SIPMOS® Power-Transistor

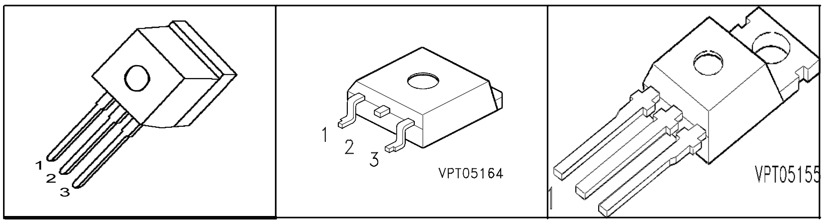
Feature

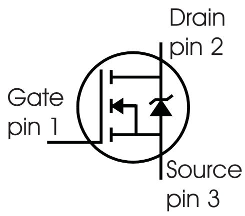
- N-Channel
- Enhancement mode
- Logic Level
- 175°C operating temperature
- Avalanche rated
- dv/dt rated

Product Summary

V_{DS}	100	V
$R_{DS(on)}$	26	mΩ
I_D	47	A

P-TO262-3-1 P-TO263-3-2 P-TO220-3-1





Type	Package	Ordering Code	Marking
SPP47N10L	P-TO220-3-1	Q67040-S4177	47N10L
SPB47N10L	P-TO263-3-2	Q67040-S4176	47N10L
SPI47N10L	P-TO262-3-1	tbd	47N10L

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 T_C=25°C	$I_{D\ puls}$	188	
Avalanche energy, single pulse I_D=47 A , V_{DD}=25V, R_{GS}=25Ω	E_{AS}	400	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	17.5	
Reverse diode dv/dt I_S=47A, V_{DS}=0V, di/dt=200A/µs	dv/dt	6	kV/µs
Gate source voltage	V_{GS}	±20	V
Power dissipation T_C=25°C	P_{tot}	175	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}	-	-	0.85	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	62	
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	62	
@ 6 cm^2 cooling area [1)]		-	-	40	

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=2mA	$V_{(BR)DSS}$	100	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D = 2 mA	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=100V, V_{GS}=0V, T_j=25°C		-	0.1	1	
V_{DS}=100V, V_{GS}=0V, T_j=150°C		-	-	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=33A	$R_{DS(on)}$	-	25	40	mΩ
Drain-source on-state resistance V_{GS}=10V, I_D=33A	$R_{DS(on)}$	-	18	26	

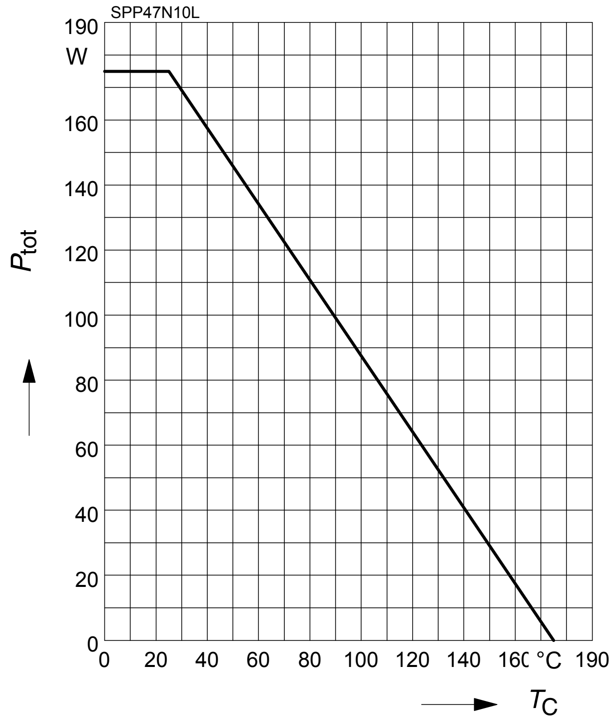
[1]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

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}≥2*I_D*$R_{DS(on)max}$, I_D=33A	18	36	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	2000	2500	pF
Output capacitance	C_{oss}		-	375	470	
Reverse transfer capacitance	C_{rss}		-	210	265	
Turn-on delay time	$t_{d(on)}$	V_{DD}=50V, V_{GS}=4.5V, I_D=47A, R_G=2Ω	-	50	75	ns
Rise time	t_r		-	100	150	
Turn-off delay time	$t_{d(off)}$		-	50	75	
Fall time	t_f		-	70	105	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=80V, I_D=47A	-	8	12	nC
Gate to drain charge	Q_{gd}		-	16	24	
Gate charge total	Q_g	V_{DD}=80V, I_D=47A, V_{GS}=0 to 10V	-	90	135	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=80V, I_D=47A	-	3.38	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	47	A
Inverse diode direct current, pulsed	I_{SM}		-	-	188	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=94A	-	1.1	1.5	V
Reverse recovery time	t_{rr}	V_R=50V, I_F=I_S, di_F/dt=100A/µs	-	80	120	ns
Reverse recovery charge	Q_{rr}		-	340	510	nC

