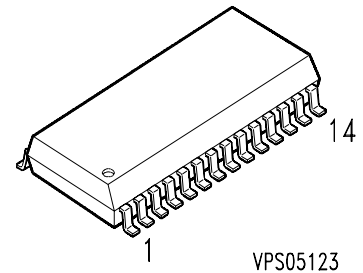
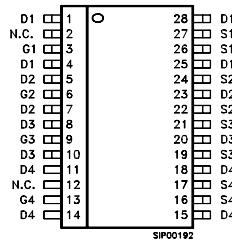


SIPMOS[®] Power Transistor

- Quad-channel
- Enhancement mode
- Logic level
- Avalanche-rated
- dv/dt rated



VPS05123

Type	V_{DS}	I_D	$R_{DS(on)}$	Package	Ordering Code
BUZ 104SL-4	55 V	3.2 A	0.125 Ω	P-DSO-28	C67078-S. . . . - . .

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current <i>one channel active</i> $T_A = 25\text{ }^\circ\text{C}$	I_D	3.2	A
Pulsed drain current <i>one channel active</i> $T_A = 25\text{ }^\circ\text{C}$	I_{Dpuls}	12.8	A
Avalanche energy, single pulse $I_D = 3.2\text{ A}$, $V_{DD} = 25\text{ V}$, $R_{GS} = 25\text{ }\Omega$ $L = 10.15\text{ mH}$, $T_j = 25\text{ }^\circ\text{C}$	E_{AS}	52	mJ
Reverse diode dv/dt $I_S = 3.2\text{ A}$, $V_{DS} = 40\text{ V}$, $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_{jmax} = 175\text{ }^\circ\text{C}$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 14	V
Power dissipation, <i>one channel active</i> $T_A = 25\text{ }^\circ\text{C}$	P_{tot}	2.4	W
Operating temperature	T_j	-55 ... + 175	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 ... + 175	$^\circ\text{C}$
IEC climatic category, DIN IEC 68-1		55 / 175 / 56	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Thermal resistance, junction - soldering point ¹⁾	R_{thJS}	-	-	tbd	K/W
Thermal resistance, junction - ambient ²⁾	R_{thJA}	-	-	62.5	

1) Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6 cm² (one layer, 70µm thick) copper area for Drain connection. PCB is vertical without blown air.

2) one channel active

Electrical Characteristics, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Static Characteristics

Drain- source breakdown voltage $V_{GS} = 0 \text{ V}, I_D = 0.25 \text{ mA}, T_j = 25 \text{ }^\circ\text{C}$	$V_{(BR)DSS}$	55	-	-	V
Gate threshold voltage $V_{GS}=V_{DS}, I_D = 20 \text{ }\mu\text{A}$	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = -40 \text{ }^\circ\text{C}$ $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$ $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = 150 \text{ }^\circ\text{C}$	I_{DSS}	-	-	0.1 1 100	μA
Gate-source leakage current $V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$	I_{GSS}	-	10	100	
Drain-Source on-resistance $V_{GS} = 5 \text{ V}, I_D = 3.2 \text{ A}$	$R_{DS(on)}$	-	0.095	0.125	

Electrical Characteristics, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Dynamic Characteristics

