

SIPMOS® Small-Signal-Transistor

Features

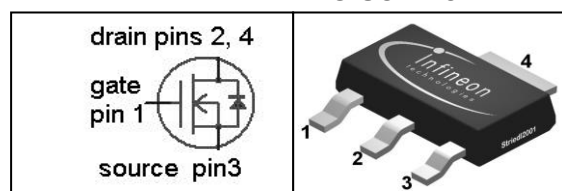
- N-channel
- Depletion mode
- dv/dt rated
- Available with $V_{GS(th)}$ indicator on reel
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21



Product Summary

V_{DS}	400	V
$R_{DS(on),max}$	24	Ω
$I_{DSS,min}$	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 ¹⁾	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	
		$T_A=25\text{ °C}$	0.83	
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/ μs
Gate source voltage	V_{GS}		± 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	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

¹⁾ see table on next page and diagram 11

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - soldering point (pin 4)	R_{thJS}		-	-	25	K/W
SMD version, device on PCB	R_{thJA}	minimal footprint	-	-	115	
		6 cm ² cooling area ²⁾	-	-	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	μA
		$V_{DS}=400\text{ V}$, $V_{GS}=-3\text{ V}$, $T_j=150\text{ °C}$	-	-	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	Ω
		$V_{GS}=10\text{ V}$, $I_D=0.21\text{ A}$	-	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 bands³⁾

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	

²⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (single layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air.

³⁾ 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 characteristics⁴⁾

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	$t_{d(on)}$	$V_{DD}=200\text{ V},$ $V_{GS}=-3\ldots 5\text{ V},$ $I_D=0.2\text{ A}, R_{G,ext}=25\text{ }\Omega$	-	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 Characteristics⁴⁾

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

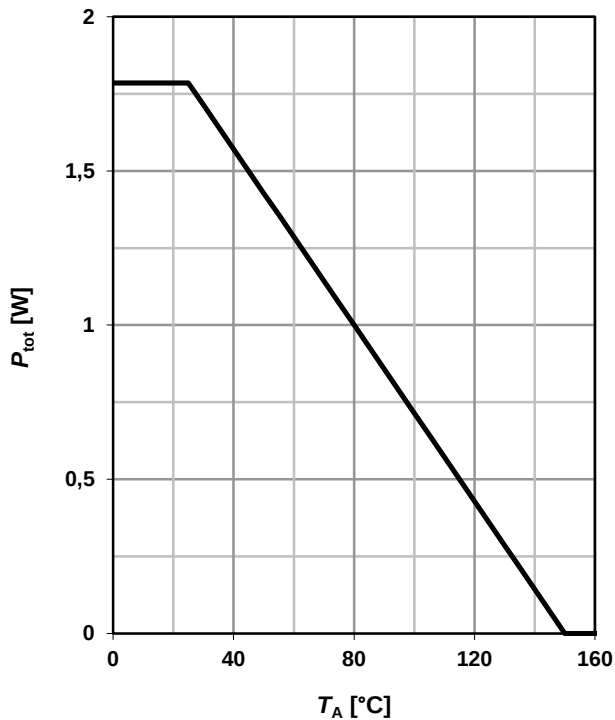
Reverse Diode

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 ⁴⁾	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 ⁴⁾	Q_{rr}		-	390	584	nC

