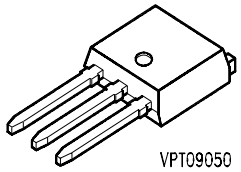
SIEMENS

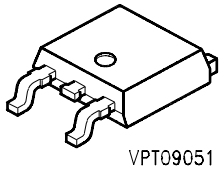
Preliminary data

SPD02N60
SPU02N60

SIPMOS® Power Transistor

- N-Channel
- Enhancement mode
- Avalanche rated





Pin 1	Pin 2	Pin 3
G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$ @ VGS		Package	Ordering Code
SPD02N60	600 V	2 A	5.5 Ω	V_{GS} = 10 V	P-TO252	Q67040-S4133
SPU02N60					P-TO251	Q67040-S4127-A2

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	 2 1.3	A
Pulsed drain current T_C = 25 °C	I_{Dpulse}	8	
Avalanche energy, single pulse I_D = 2 A, V_{DD} = 50 V, R_{GS} = 25 Ω, T_j = 25 °C	E_{AS}	135	mJ
Gate source voltage	V_{GS}	±20	V
Power dissipation T_C = 25 °C	P_{tot}	55	W
Operating temperature	T_j	-55 ... +150	°C
Storage temperature	T_{stg}	-55 ... +150	
IEC climatic category; DIN IEC 68-1		55/150/56	

Electrical Characteristics

Parameter at T_j = 25 °C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Thermal Characteristics					
Thermal resistance, junction - case	R_{thJC}	-		2.25	K/W
Thermal resistance, junction - ambient	R_{thJA}	-	100	-	
SMD version, device on PCB: @ min. footprint @ 6 cm^2 cooling area[1)]	R_{thJA}	 - -	 50 tbd	 - -	

Static Characteristics

Drain- source breakdown voltage V_{GS} = 0 V, I_D = 0.25 mA	$V_{(BR)DSS}$	600	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D = 1 mA	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current V_{DS} = 600 V, V_{GS} = 0 V, T_j = 25 °C V_{DS} = 600 V, V_{GS} = 0 V, T_j = 150 °C	I_{DSS}	 - -	 0.1 -	 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 = 1.3 A	$R_{DS(on)}$	-	4.2	5.5	Ω

1 Device on 50mm*50mm*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

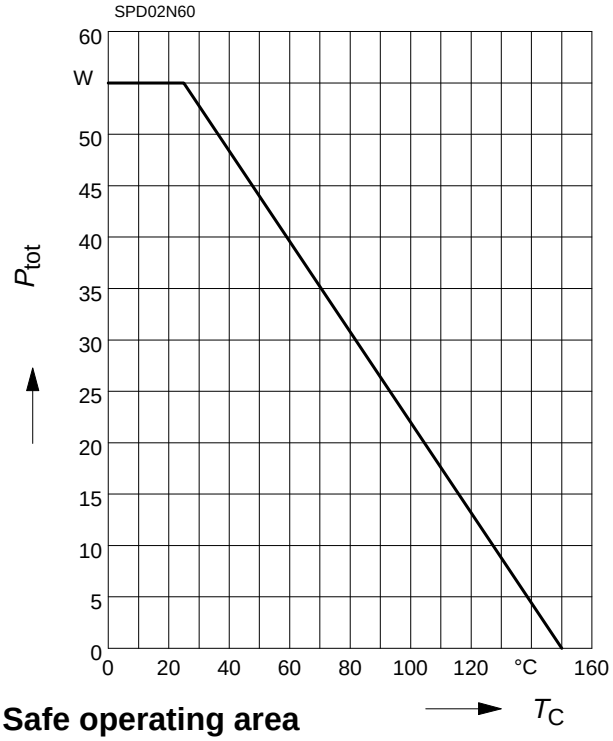
Parameter at T_j = 25 °C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS}\geq 2*I_D*R_{DS(on)max}$, I_D = 1.3 A	g_{fs}	1	1.8	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	350	460	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	-	40	60	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	-	15	22	
Turn-on delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 1.5 A, R_G = 50 Ω	$t_{d(on)}$	-	10	15	ns
Rise time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 1.5 A, R_G = 50 Ω	t_r	-	25	40	
Turn-off delay time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 1.5 A, R_G = 50 Ω	$t_{d(off)}$	-	35	50	
Fall time V_{DD} = 30 V, V_{GS} = 10 V, I_D = 1.5 A, R_G = 50 Ω	t_f	-	25	35	

