

N Channel MOSFET



Lead Free Package and Finish

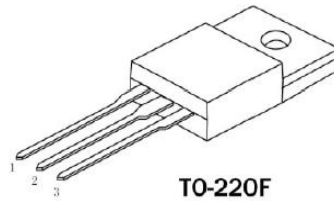
Applications:

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

ID	R _{DS(ON)} (Typ.)	V _{DSS}
4.0A	2.5Ω	700V

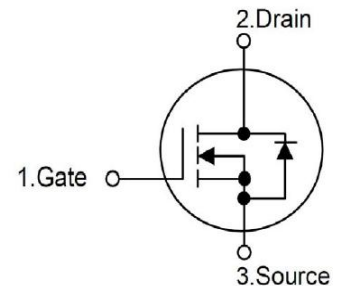
Features:

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



TO-220F

Not to Scale



Ordering Information

Part Number	Package	Marking
RS4N70F	TO-220F	RS4N70F

Absolute Maximum Ratings T_c=25°C unless otherwise specified

Symbol	Parameter	RS4N70F	Units
V _{DSS}	Drain-to-Source Voltage (Note*1)	700	V
I _D	Continuous Drain Current	4.0	A
I _{D@ 100 °C}	Continuous Drain Current	2.53	
I _{DM}	Pulsed Drain Current (Note*2)	16.0	
P _D	Power Dissipation	36	W
	Derating Factor above 25°C	0.26	W/°C
V _{GS}	Gate-to-Source Voltage	±30	V
EAS	Single Pulse Avalanche Energy I _{AS} =4A V _{DD} =50V R _G =25Ω Starting T _J =25°C	242	mJ
T _L T _{PKG}	Maximum Temperature for Soldering	300 260	°C
	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	RS4N70F	Units	Test Conditions
R _{θJC}	Junction-to-Case	3.47	°C/W	Drain lead soldered to water cooled heatsink, P _D adjusted for a peak junction temperature of +150°C.
R _{θJA}	Junction-to-Ambient	62.5		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 _{DSS}	Drain-to-source Breakdown Voltage	700	--	--	V	V _{GS} =0V, I _D =250μA
I _{DSS}	Drain-to-Source Leakage Current	--	--	1.0	μA	V _{DS} =700V, V _{GS} =0V
I _{GSS}	Gate-to-Source Forward Leakage	--	--	100	nA	V _{GS} =+30V V _{DS} =0V
	Gate-to-Source Reverse Leakage	--	--	-100		V _{GS} =-30V V _{DS} =0V

ON Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R _{DS(ON)}	Static Drain-to-Source On-Resistance	--	2.5	2.7	Ω	V _{GS} =10V, I _D =2A
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	--	12	--	ns	V _{DS} =350V I _D =4.0A R _G =25Ω (Note:3,4)
t _{rise}	Rise Time	--	22	--		
t _{d(OFF)}	Turn-OFF Delay Time	--	50	--		
t _{fall}	Fall Time	--	48	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C _{iss}	Input Capacitance	--	580	--	pF	V _{GS} =0V V _{DS} =25V f=1.0MHz
C _{oss}	Output Capacitance	--	69.5	--		
C _{rss}	Reverse Transfer Capacitance	--	10.9	--		
Q _g	Total Gate Charge	--	15	17.5	nC	V _{DS} =560V I _D =4.0A V _{GS} =10V (Note:3,4)
Q _{gs}	Gate-to-Source Charge	--	2.5	--		
Q _{gd}	Gate-to-Drain("Miller") Charge	--	7.5	--		

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current	--	--	4.0	A	Integral pn-diode in MOSFET
I_{SM}	Maximum Pulsed Current	--	--	16.0	A	
V_{SD}	Diode Forward Voltage	--	--	1.4	V	$I_S=4.0A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	--	250	--	ns	$V_{GS}=0V$
Q_{rr}	Reverse Recovery Charge	--	3.5	--	μC	$I_S=4.0A, di/dt=100A/\mu s$

Notes:

- *1. $T_J = \pm 25^\circ C$ to $+150^\circ C$.
- *2. Repetitive rating; pulse width limited by maximum junction temperature.
- *3. Pulse width $\leq 300\mu s$; duty cycle $\leq 1\%$.
- *4. Basically not affected by temperature.

