KIA
SEMICONDUCTORS

18A，500V
N-CHANNEL MOSFET

18N50H

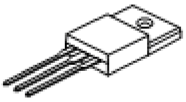
1. Description

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

- $R_{DS(on)}$=0.265Ω @ V_{GS}=10V
- Low gate charge (typical 42nC)
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability

3. Pin configuration



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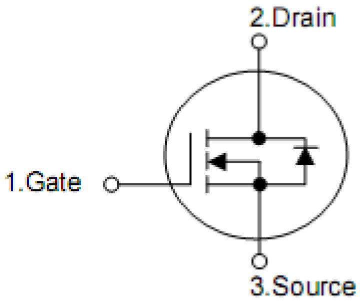

Pin	Function
1	Gate
2	Drain
3	Source

4. Absolute maximum ratings

(T_C= 25 °C , unless otherwise notes)

Parameter		Symbol	Ratings	Units
Drain-source voltage		V_{DSS}	500	V
Gate-source voltage		V_{GSS}	±30	V
Drain current continuous	T_C=25°C	I_D	20.0	A
	T_C=100°C		12.7	A
Drain current pulsed (note1)		I_{DP}	80.0	A
Avalanche energy	Repetitive (note1)	E_{AR}	27.7	mJ
	Single pulse (note2)	E_{AS}	330	mJ
Peak diode recovery dv/dt (note 3)		dv/dt	4.5	V/ns
Total power dissipation	T_C=25°C	P_D	277	W
	derate above 25°C		2.22	W/°C
Junction temperature		T_J	+150	°C
Storage temperature		T_{STG}	-55~+150	°C

Drain current limited by maximum junction temperature.

5. Thermal characteristics

Parameter	Symbol	Ratings		Units
Thermal resistance,junction-ambient	R_{thJA}	-	40	°C/W
Thermal resistance,case-to-sink typ.	R_{thCS}	0.24	-	
Thermal resistance,Junction-case	R_{thJC}	-	0.45	

6. Electrical characteristics

(T_J=25°C,unless otherwise notes)

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Off characteristics							
Drain-source breakdown voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	500	-	-	V
Zero gate voltage drain current		I_{DSS}	V_{DS}=500V ,V_{GS}=0V	-	-	1	μA
			V_{DS}=400V ,T_C=125 ºC	-	-	10	μA
Gate-body leakage current	Forward	I_{GSS}	V_{GS}=30V,V_{DS}=0V	-	-	100	nA
	Reverse		V_{GS}=-30V,V_{DS}=0V	-	-	-100	nA
Breakdown voltage temperature coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA	-	0.5	-	V/°C
On characteristics							
Gate threshold voltage		$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	3.0	-	5.0	V
Static drain-source on-resistance		$R_{DS(on)}$	V_{DS}=10V,I_D=10.0A	-	0.225	0.265	Ω
Dynamic characteristics							
Input capacitance		C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1MHz	-	2530	3290	pF
Output capacitance		C_{oss}		-	300	390	pF
Reverse transfer capacitance		C_{rss}		-	11	14.3	pF
Switching characteristics							
Turn-on delay time		$t_{d(on)}$	V_{DD}=250V,I_D=18.0A, R_G=25Ω (note4,5)	-	40	90	ns
Rise time		t_r		-	150	310	ns
Turn-off delay time		$t_{d(off)}$		-	95	200	ns
Fall time		t_f		-	110	230	ns
Total gate charge		Q_g	V_{DS}=400V,I_D=18.0A , V_{GS}=10V (note4,5)	-	42	55	nC
Gate-source charge		Q_{gs}		-	12	-	nC
Gate-drain charge		Q_{gd}		-	14	-	nC
Drain-source diode characteristics							
Drain-source diode forward voltage		V_{SD}	V_{GS}=0V,I_{SD}=20.0A	-	-	1.4	V
Continuous drain-source current		I_{SD}		-	-	20.0	A
Pulsed drain-source current		I_{SM}		-	-	80.0	A
Reverse recovery time		t_{rr}	I_{SD}=18.0A dl$_{SD}$/dt=100A/μs (note4)	-	420	-	ns
Reverse recovery charge		Q_{rr}		-	5.4	-	μC

