RS20N50W

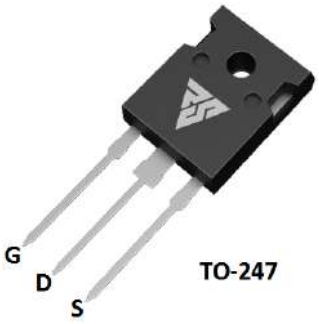
N Channel MOSFET

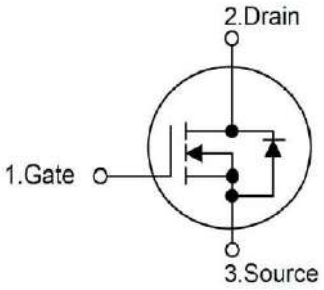
Lead Free Package and Finish

Applications:

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

I_D	$R_{DS(ON)}$(Typ.)	V_{DSS}
20A	0.23Ω	500V





Not to Scale

Features:

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

Ordering Information

Part Number	Package	Marking
RS20N50W	TO-247	RS20N50W

Absolute Maximun Ratings Tc=25℃ unless otherwise specified

Symbol	Parameter	RS20N50W	Units
V_{DSS}	Drain-to-Source Voltage (Note*1)	500	V
I_D	Continuous Drain Current	20.0	A
I_D@ 100 ℃	Continuous Drain Current	12.6	
I_{DM}	Pulsed Drain Current (Note*2)	80	
P_D	Power Dissipation	230	W
	Derating Factor above 25℃	1.85	W/℃
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Engergy L=10mH V_{DD}=50V R_G=25Ω T_J=25℃	1200	mJ
T_L	Maximum Temperature for Soldering Leads at 0.063in(1.6mm)from Case for 10 seconds	300	℃
T_{PKG}	Package Body for 10 seconds	260	
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	RS20N50W	Units	Test Conditions
RθJC	Junction-to-Case	0.54	℃/W	Drain lead soldered to water cooled heatsink,PD adjusted for a peak junction temperature of +150℃.
RθJA	Junction-to-Ambient	62.5		1 cubic foot chamber,free air.

OFF Characteristics TJ=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-source Breakdown Voltage	500	--	--	V	V_{GS}=0V,I_D=250μA
I_{DSS}	Drain-to-Source Leakage Current	--	--	1.0	μA	V_{DS}=500V,V_{GS}=0V
I_{GSS}	Gate-to-Source Forward Leakage	--	--	100	μA	V_{GS}=+30V, V_{DS}=0V
	Gate-to-Source Reverse Leakage	--	--	-100		V_{GS}=-30V ,V_{DS}=0V

ON Characteristics TJ=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	--	0.23	0.28	Ω	V_{GS}=10V,I_D=10A
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	V_{GS}=V_{DS},I_D=250μA

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	33	--	nS	V_{DS}=250V I_D=20A R_G=20Ω
t_{rise}	Rise Time	--	75	--		
$t_{d(OFF)}$	Turn-OFF Delay Time	--	91	--		
t_{fall}	Fall Time	--	83	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C_{iss}	Input Capacitance	--	1920	--	pF	V_{GS}=0V V_{DS}=25V f=1.0MHz
C_{oss}	Output Capacitance	--	290	--		
C_{rss}	Reverse Transfer Capacitance	--	18	--		
Q_g	Total Gate Charge	--	56	--	nC	V_{DS}=400V I_D=20A V_{GS}=10V
Q_{gs}	Gate-to-Source Charge	--	13	--		
Q_{gd}	Gate-to-Drain("Miller"）Charge	--	20	--		

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current	--	--	20	A	Integral pn-diode in MOSFET
I_{SM}	Maximum Pulsed Current	--	--	80	A	
V_{SD}	Diode Forward Voltage	--	--	1.2	V	I_S=20A,V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	536	--	nS	V_{GS}=0V I_S=20A,di/dt=100A/μs
Q_{rr}	Reverse Recovery Charge	--	5.6	--	μC	

Notes:

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

Typical Feature curve

Figure1 Typical Output Characteristics

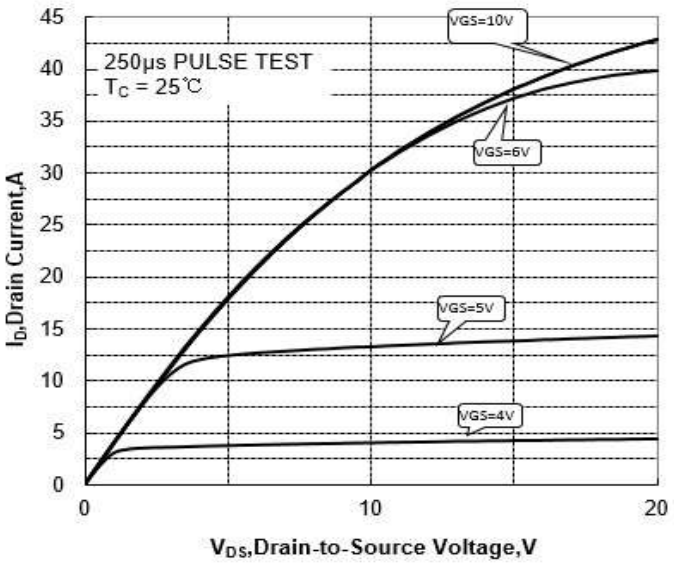


Figure2 Typical Transfer Characteristics

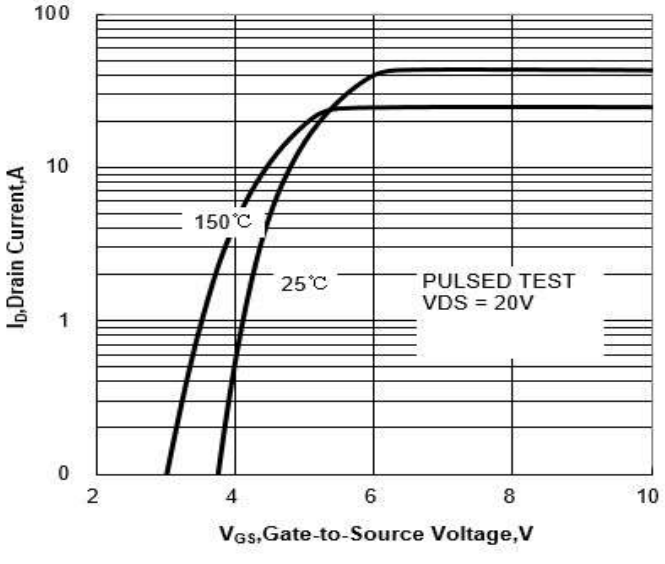


Figure3 Typical Drain to Source ON Resistance vs Drain Current

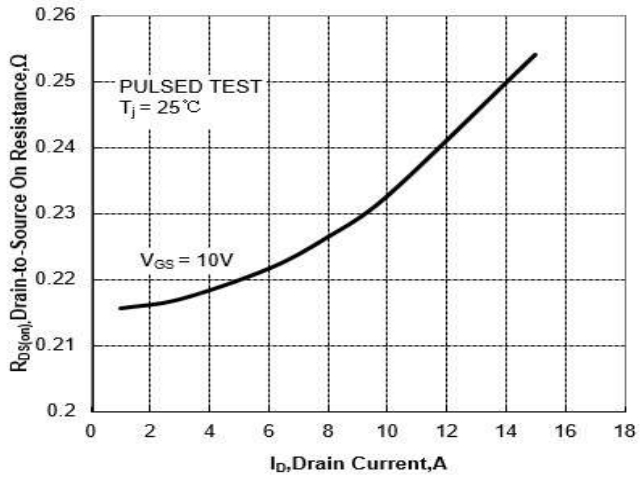


