

**N Channel MOSFET**


Lead Free Package and Finish

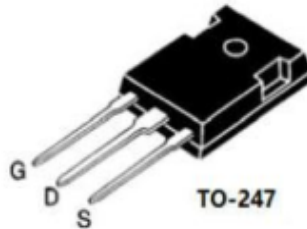
**Applications:**

- Adapter & Charger
- DC-AC inverter Power
- AC-DC Switching Power Supply
- LED driving power

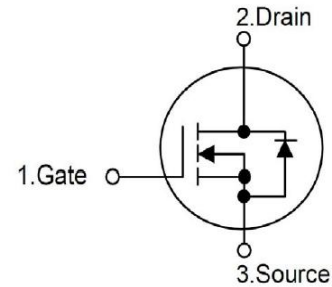
$I_D$	$R_{DS(ON)}$ (Typ.)	$V_{DSS}$
18A	0.27 $\Omega$	500V

**Features:**

- Low On Resistance
- Low Gate Charge
- Peak Current vs Pulse Width Curve
- RoHS Compliant



TO-247



Not to Scale

**Ordering Information:**

Part Number	Package	Marking
RS18N50W	TO-247	RS18N50W

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

Symbol	Parameter	RS18N50W	Units
$V_{DSS}$	Drain-to-Source Voltage (Note*1)	500	V
$I_D$	Continuous Drain Current	18.0	A
$I_{D@ 100^\circ\text{C}}$	Continuous Drain Current	9.0	
$I_{DM}$	Pulsed Drain Current (Note*2)	72.0	
PD	Power Dissipation	98	W
VGS	Gate-to-Source Voltage	$\pm 30$	V
EAS	Single Pulse Avalanche Energy $I_{AS}=14\text{A}$ $V_{DD}=50\text{V}$ $R_G=25\Omega$ Starting $T_J=25^\circ\text{C}$	998	mJ
TL	Maximum Temperature for Soldering	300 260	$^\circ\text{C}$
TPKG	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	RS18N50W	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	0.43	$^\circ\text{C}/\text{W}$	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	41		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	500	--	--	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> =500V, V <sub>GS</sub> =0V
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	--	--	100	$\mu$ A	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	--	0.27	0.32	$\Omega$	V <sub>GS</sub> =10V, I <sub>D</sub> =9A
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	--	35	--	nS	V <sub>DS</sub> =250V I <sub>D</sub> =18A R <sub>G</sub> =25 $\Omega$ (Note:3,4)
t <sub>rise</sub>	Rise Time	--	50	--		
t <sub>d(OFF)</sub>	Turn-OFF Delay Time	--	180	--		
t <sub>fall</sub>	Fall Time	--	65	--		

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C <sub>iss</sub>	Input Capacitance	--	2250	--	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =25V f=1.0MHz
C <sub>oss</sub>	Output Capacitance	--	231	--		
C <sub>rss</sub>	Reverse Transfer Capacitance	--	36	--		
Q <sub>g</sub>	Total Gate Charge	--	71	--	nC	V <sub>DS</sub> =400V I <sub>D</sub> =18A V <sub>GS</sub> =10V (Note:3,4)
Q <sub>gs</sub>	Gate-to-Source Charge	--	10.0	--		
Q <sub>gd</sub>	Gate-to-Drain("Miller") Charge	--	32	--		

**Source-Drain Diode Characteristics**

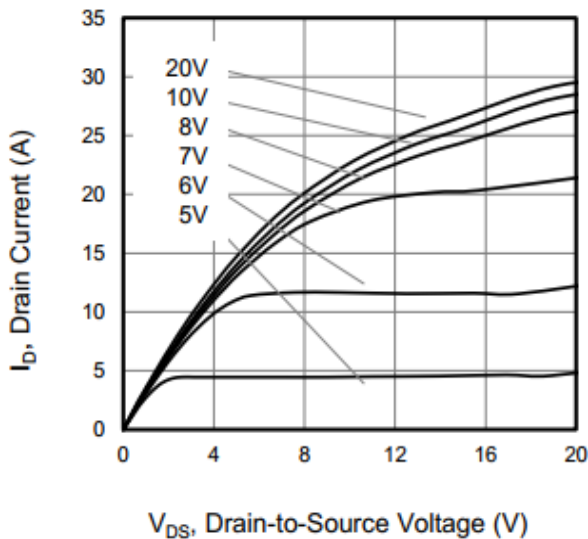
Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I <sub>S</sub>	Continuous Source Current	--	--	18	A	Integral pn-diode in MOSFET
I <sub>SM</sub>	Maximum Pulsed Current	--	--	72	A	
V <sub>SD</sub>	Diode Forward Voltage	--	--	1.4	V	I <sub>S</sub> =18A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	--	570.3	--	nS	V <sub>GS</sub> =0V
Q <sub>rr</sub>	Reverse Recovery Charge	--	7.35	--	μC	I <sub>S</sub> =18A, di/dt=100A/μs

