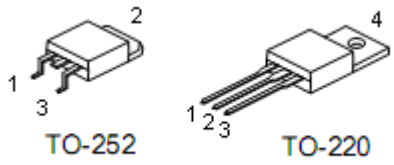
1. Features

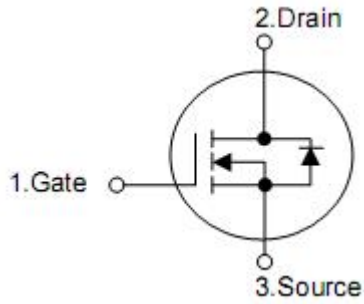
- $R_{DS(ON),typ.}$=9mΩ@V_{GS}=10V
- 100% EAS guaranteed
- Super low gate charge
- Excellent Cdv/dt effect decline
- Advanced high cell density trench technology

2.Description

The KNX3706A is the high cell density trenched N-ch MOSFET ,which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications. The KNX3706A meet the RoHS and Green product requirement, 100% EAS guaranteed with full function reliability approved.

3.Symbol





Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4.Absolute maximum ratings

Parameter		Symbol	Rating		Units
			TO-252	TO-220	
Drain-source voltage		V_{DS}	60		V
Gate-source voltage		V_{GS}	±20		V
Continuous drain current V_{GS}@-10V[1]	T_C=25°C	I_D	50		A
	T_C=100°C		30		
Pulsed drain current[2]		I_{DM}	100		A
Single pulse avalanche energy[3]		EAS	72.2		mJ
Avalanche current		I_{AS}	38		A
Total power dissipation[4]	T_c=25°C	P_D	52	80	W
Junction and storage temperature range		T_J ,T_{STG}	-55 to150		°C
Thermal resistance-junction to ambient[1]		$R_{\theta JA}$	62	-	°C/W
Thermal resistance-junction to case[1]		$R_{\theta JC}$	2.4	1.56	°C/W

5.Ordering Information

Part Number	Package	Brand
KNP3706A	TO-220	KIA
KND3706A	TO-252	KIA

6.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=-250μA	60	-	-	V
Static drain-source on- resistance[2]	$R_{DS(on)}$	V_{GS}=10V,I_D=15A	-	9	12	mΩ
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2	-	4	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=48V,V_{GS}=0V ,T_J=25°C	-	-	1	μA
		V_{DS}=48V,V_{GS}=0V ,T_J=25°C	-	-	5	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
Forward transcend ductance	g_{FS}	V_{DS}=5V, I_D=30A	-	42	-	S
Total gate charge(4.5V)	Q_g	V_{DS}=48V, V_{GS}=10V I_D =15A	-	33	-	nC
Gate-source charge	Q_{gs}		-	11	-	
Gate-drain charge	Q_{gd}		-	9.5	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=30V, R_G=3.3Ω, V_{GS}=10V I_D=15A	-	10.5	-	ns
Rise time	t_r		-	9.0	-	
Turn-off delay time	$t_{d(off)}$		-	65	-	
Fall time	t_f		-	4.5	-	
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=15V F=1.0MHZ	-	2180	-	pF
Output capacitance	C_{oss}		-	255	-	
Reverse transfer capacitance	C_{rss}		-	170	-	
Diode characteristics						
Continuous source current[1,5]	I_S	V_G=V_D=0V,Force current	-	-	30	A
Diode forward voltage[2]	V_{SD}	V_{GS}=0V,I_S=1A, T_J=25°C	-	-	1.2	V
Reverse recovery time	t_{rr}	I_F=15A,dI/dt=100A/us, T_J=25°C	-	19	-	nS
Reverse recovery charge	Q_{rr}		-	15	-	nC

