

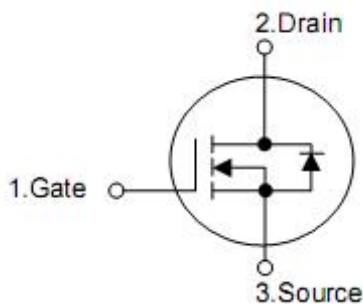
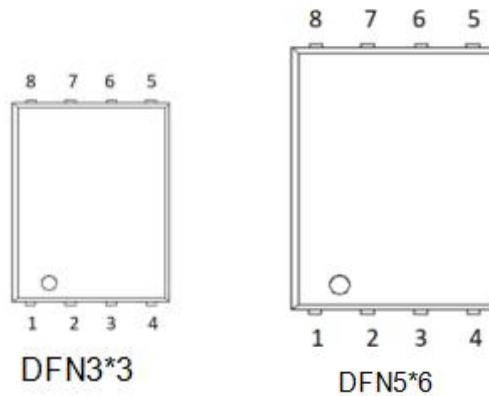
## 1. Description

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

## 3.Symbol



Pin	Function
4	Gate
5,6,7,8	Drain
1,2,3	Source

## 4. Ordering information

Part Number	Package	Brand
KNG3303A	DFN3*3	KIA
KNY3303A	DFN5*6	KIA

## 5. Absolute maximum ratings

( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

Parameter	Symbol	Rating		Units
		DFN3*3	DFN5*6	
Drain-source voltage	$V_{DSS}$	30		V
Gate-source voltage	$V_{GSS}$	$\pm 20$		V
Continuous drain current	$I_D$	$T_C=25^{\circ}\text{C}$		A
		$T_C=100^{\circ}\text{C}$		A
Pulse drain current (note 1)	$I_{DP}$	$T_C=25^{\circ}\text{C}$		A
Avalanche current (note 2)	$I_{AS}$	50		A
Avalanche energy, (note 2)	$E_{AS}$	125		mJ
Maximum power dissipation	$P_D$	$T_C=25^{\circ}\text{C}$		W
		Derate above $25^{\circ}\text{C}$		$W/^{\circ}\text{C}$
Junction & storage temperature range	$T_J, T_{STG}$	-55-150		$^{\circ}\text{C}$

\*Drain current limited by maximum junction temperature.

## 6. Thermal characteristics

Parameter	Symbol	Rating		Unit
		DFN3*3	DFN5*6	
Thermal resistance, Junction-ambient	$R_{\theta JA}$	95	62	$^{\circ}\text{C}/\text{W}$
Thermal resistance, Junction-case	$R_{\theta JC}$	2.88	1.81	$^{\circ}\text{C}/\text{W}$

**7. Electrical characteristics**

 (T<sub>A</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	30	-	-	V
BV <sub>DSS</sub> temperature coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Reference to 25°C, I <sub>D</sub> =1mA	-	0.03	-	V/°C
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	-	-	1	μA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	-	-	10	
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.6	2.5	V
V <sub>GS(th)</sub> temperature coefficient	$\Delta V_{GS(th)}$	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	-	-5	-	mV/°C
Gate leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Drain-source on-resistance(note3)	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =24A	-	3.1	4	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =12A	-	4.5	6	
Forward transconductance	g <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =10A	-	15.5	-	S
Gate resistance	R <sub>g</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	-	2	4	Ω
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	-	3070		pF
Output capacitance	C <sub>oss</sub>		-	400		
Reverse transfer capacitance	C <sub>rss</sub>		-	315		
Turn-on delay time(note 3,4)	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =15A, R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =10V	-	12.6		nS
Rise time(note 3,4)	t <sub>r</sub>		-	19.5		
Turn-off delay time(note 3,4)	t <sub>d(off)</sub>		-	42.8		
Fall time(note 3,4)	t <sub>f</sub>		-	13.2		
Total gate charge(note 3,4)	Q <sub>g</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V I <sub>DS</sub> =24A	-	24		nC
Gate-source charge(note 3,4)	Q <sub>gs</sub>		-	4.2		
Gate-drain charge(note 3,4)	Q <sub>gd</sub>		-	13		
Single pulse avalanche energy	EAS	V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =24A	31	-	-	mJ
Continuous source current	I <sub>S</sub>	V <sub>GS</sub> =V <sub>DS</sub> =0V, force current	-	-	90	A
Pulsed source current (note 3)	I <sub>SM</sub>		-	-	360	A
Diode forward voltage(note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	-	-	1	V
Reverse recovery time	t <sub>rr</sub>	V <sub>DS</sub> =30V, I <sub>S</sub> =1A, di/dt=100A/μs	-	-	-	nS
Reverse recovery charge	Q <sub>rr</sub>		-	-	-	nC

