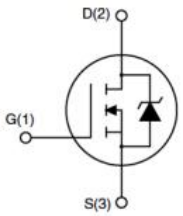
500V N-Channel MOSFET
RCF18N50

General Description :

RCF18N50, N-channel Enhanced VDMOSFET, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220F, which accords with the RoHS standard.

V_{DSS}	500	V
I_D	18	A
P_D (T_C =25℃)	70	W
$R_{DS(ON).TYP.}$	0.28	Ω

TO-220F



Features:

- ▶Fast Switching
- ▶Low ON Resistance
- ▶Low Gate Charge
- ▶Low Reverse transfer capacitances
- ▶100% Single Pulse avalanche energy Test

Applications:

- ▶ Power switch circuit of adaptor and charger

Absolute (Tc=25℃ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{DSS}	Drain -to -Source Voltage	500	V
I_D	Continuous Drain Current	18	A
I_{DM} [a1]	Pulsed Drain Current	72	A
V_{GS}	Gate -to - Source Voltage	±30	V
E_{As} [a2]	Single Pulse Avalanche Energy	1400	mJ
P_D	Power Dissipation	70	W
	Derating Factor above 25°C	0.56	W/℃
T_J , T_{stg}	Operating Junction and Storage Temperature Range	150 , – 55 to 150	℃
T_L	Maximum Temperature for Soldering	300	℃

Caution Stresses greater than those in the "Absolute Maximum Ratings" may cause permanent damage to the device

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Thermal Characteristics

Symbol	Parameter	Rating	Units
$R_{\theta JC}$	Thermal Resistance, Junction - to - Case	1.79	℃/ W
$R_{\theta JA}$	Thermal Resistance, Junction - to - Ambient	100	℃/ W

Electrical Characteristics (Tc= 25℃ unless otherwise specified) :

OFF Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V,I_D=250μA	500	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	I_D =250uA,Reference25℃	--	0.55	--	V/℃
I_{DSS}	Drain to Source Leakage Current	V_{DS}= 500V, V_{GS}=0V,T_a=25℃	--	--	1.0	μA
		V_{DS}=400V, V_{GS}=0V,T_a= 125℃	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} = +30V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS}=-30V	--	--	-100	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain -to -Source On - Resistance	V_{GS} =10V,I_D =9A	--	0.28	0.35	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} =V_{GS},I_D =250μA	2.0	--	4.0	V
g_{fs}	Forward Trans conductance	V_{DS}= 15V,I_D= 18A	--	14	--	S

Pulse width<380μs; duty cycle<2%.

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS} =0V V_{DS} =25V f=1.0MHz	--	2430	--	pF
C_{oss}	Output Capacitance		--	236	--	
C_{rss}	Reverse Transfer Capacitance		--	25	--	

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn -on Delay Time	I_D = 18A,V_{DD} =250V V_{GS} =10V,R_g =6.1Ω	--	15	--	ns
t_r	Rise Time		--	30	--	
$t_{d(OFF)}$	Turn -Off Delay Time		--	50	--	
t_f	Fall Time		--	40	--	
Q_g	Total Gate Charge	I_D = 18A,V_{DD} =250V V_{GS} = 10V	--	52	--	nC
Q_{gs}	Gate to Source Charge		--	13	--	
Q_{gd}	Gate to Drain (“Miller”) Charge		--	20	--	

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Source- Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{SD}	Continuous Source Current (Body Diode)		--	--	18	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	72	A
V_{SD}	Diode Forward Voltage	I_S = 158A,V_{GS} =0V	--	--	1.5	V
t_{rr}	Reverse Recovery Time	I_S = 18A,T_j =25℃	--	592	--	ns
Q_{rr}	Reverse Recovery Charge	dI $_F$/dt=100A/μs,V_{GS} =0V	--	4.7	--	μC

