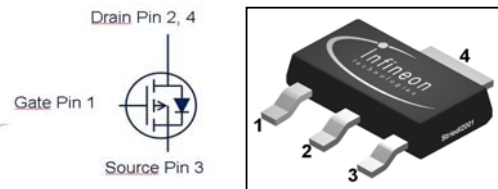


**SIPMOS® Small-Signal-Transistor**
**Features**

- P-Channel
- Enhancement mode
- 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	Lead free	Packing
BSP170P	PG-SOT223	H6327: 1000pcs/reel	BSP170P	Yes	Non Dry

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

Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	$I_D$	$T_A=25\text{ }^\circ\text{C}$	-1.9	A
		$T_A=70\text{ }^\circ\text{C}$	-1.5	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ }^\circ\text{C}$	-7.6	
Avalanche energy, single pulse	$E_{AS}$	$I_D=1.9\text{ A}$ , $R_{GS}=25\text{ }\Omega$	70	mJ
Avalanche energy, periodic limited by $T_{jmax}$	$E_{AR}$		0.18	
Reverse diode $dv/dt$	$dv/dt$	$I_D=1.9\text{ A}$ , $V_{DS}=48\text{ V}$ , $di/dt=-200\text{ A}/\mu\text{s}$ , $T_{j,max}=150\text{ }^\circ\text{C}$	-6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	V
Power dissipation	$P_{tot}$	$T_A=25\text{ }^\circ\text{C}$	1.8	W
Operating and storage temperature	$T_j$ , $T_{stg}$		-55 ... 150	$^\circ\text{C}$
ESD class		JESD22-C101 (HBM)	1A (250V to 500V)	
Soldering temperature			260 $^\circ\text{C}$	
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	$R_{thJS}$		-	-	20	K/W
SMD version, device on PCB:	$R_{thJA}$	minimal footprint	-	-	110	K/W
		6 cm <sup>2</sup> cooling area <sup>1)</sup>	-	-	70	

**Electrical characteristics, at  $T_j=25\text{ °C}$ , 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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\text{ }\mu\text{A}$	-2.1	-3	-4	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-0.1	-1	$\mu\text{A}$
		$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}$	-	-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	$R_{DS(on)}$	$V_{GS}=-10\text{ V}, I_D=-1.9\text{ A}$	-	239	300	m $\Omega$
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-1.9\text{ A}$	1.3	2.6	-	S

<sup>1)</sup> Device on 40mm\*40mm\*1.5 epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70 $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=-25\text{ V},$ $f=1\text{ MHz}$	-	328	410	pF
Output capacitance	$C_{oss}$		-	105	135	
Reverse transfer capacitance	$C_{rss}$		-	38	48	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-30\text{ V}, V_{GS}=-$ $10\text{ V}, I_D=-1.9\text{ A},$ $R_G=6\ \Omega$	-	14	21	ns
Rise time	$t_r$		-	28	42	
Turn-off delay time	$t_{d(off)}$		-	92	138	
Fall time	$t_f$		-	60	90	

**Gate Charge Characteristics**

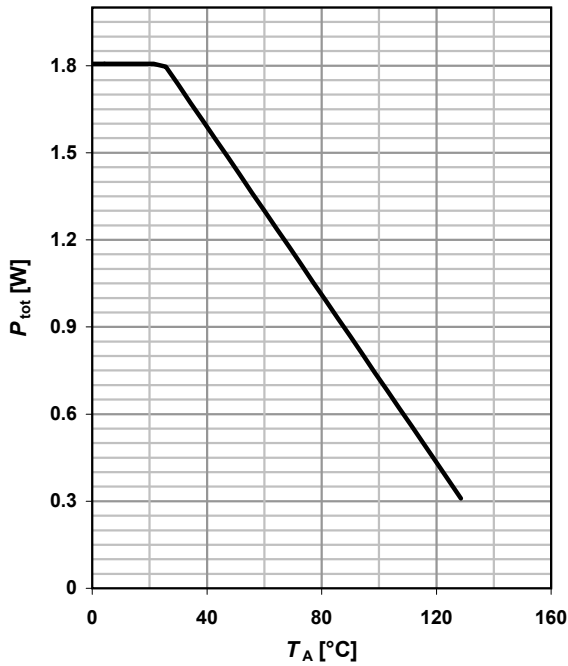
Gate to source charge	$Q_{gs}$	$V_{DD}=-48\text{ V}, I_D=-1.9\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	-1.4	-1.9	nC
Gate to drain charge	$Q_{gd}$		-	-4.9	-7.4	
Gate charge total	$Q_g$		-	-10	-14	
Gate plateau voltage	$V_{plateau}$		-	-4.34	-	V