Electrical Characteristics

Parameter at T_j = 25 °C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current T_C = 25 °C	I_S	-	-	2	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	8	
Inverse diode forward voltage V_{GS} = 0 V, I_F = 4 A	V_{SD}	-	0.85	1.4	V
Reverse recovery time V_R = 100 V, I_F=I_S , di_F/dt = 100 A/µs	t_{rr}	-	300	450	ns
Reverse recovery charge V_R = 100 V, I_F=I_S , di_F/dt = 100 A/µs	Q_{rr}	-	2.3	3.45	µC

Power Dissipation

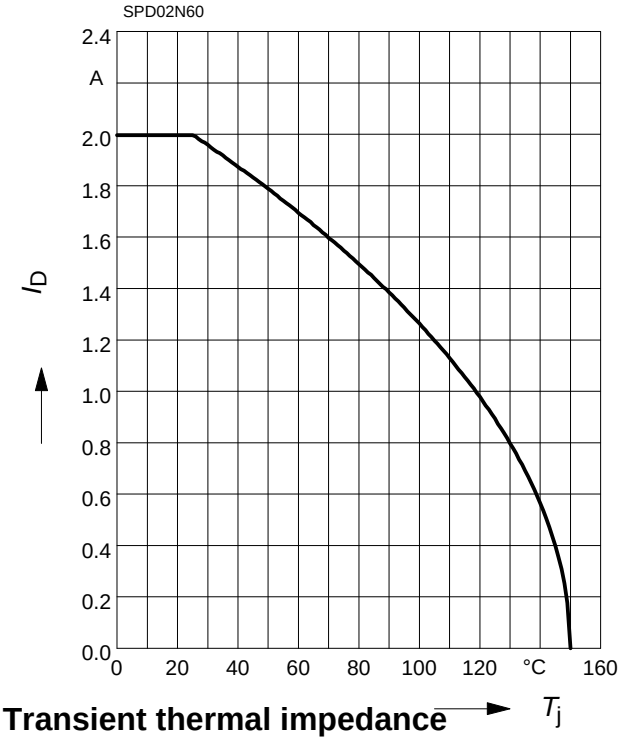
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

