SIPMOS® Power-Transistor

Features

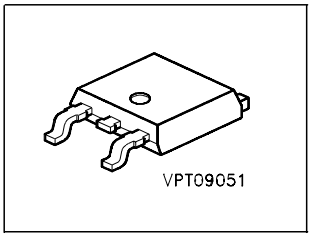
- P-Channel
- Enhancement mode
- Avalanche rated
- d*v*/d*t* rated
- 175°C operating temperature
- ° Pb-free lead plating; RoHS compliant
- ◦ Qualified according to AEC Q101

RoHS

AEC Qualified

Product Summary

Drain source voltage	V_{DS}	-60	V
Drain-source on-state resistance	$R_{DS(on)}$	0.13	Ω
Continuous drain current	I_D	-18.6	A



Pin 1	PIN 2/4	PIN 3
G	D	S

Type	Package
SPD18P06P G	PG-TO252-3

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	 -18.6 -13.2	A
Pulsed drain current T_C = 25 °C	$I_{D\ puls}$	-74.4	
Avalanche energy, single pulse I_D = -18.6 A , V_{DD} = -25 V, R_{GS} = 25 Ω	E_{AS}	150	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	8	
Reverse diode d*v*/d*t* I_S = -18.6 A, V_{DS} = -48 V, 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}	80	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}	-	-	1.85	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 V, I_D = -250 µA	$V_{(BR)DSS}$	-60	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D = -1 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 = -13.2 A	$R_{DS(on)}$	-	0.1	0.13	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}≥2*I_D*$R_{DS(on)max}$, I_D = -13.2 A	g_{fs}	4	8	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{iss}	-	690	860	pF
Output capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{oss}	-	230	290	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = -25 V, f = 1 MHz	C_{rss}	-	95	120	
Turn-on delay time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -13.2 A, R_G = 2.7 Ω	$t_{d(on)}$	-	12	18	ns
Rise time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -13.2 A, R_G = 2.7 Ω	t_r	-	5.8	8.7	
Turn-off delay time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -13.2 A, R_G = 2.7 Ω	$t_{d(off)}$	-	24.5	37	
Fall time V_{DD} = -30 V, V_{GS} = -10 V, I_D = -13.2 A, R_G = 2.7 Ω	t_f	-	11	16.5	

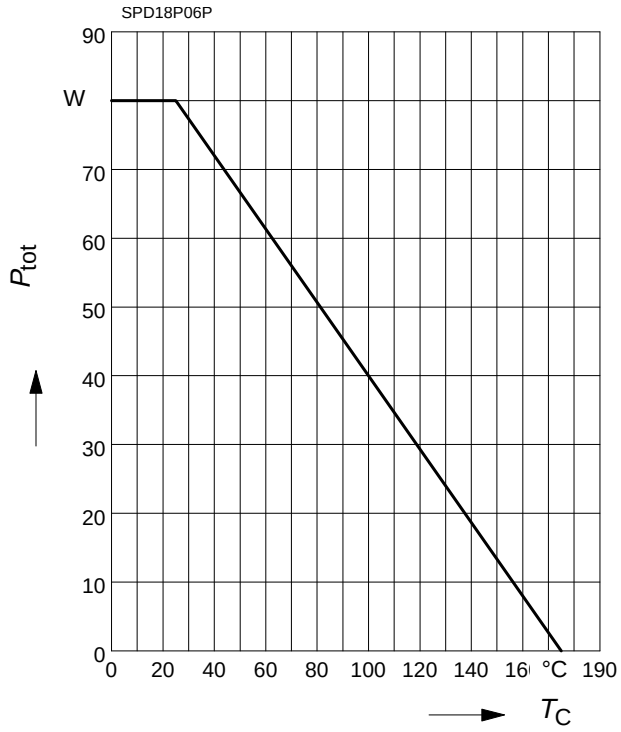
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Gate to source charge V_{DD} = -48 , I_D = -18.6 A	Q_{gs}	-	4.4	6.6	nC
Gate to drain charge V_{DD} = -48 V, I_D = -18.6 A	Q_{gd}	-	9.3	14	
Gate charge total V_{DD} = -48 V, I_D = -18.6 , V_{GS} = 0 to -10 V	Q_g	-	22	33	
Gate plateau voltage V_{DD} = -48 , I_D = -18.6 A	$V_{(plateau)}$	-	-5.56	-	V

