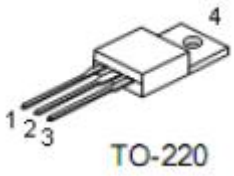
1. Features

- $R_{DS(on)\ (TYP)}$= 2.2mΩ @V_{GS}= 10 V
- Lead free and green device available
- Low Rds-on to minimize conductive loss
- High avalanche current

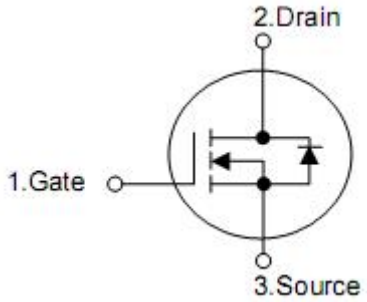
2. Applications

- Power supply
- DC-DC converters

3. Pin configuration



TO-220



Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Ordering Information

Part Number	Package	Brand
KNP2404A	TO-220	KIA

5. Absolute maximum ratings

Parameter		Symbol	Maximum	Units
Drain-to-source voltage		V_{DSS}	40	V
Gate-to-source voltage		V_{GSS}	±25	V
Continuous drain current	T_C=25ºC(Silicon limited)	I_D	190	A
	T_C=25°C(Package limited)		120	
	T_C=100°C (Silicon limited)		109	
Pulsed drain current	T_C=25 ºC	I_{DP}	480	A
Avalanche current(L=0.5mH)		I_{AS}	46	A
Avalanche energy(L=0.5mH)		E_{AS}	529	mJ
Maximum power dissipation	T_C=25 ºC	P_D	123	W
	T_C=100 ºC		82	W
Junction & storage temperature range		T_J,T_{STG}	-55～150	ºC

*Drain current limited by maximum junction temperature.

6. Thermal characteristics

Parameter	Symbol	Typical	Units
Thermal resistance-junction to case	$R_{\theta jc}$	1.02	ºC/W
Thermal resistance-junction to ambient	$R_{\theta ja}$	80	

7. Electrical characteristics

(T_A=25°C,unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V,I_{DS}=250μA	40	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=64V,V_{GS}=0V	-	-	1	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_{DS}=250μA	2	-	4	V
Gate leakage current	I_{GSS}	V_{GS}=±25V,V_{DS}=0V	-	-	±100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V,I_{DS}=30A	-	2.2	3.5	mΩ
Forward Transconductance	G_{fs}	V_{DS}=5V, I_D=40A	-	135	-	S
Diode characteristics						
Diode forward voltage	V_{SD}	I_{SD}=40A,V_{GS}=0V	-	0.9	1.3	V
Diode continuous forward current	I_S		-	-	190	A
Reverse recovery time	t_{rr}	I_S=40A,dI/dt=100A/μs	-	55	-	nS
Reverse recovery charge	Q_{rr}		-	70	-	nC
Dynamic characteristics [2]						
Gate resistance	R_G	V_{GS}=0V, V_{DS}=0V,F=1MHz	-	2.0	-	Ω
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, F=1.0MHz	-	6010	-	pF
Output capacitance	C_{oss}		-	1400	-	
Reverse transfer capacitance	C_{rss}		-	675	-	
Turn-on delay time	$t_{d(ON)}$	V_{DD}=25V,I_D=90A, V_{GS}=10V,R_G=2.7Ω	-	25	-	nS
Turn-on rise time	t_r		-	102	-	
Turn-off delay time	$t_{d(OFF)}$			62	-	
Turn-off fall time	t_f		-	84	-	
Gate charge characteristics [2]						
Total gate charge	Q_g	V_{DS}=40V, V_{GS}=10V, I_D=32A,F=1.0MHz	-	150	-	nC
Gate-to-source charge	Q_{gs}		-	32	-	
Gate-to-drain charge	Q_{gd}		-	70	-	

