SIPMOS® Power Transistor

SPD 07N20 G

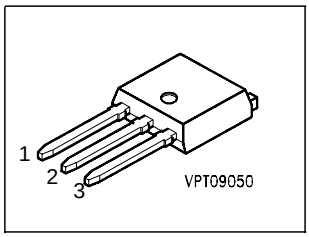
Features

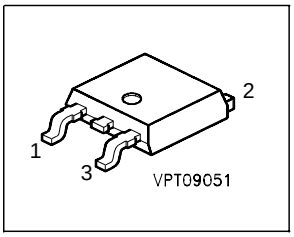
- N channel
- Enhancement mode
- Avalanche rated
- d*v*/d*t* rated
- Pb-free lead plating; RoHS compliant

RoHS

Product Summary

Drain source voltage	V_{DS}	200	V
Drain-Source on-state resistance	$R_{DS(on)}$	0.4	Ω
Continuous drain current	I_D	7	A





Type	Package	Pb-free	Packaging
SPD07N20 G	PG-TO252	Yes	Tape and Reel
SPU07N20 G	PG-TO251	Yes	Tube

Pin 1	Pin 2	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 T_C = 100 ˚C	I_D	 7 4.5	A
Pulsed drain current T_C = 25 ˚C	I_{Dpulse}	28	
Avalanche energy, single pulse I_D = 7 A, V_{DD} = 50 V, R_{GS} = 25 Ω	E_{AS}	120	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	4	
Reverse diode d*v*/d*t* I_S = 7 A, V_{DS} = 160 V, 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}	40	W
Operating and storage temperature	T_j , T_{stg}	-55... +175	˚C
IEC climatic category; DIN IEC 68-1		55/150/56	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-		3.1	K/W
Thermal resistance, junction - ambient, leded	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} = 0 V, I_D = 0.25 mA	$V_{(BR)DSS}$	200	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D = 1 mA	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS} = 200 V, V_{GS} = 0 V, T_j = 25 ˚C		-	0.1	1	
V_{DS} = 200 V, V_{GS} = 0 V, T_j = 125 ˚C		-	-	100	
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0 V	I_{GSS}	-	10	100	nA
Drain-Source on-state resistance	$R_{DS(on)}$				Ω
V_{GS} = 10 V, I_D = 4.5 A		-	0.3	0.4	

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

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

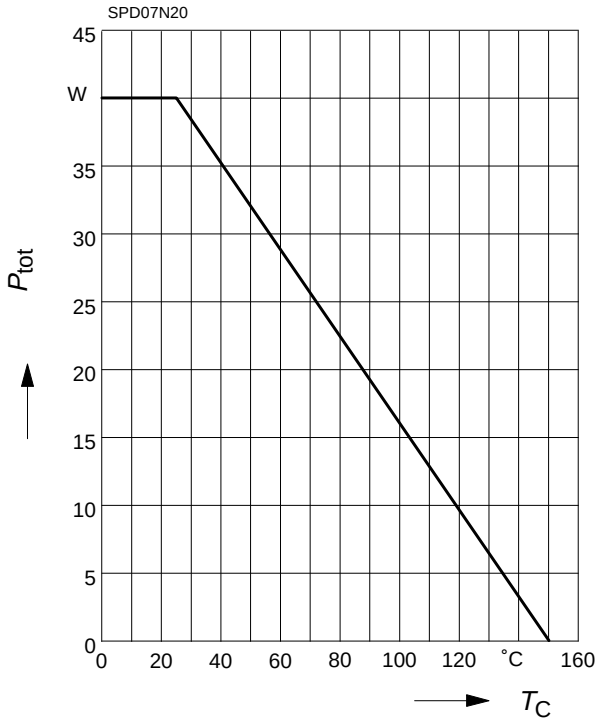
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS}\geq 2*I_D*R_{DS(on)max}$, I_D = 4.5 A	g_{fs}	3	4.2	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	400	530	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	-	85	130	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	-	45	70	
Turn-on delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A, R_G = 50 Ω	$t_{d(on)}$	-	10	15	ns
Rise time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A, R_G = 50 Ω	t_r	-	40	60	
Turn-off delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A, R_G = 50 Ω	$t_{d(off)}$	-	55	75	
Fall time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 3 A, R_G = 50 Ω	t_f	-	30	40	

