

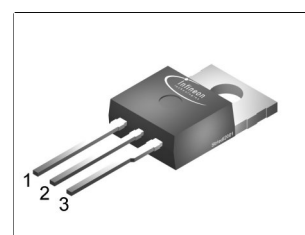
SIPMOS® Power-Transistor

Features

- P-Channel
- Enhancement mode
- Avalanche rated
- dv/dt rated
- 175°C operating temperature
- Pb-free lead plating; RoHS compliant
 - Halogen-free according to IEC61249-2-21
 - Qualified according to AEC Q101

Product Summary

Drain source voltage	V_{DS}	-60	V
Drain-source on-state resistance	$R_{DS(on)}$	0.3	Ω
Continuous drain current	I_D	-8.8	A



Type	Package
SPP08P06P H	PG-TO220-3

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	-8.8 -6.2	A
Pulsed drain current $T_C = 25\text{ °C}$	$I_D \text{ puls}$	-35.2	
Avalanche energy, single pulse $I_D = -8.8\text{ A}$, $V_{DD} = -25\text{ V}$, $R_{GS} = 25\text{ }\Omega$	E_{AS}	70	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	4.2	
Reverse diode dv/dt $I_S = -8.8\text{ A}$, $V_{DS} = -48$, $di/dt = 200\text{ A}/\mu\text{s}$, $T_{jmax} = 175\text{ °C}$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25\text{ °C}$	P_{tot}	42	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}	-	-	3.6	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 $T_j = 25\text{ °C}$, 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, $V_{GS} = V_{DS}$ $I_D = -250\text{ }\mu\text{A}$, $T_j = 25\text{ }^{\circ}\text{C}$	$V_{GS(th)}$	-2.1	-3	-4	
Zero gate voltage drain current $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25\text{ }^{\circ}\text{C}$ $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 150\text{ }^{\circ}\text{C}$	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	nA
Drain-source on-state resistance $V_{GS} = -10\text{ V}$, $I_D = -6.2\text{ A}$	$R_{DS(on)}$	-	0.23	0.3	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 $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = -6.2$ A	g_{fs}	1.5	3.6	-	S
Input capacitance $V_{GS} = 0$ V, $V_{DS} = -25$ V, $f = 1$ MHz	C_{iss}	-	335	420	pF
Output capacitance $V_{GS} = 0$ V, $V_{DS} = -25$ V, $f = 1$ MHz	C_{oss}	-	105	135	
Reverse transfer capacitance $V_{GS} = 0$ V, $V_{DS} = -25$ V, $f = 1$ MHz	C_{rss}	-	65	95	
Turn-on delay time $V_{DD} = -30$ V, $V_{GS} = -10$ V, $I_D = -6.2$ A, $R_G = 6\ \Omega$	$t_{d(on)}$	-	16	24	ns
Rise time $V_{DD} = -30$ V, $V_{GS} = -10$ V, $I_D = -6.2$ A, $R_G = 6\ \Omega$	t_r	-	46	69	
Turn-off delay time $V_{DD} = -30$ V, $V_{GS} = -10$ V, $I_D = -6.2$ A, $R_G = 6\ \Omega$	$t_{d(off)}$	-	48	72	
Fall time $V_{DD} = -30$ V, $V_{GS} = -10$ V, $I_D = -6.2$ A, $R_G = 6\ \Omega$	t_f	-	14	21	

