

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

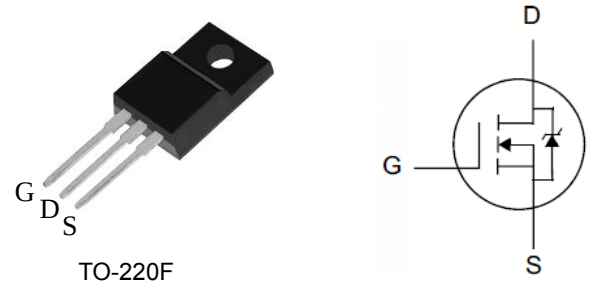
BV_{DSS}	$R_{DS(ON),typ.}$	I_D
1200V	6Ω	3.0A

Applications

- Adaptor
- Charger
- SMPS Standby Power

Ordering Information

Part Number	Package
SK03N120B-TF	TO-220F



TO-220F
Package No to Scale

Absolute Maximum Ratings

$T_C=25^{\circ}C$ 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 ^[3]	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	μA	$V_{DS}=1200V, V_{GS}=0V$
		--	--	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	Ω	$V_{GS}=10V, I_D=1.5A$
$V_{GS(TH)}$	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 ^[2]	--	--	3	A	Integral pn-diode in MOSFET
I_{SM}	Pulsed Source Current ^[2]	--	--	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 @ $T_J = 25^\circ\text{C}$

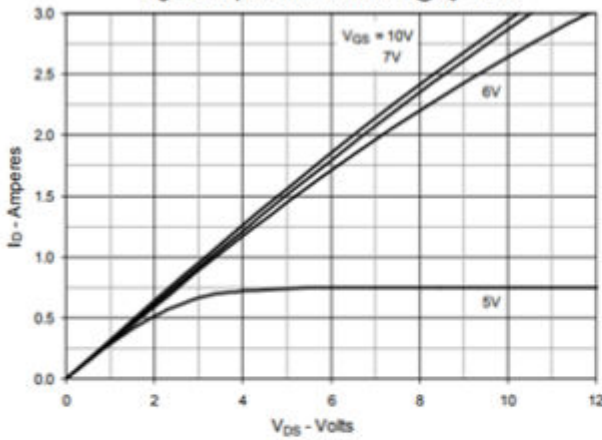


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

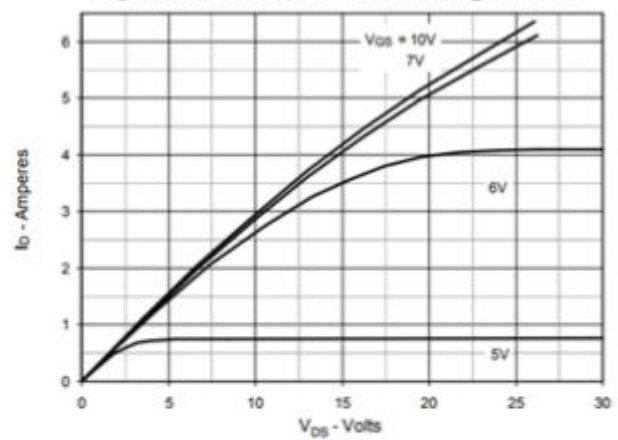


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

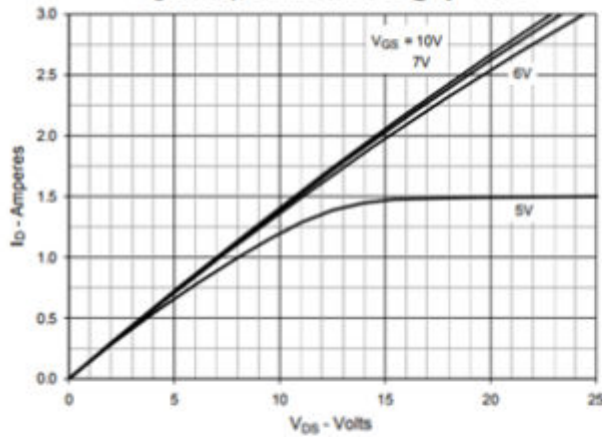


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 1.5\text{A}$ Value vs. Junction Temperature

