

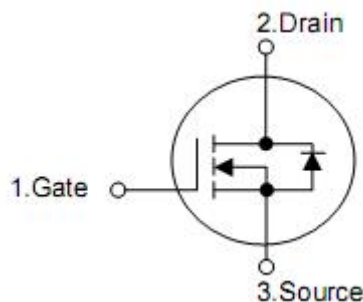
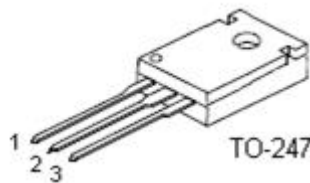
## 1. Description

This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

## 2. Features

- n Robust High Voltage Termination
- n Avalanche Energy Specified
- n Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- n Diode is Characterized for Use in Bridge Circuits
- n  $I_{DSS}$  and  $V_{DS(ON)}$  Specified at Elevated Temperature
- n Isolated Mounting Hole Reduces Mounting Hardware

## 3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

## 4. Ordering Information

Part Number	Package	Brand
KCM3250A	TO-247	KIA

## 5. Absolute maximum ratings

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

Parameter	Symbol	Rating	Units	
Drain current continuous	$I_D^1$	100	A	
Drain current pulsed	$I_{DM}$	298.5	A	
Gate-to-Source Voltage Continue	$V_{GS}$	$\pm 20$	V	
Single Pulse Drain-to-Source Avalanche Energy $T_J = 25\text{ }^\circ\text{C}$ ( $V_{DD} = 100\text{V}$ , $V_{GS} = 10\text{V}$ , $I_L = 18\text{A}$ , $L = 20\text{mH}$ , $R_G = 25\Omega$ )	$E_{AS}$	3240	mJ	
Total power dissipation	$P_D$	$T_C = 25\text{ }^\circ\text{C}$	767	W
		derate above $25\text{ }^\circ\text{C}$	6.13	W/ $^\circ\text{C}$
Operating and storage temperature range	$T_J, T_{STG}$	-55~+150	$^\circ\text{C}$	
Maximum lead temperature for soldering purposes, 1/8 " from case for 10 seconds	$T_L$	260	$^\circ\text{C}$	

1. Drain current limited by maximum junction temperature

## 6. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance, Junction-ambient	$R_{thJA}$	40	$^\circ\text{C}/\text{W}$
Thermal resistance, Junction-case	$R_{thJC}$	0.163	$^\circ\text{C}/\text{W}$

## 7. Electrical characteristics

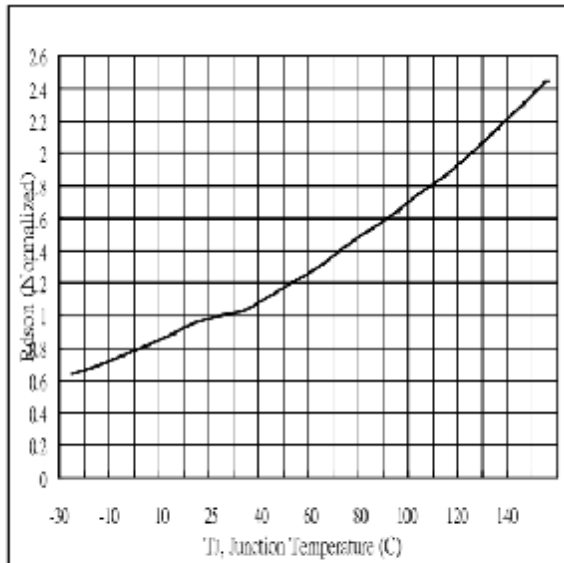
 (T<sub>C</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	500	-	-	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Source Leakage Current-Forward	I <sub>GSSF</sub>	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	-	-	100	nA
Gate-Source Leakage Current-Reverse	I <sub>GSSR</sub>	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	-	-	-100	nA
On characteristics						
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2	3	4	V
Static drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =33.4A*	-	26	31	mΩ
Dynamic characteristics						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, f=1MHz	-	6180	-	pF
Output capacitance	C <sub>oss</sub>		-	264	-	pF
Reverse transfer capacitance	C <sub>rss</sub>		-	110	-	pF
Switching characteristics						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =250V, I <sub>D</sub> =70A, R <sub>G</sub> =25Ω*	-	45	-	ns
Rise time	t <sub>r</sub>		-	116	-	ns
Turn-off delay time	t <sub>d(off)</sub>		-	193	-	ns
Fall time	t <sub>f</sub>		-	131	-	ns
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =400V, I <sub>D</sub> =70A, V <sub>GS</sub> =10V*	-	147	-	nC
Gate-source charge	Q <sub>gs</sub>		-	41	-	nC
Gate-drain charge	Q <sub>gd</sub>		-	58	-	nC
Drain-source diode characteristics and maximum ratings						
Drain-source diode forward voltage <sup>1</sup>	V <sub>SD</sub>	I <sub>S</sub> =70A d <sub>iS</sub> /dt=100A/μs	-	-	1.5	V
Forward turn-On Time	t <sub>ON</sub>		-	**	-	ns
Reverse recovery charge	t <sub>rr</sub>		-	521	-	μC

