

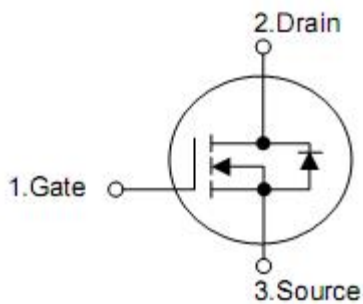
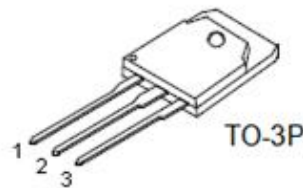
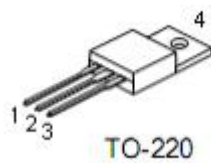
## 1. Applications

- n Power supply
- n DC-DC converters

## 2. Features

- n  $R_{DS(on)} = 7m\Omega(\text{typ.}) @V_{GS} = 10V$
- n Lead free and Green device available
- n Low  $R_{DS(on)}$  to minimize conductive loss
- n High avalanche current

## 3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

## 4. Ordering Information

Part Number	Package	Brand
KNP3306A	TO-220	KIA
KNH3306A	TO-3P	KIA

## 5. Absolute maximum ratings

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

Parameter	Symbol	Rating		Units	
		TO-220	TO-3P		
Drain-source voltage	$V_{DSS}$	60		V	
Gate-source voltage	$V_{GSS}$	$\pm 25$		V	
Continuous Drain Current	$I_D^3$	$T_C = 25^\circ\text{C}$		A	
		$T_C = 100^\circ\text{C}$			
Pulsed Drain Current	$I_{DP}^4$	$T_C = 25^\circ\text{C}$			
Avalanche Current	$I_{AS}^5$	21.5			
Avalanche Energy	$E_{AS}^5$	462.25		mJ	
Maximum Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	183	215	W
		$T_C = 100^\circ\text{C}$	92	107.5	
Junction & Storage Temperature Range	$T_L, T_{STG}$	-55~+175		$^\circ\text{C}$	

## 6. Thermal characteristics

Symbol	Parameter	Typical		Unit
		TO-220	TO-3P	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.68	0.58	$^\circ\text{C} / \text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5		

## 7. Electrical characteristics

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	60	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V T <sub>J</sub> =125 °C	-	-	1	μA
			-	-	100	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =+25V, V <sub>DS</sub> =0V	-	-	+100	nA
		V <sub>GS</sub> =-25V, V <sub>DS</sub> =0V	-	-	-100	nA
<b>On characteristics</b>						
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	3.0	4.0	V
Drain-source on resistance	R <sub>DS(on)</sub> <sup>1</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	7	8.5	mΩ
<b>Dynamic Characteristics<sup>2</sup></b>						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	3390	-	pF
Output capacitance	C <sub>oss</sub>		-	371	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	258	-	
Gate Repacitance	R <sub>G</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1.0MHz	-	1.8	-	Ω
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =30V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V,	-	73	-	nC
Gate-source charge	Q <sub>gs</sub>		-	18	-	
Gate-drain charge	Q <sub>gd</sub>		-	22	-	
<b>Resistive switching characteristics<sup>2</sup></b>						
Turn-on delay time	t <sub>d(ON)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V R <sub>G</sub> =6.8Ω	-	18	-	ns
Rise time	t <sub>rise</sub>		-	120	-	
Turn-off delay time	t <sub>d(OFF)</sub>		-	55	-	
Fall time	t <sub>fall</sub>		-	68	-	
<b>Diode Characteristics</b>						
Diode Forward Voltage	V <sub>SD</sub> <sup>1</sup>	V <sub>GS</sub> =0V, I <sub>SD</sub> =20A	-	-	1.3	V
Diode Continuous Forward current	I <sub>S</sub> <sup>3</sup>		-	-	114	A
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =30A, di/dt=100A/μs	-	45	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	76	-	nC

Note:

1: Pulse test; pulse width ≦ 300us, duty cycle ≦ 2%.

