

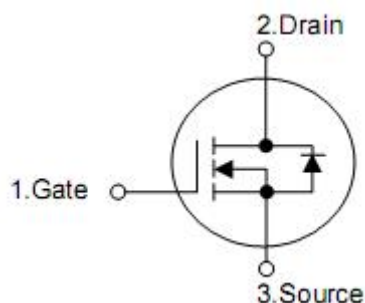
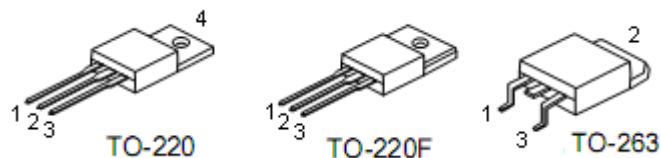
1. Description

The KIA13N50H 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, electronic lamp ballasts based on half bridge topology

2. Features

- n $R_{DS(on)}=0.4\Omega$ @ $V_{GS}=10V$
- n Low gate charge (typical 45nC)
- 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	Drain

4. Absolute maximum ratings

(T_C= 25 °C , unless otherwise notes)

Parameter	Symbol	Ratings			Units	
		TO220	TO220F	TO263		
Drain-source voltage	V _{DSS}	500			V	
Gate-source voltage	V _{GSS}	±30			V	
Drain current continuous	I _D	T _C =25°C	13.0	13.0*	13.0	A
		T _C =100°C	8.0	8.0*	8.0	A
Drain current pulsed (note1)	I _{DP}	52.0	52.0*	52.0	A	
Avalanche energy	Repetitive (note1)	E _{AR} 19.5			mJ	
	Single pulse (note2)	E _{AS} 860			mJ	
Peak diode recovery dv/dt (note 3)	dv/dt	4.5			V/ns	
Total power dissipation	P _D	T _C =25°C	195	48	195	W
		derate above 25°C	1.56	0.39	1.56	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
		TO220	TO220F	TO263	
Thermal resistance, junction-ambient	R _{thJA}	62.5			°C/W
Thermal resistance, case-to-sink typ.	R _{thJS}	0.5	-	0.5	
Thermal resistance, Junction-case	R _{thJC}	0.64	2.58	0.64	

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 °C	-	-	10	μA
Gate-body leakage current	Forward	V _{GS} =30V, V _{DS} =0V	-	-	100	nA
	Reverse	V _{GS} =-30V, V _{DS} =0V	-	-	-100	nA
Breakdown voltage temperature coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA	-	0.5	-	V/°C
On characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.0	-	4.0	V
Static drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =6.5A	-	0.4	0.48	Ω
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1MHz	-	1600	-	pF
Output capacitance	C _{oss}		-	200	-	pF
Reverse transfer capacitance	C _{rss}		-	20	-	pF
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} =250V, I _D =13.0A, R _G =25Ω (note4,5)	-	25	-	ns
Rise time	t _r		-	100	-	ns
Turn-off delay time	t _{d(off)}		-	130	-	ns
Fall time	t _f		-	100	-	ns
Total gate charge	Q _g	V _{DS} =400V, I _D =13.0A , V _{GS} =10V (note4,5)	-	45	-	nC
Gate-source charge	Q _{gs}		-	8	-	nC
Gate-drain charge	Q _{gd}		-	19	-	nC
Drain-source diode characteristics						
Drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _D =13.0A	-	-	1.4	V
Continuous drain-source current	I _{SD}		-	-	13.0	A
Pulsed drain-source current	I _{SM}		-	-	52.0	A
Reverse recovery time	t _{rr}	I _{SD} =13.0A di _{SD} /dt=100A/μs (note4)	-	410	-	ns
Reverse recovery charge	Q _{rr}		-	4.5	-	μC

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

- L=6mH, I_{AS}=13.0A, V_{DD}=50V, R_G=25Ω, starting T_J=25°C
- I_{SD}≤13.0A, di/dt≤200A/μs, V_{DD}≤BV_{DSS}, starting T_J=25 °C
- Pulse test: pulse width≤300μs, duty cycle≤2%
- Essentially independent of operating temperature

