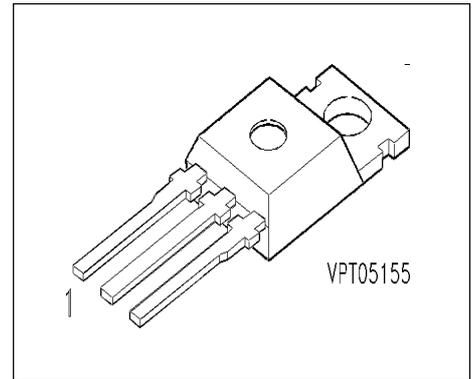# SIEMENS

SIPMOS ® Power Transistor

- N channel
- Enhancement mode
- Avalanche-rated
- Logic Level
- dv/dt rated
- Low on-resistance
- 175 °C operating temperature
- also in TO-220 SMD available

VPT05155

	Pin 1	Pin 2	Pin 3
	G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	Package	Ordering Code
BUZ 101L	50 V	29 A	0.06 Ω	TO-220 AB	C67078-S1355-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current $T_C = 31$ °C	I_D	29	A
Pulsed drain current $T_C = 25$ °C	I_{Dpuls}	116	
Avalanche energy, single pulse $I_D = 29$ A, $V_{DD} = 25$ V, $R_{GS} = 25$ Ω $L = 83$ µH, $T_j = 25$ °C	E_{AS}	70	mJ
Reverse diode dv/dt $I_S = 29$ A, $V_{DS} = 40$ V, di_F/d$t = 200$ A/µs $T_{jmax} = 175$ °C	dv/dt	6	kV/µs
Gate source voltage	V_{GS}	± 14	V
Gate-source peak voltage, aperiodic	V_{gs}	± 20	
Power dissipation $T_C = 25$ °C	P_{tot}	100	W

Maximum Ratings

Parameter	Symbol	Values	Unit
Operating temperature	T_j	-55 ... + 175	°C
Storage temperature	T_{stg}	-55 ... + 175	
Thermal resistance, chip case	R_{thJC}	≤ 1.5	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 / 175 / 56	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Static Characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Drain- source breakdown voltage	$V_{(BR)DSS}$				V
$V_{GS} = 0$ V, $I_D = 0.25$ mA, $T_j = -40$ °C		50	-	-	
Gate threshold voltage	$V_{GS(th)}$				
$V_{GS} = V_{DS}$, $I_D = 1$ mA		1.2	1.6	2	
Zero gate voltage drain current	I_{DSS}				
$V_{DS} = 50$ V, $V_{GS} = 0$ V, $T_j = 25$ °C		-	0.1	1	µA
$V_{DS} = 50$ V, $V_{GS} = 0$ V, $T_j = -40$ °C		-	1	100	nA
$V_{DS} = 50$ V, $V_{GS} = 0$ V, $T_j = 150$ °C		-	10	100	µA
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
$V_{GS} = 5$ V, $I_D = 14.5$ A		-	0.045	0.06	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}$, $I_D = 14.5$ A	g_{fs}	7	17	-	S
Input capacitance $V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1$ MHz	C_{iss}	-	720	960	pF
Output capacitance $V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1$ MHz	C_{oss}	-	220	330	
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	-	95	140	
Turn-off delay time $V_{DD} = 30$ V, $V_{GS} = 5$ V, $I_D = 3$ A $R_{GS} = 50$ Ω	$t_{d(off)}$	-	140	190	
Fall time $V_{DD} = 30$ V, $V_{GS} = 5$ V, $I_D = 3$ A $R_{GS} = 50$ Ω	t_f	-	85	115	

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	-	-	29	A
Inverse diode direct current,pulsed $T_C = 25 °C$	I_{SM}	-	-	116	
Inverse diode forward voltage $V_{GS} = 0$ V, $I_F = 58$ A	V_{SD}	-	1.2	2	V
Reverse recovery time $V_R = 30$ V, $I_{F=}I_S$, $di_F/dt = 100$ A/µs	t_{rr}	-	50	-	ns
Reverse recovery charge $V_R = 30$ V, $I_{F=}I_S$, $di_F/dt = 100$ A/µs	Q_{rr}	-	70	-	µC

