

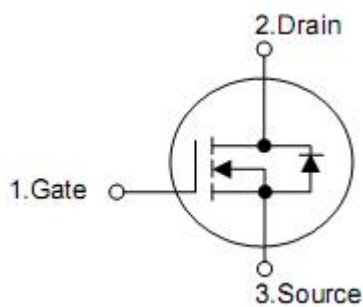
## 1. Features

- $R_{DS(ON),typ.}=5.0m\Omega(typ.)@V_{GS}=10V$
- Uses CRM(CQ) advanced Trench MOS technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent  $Q_g \times R_{DS(on)}$  product(FOM)
- Qualified according to JEDEC criteria

## 2. Applications

- Motor control and drive
- Battery management
- UPS (Uninterruptible Power Supplies)

## 3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

## 4. Ordering Information

Part Number	Package	Brand
KND3404B	TO-252	KIA

## 5. Absolute maximum ratings

TC=25 °C unless otherwise specified

Parameter	Symbol	Ratings	Unit
Drain-to-Source Voltage	$V_{DSS}$	40	V
Continuous Drain Current <sup>1</sup>	$T_C=25\text{ °C}$	80	A
	$T_C=100\text{ °C}$	58	
Pulsed drain current ( $T_C = 25\text{ °C}$ , $t_p$ limited by $T_{jmax}$ ) <sup>2</sup>	$I_{DP}$	320	
Avalanche energy, single pulse <sup>3</sup>	$E_{AS}$	225	mJ
Gate-Source voltage	$V_{GS}$	±20	V
Power dissipation ( $T_C = 25\text{ °C}$ ) <sup>4</sup>	$P_{tot}$	92	W
Junction & Storage Temperature Range	$T_J$ & $T_{STG}$	-55 to 150	°C

## 6. Thermal characteristics

Parameter	Symbol	Ratings	Units
Thermal resistance, junction-ambient	$R_{\theta JA}$	94	°C/W
Thermal resistance, Junction-case	$R_{\theta JC}$	1.37	

## 7. Electrical characteristics

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static characteristics						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, T <sub>J</sub> =25 °C	-	-	1	μA
		V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	-	-	10	
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.8	2.5	V
Gate leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	-	1	100	nA
Drain-source on-resistance <sup>2</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	5.0	6.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =30A	-	5.5	8.0	
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =40A	-	110	-	S
Dynamic characteristics						
Gate Resistance	R <sub>G</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V Frequency=1MHz	-	2.0	-	Ω
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz	-	2300	-	pF
Output capacitance	C <sub>oss</sub>		-	290	-	pF
Reverse transfer capacitance	C <sub>rss</sub>		-	150	-	pF
Turn-on delay time	t <sub>d(on)</sub>		-	9.5	-	ns
Rise time	t <sub>r</sub>	V <sub>DD</sub> =20V, I <sub>D</sub> =40A, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω	-	30	-	ns
Turn-off delay time	t <sub>d(off)</sub>		-	55	-	ns
Fall time	t <sub>f</sub>		-	17.5	-	ns
Gate Charge Characteristics						
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =20V, I <sub>D</sub> =40A, V <sub>GS</sub> =10V, F=1MHz	-	47.5	-	nC
Gate-source charge	Q <sub>gs</sub>		-	9.0	-	nC
Gate-drain charge	Q <sub>gd</sub>		-	10.0	-	nC
Diode characteristics						
Diode forward voltage <sup>2</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>SD</sub> =40A	-	-	1.5	V
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =40A DI <sub>F</sub> /dt=100A/μs	-	20	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	9.0	-	nC

Note:1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z 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<sub>DD</sub>=40V, V<sub>GS</sub>=10V, L=0.5mH, I<sub>AS</sub>=30A.

