

SIPMOS[®] Power-Transistor
Features

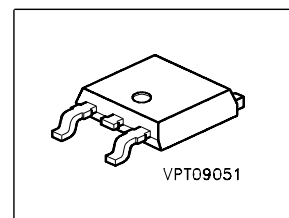
- P-Channel
- Enhancement mode
- Avalanche rated
- dv/dt rated
- 175°C operating temperature



Type	Package
SPD18P06P G	PG-TO252-3

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

Maximum Ratings, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current $T_C = 25\text{ °C}$ $T_C = 100\text{ °C}$	I_D	-18.6 -13.2	A
Pulsed drain current $T_C = 25\text{ °C}$	$I_{D\text{ puls}}$	-74.4	
Avalanche energy, single pulse $I_D = -18.6\text{ A}$, $V_{DD} = -25\text{ V}$, $R_{GS} = 25\ \Omega$	E_{AS}	150	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	8	
Reverse diode dv/dt $I_S = -18.6\text{ A}$, $V_{DS} = -48\text{ V}$, $di/dt = 200\text{ A}/\mu\text{s}$, $T_{jmax} = 175\text{ °C}$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25\text{ °C}$	P_{tot}	80	W
Operating and storage temperature	T_j, T_{stg}	-55...+175	$^{\circ}\text{C}$
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: @ min. footprint @ 6 cm ² cooling area ¹⁾	R_{thJA}	-	-	75 50	

Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain- source breakdown voltage $V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	$V_{(BR)DSS}$	-60	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = -1\text{ mA}$	$V_{GS(th)}$	-2.1	-3	-4	
Zero gate voltage drain current $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25\text{ °C}$ $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 150\text{ °C}$	I_{DSS}	-	-0.1 -10	-1 -100	μA
Gate-source leakage current $V_{GS} = -20\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	-	-10	-100	
Drain-source on-state resistance $V_{GS} = -10\text{ V}$, $I_D = -13.2\text{ A}$	$R_{DS(on)}$	-	0.1	0.13	Ω

¹Device 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 $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = -13.2\text{ A}$	g_{fs}	4	8	-	S
Input capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{iss}	-	690	860	pF
Output capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{oss}	-	230	290	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{rss}	-	95	120	
Turn-on delay time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -13.2\text{ A}$, $R_G = 2.7\ \Omega$	$t_{d(on)}$	-	12	18	ns
Rise time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -13.2\text{ A}$, $R_G = 2.7\ \Omega$	t_r	-	5.8	8.7	
Turn-off delay time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -13.2\text{ A}$, $R_G = 2.7\ \Omega$	$t_{d(off)}$	-	24.5	37	
Fall time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -13.2\text{ A}$, $R_G = 2.7\ \Omega$	t_f	-	11	16.5	

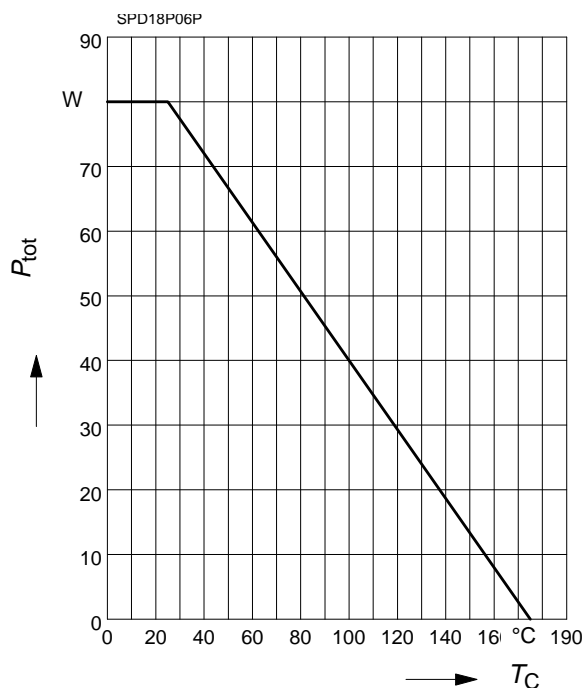
Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

