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SIPMOS® Small-Signal-Transistor

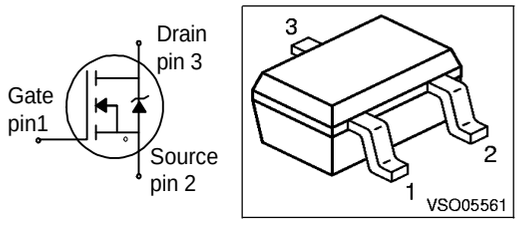
Feature

- 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}	60	V
$R_{DS(on)}$	5	Ω
I_D	0.23	A

PG-SOT-323



Type	Package	Pb-free	Tape and Reel Information	Marking
SN7002W	PG-SOT-323	Yes	H6327: 3000 pcs/reel	sSN
SN7002W	PG-SOT-323	Yes	H6433: 10000 pcs/reel	sSN

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	 0.23 0.18	A
Pulsed drain current T_A=25°C	$I_{D\ puls}$	0.92	
Reverse diode d*v*/d*t* I_S=0.23A, V_{DS}=48V, d*i*/d*t*=200A/µs, T_{jmax}=150°C	d*v*/d*t*	6	kV/µs
Gate source voltage	V_{GS}	±20	V
ESD class (JESD22-A114-HBM)		0 (<250V)	
Power dissipation T_A=25°C	P_{tot}	0.5	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 - ambient at minimal footprint	R_{thJA}	-	-	250	K/W

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=250µA	$V_{(BR)DSS}$	60	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D=26µA	$V_{GS(th)}$	0.8	1.4	1.8	
Zero gate voltage drain current V_{DS}=60V, V_{GS}=0, T_j=25°C V_{DS}=60V, V_{GS}=0, T_j=150°C	I_{DSS}	 - -	 - -	 0.1 5	µA
Gate-source leakage current V_{GS}=20V, V_{DS}=0	I_{GSS}	-	-	10	nA
Drain-source on-state resistance V_{GS}=4.5V, I_D=0.2A	$R_{DS(on)}$	-	4.1	7.5	Ω
Drain-source on-state resistance V_{GS}=10V, I_D=0.23A	$R_{DS(on)}$	-	2.3	5	

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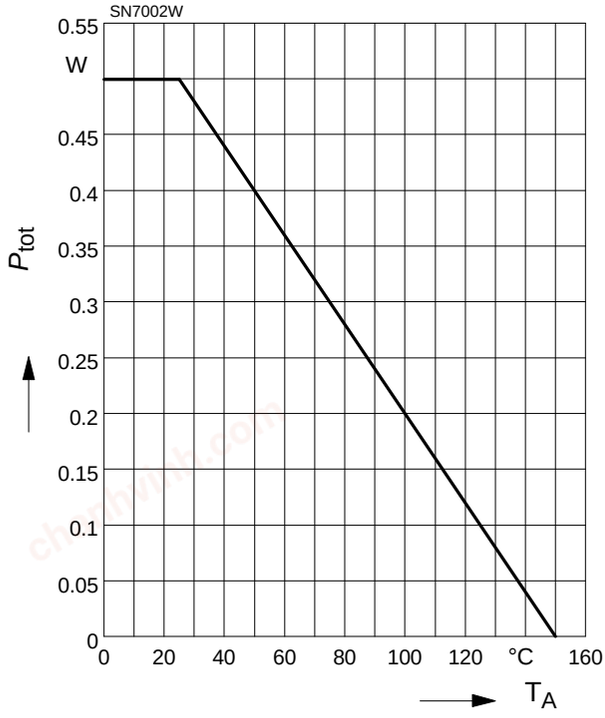
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