**Notes:**

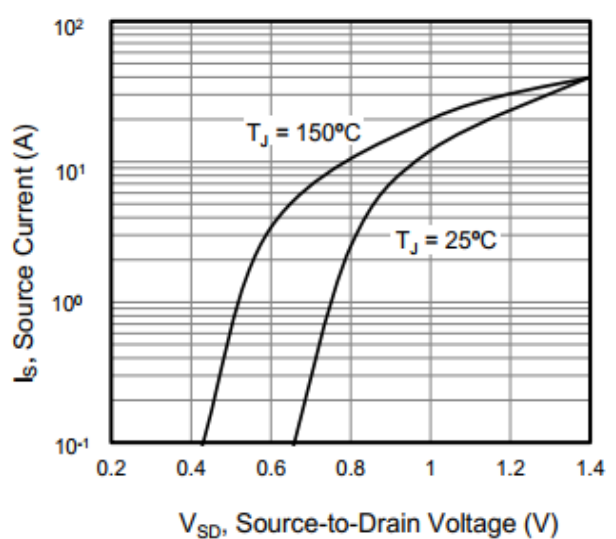
- \*1. T<sub>J</sub>=±25°C to +150°C.
- \*2. Repetitive rating; pulse width limited by maximum junction temperature.
- \*3. Pulse width ≤ 300μs; duty cycle ≤ 1%.
- \*4. Basically not affected by temperature.

**Typical Feature curve**

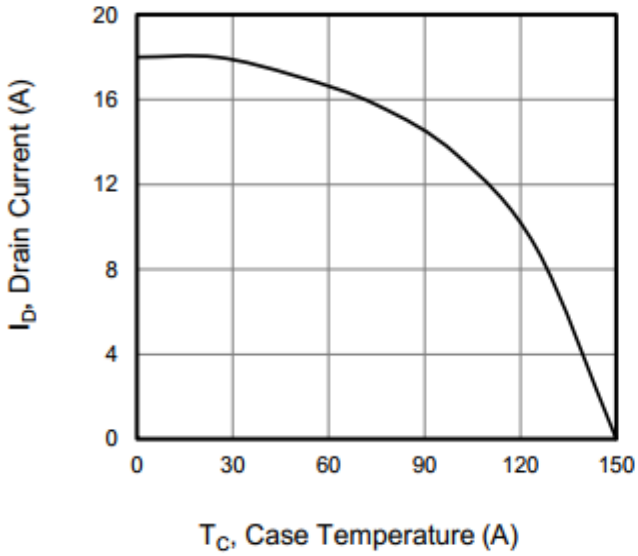
**Figure 1. Output Characteristics (T<sub>J</sub> = 25°C)**



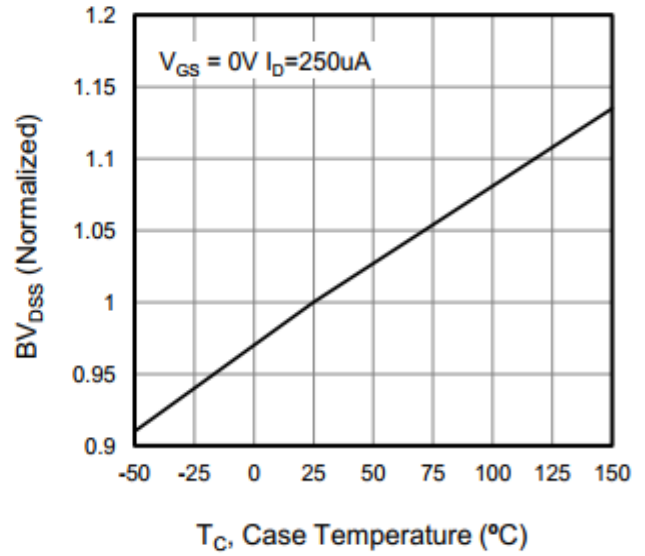
**Figure 2. Body Diode Forward Voltage**



