SIPMOS® Power-Transistor

Feature

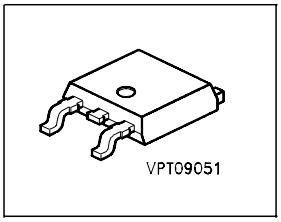
- P-channel
- Enhancement mode
- Logic Level
- 175°C operating temperature
- Avalanche rated
- dv/dt rated
- Pb-free lead plating; RoHS compliant

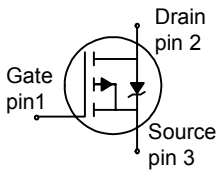
RoHS

Product Summary

V_{DS}	-60	V
$R_{DS(on)}$	0.25	Ω
I_D	-9.7	A

PG-TO252-3





Type	Package	Lead free
SPD09P06PL G	PG-TO252-3	Yes

Maximum Ratings,at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current	I_D		A
T_C=25°C		-9.7	
T_C=100°C		-6.8	
Pulsed drain current	$I_{D\ puls}$	-38.8	
T_C=25°C			
Avalanche energy, single pulse	E_{AS}	70	mJ
I_D=-9.7 A , V_{DD}=-25V, R_{GS}=25Ω			
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	4.2	
Reverse diode dv/dt	dv/dt	6	kV/µs
I_S=-9.7A, V_{DS}=-48, di/dt=200A/µs, T_{jmax}=175°C			
Gate source voltage	V_{GS}	±20	V
Power dissipation	P_{tot}	42	W
T_C=25°C			
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}	-	-	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}=0V, I_D=-250µA	$V_{(BR)DSS}$	-60	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D=-250µA	$V_{GS(th)}$	-1	-1.5	-2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=-60V, V_{GS}=0V, T_j=25°C		-	-0.1	-1	
V_{DS}=-60V, V_{GS}=0V, T_j=150°C		-	-10	-100	
Gate-source leakage current V_{GS}=-20V, V_{DS}=0V	I_{GSS}	-	-10	-100	nA
Drain-source on-state resistance V_{GS}=-4.5V, I_D=-5.4A	$R_{DS(on)}$	-	0.3	0.4	Ω
Drain-source on-state resistance V_{GS}=-10V, I_D=-6.8A	$R_{DS(on)}$	-	0.2	0.25	

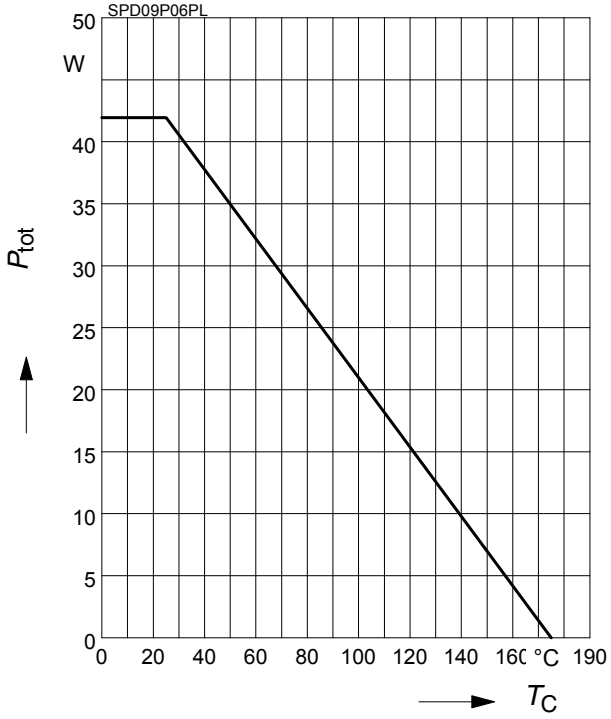
[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$V_{DS}\geq 2*I_D*R_{DS(on)max}$, I_D=-5.4	1.8	3.5	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-25V, f=1MHz	-	360	450	pF
Output capacitance	C_{oss}		-	103	130	
Reverse transfer capacitance	C_{rss}		-	40	50	
Turn-on delay time	$t_{d(on)}$	V_{DD}=-30V, V_{GS}=-4.5V, I_D=-5.4, R_G=6Ω	-	11	17	ns
Rise time	t_r	V_{DD}=-30V, V_{GS}=-4.5V, I_D=-5.4A, R_G=6Ω	-	168	252	
Turn-off delay time	$t_{d(off)}$		-	49	74	
Fall time	t_f		-	89	134	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=-48V, I_D=-9.7A	-	1.3	2	nC
Gate to drain charge	Q_{gd}		-	5.1	7.5	
Gate charge total	Q_g	V_{DD}=-48V, I_D=-9.7A, V_{GS}=0 to -10V	-	14	21	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=-48V, I_D=-9.7A	-	-4.1	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	-9.7	A
Inverse diode direct current, pulsed	I_{SM}		-	-	-38.8	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=-9.7A	-	-1.1	-1.4	V
Reverse recovery time	t_{rr}	V_R=-30V, I_F=I_S, di_F/dt=100A/µs	-	52	76	ns
Reverse recovery charge	Q_{rr}		-	64	96	nC

