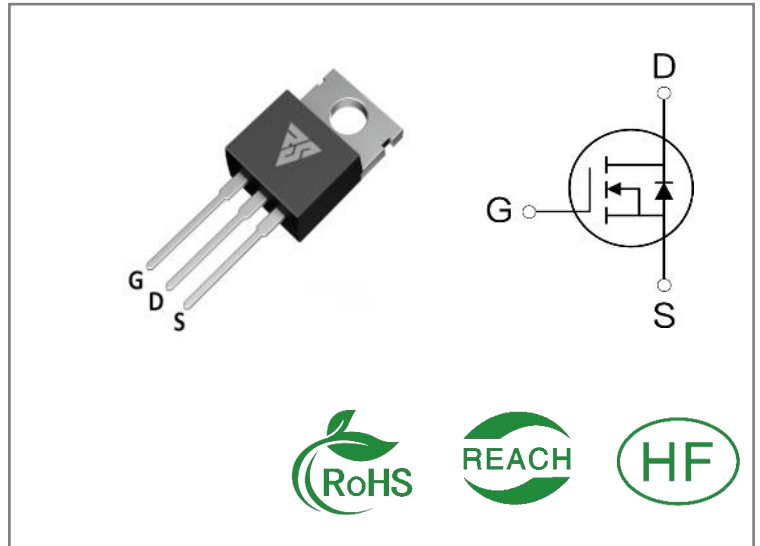


ID	R _{DS(ON)} (Typ)	VDSS
120A	2.8mΩ	40V


Applications:

- Load Switch
- PWM Applications
- Power Management

Features:

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

Ordering Information

Part Number	Package	Marking	Packing	Qty.
RS40N120T	TO-220	RS40N120T	Tube	50 PCS

Absolute Maximum Ratings T_c= 25°C unless otherwise specified

Symbol	Parameter	RS40N120T	Units
VDSS	Drain-to-Source Voltage	40	V
ID	Continuous Drain Current TC=25°C	120	A
	Continuous Drain Current TC=100°C	76	
IDM	Pulsed Drain Current	390	
PD	Power Dissipation	110	W
VGS	Gate- to- Source Voltage	±20	V
EAS	Single Pulse Avalanche Energy L = 0.5mH,VDD = 40V, VG = 10V, Tj = 25°C	272	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	RS40N120T	Units	Test Conditions
R θ JC	Junction-to-Case	1.14	$^{\circ}\text{C} / \text{W}$	Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 150 $^{\circ}\text{C}$
R θ JA	Junction-to-Ambient	20		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	40	--	--	V	VGS=0V, ID=250 μA
IDSS	Drain- to- Source Leakage Current	--	--	1	μA	VDS=40V, VGS=0V
IGSS	Gate- to- Source Forward Leakage	--	--	100	nA	VGS=20V, VDS=0V
	Gate- to- Source Reverse Leakage	--	--	-100		VGS=-20V, VDS=0V

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	--	2.8	3.5	m Ω	VGS=10V, ID=15A
		--	4.0	4.8	m Ω	VGS=4.5V, ID=10A
VGS(TH)	Gate Threshold Voltage	1.0	--	2.5	V	VGS=VDS, ID=250 μA

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
td(ON)	Turn- on Delay Time	--	12	--	nS	VDS=20V ID=20A RG=25 Ω VGS=10V
trise	Rise Time	--	54	--		
td(OFF)	Turn- OFF Delay Time	--	120	--		
tfall	Fall Time	--	80	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance (10V)	--	4645	--	pF	VGS= 0V VDS=20V f=1.0MHz
Coss	Output Capacitance (4.5V)	--	436	--		
Crss	Reverse Transfer Capacitance	--	360	--		
Qg	Total Gate Charge	--	102	--	nC	VDS=20V ID=20A VGS=10V
	Total Gate Charge	--	49	--		
Qgs	Gate- to- Source Charge	--	15.8	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	21.9	--		

Source- Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	120	A	Integral pn- diode in MOSFET
ISM	Maximum Pulsed Current	--	--	390	A	
VSD	Diode Forward Voltage	--	--	1.2	V	IS=15A,VGS=0V
trr	Reverse Recovery Time	--	22.3	--	nS	VGS=0V IS=20A di/dt=100A/μs
Qrr	Reverse Recovery Charge	--	7.4	--	nC	

