

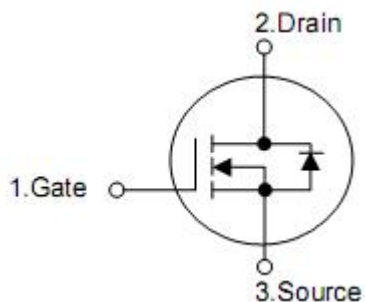
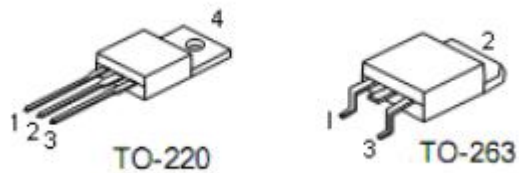
1. Features

- $R_{DS(on)}$ (TYP)= 2.2m Ω @ 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



Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Ordering Information

Part Number	Package	Brand
KNP2404A	TO-220	KIA
KNB2404A	TO-263	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	$T_C=25^{\circ}\text{C}$ (Silicon limited)	I_D	190	A
	$T_C=25^{\circ}\text{C}$ (Package limited)		120	
	$T_C=100^{\circ}\text{C}$ (Silicon limited)		109	
Pulsed drain current	$T_C=25^{\circ}\text{C}$	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	$T_C=25^{\circ}\text{C}$	P_D	123	W
	$T_C=100^{\circ}\text{C}$		82	W
Junction & storage temperature range		T_J, T_{STG}	-55~150	$^{\circ}\text{C}$

*Drain current limited by maximum junction temperature.

6. Thermal characteristics

Parameter	Symbol	Typical	Units
Thermal resistance-junction to case	$R_{\theta jc}$	1.02	$^{\circ}\text{C}/\text{W}$
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

