

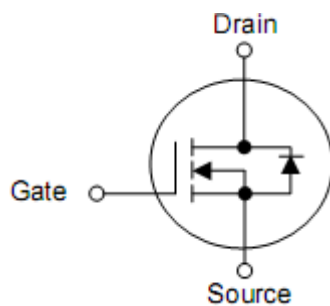
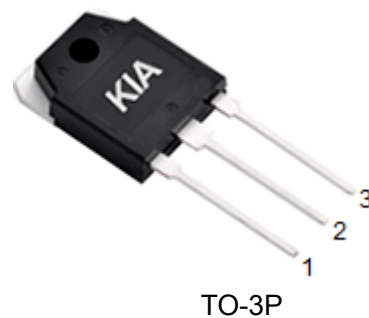
1. Features

- $R_{DS(ON)}=0.16\Omega(\text{typ.})@V_{GS}=10V$
- Low Gate Charge
- Low C_{rss}
- 100% Avalanche Aested
- Improve dv/dt Capability
- RoHS Compliant

2. Applications

- LED power supplies
- Cell Phone Charger
- Standby Power

3. Symbol



Pin	Function
1	Gate
2	Drain
3	Source

4. Ordering Information

Part Number	Package	Brand
KIA28N50HF	TO-220F	KIA
KIA28N50HH	TO-3P	KIA

5. Absolute maximum ratings

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

Parameter		Symbol	Rating		Units
			TO-220F	TO-3P	
Drain-source voltage		V _{DSS}	500		V
Gate-to-Source Voltage		V _{GSS}	±30		V
Continuous drain current		I _D	28*		A
Pulsed Drain Current ¹⁾		I _{DM}	80*		A
Single pulse avalanche energy ²⁾		E _{AS}	1110		mJ
Avalanche Current ¹⁾		I _{AR}	20		A
Repetitive Avalanche Energy ¹⁾		E _{AR}	25		mJ
Peak Diode Recovery dv/dt ³⁾		dv/dt	20		V/ns
Power dissipation	T _C =25°C	P _D	50	138	W
	Derate above 25°C		0.3	0.83	W/°C
Maximum Lead Temperature for Soldering Purpose, 1/8” from Case for 5 Seconds		T _L	300		°C
Operating junction and storage temperature range		T _J , T _{STG}	-55 to150		°C

*Drain current limited by maximum junction temperature

6. Thermal characteristics

Parameter	Symbol	Rating		Unit
		TO-220F	TO-3P	
Thermal resistance junction-case	$R_{\theta JC}$	3.3	1.19	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	34.4	$^{\circ}\text{C/W}$

7. Electrical characteristics

(T_C=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	500	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	I _D =250uA, Referenced to 25°C	-	0.7	-	V/°C
Drain-source leakage current	I _{DSS}	V _{DS} =500V, V _{GS} =0V	-	-	1	uA
Gate-source forward leakage	I _{GSS}	V _{GS} =±30V, V _{DS} =0V	-	-	±100	nA
Drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =14A	-	0.16	0.24	Ω
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250uA	2.0	-	4.0	V
Forward Transconductance	g _{fs}	V _{DS} =20V, I _D =10A	-	25	-	S
Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V f=1MHz	-	2555	-	pF
Output capacitance	C _{oss}		-	355	-	pF
Reverse transfer capacitance	C _{rss}		-	29	-	pF
Total gate charge	Q _g	V _{DD} =400V, I _D =20A V _{GS} =10V ⁴⁾	-	45	-	nC
Gate-source charge	Q _{gs}		-	12	-	nC
Gate-drain charge	Q _{gd}		-	18	-	nC
Turn-on delay time	t _{d(on)}	V _{DD} =250V, R _G =25Ω, I _D =20A ⁴⁾	-	46	-	ns
Rise time	t _r		-	118	-	ns
Turn-off delay time	t _{d(off)}		-	105	-	ns
Fall time	t _f		-	62	-	ns
Maximum Continuous Drain to Source Diode Forward Current	I _S	—	-	-	20	A
Maximum Pulsed Drain to Source Diode Forward Current	I _{SM}	—	-	-	80	A
Diode forward voltage	V _{SD}	I _S =20A, V _{GS} =0V,	-	-	1.5	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _F =20A, di/dt=100A/us	-	154	-	nS
Reverse Recovery Charge	Q _{rr}		-	0.5	-	nC