1 Power dissipation

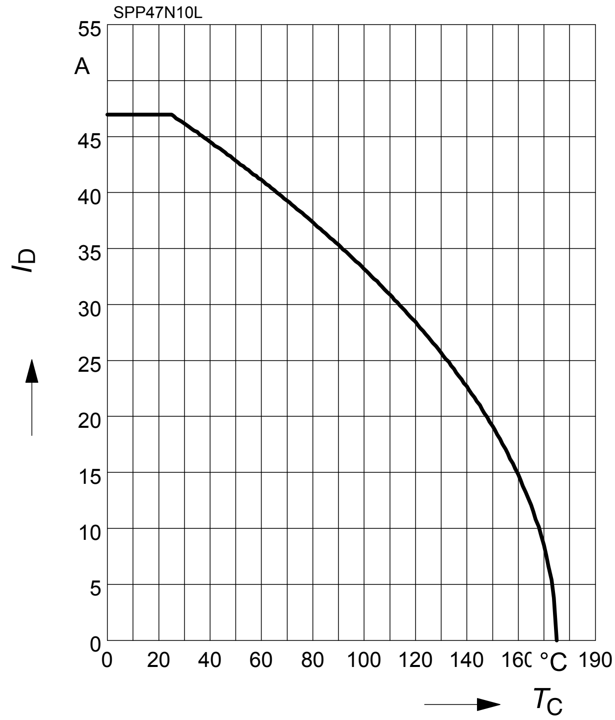
$P_{tot} = f(T_C)$



2 Drain current

$I_D = f(T_C)$

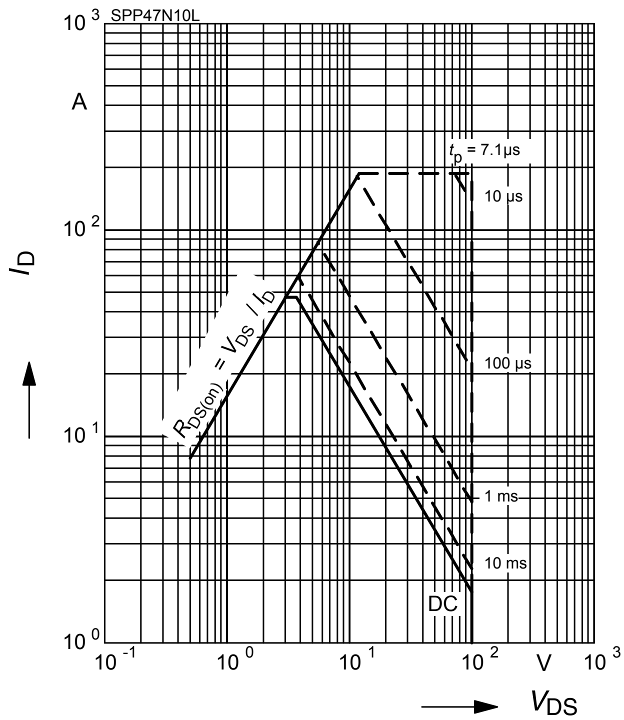
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

