

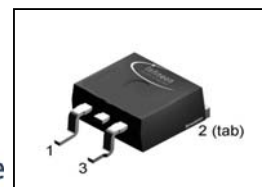
**SIPMOS® Power-Transistor**
**Features**

- 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	$\Omega$
$I_D$	-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/ $\mu\text{s}$
Gate source voltage	$V_{GS}$		$\pm 20$	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 <sup>2</sup> cooling area <sup>1)</sup>	-	-	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	$\mu\text{A}$
		$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ }^\circ\text{C}$	-	-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 $\Omega$
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-13.2\text{ A}$	5	10	-	S

<sup>1)</sup> Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  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**

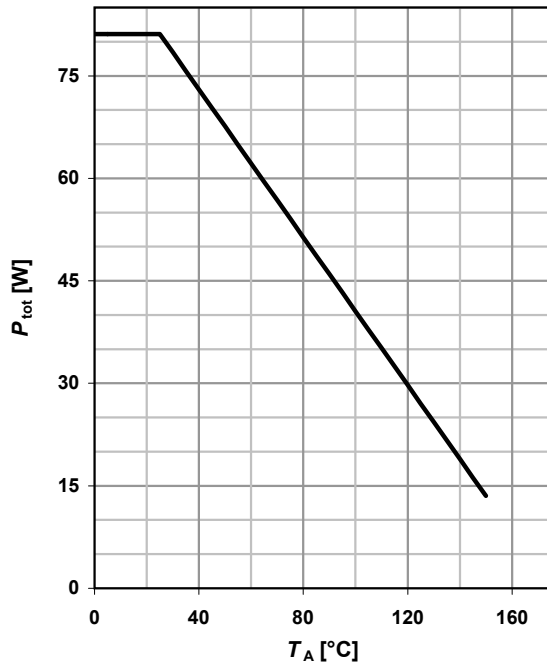
Gate to source charge	$Q_{gs}$	$V_{DD}=-48\text{ V}, I_D=-$ $18.6\text{ A}, V_{GS}=0\text{ to }-10\text{ V}$	-	-4.1	-5.5	nC
Gate to drain charge	$Q_{gd}$		-	-11	-17	
Gate charge total	$Q_g$		-	-21	-28	
Gate plateau voltage	$V_{plateau}$		-	-5.94	-	V

