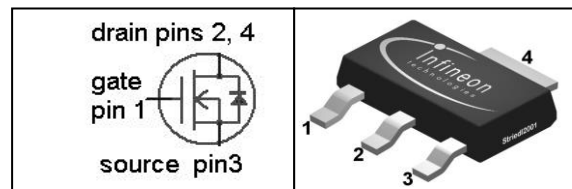


**SIPMOS<sup>®</sup> Small-Signal-Transistor**
**Features**

- N-channel
- Depletion mode
- dv/dt rated
- Available with  $V_{GS(th)}$  indicator on reel
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21


**Product Summary**

$V_{DS}$	400	V
$R_{DS(on).max}$	24	$\Omega$
$I_{DSS.min}$	40	mA

**PG-SOT223**


Type	Package	Tape and Reel	Marking	Halogen-	Packaging
BSP179	PG-SOT223	H6327: 1000 pcs/reel	BSP179	Yes	Non dry
BSP179	PG-SOT223	H6906: 1000 pcs/reel sorted in $V_{GS(th)}$ bands <sup>1)</sup>	BSP179	Yes	Non dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_A=25\text{ °C}$	0.21	A
		$T_A=70\text{ °C}$	0.17	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	0.83	
Reverse diode dv/dt	dv/dt	$I_D=0.21\text{ A}$ , $V_{DS}=20\text{ V}$ , $di/dt=200\text{ A}/\mu\text{s}$ , $T_{j,max}=150\text{ °C}$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	V
ESD sensitivity (HBM) as per JESD-A114-HBM			1A (>250V, <500V)	
Power dissipation	$P_{tot}$	$T_A=25\text{ °C}$	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	

<sup>1)</sup> see table on next page and diagram 11

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
<b>Thermal characteristics</b>						
Thermal resistance, junction - soldering point (pin 4)	$R_{thJS}$		-	-	25	K/W
SMD version, device on PCB	$R_{thJA}$	minimal footprint	-	-	115	
		6 cm <sup>2</sup> cooling area <sup>2)</sup>	-	-	70	

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

**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=-3\text{ V}, I_D=250\text{ }\mu\text{A}$	400	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=3\text{ V}, I_D=94\text{ }\mu\text{A}$	-2.1	-1.4	-1	
Drain-source cutoff current	$I_{D(off)}$	$V_{DS}=400\text{ V}, V_{GS}=-3\text{ V}, T_j=25\text{ °C}$	-	-	0.1	$\mu\text{A}$
		$V_{DS}=400\text{ V}, V_{GS}=-3\text{ V}, T_j=150\text{ °C}$	-	-	10	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
On-state drain current	$I_{DSS}$	$V_{GS}=0\text{ V}, V_{DS}=10\text{ V}$	40	-	-	mA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=0\text{ V}, I_D=0.01\text{ A}$	-	18	24	$\Omega$
		$V_{GS}=10\text{ V}, I_D=0.21\text{ A}$	-	13	18	
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=0.17\text{ A}$		0.21	-	S

**Threshold voltage  $V_{GS(th)}$  sorted in bands<sup>3)</sup>**

J	$V_{GS(th)}$	$V_{DS}=3\text{ V}, I_D=94\text{ }\mu\text{A}$	-1.2	-	-1	V
K			-1.35	-	-1.15	
L			-1.5	-	-1.30	
M			-1.65	-	-1.45	
N			-1.8	-	-1.6	

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

<sup>3)</sup> Each reel contains transistors out of one band whose identifying letter is printed on the reel label. A specific band cannot be ordered separately.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics<sup>4)</sup>**

Input capacitance	$C_{iss}$	$V_{GS}=-3\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	102	135	pF
Output capacitance	$C_{oss}$		-	10	14	
Reverse transfer capacitance	$C_{rss}$		-	6	9	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=200\text{ V},$ $V_{GS}=-3\dots 5\text{ V},$ $I_D=0.2\text{ A}, R_{G,ext}=25\ \Omega$	-	6.1	9.2	ns
Rise time	$t_r$		-	8.8	13.1	
Turn-off delay time	$t_{d(off)}$		-	17	25	
Fall time	$t_f$		-	68	102	