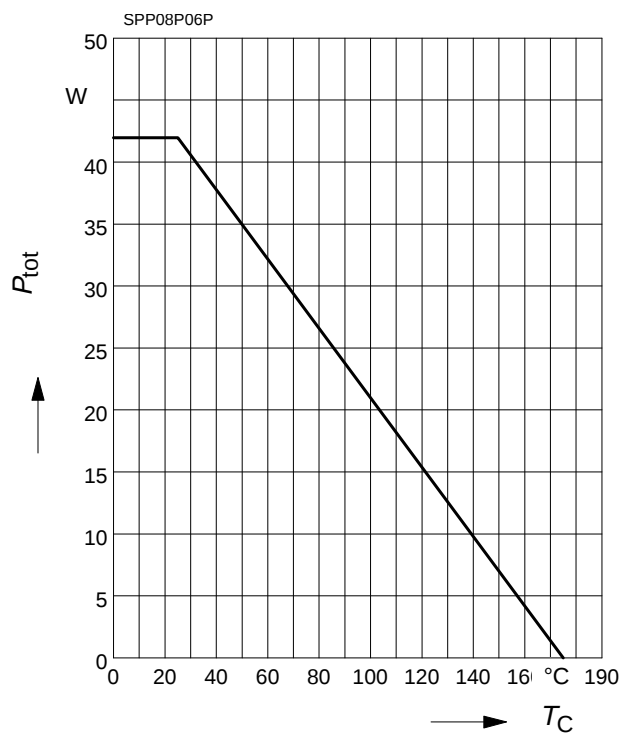
Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Gate to source charge $V_{DD} = -48$, $I_D = -8.8$ A	Q_{gs}	-	1.4	2.1	nC
Gate to drain charge $V_{DD} = -48$ V, $I_D = -8.8$ A	Q_{gd}	-	4	6	
Gate charge total $V_{DD} = -48$ V, $I_D = -8.8$ A, $V_{GS} = 0$ to -10 V	Q_g	-	10	15	
Gate plateau voltage $V_{DD} = -48$, $I_D = -8.8$ A	$V_{(plateau)}$	-	-3.85	-	V

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current $T_C = 25\text{ }^{\circ}\text{C}$	I_S	-	-	-8.8	A
Inverse diode direct current,pulsed $T_C = 25\text{ }^{\circ}\text{C}$	I_{SM}	-	-	-35.2	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$, $I_F = -8.8\text{ A}$	V_{SD}	-	-1.17	-1.55	V
Reverse recovery time $V_R = -30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	60	90	ns
Reverse recovery charge $V_R = -30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	100	150	nC