a1 : Repetitive rating; pulse width limited by maximum junction temperature

a2 : L=10mH, I $_D$ = 18A, Start T_J =25℃

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Characteristics Curves

Figure 1: Output Characteritsics

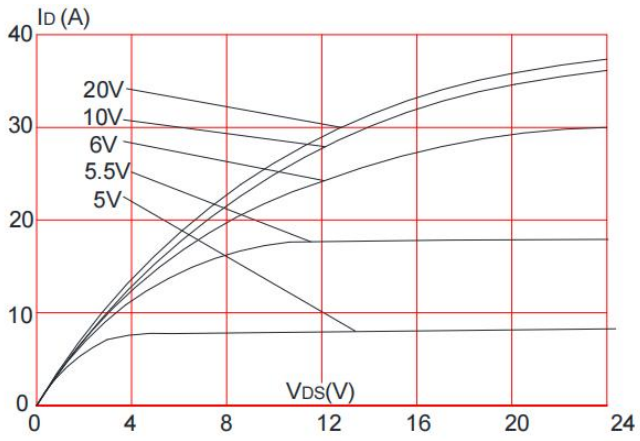

Figure 2: Typical Transfer Characteritsics

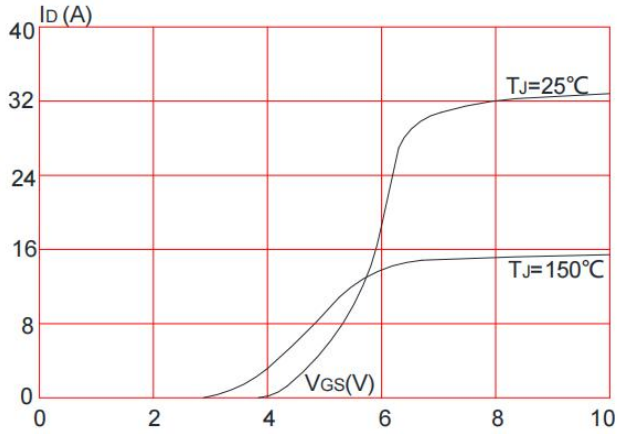

Figure 3:On Resistance Vs Drain Current

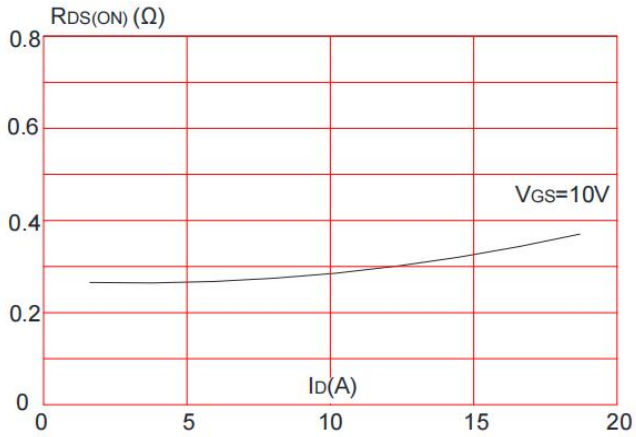

Figure 4:Body Diode Characteristics

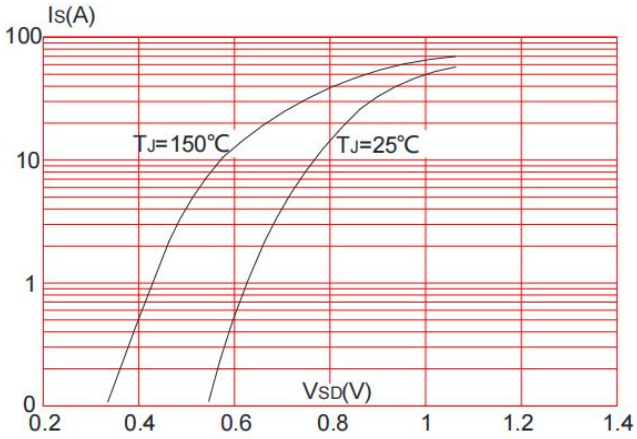

Figure 5:Gate Charge Characteristics

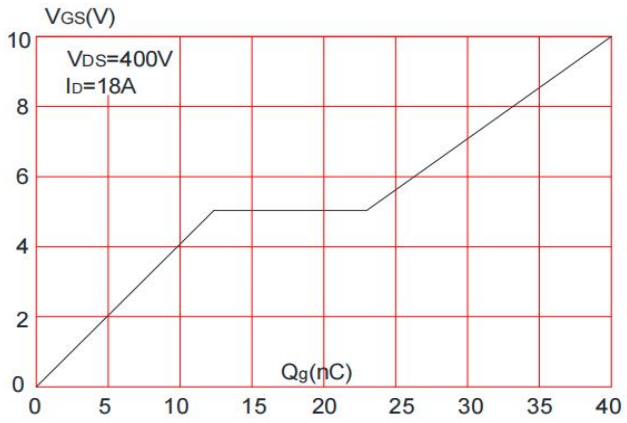

