



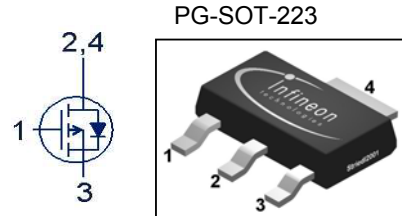
## SIPMOS® Small-Signal-Transistor

### Features

- P-Channel
- Enhancement mode
- Normal level
- Avalanche rated
- Pb-free lead plating; RoHS compliant

### Product Summary

$V_{DS}$	-100	V
$R_{DS(on),max}$	900	mΩ
$I_D$	-0.98	A



Type	Package	Tape and Reel Information	Marking	Lead free	Packing
BSP321P	PG-SOT-223	L6327: 1000 pcs/reel	BSP321P	Yes	Non dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_C=25\text{ °C}$	-0.98	A
		$T_C=70\text{ °C}$	-0.79	
Pulsed drain current	$I_{D,pulse}$	$T_C=25\text{ °C}$	-3.9	
Avalanche energy, single pulse	$E_{AS}$	$I_D=-0.98\text{ A}$ , $R_{GS}=25\text{ Ω}$	57	mJ
Gate source voltage	$V_{GS}$		±20	V
Power dissipation	$P_{tot}$	$T_C=25\text{ °C}$	1.8	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 150	°C
ESD Class		JESD22-C101-HBM	1A (250V to 500V)	
Soldering temperature			260 °C	
IEC climatic category; DIN IEC 68-1			55/150/56	



Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

### Thermal characteristics

Thermal resistance, junction - ambient	$R_{thJA}$	minimal footprint, steady state	-	-	115	
		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	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-250\text{ }\mu\text{A}$	-100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-380\text{ }\mu\text{A}$	-2.1	-3.0	-4	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-100\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$	-	-0.1	-1	$\mu\text{A}$
		$V_{DS}=-100\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ }^\circ\text{C}$	-	-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	$R_{DS(on)}$	$V_{GS}=-10\text{ V}, I_D=-0.98\text{ A}$	-	689	900	m $\Omega$
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-0.79\text{ A}$	0.6	1.2	-	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	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=-25\text{ V},$ $f=1\text{ MHz}$	-	240	319	pF
Output capacitance	$C_{oss}$		-	62	82	
Reverse transfer capacitance	$C_{rss}$		-	28	42	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-50\text{ V}, V_{GS}=-$ $10\text{ V}, I_D=-0.98\text{ A},$ $R_G=6\ \Omega$	-	5.9	8.8	ns
Rise time	$t_r$		-	4.4	6.6	
Turn-off delay time	$t_{d(off)}$		-	16.5	24.7	
Fall time	$t_f$		-	8.5	12.7	

**Gate Charge Characteristics<sup>2)</sup>**

Gate to source charge	$Q_{gs}$	$V_{DD}=-80\text{ V}, I_D=-$ $0.98\text{ A}, V_{GS}=0\text{ to }-10\text{ V}$	-	1.1	1.4	nC
Gate to drain charge	$Q_{gd}$		-	4	6	
Gate charge total	$Q_g$		-	9	12	
Gate plateau voltage	$V_{plateau}$		-	4.5	-	

