

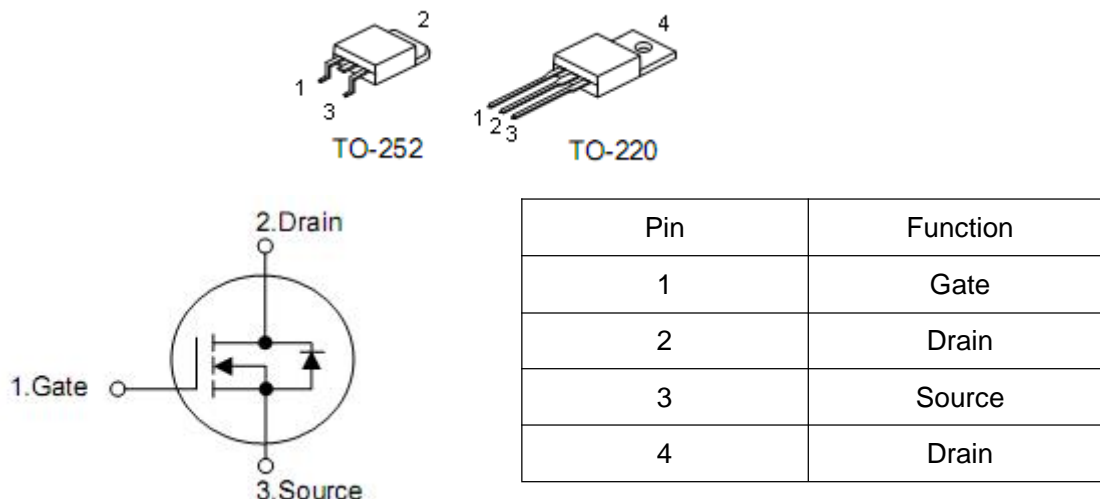
1. Features

- n $R_{DS(ON),typ.}=9m\Omega@V_{GS}=10V$
- n 100% EAS guaranteed
- n Super low gate charge
- n Excellent Cdv/dt effect decline
- n 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



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 $V_{GS}@-10V^1$	I_D	$T_C=25^\circ C$		A
		$T_C=100^\circ C$		
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	P_D	$T_C=25^\circ C$		W
Junction and storage temperature range		T_J, T_{STG}	-55 to150	
Thermal resistance-junction to ambient ¹	$R_{\theta JA}$	62	-	$^\circ C/W$
Thermal resistance-junction to case ¹	$R_{\theta JC}$	2.4	1.56	$^\circ C/W$

5. Ordering Information

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

6. Electrical characteristics

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	60	-	-	V
Static drain-source on- resistance ²	$R_{DS(on)}$	$V_{GS}=10V, I_D=15A$	-	9	12	m Ω
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=48V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{DS}=48V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	5	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Forward transconductance	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	$t_{d(on)}$	$V_{DD}=30V,$ $R_G=3.3\Omega, V_{GS}=10V$ $I_D=15A$	-	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}	$V_{GS}=0V, V_{DS}=15V$ $F=1.0\text{MHz}$	-	2180	-	pF
Output capacitance	C_{oss}		-	255	-	
Reverse transfer capacitance	C_{rss}		-	170	-	
Diode characteristics						
Continuous source current ^{1,5}	I_S	$V_G=V_D=0V, \text{Force current}$	-	-	30	A
Diode forward voltage ²	V_{SD}	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	-	-	1.2	V
Reverse recovery time	t_{rr}	$I_F=15A, di/dt=100A/\mu s,$ $T_J=25^\circ\text{C}$	-	19	-	nS
Reverse recovery charge	Q_{rr}		-	15	-	nC

