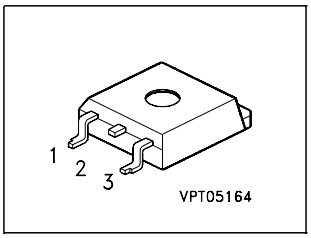
SIPMOS® Power-Transistor

Features

- P-Channel
- Enhancement mode
- Avalanche rated
- d*v*/d*t* rated
- 175°C operating temperature
- ° Pb-free lead plating: RoHS compliant
- ° 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	$R_{DS(on)}$	0.023	Ω
Continuous drain current	I_D	-80	A



Type	Package	Lead free
SPB80P06P G	PG-TO263-3	Yes

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	

[1]Current 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: @ min. footprint @ 6 cm^2 cooling area [1)]	R_{thJA}	 - -	 - -	 62 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 V_{DS} = -60 V, V_{GS} = 0 V, T_j = 25 °C V_{DS} = -60 V, V_{GS} = 0 V, T_j = 150 °C	I_{DSS}	 - -	 -0.1 -10	 -1 -100	µA
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	

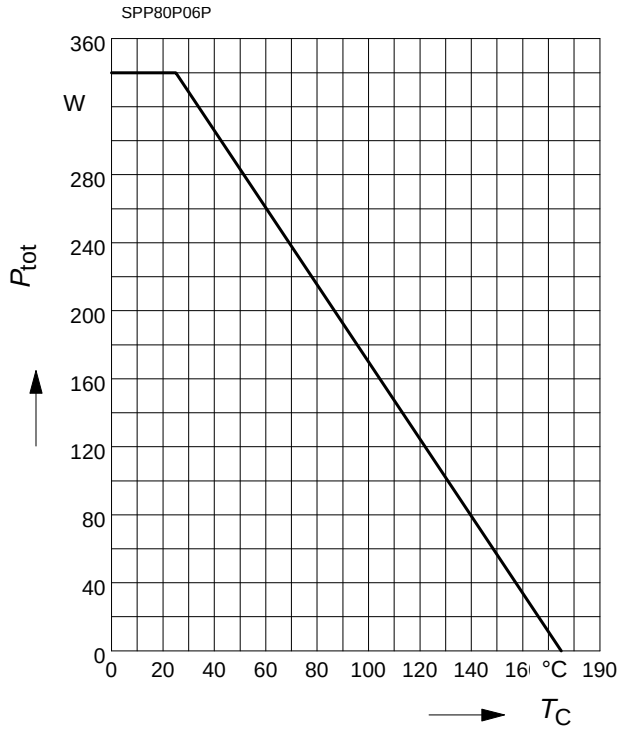
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

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

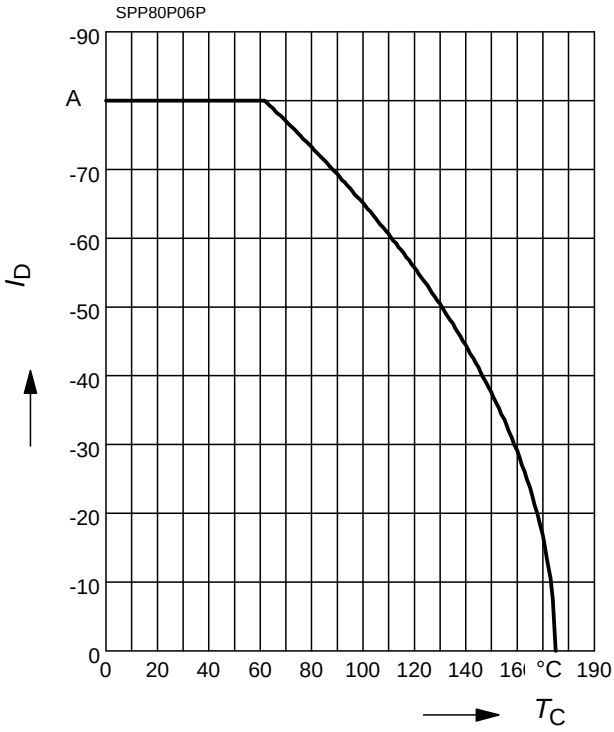
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

