60V N-Channel MOSFET

Lead Free Package and Finish

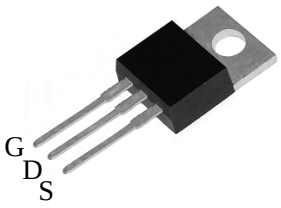
BV_{DSS}	$R_{DS(ON),typ.}$	I_D[2]
60V	3.4mΩ	150A

General Features

- Proprietary New Trench Technology
- $R_{DS(ON),typ.}$=3.4 mΩ@V_{GS}=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

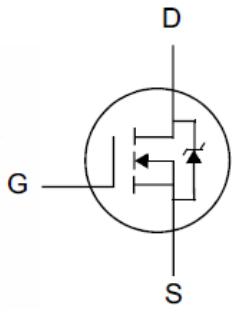
Applications

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



TO-220

Package No to Scale



Ordering Information

Part Number	Package	Brand
PTP03N06NB	TO-220	

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter	PTP03N06NB	Unit
V_{DSS}	Drain-to-Source Voltage[1]	60	V
V_{GSS}	Gate-to-Source Voltage	±20	
I_D	Continuous Drain Current[2]	150	A
	Continuous Drain Current @ Tc=100℃	105	
I_{DM}	Pulsed Drain Current at V_{GS}=10V[2,4]	600	
E_{AS}	Single Pulse Avalanche Energy	635	mJ
P_D	Power Dissipation	220	W
	Derating Factor above 25℃	1.47	W/℃
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	℃
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	PTP03N06NB	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.68	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	

Electrical Characteristics

OFF Characteristics

T_J =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	60	68	--	V	V_{GS}=0V, I_D=250uA
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	uA	V_{DS}=60V, V_{GS}=0V
		--	--	100		V_{DS}=48V, V_{GS}=0V, T_J =125℃
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℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	3.4	4.5	mΩ	V_{GS}=10V, I_D=75A [5]
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	V_{DS}=V_{GS}, I_D=250uA
g_{FS}	Forward Transconductance	180	--	--	S	VDS=10V, I_D=75A [5]

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	6500	--	pF	V_{GS}=0V, V_{DS}=25V, f=1.0MH_Z
C_{rss}	Reverse Transfer Capacitance	--	650	--		
C_{oss}	Output Capacitance	--	590	--		
Q_g	Total Gate Charge	--	162	--	nC	V_{DD}=30V, I_D=30A, V_{GS}=0 to 10V
Q_{gs}	Gate-to-Source Charge	--	30	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	63	--		

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=2A, V_{GS}= 10V RG=2.5Ω
t_{rise}	Rise Time	--	25	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	90	--		
t_{fall}	Fall Time	--	40	--		

Source-Drain Body Diode Characteristics

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current[2]	--	--	150	A	Integral PN-diode in MOSFET
I_{SM}	Pulsed Source Current[2]	--	--	600		
V_{SD}	Diode Forward Voltage	--	--	1.2	V	I_S=80A, V_{GS}=0V
trr	Reverse recovery time	--	40	--	ns	V_{GS}=0V ,I_F=40A, di_F/dt=100A/μs
Qrr	Reverse recovery charge	--	65	--	nC	

Note:

[1] T_J=+25℃ to +175℃ .
[2] Silicon limited current only.
[3] Package limited current.
[4] Repetitive rating; pulse width limited by maximum junction temperature.
[5] Pulse width≤380μs; duty cycle≤2%.

