SIPMOS® Power Transistor

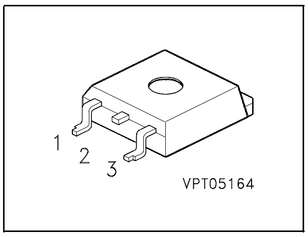
BUZ 111SL

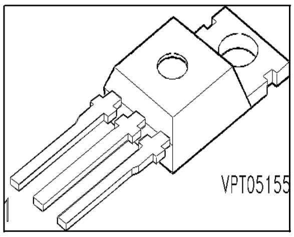
Features

- N channel
- Enhancement mode
- Avalanche rated
- Logic Level
- d*v*/d*t* rated
- 175°C operating temperature

Product Summary

Drain source voltage	V_{DS}	55	V
Drain-Source on-state resistance	$R_{DS(on)}$	0.007	Ω
Continuous drain current	I_D	80	A





Type	Package	Ordering Code	Packaging
BUZ111SL	P-TO220-3-1	Q67040-S4002-A2	Tube
BUZ111SL E3045A	P-TO263-3-2	Q67040-S4002-A6	Tape and Reel
BUZ111SL E3045	P-TO263-3-2	Q67040-S4002-A5	Tube

Pin 1	Pin 2	Pin 3
G	D	S

Maximum Ratings, at T_j = 25 °C, unless otherwise specified

Parameter	**Symbol**	**Value**	**Unit**
Continuous drain current T_C = 25 °C, 1) T_C = 100 °C	I_D	 80 80	A
Pulsed drain current T_C = 25 °C	I_{Dpulse}	320	
Avalanche energy, single pulse I_D = 80 A, V_{DD} = 25 V, R_{GS} = 25 Ω	E_{AS}	700	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	30	
Reverse diode d*v*/d*t* I_S = 80 A, V_{DS} = 40 V, d*i*/d*t* = 200 A/µs, T_{jmax} = 175 °C	d*v*/d*t*	6	kV/µs
Gate source voltage	V_{GS}	±20	V
Power dissipation T_C = 25 °C	P_{tot}	300	W
Operating and storage temperature	T_j , T_{stg}	-55... +175	°C
IEC climatic category; DIN IEC 68-1		55/175/56	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	-	0.5	K/W
Thermal resistance, junction - ambient, leded	R_{thJA}	-	-	62	
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	62	
@ 6 cm^2 cooling area[2]		-	-	40	

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	$V_{(BR)DSS}$	55	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ I_D = 240 µA	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS} = 50 V, V_{GS} = 0 V, T_j = 25 °C		-	0.1	1	
V_{DS} = 50 V, V_{GS} = 0 V, T_j = 150 °C		-	-	100	
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0 V	I_{GSS}	-	10	100	nA
Drain-Source on-state resistance	$R_{DS(on)}$				Ω
V_{GS} = 4.5 V, I_D = 80 A		-	0.0085	0.01	
V_{GS} = 10 V, I_D = 80 A		-	0.0055	0.007	

[1] current limited by bond wire

[2] Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6 cm2 (one layer, 70µm thick) copper area for drain connection. PCB is vertical without blown air.

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 = 80 A	g_{fs}	30	95	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	3850	4800	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	-	1090	1357	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	-	570	715	
Turn-on delay time V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 80 A, R_G = 1.3 Ω	$t_{d(on)}$	-	30	45	ns
Rise time V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 80 A, R_G = 1.3 Ω	t_r	-	37	56	
Turn-off delay time V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 80 A, R_G = 1.3 Ω	$t_{d(off)}$	-	70	105	
Fall time V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 80 A, R_G = 1.3 Ω	t_f	-	36	55	

