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OptiMOS™ Small-Signal-Transistor

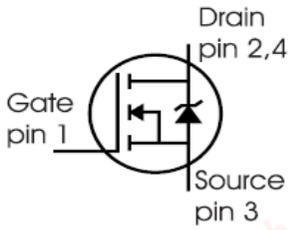
Features

- N-channel
- Enhancement mode
- Logic level (4.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100% lead-free; RoHS compliant
- Halogen-free according to IEC61249-2-21

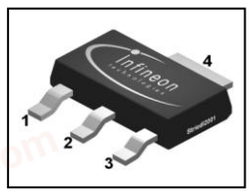
AEC Qualified RoHS Halogen-Free

Product Summary

V_{DS}		100	V
$R_{DS(on),max}$	V_{GS}=10 V	0.6	Ω
	V_{GS}=4.5 V	0.8	
I_D		1.2	A



PG-SOT223



Type	Package	Tape and Reel Information	Marking	Halogen-Free	Packing
BSP296N	SOT223	H6327: 1000 pcs/ reel	BSP296N	Yes	Non dry

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_A=25 °C	1.2	A
		T_A=70 °C	0.9	
Pulsed drain current	$I_{D,pulse}$	T_A=25 °C	4.6	
Avalanche energy, single pulse	E_{AS}	I_D=1.2 A, R_{GS}=25 Ω	15.0	mJ
Reverse diode dv/dt	dv/dt	I_D=1.2 A, V_{DS}=80 V, di/dt=200 A/µs, $T_{j,max}$=150 °C	6	kV/µs
Gate source voltage	V_{GS}		±20	V
Power dissipation	P_{tot}	T_A=25 °C	1.8	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 150	°C
ESD Class		JESD22-A114 -HBM	0 (<250V)	
Soldering Temperature			260 °C	
IEC climatic category; DIN IEC 68-1			55/150/56	

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Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - soldering point	R_{thJS}		-	-	25	K/W
Thermal resistance junction - ambient	R_{thJA}	minimal footprint	-	-	110	
		6 cm² cooling area[1)]	-	-	70	
Electrical characteristics, at T_j=25 °C, unless otherwise specified						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=250 µA	100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=Vgs V, I_D=100 µA	0.8	1.4	1.8	
Drain-source leakage current	I_{DSS}	V_{DS}=100 V, V_{GS}=0 V, T_j=25 °C	-	-	0.1	µA
		V_{DS}=100 V, V_{GS}=0 V, T_j=150 °C	-	-	10	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	-	10	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=4.5 V, I_D=0.95 A	-	371	800	mΩ
		V_{GS}=10 V, I_D=1.2 A	-	329	600	
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=0.9 A		2.66	-	S

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

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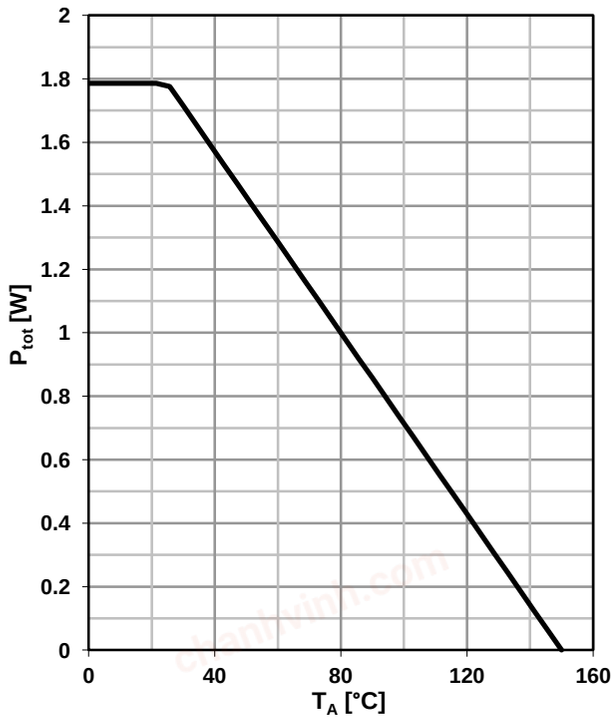
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=25 V, f=1 MHz	-	114.8	152.7	pF
Output capacitance	C_{oss}		-	19.7	26.3	
Reverse transfer capacitance	C_{rss}		-	9.8	14.7	
Turn-on delay time	$t_{d(on)}$	V_{DD}=50 V, V_{GS}=10 V, I_D=1.2 A, $R_{G,ext}$=6 Ω	-	3.5	5.3	ns
Rise time	t_r		-	3.8	5.7	
Turn-off delay time	$t_{d(off)}$		-	18.4	27.6	
Fall time	t_f		-	5.2	7.8	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=50 V, I_D=1.2 A, V_{GS}=0 to 10 V	-	0.27	0.4	nC
Gate to drain charge	Q_{gd}		-	1.45	2.2	
Gate charge total	Q_g		-	4.5	6.7	
Gate plateau voltage	$V_{plateau}$		-	2.4	-	V
Reverse Diode						
Diode continous forward current	I_S	T_A=25 °C	-	-	1.2	A
Diode pulse current	$I_{S,pulse}$		-	-	4.6	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=1.2 A, T_j=25 °C	-	0.85	1.1	V
Reverse recovery time	t_{rr}	V_R=50 V, I_F=1.2 A, di_F/dt=100 A/µs	-	27	40.5	ns
Reverse recovery charge	Q_{rr}		-	30	45	nC

