

SIPMOS® Power-Transistor

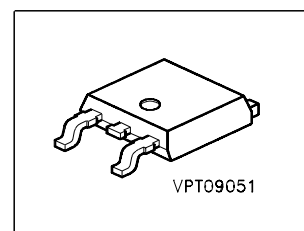
Features

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



Product Summary

Drain source voltage	V_{DS}	-60	V
Drain-source on-state resistance	$R_{DS(on)}$	0.075	Ω
Continuous drain current	I_D	-30	A



Pin 1	PIN 2/4	PIN 3
G	D	S

Type	Package
SPD30P06P G	PG-TO252-3

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	-30 -21.5	A
Pulsed drain current $T_C = 25\text{ °C}$	$I_{D\text{ puls}}$	-120	
Avalanche energy, single pulse $I_D = -30\text{ A}$, $V_{DD} = -25\text{ V}$, $R_{GS} = 25\text{ }\Omega$	E_{AS}	250	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	12.5	
Reverse diode dv/dt $I_S = -30\text{ A}$, $V_{DS} = -48\text{ V}$, $di/dt = 200\text{ A}/\mu\text{s}$, $T_{jmax} = 175\text{ °C}$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25\text{ °C}$	P_{tot}	125	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}	-	-	1.2	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 $T_j = 25\text{ °C}$, 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, $V_{GS} = V_{DS}$ $I_D = -1.7\text{ mA}$	$V_{GS(th)}$	-2.1	-3	-4	
Zero gate voltage drain current $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25\text{ }^{\circ}\text{C}$ $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 150\text{ }^{\circ}\text{C}$	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	
Drain-source on-state resistance $V_{GS} = -10\text{ V}$, $I_D = -21.5\text{ A}$	$R_{DS(on)}$	-	0.069	0.075	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 $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = -21.5\text{ A}$	g_{fs}	5.2	10.4	-	S
Input capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{iss}	-	1228	1535	pF
Output capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{oss}	-	387	383	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = -25\text{ V}$, $f = 1\text{ MHz}$	C_{rss}	-	142	177	
Turn-on delay time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -21.5\text{ A}$, $R_G = 1.6\text{ }\Omega$	$t_{d(on)}$	-	13	19.5	ns
Rise time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -21.5\text{ A}$, $R_G = 1.6\text{ }\Omega$	t_r	-	11	16.5	
Turn-off delay time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -21.5\text{ A}$, $R_G = 1.6\text{ }\Omega$	$t_{d(off)}$	-	30	45	
Fall time $V_{DD} = -30\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -21.5\text{ A}$, $R_G = 1.6\text{ }\Omega$	t_f	-	20	30	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Dynamic Characteristics

Gate to source charge $V_{DD} = -48\text{ V}$, $I_D = -30\text{ A}$	Q_{gs}	-	3.7	5.6	nC
Gate to drain charge $V_{DD} = -48\text{ V}$, $I_D = -30\text{ A}$	Q_{gd}	-	13.8	20.7	
Gate charge total $V_{DD} = -48\text{ V}$, $I_D = -30\text{ A}$, $V_{GS} = 0\text{ to }-10\text{ V}$	Q_g	-	32	48	
Gate plateau voltage $V_{DD} = -48\text{ V}$, $I_D = -30\text{ A}$	$V_{(plateau)}$	-	-5.2	-	V

