

## 700V N Channel MOSFET



Lead Free Package and Finish

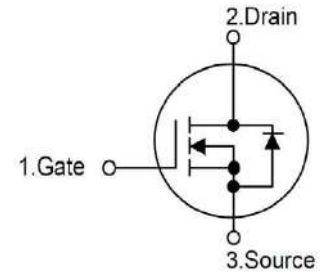
## Applications:

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply(UPS)
- Power Factor Correction(PFC)

$I_D$	$R_{DS(ON)}$ (Typ.)	$V_{DSS}$
6A	1.3 $\Omega$	700V

## Features:

- improved dv/dt capability
- 100% avalanche tested
- Fast switching
- RoHS Compliant



## Ordering Information

Part Number	Package	Marking
RS6N70F	TO-220F	RS6N70F

Not to Scale

Absolute Maximum Ratings  $T_c=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	RS6N70F	Units
$V_{DSS}$	Drain-to-Source Voltage (Note*1)	700	V
$I_D$	Continuous Drain Current	6	A
$I_{DM}$	Pulsed Drain Current (Note*2)	24	
PD	Power Dissipation( $T_c=25^\circ\text{C}$ )	63	W
VGS	Gate-to-Source Voltage	$\pm 30$	V
EAS	Single Pulse Avalanche Energy $I_{AS}=6\text{A}$ $V_{DD}=50\text{V}$ $R_G=25\Omega$ $T_J=25^\circ\text{C}$	198	mJ
$I_{AR}$	Avalanche Current	4.5	A
EAR	Repetitive Avalanche Energy	40	mJ
$T_L$ TPKG	Maximum Temperature for Soldering	300 260	$^\circ\text{C}$
	Leads at 0.063in(1.6mm)from Case for 10 seconds		
	Package Body for 10 seconds		
$T_J$ and $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to 150	

\*Drain Current Limited by Maximum Junction Temperature

Caution:Stresses greater than those listed in the“Absolute Maximum Ratings”Table may cause permanent damage to the device.

## Thermal Resistance

Symbol	Parameter	RS6N70F	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	1.98	$^\circ\text{C}/\text{W}$	Drain lead soldered to water cooled heatsink,PD Adjusted for a peak junction temperature of $+150^\circ\text{C}$ .
$R_{\theta JA}$	Junction-to-Ambient	62.5		1 cubic foot chamber,free air.

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub>	Drain-to-source Breakdown Voltage	700	--	--	v	V <sub>GS</sub> =0V, I <sub>D</sub> =250 $\mu$ A
I <sub>DSS</sub>	Drain-to-Source Leakage Current	--	--	1.0	$\mu$ A	V <sub>DS</sub> =700V, V <sub>GS</sub> =0V
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	--	--	100	nA	V <sub>GS</sub> =+30V V <sub>DS</sub> =0V
	Gate-to-Source Reverse Leakage	--	--	-100		V <sub>GS</sub> =-30V V <sub>DS</sub> =0V

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	--	1.3	1.6	$\Omega$	V <sub>GS</sub> =10V, I <sub>D</sub> =3.0A
V <sub>GS(TH)</sub>	Gate Threshold Voltage	3.0	--	4.0	V	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250 $\mu$ A

**Resistive Switching Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t <sub>d(ON)</sub>	Turn-on Delay Time	--	15	--	ns	V <sub>DS</sub> =350V I <sub>D</sub> =6A R <sub>G</sub> =25 $\Omega$
t <sub>rise</sub>	Rise Time	--	18	--		
t <sub>d(OFF)</sub>	Turn-OFF Delay Time	--	80	--		
t <sub>fall</sub>	Fall Time	--	35	--		