Power dissipation

$P_{tot} = f(T_C)$
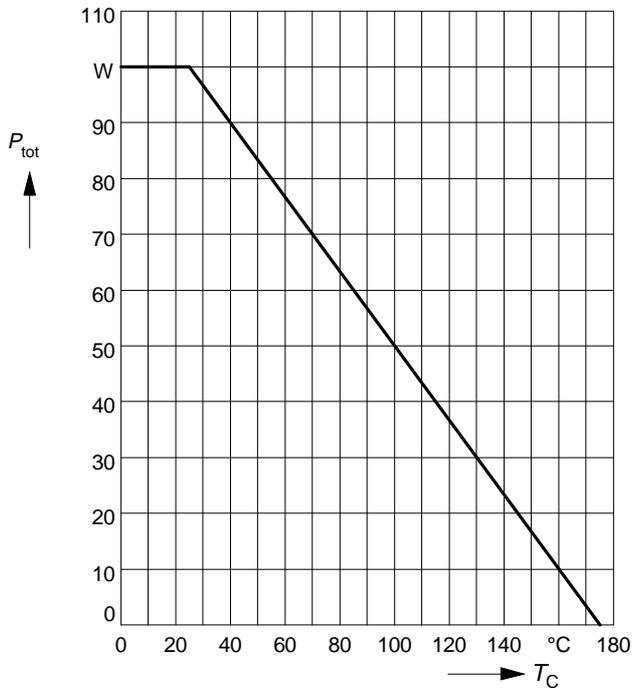
Drain current

$I_D = f(T_C)$
parameter: $V_{GS} \geq 5$ V
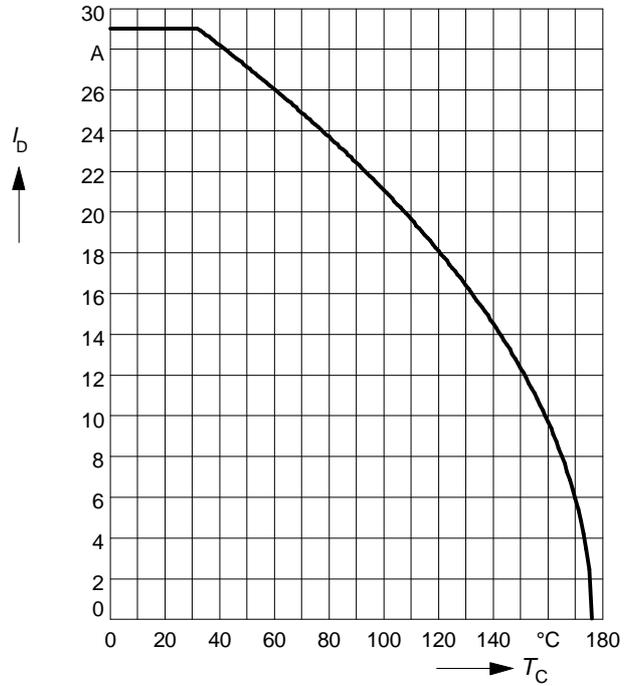
Safe operating area

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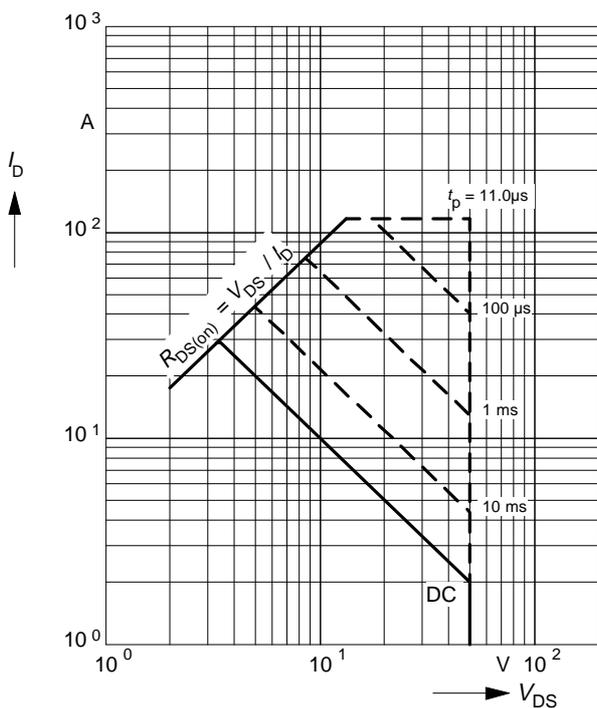
Transient thermal impedance

