

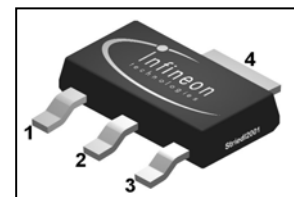
**SIPMOS® Small-Signal-Transistor**
**Features**

- P-Channel
- Enhancement mode
- Logic level
- Avalanche rated
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21

**Product Summary**

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

PG-SOT223



Type	Package	Tape and Reel Information	Marking	Packaging
BSP171P	PG-SOT223	H6327: 1000 pcs/reel	BSP171P	Non dry

**Maximum ratings, at  $T_j=25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	$I_D$	$T_A=25\text{ °C}^{1)}$	-1.9	A
		$T_A=70\text{ °C}^{1)}$	-1.5	
		$T_A=25\text{ °C}$	-7.6	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	-7.6	
Avalanche energy, single pulse	$E_{AS}$	$I_D=-1.9\text{ A}$ , $R_{GS}=25\ \Omega$	70	mJ
Reverse diode dv/dt	dv/dt	$I_D=-1.9\text{ A}$ , $V_{DS}=-48\text{ V}$ , $di/dt=-200\text{ A}/\mu\text{s}$ , $T_{j,max}=150\text{ °C}$	-6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	V
Power dissipation	$P_{tot}$	$T_A=25\text{ °C}^{1)}$	1.8	W
Operating and storage temperature	$T_j$ , $T_{stg}$		-55 ... 150	$^{\circ}\text{C}$
IEC climatic category; DIN IEC 68-1			55/150/56	
ESD Class; JESD22-A114-HBM			Class 1a	

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 <sup>2</sup> cooling area <sup>1)</sup> , steady state	-	-	70	

**Electrical characteristics, at  $T_j=25\text{ }^\circ\text{C}$ , unless otherwise specified**
**Static characteristics**

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

<sup>1)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical in still air.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}$ , $V_{DS}=-25\text{ V}$ , $f=1\text{ MHz}$	-	365	460	pF
Output capacitance	$C_{oss}$		-	105	135	
Reverse transfer capacitance	$C_{rss}$		-	40	55	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-25\text{ V}$ , $V_{GS}=-10\text{ V}$ , $I_D=-1.9\text{ A}$ , $R_G=6\ \Omega$	-	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<sup>2)</sup>**

Gate to source charge	$Q_{gs}$	$V_{DD}=-48\text{ V}$ , $I_D=1.9\text{ A}$ , $V_{GS}=0\text{ to }-10\text{ V}$	-	-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	$Q_{oss}$	$V_{DD}=-15\text{ V}$ , $V_{GS}=0\text{ V}$	-	-5	-7	

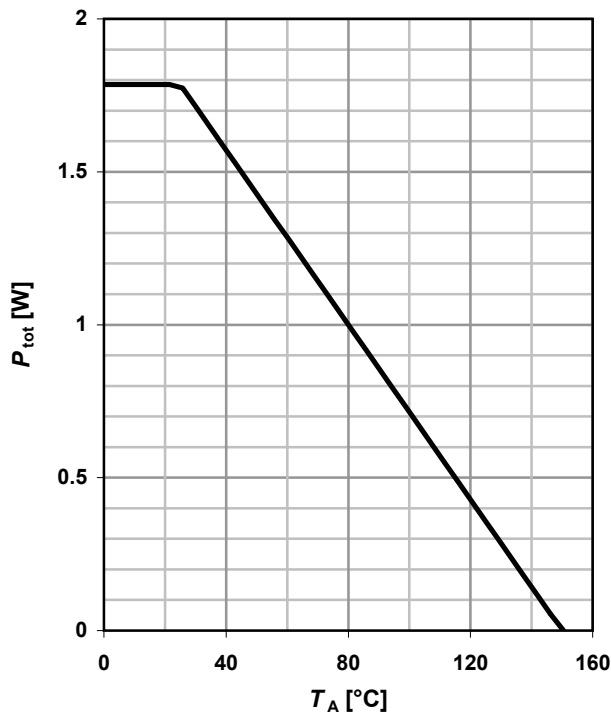
**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	-1.9	A
Diode pulse current	$I_{S,pulse}$		-	-	-7.6	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}$ , $I_F=1.9\text{ A}$ , $T_J=25\text{ }^\circ\text{C}$	-	-0.84	-1.1	V
Reverse recovery time	$t_{rr}$	$V_R=-30\text{ V}$ , $I_F= I_S $ , $di_F/dt=100\text{ A}/\mu\text{s}$	-	80	120	ns
Reverse recovery charge	$Q_{rr}$		-	-125	-190	