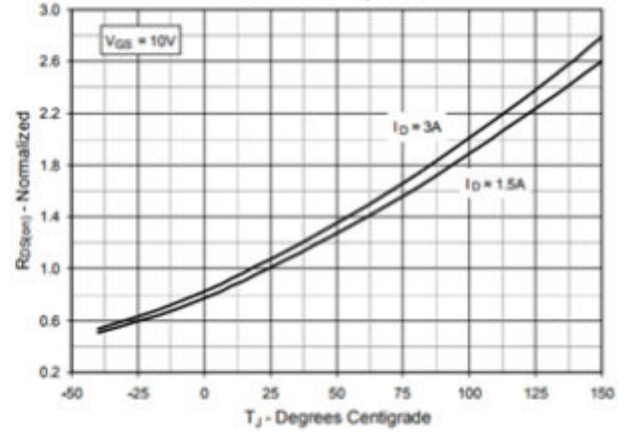


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 1.5\text{A}$ Value vs. Drain Current

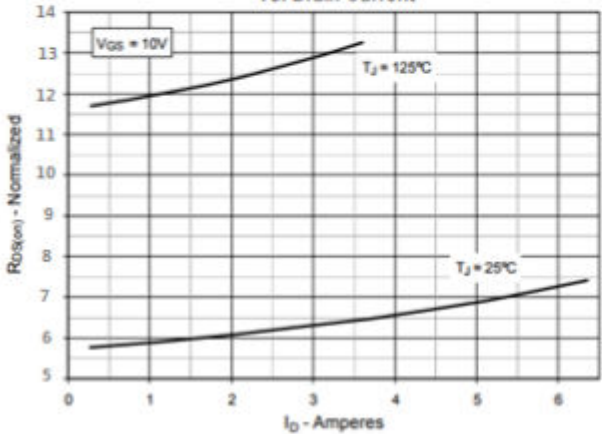
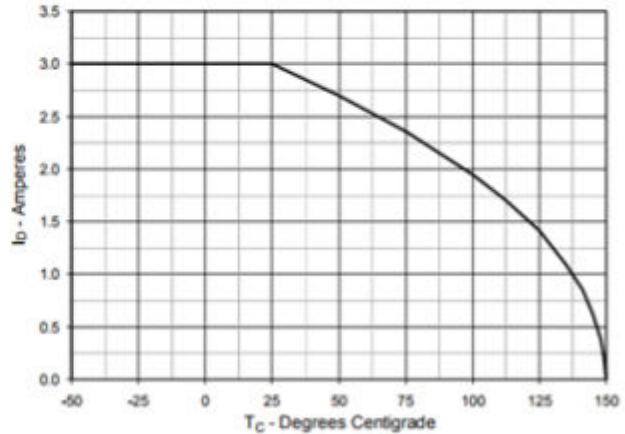


Fig. 6. Maximum Drain Current vs. Case Temperature



Typical Characteristics(Cont.)