Typical Feature curve $T_J = 25^\circ C$, unless otherwise noted

Figure 1. Output Characteristics ($T_J = 25^\circ C$)

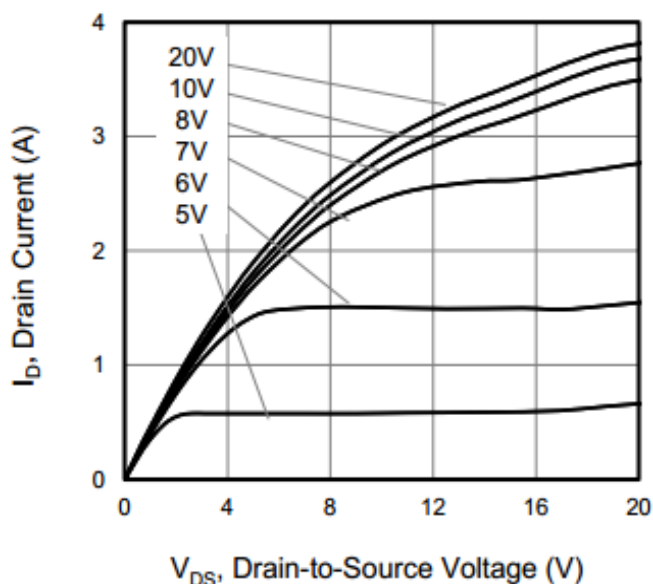


Figure 2. Body Diode Forward Voltage

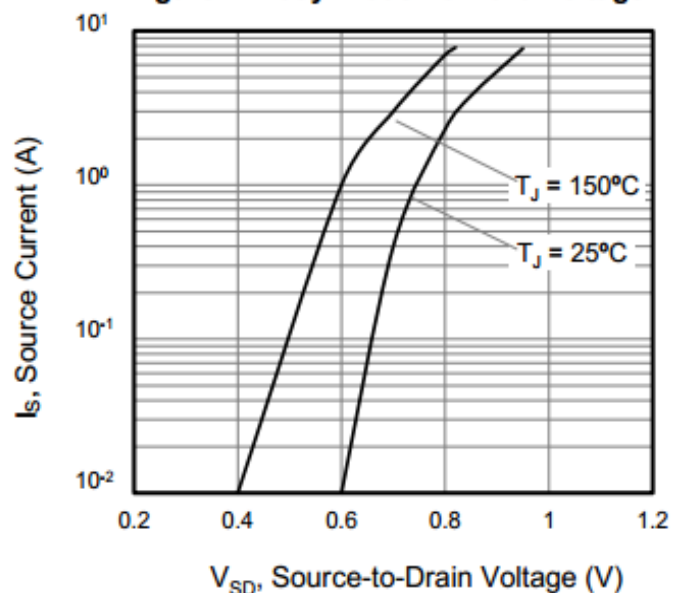


