



# XTMF95N12F

## 950V N-Channel MOSFET

### Product Description

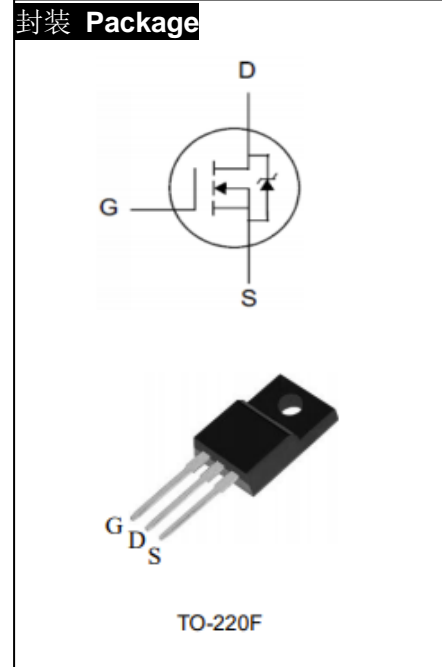
$BV_{DSS}$	950	V
$I_D$	12	A
$R_{DS(ON),Typ.}$	0.75	$\Omega$

### General Features

- Advanced Planar Process
- $R_{DS(ON),typ.}=0.75 \Omega @ V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Rugged Polysilicon Gate Structure

### Applications

- BLDC Motor Driver
- Electric Welder
- SMPS Standby Power



Device	Package	Marking
XTMF95N12F	TO-220F	XTMF95N12F

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

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain-to-Source Voltage	950	V
$V_{GSS}$	Gate-to-Source Voltage	$\pm 30$	
$I_D$	Continuous Drain Current	12	A
$I_{DM}$	Pulsed Drain Current at $V_{GS}=10V$	48	
$E_{AS}$	Single Pulse Avalanche Energy	1200	mJ
$P_D$	Power Dissipation	175	W
	Derating Factor above $25^\circ\text{C}$	1.4	W/ $^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering Leads at 0.063in (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	0.714	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	55	$^{\circ}C/W$

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

### OFF Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	950	-	-	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	-	-	1	$\mu A$	$V_{DS}=950V, V_{GS}=0V$
		-	-	500		$V_{DS}=760V, V_{GS}=0V, T_j=125^{\circ}C$
$I_{GSS}$	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	-	0.75	1.0	$\Omega$	$V_{GS}=10V, I_D=6A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	-	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$g_{FS}$	Forward Transconductance	-	32	-	S	$V_{DS}=25V, I_D=6A$



## Dynamic Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$C_{iss}$	Input Capacitance	-	3000	-	pF	$V_{GS}=0V$ , $V_{DS}=25V$ , $f=1.0MHz$
$C_{rss}$	Reverse Transfer Capacitance	-	76	-		
$C_{oss}$	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

