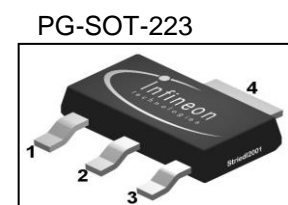
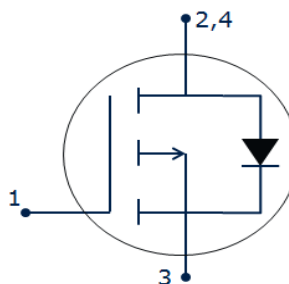


**OptiMOS™-P Small-Signal-Transistor**
**Features**

- P-channel
- Enhancement mode
- Logic level (4.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100% lead-free; RoHS compliant
- Halogen-free according to AEC61249-2-21

**Product Summary**

$V_{DS}$		-60	V
$R_{DS(on),max}$	$V_{GS}=10\text{ V}$	120	m $\Omega$
	$V_{GS}=4.5\text{ V}$	170	
$I_D$		-3	A



Type	Package	Tape and Reel Information	Marking	Halogen Free	Packing
BSS612P	SOT223	H6327: 1000 pcs/ reel	BSP612P	Yes	Non dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_A=25\text{ °C}$	-3.0	A
		$T_A=70\text{ °C}$	-2.44	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	-12	
Avalanche energy, single pulse	$E_{AS}$	$I_D=-3\text{ A}$ , $V_{DD}=-25\text{ V}$ , $R_{GS}=25\text{ }\Omega$	150	mJ
Reverse diode $dv/dt$	$dv/dt$	$I_D=-3\text{ A}$ , $V_{DS}=-48\text{ V}$ , $di/dt=200\text{ A}/\mu\text{s}$ , $T_{j,max}=150\text{ °C}$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	V
Power dissipation <sup>1)</sup>	$P_{tot}$	$T_A=25\text{ °C}$	1.8	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 150	$^{\circ}\text{C}$
ESD Class		JESD22-A114 -HBM	1C	V
Soldering Temperature			260 $^{\circ}\text{C}$	$^{\circ}\text{C}$
IEC climatic category; DIN IEC 68-1			55/150/56	$^{\circ}\text{C}$

OptiMOS™-P Small-Signal-Transis	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
<b>Thermal characteristics</b>						
Thermal resistance, junction - soldering point (Pin 4)	$R_{thJS}$				25	K/W
Thermal resistance, junction - ambient	$R_{thJA}$	minimal footprint			100	
Thermal resistance, junction - ambient	$R_{thJA}$	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	$V_{GS(th)}$	$V_{DS}=0\text{ V}, I_D=-1\text{ mA}$	-2.0	-1.5	-1.0	
Drain-source leakage current	$I_{DSS}$	$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-	-40	nA
		$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$	-	-	-20	$\mu\text{A}$
Gate-source leakage current	$I_{GSS}$	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5\text{ V}, I_D=-2.3\text{ A}$	-	140	170	m $\Omega$
		$V_{GS}=-10\text{ V}, I_D=-3\text{ A}$	-	101	120	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=2.44\text{ A}$		4.6	-	S

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

OptiMOS™-P Small-Signal-Transis	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics<sup>2)</sup>**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=-25\text{ V},$ $f=1\text{ MHz}$	-	814	1083	pF
Output capacitance	$C_{oss}$		-	248	330	
Reverse transfer capacitance	$C_{rss}$		-	109	163	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-30\text{ V}, V_{GS}=-$ $10\text{ V}, I_D=-3\text{ A},$ $R_{G,ext}=2.7\ \Omega$	-	8.3	12.5	ns
Rise time	$t_r$		-	10.4	15.6	
Turn-off delay time	$t_{d(off)}$		-	43.2	64.8	
Fall time	$t_f$		-	11.3	17.0	