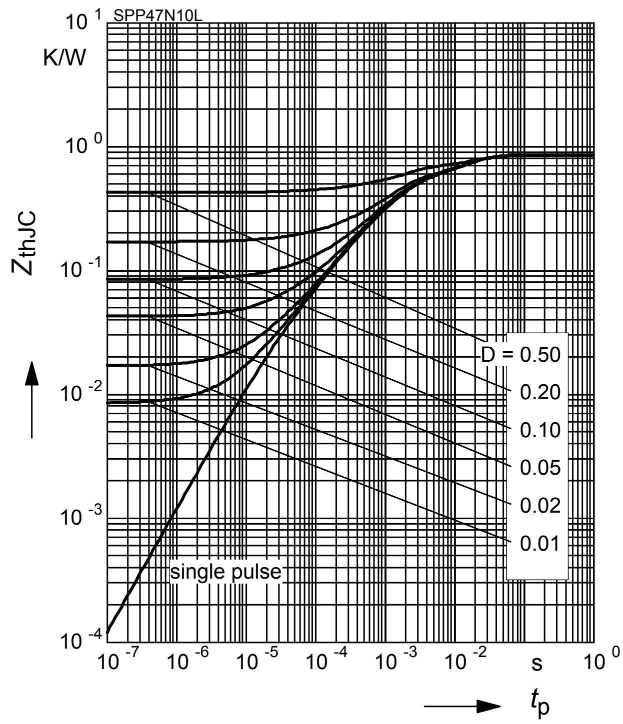
parameter : $D = 0$, $T_C = 25$ °C



4 Transient thermal impedance

$Z_{thJC} = f(t_p)$

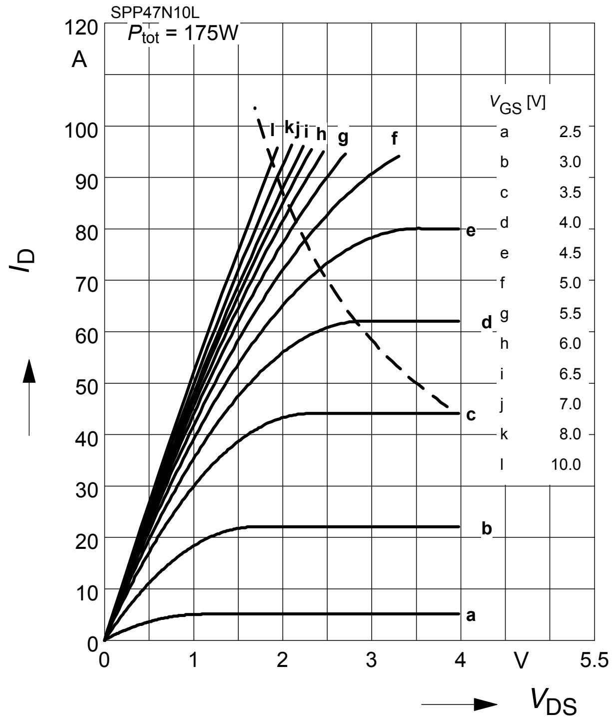
parameter : $D = t_p/T$



5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

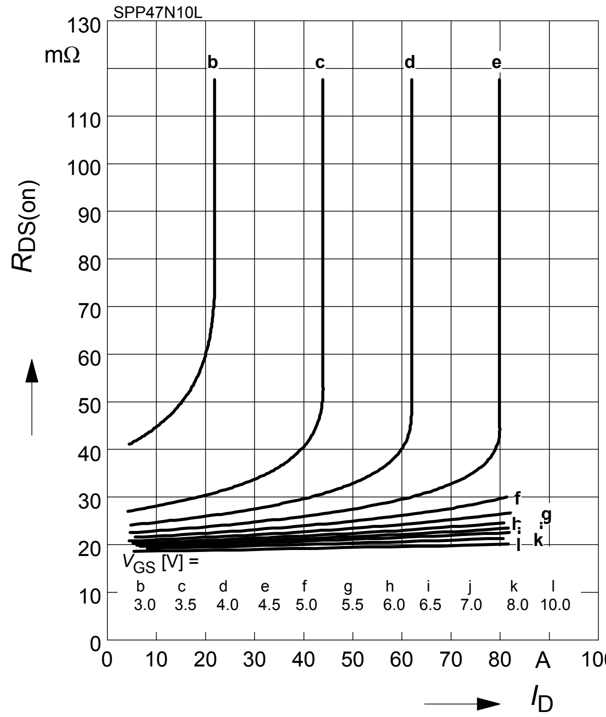
parameter: t_p = 80 µs



6 Typ. drain-source on resistance

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