Fig. 7. Input Admittance

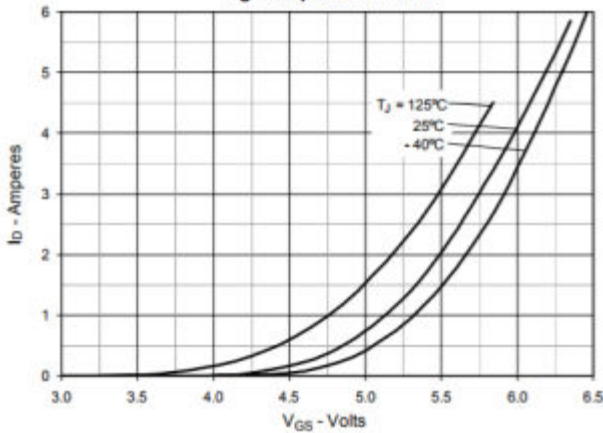


Fig. 8. Transconductance

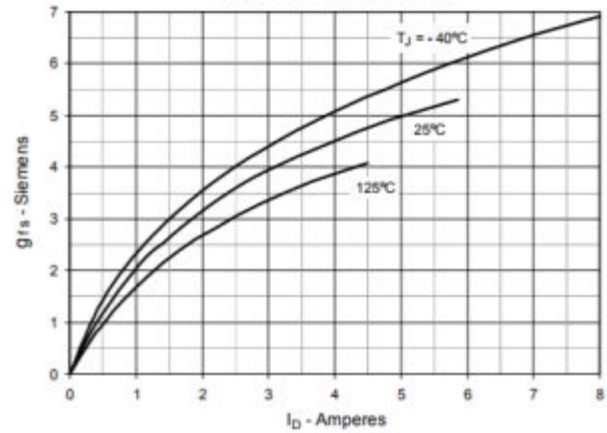


Fig. 9. Forward Voltage Drop of Intrinsic Diode

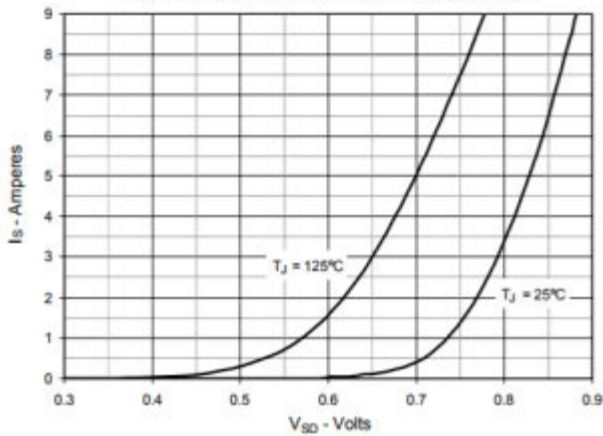


Fig. 10. Gate Charge