<sup>2)</sup> See figure 16 for gate charge parameter definition

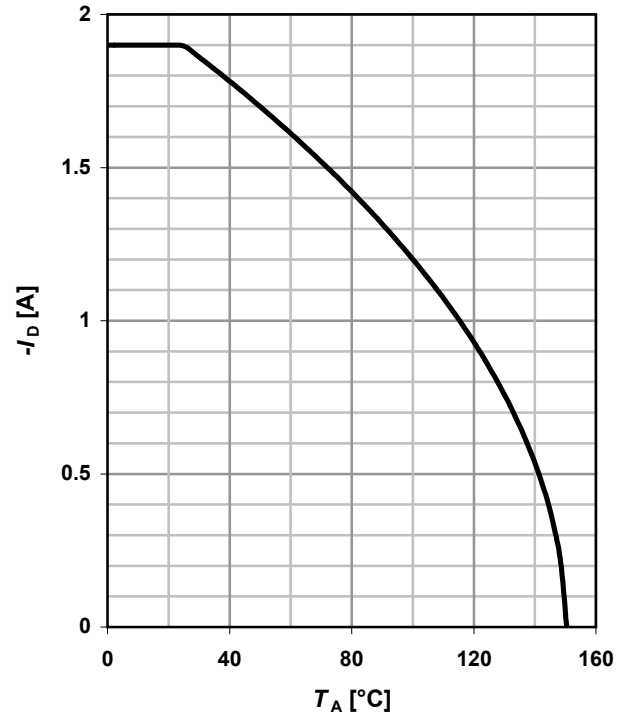
### 1 Power dissipation

$$P_{tot} = f(T_A)$$



### 2 Drain current

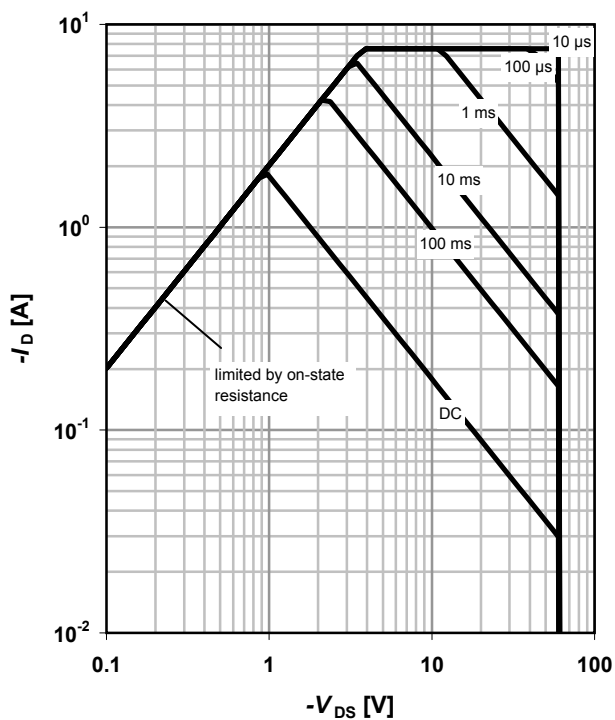
$$I_D = f(T_A); |V_{GS}| \geq 10 \text{ V}$$



