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

- n $R_{DS(on)}$=3.3mΩ @ V_{GS}=10V
- n Improved dv/dt capability
- n Fast switching
- n Green device available

3. Symbol
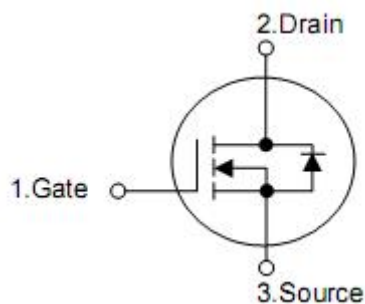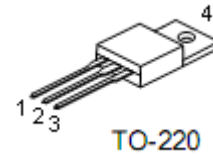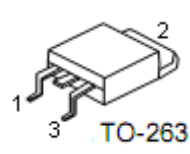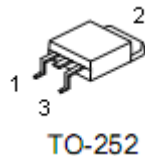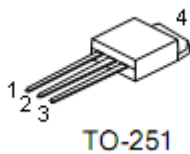
Pin	Function
1	Gate
2	Drain
3	Source

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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$_{GSS}$	$\pm$20		V
Continuous drain current	T$_C$=25°C	I$_D$	90		A
	T$_C$=100°C		57		A
Pulse drain current (note 1)	T$_C$=25°C	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 °C	P$_D$	88	158	W
	Derate above 25 °C		0.59	1.06	W/°C
Junction & storage temperature range		T$_J$,T$_{STG}$	-55-150		°C

5. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance, Junction-ambient	R$_{\theta JA}$	62	°C/W
Thermal resistance, Junction-case	R$_{\theta JC}$	1.7	°C/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$_{GS}$=±20V, V$_{DS}$=0V	-	-	±100	nA
Drain-source on-resistance(note3)	R$_{DS(on)}$	V$_{GS}$=10V,I$_D$=24A (To-251/252)	-	3.3	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	-	Ω
Input capacitance	C$_{iss}$	V$_{DS}$=25V,V$_{GS}$=0V, f=1MHz	-	3070	-	pF
Output capacitance	C$_{oss}$		-	400	-	
Reverse transfer capacitance	C$_{rss}$		-	315	-	
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	-	nS
Rise time(note 3,4)	t$_r$		-	19.5	-	
Turn-off delay time(note 3,4)	t$_{d(off)}$		-	42.8	-	
Fall time(note 3,4)	t$_f$		-	13.2	-	
Total gate charge(note 3,4)	Q$_g$	V$_{DS}$=15V, V$_{GS}$=4.5V I$_{DS}$=24A	-	24	-	nC
Gate-source charge(note 3,4)	Q$_{gs}$		-	4.2	-	
Gate-drain charge(note 3,4)	Q$_{gd}$		-	13	-	
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.
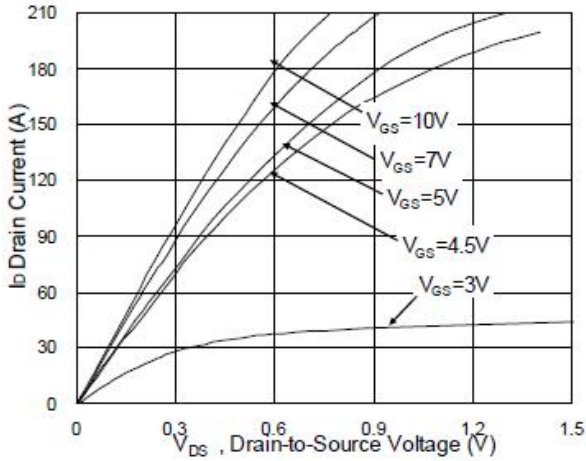
7. Test circuits and waveforms

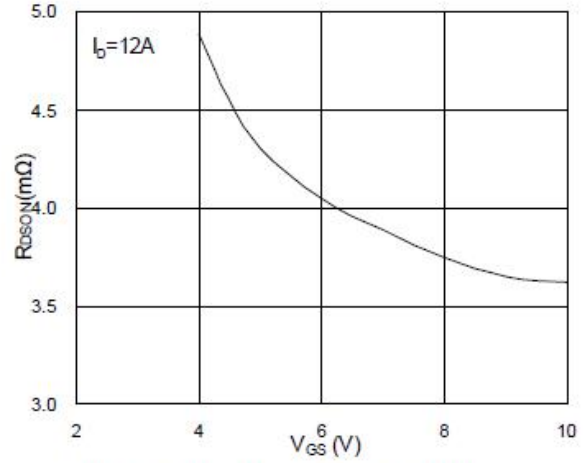**Fig.1 Typical Output Characteristics**
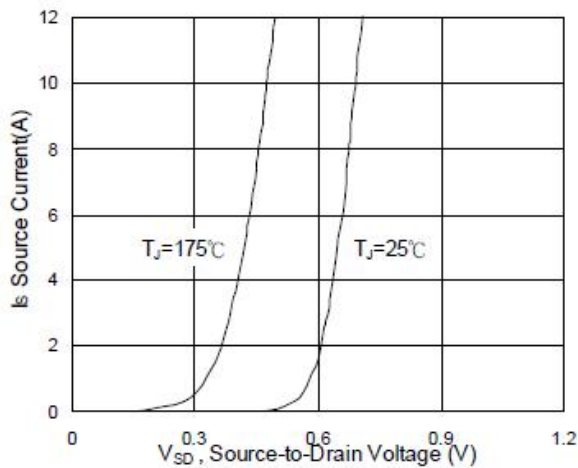

