

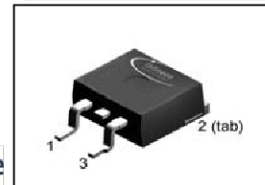
SIPMOS® Power-Transistor
Features

- P-Channel
- Enhancement mode
- Avalanche rated
- dv/dt rated
- 175°C operating temperature
- Pb-free lead plating; RoHS compliant
- ° Halogen-free according to IEC61249-2-21
- ° Qualified according to AEC Q101

Product Summary

V_{DS}	-60	V
$R_{DS(on),max}$	0.13	Ω
I_D	-18.6	A

PG-TO263-3



Type	Package	Tape and reel information	Marking	Lead free	Packing
SPB18P06PG	PG-TO263-3	1000 pcs / reel	18P06P	Yes	Non dry

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

Parameter	Symbol	Conditions	Value		Unit
			steady state		
Continuous drain current	I_D	$T_A=25\text{ °C}$	-18.7		A
		$T_A=100\text{ °C}$	-13.2		
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}$	-74.8		
Avalanche energy, single pulse	E_{AS}	$I_D=18.7\text{ A}, R_{GS}=25\ \Omega$	151		mJ
Avalanche energy, periodic limited by $T_{j,max}$	E_{AR}		8		
Reverse diode dv/dt	dv/dt	$I_D=18.7\text{ A}, V_{DS}=48\text{ V}, di/dt=-200\text{ A}/\mu\text{s}, T_{j,max}=175\text{ °C}$	-6		kV/ μs
Gate source voltage	V_{GS}		± 20		V
Power dissipation	P_{tot}	$T_A=25\text{ °C}$	81.1		W
Operating and storage temperature	T_j, T_{stg}		"-55 ... +175"		$^{\circ}\text{C}$
ESD class					
Soldering temperature			260 $^{\circ}\text{C}$		
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}		-	-	1.85	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 ¹⁾	-	-	40	

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

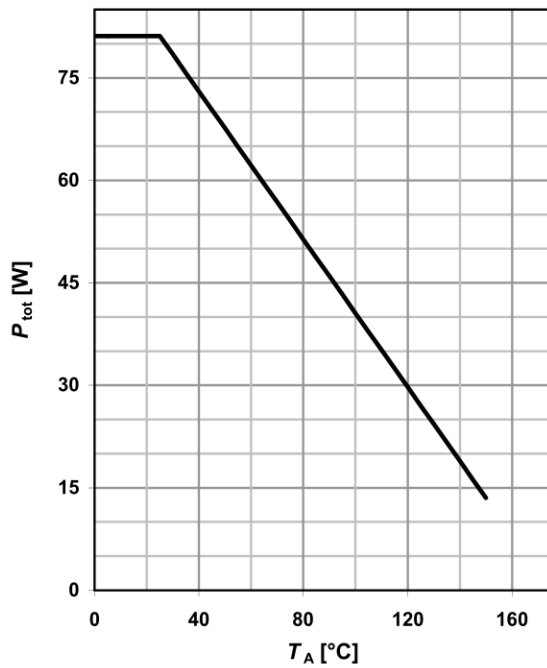
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-250\text{ }\mu\text{A}$	-60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-1000\text{ }\mu\text{A}$	-2.1	3	-4	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$	-	-0.1	-1	μA
		$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ }^\circ\text{C}$	-	-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	$R_{DS(on)}$	$V_{GS}=-10\text{ V}, I_D=-13.2\text{ A}$	-	101	130	m Ω
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-13.2\text{ A}$	5	10	-	S

¹⁾ Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. FCB is vertical without blown air.