**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	nC

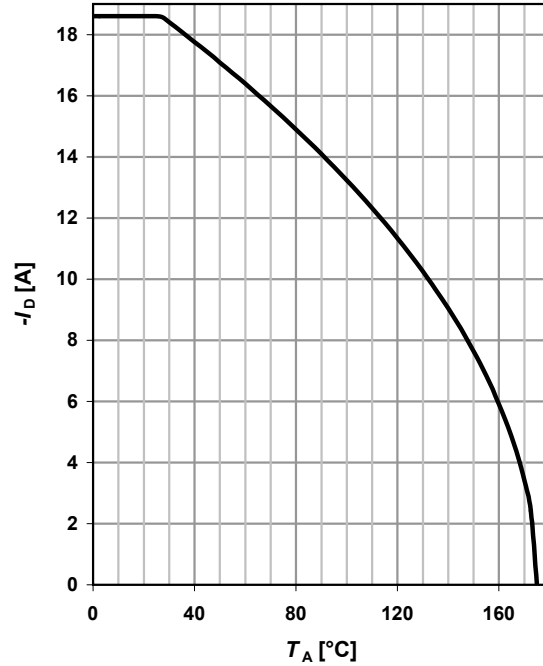
### 1 Power dissipation

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



### 2 Drain current

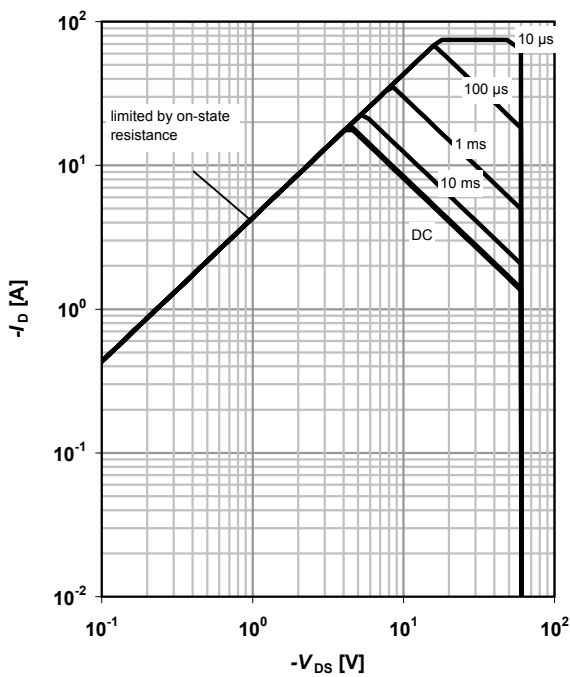
$$I_D = f(T_A); |V_{GS}| \geq 10 \text{ V}$$



### 3 Safe operating area

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

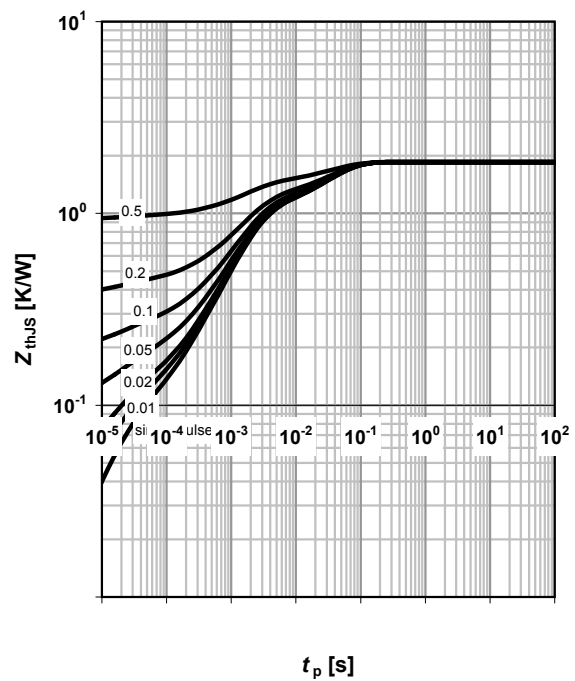
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