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

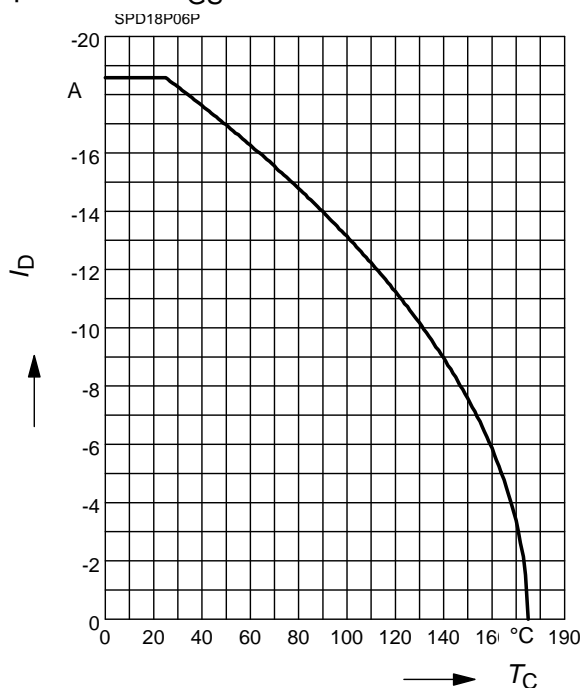
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current $T_C = 25\text{ °C}$	I_S	-	-	-18.6	A
Inverse diode direct current, pulsed $T_C = 25\text{ °C}$	I_{SM}	-	-	-74.4	
Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = -18.6\text{ A}$	V_{SD}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

