

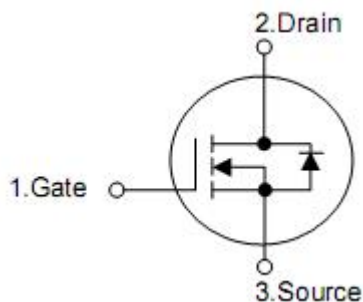
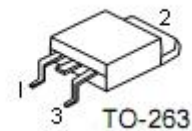
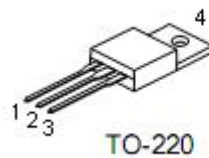
## 1. Features

- $R_{DS(on)}=2.2m\Omega$  (typ.) @  $V_{GS}=10V$
- Low On-Resistance
- Fast Switching
- 100% Avalanche Tested
- Repetitive Avalanche Allowed up to  $T_{jmax}$
- Lead-Free, RoHS Compliant

## 2. Features

KNX2803A designed by the trench processing techniques to achieve extremely low on-resistance. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Motor applications and a wide variety of other applications.

## 3. Pin configuration



Pin TO-252/263	Pin TO-220	Pin DFN5*6	Function
1	1	4	Gate
2	2,4	5,6,7,8	Drain
3	3	1,2,3	Source

#### 4. Ordering Information

Part Number	Package	Brand
KNP2803A	TO-220	KIA
KNB2803A	TO-263	KIA
KND2803A	TO-252	KIA
KNY2803A	DFN5*6	KIA

#### 5. Absolute maximum ratings

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

Parameter	Symbol	Ratings		Units
		TO-252/ DFN5*6	TO-263/ TO-220	
Drain-source voltage	V <sub>DSS</sub>	30		V
Gate-source voltage	V <sub>GSS</sub>	±20		V
Continuous drain current @V <sub>GS</sub> =10V,T <sub>C</sub> =25 °C,(See Fig2)	I <sub>D</sub>	150		A
Pulsed drain current tested T <sub>C</sub> =25 °C (Sillicon Limit)	I <sub>DM</sub>	600		A
Avalanche energy single pulse <sup>2</sup>	E <sub>AS</sub>	625		mJ
Maximum Power dissipation T <sub>C</sub> =25 °C	P <sub>D</sub>	50	160	W
Maximum junction temperature	T <sub>J</sub>	175		°C
Storage temperature range	T <sub>STG</sub>	-55~+175		°C
Diode continuous forward current T <sub>C</sub> =25 °C <sup>1</sup>	I <sub>S</sub>	150		A

#### 6. Thermal characteristics

Parameter	Symbol	Rating		Unit
		TO-252/ DFN5*6	TO-263/ TO-220	
Thermal resistance,Junction-to-case	θ <sub>JC</sub>	3.0	0.93	°C/W

## 7. Electrical characteristics

( $T_C=25^\circ\text{C}$ , unless otherwise notes)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Drain-to-source leakage current	$I_{DSS}$	$V_{DS}=24V, V_{GS}=0V$	-	-	1	$\mu A$
		$T_C=125^\circ\text{C}$	-	-	100	$\mu A$
Gate-to-source leakage current	$I_{GSS}$	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
		$V_{GS}=-20V, V_{DS}=0V$	-	-	-100	nA
<b>On characteristics</b>						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.8	1.3	2.0	V
Static drain-source on-resistance <sup>1</sup>	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A$	-	2.2	3.0	m $\Omega$
Static drain-source on-resistance <sup>1</sup>	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=40A$	-	2.8	4.0	m $\Omega$
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, f=1.0\text{MHz}$	-	5350	-	pF
Output capacitance	$C_{oss}$		-	715	-	
Reverse transfer capacitance	$C_{rss}$		-	605	-	
Total gate charge	$Q_g$	$V_{DS}=15V, I_D=20A, V_{GS}=4.5V$	-	110	-	nC
Gate-source charge	$Q_{gs}$		-	35	-	
Gate-drain (Miller) charge	$Q_{gd}$		-	14	-	
<b>Resistive switching characteristics</b>						
Turn-on delay time	$T_{d(ON)}$	$V_{DD}=15V, I_D=10A, V_{GS}=4.5V,$ $R_G=6.8\Omega$	-	19	-	nS
Rise time	$t_{rise}$		-	50	-	
Turn-off delay time	$T_{d(OFF)}$		-	20	-	
Fall time	$t_{fall}$		-	26	-	
<b>Source-drain body diode characteristics</b> $T_J=25^\circ\text{C}$ , unless otherwise notes						
Diode forward voltage <sup>1</sup>	$V_{SD}$	$V_{GS}=0V, I_{SD}=20A$	-	-	1.3	V
Reverse recovery time	$t_{rr}$	$I_{SD}=30A, di_f/dt=100A/\mu s,$	-	32	-	ns
Reverse recovery charge	$Q_{rr}$	$T_J=25^\circ\text{C}, V_{GS}=0V$	-	33	-	nC

