900V N-Channel MOSFET

Lead Free Package and Finish

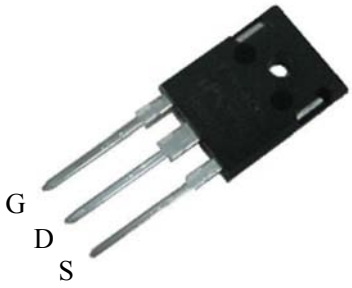
BV_{DSS}	$R_{DS(ON),typ.}$	I_D
900V	750mΩ	12A

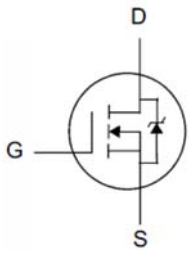
General Features

- Advanced Planar Process
- $R_{DS(ON),typ.}$=750 mΩ@V_{GS}=10V
- Low Gate Charge Minimize Switching Loss
- Rugged Poly silicon Gate Structure

Applications

- BLDC Motor Driver
- Electric Welder
- High Efficiency SMPS





TO-247 Package

Ordering Information

Part Number	Package	Brand
PTF12N90	TO-247	

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter	PTF12N90	Unit
V_{DSS}	Drain-to-Source Voltage	900	V
V_{GSS}	Gate-to-Source Voltage	±30	
I_D	Continuous Drain Current	12	A
	Continuous Drain Current @ Tc=100℃	7.5	
I_{DM}	Pulsed Drain Current at V_{GS}=10V[2,4]	48	
E_{AS}	Single Pulse Avalanche Energy	1200	mJ
dv/dt	Peak Diode Recovery dv/dt[3]	5.0	V/ns
P_D	Power Dissipation	175	W
	Derating Factor above 25℃	1.4	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 150	

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

Thermal Characteristics

Symbol	Parameter	PTF12N90	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.714	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	65	

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	900	--	--	V	V_{GS}=0V, I_D=250uA
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	uA	V_{DS}=900V, V_{GS}=0V
		--	--	125		V_{DS}=720V, V_{GS}=0V, T_J =125℃
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	V_{GS}=+30V, V_{DS}=0V
		--	--	-100		V_{GS}=-30V, 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	--	0.75	1.0	Ω	V_{GS}=10V, I_D=6A
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	V_{DS}=V_{GS}, I_D=250uA
g_{FS}	Forward Transconductance	--	32	--	S	V_{DS} =25V, I_D=6A

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	3000	--	pF	V_{GS}=0V, V_{DS}=25V, f=1.0MH_Z
C_{rss}	Reverse Transfer Capacitance	--	300	--		
C_{oss}	Output Capacitance	--	250	--		
Q_g	Total Gate Charge	--	83	--	nC	V_{DD}=450V, I_D=12A, V_{GS}=0 to 10V
Q_{gs}	Gate-to-Source Charge	--	18	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	32	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	27	--	ns	V_{DD}=450V, I_D=12A, V_{GS}= 10V R_G=10Ω
t_{rise}	Rise Time	--	80	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	67	--		
t_{fall}	Fall Time	--	79	--		

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]	--	--	12	A	Integral PN-diode in MOSFET
I_{SM}	Pulsed Source Current[2]	--	--	48		
V_{SD}	Diode Forward Voltage	--	--	1.5	V	I_S=12A, V_{GS}=0V
trr	Reverse recovery time	--	550	--	ns	V_{GS}=0V ,I_F=12A, di_F/dt=100A/μs
Qrr	Reverse recovery charge	--	4.5	--	uC	

Note:

[1] T_J=+25℃ to +150℃ .
[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%.