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

Gate to source charge	$Q_{gs}$	$V_{DD}=-48\text{ V}, I_D=-3\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	-2.42	-3.2	nC
Gate to drain charge	$Q_{gd}$		-	-10.1	-15.2	
Gate charge total	$Q_g$		-	-26.3	-39.4	
Gate plateau voltage	$V_{plateau}$		-	-3.1	-	V

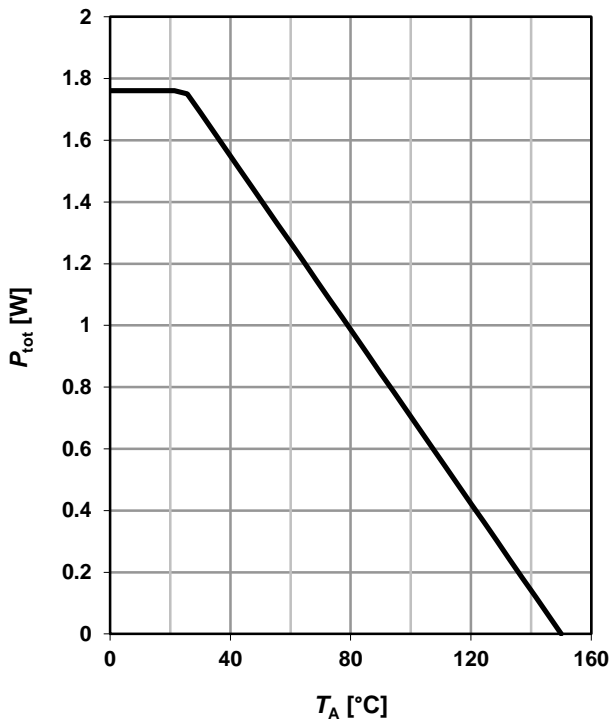
**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ °C}$	-	-	-3.0	A
Diode pulse current	$I_{S,pulse}$		-	-	-12	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=-3\text{ A},$	-	0.80	1.1	V
Reverse recovery time <sup>2)</sup>	$t_{rr}$	$V_R=-30\text{ V}, I_F=-3\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	44.8	67.2	ns
Reverse recovery charge <sup>2)</sup>	$Q_{rr}$		-	62.9	94.4	nC

