SIPMOS® Small-Signal-Transistor

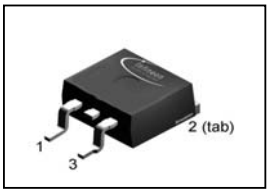
Features

- P-Channel
- Enhancement mode
- Avalanche rated
- d*v*/d*t* rated
- 175°C operating temperature
- Pb-free lead finishing; RoHS compliant

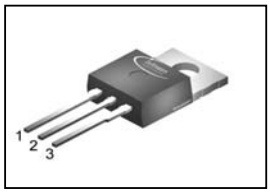
Product Summary

V_{DS}	-60	V
$R_{DS(on),max}$	0.023	Ω
I_D	-80	A

P-TO263-3-2



PG-TO220-3-1



Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	I_D	T_A=25 °C[1)]	-80	A
		T_A=100 °C	-68	
Pulsed drain current	$I_{D,pulse}$	T_A=25 °C	-320	
Avalanche energy, single pulse	E_{AS}	I_D=80 A, R_{GS}=25 Ω	824	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}		34	
Reverse diode d*v*/d*t*	d*v*/d*t*	I_D=80 A, V_{DS}=48 V, d*i*/d*t*=-200 A/µs, $T_{j,max}$=175 °C	-6	kV/µs
Gate source voltage	V_{GS}		±20	V
Power dissipation	P_{tot}	T_A=25 °C	375	W
Operating and storage temperature	T_j, T_{stg}		"-55 ... +175"	°C
ESD class				
Soldering temperature			260 °C	
IEC climatic category; DIN IEC 68-1			55/175/56	

[1)] Current limited by bondwire; with an R_{thJC}= 0.4 K/W the chip is able to carry I_D= -91A

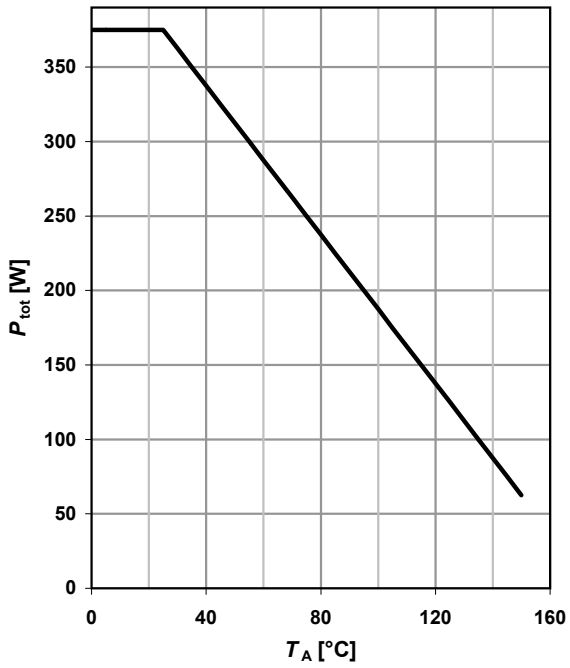
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - case	R_{thJC}		-	-	0.4	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}		-	-	62	
SMD version, device on PCB:	R_{thJA}	minimal footprint	-	-	62	K/W
		6 cm^2 cooling area[2)]	-	-	40	
Electrical characteristics, at T_j=25 °C, unless otherwise specified						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=-250 µA	-60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-5500 µA	-2.1	3	-4	
Zero gate voltage drain current	I_{DSS}	V_{DS}=-60 V, V_{GS}=0 V, T_j=25 °C	-	-0.1	-1	µA
		V_{DS}=-60 V, V_{GS}=0 V, T_j=150 °C	-	-10	-100	
Gate-source leakage current	I_{GSS}	V_{GS}=-20 V, V_{DS}=0 V	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=-10 V, I_D=-64 A	-	21	23	mΩ
Transconductance	g_{fs}	$\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, I_D=-64 A	18	36	-	S