### 3 Safe operating area

$$I_D = f(V_{DS}); T_A = 25 \text{ °C}^1; D = 0$$

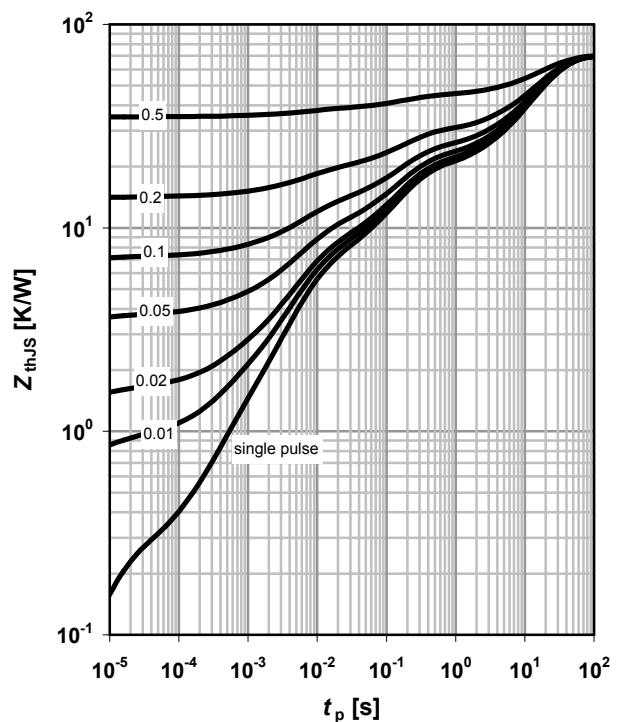
parameter:  $t_p$



### 4 Max. transient thermal impedance

$$Z_{thJA} = f(t_p)$$

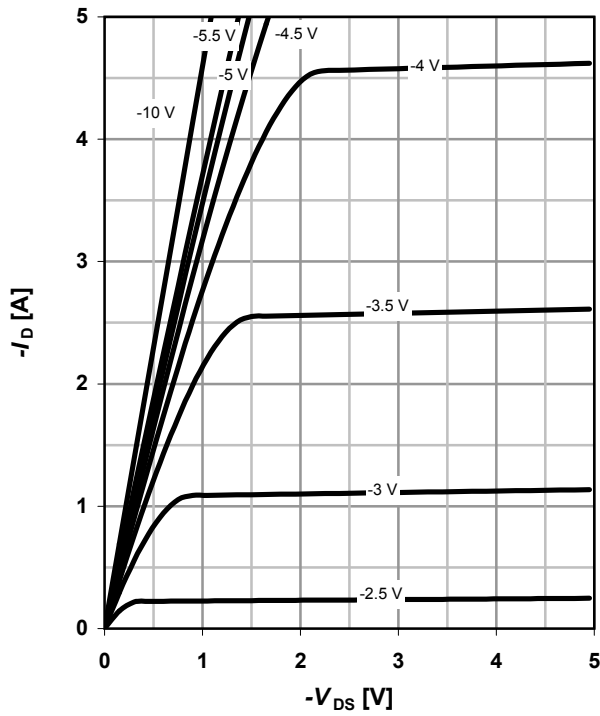
parameter:  $D = t_p/T$



**5 Typ. output characteristics**

$I_D=f(V_{DS}); T_j=25\text{ }^\circ\text{C}$

