OptiMOS®-P Power - Transistor

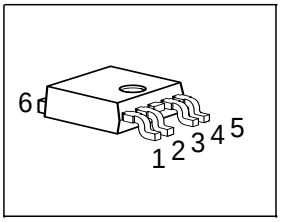
Feature

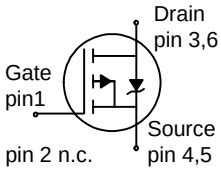
- P-Channel
- Enhancement mode
- Logic Level
- High current rating
- 175°C operating temperature
- Avalanche rated
- d*v*/d*t* rated

Product Summary

V_{DS}	-30	V
$R_{DS(on)}$	7	mΩ
I_D	-50	A

P-TO252-5-3





Type	Package	Ordering Code
SPD50P03L	P-TO252-5-3	Q67042-S4076

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

Parameter	Symbol	Value	Unit
Continuous drain current	I_D		A
T_C=25°C		-50	
T_C=100°C		-50	
Pulsed drain current	$I_{D\ puls}$	-200	
T_C=25°C			
Avalanche energy, single pulse	E_{AS}	256	mJ
I_D=-50 A , V_{DD}=-25V, R_{GS}=25Ω			
Reverse diode d*v*/d*t*	d*v*/d*t*	-6	kV/µs
I_S=-50A, V_{DS}=-24V, d*i*/d*t*=200A/µs, T_{jmax}=175°C			
Gate source voltage	V_{GS}	±20	V
Power dissipation	P_{tot}	150	W
T_C=25°C			
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	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint, t < 10s		-	-	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}=0V, I_D=-250µA	$V_{(BR)DSS}$	-30	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D=-250µA	$V_{GS(th)}$	-1	-1.5	-2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=-30V, V_{GS}=0, T_j=25°C		-	-0.1	-1	
V_{DS}=-30V, 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}=-4.5V, I_D=-30A	$R_{DS(on)}$	-	8.5	12.5	mΩ
Drain-source on-state resistance V_{GS}=-10V, I_D=-50A	$R_{DS(on)}$	-	5.7	7	

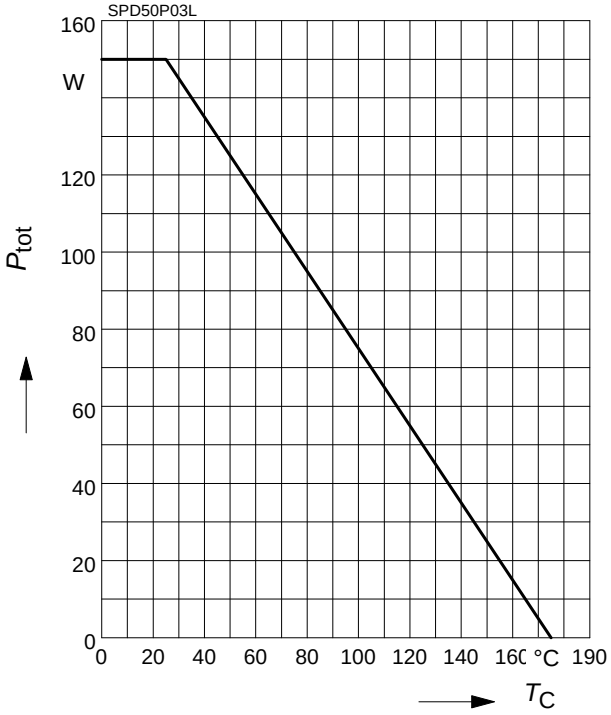
[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm^2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air; t≤10 sec.

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$\lvert V_{DS}\rvert \geq 2 * \lvert I_D\rvert * R_{DS(on)max}$, I_D=-50A	47	94	-	S
Input capacitance	C_{iss}	V_{GS}=0, V_{DS}=-25V, f=1MHz	-	4560	-	pF
Output capacitance	C_{oss}		-	1178	-	
Reverse transfer capacitance	C_{rss}		-	965	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-15V, V_{GS}=-10V, I_D=-1A, R_G=6Ω	-	14.8	22	ns
Rise time	t_r		-	21.7	32	
Turn-off delay time	$t_{d(off)}$		-	139	208	
Fall time	t_f		-	104	156	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=-24V, I_D=-50A	-	-12.7	-17	nC
Gate to drain charge	Q_{gd}		-	-40	-60	
Gate charge total	Q_g	V_{DD}=-24V, I_D=-50A, V_{GS}=0 to -10V	-	-119	-178	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=-24V, I_D=-50A	-	-2.7	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	-50	A
Inverse diode direct current, pulsed	I_{SM}		-	-	-200	
Inverse diode forward voltage	V_{SD}	V_{GS}=0, $\lvert I_F\rvert = \lvert I_D\rvert$	-	-1.1	-1.65	V
Reverse recovery time	t_{rr}	V_R=-15V, $\lvert I_F\rvert = \lvert I_D\rvert$, di_F/dt=100A/µs	-	38	47	ns
Reverse recovery charge	Q_{rr}		-	46	57	nC

1 Power dissipation

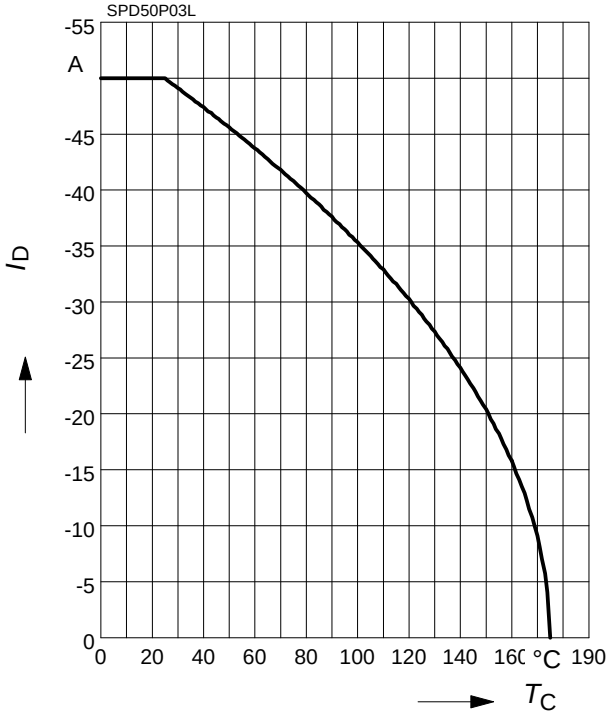
$P_{tot} = f(T_C)$



2 Drain current

$I_D = f(T_C)$

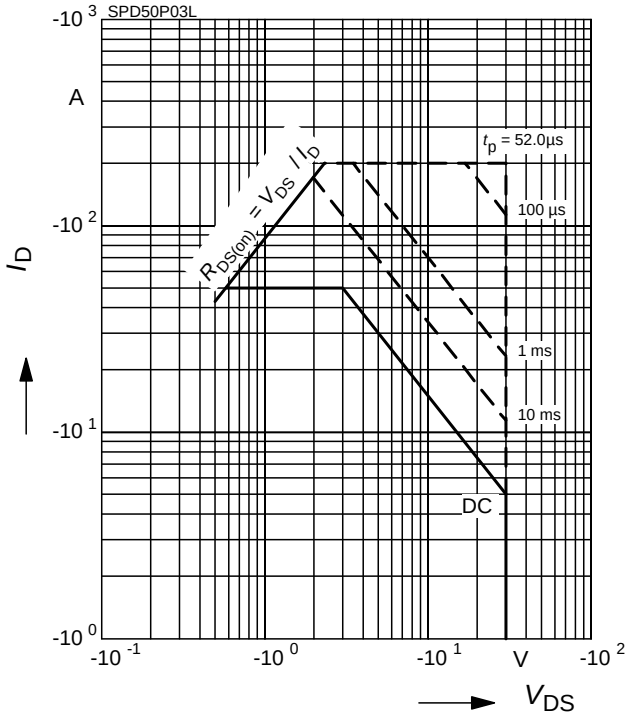
parameter: $|V_{GS}| \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