Figure 6:Capacitance Characteristics

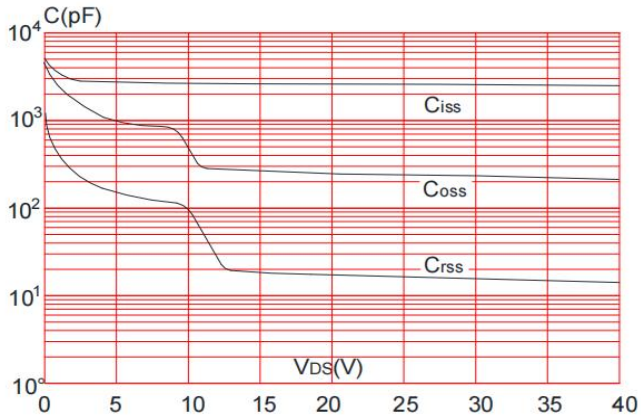

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Figure 7:Normalized Breakdown Voltage vs. Junction Temperature

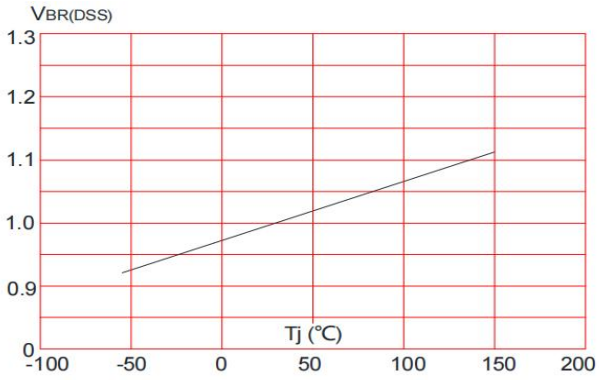


Figure 8:Normalized on Resistance vs. Junction Temperature

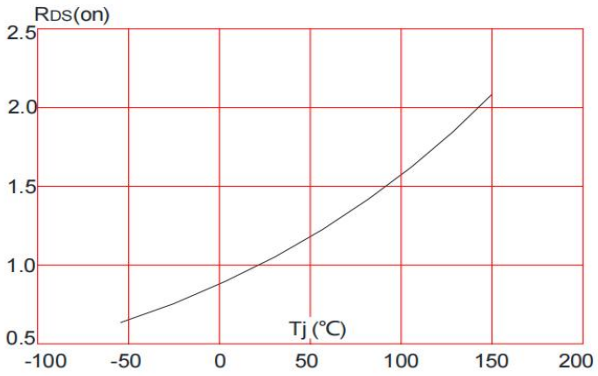


Figure 9:Maximum Safe Operating Area

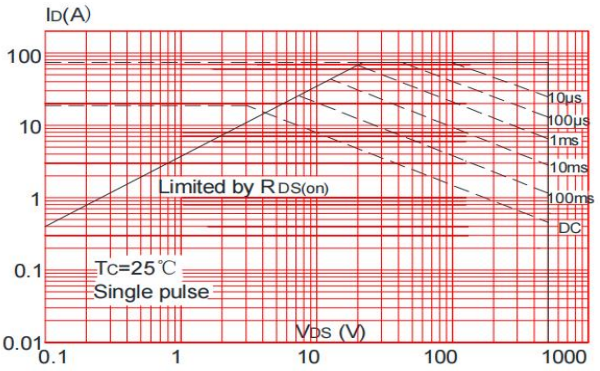


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

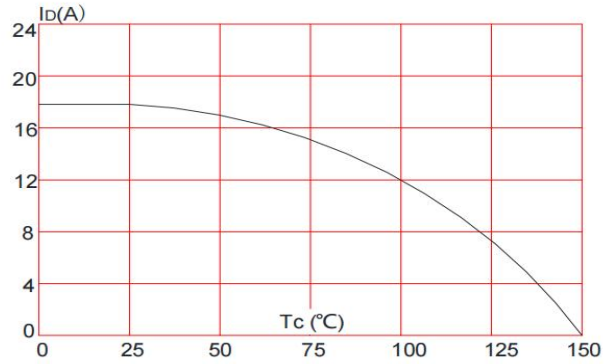
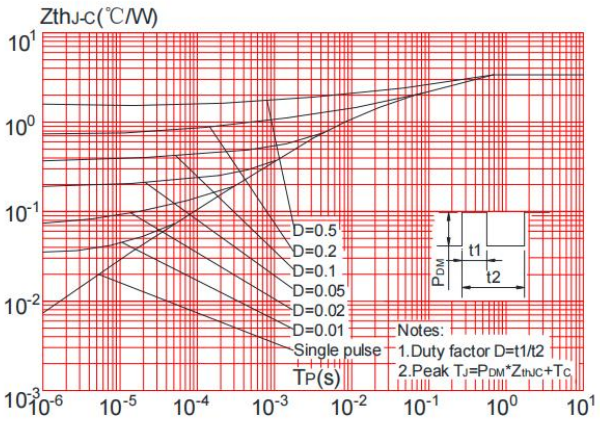


