

1. Features

- $R_{DS(ON)}=5.8m\Omega(typ.)@V_{GS}=10V$
- High ruggedness
- Low Gate Charge (Typ 107nC)
- 100% avalanche tested
- Improved dv/dt capability

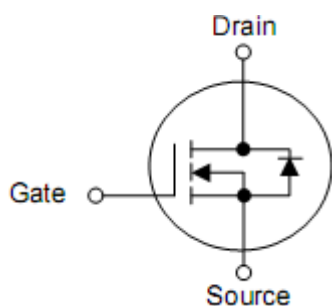
2. Applications

- Synchronous Rectification
- Li Battery Protect Board
- Inverter

3. Symbol



TO-220



Pin	Function
1	Gate
2	Drain
3	Source

4. Ordering Information

Part Number	Package	Brand
KNP3006A	TO-220	KIA

5. Absolute maximum ratings

$T_C=25^{\circ}\text{C}$ unless otherwise noted

Parameter		Symbol	Rating	Units
Drain-source voltage		V_{DSS}	68	V
Gate-to-Source Voltage		V_{GSS}	± 20	V
Continuous drain current *	$T_C=25^{\circ}\text{C}$	I_D	120	A
	$T_C=100^{\circ}\text{C}$	I_D	95	A
Pulsed Drain Current ¹⁾		I_{DM}	480	A
Single pulse avalanche energy ²⁾		E_{AS}	289	mJ
Repetitive Avalanche Energy ¹⁾		E_{AR}	28	mJ
Peak diode recovery dv/dt ³⁾		dv/dt	5	V/ns
Power dissipation ($T_C=25^{\circ}\text{C}$)		P_D	266	W
Derating factor above 25°C		P_D	2.13	W/ $^{\circ}\text{C}$
Maximum lead temperature for soldering purpose, 1/8 from case for 5 seconds.		T_L	300	$^{\circ}\text{C}$
Operating junction and storage temperature range		T_J, T_{STG}	-55 to 150	$^{\circ}\text{C}$

* Drain current is limited by junction temperature.

6. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance junction-case	$R_{\theta JC}$	0.47	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	$^{\circ}\text{C/W}$

7. Electrical characteristics

(T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	68	-	-	V
Breakdown voltage temperature coefficient	$\Delta BV_{DSS} / \Delta T_J$	I _D =250uA, referenced to 25°C	-	0.06	-	V/°C
Drain-source leakage current	I _{DSS}	V _{DS} =68V, V _{GS} =0V	-	-	1	uA
		V _{DS} =54V, T _J =125°C	-	-	50	uA
Gate-source forward leakage	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
Drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =30A	-	5.8	7.0	mΩ
		V _{GS} =10V, I _D =50A	-	5.9	7.0	mΩ
		V _{GS} =10V, I _D =30A, T _J =125°C	-	10.4	-	mΩ
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250uA	2.0	-	4.0	V
Forward Transconductance	g _{fs}	V _{DS} =10V, I _D =30A	-	46	-	S
Input capacitance	C _{iss}	V _{DS} =34V, V _{GS} =0V f=1MHz	-	5600	-	pF
Reverse transfer capacitance	C _{oss}		-	350	-	pF
Output capacitance	C _{rss}		-	310	-	pF
Total gate charge	Q _g	V _{DS} =54V, I _D =30A V _{GS} =10V, I _G =5mA ^{4),5)}	-	100	-	nC
Gate-source charge	Q _{gs}		-	28	-	nC
Gate-drain charge	Q _{gd}		-	34	-	nC
Turn-on delay time	t _{d(on)}	V _{DS} =34V, V _{GS} =10V, R _G =4.7Ω, I _D =30A ^{4),5)}	-	25	-	ns
Rise time	t _r		-	65	-	ns
Turn-off delay time	t _{d(off)}		-	74	-	ns
Fall time	t _f		-	30	-	ns
Gate resistance	R _G	V _{DS} =0V, Scan F mode	-	3	-	Ω
Continuous Source Current	I _{SD}	Integral reverse p-n Junction diode in the MOSFET	-	-	120	A
Pulsed Source Current	I _{SM}		-	-	480	A
Diode forward voltage	V _{SD}	I _S =30A, V _{GS} =0V,	-	-	1.4	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _S =30A, dI _F /dt=100A/μs	-	33	-	nS
Reverse Recovery Charge	Q _{rr}		-	41	-	uC

Note:

- 1) Repetitive rating: pulse width limited by junction temperature.
- 2) L=0.5mH, I_{AS}=34A, V_{DD}=40V, R_G=25Ω, Starting T_J=25°C.
- 3) I_{SD}≤30A, di/dt=100A/us, V_{DD}≤BV_{DSS}, Starting T_J=25°C.
- 4) Pulse Test: Pulse Width≤300us, duty cycle≤2%.
- 5) Essentially independent of operating temperature.