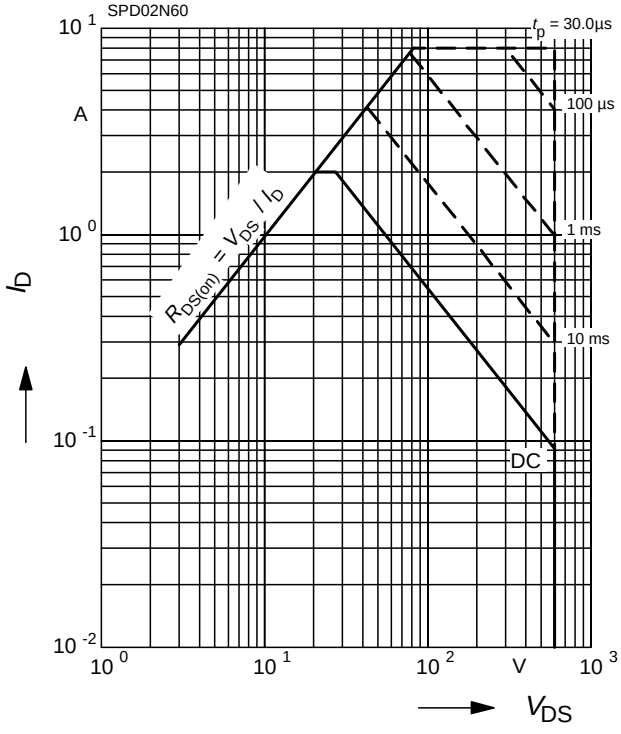
parameter: $V_{GS} \geq 10$ V



Safe operating area

$I_D = f(V_{DS})$

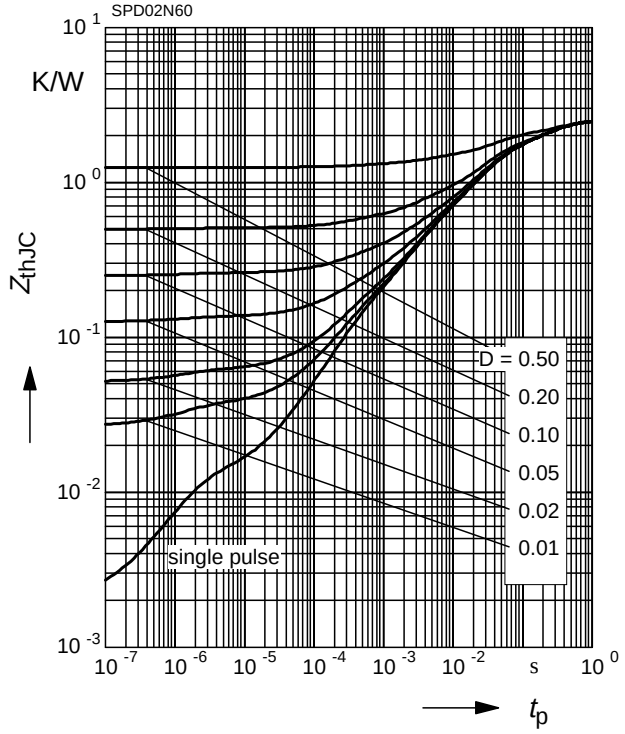
parameter : $D = 0$, $T_C = 25$ °C



Transient thermal impedance

$Z_{thJC} = f(t_p)$

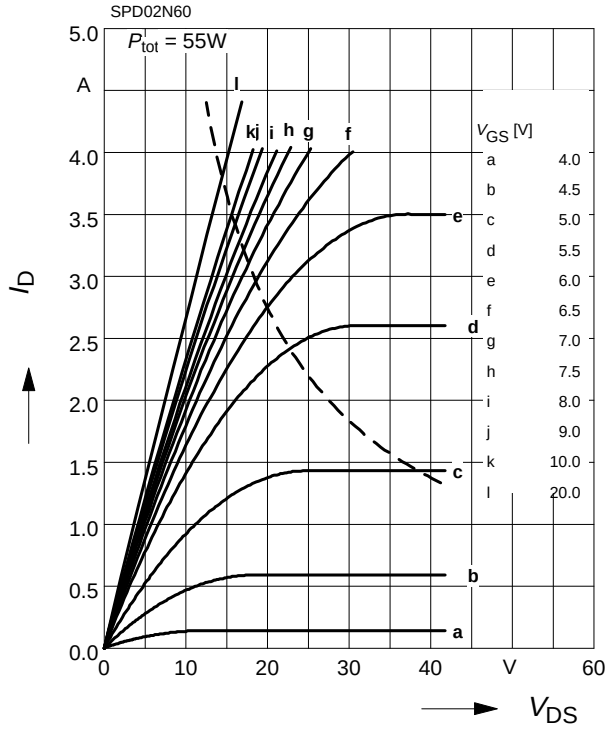
parameter : $D = t_p / T$



Typ. output characteristics

$I_D = f(V_{DS})$

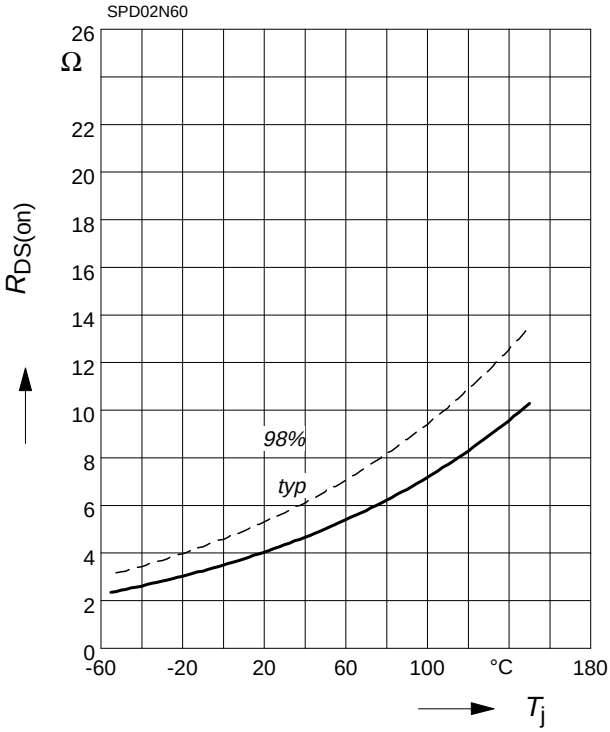
parameter: t_p = 80 µs



Drain-source on-resistance