**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	-1.98	A
Diode pulse current	$I_{S,pulse}$		-	-	-7.6	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=-1.9\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	-0.83	-1.1	V
Reverse recovery time	$t_{rr}$	$V_R=30\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	36	54	ns
Reverse recovery charge	$Q_{rr}$		-	41	62	

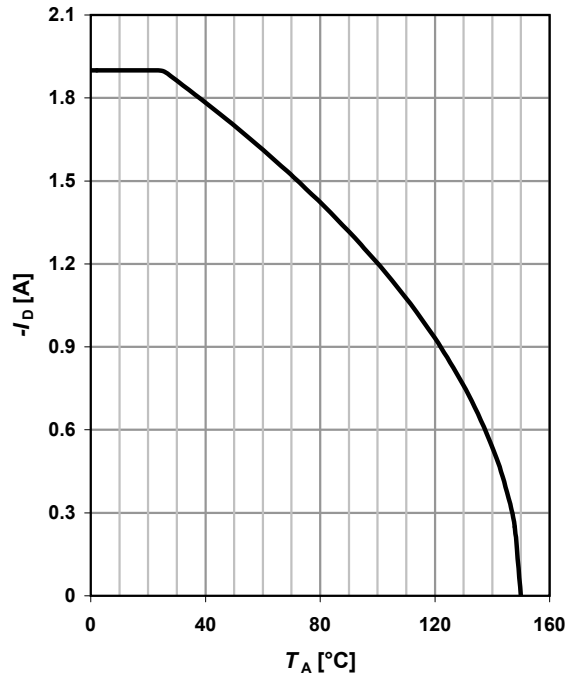
**1 Power dissipation**

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



**2 Drain current**

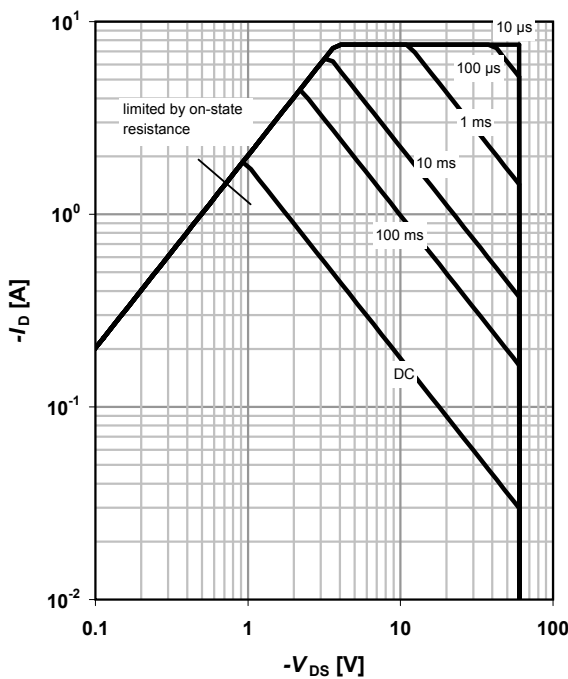
$$I_D = f(T_A); |V_{GS}| \geq 10 \text{ V}$$



