

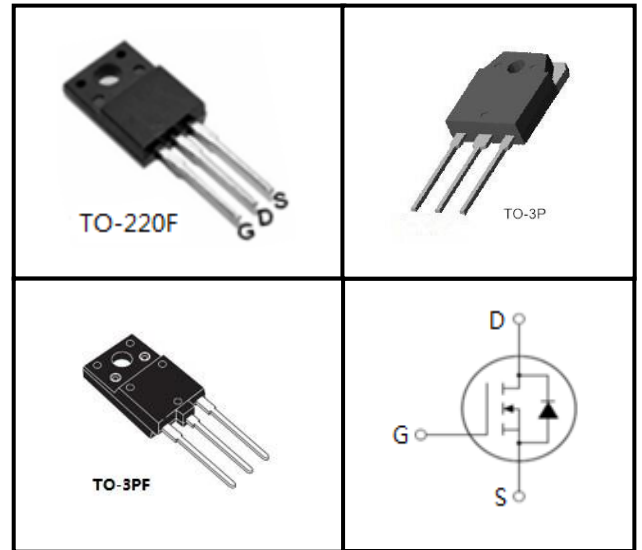
## 1000V N-Channel MOSFET

### 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
CS4N100F	TO-220F	CS4N100F
CS4N100V	TO-3P	CS4N100V
CS4N100VF	TO-3PF	CS4N100VF

### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Value			Unit
		TO-220F	TO-3P	TO-3PF	
Drain-Source Voltage ( $V_{GS} = 0V$ )	$V_{DSS}$	1000			V
Continuous Drain Current	$I_D$	4			A
Pulsed Drain Current (note1)	$I_{DM}$	16			A
Gate-Source Voltage	$V_{GSS}$	$\pm 30$			V
Single Pulse Avalanche Energy (note2)	$E_{AS}$	88			mJ
Avalanche Current (note1)	$I_{AS}$	4.2			A
Repetitive Avalanche Energy (note1)	$E_{AR}$	52			mJ
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	36	75		W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150			$^\circ\text{C}$