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C <sub>iss</sub>	Input Capacitance	--	891	--	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =25V f=1.0MHz
C <sub>oss</sub>	Output Capacitance	--	110	--		
C <sub>rss</sub>	Reverse Transfer Capacitance	--	14	--		
Q <sub>g</sub>	Total Gate Charge	--	22	--	nC	V <sub>DS</sub> =560V I <sub>D</sub> =6A V <sub>GS</sub> =10V
Q <sub>gs</sub>	Gate-to-Source Charge	--	4.3	--		
Q <sub>gd</sub>	Gate-to-Drain("Miller") Charge	--	13	--		

## Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I <sub>S</sub>	Continuous Source Current	--	--	6	A	Integral pn-diode in MOSFET
I <sub>SM</sub>	Maximum Pulsed Current	--	--	24	A	
V <sub>SD</sub>	Diode Forward Voltage	--	--	1.4	V	I <sub>S</sub> =6A, V <sub>GS</sub> =0V T <sub>J</sub> =25°C
t <sub>rr</sub>	Reverse Recovery Time	--	300	--	nS	V <sub>GS</sub> =0V
Q <sub>rr</sub>	Reverse Recovery Charge	--	4.1	--	μC	I <sub>S</sub> =6A, di/dt=100A/μs

## Notes:

\*1. T<sub>J</sub>=±25°C to +150°C.

\*2. Repetitive rating; pulse width limited by maximum junction temperature.

\*3. Pulse width ≤ 300μs; duty cycle ≤ 1%.

Typical Feature curve T<sub>J</sub>=25°C, unless otherwise noted

Figure1. Typical Output Characteristics

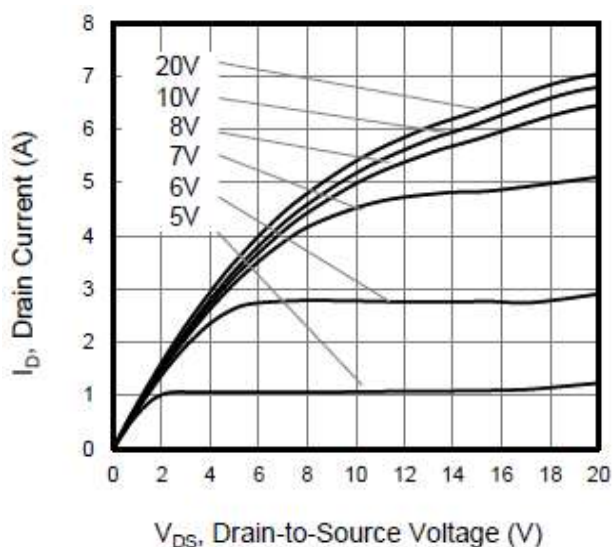
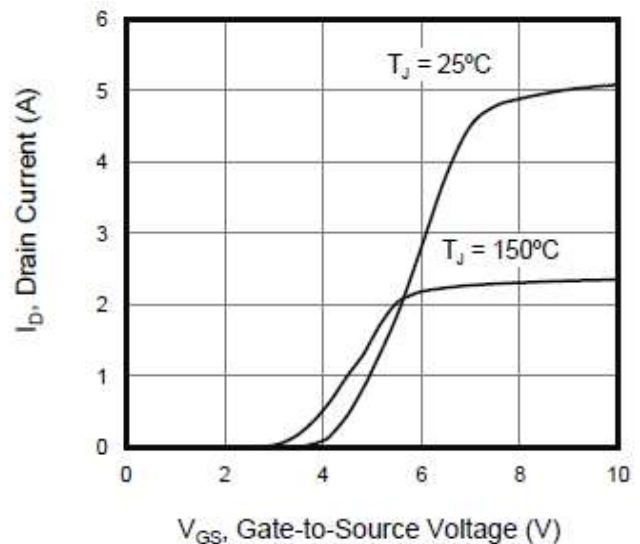
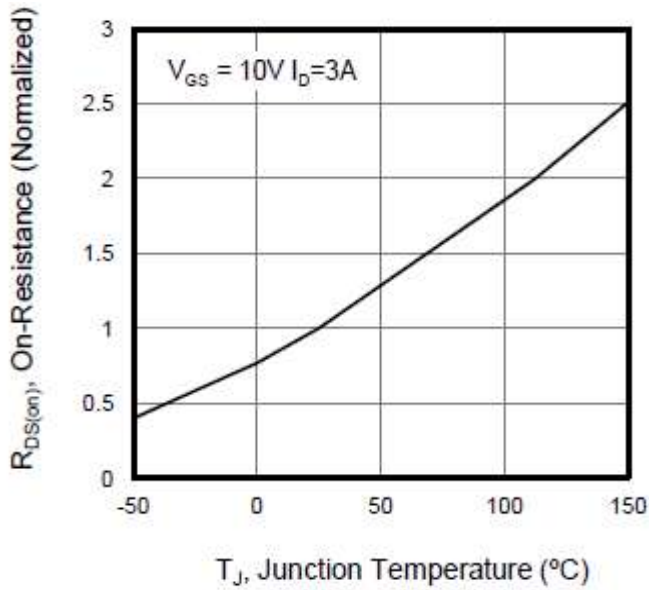


