

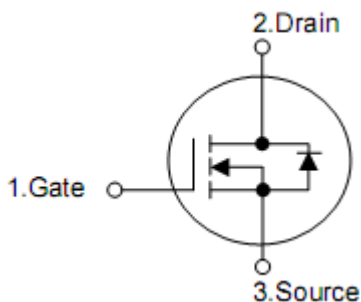
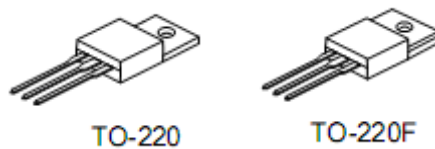
1. Description

The KIA7N60 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

2. Features

- 6.9A, 600V, $R_{DS(on)} = 1.1\Omega @ V_{GS} = 10\text{ V}$
- Low gate charge (typical 32nC)
- Low crss (typical 15pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

4. Absolute maximum ratings

(TC= 25 °C , unless otherwise specified)

Parameter	Symbol	Rating	Units
Drain-source voltage	V_{DSS}	600	V
Drain current	I_D	Tc=25 °C	6.9
		Tc=100 °C	4.14
Drain current pulsed (note 1)	I_{DM}	27.6	A
Gate-source voltage	V_{GSS}	±30	V
Single pulsed avalanche energy (note 2)	E_{AS}	275	mJ
Avalanche current (note 1)	I_{AR}	7	A
Repetitive avalanche energy (note 1)	E_{AR}	8.3	mJ
Peak diode recovery dv/dt (note 3)	dv/dt	4.5	V/ns
Power dissipation	P_D	Tc=25 °C	83
		derate above 25 °C	0.67
Operating and Storage temperature range	T_J, T_{STG}	-55 ~ +150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300	°C

5. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance, Junction-to-case	$R_{\theta JC}$	1.5	°C /W
Thermal resistance, Junction-to-ambient	$R_{\theta JA}$	62.5	°C /W

6. Electrical characteristics

(T_J=25°C, unless otherwise notes)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA, T _J =25°C	600			V
		V _{GS} =0V, I _D =250μA, T _J =150°C		650		V
Breakdown voltage temperature coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA, referenced to 25 °C		0.6		V/°C
Zero gate voltage drain current	I _{DSS}	V _{DS} =600V, V _{GS} =0V			1	μA
		V _{DS} =480V, T _C =125 °C			10	μA
Gate-body leakage current	Forward	I _{GSSF}			100	nA
	Reverse	I _{GSSR}			-100	nA
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 =4.14A		0.9	1.1	Ω
Forward transconductance	g _{FS}	V _{DS} =15V, I _D =3.45A			10	S
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		1485		pF
Output capacitance	C _{oss}			122		pF
Reverse transfer capacitance	C _{rss}			15		pF
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} =300V, I _D =6.9A, R _G =10Ω V _{GS} =10V, R _D =43.5Ω (note4)		15		ns
Turn-on rise time	t _r			12		ns
Turn-off delay time	t _{d(off)}			41		ns
Turn-off fall time	t _f			19		ns
Total gate charge	Q _g	V _{DS} =300V, I _D =6.9A, V _{GS} =10V, (note4)		32		nC
Gate-source charge	Q _{gs}			7		nC
Gate-drain charge	Q _{gd}			14		nC
Drain-source diode characteristics and maximum rating						
Maximum continuous drain-source diode forward current	I _S				6.9	A
Maximum pulsed drain-source diode forward current	I _{SM}				24	A
Drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _S =3.45A			1.5	V
Reverse recovery time	t _{rr}	V _{GS} =0V, I _S =6.9A		450		ns
Reverse recovery charge	Q _{rr}	di/dt=100A/μs (note4)		48		μC

- Note: 1. repetitive rating: pulse width limited by maximum junction temperature
 2. L=11.5mH, I_{AS}=6.9A, V_{DD}=50V, R_G=25Ω, starting T_J=25°C
 3. I_{SD}≤6.9A, di/dt≤100A/μs, V_{DD}≤BV_{DSS}, starting T_J=25 °C
 4. Essentially independent of operating temperature Typical characteristics

