1. Description

This power MOSFET is produced with advanced technology of KIA.This technology enable the power MOSFET to have better characteristics, including fast switching time, low on resistance, low gate charge and especially excellent avalanche characteristics.

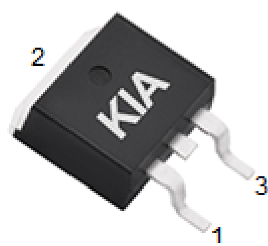
2. Features

- $R_{DS(on)Typ}$=4.6mΩ @ V_{GS}=10V
- Low gate charge (typical 148nC)
- High ruggedness
- 100% avalanche tested
- Improved dv/dt capability

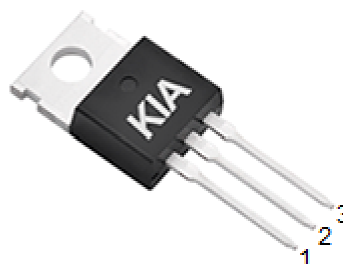
3. Application

- Synchronous Rectification
- Li Battery Protect Board
- Inverter

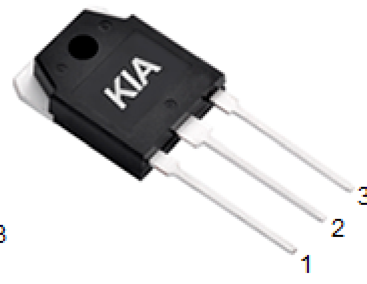
4. Pin configuration



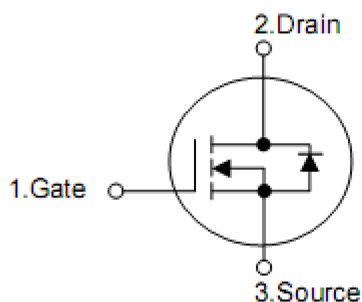
TO-263



TO-220



TO-3P



Pin	Function
1	Gate
2	Drain
3	Source

5. Ordering Information

Part Number	Package	Brand
KNP2906B	TO-220	KIA
KNB2906B	TO-263	KIA
KNH2906B	TO-3P	KIA

6. Absolute maximum ratings

T_C=25℃ unless otherwise specified

Parameter		Symbol	Ratings		Units
			TO-220,TO-263	TO-3P	
Drain-Source Voltage		V_{DSS}	60		V
Drain Current	T_C=25°C	I_D	130*		A
	T_C=100°C	I_D	91*		A
Drain Current Pulsed [1)]		I_{DM}	580		A
Gate-Source Voltage		V_{GSS}	±20		V
Single Pulsed Avalanche Energy [2)]		EAS	506		mJ
Repetitive Avalanche Energy [1)]		E_{AR}	50		mJ
Peak Diode Recovery dv/dt [3)]		dv/dt	5		V/ns
Power Dissipation	T_C=25°C	P_D	195.3	312.5	W
	Derating factor above 25°C	P_D	1.56	2.5	W/°C
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150		°C
Maximum lead temperature for soldering purposes, 1/8 from case for 5 seconds		T_L	300		°C

* Drain current is limited by junction temperature.

7. Thermal characteristics

Parameter	Symbol	Ratings		Unit
		TO-220,TO-263	TO-3P	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.64	0.4	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	45	35	°C/W