Note: 1. Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .

2. Limited by  $T_{Jmax}$ , Starting  $T_J=25^\circ\text{C}$ .  $L=0.5\text{mH}$   $R_G=25\Omega$ ,  $I_{AS}=50A$ ,  $V_{GS}=10V$ ,  
Part not recommended for use above this value.

3. Repetitive rating; pulse width limited by max, junction temperature.

**8. Typical characteristics**

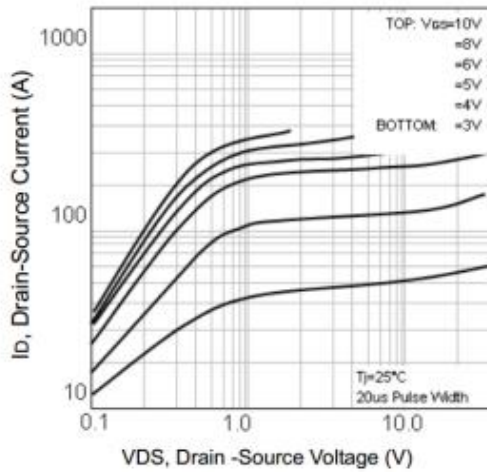


Fig1. Typical Output Characteristics

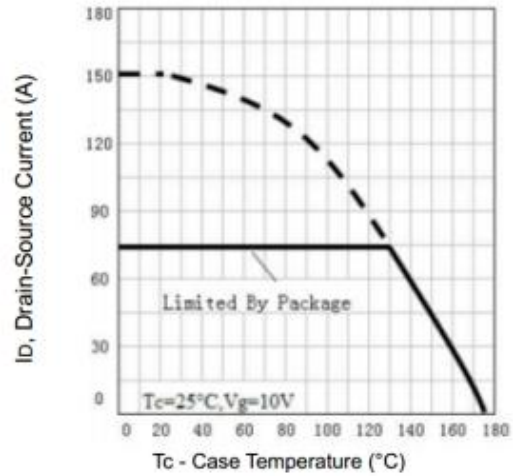


