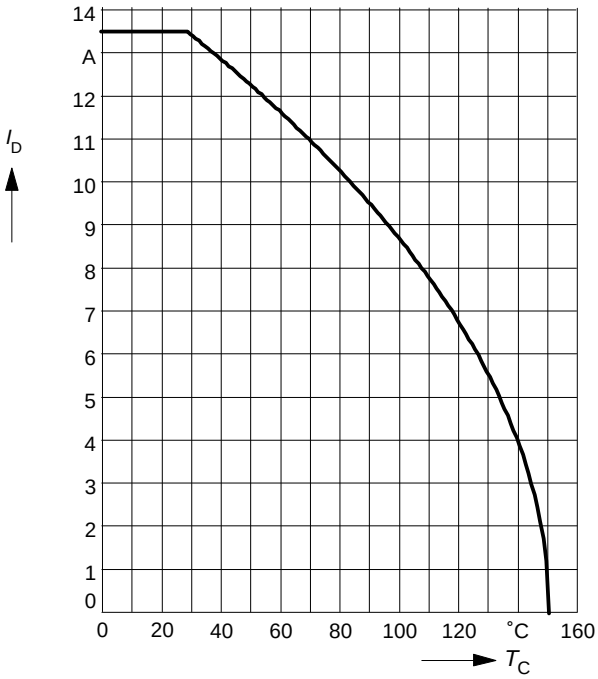
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

