

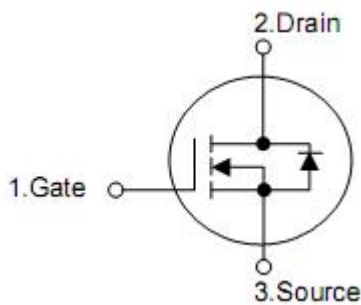
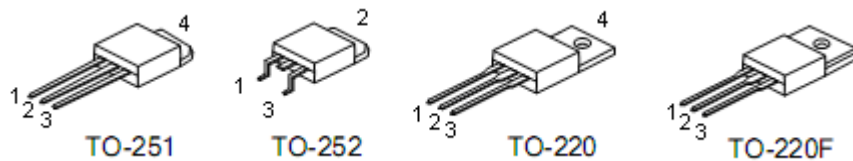
## 1. Description

The KIA2N60H N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

## 2. Features

- n  $R_{DS(ON)}=4.1\Omega@V_{GS}=10V$ .
- n Low gate charge (typical 9nC)
- n High ruggedness
- 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

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

Parameter	Symbol	Rating			Units	
		252/251	220	220F		
Drain-source voltage	$V_{DSS}$	600			V	
Gate-source voltage	$V_{GSS}$	$\pm 30$			V	
Drain current continuous	$I_D$	$T_C = 25^\circ\text{C}$	2.0*	2.0	2.0*	A
		$T_C = 100^\circ\text{C}$	1.35*	1.35	1.35*	A
Drain current pulsed (note1)	$I_{DP}$	8*	8	8*	A	
Avalanche Enlsted	Repetitive (note1)	$E_{AR}$			mJ	
	Single pulse (note2)	$E_{AS}$			mJ	
Peak diode recovery dv/dt (note3)	dv/dt	4.5			V/ns	
Total power dissipation	$P_D$	$T_C = 25^\circ\text{C}$	44	55.5	23.6	W
		Derate above $25^\circ\text{C}$	0.35	0.44	0.19	W/°C
Junction temperature	$T_J$	+150			°C	
Storage temperature	$T_{STG}$	-50~+150			°C	

\*Drain current limited by maximum junction temperature.

## 5. Thermal characteristics

Parameter	Symbol	Rating			Unit
		252/251	220	220F	
Thermal resistance,Junction-ambient	$R_{thJA}$	62.5	62.5	62.5	°C/W
Thermal resistance,case-to-sink typ.	$R_{thCS}$	--	0.5	--	°C/W
Thermal resistance,Junction-case	$R_{thJC}$	2.87	2.25	5.3	°C/W

## 6. Electrical characteristics

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

Parameter		Symbol	Test conditions	Min	Typ	Max	Unit
Off characteristics							
Drain-source breakdown voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	600	-	-	V
Zero gate voltage drain current		I <sub>DSS</sub>	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V	-	-	1	μA
			V <sub>DS</sub> =480V, T <sub>C</sub> =125°C	-	-	10	μA
Gate-body leakage current	Forward	I <sub>GSS</sub>	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	-	0.7	-	V/°C
On characteristics							
Gate threshold voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> =250μA	2.0	-	4.0	V
Static drain-source on- resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =1.0A	-	4.1	5.0	Ω
Dynamic characteristics							
Input capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	-	200	-	pF
Output capacitance		C <sub>OSS</sub>		-	20	-	pF
Reverse transfer capacitance		C <sub>RSS</sub>		-	4	-	pF
Switching characteristics							
Turn-on delay time		t <sub>D(ON)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =2.0A, R <sub>G</sub> =25Ω (note4,5)	-	10	-	ns
Rise time		t <sub>R</sub>		-	25	-	ns
Turn-off delay time		t <sub>D(OFF)</sub>		-	25	-	ns
Fall time		t <sub>F</sub>		-	30	-	ns
Total gate charge		Q <sub>G</sub>	V <sub>DS</sub> =480V, I <sub>D</sub> =2.0A V <sub>GS</sub> =10V (note4,5)	-	9	-	nC
Gate-source charge		Q <sub>GS</sub>		-	1.5	-	nC
Gate-drain charge		Q <sub>GD</sub>		-	4.0	-	nC
Drain-source diode characteristics							
drain-source diode forward voltage		V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>SD</sub> =2.0A	-	-	1.4	V
Continuous drain-source current		I <sub>SD*</sub>		-	-	2.0	A
Pulsed drain-source current		I <sub>SM*</sub>				8.0	A
Reverse recovery time		t <sub>RR</sub>	I <sub>SD</sub> =2.0A		230	-	ns
Reverse recovery charge		Q <sub>RR</sub>	dI <sub>SD</sub> /dt=100A/μs (note4)		1.0	-	μC