<sup>2)</sup> Defined by design. Not subjected to production test

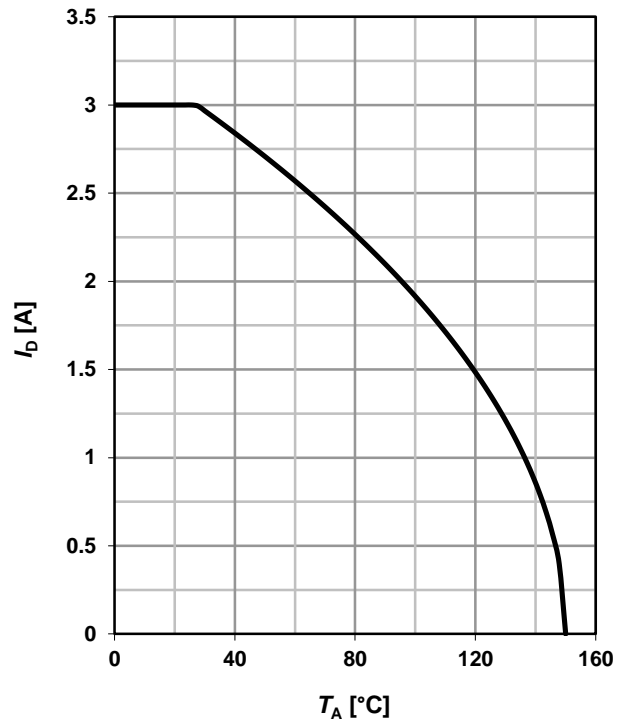
**1 Power dissipation**

$P_{tot}=f(T_A)$



**2 Drain current**

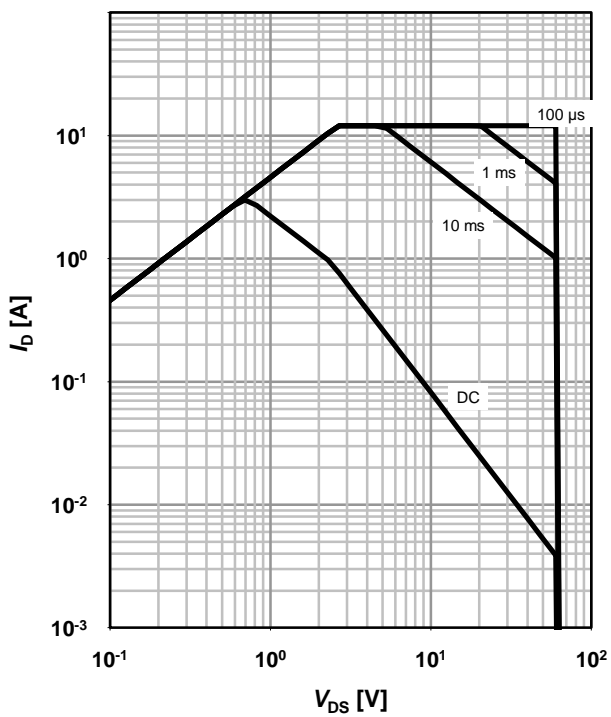
$I_D=f(T_A); V_{GS}\leq-10\text{ V}$



**3 Safe operating area**

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

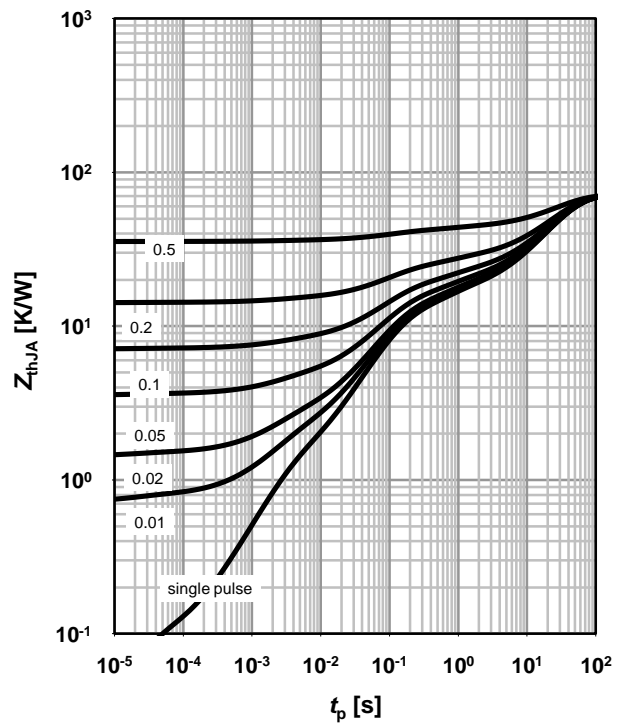
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJA}=f(t_p)$

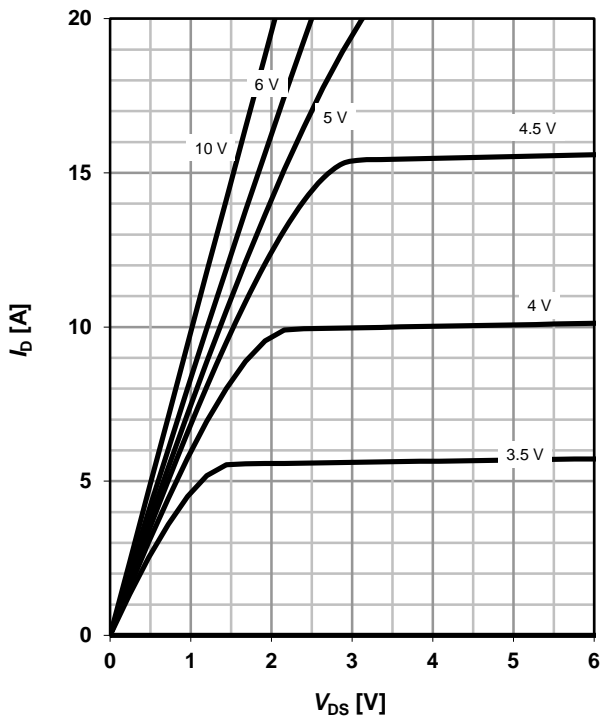
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

