

## 1200V N-chPlanar MOSFET

### General Features

- RoHS Compliant
- $R_{DS(ON),typ.} = 6\Omega @ V_{GS} = 10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

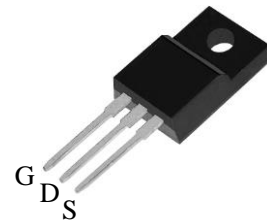
$BV_{DSS}$	$R_{DS(ON),typ.}$	$I_D$
1200V	6Ω	3.0A

### Applications

- Adaptor
- Charger
- SMPS Standby Power

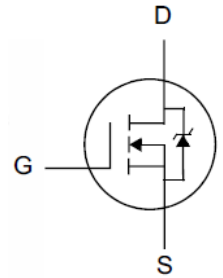
### Ordering Information

Part Number	Package
SK03N120B-TF	TO-220F



TO-220F

Package No to Scale



### Absolute Maximum Ratings

$T_C = 25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter		Unit
$V_{DSS}$	Drain-to-Source Voltage	1200	V
$V_{GSS}$	Gate-to-Source Voltage	±30	
$I_D$	Continuous Drain Current	3.0	A
$I_{DM}$	Pulsed Drain Current at $V_{GS} = 10V$	12	
$E_{AS}$	Single Pulse Avalanche Energy	100	mJ
dv/dt	Peak Diode Recovery dv/dt <sup>[3]</sup>	5.0	V/ns
$P_D$	Power Dissipation	30	W
	Derating Factor above 25°C	0.24	W/°C
$T_L$	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300	°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		Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.17	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	100	

## Electrical Characteristics

### OFF Characteristics

 $T_J = 25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	1200	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	1	$\mu A$	$V_{DS}=1200V, V_{GS}=0V$
		--	--	100		$V_{DS}=960V, V_{GS}=0V, T_J=125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Leakage Current	--	--	+100	$nA$	$V_{GS}=+30V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-30V, V_{DS}=0V$

### ON Characteristics

 $T_J = 25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	6.0	7.5	$\Omega$	$V_{GS}=10V, I_D=1.5A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.5	--	4.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
gfs	Forward Transconductance	--	4	--	S	$V_{DS}=20V, I_D=1.5A$

### Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$C_{iss}$	Input Capacitance	--	860	--	$pF$	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$
$C_{rss}$	Reverse Transfer Capacitance	--	22	--		
$C_{oss}$	Output Capacitance	--	60	--		
$Q_g$	Total Gate Charge	--	17.5	--	$nC$	$V_{DD}=600V, I_D=3A, V_{GS}=0 \text{ to } 10V$
$Q_{gs}$	Gate-to-Source Charge	--	5	--		
$Q_{gd}$	Gate-to-Drain (Miller) Charge	--	5.5	--		

### Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	17	--	$ns$	$V_{DD}=600V, I_D=3A, V_{GS}=10V, R_g=4.7\Omega$
$t_{rise}$	Rise Time	--	6	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	23	--		
$t_{fall}$	Fall Time	--	11	--		

**Source-Drain Body Diode Characteristics**  $T_J=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
$I_{SD}$	Continuous Source Current <sup>[2]</sup>	--	--	3	A	Integral pn-diode in MOSFET
$I_{SM}$	Pulsed Source Current <sup>[2]</sup>	--	--	12		
$V_{SD}$	Diode Forward Voltage	--	--	1.5	V	$I_S=3\text{A}$ , $V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	--	200	--	ns	$V_{GS}=0\text{V}$ $I_F=I_S$ , $di/dt=100\text{A}/\mu\text{s}$
$Q_{rr}$	Reverse Recovery Charge	--	760	--	nC	