1 Power dissipation

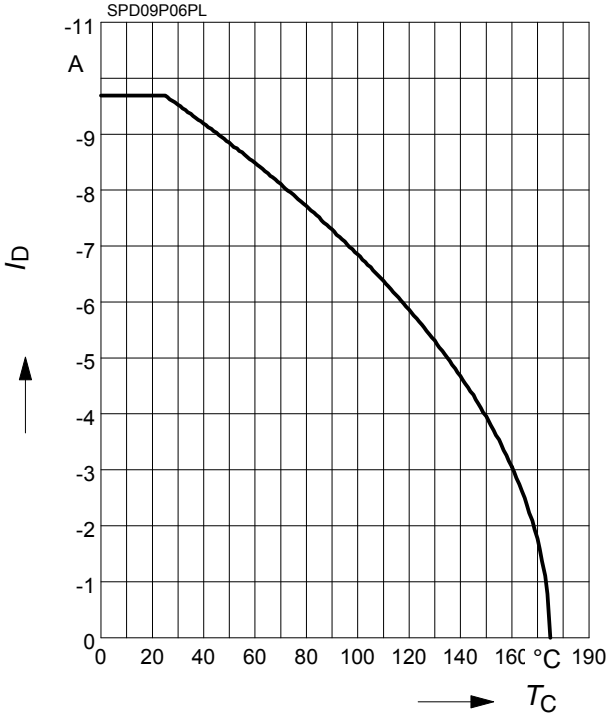
$P_{tot} = f(T_C)$



2 Drain current

$I_D = f(T_C)$

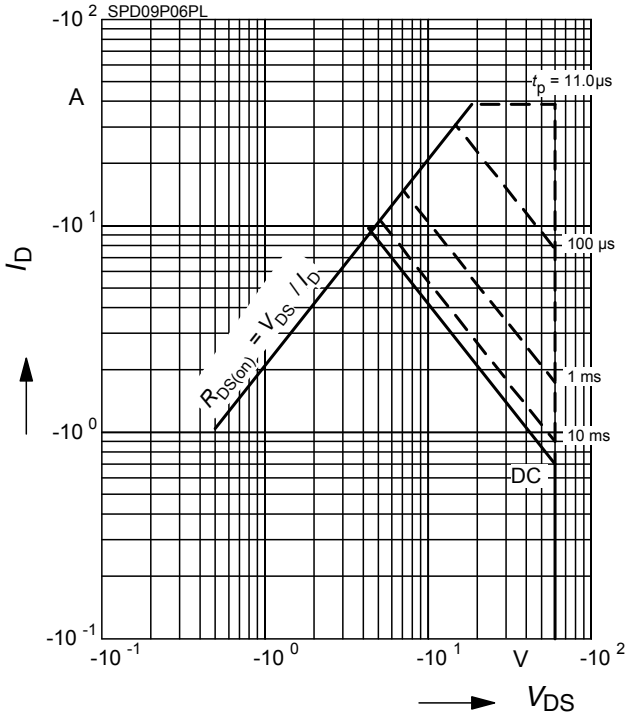
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

