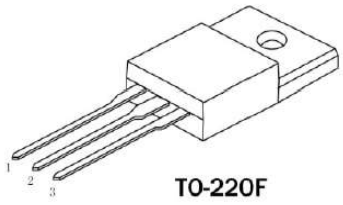
N Channel MOSFET

Lead Free Package and Finish

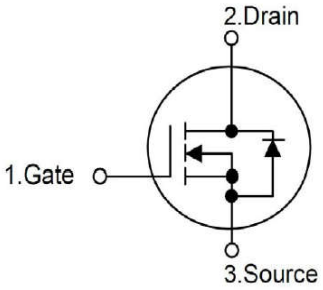
Applications:

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

I_D	$R_{DS(ON)}$ (Typ.)	V_{DSS}
18A	0.27Ω	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
RS18N50F	TO-220F	RS18N50F

Absolute Maximun Ratings Tc=25℃ unless otherwise specified

Symbol	Parameter	RS18N50F	Units
VDSS	Drain-to-Source Voltage (Note*1)	500	V
ID	Continuous Drain Current	18	A
ID@ 100 ℃	Continuous Drain Current	9	
IDM	Pulsed Drain Current (Note*2)	72.0	
PD	Power Dissipation	98	W
	Derating Factor above 25℃	0.784	W/℃
VGS	Gate-to-Source Voltage	±30	V
EAS	Single Pulse Avalanche Engergy L=6mH IAS=14A VDD=50V RG=25Ω TJ=25℃	998	mJ
TL	Maximum Temperature for Soldering Leads at 0.063in(1.6mm)from Case for 10 seconds	300	℃
TPKG	Package Body for 10 seconds	260	
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	RS18N50F	Units	Test Conditions
RθJC	Junction-to-Case	1.27	℃/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	--	0.27	0.32	Ω	V_{GS}=10V, I_D= 9 A
$V_{GS(TH)}$	Gate Threshold Voltage	3.0	--	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	--	35.0	--	nS	V_{DS}=250V I_D=18A R_G=25Ω (Note:3,4)
t_{rise}	Rise Time	--	50.0	--		
$t_{d(OFF)}$	Turn-OFF Delay Time	--	180	--		
t_{fall}	Fall Time	--	65.0	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C_{iss}	Input Capacitance	--	2250	--	pF	V_{GS}=0V V_{DS}=25V f=1.0MHz
C_{oss}	Output Capacitance	--	231	--		
C_{rss}	Reverse Transfer Capacitance	--	36	--		
Q_g	Total Gate Charge	--	71	--	nC	V_{DS}=400V I_D=18A V_{GS}=10V (Note:3,4)
Q_{gs}	Gate-to-Source Charge	--	10	--		
Q_{gd}	Gate-to-Drain("Miller") Charge	--	32	--		

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current	--	--	18.0	A	Integral pn-diode in MOSFET
I_{SM}	Maximum Pulsed Current	--	--	72.0	A	
V_{SD}	Diode Forward Voltage	--	--	1.4	V	I_S=18A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	570.30	--	nS	V_{GS}=0V
Q_{rr}	Reverse Recovery Charge	--	7.35	--	μC	I_S=18A, di/dt=100A/μs

Notes:

*1. TJ=±25℃ to +150℃.
*2. Repetitive rating;pulse width limited by maximum junction temperature.
*3. Pulse width≤300μs;duty cycle ≤2%.
*4. Basically not affected by temperature.

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25ºC)

