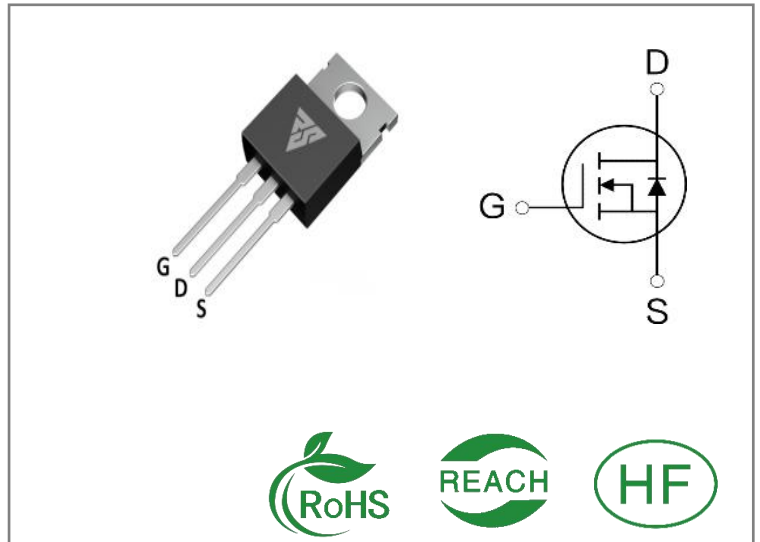


ID	R <sub>DS(ON)</sub> (Typ)	VDSS
20A	170mΩ	650V



### Applications:

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

### Features:

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

### Ordering Information

Part Number	Package	Marking	Packing	Qty.
RSF65R190T	T0-220	RSF65R190T	Tube	50 PCS

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

Symbol	Parameter	RSF65R190T	Units
VDSS	Drain-to-Source Voltage	650	V
ID	Continuous Drain Current TC=25°C	20	A
ID	Continuous Drain Current TC=100°C	12	
IDM	Pulsed Drain Current (Note*1)	60	
PD	Power Dissipation	151	W
VGS	Gate- to- Source Voltage	±30	V
EAS	Single Pulse Avalanche Energy L=10mH,VDS= 50V, RG = 25 Ω, TC=25°C	484	mJ
dv/dt	MOSFET dv/ dt ruggednessVDS = 0...400V	50	V/ns
dv/dt	Reverse diode dv/dt VDS = 0...400V, Tj = 25°C, ISD≤ID	15	V/ns
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	RSF65R190T	Units	Test Conditions
R $\theta$ JC	Junction-to-Case	0.83	$^{\circ}\text{C} / \text{W}$	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	62		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	650	--	--	V	VGS=0V, ID=250 $\mu$ A
IDSS	Drain- to- Source Leakage Current	--	--	1	$\mu$ A	VDS=650V, VGS=0V
IGSS	Gate- to- Source Forward Leakage	--	--	100	nA	VGS=30V, VDS=0V
	Gate- to- Source Reverse Leakage	--	--	-100		VGS=-30V, 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(Note*2)	--	170	190	m $\Omega$	VGS=10V, ID=10A
VGS(TH)	Gate Threshold Voltage	3	--	5	V	VGS=VDS, ID=250 $\mu$ A

**Resistive Switching Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
td(ON)	Turn- on Delay Time	--	34	--	nS	VDS=400V ID=20A RG=25 $\Omega$
trise	Rise Time	--	72	--		
td(OFF)	Turn- OFF Delay Time	--	114	--		
tfall	Fall Time	--	41	--		

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance	--	2415	--	pF	VGS=0V VDS=100V f=1.0MHz
Coss	Output Capacitance	--	69	--		
Crss	Reverse Transfer Capacitance	--	6	--		
Qg	Total Gate Charge	--	42	--	nC	VDS=520V ID=20A VGS=10V
Qgs	Gate- to- Source Charge	--	10	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	17	--		

**Source- Drain Diode Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	20	A	Integral pn- diode in MOSFET
ISM	Maximum Pulsed Current	--	--	60	A	
VSD	Diode Forward Voltage	--	--	1.2	V	IS=10A,VGS=0V
trr	Reverse Recovery Time	--	112	--	nS	VR=400V IS=20A,di/dt=100 A/μs
Qrr	Reverse Recovery Charge	--	0.54	--	μC	