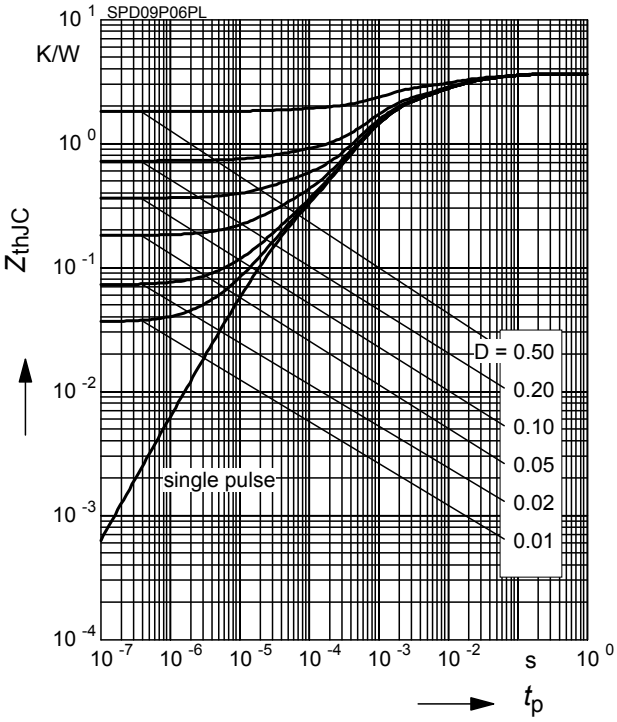
parameter : $D = 0$, $T_C = 25$ °C



4 Transient thermal impedance

$Z_{thJC} = f(t_p)$

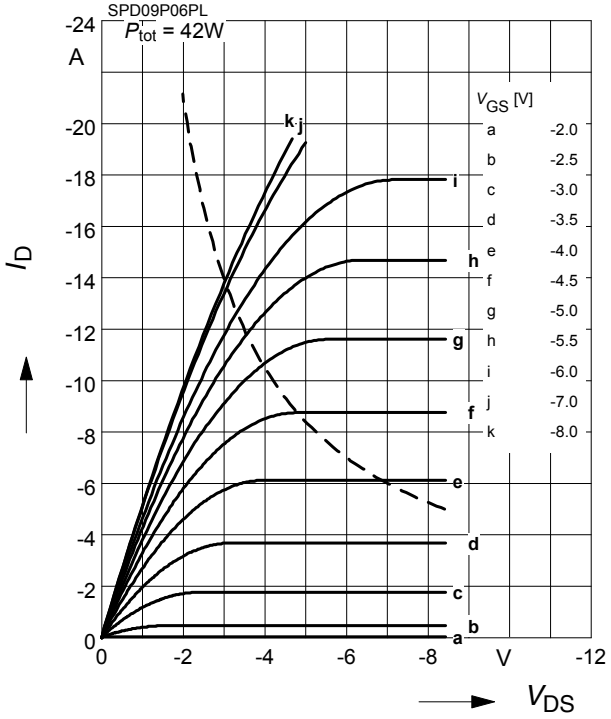
parameter : $D = t_p/T$



5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

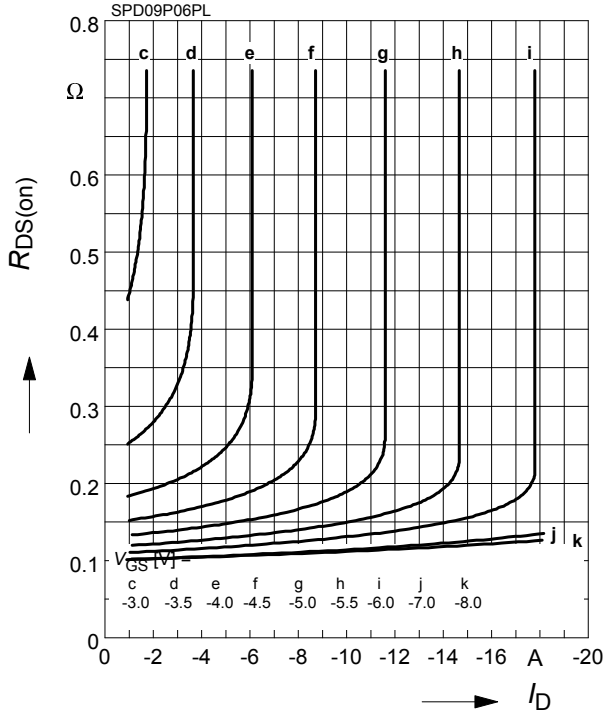
parameter: t_p = 80 µs



6 Typ. drain-source on resistance

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