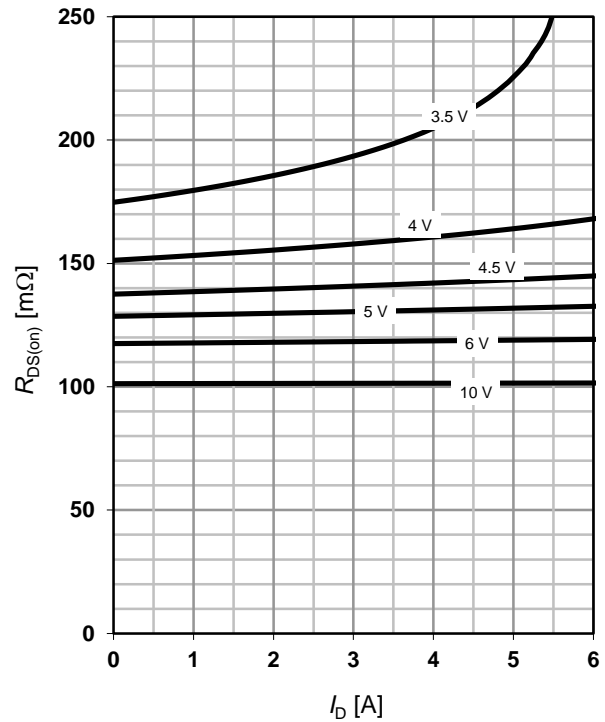
parameter:  $V_{GS}$



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

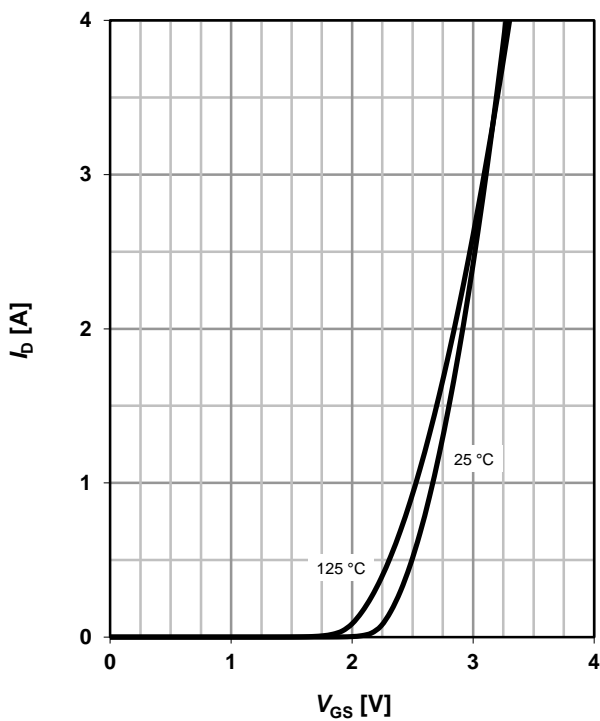
$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

