

SIPMOS® Power-Transistor

Features

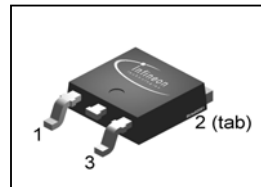
- P-Channel
- Enhancement mode
- Avalanche rated
- dv/dt rated
- 175°C operating temperature
- Pb-free lead plating; RoHS compliant (PG-TO252)



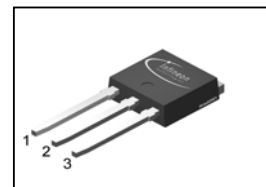
Product Summary

V_{DS}	-60	V
$R_{DS(on),max}$	0.3	Ω
I_D	-8.8	A

PG-TO252-3



P-TO251-3



Type	Package	Tape and reel information	Marking	Lead free	Packing
SPU08P06P	P-TO251-3			No	
SPD08P06P	PG-TO252-3			Yes	

Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	I_D	$T_A=25\text{ °C}$	-8.83	A
		$T_A=100\text{ °C}$	-6.25	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	-35.32	
Avalanche energy, single pulse	E_{AS}	$I_D=8.83\text{ A}$, $R_{GS}=25\text{ }\Omega$	70	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}		4.2	
Reverse diode dv/dt	dv/dt	$I_D=8.83\text{ A}$, $V_{DS}=48\text{ V}$, $di/dt=-200\text{ A}/\mu\text{s}$, $T_{j,max}=175\text{ °C}$	-6	kV/ μs
Gate source voltage	V_{GS}		± 20	V
Power dissipation	P_{tot}	$T_A=25\text{ °C}$	42	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	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - case	R_{thJC}		-	-		K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}		-	-	110	
SMD version, device on PCB:	R_{thJA}	minimal footprint	-	-	250	K/W
		6 cm ² cooling area ¹⁾	-	-	70	

Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-250\text{ }\mu\text{A}$	-60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\text{ }\mu\text{A}$	-2.1	-3.0	-4	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	-0.1	-1	μA
		$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$	-	-10	-100	
Gate-source leakage current	I_{GSS}	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-6.2\text{ V}, I_D=-10\text{ A}$	-	230	300	m Ω
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-6.2\text{ A}$	2.5	4.9	-	S

¹⁾ Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6 cm² (one layer, 70 μ , 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}	$V_{GS}=0\text{ V}, V_{DS}=-25\text{ V},$ $f=1\text{ MHz}$	-	335	420	pF
Output capacitance	C_{oss}		-	105	135	
Reverse transfer capacitance	C_{rss}		-	65	95	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-30\text{ V}, V_{GS}=-10\text{ V}, I_D=-6.2\text{ A},$ $R_G=6\ \Omega$	-	16.0	24.0	
Rise time	t_r		-	46.0	69	
Turn-off delay time	$t_{d(off)}$		-	48	72	
Fall time	t_f		-	14	21	

Gate Charge Characteristics

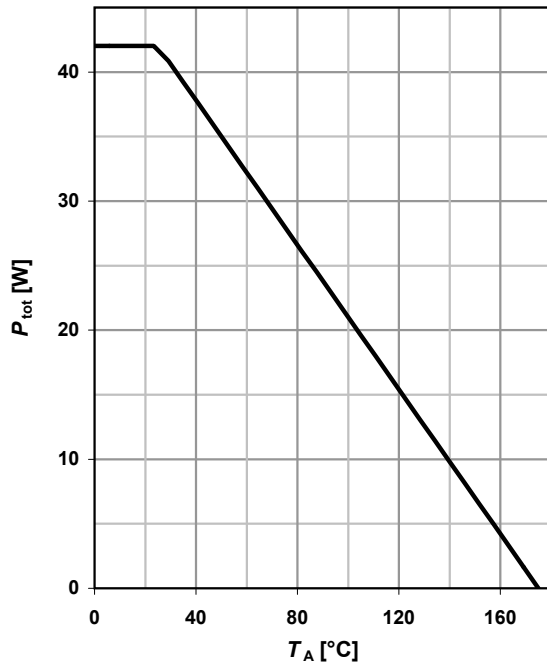
Gate to source charge	Q_{gs}	$V_{DD}=-48\text{ V}, I_D=-8.8\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	-1.9	-2.6	nC
Gate to drain charge	Q_{gd}		-	-5	-8	
Gate charge total	Q_g		-	-10	-13	
Gate plateau voltage	$V_{plateau}$		-	-6	-	V