**3 Safe operating area**

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

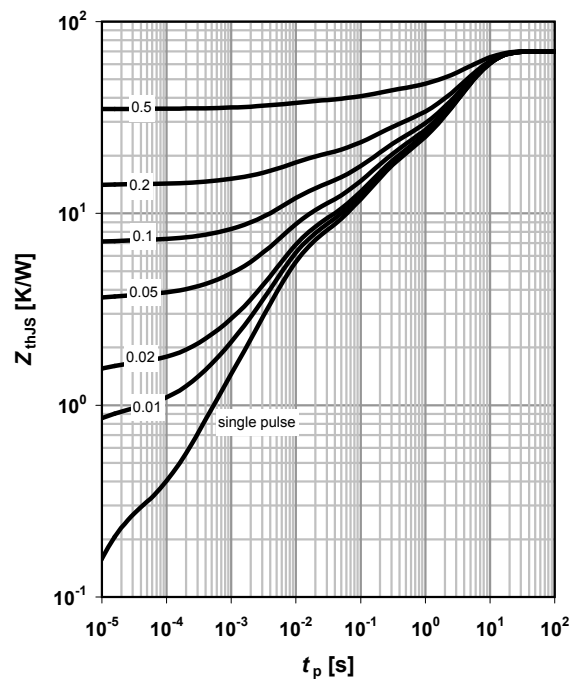
parameter:  $t_p$



**4 Max. transient thermal impedance**

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

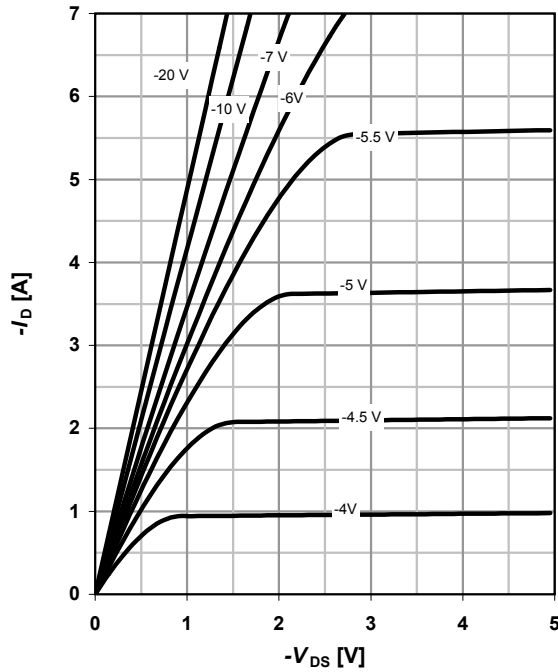
parameter:  $D = t_p/T$



**5 Typ. output characteristics**

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

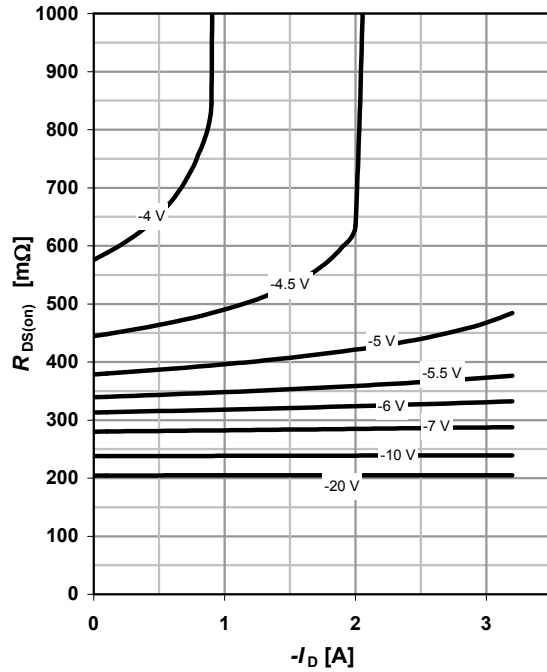
parameter:  $V_{GS}$



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

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

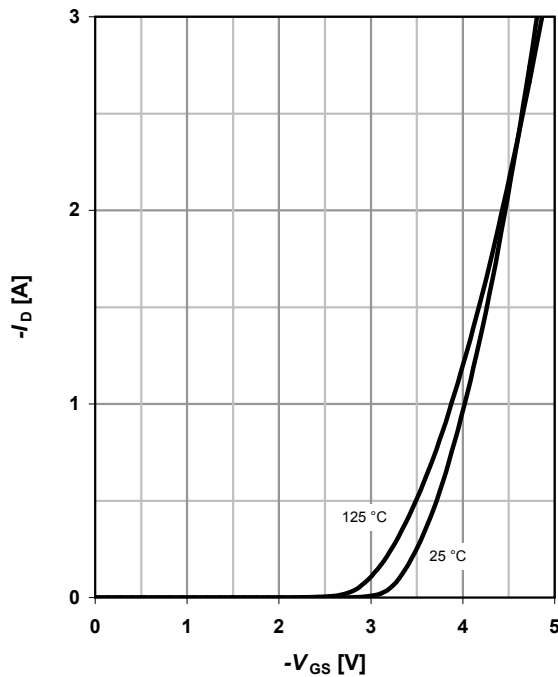
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