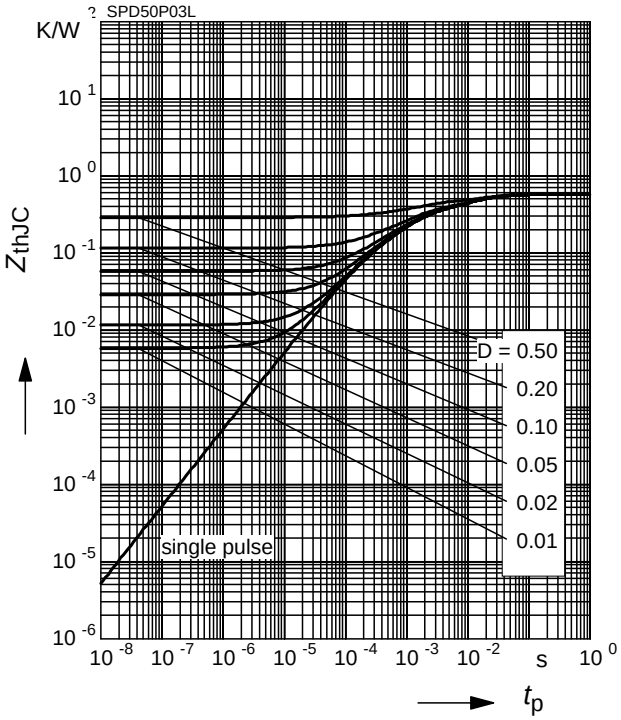
parameter : $D = 0$, $T_C = 25$ °C



4 Transient thermal impedance

$Z_{thJC} = f(t_p)$

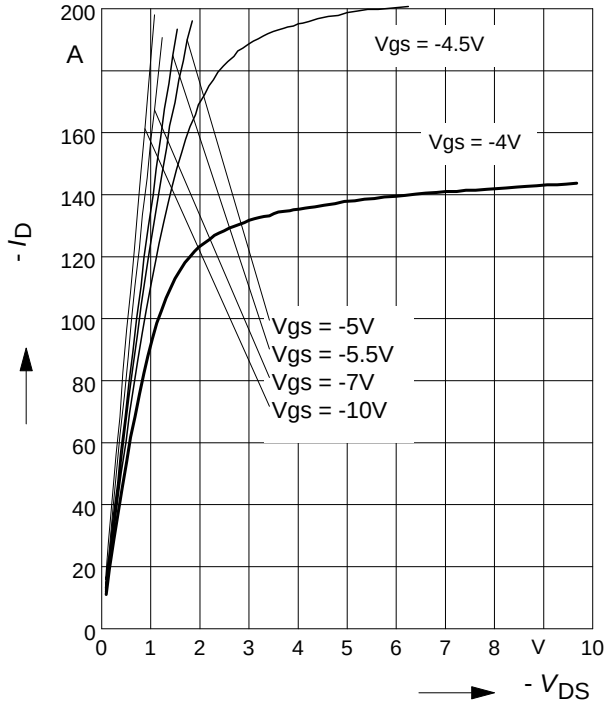
parameter : $D = t_p/T$



5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

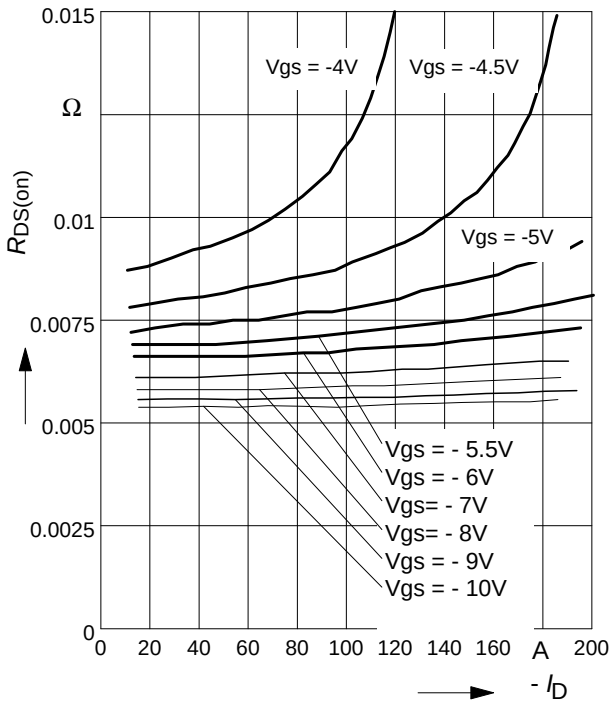
parameter: t_p = 80 µs



6 Typ. drain-source on resistance

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

