

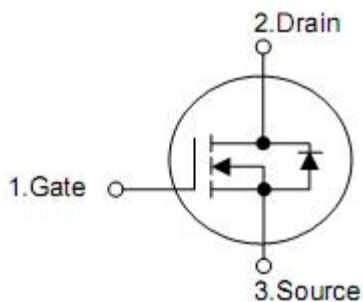
## 1. Features

- n Advanced trench process technology
- n High density cell design for ultra low on-resistance
- n Fully characterized avalanche voltage and current

## 2. Features

- n 50A, 30V,  $R_{DS(on)}$  typ. =  $6.5m\Omega$ (typ.)@ $V_{GS} = 10 V$
- n Low gate charge
- n Low  $C_{rss}$
- n Fast switching
- n Improved  $dv/dt$  capability

## 3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

#### 4. Ordering Information

Part Number	Package	Brand
KIA50N03BD	TO-252	KIA

#### 5. Absolute maximum ratings

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

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain-Source Voltage	30	V
$I_D$	Drain Current -Continuous ( $T_C = 25^\circ\text{C}$ ) -Continuous ( $T_C = 100^\circ\text{C}$ )	50	A
		30	A
$I_{DM}$	Drain Current -Pulsed	200	A
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 1)	85	mJ
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ ) -Derate above $25^\circ\text{C}$	60	W
		0.5	W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

#### 6. Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.8	$^\circ\text{C} / \text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	$^\circ\text{C} / \text{W}$

## 7. Electrical characteristics

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
B <sub>VDS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 uA	30	--	--	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V	--	--	1	uA
I <sub>GSS</sub>	Gate- Source Leakage Current	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V	--	--	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 uA	1.0	1.6	3.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A	--	6.5	9.9	mΩ
R <sub>G</sub>	Gate Resistance	f = 1.0 MHz	--	5.0	--	Ω
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz	--	1200	--	pF
C <sub>oss</sub>	Output Capacitance		--	150	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	115	--	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 20 V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 15 A, R <sub>G</sub> = 6 Ω (Note 2,3)	--	4.6	--	ns
t <sub>r</sub>	Turn-On Rise Time		--	35	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	40	--	ns
t <sub>f</sub>	Turn-Off Fall Time		--	16	--	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> = 24 V, I <sub>D</sub> = 15A, V <sub>GS</sub> = 10 V (Note 2,3)	--	25	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	5.0	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	5.5	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Continuous Source Current	Integral Reverse P-N Junction Diode in the MOSFET	--	--	50	A
I <sub>SM</sub>	Pulsed Source Current		--	--	200	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 15 A	--	--	1.5	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 15 A, dI <sub>F</sub> / dt = 100 A/us (Note 2)	--	12.5	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	0.005	--	uC

**Notes:**

1. L = 0.5mH, V<sub>DD</sub> = 15V, V<sub>GS</sub> = 10V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C
2. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
3. Essentially independent of operating temperature

