1. Description

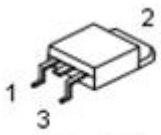
This Power MOSFET is produced using KIA's advanced planar stripe DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for low voltage applications such as DC/DC converters and high efficiency switching for power management in portable and battery operated products.

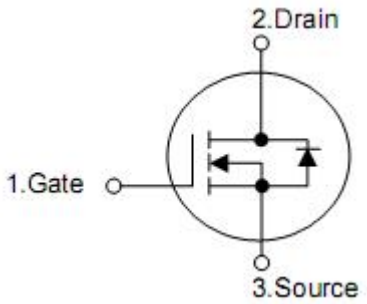
2. Features

- n 35A, 60V, $R_{DS(on)Typ}$=15mΩ @ V_{GS}=10V
- n Low gate charge (typical 33nC)
- n High ruggedness
- n Fast switching
- n 100% avalanche tested
- n Improved dv/dt capability

3. Pin configuration



TO-252



Pin	Function
1	Gate
2	Drain
3	Source

4. Ordering Information

Part Number	Package	Brand
KND8606B	TO-252	KIA

5. Absolute maximum ratings

TC=25℃ unless otherwise specified

Parameter		Symbol	Ratings	Units
Drain-Source Voltage		V_{DSS}	60	V
Drain Current	T_C=25°C	I_D	35	A
	T_C=100°C		22	A
Drain Current —Pulsed (Note 1)		I_{DM}	80	A
Gate-Source Voltage		V_{GSS}	±20	V
Single Pulsed Avalanche Energy (Note 2)		EAS	450	mJ
Avalanche Current (Note 1)		I_{AR}	35	A
Repetitive Avalanche Energy (Note 1)		E_{AR}	12	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation	T_C=25°C	P_D	60	W
	Derate above 25°C		0.8	W/°C
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	°C

6. Thermal characteristics

Parameter	Symbol	Ratings	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance, Case-to-Sink Typ.	$R_{\theta JS}$		°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°C/W

7. Electrical characteristics

(TJ=25°C,unless otherwise notes)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=250uA	60	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D=250uA, Referenced to 25°C	--	0.06	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=60V,V_{GS}=0V	--	--	1	uA
		V_{DS}=48V,T_C=150℃	--	--	10	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS}=20V,V_{DS}=0V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS}=-20V,V_{DS}=0V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	1	1.8	2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=10V,I_D=20A	--	15	20	mΩ
g_{FS}	Forward Transconductance	V_{DS}=25V,I_D=25A (Note 4)	--	22	--	S
Dynamic Characteristics						
Ciss	Input Capacitance	V_{DS}=25V,V_{GS}=0V, f=1.0MHz	--	2800	--	pF
Coss	Output Capacitance		--	200	--	pF
Crss	Reverse Transfer Capacitance		--	100	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=30V,I_D=25A, R_G=25Ω (Note 4,5)	--	15	--	ns
t_r	Turn-On Rise Time		--	105	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	60	--	ns
t_f	Turn-Off Fall Time		--	65	--	ns
Q_g	Total Gate Charge	V_{DS}=48V,I_D=25A, V_{GS}=10V (Note 4,5)	--	33	--	nC
Q_{gs}	Gate-Source Charge		--	8.5	--	nC
Q_{gd}	Gate-Drain Charge		--	14	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	35	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	80	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS}=0V, I_S=35A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS}=0V,I_S=35A, dI_F/dt=100A/us (Note 4)	--	60	--	ns
Q_{rr}	Reverse Recovery Charge		--	80	--	nC

Notes：
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. I_{AS}=35A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
3. I_{SD}≤35A, di/dt≤200A/us, V_{DD}≤BV_{DSS}, Starting T_J=25°C
4. Pulse Test：Pulse width≤300us, Duty cycle≤2%
5. Essentially independent of operating temperature