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current T_C = 25 °C	I_S	-	-	-18.6	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	-74.4	
Inverse diode forward voltage V_{GS} = 0 V, I_F = -18.6 A	V_{SD}	-	-1	-1.33	V
Reverse recovery time V_R = -30 V, I_F=I_S , di_F/dt = 100 A/µs	t_{rr}	-	70	105	ns
Reverse recovery charge V_R = -30 V, I_F=I_S , di_F/dt = 100 A/µs	Q_{rr}	-	139	208	nC

Power dissipation

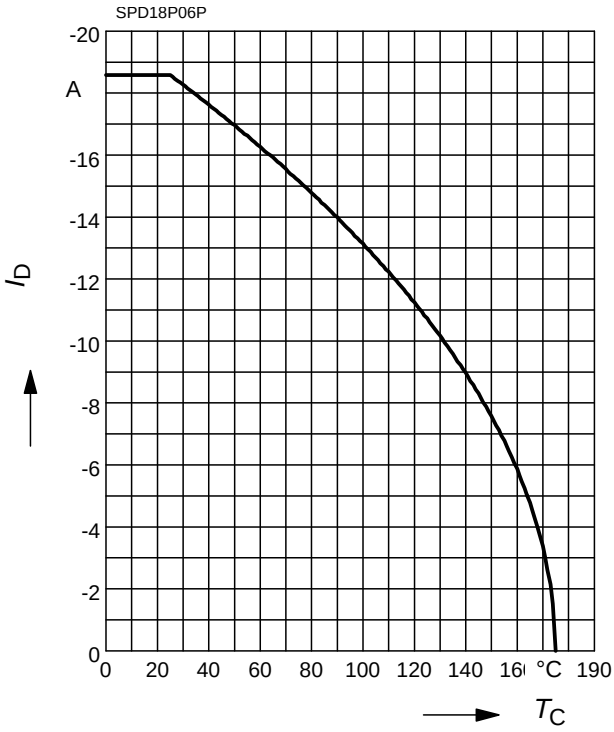
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

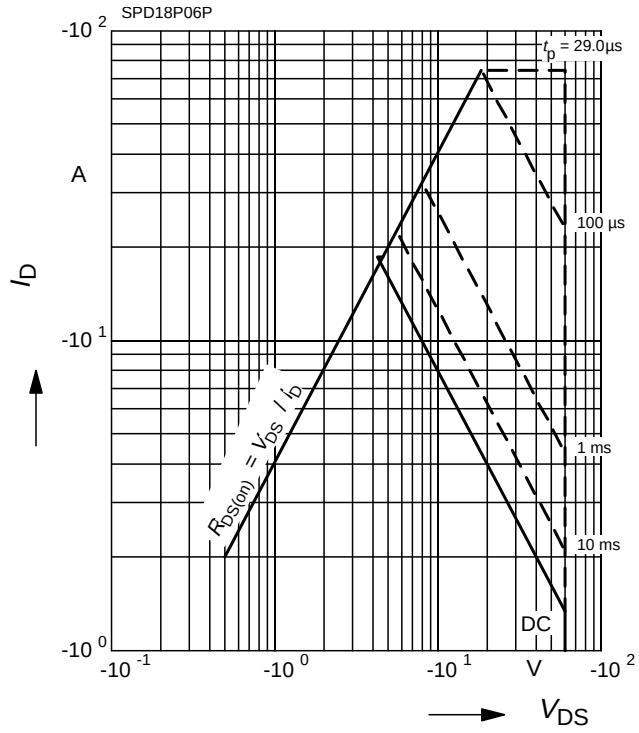
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