parameter:  $V_{GS}$



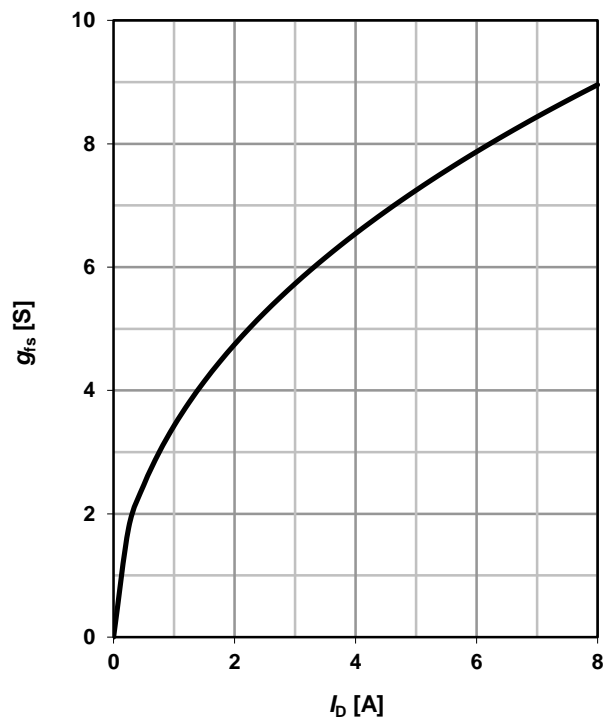
**7 Typ. transfer characteristics**

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



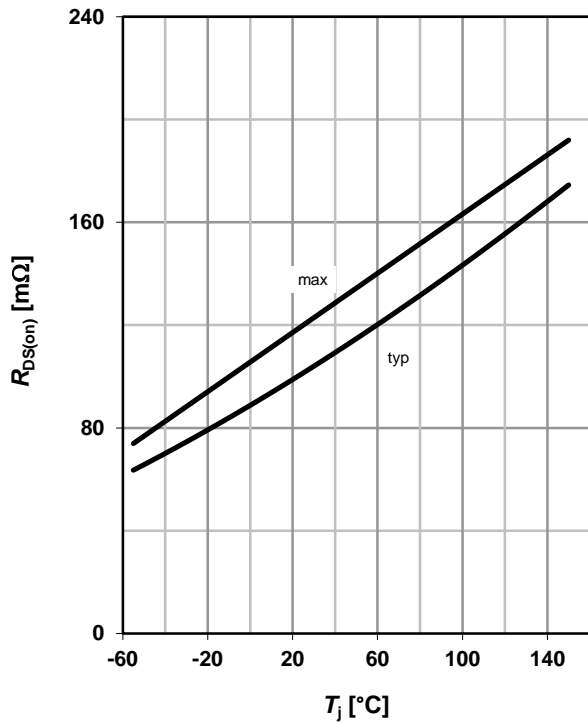
**8 Typ. forward transconductance**

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



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

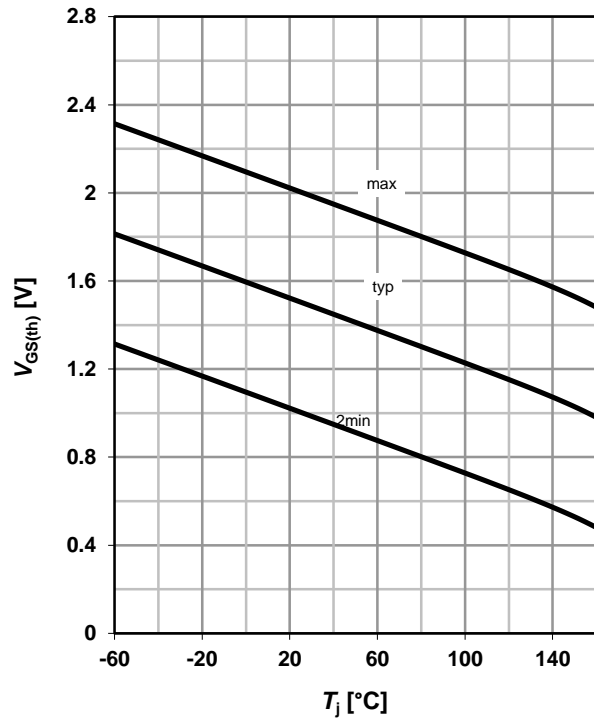
$R_{DS(on)}=f(T_j); I_D=-3\text{ A}; V_{GS}=-10\text{ V}$



