



XTMF120N03E

1200V N-Channel MOSFET

Product Description

BV_{DSS}	1200	V
I_D	3.0	A
$R_{DS(ON), Typ.}$	6	Ω

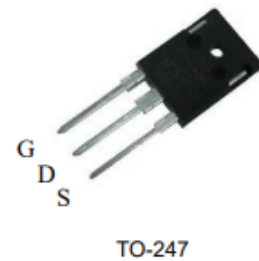
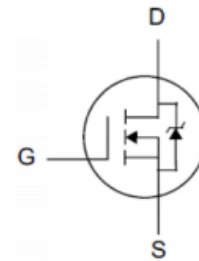
General Features

- RoHS Compliant
- $R_{DS(ON), typ.} = 6\Omega$ @ $V_{GS} = 10V$
- Fast Recovery Body Diode
- Low Gate Charge Minimize Switching Loss

Applications

- Charger
- Adaptor
- SMPS Standby Power

封装 Package



Device	Package	Marking
XTMF120N03E	TO-247	XTMF120N03E

Absolute Maximum Ratings $T_j = 25^\circ\text{C}$

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-to-Source Voltage	1200	V
V_{GSS}	Gate-to-Source Voltage	± 30	
I_D	Continuous Drain Current	3	A
I_{DM}	Pulsed Drain Current at $V_{GS} = 10V$	12	
E_{AS}	Single Pulse Avalanche Energy	100	mJ
P_D	Power Dissipation	75	W
	Derating Factor above 25°C	0.6	W/ $^\circ\text{C}$
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300	$^\circ\text{C}$
$T_J \& T_{STG}$	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.



Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.67	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	75	$^{\circ}\text{C/W}$

Electrical Characteristics $T_j=25^{\circ}\text{C}$

OFF Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
BV_{DSS}	Drain-to-Source Breakdown Voltage	1200	-	-	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	-	-	1	μA	$V_{DS}=1200V, V_{GS}=0V$
		-	-	100		$V_{DS}=960V, V_{GS}=0V,$ $T_j=125^{\circ}\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	-	-	+100	nA	$V_{GS}=+30V, V_{DS}=0V$
		-	-	-100		$V_{GS}=-30V, V_{DS}=0V$

ON Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	-	6.0	7.5	Ω	$V_{GS}=10V, I_D=1.5A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.5	-	4.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
gfs	Forward Transconductance	-	4	-	S	$V_{DS}=20V, I_D=1.5A$



Dynamic Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
C_{iss}	Input Capacitance	-	860	-	pF	$V_{GS}=0V$, $V_{DS}=25V$, $f=1.0MHz$
C_{rss}	Reverse Transfer Capacitance	-	22	-		
C_{oss}	Output Capacitance	-	60	-		
Q_g	Total Gate Charge	-	17.5	-	nC	$V_{DD}=600V$, $I_D=3A$, $V_{GS}=0$ to $10V$
Q_{gs}	Gate-to-Source Charge	-	5	-		
Q_{gd}	Gate-to-Drain (Miller) Charge	-	5.5	-		

Resistive Switching Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$t_{d(ON)}$	Turn-on Delay Time	-	17	-	ns	$V_{DD}=600V$, $I_D=3A$, $V_{GS}=10V$ $R_g=4.7\Omega$
t_{rise}	Rise Time	-	6	-		
$t_{d(OFF)}$	Turn-Off Delay Time	-	23	-		
t_{fall}	Fall Time	-	11	-		

Source-Drain Body Diode Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
I_{SD}	Continuous Source Current ^[1]	-	-	3	A	Integral pn-diode in MOSFET
I_{SM}	Pulsed Source Current ^[1]	-	-	12		
V_{SD}	Diode Forward Voltage	-	-	1.5	V	$I_S=3A$, $V_{GS}=0V$
t_{rr}	Reverse Recovery Time	-	200	-	ns	$V_{GS}=0V$ $I_F=I_S$, $di_F/dt=100A/\mu s$
Q_{rr}	Reverse Recovery Charge	-	760	-	nC	

