SIEMENS

SIPMOS ® Power Transistor

- N channel
- Enhancement mode
- Avalanche-rated
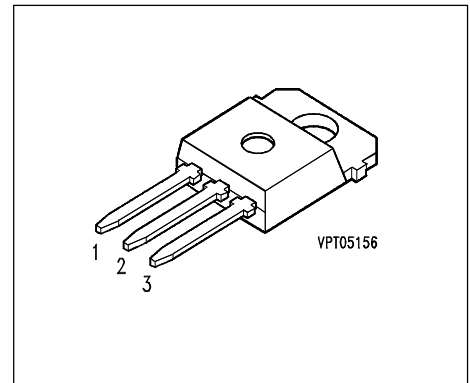
	Pin 1	Pin 2	Pin 3
	G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	Package	Ordering Code
BUZ 330	500 V	9.5 A	0.6 Ω	TO-218 AA	C67078-S3105-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current $T_C = 28\ °C$	I_D	9.5	A
Pulsed drain current $T_C = 25\ °C$	I_{Dpuls}	38	
Avalanche current, limited by T_{jmax}	I_{AR}	9.5	
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	13	mJ
Avalanche energy, single pulse $I_D = 9.5\ A,\ V_{DD} = 50\ V,\ R_{GS} = 25\ \Omega$ $L = 13.4\ mH,\ T_j = 25\ °C$	E_{AS}	670	
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25\ °C$	P_{tot}	125	W
Operating temperature	T_j	-55 ... + 150	°C
Storage temperature	T_{stg}	-55 ... + 150	
Thermal resistance, chip case	R_{thJC}	≤ 1	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	$V_{(BR)DSS}$	500	-	-	V
Gate threshold voltage $V_{GS} = V_{DS}$, $I_D = 1$ mA	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current $V_{DS} = 500$ V, $V_{GS} = 0$ V, $T_j = 25$ °C $V_{DS} = 500$ 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 $V_{GS} = 10$ V, $I_D = 6$ A	$R_{DS(on)}$	-	0.45	0.6	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 = 6 A	g_{fs}	5	9.3	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	1700	2300	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}	-	95	140	
Turn-on delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A R_{GS} = 50 Ω	$t_{d(on)}$	-	23	45	ns
Rise time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A R_{GS} = 50 Ω	t_r	-	95	145	
Turn-off delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A R_{GS} = 50 Ω	$t_{d(off)}$	-	340	450	
Fall time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A R_{GS} = 50 Ω	t_f	-	110	150	

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	-	-	9.5	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	38	
Inverse diode forward voltage V_{GS} = 0 V, I_F = 19 A	V_{SD}	-	1	1.4	V
Reverse recovery time V_R = 100 V, $I_{F=}I_S$, di_F/dt = 100 A/µs	t_{rr}	-	400	-	ns
Reverse recovery charge V_R = 100 V, $I_{F=}I_S$, di_F/dt = 100 A/µs	Q_{rr}	-	6	-	µC

Power dissipation

$P_{tot} = f(T_C)$

Drain current

$I_D = f(T_C)$
parameter: $V_{GS} \geq 10$ V
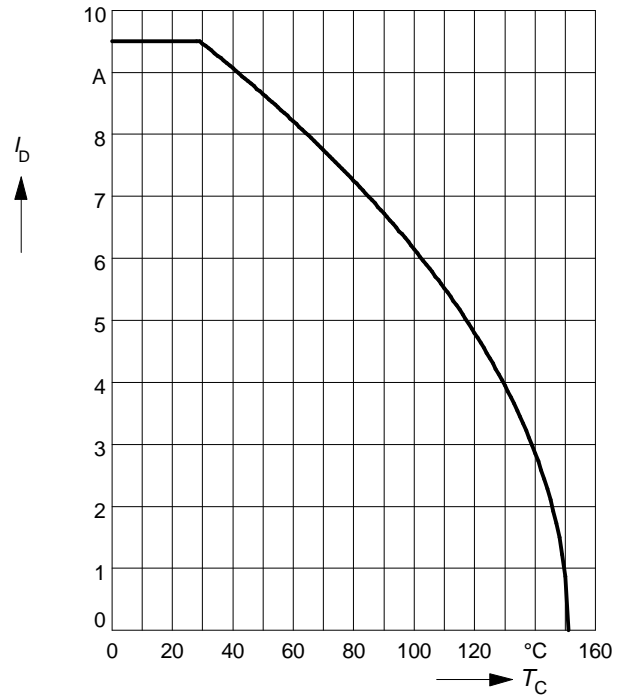
Safe operating area