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} = 160 V, I_D = 7 A	Q_{gs}	-	5	7.5	nC
Gate to drain charge V_{DD} = 160 V, I_D = 7 A	Q_{gd}	-	10	22.5	
Gate charge total V_{DD} = 160 V, I_D = 7 A, V_{GS} = 0 to 10 V	Q_g	-	21	31.5	
Gate plateau voltage V_{DD} = 160 V, I_D = 7 A	$V_{(plateau)}$	-	7	-	V
Reverse Diode					
Inverse diode continuous forward current T_C = 25 ˚C	I_S	-	-	7	A
Inverse diode direct current,pulsed T_C = 25 ˚C	I_{SM}	-	-	28	
Inverse diode forward voltage V_{GS} = 0 V, I_F = 14 A	V_{SD}	-	1.3	1.7	V
Reverse recovery time V_R = 100 V, I_F=I_S , di_F/dt = 100 A/µs	t_{rr}	-	200	300	ns
Reverse recovery charge V_R = 100 V, I_F=I_S , di_F/dt = 100 A/µs	Q_{rr}	-	0.6	0.9	µC

Power Dissipation

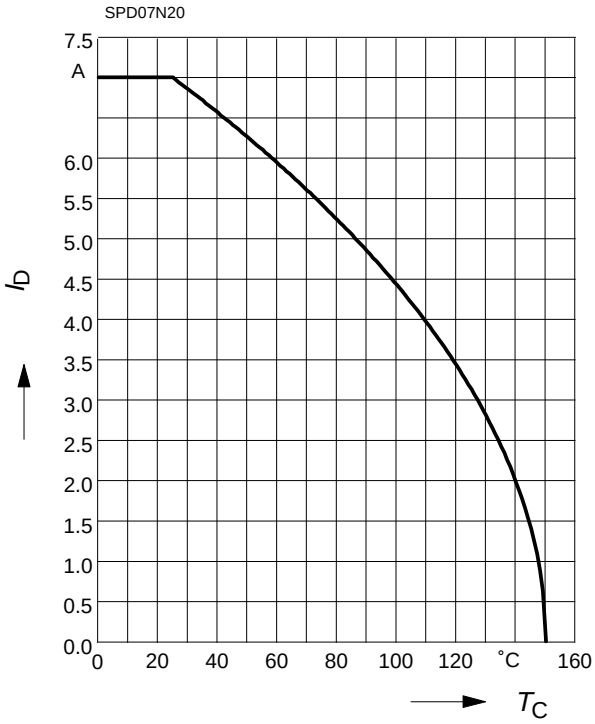
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

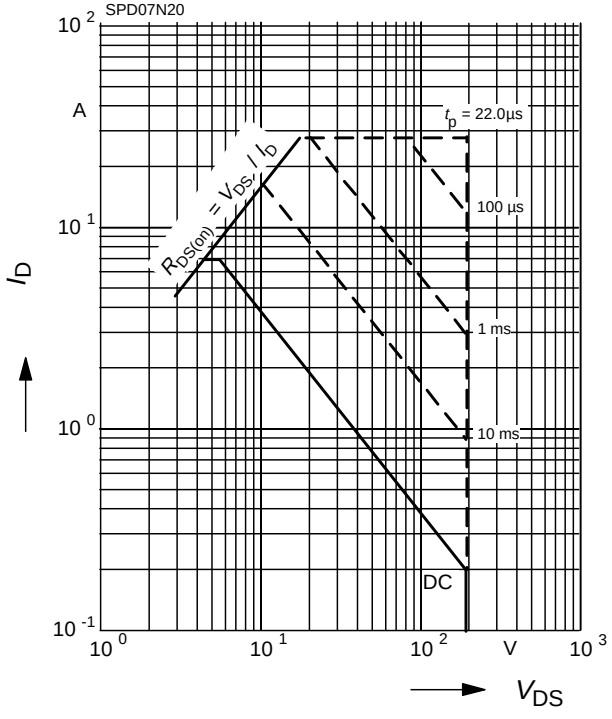
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