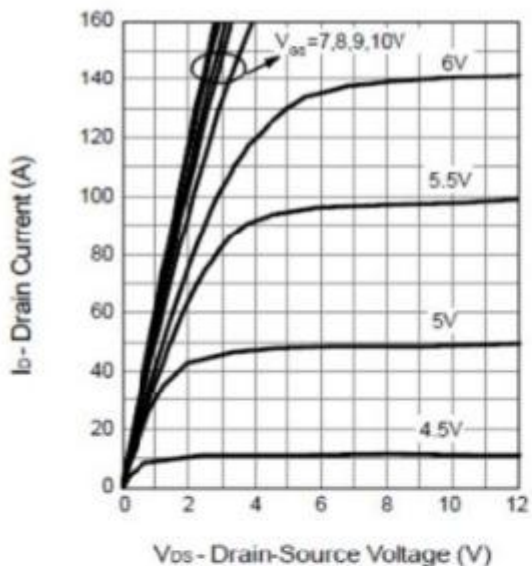
2: Guaranteed by design, not subject to production testing.

3: Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 55A.

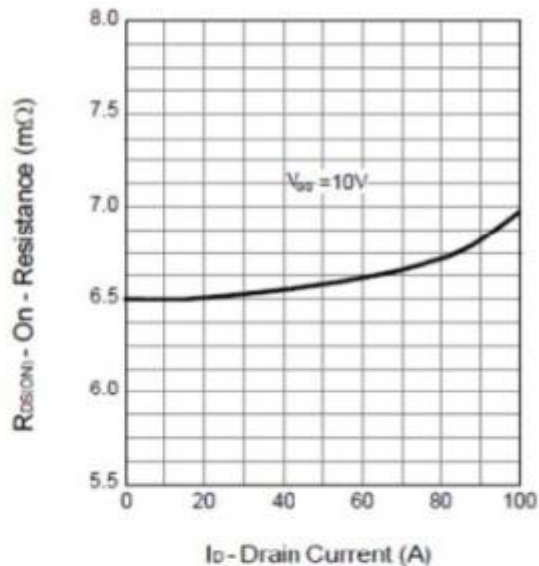
4: Repetitive rating, pulse width limited by max junction temperature.

5: Starting T<sub>J</sub>=25 °C, V<sub>D</sub>=50V, L=0.5mH, I<sub>AS</sub>=43A.