7. Test circuits and waveforms

Figure 1. On-Region Characteristics

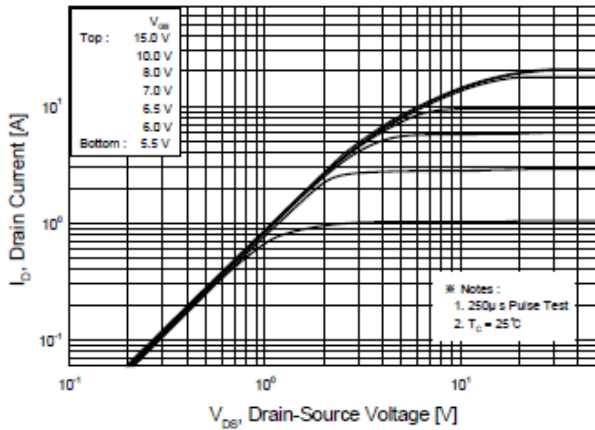


Figure 2. Transfer Characteristics

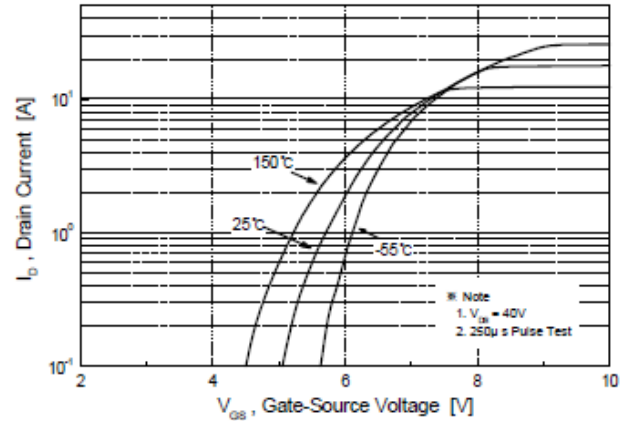


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

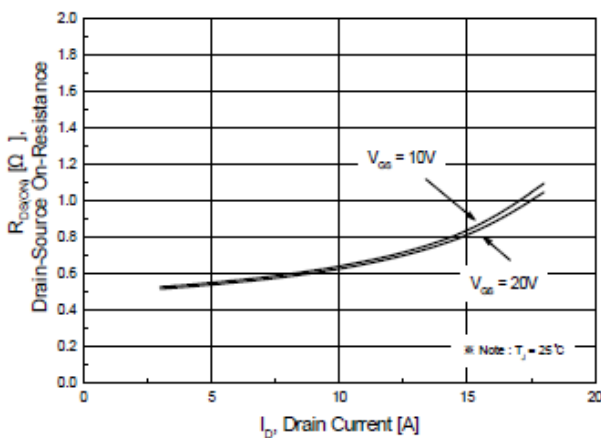


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