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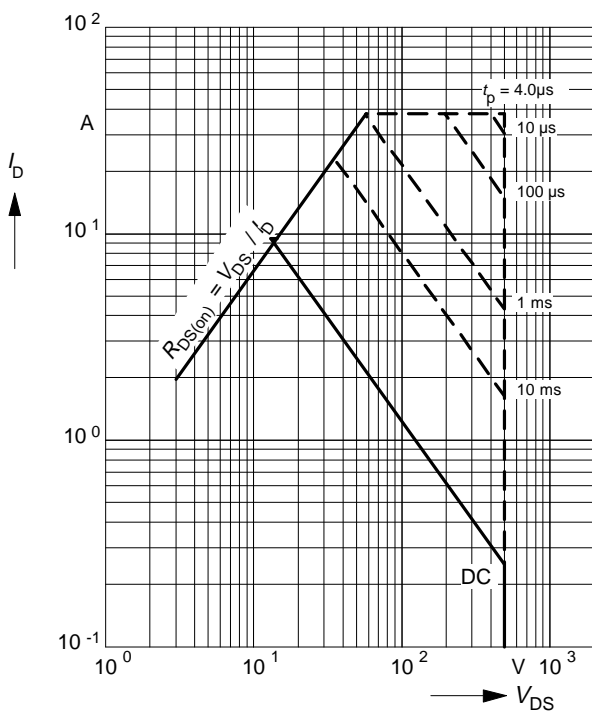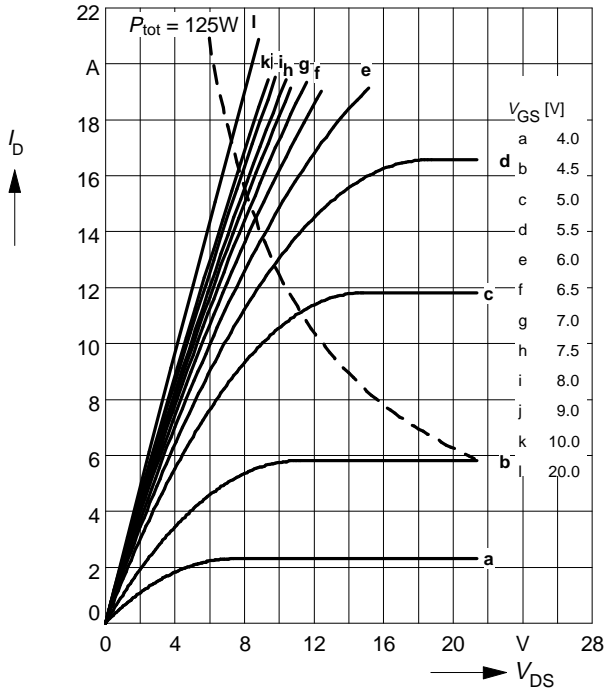

Transient thermal impedance

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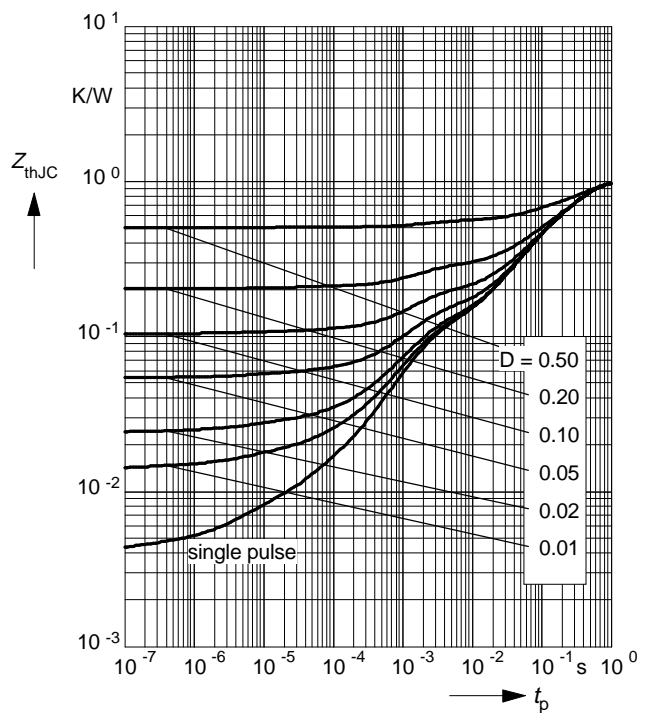
Typ. output characteristics