Typical Characteristics

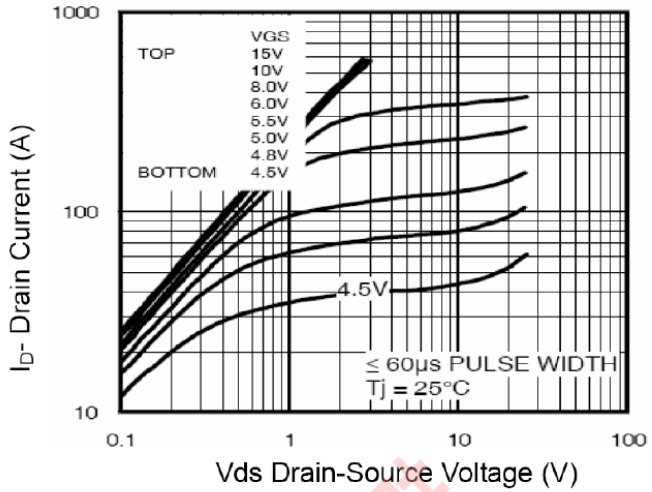


Figure 1 Output Characteristics

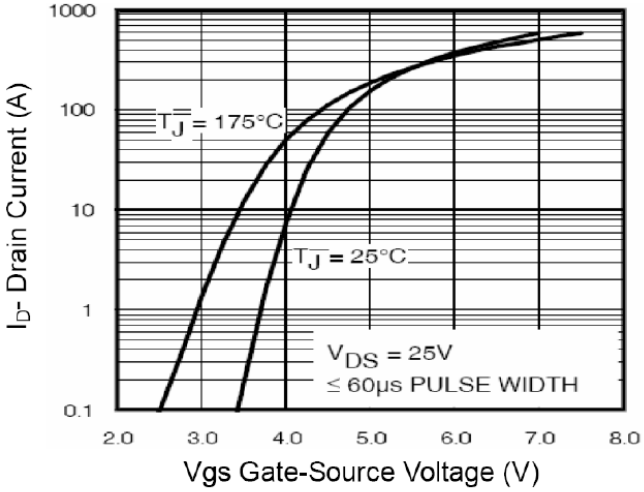


Figure 2 Transfer Characteristics

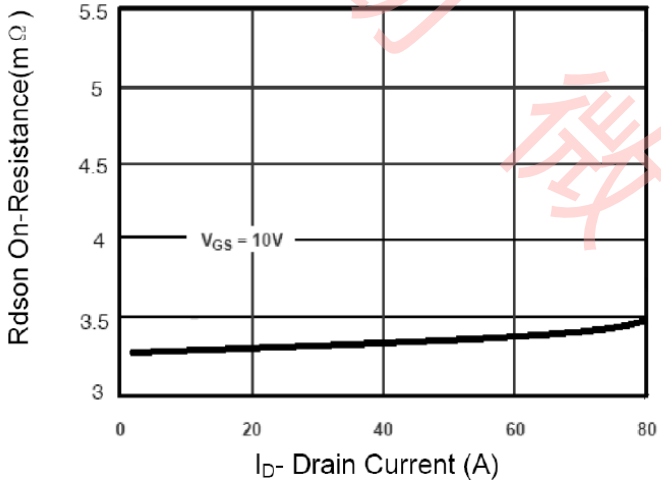


Figure 3 Rdson- Drain Current

