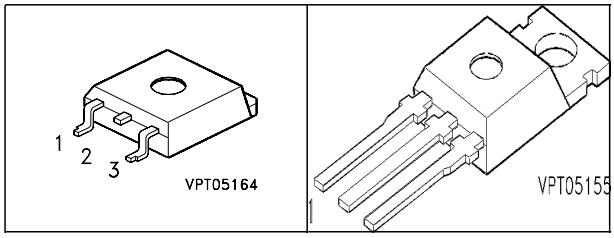
SIPMOS® Power-Transistor

Features

- P-Channel
- Enhancement mode
- Avalanche rated
- d*v*/d*t* rated
- 175°C operating temperature

Product Summary

Drain source voltage	V_{DS}	-60	V
Drain-source on-state resistance	$R_{DS(on)}$	0.023	Ω
Continuous drain current	I_D	-80	A



Type	Package	Ordering Code
SPP80P06P	P-TO220-3-1	Q67042-S4017
SPB80P06P	P-TO263-3-2	Q67042-S4016

Pin 1	PIN 2/4	PIN 3
G	D	S

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

Parameter	Symbol	Value	Unit
Continuous drain current T_C = 25 °C, 1) T_C = 100 °C	I_D	 -80 -64	A
Pulsed drain current T_C = 25 °C	$I_{D\ puls}$	-320	
Avalanche energy, single pulse I_D = -80 A , V_{DD} = -25 V, R_{GS} = 25 Ω	E_{AS}	823	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	34	
Reverse diode d*v*/d*t* I_S = -80 A, V_{DS} = -48 , d*i*/d*t* = 200 A/µs, T_{jmax} = 175 °C	d*v*/d*t*	6	kV/µs
Gate source voltage	V_{GS}	±20	V
Power dissipation T_C = 25 °C	P_{tot}	340	W
Operating and storage temperature	T_j , T_{stg}	-55...+175	°C
IEC climatic category; DIN IEC 68-1		55/175/56	

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

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
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}				
@ min. footprint		-	-	62	
@ 6 cm^2 cooling area [1)]		-	-	40	

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 V, I_D = -250 µA	$V_{(BR)DSS}$	-60	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D = -5.5 mA	$V_{GS(th)}$	-2.1	-3	-4	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS} = -60 V, V_{GS} = 0 V, T_j = 25 °C		-	-0.1	-1	
V_{DS} = -60 V, V_{GS} = 0 V, T_j = 150 °C		-	-10	-100	
Gate-source leakage current V_{GS} = -20 V, V_{DS} = 0 V	I_{GSS}	-	-10	-100	nA
Drain-source on-state resistance V_{GS} = -10 V, I_D = -64 A	$R_{DS(on)}$	-	0.021	0.023	Ω

[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm^2 (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	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(on)max}$, I_D = -64 A	g_{fs}	18	36	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{iss}	-	4026	5033	pF
Output capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{oss}	-	1252	1565	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{rss}	-	437	546	
Turn-on delay time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -64 A, R_G = 1 Ω	$t_{d(on)}$	-	24	36	ns
Rise time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -64 A, R_G = 1 Ω	t_r	-	18	27	
Turn-off delay time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -64 A, R_G = 1 Ω	$t_{d(off)}$	-	56	84	
Fall time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -64 A, R_G = 1 Ω	t_f	-	30	45	

