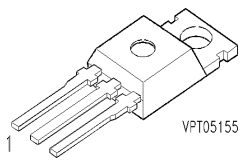
SIEMENS

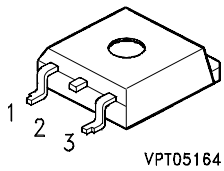
Preliminary data

SPB47N10L
SPP47N10L

SIPMOS® Power Transistor

- N-Channel
- Enhancement mode
- Avalanche rated
- Logic Level
- d*v*/d*t* rated
- 175°C operating temperature





Pin 1	Pin 2	Pin 3
G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	@ V_{GS}	Package	Ordering Code
SPB47N10L	100 V	47 A			P-TO263-3-2	Q67040-S4176
SPP47N10L			0.04 Ω	V_{GS} = 4.5 V	P-TO220-3-1	Q67040-S4177
			0.026 Ω	V_{GS} = 10 V		

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

Parameter	Symbol	Value	Unit
Continuous drain current	I_D		A
T_C = 25 °C		47	
T_C = 100 °C		33	
Pulsed drain current	I_{Dpulse}	188	
T_C = 25 °C			
Avalanche energy, single pulse	E_{AS}	650	mJ
I_D = 47 A, V_{DD} = 25 V, R_{GS} = 25 Ω			
Avalanche current,periodic limited by T_{jmax}	I_{AR}	47	A
Avalanche energy,periodic limited by $T_{j(max)}$	E_{AR}	17.5	mJ
Reverse diode d*v*/d*t*	d*v*/d*t*	6	kV/µs
I_S = 47 A, $V_{DD} \leq V_{(BR)DSS}$, d*i*/d*t* = 200 A/µs,			
T_{jmax} = 175 °C			
Gate source voltage	V_{GS}	±14	V
Gate source peak voltage , $t_p \leq$ 100µs	V_{gs}	±20	
Power dissipation	P_{tot}	175	W
T_C = 25 °C			
Operating temperature	T_j	-55 ... +175	°C
Storage temperature	T_{stg}	-55 ... +175	
IEC climatic category; DIN IEC 68-1		55/175/56	

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}	-	-	0.85	K/W
Thermal resistance, junction - ambient	R_{thJA}	-	62.5	-	
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	tbd	-	
@ 6 cm^2 cooling area[1)]		-	tbd	-	

Static Characteristics

Drain- source breakdown voltage V_{GS} = 0 V, I_D = 0.25 mA	$V_{(BR)DSS}$	100	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D = 150 µA	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS} = 100 V, V_{GS} = 0 V, T_j = 25 °C		-	0.1	1	
V_{DS} = 100 V, V_{GS} = 0 V, T_j = 150 °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} = 4.5 V, I_D = 33 A		-	0.025	0.04	
V_{GS} = 10 V, I_D = 33 A		-	0.018	0.026	

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 = 33 A	g_{fs}	30	45	-	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	-	2000	2500	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	-	375	470	
Reverse transfer capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{rss}	-	210	265	
Turn-on delay time V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 47 A, R_G = 2 Ω	$t_{d(on)}$	-	50	75	ns
Rise time V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 47 A, R_G = 2 Ω	t_r	-	100	150	
Turn-off delay time V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 47 A, R_G = 2 Ω	$t_{d(off)}$	-	50	75	
Fall time V_{DD} = 30 V, V_{GS} = 4.5 V, I_D = 47 A, R_G = 2 Ω	t_f	-	70	105	

