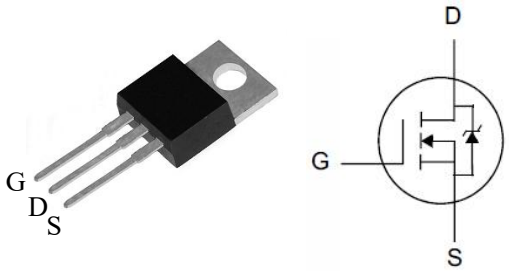
General Features

- Proprietary New Planar Technology
- $R_{DS(ON),typ.}$=3.5m Ω@V_{GS}=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

BV_{DSS}	$R_{DS(ON),typ.}$	I_D
40V	3.5mΩ	162A

Applications

- DC-DC Converters
- DC-AC Inverters
- Power Supply



TO-220

Package No to Scale

Ordering Information

Part Number	Package
IRF1404PBF-CN	TO-220

Absolute Maximum Ratings T_C=25℃ unless otherwise specified

Symbol	Parameter	IRF1404PBF-CN	Unit
V_{DSS}	Drain-to-Source Voltage[1]	40	V
V_{GSS}	Gate-to-Source Voltage	±20	
I_D	Continuous Drain Current	162	A
	Continuous Drain Current	115	
I_{DM}	Pulsed Drain Current at V_{GS}=10V[2]	650	
E_{AS}	Single Pulse Avalanche Energy	520	mJ
P_D	Power Dissipation	203	W
	Derating Factor above 25℃	1.62	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	IRF1404PBF-CN	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.62	℃/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	40	--	--	V	V_{GS}=0V, I_D=250uA
I_{DSS}	Drain-to-Source Leakage Current	--	--	20	uA	V_{DS}=40V, V_{GS}=0V
I_{GSS}	Gate-to-Source Leakage Current	--	--	+200	nA	V_{GS}=+20V, V_{DS}=0V
		--	--	-200		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[2]	--	3.5	4.0	mΩ	V_{GS}=10V, I_D=16A
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	V_{DS}=V_{GS}, I_D=250uA

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	3755	--	pF	V_{GS}=0V, V_{DS}=25V, f=1.0MHz
C_{rss}	Reverse Transfer Capacitance	--	408.2	--		
C_{oss}	Output Capacitance	--	1525	--		
Q_g	Total Gate Charge	--	88.3	--	nC	V_{DD}=32V, I_D=95A, V_{GS}=0 to 10V
Q_{gs}	Gate-to-Source Charge	--	16.2	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	38.1	--		

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	43.28	--	nS	V_{DD}=20V, I_D=95A, V_{GS}= 10V R_G=2.5 Ω
t_{rise}	Rise Time	--	217.8	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	222.3	--		
t_{fall}	Fall Time	--	201.6	--		

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]	--	--	162	A	Integral PN-diode in MOSFET
I_{SM}	Pulsed Source Current[2]	--	--	650		
V_{SD}	Diode Forward Voltage	--	--	1.3	V	I_S=95A, V_{GS}=0V
trr	Reverse recovery time	--	70	--	ns	V_{GS}=0V ,I_F=95A, di_F/dt=100A/μs[3]
Qrr	Reverse recovery charge	--	0.15	--	nC	

Note:

[1] T_J=+25℃ to +150℃ .
[2] Repetitive rating; pulse width limited by maximum junction temperature.
[3] Pulse width≤300μs; duty cycle≤2%.