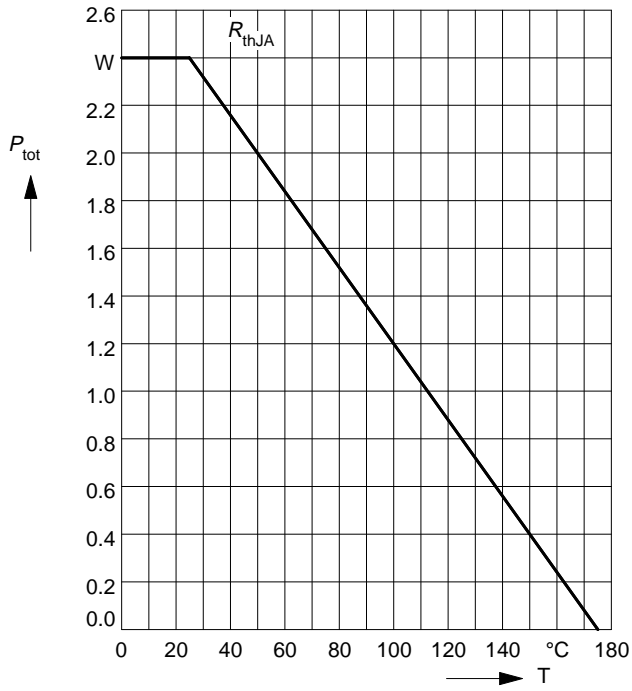
Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = 3.2 \text{ A}$	g_{fs}	3	-	-	S
Input capacitance $V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$, $f = 1 \text{ MHz}$	C_{iss}	-	320	400	pF
Output capacitance $V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$, $f = 1 \text{ MHz}$	C_{oss}	-	100	125	
Reverse transfer capacitance $V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$, $f = 1 \text{ MHz}$	C_{rss}	-	55	70	
Turn-on delay time $V_{DD} = 30 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 3.2 \text{ A}$ $R_G = 16.8 \Omega$	$t_{d(on)}$	-	20	30	ns
Rise time $V_{DD} = 30 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 3.2 \text{ A}$ $R_G = 16.8 \Omega$	t_r	-	30	45	
Turn-off delay time $V_{DD} = 30 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 3.2 \text{ A}$ $R_G = 16.8 \Omega$	$t_{d(off)}$	-	35	53	
Fall time $V_{DD} = 30 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 3.2 \text{ A}$ $R_G = 16.8 \Omega$	t_f	-	20	30	
Gate charge at threshold $V_{DD} = 40 \text{ V}$, $I_D \geq 0.1 \text{ A}$, $V_{GS} = 0 \text{ to } 1 \text{ V}$	$Q_{g(th)}$	-	0.55	0.85	nC
Gate charge at 5.0 V $V_{DD} = 40 \text{ V}$, $I_D = 3.2 \text{ A}$, $V_{GS} = 0 \text{ to } 5 \text{ V}$	$Q_{g(5)}$	-	5.3	8	
Gate charge total $V_{DD} = 40 \text{ V}$, $I_D = 3.2 \text{ A}$, $V_{GS} = 0 \text{ to } 10 \text{ V}$	$Q_{g(total)}$	-	14	21	
Gate plateau voltage $V_{DD} = 40 \text{ V}$, $I_D = 3.2 \text{ A}$	$V_{(plateau)}$	-	3.27	-	V

Electrical Characteristics, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current $T_A = 25^\circ\text{C}$	I_S	-	-	3.2	A
Inverse diode direct current, pulsed $T_A = 25^\circ\text{C}$	I_{SM}	-	-	12.8	
Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = 6.4\text{ A}$	V_{SD}	-	0.95	1.6	V
Reverse recovery time $V_R = 30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	50	75	ns
Reverse recovery charge $V_R = 30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	90	135	nC

