SIPMOS ® Power Transistor

- N channel

- Enhancement mode

- Logic Level

- Avalanche-rated

- dv/dt rated

- 175°C operating temperature

- also in SMD available

	Pin 1	Pin 2	Pin 3
	G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	Package	Ordering Code
BUZ 101 SL	55 V	20 A	0.07 Ω	TO-220 AB	Q67040-S4012-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current	I_D		A
T_C = 25 °C		20	
T_C = 100 °C		14	
Pulsed drain current	I_{Dpuls}		
T_C = 25 °C		80	
Avalanche energy, single pulse	E_{AS}		mJ
I_D = 20 A, V_{DD} = 25 V, R_{GS} = 25 Ω			
L = 450 µH, T_j = 25 °C		90	
Avalanche current,limited by T_{jmax}	I_{AR}	20	A
Avalanche energy,periodic limited by T_{jmax}	E_{AR}	5.5	mJ
Reverse diode dv/dt	dv/dt		kV/µs
I_S = 20 A, V_{DS} = 40 V, di_F/dt = 200 A/µs			
T_{jmax} = 175 °C		6	
Gate source voltage	V_{GS}	$\pm$ 14	V
Power dissipation	P_{tot}		W
T_C = 25 °C		55	

Maximum Ratings

Parameter	Symbol	Values	Unit
Operating temperature	T_j	-55 ... + 175	°C
Storage temperature	T_{stg}	-55 ... + 175	
Thermal resistance, junction - case	R_{thJC}	≤ 2.7	K/W
Thermal resistance, junction - ambient	R_{thJA}	≤ 62	
IEC climatic category, DIN IEC 68-1		55 / 175 / 56	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain- source breakdown voltage	$V_{(BR)DSS}$				V
V_{GS} = 0 V, I_D = 0.25 mA, T_j = 25 °C		55	-	-	
Gate threshold voltage	$V_{GS(th)}$				
V_{GS}=V_{DS}, I_D = 40 µA		1.2	1.6	2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS} = 50 V, V_{GS} = 0 V, T_j = -40 °C		-	-	0.1	
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	I_{GSS}				nA
V_{GS} = 20 V, V_{DS} = 0 V		-	10	100	
Drain-Source on-resistance	$R_{DS(on)}$				Ω
V_{GS} = 4.5 V, I_D = 14 A		-	0.057	0.07	
V_{GS} = 10 V, I_D = 14 A		-	0.034	0.04	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance	g_{fs}				S
$V_{DS} \geq 2 * I_D * R_{DS(on)max}$, I_D = 14 A		7	14	-	
Input capacitance	C_{iss}				pF
V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		-	560	700	
Output capacitance	C_{oss}				
V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		-	170	215	
Reverse transfer capacitance	C_{rss}				
V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		-	95	120	
Turn-on delay time	$t_{d(on)}$				ns
V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 20 A					
R_G = 10 Ω		-	15	25	
Rise time	t_r				
V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 20 A					
R_G = 10 Ω		-	35	55	
Turn-off delay time	$t_{d(off)}$				
V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 20 A					
R_G = 10 Ω		-	15	25	
Fall time	t_f				
V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 20 A					
R_G = 10 Ω		-	15	25	
Gate charge at threshold	$Q_{g(th)}$				nC
V_{DD} = 40 V, $I_D \geq$ 0.1 A, V_{GS} =0 to 1 V		-	0.8	1.2	
Gate charge at 5.0 V	$Q_{g(5)}$				
V_{DD} = 40 V, I_D = 20 A, V_{GS} =0 to 5 V		-	15	23	
Gate charge total	$Q_{g(total)}$				
V_{DD} = 40 V, I_D = 20 A, V_{GS} =0 to 10 V		-	24	36	
Gate plateau voltage	$V_{(plateau)}$				V
V_{DD} = 40 V, I_D = 20 A		-	4.06	-	

