SIPMOS® Small-Signal-Transistor

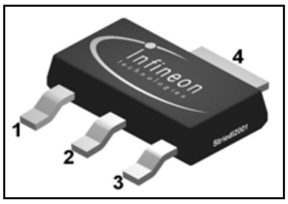
Product Summary

V_{DS}	-60	V
$R_{DS(on),max}$	0.3	Ω
I_D	-1.9	A

Features

- P-Channel
- Enhancement mode
- Logic level
- Avalanche rated
- d*v*/d*t* rated

SOT-223



Type	Package	Ordering Code	Marking
BSP 171 P	SOT-223	Q67041-S4019	171P

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

Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	I_D	T_A=25 °C[1)]	-1.9	A
		T_A=70 °C[1)]	-1.5	
Pulsed drain current	$I_{D,pulse}$	T_A=25 °C	-7.6	
Avalanche energy, single pulse	E_{AS}	I_D=-1.9 A, R_{GS}=25 Ω	70	mJ
Reverse diode d*v*/d*t*	d*v*/d*t*	I_D=-1.9 A, V_{DS}=-48 V, d*i*/d*t*=-200 A/µs, $T_{j,max}$=150 °C	-6	kV/µs
Gate source voltage	V_{GS}		±20	V
Power dissipation	P_{tot}	T_A=25 °C[1)]	1.8	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 150	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - soldering point	R_{thJS}		-	-	25	K/W
Thermal resistance, junction - ambient	R_{thJA}	minimal footprint, steady state	-	-	110	
		6 cm^2 cooling area[1], steady state	-	-	70	

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

Static characteristics

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=-250 µA	-60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-460 µA	-1	-1.5	-2	
Zero gate voltage drain current	I_{DSS}	V_{DS}=-60 V, V_{GS}=0 V, T_j=25 °C	-	-0.1	-1	µA
		V_{DS}=-60 V, V_{GS}=0 V, T_j=125 °C	-	-10	-100	
Gate-source leakage current	I_{GSS}	V_{GS}=-20 V, V_{DS}=0 V	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=-4.5 V, I_D=-1.5 A	-	0.3	0.45	Ω
		V_{GS}=-10 V, I_D=-1.9 A	-	0.21	0.3	
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=-1.5 A	1.4	2.7	-	S

[1] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm^2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

Parameter	**Symbol**	**Conditions**	**Values**			**Unit**
			min.	**typ.**	**max.**	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=-25 V, f=1 MHz	-	365	460	pF
Output capacitance	C_{oss}		-	105	135	
Reverse transfer capacitance	C_{rss}		-	40	55	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-25 V, V_{GS}=-10 V, I_D=-1.9 A, R_G=6 Ω	-	6	8	ns
Rise time	t_r		-	25	33	
Turn-off delay time	$t_{d(off)}$		-	208	276	
Fall time	t_f		-	87	130	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=-48 V, I_D=1.9 A, V_{GS}=0 to -10 V	-	-1.2	-1.6	nC
Gate to drain charge	Q_{gd}		-	-5	-7	
Gate charge total	Q_g		-	-13	-20	
Gate plateau voltage	$V_{plateau}$		-	-3	-	V
Output charge	Q_{oss}	V_{DD}=-15 V, V_{GS}=0 V	-	-5	-7	
Reverse Diode						
Diode continuous forward current	I_S	T_A=25 °C	-	-	-1.9	A
Diode pulse current	$I_{S,pulse}$		-	-	-7.6	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=1.9 A, T_j=25 °C	-	-0.84	-1.1	V
Reverse recovery time	t_{rr}	V_R=-30 V, I_F=|I_S|, di_F/dt=100 A/µs	-	80	120	ns
Reverse recovery charge	Q_{rr}		-	-125	-190	nC

