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SIPMOS ® Power Transistor

• N channel

• Enhancement mode

• Avalanche-rated

VPT05155
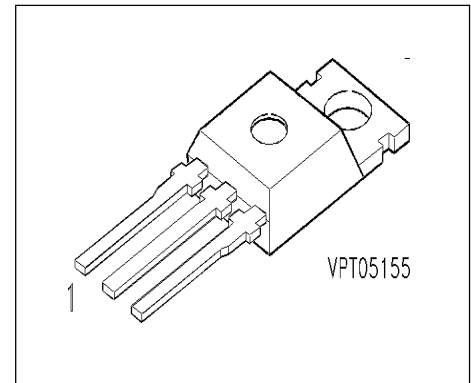
Pin 1	Pin 2	Pin 3
G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	Package	Ordering Code
BUZ 30A	200 V	21 A	0.13 Ω	TO-220 AB	C67078-S1303-A3

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current $T_C = 26\ °C$	I_D	21	A
Pulsed drain current $T_C = 25\ °C$	I_{Dpuls}	84	
Avalanche current, limited by T_{jmax}	I_{AR}	21	
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	12	mJ
Avalanche energy, single pulse $I_D = 21$ A, $V_{DD} = 50$ V, $R_{GS} = 25\ \Omega$ $L = 1.53$ mH, $T_j = 25\ °C$	E_{AS}	450	
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	$V_{(BR)DSS}$	200	-	-	V
Gate threshold voltage $V_{GS} = V_{DS,}$ $I_D = 1$ mA	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current $V_{DS} = 200$ 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 $V_{GS} = 10$ V, $I_D = 13.5$ A	$R_{DS(on)}$	-	0.1	0.13	Ω

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

Parameter	Symbol	Values			Unit
		min.	**typ.**	**max.**	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}$, $I_D = 13.5$ A	g_{fs}	6	15	-	S
Input capacitance $V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1$ MHz	C_{iss}	-	1400	1900	pF
Output capacitance $V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1$ MHz	C_{oss}	-	280	400	
Reverse transfer capacitance $V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1$ MHz	C_{rss}	-	130	200	
Turn-on delay time $V_{DD} = 30$ V, $V_{GS} = 10$ V, $I_D = 3$ A $R_{GS} = 50$ Ω	$t_{d(on)}$	-	30	45	ns
Rise time $V_{DD} = 30$ V, $V_{GS} = 10$ V, $I_D = 3$ A $R_{GS} = 50$ Ω	t_r	-	70	110	
Turn-off delay time $V_{DD} = 30$ V, $V_{GS} = 10$ V, $I_D = 3$ A $R_{GS} = 50$ Ω	$t_{d(off)}$	-	250	320	
Fall time $V_{DD} = 30$ V, $V_{GS} = 10$ V, $I_D = 3$ A $R_{GS} = 50$ Ω	t_f	-	90	120	

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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	-	-	21	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	84	
Inverse diode forward voltage V_{GS} = 0 V, I_F = 42 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

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BUZ 30A

Power dissipation

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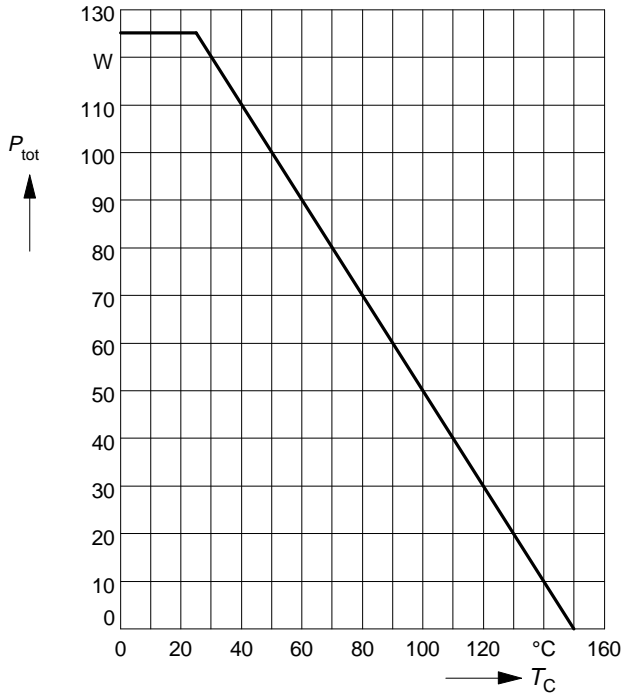
Drain current