Electrical Characteristics, at T_j = 25°C, unless otherwise specified
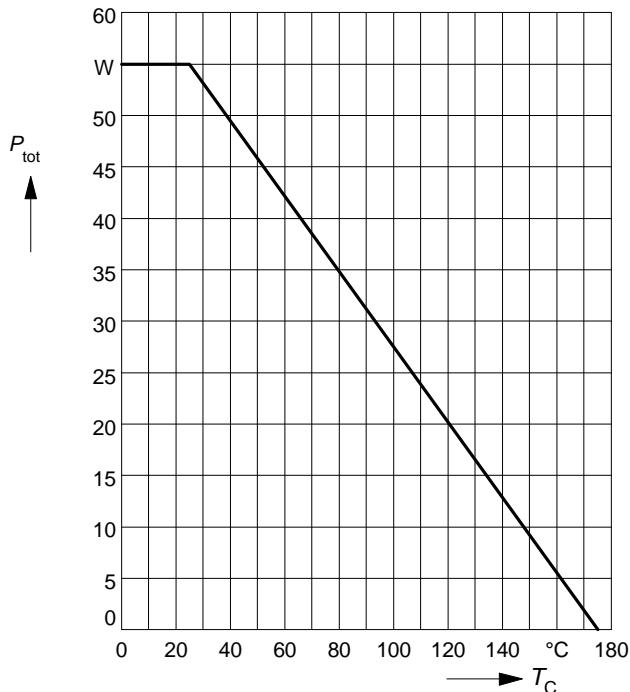
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current T_C = 25 °C	I_S	-	-	20	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	80	
Inverse diode forward voltage V_{GS} = 0 V, I_F = 40 A	V_{SD}	-	1.12	1.8	V
Reverse recovery time V_R = 30 V, $I_F=I_S$, di_F/dt = 100 A/µs	t_{rr}	-	50	75	ns
Reverse recovery charge V_R = 30 V, $I_F=I_S$, di_F/dt = 100 A/µs	Q_{rr}	-	0.12	0.18	µC
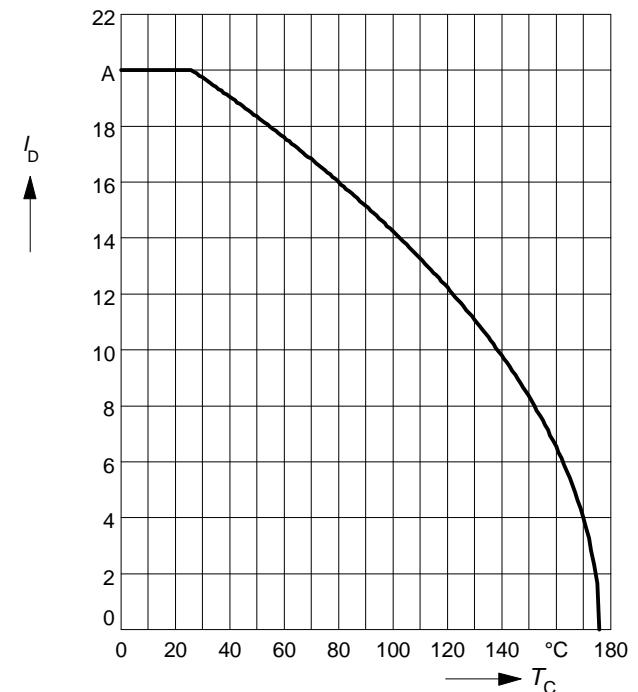
Power dissipation
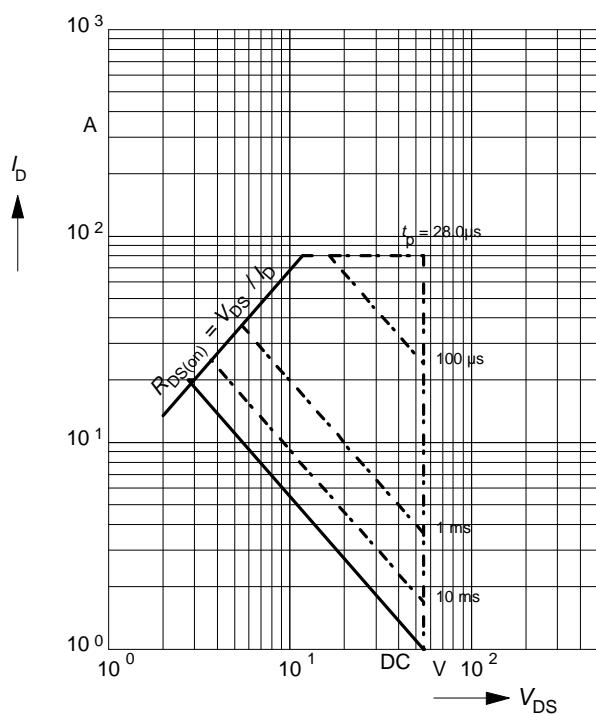
$P_{tot} = f(T_C)$

