

H13N50F

500V N-Channel MOSFET

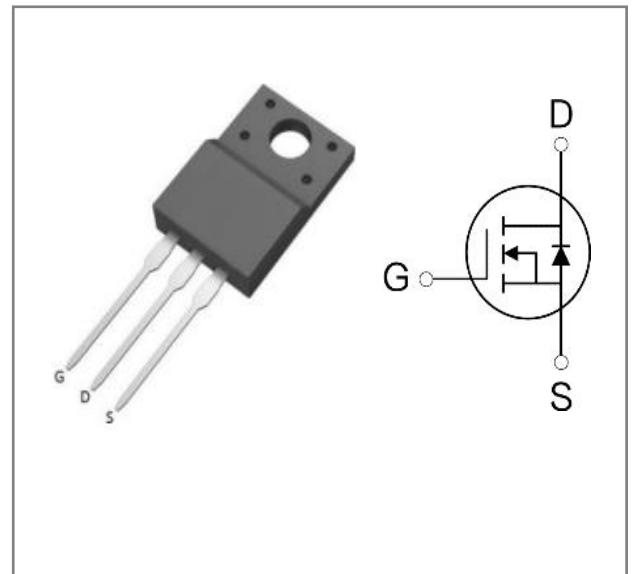
VDSS	$R_{DS(ON)}$ (Typ)	ID
500V	0.38 Ω	13A

Features:

- Fast switching speed
- 100% avalanche tested
- Improved dv/dt capability
- Enhanced Avalanche Ruggedness
- Lead Free

Applications:

- Switch Mode Power Supply(SMPS)
- Adapter & Charger
- AC-DC Switching Power Supply



Ordering Information

Part Number	Package	Marking	Packing	Qty.
H13N50F	TO-220F	H13N50F	Tube	50 PCS

Absolute Maximun Ratings (Tc= 2 5℃ unless otherwise specified)

Symbol	Parameter	Rating	Units
VDS	Drain-to-Source Voltage	500	V
VGS	Gate- to- Source Voltage	±30	V
ID	Continuous Drain Current TC=25℃	13	A
	Continuous Drain Current TC=100℃	9.5	
IDM	Pulsed Drain Current	52	
PD	Power Dissipation	40	W
EAS	Single Pulse Avalanche Enenergy L = 10mH, RG = 25 Ω , TC=25℃	360	mJ
TJ, TSTG	Operating Junction and Storage Temperature Range	-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ	Max	Unit
R θ JC	Thermal Resistance Junction-Case	--	3.2	℃/ W
R θ JA	Thermal Resistance Junction-Ambient	--	62.5	℃/ W

Electrical Characteristics (TJ= 25℃ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V(BR)DSS	Drain- Source Breakdown Voltage	500	--	--	V	VGS=0V,ID=250μA
IDSS	Zero Gate Voltage Drain Current (25℃)	--	--	1	μA	VDS=500V,VGS=0V
	Zero Gate Voltage Drain Current (100℃)	--	--	100	μA	VDS=500V,VGS=0V
IGSS	Gate to Source Forward Leakage	--	--	100	nA	VGS=30V ,VDS=0V
	Gate to Source Reverse Leakage	--	--	-100		VGS=-30V ,VDS=0V
VGS(TH)	Gate Threshold Voltage	2	--	4	V	VGS=VDS,ID=250μA
RDS(on)	Static Drain- to- Source On-Resistance	--	0.38	0.48	Ω	VGS=10V,ID=6.5A

Dynamic Electrical Characteristics

Ciss	Input Capacitance	--	1510	--	pF	VGS=0V VDS=25V f=1MHz
Coss	Output Capacitance	--	170	--		
Crss	Reverse Transfer Capacitance	--	18	--		
Qg	Total Gate Charge	--	45	--	nC	VDS=400V ID=13A VGS=10V
Qgs	Gate- to- Source Charge	--	6	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	22	--		

Switching Characteristics

td(ON)	Turn- on Delay Time	--	13	--	nS	VDS=250V ID=13A VGS=10V
trise	Rise Time	--	35	--		
td(OFF)	Turn- OFF Delay Time	--	45	--		
tfall	Fall Time	--	20	--		

