

SIPMOS® Small-Signal-Transistor
Features

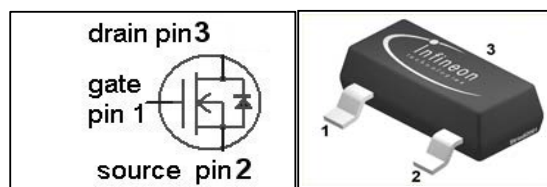
- N-channel
- Depletion mode
- dv/dt rated
- Available with $V_{GS(th)}$ indicator on reel
- Pb-free lead-plating; RoHS compliant
- Halogen-free according to AEC61249-2-21
- Qualified according to AEC Q101

Product Summary

V_{DS}	100	V
$R_{DS(on),max}$	12	Ω
$I_{DSS,min}$	0.09	A



PG-SOT-23



Type	Package	Pb-free	Tape and Reel Information	Marking
BSS169	PG-SOT-23	Yes	H6327: 3000 pcs/reel	SFs
BSS169	PG-SOT-23	Yes	H6906: 3000 pcs/reel sorted in $V_{GS(th)}$ bands ¹⁾	SFs

Maximum ratings, at $T_j=25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_A=25\text{ °C}$	0.17	A
		$T_A=70\text{ °C}$	0.14	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	0.68	
Reverse diode dv/dt	dv/dt	$I_D=0.17\text{ A}$, $V_{DS}=80\text{ V}$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ °C}$	6	kV/ μs
Gate source voltage	V_{GS}		± 20	V
ESD sensitivity (HBM) as per MIL-STD 883			Class 0	
Power dissipation	P_{tot}	$T_A=25\text{ °C}$	0.36	W
Operating and storage temperature	T_j , T_{stg}		-55 ... 150	$^{\circ}\text{C}$
IEC climatic category; DIN IEC 68-1			55/150/56	

¹⁾ see table on next page and diagram 11

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - ambient	R_{thJA}	minimal footprint	-	-	350	K/W
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Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified
Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=-10\text{ V}, I_D=250\text{ }\mu\text{A}$	100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=3\text{ V}, I_D=50\text{ }\mu\text{A}$	-2.9	-2.2	-1.8	
Drain-source cutoff current	$I_{D(off)}$	$V_{DS}=100\text{ V},$ $V_{GS}=-10\text{ V}, T_j=25\text{ °C}$	-	-	0.1	μA
		$V_{DS}=100\text{ V},$ $V_{GS}=-10\text{ V}, T_j=125\text{ °C}$	-	-	10	
Gate-source leakage current	I_{GSS}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	10	nA
On-state drain current	I_{DSS}	$V_{GS}=0\text{ V}, V_{DS}=10\text{ V}$	90	-	-	mA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=0\text{ V}, I_D=0.05\text{ A}$	-	5.3	12	Ω
		$V_{GS}=10\text{ V}, I_D=0.17\text{ A}$	-	2.9	6	
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max},$ $I_D=0.14\text{ A}$	0.10	0.19	-	S

Threshold voltage $V_{GS(th)}$ sorted in bands²⁾

J	$V_{GS(th)}$	$V_{DS}=3\text{ V}, I_D=50\text{ }\mu\text{A}$	-2	-	-1.8	V
K			-2.15	-	-1.95	
L			-2.3	-	-2.1	
M			-2.45	-	-2.25	
N			-2.6	-	-2.4	

²⁾ Each reel contains transistors out of one band whose identifying letter is printed on the reel label. A specific band cannot be ordered separately.

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=-10\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	51	68	pF
Output capacitance	C_{oss}		-	9	13	
Reverse transfer capacitance	C_{rss}		-	4	7	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=50\text{ V},$ $V_{GS}=-3\dots 7\text{ V},$ $I_D=0.12\text{ A}, R_G=6\ \Omega$	-	2.9	4.2	ns
Rise time	t_r		-	2.7	4.0	
Turn-off delay time	$t_{d(off)}$		-	11	17	
Fall time	t_f		-	27	40	