**Reverse Diode**

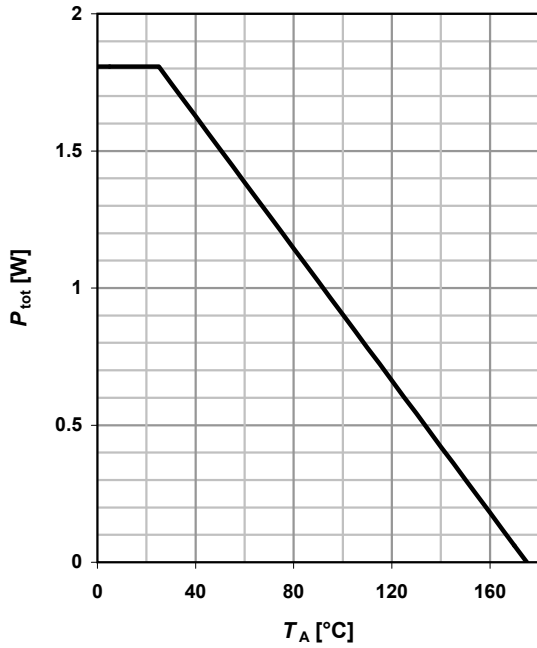
Diode continuous forward current	$I_S$	$T_C=25\text{ }^\circ\text{C}$	-	-	-0.98	A
Diode pulse current	$I_{S,pulse}$		-	-	-3.9	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=0.98\text{ A},$ $T_J=25\text{ }^\circ\text{C}$	-	0.84	1.2	V
Reverse recovery time	$t_{rr}$	$V_R=50\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	47	-	ns
Reverse recovery charge	$Q_{rr}$		-	96	-	nC