### 8. Typical Characteristics

Figure 1. Output Characteristics

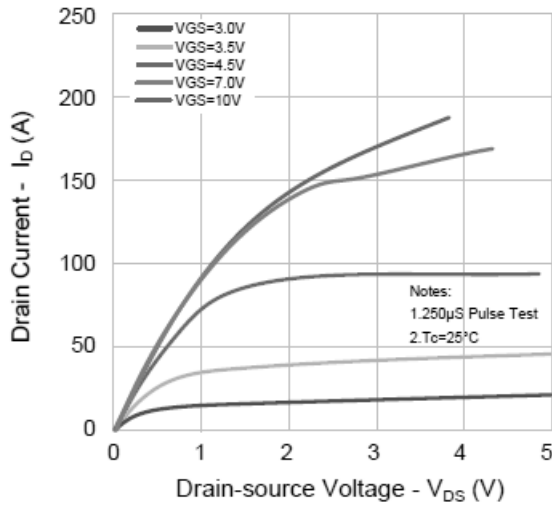


Figure 2. Transfer Characteristics

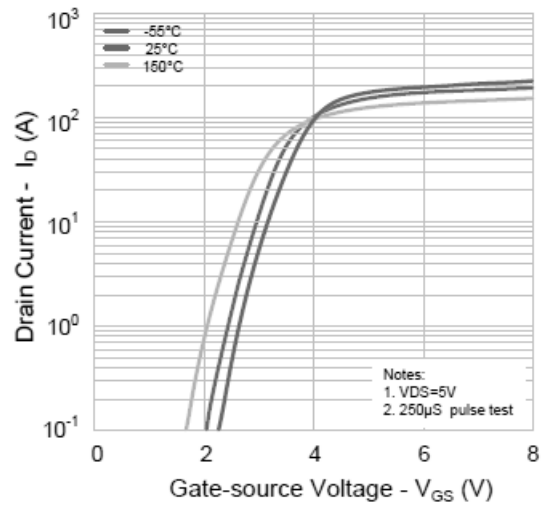


Figure 3. On-resistance vs. Drain Current

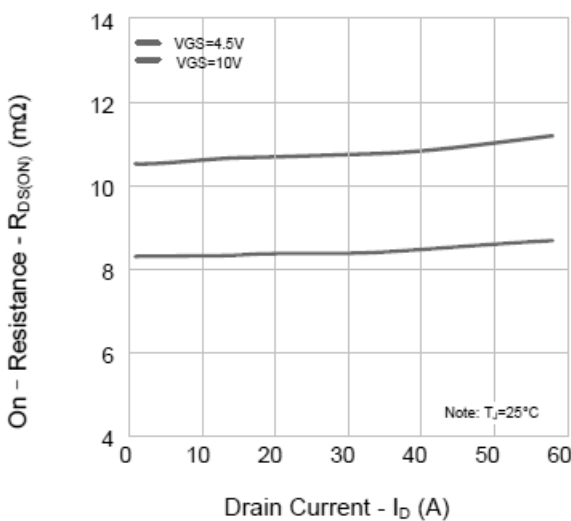


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

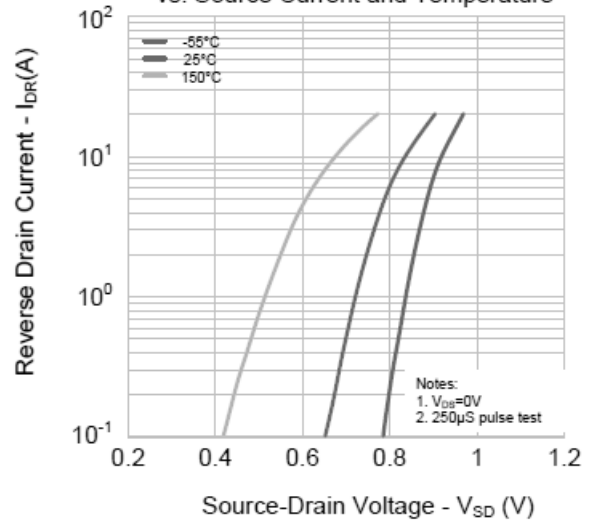


Figure 5. Capacitance Characteristics

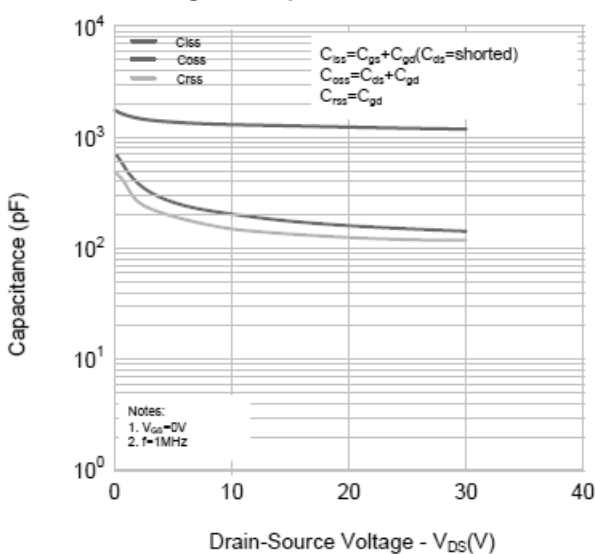


Figure 6. Gate Charge