**10 Typ. gate threshold voltage**

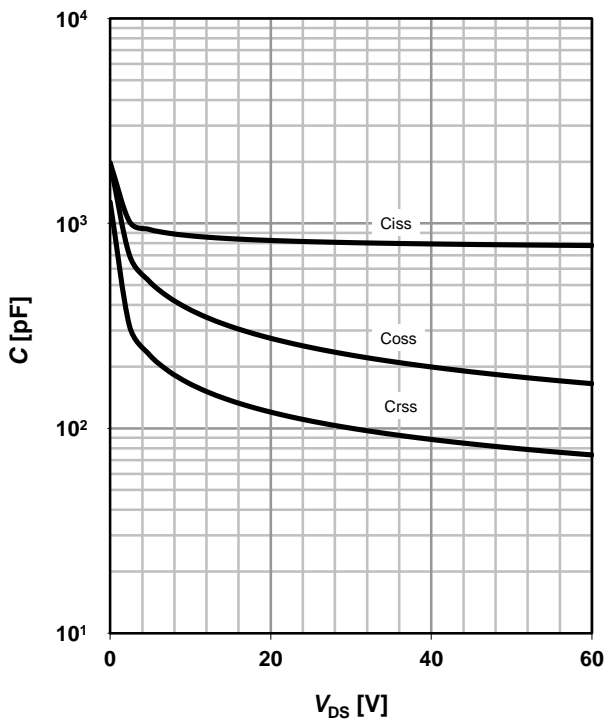
$V_{GS(th)}=f(T_j); V_{DS}=V_{GS}; I_D=-1\text{ mA}$

parameter:  $I_D$



**11 Typ. capacitances**

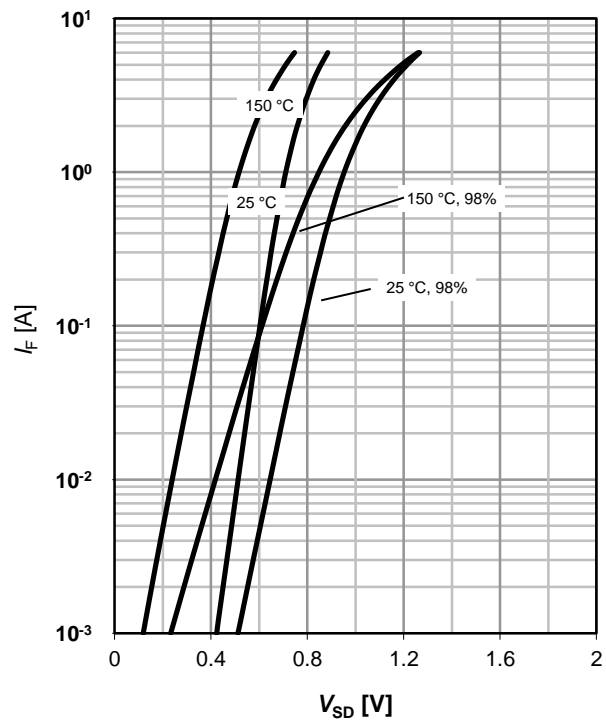
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}; T_j=25^\circ\text{C}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