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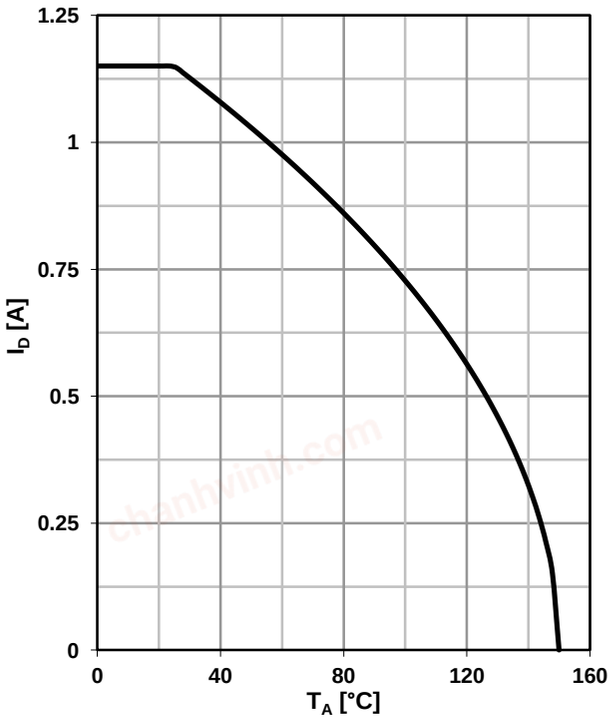
1 Power dissipation

