

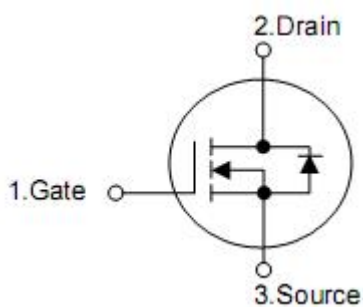
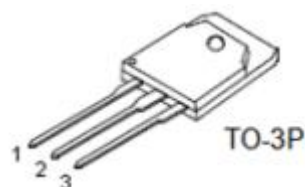
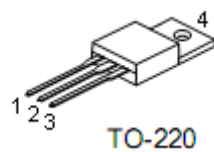
1. Features

- n Proprietary New Planar Technology
- n $R_{DS(ON)}=50m\ \Omega_{(typ.)}@V_{GS}=10V$
- n Low Gate Charge Minimize Switching Loss
- n Fast Recovery Body Diode

2. Application

- n DC-DC Converters
- n DC-AC Inverters for UPS
- n SMPS and Motor controls

3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Ordering Information

Part Number	Package	Brand
KNP9120A	TO-220	KIA
KNH9120A	TO-3P	KIA

5. Absolute maximum ratings

(T_C= 25°C , unless otherwise specified)

Parameter	Symbol	Rating		Units
		TO-220	TO-3P	
Drain-source voltage ^[1]	V _{DSS}	200		V
Gate-source voltage	V _{GSS}	±20		V
Continuous Drain Current	I _D	40		A
Continuous Drain Current @T _c =100°C	I _{D @ T_C=100°C}	Figure3		A
Pulsed Drain Current at V _{GS} =10V ^[2]	I _{DM}	Figure6		A
Avalanche energy	E _{AS}	1200		mJ
Single pulse				
Peak Diode Recovery dv/dt ^[3]	dv/dt ^[3]	5.0		V/ns
Power Dissipation	P _D	125	150	W
Derating Factor above 25 °C		1.0	1.2	
Maximum Temperature for Soldering Leads at 0.063in(1.6mm) form Case for 10 Seconds	T _L T _{PAK}	300 260		°C
Storage temperature	T _{STG}	-55~+150		°C

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

6. Thermal Characteristics

Symbol	Parameter	Rating		Unit
		TO-220	TO-3P	
R _{θJC}	Thermal Resistance, Junction-to-Case	1.0	0.83	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62		

7. Electrical characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics (T _J =25°C, unless otherwise specified)						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	200	-	-	V
Drain-to-Source Leakage Current	I _{DSS}	V _{DS} =200V, V _{GS} =0V	-	-	1	μA
		V _{DS} =160V, V _{GS} =0V T _J =125 °C	-	-	100	μA
Gate-to-source Leakage Current	I _{GSS}	V _{GS} =+20V, V _{DS} =0V	-	-	+100	nA
		V _{GS} =-20V, V _{DS} =0V	-	-	-100	nA
On characteristics (T _J =25°C, unless otherwise specified)						
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0	-	4.0	V
Static drain-source on-resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	50	65	mΩ
Forward Transconductance ^[4]	G _{FS}	V _{DS} =15V, I _D =20A	-	65	-	S
Dynamic characteristics (Essentially independent of operating temperature)						
Input capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz	-	2800	-	pF
Output capacitance	C _{OSS}		-	305	-	pF
Reverse transfer capacitance	C _{RSS}		-	110	-	pF
Turn-on delay time	t _{D(ON)}	V _{DD} =100V, I _D =20A, R _G =3.9Ω, V _{GS} =10V	-	20	-	ns
Rise time	t _R		-	30	-	ns
Turn-off delay time	t _{D(OFF)}		-	65	-	ns
Fall time	t _F		-	25	-	ns
Switching characteristics (Essentially independent of operating temperature)						
Total gate charge	Q _G	V _{DD} =100V, I _D =20A V _{GS} =0 to 10V	-	97	-	nC
Gate-source charge	Q _{GS}		-	14	-	nC
Gate-drain charge	Q _{GD}		-	39	-	nC
Switching characteristics (T _J =25°C, unless otherwise specified)						
Drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.5	V
Continuous drain-source current ^[4]	I _{SD}	Integral PN-diode in MOSFET	-	-	40	A
Pulsed drain-source current ^[4]	I _{SM}		-	-	160	A
Reverse recovery time	t _{rr}	V _{GS} =0V, I _F =20A	-	280	-	ns
Reverse recovery charge	Q _{rr}	di _F /dt=100A/μs	-	420	-	μC