Notes:

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

Typical Feature Curve

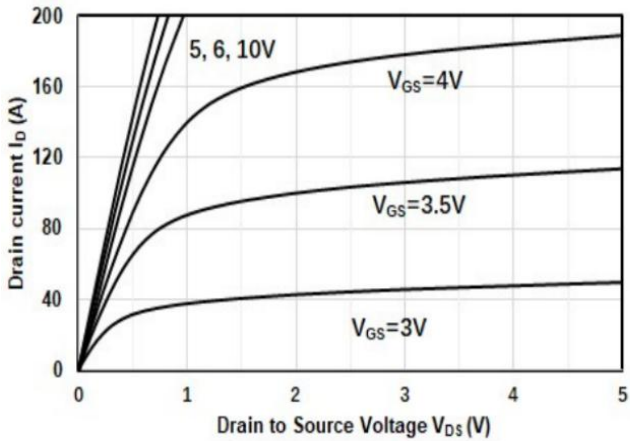


Figure1. Output Characteristics

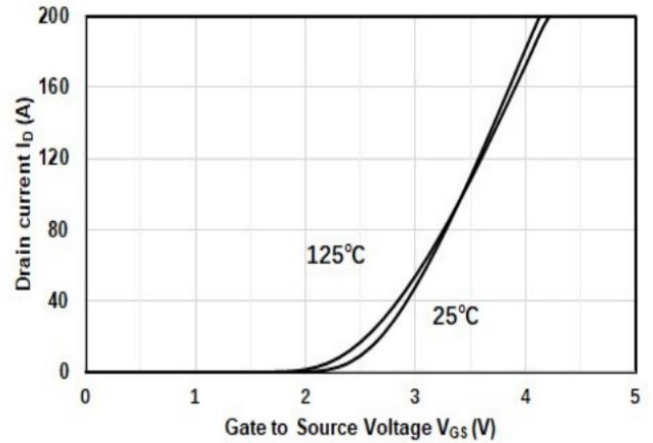


Figure2. Transfer Characteristics

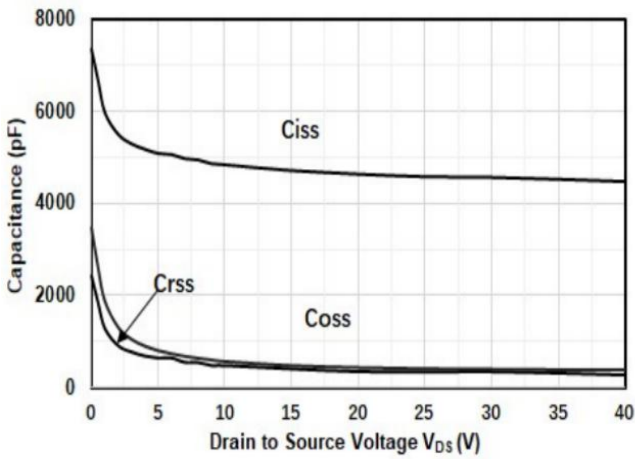