Figure2. Typical Transfer Characteristics



Figuer3. Typical ON-Resistance vs Temperature



Figuer4. Typical Body Diode Transfer Characteristics

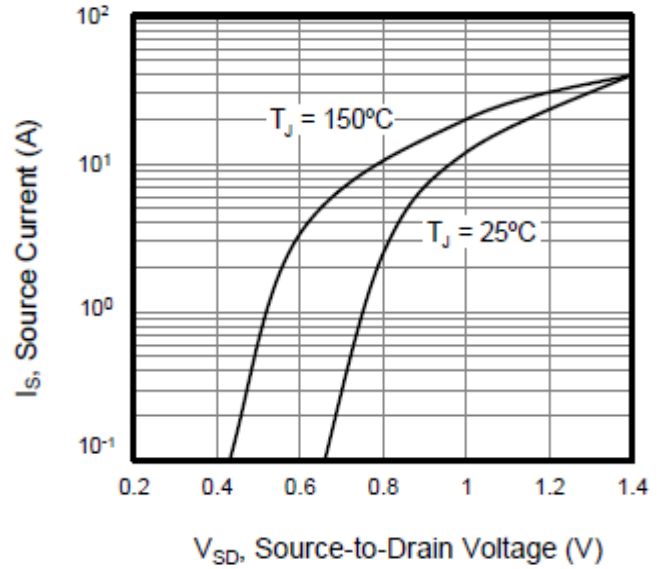


Figure5. Typical Temperature vs Drain Current

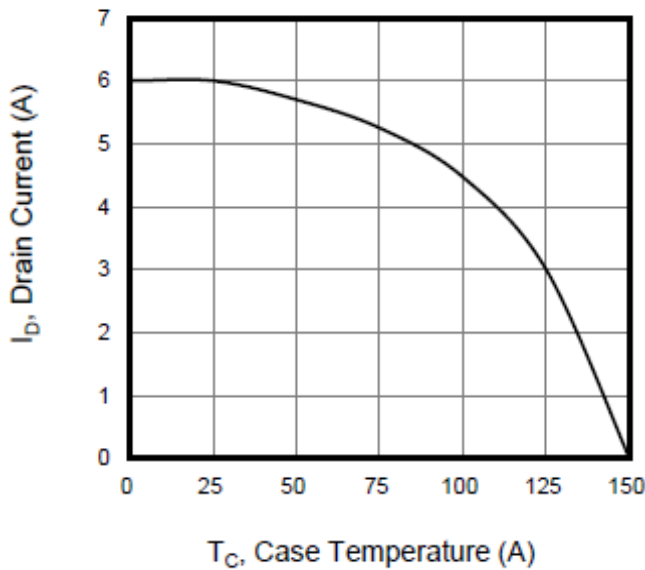