**Notes:**

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

Typical Feature Curve

Figure 1. Output Characteristics

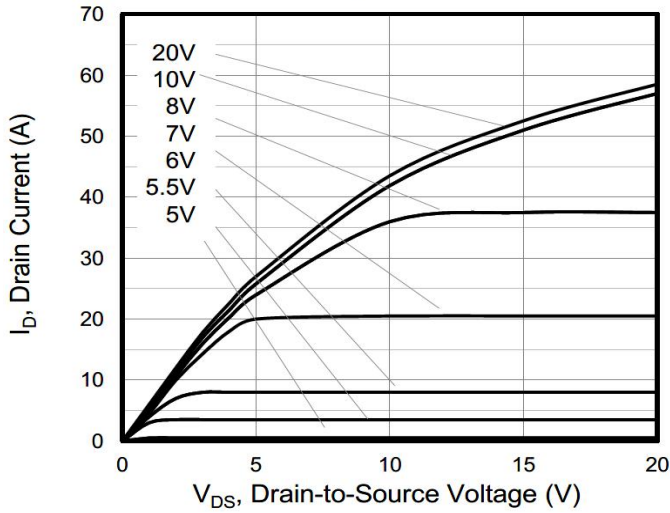


Figure 2. Transfer Characteristics

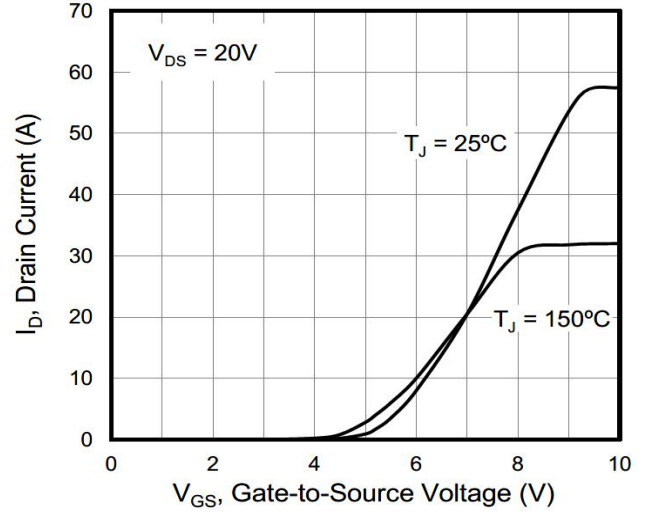


Figure 3. On-Resistance vs. Drain Current

