1. Description

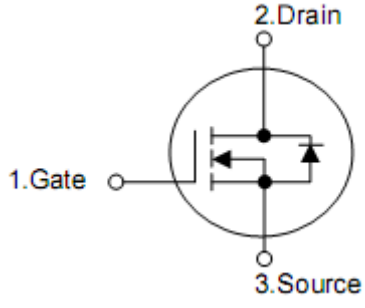
KCX2704A is an N-channel enhancement mode power MOSFET which is produced using LVMOS technology. The improved process and cell structure have been especially tailored to minimize on-state resistance, provide superior switching performance. This device is widely used in power management for UPS and Inverter Systems.

2. Features

- $R_{DS(ON)}$=1.25mΩ (typ.) @ V_{GS}=10V
- Low gate charge
- Low Crss
- Fast switching
- Extreme dv/dt rated
- 100% avalanche tested
- Pb-free lead plating
- RoHS compliant

3. Pin configuration

DFN5*6



Pin	Function
1,2,3	Source
4	Gate
5,6,7,8	Drain

4. Ordering Information

Part Number	Package	Brand
KCY2704A	DFN5*6	KIA

5. Absolute maximum ratings

T_J=25℃ unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Drain-to-Source Voltage	V_{DSS}	—	40	-	-	V
Gate-to-Source Voltage	V_{GSS}	—	-20	-	20	V
Continuous Drain Current	I_D	T_C=25°C	-	-	150	A
		T_C=100°C	-	-	95	A
Pulsed Drain Current [1)]	I_{DM}	T_C=25°C	-	-	500	A
Total Power Dissipation [2)]	P_D	T_C=25°C	-	-	104	W
Avalanche Energy	EAS	L=0.1mH,V_{DD}=32V,R_G=25Ω, Starting temperature T_J=25°C	-	-	266	mJ
Single Pulsed Current	I_{AS}	—	-	-	73	A
Operation Junction Temperature Range	T_J	—	-55	-	150	°C
Storage Temperature Range	T_{STG}	—	-55	-	150	°C

6. Thermal characteristics

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	—	-	-	1.2	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	—	-	-	50	°C/W
Soldering Temperature (SMD)	T_{sold}	Reflow soldering:10±1sec,3times Wave soldering:10^{+2}_{-0} sec,1time	-	-	260	°C

7. Electrical characteristics

(T_J=25°C,unless otherwise notes)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}= 0V, I_D=250μA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V, T_J=25°C	-	-	1	μA
		V_{DS}=40V,V_{GS}=0V, T_J=125°C	-	2	-	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.4	-	2.4	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=50A	-	1.25	1.45	mΩ
		V_{GS}=4.5V, I_D=50A	-	1.65	2.1	mΩ
Gate Resistance	R_g	F=1MHz	-	2.6	-	Ω
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V, f=1MHZ	-	5700	-	pF
Output Capacitance	C_{oss}		-	1650	-	pF
Reverse Transfer Capacitance	C_{rss}		-	43	-	pF
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=10V,V_{DD}=20V, I_D=50A,R_G=4.7Ω [3),4)]	-	22	-	ns
Turn-on Rise Time	t_r		-	64	-	ns
Turn-off Delay Time	$t_{d(off)}$		-	87	-	ns
Turn-off fall Time	t_f		-	28	-	ns
Total Gate Charge	Q_g	V_{GS}=10V,V_{DD}=20V, I_D=50A [3),4)]	-	88	-	nC
Gate-Source Charge	Q_{gs}		-	30	-	nC
Gate-Drain Charge	Q_{gd}		-	9.4	-	nC
Gate-planteau Voltage	$V_{plateau}$		-	4.6	-	V
Continuous Diode Forward Current	I_S	Integral reverse P-N junction diode in the MOSFET	-	-	150	A
Diode Plus Current	$I_{S,pulse}$		-	-	500	A
Diode Forward Voltage	V_{SD}	I_S=100A,V_{GS}=0V	-	-	1.4	V
Reverse Recovery Time	t_{rr}	I_S=37.5A,V_{GS}=0V,V_R=40V di/dt=100A/us [3)]	-	67	-	ns
Reverse Recovery Chrage	Q_{rr}		-	73	-	nC

Notes:
1).Pulse time 5us；
2).The dissipation power will change with temperature, derating above 25°C：0.83W/°C；
3).Pulse Test：Pulse width≤300us,Duty cycle≤20%；
4).Essentially independent of operating temperature.