Typical Characteristics

图1. 输出特性

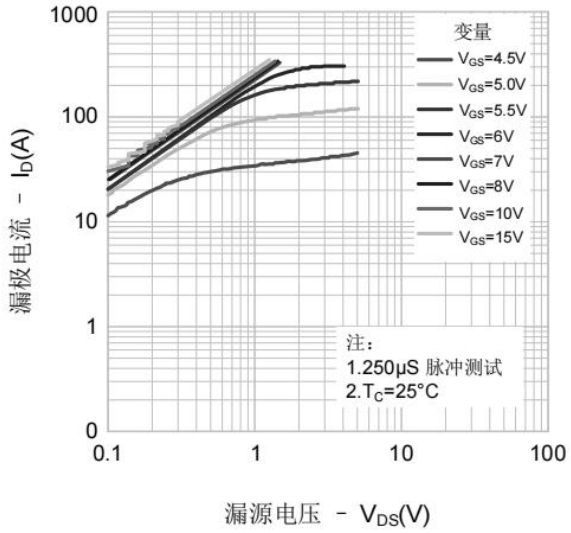


图2. 传输特性

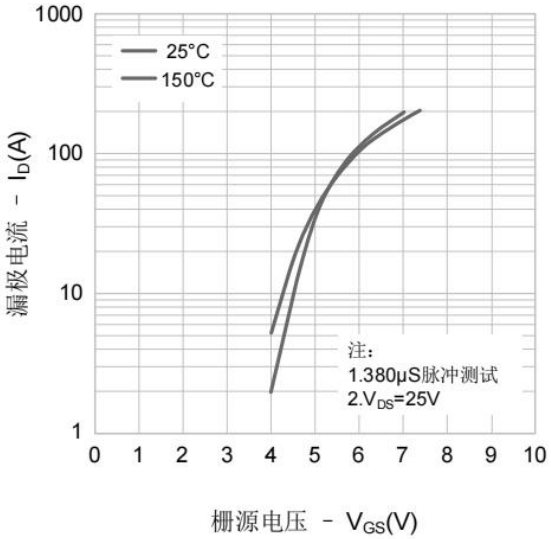


图3. 源漏二极管正向压降

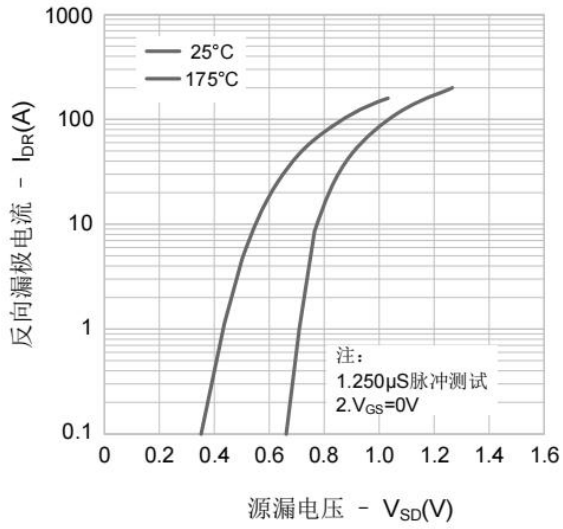


图4. 电容特性

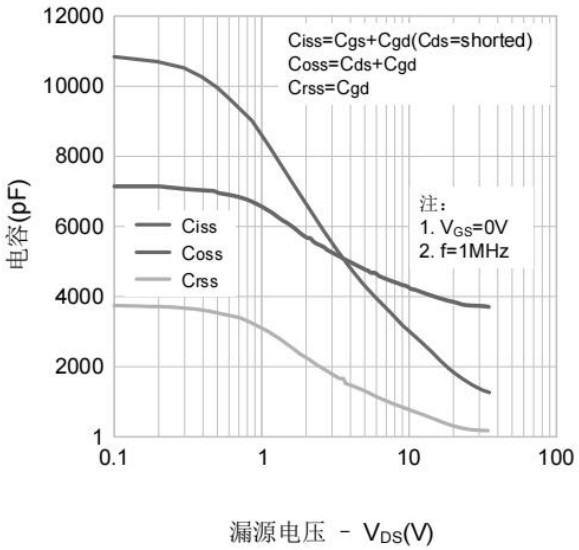


图5. 电荷量特性

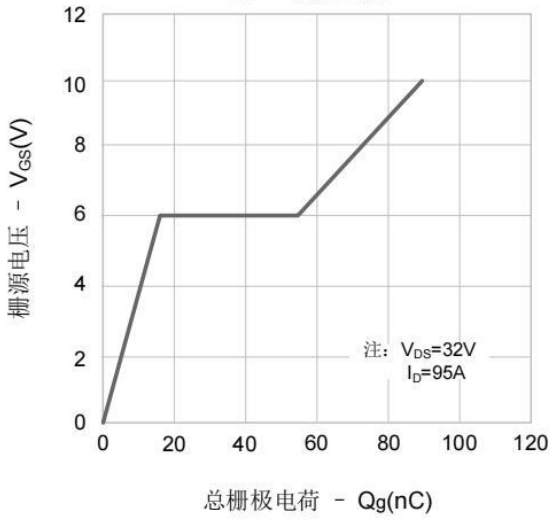
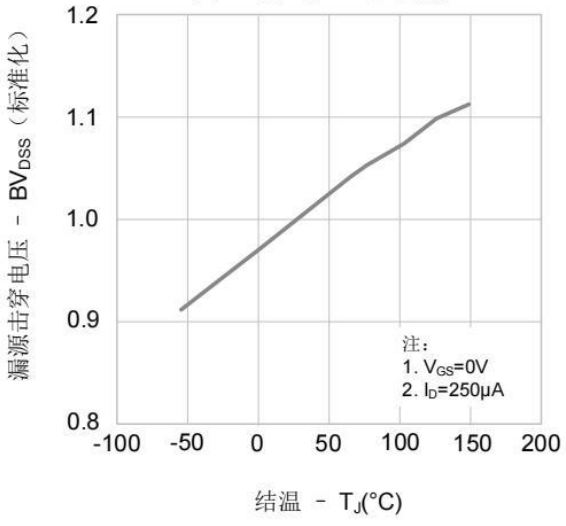