[1] Pulse width $\leq 380\mu s$; duty cycle $\leq 2\%$



Typical Characteristics

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

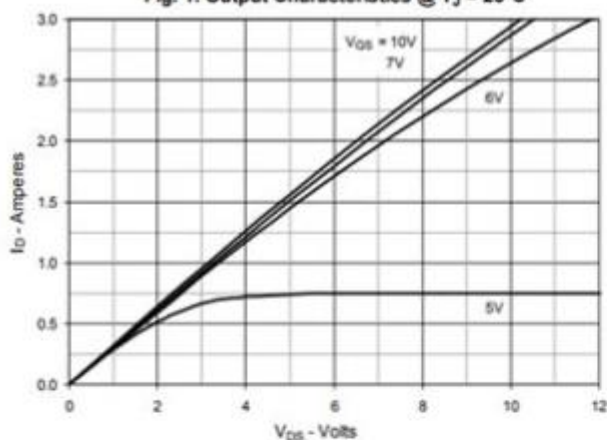


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

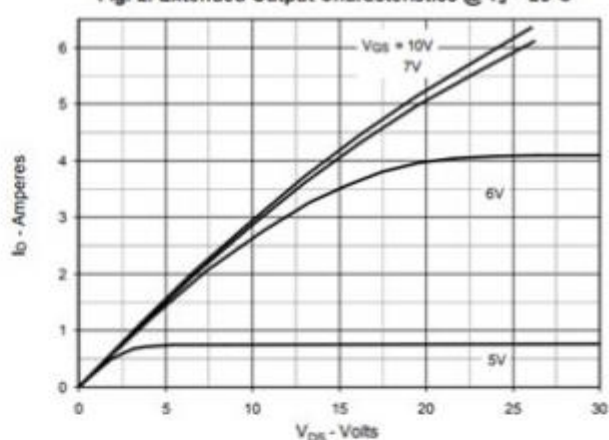


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

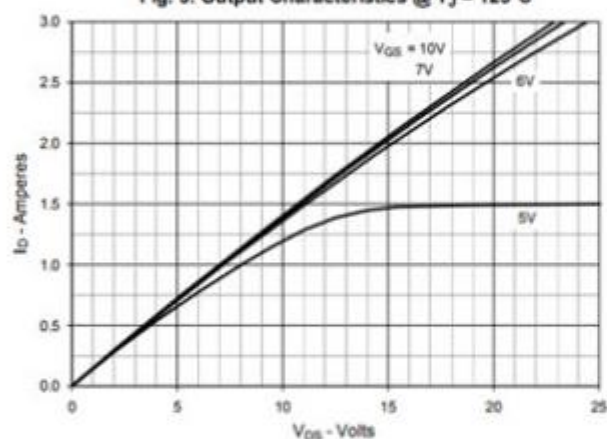


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 1.5\text{A}$ Value vs. Junction Temperature

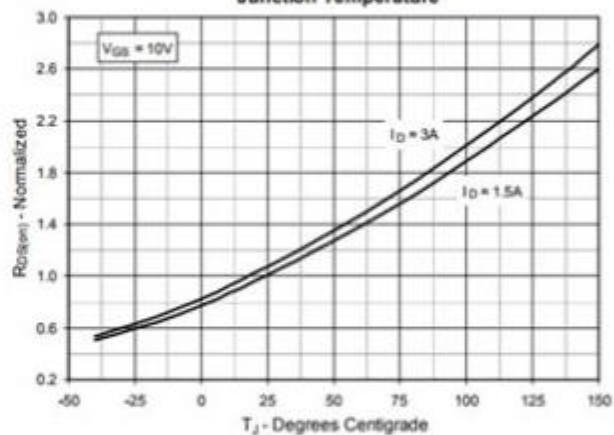


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 1.5\text{A}$ Value vs. Drain Current