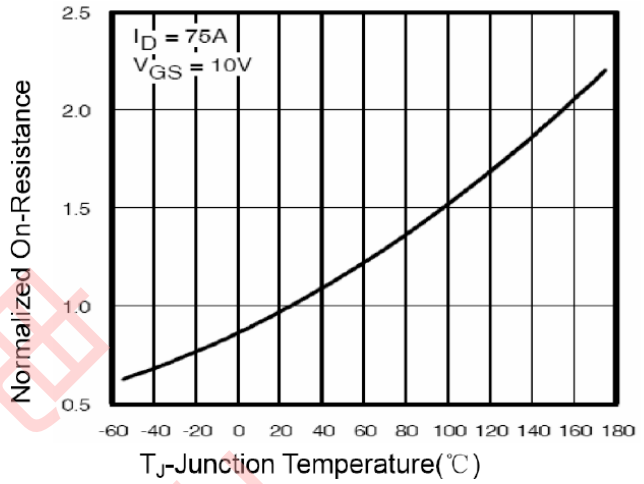


Figure 4 Rdson-JunctionTemperature

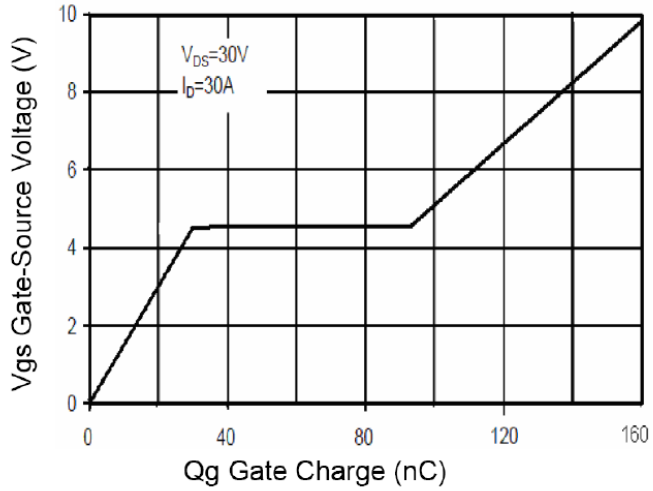


Figure 5 Gate Charge

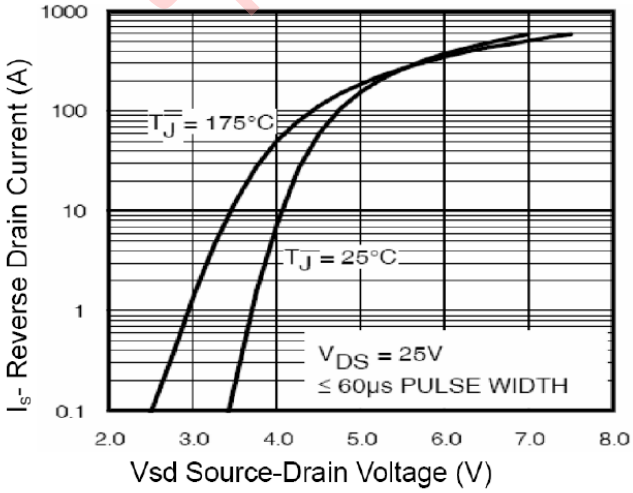


Figure 6 Source- Drain Diode Forward

Typical Characteristics(Cont.)