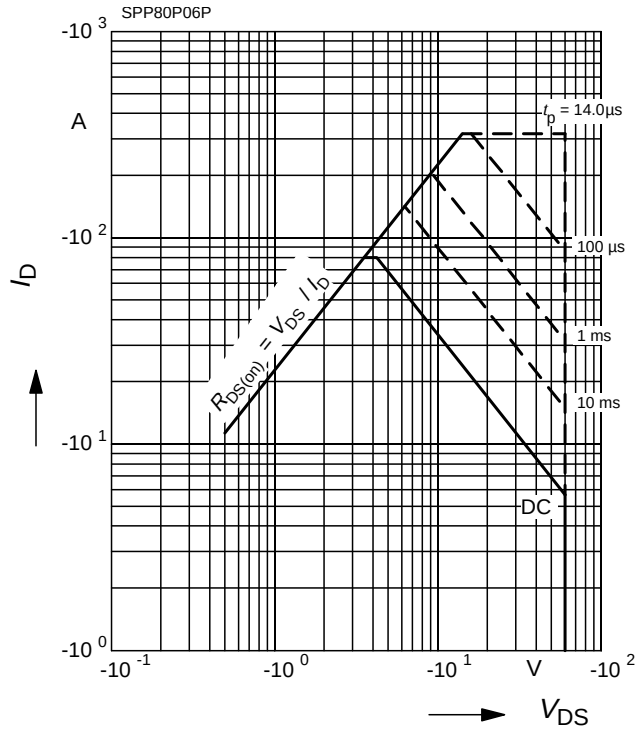
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