**Gate Charge Characteristics<sup>4)</sup>**

Gate to source charge	$Q_{gs}$	$V_{DD}=400\text{ V},$ $I_D=0.21\text{ A},$ $V_{GS}=-3\text{ to }5\text{ V}$	-	0.43	0.65	nC
Gate to drain charge	$Q_{gd}$		-	2.2	3.3	
Gate charge total	$Q_g$		-	4.5	6.8	
Gate plateau voltage	$V_{plateau}$		-	0.49	-	V

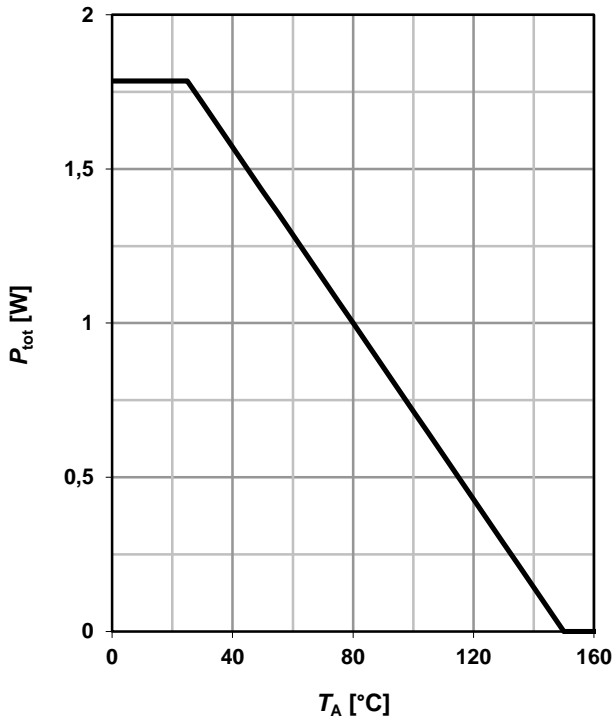
**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	0.21	A
Diode pulse current	$I_{S,pulse}$		-	-	0.83	
Diode forward voltage	$V_{SD}$	$V_{GS}=-3\text{ V}, I_F=0.21\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.84	1.1	V
Reverse recovery time <sup>4)</sup>	$t_{rr}$	$V_R=200\text{ V}, I_F=0.21\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	111	167	ns
Reverse recovery charge <sup>4)</sup>	$Q_{rr}$		-	390	584	nC