Figure3. Capacitance Characteristics

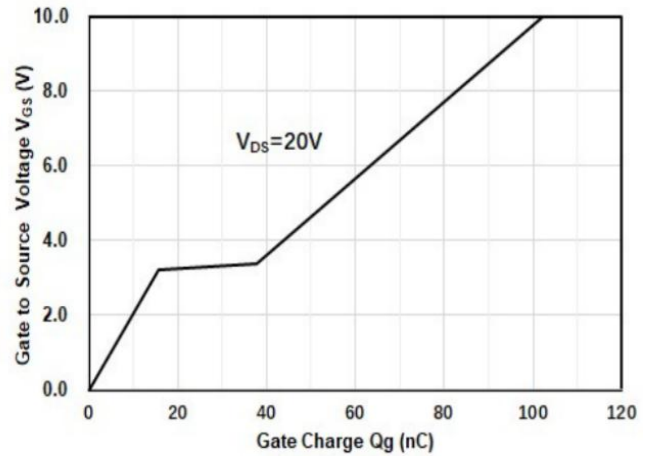


Figure4. Gate Charge

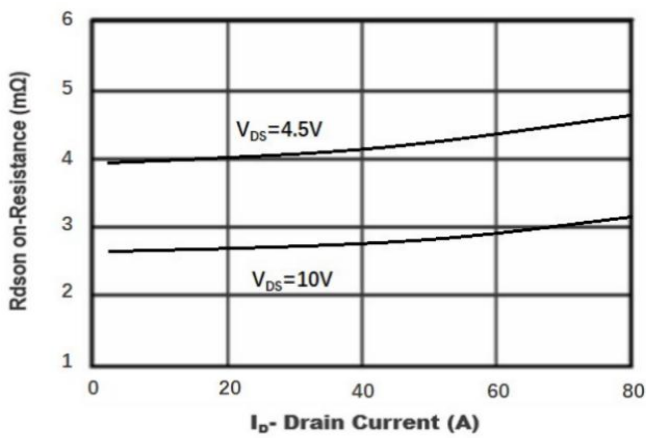


Figure5. Drain-Source on Resistance

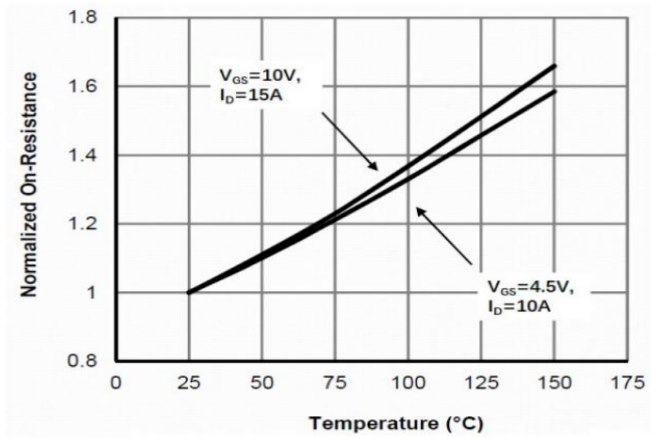


Figure6. Drain-Source on Resistance

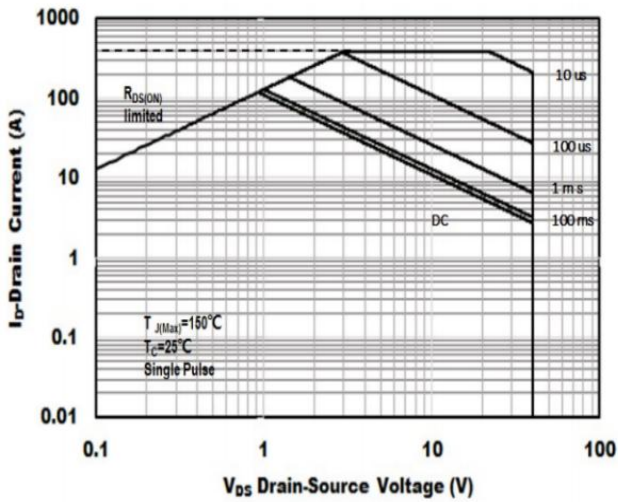