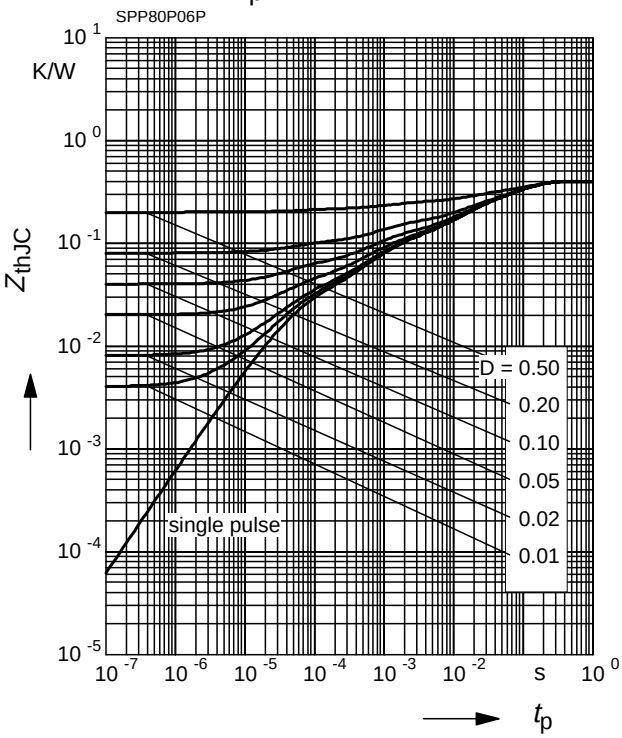
parameter : $D = 0$, $T_C = 25$ °C



Transient thermal impedance

$Z_{thJC} = f(t_p)$

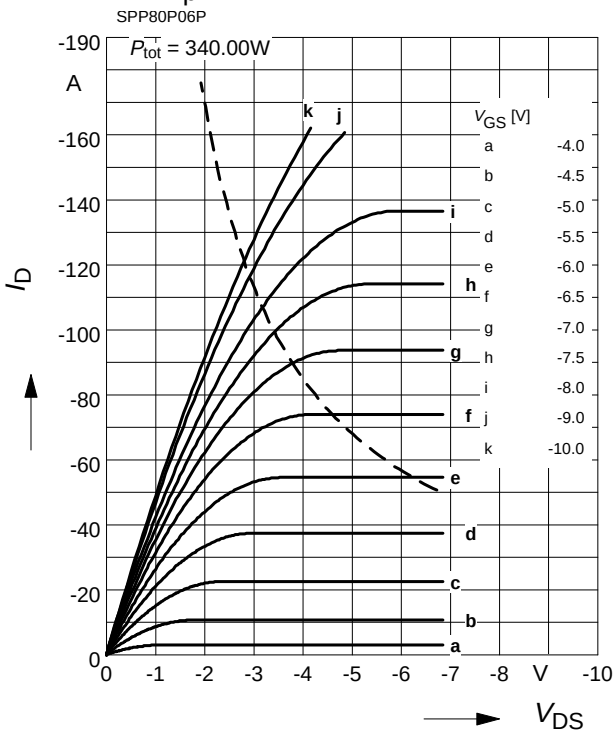
parameter : $D = t_p / T$



Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

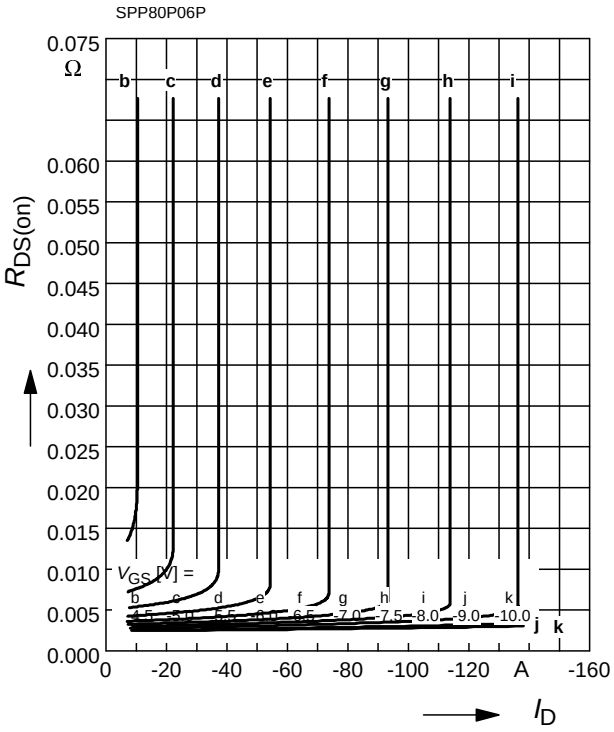
parameter: t_p = 80 µs



Typ. drain-source-on-resistance