NOTE:[1] T_J=+25°C to +150°C ;

[2] Repetitive rating; pulse width limited by maximum junction temperature;

[3] I_{SD}= 20A di/dt < 100 A/μs, V_{DD} < BV_{DSS}, T_J=+150°C;

[4] Pulse width≤380μs; duty cycle≤2%.

8. Test circuits and waveforms

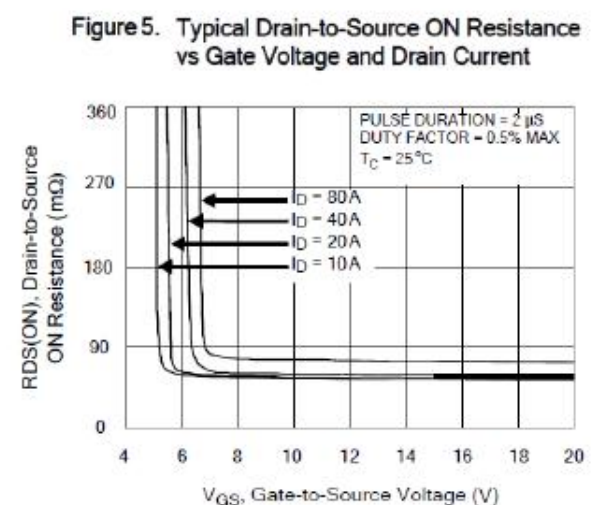
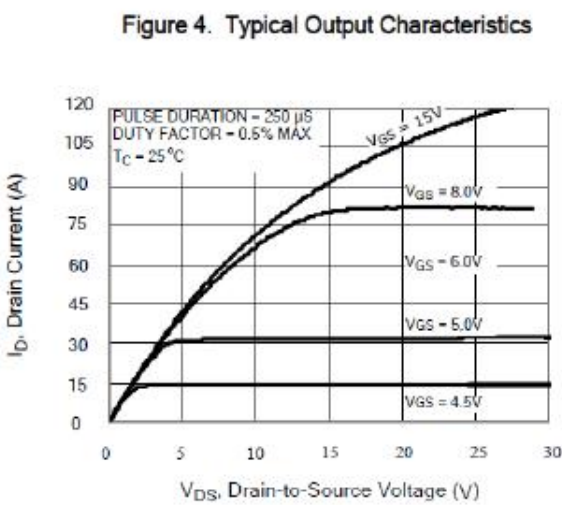
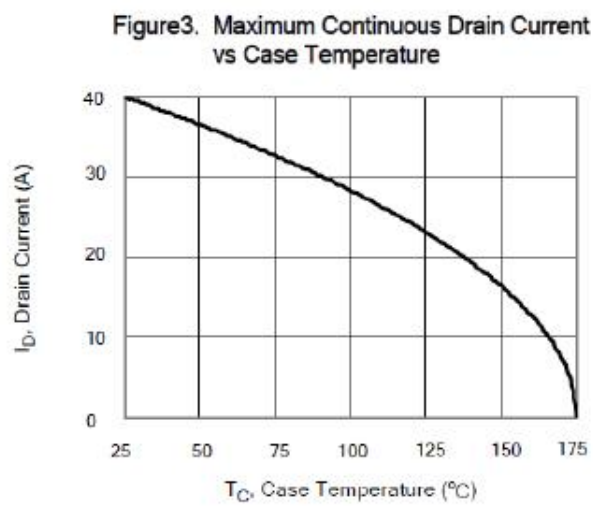
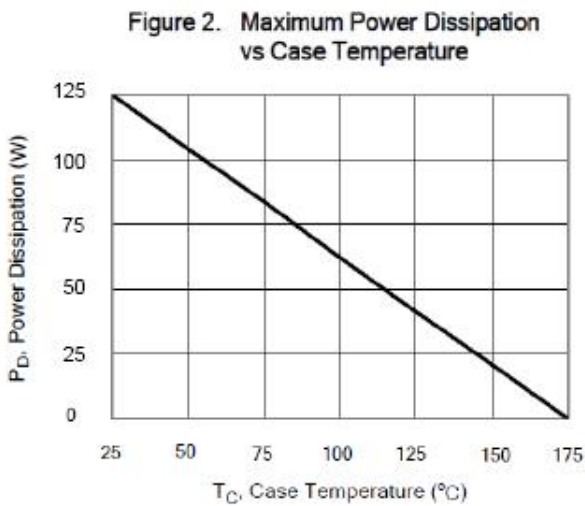
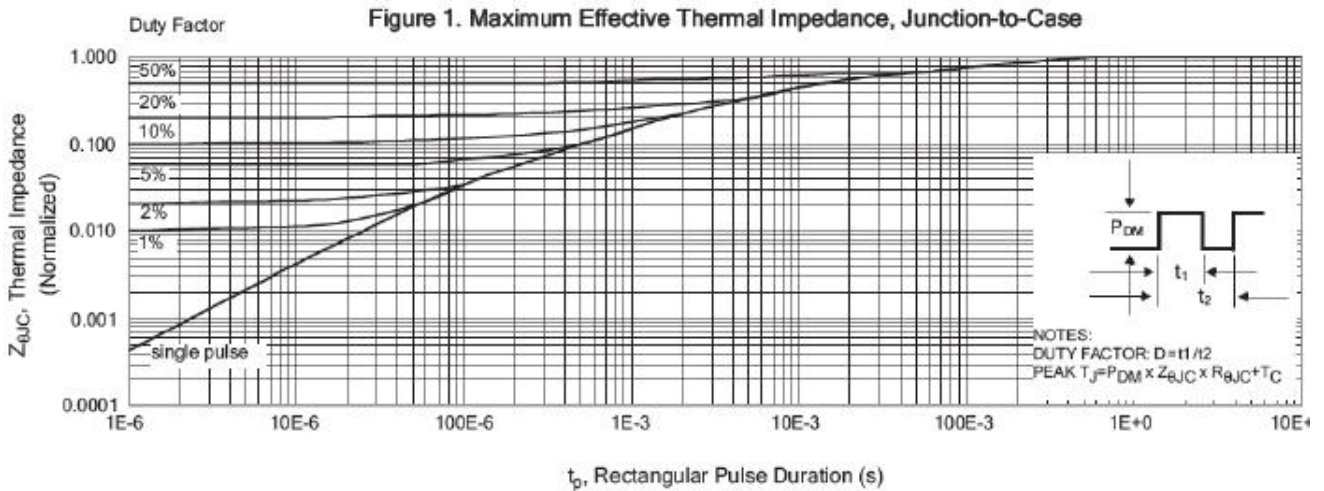