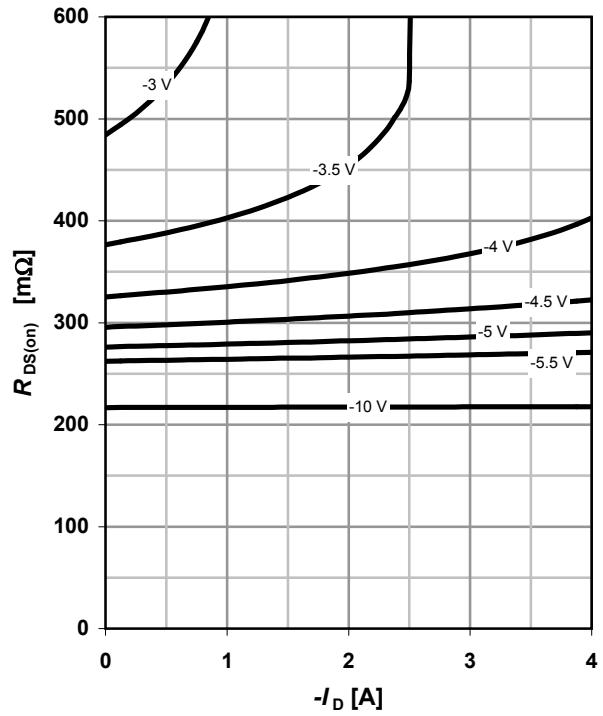
parameter:  $V_{GS}$



**6 Typ. drain-source on resistance**

$R_{DS(on)}=f(I_D); T_j=25\text{ }^\circ\text{C}$

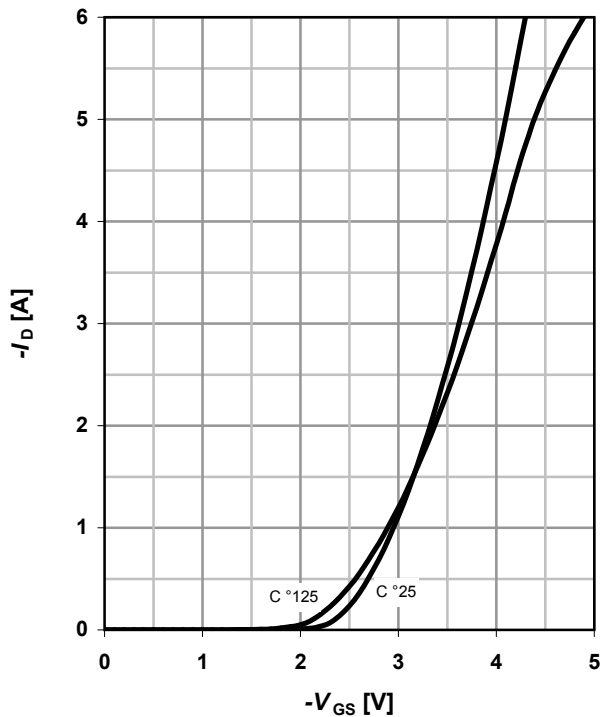
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

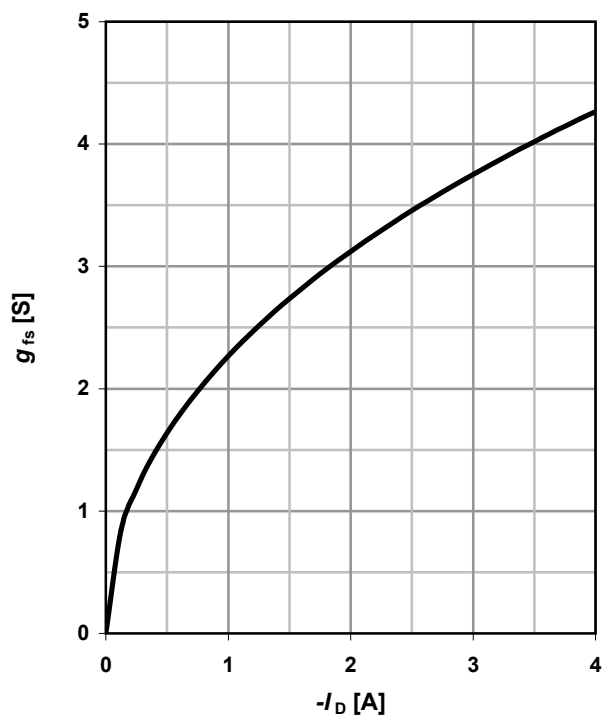
$I_D=f(V_{GS}); |V_{DS}|>2|I_D|R_{DS(on)max}$