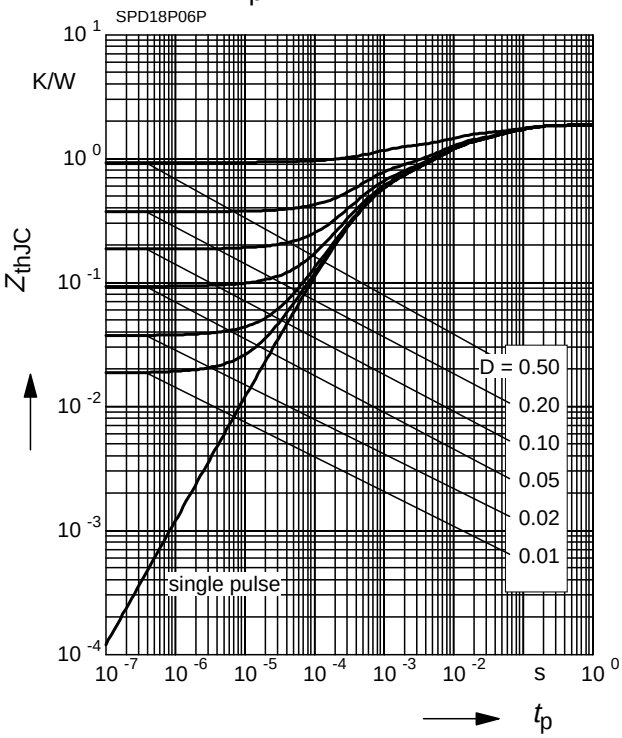
parameter : $D = 0$, $T_C = 25$ °C



Transient thermal impedance

$Z_{thJC} = f(t_p)$

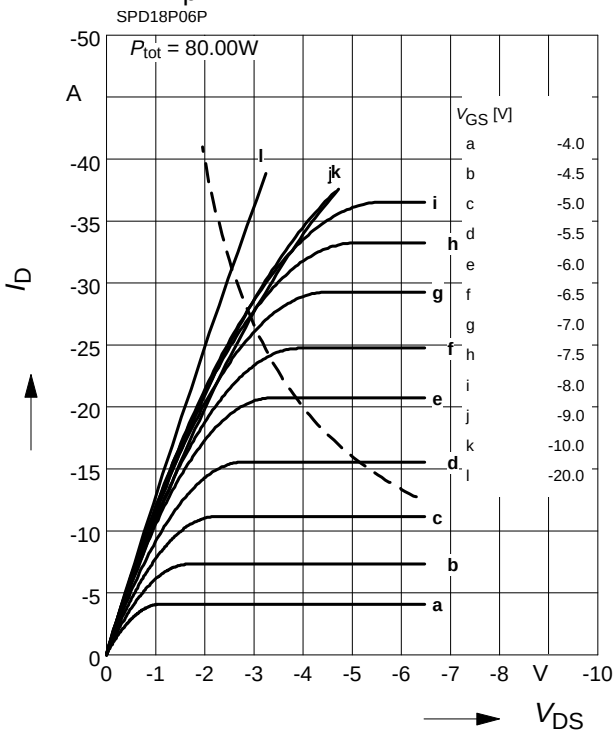
parameter : $D = t_p / T$



Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

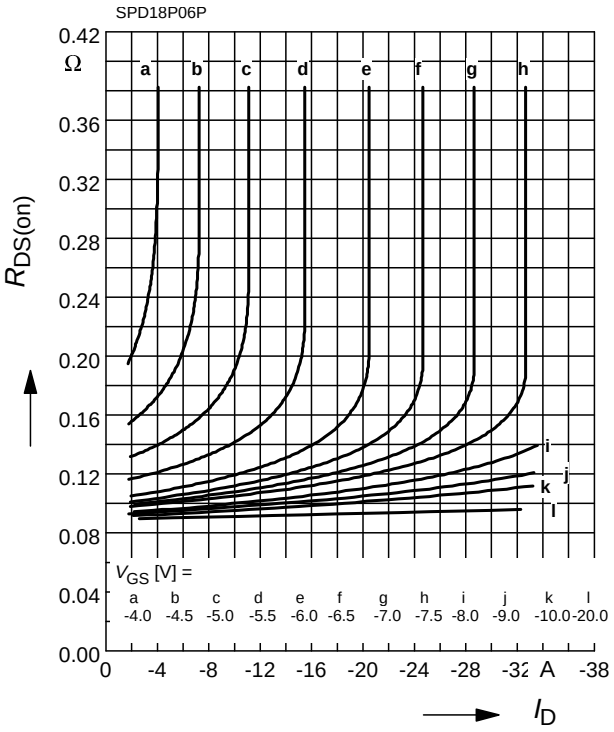
parameter: t_p = 80 µs