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

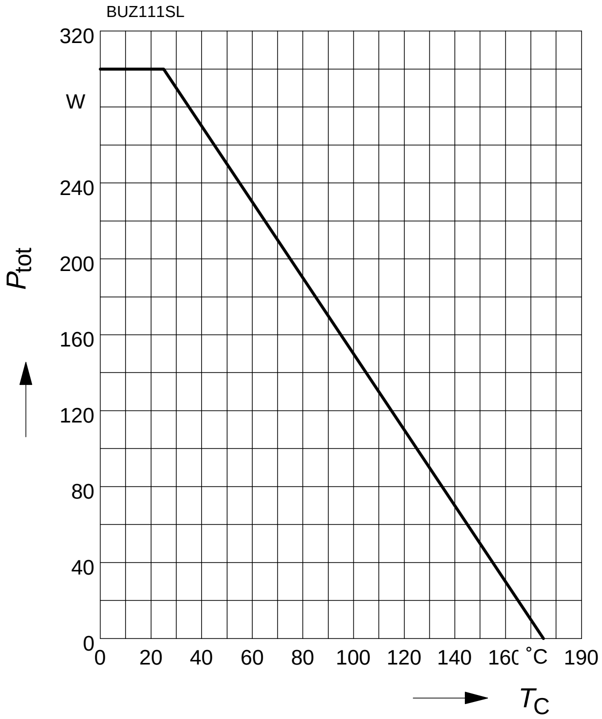
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Gate to source charge V_{DD} = 40 V, I_D = 80 A	Q_{gs}	-	12	18	nC
Gate to drain charge V_{DD} = 40 V, I_D = 80 A	Q_{gd}	-	61	91.5	
Gate charge total V_{DD} = 40 V, I_D = 80 A, V_{GS} = 0 to 10 V	Q_g	-	155	232	
Gate plateau voltage V_{DD} = 40 V, I_D = 80 A	$V_{(plateau)}$	-	3.4	-	V

Reverse Diode

Inverse diode continuous forward current T_C = 25 ˚C	I_S	-	-	80	A
Inverse diode direct current,pulsed T_C = 25 ˚C	I_{SM}	-	-	320	
Inverse diode forward voltage V_{GS} = 0 V, I_F = 160 A	V_{SD}	-	1.25	1.8	V
Reverse recovery time V_R = 30 V, I_F=I_S , di_F/dt = 100 A/µs	t_{rr}	-	105	157	ns
Reverse recovery charge V_R = 30 V, I_F=I_S , di_F/dt = 100 A/µs	Q_{rr}	-	0.31	0.47	µC

Power Dissipation

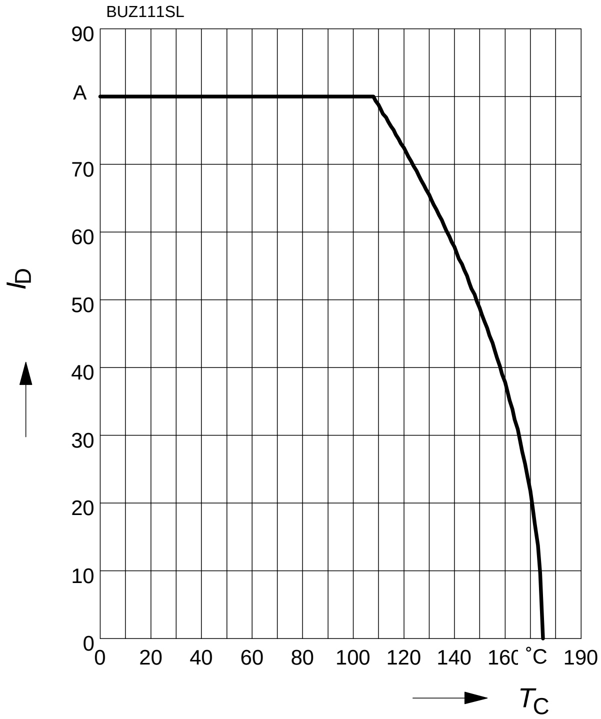
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

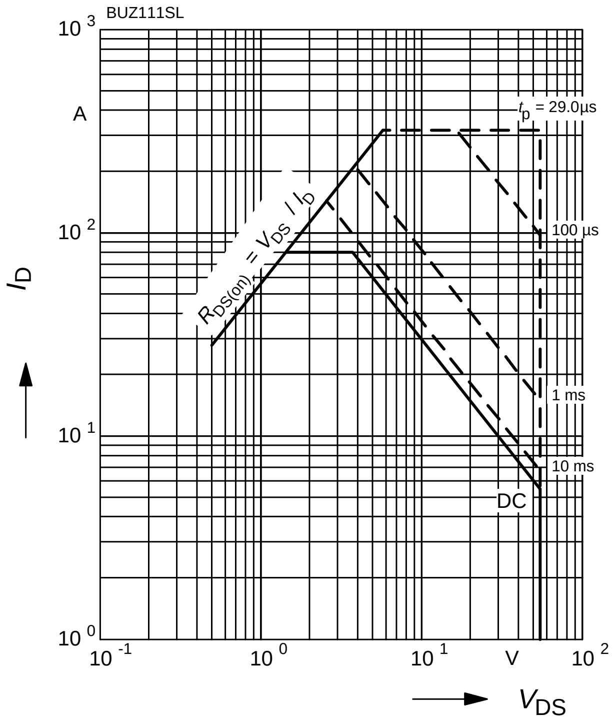
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