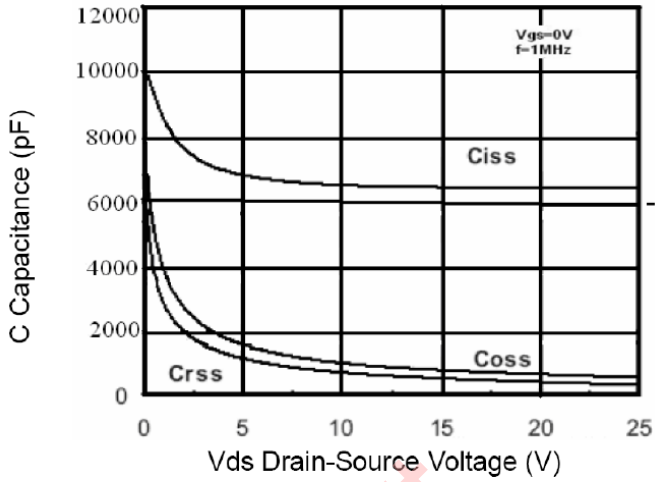


Figure 7 Capacitance vs Vds

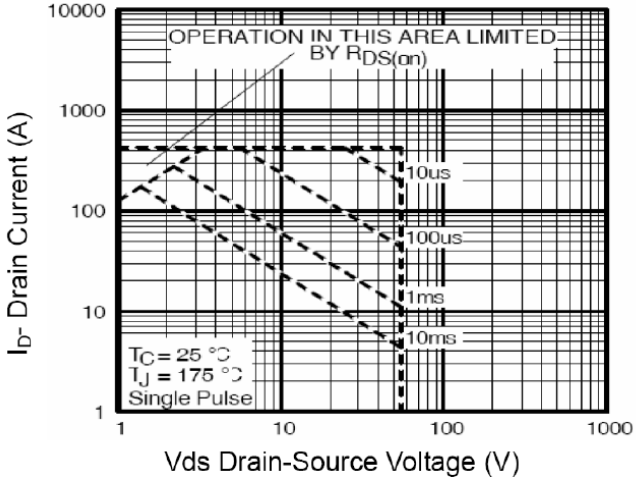


Figure 8 Safe Operation Area

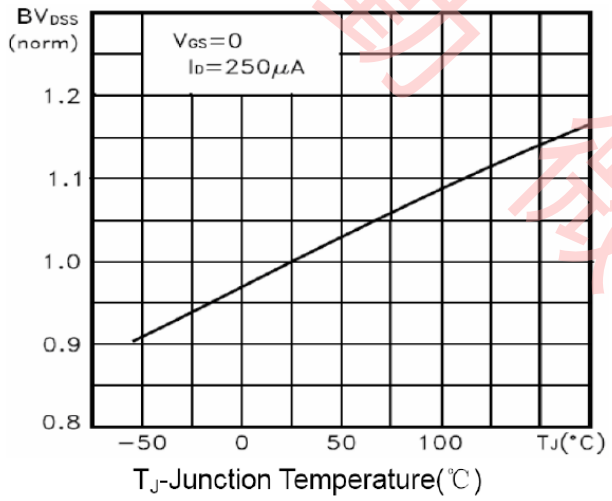


Figure 9 BV_{DSS} vs Junction Temperature

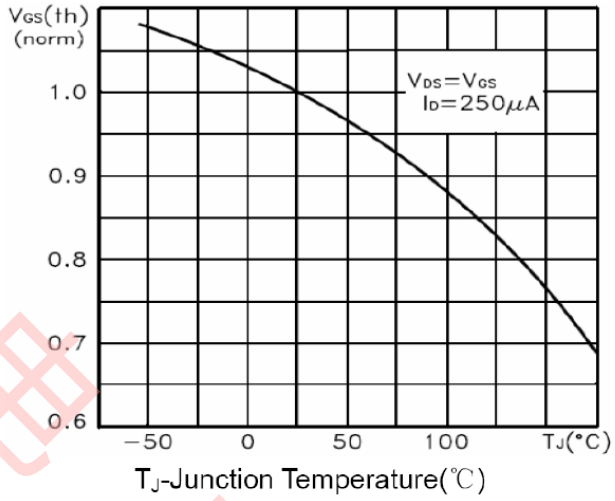


Figure 10 $V_{GS(th)}$ vs Junction Temperature