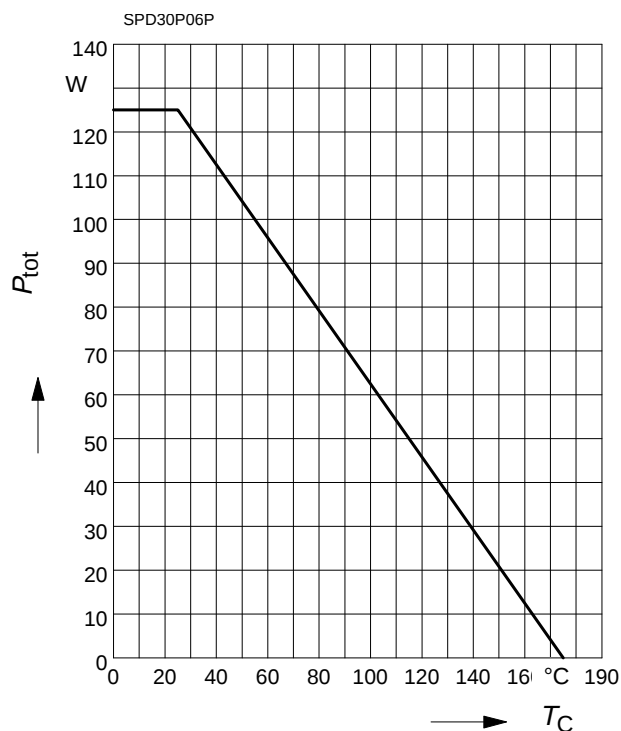
Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Reverse Diode

Inverse diode continuous forward current $T_C = 25\text{ °C}$	I_S	-	-	-30	A
Inverse diode direct current,pulsed $T_C = 25\text{ °C}$	I_{SM}	-	-	-120	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$, $I_F = -30$	V_{SD}	-	-1.3	-1.7	V
Reverse recovery time $V_R = -30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	64.6	97	ns
Reverse recovery charge $V_R = -30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	153	230	nC