Gate Charge Characteristics

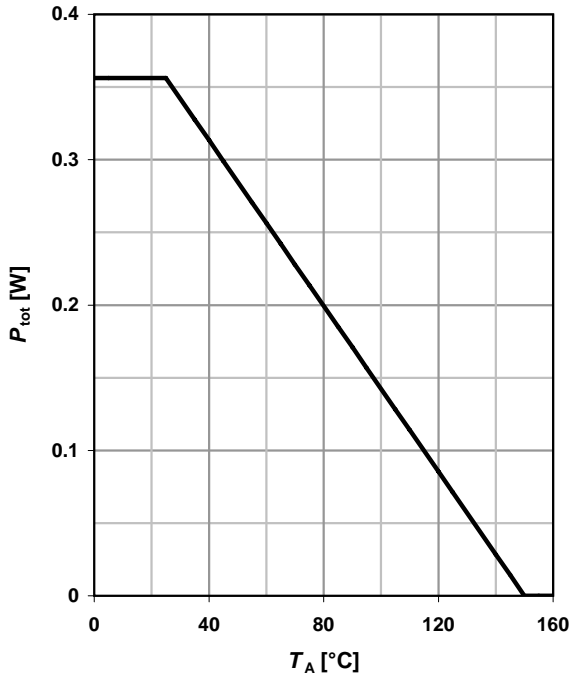
Gate to source charge	Q_{gs}	$V_{DD}=80\text{ V}, I_D=0.12\text{ A},$ $V_{GS}=-3\text{ to }7\text{ V}$	-	0.12	0.16	nC
Gate to drain charge	Q_{gd}		-	0.9	1.4	
Gate charge total	Q_g		-	2.1	2.8	
Gate plateau voltage	$V_{plateau}$		-	-0.43	-	V

Reverse Diode

Diode continuous forward current	I_S	$T_A=25\text{ }^\circ\text{C}$	-	-	0.17	A
Diode pulse current	$I_{S,pulse}$		-	-	0.68	
Diode forward voltage	V_{SD}	$V_{GS}=-10\text{ V}, I_F=0.17\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	0.79	1.2	V
Reverse recovery time	t_{rr}	$V_R=50\text{ V}, I_F=0.12\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	20.5	25.6	ns
Reverse recovery charge	Q_{rr}		-	9.7	12.1	

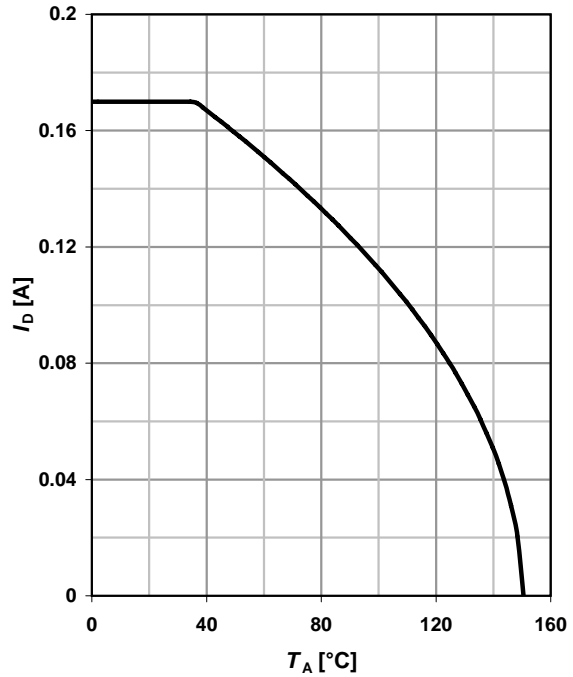
1 Power dissipation

$$P_{tot} = f(T_A)$$



2 Drain current

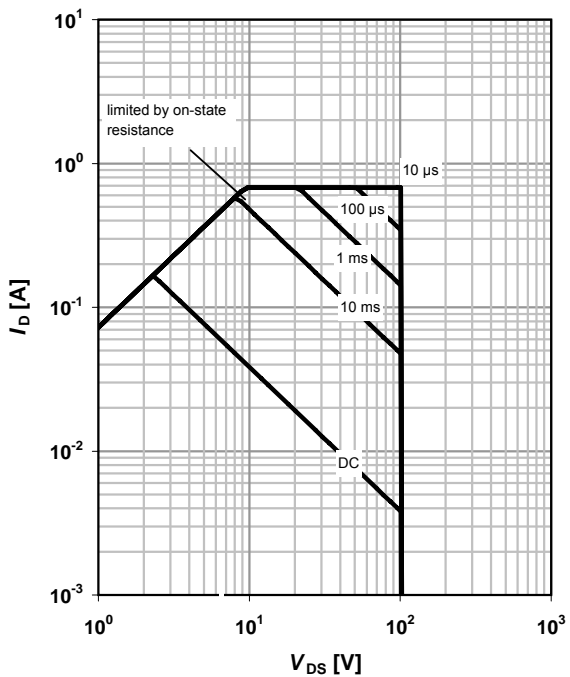
$$I_D = f(T_A); V_{GS} \geq 10 \text{ V}$$