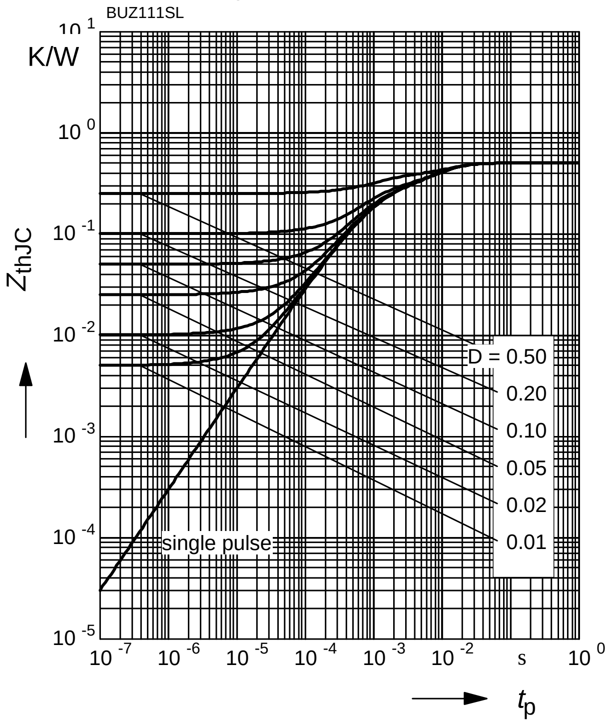
parameter : $D = 0$, $T_C = 25$ °C



Transient thermal impedance

$Z_{thJC} = f(t_p)$

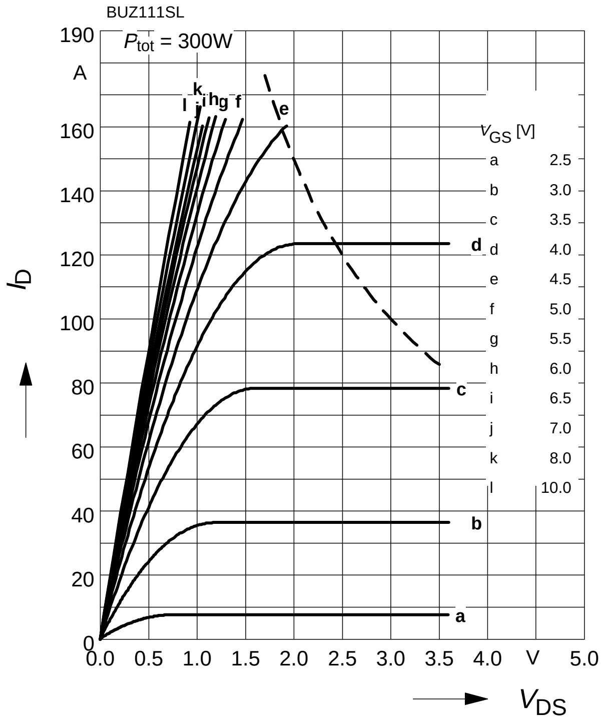
parameter : $D = t_p / T$



Typ. output characteristics

$I_D = f(V_{DS})$

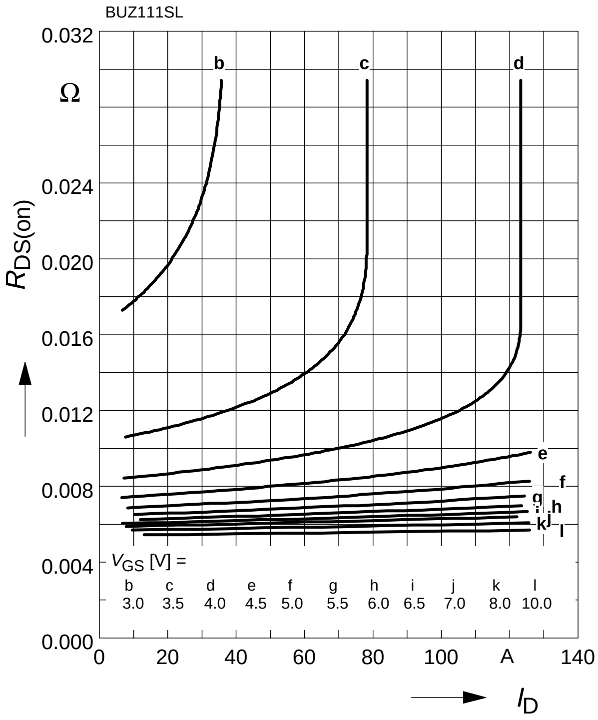
parameter: t_p = 80 µs



Typ. drain-source-on-resistance