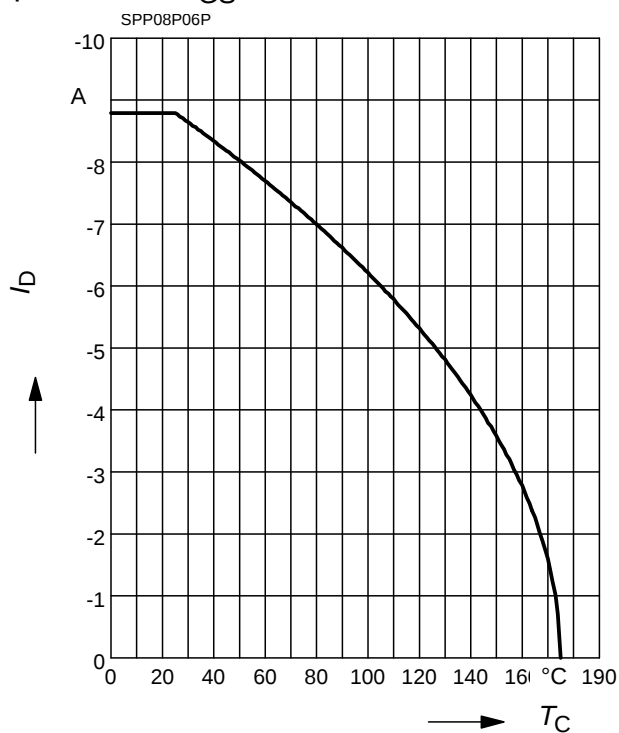
Power dissipation

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


Drain current

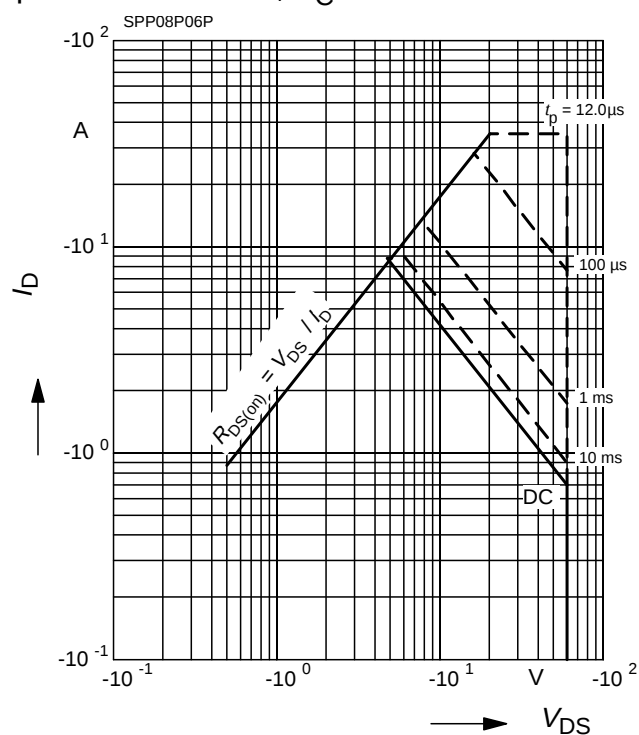
$$I_D = f(T_C)$$

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


Safe operating area

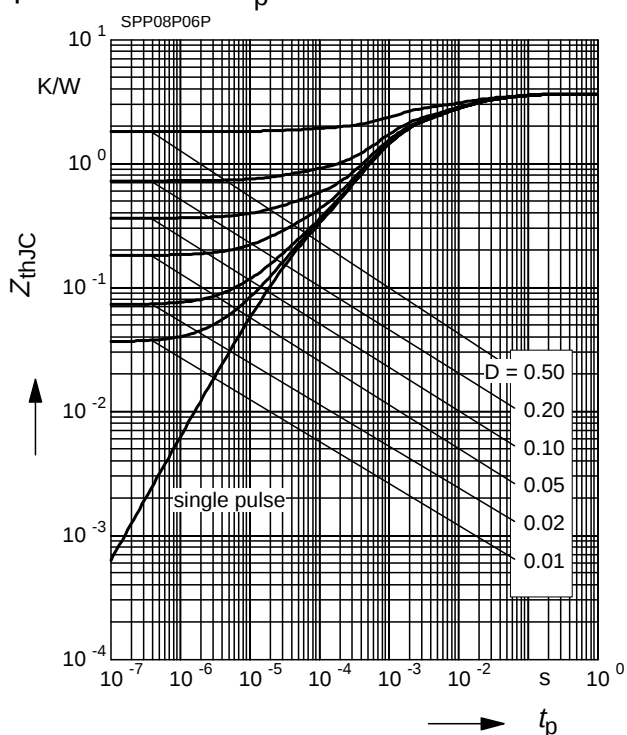
$$I_D = f(V_{DS})$$

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


Transient thermal impedance

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

