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OptiMOS®-P Small-Signal-Transistor

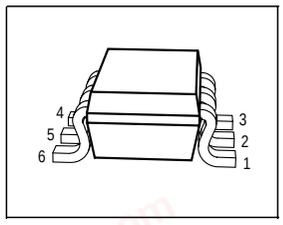
Feature

- P-Channel
- Enhancement mode
- Super Logic Level (2.5 V rated)
- 150°C operating temperature
- Avalanche rated
- d*v*/d*t* rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen free according to IEC61249-2-21

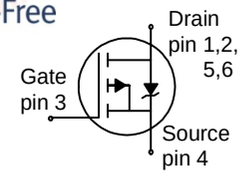
Product Summary

V_{DS}	-20	V
$R_{DS(on)}$	67	mΩ
I_D	-4.7	A

P-TSOP6-6



AEC Qualified RoHS Halogen-Free



Type	Package	Tape and reel	Marking
BSL211SP	P-TSOP6-6	H6327: 3000pcs/r.	sPB

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

Parameter	Symbol	Value	Unit
Continuous drain current T_A=25°C T_A=70°C	I_D	 -4.7 -3.8	A
Pulsed drain current T_A=25°C	$I_{D\ puls}$	-18.8	
Avalanche energy, single pulse I_D=-4.7 A , V_{DD}=-10V, R_{GS}=25Ω	E_{AS}	26	mJ
Reverse diode d*v*/d*t* I_S=-4.7A, V_{DS}=-16V, d*i*/d*t*=200A/µs, T_{jmax}=150°C	d*v*/d*t*	-6	kV/µs
Gate source voltage	V_{GS}	±12	V
Power dissipation T_A=25°C	P_{tot}	2	W
Operating and storage temperature	T_j , T_{stg}	-55... +150	°C
IEC climatic category; DIN IEC 68-1		55/150/56	
ESD Class JESD22-A114-HBM		Class 0	

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Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - soldering point	R_{thJS}	-	-	50	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	230	
@ 6 cm^2 cooling area [1)]		-	-	62.5	

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage V_{GS}=0V, I_D=-250µA	$V_{(BR)DSS}$	-20	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D=-25µA	$V_{GS(th)}$	-0.6	-0.9	-1.2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=-20V, V_{GS}=0, T_j=25°C		-	-0.1	-1	
V_{DS}=-20V, V_{GS}=0, T_j=150°C		-	-10	-100	
Gate-source leakage current V_{GS}=-12V, V_{DS}=0	I_{GSS}	-	-10	-100	nA
Drain-source on-state resistance V_{GS}=-2.5V, I_D=-3.7A	$R_{DS(on)}$	-	94	110	mΩ
Drain-source on-state resistance V_{GS}=-4.5, I_D=-4.7A	$R_{DS(on)}$	-	54	67	

[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm^2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air; t≤ 5 sec.