Drain current
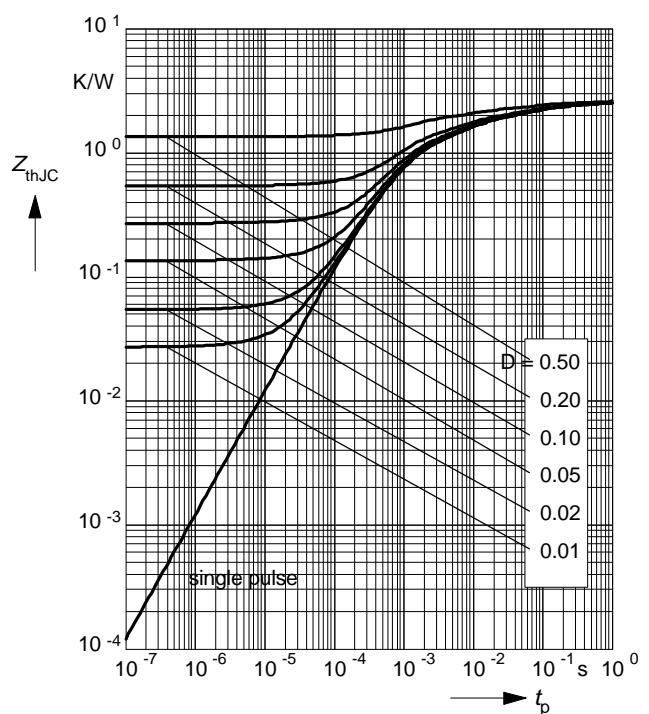
$I_D = f(T_C)$
parameter: $V_{GS} \geq 4$ V

Safe operating area

$I_D = f(V_{DS})$
parameter: $D = 0.01$, $T_C = 25°C$

Transient thermal impedance
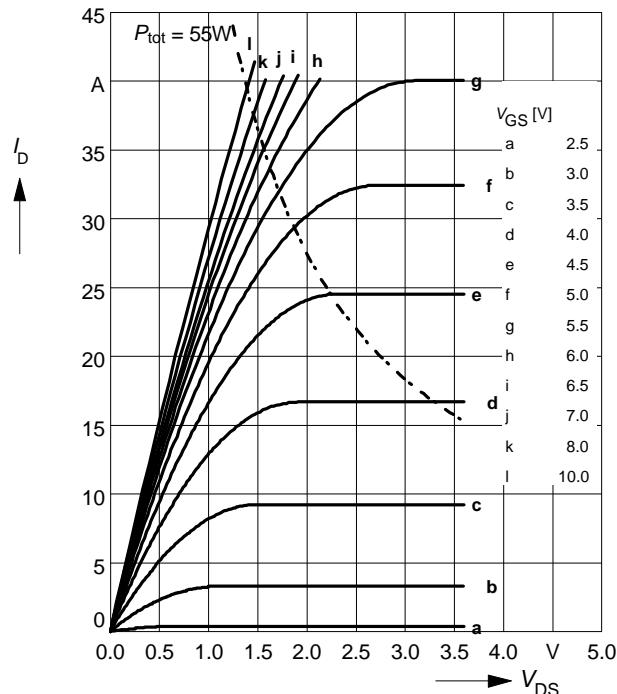
$Z_{th\,JC} = f(t_p)$
parameter: $D = t_p / T$