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=0.18A	0.1	0.21	-	S
Input capacitance	C_{iss}	V_{GS}=0, V_{DS}=25V, f=1MHz	-	34	45	pF
Output capacitance	C_{oss}		-	7.2	9.6	
Reverse transfer capacitance	C_{rss}		-	3	4.5	
Turn-on delay time	$t_{d(on)}$	V_{DD}=30V, V_{GS}=10V, I_D=0.23A, R_G=6Ω	-	2.4	3.6	ns
Rise time	t_r		-	2.8	4.2	
Turn-off delay time	$t_{d(off)}$		-	6	9	
Fall time	t_f		-	8.5	12.75	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=48V, I_D=0.23A	-	0.11	0.17	nC
Gate to drain charge	Q_{gd}		-	0.42	0.63	
Gate charge total	Q_g	V_{DD}=48V, I_D=0.23A, V_{GS}=0 to 10V	-	1	1.5	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=48V, I_D = 0.23 A	-	3.4	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_A=25°C	-	-	0.23	A
Inv. diode direct current, pulsed	I_{SM}		-	-	0.92	
Inverse diode forward voltage	V_{SD}	V_{GS}=0, I_F=0.23A	-	0.85	1.2	V
Reverse recovery time	t_{rr}	V_R=30V, I_F=I_S, di_F/dt=100A/µs	-	10.8	16.2	ns
Reverse recovery charge	Q_{rr}		-	3.2	4.8	nC

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1 Power dissipation

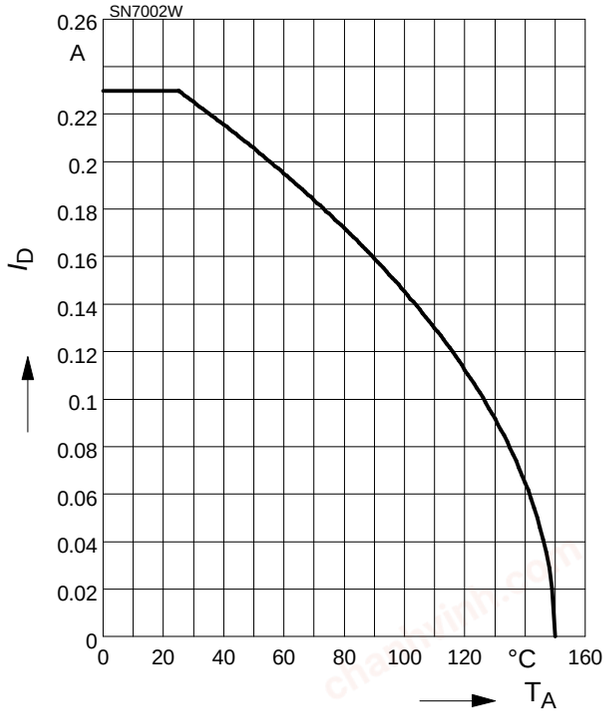
$P_{tot} = f(T_A)$



2 Drain current

$I_D = f(T_A)$

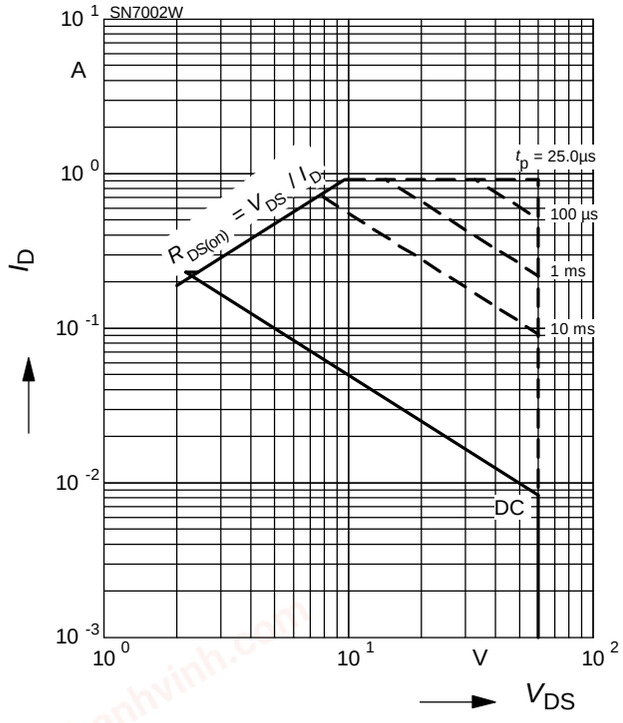
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

