



# XTMS60R160F1

## 600V N-ch Planar MOSFET

### Product Description

$BV_{DSS}$	600	V
$I_D$	20	A
$R_{DS(ON),Typ.}$	0.16	$\Omega$

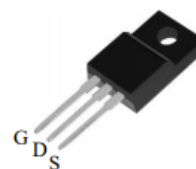
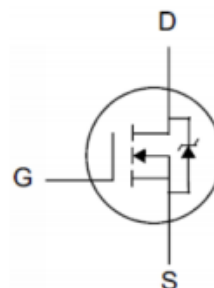
### General Features

- RoHS Compliant
- $R_{DS(ON),typ.}=0.16\Omega@V_{GS}=10V$
- Fast Recovery Body Diode
- Low Gate Charge Minimize Switching Loss

### Applications

- Adaptor
- Charger
- SMPS Standby Power

### 封装 Package



TO-220

Device	Package	Marking
XTMS60R160F1	TO-220	XTMS60R160F1

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

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain-to-Source Voltage	600	V
$V_{GSS}$	Gate-to-Source Voltage	$\pm 30$	
$I_D$	Continuous Drain Current	20	A
$I_{DM}$	Pulsed Drain Current at $V_{GS}=10V$	80	
$E_{AS}$	Single Pulse Avalanche Energy	663	mJ
$P_D$	Power Dissipation	45	W
	Derating Factor above $25^\circ\text{C}$	663	W/ $^\circ\text{C}$
$T_J \& T_{STG}$	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

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	2.8	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^{\circ}\text{C}/\text{W}$

## 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	600	-	-	V	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$
$I_{DSS}$	Drain-to-Source Leakage Current	-	-	1.0	uA	$V_{DS}=600\text{V}, V_{GS}=0\text{V}$
		-	3.0	-		$V_{DS}=600\text{V}, V_{GS}=0\text{V}, T_j=125^{\circ}\text{C}$
$I_{GSS}$	Gate-to-Source Leakage Current	-	-	+100	nA	$V_{GS}=+30\text{V}, V_{DS}=0\text{V}$
		-	-	-100		$V_{GS}=-30\text{V}, V_{DS}=0\text{V}$

### ON Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	-	0.16	0.19	$\Omega$	$V_{GS}=10\text{V}, I_D=10\text{A}$
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	-	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$



**Dynamic Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$C_{iss}$	Input Capacitance	-	1776	-	pF	$V_{GS}=0V,$ $V_{DS}=100V,$ $f=1.0MHz$
$C_{rss}$	Reverse Transfer Capacitance	-	65	-		
$C_{oss}$	Output Capacitance	-	1.2	-		
$Q_g$	Total Gate Charge	-	46	-	nC	$V_{DD}=480V,$ $I_D=20A, V_{GS}=10V$
$Q_{gs}$	Gate-to-Source Charge	-	15	-		
$Q_{gd}$	Gate-to-Drain (Miller) Charge	-	20	-		

**Resistive Switching Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$t_{d(ON)}$	Turn-on Delay Time	-	30	-	ns	$V_{DD}=3000V,$ $I_D=20A,$ $V_{GS}=10V$ $R_g=250\Omega$
$t_{rise}$	Rise Time	-	64	-		
$t_{d(OFF)}$	Turn-Off Delay Time	-	119	-		
$t_{fall}$	Fall Time	-	49	-		