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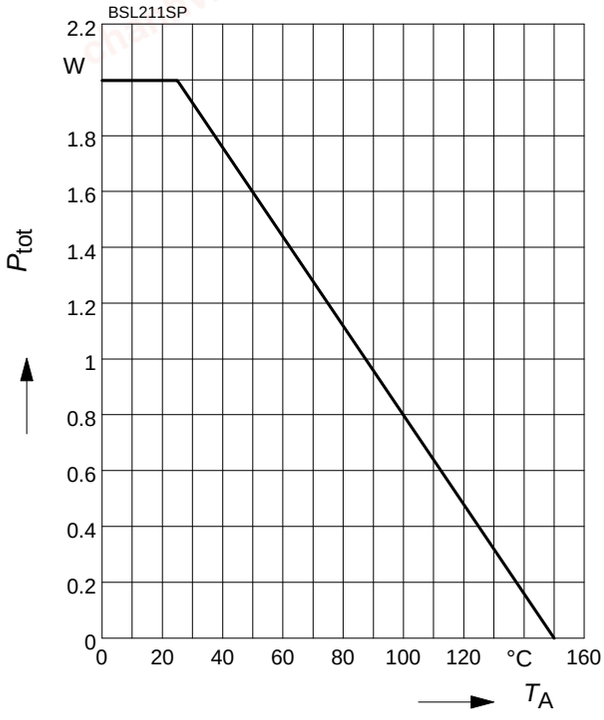
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$\lvert V_{DS}\rvert \geq 2 * \lvert I_D\rvert * R_{DS(on)max}$, I_D=-3.8A	6.2	12.4	-	S
Input capacitance	C_{iss}	V_{GS}=0, V_{DS}=-15V, f=1MHz	-	654	-	pF
Output capacitance	C_{oss}		-	241	-	
Reverse transfer capacitance	C_{rss}		-	197	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-10V, V_{GS}=-4.5V, I_D=-1A, R_G=6Ω	-	8.7	13	ns
Rise time	t_r		-	13.9	21	
Turn-off delay time	$t_{d(off)}$		-	25	37.3	
Fall time	t_f		-	23.3	35	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=-10V, I_D=-4.7A	-	-1.3	-2	nC
Gate to drain charge	Q_{gd}		-	-4.7	-7	
Gate charge total	Q_g	V_{DD}=-10V, I_D=-4.7A, V_{GS}=0 to -4.5V	-	-8.3	-12.4	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=-10V, I_D=-4.7A	-	-2	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_A=25°C	-	-	-2	A
Inverse diode direct current, pulsed	I_{SM}		-	-	-18.8	
Inverse diode forward voltage	V_{SD}	V_{GS}=0, $\lvert I_F\rvert = \lvert I_D\rvert$	-	-0.94	-1.4	V
Reverse recovery time	t_{rr}	V_R=-10V, $\lvert I_F\rvert = \lvert I_D\rvert$, di_F/dt=100A/µs	-	20.6	25.8	ns
Reverse recovery charge	Q_{rr}		-	6.3	7.9	nC