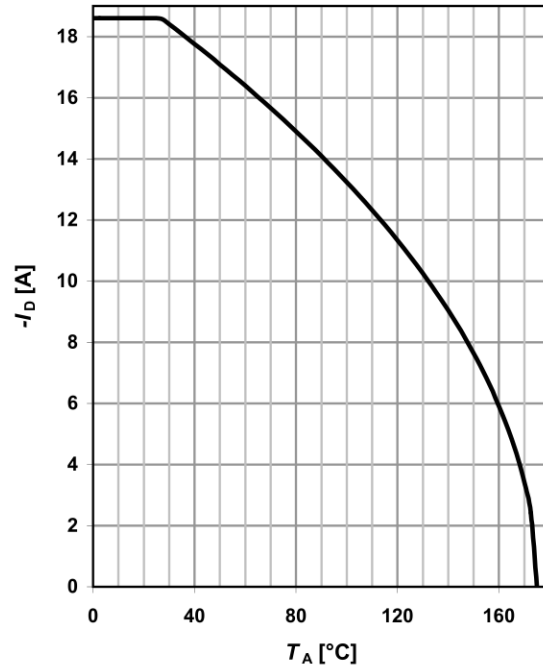
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=-25\text{ V},$ $f=1\text{ MHz}$	-	690	860	pF
Output capacitance	C_{oss}		-	230	290	
Reverse transfer capacitance	C_{rss}		-	95	120	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-30\text{ V}, V_{GS}=-10\text{ V}, I_D=-13.2\text{ A},$ $R_G=2.7\ \Omega$	-	12	18	ns
Rise time	t_r		-	5.8	8.7	
Turn-off delay time	$t_{d(off)}$		-	25	37	
Fall time	t_f		-	11	16.5	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	$V_{DD}=-48\text{ V}, I_D=-18.6\text{ A}, V_{GS}=0\text{ to }-10\text{ V}$	-	-4.1	-5.5	nC
Gate to drain charge	Q_{gd}		-	-11	-17	
Gate charge total	Q_g		-	-21	-28	
Gate plateau voltage	$V_{plateau}$		-	-5.94	-	V
Reverse Diode						
Diode continuous forward current	I_S	$T_A=25\text{ }^\circ\text{C}$	-	-	-18.6	A
Diode pulse current	$I_{S,pulse}$		-	-	-74.8	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=18.6\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	-0.99	-1.33	V
Reverse recovery time	t_{rr}	$V_R=30\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	70	105	ns
Reverse recovery charge	Q_{rr}		-	139	208	