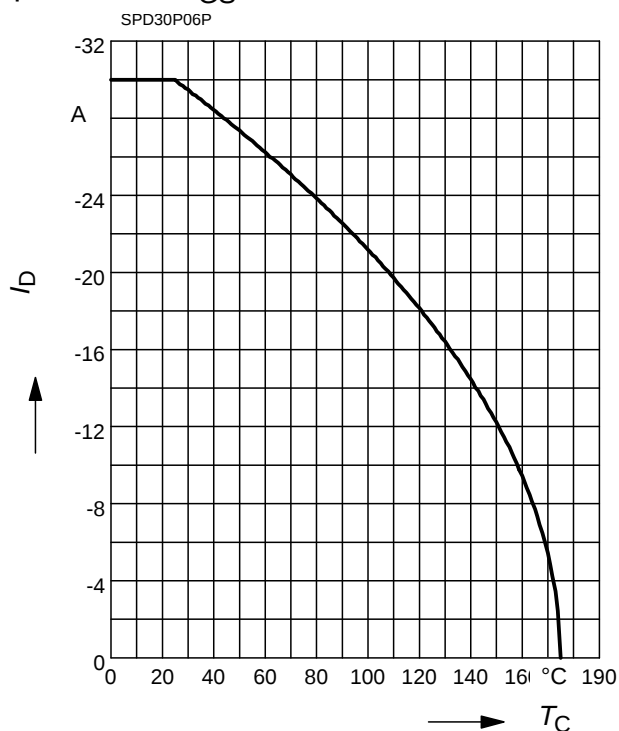
Power dissipation

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


Drain current

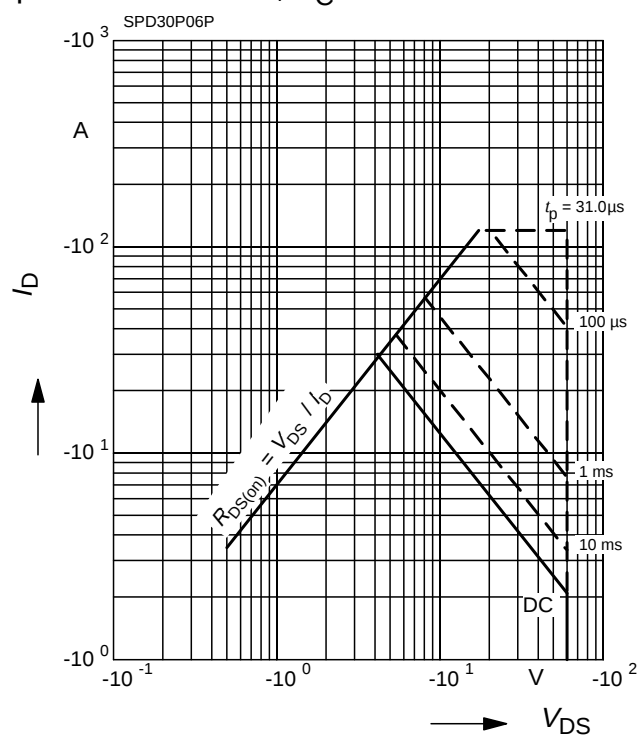
$$I_D = f(T_C)$$

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


Safe operating area

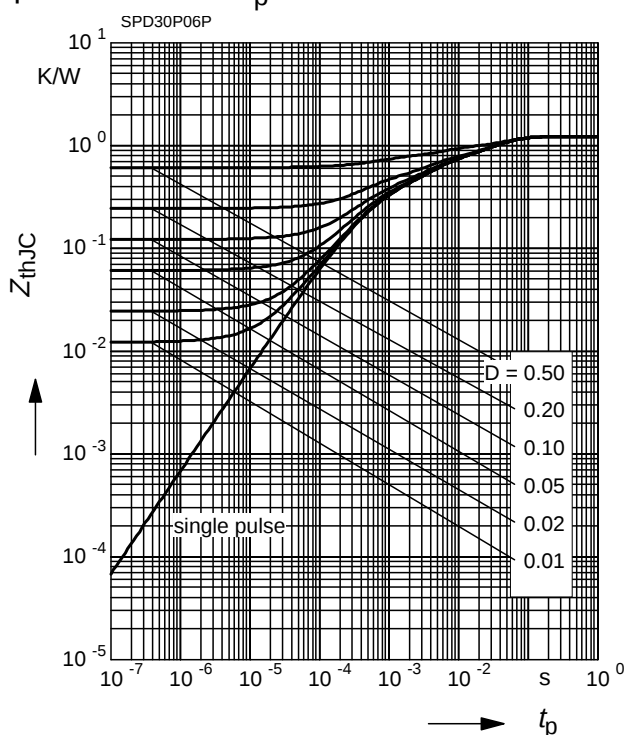
$$I_D = f(V_{DS})$$

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


Transient thermal impedance

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

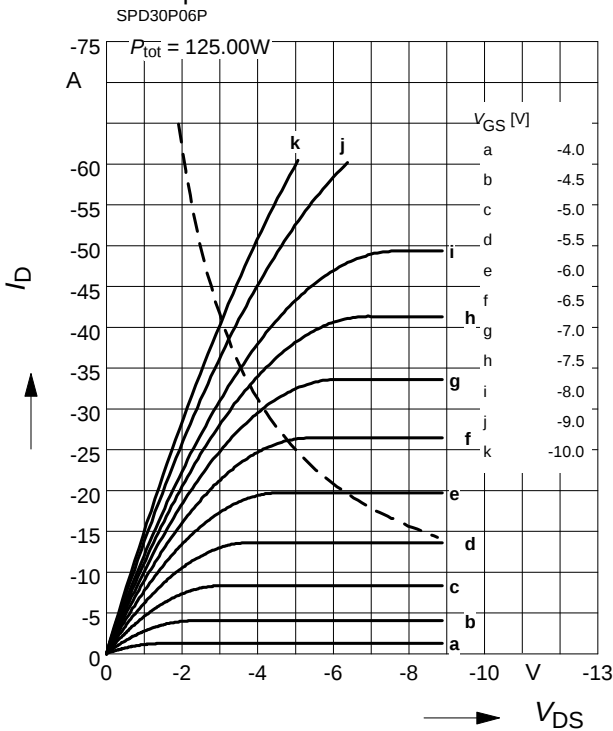