Power dissipation

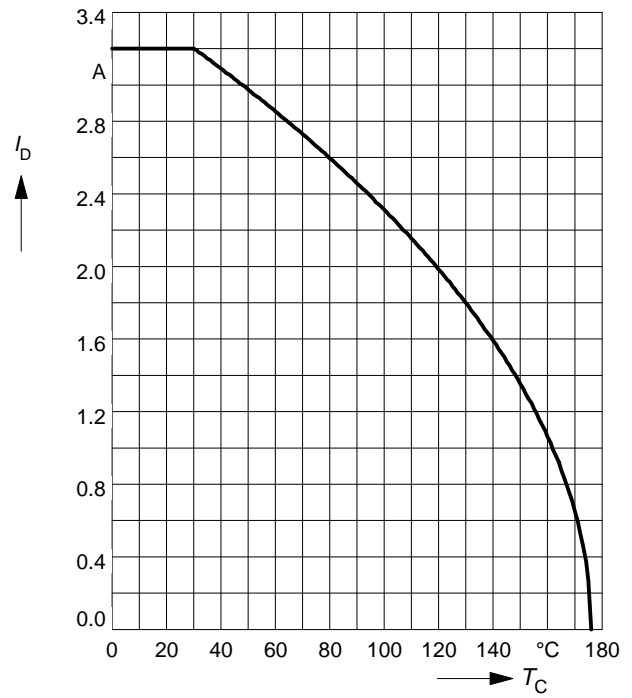
$$P_{\text{tot}} = f(T)$$



Drain current

$$I_D = f(T_C)$$

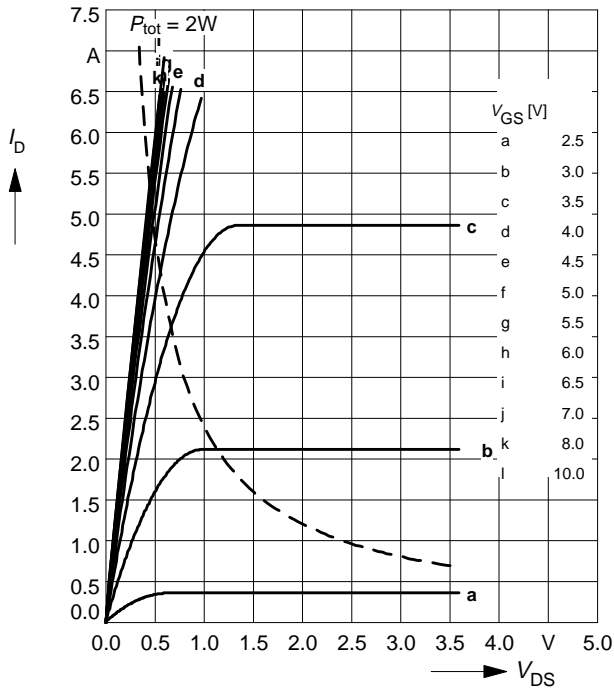
parameter: $V_{\text{GS}} \geq 5 \text{ V}$