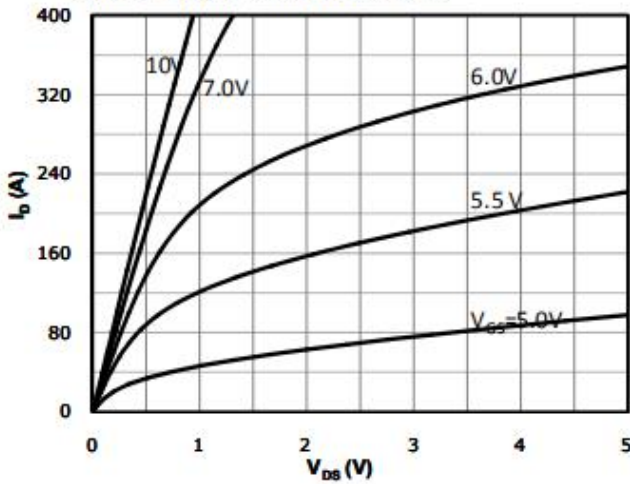


Fig 2: Transfer Characteristics

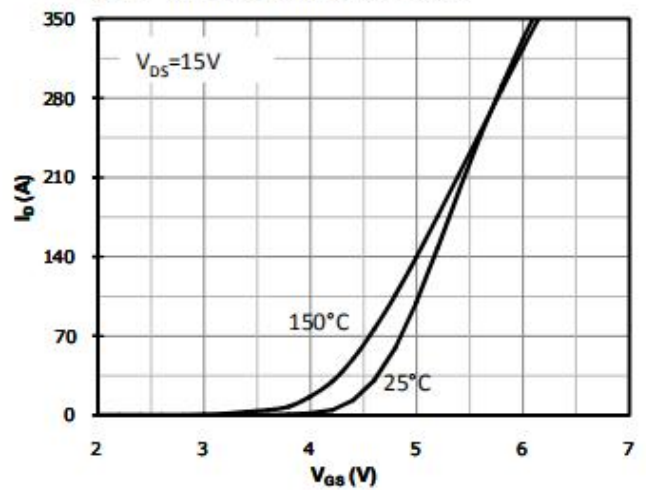


Fig 3: Rds(on) vs Drain Current and Gate Voltage

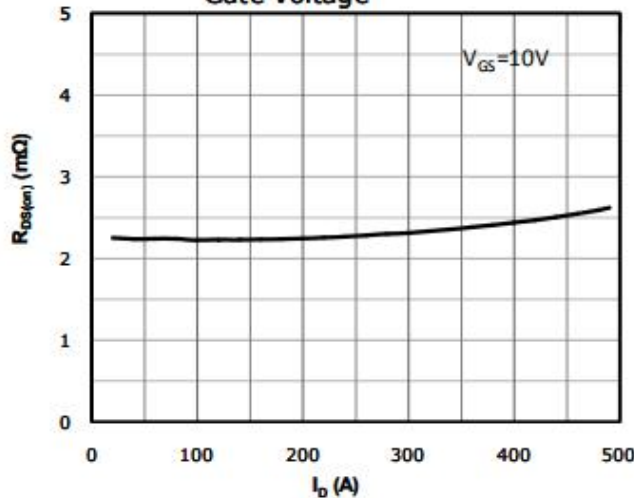


Fig 4: Rds(on) vs Gate Voltage

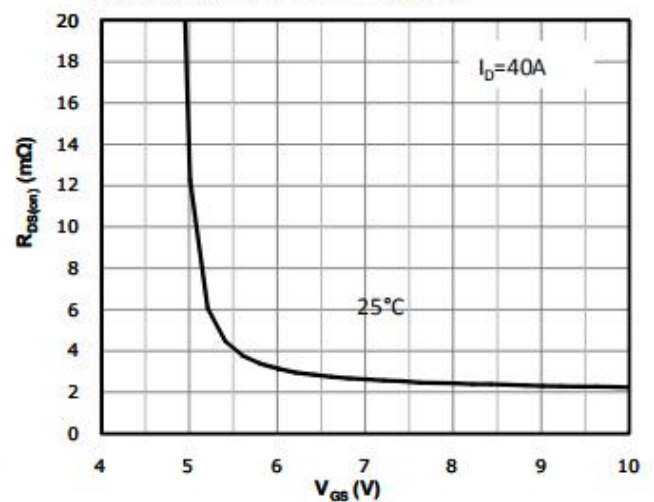


Fig 5: Rds(on) vs. Temperature

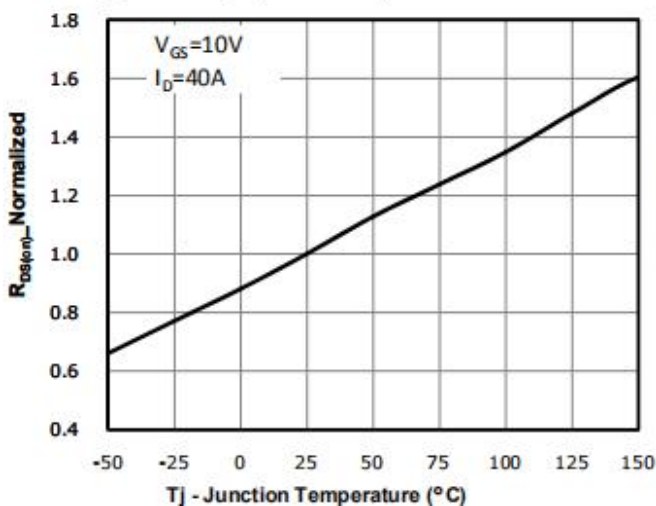


Fig 6: Capacitance Characteristics

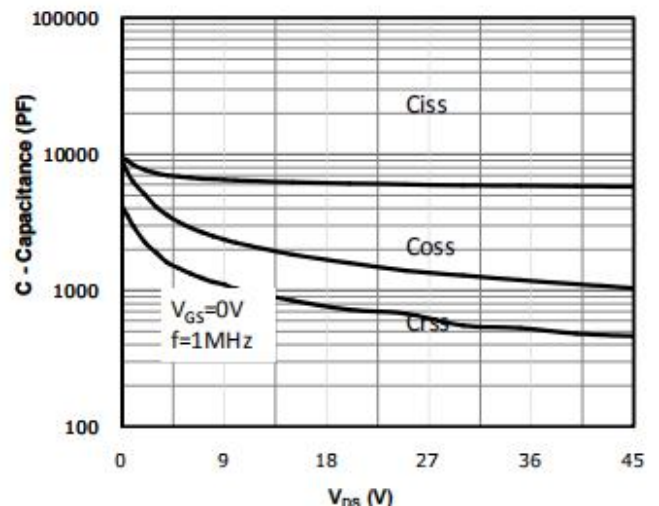