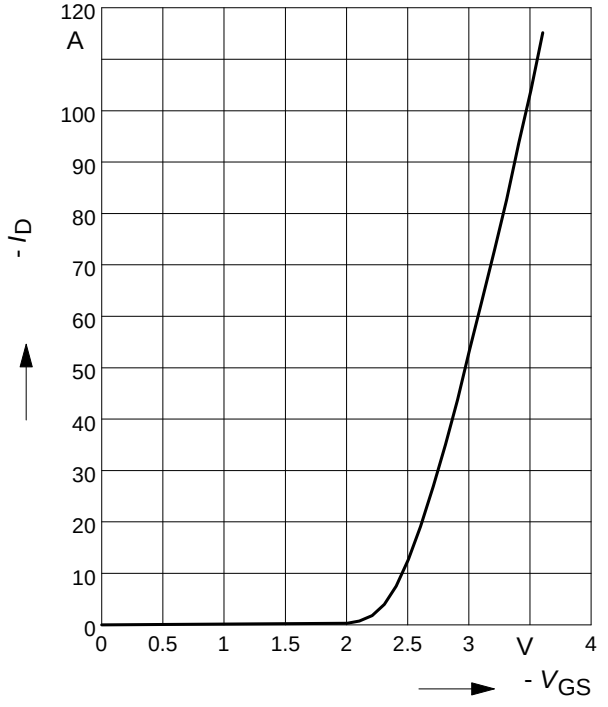
parameter: V_{GS}



7 Typ. transfer characteristics

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

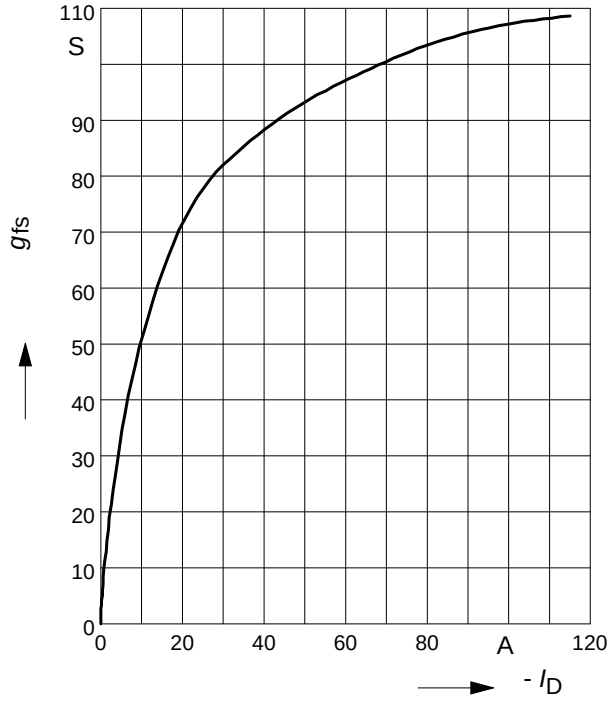
parameter: t_p = 80 µs



8 Typ. forward transconductance

g_{fs} = f(I_D); T_j=25°C

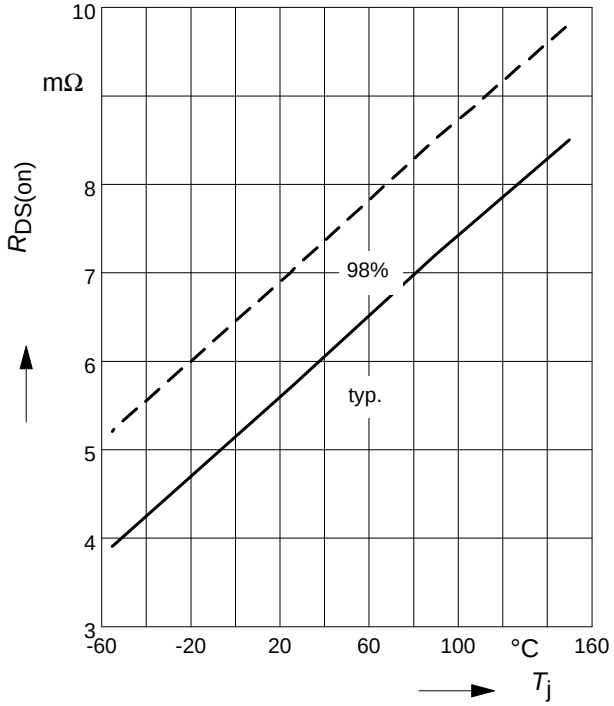
parameter: t_p = 80 µs



9 Drain-source on-resistance

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

