

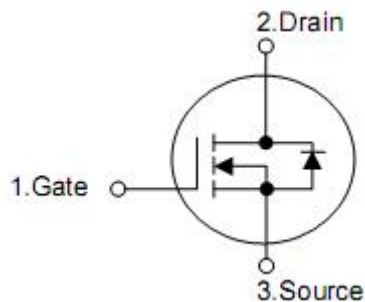
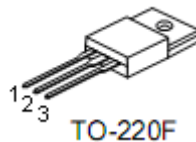
1. Description

The KIA12N65H 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 $R_{DS(on)} = 0.63\Omega @ V_{GS} = 10V$
- n Low gate charge (typical 52nC)
- 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_C = 25 °C , unless otherwise specified)

Parameter	Symbol	Rating	Units
Drain-source voltage	V _{DSS}	650	V
Drain-source voltage	V _{GSS}	± 30	V
Drain current continuous	I _D	T _C =25 °C	12.0*
		T _C =100 °C	7.4*
Drain current pulsed (note 1)	I _{DP}	48.0*	A
Avalanche energy	Repetitive (note 1)	E _{AR}	23.1
	Single pulse (note 2)	E _{AS}	865
Peak diode recovery dv/dt (note 3)	dv/dt	4.5	V/ns
Total power dissipation	P _D	T _C =25 °C	54
		derate above 25 °C	0.43
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	Rating	Unit
Thermal resistance,Junction--ambient	R _{thJA}	62.5	°C/W
Thermal resistance,case-to-sink typ.	R _{thCS}	-	°C/W
Thermal resistance,Junction-case	R _{thJC}	2.33	°C/W

6. Electrical characteristics

($T_J=25^\circ\text{C}$, unless otherwise notes)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$	-	-	1	μA
		$V_{DS}=520V, T_C=125^\circ\text{C}$	-	-	10	μA
Gate-body leakage current	Forward	I_{GSS}	-	-	100	nA
	Reverse				-100	nA
Breakdown voltage temperature coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$	-	0.7	-	$V/^\circ\text{C}$
On characteristics						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Static drain-source on-resistance	$R_{DS(on)}$	$V_{DS}=10V, I_D=6.0A$	-	0.63	0.75	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1\text{MHz}$	-	1850	-	pF
Output capacitance	C_{oss}		-	180	-	pF
Reverse transfer capacitance	C_{rss}		-	20	-	pF
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD}=325V, I_D=12.0A,$ $R_G=25\Omega$ (note4,5)	-	30	-	ns
Rise time	t_r		-	90	-	ns
Turn-off delay time	$t_{d(off)}$		-	140	-	ns
fall time	t_f		-	90	-	ns
Total gate charge	Q_g	$V_{DS}=520V, I_D=12.0A$ $V_{GS}=10V$ (note4,5)	-	52	-	nC
Gate-source charge	Q_{gs}		-	8.5	-	nC
Gate-drain charge	Q_{gd}		-	20	-	nC
Drain-source diode characteristics						
Drain-source diode forward voltage	V_{SD}	$V_{GS}=0V, I_{SD}=12.0A$	-	-	1.4	V
Continuous drain-source current	I_{SD}		-	-	12.0	A
Pulsed drain-source current	I_{SM}		-	-	48.0	A
Reverse recovery time	t_{rr}	$I_{SD}=12.0A$ $di_{SD}/dt=100A/\mu s$ (note4)	-	430	-	ns
Reverse recovery charge	Q_{rr}		-	5.0	-	μC

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

2. $L=11\text{mH}, I_{AS}=12.0A, V_{DD}=50V, R_G=25\Omega$, starting $T_J=25^\circ\text{C}$

3. $I_{SD}\leq 12.0A, di/dt\leq 200A/\mu s, V_{DD}\leq BV_{DSS}$, starting $T_J=25^\circ\text{C}$

4. Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

5. Essentially independent of operating temperature

7. Test circuits and waveforms

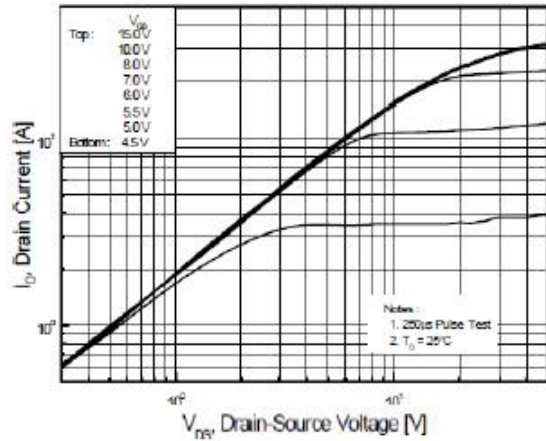


Figure 1. On-Region Characteristics

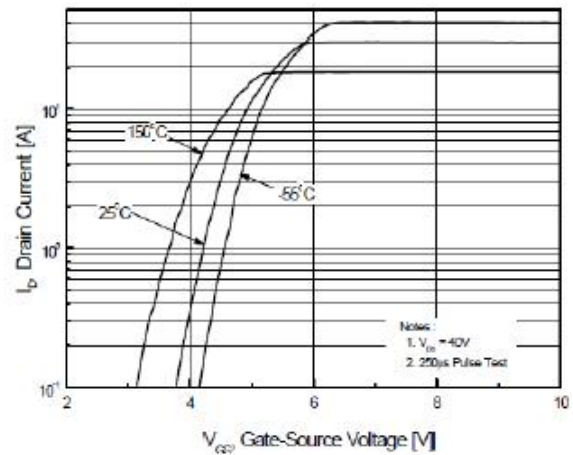


Figure 2. Transfer Characteristics

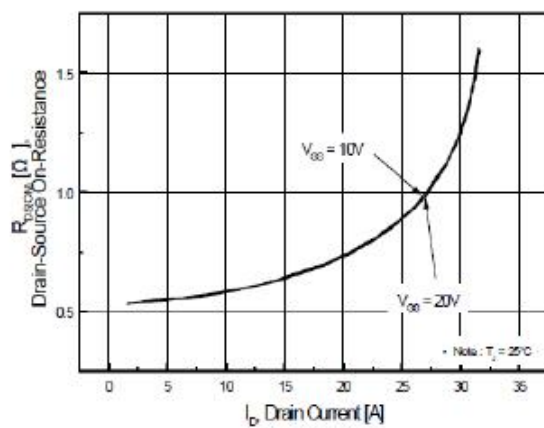


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

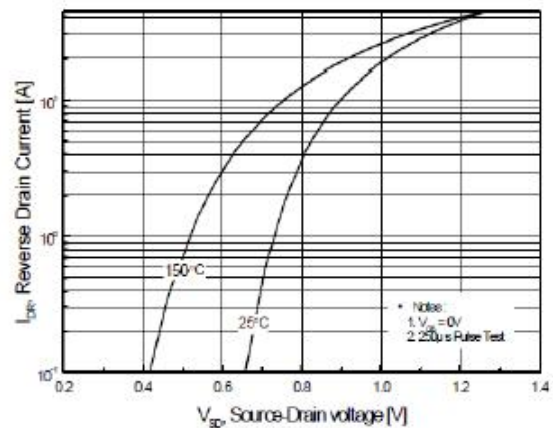


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

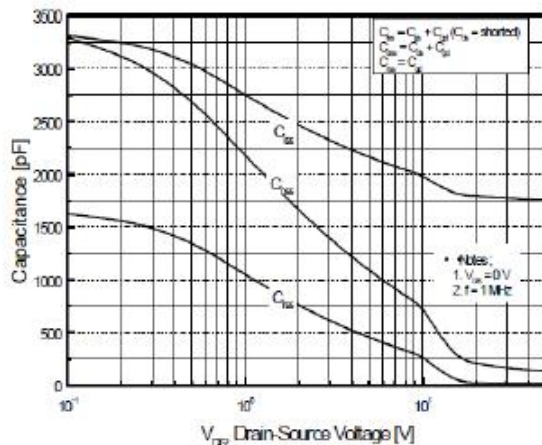


Figure 5. Capacitance Characteristics