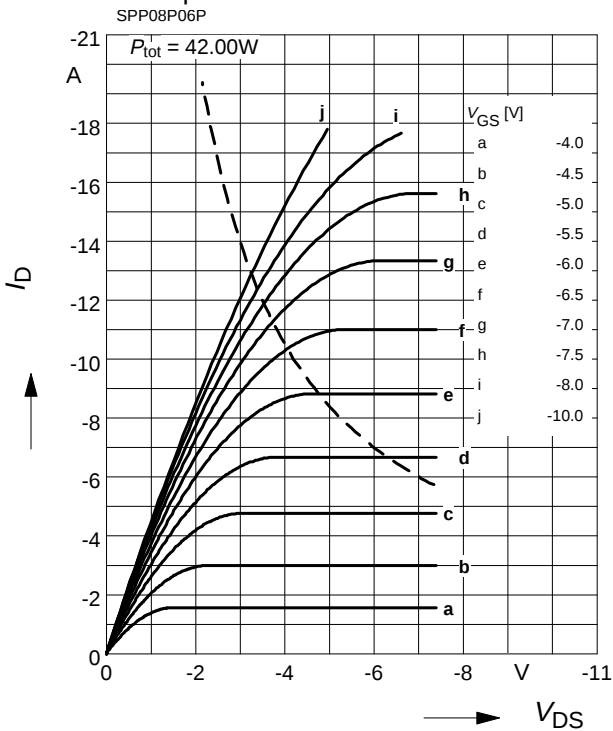
parameter: $D = t_p/T$



Typ. output characteristic

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

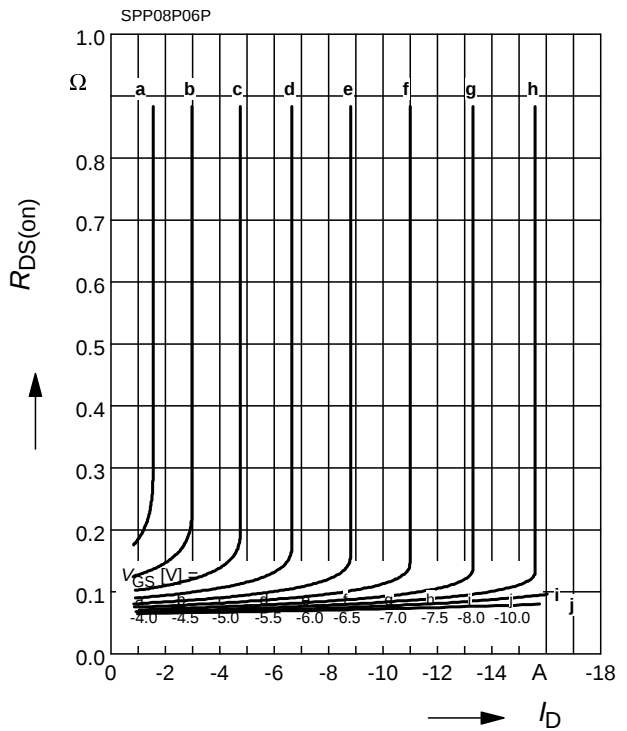
parameter: $t_p = 80 \mu\text{s}$



Typ. drain-source-on-resistance

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

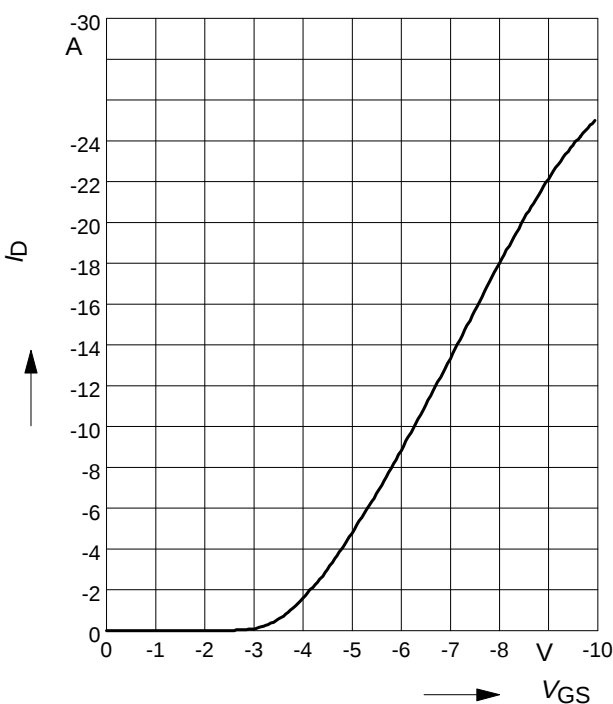
parameter: V_{GS}



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