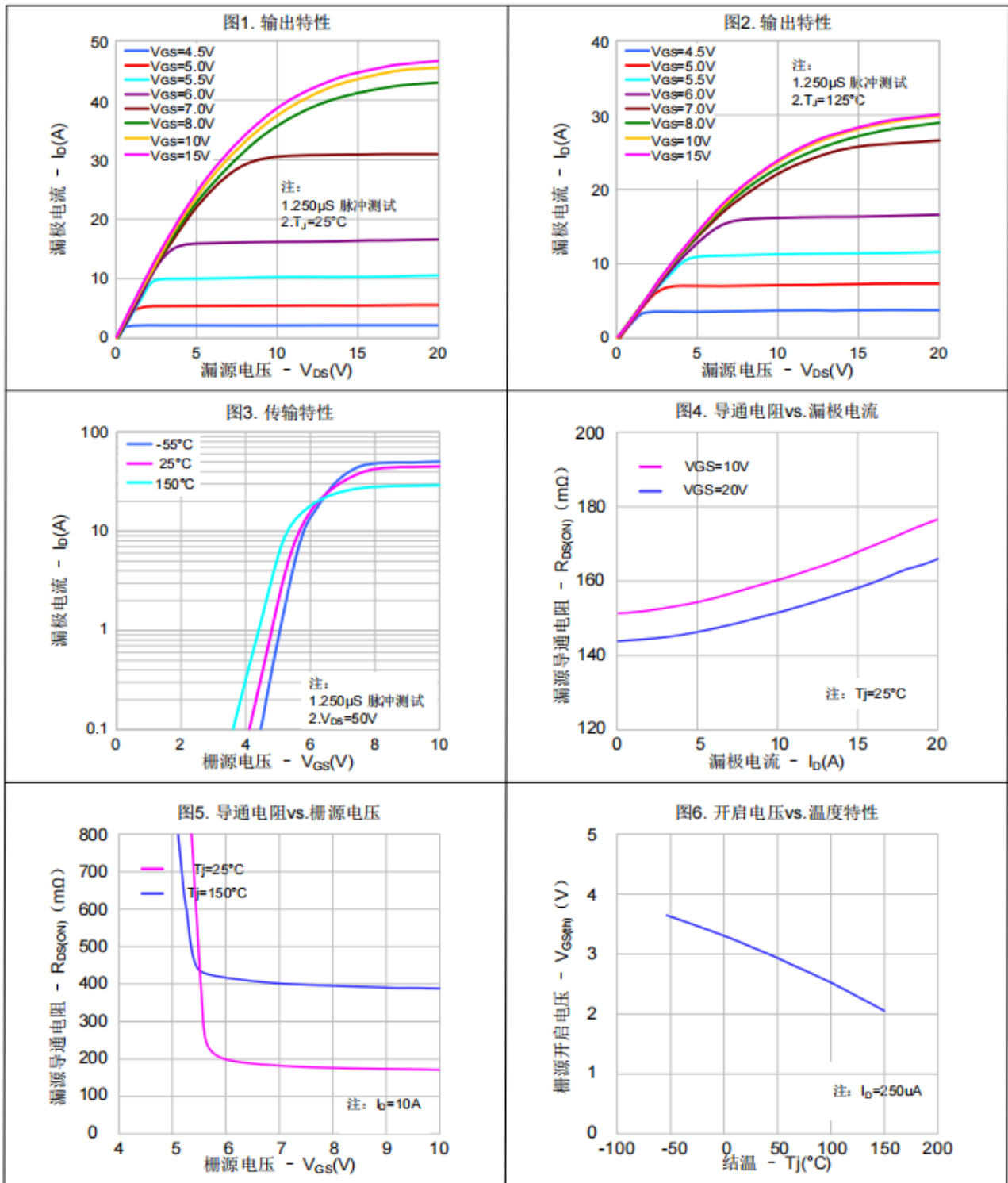
**Source-Drain Body Diode Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
$V_{SD}$	Diode Forward Voltage	-	-	1.4	V	$I_S=20A, V_{GS}=0V$
$t_{rr}$	Reverse Recovery Time	-	385	-	ns	$V_{GS}=0V, I_S=20A,$ $di/dt=100A/\mu s$
$Q_{rr}$	Reverse Recovery Charge	-	5.8	-	uC	