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

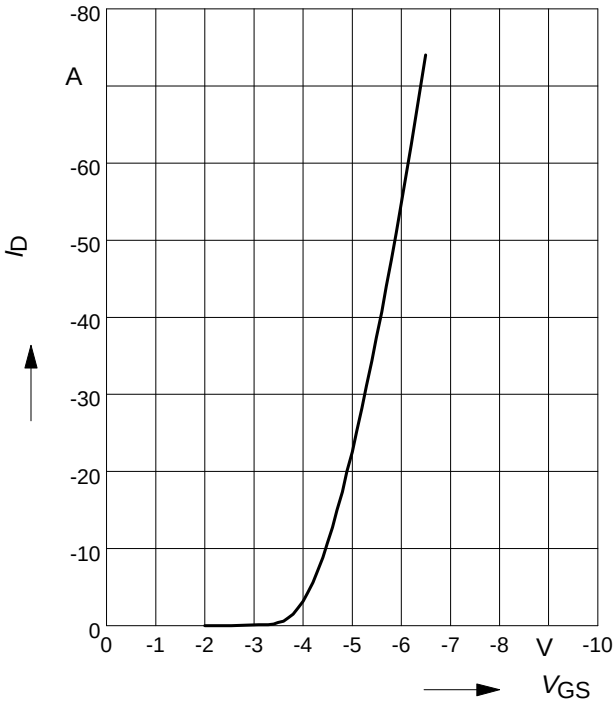
parameter: V_{GS}



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

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

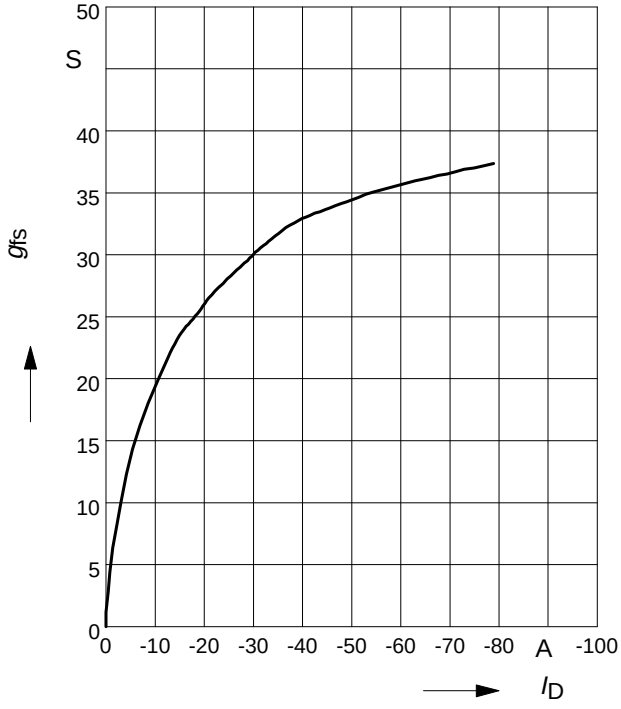
parameter: t_p = 80 µs



Typ. forward transconductance

g_{fs} = f(I_D); T_j=25°C

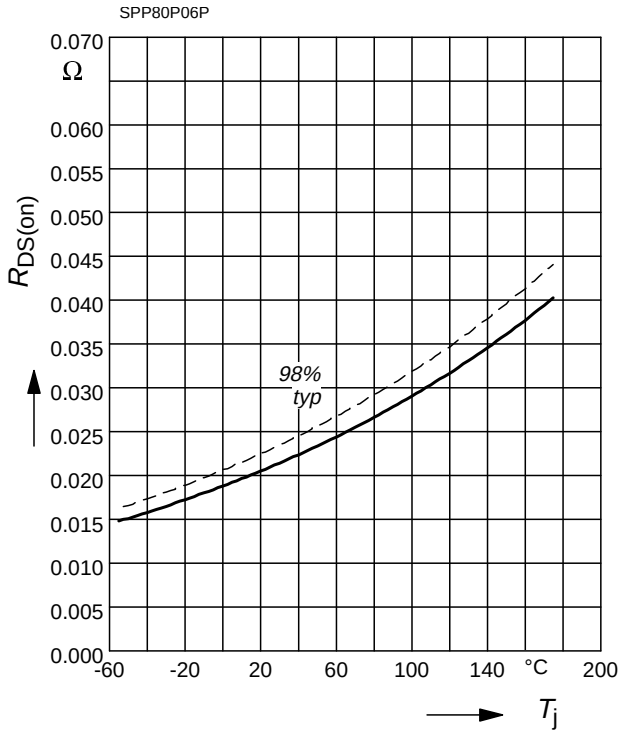