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

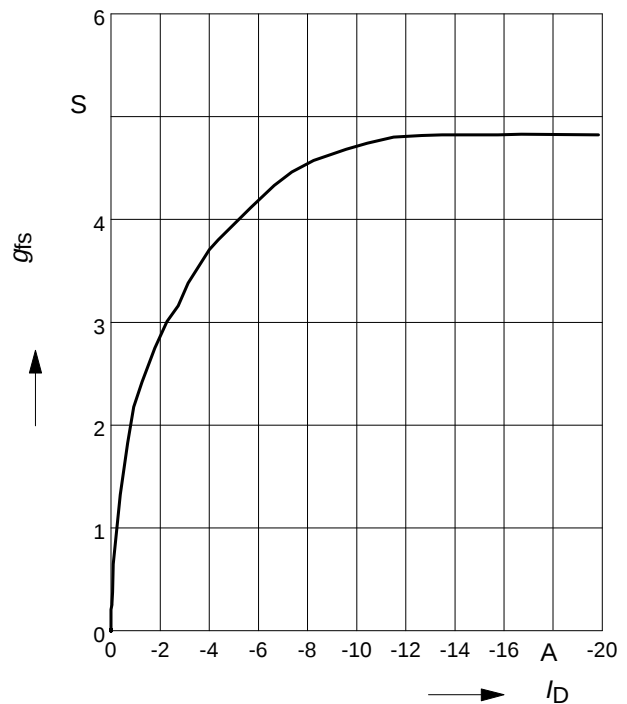
parameter: $t_p = 80 \mu\text{s}$



Typ. forward transconductance

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

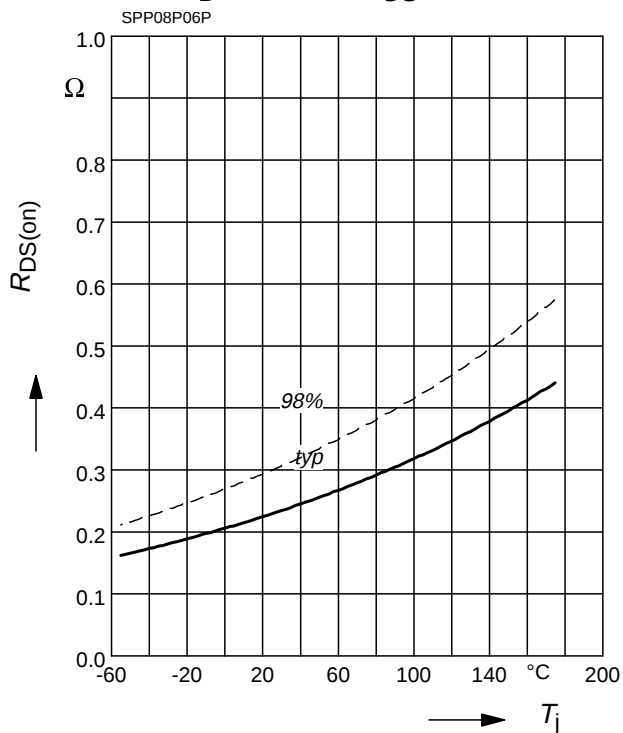
parameter: g_{fs}



Drain-source on-state resistance

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

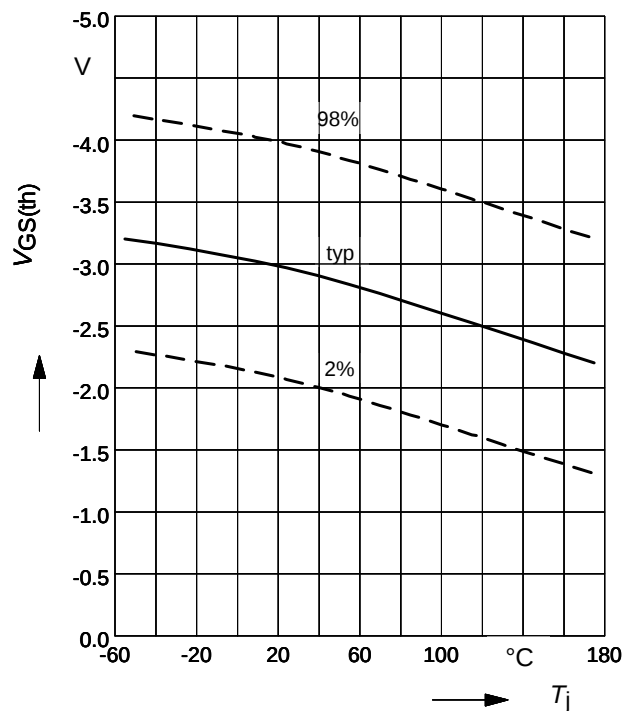
parameter: $I_D = -6.2$ A, $V_{GS} = -10$ V



