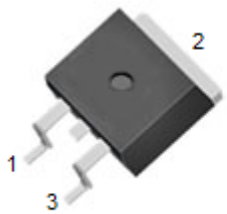
1. Features

- $R_{DS(ON)}$=2.8mΩ(typ.)@V_{GS}=10V
- Very Low On-resistance RDS(ON)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

2. Applications

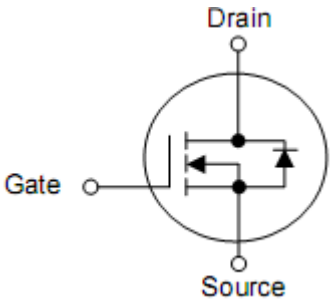
- PWM Application
- Power Management
- Load switch

3. Symbol



TO-263

TO-220



Pin	Function
1	Gate
2	Drain
3	Source

4. Ordering Information

Part Number	Package	Brand
KNB2706A	TO-263	KIA
KNP2706A	TO-220	KIA

5. Absolute maximum ratings

T_C=25°C unless otherwise noted

Parameter		Symbol	Rating		Units
			TO-263	TO-220	
Drain-source voltage		V_{DSS}	60		V
Continuous drain current	T_C=25°C	I_D	150		A
	T_C=100°C	I_D	98		A
Pulsed drain current -Pulsed [1]		I_{DM}	450		A
Gate-source voltage		V_{GS}	±20		V
Single pulse avalanche energy [2]		E_{AS}	552		mJ
Repetitive Avalanche Energy [1]		E_{AR}	240		mJ
Peak Diode Recovery dv/dt [3]		dv/dc	4.5		V/ns
Power dissipation	T_C=25°C	P_D	238	320	W
	Derate above 25°C		-	2.56	W/°C
Operating junction and storage temperature range		T_J ,T_{STG}	-55 to150		ºC
Maximum lead temperature for soldering purposes,1/8" from case for 5 seconds		T_L	300		° C

*Drain current limited by maximum junction temperature.

6. Thermal characteristics

Parameter	Symbol	Rating		Unit
		TO-263	TO-220	
Thermal resistance junction-case	$R_{\theta JC}$	0.53	0.39	ºC/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	-	62.5	ºC/W

7. Electrical characteristics

(T_C=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	60	-	-	V
Breakdown Voltage Temperature Coefficient	ΔBV_{DSS} /ΔT_J	I_D=250uA, Referenced to 25°C	-	0.06	-	V/°C
Drain-source leakage current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	uA
		V_{DS}=48V, T_C=150°C			10	uA
Gate-source forward leakage	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=250uA	2.2	-	3.6	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=20A	-	2.8	3.6	mΩ
Input capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V f=1MHz	-	8850	-	pF
Output capacitance	C_{oss}		-	610	-	pF
Reverse transfer capacitance	C_{rss}		-	730	-	pF
Turn-on delay time	$t_{d(on)}$	V_{DD}=30V, R_G=25Ω, I_D=50A [4),5)]		20		ns
Rise time	t_r			38		ns
Turn-off delay time	$t_{d(off)}$			49		ns
Fall time	t_f			30		ns
Total gate charge(10V)	Q_g	V_{DS}=30V, I_D=50A V_{GS}=10V [4),5)]	-	200	-	nC
Gate-source charge	Q_{gs}		-	35	-	nC
Gate-drain charge	Q_{gd}		-	72	-	nC
Maximum Continuous Drain-Source Diode Forward Current	I_S	—	-	-	150	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	—	-	-	450	A
Diode forward voltage	V_{SD}	I_S=50A,V_{GS}=0V,	-	-	1.2	V
Reverse Recovery Time	t_{rr}	V_{GS}=0V,I_S=50A, dI_F/dt=100A/μs [4)]	-	62	-	nS
Reverse Recovery Charge	Q_{rr}		-	105	-	nC

Note:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. I_{AS}=I_D, V_{DD}=20V, R_G=25Ω, Starting T_J=25°C
3. ISD≤ID, di/dt≤200A/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

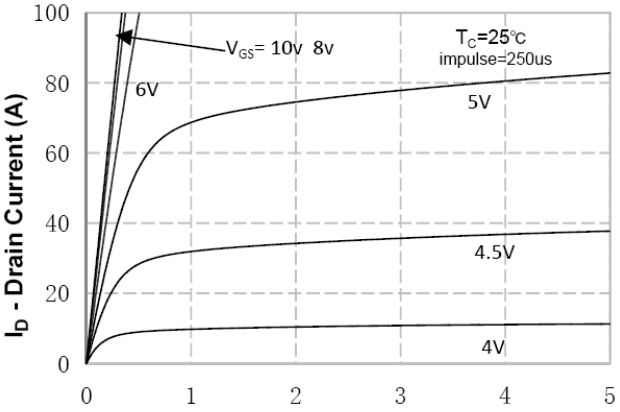


Figure 1. On-Region Characteristics

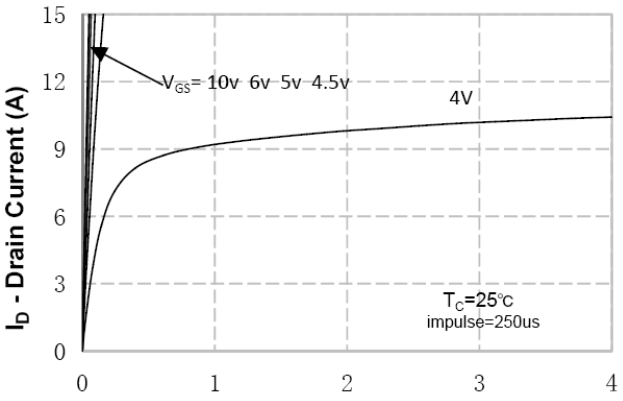


Figure 2. On-Region Characteristics

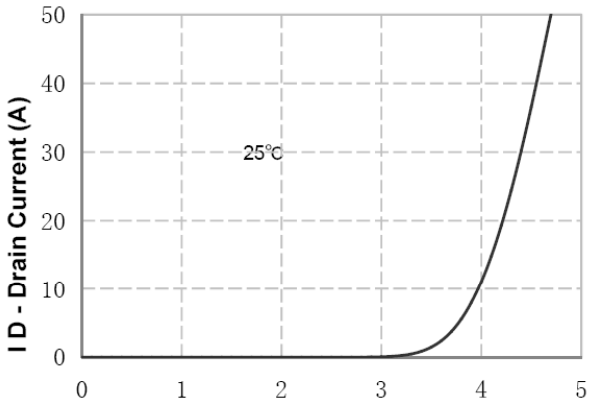


Figure 3. Transfer Characteristics

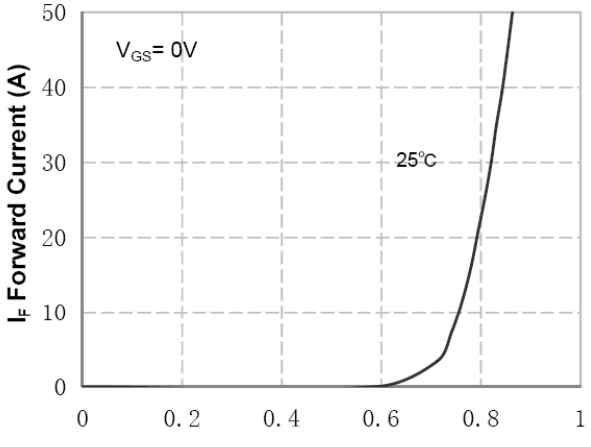


Figure 4. Body Diode Forward Voltage Variation vs Source Current

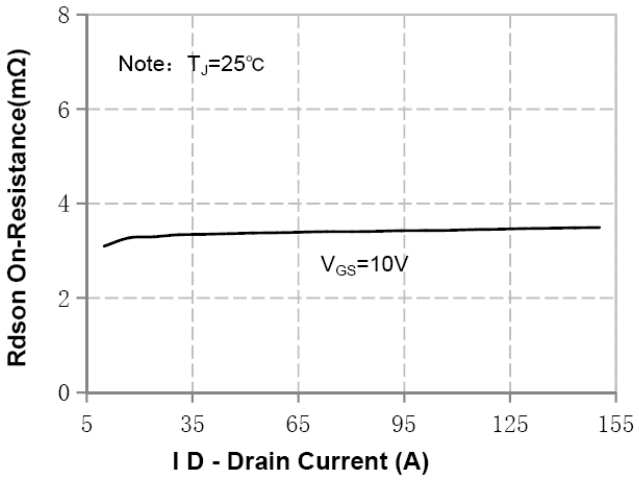


Figure 5. On-Resistance Variation vs Drain Current and Gate Voltage