parameter: g_{fs}



Drain-source on-state resistance

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

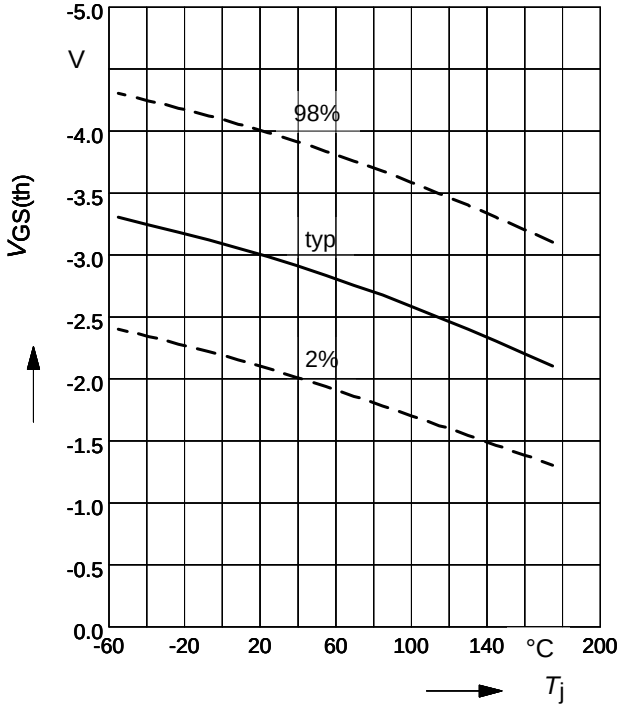
parameter : I_D = -64 A, V_{GS} = -10 V



Gate threshold voltage

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

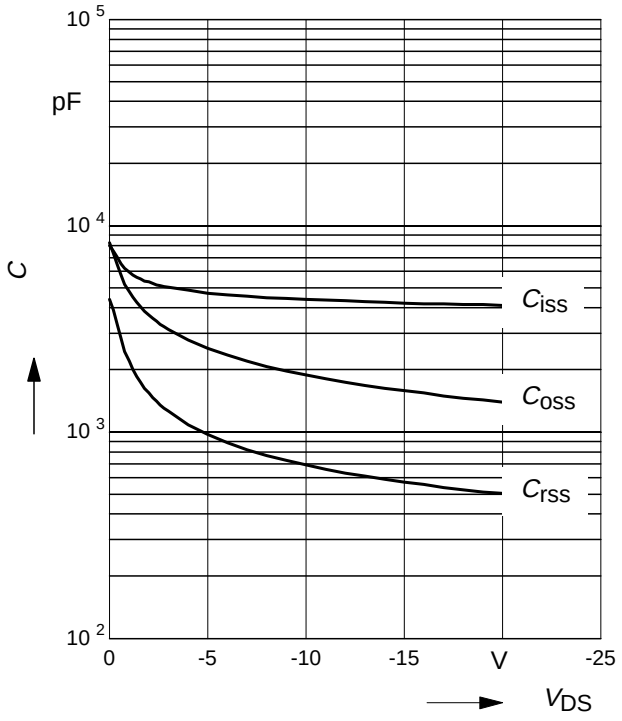
parameter: $V_{GS} = V_{DS}$, I_D = -5.5 mA