Gate threshold voltage

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

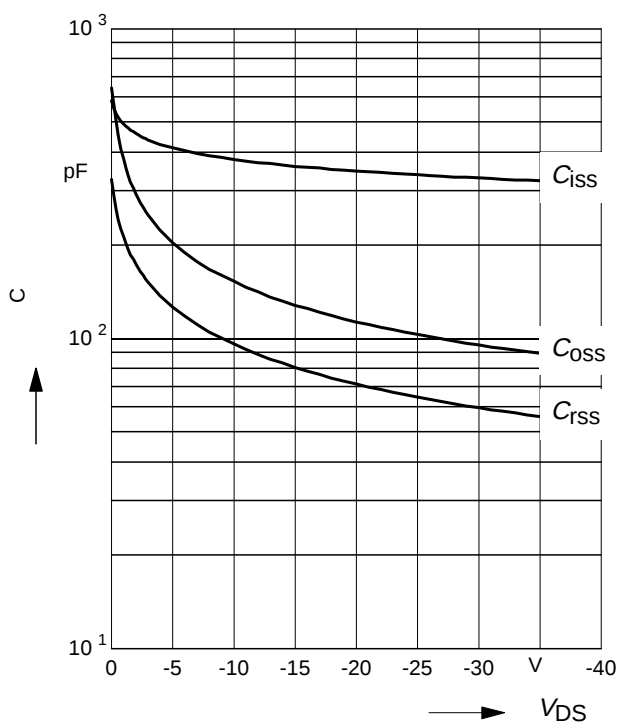
parameter: $V_{GS} = V_{DS}$, $I_D = -250$ μ A