$Z_{th\ JC} = f(t_p)$
parameter: $D = t_p / T$
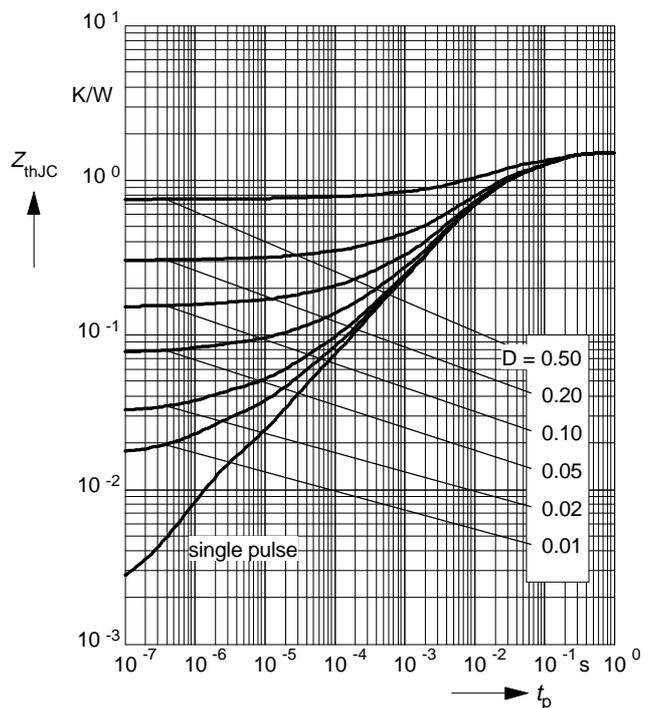
Typ. output characteristics