1 Power dissipation

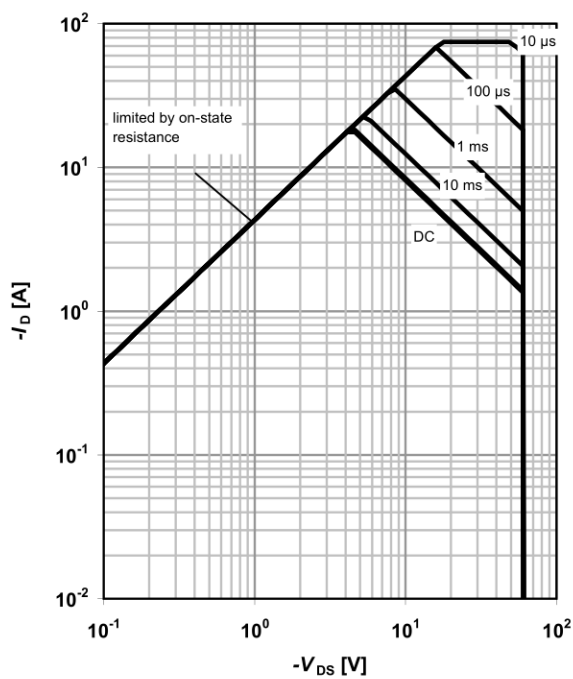
$$P_{\text{tot}} = f(T_A)$$


2 Drain current

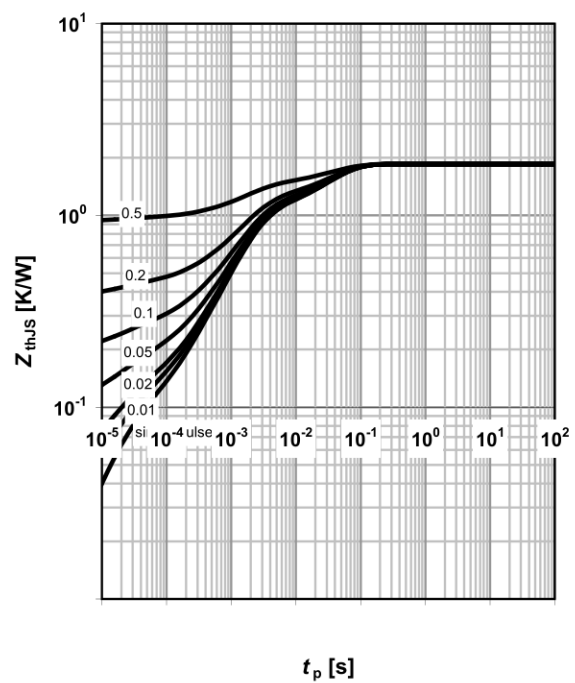
$$I_D = f(T_A); |V_{\text{GS}}| \geq 10 \text{ V}$$