parameter: $D = t_p/T$



Typ. output characteristic

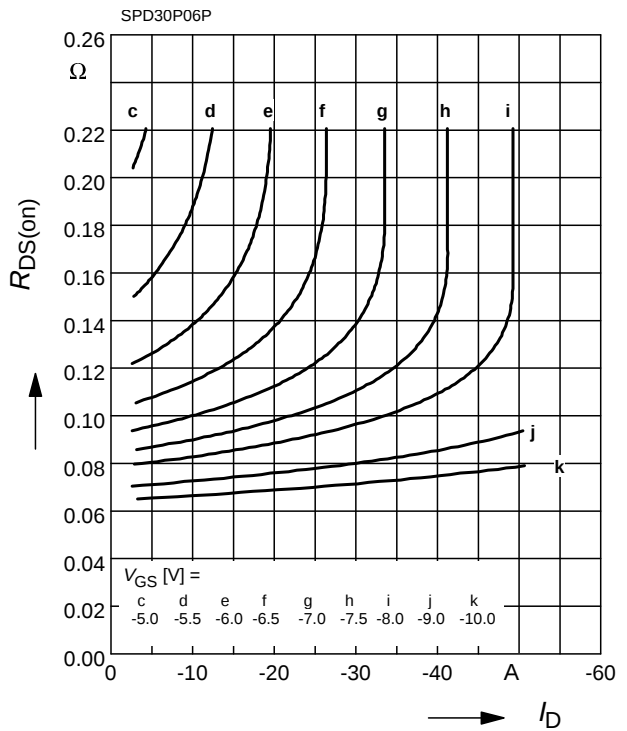
$$I_D = f(V_{DS}); T_J = 25^\circ\text{C}$$

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


Typ. drain-source-on-resistance

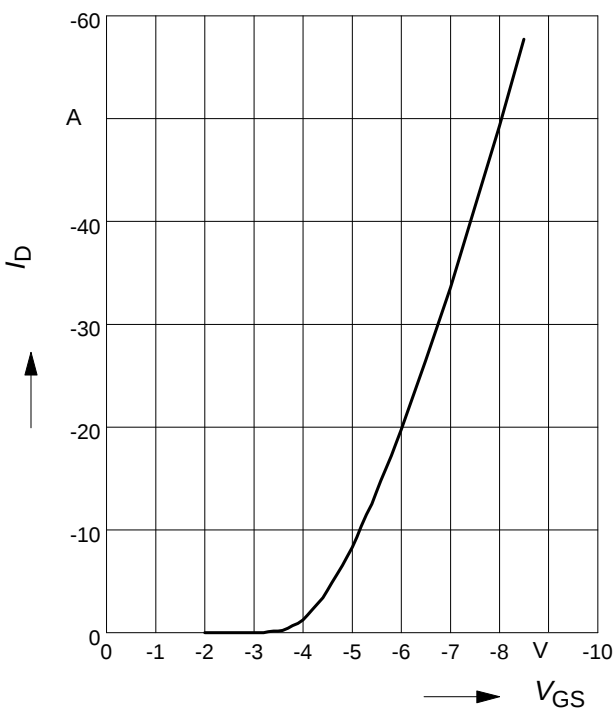
$$R_{DS(\text{on})} = f(I_D)$$

parameter: V_{GS}


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

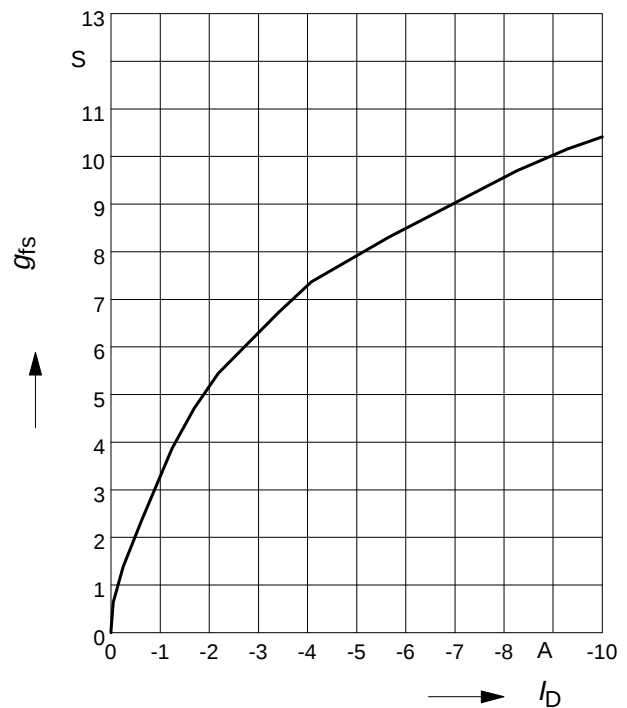
$$V_{DS} \geq 2 \times I_D \times R_{DS(\text{on})\text{max}}$$