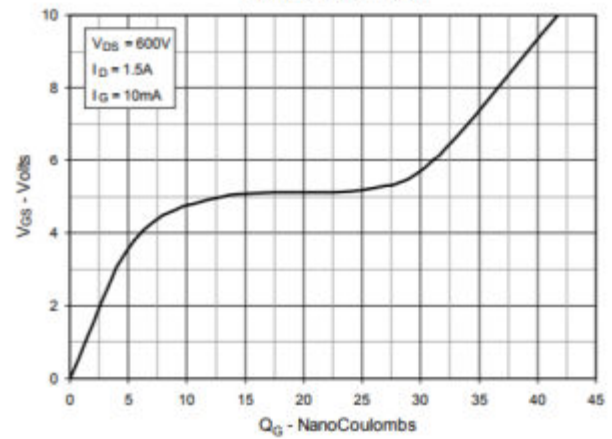


Fig. 11. Capacitance

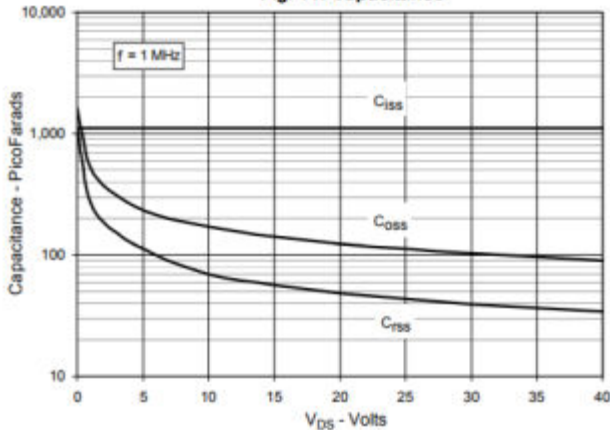
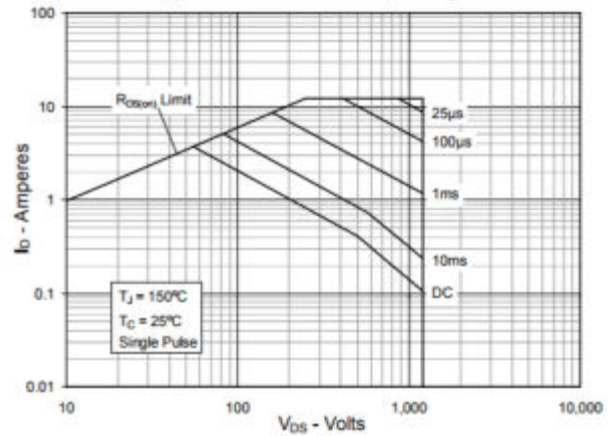
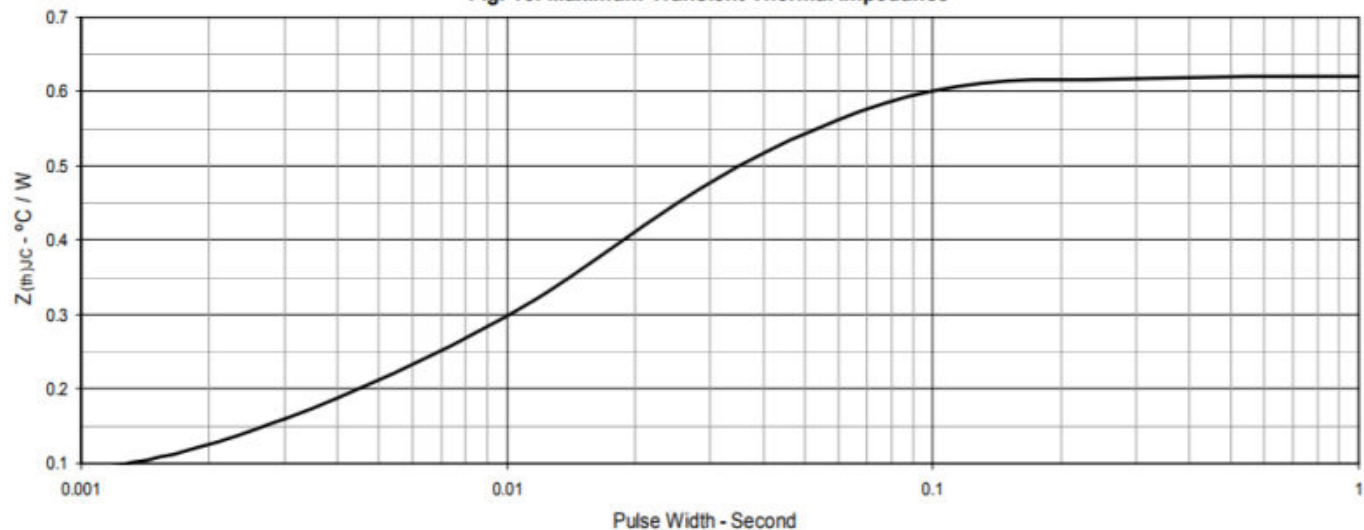


Fig.12. Forward-Bias Safe Operating Area



Typical Characteristics(Cont.)