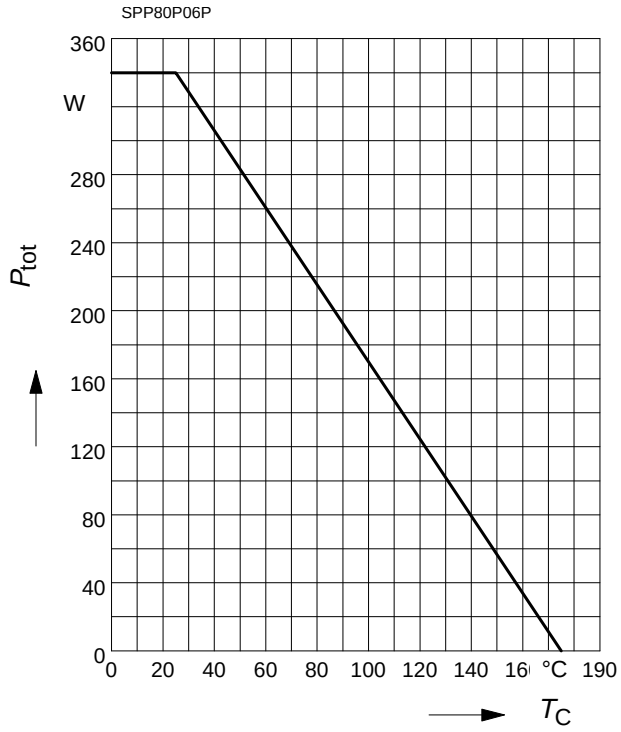
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Gate to source charge V_{DD} = -48 V, I_D = -80 A	Q_{gs}	-	27.4	41	nC
Gate to drain charge V_{DD} = -48 V, I_D = -80 A	Q_{gd}	-	50	75	
Gate charge total V_{DD} = -48 V, I_D = -80 A, V_{GS} = 0 to -10 V	Q_g	-	115	173	
Gate plateau voltage V_{DD} = -48 V , I_D = -80 A	$V_{(plateau)}$	-	-6.2	-	V

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current T_C = 25 °C	I_S	-	-	-80	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	-320	
Inverse diode forward voltage V_{GS} = 0 V, I_F = -80 A	V_{SD}	-	-1.2	-1.6	V
Reverse recovery time V_R = -30 V, I_F=I_S , di_F/dt = 100 A/µs	t_{rr}	-	117	175	ns
Reverse recovery charge V_R = -30 V, I_F=I_S , di_F/dt = 100 A/µs	Q_{rr}	-	420	630	nC

Power dissipation

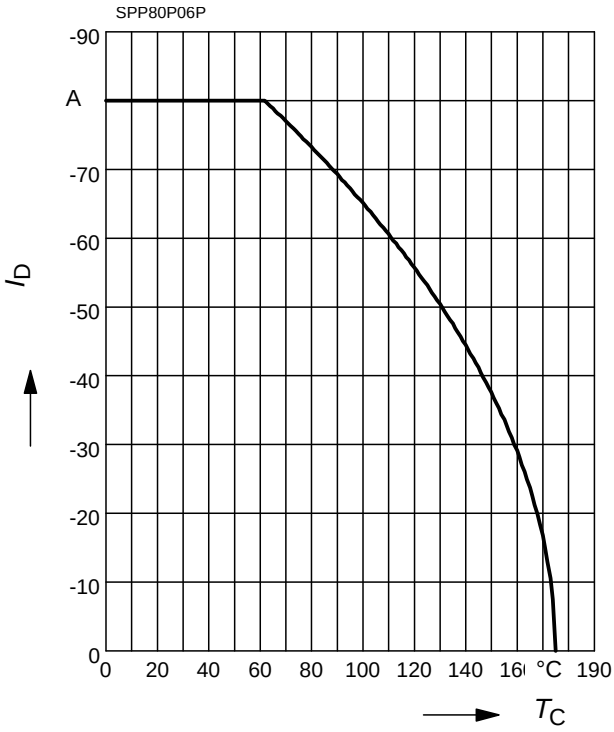
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