Electrical Characteristics

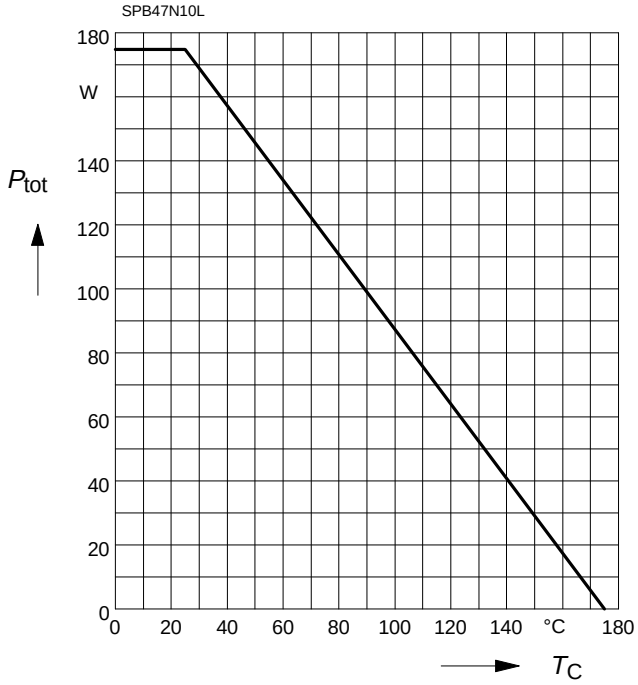
Parameter at T_j = 25 °C, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Gate charge at threshold V_{DD} = 80 V, I_D≥0,1 A, V_{GS} = 0 to 1 V	$Q_{G(th)}$	-	7	11	nC
Gate charge at V_{gs}=5V V_{DD} = 80 V, I_D = 47 A , V_{GS} = 0 to 5 V	$Q_{g(5)}$	-	43	65	
Gate charge total V_{DD} = 80 V, I_D = 47 A, V_{GS} = 0 to 10 V	Q_g	-	90	135	nC
Gate plateau voltage V_{DD} = 80 V, I_D = 47 A	$V_{(plateau)}$	-	3.38	-	V

Reverse Diode

Inverse diode continuous forward current T_C = 25 °C	I_S	-	-	47	A
Inverse diode direct current,pulsed T_C = 25 °C	I_{SM}	-	-	188	
Inverse diode forward voltage V_{GS} = 0 V, I_F = 94 A	V_{SD}	-	1.1	1.5	V
Reverse recovery time V_R = 80 V, I_F=I_S , di_F/dt = 100 A/µs	t_{rr}	-	80	120	ns
Reverse recovery charge V_R = 80 V, I_F=I_S , di_F/dt = 100 A/µs	Q_{rr}	-	340	510	nC