$P_{tot}=f(T_A)$



2 Drain current

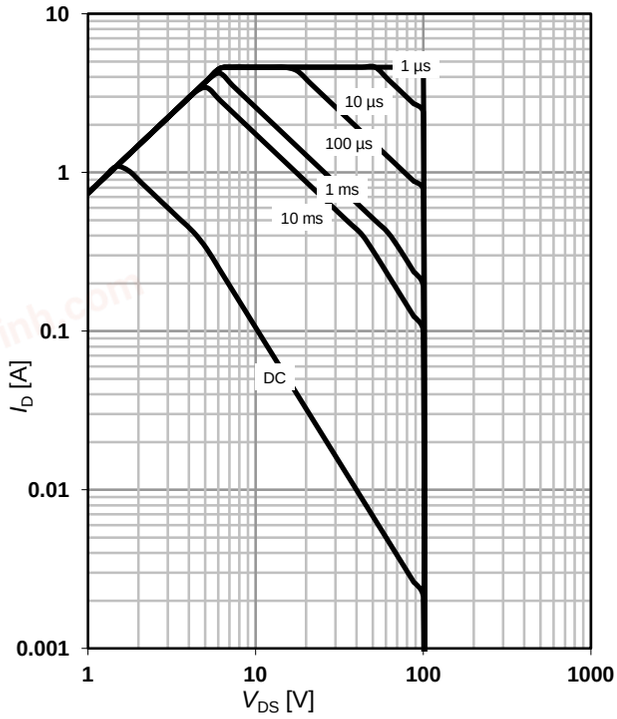
$I_D=f(T_A)$; $V_{GS}\geq 10$ V



3 Safe operating area

$I_D=f(V_{DS})$; $T_A=25$ °C; $D=0$

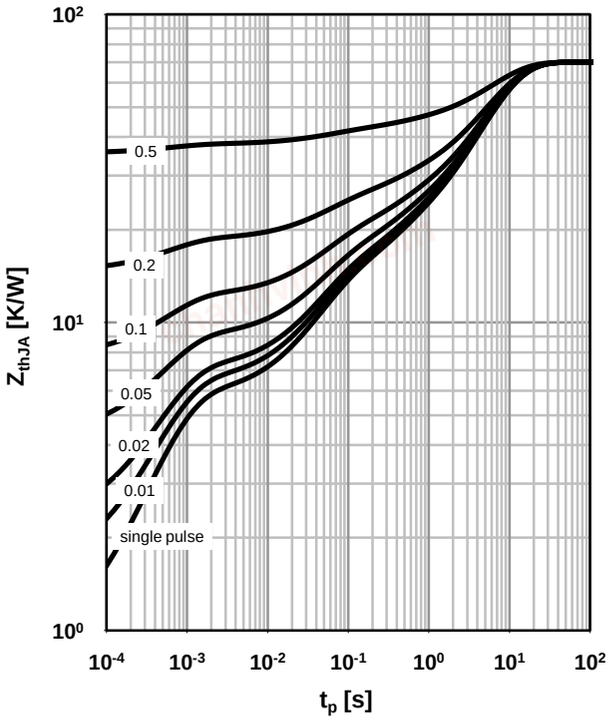
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJA}=f(t_p)$

parameter: $D=t_p/T$



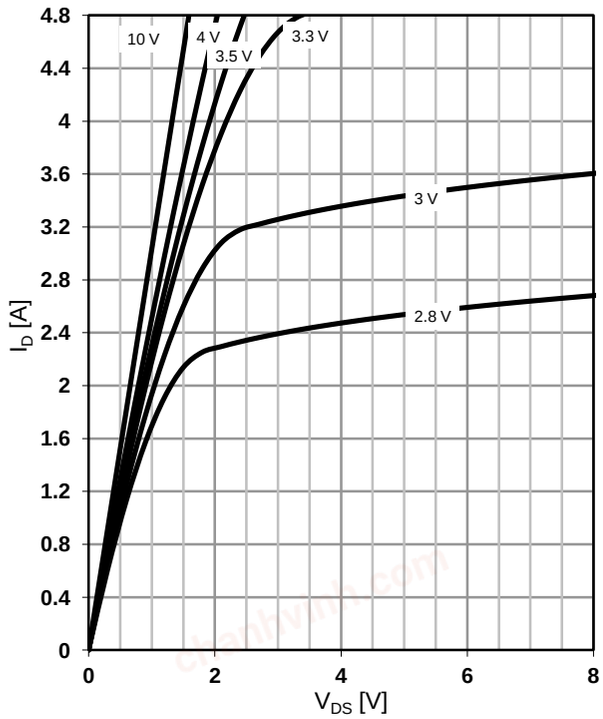
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5 Typ. output characteristics