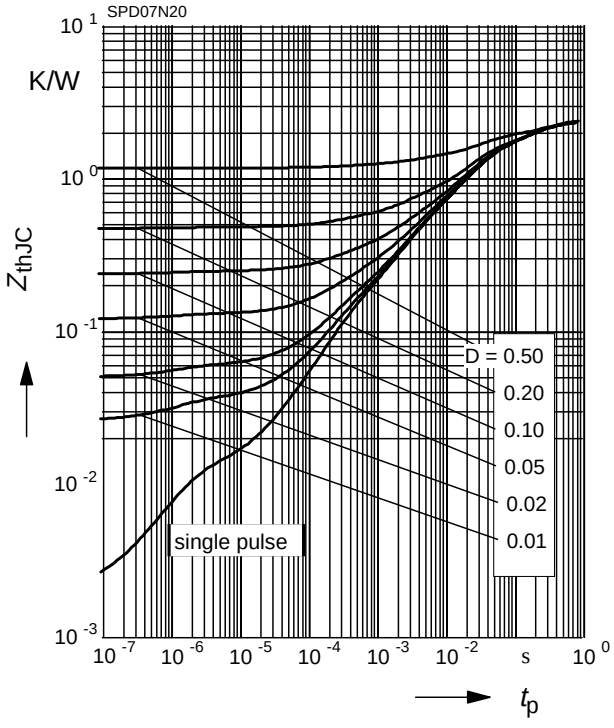
parameter : $D = 0$, $T_C = 25$ °C



Transient thermal impedance

$Z_{thJC} = f(t_p)$

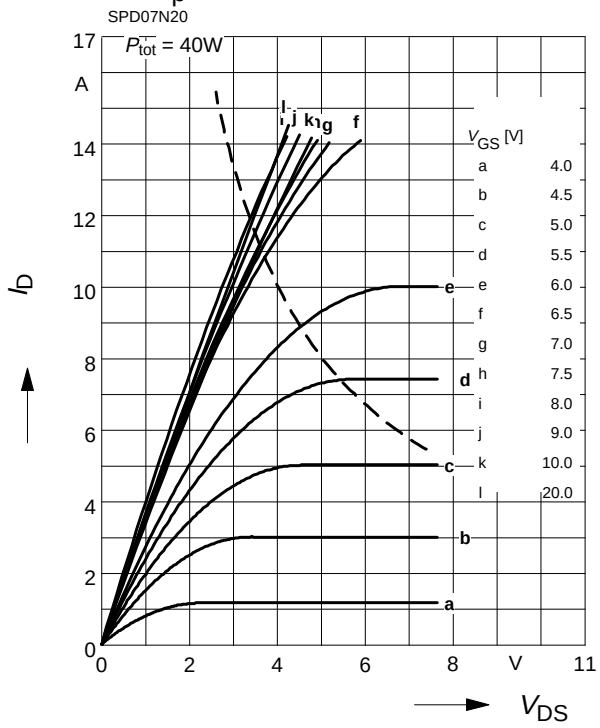
parameter : $D = t_p / T$



Typ. output characteristics

$I_D = f(V_{DS})$

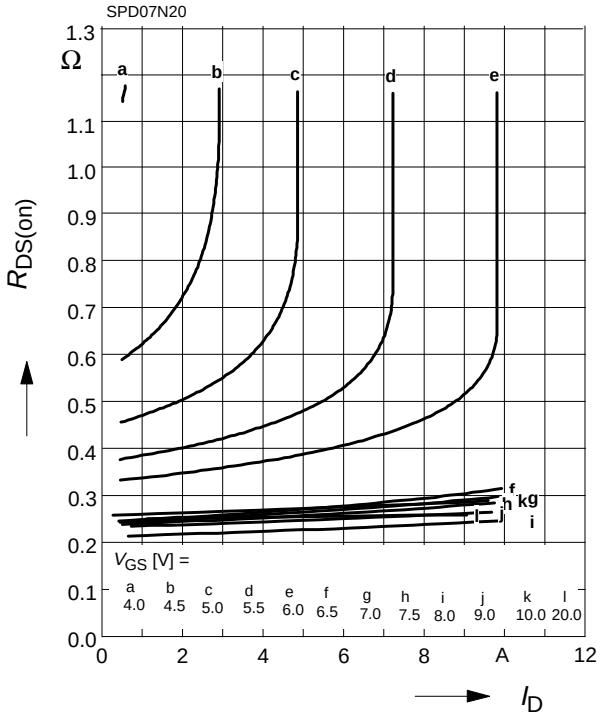
parameter: t_p = 80 µs