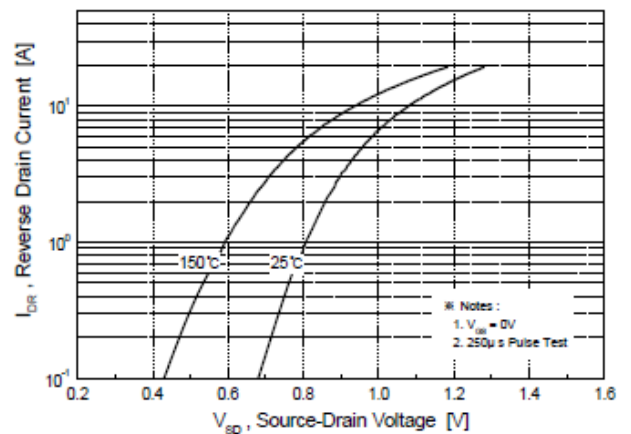


Figure 5. Capacitance Characteristics

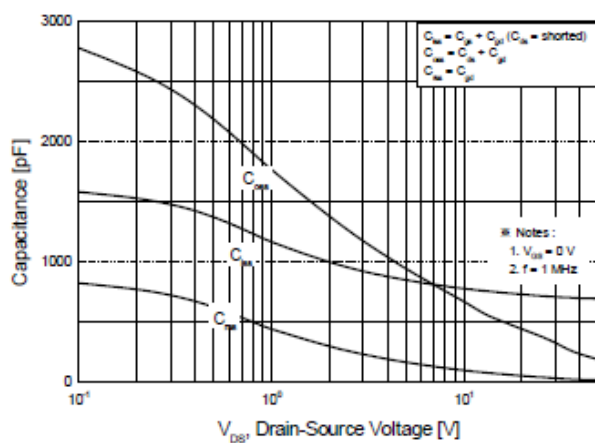


Figure 6. Gate Charge Characteristics

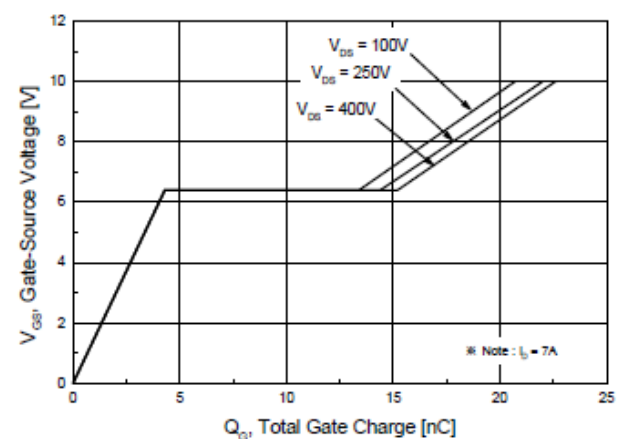


Figure 7. Breakdown Voltage Variation vs. Temperature

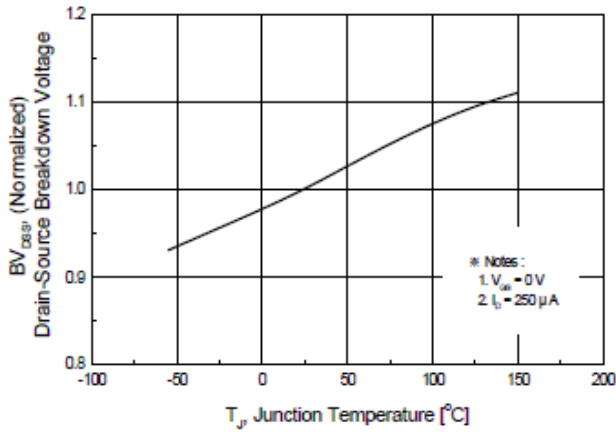


