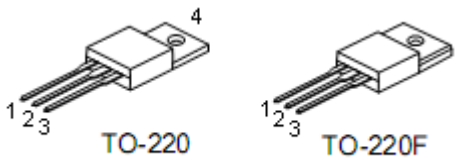
1. General Features

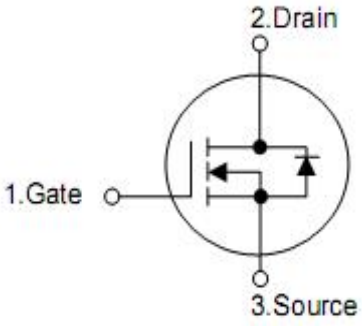
- RoHS Compliant
- $R_{DS(ON),typ.}$=0.8Ω@V_{GS}=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

2. Applications

- Adaptor
- Charger
- SMPS Standby Power

3. Pin configuration





Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Ordering Information

Part Number	Package	Brand
KNP4540A	TO-220	KIA
KNF4540A	TO-220F	KIA

5. Absolute maximum ratings

(T_C= 25 ºC , unless otherwise specified)

Symbol	Parameter	KNP4540A	KNF4540A	Unit
V_{DSS}	Drain-to-Source Voltage	400		V
V_{GSS}	Gate-to-Source Voltage	±30		
I_D	Continuous Drain Current	6.0		A
I_{DM}	Pulsed Drain Current at V_{GS}=10V	24		
E_{AS}	Single Pulse Avalanche Energy	200		mJ
P_D	Power Dissipation	75	25	W
	Derating Factor above 25 ºC	0.6	0.2	W/ ºC
T_L T_{PAK}	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds	300 260		ºC
T_J&T_{STG}	Operating and Storage Temperature Range	-55 to 150		

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

6. Thermal characteristics

Symbol	Parameter	KNP4540A	KNF4540A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.67	5.0	ºC /W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	100	

6. Electrical characteristics

OFF Characteristics		(TJ=25°C,unless otherwise specified)				
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-to-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	400	--	--	V
I_{DSS}	Drain-to-Source Leakage Current	V_{DS}=400V, V_{GS}=0V	--	--	1	uA
		V_{DS}=320V,V_{GS}=0V, T_J=125°C	--	--	100	
I_{GSS}	Gate-to-Source Leakage Current	V_{GS}=+20V,V_{DS}=0V	--	--	+1.0	uA
		V_{GS}=-20V, V_{DS}=0V	--	--	-1.0	
ON Characteristics		(TJ=25°C,unless otherwise specified)				
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	V_{GS}=10V, I_D=3.0A	--	0.8	1.0	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	2.0	--	4.0	V
g_{FS}	Forward Transconductance	V_{DS}=15V,I_D=3A	--	5.0	--	S
Dynamic Characteristics		Essentially independent of operating temperature				
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1.0MHZ	--	490	--	pF
C_{rss}	Reverse Transfer Capacitance		--	7.5	--	
C_{oss}	Output Capacitance		--	63	--	
Q_g	Total Gate Charge	V_{DD}=200V, I_D=6A, V_{GS}=0 to 10V	--	14	--	nC
Q_{gs}	Gate-to-Source Charge		--	3.1	--	
Q_{gd}	Gate-to-Drain (Miller) Charge		--	6.4	--	
Resistive Switching Characteristics		Essentially independent of operating temperature				
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=200V, I_D=6A, V_{GS}= 10V R_G=9.1Ω	--	8.1	--	nS
t_{rise}	Rise Time		--	10.2	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	26	--	
t_{fall}	Fall Time		--	14	--	
Source-Drain Body Diode Characteristics		(T_J=25°C,unless otherwise specified)				
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Unit
I_{SD}	Continuous Source Current[2]	Integral PN-diode in MOSFET	--	--	6.0	A
I_{SM}	Pulsed Source Current[2]		--	--	24	
V_{SD}	Diode Forward Voltage	I_S=30A, V_{GS}=0V	--	--	1.5	V
t_{rr}	Reverse recovery time	V_{GS}=0V ,I_F=6A, diF/dt=100A/μs	--	305	--	ns
Q_{rr}	Reverse recovery charge		--	840	--	uC

Note:
1.T_J=+25°C to +150°C
2.Pulse width≤380μs; duty cycle≤2%.