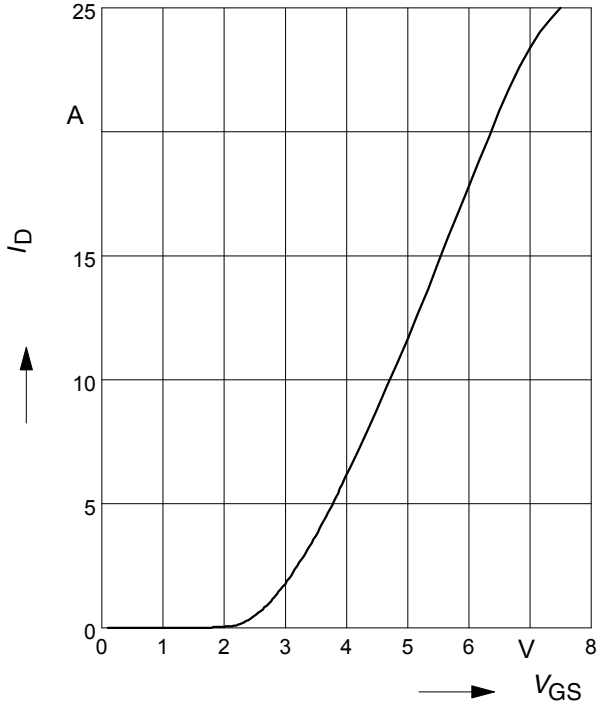
parameter: V_{GS}



7 Typ. transfer characteristics

$I_D = f(V_{GS})$; $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

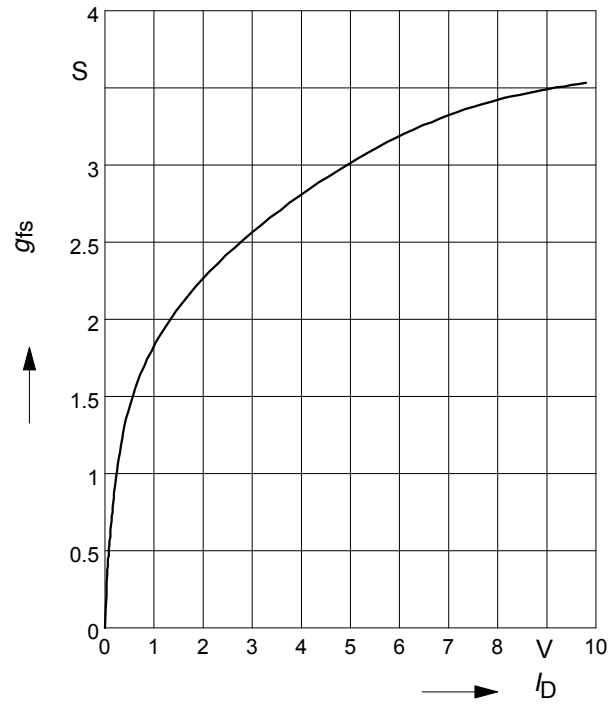
parameter: t_p = 80 µs



8 Typ. forward transconductance

g_{fs} = f(I_D); T_j=25°C

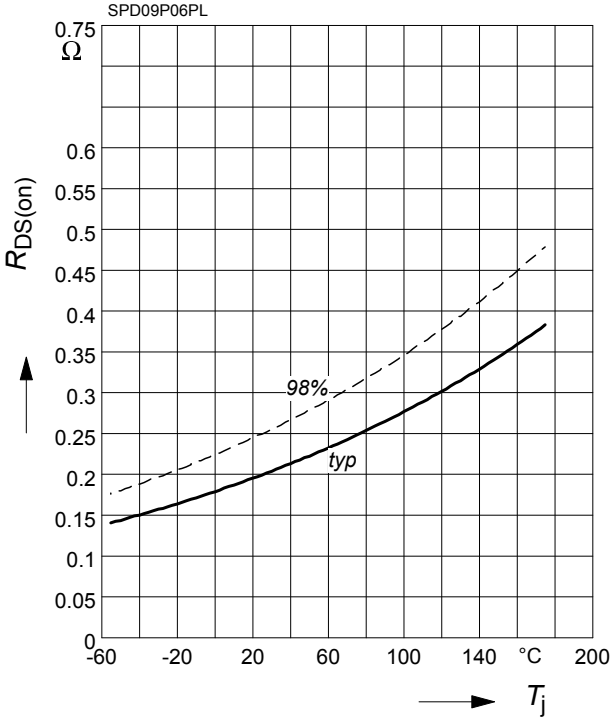
parameter: g_{fs}



9 Drain-source on-state resistance

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