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

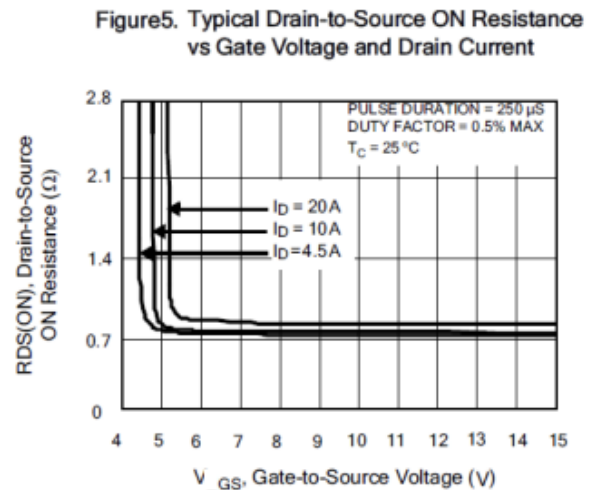
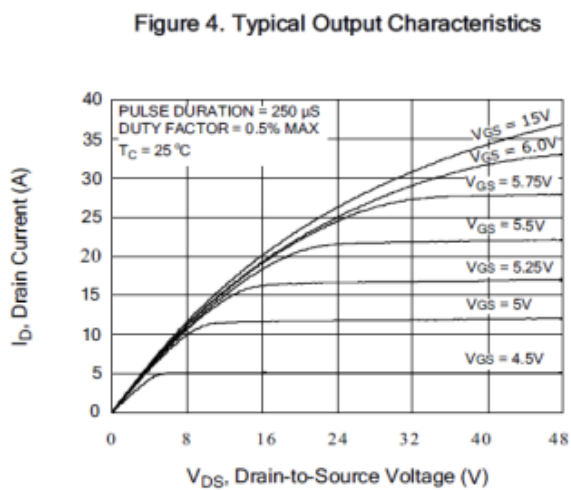
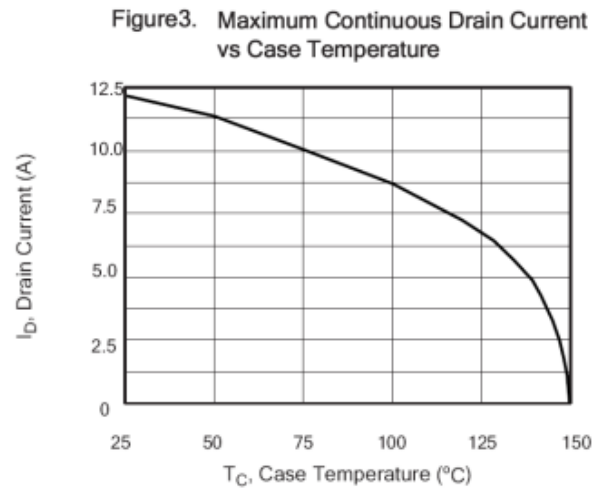
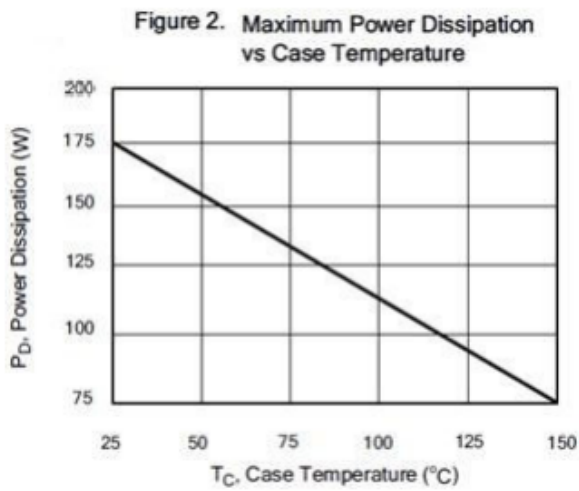
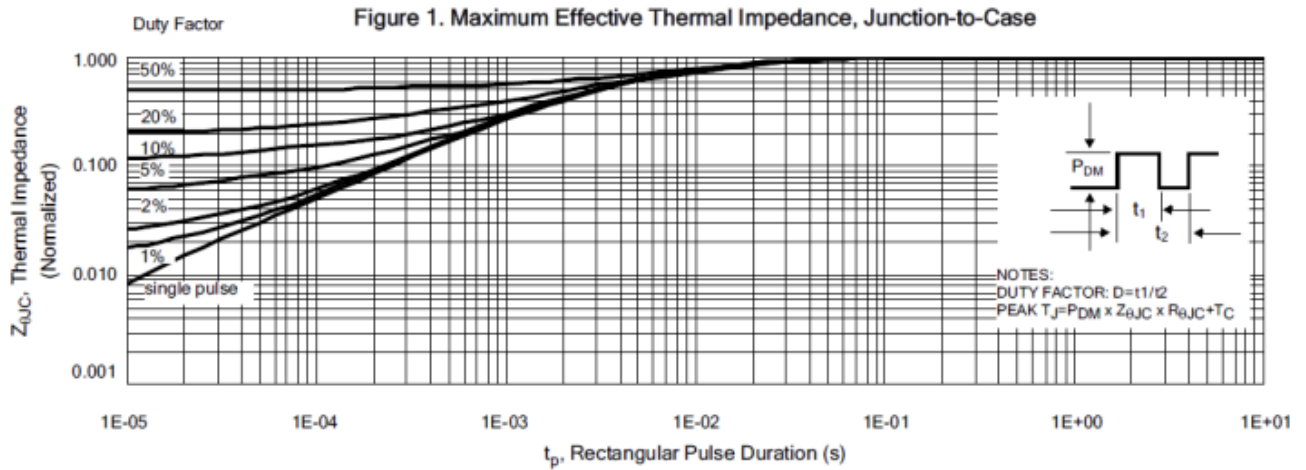
## Source-Drain Body Diode Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$I_{SD}$	Continuous Source Current <sup>[1]</sup>	-	-	12	A	Integral PN-diode in MOSFET
$I_{SM}$	Pulsed Source Current <sup>[1]</sup>	-	-	48		
$V_{SD}$	Diode Forward Voltage	-	-	1.5	V	$I_S=12A$ , $V_{GS}=0V$
$t_{rr}$	Reverse Recovery Time	-	550	-	ns	$V_{GS}=0V$ $I_F=12A$ , $di_F/dt=100A/\mu s$
$Q_{rr}$	Reverse Recovery Charge	-	4.5	-	uC	

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



## Typical Characteristics





### Typical Characteristics(Cont.)

Figure 6. Maximum Peak Current Capability

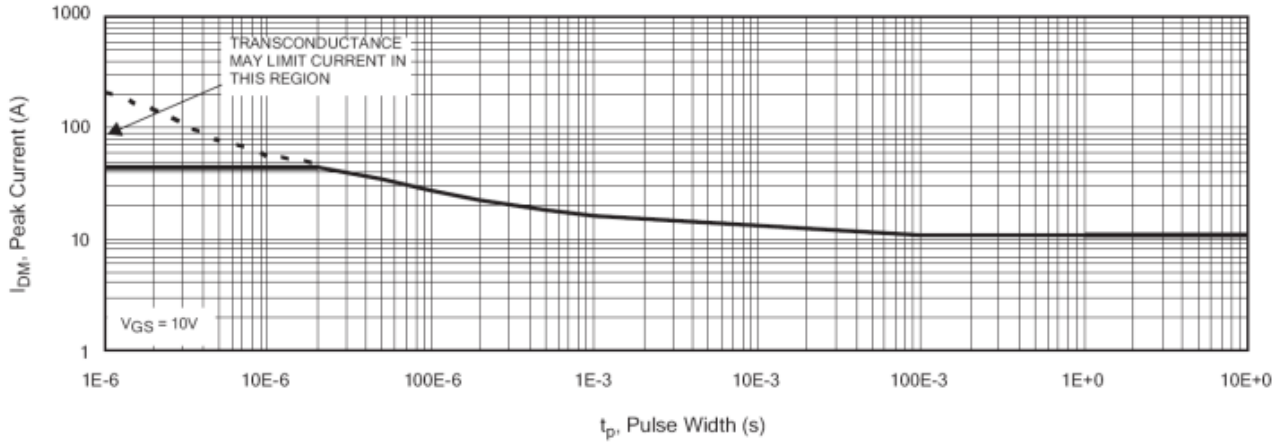


Figure 7. Typical Transfer Characteristics

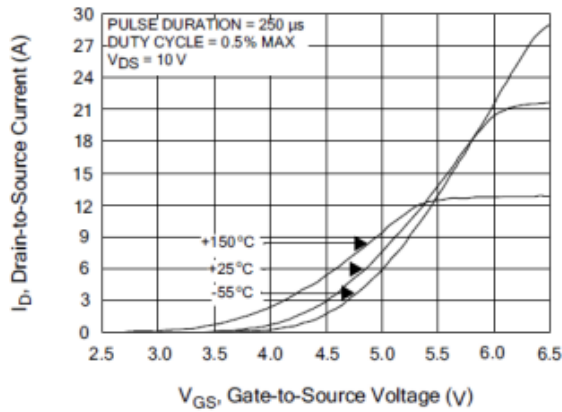


Figure 8. Undamped Inductive Switching Capability

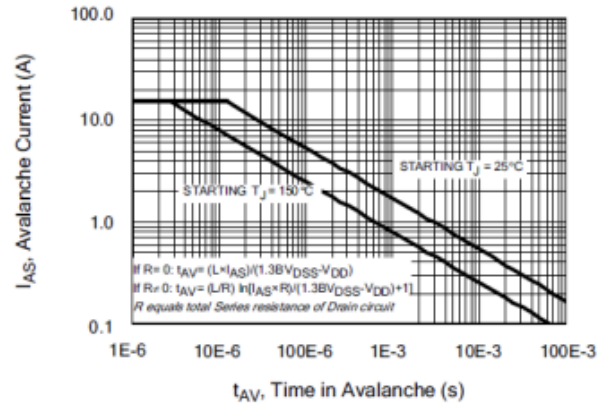


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

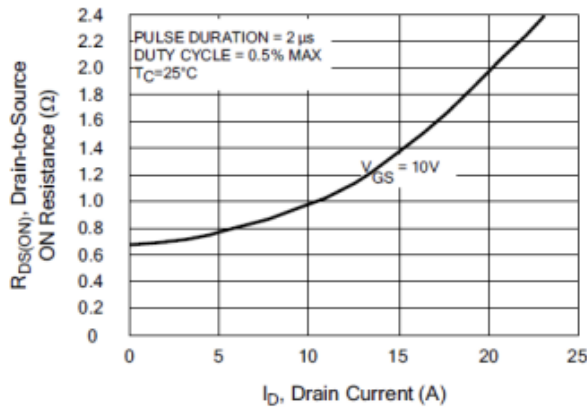
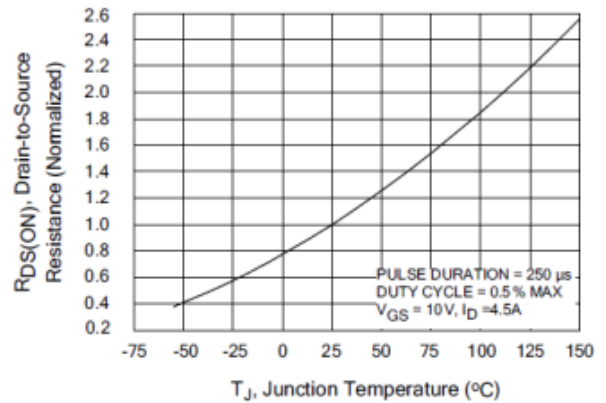