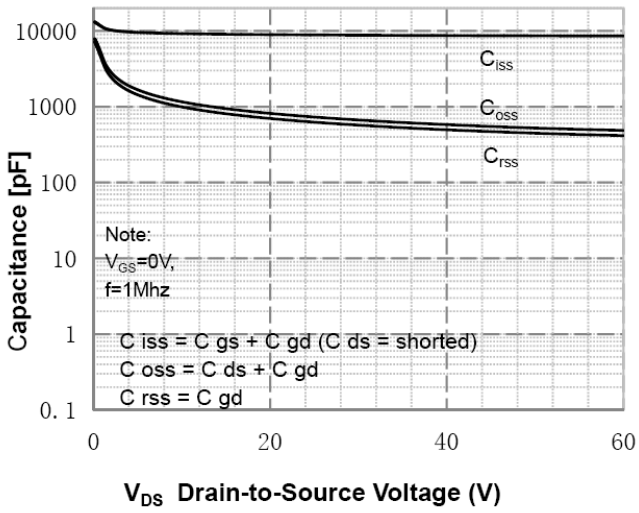


Figure 6. Capacitance Characteristics

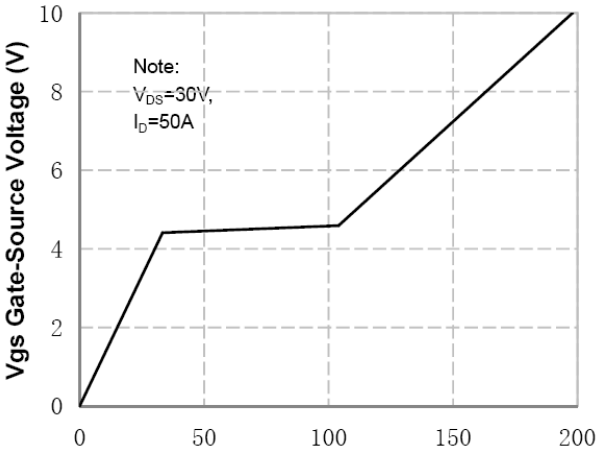


Figure 7. Gate Charge Characteristics

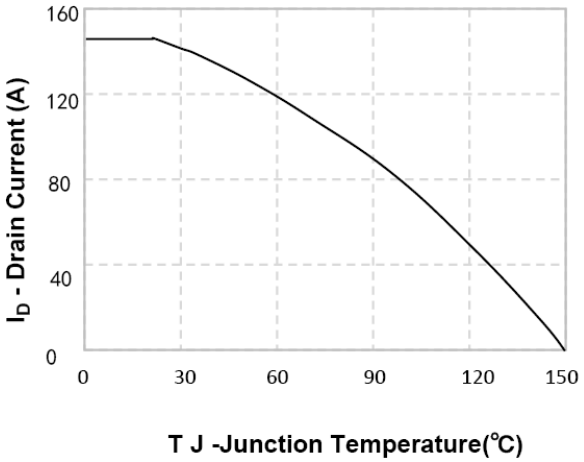


Figure 8. Maximum PContinuous Drain Currentvs Case Temperature

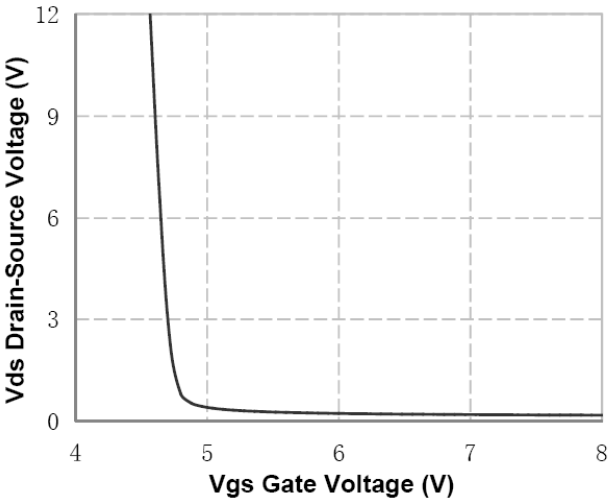


Figure 9. Vds Drain-Source Voltage vs Gate Voltage

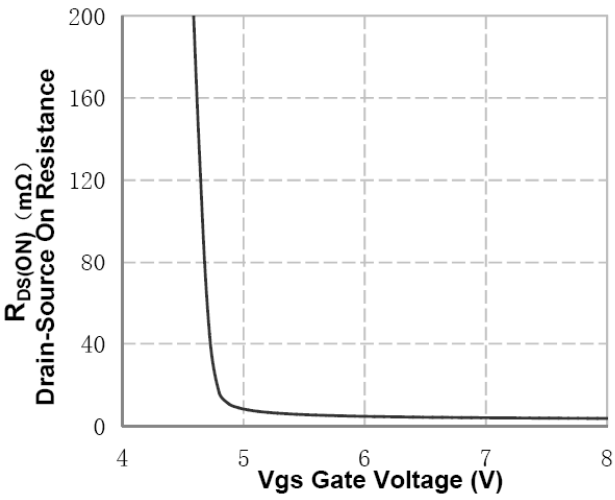


