

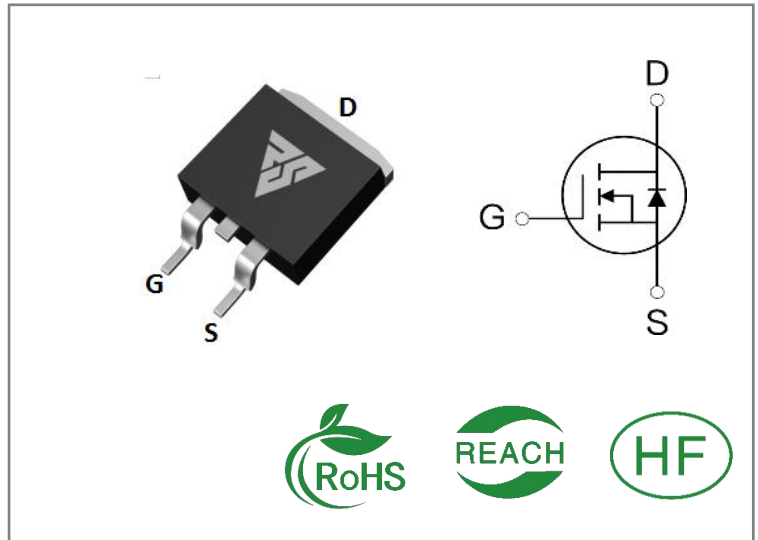
ID	R <sub>DS(ON)</sub> (Typ)	VDSS
9A	1.2Ω	900V

#### 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.
RS9N90S	T0-263	RS9N90S	Tape&reel	800 PCS

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

Symbol	Parameter	RS9N90S	Units
VDSS	Drain-to-Source Voltage	900	V
ID	Continuous Drain Current TC=25°C	9	A
IDM	Pulsed Drain Current (Note*1)	36	
PD	Power Dissipation	160	W
VGS	Gate- to- Source Voltage	±30	V
EAS	Single Pulse Avalanche Energy L = 10mH, VDD = 50V, RG = 25 Ω	650	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	RS9N90S	Units	Test Conditions
R $\theta$ JC	Junction-to-Case	0.78	$^{\circ}\text{C} / \text{W}$	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	900	--	--	V	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$
IDSS	Drain- to- Source Leakage Current	--	--	1	$\mu\text{A}$	$V_{DS}=900\text{V}, V_{GS}=0\text{V}$
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)	--	1.2	1.55	$\Omega$	$V_{GS}=10\text{V}, I_D=4.5\text{A}$
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	--	41	--	nS	$V_{DS}=450\text{V}$ $I_D=9\text{A}$ $R_G=25\Omega$
trise	Rise Time	--	23	--		
td(OFF)	Turn- OFF Delay Time	--	190	--		
tfall	Fall Time	--	53	--		

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance	--	1572	--	pF	VGS=0V VDS=25V f=1.0MHz
Coss	Output Capacitance	--	148	--		
Crss	Reverse Transfer Capacitance	--	31	--		
Qg	Total Gate Charge	--	64	--	nC	VDS=720V ID=9A VGS=15V
Qgs	Gate- to- Source Charge	--	6.7	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	35	--		

**Source- Drain Diode Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	9	A	Integral pn- diode in MOSFET
ISM	Maximum Pulsed Current	--	--	36	A	
VSD	Diode Forward Voltage	--	--	1.4	V	IS=4.5A,VGS=0V
trr	Reverse Recovery Time	--	563	--	nS	VGS=0V IS=9A,di/dt=100A /μs
Qrr	Reverse Recovery Charge	--	7.65	--	μC	