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

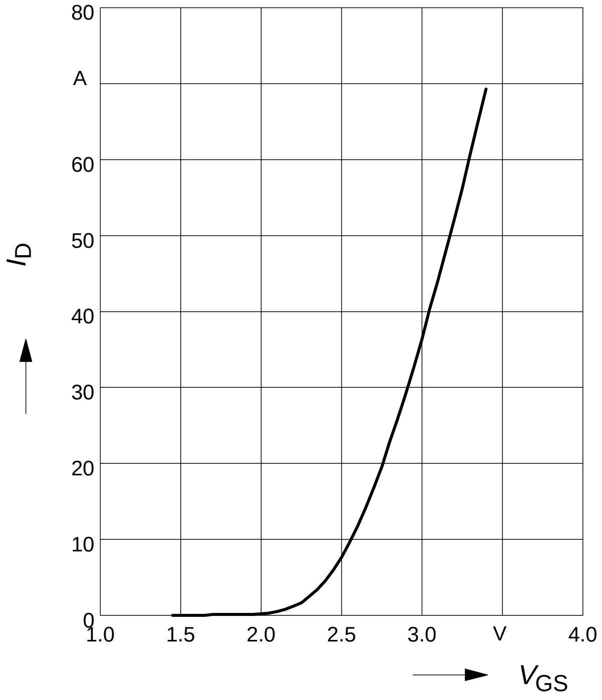
parameter: V_{GS}



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

parameter: t_p = 80 µs

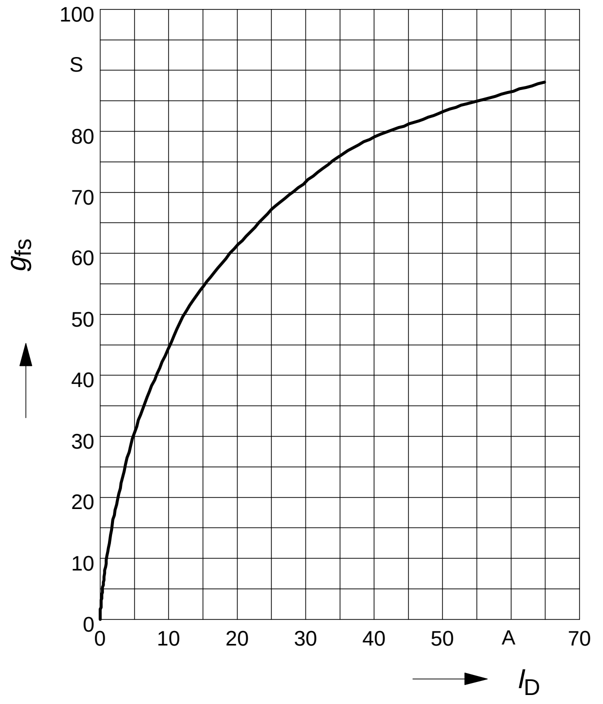
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Typ. forward transconductance

