

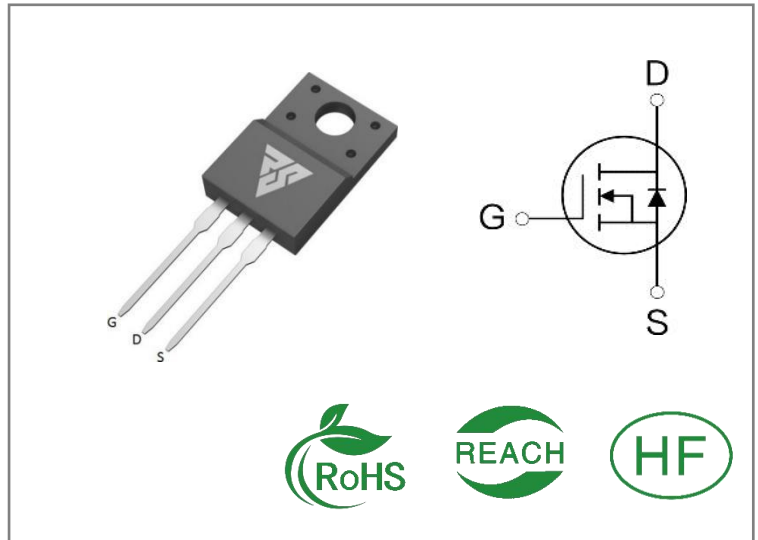
ID	R <sub>DS(ON)</sub> (Typ)	VDSS
12A	0.5Ω	600V

#### Applications:

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

#### Features:

- Fast switching speed
- 100% avalanche tested
- Improved dv/dt capability



#### Ordering Information

Part Number	Package	Marking	Packing	Qty.
RS12N60F	T0-220F	RS12N60F	Tube	50 PCS

#### Absolute Maximum Ratings Tc= 25°C unless otherwise specified

Symbol	Parameter	RS12N60F	Units
VDSS	Drain-to-Source Voltage	600	V
ID	Continuous Drain Current TC=25°C	12	A
IDM	Pulsed Drain Current (Note*1)	48	
PD	Power Dissipation	42	W
VGS	Gate- to- Source Voltage	±30	V
EAS	Single Pulse Avalanche Energy L = 10mH, VDD = 50V, RG = 25 Ω	450	mJ
TL TPKG	Maximum Temperature for Soldering	300 260	°C
	Leads at 0.063in(1.6mm)from Case for 10 seconds		
	Package Body for 10 seconds		
TJ and TSTG	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	RS12N60F	Units	Test Conditions
R $\theta$ JC	Junction-to-Case	1.92	$^{\circ}\text{C} / \text{W}$	Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 1 5 0 $^{\circ}\text{C}$
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
BVDSS	Drain- to- source Breakdown Voltage	600	--	--	V	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$
IDSS	Drain- to- Source Leakage Current	--	--	1	$\mu\text{A}$	$V_{DS}=600\text{V}, V_{GS}=0\text{V}$
IGSS	Gate- to- Source Forward Leakage	--	--	100	nA	$V_{GS}=30\text{V}, V_{DS}=0\text{V}$
	Gate- to- Source Reverse Leakage	--	--	-100		$V_{GS}=-30\text{V}, V_{DS}=0\text{V}$

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
RDS(on)	Static Drain- to- Source On-Resistance(Note*2)	--	0.5	0.62	$\Omega$	$V_{GS}=10\text{V}, I_D=6\text{A}$
VGS(TH)	Gate Threshold Voltage	3	--	4	V	$V_{GS}=V_{DS}, I_D=250\mu\text{A}$

### Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
td(ON)	Turn- on Delay Time	--	46	--	nS	$V_{DS}=300\text{V}$ $I_D=12\text{A}$ $R_G=25\Omega$
trise	Rise Time	--	32	--		
td(OFF)	Turn- OFF Delay Time	--	212	--		
tfall	Fall Time	--	54	--		

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance	--	1703	--	pF	VGS=0V VDS=25V f=1.0MHz
Coss	Output Capacitance	--	162	--		
Crss	Reverse Transfer Capacitance	--	19	--		
Qg	Total Gate Charge	--	49	--	nC	VDS=400V ID=12A VGS=10V
Qgs	Gate- to- Source Charge	--	7.5	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	23.5	--		