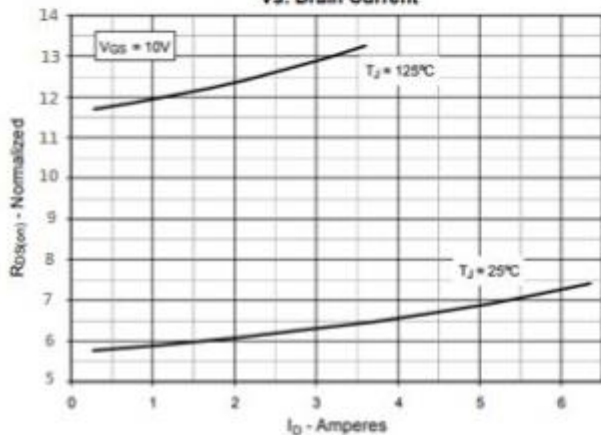
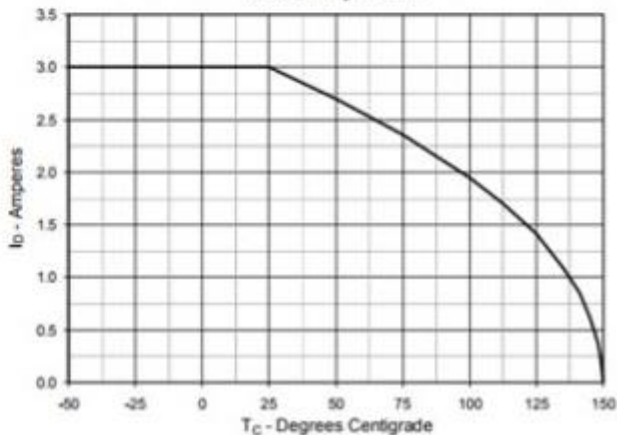


