CR10N60F A9K

V_{DSS}	600	V
I_D	10	A
$P_D(T_C=25℃)$	40	W
$R_{DS(ON)Typ}$	0.68	Ω

General Description：

CR10N60F A9K, the silicon N-channel Enhanced VDMOSFETs, 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.

Features：

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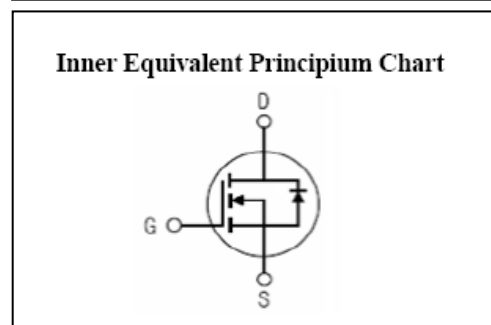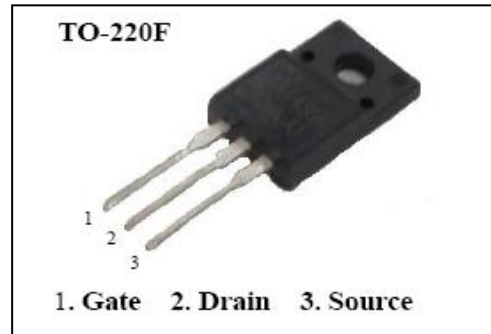- **100% Single Pulse avalanche energy Test**

TO-220F

1. Gate   2. Drain   3. Source

Inner Equivalent Principium Chart

Applications：

Power switch circuit of adaptor and charger.

Absolute（Tc= 25℃ unless otherwise specified）：

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current	10	A
	Continuous Drain Current $T_C = 100℃$	6.3	A
$I_{DM}{}^{a1}$	Pulsed Drain Current	40	A
V_{GS}	Gate-to-Source Voltage	± 30	V
$E_{AS}{}^{a2}$	Single Pulse Avalanche Energy	580	mJ
$dv/dt\ ^{a3}$	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	40	W
	Derating Factor above 25℃	0.32	W/℃
T_J，T_{stg}	Operating Junction and Storage Temperature Range	150，−55 to 150	℃
T_L	Maximum Temperature for Soldering	300	℃

Electrical Characteristics（T_J= 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	600	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	ID=250uA,Reference25℃	--	0.67	--	V/℃
I_{DSS}	Drain to Source Leakage Current	V_{DS} =600V, V_{GS}= 0V, T_J = 25℃	--	--	1	μA
		V_{DS} =480V, V_{GS}= 0V, T_J = 125℃	--	--	100	μA
$I_{GSS(F)}$	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=5A	--	0.68	0.9	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.0	--	4.0	V

Pulse width tp≤300μs, δ ≤2%

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	V_{DS}=15V, I_D =5A	--	9.5	--	S
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1.0MHz	--	1530	--	pF
C_{oss}	Output Capacitance		--	116	--	
C_{rss}	Reverse Transfer Capacitance		--	4.9	--	

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D =10A V_{DD} = 300V R_G =10Ω	--	26	--	ns
tr	Rise Time		--	23	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	49	--	
t_f	Fall Time		--	27	--	
Q_g	Total Gate Charge	I_D =10A V_{DD} =480V V_{GS} = 10V	--	31	--	nC
Q_{gs}	Gate to Source Charge		--	7	--	
Q_{gd}	Gate to Drain ("Miller")Charge		--	12	--	

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	10	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	40	A
V_{SD}	Diode Forward Voltage	I_S=10A,V_{GS}=0V	--	--	1.5	V
trr	Reverse Recovery Time	I_S=10A,T_j = 25℃ dI$_F$/dt=100A/us, V_{GS}=0V	--	1010	--	ns
Qrr	Reverse Recovery Charge		--	5150	--	nC
I_{RRM}	Reverse Recovery Current		--	13.5	--	A
Pulse width tp≤300μs, δ ≤2%						

Symbol	Parameter	Max.	Units
R$_{θJC}$	Junction-to-Case	3.13	℃/W
R$_{θJA}$	Junction-to-Ambient	62.5	℃/W