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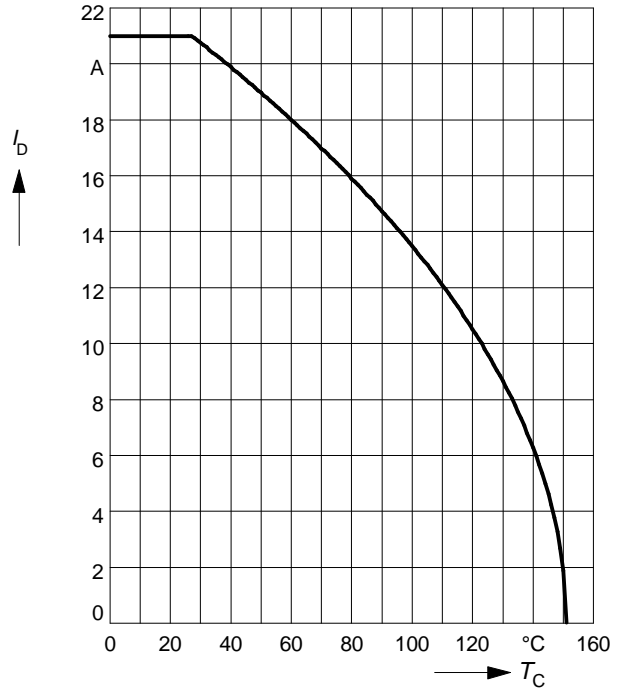
Safe operating area

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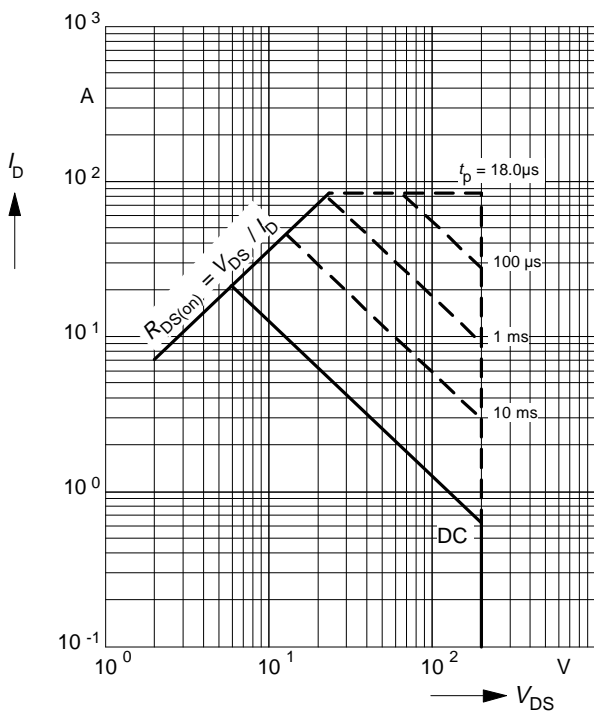
Transient thermal impedance