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



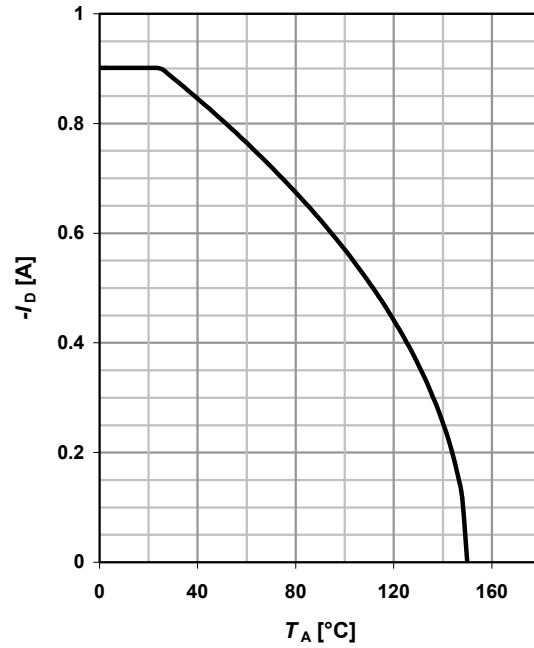
**1 Power dissipation**

$P_{tot}=f(T_C)$



**2 Drain current**

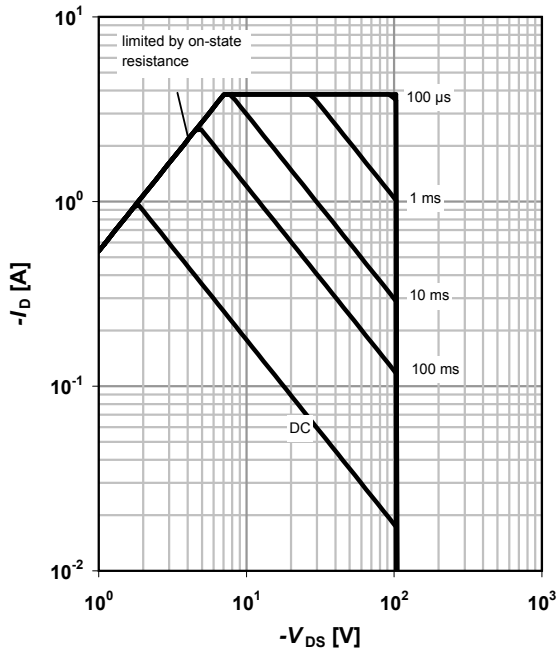
$I_D=f(T_C); |V_{GS}| \geq 10\text{ V}$



**3 Safe operating area**

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

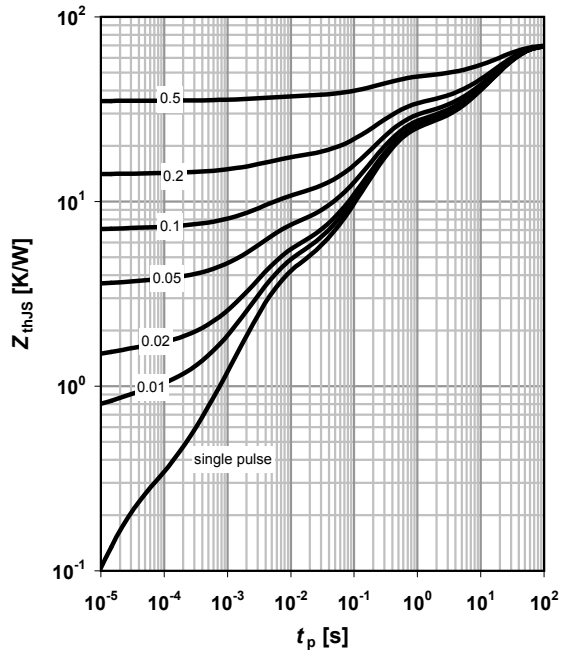
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJC}=f(t_p)$