Fig. 6. Maximum Drain Current vs. Case Temperature





Typical Characteristics

Fig. 7. Input Admittance

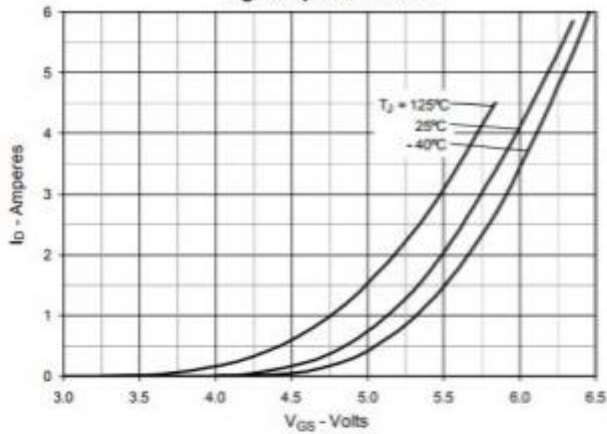


Fig. 8. Transconductance

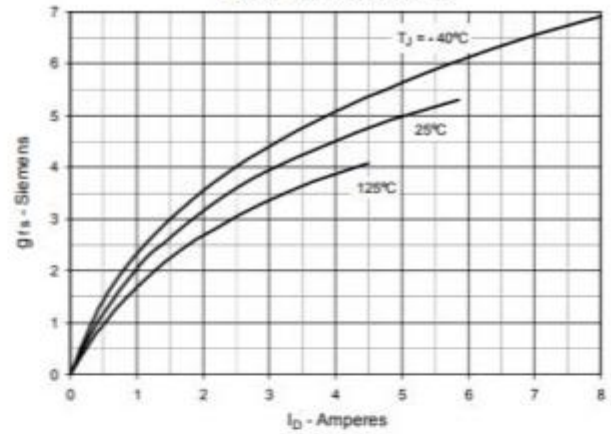


Fig. 9. Forward Voltage Drop of Intrinsic Diode

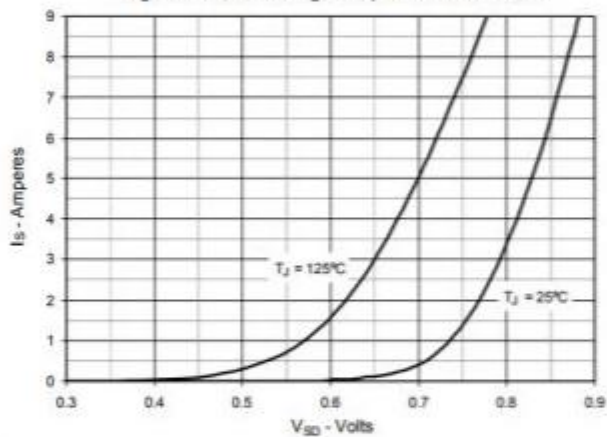


Fig. 10. Gate Charge

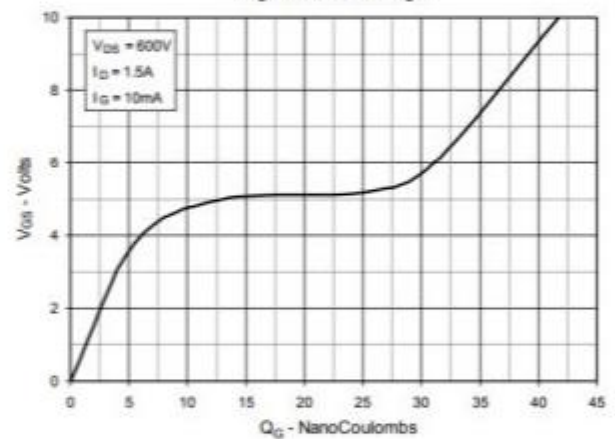