Figure 3. Drain Current vs. Temperature

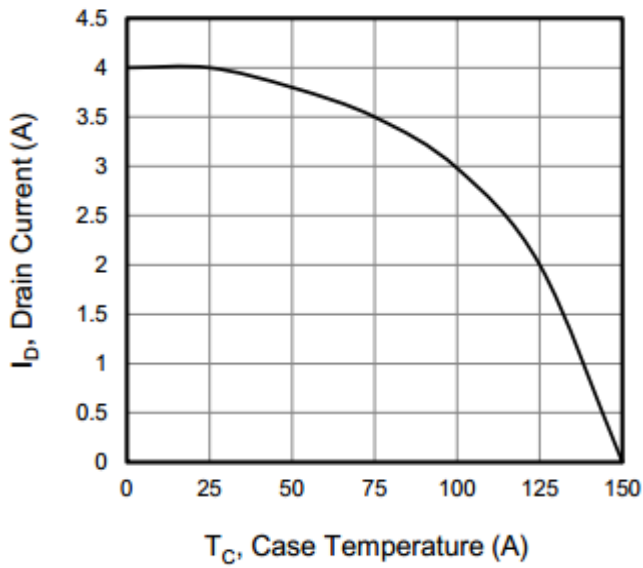


Figure 4. Power Dissipation vs. Temperature

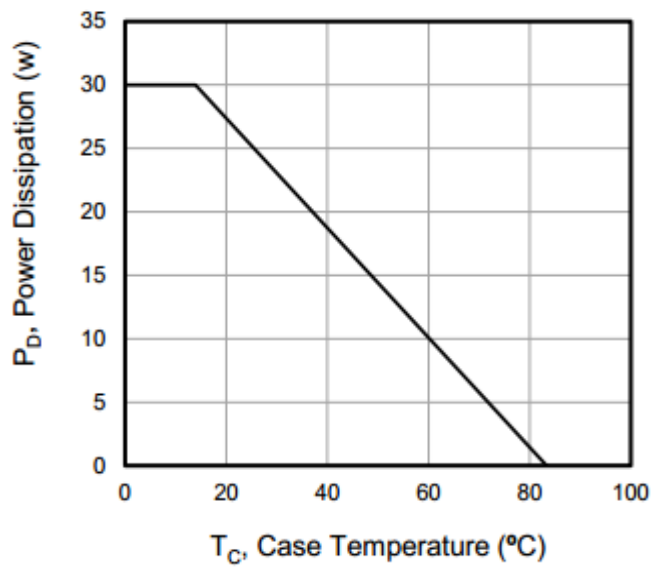


Figure 5. Transfer Characteristics

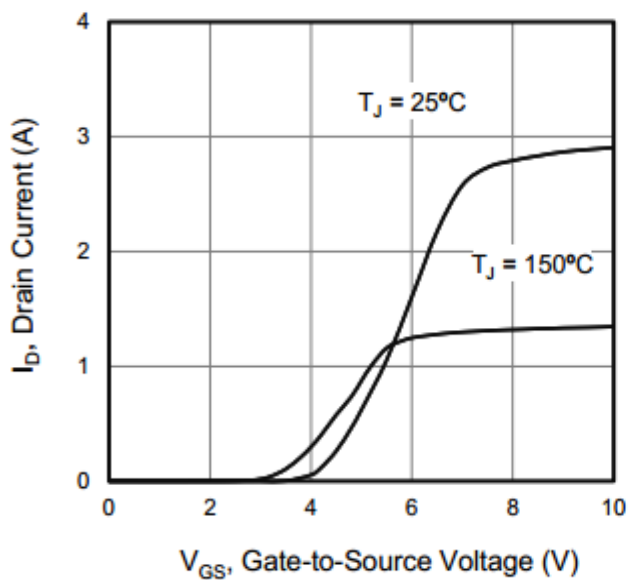