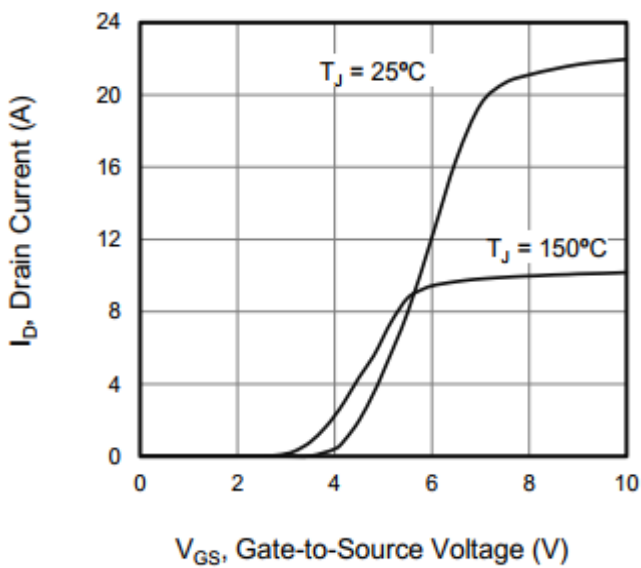
**Figure 3. Drain Current vs. Temperature**



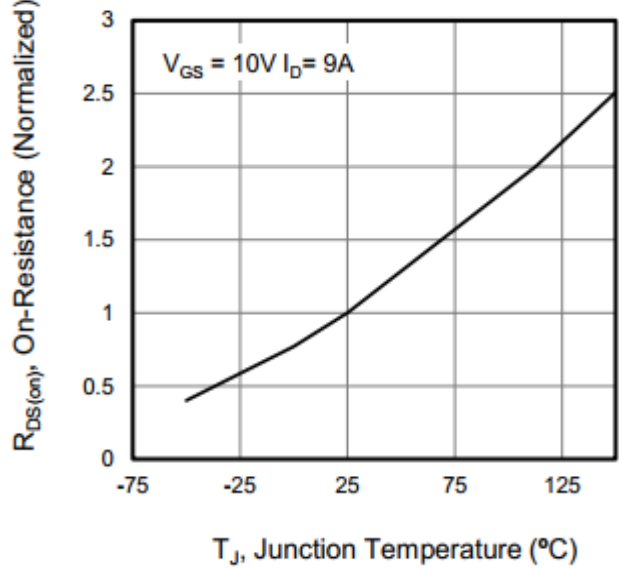
**Figure 4.  $BV_{DSS}$  Variation vs. Temperature**



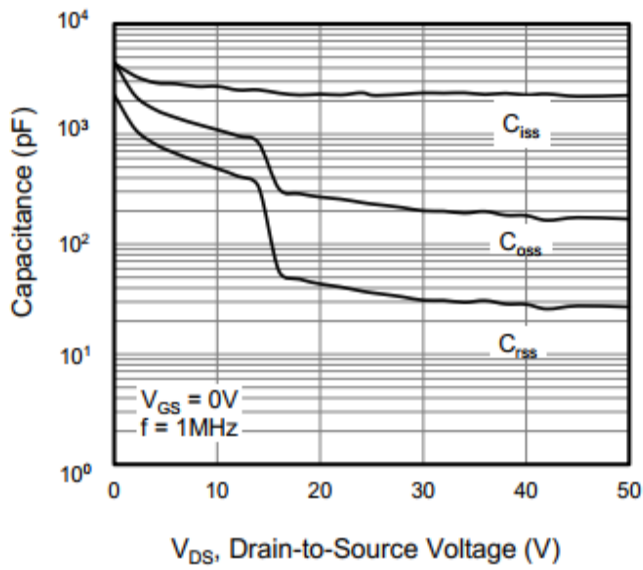
**Figure 5. Transfer Characteristics**



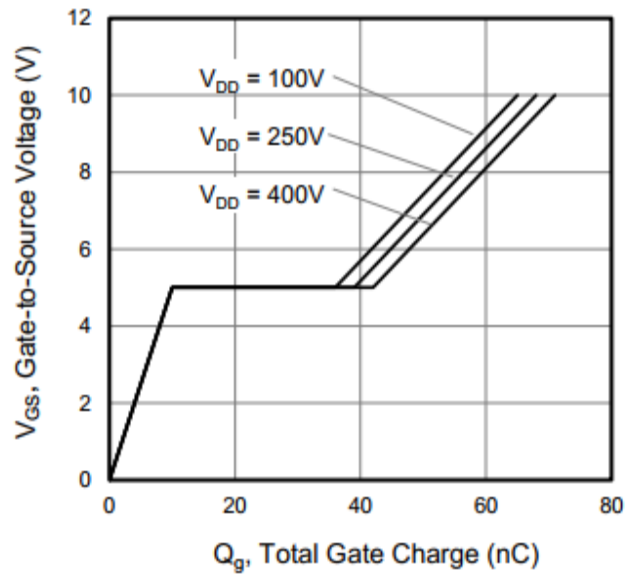
**Figure 6. On-Resistance vs. Temperature**