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature





### Typical Characteristics(Cont.)

Figure 11. Typical Breakdown Voltage vs Junction Temperature

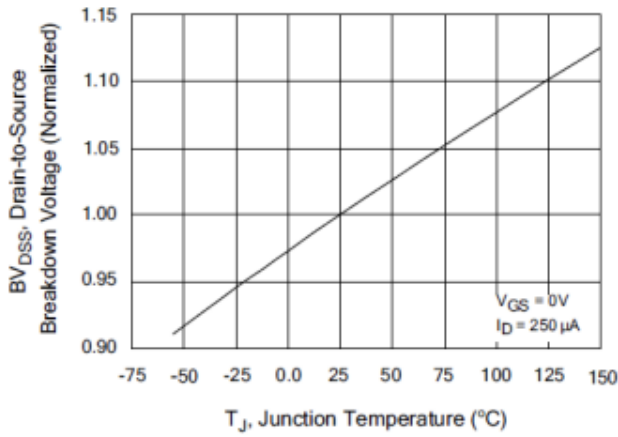


Figure 12. Typical Threshold Voltage vs Junction Temperature

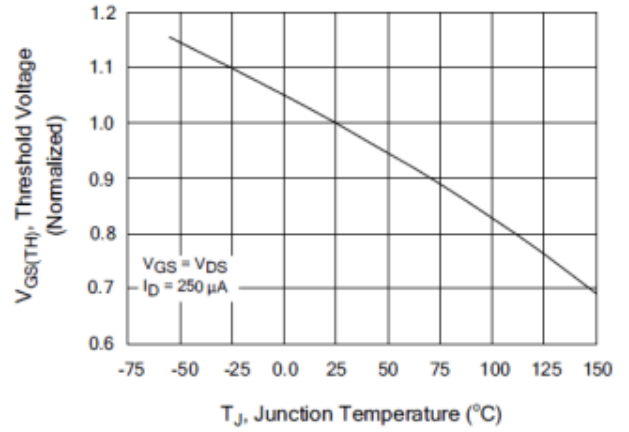


Figure 13. Maximum Forward Bias Safe Operating Area

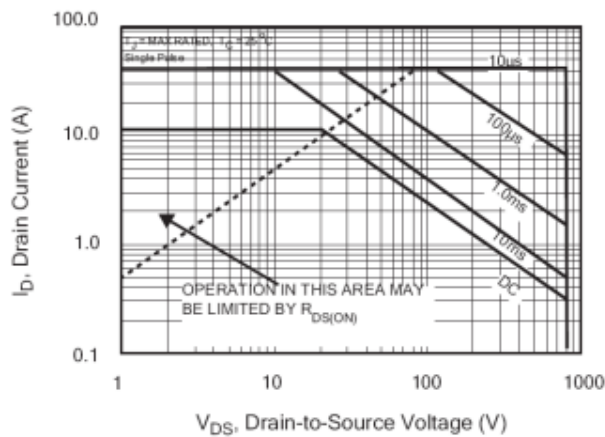
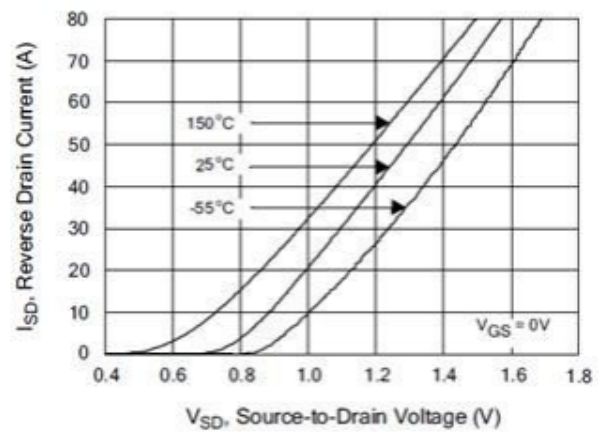


Figure 14 Typical Body Diode Transfer Characteristics





Typical Characteristics(Cont.)