### Thermal Resistance

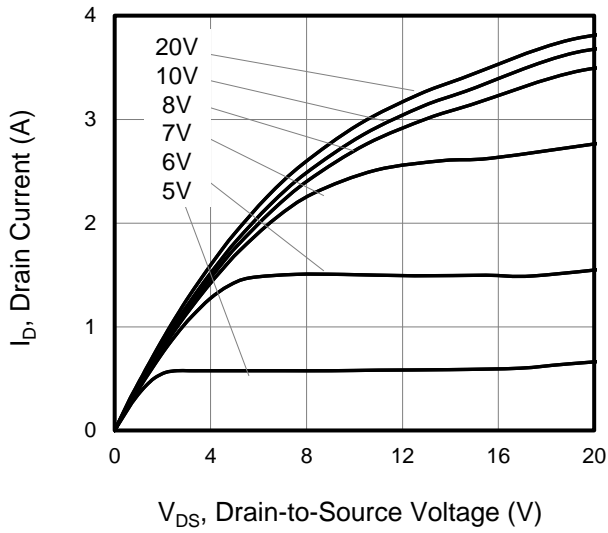
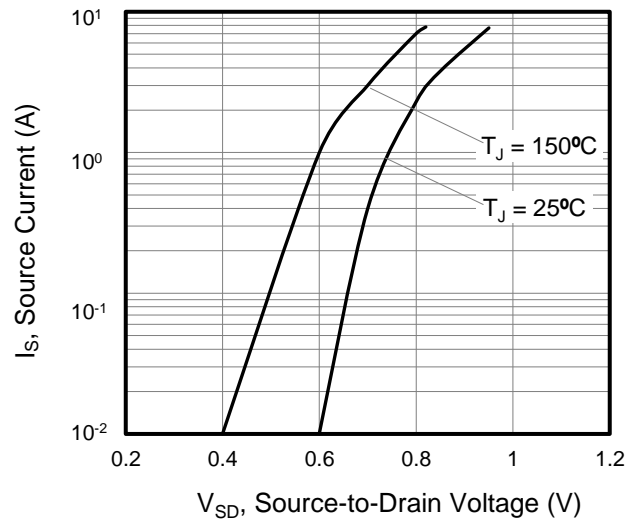
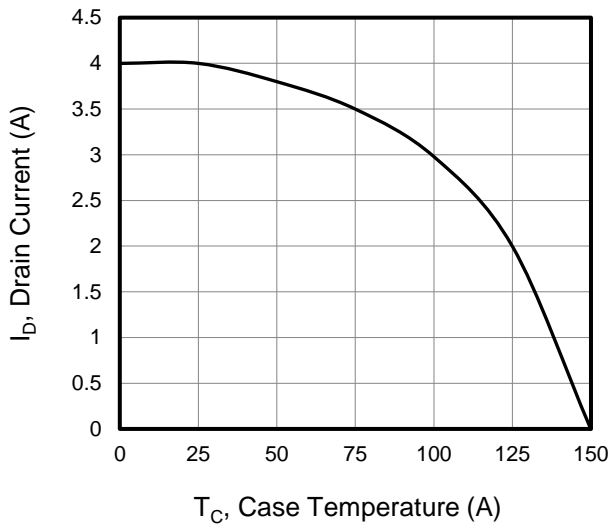
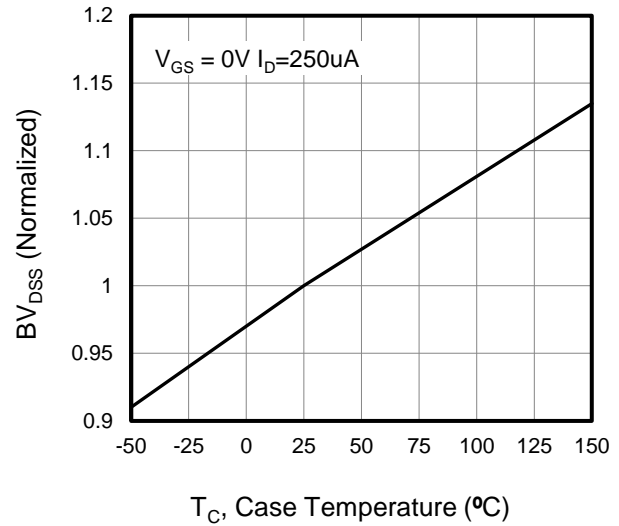
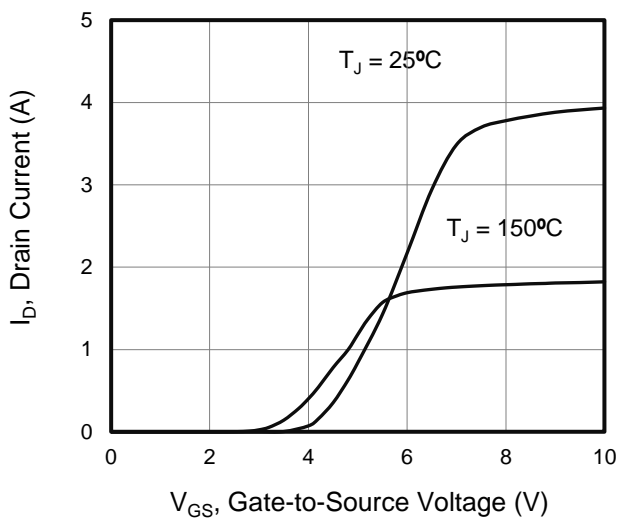
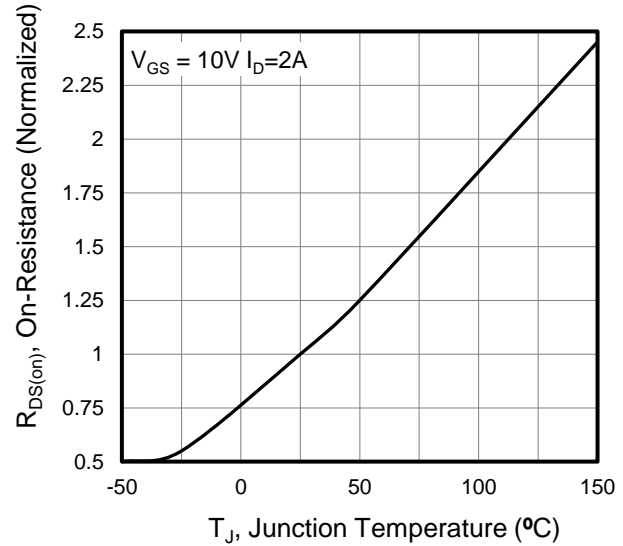
Parameter	Symbol	Value			Unit
		TO-220F	TO-3P	TO-3PF	
Thermal Resistance, Junction-to-Case	$R_{thJC}$	3.47	1.67		$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	60		