<sup>4)</sup> Defined by design. Not subjected to production test

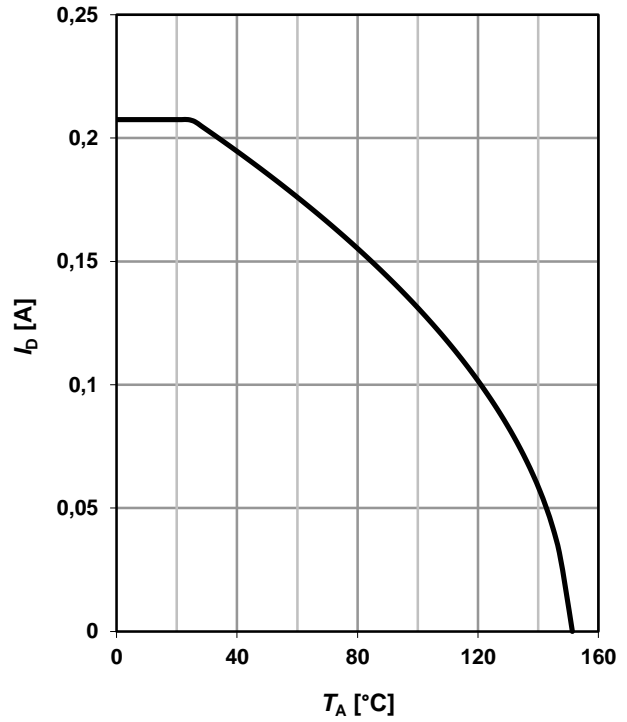
**1 Power dissipation**

$P_{tot}=f(T_A)$



**2 Drain current**

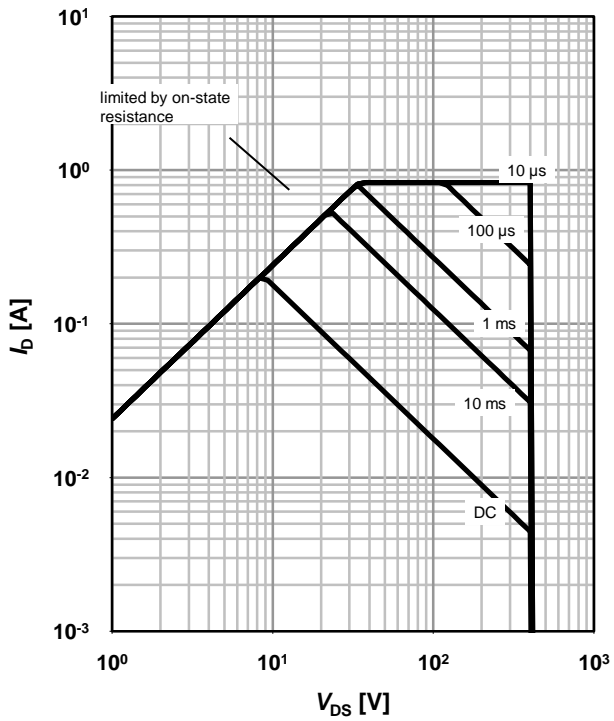
$I_D=f(T_A); V_{GS} \geq 10\text{ V}$



**3 Safe operating area**

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

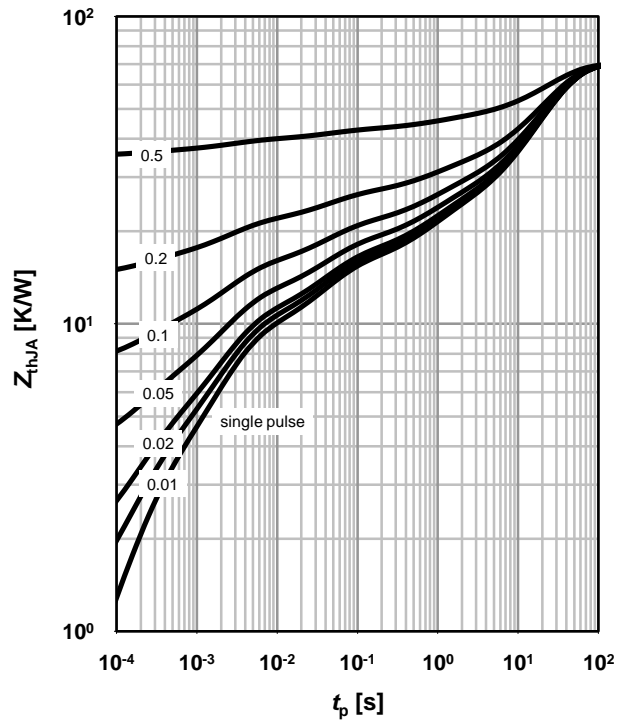
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJA}=f(t_p)$

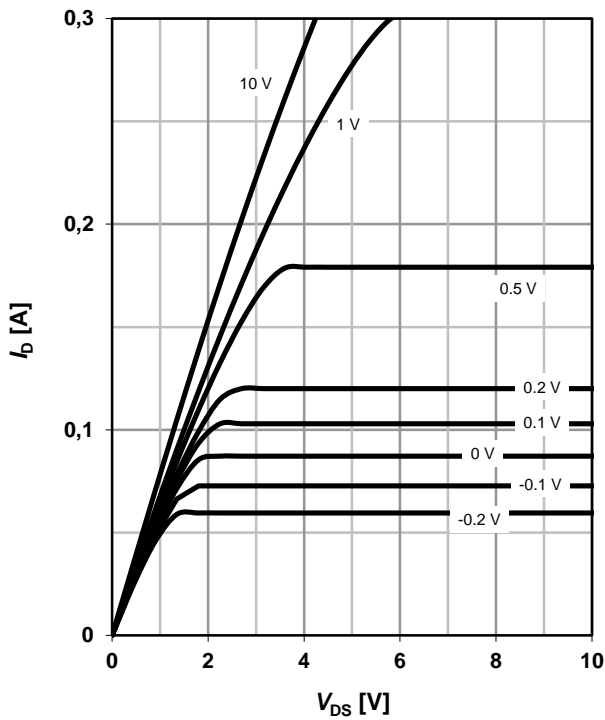
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

