

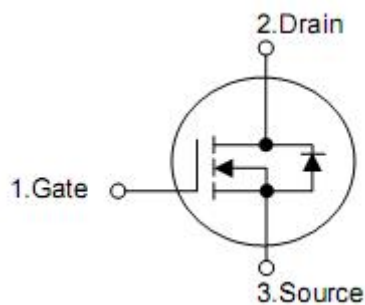
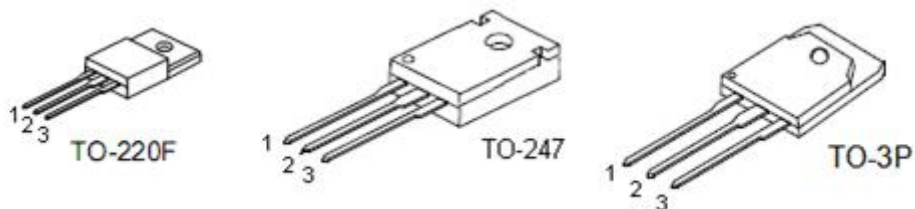
## 1. Description

The KIA18N50H N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as high efficiency switched mode power supplies, active power factor correction.

## 2. Features

- n  $R_{DS(on)}=0.25\Omega$  @  $V_{GS}=10V$
- n Low gate charge ( typical 50nC)
- n Fast switching capability
- n Avalanche energy specified
- n Improved dv/dt capability

## 3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

#### 4. Absolute maximum ratings

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

Parameter	Symbol	Ratings		Units	
		TO220F	TO247/3P		
Drain-source voltage	V <sub>DSS</sub>	500		V	
Gate-source voltage	V <sub>GSS</sub>	±30		V	
Drain current continuous	I <sub>D</sub>	T <sub>C</sub> =25°C	18.0*	18.0	A
		T <sub>C</sub> =100°C	10.8*	10.8	A
Drain current pulsed (note1)	I <sub>DP</sub>	72*	72	A	
Avalanche energy	Repetitive (note1)	E <sub>AR</sub>	23.5	23.5	mJ
	Single pulse (note2)	E <sub>AS</sub>	990	990	mJ
Peak diode recovery dv/dt (note 3)	dv/dt	4.5		V/ns	
Total power dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	38.5	235	W
		derate above 25°C	0.3	1.88	W/°C
Junction temperature	T <sub>J</sub>	+150		°C	
Storage temperature	T <sub>STG</sub>	-55~+150		°C	

\*Drain current limited by maximum junction temperature.

#### 5. Thermal characteristics

Parameter	Symbol	Ratings		Units
		TO220F	TO247/3P	
Thermal resistance,junction-ambient	R <sub>thJA</sub>	62.5	40	°C/W
Thermal resistance,case-to-sink typ.	R <sub>thCS</sub>	-	-	
Thermal resistance,Junction-case	R <sub>thJC</sub>	3.3	0.52	

## 6. Electrical characteristics

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Off characteristics</b>						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	500	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =400V, T <sub>C</sub> =125 °C	-	-	10	μA
Gate-body leakage current	Forward	V <sub>GS</sub> =30V, V <sub>DS</sub> =0V	-	-	100	nA
	Reverse	V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V	-	-	-100	nA
Breakdown voltage temperature coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA	-	TO220F 0.6	-	V/°C
		TO247		0.5		
<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	3.0	-	5.0	V
Static drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =9A	-	0.25	0.32	Ω
<b>Dynamic characteristics</b>						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	2500	-	pF
Output capacitance	C <sub>oss</sub>		-	400	-	pF
Reverse transfer capacitance	C <sub>rss</sub>		-	40	-	pF
<b>Switching characteristics</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =250V, I <sub>D</sub> =18.0A, R <sub>G</sub> =25Ω (note4,5)	-	70	-	ns
Rise time	t <sub>r</sub>		-	190	-	ns
Turn-off delay time	t <sub>d(off)</sub>		-	100	-	ns
Fall time	t <sub>f</sub>		-	100	-	ns
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =400V, I <sub>D</sub> =18.0A , V <sub>GS</sub> =10V (note4,5)	-	50	-	nC
Gate-source charge	Q <sub>gs</sub>		-	14	-	nC
Gate-drain charge	Q <sub>gd</sub>		-	22	-	nC
<b>Drain-source diode characteristics</b>						
Drain-source diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> I <sub>D</sub> =18.0A	-	-	TO220F 1.5	V
		TO247			1.4	
Continuous drain-source current	I <sub>SD</sub>		-	-	18.0	A
Pulsed drain-source current	I <sub>SM</sub>		-	-	72	A
Reverse recovery time	t <sub>rr</sub>	I <sub>SD</sub> =18.0A	-	550	-	ns
Reverse recovery charge	Q <sub>rr</sub>	di <sub>SD</sub> /dt=100A/μs (note4)	-	5.5	-	μC