$I_D=f(V_{DS})$; $T_j=25$ °C

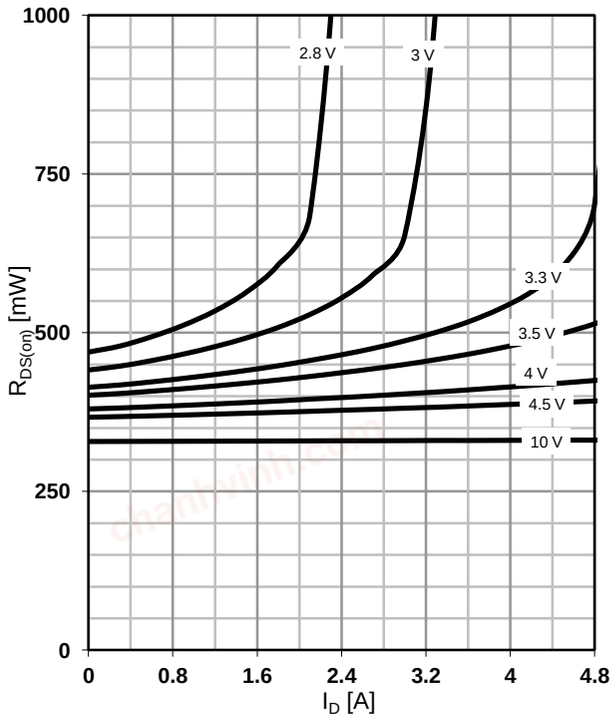
parameter: V_{GS}



6 Typ. drain-source on resistance

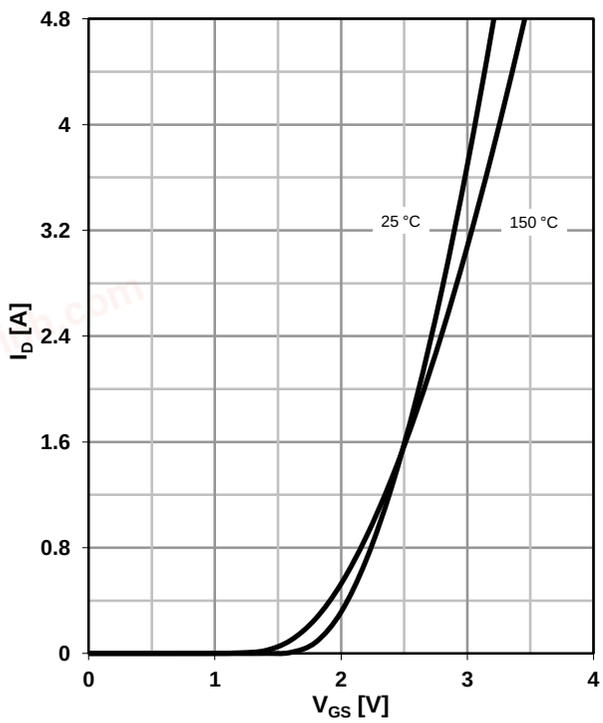
$R_{DS(on)}=f(I_D)$; $T_j=25$ °C

parameter: V_{GS}



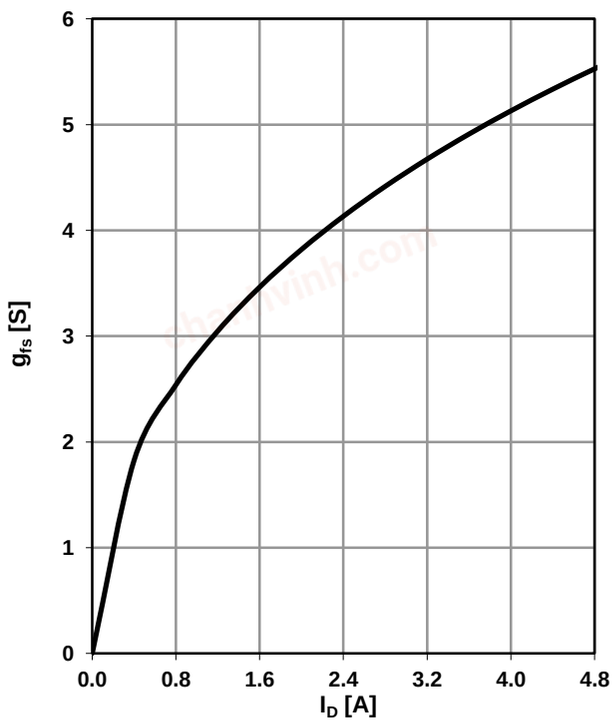
7 Typ. transfer characteristics

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



8 Typ. forward transconductance