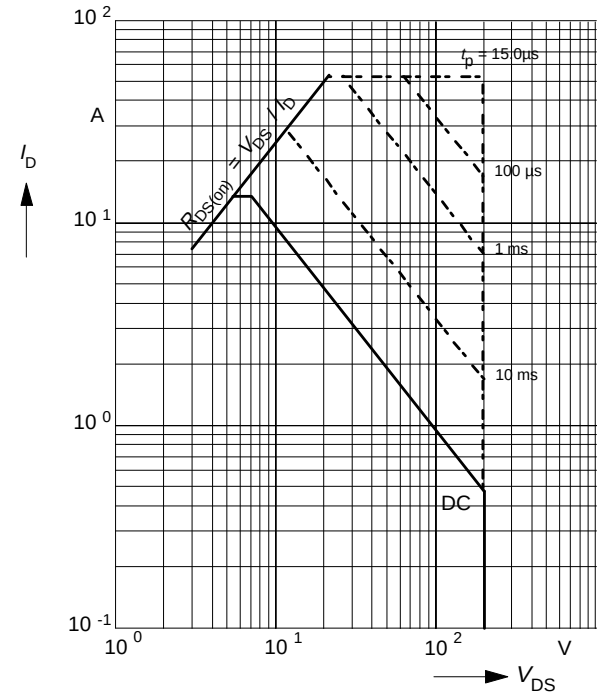
parameter: $V_{GS} \geq 5$ V



Safe operating area

$I_D = f(V_{DS})$

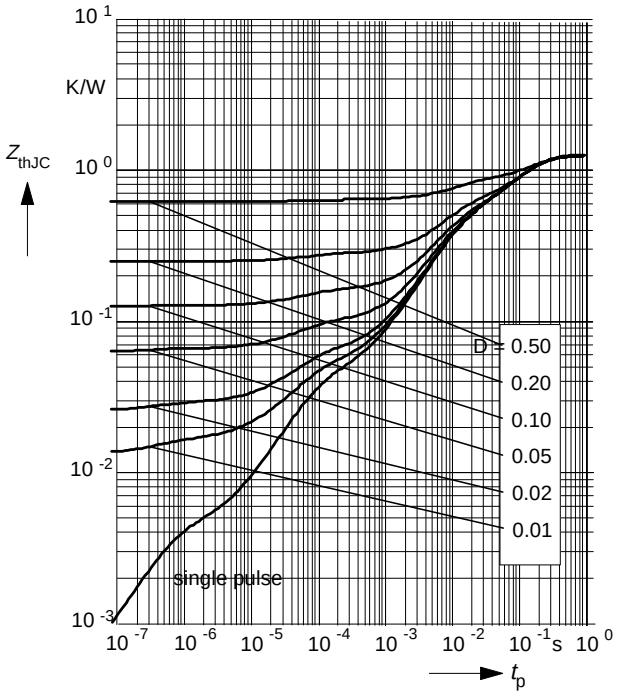
parameter: $D = 0.01$, $T_C = 25$°C



Transient thermal impedance

$Z_{th\,JC} = f(t_p)$

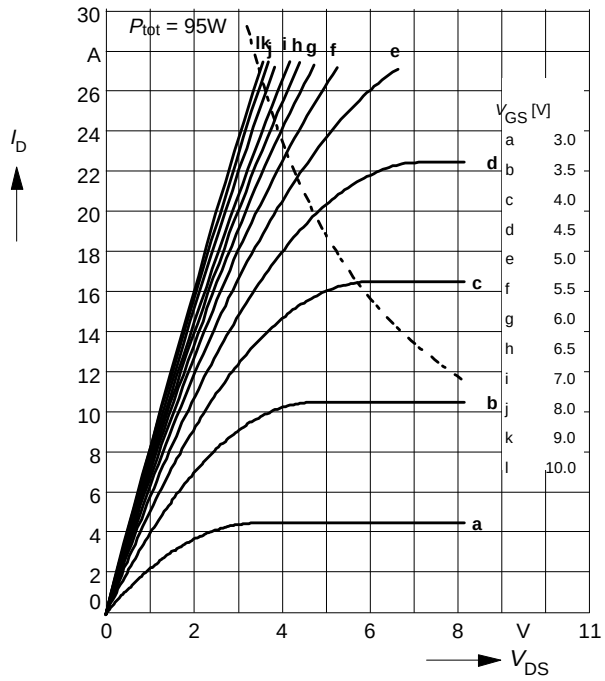
parameter: $D = t_p / T$



Typ. output characteristics

$I_D = f(V_{DS})$

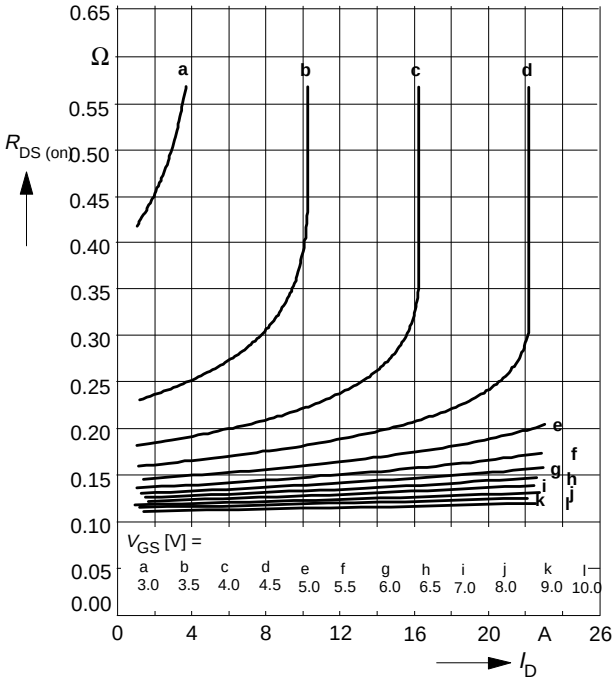
parameter: t_p = 80 µs , T_j = 25 ˚C



Typ. drain-source on-resistance