Figure 8. On-Resistance Variation vs. Temperature

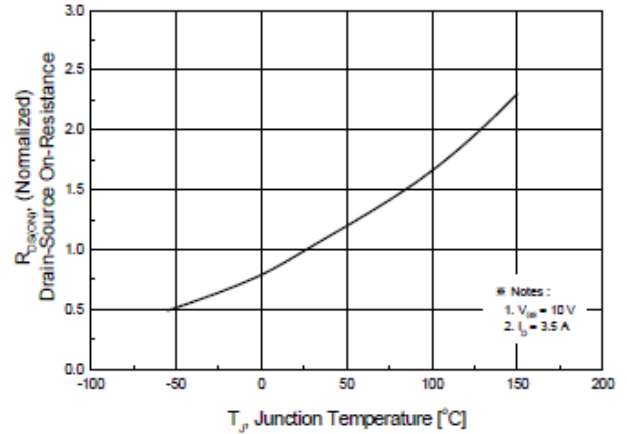


Figure 9. Maximum Safe Operating Area

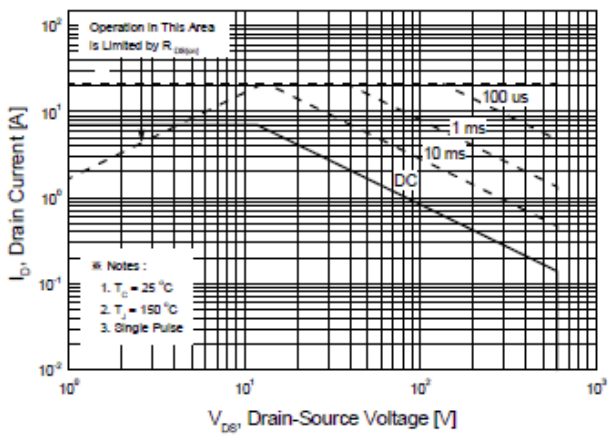


Figure 10. Maximum Drain Current vs. Case Temperature

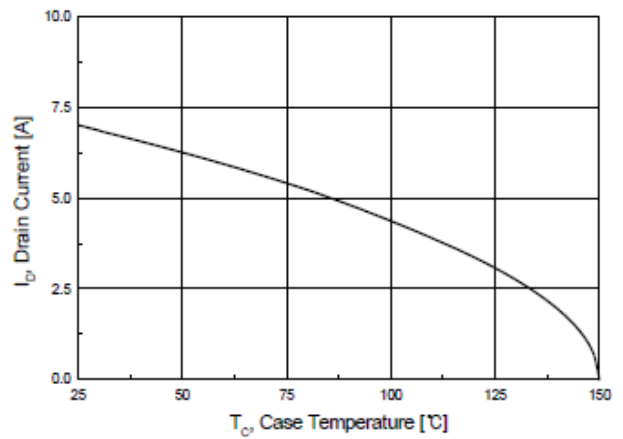
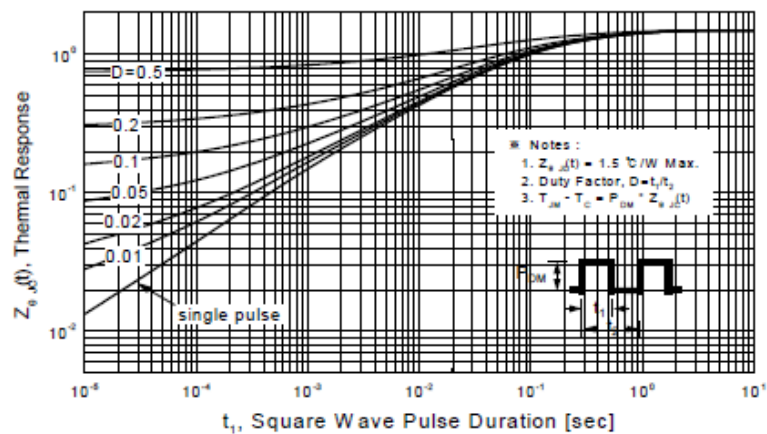
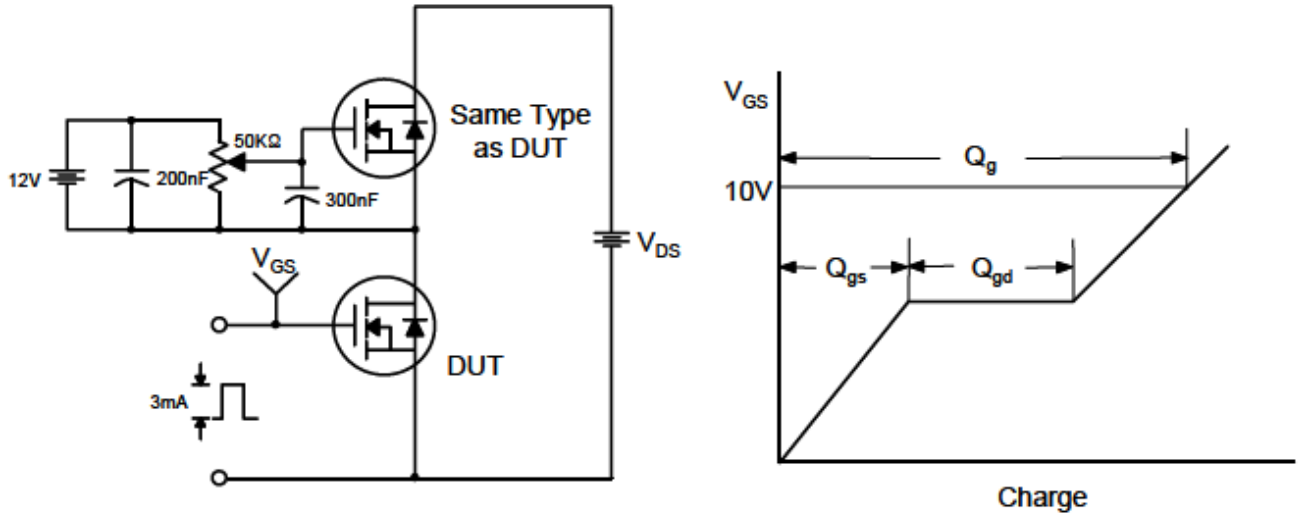