**Source- Drain Diode Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	12	A	Integral pn- diode in MOSFET
ISM	Maximum Pulsed Current	--	--	48	A	
VSD	Diode Forward Voltage	--	--	1.4	V	IS=6A,VGS=0V
trr	Reverse Recovery Time	--	616	--	nS	VGS=0V IS=12A,di/dt=100 A/μs
Qrr	Reverse Recovery Charge	--	3	--	μC	

**Notes:**

- \* 1. Repetitive rating,pulse width limited by maximum junction temperature.
- \* 2. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

## Typical Feature Curve

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

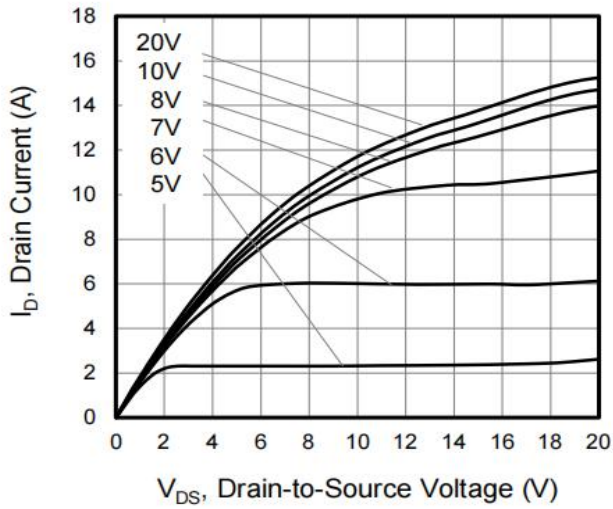


Figure 2. Body Diode Forward Voltage

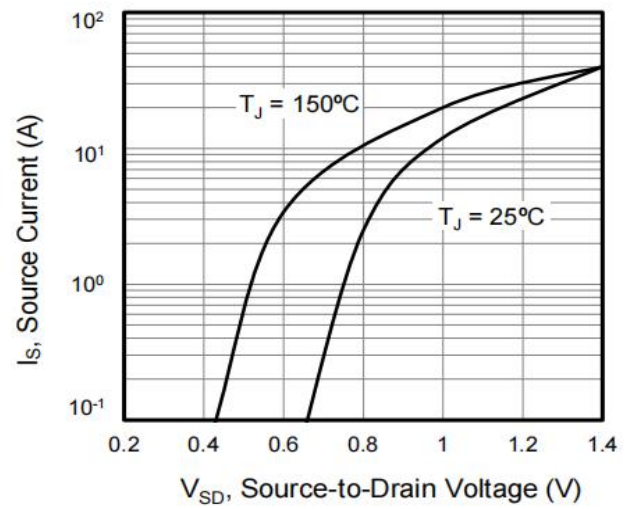


Figure 3. Drain Current vs. Temperature

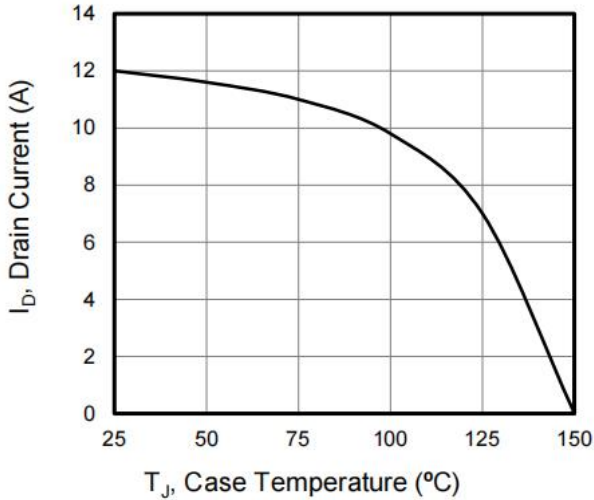


Figure 4.  $BV_{DSS}$  Variation vs. Temperature

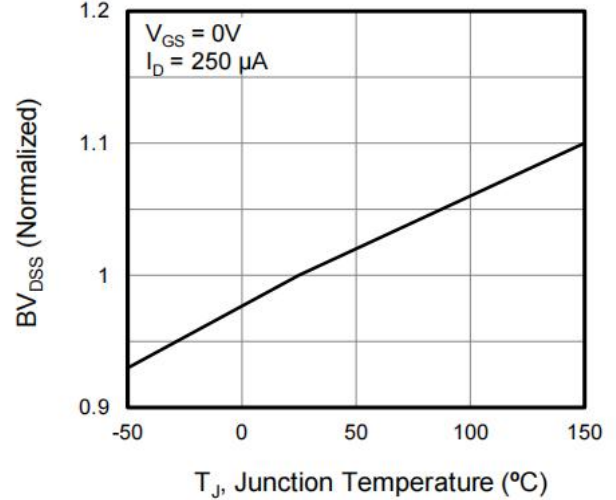


Figure 5. Transfer Characteristics

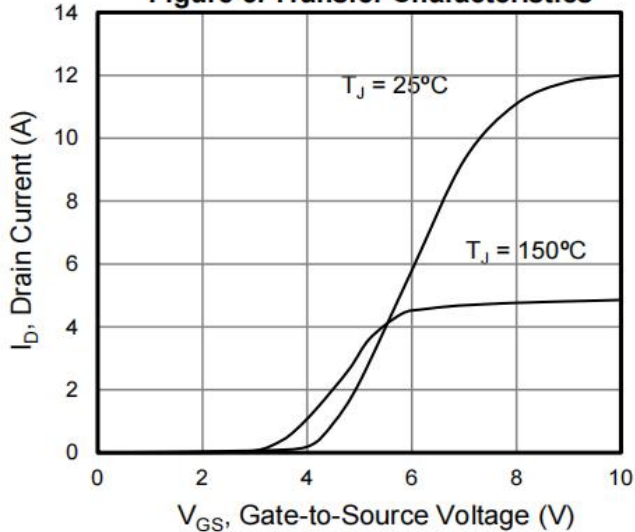
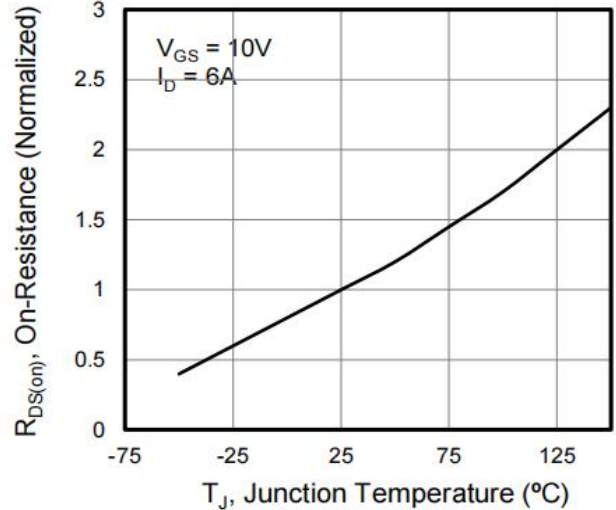
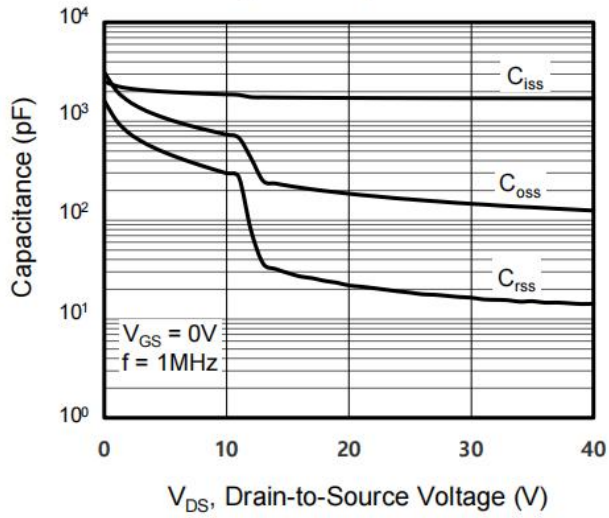