$I_D = f(V_{DS})$
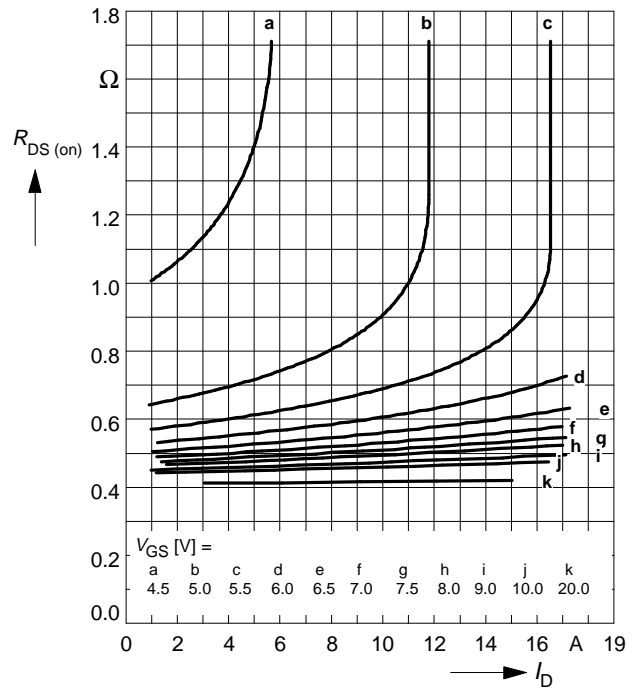parameter: t_p = 80 µs

V_{GS} [V]	
a	4.0
b	4.5
c	5.0
d	5.5
e	6.0
f	6.5
g	7.0
h	7.5
i	8.0
j	9.0
k	10.0
l	20.0

Typ. drain-source on-resistance

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

V_{GS} [V] =

a	b	c	d	e	f	g	h	i	j	k
4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	9.0	10.0	20.0

Typ. transfer characteristics $I_D = f(V_{GS})$
parameter: t_p = 80 µs
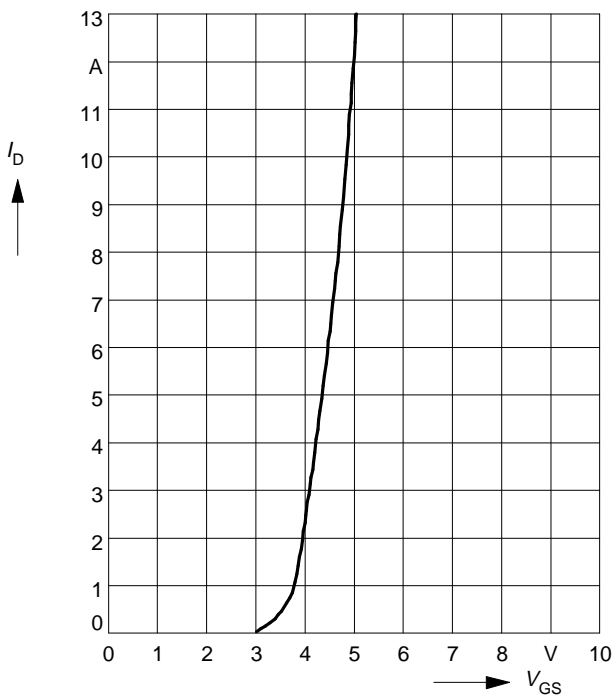
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: t_p = 80 µs,