7. Test circuits and waveforms

Figure 1. Maximun Forward Bias Safe Operating Area

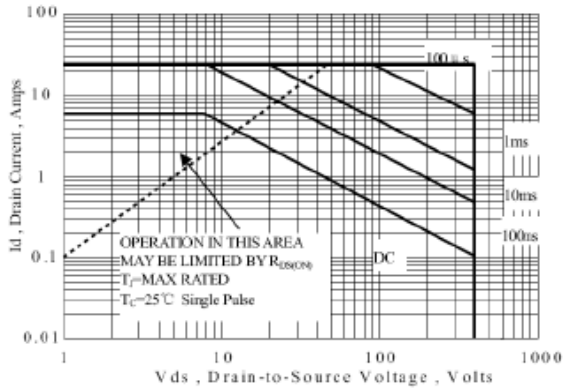


Figure 2. Maximun Power Dissipation vs Case Temperature

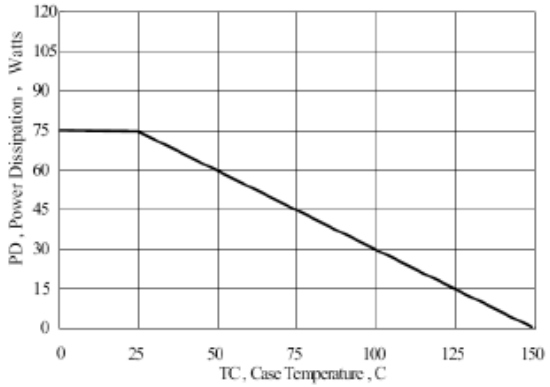


Figure 3. Maximum Continuous Drain Current vs Case Temperature

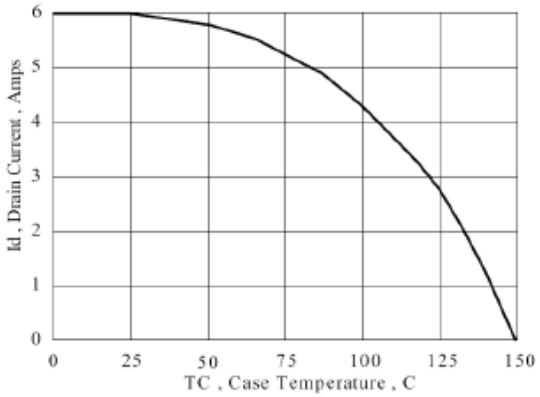


Figure 4. Typical Output Characteristics