Power Dissipation

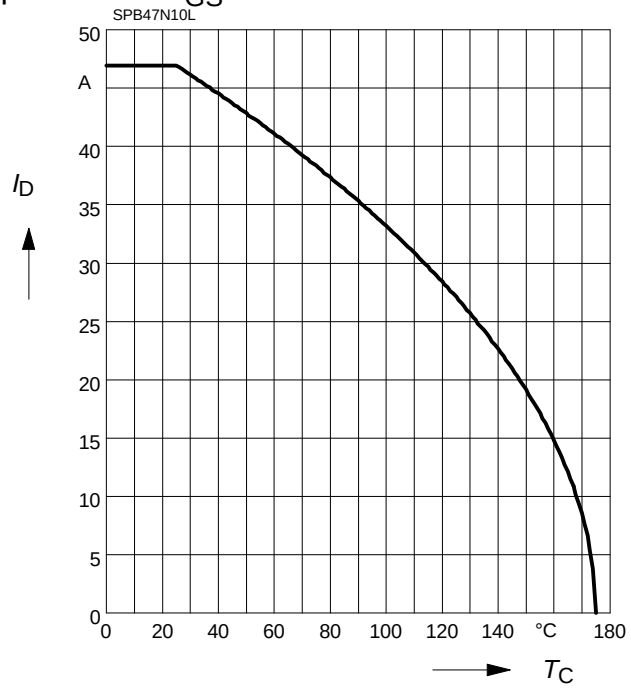
$P_{tot} = f(T_C)$



Drain current

$I_D = f(T_C)$

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



Transient thermal impedance

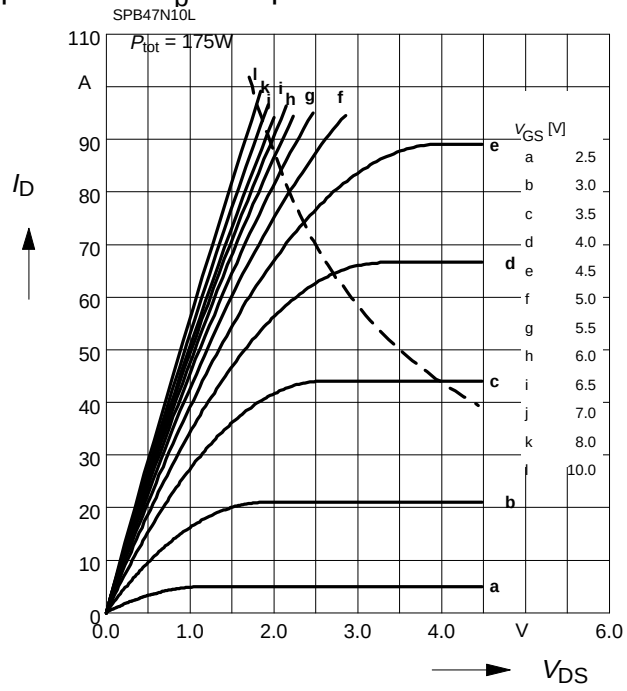
$Z_{thJC} = f(t_p)$

parameter: D = tp/T

Typ. output characteristics

$I_D = f(V_{DS})$

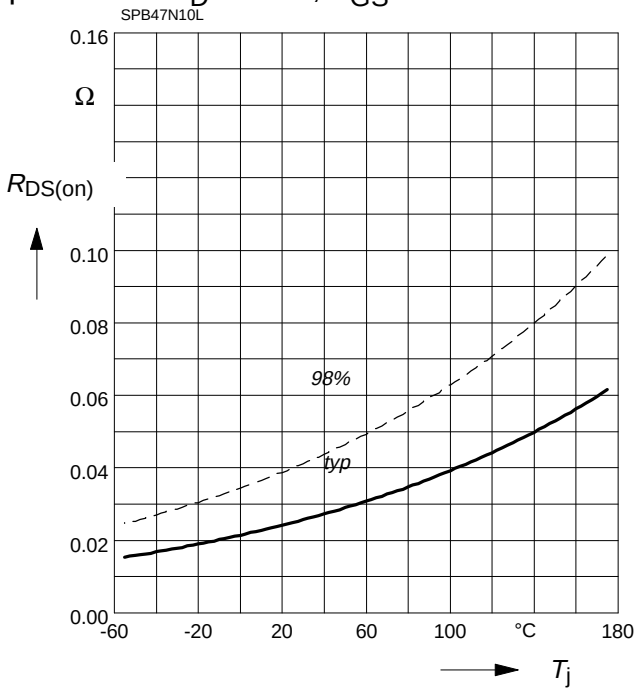
parameter: t_p = 80 µs



Drain-source on-resistance

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