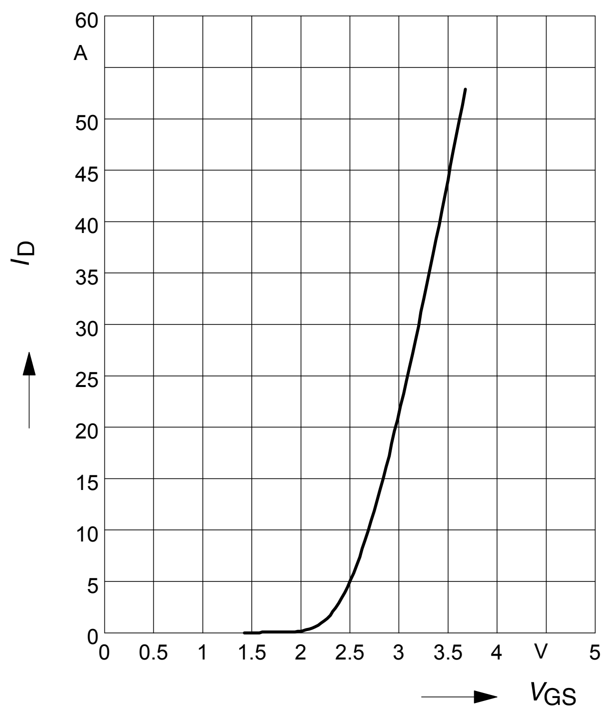
parameter: V_{GS}



7 Typ. transfer characteristics

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

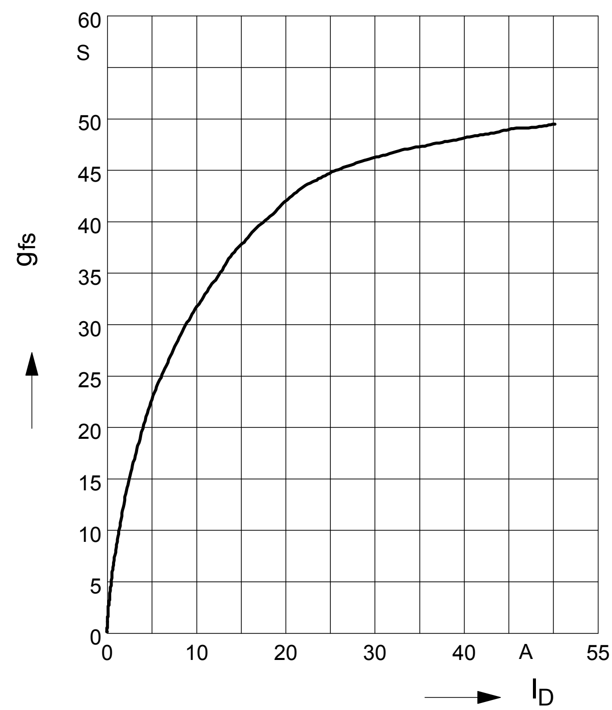
parameter: t_p = 80 µs



8 Typ. forward transconductance

$g_{fs} = f(I_D)$; T_j=25°C

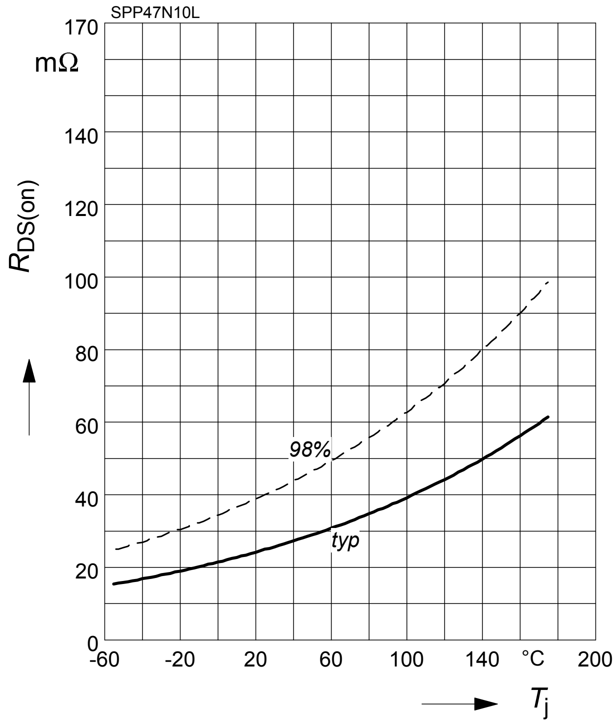
parameter: g_{fs}



9 Drain-source on-state resistance

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