Note:1 Repetitive rating: pulse width limited by maximum junction temperature

- L=5.5mH, I<sub>AS</sub>=18.0A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, starting T<sub>J</sub>=25°C
- I<sub>SD</sub>≤18.0A, di/dt≤200A/μs, V<sub>DD</sub>≤BV<sub>DSS</sub>, starting T<sub>J</sub>=25 °C
- Pulse test: pulse width≤300μs, duty cycle≤2%
- Essentially independent of operating temperature

**7. Test circuits and waveforms**

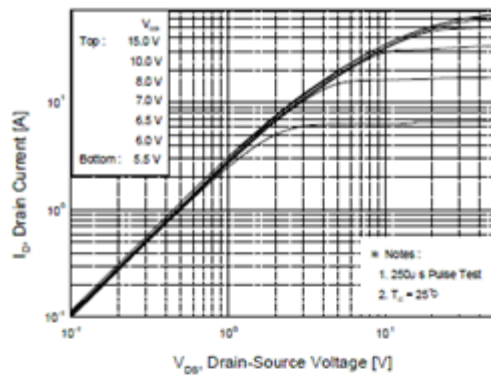


Figure 1. On-Region Characteristics

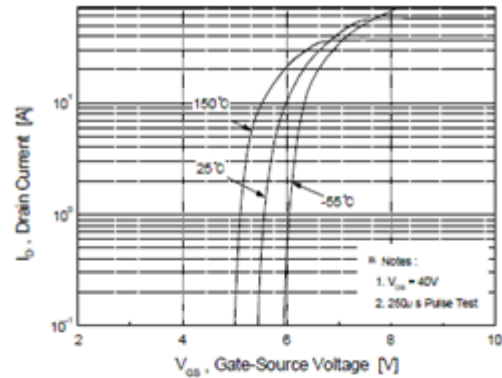


Figure 2. Transfer Characteristics

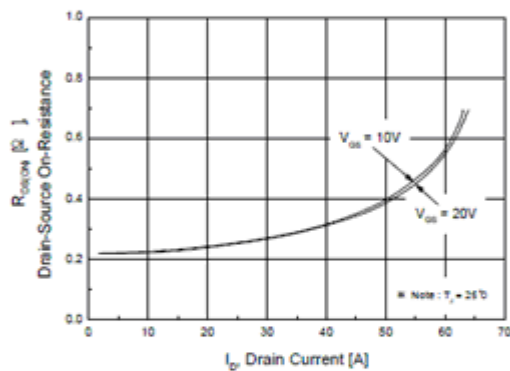


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

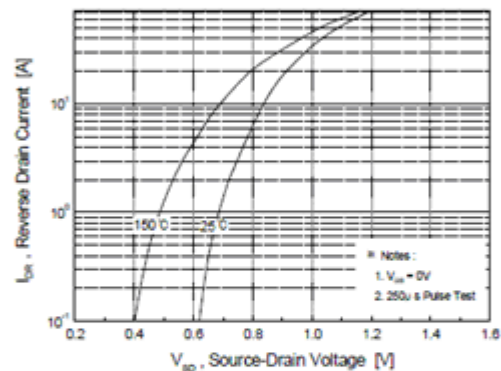


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