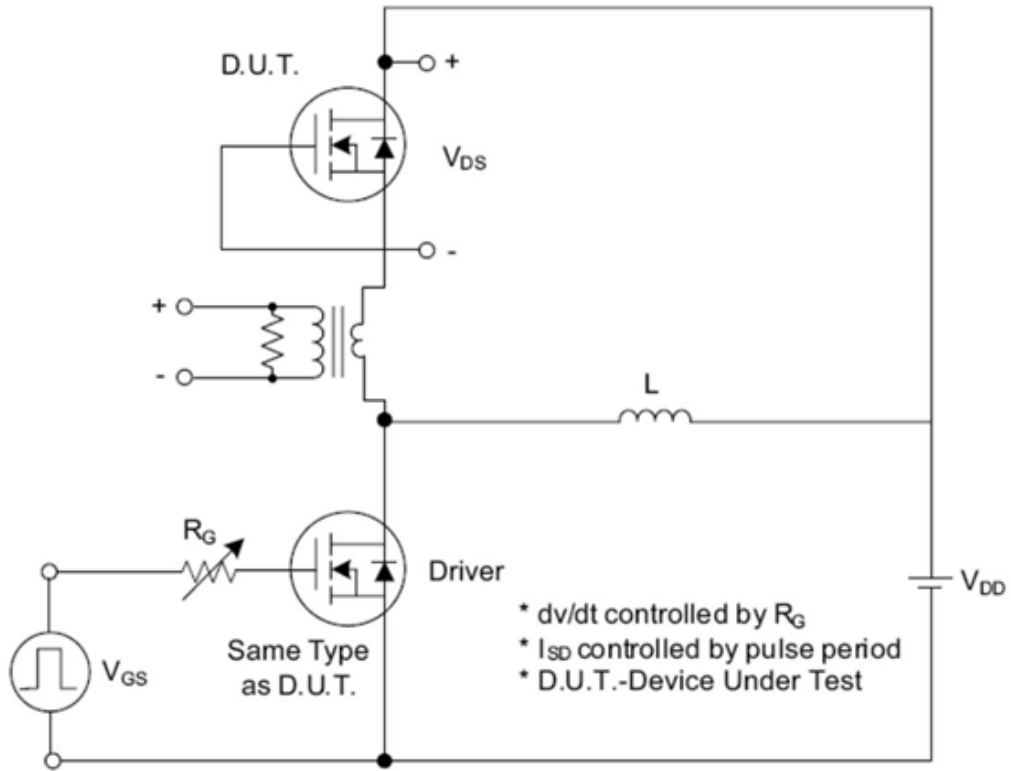


Fig. 1.1 Peak Diode Recovery  $dv/dt$  Test Circuit

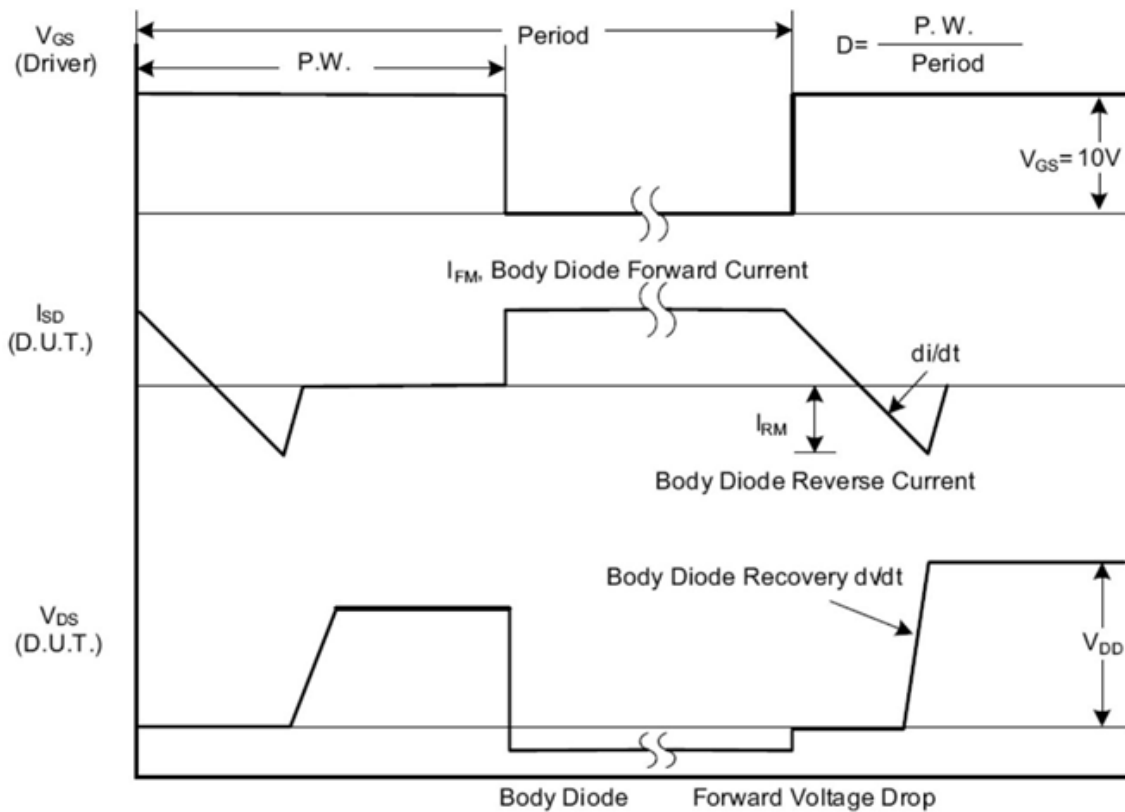


Fig. 1.2 Peak Diode Recovery  $dv/dt$  Waveforms



Test Circuits and Waveforms (Cont.)