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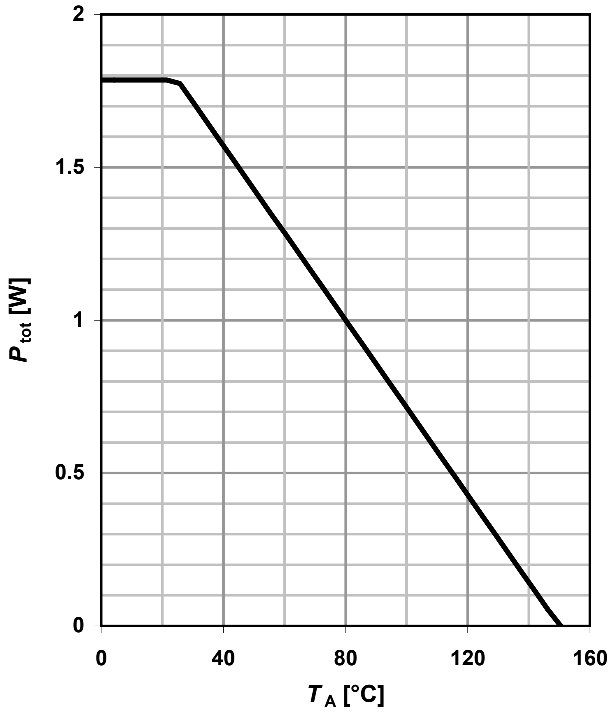
[2] See figure 16 for gate charge parameter definition

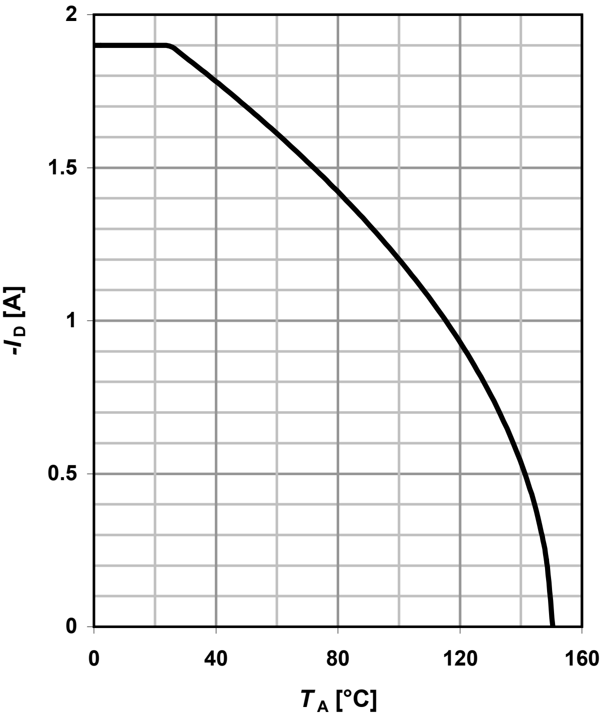
1 Power dissipation

P_{tot}=f(T_A)