Power dissipation

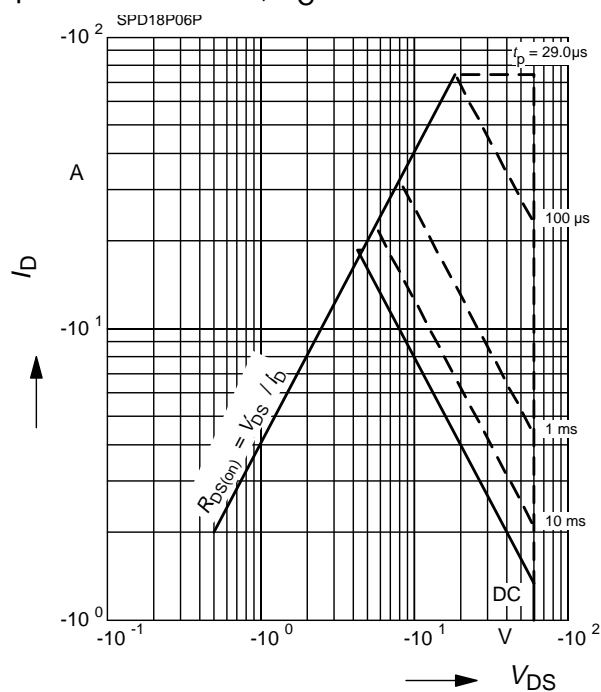
$$P_{\text{tot}} = f(T_C)$$


Drain current

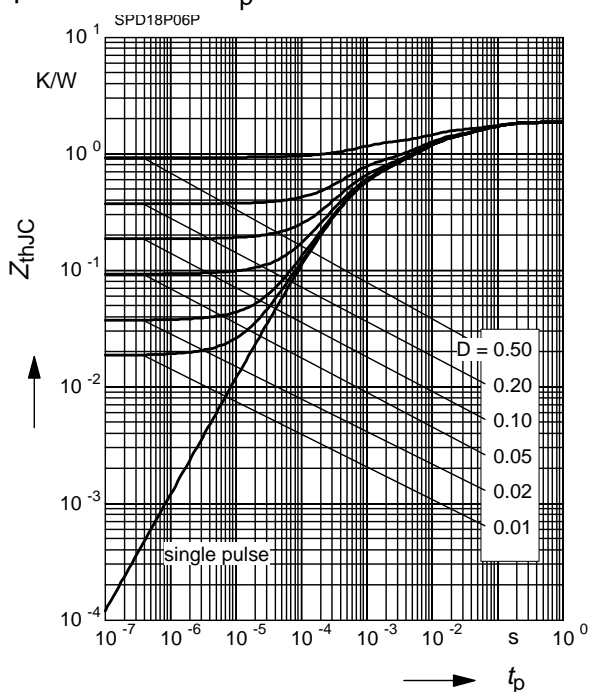
$$I_D = f(T_C)$$

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

Safe operating area

$$I_D = f(V_{DS})$$

 parameter : $D = 0$, $T_C = 25 \text{ }^\circ\text{C}$

Transient thermal impedance

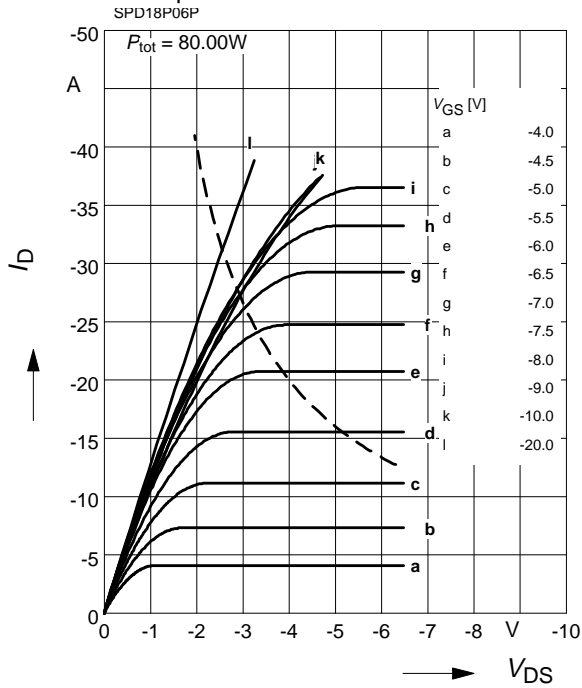
$$Z_{\text{thJC}} = f(t_p)$$

 parameter : $D = t_p / T$


Typ. output characteristic

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

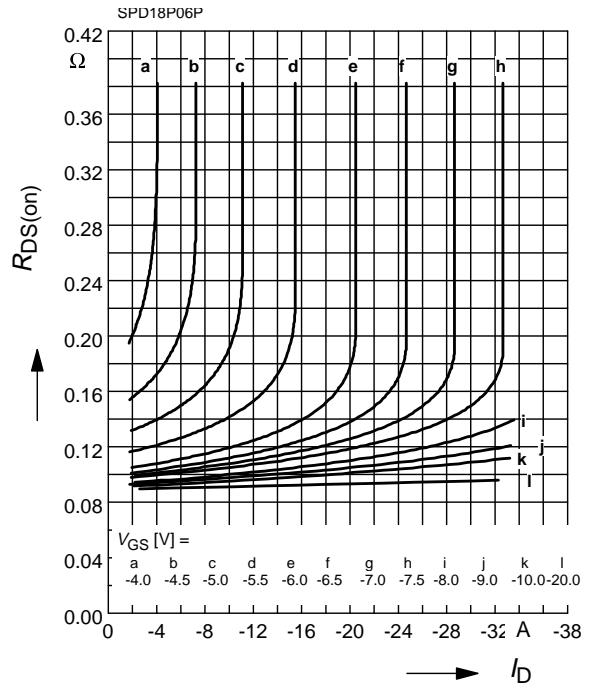
parameter: $t_p = 80 \mu\text{s}$



Typ. drain-source-on-resistance

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

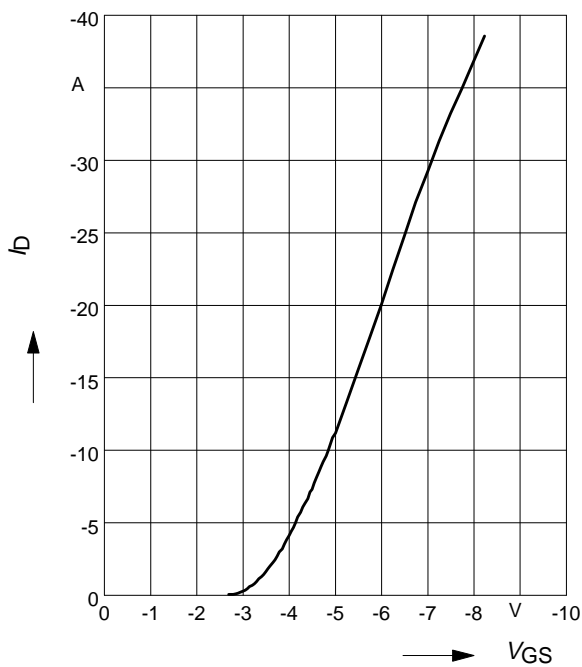