<b>Specifications</b> $T_J = 25^{\circ}\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	1000	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 1000V, V_{GS} = 0V, T_J = 25^{\circ}\text{C}$	--	--	1	$\mu A$
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 30V$	--	--	$\pm 100$	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)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 2.0A$	--	3.6	4.3	$\Omega$
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	689	--	pF
Output Capacitance	$C_{oss}$		--	68	--	
Reverse Transfer Capacitance	$C_{rss}$		--	13	--	
Total Gate Charge	$Q_g$	$V_{DD} = 800V, I_D = 4.0A,$ $V_{GS} = 10V$	--	27	--	nC
Gate-Source Charge	$Q_{gs}$		--	4	--	
Gate-Drain Charge	$Q_{gd}$		--	12	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 500V, I_D = 4.0A,$ $R_G = 25\Omega$	--	37	--	ns
Turn-on Rise Time	$t_r$		--	16	--	
Turn-off Delay Time	$t_{d(off)}$		--	145	--	
Turn-off Fall Time	$t_f$		--	37	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^{\circ}\text{C}$	--	--	4	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	16	
Body Diode Voltage	$V_{SD}$	$T_J = 25^{\circ}\text{C}, I_{SD} = 2.0A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_S = 4.0A,$ $di_F/dt = 100A/\mu s$	--	980	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	1.6	--	$\mu C$

**Notes**

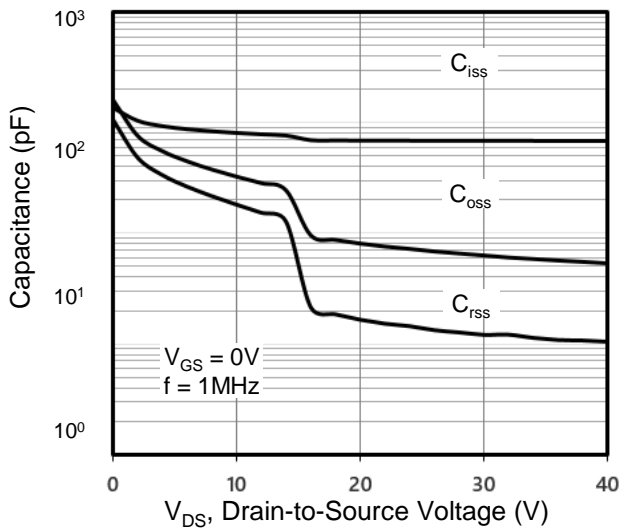
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L = 10.0\text{mH}, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

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

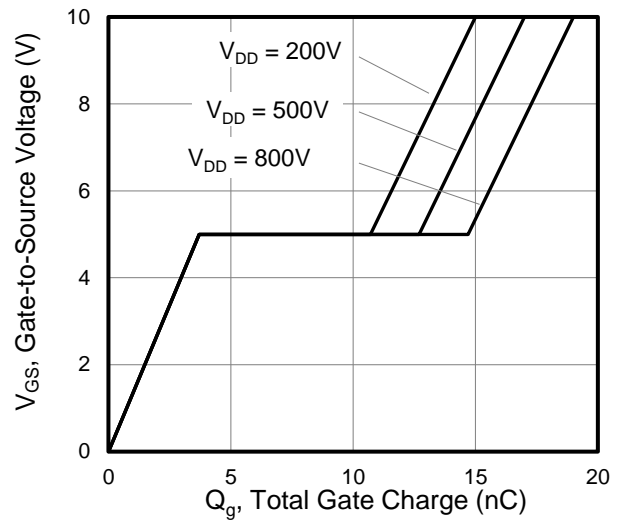
**Figure 1. Output Characteristics ( $T_J = 25^\circ\text{C}$ )**