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

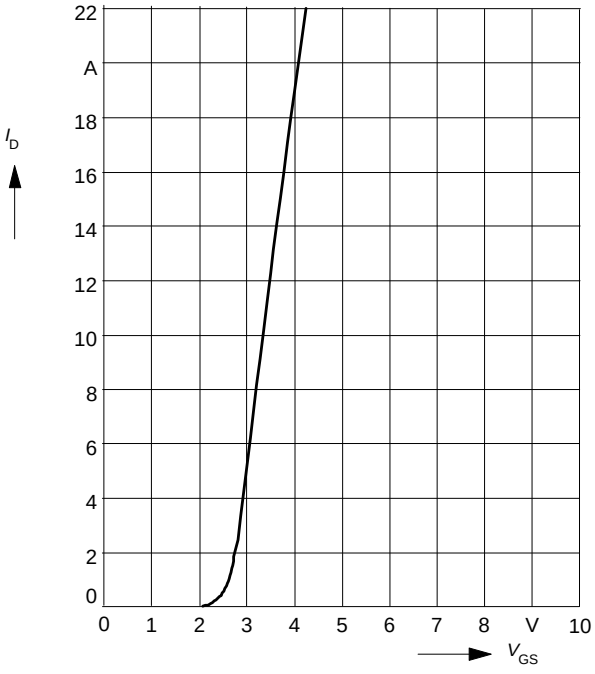
parameter: t_p = 80 µs, T_j = 25 ˚C



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

parameter: t_p = 80 µs

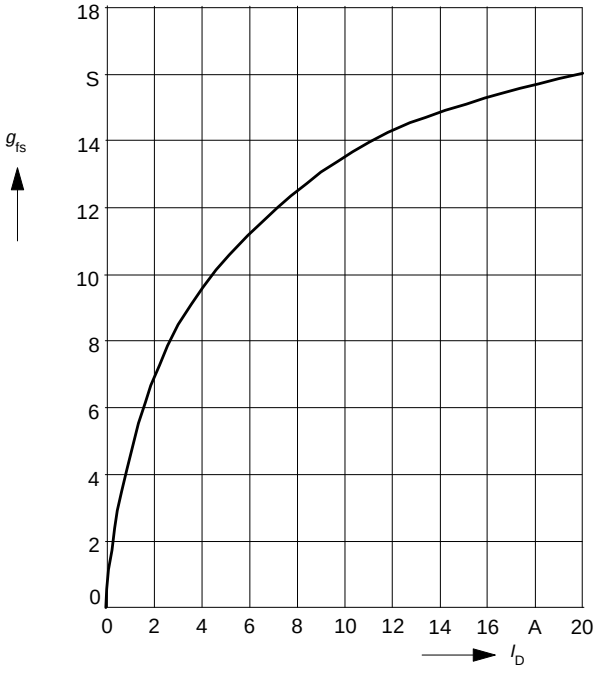
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



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

parameter: t_p = 80 µs,

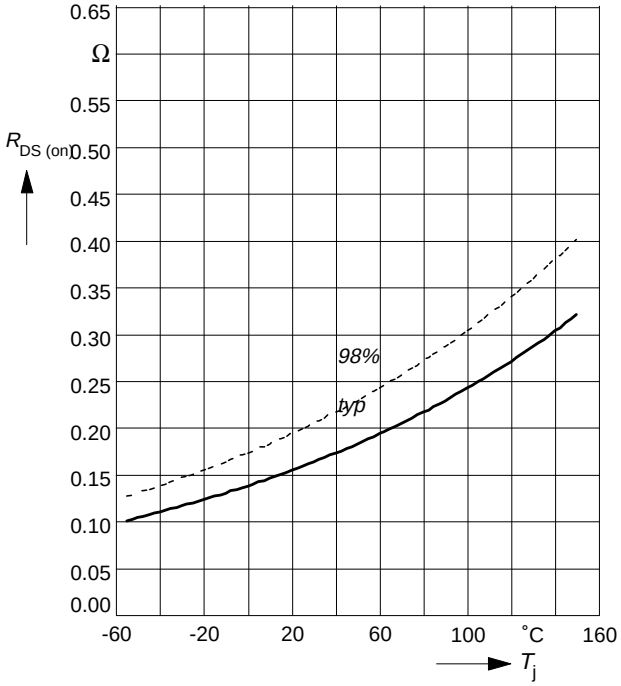
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Drain-source on-resistance