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

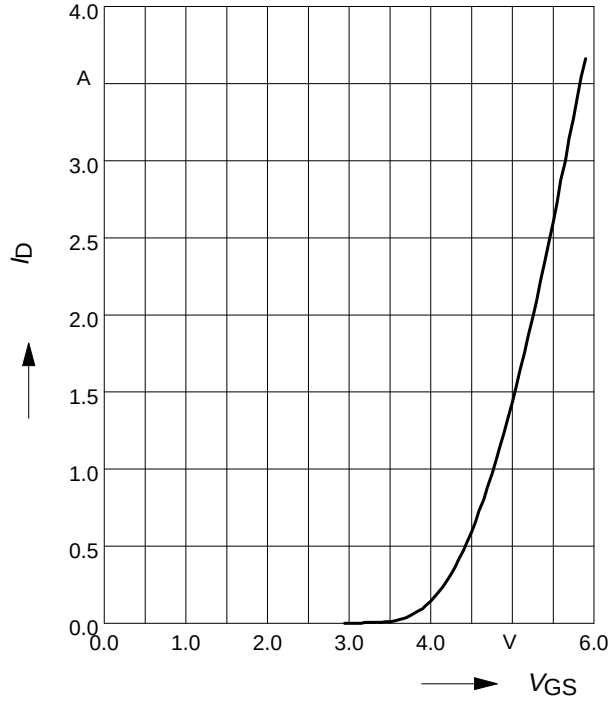
parameter : I_D = 1.3 A, V_{GS} = 10 V



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

parameter: t_p = 80 µs

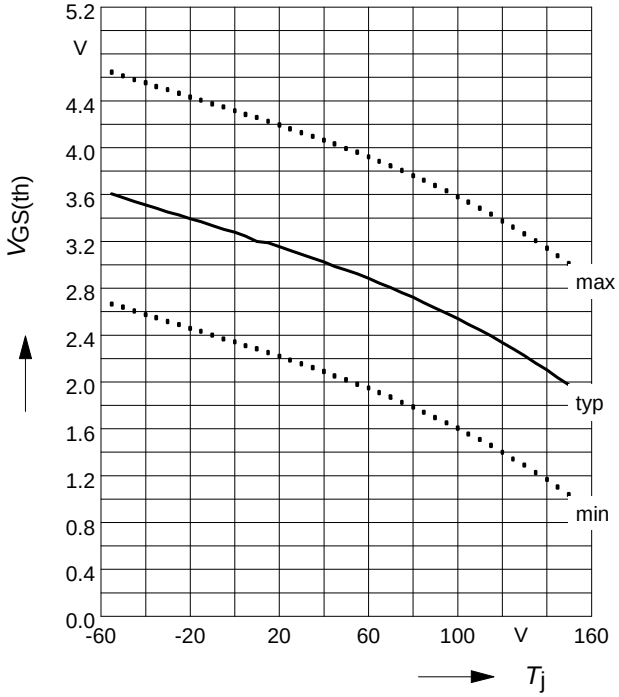
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Gate threshold voltage

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

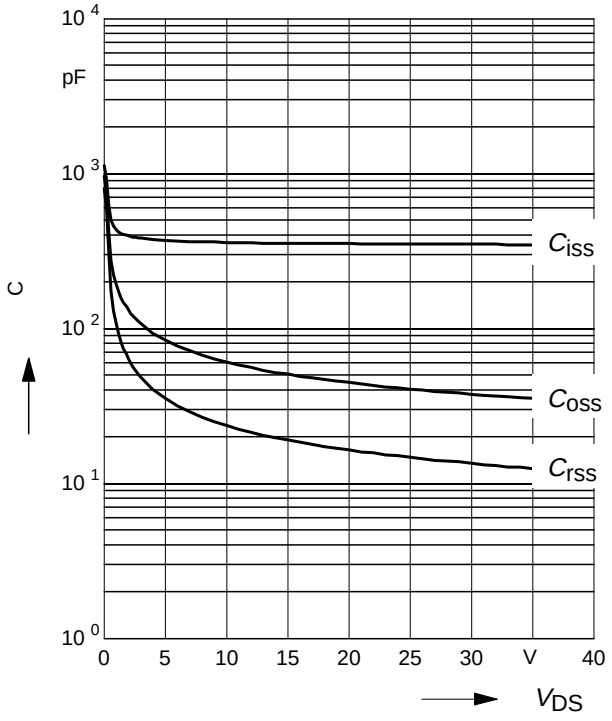
parameter : $V_{GS} = V_{DS}, I_D$ = 1 mA