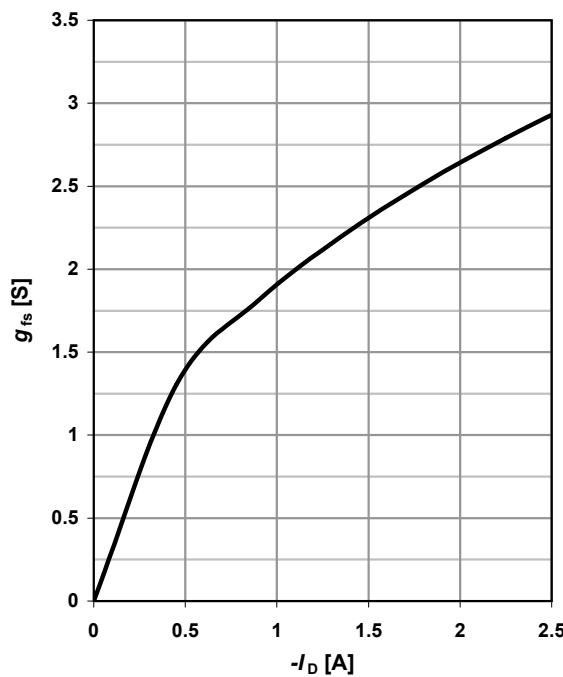
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