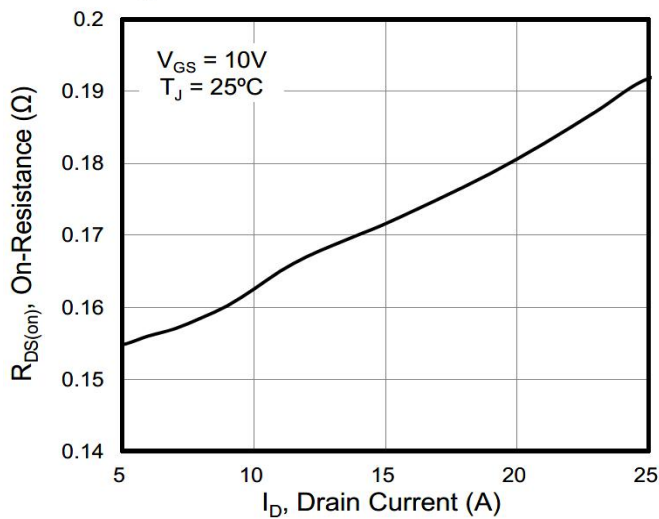


Figure 4. Capacitance

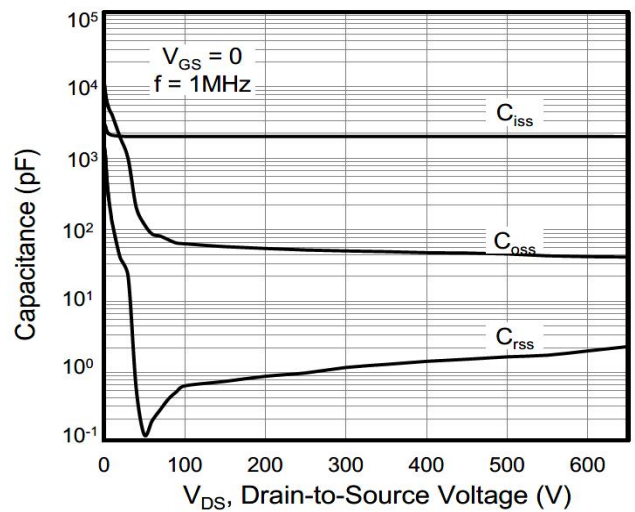


Figure 5. Gate Charge

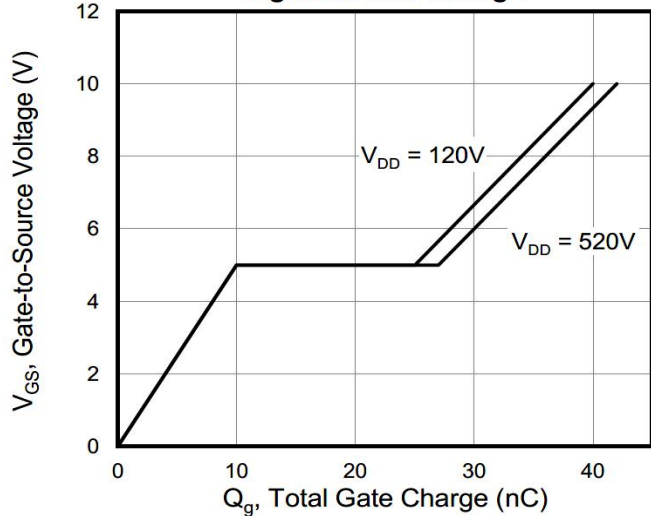


Figure 6. Body Diode Forward Voltage

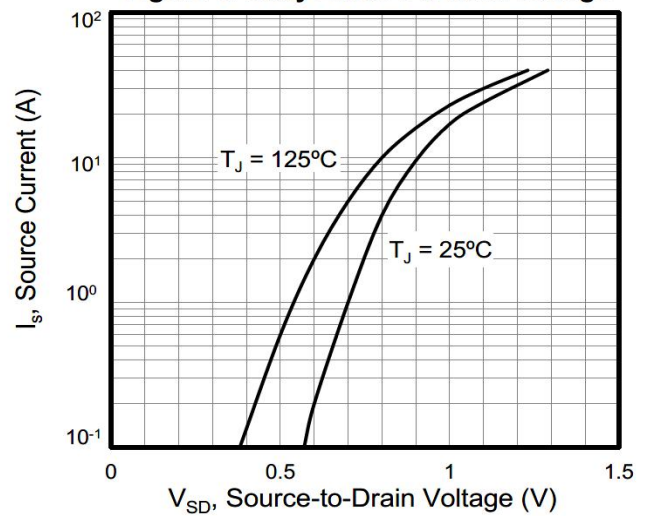


Figure 7. On-Resistance vs. Junction Temperature