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=-25 V, f=1 MHz	-	3900	5190	pF
Output capacitance	C_{oss}		-	1370	1820	
Reverse transfer capacitance	C_{rss}		-	610	920	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-30 V, V_{GS}=-10 V, I_D=-64 A, R_G=1 Ω	-	21.5	32.2	ns
Rise time	t_r		-	58.9	88	
Turn-off delay time	$t_{d(off)}$		-	44	65	
Fall time	t_f		-	29	43	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=-48 V, I_D=-80 A, V_{GS}=0 to -10 V	-	-21.2	-28.2	nC
Gate to drain charge	Q_{gd}		-	-58	-87	
Gate charge total	Q_g		-	-115	-153	
Gate plateau voltage	$V_{plateau}$		-	-6	-	V
Reverse Diode						
Diode continuous forward current	I_S	T_A=25 °C	-	-	-80	A
Diode pulse current	$I_{S,pulse}$		-	-	-320	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=-80 A, T_j=25 °C	-	-1.02	-1.6	V
Reverse recovery time	t_{rr}	V_R=30 V, I_F=$\|I_S\|$, di_F/dt=100 A/µs	-	117	175	ns
Reverse recovery charge	Q_{rr}		-	420	630	nC

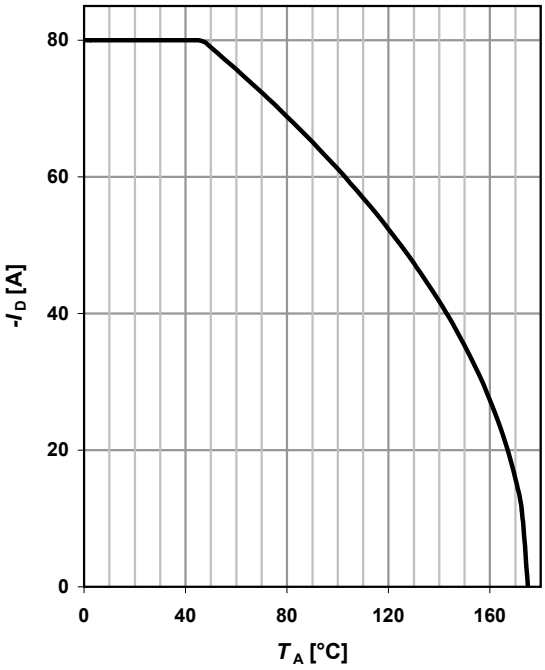
1 Power dissipation

$P_{tot}=f(T_A)$



2 Drain current

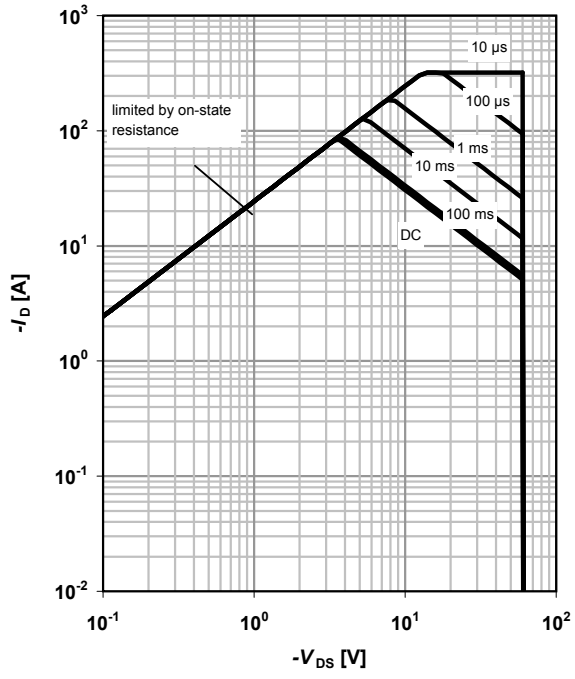
$I_D=f(T_A)$; $|V_{GS}|\geq 10$ V



3 Safe operating area

$I_D=f(V_{DS})$; $T_A=25$ °C[1)]; $D=0$

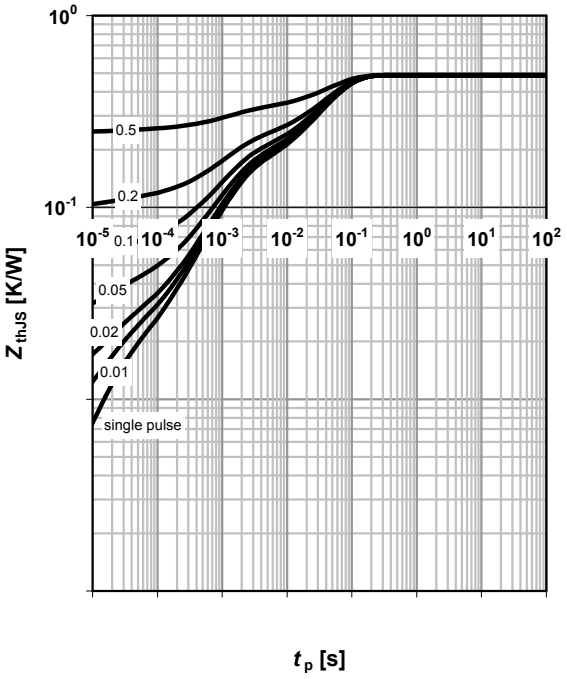
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJA}=f(t_p)$

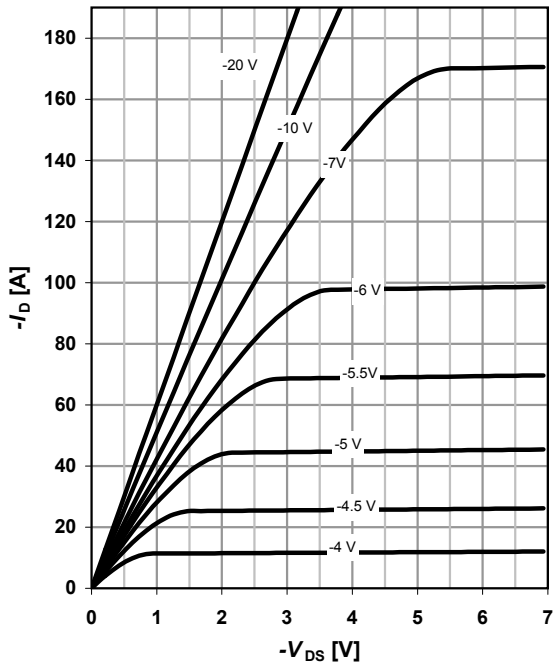
parameter: $D=t_p/T$



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C

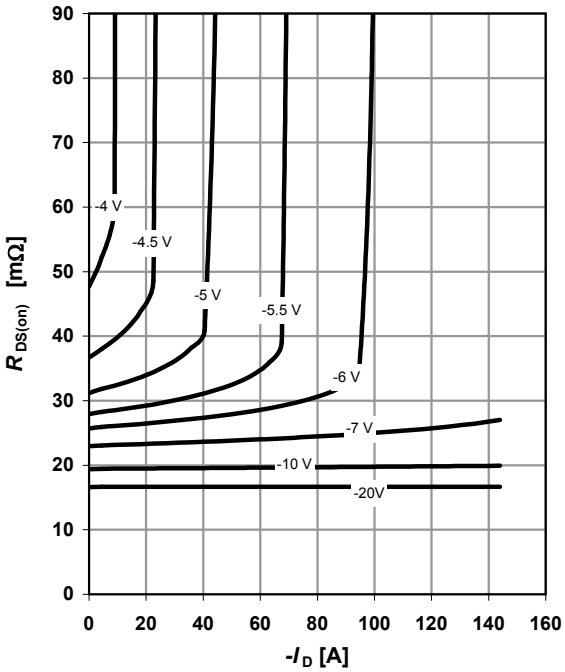
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}$=f(I_D); T_j=25 °C