Fig. 11. Capacitance

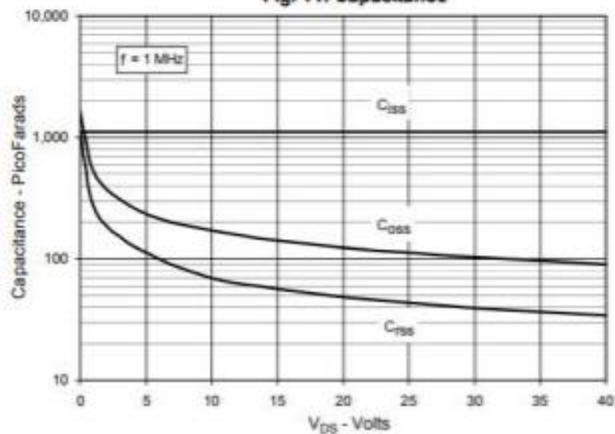
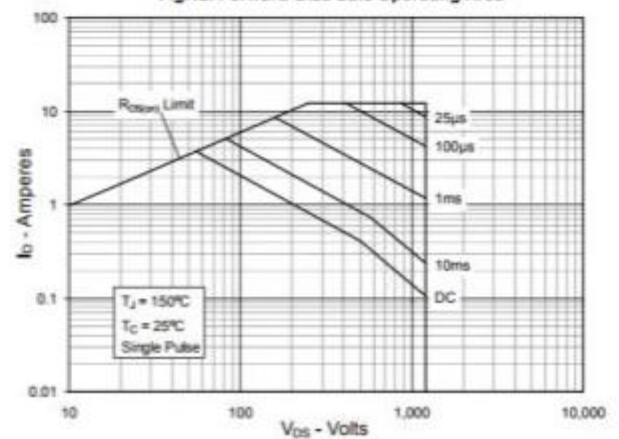
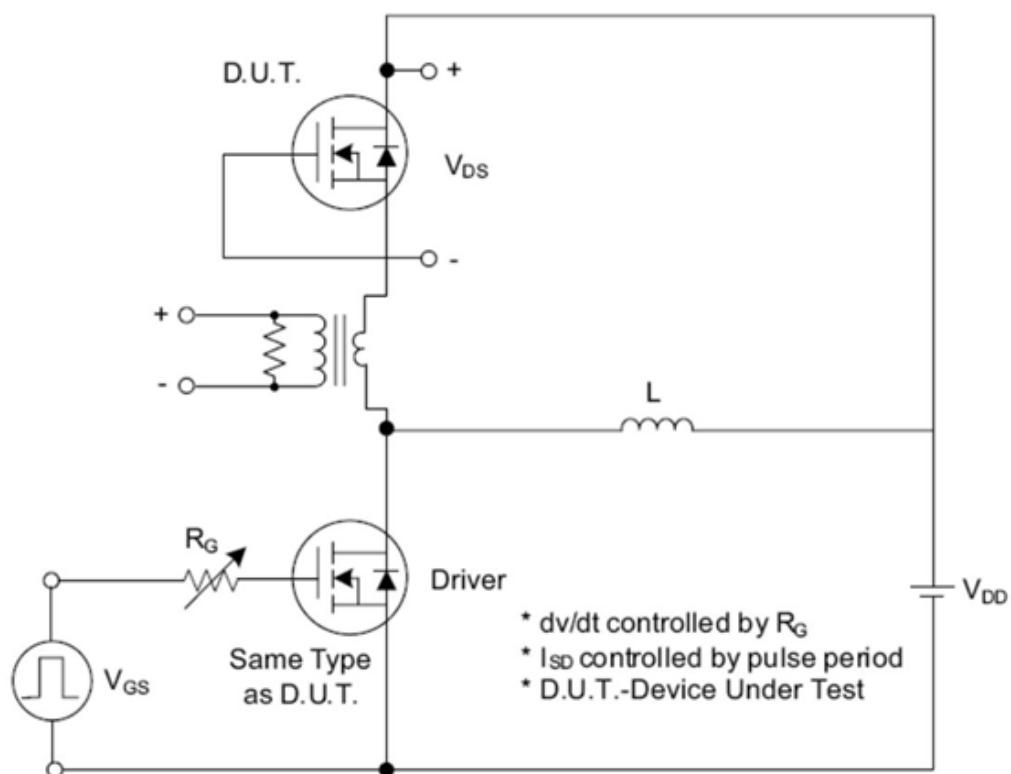
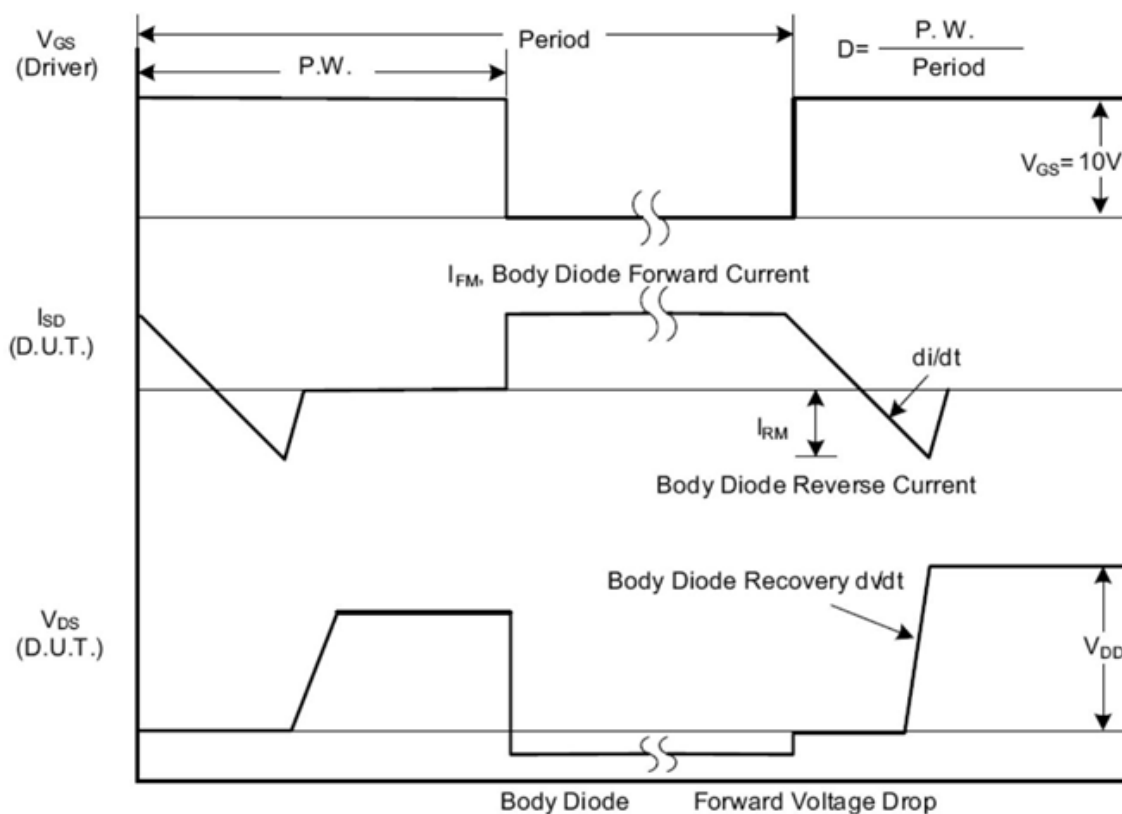


Fig.12. Forward-Bias Safe Operating Area





Test Circuits and Waveforms

Fig. 1.1 Peak Diode Recovery dv/dt Test CircuitFig. 1.2 Peak Diode Recovery dv/dt Waveforms



Test Circuits and Waveforms (Cont.)