$g_{fs} = f(I_D)$; T_j = 25°C

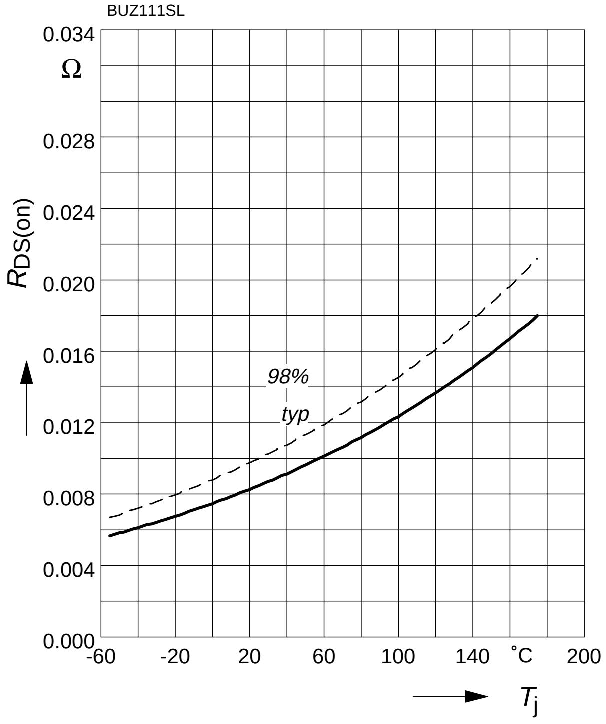
Parameter: g_{fs}



Drain-source on-resistance

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

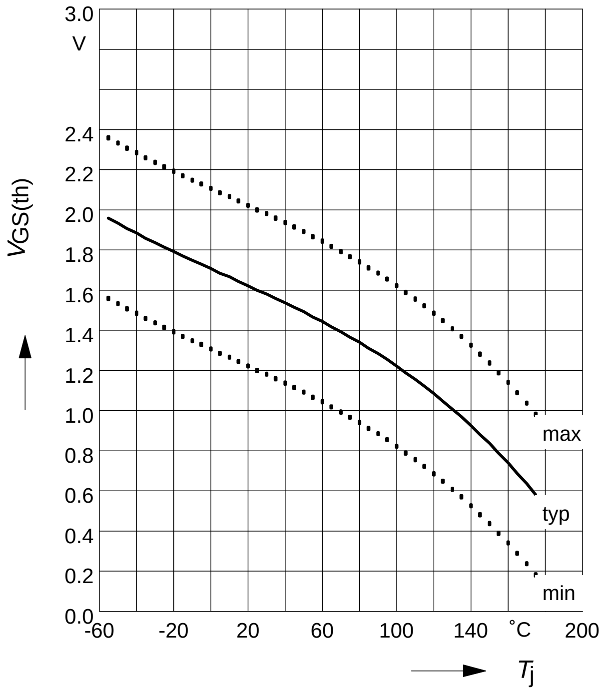
parameter : I_D = 80 A, V_{GS} = 4.5 V



Gate threshold voltage

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

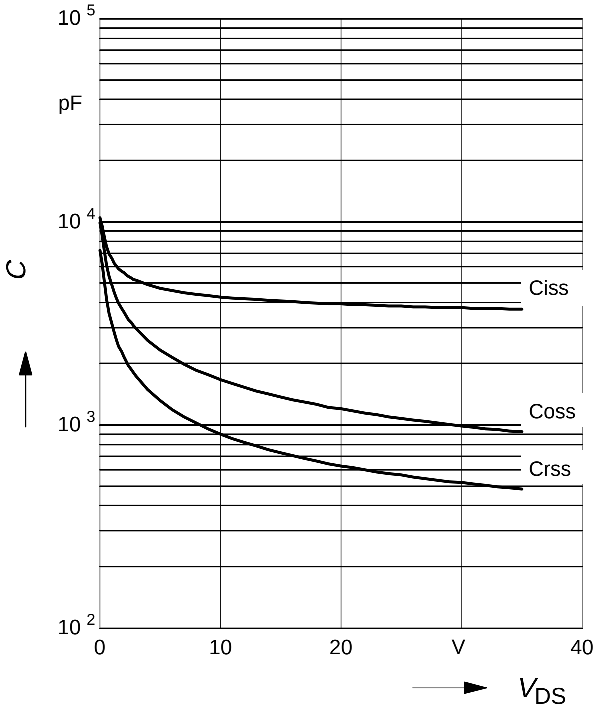
parameter : $V_{GS} = V_{DS}$, I_D = 240 µA