parameter:  $D=t_p/T$

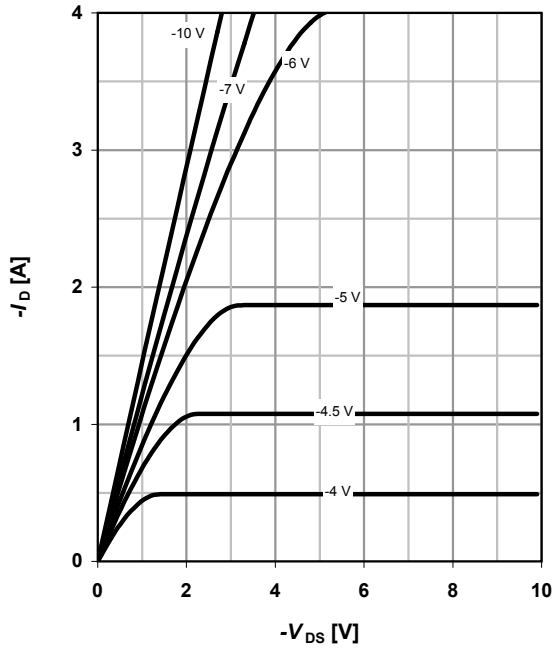




**5 Typ. output characteristics**

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

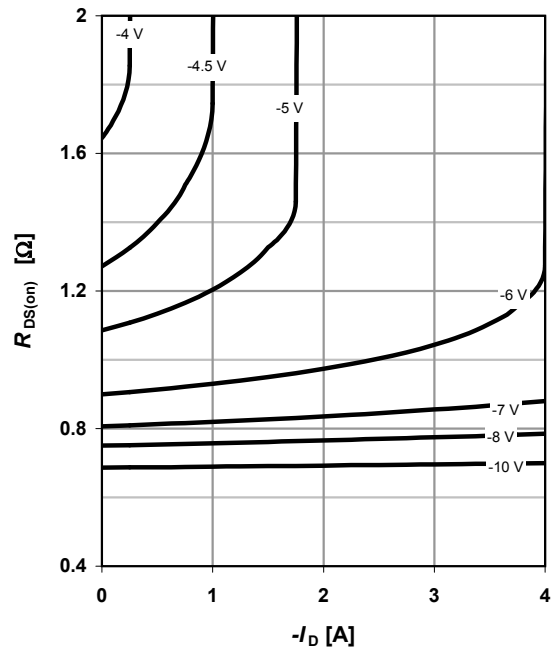
parameter:  $V_{GS}$



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

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

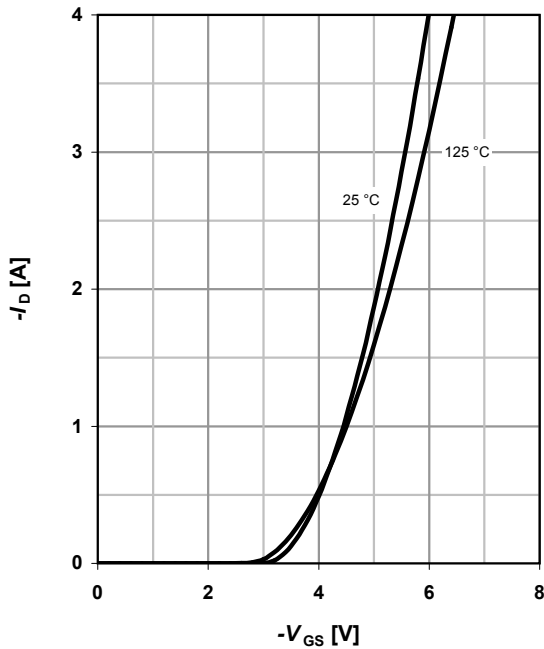
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

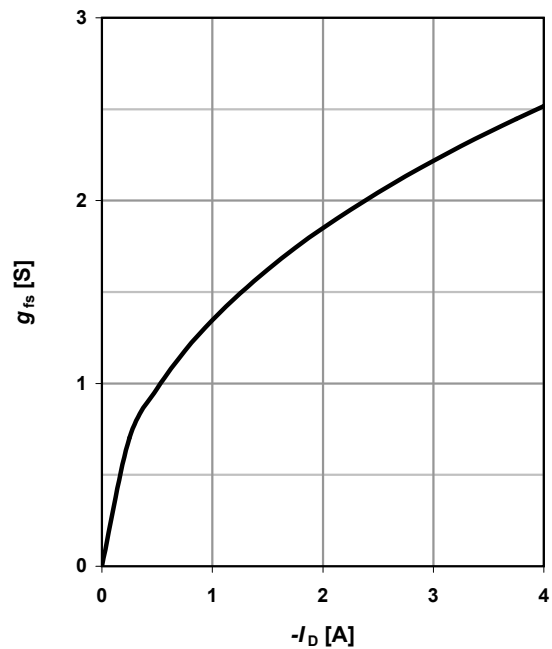
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



**8 Typ. forward transconductance**

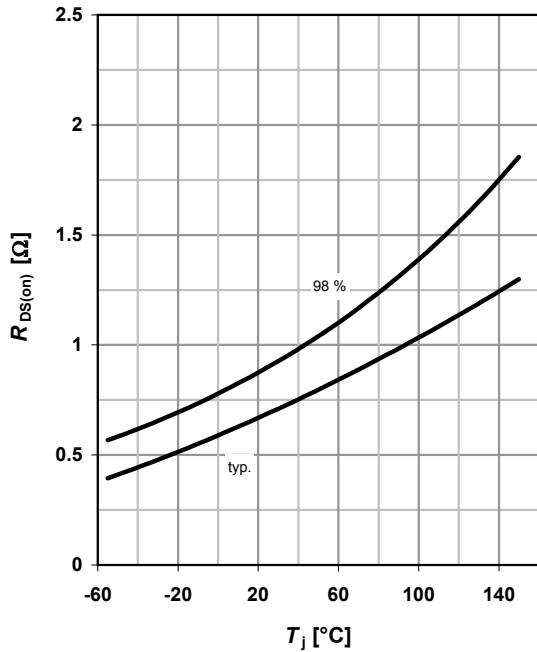
$g_{fs} = f(I_D); T_j = 25\text{ }^\circ\text{C}$