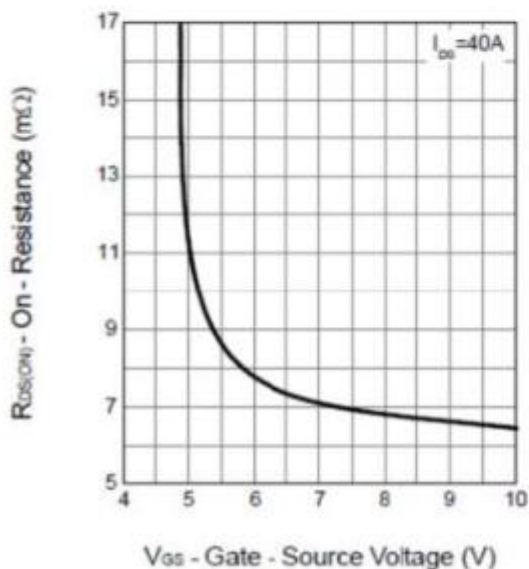
**Output Characteristics**



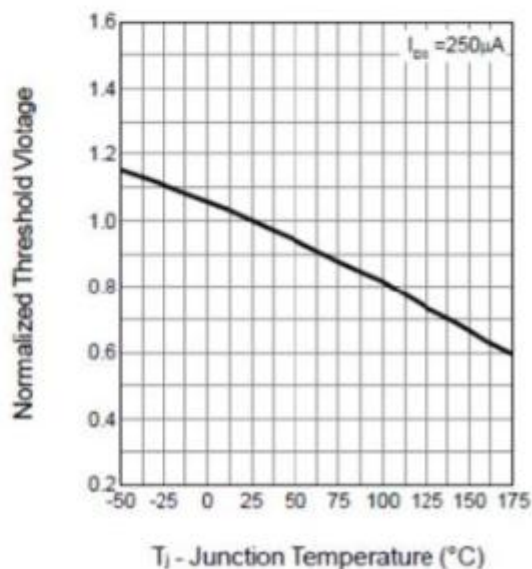
**Drain-Source On Resistance**



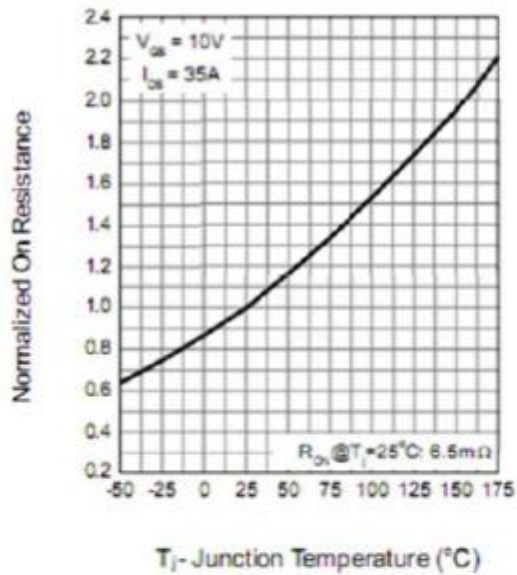
**Drain-Source On Resistance**



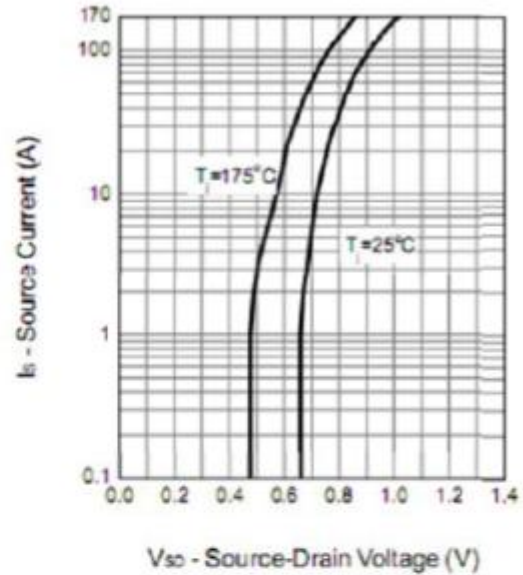
**Gate Threshold Voltage**



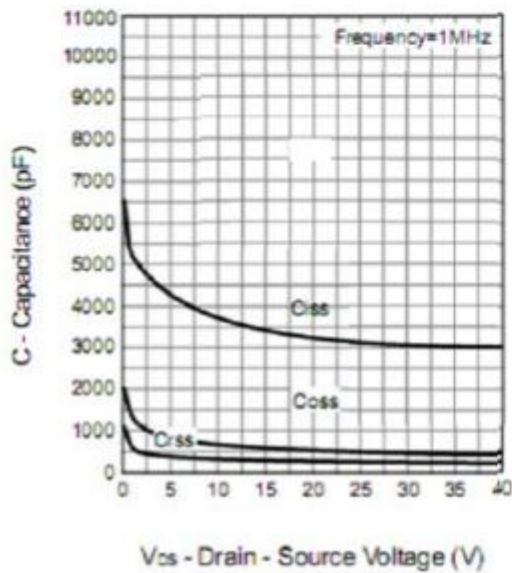