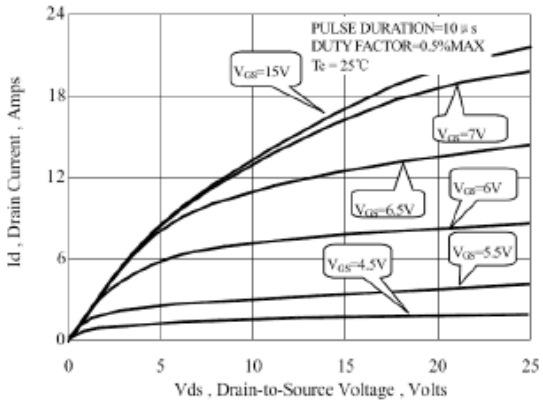


Figure 5. Maximum Effective Thermal Impendance , Junction to Case

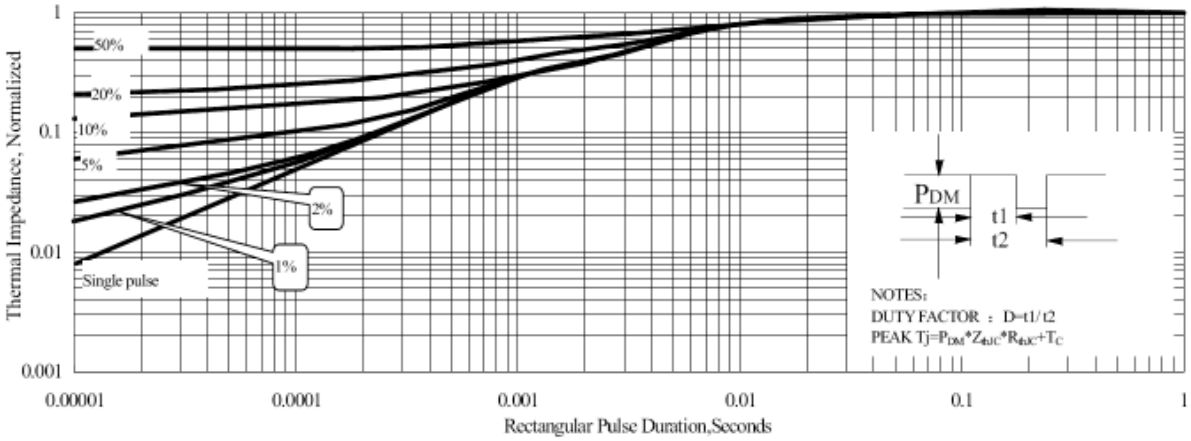


Figure 6. MaximunPeak Current Capability

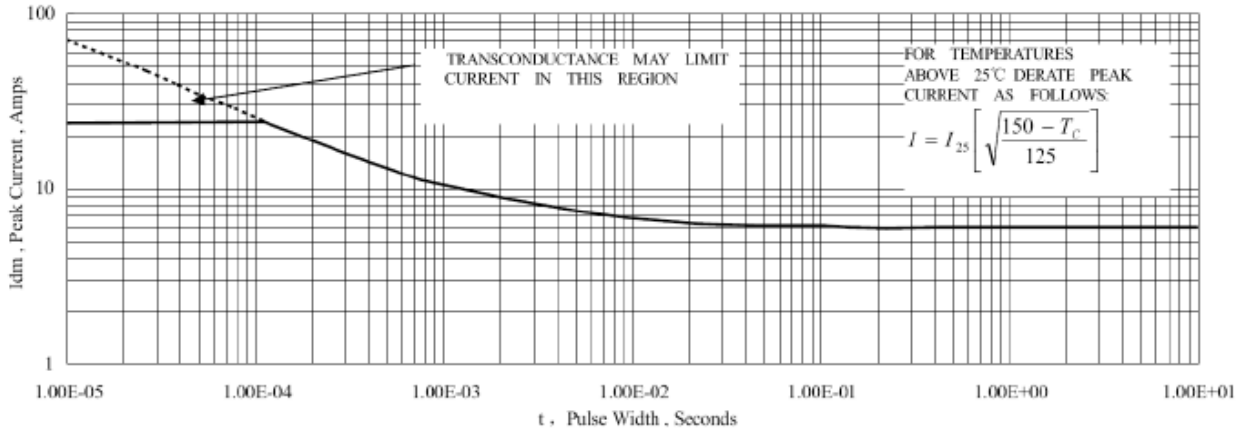


Figure 7. Typical Transfer Characteristics

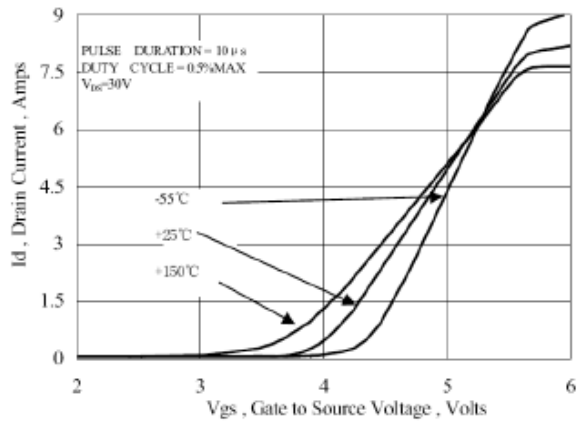


Figure .8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

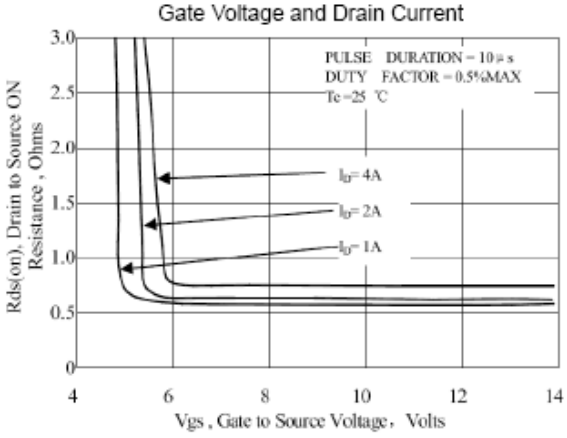