$I_D = f(V_{DS})$

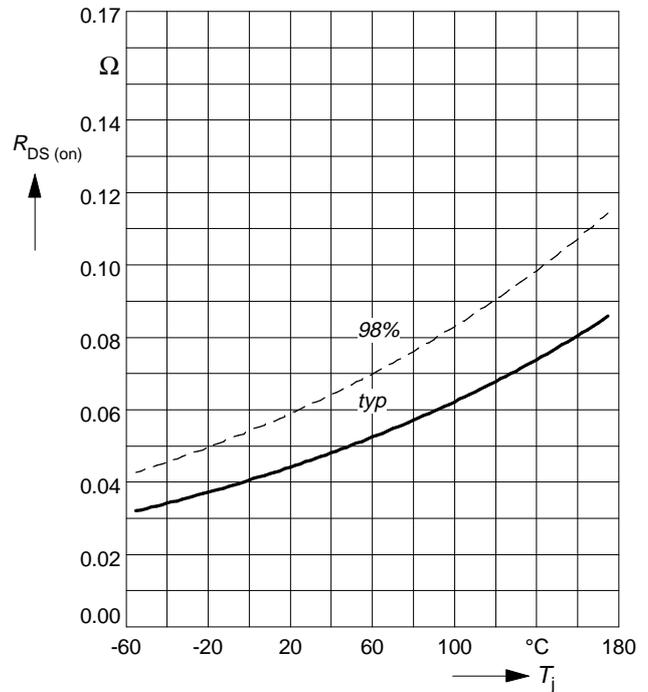parameter: $t_p = 80$ µs

V_{GS} [V]	
a	2.0
b	2.5
c	3.0
d	3.5
e	4.0
f	4.5
g	5.0
h	5.5
i	6.0
j	7.0
k	8.0
l	10.0
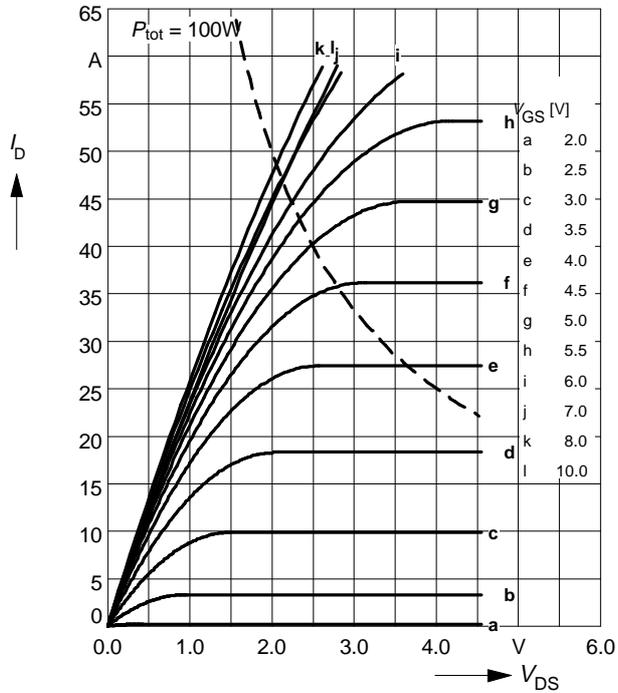
Drain-source on-resistance

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

parameter: $I_D = 14.5$ A, $V_{GS} = 5$ V

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

parameter: $t_p = 80$ µs

$V_{DS} \geq 2$ x I_D x $R_{DS(on)max}$
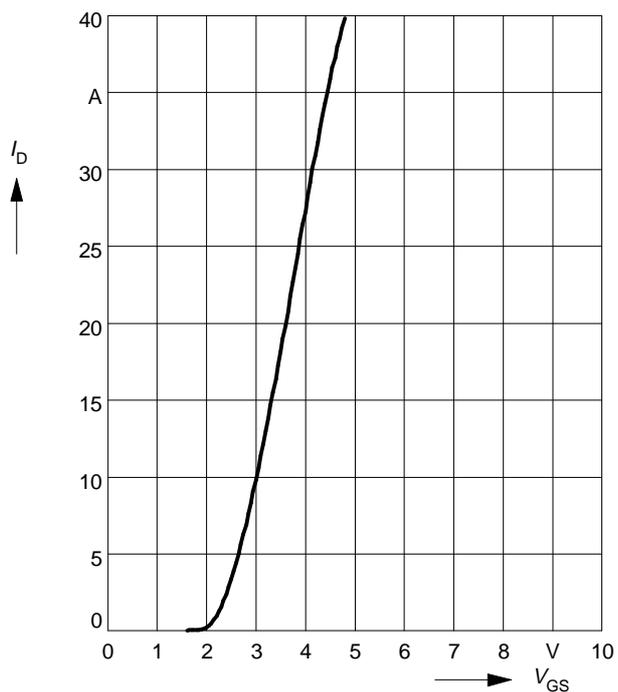
Typ. forward transconductance $g_{fs} = f(I_D)$

parameter: $t_p = 80$ µs,

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

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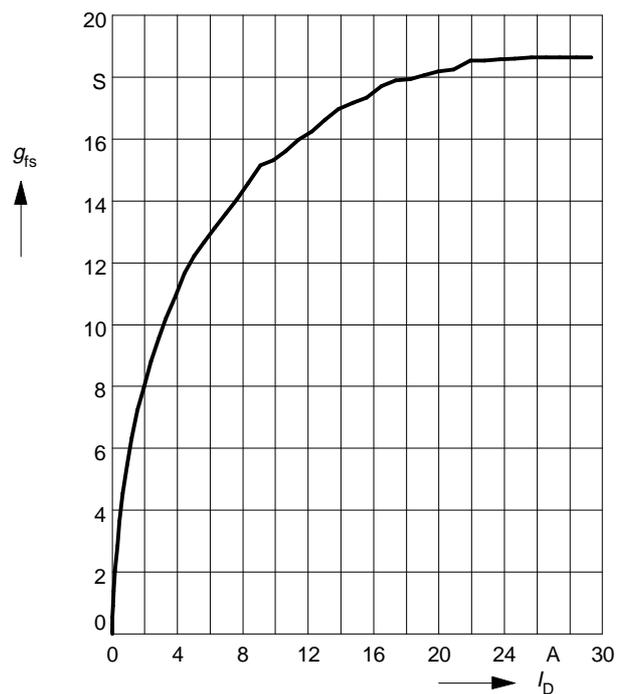
Typ. drain-source on-resistance