Source- Drain Diode Characteristics

VSD	Diode Forward Voltage	--	--	1.4	V	IF=2A,VGS=0V
trr	Reverse Recovery Time	--	380	--	nS	VGS=0V,IF=13A di/dt=100A/μs
Qrr	Reverse Recovery Charge	--	4	--	uC	

Notes:

- * 1. Repetitive rating, pulse width limited by maximum junction temperature.
- * 2. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

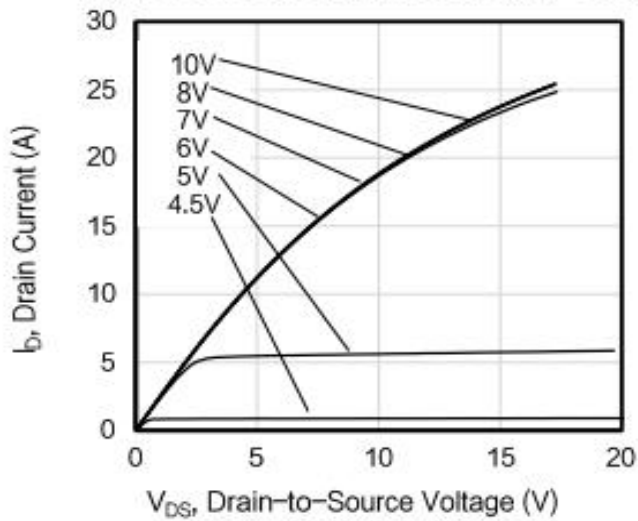


Figure 2. Body Diode Forward Voltage

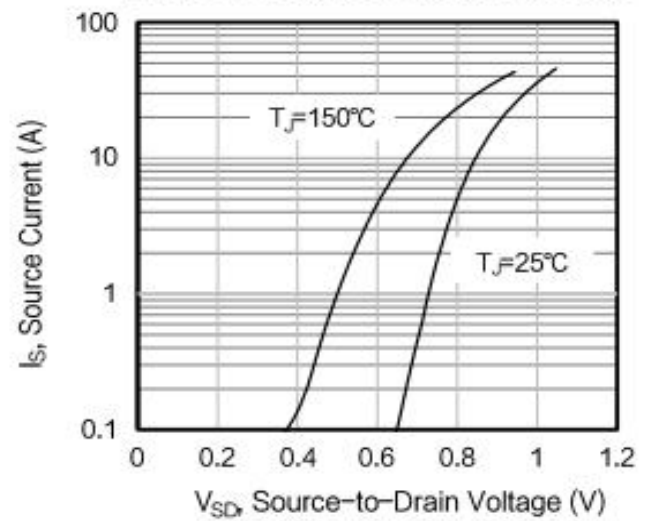


Figure 3. Drain Current vs. Temperature

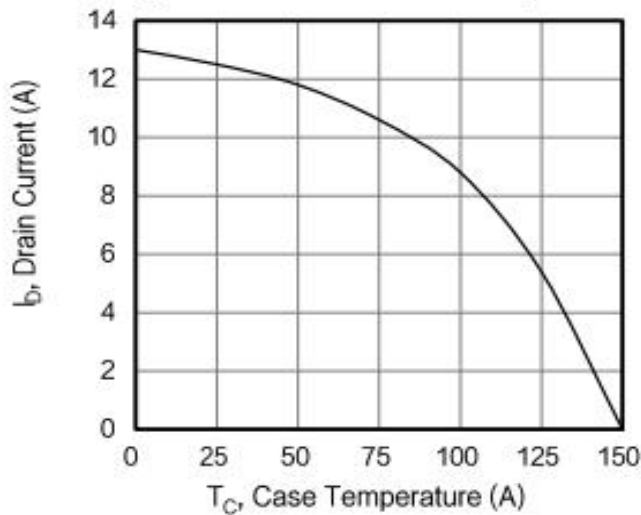


Figure 4. BV_{DSS} Variation vs. Temperature

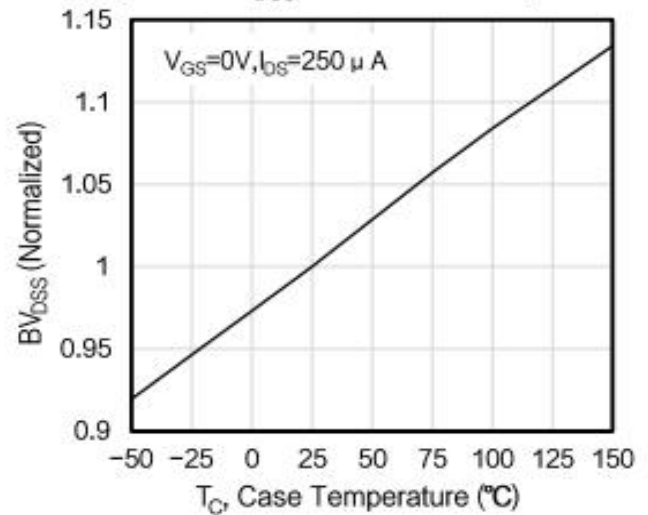


Figure 5. Transfer Characteristics

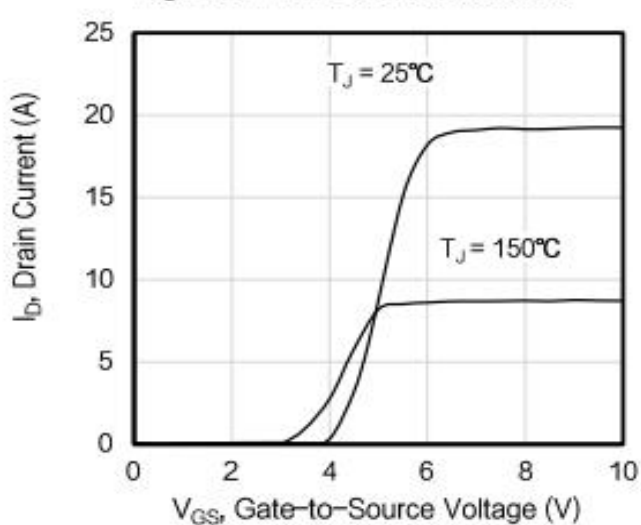