8. Typical operating characteristics

Fig. 1. On-state characteristics

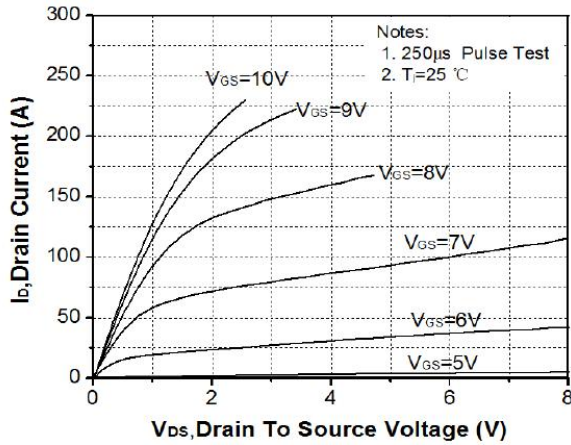


Fig. 2. Transfer Characteristics

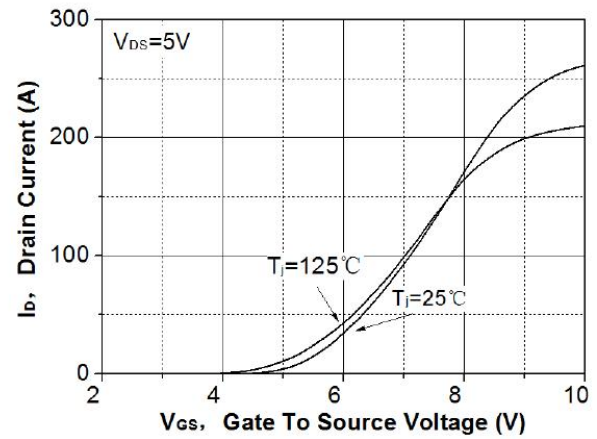


Fig. 3. On-resistance variation vs. drain current and gate voltage

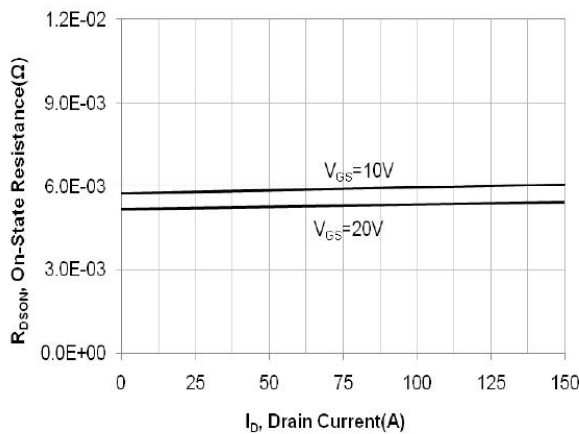