Note:

- 1) Repetitive Rating: Pulse width limited by maximum junction temperature
- 2) L=5mH, I_{AS}=20A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
- 3) I_{SD}≤20A, di/dt≤200A/us, V_{DD}≤BV_{DSS}, Starting T_J=25°C
- 4) Essentially Independent of Operating Temperature Typical Characteristics

8. Typical operating characteristics

Figure 1. On-Region Characteristics

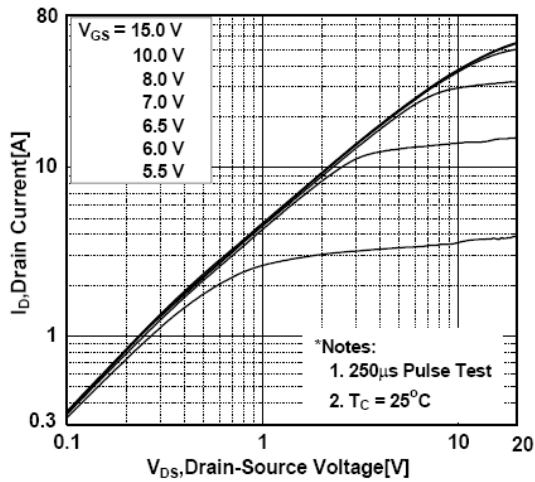