⁴⁾ Defined by design. Not subjected to production test

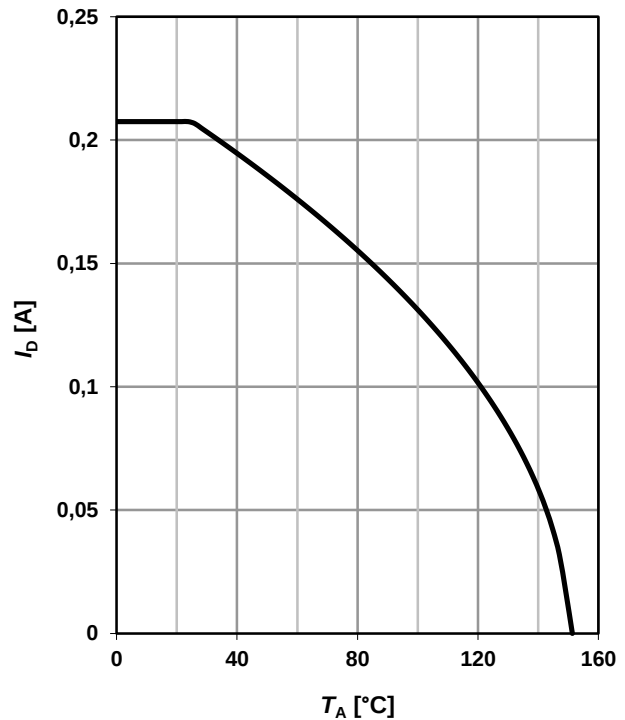
1 Power dissipation

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



2 Drain current

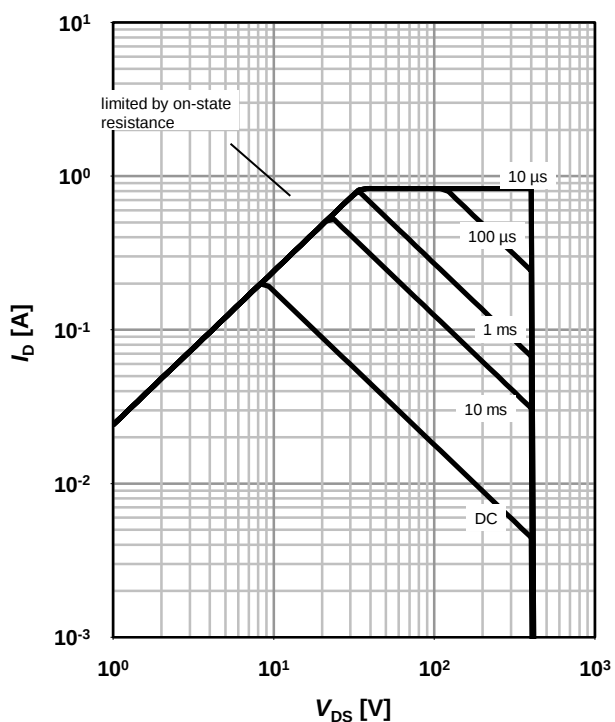
$$I_D = f(T_A); V_{GS} \geq 10 \text{ V}$$