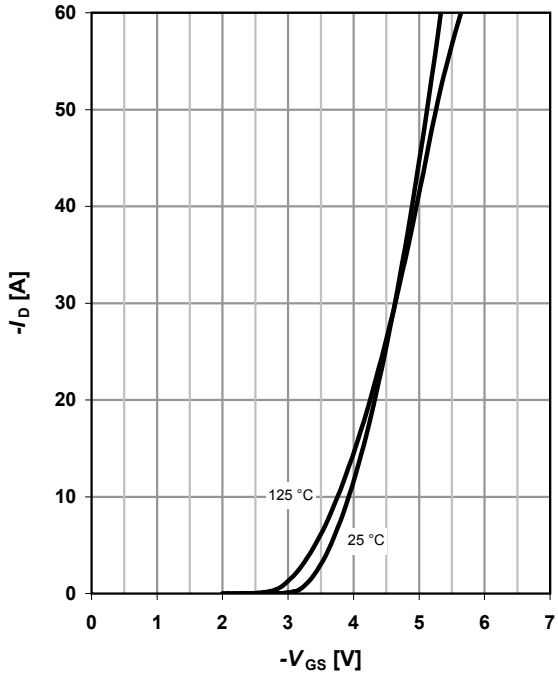
parameter: V_{GS}



7 Typ. transfer characteristics

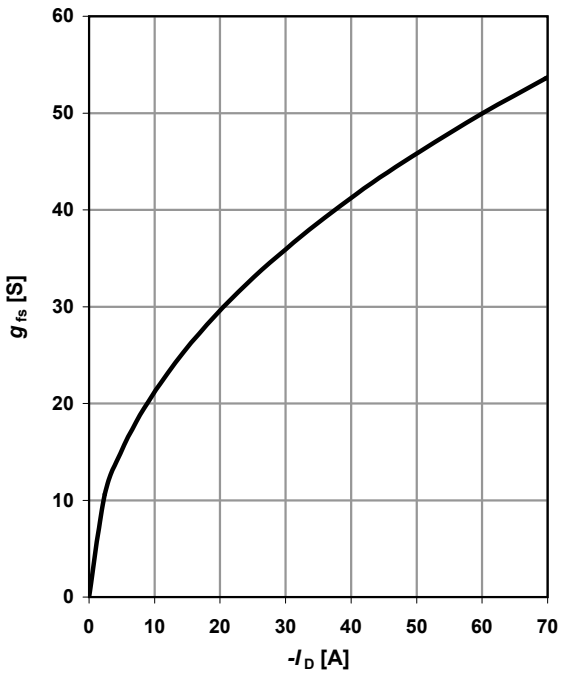
I_D=f(V_{GS}); $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: T_j