Figure 2. Transfer Characteristics

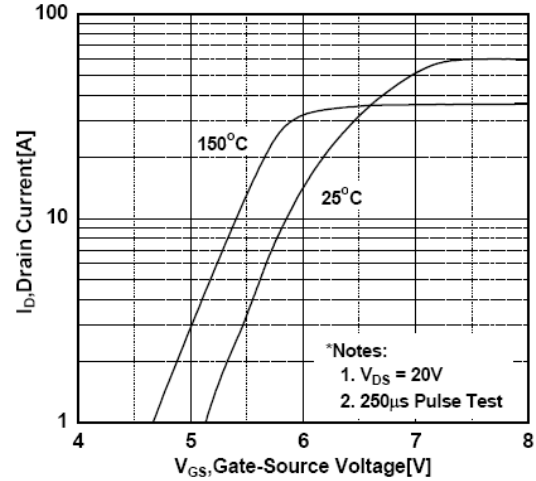


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

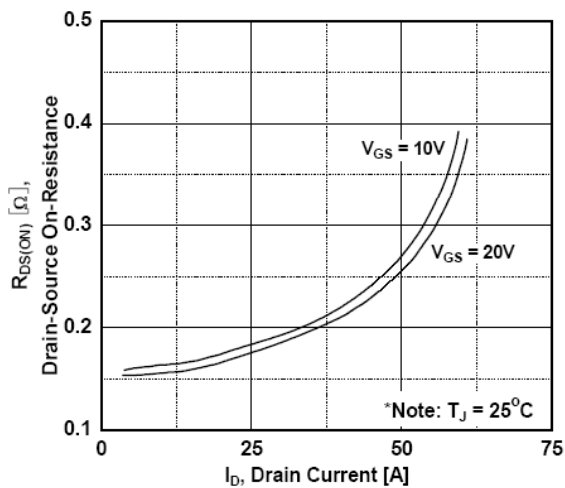


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

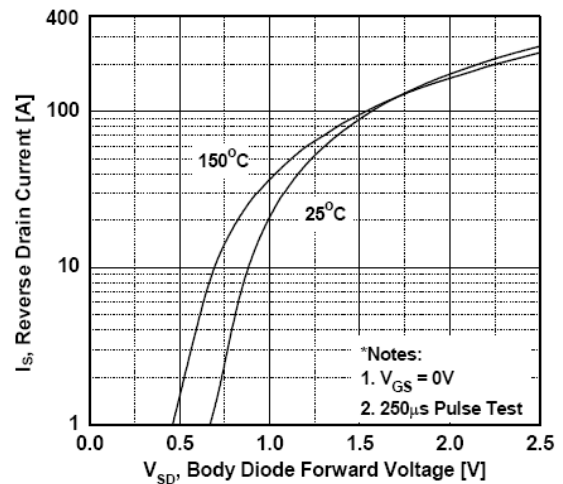


Figure 5. Capacitance Characteristics

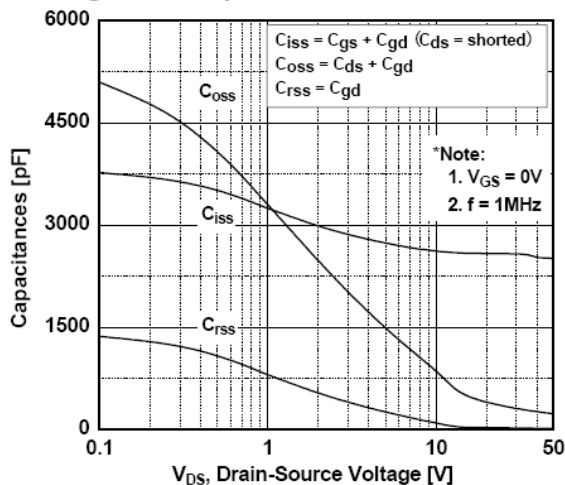


Figure 6. Gate Charge Characteristics