Reverse Diode

Diode continuous forward current	I_S	$T_A=25\text{ °C}$	-	-	-8.80	A
Diode pulse current	$I_{S,pulse}$		-	-	-35.3	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=-8.83\text{ A},$ $T_j=25\text{ °C}$	-	-0.98	-1.55	V
Reverse recovery time	t_{rr}	$V_R=30\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	60	90	ns
Reverse recovery charge	Q_{rr}		-	100	150	nC

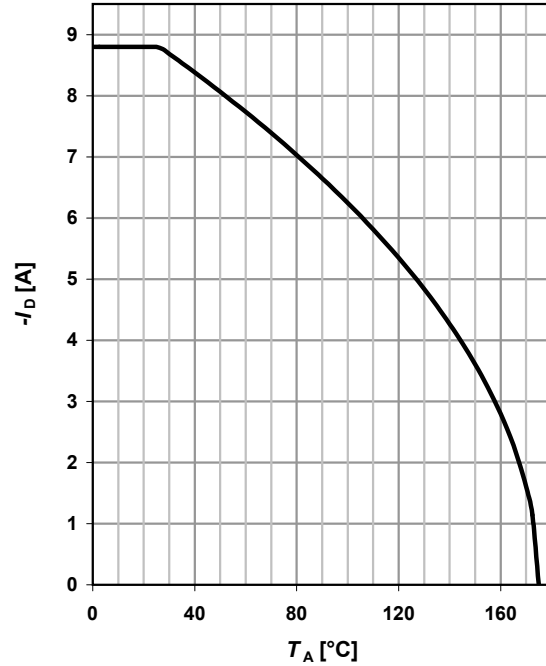
1 Power dissipation

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



2 Drain current

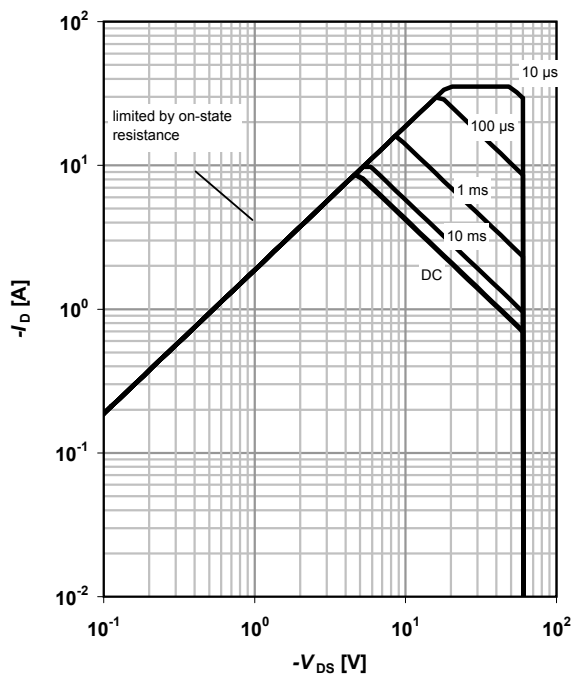
$$I_D = f(T_A); |V_{GS}| \geq 10 \text{ V}$$