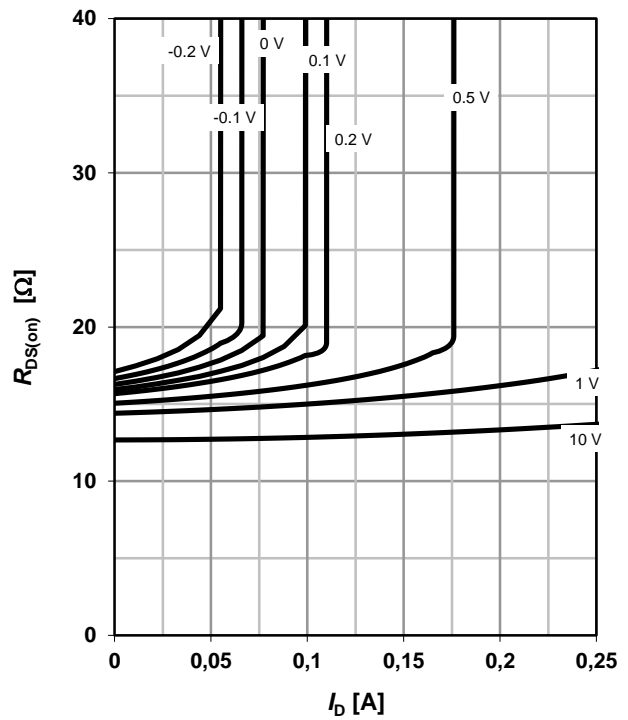
parameter:  $V_{GS}$



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

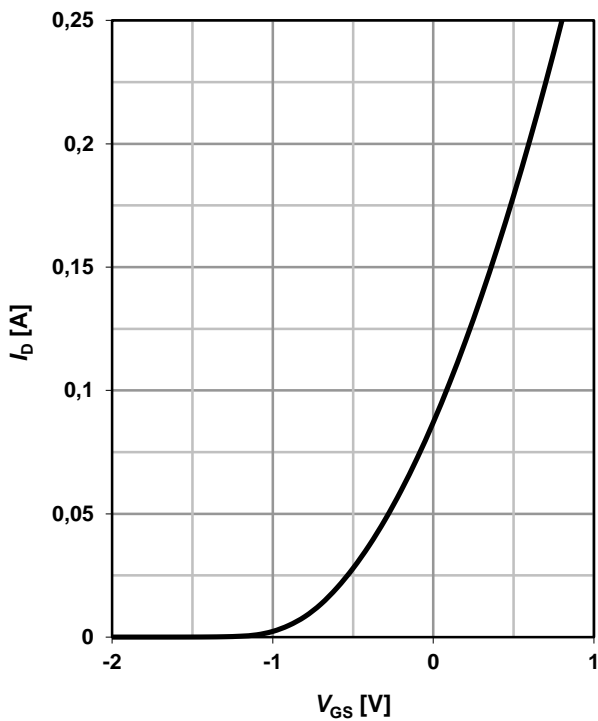
$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