Note:1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

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

3. The EAS data shows Max.rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH.I_{AS}=38A.

4. The power dissipation is limited by 150 ºC junction temperature.

5. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

7. Test circuits and waveforms

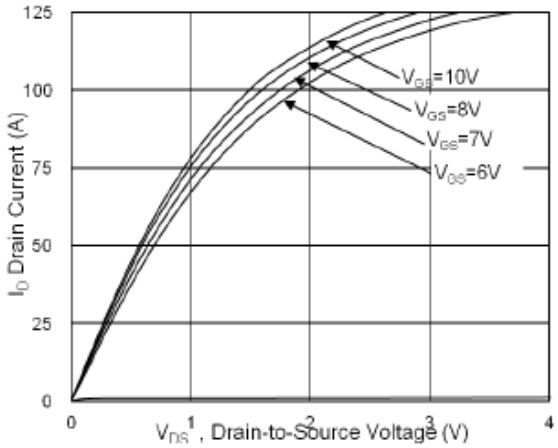


Fig.1 Typical Output Characteristics

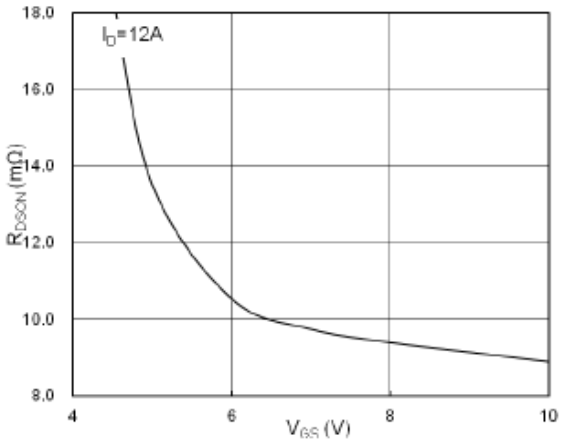


Fig.2 On-Resistance vs. G-S Voltage

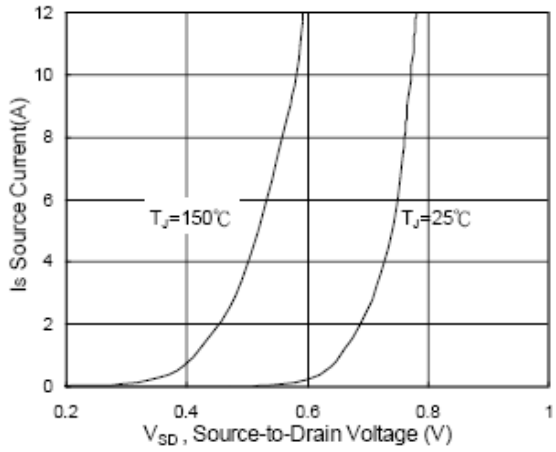


Fig.3 Source Drain Forward Characteristics