Figure 9. Typical Drain to Source ON Resistance vs Drain Current

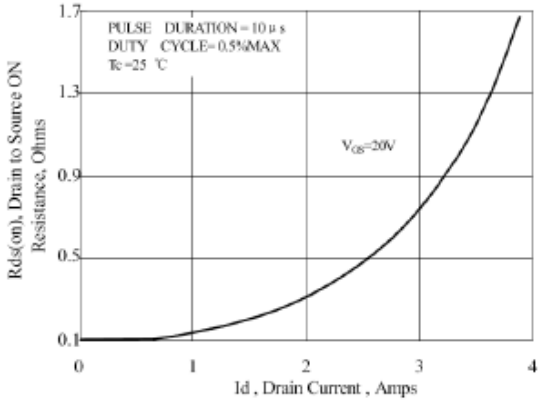


Figure 10. Typical Drian to Source on Resistance vs Junction Temperature

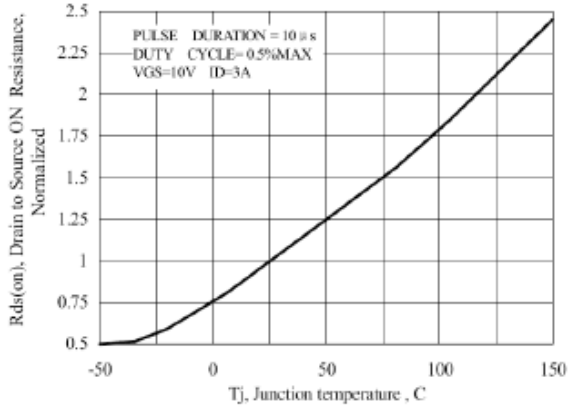


Figure 11. Typical Theshold Voltage vs Junction Temperature

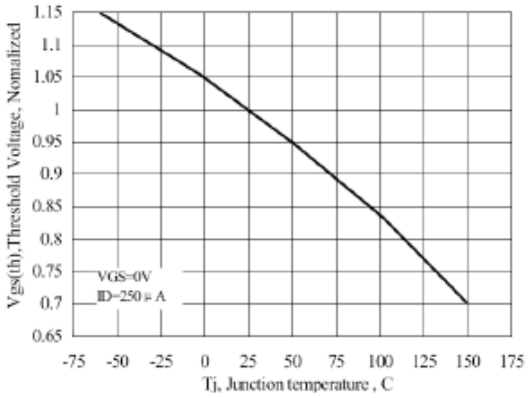


Figure 1.2 Typical Breakdown Voltage vs Junction Temperature