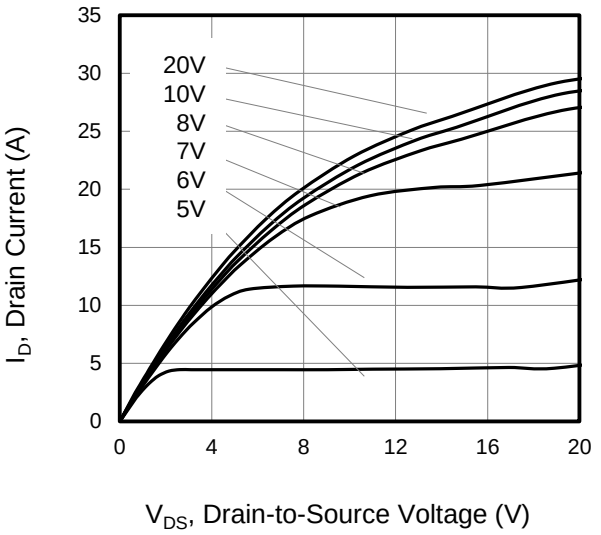


Figure 2. Body Diode Forward Voltage

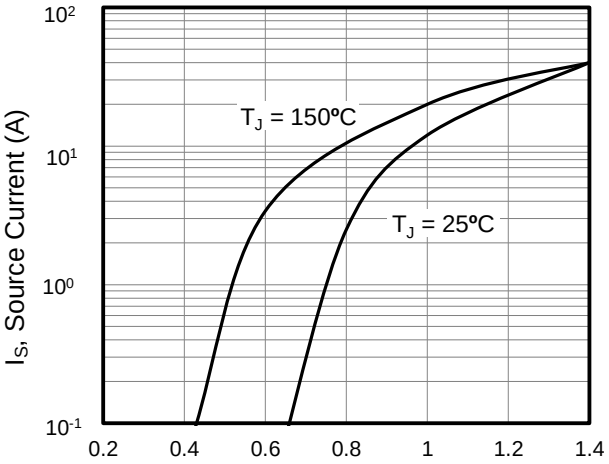


Figure 3. Drain Current vs. Temperature

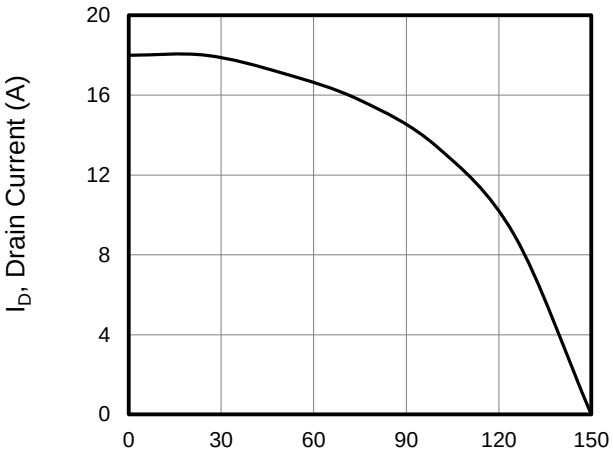


Figure 4. BV_{DSS} Variation vs. Temperature

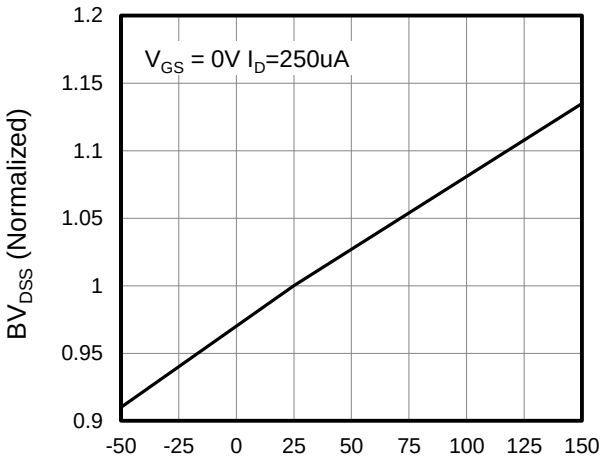


Figure 5. Transfer Characteristics