8. Typical Characteristics

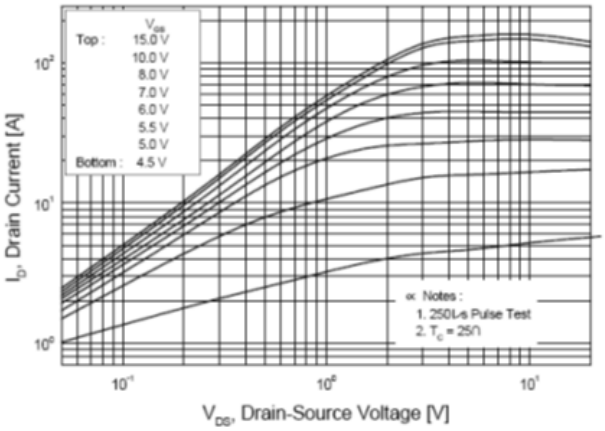


Figure 1. On-Region Characteristics

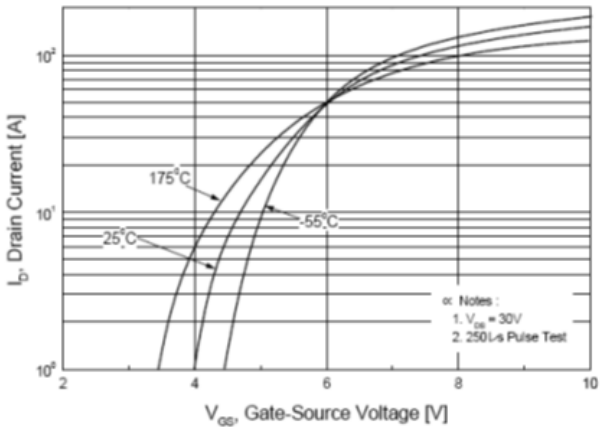


Figure 2. Transfer Characteristics

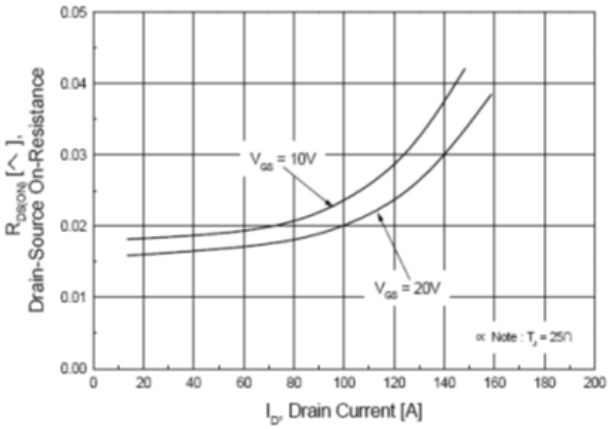


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

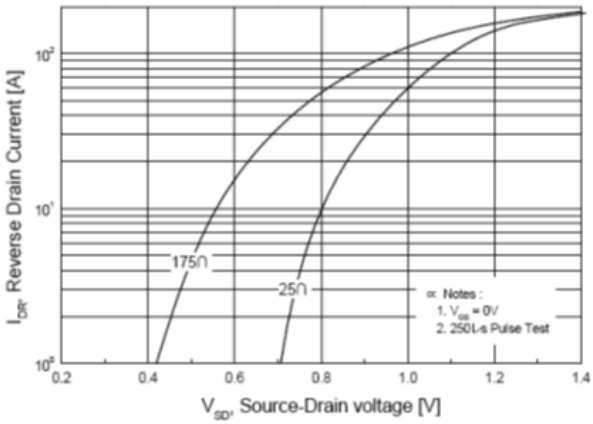


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

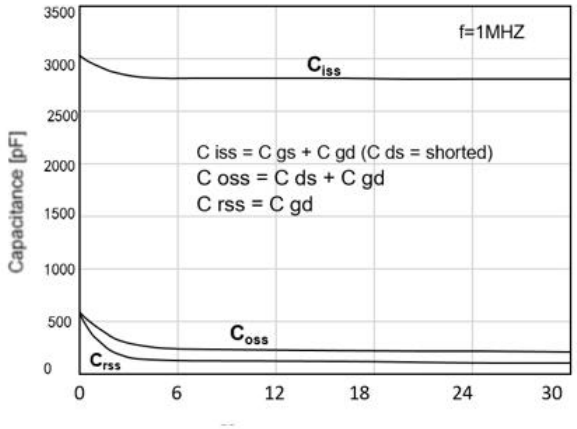


Figure 5. Capacitance Characteristics