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

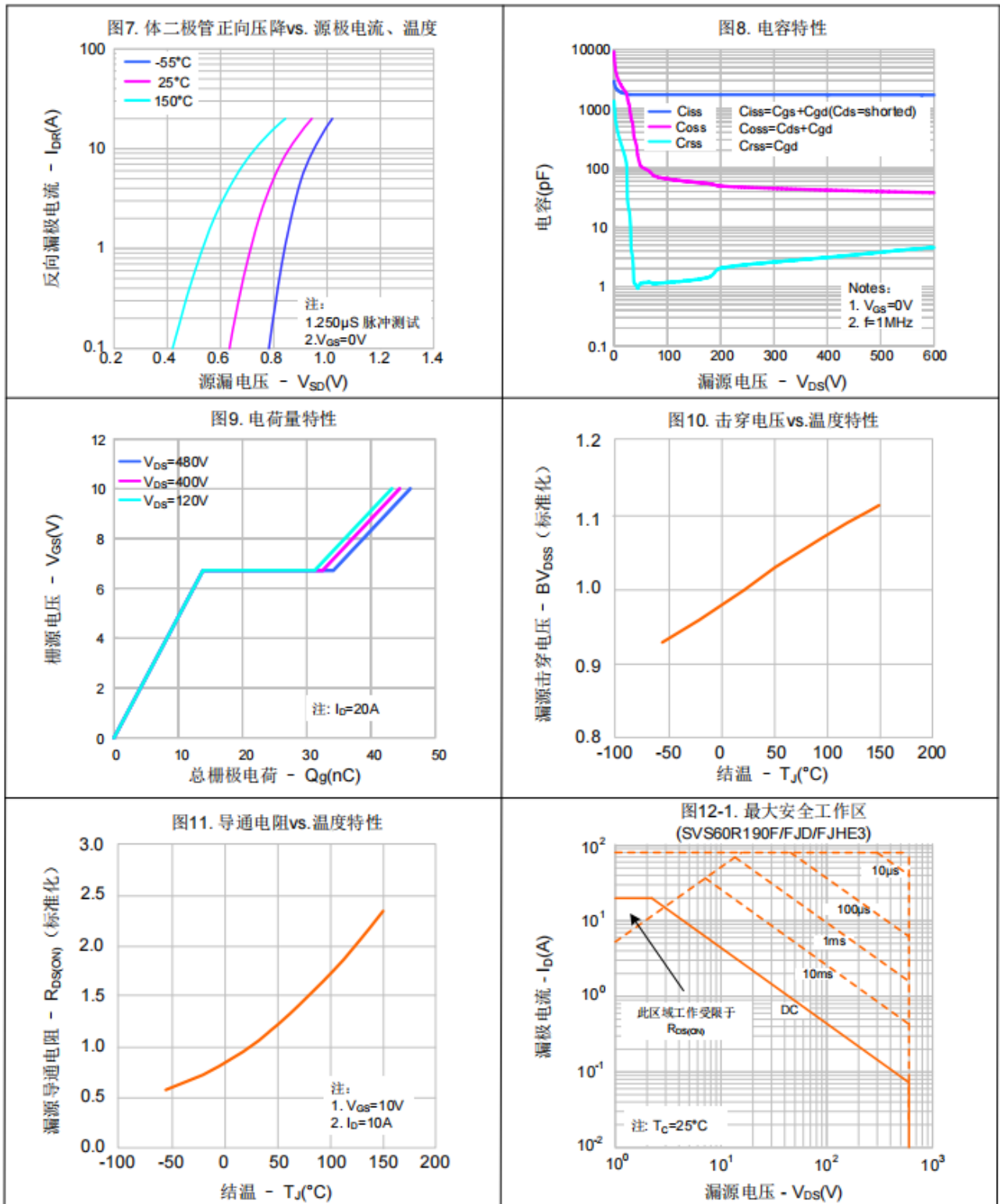


### Typical Characteristics



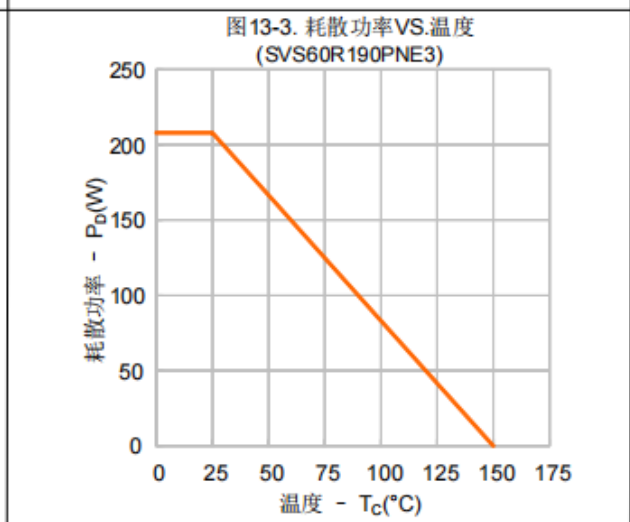