parameter:  $T_j$



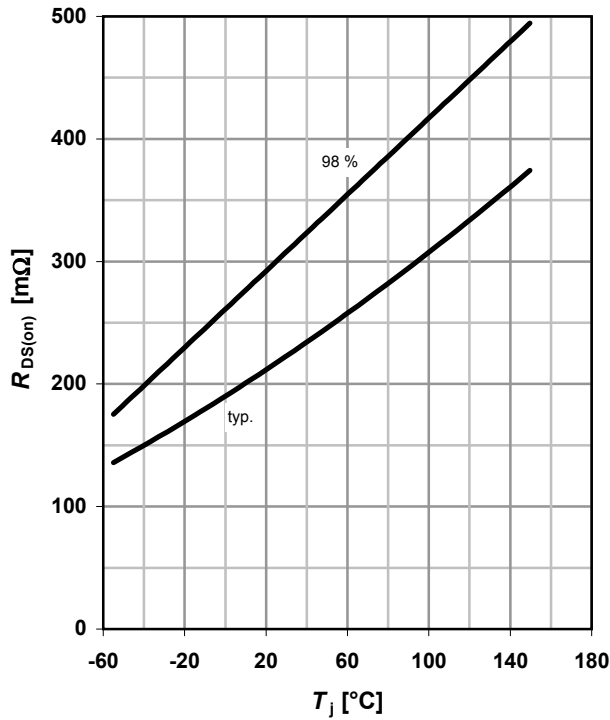
**8 Typ. forward transconductance**

$g_{fs}=f(I_D); T_j=25\text{ }^\circ\text{C}$



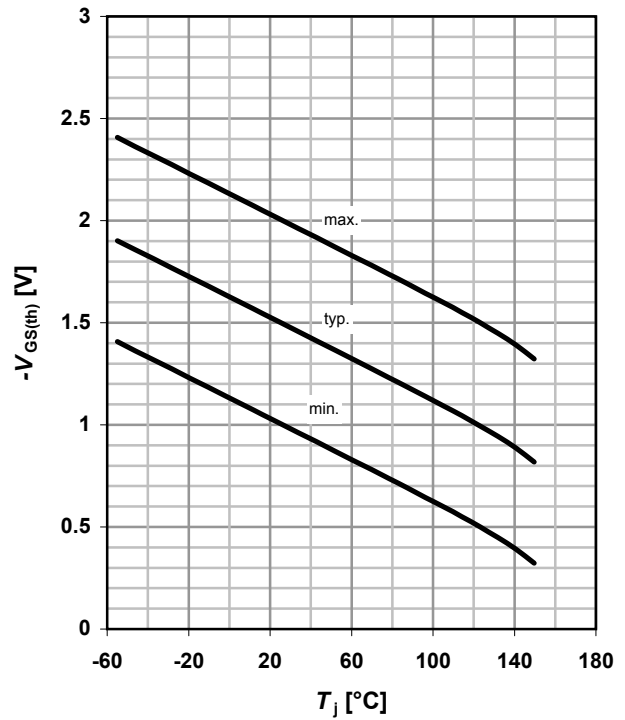
**9 Drain-source on-state resistance**

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