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

2.L=1.83mH,I_{AS}=18.0A,V_{DD}=50V,R_G=25Ω,staring T_J=25ºC

3.I_{SD}≤18.0A,di/dt≤200A/μs,V_{DD}≤BV_{DSS},staring T_J=25 ºC

4.Pulse test:pulse width≤300μs,duty cycle≤2%

5.Essentially independent of operating temperature

7. Test circuits and waveforms

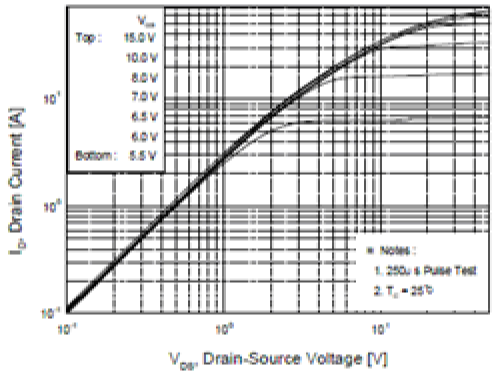

Figure 1. On-Region Characteristics

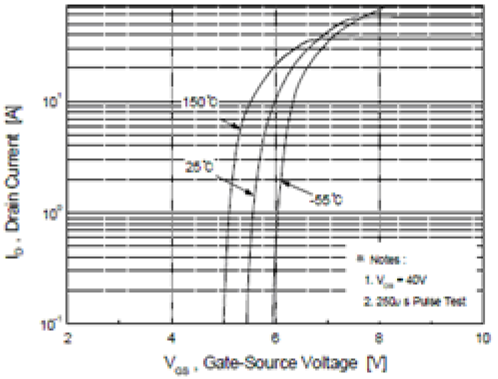

Figure 2. Transfer Characteristics

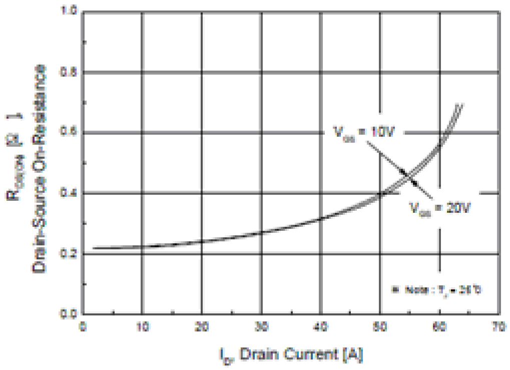

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

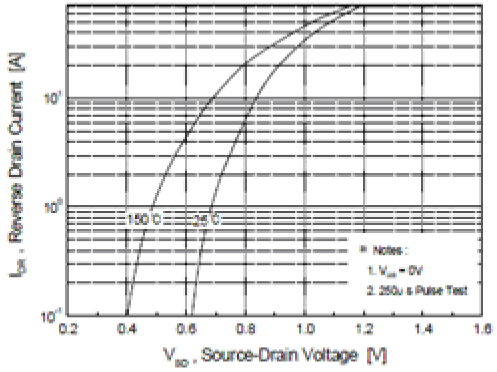

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