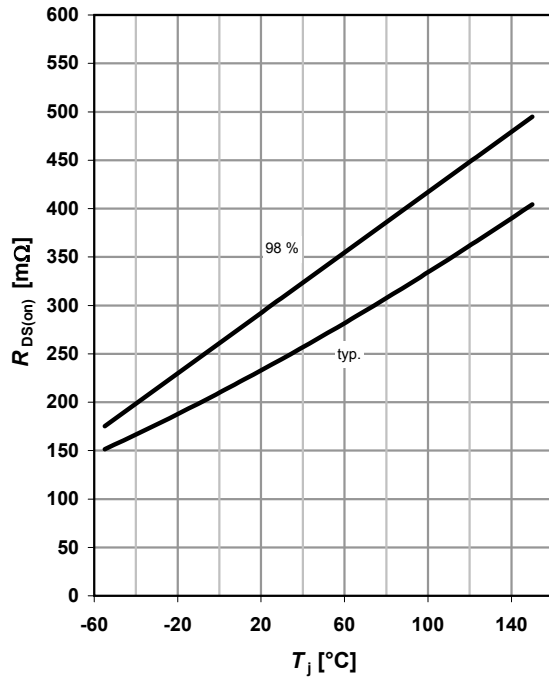
**8 Typ. forward transconductance**

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



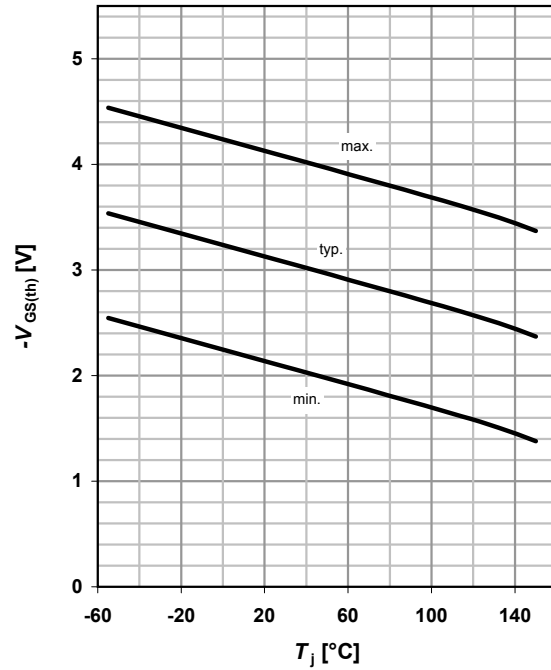
**9 Drain-source on-state resistance**

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



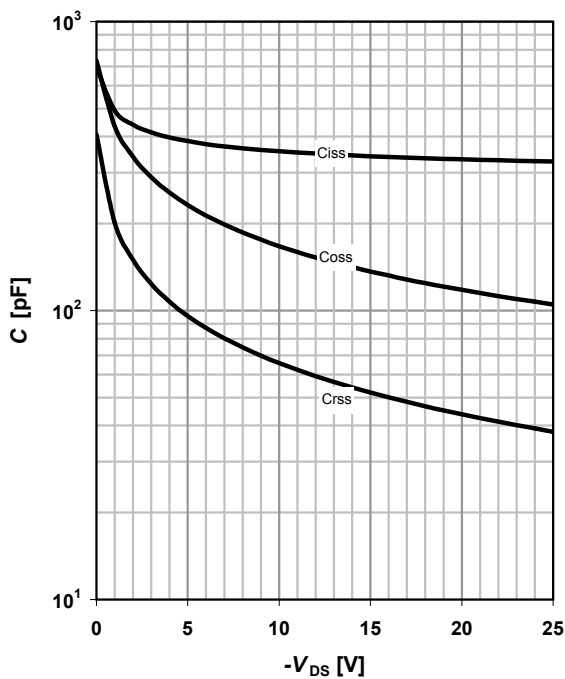
**10 Typ. gate threshold voltage**

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -250 \mu\text{A}$$



**11 Typ. capacitances**

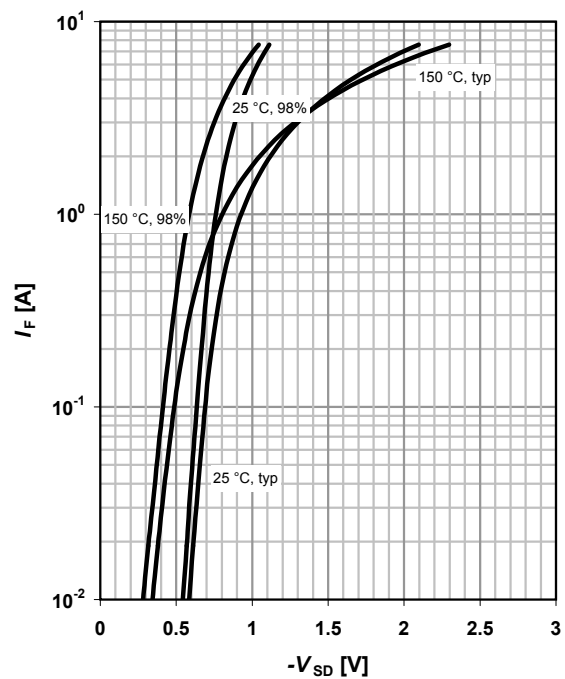
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



**12 Forward characteristics of reverse diode**

$$I_F = f(V_{SD})$$

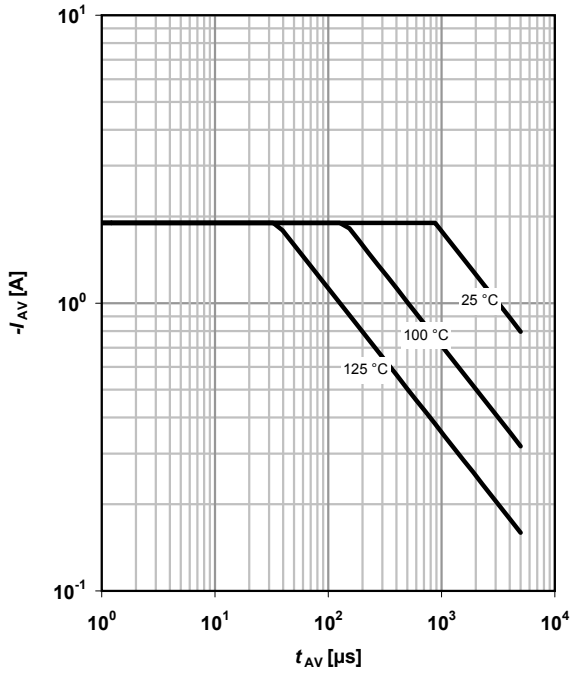
parameter:  $T_j$



**13 Avalanche characteristics**

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

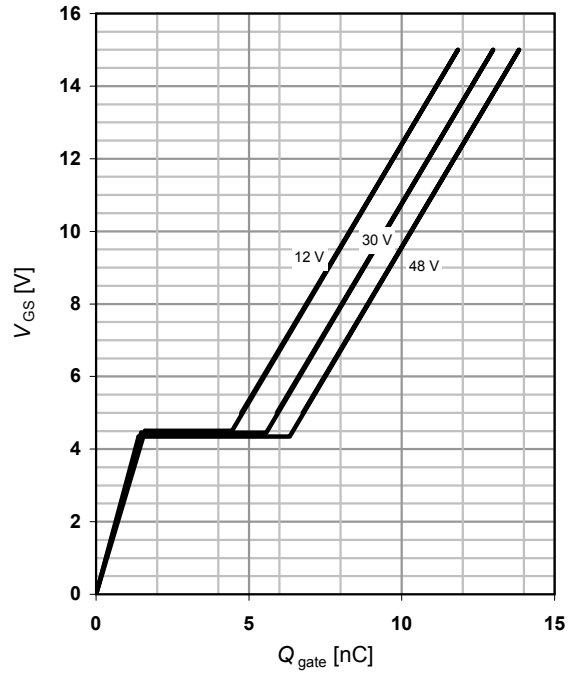
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