Fig 7: Gate Charge Characteristics

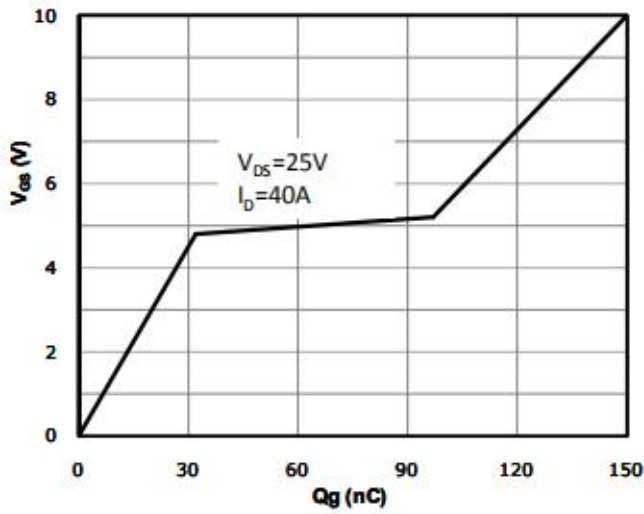


Fig 8: Body-diode Forward Characteristics

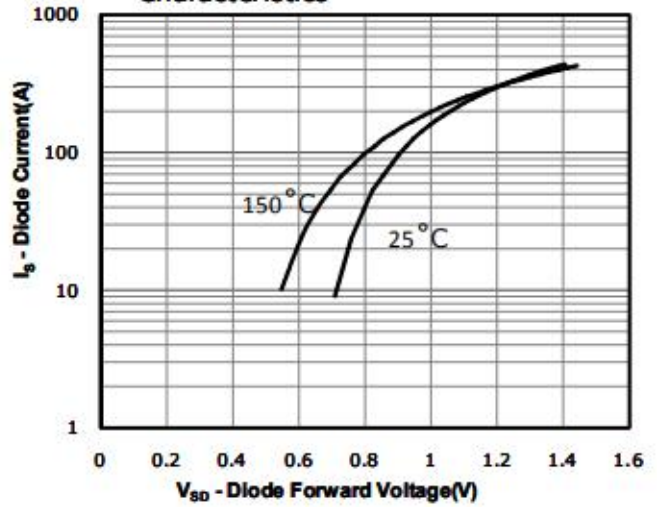


Fig 9: Power Dissipation

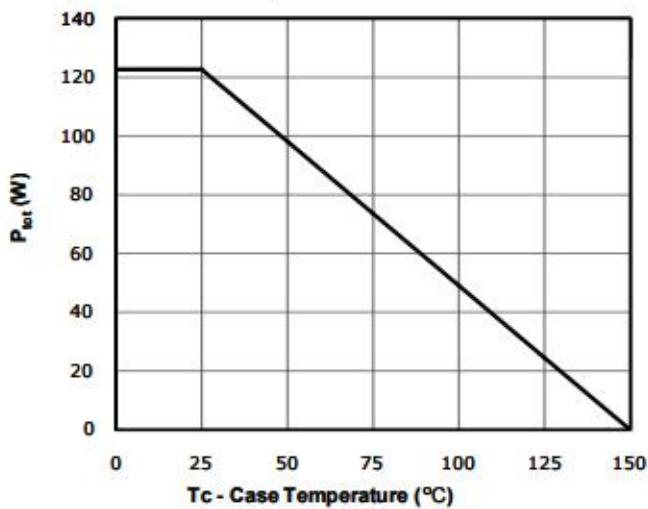


Fig 10: Drain Current Derating

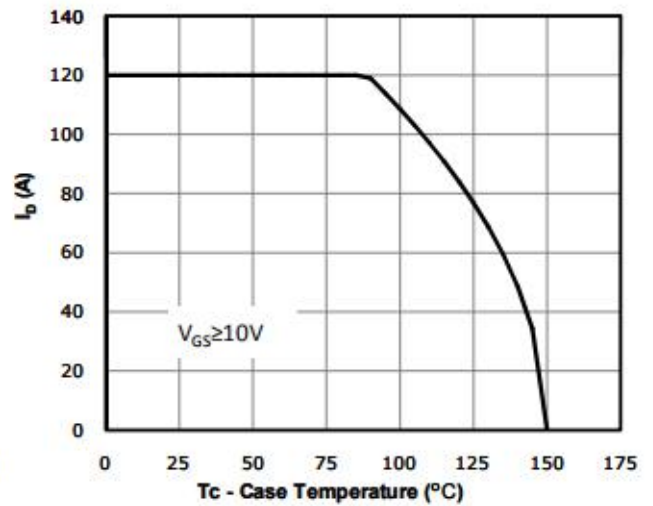


Fig 11: Safe Operating Area

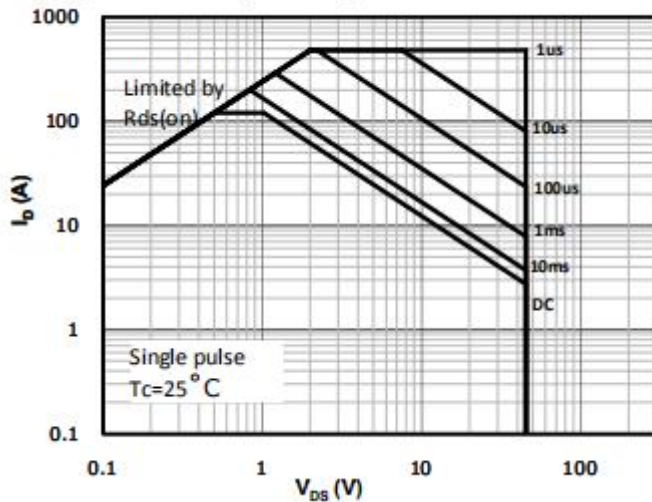


Fig 12: Max. Transient Thermal Impedance