8. Typical Characteristics

Figure 1. On-Region Characteristics

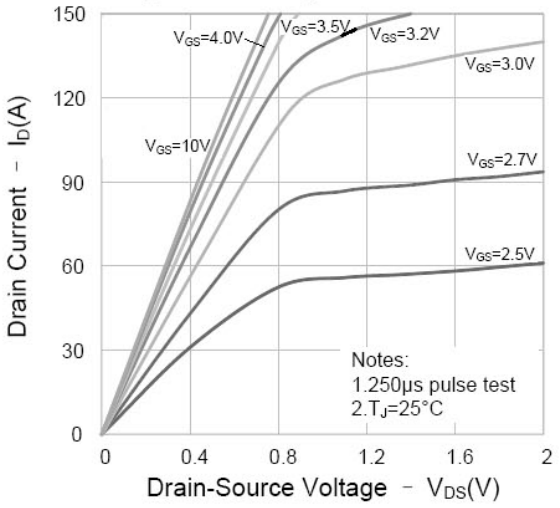


Figure 2. Transfer Characteristics

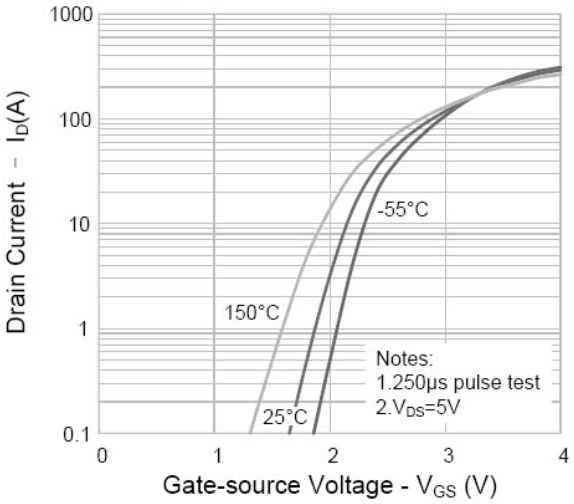


Figure 3. On-resistance vs. Drain Current

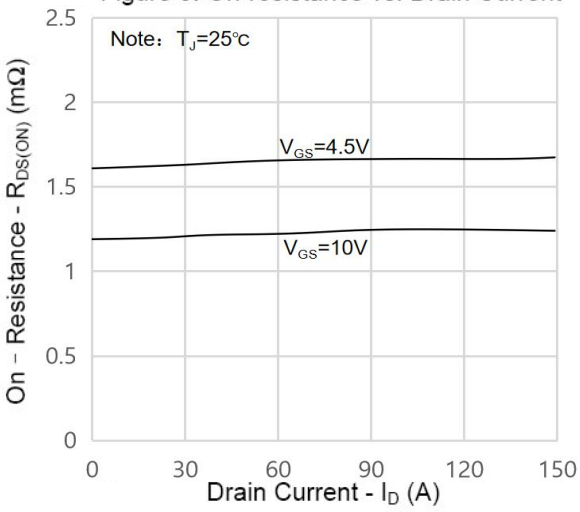


Figure 4. On-resistance vs. Gate-source Voltage

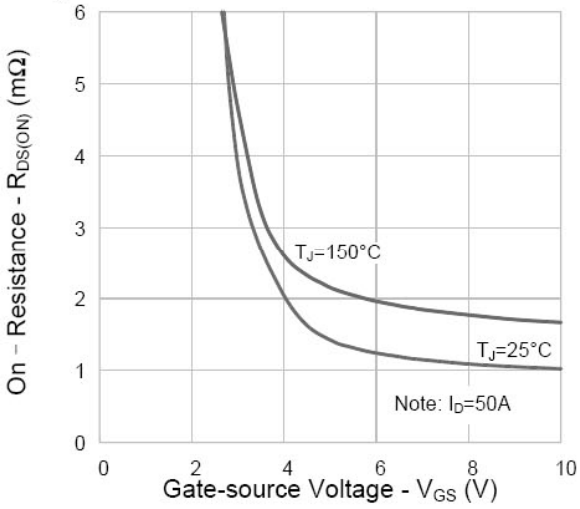


Figure 5. Turn-on Voltage vs. Temperature characteristics

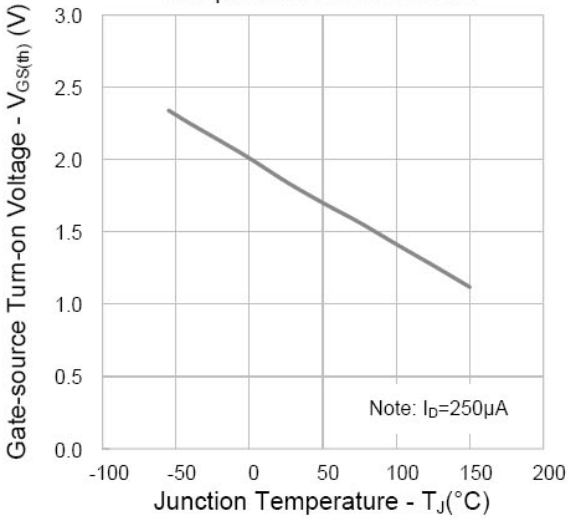


Figure 6. Body Diode Forward Voltage Variation vs. Source Current and Temperature