3 Safe operating area

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

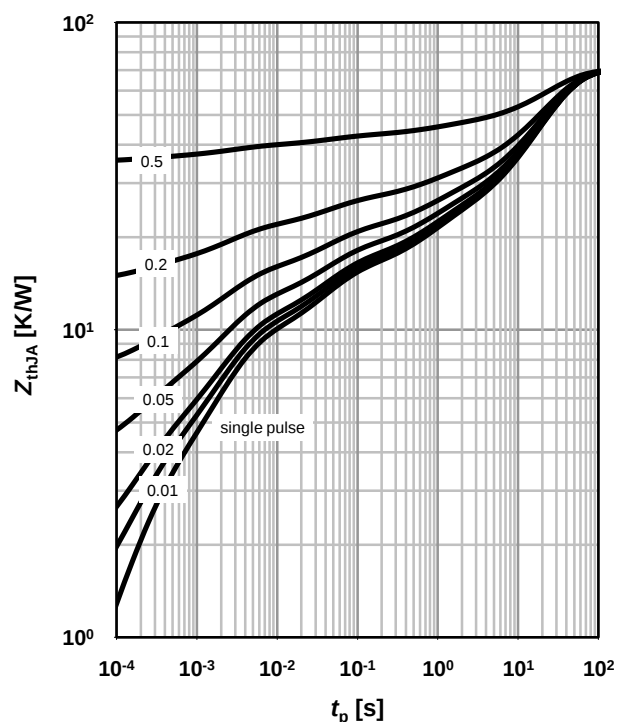
parameter: t_p



4 Max. transient thermal impedance

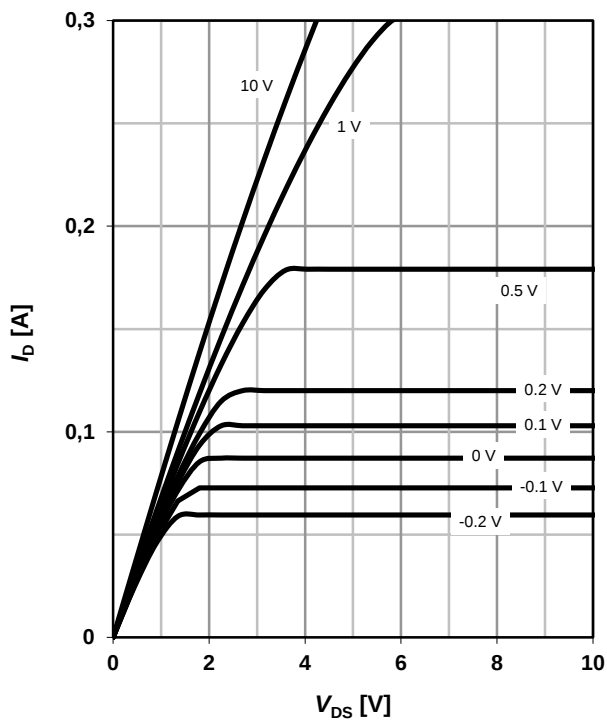
$$Z_{thJA} = f(t_p)$$

parameter: $D = t_p/T$



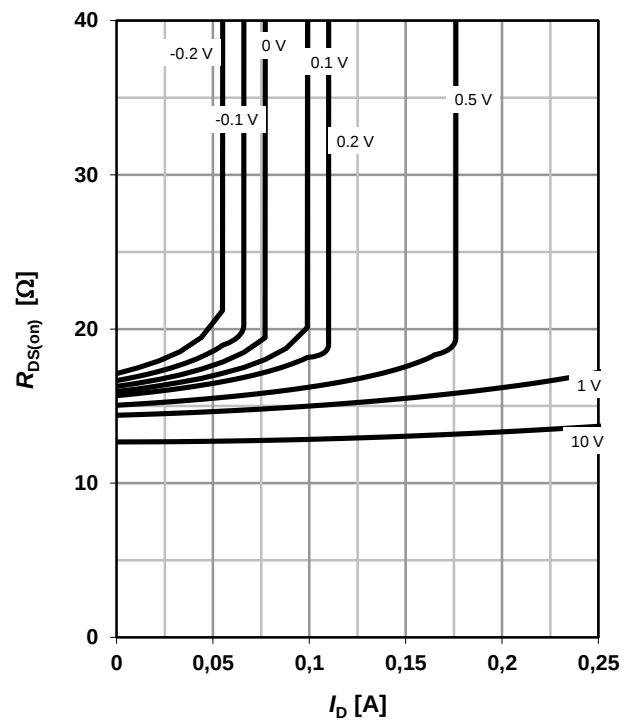
5 Typ. output characteristics

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

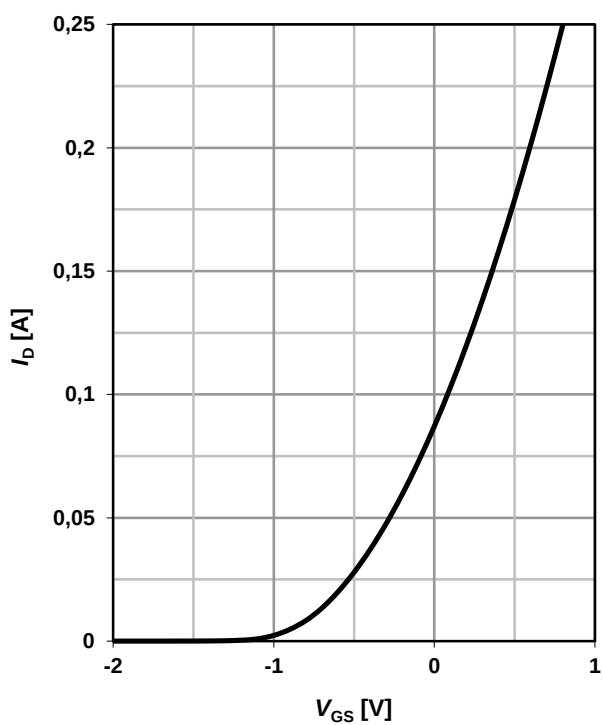
parameter: V_{GS}


6 Typ. drain-source on resistance