Typ. output characteristics
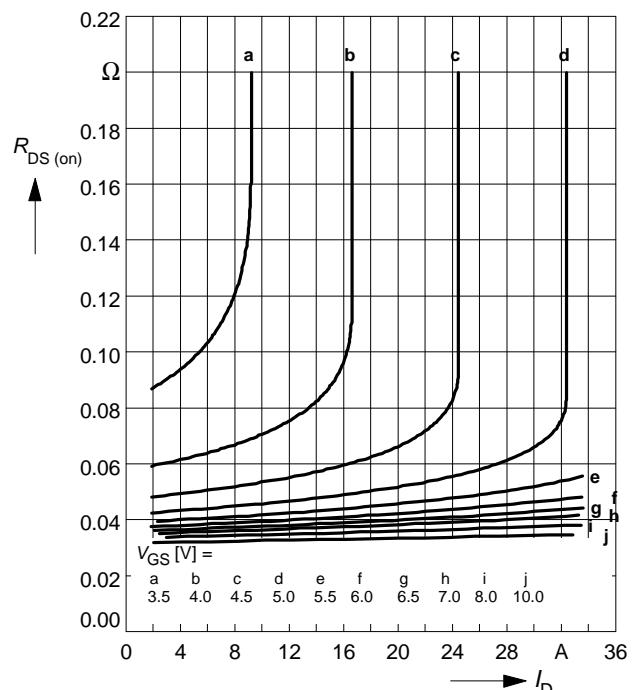
$I_D = f(V_{DS})$
parameter: $t_p = 80\ \mu s$, $T_j = 25\ °C$

## Typ. drain-source on-resistance
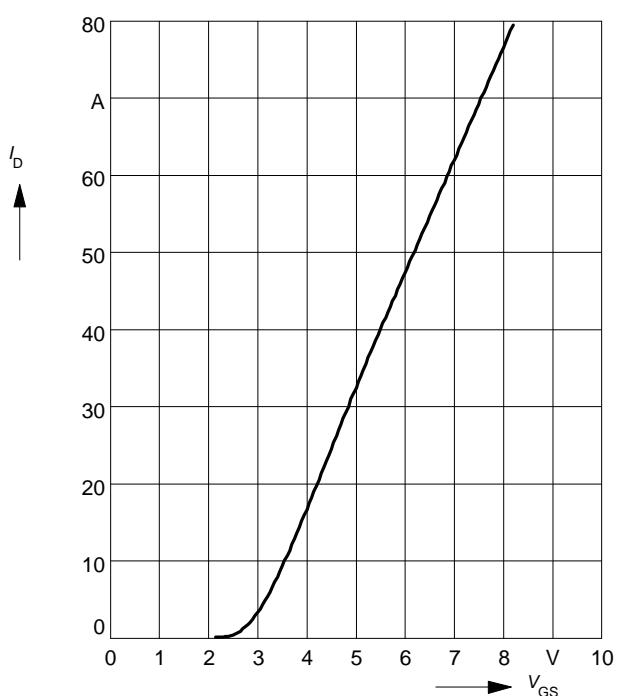
$R_{DS\ (on)} = f(I_D)$
parameter: $t_p = 80\ \mu s$, $T_j = 25\ °C$

Typ. transfer characteristics $I_D = f(V_{GS})$
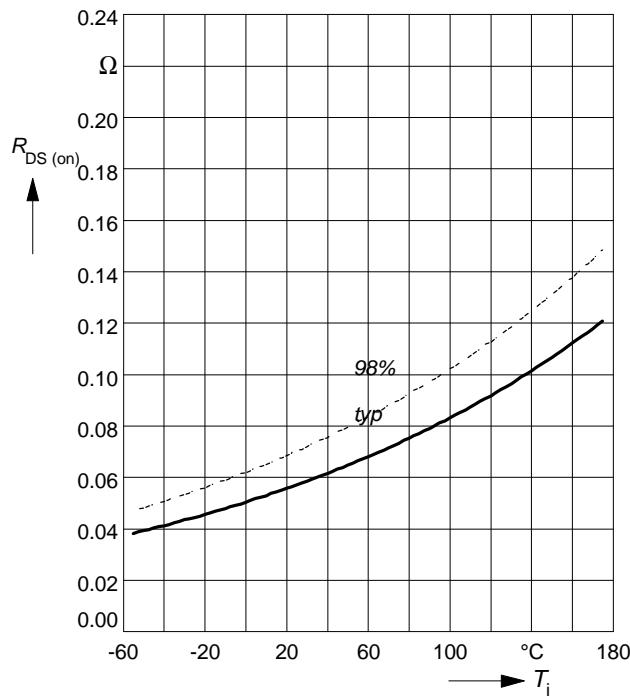
parameter: $t_p = 80\ \mu s$