Typ. output characteristics

$$I_D = f(V_{DS})$$

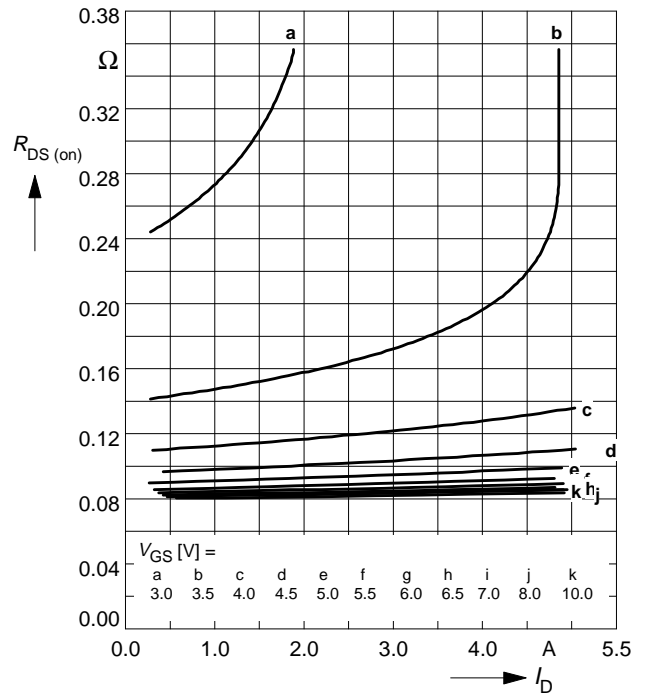
parameter: $t_p = 80 \mu s$



Typ. drain-source on-resistance

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

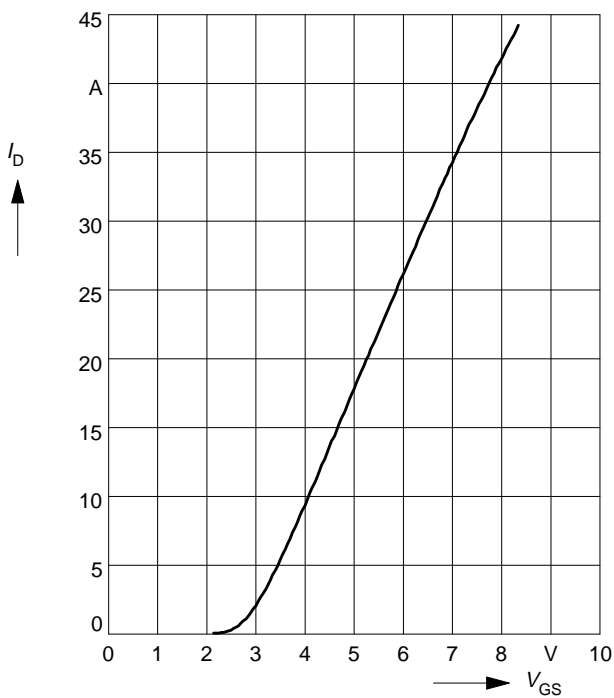
parameter: $t_p = 80 \mu s, T_j = 25 \text{ }^\circ\text{C}$



Typ. transfer characteristics $I_D = f(V_{GS})$

parameter: $t_p = 80 \mu s$

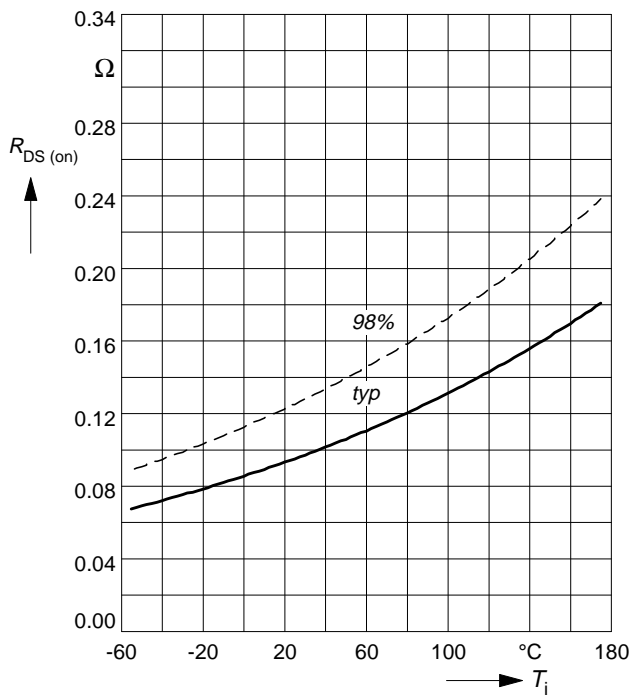
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



Drain-source on-resistance

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

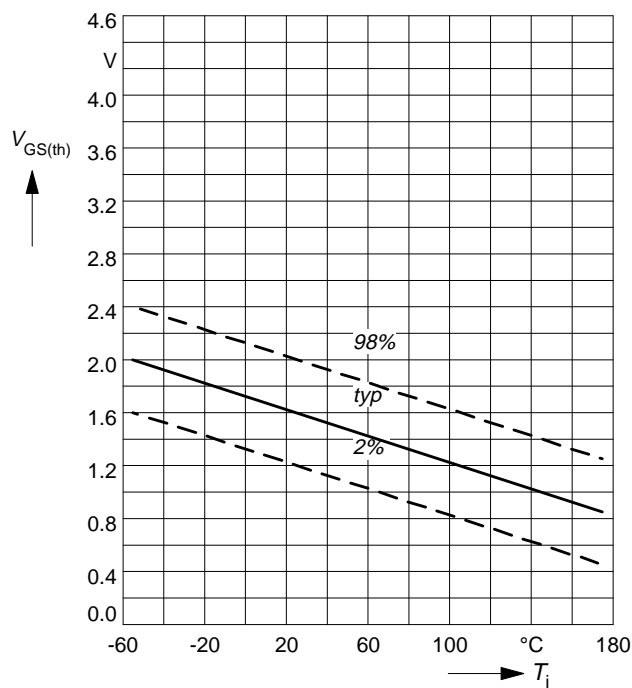
parameter: $I_D = 3.2 \text{ A}$, $V_{GS} = 5 \text{ V}$