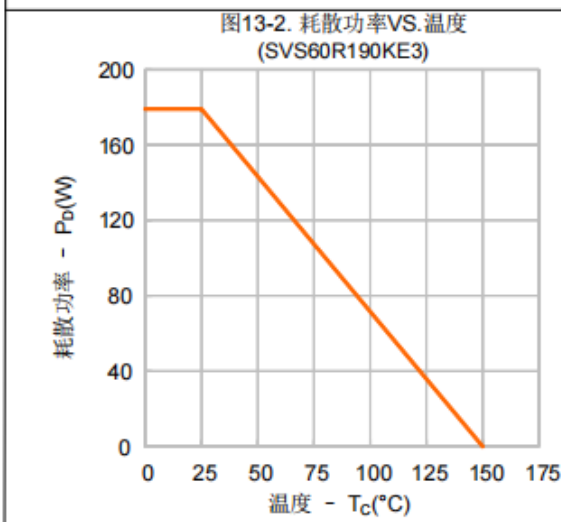
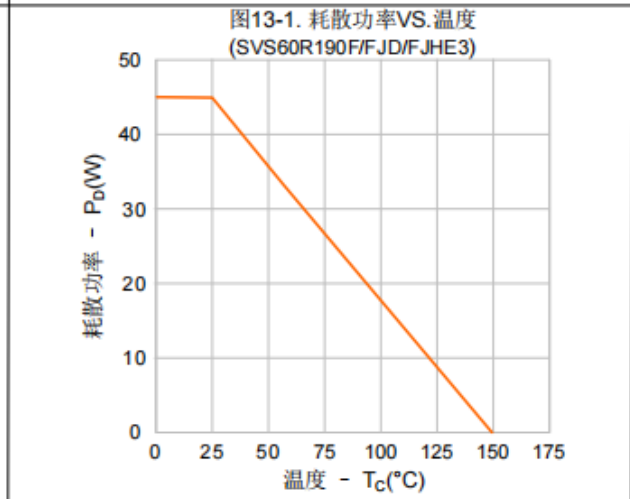
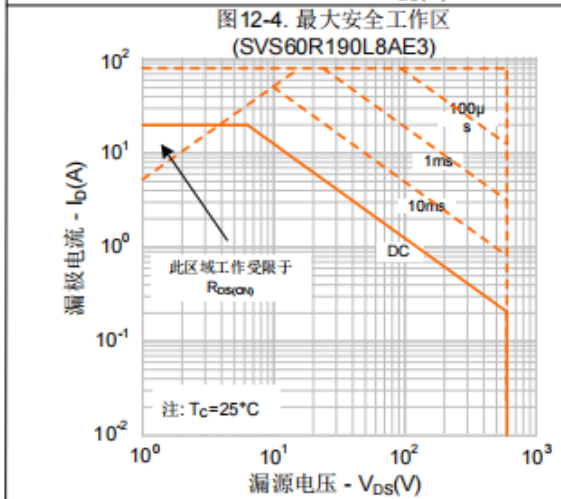
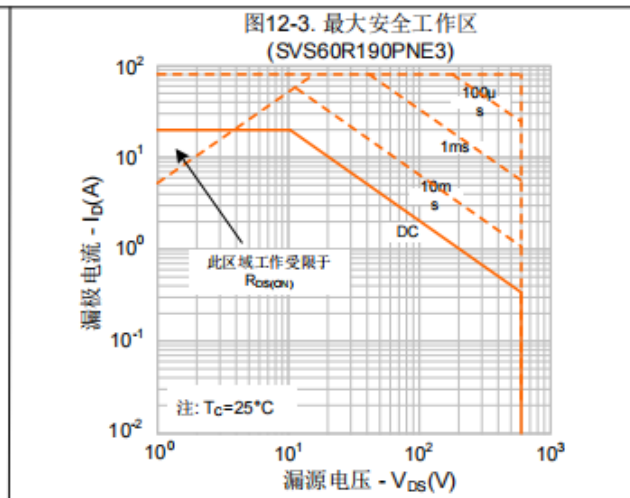
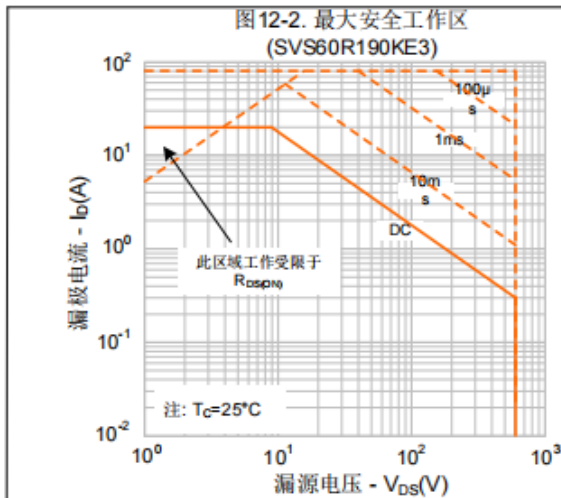