Typ. drain-source-on-resistance

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

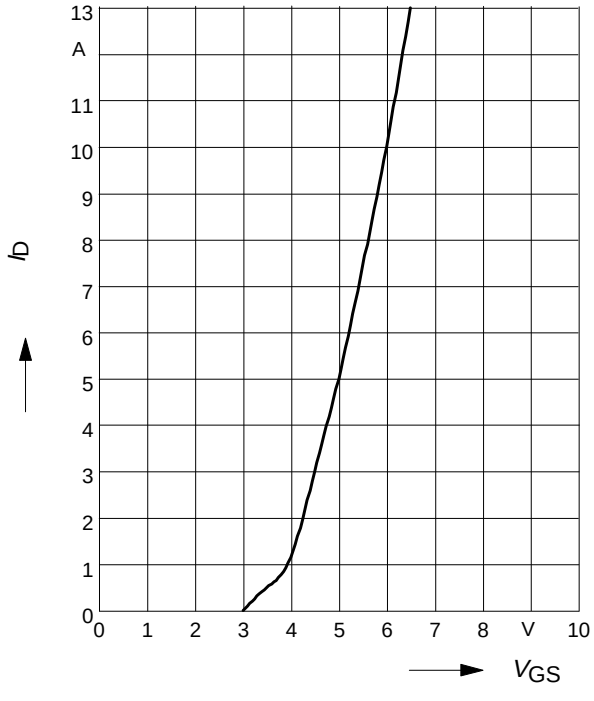
parameter: V_{GS}



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

parameter: t_p = 80 µs

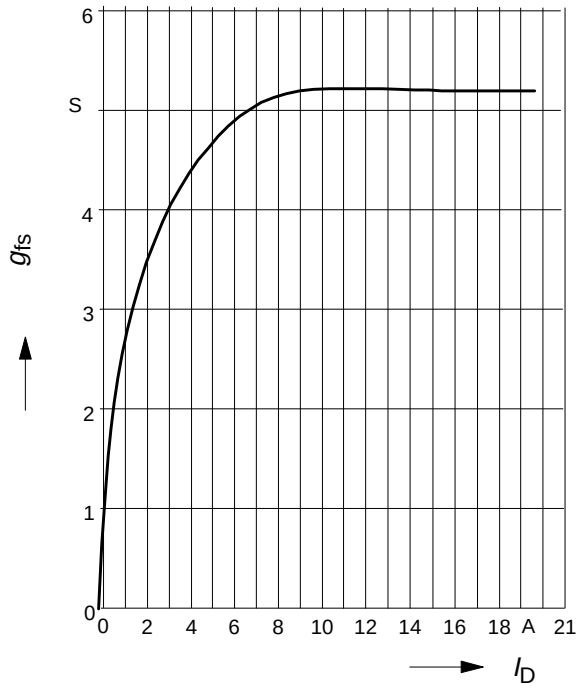
$V_{DS} \geq 2 \times I_D \times R_{DS(on)\ max}$