Typ. capacitances

$C = f(V_{DS})$

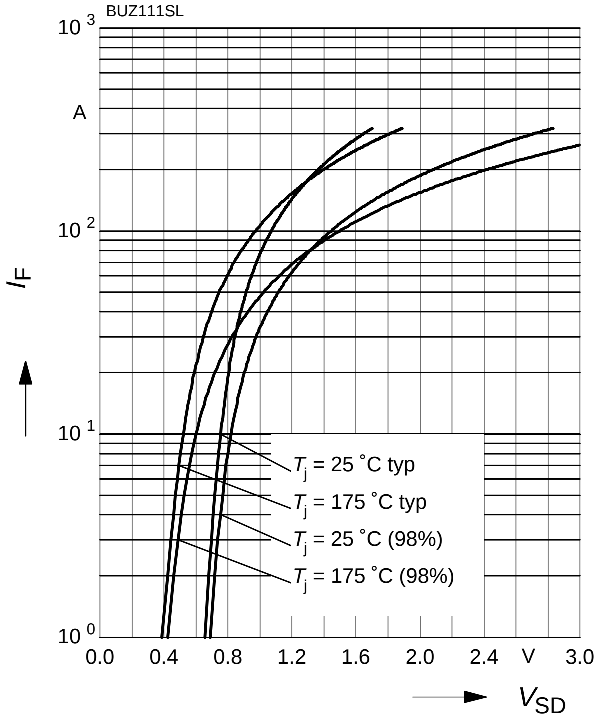
parameter: V_{GS} = 0 V, f = 1 MHz



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

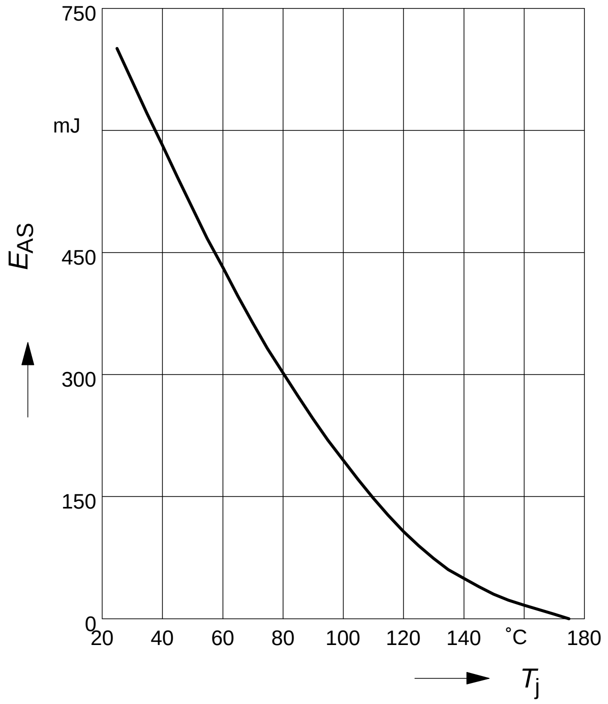
parameter: T_j , t_p = 80 µs



Avalanche Energy $E_{AS} = f\,(T_j)$

parameter: I_D = 80 A, V_{DD} = 25 V

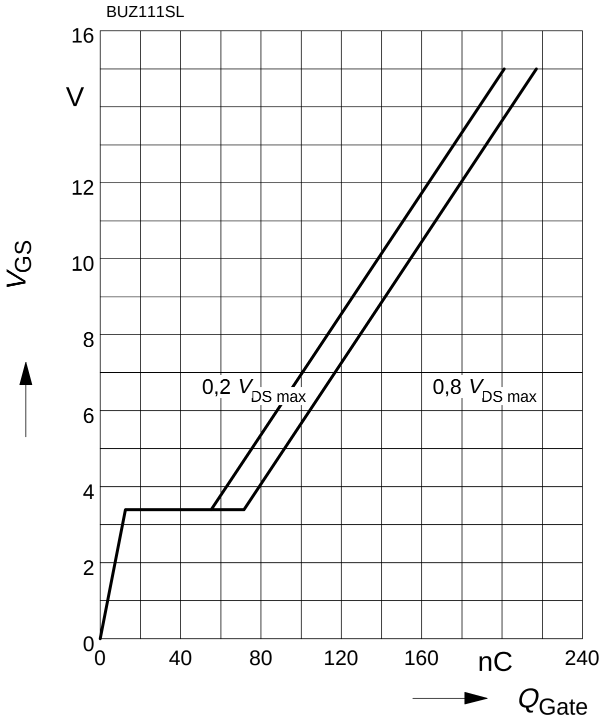
R_{GS} = 25 Ω



Typ. gate charge

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

parameter: $I_{D\ puls}$ = 80 A



Drain-source breakdown voltage

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