Typical Characteristics(Cont.)



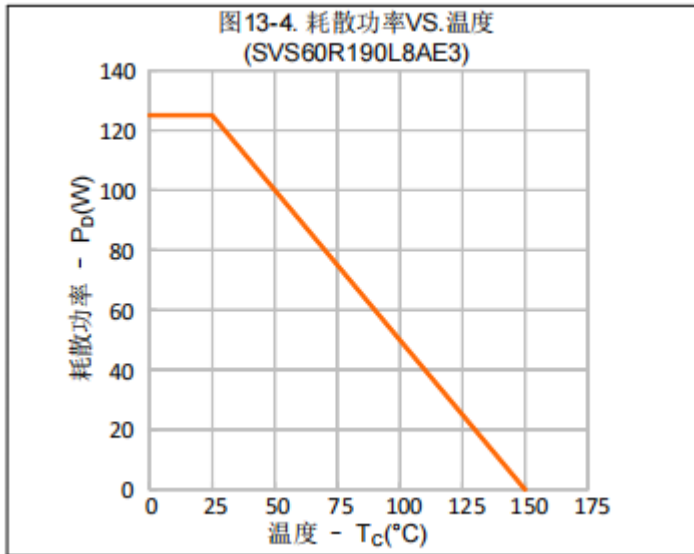


Typical Characteristics(Cont.)