Figure4 Typical Drian to Source on Resistance vs Junction Temperature

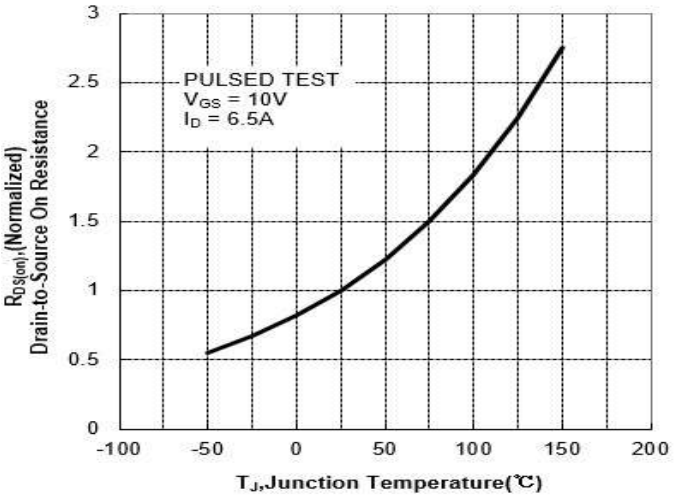


Figure5 Typical Theshold Voltage vs Junction Temperature

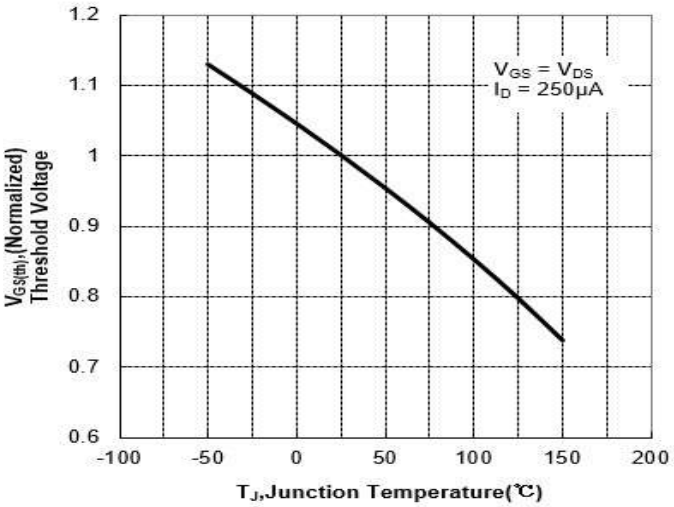


Figure6 Typical Breakdown Voltage vs Junction Temperature

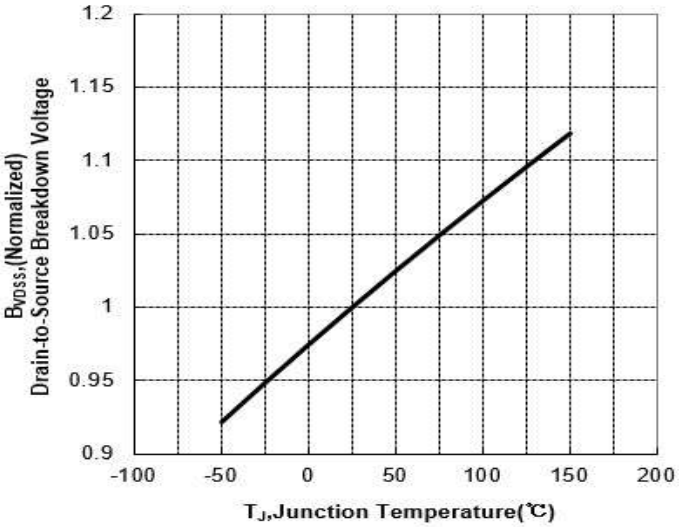


Figure7 Power Dissipation