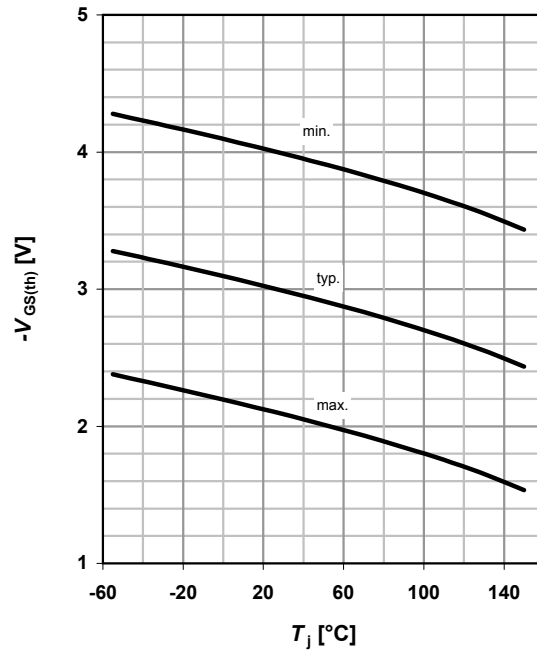
**9 Drain-source on-state resistance**

$R_{DS(on)} = f(T_j); I_D = -0.98 \text{ A}; V_{GS} = -10 \text{ V}$



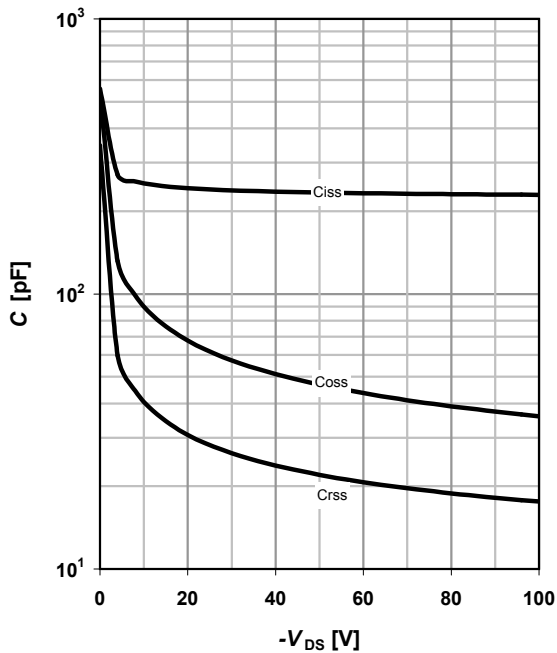
**10 Typ. gate threshold voltage**

$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -380 \mu\text{A}$



**11 Typ. capacitances**

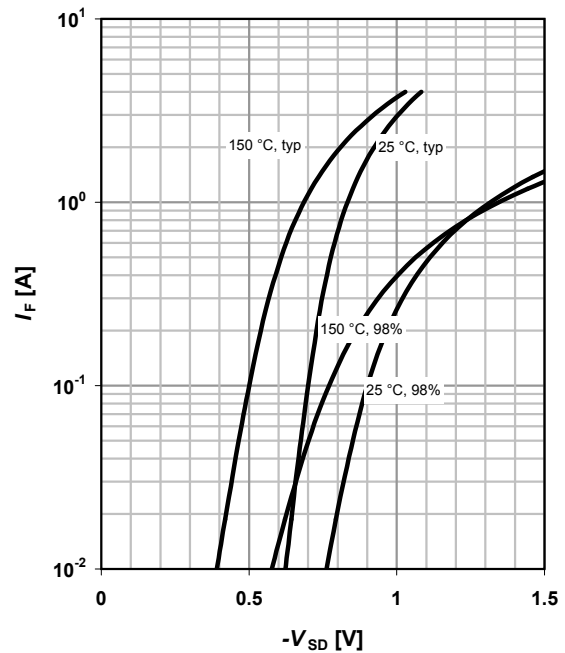
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