3 Safe operating area

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

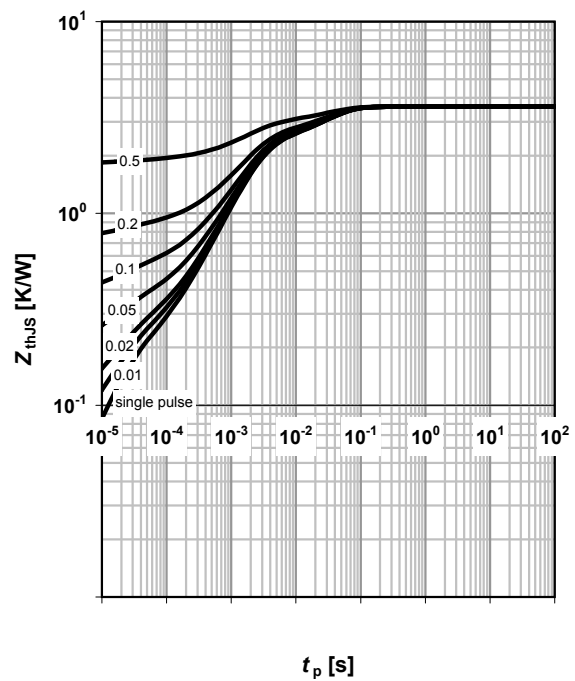
parameter: t_p



4 Max. transient thermal impedance

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

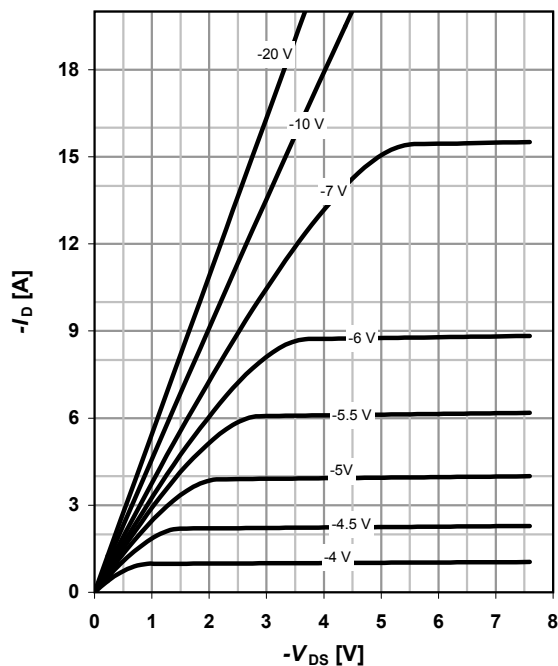
parameter: $D = t_p / T$



5 Typ. output characteristics

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