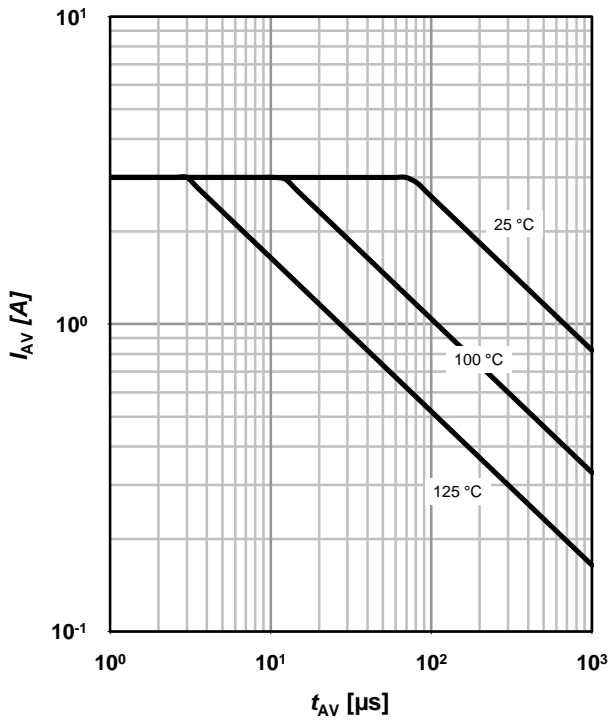
parameter:  $T_j$



**13 Avalanche characteristics**

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

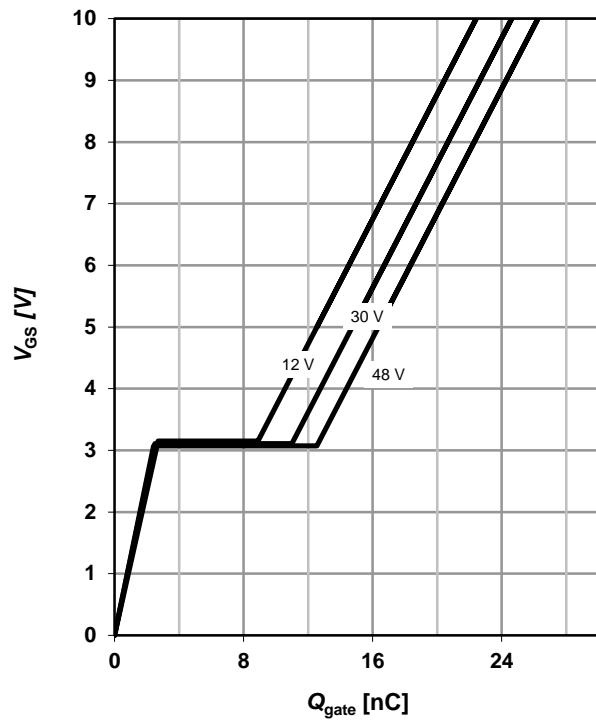
parameter:  $T_{j(\text{start})}$



**14 Typ. gate charge**

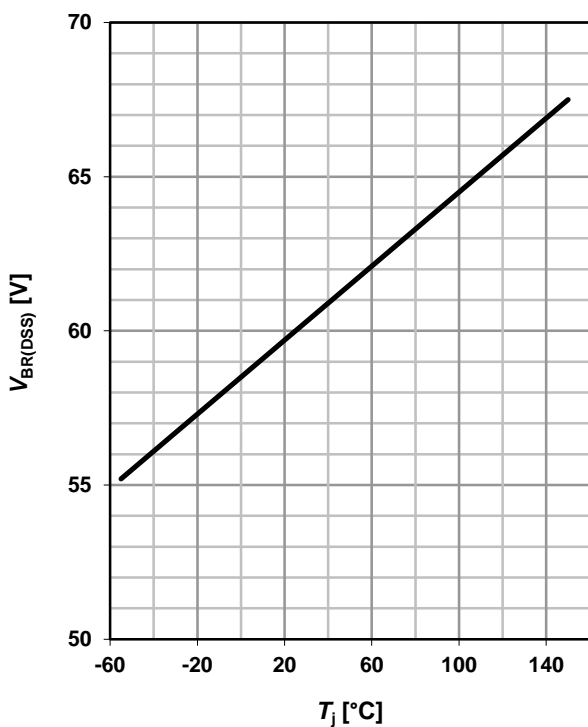
$V_{GS}=f(Q_{\text{gate}}); I_D=-3 \text{ A pulsed}$