3 Safe operating area

$$I_D = f(V_{DS}); T_A = 25 \text{ °C}; D = 0$$

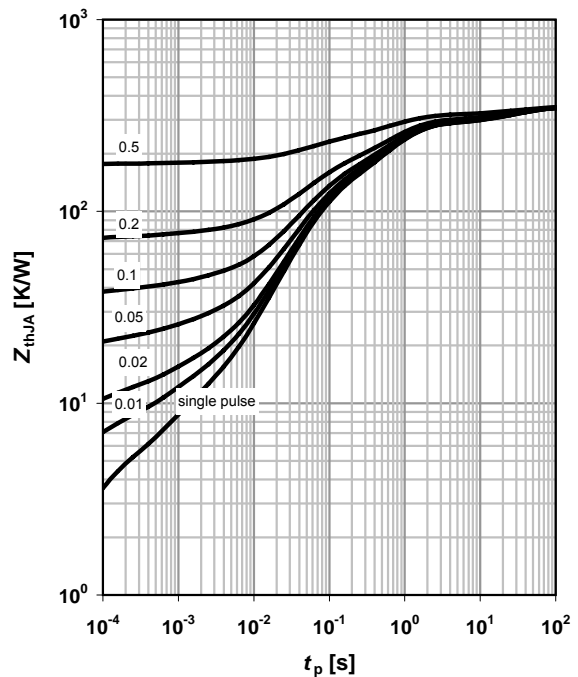
parameter: t_p



4 Max. transient thermal impedance

$$Z_{thJA} = f(t_p)$$

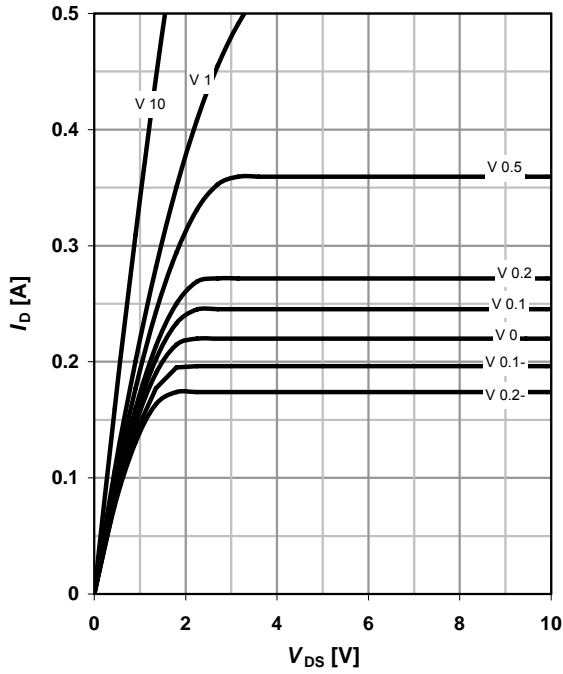
parameter: $D = t_p / T$



5 Typ. output characteristics

$$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}$$

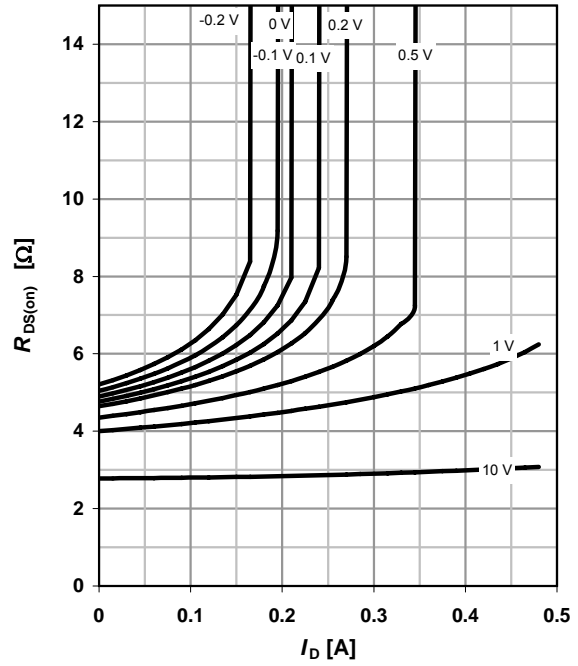
parameter: V_{GS}



6 Typ. drain-source on resistance

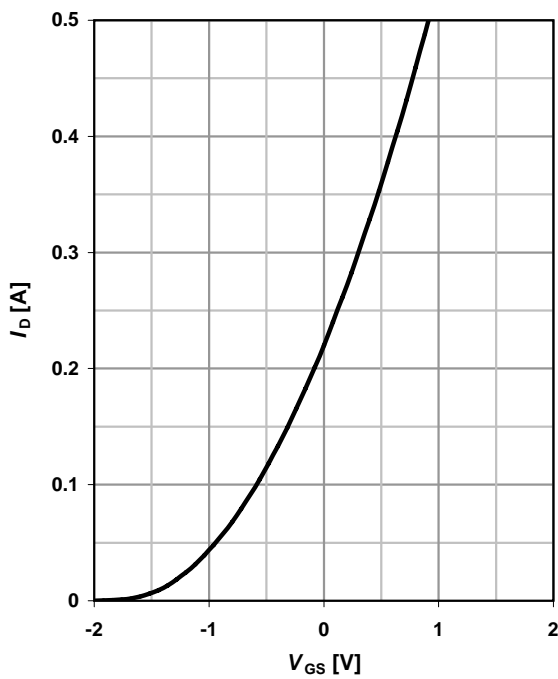
$$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$$

