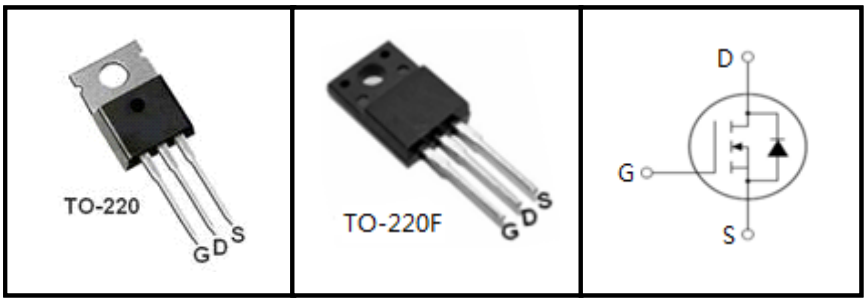
900V N-Channel MOSFET

FEATURES

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

APPLICATIONS

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



RoHS

Device Marking and Package Information

Device	Package	Marking
TMA6N90H	TO-220F	A6N90H
TMP6N90H	TO-220	P6N90H

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Value		Unit
		TO-220	TO-220F	
Drain-Source Voltage (V_{GS} = 0V)	V_{DSS}	900		V
Continuous Drain Current	I_D	6		A
Pulsed Drain Current (note1)	I_{DM}	24		A
Gate-Source Voltage	V_{GSS}	±30		V
Single Pulse Avalanche Energy (note2)	E_{AS}	562		mJ
Avalanche Current (note1)	I_{AR}	7.2		A
Repetitive Avalanche Energy (note1)	E_{AR}	26		mJ
Power Dissipation (T_C = 25ºC)	P_D	105	33	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150		ºC

Thermal Resistance

Parameter	Symbol	Value		Unit
		TO-220	TO-220F	
Thermal Resistance, Junction-to-Case	R_{thJC}	1.2	3.7	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	62.5	

Specifications T_J = 25ºC, 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 = 250μA	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 900V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
		V_{DS} = 720V, V_{GS} = 0V, T_J = 125ºC	--	--	100	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	3.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 3A	--	1.7	2.15	Ω
Forward Transconductance (Note3)	g_{fs}	V_{DS} = 10V, I_D = 3A	--	3	--	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	1215	--	pF
Output Capacitance	C_{oss}		--	119	--	
Reverse Transfer Capacitance	C_{rss}		--	24	--	
Total Gate Charge	Q_g	V_{DD} = 720V, I_D = 6A, V_{GS} = 10V	--	47	--	nC
Gate-Source Charge	Q_{gs}		--	7.5	--	
Gate-Drain Charge	Q_{gd}		--	23	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 450V, I_D =6A, R_G = 25 Ω	--	20	--	ns
Turn-on Rise Time	t_r		--	23	--	
Turn-off Delay Time	$t_{d(off)}$		--	28	--	
Turn-off Fall Time	t_f		--	26	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25 ºC	--	--	4	A
Pulsed Diode Forward Current	I_{SM}		--	--	16	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 6A, V_{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V,I_S = 6A, di_F/dt =100A /μs	--	450	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.5	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS} = 7.2A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25 ºC
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25ºC)