Typical Characteristics

Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$

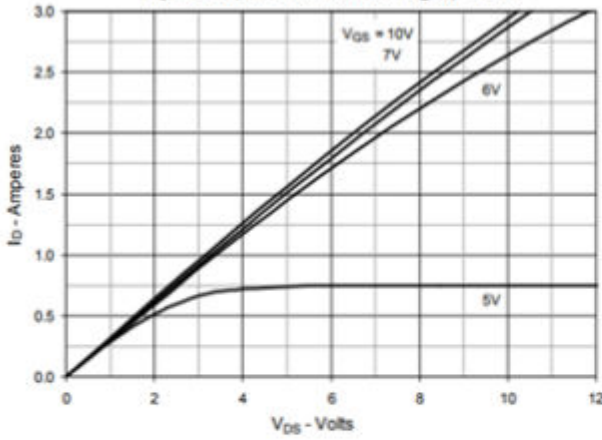


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

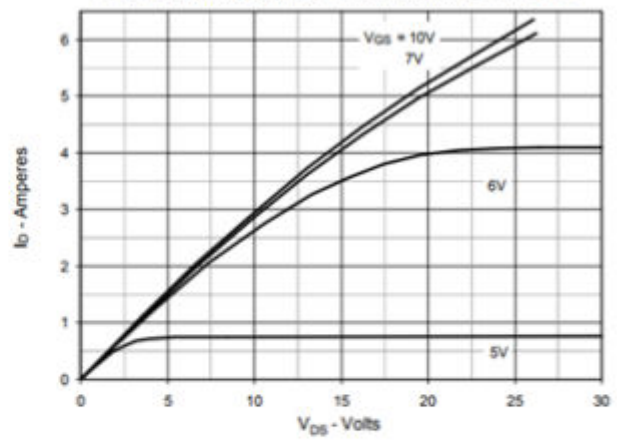


Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$

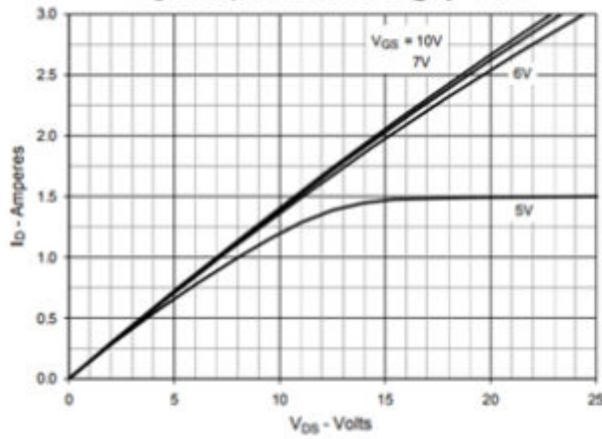


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Junction Temperature

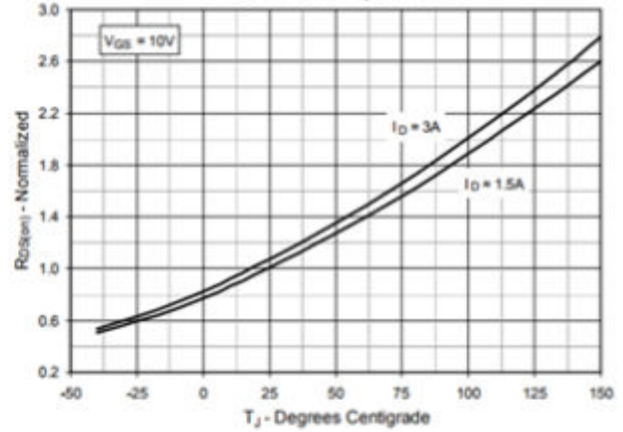


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 1.5\text{A}$  Value vs. Drain Current