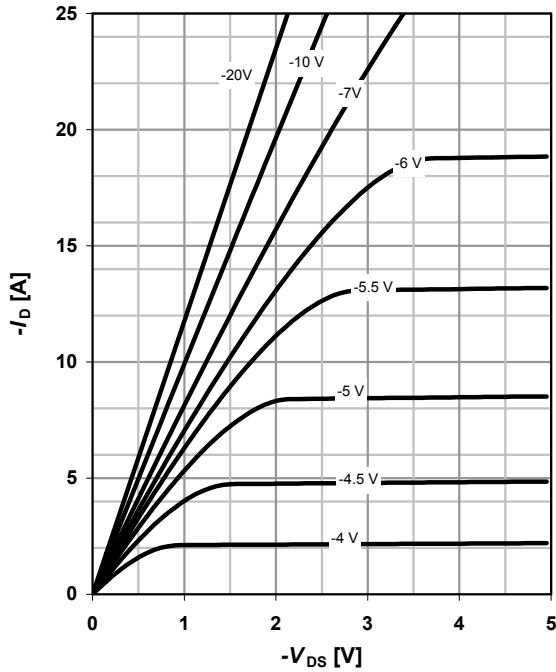
parameter:  $D = t_p / T$



**5 Typ. output characteristics**

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

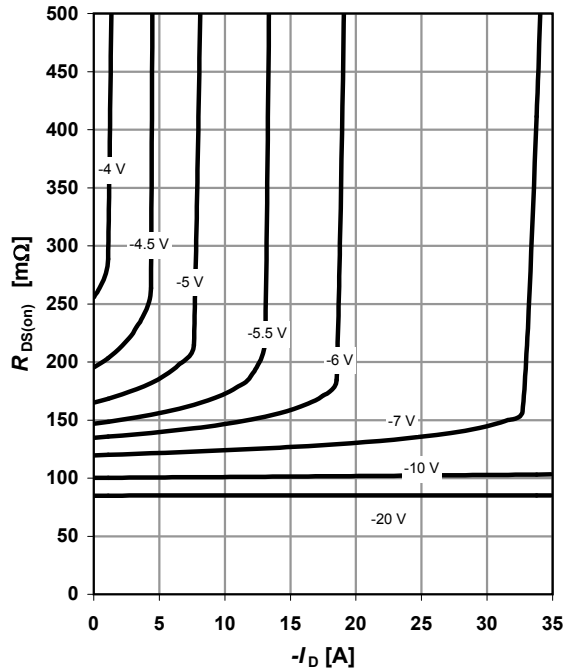
parameter:  $V_{GS}$



**6 Typ. drain-source on resistance**

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

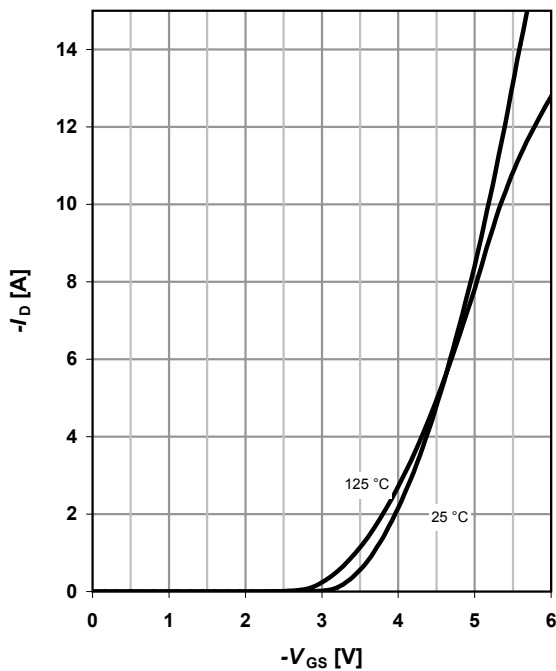
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

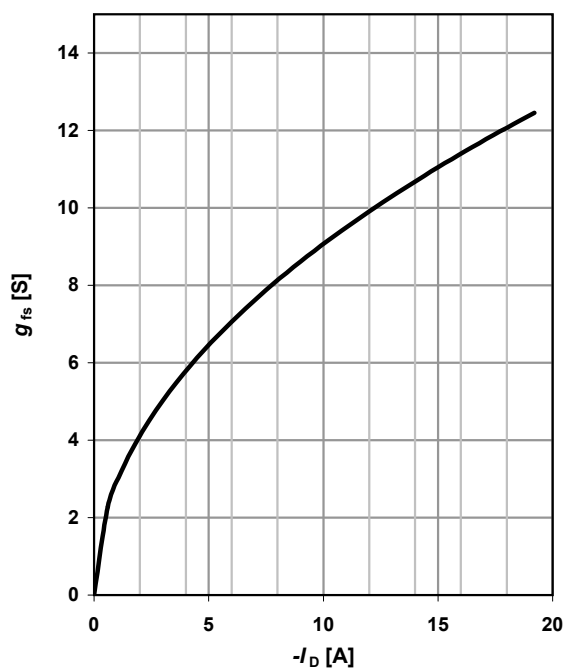
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