2 Drain current

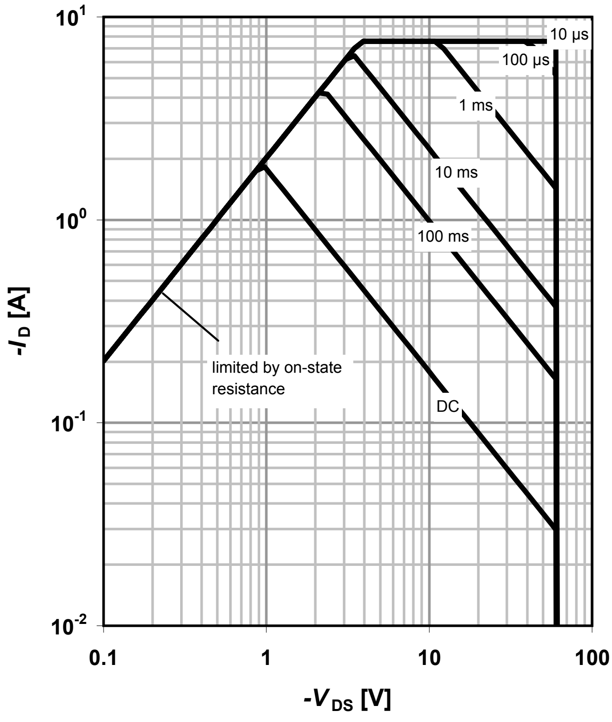
I_D=f(T_A); |V_{GS}|≥10 V



3 Safe operation area

I_D=f(V_{DS}); T_A=25 °C[1]; D=0

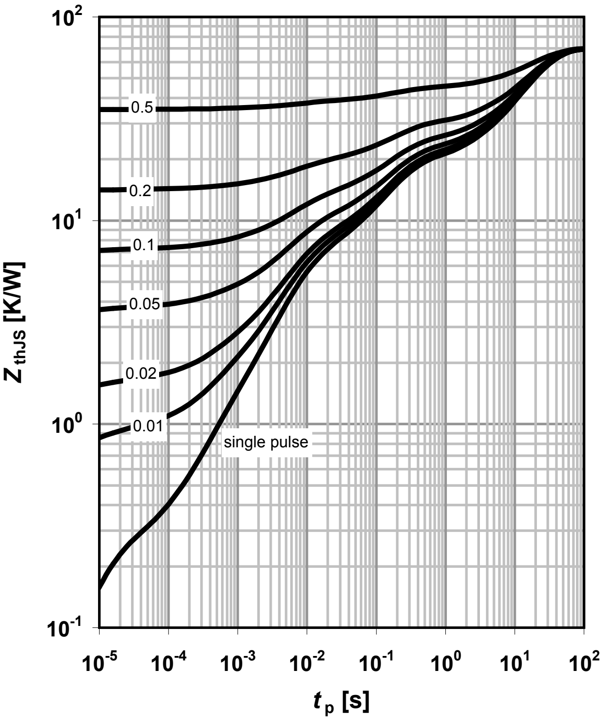
parameter: t_p



4 Max. transient thermal impedance

Z_{thJA}=f(t_p)