Fig2. Maximum Drain Current Vs. Case Temperature

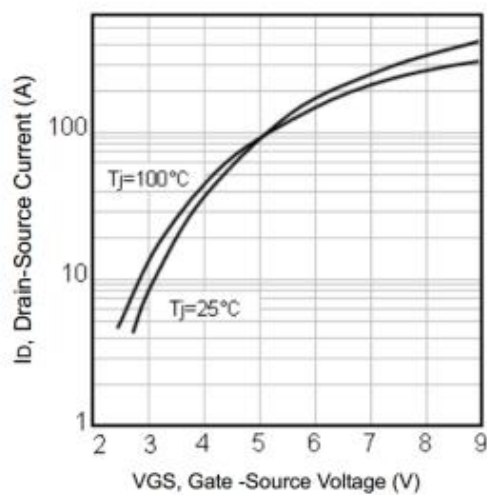


Fig3. Typical Transfer Characteristics

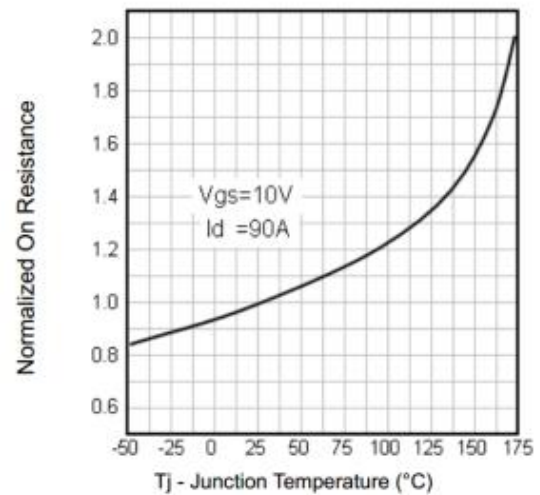


Fig4. Normalized On-Resistance Vs. Temperature

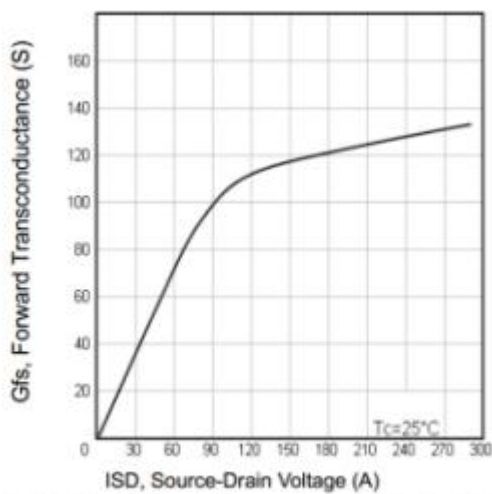


Fig5. Typical Forward Transconductance Vs. Drain Current

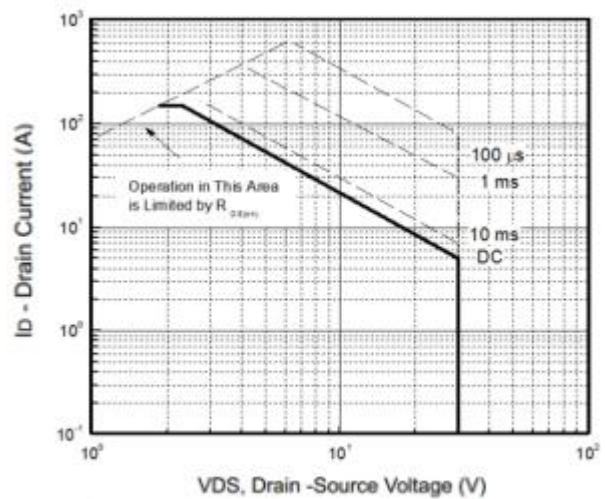


Fig6. Maximum Safe Operating Area

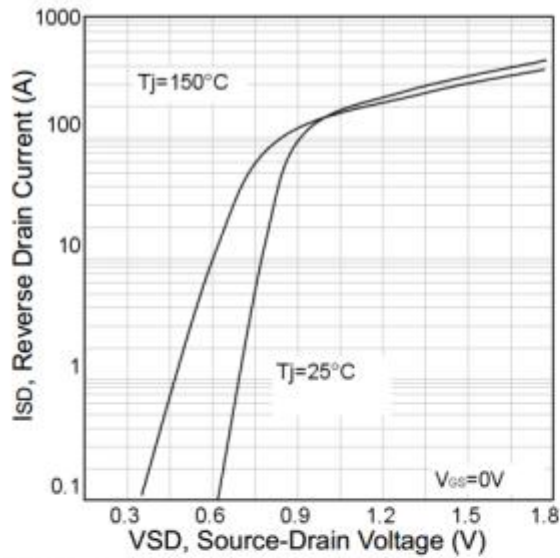


Fig7. Typical Source-Drain Diode Forward Voltage