$g_{fs}=f(I_D)$; $T_j=25$ °C

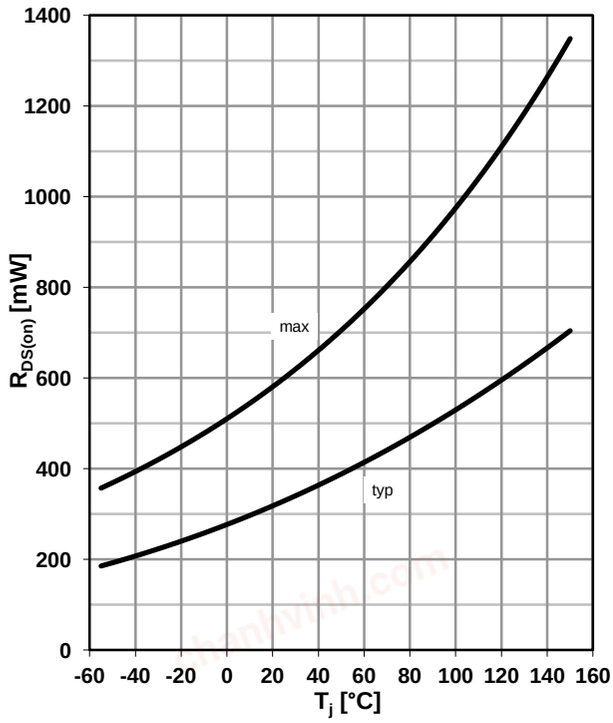


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9 Drain-source on-state resistance

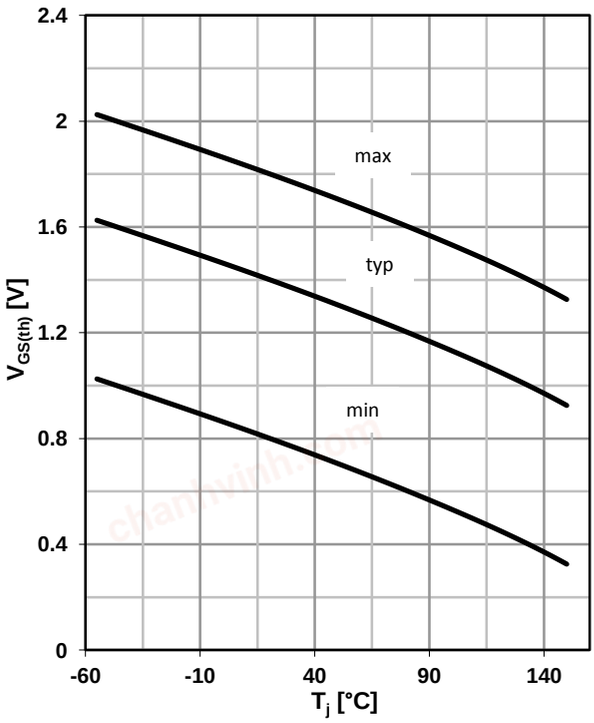
$R_{DS(on)}=f(T_j)$; $I_D=1.2$ A; $V_{GS}=10$ V



10 Typ. gate threshold voltage

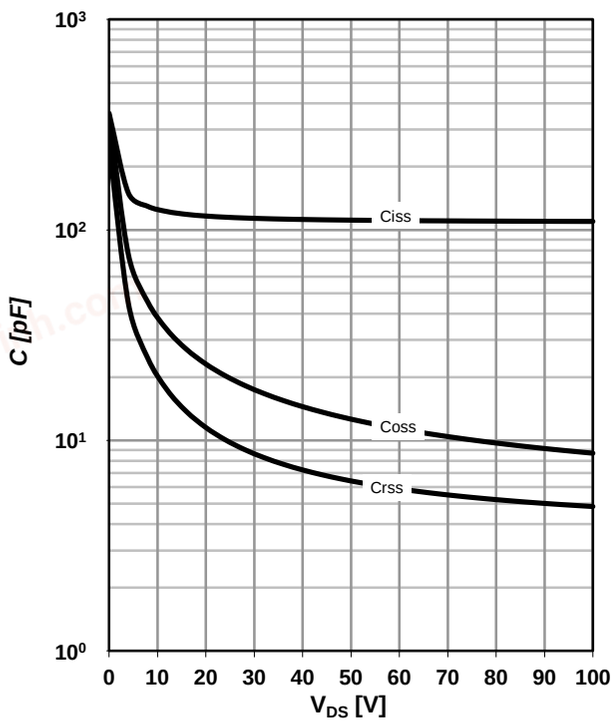
$V_{GS(th)}=f(T_j)$; $V_{DS}=V_{GS}$; $I_D=100$ µA