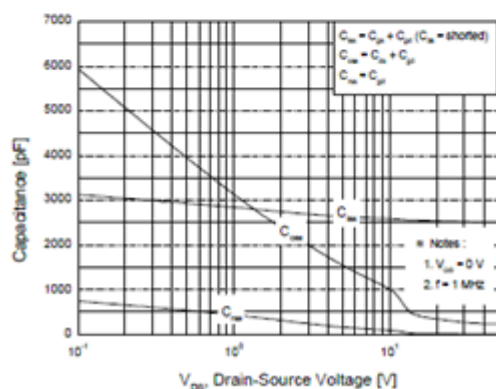


Figure 5. Capacitance Characteristics

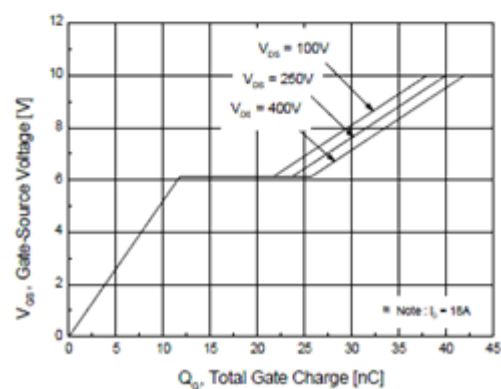


Figure 6. Gate Charge Characteristics

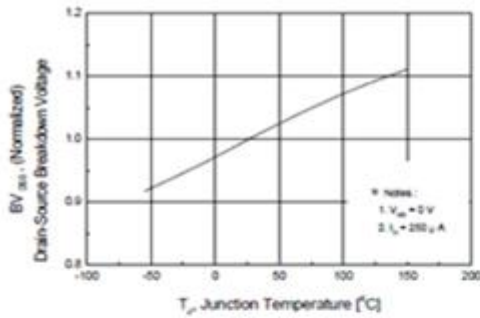


Figure 7. Breakdown Voltage Variation vs Temperature

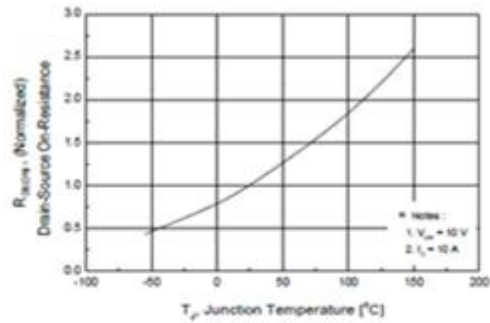


Figure 8. On-Resistance Variation vs Temperature

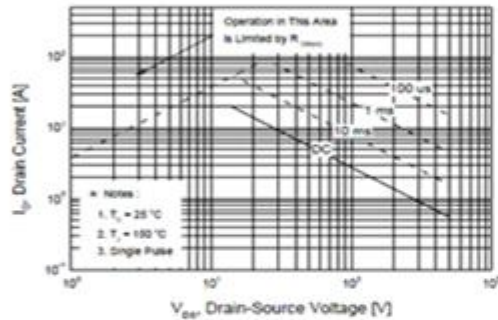


Figure 9. Maximum Safe Operating Area

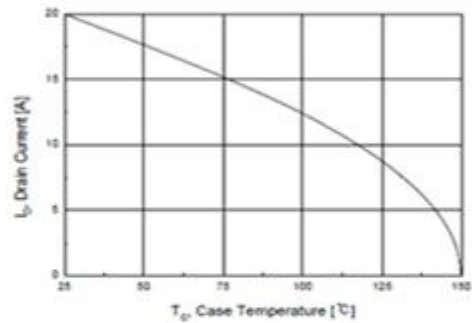


Figure 10. Maximum Drain Current vs Case Temperature

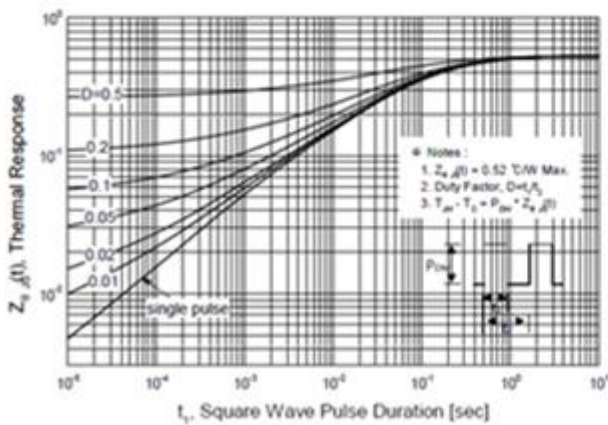


Figure 11. Transient Thermal Response Curve for To-247 TO-3P

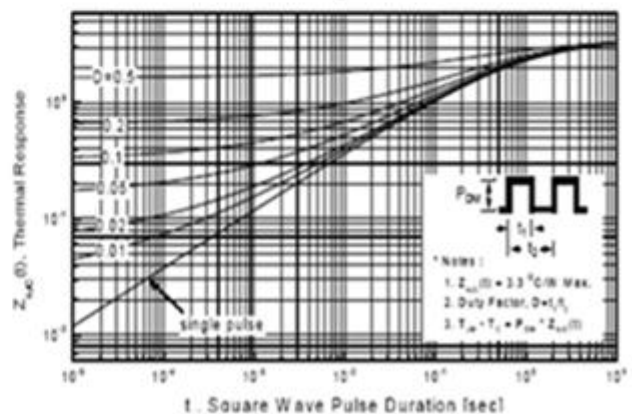


Figure 11-1. Transient Thermal Response Curve for To-220F