parameter: V_{GS}



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

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

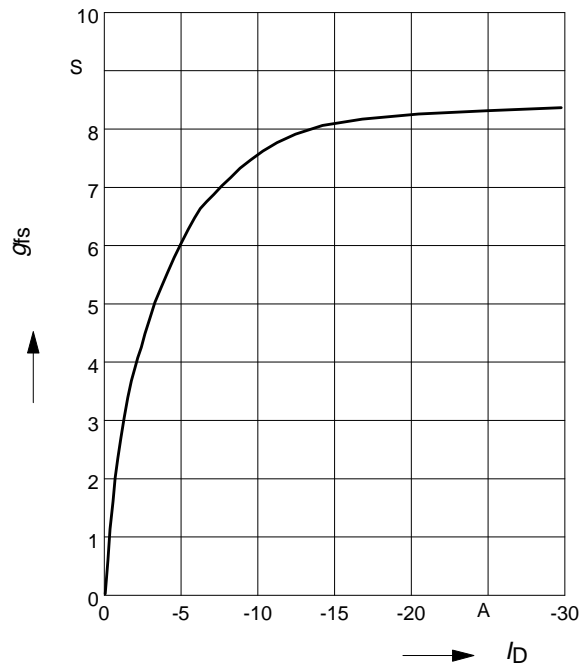
parameter: $t_p = 80 \mu\text{s}$



Typ. forward transconductance

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

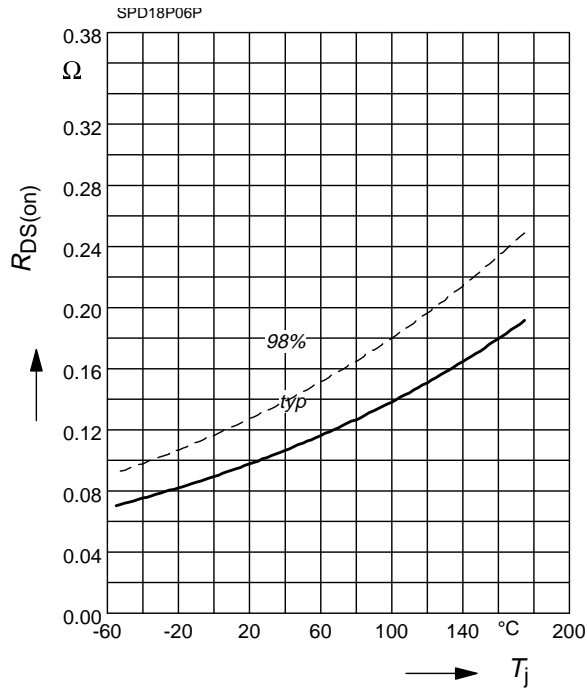
parameter: g_{fs}



Drain-source on-state resistance

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

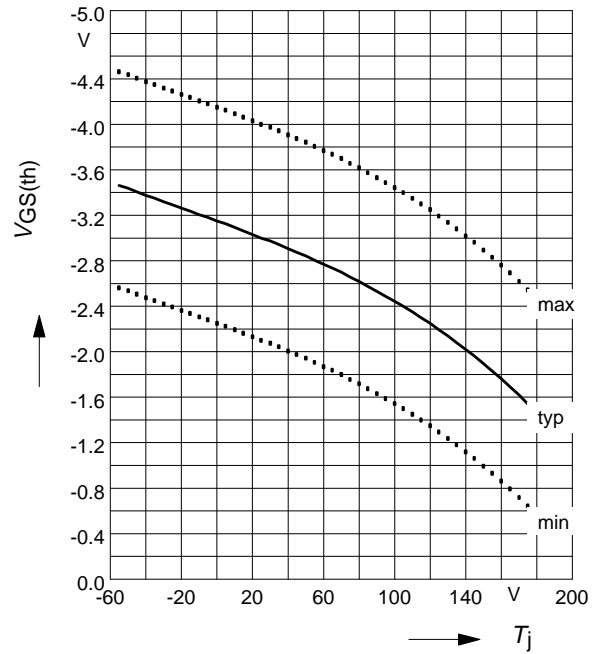
parameter: $I_D = -13.2 \text{ A}$, $V_{GS} = -10 \text{ V}$



Gate threshold voltage

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

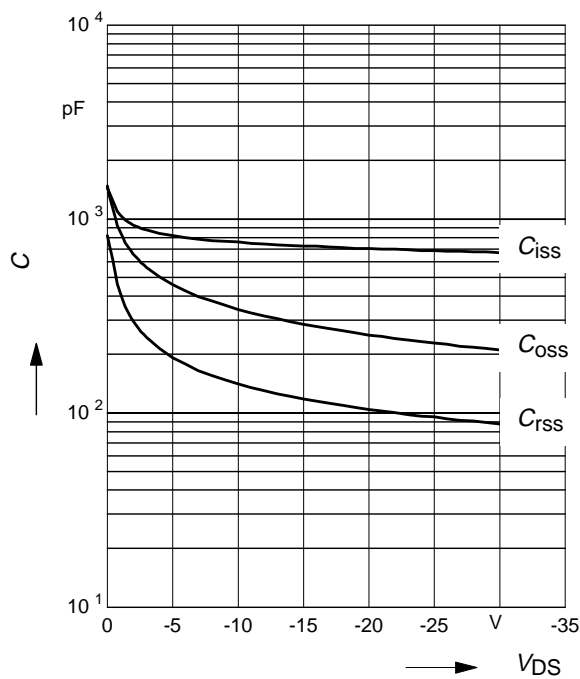
parameter: $V_{GS} = V_{DS}$, $I_D = -1 \text{ mA}$



