



60V N-Channel MOSFET

Lead Free Package and Finish

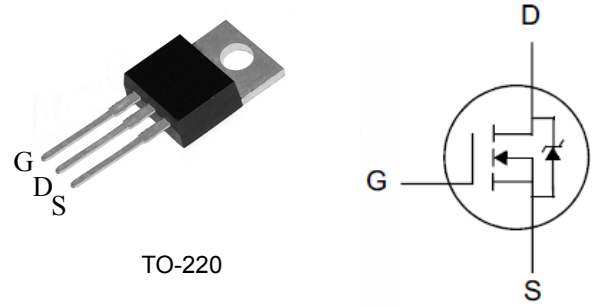
General Features

- Proprietary New Trench Technology
- $R_{DS(ON),typ.}=6.1\text{ m}\Omega@V_{GS}=10\text{V}$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

BV_{DSS}	$R_{DS(ON),typ.}$	$I_D^{[2]}$
60V	6.1m Ω	105A

Applications

- High efficiency DC/DC Converters
- Synchronous Rectification
- UPS Inverter



TO-220

Package No to Scale

Ordering Information

Part Number	Package	Brand
PTP08N06NB	TO-220	

Absolute Maximum Ratings

$T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	PTP08N06NB	Unit
V_{DSS}	Drain-to-Source Voltage ^[1]	60	V
V_{GSS}	Gate-to-Source Voltage	± 20	
I_D	Continuous Drain Current $T_C = 25^\circ\text{C}$	105	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	73.5	
I_{DM}	Pulsed Drain Current at $V_{GS}=10\text{V}^{[2,4]}$	420	
I_{AS}	Avalanche Current	30	
E_{AS}	Single Pulse Avalanche Energy	450	mJ
dv/dt	Peak Diode Recovery $dv/dt^{[3]}$	5.0	V/ns
P_D	Power Dissipation	187.5	W
	Derating Factor above 25°C	1.25	W/ $^\circ\text{C}$
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	$^\circ\text{C}$
T_J & T_{STG}	Operating and Storage Temperature Range	-55 to 175	

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

Thermal Characteristics

Symbol	Parameter	PTP08N06A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.8	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	



Electrical Characteristics

OFF Characteristics $T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	60	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=60V, V_{GS}=0V$
		--	--	100		$V_{DS}=48V, V_{GS}=0V,$ $T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	$V_{GS}=+20V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-20V, V_{DS}=0V$

ON Characteristics

$T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	6.1	7.5	$m\Omega$	$V_{GS}=10V, I_D=50A$ ^[5]
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
gfs	Forward Transconductance	--	50	--	S	$V_{DS}=10V, I_D=25A$ ^[5]

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	3800	--	pF	$V_{GS}=0V,$ $V_{DS}=25V,$ $f=1.0MHz$
C_{rss}	Reverse Transfer Capacitance	--	380	--		
C_{oss}	Output Capacitance	--	298	--		
Q_g	Total Gate Charge	--	70	--	nC	$V_{DD}=30V,$ $I_D=55A, V_{GS}=0$ to 10V
Q_{gs}	Gate-to-Source Charge	--	25	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	14	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	25	--	nS	$V_{DD}=30V,$ $I_D=55A,$ $V_{GS}=10V$ $R_G=2.5\Omega$
t_{rise}	Rise Time	--	12	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	38	--		
t_{fall}	Fall Time	--	10	--		

**Source-Drain Body Diode Characteristics** $T_J=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current ^[2]	--	--	105	A	Integral PN-diode in MOSFET
I_{SM}	Pulsed Source Current ^[2]	--	--	420		
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_S=30\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse recovery time	--	45	--	ns	$V_{GS}=0\text{V}$, $I_F=30\text{A}$, $di_F/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse recovery charge	--	55	--	nC	

Note:

- [1] $T_J=+25^{\circ}\text{C}$ to $+175^{\circ}\text{C}$
[2] Silicon limited current only.
[3].Package limited current
[4] Repetitive rating; pulse width limited by maximum junction temperature.
[5] Pulse width $\leq 380\mu\text{s}$; duty cycle $\leq 2\%$.