图6. 击穿电压vs.温度特性



Typical Characteristics

图7. 导通电阻vs.温度特性

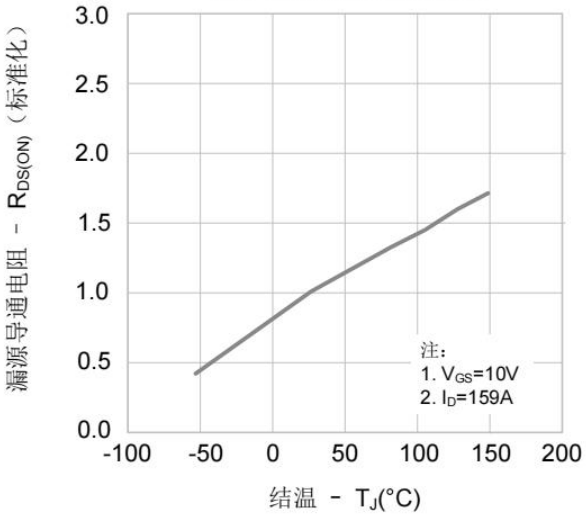


图8. 漏源漏电流vs.温度特性

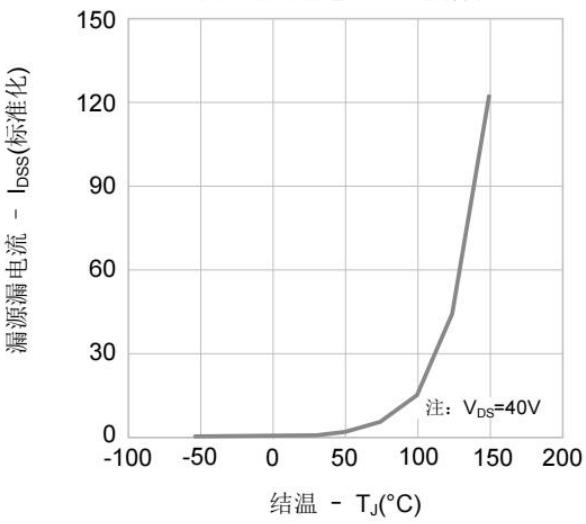


图9. 最大安全工作区域

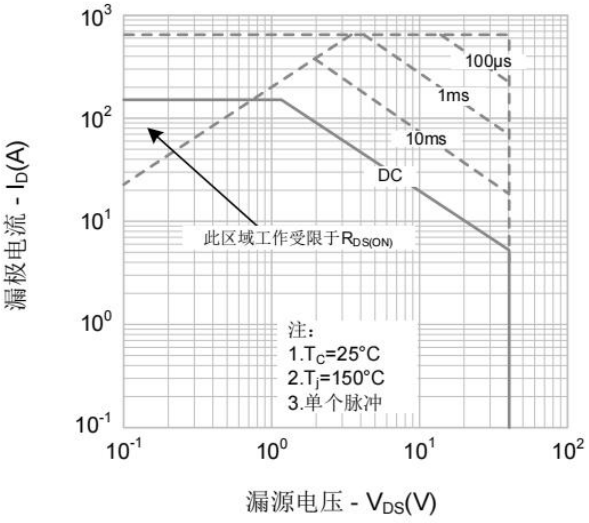
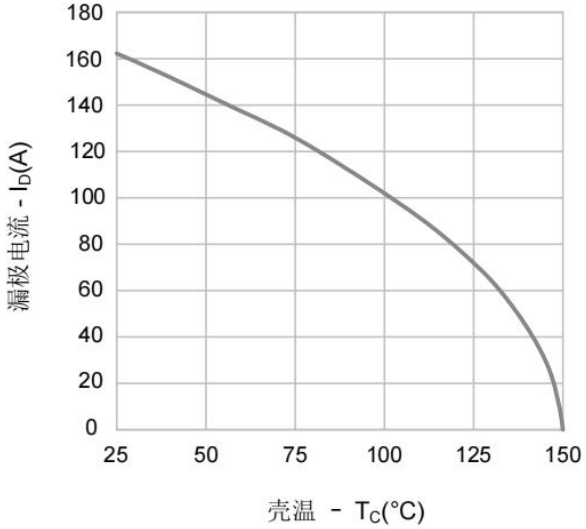