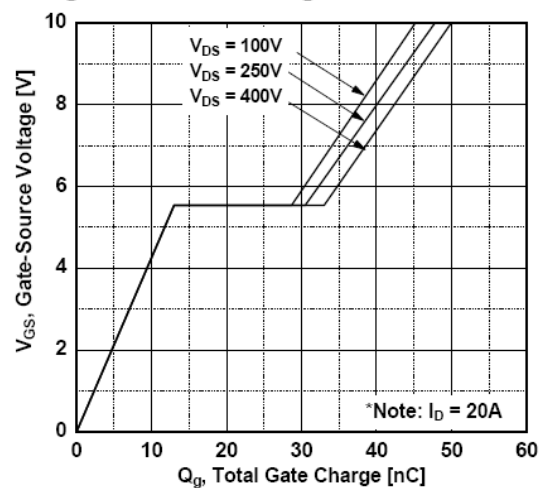


Figure 7. Breakdown Voltage Variation vs. Temperature

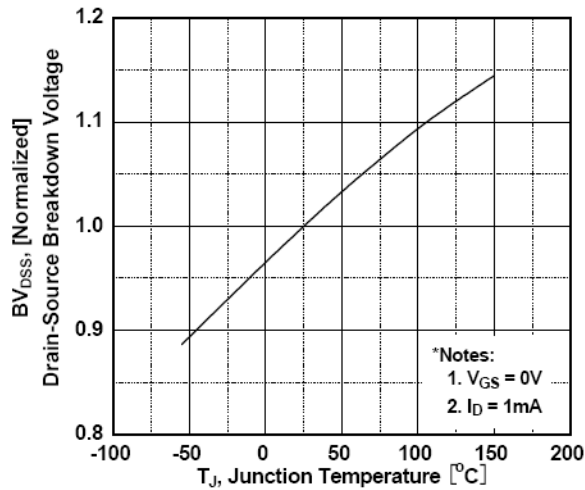


Figure 8. Maximum Safe Operating Area

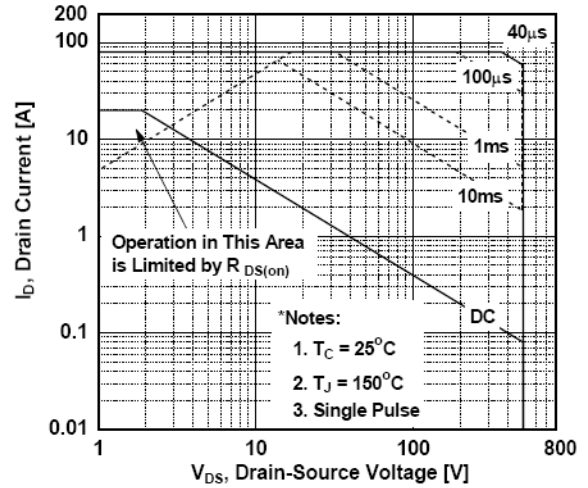


Figure 9. Transient Thermal Response Curve

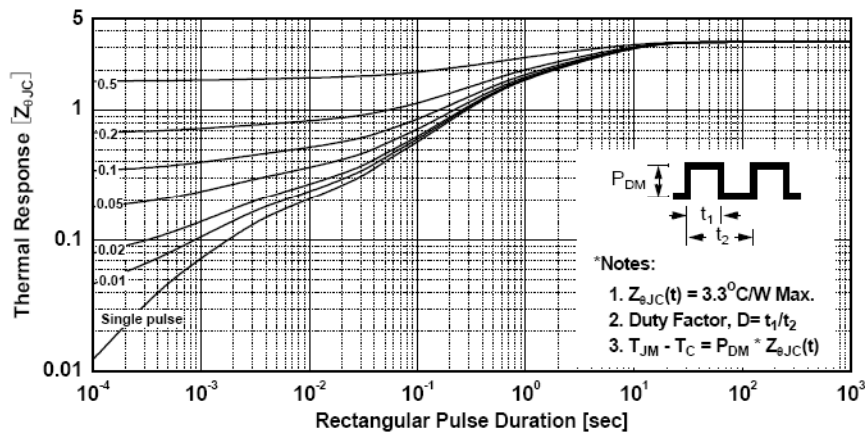
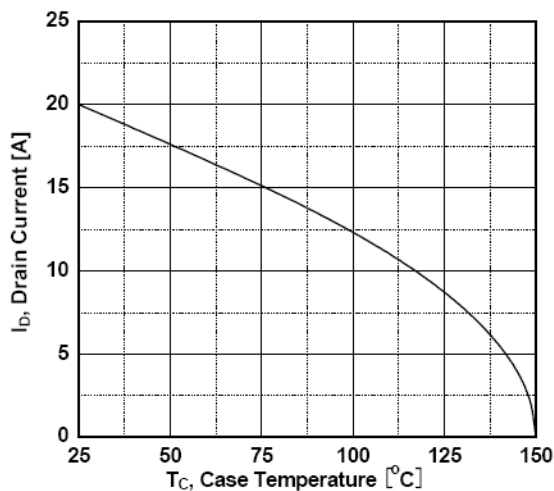
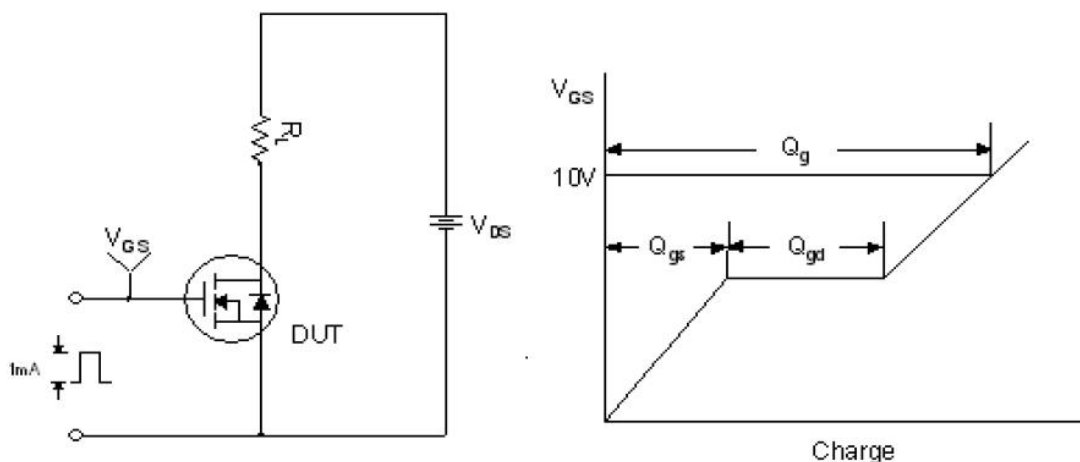


