

1. Description

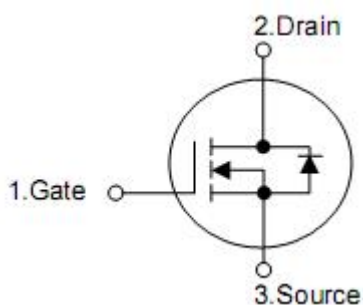
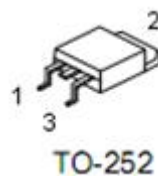
This Power MOSFET is produced using KIA's advanced planar stripe DMOS technology.

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

3. Pin configuration



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°C unless otherwise specified

Parameter		Symbol	Ratings	Units
Drain-Source Voltage		V_{DSS}	60	V
Drain Current	$T_C=25^\circ\text{C}$	I_D	35	A
	$T_C=100^\circ\text{C}$		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	$T_C=25^\circ\text{C}$	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

(T_J=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/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V, V _{GS} =0V	--	--	1	uA
		V _{DS} =48V, T _C =150°C	--	--	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						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	--	2800	--	pF
C _{oss}	Output Capacitance		--	200	--	pF
C _{rss}	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

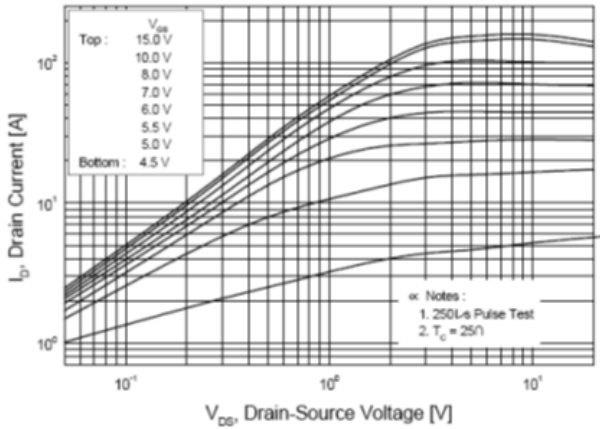


Figure 1. On-Region Characteristics

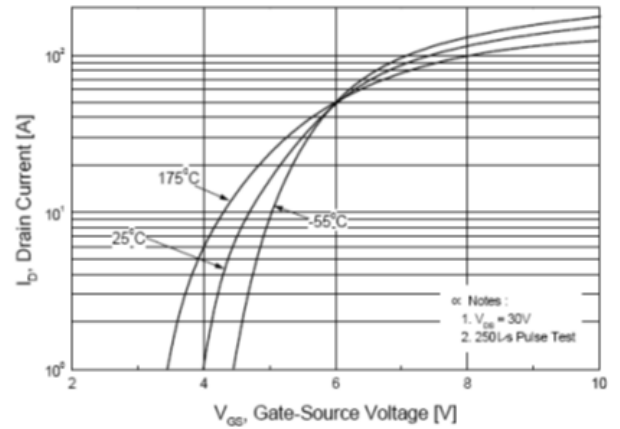


Figure 2. Transfer Characteristics

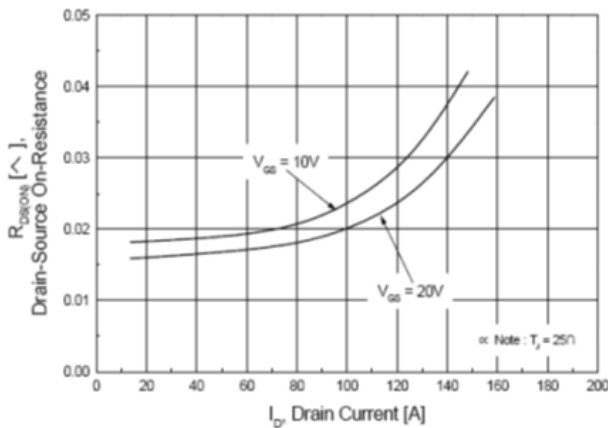


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

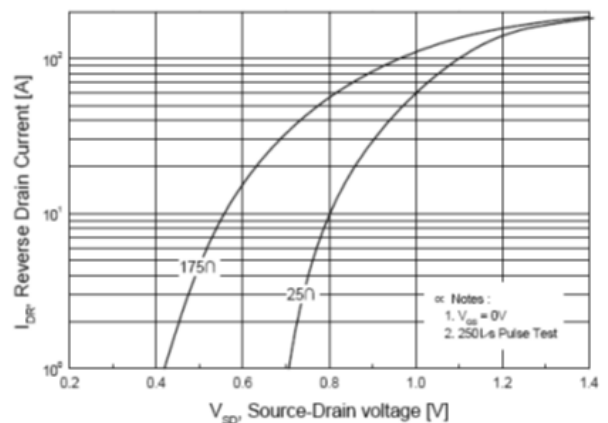


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

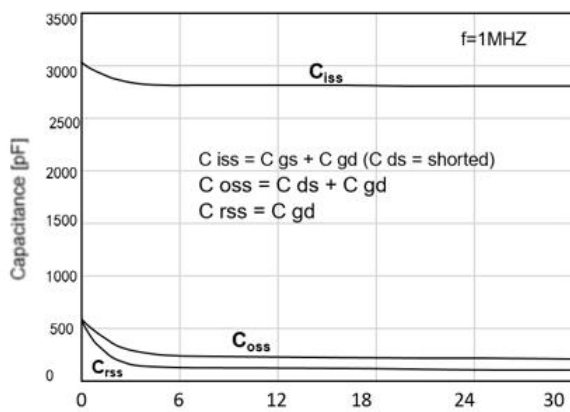


Figure 5. Capacitance Characteristics

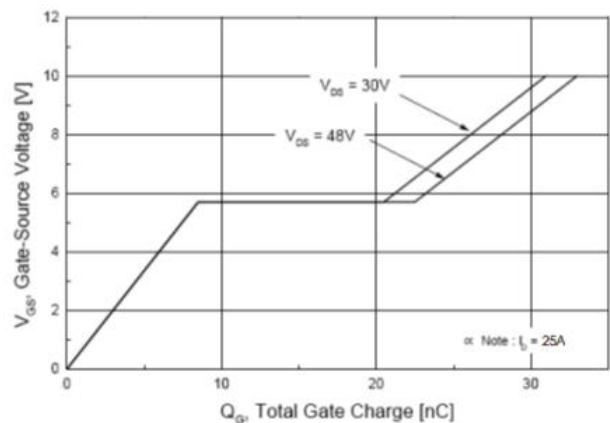


Figure 6. Gate Charge Characteristics