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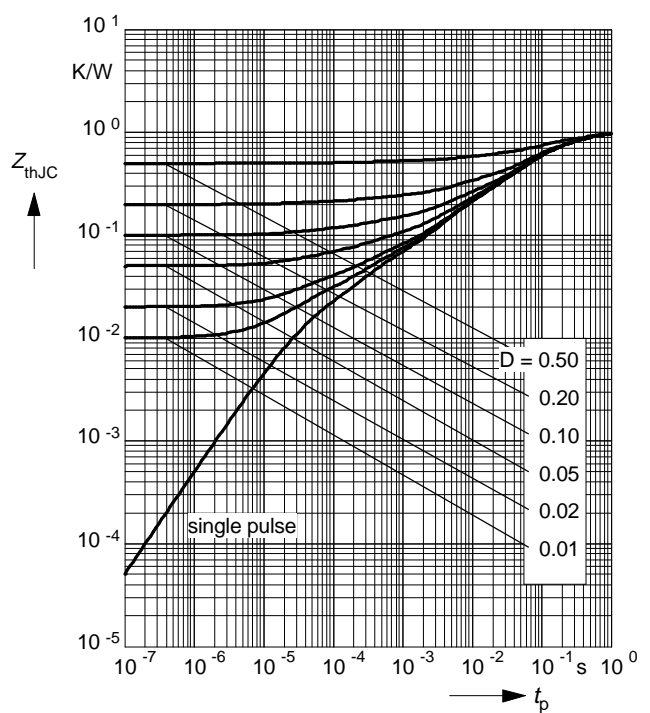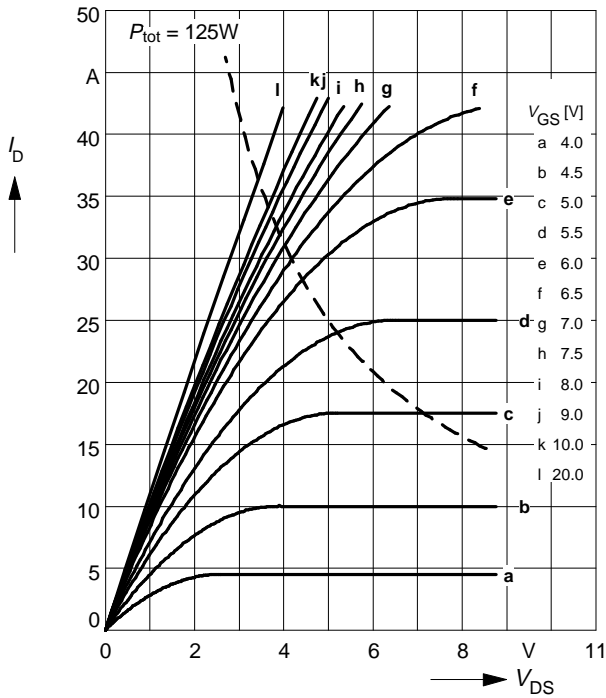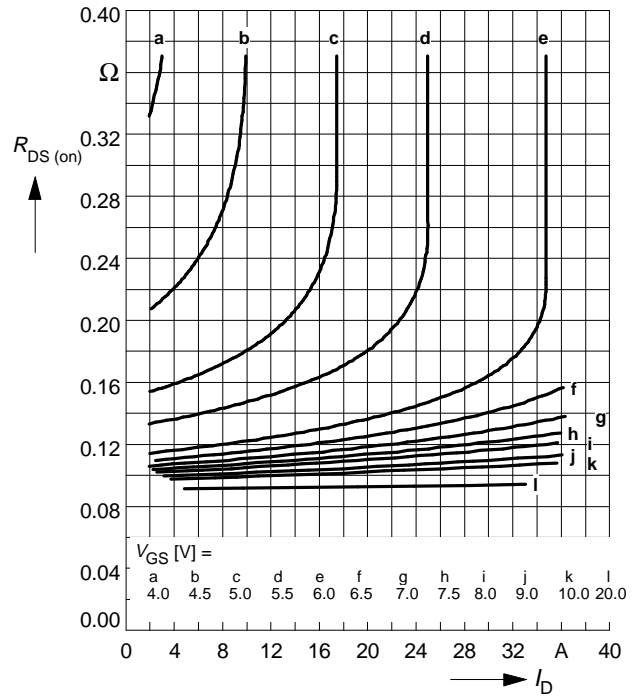
Typ. output characteristics