Figure 6. On-Resistance vs. Temperature

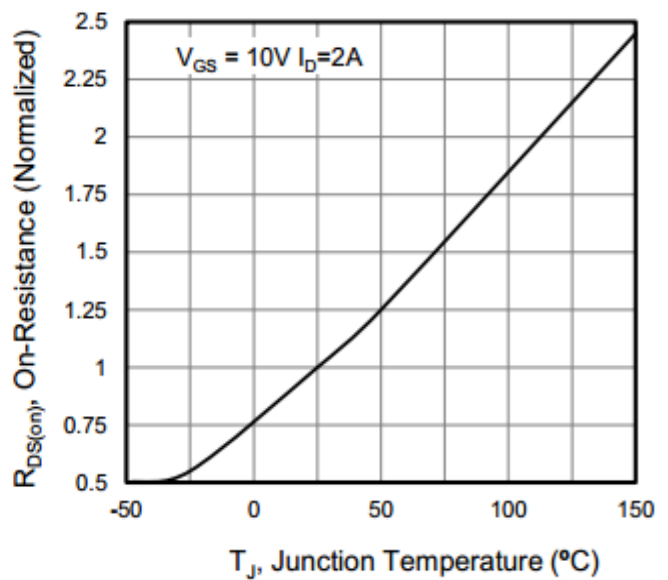


Figure 7. Capacitance

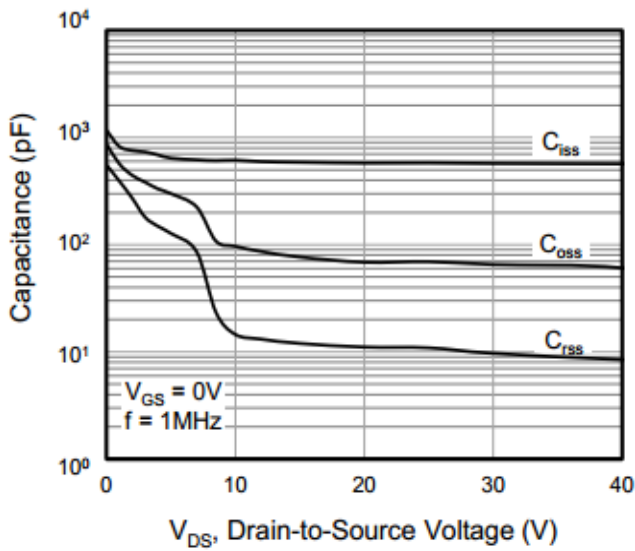


Figure 8. Gate Charge

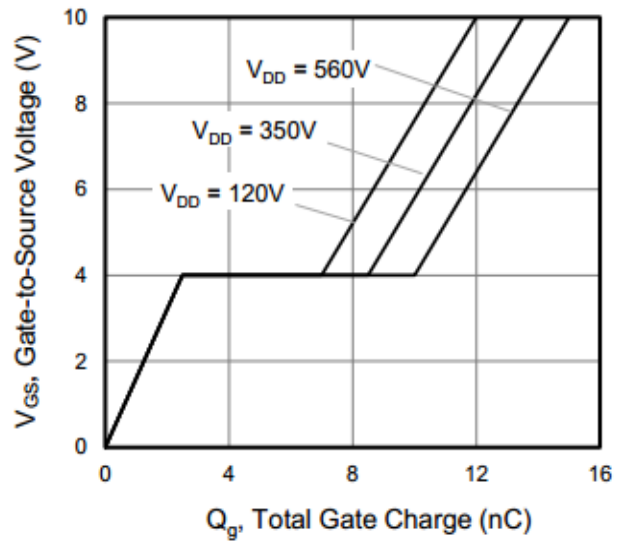
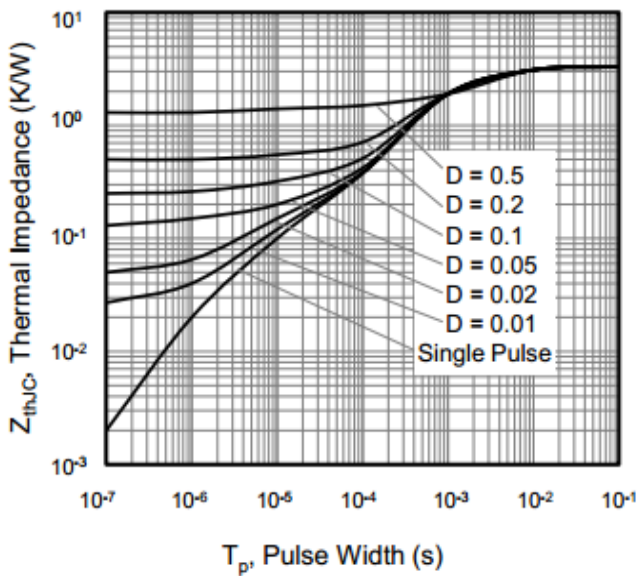


