SIPMOS® Power-Transistor

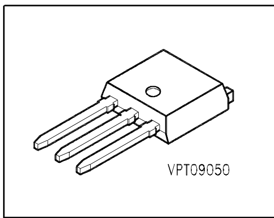
Feature

- P-Channel
- Enhancement mode
- 175°C operating temperature
- Avalanche rated
- dv/dt rated

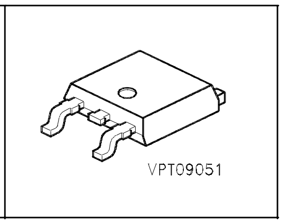
Product Summary

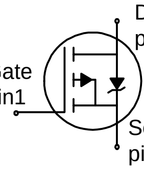
V_{DS}	-60	V
$R_{DS(on)}$	0.075	Ω
I_D	-30	A

P-TO251



P-TO252





Type	Package	Ordering Code
SPD30P06P	P-TO252	Q67042-S4018
SPU30P06P	P-TO251	Q67042-S4019

Maximum Ratings, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current T_C=25°C T_C=100°C	I_D	 -30 -21.5	A
Pulsed drain current T_C=25°C	$I_{D\ puls}$	-120	
Avalanche energy, single pulse I_D=-30 A , V_{DD}=-25V, R_{GS}=25Ω	E_{AS}	250	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	12.5	
Reverse diode dv/dt I_S=-30A, V_{DS}=-48V, di/dt=-200A/µs, T_{jmax}=175°C	dv/dt	-6	kV/µs
Gate source voltage	V_{GS}	±20	V
Power dissipation T_C=25°C	P_{tot}	125	W
Operating and storage temperature	T_j , T_{stg}	-55... +175	°C
IEC climatic category; DIN IEC 68-1		55/175/56	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	-	1.2	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	100	
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	75	
@ 6 cm^2 cooling area [1)]		-	-	50	

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage V_{GS}=0, I_D=-250µA	$V_{(BR)DSS}$	-60	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D=-1.7mA	$V_{GS(th)}$	-2.1	-3	-4	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=-60V, V_{GS}=0, T_j=25°C		-	-0.1	-1	
V_{DS}=-60V, V_{GS}=0, T_j=150°C		-	-10	-100	
Gate-source leakage current V_{GS}=-20V, V_{DS}=0	I_{GSS}	-	-10	-100	nA
Drain-source on-state resistance V_{GS}=-10V, I_D=-21.5A	$R_{DS(on)}$	-	0.066	0.075	Ω

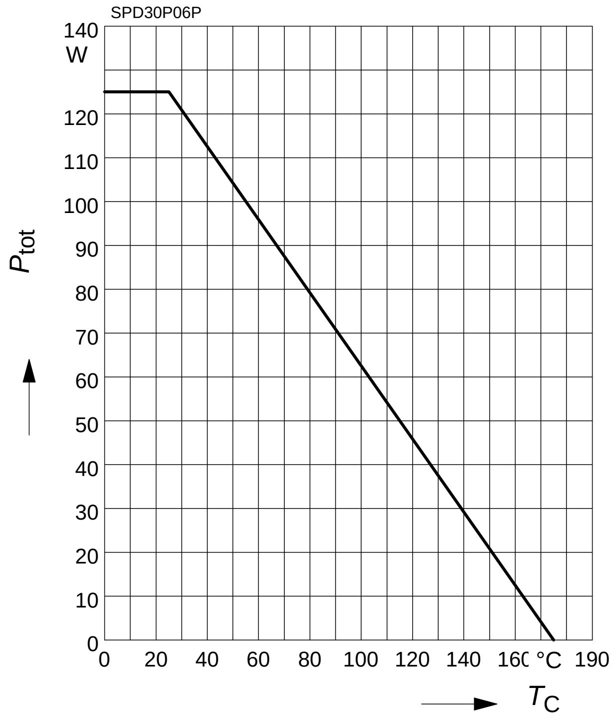
[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$\|V_{DS}\|\geq2*\|I_D\|*R_{DS(on)max}$, I_D=-21.5A	5.2	10.4	-	S
Input capacitance	C_{iss}	V_{GS}=0, V_{DS}=-25V, f=1MHz	-	1228	1535	pF
Output capacitance	C_{oss}		-	387	484	
Reverse transfer capacitance	C_{rss}		-	142	177	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-30V, V_{GS}=-10V, I_D=-21.5A, R_G=3.3Ω	-	8.7	13	ns
Rise time	t_r		-	25.2	37.8	
Turn-off delay time	$t_{d(off)}$		-	27.4	41.1	
Fall time	t_f		-	14.6	21.9	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=-48V, I_D=-30A	-	-3.7	-5.6	nC
Gate to drain charge	Q_{gd}		-	-13.8	-20.7	
Gate charge total	Q_g	V_{DD}=-48V, I_D=-30A, V_{GS}=0 to -10V	-	-32	-48	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=-48V, I_D=-30A	-	-5.2	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	-30	A
Inv. diode direct current, pulsed	I_{SM}		-	-	-120	
Inverse diode forward voltage	V_{SD}	V_{GS}=0, $\|I_F\|$ = $\|I_S\|$	-	-1.3	-1.7	V
Reverse recovery time	t_{rr}	V_R=-30V, $\|I_F\|$ = $\|I_S\|$, di_F/dt=100A/µs	-	64.6	97	ns
Reverse recovery charge	Q_{rr}		-	153	230	nC

1 Power dissipation

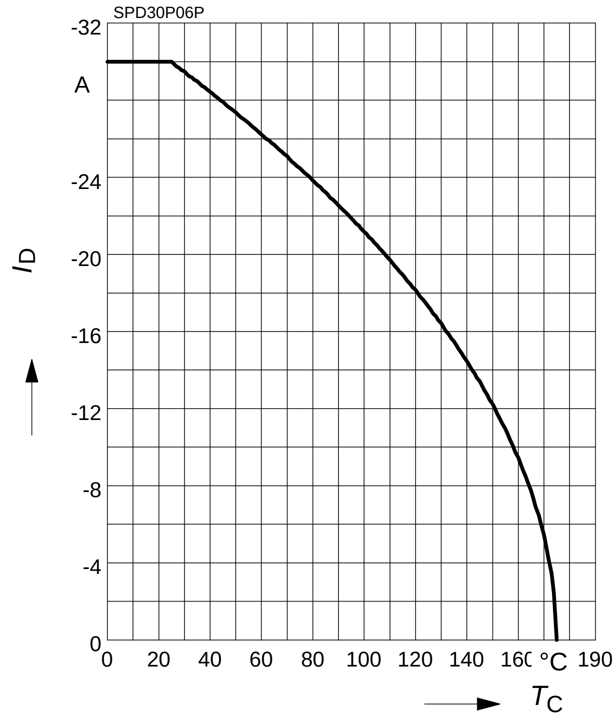
$P_{tot} = f(T_C)$



2 Drain current

$I_D = f(T_C)$

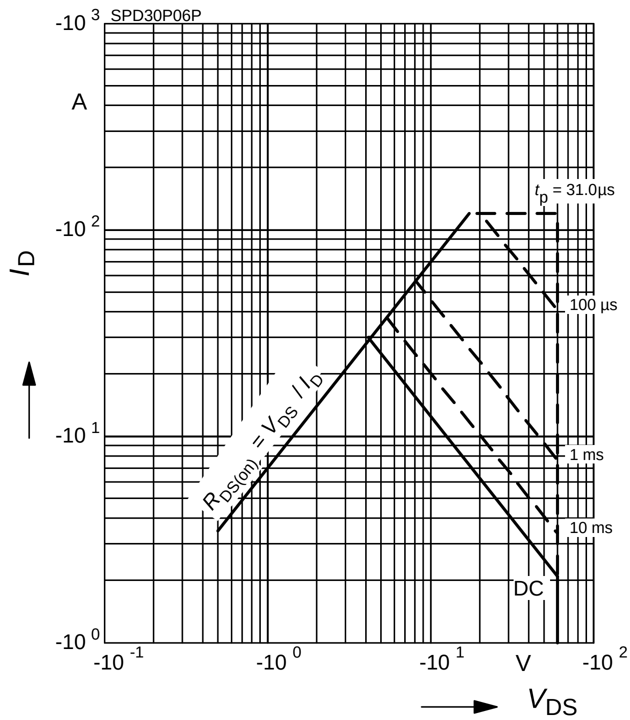
parameter: $|V_{GS}| \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

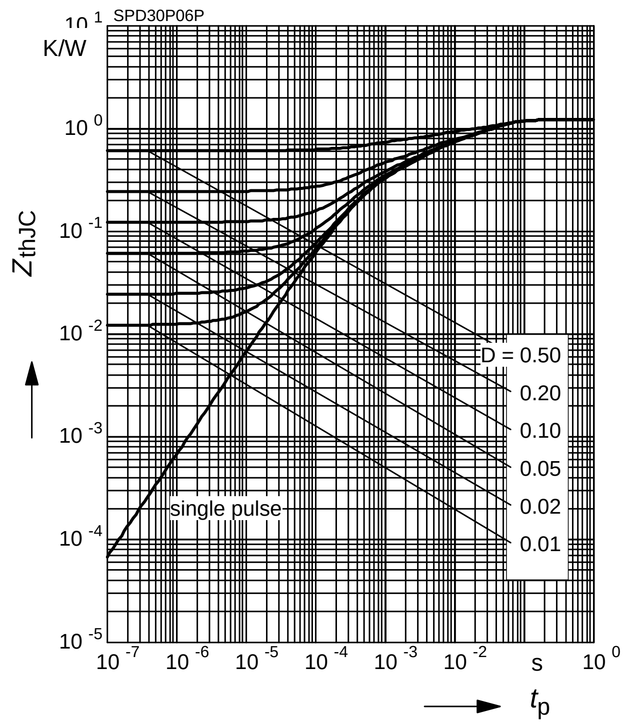
parameter : $D = 0$, $T_C = 25$ °C



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

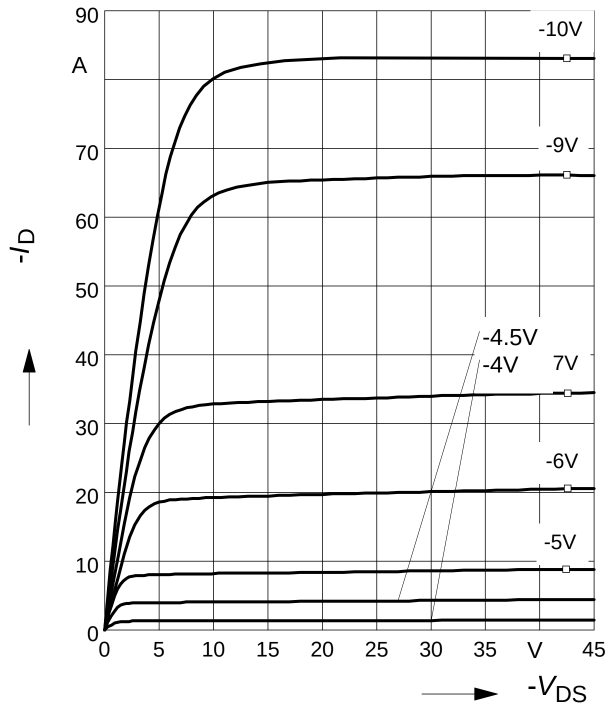
parameter : $D = t_p/T$



5 Typ. output characteristic

$I_D = f(V_{DS})$

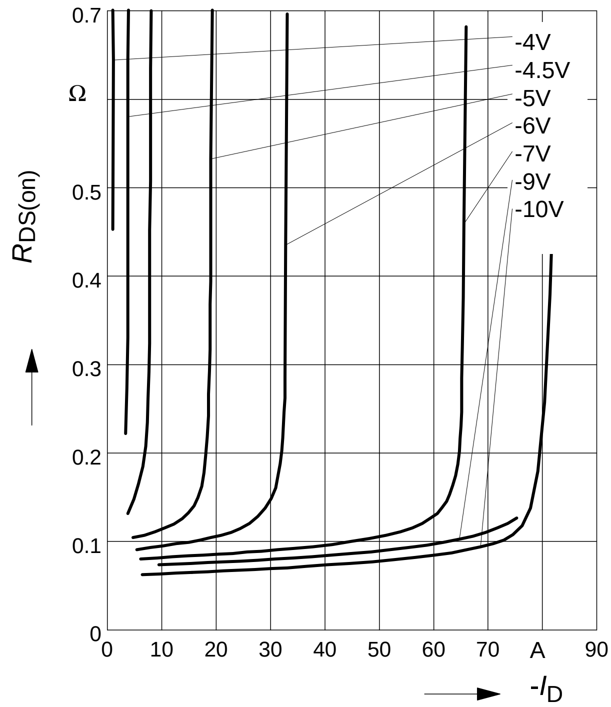