图10. 最大漏极电流vs. 壳温



Test Circuits and Waveforms

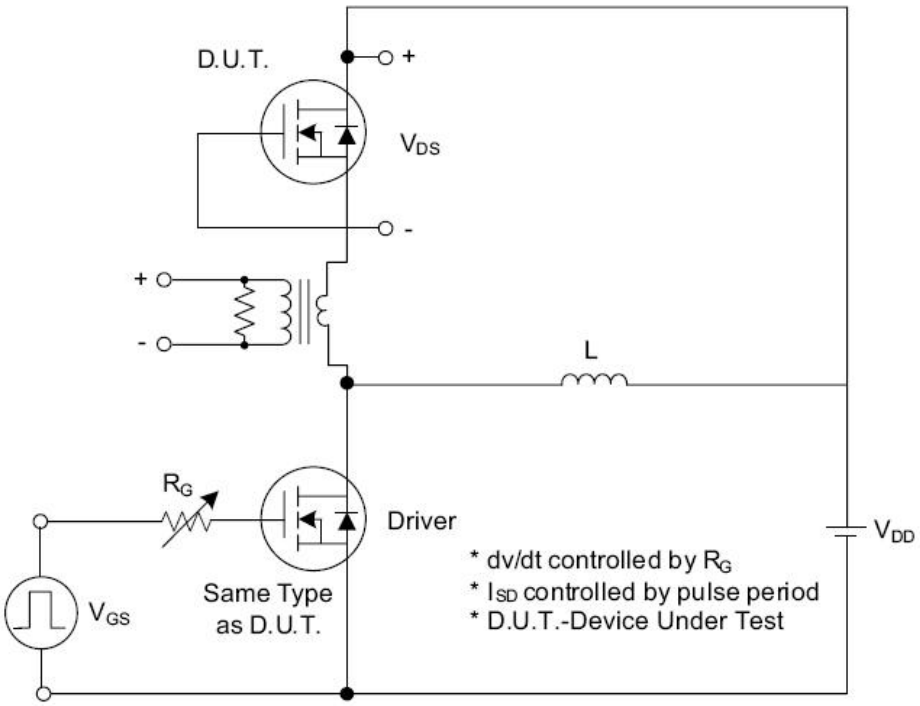


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

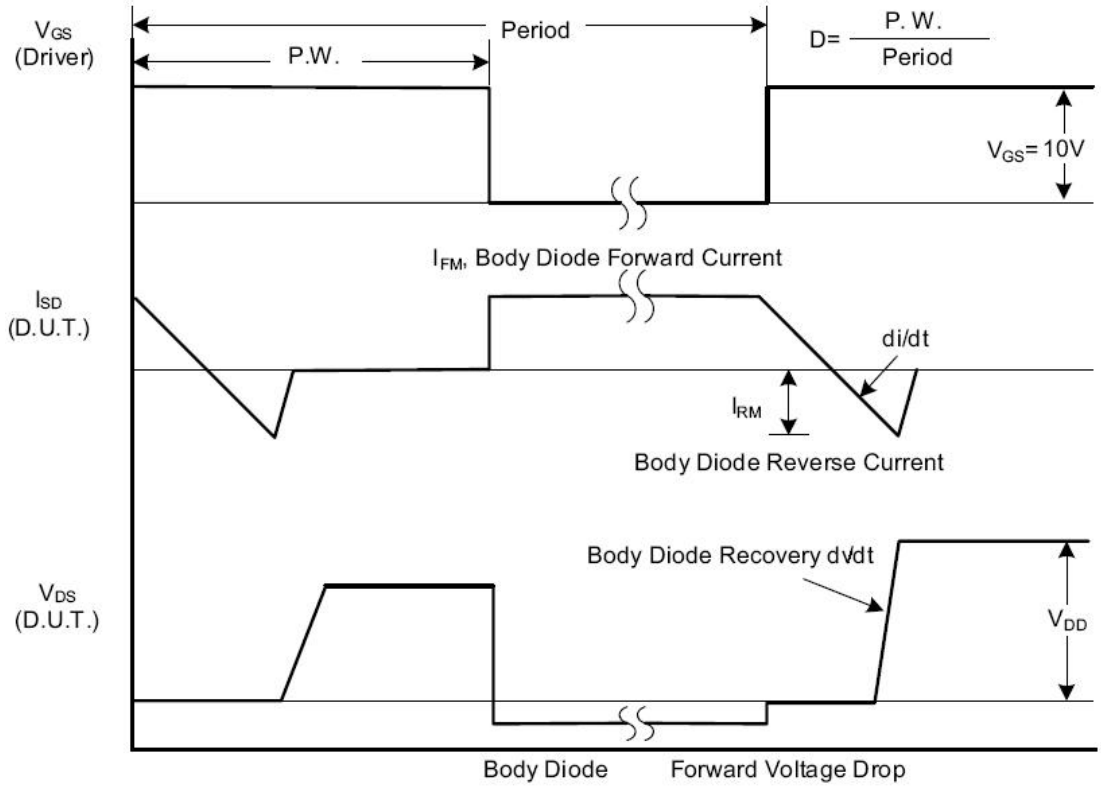


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