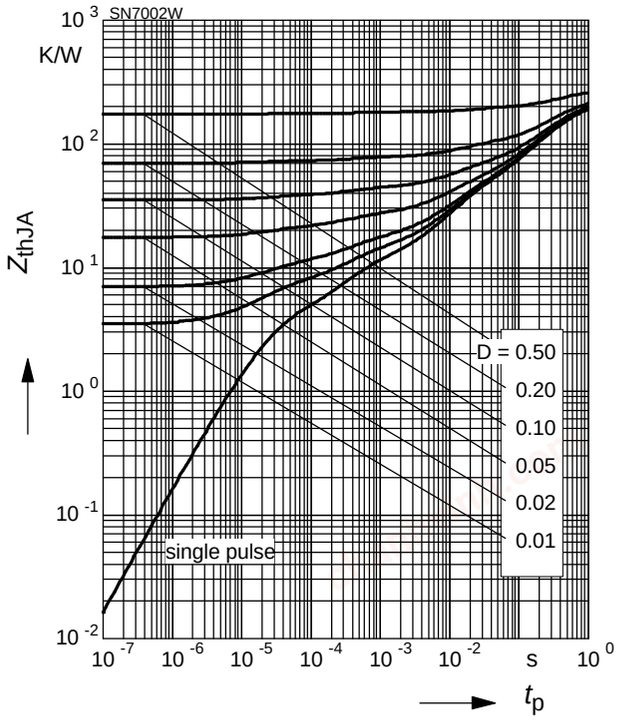
parameter : $D = 0$, $T_A = 25$ °C



4 Transient thermal impedance

$Z_{thJA} = f(t_p)$

parameter : $D = t_p/T$

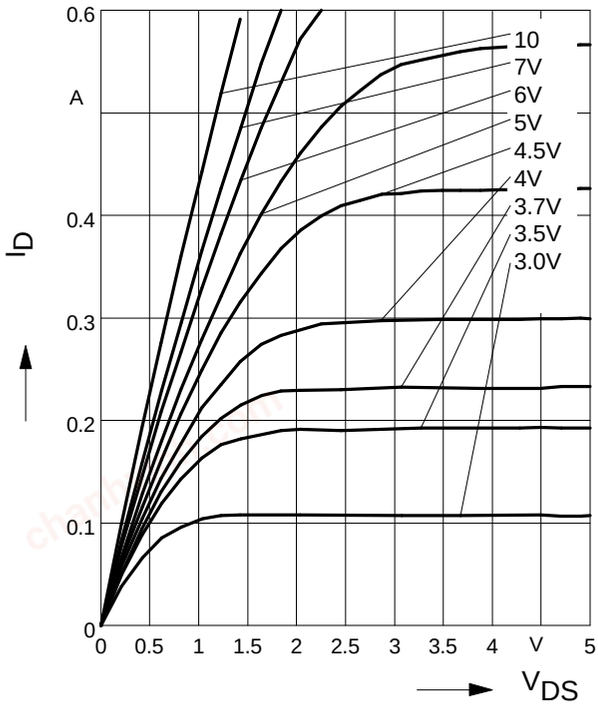


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5 Typ. output characteristic