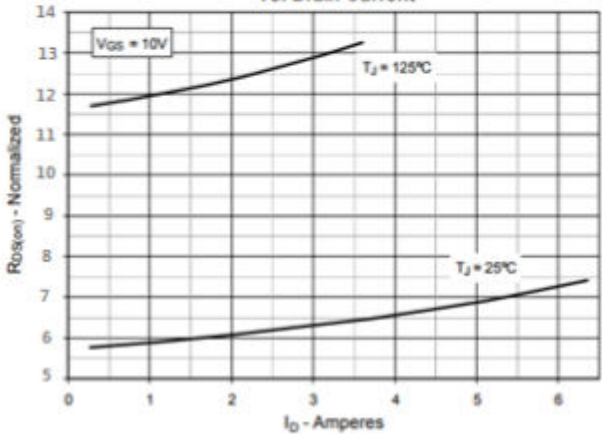
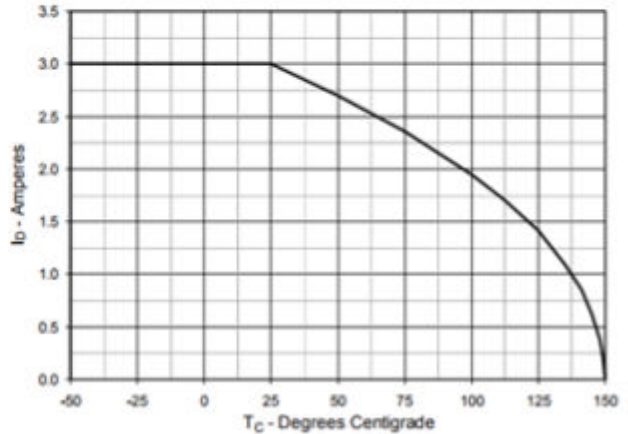


Fig. 6. Maximum Drain Current vs. Case Temperature



Typical Characteristics(Cont.)

