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SIPMOS® Power-Transistor

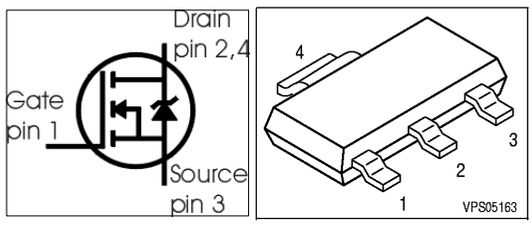
Feature

- N-Channel
- Enhancement mode
- Logic Level
- 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}	600	V
$R_{DS(on)}$	45	Ω
I_D	0.12	A

PG-SOT223



Type	Package	RoHS compliant	Tape and Reel Information	Marking	Packaging
BSP125	PG-SOT223	Yes	H6433: 4000 pcs/reel	BSP125	Non dry
BSP125	PG-SOT223	Yes	H6327: 1000 pcs/reel	BSP125	Non dry

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	 0.12 0.1	A
Pulsed drain current T_A=25°C	$I_{D\ puls}$	0.48	
Reverse diode d*v*/d*t* I_S=0.12A, V_{DS}=480V, d*i*/d*t*=200A/µs, T_{jmax}=175°C	d*v*/d*t*	6	kV/µs
Gate source voltage	V_{GS}	±20	V
ESD Class (JESD22-A114-HBM)		1A (>250V, <500V)	
Power dissipation T_A=25°C, T_A=25	P_{tot}	1.8	W
Operating and storage temperature	T_j , T_{stg}	-55... +150	°C
IEC climatic category; DIN IEC 68-1		55/150/56	

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Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - soldering point (Pin 4)	R_{thJS}	-	-	25	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	115	
@ 6 cm^2 cooling area [1)]		-	-	70	

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}=0, I_D=0.25mA	$V_{(BR)DSS}$	600	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D=94µA	$V_{GS(th)}$	1.3	1.9	2.3	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=600V, V_{GS}=0, T_j=25°C		-	-	0.1	
V_{DS}=600V, V_{GS}=0, T_j=125°C		-	-	5	
Gate-source leakage current V_{GS}=20V, V_{DS}=0	I_{GSS}	-	10	100	nA
Drain-source on-state resistance V_{GS}=4.5V, I_D=0.11A	$R_{DS(on)}$	-	26	60	Ω
Drain-source on-state resistance V_{GS}=10V, I_D=0.12A	$R_{DS(on)}$	-	25	45	

[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

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

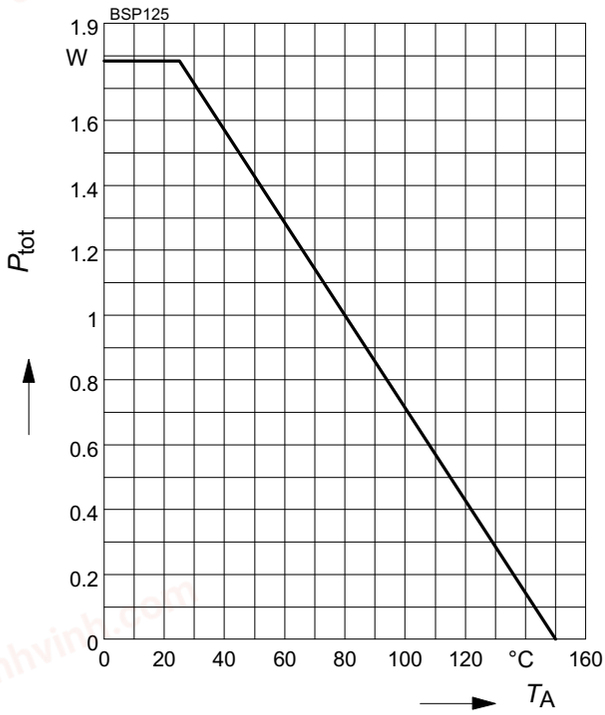
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$V_{DS}\geq 2*I_D*R_{DS(on)max}$, I_D=0.1A	0.06	0.18	-	S
Input capacitance	C_{iss}	V_{GS}=0, V_{DS}=25V, f=1MHz	-	100	150	pF
Output capacitance	C_{oss}		-	8.2	12.3	
Reverse transfer capacitance	C_{rss}		-	3.2	4.8	
Turn-on delay time	$t_{d(on)}$	V_{DD}=300V, V_{GS}=10V, I_D=0.13A, R_G=6Ω	-	7.7	11.6	ns
Rise time	t_r		-	14.4	21	
Turn-off delay time	$t_{d(off)}$		-	20	30	
Fall time	t_f		-	110	165	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=400V, I_D=0.13A	-	0.27	0.3	nC
Gate to drain charge	Q_{gd}		-	2.3	3.5	
Gate charge total	Q_g	V_{DD}=400V, I_D=0.13A, V_{GS}=0 to 10V	-	4.4	6.6	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=400V, I_D=0.13A	-	3.44	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_A=25°C	-	-	0.12	A
Inv. diode direct current, pulsed	I_{SM}		-	-	0.48	
Inverse diode forward voltage	V_{SD}	V_{GS}=0, I_F=0.12A	-	0.8	1.2	V
Reverse recovery time	t_{rr}	V_R=300V, I_F=I_S, di_F/dt=100A/µs	-	156	235	ns
Reverse recovery charge	Q_{rr}		-	165	250	nC