Note:1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

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

4. The power dissipation is limited by 150 °C 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

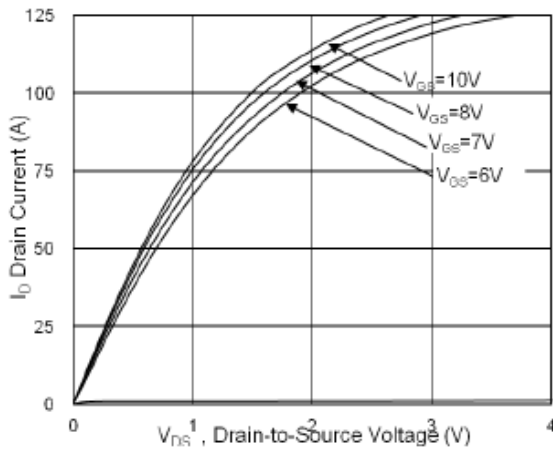


Fig.1 Typical Output Characteristics

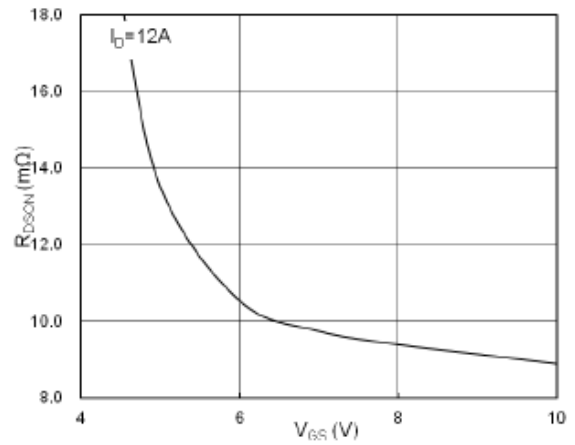


Fig.2 On-Resistance vs. G-S Voltage

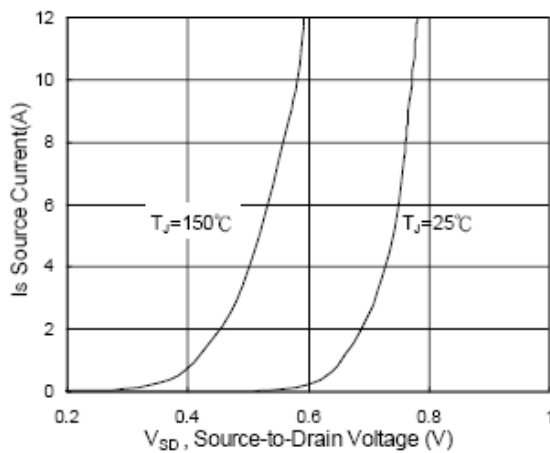


Fig.3 Source Drain Forward Characteristics

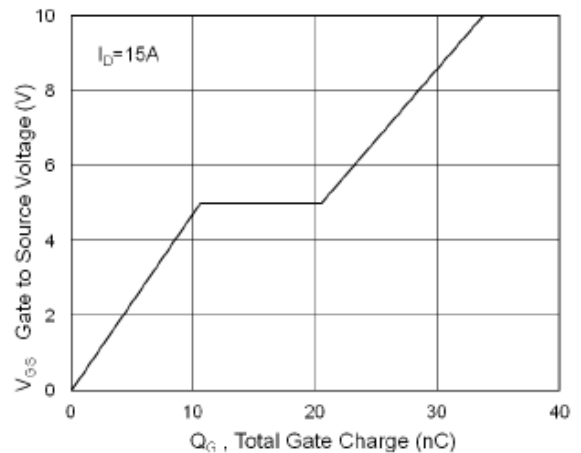


Fig.4 Gate-Charge Characteristics

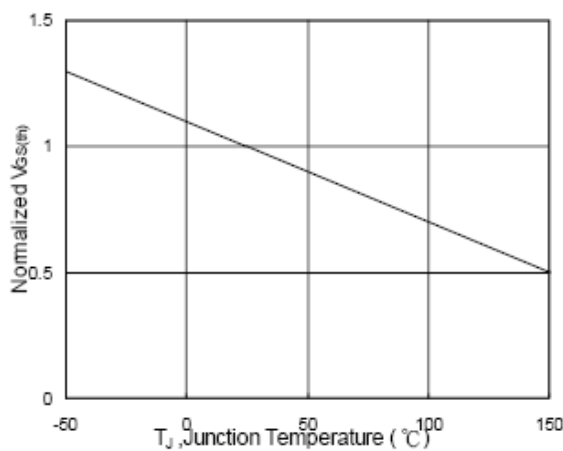