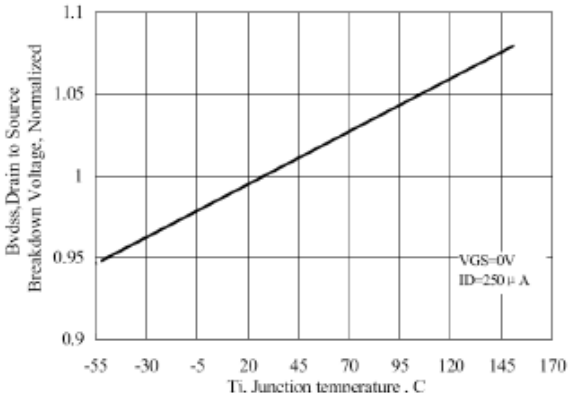


Figure 13. Typical Capacitance vs Drain to Source Voltage

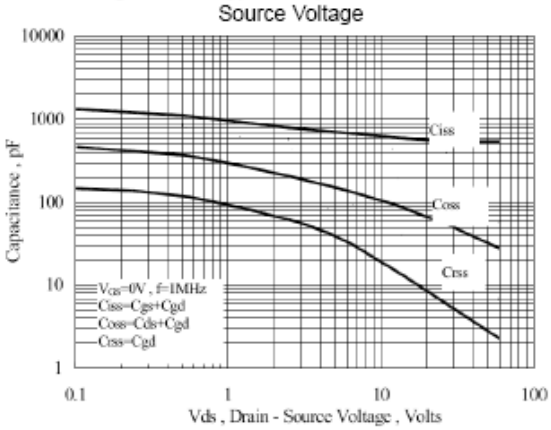


Figure 14. Typical Gate Charge vs Gate to Source Voltage

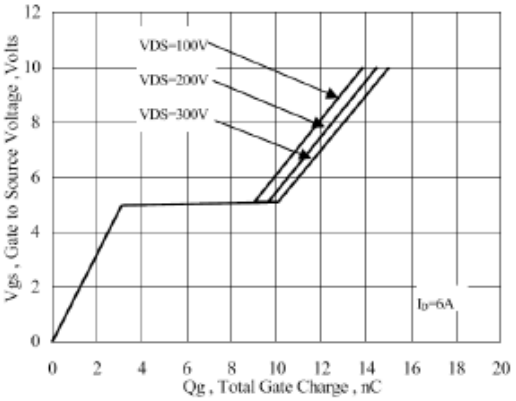


Figure 15. Typical Body Diode Transfer Characteristics

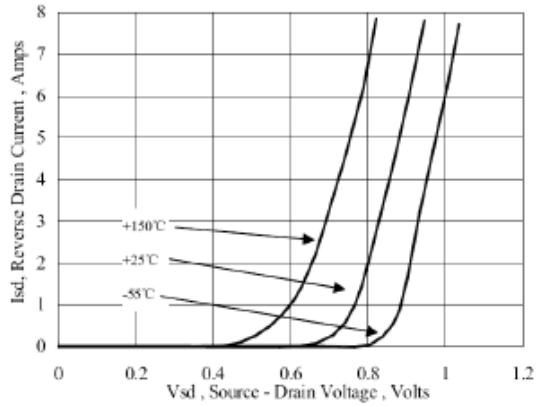
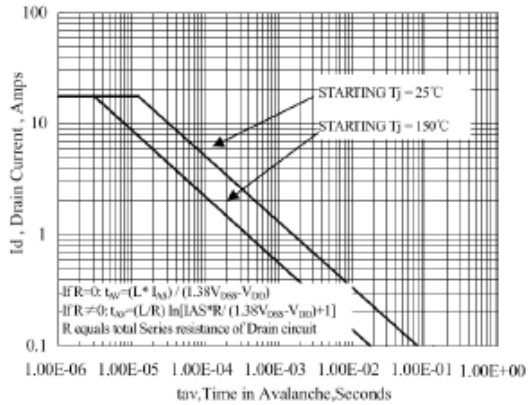