parameter:  $V_{GS}$



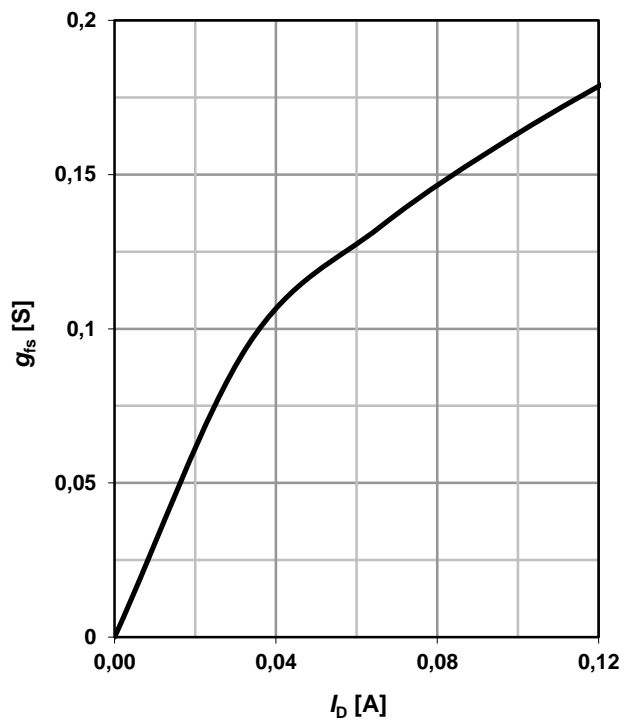
**7 Typ. transfer characteristics**

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



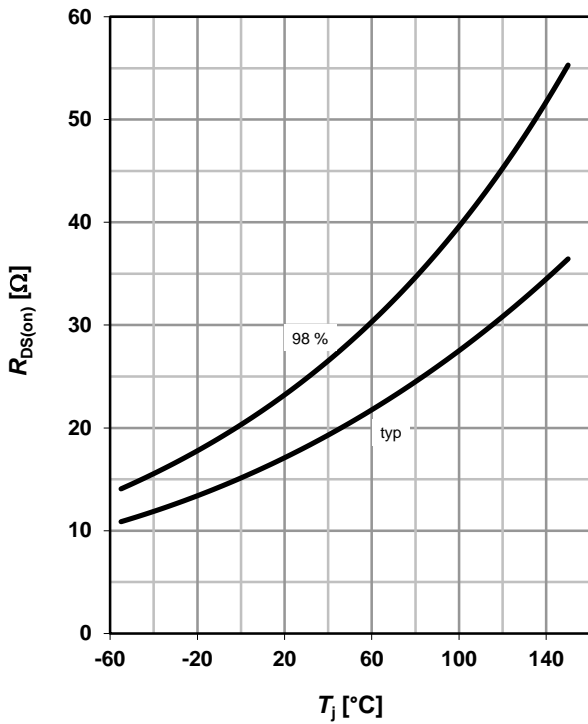
**8 Typ. forward transconductance**

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



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

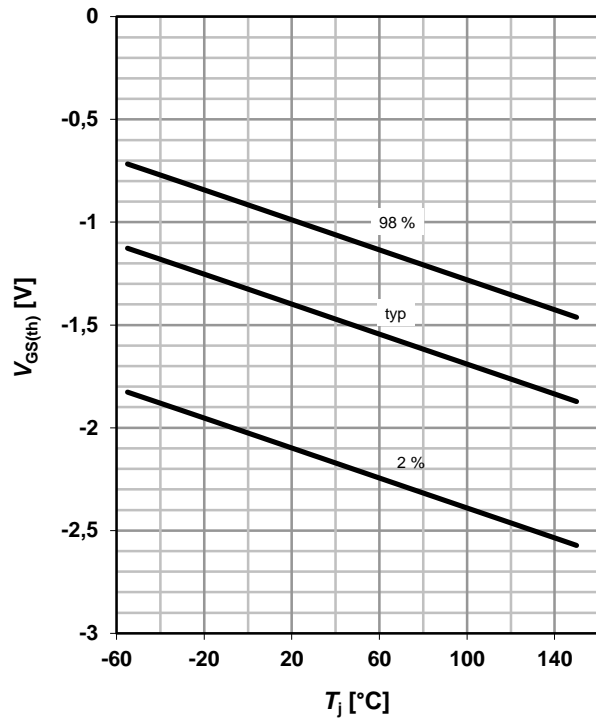
$R_{DS(on)}=f(T_j); I_D=0.01\text{ A}; V_{GS}=0\text{ V}$