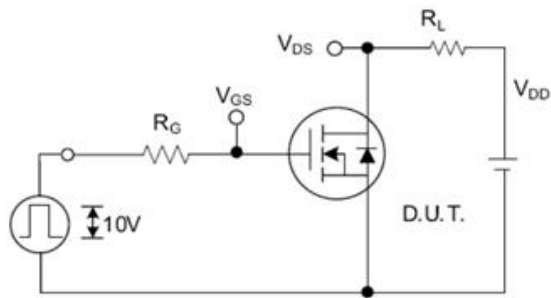


Fig. 2.1 Switching Test Circuit

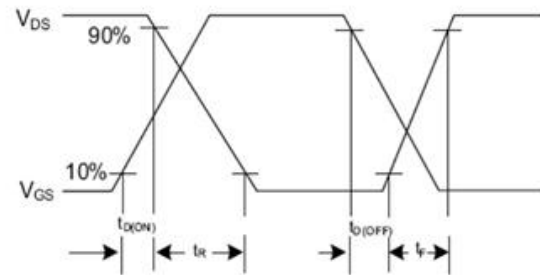


Fig. 2.2 Switching Waveforms

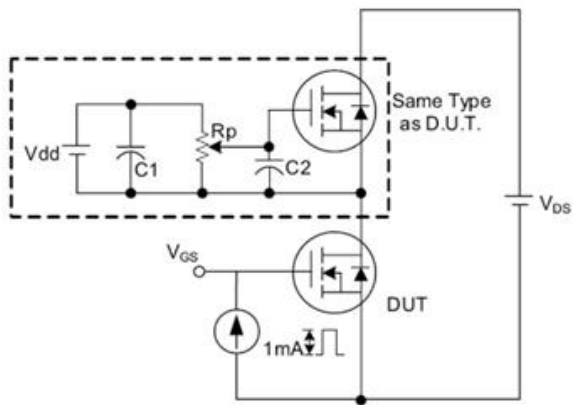


Fig. 3.1 Gate Charge Test Circuit

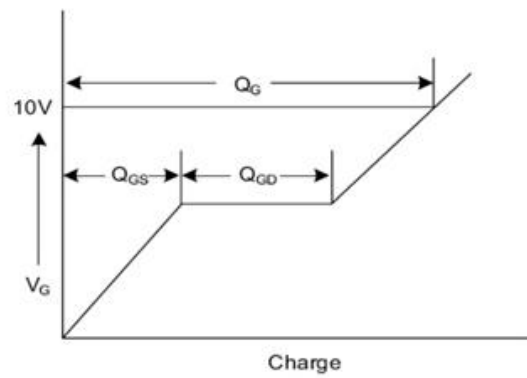


Fig. 3.2 Gate Charge Waveform

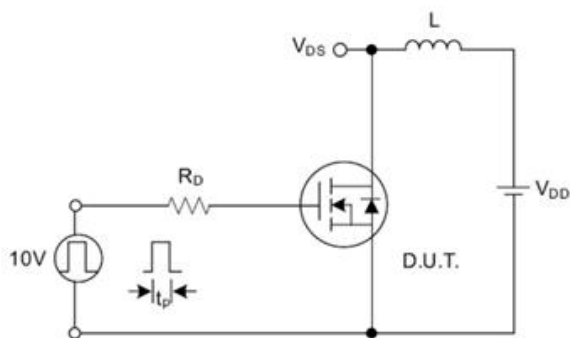


Fig. 4.1 Unclamped Inductive Switching Test Circuit

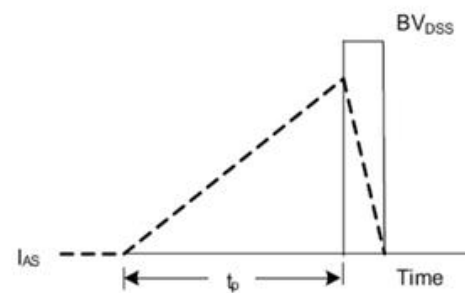


Fig. 4.2 Unclamped Inductive Switching Waveforms