8. Electrical characteristics

(T_J=25°C,unless otherwise notes)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250uA	60	-	-	V
Breakdown Voltage Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	I_D=250uA, Referenced to 25°C	-	0.05	-	V/℃
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=68V,V_{GS}=0V	-	-	1	uA
		V_{DS}=54V,T_J=125°C	-	-	50	uA
Gate-Body Leakage Current, Forward	I_{GSSF}	V_{GS}=20V,V_{DS}=0V	-	-	100	nA
Gate-Body Leakage Current, Reverse	I_{GSSR}	V_{GS}=-20V,V_{DS}=0V	-	-	-100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	2	-	4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=30A,T_J=25°C	-	4.6	5.4	mΩ
		V_{GS}=10V,I_D=30A,T_J=125°C	-	7.5	-	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=30A	--	64	-	S
Input Capacitance	Ciss	V_{DS}=34V,V_{GS}=0V, f=1.0MHz	-	6564	-	pF
Output Capacitance	Coss		-	553	-	pF
Reverse Transfer Capacitance	Crss		-	396	-	pF
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=34V,I_D=30A, R_G=4.7Ω,V_{GS}=10V 4),5)	-	35	-	ns
Turn-On Rise Time	t_r		-	78	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	135	-	ns
Turn-Off Fall Time	t_f		-	60	-	ns
Total Gate Charge	Q_g	V_{DS}=54V,I_D=30A, V_{GS}=10V,I_G=5mA 4),5)	-	148	-	nC
Gate-Source Charge	Q_{gs}		-	32	-	nC
Gate-Drain Charge	Q_{gd}		-	53	-	nC
Gate resistance	Rg	V_{DS}=0V, Scan F mode	-	3.2	-	Ω
Maximum Continuous Drain-Source Diode Forward Current	I_S	Integral reverse p-n Junction diode in the MOSFET	-	-	145	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	580	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=45A	-	-	1.4	V
Reverse Recovery Time	t_{rr}	V_{GS}=0V,I_S=30A, dI_F/dt=100A/us	-	42	-	ns
Reverse Recovery Charge	Q_{rr}		-	64	-	nC

Note：
1. Repeatitive rating: pulse width limited by junction temperature.
2. L=0.5mH, I_{AS}=45A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
3. I_{SD}≤30A, di/dt=100A/us, V_{DD}≤BV_{DSS}, Staring T_J=25°C
4. Pulse Test: Pulse Width≤300us, duty cycle≤2%.
5. Essentially independent of operating temperature.

9. Typical Characteristics

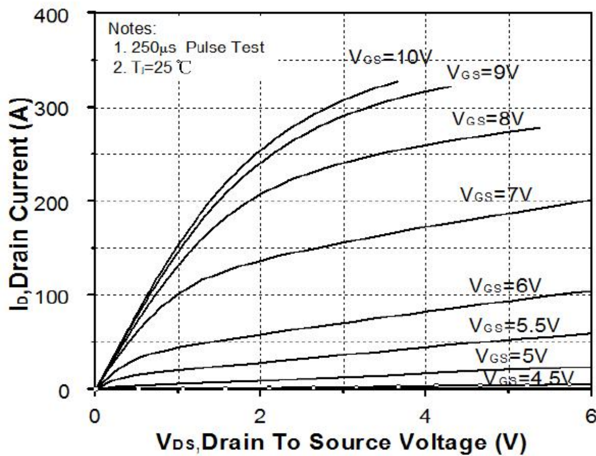


Fig. 1. On-state characteristics

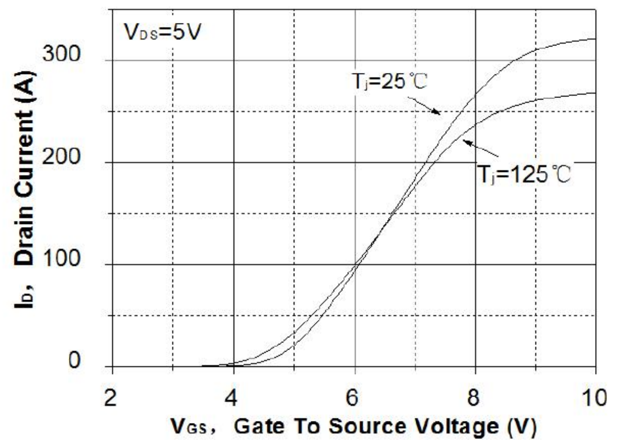


Fig. 2. Transfer Characteristics

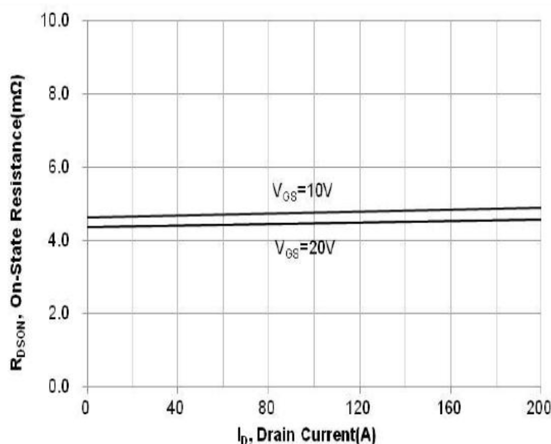


Fig. 3. On-resistance variation vs. drain current and gate voltage

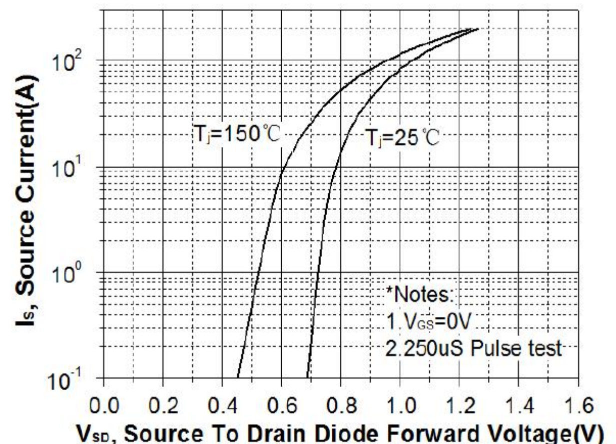


Fig.4. On-state current vs. diode forward voltage

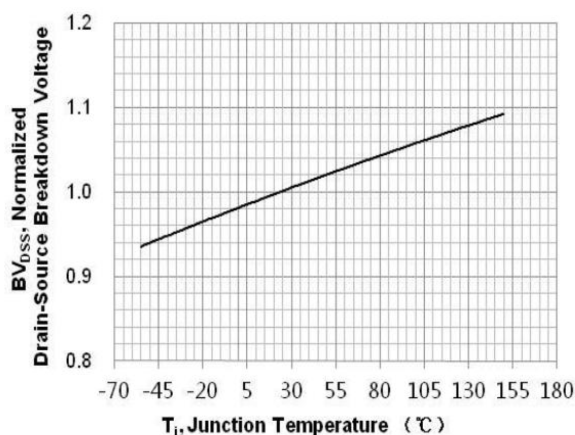


Fig.5. Breakdown voltage variation vs. junction temperature

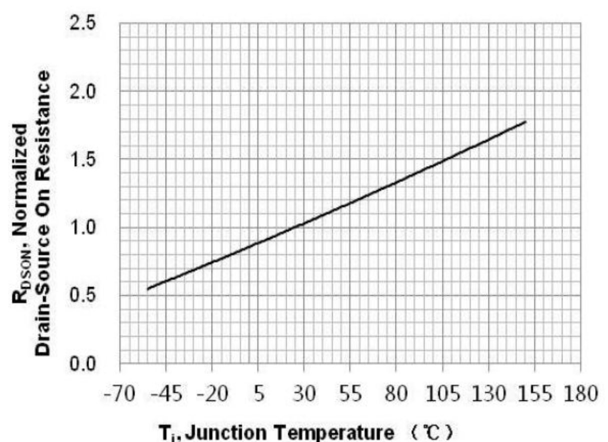


Fig. 6. On-resistance variation vs. junction temperature

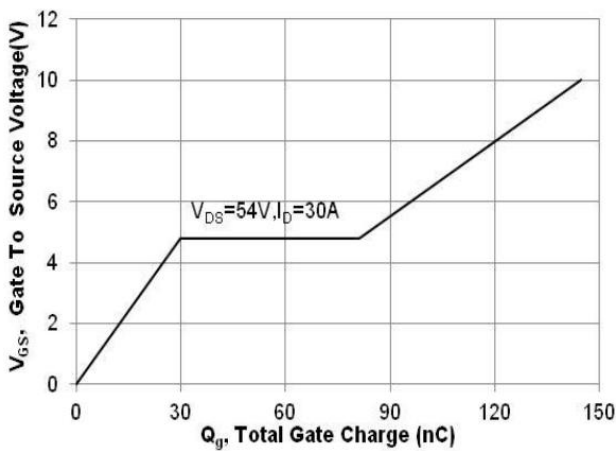


Fig. 7. Gate charge characteristics

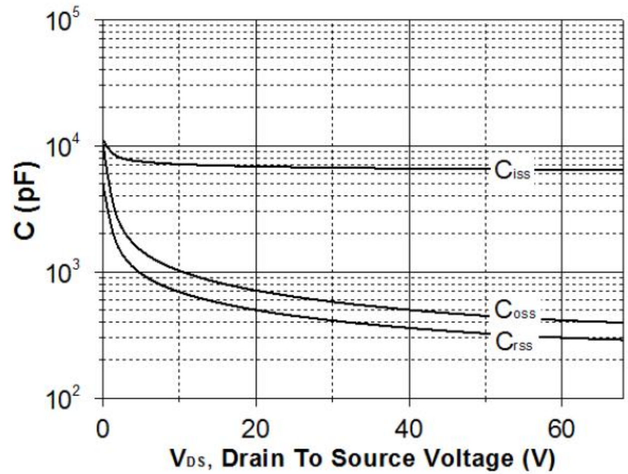


Fig. 8. Capacitance Characteristics

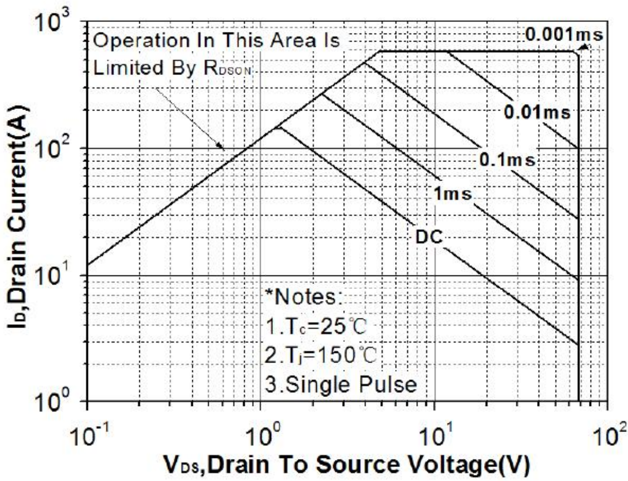


Fig. 9. Maximum safe operating area (TO220&TO263)

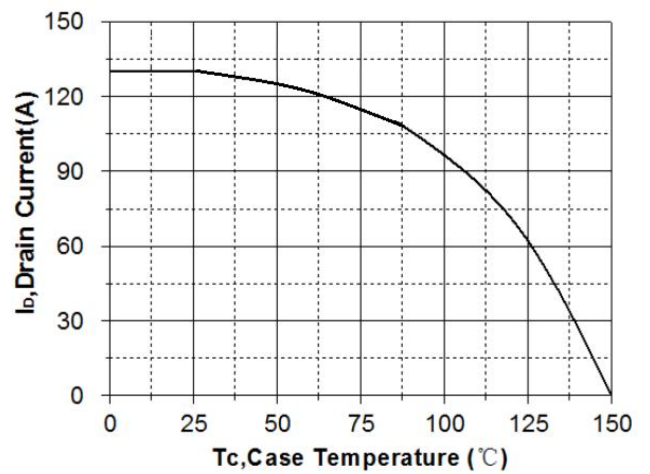


Fig.10. Maximum drain current vs.case temperature (TO220&TO263)

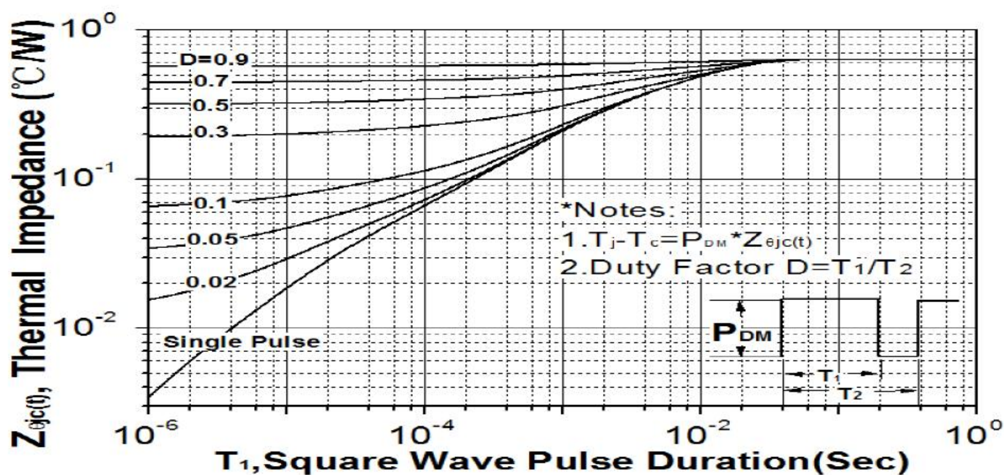
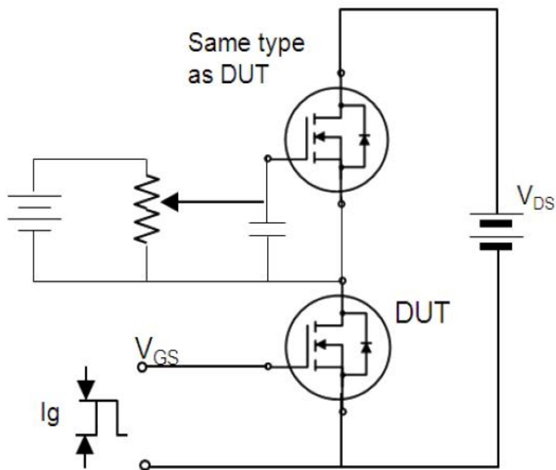


Fig.11. Transient thermal response curve(TO220&TO263)

10. Test Circuits and Waveforms



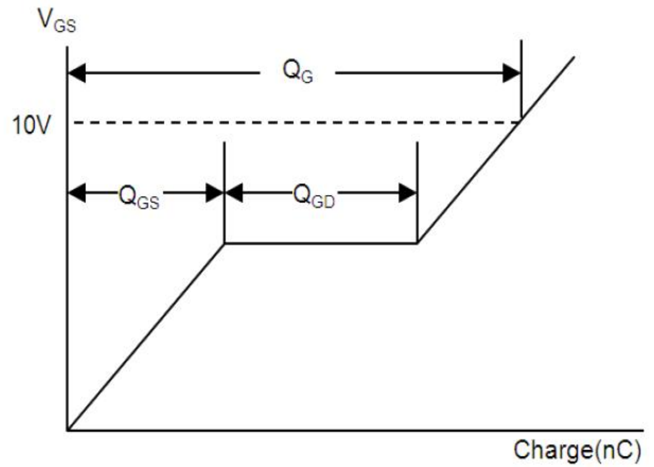
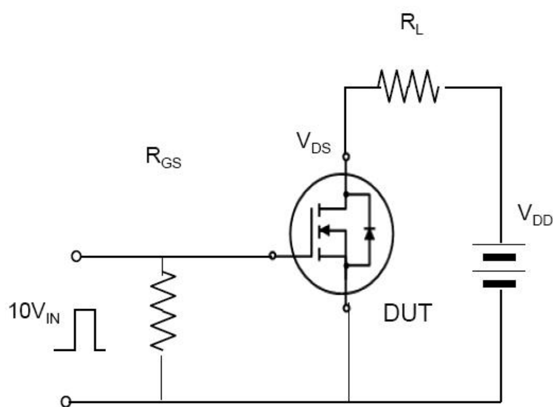