Test Circuits and Waveforms

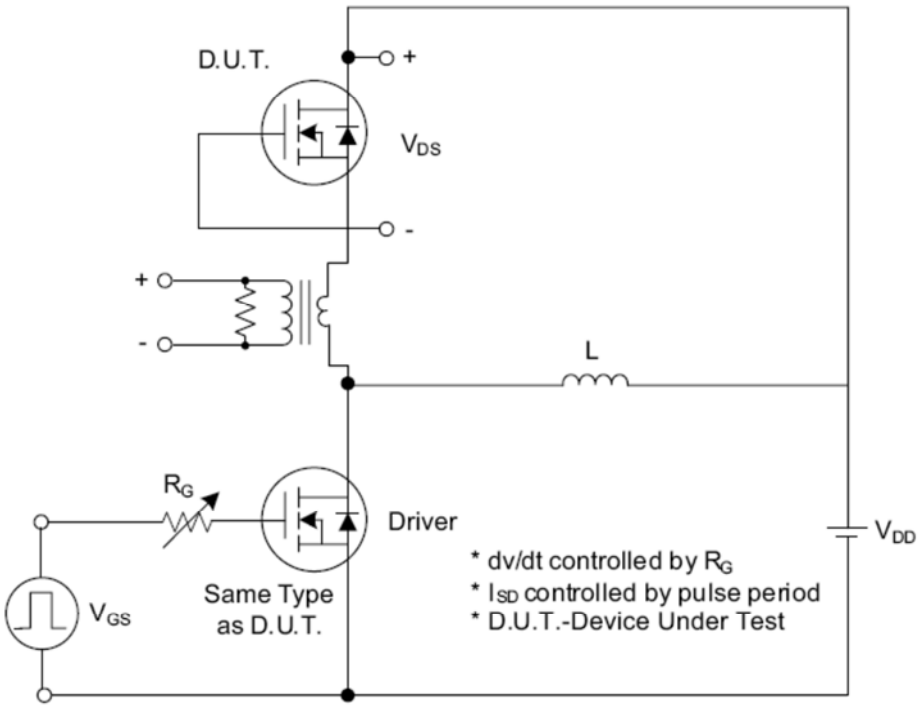


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

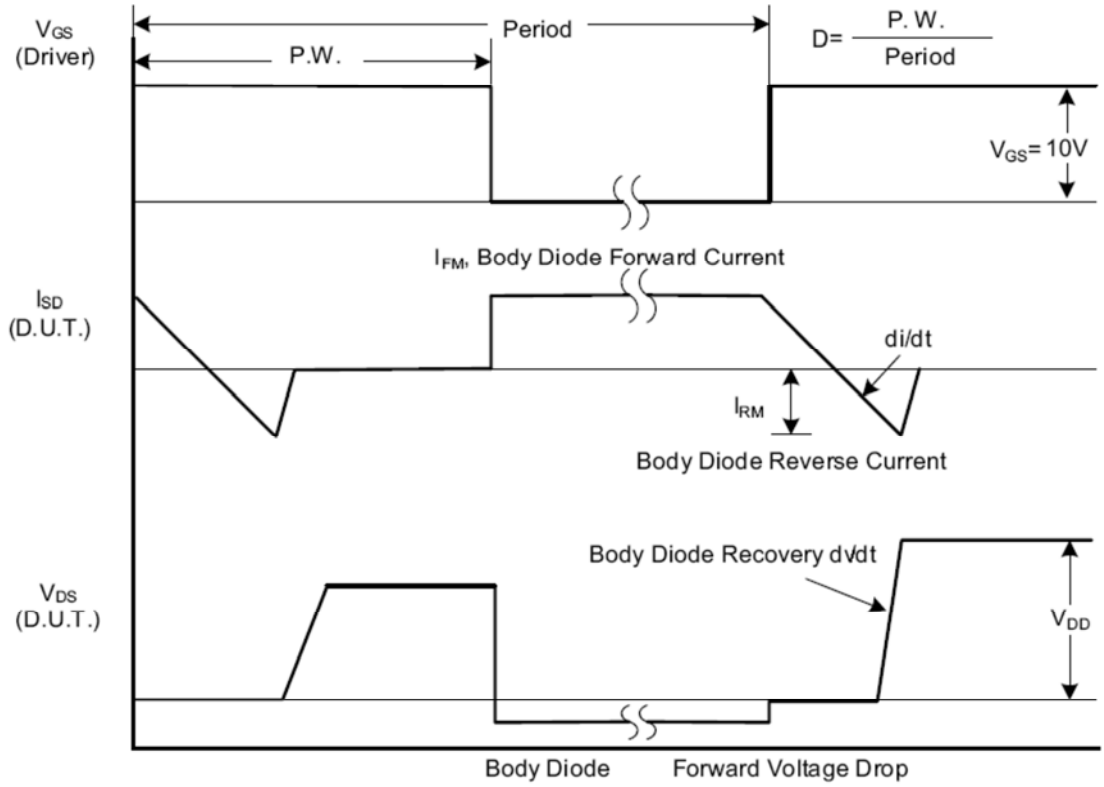


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

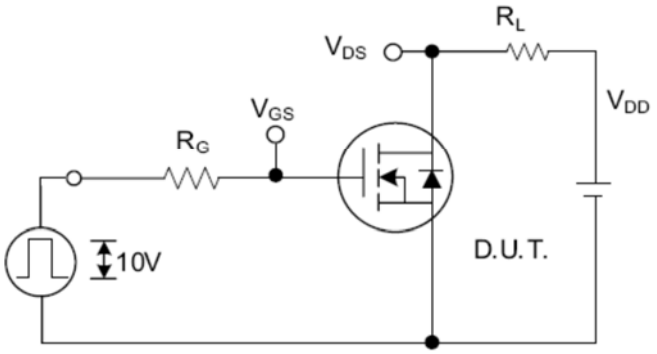


Fig. 2.1 Switching Test Circuit

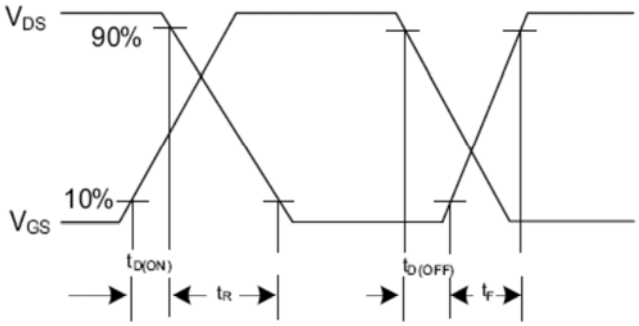


Fig. 2.2 Switching Waveforms