Figure7. Safe Operation Area

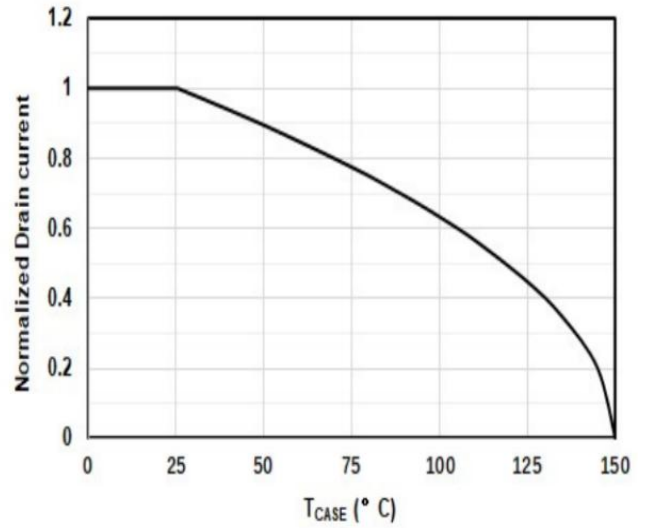


Figure8. Drain current vs. Case Temperature

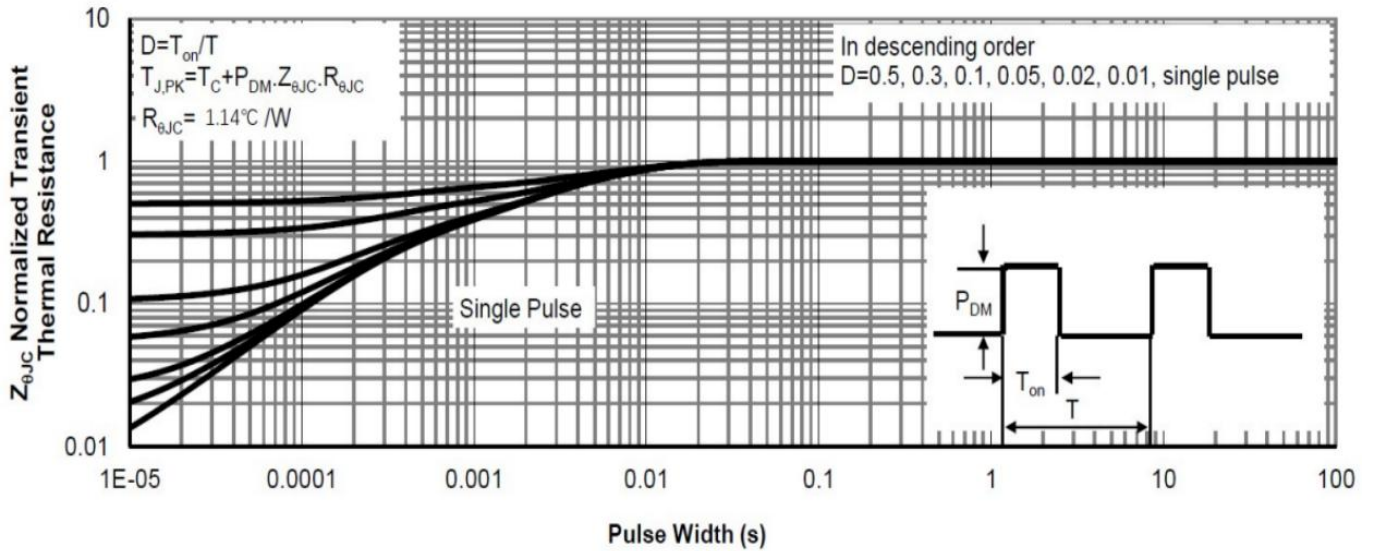


Figure9. Normalized Maximum Transient Thermal Impedance

Test Circuits and Waveforms

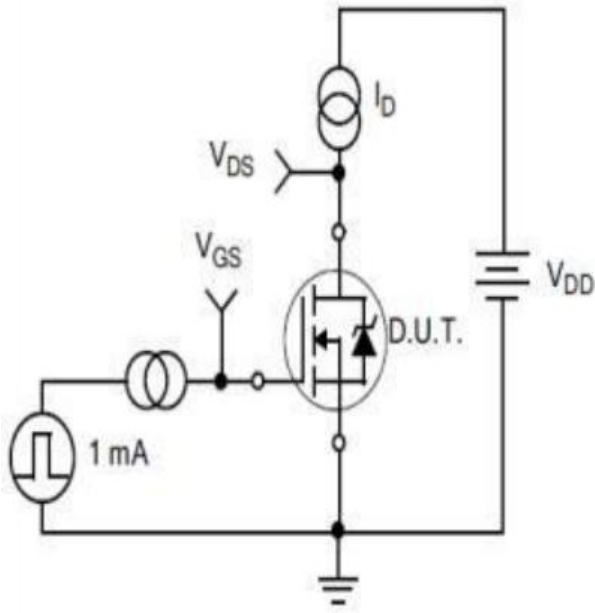