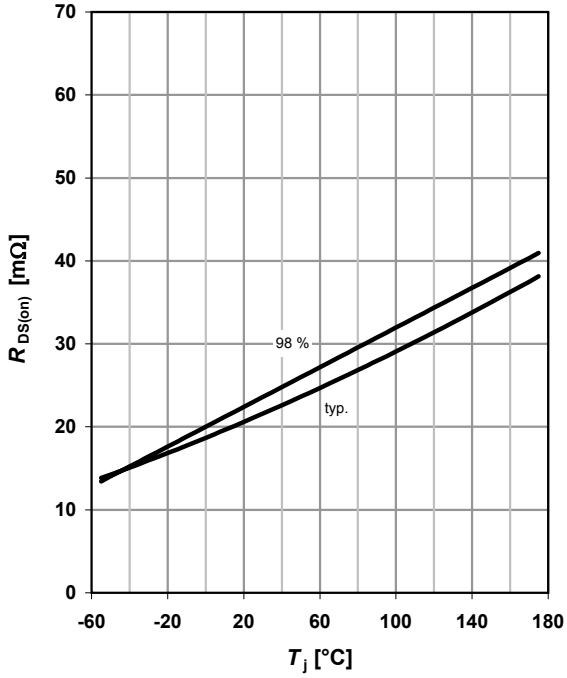
8 Typ. forward transconductance

g_{fs}=f(I_D); T_j=25 °C



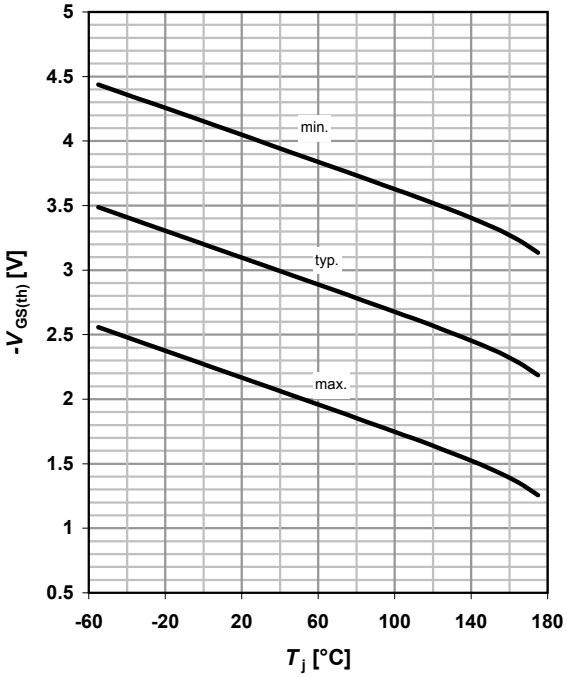
9 Drain-source on-state resistance

$R_{DS(on)}$=f(T_j); I_D=-64 A; V_{GS}=-10 V



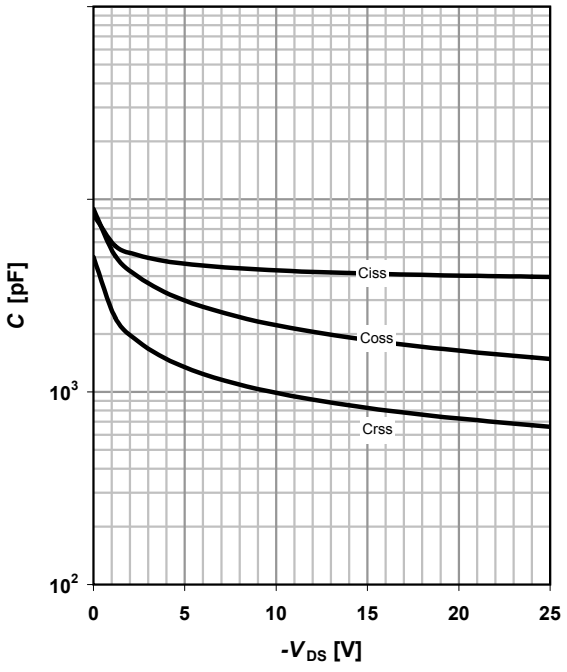
10 Typ. gate threshold voltage

$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}; I_D=-5500 µA



11 Typ. capacitances

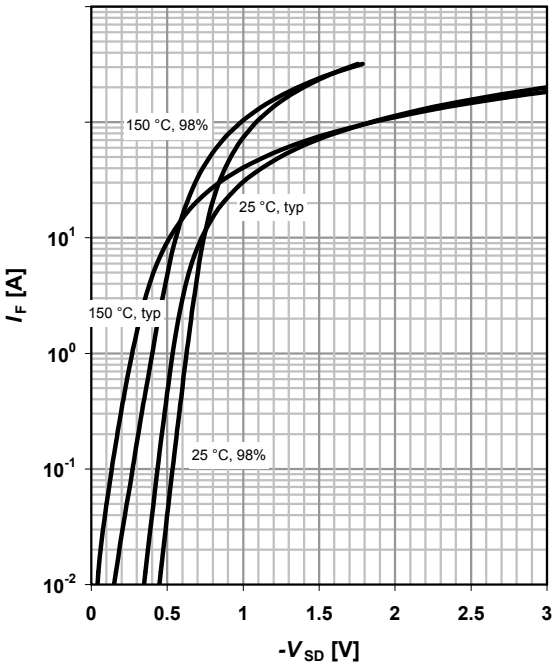
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Forward characteristics of reverse diode

I_F=f(V_{SD})