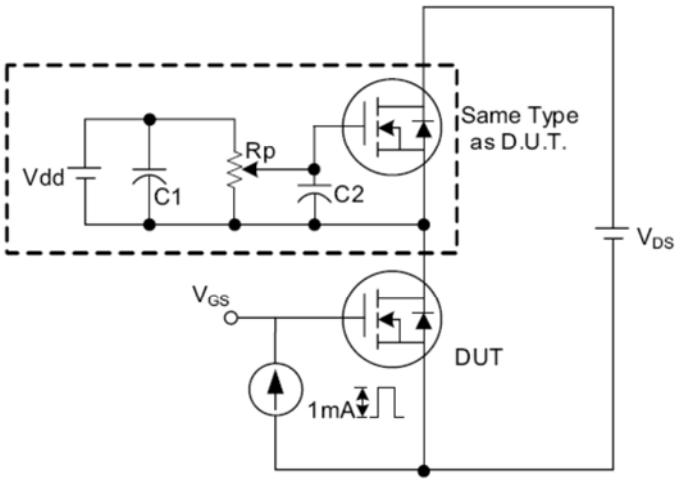


Fig. 3 . 1 Gate Charge Test Circuit

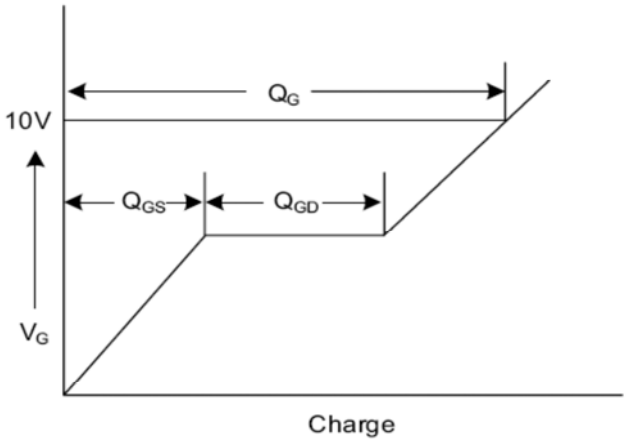


Fig. 3 . 2 Gate Charge Waveform

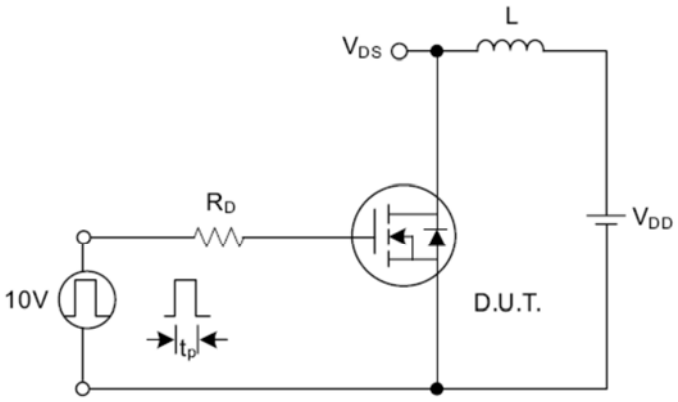


Fig. 4.1 Unclamped Inductive Switching Test Circuit

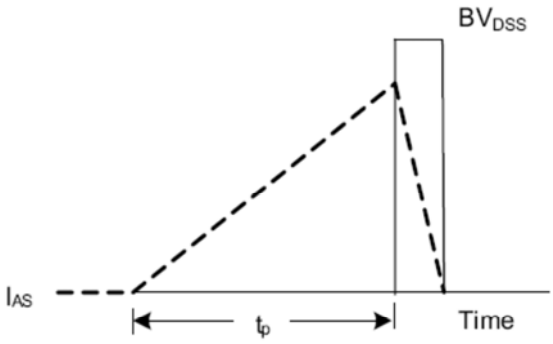


Fig. 4.2 Unclamped Inductive Switching Waveforms

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