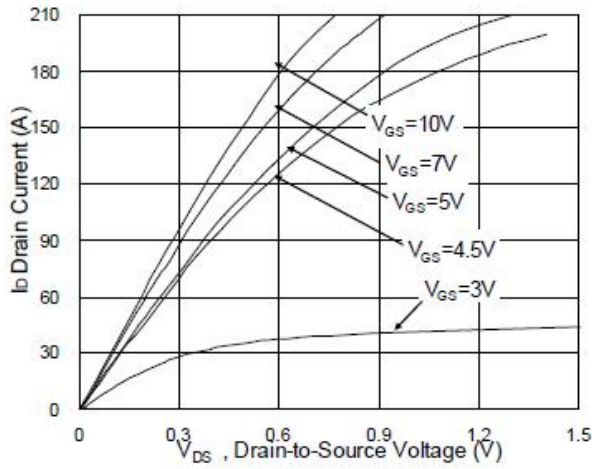
Note:1: Repetitive rating, pulse width limited by max junction temperature.

 2: V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=50A, R<sub>G</sub>=25Ω, starting T<sub>J</sub>=25°C

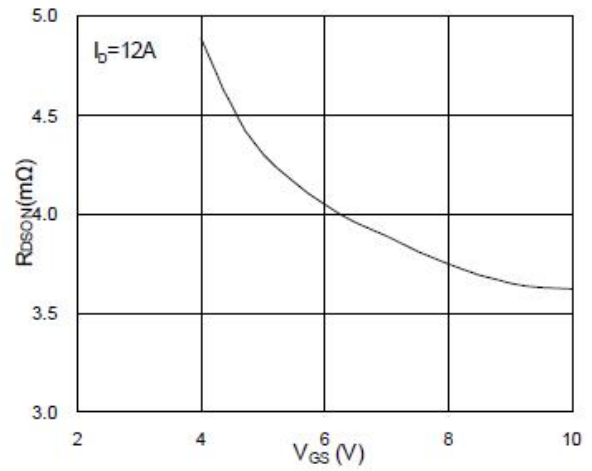
3: The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%

4: Essentially independent of operating temperature.