Notes:1.repetitive rating:pulse width limited by maximum junction temperature

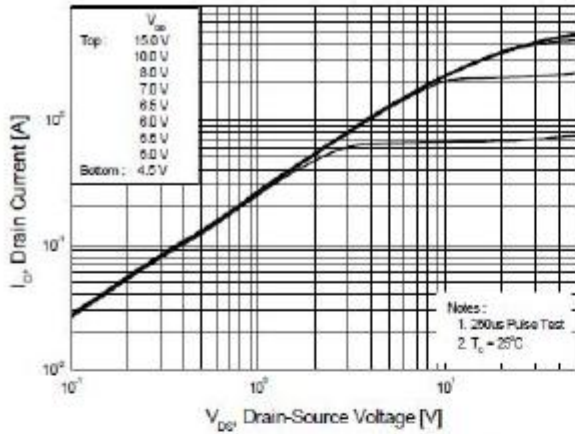
2.L=60mH, I<sub>AS</sub>=2.0A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, starting T<sub>J</sub>=25°C

3.I<sub>SD</sub>≤2.0A, di/dt≤200A/μs, V<sub>DD</sub>≤BV<sub>DSS</sub>, starting T<sub>J</sub>=25°C

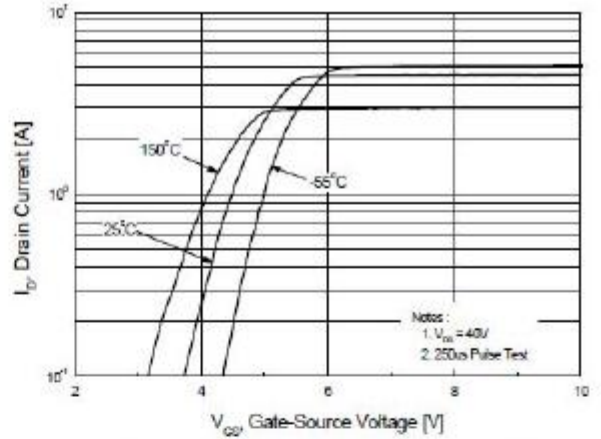
4.Pulse test:pulse width≤300μs,duty cycle≤2%