Typ. drain-source-on-resistance

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

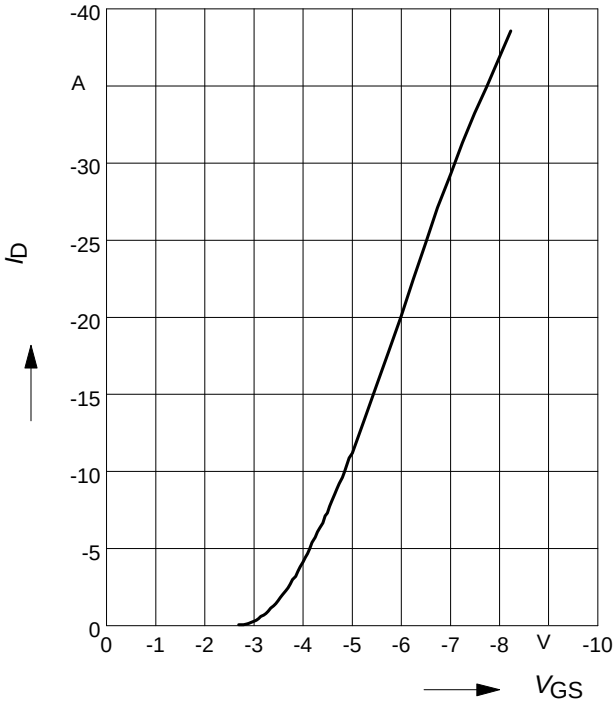
parameter: V_{GS}



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

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

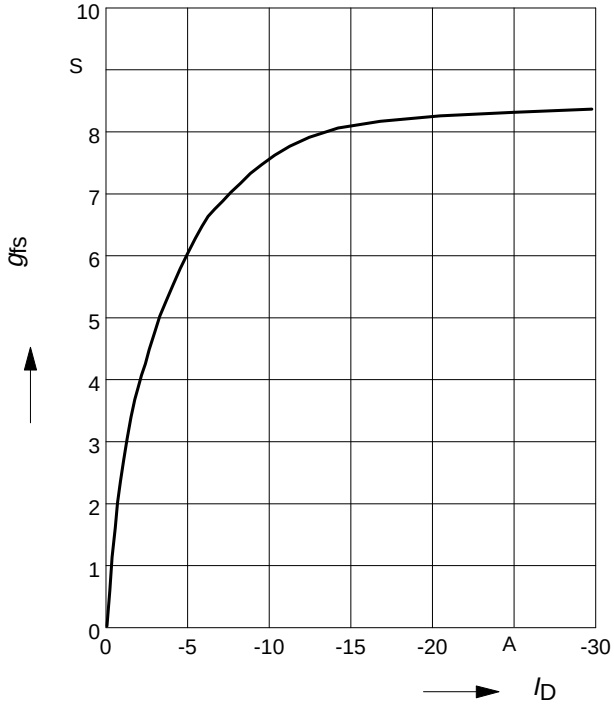