Typ. forward transconductance

$g_{fs} = f(I_D)$; T_j = 25˚C

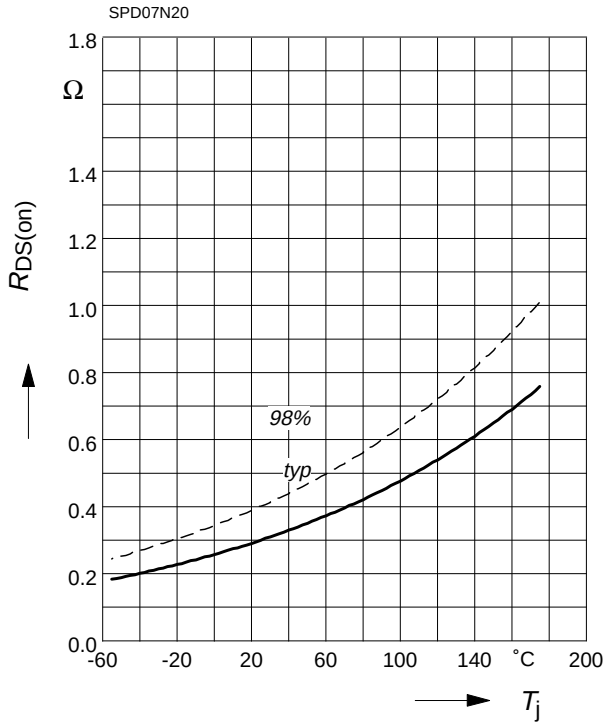
parameter: g_{fs}



Drain-source on-resistance

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

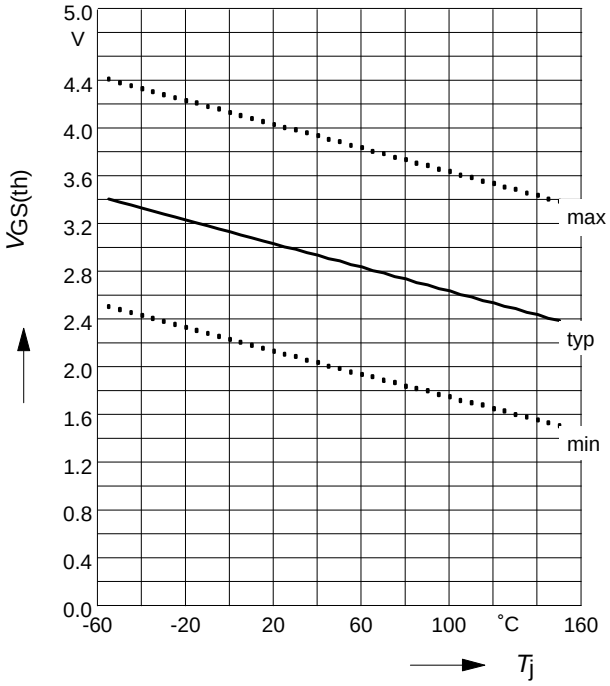
parameter : I_D = 4.5 A, V_{GS} = 10 V



Gate threshold voltage

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

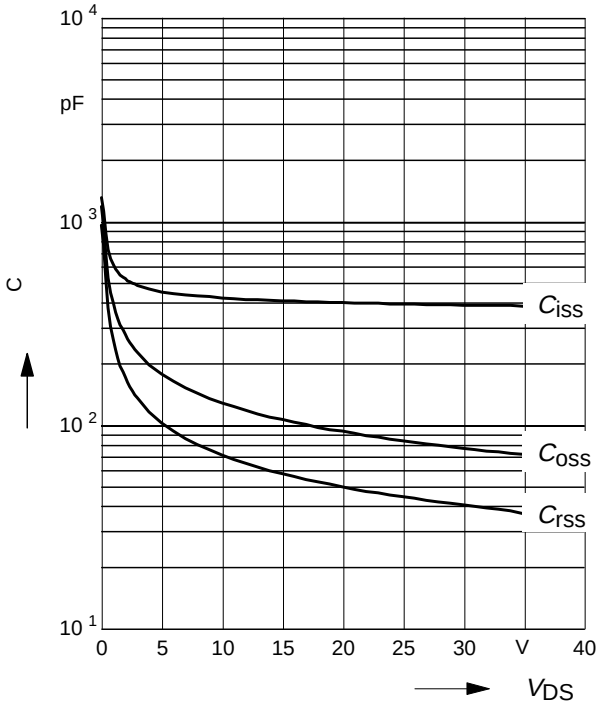
parameter : $V_{GS} = V_{DS}$, I_D = 1 mA