parameter: I_D



11 Typ. capacitances

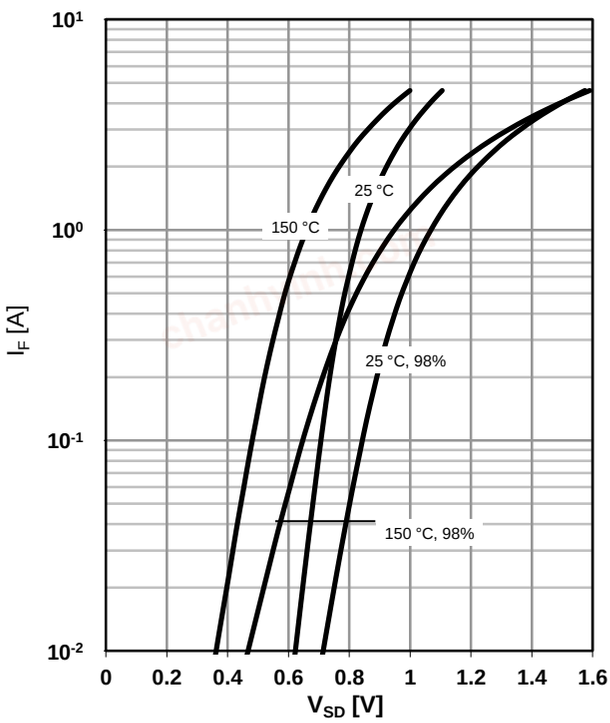
$C=f(V_{DS})$; $V_{GS}=0$ V; $f=1$ MHz; $T_j=25$°C



12 Forward characteristics of reverse diode

$I_F=f(V_{SD})$

parameter: T_j



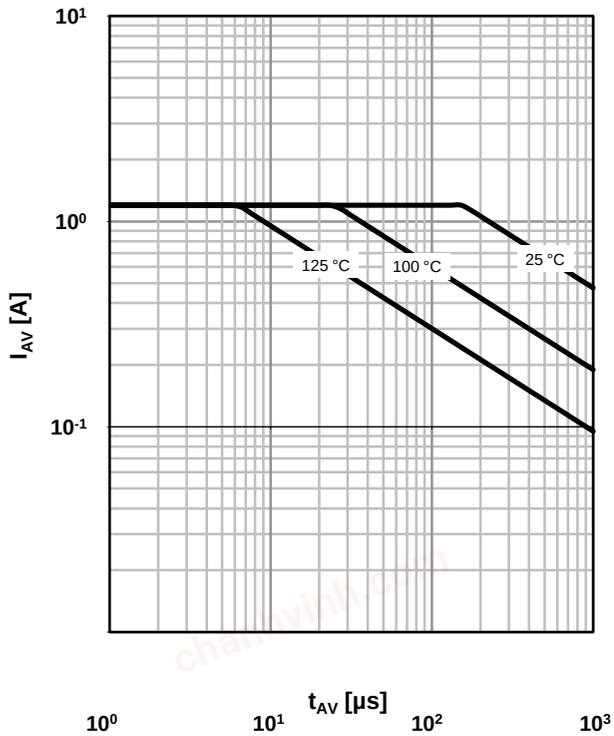
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13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