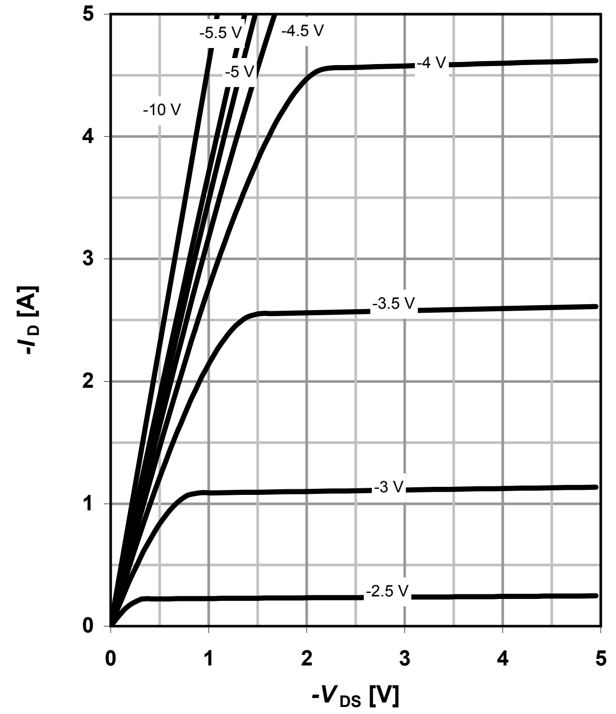
parameter: D=t_p/T



5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25$ °C

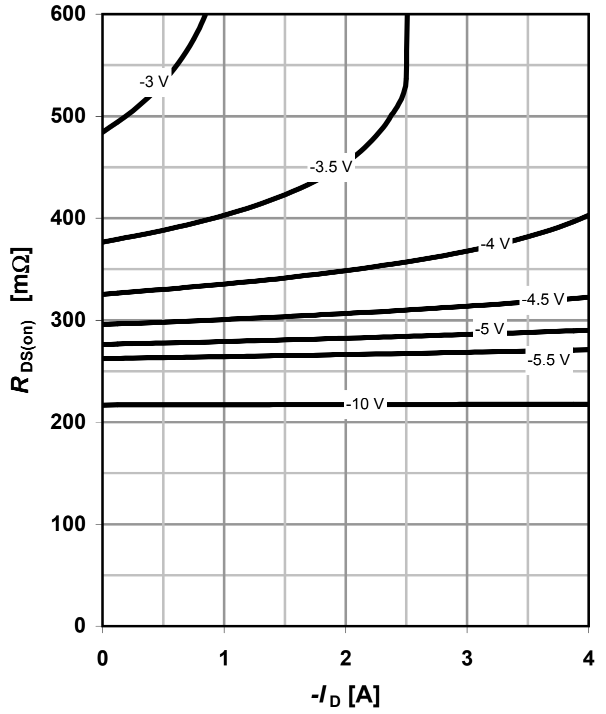
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)} = f(I_D)$; $T_j = 25$ °C

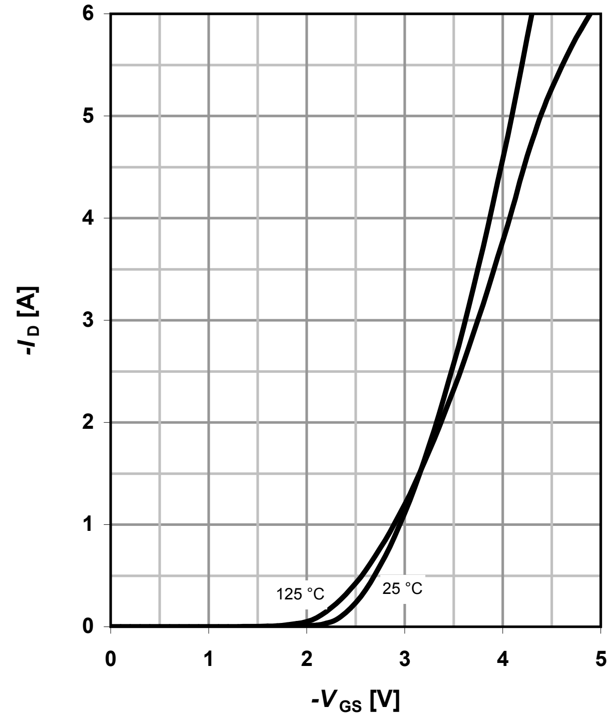
parameter: V_{GS}



7 Typ. transfer characteristics

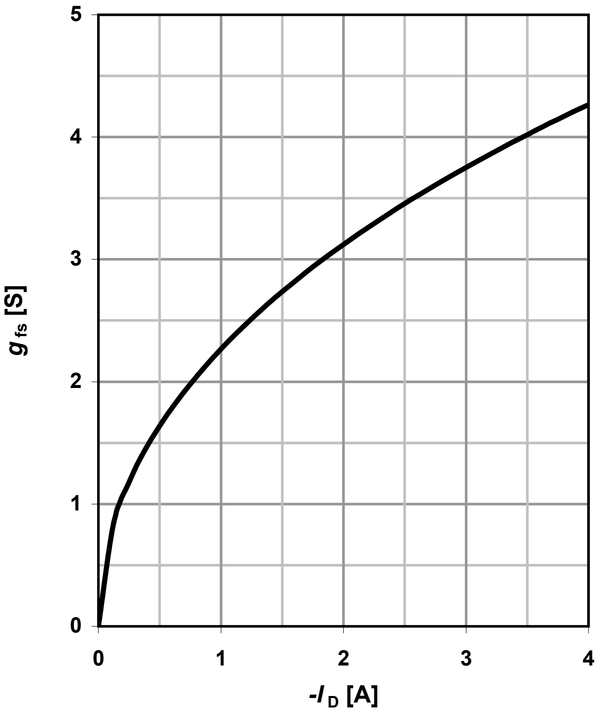
$I_D = f(V_{GS})$; $|V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