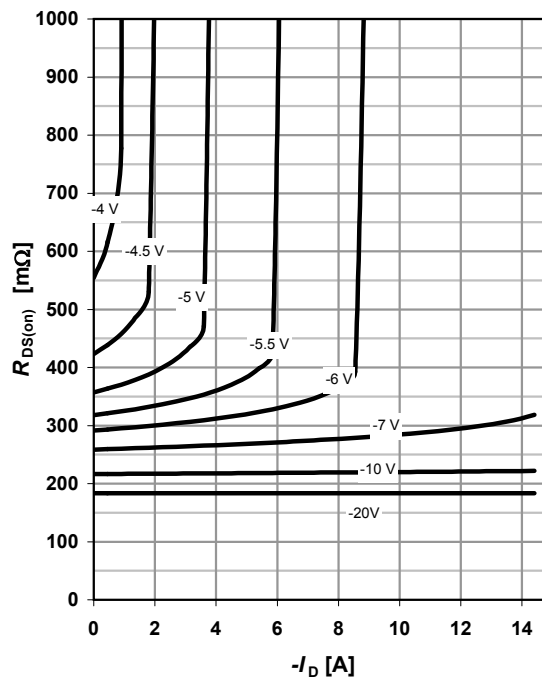
parameter: V_{GS}



6 Typ. drain-source on resistance

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

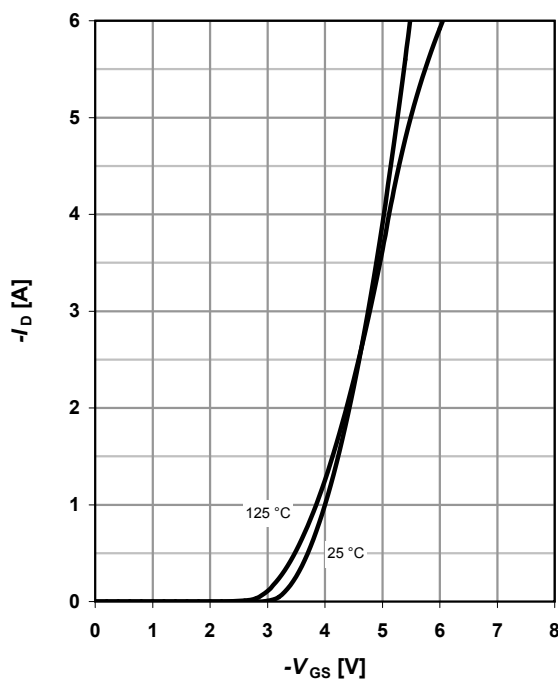
parameter: V_{GS}



7 Typ. transfer characteristics

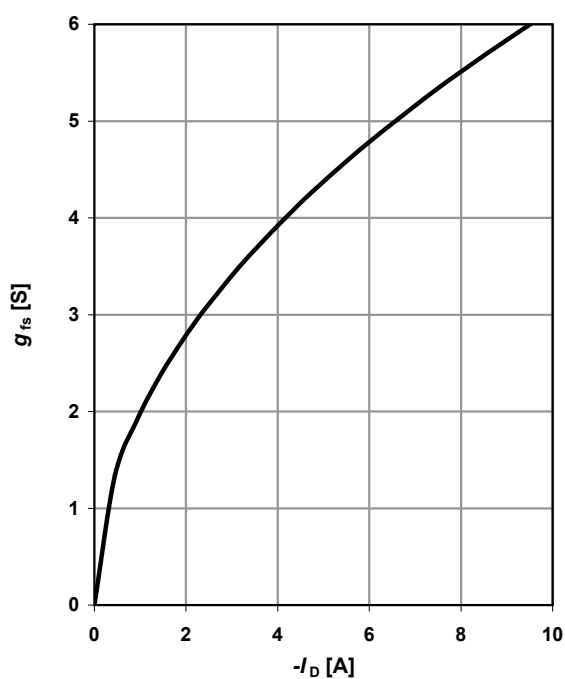
$$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$$