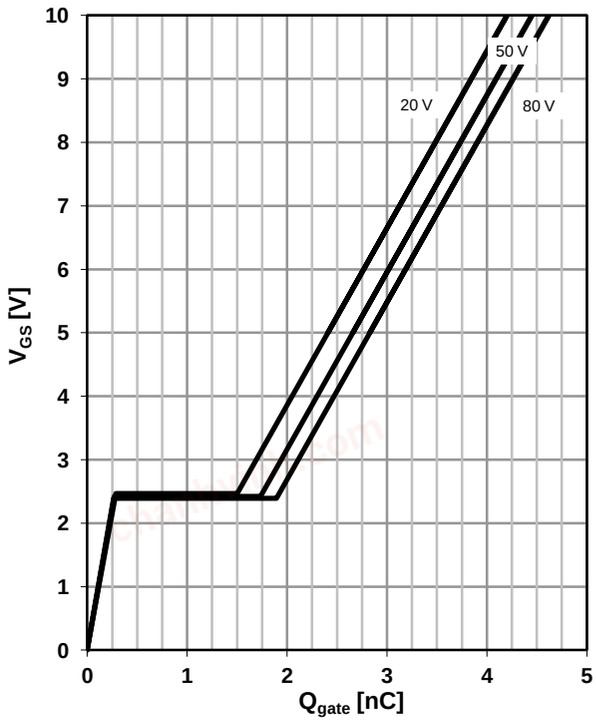
parameter: $T_{j(start)}$



14 Typ. gate charge

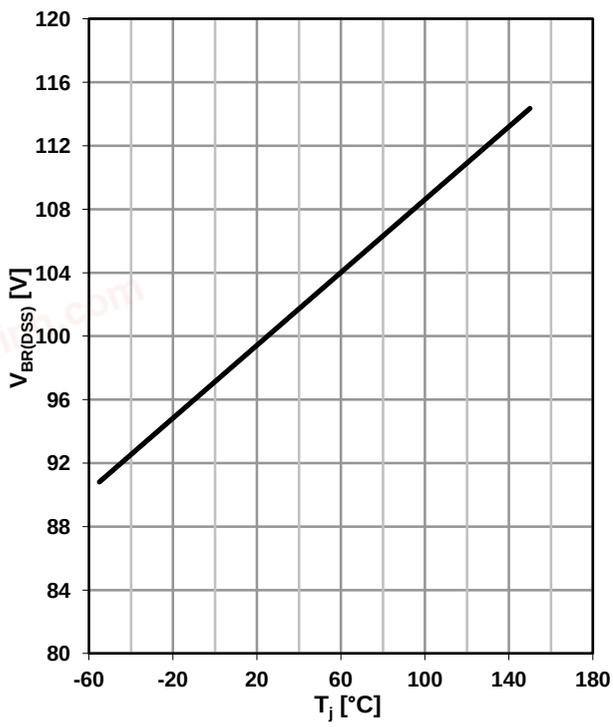
V_{GS}=f(Q_{gate}); I_D=1.2 A pulsed

parameter: V_{DD}

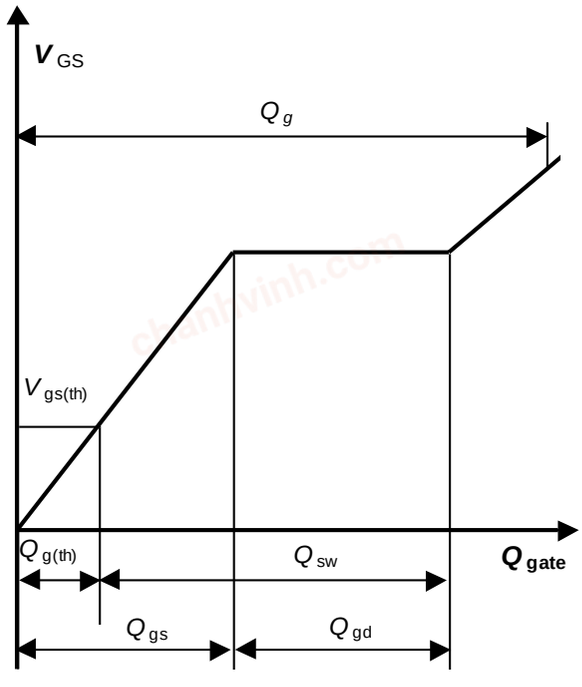


15 Drain-source breakdown voltage

$V_{BR(DSS)}$=f(T_j); I_D=250 µA



16 Gate charge waveforms