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

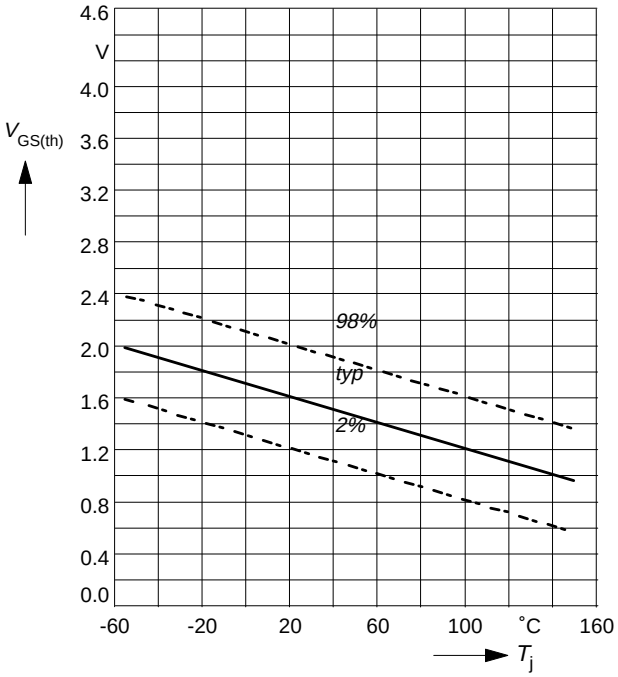
parameter: I_D = 7 A, V_{GS} = 5 V



Gate threshold voltage

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

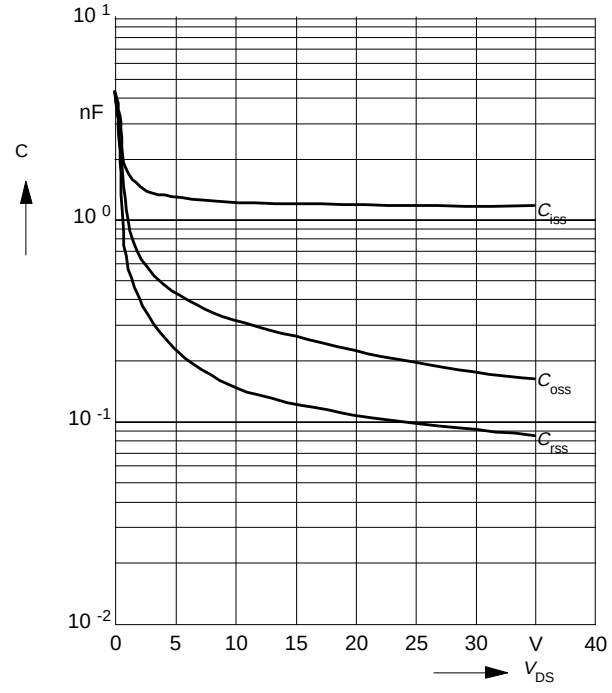
parameter: $V_{GS} = V_{DS}$, I_D = 1 mA



Typ. capacitances

$C = f(V_{DS})$

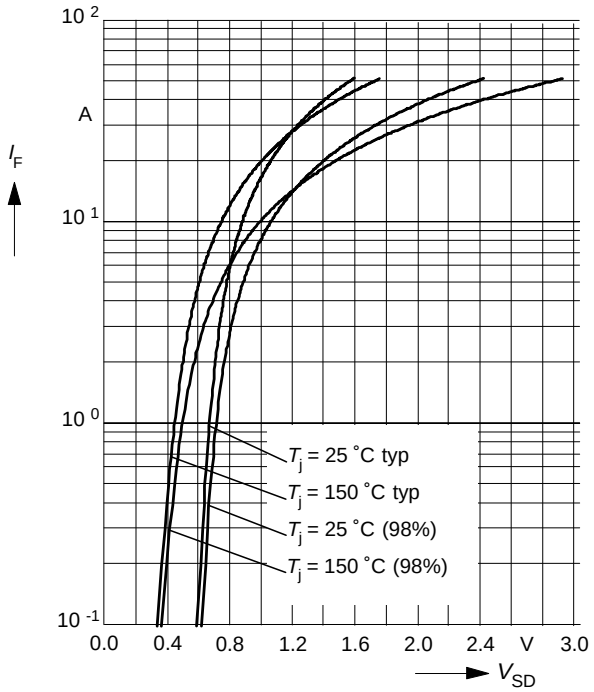
parameter: V_{GS} = 0V, f = 1MHz



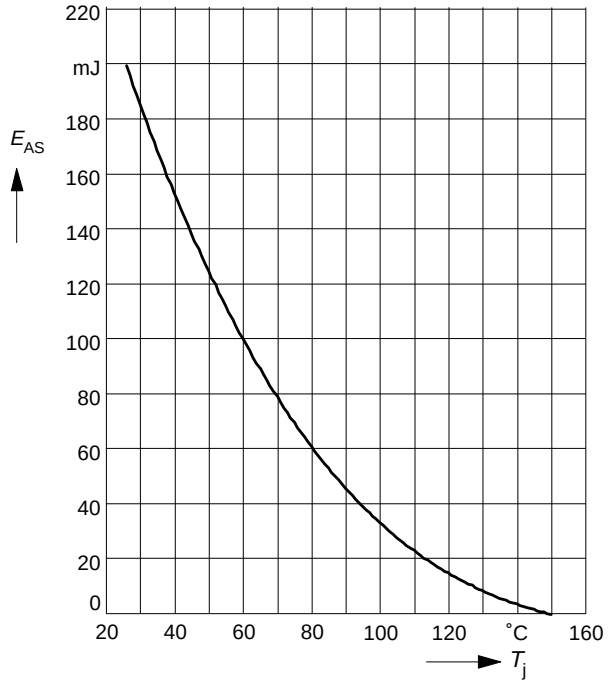
Forward characteristics of reverse diode