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1 Power dissipation

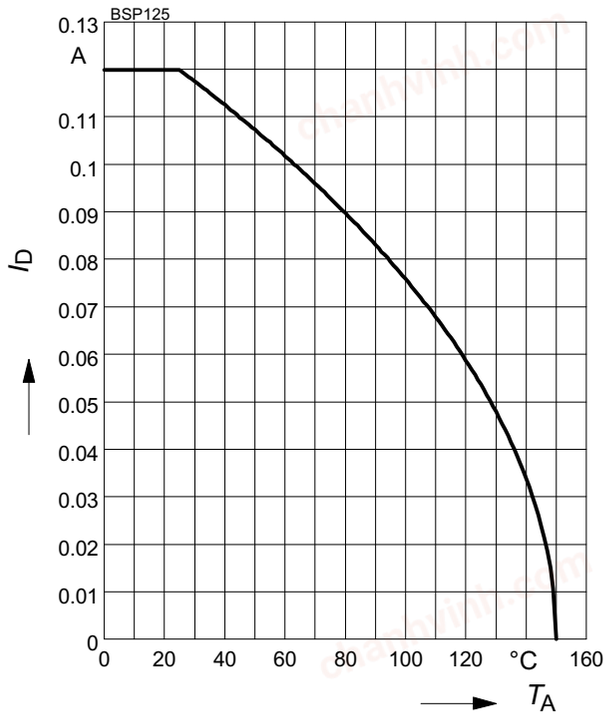
$P_{tot} = f(T_A)$



2 Drain current

$I_D = f(T_A)$

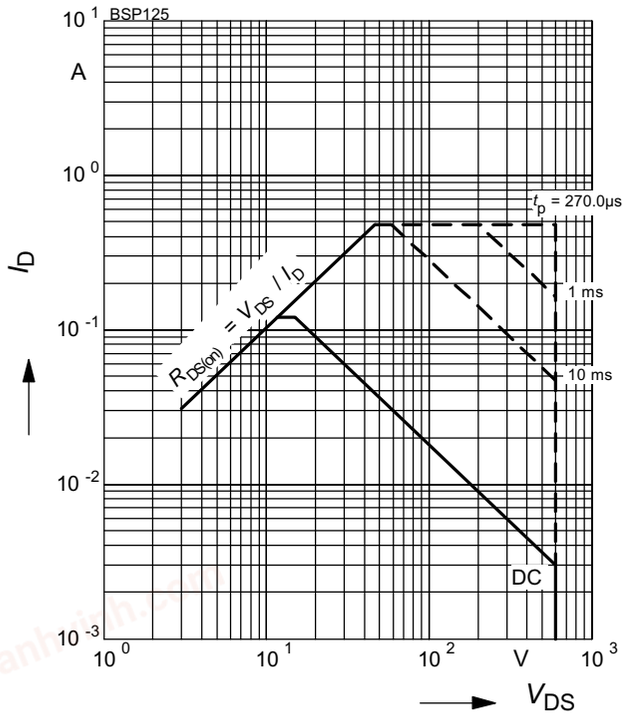
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