3 Safe operating area

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

 parameter: t_p

4 Max. transient thermal impedance

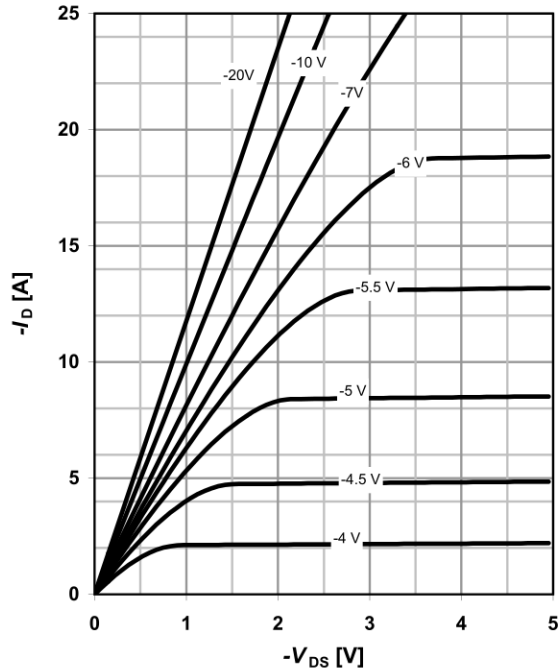
$$Z_{\text{thJA}} = f(t_p)$$

 parameter: $D = t_p / T$


5 Typ. output characteristics

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

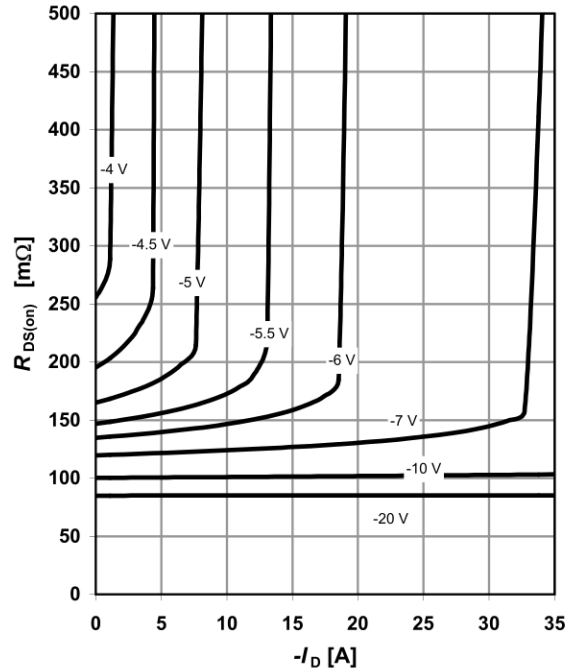
parameter: V_{GS}



6 Typ. drain-source on resistance

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

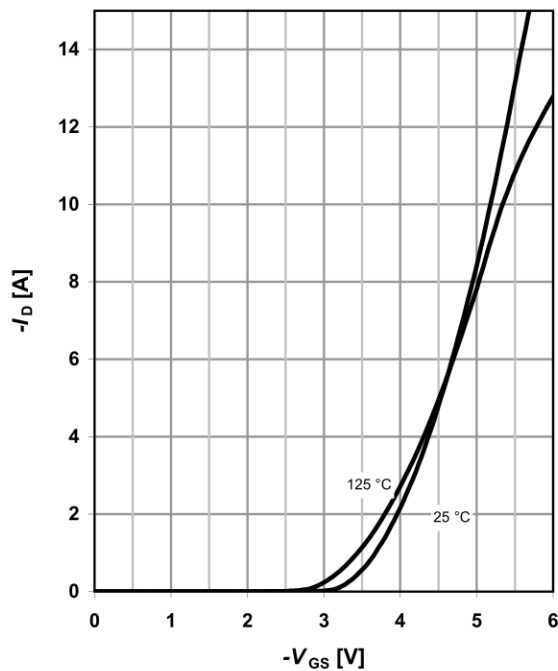
parameter: V_{GS}



7 Typ. transfer characteristics

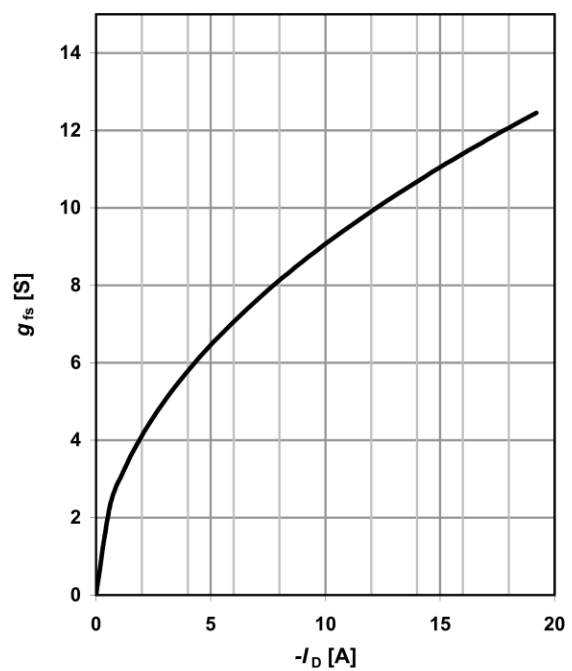
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