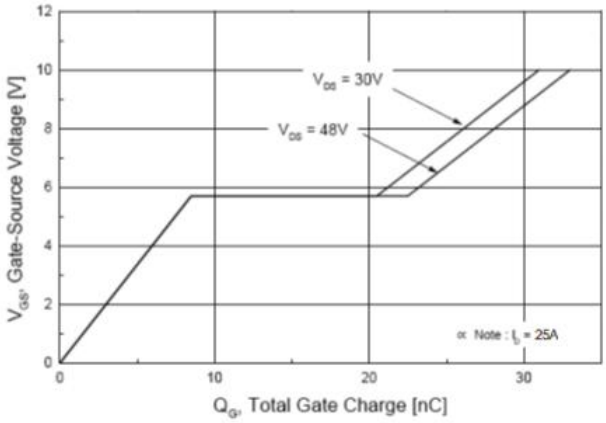


Figure 6. Gate Charge Characteristics

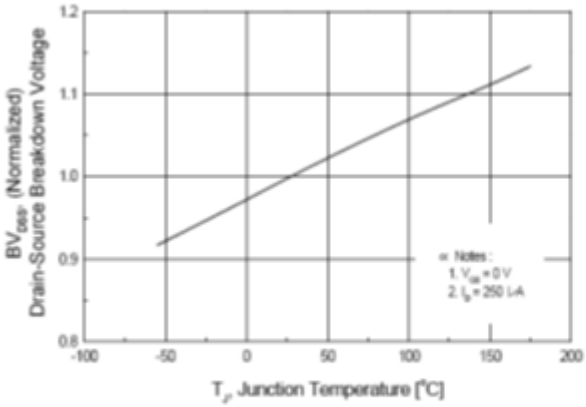


Figure 7. Breakdown Voltage Variation vs Temperature

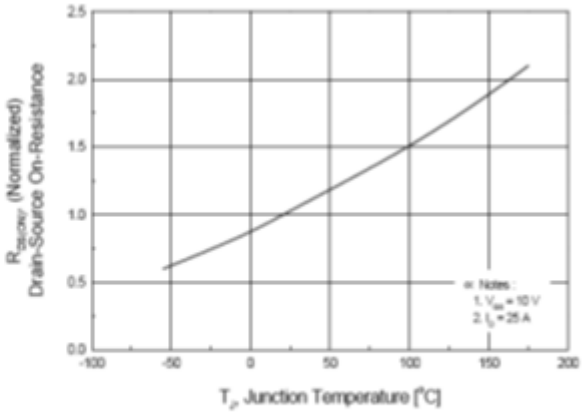


Figure 8. On-Resistance Variation vs Temperature

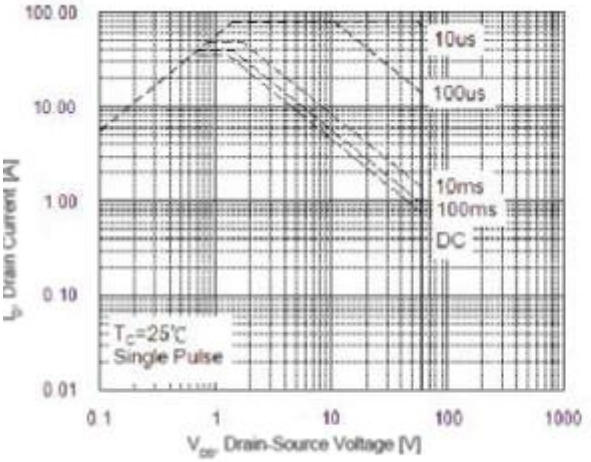


Figure 9. Maximum Safe Operating Area

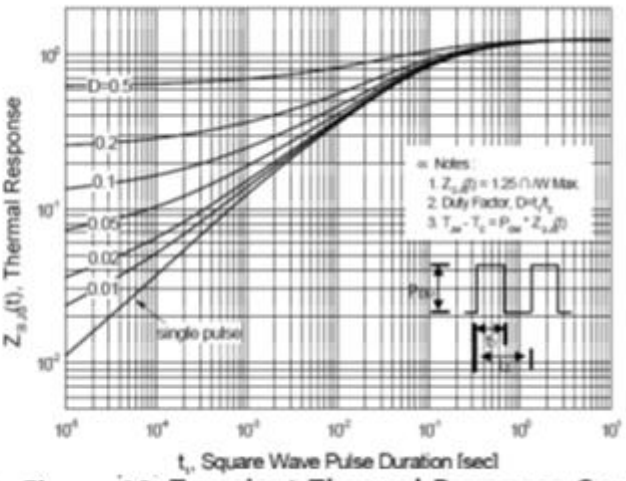
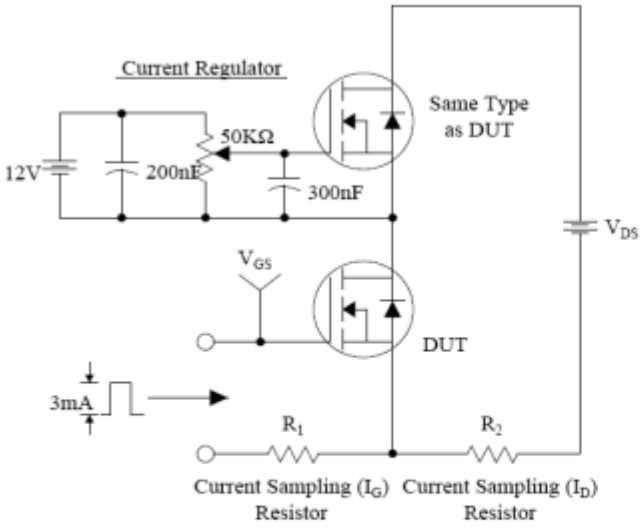
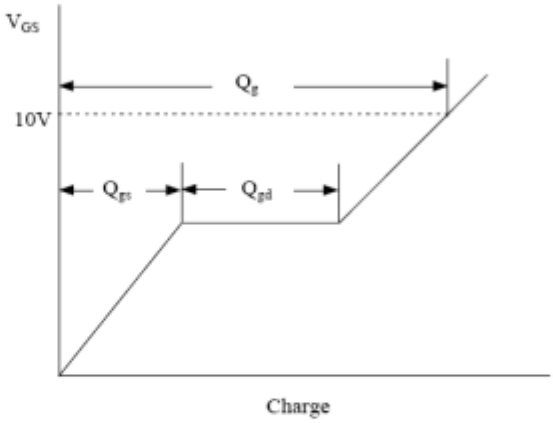