**Notes:**

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

## Typical Feature Curve

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

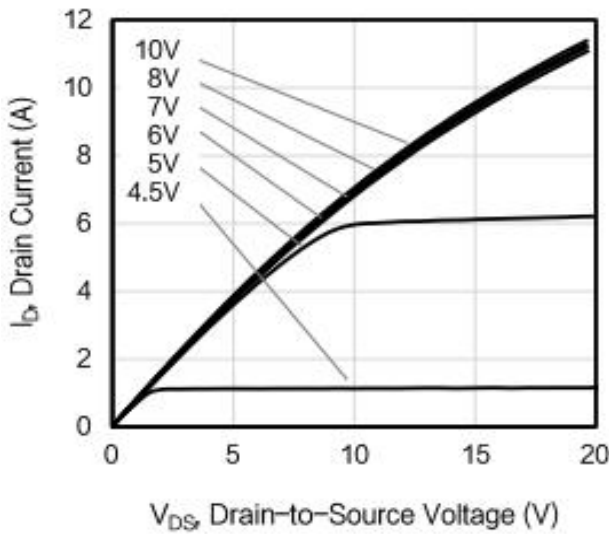


Figure 2. Body Diode Forward Voltage

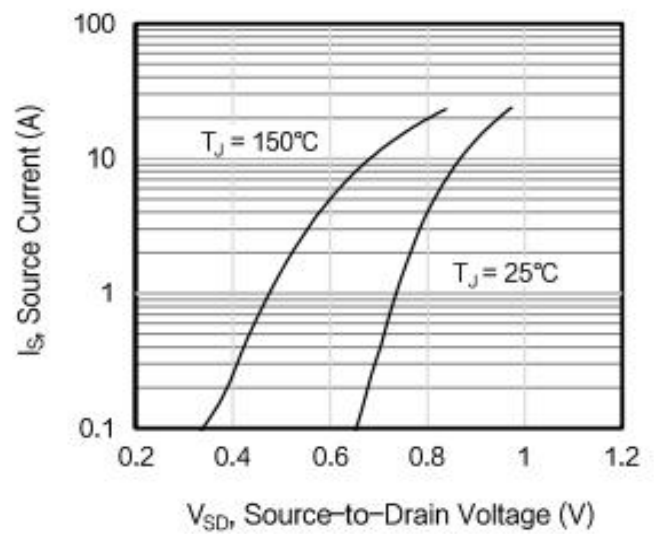