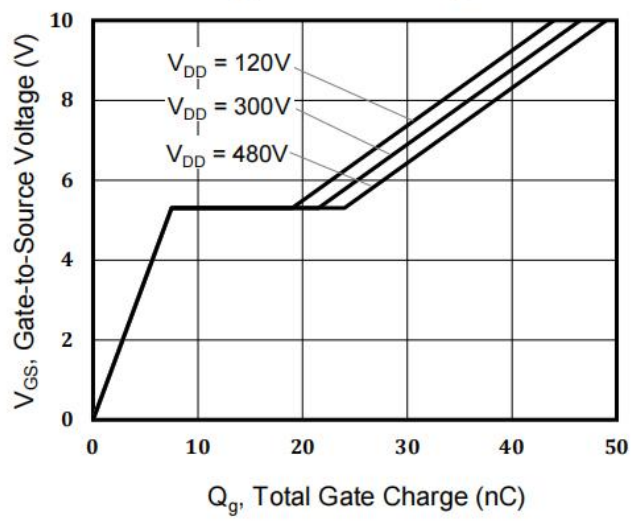
Figure 6. On-Resistance vs. Temperature



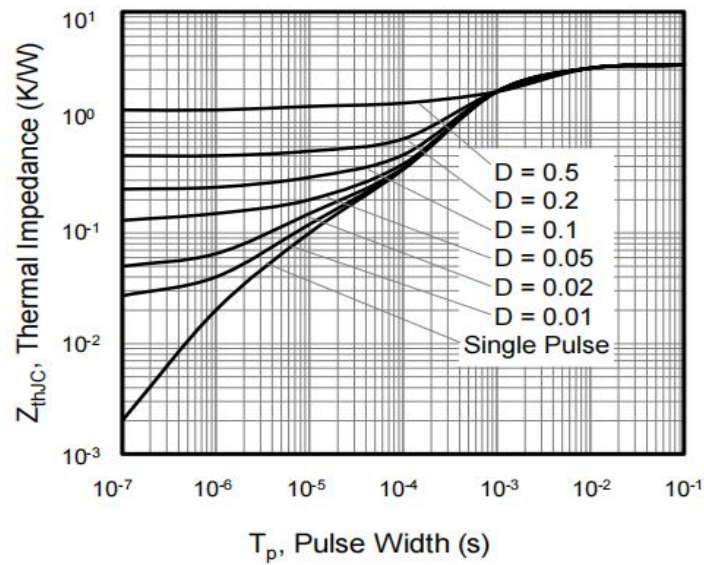
**Figure 7. Capacitance**



**Figure 8. Gate Charge**



**Figure 9. Transient Thermal Impedance**



## Test Circuits and Waveforms

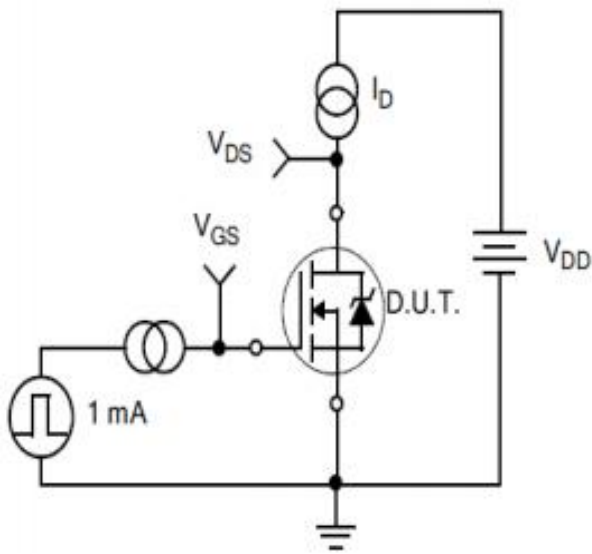