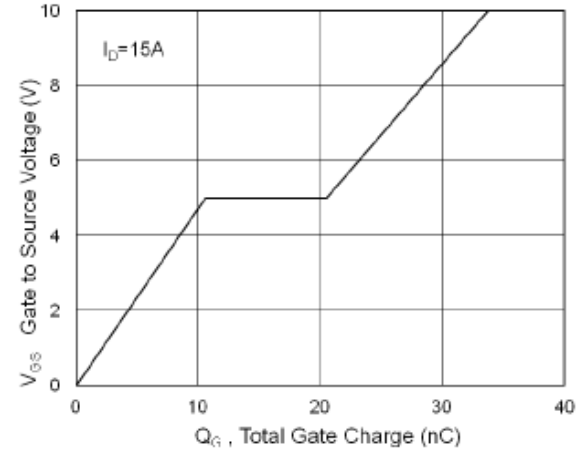


Fig.4 Gate-Charge Characteristics

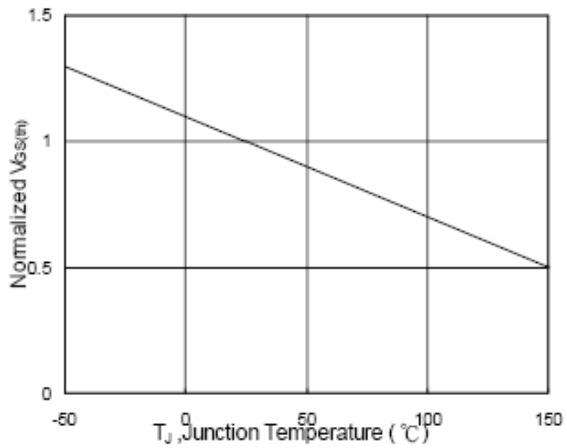


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

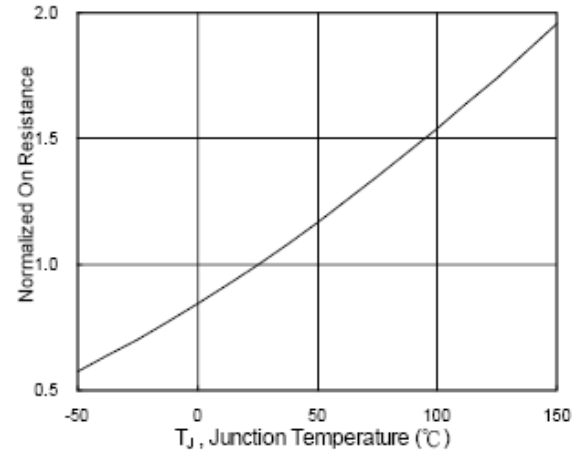


Fig.6 Normalized R_{DSON} vs. T_J

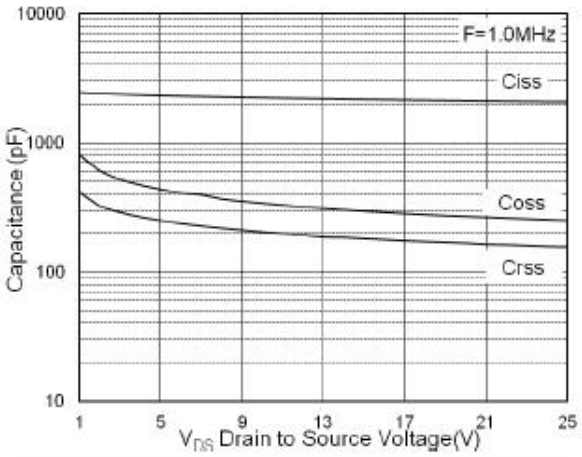


Fig.7 Capacitance

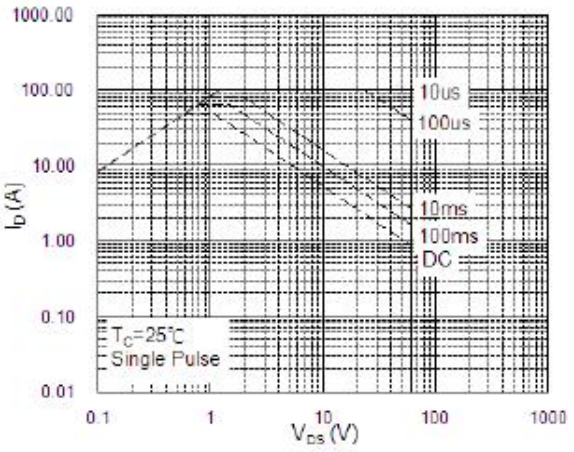


Fig.8 Safe Operating Area

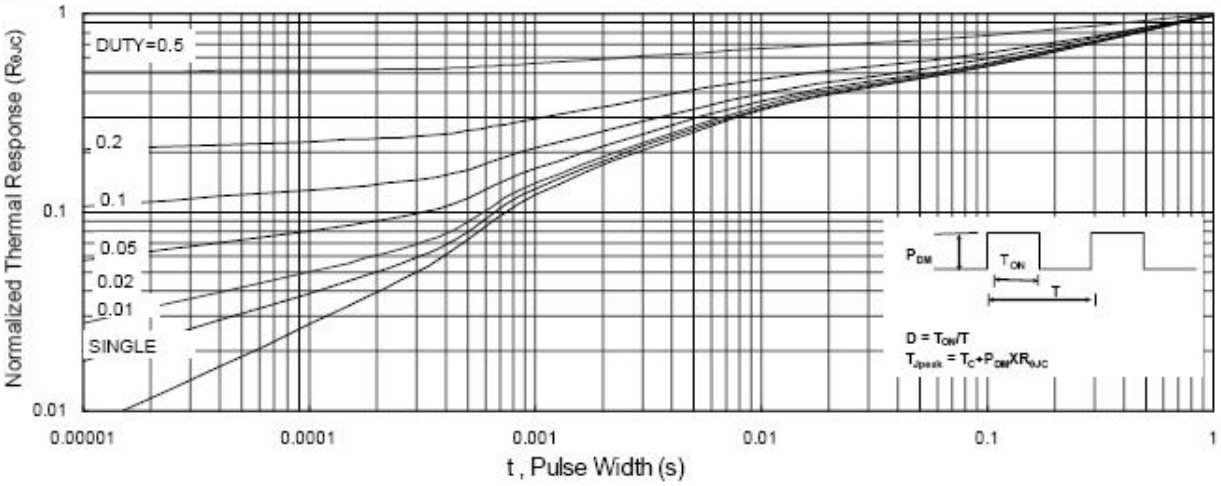


Fig.9 Normalized Maximum Transient Thermal Impedance

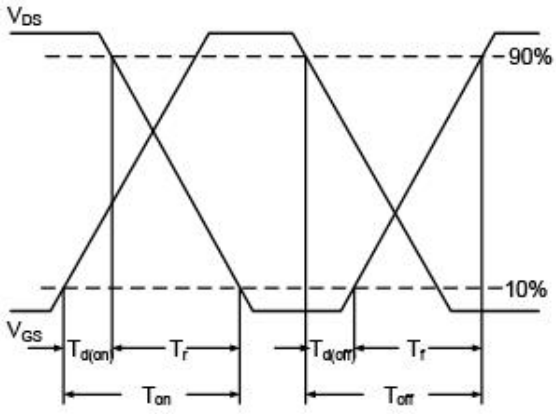


Fig.10 Switching Time Waveform

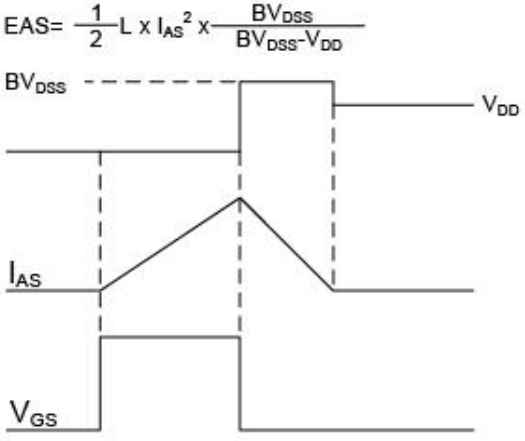


Fig.11 Unclamped Inductive Switching Waveform