$V_{DS} \geq 2\ x\ I_D\ x\ R_{DS(on)max}$
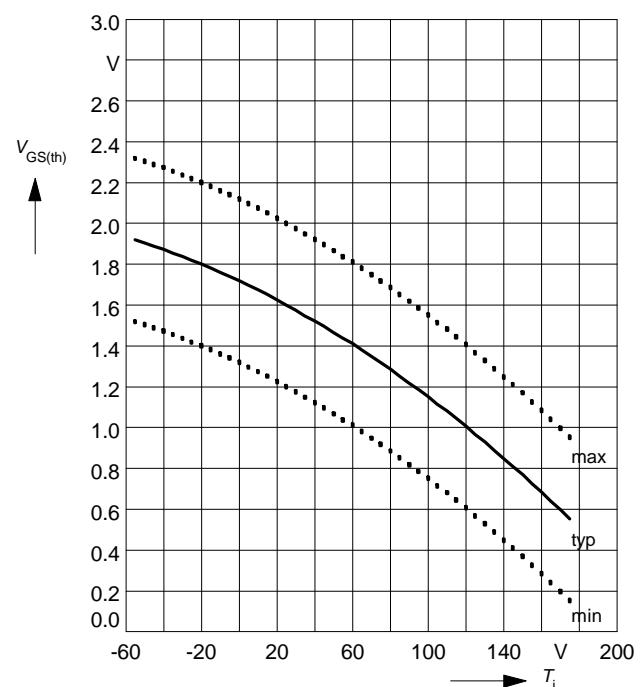
Drain-source on-resistance

$R_{DS\,(on)} = f(T_j)$
parameter: $I_D = 14$ A, $V_{GS} = 4.5$ V
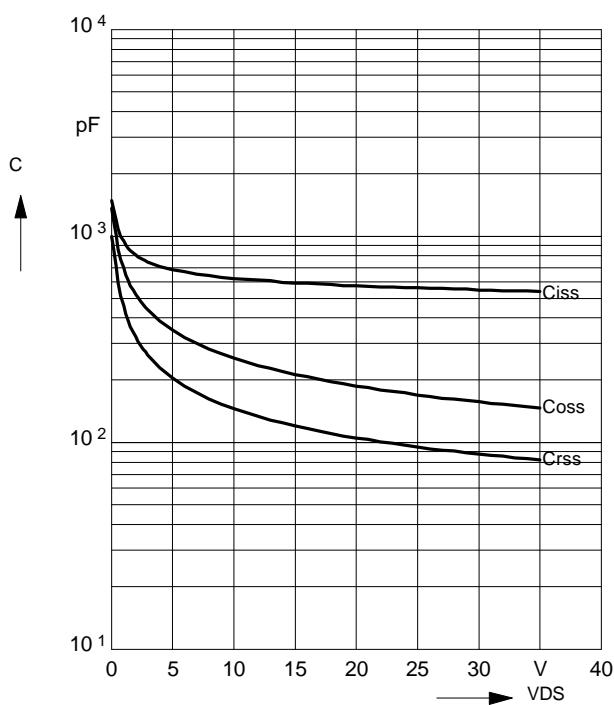