Typ. capacitances

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

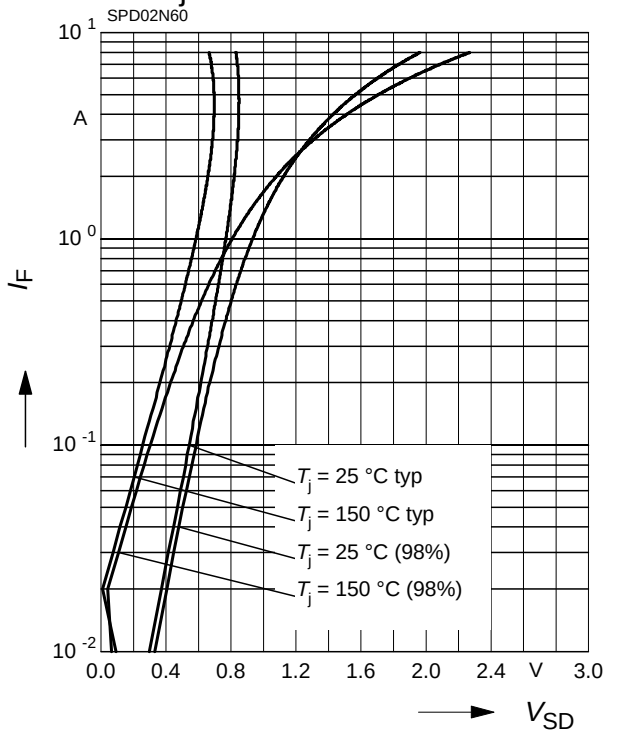
Parameter: V_{GS}=0 V, *f*=1 MHz



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

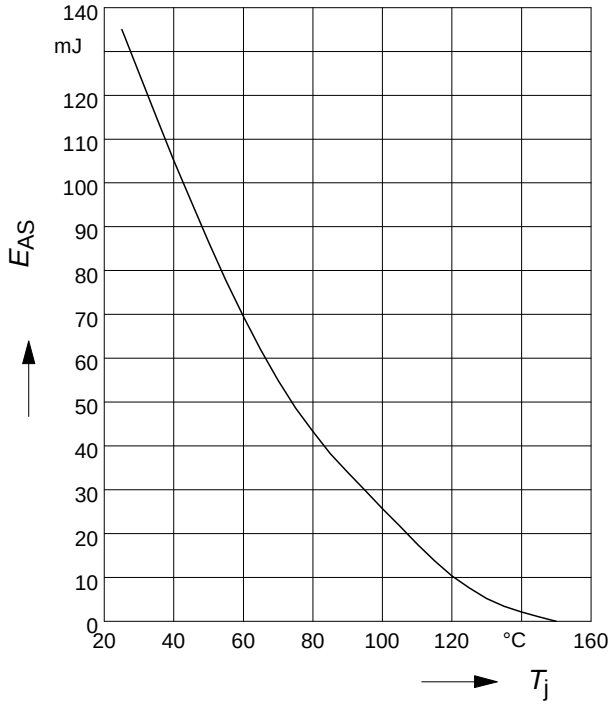
parameter: T_j , tp = 80 µs



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

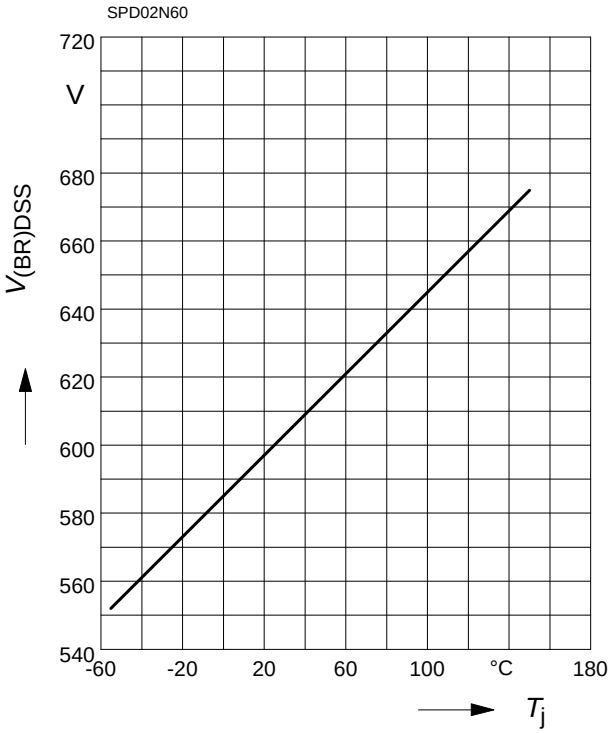
parameter: I_D = 2 A, V_{DD} = 50 V

R_{GS} = 25 Ω



Drain-source breakdown voltage

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



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