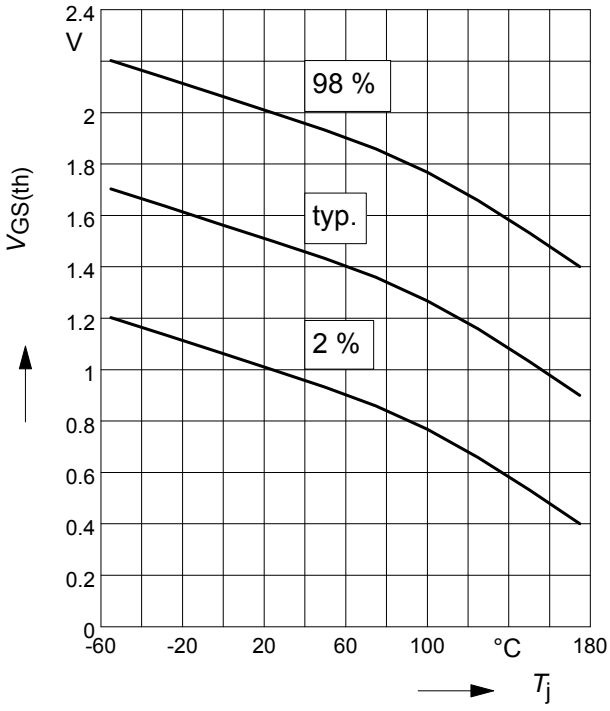
parameter : I_D = -6.8 A, V_{GS} = -10 V



10 Gate threshold voltage

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

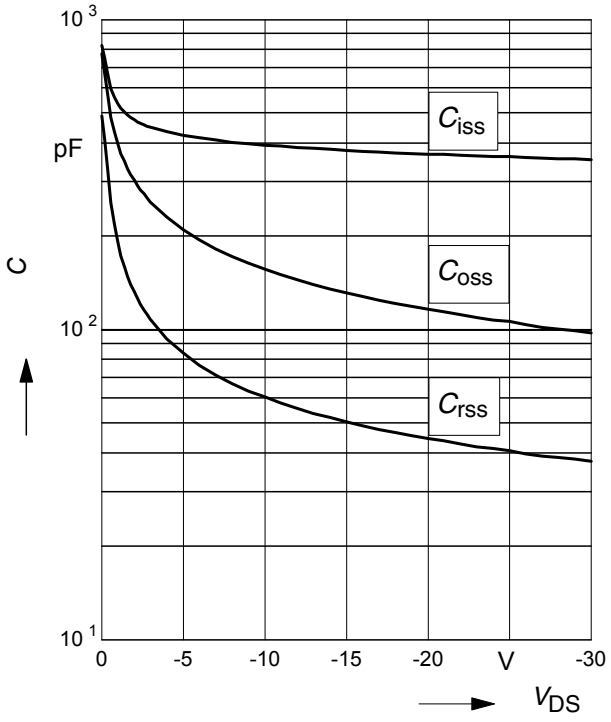
parameter: $V_{GS} = V_{DS}$, I_D = -250 µA



11 Typ. capacitances

$C = f(V_{DS})$

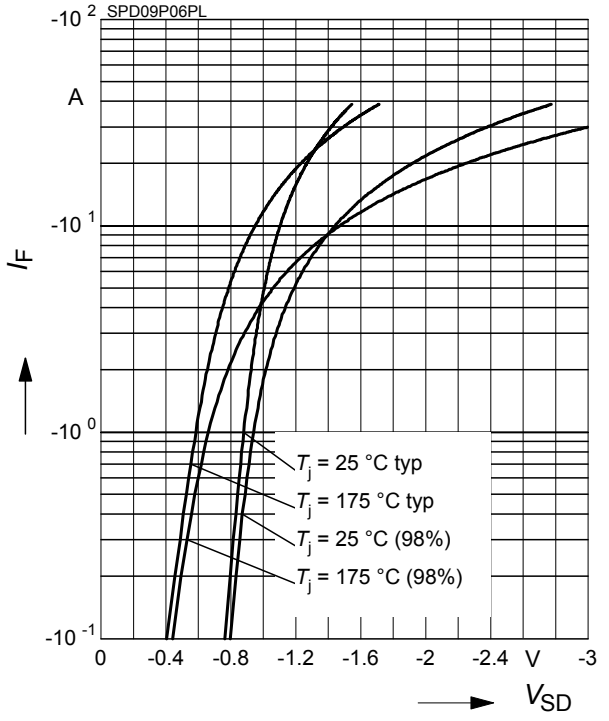
parameter: V_{GS}=0V, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