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1 Power dissipation

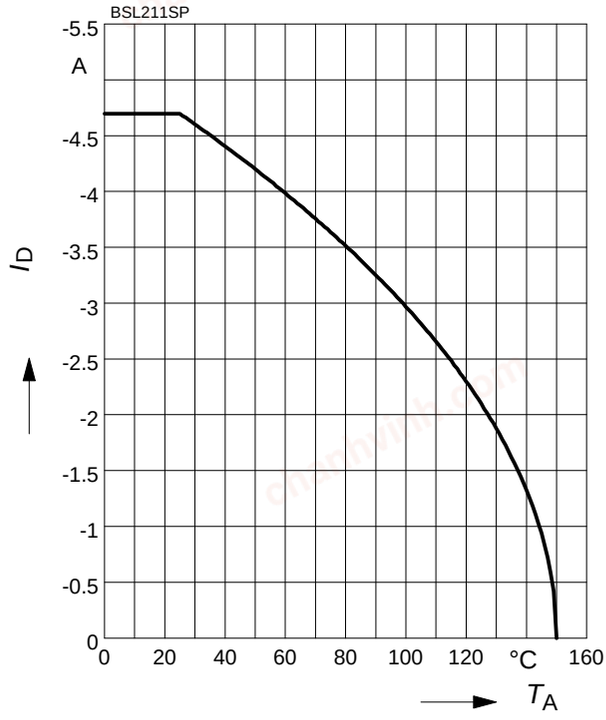
$P_{tot} = f(T_A)$



2 Drain current

$I_D = f(T_A)$

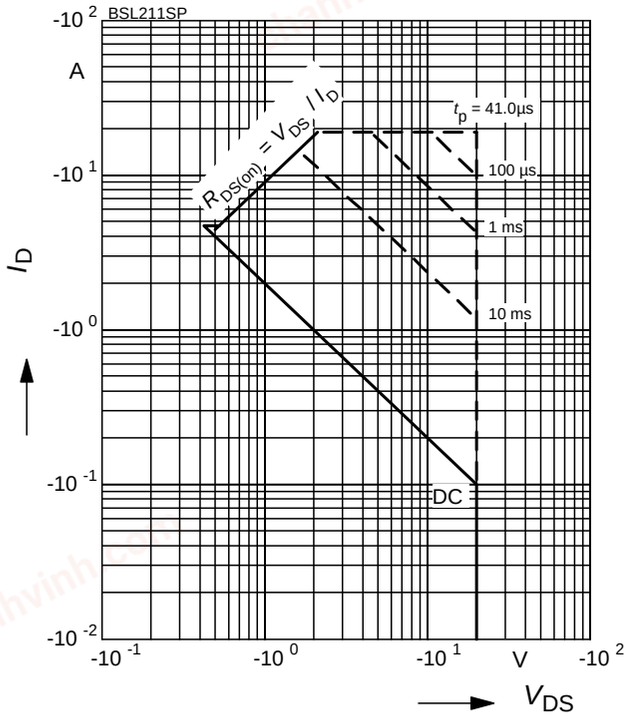
parameter: $|V_{GS}| \geq 4.5$ V



3 Safe operating area

$I_D = f(V_{DS})$

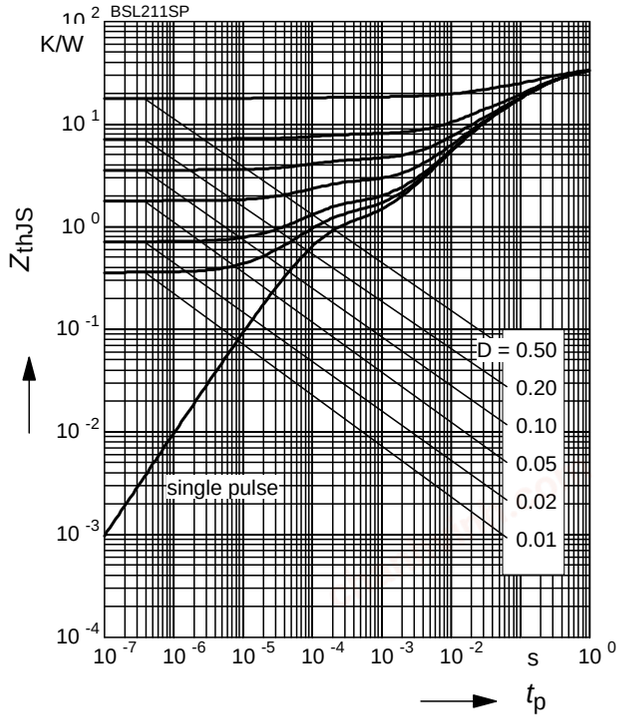
parameter : $D = 0$, $T_A = 25$ °C



4 Transient thermal impedance

$Z_{thJS} = f(t_p)$

parameter : $D = t_p/T$

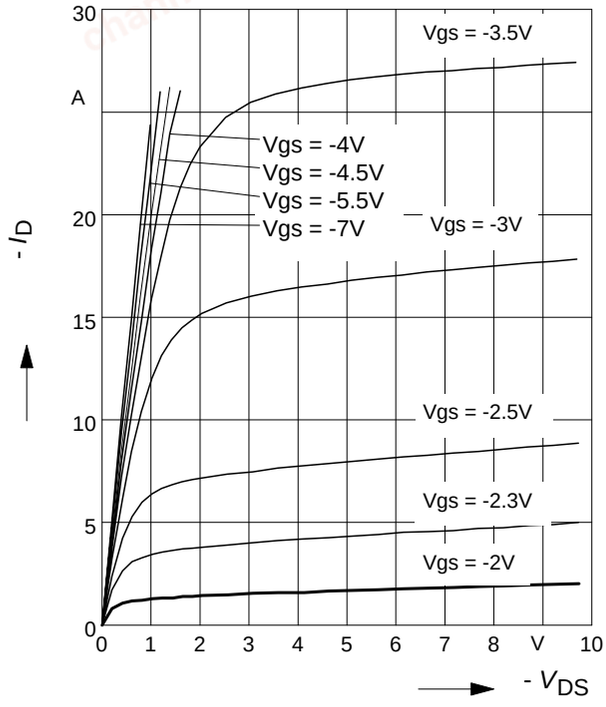


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5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