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

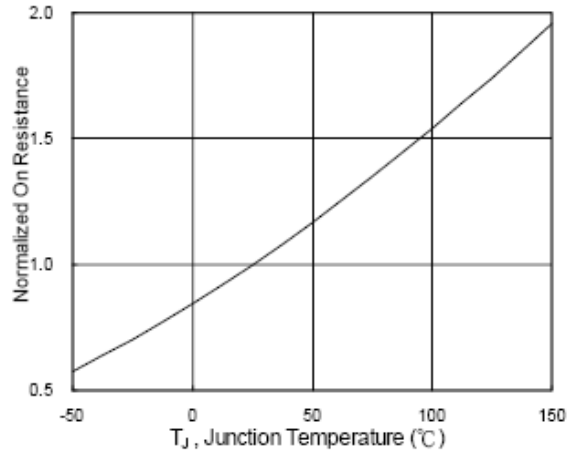


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

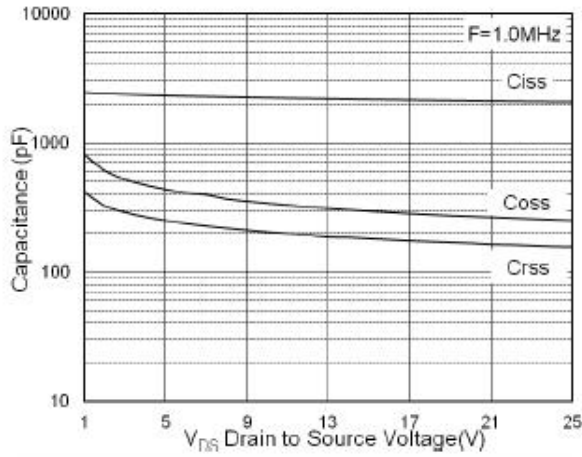


Fig.7 Capacitance

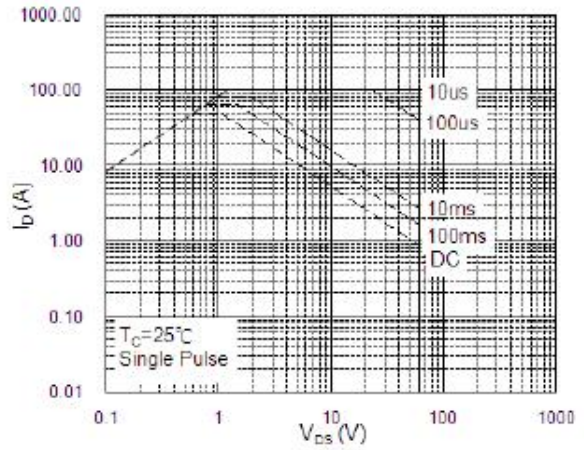


Fig.8 Safe Operating Area

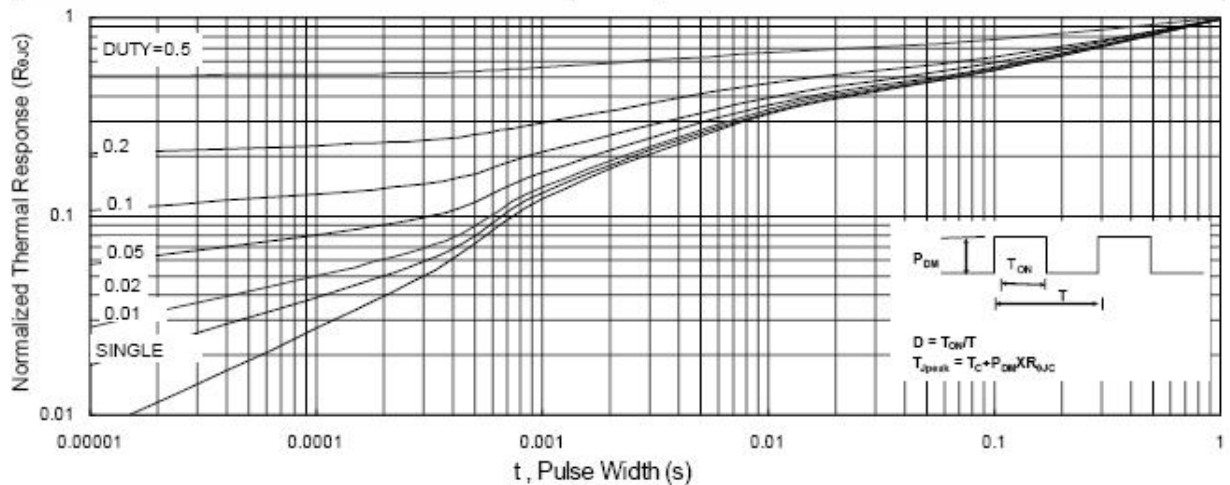


Fig.9 Normalized Maximum Transient Thermal Impedance

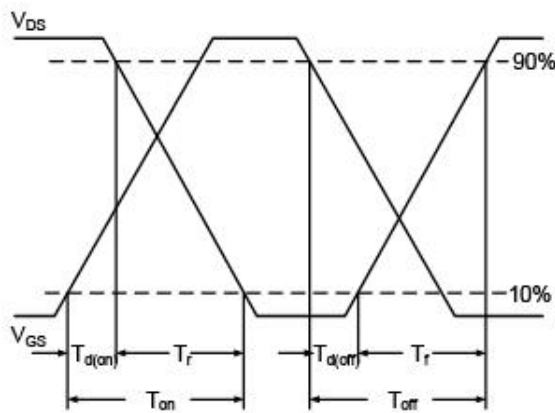


Fig.10 Switching Time Waveform

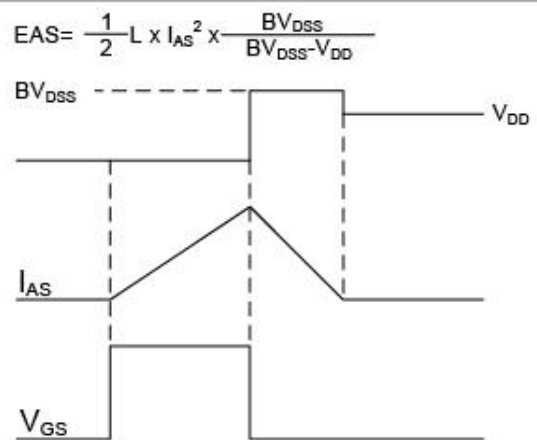


Fig.11 Unclamped Inductive Switching Waveform