Figure 6. Maximum Peak Current Capability

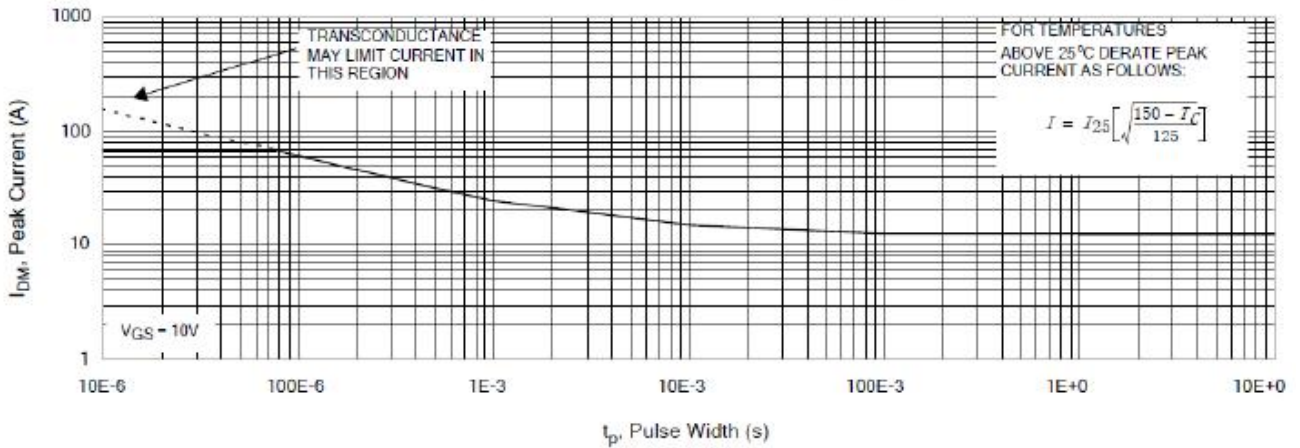


Figure 7. Typical Transfer Characteristics

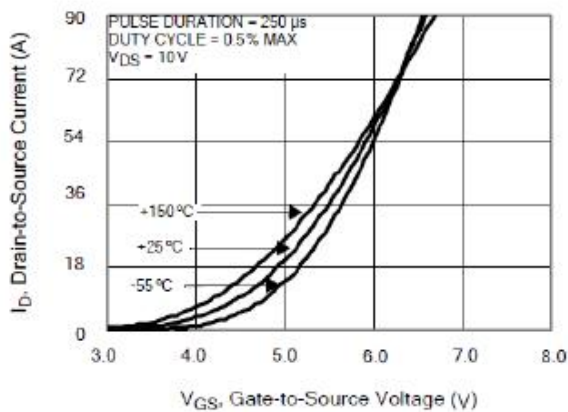


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

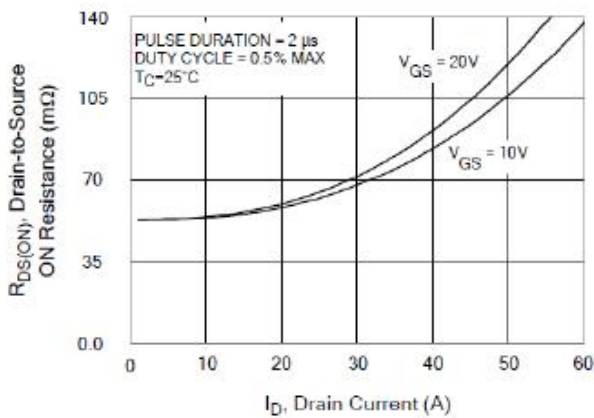


Figure 8. Unclamped Inductive Switching Capability