Typ. capacitances

C = $f(V_{DS})$

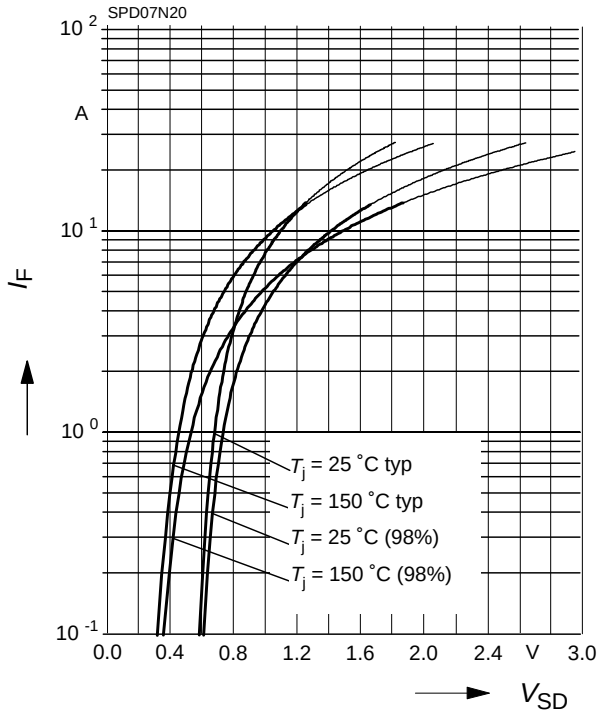
parameter: V_{GS} = 0 V, f = 1 MHz



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

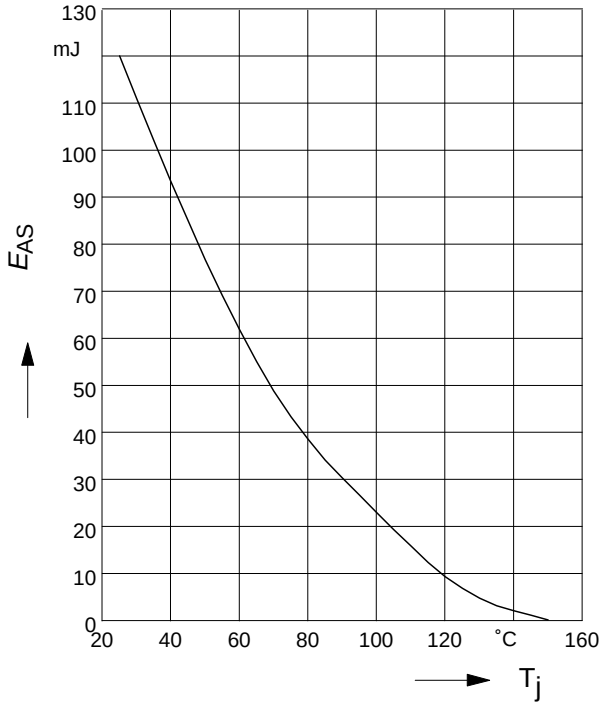
parameter: T_j , t_p = 80 µs



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

parameter: I_D = 7 A, V_{DD} = 50 V

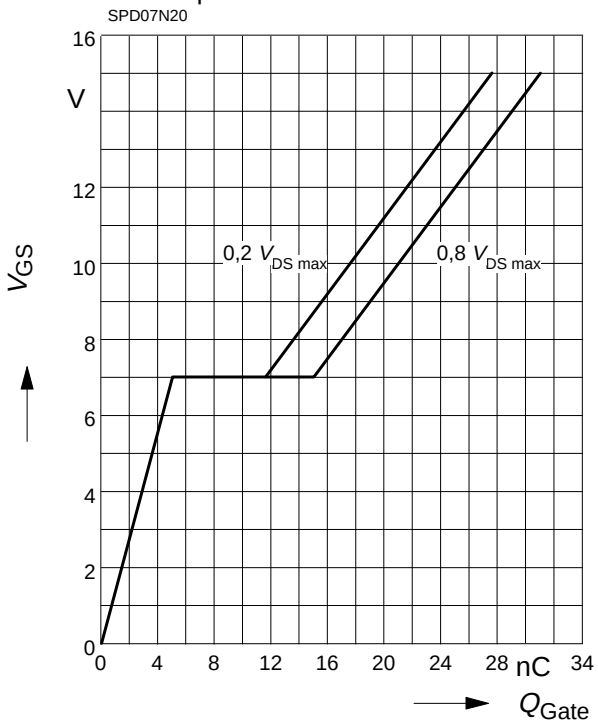
