KIA
SEMICONDUCTORS

90A，30V
N-CHANNEL MOSFET

100N03A

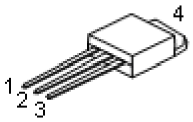
1. Description

This Power MOSFET is produced using KIA`s advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

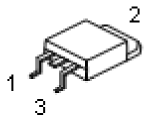
2. Features

- $R_{DS(on)}$=3.1mΩ@ V_{GS}=10V
- Improved dv/dt capability
- Fast switching
- Green device available

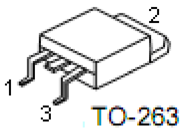
3.Symbol



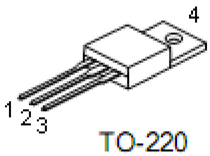
TO-251



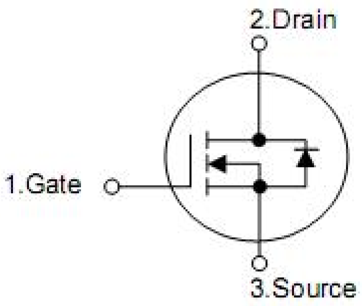
TO-252



TO-263



TO-220



Pin	Function
1	Gate
2	Drain
3	Source

4. Absolute maximum ratings

(T_A=25°C,unless otherwise noted)

Parameter		Symbol	Rating		Units
			To-251/252	To-220/263	
Drain-source voltage		V_{DSS}	30		V
Gate-source voltage		V_{GSS}	$\underline{+}$20		V
Continuous drain current	T_C=25ºC	I_D	90		A
	T_C=100ºC		57		A
Pulse drain current (note 1)	T_C=25ºC	I_{DP}	360		A
Avalanche current (note 2)		I_{AS}	50		A
Avalanche energy, (note 2)		E_{AS}	125		mJ
Maximum power dissipation	T_C=25 ºC	P_D	88	158	W
	Derate above 25 ºC		0.59	1.06	W/℃
Junction & storage temperature range		T_J,T_{STG}	-55-175		℃

5. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance, Junction-ambient	$R_{\theta JA}$	62	ºC/W
Thermal resistance, Junction-case	$R_{\theta JC}$	1.7	ºC/W

6. Electrical characteristics

(T_A=25°C,unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V,I_{DS}=250μA	30	-	-	V
BV_{DSS} temperature coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=1mA	-	0.03	-	V/°C
Zero gate voltage drain current	I_{DSS}	V_{DS}=30V, V_{GS}=0V, T_J=25°C	-	-	1	μA
		V_{DS}=24V, V_{GS}=0V, T_J=125°C	-	-	10	
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.2	1.6	2.5	V
$V_{GS(th)}$ temperature coefficient	$\triangle V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	-	-5	-	mV/°C
Gate leakage current	I_{GSS}	V_{GS}=$\pm$20V, V_{DS}=0V	-	-	$\pm$100	nA
Drain-source on-resistance(note3)	$R_{DS(on)}$	V_{GS}=10V,I_D=24A (To-251/252)	-	3.1	4	mΩ
		V_{GS}=10V,I_D=24A(To-220,263)		4.0	5.0	
		V_{GS}=4.5V,I_D=12A	-	4.5	6	
Forward transconductance	gfs	V_{DS}=10V,I_D=10A	-	15.5	-	S
Gate resistance	R_g	V_{DS}=0V, V_{GS}=0V,f=1MHz	-	2	4	Ω
Input capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1MHz	-	2200	3190	pF
Output capacitance	C_{oss}		-	280	410	
Reverse transfer capacitance	C_{rss}		-	177	260	
Turn-on delay time(note 3,4)	$t_{d(on)}$	V_{DD}=15V, I_D=15A, R_G=3.3Ω,V_{GS}=10V	-	12.6	24	nS
Rise time(note 3,4)	t_r		-	19.5	37	
Turn-off delay time(note 3,4)	$t_{d(off)}$		-	42.8	81	
Fall time(note 3,4)	t_f		-	13.2	25	
Total gate charge(note 3,4)	Q_g	V_{DS}=15V, V_{GS}=4.5V I_{DS}=24A	-	24	34	nC
Gate-source charge(note 3,4)	Q_{gs}		-	4.2	6	
Gate-drain charge(note 3,4)	Q_{gd}		-	13	18	
Single pulse avalanche energy	EAS	V_{DD}=25V,L=0.1mH,I_{AS}=24A	31	-	-	mJ
Continuous source current	I_S	V_{GS}=V_{DS}=0V,force current	-	-	90	A
Pulsed source current (note 3)	I_{SM}		-	-	360	A
Diode forward voltage(note 3)	V_{SD}	V_{GS}=0V,I_S=1A,T_J=25°C	-	-	1	V
Reverse recovery time	t_{rr}	V_{DS}=30V,I_S=1A, di/dt=100A/μs	-	-	-	nS
Reverse recovery charge	Q_{rr}		-	-	-	nC