Fig. 7. Input Admittance

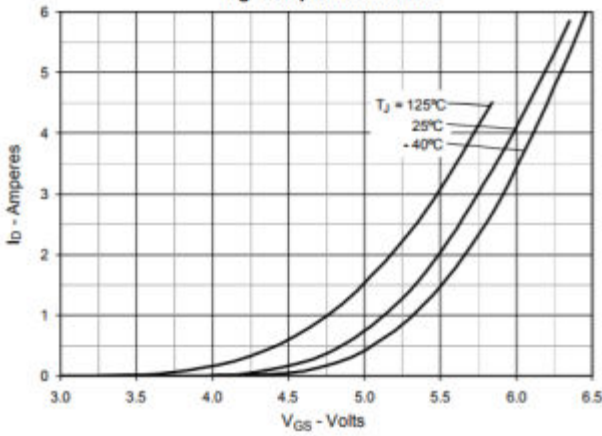


Fig. 8. Transconductance

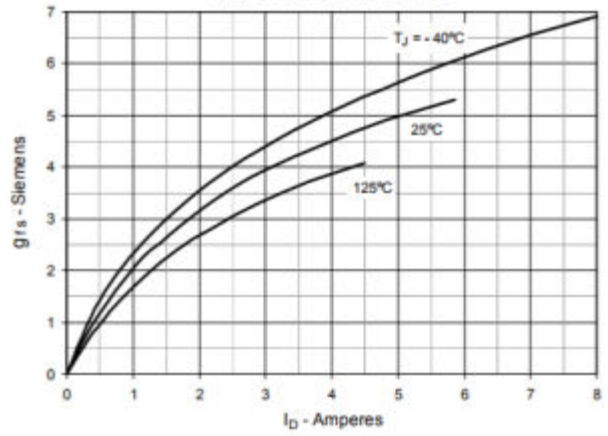


Fig. 9. Forward Voltage Drop of Intrinsic Diode

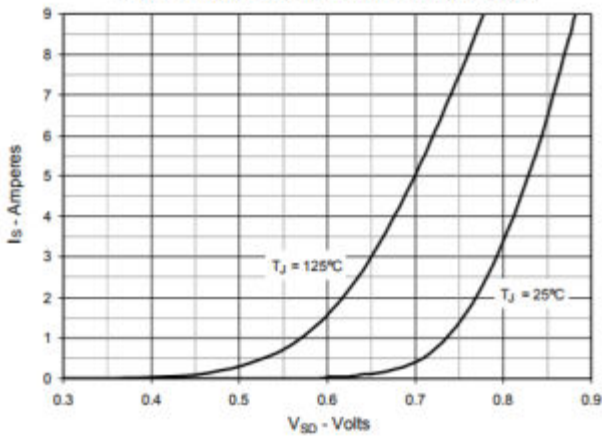