Typical Characteristics

Figure 1. Output Characteristics

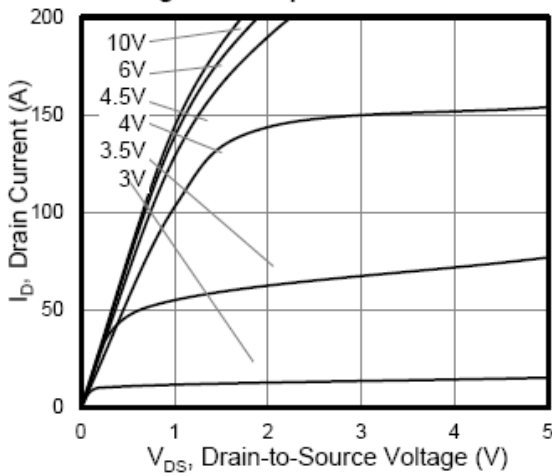


Figure 2. Transfer Characteristics

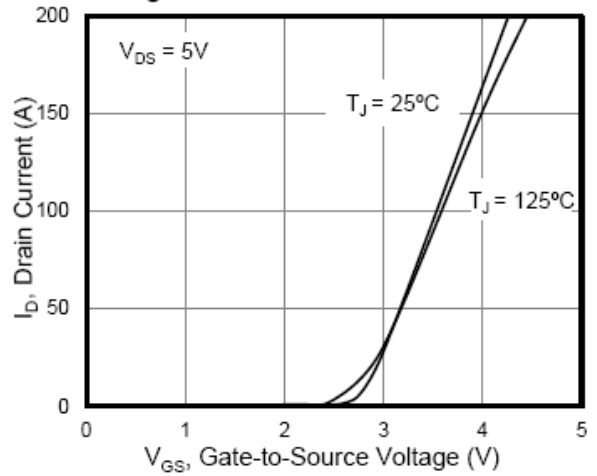


Figure 3. On-Resistance vs. Drain Current

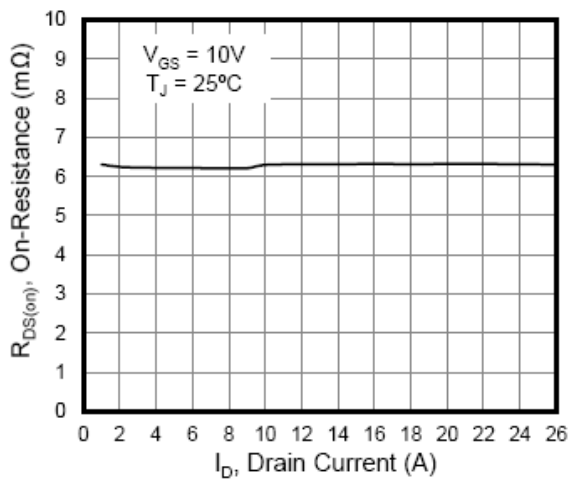