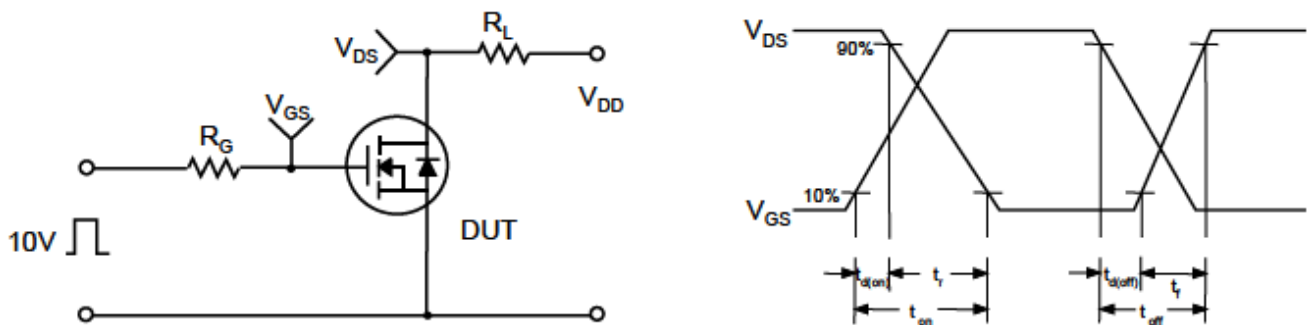
Figure 11. Transient Thermal Response Curve



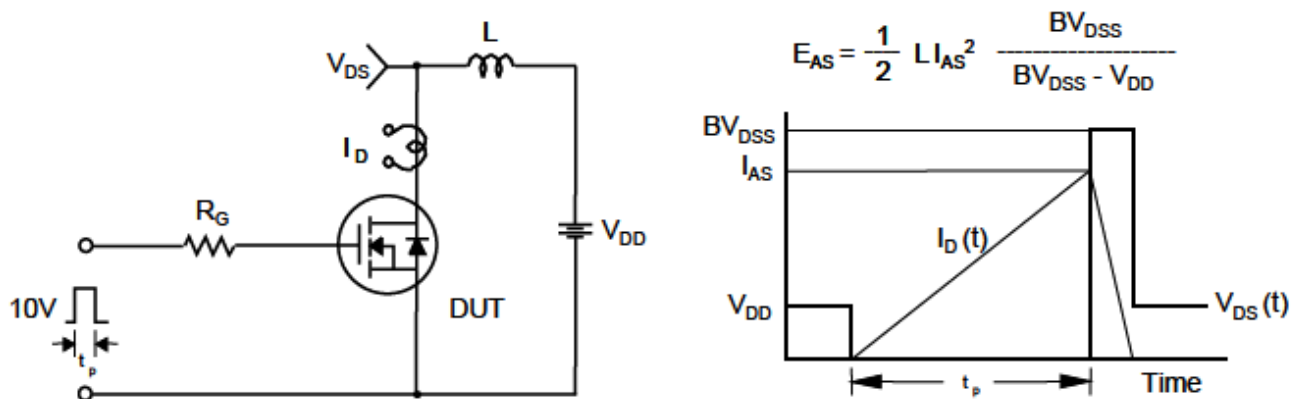
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