4. The power dissipation is limited by 150 °C junction temperature.

**8. Typical Characteristics**

Fig 1: Output Characteristics

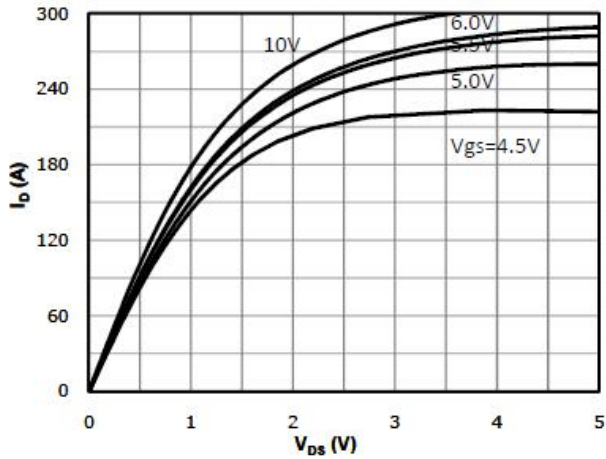


Fig 2: Transfer Characteristics

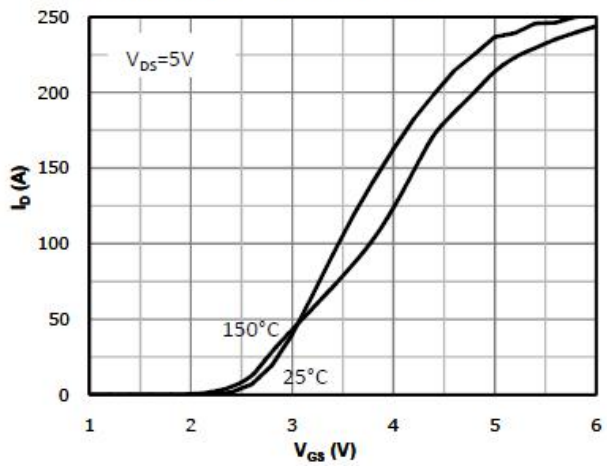


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

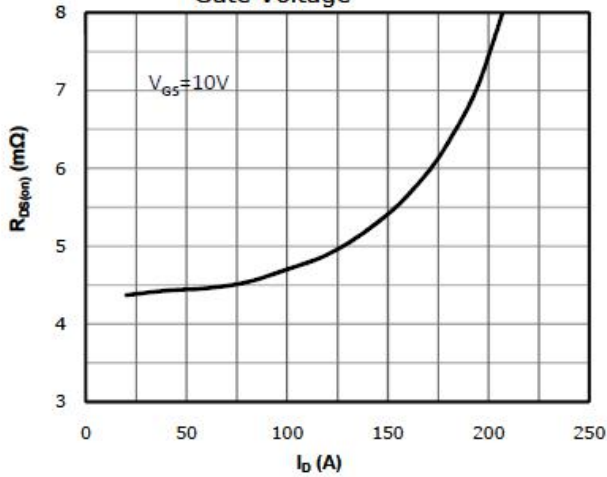


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

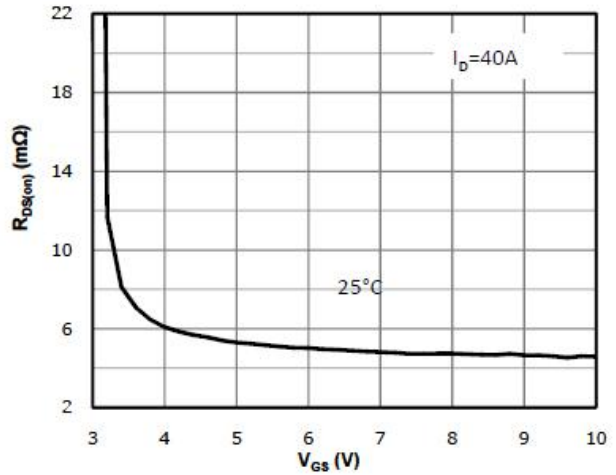


Fig 5:  $R_{DS(on)}$  vs. Temperature

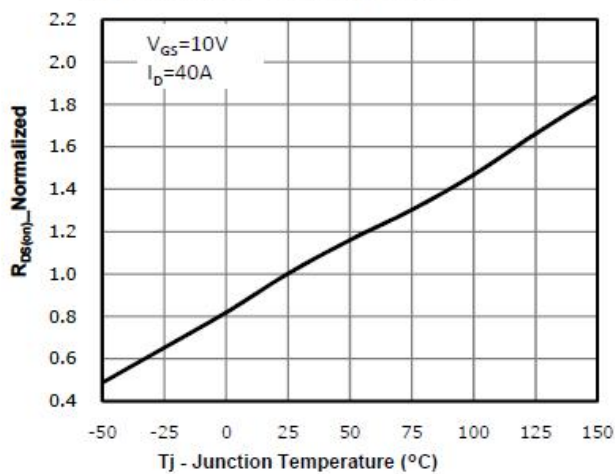