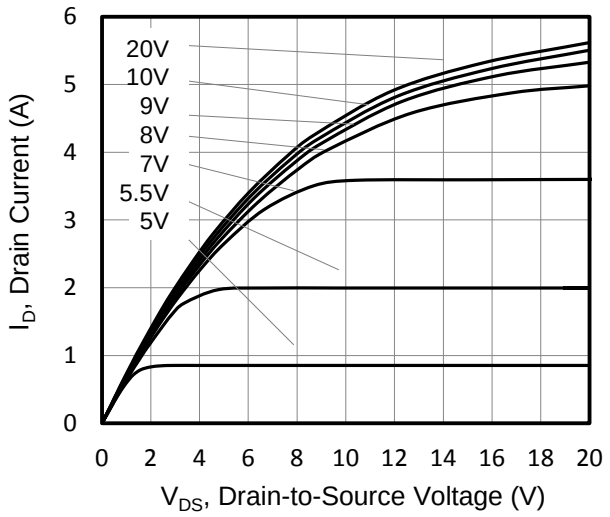


Figure 2. Transfer Characteristics

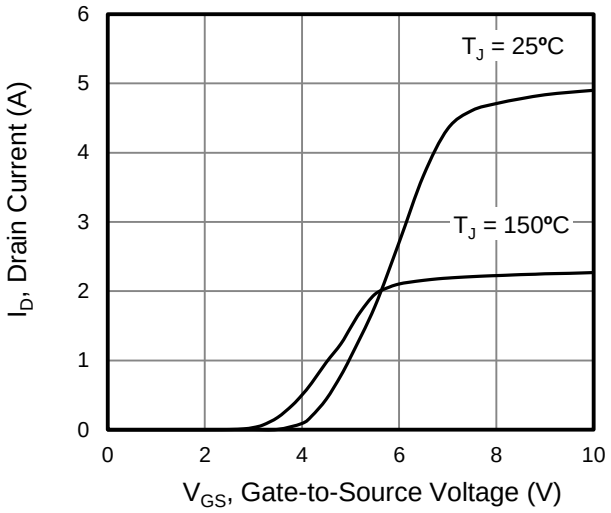


Figure 3. On-Resistance vs. Drain Current

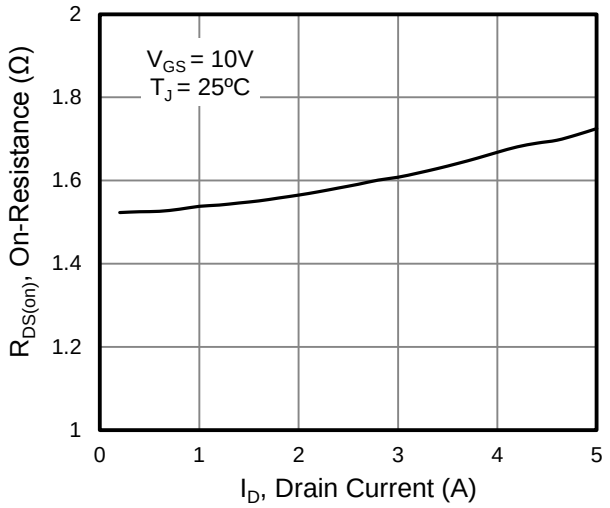


Figure 4. Capacitance

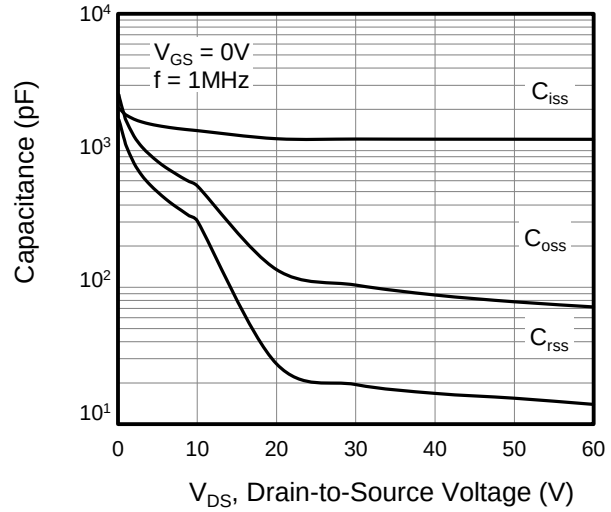


Figure 5. Gate Charge

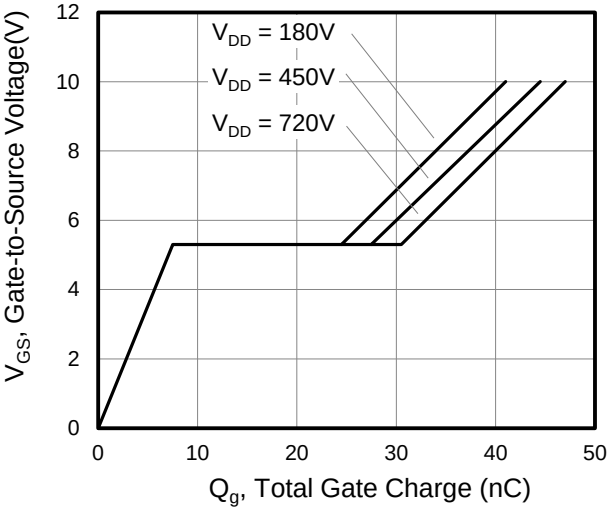
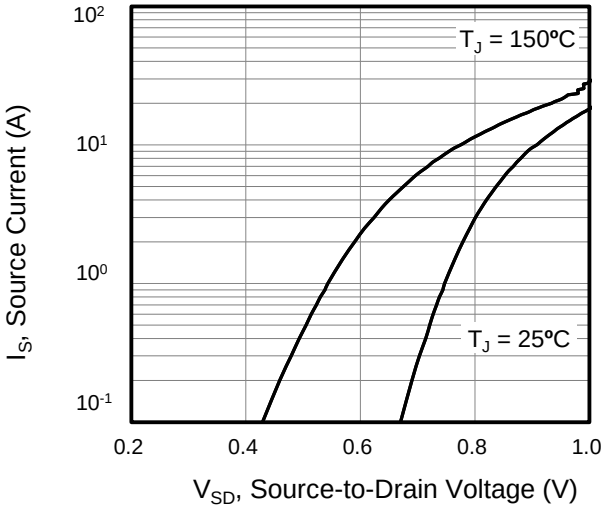


Figure 6. Body Diode Forward Voltage



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. On-Resistance vs. Temperature

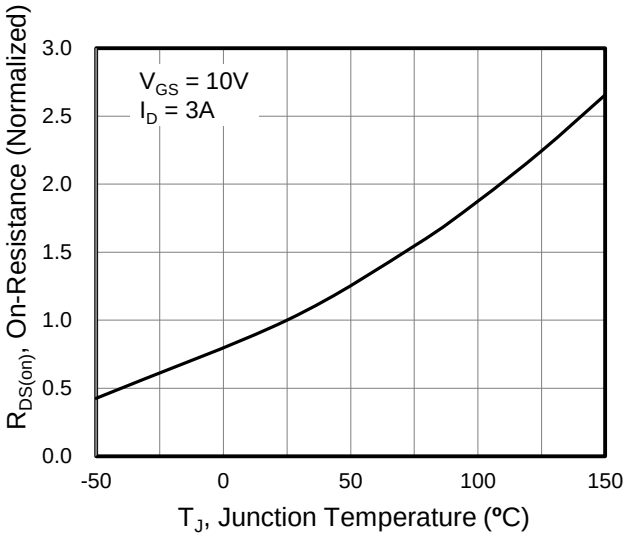


Figure 8. Threshold Voltage vs. Junction Temperature

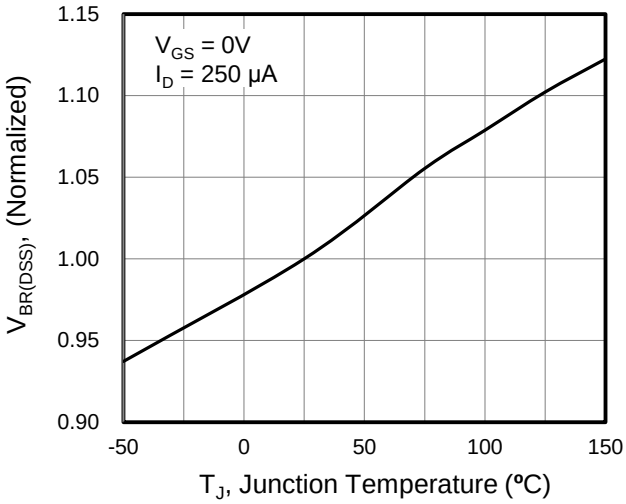


Figure 9. Transient Thermal Impedance

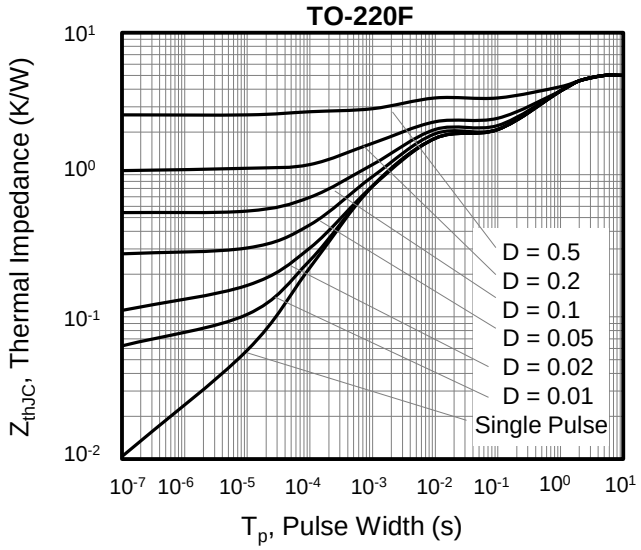


Figure 10. Transient Thermal Impedance

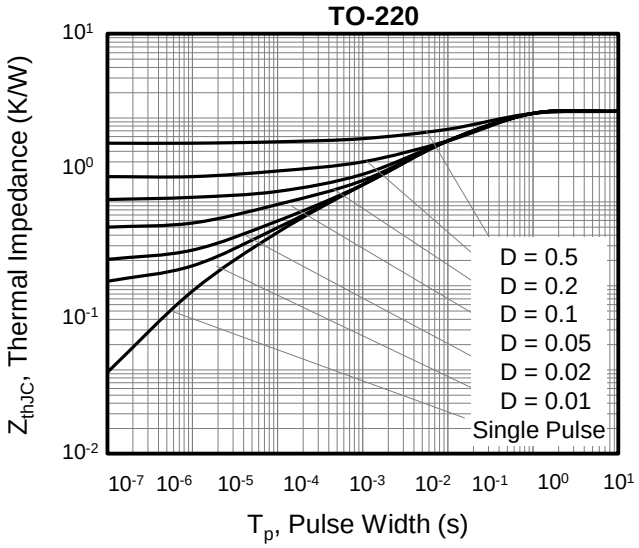


Figure 11. Safe operation area for

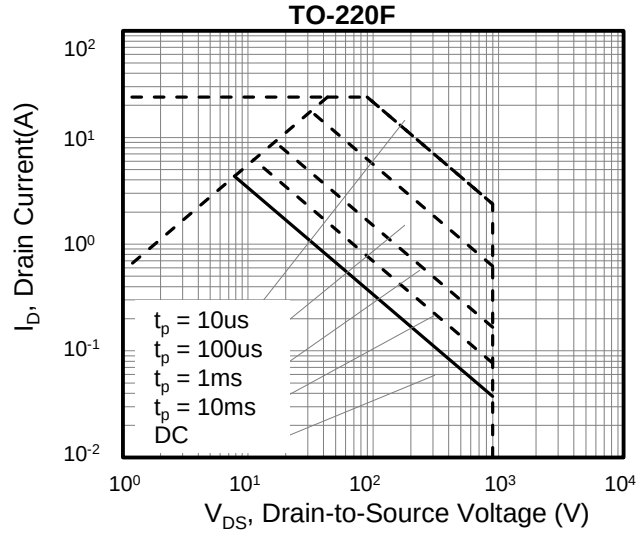


Figure 12. Safe operation area for

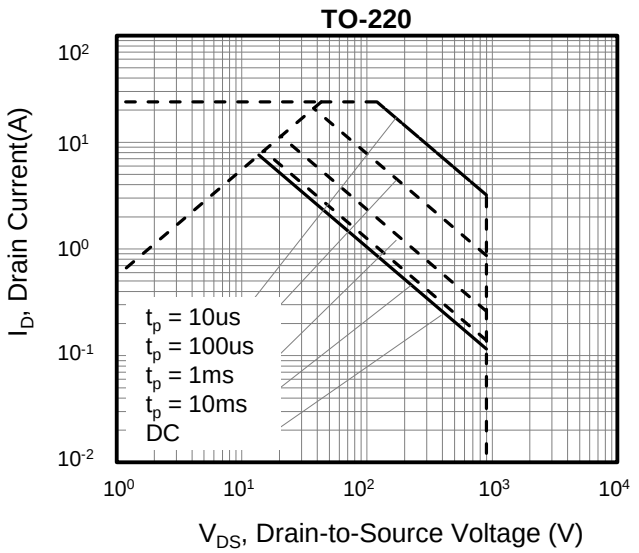


Figure A：Gate Charge Test Circuit and Waveform

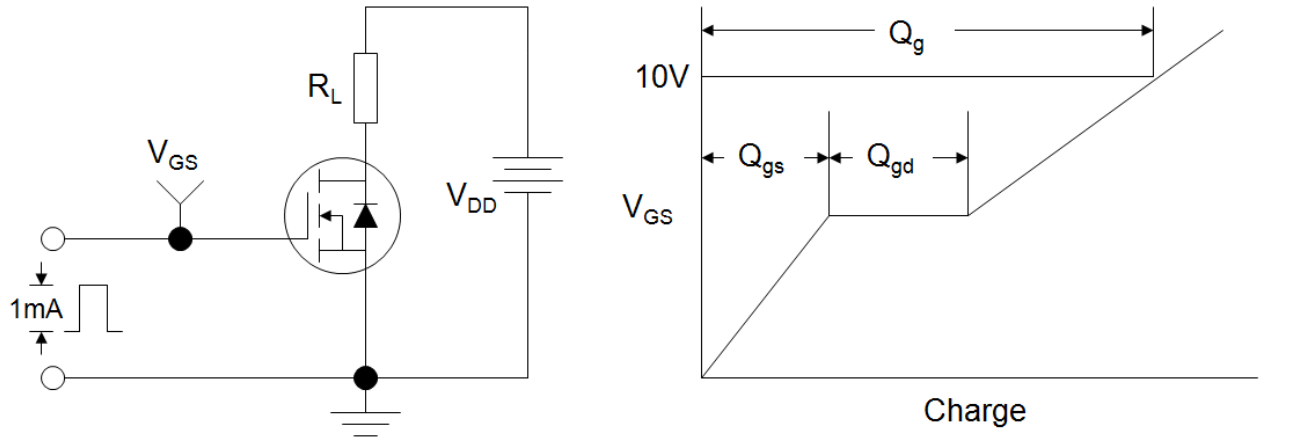


Figure B：Resistive Switching Test Circuit and Waveform

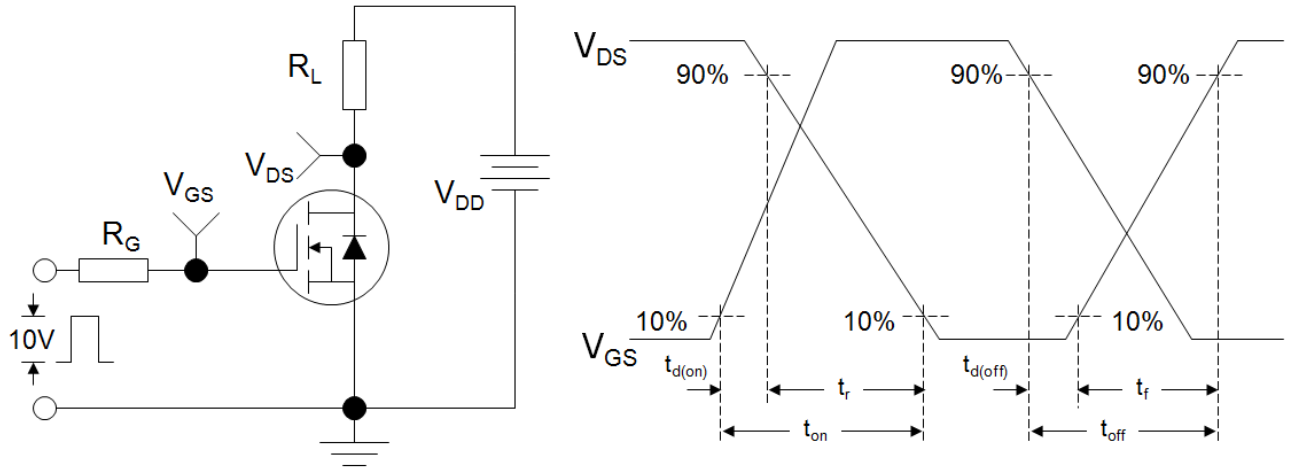
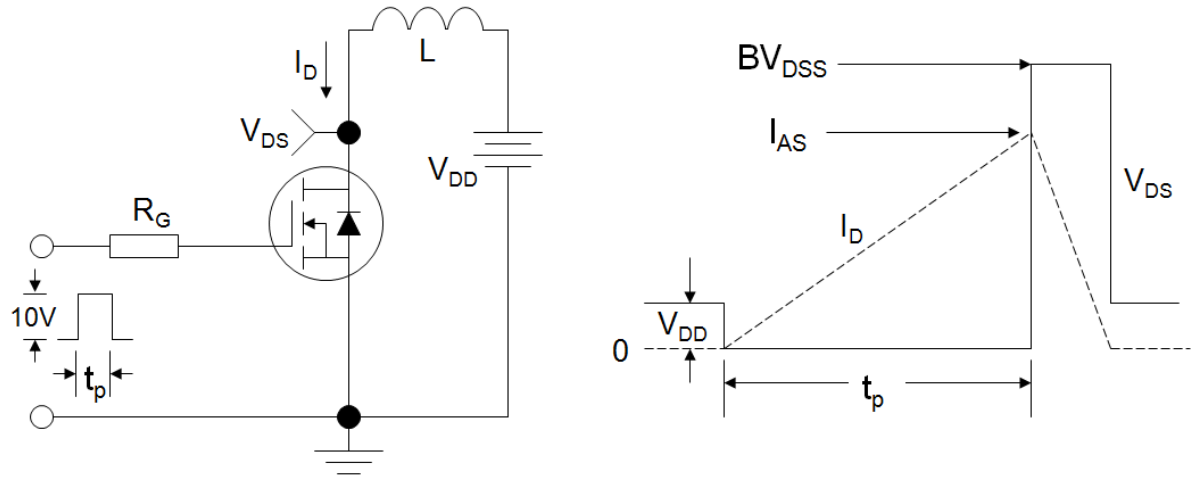
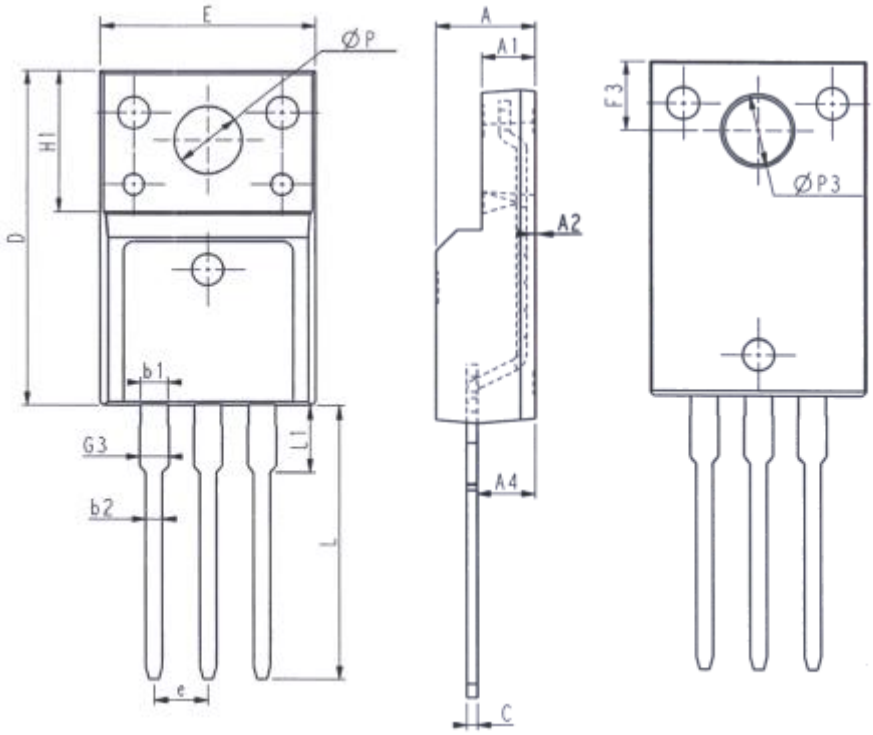


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



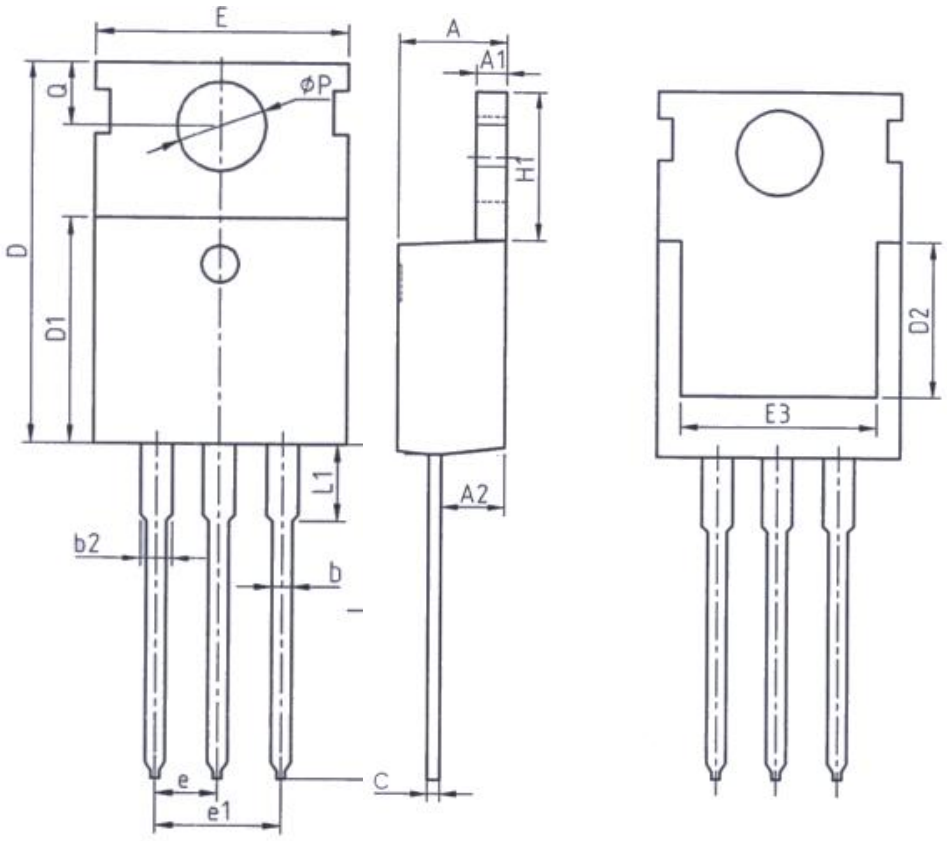
TO-220F



Unit: mm		
Symbol	Min.	Max.
E	9.96	10.36
A	4.50	4.90
A1	2.34	2.74
A2	0.30	0.60
A4	2.56	2.96
c	0.40	0.65
D	15.57	16.17
H1	6.70REF	
e	2.54BSC	

Unit: mm		
Symbol	Min.	Max.
L	12.68	13.28
L1	2.93	3.13
P	3.03	3.38
P3	3.15	3.65
F3	3.15	3.45
G3	1.25	1.55
b1	1.18	1.43
b2	0.70	0.95

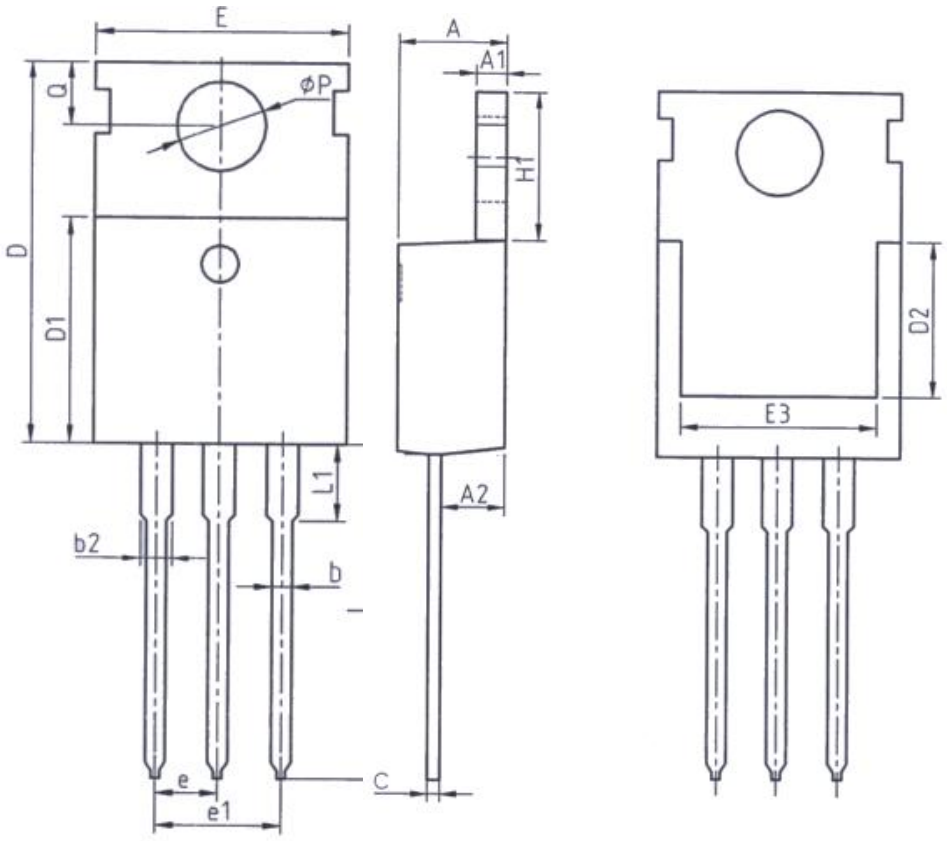
TO-220



Unit: mm		
Symbol	Min.	Max.
A	4.37	4.77
A1	1.25	1.45
A2	2.20	2.60
b	0.70	0.95
b2	1.17	1.47
c	0.40	0.65
D	15.10	16.10
D1	8.80	9.40
D2	5.50	–

Unit: mm		
Symbol	Min.	Max.
E	9.70	10.30
E3	7.00	–
e	2.54BSC	
e1	5.08BSC	
H1	6.25	6.85
L	12.75	13.80
L1	–	3.40
P	3.40	3.80
Q	2.60	3.00

TO-220



Unit: mm		
Symbol	Min.	Max.
A	4.37	4.77
A1	1.25	1.45
A2	2.20	2.60
b	0.70	0.95
b2	1.17	1.47
c	0.40	0.65
D	15.10	16.10
D1	8.80	9.40
D2	5.50	–

Unit: mm		
Symbol	Min.	Max.
E	9.70	10.30
E3	7.00	–
e	2.54BSC	
e1	5.08BSC	
H1	6.25	6.85
L	12.75	13.80
L1	–	3.40
P	3.40	3.80
Q	2.60	3.00

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