parameter: T_j =25°C



6 Typ. drain-source on resistance

$R_{DS(on)} = f(I_D)$

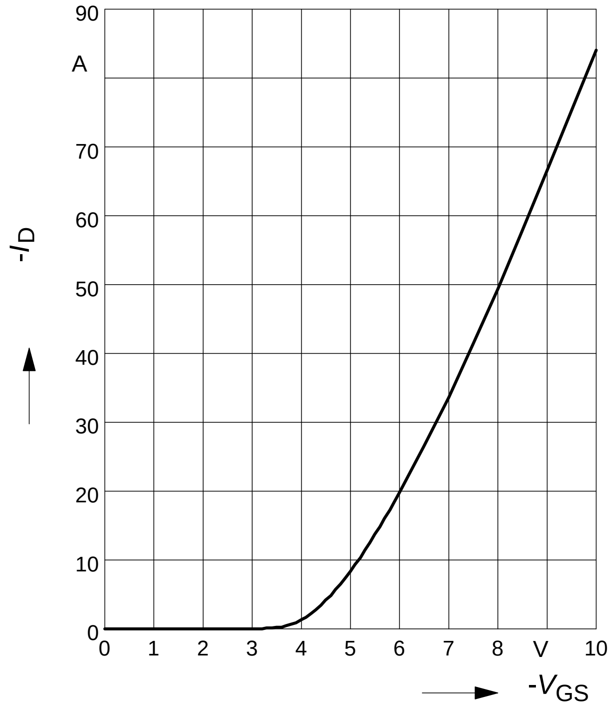
parameter: V_{GS}; T_j = 25 °C



7 Typ. transfer characteristics

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

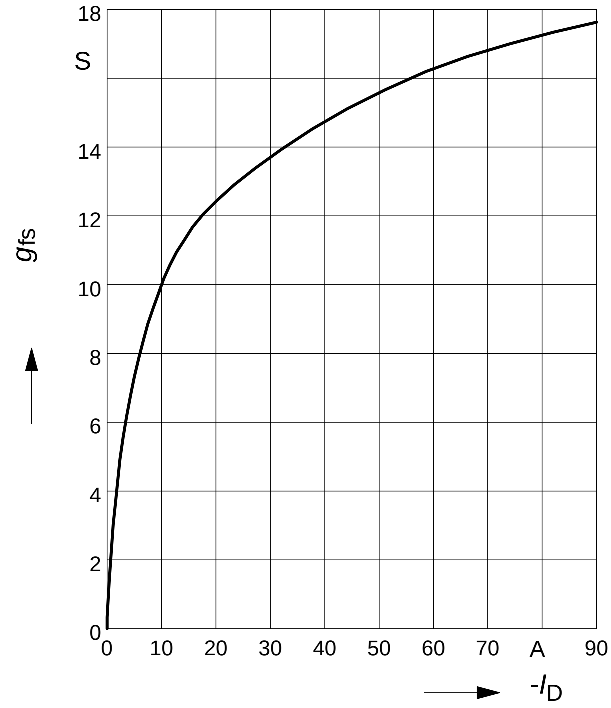