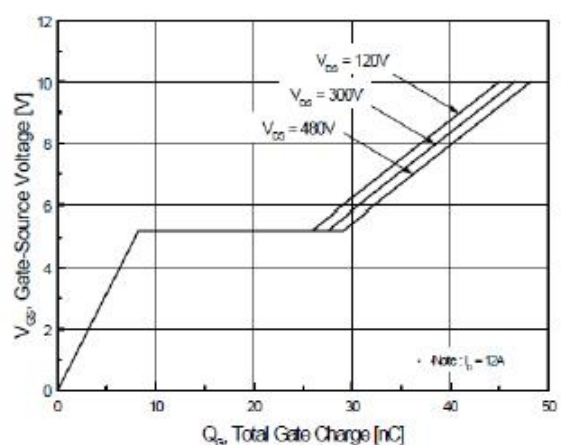


Figure 6. Gate Charge Characteristics

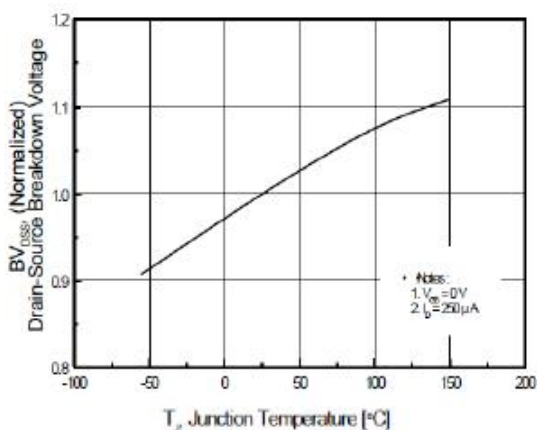


Figure 7. Breakdown Voltage Variation vs Temperature

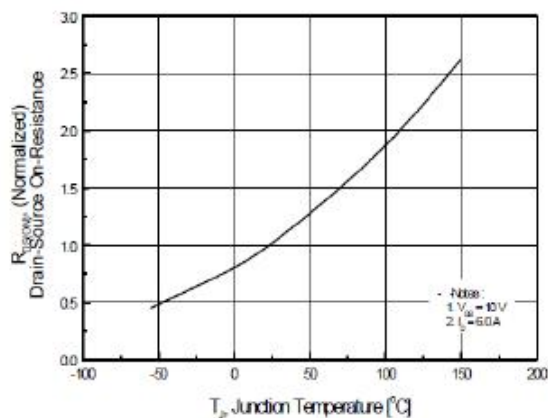


Figure 8. On-Resistance Variation vs Temperature

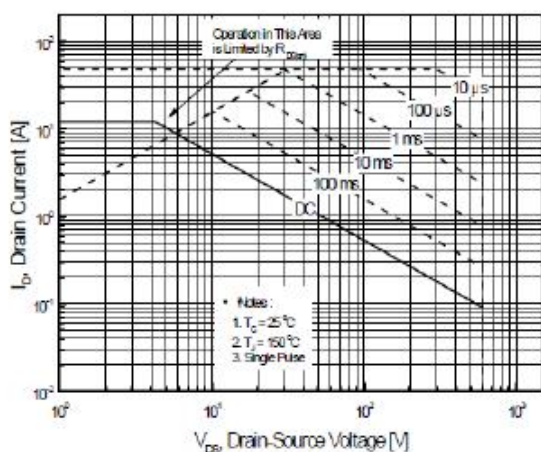


Figure 9. Maximum Safe Operating Area for TO220F

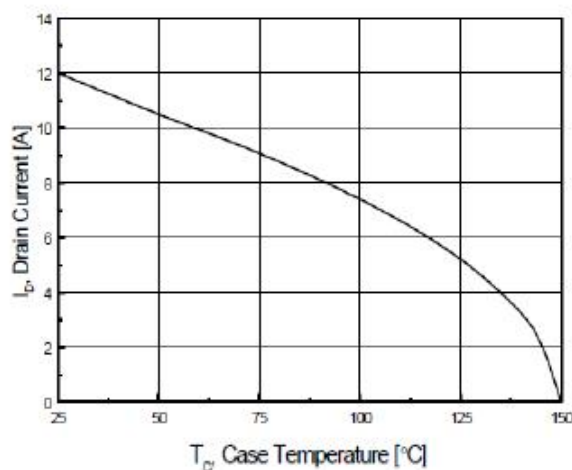


Figure 10. Maximum Drain Current vs Case Temperature

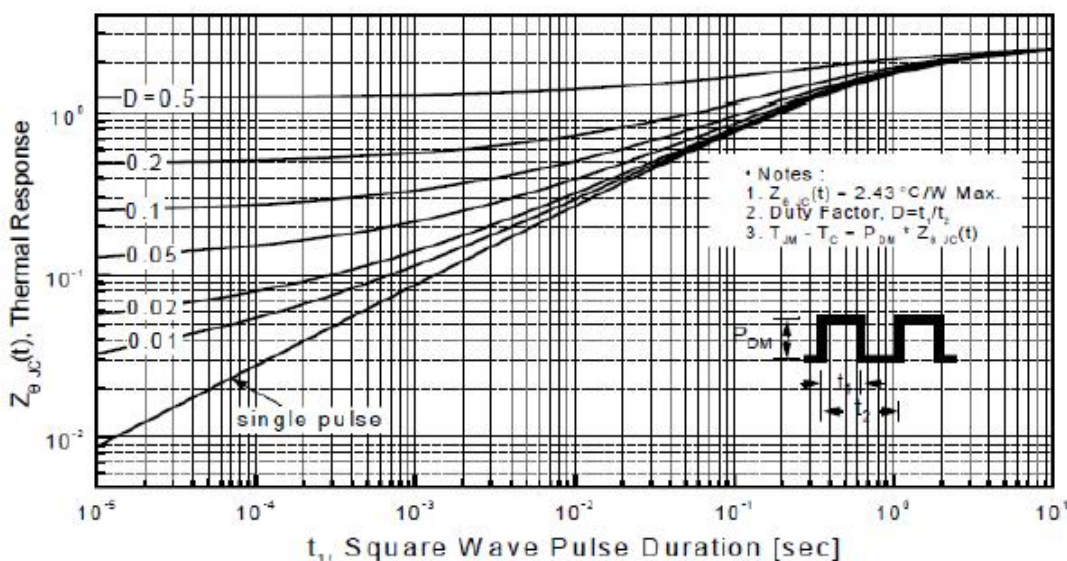


Figure 11. Transient Thermal Response Curve for TO220F