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


Typ. forward transconductance

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

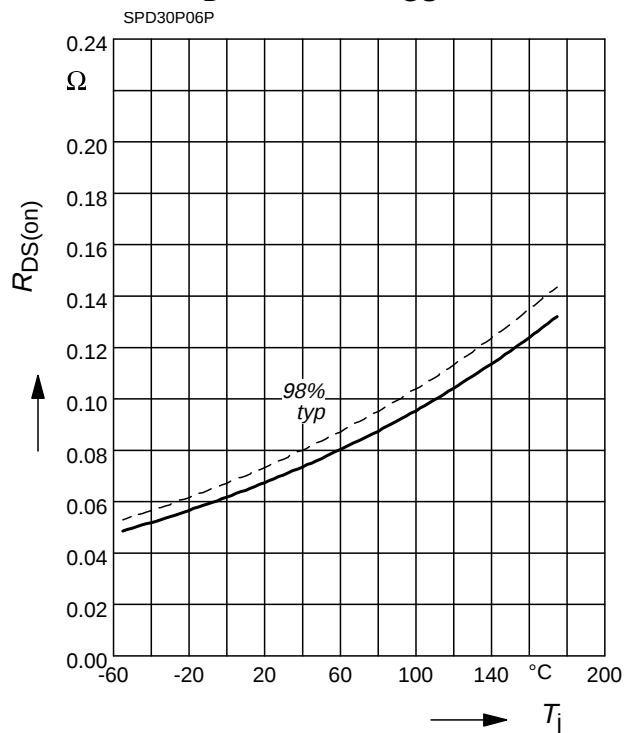
parameter: g_{fs}



Drain-source on-state resistance

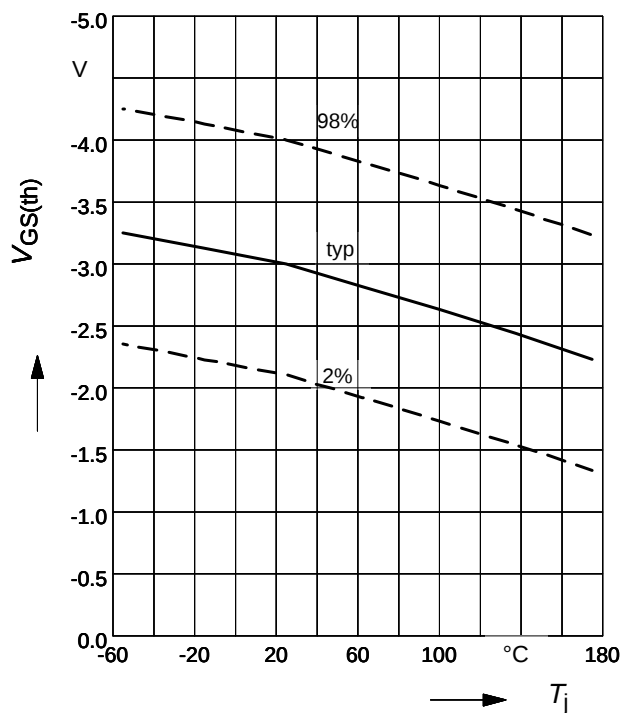
$$R_{DS(on)} = f(T_j)$$

parameter : $I_D = -21.5 \text{ A}$, $V_{GS} = -10 \text{ V}$


Gate threshold voltage

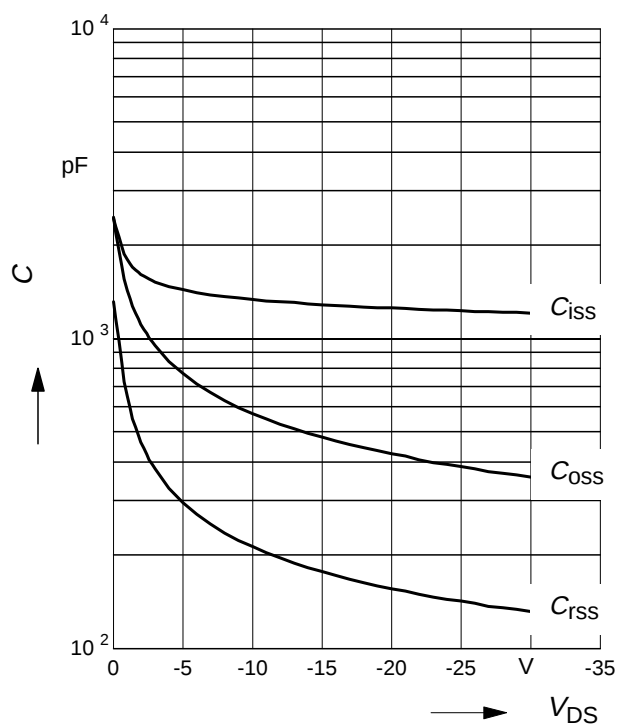
$$V_{GS(th)} = f(T_j)$$

parameter: $V_{GS} = V_{DS}$, $I_D = -1.7 \text{ mA}$