parameter: T_j = 25 °C



8 Typ. forward transconductance

$g_{fs} = f(I_D)$

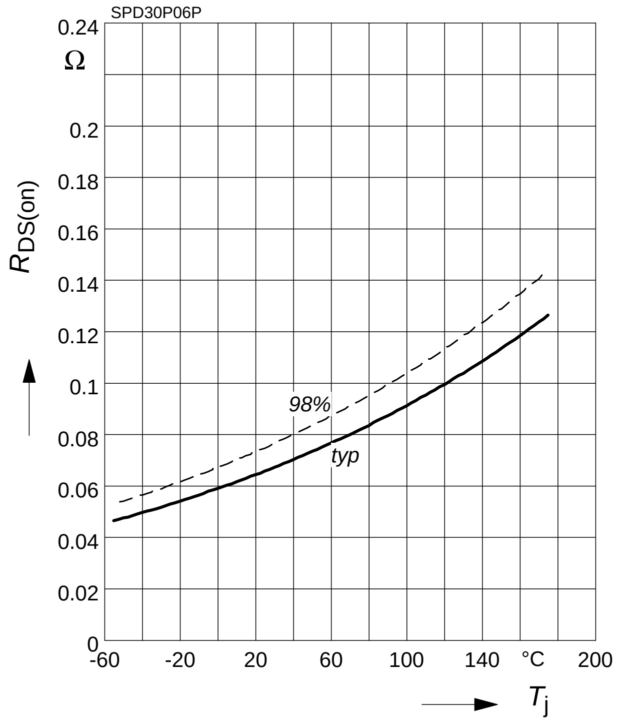
parameter: T_j = 25 °C



9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j)$

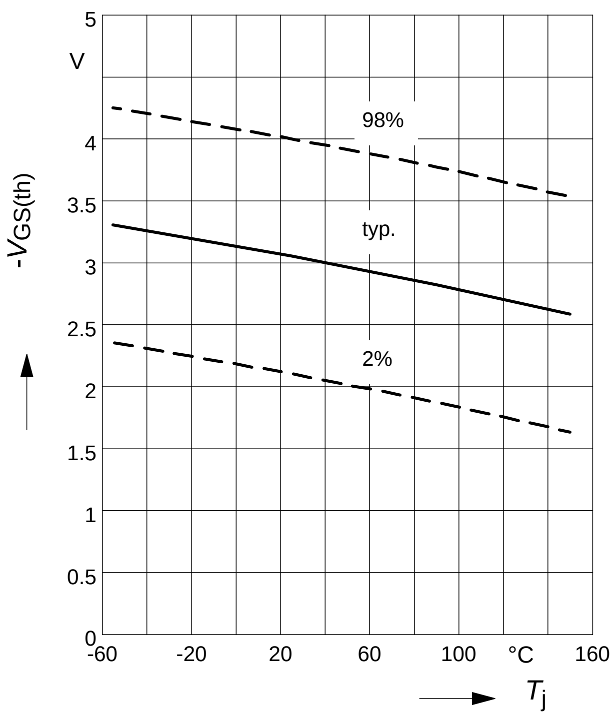
parameter : I_D = -21.5 A, V_{GS} = -10 V