Gate threshold voltage

$V_{GS(th)} = f(T_j)$
parameter: $V_{GS} = V_{DS}, I_D = 40\mu A$
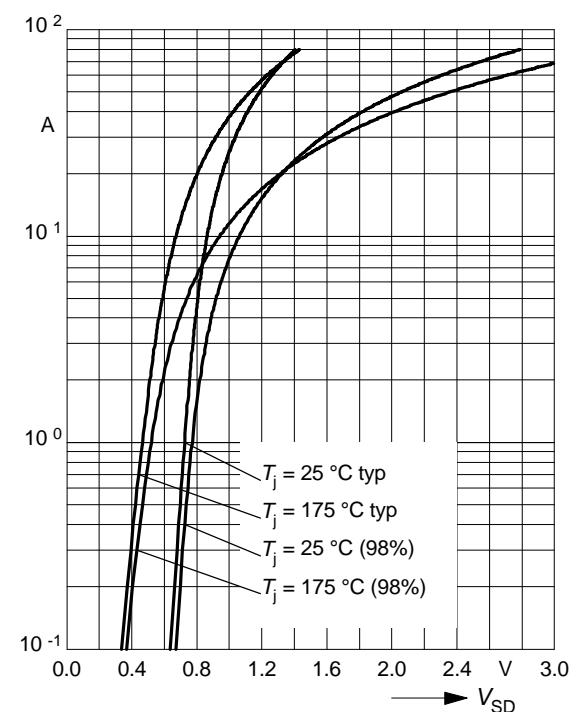

Typ. capacitances

$C = f(V_{DS})$
parameter: $V_{GS} = 0V$, $f = 1MHz$

Forward characteristics of reverse diode
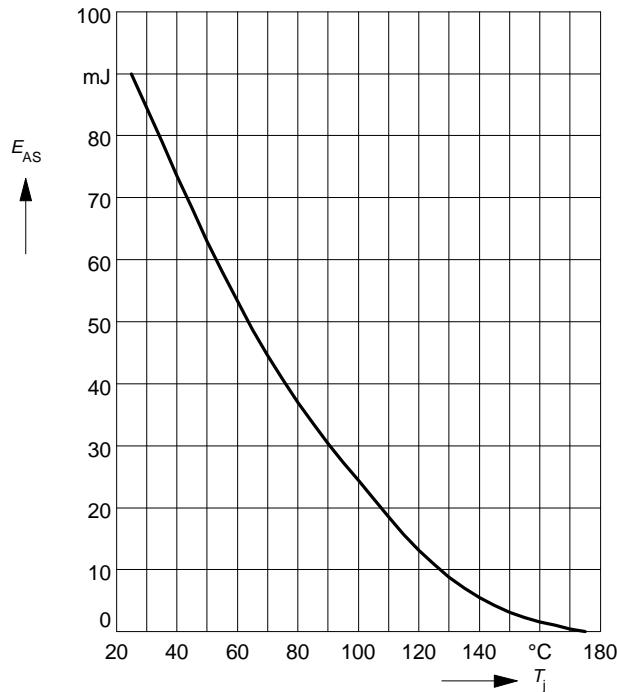
$I_F = f(V_{SD})$
parameter: T_j, $t_p = 80$ µs

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

parameter: I_D=20A, V_{DD} =25 V
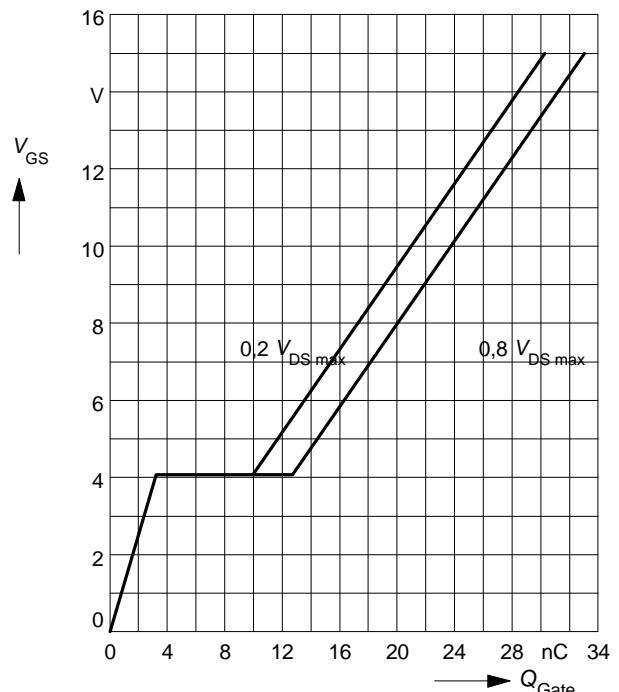
R_{GS} =25 Ω , L = 450µH

Typ. gate charge

$V_{GS} = f(Q_{Gate})$
parameter: $I_{D\,puls}$ = 20 A

Drain-source breakdown voltage

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