

1500V N-Channel MOSFET

FEATURES

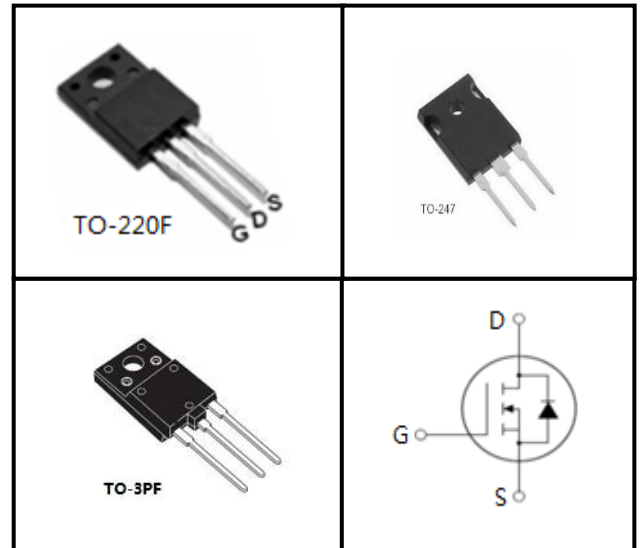
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

APPLICATIONS

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

Device Marking and Package Information

Device	Package	Marking
CS3N150F	TO-220F	CS3N150F
CS3N150W	TO-247	CS3N150W
CS3N150VF	TO-3PF	CS3N150VF



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

Parameter	Symbol	Value			Unit
		TO-220F	TO-247	TO-3PF	
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	1500			V
Continuous Drain Current	I_D	3			A
Pulsed Drain Current (note1)	I_{DM}	12			A
Gate-Source Voltage	V_{GSS}	± 20			V
Single Pulse Avalanche Energy (note2)	E_{AS}	88.2			mJ
Avalanche Current (note1)	I_{AR}	4.2			A
Repetitive Avalanche Energy (note1)	E_{AR}	52.9			mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	160	63		W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150			$^\circ\text{C}$