Fig. 13. Maximum Transient Thermal Impedance



TestCircuitsandWaveforms

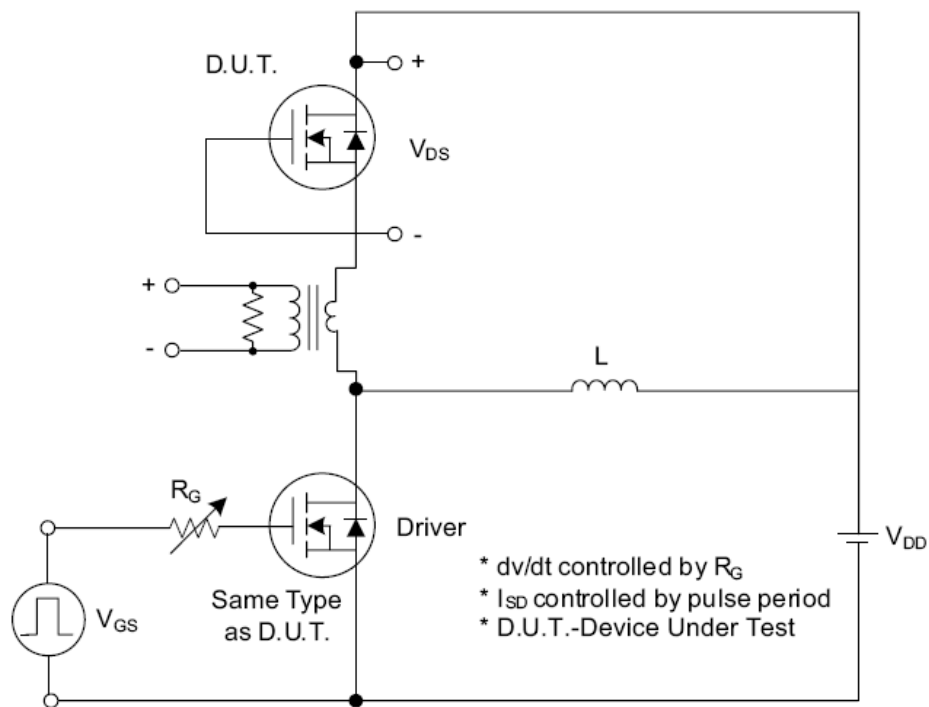


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

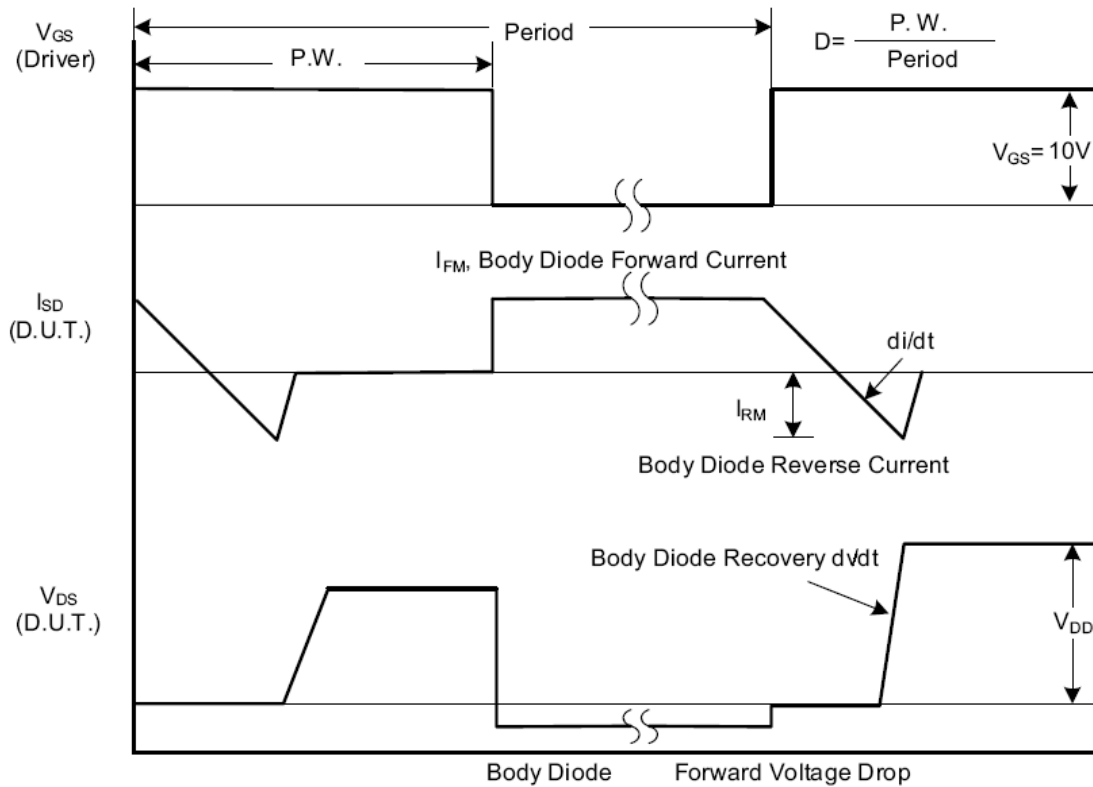


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

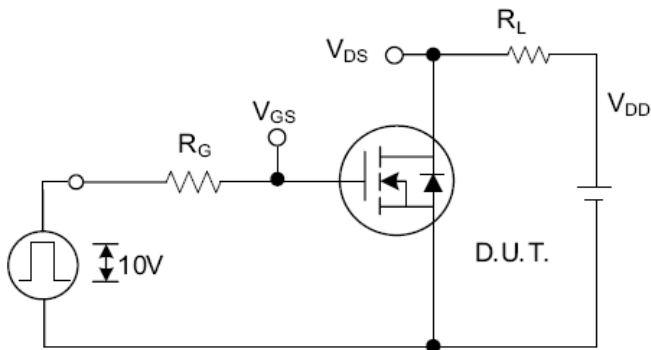


Fig. 2.1 Switching Test Circuit