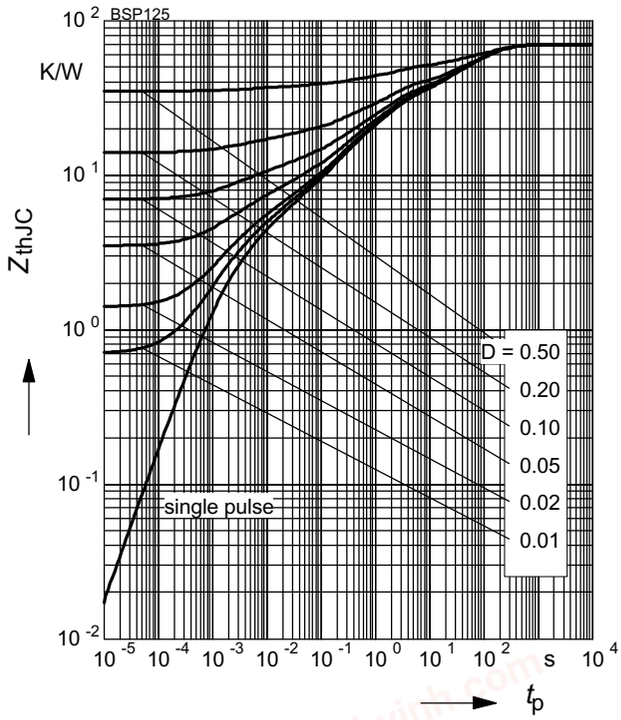
parameter : $D = 0$, $T_A = 25$



4 Transient thermal impedance

$Z_{thJA} = f(t_p)$

parameter : $D = t_p/T$



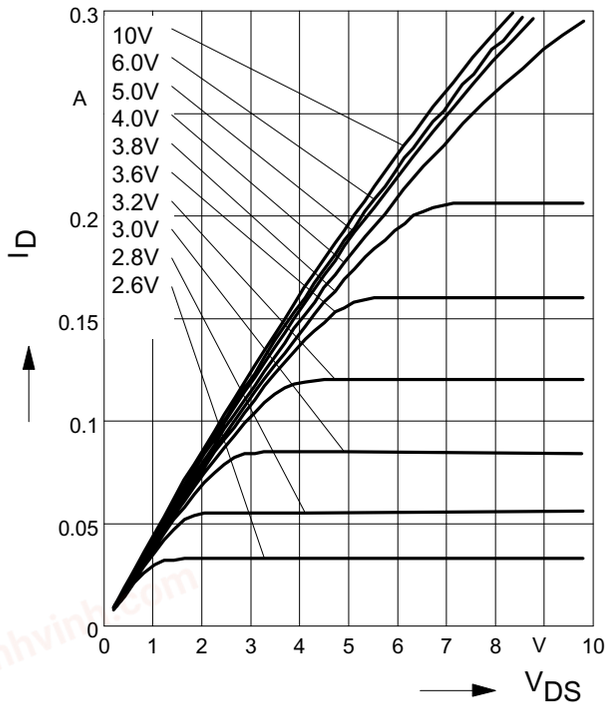
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5 Typ. output characteristic