Typ. capacitances

$C = f(V_{DS})$

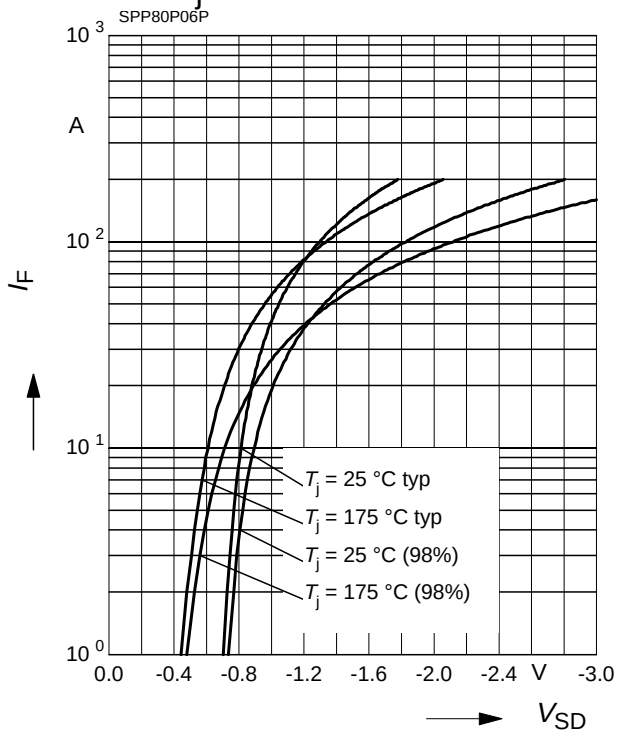
parameter: V_{GS}=0V, f=1 MHz



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

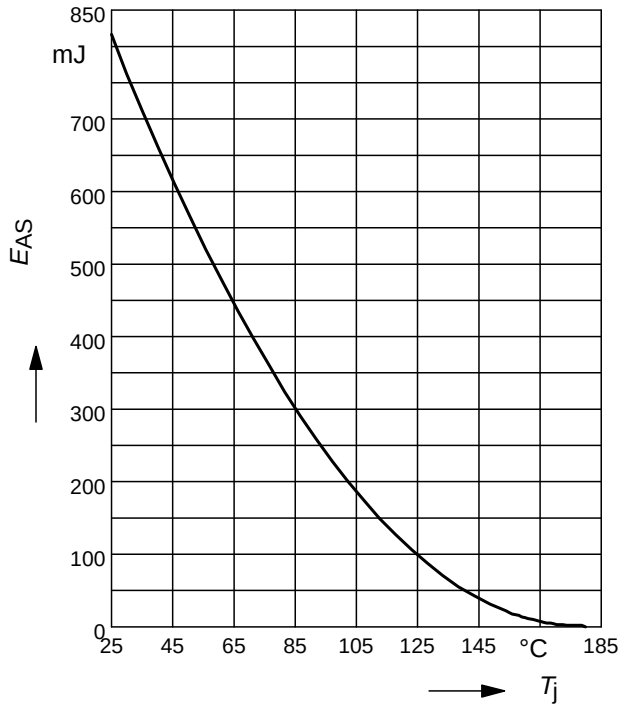
parameter: T_j , tp = 80 µs



Avalanche energy

$E_{AS} = f(T_j)$

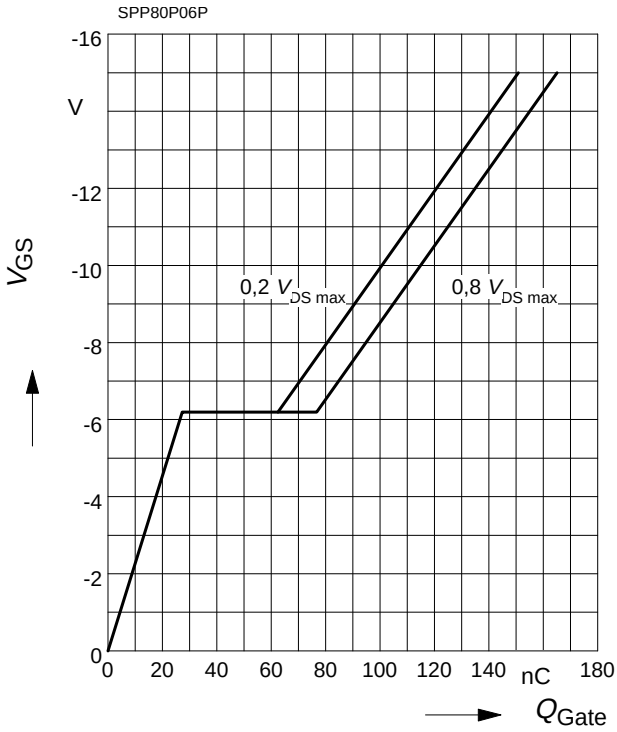
para.: I_D = -80 A , V_{DD} = -25 V, R_{GS} = 25 Ω