Fig. 12. Gate charge test circuit & waveform



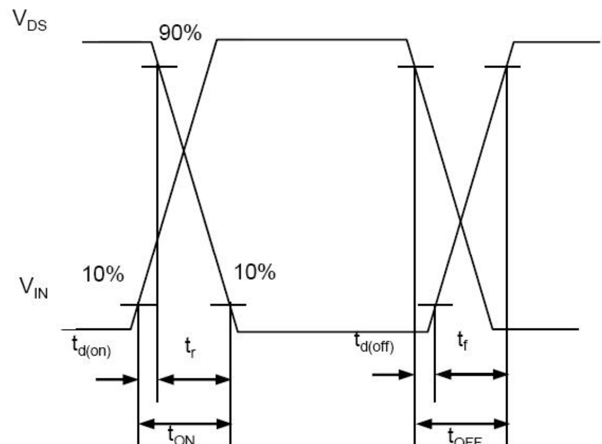
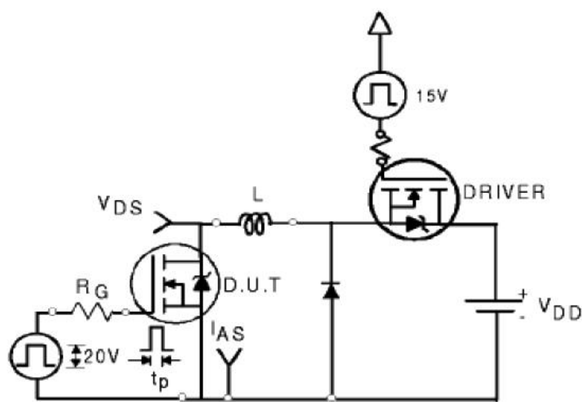


Fig. 13. Switching time test circuit & waveform



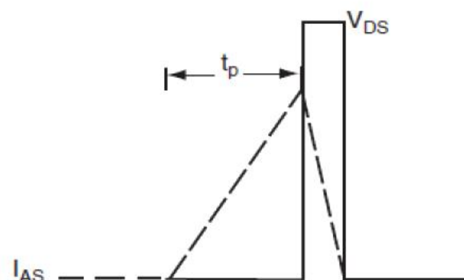


Fig. 14. Unclamped Inductive switching test circuit & waveform

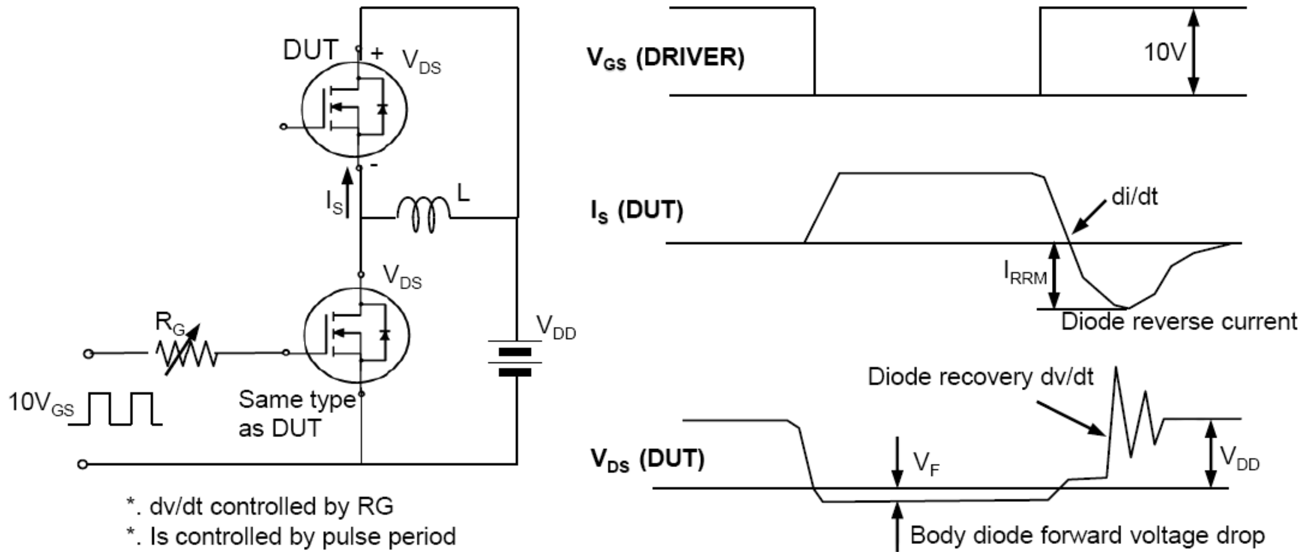


Fig. 15. Peak diode recovery dv/dt test circuit & waveform