5.Essentially independent of operating temperature

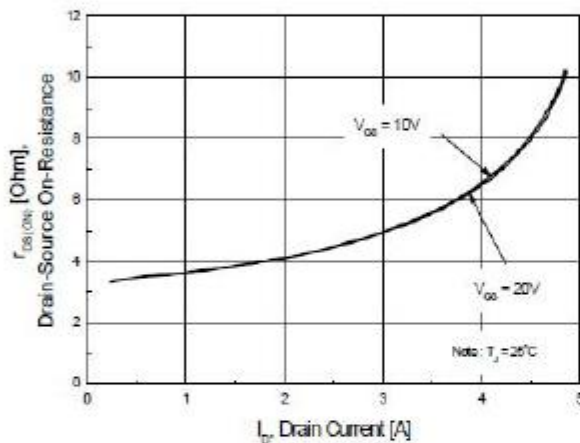
**7. Typical characteristics**



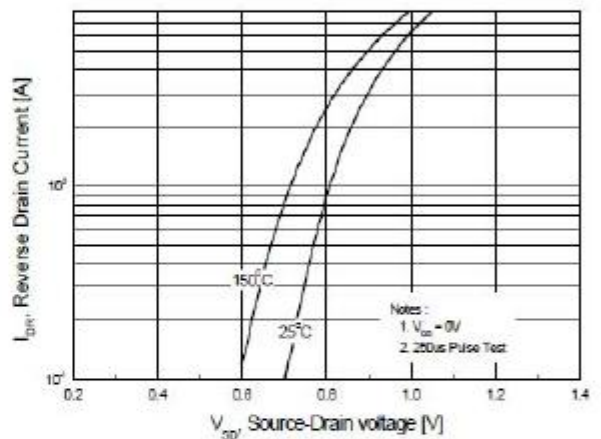
**Figure 1. On-Region Characteristics**



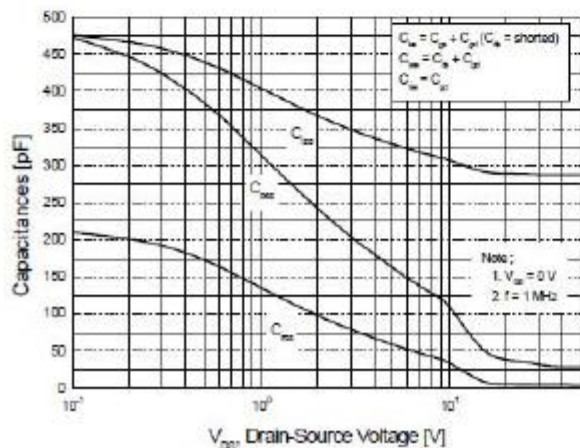
**Figure 2. Transfer Characteristics**



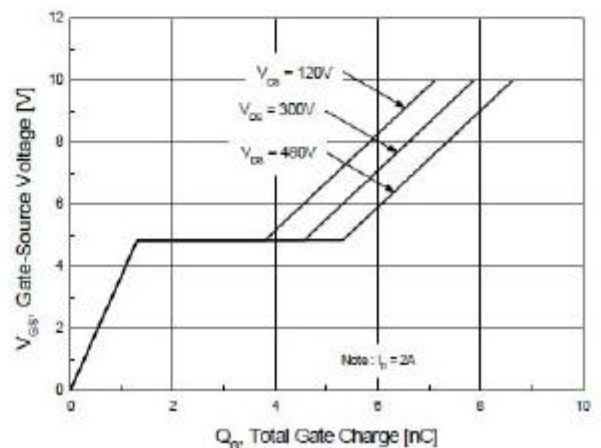
**Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage**