Gate threshold voltage

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

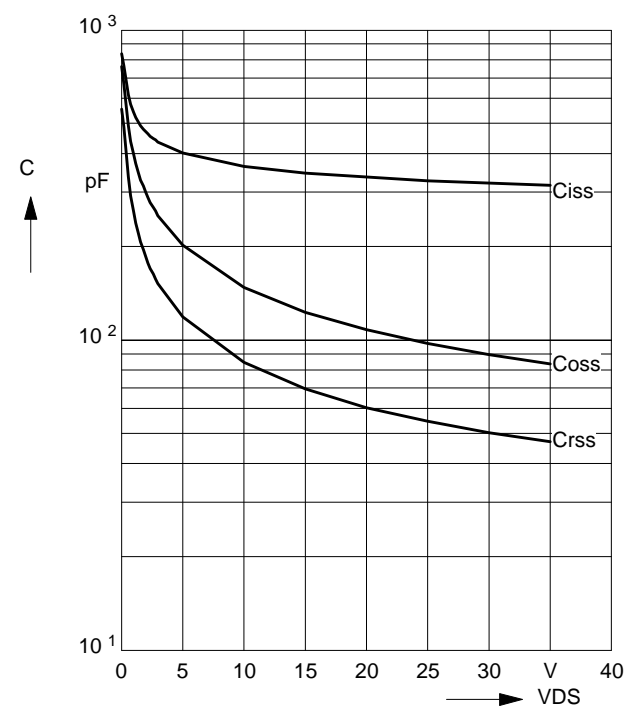
parameter: $V_{GS} = V_{DS}$, $I_D = 20 \mu\text{A}$



Typ. capacitances

$$C = f(V_{DS})$$

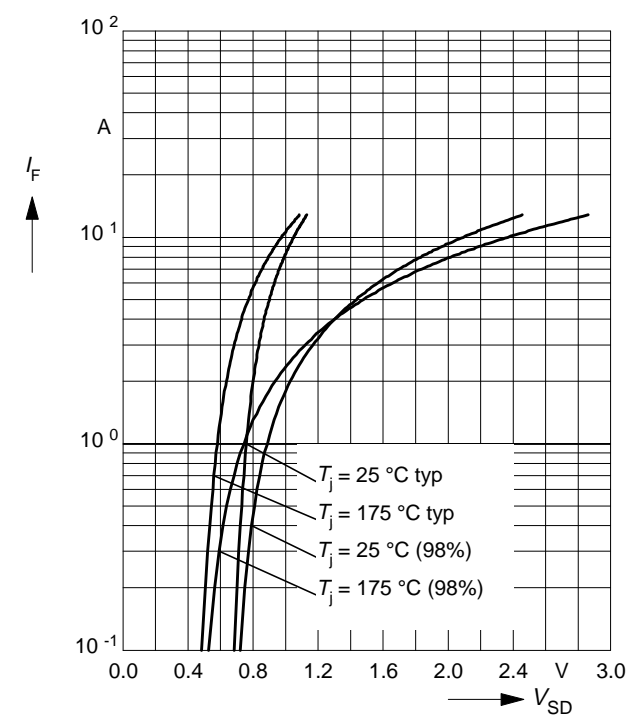
parameter: $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$