parameter: t_p = 80 µs



Typ. forward transconductance

g_{fs} = f(I_D); T_j=25°C

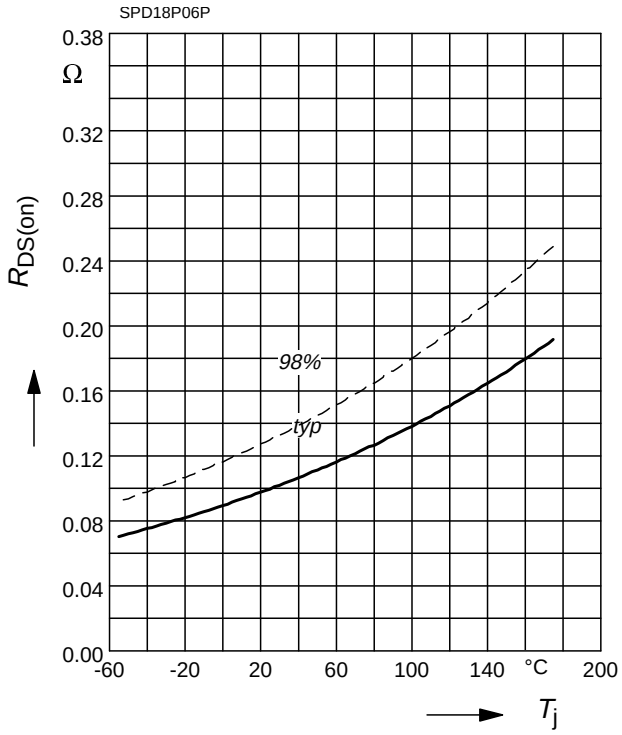
parameter: g_{fs}



Drain-source on-state resistance

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

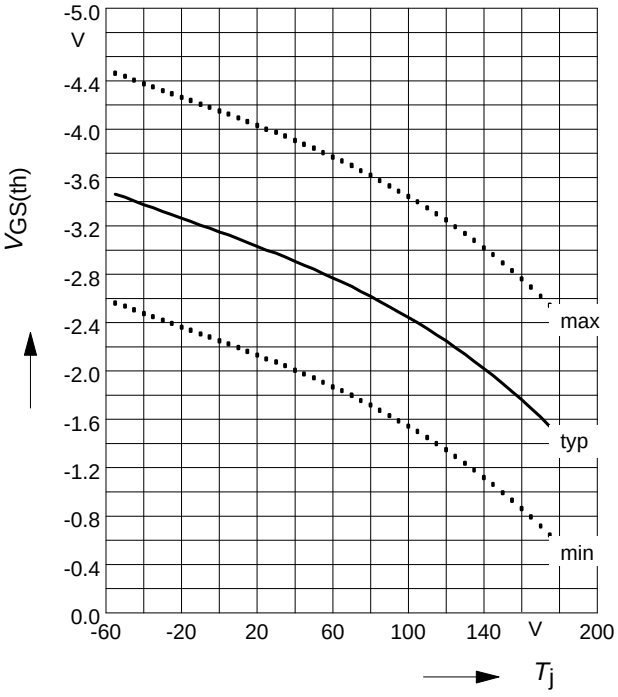
parameter : I_D = -13.2 A, V_{GS} = -10 V