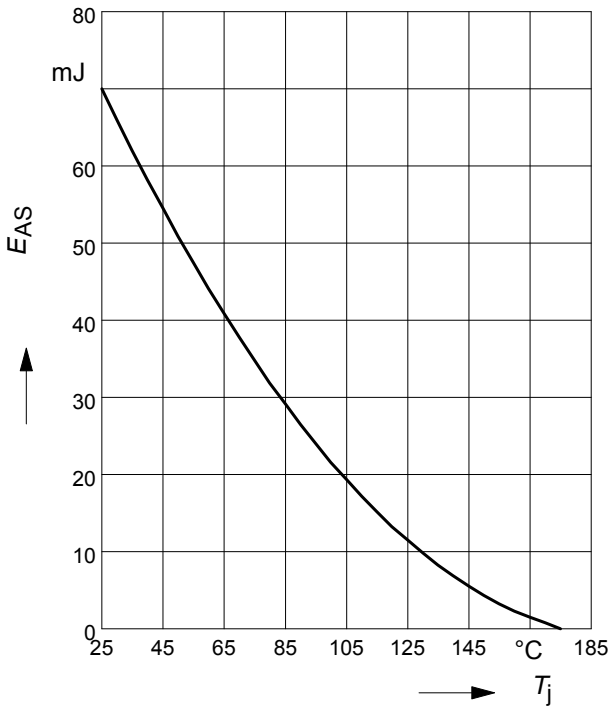
parameter: T_j , tp = 80 µs



13 Typ. avalanche energy

$E_{AS} = f(T_j)$

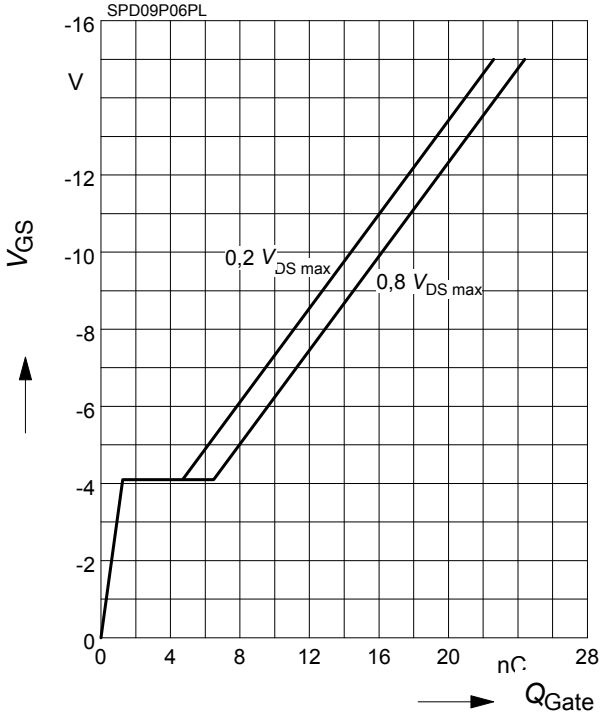
par.: I_D = -9.7 A , V_{DD} = -25 V, R_{GS} = 25 Ω