**Figure 2. 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  $T_J = 25^\circ\text{C}$ , unless otherwise noted

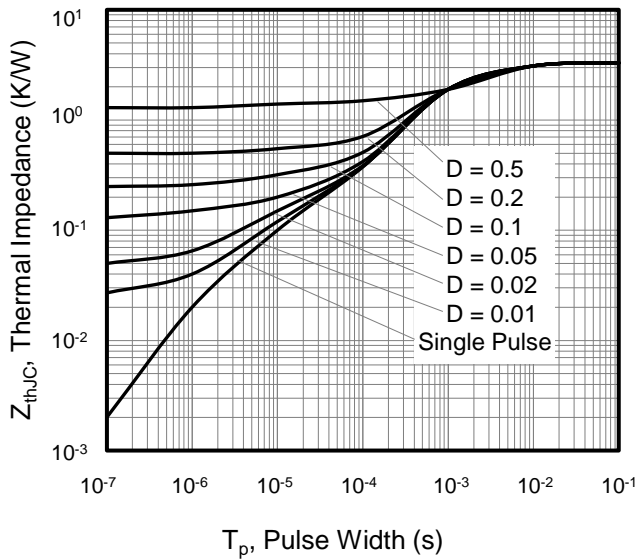
**Figure 7. Capacitance**



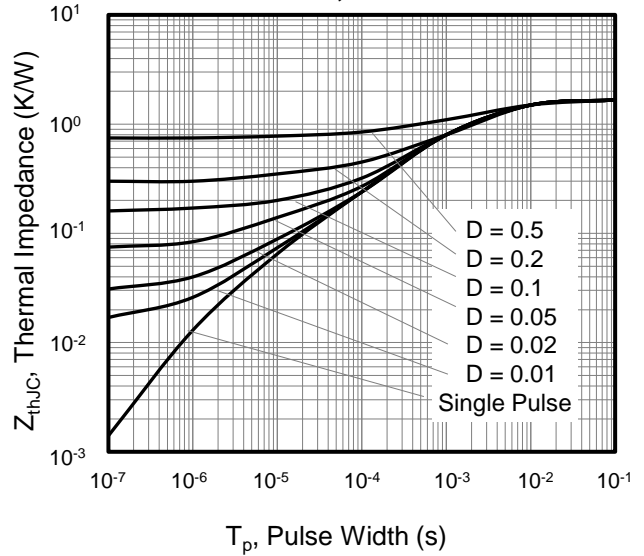
**Figure 8. Gate Charge**



**Figure 9. Transient Thermal Impedance TO-220F**



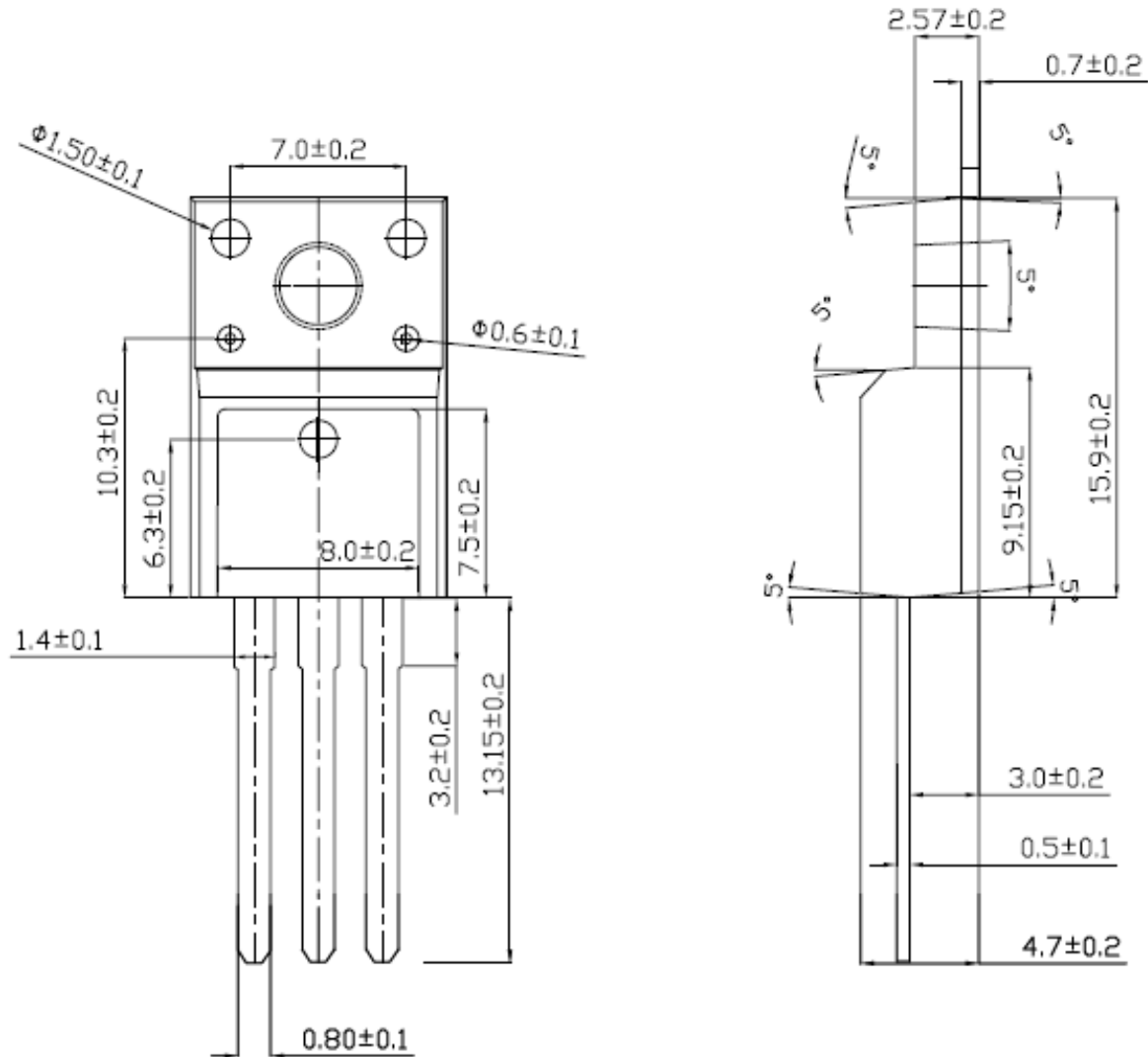
**Figure 10. Transient Thermal Impedance TO-3P, TO-3PF**