Thermal Resistance

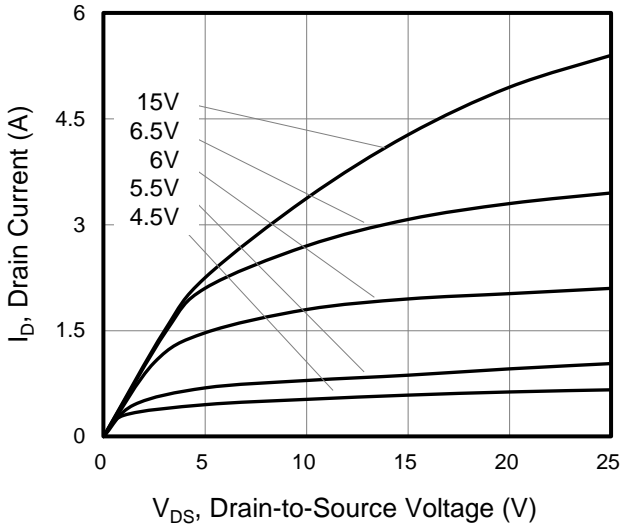
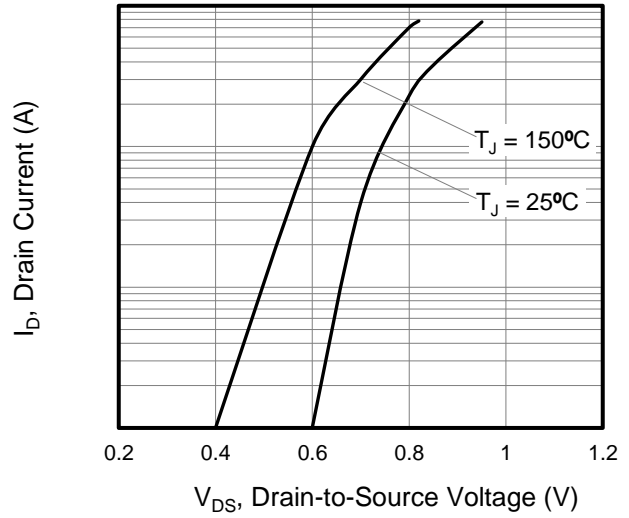
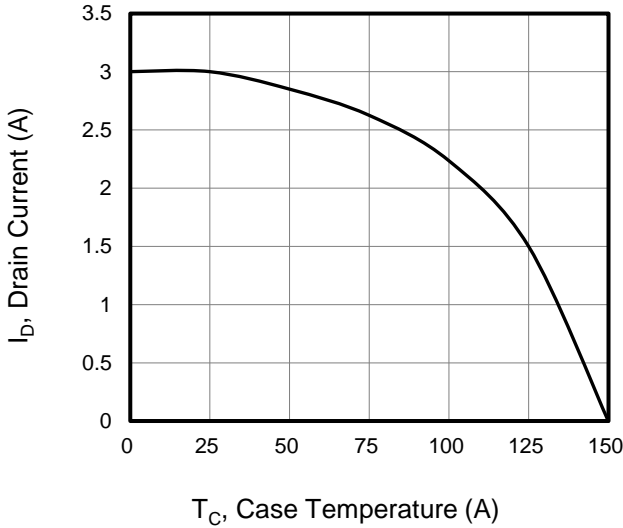
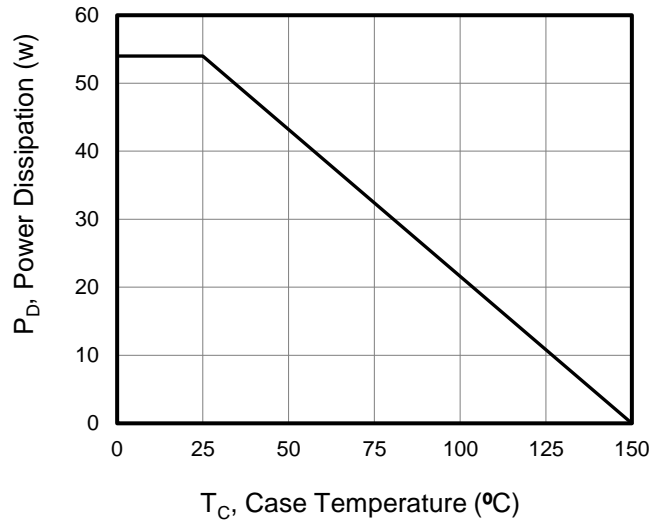
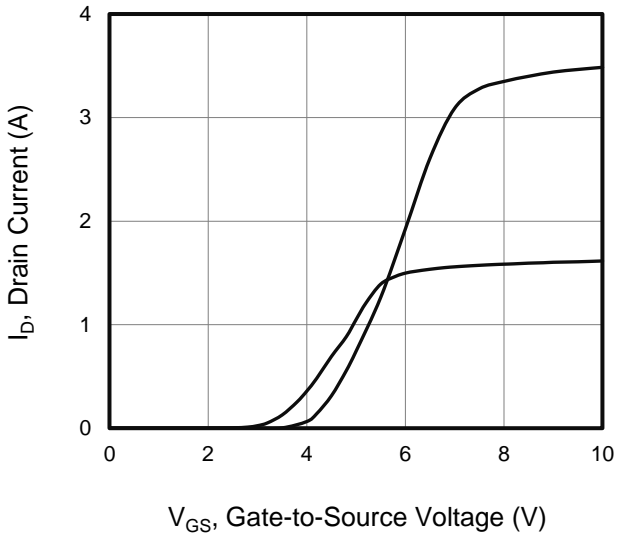
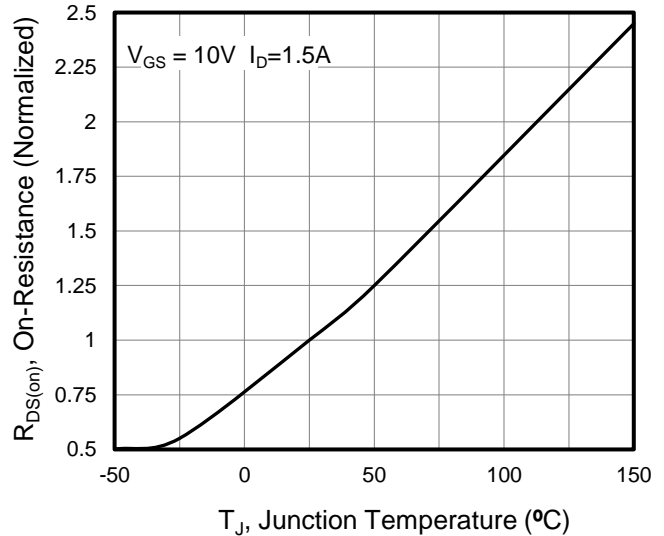
Parameter	Symbol	Value			Unit
		TO-220F	TO-247	TO-3PF	
Thermal Resistance, Junction-to-Case	R_{thJC}	0.78	2		K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	50		

Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu\text{A}$	1500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 1500V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	3.0	--	5.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 1.5A$	--	6	7.2	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	1348	--	pF
Output Capacitance	C_{oss}		--	101	--	
Reverse Transfer Capacitance	C_{rss}		--	15	--	
Total Gate Charge	Q_g	$V_{DD} = 1200V, I_D = 3.0A,$ $V_{GS} = 10V$	--	54.5	--	nC
Gate-Source Charge	Q_{gs}		--	6.4	--	
Gate-Drain Charge	Q_{gd}		--	31.5	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 750V, I_D = 3.0A,$ $R_G = 25\Omega$	--	45	--	ns
Turn-on Rise Time	t_r		--	22.5	--	
Turn-off Delay Time	$t_{d(off)}$		--	224	--	
Turn-off Fall Time	t_f		--	55.5	--	
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}	$T_J = 25^\circ\text{C}, I_{SD} = 1.5A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 3.0A,$ $di_F/dt = 100A/\mu\text{s}$	--	647.5	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.98	--	μC

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 $\leq 300\mu\text{s}$, 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. Forward Bias Safe Operating Area

Figure 3. Drain Current vs. Temperature

Figure 4. Power Dissipation 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

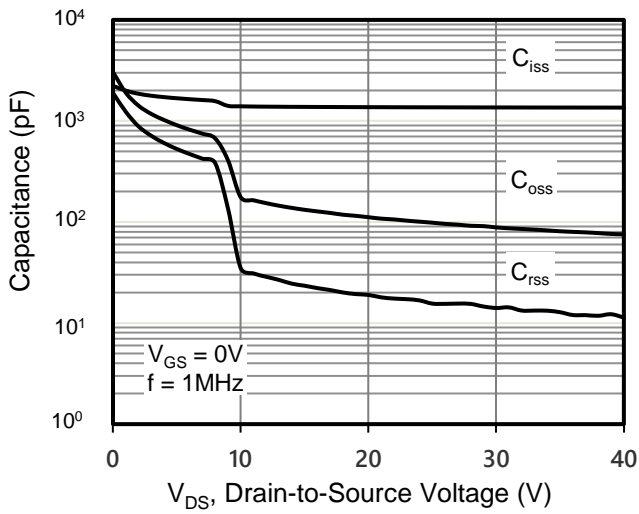


Figure 8. Gate Charge

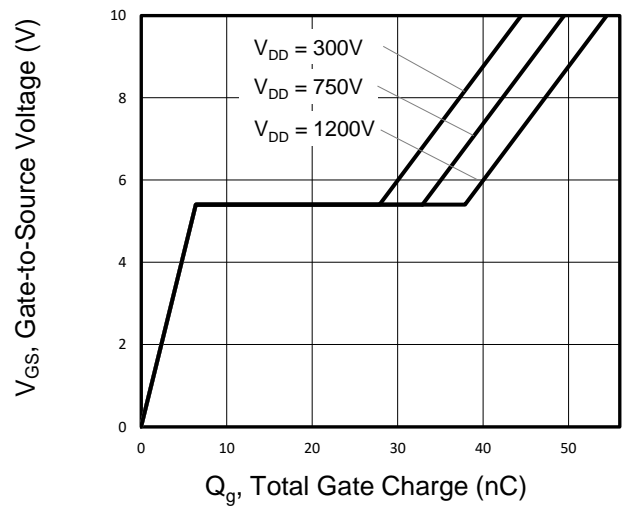


Figure 9. Transient Thermal Impedance TO-247, TO-3PF

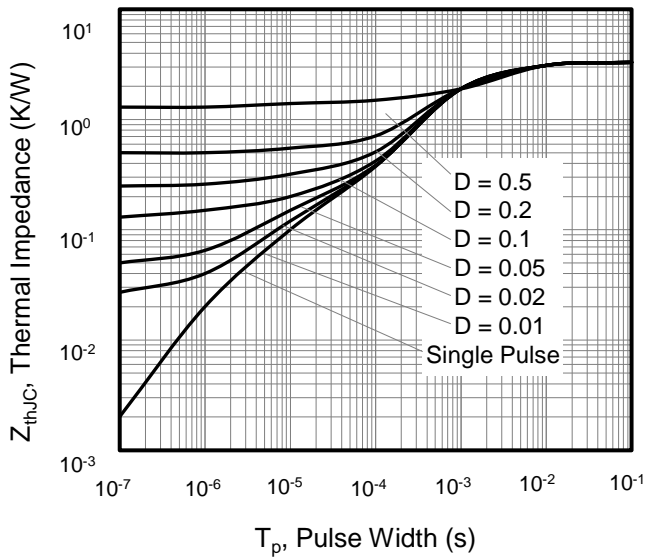


Figure 10. Transient Thermal Impedance TO-220F

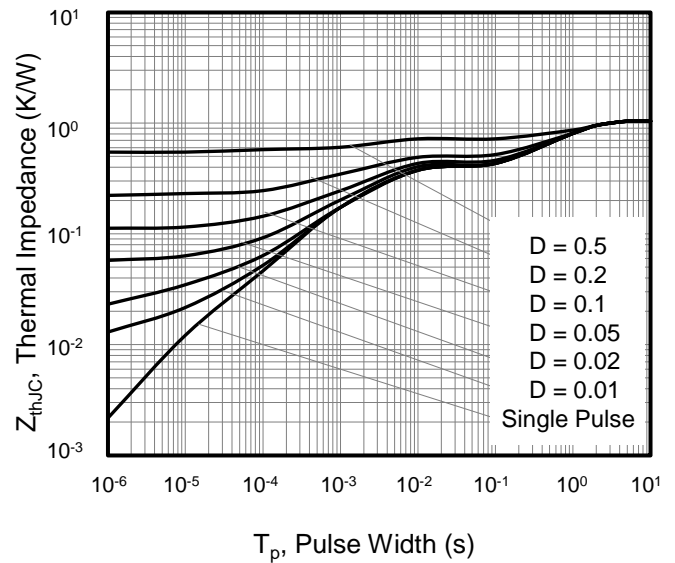
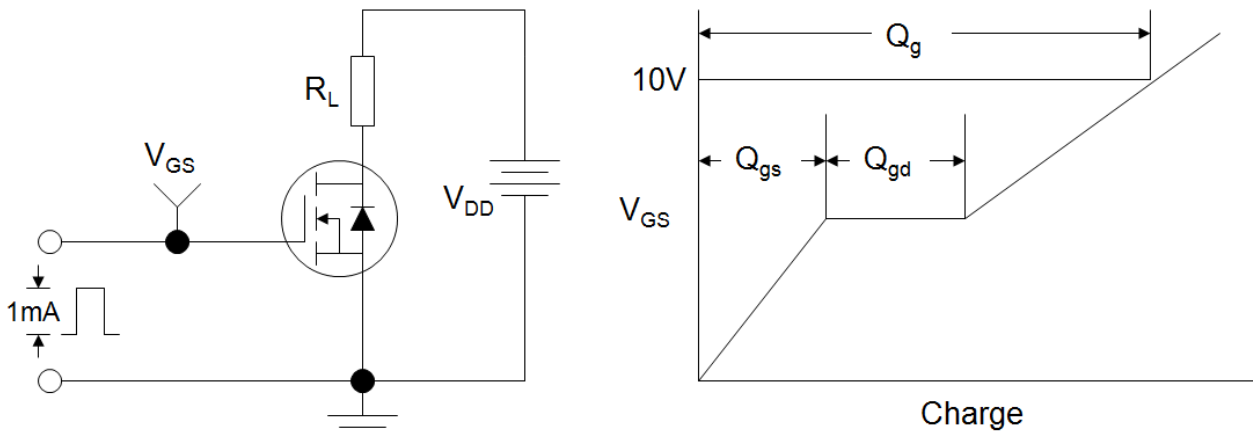
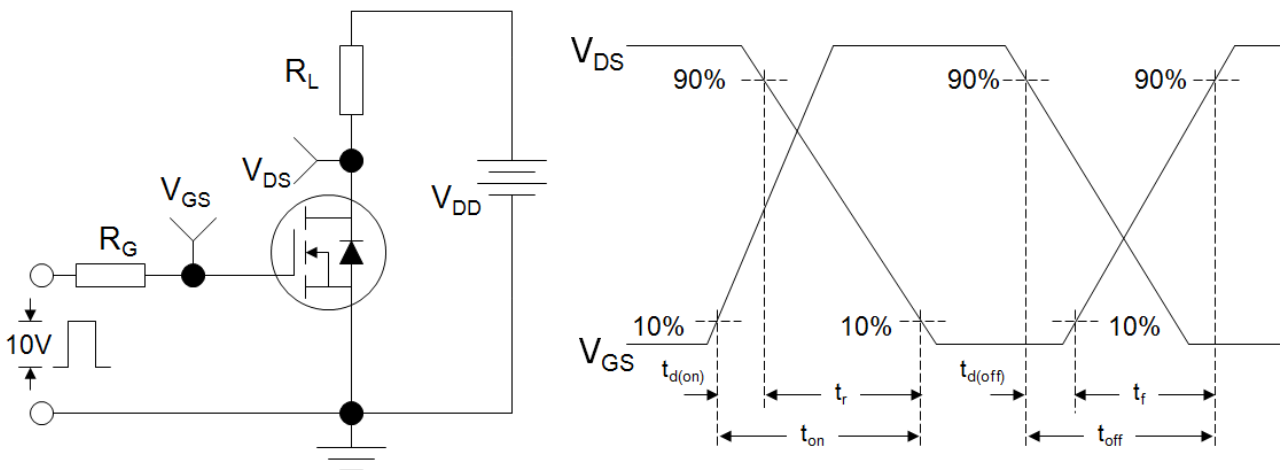
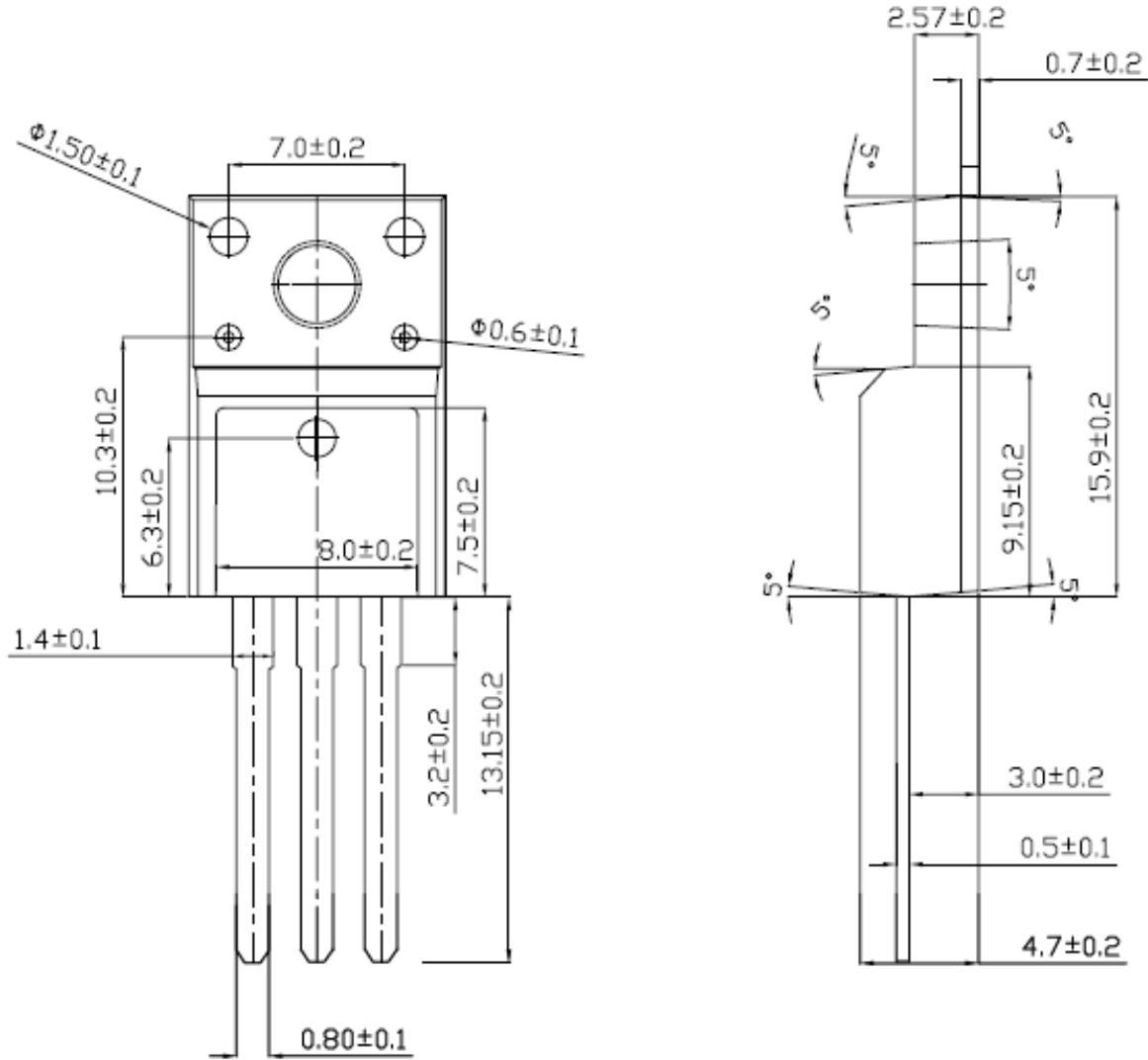
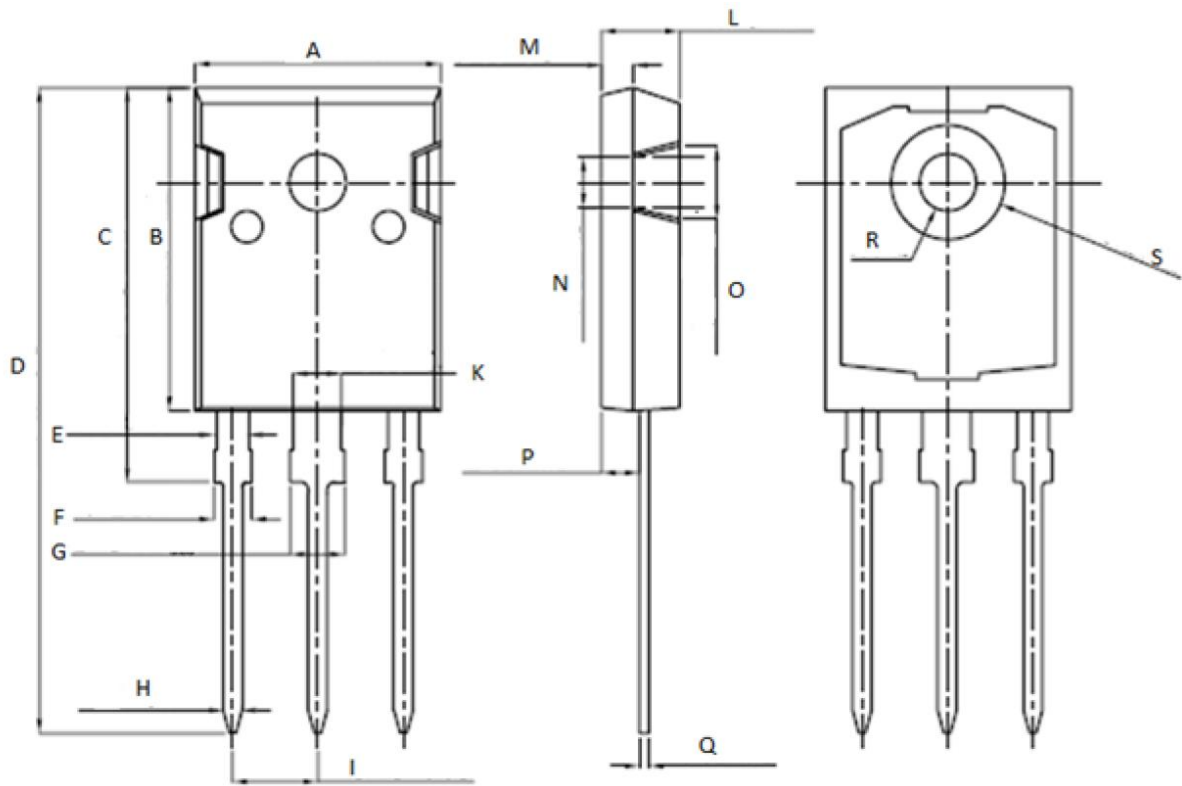