Figure 4. Capacitance

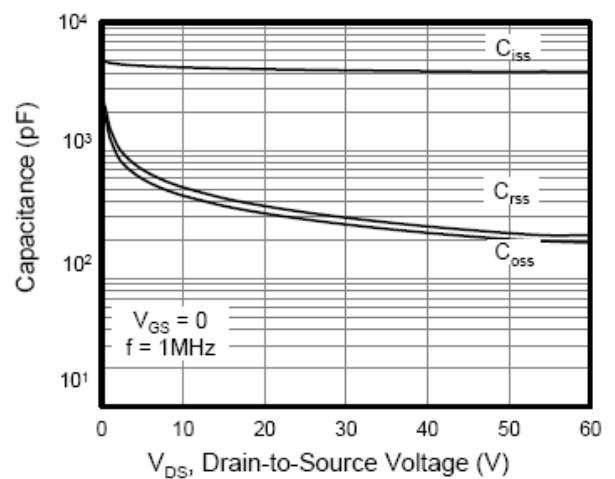


Figure 5. Gate Charge

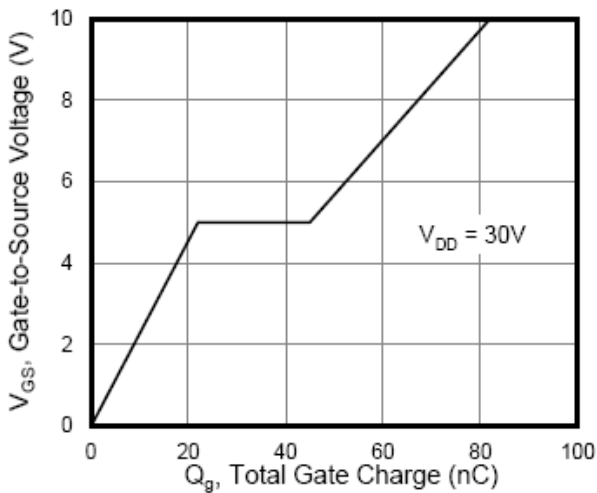
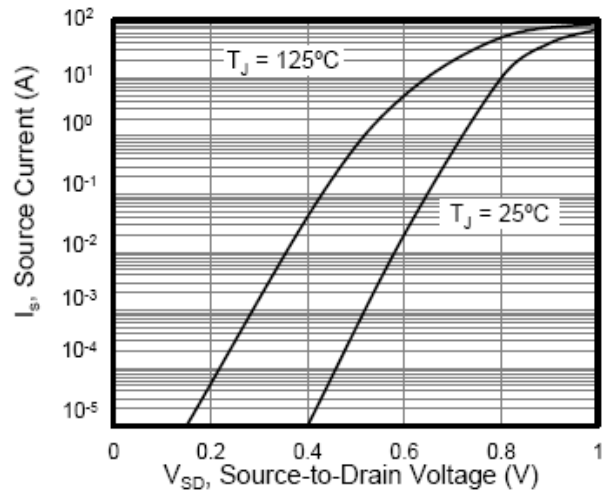


Figure 6. Body Diode Forward Voltage





Typical Characteristics(Cont.)