Figure10.  
Gate Charge Test Circuit

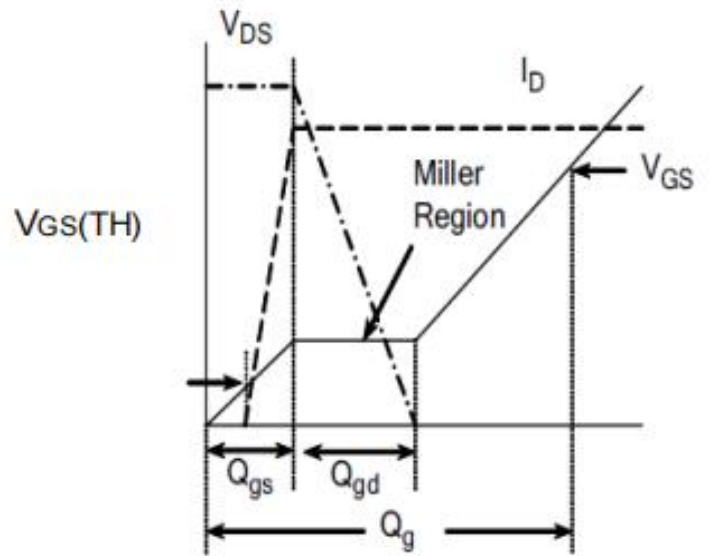


Figure11.  
Gate Charge Waveform

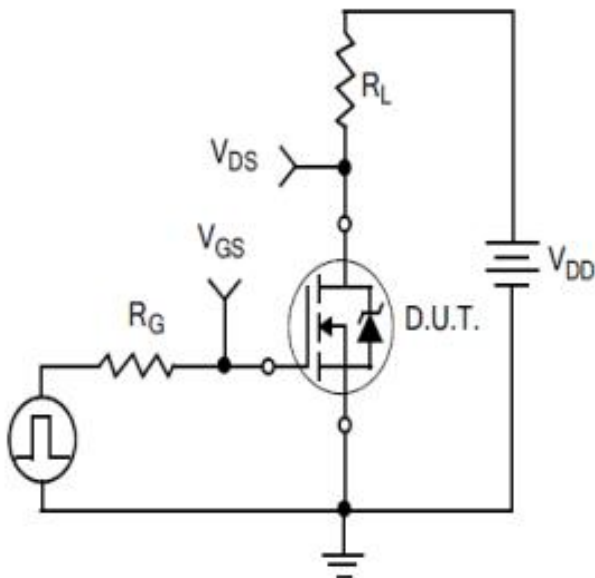


Figure12.  
Resistive Switching Test Circuit

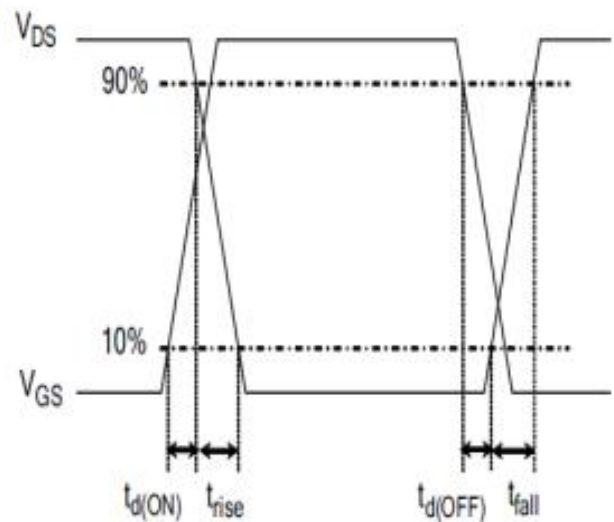


Figure13.  
Resistive Switching Waveforms