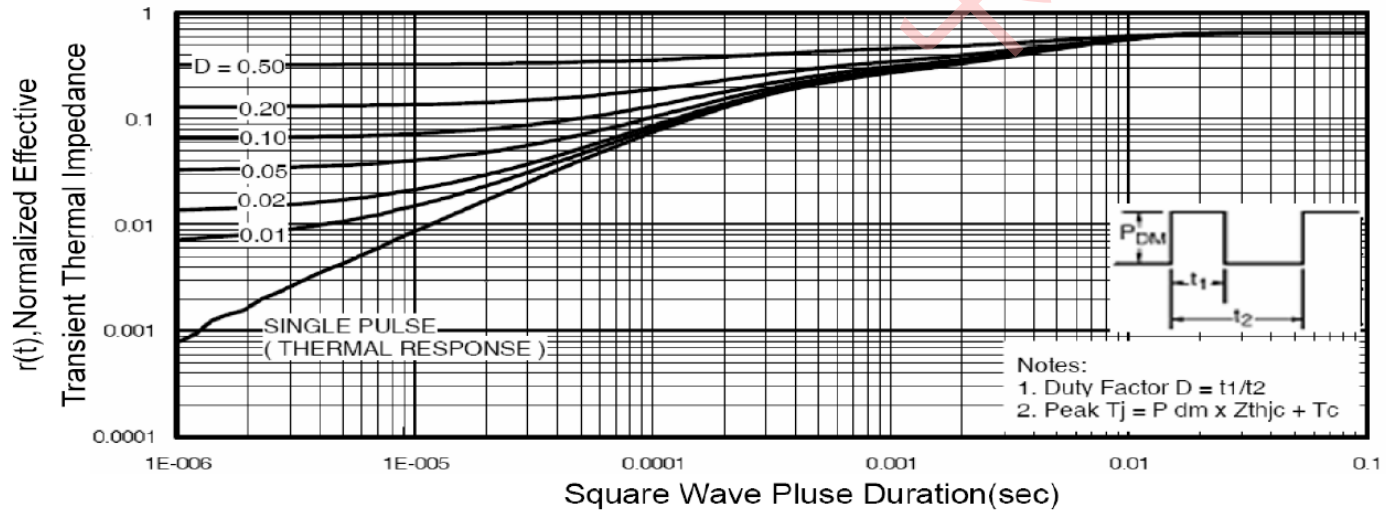


Figure 11 Normalized Maximum Transient Thermal Impedance

Test Circuits and Waveforms

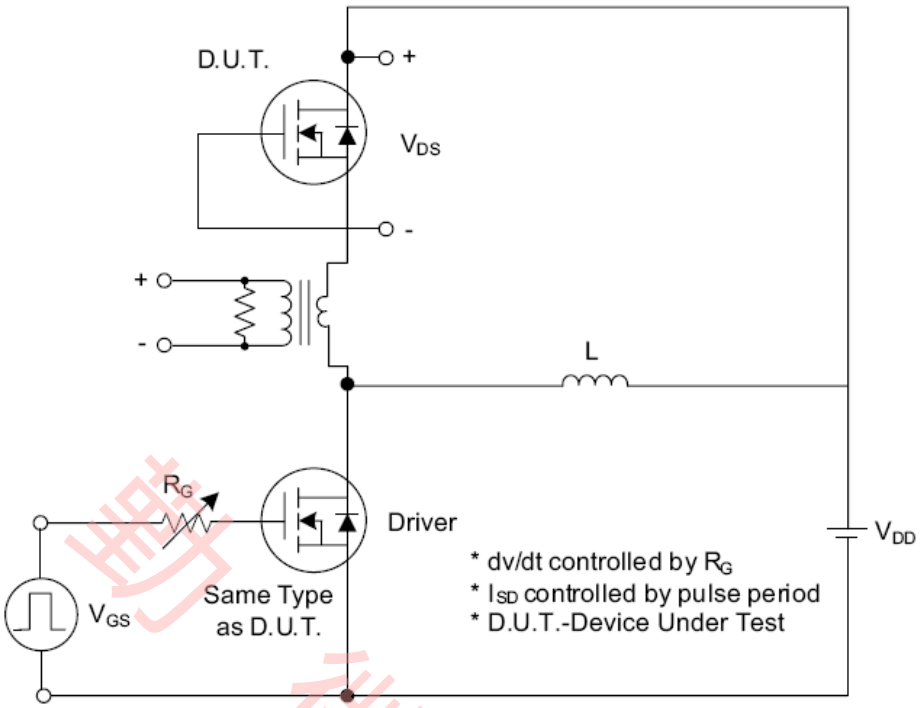


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

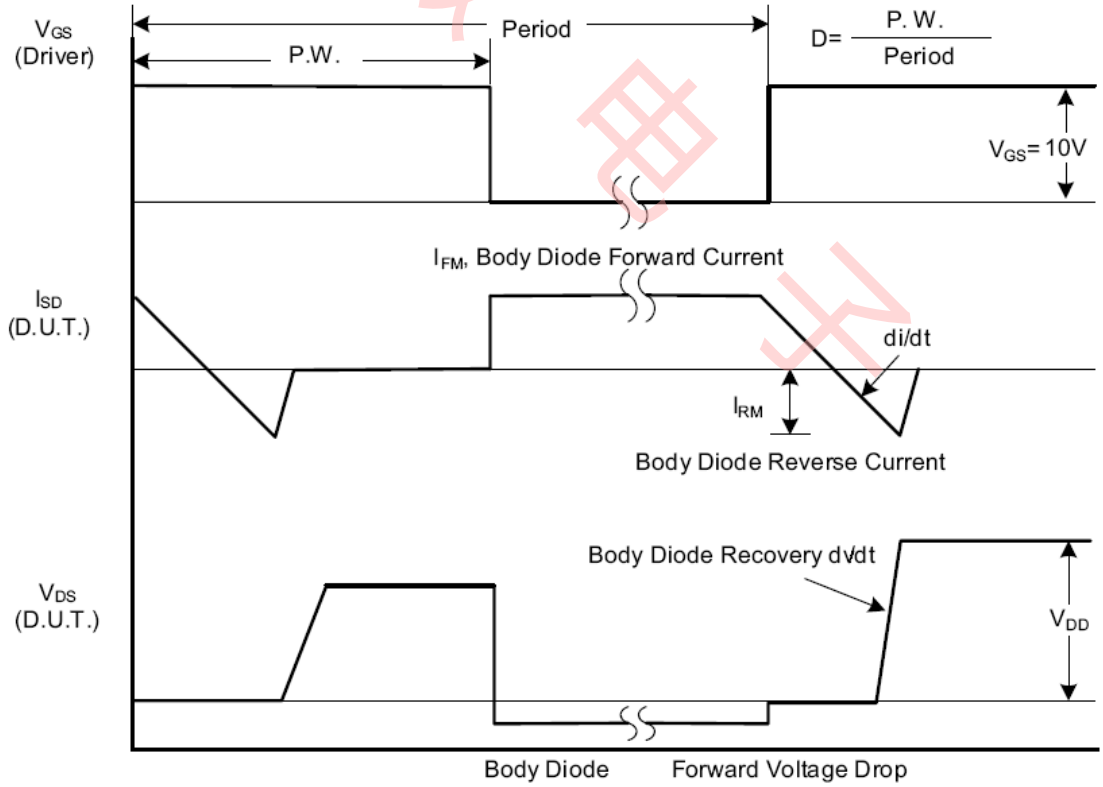


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

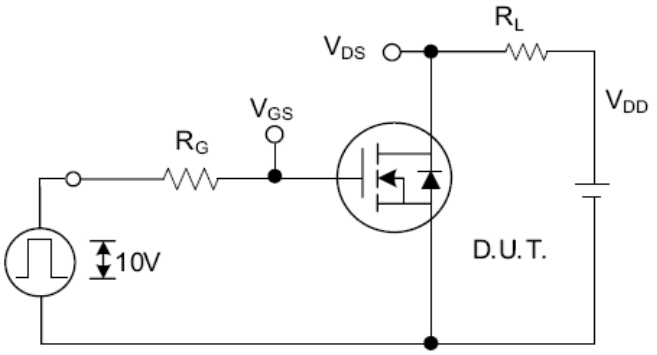


Fig. 2.1 Switching Test Circuit

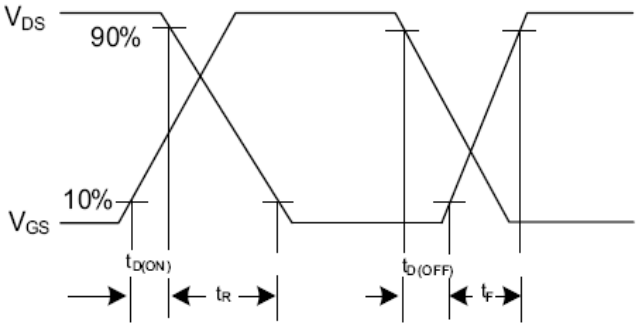


Fig. 2.2 Switching Waveforms

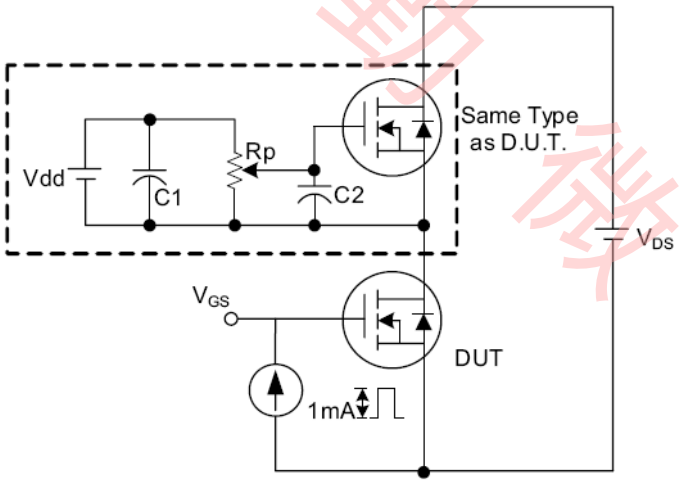


Fig. 3 . 1 Gate Charge Test Circuit