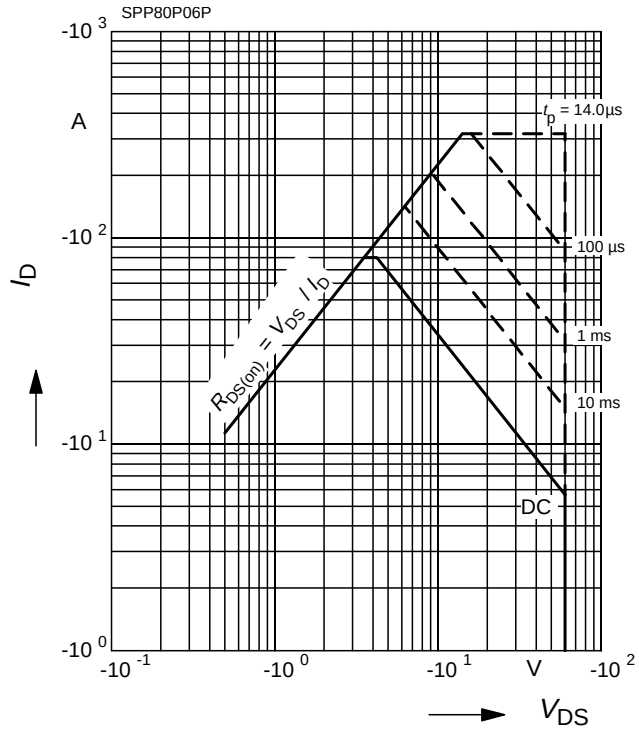
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