Figure 10. On-Resistance vs Gate Voltage

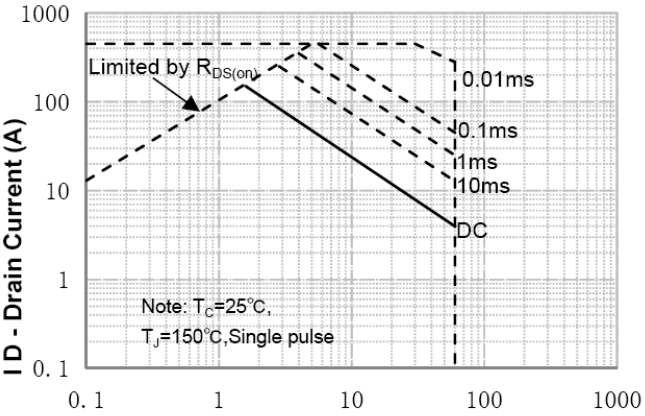


Figure 11. Maximum Safe Operating Area

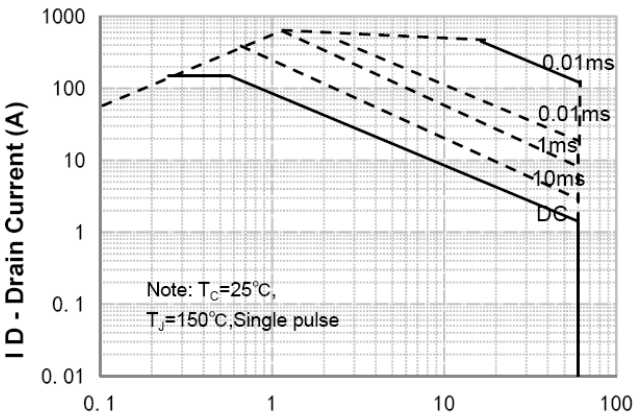


Figure 12. Maximum Safe Operating Area

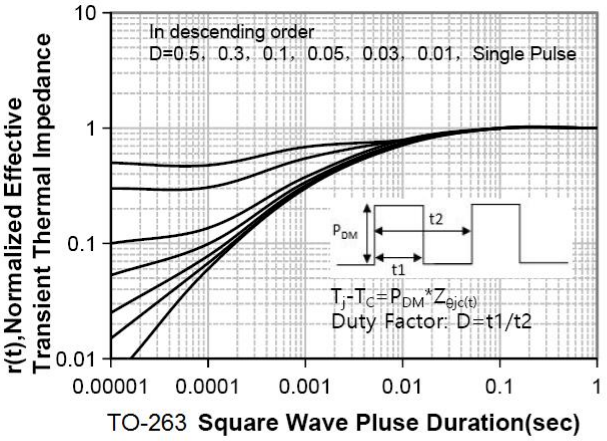


Figure 13. Transient Thermal Response Curve

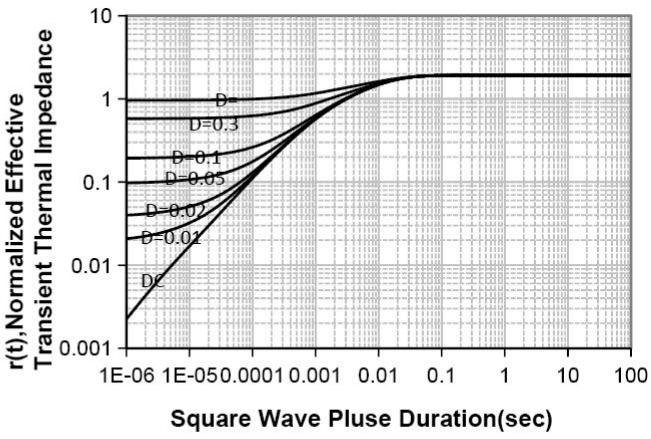
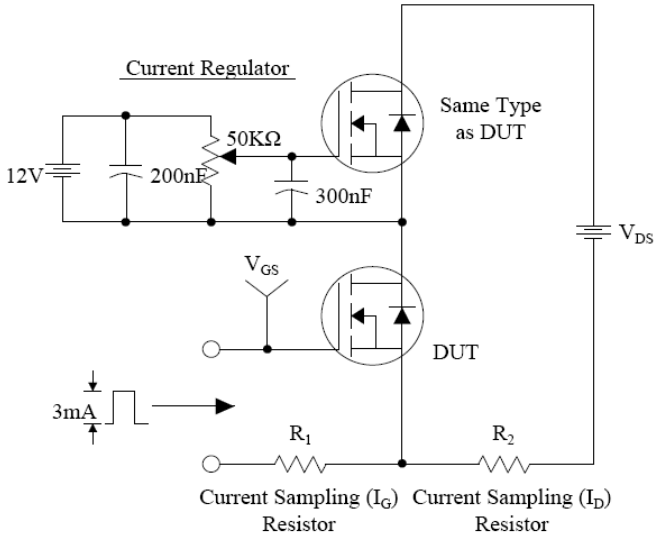
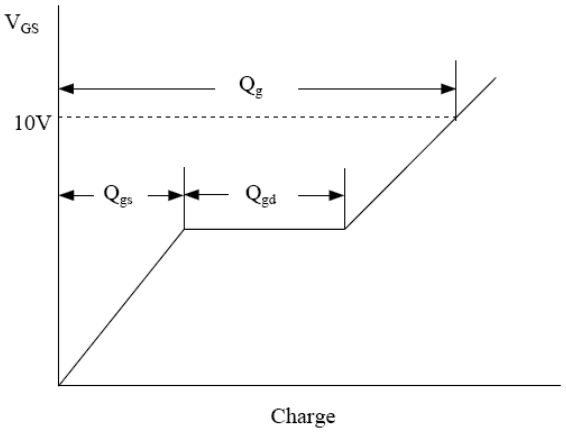