parameter:  $T_j$

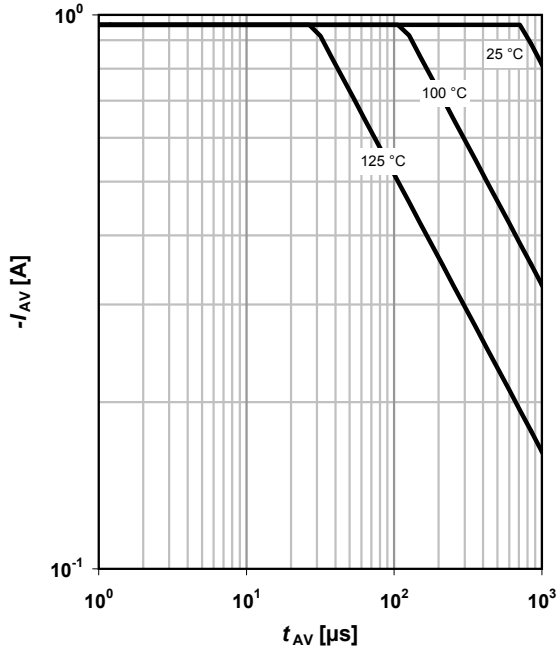




**13 Avalanche characteristics**

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

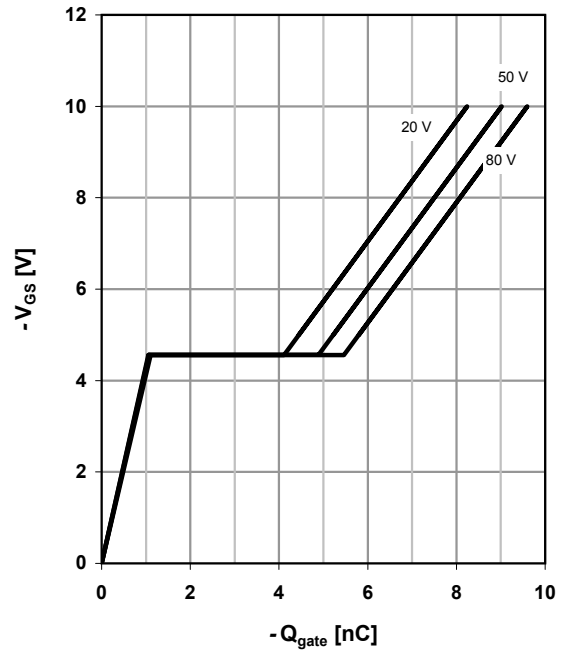
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

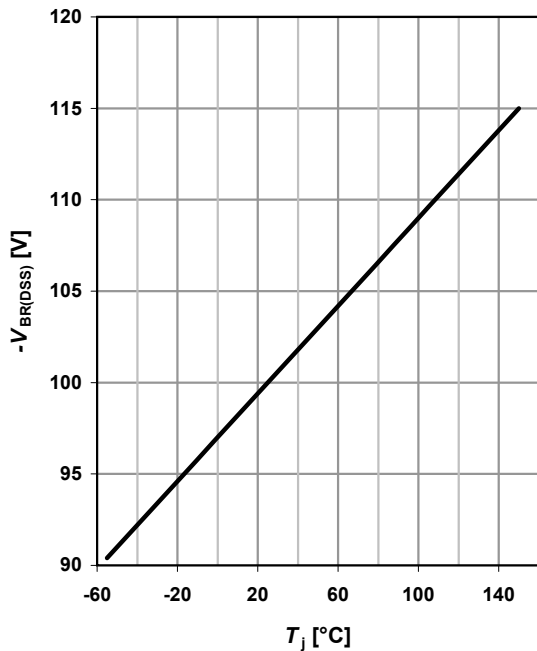
$V_{GS}=f(Q_{gate}); I_D=-0.98 \text{ A pulsed}$