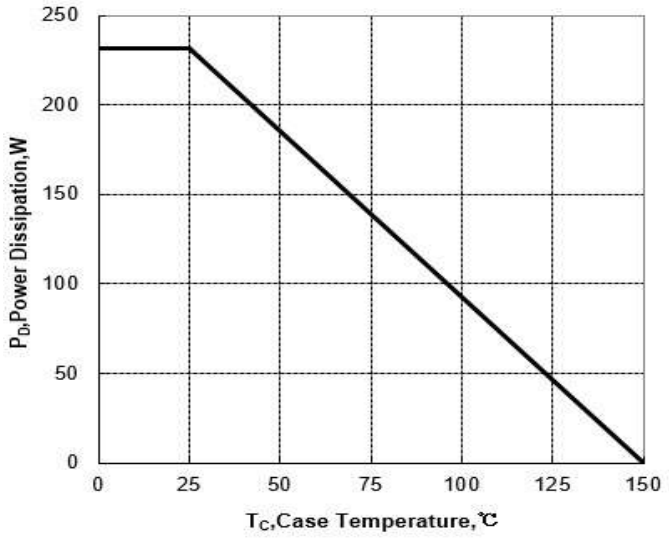


Figure8 Typical Breakdown Voltage vs Junction Temperature

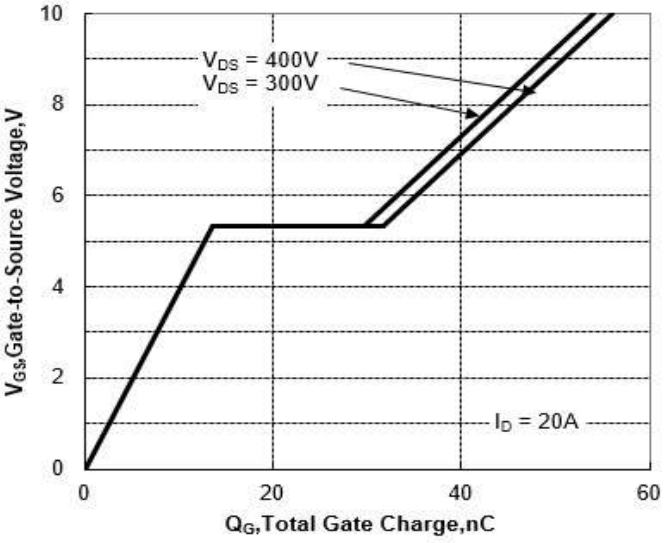


Figure9 Typical Theshold Voltage vs Junction Temperature

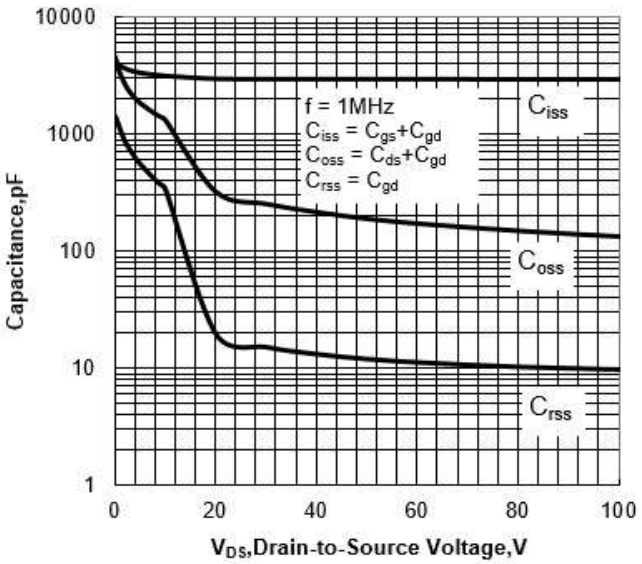


Figure10 Safe Operating Area

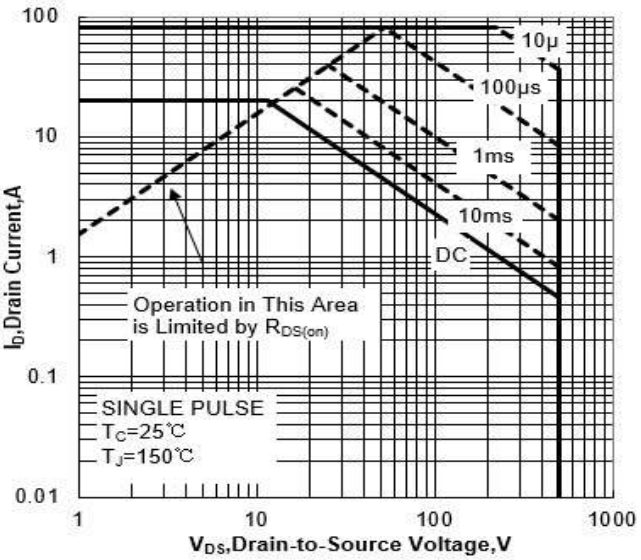
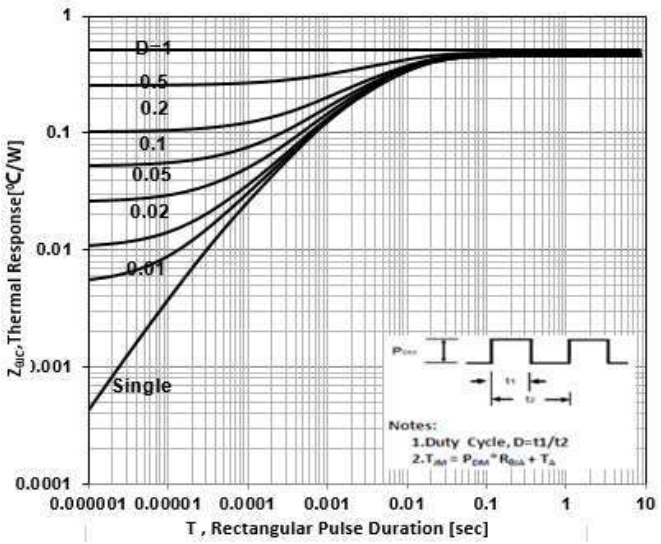