## Test Circuits and Waveforms

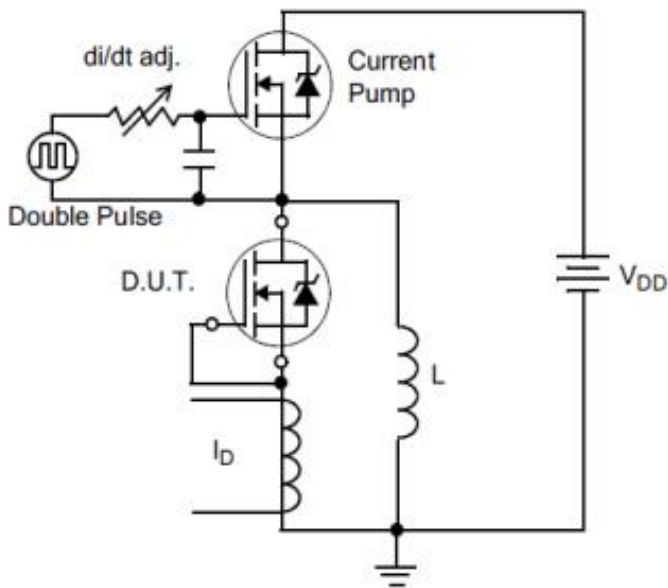


Figure14.Diode Reverse Recovery Test Circuit

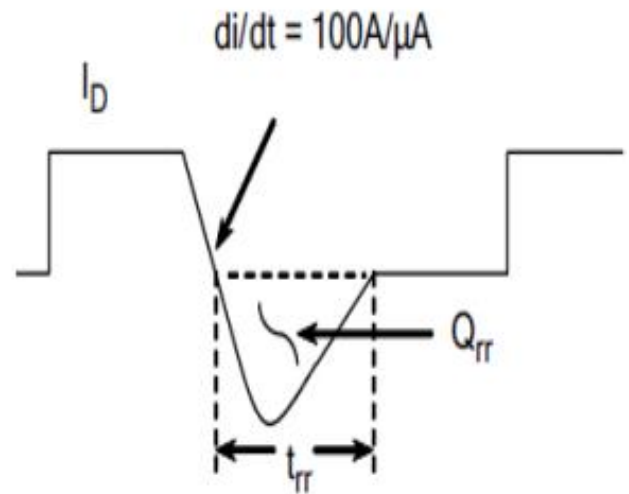


Figure15.Diode Reverse Recovery Waveform

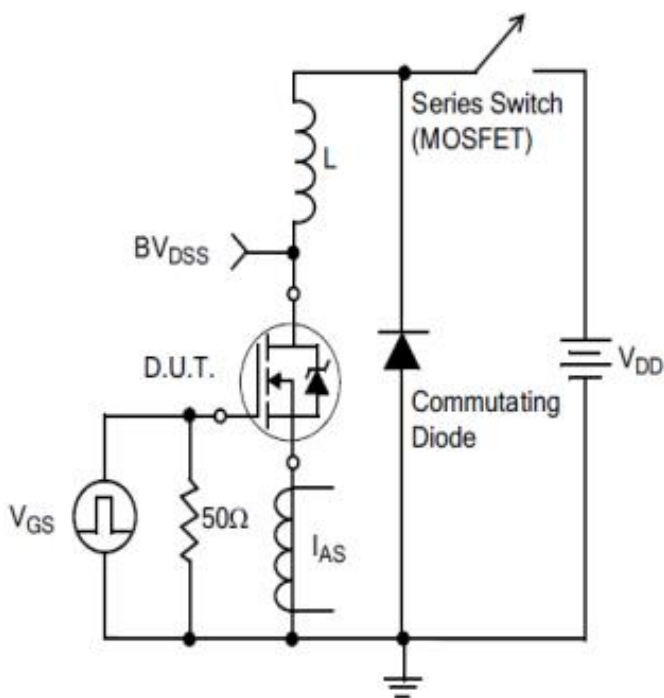
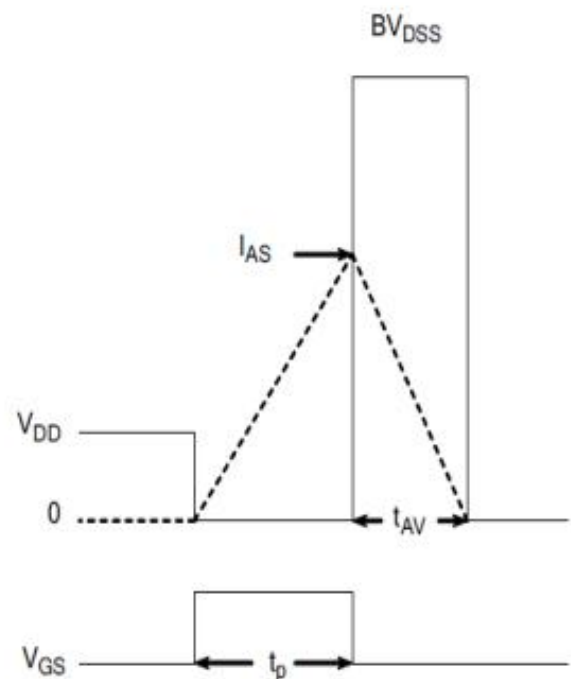