8. Test circuits and waveforms

Fig 1: Output Characteristics

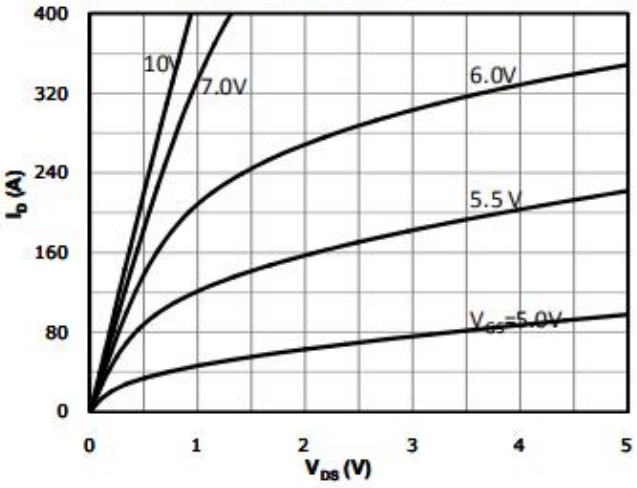


Fig 2: Transfer Characteristics

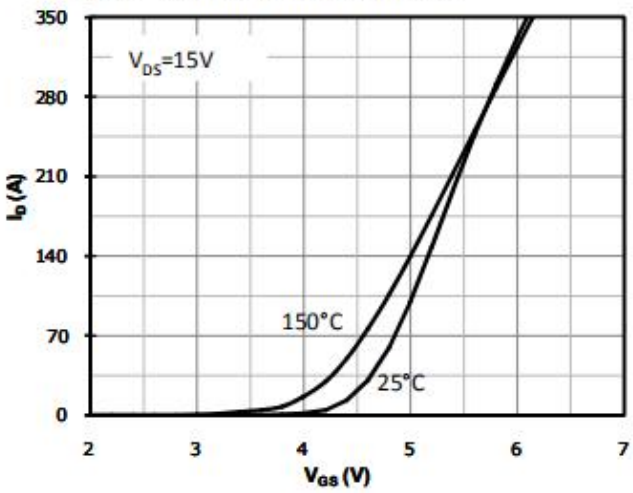


Fig 3: Rds(on) vs Drain Current and Gate Voltage

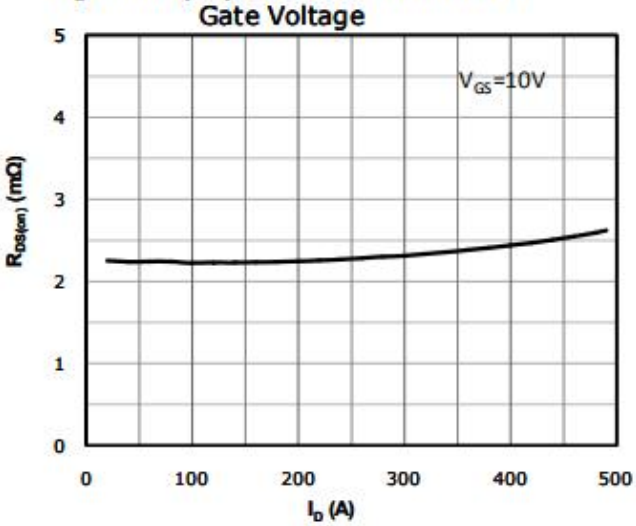


Fig 4: Rds(on) vs Gate Voltage

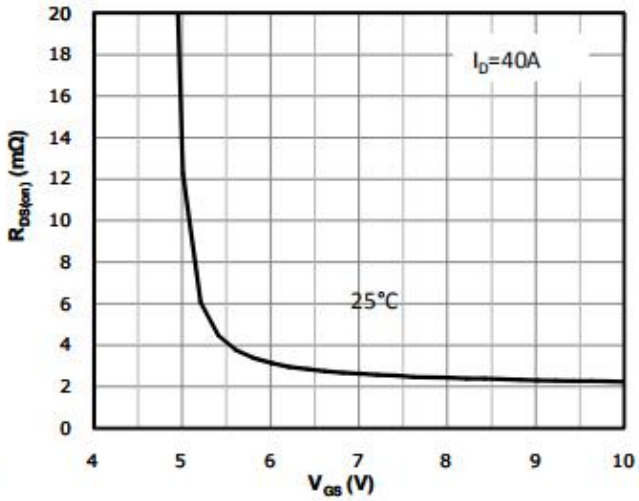