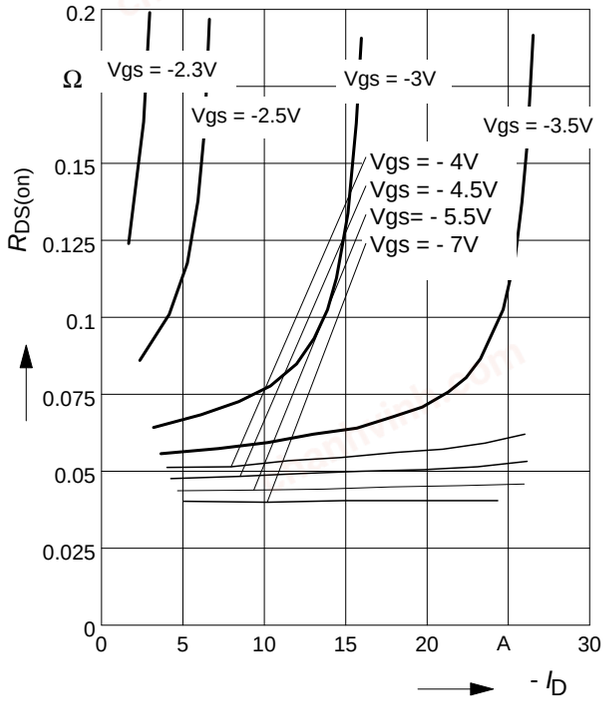
parameter: t_p = 80 µs



6 Typ. drain-source on resistance

$R_{DS(on)} = f(I_D)$

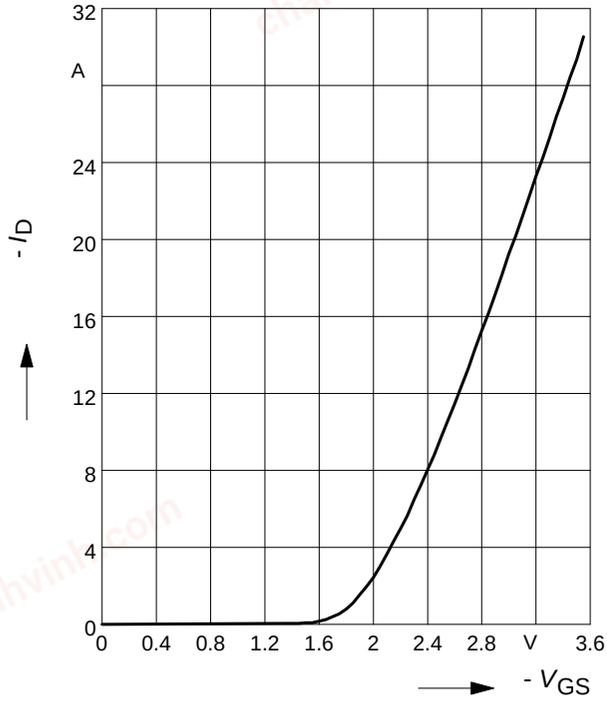
parameter: V_{GS}



7 Typ. transfer characteristics

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

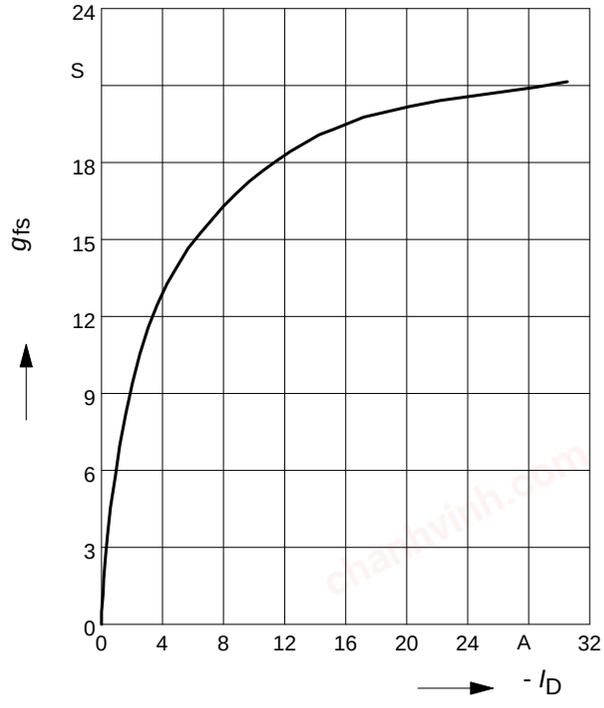
parameter: t_p = 80 µs