Figure11 Max Thermal Impendance



Test Circuits and Waveforms

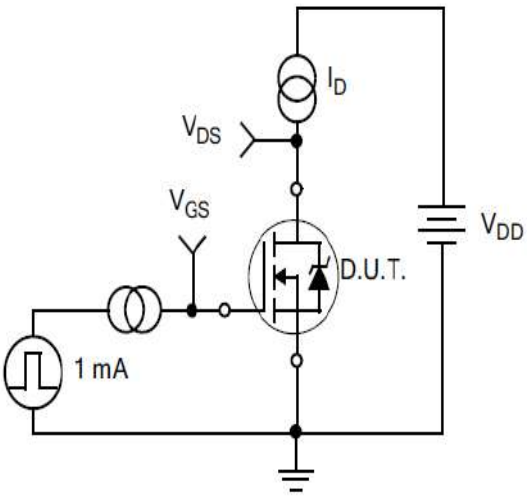


Figure12.
Gate Charge Test Circuit

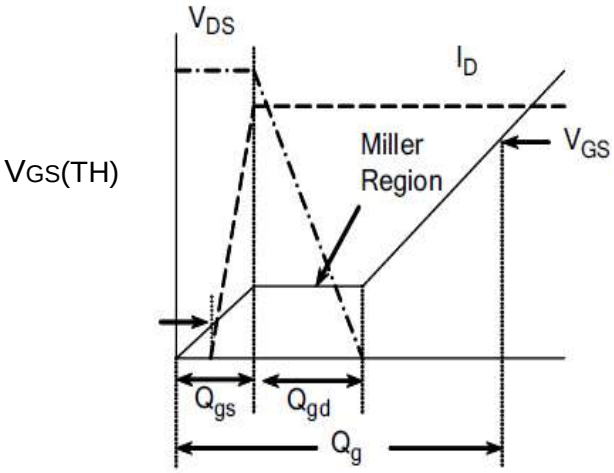


Figure13.
Gate Charge Waveform

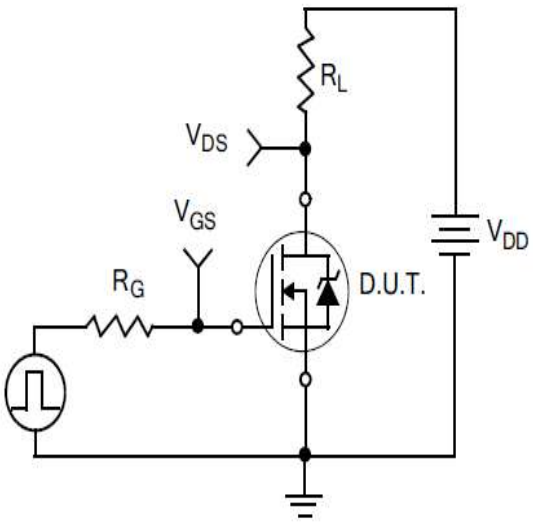


Figure14.
Resistive Switching Test Circuit

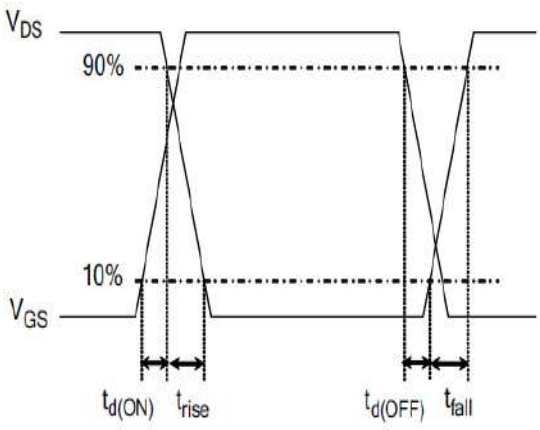