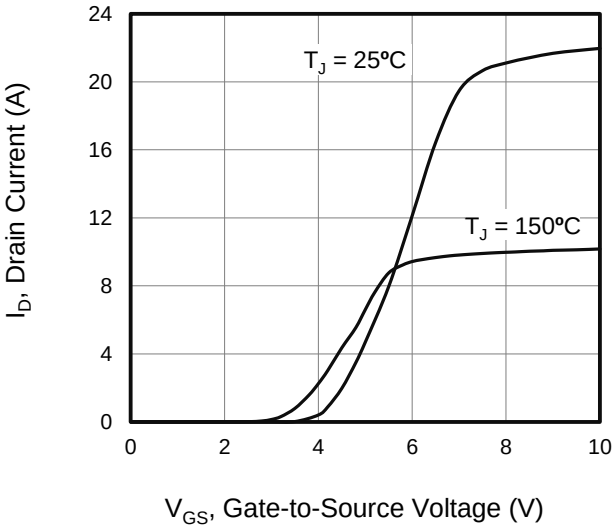
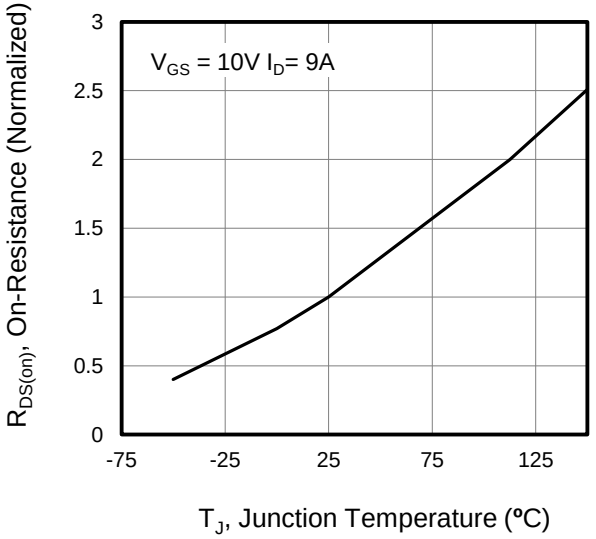


Figure 6. On-Resistance vs. Temperature



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Capacitance

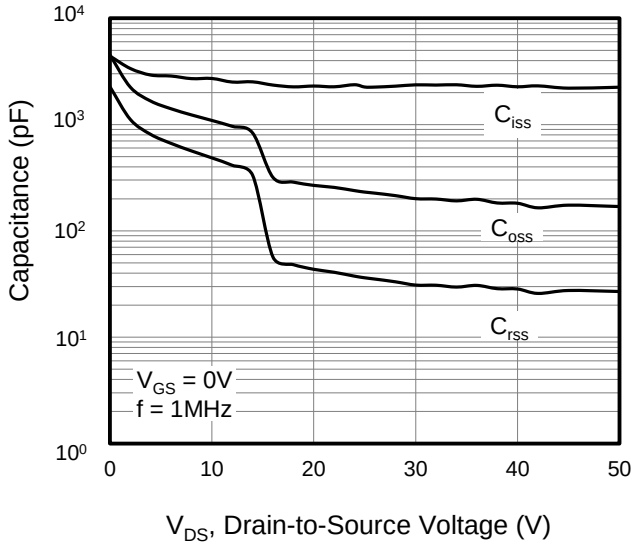


Figure 8. Gate Charge

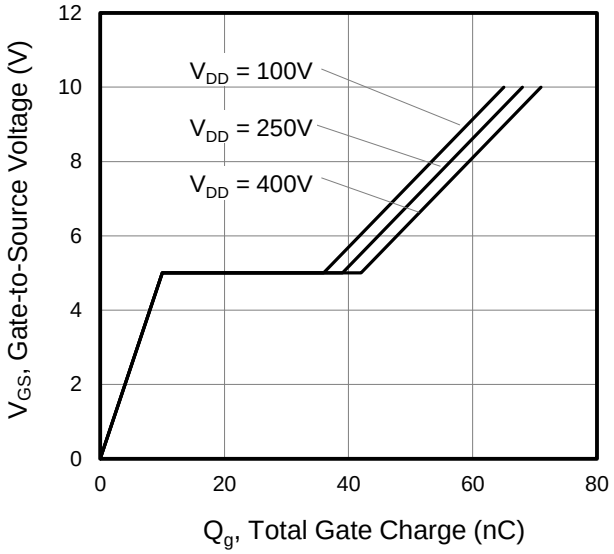
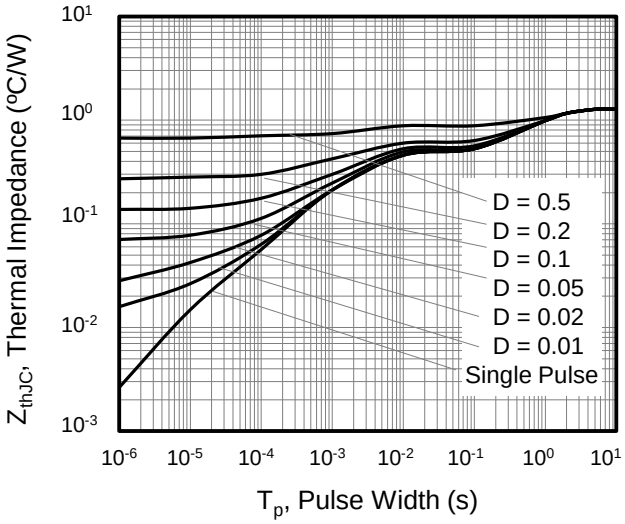