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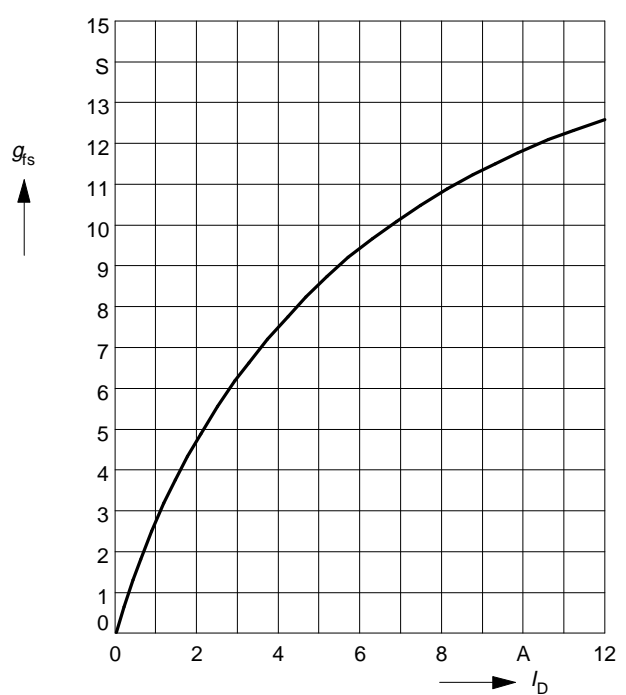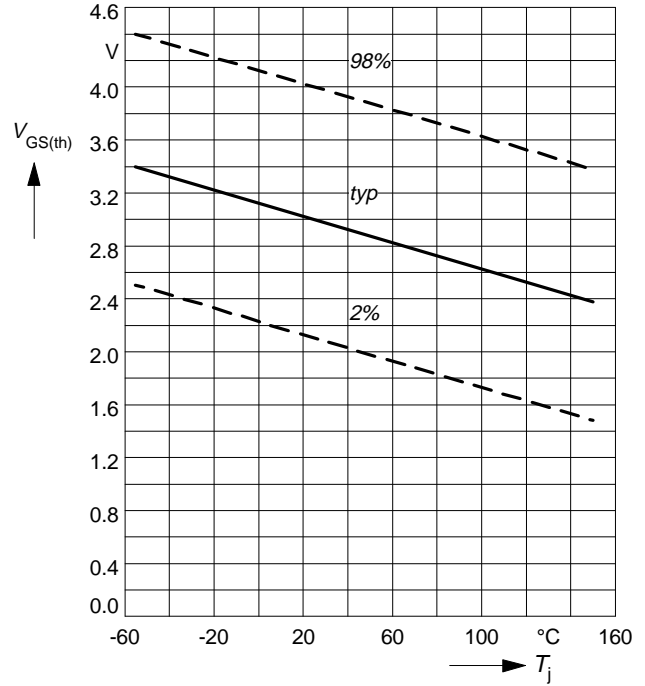
Drain-source on-resistance