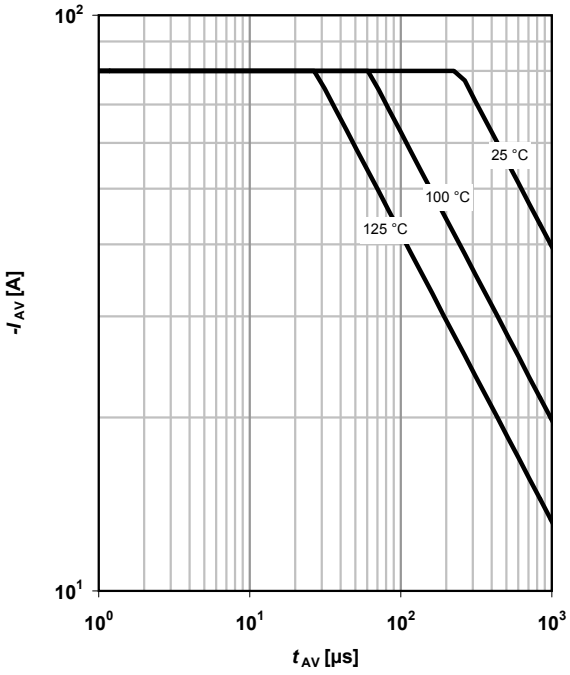
parameter: T_j



13 Avalanche characteristics

I_{AS}=f(t_{AV}); R_{GS}=25 Ω

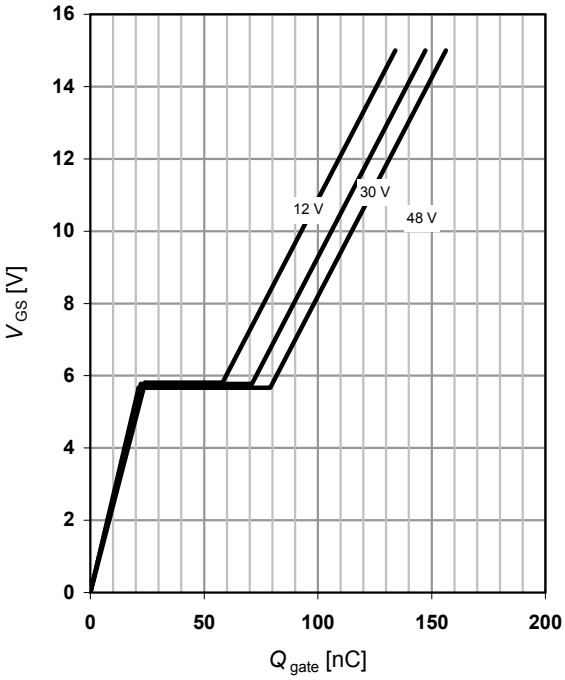
parameter: $T_{j(start)}$



14 Typ. gate charge

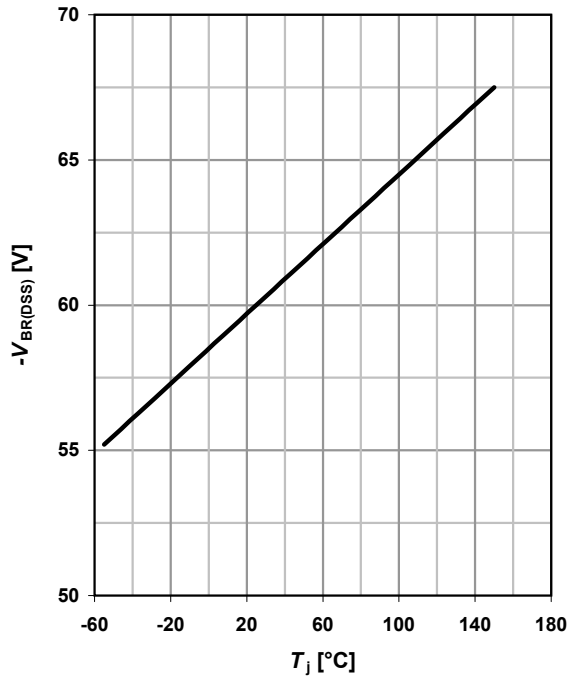
V_{GS}=f(Q_{gate}); I_D=-80 A pulsed

parameter: V_{DD}



15 Drain-source breakdown voltage

$V_{BR(DSS)}$=f(T_j); I_D=-250 µA



16 Gate charge waveforms

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