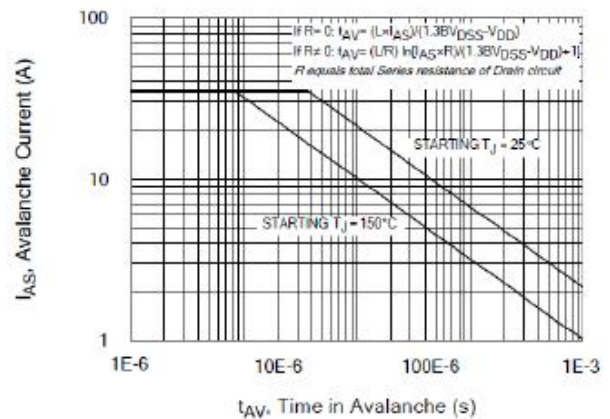


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

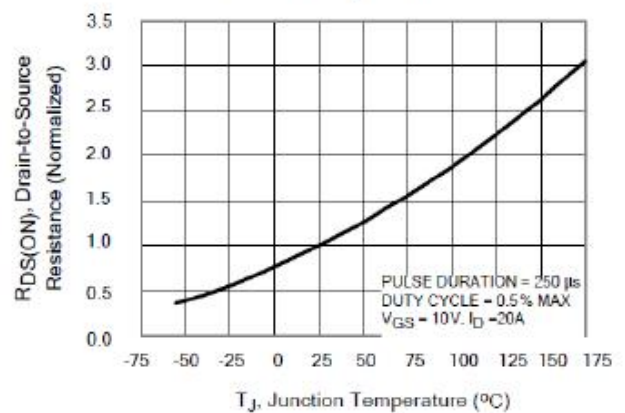


Figure 11. Typical Breakdown Voltage vs Junction Temperature

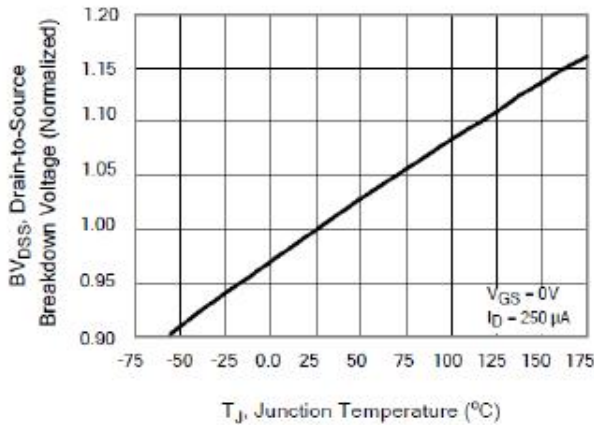


Figure 12. Typical Threshold Voltage vs Junction Temperature

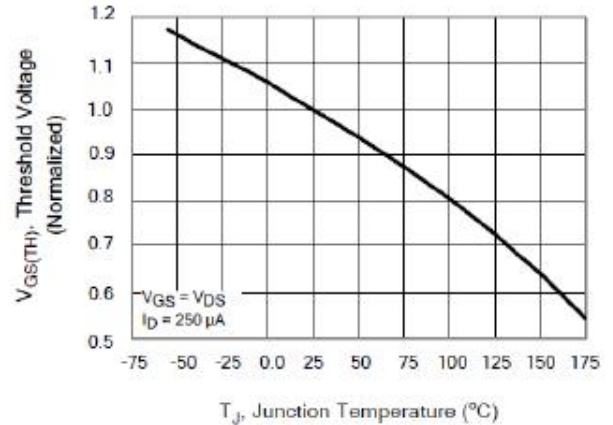