$I_D = f(V_{DS})$

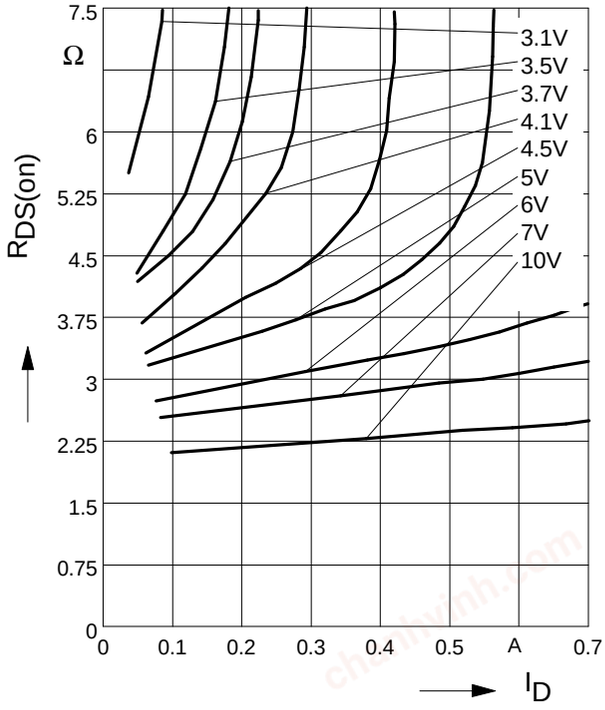
parameter: T_j = 25 °C, V_{GS}



6 Typ. drain-source on resistance

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

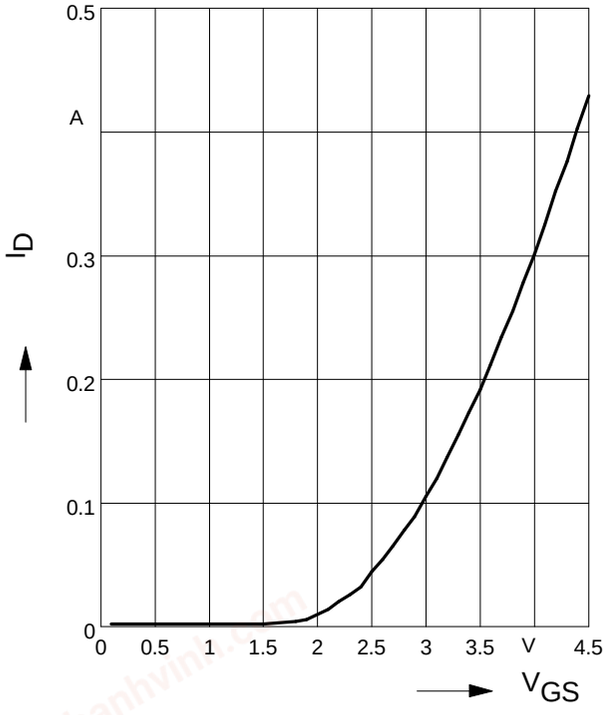
parameter: T_j = 25 °C, V_{GS}



7 Typ. transfer characteristics

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

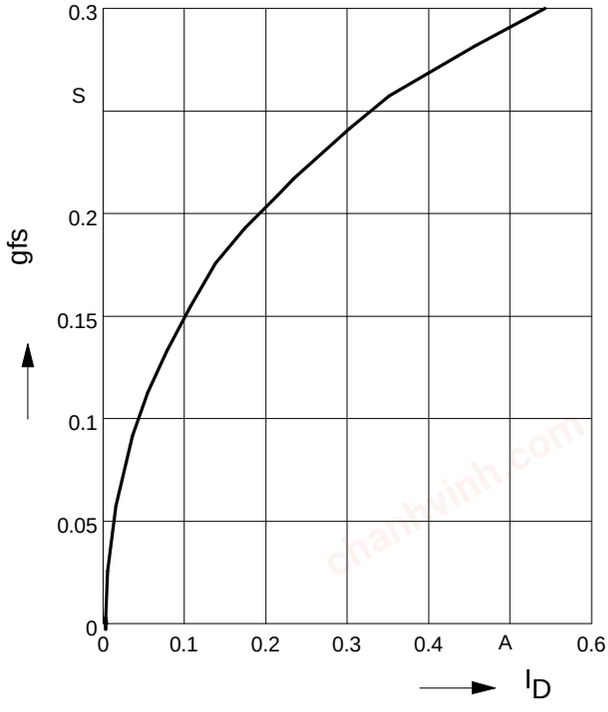
parameter: T_j = 25 °C



8 Typ. forward transconductance

$g_{fs} = f(I_D)$

parameter: T_j = 25 °C

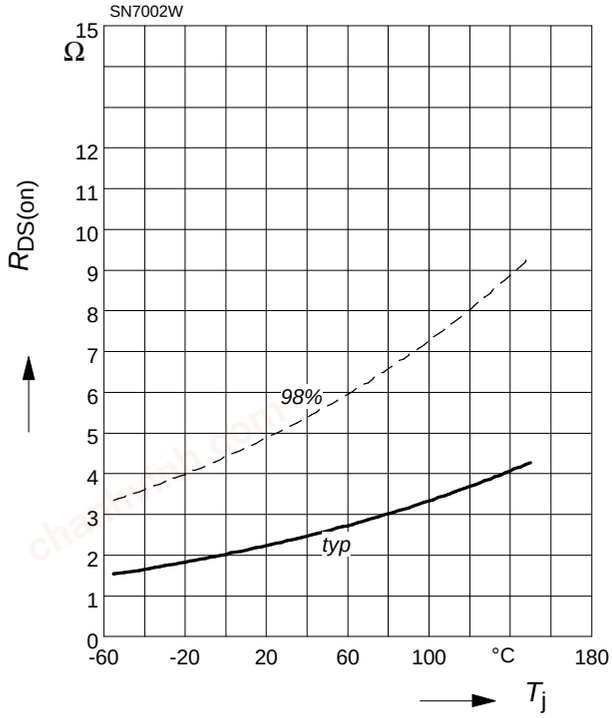


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(.) Drain-source on-state resistance