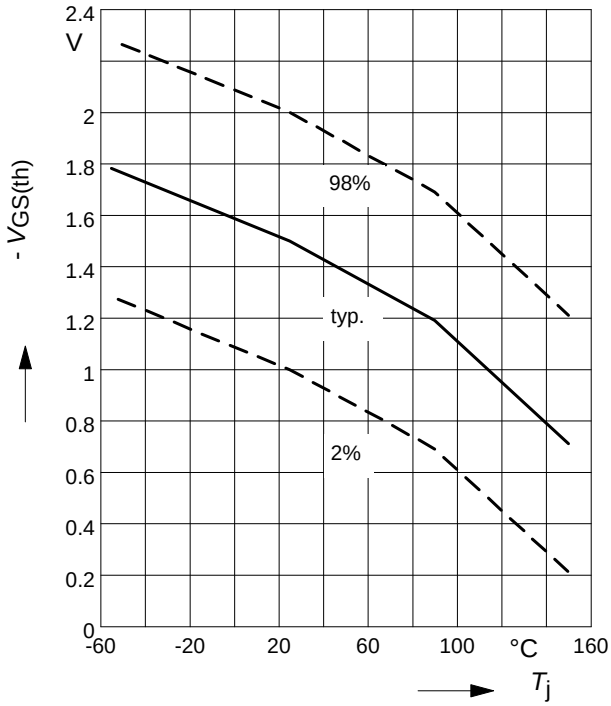
parameter: I_D = -50 A, V_{GS} = -10 V



10 Gate threshold voltage

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

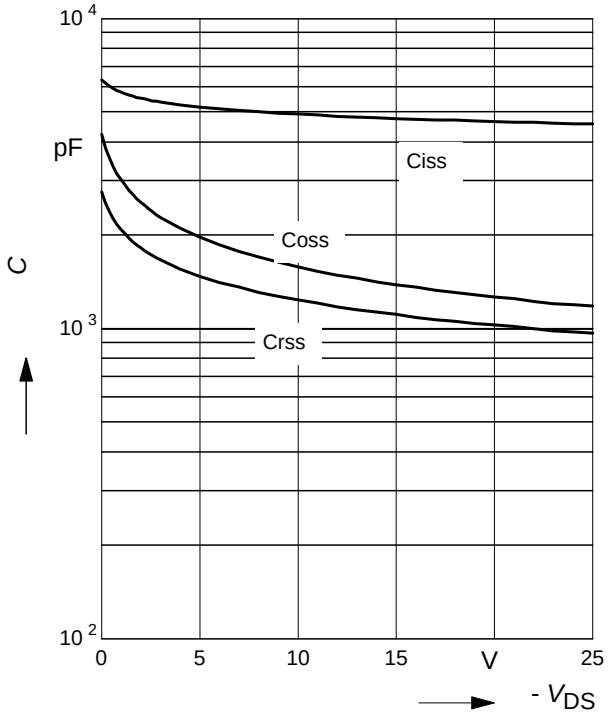
parameter: $V_{GS} = V_{DS}$, I_D = -250 µA



11 Typ. capacitances

$C = f(V_{DS})$

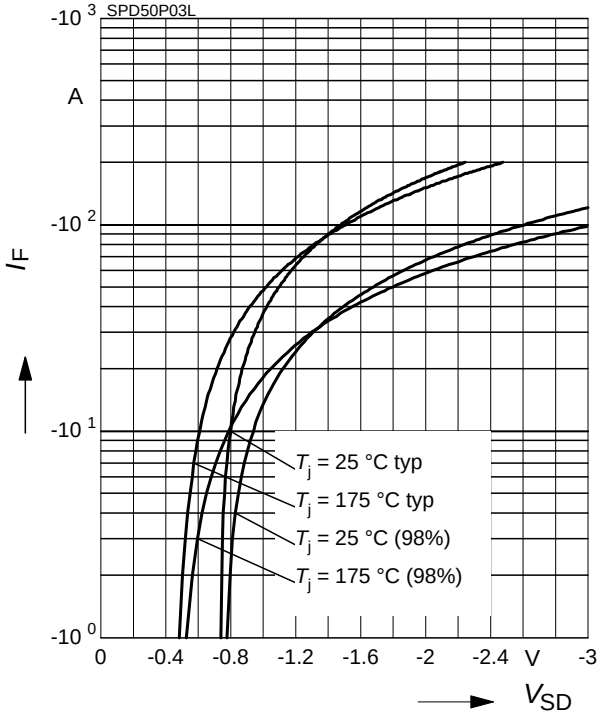
parameter: V_{GS}=0, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