Typ. gate charge

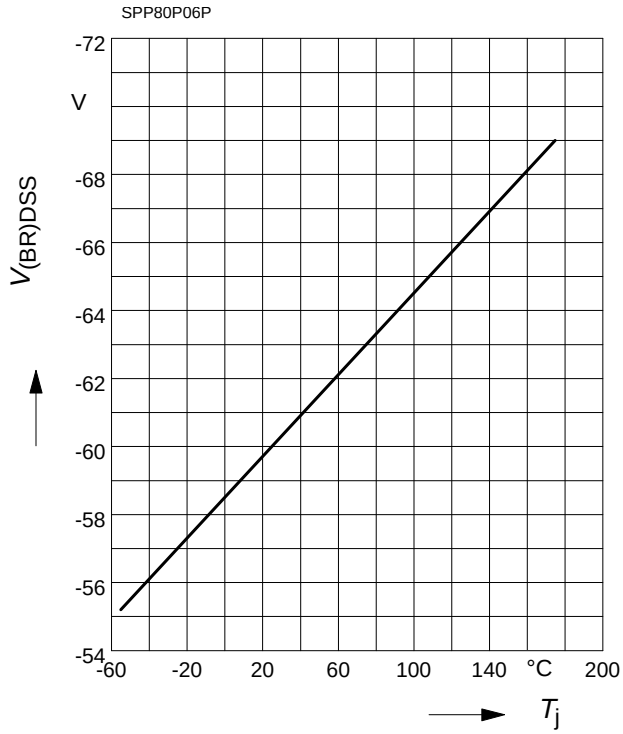
$V_{GS} = f\ (Q_{Gate})$

parameter: I_D = -80 A pulsed



Drain-source breakdown voltage

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



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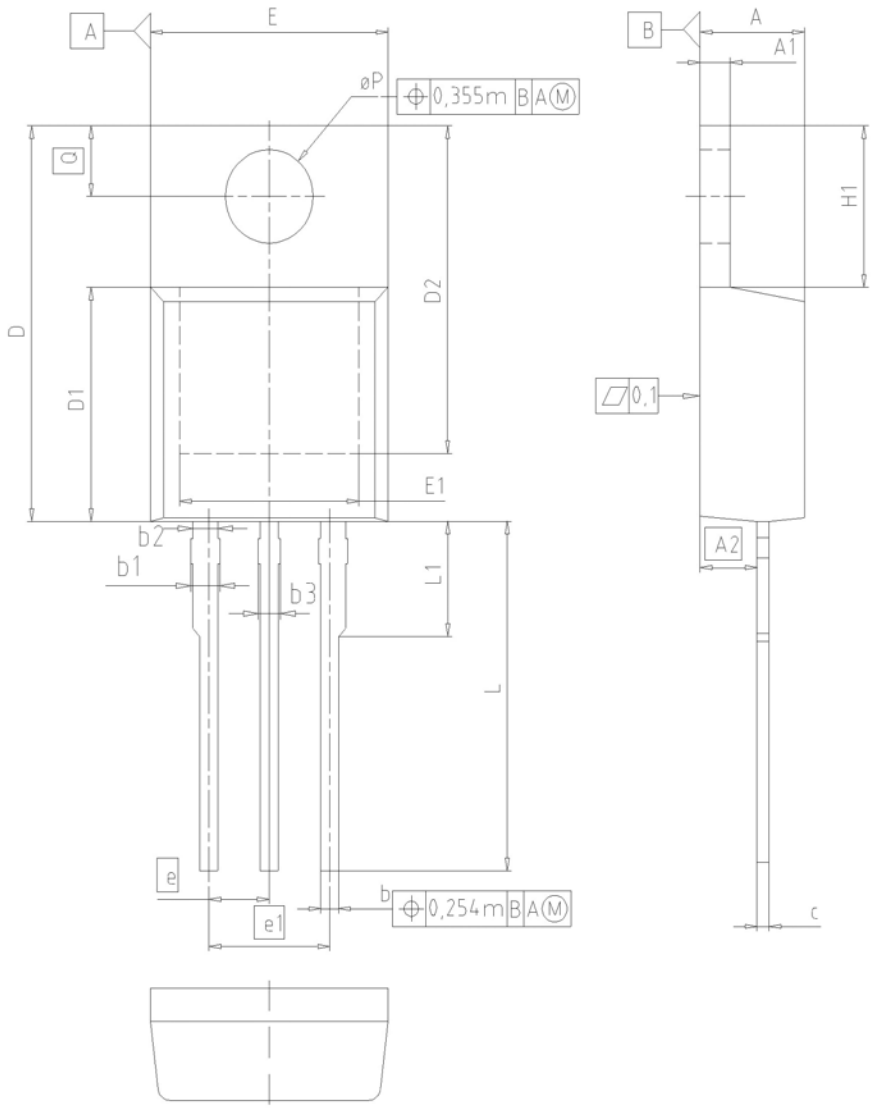