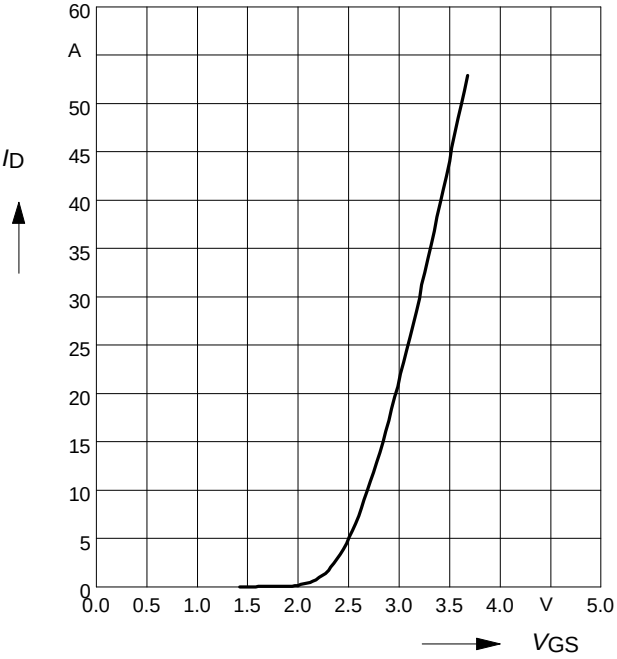
parameter : I_D = 33 A, V_{GS} = 4.5 V



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

parameter: t_p = 80 µs

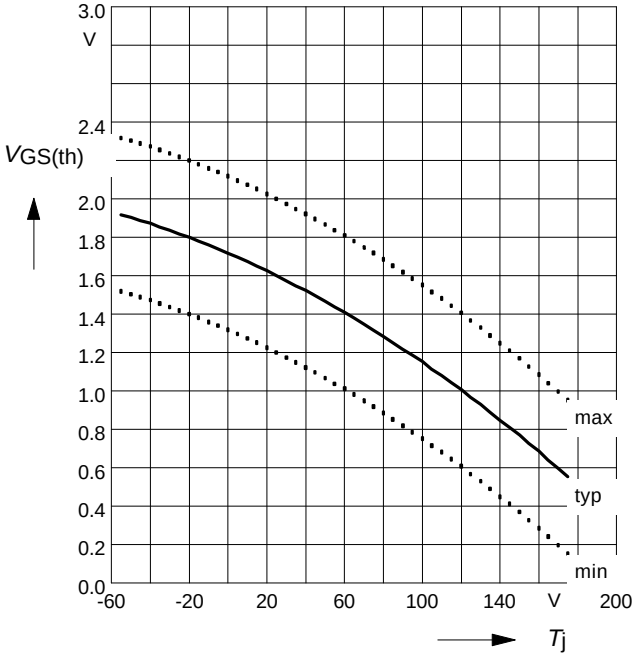
$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$



Gate threshold voltage

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

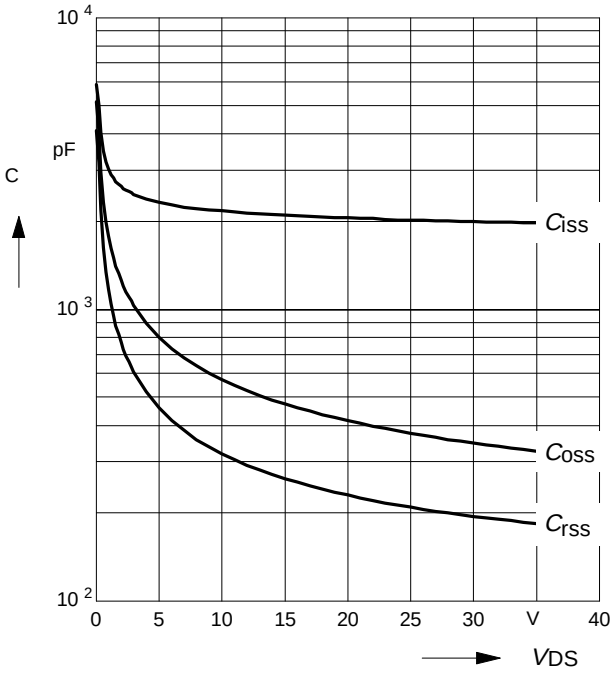
parameter : $V_{GS} = V_{DS}$, I_D = 150 µA