parameter:  $V_{DD}$

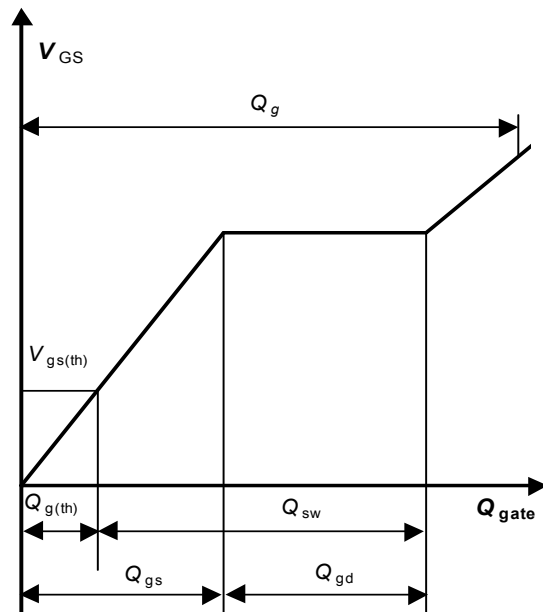


**15 Drain-source breakdown voltage**

$V_{BR(DSS)}=f(T_j); I_D=-250 \mu\text{A}$

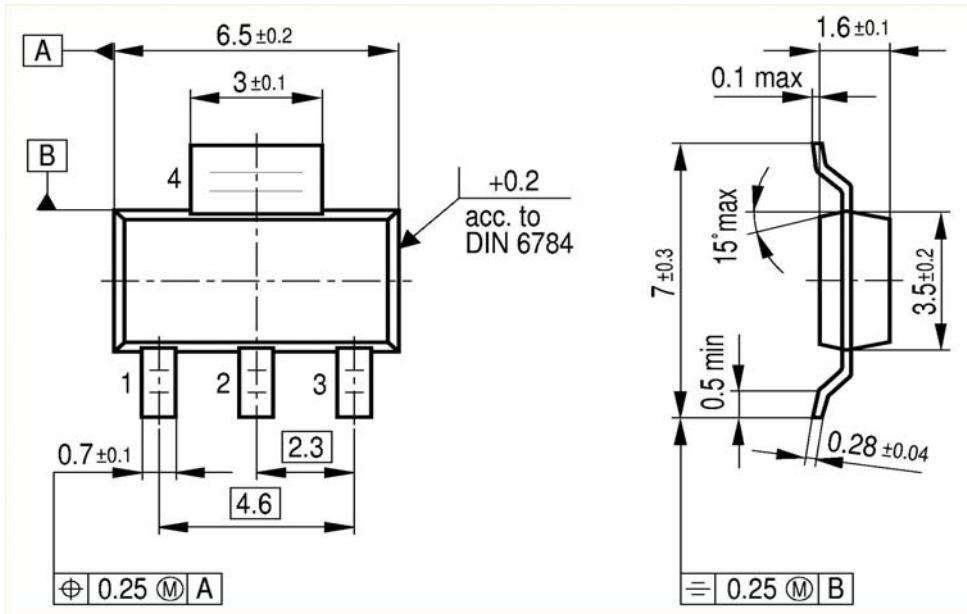


**16 Gate charge waveforms**

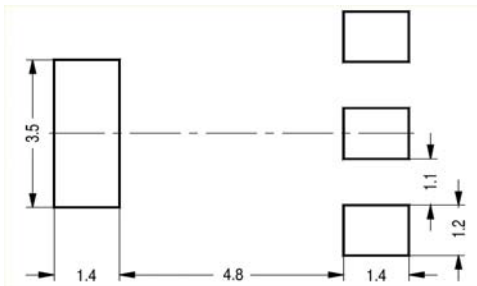




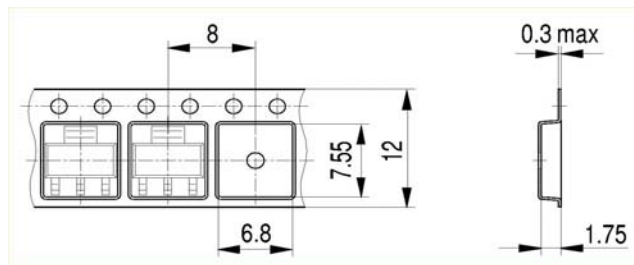
Package Outline: PG-SOT-223



Footprint:



Packaging:



Dimensions in mm





**Published by**

**Infineon Technologies AG**

**81726 München, Germany**

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