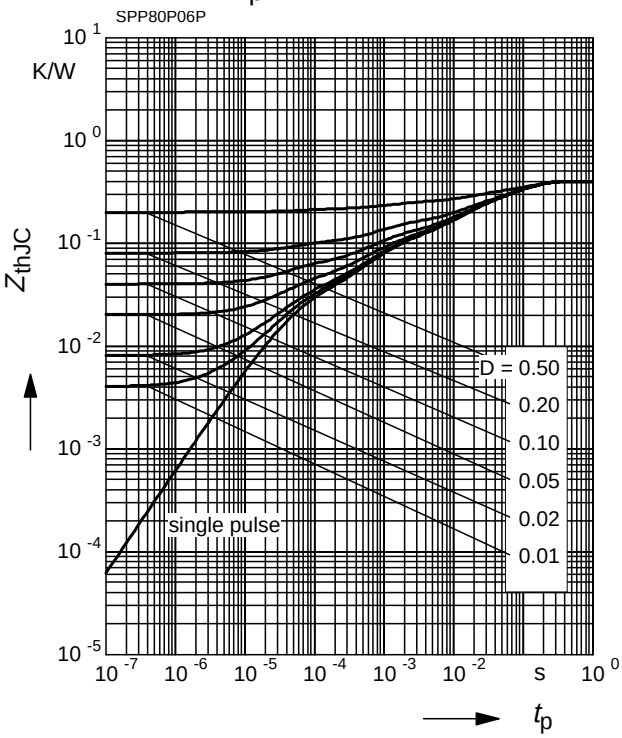
parameter : $D = 0$, $T_C = 25$ °C



Transient thermal impedance

$Z_{thJC} = f(t_p)$

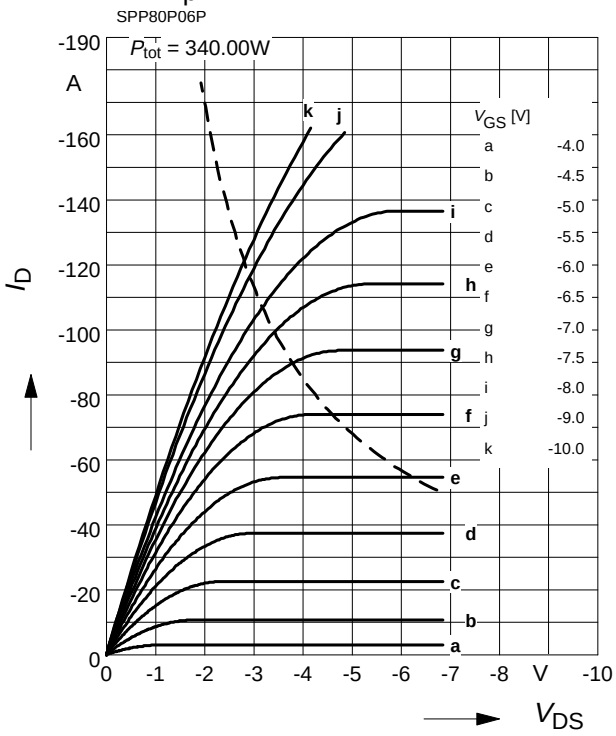
parameter : $D = t_p / T$



Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

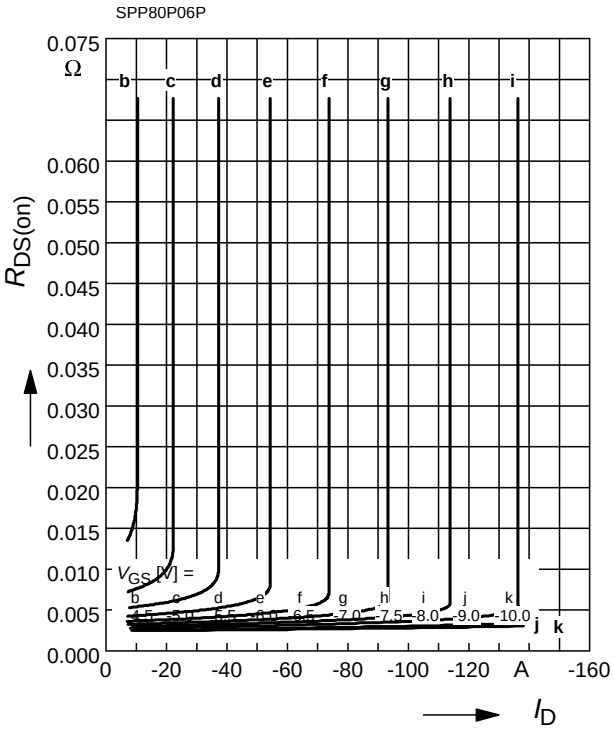
parameter: t_p = 80 µs



Typ. drain-source-on-resistance