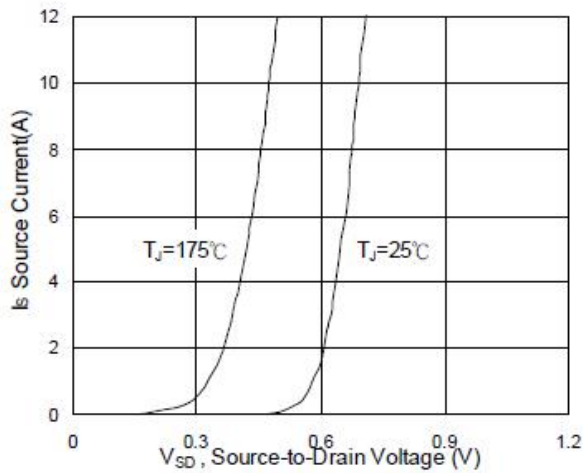
**8. Test circuits and waveforms**



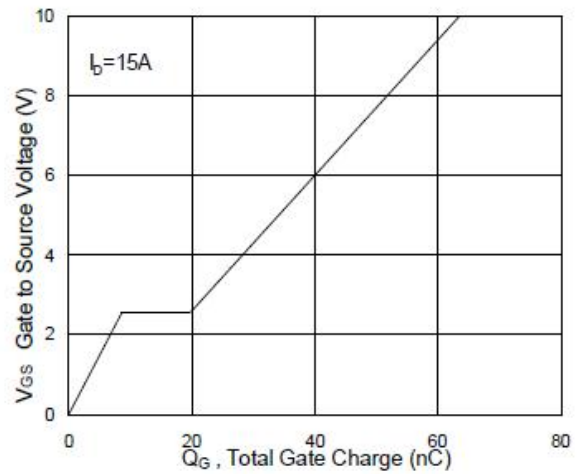
**Fig.1 Typical Output Characteristics**



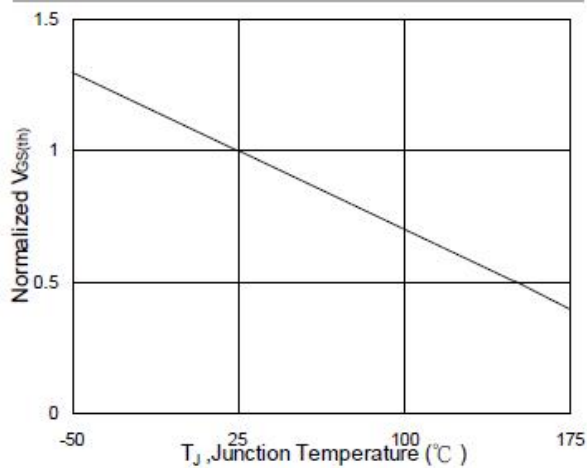
**Fig.2 On-Resistance vs. G-S Voltage**



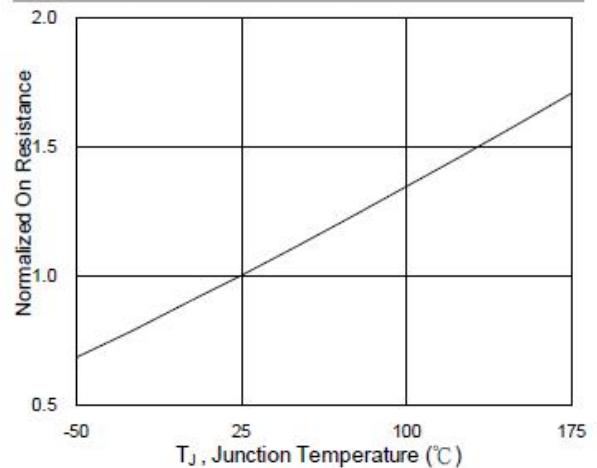
**Fig.3 Forward Characteristics of Reverse**



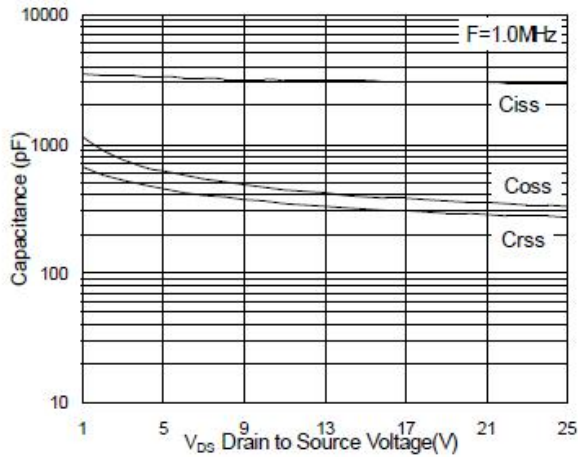
**Fig.4 Gate-charge Characteristics**



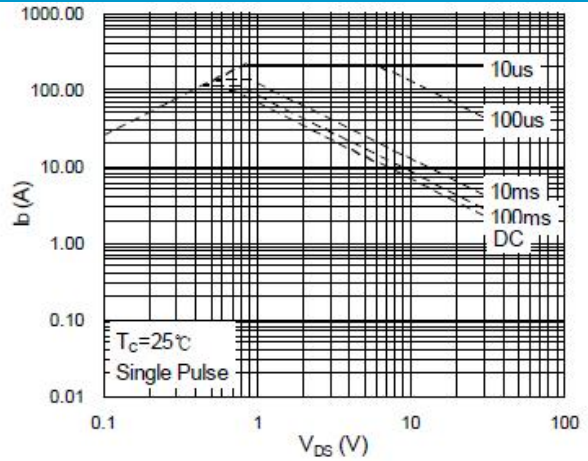
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