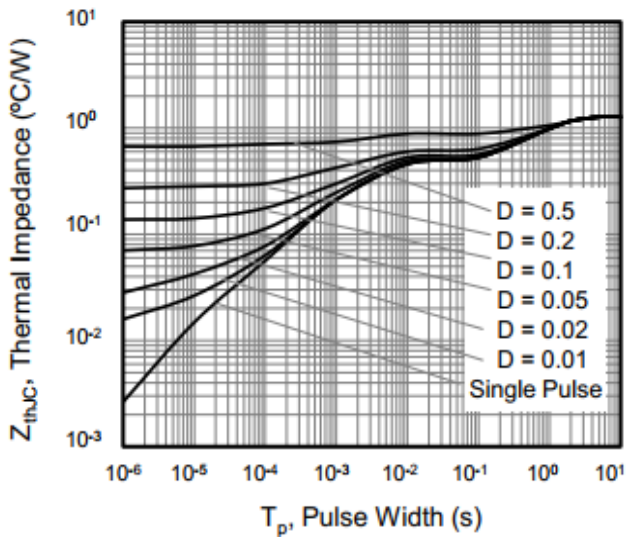
**Figure 7. Capacitance**



**Figure 8. Gate Charge**



**Figure 9. Transient Thermal Impedance**



**Test Circuits and Waveforms**

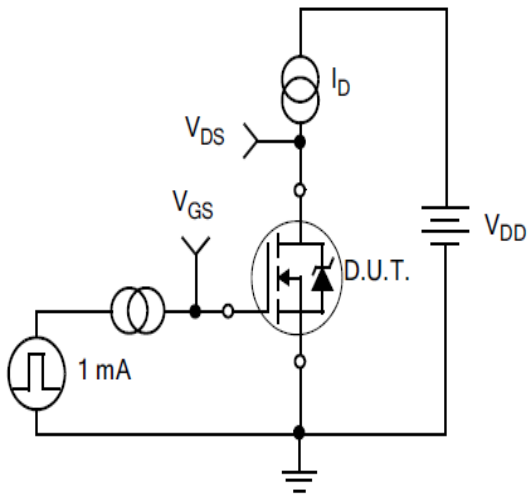


Figure10.  
Gate Charge Test Circuit

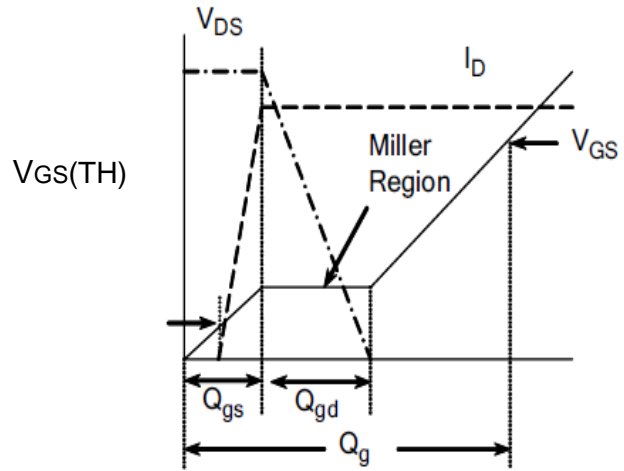


Figure11.  
Gate Charge Waveform

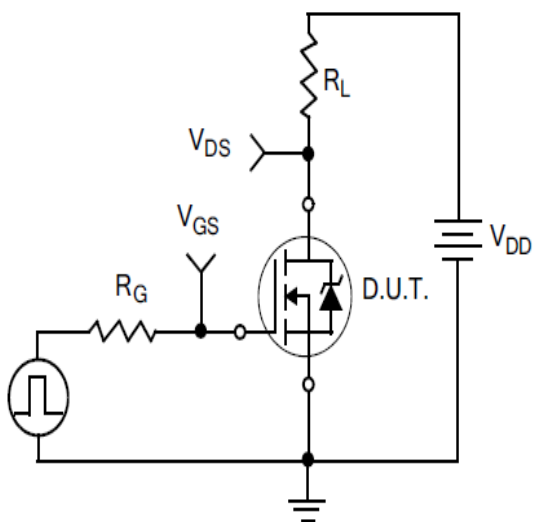


Figure12.  