Figure 9. Transient Thermal Impedance



Test Circuits and Waveforms

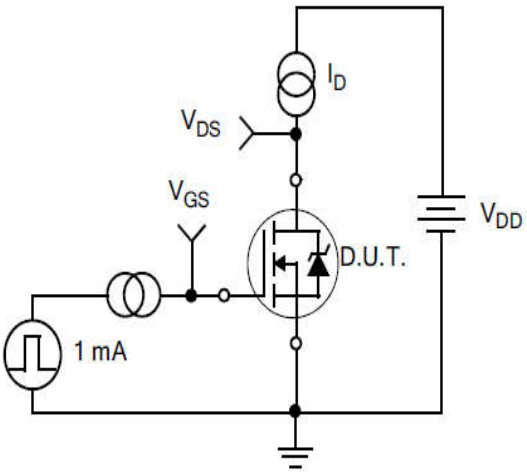


Figure11.
Gate Charge Test Circuit

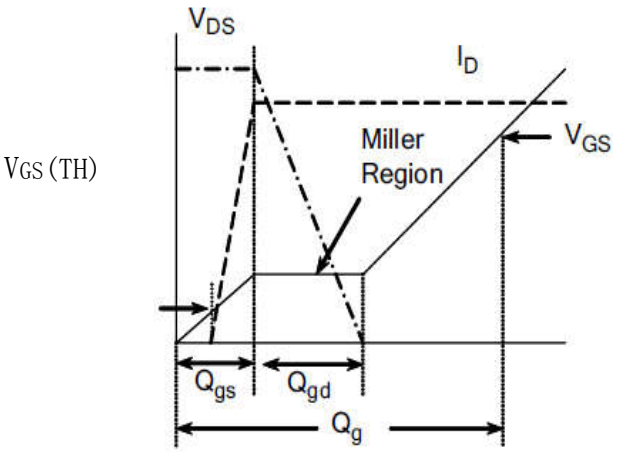


Figure12.
Gate Charge Waveform

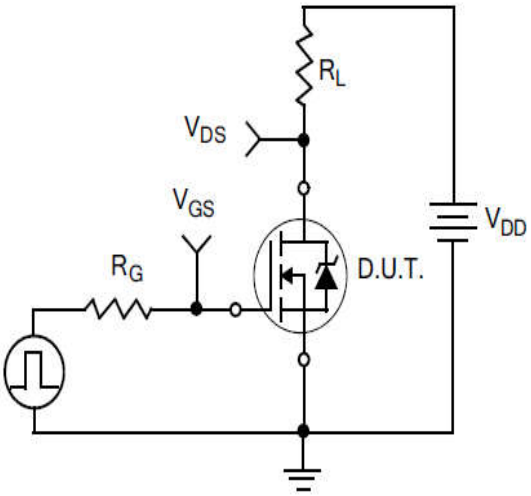


Figure13.
Resistive Switching Test Circuit

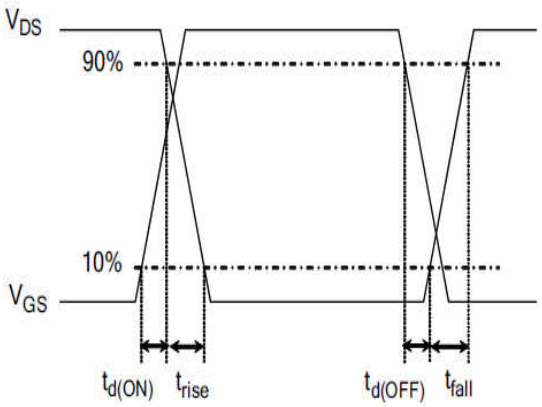