Figure15.
Resistive Switching Waveforms

Test Circuits and Waveforms

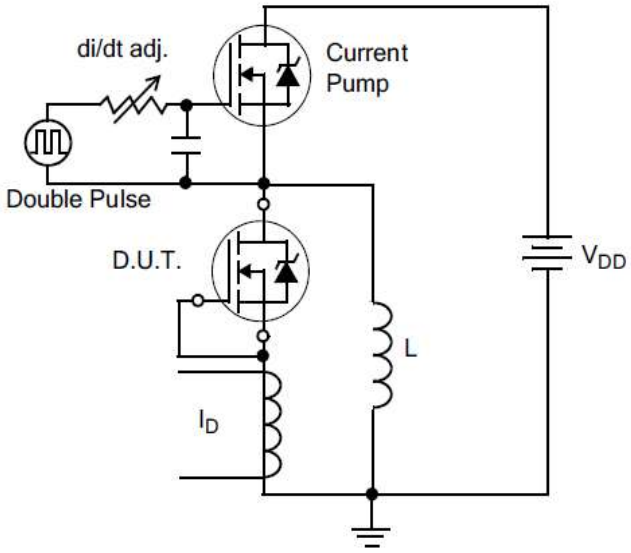


Figure16.Diode Reverse Recovery Test Circuit

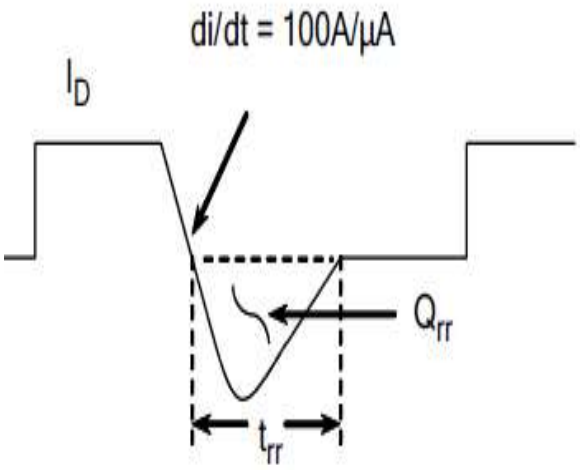


Figure17.Diode Reverse Recovery Waveform

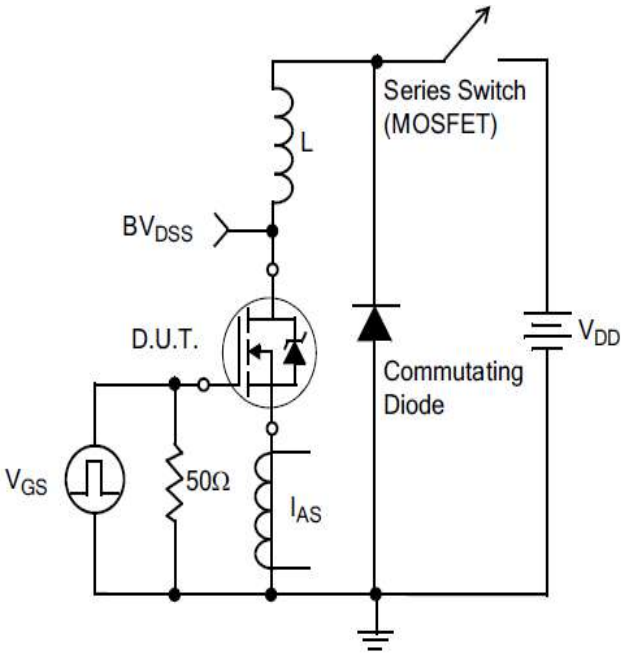
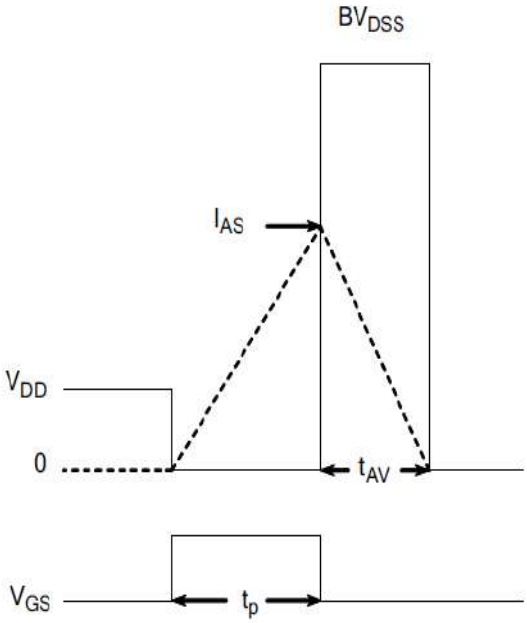