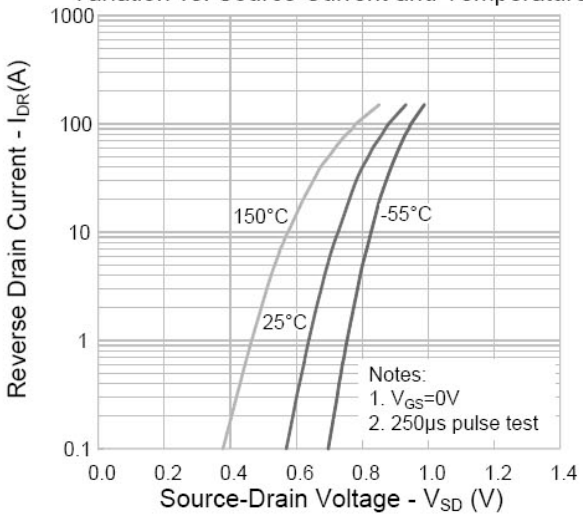


Figure 7. Capacitance Characteristics

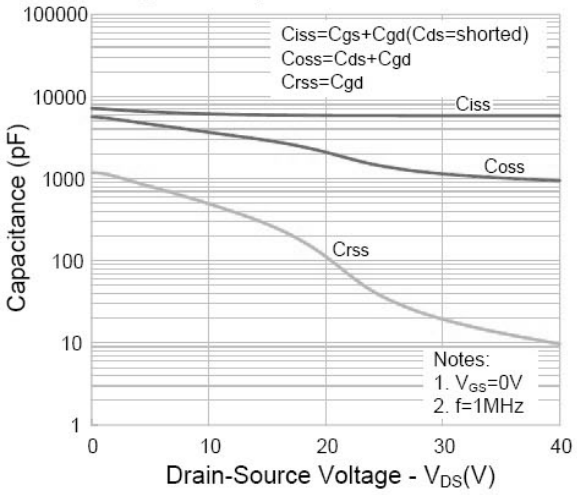


Figure 8. Gate Charge

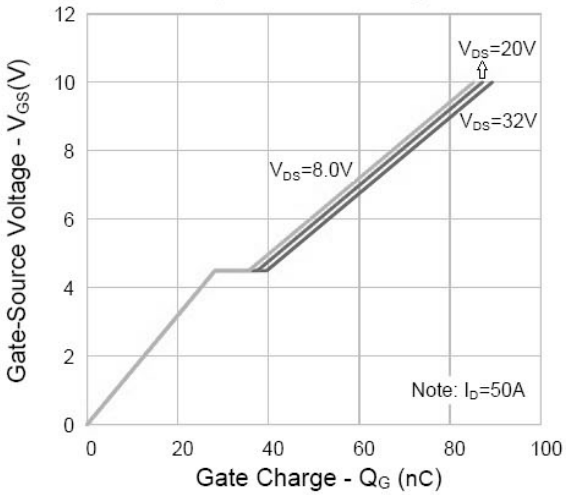


Figure 9. Breakdown Voltage Variation vs. Temperature

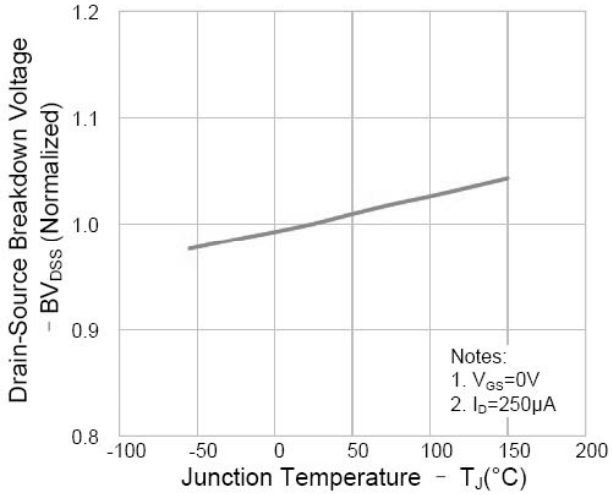