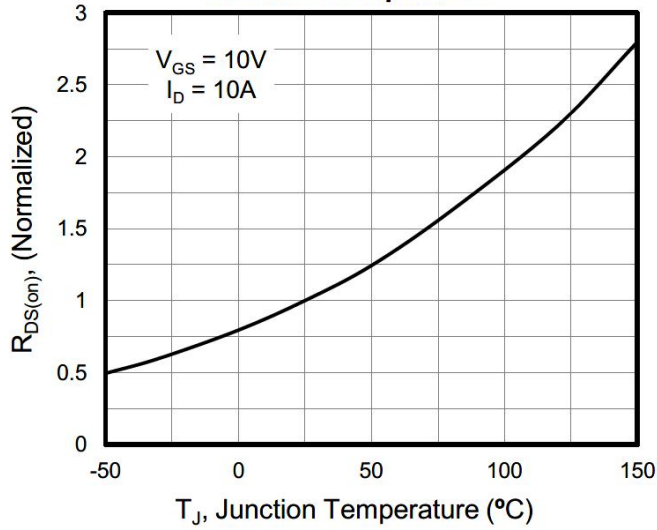


Figure 8. Breakdown voltage vs. Junction Temperature

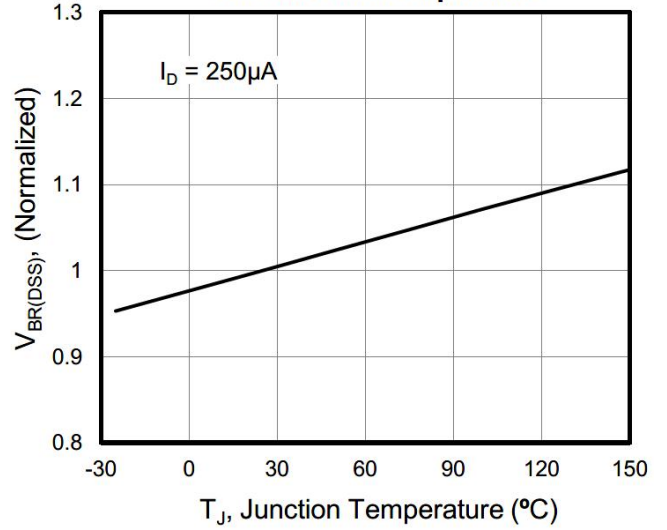


Figure 9. Transient Thermal Impedance

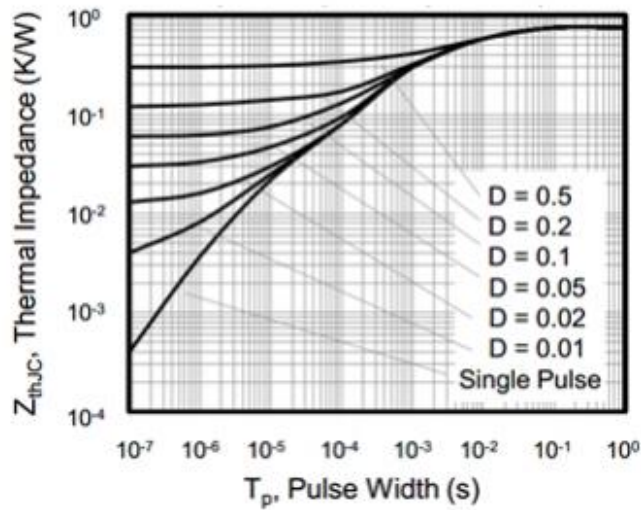
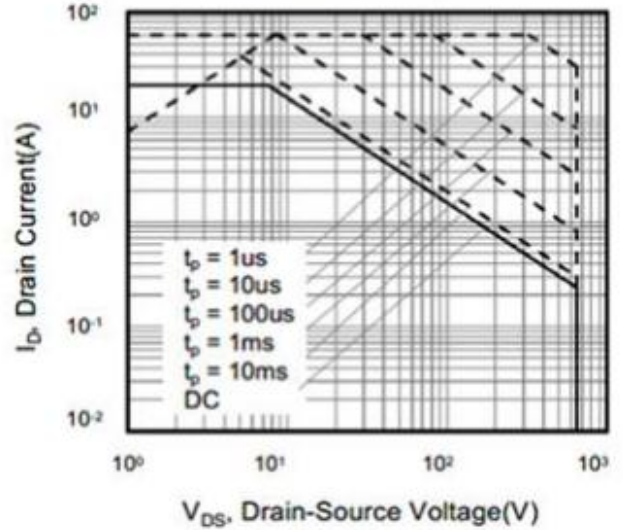