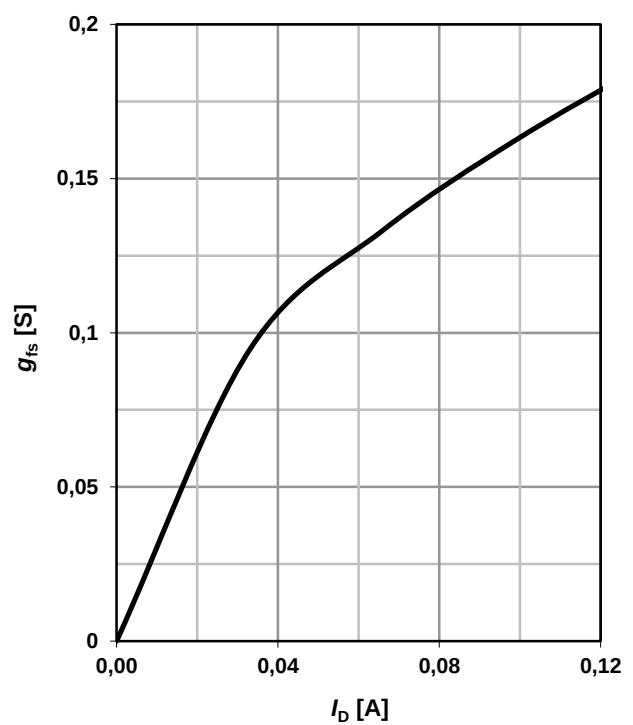
 $R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$

parameter: V_{GS}


7 Typ. transfer characteristics

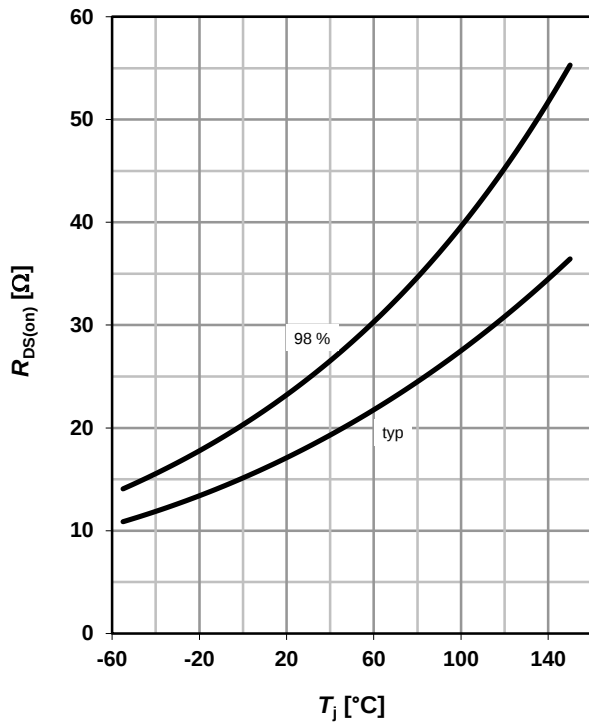
 $I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$


8 Typ. forward transconductance

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


9 Drain-source on-state resistance

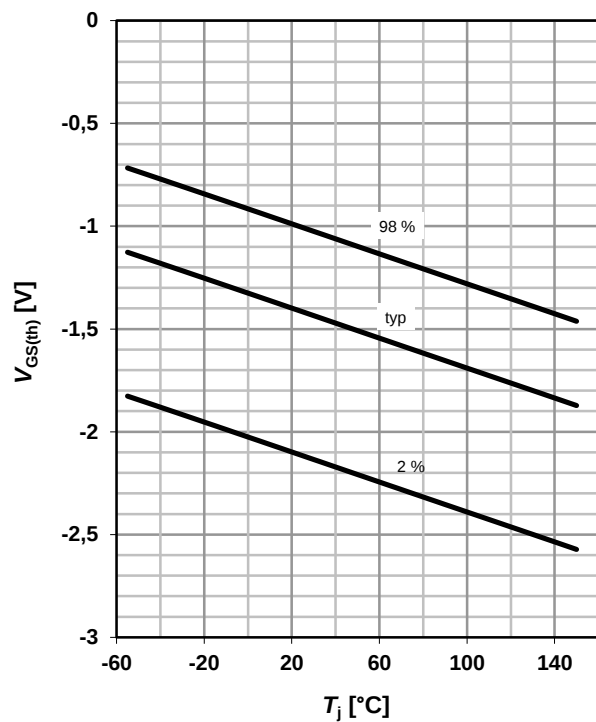
$$R_{DS(on)} = f(T_j); I_D = 0.01 \text{ A}; V_{GS} = 0 \text{ V}$$