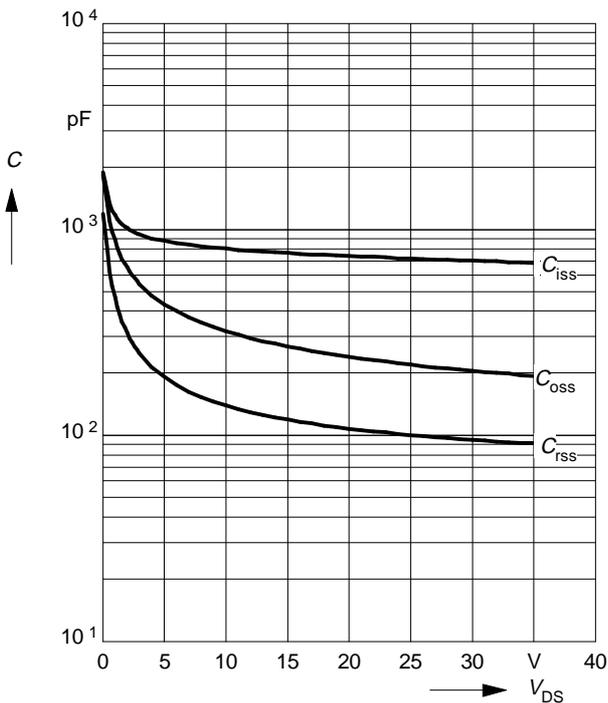$R_{DS\,(on)} = f(I_D)$
parameter: V_{GS}
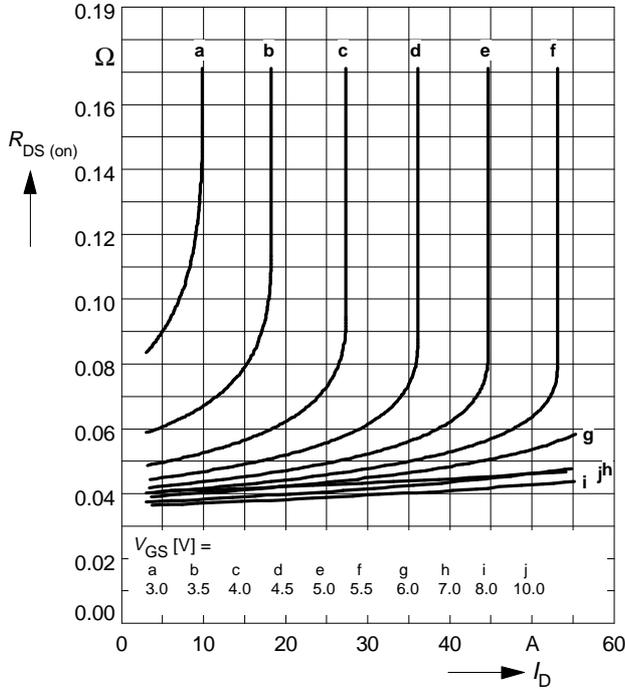
Gate threshold voltage