$I_F = f(V_{SD})$

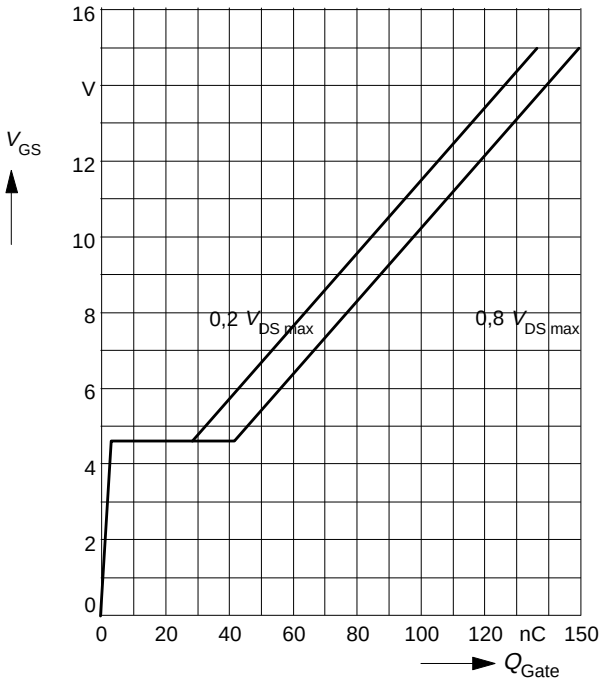
parameter: T_j, t_p = 80 µs



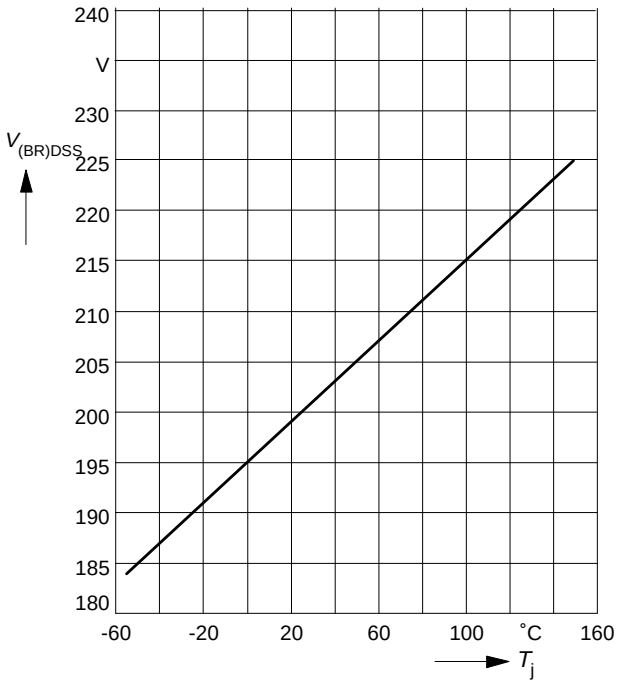
Avalanche energy $E_{AS} = f(T_j)$
parameter: I_D = 13.5 A, V_{DD} = 50 V
R_{GS} = 25 Ω, L = 1.65 mH