Figure 3. Drain Current vs. Temperature

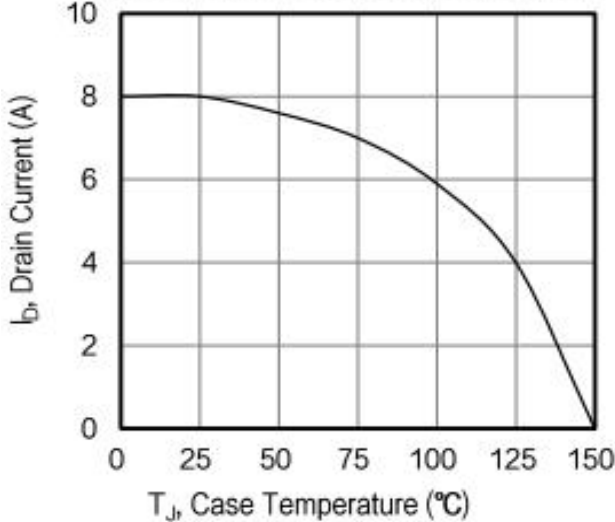


Figure 4.  $BV_{DSS}$  Variation vs. Temperature

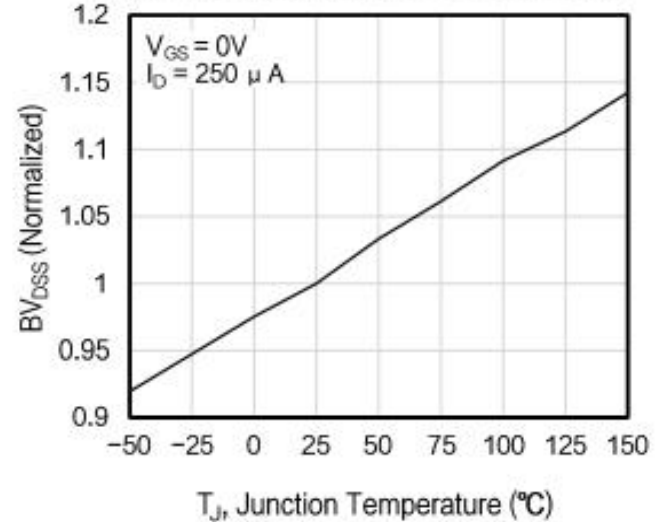


Figure 5. Transfer Characteristics

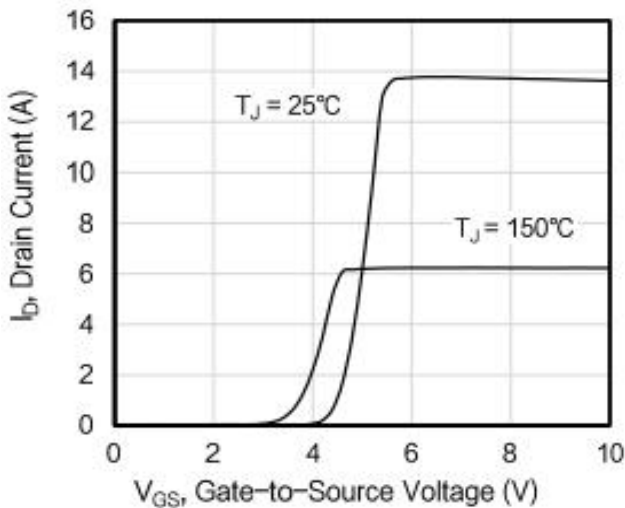