Typ. capacitances

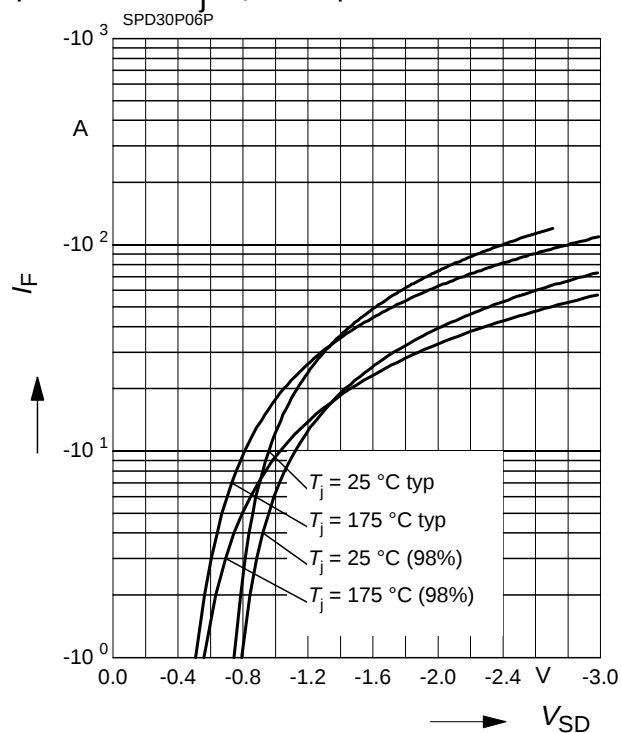
$$C = f(V_{DS})$$

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


Forward characteristics of reverse diode

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

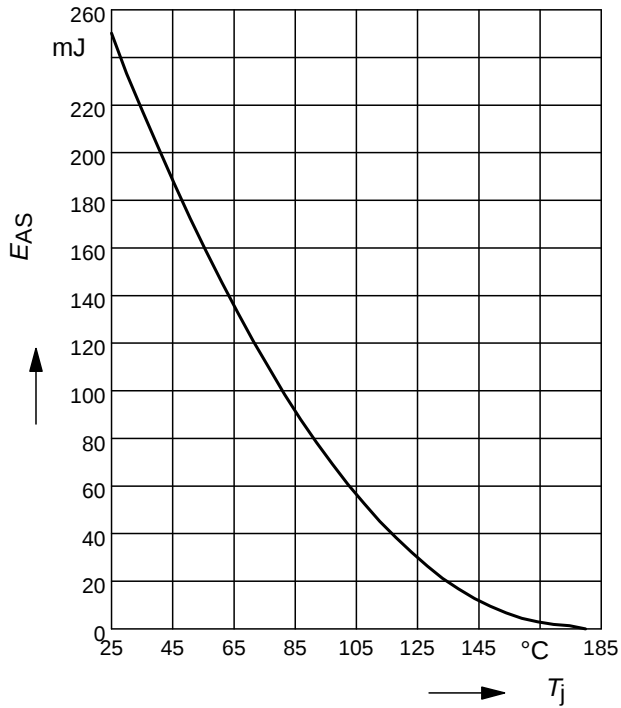
parameter: T_j , $t_p = 80 \mu\text{s}$



Avalanche energy

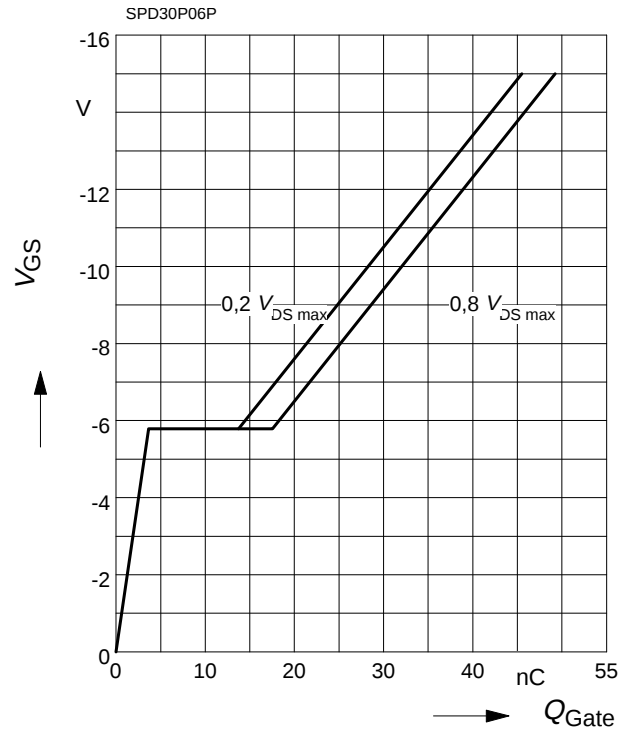
$$E_{AS} = f(T_j)$$

para.: $I_D = -30\text{ A}$, $V_{DD} = -25\text{ V}$, $R_{GS} = 25\ \Omega$

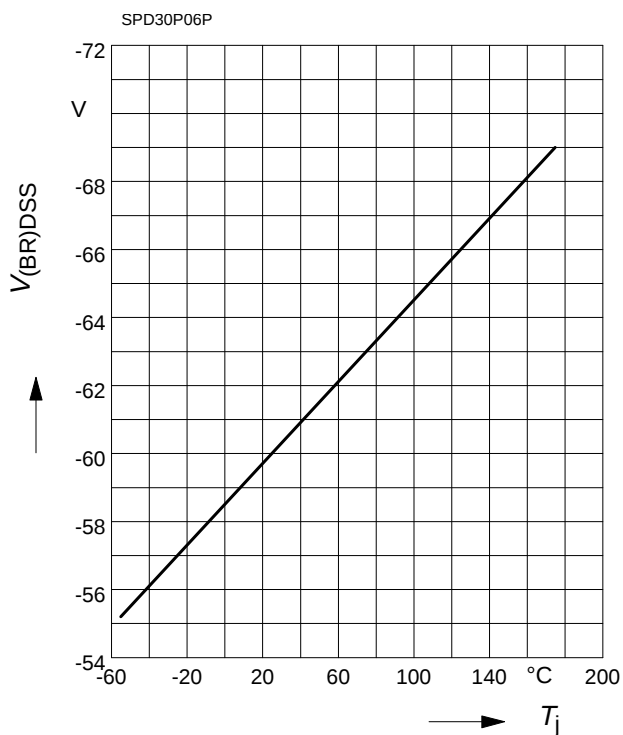