Figure 13. Maximum Forward Bias Safe Operating Area

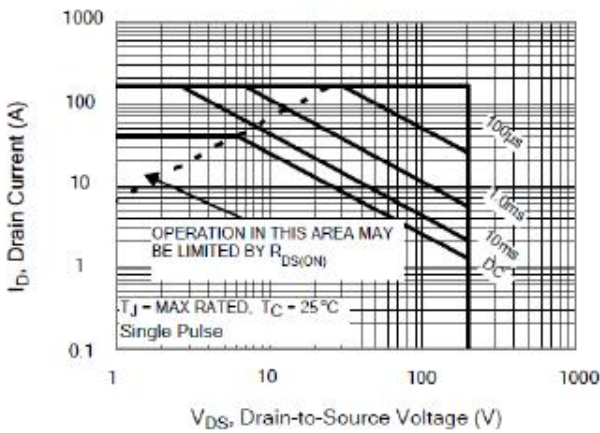


Figure 14. Typical Capacitance vs Drain-to-Source Voltage

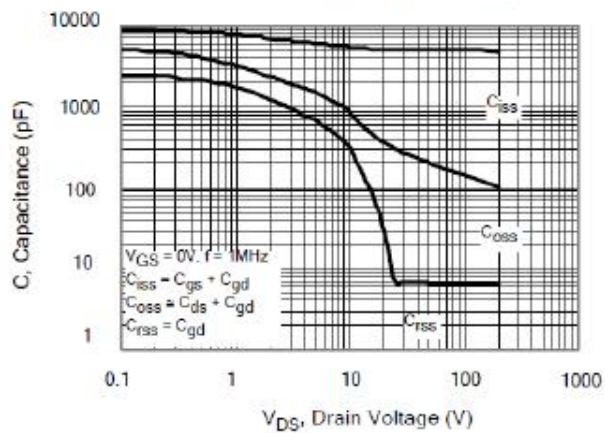


Figure 15. Typical Gate Charge

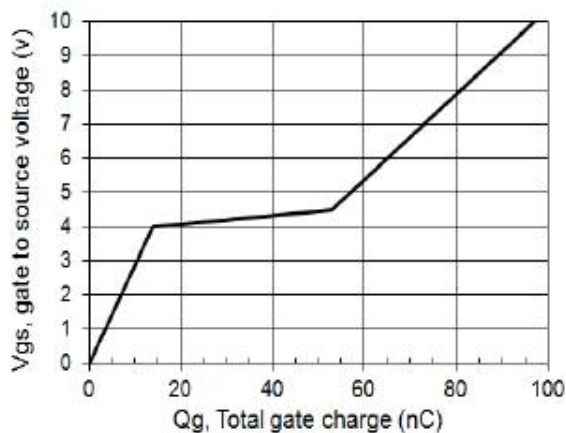
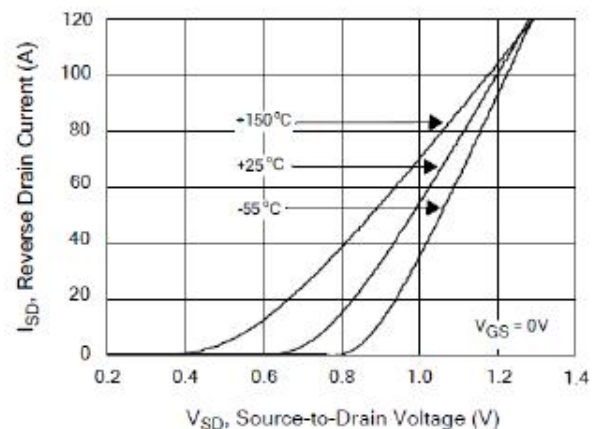