8 Typ. forward transconductance

$g_{fs} = f(I_D)$; T_j=25°C

parameter: t_p = 80 µs

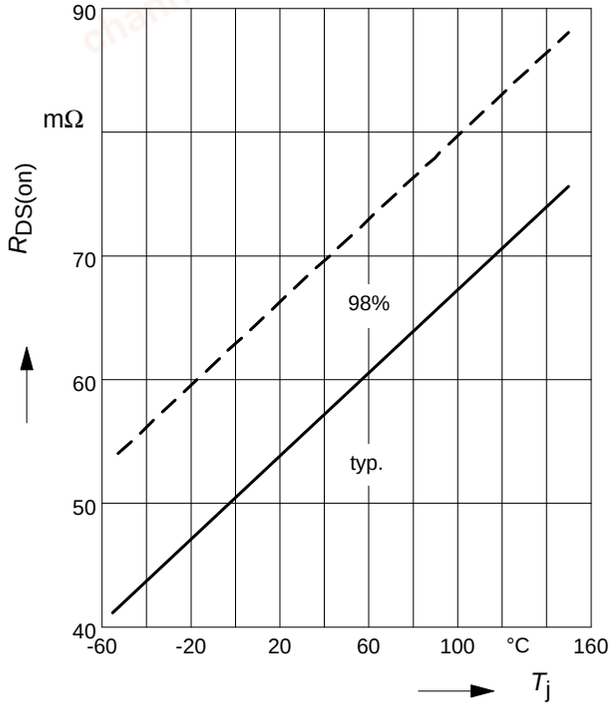


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9 Drain-source on-resistance

$R_{DS(on)} = f(T_j)$

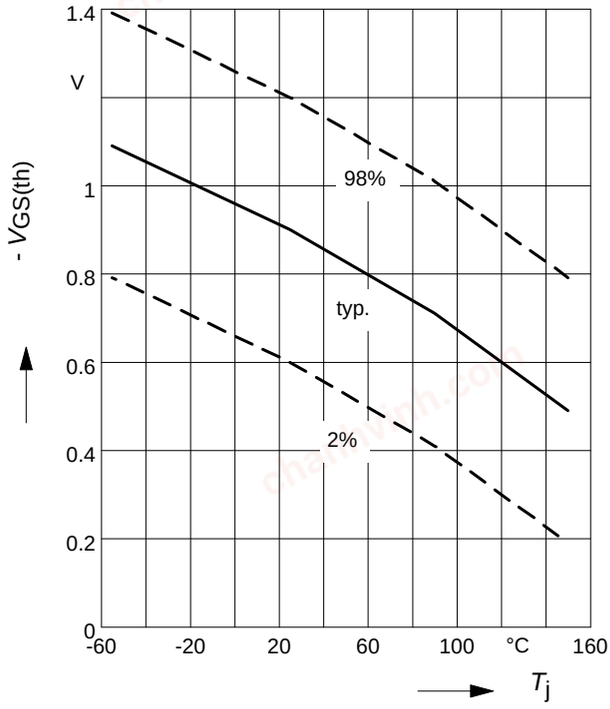
parameter: I_D = -4.7 A, V_{GS} = -4.5 V