Fig.4. On-state current vs. diode forward voltage

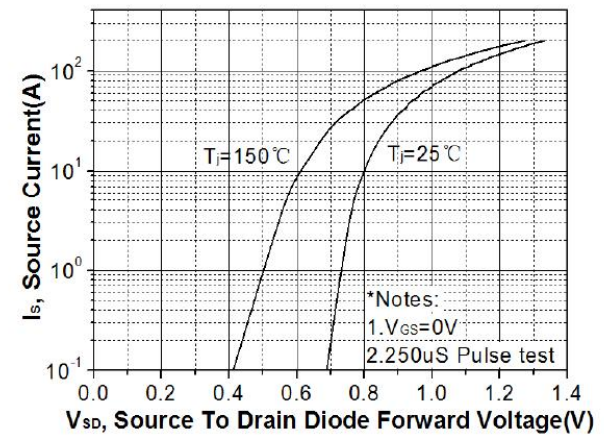


Fig 5. Breakdown voltage variation vs. junction temperature

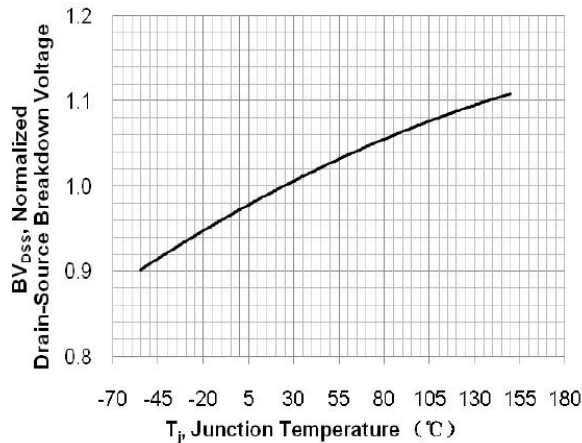


Fig. 6. On-resistance variation vs. junction temperature

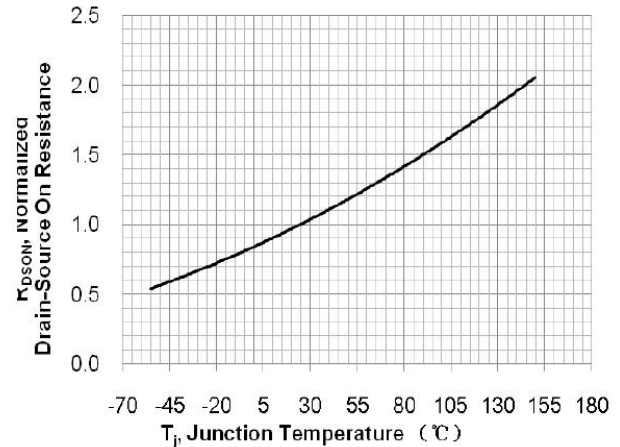


Fig. 7. Gate charge characteristics