Figure 10. Safe operation area for



Test Circuits and Waveforms

Figure A: Gate Charge Test Circuit and Waveform

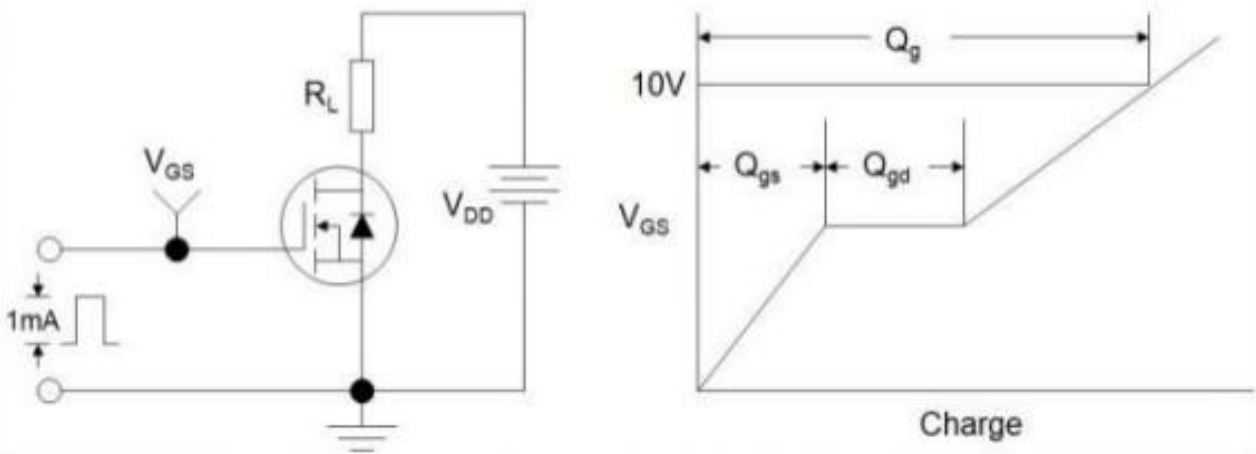


Figure B: Resistive Switching Test Circuit and Waveform

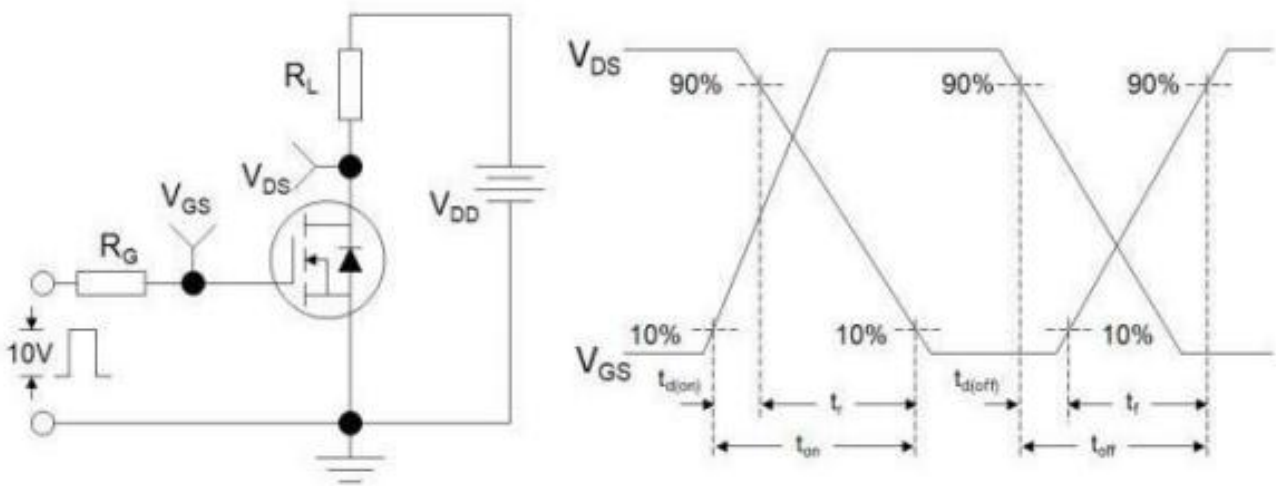