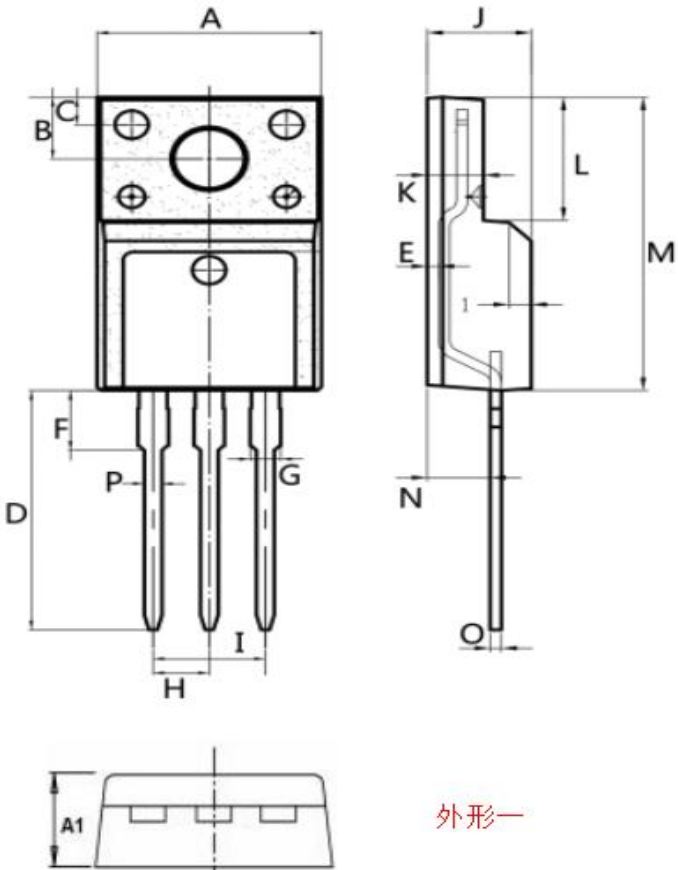
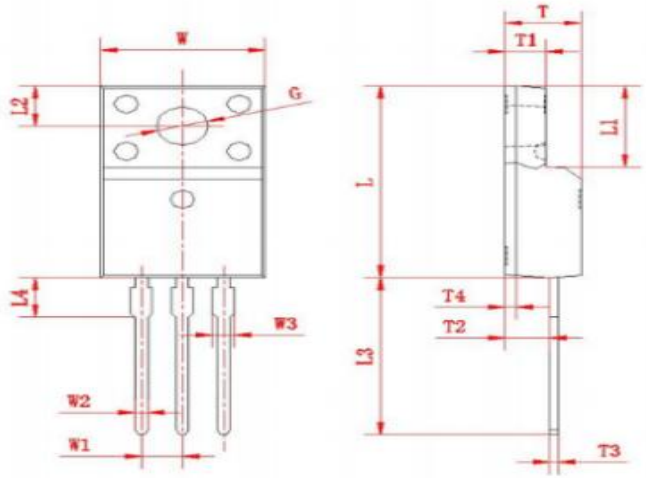
Figure16.Unclamped Inductive Switching Test Circuit



$$EAS = \frac{IAS^2 L}{2}$$

Figure17.Unclamped Inductive Switching Waveforms

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

 <p>外形一</p>	Dim.	Min.	Max.
	A	9.95	10.36
	A1	4.5	5.0
	B	2.95	3.25
	C	1.25	1.45
	D	12.60	13.60
	E	0.40	0.60
	F	2.8	3.5
	G	1.30	1.45
	H	(2.54)	
	I	(5.08)	
	J	4.60	4.75
	K	2.45	2.65
	L	6.5	6.8
	M	15.4	16.0
	N	2.25	3.05
	O	0.45	0.55
	P	0.70	0.90
All Dimensions in millimeter			
 <p>外形二</p>	Dim.	Min.	Max.
	W	9.95	10.36
	W1	(2.54)	
	W2	0.70	0.90
	W3	1.25	1.47
	L	15.67	16.07
	L1	6.48	6.88
	L2	3.2	3.4
	L3	12.6	13.6
	L4	(3.23)	
	T	4.50	4.90
	T1	2.34	2.74
	T2	2.25	2.95
	T3	0.45	0.60
	T4	(0.70)	
	G	3.08	3.28
All Dimensions in millimeter			



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