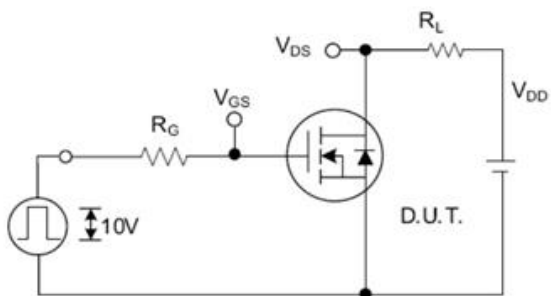


Fig. 2.1 Switching Test Circuit

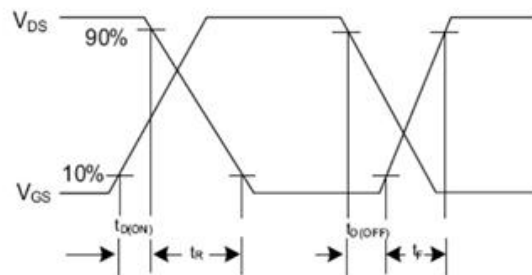


Fig. 2.2 Switching Waveforms

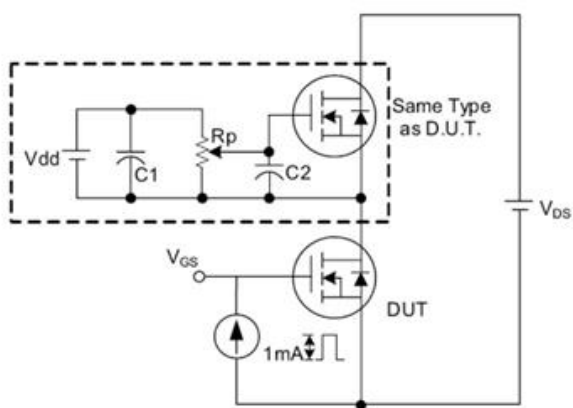


Fig. 3.1 Gate Charge Test Circuit

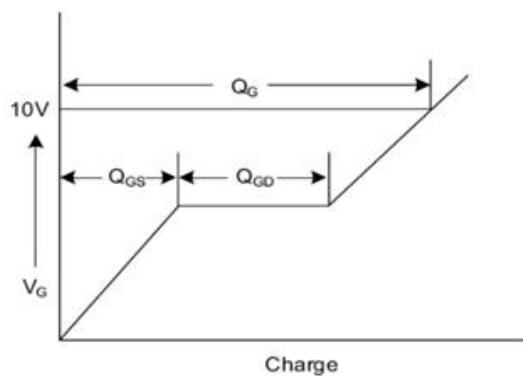


Fig. 3.2 Gate Charge Waveform

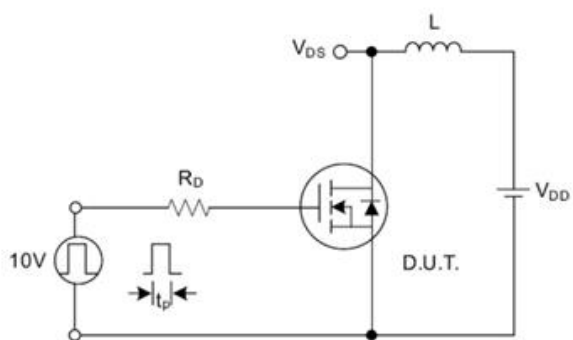


Fig. 4.1 Unclamped Inductive Switching Test Circuit

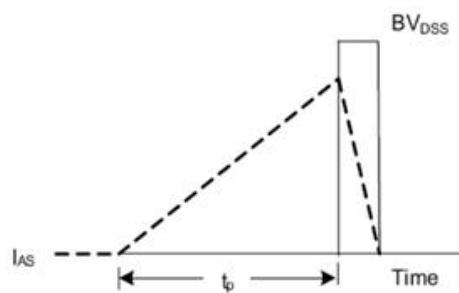


Fig. 4.2 Unclamped Inductive Switching Waveforms