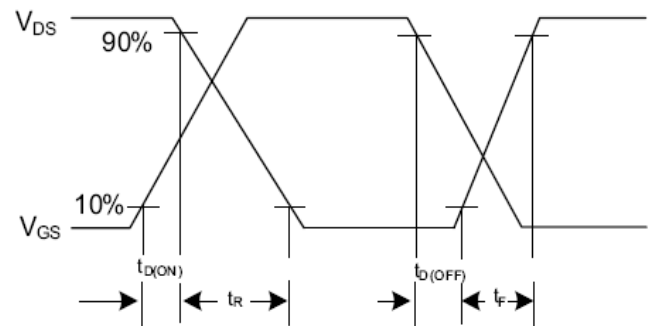


Fig. 2.2 Switching Waveforms

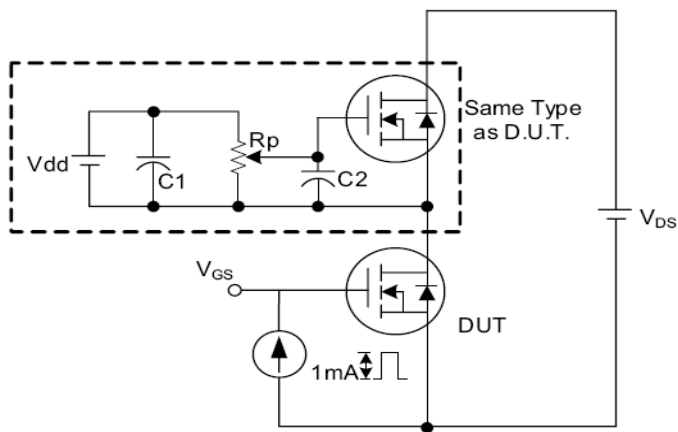


Fig. 3.1 Gate Charge Test Circuit

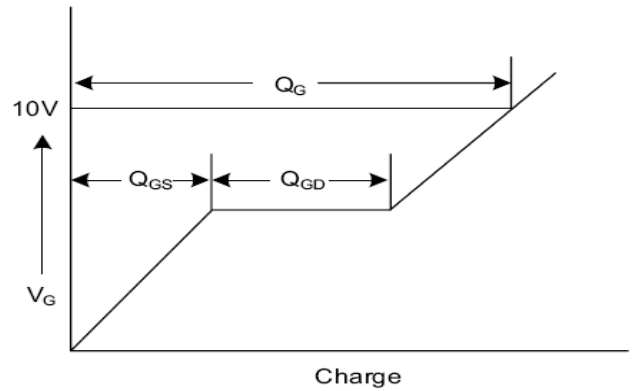


Fig. 3.2 Gate Charge Waveform

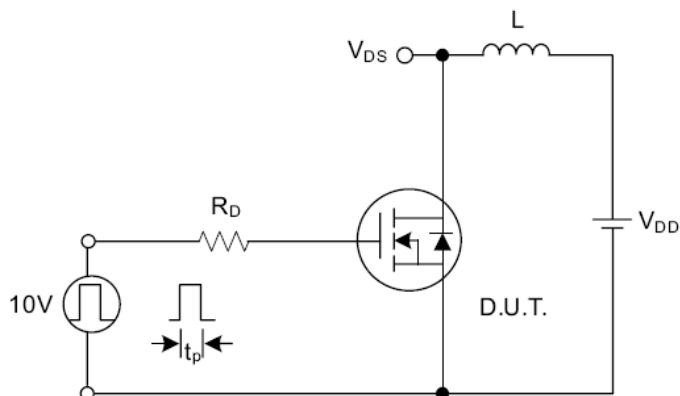


Fig. 4.1 Unclamped Inductive Switching Test Circuit