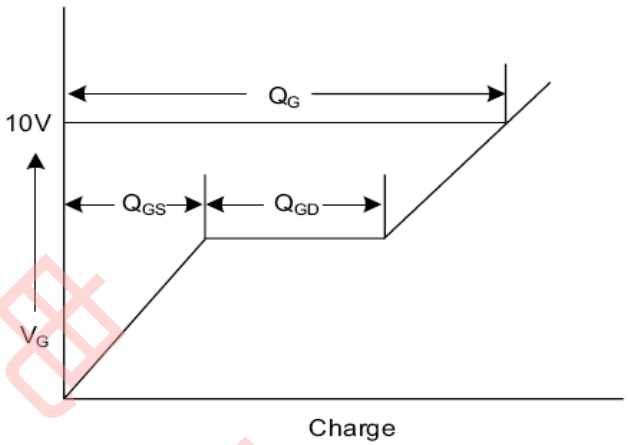


Fig. 3 . 2 Gate Charge Waveform

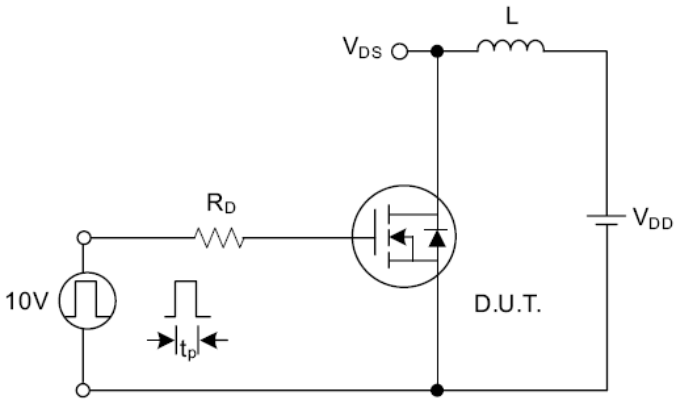


Fig. 4.1 Unclamped Inductive Switching Test Circuit

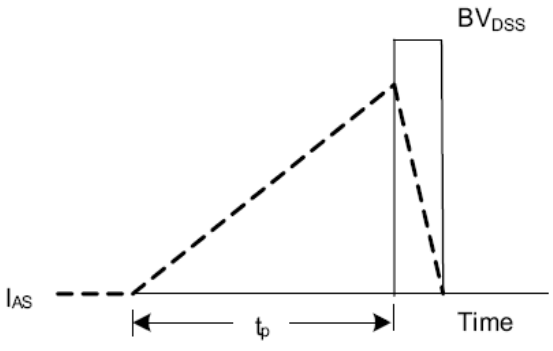


Fig. 4.2 Unclamped Inductive Switching Waveforms

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