Figure 10. Transient Thermal Response Curve

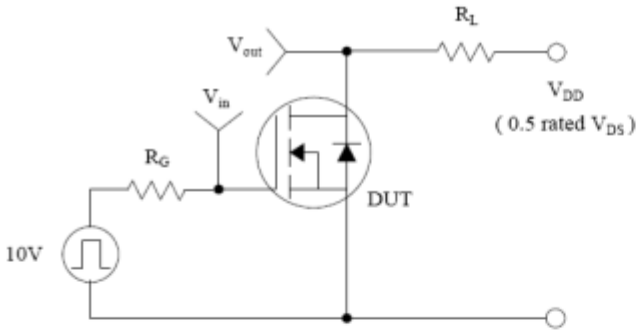
9. Test Circuits and Waveforms

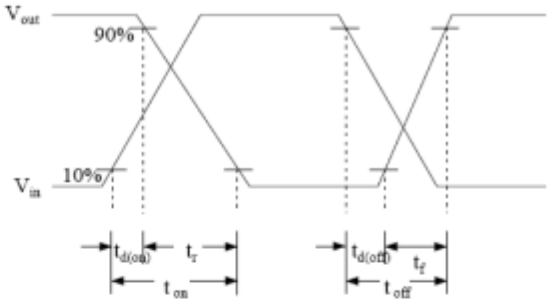
Gate Charge Test Circuit & Waveform



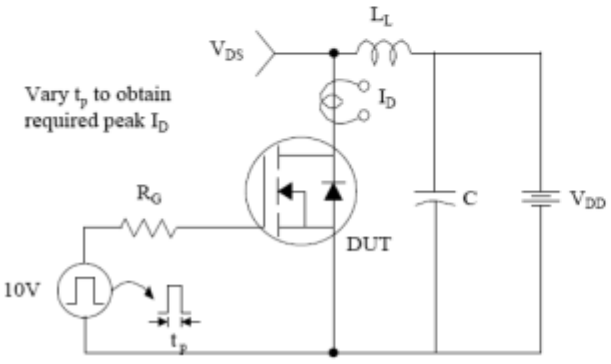


Resistive Switching Test Circuit & Waveforms

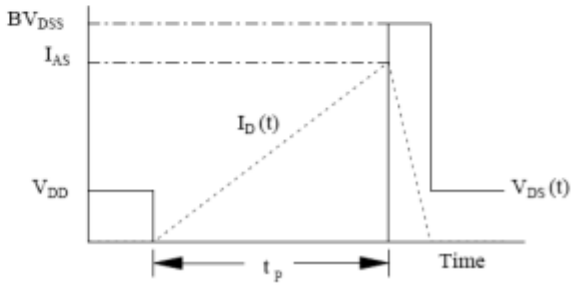




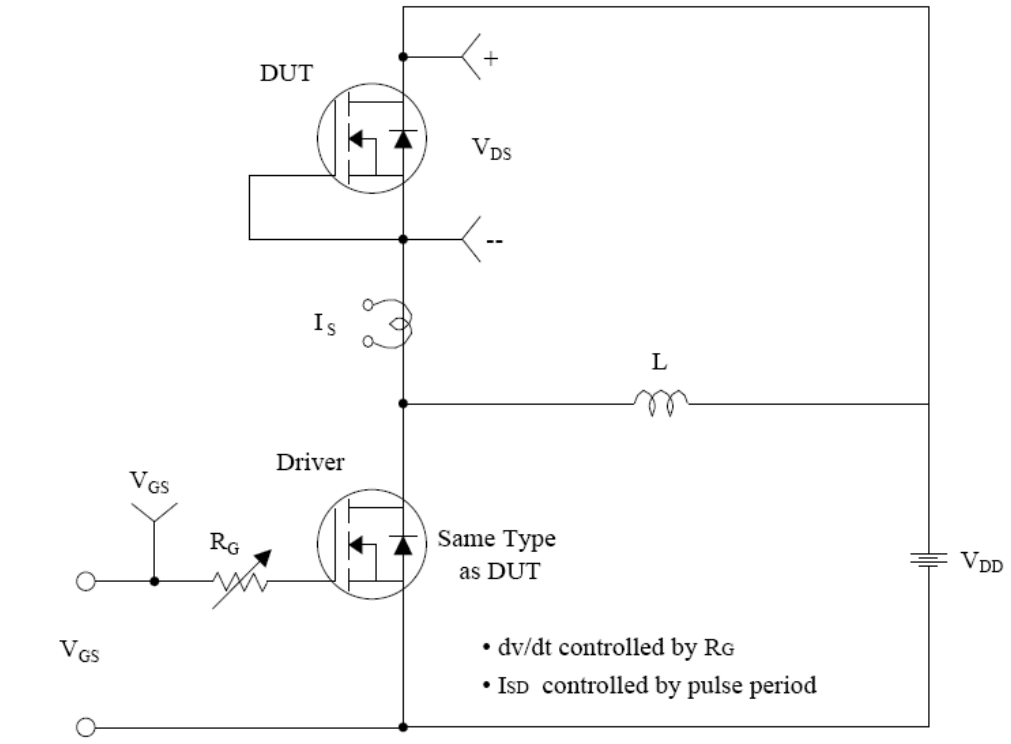