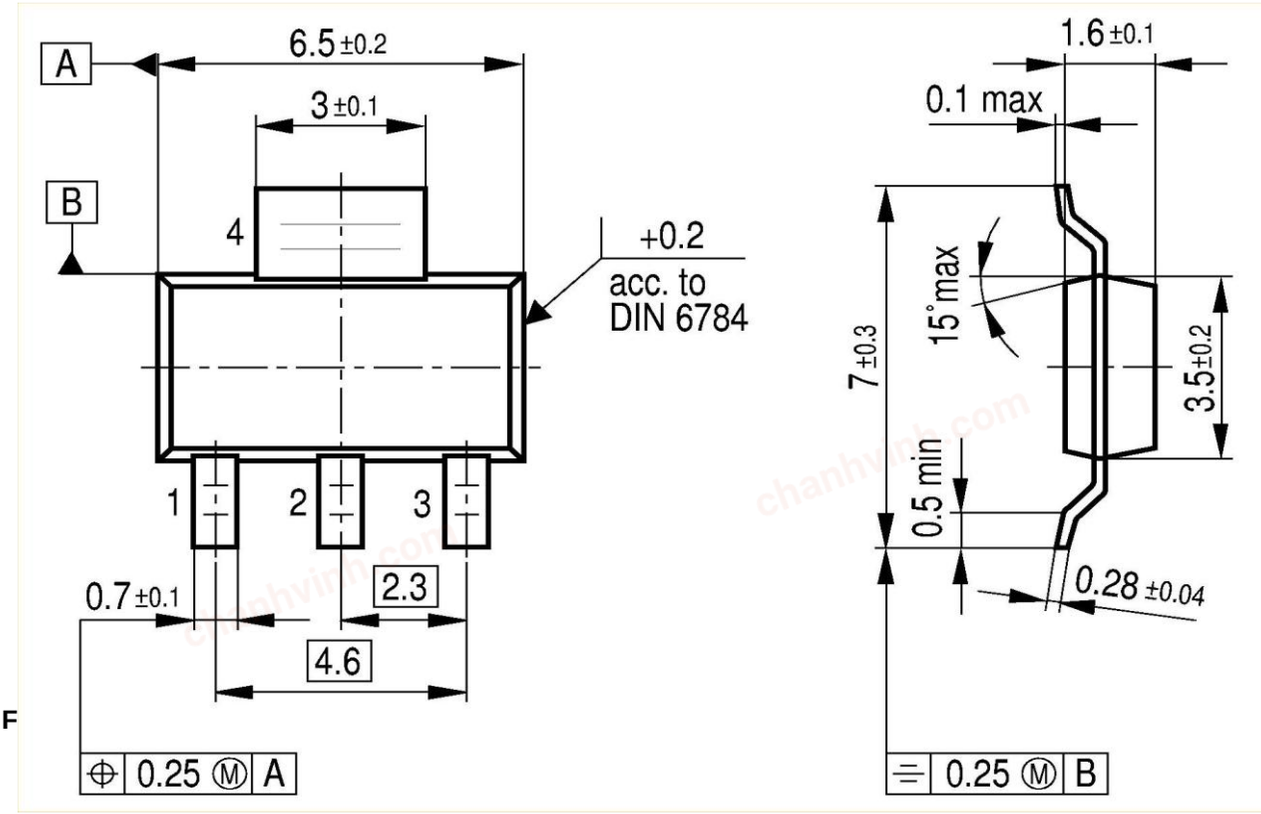


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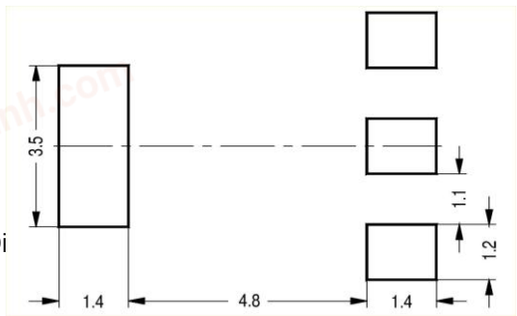
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SOT223

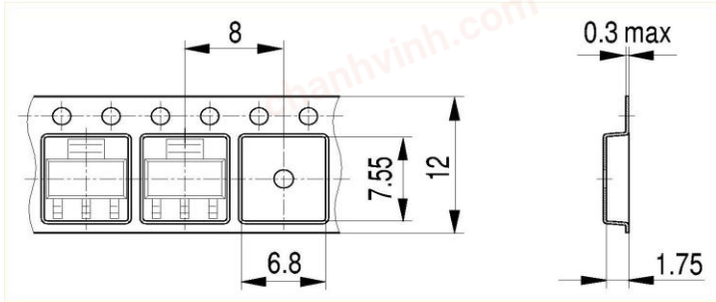
Package Outline:



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