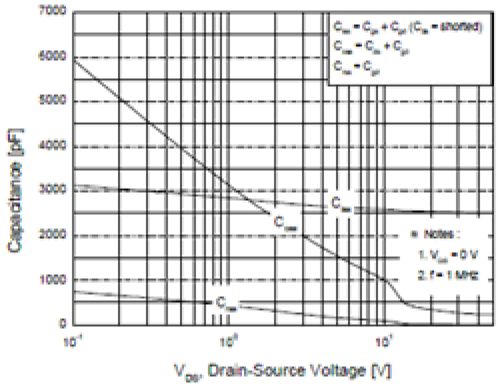

Figure 5. Capacitance Characteristics

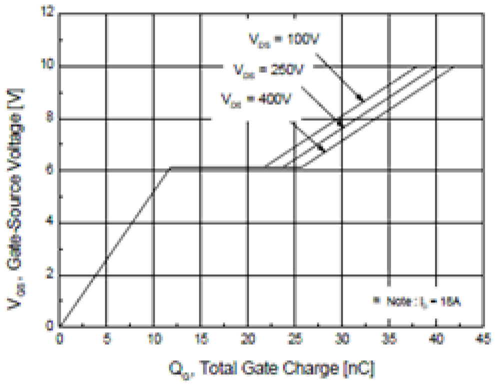

Figure 6. Gate Charge Characteristics

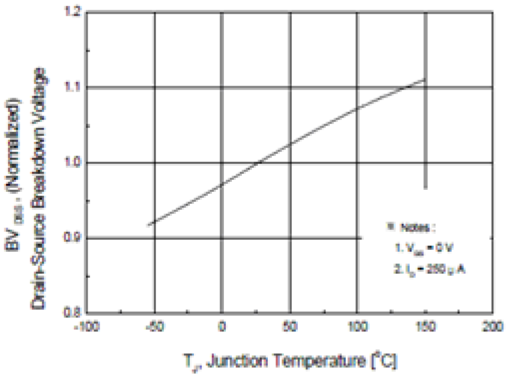

Figure 7. Breakdown Voltage Variation vs Temperature

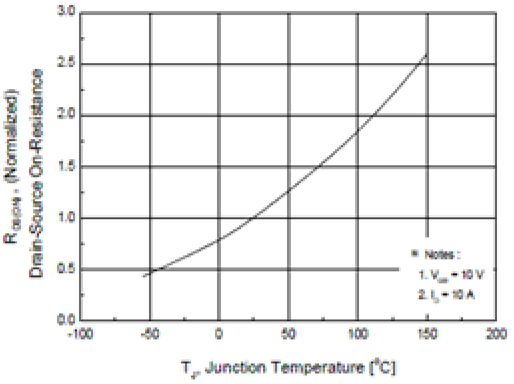

Figure 8. On-Resistance Variation vs Temperature

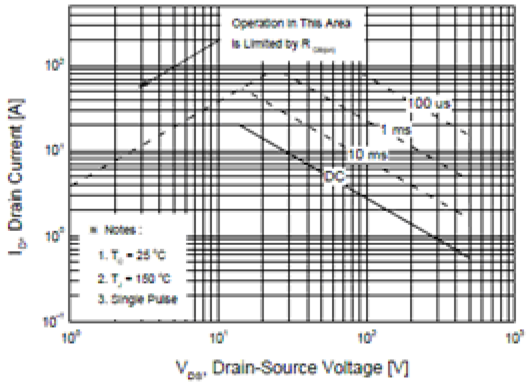

Figure 9. Maximum Safe Operating Area

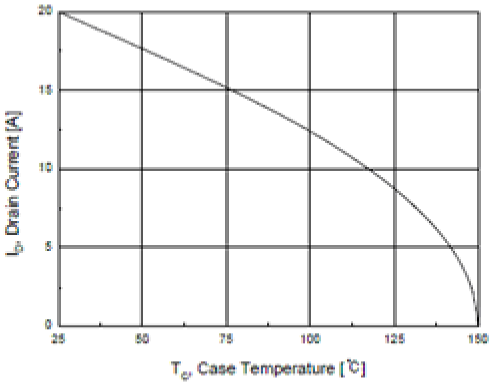

Figure 10. Maximum Drain Current vs Case Temperature

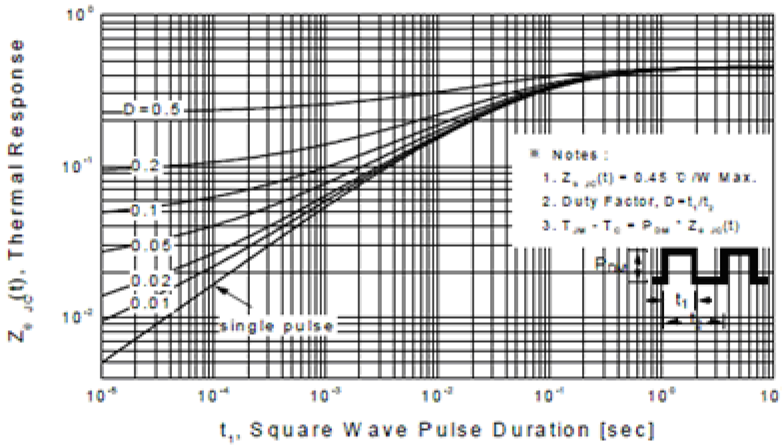

Figure 11. Transient Thermal Response Curve