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

a2：L=10mH, I_D=10A, Start T_J=25℃

a3： I_{SD} =10A,di/dt ≤100A/us,V_{DD}≤BV$_{DS,}$ Start T_J=25℃

Test Circuit and Waveform

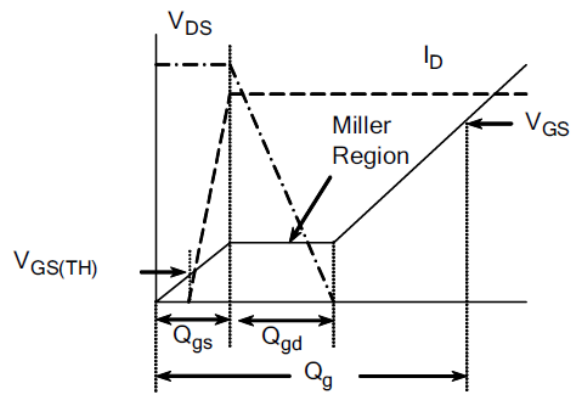Figure 14. Gate Charge Test Circuit

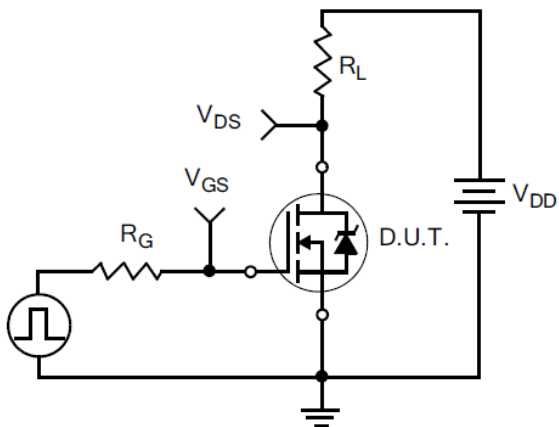Figure 15. Gate Charge Waveforms
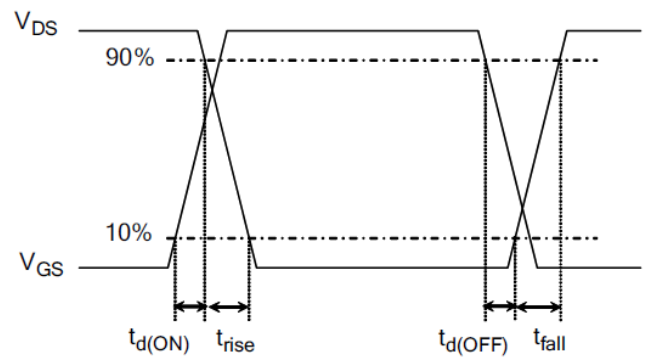

Figure 16. Resistive Switching Test Circuit

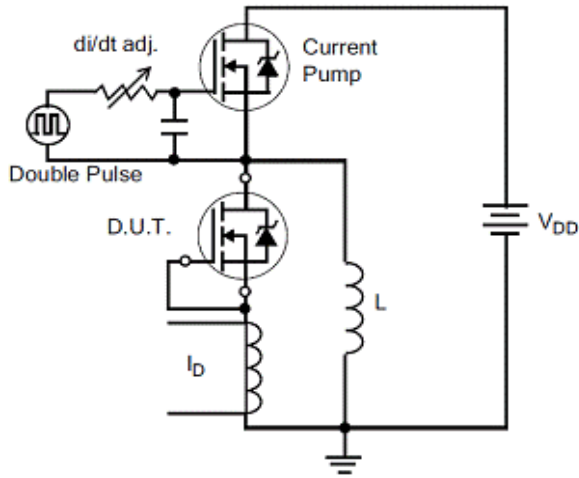Figure 17. Resistive Switching Waveforms
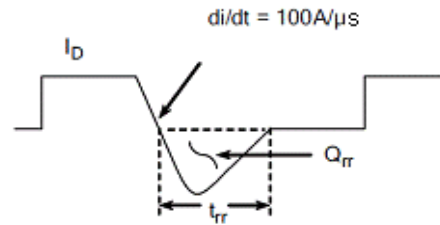
Figure 18. Diode Reverse Recovery Test Circuit
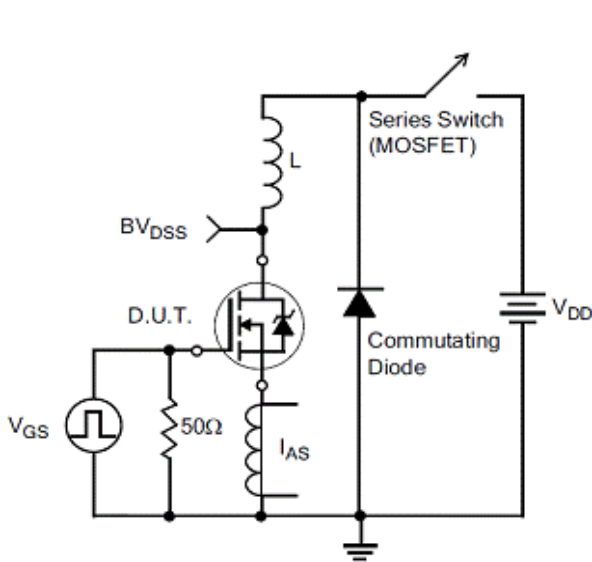

Figure 19. Diode Reverse Recovery Waveform
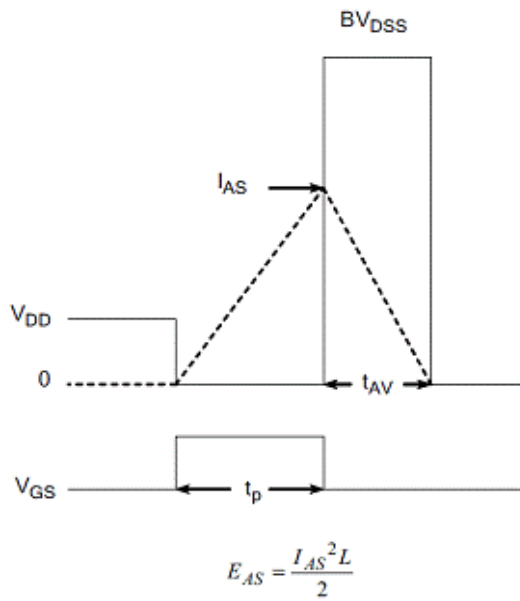

Figure20.Unclamped Inductive Switching Test Circuit

Figure21.Unclamped Inductive Switching Waveform

$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Package Information

Items	Values(mm)	
	MIN	MAX
A	9.60	10.4
B	15.4	16.2
B1	8.90	9.50
C	4.30	4.90
C1	2.10	3.00
D	2.40	3.00
E	0.60	1.00
F	0.30	0.60
G	1.12	1.42
H	3.40	3.80
L*	12.0	14.0
N	2.34	2.74
Q	3.15	3.55
ΦP	2.90	3.30

*adjustable

TO-220F Package

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