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	1.17	1.40	0.046	0.055
A2	2.15	2.72	0.085	0.107
b	0.65	0.86	0.026	0.034
b1	0.95	1.40	0.037	0.055
b2	0.95	1.15	0.037	0.045
b3	0.65	1.15	0.026	0.045
c	0.33	0.60	0.013	0.024
D	14.81	15.95	0.583	0.628
D1	8.51	9.45	0.335	0.372
D2	12.19	13.10	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
øP	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

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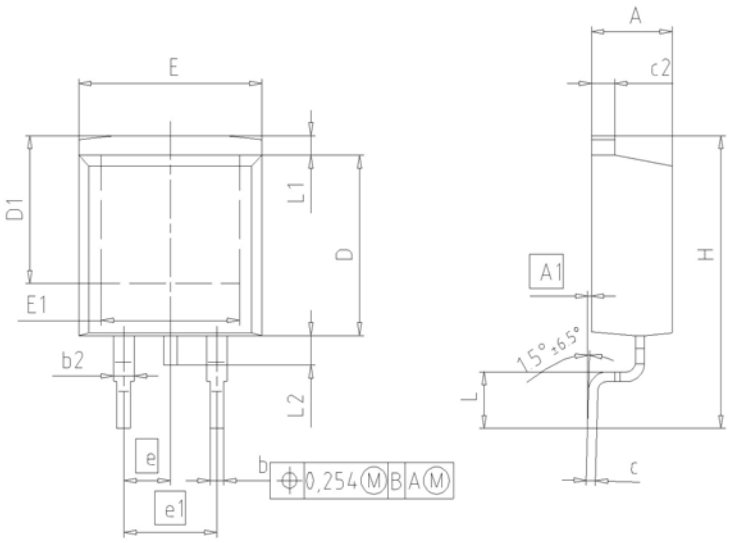
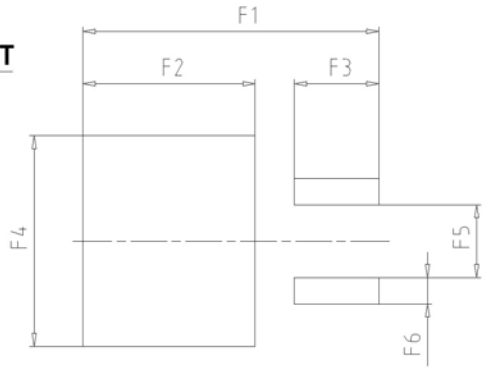


FOOTPRINT



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	0.00	0.25	0.000	0.010
b	0.65	0.85	0.026	0.033
b2	0.95	1.15	0.037	0.045
c	0.33	0.65	0.013	0.026
c2	1.17	1.40	0.046	0.055
D	8.51	9.45	0.335	0.372
D1	7.10	7.90	0.280	0.311
E	9.80	10.31	0.386	0.406
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	2		2	
H	14.61	15.88	0.575	0.625
L	2.29	3.00	0.090	0.118
L1	0.70	1.60	0.028	0.063
L2	1.00	1.78	0.039	0.070
F1	16.05	16.25	0.632	0.640
F2	9.30	9.50	0.366	0.374
F3	4.50	4.70	0.177	0.185
F4	10.70	10.90	0.421	0.429
F5	3.65	3.85	0.144	0.152
F6	1.25	1.45	0.049	0.057

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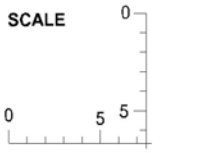
SCALE



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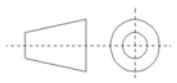

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