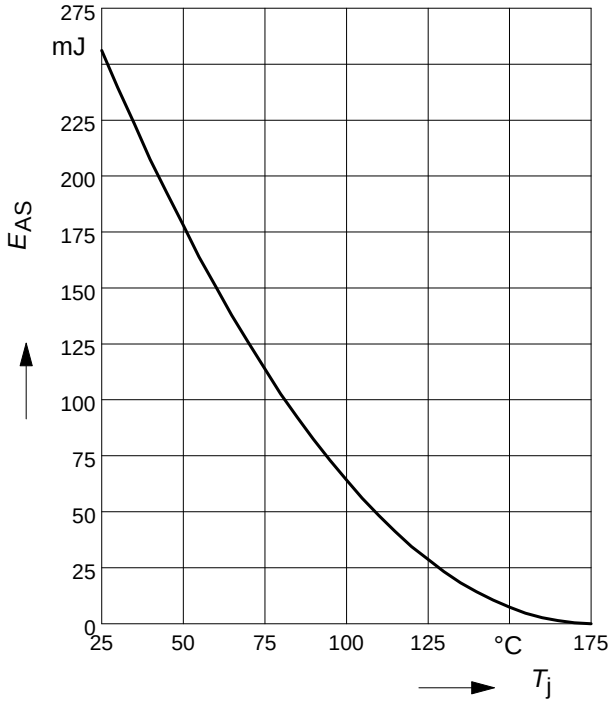
parameter: T_j , tp = 80 µs



13 Typ. avalanche energy

$E_{AS} = f(T_j)$, par.: I_D = -50 A

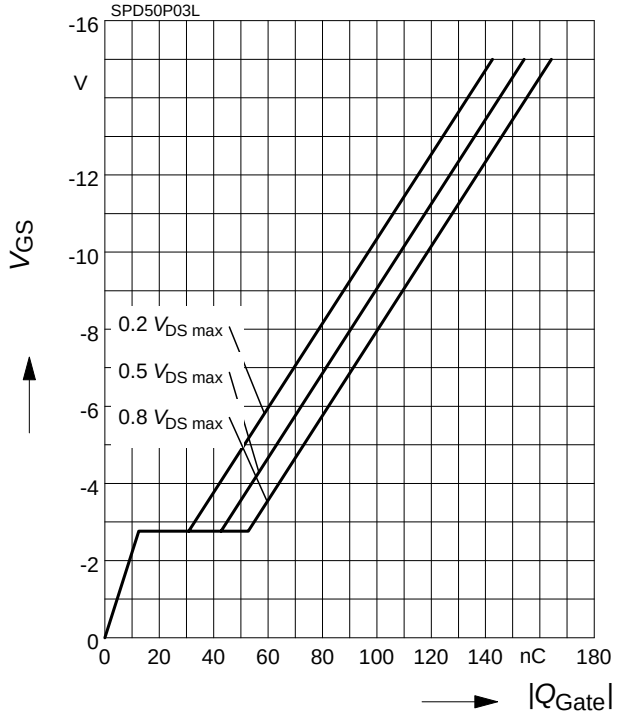
V_{DD} = -25 V, R_{GS} = 25 Ω



14 Typ. gate charge

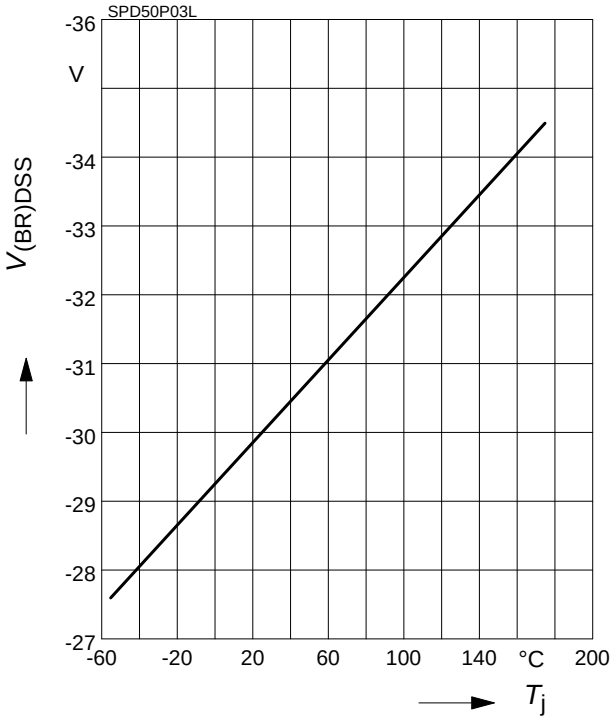
$V_{GS} = f(Q_{Gate})$

parameter: I_D = -50 A pulsed



15 Drain-source breakdown voltage

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



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