Figure 6. On-Resistance vs. Temperature

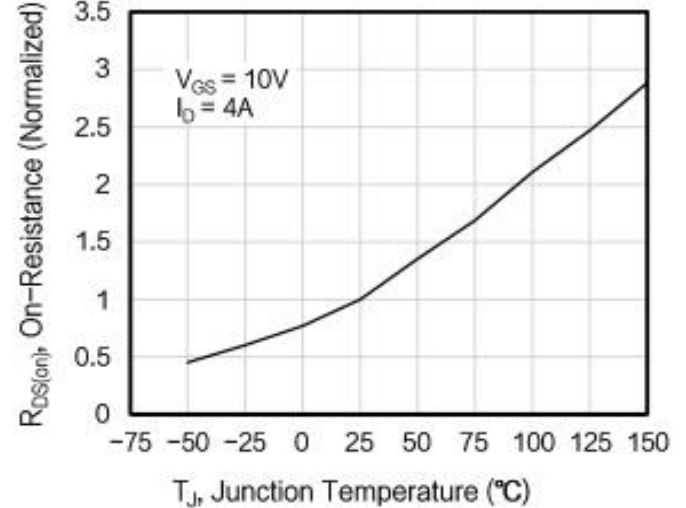


Figure 7. Capacitance

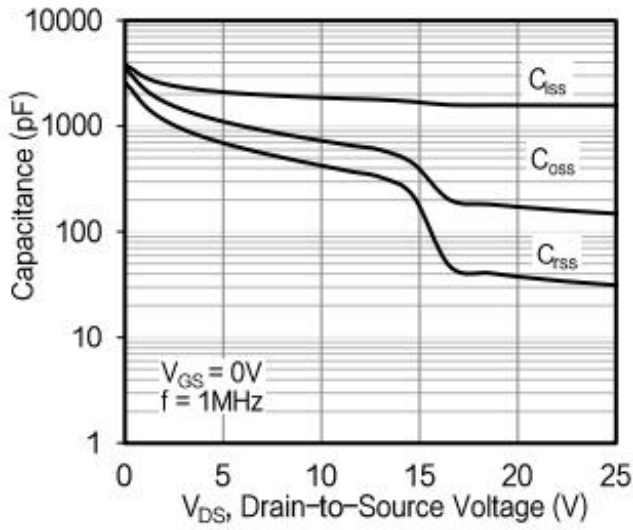


Figure 8. Gate Charge

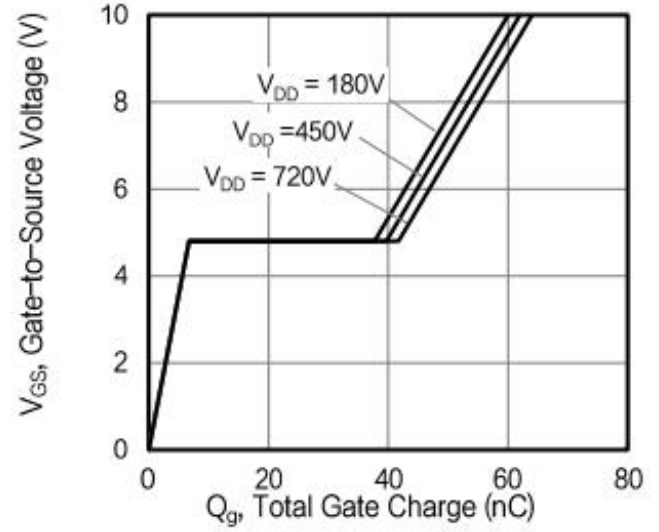
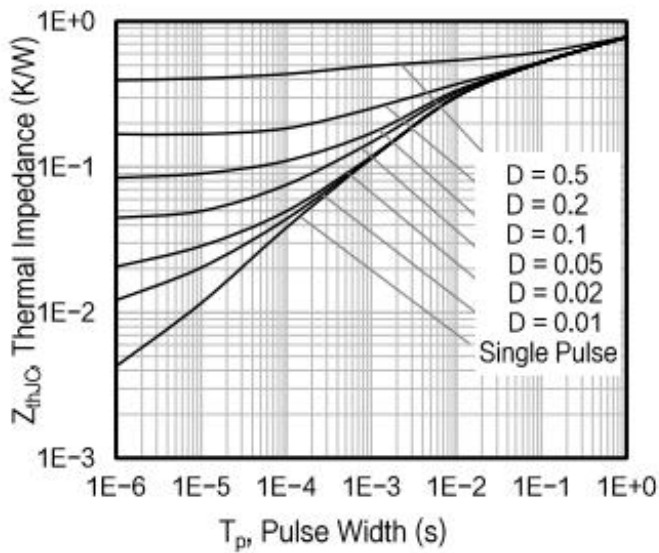