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Test Circuits and Waveforms

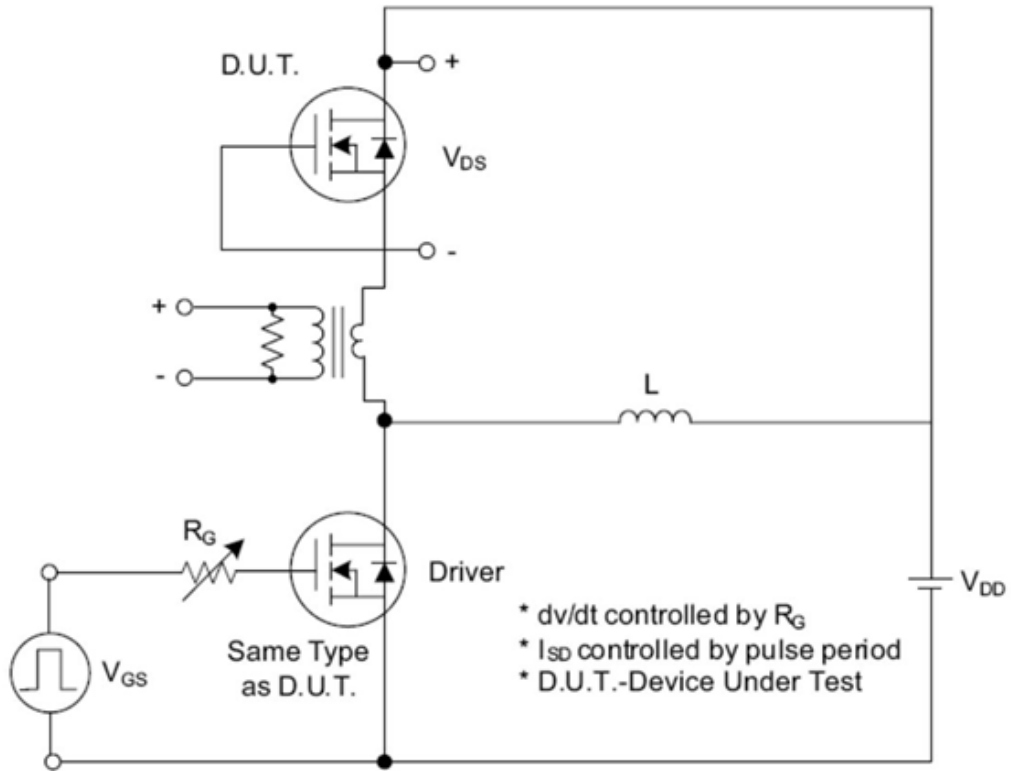


Fig. 1.1 Peak Diode Recovery  $dv/dt$  Test Circuit

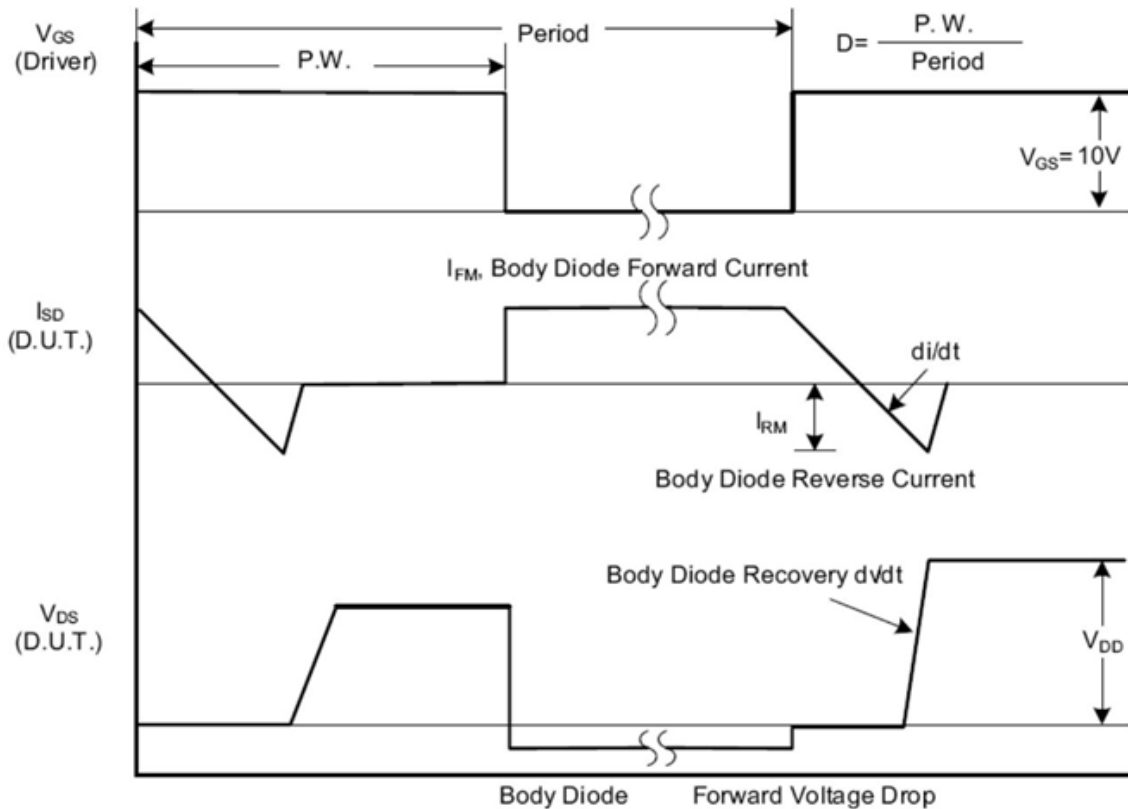


Fig. 1.2 Peak Diode Recovery  $dv/dt$  Waveforms





Test Circuits and Waveforms (Cont.)