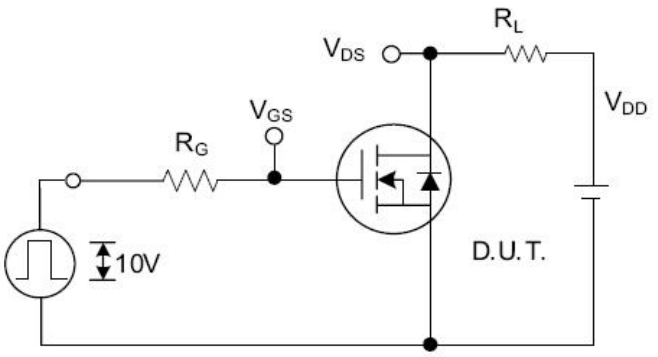


Fig. 2.1 Switching Test Circuit

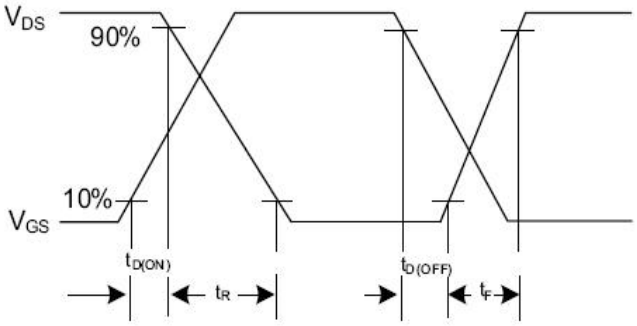


Fig. 2.2 Switching Waveforms

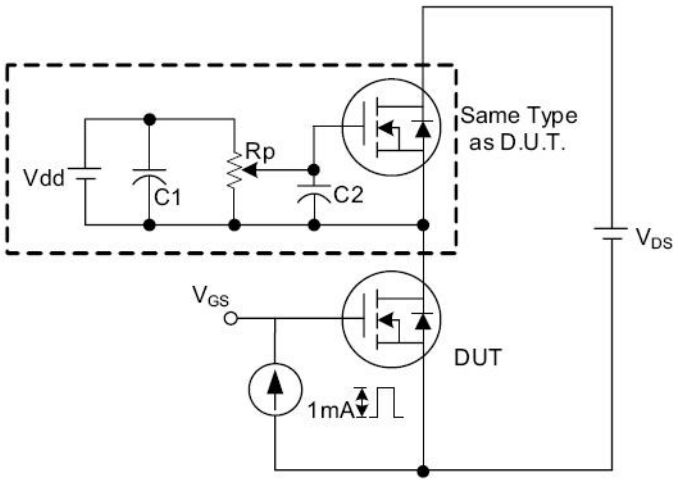


Fig. 3 . 1 Gate Charge Test Circuit

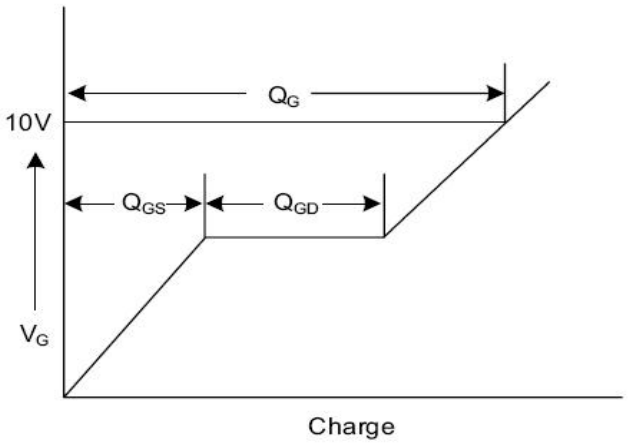