Figure 9. Transient Thermal Impedance TO-220F



Test Circuits and Waveforms

Figure10.
Gate Charge Test Circuit

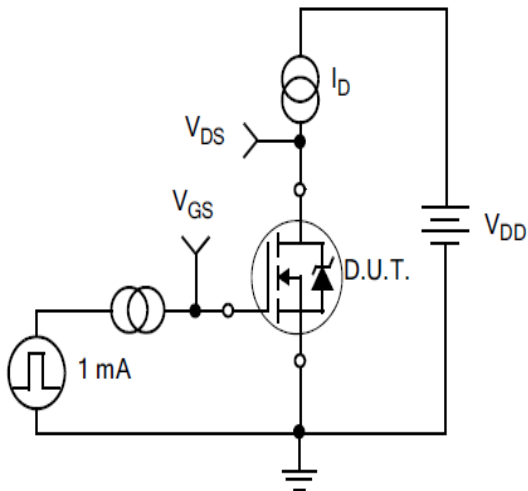


Figure11.
Gate Charge Waveform

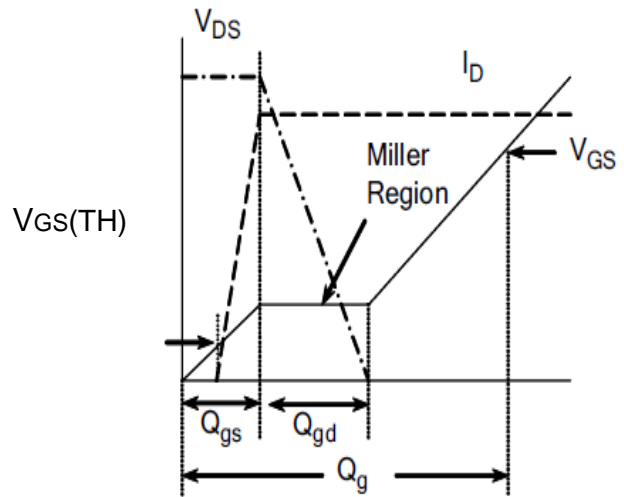


Figure12.
Resistive Switching Test Circuit

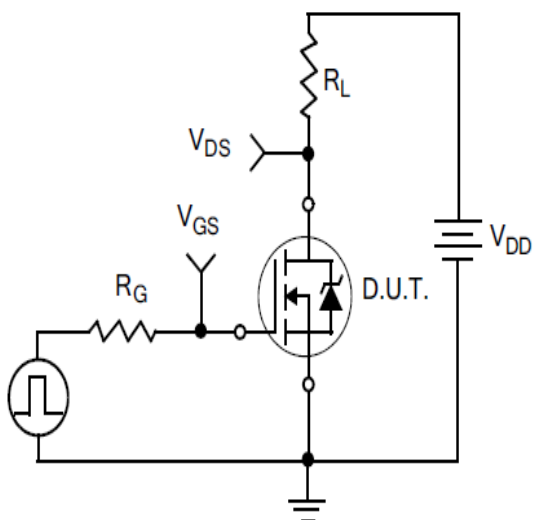
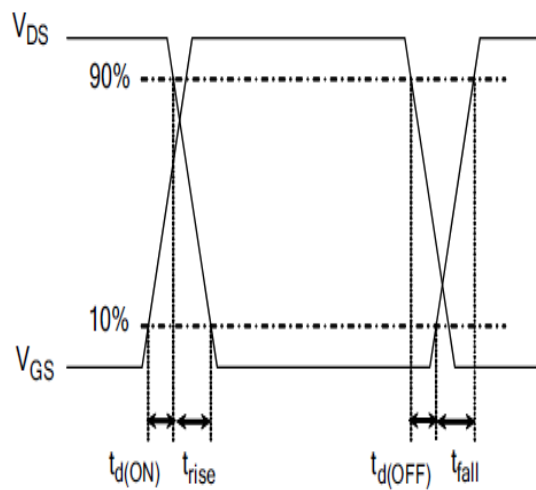