Fig. 10. Gate Charge

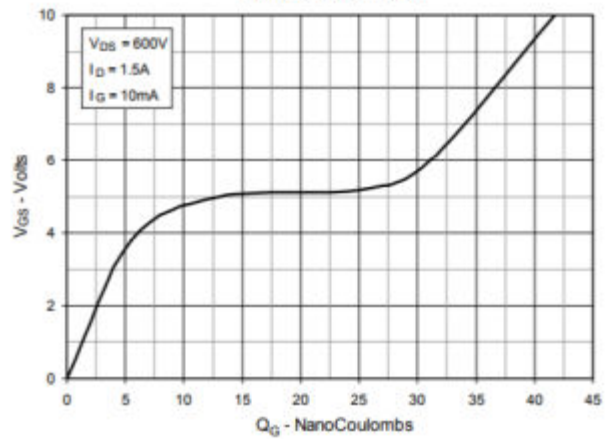


Fig. 11. Capacitance

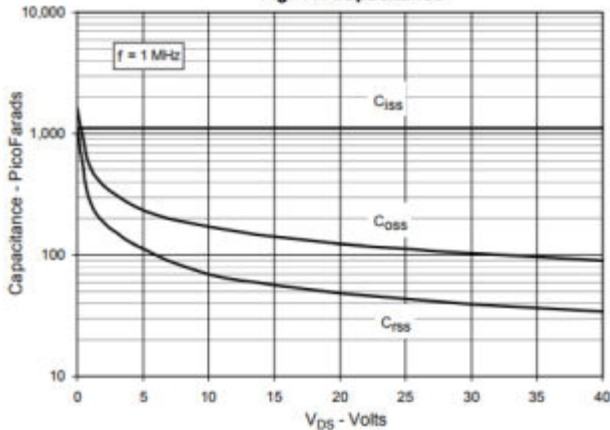
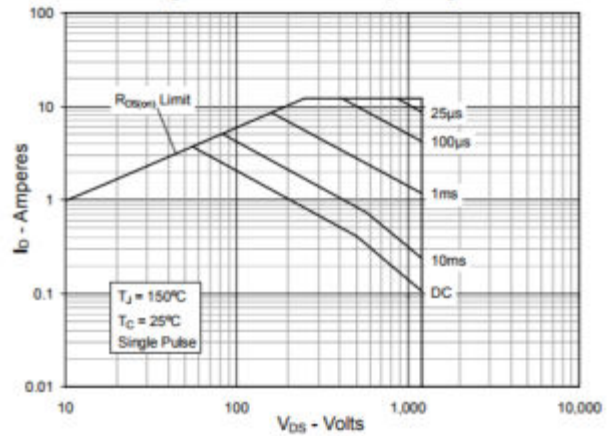
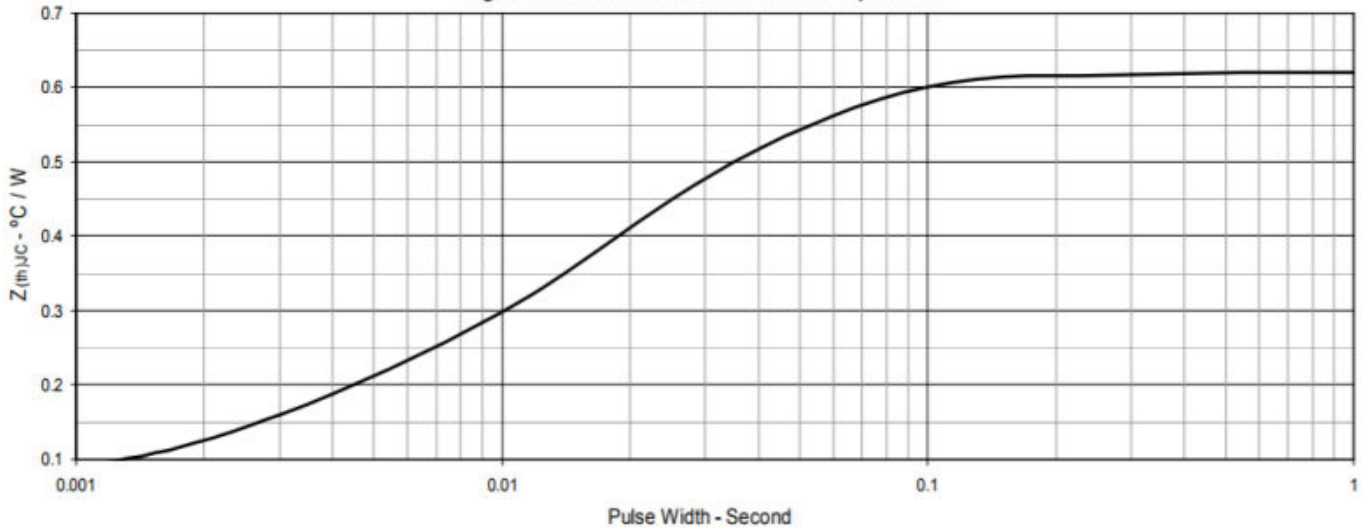