Figure 7. On-Resistance vs. Junction Temperature

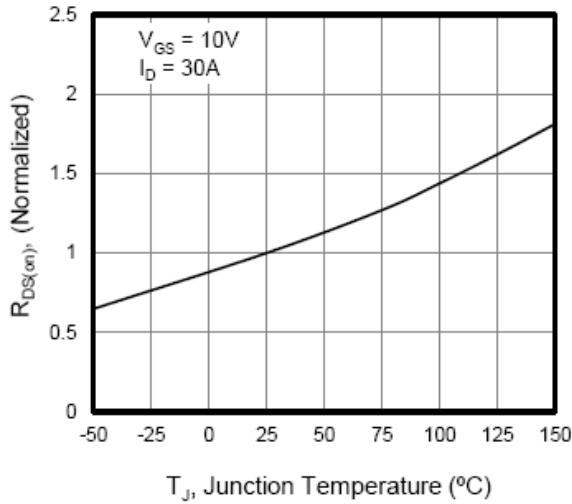


Figure 8. Threshold Voltage vs. Junction Temperature

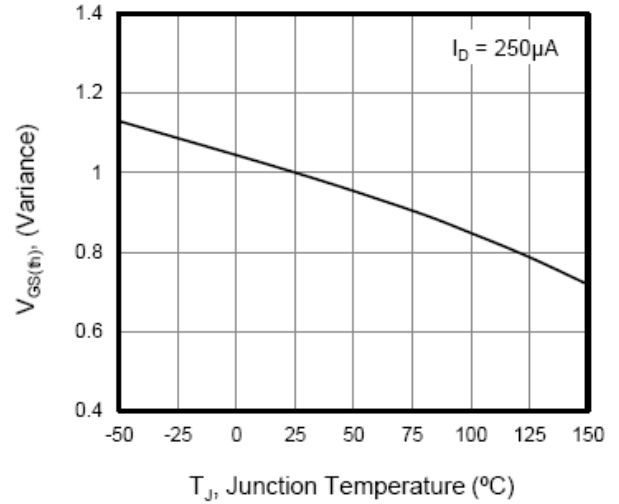


Figure 9. Transient Thermal Impedance

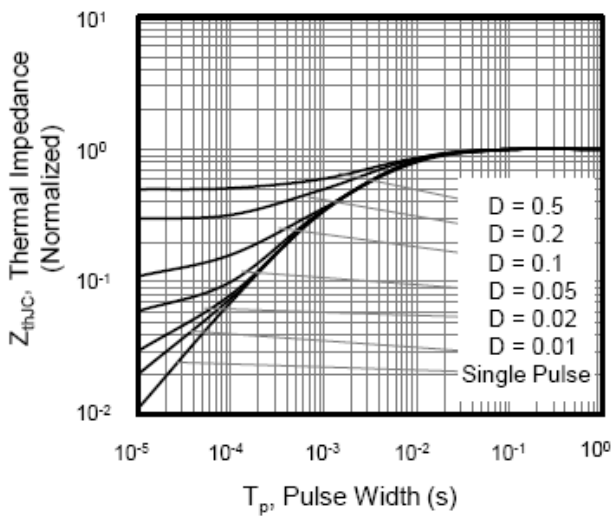
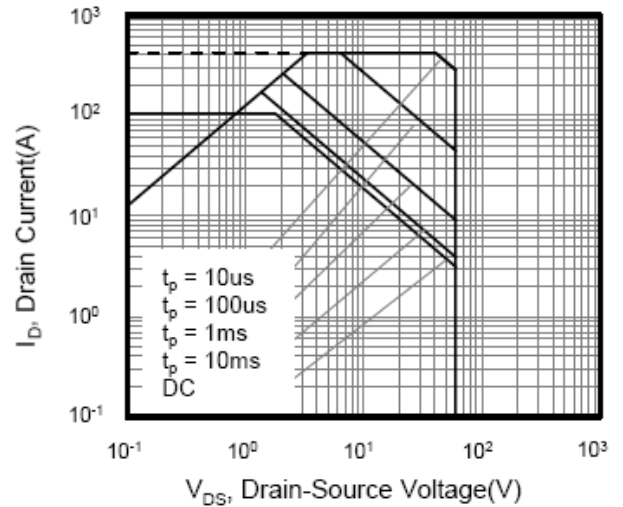