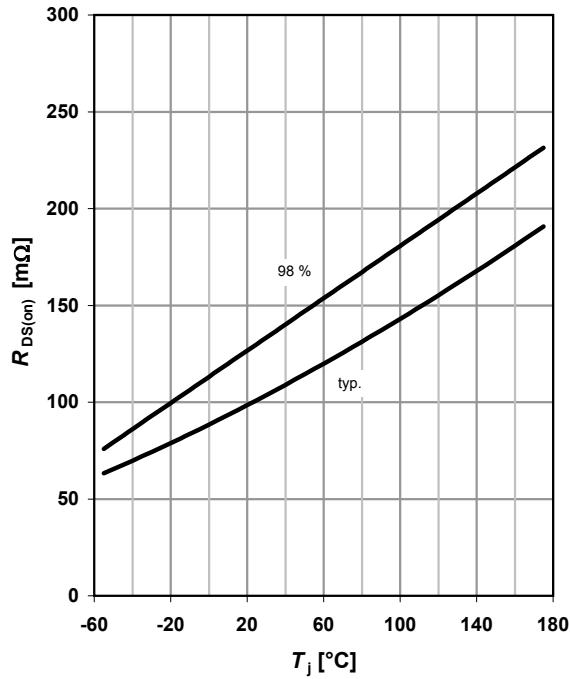
**8 Typ. forward transconductance**

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

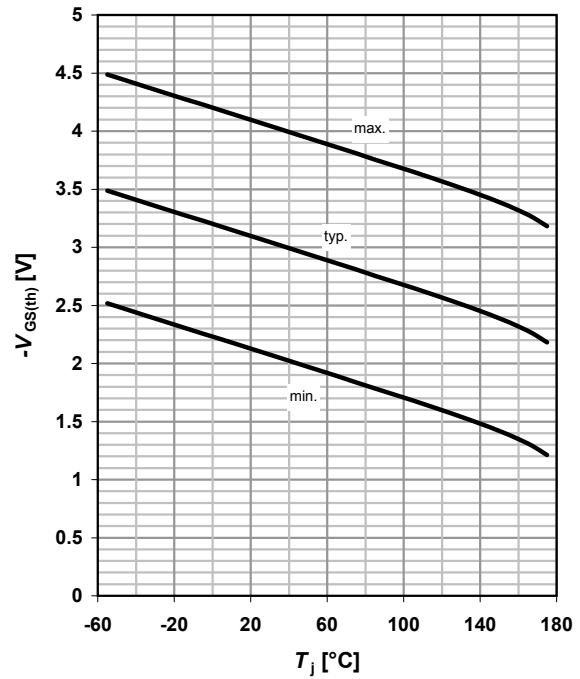


**9 Drain-source on-state resistance**

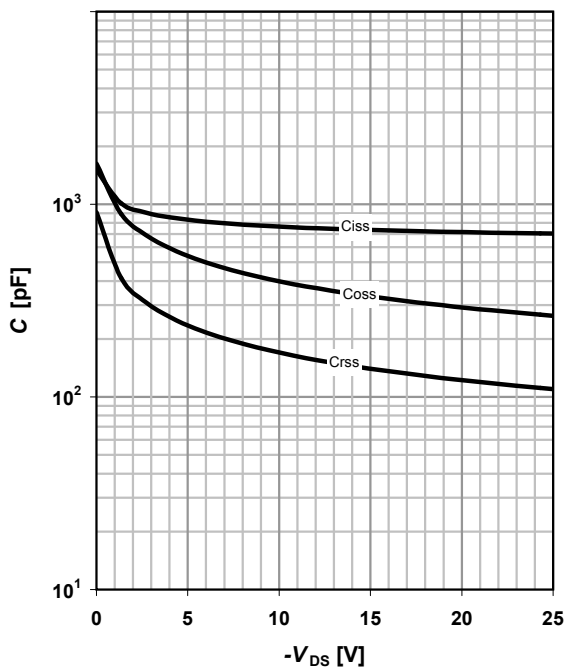
$$R_{DS(on)} = f(T_j); I_D = -13.2 \text{ A}; V_{GS} = -10 \text{ V}$$


**10 Typ. gate threshold voltage**

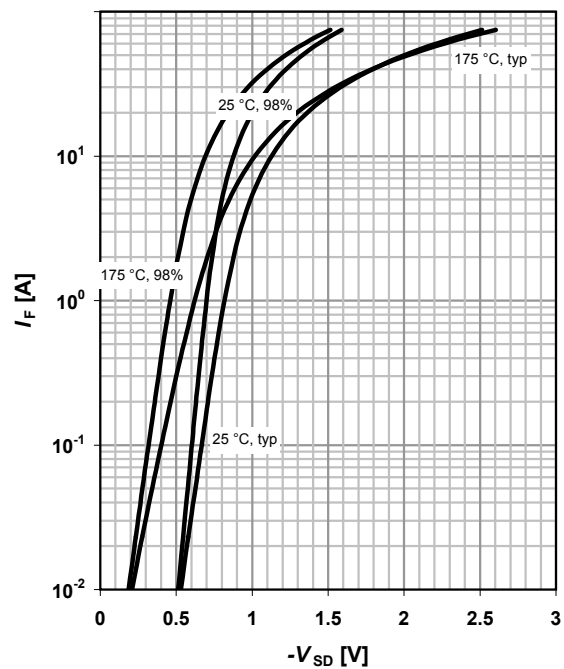
$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -1000 \mu\text{A}$$