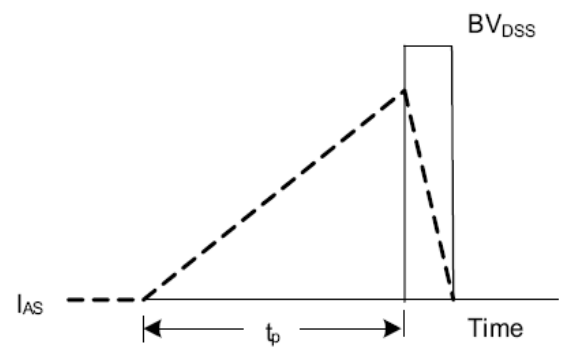
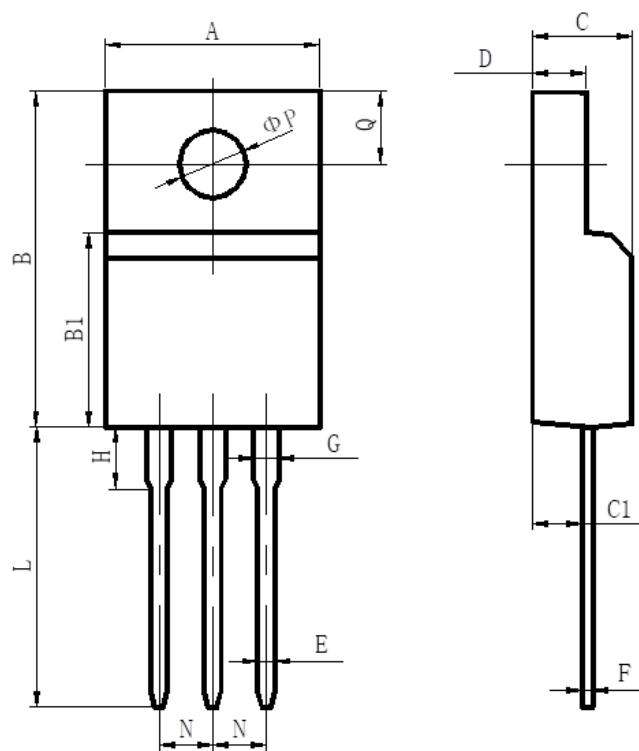


Fig. 4.2 Unclamped Inductive Switching Waveforms

PACKAGE OUTLINE

TO-220F



	Unit (mm)	
	MIN	MAX
A	9.70	10.30
B	15.50	16.10
B1	8.99	9.39
C	4.40	4.80
C1	2.15	2.55
D	2.50	2.90
E	0.70	0.90
F	0.40	0.60
G	1.12	1.42
H	3.40	3.80
L	12.6	13.6
N	2.34	2.74
Q	3.15	3.55
ΦP	3.00	3.30