parameter:  $V_{DD}$

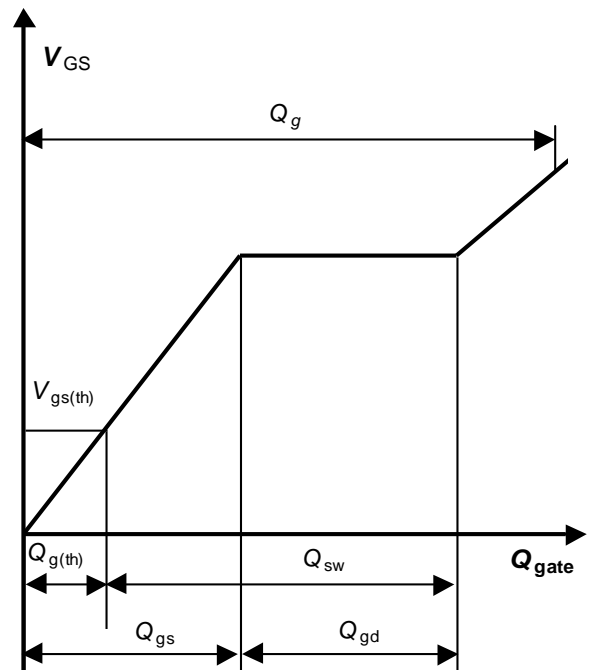


**15 Drain-source breakdown voltage**

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

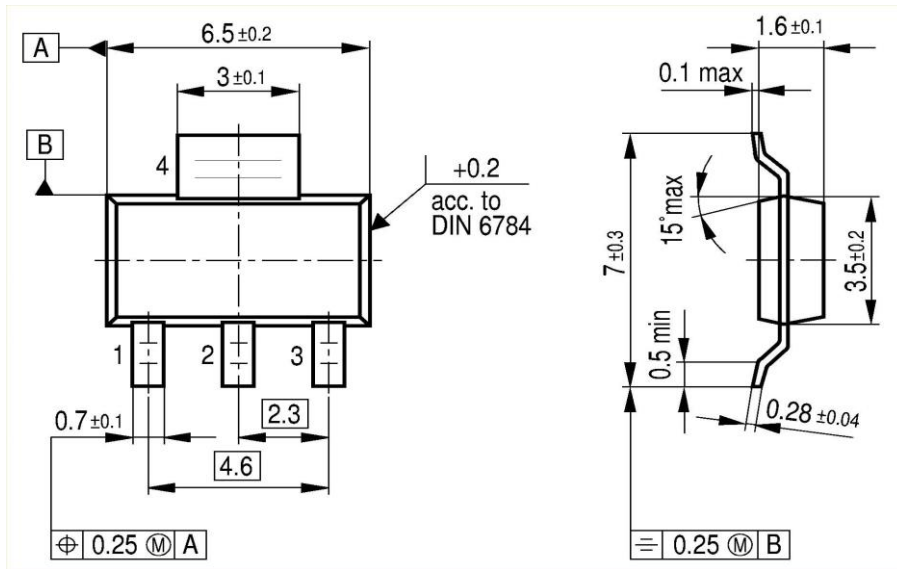


**16 Gate charge waveforms**



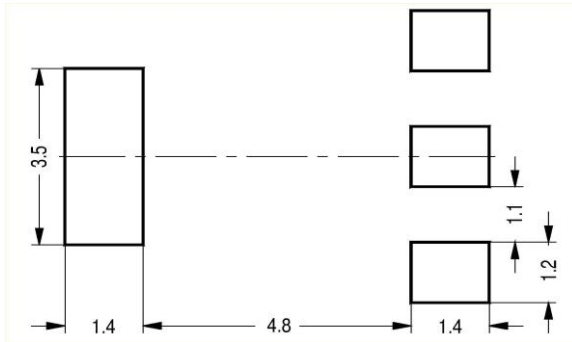
SOT223

Package Outline:

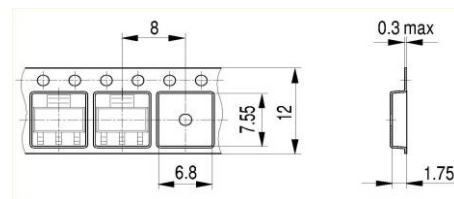


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Footprint:



Packaging:





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