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

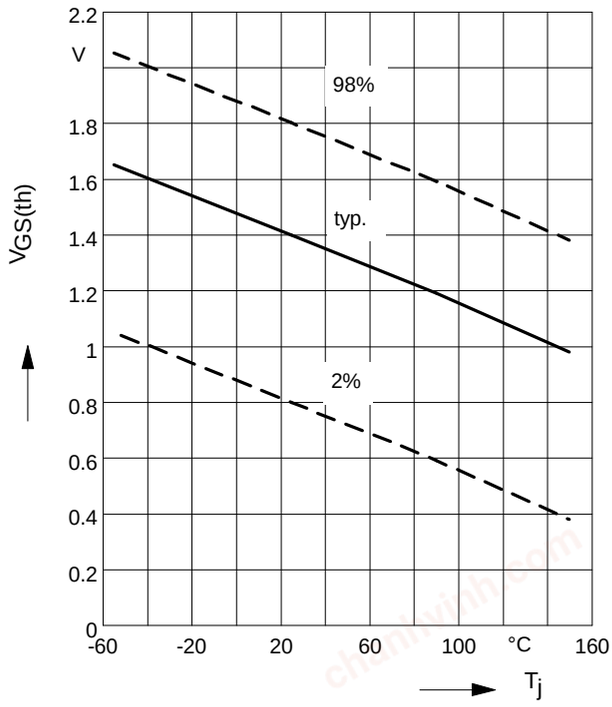
parameter : I_D = 0.23 A, V_{GS} = 10 V



10 Typ. gate threshold voltage

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

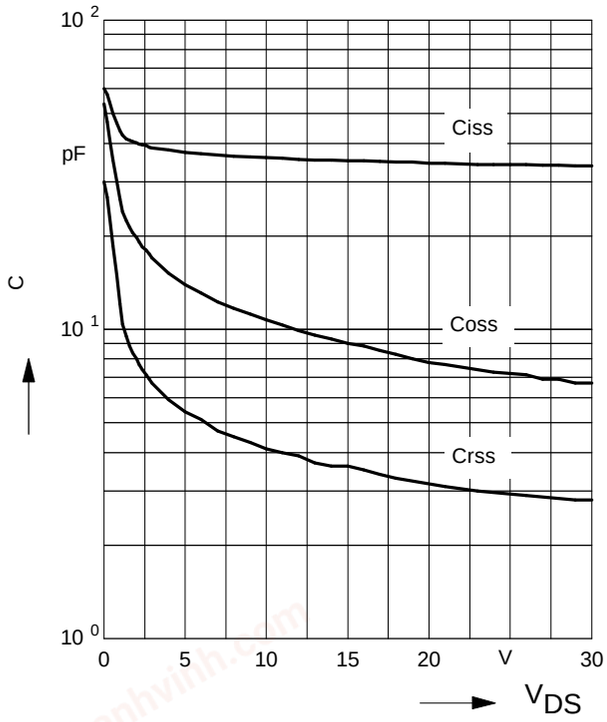
parameter: $V_{GS} = V_{DS}$; I_D =26µA



11 Typ. capacitances

$C = f(V_{DS})$

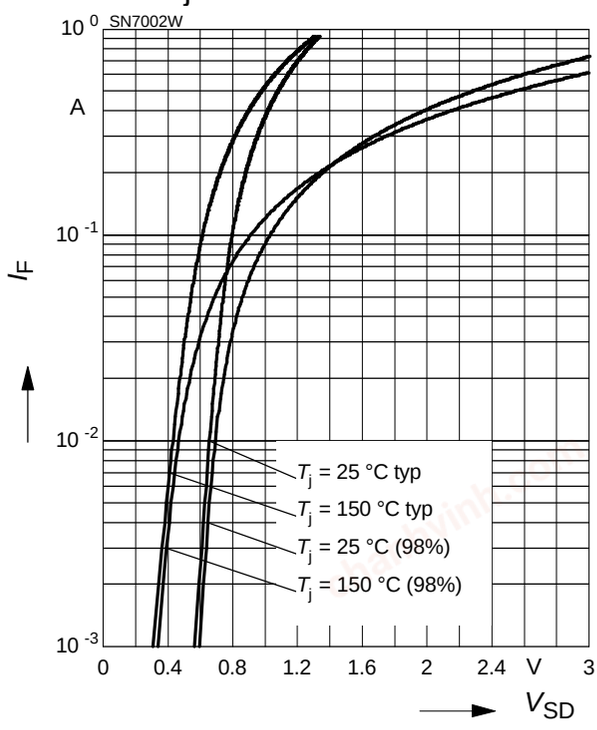
parameter: V_{GS}=0, f=1 MHz, T_j = 25 °C