Figure A.
Gate Charge Test Circuit

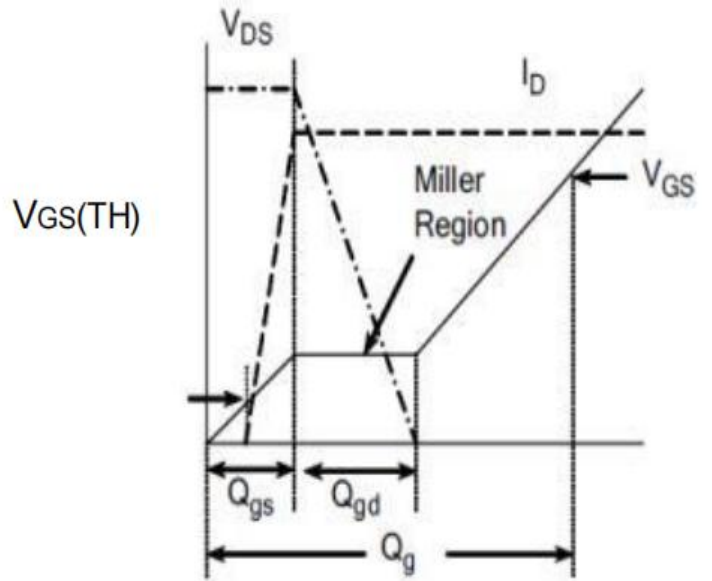


Figure B.
Gate Charge Waveform

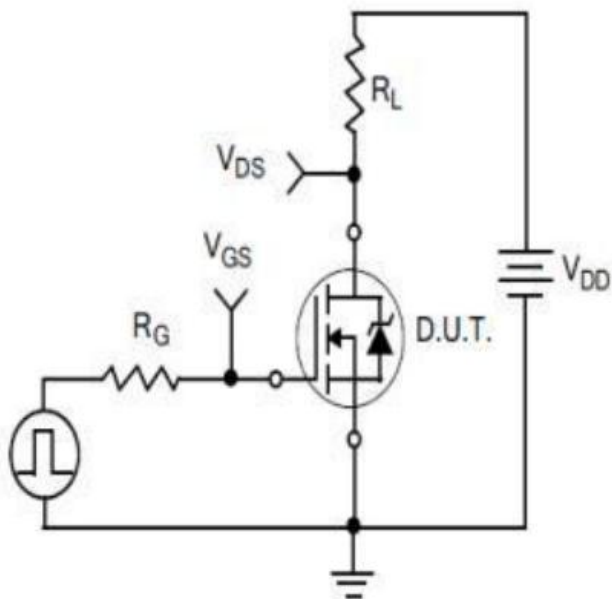


Figure C.
Resistive Switching Test Circuit

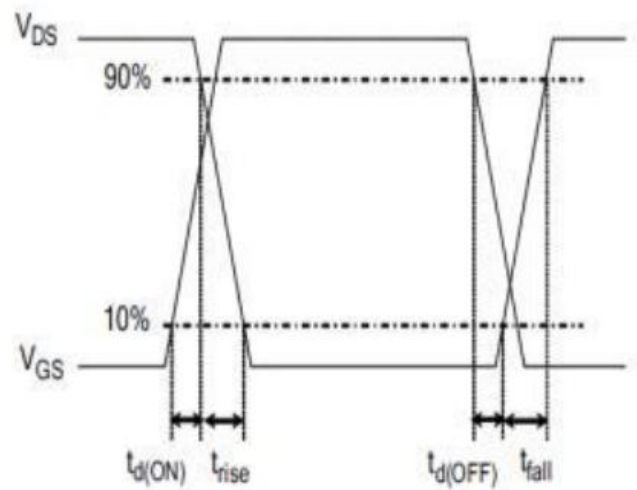


Figure D.
Resistive Switching Waveforms