$I_D = f(V_{DS})$

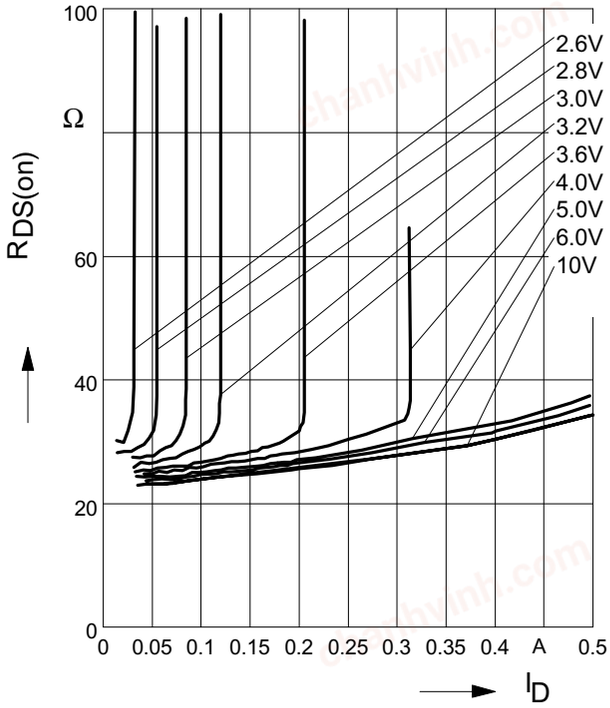
parameter: T_j = 25 °C, V_{GS}



6 Typ. drain-source on resistance

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

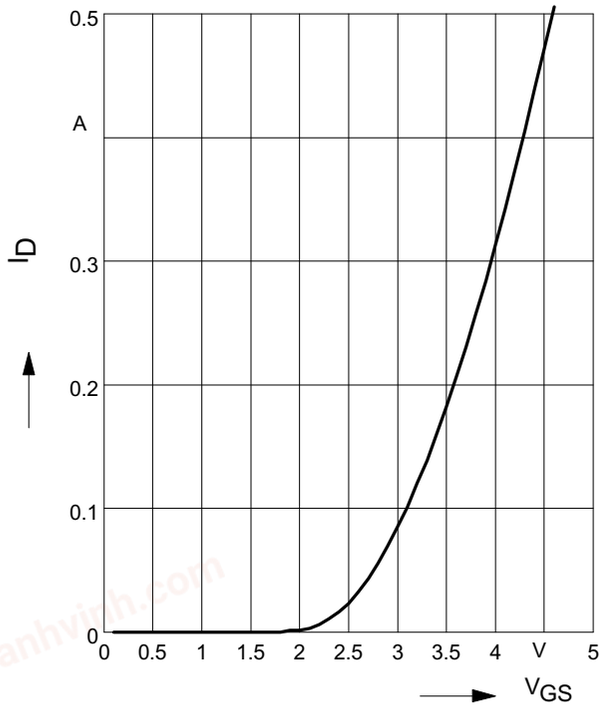
parameter: T_j = 25 °C, V_{GS}



7 Typ. transfer characteristics

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

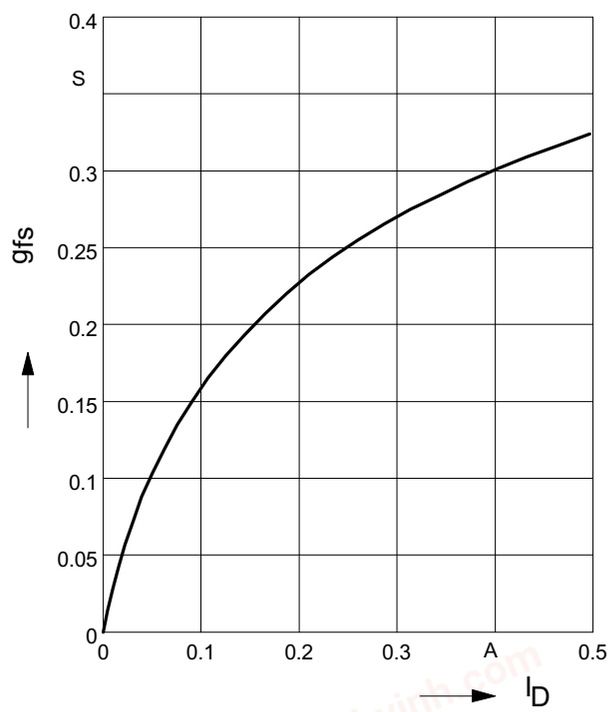
parameter: T_j = 25 °C



8 Typ. forward transconductance

$g_{fs} = f(I_D)$

parameter: T_j = 25 °C



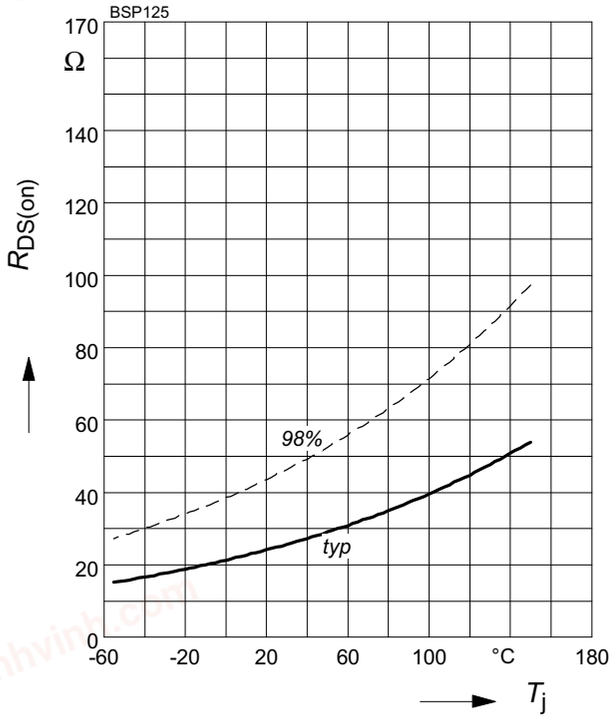
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9 Drain-source on-state resistance