Figure6. Typical Temperature vs BVdss Variation

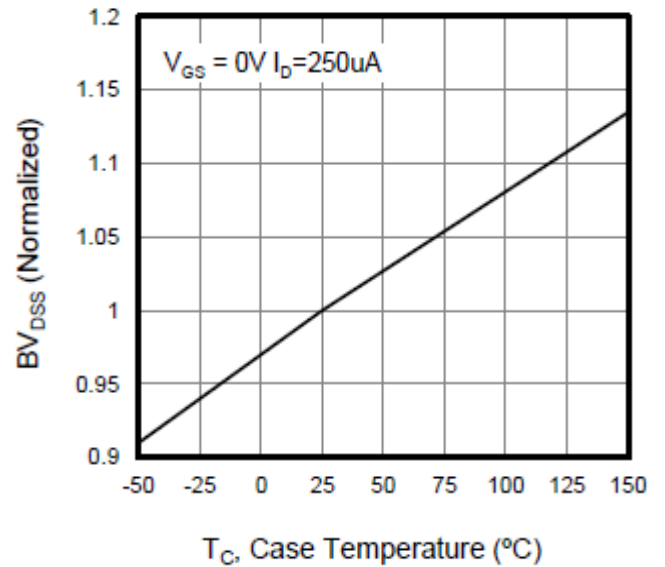


Figure7. Typical Capacitance vs Drain-to-Source Voltage

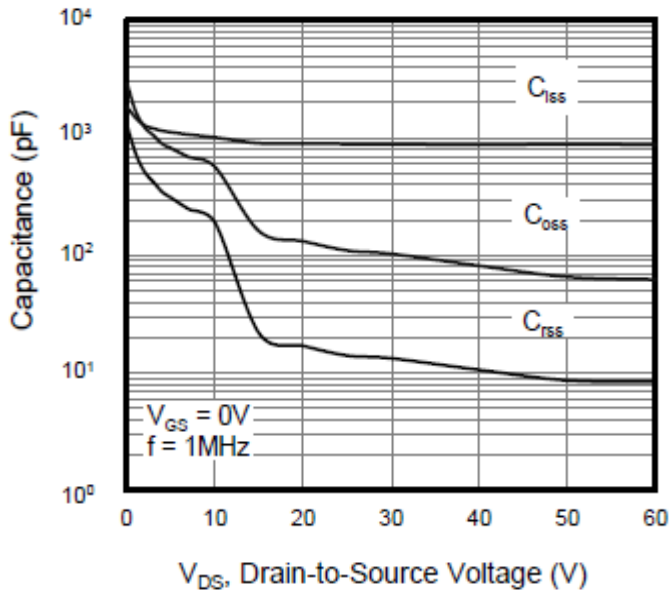


Figure8. Typical Gate Charge

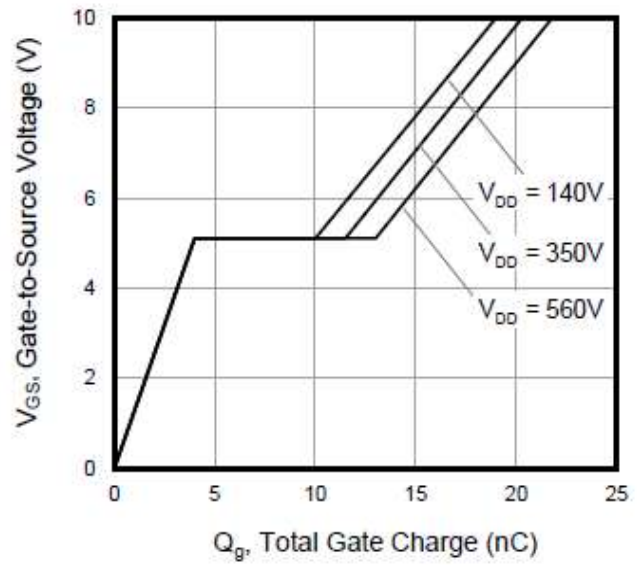
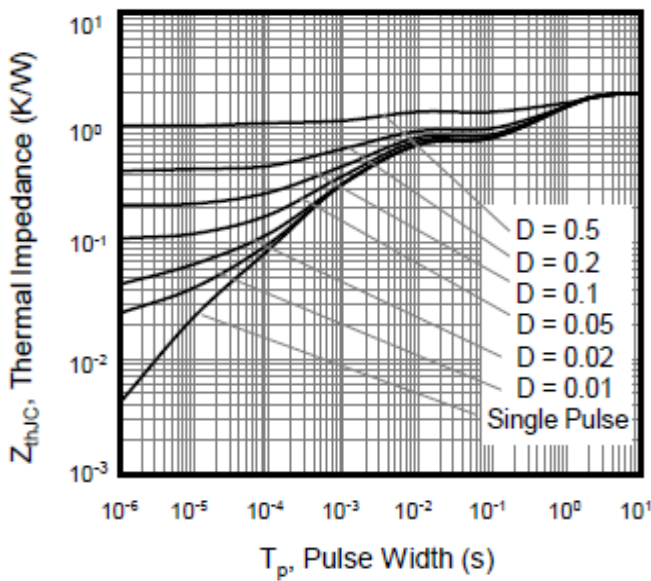