10 Gate threshold voltage

$V_{GS(th)} = f(T_j)$

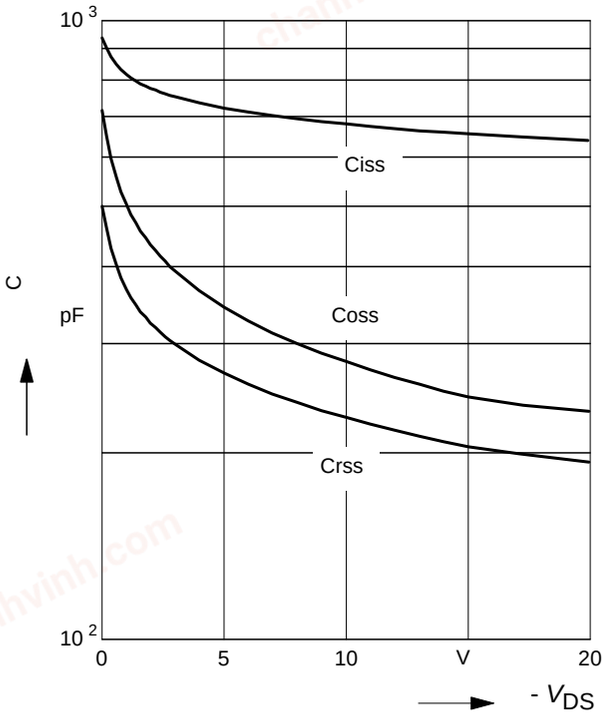
parameter: $V_{GS} = V_{DS}$, I_D = -25 µA



11 Typ. capacitances

$C = f(V_{DS})$

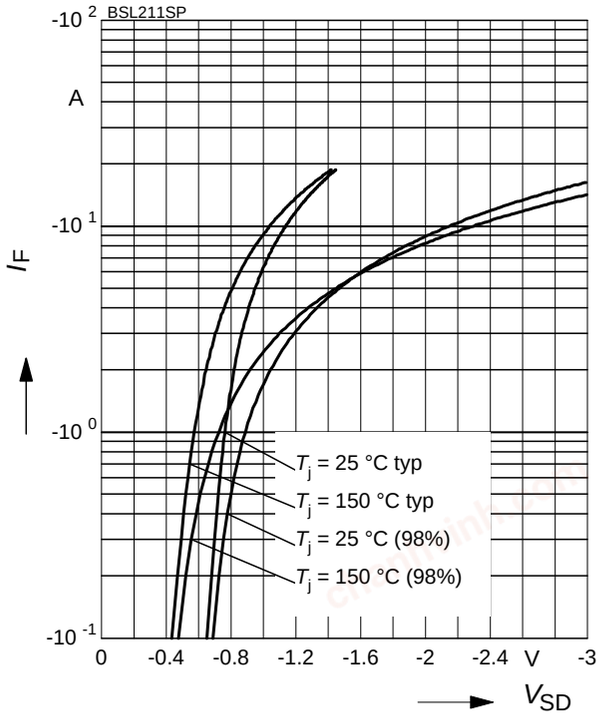
parameter: V_{GS}=0, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