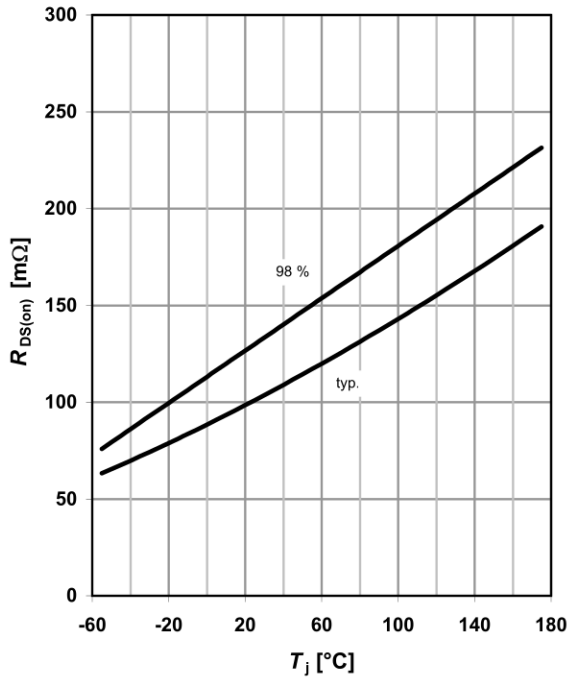
8 Typ. forward transconductance

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



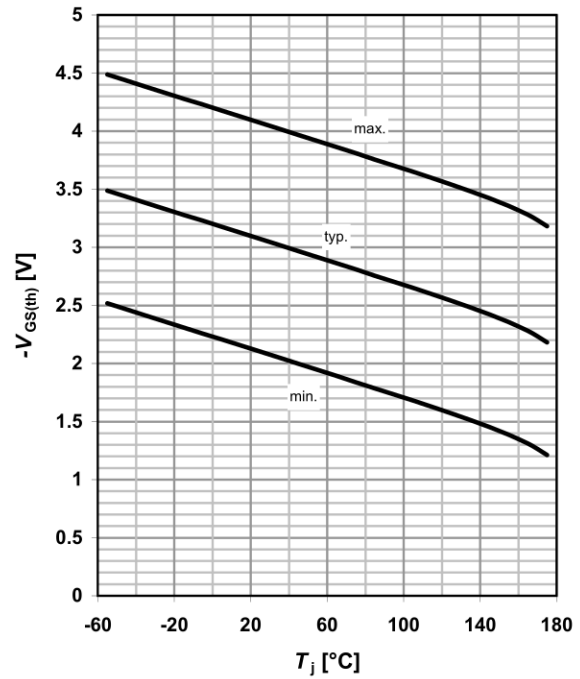
9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j); I_D = -13.2 \text{ A}; V_{GS} = -10 \text{ V}$



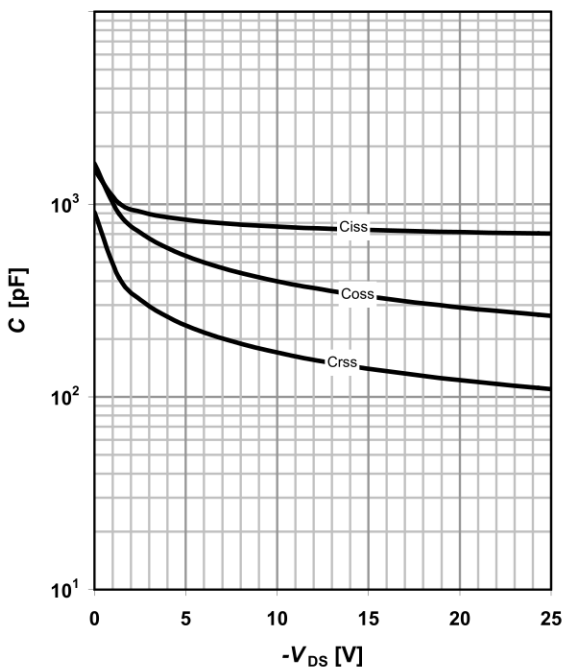
10 Typ. gate threshold voltage

$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -1000 \mu\text{A}$



11 Typ. capacitances

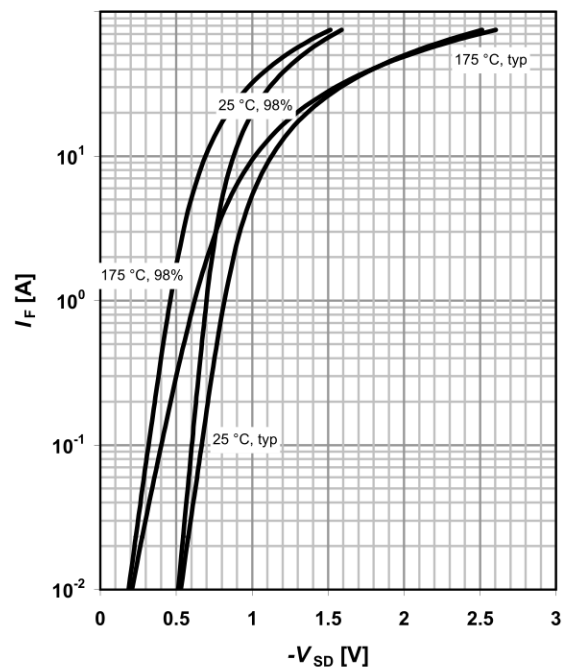
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