10 Typ. gate threshold voltage

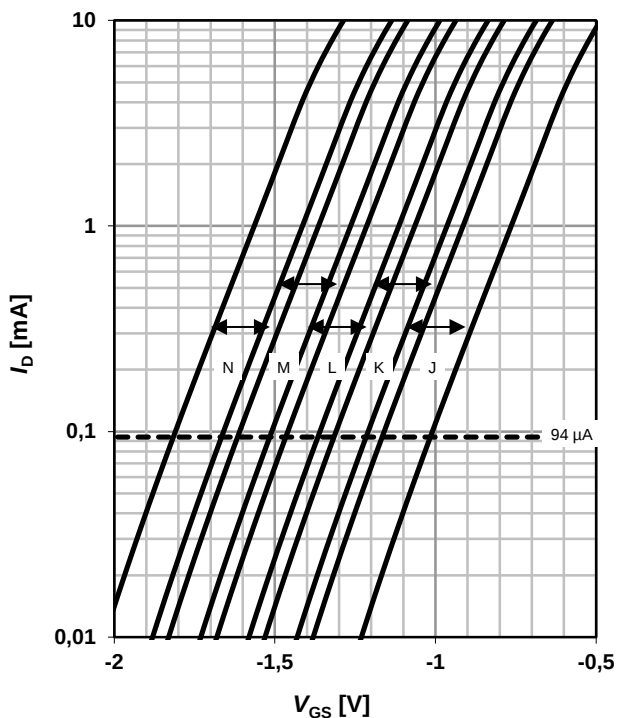
$$V_{GS(th)} = f(T_j); V_{DS} = 3 \text{ V}; I_D = 94 \text{ μA}$$