10 Typ. gate threshold voltage

$V_{GS(th)} = f(T_j)$

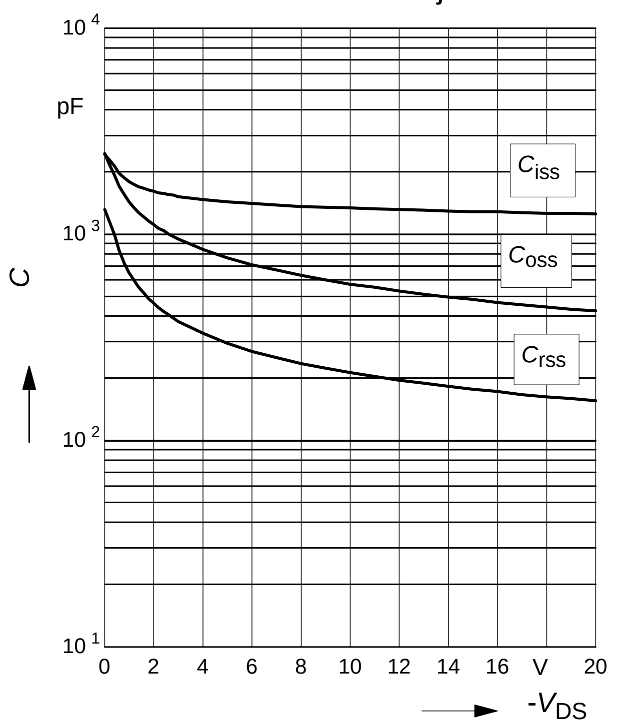
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

$C = f(V_{DS})$

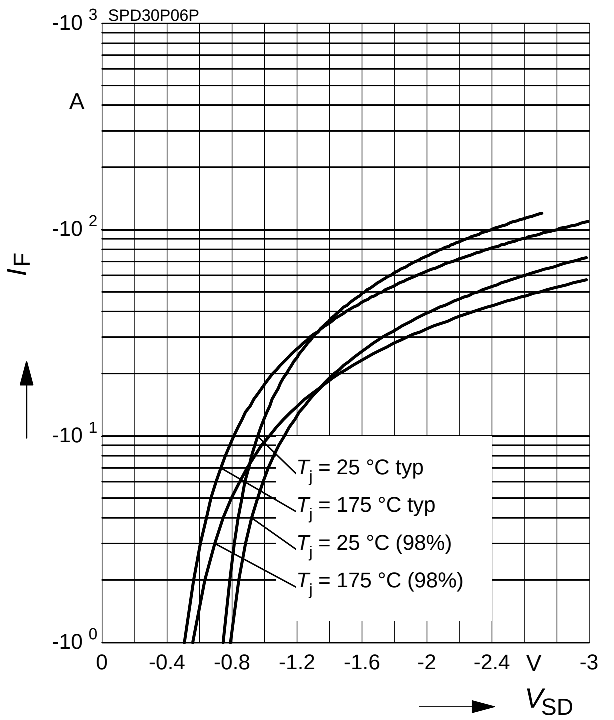
parameter: V_{GS}=0, f=1 MHz; T_j = 25 °C