Typ. capacitances

$$C = f(V_{DS})$$

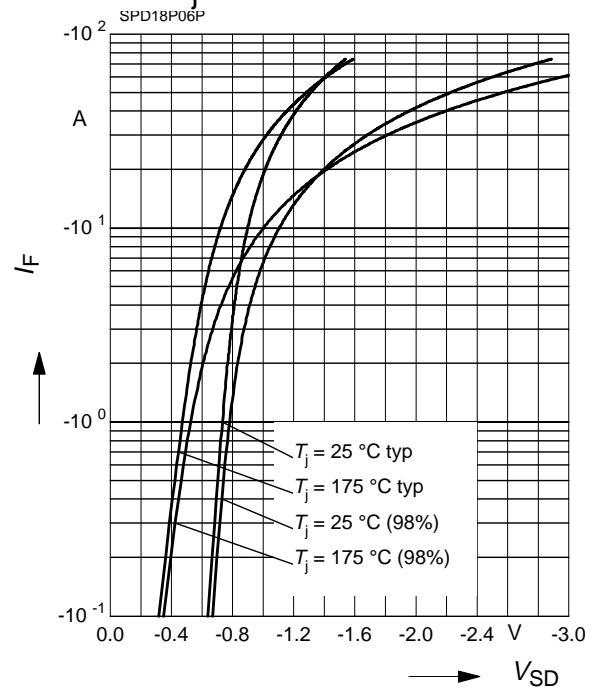
parameter: $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$



Forward characteristics of reverse diode

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

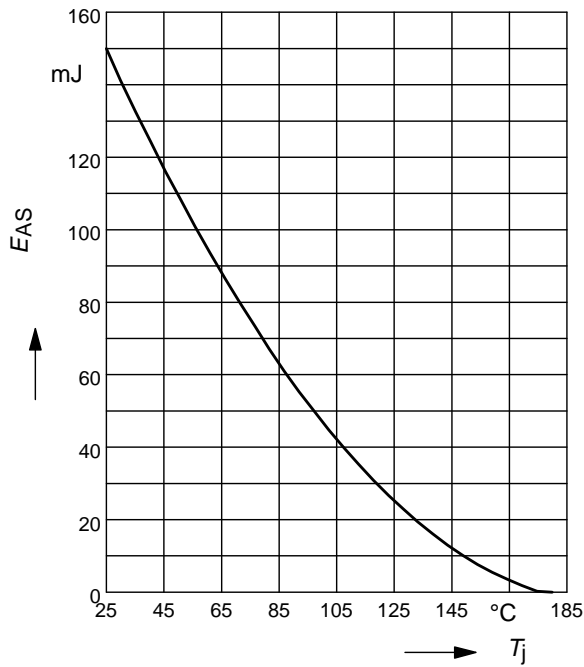
parameter: T_j , $t_p = 80 \mu\text{s}$



Avalanche energy

$$E_{AS} = f(T_j)$$

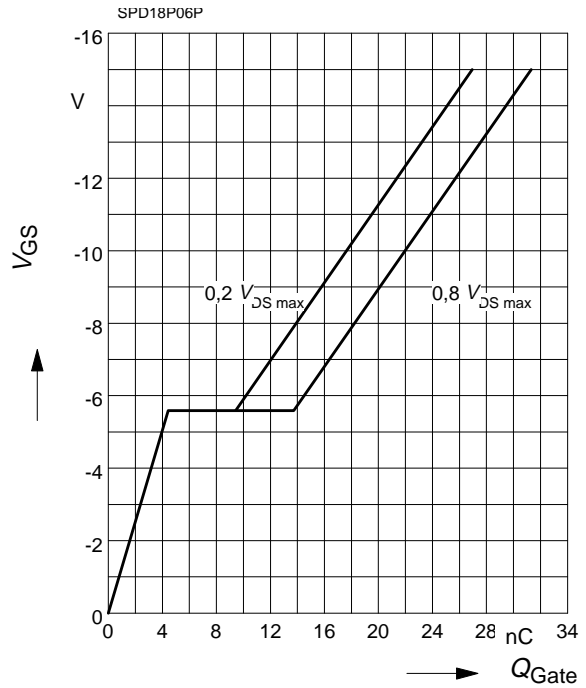
para.: $I_D = -18.6 \text{ A}$, $V_{DD} = -25 \text{ V}$, $R_{GS} = 25$