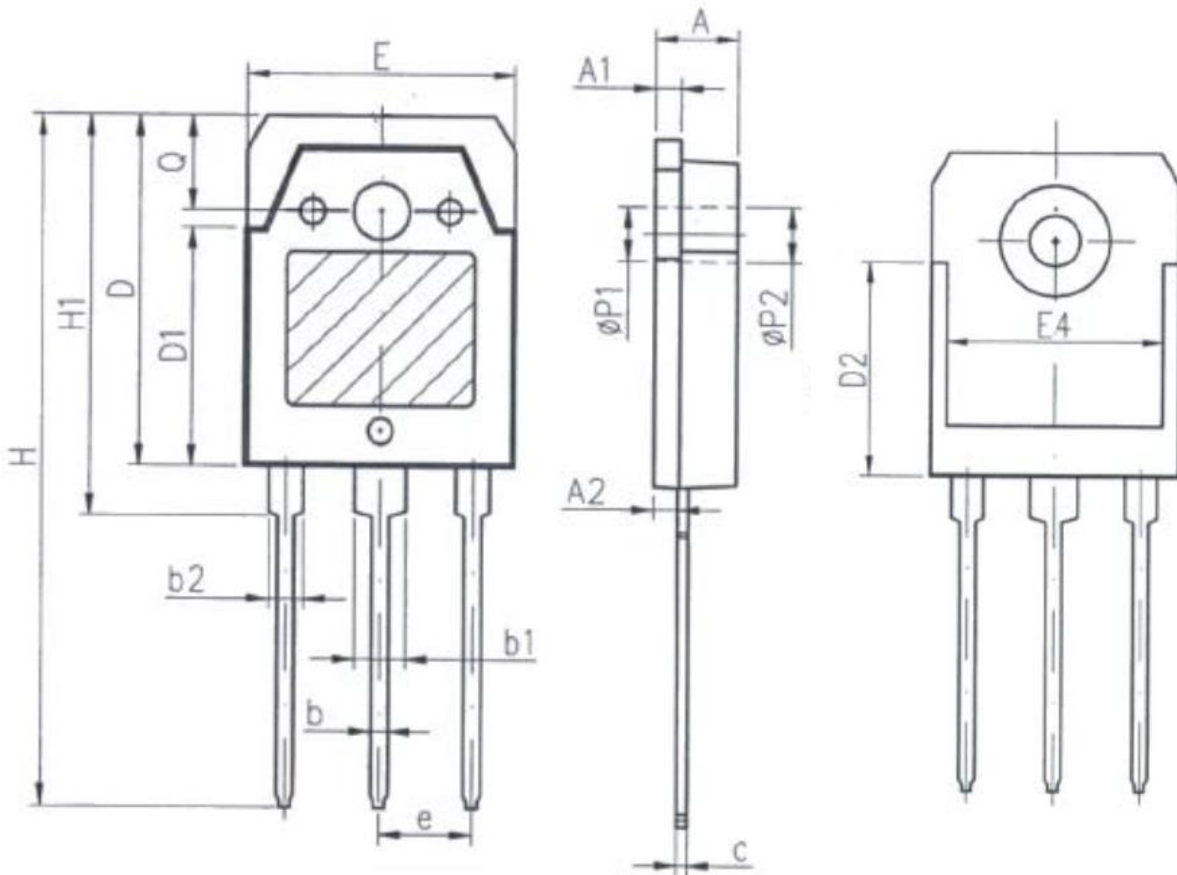


**Figure A: Gate Charge Test Circuit and Waveform**

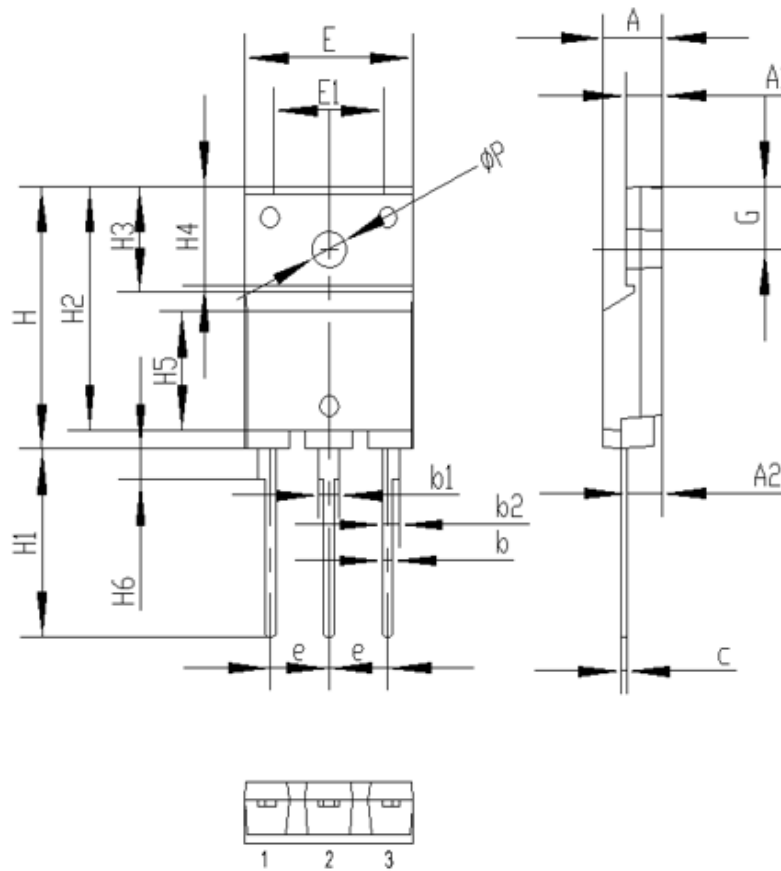
**Figure B: Resistive Switching Test Circuit and Waveform**

**Figure C: Unclamped Inductive Switching Test Circuit and Waveform**


**TO-220F**


**TO-3P**


Unit:mm		
Symbol	Min.	Max.
A	4.6	5
A1	1.4	1.65
A2	1.18	1.58
b	0.8	1.2
b1	2.8	3.2
b2	1.8	2.2
c	0.5	0.75
D	19.6	20.2
D1	13.55	14.25
D2	12.9REF	
E	15.35	15.85
E4	12.6	-
e	5.45TYP	
H	40.1	40.9
H1	23.15	23.65
P1	3.2REF	
P2	3.5REF	

**TO-3PF**


Symbol	单位 mm		
	Min	Nom	Max
A	5.30	5.50	5.70
A1	3.30	3.50	3.70
A2	3.20	3.40	3.60
b	0.80	1.0	1.20
b1	1.80	2.00	2.20
b2	1.40	1.60	1.80
c	0.40	0.50	0.60
e	5.25	5.45	5.65
E	15.4	15.6	15.8
E1	10.0	10.2	10.4
H	22.8	23.0	23.2
H1	16.0	16.5	17.0
H2	21.2	21.4	21.6
H3	9.10	9.30	9.50
H4	8.55	8.75	8.95
H5	10.2	10.4	10.6
H6	2.55	2.70	2.85
G	5.3	5.5	5.7
ΦP	3.00	3.20	3.40



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