Note:1: Repetitive rating, pulse width limited by max junction temperature.

2: V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=50A, R_G=25Ω, starting T_J=25°C

3: The data tested by pulsed, pulse width ≦300us, duty cycle ≦2%

4: Essentially independent of operating temperature.

7. Test circuits and waveforms

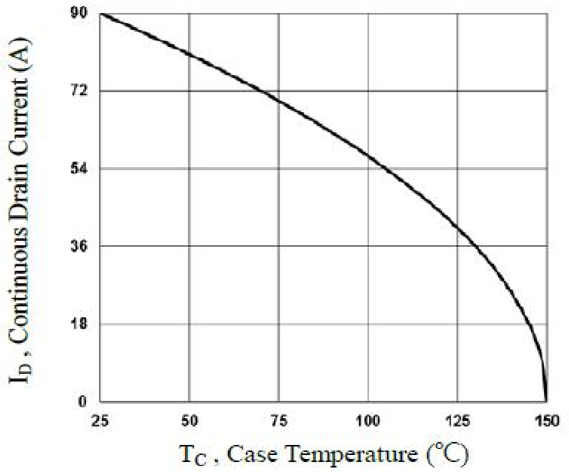


Fig.1 Continuous drain current vs. Tc

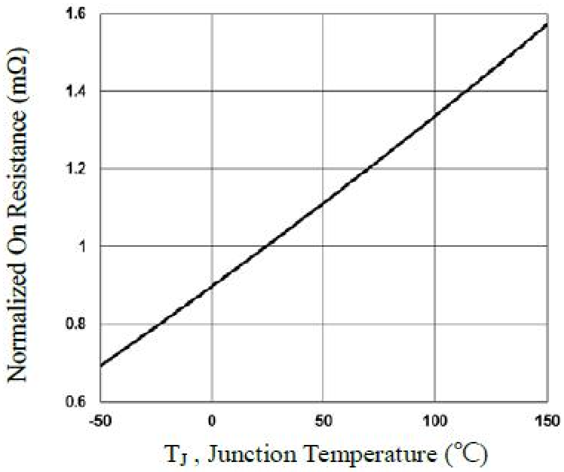