Figure 16. Unclamped Inductive Switching Capability



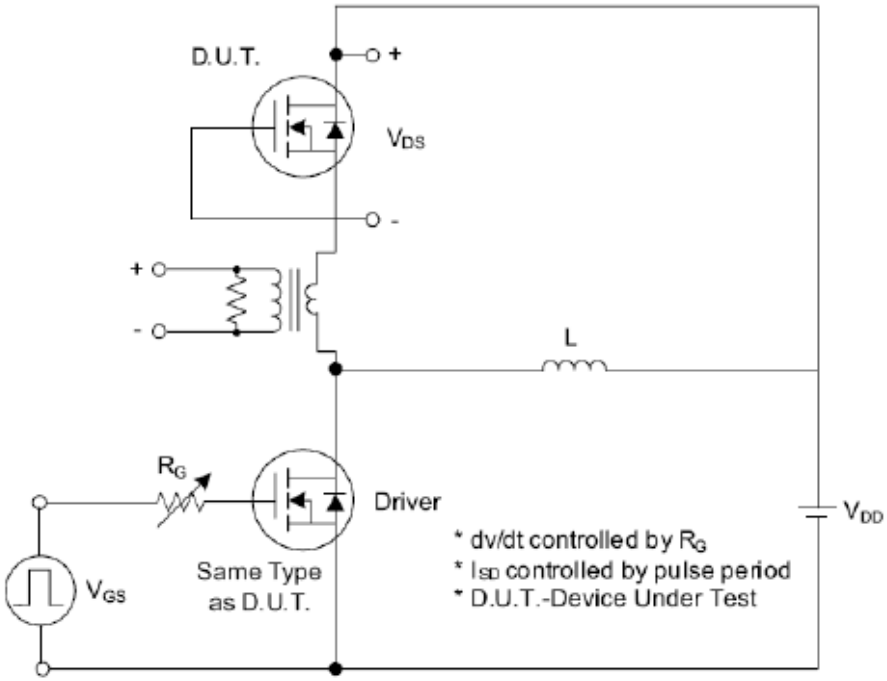


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

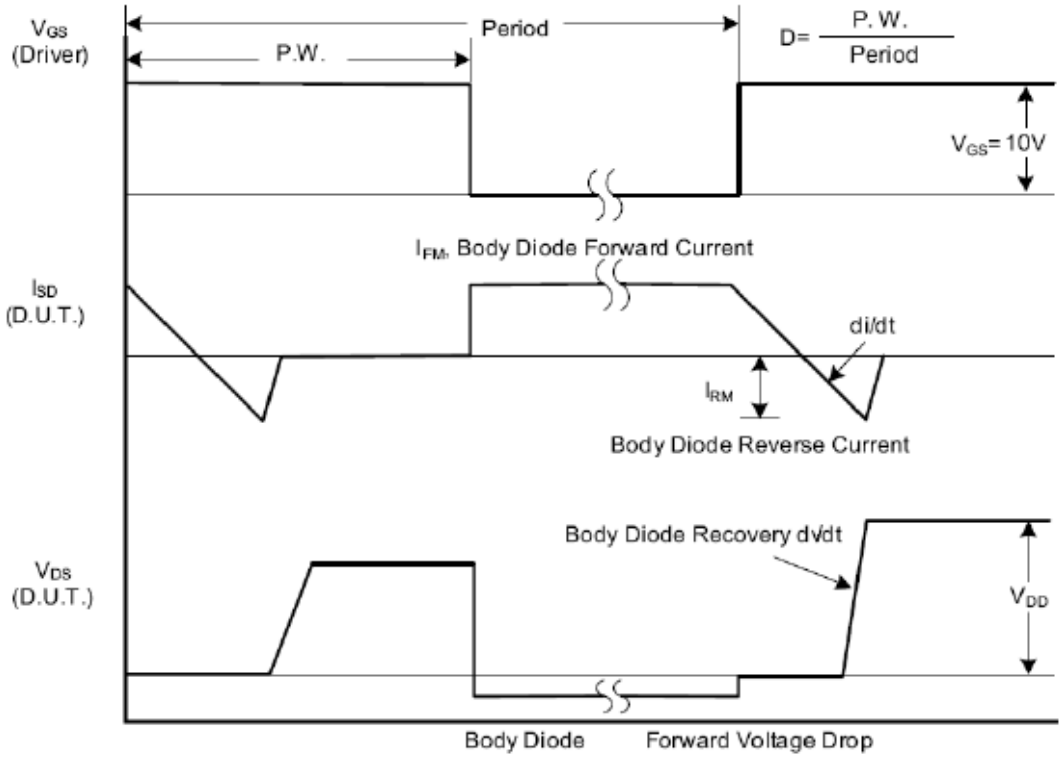


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

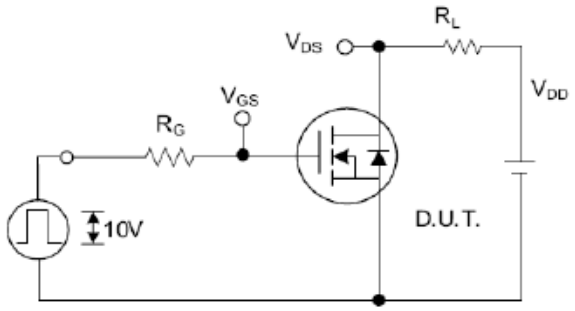


Fig. 2.1 Switching Test Circuit

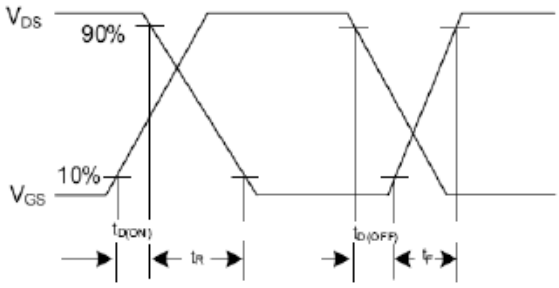


Fig. 2.2 Switching Waveforms