Test Circuits and Waveforms

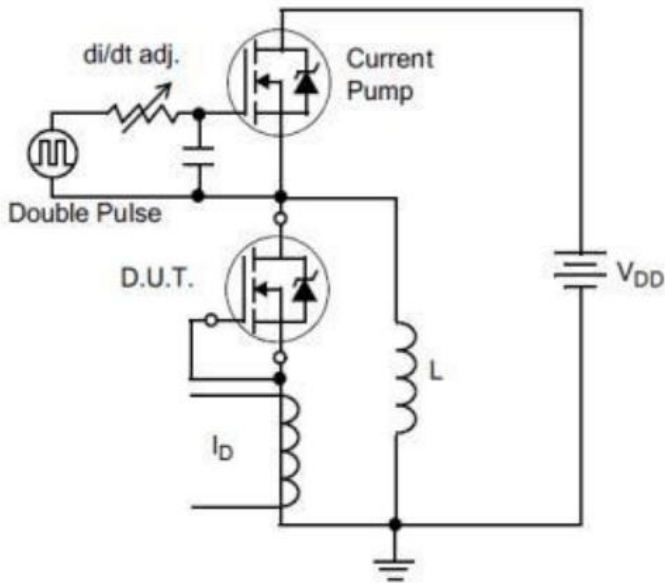


Figure E. Diode Reverse Recovery Test Circuit

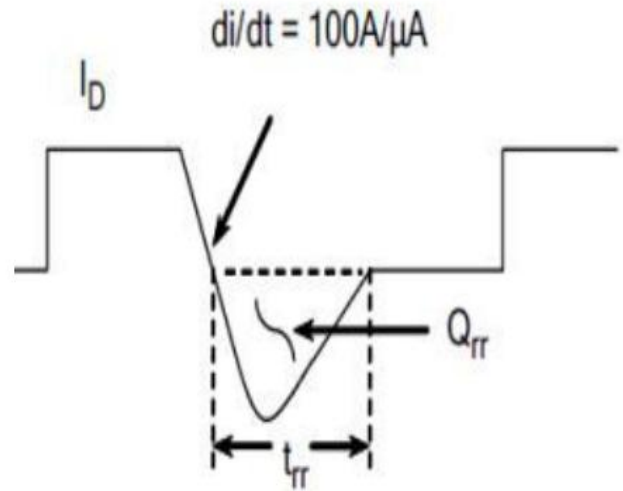


Figure F. Diode Reverse Recovery Waveform

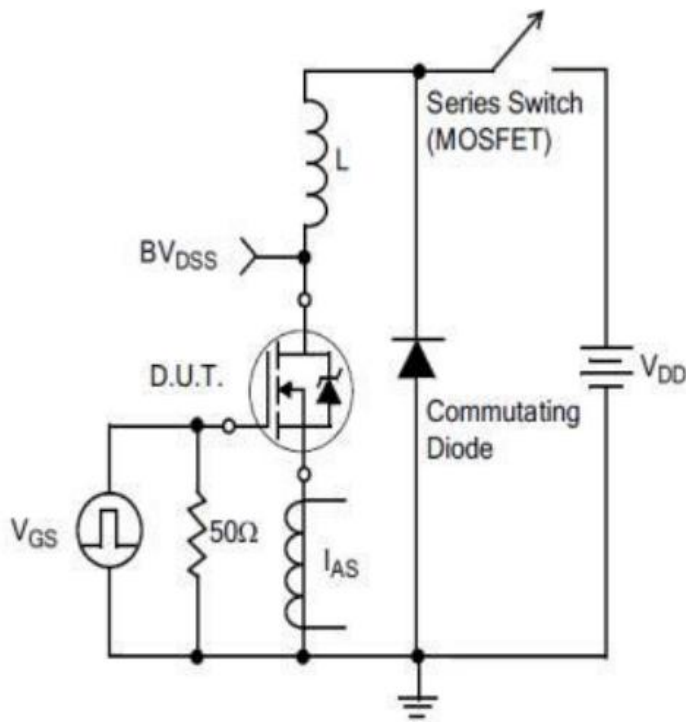
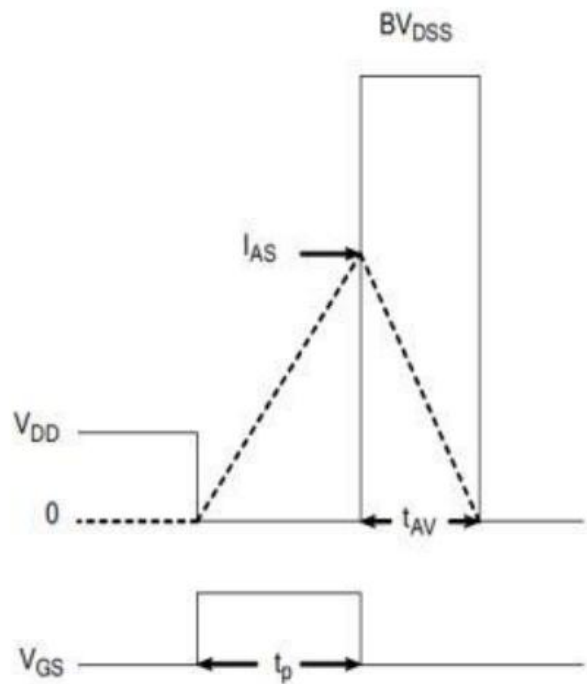