parameter: I_D



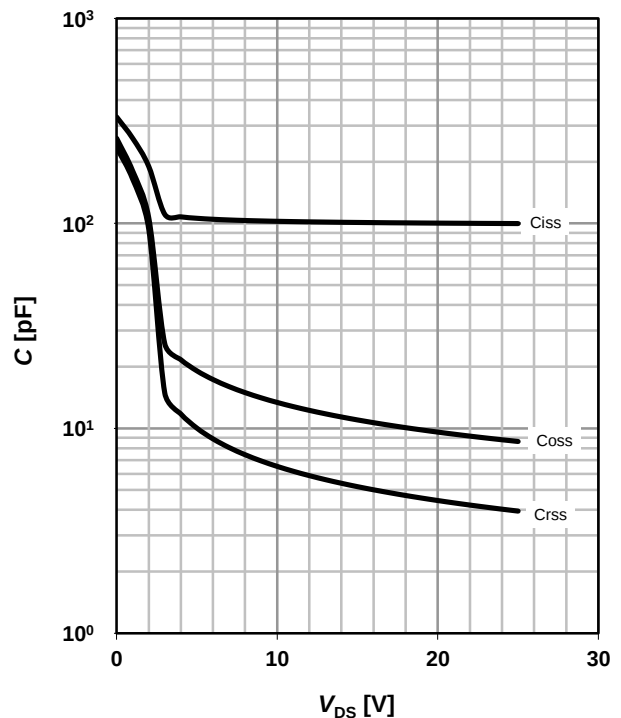
11 Threshold voltage bands

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



12 Typ. capacitances

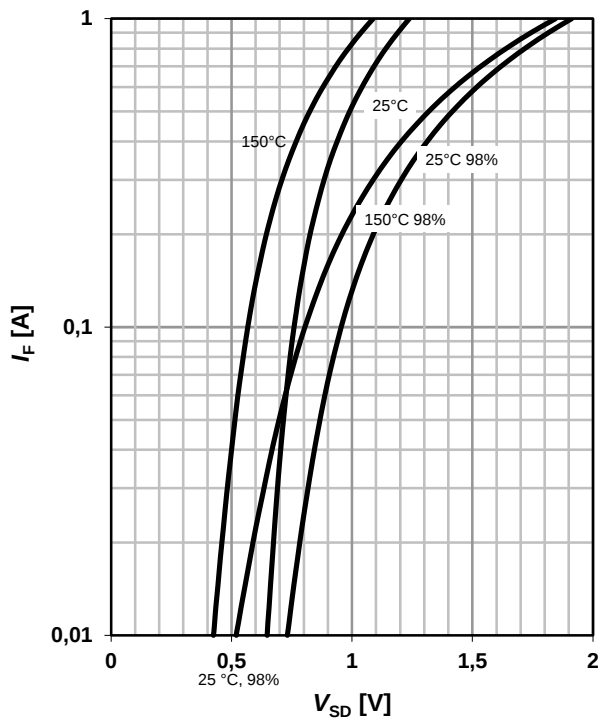
$$C = f(V_{DS}); V_{GS} = -3 \text{ V}; f = 1 \text{ MHz}$$



13 Forward characteristics of reverse diode

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

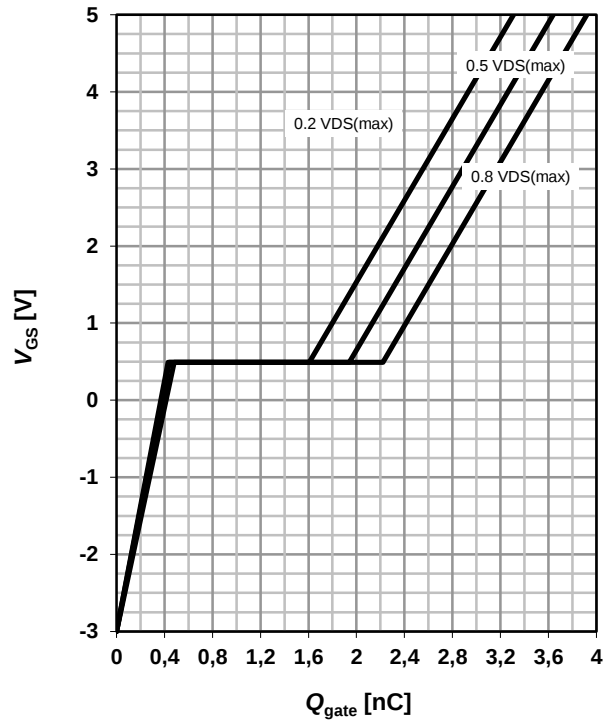
parameter: T_j



15 Typ. gate charge

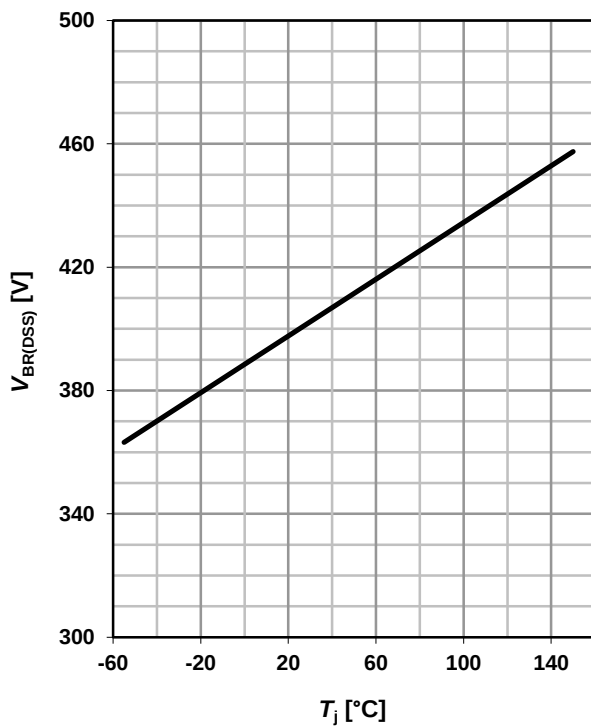
$$V_{GS} = f(Q_{gate}); I_D = 0.21 \text{ A pulsed}$$