Figure18.Unclamped Inductive Switching Test Circuit

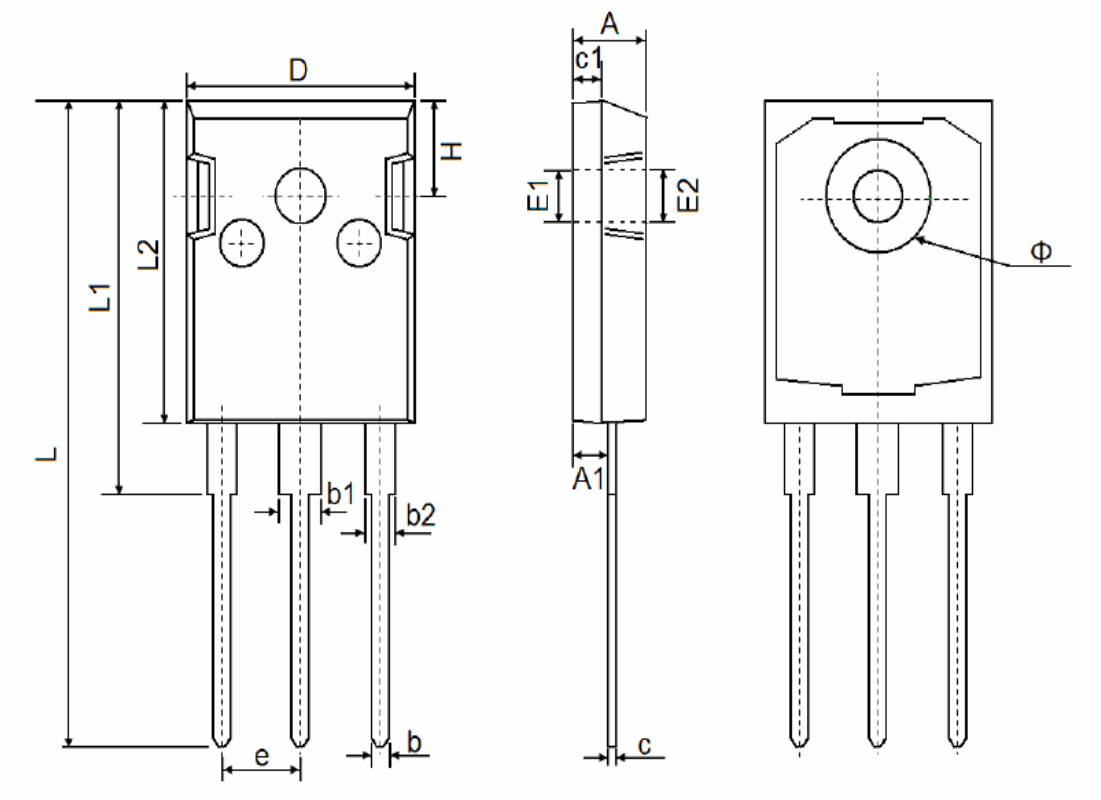


$$E_{AS}=\frac{I_{AS}^2 L}{2}$$

Figure19.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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