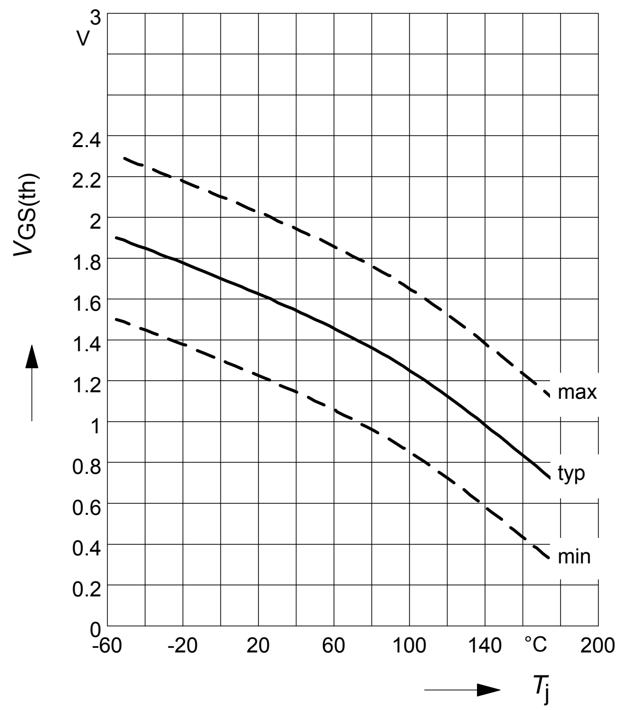
parameter : I_D = 33 A, V_{GS} = 4.5 V



10 Gate threshold voltage

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

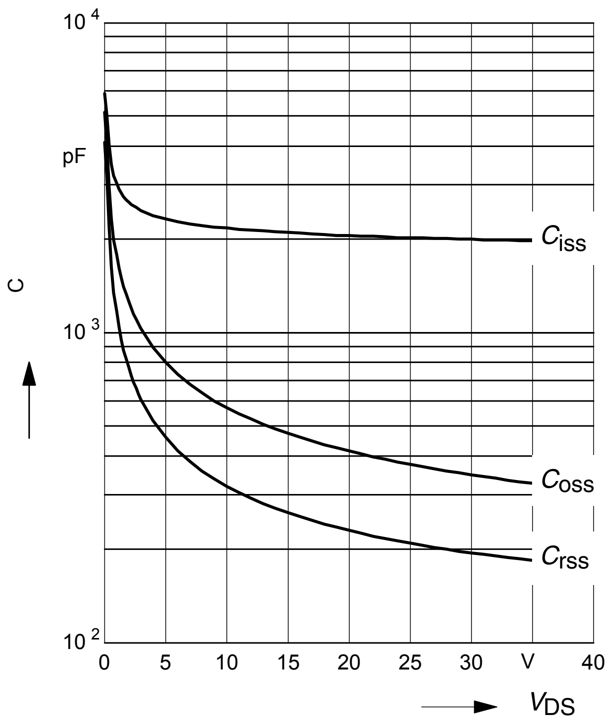
parameter: $V_{GS} = V_{DS}$, I_D = 2 mA



11 Typ. capacitances

$C = f(V_{DS})$

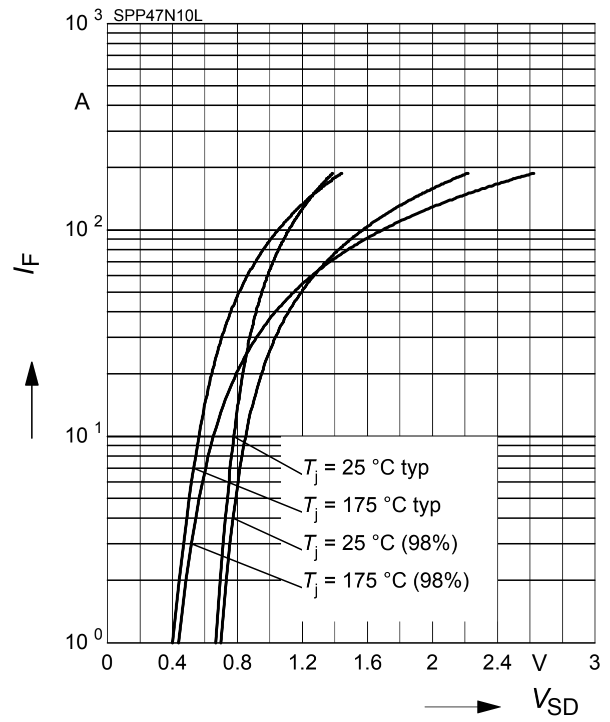
parameter: V_{GS}=0V, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