Fig 5: Rds(on) vs. Temperature

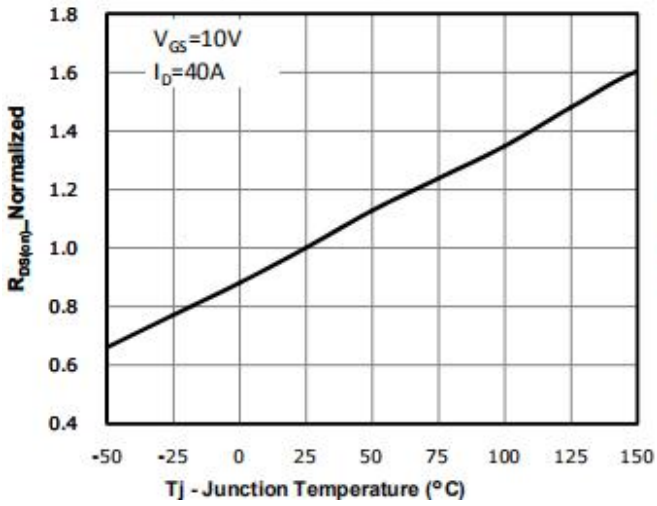


Fig 6: Capacitance Characteristics

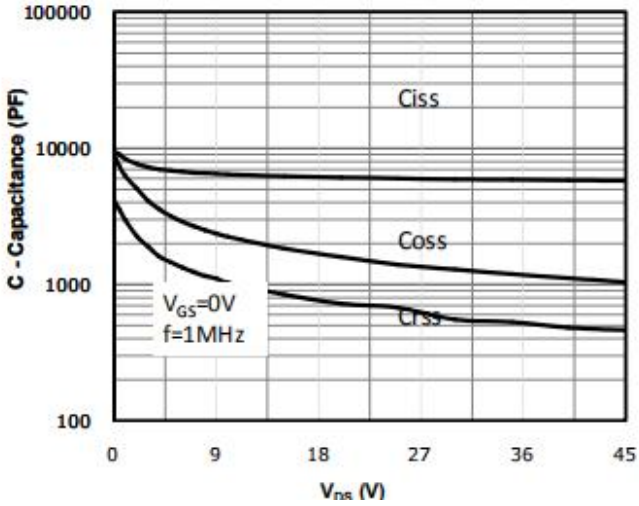


Fig 7: Gate Charge Characteristics

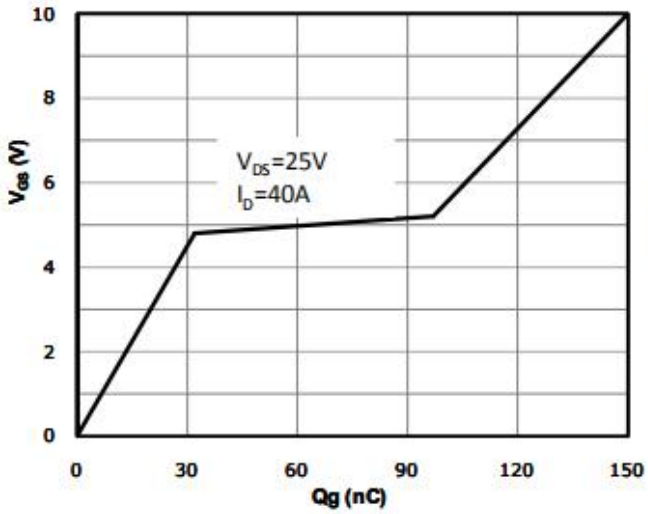


Fig 8: Body-diode Forward Characteristics

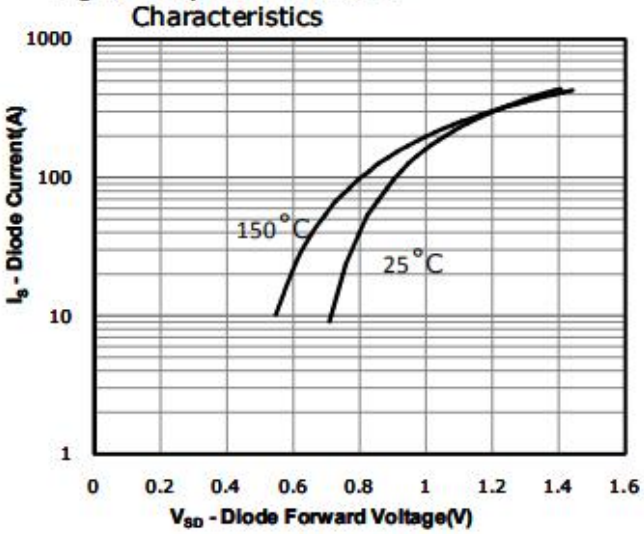