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



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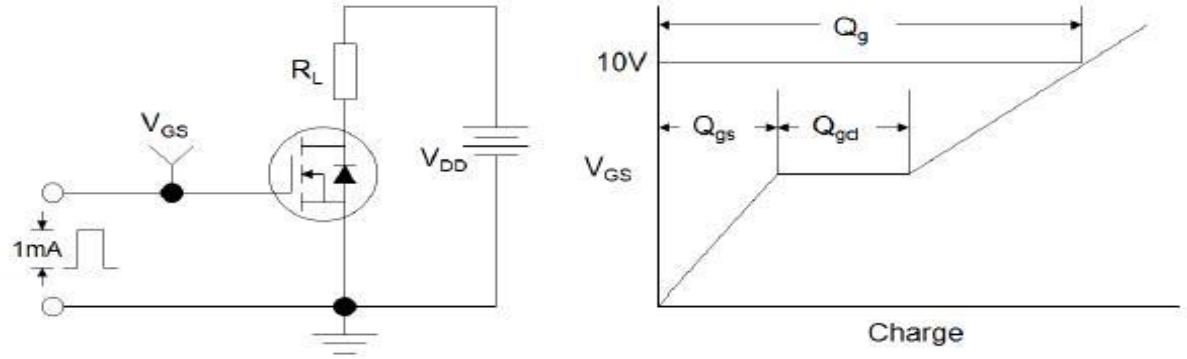
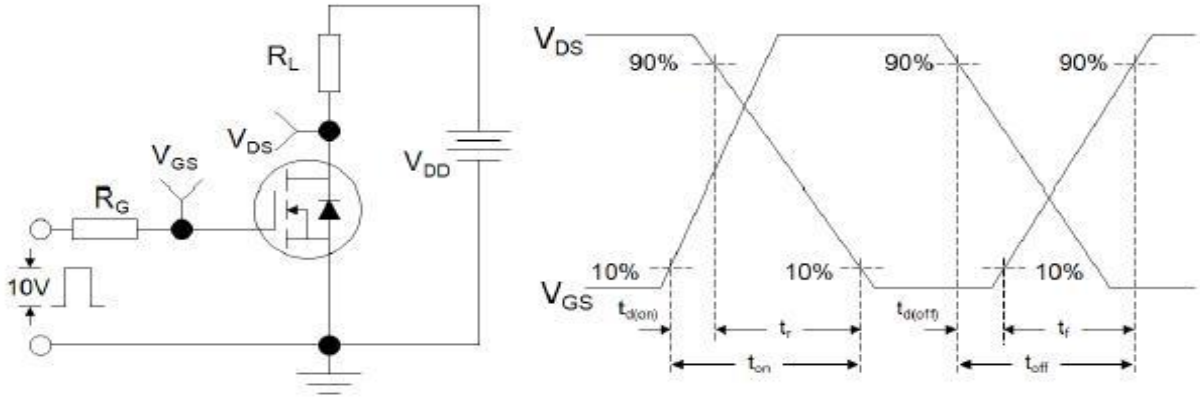
Test Circuit & Waveform