Figure 10. On-resistance Variation vs. Temperature

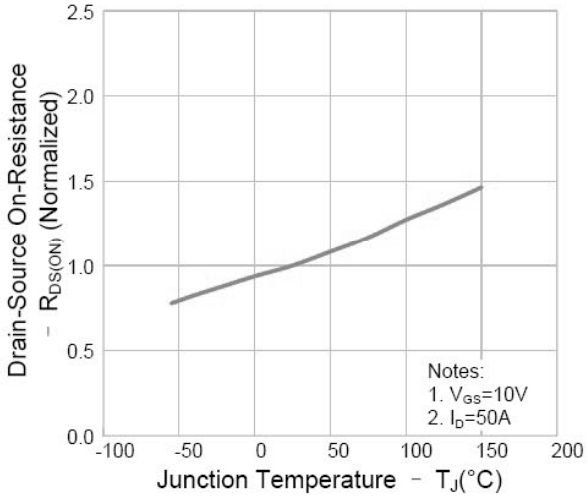


Figure 11. Max. Safe Operating Area

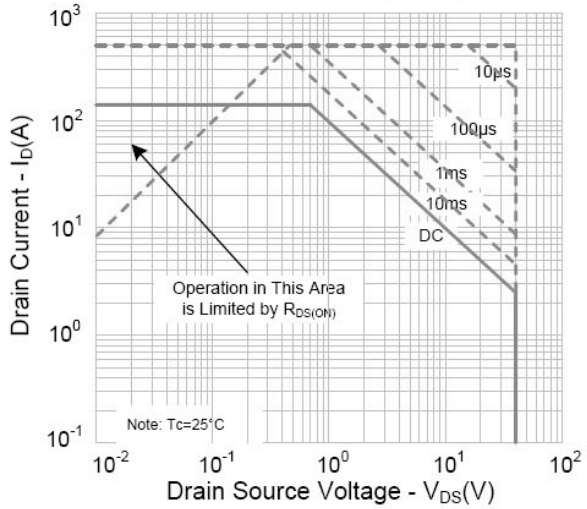
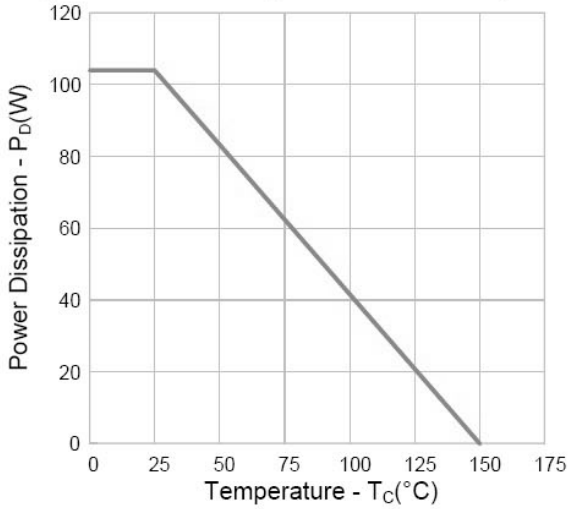
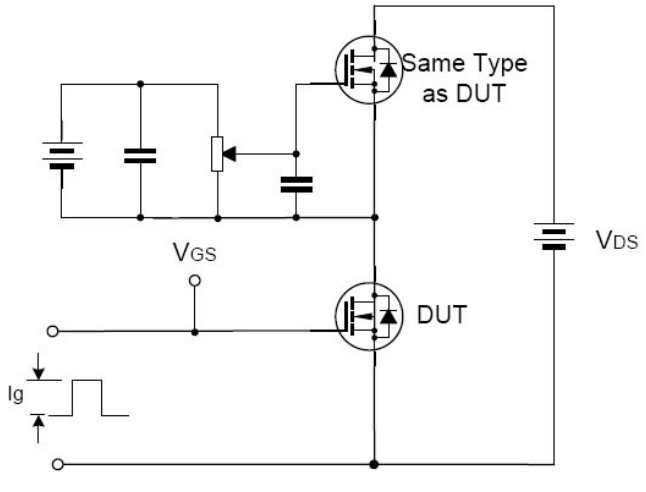