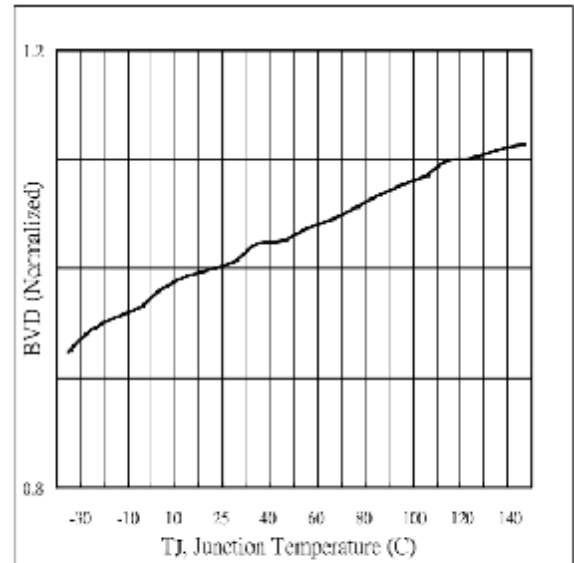
Note:\*. Pulse test: pulse width≤300μs, duty cycle≤2%

\*\*. Negligible, Dominated by circuit inductance

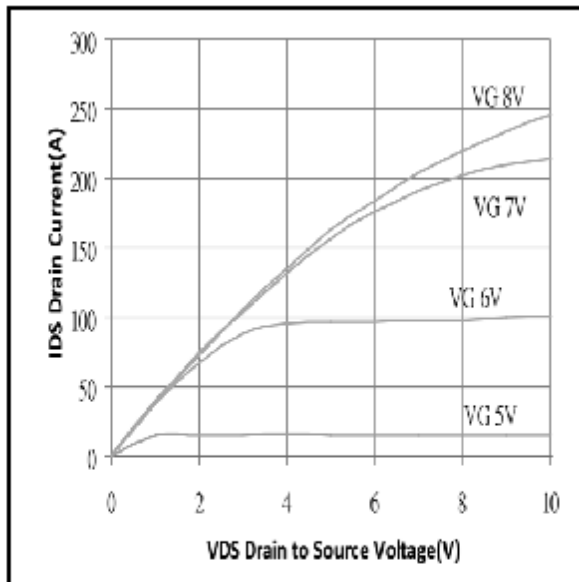
**8. Test circuits and waveforms**



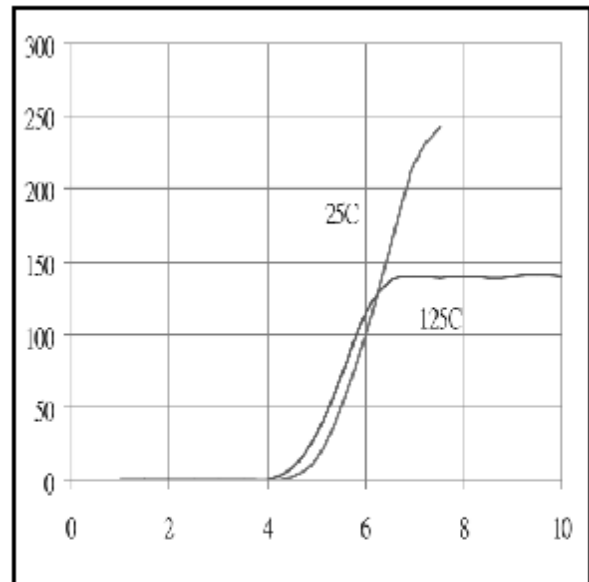
**Fig 1. On-Resistance Variation with vs. Temperature**



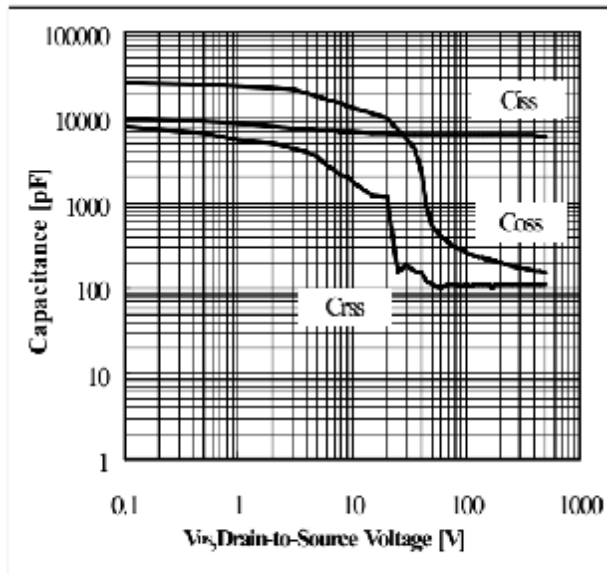
**Fig.2 Breakdown Voltage Variation vs. Temperature**



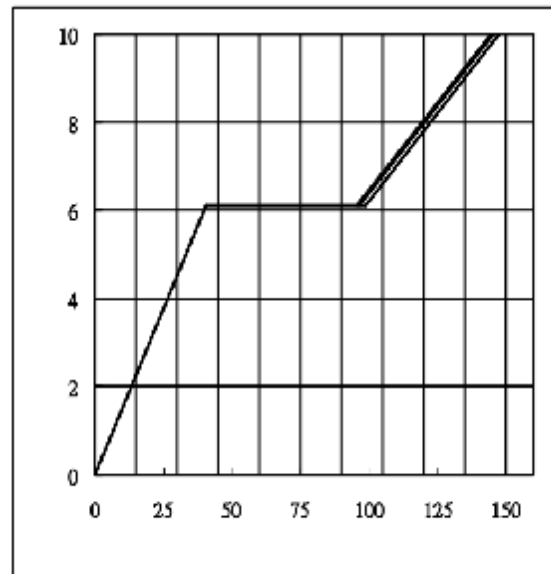
**Fig 3. Typical Output Characteristics**



**Fig 4. Typical Transfer Characteristics**



**Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage**



**Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage**