



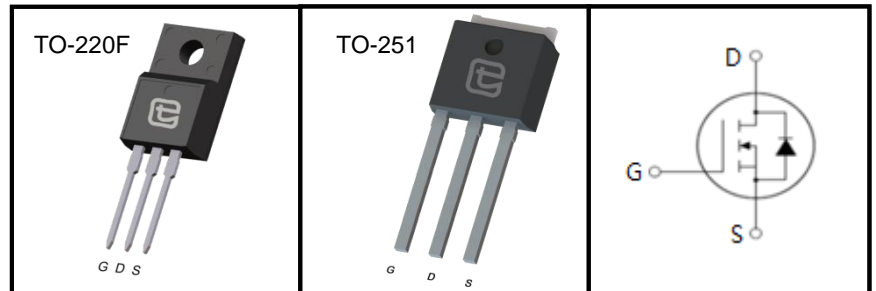
900V N-Channel MOSFET

FEATURES

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

APPLICATIONS

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



Device Marking and Package Information		
Device	Package	Marking
TMA3N90HG	TO-220F	A3N90HG
TMU3N90HG	TO-251	U3N90HG

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted				
Parameter	Symbol	Value		Unit
		TO-220F	TO-251	
Drain-Source Voltage ($V_{GS} = 0\text{V}$)	V_{DSS}	900		V
Continuous Drain Current	I_D	3		A
Pulsed Drain Current (note1)	I_{DM}	12		A
Gate-Source Voltage	V_{GSS}	± 30		V
Single Pulse Avalanche Energy (note2)	E_{AS}	65		mJ
Avalanche Current (note1)	I_{AR}	3.6		A
Repetitive Avalanche Energy (note1)	E_{AR}	39		mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	25	70	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150		$^\circ\text{C}$

Thermal Resistance				
Parameter	Symbol	Value		Unit
		TO-220F	TO-251	
Thermal Resistance, Junction-to-Case	R_{thJC}	5	1.78	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	60	



Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 900V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	μA
		$V_{DS} = 720V, V_{GS} = 0V, T_J = 125^\circ\text{C}$	--	--	100	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 1.5A$	--	3.6	4.8	Ω
Forward Transconductance (Note3)	g_{fs}	$V_{DS} = 10V, I_D = 1.5A$	3	--	--	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	595	--	μF
Output Capacitance	C_{oss}		--	59	--	
Reverse Transfer Capacitance	C_{rss}		--	10	--	
Total Gate Charge	Q_g	$V_{DD} = 720V, I_D = 3A,$ $V_{GS} = 10V$	--	23	--	nC
Gate-Source Charge	Q_{gs}		--	3	--	
Gate-Drain Charge	Q_{gd}		--	10	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 450V, I_D = 3A,$ $R_G = 25\Omega$	--	37	--	ns
Turn-on Rise Time	t_r		--	16	--	
Turn-off Delay Time	$t_{d(off)}$		--	112	--	
Turn-off Fall Time	t_f		--	37	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	3	A
Pulsed Diode Forward Current	I_{SM}		--	--	12	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 3A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 3A,$ $di_F/dt = 100A/\mu s$	--	754	--	ns
Reverse Recovery Charge	Q_{rr}		--	1.3	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 3.6A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

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

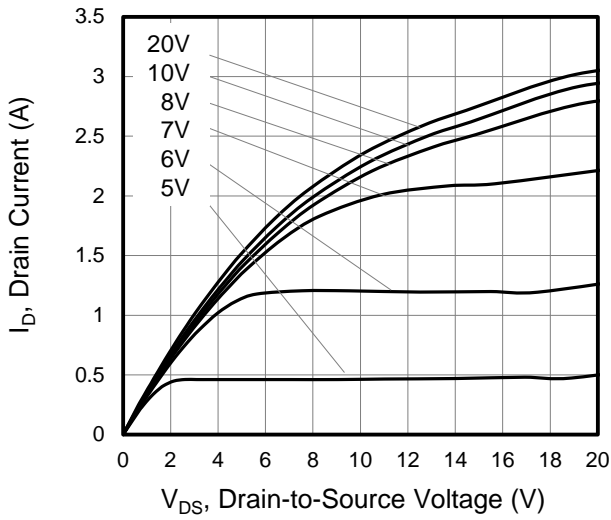


Figure 2. Transfer Characteristics

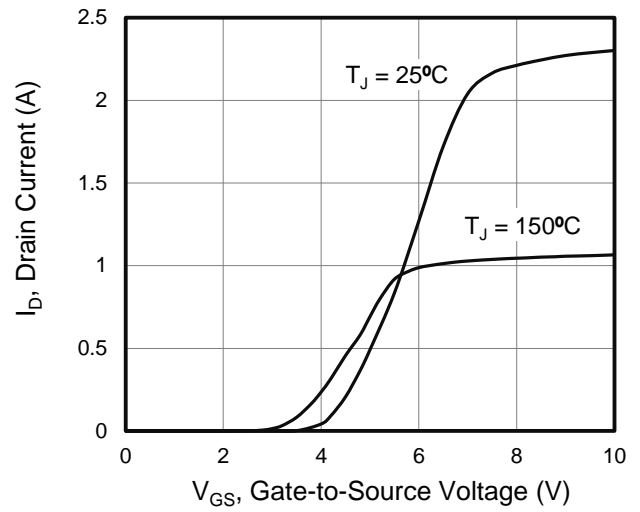


Figure 3. On-Resistance vs. Drain Current

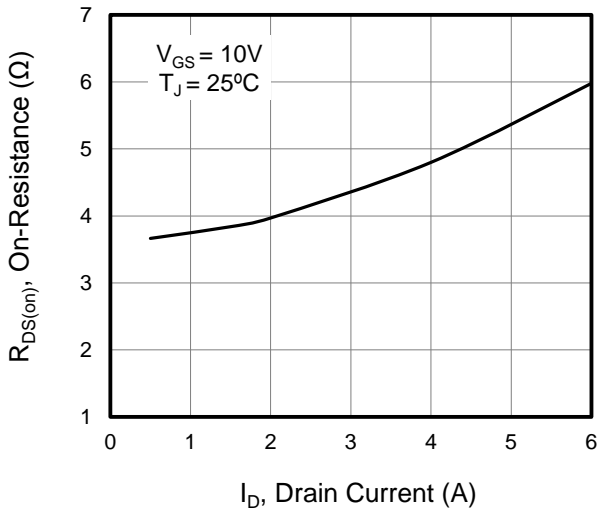


Figure 4. Capacitance

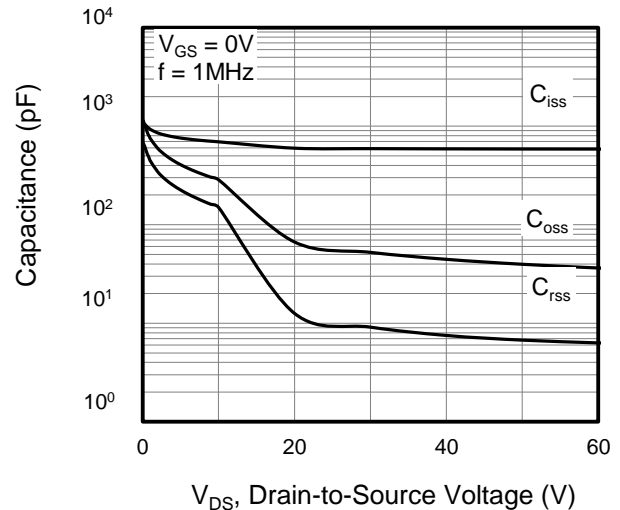


Figure 5. Gate Charge

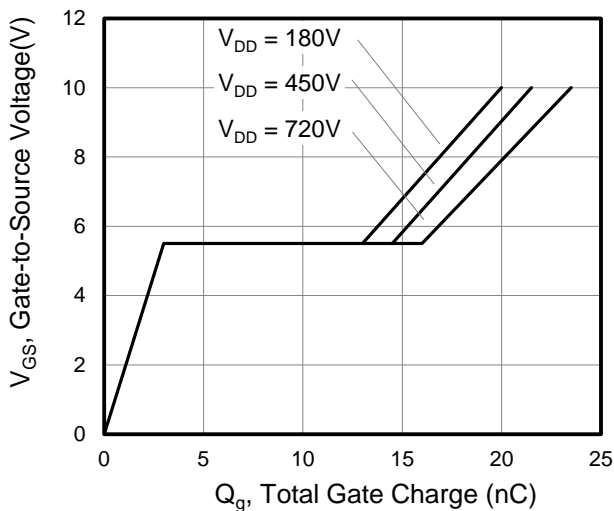
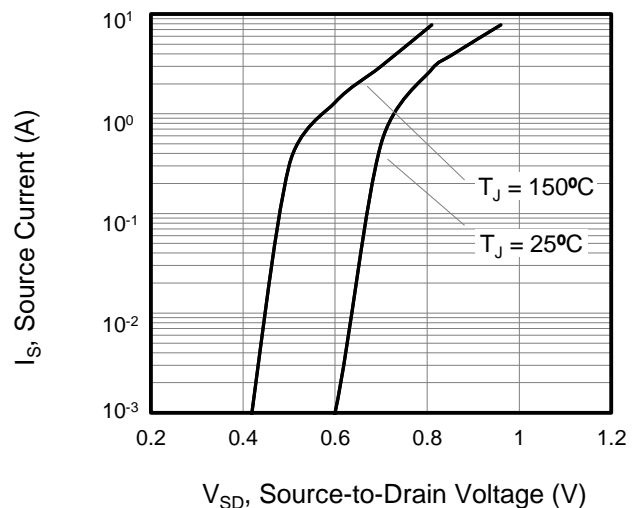


Figure 6. Body Diode Forward Voltage





Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. On-Resistance vs. Temperature

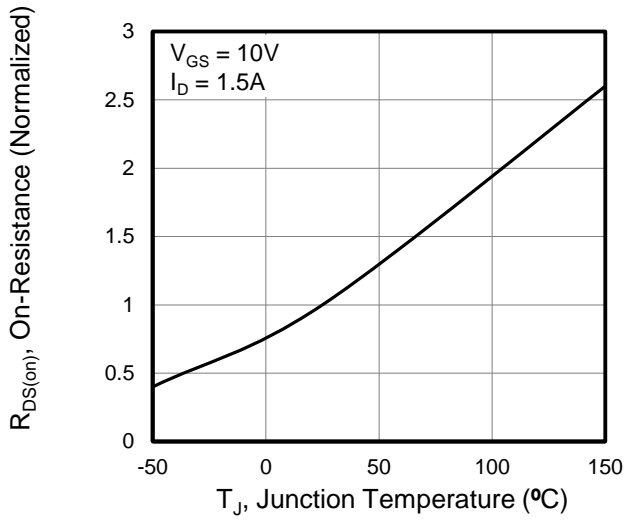


Figure 8. Breakdown voltage vs. Junction Temperature

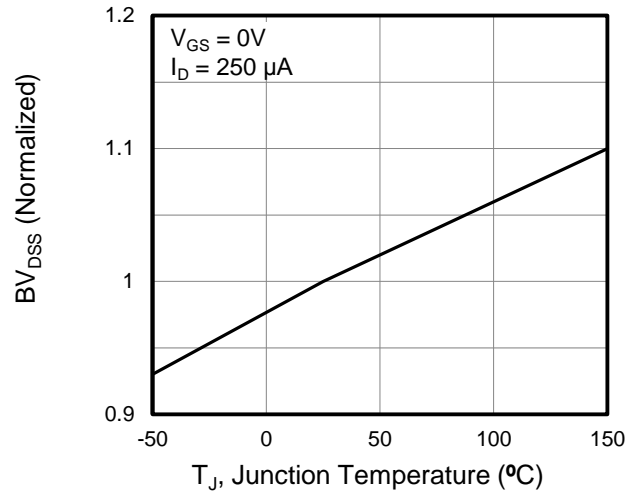


Figure 9. Transient Thermal Impedance

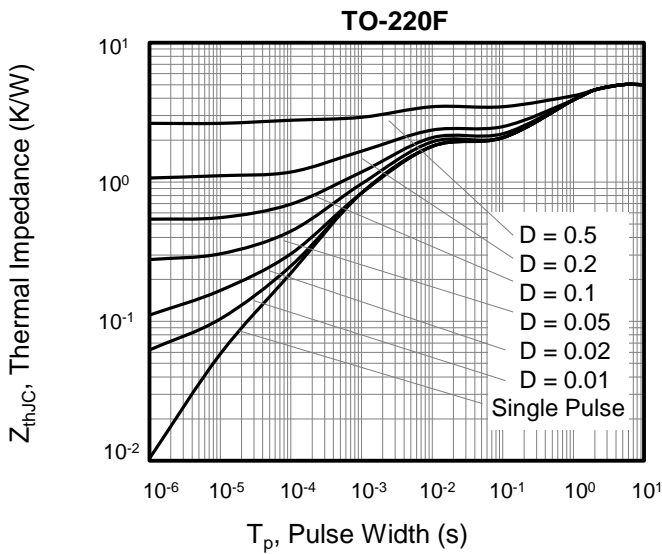


Figure 10. Transient Thermal Impedance

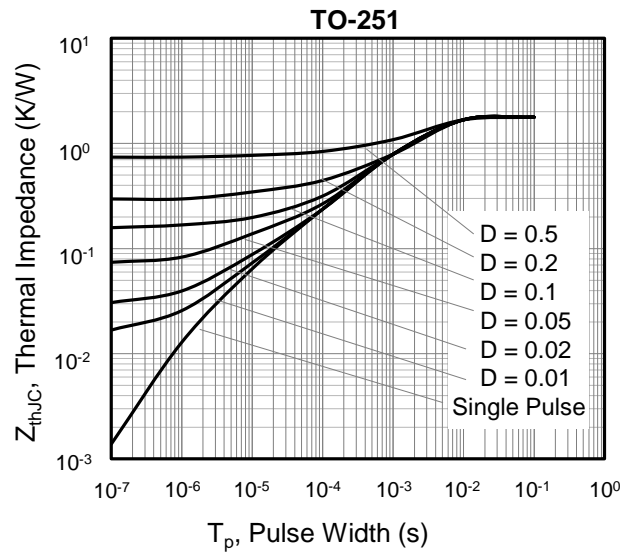


Figure 12. Safe operation area for

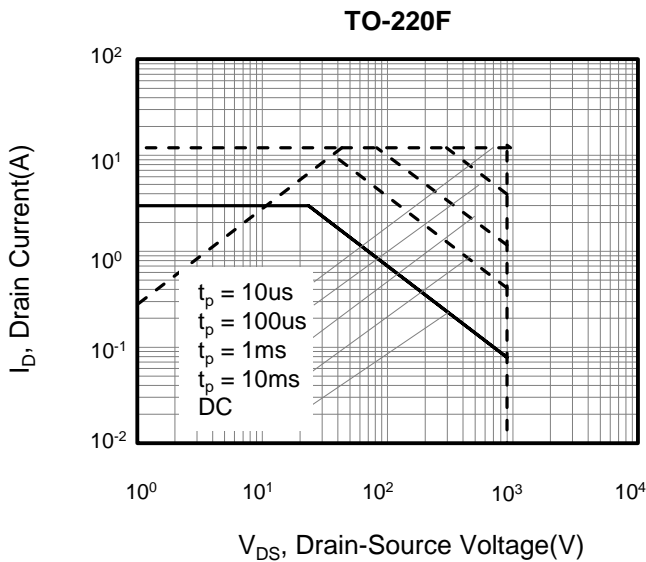


Figure 13. Safe operation area for

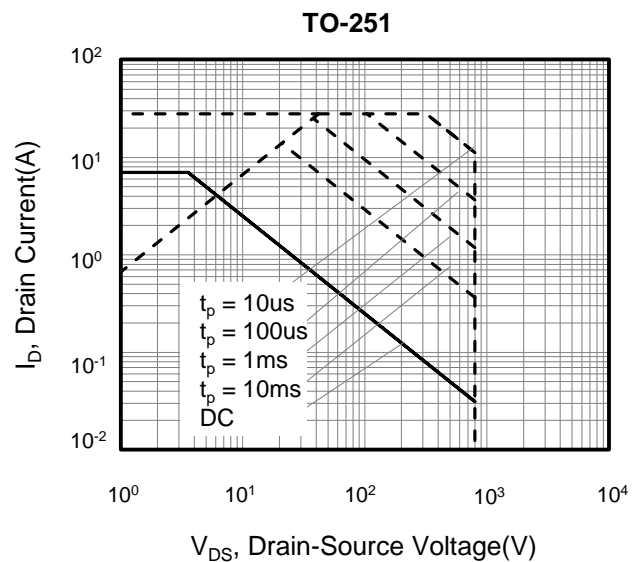




Figure A: Gate Charge Test Circuit and Waveform



Figure B: Resistive Switching Test Circuit and Waveform

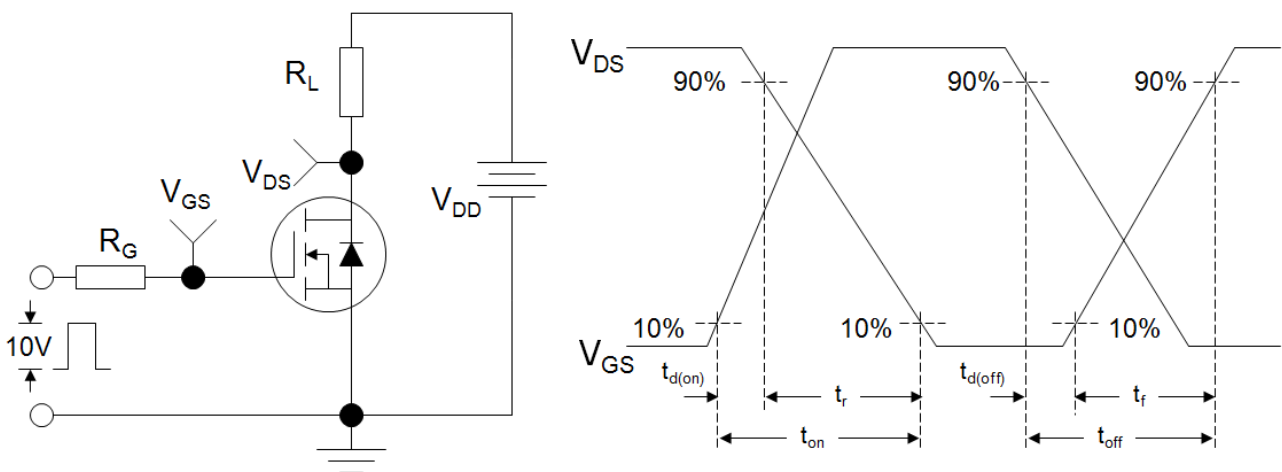
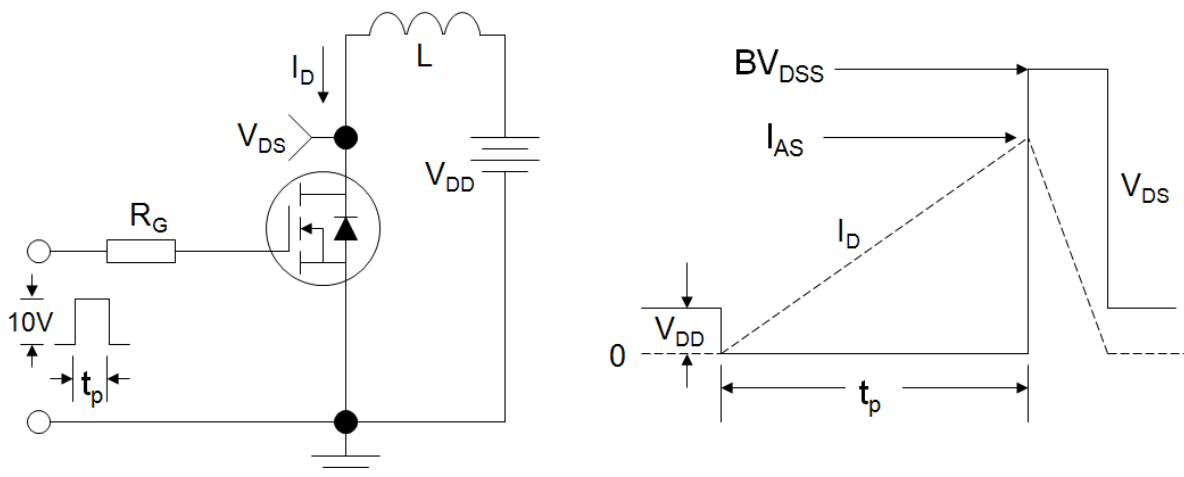
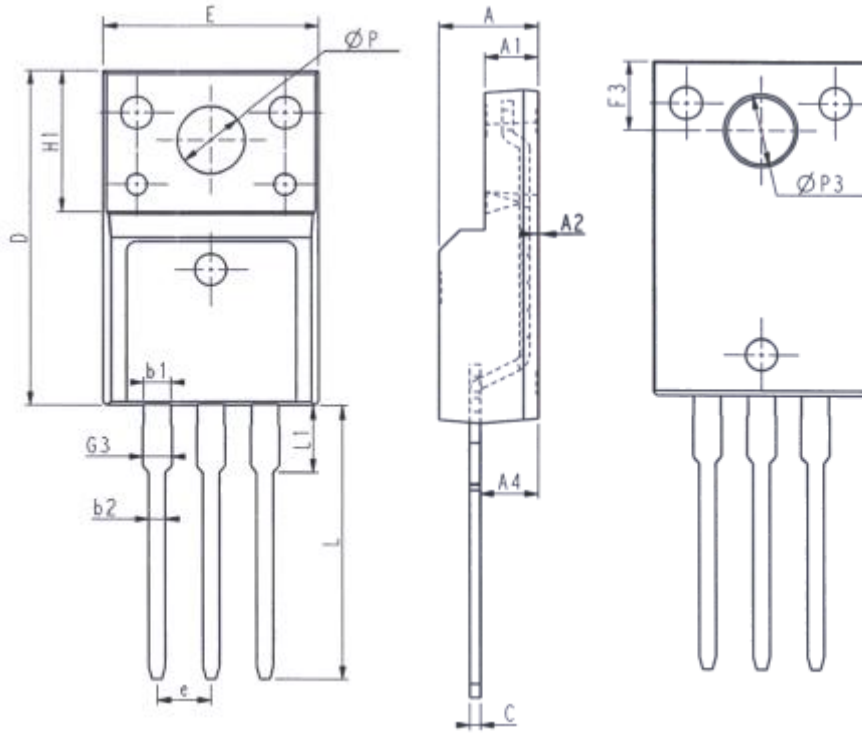


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





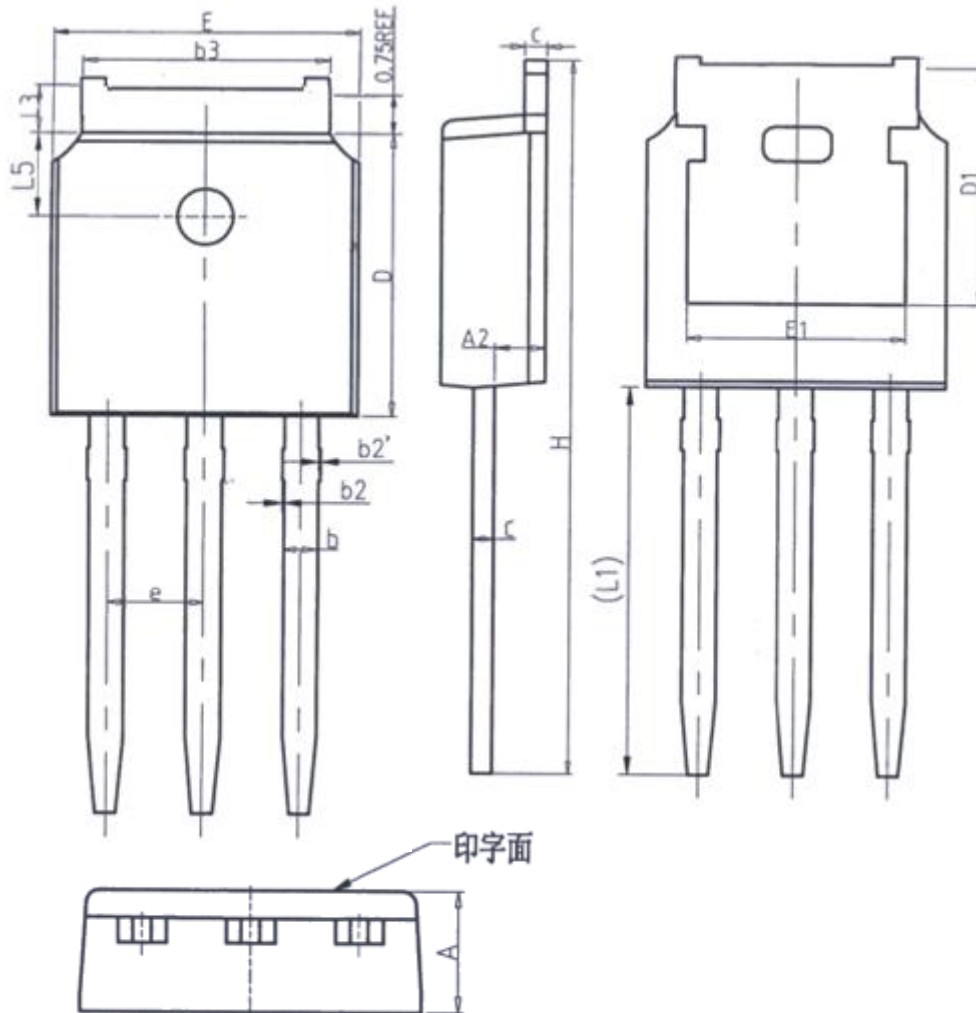
TO-220F



Unit: mm			Unit: mm		
Symbol	Min.	Max.	Symbol	Min.	Max.
E	9.96	10.36	L	12.68	13.28
A	4.50	4.90	L1	2.93	3.13
A1	2.34	2.74	P	3.03	3.38
A2	0.30	0.60	P3	3.15	3.65
A4	2.56	2.96	F3	3.15	3.45
c	0.40	0.65	G3	1.25	1.55
D	15.57	16.17	b1	1.18	1.43
H1	6.70REF		b2	0.70	0.95
e	2.54BSC				



TO-251



Unit: mm		
Symbol	Min.	Max.
A	2.20	2.40
A2	0.97	1.17
b	0.68	0.90
b2	0.00	0.10
b2'	0.00	0.10
b3	5.20	5.50
c	0.43	0.63
D	5.98	6.22

Unit: mm		
Symbol	Min.	Max.
D1	5.30REF	
E	6.40	6.80
E1	4.63	-
e	2.286BSC	
H	16.22	16.82
L1	9.15	9.65
L3	0.88	1.28
L5	1.65	1.95



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