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

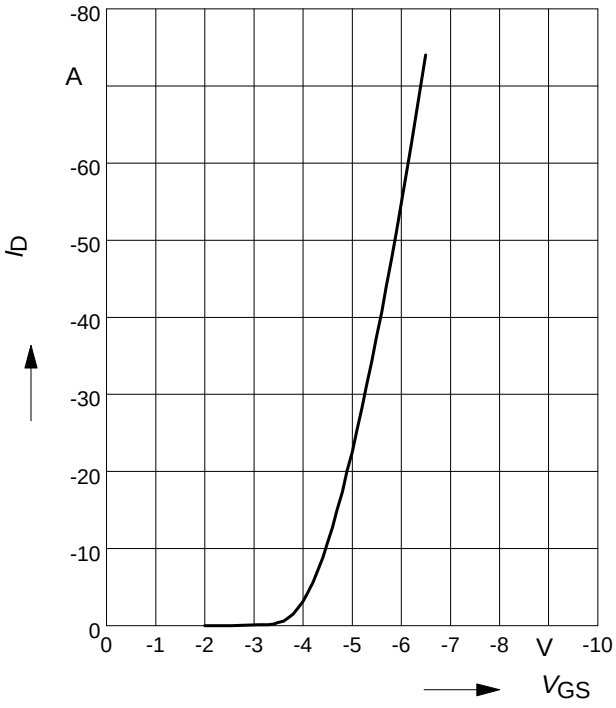
parameter: V_{GS}



Typ. transfer characteristics $I_D = f(V_{GS})$

$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

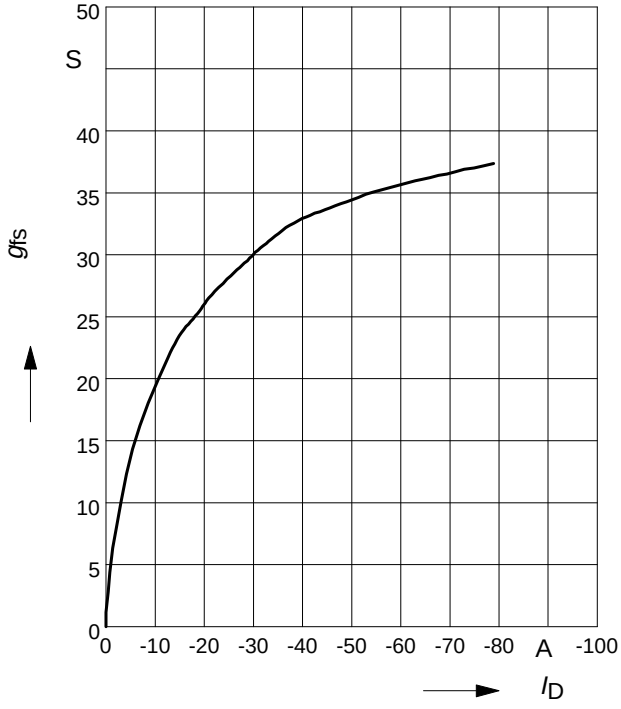
parameter: t_p = 80 µs



Typ. forward transconductance

g_{fs} = f(I_D); T_j=25°C

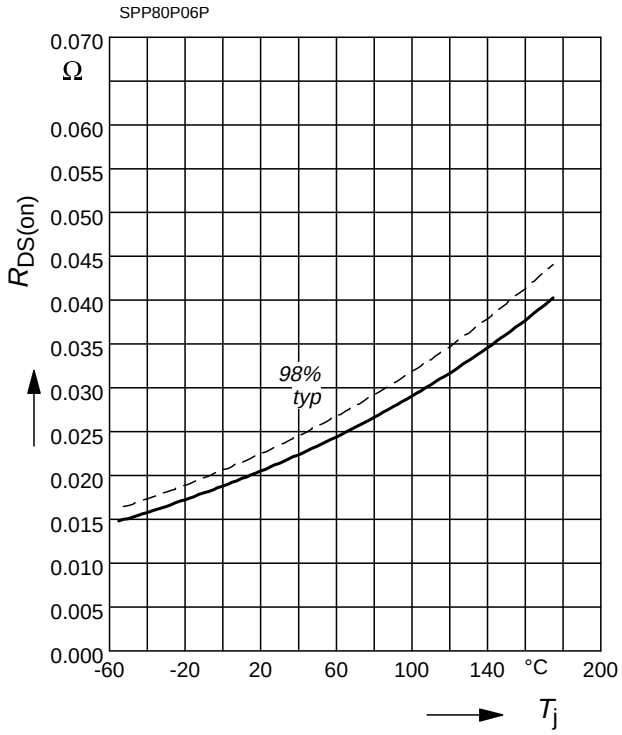