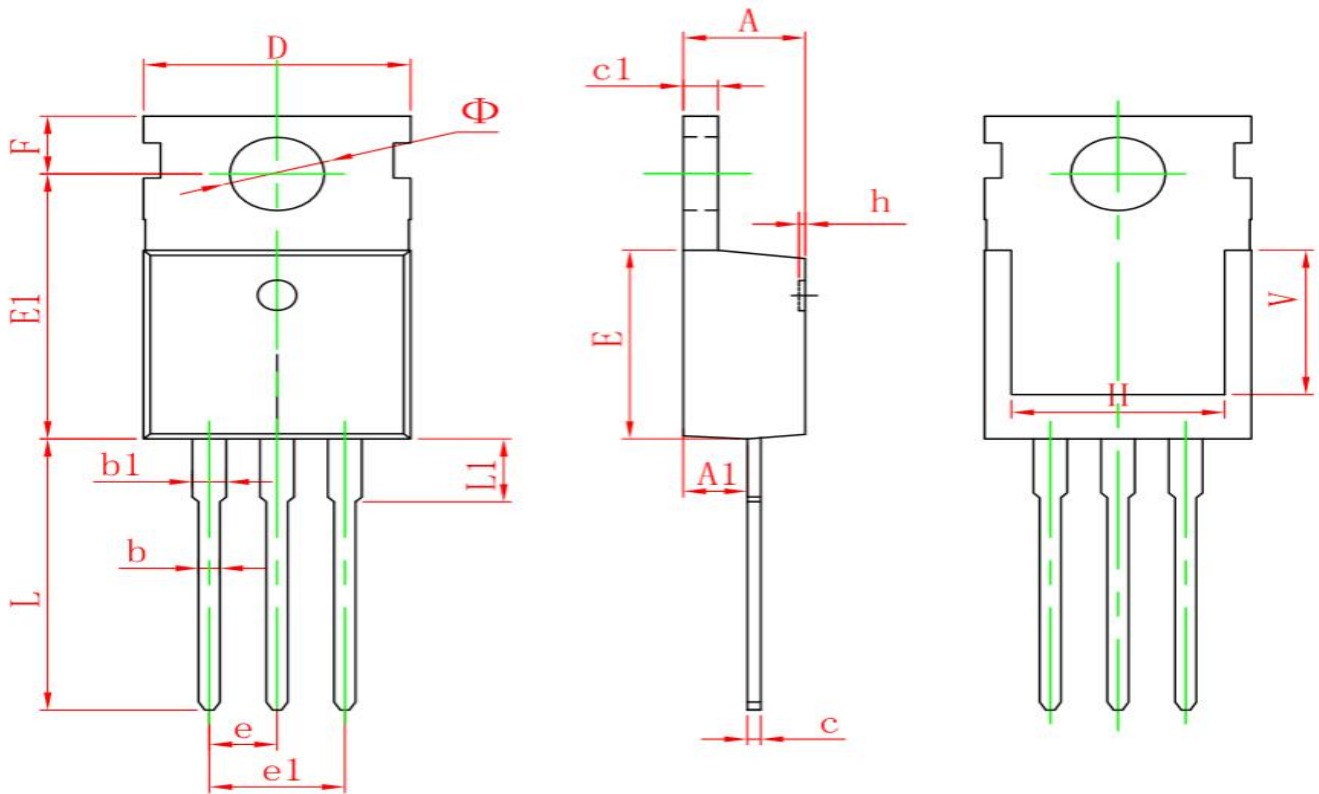
Figure G. Unclamped Inductive Switching Test Circuit



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

Figure H. Unclamped Inductive Switching Waveforms

Package outline drawing(TO-220 Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150

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