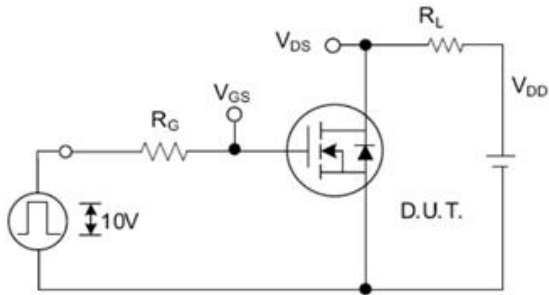


Fig. 2.1 Switching Test Circuit

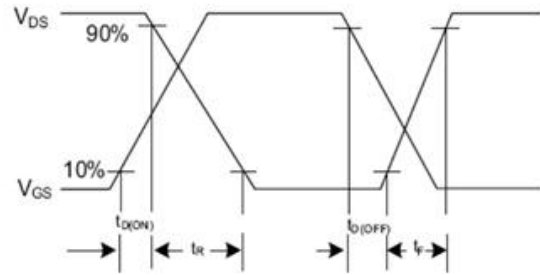


Fig. 2.2 Switching Waveforms

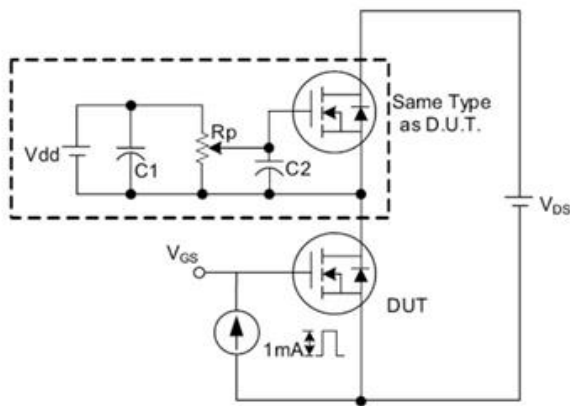


Fig. 3.1 Gate Charge Test Circuit

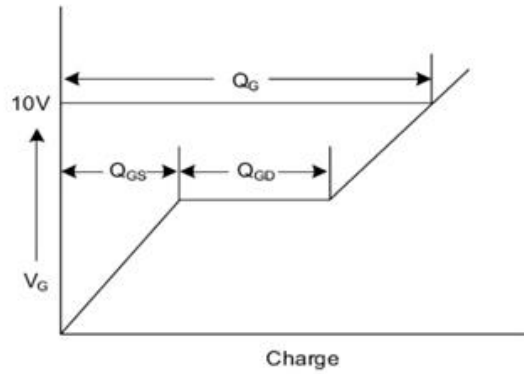


Fig. 3.2 Gate Charge Waveform

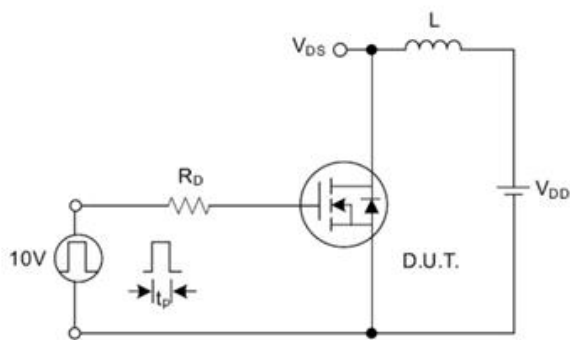


Fig. 4.1 Unclamped Inductive Switching Test Circuit

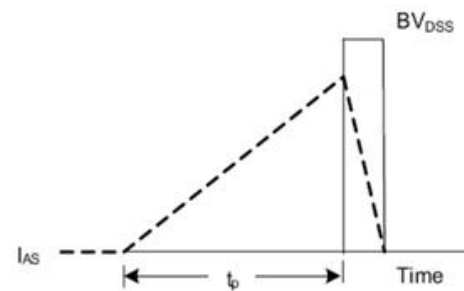


Fig. 4.2 Unclamped Inductive Switching Waveforms