$I_D = f(V_{DS})$
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	l
4.0	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
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$
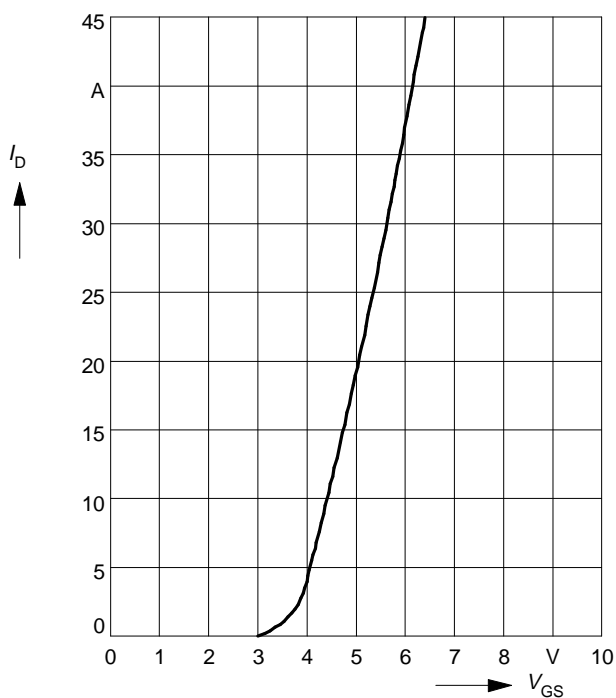
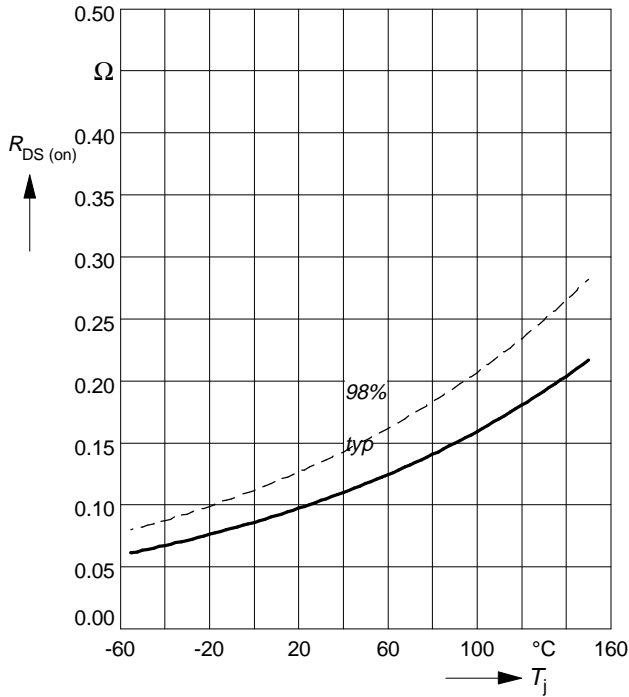## Typ. forward transconductance $g_{fs} = f(I_D)$
parameter: $t_p = 80$ µs,
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$
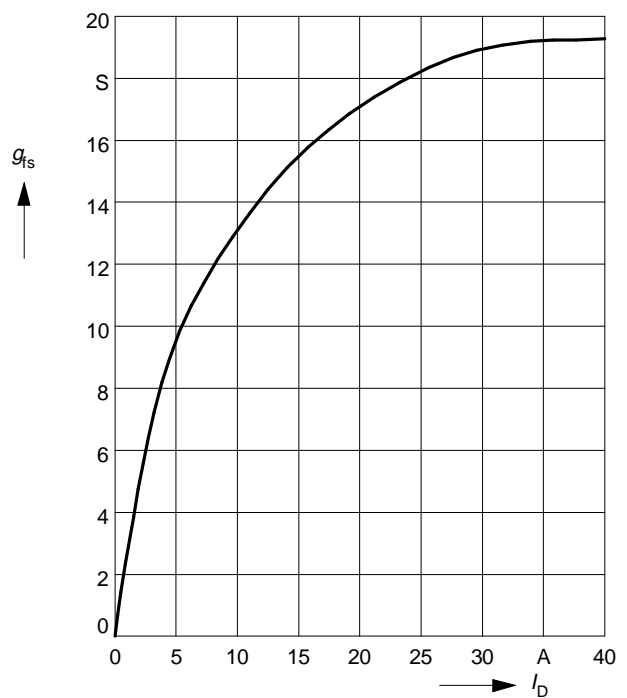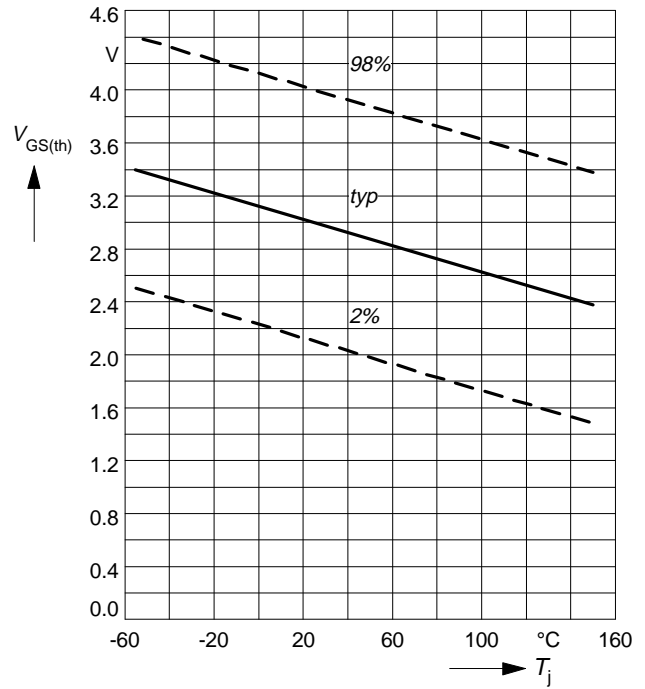
Drain-source on-resistance