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

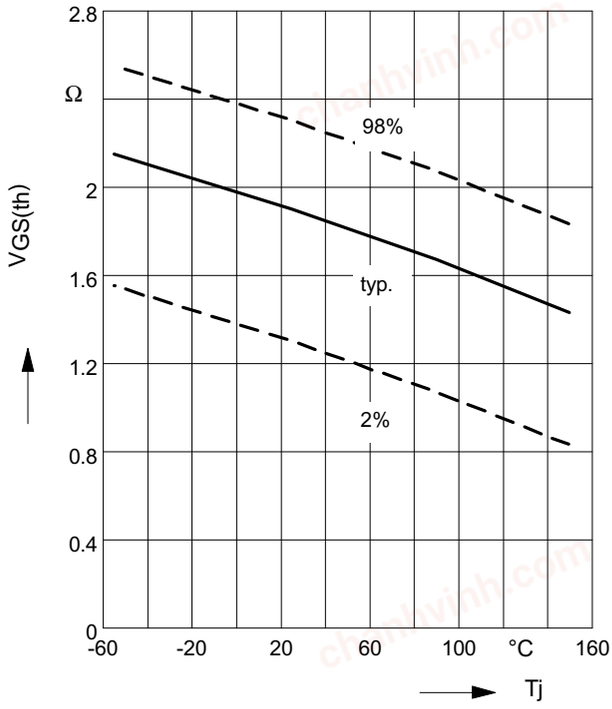
parameter : I_D = 0.12 A, V_{GS} = 10 V



(.) Typ. gate threshold voltage

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

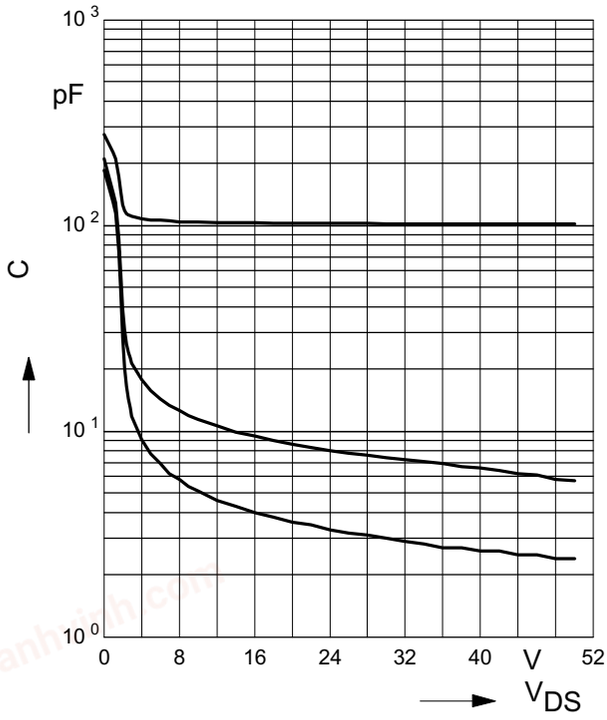
parameter: $V_{GS} = V_{DS}$; I_D =94µA



11 Typ. capacitances

$C = f(V_{DS})$

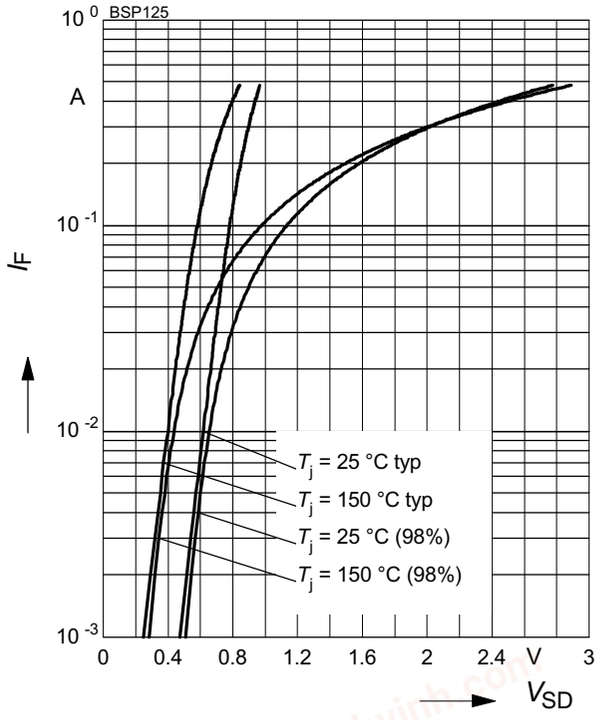
parameter: V_{GS}=0, f=1 MHz, T_j = 25 °C