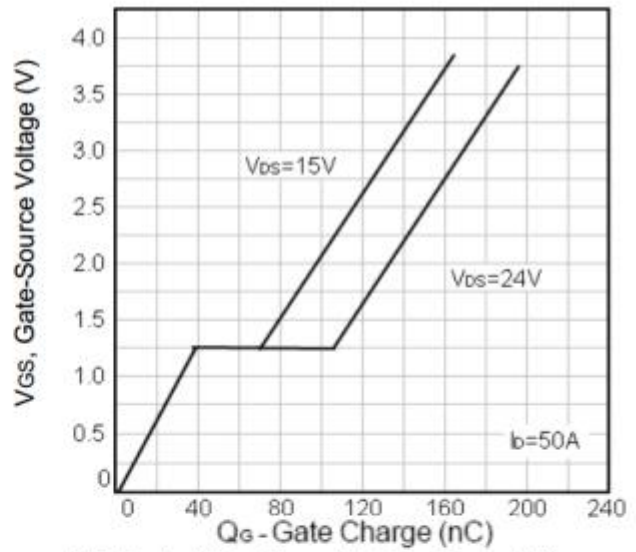


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

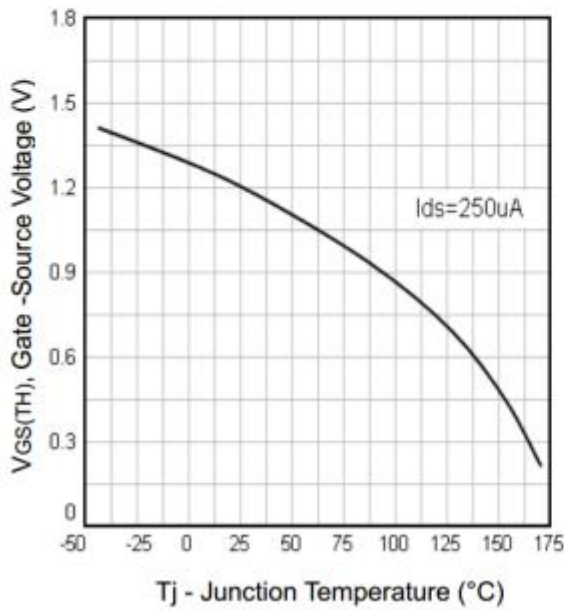


Fig9. Threshold Voltage Vs. Temperature

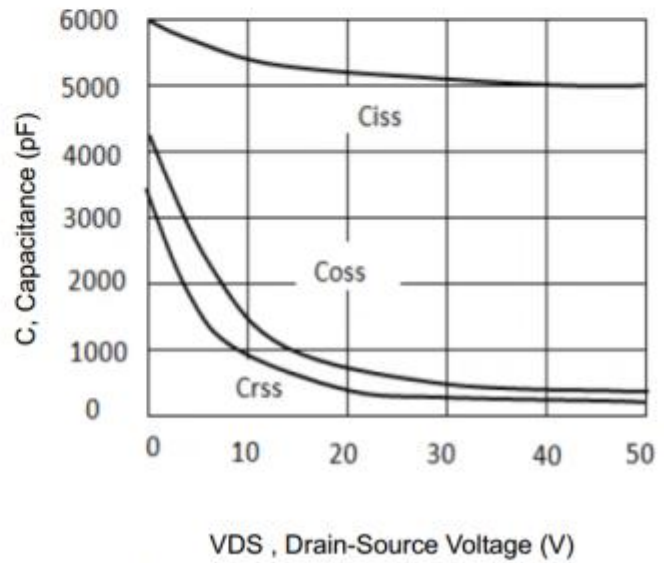


Fig10. Typical Capacitance Vs. Drain-Source Voltage

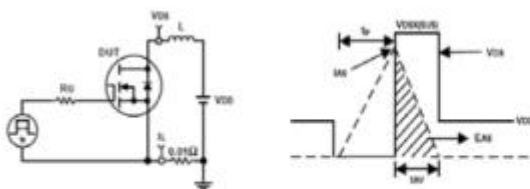


Fig11. Unclamped Inductive Test Circuit and waveforms

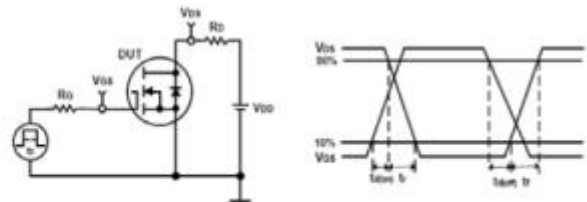


Fig12. Switching Time Test Circuit and waveforms