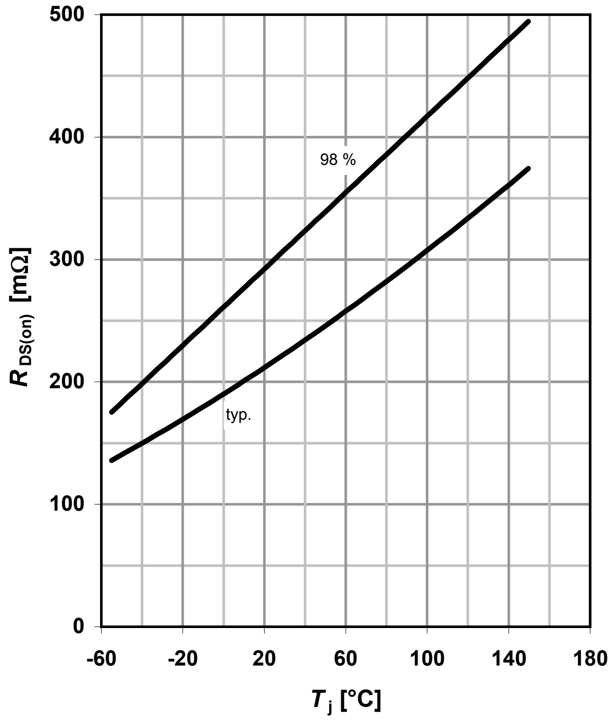
8 Typ. forward transconductance

$g_{fs} = f(I_D)$; $T_j = 25$ °C



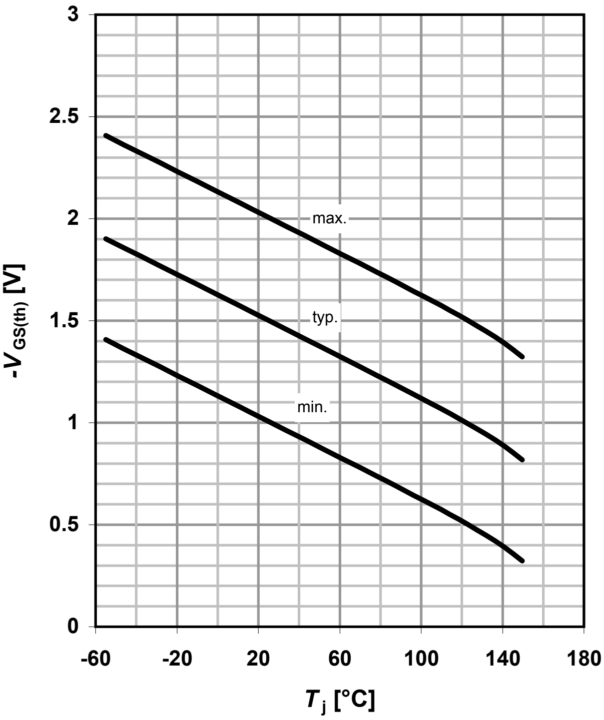
9 Drain-source on-state resistance

$R_{DS(on)}$=f(T_j); I_D=-1.9 A; V_{GS}=-10 V



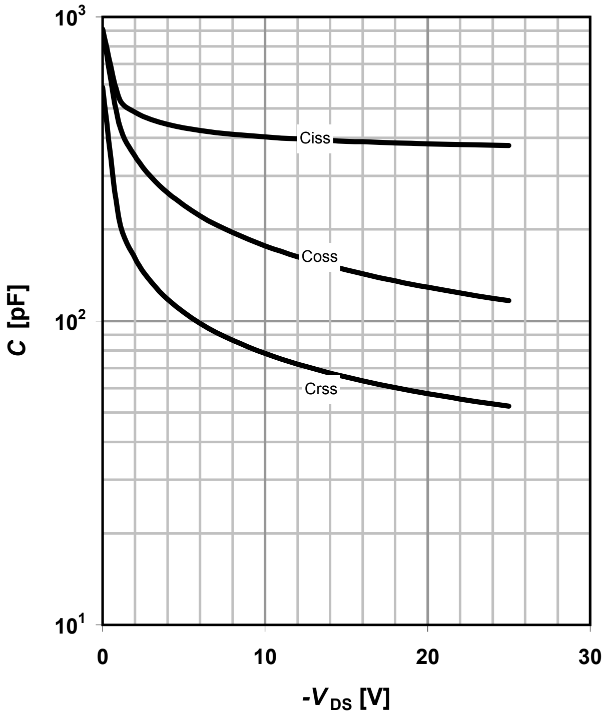
10 Typ. gate threshold voltage