Fig 6: Capacitance Characteristics

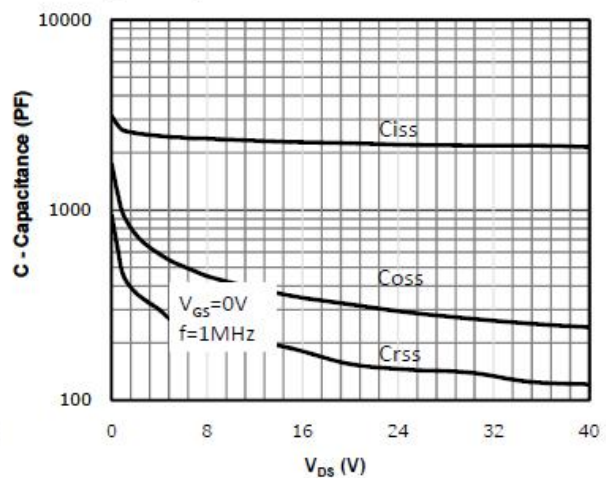


Fig 7: Gate Charge Characteristics

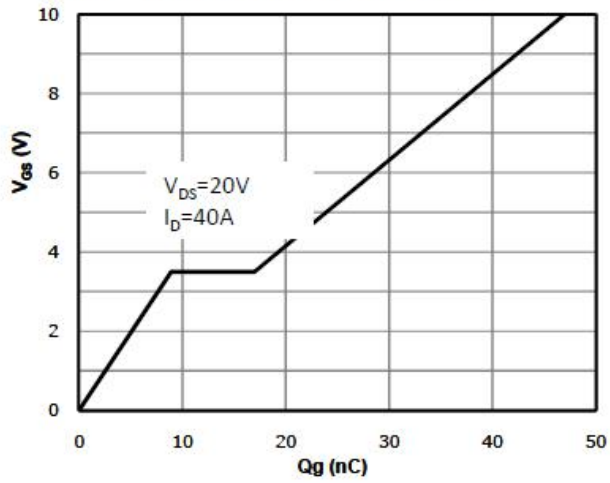


Fig 8: Body-diode Forward Characteristics

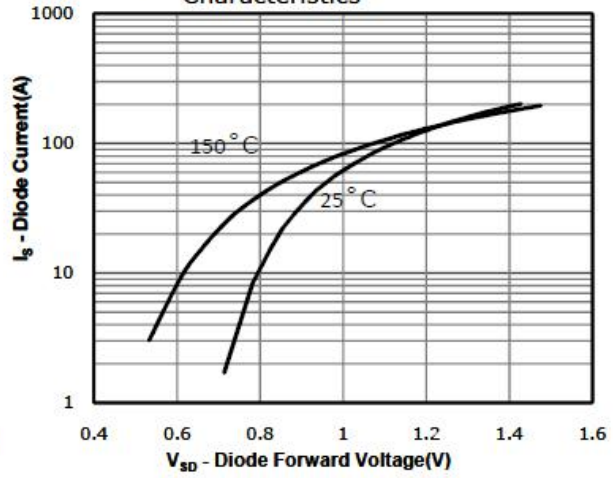


Fig 9: Power Dissipation

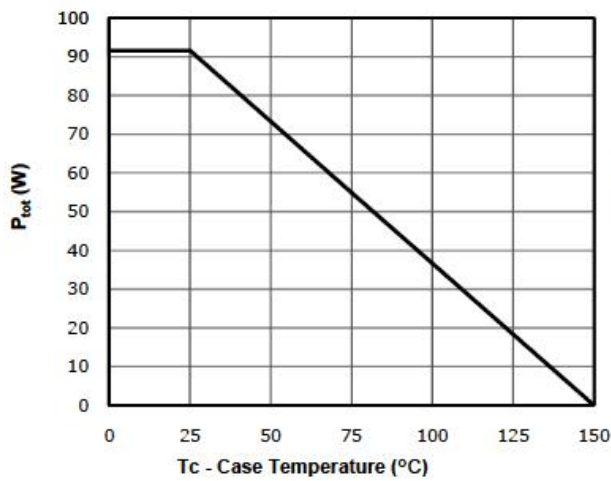


Fig 10: Drain Current Derating

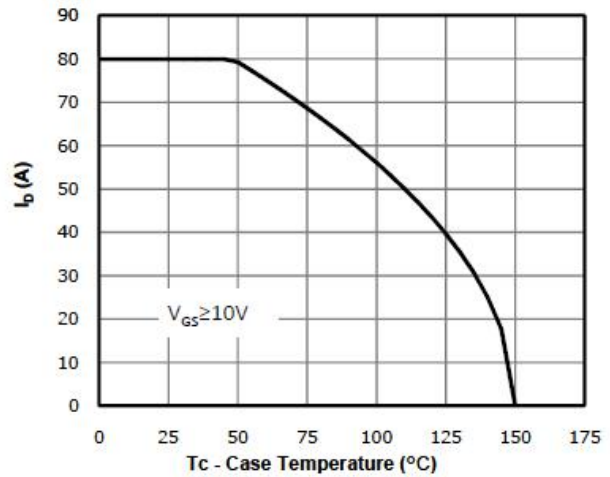


Fig 11: Safe Operating Area

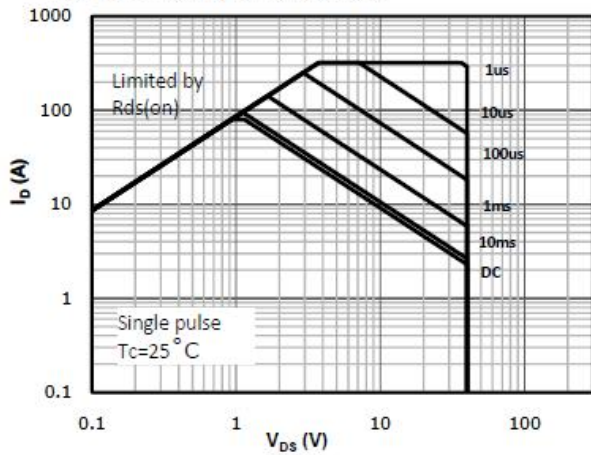


Fig 12: Max. Transient Thermal Impedance