$R_{DS\,(on)} = f(T_j)$
parameter: $I_D = 13.5$ A, $V_{GS} = 10$ V
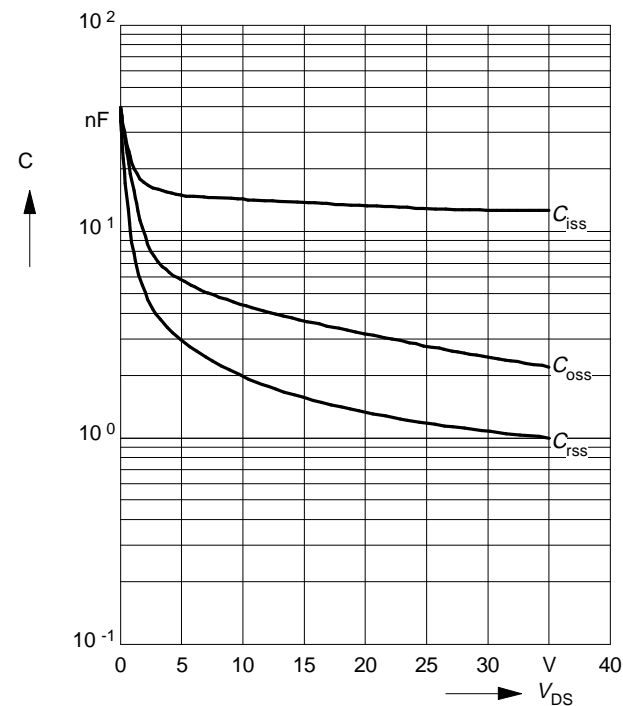

Gate threshold voltage

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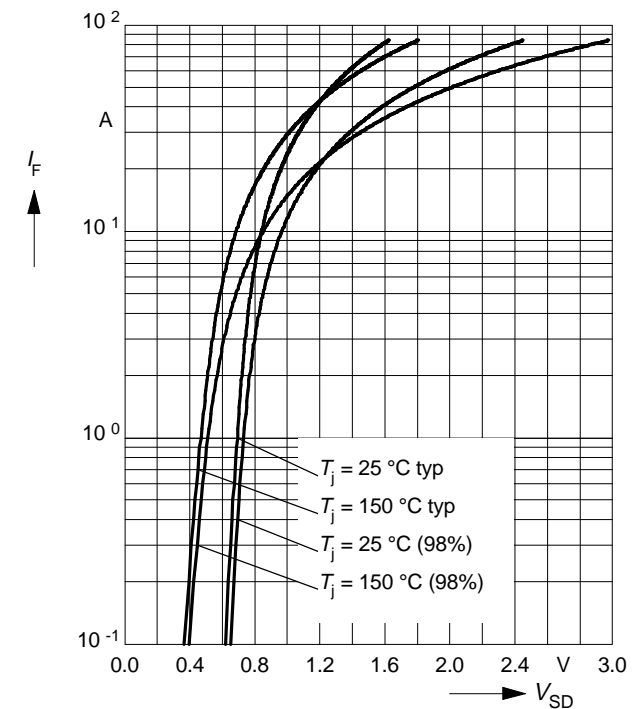