Typ. capacitances

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

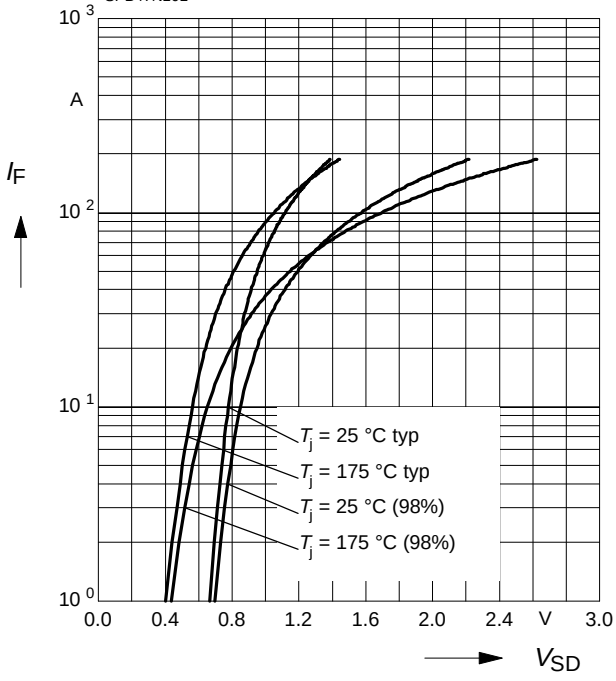
Parameter: V_{GS}=0 V, f=1 MHz



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

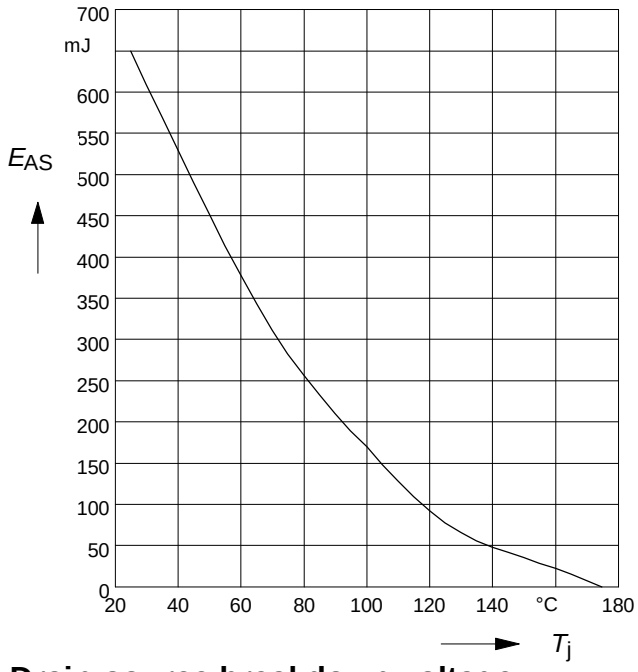
parameter: T_j , tp = 80 µs



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

parameter: I_D = 47 A, V_{DD} = 25 V

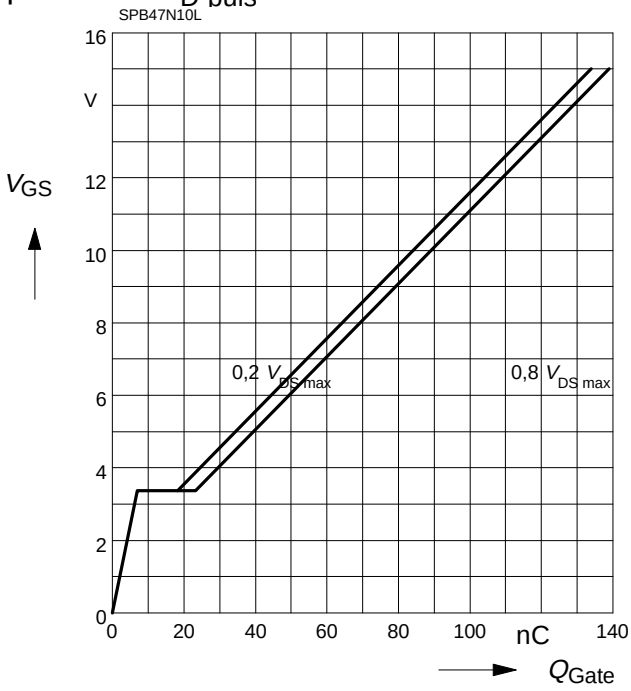
R_{GS} = 25 Ω



Typ. gate charge

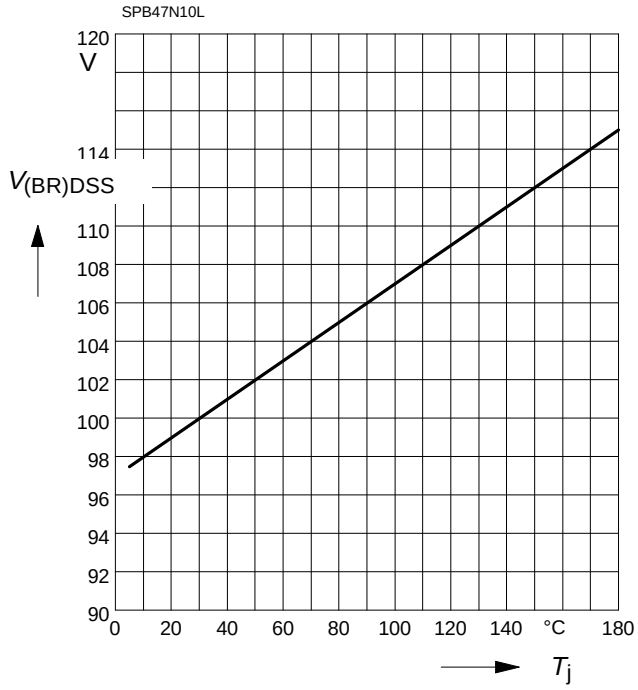
$V_{GS} = f(Q_{Gate})$

parameter: $I_{D\ puls}$ =47A



Drain-source breakdown voltage

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



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