Figure 14. Transient Thermal Response Curve

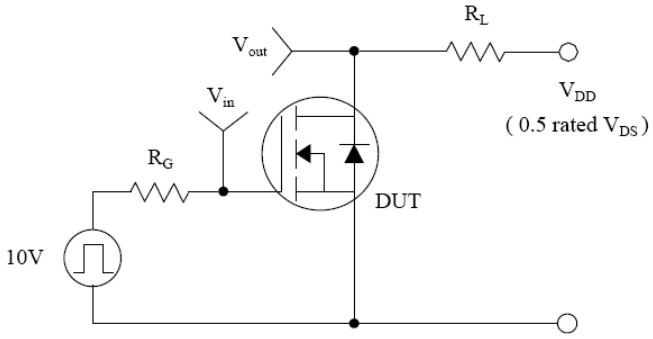
9. Test Circuits and Waveforms

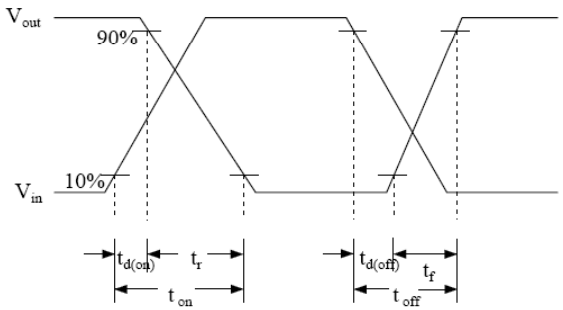
Gate Charge Test Circuit & Waveform



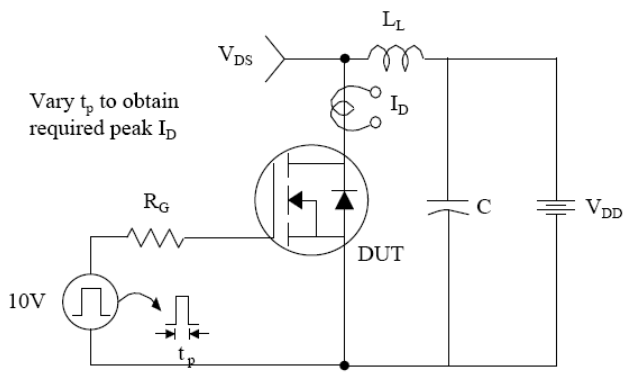


Resistive Switching Test Circuit & Waveforms

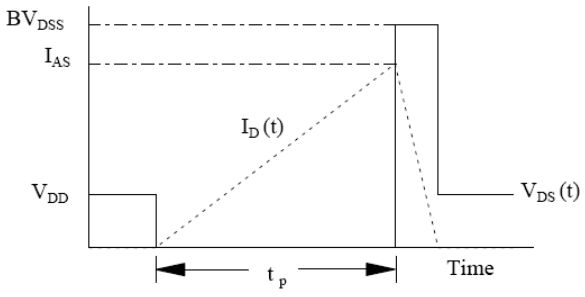




Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



Peak Diode Recovery dv/dt Test Circuit & Waveforms