**11 Typ. capacitances**

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

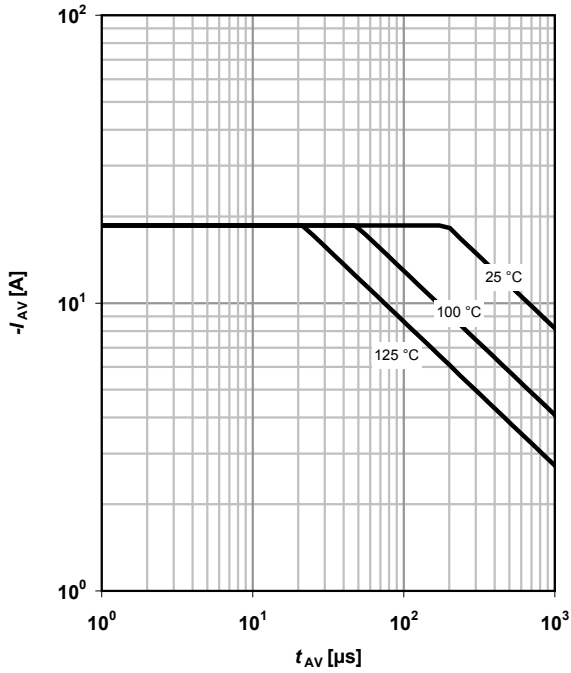

**12 Forward characteristics of reverse diode**

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

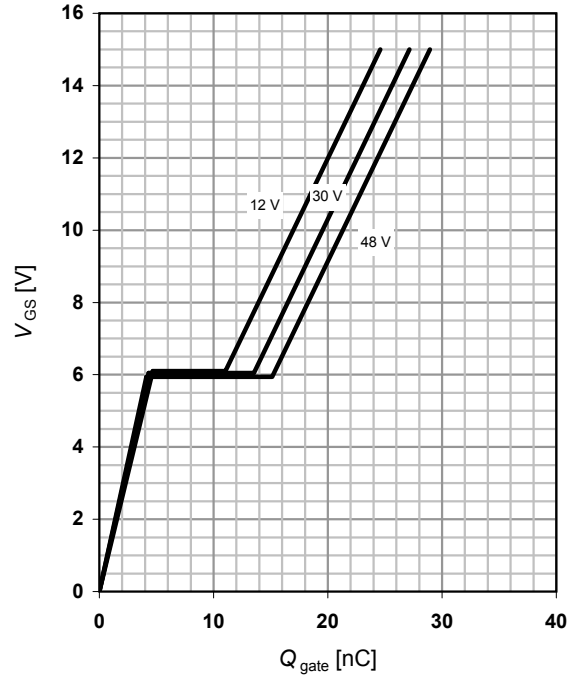
 parameter:  $T_j$ 


**13 Avalanche characteristics**

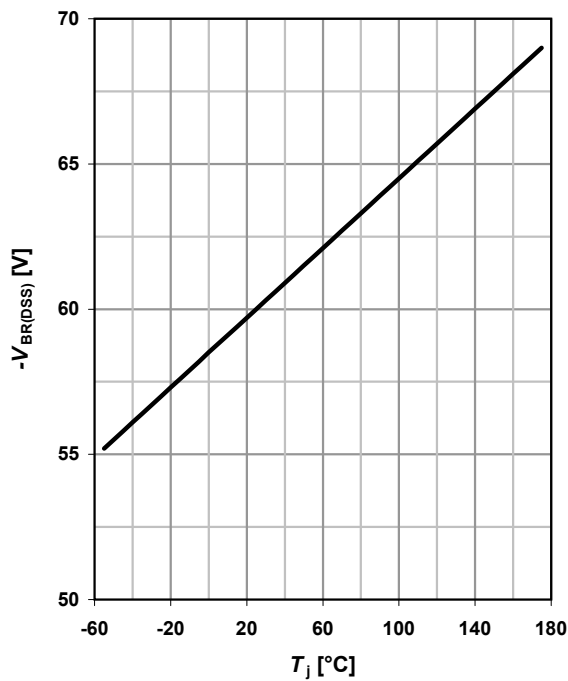
$$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$$

 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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