Resistive Switching Test Circuit

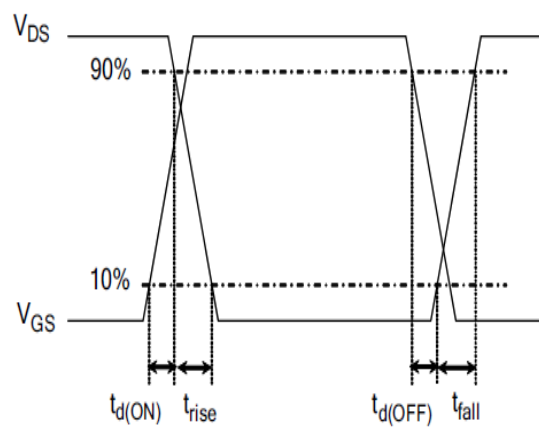


Figure13.  
Resistive Switching Waveforms

**Test Circuits and Waveforms**

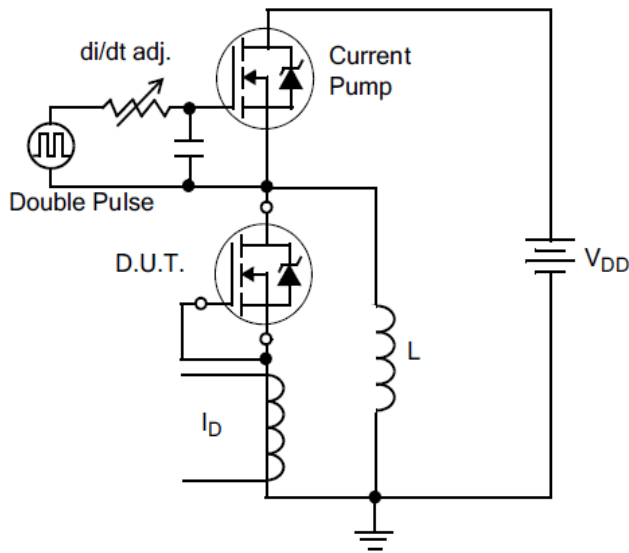


Figure14.Diode Reverse Recovery Test Circuit

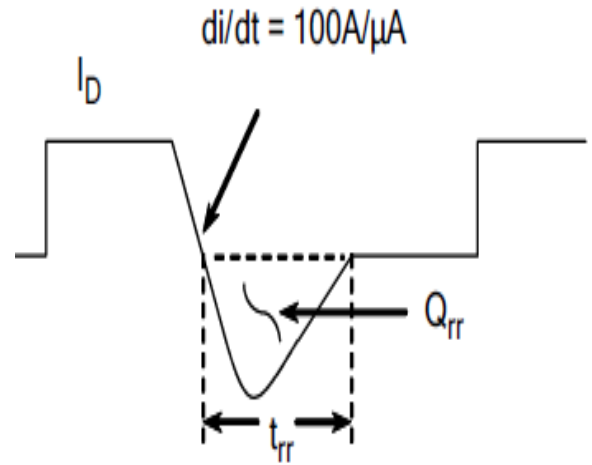


Figure15.Diode Reverse Recovery Waveform

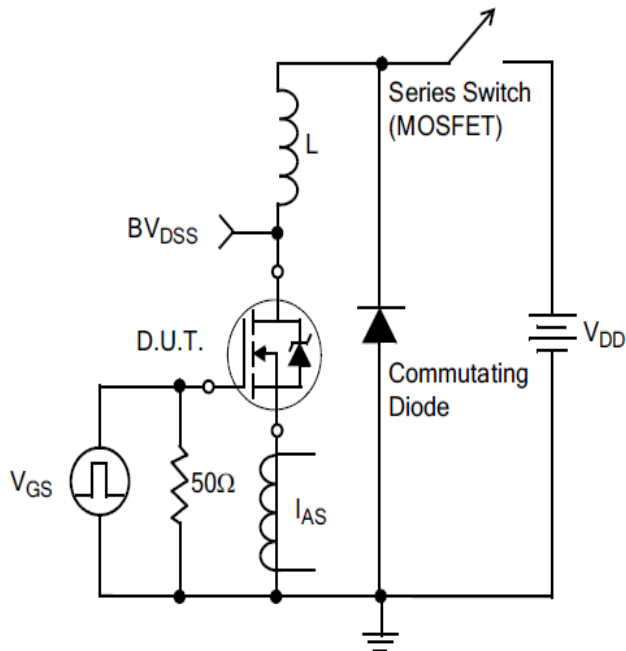