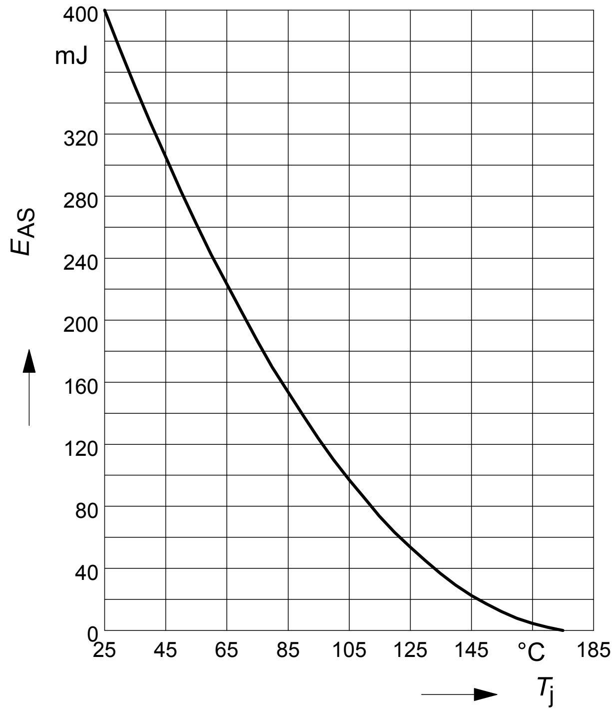
parameter: T_j , t_p = 80 µs



13 Typ. avalanche energy

$E_{AS} = f(T_j)$

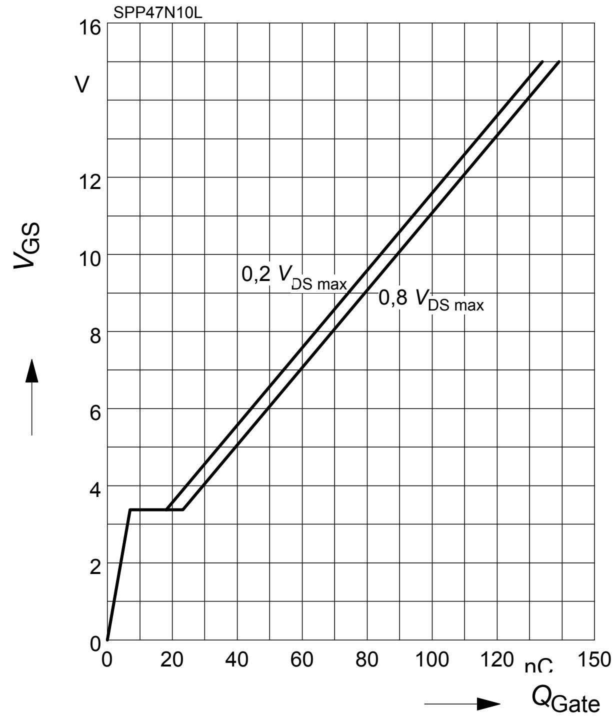
par.: I_D = 47 A , V_{DD} = 25 V, R_{GS} = 25 Ω



14 Typ. gate charge

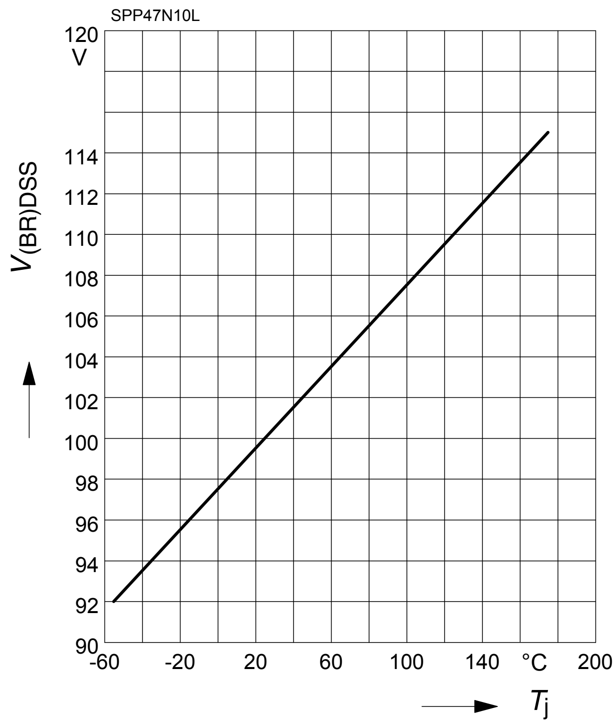
$V_{GS} = f(Q_{Gate})$

parameter: I_D = 47 A pulsed



15 Drain-source breakdown voltage

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



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Further information
Please notice that the part number is BSPP47N10L, BSPB47N10L and BSPI47N10L, for simplicity the device is referred to by the term SPP47N10L, SPB47N10L and SPI47N10L throughout this documentation