parameter: g_{fs}



Drain-source on-state resistance

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

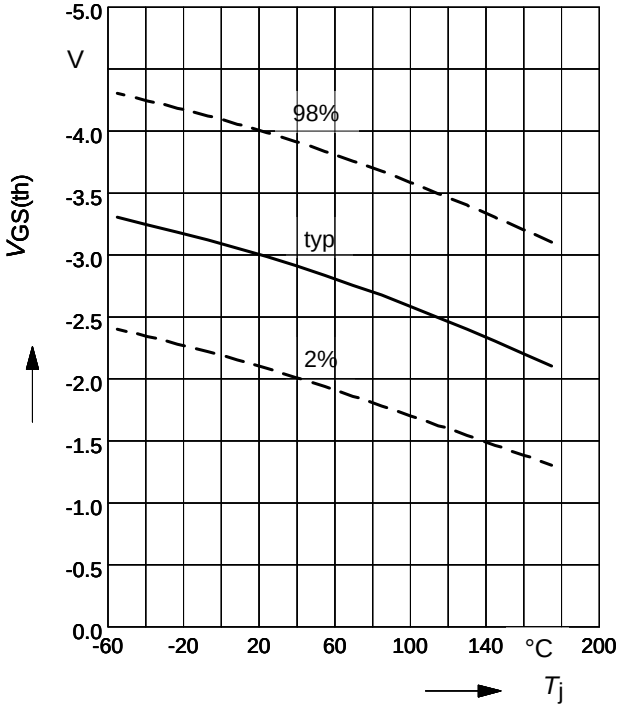
parameter : I_D = -64 A, V_{GS} = -10 V



Gate threshold voltage

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

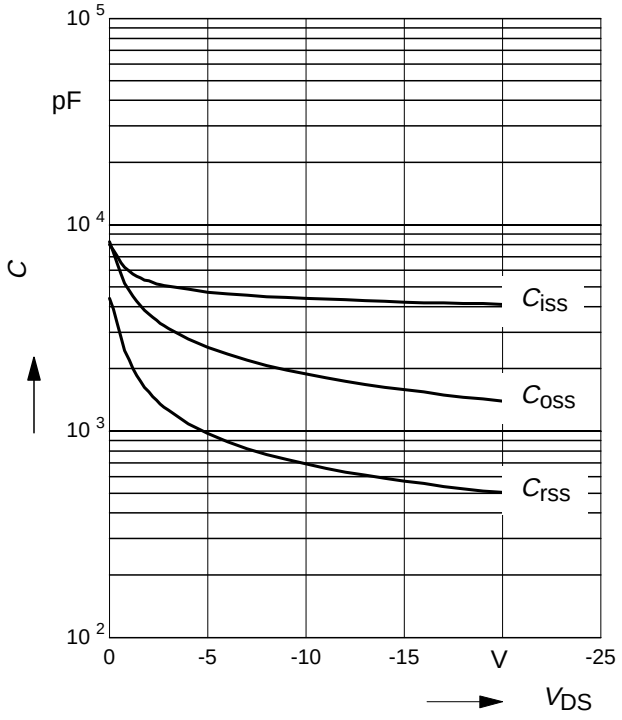
parameter: $V_{GS} = V_{DS}$, I_D = -5.5 mA