Fig. 3 . 2 Gate Charge Waveform

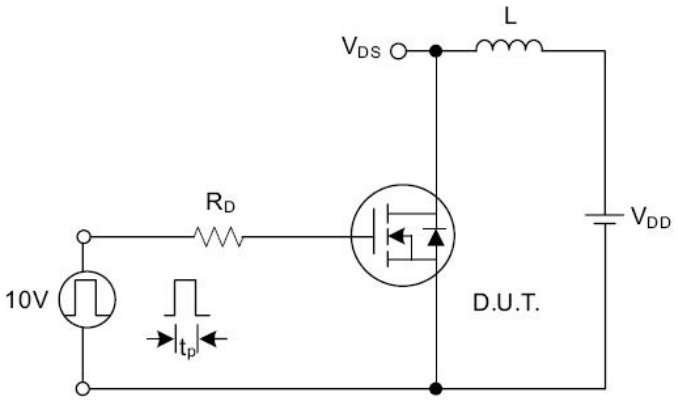


Fig. 4.1 Unclamped Inductive Switching Test Circuit

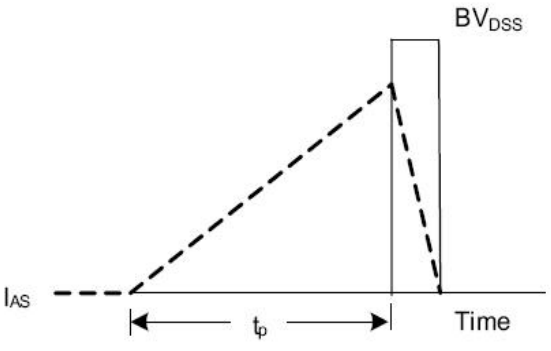


Fig. 4.2 Unclamped Inductive Switching Waveforms

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