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

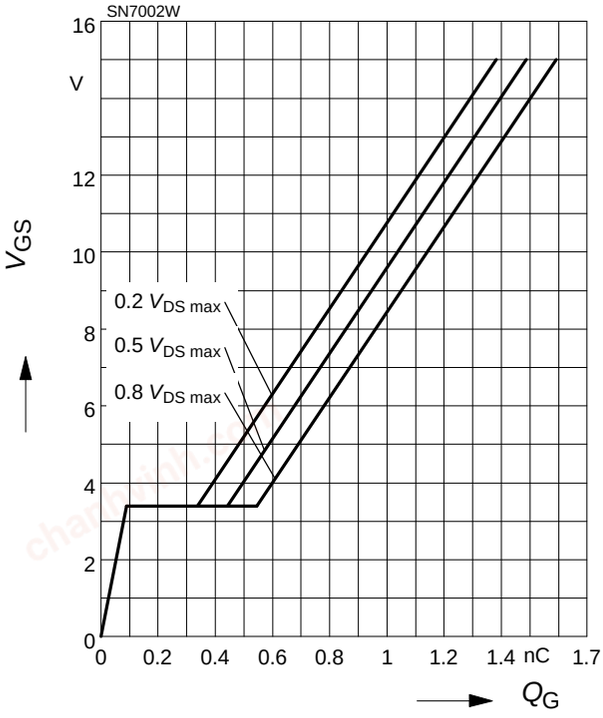
parameter: T_j



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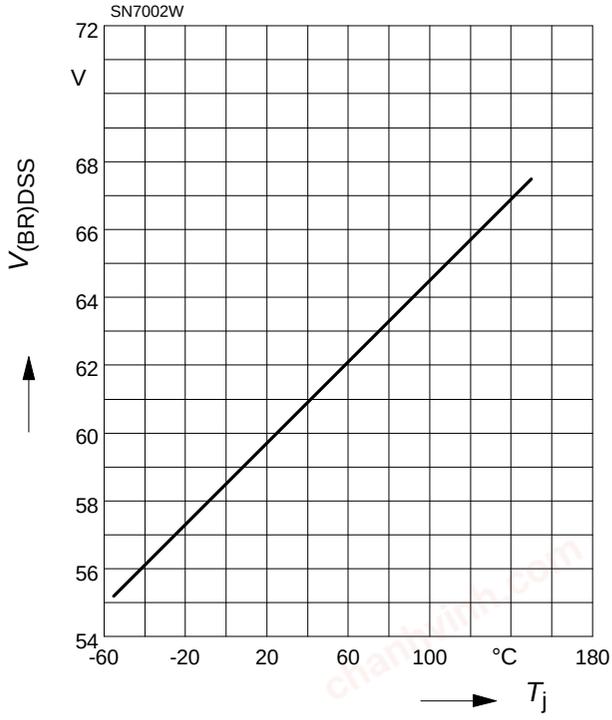
13 Typ. gate charge

$V_{GS} = f\ (Q_G)$; parameter: V_{DS} ,
$I_D = 0.16$ A pulsed, $T_j = 25$ °C



14 Drain-source breakdown voltage

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



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