parameter: T_j



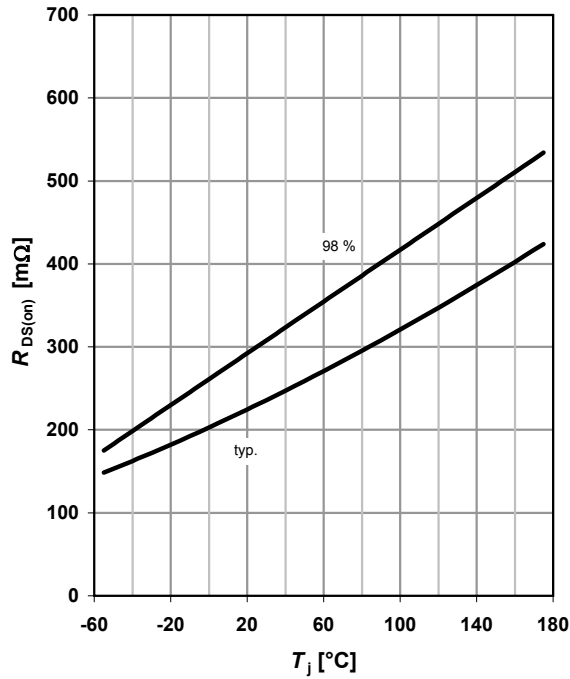
8 Typ. forward transconductance

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



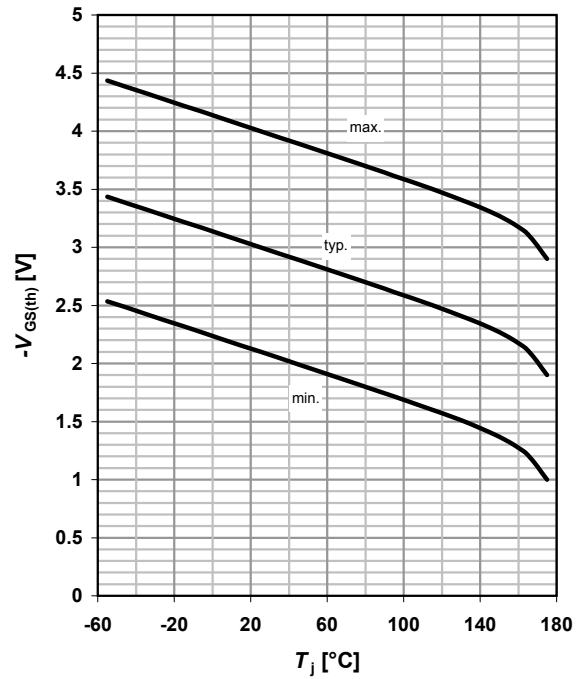
9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = -6.2 \text{ A}; V_{GS} = -10 \text{ V}$$



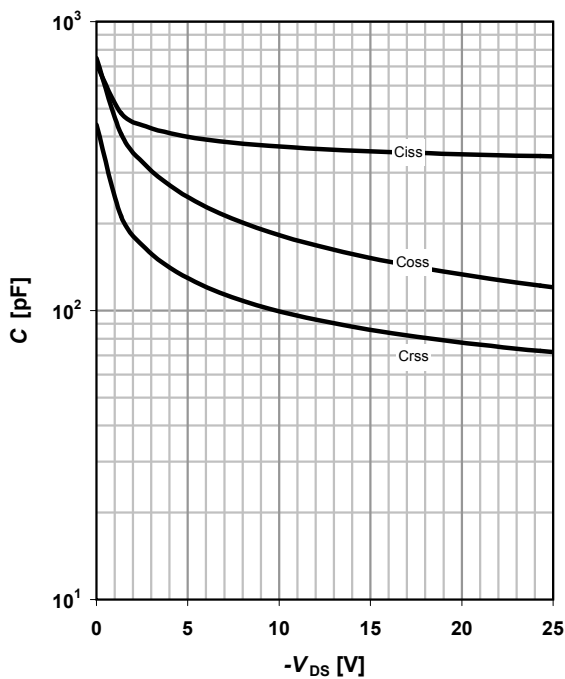
10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -250 \mu\text{A}$$



11 Typ. capacitances

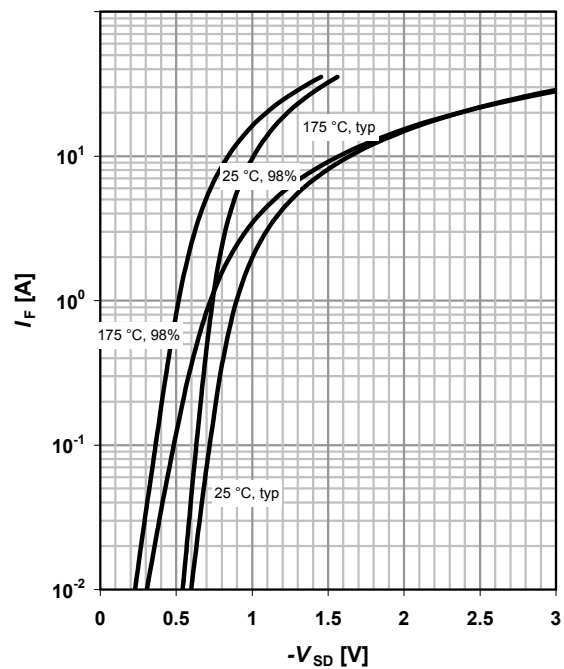
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