Figure 6. On-Resistance vs. Temperature

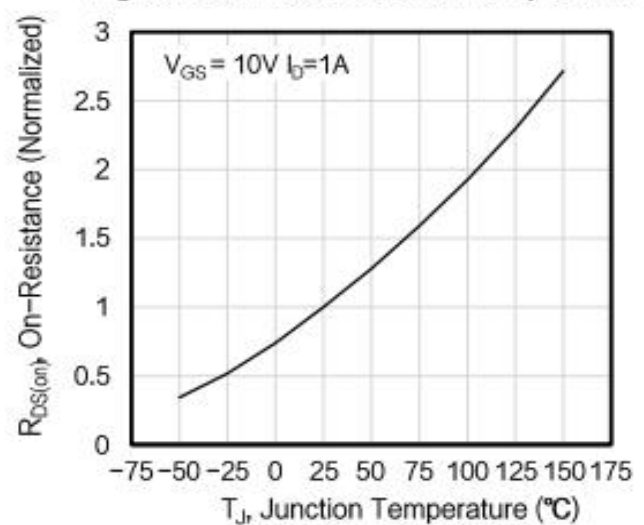


Figure 7. Capacitance

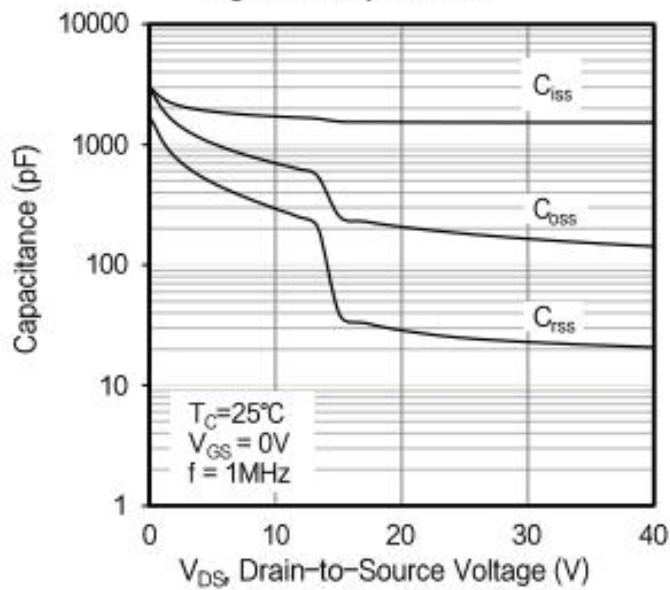


Figure 8. Gate Charge

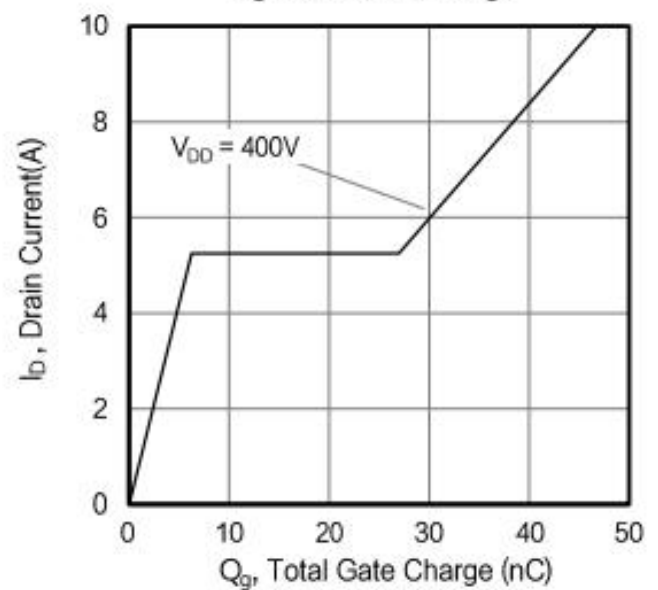


Figure 9. Transient Thermal Impedance

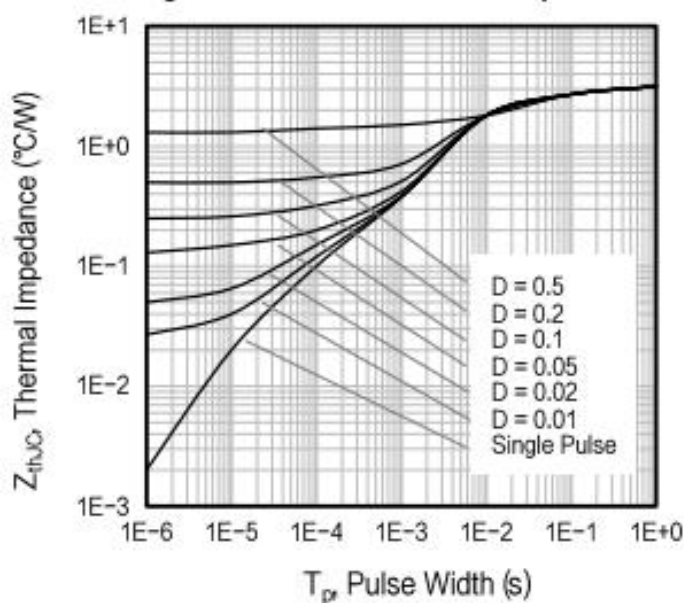
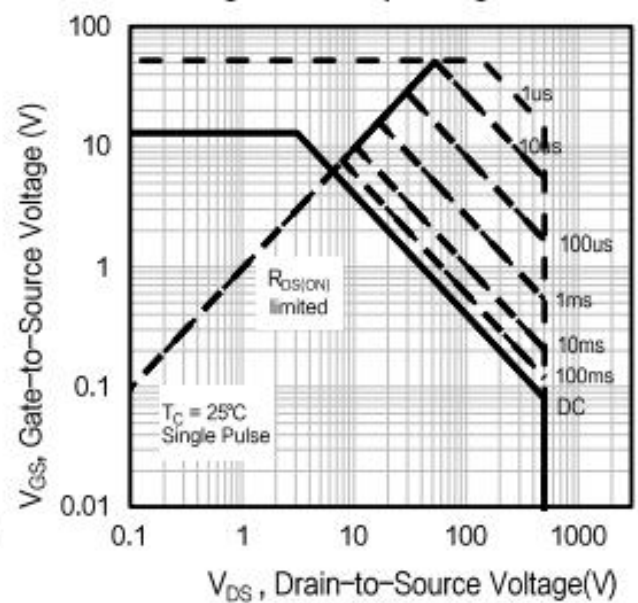