Fig.2 Normalized RDSON vs. Tj

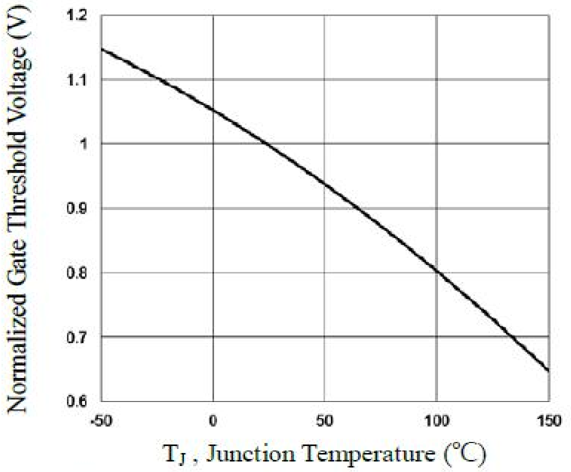


Fig.3 Normalized Vth vs. Tj

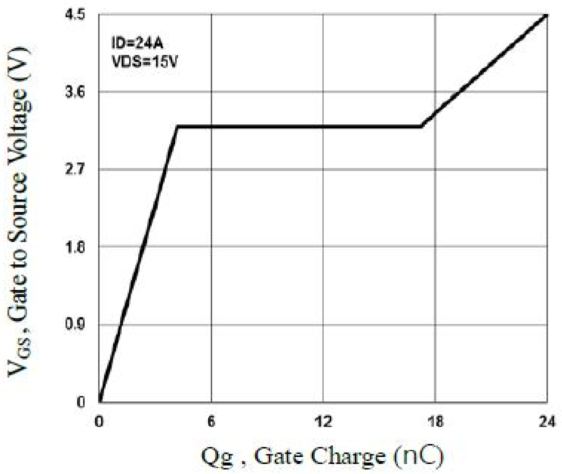


Fig.4 Gate charge waveform

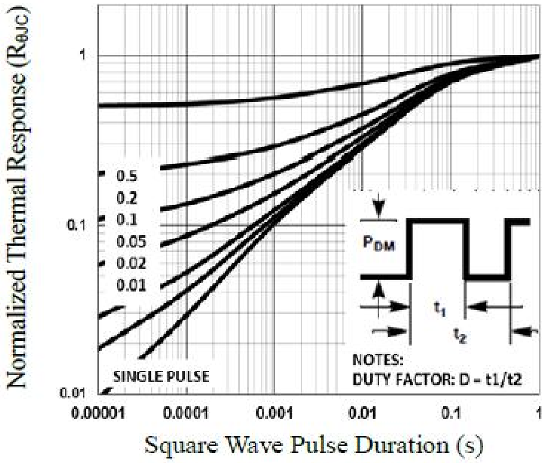


Fig.5 Normalized transient impedance

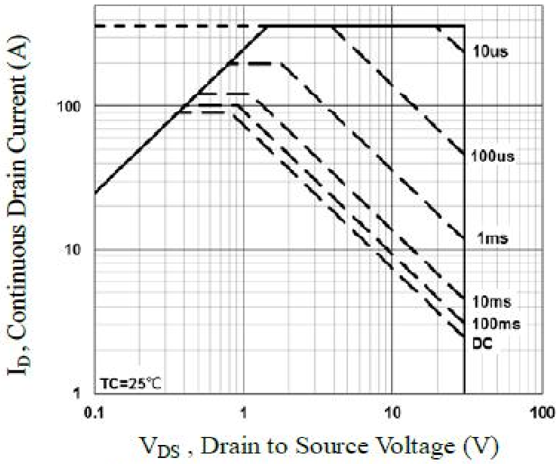


Fig.6 Maximum safe operation area

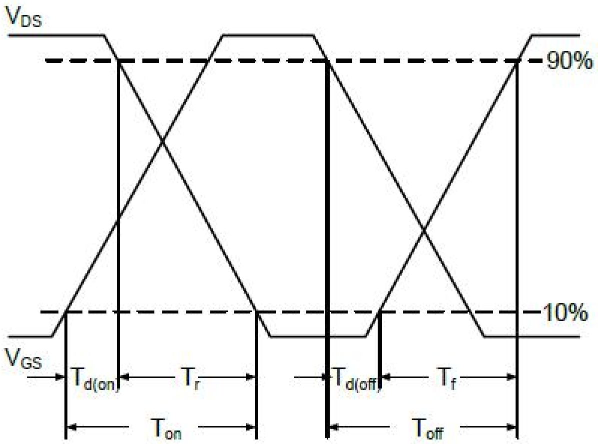


Fig.7 Switching time waveform

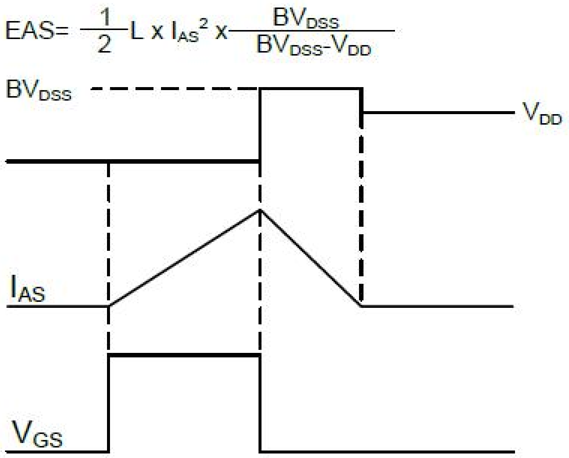


Fig.8 EAS waveform