$V_{GS\,(th)} = f(T_j)$
parameter: $V_{GS} = V_{DS}$, $I_D = 1\,mA$
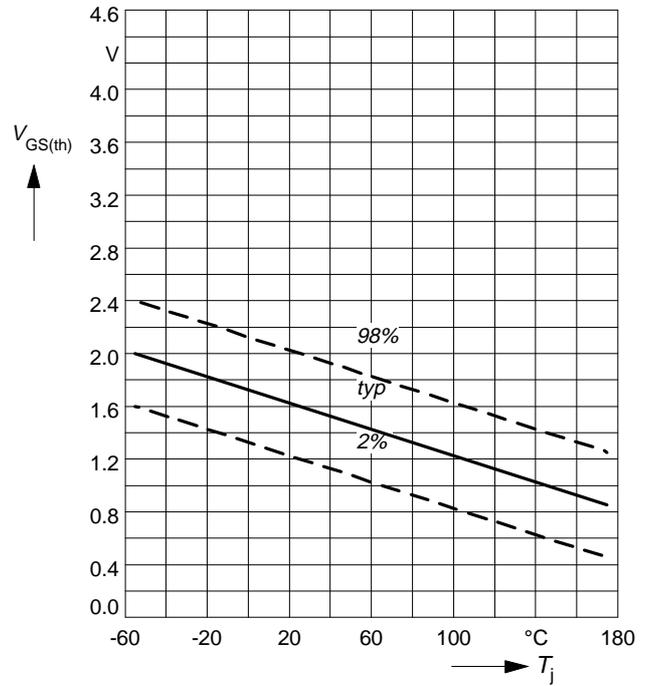
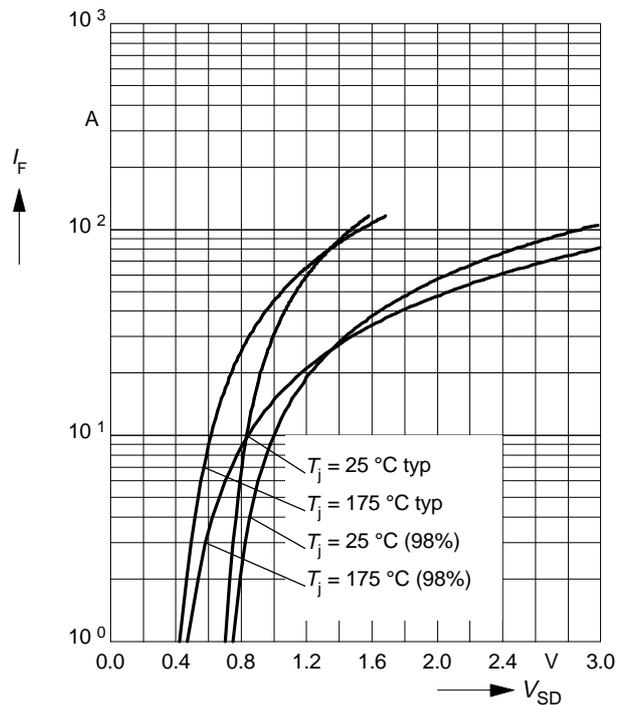## Typ. capacitances

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

Forward characteristics of reverse diode

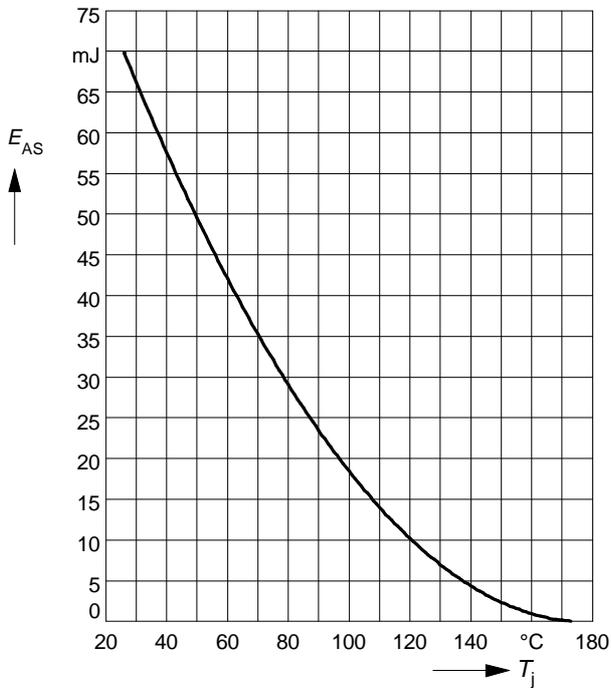$I_F = f(V_{SD})$
parameter: T_j, $t_p = 80\,µs$