Fig.12. Forward-Bias Safe Operating Area



Typical Characteristics(Cont.)

Fig. 13. Maximum Transient Thermal Impedance



TestCircuitsandWaveforms

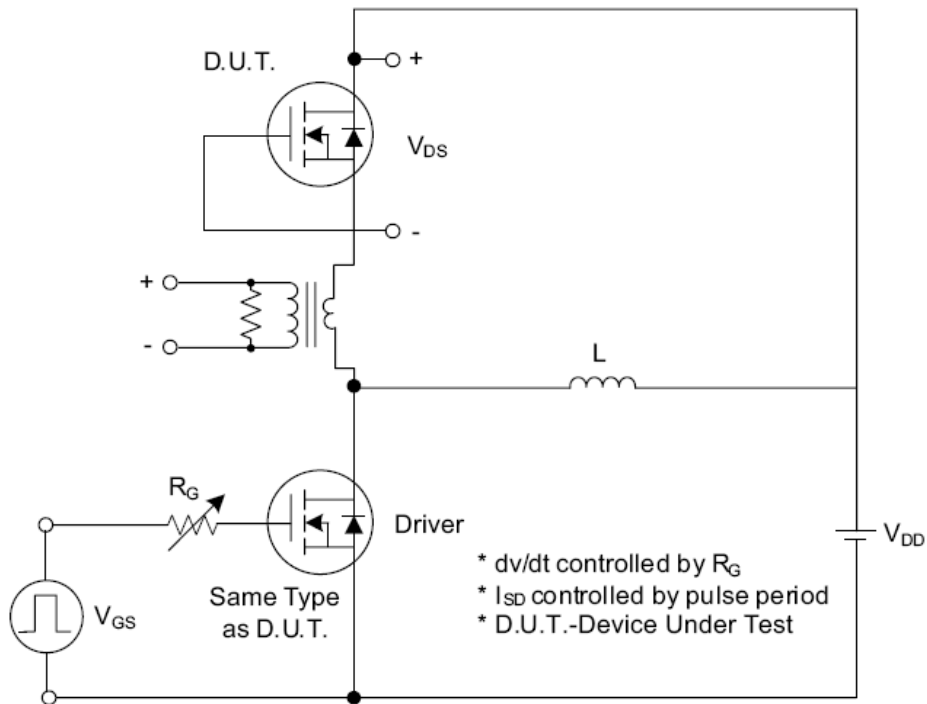


Fig. 1.1 Peak Diode Recovery  $dv/dt$  Test Circuit

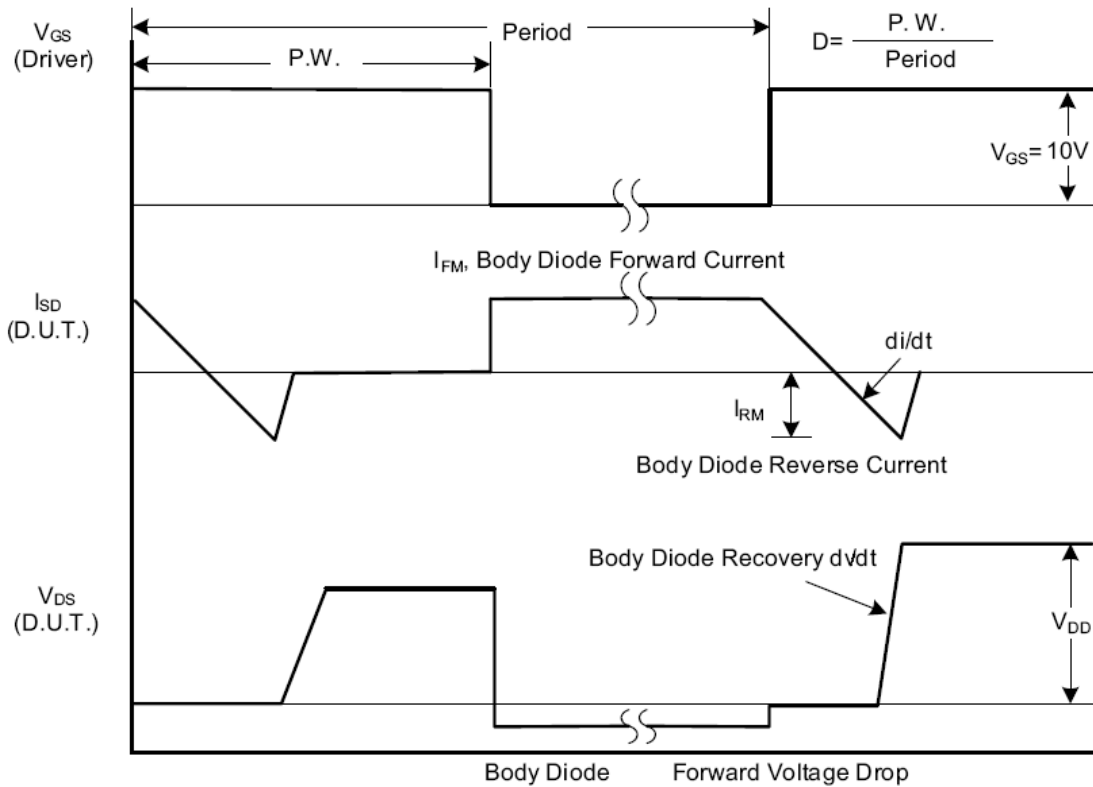


Fig. 1.2 Peak Diode Recovery  $dv/dt$  Waveforms

Test Circuits and Waveforms (Cont.)