Typ. capacitances

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

Forward characteristics of reverse diode

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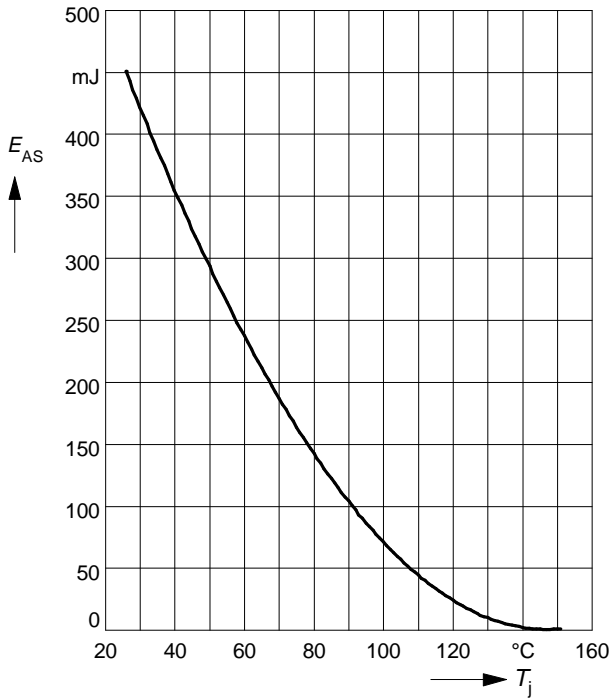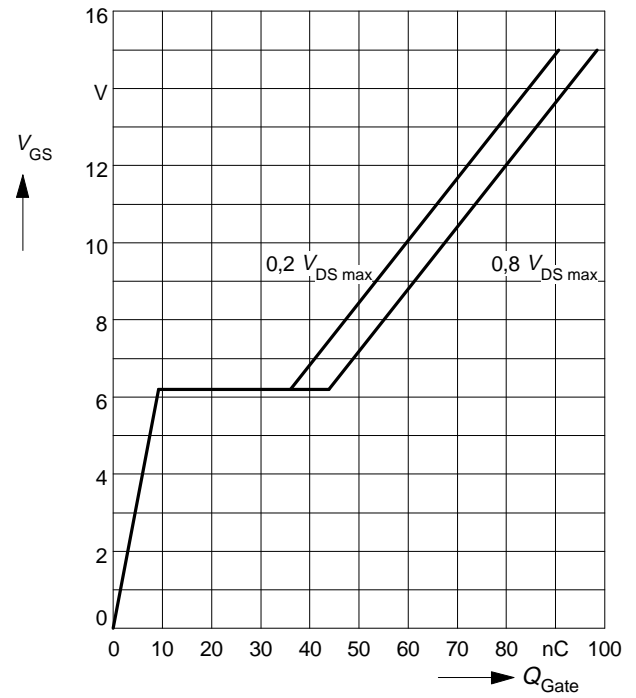parameter: T_j, $t_p = 80$ μs

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

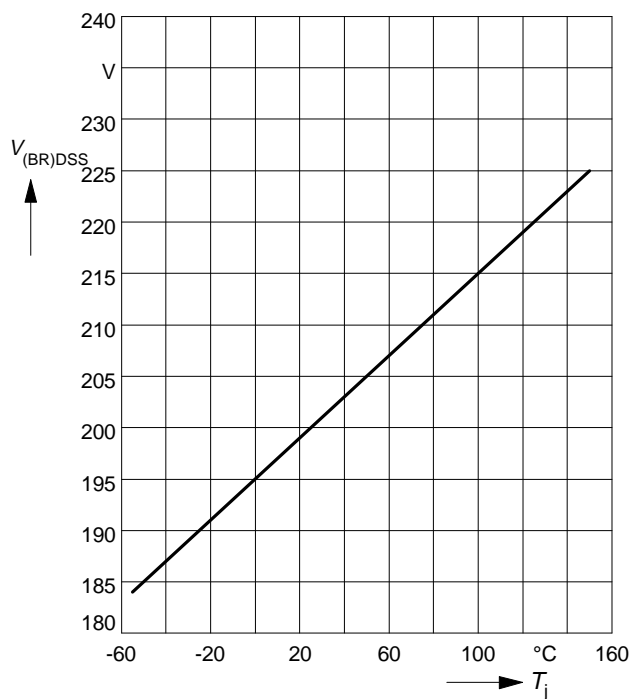parameter: $I_D = 21$ A, $V_{DD} = 50$ V
$R_{GS} = 25$ Ω, $L = 1.53$ mH

Typ. gate charge

$V_{GS} = f(Q_{Gate})$
parameter: $I_{D\ puls} = 32$ A

Drain-source breakdown voltage

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

07/96

Package Outlines

TO-220 AB

Dimension in mm

GPT05155

1) punch direction, burr max. 0.04
2) dip tinning
3) max. 14.5 by dip tinning press burr max. 0.05