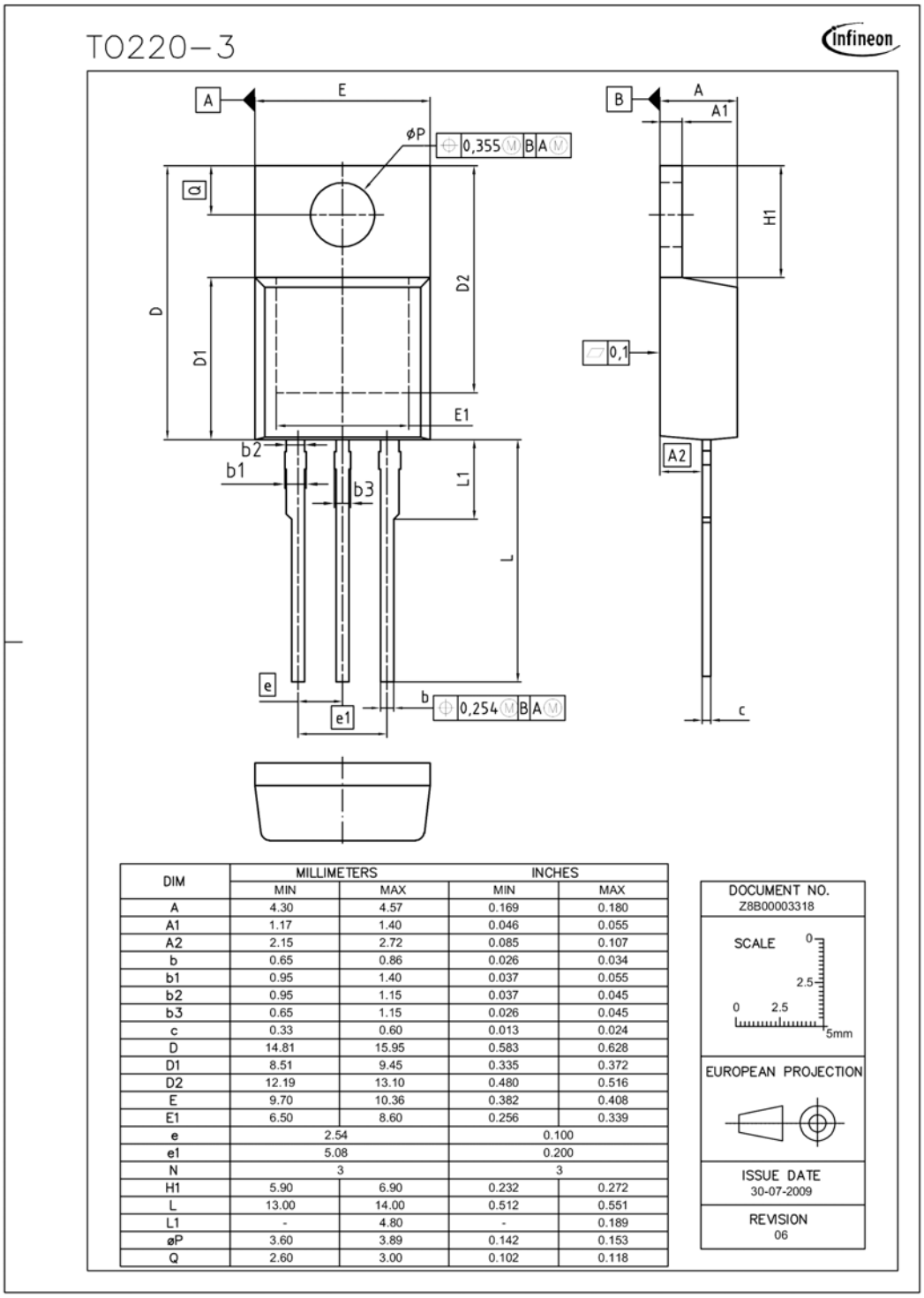
Typ. gate charge
$V_{GS} = f(Q_{Gate})$
parameter: $I_{D\ puls}$ = 21 A



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



Package Drawing: TO220-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	1.17	1.40	0.046	0.055
A2	2.15	2.72	0.085	0.107
b	0.65	0.86	0.026	0.034
b1	0.95	1.40	0.037	0.055
b2	0.95	1.15	0.037	0.045
b3	0.65	1.15	0.026	0.045
c	0.33	0.60	0.013	0.024
D	14.81	15.95	0.583	0.628
D1	8.51	9.45	0.335	0.372
D2	12.19	13.10	0.480	0.516
E	9.70	10.36	0.382	0.408
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	3		3	
H1	5.90	6.90	0.232	0.272
L	13.00	14.00	0.512	0.551
L1	-	4.80	-	0.189
øP	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

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