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



**Figure 5. Capacitance Characteristics**



**Figure 6. Gate Charge Characteristics**

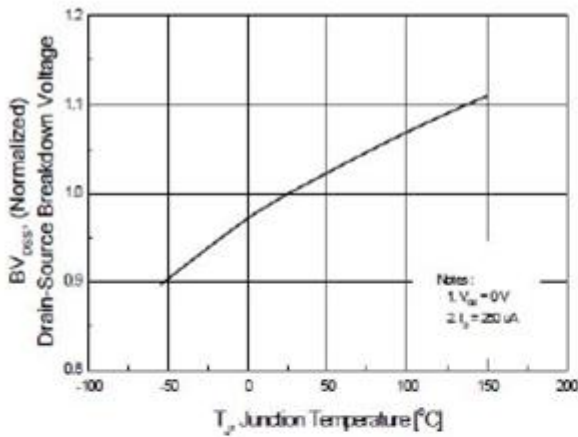


Figure 7. Breakdown Voltage Variation vs Temperature

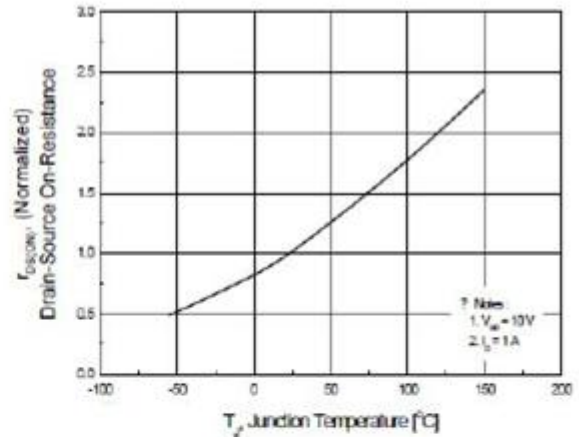


Figure 8. On-Resistance Variation vs Temperature

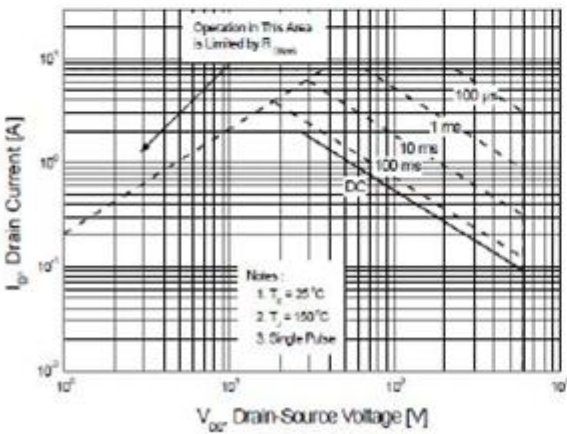


Figure 9. Maximum Safe Operating Area

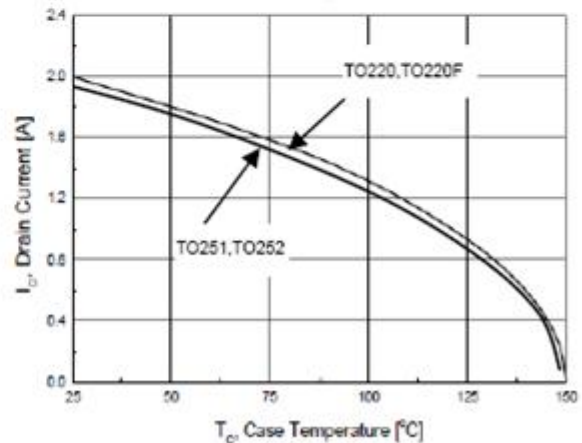