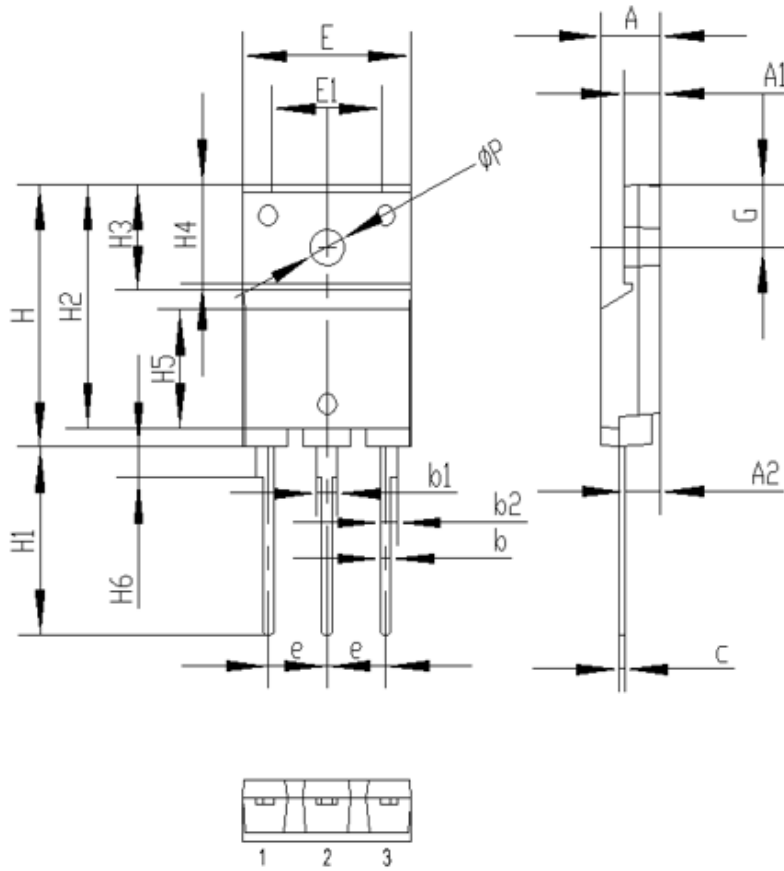
Figure A: Gate Charge Test Circuit and Waveform

Figure B: Resistive Switching Test Circuit and Waveform

Figure C: Unclamped Inductive Switching Test Circuit and Waveform


TO-220F


TO-247


Unit: mm		
Symbol	Min.	Max.
A	15.95	16.25
B	20.85	21.25
C	20.95	21.35
D	40.5	40.9
E	1.9	2.1
F	2.1	2.25
G	3.1	3.25
H	1.1	1.3
I	5.40	5.50

Unit: mm		
Symbol	Min.	Max.
K	2.90	3.10
L	4.90	5.30
M	1.90	2.10
N	4.50	4.70
O	5.40	5.60
P	2.29	2.49
Q	0.51	0.71
R	φ 3.5	φ 3.7
S	φ 7.1	φ 7.3

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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