parameter: V_{GS}



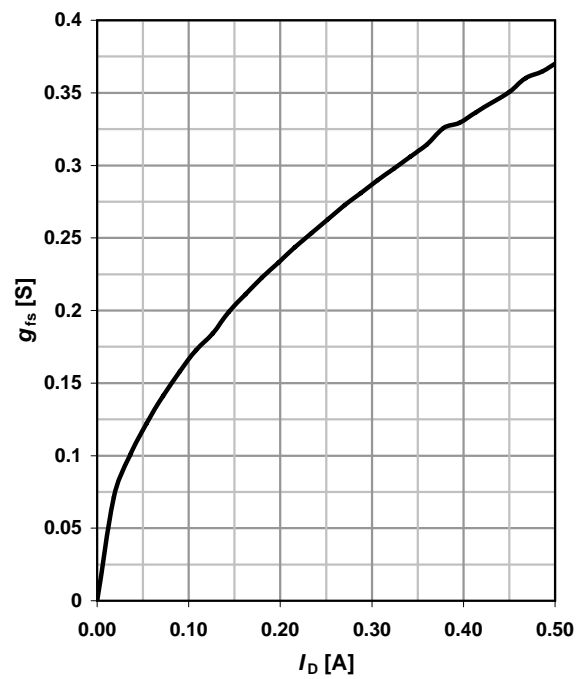
7 Typ. transfer characteristics

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



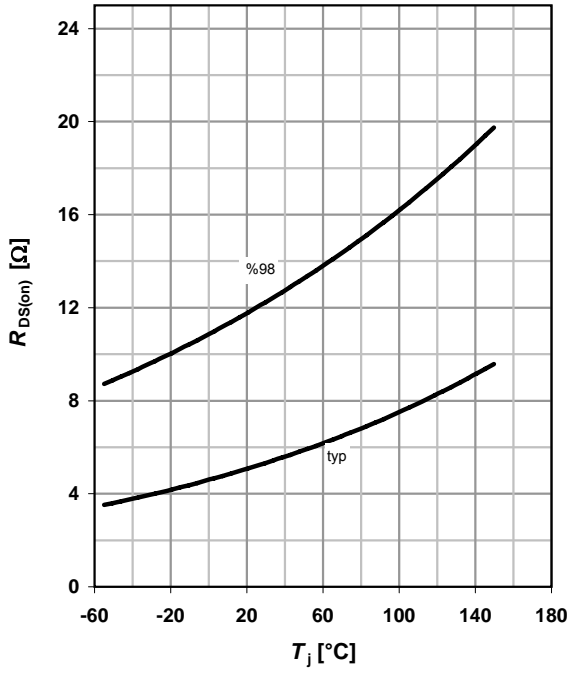
8 Typ. forward transconductance

$$g_{fs} = f(I_D); T_j = 25\text{ }^\circ\text{C}$$



9 Drain-source on-state resistance

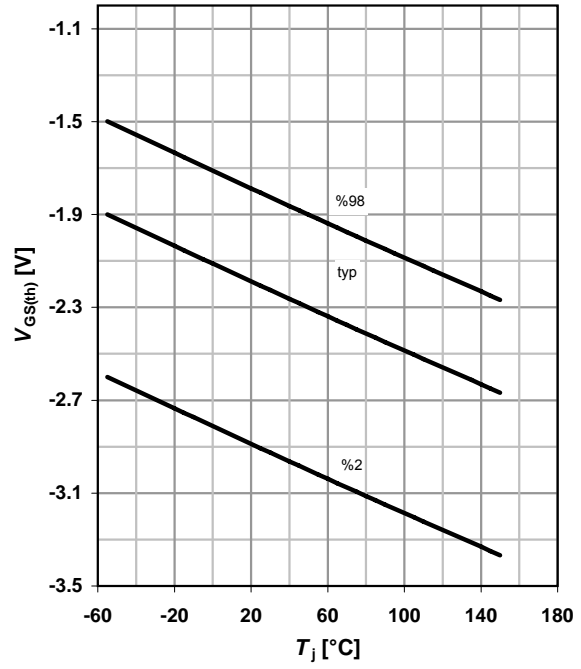
$R_{DS(on)} = f(T_j); I_D = 0.05 \text{ A}; V_{GS} = 0 \text{ V}$



10 Typ. gate threshold voltage

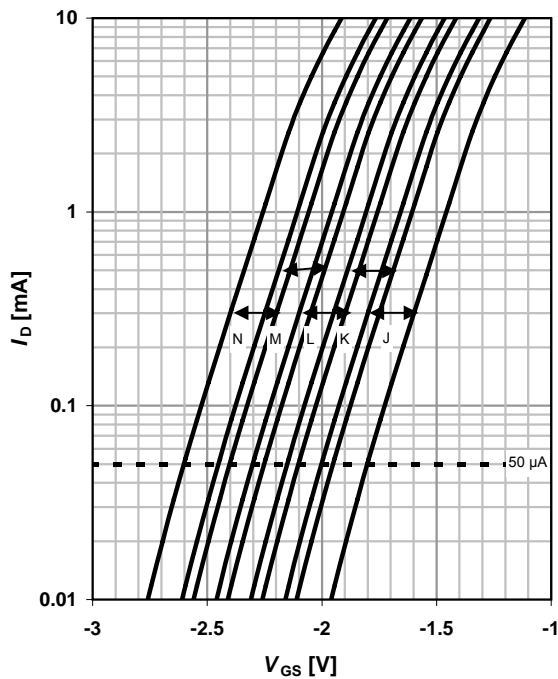
$V_{GS(th)} = f(T_j); V_{DS} = 3 \text{ V}; I_D = 50 \mu\text{A}$