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=-460 µA



11 Typ. capacitances

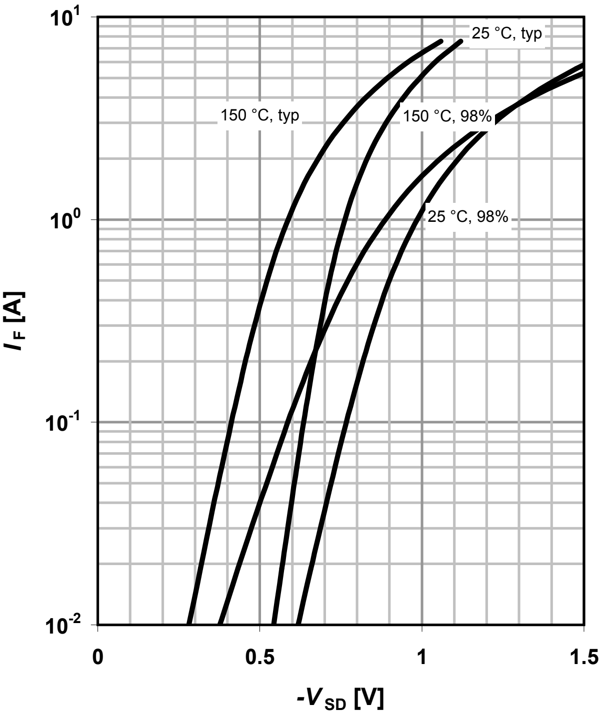
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

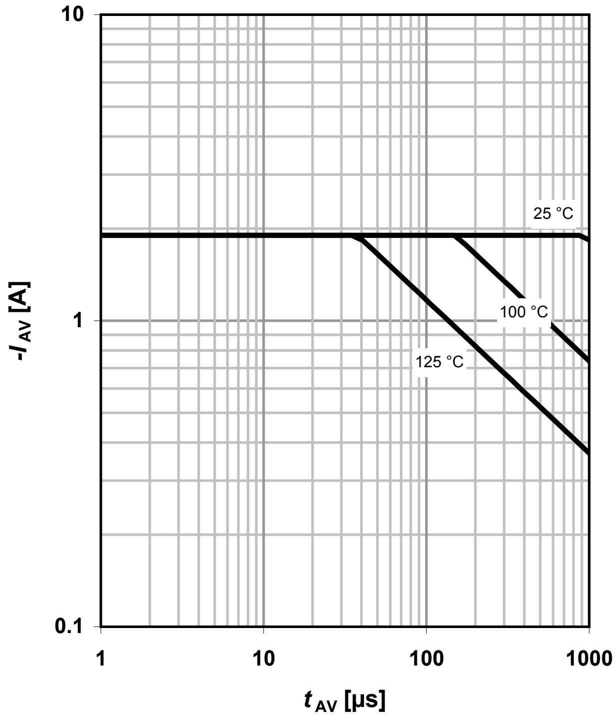
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