**Drain-Source On Resistance**



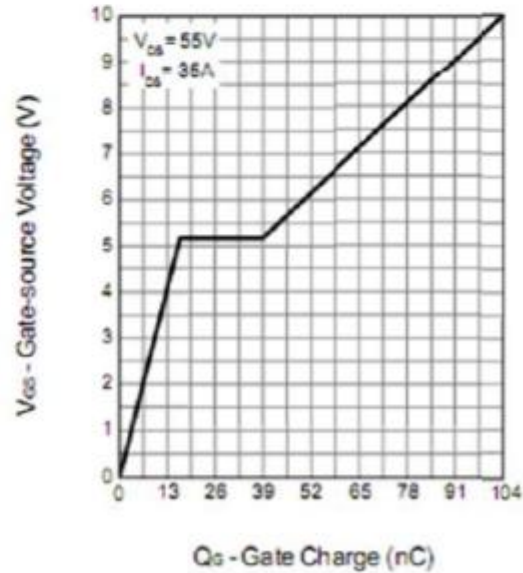
**Source-Drain Diode Forward**



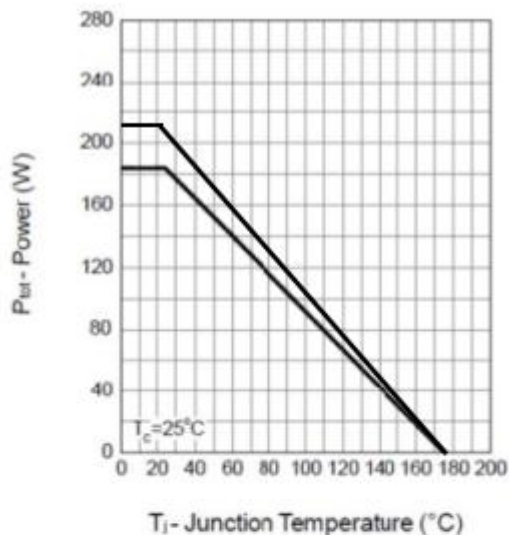
**Capacitance**



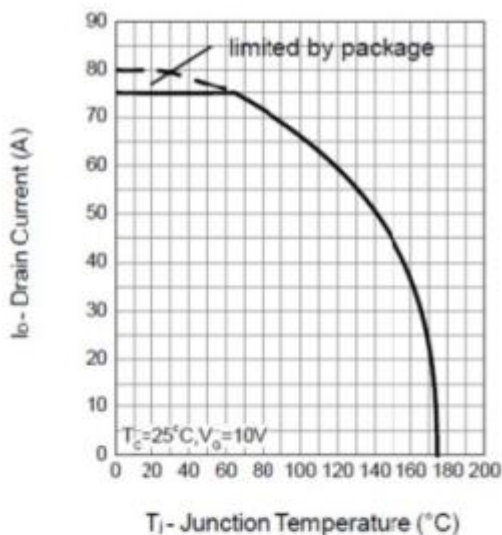
**Gate Charge**



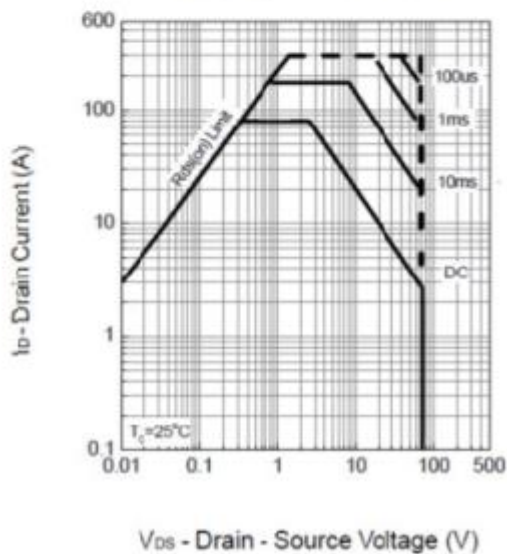
**Power Dissipation**



**Drain Current**



**Safe Operation Area**



**Thermal Transient Impedance**