Fig.2 On-Resistance vs. G-S Voltage

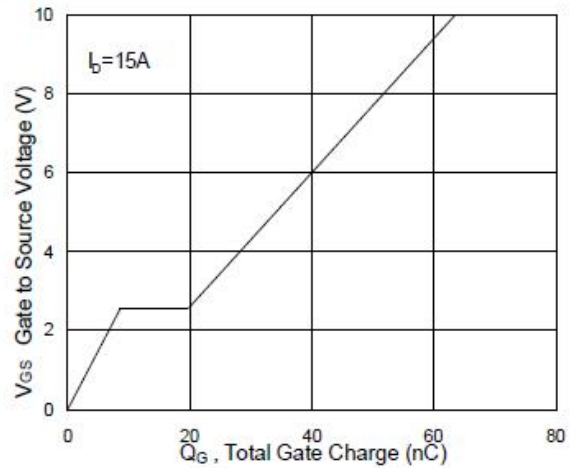**Fig.3 Forward Characteristics of Reverse**

Fig.4 Gate-charge Characteristics
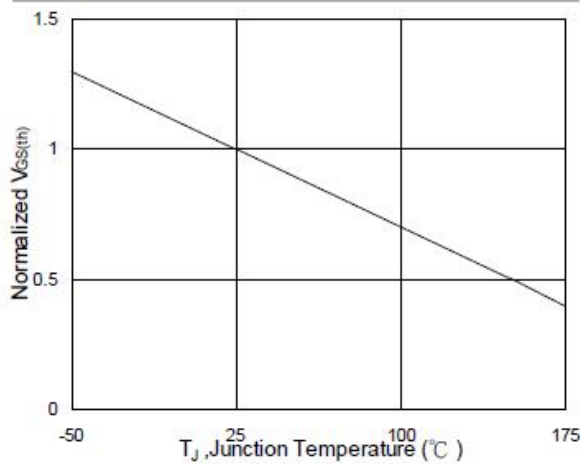
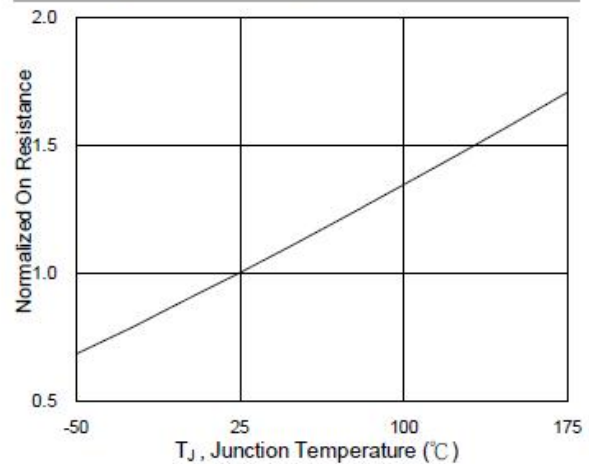**Fig.5 Normalized V$_{GS(th)}$ vs. T$_J$**