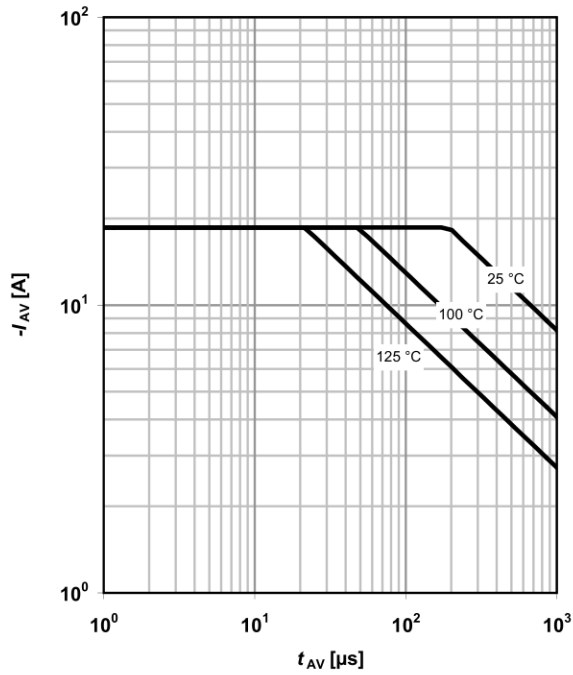
$I_F = f(V_{SD})$

parameter: T_j

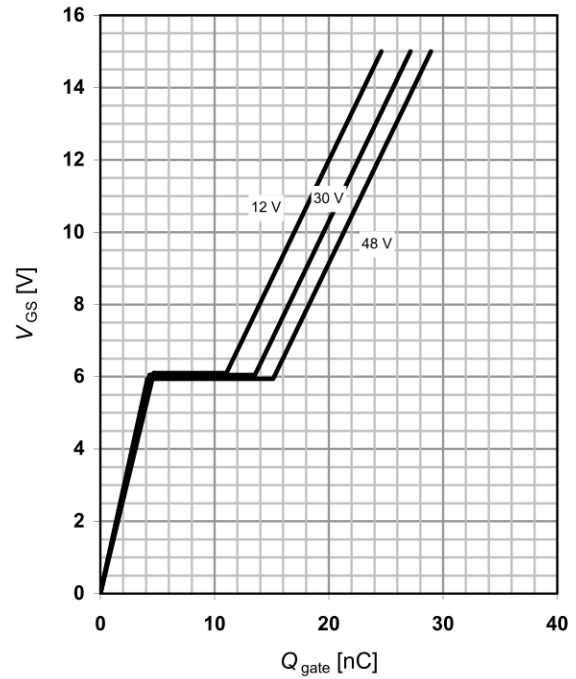


13 Avalanche characteristics

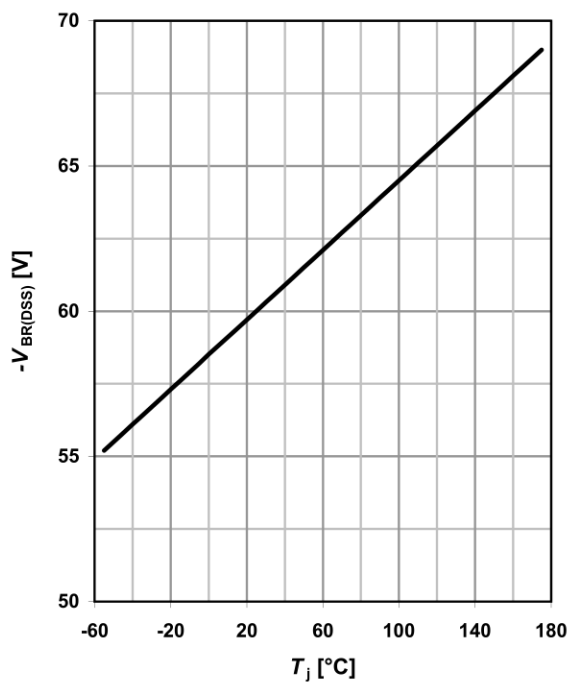
$$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$$

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

14 Typ. gate charge

$$V_{GS}=f(Q_{\text{gate}}); I_D=-18.6 \text{ A pulsed}$$

 parameter: V_{DD}

15 Drain-source breakdown voltage

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



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