R_{GS} = 25 Ω



Typ. gate charge

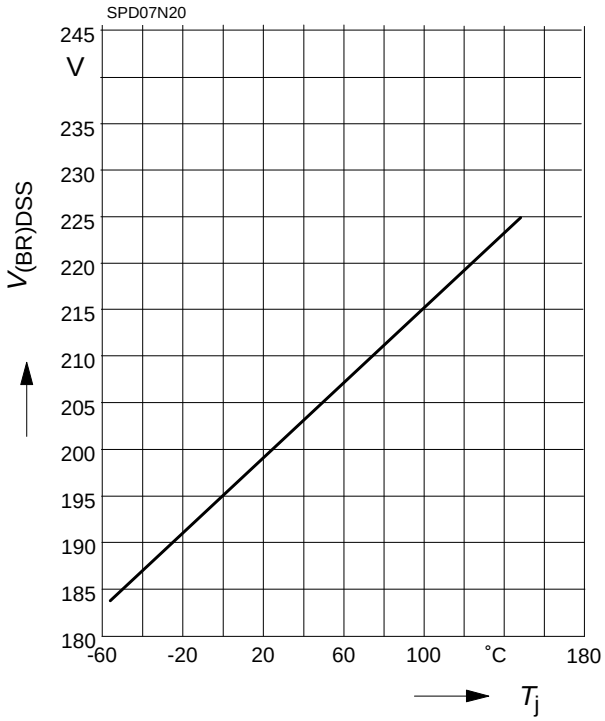
$V_{GS} = f(Q_{Gate})$

parameter: $I_{D\ puls}$ = 7 A

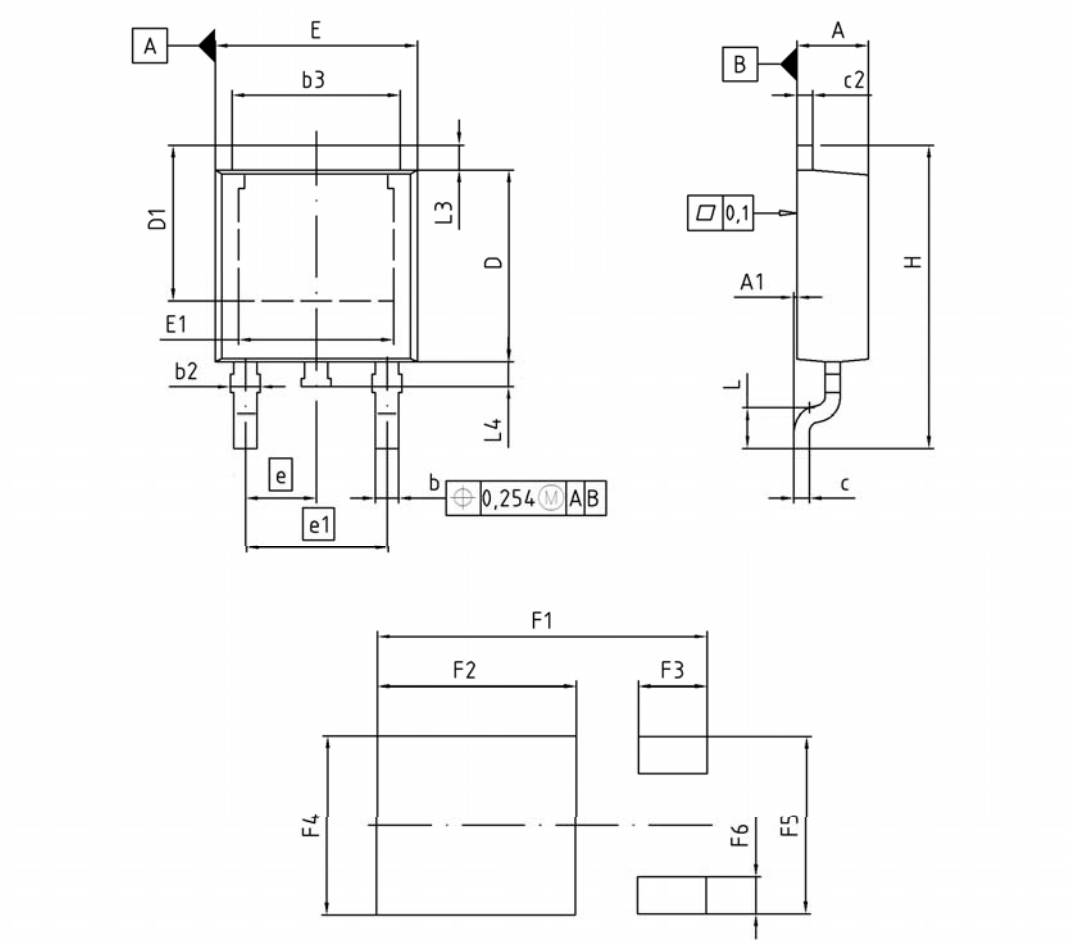


Drain-source breakdown voltage

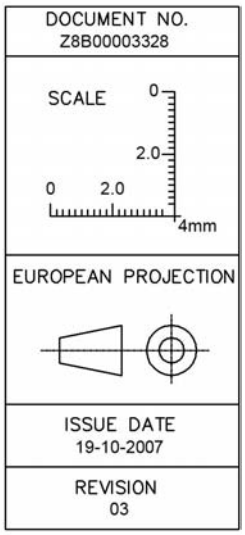
$V_{(BR)DSS} = f(T_j)$



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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