$R_{DS\,(on)} = f(T_j)$
parameter: I_D = 6 A, V_{GS} = 10 V
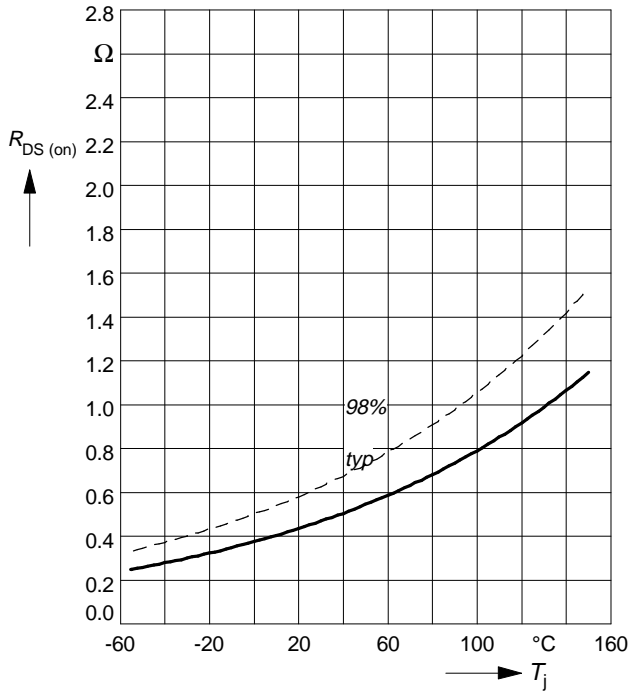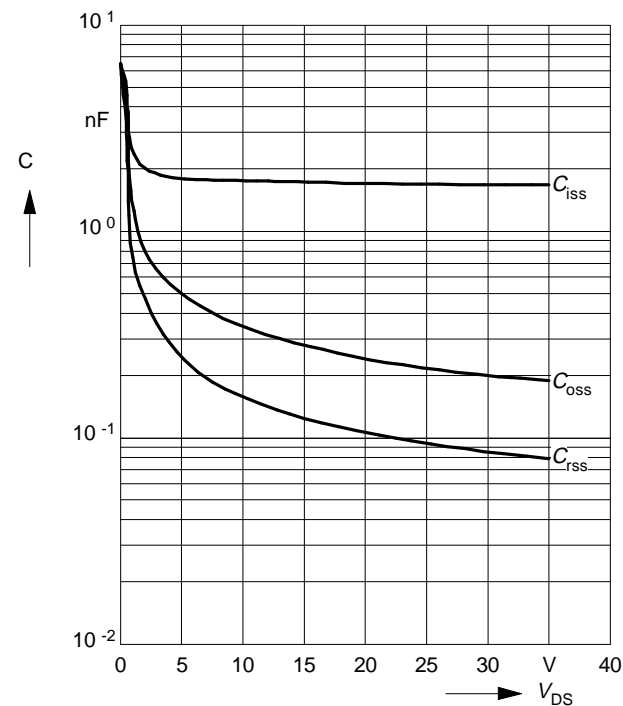

Gate threshold voltage

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

Typ. capacitances

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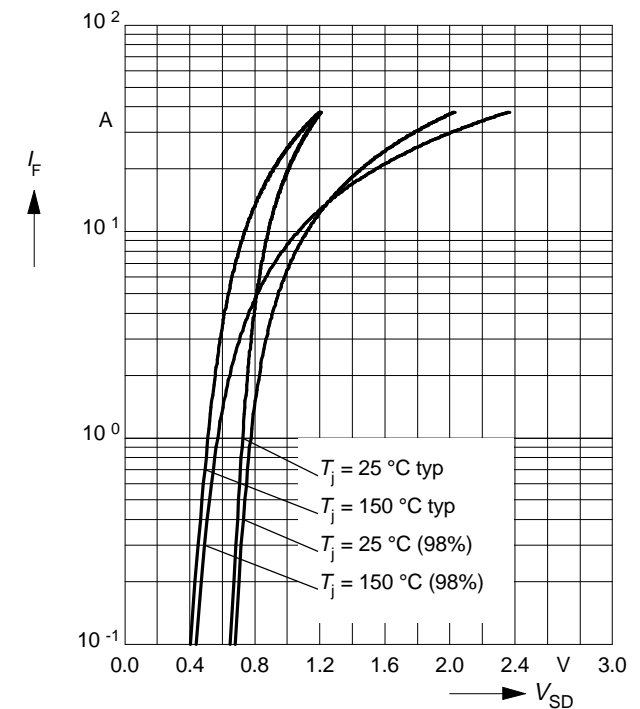parameter: V_{GS} = 0V, f = 1MHz