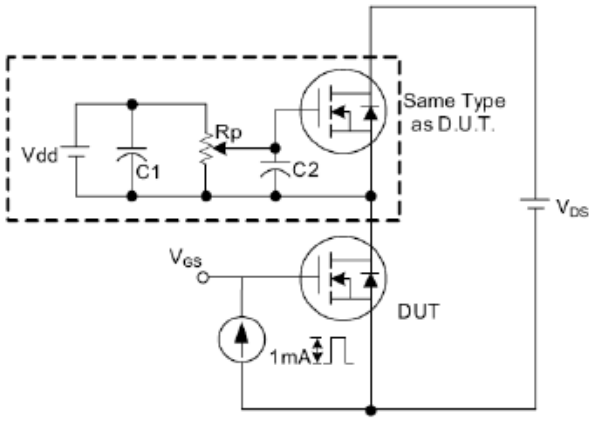


Fig. 3 . 1 Gate Charge Test Circuit

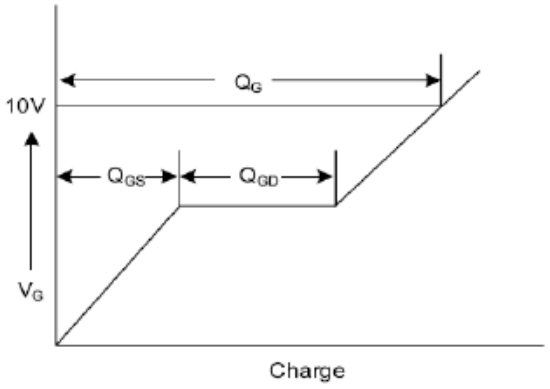


Fig. 3 . 2 Gate Charge Waveform

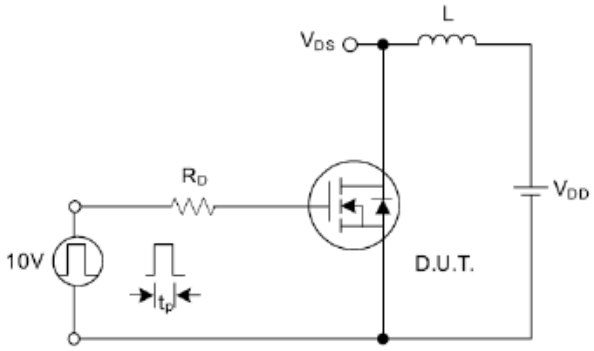


Fig. 4.1 Unclamped Inductive Switching Test Circuit

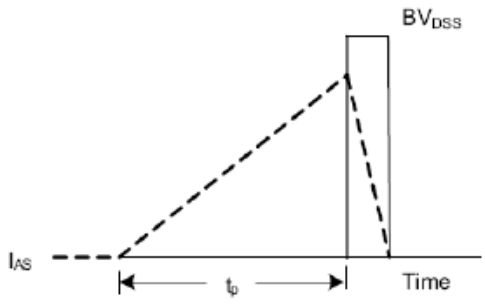


Fig. 4.2 Unclamped Inductive Switching Waveforms

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