parameter: I_D



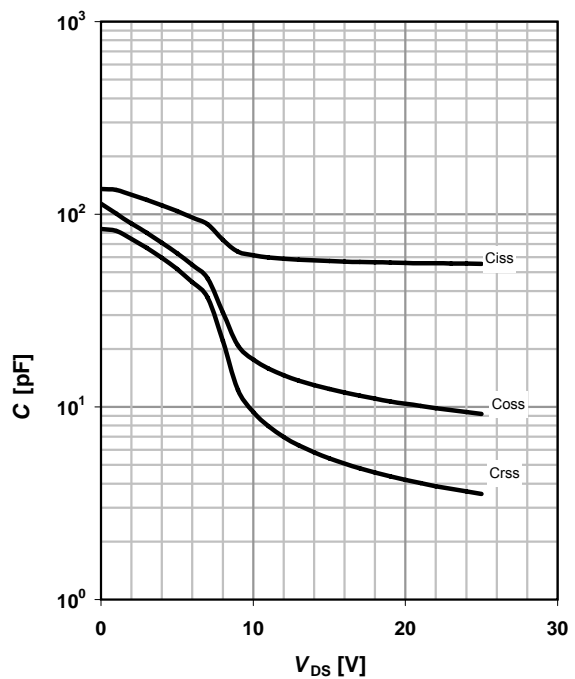
11 Threshold voltage bands

$I_D = f(V_{GS}); V_{DS} = 3 \text{ V}; T_j = 25 \text{ °C}$



12 Typ. capacitances

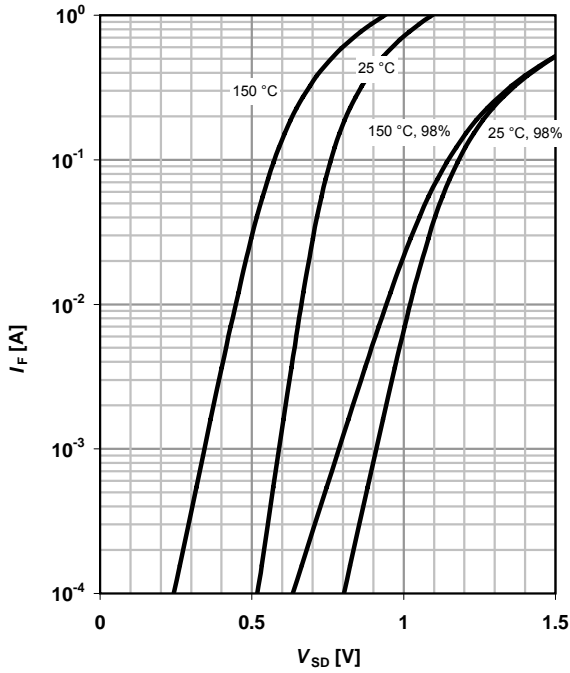
$C = f(V_{DS}); V_{GS} = -10 \text{ V}; f = 1 \text{ MHz}$



13 Forward characteristics of reverse diode

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