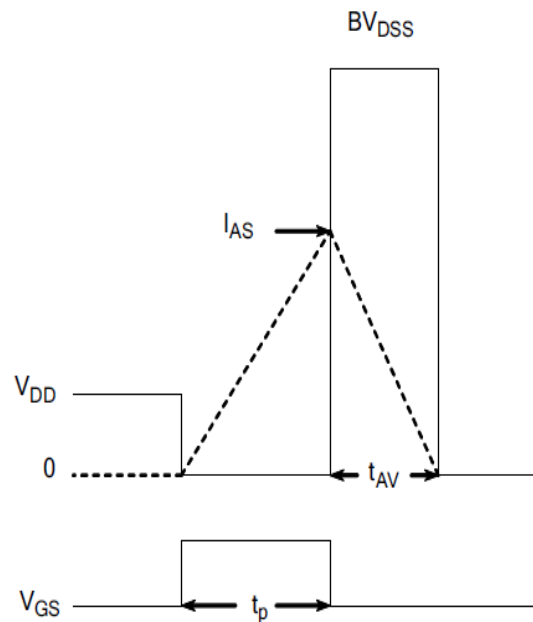


Figure16.Unclamped Inductive Switching Test Circuit

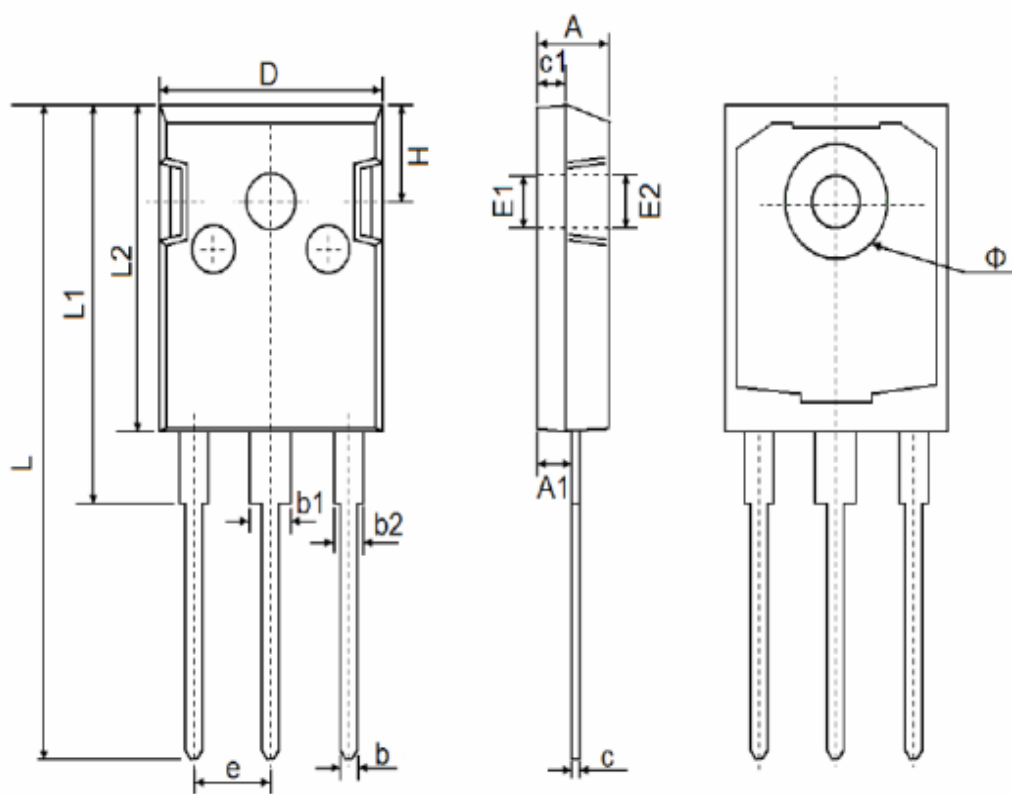


$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Figure17.Unclamped Inductive Switching Waveforms

**Package outline drawing**

Unit:mm


**TO-247**

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	



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