Fig.6 Normalized R$_{DSON}$ vs. T$_J$
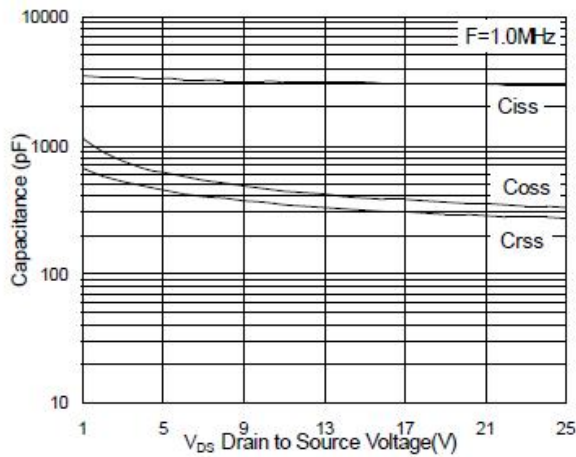
Fig.7 Capacitance
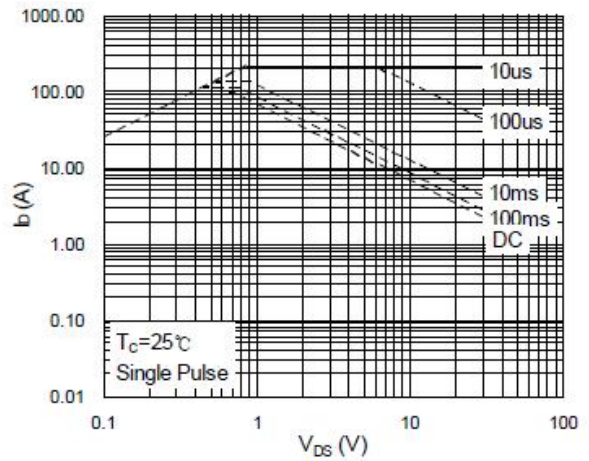
Fig.8 Safe Operating Area

$D = T_{ON}/T$

$T_J peak = T_C + P_{DM} \times R_{\theta JC}$
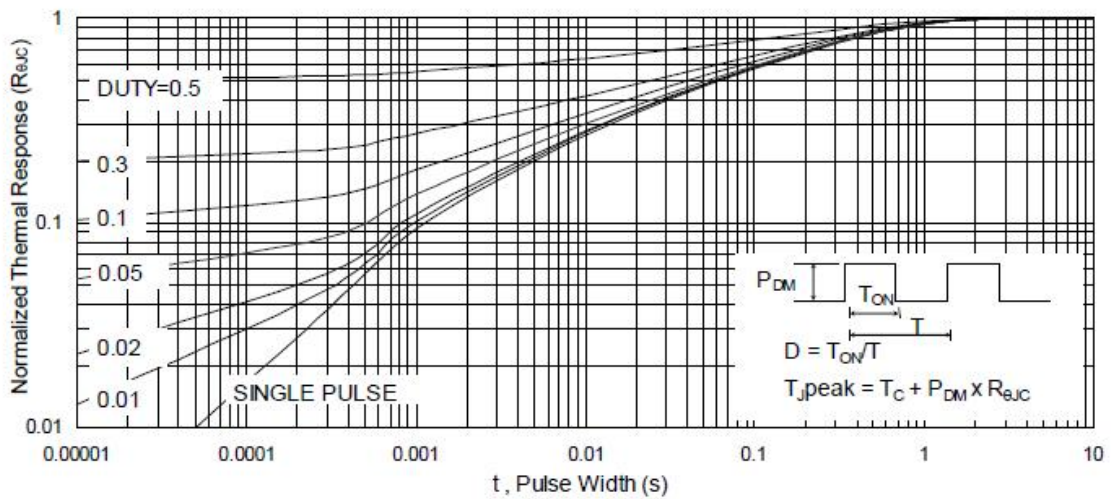
Fig.9 Normalized Maximum Transient Thermal Impedance
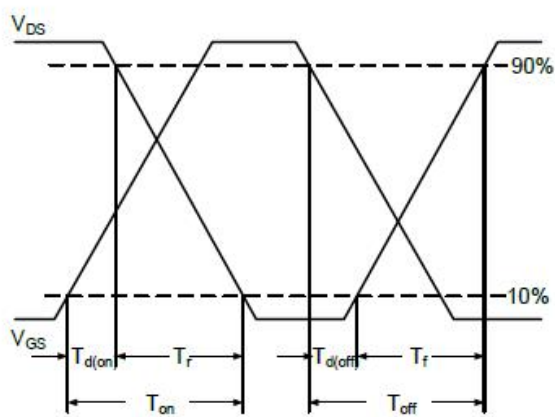
Fig.10 Switching Time Waveform

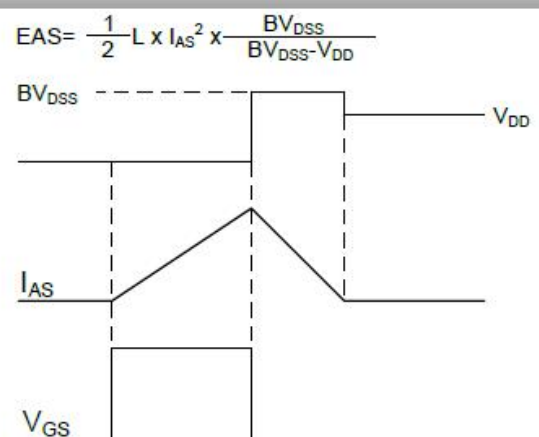$$EAS = \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

Fig.11 Unclamped Inductive Switching Waveform