Figure13.
Resistive Switching Waveforms



Test Circuits and Waveforms

Figure14.Diode Reverse Recovery Test Circuit

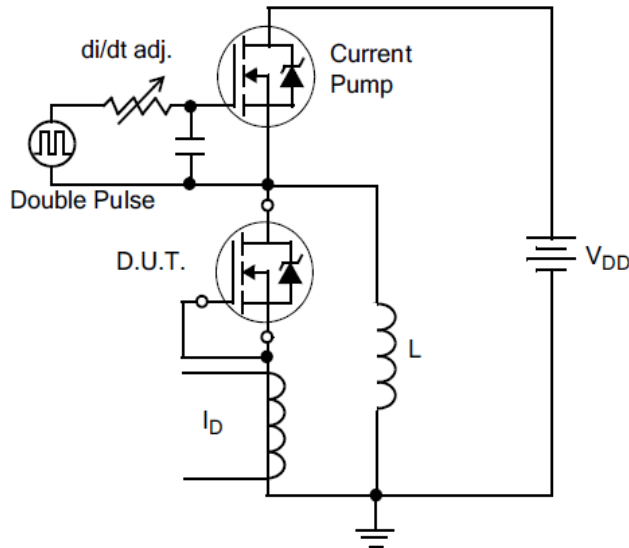


Figure15.Diode Reverse Recovery Waveform

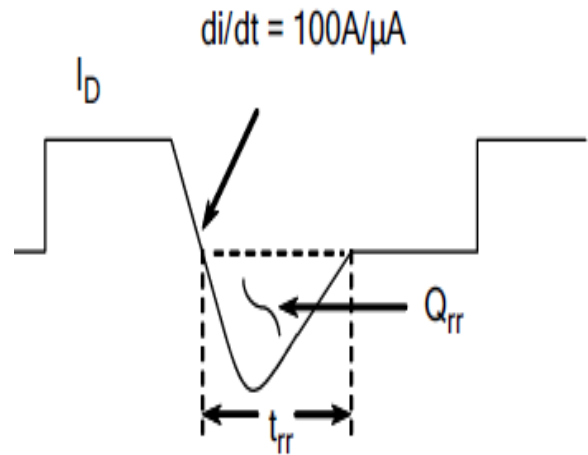


Figure16.Unclamped Inductive Switching Test Circuit