Figure 16. Typical Body Diode Transfer Characteristics



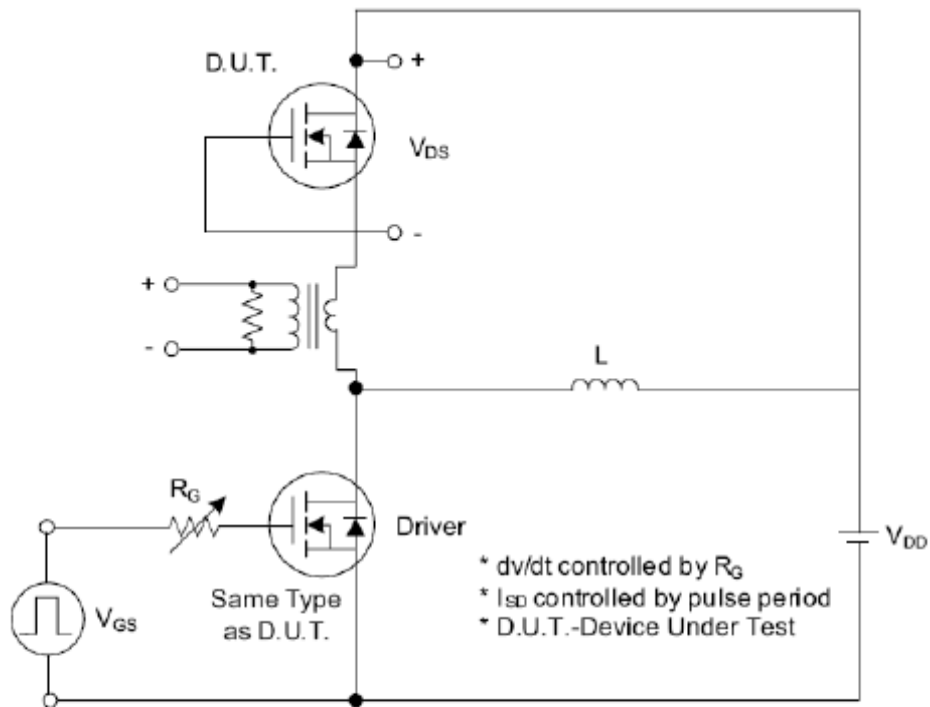


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

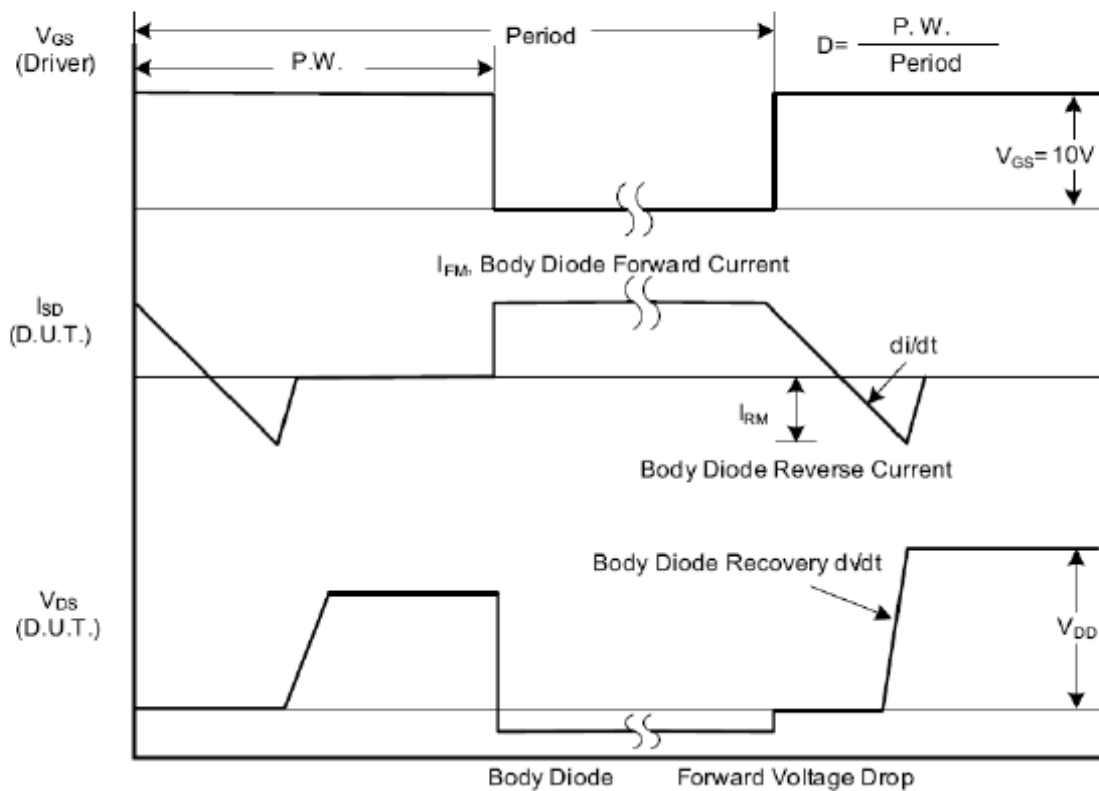


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

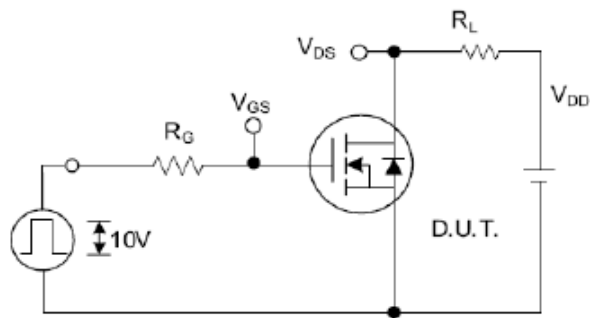


Fig. 2.1 Switching Test Circuit

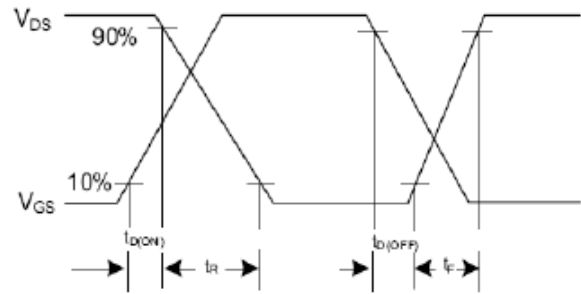