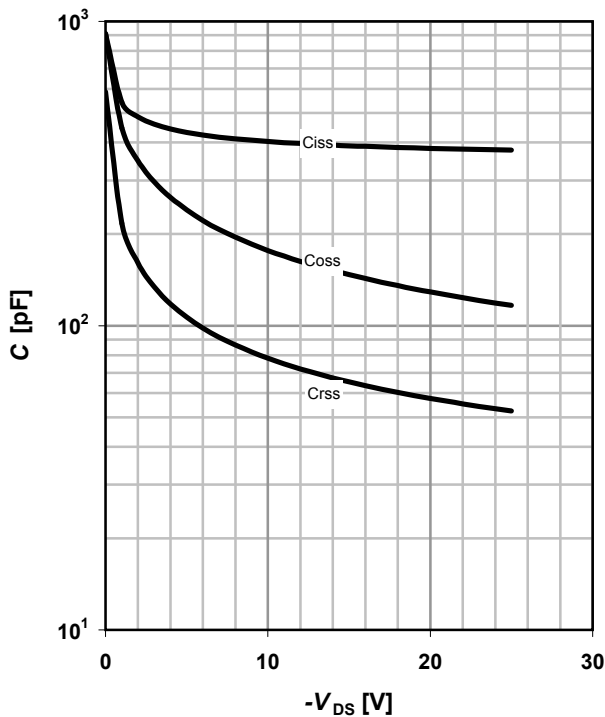
**10 Typ. gate threshold voltage**

$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_D=-460\ \mu\text{A}$



**11 Typ. capacitances**

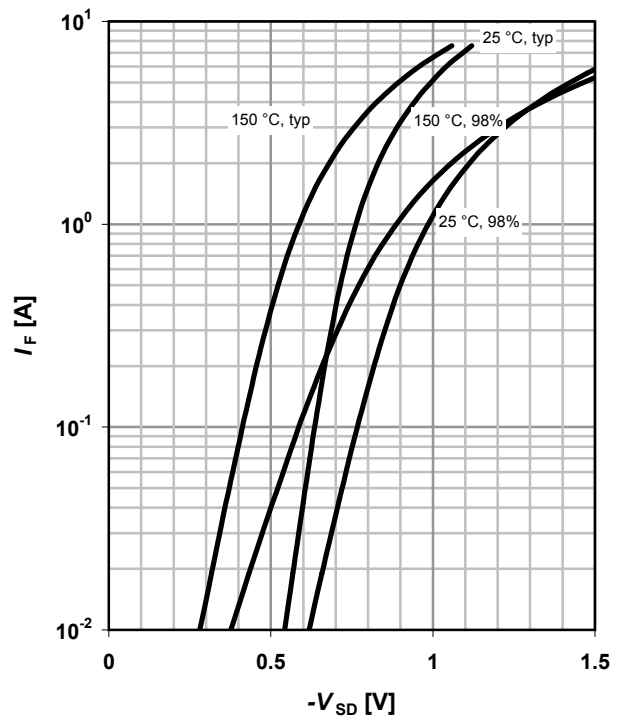
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