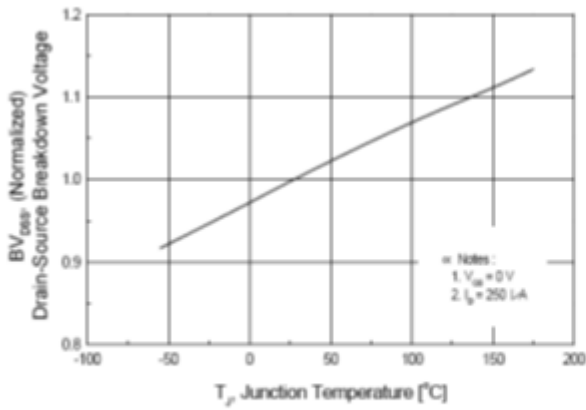


Figure 7. Breakdown Voltage Variation vs Temperature

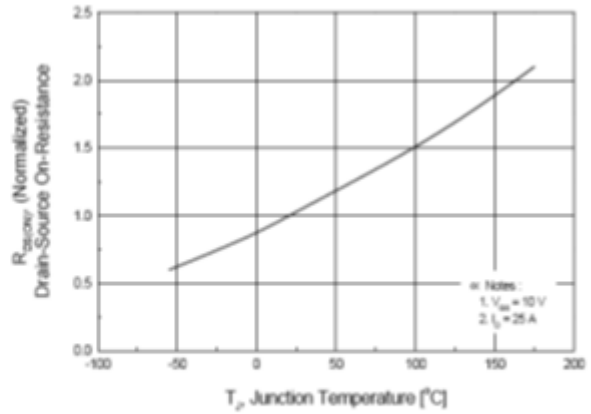


Figure 8. On-Resistance Variation vs Temperature

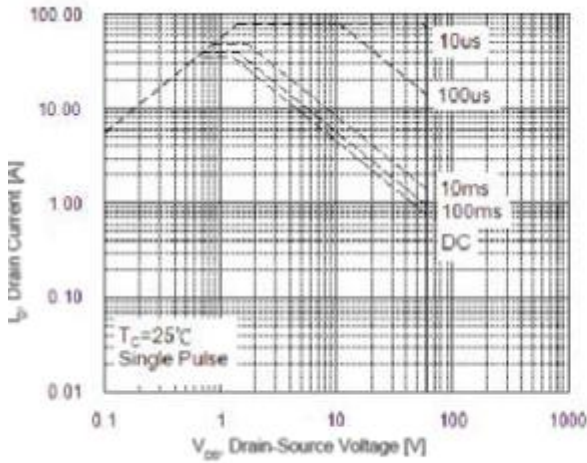


Figure 9. Maximum Safe Operating Area

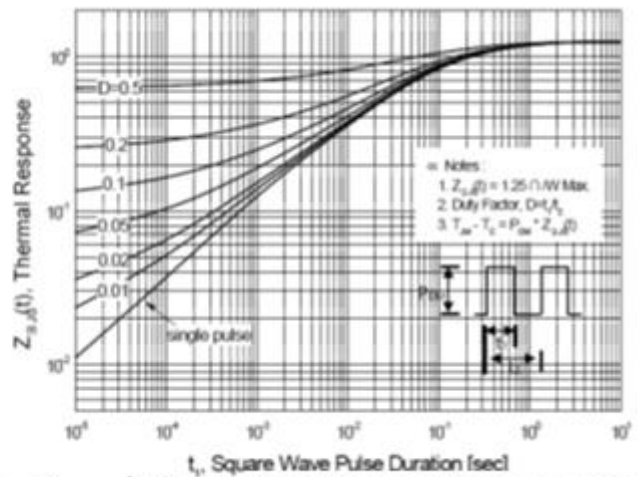
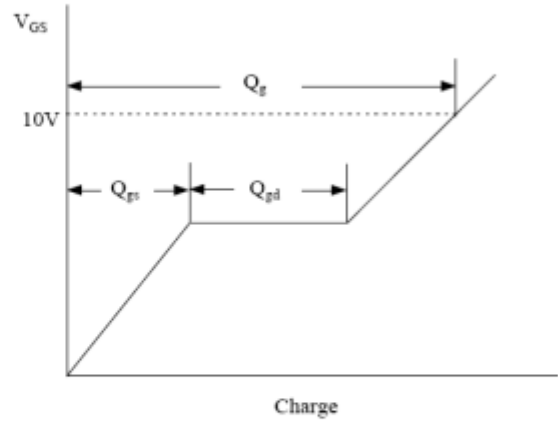
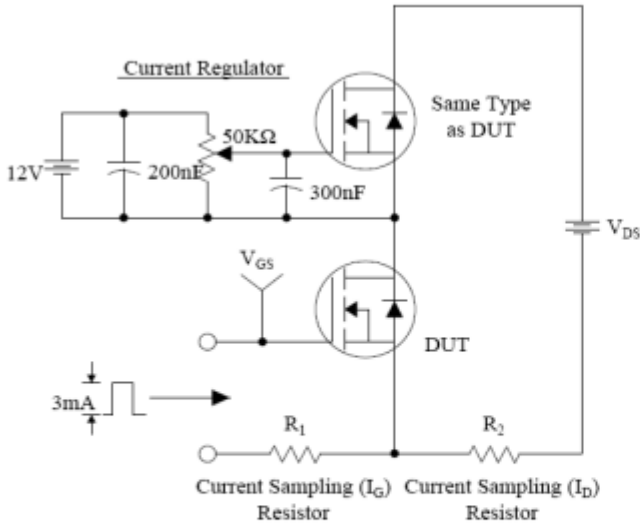


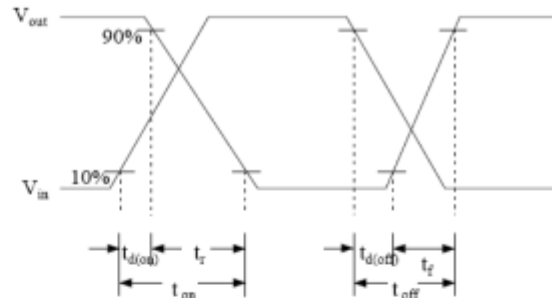
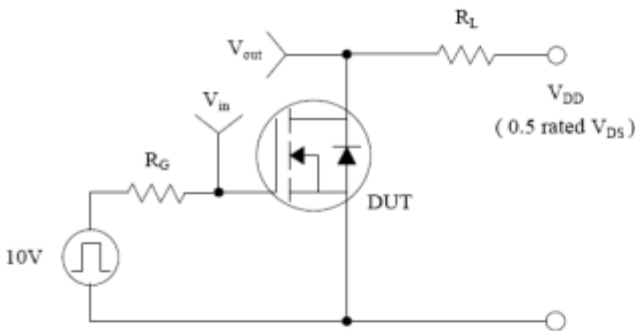
Figure 10. Transient Thermal Response Curve

9. Test Circuits and Waveforms

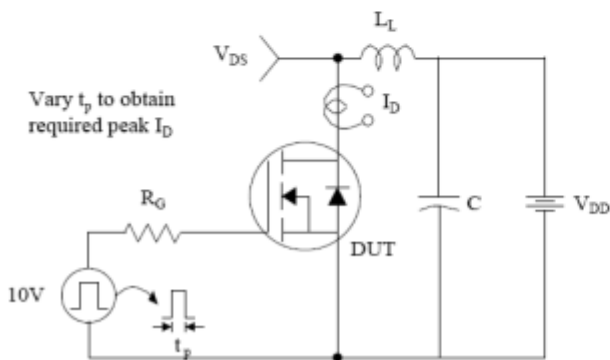
Gate Charge Test Circuit & Waveform



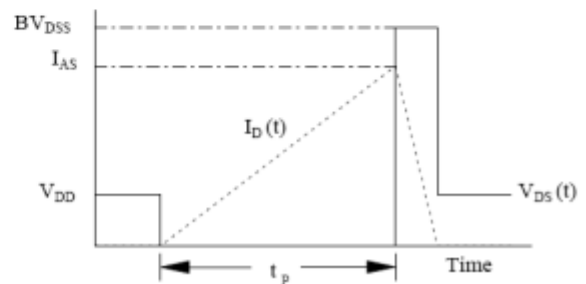
Resistive Switching Test Circuit & Waveforms



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