12 Forward characteristics of reverse diode

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

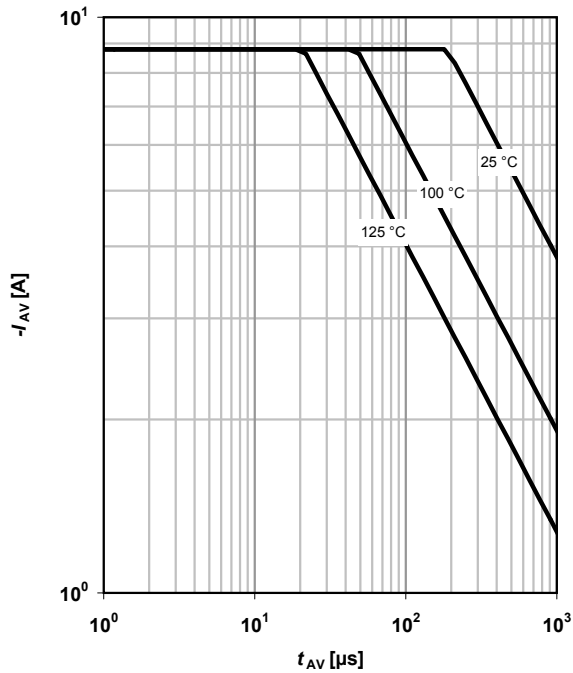
parameter: T_j



13 Avalanche characteristics

$$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$$

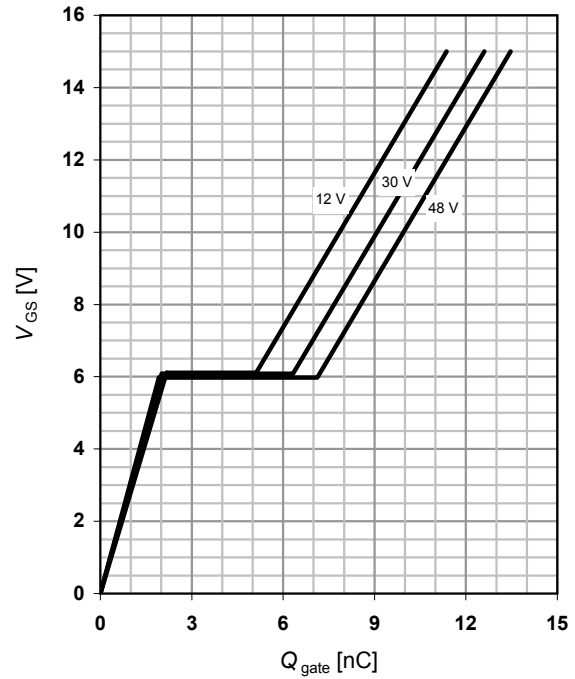
parameter: $T_{j(\text{start})}$



14 Typ. gate charge

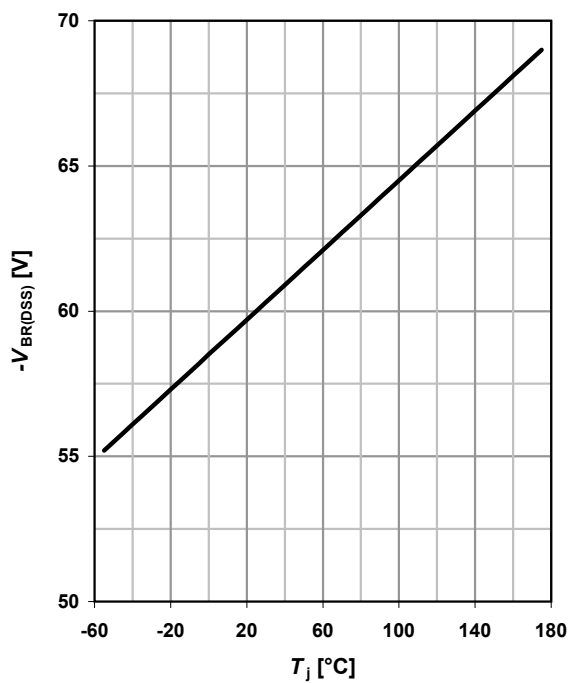
$$V_{GS}=f(Q_{\text{gate}}); I_D=-8.8\ \text{A pulsed}$$

parameter: V_{DD}



15 Drain-source breakdown voltage

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



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