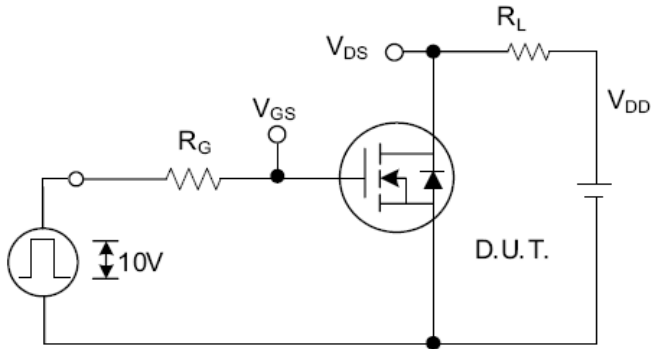


Fig. 2.1 Switching Test Circuit

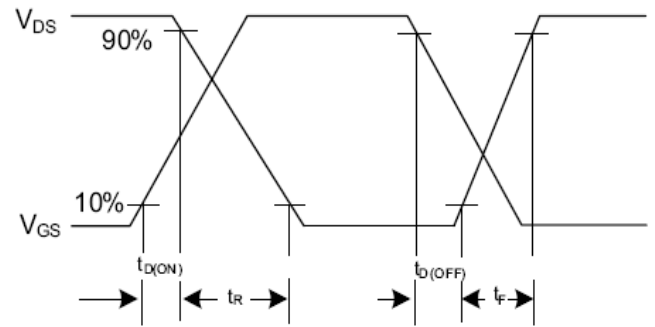


Fig. 2.2 Switching Waveforms

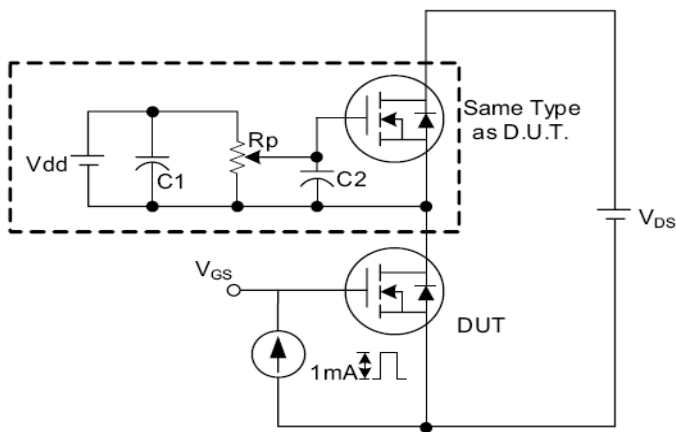


Fig. 3.1 Gate Charge Test Circuit

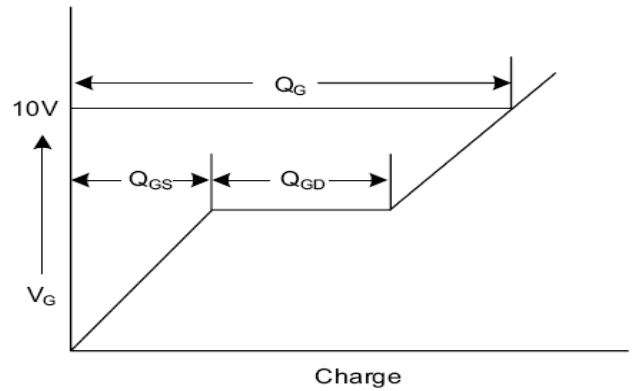


Fig. 3.2 Gate Charge Waveform

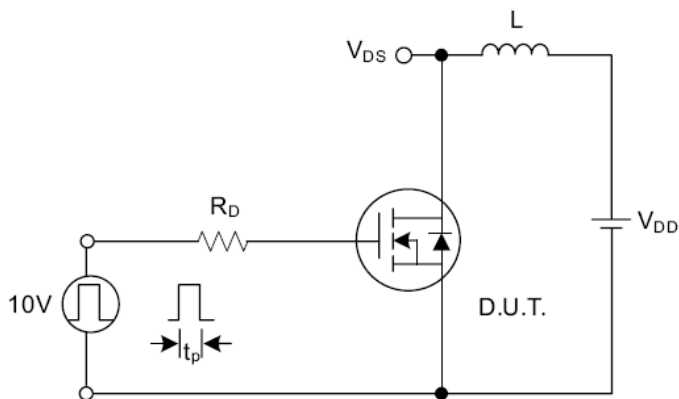


Fig. 4.1 Unclamped Inductive Switching Test Circuit

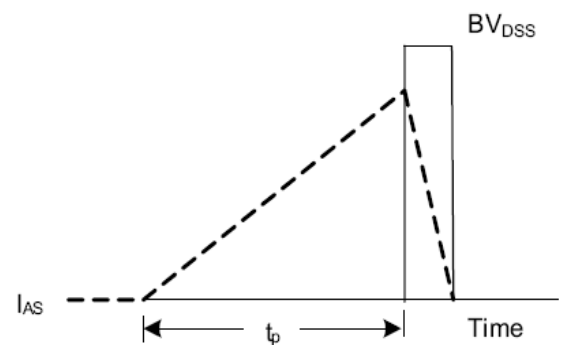


Fig. 4.2 Unclamped Inductive Switching Waveforms



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