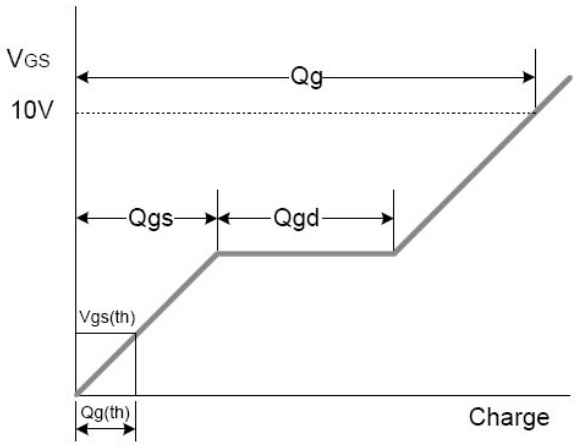
Figure 12. Power Dissipation vs. Case Temperature



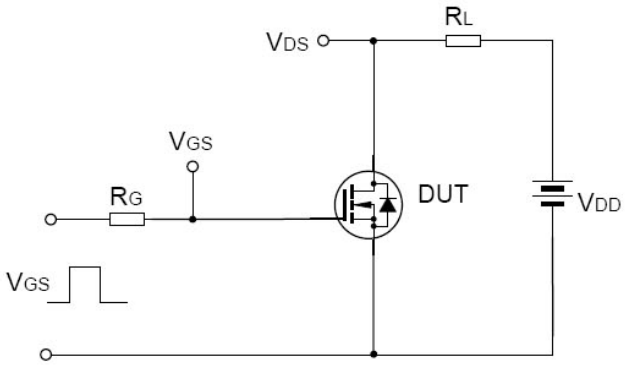
9. Typical Test Circuits

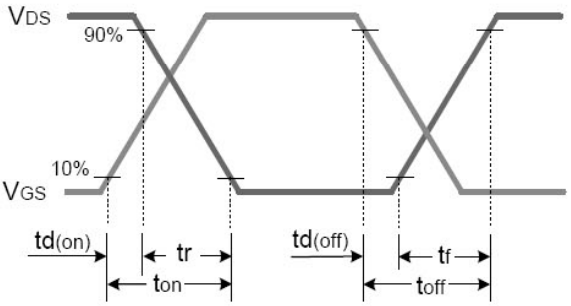
Gate Charge Test Circuit & Waveform



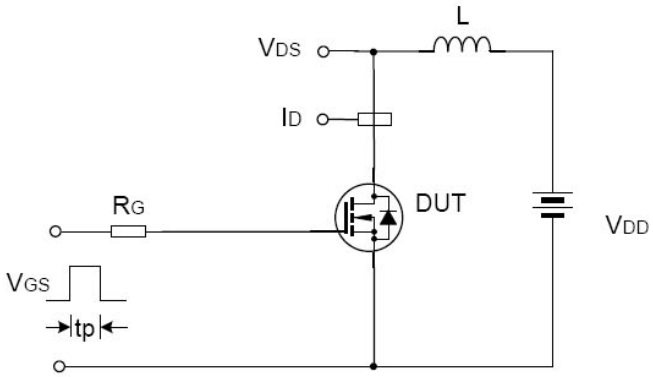


Resistive Switching Test Circuit & Waveform





Unclamped Inductive Switching Test Circuit & Waveform



$$E_{AS} = \frac{1}{2} LI_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$