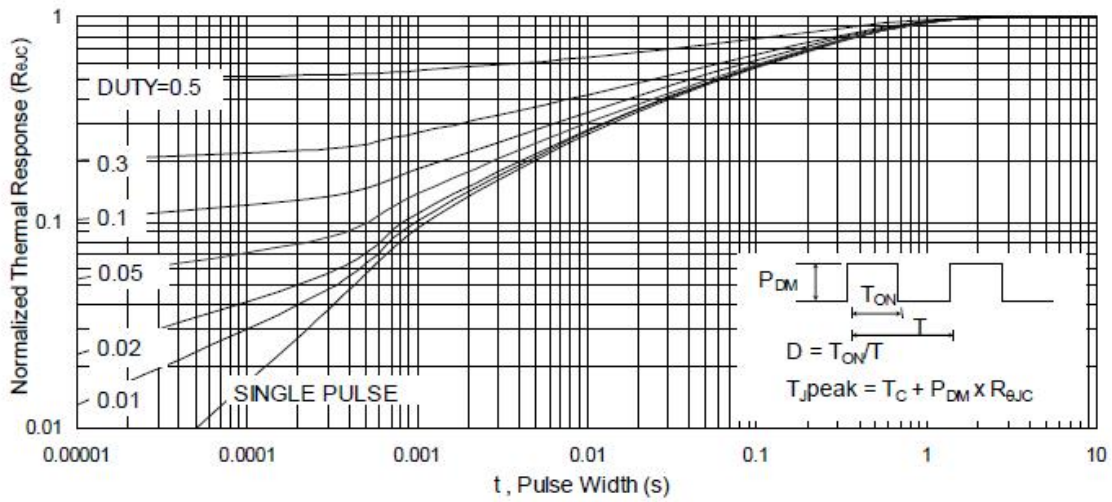
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



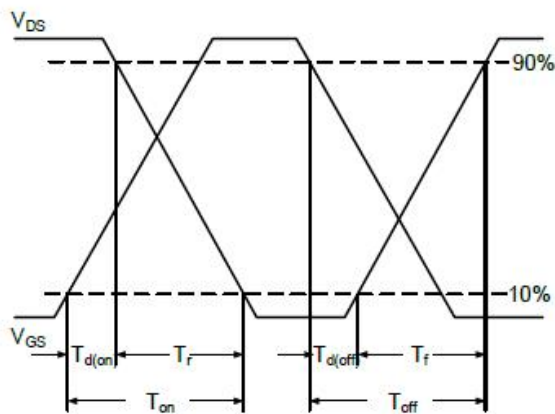
**Fig.7 Capacitance**



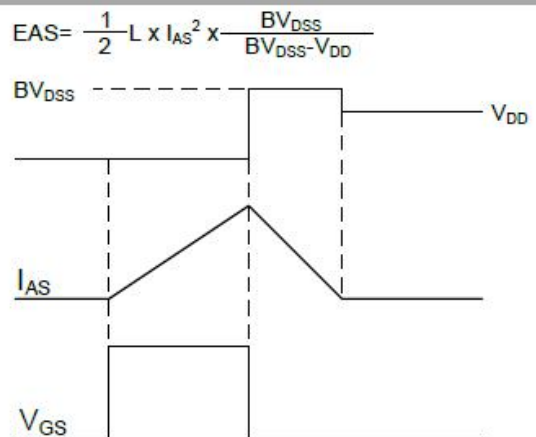
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**