Avalanche energy $E_{AS} = f(T_j)$
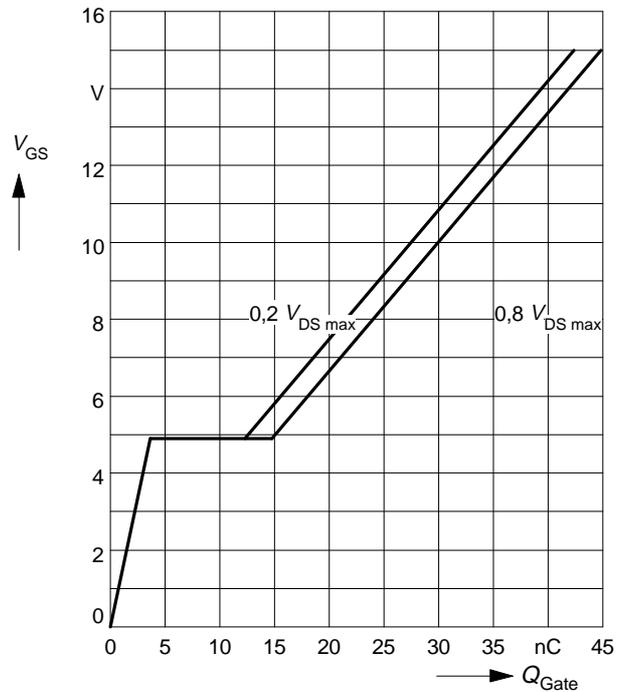
parameter: $I_D = 29$ A, $V_{DD} = 25$ V

$R_{GS} = 25$ Ω, $L = 83$ μH
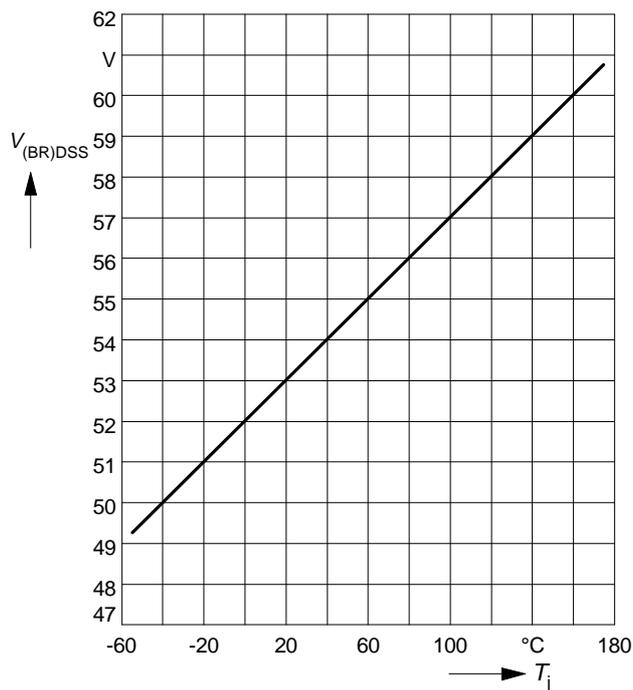
Typ. gate charge

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

parameter: $I_{D\,puls} = 44$ A

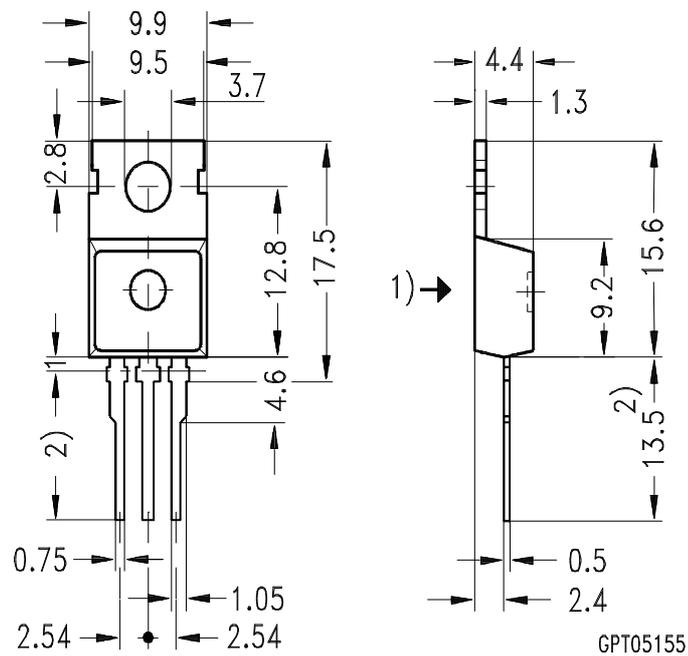**Drain-source breakdown voltage**

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

SIEMENS

BUZ 101L

Package Outlines

TO-220 AB

Dimension in mm

1) punch direction, burr max. 0.04

2) dip tinning

3) max. 14.5 by dip tinning press burr max. 0.05

Semiconductor Group 9 07/96