Figure 10. Safe operation area



Test Circuits and Waveforms

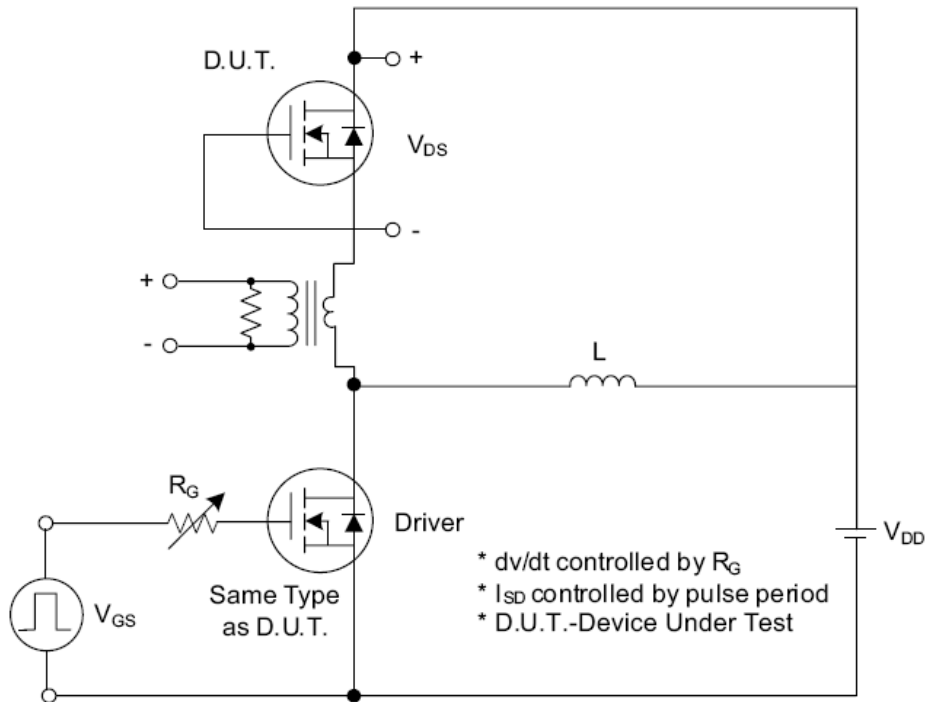


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

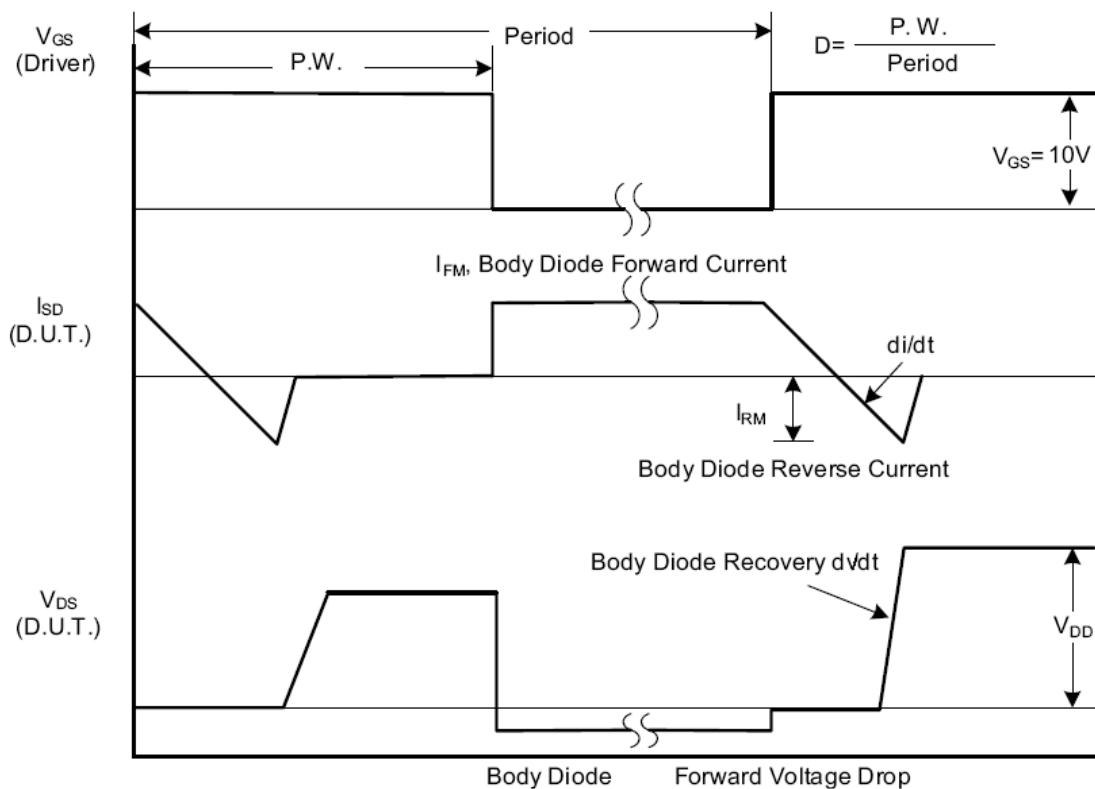


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

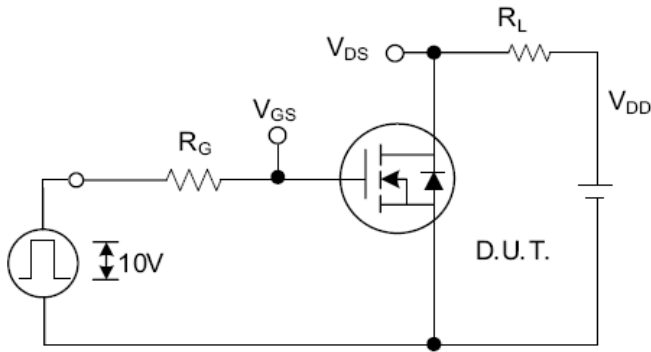
Test Circuits and Waveforms (Cont.)