Fig. 10 Safe Operating Area



Test Circuits and Waveforms

Figure A: Gate Charge Test Circuit and Waveform

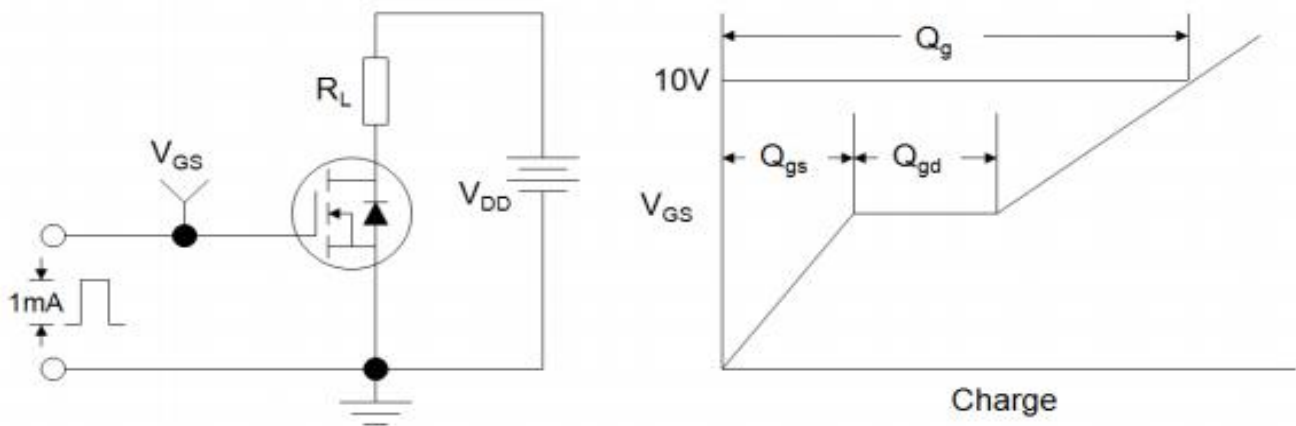


Figure B: Resistive Switching Test Circuit and Waveform

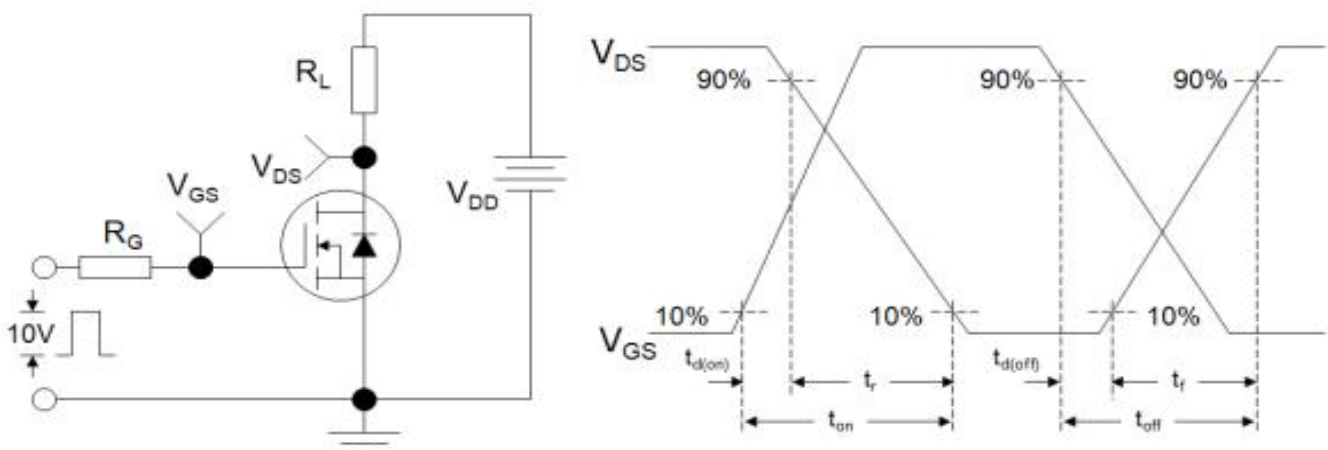
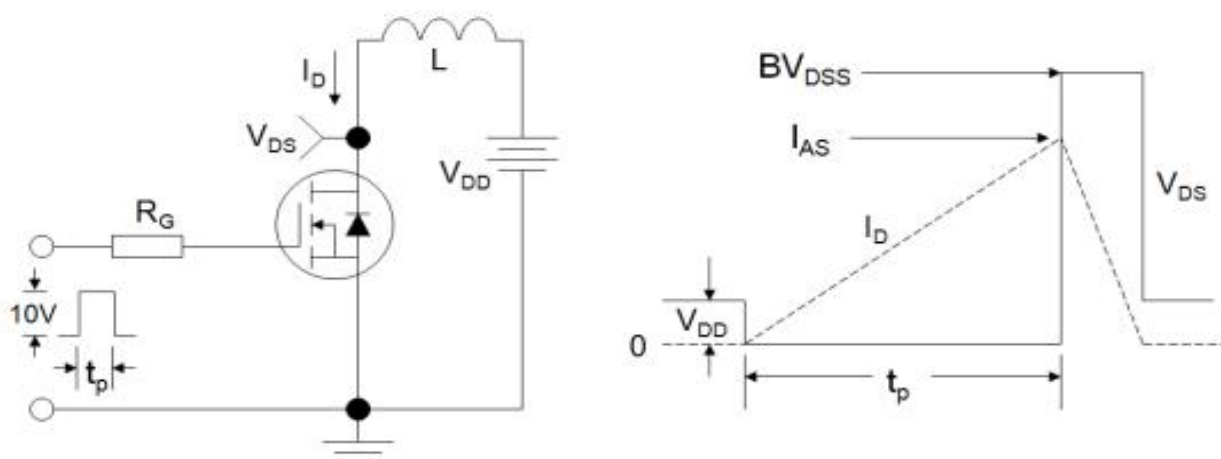