Forward characteristics of reverse diode

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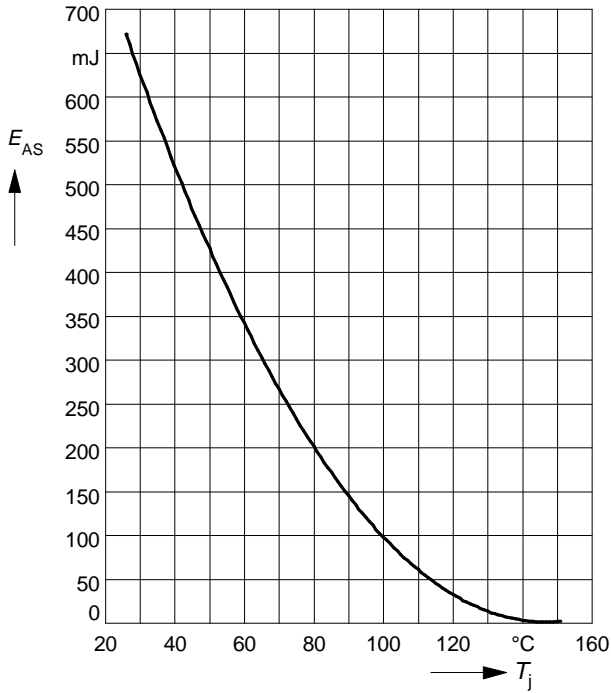parameter: T_j, t_p = 80 μs

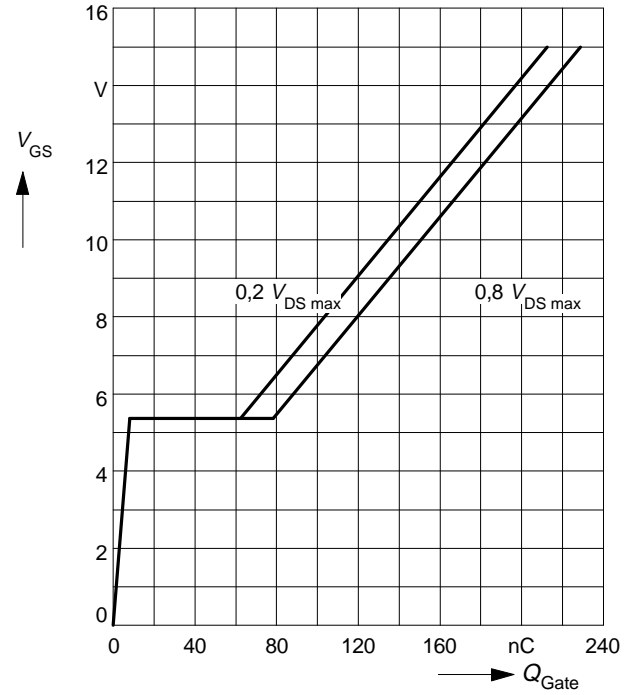**Avalanche energy** $E_{AS} = f(T_j)$
parameter: I_D = 9.5 A, V_{DD} = 50 V
R_{GS} = 25 Ω, L = 13.4 mH

Typ. gate charge
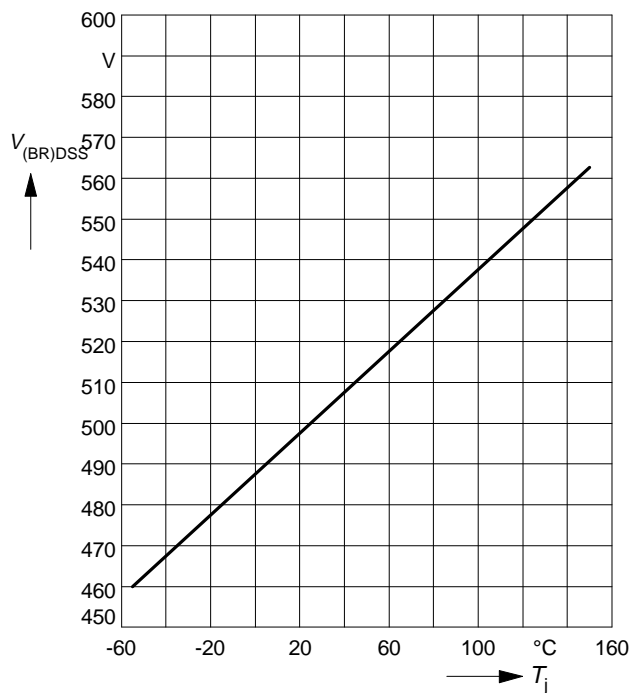$V_{GS} = f(Q_{Gate})$
parameter: $I_{D\,puls}$ = 14 A

Drain-source breakdown voltage

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

07/96

Package Outlines

TO-218 AA

Dimension in mm

GPT05156

1) punch direction, burr max. 0.04
2) dip tinning
3) max. 15.5 by dip tinning press burr max. 0.05