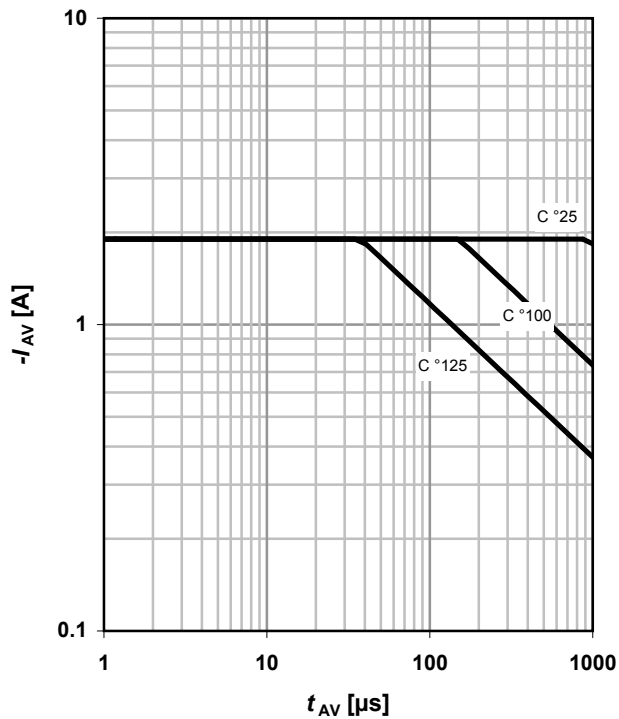
parameter:  $T_j$



### 13 Avalanche characteristics

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

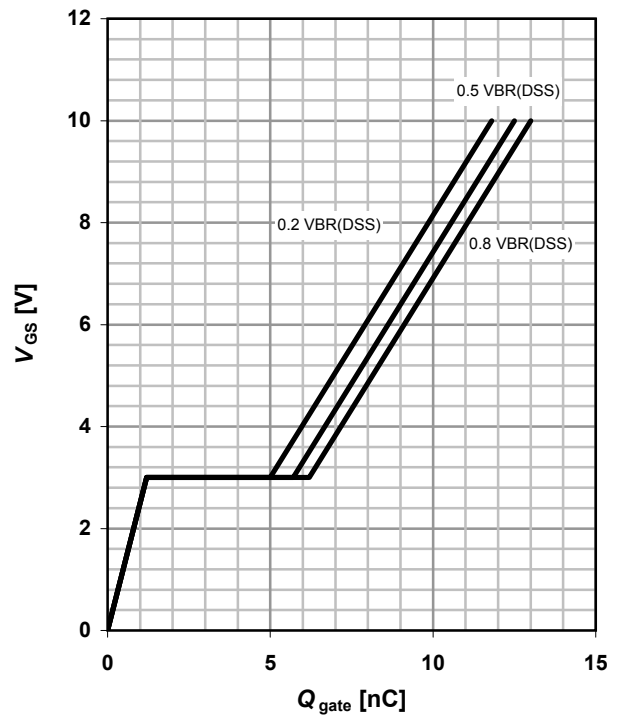
parameter:  $T_{j(start)}$



### 14 Typ. gate charge

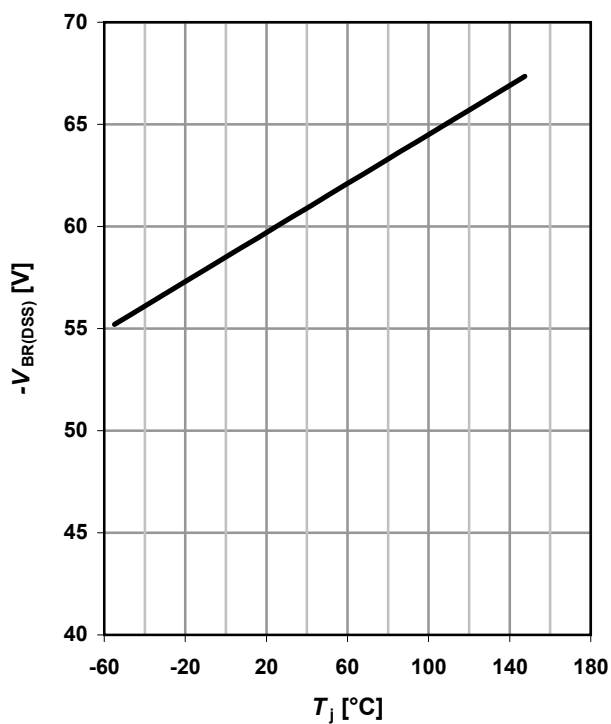
$V_{GS}=f(Q_{gate}); I_D=-1.9 \text{ A pulsed}$