7. Typical Characteristics

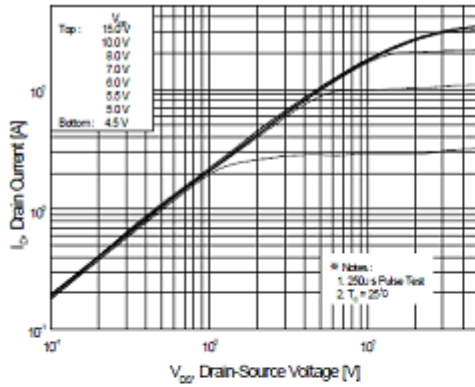


Figure 1. On-Region Characteristics

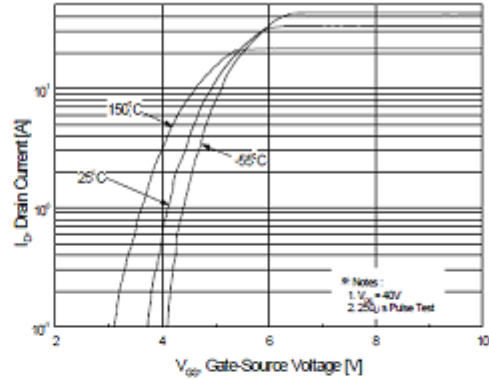


Figure 2. Transfer Characteristics

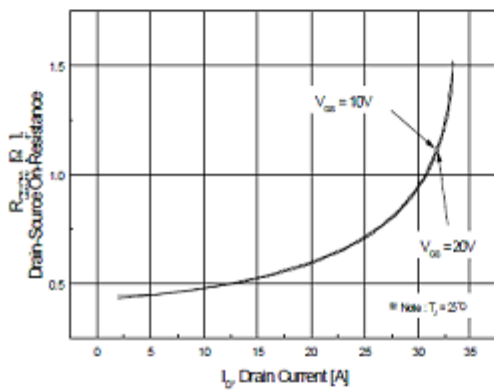


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

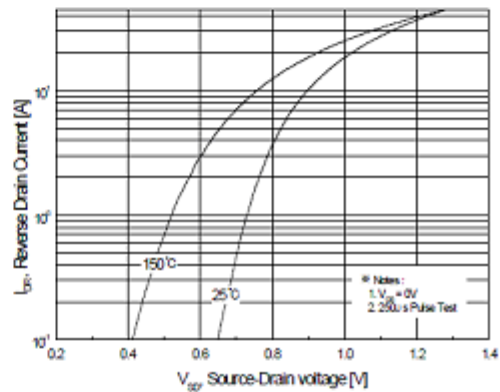


Figure 4. Body Diode Forward Voltage Variation with Source Current

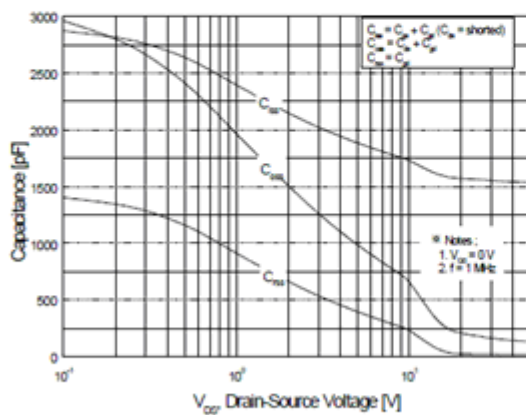


Figure 5. Capacitance Characteristics

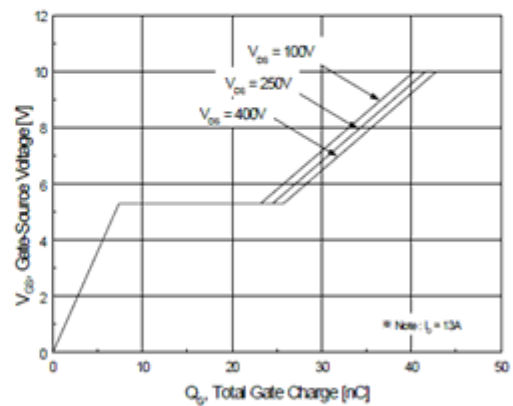