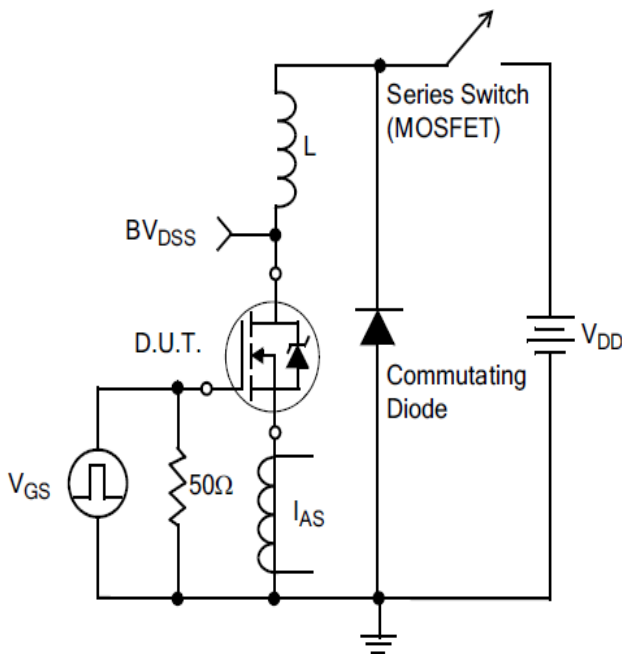
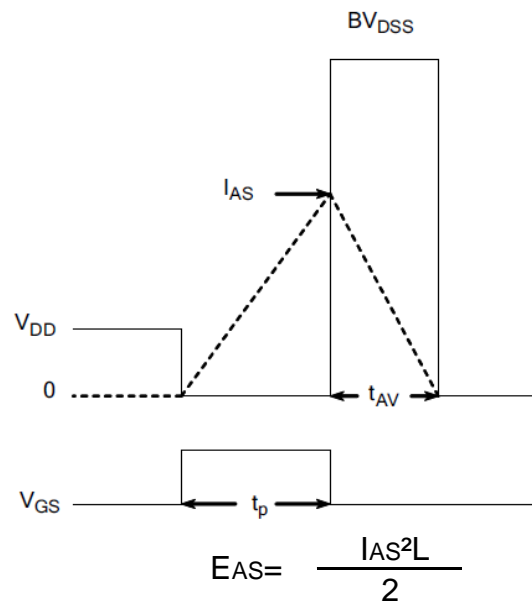
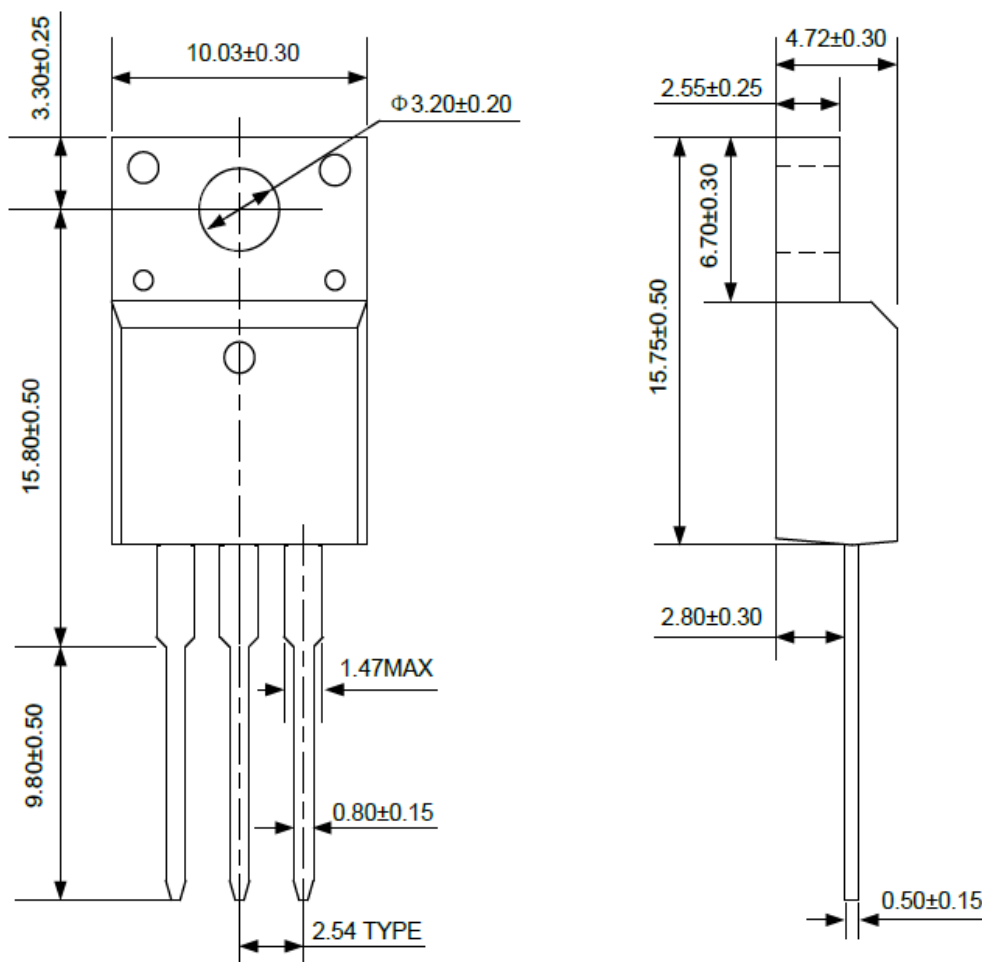


Figure17.Unclamped Inductive Switching Waveforms



Package outline drawing

Unit: mm



TO-220F

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