Typ. capacitances

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

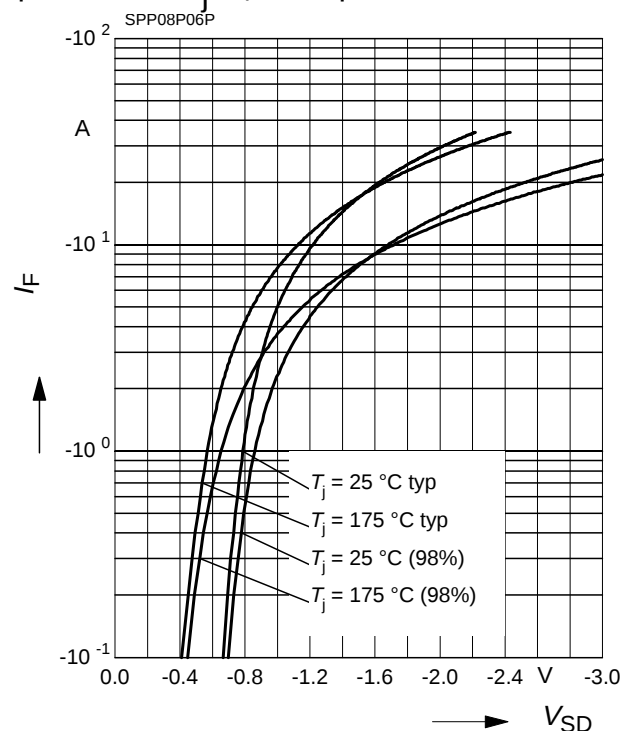
parameter: $V_{GS}=0$ V, $f=1$ MHz



Forward characteristics of reverse diode

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

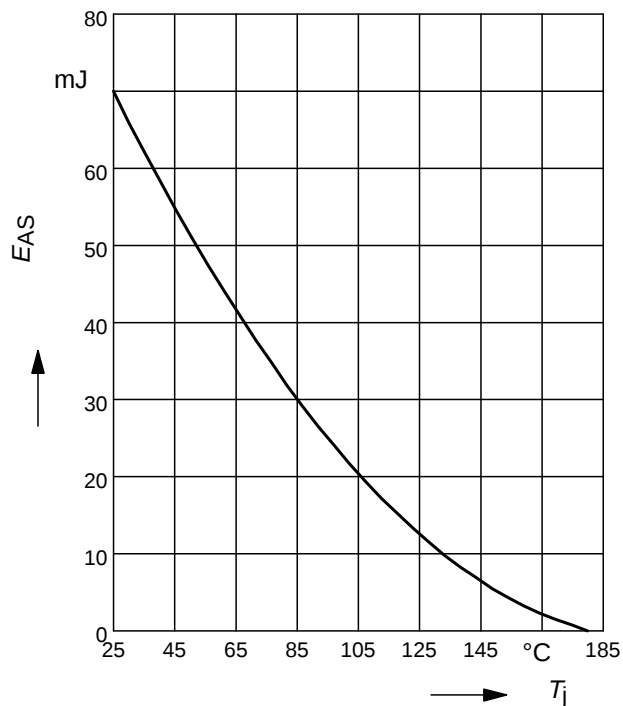
parameter: T_j , $t_p = 80$ μ s



Avalanche energy

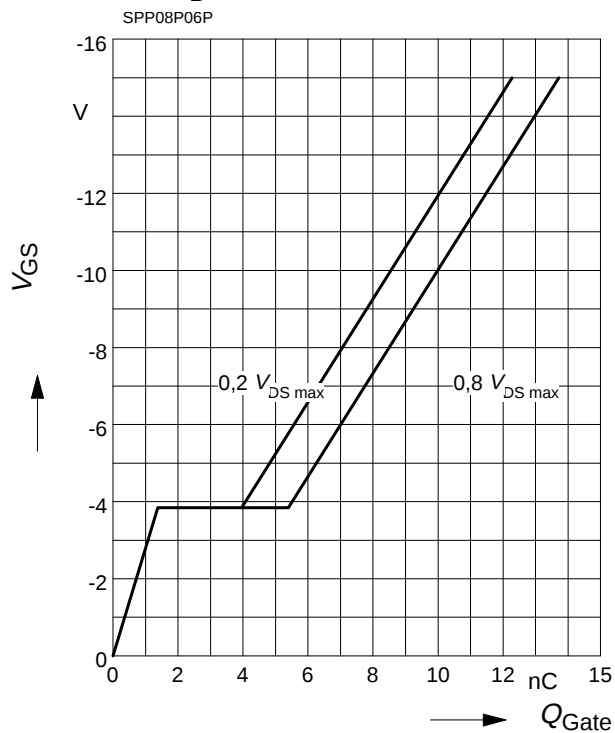
$$E_{AS} = f(T_j)$$

para.: $I_D = -8.8 \text{ A}$, $V_{DD} = -25 \text{ V}$, $R_{GS} = 25 \text{ } \Omega$