parameter: V_{DD}

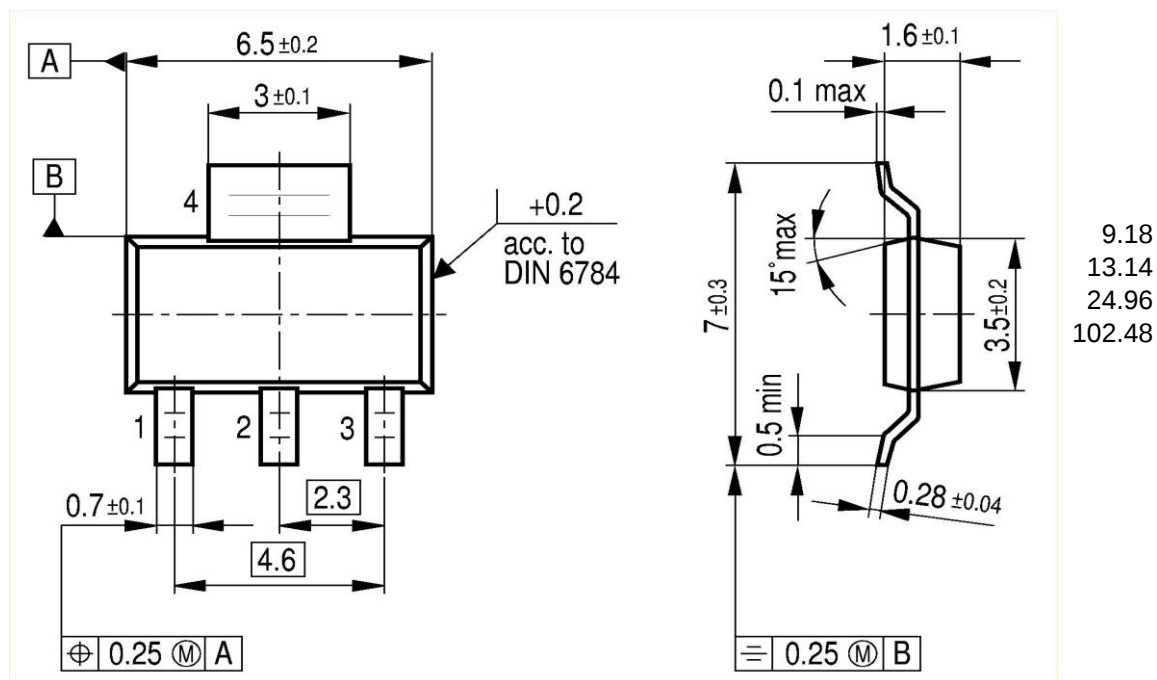


16 Drain-source breakdown voltage

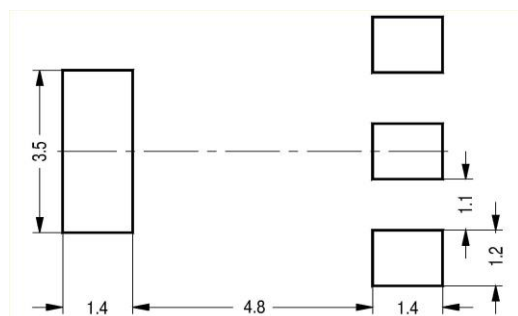
$$V_{BR(DSS)} = f(T_j); I_D = 250 \mu\text{A}$$



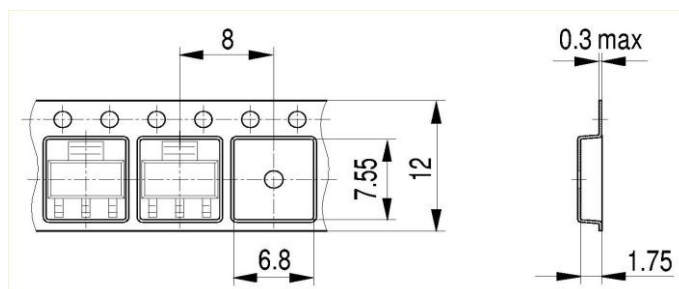
Package Outline:



Footprint:



Packaging:



Dimensions in mm