Figure9. Transient Thermal Impedance TO-220F



**Test Circuits and Waveforms**

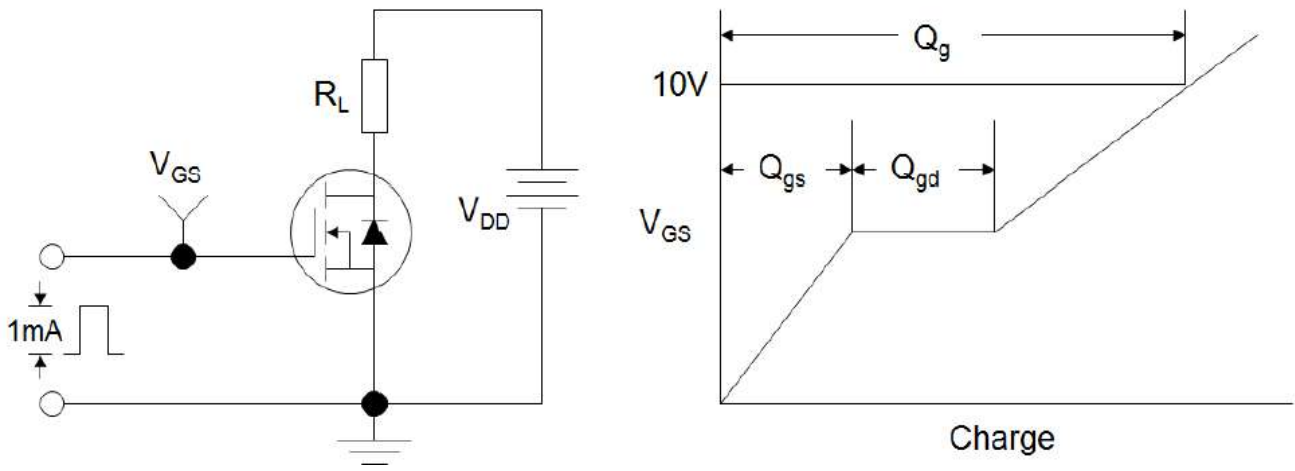


Figure10.  
Gate Charge Test Circuit and Waveform

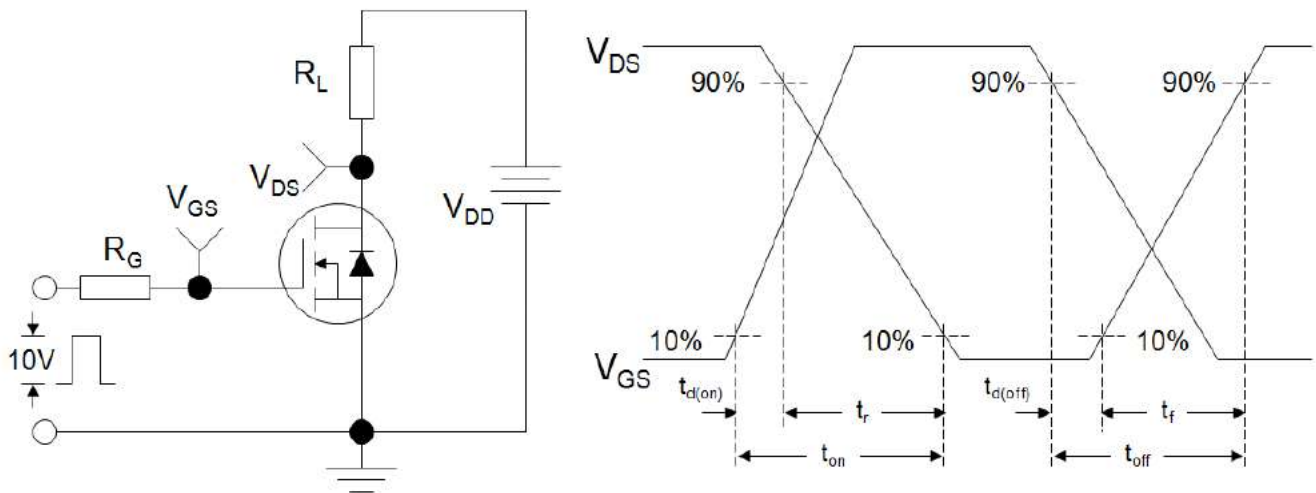


Figure11.  
Resistive Switching Test Circuit and Waveform

Test Circuits and Waveforms