14 Typ. gate charge

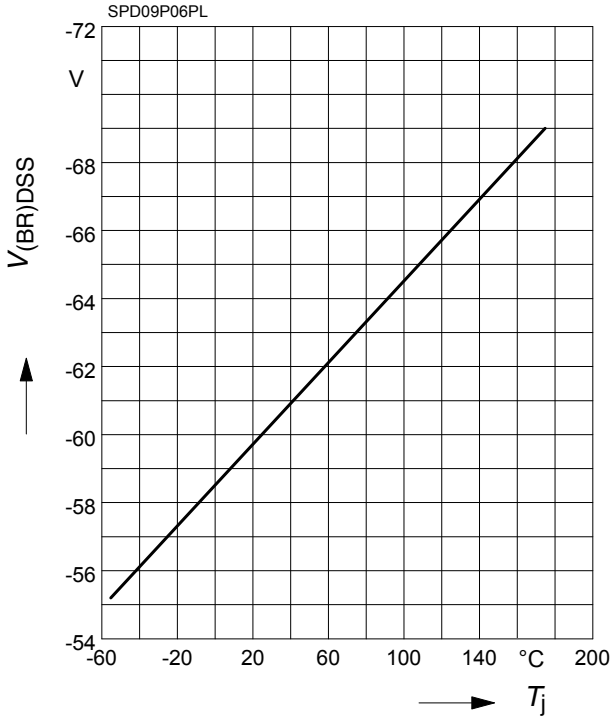
$V_{GS} = f(Q_{Gate})$

parameter: I_D = -9.7 A pulsed

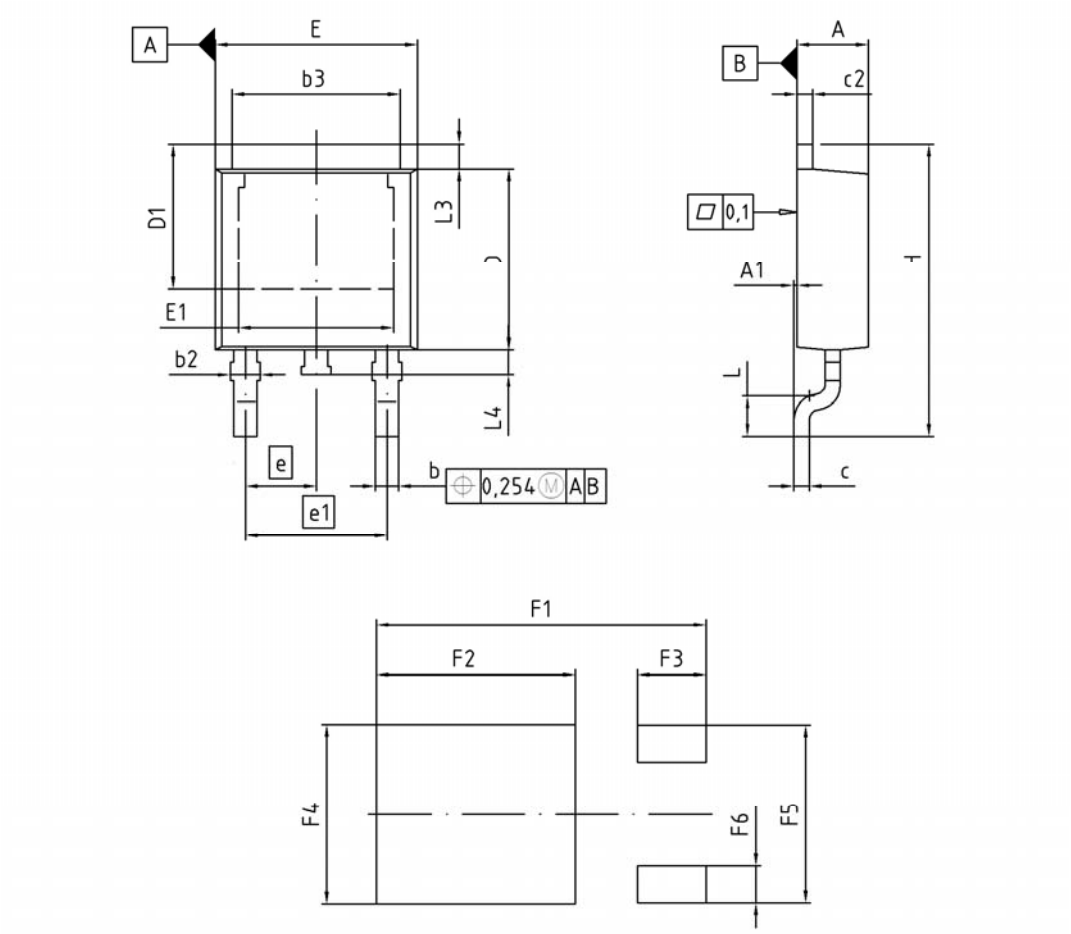


15 Drain-source breakdown voltage

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



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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SCALE
0
2.0
0 2.0
4mm

EUROPEAN PROJECTION

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