Gate threshold voltage

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

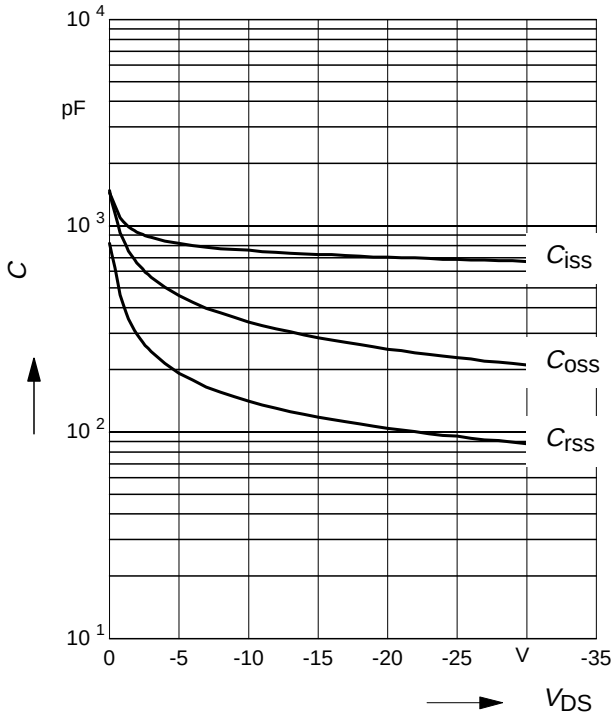
parameter: $V_{GS} = V_{DS}$, I_D = -1 mA