Figure 10. Maximum Drain Current vs Case Temperature

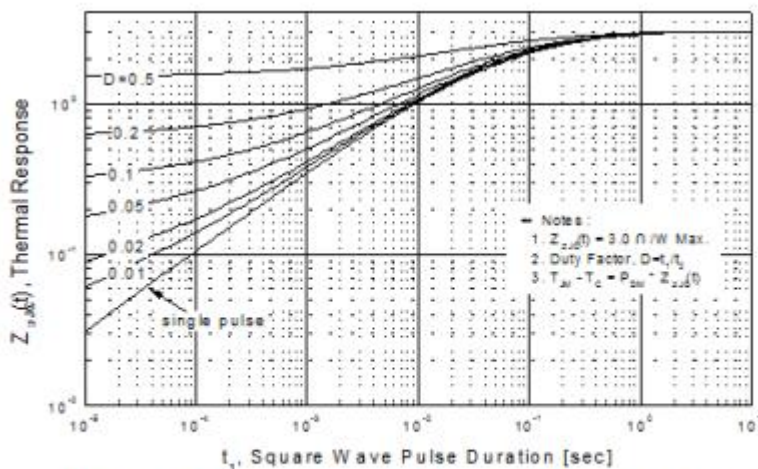


Figure 11. Transient Thermal Response Curve for TO-251/252



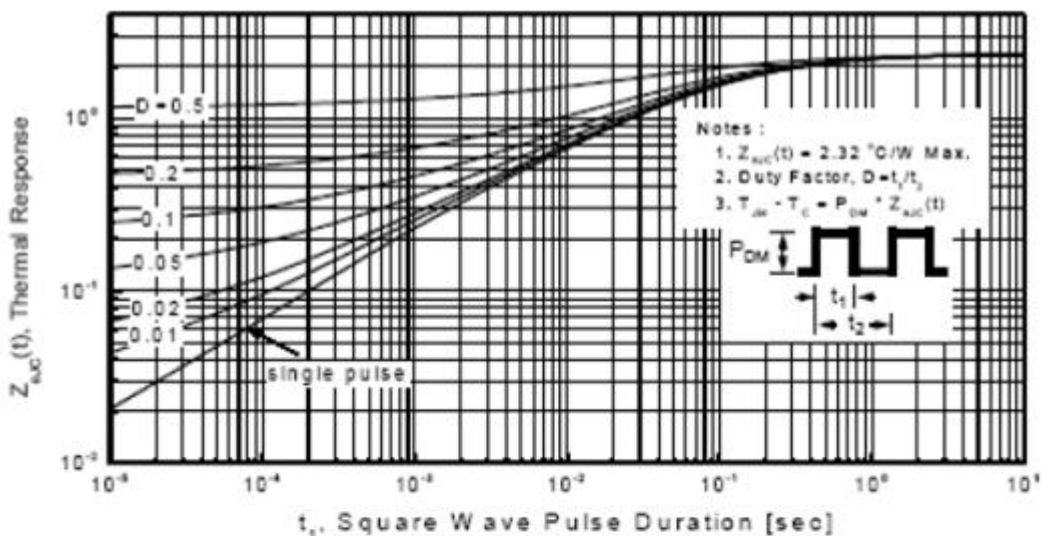


Figure 11-1. Transient Thermal Response Curve  
for TO-220

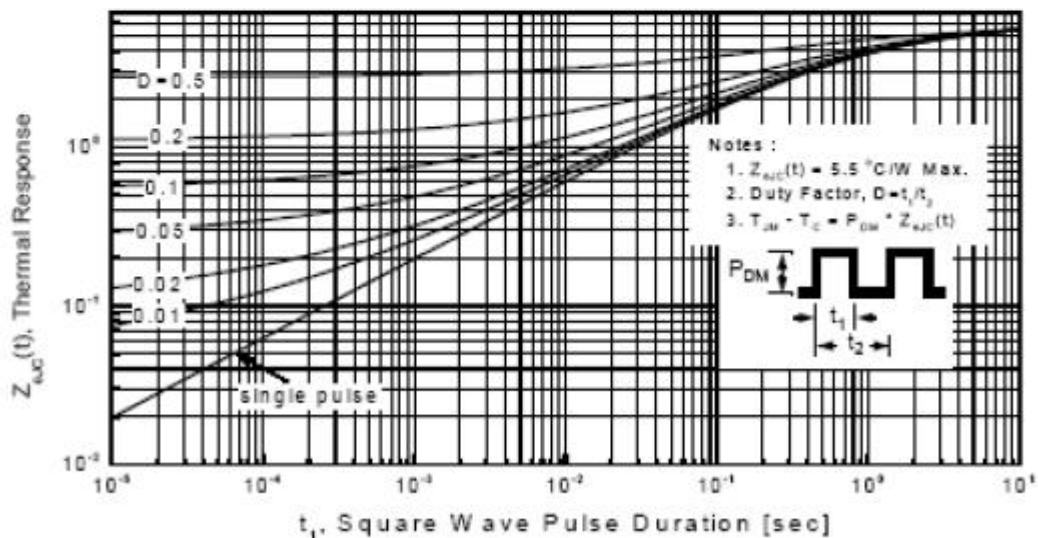


Figure 11-2. Transient Thermal Response Curve  
for TO-220F

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