Figure 6. Gate Charge Characteristics

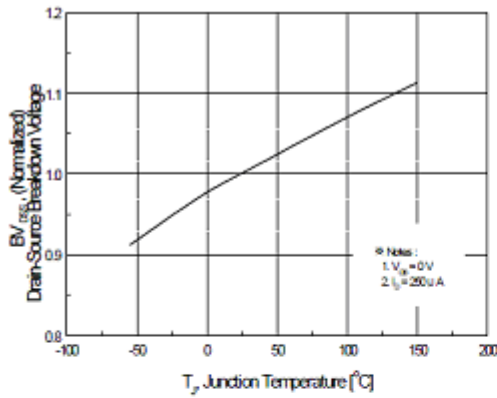


Figure 7. Breakdown Voltage Variation vs Temperature

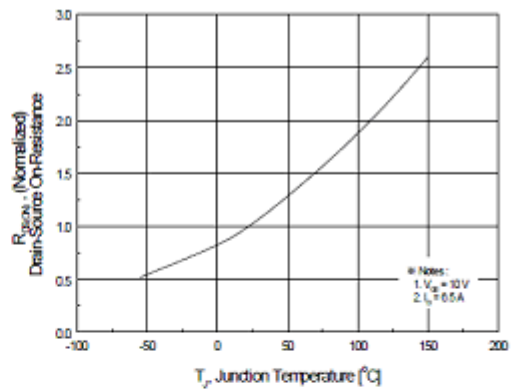


Figure 8. On-Resistance Variation vs Temperature

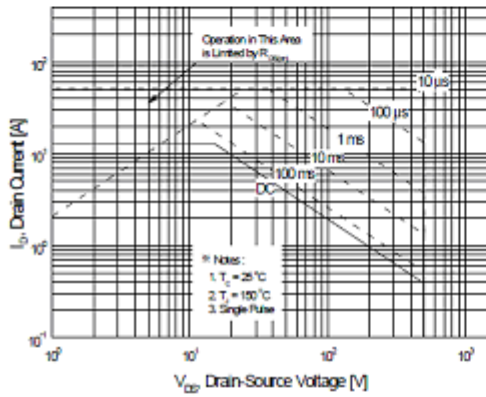


Figure 9. Maximum Safe Operating Area

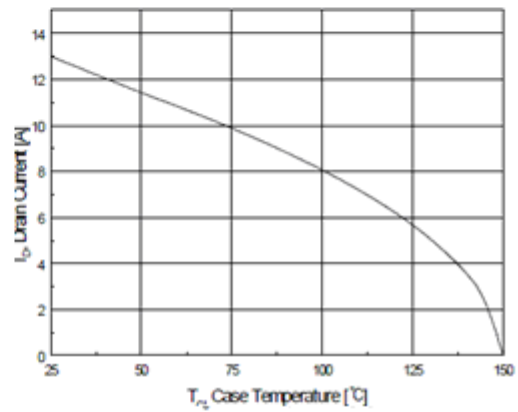


Figure 10. Maximum Drain Current vs Case Temperature

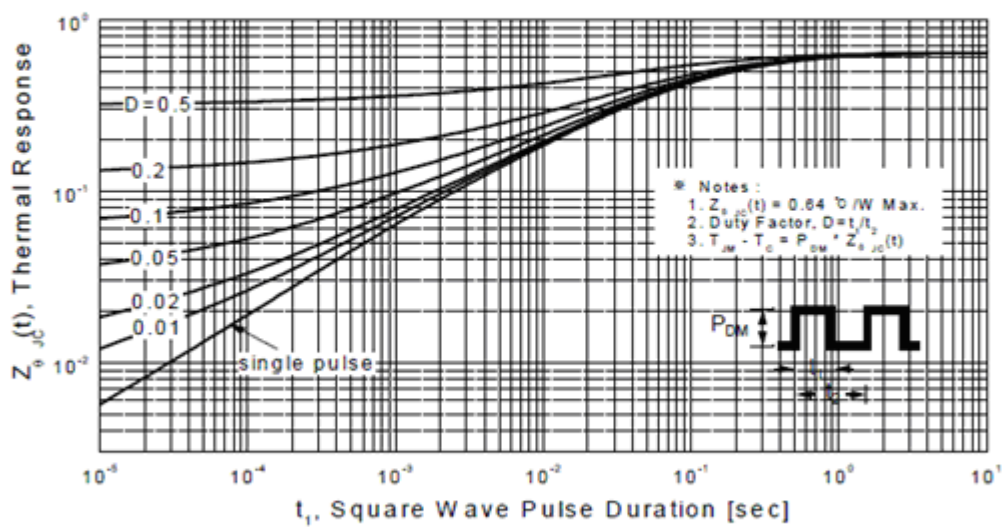


Figure 11. Transient Thermal Response Curve