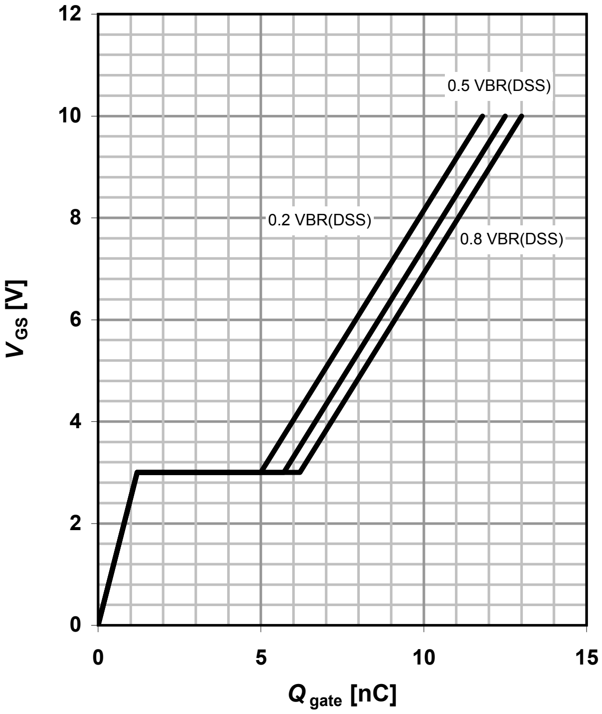
parameter: $T_{j(start)}$



14 Typ. gate charge

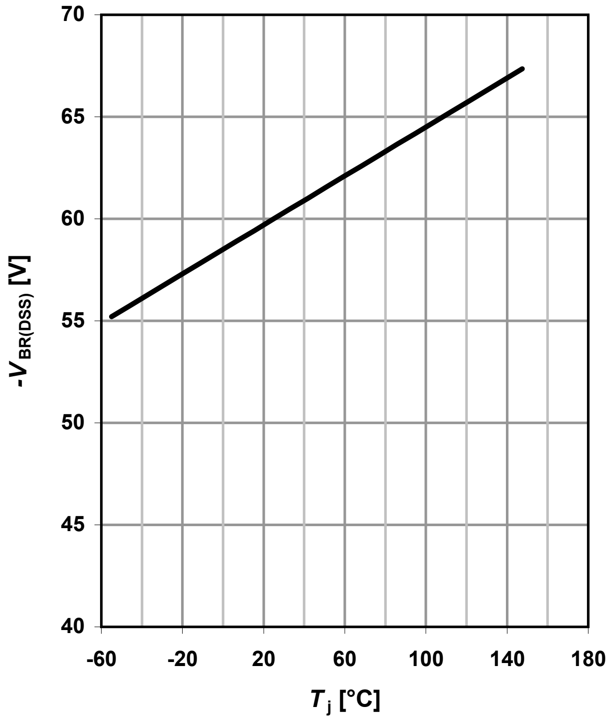
V_{GS}=f(Q_{gate}); I_D=-1.9 A pulsed

parameter: V_{DD}

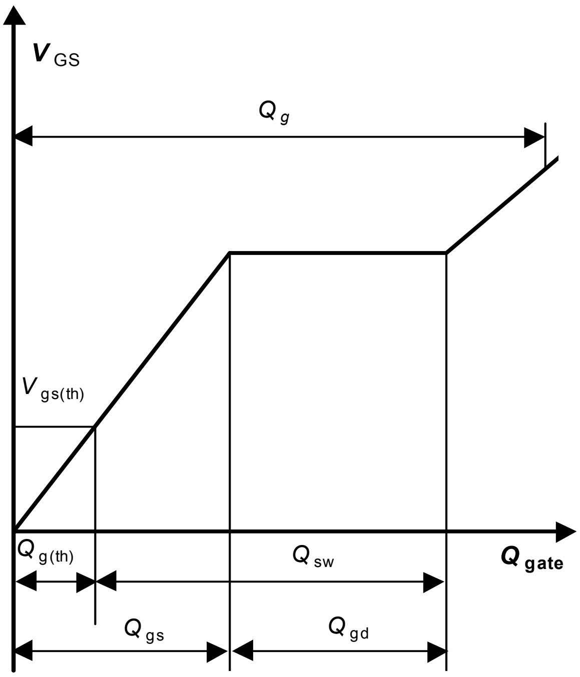


15 Drain-source breakdown voltage

$V_{BR(DSS)}$=f(T_j); I_D=-1 mA