Figure14.
Resistive Switching Waveforms

Test Circuits and Waveforms

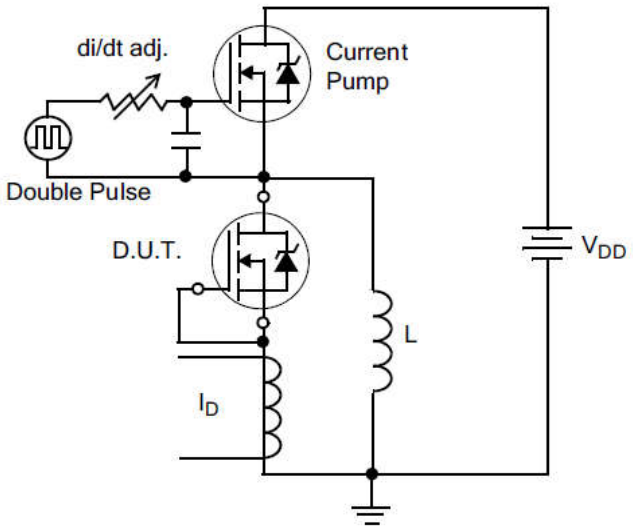


Figure15. Diode Reverse Recovery Test Circuit

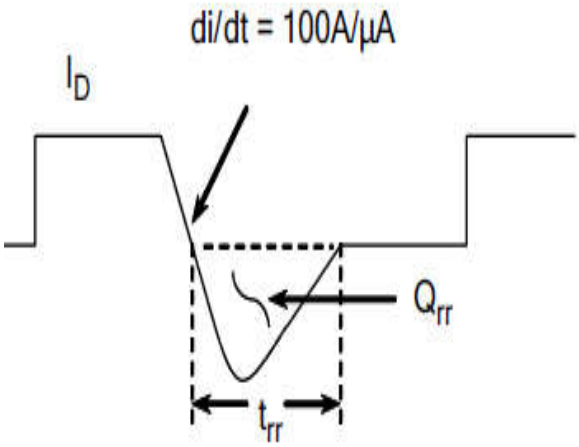


Figure16. Diode Reverse Recovery Waveform

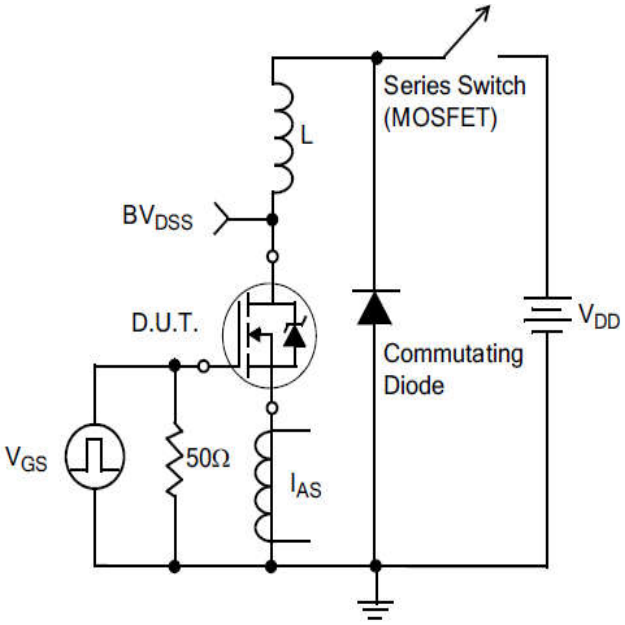
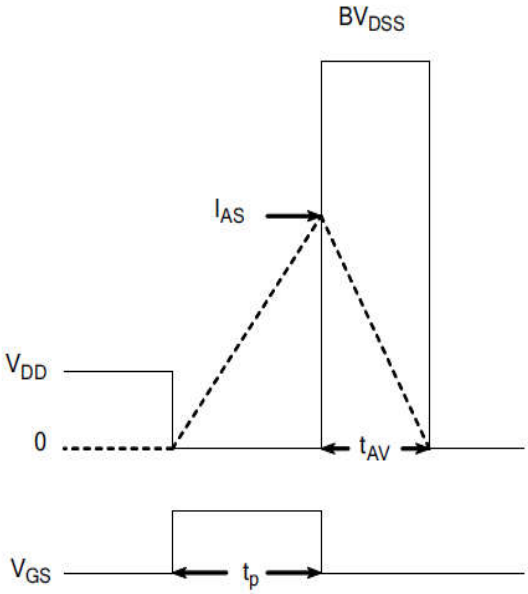