Figure 9. Transient Thermal Impedance



## Test Circuits and Waveforms

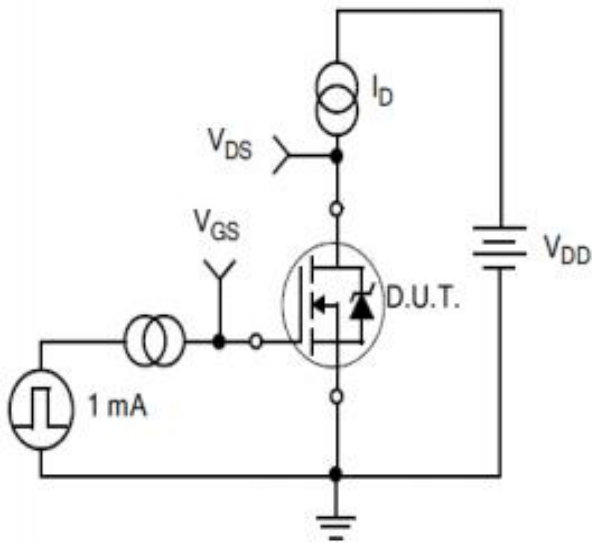


Figure10.  
Gate Charge Test Circuit

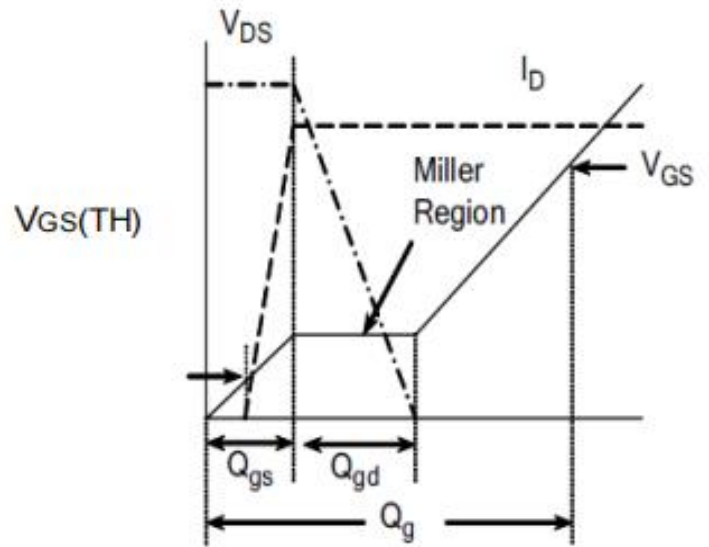


Figure11.  
Gate Charge Waveform

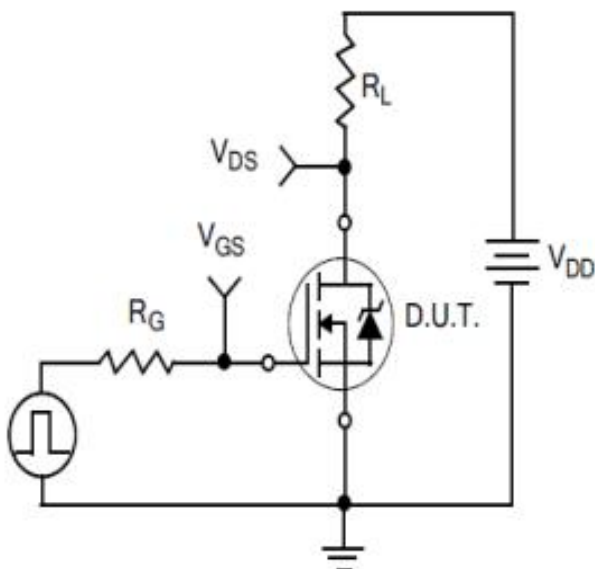


Figure12.  
Resistive Switching Test Circuit

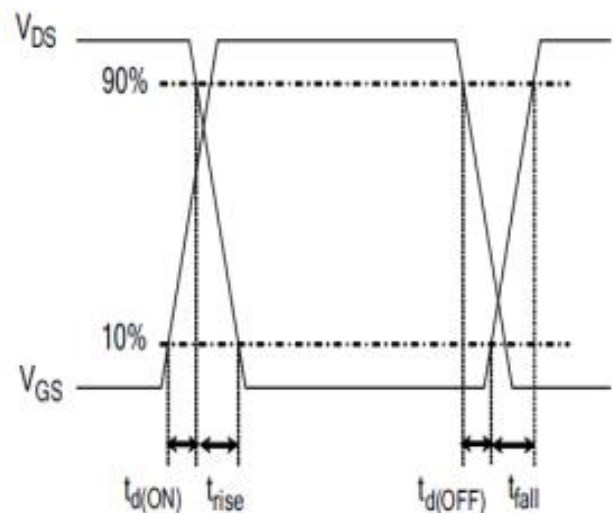


Figure13.  
Resistive Switching Waveforms