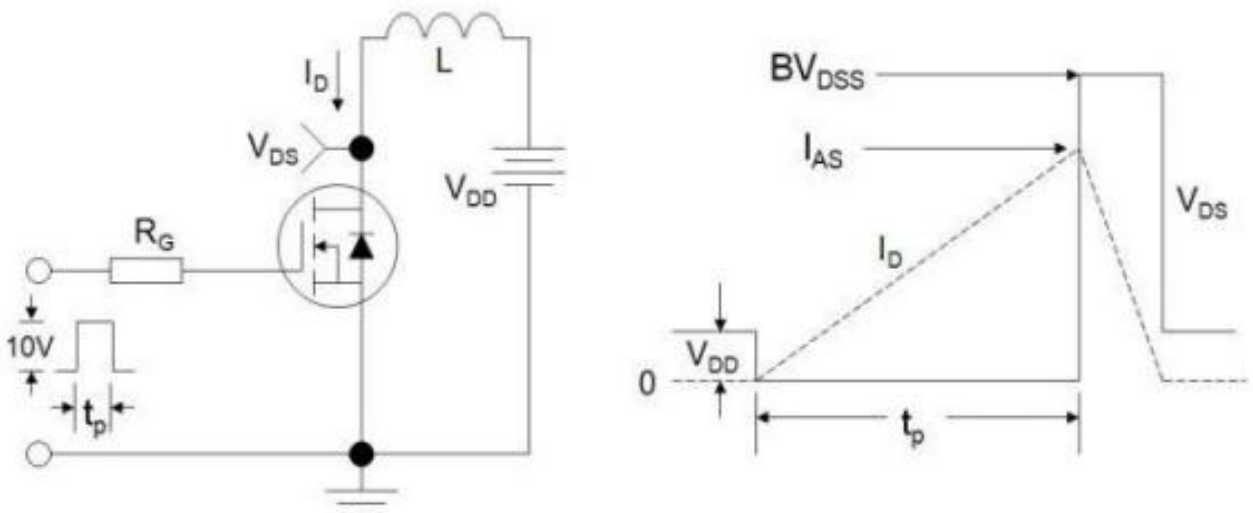
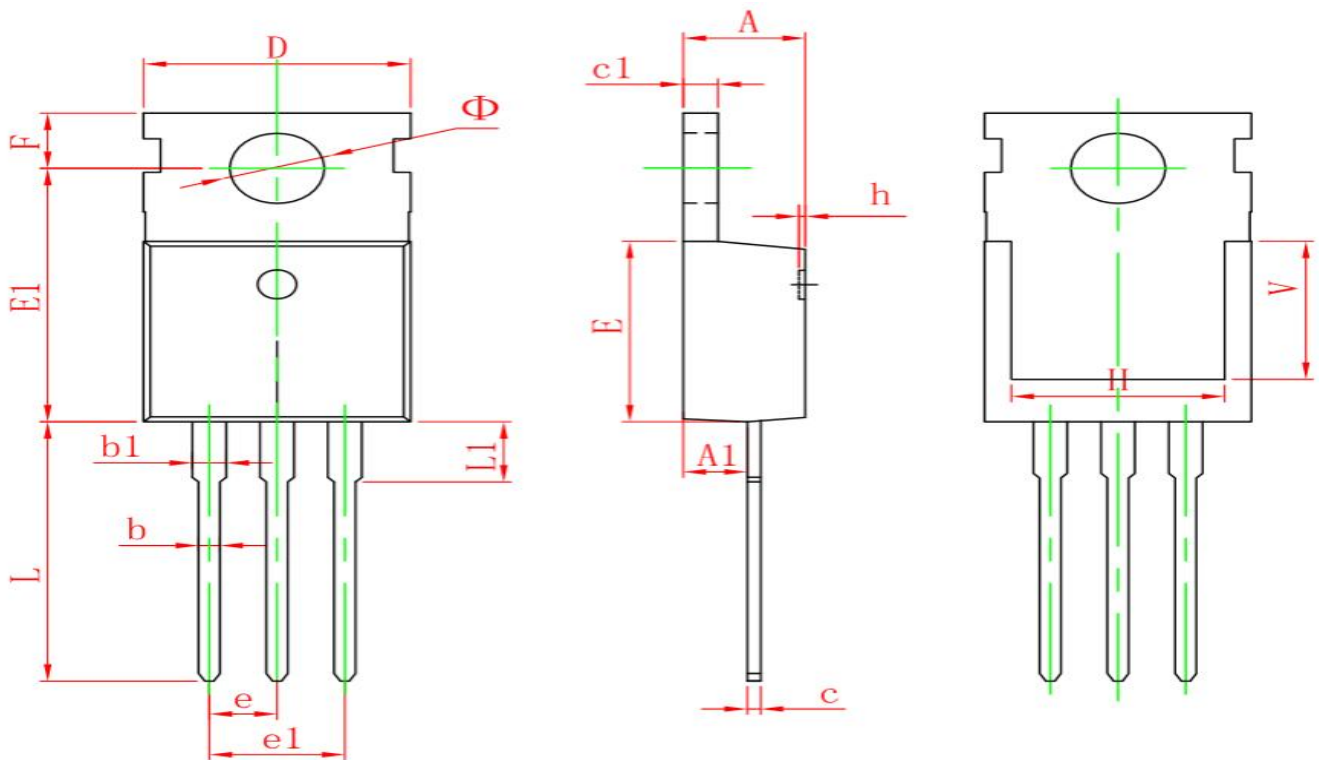


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





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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