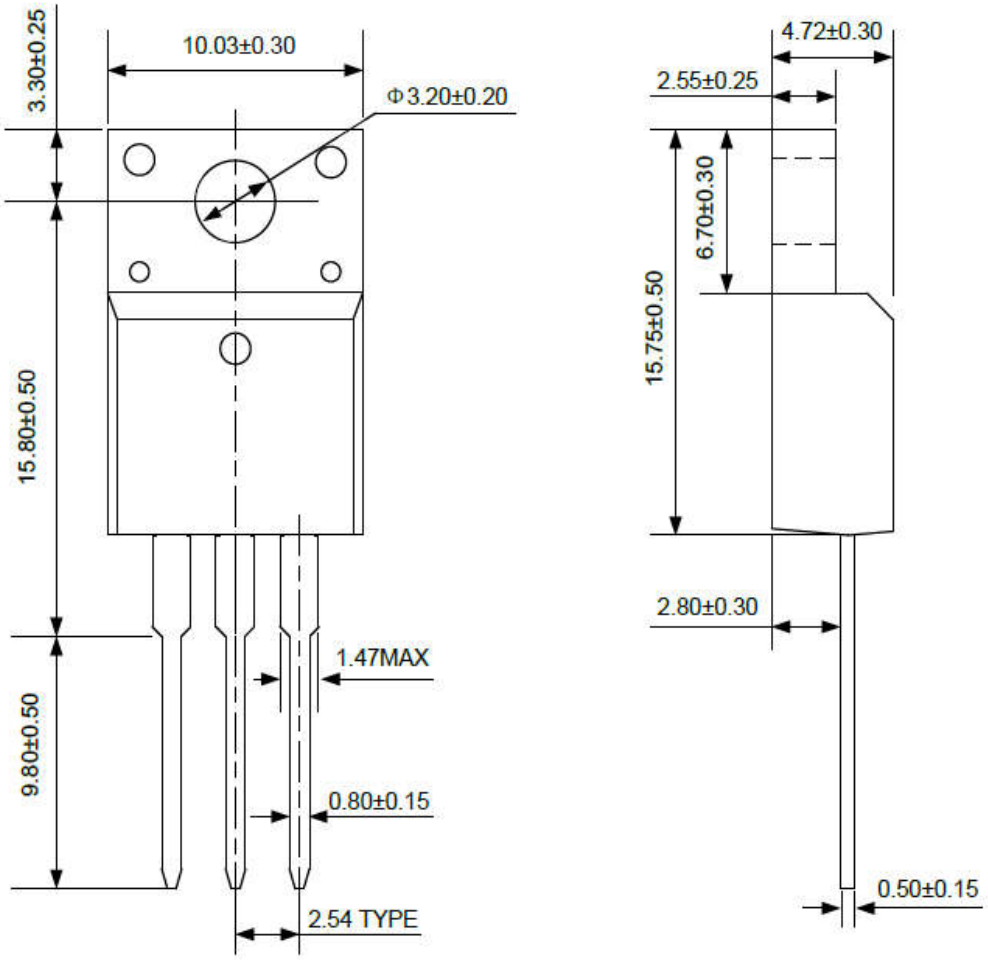
Figure17. Unclamped Inductive Switching Test Circuit



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

Figure18. Unclamped Inductive Switching Waveforms

Package outline drawing



TO-220F

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