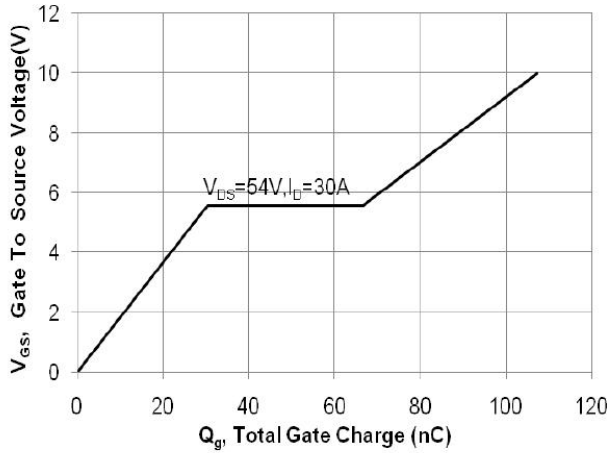


Fig. 8. Capacitance Characteristics

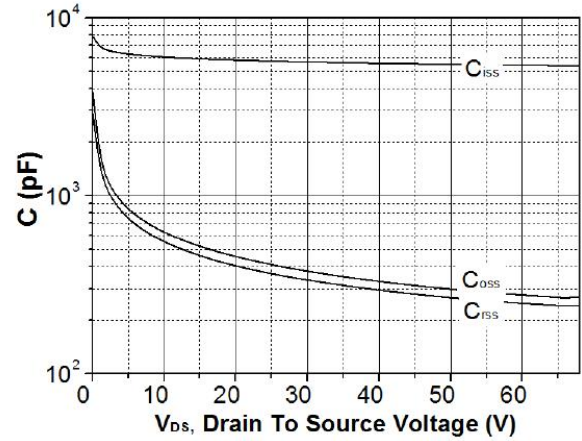


Fig. 9. Maximum safe operating area

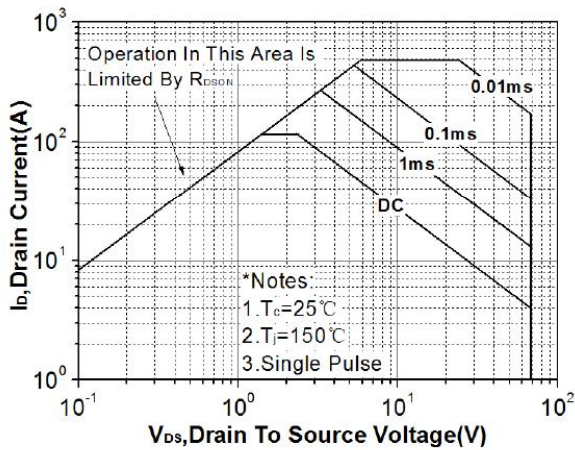


Fig.10. Maximum drain current vs. case temperature

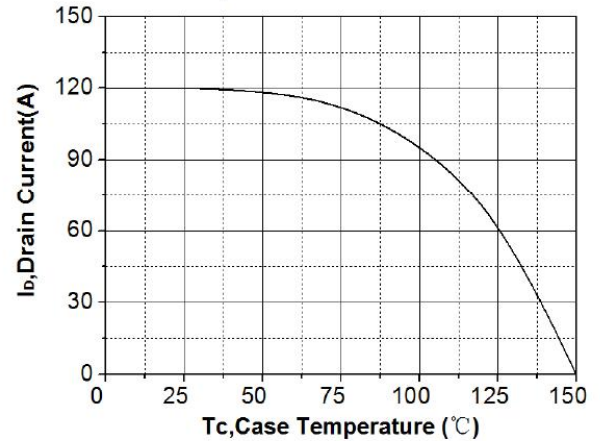
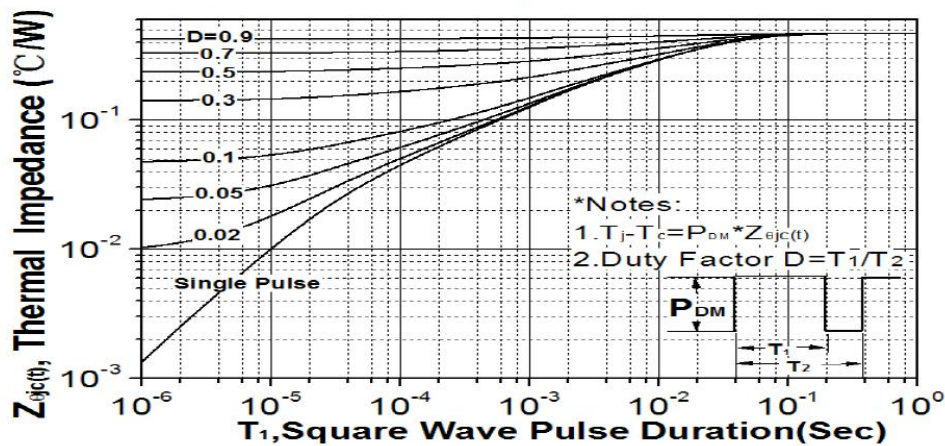