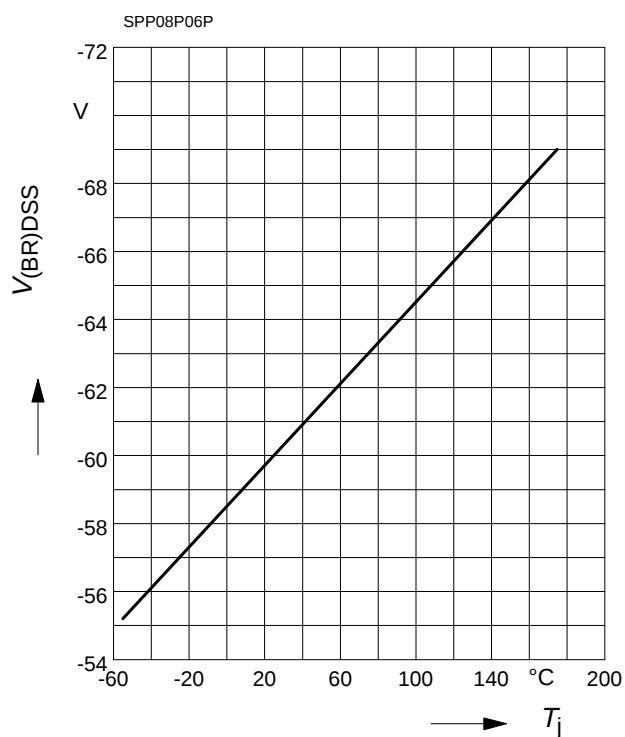

Typ. gate charge

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

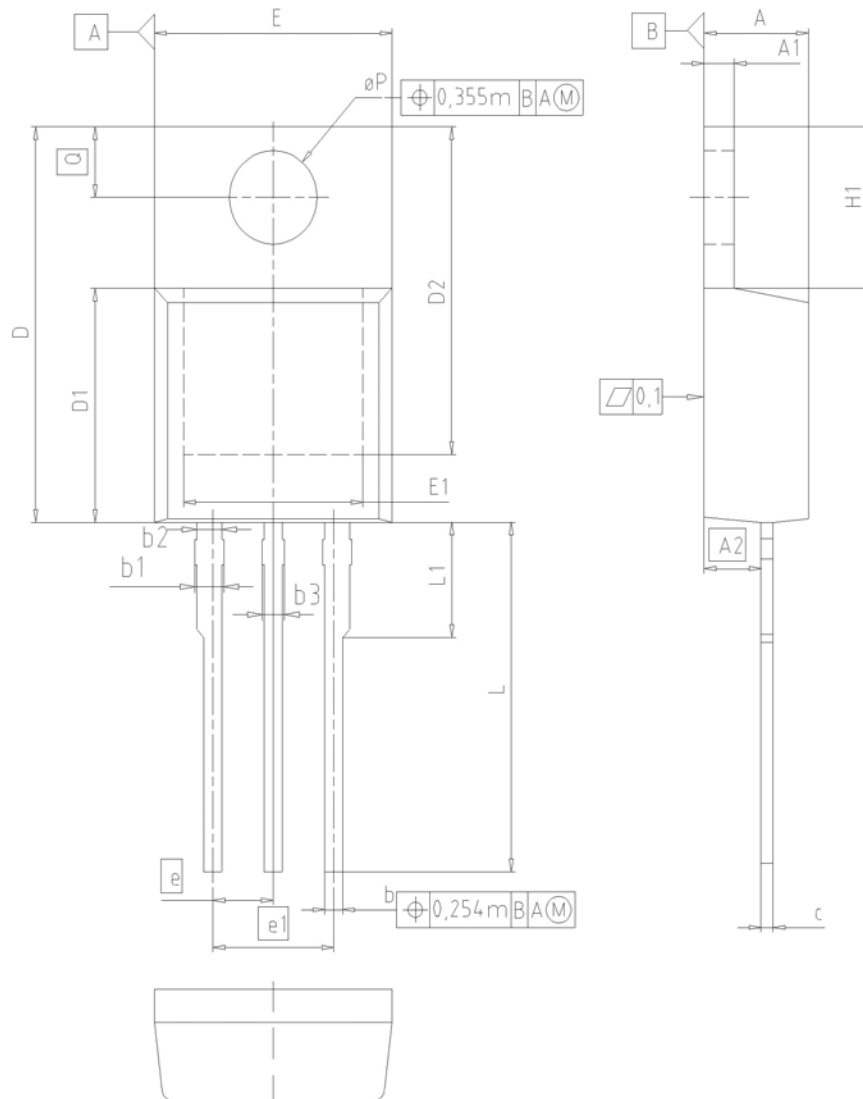
parameter: $I_D = -8.8 \text{ A}$ pulsed


Drain-source breakdown voltage

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



PG-TO220-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	1.17	1.40	0.046	0.055
A2	2.15	2.72	0.085	0.107
b	0.65	0.86	0.026	0.034
b1	0.95	1.40	0.037	0.055
b2	0.95	1.15	0.037	0.045
b3	0.65	1.15	0.026	0.045
c	0.33	0.60	0.013	0.024
D	14.81	15.95	0.583	0.628
D1	8.51	9.45	0.335	0.372
D2	12.19	13.10	0.480	0.516
E	9.70	10.36	0.382	0.408
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	3		3	
H1	5.90	6.90	0.232	0.272
L	13.00	14.00	0.512	0.551
L1	-	4.80	-	0.189
ϕP	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

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