Typ. capacitances

$C = f(V_{DS})$

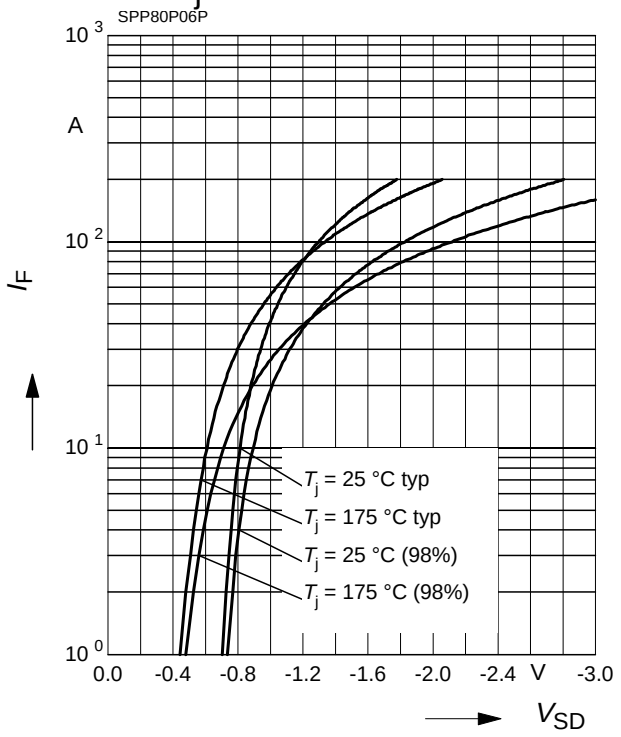
parameter: V_{GS}=0V, f=1 MHz



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

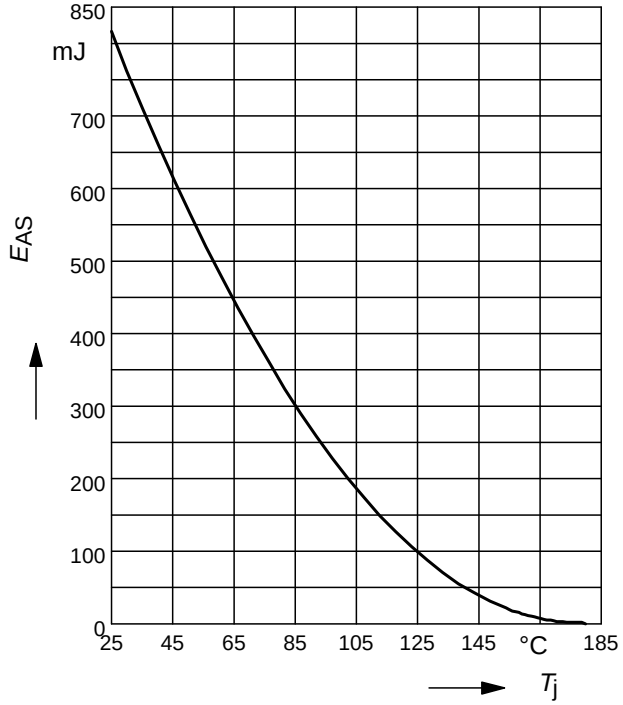
parameter: T_j , tp = 80 µs



Avalanche energy

$E_{AS} = f(T_j)$

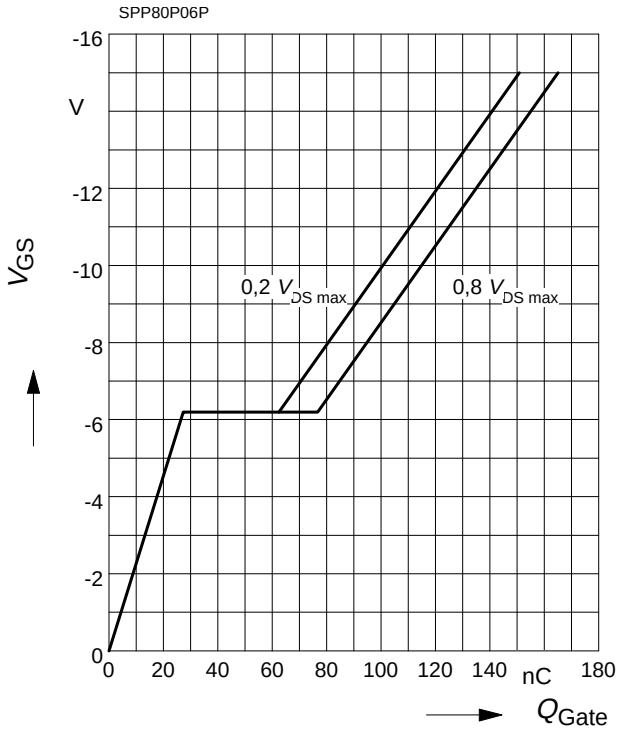
para.: I_D = -80 A , V_{DD} = -25 V, R_{GS} = 25 Ω



Typ. gate charge

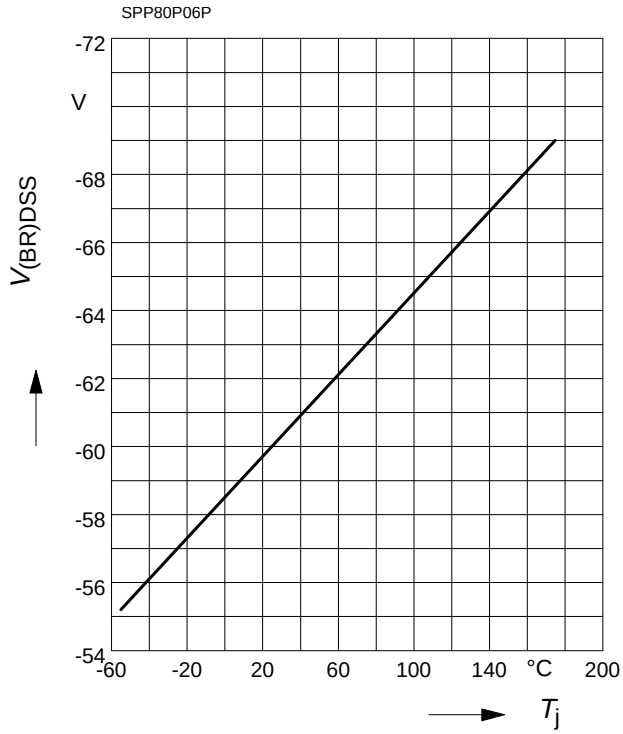
$V_{GS} = f\ (Q_{Gate})$

parameter: I_D = -80 A pulsed



Drain-source breakdown voltage

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



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