**10 Typ. gate threshold voltage**

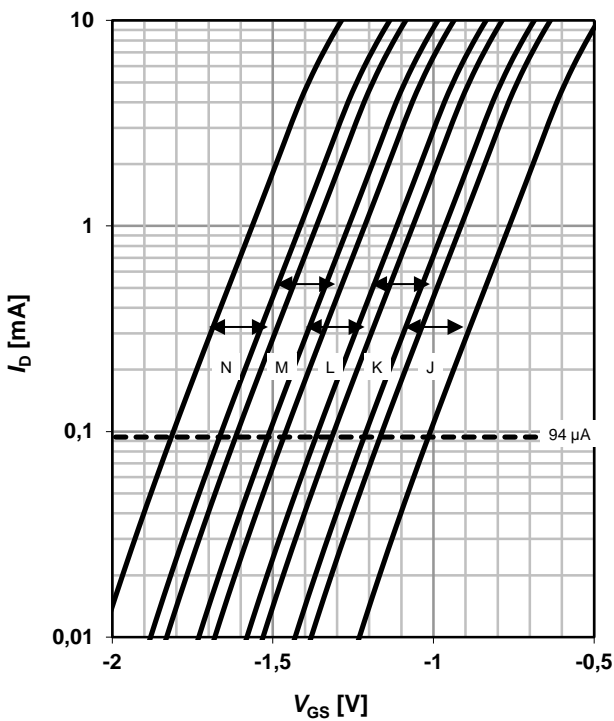
$V_{GS(th)}=f(T_j); V_{DS}=3\text{ V}; I_D=94\text{ }\mu\text{A}$