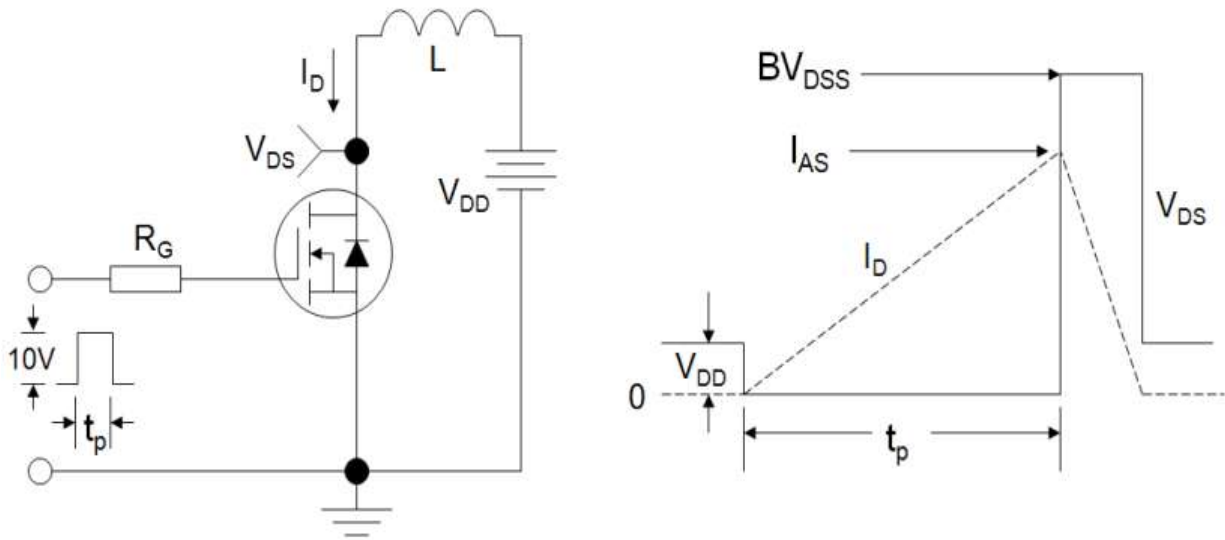
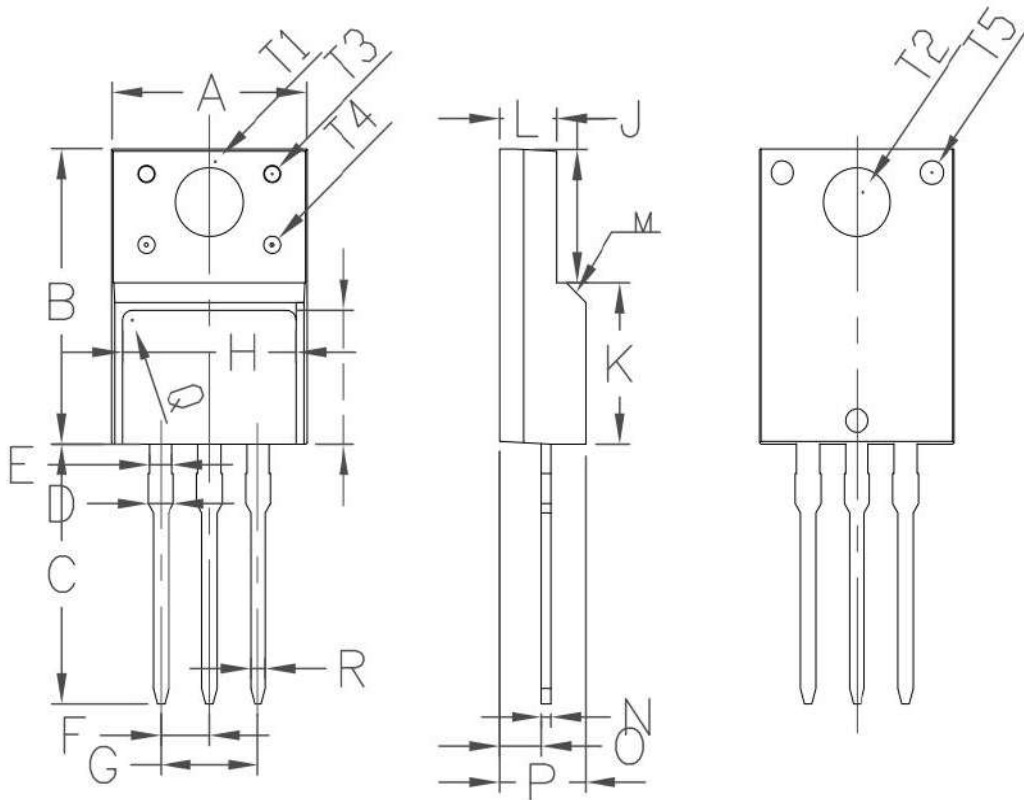


Figure12.Unclamped Inductive Switching Test Circuit and Waveform

Package outline drawing

TO-220F

Unit:mm



Symbol	Min	Non	Max
A	9.96	10.16	10.36
B	15.67	15.87	16.07
C	13.14	13.34	13.54
D	1.20	1.30	1.40
E		1.20	
F		2.54	
G		5.08	
H	7.60	7.80	8.00
I	7.10	7.30	7.50
J	6.48	6.68	6.88
K	8.99	9.19	9.39
L	2.34	2.54	2.74
M		45°	
N	0.49	0.50	0.52
O	2.15	2.35	2.55
P	4.50	4.70	4.90
Q		0.50	
S	4°	4.5°	5°
T1		3.45	
T2		3.18	
T3		1.50	
T4		1.20	
T5		1.50	
R	0.77	0.8	0.83



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