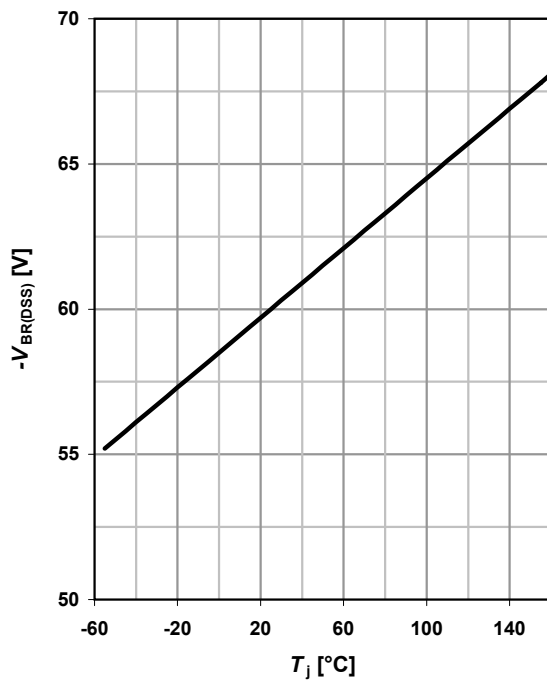
$V_{GS}=f(Q_{gate}); I_D=-1.9 \text{ A pulsed}$

parameter:  $V_{DD}$



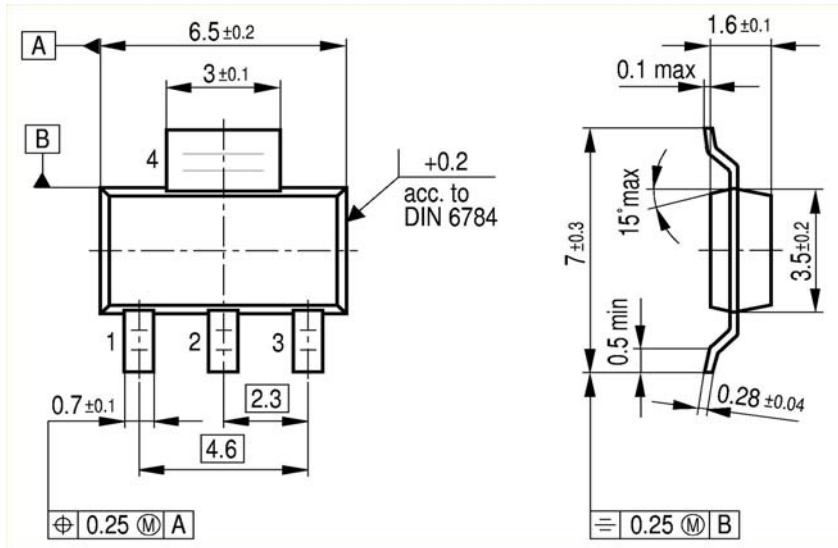
**15 Drain-source breakdown voltage**

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

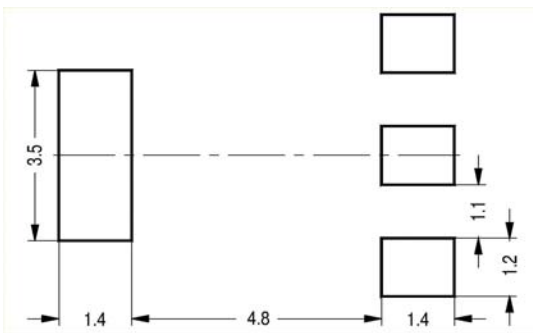


Package Outline

SOT-223: Outline

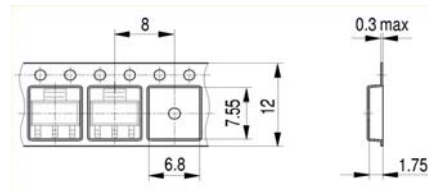


Footprint



Packaging

Tape



Dimensions in mm



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