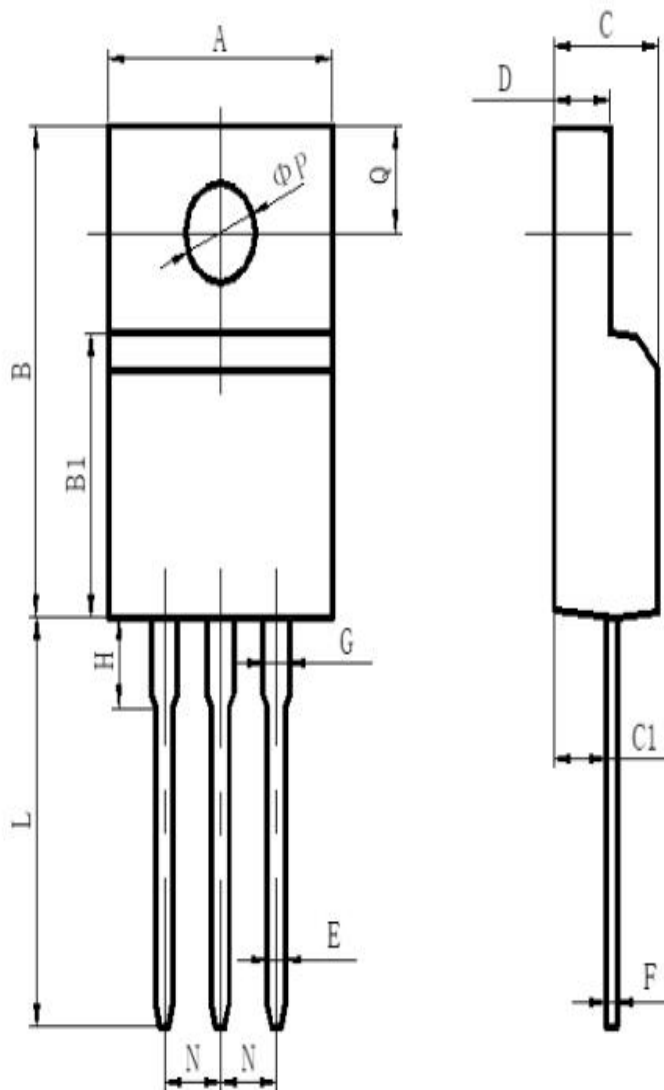


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Package outline drawing (TO-220F Unit: mm)



Symbol	unit(mm)	
	MIN	MAX
A	9.7	10.4
B	15.5	16.10
B1	8.95	9.40
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	4.00
L	12.6	13.6
N	2.34	2.74
Q	3.15	3.55
Φ P	3.00	3.30