Fig 9: Power Dissipation

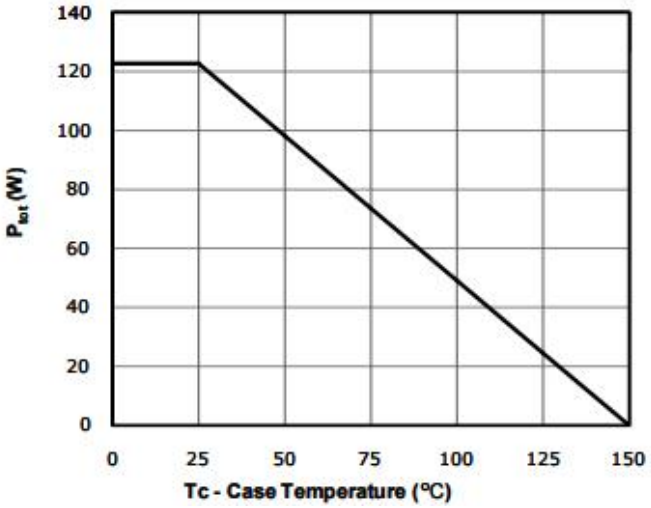


Fig 10: Drain Current Derating

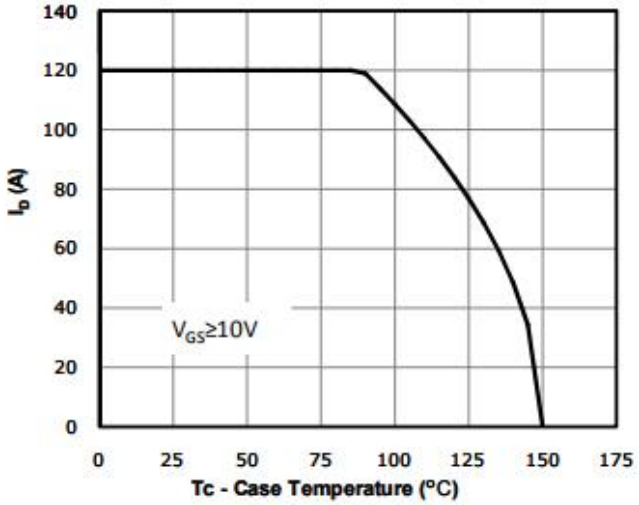


Fig 11: Safe Operating Area

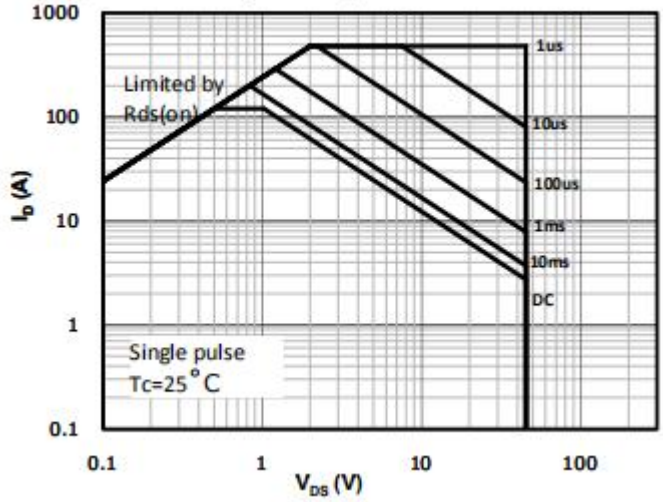
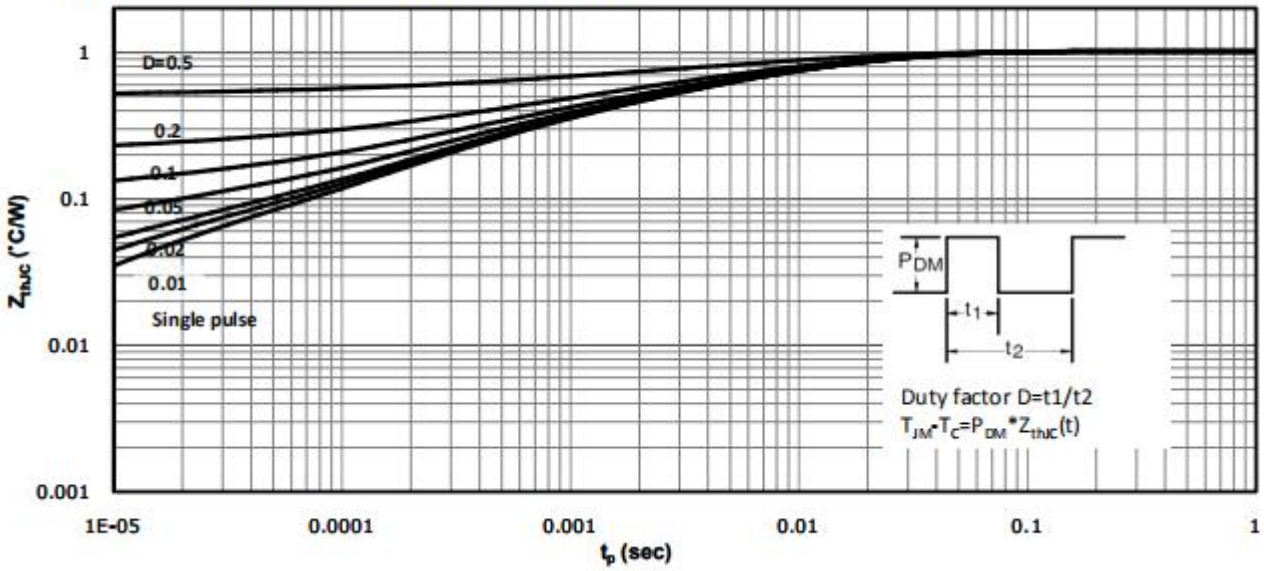


Fig 12: Max. Transient Thermal Impedance



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