## Test Circuits and Waveforms

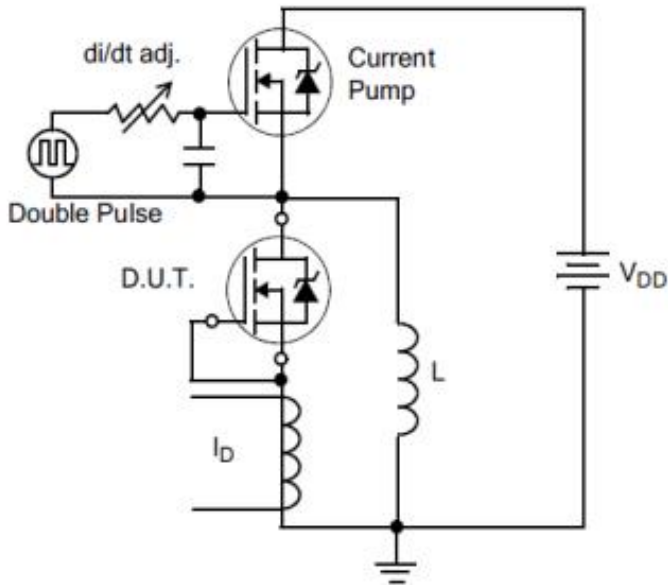


Figure14.Diode Reverse Recovery Test Circuit

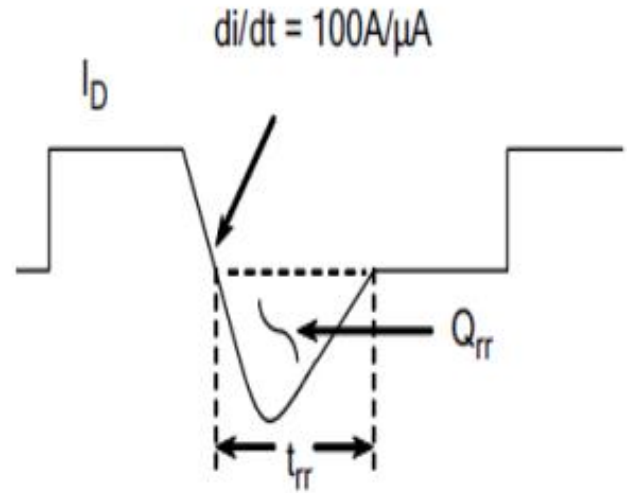


Figure15.Diode Reverse Recovery Waveform

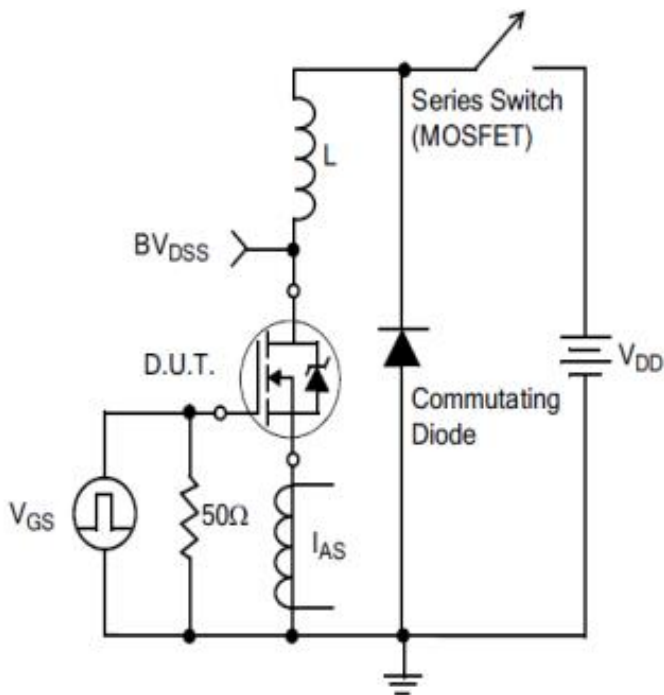
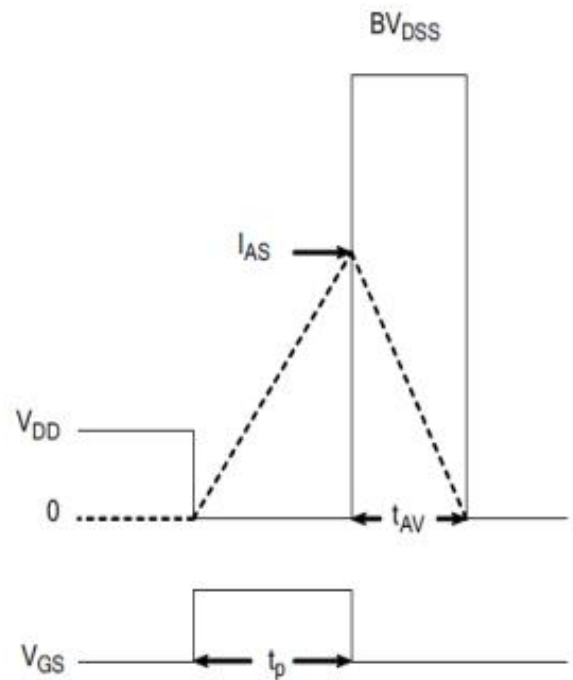
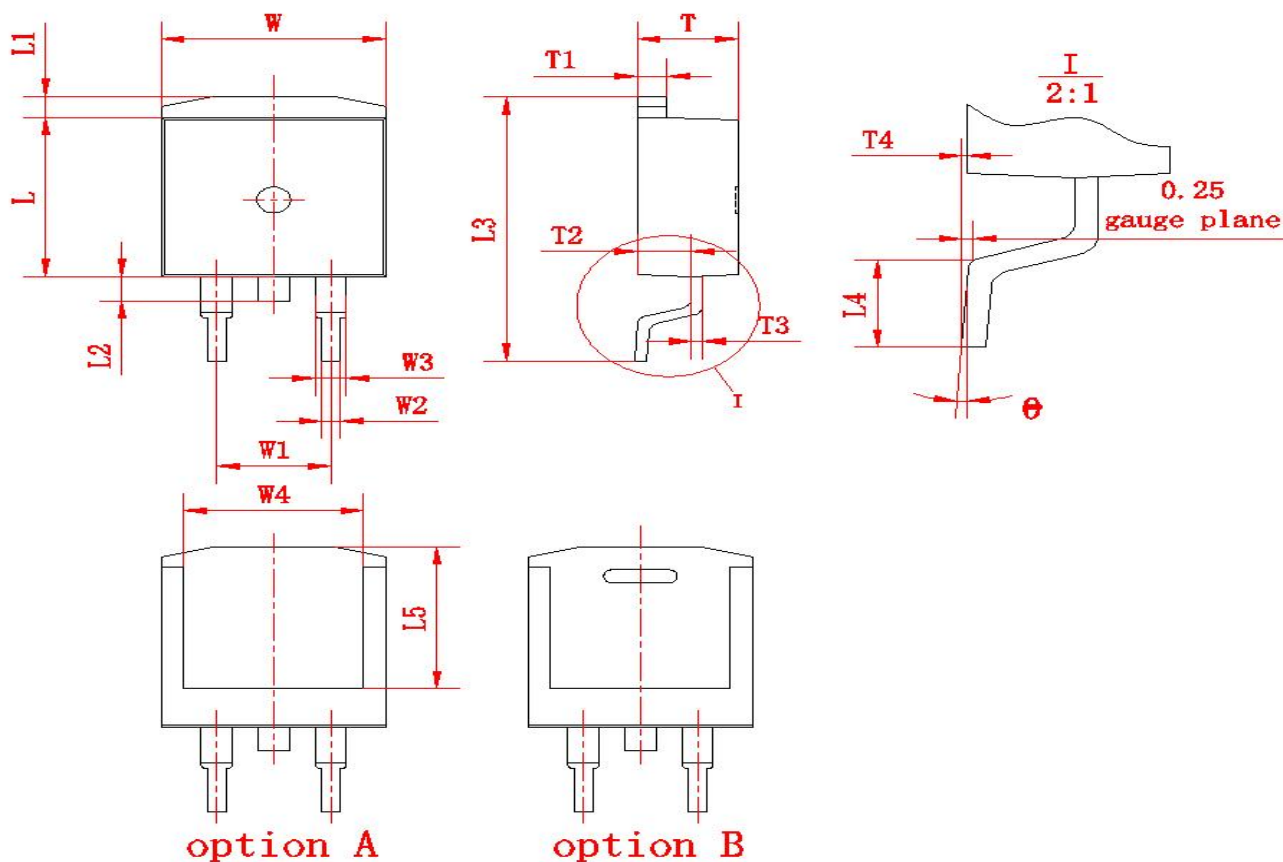


Figure16.Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Figure17.Unclamped Inductive Switching Waveforms

**Package outline drawing(TO-263 Unit: mm )**


(单位: mm)

符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max
W	9.80	10.20	L1	1.00	1.40	T1	1.20	1.40
W1	(5.08)		L2	1.20	1.60	T2	2.20	2.60
W2	0.70	0.95	L3	15.00	15.60	T3	0.45	0.65
W3	1.17	1.62	L4	2.20	2.80	T4	0	0.25
W4	(8.0)		L5	(8.2)		$\theta$	0°	8°
L	9.00	9.40	T	4.30	4.70			



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