Fig. 2.2 Switching Waveforms

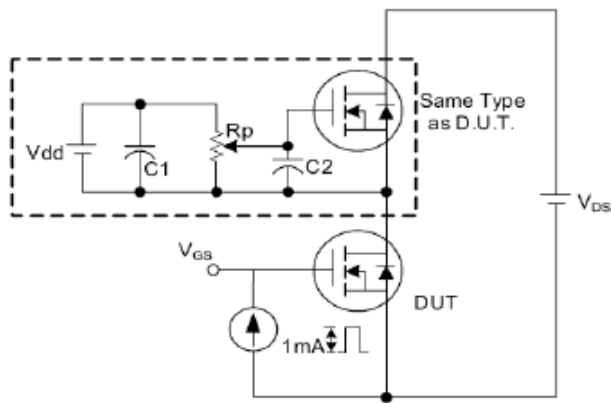


Fig. 3.1 Gate Charge Test Circuit

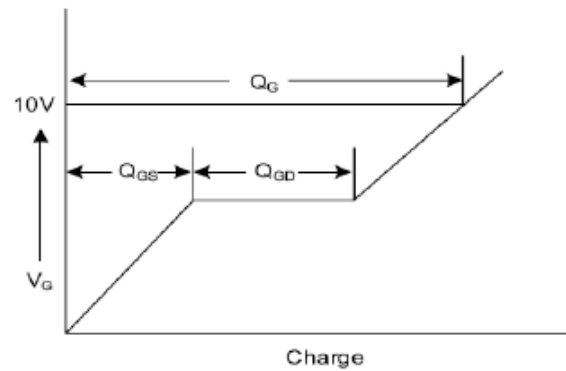


Fig. 3.2 Gate Charge Waveform

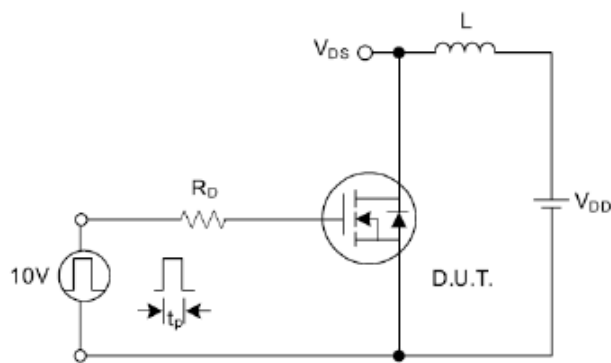


Fig. 4.1 Unclamped Inductive Switching Test Circuit

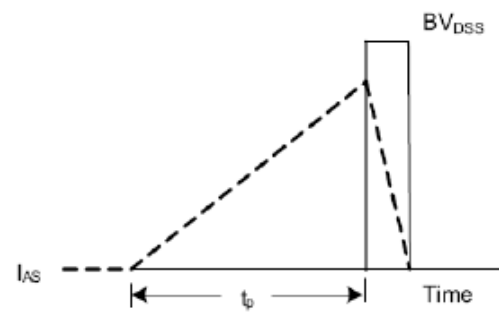


Fig. 4.2 Unclamped Inductive Switching Waveforms