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

parameter: T_j

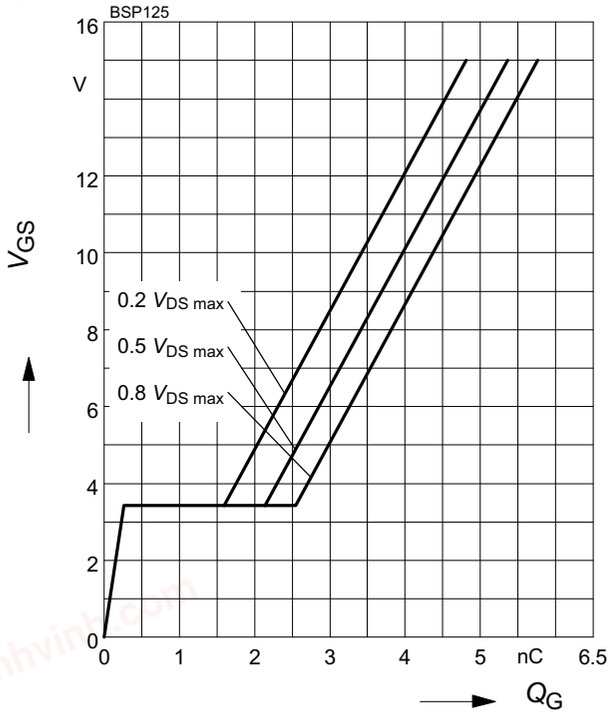


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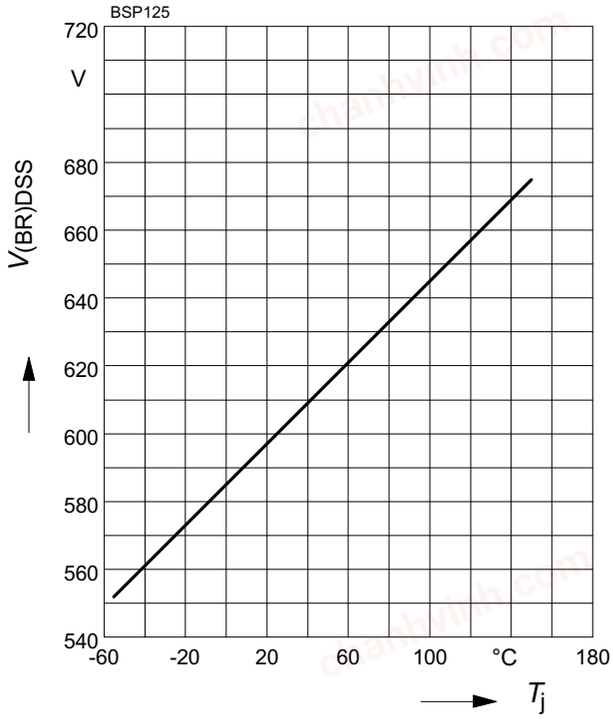
13 Typ. gate charge

$V_{GS} = f\ (Q_G)$; parameter: V_{DS} ,
$I_D = 0.12$ A pulsed, $T_j = 25$ °C



14 Drain-source breakdown voltage

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



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