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

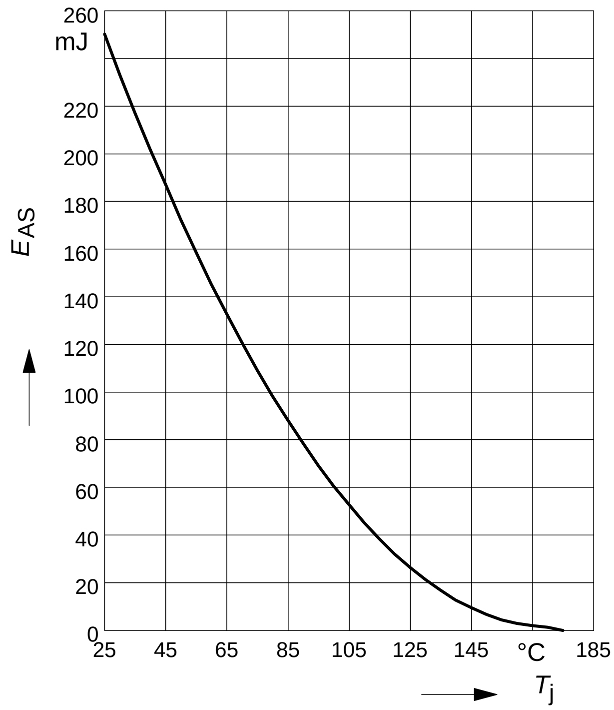
parameter: T_j , tp = 80 µs



13 Typ. avalanche energy

$E_{AS} = f(T_j)$

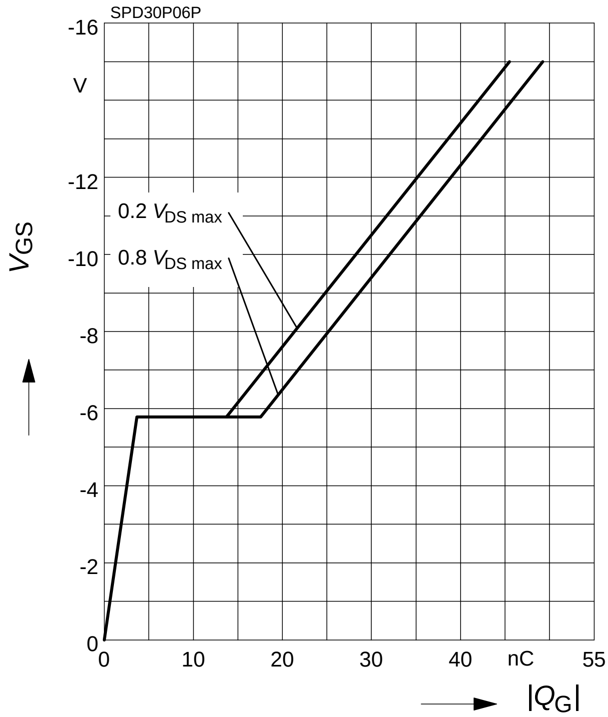
par.: I_D = -30 A , V_{DD} = -25 V, R_{GS} = 25 Ω



14 Typ. gate charge

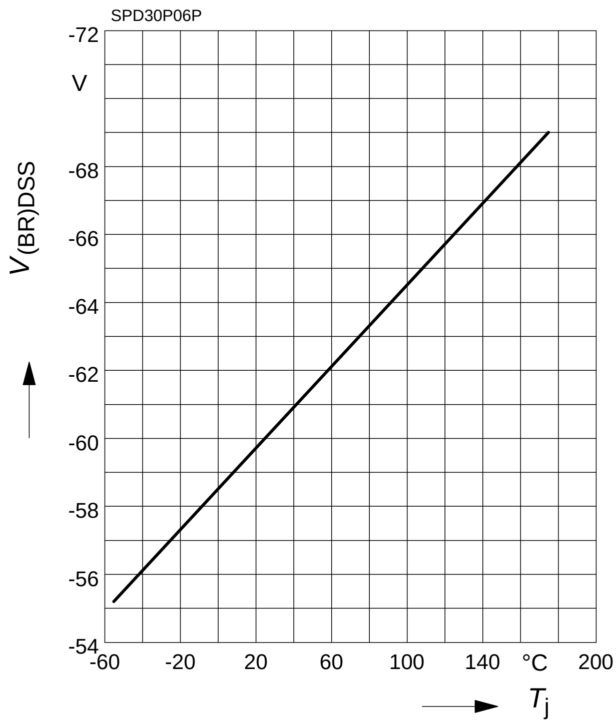
$V_{GS} = f(Q_G)$, parameter: V_{DS} ; T_j = 25 °C

I_D = -30 A pulsed;



15 Drain-source breakdown voltage

$V_{(BR)DSS} = f(T_j)$



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