Forward characteristics of reverse diode

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

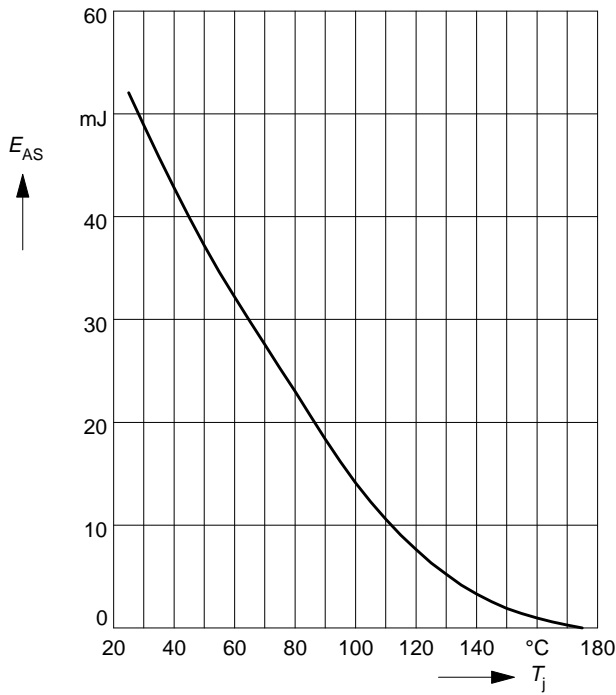
parameter: T_j , $t_p = 80 \mu\text{s}$



Avalanche energy $E_{AS} = f(T_j)$

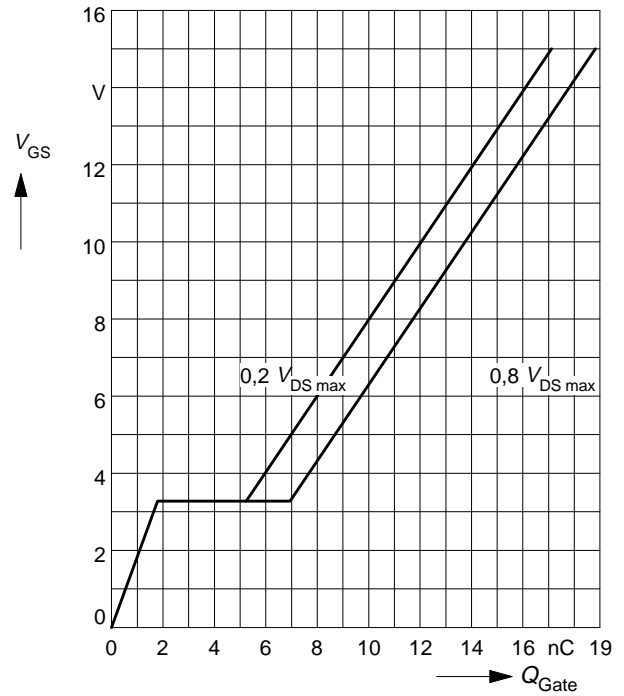
parameter: $I_D = 3.2A, V_{DD} = 25V$

$R_{GS} = 25\Omega, L = 10.15mH$

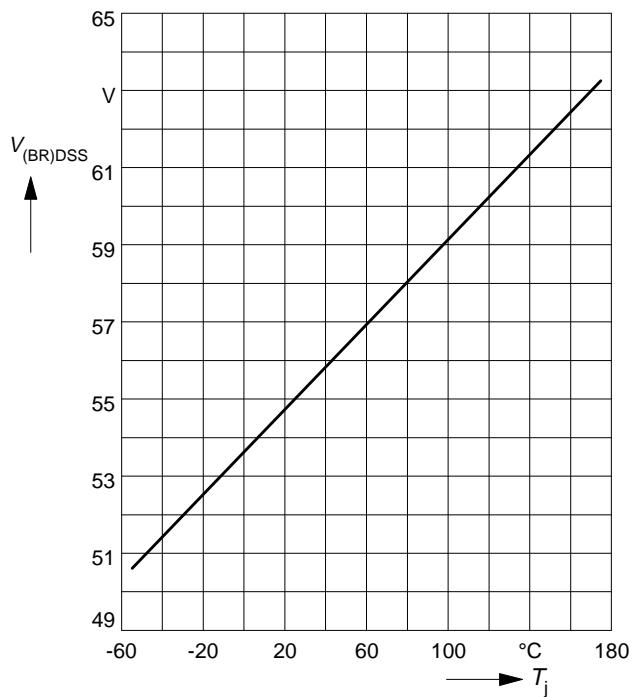


Typ. gate charge $V_{GS} = f(Q_{Gate})$

parameter: $I_{D\ puls} = 3A$



Drain-source breakdown voltage $V_{(BR)DSS} = f(T_j)$





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