parameter:  $I_D$



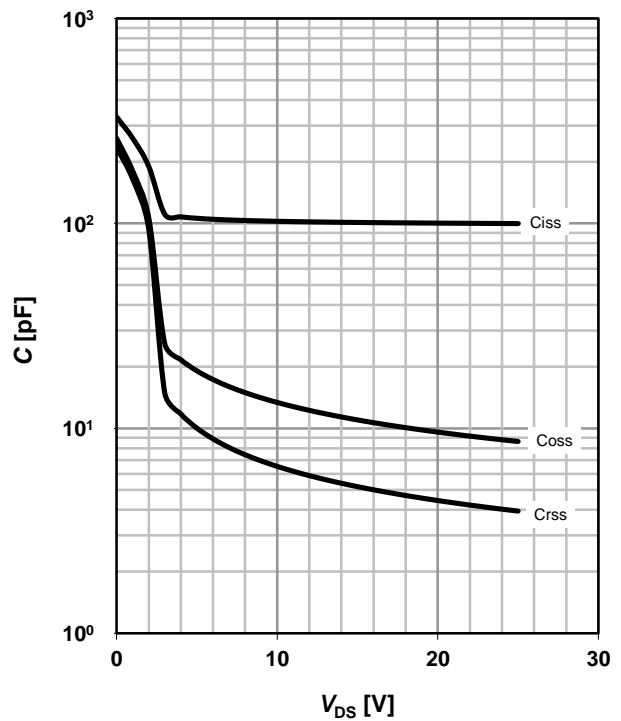
**11 Threshold voltage bands**

$I_D=f(V_{GS}); V_{DS}=3\text{ V}; T_j=25\text{ }^\circ\text{C}$



**12 Typ. capacitances**

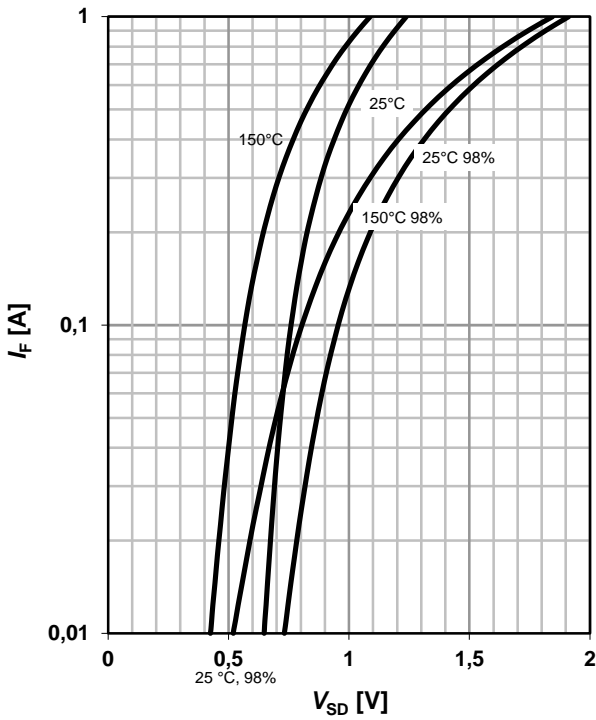
$C=f(V_{DS}); V_{GS}=-3\text{ V}; f=1\text{ MHz}$



**13 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

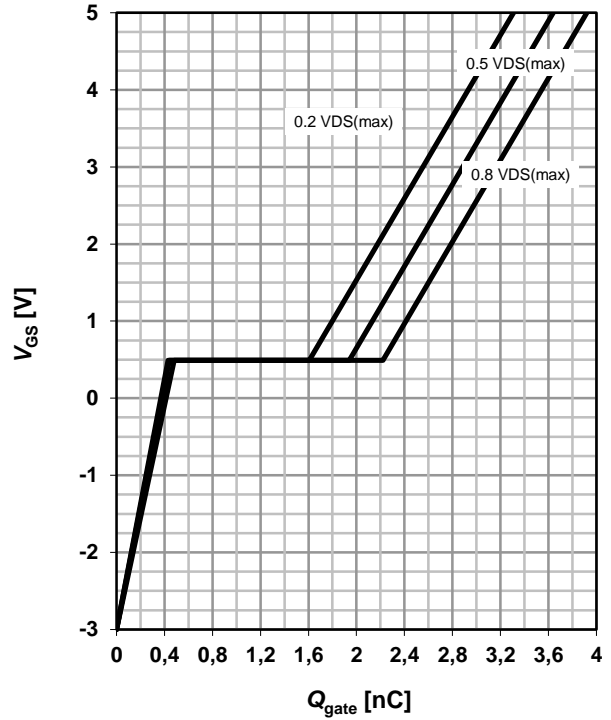
parameter:  $T_j$



**15 Typ. gate charge**

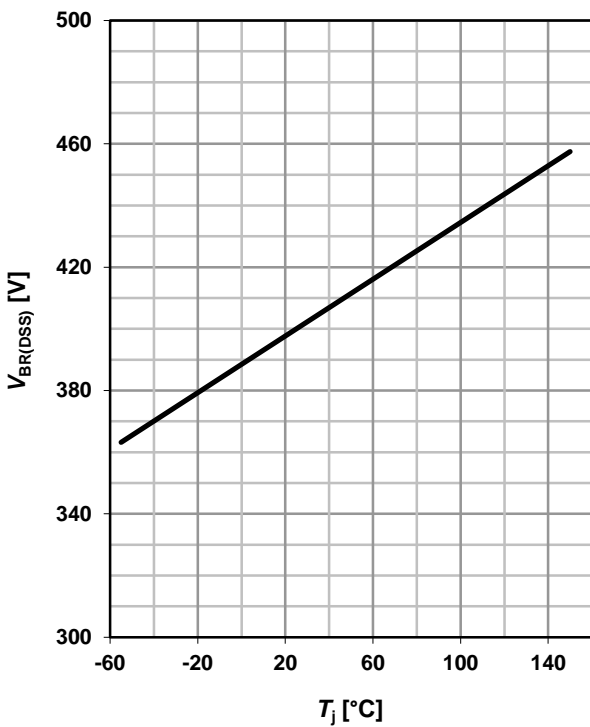
$V_{GS}=f(Q_{gate}); I_D=0.21\text{ A pulsed}$