Fig.11. Transient thermal response curve



9. Test Circuits and Waveforms

Fig. 12. Gate charge test circuit & waveform

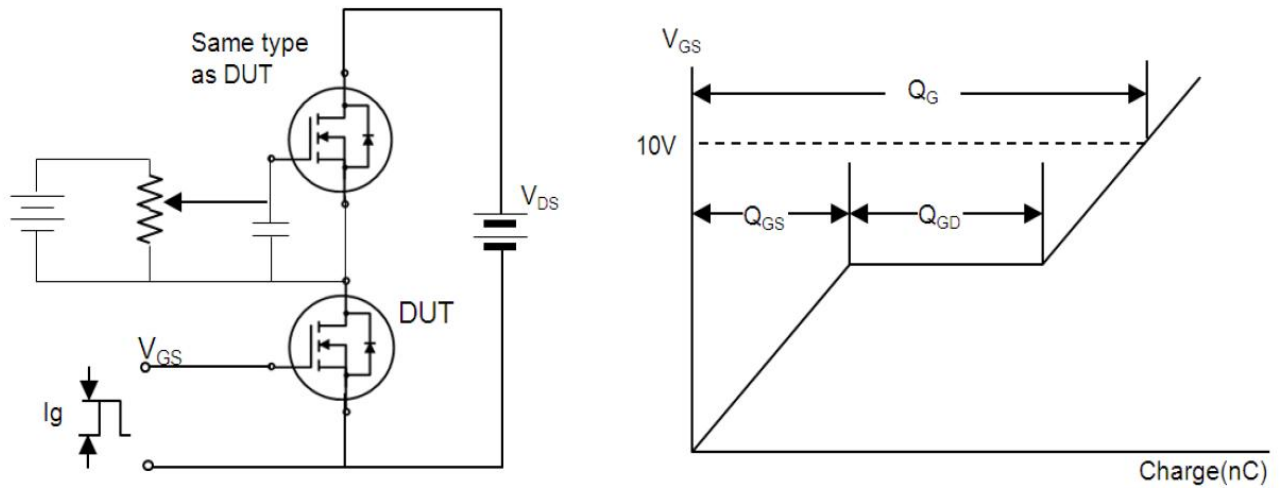


Fig. 13. Switching time test circuit & waveform

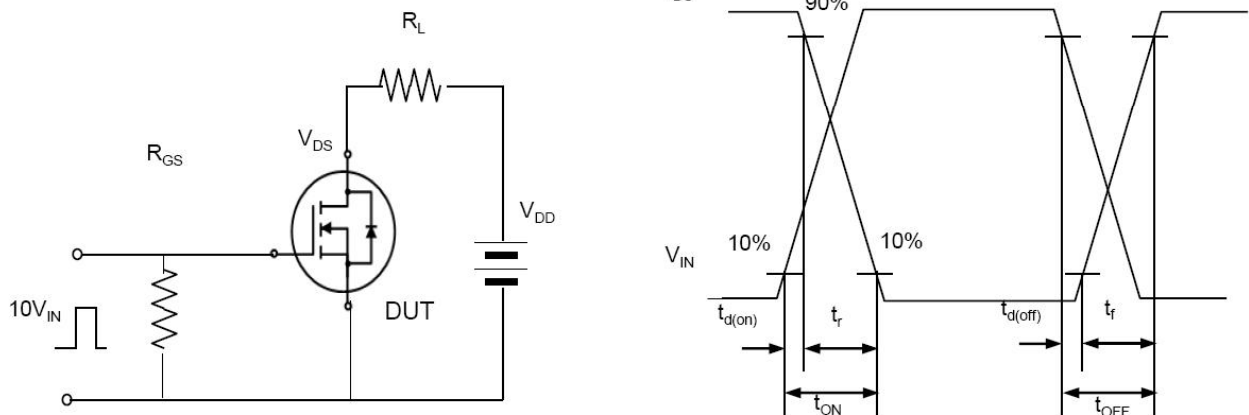


Fig. 14. Unclamped Inductive switching test circuit & waveform

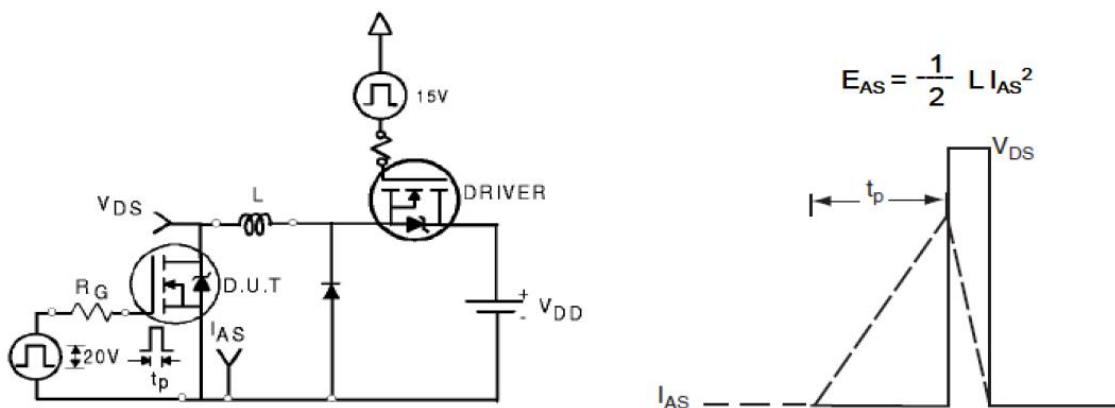


Fig. 15. Peak diode recovery dv/dt test circuit & waveform