Typ. capacitances

$C = f(V_{DS})$

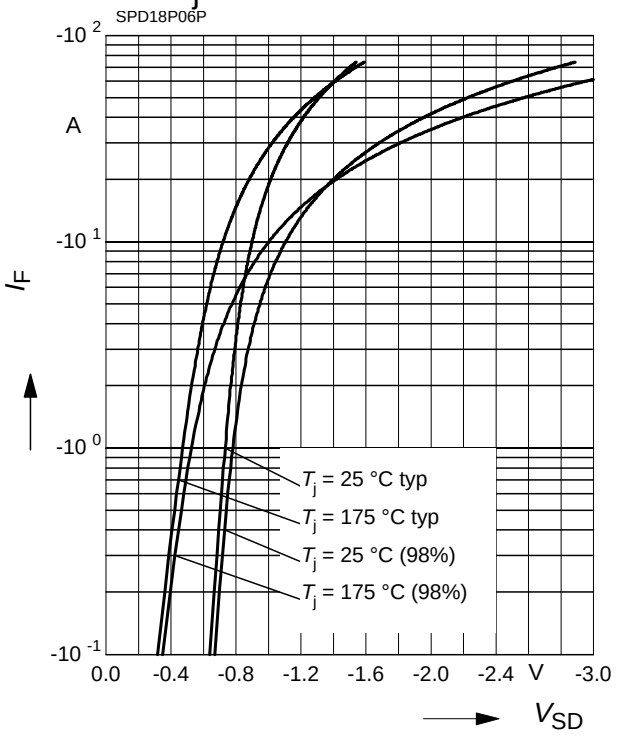
parameter: V_{GS}=0V, f=1 MHz



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

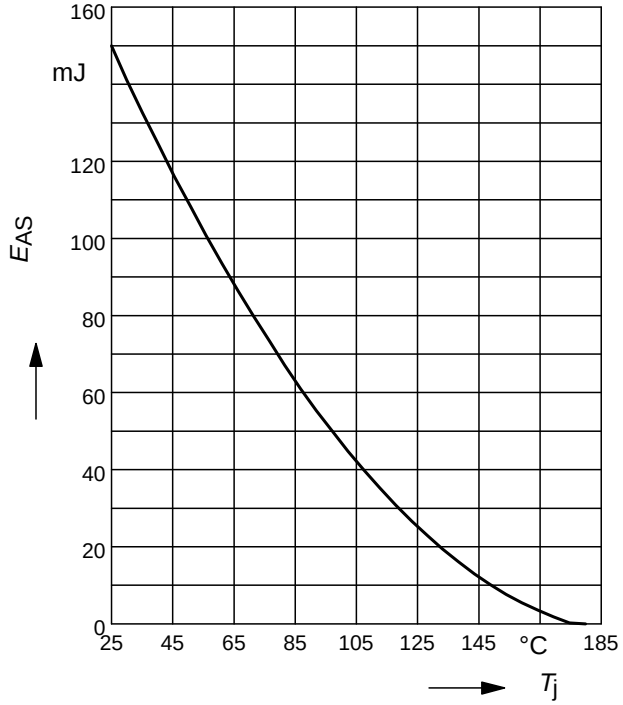
parameter: T_j , tp = 80 µs



Avalanche energy

$E_{AS} = f(T_j)$

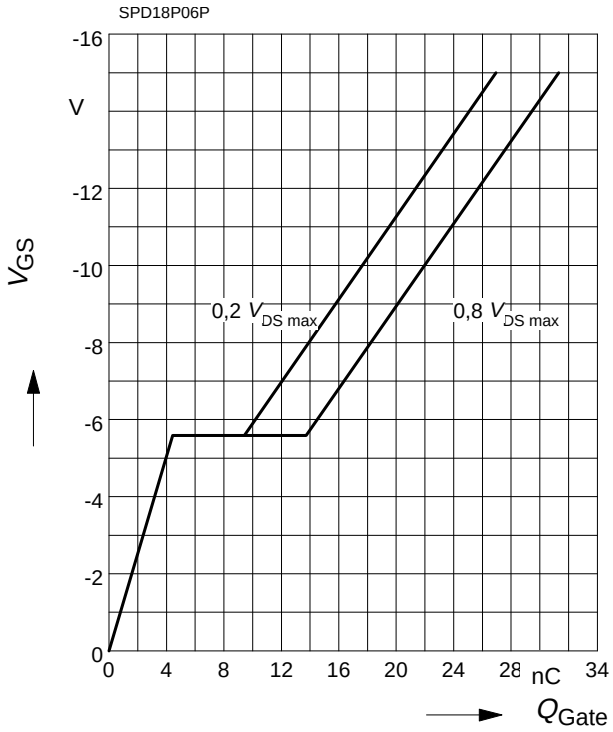
para.: I_D = -18.6 A , V_{DD} = -25 V, R_{GS} = 25