parameter:  $V_{DD}$

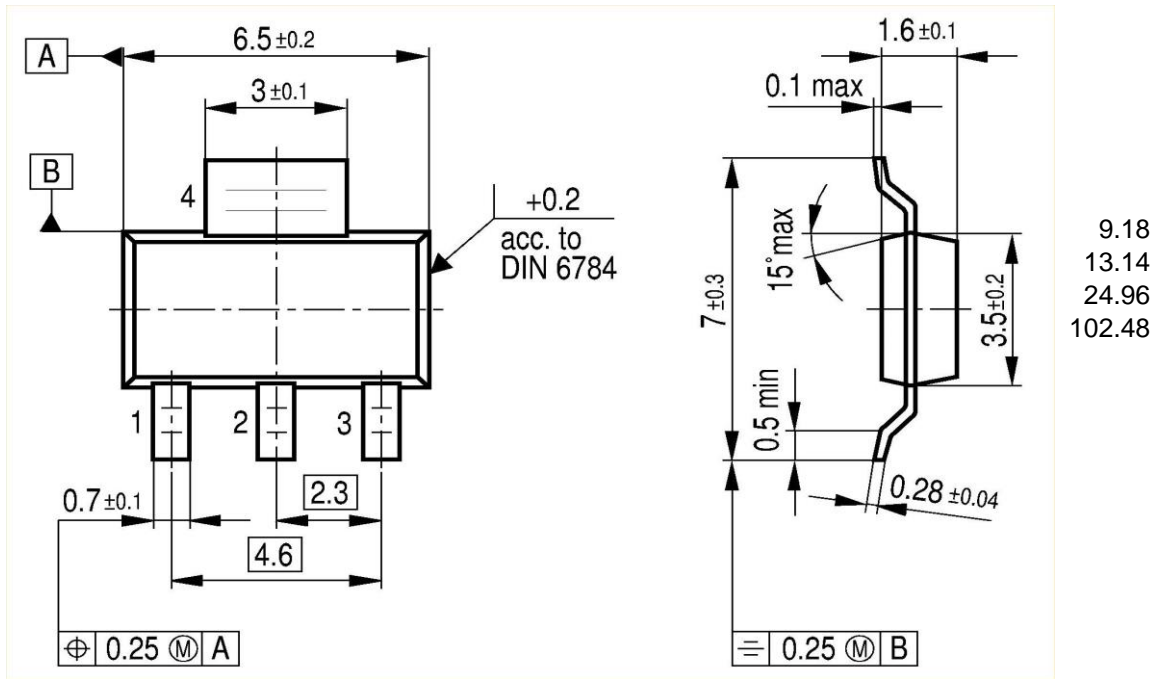


**16 Drain-source breakdown voltage**

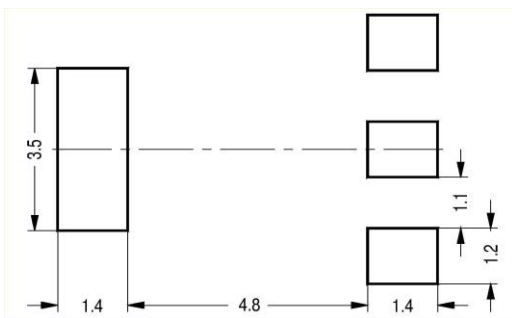
$V_{BR(DSS)}=f(T_j); I_D=250\ \mu\text{A}$



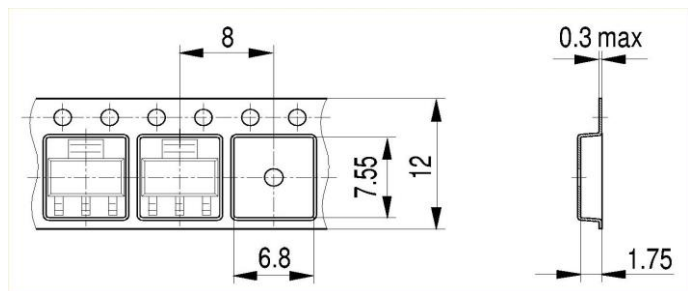
Package Outline:



Footprint:



Packaging:



Dimensions in mm