Unclamped Inductive Switching Test Circuit & Waveforms

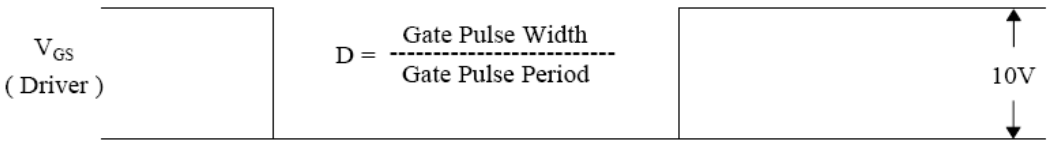


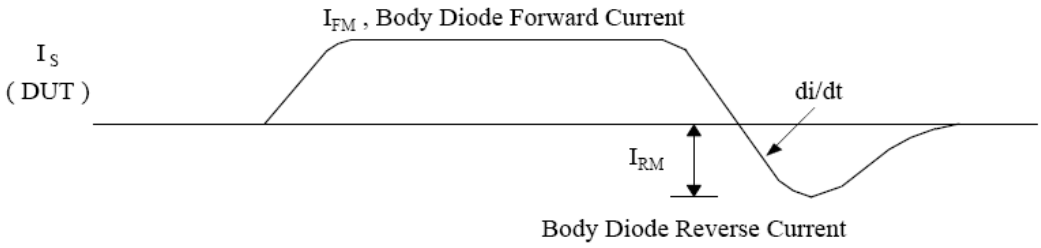
$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

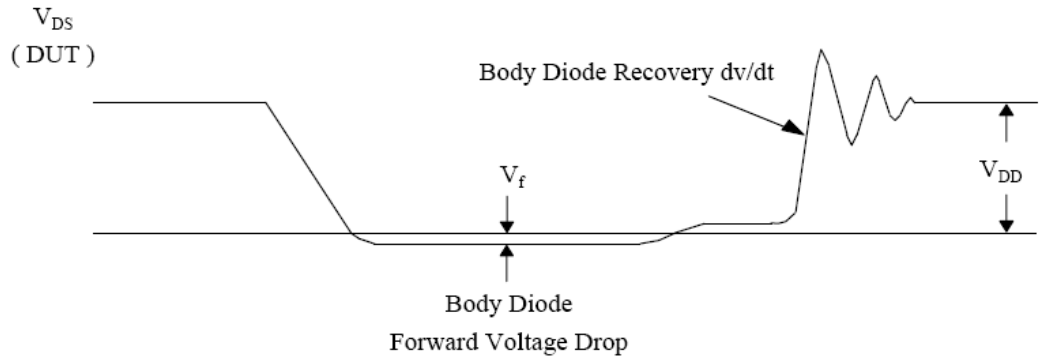


Peak Diode Recovery dv/dt Test Circuit & Waveforms









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