parameter:  $V_{DD}$

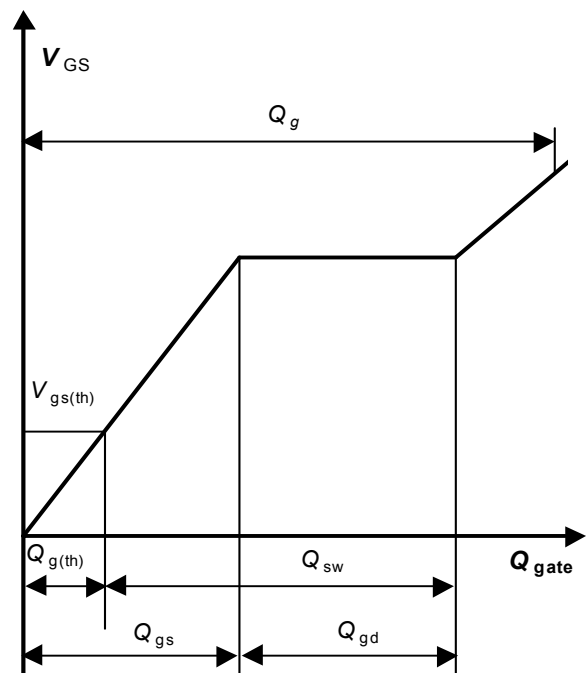


### 15 Drain-source breakdown voltage

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

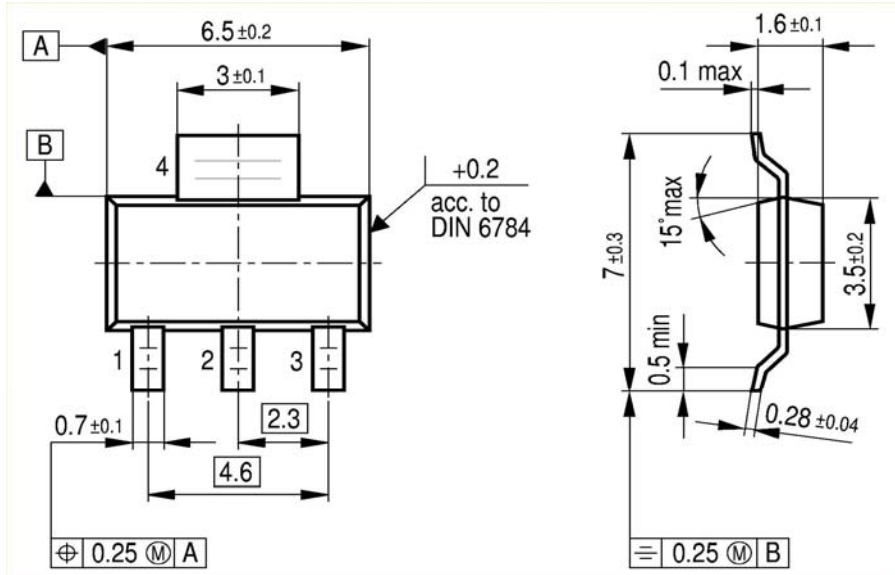


### 16 Gate charge waveforms

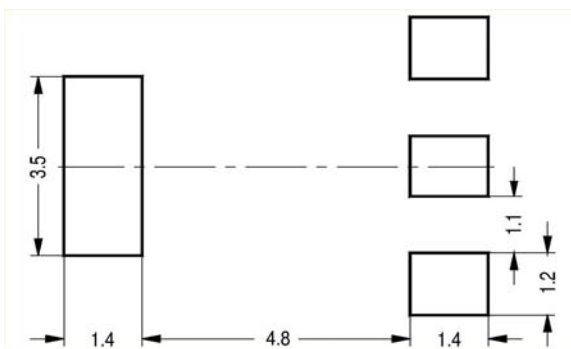


Package Outline

SOT-223: Outline

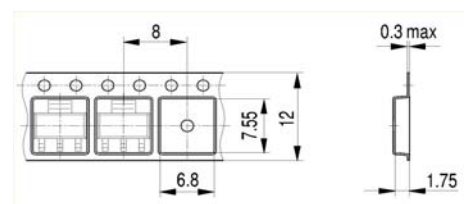


Footprint



Packaging

Tape



Dimensions in mm



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