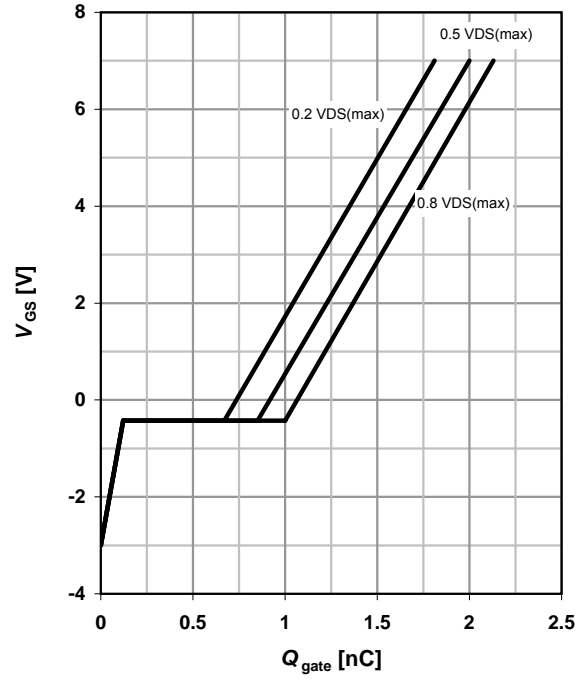
parameter: T_j



15 Typ. gate charge

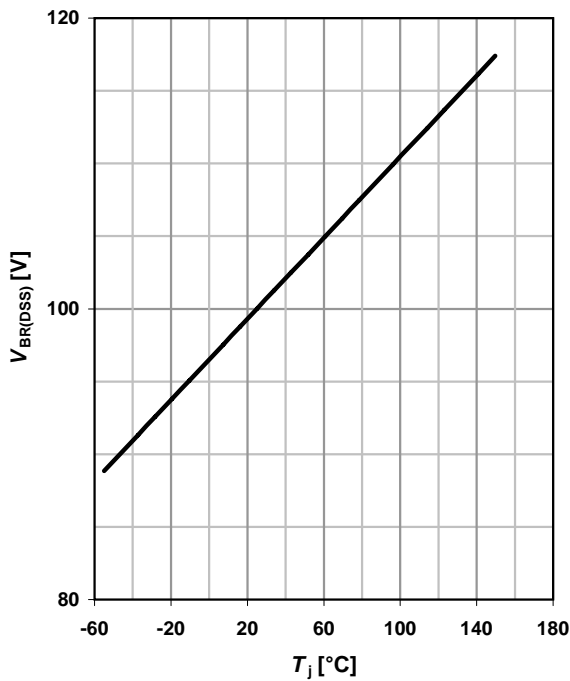
$$V_{GS} = f(Q_{gate}); I_D = 0.12 \text{ A pulsed}$$

parameter: V_{DD}



16 Drain-source breakdown voltage

$$V_{BR(DSS)} = f(T_j); I_D = 250 \mu\text{A}$$



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