Typ. gate charge

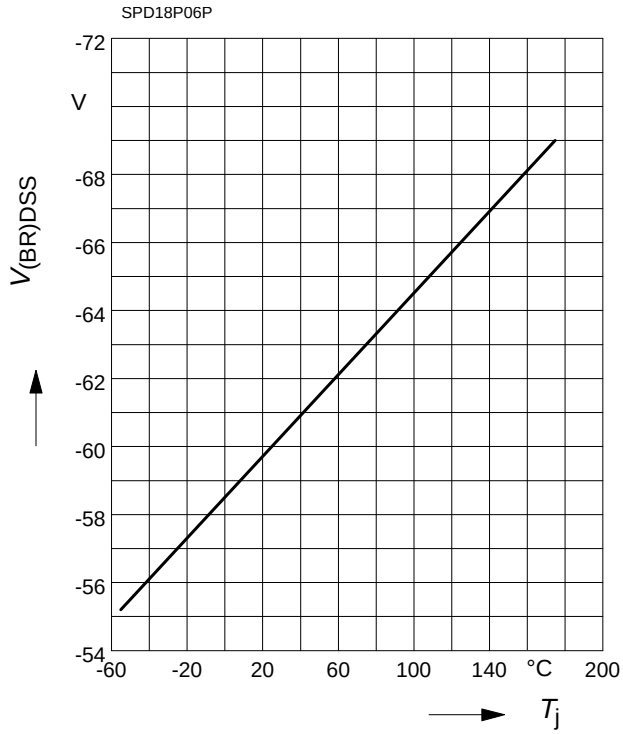
$V_{GS} = f\ (Q_{Gate})$

parameter: I_D = -18.6 A pulsed

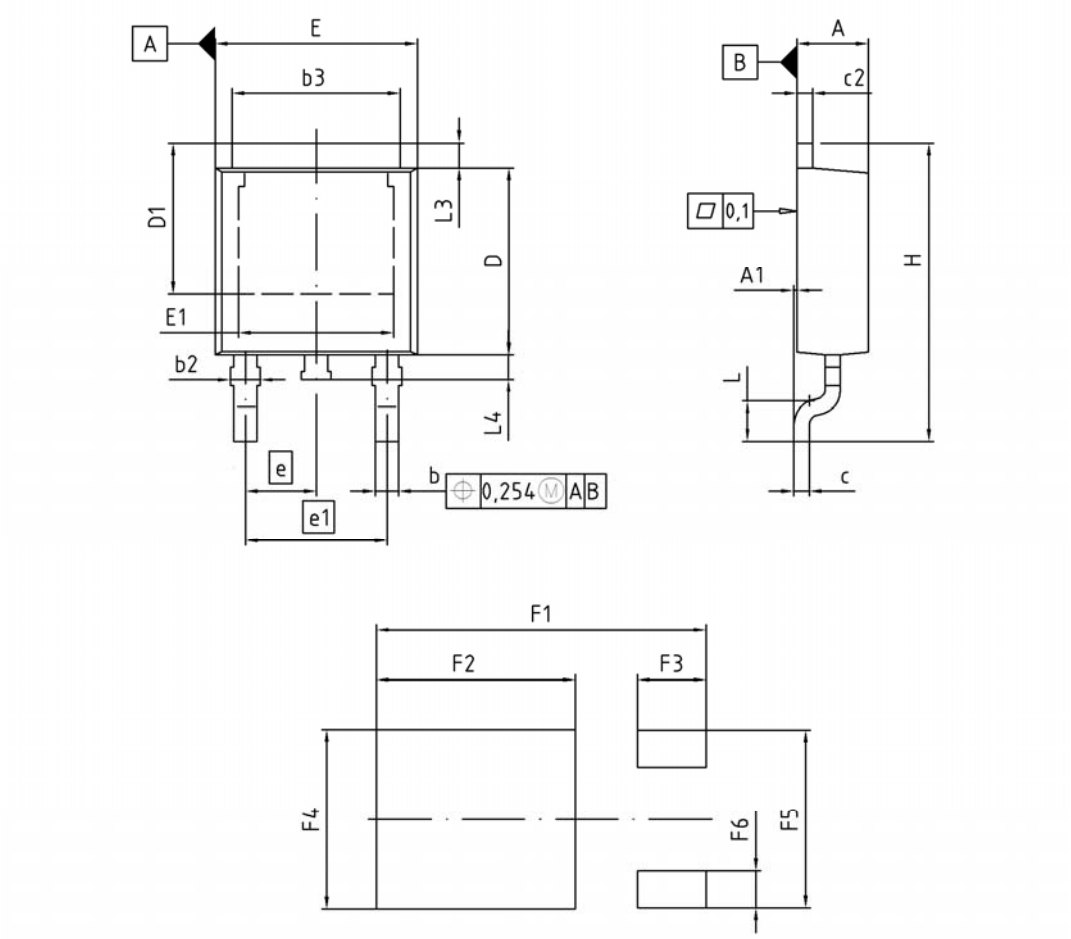


Drain-source breakdown voltage

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



Package outline: PG-TO252-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.16	2.41	0.085	0.095
A1	0.00	0.15	0.000	0.006
b	0.64	0.89	0.025	0.035
b2	0.65	1.15	0.026	0.045
b3	5.00	5.50	0.197	0.217
c	0.46	0.60	0.018	0.024
c2	0.46	0.98	0.018	0.039
D	5.97	6.22	0.235	0.245
D1	5.02	5.84	0.198	0.230
E	6.40	6.73	0.252	0.265
E1	4.70	5.21	0.185	0.205
e	2.29		0.090	
e1	4.57		0.180	
N	3		3	
H	9.40	10.48	0.370	0.413
L	1.18	1.70	0.046	0.067
L3	0.90	1.25	0.035	0.049
L4	0.51	1.00	0.020	0.039
F1	10.50	10.70	0.413	0.421
F2	6.30	6.50	0.248	0.256
F3	2.10	2.30	0.083	0.091
F4	5.70	5.90	0.224	0.232
F5	5.66	5.86	0.223	0.231
F6	1.10	1.30	0.043	0.051

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