Typ. gate charge

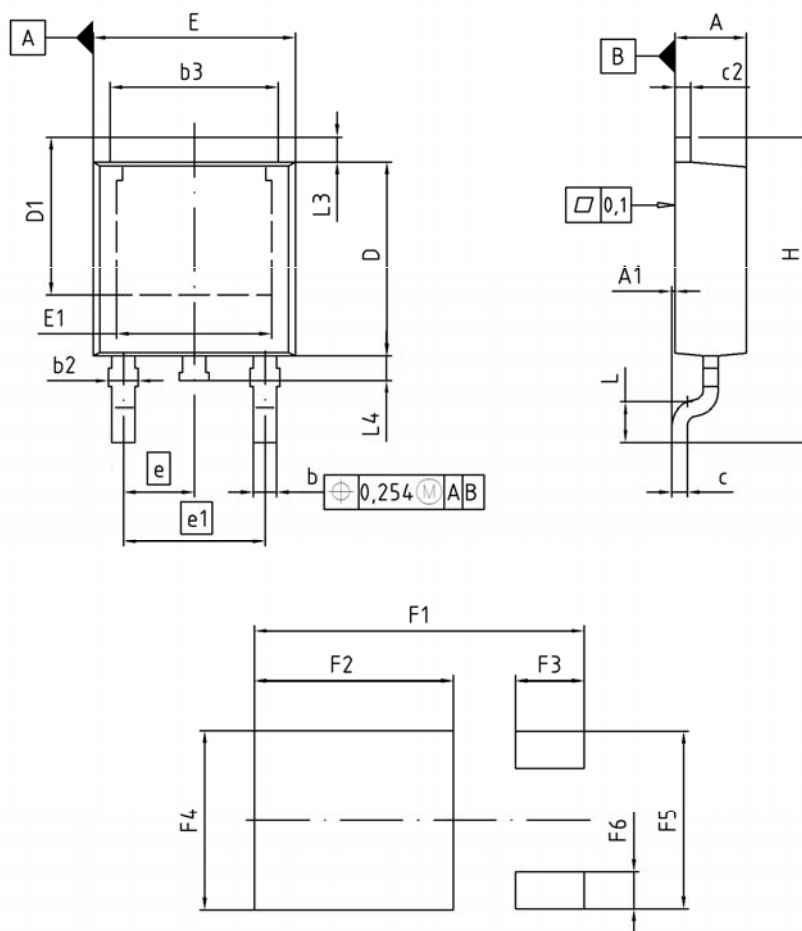
$$V_{GS} = f(Q_{Gate})$$

parameter: $I_D = -30\text{ A}$ pulsed


Drain-source breakdown voltage

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

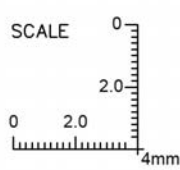


Package outline: PG-TO252-3


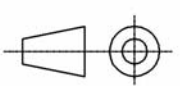
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.16	2.41	0.085	0.095
A1	0.00	0.15	0.000	0.006
b	0.64	0.89	0.025	0.035
b2	0.65	1.15	0.026	0.045
b3	5.00	5.50	0.197	0.217
c	0.46	0.60	0.018	0.024
c2	0.46	0.98	0.018	0.039
D	5.97	6.22	0.235	0.245
D1	5.02	5.84	0.198	0.230
E	6.40	6.73	0.252	0.265
E1	4.70	5.21	0.185	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

DOCUMENT NO.
Z8B00003328

SCALE



EUROPEAN PROJECTION



ISSUE DATE
19-10-2007

REVISION
03

Published by
Infineon Technologies AG
81726 Munich, Germany
© 2008 Infineon Technologies AG
All Rights Reserved.

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office. Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.