parameter: T_j , tp = 80 µs

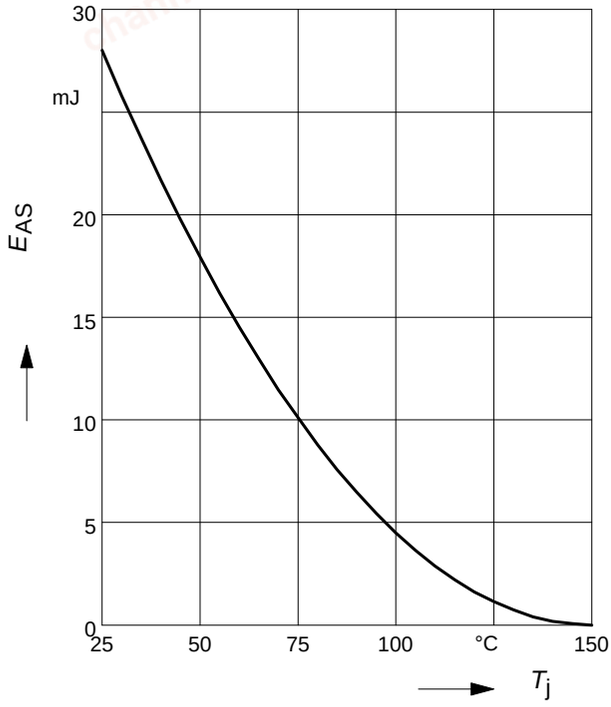


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13 Typ. avalanche energy

$E_{AS} = f(T_j)$, par.: I_D = -4.7 A

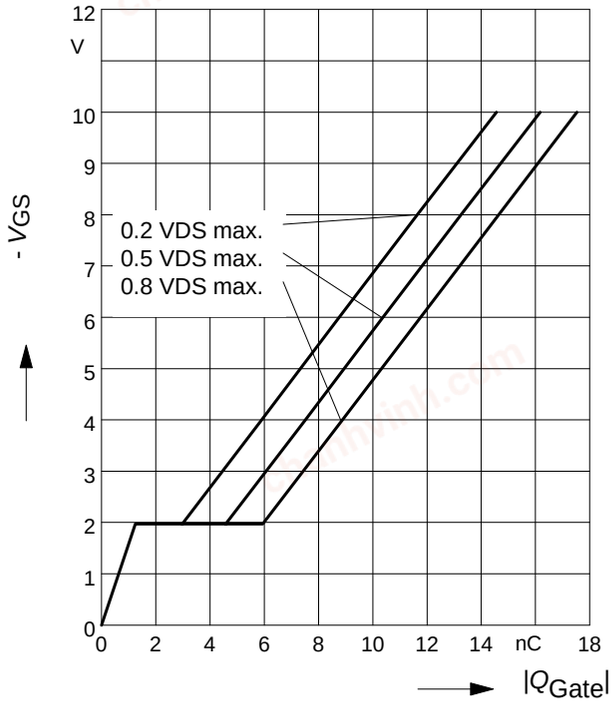
V_{DD} = -10 V, R_{GS} = 25 Ω



14 Typ. gate charge

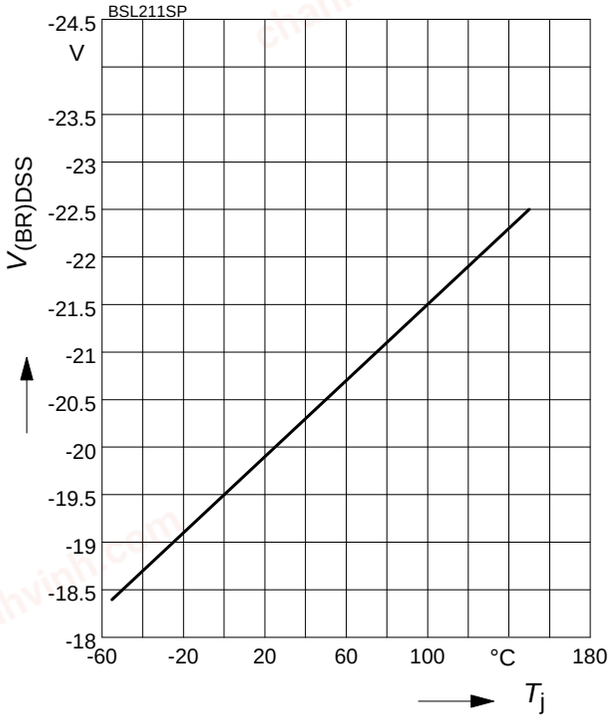
$|V_{GS}| = f(Q_{Gate})$

parameter: I_D = -4.7 A pulsed



15 Drain-source breakdown voltage

$V_{(BR)DSS} = f(T_j)$



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