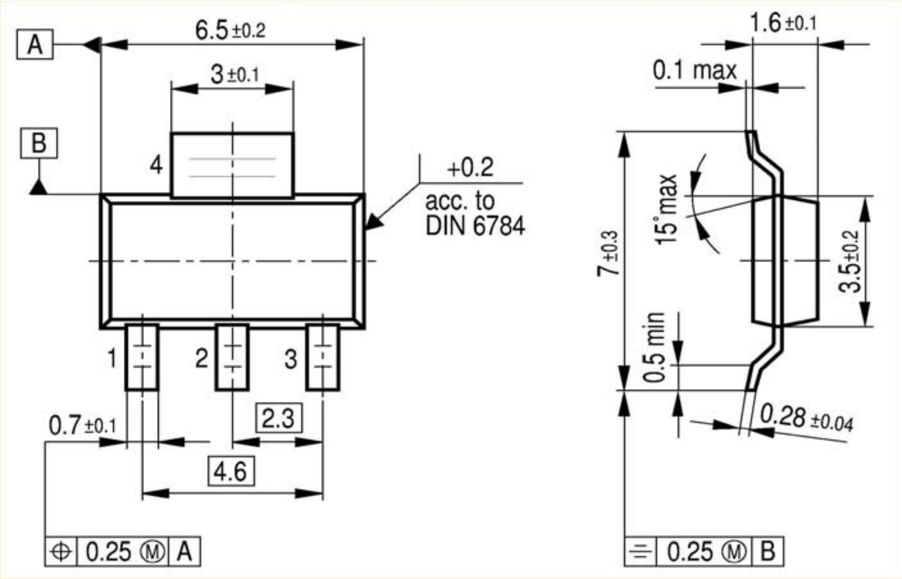


16 Gate charge waveforms

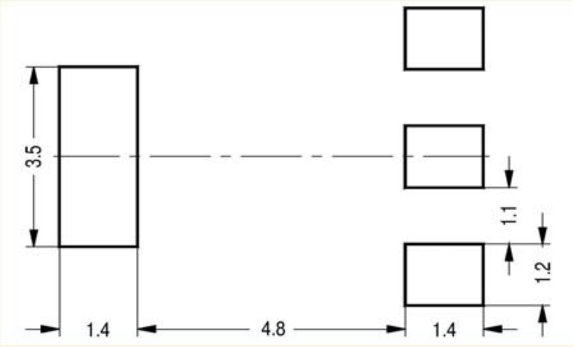


Package Outline

SOT-223: Outline

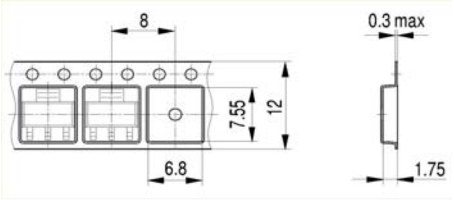


Footprint



Packaging

Tape



Dimensions in mm

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