Fig. 2.1 Switching Test Circuit

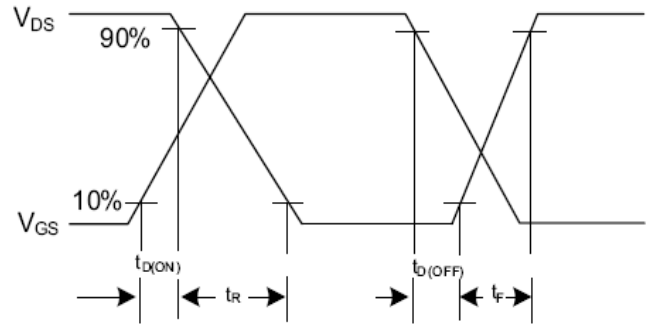


Fig. 2.2 Switching Waveforms

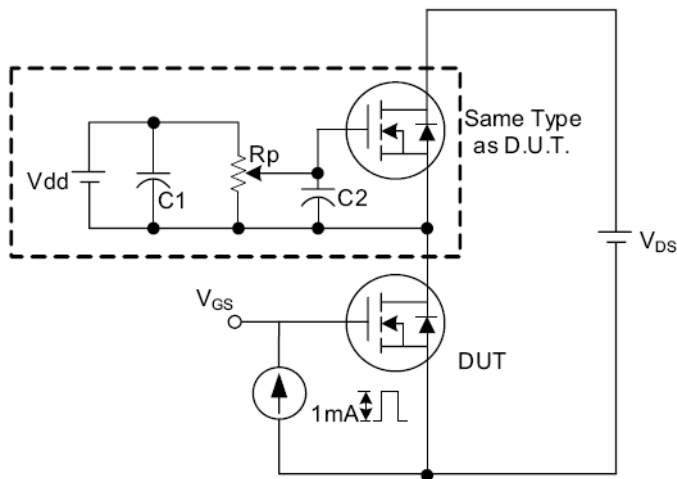


Fig. 3.1 Gate Charge Test Circuit

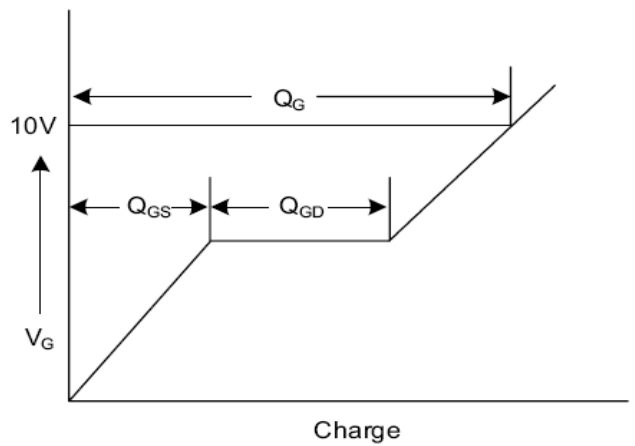


Fig. 3.2 Gate Charge Waveform

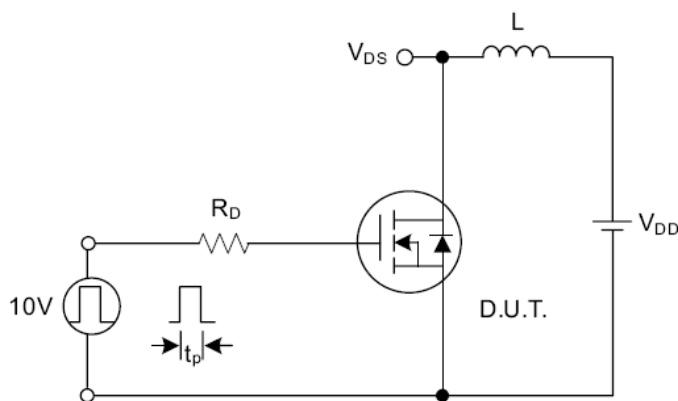


Fig. 4.1 Unclamped Inductive Switching Test Circuit

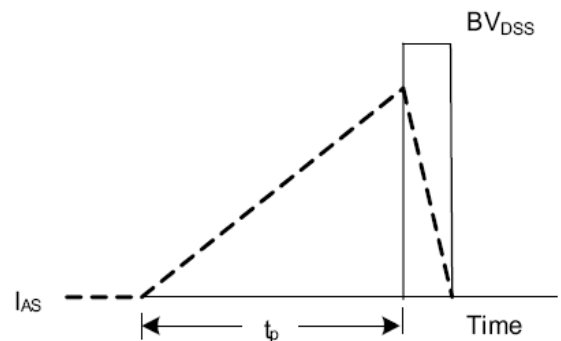


Fig. 4.2 Unclamped Inductive Switching Waveforms



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