Figure 10. Maximum Drain Current vs. Case Temperature

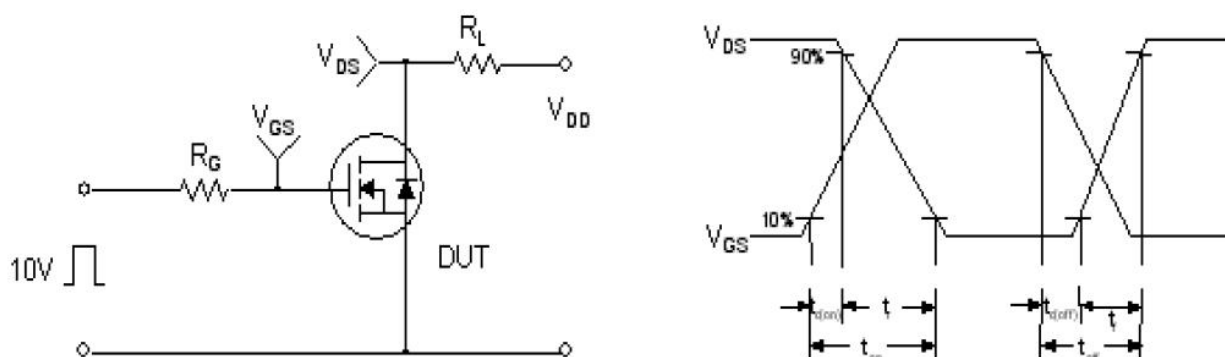


9. Test Circuits and Waveforms

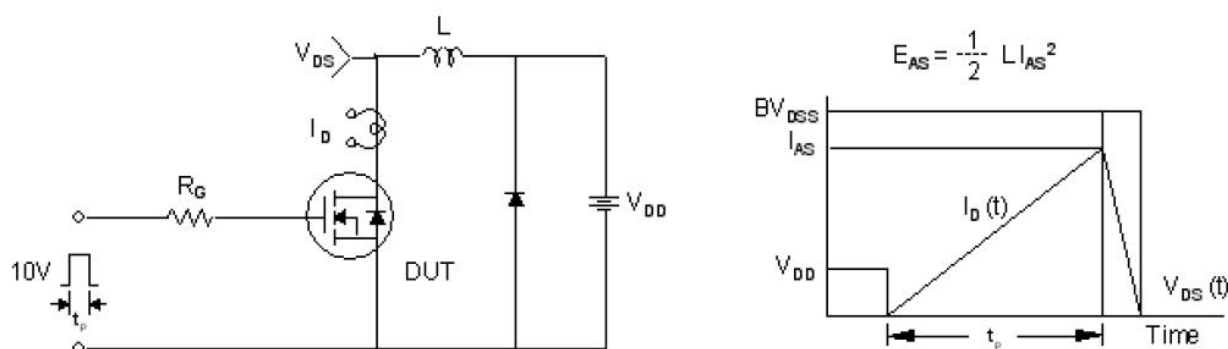
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