Typ. gate charge

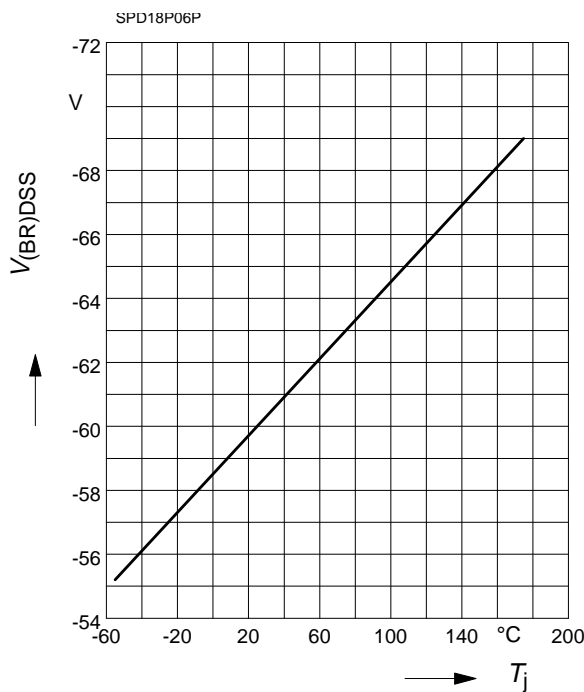
$$V_{GS} = f(Q_{Gate})$$

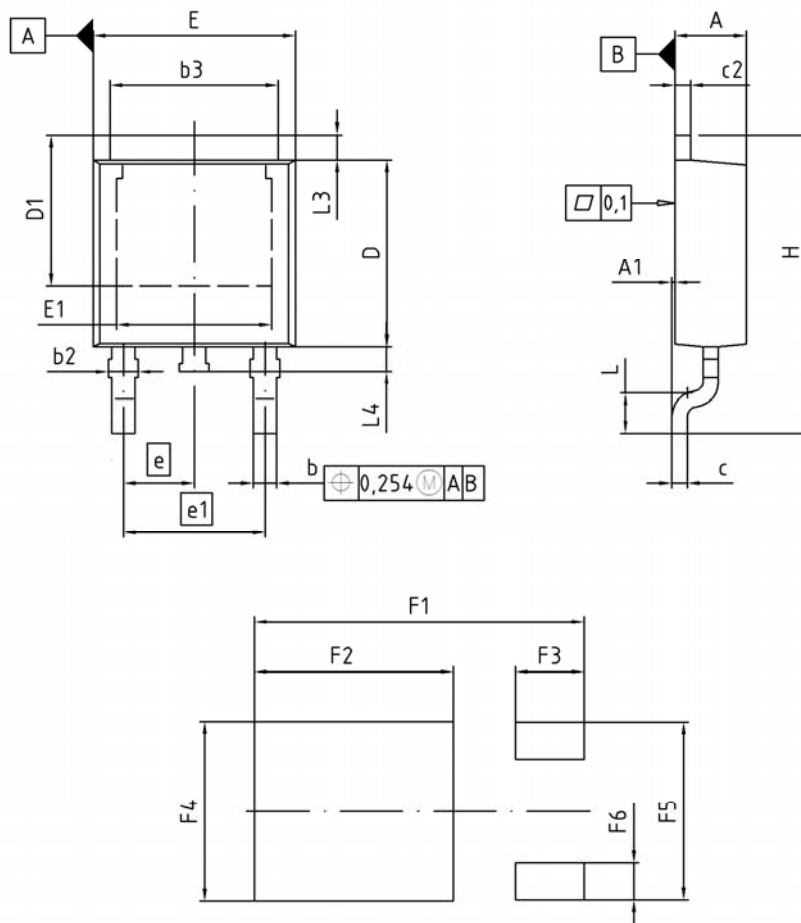
parameter: $I_D = -18.6 \text{ A}$ pulsed



Drain-source breakdown voltage

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





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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