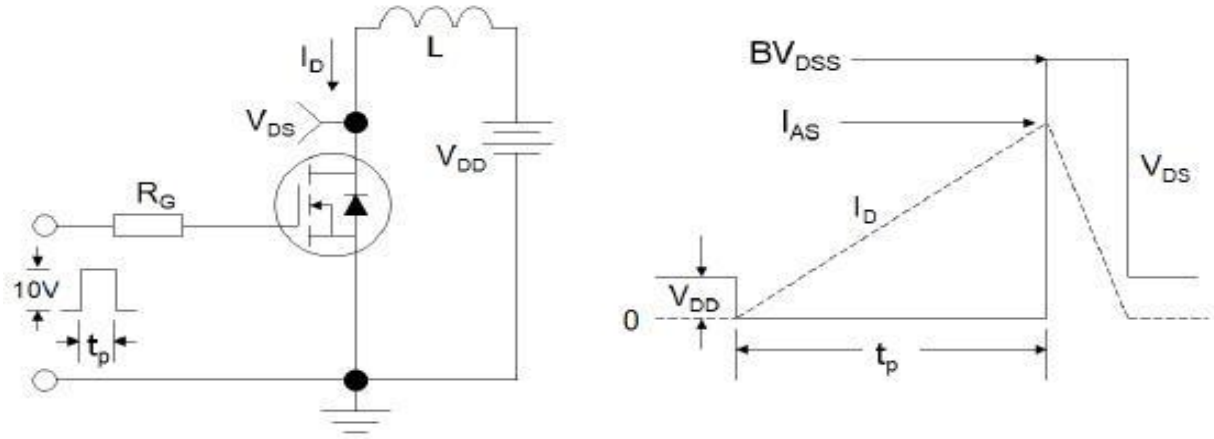
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform



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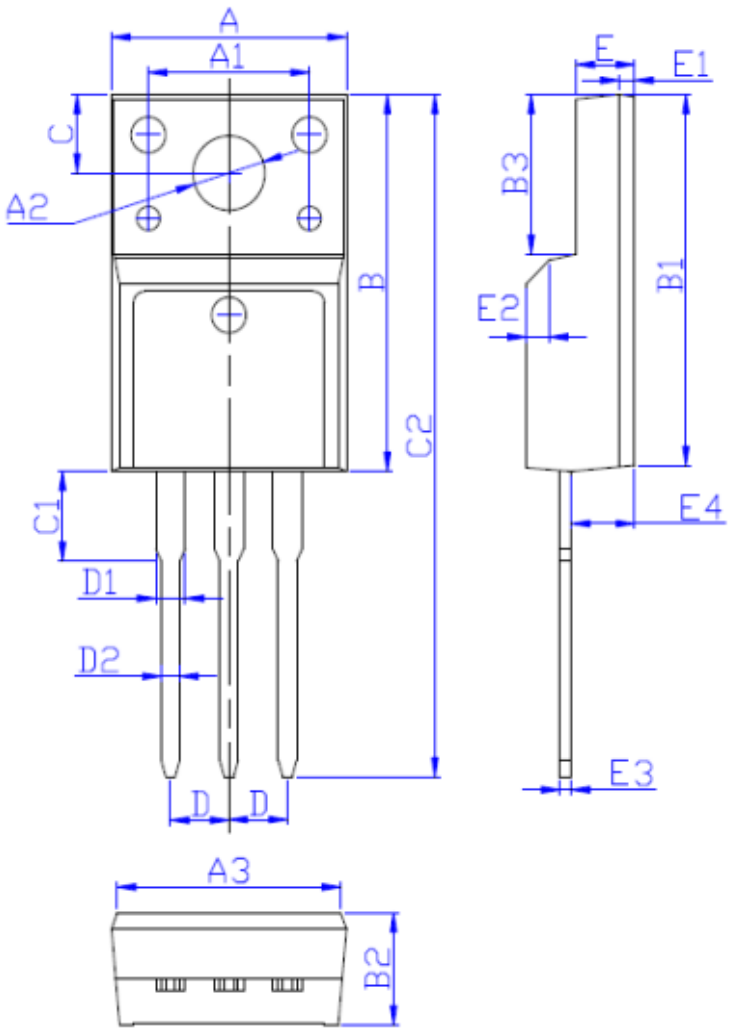
Package Dimension：

TO-220F



DIM	MILLIMETERS
A	10.16±0.30
A1	7.00±0.20
A2	3.12±0.20
A3	9.70±0.30
B	15.90±0.50
B1	15.60±0.50
B2	4.70±0.30
B3	6.70±0.30
C	3.30±0.25
C1	3.25±0.30
C2	28.70±0.50
D	Typical 2.54
D1	1.47 (MAX)
D2	0.80±0.20
E	2.55±0.25
E1	0.70±0.25
E2	1.0×45°
E3	0.50±0.20
E4	2.75±0.30

(Unit:mm)